

# SAR TEST REPORT

FCC 47 CFR Part 2.1093  
Industry Canada RSS-102

RF-Exposure evaluation of portable equipment

Report Reference No. .... : G0M-1407-3954-TFC093S-V06

Testing Laboratory ..... : Eurofins Product Service GmbH

Address ..... : Storkower Str. 38c  
15526 Reichenwalde  
Germany

Accreditation ..... :



A2LA Accredited Testing Laboratory, Certificate No.: 1983.01  
FCC Filed Test Laboratory, Reg.-No.: 96970  
IC OATS Filing assigned code: 3470A

Applicant's name ..... : Datalogic ADC SRL

Address ..... : Via San Vitalino, 13  
40012 Lippo di Calderara di Reno, Bologna  
Italy

## Test specification:

Standard..... : FCC 47 CFR Part 2 §2.1093  
FCC OET Bulletin 65 Supplement C 01-01  
IEEE Std. 1528 - 2003  
IEEE Std. 1528 – 2013  
IC RSS-102 Issue 4  
Safety Code 6 (2009)

Non-standard test method..... : None

Test scope..... : complete Radio compliance test

## Equipment under test (EUT):

|                             |                    |                |
|-----------------------------|--------------------|----------------|
| Product description         | Handheld           |                |
| Model No.                   | Datalogic FalconX3 |                |
| Additional Models           | None               |                |
| Hardware version            | None               |                |
| Firmware / Software version | None               |                |
|                             | FCC-ID: U4GFX3P    | IC: 3862E-FX3P |

Test result **Passed**

Test Report No.: G0M-1407-3954-TFC093S-V06

Eurofins Product Service GmbH  
Storkower Str. 38c, D-15526 Reichenwalde, Germany

**Possible test case verdicts:**

- neither assessed nor tested .....: N/N
- required by standard but not appl. to test object.....: N/A
- required by standard but not tested.....: N/T
- not required by standard for the test object .....: N/R
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

**Testing:**

Date of receipt of test item .....: 2014-07-10

Date (s) of performance of tests .....: 2014-07-17 - 2014-09-01

Compiled by .....: Matthias Handrik

Tested by (+ signature).....: Matthias Handrik  
(Testing Manager)



Approved by (+ signature) .....: Christian Weber  
(Test Lab Manager)



Date of issue .....: 2014-09-03

Total number of pages .....: 104

**General remarks:**

**The test results presented in this report relate only to the object tested.**

**The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

**Additional comments:**


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Test Report No.: G0M-1407-3954-TFC093S-V06

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## Version History

| Version | Issue Date | Remarks                                                                                                                                                                                                                                                                                       | Revised by |
|---------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 01      | 2014-05-13 | Initial Release                                                                                                                                                                                                                                                                               |            |
| 02      | 2014-08-28 | Replaced document: G0M-1407-3954-TFC093S-V01<br>Replaced by: G0M-1407-3954-TFC093S-V02<br><br>Changes :<br>Results for 5725 – 5850 MHz U-NII Band added<br>Additional result plots added<br>Antenna details added<br>DAE calibration data added                                               | C. Weber   |
| 03      | 2014-08-29 | Replaced document: G0M-1407-3954-TFC093S-V02<br>Replaced by: G0M-1407-3954-TFC093S-V03<br><br>Changes :<br>Issue date of V02 corrected<br>IEEE 1528-2013 reference added<br>Operating frequency range for 2.4 GHz and 5 GHz WiFi corrected<br>Test dates for 5 GHz and 2.4 GHz WiFi corrected | C. Weber   |
| 04      | 2014-09-01 | Replaced document: G0M-1407-3954-TFC093S-V03<br>Replaced by: G0M-1407-3954-TFC093S-V04<br><br>Changes :<br>Results for 5150 – 5250 MHz U-NII Band added                                                                                                                                       | C. Weber   |
| 05      | 2014-09-02 | Replaced document: G0M-1407-3954-TFC093S-V04<br>Replaced by: G0M-1407-3954-TFC093S-V05<br><br>Changes :<br>Test dates of SAR result plots and system validations corrected<br>Reported SAR ConvF values changed to correct values used for measurement<br>Referenced KDBs adjusted            | C. Weber   |
| 06      | 2014-09-03 | Replaced document: G0M-1407-3954-TFC093S-V05<br>Replaced by: G0M-1407-3954-TFC093S-V06<br><br>Changes :<br>Test dates of SAR result plots and system validations corrected                                                                                                                    | C. Weber   |

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## 1 Equipment (Test item) Description

|                                     |                                                                                                                                                                                                                                                                                     |                                      |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>Description</b>                  | Handheld                                                                                                                                                                                                                                                                            |                                      |
| <b>Model</b>                        | Datalogic FalconX3                                                                                                                                                                                                                                                                  |                                      |
| <b>Additional Models</b>            | None                                                                                                                                                                                                                                                                                |                                      |
| <b>Serial number</b>                | None                                                                                                                                                                                                                                                                                |                                      |
| <b>Hardware version</b>             | None                                                                                                                                                                                                                                                                                |                                      |
| <b>Software / Firmware version</b>  | None                                                                                                                                                                                                                                                                                |                                      |
| <b>FCC-ID</b>                       | U4GFX3P                                                                                                                                                                                                                                                                             |                                      |
| <b>IC</b>                           | 3862E-FX3P                                                                                                                                                                                                                                                                          |                                      |
| <b>Equipment type</b>               | End product                                                                                                                                                                                                                                                                         |                                      |
| <b>Prototype or production unit</b> | Identical Prototype                                                                                                                                                                                                                                                                 |                                      |
| <b>Device category</b>              | Handset                                                                                                                                                                                                                                                                             |                                      |
| <b>Environment</b>                  | General public                                                                                                                                                                                                                                                                      |                                      |
| <b>Radio technologies</b>           | Bluetooth, WLAN IEEE 802.11a,b,g,n                                                                                                                                                                                                                                                  |                                      |
| <b>Operating frequency ranges</b>   | 2.4 GHz : 2402 – 2480 MHz (Bluetooth)<br>2.4 GHz : 2412 – 2462 MHz (WLAN 20 MHz / 1 Stream)<br>5 GHz : 5180 – 5240 MHz (WLAN 20 MHz / 1 Stream)<br>5260 – 5320 MHz (WLAN 20 MHz / 1 Stream)<br>5500 – 5700 MHz (WLAN 20 MHz / 1 Stream)<br>5745 – 5825 MHz (WLAN 20 MHz / 1 Stream) |                                      |
| <b>Modulations</b>                  | Bluetooth: GFSK / PI/4-DQPSK / 8-DPSK<br>WLAN: CCK / DSSS / OFDM                                                                                                                                                                                                                    |                                      |
| <b>Antenna: MAIN</b>                | Type                                                                                                                                                                                                                                                                                | integrated                           |
|                                     | Model                                                                                                                                                                                                                                                                               | chip antenna                         |
|                                     | Manufacturer                                                                                                                                                                                                                                                                        | unspecified                          |
|                                     | Gain                                                                                                                                                                                                                                                                                | 2.4 GHz = 3.01 dBi, 5 GHz = 4.15 dBi |
| <b>Antenna: AUX</b>                 | Type                                                                                                                                                                                                                                                                                | integrated                           |
|                                     | Model                                                                                                                                                                                                                                                                               | chip antenna                         |
|                                     | Manufacturer                                                                                                                                                                                                                                                                        | unspecified                          |
|                                     | Gain                                                                                                                                                                                                                                                                                | 2.4 GHz = 0.99 dBi, 5 GHz = 1.96 dBi |
| <b>Power supply</b>                 | V <sub>NOM</sub>                                                                                                                                                                                                                                                                    | 3.7 VDC (Lithium Battery)            |
| <b>Accessories</b>                  | None                                                                                                                                                                                                                                                                                |                                      |
| <b>Manufacturer</b>                 | Datalogic ADC SRL<br>Via San Vitalino, 13<br>40012 Lippo di Calderara di Reno, Bologna<br>Italy                                                                                                                                                                                     |                                      |

### 1.3 Reference Documents

| Document                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------|
| KDB Publication 447498 : Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies              |
| KDB Publication 865664: RF Exposure Compliance Reporting and Documentation Considerations                                    |
| KDB Publication 648474 : SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas                  |
| KDB Publication 648474 : Review and Approval Policies for SAR Evaluation of Handsets with Multiple Transmitters and Antennas |
| KDB Publication 865664 : SAR measurement procedures for devices operating between 100 MHz to 6 GHz                           |
| KDB Publication 248227 : SAR Measurement Procedures for 802.11 a/b/g Transmitters                                            |
| KDB Publication 450824 : SAR Probe Calibration and System Verification considerations for measurements from 150 MHz to 3 GHz |

#### 1.4 Supporting Equipment Used During Testing

| Product Type*                                                                                                                                                                       | Device | Manufacturer | Model No. | Comments |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|-----------|----------|
| None                                                                                                                                                                                |        |              |           |          |
| <p><b>*Note:</b> Use the following abbreviations:</p> <p>AE : Auxiliary/Associated Equipment, or</p> <p>SIM : Simulator (Not Subjected to Test)</p> <p>CABL : Connecting cables</p> |        |              |           |          |

## 1.5 Supported standalone operating modes

| Mode                | Modulation       | Frequency range | Maximum Duty cycle |
|---------------------|------------------|-----------------|--------------------|
| Bluetooth           | FHSS, GFSK       | 2402 – 2480 MHz | 0.775              |
| Bluetooth           | FHSS, PI/4-DQPSK | 2402 – 2480 MHz | 0.775              |
| Bluetooth           | FHSS, 8-DPSK     | 2402 – 2480 MHz | 0.775              |
| 802.11b/n<br>20MHz  | DSSS             | 2412 – 2462 MHz | 1.0                |
| 802.11g/n<br>20MHz  | OFDM             | 2412 – 2462 MHz | 1.0                |
| 802.11a/n<br>20 MHz | OFDM             | 5180 – 5240 MHz | 1.0                |
| 802.11a/n<br>20 MHz | OFDM             | 5260 – 5320 MHz | 1.0                |
| 802.11a/n<br>20 MHz | OFDM             | 5500 – 5700 MHz | 1.0                |
| 802.11a/n<br>20 MHz | OFDM             | 5725 – 5850 MHz | 1.0                |

## 1.6 Supported concurrent (multi-transmitter) operating modes

The EUT contains a fixed WLAN transceiver and a Bluetooth BR+EDR transceiver.

All two transceiver (WLAN, Bluetooth) can operate simultaneously.

According to KDB 447498 D01 v05r02 for standalone SAR evaluation the test exclusion power condition is given by

$$\frac{\text{max Power, mW}}{\text{test distance, mm}} \cdot \sqrt{f_{\text{GHz}}} \leq 3.0$$

With the maximum source-base time averaged conducted power level of 0.92 dBm the test exclusion condition gives (test distance 5 mm for distances  $\leq 5$  mm) = 0.39 which is below the exclusion threshold of 3.

Hence the test exclusion condition for the Bluetooth transmitter for standalone operation is fulfilled.

For simultaneous transmission SAR the following SAR estimation exists:

$$\frac{\text{max Power, mW}}{\text{test distance, mm}} \cdot \frac{\sqrt{f_{\text{GHz}}}}{7.5}$$

For the maximum power level and the test distance of 5 mm the following SAR value estimation is given: 0.05 W/kg

Taking this SAR estimation into account the maximum SAR value for the WLAN transceiver has to be lower or equal to  $1.6 - 0.05 = 1.55$ . As long as the maximum SAR value for the WLAN transmitter is lower than 1.55 W/kg that WLAN transmitter complies with the SAR limit.

## 1.7 Supported use cases

| Use case                                                       | Distance to human body | corresponding test configuration |
|----------------------------------------------------------------|------------------------|----------------------------------|
| EUT placed at human body;<br>Display faces to the human body   | 0 mm (worst case)      | body-worn device                 |
| EUT held in the human hand<br>(Back side of EUT at human body) | 0 mm (worst case)      | body-worn device                 |

## 1.8 Radio Test Modes

| Mode            | Settings                                                                                                                                                            |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bluetooth DH5   | Mode = Bluetooth<br>Modulation = FHSS, GFSK<br>Duty cycle = 77.5%<br>Data rate = 1 Mbps<br>Power level = maximum<br>Antennas = integrated                           |
| Bluetooth 2-DH5 | Mode = Bluetooth<br>Modulation = FHSS, PI/4-DQPSK<br>Duty cycle = 77.5%<br>Data rate = 2 Mbps<br>Power level = maximum<br>Antennas = integrated                     |
| Bluetooth 3-DH5 | Mode = Bluetooth<br>Modulation = FHSS, 8-DPSK<br>Duty cycle = 77.5%<br>Data rate = 3 Mbps<br>Power level = maximum<br>Antennas = integrated                         |
| IEEE 802.11b    | Mode = 802.11b/n 20MHz<br>Modulation = DSSS<br>Duty cycle = 100%<br>Data rate = 1, 2, 5.5, 11 Mbps<br>Power level = maximum<br>Antennas = integrated                |
| IEEE 802.11g    | Mode = 802.11g/n 20MHz<br>Modulation = OFDM<br>Duty cycle = 100%<br>Data rate = 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>Power level = maximum<br>Antennas = integrated |
| IEEE 802.11g/n  | Mode = 802.11g/n 20MHz<br>Modulation = OFDM<br>Duty cycle = 100%<br>Data rate = MCS0-7<br>Power level = maximum<br>Antennas = integrated                            |

|                |                                                                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 802.11a   | Mode = 802.11a/n 20MHz<br>Modulation = OFDM<br>Duty cycle = 100%<br>Data rate = 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>Power level = maximum<br>Antennas = integrated |
| IEEE 802.11a/n | Mode = 802.11a/n 20MHz<br>Modulation = OFDM<br>Duty cycle = 100%<br>Data rate = MCS0-7<br>Power level = maximum<br>Antennas = integrated                            |

## 1.9 Conducted Power Values Bluetooth

| Bluetooth |                 |                              |                  |              |                                        |                  |              |
|-----------|-----------------|------------------------------|------------------|--------------|----------------------------------------|------------------|--------------|
| Channel   | Frequency [MHz] | Peak (Burst) RMS Power [dBm] |                  |              | Source-based time averaged Power [dBm] |                  |              |
|           |                 | BR (GFSK)                    | EDR (PI/4-DQPSK) | EDR (8-DPSK) | BR (GFSK)                              | EDR (PI/4-DQPSK) | EDR (8-DPSK) |
|           |                 | DH5                          | 2-DH5            | 3-DH5        | DH5                                    | 2-DH5            | 3-DH5        |
| 0         | 2402            | 0.42                         | 0.55             | 0.52         | -0.69                                  | -0.56            | -0.59        |
| 39        | 2441            | 1.91                         | 2.02             | 2.03         | <u>0.80</u>                            | 0.91             | 0.92         |
| 78        | 2480            | 1.85                         | 1.95             | 1.98         | 0.74                                   | 0.84             | 0.87         |

## 1.10 Conducted Power Values WLAN 2.4 GHz

The conducted power values for the various operating modes of the Wireless LAN transmitter were measured according to KDB 248227 v01r02:

### antenna AUX

| IEEE 802.11b |         |           |                                       |       |       |       |
|--------------|---------|-----------|---------------------------------------|-------|-------|-------|
| Mode         | Channel | Frequency | Source-based time average power [dBm] |       |       |       |
|              |         |           | Data Rate [Mbps]                      |       |       |       |
|              |         |           | 1                                     | 2     | 5.5   | 11    |
| IEEE 802.11b | 1       | 2412      | 13.00                                 | 13.27 | 13.18 | 13.00 |
|              | 6       | 2437      | 14.51                                 | 14.76 | 14.56 | 14.60 |
|              | 11      | 2462      | <u>15.20</u>                          | 15.43 | 15.30 | 15.10 |

### antenna MAIN

| IEEE 802.11b |         |           |                                       |       |       |       |
|--------------|---------|-----------|---------------------------------------|-------|-------|-------|
| Mode         | Channel | Frequency | Source-based time average power [dBm] |       |       |       |
|              |         |           | Data Rate [Mbps]                      |       |       |       |
|              |         |           | 1                                     | 2     | 5.5   | 11    |
| IEEE 802.11b | 1       | 2412      | 13.95                                 | 14.17 | 14.00 | 13.86 |
|              | 6       | 2437      | 15.00                                 | 15.24 | 15.00 | 14.90 |
|              | 11      | 2462      | <u>15.66</u>                          | 15.90 | 15.71 | 15.50 |

### antenna AUX

| IEEE 802.11g |         |           |                                       |       |       |       |       |       |       |       |
|--------------|---------|-----------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Mode         | Channel | Frequency | Source-based time average power [dBm] |       |       |       |       |       |       |       |
|              |         |           | Data Rate [Mbps]                      |       |       |       |       |       |       |       |
|              |         |           | 6                                     | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| IEEE 802.11g | 1       | 2412      | 10.75                                 | 10.04 | 9.96  | 9.81  | 9.67  | 9.26  | 9.02  | 8.56  |
|              | 6       | 2437      | 12.50                                 | 12.38 | 12.28 | 12.15 | 11.87 | 11.55 | 11.22 | 10.44 |
|              | 11      | 2462      | <u>12.95</u>                          | 12.90 | 12.80 | 12.60 | 12.40 | 12.10 | 11.80 | 10.97 |

### antenna MAIN

| IEEE 802.11g |         |           |                                       |       |       |       |       |       |       |       |
|--------------|---------|-----------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Mode         | Channel | Frequency | Source-based time average power [dBm] |       |       |       |       |       |       |       |
|              |         |           | Data Rate [Mbps]                      |       |       |       |       |       |       |       |
|              |         |           | 6                                     | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| IEEE 802.11g | 1       | 2412      | 11.81                                 | 11.78 | 11.68 | 11.48 | 11.24 | 10.95 | 10.60 | 9.80  |
|              | 6       | 2437      | 12.80                                 | 12.80 | 12.70 | 12.53 | 12.40 | 12.00 | 11.70 | 10.87 |
|              | 11      | 2462      | <u>13.30</u>                          | 13.27 | 13.18 | 13.15 | 12.85 | 12.55 | 12.25 | 11.40 |

### antenna AUX

| IEEE 802.11n / 20 MHz / 1 Stream |         |           |                 |                     |                                       |         |           |         |         |         |         |         |
|----------------------------------|---------|-----------|-----------------|---------------------|---------------------------------------|---------|-----------|---------|---------|---------|---------|---------|
| Mode                             | Channel | Frequency | Bandwidth [MHz] | Guard Interval [ns] | Source-based time average power [dBm] |         |           |         |         |         |         |         |
|                                  |         |           |                 |                     | Data Rate [Mbps]                      |         |           |         |         |         |         |         |
|                                  |         |           |                 |                     | MCS0                                  | MCS1    | MCS2      | MCS3    | MCS4    | MCS5    | MCS6    | MCS7    |
| IEEE 802.11n                     | 1       | 2412      | 20              | 800/400             | 6.5/7.2                               | 13/14.4 | 19.5/21.7 | 26/28.9 | 39/43.3 | 52/57.8 | 58.5/65 | 65/72.2 |
|                                  | 6       | 2437      | 20              | 800/400             | 11.00                                 | 10.31   | 10.15     | 10.00   | 8.61    | 8.57    | 8.47    | 8.40    |
|                                  | 11      | 2462      | 20              | 800/400             | 12.13                                 | 12.23   | 11.57     | 11.33   | 9.94    | 9.92    | 9.81    | 9.74    |
| IEEE 802.11n                     | 1       | 2412      | 20              | 800/400             | 12.55                                 | 12.40   | 12.26     | 11.92   | 10.37   | 10.53   | 10.44   | 10.35   |

### antenna MAIN

| IEEE 802.11n / 20 MHz / 1 Stream |         |           |                 |                     |                                       |         |           |         |         |         |         |         |
|----------------------------------|---------|-----------|-----------------|---------------------|---------------------------------------|---------|-----------|---------|---------|---------|---------|---------|
| Mode                             | Channel | Frequency | Bandwidth [MHz] | Guard Interval [ns] | Source-based time average power [dBm] |         |           |         |         |         |         |         |
|                                  |         |           |                 |                     | Data Rate [Mbps]                      |         |           |         |         |         |         |         |
|                                  |         |           |                 |                     | MCS0                                  | MCS1    | MCS2      | MCS3    | MCS4    | MCS5    | MCS6    | MCS7    |
| IEEE 802.11n                     | 1       | 2412      | 20              | 800/400             | 6.5/7.2                               | 13/14.4 | 19.5/21.7 | 26/28.9 | 39/43.3 | 52/57.8 | 58.5/65 | 65/72.2 |
|                                  | 6       | 2437      | 20              | 800/400             | 10.86                                 | 10.69   | 10.36     | 10.23   | 8.72    | 8.51    | 8.42    | 8.12    |
|                                  | 11      | 2462      | 20              | 800/400             | 11.61                                 | 11.46   | 11.34     | 11.39   | 9.97    | 9.72    | 9.62    | 9.54    |
| IEEE 802.11n                     | 1       | 2412      | 20              | 800/400             | 11.52                                 | 11.16   | 11.01     | 10.87   | 9.50    | 9.30    | 8.96    | 8.89    |

Test Report No.: G0M-1407-3954-TFC093S-V06

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According to KDB 248227 v01r02 SAR measurements for 802.11g are not necessary because the conducted power values are not more than ¼ dB higher than the power values for 802.11b.

According to KDB 248227 v01r02 SAR measurements for 802.11n are not necessary because the conducted power values are not more than ¼ dB higher than the power values for 802.11b.

According to KDB 248227 v01r02 SAR measurements are performed for 802.11b and the lowest data rate of 1 Mbps.

## 1.11 Conducted Power Values WLAN 5 GHz

The conducted power values for the various operating modes of the Wireless LAN transmitter were measured according to KDB 248227 v01r02:

antenna AUX

| IEEE 802.11a |          |         |           |                                       |       |       |       |       |       |       |       |
|--------------|----------|---------|-----------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Mode         | Band     | Channel | Frequency | Source-based time average power [dBm] |       |       |       |       |       |       |       |
|              |          |         |           | Data Rate [Mbps]                      |       |       |       |       |       |       |       |
|              |          |         |           | 6                                     | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| IEEE 802.11a | U-NII-1  | 36      | 5180      | <b>9.60</b>                           | 9.44  | 9.47  | 9.24  | 9.05  | 8.77  | 5.00  | 4.90  |
|              |          | 40      | 5200      | 8.81                                  | 8.69  | 8.62  | 8.47  | 8.31  | 8.04  | 4.30  | 4.23  |
|              |          | 44      | 5220      | 8.17                                  | 8.13  | 8.07  | 7.92  | 7.78  | 7.50  | 3.80  | 3.62  |
|              |          | 48      | 5240      | 7.59                                  | 7.50  | 7.35  | 7.18  | 7.02  | 6.76  | 2.97  | 2.88  |
|              | U-NII-2  | 52      | 5260      | <b>7.04</b>                           | 6.92  | 6.83  | 6.66  | 6.52  | 6.24  | 2.45  | 2.27  |
|              |          | 56      | 5280      | 6.70                                  | 6.48  | 6.40  | 6.21  | 6.04  | 5.76  | 2.10  | 2.00  |
|              |          | 60      | 5300      | 6.13                                  | 6.04  | 5.96  | 5.81  | 5.67  | 5.41  | 1.66  | 1.52  |
|              |          | 64      | 5320      | 5.89                                  | 5.83  | 5.74  | 5.52  | 5.32  | 4.99  | 1.38  | 1.27  |
|              | U-NII-2e | 100     | 5500      | 7.40                                  | 7.29  | 7.19  | 7.04  | 6.91  | 6.60  | 2.10  | 2.11  |
|              |          | 104     | 5520      | 7.72                                  | 7.69  | 7.56  | 7.34  | 7.19  | 6.92  | 2.41  | 2.28  |
|              |          | 108     | 5540      | 8.08                                  | 7.98  | 7.88  | 7.71  | 7.58  | 7.33  | 2.94  | 2.85  |
|              |          | 112     | 5560      | 8.60                                  | 8.51  | 8.35  | 8.20  | 8.04  | 7.76  | 3.43  | 3.27  |
|              |          | 116     | 5580      | 9.12                                  | 9.05  | 8.98  | 8.84  | 8.70  | 8.33  | 3.99  | 3.81  |
|              |          | 120     | 5600      | N/A                                   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
|              |          | 124     | 5620      | N/A                                   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
|              |          | 128     | 5640      | N/A                                   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
|              |          | 132     | 5660      | 12.28                                 | 12.21 | 12.14 | 11.99 | 11.86 | 11.41 | 7.30  | 7.14  |
|              |          | 136     | 5680      | 13.24                                 | 13.16 | 13.03 | 12.76 | 12.61 | 12.36 | 8.18  | 8.11  |
|              |          | 140     | 5700      | <b>13.45</b>                          | 13.38 | 13.29 | 13.18 | 13.04 | 12.57 | 8.81  | 8.60  |
|              | U-NII-3  | 149     | 5745      | 16.17                                 | 16.02 | 15.88 | 15.71 | 15.56 | 15.30 | 12.05 | 12.00 |
|              |          | 153     | 5765      | 16.34                                 | 16.19 | 16.08 | 15.89 | 15.70 | 15.45 | 12.00 | 12.12 |
|              |          | 157     | 5785      | 16.33                                 | 16.23 | 16.15 | 15.92 | 15.84 | 15.52 | 12.05 | 11.96 |
|              |          | 161     | 5805      | <b>16.43</b>                          | 16.30 | 16.14 | 15.99 | 15.85 | 15.58 | 12.03 | 11.85 |
|              |          | 165     | 5825      | 16.35                                 | 16.27 | 16.19 | 16.04 | 15.87 | 15.48 | 12.25 | 12.00 |

antenna MAIN

| IEEE 802.11a |          |         |           |                                       |       |       |       |       |       |       |       |
|--------------|----------|---------|-----------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Mode         | Band     | Channel | Frequency | Source-based time average power [dBm] |       |       |       |       |       |       |       |
|              |          |         |           | Data Rate [Mbps]                      |       |       |       |       |       |       |       |
|              |          |         |           | 6                                     | 9     | 12    | 18    | 24    | 36    | 48    | 54    |
| IEEE 802.11a | U-NII-1  | 36      | 5180      | 15.82                                 | 15.73 | 15.61 | 15.49 | 15.29 | 15.00 | 11.00 | 10.92 |
|              |          | 40      | 5200      | <b>15.86</b>                          | 15.76 | 15.65 | 15.50 | 15.35 | 15.10 | 11.19 | 11.04 |
|              |          | 44      | 5220      | 15.75                                 | 15.69 | 15.60 | 15.43 | 15.28 | 15.01 | 11.18 | 11.10 |
|              |          | 48      | 5240      | 15.72                                 | 15.62 | 15.55 | 15.30 | 15.12 | 14.82 | 11.21 | 11.06 |
|              | U-NII-2  | 52      | 5260      | <b>15.51</b>                          | 15.30 | 15.21 | 15.08 | 14.90 | 14.65 | 11.02 | 10.96 |
|              |          | 56      | 5280      | 15.21                                 | 15.12 | 15.04 | 14.89 | 14.76 | 14.50 | 10.70 | 10.80 |
|              |          | 60      | 5300      | 15.15                                 | 15.00 | 14.89 | 14.70 | 14.51 | 14.16 | 10.48 | 10.40 |
|              |          | 64      | 5320      | 14.89                                 | 14.81 | 14.74 | 14.50 | 14.29 | 14.02 | 10.37 | 10.24 |
|              | U-NII-2e | 100     | 5500      | <b>15.76</b>                          | 15.71 | 15.63 | 15.48 | 15.34 | 15.08 | 11.09 | 11.03 |
|              |          | 104     | 5520      | 15.74                                 | 15.53 | 15.44 | 15.31 | 15.17 | 14.79 | 10.86 | 10.74 |
|              |          | 108     | 5540      | 15.39                                 | 15.36 | 15.28 | 15.13 | 14.98 | 14.73 | 10.60 | 10.53 |
|              |          | 112     | 5560      | 15.15                                 | 15.08 | 15.01 | 14.87 | 14.74 | 14.50 | 10.30 | 10.17 |
|              |          | 116     | 5580      | 15.03                                 | 15.00 | 14.91 | 14.75 | 14.60 | 14.14 | 9.93  | 9.80  |
|              |          | 120     | 5600      | N/A                                   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
|              |          | 124     | 5620      | N/A                                   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
|              |          | 128     | 5640      | N/A                                   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
|              |          | 132     | 5660      | 14.18                                 | 14.14 | 14.06 | 13.90 | 13.77 | 13.51 | 8.99  | 8.92  |
|              |          | 136     | 5680      | 14.19                                 | 14.10 | 14.01 | 13.56 | 13.42 | 13.18 | 8.91  | 8.77  |
|              |          | 140     | 5700      | 13.46                                 | 13.28 | 13.17 | 13.01 | 12.87 | 12.62 | 8.35  | 8.29  |
|              | U-NII-3  | 149     | 5745      | 15.13                                 | 15.06 | 14.99 | 14.85 | 14.51 | 14.23 | 10.51 | 10.39 |
|              |          | 153     | 5765      | 15.28                                 | 15.25 | 15.17 | 15.02 | 14.74 | 14.41 | 10.61 | 10.41 |
|              |          | 157     | 5785      | 15.44                                 | 15.36 | 15.29 | 15.14 | 14.79 | 14.55 | 10.62 | 10.55 |
|              |          | 161     | 5805      | 15.47                                 | 15.44 | 15.35 | 15.21 | 15.07 | 14.80 | 10.76 | 10.64 |
|              |          | 165     | 5825      | <b>15.61</b>                          | 15.51 | 15.25 | 15.12 | 14.98 | 14.74 | 10.93 | 10.80 |

## antenna AUX

| IEEE 802.11n / 20 MHz / Long Guard Interval / 1 Stream |          |         |           |                 |                     |                                       |         |           |         |         |         |         |         |
|--------------------------------------------------------|----------|---------|-----------|-----------------|---------------------|---------------------------------------|---------|-----------|---------|---------|---------|---------|---------|
| Mode                                                   | Band     | Channel | Frequency | Bandwidth [MHz] | Guard Interval [ns] | Source-based time average power [dBm] |         |           |         |         |         |         |         |
|                                                        |          |         |           |                 |                     | Data Rate [Mbps]                      |         |           |         |         |         |         |         |
|                                                        |          |         |           |                 |                     | MCS0                                  | MCS1    | MCS2      | MCS3    | MCS4    | MCS5    | MCS6    | MCS7    |
| IEEE 802.11n                                           | U-NII-1  | 36      | 5180      | 20              | 800/400             | 6.5/7.2                               | 13/14.4 | 19.5/21.7 | 26/28.9 | 39/43.3 | 52/57.8 | 58.5/65 | 65/72.2 |
|                                                        |          | 8.92    | 8.73      |                 |                     | 8.57                                  | 8.42    | 8.15      | 7.92    | 4.44    | 4.34    |         |         |
|                                                        |          | 40      | 5200      |                 |                     | 8.21                                  | 8.07    | 7.84      | 7.69    | 7.43    | 7.18    | 3.74    | 3.62    |
|                                                        |          | 44      | 5220      |                 |                     | 7.60                                  | 7.40    | 7.23      | 7.06    | 6.82    | 6.56    | 3.09    | 2.98    |
|                                                        | U-NII-2  | 48      | 5240      | 7.03            | 6.79                | 6.61                                  | 6.44    | 6.21      | 5.93    | 2.44    | 2.36    |         |         |
|                                                        |          | 52      | 5260      | 6.46            | 6.29                | 6.12                                  | 5.96    | 5.69      | 5.42    | 2.00    | 1.88    |         |         |
|                                                        |          | 56      | 5280      | 5.96            | 5.75                | 5.59                                  | 5.44    | 5.18      | 4.95    | 1.56    | 1.46    |         |         |
|                                                        |          | 60      | 5300      | 5.54            | 5.33                | 5.15                                  | 5.01    | 4.75      | 4.52    | 1.05    | 0.91    |         |         |
|                                                        | U-NII-2e | 64      | 5320      | 5.24            | 5.06                | 4.89                                  | 4.74    | 4.41      | 4.13    | 0.67    | 0.60    |         |         |
|                                                        |          | 100     | 5500      | 6.67            | 6.49                | 6.25                                  | 6.05    | 5.75      | 5.53    | 1.50    | 1.33    |         |         |
|                                                        |          | 104     | 5520      | 6.84            | 6.65                | 6.47                                  | 6.31    | 6.04      | 5.84    | 1.83    | 1.77    |         |         |
|                                                        |          | 108     | 5540      | 7.33            | 7.07                | 6.89                                  | 6.75    | 6.49      | 6.30    | 2.09    | 2.05    |         |         |
|                                                        |          | 112     | 5560      | 7.76            | 7.54                | 7.38                                  | 7.23    | 6.98      | 6.76    | 2.73    | 2.49    |         |         |
|                                                        |          | 116     | 5580      | 8.30            | 8.13                | 7.98                                  | 7.85    | 7.60      | 7.34    | 3.23    | 3.08    |         |         |
|                                                        |          | 120     | 5600      | N/A             | N/A                 | N/A                                   | N/A     | N/A       | N/A     | N/A     | N/A     |         |         |
|                                                        |          | 124     | 5620      | N/A             | N/A                 | N/A                                   | N/A     | N/A       | N/A     | N/A     | N/A     |         |         |
|                                                        |          | 128     | 5640      | N/A             | N/A                 | N/A                                   | N/A     | N/A       | N/A     | N/A     | N/A     |         |         |
|                                                        |          | 132     | 5660      | 11.50           | 11.35               | 11.21                                 | 11.08   | 10.56     | 10.36   | 6.47    | 6.28    |         |         |
|                                                        |          | 136     | 5680      | 12.43           | 12.22               | 12.06                                 | 11.92   | 11.67     | 11.47   | 7.43    | 7.41    |         |         |
|                                                        |          | 140     | 5700      | 13.46           | 13.08               | 12.92                                 | 12.80   | 12.52     | 12.37   | 8.47    | 8.49    |         |         |
|                                                        | U-NII-3  | 149     | 5745      | 16.08           | 15.89               | 15.71                                 | 15.52   | 15.16     | 14.90   | 11.77   | 11.73   |         |         |
|                                                        |          | 153     | 5765      | 16.20           | 15.94               | 15.79                                 | 15.65   | 15.38     | 15.10   | 12.00   | 11.87   |         |         |
|                                                        |          | 157     | 5785      | 16.30           | 16.09               | 15.92                                 | 15.71   | 15.38     | 15.17   | 11.96   | 11.93   |         |         |
|                                                        |          | 161     | 5805      | 16.26           | 16.11               | 15.95                                 | 15.69   | 15.43     | 15.23   | 11.99   | 11.83   |         |         |
| 165                                                    |          | 5825    | 16.28     | 16.06           | 15.89               | 15.74                                 | 15.49   | 15.08     | 11.85   | 11.79   |         |         |         |
|                                                        |          |         |           |                 |                     |                                       |         |           |         |         |         |         |         |

## antenna MAIN

| IEEE 802.11n / 20 MHz / Long Guard Interval / 1 Stream |          |         |           |                 |                     |                                       |         |           |         |         |         |         |         |
|--------------------------------------------------------|----------|---------|-----------|-----------------|---------------------|---------------------------------------|---------|-----------|---------|---------|---------|---------|---------|
| Mode                                                   | Band     | Channel | Frequency | Bandwidth [MHz] | Guard Interval [ns] | Source-based time average power [dBm] |         |           |         |         |         |         |         |
|                                                        |          |         |           |                 |                     | Data Rate [Mbps]                      |         |           |         |         |         |         |         |
|                                                        |          |         |           |                 |                     | MCS0                                  | MCS1    | MCS2      | MCS3    | MCS4    | MCS5    | MCS6    | MCS7    |
| IEEE 802.11n                                           | U-NII-1  | 36      | 5180      | 20              | 800/400             | 6.5/7.2                               | 13/14.4 | 19.5/21.7 | 26/28.9 | 39/43.3 | 52/57.8 | 58.5/65 | 65/72.2 |
|                                                        |          | 15.30   | 15.09     |                 |                     | 14.91                                 | 14.76   | 14.45     | 14.13   | 10.51   | 10.44   |         |         |
|                                                        |          | 15.18   | 14.95     |                 |                     | 14.77                                 | 14.62   | 14.37     | 14.17   | 10.67   | 10.55   |         |         |
|                                                        |          | 15.11   | 14.91     |                 |                     | 14.72                                 | 14.56   | 14.30     | 14.08   | 10.67   | 10.60   |         |         |
|                                                        | U-NII-2  | 48      | 5240      | 20              | 800/400             | 15.24                                 | 15.07   | 14.91     | 14.74   | 14.36   | 14.01   | 10.56   | 10.45   |
|                                                        |          | 52      | 5260      |                 |                     | 15.11                                 | 14.91   | 14.71     | 14.48   | 14.06   | 13.71   | 10.44   | 10.32   |
|                                                        |          | 56      | 5280      |                 |                     | 14.86                                 | 14.71   | 14.56     | 14.42   | 14.09   | 13.75   | 10.20   | 10.10   |
|                                                        |          | 60      | 5300      |                 |                     | 14.51                                 | 14.30   | 14.12     | 13.96   | 13.68   | 13.43   | 10.04   | 9.96    |
|                                                        | U-NII-2e | 64      | 5320      | 20              | 800/400             | 14.32                                 | 14.12   | 13.91     | 13.73   | 13.47   | 13.25   | 9.88    | 9.77    |
|                                                        |          | 100     | 5500      |                 |                     | 15.11                                 | 14.90   | 14.73     | 14.74   | 14.35   | 14.11   | 10.44   | 10.39   |
|                                                        |          | 104     | 5520      |                 |                     | 14.91                                 | 14.73   | 14.58     | 14.44   | 14.17   | 13.92   | 10.24   | 10.08   |
|                                                        |          | 108     | 5540      |                 |                     | 14.73                                 | 14.54   | 14.35     | 14.20   | 13.95   | 13.74   | 9.92    | 9.86    |
|                                                        |          | 112     | 5560      |                 |                     | 14.54                                 | 14.31   | 14.13     | 13.96   | 13.72   | 13.51   | 9.62    | 9.45    |
|                                                        |          | 116     | 5580      |                 |                     | 14.34                                 | 14.15   | 13.94     | 13.77   | 13.39   | 13.16   | 9.22    | 9.16    |
|                                                        |          | 120     | 5600      |                 |                     | N/A                                   | N/A     | N/A       | N/A     | N/A     | N/A     | N/A     | N/A     |
|                                                        |          | 124     | 5620      |                 |                     | N/A                                   | N/A     | N/A       | N/A     | N/A     | N/A     | N/A     | N/A     |
|                                                        |          | 128     | 5640      |                 |                     | N/A                                   | N/A     | N/A       | N/A     | N/A     | N/A     | N/A     | N/A     |
|                                                        |          | 132     | 5660      |                 |                     | 13.51                                 | 13.38   | 13.12     | 12.88   | 12.61   | 12.40   | 8.33    | 8.26    |
|                                                        |          | 136     | 5680      |                 |                     | 13.42                                 | 13.08   | 12.91     | 12.78   | 12.54   | 12.34   | 8.21    | 8.05    |
|                                                        |          | 140     | 5700      |                 |                     | 13.37                                 | 13.19   | 13.00     | 12.80   | 12.41   | 12.17   | 8.04    | 7.97    |
|                                                        | U-NII-3  | 149     | 5745      | 20              | 800/400             | 14.90                                 | 14.72   | 14.59     | 14.46   | 14.22   | 14.05   | 10.24   | 10.32   |
|                                                        |          | 153     | 5765      |                 |                     | 15.12                                 | 14.95   | 14.80     | 14.66   | 14.30   | 14.22   | 10.39   | 10.33   |
|                                                        |          | 157     | 5785      |                 |                     | 15.20                                 | 15.04   | 14.90     | 14.78   | 14.33   | 14.11   | 10.56   | 10.40   |
|                                                        |          | 161     | 5805      |                 |                     | 15.33                                 | 15.14   | 14.97     | 14.84   | 14.59   | 14.39   | 10.65   | 10.60   |
| 165                                                    |          | 5825    | 15.60     |                 |                     | 15.26                                 | 15.11   | 14.98     | 14.75   | 14.33   | 10.68   | 10.73   |         |

According to KDB 248227 v01r02 SAR measurements for 802.11n are not necessary because the conducted power values are not more than ¼ dB higher than the power values for 802.11a.

According to KDB 248227 v01r02 SAR measurements are performed for 802.11a and the lowest data rate of 6 Mbps.

### 1.12 Test Positions

| Position  | Description                                  |
|-----------|----------------------------------------------|
| FRONT-0MM | EUT top side directly touching the phantom.  |
| BACK-0MM  | EUT rear side directly touching the phantom. |

### 1.13 Test Equipment Used During Testing

| SAR Measurement                      |                  |           |            |                                |                                |
|--------------------------------------|------------------|-----------|------------|--------------------------------|--------------------------------|
| Description                          | Manufacturer     | Model     | Identifier | Cal. Date                      | Cal. Due                       |
| Stäubli Robot                        | Stäubli          | RX90B L   | EF00271    | functional test                | functional test                |
| Stäubli Robot Controller             | Stäubli          | CS7MB     | EF00272    | functional test                | functional test                |
| DASY 5 Measurement Server            | Schmid & Partner |           | EF00273    | functional test                | functional test                |
| Control Pendant                      | Stäubli          |           | EF00274    | functional test                | functional test                |
| Dell Computer                        | Schmid & Partner | Intel     | EF00275    | functional test                | functional test                |
| Data Acquisition Electronics         | Schmid & Partner | DAE3V1    | EF00276    | 2013-09                        | 2014-09                        |
| Dosimetric E-Field Probe             | Schmid & Partner | ET3DV6    | EF00279    | 2013-09                        | 2014-09                        |
| Dosimetric E-Field Probe             | Schmid & Partner | EX3DV4    | EF00826    | 2013-09                        | 2014-09                        |
| System Validation Kit                | Schmid & Partner | D300V3    | EF00299    | 2012-09                        | 2015-09                        |
| System Validation Kit                | Schmid & Partner | D450V3    | EF00300    | 2012-09                        | 2015-09                        |
| System Validation Kit                | Schmid & Partner | D900V2    | EF00281    | 2012-09                        | 2015-09                        |
| System Validation Kit                | Schmid & Partner | D1800V2   | EF00282    | 2012-09                        | 2015-09                        |
| System Validation Kit                | Schmid & Partner | D1900V2   | EF00283    | 2012-09                        | 2015-09                        |
| System Validation Kit                | Schmid & Partner | D2450V2   | EF00284    | 2012-09                        | 2015-09                        |
| System Validation Kit                | Schmid & Partner | D5GHZV2   | EF00827    | 2012-11                        | 2015-11                        |
| Flat phantom                         | Schmid & Partner | V 4.4     | EF00328    | no calibration required        | no calibration required        |
| Oval flat phantom                    | Schmid & Partner | ELI 4     | EF00289    | functional test                | functional test                |
| Mounting Device                      | Schmid & Partner | V 3.1     | EF00287    | functional test                | functional test                |
| Millivoltmeter                       | Rohde & Schwarz  | URV 5     | EF00126    | 2013-08                        | 2016-08                        |
| Power sensor                         | Rohde & Schwarz  | NRV-Z2    | EF00125    | 2013-04                        | 2015-04                        |
| RF signal generator                  | Rohde & Schwarz  | SMP 02    | EF00165    | 2013-05                        | 2015-05                        |
| Insertion unit                       | Rohde & Schwarz  | URV5-Z4   | EF00322    | 2013-08                        | 2014-08                        |
| Directional Coupler                  | HP               | HP 87300B | EF00288    | functional test                | functional test                |
| Radio Communication Tester           | Rohde & Schwarz  | CMD65     | EF00625    | ICO (initial calibration only) | ICO (initial calibration only) |
| Universal Radio Communication Tester | Rohde & Schwarz  | CMU 200   | EF00304    | 2014-05                        | 2015-05                        |
| Network Analyzer 300 kHz to 6 GHz    | Agilent          | 8752C     | EF00140    | 2014-06                        | 2015-06                        |
| Dielectric Probe Kit                 | Agilent          | 85070C    | EF00291    | functional test                | functional test                |

## 2 Result Summary

| OET Bulletin 65 Supplement C, RSS-102                      |                           |                                                                            |                             |        |         |
|------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------|-----------------------------|--------|---------|
| Product Specific<br>Standard Section                       | Requirement – Test        | Reference<br>Method                                                        | Maximum SAR<br>[W/kg]       | Result | Remarks |
| OET Bulletin 65 Suppl. C<br>Section 2<br>RSS-102 Section 3 | Single-band<br>conformity | KDB Publication 447498<br>KDB Publication 248227<br>KDB Publication 865664 | 0.529                       | PASS   |         |
| OET Bulletin 65 Suppl. C<br>Section 2<br>RSS-102 Section 3 | Multi-band<br>conformity  | KDB Publication 447498<br>KDB Publication 648474<br>KDB Publication 865664 | $0.529 + 0.05$<br>$= 0.579$ | PASS   |         |
| Remarks:                                                   |                           |                                                                            |                             |        |         |

### 3 Definitions

The specific absorption rate (SAR) is defined as the time derivative of the incremental energy ( $dW$ ) absorbed by (dissipated in) an incremental mass ( $dm$ ) contained in a volume element ( $dV$ ) of a given density ( $\rho_t$ ), expressed in watts per kilogram (W/kg)

$$\text{SAR} = d/dt (dW/dm) = d/dt (dW/\rho_t dV) = \sigma/\rho_t |E_t|^2$$

where

$$dW/dt = \int_V E \cdot J \, dV = \int_V \sigma E^2 \, dV$$

#### 3.1 Controlled Exposure

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category and the general population/uncontrolled exposure limits apply to these devices.

#### 3.2 Uncontrolled Exposure

In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on the risk of potential exposure and instructions on methods to minimize such exposure risks.

#### 3.3 Localized SAR

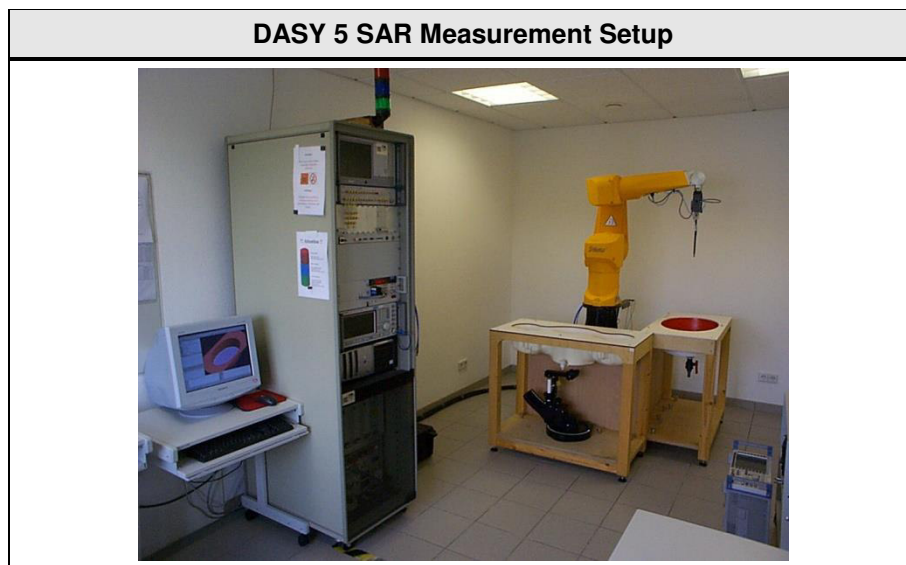
Compliance with the localized SAR limits is demonstrated using the head and trunk limit because this SAR limit is only half the limbs limit value. The values are obtained by SAR measurements according to EN 62209-2.

## 4 Localized SAR Measurement Equipment

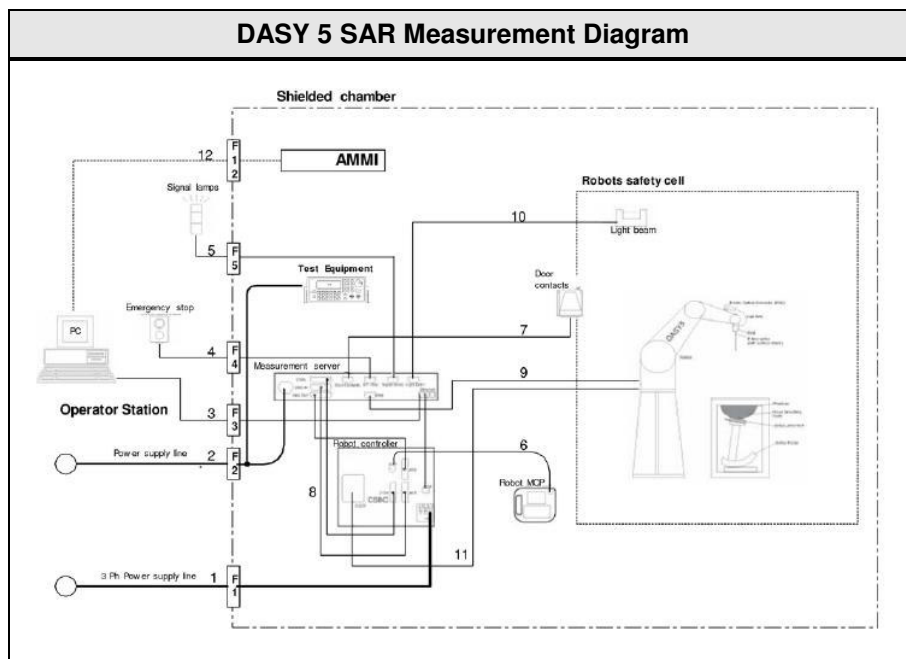
The measurements were performed with Dasy5 automated near-field scanning system comprised of high precision robot, robot controller, computer, e-field probe, probe alignment unit, phantoms, non-conductive phone positioned and software extension.

### 4.1 Complete SAR DASY5 Measurement System

Measurements are performed using the DASY5 automated assessment system made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland.



The following Diagram show the elements involved in the measurement setup.



The DASY5 system for performing compliance tests consists of the following items:

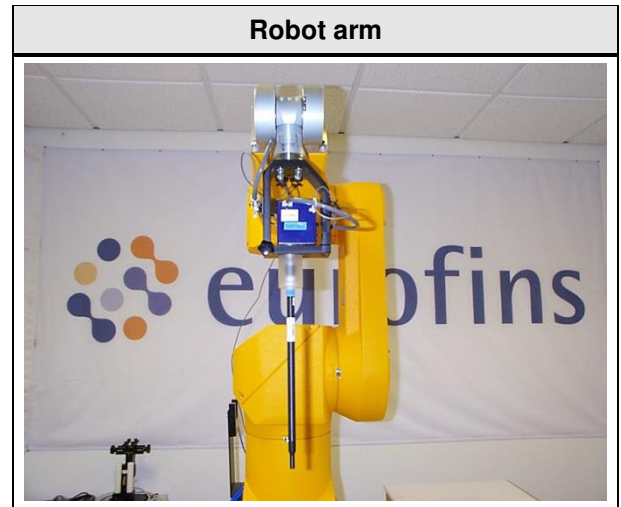
| DASY5 SAR Measurement System |                                                                                                                                                                                                                                                                                                                       |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Device                       | Description:                                                                                                                                                                                                                                                                                                          |
| RX90BL                       | A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software.                                                                                                                                                                                                               |
| Probe Alignment Unit         | A probe alignment unit which improves the (absolute) accuracy of the probe positioning.                                                                                                                                                                                                                               |
| Teach Pendant                | The Manual Control Pendant (MCP), also called the manual teach pendant, is the user interface to the robot. In DASY, it is used for certain installation and teach procedures                                                                                                                                         |
| Signal Lamps                 | External warning lamp which indicates when the robot arm is powered-on and if the robot is under software control or in manual mode (controlled with the teach pendant).                                                                                                                                              |
| DAE                          | The 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. |
| E-Field Probes               | Isotropic E-Field probe optimized and calibrated for E-field measurements in free space.                                                                                                                                                                                                                              |
| EOC                          | The electro-optical converter (EOC) performs the conversion between optical and electrical signals                                                                                                                                                                                                                    |
| Measurement Server           | The functions of the measurement server is to perform the time critical task such as signal filtering, surveillance of the robot operation, fast movement interrupts.                                                                                                                                                 |
| Control Computer             | A computer operating Windows 2000 or Windows NT with DASY 4 Software.                                                                                                                                                                                                                                                 |
| Control Software             | DASY4 and SEMCAD post processing Software                                                                                                                                                                                                                                                                             |
| SAM Twin Phantom             | The SAM twin phantom enabling testing left-hand and right-hand usage.                                                                                                                                                                                                                                                 |
| Flat Phantom                 | Flat Phantom (only for body-mounted transceivers operating below 800 MHz).                                                                                                                                                                                                                                            |
| Tissue simulating liquid     | Tissue simulating liquid mixed according to the given recipes.                                                                                                                                                                                                                                                        |
| Device Holder                | The device holder for handheld mobile phones.                                                                                                                                                                                                                                                                         |
| System Validation Dipoles    | System validation dipoles allowing to validate the proper functioning of the system.                                                                                                                                                                                                                                  |

#### 4.2 Robot Arm

The DASY5 system uses the high precision robots RX90BL type out of the newer series from Stäubli SA (France).

The RX robot series have many features that are important for our application:

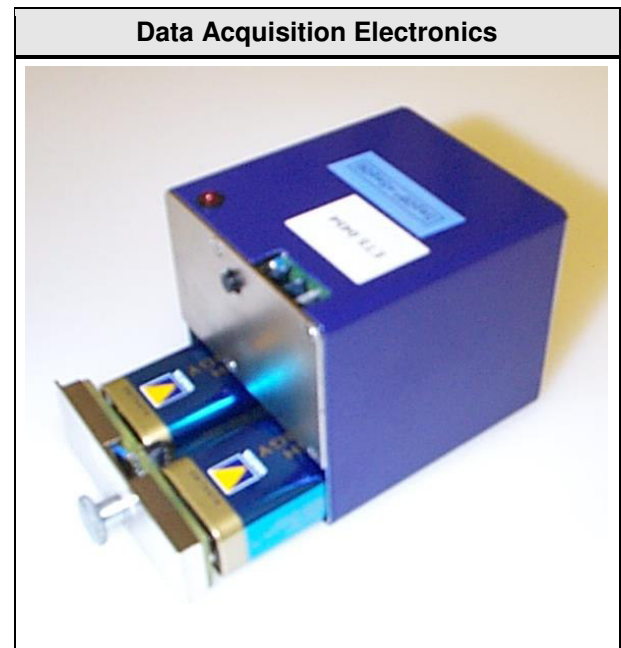
- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller



#### 4.3 Data Acquisition Electronics

The data acquisition electronics (DAE3) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE3 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



#### 4.4 Isotropic E-Field Probe $\leq 3$ GHz

##### Probe Specifications

###### **Construction:**

One dipole parallel, two dipoles normal to probe axis built-in shielding against static charges.

###### **Calibration:**

In air from 10 MHz to 2.5 GHz,  
In brain and muscle simulating tissue at  
Frequencies of 835MHz, 900MHz, 1800MHz,  
1900 MHz and 2450 MHz

###### **Frequency:**

10MHz to  $> 3$ GHz,  
Linearity  $\pm 0.2$ dB (30MHz to 3GHz)

###### **Directivity:**

$\pm 0.2$ dB in HSL (rotation around probe axis)  
 $\pm 0.4$ dB in HSL (rotation normal to probe axis)

###### **Dynamic Range:**

$5\mu\text{W/g}$  to  $> 100\text{mW/g}$

###### **Linearity:**

$\pm 0.2$ dB

###### **Dimensions:**

Overall Length: 330mm (Tip: 16mm),  
Tip Diameter: 6.8mm (Body: 12mm),  
Distance from probe tip to dipole centers: 2.7mm

###### **Application:**

General dosimetry up to 3 GHz  
Compliance tests of mobile phones  
Fast automatic scanning in arbitrary phantoms



#### 4.5 Isotropic E-Field Probe $\leq 6$ GHz

##### Probe Specifications

###### **Construction:**

One dipole parallel, two dipoles normal to probe axis built-in shielding against static charges.

###### **Calibration:**

In air from 10 MHz to 6 GHz,  
In brain and muscle simulating tissue at  
Frequencies of 5200, 5500, 5800

###### **Frequency:**

10MHz to 6GHz,  
Linearity  $\pm 0.2$ dB (30MHz to 6GHz)

###### **Directivity:**

$\pm 0.3$ dB in HSL (rotation around probe axis)  
 $\pm 0.5$ dB in tissue material (rotation normal to probe axis)

###### **Dynamic Range:**

10 $\mu$ W/g to > 100mW/g

###### **Linearity:**

$\pm 0.2$ dB

###### **Dimensions:**

Overall Length: 337mm (Tip: 20mm),  
Tip Diameter: 2.5mm (Body: 12mm),  
Distance from probe tip to dipole centers: 1mm

###### **Application:**

General dosimetry up to 6 GHz  
Compliance tests of mobile phones  
Fast automatic scanning in arbitrary phantoms



#### 4.6 Test phantom and positioner

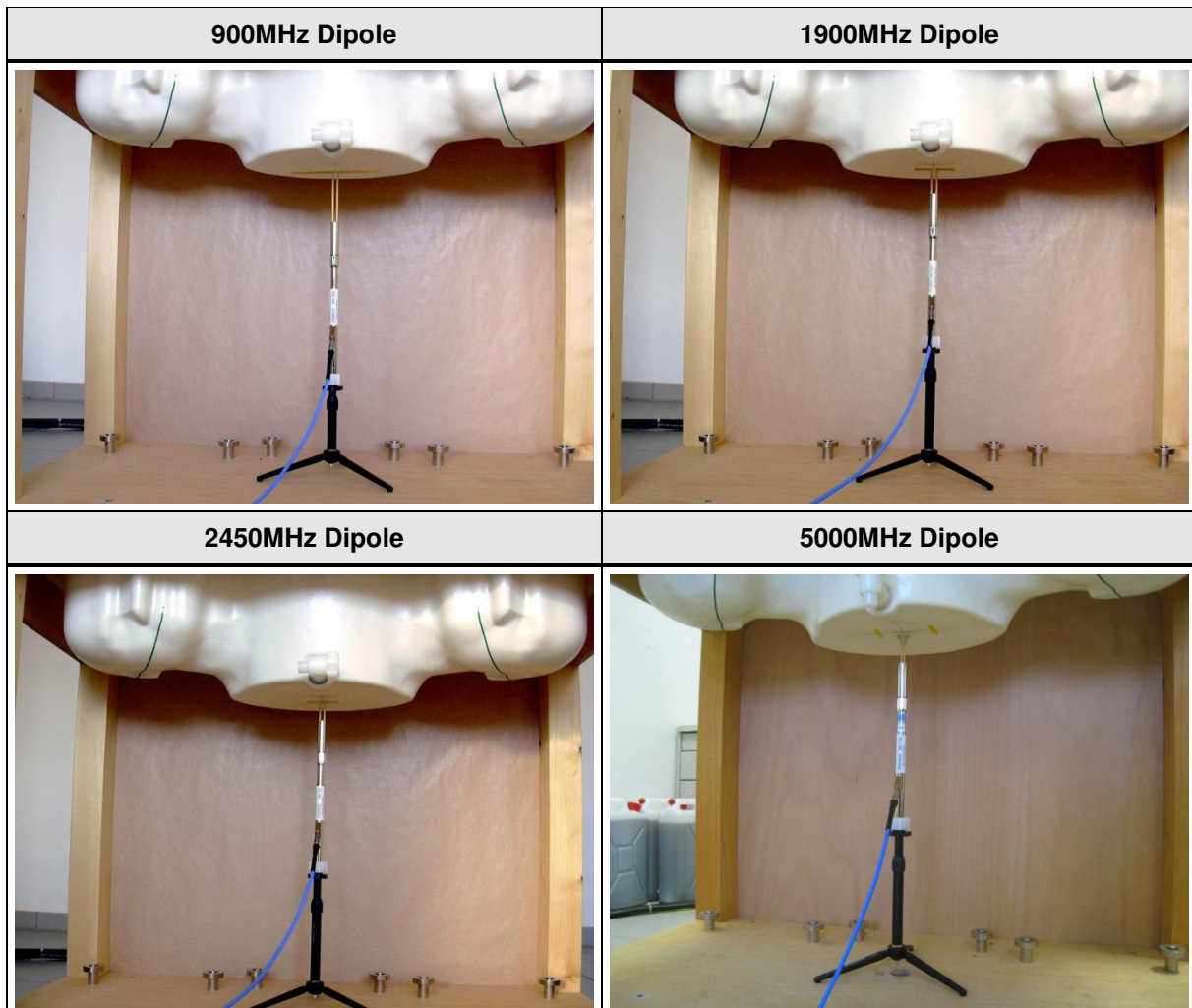
The positioner and test phantoms are manufactured by SPEAG. The test phantoms are used for all tests i.e. for both validation testing and device testing. The positioner and test phantom conforms to the requirements of EN 62209 and IEEE 1528.

The SPEAG device holder was used to position the test device in all tests whilst a tripod was used to position the validation dipoles in the test arch.

| Probe Positioner                                                                    | SAM Twin Phantom                                                                     |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|   |   |
| ELI4 phantom                                                                        | Flat phantom                                                                         |
|  |  |

#### 4.7 System Validation Dipoles

A set of calibration dipoles (D900V2, D1900V2, D2450V2, D5GHzV2) is included as a part of the SAR measurement setup. These are used for the validation of the test setup after its installation and prior to the EUT measurements. The calibration dipole is placed in the position normally occupied by the EUT. All calibration dipoles have the same height which allows an exact fitting below the center point of the test phantom. The dipole center is 10mm below the surface of the test phantom.



## 5 Single-band SAR Measurement

After successful completion of the tissue and system verification the SAR values of the EUT are measured according to the following description.

### 5.1 General measurement description

The measurement is performed for each frequency band of the device. If the width of the transmit frequency band exceeds 1% of its center frequency, then the channels at the lowest and highest frequencies should also be tested. Furthermore, if the width of the transmit band exceeds 10% of its center frequency the following formula is used to determine the number of channels:

$$N_C = 2 \cdot \text{roundup}[10 \cdot (f_{\text{high}} - f_{\text{low}}) / f_c] + 1$$

First the device is tested on the center channel of each frequency band used by the device. An operation mode and configuration with maximum transmit power is established. If battery operated equipment is used, the batteries are fully charged.

SAR measurements are performed using the steps outlined in the next section for all relevant operational modes, EUT configurations and measurement positions.

For the condition (position, configuration, operational mode) that provides the highest spatial-average SAR value on the center channel, the other channels are also tested.

Additionally all other conditions where the spatial-average SAR value is within 3dB of the SAR limit are also tested on all determined test frequencies.

### 5.2 SAR measurement description

First the local SAR value at a test point within 10mm or less in normal direction from the inner surface of the phantom is measured. This SAR value is used to determine the measurement drift during SAR measurement.

Next an area scan is performed over an area larger than the projection of the EUT with antenna on the surface of the phantom with a spatial grid step of 10mm.

From the scanned SAR distribution the position of maximum SAR value is identified as well as any local SAR maxima within 2dB of the maximum value that are not within the zoom scan volume. (The additional peaks are only measured when the primary peak is within 2dB of the SAR limit.)

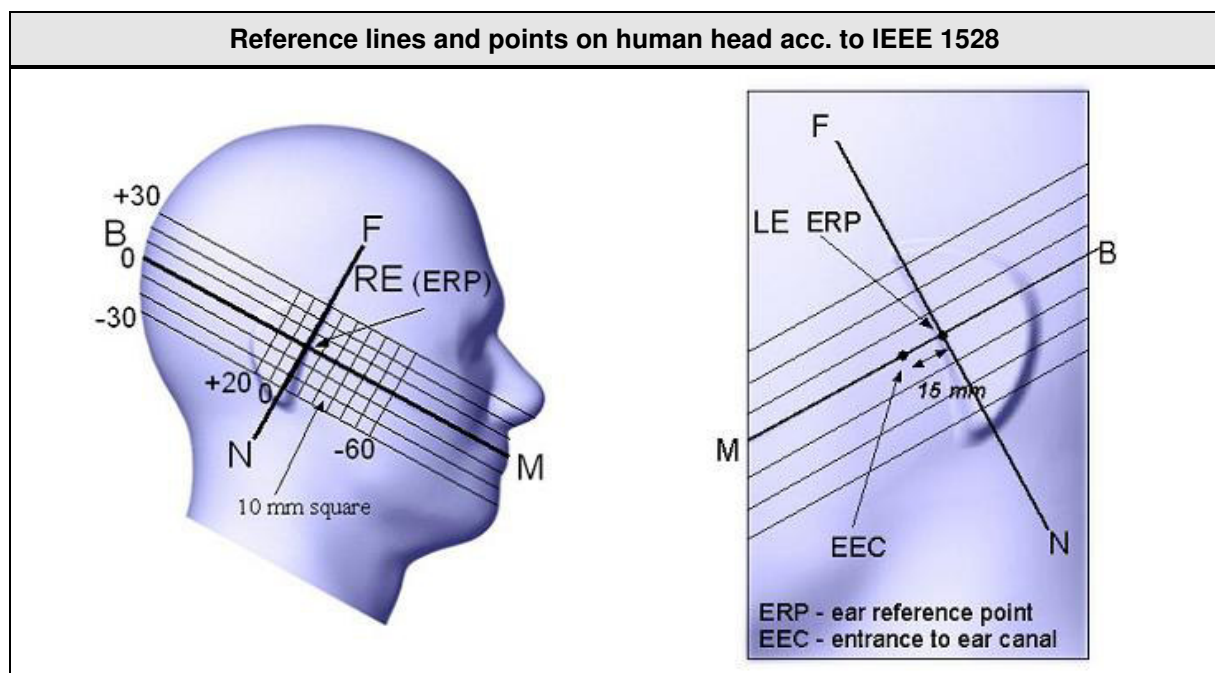
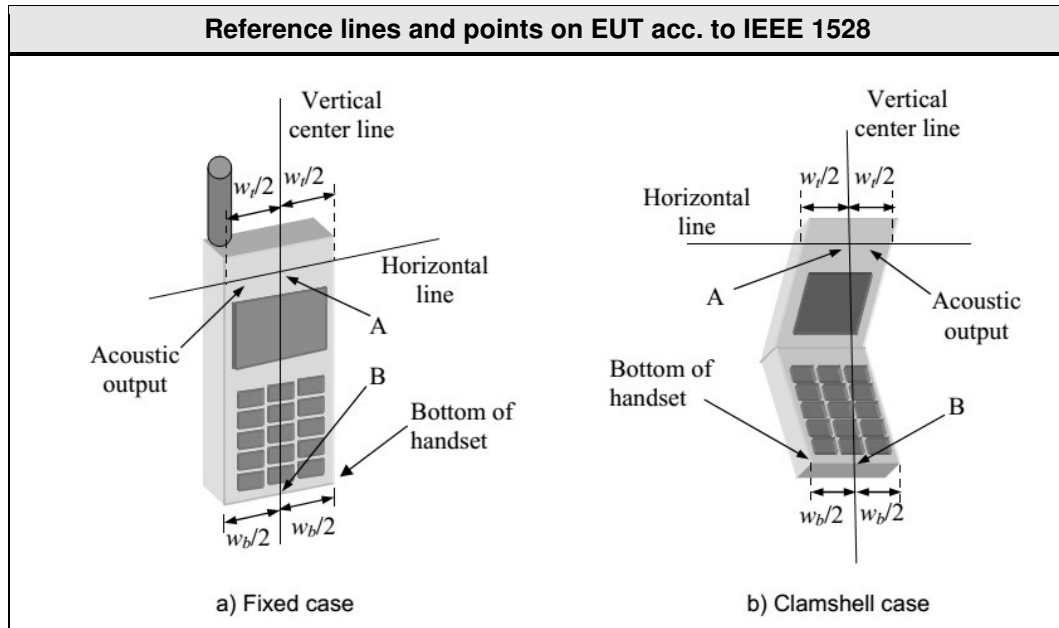
The zoom-scan volume constructed on the peak SAR position is scanned with a grid step of 5mm. The measured data are extracted and the local SAR value for each measurement point is calculated. The measured values are interpolated over a fine-mesh within the scan volume and the average SAR value over 10g mass is calculated.

At the end of the measurement the reference point measured at the beginning of the measurement is measured again and from the difference the drift is calculated.

### 5.3 Reference lines and points for Handsets

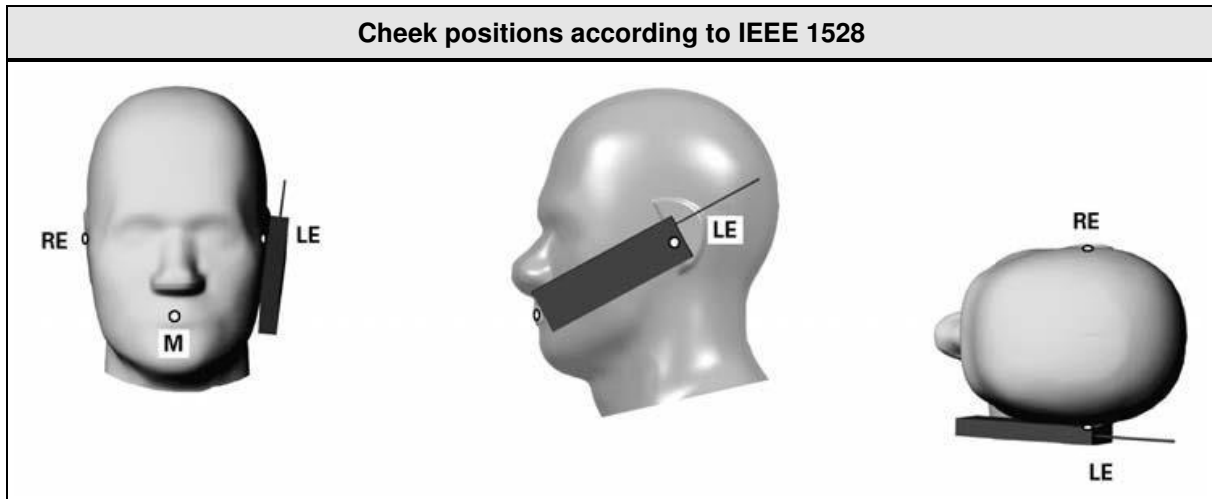
For all measurement positions of the EUT, the EUT has to be placed in a specific orientation with respect to the phantom. The orientation of the EUT relative to the phantom is defined by reference lines and points.

According to IEEE 1528, the reference lines and points shall be positioned at the EUT as shown in the following figure.



## 5.4 Test positions relative to the Head

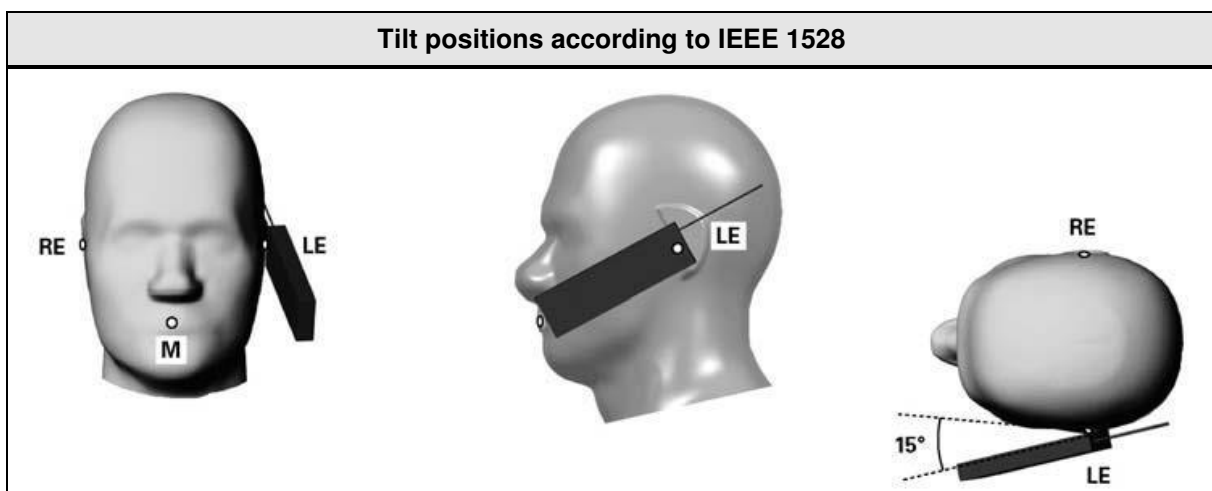
### Cheek position



The handset is positioned close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom. Next the handset is translated towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.

While the handset is maintained in this plane, it is rotated around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane. Then it is rotated around the vertical centerline until the handset (horizontal line) is parallel to the N-F line. While the vertical centerline is maintained in the Reference Plane, point A is kept on the line passing through RE and LE, and the handset is maintained in contact with the pinna, the handset is rotated about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek.

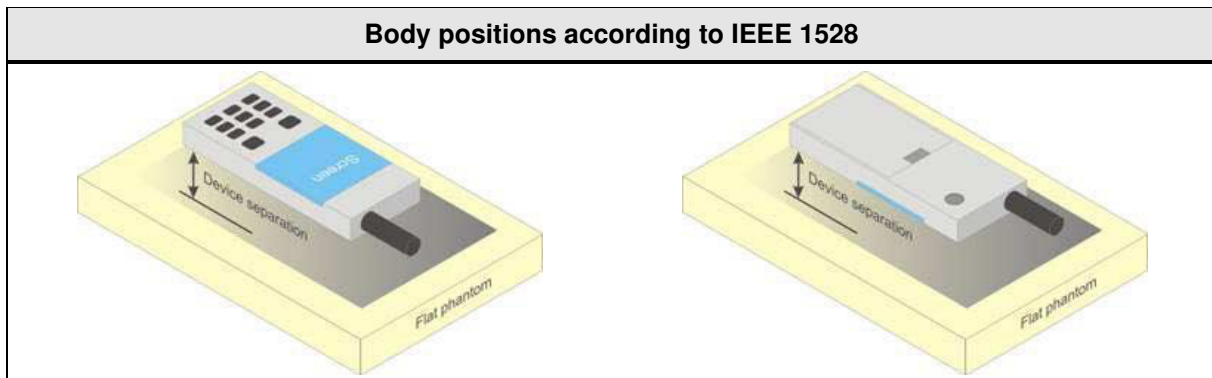
### Tilt position



First the EUT is placed in the cheek position. Next the handset is moved away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by  $15^\circ$ . Then the handset is rotated around the horizontal line by  $15^\circ$ .

The handset is moved towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point on the handset is in contact with the phantom, e.g., the antenna with the back of the head

## 5.5 Test positions relative to the human body



In body worn configuration the device is positioned parallel to the phantom surface with either top or bottom side of the EUT facing against the phantom.

The separation distance of the EUT is selected according to the use case of the EUT (e.g. with belt clip or holster).

## 5.6 Measurement Uncertainty

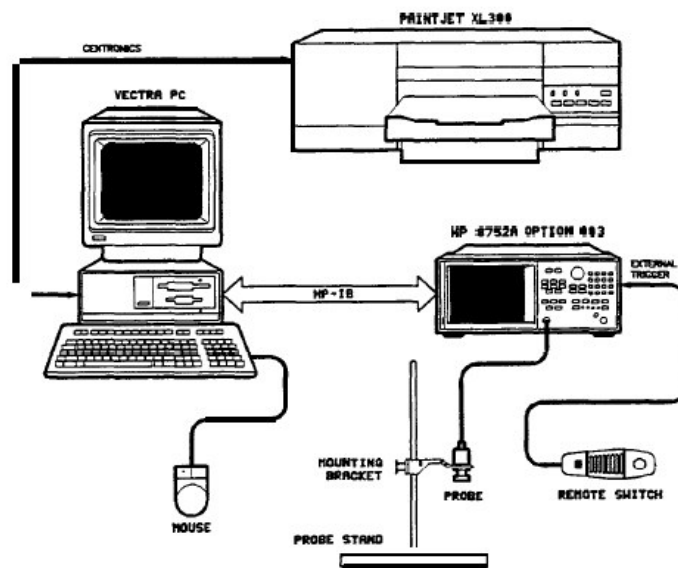
| Measurement Uncertainty according to IEEE 1528 |                   |                          |            |                     |                      |               |               |
|------------------------------------------------|-------------------|--------------------------|------------|---------------------|----------------------|---------------|---------------|
| Error Description                              | Uncertainty Value | Probability Distribution | Div.       | c <sub>i</sub> (1g) | c <sub>i</sub> (10g) | Std. Unc. 1g  | Std. Unc. 10g |
| <b>Measurement System</b>                      |                   |                          |            |                     |                      |               |               |
| Probe Calibration                              | ±6.55%            | N                        | 1          | 1                   | 1                    | ±6.55%        | ±6.55%        |
| Axial Isotropy                                 | ±4.7%             | R                        | $\sqrt{3}$ | 0.7                 | 0.7                  | ±1.9%         | ±1.9%         |
| Hemispherical Isotropy                         | ±9.6%             | R                        | $\sqrt{3}$ | 0.7                 | 0.7                  | ±3.9%         | ±3.9%         |
| Linearity                                      | ±4.7%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±2.7%         | ±2.7%         |
| Modulation Response                            | ±2.4%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±1.4%         | ±1.4%         |
| System Detection Limits                        | ±1.0%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±0.6%         | ±0.6%         |
| Boundary effects                               | ±2.0%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±1.2%         | ±1.2%         |
| Readout Electronics                            | ±0.3%             | N                        | 1          | 1                   | 1                    | ±0.3%         | ±0.3%         |
| Response Time                                  | ±0.8%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±0.5%         | ±0.5%         |
| Integration Time                               | ±2.6%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±1.5%         | ±1.5%         |
| RF Ambient Noise                               | ±3.0%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±1.7%         | ±1.7%         |
| RF Ambient Reflections                         | ±3.0%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±1.7%         | ±1.7%         |
| Probe Positioner                               | ±0.8%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±0.5%         | ±0.5%         |
| Probe Positioning                              | ±6.7%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±3.9%         | ±3.9%         |
| Post processing                                | ±4.0%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±2.3%         | ±2.3%         |
| <b>Test Sample Related</b>                     |                   |                          |            |                     |                      |               |               |
| Device Holder                                  | ±3.6%             | N                        | 1          | 1                   | 1                    | ±3.6%         | ±3.6%         |
| Test Sample Positioning                        | ±2.9%             | N                        | 1          | 1                   | 1                    | ±2.9%         | ±2.9%         |
| Power Scaling                                  | ±0%               | R                        | $\sqrt{3}$ | 1                   | 1                    | ±0%           | ±0%           |
| Power Drift                                    | ±5.0%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±2.9%         | ±2.9%         |
| <b>Phantom and Setup Related</b>               |                   |                          |            |                     |                      |               |               |
| Phantom Uncertainty                            | ±7.9%             | R                        | $\sqrt{3}$ | 1                   | 1                    | ±4.6%         | ±4.6%         |
| SAR correction                                 | ±1.9%             | R                        | $\sqrt{3}$ | 1                   | 0.84                 | ±1.1%         | ±0.9%         |
| Liquid conductivity (measured)                 | ±2.5%             | N                        | 1          | 0.78                | 0.71                 | ±2.0%         | ±1.8%         |
| Liquid permittivity (measured)                 | ±2.5%             | N                        | 1          | 0.26                | 0.26                 | ±0.1%         | ±0.1%         |
| Temperature uncertainty - Conductivity         | ±5.2%             | R                        | $\sqrt{3}$ | 0.78                | 0.71                 | ±2.3%         | ±2.1%         |
| Temperature uncertainty - Permittivity         | ±0.8%             | R                        | $\sqrt{3}$ | 0.23                | 0.26                 | ±0.1%         | ±0.1%         |
| Combined Standard Uncertainty                  |                   |                          |            |                     |                      | ±12.8%        | ±12.7%        |
| <b>Expanded Standard Uncertainty</b>           |                   |                          |            |                     |                      | <b>±25.6%</b> | <b>±25.4%</b> |

## 6 Test Conditions and Results

### 6.1 Test Conditions and Results – Tissue Validation

| Tissue Validation acc. to FCC OET Bulletin 65 Suppl. C / IC RSS-102 |                                           |                              |                                           |                             | Verdict: PASS           |
|---------------------------------------------------------------------|-------------------------------------------|------------------------------|-------------------------------------------|-----------------------------|-------------------------|
| Test according to measurement reference                             |                                           | Reference Method             |                                           |                             |                         |
|                                                                     |                                           | OET Bulletin 65 Supplement C |                                           |                             |                         |
| Target Values                                                       |                                           |                              |                                           |                             |                         |
| Frequency [MHz]                                                     | Head                                      |                              | Body                                      |                             | Permitted tolerance [%] |
|                                                                     | Relative dielectric constant $\epsilon_r$ | Conductivity $\sigma$ [S/m]  | Relative dielectric constant $\epsilon_r$ | Conductivity $\sigma$ [S/m] |                         |
| 150                                                                 | 52.3                                      | 0.76                         | 61.9                                      | 0.80                        | $\leq \pm 5$            |
| 300                                                                 | 45.3                                      | 0.87                         | 58.2                                      | 0.92                        | $\leq \pm 5$            |
| 450                                                                 | 43.5                                      | 0.87                         | 56.7                                      | 0.94                        | $\leq \pm 5$            |
| 835                                                                 | 41.5                                      | 0.90                         | 55.2                                      | 0.97                        | $\leq \pm 5$            |
| 900                                                                 | 41.5                                      | 0.97                         | 55.0                                      | 1.05                        | $\leq \pm 5$            |
| 915                                                                 | 41.5                                      | 0.98                         | 55.0                                      | 1.06                        | $\leq \pm 5$            |
| 1450                                                                | 40.5                                      | 1.20                         | 54.0                                      | 1.30                        | $\leq \pm 5$            |
| 1610                                                                | 40.3                                      | 1.29                         | 53.8                                      | 1.40                        | $\leq \pm 5$            |
| 1800 – 2000                                                         | 40.0                                      | 1.40                         | 53.3                                      | 1.52                        | $\leq \pm 5$            |
| 2450                                                                | 39.2                                      | 1.80                         | 52.7                                      | 1.95                        | $\leq \pm 5$            |
| 3000                                                                | 38.5                                      | 2.40                         | 52.0                                      | 2.73                        | $\leq \pm 5$            |
| 5200                                                                | 36.0                                      | 4.66                         | 49.0                                      | 5.30                        | $\leq \pm 5$            |
| 5500                                                                | 35.6                                      | 4.96                         | 48.6                                      | 5.65                        | $\leq \pm 5$            |
| 5800                                                                | 35.3                                      | 5.27                         | 48.2                                      | 6.00                        | $\leq \pm 5$            |
|                                                                     |                                           |                              |                                           |                             |                         |

### Test setup



### Test procedure

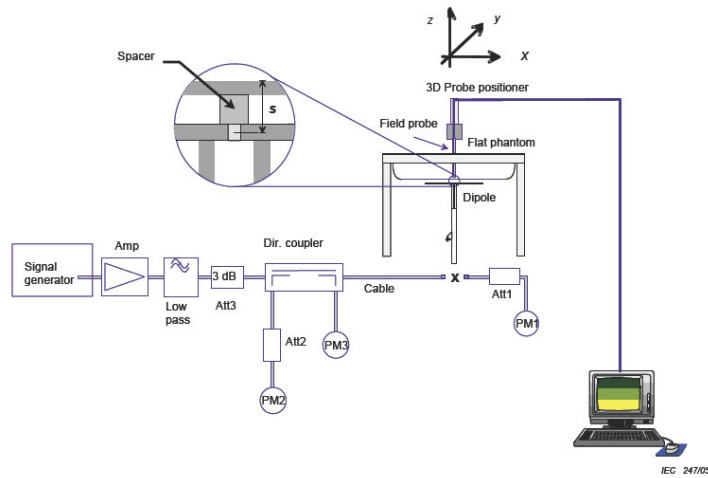
1. The dielectric probe kit is calibrated using the standards air, short circuit and deionized water
2. The tissue simulating liquid is measured using the dielectric probe
3. Target values are compared to the measurement values and deviations are determined

### Test results

| Frequency [MHz] | Tissue | Measured $\epsilon_r$ | Target $\epsilon_r$ | Delta $\epsilon_r$ [%] | Measured $\sigma$ [S/m] | Target $\sigma$ [S/m] | Delta $\sigma$ [%] |
|-----------------|--------|-----------------------|---------------------|------------------------|-------------------------|-----------------------|--------------------|
| 2450            | Body   | 50.56                 | 52.7                | -04.06                 | 2.02                    | 1.95                  | 03.59              |
| 5200            | Body   | 47.4                  | 49.0                | -03.27                 | 5.30                    | 5.30                  | 00.00              |
| 5500            | Body   | 46.7                  | 48.6                | -03.91                 | 5.68                    | 5.65                  | 00.53              |
| 5800            | Body   | 48.4                  | 48.2                | 00.41                  | 6.29                    | 6.00                  | 04.83              |

Comments:

## 6.2 Test Conditions and Results – System Validation

| System Validation acc. to FCC OET Bulletin 65 Suppl. C / IC RSS-102                                                                                                                                                                                                                 |                                          | Verdict: PASS           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------|
| Test according to measurement reference                                                                                                                                                                                                                                             | Reference Method                         |                         |
|                                                                                                                                                                                                                                                                                     | OET Bulletin 65 Supplement C / IEEE 1528 |                         |
| Test frequency range                                                                                                                                                                                                                                                                | Tested frequencies                       |                         |
|                                                                                                                                                                                                                                                                                     | 2450 MHz , 5200 MHz, 5500 MHz, 5800 MHz  |                         |
| Test mode                                                                                                                                                                                                                                                                           | unmodulated CW                           |                         |
| Target Values                                                                                                                                                                                                                                                                       |                                          |                         |
| Frequency [MHz]                                                                                                                                                                                                                                                                     | Target SAR value [W/kg (1g)]             | Permitted tolerance [%] |
| 2450                                                                                                                                                                                                                                                                                | 12.9 @ 250mW                             | ≤ ±10                   |
| 5200                                                                                                                                                                                                                                                                                | 7.42 @ 100mW                             | ≤ ±10                   |
| 5500                                                                                                                                                                                                                                                                                | 7.97 @ 100mW                             | ≤ ±10                   |
| 5800                                                                                                                                                                                                                                                                                | 7.43 @ 100mW                             | ≤ ±10                   |
| The target reference values are taken from the calibration sheets (see annex)                                                                                                                                                                                                       |                                          |                         |
| Test setup                                                                                                                                                                                                                                                                          |                                          |                         |
|  <p>IEC 247/05</p>                                                                                                                                                                              |                                          |                         |
| Test procedure                                                                                                                                                                                                                                                                      |                                          |                         |
| <div>1. The dipole antenna input power is set to 250mW</div> <div>2. The reference dipole is positioned under the phantom</div> <div>3. With the dipole antenna powered the SAR value is measured</div> <div>4. The measured SAR values are compared to the target SAR values</div> |                                          |                         |

| Test results       |                     |                                   |                                 |              |
|--------------------|---------------------|-----------------------------------|---------------------------------|--------------|
| Frequency<br>[MHz] | Input power<br>[mW] | Measured SAR value<br>[W/kg (1g)] | Target SAR value<br>[W/kg (1g)] | Delta<br>[%] |
| 2450               | 250                 | 13.6                              | 12.9                            | 9.49         |
| 5200               | 100                 | 8.03                              | 7.42                            | 8.22         |
| 5200               | 100                 | 8.02                              | 7.42                            | 8.09         |
| 5500               | 100                 | 8.35                              | 7.97                            | 4.77         |
| 5800               | 100                 | 7.25                              | 7.43                            | -2.42        |
| Comments:          |                     |                                   |                                 |              |

### 6.3 Test Conditions and Results – Standalone SAR Measurement

| Standalone SAR acc. to FCC OET Bulletin 65 Suppl. C / IC RSS-102 |           |         |                                                       |            |                                  |                  |                          | Verdict: PASS         |          |
|------------------------------------------------------------------|-----------|---------|-------------------------------------------------------|------------|----------------------------------|------------------|--------------------------|-----------------------|----------|
| Test according to measurement reference                          |           |         | Reference Method                                      |            |                                  |                  |                          |                       |          |
|                                                                  |           |         | FCC OET Bulletin 65 Supplement C / IC RSS-102 Issue 4 |            |                                  |                  |                          |                       |          |
| Room temperature                                                 |           |         | 22.0 – 23.0 °C                                        |            |                                  |                  |                          |                       |          |
| Liquid depth                                                     |           |         | 15.5 cm                                               |            |                                  |                  |                          |                       |          |
| Environment                                                      |           |         | general public                                        |            |                                  |                  |                          |                       |          |
| Limits                                                           |           |         |                                                       |            |                                  |                  |                          |                       |          |
| Region                                                           |           |         | Occupational SAR values [W/kg]                        |            | General public SAR values [W/kg] |                  |                          |                       |          |
| Whole body average SAR                                           |           |         | 0.4                                                   |            | 0.08                             |                  |                          |                       |          |
| Localized SAR (Head and trunk)<br>SAR averaging mass = 10g       |           |         | 8                                                     |            | 1.6                              |                  |                          |                       |          |
| Localized SAR (Limbs)<br>SAR averaging mass = 10g                |           |         | 20                                                    |            | 4                                |                  |                          |                       |          |
| Test results                                                     |           |         |                                                       |            |                                  |                  |                          |                       |          |
| Mode                                                             | Position  | Channel | Frequency [MHz]                                       | Drift [dB] | Average SAR [W/kg (1g)]          | Scaling Factor** | Reported SAR [W/kg (1g)] | SAR Limit [W/kg (1g)] | Plot No. |
| Antenna: MAIN                                                    |           |         |                                                       |            |                                  |                  |                          |                       |          |
| IEEE 802.11b                                                     | FRONT-0MM | 11      | 2462                                                  | 0.05       | 0.037                            | 1.202            | 0.045                    | 1.55*                 |          |
| IEEE 802.11b                                                     | BACK-0MM  | 11      | 2462                                                  | -0.16      | 0.112                            | 1.202            | 0.135                    | 1.55*                 | 1        |
| IEEE 802.11a                                                     | FRONT-0MM | 40      | 5200                                                  | -0.10      | 0.123                            | 1.033            | 0.127                    | 1.55*                 |          |
| IEEE 802.11a                                                     | BACK-0MM  | 40      | 5200                                                  | -0.08      | 0.178                            | 1.033            | 0.184                    | 1.55*                 | 2        |
| IEEE 802.11a                                                     | FRONT-0MM | 52      | 5260                                                  | -0.09      | 0.105                            | 1.119            | 0.118                    | 1.55*                 |          |
| IEEE 802.11a                                                     | BACK-0MM  | 52      | 5260                                                  | 0.07       | 0.258                            | 1.119            | 0.289                    | 1.55*                 | 3        |
| IEEE 802.11a                                                     | FRONT-0MM | 100     | 5500                                                  | 0.18       | 0.193                            | 1.057            | 0.204                    | 1.55*                 |          |
| IEEE 802.11a                                                     | BACK-0MM  | 100     | 5500                                                  | -0.07      | 0.429                            | 1.057            | 0.453                    | 1.55*                 | 4        |
| IEEE 802.11a                                                     | FRONT-0MM | 165     | 5825                                                  | -0.03      | 0.097                            | 1.016            | 0.098                    | 1.55*                 |          |
| IEEE 802.11a                                                     | BACK-0MM  | 165     | 5825                                                  | 0.06       | 0.333                            | 1.016            | 0.338                    | 1.55*                 | 5        |

| Antenna: AUX                                                                                                            |           |     |      |       |       |       |              |       |   |
|-------------------------------------------------------------------------------------------------------------------------|-----------|-----|------|-------|-------|-------|--------------|-------|---|
| IEEE 802.11b                                                                                                            | FRONT-0MM | 11  | 2462 | -0.17 | 0.040 | 1.072 | 0.040        | 1.55* |   |
| IEEE 802.11b                                                                                                            | BACK-0MM  | 11  | 2462 | 0.17  | 0.092 | 1.072 | 0.099        | 1.55* |   |
| IEEE 802.11a                                                                                                            | FRONT-0MM | 36  | 5180 | 0.02  | 0.013 | 1.096 | 0.014        | 1.55* |   |
| IEEE 802.11a                                                                                                            | BACK-0MM  | 36  | 5180 | 0.00  | 0.059 | 1.096 | 0.065        | 1.55* |   |
| IEEE 802.11a                                                                                                            | FRONT-0MM | 52  | 5260 | 0.01  | 0.000 | 1.112 | 0.000        | 1.55* |   |
| IEEE 802.11a                                                                                                            | BACK-0MM  | 52  | 5260 | 0.10  | 0.065 | 1.112 | 0.072        | 1.55* |   |
| IEEE 802.11a                                                                                                            | FRONT-0MM | 140 | 5700 | 0.00  | 0.002 | 1.012 | 0.002        | 1.55* |   |
| IEEE 802.11a                                                                                                            | BACK-0MM  | 140 | 5700 | 0.05  | 0.035 | 1.012 | 0.035        | 1.55* |   |
| IEEE 802.11a                                                                                                            | FRONT-0MM | 161 | 5805 | -0.10 | 0.097 | 1.227 | 0.119        | 1.55* |   |
| IEEE 802.11a                                                                                                            | BACK-0MM  | 161 | 5805 | 0.10  | 0.431 | 1.227 | <b>0.529</b> | 1.55* | 6 |
| Overall maximum SAR value [W/kg (1g)]                                                                                   |           |     |      |       |       |       | <b>0.529</b> | 1.55* |   |
| Comments: * See section 1.6 multi-transmitter operation modes<br>**tune up tolerance / conducted power = scaling factor |           |     |      |       |       |       |              |       |   |

SAR measurements were started with the highest power channel of the transmission band under investigation. Other measurement channels were omitted when the SAR value of the highest power channel was below 0.8 W/kg according to KDB 248227 v01r02.

According to KDB 865664 D02 v01r01 only the SAR plots for the highest SAR results for each EUT configuration and operating condition are given in the "SAR Results" part of the report.