

# SAR TEST REPORT

The following samples were submitted and identified on behalf of the client as:

|                             |                                                                                                                                                                                               |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Equipment Under Test</b> | Mobile Phone                                                                                                                                                                                  |
| <b>Brand Name</b>           | Sony                                                                                                                                                                                          |
| <b>Type No.</b>             | PM-0854-BV                                                                                                                                                                                    |
| <b>Company Name</b>         | Sony Mobile Communications AB                                                                                                                                                                 |
| <b>Company Address</b>      | Nya Vattentorget 22188 Lund/SWEDEN                                                                                                                                                            |
| <b>Standards</b>            | IEEE /ANSI C95.1, C95.3, IEEE 1528, KDB447498D01v05r02, KDB248227D01v01r02, KDB941225D01v03, KDB941225D05v02r03, KDB941225D06v02, KDB865664D01v01r03, KDB865664D02v01r01, KDB648474D04v01r02. |
| <b>FCC ID</b>               | PY7-PM0854                                                                                                                                                                                    |
| <b>Date of Receipt</b>      | Nov. 06 , 2014                                                                                                                                                                                |
| <b>Date of Test(s)</b>      | Nov. 17, 2014 ~ Dec. 08, 2014                                                                                                                                                                 |
| <b>Date of Issue</b>        | Jan. 16, 2015                                                                                                                                                                                 |

In the configuration tested, the EUT complied with the standards specified above.

## Remarks:

This report details the results of the testing carried out on three samples, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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## Signed on behalf of SGS

Engineer

Sam Kuo

Date: Jan. 16, 2015

Supervisor

Ricky Huang

Date: Jan. 16, 2015

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## Version

| Report Number | Revision | Description                  | Issue Date    |
|---------------|----------|------------------------------|---------------|
| E5/2014/B0008 | 00       | Initial Version              | Jan. 10, 2015 |
| E5/2014/B0008 | 01       | 1 <sup>st</sup> modification | Jan. 16, 2015 |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |

**This test report contains a reference to the previous version test report that it replaces.**

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# 1. General Information

## 1.1 Testing Laboratory

|                                                        |                                                             |
|--------------------------------------------------------|-------------------------------------------------------------|
| SGS Taiwan Ltd. Electronics & Communication Laboratory |                                                             |
| No.134, Wu Kung Road, New Taipei Industrial Park       |                                                             |
| Wuku District, New Taipei City, Taiwan                 |                                                             |
| Tel                                                    | +886-2-2299-3279                                            |
| Fax                                                    | +886-2-2298-0488                                            |
| Internet                                               | <a href="http://www.tw.sgs.com/">http://www.tw.sgs.com/</a> |

## 1.2 Details of Applicant

|                 |                                    |
|-----------------|------------------------------------|
| Company Name    | Sony Mobile Communications AB      |
| Company Address | Nya Vattentornet 22188 Lund/SWEDEN |

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### 1.3 Description of EUT

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                     |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| EUT Name          | Mobile Phone                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                     |
| Brand Name        | Sony                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                     |
| Type No.          | PM-0854-BV                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                     |
| HW Version        | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                     |
| SW Version        | 25.0.A.0.33                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                     |
| Serial No.        | 2G/3G: ZH8005Y2UR<br>LTE: ZH8005XVW4<br>WLAN: ZH8005YAB8                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                     |
| IMEI Code         | 2G/3G: 004402453545489<br>LTE: 004402453548541<br>WLAN: 004402453545687                                                                                                                                                                                                                                                                                                                                                                                            |                                                                     |
| FCC ID            | PY7-PM0854                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                     |
| Mode of Operation | <input checked="" type="checkbox"/> GSM <input checked="" type="checkbox"/> GPRS <input checked="" type="checkbox"/> EDGE <input checked="" type="checkbox"/> WCDMA <input checked="" type="checkbox"/> HSDPA<br><input checked="" type="checkbox"/> HSUPA <input checked="" type="checkbox"/> HSPA+ <input checked="" type="checkbox"/> LTE FDD<br><input checked="" type="checkbox"/> WLAN802.11 a/b/g/n (20M/40M) <input checked="" type="checkbox"/> Bluetooth |                                                                     |
| Duty Cycle        | GSM                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1/8.3                                                               |
|                   | GPRS<br>(support multi class 12 max)                                                                                                                                                                                                                                                                                                                                                                                                                               | 1/2 (1Dn4UP)<br>1/2.76 (1Dn3UP)<br>1/4.1 (1Dn2UP)<br>1/8.3 (1Dn1UP) |
|                   | EDGE<br>(support multi class 12 max)                                                                                                                                                                                                                                                                                                                                                                                                                               | 1/2 (1Dn4UP)<br>1/2.76 (1Dn3UP)<br>1/4.1 (1Dn2UP)<br>1/8.3 (1Dn1UP) |
|                   | WCDMA                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                                                   |
|                   | LTE                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1                                                                   |
|                   | WLAN 802.11 a/b/g/n(20M/40M)                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                                                                   |
|                   | Bluetooth                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                                   |

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|--------------------------|--------------------------|--------|---|--------|
| TX Frequency Range (MHz) | GSM850                   | 824.2  | — | 848.8  |
|                          | GSM1900                  | 1850.2 | — | 1909.8 |
|                          | WCDMA Band II            | 1852.4 | — | 1907.6 |
|                          | WCDMA Band IV            | 1712.4 | — | 1752.6 |
|                          | WCDMA Band V             | 826.4  | — | 846.6  |
|                          | LTE FDD Band II          | 1850   | — | 1910   |
|                          | LTE FDD Band IV          | 1710   | — | 1755   |
|                          | LTE FDD Band V           | 824    | — | 849    |
|                          | LTE FDD Band VII         | 2500   | — | 2570   |
|                          | WLAN 802.11 b/g/n(20M)   | 2412   | — | 2462   |
|                          | WLAN 802.11 n(40M)       | 2422   | — | 2452   |
|                          | WLAN802.11 a/n(20M) 5.2G | 5180   | — | 5240   |
|                          | WLAN802.11 a/n(20M) 5.3G | 5260   | — | 5320   |
|                          | WLAN802.11 a/n(20M) 5.5G | 5500   | — | 5700   |
|                          | WLAN802.11 a/n(20M) 5.8G | 5745   | — | 5825   |
|                          | WLAN802.11 n(40M) 5.2G   | 5190   | — | 5230   |
|                          | WLAN802.11 n(40M) 5.3G   | 5270   | — | 5310   |
|                          | WLAN802.11 n(40M) 5.5G   | 5510   | — | 5670   |
|                          | WLAN802.11 n(40M) 5.8G   | 5755   | — | 5795   |
|                          | Bluetooth                | 2402   | — | 2480   |

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|------------------------------|--------------------------|-------|---|-------|
| Channel<br>Number<br>(ARFCN) | GSM850                   | 128   | — | 251   |
|                              | GSM1900                  | 512   | — | 810   |
|                              | WCDMA Band II            | 9262  | — | 9538  |
|                              | WCDMA Band IV            | 1312  | — | 1513  |
|                              | WCDMA Band V             | 4132  | — | 4233  |
|                              | LTE FDD Band II          | 18607 | — | 19193 |
|                              | LTE FDD Band IV          | 19957 | — | 20393 |
|                              | LTE FDD Band V           | 20407 | — | 20643 |
|                              | LTE FDD Band VII         | 20775 | — | 21425 |
|                              | WLAN 802.11 b/g/n(20M)   | 1     | — | 11    |
|                              | WLAN 802.11 n(40M)       | 3     | — | 9     |
|                              | WLAN802.11 a/n(20M) 5.2G | 36    | — | 48    |
|                              | WLAN802.11 a/n(20M) 5.3G | 52    | — | 64    |
|                              | WLAN802.11 a/n(20M)5.6G  | 100   | — | 140   |
|                              | WLAN802.11 a/n(20M)5.8G  | 149   | — | 165   |
|                              | WLAN802.11 n(40M) 5.2G   | 38    | — | 46    |
|                              | WLAN802.11 n(40M) 5.3G   | 54    | — | 62    |
|                              | WLAN802.11 n(40M) 5.6G   | 102   | — | 134   |
|                              | WLAN802.11 n(40M) 5.8G   | 151   | — | 159   |
|                              | Bluetooth                | 0     | — | 78    |

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| Max. SAR (1 g) (Unit: W/Kg) |                  |          |          |                                                                                                                                                                            |
|-----------------------------|------------------|----------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                        | Band             | Measured | Reported | Position / Channel                                                                                                                                                         |
| Head                        | GSM 850          | 0.387    | 0.424    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>128</u> Channel   |
|                             | GSM 1900         | 0.147    | 0.147    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>810</u> Channel   |
|                             | WCDMA Band II    | 0.228    | 0.234    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>9538</u> Channel  |
|                             | WCDMA Band IV    | 0.519    | 0.519    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>1312</u> Channel  |
|                             | WCDMA Band V     | 0.355    | 0.392    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>4233</u> Channel  |
|                             | LTE FDD Band II  | 0.429    | 0.432    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>19100</u> Channel |
|                             | LTE FDD Band IV  | 0.38     | 0.388    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>20050</u> Channel |
|                             | LTE FDD Band V   | 0.373    | 0.444    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>20525</u> Channel |
|                             | LTE FDD Band VII | 0.38     | 0.382    | <input checked="" type="checkbox"/> Left <input type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br><u>21100</u> Channel |

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| Max. SAR (1 g) (Unit: W/Kg) |                  |          |          |                                                                                                                                                                   |
|-----------------------------|------------------|----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                        | Band             | Measured | Reported | Position / Channel                                                                                                                                                |
| Head                        | WLAN802.11 b     | 0.786    | 0.797    | <input type="checkbox"/> Left <input checked="" type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br>11 Channel  |
|                             | WLAN802.11a 5.2G | 0.158    | 0.161    | <input type="checkbox"/> Left <input checked="" type="checkbox"/> Right<br><input type="checkbox"/> Cheek <input checked="" type="checkbox"/> Tilt<br>48 Channel  |
|                             | WLAN802.11a 5.3G | 0.17     | 0.171    | <input type="checkbox"/> Left <input checked="" type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br>60 Channel  |
|                             | WLAN802.11a 5.6G | 0.423    | 0.424    | <input type="checkbox"/> Left <input checked="" type="checkbox"/> Right<br><input checked="" type="checkbox"/> Cheek <input type="checkbox"/> Tilt<br>140 Channel |
|                             | WLAN802.11a 5.8G | 0.478    | 0.507    | <input type="checkbox"/> Left <input checked="" type="checkbox"/> Right<br><input type="checkbox"/> Cheek <input checked="" type="checkbox"/> Tilt<br>161 Channel |

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| Max. SAR (1 g) (Unit: W/Kg) |                  |          |          |                                                                                                                    |
|-----------------------------|------------------|----------|----------|--------------------------------------------------------------------------------------------------------------------|
| Mode                        | Band             | Measured | Reported | Position / Channel                                                                                                 |
| Body worn<br>(speech mode)  | GSM 850          | 0.29     | 0.318    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>128 Channel                             |
|                             | GSM 1900         | 0.47     | 0.47     | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>810 Channel                             |
|                             | WCDMA Band II    | 0.817    | 0.84     | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>9538 Channel<br>-repeat with worse case |
|                             | WCDMA Band IV    | 0.689    | 0.689    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>1312 Channel                            |
|                             | WCDMA Band V     | 0.288    | 0.318    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>4233 Channel                            |
|                             | LTE FDD Band II  | 0.804    | 0.81     | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>19100 Channel                           |
|                             | LTE FDD Band IV  | 0.559    | 0.571    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>20050 Channel                           |
|                             | LTE FDD Band V   | 0.517    | 0.541    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>20600 Channel                           |
|                             | LTE FDD Band VII | 0.489    | 0.507    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>20850 Channel                           |
|                             | WLAN802.11a 5.2G | 0.339    | 0.353    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>40 Channel                              |
|                             | WLAN802.11a 5.3G | 0.316    | 0.317    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>60 Channel                              |
|                             | WLAN802.11a 5.6G | 0.402    | 0.408    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>132 Channel                             |
|                             | WLAN802.11a 5.8G | 0.369    | 0.392    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br>161 Channel                             |

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| Max. SAR (1 g) (Unit: W/Kg) |                    |          |          |                                                                                                                                                                                             |
|-----------------------------|--------------------|----------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                        | Band               | Measured | Reported | Position / Channel                                                                                                                                                                          |
| Hotspot mode                | GPRS 850 (1Dn1UP)  | 0.638    | 0.7      | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br><input type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>128 Channel   |
|                             | GPRS 1900 (1Dn1UP) | 0.898    | 0.898    | <input type="checkbox"/> Front <input type="checkbox"/> Back<br><input checked="" type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>810 Channel   |
|                             | WCDMA Band II      | 0.87     | 1.02     | <input type="checkbox"/> Front <input type="checkbox"/> Back<br><input checked="" type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>9538 Channel  |
|                             | WCDMA Band IV      | 0.947    | 1.192    | <input type="checkbox"/> Front <input type="checkbox"/> Back<br><input checked="" type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>1513 Channel  |
|                             | WCDMA Band V       | 0.758    | 0.837    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br><input type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>4233 Channel  |
|                             | LTE FDD Band II    | 0.919    | 1.01     | <input type="checkbox"/> Front <input type="checkbox"/> Back<br><input checked="" type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>18700 Channel |
|                             | LTE FDD Band IV    | 1.28     | 1.307    | <input type="checkbox"/> Front <input type="checkbox"/> Back<br><input checked="" type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>20050 Channel |
|                             | LTE FDD Band V     | 0.716    | 0.762    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br><input type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>20525 Channel |

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| Max. SAR (1 g) (Unit: W/Kg) |                  |          |          |                                                                                                                                                                                             |
|-----------------------------|------------------|----------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                        | Band             | Measured | Reported | Position / Channel                                                                                                                                                                          |
| Hotspot mode                | LTE FDD Band VII | 1        | 1.038    | <input type="checkbox"/> Front <input type="checkbox"/> Back<br><input checked="" type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>20850 Channel |
|                             | WLAN802.11b      | 0.679    | 0.688    | <input type="checkbox"/> Front <input checked="" type="checkbox"/> Back<br><input type="checkbox"/> Bottom <input type="checkbox"/> Right<br><input type="checkbox"/> Left<br>11 Channel    |

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# #. Conducted power table:

## GSM/GPRS/EDGE conducted power table:

| EUT mode                                                   | Frequency (MHz) | CH  | Max. Rated Avg. Power + Max. Tolerance (dBm) | Burst average power | Source-based time average power |
|------------------------------------------------------------|-----------------|-----|----------------------------------------------|---------------------|---------------------------------|
|                                                            |                 |     |                                              | Avg.(dBm)           | Avg.(dBm)                       |
| GSM 850 (GMSK)                                             | 824.2           | 128 | 33.5                                         | 33.10               | 24.07                           |
|                                                            | 836.6           | 190 | 33.5                                         | 33.20               | 24.17                           |
|                                                            | 848.8           | 251 | 33.5                                         | 33.50               | 24.47                           |
| The division factor compared to the number of TX time slot |                 |     |                                              |                     |                                 |
| Division factor                                            |                 |     |                                              | 1 TX time slot      |                                 |
|                                                            |                 |     |                                              | -9.03               |                                 |

| Burst average power                                        |                 |     |                |                |                |                |
|------------------------------------------------------------|-----------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power + Max. Tolerance (dBm)               |                 |     | 33.5           | 30.5           | 28.5           | 27.5           |
|                                                            |                 |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency (MHz) | CH  | Avg. (dBm)     | Avg. (dBm)     | Avg. (dBm)     | Avg. (dBm)     |
| GPRS 850 (GMSK)                                            | 824.2           | 128 | 33.10          | 29.50          | 27.80          | 26.90          |
|                                                            | 836.6           | 190 | 33.20          | 29.50          | 27.90          | 27.10          |
|                                                            | 848.8           | 251 | 33.50          | 29.70          | 28.10          | 27.30          |
| Source-based time average power                            |                 |     |                |                |                |                |
| GPRS 850 (GMSK)                                            | 824.2           | 128 | 24.07          | 23.48          | 23.54          | 23.89          |
|                                                            | 836.6           | 190 | 24.17          | 23.48          | 23.64          | 24.09          |
|                                                            | 848.8           | 251 | 24.47          | 23.68          | 23.84          | 24.29          |
| The division factor compared to the number of TX time slot |                 |     |                |                |                |                |
| Division factor                                            |                 |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                 |     | -9.03          | -6.02          | -4.26          | -3.01          |

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| Burst average power                                        |                    |     |                |                |                |                |
|------------------------------------------------------------|--------------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power +<br>Max. Tolerance (dBm)            |                    |     | 28             | 25.5           | 25             | 25             |
|                                                            |                    |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency<br>(MHz) | CH  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  |
| EDGE 850<br>(MCS 5)                                        | 824.2              | 128 | 27.90          | 24.90          | 24.50          | 24.50          |
|                                                            | 836.6              | 190 | 27.90          | 25.00          | 24.50          | 24.50          |
|                                                            | 848.8              | 251 | 28.00          | 25.10          | 24.60          | 24.60          |
| Source-based time average power                            |                    |     |                |                |                |                |
| EDGE 850<br>(MCS 5)                                        | 824.2              | 128 | 18.87          | 18.88          | 20.24          | 21.49          |
|                                                            | 836.6              | 190 | 18.87          | 18.98          | 20.24          | 21.49          |
|                                                            | 848.8              | 251 | 18.97          | 19.08          | 20.34          | 21.59          |
| The division factor compared to the number of TX time slot |                    |     |                |                |                |                |
| Division factor                                            |                    |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                    |     | -9.03          | -6.02          | -4.26          | -3.01          |

| Burst average power                                        |                    |     |                |                |                |                |
|------------------------------------------------------------|--------------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power +<br>Max. Tolerance (dBm)            |                    |     | 33.5           | 30.5           | 28.5           | 27.5           |
|                                                            |                    |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency<br>(MHz) | CH  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  |
| EDGE 850<br>(MCS 4)                                        | 824.2              | 128 | 33.00          | 29.50          | 27.70          | 26.90          |
|                                                            | 836.6              | 190 | 33.10          | 29.50          | 27.80          | 27.00          |
|                                                            | 848.8              | 251 | 33.30          | 29.60          | 28.00          | 27.20          |
| Source-based time average power                            |                    |     |                |                |                |                |
| EDGE 850<br>(MCS 4)                                        | 824.2              | 128 | 23.97          | 23.48          | 23.44          | 23.89          |
|                                                            | 836.6              | 190 | 24.07          | 23.48          | 23.54          | 23.99          |
|                                                            | 848.8              | 251 | 24.27          | 23.58          | 23.74          | 24.19          |
| The division factor compared to the number of TX time slot |                    |     |                |                |                |                |
| Division factor                                            |                    |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                    |     | -9.03          | -6.02          | -4.26          | -3.01          |

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| Burst average power                                        |                    |     |                |                |                |                |
|------------------------------------------------------------|--------------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power +<br>Max. Tolerance (dBm)            |                    |     | 28             | 25.5           | 25             | 25             |
|                                                            |                    |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency<br>(MHz) | CH  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  |
| EDGE 850<br>(MCS 9)                                        | 824.2              | 128 | 27.80          | 24.90          | 24.50          | 24.50          |
|                                                            | 836.6              | 190 | 27.90          | 24.90          | 24.50          | 24.50          |
|                                                            | 848.8              | 251 | 28.00          | 25.10          | 24.60          | 24.60          |
| Source-based time average power                            |                    |     |                |                |                |                |
| EDGE 850<br>(MCS 9)                                        | 824.2              | 128 | 18.77          | 18.88          | 20.24          | 21.49          |
|                                                            | 836.6              | 190 | 18.87          | 18.88          | 20.24          | 21.49          |
|                                                            | 848.8              | 251 | 18.97          | 19.08          | 20.34          | 21.59          |
| The division factor compared to the number of TX time slot |                    |     |                |                |                |                |
| Division factor                                            |                    |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                    |     | -9.03          | -6.02          | -4.26          | -3.01          |

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| EUT mode                                                   | Frequency (MHz) | CH  | Max. Rated Avg. Power + Max. Tolerance (dBm) | Burst average power | Source-based time average power |
|------------------------------------------------------------|-----------------|-----|----------------------------------------------|---------------------|---------------------------------|
|                                                            |                 |     |                                              | Avg.(dBm)           | Avg.(dBm)                       |
| GSM 1900 (GMSK)                                            | 1850.2          | 512 | 30.5                                         | 30.30               | 21.27                           |
|                                                            | 1880            | 661 | 30.5                                         | 30.30               | 21.27                           |
|                                                            | 1909.8          | 810 | 30.5                                         | 30.50               | 21.47                           |
| The division factor compared to the number of TX time slot |                 |     |                                              |                     |                                 |
| Division factor                                            |                 |     |                                              | 1 TX time slot      |                                 |
|                                                            |                 |     |                                              | -9.03               |                                 |

| Burst average power                                        |                 |     |                |                |                |                |
|------------------------------------------------------------|-----------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power + Max. Tolerance (dBm)               |                 |     | 30.5           | 27             | 25             | 24.5           |
|                                                            |                 |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency (MHz) | CH  | Avg. (dBm)     | Avg. (dBm)     | Avg. (dBm)     | Avg. (dBm)     |
| GPRS 1900 (GMSK)                                           | 1850.2          | 512 | 30.30          | 26.50          | 24.70          | 24.00          |
|                                                            | 1880            | 661 | 30.30          | 26.50          | 24.70          | 23.90          |
|                                                            | 1909.8          | 810 | 30.50          | 26.60          | 24.80          | 24.20          |
| Source-based time average power                            |                 |     |                |                |                |                |
| GPRS 1900 (GMSK)                                           | 1850.2          | 512 | 21.27          | 20.48          | 20.44          | 20.99          |
|                                                            | 1880            | 661 | 21.27          | 20.48          | 20.44          | 20.89          |
|                                                            | 1909.8          | 810 | 21.47          | 20.58          | 20.54          | 21.19          |
| The division factor compared to the number of TX time slot |                 |     |                |                |                |                |
| Division factor                                            |                 |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                 |     | -9.03          | -6.02          | -4.26          | -3.01          |

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| Burst average power                                        |                    |     |                |                |                |                |
|------------------------------------------------------------|--------------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power +<br>Max. Tolerance (dBm)            |                    |     | 27.5           | 24.5           | 23.5           | 22.5           |
|                                                            |                    |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency<br>(MHz) | CH  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  |
| EDGE<br>1900<br>(MCS 5)                                    | 1850.2             | 512 | 27.00          | 24.20          | 22.50          | 21.50          |
|                                                            | 1880               | 661 | 27.00          | 24.00          | 22.50          | 21.50          |
|                                                            | 1909.8             | 810 | 27.00          | 24.10          | 22.50          | 21.50          |
| Source-based time average power                            |                    |     |                |                |                |                |
| EDGE<br>1900<br>(MCS 5)                                    | 1850.2             | 512 | 17.97          | 18.18          | 18.24          | 18.49          |
|                                                            | 1880               | 661 | 17.97          | 17.98          | 18.24          | 18.49          |
|                                                            | 1909.8             | 810 | 17.97          | 18.08          | 18.24          | 18.49          |
| The division factor compared to the number of TX time slot |                    |     |                |                |                |                |
| Division factor                                            |                    |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                    |     | -9.03          | -6.02          | -4.26          | -3.01          |

| Burst average power                                        |                    |     |                |                |                |                |
|------------------------------------------------------------|--------------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power +<br>Max. Tolerance (dBm)            |                    |     | 30.5           | 27             | 25             | 24.5           |
|                                                            |                    |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency<br>(MHz) | CH  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  |
| EDGE<br>1900<br>(MCS 4)                                    | 1850.2             | 512 | 30.30          | 26.40          | 24.50          | 24.00          |
|                                                            | 1880               | 661 | 30.30          | 26.30          | 24.50          | 23.90          |
|                                                            | 1909.8             | 810 | 30.50          | 26.60          | 24.70          | 24.10          |
| Source-based time average power                            |                    |     |                |                |                |                |
| EDGE<br>1900<br>(MCS 4)                                    | 1850.2             | 512 | 21.27          | 20.38          | 20.24          | 20.99          |
|                                                            | 1880               | 661 | 21.27          | 20.28          | 20.24          | 20.89          |
|                                                            | 1909.8             | 810 | 21.47          | 20.58          | 20.44          | 21.09          |
| The division factor compared to the number of TX time slot |                    |     |                |                |                |                |
| Division factor                                            |                    |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                    |     | -9.03          | -6.02          | -4.26          | -3.01          |

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| Burst average power                                        |                    |     |                |                |                |                |
|------------------------------------------------------------|--------------------|-----|----------------|----------------|----------------|----------------|
| Max. Rated Avg. Power +<br>Max. Tolerance (dBm)            |                    |     | 27.5           | 24.5           | 23.5           | 22.5           |
|                                                            |                    |     | 1Dn1UP         | 1Dn2UP         | 1Dn3UP         | 1Dn4UP         |
| EUT mode                                                   | Frequency<br>(MHz) | CH  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  | Avg.<br>(dBm)  |
| EDGE<br>1900<br>(MCS 9)                                    | 1850.2             | 512 | 27.00          | 24.10          | 22.50          | 21.50          |
|                                                            | 1880               | 661 | 26.90          | 24.00          | 22.50          | 21.50          |
|                                                            | 1909.8             | 810 | 26.90          | 24.00          | 22.50          | 21.50          |
| Source-based time average power                            |                    |     |                |                |                |                |
| EDGE<br>1900<br>(MCS 9)                                    | 1850.2             | 512 | 17.97          | 18.08          | 18.24          | 18.49          |
|                                                            | 1880               | 661 | 17.87          | 17.98          | 18.24          | 18.49          |
|                                                            | 1909.8             | 810 | 17.87          | 17.98          | 18.24          | 18.49          |
| The division factor compared to the number of TX time slot |                    |     |                |                |                |                |
| Division factor                                            |                    |     | 1 TX time slot | 2 TX time slot | 3 TX time slot | 4 TX time slot |
|                                                            |                    |     | -9.03          | -6.02          | -4.26          | -3.01          |

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## WCDMA Band II / Band IV / Band V - HSDPA / HSUPA / HSPA+ conducted power table:

| Band             | CH   | Max.<br>Rated<br>Avg.<br>Power +<br>Max.<br>Tolerance<br>(dBm) | Rel99<br>AV<br>(dBm) | HSDPA mode AV(dBm) |       |       |       | HSUPA mode AV(dBm) |       |       |       |       | HSPA+ mode AV(dBm) |       |       |       |       |
|------------------|------|----------------------------------------------------------------|----------------------|--------------------|-------|-------|-------|--------------------|-------|-------|-------|-------|--------------------|-------|-------|-------|-------|
|                  |      |                                                                |                      | SUB-1              | SUB-2 | SUB-3 | SUB-4 | SUB-1              | SUB-2 | SUB-3 | SUB-4 | SUB-5 | SUB-1              | SUB-2 | SUB-3 | SUB-4 | SUB-5 |
| WCDMA<br>Band II | 9262 | 24.5                                                           | 24.48                | 23.42              | 23.36 | 22.94 | 23.01 | 24.40              | 22.45 | 23.46 | 22.58 | 23.02 | 24.41              | 22.39 | 23.38 | 22.50 | 24.21 |
|                  | 9400 | 24.5                                                           | 24.50                | 23.11              | 23.36 | 22.66 | 22.67 | 24.48              | 22.55 | 23.5  | 22.6  | 22.90 | 24.47              | 22.51 | 23.46 | 22.55 | 24.32 |
|                  | 9538 | 24.5                                                           | 24.38                | 22.83              | 23.23 | 22.3  | 22.42 | 24.32              | 22.36 | 23.4  | 22.4  | 22.85 | 24.33              | 22.32 | 23.34 | 22.36 | 24.19 |
| WCDMA<br>Band IV | 1312 | 24.5                                                           | 24.50                | 23.42              | 23.38 | 22.94 | 23.01 | 24.42              | 22.47 | 23.48 | 22.6  | 23.46 | 24.13              | 22.23 | 23.17 | 22.34 | 23.15 |
|                  | 1412 | 24.5                                                           | 24.48                | 23.28              | 23.34 | 22.83 | 22.84 | 24.46              | 22.53 | 23.48 | 22.58 | 23.55 | 24.19              | 22.33 | 23.28 | 22.35 | 23.28 |
|                  | 1513 | 24.5                                                           | 24.47                | 23.21              | 23.32 | 22.68 | 22.8  | 24.41              | 22.45 | 23.49 | 22.49 | 23.46 | 24.09              | 22.21 | 23.15 | 22.25 | 23.21 |
| WCDMA<br>Band V  | 4132 | 24.5                                                           | 24.44                | 23.29              | 23.37 | 22.83 | 22.88 | 24.40              | 22.46 | 23.44 | 22.51 | 23.30 | 24.41              | 22.44 | 23.39 | 22.47 | 24.22 |
|                  | 4183 | 24.5                                                           | 24.20                | 23.12              | 23.09 | 22.64 | 22.68 | 24.13              | 22.21 | 23.19 | 22.27 | 23.14 | 24.12              | 22.14 | 23.12 | 22.20 | 23.89 |
|                  | 4233 | 24.5                                                           | 24.07                | 22.78              | 23.01 | 22.29 | 22.35 | 23.99              | 22.03 | 23.07 | 22.11 | 22.77 | 23.98              | 21.95 | 22.97 | 22.01 | 23.80 |

## WCDMA Band II / Band IV - HSDPA / HSUPA / HSPA+ conducted power table (Reduced power):

| Band             | CH   | Max.<br>Rated<br>Avg.<br>Power +<br>Max.<br>Tolerance<br>(dBm) | Rel99<br>AV<br>(dBm) | HSDPA mode AV(dBm) |       |       |       | HSUPA mode AV(dBm) |       |       |       |       | HSPA+ mode AV(dBm) |       |       |       |       |
|------------------|------|----------------------------------------------------------------|----------------------|--------------------|-------|-------|-------|--------------------|-------|-------|-------|-------|--------------------|-------|-------|-------|-------|
|                  |      |                                                                |                      | SUB-1              | SUB-2 | SUB-3 | SUB-4 | SUB-1              | SUB-2 | SUB-3 | SUB-4 | SUB-5 | SUB-1              | SUB-2 | SUB-3 | SUB-4 | SUB-5 |
| WCDMA<br>Band II | 9262 | 22                                                             | 21.57                | 21.54              | 21.45 | 21.06 | 21.13 | 21.49              | 19.54 | 20.55 | 19.67 | 21.52 | 21.50              | 19.48 | 20.47 | 19.59 | 21.30 |
|                  | 9400 | 22                                                             | 21.53                | 21.51              | 21.39 | 21.06 | 21.07 | 21.51              | 19.58 | 20.53 | 19.63 | 21.45 | 21.50              | 19.54 | 20.49 | 19.58 | 21.35 |
|                  | 9538 | 22                                                             | 21.31                | 21.29              | 21.16 | 20.76 | 20.88 | 21.25              | 19.29 | 20.33 | 19.33 | 21.26 | 21.26              | 19.25 | 20.27 | 19.29 | 21.12 |
| WCDMA<br>Band IV | 1312 | 22.5                                                           | 21.48                | 21.46              | 21.36 | 21.34 | 21.34 | 21.40              | 19.45 | 20.46 | 19.58 | 21.43 | 21.45              | 19.48 | 20.43 | 19.51 | 21.26 |
|                  | 1412 | 22.5                                                           | 21.56                | 21.53              | 21.42 | 21.08 | 21.09 | 21.54              | 19.61 | 20.56 | 19.66 | 21.50 | 21.48              | 19.50 | 20.48 | 19.56 | 21.25 |
|                  | 1513 | 22.5                                                           | 21.50                | 21.48              | 21.35 | 20.95 | 21.07 | 21.44              | 19.48 | 20.52 | 19.52 | 21.45 | 21.41              | 19.38 | 20.40 | 19.44 | 21.23 |

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## HSDPA

| SUB-TEST | $\beta_c$ | $\beta_d$ | $\beta_d$<br>(SF) | $\beta_c/\beta_d$ | $\beta_{HS}$<br>(Note1, Note 2) | CM (dB)<br>(Note 3) | MPR (dB)<br>(Note 3) |
|----------|-----------|-----------|-------------------|-------------------|---------------------------------|---------------------|----------------------|
| 1        | 2/15      | 15/15     | 64                | 2/15              | 4/15                            | 0.0                 | 0.0                  |
| 2        | 12/15     | 15/15     | 64                | 12/15             | 24/15                           | 1.0                 | 0.0                  |
| 3        | 15/15     | 8/15      | 64                | 15/8              | 30/15                           | 1.5                 | 0.5                  |
| 4        | 15/15     | 4/15      | 64                | 15/4              | 30/15                           | 1.5                 | 0.5                  |

## HSUPA

| SUB-TEST | $\beta_c$ | $\beta_d$ | $\beta_d$<br>(SF) | $\beta_c/\beta_d$ | $\beta_{HS}$<br>(Note1) | $\beta_{ec}$ | $\beta_{ed}$<br>(Note 5)<br>(Note 6)                 | $\beta_{ed}$<br>(SF) | $\beta_{ed}$<br>(Codes) | CM<br>(dB)<br>(Note 2) | MPR<br>(dB)<br>(Note 2) | AG<br>Index<br>(Note 6) | E-TFCI |
|----------|-----------|-----------|-------------------|-------------------|-------------------------|--------------|------------------------------------------------------|----------------------|-------------------------|------------------------|-------------------------|-------------------------|--------|
| 1        | 11/15     | 15/15     | 64                | 11/15             | 22/15                   | 209/225      | 1309/225                                             | 4                    | 1                       | 1.0                    | 0.0                     | 20                      | 75     |
| 2        | 6/15      | 15/15     | 64                | 6/15              | 12/15                   | 12/15        | 94/75                                                | 4                    | 1                       | 3.0                    | 2.0                     | 12                      | 67     |
| 3        | 15/15     | 9/15      | 64                | 15/9              | 30/15                   | 30/15        | $\beta_{ed1}$ :<br>47/15<br>$\beta_{ed2}$ :<br>47/15 | 4<br>4               | 2                       | 2.0                    | 1.0                     | 15                      | 92     |
| 4        | 2/15      | 15/15     | 64                | 2/15              | 4/15                    | 2/15         | 56/75                                                | 4                    | 1                       | 3.0                    | 2.0                     | 17                      | 71     |
| 5        | 15/15     | 15/15     | 64                | 15/15             | 30/15                   | 24/15        | 134/15                                               | 4                    | 1                       | 1.0                    | 0.0                     | 21                      | 81     |

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### LTE FDD Band II / Band IV / Band V / Band VII power table:

| FDD Band 2 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 20         | QPSK       | 1 RB    | 0         | 1860            | 18700   | 24.25                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.14                 | 24.5                                | 0                        |
|            |            |         |           | 1900            | 19100   | 24.26                 | 24.5                                | 0                        |
|            |            |         | 50        | 1860            | 18700   | 24.20                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.19                 | 24.5                                | 0                        |
|            |            |         |           | 1900            | 19100   | 24.29                 | 24.5                                | 0                        |
|            |            |         | 99        | 1860            | 18700   | 24.27                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.37                 | 24.5                                | 0                        |
|            |            |         |           | 1900            | 19100   | 24.47                 | 24.5                                | 0                        |
|            |            | 50 RB   | 0         | 1860            | 18700   | 23.33                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.42                 | 24                                  | 0-1                      |
|            |            |         | 25        | 1860            | 18700   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.38                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.50                 | 24                                  | 0-1                      |
|            |            |         | 50        | 1860            | 18700   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.42                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.69                 | 24                                  | 0-1                      |
|            |            | 100RB   |           | 1860            | 18700   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.44                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1860            | 18700   | 23.24                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.74                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.76                 | 24                                  | 0-1                      |
|            |            |         | 50        | 1860            | 18700   | 23.39                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.73                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.33                 | 24                                  | 0-1                      |
|            |            |         | 99        | 1860            | 18700   | 23.77                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.72                 | 24                                  | 0-1                      |
|            |            |         |           | 1900            | 19100   | 23.86                 | 24                                  | 0-1                      |
|            |            | 50 RB   | 0         | 1860            | 18700   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.44                 | 23                                  | 0-2                      |
|            |            |         |           | 1900            | 19100   | 22.42                 | 23                                  | 0-2                      |
|            |            |         | 25        | 1860            | 18700   | 22.38                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.38                 | 23                                  | 0-2                      |
|            |            |         |           | 1900            | 19100   | 22.49                 | 23                                  | 0-2                      |
|            |            |         | 50        | 1860            | 18700   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.49                 | 23                                  | 0-2                      |
|            |            |         |           | 1900            | 19100   | 22.63                 | 23                                  | 0-2                      |
|            |            | 100RB   |           | 1860            | 18700   | 22.37                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 1900            | 19100   | 22.48                 | 23                                  | 0-2                      |

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| FDD Band 2 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 15         | QPSK       | 1 RB    | 0         | 1857.5          | 18675   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 1902.5          | 19125   | 24.21                 | 24.5                                | 0                        |
|            |            |         | 36        | 1857.5          | 18675   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.25                 | 24.5                                | 0                        |
|            |            |         |           | 1902.5          | 19125   | 24.25                 | 24.5                                | 0                        |
|            |            |         | 74        | 1857.5          | 18675   | 24.19                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.27                 | 24.5                                | 0                        |
|            |            |         |           | 1902.5          | 19125   | 24.41                 | 24.5                                | 0                        |
|            |            | 36 RB   | 0         | 1857.5          | 18675   | 23.37                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.46                 | 24                                  | 0-1                      |
|            |            |         | 18        | 1857.5          | 18675   | 23.32                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.54                 | 24                                  | 0-1                      |
|            |            |         | 37        | 1857.5          | 18675   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.62                 | 24                                  | 0-1                      |
|            |            | 75RB    |           | 1857.5          | 18675   | 23.28                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.47                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1857.5          | 18675   | 23.28                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.63                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.24                 | 24                                  | 0-1                      |
|            |            |         | 36        | 1857.5          | 18675   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.47                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.44                 | 24                                  | 0-1                      |
|            |            |         | 74        | 1857.5          | 18675   | 23.80                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.46                 | 24                                  | 0-1                      |
|            |            |         |           | 1902.5          | 19125   | 23.27                 | 24                                  | 0-1                      |
|            |            | 36 RB   | 0         | 1857.5          | 18675   | 22.37                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.36                 | 23                                  | 0-2                      |
|            |            |         |           | 1902.5          | 19125   | 22.52                 | 23                                  | 0-2                      |
|            |            |         | 18        | 1857.5          | 18675   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 1902.5          | 19125   | 22.56                 | 23                                  | 0-2                      |
|            |            |         | 37        | 1857.5          | 18675   | 22.42                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 1902.5          | 19125   | 22.63                 | 23                                  | 0-2                      |
|            |            | 75RB    |           | 1857.5          | 18675   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.38                 | 23                                  | 0-2                      |
|            |            |         |           | 1902.5          | 19125   | 22.55                 | 23                                  | 0-2                      |

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| FDD Band 2 |            |         |           |                 |         |                       |                                     |                          |     |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|-----|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |     |
| 10         | QPSK       | 1 RB    | 0         | 1855            | 18650   | 24.06                 | 24.5                                | 0                        |     |
|            |            |         |           | 1880            | 18900   | 24.22                 | 24.5                                | 0                        |     |
|            |            |         |           | 1905            | 19150   | 24.38                 | 24.5                                | 0                        |     |
|            |            |         | 25        | 1855            | 18650   | 24.30                 | 24.5                                | 0                        |     |
|            |            |         |           | 1880            | 18900   | 24.21                 | 24.5                                | 0                        |     |
|            |            |         |           | 1905            | 19150   | 24.36                 | 24.5                                | 0                        |     |
|            |            |         | 49        | 1855            | 18650   | 24.16                 | 24.5                                | 0                        |     |
|            |            |         |           | 1880            | 18900   | 24.19                 | 24.5                                | 0                        |     |
|            |            |         |           | 1905            | 19150   | 24.43                 | 24.5                                | 0                        |     |
|            |            | 25 RB   | 0         | 1855            | 18650   | 23.28                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.32                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1905            | 19150   | 23.46                 | 24                                  | 0-1                      |     |
|            |            |         | 12        | 1855            | 18650   | 23.26                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.33                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1905            | 19150   | 23.53                 | 24                                  | 0-1                      |     |
|            |            |         | 25        | 1855            | 18650   | 23.25                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.32                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1905            | 19150   | 23.59                 | 24                                  | 0-1                      |     |
|            |            | 50RB    |           |                 | 1855    | 18650                 | 23.33                               | 24                       | 0-1 |
|            |            |         |           |                 | 1880    | 18900                 | 23.35                               | 24                       | 0-1 |
|            |            |         |           |                 | 1905    | 19150                 | 23.54                               | 24                       | 0-1 |
|            |            | 16-QAM  | 1 RB      | 0               | 1855    | 18650                 | 23.32                               | 24                       | 0-1 |
|            |            |         |           |                 | 1880    | 18900                 | 23.27                               | 24                       | 0-1 |
|            |            |         |           |                 | 1905    | 19150                 | 23.50                               | 24                       | 0-1 |
|            |            |         |           | 25              | 1855    | 18650                 | 23.25                               | 24                       | 0-1 |
|            |            |         |           |                 | 1880    | 18900                 | 23.44                               | 24                       | 0-1 |
|            |            |         |           |                 | 1905    | 19150                 | 23.62                               | 24                       | 0-1 |
|            | 49         |         |           | 1855            | 18650   | 23.40                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.40                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1905            | 19150   | 23.47                 | 24                                  | 0-1                      |     |
|            | 25 RB      |         |           | 0               | 1855    | 18650                 | 22.38                               | 23                       | 0-2 |
|            |            |         |           |                 | 1880    | 18900                 | 22.38                               | 23                       | 0-2 |
|            |            |         |           |                 | 1905    | 19150                 | 22.47                               | 23                       | 0-2 |
|            |            |         | 12        | 1855            | 18650   | 22.37                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1880            | 18900   | 22.40                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1905            | 19150   | 22.48                 | 23                                  | 0-2                      |     |
|            |            |         | 25        | 1855            | 18650   | 22.28                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1880            | 18900   | 22.31                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1905            | 19150   | 22.58                 | 23                                  | 0-2                      |     |
|            | 50RB       |         |           | 1855            | 18650   | 22.38                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1880            | 18900   | 22.42                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1905            | 19150   | 22.52                 | 23                                  | 0-2                      |     |

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| FDD Band 2 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 5          | QPSK       | 1 RB    | 0         | 1852.5          | 18625   | 23.93                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 23.93                 | 24.5                                | 0                        |
|            |            |         |           | 1907.5          | 19175   | 24.17                 | 24.5                                | 0                        |
|            |            |         | 12        | 1852.5          | 18625   | 24.04                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.13                 | 24.5                                | 0                        |
|            |            |         |           | 1907.5          | 19175   | 24.18                 | 24.5                                | 0                        |
|            |            |         | 24        | 1852.5          | 18625   | 24.00                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 23.93                 | 24.5                                | 0                        |
|            |            |         |           | 1907.5          | 19175   | 24.27                 | 24.5                                | 0                        |
|            |            | 12 RB   | 0         | 1852.5          | 18625   | 23.09                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.09                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.41                 | 24                                  | 0-1                      |
|            |            |         | 6         | 1852.5          | 18625   | 23.08                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.13                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.38                 | 24                                  | 0-1                      |
|            |            |         | 13        | 1852.5          | 18625   | 23.05                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.17                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.33                 | 24                                  | 0-1                      |
|            |            | 25RB    |           | 1852.5          | 18625   | 23.05                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.10                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.32                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1852.5          | 18625   | 23.08                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.57                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.70                 | 24                                  | 0-1                      |
|            |            |         | 12        | 1852.5          | 18625   | 23.14                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.53                 | 24                                  | 0-1                      |
|            |            |         | 24        | 1852.5          | 18625   | 23.11                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.07                 | 24                                  | 0-1                      |
|            |            |         |           | 1907.5          | 19175   | 23.07                 | 24                                  | 0-1                      |
|            |            | 12 RB   | 0         | 1852.5          | 18625   | 22.15                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.25                 | 23                                  | 0-2                      |
|            |            |         |           | 1907.5          | 19175   | 22.37                 | 23                                  | 0-2                      |
|            |            |         | 6         | 1852.5          | 18625   | 22.05                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.22                 | 23                                  | 0-2                      |
|            |            |         |           | 1907.5          | 19175   | 22.40                 | 23                                  | 0-2                      |
|            |            |         | 13        | 1852.5          | 18625   | 22.11                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.26                 | 23                                  | 0-2                      |
|            |            |         |           | 1907.5          | 19175   | 22.29                 | 23                                  | 0-2                      |
|            |            | 25RB    |           | 1852.5          | 18625   | 22.12                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.19                 | 23                                  | 0-2                      |
|            |            |         |           | 1907.5          | 19175   | 22.33                 | 23                                  | 0-2                      |

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| FDD Band 2 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 3          | QPSK       | 1 RB    | 0         | 1851.5          | 18615   | 24.13                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 1908.5          | 19185   | 24.35                 | 24.5                                | 0                        |
|            |            |         | 7         | 1851.5          | 18615   | 24.12                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.25                 | 24.5                                | 0                        |
|            |            |         |           | 1908.5          | 19185   | 24.37                 | 24.5                                | 0                        |
|            |            |         | 14        | 1851.5          | 18615   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 1880            | 18900   | 24.09                 | 24.5                                | 0                        |
|            |            |         |           | 1908.5          | 19185   | 24.34                 | 24.5                                | 0                        |
|            |            | 8 RB    | 0         | 1851.5          | 18615   | 23.22                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.55                 | 24                                  | 0-1                      |
|            |            |         | 4         | 1851.5          | 18615   | 23.27                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.51                 | 24                                  | 0-1                      |
|            |            |         | 7         | 1851.5          | 18615   | 23.25                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.33                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.53                 | 24                                  | 0-1                      |
|            |            | 15RB    |           | 1851.5          | 18615   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.39                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.47                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1851.5          | 18615   | 23.28                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.29                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.22                 | 24                                  | 0-1                      |
|            |            |         | 7         | 1851.5          | 18615   | 23.24                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.59                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.43                 | 24                                  | 0-1                      |
|            |            |         | 14        | 1851.5          | 18615   | 23.40                 | 24                                  | 0-1                      |
|            |            |         |           | 1880            | 18900   | 23.68                 | 24                                  | 0-1                      |
|            |            |         |           | 1908.5          | 19185   | 23.38                 | 24                                  | 0-1                      |
|            |            | 8 RB    | 0         | 1851.5          | 18615   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.36                 | 23                                  | 0-2                      |
|            |            |         |           | 1908.5          | 19185   | 22.62                 | 23                                  | 0-2                      |
|            |            |         | 4         | 1851.5          | 18615   | 22.34                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 1908.5          | 19185   | 22.49                 | 23                                  | 0-2                      |
|            |            |         | 7         | 1851.5          | 18615   | 22.39                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.42                 | 23                                  | 0-2                      |
|            |            |         |           | 1908.5          | 19185   | 22.49                 | 23                                  | 0-2                      |
|            |            | 15RB    |           | 1851.5          | 18615   | 22.39                 | 23                                  | 0-2                      |
|            |            |         |           | 1880            | 18900   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 1908.5          | 19185   | 22.41                 | 23                                  | 0-2                      |

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| FDD Band 2 |            |         |           |                 |         |                       |                                     |                          |     |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|-----|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |     |
| 1.4        | QPSK       | 1 RB    | 0         | 1850.7          | 18607   | 24.15                 | 24.5                                | 0                        |     |
|            |            |         |           | 1880            | 18900   | 24.18                 | 24.5                                | 0                        |     |
|            |            |         |           | 1909.3          | 19193   | 24.29                 | 24.5                                | 0                        |     |
|            |            |         | 2         | 1850.7          | 18607   | 24.24                 | 24.5                                | 0                        |     |
|            |            |         |           | 1880            | 18900   | 24.30                 | 24.5                                | 0                        |     |
|            |            |         |           | 1909.3          | 19193   | 24.28                 | 24.5                                | 0                        |     |
|            |            |         | 5         | 1850.7          | 18607   | 24.03                 | 24.5                                | 0                        |     |
|            |            |         |           | 1880            | 18900   | 24.18                 | 24.5                                | 0                        |     |
|            |            |         |           | 1909.3          | 19193   | 24.43                 | 24.5                                | 0                        |     |
|            |            | 3 RB    | 0         | 1850.7          | 18607   | 23.28                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.31                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1909.3          | 19193   | 23.34                 | 24                                  | 0-1                      |     |
|            |            |         | 2         | 1850.7          | 18607   | 23.21                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.26                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1909.3          | 19193   | 23.43                 | 24                                  | 0-1                      |     |
|            |            |         | 3         | 1850.7          | 18607   | 23.29                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.28                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1909.3          | 19193   | 23.51                 | 24                                  | 0-1                      |     |
|            |            | 6RB     |           |                 | 1850.7  | 18607                 | 23.29                               | 24                       | 0-1 |
|            |            |         |           |                 | 1880    | 18900                 | 23.33                               | 24                       | 0-1 |
|            |            |         |           |                 | 1909.3  | 19193                 | 23.52                               | 24                       | 0-1 |
|            | 16-QAM     | 1 RB    | 0         | 1850.7          | 18607   | 23.34                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.45                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1909.3          | 19193   | 23.59                 | 24                                  | 0-1                      |     |
|            |            |         | 2         | 1850.7          | 18607   | 23.26                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.71                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1909.3          | 19193   | 23.57                 | 24                                  | 0-1                      |     |
|            |            |         | 5         | 1850.7          | 18607   | 23.61                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1880            | 18900   | 23.24                 | 24                                  | 0-1                      |     |
|            |            |         |           | 1909.3          | 19193   | 23.72                 | 24                                  | 0-1                      |     |
|            |            | 3 RB    | 0         | 1850.7          | 18607   | 22.24                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1880            | 18900   | 22.27                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1909.3          | 19193   | 22.44                 | 23                                  | 0-2                      |     |
|            |            |         | 2         | 1850.7          | 18607   | 22.28                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1880            | 18900   | 22.31                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1909.3          | 19193   | 22.38                 | 23                                  | 0-2                      |     |
|            |            |         | 3         | 1850.7          | 18607   | 22.31                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1880            | 18900   | 22.37                 | 23                                  | 0-2                      |     |
|            |            |         |           | 1909.3          | 19193   | 22.43                 | 23                                  | 0-2                      |     |
|            |            | 6RB     |           |                 | 1850.7  | 18607                 | 22.46                               | 23                       | 0-2 |
|            |            |         |           |                 | 1880    | 18900                 | 22.39                               | 23                       | 0-2 |
|            |            |         |           |                 | 1909.3  | 19193                 | 22.45                               | 23                       | 0-2 |

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| FDD Band 2 Reduction Power |            |         |           |                 |         |                       |                                     |                          |
|----------------------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)                    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 20                         | QPSK       | 1 RB    | 0         | 1860            | 18700   | 21.67                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.66                 | 22                                  | 0                        |
|                            |            |         |           | 1900            | 19100   | 21.64                 | 22                                  | 0                        |
|                            |            |         | 50        | 1860            | 18700   | 21.69                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.57                 | 22                                  | 0                        |
|                            |            |         |           | 1900            | 19100   | 21.81                 | 22                                  | 0                        |
|                            |            |         | 99        | 1860            | 18700   | 21.71                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.67                 | 22                                  | 0                        |
|                            |            |         |           | 1900            | 19100   | 21.92                 | 22                                  | 0                        |
|                            |            | 50 RB   | 0         | 1860            | 18700   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.63                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.83                 | 22                                  | 0-1                      |
|                            |            |         | 25        | 1860            | 18700   | 21.55                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.65                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.90                 | 22                                  | 0-1                      |
|                            |            |         | 50        | 1860            | 18700   | 21.66                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.69                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.96                 | 22                                  | 0-1                      |
|                            |            | 100RB   |           | 1860            | 18700   | 21.59                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.65                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.84                 | 22                                  | 0-1                      |
|                            | 16-QAM     | 1 RB    | 0         | 1860            | 18700   | 21.57                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.61                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.54                 | 22                                  | 0-1                      |
|                            |            |         | 50        | 1860            | 18700   | 21.62                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.76                 | 22                                  | 0-1                      |
|                            |            |         | 99        | 1860            | 18700   | 21.64                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.55                 | 22                                  | 0-1                      |
|                            |            |         |           | 1900            | 19100   | 21.73                 | 22                                  | 0-1                      |
|                            |            | 50 RB   | 0         | 1860            | 18700   | 21.49                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.47                 | 22                                  | 0-2                      |
|                            |            |         |           | 1900            | 19100   | 21.61                 | 22                                  | 0-2                      |
|                            |            |         | 25        | 1860            | 18700   | 21.53                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.47                 | 22                                  | 0-2                      |
|                            |            |         |           | 1900            | 19100   | 21.71                 | 22                                  | 0-2                      |
|                            |            |         | 50        | 1860            | 18700   | 21.52                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.49                 | 22                                  | 0-2                      |
|                            |            |         |           | 1900            | 19100   | 21.74                 | 22                                  | 0-2                      |
|                            |            | 100RB   |           | 1860            | 18700   | 21.49                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.46                 | 22                                  | 0-2                      |
|                            |            |         |           | 1900            | 19100   | 21.59                 | 22                                  | 0-2                      |

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| FDD Band 2 Reduction Power |            |         |           |                 |         |                       |                                     |                          |
|----------------------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)                    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 15                         | QPSK       | 1 RB    | 0         | 1857.5          | 18675   | 21.56                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.49                 | 22                                  | 0                        |
|                            |            |         |           | 1902.5          | 19125   | 21.63                 | 22                                  | 0                        |
|                            |            |         | 36        | 1857.5          | 18675   | 21.52                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0                        |
|                            |            |         |           | 1902.5          | 19125   | 21.76                 | 22                                  | 0                        |
|                            |            |         | 74        | 1857.5          | 18675   | 21.54                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.56                 | 22                                  | 0                        |
|                            |            |         |           | 1902.5          | 19125   | 21.82                 | 22                                  | 0                        |
|                            |            | 36 RB   | 0         | 1857.5          | 18675   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.78                 | 22                                  | 0-1                      |
|                            |            |         | 18        | 1857.5          | 18675   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.57                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.84                 | 22                                  | 0-1                      |
|                            |            |         | 37        | 1857.5          | 18675   | 21.51                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.58                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.87                 | 22                                  | 0-1                      |
|                            |            | 75RB    |           | 1857.5          | 18675   | 21.57                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.48                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.73                 | 22                                  | 0-1                      |
|                            | 16-QAM     | 1 RB    | 0         | 1857.5          | 18675   | 21.63                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.51                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.58                 | 22                                  | 0-1                      |
|                            |            |         | 36        | 1857.5          | 18675   | 21.67                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.47                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.76                 | 22                                  | 0-1                      |
|                            |            |         | 74        | 1857.5          | 18675   | 21.71                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1902.5          | 19125   | 21.69                 | 22                                  | 0-1                      |
|                            |            | 36 RB   | 0         | 1857.5          | 18675   | 21.42                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.37                 | 22                                  | 0-2                      |
|                            |            |         |           | 1902.5          | 19125   | 21.58                 | 22                                  | 0-2                      |
|                            |            |         | 18        | 1857.5          | 18675   | 21.44                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.41                 | 22                                  | 0-2                      |
|                            |            |         |           | 1902.5          | 19125   | 21.68                 | 22                                  | 0-2                      |
|                            |            |         | 37        | 1857.5          | 18675   | 21.44                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1902.5          | 19125   | 21.70                 | 22                                  | 0-2                      |
|                            |            | 75RB    |           | 1857.5          | 18675   | 21.47                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.32                 | 22                                  | 0-2                      |
|                            |            |         |           | 1902.5          | 19125   | 21.57                 | 22                                  | 0-2                      |

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| FDD Band 2 Reduction Power |            |         |           |                 |         |                       |                                     |                          |
|----------------------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)                    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 10                         | QPSK       | 1 RB    | 0         | 1855            | 18650   | 21.51                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.52                 | 22                                  | 0                        |
|                            |            |         |           | 1905            | 19150   | 21.68                 | 22                                  | 0                        |
|                            |            |         | 25        | 1855            | 18650   | 21.51                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.54                 | 22                                  | 0                        |
|                            |            |         |           | 1905            | 19150   | 21.84                 | 22                                  | 0                        |
|                            |            |         | 49        | 1855            | 18650   | 21.48                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.55                 | 22                                  | 0                        |
|                            |            |         |           | 1905            | 19150   | 21.77                 | 22                                  | 0                        |
|                            |            | 25 RB   | 0         | 1855            | 18650   | 21.47                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.49                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.81                 | 22                                  | 0-1                      |
|                            |            |         | 12        | 1855            | 18650   | 21.47                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.84                 | 22                                  | 0-1                      |
|                            |            |         | 25        | 1855            | 18650   | 21.47                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.81                 | 22                                  | 0-1                      |
|                            |            | 50RB    |           | 1855            | 18650   | 21.67                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.76                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.89                 | 22                                  | 0-1                      |
|                            | 16-QAM     | 1 RB    | 0         | 1855            | 18650   | 21.20                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.24                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.58                 | 22                                  | 0-1                      |
|                            |            |         | 25        | 1855            | 18650   | 21.21                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.25                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.68                 | 22                                  | 0-1                      |
|                            |            |         | 49        | 1855            | 18650   | 21.23                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.22                 | 22                                  | 0-1                      |
|                            |            |         |           | 1905            | 19150   | 21.56                 | 22                                  | 0-1                      |
|                            |            | 25 RB   | 0         | 1855            | 18650   | 21.34                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.35                 | 22                                  | 0-2                      |
|                            |            |         |           | 1905            | 19150   | 21.64                 | 22                                  | 0-2                      |
|                            |            |         | 12        | 1855            | 18650   | 21.35                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.36                 | 22                                  | 0-2                      |
|                            |            |         |           | 1905            | 19150   | 21.66                 | 22                                  | 0-2                      |
|                            |            |         | 25        | 1855            | 18650   | 21.36                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.35                 | 22                                  | 0-2                      |
|                            |            |         |           | 1905            | 19150   | 21.60                 | 22                                  | 0-2                      |
|                            |            | 50RB    |           | 1855            | 18650   | 21.57                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.60                 | 22                                  | 0-2                      |
|                            |            |         |           | 1905            | 19150   | 21.59                 | 22                                  | 0-2                      |

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| FDD Band 2 Reduction Power |            |         |           |                 |         |                       |                                     |                          |
|----------------------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)                    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 5                          | QPSK       | 1 RB    | 0         | 1852.5          | 18625   | 21.44                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.44                 | 22                                  | 0                        |
|                            |            |         |           | 1907.5          | 19175   | 21.55                 | 22                                  | 0                        |
|                            |            |         | 12        | 1852.5          | 18625   | 21.45                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.49                 | 22                                  | 0                        |
|                            |            |         |           | 1907.5          | 19175   | 21.77                 | 22                                  | 0                        |
|                            |            |         | 24        | 1852.5          | 18625   | 21.39                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.46                 | 22                                  | 0                        |
|                            |            |         |           | 1907.5          | 19175   | 21.72                 | 22                                  | 0                        |
|                            |            | 12 RB   | 0         | 1852.5          | 18625   | 21.48                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.80                 | 22                                  | 0-1                      |
|                            |            |         | 6         | 1852.5          | 18625   | 21.49                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.53                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.83                 | 22                                  | 0-1                      |
|                            |            |         | 13        | 1852.5          | 18625   | 21.48                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.78                 | 22                                  | 0-1                      |
|                            |            |         | 25RB      | 1852.5          | 18625   | 21.59                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.65                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.92                 | 22                                  | 0-1                      |
|                            | 16-QAM     | 1 RB    | 0         | 1852.5          | 18625   | 21.56                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.59                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.87                 | 22                                  | 0-1                      |
|                            |            |         | 12        | 1852.5          | 18625   | 21.59                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.61                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.82                 | 22                                  | 0-1                      |
|                            |            |         | 24        | 1852.5          | 18625   | 21.56                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.53                 | 22                                  | 0-1                      |
|                            |            |         |           | 1907.5          | 19175   | 21.72                 | 22                                  | 0-1                      |
|                            |            | 12 RB   | 0         | 1852.5          | 18625   | 21.38                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1907.5          | 19175   | 21.64                 | 22                                  | 0-2                      |
|                            |            |         | 6         | 1852.5          | 18625   | 21.41                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.42                 | 22                                  | 0-2                      |
|                            |            |         |           | 1907.5          | 19175   | 21.61                 | 22                                  | 0-2                      |
|                            |            |         | 13        | 1852.5          | 18625   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.43                 | 22                                  | 0-2                      |
|                            |            |         |           | 1907.5          | 19175   | 21.54                 | 22                                  | 0-2                      |
|                            |            |         | 25RB      | 1852.5          | 18625   | 21.44                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.47                 | 22                                  | 0-2                      |
|                            |            |         |           | 1907.5          | 19175   | 21.57                 | 22                                  | 0-2                      |

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| FDD Band 2 Reduction Power |            |         |           |                 |         |                       |                                     |                          |
|----------------------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)                    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 3                          | QPSK       | 1 RB    | 0         | 1851.5          | 18615   | 21.30                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.33                 | 22                                  | 0                        |
|                            |            |         |           | 1908.5          | 19185   | 21.68                 | 22                                  | 0                        |
|                            |            |         | 7         | 1851.5          | 18615   | 21.38                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.45                 | 22                                  | 0                        |
|                            |            |         |           | 1908.5          | 19185   | 21.76                 | 22                                  | 0                        |
|                            |            |         | 14        | 1851.5          | 18615   | 21.40                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.70                 | 22                                  | 0                        |
|                            |            |         |           | 1908.5          | 19185   | 21.30                 | 22                                  | 0                        |
|                            |            | 8 RB    | 0         | 1851.5          | 18615   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.57                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.83                 | 22                                  | 0-1                      |
|                            |            |         | 4         | 1851.5          | 18615   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.56                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.83                 | 22                                  | 0-1                      |
|                            |            |         | 7         | 1851.5          | 18615   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.54                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.80                 | 22                                  | 0-1                      |
|                            |            | 15RB    |           | 1851.5          | 18615   | 21.51                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.55                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.82                 | 22                                  | 0-1                      |
|                            | 16-QAM     | 1 RB    | 0         | 1851.5          | 18615   | 21.35                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.39                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.69                 | 22                                  | 0-1                      |
|                            |            |         | 7         | 1851.5          | 18615   | 21.42                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.52                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.73                 | 22                                  | 0-1                      |
|                            |            |         | 14        | 1851.5          | 18615   | 21.36                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.41                 | 22                                  | 0-1                      |
|                            |            |         |           | 1908.5          | 19185   | 21.64                 | 22                                  | 0-1                      |
|                            |            | 8 RB    | 0         | 1851.5          | 18615   | 21.39                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.31                 | 22                                  | 0-2                      |
|                            |            |         |           | 1908.5          | 19185   | 21.56                 | 22                                  | 0-2                      |
|                            |            |         | 4         | 1851.5          | 18615   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.42                 | 22                                  | 0-2                      |
|                            |            |         |           | 1908.5          | 19185   | 21.54                 | 22                                  | 0-2                      |
|                            |            |         | 7         | 1851.5          | 18615   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1908.5          | 19185   | 21.53                 | 22                                  | 0-2                      |
|                            |            | 15RB    |           | 1851.5          | 18615   | 21.32                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.42                 | 22                                  | 0-2                      |
|                            |            |         |           | 1908.5          | 19185   | 21.60                 | 22                                  | 0-2                      |

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| FDD Band 2 Reduction Power |            |         |           |                 |         |                       |                                     |                          |
|----------------------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)                    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 1.4                        | QPSK       | 1 RB    | 0         | 1850.7          | 18607   | 21.39                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.45                 | 22                                  | 0                        |
|                            |            |         |           | 1909.3          | 19193   | 21.72                 | 22                                  | 0                        |
|                            |            |         | 2         | 1850.7          | 18607   | 21.48                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.53                 | 22                                  | 0                        |
|                            |            |         |           | 1909.3          | 19193   | 21.79                 | 22                                  | 0                        |
|                            |            |         | 5         | 1850.7          | 18607   | 21.40                 | 22                                  | 0                        |
|                            |            |         |           | 1880            | 18900   | 21.49                 | 22                                  | 0                        |
|                            |            |         |           | 1909.3          | 19193   | 21.73                 | 22                                  | 0                        |
|                            |            | 3 RB    | 0         | 1850.7          | 18607   | 21.54                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.73                 | 22                                  | 0-1                      |
|                            |            |         | 2         | 1850.7          | 18607   | 21.46                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.73                 | 22                                  | 0-1                      |
|                            |            |         | 3         | 1850.7          | 18607   | 21.50                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.53                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.73                 | 22                                  | 0-1                      |
|                            |            | 6RB     |           | 1850.7          | 18607   | 21.55                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.60                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.85                 | 22                                  | 0-1                      |
|                            | 16-QAM     | 1 RB    | 0         | 1850.7          | 18607   | 21.63                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.66                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.61                 | 22                                  | 0-1                      |
|                            |            |         | 2         | 1850.7          | 18607   | 21.72                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.61                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.64                 | 22                                  | 0-1                      |
|                            |            |         | 5         | 1850.7          | 18607   | 21.67                 | 22                                  | 0-1                      |
|                            |            |         |           | 1880            | 18900   | 21.63                 | 22                                  | 0-1                      |
|                            |            |         |           | 1909.3          | 19193   | 21.80                 | 22                                  | 0-1                      |
|                            |            | 3 RB    | 0         | 1850.7          | 18607   | 21.38                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.41                 | 22                                  | 0-2                      |
|                            |            |         |           | 1909.3          | 19193   | 21.58                 | 22                                  | 0-2                      |
|                            |            |         | 2         | 1850.7          | 18607   | 21.34                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.40                 | 22                                  | 0-2                      |
|                            |            |         |           | 1909.3          | 19193   | 21.58                 | 22                                  | 0-2                      |
|                            |            |         | 3         | 1850.7          | 18607   | 21.38                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.43                 | 22                                  | 0-2                      |
|                            |            |         |           | 1909.3          | 19193   | 21.56                 | 22                                  | 0-2                      |
|                            |            | 6RB     |           | 1850.7          | 18607   | 21.43                 | 22                                  | 0-2                      |
|                            |            |         |           | 1880            | 18900   | 21.46                 | 22                                  | 0-2                      |
|                            |            |         |           | 1909.3          | 19193   | 21.59                 | 22                                  | 0-2                      |

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| FDD Band 4 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 20         | QPSK       | 1 RB    | 0         | 1720            | 20050   | 24.40                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.34                 | 24.5                                | 0                        |
|            |            |         |           | 1745            | 20300   | 24.38                 | 24.5                                | 0                        |
|            |            |         | 50        | 1720            | 20050   | 24.41                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.39                 | 24.5                                | 0                        |
|            |            |         |           | 1745            | 20300   | 24.25                 | 24.5                                | 0                        |
|            |            |         | 99        | 1720            | 20050   | 24.27                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.29                 | 24.5                                | 0                        |
|            |            |         |           | 1745            | 20300   | 24.19                 | 24.5                                | 0                        |
|            |            | 50 RB   | 0         | 1720            | 20050   | 23.52                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.55                 | 24                                  | 0-1                      |
|            |            |         | 25        | 1720            | 20050   | 23.45                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.47                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.40                 | 24                                  | 0-1                      |
|            |            |         | 50        | 1720            | 20050   | 23.44                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.54                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.53                 | 24                                  | 0-1                      |
|            |            | 100RB   |           | 1720            | 20050   | 23.40                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.44                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.46                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1720            | 20050   | 23.67                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.67                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.58                 | 24                                  | 0-1                      |
|            |            |         | 50        | 1720            | 20050   | 23.51                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.79                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.54                 | 24                                  | 0-1                      |
|            |            |         | 99        | 1720            | 20050   | 23.59                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.48                 | 24                                  | 0-1                      |
|            |            |         |           | 1745            | 20300   | 23.47                 | 24                                  | 0-1                      |
|            |            | 50 RB   | 0         | 1720            | 20050   | 22.52                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.53                 | 23                                  | 0-2                      |
|            |            |         |           | 1745            | 20300   | 22.45                 | 23                                  | 0-2                      |
|            |            |         | 25        | 1720            | 20050   | 22.48                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.44                 | 23                                  | 0-2                      |
|            |            |         |           | 1745            | 20300   | 22.49                 | 23                                  | 0-2                      |
|            |            |         | 50        | 1720            | 20050   | 22.49                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 1745            | 20300   | 22.43                 | 23                                  | 0-2                      |
|            |            | 100RB   |           | 1720            | 20050   | 22.43                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.48                 | 23                                  | 0-2                      |
|            |            |         |           | 1745            | 20300   | 22.44                 | 23                                  | 0-2                      |

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| FDD Band 4 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 15         | QPSK       | 1 RB    | 0         | 1717.5          | 20025   | 24.44                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.29                 | 24.5                                | 0                        |
|            |            |         |           | 1747.5          | 20325   | 24.25                 | 24.5                                | 0                        |
|            |            |         | 36        | 1717.5          | 20025   | 24.26                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.21                 | 24.5                                | 0                        |
|            |            |         |           | 1747.5          | 20325   | 24.24                 | 24.5                                | 0                        |
|            |            |         | 74        | 1717.5          | 20025   | 24.24                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.17                 | 24.5                                | 0                        |
|            |            |         |           | 1747.5          | 20325   | 24.18                 | 24.5                                | 0                        |
|            |            | 36 RB   | 0         | 1717.5          | 20025   | 23.55                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.37                 | 24                                  | 0-1                      |
|            |            |         | 18        | 1717.5          | 20025   | 23.49                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.41                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.37                 | 24                                  | 0-1                      |
|            |            |         | 37        | 1717.5          | 20025   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.42                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.37                 | 24                                  | 0-1                      |
|            |            | 75RB    |           | 1717.5          | 20025   | 23.51                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.34                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1717.5          | 20025   | 23.55                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.73                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.23                 | 24                                  | 0-1                      |
|            |            |         | 36        | 1717.5          | 20025   | 23.25                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.76                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.51                 | 24                                  | 0-1                      |
|            |            |         | 74        | 1717.5          | 20025   | 23.18                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.45                 | 24                                  | 0-1                      |
|            |            |         |           | 1747.5          | 20325   | 23.25                 | 24                                  | 0-1                      |
|            |            | 36 RB   | 0         | 1717.5          | 20025   | 22.57                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.43                 | 23                                  | 0-2                      |
|            |            |         |           | 1747.5          | 20325   | 22.45                 | 23                                  | 0-2                      |
|            |            |         | 18        | 1717.5          | 20025   | 22.48                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 1747.5          | 20325   | 22.38                 | 23                                  | 0-2                      |
|            |            |         | 37        | 1717.5          | 20025   | 22.44                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.45                 | 23                                  | 0-2                      |
|            |            |         |           | 1747.5          | 20325   | 22.43                 | 23                                  | 0-2                      |
|            |            | 75RB    |           | 1717.5          | 20025   | 22.46                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.46                 | 23                                  | 0-2                      |
|            |            |         |           | 1747.5          | 20325   | 22.46                 | 23                                  | 0-2                      |

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| FDD Band 4 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 10         | QPSK       | 1 RB    | 0         | 1715            | 20000   | 24.40                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.14                 | 24.5                                | 0                        |
|            |            |         |           | 1750            | 20350   | 24.23                 | 24.5                                | 0                        |
|            |            |         | 25        | 1715            | 20000   | 24.24                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.35                 | 24.5                                | 0                        |
|            |            |         |           | 1750            | 20350   | 24.27                 | 24.5                                | 0                        |
|            |            |         | 49        | 1715            | 20000   | 24.33                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.15                 | 24.5                                | 0                        |
|            |            |         |           | 1750            | 20350   | 24.17                 | 24.5                                | 0                        |
|            |            | 25 RB   | 0         | 1715            | 20000   | 23.48                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.40                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.32                 | 24                                  | 0-1                      |
|            |            |         | 12        | 1715            | 20000   | 23.46                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.30                 | 24                                  | 0-1                      |
|            |            |         | 25        | 1715            | 20000   | 23.40                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.29                 | 24                                  | 0-1                      |
|            |            | 50RB    |           | 1715            | 20000   | 23.39                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.33                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1715            | 20000   | 23.64                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.75                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.26                 | 24                                  | 0-1                      |
|            |            |         | 25        | 1715            | 20000   | 23.48                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.66                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.44                 | 24                                  | 0-1                      |
|            |            |         | 49        | 1715            | 20000   | 23.45                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.26                 | 24                                  | 0-1                      |
|            |            |         |           | 1750            | 20350   | 23.31                 | 24                                  | 0-1                      |
|            |            | 25 RB   | 0         | 1715            | 20000   | 22.52                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.48                 | 23                                  | 0-2                      |
|            |            |         |           | 1750            | 20350   | 22.37                 | 23                                  | 0-2                      |
|            |            |         | 12        | 1715            | 20000   | 22.49                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.42                 | 23                                  | 0-2                      |
|            |            |         |           | 1750            | 20350   | 22.31                 | 23                                  | 0-2                      |
|            |            |         | 25        | 1715            | 20000   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 1750            | 20350   | 22.25                 | 23                                  | 0-2                      |
|            |            | 50RB    |           | 1715            | 20000   | 22.46                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.45                 | 23                                  | 0-2                      |
|            |            |         |           | 1750            | 20350   | 22.36                 | 23                                  | 0-2                      |

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| FDD Band 4 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 5          | QPSK       | 1 RB    | 0         | 1712.5          | 19975   | 24.34                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.30                 | 24.5                                | 0                        |
|            |            |         |           | 1752.5          | 20375   | 24.29                 | 24.5                                | 0                        |
|            |            |         | 12        | 1712.5          | 19975   | 24.12                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.25                 | 24.5                                | 0                        |
|            |            |         |           | 1752.5          | 20375   | 24.15                 | 24.5                                | 0                        |
|            |            |         | 24        | 1712.5          | 19975   | 24.28                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.11                 | 24.5                                | 0                        |
|            |            |         |           | 1752.5          | 20375   | 24.13                 | 24.5                                | 0                        |
|            |            | 12 RB   | 0         | 1712.5          | 19975   | 23.54                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.37                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.37                 | 24                                  | 0-1                      |
|            |            |         | 6         | 1712.5          | 19975   | 23.53                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.37                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.33                 | 24                                  | 0-1                      |
|            |            |         | 13        | 1712.5          | 19975   | 23.52                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.32                 | 24                                  | 0-1                      |
|            |            |         | 25RB      | 1712.5          | 19975   | 23.47                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.28                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1712.5          | 19975   | 23.69                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.73                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.51                 | 24                                  | 0-1                      |
|            |            |         | 12        | 1712.5          | 19975   | 23.56                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.29                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.44                 | 24                                  | 0-1                      |
|            |            |         | 24        | 1712.5          | 19975   | 23.81                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.77                 | 24                                  | 0-1                      |
|            |            |         |           | 1752.5          | 20375   | 23.27                 | 24                                  | 0-1                      |
|            |            | 12 RB   | 0         | 1712.5          | 19975   | 22.58                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.34                 | 23                                  | 0-2                      |
|            |            |         |           | 1752.5          | 20375   | 22.47                 | 23                                  | 0-2                      |
|            |            |         | 6         | 1712.5          | 19975   | 22.54                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 1752.5          | 20375   | 22.39                 | 23                                  | 0-2                      |
|            |            |         | 13        | 1712.5          | 19975   | 22.59                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.46                 | 23                                  | 0-2                      |
|            |            |         |           | 1752.5          | 20375   | 22.28                 | 23                                  | 0-2                      |
|            |            |         | 25RB      | 1712.5          | 19975   | 22.52                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.28                 | 23                                  | 0-2                      |
|            |            |         |           | 1752.5          | 20375   | 22.37                 | 23                                  | 0-2                      |

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| FDD Band 4 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 3          | QPSK       | 1 RB    | 0         | 1711.5          | 19965   | 24.37                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.08                 | 24.5                                | 0                        |
|            |            |         |           | 1753.5          | 20385   | 24.14                 | 24.5                                | 0                        |
|            |            |         | 7         | 1711.5          | 19965   | 24.21                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.23                 | 24.5                                | 0                        |
|            |            |         |           | 1753.5          | 20385   | 24.20                 | 24.5                                | 0                        |
|            |            |         | 14        | 1711.5          | 19965   | 24.27                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.22                 | 24.5                                | 0                        |
|            |            |         |           | 1753.5          | 20385   | 24.09                 | 24.5                                | 0                        |
|            |            | 8 RB    | 0         | 1711.5          | 19965   | 23.52                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.33                 | 24                                  | 0-1                      |
|            |            |         | 4         | 1711.5          | 19965   | 23.50                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.30                 | 24                                  | 0-1                      |
|            |            |         | 7         | 1711.5          | 19965   | 23.49                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.29                 | 24                                  | 0-1                      |
|            |            | 15RB    |           | 1711.5          | 19965   | 23.50                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.33                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1711.5          | 19965   | 23.70                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.65                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.37                 | 24                                  | 0-1                      |
|            |            |         | 7         | 1711.5          | 19965   | 23.94                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.32                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.58                 | 24                                  | 0-1                      |
|            |            |         | 14        | 1711.5          | 19965   | 23.33                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.52                 | 24                                  | 0-1                      |
|            |            |         |           | 1753.5          | 20385   | 23.29                 | 24                                  | 0-1                      |
|            |            | 8 RB    | 0         | 1711.5          | 19965   | 22.59                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.51                 | 23                                  | 0-2                      |
|            |            |         |           | 1753.5          | 20385   | 22.46                 | 23                                  | 0-2                      |
|            |            |         | 4         | 1711.5          | 19965   | 22.55                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.51                 | 23                                  | 0-2                      |
|            |            |         |           | 1753.5          | 20385   | 22.36                 | 23                                  | 0-2                      |
|            |            |         | 7         | 1711.5          | 19965   | 22.53                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.39                 | 23                                  | 0-2                      |
|            |            |         |           | 1753.5          | 20385   | 22.36                 | 23                                  | 0-2                      |
|            |            | 15RB    |           | 1711.5          | 19965   | 22.50                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.53                 | 23                                  | 0-2                      |
|            |            |         |           | 1753.5          | 20385   | 22.28                 | 23                                  | 0-2                      |

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| FDD Band 4 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 1.4        | QPSK       | 1 RB    | 0         | 1710.7          | 19957   | 24.35                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 1754.3          | 20393   | 24.15                 | 24.5                                | 0                        |
|            |            |         | 2         | 1710.7          | 19957   | 24.21                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.23                 | 24.5                                | 0                        |
|            |            |         |           | 1754.3          | 20393   | 24.19                 | 24.5                                | 0                        |
|            |            |         | 5         | 1710.7          | 19957   | 24.26                 | 24.5                                | 0                        |
|            |            |         |           | 1732.5          | 20175   | 24.27                 | 24.5                                | 0                        |
|            |            |         |           | 1754.3          | 20393   | 24.27                 | 24.5                                | 0                        |
|            |            | 3 RB    | 0         | 1710.7          | 19957   | 23.46                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.29                 | 24                                  | 0-1                      |
|            |            |         | 2         | 1710.7          | 19957   | 23.27                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.26                 | 24                                  | 0-1                      |
|            |            |         | 3         | 1710.7          | 19957   | 23.38                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.29                 | 24                                  | 0-1                      |
|            |            | 6RB     |           | 1710.7          | 19957   | 23.44                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.29                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 1710.7          | 19957   | 23.51                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.71                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.36                 | 24                                  | 0-1                      |
|            |            |         | 2         | 1710.7          | 19957   | 23.44                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.50                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.58                 | 24                                  | 0-1                      |
|            |            |         | 5         | 1710.7          | 19957   | 23.26                 | 24                                  | 0-1                      |
|            |            |         |           | 1732.5          | 20175   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 1754.3          | 20393   | 23.25                 | 24                                  | 0-1                      |
|            |            | 3 RB    | 0         | 1710.7          | 19957   | 22.43                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.44                 | 23                                  | 0-2                      |
|            |            |         |           | 1754.3          | 20393   | 22.36                 | 23                                  | 0-2                      |
|            |            |         | 2         | 1710.7          | 19957   | 22.32                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 1754.3          | 20393   | 22.28                 | 23                                  | 0-2                      |
|            |            |         | 3         | 1710.7          | 19957   | 22.52                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.28                 | 23                                  | 0-2                      |
|            |            |         |           | 1754.3          | 20393   | 22.33                 | 23                                  | 0-2                      |
|            |            | 6RB     |           | 1710.7          | 19957   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 1732.5          | 20175   | 22.58                 | 23                                  | 0-2                      |
|            |            |         |           | 1754.3          | 20393   | 22.37                 | 23                                  | 0-2                      |

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| FDD Band 5 |            |         |           |                 |         |                       |                                     |                          |     |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|-----|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |     |
| 10         | QPSK       | 1 RB    | 0         | 829             | 20450   | 24.36                 | 24.5                                | 0                        |     |
|            |            |         |           | 836.5           | 20525   | 24.22                 | 24.5                                | 0                        |     |
|            |            |         |           | 844             | 20600   | 24.16                 | 24.5                                | 0                        |     |
|            |            |         | 25        | 829             | 20450   | 24.22                 | 24.5                                | 0                        |     |
|            |            |         |           | 836.5           | 20525   | 24.23                 | 24.5                                | 0                        |     |
|            |            |         |           | 844             | 20600   | 24.30                 | 24.5                                | 0                        |     |
|            |            |         | 49        | 829             | 20450   | 24.25                 | 24.5                                | 0                        |     |
|            |            |         |           | 836.5           | 20525   | 24.21                 | 24.5                                | 0                        |     |
|            |            |         |           | 844             | 20600   | 24.24                 | 24.5                                | 0                        |     |
|            |            | 25 RB   | 0         | 829             | 20450   | 23.38                 | 24                                  | 0-1                      |     |
|            |            |         |           | 836.5           | 20525   | 23.25                 | 24                                  | 0-1                      |     |
|            |            |         |           | 844             | 20600   | 23.27                 | 24                                  | 0-1                      |     |
|            |            |         | 12        | 829             | 20450   | 23.37                 | 24                                  | 0-1                      |     |
|            |            |         |           | 836.5           | 20525   | 23.27                 | 24                                  | 0-1                      |     |
|            |            |         |           | 844             | 20600   | 23.40                 | 24                                  | 0-1                      |     |
|            |            |         | 25        | 829             | 20450   | 23.34                 | 24                                  | 0-1                      |     |
|            |            |         |           | 836.5           | 20525   | 23.29                 | 24                                  | 0-1                      |     |
|            |            |         |           | 844             | 20600   | 23.41                 | 24                                  | 0-1                      |     |
|            |            | 50RB    |           |                 | 829     | 20450                 | 23.38                               | 24                       | 0-1 |
|            |            |         |           |                 | 836.5   | 20525                 | 23.24                               | 24                       | 0-1 |
|            |            |         |           |                 | 844     | 20600                 | 23.41                               | 24                       | 0-1 |
|            | 16-QAM     | 1 RB    | 0         | 829             | 20450   | 23.88                 | 24                                  | 0-1                      |     |
|            |            |         |           | 836.5           | 20525   | 23.58                 | 24                                  | 0-1                      |     |
|            |            |         |           | 844             | 20600   | 23.43                 | 24                                  | 0-1                      |     |
|            |            |         | 25        | 829             | 20450   | 23.59                 | 24                                  | 0-1                      |     |
|            |            |         |           | 836.5           | 20525   | 23.25                 | 24                                  | 0-1                      |     |
|            |            |         |           | 844             | 20600   | 23.58                 | 24                                  | 0-1                      |     |
|            |            |         | 49        | 829             | 20450   | 23.46                 | 24                                  | 0-1                      |     |
|            |            |         |           | 836.5           | 20525   | 23.48                 | 24                                  | 0-1                      |     |
|            |            |         |           | 844             | 20600   | 23.77                 | 24                                  | 0-1                      |     |
|            |            | 25 RB   | 0         | 829             | 20450   | 22.47                 | 23                                  | 0-2                      |     |
|            |            |         |           | 836.5           | 20525   | 22.34                 | 23                                  | 0-2                      |     |
|            |            |         |           | 844             | 20600   | 22.54                 | 23                                  | 0-2                      |     |
|            |            |         | 12        | 829             | 20450   | 22.47                 | 23                                  | 0-2                      |     |
|            |            |         |           | 836.5           | 20525   | 22.34                 | 23                                  | 0-2                      |     |
|            |            |         |           | 844             | 20600   | 22.58                 | 23                                  | 0-2                      |     |
|            |            |         | 25        | 829             | 20450   | 22.42                 | 23                                  | 0-2                      |     |
|            |            |         |           | 836.5           | 20525   | 22.46                 | 23                                  | 0-2                      |     |
|            |            |         |           | 844             | 20600   | 22.51                 | 23                                  | 0-2                      |     |
|            |            | 50RB    |           |                 | 829     | 20450                 | 22.44                               | 23                       | 0-2 |
|            |            |         |           |                 | 836.5   | 20525                 | 22.38                               | 23                       | 0-2 |
|            |            |         |           |                 | 844     | 20600                 | 22.48                               | 23                       | 0-2 |

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| FDD Band 5 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 5          | QPSK       | 1 RB    | 0         | 826.5           | 20425   | 24.36                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.18                 | 24.5                                | 0                        |
|            |            |         |           | 846.5           | 20625   | 24.17                 | 24.5                                | 0                        |
|            |            |         | 12        | 826.5           | 20425   | 24.19                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.12                 | 24.5                                | 0                        |
|            |            |         |           | 846.5           | 20625   | 24.29                 | 24.5                                | 0                        |
|            |            |         | 24        | 826.5           | 20425   | 24.28                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.14                 | 24.5                                | 0                        |
|            |            |         |           | 846.5           | 20625   | 24.11                 | 24.5                                | 0                        |
|            |            | 12 RB   | 0         | 826.5           | 20425   | 23.42                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.21                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.23                 | 24                                  | 0-1                      |
|            |            |         | 6         | 826.5           | 20425   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.26                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.39                 | 24                                  | 0-1                      |
|            |            |         | 13        | 826.5           | 20425   | 23.32                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.28                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.40                 | 24                                  | 0-1                      |
|            |            | 25RB    |           | 826.5           | 20425   | 23.31                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.19                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.38                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 826.5           | 20425   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.40                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.46                 | 24                                  | 0-1                      |
|            |            |         | 12        | 826.5           | 20425   | 23.65                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.28                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.66                 | 24                                  | 0-1                      |
|            |            |         | 24        | 826.5           | 20425   | 23.49                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.35                 | 24                                  | 0-1                      |
|            |            |         |           | 846.5           | 20625   | 23.71                 | 24                                  | 0-1                      |
|            |            | 12 RB   | 0         | 826.5           | 20425   | 22.42                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.30                 | 23                                  | 0-2                      |
|            |            |         |           | 846.5           | 20625   | 22.54                 | 23                                  | 0-2                      |
|            |            |         | 6         | 826.5           | 20425   | 22.47                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.32                 | 23                                  | 0-2                      |
|            |            |         |           | 846.5           | 20625   | 22.56                 | 23                                  | 0-2                      |
|            |            |         | 13        | 826.5           | 20425   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.37                 | 23                                  | 0-2                      |
|            |            |         |           | 846.5           | 20625   | 22.50                 | 23                                  | 0-2                      |
|            |            | 25RB    |           | 826.5           | 20425   | 22.41                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.30                 | 23                                  | 0-2                      |
|            |            |         |           | 846.5           | 20625   | 22.45                 | 23                                  | 0-2                      |

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|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 3          | QPSK       | 1 RB    | 0         | 825.5           | 20415   | 24.27                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.08                 | 24.5                                | 0                        |
|            |            |         |           | 847.5           | 20635   | 24.15                 | 24.5                                | 0                        |
|            |            |         | 7         | 825.5           | 20415   | 23.24                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.07                 | 24.5                                | 0                        |
|            |            |         |           | 847.5           | 20635   | 24.18                 | 24.5                                | 0                        |
|            |            |         | 14        | 825.5           | 20415   | 24.22                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.15                 | 24.5                                | 0                        |
|            |            |         |           | 847.5           | 20635   | 24.06                 | 24.5                                | 0                        |
|            |            | 8 RB    | 0         | 825.5           | 20415   | 23.34                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.24                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.25                 | 24                                  | 0-1                      |
|            |            |         | 4         | 825.5           | 20415   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.24                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.36                 | 24                                  | 0-1                      |
|            |            |         | 7         | 825.5           | 20415   | 23.36                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.23                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.35                 | 24                                  | 0-1                      |
|            |            | 15RB    |           | 825.5           | 20415   | 23.41                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.20                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.39                 | 24                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 825.5           | 20415   | 23.29                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.53                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.46                 | 24                                  | 0-1                      |
|            |            |         | 7         | 825.5           | 20415   | 23.51                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.06                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.51                 | 24                                  | 0-1                      |
|            |            |         | 14        | 825.5           | 20415   | 23.61                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.52                 | 24                                  | 0-1                      |
|            |            |         |           | 847.5           | 20635   | 23.10                 | 24                                  | 0-1                      |
|            |            | 8 RB    | 0         | 825.5           | 20415   | 22.58                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.31                 | 23                                  | 0-2                      |
|            |            |         |           | 847.5           | 20635   | 22.52                 | 23                                  | 0-2                      |
|            |            |         | 4         | 825.5           | 20415   | 22.58                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.36                 | 23                                  | 0-2                      |
|            |            |         |           | 847.5           | 20635   | 22.47                 | 23                                  | 0-2                      |
|            |            |         | 7         | 825.5           | 20415   | 22.52                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.45                 | 23                                  | 0-2                      |
|            |            |         |           | 847.5           | 20635   | 22.55                 | 23                                  | 0-2                      |
|            |            | 15RB    |           | 825.5           | 20415   | 22.54                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.27                 | 23                                  | 0-2                      |
|            |            |         |           | 847.5           | 20635   | 22.45                 | 23                                  | 0-2                      |

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| FDD Band 5 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 1.4        | QPSK       | 1 RB    | 0         | 824.7           | 20407   | 24.19                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.06                 | 24.5                                | 0                        |
|            |            |         |           | 848.3           | 20643   | 24.15                 | 24.5                                | 0                        |
|            |            |         | 2         | 824.7           | 20407   | 24.29                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.14                 | 24.5                                | 0                        |
|            |            |         |           | 848.3           | 20643   | 24.35                 | 24.5                                | 0                        |
|            |            |         | 5         | 824.7           | 20407   | 24.21                 | 24.5                                | 0                        |
|            |            |         |           | 836.5           | 20525   | 24.13                 | 24.5                                | 0                        |
|            |            |         |           | 848.3           | 20643   | 24.14                 | 24.5                                | 0                        |
|            |            | 3 RB    | 0         | 824.7           | 20407   | 23.30                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.21                 | 24                                  | 0-1                      |
|            |            |         |           | 848.3           | 20643   | 23.32                 | 24                                  | 0-1                      |
|            |            |         | 2         | 824.7           | 20407   | 23.29                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.13                 | 24                                  | 0-1                      |
|            |            |         |           | 848.3           | 20643   | 23.23                 | 24                                  | 0-1                      |
|            |            |         | 3         | 824.7           | 20407   | 23.23                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.19                 | 24                                  | 0-1                      |
|            |            |         |           | 848.3           | 20643   | 23.36                 | 24                                  | 0-1                      |
|            |            | 6RB     | 824.7     | 20407           | 23.33   | 24                    | 0-1                                 |                          |
|            |            |         | 836.5     | 20525           | 23.18   | 24                    | 0-1                                 |                          |
|            |            |         | 848.3     | 20643           | 23.39   | 24                    | 0-1                                 |                          |
|            | 16-QAM     | 1 RB    | 0         | 824.7           | 20407   | 23.46                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.60                 | 24                                  | 0-1                      |
|            |            |         |           | 848.3           | 20643   | 23.19                 | 24                                  | 0-1                      |
|            |            |         | 2         | 824.7           | 20407   | 23.76                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.38                 | 24                                  | 0-1                      |
|            |            |         |           | 848.3           | 20643   | 23.79                 | 24                                  | 0-1                      |
|            |            |         | 5         | 824.7           | 20407   | 23.13                 | 24                                  | 0-1                      |
|            |            |         |           | 836.5           | 20525   | 23.43                 | 24                                  | 0-1                      |
|            |            |         |           | 848.3           | 20643   | 23.47                 | 24                                  | 0-1                      |
|            |            | 3 RB    | 0         | 824.7           | 20407   | 22.35                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.33                 | 23                                  | 0-2                      |
|            |            |         |           | 848.3           | 20643   | 22.39                 | 23                                  | 0-2                      |
|            |            |         | 2         | 824.7           | 20407   | 22.31                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.17                 | 23                                  | 0-2                      |
|            |            |         |           | 848.3           | 20643   | 22.31                 | 23                                  | 0-2                      |
|            |            |         | 3         | 824.7           | 20407   | 22.45                 | 23                                  | 0-2                      |
|            |            |         |           | 836.5           | 20525   | 22.16                 | 23                                  | 0-2                      |
|            |            |         |           | 848.3           | 20643   | 22.37                 | 23                                  | 0-2                      |
|            |            | 6RB     | 824.7     | 20407           | 22.39   | 23                    | 0-2                                 |                          |
|            |            |         | 836.5     | 20525           | 22.47   | 23                    | 0-2                                 |                          |
|            |            |         | 848.3     | 20643           | 22.49   | 23                    | 0-2                                 |                          |

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| FDD Band 7 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 20         | QPSK       | 1 RB    | 0         | 2510            | 20850   | 22.01                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 21.97                 | 22.3                                | 0                        |
|            |            |         |           | 2560            | 21350   | 22.09                 | 22.3                                | 0                        |
|            |            |         | 50        | 2510            | 20850   | 22.03                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.06                 | 22.3                                | 0                        |
|            |            |         |           | 2560            | 21350   | 22.16                 | 22.3                                | 0                        |
|            |            |         | 99        | 2510            | 20850   | 22.14                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.28                 | 22.3                                | 0                        |
|            |            |         |           | 2560            | 21350   | 22.27                 | 22.3                                | 0                        |
|            |            | 50 RB   | 0         | 2510            | 20850   | 21.03                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.12                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.26                 | 22                                  | 0-1                      |
|            |            |         | 25        | 2510            | 20850   | 21.02                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.13                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.26                 | 22                                  | 0-1                      |
|            |            |         | 50        | 2510            | 20850   | 21.14                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.23                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.32                 | 22                                  | 0-1                      |
|            |            | 100RB   |           | 2510            | 20850   | 21.02                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.17                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.24                 | 22                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 2510            | 20850   | 21.22                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.02                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.06                 | 22                                  | 0-1                      |
|            |            |         | 50        | 2510            | 20850   | 21.19                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.10                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.02                 | 22                                  | 0-1                      |
|            |            |         | 99        | 2510            | 20850   | 21.34                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.28                 | 22                                  | 0-1                      |
|            |            |         |           | 2560            | 21350   | 21.25                 | 22                                  | 0-1                      |
|            |            | 50 RB   | 0         | 2510            | 20850   | 20.01                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.21                 | 21                                  | 0-2                      |
|            |            |         |           | 2560            | 21350   | 20.18                 | 21                                  | 0-2                      |
|            |            |         | 25        | 2510            | 20850   | 20.08                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.23                 | 21                                  | 0-2                      |
|            |            |         |           | 2560            | 21350   | 20.33                 | 21                                  | 0-2                      |
|            |            |         | 50        | 2510            | 20850   | 20.15                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.30                 | 21                                  | 0-2                      |
|            |            |         |           | 2560            | 21350   | 20.36                 | 21                                  | 0-2                      |
|            |            | 100RB   |           | 2510            | 20850   | 20.10                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.16                 | 21                                  | 0-2                      |
|            |            |         |           | 2560            | 21350   | 20.20                 | 21                                  | 0-2                      |

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| FDD Band 7 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 15         | QPSK       | 1 RB    | 0         | 2507.5          | 20825   | 21.99                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.00                 | 22.3                                | 0                        |
|            |            |         |           | 2562.5          | 21375   | 22.09                 | 22.3                                | 0                        |
|            |            |         | 36        | 2507.5          | 20825   | 21.99                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.12                 | 22.3                                | 0                        |
|            |            |         |           | 2562.5          | 21375   | 22.17                 | 22.3                                | 0                        |
|            |            |         | 74        | 2507.5          | 20825   | 22.06                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.23                 | 22.3                                | 0                        |
|            |            |         |           | 2562.5          | 21375   | 22.26                 | 22.3                                | 0                        |
|            |            | 36 RB   | 0         | 2507.5          | 20825   | 21.04                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.15                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.29                 | 22                                  | 0-1                      |
|            |            |         | 18        | 2507.5          | 20825   | 21.07                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.18                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.24                 | 22                                  | 0-1                      |
|            |            |         | 37        | 2507.5          | 20825   | 21.18                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.27                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.31                 | 22                                  | 0-1                      |
|            |            | 75RB    |           | 2507.5          | 20825   | 21.08                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.20                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.26                 | 22                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 2507.5          | 20825   | 21.19                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.20                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.49                 | 22                                  | 0-1                      |
|            |            |         | 36        | 2507.5          | 20825   | 21.17                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.33                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.59                 | 22                                  | 0-1                      |
|            |            |         | 74        | 2507.5          | 20825   | 21.21                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.30                 | 22                                  | 0-1                      |
|            |            |         |           | 2562.5          | 21375   | 21.71                 | 22                                  | 0-1                      |
|            |            | 36 RB   | 0         | 2507.5          | 20825   | 20.03                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.11                 | 21                                  | 0-2                      |
|            |            |         |           | 2562.5          | 21375   | 20.13                 | 21                                  | 0-2                      |
|            |            |         | 18        | 2507.5          | 20825   | 20.02                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.16                 | 21                                  | 0-2                      |
|            |            |         |           | 2562.5          | 21375   | 20.13                 | 21                                  | 0-2                      |
|            |            |         | 37        | 2507.5          | 20825   | 20.07                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.21                 | 21                                  | 0-2                      |
|            |            |         |           | 2562.5          | 21375   | 20.23                 | 21                                  | 0-2                      |
|            |            | 75RB    |           | 2507.5          | 20825   | 20.04                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.17                 | 21                                  | 0-2                      |
|            |            |         |           | 2562.5          | 21375   | 20.15                 | 21                                  | 0-2                      |

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| FDD Band 7 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 10         | QPSK       | 1 RB    | 0         | 2505            | 20800   | 21.82                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 21.98                 | 22.3                                | 0                        |
|            |            |         |           | 2565            | 21400   | 22.16                 | 22.3                                | 0                        |
|            |            |         | 25        | 2505            | 20800   | 21.81                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 21.99                 | 22.3                                | 0                        |
|            |            |         |           | 2565            | 21400   | 22.19                 | 22.3                                | 0                        |
|            |            |         | 49        | 2505            | 20800   | 21.87                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.09                 | 22.3                                | 0                        |
|            |            |         |           | 2565            | 21400   | 22.25                 | 22.3                                | 0                        |
|            |            | 25 RB   | 0         | 2505            | 20800   | 21.03                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.14                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.20                 | 22                                  | 0-1                      |
|            |            |         | 12        | 2505            | 20800   | 21.05                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.14                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.20                 | 22                                  | 0-1                      |
|            |            |         | 25        | 2505            | 20800   | 21.04                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.17                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.14                 | 22                                  | 0-1                      |
|            |            | 50RB    |           | 2505            | 20800   | 21.02                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.16                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.22                 | 22                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 2505            | 20800   | 21.21                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.50                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.43                 | 22                                  | 0-1                      |
|            |            |         | 25        | 2505            | 20800   | 21.15                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.53                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.49                 | 22                                  | 0-1                      |
|            |            |         | 49        | 2505            | 20800   | 21.20                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.60                 | 22                                  | 0-1                      |
|            |            |         |           | 2565            | 21400   | 21.54                 | 22                                  | 0-1                      |
|            |            | 25 RB   | 0         | 2505            | 20800   | 20.04                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.08                 | 21                                  | 0-2                      |
|            |            |         |           | 2565            | 21400   | 20.08                 | 21                                  | 0-2                      |
|            |            |         | 12        | 2505            | 20800   | 20.03                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.07                 | 21                                  | 0-2                      |
|            |            |         |           | 2565            | 21400   | 20.07                 | 21                                  | 0-2                      |
|            |            |         | 25        | 2505            | 20800   | 20.02                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.12                 | 21                                  | 0-2                      |
|            |            |         |           | 2565            | 21400   | 20.12                 | 21                                  | 0-2                      |
|            |            | 50RB    |           | 2505            | 20800   | 20.00                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.14                 | 21                                  | 0-2                      |
|            |            |         |           | 2565            | 21400   | 20.11                 | 21                                  | 0-2                      |

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| FDD Band 7 |            |         |           |                 |         |                       |                                     |                          |
|------------|------------|---------|-----------|-----------------|---------|-----------------------|-------------------------------------|--------------------------|
| BW(Mhz)    | Modulation | RB Size | RB Offset | Frequency (MHz) | Channel | Conducted power (dBm) | Target Power + Max. Tolerance (dBm) | MPR Allowed per 3GPP(dB) |
| 5          | QPSK       | 1 RB    | 0         | 2502.5          | 20775   | 21.93                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.04                 | 22.3                                | 0                        |
|            |            |         |           | 2567.5          | 21425   | 22.12                 | 22.3                                | 0                        |
|            |            |         | 12        | 2502.5          | 20775   | 22.01                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.12                 | 22.3                                | 0                        |
|            |            |         |           | 2567.5          | 21425   | 22.24                 | 22.3                                | 0                        |
|            |            |         | 24        | 2502.5          | 20775   | 21.89                 | 22.3                                | 0                        |
|            |            |         |           | 2535            | 21100   | 22.05                 | 22.3                                | 0                        |
|            |            |         |           | 2567.5          | 21425   | 22.11                 | 22.3                                | 0                        |
|            |            | 12 RB   | 0         | 2502.5          | 20775   | 21.07                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.18                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.25                 | 22                                  | 0-1                      |
|            |            |         | 6         | 2502.5          | 20775   | 21.12                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.16                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.26                 | 22                                  | 0-1                      |
|            |            |         | 13        | 2502.5          | 20775   | 21.06                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.19                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.28                 | 22                                  | 0-1                      |
|            |            | 25RB    |           | 2502.5          | 20775   | 21.03                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.15                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.23                 | 22                                  | 0-1                      |
|            | 16-QAM     | 1 RB    | 0         | 2502.5          | 20775   | 21.18                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.24                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.30                 | 22                                  | 0-1                      |
|            |            |         | 12        | 2502.5          | 20775   | 21.27                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.25                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.35                 | 22                                  | 0-1                      |
|            |            |         | 24        | 2502.5          | 20775   | 21.07                 | 22                                  | 0-1                      |
|            |            |         |           | 2535            | 21100   | 21.26                 | 22                                  | 0-1                      |
|            |            |         |           | 2567.5          | 21425   | 21.27                 | 22                                  | 0-1                      |
|            |            | 12 RB   | 0         | 2502.5          | 20775   | 20.07                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.17                 | 21                                  | 0-2                      |
|            |            |         |           | 2567.5          | 21425   | 20.24                 | 21                                  | 0-2                      |
|            |            |         | 6         | 2502.5          | 20775   | 20.06                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.17                 | 21                                  | 0-2                      |
|            |            |         |           | 2567.5          | 21425   | 20.26                 | 21                                  | 0-2                      |
|            |            |         | 13        | 2502.5          | 20775   | 20.08                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.19                 | 21                                  | 0-2                      |
|            |            |         |           | 2567.5          | 21425   | 20.23                 | 21                                  | 0-2                      |
|            |            | 25RB    |           | 2502.5          | 20775   | 20.01                 | 21                                  | 0-2                      |
|            |            |         |           | 2535            | 21100   | 20.07                 | 21                                  | 0-2                      |
|            |            |         |           | 2567.5          | 21425   | 20.24                 | 21                                  | 0-2                      |

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# # . WLAN802.11 a/b/g/n (20M/40M) conducted power table:

| 802.11b |                    | Max. Rated Avg.<br>Power + Max.<br>Tolerance (dBm) | Average Power Output (dBm) |       |       |       |
|---------|--------------------|----------------------------------------------------|----------------------------|-------|-------|-------|
| CH      | Frequency<br>(MHz) |                                                    | Data Rate (Mbps)           |       |       |       |
|         |                    |                                                    | 1                          | 2     | 5.5   | 11    |
| 1       | 2412               | 16.00                                              | 15.99                      | 15.87 | 15.76 | 15.66 |
| 6       | 2437               | 16.00                                              | 15.87                      | 15.77 | 15.65 | 15.51 |
| 11      | 2462               | 16.00                                              | 15.94                      | 15.87 | 15.79 | 15.65 |

| 802.11g |                    | Max. Rated Avg.<br>Power + Max.<br>Tolerance (dBm) | Average Power Output(dBm) |       |       |       |       |       |       |       |
|---------|--------------------|----------------------------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|
| CH      | Frequency<br>(MHz) |                                                    | Data Rate (Mbps)          |       |       |       |       |       |       |       |
|         |                    |                                                    | 6                         | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| 1       | 2412               | 15.00                                              | 14.74                     | 14.68 | 14.61 | 14.54 | 14.33 | 14.21 | 14.17 | 14.11 |
| 6       | 2437               | 15.00                                              | 14.78                     | 14.62 | 14.55 | 14.41 | 14.32 | 14.27 | 14.07 | 14.00 |
| 11      | 2462               | 15.00                                              | 14.82                     | 14.72 | 14.64 | 14.53 | 14.41 | 14.36 | 14.22 | 14.12 |

| 802.11n (20M) |                    | Max. Rated Avg.<br>Power + Max.<br>Tolerance (dBm) | Average Power Output(dBm) |       |       |       |       |       |       |       |
|---------------|--------------------|----------------------------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|
| CH            | Frequency<br>(MHz) |                                                    | Data Rate (Mbps)          |       |       |       |       |       |       |       |
|               |                    |                                                    | 6.5                       | 13    | 19.5  | 26    | 39    | 52    | 58.5  | 65    |
| 1             | 2412               | 11.50                                              | 11.20                     | 11.14 | 11.09 | 11.01 | 10.92 | 10.84 | 10.74 | 10.62 |
| 6             | 2437               | 11.50                                              | 11.12                     | 11.04 | 10.98 | 10.91 | 10.82 | 10.72 | 10.64 | 10.55 |
| 11            | 2462               | 11.50                                              | 11.14                     | 11.09 | 10.95 | 10.84 | 10.78 | 10.72 | 10.62 | 10.58 |

| 802.11n (40M) |                    | Max. Rated Avg.<br>Power + Max.<br>Tolerance (dBm) | Average Power Output(dBm) |       |       |       |       |       |       |       |
|---------------|--------------------|----------------------------------------------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|
| CH            | Frequency<br>(MHz) |                                                    | Data Rate (Mbps)          |       |       |       |       |       |       |       |
|               |                    |                                                    | 13.5                      | 27    | 40.5  | 54    | 81    | 108   | 121.5 | 135   |
| 3             | 2422               | 11.50                                              | 11.31                     | 11.08 | 10.92 | 10.84 | 10.73 | 10.63 | 10.57 | 10.51 |
| 6             | 2437               | 11.50                                              | 11.40                     | 11.33 | 11.20 | 11.14 | 11.07 | 11.01 | 10.94 | 10.85 |
| 9             | 2452               | 11.50                                              | 11.48                     | 11.35 | 11.21 | 11.08 | 11.00 | 10.95 | 10.85 | 10.64 |

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| 802.11a             |                    | Max. Rated<br>Avg. Power +<br>Max. Tolerance<br>(dBm) | Average Power (dBm) |       |       |       |       |       |       |       |
|---------------------|--------------------|-------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|
| 5.2G/5.3G/5.6G/5.8G |                    |                                                       | Data Rate (Mbps)    |       |       |       |       |       |       |       |
| CH                  | Frequency<br>(MHz) |                                                       | 6                   | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| 36                  | 5180               | 14.00                                                 | 13.77               | 13.62 | 13.54 | 13.41 | 13.34 | 13.28 | 13.18 | 13.07 |
| 40                  | 5200               | 14.00                                                 | 13.82               | 13.72 | 13.61 | 13.57 | 13.42 | 13.39 | 13.32 | 13.27 |
| 44                  | 5220               | 14.00                                                 | 13.87               | 13.75 | 13.70 | 13.64 | 13.54 | 13.48 | 13.42 | 13.37 |
| 48                  | 5240               | 14.00                                                 | 13.93               | 13.88 | 13.72 | 13.62 | 13.51 | 13.41 | 13.38 | 13.21 |
| 52                  | 5260               | 14.00                                                 | 13.99               | 13.84 | 13.75 | 13.62 | 13.54 | 13.43 | 13.31 | 13.28 |
| 56                  | 5280               | 14.00                                                 | 13.95               | 13.87 | 13.81 | 13.74 | 13.54 | 13.42 | 13.36 | 13.28 |
| 60                  | 5300               | 14.00                                                 | 13.98               | 13.85 | 13.81 | 13.64 | 13.58 | 13.50 | 13.47 | 13.32 |
| 64                  | 5320               | 14.00                                                 | 13.67               | 13.52 | 13.44 | 13.36 | 13.27 | 13.18 | 13.07 | 13.02 |
| 100                 | 5500               | 14.00                                                 | 13.87               | 13.76 | 13.61 | 13.54 | 13.41 | 13.27 | 13.18 | 13.08 |
| 104                 | 5520               | 14.00                                                 | 13.86               | 13.75 | 13.66 | 13.54 | 13.43 | 13.31 | 13.25 | 13.15 |
| 108                 | 5540               | 14.00                                                 | 13.88               | 13.81 | 13.72 | 13.61 | 13.52 | 13.41 | 13.34 | 13.24 |
| 112                 | 5560               | 14.00                                                 | 13.68               | 13.54 | 13.44 | 13.35 | 13.26 | 13.22 | 13.15 | 13.04 |
| 116                 | 5580               | 14.00                                                 | 13.82               | 13.72 | 13.64 | 13.51 | 13.48 | 13.22 | 13.17 | 13.05 |
| 132                 | 5660               | 14.00                                                 | 13.94               | 13.88 | 13.74 | 13.64 | 13.53 | 13.48 | 13.34 | 13.25 |
| 136                 | 5680               | 14.00                                                 | 13.65               | 13.61 | 13.52 | 13.42 | 13.34 | 13.27 | 13.15 | 13.02 |
| 140                 | 5700               | 14.00                                                 | 13.99               | 13.85 | 13.72 | 13.61 | 13.54 | 13.42 | 13.34 | 13.28 |
| 149                 | 5745               | 14.00                                                 | 13.77               | 13.62 | 13.54 | 13.42 | 13.34 | 13.27 | 13.18 | 13.14 |
| 153                 | 5765               | 14.00                                                 | 13.82               | 13.71 | 13.61 | 13.54 | 13.42 | 13.37 | 13.32 | 13.24 |
| 157                 | 5785               | 14.00                                                 | 13.83               | 13.72 | 13.67 | 13.55 | 13.41 | 13.38 | 13.24 | 13.12 |
| 161                 | 5805               | 14.00                                                 | 13.74               | 13.66 | 13.54 | 13.48 | 13.37 | 13.27 | 13.15 | 13.03 |
| 165                 | 5825               | 14.00                                                 | 13.72               | 13.61 | 13.54 | 13.42 | 13.31 | 13.21 | 13.17 | 13.08 |

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| 802.11n(20M)        |                    | Max. Rated<br>Avg. Power +<br>Max. Tolerance<br>(dBm) | Average Power (dBm) |       |       |       |       |       |       |       |
|---------------------|--------------------|-------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|
| 5.2G/5.3G/5.6G/5.8G |                    |                                                       | Data Rate (Mbps)    |       |       |       |       |       |       |       |
| CH                  | Frequency<br>(MHz) |                                                       | 6.5                 | 13    | 19.5  | 26    | 39    | 52    | 58.5  | 65    |
| 36                  | 5180               | 13.00                                                 | 12.86               | 12.75 | 12.62 | 12.54 | 12.41 | 12.34 | 12.26 | 12.15 |
| 40                  | 5200               | 13.00                                                 | 12.47               | 12.42 | 12.34 | 12.28 | 12.23 | 12.18 | 12.14 | 12.02 |
| 44                  | 5220               | 13.00                                                 | 12.73               | 12.62 | 12.54 | 12.42 | 12.37 | 12.25 | 12.17 | 12.08 |
| 48                  | 5240               | 13.00                                                 | 12.44               | 12.38 | 12.33 | 12.27 | 12.22 | 12.19 | 12.12 | 12.01 |
| 52                  | 5260               | 13.00                                                 | 12.86               | 12.75 | 12.62 | 12.52 | 12.42 | 12.34 | 12.28 | 12.17 |
| 56                  | 5280               | 13.00                                                 | 12.52               | 12.48 | 12.45 | 12.31 | 12.26 | 12.22 | 12.12 | 12.02 |
| 60                  | 5300               | 13.00                                                 | 12.99               | 12.84 | 12.72 | 12.67 | 12.50 | 12.42 | 12.31 | 12.25 |
| 64                  | 5320               | 13.00                                                 | 12.60               | 12.52 | 12.41 | 12.37 | 12.21 | 12.17 | 12.12 | 12.04 |
| 100                 | 5500               | 13.00                                                 | 12.86               | 12.81 | 12.72 | 12.61 | 12.52 | 12.41 | 12.34 | 12.28 |
| 104                 | 5520               | 13.00                                                 | 12.83               | 12.72 | 12.61 | 12.57 | 12.42 | 12.32 | 12.18 | 12.08 |
| 108                 | 5540               | 13.00                                                 | 12.91               | 12.85 | 12.75 | 12.64 | 12.52 | 12.46 | 12.34 | 12.25 |
| 112                 | 5560               | 13.00                                                 | 12.74               | 12.64 | 12.52 | 12.41 | 12.34 | 12.28 | 12.18 | 12.08 |
| 116                 | 5580               | 13.00                                                 | 12.54               | 12.44 | 12.38 | 12.32 | 12.25 | 12.16 | 12.12 | 12.05 |
| 132                 | 5660               | 13.00                                                 | 12.97               | 12.82 | 12.73 | 12.62 | 12.54 | 12.42 | 12.37 | 12.24 |
| 136                 | 5680               | 13.00                                                 | 12.96               | 12.82 | 12.74 | 12.61 | 12.57 | 12.40 | 12.33 | 12.25 |
| 140                 | 5700               | 13.00                                                 | 12.58               | 12.52 | 12.44 | 12.34 | 12.28 | 12.25 | 12.17 | 12.09 |
| 149                 | 5745               | 13.00                                                 | 12.60               | 12.54 | 12.42 | 12.39 | 12.29 | 12.18 | 12.09 | 12.01 |
| 153                 | 5765               | 13.00                                                 | 12.76               | 12.65 | 12.60 | 12.52 | 12.41 | 12.34 | 12.28 | 12.18 |
| 157                 | 5785               | 13.00                                                 | 12.78               | 12.62 | 12.53 | 12.44 | 12.35 | 12.28 | 12.24 | 12.16 |
| 161                 | 5805               | 13.00                                                 | 12.83               | 12.64 | 12.55 | 12.41 | 12.37 | 12.31 | 12.27 | 12.18 |
| 165                 | 5825               | 13.00                                                 | 12.66               | 12.61 | 12.59 | 12.45 | 12.31 | 12.25 | 12.12 | 12.05 |

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|---------------------|--------------------|-------------------------------------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|
| 5.2G/5.3G/5.6G/5.8G |                    |                                                       | Data Rate (Mbps)    |       |       |       |       |       |       |       |
| CH                  | Frequency<br>(MHz) |                                                       | 13.5                | 27    | 40.5  | 54    | 81    | 108   | 121.5 | 135   |
| 38                  | 5190               | 10.50                                                 | 10.25               | 10.17 | 10.11 | 10.05 | 9.98  | 9.85  | 9.77  | 9.68  |
| 46                  | 5230               | 12.00                                                 | 11.77               | 11.65 | 11.57 | 11.45 | 11.36 | 11.21 | 11.18 | 11.11 |
| 54                  | 5270               | 12.00                                                 | 11.74               | 11.65 | 11.54 | 11.42 | 11.32 | 11.24 | 11.16 | 11.06 |
| 62                  | 5310               | 11.50                                                 | 11.40               | 11.32 | 11.29 | 11.22 | 11.13 | 11.02 | 10.94 | 10.86 |
| 102                 | 5510               | 11.50                                                 | 11.30               | 11.21 | 11.15 | 11.07 | 10.96 | 10.81 | 10.76 | 10.69 |
| 110                 | 5550               | 12.00                                                 | 11.79               | 11.70 | 11.61 | 11.52 | 11.44 | 11.36 | 11.28 | 11.19 |
| 134                 | 5670               | 12.00                                                 | 11.87               | 11.79 | 11.65 | 11.52 | 11.43 | 11.33 | 11.21 | 11.18 |
| 151                 | 5755               | 12.00                                                 | 11.99               | 11.91 | 11.82 | 11.73 | 11.66 | 11.58 | 11.51 | 11.40 |
| 159                 | 5795               | 12.00                                                 | 11.76               | 11.68 | 11.57 | 11.44 | 11.36 | 11.28 | 11.16 | 11.09 |

#### #. Bluetooth conducted power table:

| Frequency<br>(MHz) | Peak (dBm) |         |         |
|--------------------|------------|---------|---------|
|                    | BR-DH5     | ER-2DH5 | ER-3DH5 |
| 2402               | 3.50       | 3.13    | 3.24    |
| 2441               | 5.38       | 4.74    | 4.80    |
| 2480               | 4.42       | 3.80    | 3.90    |

| Frequency<br>(MHz) | Avg. (dBm) |
|--------------------|------------|
|                    | BT4.0      |
| 2402               | -6         |
| 2442               | -3.86      |
| 2480               | -5.21      |

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## 1.4 Test Environment

Ambient Temperature :  $22 \pm 2^{\circ} \text{C}$

Tissue Simulating Liquid:  $22 \pm 2^{\circ} \text{C}$

## 1.5 Operation Description

### General:

1. The EUT is controlled by using a Radio Communication Tester (R&S CMU200 and Anritsu MT8820C), and the communication between the EUT and the tester is established by air link.
2. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
3. During the SAR testing, the DASY 5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
4. Testing head SAR at lowest, middle and highest channel for all bands with Left Tilt /Left Cheek/Right Tilt/Right Cheek conditions.
5. Testing body-worn SAR by separating the EUT and the phantom **15mm** distance when performing GSM850/1900, WCDMA Band II/IV/V, LTE Band 2/4/5/7 and WLAN 5G. (Both front side & back side)
6. Testing hotspot mode SAR by separating the EUT and the phantom **10mm** distance.
  - #. The SAR testing for portable devices with wireless router capability is referred as test guidance of **KDB 941225D06v02** (SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities).
  - #. The following procedures are applicable when the overall device length and width are  $\geq 9 \text{ cm} \times 5 \text{ cm}$  respectively. A test separation of 10 mm is required. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25 mm from that surface or edge, for the data modes, wireless technologies and frequency bands supporting hotspot mode.

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# For WLAN 2.4G (15mm separation): the testing device support mobile hotspot function, the separation distance is **10mm {No need to perform body-worn SAR testing due to the hotspot mode(10mm separation distance) is more conservative than body-worn mode (15mm separation distance).}**

Test configurations:

- (1) Front side
- (2) Back side
- (3) Top side.(WWAN antenna to edge distance >25mm\_ No SAR measurement is necessary for this configuration)
- (4) Bottom side. (WLAN antenna to edge distance >25mm\_ No SAR measurement is necessary for this configuration)
- (5) Right side. (WLAN antenna to edge distance >25mm\_ No SAR measurement is necessary for this configuration)
- (6) Left side.

7. According to **KDB447498D01v05r02** – The 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:  $[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR, SAR evaluation is not required. **(Max power of Bluetooth = 5.38 dBm)**

When SAR evaluation is not required to be measured, per FCC KDB447498D01v05r02, the following equation must be used to estimate the 1g SAR for simultaneous transmission assessment involving that transmitter.

Estimated SAR =  $[\sqrt{f(\text{GHz})}/7.5] \cdot [(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})]$

Estimated 10g SAR =  $[\sqrt{f(\text{GHz})}/18.75] \cdot [(\text{max. power of channel, mW})/(\text{min. test separation distance, mm})]$

| Mode      | Frequency (MHz) | Maximum Power (dBm) | Separation Distance (Body) (mm) | Estimated SAR 1g (Body) (W/kg) |
|-----------|-----------------|---------------------|---------------------------------|--------------------------------|
| Bluetooth | 2441            | 5.38                | 15                              | 0.048                          |
| Bluetooth | 2441            | 5.38                | 10                              | 0.072                          |

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8. The SAR measurement for EDGE mode is not required since the source-based time-averaged power for EDGE mode is lower than that for GPRS mode.
9. The SAR measurement is not required for HSPA since its maximum output power is less than  $\frac{1}{4}$  dB higher than RMC without HSPA.
10. The SAR measurement is not required for HSPA+ since its maximum output power is less than  $\frac{1}{4}$  dB higher than RMC without HSPA+.
11. LTE modes test according to **KDB 941225D05v02r03**.
  - a. Per Section 5.2.1, the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation.
    - Using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
    - When the reported SAR is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.
    - When the reported SAR of a required test channel is  $> 1.45$  W/kg, SAR is required for all three RB offset configurations for that required test channel.
  - b. Per Section 5.2.2, the largest channel bandwidth and measure SAR for QPSK with 50% RB allocation
    - The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.
  - c. Per Section 5.2.3, the largest channel bandwidth and measure SAR for QPSK with 100% RB allocation
    - For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are  $\leq 0.8$  W/kg.
    - Otherwise, SAR is measured for the highest output power channel and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.
  - d. Per Section 5.2.4, Higher order modulations
    - For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK

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procedures in sections 5.2.1, 5.2.2 and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is  $> \frac{1}{2}$  dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is  $> 1.45$  W/kg.

e. Per Section 5.3, other channel bandwidth standalone SAR test requirements

- For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 5.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is  $> \frac{1}{2}$  dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is  $> 1.45$  W/kg.
- The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth.

12. The SAR measurement is not required for 802.11g/n since its maximum output power is less than 1/4 dB higher than 802.11b.
13. The SAR measurement is not required for 802.11n since its maximum output power is less than 1/4 dB higher than 802.11a.
14. The highest body SAR configuration is repeated with a headset attached.
15. According to KDB447498D01v05r02, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.8$  W/kg, when the transmission band is  $\leq 100$  MHz.
16. According to KDB447498D01v05r02, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.6$  W/kg, when the transmission band is between 100 MHz and 200MHz.
17. According to KDB447498 D01v05r02, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.4$  W/kg, when the transmission band is  $\geq 200$ MHz.

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18. According to KDB865664D01v01r03, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is  $\geq 0.8$  W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is  $> 1.20$  or when the original or repeated measurement is  $\geq 1.45$  W/kg (~ 10% from the 1-g SAR limit)

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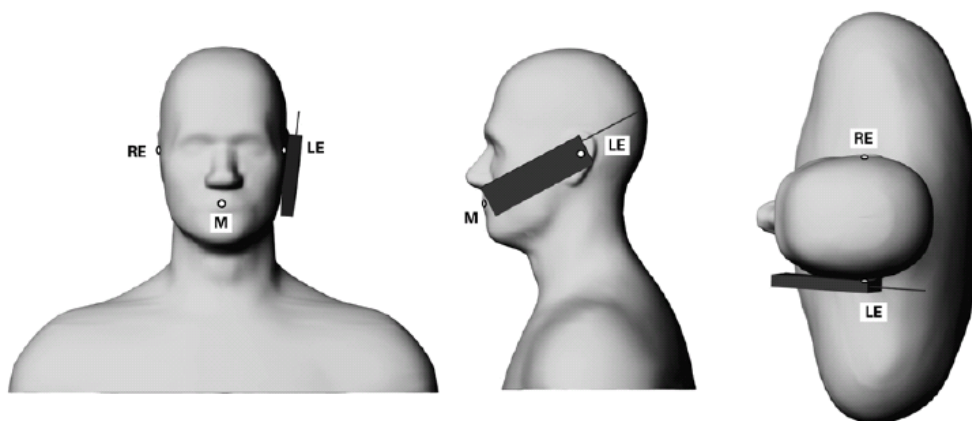
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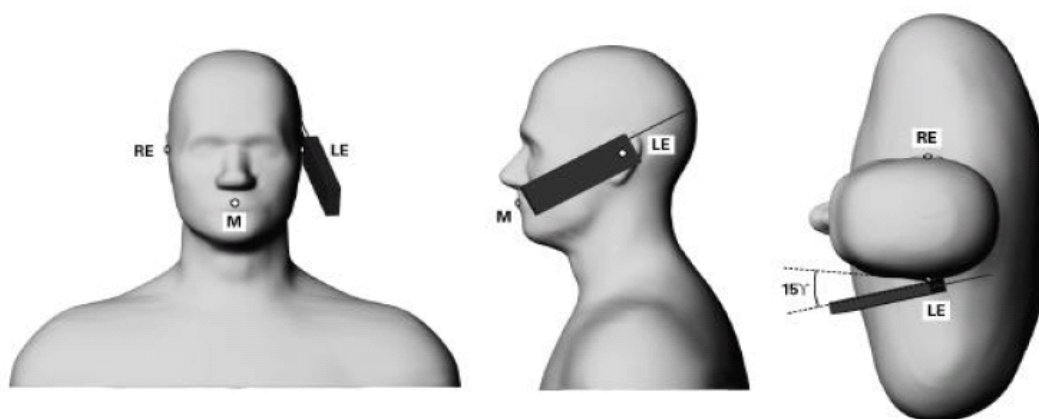
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## 1.6 Positioning Procedure



Phone position 1, “cheek” or “touch” position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.



Phone position 2, “tilted position.” The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.

### Cheek/Touch Position:

The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

### Ear/Tilt Position:

With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

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## 1.7 Evaluation Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
3. The generation of a high-resolution mesh within the measured volume.
4. The interpolation of all measured values from the measurement grid to the high-resolution grid.
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface.
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within -2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for

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most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans.

The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is then moved around until the highest averaged SAR is found.

If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

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## 1.8 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

### 1.8.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field ( $E$ ) and the temperature gradient ( $\delta T / \delta t$ ) in the liquid.

$$SAR = \frac{\sigma}{\rho} |E|^2 = c \frac{\delta T}{\delta t}$$

Whereby  $\sigma$  is the conductivity,  $\rho$  the density and  $c$  the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

- The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.

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- The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures ( $\sim 2\%$  for  $c$ ; much better for  $\rho$ ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed  $\pm 5\%$ .
- Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about  $\pm 10\%$  (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is  $\pm 5\%$  (RSS) when the same liquid is used for the calibration and for actual measurements and  $\pm 7-9\%$  (RSS) when not, which is in good agreement with the estimates given in [2].

### 1.8.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

- The setup must enable accurate determination of the incident power.

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- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

## References

- [1] N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.
- [2] K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, "Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954-1962, Oct. 1996.
- [3] K. Jokela, P. Hyysalo, and L. Puranen, "Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432-438, Apr. 1998.

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## 1.9 The SAR Measurement System

A block diagram of the SAR measurement system is given in Fig. a. This SAR measurement system uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). Model EX3DV4 field probes are used to determine the internal electric fields. The SAR can be obtained from the equation  $SAR = \sigma (|E_i|^2) / \rho$  where  $\sigma$  and  $\rho$  are the conductivity and mass density of the tissue-simulant.

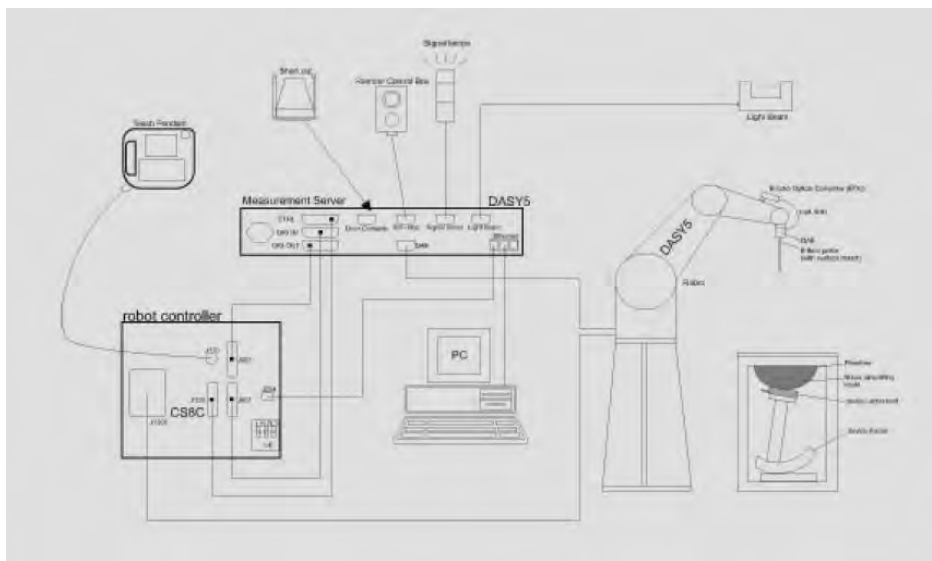


Fig. a A block diagram of the SAR measurement system

The DASY 5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- Data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

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- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7
- DASY 5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

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## 1.10 System Components

### EX3DV4 E-Field Probe

|               |                                                                                                                                                                                                            |                                                                                     |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Construction  | Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)                                                      |  |
| Calibration   | Basic Broad Band Calibration in air<br>Conversion Factors (CF) for HSL<br>835/1750/1900/2450/2600/5200/5300/<br>5600/5800 MHz Additional CF for other liquids<br>and frequencies upon request              |                                                                                     |
| Frequency     | 10 MHz to > 6 GHz, Linearity: $\pm 0.6$ dB                                                                                                                                                                 |                                                                                     |
| Directivity   | $\pm 0.3$ dB in HSL (rotation around probe axis)<br>$\pm 0.5$ dB in tissue material (rotation normal to probe axis)                                                                                        |                                                                                     |
| Dynamic Range | 10 $\mu$ W/g to > 100 mW/g<br>Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)                                                                                                                     |                                                                                     |
| Dimensions    | Tip diameter: 2.5 mm                                                                                                                                                                                       |                                                                                     |
| Application   | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |                                                                                     |

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### SAM PHANTOM V4.0C

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Construction:    | <p>The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X and IEC 62209.</p> <p>It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.</p> |                                                                                     |
| Shell Thickness: | 2 ± 0.2 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| Filling Volume:  | Approx. 25 liters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                     |
| Dimensions:      | Height: 210 mm;<br>Length: 1000 mm;<br>Width: 500 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |

### DEVICE HOLDER

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                            |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Construction | <p>In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).</p> |  <p>Device Holder</p> |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|

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## 1.11 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within  $\pm 10\%$  (according to KDB865664 D01) from the target SAR values.

These tests were done at 835/1750/1900/2450/2600/5200/5300/5600/5800 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the ambient temperature of the laboratory was  $21.7^{\circ}\text{C}$ , the relative humidity was 62% and the liquid depth above the ear reference points was above 15 cm ( $\leq 3\text{G}$ ) or 10 cm ( $> 3\text{G}$ ) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

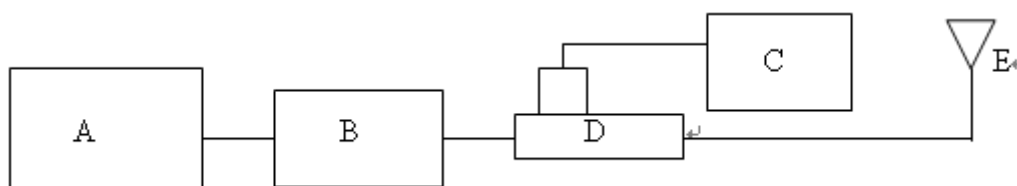


Fig. b The block diagram of system verification

- A. Signal Generator
- B. Amplifier
- C. Power Sensor
- D. Dual Directional Coupling
- E. Reference Dipole Antenna



Photograph of the Dipole Antenna

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| Validation Kit | S/N   | Frequency (MHz) |      | Target SAR (1g)<br>(Pin=250mW)<br>(mW/g) | Measured SAR (1g)(mW/g) | Deviation (%) | Measured Date |
|----------------|-------|-----------------|------|------------------------------------------|-------------------------|---------------|---------------|
| D835V2         | 4d063 | 835             | Head | 2.38                                     | 2.35                    | 1.26%         | Nov. 17, 2014 |
|                |       |                 |      | 2.38                                     | 2.44                    | -2.52%        | Dec. 04, 2014 |
|                |       |                 | Body | 2.41                                     | 2.41                    | 0.00%         | Nov. 17, 2014 |
|                |       |                 |      | 2.41                                     | 2.47                    | -2.49%        | Dec. 05, 2014 |
| D1750V2        | 1008  | 1750            | Head | 9.26                                     | 8.96                    | 3.24%         | Nov. 18, 2014 |
|                |       |                 |      | 9.26                                     | 9.22                    | 0.43%         | Dec. 02, 2014 |
|                |       |                 | Body | 9.44                                     | 9.34                    | 1.06%         | Nov. 18, 2014 |
|                |       |                 |      | 9.44                                     | 9.26                    | 1.91%         | Dec. 03, 2014 |
| D1900V2        | 5d027 | 1900            | Head | 9.71                                     | 9.4                     | 3.19%         | Nov. 19, 2014 |
|                |       |                 |      | 9.71                                     | 9.95                    | -2.47%        | Nov. 20, 2014 |
|                |       |                 | Body | 9.87                                     | 10.1                    | -2.33%        | Nov. 19, 2014 |
|                |       |                 |      | 9.87                                     | 10.1                    | -2.33%        | Dec. 01, 2014 |
| D2450V2        | 727   | 2450            | Head | 13.1                                     | 13.4                    | -2.29%        | Nov. 23, 2014 |
|                |       |                 | Body | 12.8                                     | 13.1                    | -2.34%        |               |
| D2600V2        | 1005  | 2600            | Head | 14.7                                     | 14.8                    | -0.68%        | Dec. 06, 2014 |
|                |       |                 | Body | 14.3                                     | 14.2                    | 0.70%         | Dec. 08, 2014 |
| D5GHzV2        | 1104  | 5200            | Head | 8.02                                     | 7.94                    | 1.00%         | Nov. 20, 2014 |
|                |       |                 | Body | 7.69                                     | 7.51                    | 2.34%         | Nov. 22, 2014 |
|                |       | 5300            | Head | 8.45                                     | 8.66                    | -2.49%        | Nov. 21, 2014 |
|                |       |                 | Body | 7.84                                     | 7.88                    | -0.51%        | Nov. 22, 2014 |
|                |       | 5600            | Head | 8.31                                     | 8.47                    | -1.93%        | Nov. 20, 2014 |
|                |       |                 | Body | 8.21                                     | 8.17                    | 0.49%         | Nov. 22, 2014 |
|                |       | 5800            | Head | 7.95                                     | 7.96                    | -0.13%        | Nov. 21, 2014 |
|                |       |                 | Body | 7.73                                     | 7.56                    | 2.20%         | Nov. 22, 2014 |

Table 1. System validation (follow manufacture target value)

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### 1.12 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-simulant fluid were measured by using the Agilent Model 85070E Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Network Analyzer.

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the flat section of the phantom was at least 15 cm ( $\leq 3G$ ) or 10 cm ( $> 3G$ ) during all tests. (Appendix Fig. 2)

| Tissue Type | Measured Frequency (MHz) | Target Dielectric Constant, $\epsilon_r$ | Target Conductivity, $\sigma$ (S/m) | Measured Dielectric Constant, $\epsilon_r$ | Measured Conductivity, $\sigma$ (S/m) | % dev $\epsilon_r$ | % dev $\sigma$ | Measurement Date |
|-------------|--------------------------|------------------------------------------|-------------------------------------|--------------------------------------------|---------------------------------------|--------------------|----------------|------------------|
| Head        | 824.2                    | 41.556                                   | 0.899                               | 41.276                                     | 0.872                                 | 0.67%              | 3.02%          | Nov.17, 2014     |
|             | 826.4                    | 41.545                                   | 0.899                               | 41.250                                     | 0.874                                 | 0.71%              | 2.78%          |                  |
|             | 835                      | 41.500                                   | 0.900                               | 41.143                                     | 0.883                                 | 0.86%              | 1.89%          |                  |
|             | 836.6                    | 41.500                                   | 0.902                               | 41.119                                     | 0.885                                 | 0.92%              | 1.88%          |                  |
|             | 846.6                    | 41.500                                   | 0.912                               | 40.990                                     | 0.894                                 | 1.23%              | 1.97%          |                  |
|             | 848.8                    | 41.500                                   | 0.915                               | 40.965                                     | 0.896                                 | 1.29%              | 2.08%          |                  |
| Body        | 824.2                    | 55.242                                   | 0.969                               | 52.977                                     | 1.001                                 | 4.10%              | -3.29%         | Nov.17, 2014     |
|             | 826.4                    | 55.234                                   | 0.969                               | 52.958                                     | 1.004                                 | 4.12%              | -3.61%         |                  |
|             | 835                      | 55.2                                     | 0.97                                | 52.883                                     | 1.013                                 | 4.20%              | -4.43%         |                  |
|             | 836.6                    | 55.195                                   | 0.972                               | 52.864                                     | 1.015                                 | 4.22%              | -4.42%         |                  |
|             | 846.6                    | 55.164                                   | 0.984                               | 52.778                                     | 1.025                                 | 4.33%              | -4.17%         |                  |
|             | 848.8                    | 55.158                                   | 0.987                               | 52.759                                     | 1.027                                 | 4.35%              | -4.05%         |                  |
| Head        | 829                      | 41.531                                   | 0.9                                 | 40.238                                     | 0.887                                 | 3.11%              | 1.44%          | Dec. 04, 2014    |
|             | 835                      | 41.500                                   | 0.9                                 | 40.231                                     | 0.893                                 | 3.06%              | 0.78%          |                  |
|             | 836.5                    | 41.500                                   | 0.902                               | 40.227                                     | 0.896                                 | 3.07%              | 0.67%          |                  |
|             | 844                      | 41.500                                   | 0.91                                | 40.219                                     | 0.903                                 | 3.09%              | 0.77%          |                  |
| Body        | 829                      | 55.223                                   | 0.97                                | 54.161                                     | 0.962                                 | 1.92%              | 0.82%          | Dec. 05, 2014    |
|             | 835                      | 55.2                                     | 0.97                                | 54.153                                     | 0.97                                  | 1.90%              | 0.00%          |                  |
|             | 836.5                    | 55.195                                   | 0.972                               | 54.149                                     | 0.973                                 | 1.90%              | -0.10%         |                  |
|             | 844                      | 55.172                                   | 0.981                               | 54.002                                     | 0.992                                 | 2.12%              | -1.12%         |                  |
| Head        | 1712.4                   | 40.138                                   | 1.349                               | 39.596                                     | 1.343                                 | 1.35%              | 0.44%          | Nov. 18, 2014    |
|             | 1732.4                   | 40.107                                   | 1.361                               | 39.609                                     | 1.364                                 | 1.24%              | -0.22%         |                  |
|             | 1750                     | 40.079                                   | 1.371                               | 39.577                                     | 1.377                                 | 1.25%              | -0.44%         |                  |
|             | 1752.6                   | 40.075                                   | 1.373                               | 39.561                                     | 1.379                                 | 1.28%              | -0.44%         |                  |
| Body        | 1712.4                   | 53.531                                   | 1.465                               | 54.495                                     | 1.431                                 | -1.80%             | 2.32%          |                  |
|             | 1732.4                   | 53.478                                   | 1.477                               | 54.462                                     | 1.446                                 | -1.84%             | 2.10%          |                  |
|             | 1750                     | 53.432                                   | 1.488                               | 54.398                                     | 1.458                                 | -1.81%             | 2.02%          |                  |
|             | 1752.6                   | 53.425                                   | 1.49                                | 54.383                                     | 1.461                                 | -1.79%             | 1.95%          |                  |

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| Tissue Type | Measured Frequency (MHz) | Target Dielectric Constant, $\epsilon_r$ | Target Conductivity, $\sigma$ (S/m) | Measured Dielectric Constant, $\epsilon_r$ | Measured Conductivity, $\sigma$ (S/m) | % dev $\epsilon_r$ | % dev $\sigma$ | Measurement Date |
|-------------|--------------------------|------------------------------------------|-------------------------------------|--------------------------------------------|---------------------------------------|--------------------|----------------|------------------|
| Head        | 1720                     | 40.126                                   | 1.354                               | 40.523                                     | 1.294                                 | -0.99%             | 4.43%          | Dec. 02, 2014    |
|             | 1732.5                   | 40.107                                   | 1.361                               | 40.392                                     | 1.306                                 | -0.71%             | 4.04%          |                  |
|             | 1745                     | 40.187                                   | 1.368                               | 40.211                                     | 1.314                                 | -0.06%             | 3.95%          |                  |
|             | 1750                     | 40.079                                   | 1.371                               | 40.155                                     | 1.321                                 | -0.19%             | 3.65%          |                  |
| Body        | 1720                     | 53.511                                   | 1.469                               | 54.922                                     | 1.448                                 | -2.64%             | 1.43%          | Dec. 03, 2014    |
|             | 1732.5                   | 53.478                                   | 1.477                               | 54.757                                     | 1.457                                 | -2.39%             | 1.35%          |                  |
|             | 1745                     | 53.445                                   | 1.485                               | 54.533                                     | 1.469                                 | -2.04%             | 1.08%          |                  |
|             | 1750                     | 53.432                                   | 1.488                               | 54.458                                     | 1.476                                 | -1.92%             | 0.81%          |                  |
| Head        | 1850.2                   | 40.000                                   | 1.400                               | 39.758                                     | 1.358                                 | 0.60%              | 3.00%          | Nov. 19, 2014    |
|             | 1852.4                   | 40.000                                   | 1.400                               | 39.748                                     | 1.340                                 | 0.63%              | 4.29%          |                  |
|             | 1880                     | 40.000                                   | 1.400                               | 39.651                                     | 1.368                                 | 0.87%              | 2.29%          |                  |
|             | 1900                     | 40.000                                   | 1.400                               | 39.567                                     | 1.388                                 | 1.08%              | 0.86%          |                  |
|             | 1907.6                   | 40.000                                   | 1.400                               | 39.538                                     | 1.396                                 | 1.16%              | 0.29%          |                  |
|             | 1909.8                   | 40.000                                   | 1.400                               | 39.531                                     | 1.398                                 | 1.17%              | 0.14%          |                  |
| Body        | 1850.2                   | 53.300                                   | 1.520                               | 51.913                                     | 1.450                                 | 2.60%              | 4.61%          |                  |
|             | 1852.4                   | 53.300                                   | 1.520                               | 51.902                                     | 1.459                                 | 2.62%              | 4.01%          |                  |
|             | 1880                     | 53.300                                   | 1.520                               | 51.735                                     | 1.468                                 | 2.94%              | 3.42%          |                  |
|             | 1900                     | 53.300                                   | 1.520                               | 51.639                                     | 1.492                                 | 3.12%              | 1.84%          |                  |
|             | 1907.6                   | 53.300                                   | 1.520                               | 51.621                                     | 1.503                                 | 3.15%              | 1.12%          |                  |
|             | 1909.8                   | 53.300                                   | 1.520                               | 51.618                                     | 1.505                                 | 3.16%              | 0.99%          |                  |
| Head        | 1860                     | 40.000                                   | 1.400                               | 39.406                                     | 1.419                                 | 1.49%              | -1.36%         | Nov. 20, 2014    |
|             | 1880                     | 40.000                                   | 1.400                               | 39.349                                     | 1.424                                 | 1.63%              | -1.71%         |                  |
|             | 1900                     | 40.000                                   | 1.400                               | 39.256                                     | 1.432                                 | 1.86%              | -2.29%         |                  |
| Body        | 1860                     | 53.300                                   | 1.520                               | 54.016                                     | 1.492                                 | -1.34%             | 1.84%          | Dec. 01, 2014    |
|             | 1880                     | 53.300                                   | 1.520                               | 53.769                                     | 1.527                                 | -0.88%             | -0.46%         |                  |
|             | 1900                     | 53.300                                   | 1.520                               | 53.523                                     | 1.549                                 | -0.42%             | -1.91%         |                  |
| Head        | 2412                     | 39.268                                   | 1.766                               | 39.3                                       | 1.779                                 | -0.08%             | -0.74%         | Nov. 23, 2014    |
|             | 2437                     | 39.223                                   | 1.788                               | 39.231                                     | 1.808                                 | -0.02%             | -1.12%         |                  |
|             | 2450                     | 39.200                                   | 1.800                               | 39.185                                     | 1.823                                 | 0.04%              | -1.28%         |                  |
|             | 2462                     | 39.185                                   | 1.813                               | 39.117                                     | 1.836                                 | 0.17%              | -1.27%         |                  |
| Body        | 2412                     | 52.751                                   | 1.914                               | 50.237                                     | 1.992                                 | 4.77%              | -4.08%         |                  |
|             | 2437                     | 52.717                                   | 1.938                               | 50.142                                     | 2.027                                 | 4.88%              | -4.59%         |                  |
|             | 2450                     | 52.700                                   | 1.950                               | 50.104                                     | 2.045                                 | 4.93%              | -4.87%         |                  |
|             | 2462                     | 52.685                                   | 1.967                               | 50.06                                      | 2.063                                 | 4.98%              | -4.88%         |                  |

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| Tissue Type | Measured Frequency (MHz) | Target Dielectric Constant, $\epsilon_r$ | Target Conductivity, $\sigma$ (S/m) | Measured Dielectric Constant, $\epsilon_r$ | Measured Conductivity, $\sigma$ (S/m) | % dev $\epsilon_r$ | % dev $\sigma$ | Measurement Date |
|-------------|--------------------------|------------------------------------------|-------------------------------------|--------------------------------------------|---------------------------------------|--------------------|----------------|------------------|
| Head        | 2510                     | 39.124                                   | 1.865                               | 41.058                                     | 1.812                                 | -4.94%             | 2.84%          | Dec. 06, 2014    |
|             | 2535                     | 39.092                                   | 1.893                               | 41.027                                     | 1.827                                 | -4.95%             | 3.49%          |                  |
|             | 2560                     | 39.060                                   | 1.920                               | 40.809                                     | 1.848                                 | -4.48%             | 3.75%          |                  |
|             | 2600                     | 39.009                                   | 1.964                               | 40.522                                     | 1.886                                 | -3.88%             | 3.97%          |                  |
| Body        | 2510                     | 52.624                                   | 2.035                               | 53.492                                     | 1.976                                 | -1.65%             | 2.90%          | Dec. 08, 2014    |
|             | 2535                     | 52.592                                   | 2.071                               | 53.211                                     | 2.019                                 | -1.18%             | 2.51%          |                  |
|             | 2560                     | 52.560                                   | 2.106                               | 53.008                                     | 2.062                                 | -0.85%             | 2.09%          |                  |
|             | 2600                     | 52.509                                   | 2.163                               | 52.776                                     | 2.11                                  | -0.51%             | 2.45%          |                  |
| Head        | 5200                     | 35.986                                   | 4.655                               | 36.085                                     | 4.615                                 | -0.28%             | 0.86%          | Nov. 20, 2014    |
|             | 5240                     | 35.940                                   | 4.696                               | 36.083                                     | 4.666                                 | -0.40%             | 0.64%          |                  |
|             | 5540                     | 35.597                                   | 5.004                               | 35.299                                     | 5.015                                 | 0.84%              | -0.23%         |                  |
|             | 5600                     | 35.529                                   | 5.065                               | 35.154                                     | 5.078                                 | 1.05%              | -0.26%         |                  |
|             | 5660                     | 35.460                                   | 5.127                               | 35.047                                     | 5.151                                 | 1.16%              | -0.48%         |                  |
|             | 5700                     | 35.414                                   | 5.168                               | 34.941                                     | 5.193                                 | 1.34%              | -0.48%         |                  |
|             | 5260                     | 35.917                                   | 4.717                               | 36.013                                     | 4.675                                 | -0.27%             | 0.89%          | Nov. 21, 2014    |
|             | 5300                     | 35.871                                   | 4.758                               | 35.839                                     | 4.728                                 | 0.09%              | 0.62%          |                  |
|             | 5765                     | 35.340                                   | 5.234                               | 34.773                                     | 5.274                                 | 1.60%              | -0.76%         |                  |
|             | 5785                     | 35.317                                   | 5.255                               | 34.739                                     | 5.302                                 | 1.64%              | -0.89%         |                  |
|             | 5800                     | 35.300                                   | 5.270                               | 34.714                                     | 5.312                                 | 1.66%              | -0.80%         |                  |
|             | 5805                     | 35.294                                   | 5.275                               | 34.689                                     | 5.317                                 | 1.71%              | -0.79%         |                  |
| Body        | 5200                     | 49.014                                   | 5.299                               | 48.522                                     | 5.337                                 | 1.00%              | -0.71%         | Nov. 22, 2014    |
|             | 5240                     | 48.960                                   | 5.346                               | 48.343                                     | 5.351                                 | 1.26%              | -0.09%         |                  |
|             | 5260                     | 48.933                                   | 5.369                               | 48.196                                     | 5.408                                 | 1.51%              | -0.72%         |                  |
|             | 5300                     | 48.879                                   | 5.416                               | 47.787                                     | 5.474                                 | 2.23%              | -1.07%         |                  |
|             | 5540                     | 48.553                                   | 5.696                               | 47.094                                     | 5.821                                 | 3.00%              | -2.19%         |                  |
|             | 5600                     | 48.471                                   | 5.766                               | 47.056                                     | 5.911                                 | 2.92%              | -2.51%         |                  |
|             | 5660                     | 48.390                                   | 5.837                               | 46.833                                     | 6.004                                 | 3.22%              | -2.87%         |                  |
|             | 5700                     | 48.336                                   | 5.883                               | 46.798                                     | 6.027                                 | 3.18%              | -2.44%         |                  |
|             | 5765                     | 48.248                                   | 5.959                               | 46.666                                     | 6.143                                 | 3.28%              | -3.09%         |                  |
|             | 5785                     | 48.220                                   | 5.982                               | 46.545                                     | 6.174                                 | 3.47%              | -3.20%         |                  |
|             | 5800                     | 48.200                                   | 6.000                               | 46.450                                     | 6.190                                 | 3.63%              | -3.17%         |                  |
|             | 5805                     | 48.193                                   | 6.006                               | 46.422                                     | 6.193                                 | 3.68%              | -3.12%         |                  |

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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### The composition of the brain tissue simulating liquid:

| Frequency<br>(MHz) | Mode | Ingredient |          |         |                  |           |       | Total<br>amount |
|--------------------|------|------------|----------|---------|------------------|-----------|-------|-----------------|
|                    |      | DGMBE      | Water    | Salt    | Preventol<br>D-7 | Cellulose | Sugar |                 |
| 850                | Head | —          | 532.98 g | 18.3 g  | 2.4 g            | 3.2 g     | 766 g | 1.3L(Kg)        |
|                    | Body | —          | 631.68 g | 11.72 g | 1.2 g            | —         | 600 g | 1.0L(Kg)        |
| 1750               | Head | 444.52 g   | 552.42 g | 3.06 g  | —                | —         | —     | 1.0L(Kg)        |
|                    | Body | 300.67 g   | 716.56 g | 4.0 g   | —                | —         | —     | 1.0L(Kg)        |
| 1900               | Head | 444.52 g   | 552.42 g | 3.06 g  | —                | —         | —     | 1.0L(Kg)        |
|                    | Body | 300.67 g   | 716.56 g | 4.0 g   | —                | —         | —     | 1.0L(Kg)        |
| 2450               | Head | 550ml      | 450ml    | —       | —                | —         | —     | 1.0L(Kg)        |
|                    | Body | 301.7ml    | 698.3ml  | —       | —                | —         | —     | 1.0L(Kg)        |
| 2600               | Head | 550ml      | 450ml    | —       | —                | —         | —     | 1.0L(Kg)        |
|                    | Body | 301.7ml    | 698.3ml  | —       | —                | —         | —     | 1.0L(Kg)        |

### Simulating Liquids for 5 GHz, Manufactured by SPEAG:

| Ingredients   | Water | Esters, Emulsifiers, Inhibitors | Sodium and Salt |
|---------------|-------|---------------------------------|-----------------|
| (% by weight) | 60-80 | 20-40                           | 0-1.5           |

Table 3. Recipes for tissue simulating liquid

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### 1.13 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.

These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter.

Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

- (1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over a 10 grams of tissue (defined as a tissue volume in the shape of a cube).

Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

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(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube).

General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure.

Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .6)

| Human Exposure                               | Uncontrolled Environment<br>General Population | Controlled Environment<br>Occupational |
|----------------------------------------------|------------------------------------------------|----------------------------------------|
| Spatial Peak SAR<br>(Brain)                  | 1.60 m W/g                                     | 8.00 m W/g                             |
| Spatial Average SAR<br>(Whole Body)          | 0.08 m W/g                                     | 0.40 m W/g                             |
| Spatial Peak SAR<br>(Hands/Feet/Ankle/Wrist) | 4.00 m W/g                                     | 20.00 m W/g                            |

Table 4. RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

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## 2. Summary of Results

### GSM 850 MHz

| Mode                        | Position    | Distance (mm) | CH  | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-----------------------------|-------------|---------------|-----|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                             |             |               |     |             |                                              |                           |         | Measured                    | Reported |           |
| GSM850 (GMSK) (Head)        | Re Cheek    | -             | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.265                       | 0.265    | -         |
|                             | Re Tilt     | -             | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.184                       | 0.184    | -         |
|                             | Le Cheek    | -             | 128 | 824.2       | 33.50                                        | 33.10                     | 9.65%   | 0.387                       | 0.424    | 108       |
|                             | Le Cheek    | -             | 190 | 836.6       | 33.50                                        | 33.20                     | 7.15%   | 0.341                       | 0.365    | -         |
|                             | Le Cheek    | -             | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.311                       | 0.311    | -         |
|                             | Le Tilt     | -             | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.176                       | 0.176    | -         |
| GSM850 (GMSK) (Speech mode) | Front side  | 15mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.146                       | 0.146    | -         |
|                             | Back side   | 15mm          | 128 | 824.2       | 33.50                                        | 33.10                     | 9.65%   | 0.29                        | 0.318    | 109       |
|                             | Back side   | 15mm          | 190 | 836.6       | 33.50                                        | 33.20                     | 7.15%   | 0.261                       | 0.280    | -         |
|                             | Back side   | 15mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.236                       | 0.236    | -         |
| GPRS850 (GMSK) (Hotspot)    | Front side  | 10mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.337                       | 0.337    | -         |
|                             | Back side   | 10mm          | 128 | 824.2       | 33.50                                        | 33.10                     | 9.65%   | 0.638                       | 0.700    | 110       |
|                             | Back side   | 10mm          | 190 | 836.6       | 33.50                                        | 33.20                     | 7.15%   | 0.588                       | 0.630    | -         |
|                             | Back side   | 10mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.54                        | 0.540    | -         |
|                             | Bottom side | 10mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.182                       | 0.182    | -         |
|                             | Right side  | 10mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.28                        | 0.280    | -         |
|                             | Left side   | 10mm          | 251 | 848.8       | 33.50                                        | 33.50                     | 0.00%   | 0.478                       | 0.478    | -         |

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## GSM 1900 MHz

| Mode                         | Position     | Distance (mm) | CH  | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|------------------------------|--------------|---------------|-----|-------------|----------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                              |              |               |     |             |                                        |                           |         | Measured                    | Reported |           |
| GSM1900 (GMSK) (Head)        | Re Cheek     | -             | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.09                        | 0.090    | -         |
|                              | Re Tilt      | -             | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.048                       | 0.048    | -         |
|                              | Le Cheek     | -             | 512 | 1850.2      | 30.50                                  | 30.30                     | 4.71%   | 0.089                       | 0.093    | -         |
|                              | Le Cheek     | -             | 661 | 1880        | 30.50                                  | 30.30                     | 4.71%   | 0.122                       | 0.128    | -         |
|                              | Le Cheek     | -             | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.147                       | 0.147    | 111       |
|                              | Le Tilt      | -             | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.052                       | 0.052    | -         |
| GSM1900 (GMSK) (Speech mode) | Front side   | 15mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.304                       | 0.304    | -         |
|                              | Back side    | 15mm          | 512 | 1850.2      | 30.50                                  | 30.30                     | 4.71%   | 0.356                       | 0.373    | -         |
|                              | Back side    | 15mm          | 661 | 1880        | 30.50                                  | 30.30                     | 4.71%   | 0.389                       | 0.407    | -         |
|                              | Back side    | 15mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.47                        | 0.470    | 112       |
| GPRS1900 (GMSK) (Hotspot)    | Front side   | 10mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.432                       | 0.432    | -         |
|                              | Back side    | 10mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.711                       | 0.711    | -         |
|                              | Bottom side  | 10mm          | 512 | 1850.2      | 30.50                                  | 30.30                     | 4.71%   | 0.74                        | 0.775    | -         |
|                              | Bottom side  | 10mm          | 661 | 1880        | 30.50                                  | 30.30                     | 4.71%   | 0.791                       | 0.828    | -         |
|                              | Bottom side  | 10mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.898                       | 0.898    | 113       |
|                              | *Bottom side | 10mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.889                       | 0.889    | -         |
|                              | Right side   | 10mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.11                        | 0.110    | -         |
|                              | Left side    | 10mm          | 810 | 1909.8      | 30.50                                  | 30.50                     | 0.00%   | 0.124                       | 0.124    | -         |

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## WCDMA Band II

| Mode                    | Position     | Distance (mm) | CH   | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-------------------------|--------------|---------------|------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                         |              |               |      |             |                                              |                           |         | Measured                    | Reported |           |
| R99 (Head)              | RE Cheek     | -             | 9400 | 1880        | 24.5                                         | 24.50                     | 0.00%   | 0.159                       | 0.159    | -         |
|                         | RE Tilt      | -             | 9400 | 1880        | 24.5                                         | 24.50                     | 0.00%   | 0.098                       | 0.098    | -         |
|                         | LE Cheek     | -             | 9262 | 1852.4      | 24.5                                         | 24.48                     | 0.46%   | 0.151                       | 0.152    | -         |
|                         | LE Cheek     | -             | 9400 | 1880        | 24.5                                         | 24.50                     | 0.00%   | 0.192                       | 0.192    | -         |
|                         | LE Cheek     | -             | 9538 | 1907.6      | 24.5                                         | 24.38                     | 2.80%   | 0.228                       | 0.234    | 114       |
|                         | LE Tilt      | -             | 9400 | 1880        | 24.5                                         | 24.50                     | 0.00%   | 0.082                       | 0.082    | -         |
| Body-worn (speech mode) | Front side   | 15mm          | 9400 | 1880        | 24.5                                         | 24.50                     | 0.00%   | 0.468                       | 0.468    | -         |
|                         | Back side    | 15mm          | 9262 | 1852.4      | 24.5                                         | 24.48                     | 0.46%   | 0.733                       | 0.736    | -         |
|                         | Back side    | 15mm          | 9400 | 1880        | 24.5                                         | 24.50                     | 0.00%   | 0.784                       | 0.784    | -         |
|                         | Back side    | 15mm          | 9538 | 1907.6      | 24.5                                         | 24.38                     | 2.80%   | 0.792                       | 0.814    | -         |
|                         | Back side*   | 15mm          | 9538 | 1907.6      | 24.5                                         | 24.38                     | 2.80%   | 0.817                       | 0.840    | 115       |
| Hotspot                 | Front side   | 10mm          | 9262 | 1852.4      | 22                                           | 21.57                     | 10.41%  | 0.48                        | 0.530    | -         |
|                         | Back side    | 10mm          | 9262 | 1852.4      | 22                                           | 21.57                     | 10.41%  | 0.773                       | 0.853    | -         |
|                         | Back side    | 10mm          | 9400 | 1880        | 22                                           | 21.53                     | 11.43%  | 0.864                       | 0.963    | -         |
|                         | Back side    | 10mm          | 9538 | 1907.6      | 22                                           | 21.31                     | 17.22%  | 0.844                       | 0.989    | -         |
|                         | Bottom side  | 10mm          | 9262 | 1852.4      | 22                                           | 21.57                     | 10.41%  | 0.918                       | 1.014    | 116       |
|                         | Bottom side  | 10mm          | 9400 | 1880        | 22                                           | 21.53                     | 11.43%  | 0.907                       | 1.011    | -         |
|                         | Bottom side  | 10mm          | 9538 | 1907.6      | 22                                           | 21.31                     | 17.22%  | 0.87                        | 1.020    | -         |
|                         | Bottom side* | 10mm          | 9538 | 1907.6      | 22                                           | 21.31                     | 17.22%  | 0.867                       | 1.016    | -         |
|                         | Right side   | 10mm          | 9262 | 1852.4      | 22                                           | 21.57                     | 10.41%  | 0.071                       | 0.078    | -         |
|                         | Left side    | 10mm          | 9262 | 1852.4      | 22                                           | 21.57                     | 10.41%  | 0.113                       | 0.125    | -         |

\* - repeated at the highest SAR measurement according to the KDB 865664 D01v01

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## WCDMA Band IV

| Mode                    | Position     | Distance (mm) | CH   | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-------------------------|--------------|---------------|------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                         |              |               |      |             |                                              |                           |         | Measured                    | Reported |           |
| R99 (Head)              | RE Cheek     | -             | 1312 | 1712.4      | 24.5                                         | 24.50                     | 0.00%   | 0.41                        | 0.410    | -         |
|                         | RE Tilt      | -             | 1312 | 1712.4      | 24.5                                         | 24.50                     | 0.00%   | 0.109                       | 0.109    | -         |
|                         | LE Cheek     | -             | 1312 | 1712.4      | 24.5                                         | 24.50                     | 0.00%   | 0.519                       | 0.519    | 117       |
|                         | LE Cheek     | -             | 1412 | 1732.4      | 24.5                                         | 24.48                     | 0.46%   | 0.456                       | 0.458    | -         |
|                         | LE Cheek     | -             | 1513 | 1752.6      | 24.5                                         | 24.47                     | 0.69%   | 0.428                       | 0.431    | -         |
|                         | LE Tilt      | -             | 1312 | 1712.4      | 24.5                                         | 24.50                     | 0.00%   | 0.081                       | 0.081    | -         |
| Body-worn (speech mode) | Front side   | 15mm          | 1312 | 1712.4      | 24.5                                         | 24.50                     | 0.00%   | 0.635                       | 0.635    | -         |
|                         | Back side    | 15mm          | 1312 | 1712.4      | 24.5                                         | 24.50                     | 0.00%   | 0.689                       | 0.689    | 118       |
|                         | Back side    | 15mm          | 1412 | 1732.4      | 24.5                                         | 24.48                     | 0.46%   | 0.611                       | 0.614    | -         |
|                         | Back side    | 15mm          | 1513 | 1752.6      | 24.5                                         | 24.47                     | 0.69%   | 0.665                       | 0.670    | -         |
| Hotspot                 | Front side   | 10mm          | 1412 | 1732.4      | 22.5                                         | 21.56                     | 24.17%  | 0.6                         | 0.745    | -         |
|                         | Back side    | 10mm          | 1412 | 1732.4      | 22.5                                         | 21.56                     | 24.17%  | 0.615                       | 0.764    | -         |
|                         | Bottom side  | 10mm          | 1312 | 1712.4      | 22.5                                         | 21.48                     | 26.47%  | 0.787                       | 0.995    | -         |
|                         | Bottom side  | 10mm          | 1412 | 1732.4      | 22.5                                         | 21.56                     | 24.17%  | 0.879                       | 1.091    | -         |
|                         | Bottom side  | 10mm          | 1513 | 1752.6      | 22.5                                         | 21.50                     | 25.89%  | 0.947                       | 1.192    | 119       |
|                         | Bottom side* | 10mm          | 1513 | 1752.6      | 22.5                                         | 21.50                     | 25.89%  | 0.946                       | 1.191    | -         |
|                         | Right side   | 10mm          | 1412 | 1732.4      | 22.5                                         | 21.56                     | 24.17%  | 0.154                       | 0.191    | -         |
|                         | Left side    | 10mm          | 1412 | 1732.4      | 22.5                                         | 21.56                     | 24.17%  | 0.141                       | 0.175    | -         |

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## WCDMA Band V

| Mode                    | Position    | Distance (mm) | CH   | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-------------------------|-------------|---------------|------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                         |             |               |      |             |                                              |                           |         | Measured                    | Reported |           |
| R99 (Head)              | RE Cheek    | -             | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.306                       | 0.310    | -         |
|                         | RE Tilt     | -             | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.205                       | 0.208    | -         |
|                         | LE Cheek    | -             | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.372                       | 0.377    | 120       |
|                         | LE Cheek    | -             | 4183 | 836.6       | 24.5                                         | 24.20                     | 7.15%   | 0.349                       | 0.374    | -         |
|                         | LE Cheek    | -             | 4233 | 846.6       | 24.5                                         | 24.07                     | 10.41%  | 0.355                       | 0.392    | -         |
|                         | LE Tilt     | -             | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.21                        | 0.213    | -         |
| Body-worn (speech mode) | Front side  | 15mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.235                       | 0.238    | -         |
|                         | Back side   | 15mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.294                       | 0.298    | 121       |
|                         | Back side   | 15mm          | 4183 | 836.6       | 24.5                                         | 24.20                     | 7.15%   | 0.282                       | 0.302    | -         |
|                         | Back side   | 15mm          | 4233 | 846.6       | 24.5                                         | 24.07                     | 10.41%  | 0.288                       | 0.318    | -         |
| Hotspot                 | Front side  | 10mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.49                        | 0.497    | -         |
|                         | Back side   | 10mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.796                       | 0.807    | 122       |
|                         | Back side   | 10mm          | 4183 | 836.6       | 24.5                                         | 24.20                     | 7.15%   | 0.729                       | 0.781    | -         |
|                         | Back side   | 10mm          | 4233 | 846.6       | 24.5                                         | 24.07                     | 10.41%  | 0.758                       | 0.837    | -         |
|                         | Bottom side | 10mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.201                       | 0.204    | -         |
|                         | Right side  | 10mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.34                        | 0.345    | -         |
|                         | Left side   | 10mm          | 4132 | 826.4       | 24.5                                         | 24.44                     | 1.39%   | 0.545                       | 0.553    | -         |

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## LTE FDD Band II

| Mode                   | Bandwidth (MHz) | Modulation | RB Size | RB start | Position   | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|------------------------|-----------------|------------|---------|----------|------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                        |                 |            |         |          |            |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 2 (Head)      | 20MHz           | QPSK       | 1 RB    | 99       | RE Cheek   | -             | 19100 | 1900        | 24.5                                         | 24.47                     | 0.69%   | 0.381                       | 0.384    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 19100 | 1900        | 24.5                                         | 24.47                     | 0.69%   | 0.117                       | 0.118    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 18700 | 1860        | 24.5                                         | 24.27                     | 5.44%   | 0.384                       | 0.405    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 18900 | 1880        | 24.5                                         | 24.37                     | 3.04%   | 0.415                       | 0.428    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 19100 | 1900        | 24.5                                         | 24.47                     | 0.69%   | 0.429                       | 0.432    | 123       |
|                        |                 |            |         |          | LE Tilt    | -             | 19100 | 1900        | 24.5                                         | 24.47                     | 0.69%   | 0.081                       | 0.082    | -         |
|                        |                 |            | 50 RB   | 50       | RE Cheek   | -             | 19100 | 1900        | 24                                           | 23.69                     | 7.40%   | 0.315                       | 0.338    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 19100 | 1900        | 24                                           | 23.69                     | 7.40%   | 0.095                       | 0.102    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 19100 | 1900        | 24                                           | 23.69                     | 7.40%   | 0.359                       | 0.386    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 19100 | 1900        | 24                                           | 23.69                     | 7.40%   | 0.066                       | 0.071    | -         |
|                        |                 |            | 100 RB  |          | RE Cheek   | -             | 19100 | 1900        | 24                                           | 23.44                     | 13.76%  | 0.311                       | 0.354    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 19100 | 1900        | 24                                           | 23.44                     | 13.76%  | 0.091                       | 0.104    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 19100 | 1900        | 24                                           | 23.44                     | 13.76%  | 0.356                       | 0.405    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 19100 | 1900        | 24                                           | 23.44                     | 13.76%  | 0.064                       | 0.073    | -         |
| LTE Band 2 (Body-Worn) | 20MHz           | QPSK       | 1 RB    | 99       | Front side | 15mm          | 19100 | 1900        | 24.5                                         | 24.47                     | 0.69%   | 0.434                       | 0.437    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 18700 | 1860        | 24.5                                         | 24.27                     | 5.44%   | 0.738                       | 0.778    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 18900 | 1880        | 24.5                                         | 24.37                     | 3.04%   | 0.758                       | 0.781    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 19100 | 1900        | 24.5                                         | 24.47                     | 0.69%   | 0.804                       | 0.810    | 124       |
|                        |                 |            | 50 RB   | 50       | Front side | 15mm          | 19100 | 1900        | 24                                           | 23.69                     | 7.40%   | 0.346                       | 0.372    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 19100 | 1900        | 24                                           | 23.69                     | 7.40%   | 0.644                       | 0.692    | -         |
|                        |                 |            | 100 RB  |          | Front side | 15mm          | 19100 | 1900        | 24                                           | 23.44                     | 13.76%  | 0.327                       | 0.372    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 19100 | 1900        | 24                                           | 23.44                     | 13.76%  | 0.643                       | 0.731    | -         |

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| Mode                 | Bandwidth (MHz) | Modulation | RB Size | RB start | Position     | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|----------------------|-----------------|------------|---------|----------|--------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                      |                 |            |         |          |              |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 2 (Hotspot) | 20MHz           | QPSK       | 1 RB    | 99       | Front side   | 10mm          | 19100 | 1900        | 22                                           | 21.92                     | 1.86%   | 0.426                       | 0.434    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 18700 | 1860        | 22                                           | 21.71                     | 6.91%   | 0.707                       | 0.756    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 18900 | 1880        | 22                                           | 21.67                     | 7.89%   | 0.747                       | 0.806    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 19100 | 1900        | 22                                           | 21.92                     | 1.86%   | 0.786                       | 0.801    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 18700 | 1860        | 22                                           | 21.71                     | 6.91%   | 0.874                       | 0.934    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 18900 | 1880        | 22                                           | 21.67                     | 7.89%   | 0.859                       | 0.927    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 19100 | 1900        | 22                                           | 21.92                     | 1.86%   | 0.899                       | 0.916    | -         |
|                      |                 |            |         |          | Right side   | 10mm          | 19100 | 1900        | 22                                           | 21.92                     | 1.86%   | 0.086                       | 0.088    | -         |
|                      |                 |            |         |          | Left side    | 10mm          | 19100 | 1900        | 22                                           | 21.92                     | 1.86%   | 0.091                       | 0.093    | -         |
|                      |                 |            | 50 RB   | 50       | Front side   | 10mm          | 19100 | 1900        | 22                                           | 21.96                     | 0.93%   | 0.445                       | 0.449    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 18700 | 1860        | 22                                           | 21.66                     | 8.14%   | 0.715                       | 0.773    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 18900 | 1880        | 22                                           | 21.69                     | 7.40%   | 0.771                       | 0.828    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 19100 | 1900        | 22                                           | 21.96                     | 0.93%   | 0.83                        | 0.838    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 18700 | 1860        | 22                                           | 21.66                     | 8.14%   | 0.916                       | 0.991    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 18900 | 1880        | 22                                           | 21.69                     | 7.40%   | 0.897                       | 0.963    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 19100 | 1900        | 22                                           | 21.96                     | 0.93%   | 0.949                       | 0.958    | 125       |
|                      |                 |            |         |          | Bottom side* | 10mm          | 19100 | 1900        | 22                                           | 21.96                     | 0.93%   | 0.949                       | 0.958    | -         |
|                      |                 |            |         |          | Right side   | 10mm          | 19100 | 1900        | 22                                           | 21.96                     | 0.93%   | 0.089                       | 0.090    | -         |
|                      |                 |            |         |          | Left side    | 10mm          | 19100 | 1900        | 22                                           | 21.96                     | 0.93%   | 0.096                       | 0.097    | -         |
|                      |                 |            | 100 RB  |          | Front side   | 10mm          | 19100 | 1900        | 22                                           | 21.84                     | 3.75%   | 0.432                       | 0.448    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 18700 | 1860        | 22                                           | 21.59                     | 9.90%   | 0.715                       | 0.786    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 18900 | 1880        | 22                                           | 21.65                     | 8.39%   | 0.758                       | 0.822    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 19100 | 1900        | 22                                           | 21.84                     | 3.75%   | 0.805                       | 0.835    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 18700 | 1860        | 22                                           | 21.59                     | 9.90%   | 0.919                       | 1.010    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 18900 | 1880        | 22                                           | 21.65                     | 8.39%   | 0.889                       | 0.964    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 19100 | 1900        | 22                                           | 21.84                     | 3.75%   | 0.931                       | 0.966    | -         |
|                      |                 |            |         |          | Right side   | 10mm          | 19100 | 1900        | 22                                           | 21.84                     | 3.75%   | 0.09                        | 0.093    | -         |
|                      |                 |            |         |          | Left side    | 10mm          | 19100 | 1900        | 22                                           | 21.84                     | 3.75%   | 0.095                       | 0.099    | -         |

\* - repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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### LTE FDD Band IV

| Mode                   | Bandwidth (MHz) | Modulation | RB Size | RB start | Position   | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|------------------------|-----------------|------------|---------|----------|------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                        |                 |            |         |          |            |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 4 (Head)      | 20MHz           | QPSK       | 1 RB    | 50       | RE Cheek   | -             | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.311                       | 0.318    | -         |
|                        |                 |            |         | 50       | RE Tilt    | -             | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.102                       | 0.104    | -         |
|                        |                 |            |         | 0        | LE Cheek   | -             | 20300 | 1745        | 24.5                                         | 24.38                     | 2.80%   | 0.328                       | 0.337    | -         |
|                        |                 |            |         | 50       | LE Cheek   | -             | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.38                        | 0.388    | 126       |
|                        |                 |            |         | 50       | LE Cheek   | -             | 20175 | 1732.5      | 24.5                                         | 24.39                     | 2.57%   | 0.328                       | 0.336    | -         |
|                        |                 |            |         | 50       | LE Tilt    | -             | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.043                       | 0.044    | -         |
|                        |                 |            | 50 RB   | 0        | RE Cheek   | -             | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.253                       | 0.281    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.097                       | 0.108    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.285                       | 0.316    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.037                       | 0.041    | -         |
|                        |                 |            | 100 RB  |          | RE Cheek   | -             | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.24                        | 0.272    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.095                       | 0.108    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.308                       | 0.349    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.038                       | 0.043    | -         |
| LTE Band 4 (Body-Worn) | 20MHz           | QPSK       | 1 RB    | 50       | Front side | 15mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.298                       | 0.304    | -         |
|                        |                 |            |         | 0        | Back side  | 15mm          | 20300 | 1745        | 24.5                                         | 24.38                     | 2.80%   | 0.461                       | 0.474    | -         |
|                        |                 |            |         | 50       | Back side  | 15mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.559                       | 0.571    | 127       |
|                        |                 |            |         | 50       | Back side  | 15mm          | 20175 | 1732.5      | 24.5                                         | 24.39                     | 2.57%   | 0.464                       | 0.476    | -         |
|                        |                 |            | 50 RB   | 0        | Front side | 15mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.142                       | 0.158    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.47                        | 0.521    | -         |
|                        |                 |            | 100 RB  |          | Front side | 15mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.147                       | 0.166    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.466                       | 0.528    | -         |

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| Mode                 | Bandwidth (MHz) | Modulation | RB Size | RB start | Position                  | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|----------------------|-----------------|------------|---------|----------|---------------------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                      |                 |            |         |          |                           |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 4 (Hotspot) | 20MHz           | QPSK       | 1 RB    | 50       | Front side                | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.562                       | 0.574    | -         |
|                      |                 |            |         | 0        | Back side                 | 10mm          | 20300 | 1745        | 24.5                                         | 24.38                     | 2.80%   | 0.891                       | 0.916    | -         |
|                      |                 |            |         | 50       | Back side                 | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.964                       | 0.984    | -         |
|                      |                 |            |         | 50       | Back side                 | 10mm          | 20175 | 1732.5      | 24.5                                         | 24.39                     | 2.57%   | 0.87                        | 0.892    | -         |
|                      |                 |            |         | 0        | Bottom side               | 10mm          | 20300 | 1745        | 24.5                                         | 24.38                     | 2.80%   | 1.15                        | 1.182    | -         |
|                      |                 |            |         | 50       | Bottom side               | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 1.28                        | 1.307    | 128       |
|                      |                 |            |         | 50       | Bottom side               | 10mm          | 20175 | 1732.5      | 24.5                                         | 24.39                     | 2.57%   | 1.1                         | 1.128    | -         |
|                      |                 |            |         | 50       | Bottom side*              | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 1.27                        | 1.297    | -         |
|                      |                 |            |         | 50       | Bottom side -with headset | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 1.07                        | 1.092    | -         |
|                      |                 |            |         | 50       | Right side                | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.226                       | 0.231    | -         |
|                      |                 |            |         | 50       | Left side                 | 10mm          | 20050 | 1720        | 24.5                                         | 24.41                     | 2.09%   | 0.248                       | 0.253    | -         |
|                      |                 |            | 50 RB   | 0        | Front side                | 10mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.337                       | 0.374    | -         |
|                      |                 |            |         |          | Back side                 | 10mm          | 20050 | 1720        | 24                                           | 23.52                     | 11.69%  | 0.792                       | 0.885    | -         |
|                      |                 |            |         |          | Back side                 | 10mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.74                        | 0.821    | -         |
|                      |                 |            |         |          | Bottom side               | 10mm          | 20050 | 1720        | 24                                           | 23.52                     | 11.69%  | 1.04                        | 1.162    | -         |
|                      |                 |            |         |          | Bottom side               | 10mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 1.09                        | 1.209    | -         |
|                      |                 |            |         |          | Right side                | 10mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.203                       | 0.225    | -         |
|                      |                 |            |         |          | Left side                 | 10mm          | 20300 | 1745        | 24                                           | 23.55                     | 10.92%  | 0.194                       | 0.215    | -         |
|                      |                 |            |         | 50       | Back side                 | 10mm          | 20175 | 1732.5      | 24                                           | 23.54                     | 11.17%  | 0.733                       | 0.815    | -         |
|                      |                 |            |         |          | Bottom side               | 10mm          | 20175 | 1732.5      | 24                                           | 23.54                     | 11.17%  | 1.09                        | 1.212    | -         |
|                      |                 |            | 100 RB  |          | Front side                | 10mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.335                       | 0.379    | -         |
|                      |                 |            |         |          | Back side                 | 10mm          | 20050 | 1720        | 24                                           | 23.4                      | 14.82%  | 0.7                         | 0.804    | -         |
|                      |                 |            |         |          | Back side                 | 10mm          | 20175 | 1732.5      | 24                                           | 23.44                     | 13.76%  | 0.774                       | 0.881    | -         |
|                      |                 |            |         |          | Back side                 | 10mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.743                       | 0.841    | -         |
|                      |                 |            |         |          | Bottom side               | 10mm          | 20050 | 1720        | 24                                           | 23.4                      | 14.82%  | 1.03                        | 1.183    | -         |
|                      |                 |            |         |          | Bottom side               | 10mm          | 20175 | 1732.5      | 24                                           | 23.44                     | 13.76%  | 1.09                        | 1.240    | -         |
|                      |                 |            |         |          | Bottom side               | 10mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 1.1                         | 1.246    | -         |
|                      |                 |            |         |          | Right side                | 10mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.194                       | 0.220    | -         |
|                      |                 |            |         |          | Left side                 | 10mm          | 20300 | 1745        | 24                                           | 23.46                     | 13.24%  | 0.191                       | 0.216    | -         |

\* - repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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### LTE FDD Band V

| Mode                   | Bandwidth (MHz) | Modulation | RB Size | RB start | Position    | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|------------------------|-----------------|------------|---------|----------|-------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                        |                 |            |         |          |             |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 5 (Head)      | 10MHz           | QPSK       | 1 RB    | 0        | RE Cheek    | -             | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.338                       | 0.349    | -         |
|                        |                 |            |         |          | RE Tilt     | -             | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.234                       | 0.242    | -         |
|                        |                 |            |         |          | LE Cheek    | -             | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.418                       | 0.432    | 129       |
|                        |                 |            |         |          | LE Tilt     | -             | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.231                       | 0.239    | -         |
|                        |                 |            | 25 RB   | 25       | RE Cheek    | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.254                       | 0.291    | -         |
|                        |                 |            |         |          | RE Tilt     | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.176                       | 0.202    | -         |
|                        |                 |            |         |          | LE Cheek    | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.302                       | 0.346    | -         |
|                        |                 |            |         |          | LE Tilt     | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.2                         | 0.229    | -         |
|                        |                 |            | 50 RB   |          | RE Cheek    | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.31                        | 0.355    | -         |
|                        |                 |            |         |          | RE Tilt     | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.21                        | 0.241    | -         |
|                        |                 |            |         |          | LE Cheek    | -             | 20450 | 829         | 24                                           | 23.38                     | 15.35%  | 0.372                       | 0.429    | -         |
|                        |                 |            |         |          | LE Cheek    | -             | 20525 | 836.5       | 24                                           | 23.24                     | 19.12%  | 0.373                       | 0.444    | -         |
|                        |                 |            |         |          | LE Cheek    | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.379                       | 0.434    | -         |
|                        |                 |            |         |          | LE Tilt     | -             | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.199                       | 0.228    | -         |
| LTE Band 5 (Body-Worn) | 10MHz           | QPSK       | 1 RB    | 0        | Front side  | 15mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.351                       | 0.362    | -         |
|                        |                 |            |         | 0        | Back side   | 15mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.494                       | 0.510    | -         |
|                        |                 |            |         | 25       | Back side   | 15mm          | 20525 | 836.5       | 24.5                                         | 24.23                     | 6.41%   | 0.47                        | 0.500    | -         |
|                        |                 |            |         | 25       | Back side   | 15mm          | 20600 | 844         | 24.5                                         | 24.3                      | 4.71%   | 0.517                       | 0.541    | 130       |
|                        |                 |            | 25 RB   | 25       | Front side  | 15mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.263                       | 0.301    | -         |
|                        |                 |            |         |          | Back side   | 15mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.363                       | 0.416    | -         |
|                        |                 |            | 50 RB   |          | Front side  | 15mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.328                       | 0.376    | -         |
|                        |                 |            |         |          | Back side   | 15mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.443                       | 0.507    | -         |
| LTE Band 5 (Hotspot)   | 10MHz           | QPSK       | 1 RB    | 0        | Front side  | 10mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.414                       | 0.428    | -         |
|                        |                 |            |         | 0        | Back side   | 10mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.645                       | 0.666    | -         |
|                        |                 |            |         | 25       | Back side   | 10mm          | 20525 | 836.5       | 24.5                                         | 24.23                     | 6.41%   | 0.716                       | 0.762    | 131       |
|                        |                 |            |         | 25       | Back side   | 10mm          | 20600 | 844         | 24.5                                         | 24.3                      | 4.71%   | 0.627                       | 0.657    | -         |
|                        |                 |            |         | 0        | Bottom side | 10mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.194                       | 0.200    | -         |
|                        |                 |            |         | 0        | Right side  | 10mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.241                       | 0.249    | -         |
|                        |                 |            |         | 0        | Left side   | 10mm          | 20450 | 829         | 24.5                                         | 24.36                     | 3.28%   | 0.311                       | 0.321    | -         |
|                        |                 |            | 25 RB   | 25       | Front side  | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.342                       | 0.392    | -         |
|                        |                 |            |         |          | Back side   | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.465                       | 0.533    | -         |
|                        |                 |            |         |          | Bottom side | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.138                       | 0.158    | -         |
|                        |                 |            |         |          | Right side  | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.215                       | 0.246    | -         |
|                        |                 |            |         |          | Left side   | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.225                       | 0.258    | -         |
|                        |                 |            | 50 RB   |          | Front side  | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.378                       | 0.433    | -         |
|                        |                 |            |         |          | Back side   | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.571                       | 0.654    | -         |
|                        |                 |            |         |          | Bottom side | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.161                       | 0.184    | -         |
|                        |                 |            |         |          | Right side  | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.233                       | 0.267    | -         |
|                        |                 |            |         |          | Left side   | 10mm          | 20600 | 844         | 24                                           | 23.41                     | 14.55%  | 0.228                       | 0.261    | -         |

\* - repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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### LTE FDD Band VII

| Mode                   | Bandwidth (MHz) | Modulation | RB Size | RB start | Position   | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|------------------------|-----------------|------------|---------|----------|------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                        |                 |            |         |          |            |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 7 (Head)      | 20MHz           | QPSK       | 1 RB    | 99       | RE Cheek   | -             | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.294                       | 0.295    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.106                       | 0.106    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 20850 | 2510        | 22.3                                         | 22.14                     | 3.75%   | 0.325                       | 0.337    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.38                        | 0.382    | 132       |
|                        |                 |            |         |          | LE Cheek   | -             | 21350 | 2560        | 22.3                                         | 22.27                     | 0.69%   | 0.328                       | 0.330    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.072                       | 0.072    | -         |
|                        |                 |            | 50 RB   | 50       | RE Cheek   | -             | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.234                       | 0.274    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.088                       | 0.103    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.288                       | 0.337    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.054                       | 0.063    | -         |
|                        |                 |            | 100 RB  |          | RE Cheek   | -             | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.232                       | 0.276    | -         |
|                        |                 |            |         |          | RE Tilt    | -             | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.086                       | 0.102    | -         |
|                        |                 |            |         |          | LE Cheek   | -             | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.294                       | 0.350    | -         |
|                        |                 |            |         |          | LE Tilt    | -             | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.054                       | 0.064    | -         |
| LTE Band 7 (Body-Worn) | 20MHz           | QPSK       | 1 RB    | 99       | Front side | 15mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.279                       | 0.280    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 20850 | 2510        | 22.3                                         | 22.14                     | 3.75%   | 0.489                       | 0.507    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.497                       | 0.499    | 133       |
|                        |                 |            |         |          | Back side  | 15mm          | 21350 | 2560        | 22.3                                         | 22.27                     | 0.69%   | 0.459                       | 0.462    | -         |
|                        |                 |            | 50 RB   | 50       | Front side | 15mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.233                       | 0.272    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.384                       | 0.449    | -         |
|                        |                 |            | 100 RB  |          | Front side | 15mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.235                       | 0.280    | -         |
|                        |                 |            |         |          | Back side  | 15mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.386                       | 0.460    | -         |

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| Mode                 | Bandwidth (MHz) | Modulation | RB Size | RB start | Position     | Distance (mm) | CH    | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|----------------------|-----------------|------------|---------|----------|--------------|---------------|-------|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|                      |                 |            |         |          |              |               |       |             |                                              |                           |         | Measured                    | Reported |           |
| LTE Band 7 (Hotspot) | 20MHz           | QPSK       | 1 RB    | 99       | Front side   | 10mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.537                       | 0.539    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 20850 | 2510        | 22.3                                         | 22.14                     | 3.75%   | 0.971                       | 1.007    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 1.01                        | 1.015    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 21350 | 2560        | 22.3                                         | 22.27                     | 0.69%   | 0.932                       | 0.938    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 20850 | 2510        | 22.3                                         | 22.14                     | 3.75%   | 1                           | 1.038    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 1.02                        | 1.025    | 134       |
|                      |                 |            |         |          | Bottom side  | 10mm          | 21350 | 2560        | 22.3                                         | 22.27                     | 0.69%   | 0.922                       | 0.928    | -         |
|                      |                 |            |         |          | Bottom side* | 10mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 1.02                        | 1.025    | -         |
|                      |                 |            |         |          | Right side   | 10mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.159                       | 0.160    | -         |
|                      |                 |            |         |          | Left side    | 10mm          | 21100 | 2535        | 22.3                                         | 22.28                     | 0.46%   | 0.142                       | 0.143    | -         |
|                      |                 |            | 50 RB   | 50       | Front side   | 10mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.431                       | 0.504    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 20850 | 2510        | 22                                           | 21.14                     | 21.90%  | 0.777                       | 0.947    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 21100 | 2535        | 22                                           | 21.23                     | 19.40%  | 0.798                       | 0.953    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.772                       | 0.903    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 20850 | 2510        | 22                                           | 21.14                     | 21.90%  | 0.822                       | 1.002    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 21100 | 2535        | 22                                           | 21.23                     | 19.40%  | 0.819                       | 0.978    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.76                        | 0.889    | -         |
|                      |                 |            |         |          | Right side   | 10mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.131                       | 0.153    | -         |
|                      |                 |            |         |          | Left side    | 10mm          | 21350 | 2560        | 22                                           | 21.32                     | 16.95%  | 0.111                       | 0.130    | -         |
|                      |                 |            | 100 RB  |          | Front side   | 10mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.433                       | 0.516    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 20850 | 2510        | 22                                           | 21.02                     | 25.31%  | 0.775                       | 0.971    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 21100 | 2535        | 22                                           | 21.17                     | 21.06%  | 0.798                       | 0.966    | -         |
|                      |                 |            |         |          | Back side    | 10mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.768                       | 0.915    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 20850 | 2510        | 22                                           | 21.02                     | 25.31%  | 0.819                       | 1.026    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 21100 | 2535        | 22                                           | 21.17                     | 21.06%  | 0.83                        | 1.005    | -         |
|                      |                 |            |         |          | Bottom side  | 10mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.771                       | 0.918    | -         |
|                      |                 |            |         |          | Right side   | 10mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.133                       | 0.158    | -         |
|                      |                 |            |         |          | Left side    | 10mm          | 21350 | 2560        | 22                                           | 21.24                     | 19.12%  | 0.102                       | 0.122    | -         |

\* - repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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**WLAN802.11 b**

| Mode    | Position   | Distance (mm) | CH | Freq. (MHz) | Max. Rated Avg. Power + Max. | Measured Avg. Power | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|---------|------------|---------------|----|-------------|------------------------------|---------------------|---------|-----------------------------|----------|-----------|
|         |            |               |    |             |                              |                     |         | Measured                    | Reported |           |
| Head    | RE Cheek   | -             | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.422                       | 0.423    | -         |
|         | RE Cheek   | -             | 6  | 2437        | 16.00                        | 15.87               | 3.04%   | 0.64                        | 0.659    | -         |
|         | RE Cheek   | -             | 11 | 2462        | 16.00                        | 15.94               | 1.39%   | 0.786                       | 0.797    | 135       |
|         | RE Tilt    | -             | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.283                       | 0.284    | -         |
|         | LE Cheek   | -             | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.193                       | 0.193    | -         |
|         | LE Tilt    | -             | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.138                       | 0.138    | -         |
| Hotspot | Front side | 10mm          | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.12                        | 0.120    | -         |
|         | Back side  | 10mm          | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.447                       | 0.448    | -         |
|         | Back side  | 10mm          | 6  | 2437        | 16.00                        | 15.87               | 3.04%   | 0.529                       | 0.545    | -         |
|         | Back side  | 10mm          | 11 | 2462        | 16.00                        | 15.94               | 1.39%   | 0.679                       | 0.688    | 136       |
|         | Top side   | 10mm          | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.049                       | 0.049    | -         |
|         | Left side  | 10mm          | 1  | 2412        | 16.00                        | 15.99               | 0.23%   | 0.182                       | 0.182    | -         |

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# WLAN802.11 a 5.2G

| Mode      | Position   | Distance (mm) | CH | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-----------|------------|---------------|----|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|           |            |               |    |             |                                              |                           |         | Measured                    | Reported |           |
| Head      | RE Cheek   | -             | 48 | 5240        | 14.00                                        | 13.93                     | 1.62%   | 0.126                       | 0.128    | -         |
|           | RE Tilt    | -             | 40 | 5200        | 14.00                                        | 13.82                     | 4.23%   | 0.154                       | 0.161    | -         |
|           | RE Tilt    | -             | 48 | 5240        | 14.00                                        | 13.93                     | 1.62%   | 0.158                       | 0.161    | 137       |
|           | LE Cheek   | -             | 48 | 5240        | 14.00                                        | 13.93                     | 1.62%   | 0.138                       | 0.140    | -         |
|           | LE Tilt    | -             | 48 | 5240        | 14.00                                        | 13.93                     | 1.62%   | 0.139                       | 0.141    | -         |
| Body-worn | Front side | 15mm          | 48 | 5240        | 14.00                                        | 13.93                     | 1.62%   | 0.039                       | 0.040    | -         |
|           | Back side  | 15mm          | 40 | 5200        | 14.00                                        | 13.82                     | 4.23%   | 0.339                       | 0.353    | 138       |
|           | Back side  | 15mm          | 48 | 5240        | 14.00                                        | 13.93                     | 1.62%   | 0.305                       | 0.310    | -         |

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## WLAN802.11 a 5.3G

| Mode      | Position   | Distance (mm) | CH | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-----------|------------|---------------|----|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|           |            |               |    |             |                                              |                           |         | Measured                    | Reported |           |
| Head      | RE Cheek   | -             | 52 | 5260        | 14.00                                        | 13.99                     | 0.23%   | 0.135                       | 0.135    | -         |
|           | RE Cheek   | -             | 60 | 5300        | 14.00                                        | 13.98                     | 0.46%   | 0.17                        | 0.171    | 139       |
|           | RE Tilt    | -             | 52 | 5260        | 14.00                                        | 13.99                     | 0.23%   | 0.134                       | 0.134    | -         |
|           | LE Cheek   | -             | 52 | 5260        | 14.00                                        | 13.99                     | 0.23%   | 0.133                       | 0.133    | -         |
|           | LE Tilt    | -             | 52 | 5260        | 14.00                                        | 13.99                     | 0.23%   | 0.119                       | 0.119    | -         |
| Body-worn | Front side | 15mm          | 52 | 5260        | 14.00                                        | 13.99                     | 0.23%   | 0.031                       | 0.031    | -         |
|           | Back side  | 15mm          | 52 | 5260        | 14.00                                        | 13.99                     | 0.23%   | 0.306                       | 0.307    | -         |
|           | Back side  | 15mm          | 60 | 5300        | 14.00                                        | 13.98                     | 0.46%   | 0.316                       | 0.317    | 140       |

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# WLAN802.11 a 5.6G

| Mode      | Position   | Distance (mm) | CH  | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-----------|------------|---------------|-----|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|           |            |               |     |             |                                              |                           |         | Measured                    | Reported |           |
| Head      | RE Cheek   | -             | 108 | 5540        | 14.00                                        | 13.88                     | 2.80%   | 0.293                       | 0.301    | -         |
|           | RE Cheek   | -             | 132 | 5660        | 14.00                                        | 13.94                     | 1.39%   | 0.354                       | 0.359    | -         |
|           | RE Cheek   | -             | 140 | 5700        | 14.00                                        | 13.99                     | 0.23%   | 0.423                       | 0.424    | 141       |
|           | RE Tilt    | -             | 140 | 5700        | 14.00                                        | 13.99                     | 0.23%   | 0.388                       | 0.389    | -         |
|           | LE Cheek   | -             | 140 | 5700        | 14.00                                        | 13.99                     | 0.23%   | 0.287                       | 0.288    | -         |
|           | LE Tilt    | -             | 140 | 5700        | 14.00                                        | 13.99                     | 0.23%   | 0.282                       | 0.283    | -         |
| Body-worn | Front side | 15mm          | 140 | 5700        | 14.00                                        | 13.99                     | 0.23%   | 0.05                        | 0.050    | -         |
|           | Back side  | 15mm          | 108 | 5540        | 14.00                                        | 13.88                     | 2.80%   | 0.367                       | 0.377    | -         |
|           | Back side  | 15mm          | 132 | 5660        | 14.00                                        | 13.94                     | 1.39%   | 0.402                       | 0.408    | 142       |
|           | Back side  | 15mm          | 140 | 5700        | 14.00                                        | 13.99                     | 0.23%   | 0.382                       | 0.383    | -         |

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**WLAN802.11 a 5.8G**

| Mode      | Position   | Distance (mm) | CH  | Freq. (MHz) | Max. Rated Avg. Power + Max. Tolerance (dBm) | Measured Avg. Power (dBm) | Scaling | Averaged SAR over 1g (W/kg) |          | Plot page |
|-----------|------------|---------------|-----|-------------|----------------------------------------------|---------------------------|---------|-----------------------------|----------|-----------|
|           |            |               |     |             |                                              |                           |         | Measured                    | Reported |           |
| Head      | RE Cheek   | -             | 157 | 5785        | 14.00                                        | 13.83                     | 3.99%   | 0.463                       | 0.481    | -         |
|           | RE Tilt    | -             | 153 | 5765        | 14.00                                        | 13.82                     | 4.23%   | 0.455                       | 0.474    | -         |
|           | RE Tilt    | -             | 157 | 5785        | 14.00                                        | 13.83                     | 3.99%   | 0.471                       | 0.490    | -         |
|           | RE Tilt    | -             | 161 | 5805        | 14.00                                        | 13.74                     | 6.17%   | 0.478                       | 0.507    | 143       |
|           | LE Cheek   | -             | 157 | 5785        | 14.00                                        | 13.83                     | 3.99%   | 0.308                       | 0.320    | -         |
|           | LE Tilt    | -             | 157 | 5785        | 14.00                                        | 13.83                     | 3.99%   | 0.333                       | 0.346    | -         |
| Body-worn | Front side | 15mm          | 157 | 5785        | 14.00                                        | 13.83                     | 3.99%   | 0.066                       | 0.069    | -         |
|           | Back side  | 15mm          | 153 | 5765        | 14.00                                        | 13.82                     | 4.23%   | 0.363                       | 0.378    | -         |
|           | Back side  | 15mm          | 157 | 5785        | 14.00                                        | 13.83                     | 3.99%   | 0.343                       | 0.357    | -         |
|           | Back side  | 15mm          | 161 | 5805        | 14.00                                        | 13.74                     | 6.17%   | 0.369                       | 0.392    | 144       |

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### 3. Simultaneous Transmission Analysis

#### Simultaneous Transmission Scenarios:

| Simultaneous Transmit Configurations | Head | Body-Worn | Hotspot |
|--------------------------------------|------|-----------|---------|
| GSM850/1900 + 2.4GHz Wi-Fi           | Yes  | No        | No      |
| GPRS850/1900 + 2.4GHz Wi-Fi          | No   | No        | Yes     |
| UMTS B2/4/5 + 2.4GHz Wi-Fi           | Yes  | No        | Yes     |
| LTE FDD B2/4/5/7 + 2.4GHz Wi-Fi      | Yes  | No        | Yes     |
| GSM850/1900 + 5GHz Wi-Fi             | Yes  | Yes       | No      |
| GPRS850/1900 + 5GHz Wi-Fi            | No   | No        | No      |
| UMTS B2/4/5 + 5GHz Wi-Fi             | Yes  | Yes       | No      |
| LTE FDD B2/4/5/7 + 5GHz Wi-Fi        | Yes  | Yes       | No      |
| GSM850/1900 + Bluetooth              | No   | Yes       | No      |
| GPRS850/1900 + Bluetooth             | No   | No        | Yes     |
| UMTS B2/4/5 + Bluetooth              | No   | Yes       | Yes     |
| LTE FDD B2/4/5/7 + Bluetooth         | No   | Yes       | Yes     |

#### Notes:

1. GSM & WCDMA & LTE share the same antenna path and cannot transmit simultaneously
2. Bluetooth, 5GHz WFi, and 2.4GHz WFi share the same antenna path and cannot transmit simultaneously.

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### 3.1 Estimated SAR calculation

According to KDB447498 D01v05 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$\text{Estimated SAR} = \frac{\text{Max.tune up power(mW)}}{\text{Min.test separation distance(mm)}} \times \frac{\sqrt{f(\text{GHz})}}{7.5}$$

If the minimum test separation distance is < 5mm, a distance of 5mm is used for estimated SAR calculation. When the test separation distance is >50mm, the 0.4W/kg is used for SAR-1g.

### 3.2 SPLSR evaluation and analysis

Per KDB447498D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR sum to peak location separation ratio(SPLSR).

The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion.

The ratio is determined by  $(\text{SAR1} + \text{SAR2})^{1.5}/R_i$ , rounded to two decimal digits, and must be  $\leq 0.04$  for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

SAR1 and SAR2 are the highest reported or estimated SAR for each antenna in the pair, and  $R_i$  is the separation distance between the peak SAR locations for the antenna pair in mm.

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna.

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## Simultaneous Transmission Combination

| reported SAR WWAN and WLAN DTS 2.4GHz, $\Sigma$ SAR evaluation |          |          |                     |       |              |                          |                       |
|----------------------------------------------------------------|----------|----------|---------------------|-------|--------------|--------------------------|-----------------------|
| Frequency band                                                 | Position |          | reported SAR / W/kg |       | $\Sigma$ SAR | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                                |          |          | WWAN                | WLAN  | <1.6W/kg     |                          |                       |
| GSM 850                                                        | Head     | RE cheek | 0.265               | 0.797 | 1.062        | -                        | -                     |
|                                                                |          | RE tilt  | 0.184               | 0.284 | 0.468        | -                        | -                     |
|                                                                |          | LE cheek | 0.424               | 0.193 | 0.617        | -                        | -                     |
|                                                                |          | LE tilt  | 0.176               | 0.138 | 0.314        | -                        | -                     |
| GPRS 850 (1Dn1UP)                                              | Hotspot  | Front    | 0.337               | 0.120 | 0.457        | -                        | -                     |
|                                                                |          | Back     | 0.7                 | 0.688 | 1.388        | -                        | -                     |
|                                                                |          | Top      | -                   | 0.049 | -            | -                        | -                     |
|                                                                |          | Bottom   | 0.182               | -     | -            | -                        | -                     |
|                                                                |          | Right    | 0.28                | -     | -            | -                        | -                     |
|                                                                |          | Left     | 0.478               | 0.182 | 0.660        | -                        | -                     |
| GSM 1900                                                       | Head     | RE cheek | 0.09                | 0.797 | 0.887        | -                        | -                     |
|                                                                |          | RE tilt  | 0.048               | 0.284 | 0.332        | -                        | -                     |
|                                                                |          | LE cheek | 0.147               | 0.193 | 0.340        | -                        | -                     |
|                                                                |          | LE tilt  | 0.052               | 0.138 | 0.190        | -                        | -                     |
| GPRS 1900 (1Dn1UP)                                             | Hotspot  | Front    | 0.432               | 0.120 | 0.552        | -                        | -                     |
|                                                                |          | Back     | 0.711               | 0.688 | 1.399        | -                        | -                     |
|                                                                |          | Top      | -                   | 0.049 | -            | -                        | -                     |
|                                                                |          | Bottom   | 0.898               | -     | -            | -                        | -                     |
|                                                                |          | Right    | 0.11                | -     | -            | -                        | -                     |
|                                                                |          | Left     | 0.124               | 0.182 | 0.306        | -                        | -                     |

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| reported SAR WWAN and WLAN DTS 2.4GHz, $\Sigma$ SAR evaluation |          |          |                     |       |                   |                          |                       |
|----------------------------------------------------------------|----------|----------|---------------------|-------|-------------------|--------------------------|-----------------------|
| Frequency band                                                 | Position |          | reported SAR / W/kg |       | $\Sigma$ SAR      | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                                |          |          | WWAN                | WLAN  | $<1.6\text{W/kg}$ |                          |                       |
| WCDMA Band II                                                  | Head     | RE cheek | 0.159               | 0.797 | 0.956             | -                        | -                     |
|                                                                |          | RE tilt  | 0.098               | 0.284 | 0.382             | -                        | -                     |
|                                                                |          | LE cheek | 0.234               | 0.193 | 0.427             | -                        | -                     |
|                                                                |          | LE tilt  | 0.082               | 0.138 | 0.220             | -                        | -                     |
|                                                                | Hotspot  | Front    | 0.53                | 0.120 | 0.650             | -                        | -                     |
|                                                                |          | Back     | 0.989               | 0.688 | <b>1.677</b>      | 120                      | 0.018                 |
|                                                                |          | Top      | -                   | 0.049 | -                 | -                        | -                     |
|                                                                |          | Bottom   | 1.02                | -     | -                 | -                        | -                     |
|                                                                |          | Right    | 0.078               | -     | -                 | -                        | -                     |
|                                                                |          | Left     | 0.125               | 0.182 | 0.307             | -                        | -                     |
| WCDMA Band IV                                                  | Head     | RE cheek | 0.41                | 0.797 | 1.207             | -                        | -                     |
|                                                                |          | RE tilt  | 0.109               | 0.284 | 0.393             | -                        | -                     |
|                                                                |          | LE cheek | 0.519               | 0.193 | 0.712             | -                        | -                     |
|                                                                |          | LE tilt  | 0.081               | 0.138 | 0.219             | -                        | -                     |
|                                                                | Hotspot  | Front    | 0.745               | 0.120 | 0.865             | -                        | -                     |
|                                                                |          | Back     | 0.764               | 0.688 | 1.452             | -                        | -                     |
|                                                                |          | Top      | -                   | 0.049 | -                 | -                        | -                     |
|                                                                |          | Bottom   | 1.192               | -     | -                 | -                        | -                     |
|                                                                |          | Right    | 0.191               | -     | -                 | -                        | -                     |
|                                                                |          | Left     | 0.175               | 0.182 | 0.357             | -                        | -                     |
| WCDMA Band V                                                   | Head     | RE cheek | 0.31                | 0.797 | 1.107             | -                        | -                     |
|                                                                |          | RE tilt  | 0.208               | 0.284 | 0.492             | -                        | -                     |
|                                                                |          | LE cheek | 0.392               | 0.193 | 0.585             | -                        | -                     |
|                                                                |          | LE tilt  | 0.213               | 0.138 | 0.351             | -                        | -                     |
|                                                                | Hotspot  | Front    | 0.497               | 0.120 | 0.617             | -                        | -                     |
|                                                                |          | Back     | 0.837               | 0.688 | 1.525             | -                        | -                     |
|                                                                |          | Top      | -                   | 0.049 | -                 | -                        | -                     |
|                                                                |          | Bottom   | 0.204               | -     | -                 | -                        | -                     |
|                                                                |          | Right    | 0.345               | -     | -                 | -                        | -                     |
|                                                                |          | Left     | 0.553               | 0.182 | 0.735             | -                        | -                     |

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| Conditions       | Position  | SAR Value (W/kg) | Coordinates (cm) |       |       | $\Sigma$ SAR (W/kg) | Peak Location Separation Distance (mm) | SPLSR | Simultaneous Transmission SAR Test |
|------------------|-----------|------------------|------------------|-------|-------|---------------------|----------------------------------------|-------|------------------------------------|
|                  |           |                  | x                | y     | z     |                     |                                        |       |                                    |
| WCDMA B2 CH 9538 | Back side | 0.989            | 0.15             | 6.53  | -0.05 | 1.677               | 120                                    | 0.018 | SPLSR<0.04, Not required           |
| 802.11b CH 11    |           | 0.688            | -3.36            | -4.94 | -0.09 |                     |                                        |       |                                    |



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| reported SAR WWAN and WLAN DTS 2.4GHz, $\Sigma$ SAR evaluation |          |          |                     |       |                    |                          |                       |
|----------------------------------------------------------------|----------|----------|---------------------|-------|--------------------|--------------------------|-----------------------|
| Frequency band                                                 | Position |          | reported SAR / W/kg |       | $\Sigma$ SAR       | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                                |          |          | WWAN                | WLAN  | $< 1.6\text{W/kg}$ |                          |                       |
| LTE FDD Band 2                                                 | Head     | RE cheek | 0.384               | 0.797 | 1.181              | -                        | -                     |
|                                                                |          | RE tilt  | 0.118               | 0.284 | 0.402              | -                        | -                     |
|                                                                |          | LE cheek | 0.432               | 0.193 | 0.625              | -                        | -                     |
|                                                                |          | LE tilt  | 0.082               | 0.138 | 0.220              | -                        | -                     |
|                                                                | Hotspot  | Front    | 0.449               | 0.120 | 0.569              | -                        | -                     |
|                                                                |          | Back     | 0.838               | 0.688 | 1.526              | -                        | -                     |
|                                                                |          | Top      | -                   | 0.049 | -                  | -                        | -                     |
|                                                                |          | Bottom   | 1.01                | -     | -                  | -                        | -                     |
|                                                                |          | Right    | 0.093               | -     | -                  | -                        | -                     |
|                                                                |          | Left     | 0.099               | 0.182 | 0.281              | -                        | -                     |
| LTE FDD Band 4                                                 | Head     | RE cheek | 0.318               | 0.797 | 1.115              | -                        | -                     |
|                                                                |          | RE tilt  | 0.108               | 0.284 | 0.392              | -                        | -                     |
|                                                                |          | LE cheek | 0.388               | 0.193 | 0.581              | -                        | -                     |
|                                                                |          | LE tilt  | 0.044               | 0.138 | 0.182              | -                        | -                     |
|                                                                | Hotspot  | Front    | 0.574               | 0.120 | 0.694              | -                        | -                     |
|                                                                |          | Back     | 0.984               | 0.688 | <b>1.672</b>       | 113                      | 0.019                 |
|                                                                |          | Top      | -                   | 0.049 | -                  | -                        | -                     |
|                                                                |          | Bottom   | 1.307               | -     | -                  | -                        | -                     |
|                                                                |          | Right    | 0.231               | -     | -                  | -                        | -                     |
|                                                                |          | Left     | 0.253               | 0.182 | 0.435              | -                        | -                     |
| LTE FDD Band 5                                                 | Head     | RE cheek | 0.355               | 0.797 | 1.152              | -                        | -                     |
|                                                                |          | RE tilt  | 0.242               | 0.284 | 0.526              | -                        | -                     |
|                                                                |          | LE cheek | 0.444               | 0.193 | 0.637              | -                        | -                     |
|                                                                |          | LE tilt  | 0.239               | 0.138 | 0.377              | -                        | -                     |
|                                                                | Hotspot  | Front    | 0.433               | 0.120 | 0.553              | -                        | -                     |
|                                                                |          | Back     | 0.762               | 0.688 | 1.450              | -                        | -                     |
|                                                                |          | Top      | -                   | 0.049 | -                  | -                        | -                     |
|                                                                |          | Bottom   | 0.2                 | -     | -                  | -                        | -                     |
|                                                                |          | Right    | 0.267               | -     | -                  | -                        | -                     |
|                                                                |          | Left     | 0.321               | 0.182 | 0.503              | -                        | -                     |

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| Conditions          | Position  | SAR Value (W/kg) | Coordinates (cm) |       |       | $\Sigma$ SAR (W/kg) | Peak Location Separation Distance (mm) | SPLSR | Simultaneous Transmission SAR Test |
|---------------------|-----------|------------------|------------------|-------|-------|---------------------|----------------------------------------|-------|------------------------------------|
|                     |           |                  | x                | y     | z     |                     |                                        |       |                                    |
| LTE Band 4 CH 20050 | Back side | 0.984            | 1.34             | 5.33  | -0.02 | 1.672               | 113                                    | 0.019 | SPLSR<0.04, Not required           |
| 802.11b CH 11       |           | 0.688            | -3.36            | -4.94 | -0.09 |                     |                                        |       |                                    |



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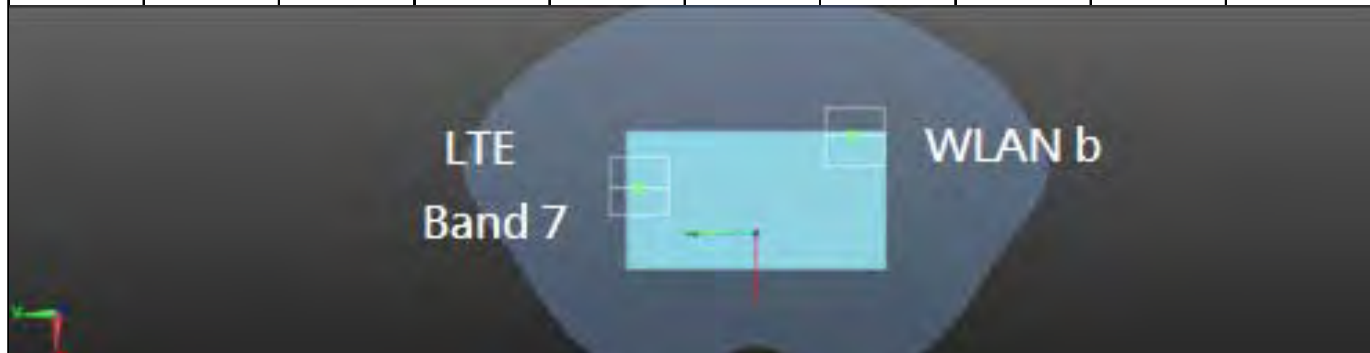
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| reported SAR WWAN and WLAN DTS 2.4GHz, ΣSAR evaluation |          |          |                     |       |              |                          |               |
|--------------------------------------------------------|----------|----------|---------------------|-------|--------------|--------------------------|---------------|
| Frequency band                                         | Position |          | reported SAR / W/kg |       | ΣSAR         | Calculated distance (mm) | SPLSR (≤0.04) |
|                                                        |          |          | WWAN                | WLAN  | <1.6W/kg     |                          |               |
| LTE FDD Band 7                                         | Head     | RE cheek | 0.295               | 0.797 | 1.092        | -                        | -             |
|                                                        |          | RE tilt  | 0.106               | 0.284 | 0.390        | -                        | -             |
|                                                        |          | LE cheek | 0.382               | 0.193 | 0.575        | -                        | -             |
|                                                        |          | LE tilt  | 0.072               | 0.138 | 0.210        | -                        | -             |
|                                                        | Hotspot  | Front    | 0.539               | 0.120 | 0.659        | -                        | -             |
|                                                        |          | Back     | 1.015               | 0.688 | <b>1.703</b> | 112.4                    | 0.020         |
|                                                        |          | Top      | -                   | 0.049 | -            | -                        | -             |
|                                                        |          | Bottom   | 1.038               | -     | -            | -                        | -             |
|                                                        |          | Right    | 0.160               | -     | -            | -                        | -             |
|                                                        |          | Left     | 0.143               | 0.182 | 0.325        | -                        | -             |

| Conditions          | Position  | SAR Value (W/kg) | Coordinates (cm) |       |       | ΣSAR (W/kg) | Peak Location Separation Distance (mm) | SPLSR | Simultaneous Transmission SAR Test |
|---------------------|-----------|------------------|------------------|-------|-------|-------------|----------------------------------------|-------|------------------------------------|
|                     |           |                  | x                | y     | z     |             |                                        |       |                                    |
| LTE Band 7 CH 21100 | Back side | 1.015            | -0.62            | 5.96  | -0.04 | 1.703       | 112.4                                  | 0.020 | SPLSR<0.04, Not required           |
| 802.11b CH 11       |           | 0.688            | -3.36            | -4.94 | -0.09 |             |                                        |       |                                    |



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| reported SAR WWAN and WLAN DTS 5.8 GHz, $\Sigma$ SAR evaluation |           |          |                     |       |              |                          |                       |
|-----------------------------------------------------------------|-----------|----------|---------------------|-------|--------------|--------------------------|-----------------------|
| Frequency band                                                  | Position  |          | reported SAR / W/kg |       | $\Sigma$ SAR | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                                 |           |          | WWAN                | WLAN  | <1.6W/kg     |                          |                       |
| GSM 850                                                         | Head      | RE cheek | 0.265               | 0.481 | 0.746        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.184               | 0.507 | 0.691        | -                        | -                     |
|                                                                 |           | LE cheek | 0.424               | 0.32  | 0.744        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.176               | 0.346 | 0.522        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.146               | 0.069 | 0.215        | -                        | -                     |
|                                                                 |           | Back     | 0.318               | 0.392 | 0.71         | -                        | -                     |
| GSM 1900                                                        | Head      | RE cheek | 0.09                | 0.481 | 0.571        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.048               | 0.507 | 0.555        | -                        | -                     |
|                                                                 |           | LE cheek | 0.147               | 0.32  | 0.467        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.052               | 0.346 | 0.398        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.304               | 0.069 | 0.373        | -                        | -                     |
|                                                                 |           | Back     | 0.47                | 0.392 | 0.862        | -                        | -                     |
| WCDMA Band II                                                   | Head      | RE cheek | 0.159               | 0.481 | 0.64         | -                        | -                     |
|                                                                 |           | RE tilt  | 0.098               | 0.507 | 0.605        | -                        | -                     |
|                                                                 |           | LE cheek | 0.234               | 0.32  | 0.554        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.082               | 0.346 | 0.428        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.468               | 0.069 | 0.537        | -                        | -                     |
|                                                                 |           | Back     | 0.84                | 0.392 | 1.232        | -                        | -                     |
| WCDMA Band IV                                                   | Head      | RE cheek | 0.41                | 0.481 | 0.891        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.109               | 0.507 | 0.616        | -                        | -                     |
|                                                                 |           | LE cheek | 0.519               | 0.32  | 0.839        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.081               | 0.346 | 0.427        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.635               | 0.069 | 0.704        | -                        | -                     |
|                                                                 |           | Back     | 0.689               | 0.392 | 1.081        | -                        | -                     |
| WCDMA Band V                                                    | Head      | RE cheek | 0.31                | 0.481 | 0.791        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.208               | 0.507 | 0.715        | -                        | -                     |
|                                                                 |           | LE cheek | 0.392               | 0.32  | 0.712        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.213               | 0.346 | 0.559        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.238               | 0.069 | 0.307        | -                        | -                     |
|                                                                 |           | Back     | 0.318               | 0.392 | 0.71         | -                        | -                     |

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| reported SAR WWAN and WLAN DTS 5.8 GHz, $\Sigma$ SAR evaluation |           |          |                     |       |              |                          |                       |
|-----------------------------------------------------------------|-----------|----------|---------------------|-------|--------------|--------------------------|-----------------------|
| Frequency band                                                  | Position  |          | reported SAR / W/kg |       | $\Sigma$ SAR | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                                 |           |          | WWAN                | WLAN  | <1.6W/kg     |                          |                       |
| LTE FDD Band 2                                                  | Head      | RE cheek | 0.384               | 0.481 | 0.865        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.118               | 0.507 | 0.625        | -                        | -                     |
|                                                                 |           | LE cheek | 0.432               | 0.32  | 0.752        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.082               | 0.346 | 0.428        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.437               | 0.069 | 0.506        | -                        | -                     |
|                                                                 |           | Back     | 0.81                | 0.392 | 1.202        | -                        | -                     |
| LTE FDD Band 4                                                  | Head      | RE cheek | 0.318               | 0.481 | 0.799        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.108               | 0.507 | 0.615        | -                        | -                     |
|                                                                 |           | LE cheek | 0.388               | 0.32  | 0.708        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.044               | 0.346 | 0.39         | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.304               | 0.069 | 0.373        | -                        | -                     |
|                                                                 |           | Back     | 0.571               | 0.392 | 0.963        | -                        | -                     |
| LTE FDD Band 5                                                  | Head      | RE cheek | 0.355               | 0.481 | 0.836        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.242               | 0.507 | 0.749        | -                        | -                     |
|                                                                 |           | LE cheek | 0.444               | 0.32  | 0.764        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.239               | 0.346 | 0.585        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.376               | 0.069 | 0.445        | -                        | -                     |
|                                                                 |           | Back     | 0.541               | 0.392 | 0.933        | -                        | -                     |
| LTE FDD Band 7                                                  | Head      | RE cheek | 0.295               | 0.481 | 0.776        | -                        | -                     |
|                                                                 |           | RE tilt  | 0.106               | 0.507 | 0.613        | -                        | -                     |
|                                                                 |           | LE cheek | 0.382               | 0.32  | 0.702        | -                        | -                     |
|                                                                 |           | LE tilt  | 0.072               | 0.346 | 0.418        | -                        | -                     |
|                                                                 | Body-Worn | Front    | 0.28                | 0.069 | 0.349        | -                        | -                     |
|                                                                 |           | Back     | 0.507               | 0.392 | 0.899        | -                        | -                     |

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| reported SAR WWAN and WLAN DTS 5 GHz, $\Sigma$ SAR evaluation |           |          |                     |       |              |                          |                       |
|---------------------------------------------------------------|-----------|----------|---------------------|-------|--------------|--------------------------|-----------------------|
| Frequency band                                                | Position  |          | reported SAR / W/kg |       | $\Sigma$ SAR | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                               |           |          | WWAN                | WLAN  | <1.6W/kg     |                          |                       |
| GSM 850                                                       | Head      | RE cheek | 0.265               | 0.424 | 0.689        | -                        | -                     |
|                                                               |           | RE tilt  | 0.184               | 0.389 | 0.573        | -                        | -                     |
|                                                               |           | LE cheek | 0.424               | 0.288 | 0.712        | -                        | -                     |
|                                                               |           | LE tilt  | 0.176               | 0.283 | 0.459        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.146               | 0.05  | 0.196        | -                        | -                     |
|                                                               |           | Back     | 0.318               | 0.408 | 0.726        | -                        | -                     |
| GSM 1900                                                      | Head      | RE cheek | 0.09                | 0.424 | 0.514        | -                        | -                     |
|                                                               |           | RE tilt  | 0.048               | 0.389 | 0.437        | -                        | -                     |
|                                                               |           | LE cheek | 0.147               | 0.288 | 0.435        | -                        | -                     |
|                                                               |           | LE tilt  | 0.052               | 0.283 | 0.335        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.304               | 0.05  | 0.354        | -                        | -                     |
|                                                               |           | Back     | 0.47                | 0.408 | 0.878        | -                        | -                     |
| WCDMA Band II                                                 | Head      | RE cheek | 0.159               | 0.424 | 0.583        | -                        | -                     |
|                                                               |           | RE tilt  | 0.098               | 0.389 | 0.487        | -                        | -                     |
|                                                               |           | LE cheek | 0.234               | 0.288 | 0.522        | -                        | -                     |
|                                                               |           | LE tilt  | 0.082               | 0.283 | 0.365        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.468               | 0.05  | 0.518        | -                        | -                     |
|                                                               |           | Back     | 0.84                | 0.408 | 1.248        | -                        | -                     |
| WCDMA Band IV                                                 | Head      | RE cheek | 0.41                | 0.424 | 0.834        | -                        | -                     |
|                                                               |           | RE tilt  | 0.109               | 0.389 | 0.498        | -                        | -                     |
|                                                               |           | LE cheek | 0.519               | 0.288 | 0.807        | -                        | -                     |
|                                                               |           | LE tilt  | 0.081               | 0.283 | 0.364        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.635               | 0.05  | 0.685        | -                        | -                     |
|                                                               |           | Back     | 0.689               | 0.408 | 1.097        | -                        | -                     |
| WCDMA Band V                                                  | Head      | RE cheek | 0.31                | 0.424 | 0.734        | -                        | -                     |
|                                                               |           | RE tilt  | 0.208               | 0.389 | 0.597        | -                        | -                     |
|                                                               |           | LE cheek | 0.392               | 0.288 | 0.68         | -                        | -                     |
|                                                               |           | LE tilt  | 0.213               | 0.283 | 0.496        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.238               | 0.05  | 0.288        | -                        | -                     |
|                                                               |           | Back     | 0.318               | 0.408 | 0.726        | -                        | -                     |

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| reported SAR WWAN and WLAN DTS 5 GHz, $\Sigma$ SAR evaluation |           |          |                     |       |              |                          |                       |
|---------------------------------------------------------------|-----------|----------|---------------------|-------|--------------|--------------------------|-----------------------|
| Frequency band                                                | Position  |          | reported SAR / W/kg |       | $\Sigma$ SAR | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                               |           |          | WWAN                | WLAN  | <1.6W/kg     |                          |                       |
| LTE FDD Band 2                                                | Head      | RE cheek | 0.384               | 0.424 | 0.808        | -                        | -                     |
|                                                               |           | RE tilt  | 0.118               | 0.389 | 0.507        | -                        | -                     |
|                                                               |           | LE cheek | 0.432               | 0.288 | 0.72         | -                        | -                     |
|                                                               |           | LE tilt  | 0.082               | 0.283 | 0.365        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.437               | 0.05  | 0.487        | -                        | -                     |
|                                                               |           | Back     | 0.81                | 0.408 | 1.218        | -                        | -                     |
| LTE FDD Band 4                                                | Head      | RE cheek | 0.318               | 0.424 | 0.742        | -                        | -                     |
|                                                               |           | RE tilt  | 0.108               | 0.389 | 0.497        | -                        | -                     |
|                                                               |           | LE cheek | 0.388               | 0.288 | 0.676        | -                        | -                     |
|                                                               |           | LE tilt  | 0.044               | 0.283 | 0.327        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.304               | 0.05  | 0.354        | -                        | -                     |
|                                                               |           | Back     | 0.571               | 0.408 | 0.979        | -                        | -                     |
| LTE FDD Band 5                                                | Head      | RE cheek | 0.355               | 0.424 | 0.779        | -                        | -                     |
|                                                               |           | RE tilt  | 0.242               | 0.389 | 0.631        | -                        | -                     |
|                                                               |           | LE cheek | 0.444               | 0.288 | 0.732        | -                        | -                     |
|                                                               |           | LE tilt  | 0.239               | 0.283 | 0.522        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.376               | 0.05  | 0.426        | -                        | -                     |
|                                                               |           | Back     | 0.541               | 0.408 | 0.949        | -                        | -                     |
| LTE FDD Band 7                                                | Head      | RE cheek | 0.295               | 0.424 | 0.719        | -                        | -                     |
|                                                               |           | RE tilt  | 0.106               | 0.389 | 0.495        | -                        | -                     |
|                                                               |           | LE cheek | 0.382               | 0.288 | 0.67         | -                        | -                     |
|                                                               |           | LE tilt  | 0.072               | 0.283 | 0.355        | -                        | -                     |
|                                                               | Body-Worn | Front    | 0.28                | 0.05  | 0.33         | -                        | -                     |
|                                                               |           | Back     | 0.507               | 0.408 | 0.915        | -                        | -                     |

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| reported SAR WWAN and Bluetooth, $\Sigma$ SAR evaluation |           |        |                     |           |                   |                          |                       |
|----------------------------------------------------------|-----------|--------|---------------------|-----------|-------------------|--------------------------|-----------------------|
| Frequency band                                           | Position  |        | reported SAR / W/kg |           | $\Sigma$ SAR      | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                          |           |        | WWAN                | Bluetooth | $<1.6\text{W/kg}$ |                          |                       |
| GSM 850                                                  | Body-Worn | Front  | 0.146               | 0.048     | 0.194             | -                        | -                     |
|                                                          |           | Back   | 0.318               | 0.048     | 0.366             | -                        | -                     |
| GPRS 850 (1Dn4UP)                                        | Hotspot   | Front  | 0.337               | 0.072     | 0.409             | -                        | -                     |
|                                                          |           | Back   | 0.7                 | 0.072     | 0.772             | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -                 | -                        | -                     |
|                                                          |           | Bottom | 0.182               | 0.072     | 0.254             | -                        | -                     |
|                                                          |           | Right  | 0.28                | 0.072     | 0.352             | -                        | -                     |
|                                                          |           | Left   | 0.478               | 0.072     | 0.55              | -                        | -                     |
| GSM 1900                                                 | Body-Worn | Front  | 0.304               | 0.048     | 0.352             | -                        | -                     |
|                                                          |           | Back   | 0.47                | 0.048     | 0.518             | -                        | -                     |
| GPRS 1900 (1Dn4UP)                                       | Hotspot   | Front  | 0.432               | 0.072     | 0.504             | -                        | -                     |
|                                                          |           | Back   | 0.711               | 0.072     | 0.783             | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -                 | -                        | -                     |
|                                                          |           | Bottom | 0.898               | 0.072     | 0.97              | -                        | -                     |
|                                                          |           | Right  | 0.11                | 0.072     | 0.182             | -                        | -                     |
|                                                          |           | Left   | 0.124               | 0.072     | 0.196             | -                        | -                     |
| WCDMA Band II                                            | Body-Worn | Front  | 0.468               | 0.048     | 0.516             | -                        | -                     |
|                                                          |           | Back   | 0.84                | 0.048     | 0.888             | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.53                | 0.072     | 0.602             | -                        | -                     |
|                                                          |           | Back   | 0.989               | 0.072     | 1.061             | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -                 | -                        | -                     |
|                                                          |           | Bottom | 1.02                | 0.072     | 1.092             | -                        | -                     |
|                                                          |           | Right  | 0.078               | 0.072     | 0.15              | -                        | -                     |
|                                                          |           | Left   | 0.125               | 0.072     | 0.197             | -                        | -                     |

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| reported SAR WWAN and Bluetooth, $\Sigma$ SAR evaluation |           |        |                     |           |              |                          |                       |
|----------------------------------------------------------|-----------|--------|---------------------|-----------|--------------|--------------------------|-----------------------|
| Frequency band                                           | Position  |        | reported SAR / W/kg |           | $\Sigma$ SAR | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                          |           |        | WWAN                | Bluetooth | <1.6W/kg     |                          |                       |
| WCDMA Band IV                                            | Body-Worn | Front  | 0.635               | 0.048     | 0.683        | -                        | -                     |
|                                                          |           | Back   | 0.689               | 0.048     | 0.737        | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.745               | 0.072     | 0.817        | -                        | -                     |
|                                                          |           | Back   | 0.764               | 0.072     | 0.836        | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -            | -                        | -                     |
|                                                          |           | Bottom | 1.192               | 0.072     | 1.264        | -                        | -                     |
|                                                          |           | Right  | 0.191               | 0.072     | 0.263        | -                        | -                     |
|                                                          |           | Left   | 0.175               | 0.072     | 0.247        | -                        | -                     |
| WCDMA Band V                                             | Body-Worn | Front  | 0.238               | 0.048     | 0.286        | -                        | -                     |
|                                                          |           | Back   | 0.318               | 0.048     | 0.366        | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.497               | 0.072     | 0.569        | -                        | -                     |
|                                                          |           | Back   | 0.837               | 0.072     | 0.909        | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -            | -                        | -                     |
|                                                          |           | Bottom | 0.204               | 0.072     | 0.276        | -                        | -                     |
|                                                          |           | Right  | 0.345               | 0.072     | 0.417        | -                        | -                     |
|                                                          |           | Left   | 0.553               | 0.072     | 0.625        | -                        | -                     |
| LTE FDD Band 2                                           | Body-Worn | Front  | 0.437               | 0.048     | 0.485        | -                        | -                     |
|                                                          |           | Back   | 0.81                | 0.048     | 0.858        | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.449               | 0.072     | 0.521        | -                        | -                     |
|                                                          |           | Back   | 0.838               | 0.072     | 0.91         | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -            | -                        | -                     |
|                                                          |           | Bottom | 1.01                | 0.072     | 1.082        | -                        | -                     |
|                                                          |           | Right  | 0.093               | 0.072     | 0.165        | -                        | -                     |
|                                                          |           | Left   | 0.099               | 0.072     | 0.171        | -                        | -                     |

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| reported SAR WWAN and Bluetooth, $\Sigma$ SAR evaluation |           |        |                     |           |                   |                          |                       |
|----------------------------------------------------------|-----------|--------|---------------------|-----------|-------------------|--------------------------|-----------------------|
| Frequency band                                           | Position  |        | reported SAR / W/kg |           | $\Sigma$ SAR      | Calculated distance (mm) | SPLSR ( $\leq 0.04$ ) |
|                                                          |           |        | WWAN                | Bluetooth | $<1.6\text{W/kg}$ |                          |                       |
| LTE FDD Band 4                                           | Body-Worn | Front  | 0.304               | 0.048     | 0.352             | -                        | -                     |
|                                                          |           | Back   | 0.571               | 0.048     | 0.619             | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.574               | 0.072     | 0.646             | -                        | -                     |
|                                                          |           | Back   | 0.984               | 0.072     | 1.056             | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -                 | -                        | -                     |
|                                                          |           | Bottom | 1.307               | 0.072     | 1.379             | -                        | -                     |
|                                                          |           | Right  | 0.231               | 0.072     | 0.303             | -                        | -                     |
|                                                          |           | Left   | 0.253               | 0.072     | 0.325             | -                        | -                     |
| LTE FDD Band 5                                           | Body-Worn | Front  | 0.376               | 0.048     | 0.424             | -                        | -                     |
|                                                          |           | Back   | 0.541               | 0.048     | 0.589             | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.433               | 0.072     | 0.505             | -                        | -                     |
|                                                          |           | Back   | 0.762               | 0.072     | 0.834             | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -                 | -                        | -                     |
|                                                          |           | Bottom | 0.2                 | 0.072     | 0.272             | -                        | -                     |
|                                                          |           | Right  | 0.267               | 0.072     | 0.339             | -                        | -                     |
|                                                          |           | Left   | 0.321               | 0.072     | 0.393             | -                        | -                     |
| LTE FDD Band 7                                           | Body-Worn | Front  | 0.28                | 0.048     | 0.328             | -                        | -                     |
|                                                          |           | Back   | 0.507               | 0.048     | 0.555             | -                        | -                     |
|                                                          | Hotspot   | Front  | 0.539               | 0.072     | 0.611             | -                        | -                     |
|                                                          |           | Back   | 1.015               | 0.072     | 1.087             | -                        | -                     |
|                                                          |           | Top    | -                   | 0.072     | -                 | -                        | -                     |
|                                                          |           | Bottom | 1.038               | 0.072     | 1.11              | -                        | -                     |
|                                                          |           | Right  | 0.160               | 0.072     | 0.232             | -                        | -                     |
|                                                          |           | Left   | 0.143               | 0.072     | 0.215             | -                        | -                     |

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## 4. Instruments List

| Device                       | Manufacturer                    | Type            | Serial number | Date of last calibration | Date of next calibration |
|------------------------------|---------------------------------|-----------------|---------------|--------------------------|--------------------------|
| Dosimetric E-Field Probe     | Schmid & Partner Engineering AG | EX3DV4          | 3923          | Aug.28,2014              | Aug.27,2015              |
|                              |                                 |                 | 3831          | Jan.31,2014              | Jan.30,2015              |
|                              |                                 |                 | 3938          | Jul.25,2014              | Jul.24,2015              |
|                              |                                 |                 | 3770          | Apr.24,2014              | Apr.23,2015              |
| System Validation Dipole     | Schmid & Partner Engineering AG | D835V2          | 4d063         | Aug.28,2014              | Aug.27,2015              |
|                              |                                 | D1750V2         | 1008          | Aug.28,2014              | Aug.27,2015              |
|                              |                                 | D1900V2         | 5d027         | Apr.23,2014              | Apr.22,2015              |
|                              |                                 | D2450V2         | 727           | Apr.23,2014              | Apr.22,2015              |
|                              |                                 | D2600V2         | 1005          | Jan.28,2014              | Jan.27,2015              |
|                              |                                 | D5GHzV2         | 1104          | Apr.16,2014              | Apr.15,2015              |
| Data acquisition Electronics | Schmid & Partner Engineering AG | DAE4            | 1260          | Aug.26,2014              | Aug.25,2015              |
|                              |                                 |                 | 915           | Jun.18,2014              | Jun.17,2015              |
|                              |                                 |                 | 856           | Aug.27,2014              | Aug.26,2015              |
|                              |                                 |                 | 1374          | Nov.18,2014              | Nov.17,2015              |
| Software                     | Schmid & Partner Engineering AG | DASY 52 V52.8.8 | N/A           | Calibration not required | Calibration not required |
| Phantom                      | Schmid & Partner Engineering AG | SAM             | N/A           | Calibration not required | Calibration not required |
| Network Analyzer             | Agilent                         | E5071C          | MY46107530    | Feb.14,2014              | Feb.13,2015              |
| Dielectric Probe Kit         | Agilent                         | 85070E          | MY44300677    | Calibration not required | Calibration not required |
| Dual-directional coupler     | Agilent                         | 772D            | MY46151242    | Jul.14,2014              | Jul.13,2015              |
|                              |                                 | 778D            | MY48220468    | Apr.01,2014              | Mar.31,2015              |
| RF Signal Generator          | Agilent                         | N5181A          | MY50141235    | Dec.14,2013              | Dec.13,2016              |
| Power Meter                  | Agilent                         | E4417A          | MY52240003    | Apr.30,2014              | Apr.29,2015              |
| Power Sensor                 | Agilent                         | E9301H          | MY52200004    | Apr.30,2014              | Apr.29,2015              |

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| Device                   | Manufacturer        | Type     | Serial number | Date of last calibration | Date of next calibration |
|--------------------------|---------------------|----------|---------------|--------------------------|--------------------------|
| Radio Communication Test | R&S                 | CMU200   | 122498        | Aug.14,2014              | Aug.13,2015              |
| Radio Communication Test | Anritsu             | MT8820C  | 6201061014    | Aug.06,2014              | Aug.05,2015              |
| TECPEL                   | Digital thermometer | DTM-303A | TP130074      | Mar.20,2014              | Mar.19,2015              |

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## 5. Measurements

Date: 2014/11/17

### GSM 850\_Head\_Le Cheek\_CH 128

Communication System: GSM Frequency: 824.2 MHz, Duty factor: 1:8.3

Medium parameters used:  $f = 824.2$  MHz;  $\sigma = 0.872$  S/m;  $\epsilon_r = 41.276$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.14, 9.14, 9.14); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (71x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.460 W/kg

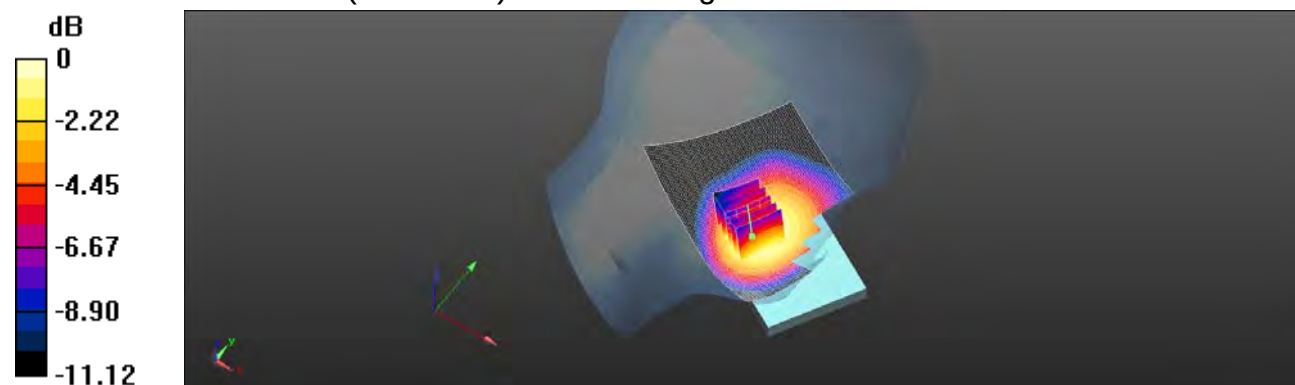
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.938 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.498 W/kg

**SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.286 W/kg**

Maximum value of SAR (measured) = 0.448 W/kg



0 dB = 0.448 W/kg = -3.49 dBW/kg

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Date: 2014/11/17

## GSM 850\_Speech mode\_Back side\_CH 128\_15mm

Communication System: GSM Frequency: 824.2 MHz, Duty factor: 1:8.3

Medium parameters used:  $f = 824.2 \text{ MHz}$ ;  $\sigma = 1.001 \text{ S/m}$ ;  $\epsilon_r = 52.977$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 0.400 W/kg

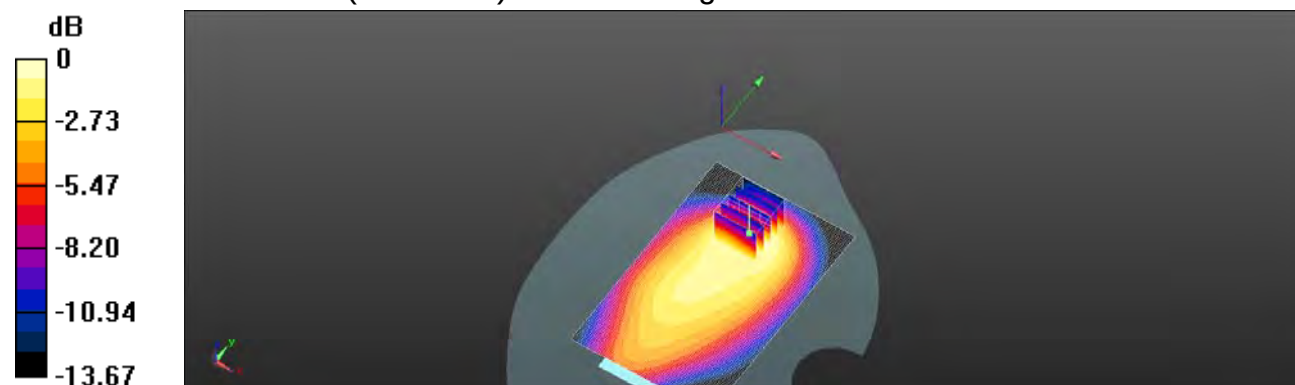
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 15.80 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.459 W/kg

**SAR(1 g) = 0.290 W/kg; SAR(10 g) = 0.183 W/kg**

Maximum value of SAR (measured) = 0.381 W/kg



0 dB = 0.381 W/kg = -4.19 dBW/kg

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# **GPRS 850\_Hotspot mode\_Back side\_CH 128\_10mm**

Communication System: GPRS (1Dn1Up) Frequency: 824.2 MHz, Duty factor: 1:8.3  
Medium parameters used:  $f = 824.2 \text{ MHz}$ ;  $\sigma = 1.001 \text{ S/m}$ ;  $\epsilon_r = 52.977$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.741 \text{ W/kg}$

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $26.43 \text{ V/m}$ ; Power Drift =  $0.07 \text{ dB}$

Peak SAR (extrapolated) =  $0.819 \text{ W/kg}$

**SAR(1 g) =  $0.638 \text{ W/kg}$ ; SAR(10 g) =  $0.473 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.737 \text{ W/kg}$

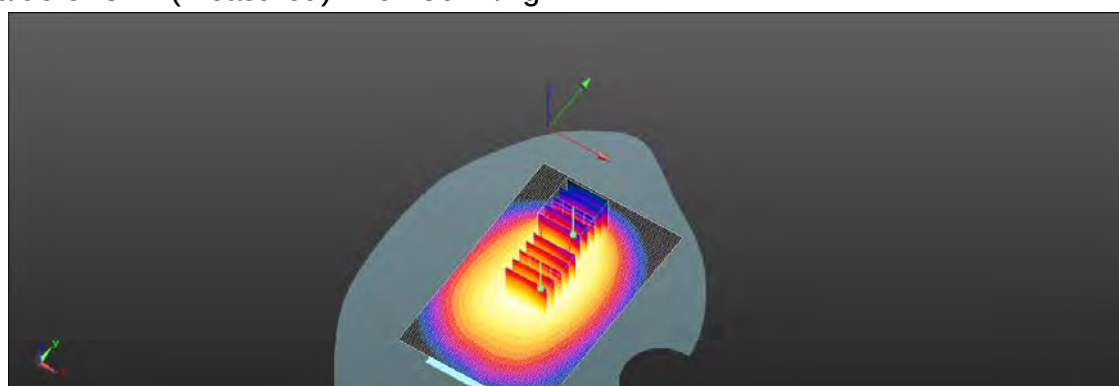
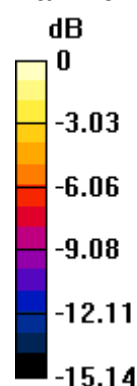
**Configuration/Body/Zoom Scan (5x5x7)/Cube 1:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $26.43 \text{ V/m}$ ; Power Drift =  $0.07 \text{ dB}$

Peak SAR (extrapolated) =  $0.946 \text{ W/kg}$

**SAR(1 g) =  $0.578 \text{ W/kg}$ ; SAR(10 g) =  $0.361 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.756 \text{ W/kg}$



0 dB =  $0.756 \text{ W/kg}$  =  $-1.21 \text{ dBW/kg}$

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Date: 2014/11/19

## GSM 1900\_Head\_Le Cheek\_CH 810

Communication System: GSM Frequency: 1909.8 MHz, Duty factor: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.398$  S/m;  $\epsilon_r = 39.531$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.79, 7.79, 7.79); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (71x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.184 W/kg

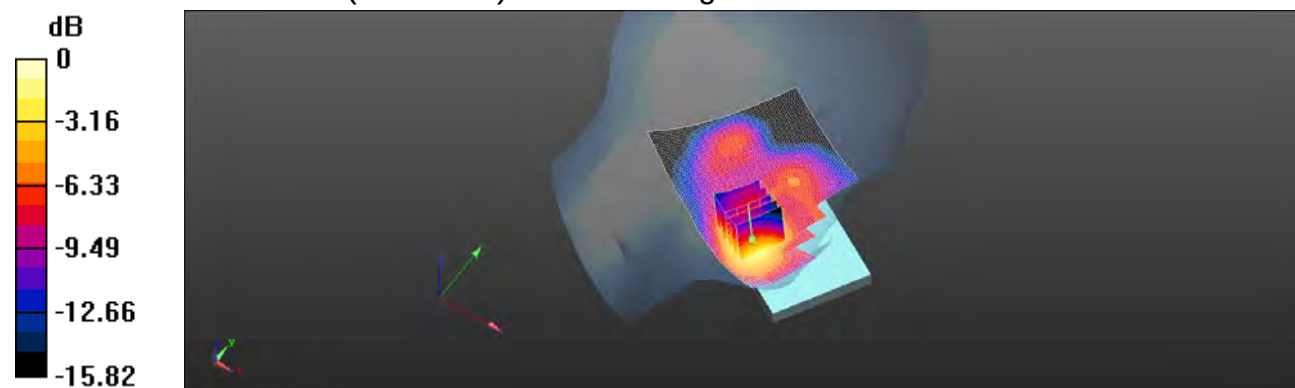
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.042 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.219 W/kg

**SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.091 W/kg**

Maximum value of SAR (measured) = 0.183 W/kg



0 dB = 0.183 W/kg = -7.38 dBW/kg

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## GSM 1900\_Speech mode\_Back side\_CH 810\_15mm

Communication System: GSM Frequency: 1909.8 MHz, Duty factor: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.505$  S/m;  $\epsilon_r = 51.618$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.613 W/kg

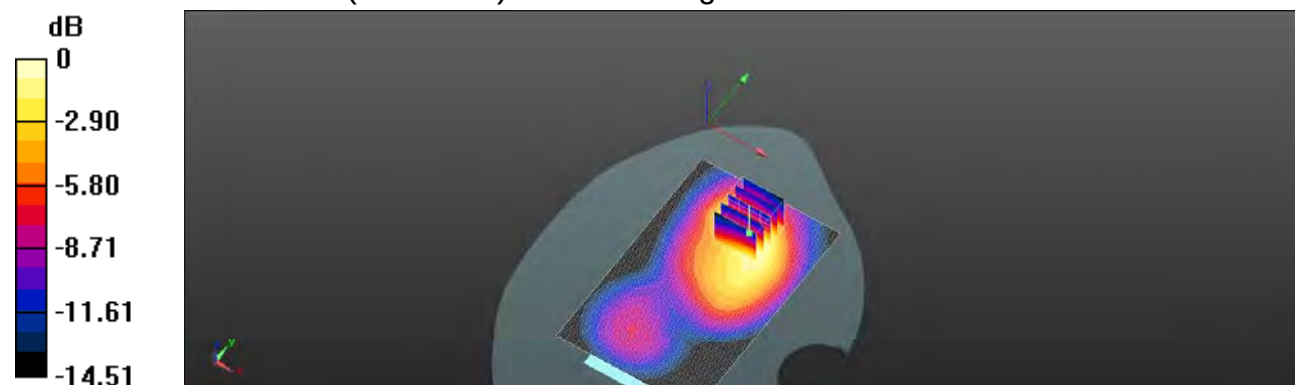
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.986 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.721 W/kg

**SAR(1 g) = 0.470 W/kg; SAR(10 g) = 0.283 W/kg**

Maximum value of SAR (measured) = 0.606 W/kg



0 dB = 0.606 W/kg = -2.18 dBW/kg

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## GPRS 1900\_Hotspot mode\_Bottom side\_CH 810\_10mm

Communication System: GPRS (1Dn1Up) Frequency: 1909.8 MHz, Duty factor: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.505$  S/m;  $\epsilon_r = 51.618$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (41x61x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.22 W/kg

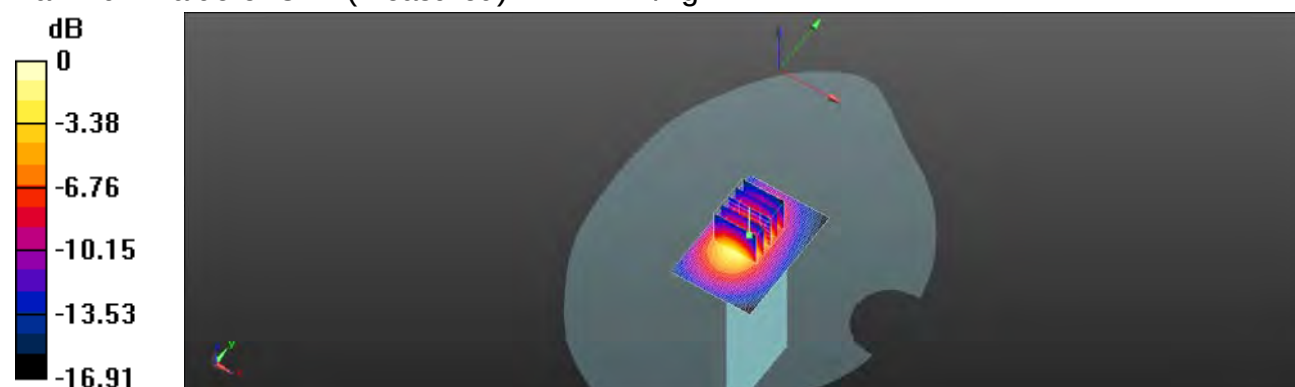
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.13 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.48 W/kg

**SAR(1 g) = 0.898 W/kg; SAR(10 g) = 0.485 W/kg**

Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/kg

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**WCDMA Band 2\_Head\_Le Cheek\_CH 9538**

Communication System: WCDMA Frequency: 1907.6 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.396$  S/m;  $\epsilon_r = 39.538$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3831; ConvF(7.79, 7.79, 7.79); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (71x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.290 W/kg

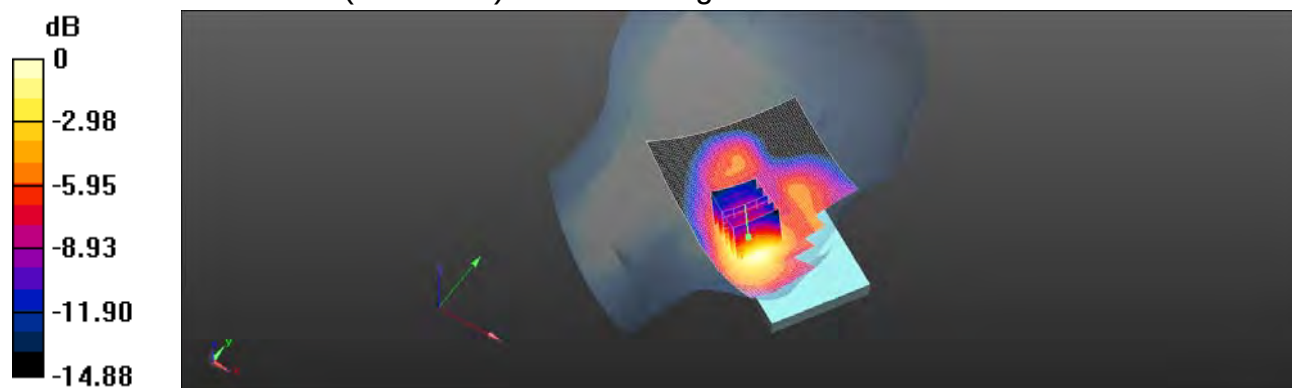
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.050 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.352 W/kg

**SAR(1 g) = 0.228 W/kg; SAR(10 g) = 0.139 W/kg**

Maximum value of SAR (measured) = 0.281 W/kg



0 dB = 0.281 W/kg = -5.51 dBW/kg

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## WCDMA Band 2\_Speech mode\_Back side\_CH 9538\_repeat SAR test at the highest SAR measurement\_15mm

Communication System: WCDMA Frequency: 1907.6 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1908 \text{ MHz}$ ;  $\sigma = 1.503 \text{ S/m}$ ;  $\epsilon_r = 51.621$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 1.05 W/kg

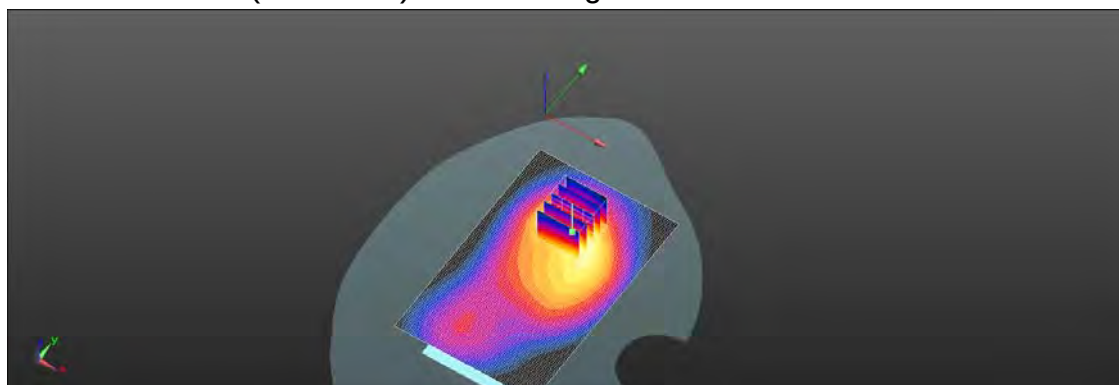
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 12.71 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.27 W/kg

**SAR(1 g) = 0.817 W/kg; SAR(10 g) = 0.489 W/kg**

Maximum value of SAR (measured) = 1.07 W/kg



0 dB = 1.07 W/kg = 0.29 dBW/kg

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## WCDMA Band 2\_Hotspot mode\_Bottom side\_CH 9262\_10mm

Communication System: WCDMA Frequency: 1852.4 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1852.4 \text{ MHz}$ ;  $\sigma = 1.459 \text{ S/m}$ ;  $\epsilon_r = 51.902$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (51x71x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 1.27 W/kg

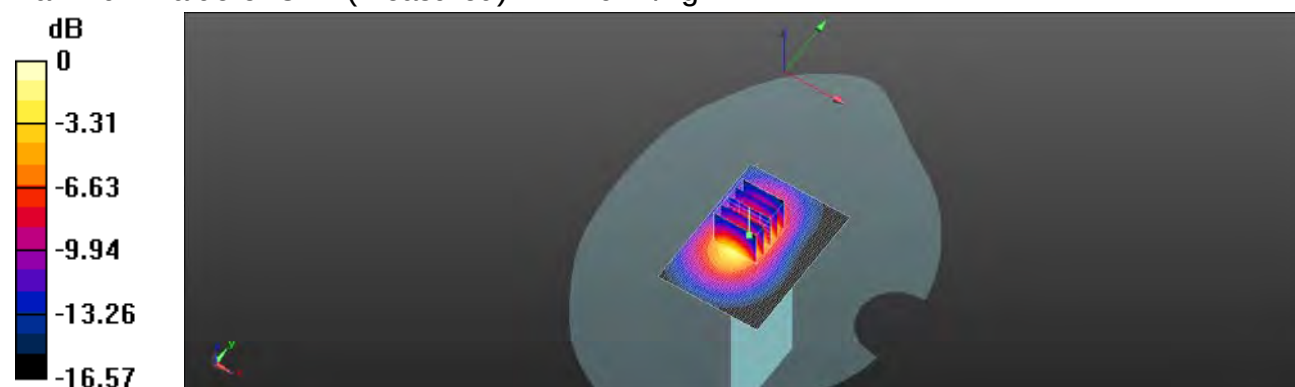
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 16.70 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.50 W/kg

**SAR(1 g) = 0.918 W/kg; SAR(10 g) = 0.498 W/kg**

Maximum value of SAR (measured) = 1.26 W/kg



0 dB = 1.26 W/kg = 1.00 dBW/kg

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**WCDMA Band 4\_Head\_Le Cheek\_CH 1312**

Communication System: WCDMA Frequency: 1712.4 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1712.4$  MHz;  $\sigma = 1.343$  S/m;  $\epsilon_r = 39.596$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(8, 8, 8); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (71x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.649 W/kg

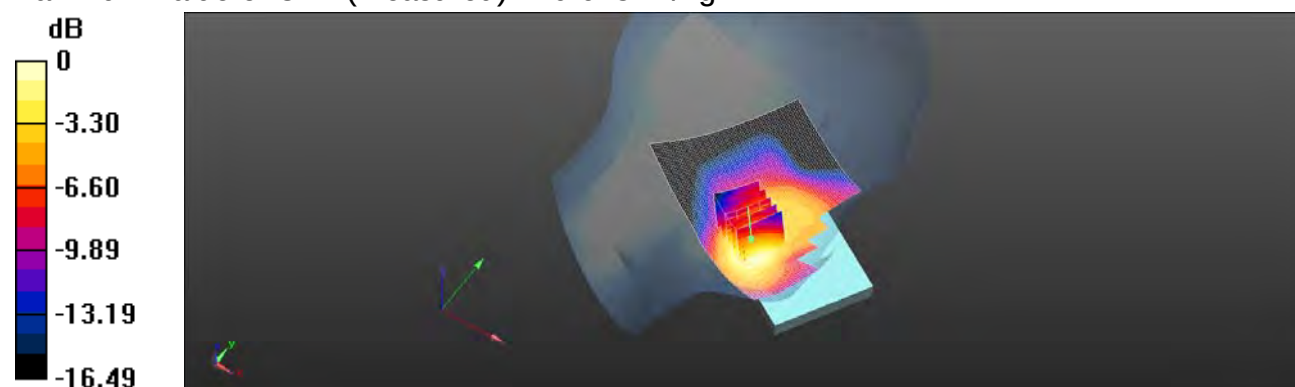
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.064 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.749 W/kg

**SAR(1 g) = 0.519 W/kg; SAR(10 g) = 0.338 W/kg**

Maximum value of SAR (measured) = 0.613 W/kg



0 dB = 0.613 W/kg = -2.13 dBW/kg

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## WCDMA Band 4\_Speech mode\_Back side\_CH 1312\_15mm

Communication System: WCDMA Frequency: 1712.4 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1712.4 \text{ MHz}$ ;  $\sigma = 1.431 \text{ S/m}$ ;  $\epsilon_r = 54.495$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 0.830 W/kg

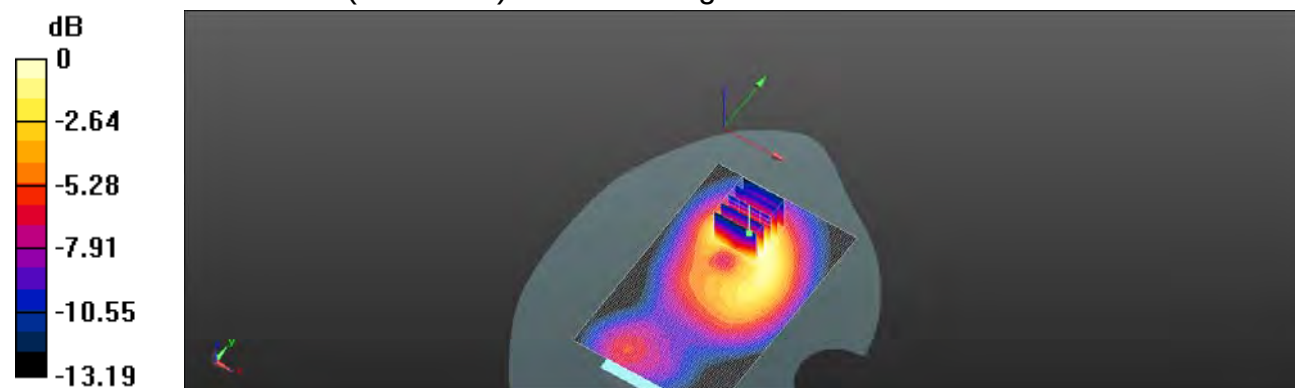
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 13.50 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.689 W/kg; SAR(10 g) = 0.427 W/kg**

Maximum value of SAR (measured) = 0.875 W/kg



0 dB = 0.875 W/kg = -0.58 dBW/kg

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## WCDMA Band 4\_Hotspot mode\_Bottom side\_CH 1513\_10mm

Communication System: WCDMA Frequency: 1752.6 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1753$  MHz;  $\sigma = 1.461$  S/m;  $\epsilon_r = 54.383$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (51x81x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.33 W/kg

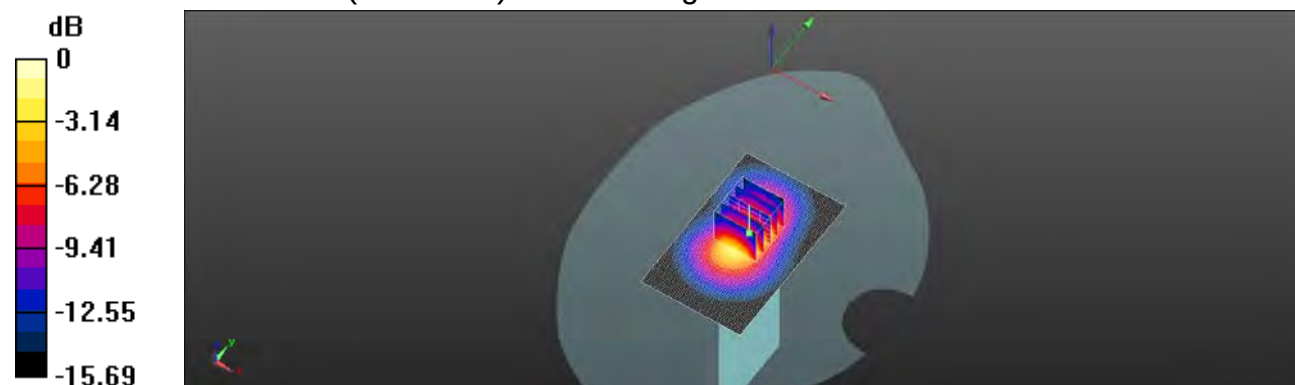
**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.84 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.52 W/kg

**SAR(1 g) = 0.947 W/kg; SAR(10 g) = 0.517 W/kg**

Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kg = 1.11 dBW/kg

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## WCDMA Band 5\_Head\_Le Cheek\_CH 4132

Communication System: WCDMA Frequency: 826.4 MHz, Duty factor: 1:1

Medium parameters used:  $f = 826.4 \text{ MHz}$ ;  $\sigma = 0.874 \text{ S/m}$ ;  $\epsilon_r = 41.25$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.14, 9.14, 9.14); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 0.443 W/kg

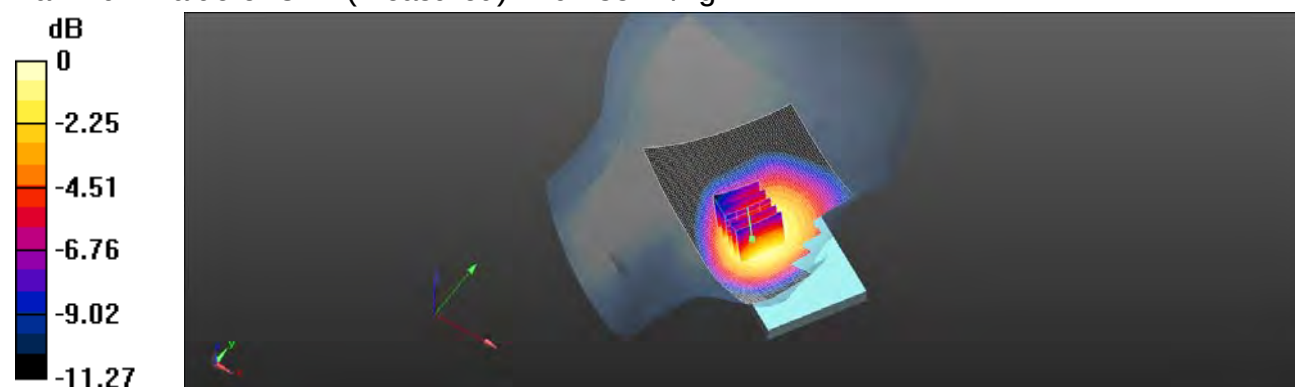
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 4.960 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.486 W/kg

**SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.273 W/kg**

Maximum value of SAR (measured) = 0.435 W/kg



0 dB = 0.435 W/kg = -3.62 dBW/kg

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## WCDMA Band 5\_Speech mode\_Back side\_CH 4132\_15mm

Communication System: WCDMA Frequency: 826.4 MHz, Duty factor: 1:1

Medium parameters used:  $f = 826.4 \text{ MHz}$ ;  $\sigma = 1.004 \text{ S/m}$ ;  $\epsilon_r = 52.958$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

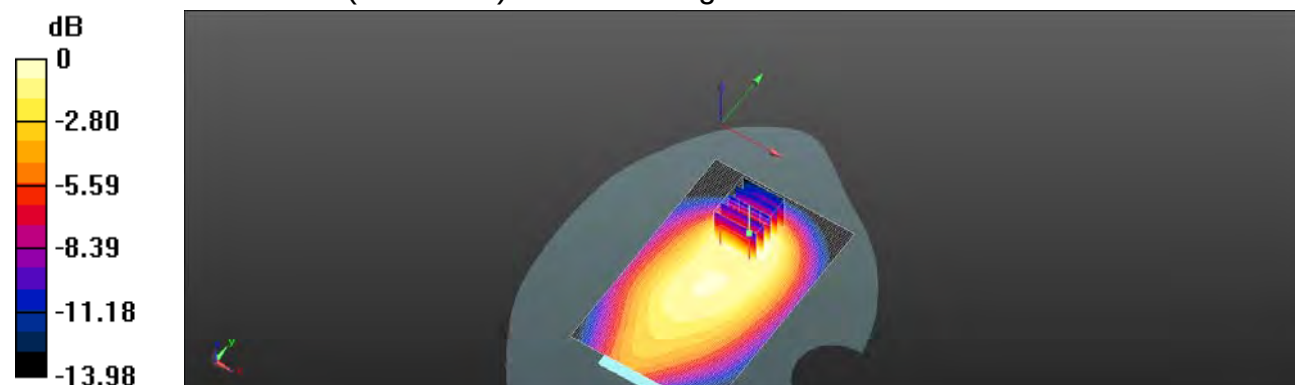
Maximum value of SAR (interpolated) =  $0.393 \text{ W/kg}$ 

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $17.63 \text{ V/m}$ ; Power Drift =  $0.02 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.461 \text{ W/kg}$ 

**SAR(1 g) =  $0.294 \text{ W/kg}$ ; SAR(10 g) =  $0.190 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.382 \text{ W/kg}$ 


0 dB =  $0.382 \text{ W/kg}$  =  $-4.18 \text{ dBW/kg}$

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# WCDMA Band 5\_Hotspot mode\_Back side\_CH 4132\_10mm

Communication System: WCDMA Frequency: 826.4 MHz, Duty factor: 1:1

Medium parameters used:  $f = 826.4 \text{ MHz}$ ;  $\sigma = 1.004 \text{ S/m}$ ;  $\epsilon_r = 52.958$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (71x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.930 \text{ W/kg}$ 

**Configuration/Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $29.90 \text{ V/m}$ ; Power Drift =  $0.01 \text{ dB}$ 

Peak SAR (extrapolated) =  $1.03 \text{ W/kg}$ 

**SAR(1 g) =  $0.796 \text{ W/kg}$ ; SAR(10 g) =  $0.587 \text{ W/kg}$**

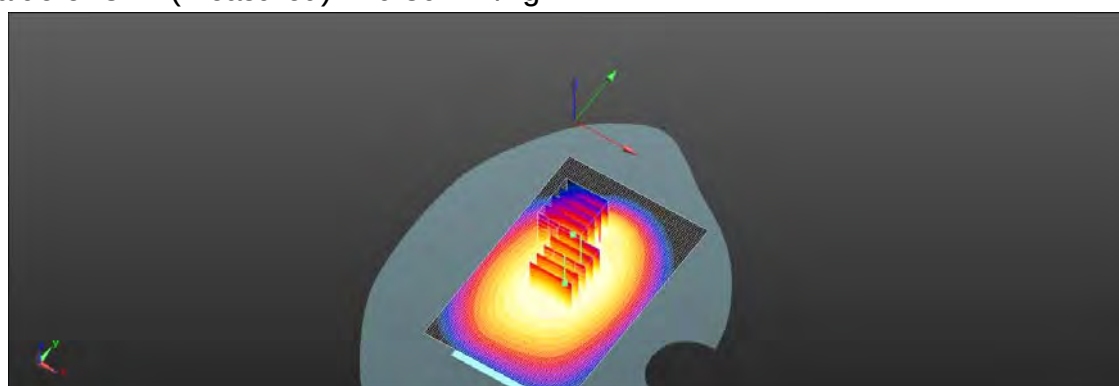
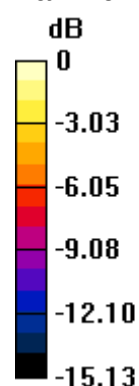
Maximum value of SAR (measured) =  $0.929 \text{ W/kg}$ 

**Configuration/Body/Zoom Scan (5x5x7)/Cube 1:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $29.90 \text{ V/m}$ ; Power Drift =  $0.01 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.905 \text{ W/kg}$ 

**SAR(1 g) =  $0.608 \text{ W/kg}$ ; SAR(10 g) =  $0.414 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.804 \text{ W/kg}$ 


0 dB =  $0.804 \text{ W/kg}$  =  $-0.95 \text{ dBW/kg}$

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**LTE Band 2 (20MHz)\_Head\_Le Cheek\_CH 19100\_QPSK\_1-99**

Communication System: LTE; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.432$  S/m;  $\epsilon_r = 39.256$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.65, 7.65, 7.65); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (71x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.579 W/kg

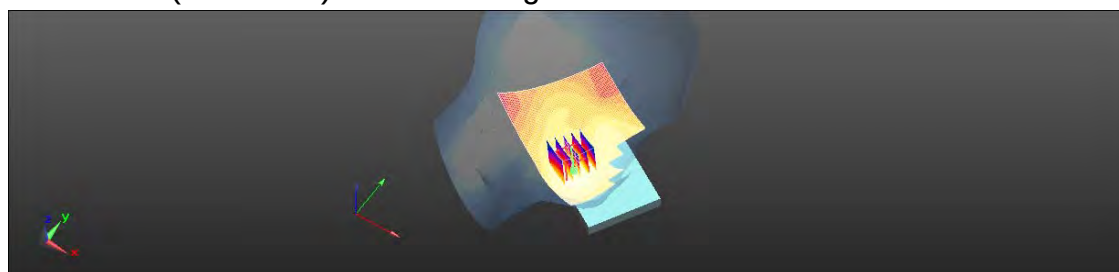
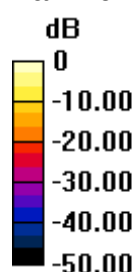
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.023 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.683 W/kg

**SAR(1 g) = 0.429 W/kg; SAR(10 g) = 0.257 W/kg**

Maximum value of SAR (measured) = 0.551 W/kg



0 dB = 0.579 W/kg = -2.37 dBW/kg

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## LTE Band 2 (20MHz)\_Body-worn\_Back side\_CH 19100\_QPSK\_1-99\_15mm

Communication System: LTE; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.549$  S/m;  $\epsilon_r = 53.523$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.03, 7.03, 7.03); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x111x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.10 W/kg

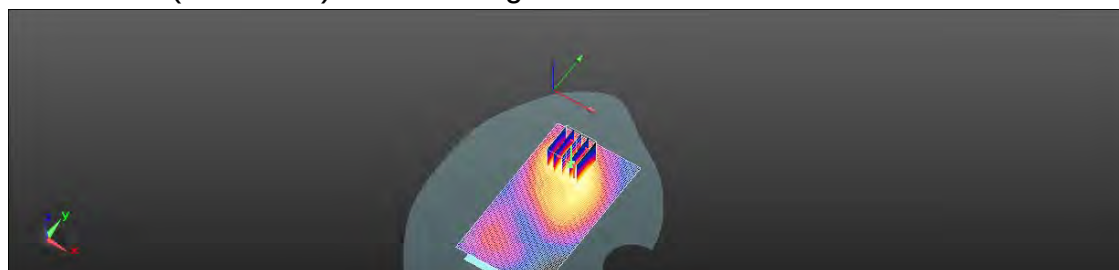
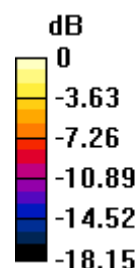
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.789 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.30 W/kg

**SAR(1 g) = 0.804 W/kg; SAR(10 g) = 0.441 W/kg**

Maximum value of SAR (measured) = 1.09 W/kg



0 dB = 1.10 W/kg = 0.41 dBW/kg

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## LTE Band 2 (20MHz) reduced\_Hotspot\_Bottom side\_CH 19100\_QPSK\_50-50\_10mm

Communication System: LTE; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.549 \text{ S/m}$ ;  $\epsilon_r = 53.523$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.03, 7.03, 7.03); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (51x71x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 1.35 W/kg

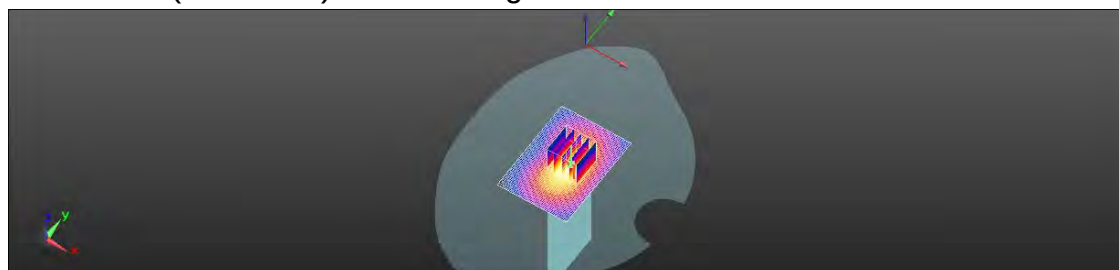
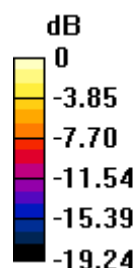
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 28.84 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 1.60 W/kg

**SAR(1 g) = 0.949 W/kg; SAR(10 g) = 0.501 W/kg**

Maximum value of SAR (measured) = 1.32 W/kg



0 dB = 1.35 W/kg = 1.30 dBW/kg

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**LTE Band 4 (20MHz)\_Head\_Le Cheek\_CH 20050\_QPSK\_1-50**

Communication System: LTE; Frequency: 1720 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1720$  MHz;  $\sigma = 1.294$  S/m;  $\epsilon_r = 40.523$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.91, 7.91, 7.91); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x101x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.523 W/kg

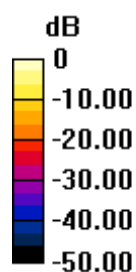
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.441 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.571 W/kg

**SAR(1 g) = 0.380 W/kg; SAR(10 g) = 0.239 W/kg**

Maximum value of SAR (measured) = 0.484 W/kg



0 dB = 0.523 W/kg = -2.81 dBW/kg

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## LTE Band 4 (20MHz)\_Body-worn\_Back side\_CH 20050\_QPSK\_1-50\_15mm

Communication System: LTE; Frequency: 1720 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.448 \text{ S/m}$ ;  $\epsilon_r = 54.922$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.36, 7.36, 7.36); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

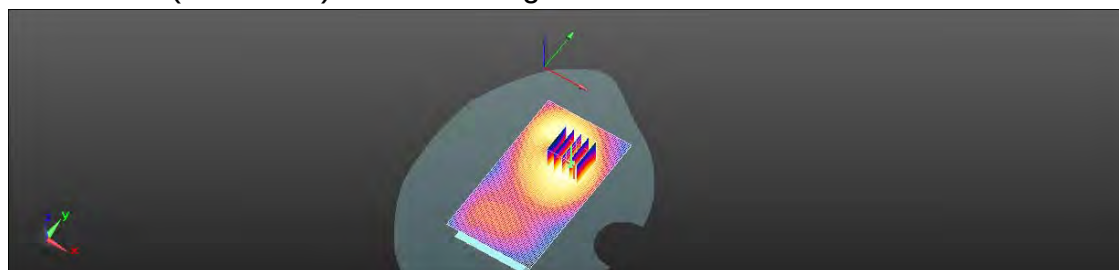
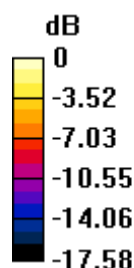
Maximum value of SAR (interpolated) =  $0.736 \text{ W/kg}$ 

**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $11.13 \text{ V/m}$ ; Power Drift =  $-0.13 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.874 \text{ W/kg}$ 

**SAR(1 g) =  $0.559 \text{ W/kg}$ ; SAR(10 g) =  $0.346 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.723 \text{ W/kg}$ 


0 dB =  $0.736 \text{ W/kg}$  =  $-1.33 \text{ dBW/kg}$

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Date: 2014/12/3

# LTE Band 4 (20MHz)\_Hotspot\_Bottom side\_CH 20050\_QPSK\_1-50\_10mm

Communication System: LTE; Frequency: 1720 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.448 \text{ S/m}$ ;  $\epsilon_r = 54.922$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.36, 7.36, 7.36); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (51x71x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$ 

Maximum value of SAR (interpolated) = 1.83 W/kg

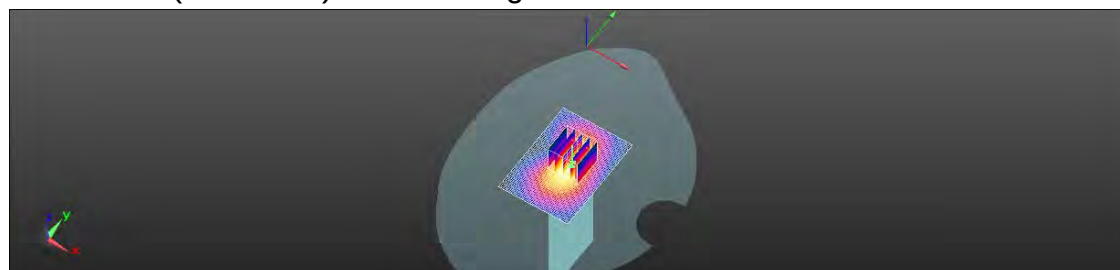
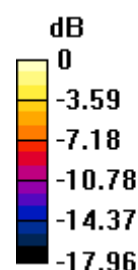
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 33.57 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 2.16 W/kg

**SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.682 W/kg**

Maximum value of SAR (measured) = 1.77 W/kg



0 dB = 1.83 W/kg = 2.62 dBW/kg

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## LTE Band 5 (10MHz)\_Head\_Le Cheek\_CH 20450\_QPSK\_1-0

Communication System: LTE; Frequency: 829 MHz, Duty factor: 1:1

Medium parameters used:  $f = 829 \text{ MHz}$ ;  $\sigma = 0.887 \text{ S/m}$ ;  $\epsilon_r = 40.238$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.41, 9.41, 9.41); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x101x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

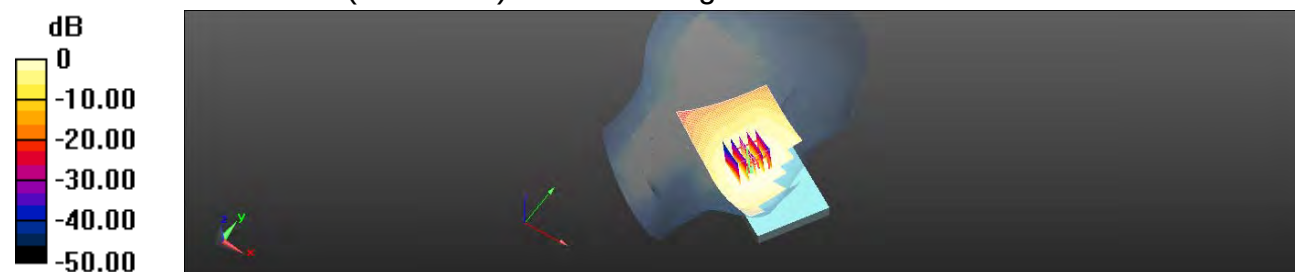
Maximum value of SAR (interpolated) =  $0.491 \text{ W/kg}$ 

**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $5.390 \text{ V/m}$ ; Power Drift =  $-0.04 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.542 \text{ W/kg}$ 

**SAR(1 g) =  $0.418 \text{ W/kg}$ ; SAR(10 g) =  $0.315 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.484 \text{ W/kg}$ 


0 dB =  $0.491 \text{ W/kg}$  =  $-3.09 \text{ dBW/kg}$

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# LTE Band 5 (10MHz)\_Body-worn\_Back side\_CH 20600\_QPSK\_1-25\_15mm

Communication System: LTE; Frequency: 844 MHz, Duty factor: 1:1

Medium parameters used:  $f = 844 \text{ MHz}$ ;  $\sigma = 0.992 \text{ S/m}$ ;  $\epsilon_r = 54.002$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.35, 9.35, 9.35); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x101x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 0.594 W/kg

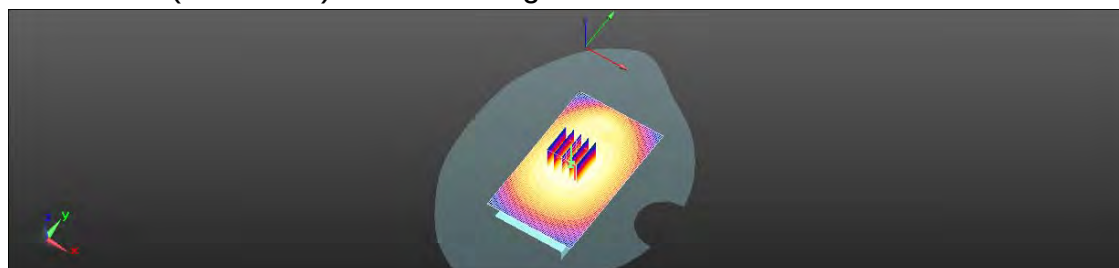
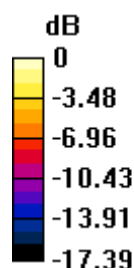
**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 24.83 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.659 W/kg

**SAR(1 g) = 0.517 W/kg; SAR(10 g) = 0.391 W/kg**

Maximum value of SAR (measured) = 0.598 W/kg



0 dB = 0.594 W/kg = -2.26 dBW/kg

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# LTE Band 5 (10MHz)\_Hotspot\_Back side\_CH 20525\_QPSK\_1-25\_10mm

Communication System: LTE; Frequency: 836.5 MHz, Duty factor: 1:1

Medium parameters used:  $f = 836.5 \text{ MHz}$ ;  $\sigma = 0.973 \text{ S/m}$ ;  $\epsilon_r = 54.149$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.35, 9.35, 9.35); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x101x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.825 \text{ W/kg}$ 

**Configuration/Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $26.38 \text{ V/m}$ ; Power Drift =  $0.17 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.829 \text{ W/kg}$ 

**SAR(1 g) =  $0.519 \text{ W/kg}$ ; SAR(10 g) =  $0.328 \text{ W/kg}$**

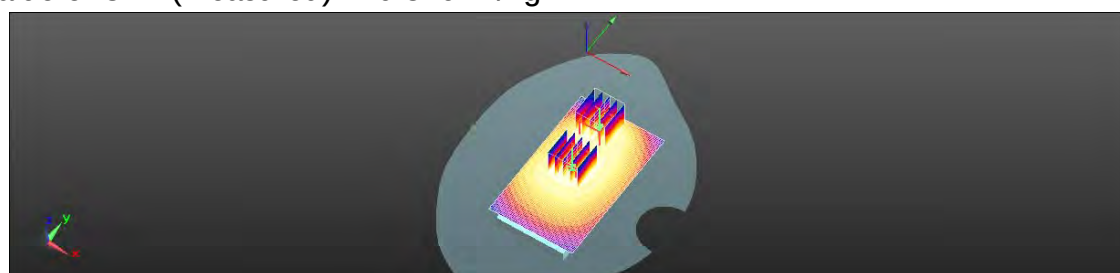
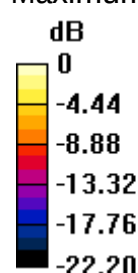
Maximum value of SAR (measured) =  $0.665 \text{ W/kg}$ 

**Configuration/Head/Zoom Scan (5x5x7)/Cube 1:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $26.38 \text{ V/m}$ ; Power Drift =  $0.17 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.919 \text{ W/kg}$ 

**SAR(1 g) =  $0.716 \text{ W/kg}$ ; SAR(10 g) =  $0.534 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.826 \text{ W/kg}$ 


0 dB =  $0.825 \text{ W/kg}$  =  $-0.84 \text{ dBW/kg}$

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**LTE Band 7 (20MHz)\_Head\_Le Cheek\_CH 21100\_QPSK\_1-99**

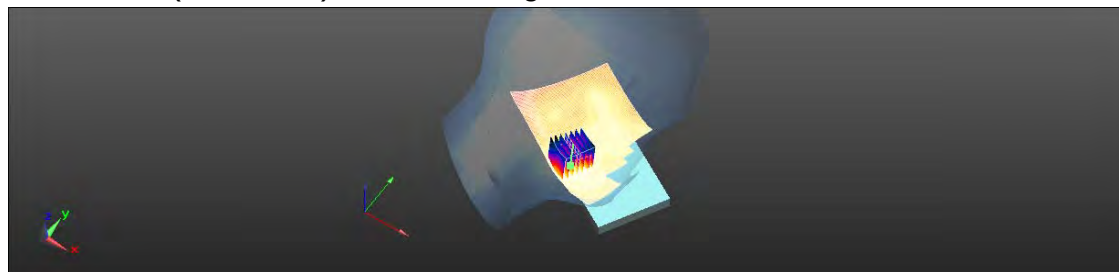
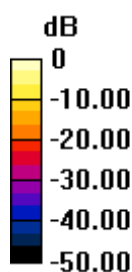
Communication System: LTE; Frequency: 2535 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2535 \text{ MHz}$ ;  $\sigma = 1.827 \text{ S/m}$ ;  $\epsilon_r = 41.027$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(6.83, 6.83, 6.83); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (81x141x1):** Interpolated grid:  $dx=12 \text{ mm}$ ,  $dy=12 \text{ mm}$ Maximum value of SAR (interpolated) =  $0.562 \text{ W/kg}$ **Configuration/Head/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ Reference Value =  $4.968 \text{ V/m}$ ; Power Drift =  $-0.15 \text{ dB}$ Peak SAR (extrapolated) =  $0.685 \text{ W/kg}$ **SAR(1 g) =  $0.380 \text{ W/kg}$ ; SAR(10 g) =  $0.200 \text{ W/kg}$** Maximum value of SAR (measured) =  $0.531 \text{ W/kg}$  $0 \text{ dB} = 0.562 \text{ W/kg} = -2.50 \text{ dBW/kg}$ 

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# **LTE Band 7 (20MHz)\_Body-worn\_Back side\_CH 21100\_QPSK\_1-99\_15mm**

Communication System: LTE; Frequency: 2535 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2535 \text{ MHz}$ ;  $\sigma = 2.019 \text{ S/m}$ ;  $\epsilon_r = 53.211$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

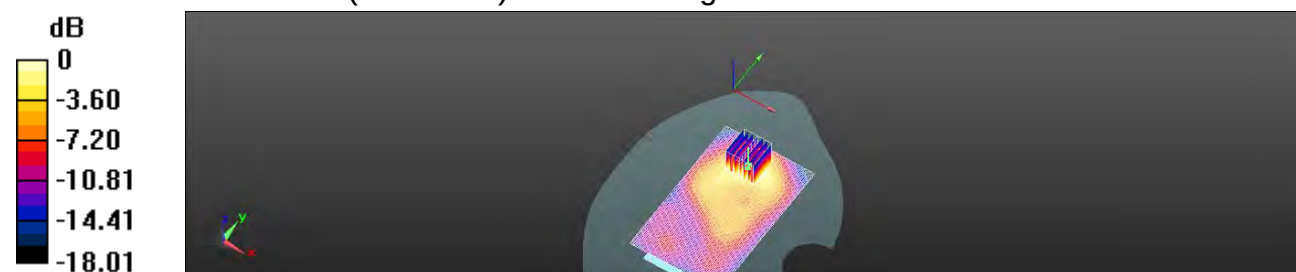
- Probe: EX3DV4 - SN3938; ConvF(6.57, 6.57, 6.57); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (81x131x1):** Interpolated grid:  $dx=12 \text{ mm}$ ,  $dy=12 \text{ mm}$ 

Maximum value of SAR (interpolated) =  $0.719 \text{ W/kg}$ 
**Configuration/Head/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value =  $9.727 \text{ V/m}$ ; Power Drift =  $-0.14 \text{ dB}$ 

Peak SAR (extrapolated) =  $0.941 \text{ W/kg}$ 
**SAR(1 g) =  $0.497 \text{ W/kg}$ ; SAR(10 g) =  $0.262 \text{ W/kg}$** 

Maximum value of SAR (measured) =  $0.712 \text{ W/kg}$ 

 $0 \text{ dB} = 0.719 \text{ W/kg} = -1.43 \text{ dBW/kg}$ 

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Date: 2014/12/8

**LTE Band 7 (20MHz)\_Hotspot\_Bottom side\_CH  
21100\_QPSK\_1-99\_10mm**

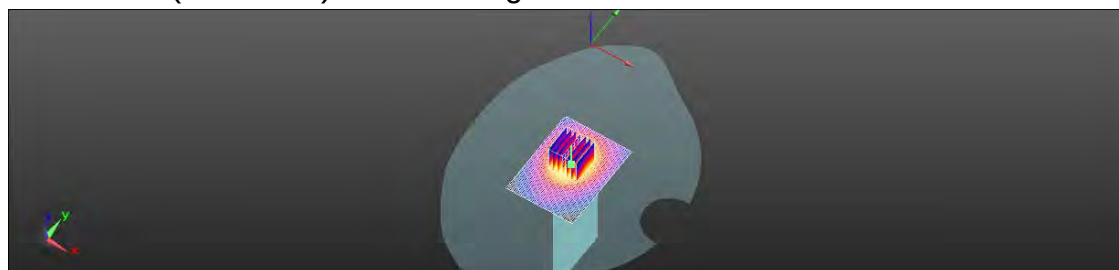
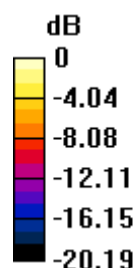
Communication System: LTE; Frequency: 2535 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2535 \text{ MHz}$ ;  $\sigma = 2.019 \text{ S/m}$ ;  $\epsilon_r = 53.211$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3938; ConvF(6.57, 6.57, 6.57); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Head/Area Scan (61x81x1):** Interpolated grid:  $dx=12 \text{ mm}$ ,  $dy=12 \text{ mm}$ Maximum value of SAR (interpolated) =  $1.56 \text{ W/kg}$ **Configuration/Head/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ Reference Value =  $23.85 \text{ V/m}$ ; Power Drift =  $-0.03 \text{ dB}$ Peak SAR (extrapolated) =  $2.03 \text{ W/kg}$ **SAR(1 g) =  $1.02 \text{ W/kg}$ ; SAR(10 g) =  $0.502 \text{ W/kg}$** Maximum value of SAR (measured) =  $1.50 \text{ W/kg}$  $0 \text{ dB} = 1.56 \text{ W/kg} = 1.93 \text{ dBW/kg}$ 

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Date: 2014/11/23

**WLAN802.11b\_Head\_RE Cheek\_CH 11**

Communication System: WLAN802.11 b & g & n(20M)(40M) ; Frequency: 2462 MHz  
, Duty factor: 1:1

Medium parameters used:  $f = 2462 \text{ MHz}$ ;  $\sigma = 1.836 \text{ S/m}$ ;  $\epsilon_r = 39.117$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.97, 6.97, 6.97); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/RE Cheek/Area Scan (91x141x1):** Interpolated grid:  $dx=12 \text{ mm}$ ,  
 $dy=12 \text{ mm}$

Maximum value of SAR (interpolated) =  $1.30 \text{ W/kg}$

**Configuration/RE Cheek/Zoom Scan (7x7x7) /Cube 0:** Measurement grid:

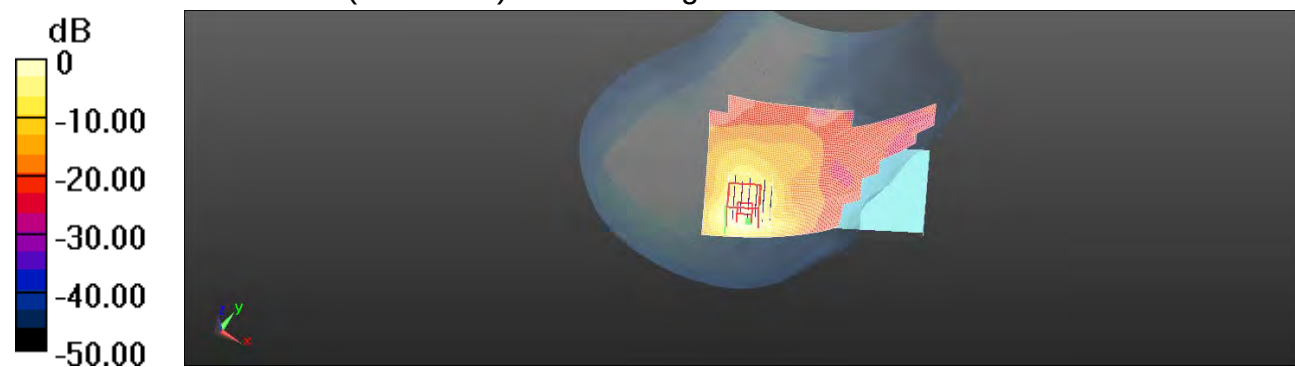
$dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $10.15 \text{ V/m}$ ; Power Drift =  $0.16 \text{ dB}$

Peak SAR (extrapolated) =  $1.78 \text{ W/kg}$

**SAR(1 g) =  $0.786 \text{ W/kg}$ ; SAR(10 g) =  $0.356 \text{ W/kg}$**

Maximum value of SAR (measured) =  $1.20 \text{ W/kg}$



$0 \text{ dB} = 1.30 \text{ W/kg} = 1.15 \text{ dBW/kg}$

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Date: 2014/11/23

**WLAN802.11b\_Hotspot\_Back side\_CH 11\_10mm**

Communication System: WLAN802.11 b & g & n(20M)(40M) ; Frequency: 2462 MHz  
, Duty factor: 1:1

Medium parameters used:  $f = 2462 \text{ MHz}$ ;  $\sigma = 2.063 \text{ S/m}$ ;  $\epsilon_r = 50.06$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Hotspot/Area Scan (91x151x1):** Interpolated grid:  $dx=12 \text{ mm}$ ,  
 $dy=12 \text{ mm}$

Maximum value of SAR (interpolated) =  $1.13 \text{ W/kg}$

**Configuration/Hotspot/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

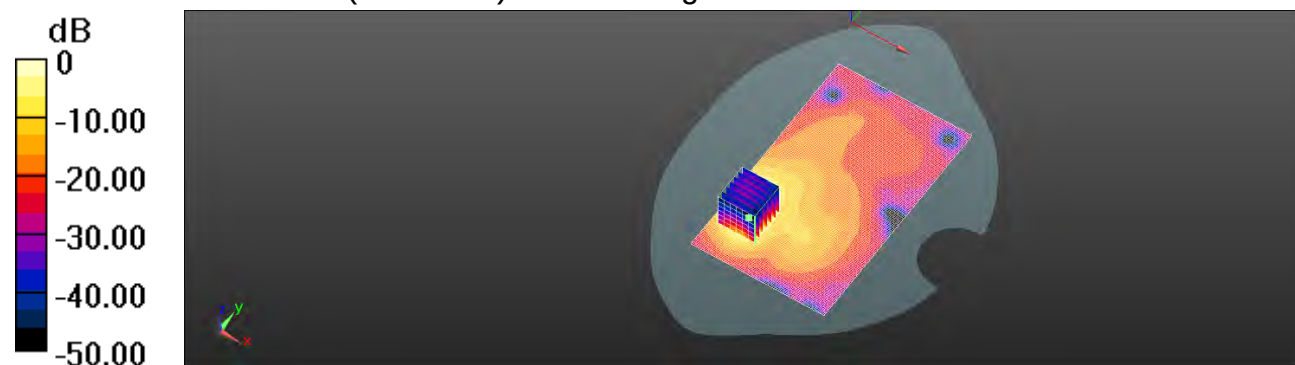
$dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $3.208 \text{ V/m}$ ; Power Drift =  $0.15 \text{ dB}$

Peak SAR (extrapolated) =  $1.53 \text{ W/kg}$

**SAR(1 g) =  $0.679 \text{ W/kg}$ ; SAR(10 g) =  $0.294 \text{ W/kg}$**

Maximum value of SAR (measured) =  $1.07 \text{ W/kg}$



0 dB =  $1.13 \text{ W/kg}$  =  $0.53 \text{ dBW/kg}$

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Date: 2014/11/20

**WLAN802.11a5.2G\_Head\_RE Tilt\_CH 48**

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5240 MHz,

Duty factor: 1:1

Medium parameters used:  $f = 5240$  MHz;  $\sigma = 4.666$  S/m;  $\epsilon_r = 36.083$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(5.25, 5.25, 5.25); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/RE Tilt/Area Scan (111x181x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.270 W/kg

**Configuration/RE Tilt/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:

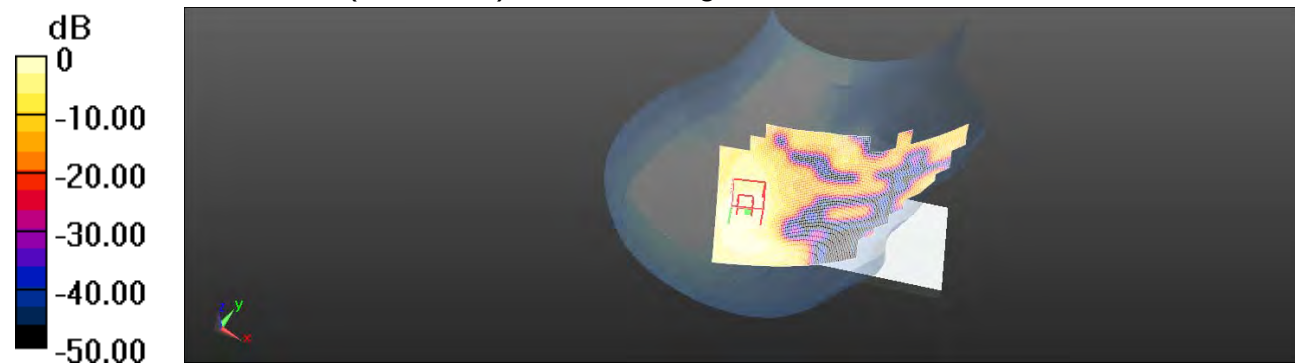
dx=4mm, dy=4mm, dz=2mm

Reference Value = 5.017 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.523 W/kg

**SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.066 W/kg**

Maximum value of SAR (measured) = 0.282 W/kg



0 dB = 0.270 W/kg = -5.68 dBW/kg

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Date: 2014/11/22

# **WLAN802.11a5.2G\_Body-worn\_Back side\_CH 40\_15mm**

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5200 MHz

, Duty factor: 1:1

Medium parameters used:  $f = 5200 \text{ MHz}$ ;  $\sigma = 5.337 \text{ S/m}$ ;  $\epsilon_r = 48.522$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.56, 4.56, 4.56); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.606 \text{ W/kg}$

**Configuration/Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:

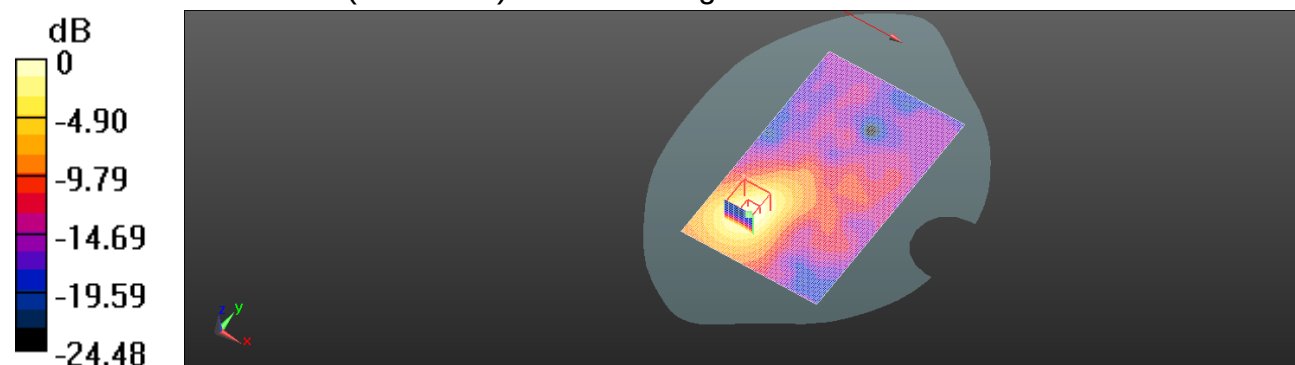
$dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value =  $3.644 \text{ V/m}$ ; Power Drift =  $0.17 \text{ dB}$

Peak SAR (extrapolated) =  $1.16 \text{ W/kg}$

**SAR(1 g) =  $0.339 \text{ W/kg}$ ; SAR(10 g) =  $0.147 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.598 \text{ W/kg}$



0 dB =  $0.606 \text{ W/kg}$  =  $-2.18 \text{ dBW/kg}$

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Date: 2014/11/21

**WLAN802.11a5.3G\_Head\_RE Cheek\_CH 60**

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5300 MHz,

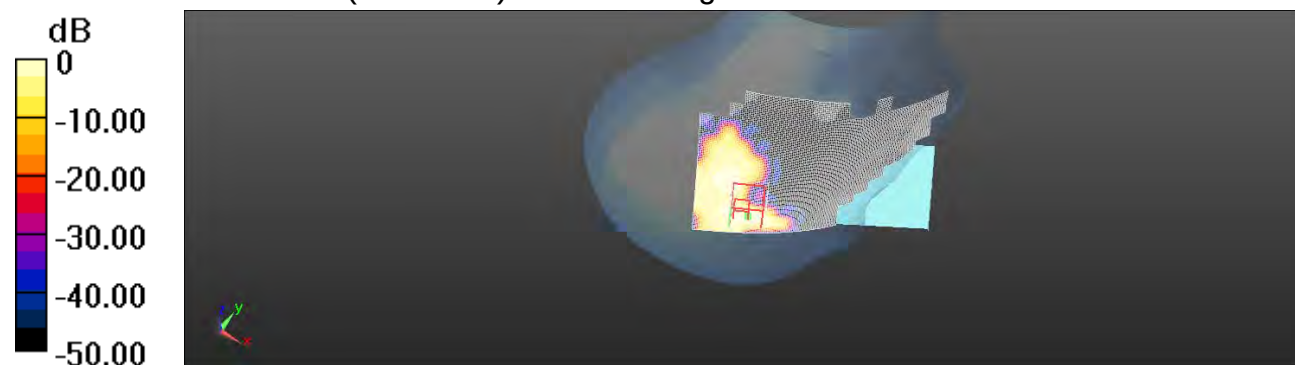
Duty factor: 1:1

Medium parameters used:  $f = 5300 \text{ MHz}$ ;  $\sigma = 4.728 \text{ S/m}$ ;  $\epsilon_r = 35.839$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(5.07, 5.07, 5.07); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/RE Cheek/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$ Maximum value of SAR (interpolated) =  $0.339 \text{ W/kg}$ **Configuration/RE Cheek/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$ Reference Value =  $4.240 \text{ V/m}$ ; Power Drift =  $0.19 \text{ dB}$ Peak SAR (extrapolated) =  $0.672 \text{ W/kg}$ **SAR(1 g) =  $0.170 \text{ W/kg}$ ; SAR(10 g) =  $0.076 \text{ W/kg}$** Maximum value of SAR (measured) =  $0.304 \text{ W/kg}$  $0 \text{ dB} = 0.339 \text{ W/kg} = -4.70 \text{ dBW/kg}$ 

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Date: 2014/11/22

## WLAN802.11a5.3G\_Body-worn\_Back side\_CH 60\_15mm

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5300 MHz

, Duty factor: 1:1

Medium parameters used:  $f = 5300 \text{ MHz}$ ;  $\sigma = 5.474 \text{ S/m}$ ;  $\epsilon_r = 47.787$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.38, 4.38, 4.38); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.574 \text{ W/kg}$

**Configuration/Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:

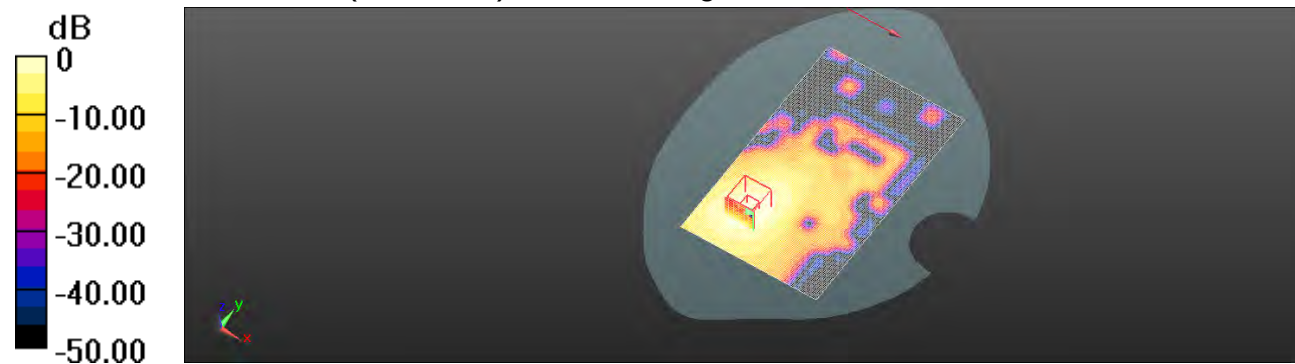
$dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value =  $3.168 \text{ V/m}$ ; Power Drift =  $0.18 \text{ dB}$

Peak SAR (extrapolated) =  $1.14 \text{ W/kg}$

**SAR(1 g) =  $0.316 \text{ W/kg}$ ; SAR(10 g) =  $0.126 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.576 \text{ W/kg}$



0 dB =  $0.574 \text{ W/kg}$  =  $-2.41 \text{ dBW/kg}$

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Date: 2014/11/20

**WLAN802.11a5.6G\_Head\_RE Cheek\_CH 140**

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5700 MHz

, Duty factor: 1:1

Medium parameters used:  $f = 5700 \text{ MHz}$ ;  $\sigma = 5.193 \text{ S/m}$ ;  $\epsilon_r = 34.941$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.48, 4.48, 4.48); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/RE Cheek/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$ 

Maximum value of SAR (interpolated) = 0.768 W/kg

**Configuration/RE Cheek/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$ 

Reference Value = 5.421 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.78 W/kg

**SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.159 W/kg**

Maximum value of SAR (measured) = 0.804 W/kg

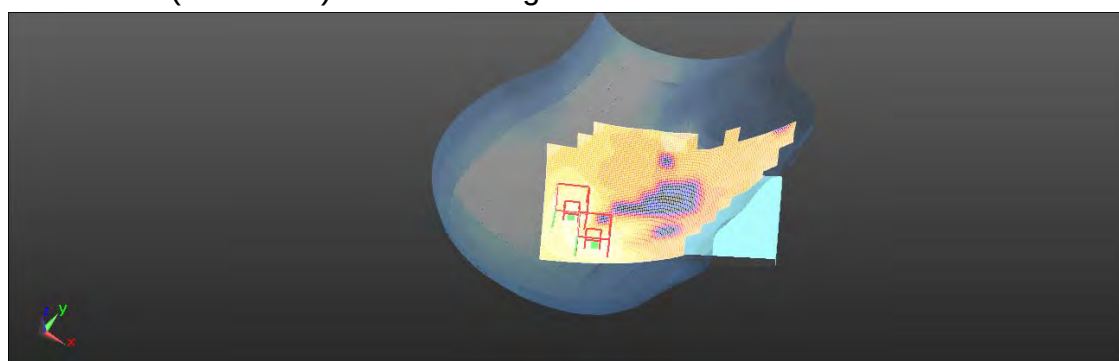
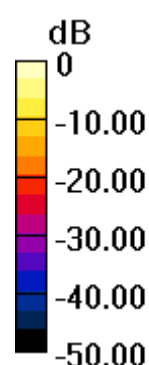
**Configuration/RE Cheek/Zoom Scan (7x7x12)/Cube 1:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$ 

Reference Value = 5.421 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.86 W/kg

**SAR(1 g) = 0.361 W/kg; SAR(10 g) = 0.128 W/kg**

Maximum value of SAR (measured) = 0.738 W/kg



0 dB = 0.768 W/kg = -1.15 dBW/kg

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Date: 2014/11/22

## WLAN802.11a5.6G\_Body-worn\_Back side\_CH 132\_15mm

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5660 MHz

, Duty factor: 1:1

Medium parameters used:  $f = 5660 \text{ MHz}$ ;  $\sigma = 6.004 \text{ S/m}$ ;  $\epsilon_r = 46.833$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.76, 3.76, 3.76); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.766 \text{ W/kg}$

**Configuration/Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid:

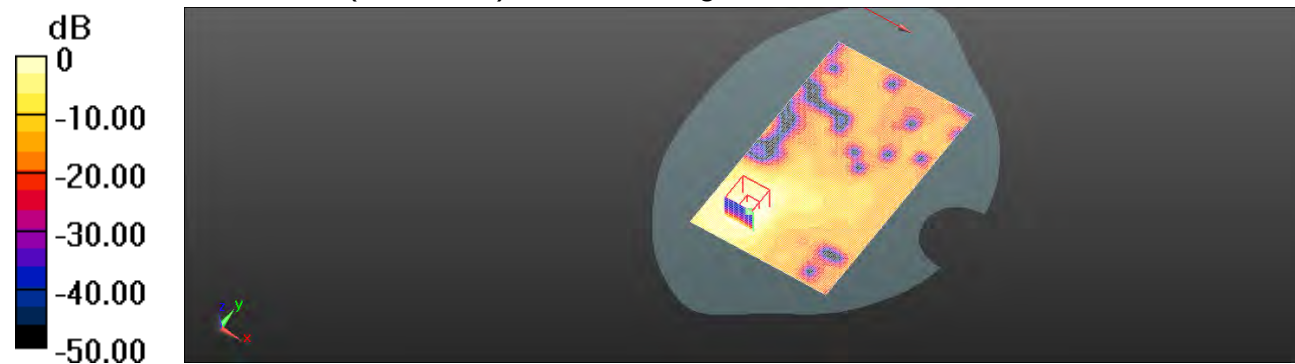
$dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$

Reference Value =  $2.921 \text{ V/m}$ ; Power Drift =  $0.12 \text{ dB}$

Peak SAR (extrapolated) =  $1.59 \text{ W/kg}$

**SAR(1 g) =  $0.402 \text{ W/kg}$ ; SAR(10 g) =  $0.163 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.750 \text{ W/kg}$



0 dB =  $0.766 \text{ W/kg}$  =  $-1.16 \text{ dBW/kg}$

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Date: 2014/11/21

**WLAN802.11a5.8G\_Head\_RE Tilt\_CH 161**

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5805 MHz

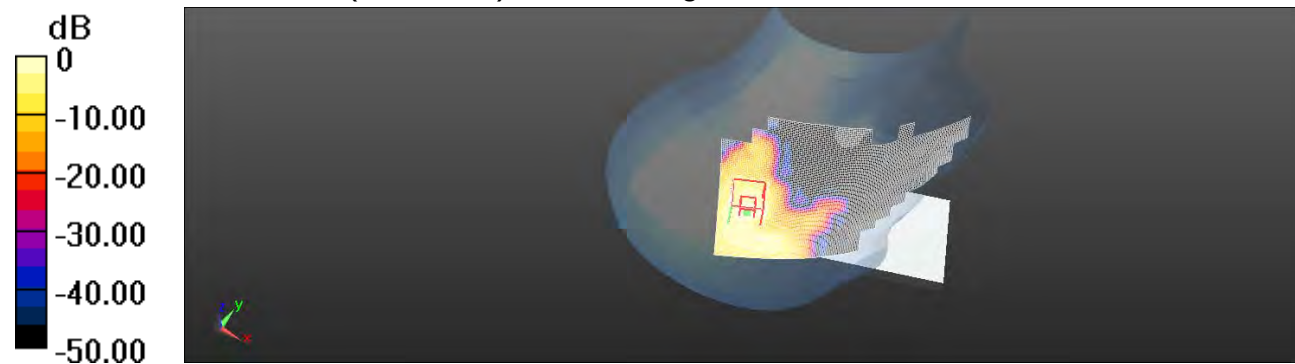
, Duty factor: 1:1

Medium parameters used:  $f = 5805 \text{ MHz}$ ;  $\sigma = 5.317 \text{ S/m}$ ;  $\epsilon_r = 34.689$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.65, 4.65, 4.65); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/RE Tilt/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$ Maximum value of SAR (interpolated) =  $0.946 \text{ W/kg}$ **Configuration/RE Tilt/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$ Reference Value =  $5.390 \text{ V/m}$ ; Power Drift =  $-0.14 \text{ dB}$ Peak SAR (extrapolated) =  $2.30 \text{ W/kg}$ **SAR(1 g) =  $0.478 \text{ W/kg}$ ; SAR(10 g) =  $0.133 \text{ W/kg}$** Maximum value of SAR (measured) =  $1.05 \text{ W/kg}$  $0 \text{ dB} = 0.946 \text{ W/kg} = -0.24 \text{ dBW/kg}$ 

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Date: 2014/11/22

**WLAN802.11a5.8G\_Body-worn\_Back side\_CH 161\_15mm**

Communication System: WLAN 802.11n/a(5G) FCC ; Frequency: 5805 MHz

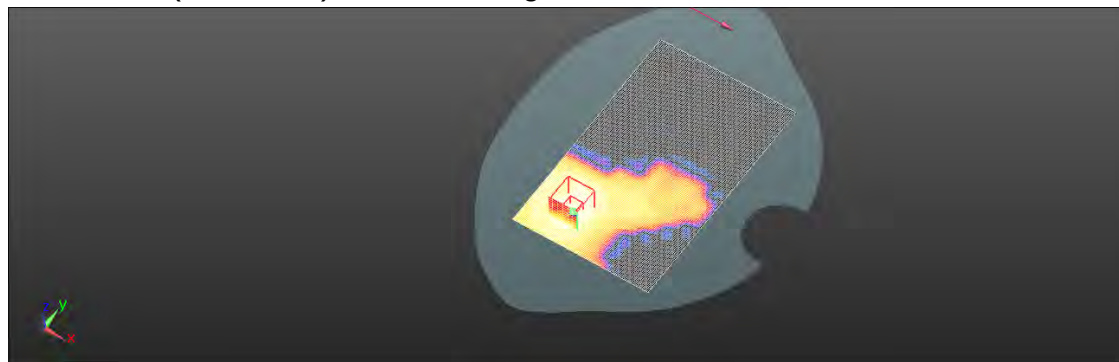
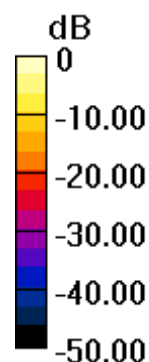
, Duty factor: 1:1

Medium parameters used:  $f = 5805 \text{ MHz}$ ;  $\sigma = 6.193 \text{ S/m}$ ;  $\epsilon_r = 46.422$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.13, 4.13, 4.13); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Body/Area Scan (111x181x1):** Interpolated grid:  $dx=10 \text{ mm}$ ,  $dy=10 \text{ mm}$ Maximum value of SAR (interpolated) =  $0.702 \text{ W/kg}$ **Configuration/Body/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=2\text{mm}$ Reference Value =  $1.906 \text{ V/m}$ ; Power Drift =  $0.13 \text{ dB}$ Peak SAR (extrapolated) =  $1.59 \text{ W/kg}$ **SAR(1 g) =  $0.369 \text{ W/kg}$ ; SAR(10 g) =  $0.138 \text{ W/kg}$** Maximum value of SAR (measured) =  $0.713 \text{ W/kg}$  $0 \text{ dB} = 0.702 \text{ W/kg} = -1.54 \text{ dBW/kg}$ 

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## 6. System Verification

Date: 2014/11/17

### Dipole 835 MHz\_SN:4d063\_Head

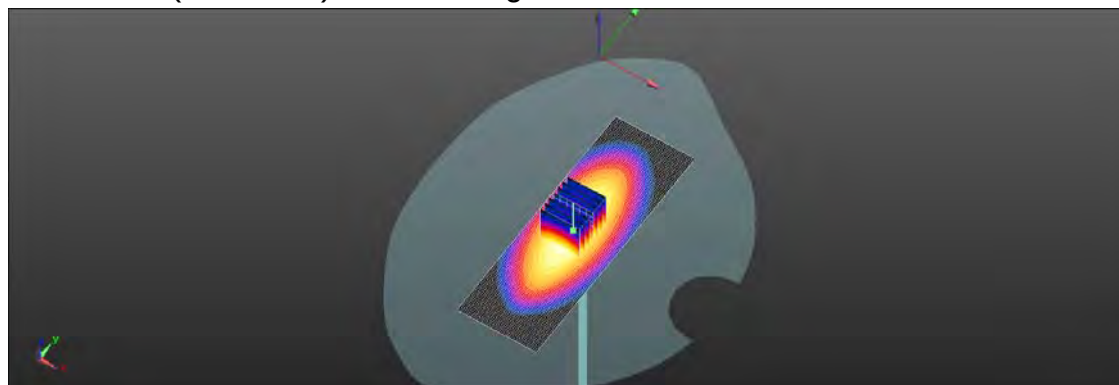
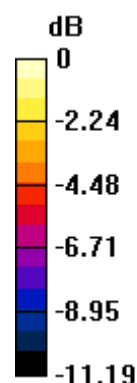
Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.883 \text{ S/m}$ ;  $\epsilon_r = 41.143$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(9.14, 9.14, 9.14); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (41x121x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$ Maximum value of SAR (interpolated) =  $3.62 \text{ W/kg}$ **Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ Reference Value =  $65.07 \text{ V/m}$ ; Power Drift =  $0.01 \text{ dB}$ Peak SAR (extrapolated) =  $4.32 \text{ W/kg}$ **SAR(1 g) =  $2.35 \text{ W/kg}$ ; SAR(10 g) =  $1.53 \text{ W/kg}$** Maximum value of SAR (measured) =  $3.64 \text{ W/kg}$  $0 \text{ dB} = 3.64 \text{ W/kg} = 5.61 \text{ dBW/kg}$ 

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Date: 2014/12/4

**Dipole 835 MHz\_SN:4d063\_Head**

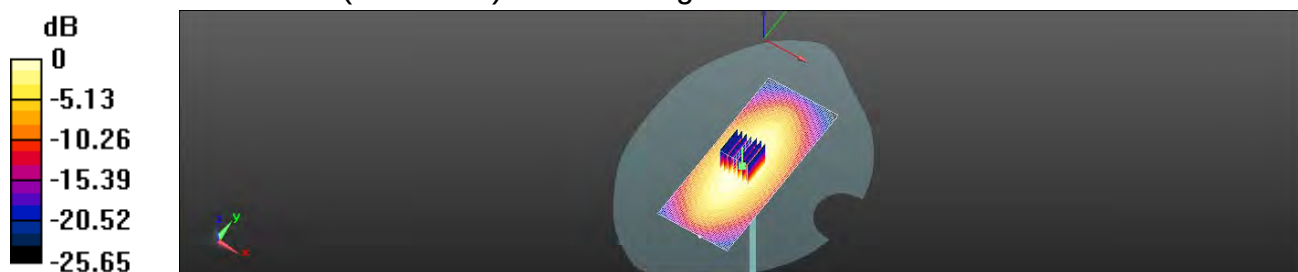
Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.893 \text{ S/m}$ ;  $\epsilon_r = 40.231$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.41, 9.41, 9.41); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x121x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$ Maximum value of SAR (interpolated) =  $3.06 \text{ W/kg}$ **Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ Reference Value =  $59.23 \text{ V/m}$ ; Power Drift =  $-0.01 \text{ dB}$ Peak SAR (extrapolated) =  $3.69 \text{ W/kg}$ **SAR(1 g) =  $2.44 \text{ W/kg}$ ; SAR(10 g) =  $1.6 \text{ W/kg}$** Maximum value of SAR (measured) =  $3.09 \text{ W/kg}$  $0 \text{ dB} = 3.06 \text{ W/kg} = 4.86 \text{ dBW/kg}$ 

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Date: 2014/11/17

**Dipole 835 MHz\_SN:4d063\_Body**

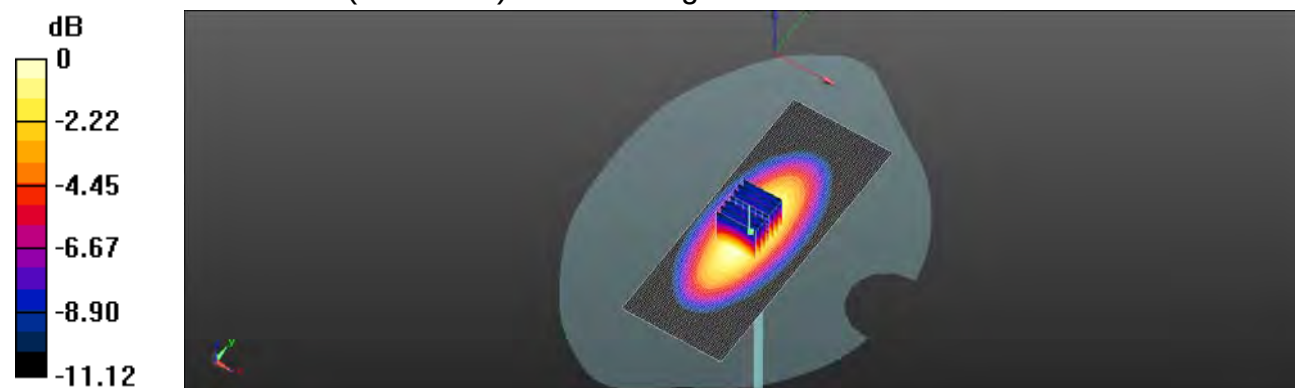
Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 1.013 \text{ S/m}$ ;  $\epsilon_r = 52.883$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x131x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$ Maximum value of SAR (interpolated) =  $3.15 \text{ W/kg}$ **Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ Reference Value =  $57.87 \text{ V/m}$ ; Power Drift =  $0.01 \text{ dB}$ Peak SAR (extrapolated) =  $3.81 \text{ W/kg}$ **SAR(1 g) =  $2.41 \text{ W/kg}$ ; SAR(10 g) =  $1.62 \text{ W/kg}$** Maximum value of SAR (measured) =  $3.22 \text{ W/kg}$  $0 \text{ dB} = 3.22 \text{ W/kg} = 5.08 \text{ dBW/kg}$ 

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Date: 2014/12/5

**Dipole 835 MHz\_SN:4d063\_Body**

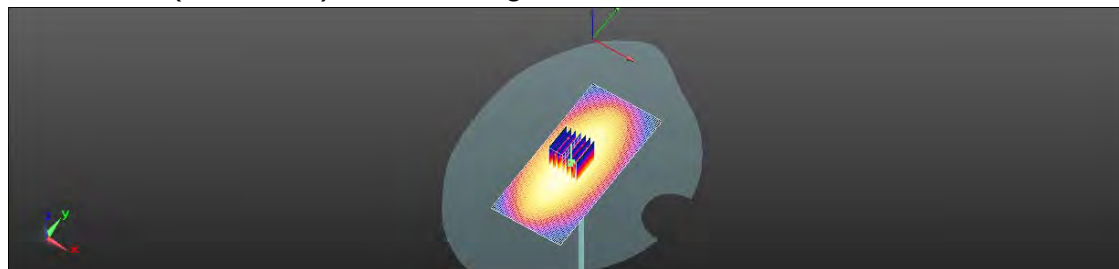
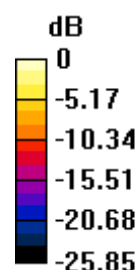
Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.97 \text{ S/m}$ ;  $\epsilon_r = 54.153$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.35, 9.35, 9.35); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x111x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$ Maximum value of SAR (interpolated) =  $3.15 \text{ W/kg}$ **Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ Reference Value =  $55.70 \text{ V/m}$ ; Power Drift =  $0.04 \text{ dB}$ Peak SAR (extrapolated) =  $3.73 \text{ W/kg}$ **SAR(1 g) =  $2.47 \text{ W/kg}$ ; SAR(10 g) =  $1.61 \text{ W/kg}$** Maximum value of SAR (measured) =  $3.15 \text{ W/kg}$  $0 \text{ dB} = 3.15 \text{ W/kg} = 4.98 \text{ dBW/kg}$ 

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Date: 2014/11/18

**Dipole 1750 MHz\_SN:1008\_Head**

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.377$  S/m;  $\epsilon_r = 39.577$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(8, 8, 8); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (41x61x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 13.0 W/kg

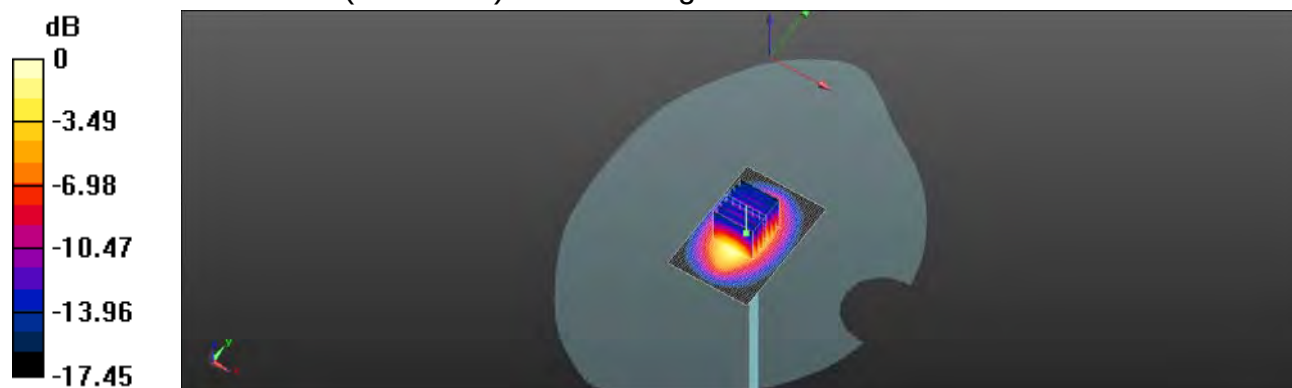
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.42 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.7 W/kg

**SAR(1 g) = 8.96 W/kg; SAR(10 g) = 4.69 W/kg**

Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kg = 11.11 dBW/kg

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Date: 2014/12/2

**Dipole 1750 MHz\_SN:1008\_Head**

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.321$  S/m;  $\epsilon_r = 40.155$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.91, 7.91, 7.91); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x101x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.2 W/kg

**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

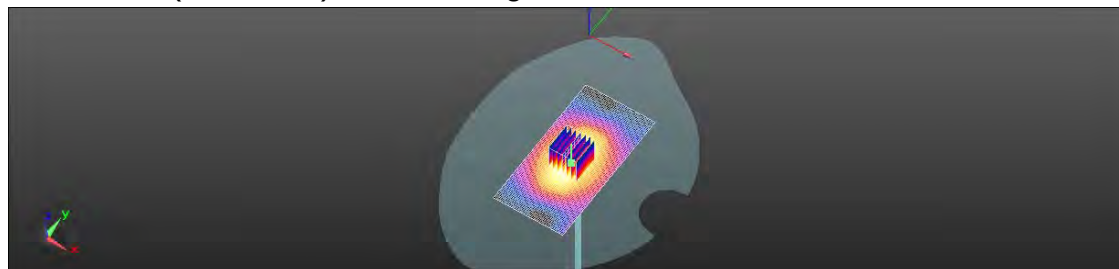
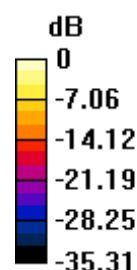
dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.2 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 16.8 W/kg

**SAR(1 g) = 9.22 W/kg; SAR(10 g) = 4.89 W/kg**

Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 14.2 W/kg = 11.52 dBW/kg

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Date: 2014/11/18

**Dipole 1750 MHz\_SN:1008\_Body**

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.458$  S/m;  $\epsilon_r = 54.398$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3831; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x61x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 13.8 W/kg

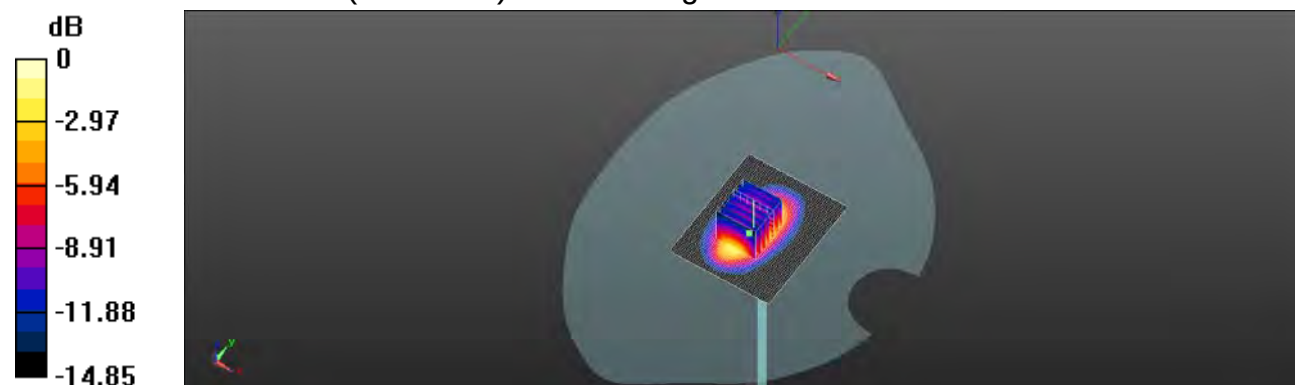
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.57 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 15.6 W/kg

**SAR(1 g) = 9.34 W/kg; SAR(10 g) = 5.22 W/kg**

Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 12.7 W/kg = 11.04 dBW/kg

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Date: 2014/12/3

## Dipole 1750 MHz\_SN:1008\_Body

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.476$  S/m;  $\epsilon_r = 54.458$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.36, 7.36, 7.36); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x101x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.9 W/kg

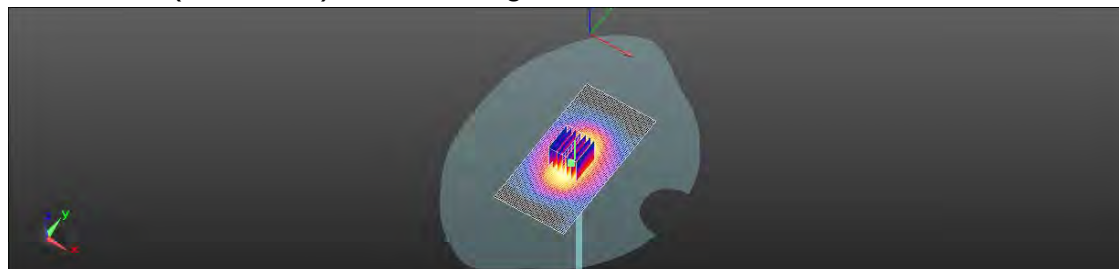
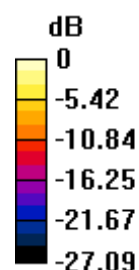
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.81 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 15.8 W/kg

**SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.98 W/kg**

Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 14.9 W/kg = 11.73 dBW/kg

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Date: 2014/11/19

**Dipole 1900 MHz\_SN:5d027\_Head**

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.388$  S/m;  $\epsilon_r = 39.567$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3831; ConvF(7.79, 7.79, 7.79); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (41x61x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 13.5 W/kg

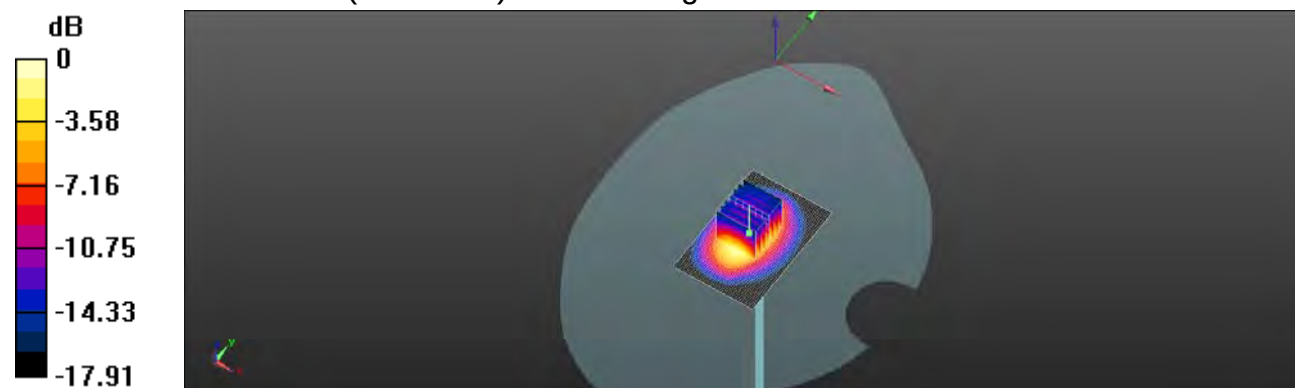
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.96 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 9.4 W/kg; SAR(10 g) = 4.97 W/kg**

Maximum value of SAR (measured) = 13.2 W/kg



0 dB = 13.2 W/kg = 11.21 dBW/kg

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Date: 2014/11/20

## Dipole 1900 MHz\_SN:5d027\_Head

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.432$  S/m;  $\epsilon_r = 39.256$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.42, 8.42, 8.42); Calibrated: 2014/8/28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2014/8/26
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (41x81x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.7 W/kg

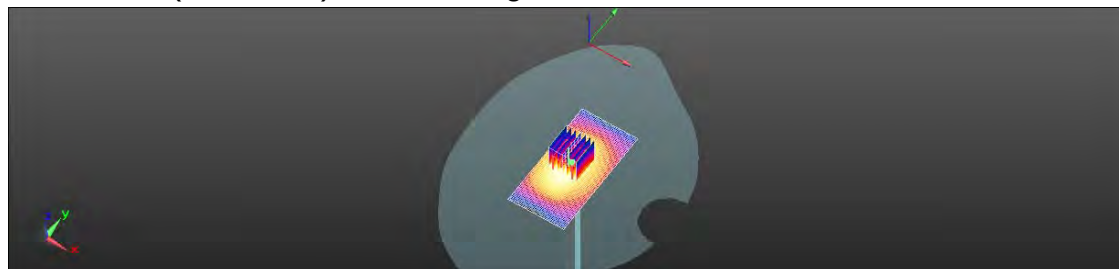
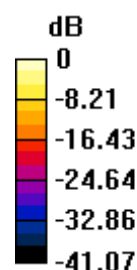
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.131 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 19.3 W/kg

**SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.17 W/kg**

Maximum value of SAR (measured) = 14.8 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

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Date: 2014/11/19

**Dipole 1900 MHz\_SN:5d027\_Body**

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.492$  S/m;  $\epsilon_r = 51.639$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x61x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 15.0 W/kg

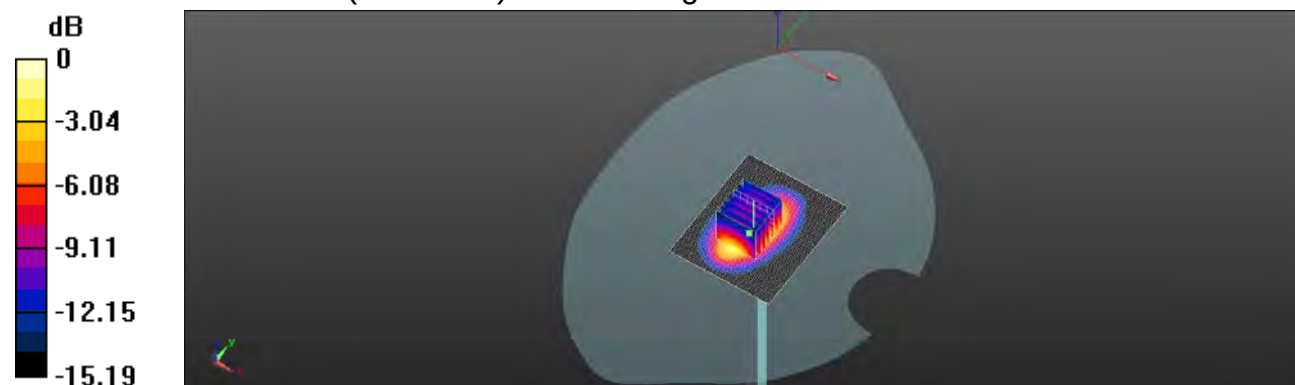
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.47 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.1 W/kg

**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.42 W/kg**

Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

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Date: 2014/12/1

## Dipole 1900 MHz\_SN:5d027\_Body

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.549 \text{ S/m}$ ;  $\epsilon_r = 53.523$ ;  $\rho = 1000 \text{ g/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.03, 7.03, 7.03); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (41x81x1):** Interpolated grid:  $dx=15 \text{ mm}$ ,  $dy=15 \text{ mm}$

Maximum value of SAR (interpolated) = 14.6 W/kg

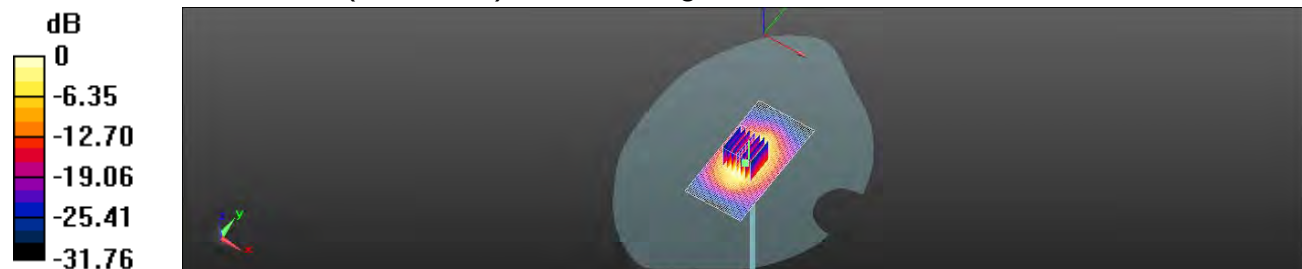
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5 \text{ mm}$ ,  $dy=5 \text{ mm}$ ,  $dz=5 \text{ mm}$

Reference Value = 96.00 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.9 W/kg

**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.28 W/kg**

Maximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

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Date: 2014/11/23

**Dipole 2450 MHz\_SN:727\_Head**

Communication System: CW; Frequency: 2450 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.823$  S/m;  $\epsilon_r = 39.185$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.97, 6.97, 6.97); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=250mW, dist=2mm:** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 22.3 W/kg

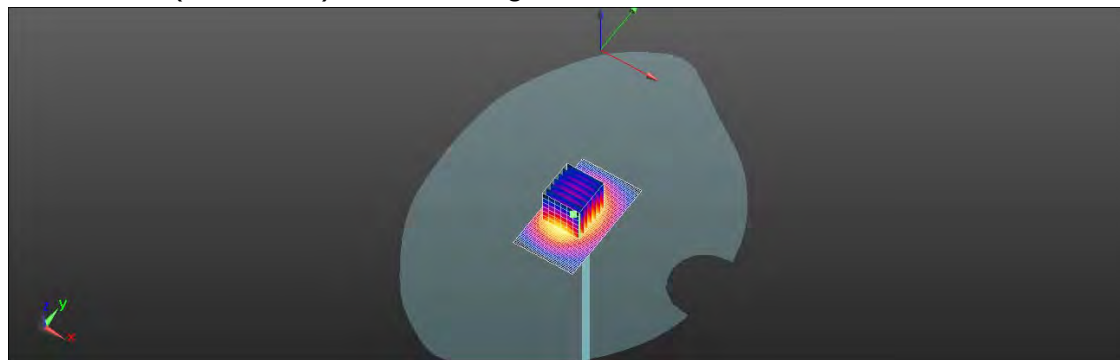
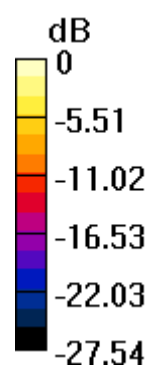
**Configuration / d=10mm, Pin=250mW, dist=2mm / Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.77 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 29.0 W/kg

**SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.02 W/kg**

Maximum value of SAR (measured) = 20.9 W/kg



0 dB = 22.3 W/kg = 13.47 dBW/kg

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Date: 2014/11/23

**Dipole 2450 MHz\_SN:727\_Body**

Communication System: CW; Frequency: 2450 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.045$  S/m;  $\epsilon_r = 50.104$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=250mW, dist=2mm:** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 23.8 W/kg

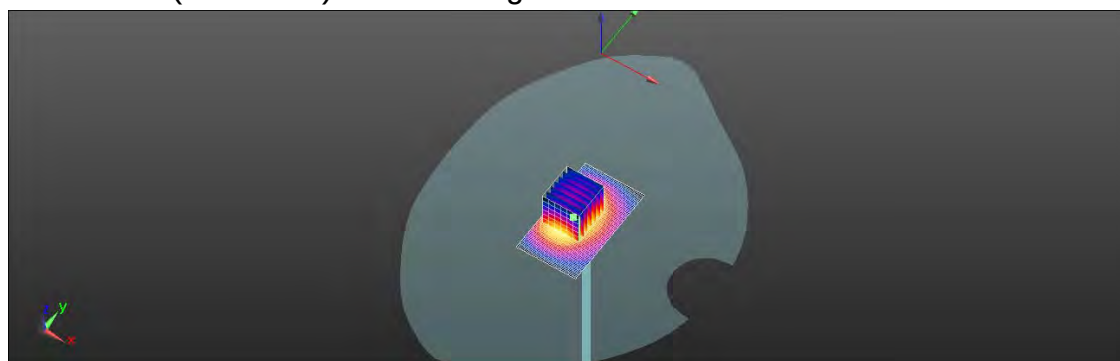
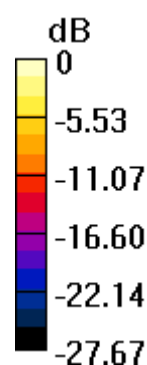
**Configuration / d=10mm, Pin=250mW, dist=2mm / Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.07 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 30.7 W/kg

**SAR(1 g) = 13.1 W/kg; SAR(10 g) = 5.85 W/kg**

Maximum value of SAR (measured) = 22.3 W/kg



0 dB = 23.8 W/kg = 13.76 dBW/kg

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Date: 2014/12/6

**Dipole 2600 MHz\_SN:1005\_Head**

Communication System: CW; Frequency: 2600 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.886$  S/m;  $\epsilon_r = 40.522$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(6.83, 6.83, 6.83); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (61x121x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 23.4 W/kg

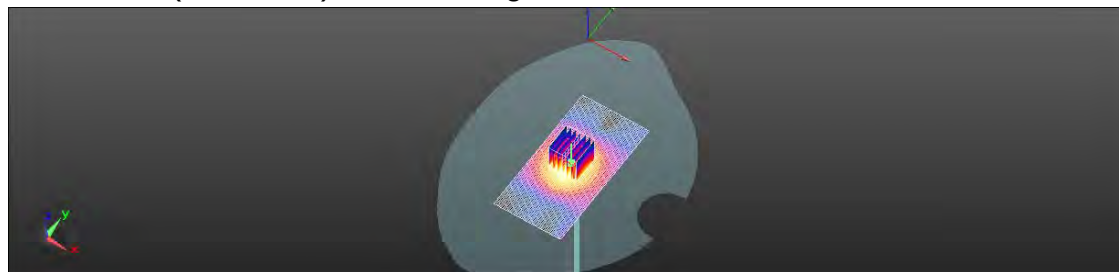
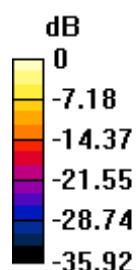
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.13 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 33.3 W/kg

**SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.42 W/kg**

Maximum value of SAR (measured) = 23.3 W/kg



0 dB = 23.4 W/kg = 13.69 dBW/kg

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Date: 2014/12/8

## Dipole 2600 MHz\_SN:1005\_Body

Communication System: CW; Frequency: 2600 MHz, Duty factor: 1:1

Medium parameters used:  $f = 2600 \text{ MHz}$ ;  $\sigma = 2.11 \text{ S/m}$ ;  $\epsilon_r = 52.776$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(6.57, 6.57, 6.57); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Pin=250mW/Area Scan (51x91x1):** Interpolated grid:  $dx=12 \text{ mm}$ ,  $dy=12 \text{ mm}$

Maximum value of SAR (interpolated) = 24.8 W/kg

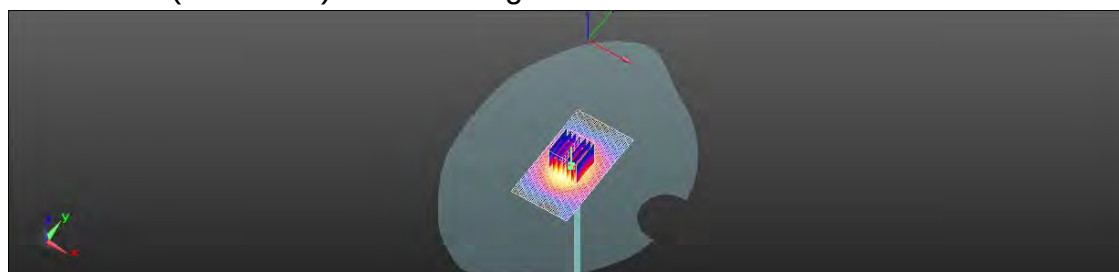
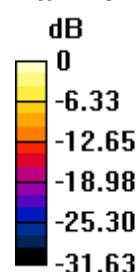
**Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 102.0 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 31.0 W/kg

**SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.24 W/kg**

Maximum value of SAR (measured) = 22.4 W/kg



0 dB = 24.8 W/kg = 13.94 dBW/kg

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Date: 2014/11/20

**Dipole 5200 MHz\_SN:1104\_Head**

Communication System: CW; Frequency: 5200 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.615$  S/m;  $\epsilon_r = 36.085$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(5.25, 5.25, 5.25); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.5 W/kg

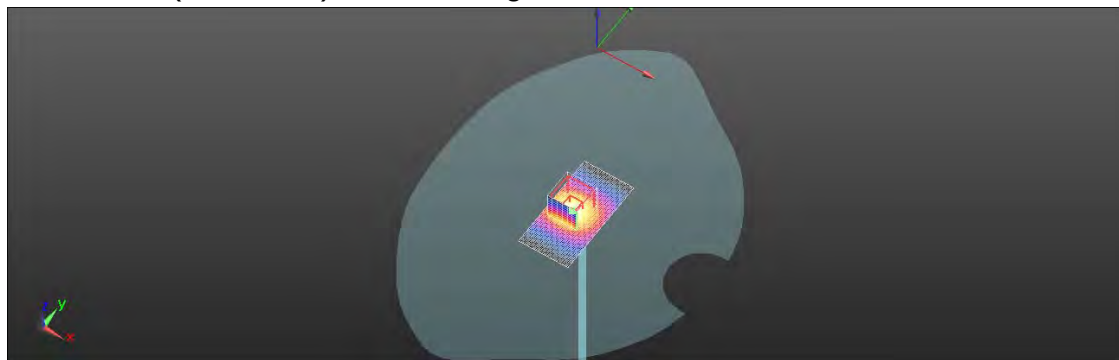
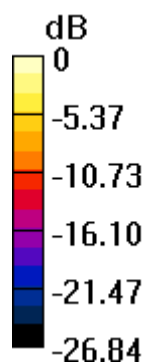
**Configuration / d=10mm, Pin=100mW, dist=2mm / Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.62 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 37.6 W/kg

**SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.23 W/kg**

Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 18.5 W/kg = 12.76 dBW/kg

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Date: 2014/11/22

**Dipole 5200 MHz\_SN:1104\_Body**

Communication System: CW; Frequency: 5200 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.337$  S/m;  $\epsilon_r = 48.522$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.56, 4.56, 4.56); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 19.2 W/kg

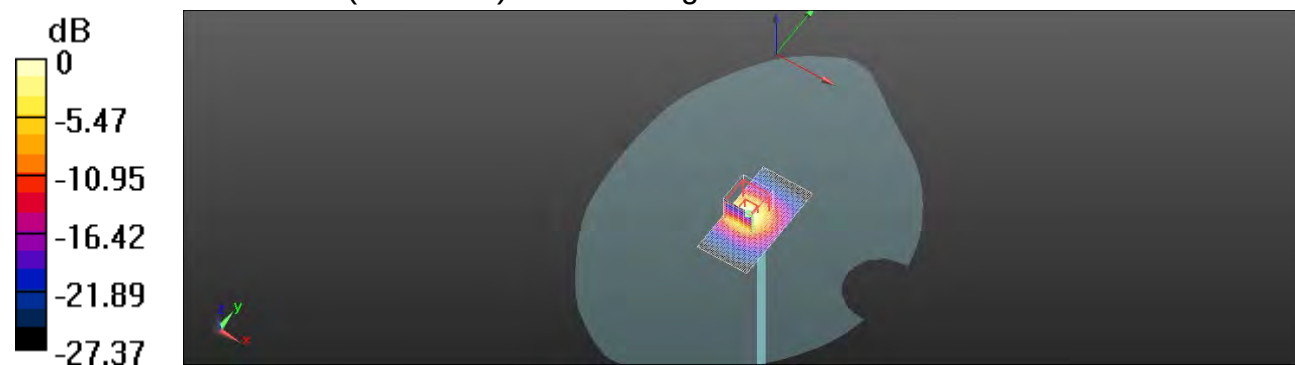
**Configuration / d=10mm, Pin=100mW, dist=2mm / Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 47.19 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 39.8 W/kg

**SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.06 W/kg**

Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 19.4 W/kg = 12.92 dBW/kg

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Date: 2014/11/21

## Dipole 5300 MHz\_SN:1104\_Head

Communication System: CW; Frequency: 5300 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5300 \text{ MHz}$ ;  $\sigma = 4.728 \text{ S/m}$ ;  $\epsilon_r = 35.839$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(5.07, 5.07, 5.07); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration /d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.4 W/kg

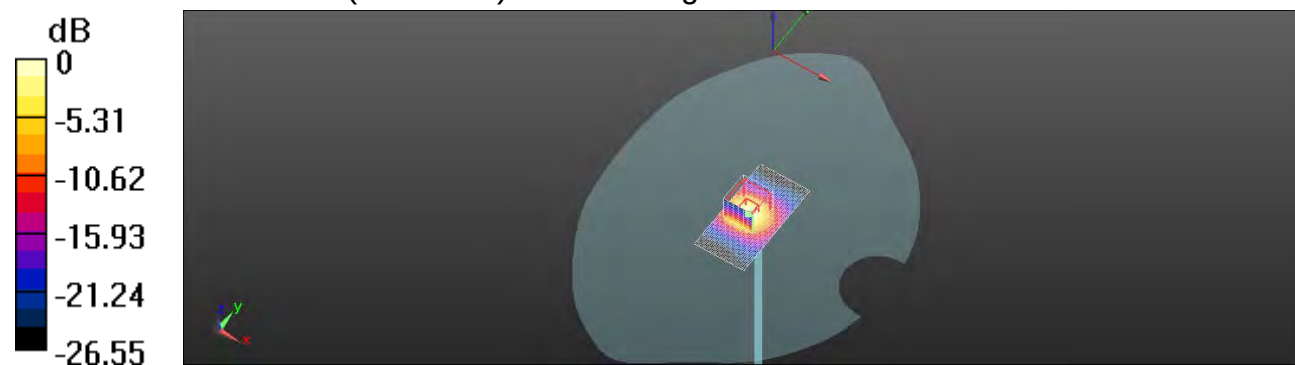
**Configuration /d=10mm, Pin=100mW, dist=2mm /Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.38 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 35.8 W/kg

**SAR(1 g) = 8.66 W/kg; SAR(10 g) = 2.47 W/kg**

Maximum value of SAR (measured) = 18.1 W/kg



0 dB = 18.4 W/kg = 12.40 dBW/kg

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Date: 2014/11/22

**Dipole 5300 MHz\_SN:1104\_Body**

Communication System: CW; Frequency: 5300 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.474$  S/m;  $\epsilon_r = 47.787$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.38, 4.38, 4.38); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.5 W/kg

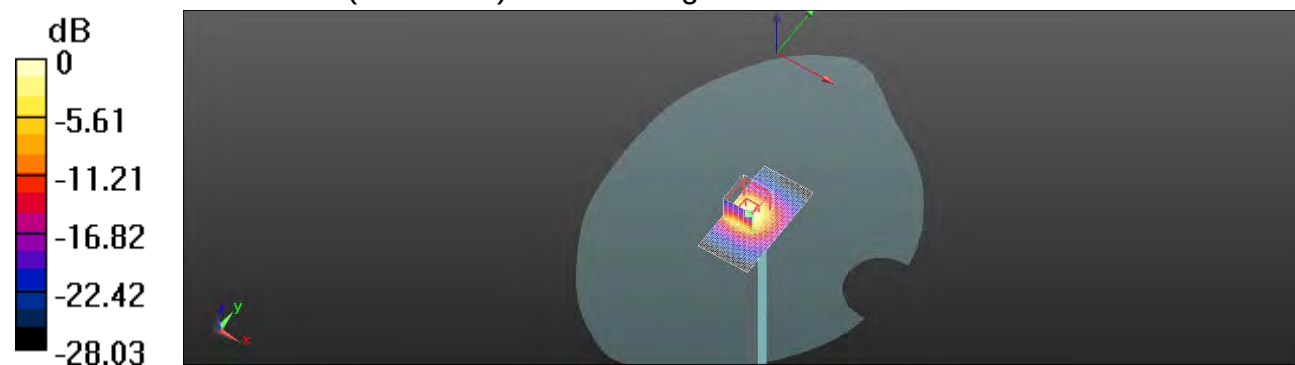
**Configuration / d=10mm, Pin=100mW, dist=2mm / Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 44.32 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 39.4 W/kg

**SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.22 W/kg**

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 18.5 W/kg = 12.47 dBW/kg

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**Dipole 5600 MHz\_SN:1104\_Head**

Communication System: CW; Frequency: 5600 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.078$  S/m;  $\epsilon_r = 35.154$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

## DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.48, 4.48, 4.48); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.7 W/kg

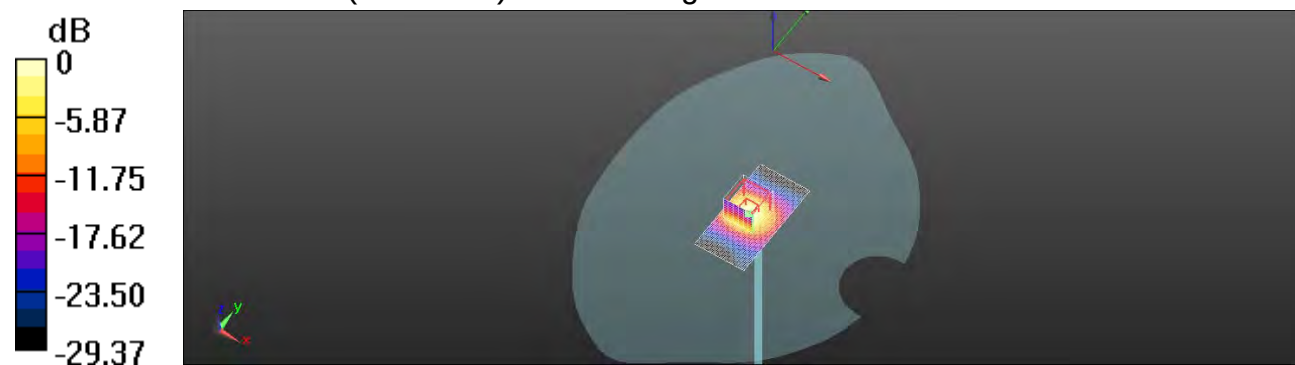
**Configuration / d=10mm, Pin=100mW, dist=2mm / Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 59.23 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 37.8 W/kg

**SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.42 W/kg**

Maximum value of SAR (measured) = 18.1 W/kg



0 dB = 18.7 W/kg = 12.53 dBW/kg

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## Dipole 5600 MHz\_SN:1104\_Body

Communication System: CW; Frequency: 5600 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.911$  S/m;  $\epsilon_r = 47.056$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(3.76, 3.76, 3.76); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 16.5 W/kg

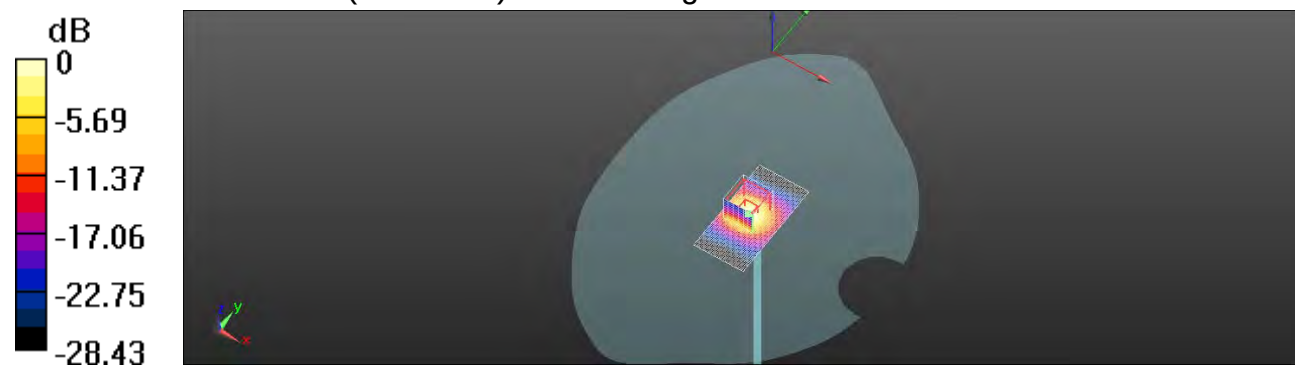
**Configuration / d=10mm, Pin=100mW, dist=2mm / Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 53.13 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 39 W/kg

**SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.15 W/kg**

Maximum value of SAR (measured) = 18.2 W/kg



0 dB = 18.2 W/kg = 12.49 dBW/kg

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## Dipole 5800 MHz\_SN:1104\_Head

Communication System: CW; Frequency: 5800 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 5.312 \text{ S/m}$ ;  $\epsilon_r = 34.714$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.65, 4.65, 4.65); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration /d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.8 W/kg

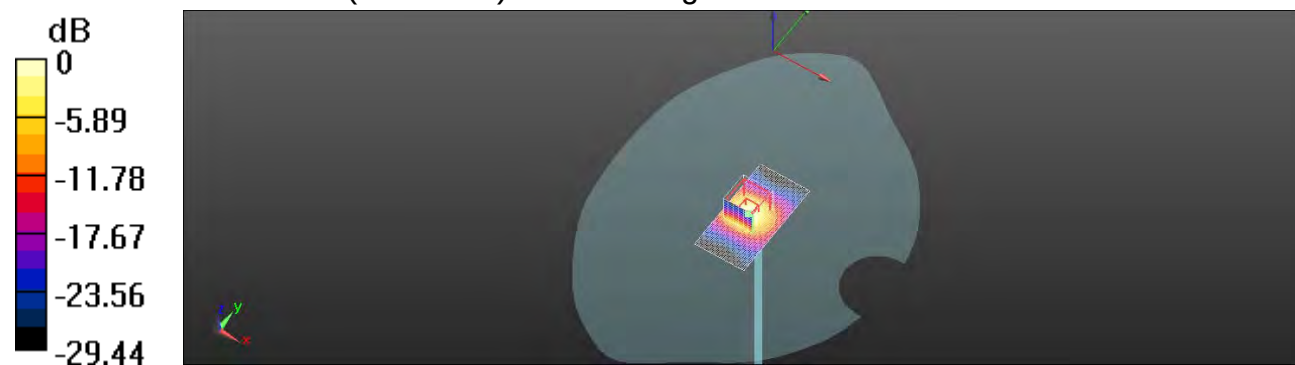
**Configuration /d=10mm, Pin=100mW, dist=2mm /Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 59.30 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 38.6 W/kg

**SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.26 W/kg**

Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 19.8 W/kg = 12.40 dBW/kg

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## Dipole 5800 MHz\_SN:1104\_Body

Communication System: CW; Frequency: 5800 MHz, Duty factor: 1:1

Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 6.19 \text{ S/m}$ ;  $\epsilon_r = 46.45$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

### DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.13, 4.13, 4.13); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration / d=10mm, Pin=100mW, dist=2mm:** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.9 W/kg

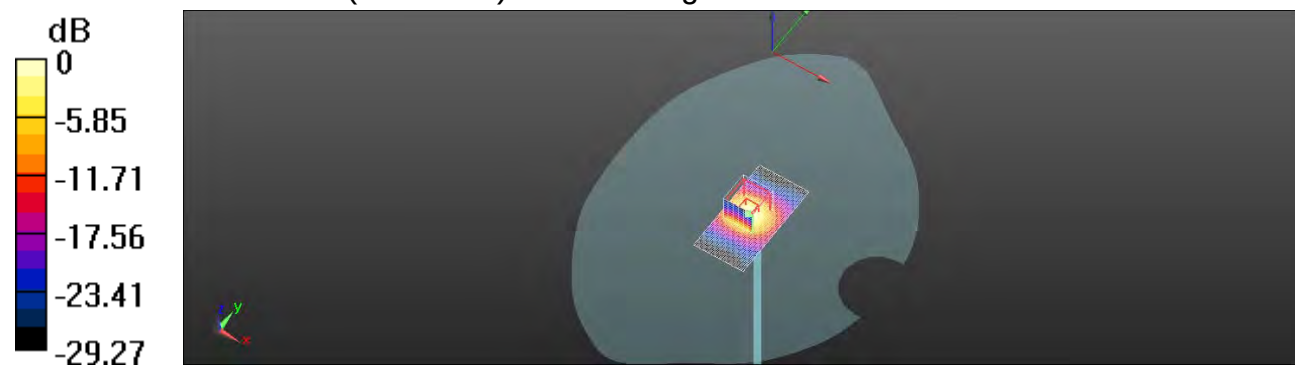
**Configuration / d=10mm, Pin=100mW, dist=2mm / Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 54.27 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 39.3 W/kg

**SAR(1 g) = 7.56 W/kg; SAR(10 g) = 2.32 W/kg**

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 18.3 W/kg = 12.63 dBW/kg

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Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
S Servizio svizzero di taratura  
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS-TW (Auden)

Certificate No.: DAE4-1260\_Aug14

| CALIBRATION CERTIFICATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                   |                            |                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------|
| Object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | DAE4 - SD 000 D04 BM - SN: 1260                                                   |                            |                                                                                                     |
| Calibration procedure(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | QA CAL-06.v26<br>Calibration procedure for the data acquisition electronics (DAE) |                            |                                                                                                     |
| Calibration date:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | August 26, 2014                                                                   |                            |                                                                                                     |
| <p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br/>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment (temperature (22 ± 3)°C and humidity &lt; 70%).</p> <p>Calibration Equipment used (MPE critical for calibration)</p> |                                                                                   |                            |                                                                                                     |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ID #                                                                              | Cal Date (Certificate No.) | Scheduled Calibration                                                                               |
| Kathley Multimeter Type 2001                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SN: 0610278                                                                       | 01-Oct-13 (No:13976)       | Oct-14                                                                                              |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ID #                                                                              | Check Date (in house)      | Scheduled Check                                                                                     |
| Auto DAE Calibration Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SE LMS 053 AA 1001                                                                | 07-Jan-14 (in house check) | In house check: Jan-15                                                                              |
| Calibrator Box V2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SE LMS 008 AA 1002                                                                | 07-Jan-14 (in house check) | In house check: Jan-15                                                                              |
| Calibrated by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Name:<br>Dominique Steffen                                                        | Function:<br>Technician    | Signature:<br> |
| Approved by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Fin Bonhof                                                                        | Deputy Technical Manager   |                |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                   |                            | Issued: August 26, 2014                                                                             |

Certificate No.: DAE4-1260\_Aug14

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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Accreditation No.: **SCS 108**

## Glossary

**DAE** data acquisition electronics  
**Connector angle** information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
  - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
  - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
  - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
  - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - **Input resistance:** Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
  - **Power consumption:** Typical value for information. Supply currents in various operating modes.

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## DC Voltage Measurement

A/D Converter Resolution nominal

High Range: 1LSB = 6.1μV, full range = -100...+800 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X                     | Y                     | Z                     |
|---------------------|-----------------------|-----------------------|-----------------------|
| High Range          | 406.033 ± 0.02% (k=2) | 405.001 ± 0.02% (k=2) | 405.579 ± 0.02% (k=2) |
| Low Range           | 3.55683 ± 1.50% (k=2) | 4.01886 ± 1.50% (k=2) | 4.00468 ± 1.50% (k=2) |

## Connector Angle

|                                           |              |
|-------------------------------------------|--------------|
| Connector Angle to be used in DASY system | 84.0 ° ± 1 ° |
|-------------------------------------------|--------------|

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## Appendix (Additional assessments outside the scope of SCS108)

### 1. DC Voltage Linearity

| High Range        | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 19997.43                  | -0.04                        | -0.00     |
| Channel X + Input | 20003.49                  | 2.49                         | 0.01      |
| Channel X - Input | -19998.62                 | 2.32                         | -0.01     |
| Channel Y + Input | 19998.97                  | 1.33                         | 0.00      |
| Channel Y + Input | 20001.53                  | 0.51                         | 0.00      |
| Channel Y - Input | -20000.52                 | 0.34                         | -0.00     |
| Channel Z + Input | 19998.52                  | 1.01                         | 0.00      |
| Channel Z + Input | 19999.80                  | -1.11                        | -0.01     |
| Channel Z - Input | -20001.65                 | -0.71                        | 0.00      |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2000.38                   | 0.17                         | 0.01      |
| Channel X + Input | 201.72                    | 0.48                         | 0.24      |
| Channel X - Input | -198.19                   | 0.50                         | -0.25     |
| Channel Y + Input | 1999.92                   | -1.02                        | -0.05     |
| Channel Y + Input | 201.16                    | -0.29                        | -0.12     |
| Channel Y - Input | -198.53                   | 0.05                         | -0.03     |
| Channel Z + Input | 2001.06                   | 0.16                         | 0.01      |
| Channel Z + Input | 200.04                    | -1.27                        | -0.63     |
| Channel Z - Input | -200.02                   | -1.46                        | 0.74      |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Common mode Input Voltage (mV) | High Range Average Reading ( $\mu\text{V}$ ) | Low Range Average Reading ( $\mu\text{V}$ ) |
|-----------|--------------------------------|----------------------------------------------|---------------------------------------------|
| Channel X | 200                            | 1.17                                         | -0.56                                       |
|           | -200                           | -1.57                                        | -0.48                                       |
| Channel Y | 200                            | 12.66                                        | 12.37                                       |
|           | 200                            | 12.16                                        | -12.07                                      |
| Channel Z | 200                            | -0.46                                        | -0.74                                       |
|           | -200                           | -1.73                                        | -1.63                                       |

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Input Voltage (mV) | Channel X ( $\mu\text{V}$ ) | Channel Y ( $\mu\text{V}$ ) | Channel Z ( $\mu\text{V}$ ) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200                | -                           | 5.89                        | -2.24                       |
| Channel Y | 200                | 9.64                        | -                           | 7.48                        |
| Channel Z | 200                | 9.68                        | 7.16                        | -                           |

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**4. AD-Converter Values with inputs shorted**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 15914            | 14950           |
| Channel Y | 15817            | 15075           |
| Channel Z | 16045            | 15582           |

**5. Input Offset Measurement**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input: 10M $\Omega$ 

|           | Average ( $\mu$ V) | min. Offset ( $\mu$ V) | max. Offset ( $\mu$ V) | Std. Deviation ( $\mu$ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | 0.26               | -0.75                  | 1.42                   | 0.43                      |
| Channel Y | -0.44              | -1.36                  | 0.61                   | 0.43                      |
| Channel Z | -1.66              | -2.60                  | -0.69                  | 0.44                      |

**6. Input Offset Current**

Nominal input circuitry offset current on all channels: &lt;25fA

**7. Input Resistance** (Typical values for information)

|           | Zeroing (k $\Omega$ m) | Measuring (M $\Omega$ m) |
|-----------|------------------------|--------------------------|
| Channel X | 200                    | 200                      |
| Channel Y | 200                    | 200                      |
| Channel Z | 200                    | 200                      |

**8. Low Battery Alarm Voltage** (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.5              |
| Supply (- Vcc) | -7.5              |

**9. Power Consumption** (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01             | +6            | +14               |
| Supply (- Vcc) | -0.01             | -6            | -9                |

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 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client: **Auden**

Certificate No: **DAE4-915\_Jun14**

## CALIBRATION CERTIFICATE

Object: **DAE4 - SD 000 D04 BK - SN: 915**

Calibration procedure(s): **QA CAL-06.v26**  
 Calibration procedure for the data acquisition electronics (DAE)

Calibration date: **June 18, 2014**

This calibration certificate documents the traceability to national standards which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility; environmental temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&E critical for calibration)

| Primary Standards            | ID #               | Cal Date (Certificate No.) | Scheduled Calibration |
|------------------------------|--------------------|----------------------------|-----------------------|
| Kathley Multimeter Type 2001 | SN: 0810276        | 01-Oct-13 (No:13976)       | Q3-14                 |
| Secondary Standards          | ID #               | Check Date (in house)      | Scheduled Check       |
| Auto DAE Calibration Unit    | SE UWS 000 AA 1001 | 07-Jan-14 (in house check) | In house check Jan-15 |
| Calibrator Box V2.1          | SE UMS 006 AA 1002 | 07-Jan-14 (in house check) | In house check Jan-15 |

|                |                           |                          |               |
|----------------|---------------------------|--------------------------|---------------|
| Calibrated by: | Name<br>Dominique Stoffen | Function<br>Technician   | Signature<br> |
| Approved by:   | Flo Bommert               | Deputy Technical Manager |               |

Issued: June 18, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: DAE4-915\_Jun14

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Accreditation No.: **SCS 108**

## Glossary

**DAE** data acquisition electronics  
**Connector angle** information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
  - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
  - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
  - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
  - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - **Input resistance:** Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
  - **Power consumption:** Typical value for information. Supply currents in various operating modes.

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### DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 404.307 $\pm$ 0.02% (k=2) | 404.432 $\pm$ 0.02% (k=2) | 404.778 $\pm$ 0.02% (k=2) |
| Low Range           | 3.97786 $\pm$ 1.50% (k=2) | 4.00889 $\pm$ 1.50% (k=2) | 3.98763 $\pm$ 1.50% (k=2) |

### Connector Angle

|                                           |                                     |
|-------------------------------------------|-------------------------------------|
| Connector Angle to be used in DASY system | 115.0 $^{\circ}$ $\pm$ 1 $^{\circ}$ |
|-------------------------------------------|-------------------------------------|

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## Appendix (Additional assessments outside the scope of SCS108)

### 1. DC Voltage Linearity

| High Range        | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 19998.08                  | 1.14                         | 0.00      |
| Channel X + Input | 20000.26                  | -0.79                        | -0.00     |
| Channel X - Input | -19989.34                 | 1.47                         | -0.01     |
| Channel Y + Input | 20000.17                  | 3.04                         | 0.00      |
| Channel Y + Input | 19999.35                  | -1.60                        | -0.01     |
| Channel Y - Input | -20000.40                 | 0.40                         | -0.00     |
| Channel Z + Input | 19999.69                  | -0.05                        | -0.00     |
| Channel Z + Input | 19999.67                  | -1.07                        | -0.01     |
| Channel Z - Input | -20001.83                 | -0.82                        | 0.00      |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2000.78                   | -0.15                        | -0.01     |
| Channel X + Input | 201.37                    | -0.01                        | -0.00     |
| Channel X - Input | -198.71                   | -0.07                        | 0.04      |
| Channel Y + Input | 2001.08                   | 0.23                         | 0.01      |
| Channel Y + Input | 201.11                    | -0.04                        | -0.02     |
| Channel Y - Input | -198.95                   | -0.16                        | 0.08      |
| Channel Z + Input | 2000.69                   | -0.17                        | -0.01     |
| Channel Z + Input | 200.66                    | -0.48                        | -0.24     |
| Channel Z - Input | -200.04                   | -1.33                        | 0.67      |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Common mode Input Voltage (mV) | High Range Average Reading ( $\mu\text{V}$ ) | Low Range Average Reading ( $\mu\text{V}$ ) |
|-----------|--------------------------------|----------------------------------------------|---------------------------------------------|
| Channel X | 200                            | -15.73                                       | -17.62                                      |
|           | - 200                          | 17.95                                        | 16.40                                       |
| Channel Y | 200                            | -5.63                                        | -5.61                                       |
|           | - 200                          | 4.75                                         | 4.70                                        |
| Channel Z | 200                            | -0.98                                        | -1.03                                       |
|           | - 200                          | -0.88                                        | -0.86                                       |

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Input Voltage (mV) | Channel X ( $\mu\text{V}$ ) | Channel Y ( $\mu\text{V}$ ) | Channel Z ( $\mu\text{V}$ ) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200                | -                           | 4.09                        | -3.56                       |
| Channel Y | 200                | 7.89                        | -                           | 5.02                        |
| Channel Z | 200                | 8.61                        | 6.69                        | -                           |

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**4. AD-Converter Values with inputs shorted**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 16112            | 13093           |
| Channel Y | 15985            | 14777           |
| Channel Z | 15881            | 15729           |

**5. Input Offset Measurement**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10M $\Omega$ 

|           | Average ( $\mu$ V) | min. Offset ( $\mu$ V) | max. Offset ( $\mu$ V) | Std. Deviation ( $\mu$ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | 0.08               | -1.17                  | 1.32                   | 0.43                      |
| Channel Y | -0.58              | -1.57                  | 0.70                   | 0.47                      |
| Channel Z | -0.51              | -1.47                  | 1.80                   | 0.44                      |

**6. Input Offset Current**

Nominal Input circuitry offset current on all channels: &lt;25fA

**7. Input Resistance** (Typical values for information)

|           | Zeroing (k $\Omega$ m) | Measuring (M $\Omega$ m) |
|-----------|------------------------|--------------------------|
| Channel X | 200                    | 200                      |
| Channel Y | 200                    | 200                      |
| Channel Z | 200                    | 200                      |

**8. Low Battery Alarm Voltage** (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9              |
| Supply (- Vcc) | -7.6              |

**9. Power Consumption** (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01             | +6            | +14               |
| Supply (- Vcc) | -0.01             | -8            | -9                |

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS - TW (Auden)

Certificate No.: DAE4-856\_Aug14

## CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04-BM - SN: 856

Calibration procedure(s): QA CAL-06.v26  
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: August 27, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3) °C and humidity < 70%.

Calibration Equipment used (MATE critical for calibration)

| Primary Standards            | ID #               | Cal Date (Certificate No.) | Scheduled Calibration  |
|------------------------------|--------------------|----------------------------|------------------------|
| Kethley Multimeter Type 2003 | SN: 0810278        | 01-Oct-13 (No. 13976)      | Oct-14                 |
| Secondary Standards          | ID #               | Check Date (in house)      | Scheduled Check        |
| Auto DAE Calibration Unit    | SE LWS 053 AA 1001 | 07-Jan-14 (in house check) | In house check: Jan-15 |
| Calibrator Box V2.1          | SE LWS 005 AA 1002 | 07-Jan-14 (in house check) | In house check: Jan-15 |

|                |                           |                          |                |
|----------------|---------------------------|--------------------------|----------------|
| Calibrated by: | Name:<br>Dominique Seiden | Function:<br>Technician  | Signature:<br> |
| Approved by:   | Fin Bommeli               | Deputy Technical Manager |                |

Issued: August 27, 2014

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Certificate No.: DAE4-856\_Aug14

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Accreditation No.: SCS 108

## Glossary

**DAE** data acquisition electronics  
**Connector angle** information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
  - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
  - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage.
  - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
  - **Input Offset Current:** Typical value for information: Maximum channel input offset current, not considering the input resistance.
  - **Input resistance:** Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - **Low Battery Alarm Voltage:** Typical value for information: Below this voltage, a battery alarm signal is generated.
  - **Power consumption:** Typical value for information: Supply currents in various operating modes.

Certificate No: DAE4-6016\_Aug14

Page 2 of 5

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**DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V ; full range = -100...+300 mV

Low Range: 1LSB = 61nV ; full range = -1...+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 403.466 $\pm$ 0.02% (k=2) | 404.581 $\pm$ 0.02% (k=2) | 403.903 $\pm$ 0.02% (k=2) |
| Low Range           | 3.97681 $\pm$ 1.50% (k=2) | 3.97783 $\pm$ 1.50% (k=2) | 3.97815 $\pm$ 1.50% (k=2) |

**Connector Angle**

|                                           |                                    |
|-------------------------------------------|------------------------------------|
| Connector Angle to be used in DASY system | 52.5 $^{\circ}$ $\pm$ 1 $^{\circ}$ |
|-------------------------------------------|------------------------------------|

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## Appendix (Additional assessments outside the scope of SCS108)

### 1. DC Voltage Linearity

| High Range        | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 19999.33                  | 0.84                         | 0.00      |
| Channel X + Input | 19998.90                  | -2.25                        | -0.01     |
| Channel X - Input | -20000.45                 | 0.34                         | -0.00     |
| Channel Y + Input | 19999.95                  | 0.95                         | 0.00      |
| Channel Y + Input | 19997.51                  | -3.82                        | -0.02     |
| Channel Y - Input | -20000.77                 | 0.07                         | -0.00     |
| Channel Z + Input | 19997.26                  | -0.19                        | -0.00     |
| Channel Z + Input | 19997.65                  | -3.57                        | -0.02     |
| Channel Z - Input | -20002.47                 | 1.55                         | 0.01      |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2001.05                   | -0.09                        | -0.00     |
| Channel X + Input | 200.34                    | 0.60                         | 0.40      |
| Channel X - Input | -198.31                   | 0.26                         | -0.13     |
| Channel Y + Input | 2001.39                   | 0.26                         | 0.01      |
| Channel Y + Input | 201.08                    | -0.36                        | -0.16     |
| Channel Y - Input | -199.24                   | -0.78                        | 0.09      |
| Channel Z + Input | 2000.92                   | -0.18                        | -0.01     |
| Channel Z + Input | -200.26                   | -1.22                        | -0.60     |
| Channel Z - Input | -199.91                   | -1.47                        | 0.74      |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Common mode Input Voltage (mV) | High Range Average Reading ( $\mu\text{V}$ ) | Low Range Average Reading ( $\mu\text{V}$ ) |
|-----------|--------------------------------|----------------------------------------------|---------------------------------------------|
| Channel X | 200                            | -14.76                                       | -16.42                                      |
|           | -200                           | 17.19                                        | 15.88                                       |
| Channel Y | 200                            | -2.17                                        | -2.25                                       |
|           | -200                           | 0.39                                         | 0.01                                        |
| Channel Z | 200                            | 10.27                                        | 10.05                                       |
|           | -200                           | -13.06                                       | -13.09                                      |

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Input Voltage (mV) | Channel X ( $\mu\text{V}$ ) | Channel Y ( $\mu\text{V}$ ) | Channel Z ( $\mu\text{V}$ ) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200                | -                           | 3.41                        | -1.15                       |
| Channel Y | 200                | 7.99                        | -                           | 3.07                        |
| Channel Z | 200                | 8.55                        | 5.24                        | -                           |

Certificate No: DAE4-B5E\_Aug14

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#### 4. AD-Converter Values with Inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec;

|           | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 15225            | 15620           |
| Channel Y | 15942            | 15803           |
| Channel Z | 15875            | 15811           |

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec;

Input 10M $\Omega$ 

|           | Average ( $\mu$ V) | min. Offset ( $\mu$ V) | max. Offset ( $\mu$ V) | Std. Deviation ( $\mu$ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | 0.72               | -0.77                  | 1.89                   | 0.38                      |
| Channel Y | -0.24              | -1.57                  | 1.09                   | 0.42                      |
| Channel Z | -0.98              | -2.01                  | 0.07                   | 0.40                      |

#### 6. Input Offset Current

Nominal input circuitry offset current on all channels:  $\leq 25$  fA

#### 7. Input Resistance (Typical values for information)

|           | Zeroing (k $\Omega$ m) | Measuring (M $\Omega$ m) |
|-----------|------------------------|--------------------------|
| Channel X | 200                    | 200                      |
| Channel Y | 200                    | 200                      |
| Channel Z | 200                    | 200                      |

#### 8. Low Battery Alarm Voltage (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9              |
| Supply (- Vcc) | -7.6              |

#### 9. Power Consumption (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | -0.01             | $\approx 6$   | +14               |
| Supply (- Vcc) | -0.01             | $\approx 6$   | -9                |

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Accreditation No.: SCS 108

Client **SGS-TW (Auden)**

Certificate No.: DAE4-1374\_Nov14

## CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 1374**

Calibration procedure(s) **QA CAL-06.v28**  
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: **November 18, 2014**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties, with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (MSTE, critical for calibration)

| Primary Standards            | ID #               | Cal Date (Certificate No.) | Scheduled Calibration  |
|------------------------------|--------------------|----------------------------|------------------------|
| Kathley Multimeter Type 2001 | SN: 0810278        | 03-Oct-14 (No:15573)       | Oct-15                 |
| Secondary Standards          | ID #               | Check Date (in house)      | Scheduled Check        |
| Auto DAE Calibration Unit    | SE UWS 063 AA 1001 | 07-Jan-14 (in house check) | In house check: Jan-15 |
| Calibrator Box V2.1          | SE UMS 006 AA 1002 | 07-Jan-14 (in house check) | In house check: Jan-15 |

|                |                            |                                       |                |
|----------------|----------------------------|---------------------------------------|----------------|
| Calibrated by: | Name:<br>Dominique Blatter | Function:<br>Technician               | Signature:<br> |
| Approved by:   | Name:<br>En Bönhoff        | Function:<br>Deputy Technical Manager | Signature:<br> |

Issued: November 18, 2014

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Certificate No.: DAE4-1374\_Nov14

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Accreditation No.: SCS 108

## Glossary

**DAE** data acquisition electronics  
**Connector angle** information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
  - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
  - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage.
  - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
  - **Input Offset Current:** Typical value for information: Maximum channel input offset current, not considering the input resistance.
  - **Input resistance:** Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
  - **Power consumption:** Typical value for information. Supply currents in various operating modes.

Certificate No: DAE4-1374\_Hsig+4

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### DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V , full range = -100...+300 mV  
Low Range: 1LSB = 61nV , full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 405.035 $\pm$ 0.02% (k=2) | 405.315 $\pm$ 0.02% (k=2) | 404.974 $\pm$ 0.02% (k=2) |
| Low Range           | 3.99839 $\pm$ 1.50% (k=2) | 4.01042 $\pm$ 1.50% (k=2) | 3.94307 $\pm$ 1.50% (k=2) |

### Connector Angle

|                                           |                                     |
|-------------------------------------------|-------------------------------------|
| Connector Angle to be used in DASY system | 245.5 $^{\circ}$ $\pm$ 1 $^{\circ}$ |
|-------------------------------------------|-------------------------------------|

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## Appendix (Additional assessments outside the scope of SCS108)

### 1. DC Voltage Linearity

| High Range        | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 200030.74                 | -5.53                        | -0.00     |
| Channel X + Input | 20004.82                  | 1.02                         | 0.01      |
| Channel X - Input | -20002.76                 | 2.80                         | -0.01     |
| Channel Y + Input | 200031.50                 | -4.36                        | -0.00     |
| Channel Y + Input | 20003.22                  | -0.50                        | -0.00     |
| Channel Y - Input | -20005.15                 | 0.53                         | -0.00     |
| Channel Z + Input | 200033.38                 | -2.72                        | -0.00     |
| Channel Z + Input | 20001.36                  | -2.46                        | -0.01     |
| Channel Z - Input | -20005.91                 | -0.24                        | 0.00      |

| Low Range         | Reading ( $\mu\text{V}$ ) | Difference ( $\mu\text{V}$ ) | Error (%) |
|-------------------|---------------------------|------------------------------|-----------|
| Channel X + Input | 2000.14                   | -0.27                        | -0.01     |
| Channel X + Input | 201.07                    | 0.50                         | 0.25      |
| Channel X - Input | -199.21                   | 0.28                         | -0.14     |
| Channel Y + Input | 1999.83                   | -0.48                        | -0.00     |
| Channel Y + Input | 199.83                    | -0.73                        | -0.36     |
| Channel Y - Input | -200.80                   | -1.02                        | 0.51      |
| Channel Z + Input | 2001.36                   | 1.13                         | 0.06      |
| Channel Z + Input | 199.82                    | -0.58                        | -0.29     |
| Channel Z - Input | -201.43                   | -1.84                        | 0.92      |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Common mode Input Voltage (mV) | High Range Average Reading ( $\mu\text{V}$ ) | Low Range Average Reading ( $\mu\text{V}$ ) |
|-----------|--------------------------------|----------------------------------------------|---------------------------------------------|
| Channel X | 200                            | 18.42                                        | 15.65                                       |
|           | -200                           | -15.63                                       | -17.40                                      |
| Channel Y | 200                            | -5.00                                        | -5.33                                       |
|           | -200                           | 4.04                                         | 3.44                                        |
| Channel Z | 200                            | -0.12                                        | -0.30                                       |
|           | -200                           | -3.07                                        | -3.01                                       |

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | Input Voltage (mV) | Channel X ( $\mu\text{V}$ ) | Channel Y ( $\mu\text{V}$ ) | Channel Z ( $\mu\text{V}$ ) |
|-----------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Channel X | 200                | -                           | 6.99                        | -1.89                       |
| Channel Y | 200                | 10.04                       | -                           | 8.18                        |
| Channel Z | 200                | 9.45                        | 7.00                        | -                           |

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**4. AD-Converter Values with inputs shorted**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

|           | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 15851            | 16263           |
| Channel Y | 15925            | 16668           |
| Channel Z | 15301            | 15198           |

**5. Input Offset Measurement**

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input: 10M $\Omega$ 

|           | Average ( $\mu$ V) | min. Offset ( $\mu$ V) | max. Offset ( $\mu$ V) | Std. Deviation ( $\mu$ V) |
|-----------|--------------------|------------------------|------------------------|---------------------------|
| Channel X | -0.50              | -1.55                  | 0.57                   | 0.45                      |
| Channel Y | 0.21               | -1.30                  | 1.15                   | 0.49                      |
| Channel Z | -1.60              | -2.65                  | 0.25                   | 0.57                      |

**6. Input Offset Current**Nominal input circuitry offset current on all channels:  $\leq 25$ fA**7. Input Resistance** (Typical values for information)

|           | Zeroing (k $\Omega$ m) | Measuring (M $\Omega$ m) |
|-----------|------------------------|--------------------------|
| Channel X | 200                    | 200                      |
| Channel Y | 200                    | 200                      |
| Channel Z | 200                    | 200                      |

**8. Low Battery Alarm Voltage** (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.5              |
| Supply (- Vcc) | -7.5              |

**9. Power Consumption** (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01             | +5            | +14               |
| Supply (- Vcc) | -0.01             | -8            | -8                |

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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client: **SGS-TW (Auden)**

Certificate No.: **EX3-3923\_Aug14**

## CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3923**

Calibration procedure(s): **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6**  
 Calibration procedure for dosimetric E-field probes

Calibration date: **August 28, 2014**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&E critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GD41293674      | 03-Apr-14 (No. 217-01811)         | Apr-15                 |
| Power sensor E4412A        | MY41486087      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: SS064 (3a)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: SS277 (20a) | 03-Apr-14 (No. 217-01919)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: SS129 (30b) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe E83DV2     | SN: 3013        | 30-Dec-13 (No. E53-3013_Dec13)    | Dec-14                 |
| DAE4                       | SN: 660         | 13-Dec-13 (No. DAE4-660_Dec13)    | Dec-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642001700    | 4-Aug-98 (in house check Apr-13)  | In house check: Apr-16 |
| Network Analyzer HP 8753E  | US37390585      | 16-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                         | Name            | Function              | Signature |
|-------------------------|-----------------|-----------------------|-----------|
| Calibrated by:          | Steph E. Boudry | Laboratory Technician |           |
| Approved by:            | Julia F. Boudry | Technical Manager     |           |
| Issued: August 28, 2014 |                 |                       |           |

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No.: **EX3-3923\_Aug14**

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Accreditation No.: **SCS 108**

### Glossary:

|                       |                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                   | tissue simulating liquid                                                                                                                          |
| NORM <sub>x,y,z</sub> | sensitivity in free space                                                                                                                         |
| ConvF                 | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                        |
| DCP                   | diode compression point                                                                                                                           |
| CF                    | crest factor (1/duty cycle) of the RF signal                                                                                                      |
| A, B, C, D            | modulation dependent linearization parameters                                                                                                     |
| Polarization $\phi$   | $\phi$ rotation around probe axis                                                                                                                 |
| Polarization $\theta$ | $\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\theta = 0$ is normal to probe axis |
| Connector Angle       | information used in DASY system to align probe sensor X <sub>1</sub> to the robot coordinate system                                               |

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>: Assessed for E-field polarization  $\theta = 0$  ( $f \leq 100$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- A<sub>x,y,z</sub>, B<sub>x,y,z</sub>, C<sub>x,y,z</sub>, D<sub>x,y,z</sub>, VR<sub>x,y,z</sub>: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

Certificate No: EXS-3923, Aug'14

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EX3DV4 - SN:3923

August 28, 2014

# Probe EX3DV4

## SN:3923

Manufactured: March 8, 2013  
Calibrated: August 28, 2014

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

Certificate No: EX343923\_Aug14

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EX3DV4- SN:3923

August 20, 2014

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923****Basic Calibration Parameters**

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)    |
|-----------------------------------------------------------|----------|----------|----------|--------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.58     | 0.48     | 0.47     | $\pm 10.1\%$ |
| DCP (mV) <sup>B</sup>                                     | 99.2     | 102.2    | 103.3    |              |

**Modulation Calibration Parameters**

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>C</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 132.8    | $\pm 1.0\%$               |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 134.8    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 135.0    |                           |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X, Y, Z do not affect the E-field uncertainty inside ISL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>C</sup> Uncertainty is determined using the peak deviation from linear response; applying rectangular distribution; only is expressed for the square of the VR value.

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EX3DV4- SN:3923

August 28, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>E</sup> | Relative Permittivity <sup>F</sup> | Conductivity (S/m) <sup>F</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>G</sup> | Depth (mm) <sup>G</sup> | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 41.9                               | 0.89                            | 10.91   | 10.91   | 10.91   | 0.25               | 1.16                    | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 10.48   | 10.48   | 10.48   | 0.27               | 1.07                    | ± 12.0 %    |
| 900                  | 41.5                               | 0.87                            | 10.26   | 10.26   | 10.26   | 0.17               | 1.53                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 8.72    | 8.72    | 8.72    | 0.75               | 0.57                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 8.42    | 8.42    | 8.42    | 0.45               | 0.77                    | ± 12.0 %    |
| 2000                 | 40.0                               | 1.40                            | 8.46    | 8.46    | 8.46    | 0.67               | 0.63                    | ± 12.0 %    |
| 2300                 | 39.5                               | 1.67                            | 8.02    | 8.02    | 8.02    | 0.35               | 0.86                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 7.66    | 7.66    | 7.66    | 0.33               | 0.87                    | ± 12.0 %    |
| 2800                 | 39.0                               | 1.96                            | 7.41    | 7.41    | 7.41    | 0.35               | 0.86                    | ± 12.0 %    |
| 5200                 | 36.0                               | 4.88                            | 5.17    | 5.17    | 5.17    | 0.35               | 1.80                    | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 4.99    | 4.99    | 4.99    | 0.35               | 1.80                    | ± 13.1 %    |
| 5800                 | 35.5                               | 5.07                            | 4.71    | 4.71    | 4.71    | 0.40               | 1.80                    | ± 13.1 %    |
| 5600                 | 35.3                               | 5.27                            | 4.67    | 4.67    | 4.67    | 0.40               | 1.80                    | ± 13.1 %    |

<sup>E</sup> Frequency validity above 300 MHz at ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 60 and 70 MHz for ConvF measurements at 30, 60, 125, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if a skin compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-8 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No.: EX3-3923\_Aug14

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EX3DV4- SN:3923

August 28, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) <sup>a</sup> | Relative Permittivity <sup>b</sup> | Conductivity (S/m) <sup>c</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>d</sup> | Depth <sup>e</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750                  | 55.5                               | 0.96                            | 10.29   | 10.29   | 10.29   | 0.30               | 1.04                    | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 10.32   | 10.32   | 10.32   | 0.55               | 0.78                    | ± 12.0 %    |
| 900                  | 55.0                               | 1.05                            | 10.04   | 10.04   | 10.04   | 0.44               | 0.88                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 8.30    | 8.30    | 8.30    | 0.39               | 0.85                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 8.03    | 8.03    | 8.03    | 0.30               | 0.95                    | ± 12.0 %    |
| 2000                 | 53.3                               | 1.52                            | 8.16    | 8.16    | 8.16    | 0.23               | 1.16                    | ± 12.0 %    |
| 2300                 | 52.9                               | 1.81                            | 7.76    | 7.76    | 7.76    | 0.44               | 0.77                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.85                            | 7.56    | 7.56    | 7.56    | 0.80               | 0.50                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 7.36    | 7.36    | 7.36    | 0.80               | 0.50                    | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.71    | 4.71    | 4.71    | 0.35               | 1.90                    | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 4.58    | 4.58    | 4.58    | 0.35               | 1.90                    | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 4.09    | 4.09    | 4.09    | 0.40               | 1.90                    | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 4.33    | 4.33    | 4.33    | 0.40               | 1.90                    | ± 13.1 %    |

<sup>a</sup> Frequency validity above 300 MHz at ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty in the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 50, 25, 40, 50 and 70 MHz for ConvF assumptions at 30, 64, 128, 150 and 220 MHz respectively. Above 6 GHz frequency validity can be extended to ± 110 MHz.

<sup>b</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon'$  and  $\alpha$ ) can be released to ± 10% if liquid compensation formula is applied to measured S11R values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon'$  and  $\alpha$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>c</sup> AlphaDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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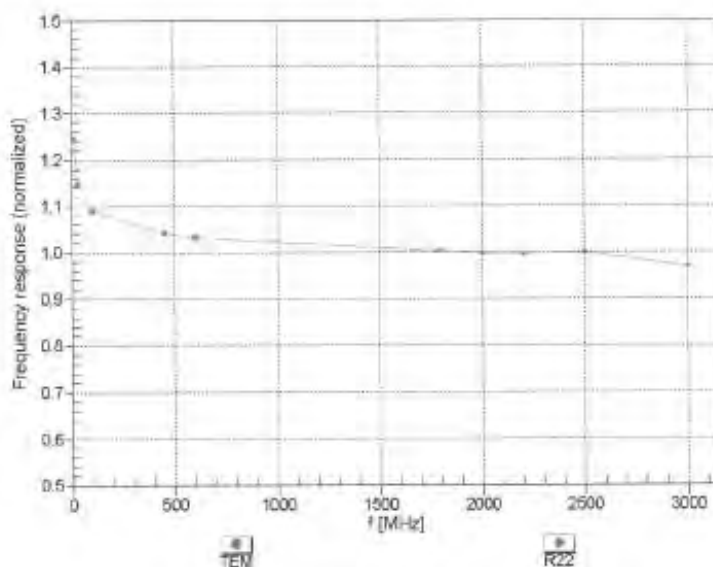
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EX3DV4- SN:3923

August 28, 2014

## Frequency Response of E-Field (TEM-Cell: Ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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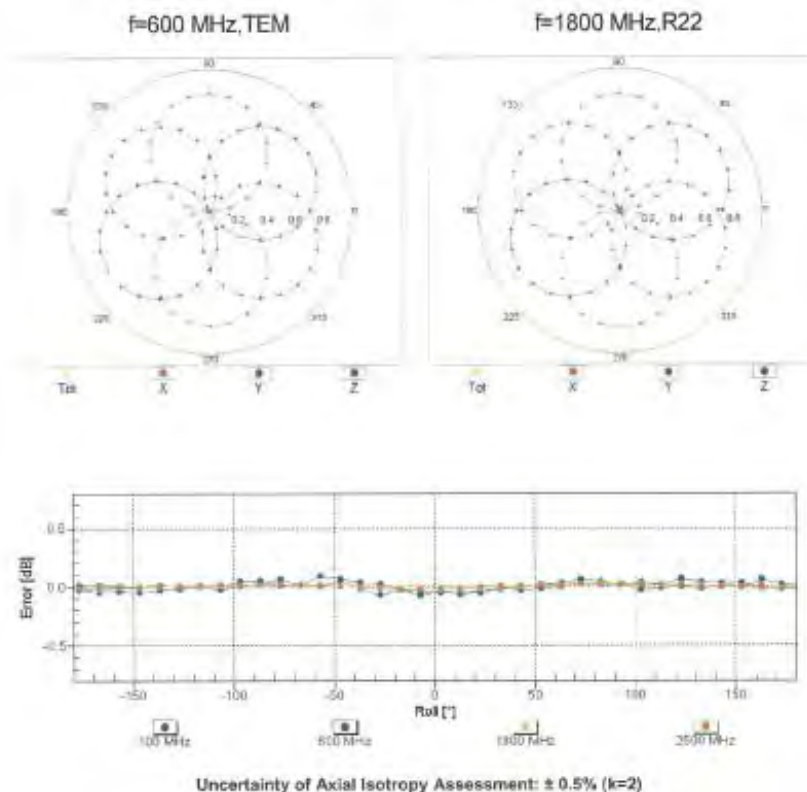
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August 28, 2014

## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



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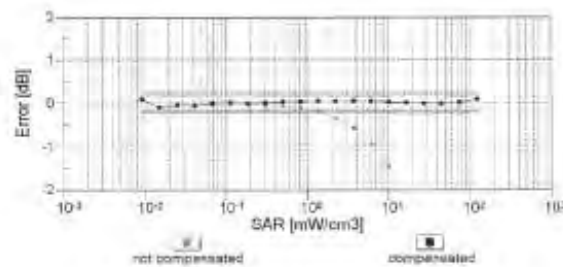
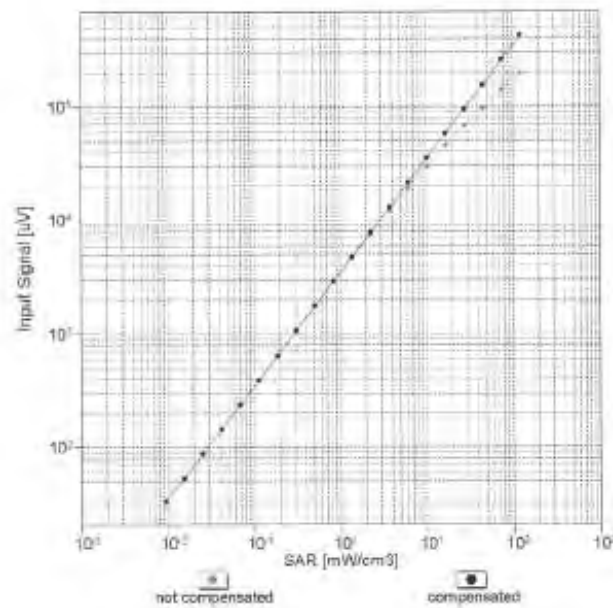
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EX3DV4- SN:3923

August 28, 2014

## Dynamic Range f(SAR<sub>head</sub>) (TEM cell, f<sub>eval</sub> = 1900 MHz)



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

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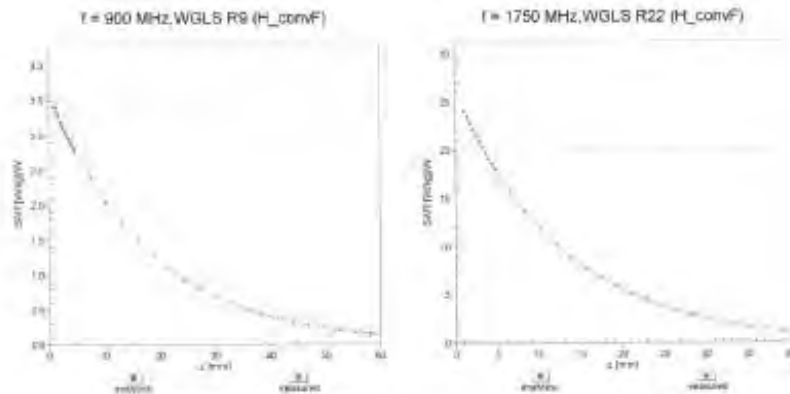
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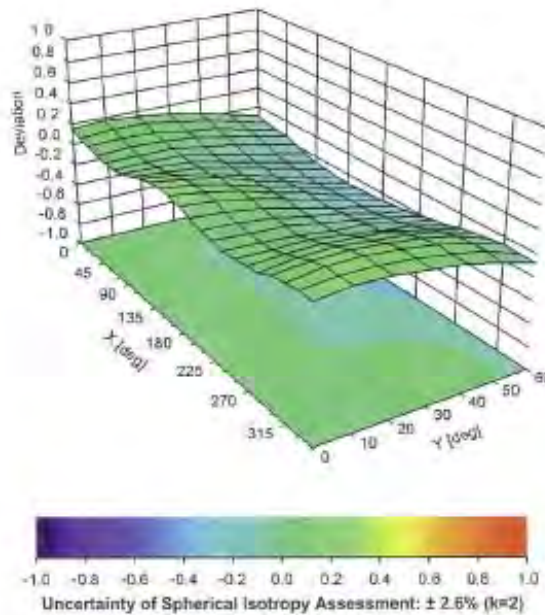
EX3DV4- SN:3923

August 28, 2014

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi$ , $\theta$ ), $f = 900$ MHz



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EX3DV4 SN:3923

August 26, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement:                           | Triangular |
| Connector Angle (°)                           | -5°        |
| Mechanical Surface Detection Mode:            | enabled    |
| Optical Surface Detection Mode:               | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 8 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 1.4 mm     |

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Accreditation No. : SCS 108

Client : SGS-TW (Auden)

Certificate No. : EX3-3831\_Jan14

## CALIBRATION CERTIFICATE

Object : EX3DV4 - SN:3831

Calibration procedure(s) : QA CAL-01.v0, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6  
Calibration procedure for dosimetric E-field probes

Calibration date : January 31, 2014

This calibration certificate documents the conformity to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility, environment temperature (22 ± 3)°C and humidity = 70%.

Calibration Equipment used (M&E critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4410B         | CG41200879      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Power sensor E4412A        | MY41400087      | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 20 dB Attenuator | SN: S5277 (20c) | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference 30 dB Attenuator | SN: S3129 (30c) | 04-Apr-13 (No. 217-01733)         | Apr-14                 |
| Reference Probe ES3DV2     | SN: 3012        | 30-Dec-13 (No. ES3-3013_Dec13)    | Dec-14                 |
| DAEs                       | SN: 660         | 13-Dec-13 (No. DAE4-660_Dec13)    | Dec-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-09 (In house check Apr-13)  | In house check: Apr-16 |
| Network Analyzer HP 8733E  | US37340585      | 18-Oct-01 (In house check Oct-13) | In house check: Oct-14 |

|                          | Name          | Function              | Signature |
|--------------------------|---------------|-----------------------|-----------|
| Calibrated by:           | Wen E-Rueue   | Laboratory Technician |           |
| Approved by:             | Karla Pulwido | Technical Manager     |           |
| Issued: January 31, 2014 |               |                       |           |

This calibration certificate shall not be reproduced without written approval of the laboratory.

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Accreditation No.: **SCS 108**

## Glossary:

|                       |                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                   | tissue simulating liquid                                                                                                                          |
| NORM <sub>x,y,z</sub> | sensitivity in free space                                                                                                                         |
| ConvF                 | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                        |
| DCP                   | diode compression point                                                                                                                           |
| CF                    | crest factor (1/duty_cycle) of the RF signal                                                                                                      |
| A, B, C, D            | modulation dependent linearization parameters                                                                                                     |
| Polarization $\phi$   | $\phi$ rotation around probe axis                                                                                                                 |
| Polarization $\theta$ | $\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\theta = 0$ is normal to probe axis |
| Connector Angle       | information used in DASY system to align probe sensor X to the robot coordinate system                                                            |

## Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>: Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM( $f$ )<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy): In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

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EX3DV4 ~ SN:3831

January 31, 2014

# Probe EX3DV4

## SN:3831

Manufactured: September 6, 2011  
Calibrated: January 31, 2014

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

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EX3DV4- SN:3831

January 31, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

### Basic Calibration Parameters

|                                                    | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|----------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V/m})^2$ ) <sup>A</sup> | 0.45     | 0.42     | 0.43     | $\pm 10,1 \%$ |
| DCP (mV) <sup>B</sup>                              | 102.4    | 100.1    | 97.7     |               |

### Modulation Calibration Parameters

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>C</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 153.1    | $\pm 3,0 \%$              |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 146.3    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 154.8    |                           |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>C</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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EX3DV4-- SN:3831

January 31, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>c</sup> | Relative Permittivity <sup>f</sup> | Conductivity (S/m) <sup>g</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>o</sup> | Depth <sup>o</sup> (mm) | Unc. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|------------|
| 750                  | 41.9                               | 0.89                            | 9.59    | 9.59    | 9.59    | 0.74               | 0.64                    | ± 12.0 %   |
| 835                  | 41.5                               | 0.90                            | 9.14    | 9.14    | 9.14    | 0.22               | 1.36                    | ± 12.0 %   |
| 900                  | 41.5                               | 0.97                            | 9.17    | 9.17    | 9.17    | 0.28               | 0.96                    | ± 12.0 %   |
| 1750                 | 40.1                               | 1.37                            | 8.00    | 8.00    | 8.00    | 0.26               | 0.99                    | ± 12.0 %   |
| 1900                 | 40.0                               | 1.40                            | 7.79    | 7.79    | 7.79    | 0.60               | 0.65                    | ± 12.0 %   |
| 2000                 | 40.0                               | 1.40                            | 7.71    | 7.71    | 7.71    | 0.39               | 0.79                    | ± 12.0 %   |
| 2300                 | 39.5                               | 1.67                            | 7.35    | 7.35    | 7.35    | 0.43               | 0.76                    | ± 12.0 %   |
| 2450                 | 39.2                               | 1.80                            | 6.99    | 6.99    | 6.99    | 0.37               | 0.85                    | ± 12.0 %   |
| 2600                 | 39.0                               | 1.96                            | 6.62    | 6.62    | 6.62    | 0.38               | 0.87                    | ± 12.0 %   |
| 5200                 | 36.0                               | 4.66                            | 4.67    | 4.67    | 4.67    | 0.35               | 1.80                    | ± 13.1 %   |
| 5300                 | 35.9                               | 4.76                            | 4.41    | 4.41    | 4.41    | 0.40               | 1.60                    | ± 13.1 %   |
| 5600                 | 35.5                               | 5.07                            | 3.99    | 3.99    | 3.99    | 0.50               | 1.80                    | ± 13.1 %   |
| 5800                 | 35.3                               | 5.27                            | 4.12    | 4.12    | 4.12    | 0.45               | 1.80                    | ± 13.1 %   |

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> Alpha/Depth are determined during calibration. SPIEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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EX3DV4- SN:3831

January 31, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

### Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) <sup>c</sup> | Relative Permittivity <sup>a</sup> | Conductivity (S/m) <sup>b</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>d</sup> | Depth (mm) | Unc. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|------------|------------|
| 750                  | 55.5                               | 0.96                            | 9.10    | 9.10    | 9.10    | 0.50               | 0.80       | ± 12.0 %   |
| 835                  | 55.2                               | 0.97                            | 9.03    | 9.03    | 9.03    | 0.28               | 1.15       | ± 12.0 %   |
| 900                  | 55.0                               | 1.05                            | 8.84    | 8.84    | 8.84    | 0.29               | 1.08       | ± 12.0 %   |
| 1750                 | 53.4                               | 1.49                            | 7.63    | 7.63    | 7.63    | 0.26               | 1.16       | ± 12.0 %   |
| 1900                 | 53.3                               | 1.52                            | 7.19    | 7.19    | 7.19    | 0.32               | 1.01       | ± 12.0 %   |
| 2000                 | 53.3                               | 1.52                            | 7.17    | 7.17    | 7.17    | 0.44               | 0.83       | ± 12.0 %   |
| 2300                 | 52.9                               | 1.81                            | 6.90    | 6.90    | 6.90    | 0.52               | 0.76       | ± 12.0 %   |
| 2450                 | 52.7                               | 1.95                            | 6.68    | 6.68    | 6.68    | 0.80               | 0.56       | ± 12.0 %   |
| 2600                 | 52.5                               | 2.16                            | 6.50    | 6.50    | 6.50    | 0.80               | 0.50       | ± 12.0 %   |
| 5200                 | 49.0                               | 5.30                            | 4.08    | 4.08    | 4.08    | 0.50               | 1.90       | ± 13.1 %   |
| 5300                 | 48.9                               | 5.42                            | 3.87    | 3.87    | 3.87    | 0.50               | 1.90       | ± 13.1 %   |
| 5600                 | 48.5                               | 5.77                            | 3.36    | 3.36    | 3.36    | 0.60               | 1.90       | ± 13.1 %   |
| 5800                 | 48.2                               | 6.00                            | 3.78    | 3.78    | 3.78    | 0.55               | 1.90       | ± 13.1 %   |

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>a</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>d</sup> Alpha/Depth are determined during calibration. SPIAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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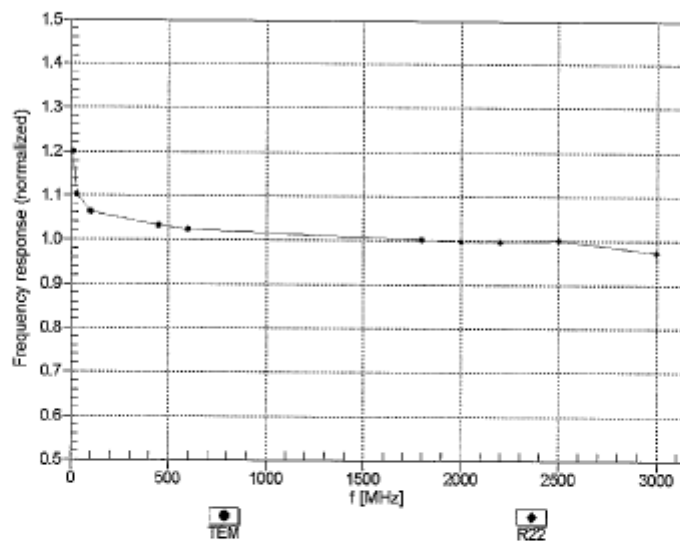
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EX3DV4-SN:3831

January 31, 2014

## Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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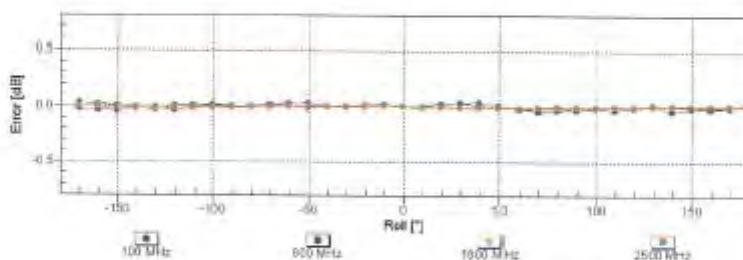
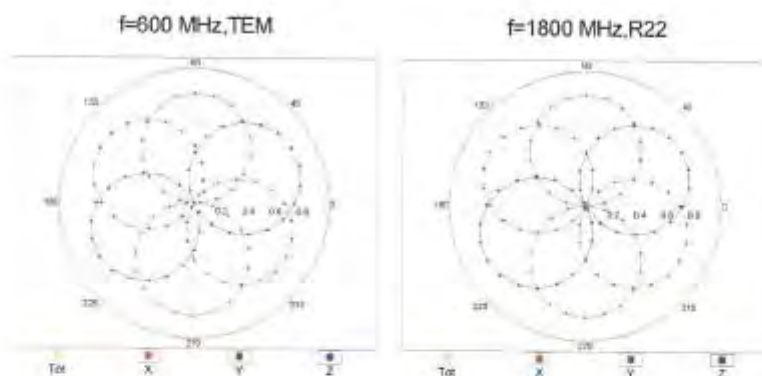
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## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

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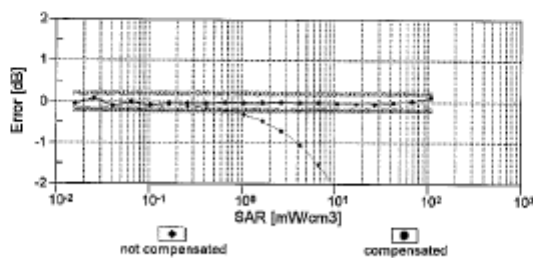
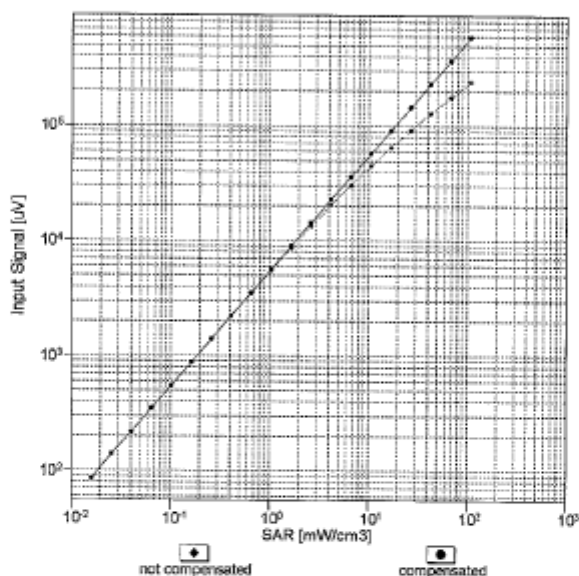
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January 31, 2014

## Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f = 900 MHz)



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

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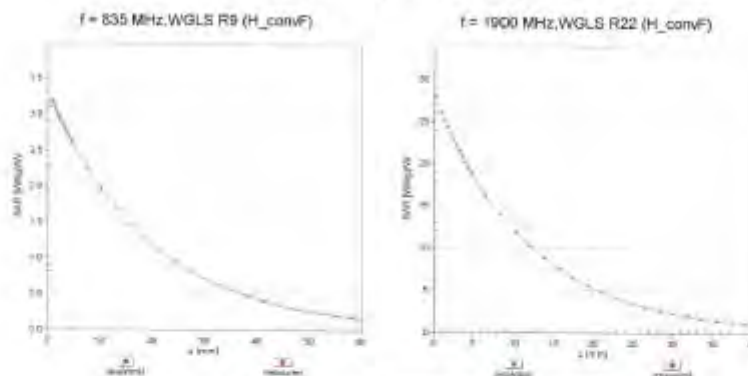
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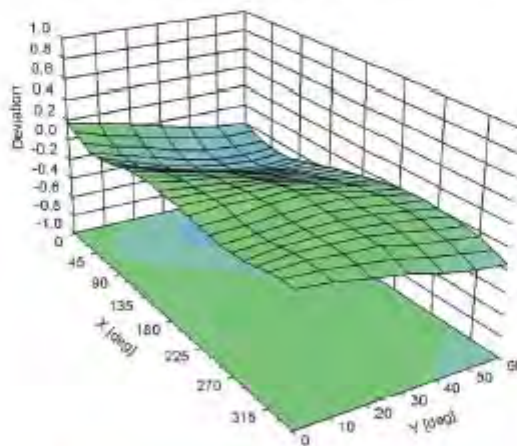
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## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ),  $f = 900 \text{ MHz}$



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

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EX3DV4- SN:3831

January 31, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -20.6      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 2 mm       |

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**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
 Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
 Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client: **SGS-TW (Auden)**

Certificate No.: **EX3-3938\_Jul14**

## CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3938**

Calibration procedure(s): **QA CAL-01.v9, QA CAL-14.v4, QA CAL-25.v5, QA CAL-25.v6**  
 Calibration procedure for dosimetric E-field probes

Calibration date: **July 25, 2014**

This calibration certificate documents the traceability to national standards, which relate the physical units of measurement (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calculations have been conducted in the client's laboratory facility: environment: temperature (22 ± 3)°C and humidity < 70%

Calibration Equipment used (M&E critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration  |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B         | GB41293874      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Power sensor E4412A        | MY41409887      | 03-Apr-14 (No. 217-01911)         | Apr-15                 |
| Reference 3 dB Attenuator  | SN: S5054 (3c)  | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 20 dB Attenuator | SN: S5277 (20c) | 03-Apr-14 (No. 217-01915)         | Apr-15                 |
| Reference 30 dB Attenuator | SN: S5179 (30c) | 03-Apr-14 (No. 217-01920)         | Apr-15                 |
| Reference Probe E33W2      | SN: 3013        | 30-Dec-13 (No. E33-3013, Dec13)   | Dec-14                 |
| DAE4                       | SN: 660         | 13-Dec-13 (No. DAE4-660, Dec13)   | Dec-14                 |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check        |
| RF generator HP 8648C      | US3642U01700    | 4-Aug-09 (in house check Apr-13)  | in house check: Apr-16 |
| Network Analyzer HP 8750B  | US17390535      | 15-Oct-01 (in house check Oct-13) | in house check: Dec-14 |

|                                                                                                                 | Name             | Function              | Signature |
|-----------------------------------------------------------------------------------------------------------------|------------------|-----------------------|-----------|
| Calibrated by:                                                                                                  | Walter El-Nassou | Laboratory Technician |           |
| Approved by:                                                                                                    | Heidi Pokorny    | Technical Manager     |           |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. |                  |                       |           |
| Issued: July 25, 2014                                                                                           |                  |                       |           |

Certificate No: **EX3-3938\_Jul14**

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### Glossary:

|                       |                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                   | tissue simulating liquid                                                                                                                          |
| NORM <sub>x,y,z</sub> | sensitivity in free space                                                                                                                         |
| ConvF                 | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                        |
| DCP                   | diode compression point                                                                                                                           |
| CF                    | crest factor (1/duty_cycle) of the RF signal                                                                                                      |
| A, B, C, D            | modulation dependent linearization parameters                                                                                                     |
| Polarization $\phi$   | $\phi$ rotation around probe axis                                                                                                                 |
| Polarization $\theta$ | $\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\theta = 0$ is normal to probe axis |
| Connector Angle       | information used in DASY system to align probe sensor X to the robot coordinate system                                                            |

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>: Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM( $f$ )<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical Isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

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EX3DV4 – SN:3938

July 25, 2014

# Probe EX3DV4

## SN:3938

Manufactured: May 2, 2013  
Calibrated: July 25, 2014

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3938\_Jul14

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EX3DV4- SN:3938

July 25, 2014

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938****Basic Calibration Parameters**

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2)     |
|-----------------------------------------------------------|----------|----------|----------|---------------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.52     | 0.59     | 0.34     | $\pm 10.1 \%$ |
| DCP (mV) <sup>B</sup>                                     | 98.3     | 99.4     | 104.7    |               |

**Modulation Calibration Parameters**

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>C</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 166.6    | $\pm 3.0 \%$              |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 157.7    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 153.7    |                           |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>C</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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EX3DV4- SN:3938

July 25, 2014

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938****Calibration Parameter Determined in Head Tissue Simulating Media**

| f (MHz) <sup>c</sup> | Relative Permittivity <sup>f</sup> | Conductivity (S/m) <sup>f</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>g</sup> | Depth <sup>g</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 835                  | 41.5                               | 0.90                            | 9.41    | 9.41    | 9.41    | 0.80               | 0.50                    | ± 12.0 %    |
| 900                  | 41.5                               | 0.97                            | 9.26    | 9.26    | 9.26    | 0.51               | 0.68                    | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 7.91    | 7.91    | 7.91    | 0.59               | 0.66                    | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 7.65    | 7.65    | 7.65    | 0.54               | 0.72                    | ± 12.0 %    |
| 2000                 | 40.0                               | 1.40                            | 7.66    | 7.66    | 7.66    | 0.80               | 0.59                    | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 6.97    | 6.97    | 6.97    | 0.41               | 0.78                    | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.83    | 6.83    | 6.83    | 0.38               | 0.86                    | ± 12.0 %    |
| 5200                 | 36.0                               | 4.66                            | 4.95    | 4.95    | 4.95    | 0.40               | 1.80                    | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 4.74    | 4.74    | 4.74    | 0.40               | 1.80                    | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 4.47    | 4.47    | 4.47    | 0.40               | 1.80                    | ± 13.1 %    |
| 5800                 | 35.3                               | 5.27                            | 4.49    | 4.49    | 4.49    | 0.40               | 1.80                    | ± 13.1 %    |

<sup>c</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 54, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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EX3DV4- SN:3938

July 25, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

### Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) <sup>c</sup> | Relative Permittivity <sup>f</sup> | Conductivity (S/m) <sup>f</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>g</sup> | Depth <sup>g</sup> (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 835                  | 55.2                               | 0.97                            | 9.35    | 9.35    | 9.35    | 0.80               | 0.60                    | ± 12.0 %    |
| 900                  | 55.0                               | 1.05                            | 9.24    | 9.24    | 9.24    | 0.80               | 0.50                    | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 7.36    | 7.36    | 7.36    | 0.80               | 0.62                    | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 7.03    | 7.03    | 7.03    | 0.44               | 0.83                    | ± 12.0 %    |
| 2000                 | 53.3                               | 1.52                            | 7.21    | 7.21    | 7.21    | 0.30               | 0.97                    | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 6.69    | 6.69    | 6.69    | 0.75               | 0.57                    | ± 12.0 %    |
| 2600                 | 52.5                               | 2.16                            | 6.57    | 6.57    | 6.57    | 0.80               | 0.50                    | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.27    | 4.27    | 4.27    | 0.45               | 1.90                    | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 4.11    | 4.11    | 4.11    | 0.45               | 1.90                    | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.70    | 3.70    | 3.70    | 0.50               | 1.90                    | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 3.92    | 3.92    | 3.92    | 0.50               | 1.90                    | ± 13.1 %    |

<sup>c</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: EX3-3938\_Jul14

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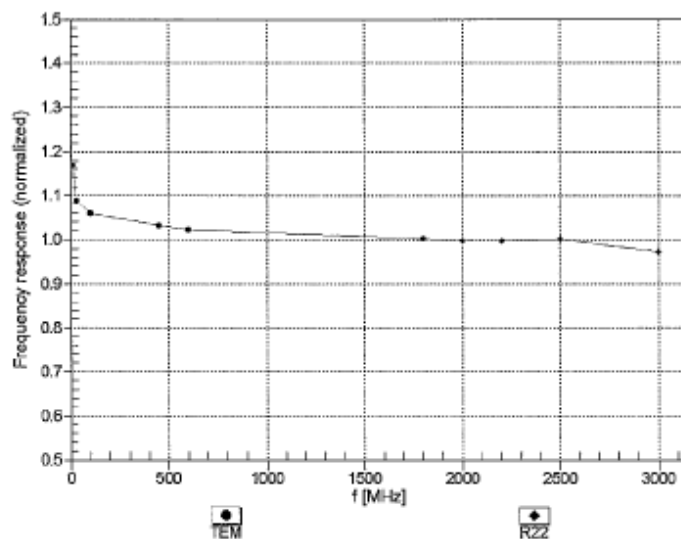
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EX3DV4- SN:3938

July 25, 2014

## Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

Certificate No: EX3-3938\_Jul14

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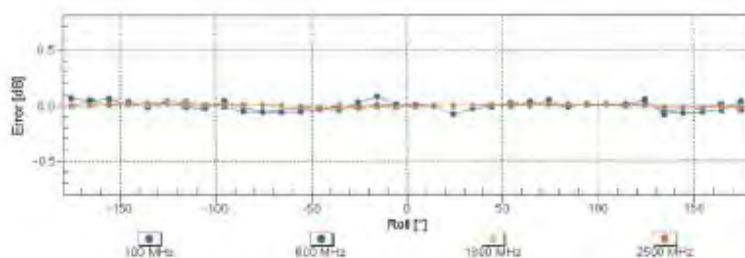
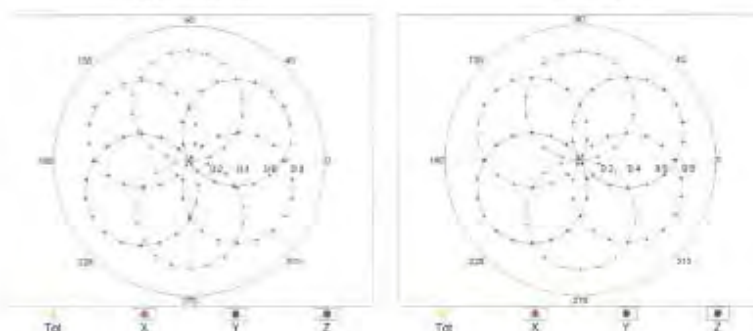
EX3DV4- SN:3938

July 25, 2014

## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

f=600 MHz, TEM

f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

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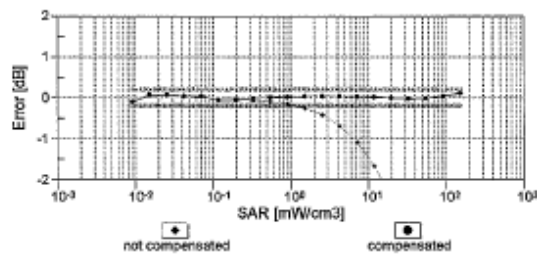
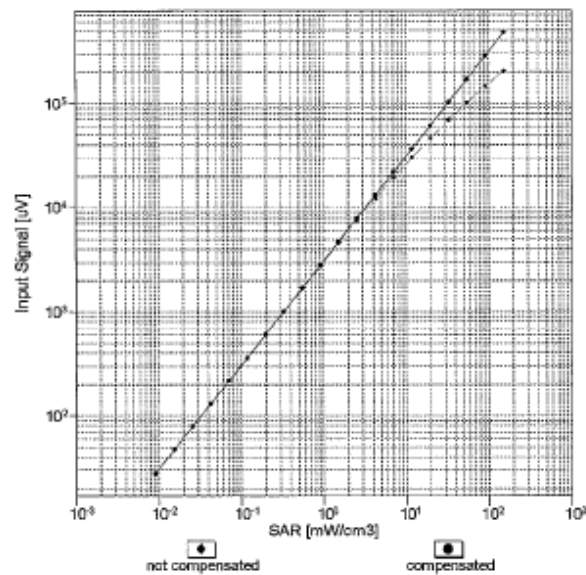
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July 25, 2014

## Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$ )



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

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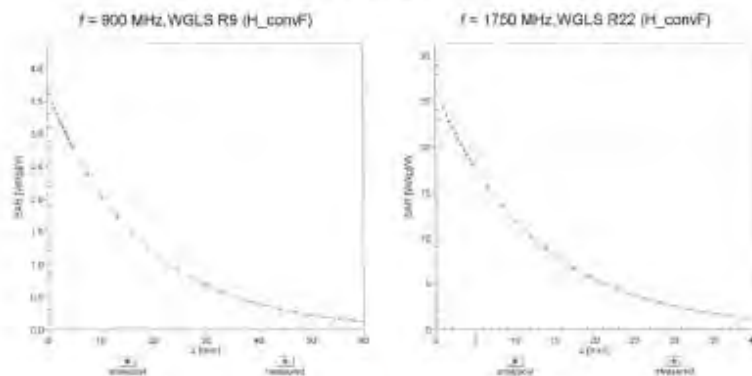
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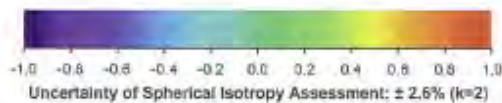
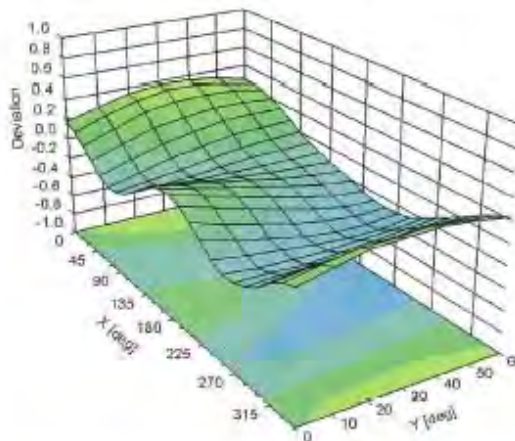
July 25, 2014

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\theta, \phi$ ),  $f = 900$  MHz



Certificate No: EX3-3938\_Jul14

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EX3DV4- SN:3938

July 25, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -25.5      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 1.4 mm     |

Certificate No: EX3-3938\_Jul14

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS-TW (Auden)

Certificate No: EX3-3770\_Apr14

## CALIBRATION CERTIFICATE

Object: EX3DV4 - SN: 3770

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v5  
Calibration procedure for dissymmetric E-field probes

Calibration date: April 24, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $\leq 10\%$ .

Calibration Equipment used (MSTF critical for calibration)

| Primary Standards          | ID              | Cal Date (Certificate No.)        | Scheduled Calibration |
|----------------------------|-----------------|-----------------------------------|-----------------------|
| Power meter E4419B         | GB41293874      | 03-Apr-14 (No. 217-01811)         | Apr-15                |
| Power sensor E4412A        | MY41680087      | 03-Apr-14 (No. 217-01811)         | Apr-15                |
| Reference 3 dB Attenuator  | SN: 35054 (3c)  | 03-Apr-14 (No. 217-01815)         | Apr-15                |
| Reference 20 dB Attenuator | SN: 35277 (20a) | 03-Apr-14 (No. 217-01819)         | Apr-15                |
| Reference 30 dB Attenuator | SN: 35129 (30b) | 03-Apr-14 (No. 217-01820)         | Apr-15                |
| Reference Probe E33DV2     | SN: 3013        | 30-Dec-13 (No. E53-3013_Dec13)    | Dec-14                |
| DAE4                       | SN: 660         | 13-Dec-13 (No. DAE4-660_Dec13)    | Dec-14                |
| Secondary Standards        | ID              | Check Date (in house)             | Scheduled Check       |
| RF generator HP 8848C      | US3642J01700    | 4-Aug-99 (in house check Apr-13)  | in house check Apr-15 |
| Network Analyzer HP 8753E  | US37390565      | 18-Oct-01 (in house check Oct-13) | in house check Oct-14 |

|                                                                                                                   | Name           | Function              | Signature |
|-------------------------------------------------------------------------------------------------------------------|----------------|-----------------------|-----------|
| Calibrated by:                                                                                                    | Jochen Kastner | Laboratory Technician |           |
| Approved by:                                                                                                      | Katja Polymov  | Technical Manager     |           |
| This calibration certificate shall not be reproduced (except in full) without written approval of the laboratory. |                |                       |           |

Issued: April 24, 2014

Certificate No: EX3-3770\_Apr14

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### Glossary:

|                       |                                                                                                                                                   |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| TSL                   | tissue simulating liquid                                                                                                                          |
| NORM <sub>x,y,z</sub> | sensitivity in free space                                                                                                                         |
| ConvF                 | sensitivity in TSL / NORM <sub>x,y,z</sub>                                                                                                        |
| DCP                   | diode compression point                                                                                                                           |
| CF                    | crest factor (1/duty_cycle) of the RF signal                                                                                                      |
| A, B, C, D            | modulation dependant linearization parameters                                                                                                     |
| Polarization $\phi$   | $\phi$ rotation around probe axis                                                                                                                 |
| Polarization $\theta$ | $\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center),<br>i.e., $\theta = 0$ is normal to probe axis |
| Connector Angle       | information used in DASY system to align probe sensor X to the robot coordinate system                                                            |

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>: Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

Certificate No: EX3-3770\_Apr14

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EX3DV4 – SN:3770

April 24, 2014

# Probe EX3DV4

## SN:3770

Manufactured: July 6, 2010  
Calibrated: April 24, 2014

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3770\_Apr14

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EX3DV4- SN:3770

April 24, 2014

**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770****Basic Calibration Parameters**

|                                                           | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|-----------------------------------------------------------|----------|----------|----------|-----------|
| Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup> | 0.31     | 0.61     | 0.40     | ± 10.1 %  |
| DCP (mV) <sup>B</sup>                                     | 104.0    | 96.9     | 102.5    |           |

**Modulation Calibration Parameters**

| UID | Communication System Name |   | A<br>dB | B<br>dB $\sqrt{\mu\text{V}}$ | C   | D<br>dB | VR<br>mV | Unc <sup>C</sup><br>(k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0   | CW                        | X | 0.0     | 0.0                          | 1.0 | 0.00    | 141.8    | ±3.5 %                    |
|     |                           | Y | 0.0     | 0.0                          | 1.0 |         | 132.9    |                           |
|     |                           | Z | 0.0     | 0.0                          | 1.0 |         | 135.7    |                           |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>C</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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EX3DV4- SN:3770

April 24, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

### Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) <sup>c</sup> | Relative Permittivity <sup>f</sup> | Conductivity (S/m) <sup>f</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>g</sup> | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|------------|-------------|
| 750                  | 41.9                               | 0.89                            | 9.70    | 9.70    | 9.70    | 0.27               | 1.09       | ± 12.0 %    |
| 835                  | 41.5                               | 0.90                            | 9.32    | 9.32    | 9.32    | 0.52               | 0.77       | ± 12.0 %    |
| 900                  | 41.5                               | 0.97                            | 9.16    | 9.16    | 9.16    | 0.14               | 1.68       | ± 12.0 %    |
| 1750                 | 40.1                               | 1.37                            | 8.08    | 8.08    | 8.08    | 0.28               | 0.92       | ± 12.0 %    |
| 1900                 | 40.0                               | 1.40                            | 7.79    | 7.79    | 7.79    | 0.36               | 0.81       | ± 12.0 %    |
| 2000                 | 40.0                               | 1.40                            | 7.75    | 7.75    | 7.75    | 0.40               | 0.78       | ± 12.0 %    |
| 2300                 | 39.5                               | 1.67                            | 7.35    | 7.35    | 7.35    | 0.26               | 0.95       | ± 12.0 %    |
| 2450                 | 39.2                               | 1.80                            | 6.97    | 6.97    | 6.97    | 0.35               | 0.82       | ± 12.0 %    |
| 2600                 | 39.0                               | 1.96                            | 6.73    | 6.73    | 6.73    | 0.45               | 0.73       | ± 12.0 %    |
| 5200                 | 36.0                               | 4.66                            | 5.25    | 5.25    | 5.25    | 0.35               | 1.80       | ± 13.1 %    |
| 5300                 | 35.9                               | 4.76                            | 5.07    | 5.07    | 5.07    | 0.35               | 1.80       | ± 13.1 %    |
| 5600                 | 35.5                               | 5.07                            | 4.48    | 4.48    | 4.48    | 0.45               | 1.80       | ± 13.1 %    |
| 5900                 | 35.3                               | 5.27                            | 4.65    | 4.65    | 4.65    | 0.45               | 1.80       | ± 13.1 %    |

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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EX3DV4- SN:3770

April 24, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

### Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) <sup>c</sup> | Relative Permittivity <sup>f</sup> | Conductivity (S/m) <sup>f</sup> | ConvF X | ConvF Y | ConvF Z | Alpha <sup>g</sup> | Depth (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|------------|-------------|
| 750                  | 55.5                               | 0.96                            | 9.54    | 9.54    | 9.54    | 0.53               | 0.79       | ± 12.0 %    |
| 835                  | 55.2                               | 0.97                            | 9.40    | 9.40    | 9.40    | 0.19               | 1.60       | ± 12.0 %    |
| 900                  | 55.0                               | 1.05                            | 9.23    | 9.23    | 9.23    | 0.27               | 1.20       | ± 12.0 %    |
| 1750                 | 53.4                               | 1.49                            | 7.79    | 7.79    | 7.79    | 0.37               | 0.87       | ± 12.0 %    |
| 1900                 | 53.3                               | 1.52                            | 7.51    | 7.51    | 7.51    | 0.47               | 0.78       | ± 12.0 %    |
| 2000                 | 53.3                               | 1.52                            | 7.59    | 7.59    | 7.59    | 0.61               | 0.69       | ± 12.0 %    |
| 2300                 | 52.9                               | 1.81                            | 7.27    | 7.27    | 7.27    | 0.60               | 0.69       | ± 12.0 %    |
| 2450                 | 52.7                               | 1.95                            | 7.15    | 7.15    | 7.15    | 0.52               | 0.72       | ± 12.0 %    |
| 2800                 | 52.5                               | 2.16                            | 6.90    | 6.90    | 6.90    | 0.80               | 0.50       | ± 12.0 %    |
| 5200                 | 49.0                               | 5.30                            | 4.56    | 4.56    | 4.56    | 0.50               | 1.90       | ± 13.1 %    |
| 5300                 | 48.9                               | 5.42                            | 4.38    | 4.38    | 4.38    | 0.50               | 1.90       | ± 13.1 %    |
| 5600                 | 48.5                               | 5.77                            | 3.76    | 3.76    | 3.76    | 0.55               | 1.90       | ± 13.1 %    |
| 5800                 | 48.2                               | 6.00                            | 4.13    | 4.13    | 4.13    | 0.55               | 1.90       | ± 13.1 %    |

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>g</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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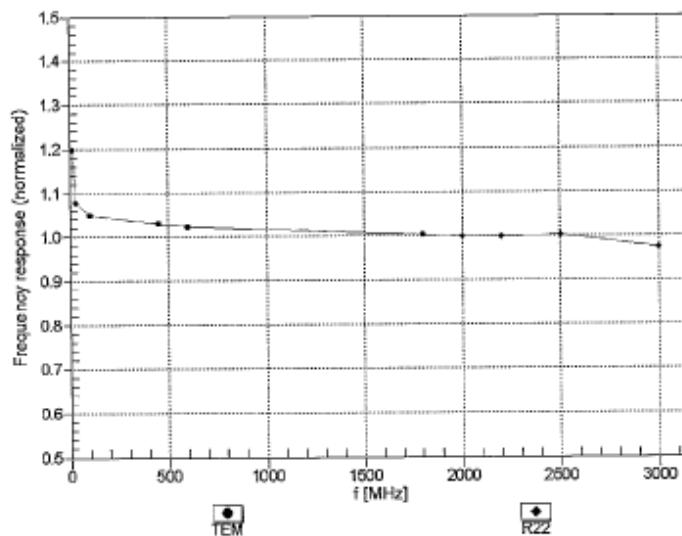
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EX3DV4- SN:3770

April 24, 2014

## Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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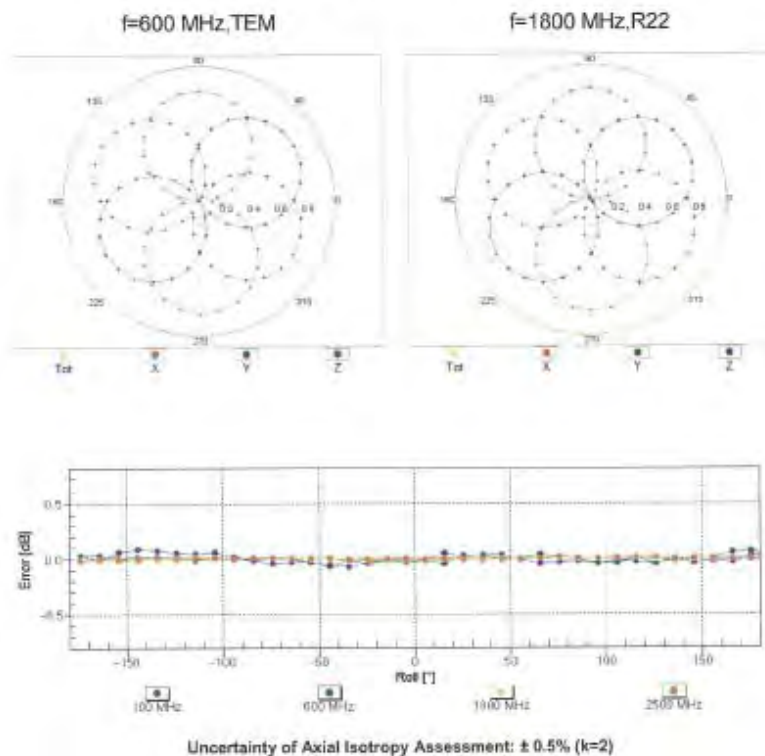
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April 24, 2014

## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$



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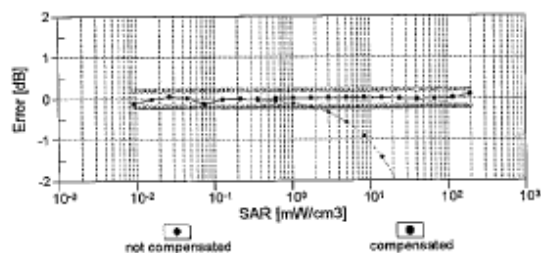
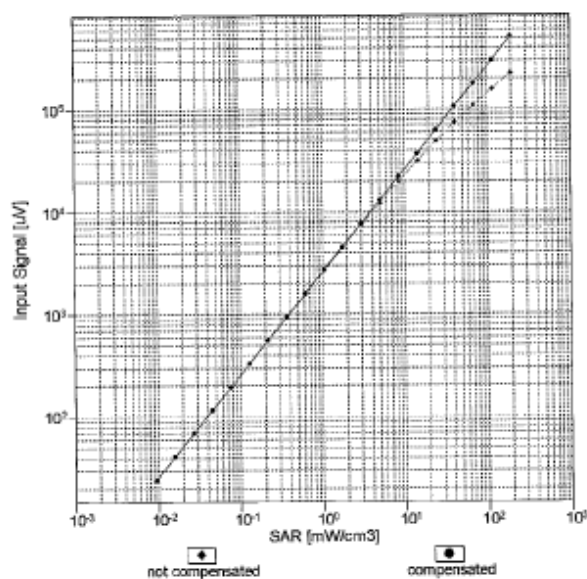
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EX3DV4- SN:3770

April 24, 2014

## Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$ )



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

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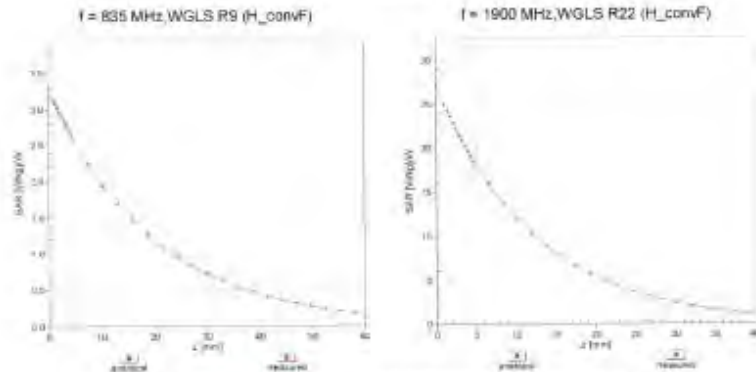
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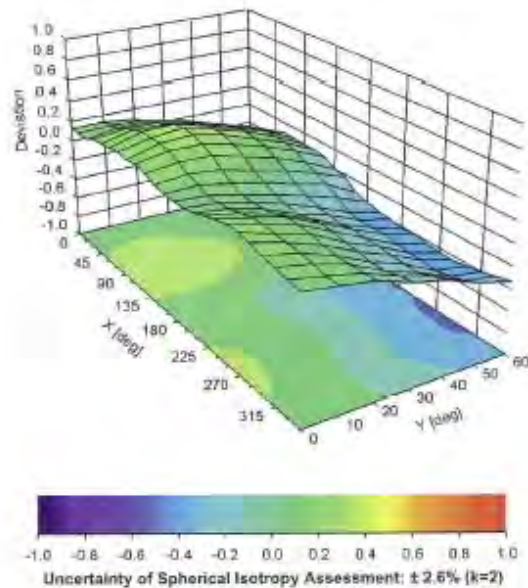
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April 24, 2014

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi$ , $\theta$ ), f = 900 MHz



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EX3DV4- SN:3770

April 24, 2014

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

### Other Probe Parameters

|                                               |            |
|-----------------------------------------------|------------|
| Sensor Arrangement                            | Triangular |
| Connector Angle (°)                           | -34.3      |
| Mechanical Surface Detection Mode             | enabled    |
| Optical Surface Detection Mode                | disabled   |
| Probe Overall Length                          | 337 mm     |
| Probe Body Diameter                           | 10 mm      |
| Tip Length                                    | 9 mm       |
| Tip Diameter                                  | 2.5 mm     |
| Probe Tip to Sensor X Calibration Point       | 1 mm       |
| Probe Tip to Sensor Y Calibration Point       | 1 mm       |
| Probe Tip to Sensor Z Calibration Point       | 1 mm       |
| Recommended Measurement Distance from Surface | 2 mm       |

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## 8. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test  
IEEE 1528

| A                                                 | c                              | D                           | e          | f       | g        | h=c * f / e             | i=c * g / e             | k           |
|---------------------------------------------------|--------------------------------|-----------------------------|------------|---------|----------|-------------------------|-------------------------|-------------|
| Source of Uncertainty                             | Tolerance/<br>Uncertainty<br>% | Probability<br>Distribution | Div        | ci (1g) | ci (10g) | Standard<br>uncertainty | Standard<br>uncertainty | vi, or Veff |
| <b>Measurement system</b>                         |                                |                             |            |         |          |                         |                         |             |
| Probe calibration(under 6Ghz)                     | 6.55%                          | N                           | 1          | 1       | 1        | 6.55%                   | 6.55%                   | ∞           |
| <i>Isotropy , Axial</i>                           | 3.50%                          | R                           | $\sqrt{3}$ | 1       | 1        | 2.02%                   | 2.02%                   | ∞           |
| <i>Isotropy, Hemispherical</i>                    | 9.60%                          | R                           | $\sqrt{3}$ | 1       | 1        | 5.54%                   | 5.54%                   | ∞           |
| Boundary Effect                                   | 1.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 0.58%                   | 0.58%                   | ∞           |
| Linearity                                         | 4.70%                          | R                           | $\sqrt{3}$ | 1       | 1        | 2.71%                   | 2.71%                   | ∞           |
| Detection Limits                                  | 1.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 0.58%                   | 0.58%                   | ∞           |
| Readout Electronics                               | 0.30%                          | N                           | 1          | 1       | 1        | 0.30%                   | 0.30%                   | ∞           |
| Response time                                     | 0.80%                          | R                           | $\sqrt{3}$ | 1       | 1        | 0.46%                   | 0.46%                   | ∞           |
| Integration Time                                  | 2.60%                          | R                           | $\sqrt{3}$ | 1       | 1        | 1.50%                   | 1.50%                   | ∞           |
| <b>Measurement drift (class A evaluation)</b>     | 1.75%                          | R                           | $\sqrt{3}$ | 1       | 1        | 1.01%                   | 1.01%                   | ∞           |
| RF ambient condition - noise                      | 3.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 1.73%                   | 1.73%                   | ∞           |
| RF ambient conditions - reflections               | 3.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 1.73%                   | 1.73%                   | ∞           |
| Probe positioner Mechanical restrictions          | 0.40%                          | R                           | $\sqrt{3}$ | 1       | 1        | 0.23%                   | 0.23%                   | ∞           |
| Probe Positioning with respect to phantom shell   | 2.90%                          | R                           | $\sqrt{3}$ | 1       | 1        | 1.67%                   | 1.67%                   | ∞           |
| Post-processing                                   | 1.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 0.58%                   | 0.58%                   | ∞           |
| Max SAR Eval                                      | 1.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 0.58%                   | 0.58%                   | ∞           |
| <b>Test Sample related</b>                        |                                |                             |            |         |          |                         |                         |             |
| Test sample positioning                           | 2.90%                          | N                           | 1          | 1       | 1        | 2.90%                   | 2.90%                   | M-1         |
| Device Holder Uncertainty                         | 3.60%                          | N                           | 1          | 1       | 1        | 3.60%                   | 3.60%                   | M-1         |
| Drift of output power                             | 5.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 2.89%                   | 2.89%                   | ∞           |
| <b>Phantom and Setup</b>                          |                                |                             |            |         |          |                         |                         |             |
| Phantom Uncertainty                               | 4.00%                          | R                           | $\sqrt{3}$ | 1       | 1        | 2.31%                   | 2.31%                   | ∞           |
| Liquid conductivity(meas.)                        | 4.88%                          | N                           | 1          | 0.64    | 0.43     | 3.12%                   | 2.10%                   | M           |
| Liquid permittivity(meas.)                        | 4.98%                          | N                           | 1          | 0.6     | 0.49     | 2.99%                   | 2.44%                   | M           |
| Combined standard uncertainty                     |                                | RSS                         |            |         |          | 12.35%                  | 12.01%                  |             |
| Expant uncertainty (95% confidence interval), K=2 |                                |                             |            |         |          | 24.70%                  | 24.02%                  |             |

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## 9. Phantom Description

Schmid &amp; Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 1 245 9700, Fax +41 1 245 9778  
info@speag.com, http://www.speag.com

### Certificate of Conformity / First Article Inspection

|              |                                                              |
|--------------|--------------------------------------------------------------|
| Item         | SAM Twin Phantom V4.0                                        |
| Type No.     | QD 000 P40 C                                                 |
| Series No.   | TP-1150 and higher                                           |
| Manufacturer | SPEAG<br>Zeughausstrasse 43<br>CH-8004 Zurich<br>Switzerland |

#### Tests

The series production process used allows the limitation to test of first articles. Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1005. Certain parameters have been retested using further series items (called samples) or are tested at each item.

| Test                        | Requirement                                                                                                                                                                                      | Details                                                               | Units tested                                |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------|
| Dimensions                  | Compliant with the geometry according to the CAD model.                                                                                                                                          | IT IS CAD File (*)                                                    | First article, Samples                      |
| Material thickness of shell | Compliant with the requirements according to the standards                                                                                                                                       | 2mm +/- 0.2mm in flat and specific areas of head section              | First article, Samples, TP-1314 ff.         |
| Material thickness at ERP   | Compliant with the requirements according to the standards                                                                                                                                       | 6mm +/- 0.2mm at ERP                                                  | First article, All items                    |
| Material parameters         | Dielectric parameters for required frequencies                                                                                                                                                   | 300 MHz - 6 GHz:<br>Relative permittivity < 5,<br>Loss tangent < 0.05 | Material samples                            |
| Material resistivity        | The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility. | DEGMBE based simulating liquids                                       | Pre-series, First article, Material samples |
| Sagging                     | Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid.                                                               | < 1% typical < 0.5% if filled with HSL900 and without DUT below       | Prototypes, Sample testing                  |

#### Standards

- [1] CENELEC EN 50381
- [2] IEEE Std 1528-2003
- [3] IEC 62209 Part I
- [4] FCC OET Bulletin 65, Supplement C, Edition 01-01

(\*) The IT IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

#### Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005

s p e a g

Signature / Stamp

Schmid & Partner Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 1 245 9700, Fax +41 1 245 9778  
info@speag.com, http://www.speag.com

Doc No. 881 - QD 000 P40 C - F

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## 10. System Validation from Original Equipment Supplier

Calibration Laboratory of  
Schmid & Partner  
Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst  
S Service suisse d'étalonnage  
S Servizio svizzero di taratura  
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS-TW (Auden)

Certificate No.: D835V2-4d063\_Aug14

### CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d063

Calibration procedure(s): QA CAL-05.v0  
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 28, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility, environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (MATE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)     | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A        | 3537460704         | 09-Oct-13 (No. 217-01827)      | Oct-14                |
| Power sensor HP 8481A       | US37292783         | 09-Oct-13 (No. 217-01827)      | Oct-14                |
| Power sensor HP 8481A       | MY41092317         | 09-Oct-13 (No. 217-01828)      | Oct-14                |
| Reference 20 dB Attenuator  | SN: 5008 (20K)     | 03-Apr-14 (No. 217-01818)      | Apr-15                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 03-Apr-14 (No. 217-01821)      | Apr-15                |
| Reference Probe ES30V4      | SN: 3206           | 30-Dec-13 (No. ES3-3206_Dec13) | Dec-14                |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601_Aug14) | Aug-15                |

| Secondary Standards       | ID #             | Check Date (in house)             | Scheduled Check       |
|---------------------------|------------------|-----------------------------------|-----------------------|
| RF generator R&S SMT-06   | 100005           | 04-Aug-09 (in house check Oct-13) | in house check Oct-16 |
| Network Analyzer HP 8753E | US37390685 54206 | 16-Oct-01 (in house check Oct-13) | in house check Oct-14 |

Calibrated by: Name: Michael Weber Function: Laboratory Technician Signature:

Approved by: Name: Kerja Polovic Function: Technical Manager Signature:

Issued: August 28, 2014

The calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No.: D835V2-4d063\_Aug14

Page 1 of 8

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

### Glossary:

TSL tissue simulating liquid  
ConvF sensitivity in TSL / NORM x,y,z  
N/A not applicable or not measured

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

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### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 835 MHz $\pm$ 1 MHz    |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 41.5           | 0.90 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 42.0 $\pm$ 6 % | 0.94 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 250 mW input power | 2.38 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 9.24 W/kg $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 250 mW input power | 1.55 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 6.05 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 55.2           | 0.97 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 55.2 $\pm$ 6 % | 1.01 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Body TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 250 mW input power | 2.41 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 9.35 W/kg $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 250 mW input power | 1.59 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.21 W/kg $\pm$ 16.5 % (k=2) |

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**Appendix (Additional assessments outside the scope of SCS108)****Antenna Parameters with Head TSL**

|                                      |                                 |
|--------------------------------------|---------------------------------|
| Impedance, transformed to feed point | 51.7 $\Omega$ - 3.6 $\mu\Omega$ |
| Return Loss                          | -28.2 dB                        |

**Antenna Parameters with Body TSL**

|                                      |                                 |
|--------------------------------------|---------------------------------|
| Impedance, transformed to feed point | 47.1 $\Omega$ - 5.8 $\mu\Omega$ |
| Return Loss                          | -29.7 dB                        |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.081 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard samlingin coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standards.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | November 27, 2006 |

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## DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.94 \text{ S/m}$ ;  $\epsilon_r = 42$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

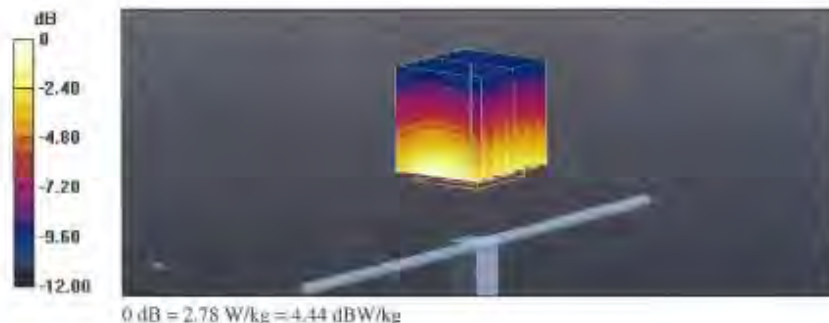
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 56.23 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.55 W/kg**

Maximum value of SAR (measured) = 2.78 W/kg

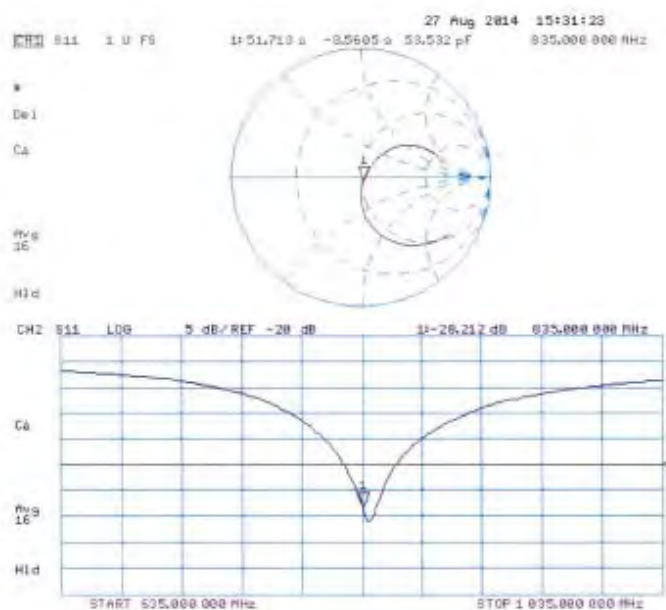


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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 27.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 1.01 \text{ S/m}$ ;  $\epsilon_r = 55.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

### DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

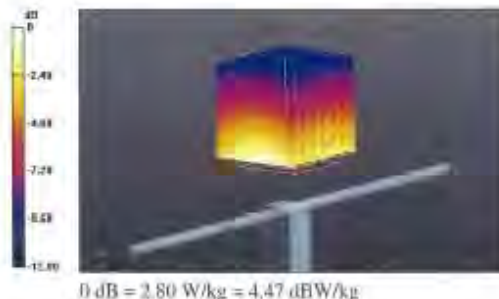
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.65 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.59 W/kg**

Maximum value of SAR (measured) = 2.80 W/kg

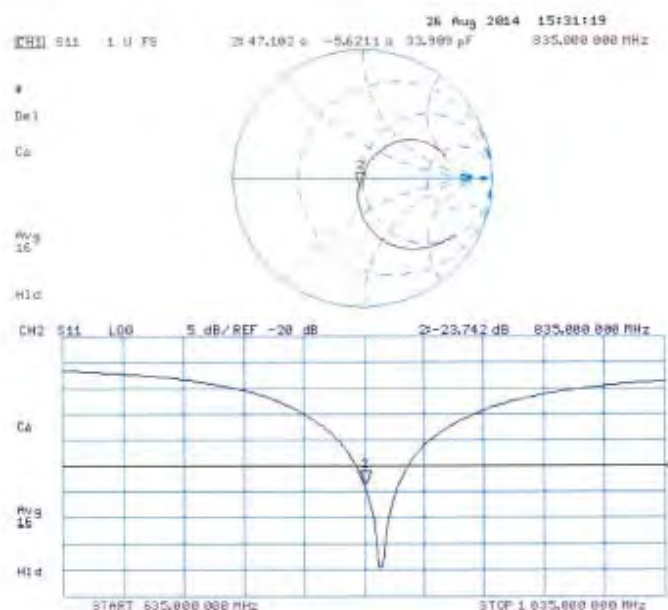


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## Impedance Measurement Plot for Body TSL



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**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: **SGS-TW (Auden)**

Certificate No.: **D1750V2-1008\_Aug14**

## CALIBRATION CERTIFICATE

Object: **D1750V2 - SN: 1008**

Calibration procedure(s): **QA CAL-05.v9**  
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **August 26, 2014**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate

All calibrations have been conducted in the closed laboratory facility, environment temperature (22 ± 0.2°C and humidity < 70%)

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)      | Scheduled Calibration |
|-----------------------------|--------------------|---------------------------------|-----------------------|
| Power meter EPM-462A        | 0507460704         | 08-Oct-13 (No. 217-01827)       | Oct-14                |
| Power sensor HP 8481A       | US37292783         | 08-Oct-13 (No. 217-01827)       | Oct-14                |
| Power sensor HP 8481A       | MY41092317         | 08-Oct-13 (No. 217-01828)       | Oct-14                |
| Reference 20 dB Attenuator  | SN: 5058 (20K)     | 03-Apr-14 (No. 217-01918)       | Apr-15                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 03-Apr-14 (No. 217-01921)       | Apr-15                |
| Reference Probe ES30V3      | SN: 3205           | 30-Dec-13 (No. ES3-3206, Dec13) | Dec-14                |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601, Aug14) | Aug-15                |

| Secondary Standards       | ID #             | Check Date (In house)             | Scheduled Check        |
|---------------------------|------------------|-----------------------------------|------------------------|
| RF generator RAS SMT-06   | 100605           | 04-Aug-09 (in house check Oct-13) | in house check: Oct-18 |
| Network Analyzer HP 8753E | US37390585 84205 | 18-Oct-01 (in house check Oct-13) | in house check: Oct-14 |

Calibrated by: **Name: Michael Weber, Function: Laboratory Technician, Signature: [Signature]**

Approved by: **Name: Katja Poudvick, Function: Technical Manager, Signature: [Signature]**

Issued: August 26, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1750V2-1008\_Aug14

Page 1 of 8

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**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Accreditation No.: **SCS 108**

**Glossary:**

TSL tissue simulating liquid  
ConvF sensitivity in TSL / NORM x,y,z  
N/A not applicable or not measured

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices; Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865864, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

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## Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.5.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 1750 MHz $\pm$ 1 MHz   |             |

## Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 40.1           | 1.37 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 39.2 $\pm$ 6 % | 1.37 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | —              | —                    |

## SAR result with Head TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 250 mW input power | 9.26 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 36.9 W/kg $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 250 mW input power | 4.91 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 19.6 W/kg $\pm$ 16.5 % (k=2) |

## Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 53.4           | 1.49 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 52.0 $\pm$ 6 % | 1.49 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | —              | —                    |

## SAR result with Body TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 250 mW input power | 9.44 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 37.5 W/kg $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | Condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 250 mW input power | 5.07 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 20.2 W/kg $\pm$ 16.5 % (k=2) |

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## Appendix (Additional assessments outside the scope of SCS108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.4 $\Omega$ + 0.3 j $\Omega$ |
| Return Loss                          | - 46.4 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.4 $\Omega$ + 0.3 j $\Omega$ |
| Return Loss                          | - 26.5 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.222 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | February 11, 2009 |

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## DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1008**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.37 \text{ S/m}$ ;  $\epsilon_r = 39.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConyF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X (4.6.10)(7331)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

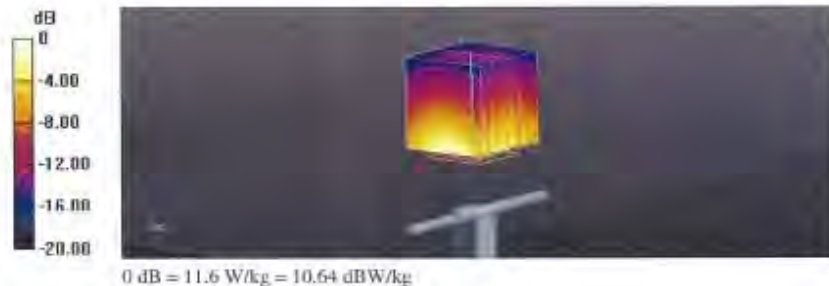
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.53 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 16.7 W/kg

**SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.91 W/kg**

Maximum value of SAR (measured) = 11.6 W/kg

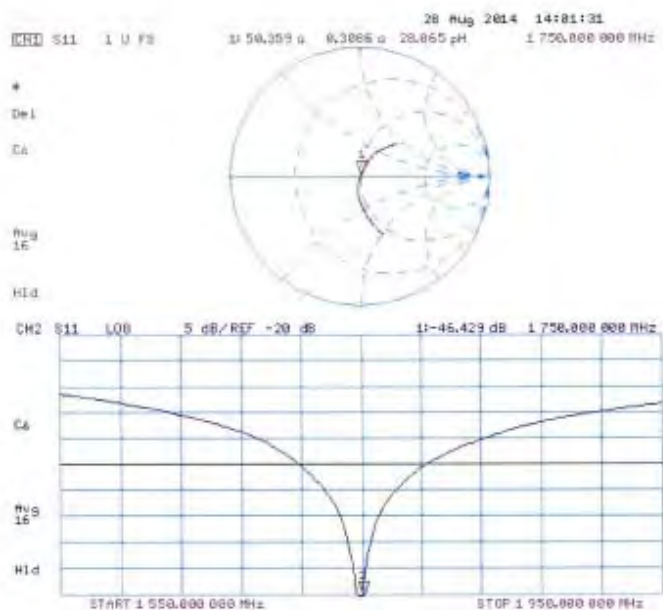


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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1008**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.49 \text{ S/m}$ ;  $\epsilon_r = 52$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

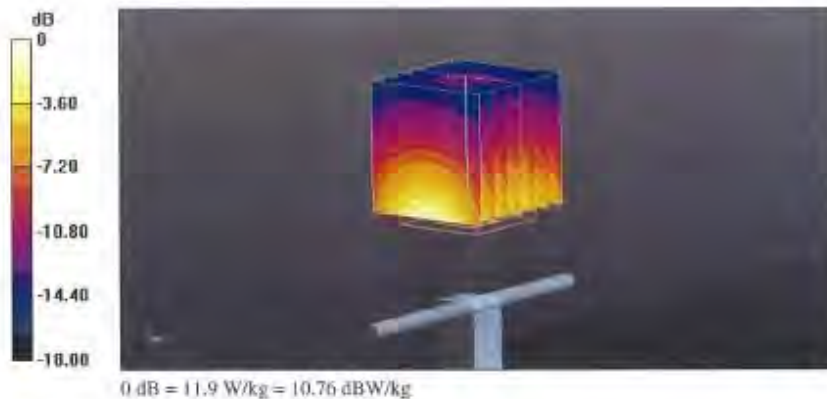
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.44 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.3 W/kg

**SAR(1 g) = 9.44 W/kg; SAR(10 g) = 5.07 W/kg**

Maximum value of SAR (measured) = 11.9 W/kg

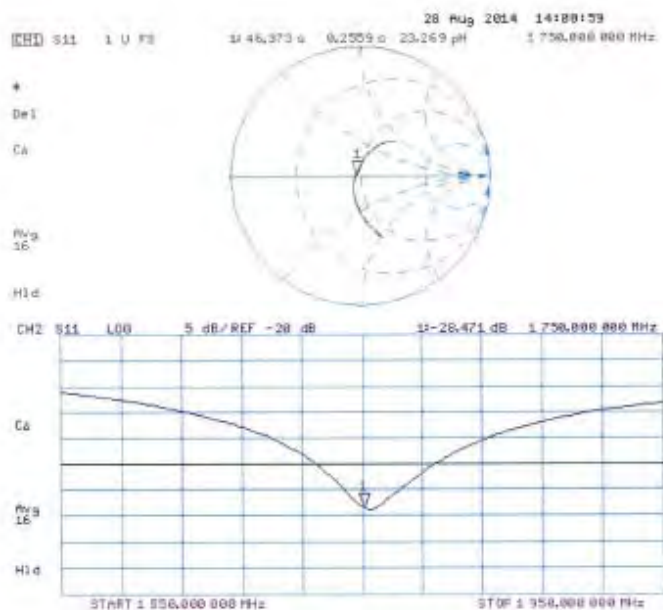


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## Impedance Measurement Plot for Body TSL



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**Calibration Laboratory of  
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: **SGS-TW (Auden)**

Certificate No: D1900V2-5d027\_Apr14

## CALIBRATION CERTIFICATE

Object: **D1900V2 - SN: 5d027**

Calibration procedure(s): **DA-CAL-05.v9**  
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **April 23, 2014**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence (probability) are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closest laboratory facility; environment temperature (23 ± 0.5)°C and humidity < 70%.

Calibration Equipment used (MATE critical for calibration)

| Primary Standards            | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|------------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A         | GB37480704         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A        | US37292783         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A        | MY41092317         | 09-Oct-13 (No. 217-01828)         | Oct-14                 |
| Reference 20 dB Attenuator   | SN: 5058 (20K)     | 03-Apr-14 (No. 217-01918)         | Apr-15                 |
| Type-N irremovch combination | SN: 5047.2 / 06327 | 03-Apr-14 (No. 217-01921)         | Apr-15                 |
| Reference Probe ES30V3       | SN: 3208           | 30-Dec-13 (No. EB3-0205_Dec13)    | Dec-14                 |
| DAE4                         | SN: 601            | 25-Apr-13 (No. DAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards          | ID #               | Check Date (in house)             | Scheduled Check        |
| HP generator H&S SMT-08      | 100006             | 04-Aug-09 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E    | US37380585 54208   | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

|                |                             |                                        |            |
|----------------|-----------------------------|----------------------------------------|------------|
| Calibrated by: | Name: <b>Ujlen Kastrati</b> | Function: <b>Laboratory Technician</b> | Signature: |
| Approved by:   | Name: <b>Katja Pokovic</b>  | Function: <b>Technical Manager</b>     | Signature: |

Issued: April 23, 2014

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Certificate No: D1900V2-5d027\_Apr14

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Accreditation No.: SCS 108

**Glossary:**

TSL tissue simulating liquid  
 ConvF sensitivity in TSL / NORM x,y,z  
 N/A not applicable or not measured

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

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### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.7     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 1900 MHz $\pm$ 1 MHz   |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 40.0           | 1.40 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 39.1 $\pm$ 6 % | 1.36 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 9.71 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 39.3 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 5.10 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 20.6 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 53.3           | 1.52 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 52.4 $\pm$ 6 % | 1.52 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Body TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 9.87 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 39.3 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 5.22 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 20.8 W/kg $\pm$ 16.5 % (k=2) |

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**Appendix****Antenna Parameters with Head TSL**

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $52.5 \Omega + 6.8 j\Omega$ |
| Return Loss                          | - 23.0 dB                   |

**Antenna Parameters with Body TSL**

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $46.3 \Omega + 2.8 j\Omega$ |
| Return Loss                          | - 26.4 dB                   |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.199 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | December 17, 2002 |

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## DASY5 Validation Report for Head TSL

Date: 23.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d027**

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.36$  S/m;  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

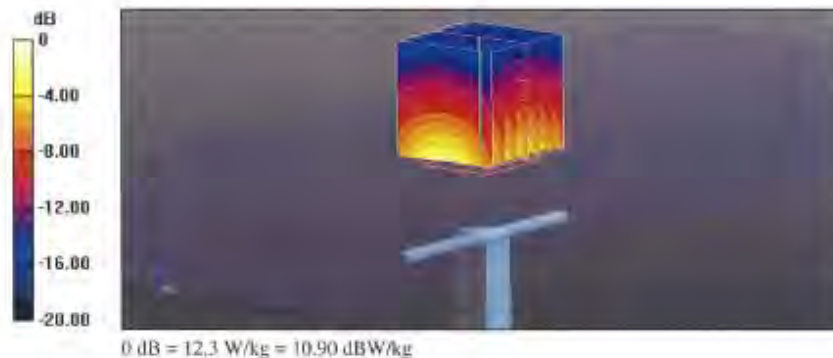
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.825 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.1 W/kg**

Maximum value of SAR (measured) = 12.3 W/kg

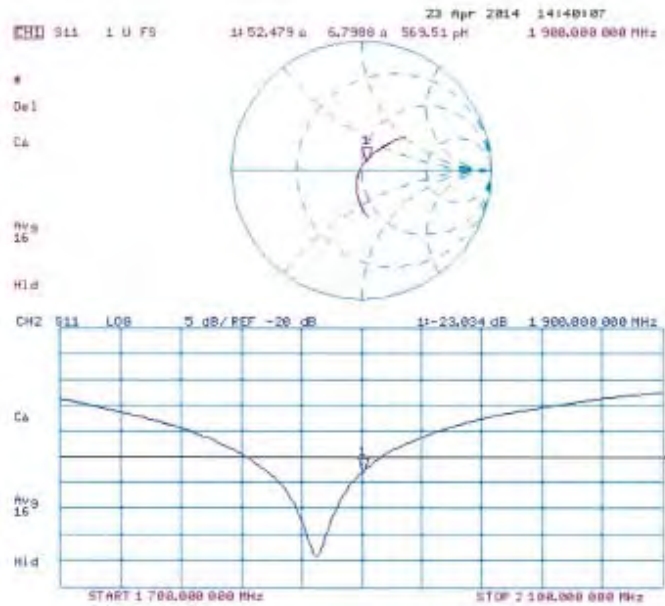


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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 22.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT; Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d027**

Communication System: UTD - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.52 \text{ S/m}$ ;  $\epsilon_r = 52.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013.
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm 2/Zoom Scan (7x7x7)/Cube 0;

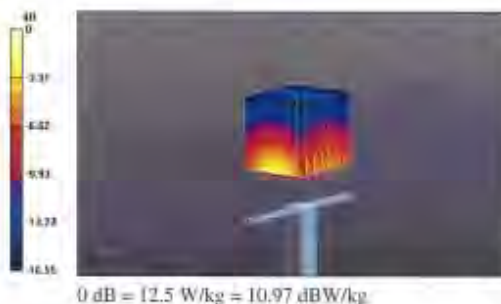
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.526 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.22 W/kg

Maximum value of SAR (measured) = 12.5 W/kg



Certificate No: D1900V2-5d027\_Apr14

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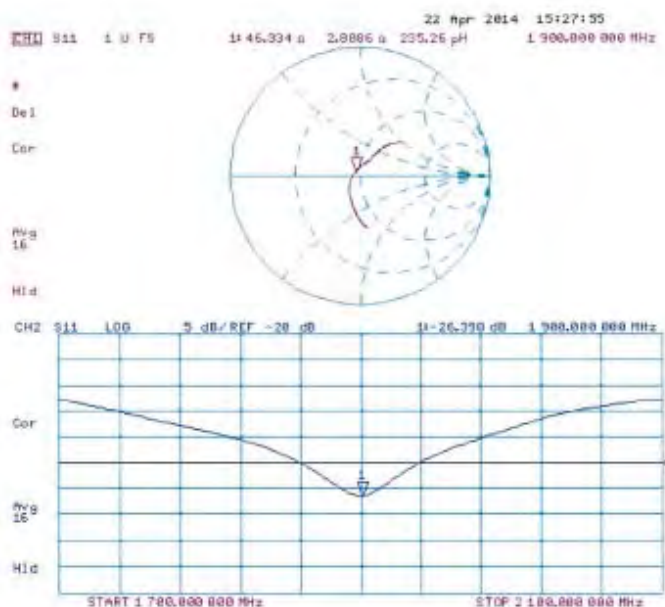
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## Impedance Measurement Plot for Body TSL



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS-TW (Auden)

Certificate No.: D2450V2-727\_Apr14

## CALIBRATION CERTIFICATE

|                                                                                                                                                                                                                                                                               |                                                                                |                                    |                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------|------------------------|
| Object                                                                                                                                                                                                                                                                        | D2450V2 - SN: 727                                                              |                                    |                        |
| Calibration procedure(s)                                                                                                                                                                                                                                                      | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |                                    |                        |
| Calibration date                                                                                                                                                                                                                                                              | April 23, 2014                                                                 |                                    |                        |
| This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. |                                                                                |                                    |                        |
| All calibration(s) have been conducted in the closed laboratory facility environment (temperature $23 \pm 2^\circ\text{C}$ and humidity $< 70\%$ ).                                                                                                                           |                                                                                |                                    |                        |
| Calibration Equipment used (MATE critical for calibration)                                                                                                                                                                                                                    |                                                                                |                                    |                        |
| Primary Standards                                                                                                                                                                                                                                                             | ID #                                                                           | Cal Date (Certificate No.)         | Scheduled Calibration  |
| Power meter EPM-442A                                                                                                                                                                                                                                                          | GB37480704                                                                     | 09-Oct-13 (No. 217-01827)          | Oct-14                 |
| Power sensor HP 8481A                                                                                                                                                                                                                                                         | US37292783                                                                     | 09-Oct-13 (No. 217-01827)          | Oct-14                 |
| Power sensor HP 8481A                                                                                                                                                                                                                                                         | MY41096317                                                                     | 09-Oct-13 (No. 217-01828)          | Oct-14                 |
| Reference 20 dB Attenuator                                                                                                                                                                                                                                                    | SN: 5058 (20K)                                                                 | 03-Apr-14 (No. 217-01918)          | Apr-15                 |
| Type-N mismatch combination                                                                                                                                                                                                                                                   | SN: 5047.2 / 06327                                                             | 03-Apr-14 (No. 217-01921)          | Apr-15                 |
| Reference Probe ES30V3                                                                                                                                                                                                                                                        | SN: 3205                                                                       | 30-Dec-13 (No. ES3-3205_Dec13)     | Dec-14                 |
| DAEA                                                                                                                                                                                                                                                                          | SN: 621                                                                        | 25-Apr-13 (No. DAE4-651_Apr13)     | Apr-14                 |
| Secondary Standards                                                                                                                                                                                                                                                           | ID #                                                                           | Check Date (in house)              | Scheduled Check        |
| RF generator P&S SMT-06                                                                                                                                                                                                                                                       | 100005                                                                         | 04-Aug-95 (in house check Oct-13)  | In house check: Oct-16 |
| Network Analyzer HP 8753E                                                                                                                                                                                                                                                     | US37390585 54206                                                               | 18-Oct-01 (in house check Oct-13)  | In house check: Oct-14 |
| Calibrated by                                                                                                                                                                                                                                                                 | Name:<br>Jelcin Kashtai                                                        | Function:<br>Laboratory Technician | Signature:<br>         |
| Approved by                                                                                                                                                                                                                                                                   | Name:<br>Katja Pokornic                                                        | Technical Manager                  |                        |
|                                                                                                                                                                                                                                                                               |                                                                                |                                    | Issued: April 23, 2014 |
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Certificate No.: D2450V2-727\_Apr14

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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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Accreditation No.: **SCS 108**

**Glossary:**

TSL tissue simulating liquid  
ConvF sensitivity in TSL / NORM x,y,z  
N/A not applicable or not measured

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

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### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.7     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 2450 MHz $\pm$ 1 MHz   |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 39.2           | 1.80 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 38.2 $\pm$ 6 % | 1.81 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ---            | ---                  |

### SAR result with Head TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 13.1 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 52.0 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 6.09 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 24.2 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 52.7           | 1.95 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 50.6 $\pm$ 6 % | 2.01 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ---            | ---                  |

### SAR result with Body TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 12.8 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 50.0 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 5.90 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 23.3 W/kg $\pm$ 16.5 % (k=2) |

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**Appendix****Antenna Parameters with Head TSL**

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $54.6 \Omega + 1.9 j\Omega$ |
| Return Loss                          | - 26.5 dB                   |

**Antenna Parameters with Body TSL**

|                                      |                             |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $51.1 \Omega + 3.5 j\Omega$ |
| Return Loss                          | - 28.7 dB                   |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.146 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

|                 |                  |
|-----------------|------------------|
| Manufactured by | SPEAG            |
| Manufactured on | January 09, 2003 |

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## DASY5 Validation Report for Head TSL

Date: 23.04.2014

Test Laboratory: SPEAG, Zürich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.81$  S/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

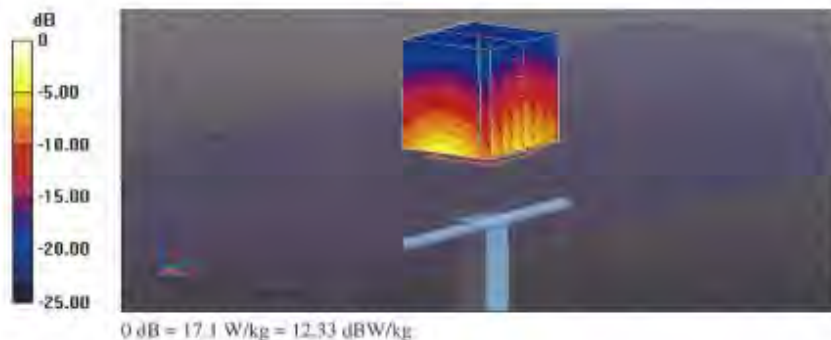
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.01 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 27.0 W/kg

**SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.09 W/kg**

Maximum value of SAR (measured) = 17.1 W/kg

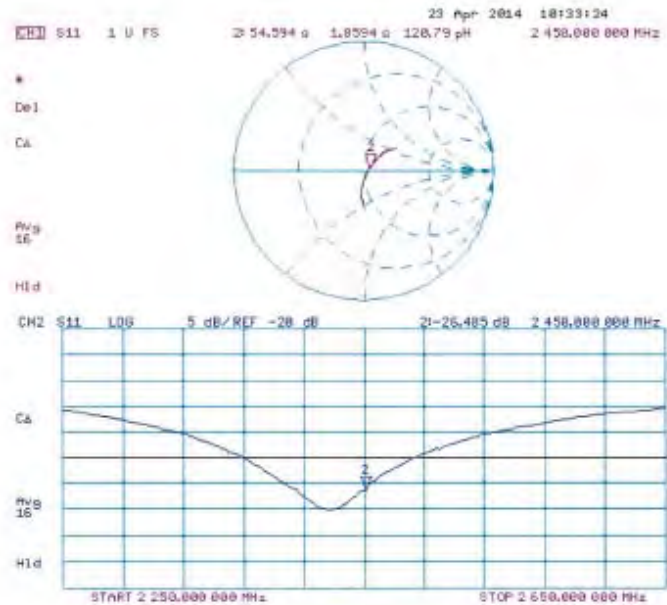


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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 23.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.01$  S/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

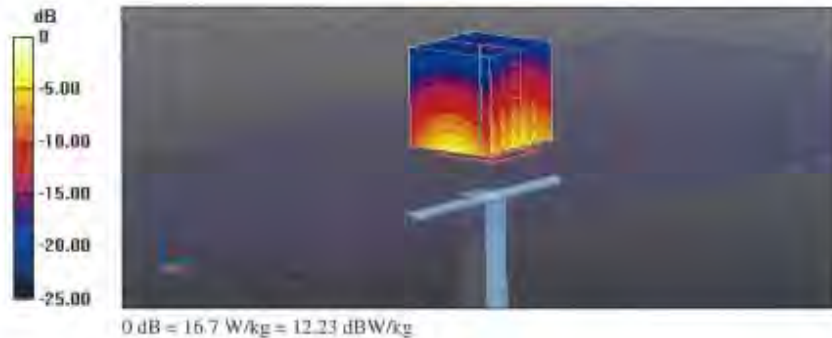
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.356 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 26.9 W/kg

**SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.9 W/kg**

Maximum value of SAR (measured) = 16.7 W/kg

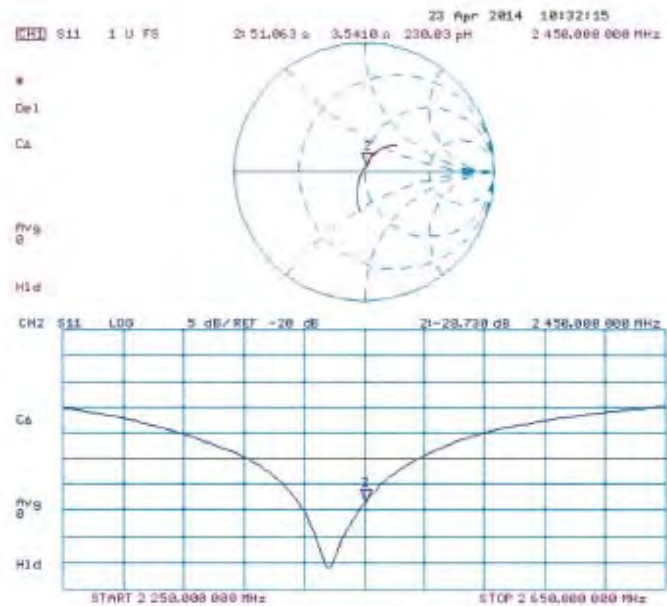


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## Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **D2600V2-1005\_Jan14**

## CALIBRATION CERTIFICATE

Object **D2600V2 - SN: 1005**

Calibration procedure(s) **QA CAL-05.V9  
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **January 28, 2014**

This calibration certificate documents the conformity to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of this certificate.

All calibrations have been conducted in the closed laboratory facility, (environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $\leq 70\%$ ).

Calibration Equipment used (MATE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37483704         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | US37292783         | 09-Oct-13 (No. 217-01827)         | Oct-14                 |
| Power sensor HP 8481A       | MY41042517         | 09-Oct-13 (No. 217-01828)         | Oct-14                 |
| Reference 20 dB Attenuator  | SN: 5068 (20x)     | 04-Apr-13 (No. 217-01736)         | Apr-14                 |
| Type-N mismatch termination | SN: 6047.3 / 06327 | 04-Apr-13 (No. 217-01739)         | Apr-14                 |
| Reference Probe ES32V3      | SN: 3235           | 30-Dec-13 (No. F53-3235, Dec13)   | Dec-14                 |
| DAE#                        | SN: 601            | 25-Apr-13 (No. OAE4-601_Apr13)    | Apr-14                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753F   | US37390585 34206   | 18-Oct-01 (in house check Oct-13) | In house check: Oct-14 |

Calibrated by: **Name: Claudio Leubler, Function: Laboratory Technician**

Approvers: **Name: Katja Eckert, Function: Technical Manager**

Issued: January 28, 2014

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Certificate No: **D2600V2-1005\_Jan14**

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**S** Swiss Calibration Service

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

**Glossary:**

TSL tissue simulating liquid  
ConvF sensitivity in TSL / NORM x,y,z  
N/A not applicable or not measured

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

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### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.7     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 2600 MHz $\pm$ 1 MHz   |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 39.0           | 1.96 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 38.2 $\pm$ 6 % | 2.02 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 250 mW input power | 14.7 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 57.7 W/kg $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 250 mW input power | 6.57 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 26.0 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 52.5           | 2.16 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 50.9 $\pm$ 6 % | 2.21 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Body TSL

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 250 mW input power | 14.3 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 56.2 W/kg $\pm$ 17.0 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 250 mW input power | 6.33 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 25.1 W/kg $\pm$ 16.5 % (k=2) |

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**Appendix****Antenna Parameters with Head TSL**

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 50.1 $\Omega$ - 3.2 j $\Omega$ |
| Return Loss                          | - 30.0 dB                      |

**Antenna Parameters with Body TSL**

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 45.5 $\Omega$ - 2.6 j $\Omega$ |
| Return Loss                          | - 26.6 dB                      |

**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.155 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | December 23, 2006 |

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## DASY5 Validation Report for Head TSL

Date: 28.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1005**

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.02$  S/m;  $\epsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

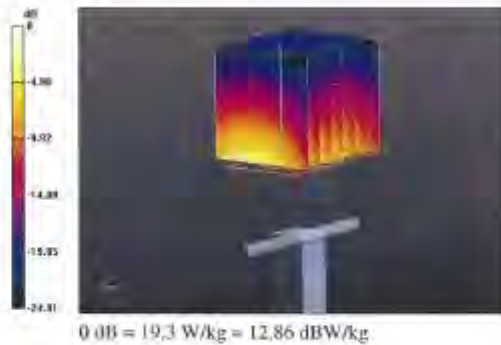
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.590 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 31.3 W/kg

**SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.57 W/kg**

Maximum value of SAR (measured) = 19.3 W/kg

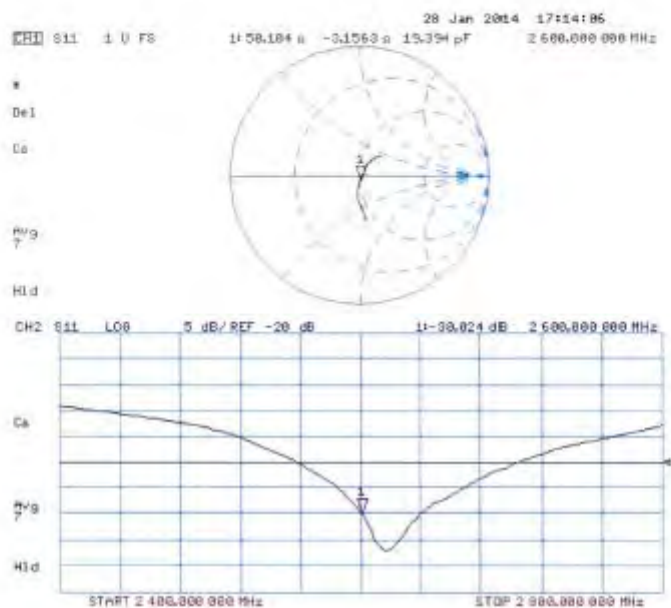


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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 28.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1005**

Communication System: UID II - CW; Frequency: 2600 MHz

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.21$  S/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

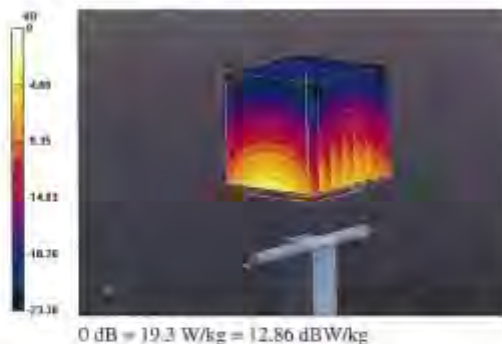
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.624 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 30.8 W/kg

**SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.33 W/kg**

Maximum value of SAR (measured) = 19.3 W/kg

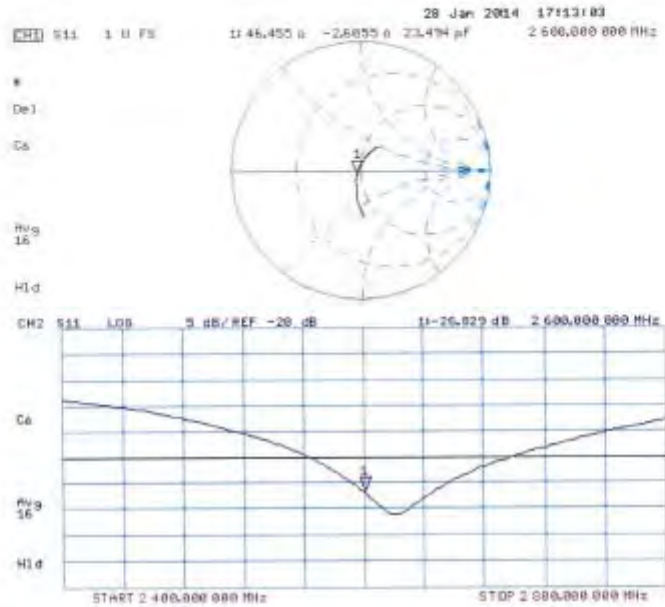


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## Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client: SGS-TW (Auden)

Certificate No.: D5GHzV2-1104\_Apr14

## CALIBRATION CERTIFICATE

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |                                    |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------|------------------------|
| Object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | D5GHzV2 - SN: 1104                                                               |                                    |                        |
| Calibration procedure(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | QA CAL-22.v2<br>Calibration procedure for dipole validation kits between 3-8 GHz |                                    |                        |
| Calibration date                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | April 16, 2014                                                                   |                                    |                        |
| <p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).<br/>The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (MATE model for calibration)</p> |                                                                                  |                                    |                        |
| Primary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ID #                                                                             | Cal Date (Certificate No.)         | Scheduled Calibration  |
| Power meter EPM-442A                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | GB37480704                                                                       | 09-Oct-13 (No. 217-01897)          | Oct-14                 |
| Power sensor HP 8481A                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | US37292753                                                                       | 09-Oct-13 (No. 217-01827)          | Oct-14                 |
| Power sensor HP 8481A                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | MY41092317                                                                       | 09-Oct-13 (No. 217-01828)          | Oct-14                 |
| Reference 20 dB Attenuator                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SN: 5058 (20K)                                                                   | 03-Apr-14 (No. 217-01918)          | Apr-15                 |
| Type-N mismatch combination                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SN: 5047.2 / 06327                                                               | 03-Apr-14 (No. 217-01921)          | Apr-15                 |
| Reference Probe EX3DV4                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SN: 3503                                                                         | 30-Dec-13 (No. EX3-3503_Dec13)     | Dec-14                 |
| DAE4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SN: 601                                                                          | 25-Apr-13 (No. DAE4-601_Apr13)     | Apr-14                 |
| Secondary Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ID #                                                                             | Check Date (in house)              | Scheduled Check        |
| HP generator HPS 5M1-06                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 100005                                                                           | 04-Aug-09 (in house check Oct-13)  | In house check: Oct-16 |
| Network Analyzer HP 8753E                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | US37390583-54205                                                                 | 18-Oct-01 (in house check Oct-13)  | In house check: Oct-14 |
| Calibrated by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Name:<br>Jeton Kastlir                                                           | Function:<br>Laboratory Technician | Signature:<br>         |
| Approved by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Name:<br>Kolja Pokovic                                                           | Technical Manager:                 | Signature:<br>         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |                                    | Issued: April 17, 2014 |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory.                                                                                                                                                                                                                                                                                                                                                                               |                                                                                  |                                    |                        |

Certificate No.: D5GHzV2-1104\_Apr14

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**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Accreditation No.: SCS 108

## Glossary:

TSL tissue simulating liquid  
ConvF sensitivity in TSL / NORM x,y,z  
N/A not applicable or not measured

## Calibration is Performed According to the Following Standards:

- IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

## Additional Documentation:

- DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

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### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                                                                                              |                                  |
|------------------------------|----------------------------------------------------------------------------------------------|----------------------------------|
| DASY Version                 | DASY5                                                                                        | V52.8.7                          |
| Extrapolation                | Advanced Extrapolation                                                                       |                                  |
| Phantom                      | Modular Flat Phantom V5.0                                                                    |                                  |
| Distance Dipole Center - TSL | 10 mm                                                                                        | with Spacer                      |
| Zoom Scan Resolution         | dx, dy = 4.0 mm, dz = 1.4 mm                                                                 | Graded Ratio = 1.4 (Z direction) |
| Frequency                    | 5200 MHz $\pm$ 1 MHz<br>5300 MHz $\pm$ 1 MHz<br>5600 MHz $\pm$ 1 MHz<br>5800 MHz $\pm$ 1 MHz |                                  |

### Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 36.0           | 4.66 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 35.8 $\pm$ 5 % | 4.43 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL at 5200 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                          | 100 mW input power | 6.02 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 80.0 W/kg $\pm$ 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR measured                                            | 100 mW input power | 2.29 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.6 W/kg $\pm$ 19.5 % (k=2) |

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### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.9         | 4.76 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.7 ± 6 %   | 4.54 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5300 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                   |
|-------------------------------------------------------|--------------------|-----------------------------------|
| SAR measured                                          | 100 mW input power | 8.45 W/kg                         |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>84.3 W / kg ± 19.9 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                            | 100 mW input power | 2.41 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>24.0 W/kg ± 19.5 % (k=2)</b> |

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.3 ± 6 %   | 4.83 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Head TSL at 5600 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                                 |
|-------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                          | 100 mW Input power | 8.31 W/kg                       |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | <b>82.6 W/kg ± 19.9 % (k=2)</b> |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                                 |
|---------------------------------------------------------|--------------------|---------------------------------|
| SAR measured                                            | 100 mW input power | 2.36 W/kg                       |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | <b>23.5 W/kg ± 19.5 % (k=2)</b> |

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#### Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.3         | 5.27 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.0 ± 6 %   | 5.03 mho/m ± 6 % |
| Head TSL temperature change during test | < 0.5 °C        | -----        | -----            |

#### SAR result with Head TSL at 5800 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                          | 100 mW input power | 7.95 W/kg                |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 79.2 W/kg ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                            | 100 mW input power | 2.26 W/kg                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.5 W/kg ± 19.5 % (k=2) |

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### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 49.0         | 5.30 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.0 ± 6 %   | 5.44 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5200 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                          | 100 mW input power | 7.69 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 76.3 W/kg ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                            | 100 mW input power | 2.15 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.3 W/kg ± 19.5 % (k=2) |

### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.9         | 5.42 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.8 ± 6 %   | 5.57 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ----         | ----             |

### SAR result with Body TSL at 5300 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                          | 100 mW input power | 7.84 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 77.6 W/kg ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                            | 100 mW input power | 2.19 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.7 W/kg ± 19.5 % (k=2) |

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### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.5         | 5.77 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.3 ± 6 %   | 5.96 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ---          | ---              |

### SAR result with Body TSL at 5600 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                          | 100 mW input power | 8.21 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 81.4 W/kg ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                            | 100 mW input power | 2.28 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 22.6 W/kg ± 19.5 % (k=2) |

### Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.2         | 6.00 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 46.0 ± 6 %   | 6.23 mho/m ± 6 % |
| Body TSL temperature change during test | < 0.5 °C        | ---          | ---              |

### SAR result with Body TSL at 5800 MHz

| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                          |
|-------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                          | 100 mW input power | 7.73 W/kg                |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 76.7 W/kg ± 19.9 % (k=2) |

| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                          |
|---------------------------------------------------------|--------------------|--------------------------|
| SAR measured                                            | 100 mW input power | 2.13 W/kg                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.1 W/kg ± 19.5 % (k=2) |

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## Appendix

## Antenna Parameters with Head TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.2 $\Omega$ - 4.8 j $\Omega$ |
| Return Loss                          | - 25.6 dB                      |

## Antenna Parameters with Head TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.5 $\Omega$ - 7.6 j $\Omega$ |
| Return Loss                          | - 22.2 dB                      |

## Antenna Parameters with Head TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.9 $\Omega$ + 0.5 j $\Omega$ |
| Return Loss                          | - 28.5 dB                      |

## Antenna Parameters with Head TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 58.3 $\Omega$ - 4.4 j $\Omega$ |
| Return Loss                          | - 21.2 dB                      |

## Antenna Parameters with Body TSL at 5200 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.6 $\Omega$ - 9.2 j $\Omega$ |
| Return Loss                          | - 20.6 dB                      |

## Antenna Parameters with Body TSL at 5300 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 53.3 $\Omega$ - 1.8 j $\Omega$ |
| Return Loss                          | - 28.7 dB                      |

## Antenna Parameters with Body TSL at 5600 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 58.7 $\Omega$ - 5.2 j $\Omega$ |
| Return Loss                          | - 20.6 dB                      |

## Antenna Parameters with Body TSL at 5800 MHz

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 57.0 $\Omega$ + 2.2 j $\Omega$ |
| Return Loss                          | - 23.3 dB                      |

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**General Antenna Parameters and Design**

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.207 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

|                 |                    |
|-----------------|--------------------|
| Manufactured by | SPEAG              |
| Manufactured on | September 24, 2010 |

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## DASY5 Validation Report for Head TSL

Date: 16.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1104**

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz  
Medium parameters used:  $f = 5200 \text{ MHz}$ ;  $\sigma = 4.43 \text{ S/m}$ ;  $\epsilon_r = 35.8$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5300 \text{ MHz}$ ;  $\sigma = 4.54 \text{ S/m}$ ;  $\epsilon_r = 35.7$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5600 \text{ MHz}$ ;  $\sigma = 4.83 \text{ S/m}$ ;  $\epsilon_r = 35.3$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 5.03 \text{ S/m}$ ;  $\epsilon_r = 35$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.52, 5.52, 5.52); Calibrated: 30.12.2013, ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2013, ConvF(4.86, 4.86, 4.86); Calibrated: 30.12.2013, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.950 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 29.4 W/kg

**SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.29 W/kg**

Maximum value of SAR (measured) = 18.2 W/kg

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.460 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 32.1 W/kg

**SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.41 W/kg**

Maximum value of SAR (measured) = 19.4 W/kg

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.602 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.3 W/kg

**SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.36 W/kg**

Maximum value of SAR (measured) = 19.7 W/kg

Certificate No: D5GHzV2-1104\_Apr14

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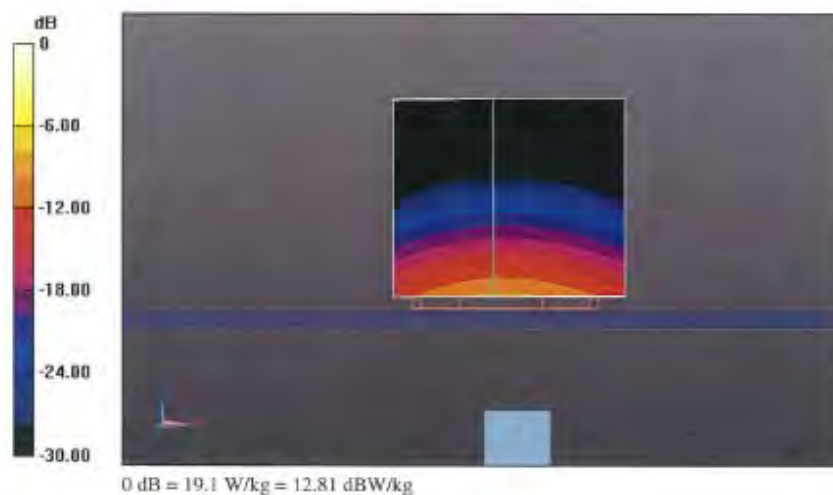
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**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,**  
**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
 Reference Value = 62.293 V/m; Power Drift = 0.01 dB  
 Peak SAR (extrapolated) = 33.5 W/kg  
**SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.26 W/kg**  
 Maximum value of SAR (measured) = 19.1 W/kg

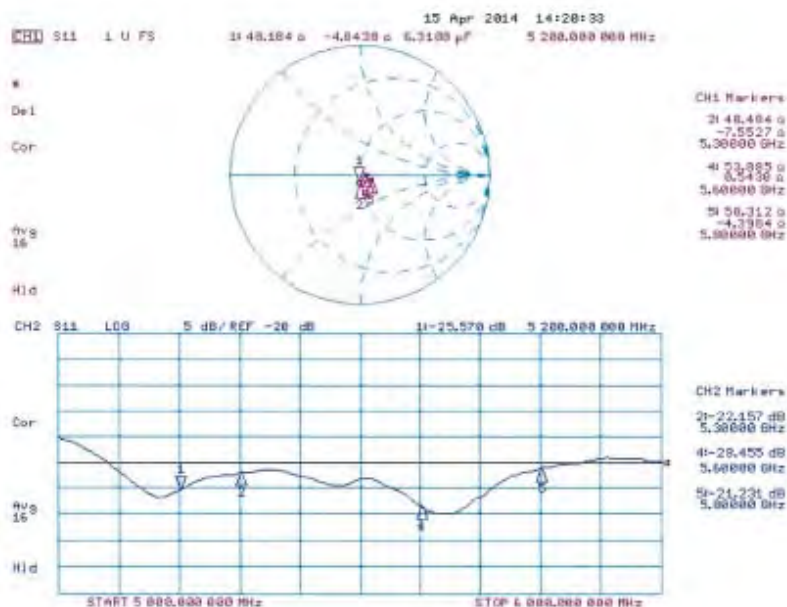


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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 15.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1104**

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.44$  S/m;  $\epsilon_r = 47$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.57$  S/m;  $\epsilon_r = 46.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.96$  S/m;  $\epsilon_r = 46.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.23$  S/m;  $\epsilon_r = 46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013, ConvF(4.3, 4.3, 4.3); Calibrated: 30.12.2013, ConvF(4.47, 4.47, 4.47); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.628 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 30.7 W/kg

**SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.15 W/kg**

Maximum value of SAR (measured) = 18.2 W/kg

### Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.482 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 32.5 W/kg

**SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.19 W/kg**

Maximum value of SAR (measured) = 18.7 W/kg

### Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan,

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.886 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 36.9 W/kg

**SAR(1 g) = 8.21 W/kg; SAR(10 g) = 2.28 W/kg**

Maximum value of SAR (measured) = 20.1 W/kg

Certificate No: D5GHzV2-1104\_Apr14

Page 13 of 15

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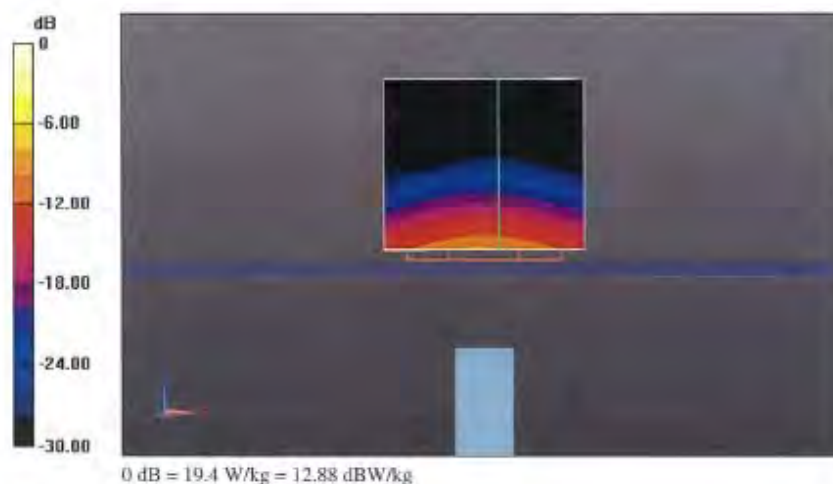
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**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
 Reference Value = 56.160 V/m; Power Drift = -0.03 dB  
 Peak SAR (extrapolated) = 36.8 W/kg  
 SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.13 W/kg  
 Maximum value of SAR (measured) = 19.4 W/kg

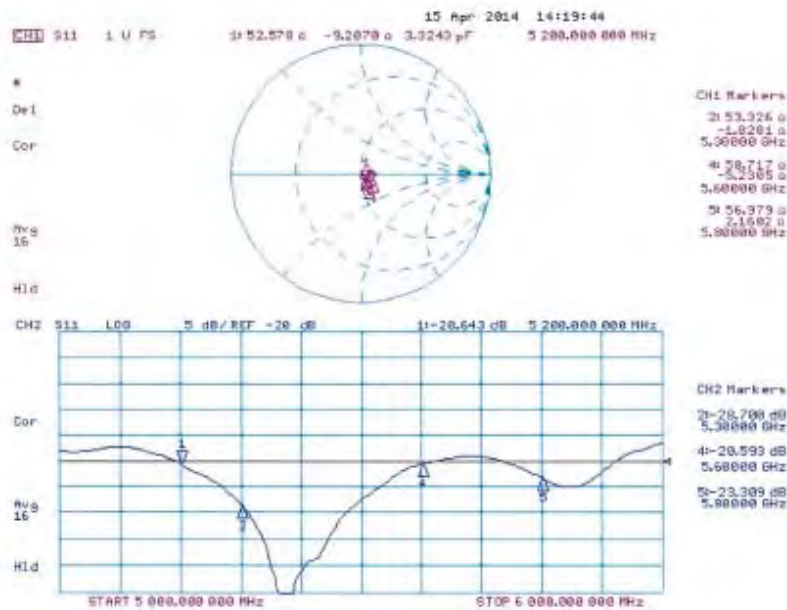


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## Impedance Measurement Plot for Body TSL



## End of 1<sup>st</sup> part of report

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