

## TEST REPORT

Test Report No.: 1-5566/17-01-02-A

BNetzA-CAB-02/21-102

### Testing Laboratory

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### Test Standards

IEEE 1528-2013 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques  
RSS-102 Issue 5 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

For further applied test standards please refer to section 3 of this test report.

### Test Item

|                                             |                                                                              |
|---------------------------------------------|------------------------------------------------------------------------------|
| Kind of test item:                          | Payment terminal                                                             |
| Device type:                                | portable device                                                              |
| Model name:                                 | <b>Move/5000 CL/4G/Wifi/BT / Move/3500 CL/4G/Wifi/BT</b>                     |
| S/N serial number:                          | 180317303201083402304887 180317303201094402300908 / 180317303201083402304879 |
| FCC-ID:                                     | XKB-M5000CL4GWIBT                                                            |
| IC:                                         | 2586D-M50CL4GWIBT                                                            |
| Product Marketing Name (PMN):               | Move/5000 & Move/3500                                                        |
| Hardware Version Identification No. (HVIN): | Move/5000 CL/4G/WiFi/BT / Move/3500 CL/4G/WiFi/BT                            |
| IMEI-Number:                                | 004401082440534 / 004401082441342                                            |
| Hardware status:                            | 01                                                                           |
| Software status:                            | OS VERSION : 040102 / APPLI VERSION : 009400                                 |
| Frequency:                                  | see technical details                                                        |
| Antenna:                                    | integrated 4 antennas                                                        |
| Battery option:                             | P/N: F12432566 3.6V / 2900mAh                                                |
| Module information:                         | Gemalto ELS81-US                                                             |
| Test sample status:                         | identical prototype                                                          |
| Exposure category:                          | general population / uncontrolled environment                                |

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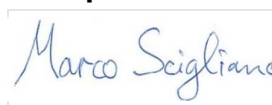
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## 1 Table of contents

|          |                                                                       |           |
|----------|-----------------------------------------------------------------------|-----------|
| <b>1</b> | <b>Table of contents.....</b>                                         | <b>2</b>  |
| <b>2</b> | <b>General information .....</b>                                      | <b>4</b>  |
| 2.1      | Notes and disclaimer .....                                            | 4         |
| 2.2      | Application details .....                                             | 4         |
| 2.3      | Statement of compliance .....                                         | 4         |
| 2.4      | Technical details .....                                               | 5         |
| 2.5      | Transmitter and Antenna Operating Configurations .....                | 5         |
| <b>3</b> | <b>Test standards/ procedures references .....</b>                    | <b>6</b>  |
| 3.1      | RF exposure limits .....                                              | 7         |
| <b>4</b> | <b>Summary of Measurement Results .....</b>                           | <b>8</b>  |
| 4.1      | SAR measurement variability and measurement uncertainty analysis..... | 8         |
| <b>5</b> | <b>Test Environment.....</b>                                          | <b>8</b>  |
| <b>6</b> | <b>Test Set-up.....</b>                                               | <b>9</b>  |
| 6.1      | Measurement system.....                                               | 9         |
| 6.1.1    | System Description.....                                               | 9         |
| 6.1.2    | Test environment.....                                                 | 10        |
| 6.1.3    | Probe description.....                                                | 10        |
| 6.1.4    | Phantom description.....                                              | 11        |
| 6.1.5    | Device holder description .....                                       | 12        |
| 6.1.6    | Scanning procedure .....                                              | 13        |
| 6.1.7    | Spatial Peak SAR Evaluation .....                                     | 14        |
| 6.1.8    | Data Storage and Evaluation.....                                      | 15        |
| 6.1.9    | Tissue simulating liquids: dielectric properties .....                | 17        |
| 6.1.10   | Tissue simulating liquids: parameters .....                           | 18        |
| 6.1.11   | Measurement uncertainty evaluation for SAR test .....                 | 19        |
| 6.1.12   | Measurement uncertainty evaluation for System Check .....             | 22        |
| 6.1.13   | System check .....                                                    | 23        |
| 6.1.14   | System check procedure .....                                          | 24        |
| 6.1.15   | System validation .....                                               | 25        |
| <b>7</b> | <b>Detailed Test Results .....</b>                                    | <b>26</b> |
| 7.1      | Conducted power measurements.....                                     | 26        |
| 7.1.1    | Conducted power measurements WCDMA FDD V (850 MHz).....               | 26        |
| 7.1.2    | Conducted power measurements WCDMA FDD IV (1700 MHz).....             | 27        |
| 7.1.3    | Conducted power measurements WCDMA FDD II (1900 MHz) .....            | 28        |
| 7.1.4    | Test-set-up information for WCDMA / HSPDA / HSUPA .....               | 29        |
| 7.1.5    | Conducted power measurements LTE FDD 2 1900 MHz .....                 | 33        |
| 7.1.6    | Conducted power measurements LTE FDD 4 1700 MHz .....                 | 36        |
| 7.1.7    | Conducted power measurements LTE FDD 5 850 MHz .....                  | 39        |
| 7.1.8    | Conducted power measurements LTE FDD 12 700 MHz .....                 | 41        |
| 7.1.9    | Justification of SAR measurements in LTE mode .....                   | 43        |
| 7.1.10   | MPR information in LTE mode .....                                     | 43        |
| 7.1.11   | Conducted power measurements WLAN 2450 MHz .....                      | 44        |
| 7.1.12   | Conducted power measurements WLAN 5 GHz.....                          | 45        |
| 7.1.1    | Conducted average power measurements Bluetooth 2.4 GHz .....          | 46        |
| 7.1.2    | Standalone SAR Test Exclusion according to FCC KDB 447498 D01 .....   | 47        |
| 7.1.3    | Standalone SAR Test Exclusion according to RSS-102 Issue 5 .....      | 47        |
| 7.2      | SAR test results.....                                                 | 48        |
| 7.2.1    | General description of test procedures .....                          | 48        |
| 7.2.2    | Results overview .....                                                | 49        |
| 7.2.3    | Multiple Transmitter Information .....                                | 57        |
| <b>8</b> | <b>Test equipment and ancillaries used for tests .....</b>            | <b>59</b> |
| <b>9</b> | <b>Observations .....</b>                                             | <b>59</b> |

|                   |                                       |           |
|-------------------|---------------------------------------|-----------|
| <b>Annex A:</b>   | <b>System performance check .....</b> | <b>60</b> |
| <b>Annex B:</b>   | <b>DASY5 measurement results.....</b> | <b>65</b> |
| <b>Annex B.1:</b> | <b>Liquid depth .....</b>             | <b>74</b> |
| <b>Annex C:</b>   | <b>Photo documentation .....</b>      | <b>77</b> |
| <b>Annex D:</b>   | <b>Calibration parameters.....</b>    | <b>77</b> |
| <b>Annex E:</b>   | <b>RSS-102 Annex A and B.....</b>     | <b>77</b> |
| <b>Annex F:</b>   | <b>Document History .....</b>         | <b>78</b> |
| <b>Annex G:</b>   | <b>Further Information .....</b>      | <b>78</b> |

## 2 General information

### 2.1 Notes and disclaimer

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### 2.2 Application details

|                                    |            |
|------------------------------------|------------|
| Date of receipt of order:          | 2018-01-18 |
| Date of receipt of test item:      | 2018-02-27 |
| Start of test:                     | 2018-03-01 |
| End of test:                       | 2018-03-15 |
| Person(s) present during the test: |            |

### 2.3 Statement of compliance

The SAR values found for the Move/5000 CL/4G/Wifi/BT / Move/3500 CL/4G/Wifi/BT Payment terminal are below the maximum recommended levels of 4 W/Kg as averaged over any 10 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1992, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure.

## 2.4 Technical details

| Band tested for this test report    | Technology  | Lowest transmit frequency/MHz | Highest transmit frequency/MHz | Lowest receive Frequency/MHz | Highest receive Frequency/MHz | Kind of modulation | Power Class | Tested power control level | Test channel low | Test channel middle | Test channel high | Maximum output power/dBm )* |
|-------------------------------------|-------------|-------------------------------|--------------------------------|------------------------------|-------------------------------|--------------------|-------------|----------------------------|------------------|---------------------|-------------------|-----------------------------|
| <input checked="" type="checkbox"/> | UMTS FDD II | 1852.4                        | 1907.6                         | 1932.4                       | 1987.6                        | QPSK               | 3           | max                        | 9262             | 9400                | 9538              | 23.0                        |
| <input checked="" type="checkbox"/> | UMTS FDD IV | 1712.4                        | 1752.6                         | 2112.4                       | 2152.6                        | QPSK               | 3           | max                        | 1312             | 1412                | 1513              | 22.8                        |
| <input checked="" type="checkbox"/> | UMTS FDD V  | 826.4                         | 846.6                          | 871.4                        | 891.6                         | QPSK               | 3           | max                        | 4132             | 4182                | 4233              | 23.4                        |
| <input checked="" type="checkbox"/> | LTE FDD 2   | 1850                          | 1910                           | 1930                         | 1990                          | QPSK               | 3           | max                        | 18700            | 18900               | 19100             | 22.3                        |
| <input checked="" type="checkbox"/> | LTE FDD 4   | 1710                          | 1755                           | 2110                         | 2155                          | QPSK               | 3           | max                        | 20050            | 20175               | 20300             | 22.9                        |
| <input checked="" type="checkbox"/> | LTE FDD 5   | 824                           | 849                            | 869                          | 894                           | QPSK               | 3           | max                        | 20450            | 20525               | 20600             | 23.3                        |
| <input checked="" type="checkbox"/> | LTE FDD 12  | 704                           | 711                            | 734                          | 741                           | QPSK               | 3           | max                        | 23060            | 23095               | 23130             | 23.4                        |
| <input checked="" type="checkbox"/> | WLAN        | 2412                          | 2462                           | 2412                         | 2462                          | CCK<br>OFDM        | --          | max                        | 1                | 6                   | 11                | 6.0                         |
| <input type="checkbox"/>            | WLAN        | 5180                          | 5240                           | 5180                         | 5240                          | OFDM               | --          | max                        | --               | --                  | --                | 0.3                         |
| <input type="checkbox"/>            | WLAN        | 5260                          | 5320                           | 5260                         | 5320                          | OFDM               | --          | max                        | --               | --                  | --                | 1.7                         |
| <input type="checkbox"/>            | WLAN        | 5500                          | 5700                           | 5500                         | 5700                          | OFDM               | --          | max                        | --               | --                  | --                | 2.7                         |
| <input type="checkbox"/>            | WLAN        | 5745                          | 5825                           | 5745                         | 5825                          | OFDM               | --          | max                        | --               | --                  | --                | 3.2                         |
| <input checked="" type="checkbox"/> | BT          | 2402                          | 2480                           | 2402                         | 2480                          | GFSK               | 3           | max                        | 0                | 39                  | 78                | 15.4                        |

)\*: measured averaged max. RMS power for UMTS, LTE, WLAN and BT.

LTE: Cat 4 / max. Data Rate DL / UL: 150 / 50 Mbps

## 2.5 Transmitter and Antenna Operating Configurations

| Simultaneous transmission conditions        |
|---------------------------------------------|
| GSM / GPRS / EDGE / UMTS + BT + WLAN 2.4GHz |
| GSM / GPRS / EDGE / UMTS + BT + WLAN 5GHz   |

Table 1: Simultaneous transmission conditions

### 3 Test standards/ procedures references

| Test Standard              | Version          | Test Standard Description                                                                                                                                                                                                                                                                                                          |
|----------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE 1528-2013             | 2013-06          | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques                                                                                                                                                        |
| RSS-102 Issue 5            | 2015-03          | Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)                                                                                                                                                                                                                                          |
| Canada's Safety Code No. 6 | 2015-06          | Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz                                                                                                                                                                                                                     |
| IEEE Std. C95-3            | 2002             | IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave                                                                                                                                                                                                                   |
| IEEE Std. C95-1            | 2005             | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.                                                                                                                                                                                                        |
| IEC 62209-2                | 2010             | Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices. Human models, instrumentation, and procedures. Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz) |
| FCC KDBs:                  |                  |                                                                                                                                                                                                                                                                                                                                    |
| KDB 865664D01v01           | August 7, 2015   | FCC OET SAR measurement requirements 100 MHz to 6 GHz                                                                                                                                                                                                                                                                              |
| KDB 865664D02v01           | October 23, 2015 | RF Exposure Compliance Reporting and Documentation Considerations                                                                                                                                                                                                                                                                  |
| KDB 447498D01v06           | October 23, 2015 | Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies                                                                                                                                                                                                                                            |
| KDB 648474D04v01           | October 23, 2015 | SAR Evaluation Considerations for Wireless Handsets                                                                                                                                                                                                                                                                                |
| KDB 941225D01v03           | October 23, 2015 | SAR Measurements Procedures for 3G Devices                                                                                                                                                                                                                                                                                         |
| KDB 941225D05v02           | October 23, 2015 | SAR for LTE Devices                                                                                                                                                                                                                                                                                                                |
| KDB 941225D05Av01          | October 23, 2015 | LTE Rel. 10 KDB Inquiry Sheet                                                                                                                                                                                                                                                                                                      |
| KDB 941225D06v02           | October 23, 2015 | SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities                                                                                                                                                                                                                                                   |
| KDB 248227D01v02           | October 23, 2015 | SAR Measurement Procedures for 802.11 a/b/g Transmitters                                                                                                                                                                                                                                                                           |

### 3.1 RF exposure limits

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

Table 2: RF exposure limits

The limit applied in this test report is shown in bold letters

Notes:

\* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

\*\* The Spatial Average value of the SAR averaged over the whole body.

\*\*\* The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

## 4 Summary of Measurement Results

|                                       |                                                             |       |
|---------------------------------------|-------------------------------------------------------------|-------|
| <input checked="" type="checkbox"/>   | No deviations from the technical specifications ascertained |       |
| <input type="checkbox"/>              | Deviations from the technical specifications ascertained    |       |
| Maximum SAR value (W/kg)              |                                                             |       |
|                                       | reported                                                    | limit |
| extremity 0 mm distance for 10g       | 2.813                                                       | 4.0   |
| collocated situations ΣSAR evaluation | 3.063                                                       | 4.0   |

### 4.1 SAR measurement variability and measurement uncertainty analysis

This analysis is required for worst case results larger than 2.0 W/kg for 10g.

| frequency band   | highest original measurement result at worst case position (W/kg) | repeated measurement result at worst case position (W/kg) | ratio <1.2 |
|------------------|-------------------------------------------------------------------|-----------------------------------------------------------|------------|
| UMTS FDD II 1900 | 2.340                                                             | 2.060                                                     | 1.14       |
| LTE FDD 2 1900   | 2.010                                                             | 2.080                                                     | 1.03       |
| UMTS FDD VI 1750 | 2.360                                                             | 2.480                                                     | 1.05       |
| LTE FDD 4 1750   | 2.260                                                             | 2.220                                                     | 1.02       |

## 5 Test Environment

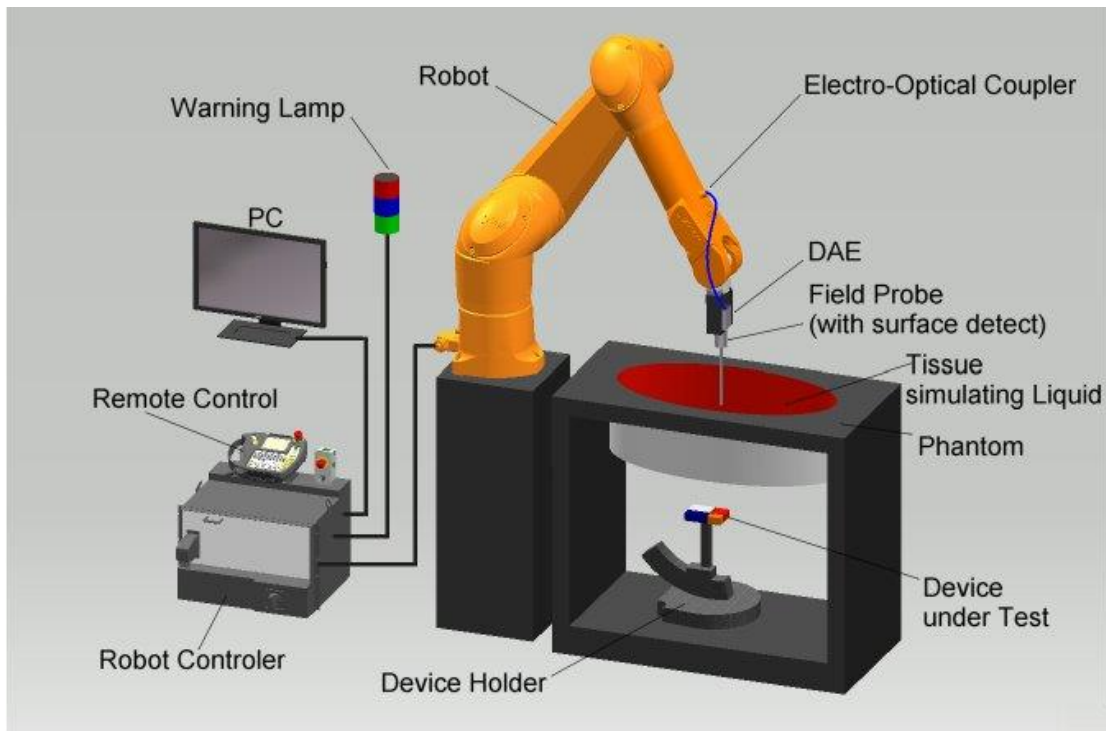
|                            |                                       |
|----------------------------|---------------------------------------|
| Ambient temperature:       | 20 – 24 °C                            |
| Tissue Simulating liquid:  | 20 – 24 °C                            |
| Relative humidity content: | 40 – 50 %                             |
| Air pressure:              | not relevant for this kind of testing |
| Power supply:              | 230 V / 50 Hz                         |

Exact temperature values for each test are shown in the table(s) under 7.1 and/or on the measurement plots.

## 6 Test Set-up

### 6.1 Measurement system

#### 6.1.1 System Description



- The DAS system for performing compliance tests consists of the following items:
- A standard high precision 6-axis robot (Stäubli RX/TX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid.
- A data acquisition electronic (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.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DAS measurement server.
- The DAS measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 7.
- DAS software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The triple flat and eli phantom for the testing of handheld and body-mounted wireless devices.
- The device holder for handheld mobile phones and mounting device adaptor for laptops
- Tissue simulating liquid mixed according to the given recipes.
- System check dipoles allowing to validate the proper functioning of the system.

### 6.1.2 Test environment

The DASY measurement system is placed in a laboratory room within an environment which avoids influence on SAR measurements by ambient electromagnetic fields and any reflection from the environment. The pictures at the beginning of the photo documentation show a complete view of the test environment. The system allows the measurement of SAR values larger than 0.005 mW/g.

### 6.1.3 Probe description

| <b>Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements</b> |                                                                                                                                                                                              |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Technical data according to manufacturer information              |                                                                                                                                                                                              |
| Construction                                                      | Symmetrical design with triangular core<br>Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol) |
| Calibration                                                       | Calibration certificate in Appendix D                                                                                                                                                        |
| Frequency                                                         | 10 MHz to 3 GHz (dosimetry); Linearity: $\pm 0.2$ dB (30 MHz to 3 GHz)                                                                                                                       |
| Directivity                                                       | $\pm 0.2$ dB in HSL (rotation around probe axis)<br>$\pm 0.3$ dB in HSL (rotation normal to probe axis)                                                                                      |
| Dynamic range                                                     | 5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB                                                                                                                                           |
| Dimensions                                                        | Overall length: 330 mm<br>Tip length: 20 mm<br>Body diameter: 12 mm<br>Tip diameter: 3.9 mm<br>Distance from probe tip to dipole centers: 2.0 mm                                             |
| Application                                                       | General dosimetry up to 3 GHz<br>Compliance tests of mobile phones<br>Fast automatic scanning in arbitrary phantoms (ES3DV3)                                                                 |

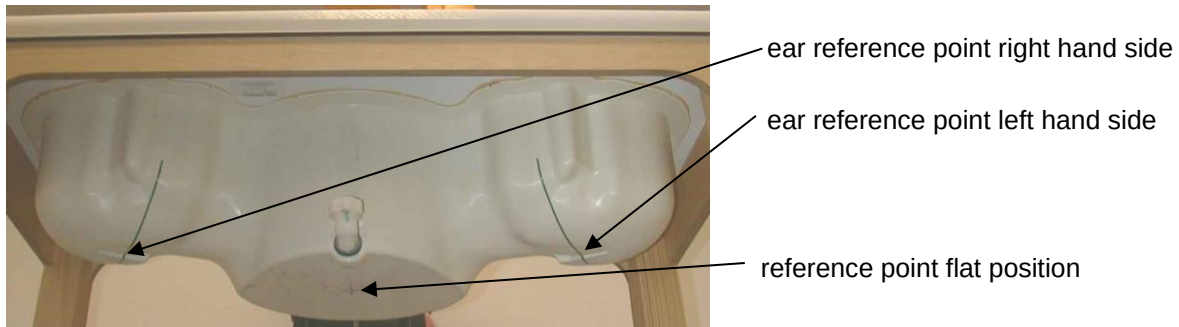
  

| <b>Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements</b> |                                                                                                                                                                                                            |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Technical data according to manufacturer information              |                                                                                                                                                                                                            |
| Construction                                                      | Symmetrical design with triangular core<br>Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE)                         |
| Calibration                                                       | ISO/IEC 17025 calibration service available.                                                                                                                                                               |
| Frequency                                                         | 10 MHz to >6 GHz (dosimetry); Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)                                                                                                                                    |
| Directivity                                                       | $\pm 0.3$ dB in HSL (rotation around probe axis)<br>$\pm 0.5$ dB in tissue material (rotation normal to probe axis)                                                                                        |
| Dynamic range                                                     | 10 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB (noise: typically <1 $\mu$ W/g)                                                                                                                        |
| Dimensions                                                        | Overall length: 337 mm (Tip: 20mm)<br>Tip length: 2.5 mm (Body: 12mm)<br>Typical distance from probe tip to dipole centers: 1mm                                                                            |
| Application                                                       | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |

#### 6.1.4 Phantom description

The used SAM Phantom meets the requirements specified in FCC KDB865664 D01 for Specific Absorption Rate (SAR) measurements.

The phantom consists of a fibreglass shell integrated in a wooden table. It allows left-hand and right-hand head as well as body-worn measurements with a maximum liquid depth of 18 cm in head position and 22 cm in planar position (body measurements). The thickness of the Phantom shell is 2 mm +/- 0.1 mm.



Triple Modular Phantom consists of three identical modules which can be installed and removed separately without emptying the liquid. It includes three reference points for phantom installation. Covers prevent evaporation of the liquid. Phantom material is resistant to DGBE based tissue simulating liquids.

### 6.1.5 Device holder description

The DASY device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.



Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.

Therefore those devices are normally only tested at the flat part of the SAM.

### 6.1.6 Scanning procedure

- The DASY installation includes predefined files with recommended procedures for measurements and system check. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.
- The „reference“ and „drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. +/- 5 %.
- The highest integrated SAR value is the main concern in compliance test applications. These values can mostly be found at the inner surface of the phantom and cannot be measured directly due to the sensor offset in the probe. To extrapolate the surface values, the measurement distances to the surface must be known accurately. A distance error of 0.5mm could produce SAR errors of 6% at 1800 MHz. Using predefined locations for measurements is not accurate enough. Any shift of the phantom (e.g., slight deformations after filling it with liquid) would produce high uncertainties. For an automatic and accurate detection of the phantom surface, the DASY5 system uses the mechanical surface detection. The detection is always at touch, but the probe will move backward from the surface the indicated distance before starting the measurement.
- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The scan uses different grid spacings for different frequency measurements. Standard grid spacing for head measurements in frequency ranges  $\leq 2$  GHz is 15 mm in x- and y-dimension. For higher frequencies a finer resolution is needed, thus for the grid spacing is reduced according the following table:

| Area scan grid spacing for different frequency ranges |              |
|-------------------------------------------------------|--------------|
| Frequency range                                       | Grid spacing |
| $\leq 2$ GHz                                          | $\leq 15$ mm |
| 2 – 4 GHz                                             | $\leq 12$ mm |
| 4 – 6 GHz                                             | $\leq 10$ mm |

Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in annex B.

- A „zoom scan“ measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. It uses a fine meshed grid where the robot moves the probe in steps along all the 3 axis (x, y and z-axis) starting at the bottom of the Phantom. The grid spacing for the cube measurement is varied according to the measured frequency range, the dimensions are given in the following table:

| Zoom scan grid spacing and volume for different frequency ranges |                            |                         |                          |
|------------------------------------------------------------------|----------------------------|-------------------------|--------------------------|
| Frequency range                                                  | Grid spacing for x, y axis | Grid spacing for z axis | Minimum zoom scan volume |
| $\leq 2$ GHz                                                     | $\leq 8$ mm                | $\leq 5$ mm             | $\geq 30$ mm             |
| 2 – 3 GHz                                                        | $\leq 5$ mm*               | $\leq 5$ mm             | $\geq 28$ mm             |
| 3 – 4 GHz                                                        | $\leq 5$ mm*               | $\leq 4$ mm             | $\geq 28$ mm             |
| 4 – 5 GHz                                                        | $\leq 4$ mm*               | $\leq 3$ mm             | $\geq 25$ mm             |
| 5 – 6 GHz                                                        | $\leq 4$ mm*               | $\leq 2$ mm             | $\geq 22$ mm             |

\* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is  $\leq 1.4$  W/kg,  $\leq 8$  mm,  $\leq 7$  mm and  $\leq 5$  mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

DASY is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in annex B. Test results relevant for the specified standard (see section 3) are shown in table form in section 7.

### 6.1.7 Spatial Peak SAR Evaluation

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of all points in the three directions x, y and z. The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 1 to 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting 'Graph Evaluated'.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

#### Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

#### Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff ].

#### Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

#### Advanced Extrapolation

DASY uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

## 6.1.8 Data Storage and Evaluation

### Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4", ".DA5x". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

|                    |                           |                                         |
|--------------------|---------------------------|-----------------------------------------|
| Probe parameters:  | - Sensitivity             | $\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$ |
|                    | - Conversion factor       | $\text{ConvF}_i$                        |
|                    | - Diode compression point | $\text{Dcpi}$                           |
| Device parameters: | - Frequency               | $f$                                     |
|                    | - Crest factor            | $cf$                                    |
| Media parameters:  | - Conductivity            | $\sigma$                                |
|                    | - Density                 | $\rho$                                  |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

with  $V_i$  = compensated signal of channel i (i = x, y, z)  
 $U_i$  = input signal of channel i (i = x, y, z)  
 cf = crest factor of exciting field (DASY parameter)  
 $dcp_i$  = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:  $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes:  $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2)/f$

with  $V_i$  = compensated signal of channel i (i = x, y, z)  
 $Norm_i$  = sensor sensitivity of channel i (i = x, y, z)  
 [mV/(V/m)<sup>2</sup>] for E-field Probes  
 $ConvF$  = sensitivity enhancement in solution  
 $a_{ij}$  = sensor sensitivity factors for H-field probes  
 f = carrier frequency [GHz]  
 $E_i$  = electric field strength of channel i in V/m  
 $H_i$  = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

with SAR = local specific absorption rate in mW/g  
 $E_{tot}$  = total field strength in V/m  
 $\sigma$  = conductivity in [mho/m] or [Siemens/m]  
 $\rho$  = equivalent tissue density in g/cm<sup>3</sup>

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with  $P_{pwe}$  = equivalent power density of a plane wave in mW/cm<sup>2</sup>  
 $E_{tot}$  = total electric field strength in V/m  
 $H_{tot}$  = total magnetic field strength in A/m

### 6.1.9 Tissue simulating liquids: dielectric properties

The following materials are used for producing the tissue-equivalent materials.

(Liquids used for tests described in section 7. are marked with ☒):

| Ingredients<br>(% of weight) | Frequency (MHz)              |                                         |                                         |                              |                               |                                          |                                          |                                          |                               |
|------------------------------|------------------------------|-----------------------------------------|-----------------------------------------|------------------------------|-------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|-------------------------------|
|                              | <input type="checkbox"/> 450 | <input checked="" type="checkbox"/> 750 | <input checked="" type="checkbox"/> 835 | <input type="checkbox"/> 900 | <input type="checkbox"/> 1450 | <input checked="" type="checkbox"/> 1750 | <input checked="" type="checkbox"/> 1900 | <input checked="" type="checkbox"/> 2450 | <input type="checkbox"/> 5000 |
| frequency band               |                              |                                         |                                         |                              |                               |                                          |                                          |                                          |                               |
| Water                        | 51.16                        | 51.7                                    | 52.4                                    | 56.0                         | 71.40                         | 71.45                                    | 71.56                                    | 71.65                                    | 64 - 78                       |
| Salt (NaCl)                  | 1.49                         | 0.9                                     | 1.40                                    | 0.76                         | 0.55                          | 0.5                                      | 0.39                                     | 0.3                                      | 2 - 3                         |
| Sugar                        | 46.78                        | 47.2                                    | 45.0                                    | 41.76                        | 0.0                           | 0.0                                      | 0.0                                      | 0.0                                      | 0.0                           |
| HEC                          | 0.52                         | 0.0                                     | 1.0                                     | 1.21                         | 0.0                           | 0.0                                      | 0.0                                      | 0.0                                      | 0.0                           |
| Bactericide                  | 0.05                         | 0.1                                     | 0.1                                     | 0.27                         | 0.1                           | 0.1                                      | 0.1                                      | 0.1                                      | 0.0                           |
| Tween 20                     | 0.0                          | 0.0                                     | 0.0                                     | 0.0                          | 27.95                         | 27.95                                    | 27.95                                    | 27.95                                    | 0.0                           |
| Emulsifiers                  | 0.0                          | 0.0                                     | 0.0                                     | 0.0                          | 0.0                           | 0.0                                      | 0.0                                      | 0.0                                      | 9 - 15                        |
| Mineral Oil                  | 0.0                          | 0.0                                     | 0.0                                     | 0.0                          | 0.0                           | 0.0                                      | 0.0                                      | 0.0                                      | 11 - 18                       |

Table 3: Body tissue dielectric properties

Salt: 99+% Pure Sodium Chloride

Water: De-ionized, 16MΩ+ resistivity

Sugar: 98+% Pure Sucrose

HEC: Hydroxyethyl Cellulose

Tween 20: Polyoxyethylene (20) sorbitan monolaurate

### 6.1.10 Tissue simulating liquids: parameters

| Liquid MSL | Freq. (MHz) | Target body tissue |                    | Measurement <b>body</b> tissue |       |              |       |       | Measurement date |
|------------|-------------|--------------------|--------------------|--------------------------------|-------|--------------|-------|-------|------------------|
|            |             | Permittivity       | Conductivity (S/m) | Permittivity                   | Dev.  | Conductivity |       | Dev.  |                  |
|            |             |                    |                    |                                |       | $\epsilon''$ | (S/m) |       |                  |
| 750        | 704         | 55.71              | 0.96               | 55.5                           | -0.3% | 23.35        | 0.91  | -4.7% | 2018-03-02       |
|            | 707         | 55.70              | 0.96               | 55.5                           | -0.3% | 23.31        | 0.92  | -4.5% |                  |
|            | 711         | 55.68              | 0.96               | 55.5                           | -0.3% | 23.31        | 0.92  | -4.0% |                  |
|            | 750         | 55.53              | 0.96               | 55.1                           | -0.8% | 22.99        | 0.96  | -0.4% |                  |
| 850/900    | 826         | 55.24              | 0.97               | 55.1                           | -0.3% | 21.32        | 0.98  | 1.1%  | 2018-03-15       |
|            | 829         | 55.22              | 0.97               | 55.0                           | -0.4% | 21.35        | 0.98  | 1.5%  |                  |
|            | 835         | 55.20              | 0.97               | 54.9                           | -0.5% | 21.34        | 0.99  | 2.2%  |                  |
|            | 837         | 55.19              | 0.97               | 54.9                           | -0.5% | 21.33        | 0.99  | 2.1%  |                  |
|            | 844         | 55.17              | 0.98               | 54.8                           | -0.7% | 21.30        | 1.00  | 1.9%  |                  |
|            | 847         | 55.16              | 0.98               | 54.8                           | -0.7% | 21.27        | 1.00  | 1.8%  |                  |
| 1750       | 1712        | 53.53              | 1.46               | 52.8                           | -1.3% | 15.46        | 1.47  | 0.5%  | 2018-03-09       |
|            | 1720        | 53.51              | 1.47               | 52.8                           | -1.3% | 15.46        | 1.48  | 0.7%  |                  |
|            | 1732        | 53.48              | 1.48               | 52.8                           | -1.3% | 15.46        | 1.49  | 0.8%  |                  |
|            | 1745        | 53.44              | 1.49               | 52.8                           | -1.3% | 15.51        | 1.51  | 1.4%  |                  |
|            | 1750        | 53.43              | 1.49               | 52.8                           | -1.3% | 15.52        | 1.51  | 1.5%  |                  |
|            | 1752        | 53.43              | 1.49               | 52.8                           | -1.3% | 15.53        | 1.51  | 1.6%  |                  |
| 1900       | 1852        | 53.30              | 1.52               | 51.9                           | -2.6% | 14.28        | 1.47  | -3.2% | 2018-03-13       |
|            | 1860        | 53.30              | 1.52               | 51.9                           | -2.7% | 14.26        | 1.48  | -2.9% |                  |
|            | 1880        | 53.30              | 1.52               | 51.9                           | -2.7% | 14.26        | 1.49  | -1.9% |                  |
|            | 1900        | 53.30              | 1.52               | 51.7                           | -2.9% | 14.36        | 1.52  | -0.2% |                  |
|            | 1908        | 53.30              | 1.52               | 51.7                           | -3.1% | 14.30        | 1.52  | -0.2% |                  |
| 2450       | 2402        | 52.76              | 1.90               | 50.9                           | -3.5% | 14.51        | 1.94  | 1.8%  | 2018-03-14       |
|            | 2412        | 52.75              | 1.91               | 50.9                           | -3.5% | 14.54        | 1.95  | 1.9%  |                  |
|            | 2437        | 52.72              | 1.94               | 50.7                           | -3.8% | 14.55        | 1.97  | 1.8%  |                  |
|            | 2441        | 52.71              | 1.94               | 50.7                           | -3.9% | 14.55        | 1.98  | 1.8%  |                  |
|            | 2450        | 52.70              | 1.95               | 50.7                           | -3.9% | 14.58        | 1.99  | 1.9%  |                  |
|            | 2462        | 52.68              | 1.97               | 50.6                           | -4.0% | 14.65        | 2.01  | 2.0%  |                  |
|            | 2480        | 52.66              | 1.99               | 50.5                           | -4.0% | 14.70        | 2.03  | 1.8%  |                  |

Table 4: Parameter of the body tissue simulating liquid

Note: The dielectric properties have been measured using the contact probe method at 22°C.

### 6.1.11 Measurement uncertainty evaluation for SAR test

| DASY5 Uncertainty Budget                                                  |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
|---------------------------------------------------------------------------|-------------------|-----|---|--------------------------|---------|------------------------|-------------------------|----------------------|------------|----------------------------------------------------|
| According to IEEE 1528/2003 and IEC 62209-1 for the 300 MHz - 3 GHz range |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Source of uncertainty                                                     | Uncertainty Value |     |   | Probability Distribution | Divisor | c <sub>i</sub><br>(1g) | c <sub>i</sub><br>(10g) | Standard Uncertainty |            | v <sub>i</sub> <sup>2</sup> or<br>v <sub>eff</sub> |
|                                                                           | ±                 | %   |   |                          |         |                        |                         | ± %, (1g)            | ± %, (10g) |                                                    |
| Measurement System                                                        |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Probe calibration                                                         | ±                 | 6.0 | % | Normal                   | 1       | 1                      | 1                       | ± 6.0 %              | ± 6.0 %    | ∞                                                  |
| Axial isotropy                                                            | ±                 | 4.7 | % | Rectangular              | √ 3     | 0.7                    | 0.7                     | ± 1.9 %              | ± 1.9 %    | ∞                                                  |
| Hemispherical isotropy                                                    | ±                 | 9.6 | % | Rectangular              | √ 3     | 0.7                    | 0.7                     | ± 3.9 %              | ± 3.9 %    | ∞                                                  |
| Boundary effects                                                          | ±                 | 1.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.6 %              | ± 0.6 %    | ∞                                                  |
| Probe linearity                                                           | ±                 | 4.7 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 2.7 %              | ± 2.7 %    | ∞                                                  |
| System detection limits                                                   | ±                 | 1.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.6 %              | ± 0.6 %    | ∞                                                  |
| Readout electronics                                                       | ±                 | 0.3 | % | Normal                   | 1       | 1                      | 1                       | ± 0.3 %              | ± 0.3 %    | ∞                                                  |
| Response time                                                             | ±                 | 0.8 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.5 %              | ± 0.5 %    | ∞                                                  |
| Integration time                                                          | ±                 | 2.6 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.5 %              | ± 1.5 %    | ∞                                                  |
| RF ambient noise                                                          | ±                 | 3.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.7 %              | ± 1.7 %    | ∞                                                  |
| RF ambient reflections                                                    | ±                 | 3.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.7 %              | ± 1.7 %    | ∞                                                  |
| Probe positioner                                                          | ±                 | 0.4 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.2 %              | ± 0.2 %    | ∞                                                  |
| Probe positioning                                                         | ±                 | 2.9 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.7 %              | ± 1.7 %    | ∞                                                  |
| Max.SAR evaluation                                                        | ±                 | 1.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.6 %              | ± 0.6 %    | ∞                                                  |
| Test Sample Related                                                       |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Device positioning                                                        | ±                 | 2.9 | % | Normal                   | 1       | 1                      | 1                       | ± 2.9 %              | ± 2.9 %    | 145                                                |
| Device holder uncertainty                                                 | ±                 | 3.6 | % | Normal                   | 1       | 1                      | 1                       | ± 3.6 %              | ± 3.6 %    | 5                                                  |
| Power drift                                                               | ±                 | 5.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 2.9 %              | ± 2.9 %    | ∞                                                  |
| Phantom and Set-up                                                        |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Phantom uncertainty                                                       | ±                 | 4.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 2.3 %              | ± 2.3 %    | ∞                                                  |
| Liquid conductivity (target)                                              | ±                 | 5.0 | % | Rectangular              | √ 3     | 0.64                   | 0.43                    | ± 1.8 %              | ± 1.2 %    | ∞                                                  |
| Liquid conductivity (meas.)                                               | ±                 | 5.0 | % | Rectangular              | √ 3     | 0.64                   | 0.43                    | ± 1.8 %              | ± 1.2 %    | ∞                                                  |
| Liquid permittivity (target)                                              | ±                 | 5.0 | % | Rectangular              | √ 3     | 0.6                    | 0.49                    | ± 1.7 %              | ± 1.4 %    | ∞                                                  |
| Liquid permittivity (meas.)                                               | ±                 | 5.0 | % | Rectangular              | √ 3     | 0.6                    | 0.49                    | ± 1.7 %              | ± 1.4 %    | ∞                                                  |
| Combined Std.                                                             |                   |     |   |                          |         |                        |                         | ± 11.1 %             | ± 10.8 %   | 387                                                |
| Expanded Std.                                                             |                   |     |   |                          |         |                        |                         | ± 22.1 %             | ± 21.6 %   |                                                    |

Table 5: Measurement uncertainties

Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528/2003.

The budget is valid for 2G and 3G communication signals and frequency range 300MHz - 3 GHz. For these conditions it represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

| Relative DASY5 Uncertainty Budget for SAR Tests                        |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
|------------------------------------------------------------------------|-------------------|-----|---|--------------------------|---------|------------------------|-------------------------|----------------------|------------|----------------------------------------------------|
| According to IEEE 1528/2013 and IEC62209/2011 for the 0.3 - 3GHz range |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Error Description                                                      | Uncertainty Value |     |   | Probability Distribution | Divisor | c <sub>i</sub><br>(1g) | c <sub>i</sub><br>(10g) | Standard Uncertainty |            | v <sub>i</sub> <sup>2</sup> or<br>v <sub>eff</sub> |
|                                                                        | ±                 | %   |   |                          |         |                        |                         | ± %, (1g)            | ± %, (10g) |                                                    |
| Measurement System                                                     |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Probe calibration                                                      | ±                 | 6.0 | % | Normal                   | 1       | 1                      | 1                       | ± 6.0 %              | ± 6.0 %    | ∞                                                  |
| Axial isotropy                                                         | ±                 | 4.7 | % | Rectangular              | √ 3     | 0.7                    | 0.7                     | ± 1.9 %              | ± 1.9 %    | ∞                                                  |
| Hemispherical isotropy                                                 | ±                 | 9.6 | % | Rectangular              | √ 3     | 0.7                    | 0.7                     | ± 3.9 %              | ± 3.9 %    | ∞                                                  |
| Boundary effects                                                       | ±                 | 1.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.6 %              | ± 0.6 %    | ∞                                                  |
| Probe linearity                                                        | ±                 | 4.7 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 2.7 %              | ± 2.7 %    | ∞                                                  |
| System detection limits                                                | ±                 | 1.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.6 %              | ± 0.6 %    | ∞                                                  |
| Modulation Response                                                    | ±                 | 2.4 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.4 %              | ± 1.4 %    | ∞                                                  |
| Readout electronics                                                    | ±                 | 0.3 | % | Normal                   | 1       | 1                      | 1                       | ± 0.3 %              | ± 0.3 %    | ∞                                                  |
| Response time                                                          | ±                 | 0.8 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.5 %              | ± 0.5 %    | ∞                                                  |
| Integration time                                                       | ±                 | 2.6 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.5 %              | ± 1.5 %    | ∞                                                  |
| RF ambient noise                                                       | ±                 | 3.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.7 %              | ± 1.7 %    | ∞                                                  |
| RF ambient reflections                                                 | ±                 | 3.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.7 %              | ± 1.7 %    | ∞                                                  |
| Probe positioner                                                       | ±                 | 0.4 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 0.2 %              | ± 0.2 %    | ∞                                                  |
| Probe positioning                                                      | ±                 | 2.9 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.7 %              | ± 1.7 %    | ∞                                                  |
| Max. SAR evaluation                                                    | ±                 | 2.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 1.2 %              | ± 1.2 %    | ∞                                                  |
| Test Sample Related                                                    |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Device positioning                                                     | ±                 | 2.9 | % | Normal                   | 1       | 1                      | 1                       | ± 2.9 %              | ± 2.9 %    | 145                                                |
| Device holder uncertainty                                              | ±                 | 3.6 | % | Normal                   | 1       | 1                      | 1                       | ± 3.6 %              | ± 3.6 %    | 5                                                  |
| Power drift                                                            | ±                 | 5.0 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 2.9 %              | ± 2.9 %    | ∞                                                  |
| Phantom and Set-up                                                     |                   |     |   |                          |         |                        |                         |                      |            |                                                    |
| Phantom uncertainty                                                    | ±                 | 6.1 | % | Rectangular              | √ 3     | 1                      | 1                       | ± 3.5 %              | ± 3.5 %    | ∞                                                  |
| SAR correction                                                         | ±                 | 1.9 | % | Rectangular              | √ 3     | 1                      | 0.84                    | ± 1.1 %              | ± 0.9 %    | ∞                                                  |
| Liquid conductivity (meas.)                                            | ±                 | 5.0 | % | Rectangular              | √ 3     | 0.78                   | 0.71                    | ± 2.3 %              | ± 2.0 %    | ∞                                                  |
| Liquid permittivity (meas.)                                            | ±                 | 5.0 | % | Rectangular              | √ 3     | 0.26                   | 0.26                    | ± 0.8 %              | ± 0.8 %    | ∞                                                  |
| Temp. Unc. - Conductivity                                              | ±                 | 3.4 | % | Rectangular              | √ 3     | 0.78                   | 0.71                    | ± 1.5 %              | ± 1.4 %    | ∞                                                  |
| Temp. Unc. - Permittivity                                              | ±                 | 0.4 | % | Rectangular              | √ 3     | 0.23                   | 0.26                    | ± 0.1 %              | ± 0.1 %    | ∞                                                  |
| Combined Uncertainty                                                   |                   |     |   |                          |         |                        |                         | ± 11.3 %             | ± 11.3 %   | 330                                                |
| Expanded Std. Uncertainty                                              |                   |     |   |                          |         |                        |                         | ± 22.7 %             | ± 22.5 %   |                                                    |

Table 6: Measurement uncertainties

Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528/2013 and IEC 62209-1/2011 standards. The budget is valid for the frequency range 300MHz -3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

| DASY5 Uncertainty Budget                                    |                   |  |                          |         |                |                |                      |            |                                                 |
|-------------------------------------------------------------|-------------------|--|--------------------------|---------|----------------|----------------|----------------------|------------|-------------------------------------------------|
| According to IEC 62209-2/2010 for the 300 MHz - 6 GHz range |                   |  |                          |         |                |                |                      |            |                                                 |
| Source of uncertainty                                       | Uncertainty Value |  | Probability Distribution | Divisor | c <sub>i</sub> | c <sub>i</sub> | Standard Uncertainty |            | v <sub>i</sub> <sup>2</sup> or v <sub>eff</sub> |
|                                                             |                   |  |                          |         | (1g)           | (10g)          | ± %, (1g)            | ± %, (10g) |                                                 |
| Measurement System                                          |                   |  |                          |         |                |                |                      |            |                                                 |
| Probe calibration                                           | ± 6.6 %           |  | Normal                   | 1       | 1              | 1              | ± 6.6 %              | ± 6.6 %    | ∞                                               |
| Axial isotropy                                              | ± 4.7 %           |  | Rectangular              | √ 3     | 0.7            | 0.7            | ± 1.9 %              | ± 1.9 %    | ∞                                               |
| Hemispherical isotropy                                      | ± 9.6 %           |  | Rectangular              | √ 3     | 0.7            | 0.7            | ± 3.9 %              | ± 3.9 %    | ∞                                               |
| Boundary effects                                            | ± 2.0 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 1.2 %              | ± 1.2 %    | ∞                                               |
| Probe linearity                                             | ± 4.7 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 2.7 %              | ± 2.7 %    | ∞                                               |
| System detection limits                                     | ± 1.0 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 0.6 %              | ± 0.6 %    | ∞                                               |
| Modulation Response                                         | ± 2.4 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 1.4 %              | ± 1.4 %    | ∞                                               |
| Readout electronics                                         | ± 0.3 %           |  | Normal                   | 1       | 1              | 1              | ± 0.3 %              | ± 0.3 %    | ∞                                               |
| Response time                                               | ± 0.8 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 0.5 %              | ± 0.5 %    | ∞                                               |
| Integration time                                            | ± 2.6 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 1.5 %              | ± 1.5 %    | ∞                                               |
| RF ambient noise                                            | ± 3.0 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 1.7 %              | ± 1.7 %    | ∞                                               |
| RF ambient reflections                                      | ± 3.0 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 1.7 %              | ± 1.7 %    | ∞                                               |
| Probe positioner                                            | ± 0.8 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 0.5 %              | ± 0.5 %    | ∞                                               |
| Probe positioning                                           | ± 6.7 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 3.9 %              | ± 3.9 %    | ∞                                               |
| Post-processing                                             | ± 4.0 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 2.3 %              | ± 2.3 %    | ∞                                               |
| Test Sample Related                                         |                   |  |                          |         |                |                |                      |            |                                                 |
| Device positioning                                          | ± 2.9 %           |  | Normal                   | 1       | 1              | 1              | ± 2.9 %              | ± 2.9 %    | 145                                             |
| Device holder uncertainty                                   | ± 3.6 %           |  | Normal                   | 1       | 1              | 1              | ± 3.6 %              | ± 3.6 %    | 5                                               |
| Power drift                                                 | ± 5.0 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 2.9 %              | ± 2.9 %    | ∞                                               |
| Phantom and Set-up                                          |                   |  |                          |         |                |                |                      |            |                                                 |
| Phantom uncertainty                                         | ± 7.9 %           |  | Rectangular              | √ 3     | 1              | 1              | ± 4.6 %              | ± 4.6 %    | ∞                                               |
| SAR correction                                              | ± 1.9 %           |  | Rectangular              | √ 3     | 1              | 0.84           | ± 1.1 %              | ± 0.9 %    | ∞                                               |
| Liquid conductivity (meas.)                                 | ± 5.0 %           |  | Rectangular              | √ 3     | 0.78           | 0.71           | ± 2.3 %              | ± 2.0 %    | ∞                                               |
| Liquid permittivity (meas.)                                 | ± 5.0 %           |  | Rectangular              | √ 3     | 0.26           | 0.26           | ± 0.8 %              | ± 0.8 %    | ∞                                               |
| Temp. Unc. - Conductivity                                   | ± 3.4 %           |  | Rectangular              | √ 3     | 0.78           | 0.71           | ± 1.5 %              | ± 1.4 %    | ∞                                               |
| Temp. Unc. - Permittivity                                   | ± 0.4 %           |  | Rectangular              | √ 3     | 0.23           | 0.26           | ± 0.1 %              | ± 0.1 %    | ∞                                               |
| Combined Uncertainty                                        |                   |  |                          |         |                |                | ± 12.7 %             | ± 12.6 %   | 330                                             |
| Expanded Std. Uncertainty                                   |                   |  |                          |         |                |                | ± 25.4 %             | ± 25.3 %   |                                                 |

Table 7: Measurement uncertainties.

Worst-Case uncertainty budget for DASY5 assessed according to IEC 62209-2/2010 standard. The budget is valid for the frequency range 300MHz - 6 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

### 6.1.12 Measurement uncertainty evaluation for System Check

| Uncertainty of a System Performance Check with DASY5 System<br>for the 0.3 - 3 GHz range |                      |                             |         |                |                |                      |            |                                                    |  |
|------------------------------------------------------------------------------------------|----------------------|-----------------------------|---------|----------------|----------------|----------------------|------------|----------------------------------------------------|--|
| Source of<br>uncertainty                                                                 | Uncertainty<br>Value | Probability<br>Distribution | Divisor | c <sub>i</sub> | c <sub>i</sub> | Standard Uncertainty |            | v <sub>i</sub> <sup>2</sup> or<br>v <sub>eff</sub> |  |
|                                                                                          |                      |                             |         | (1g)           | (10g)          | ± %, (1g)            | ± %, (10g) |                                                    |  |
| Measurement System                                                                       |                      |                             |         |                |                |                      |            |                                                    |  |
| Probe calibration                                                                        | ± 6.0 %              | Normal                      | 1       | 1              | 1              | ± 6.0 %              | ± 6.0 %    | ∞                                                  |  |
| Axial isotropy                                                                           | ± 4.7 %              | Rectangular                 | √ 3     | 0.7            | 0.7            | ± 1.9 %              | ± 1.9 %    | ∞                                                  |  |
| Hemispherical isotropy                                                                   | ± 0.0 %              | Rectangular                 | √ 3     | 0.7            | 0.7            | ± 0.0 %              | ± 0.0 %    | ∞                                                  |  |
| Boundary effects                                                                         | ± 1.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.6 %              | ± 0.6 %    | ∞                                                  |  |
| Probe linearity                                                                          | ± 4.7 %              | Rectangular                 | √ 3     | 1              | 1              | ± 2.7 %              | ± 2.7 %    | ∞                                                  |  |
| System detection limits                                                                  | ± 1.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.6 %              | ± 0.6 %    | ∞                                                  |  |
| Readout electronics                                                                      | ± 0.3 %              | Normal                      | 1       | 1              | 1              | ± 0.3 %              | ± 0.3 %    | ∞                                                  |  |
| Response time                                                                            | ± 0.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.0 %              | ± 0.0 %    | ∞                                                  |  |
| Integration time                                                                         | ± 0.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.0 %              | ± 0.0 %    | ∞                                                  |  |
| RF ambient conditions                                                                    | ± 3.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 1.7 %              | ± 1.7 %    | ∞                                                  |  |
| Probe positioner                                                                         | ± 0.4 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.2 %              | ± 0.2 %    | ∞                                                  |  |
| Probe positioning                                                                        | ± 2.9 %              | Rectangular                 | √ 3     | 1              | 1              | ± 1.7 %              | ± 1.7 %    | ∞                                                  |  |
| Max. SAR evaluation                                                                      | ± 1.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.6 %              | ± 0.6 %    | ∞                                                  |  |
| Test Sample Related                                                                      |                      |                             |         |                |                |                      |            |                                                    |  |
| Dev. of experimental dipole                                                              | ± 0.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 0.0 %              | ± 0.0 %    | ∞                                                  |  |
| Source to liquid distance                                                                | ± 2.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 1.2 %              | ± 1.2 %    | ∞                                                  |  |
| Power drift                                                                              | ± 3.4 %              | Rectangular                 | √ 3     | 1              | 1              | ± 2.0 %              | ± 2.0 %    | ∞                                                  |  |
| Phantom and Set-up                                                                       |                      |                             |         |                |                |                      |            |                                                    |  |
| Phantom uncertainty                                                                      | ± 4.0 %              | Rectangular                 | √ 3     | 1              | 1              | ± 2.3 %              | ± 2.3 %    | ∞                                                  |  |
| SAR correction                                                                           | ± 1.9 %              | Rectangular                 | √ 3     | 1              | 0.84           | ± 1.1 %              | ± 0.9 %    | ∞                                                  |  |
| Liquid conductivity (meas.)                                                              | ± 5.0 %              | Normal                      | 1       | 0.78           | 0.71           | ± 3.9 %              | ± 3.6 %    | ∞                                                  |  |
| Liquid permittivity (meas.)                                                              | ± 5.0 %              | Normal                      | 1       | 0.26           | 0.26           | ± 1.3 %              | ± 1.3 %    | ∞                                                  |  |
| Temp. unc. - Conductivity                                                                | ± 1.7 %              | Rectangular                 | √ 3     | 0.78           | 0.71           | ± 0.8 %              | ± 0.7 %    | ∞                                                  |  |
| Temp. unc. - Permittivity                                                                | ± 0.3 %              | Rectangular                 | √ 3     | 0.23           | 0.26           | ± 0.0 %              | ± 0.0 %    | ∞                                                  |  |
| Combined Uncertainty                                                                     |                      |                             |         |                |                | ± 9.1 %              | ± 8.9 %    | 330                                                |  |
| Expanded Std.<br>Uncertainty                                                             |                      |                             |         |                |                | ± 18.2 %             | ± 17.9 %   |                                                    |  |

Table 8: Measurement uncertainties of the System Check with DASY5 (0.3-3GHz)

Note: Worst case probe calibration uncertainty has been applied for all probes used during the measurements.

### 6.1.13 System check

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE 1528. The following table shows system check results for all frequency bands and tissue liquids used during the tests (plot(s) see annex A).

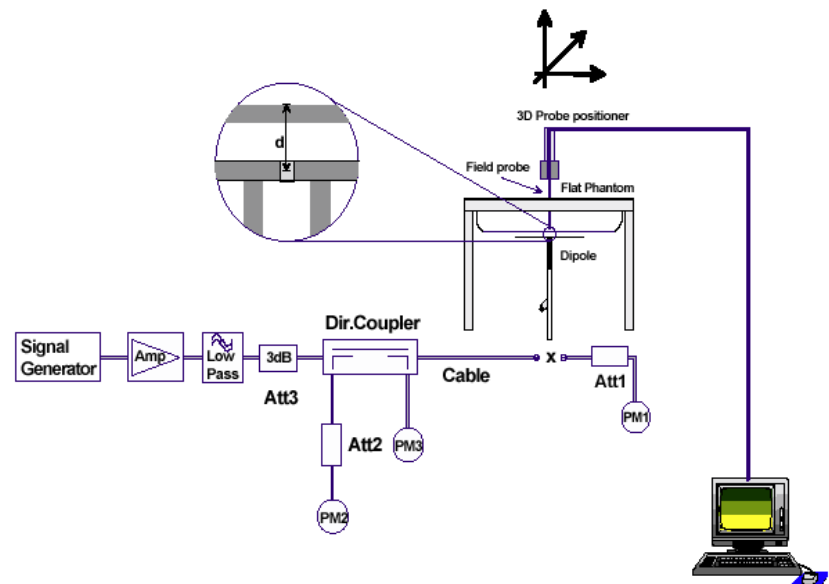
| System performance check (1000 mW) |                     |                 |                                          |                                           |                                   |                        |                                    |                         |               |
|------------------------------------|---------------------|-----------------|------------------------------------------|-------------------------------------------|-----------------------------------|------------------------|------------------------------------|-------------------------|---------------|
| System validation Kit              | Probe               | Frequency       | Target SAR <sub>1g</sub> /mW/g (+/- 10%) | Target SAR <sub>10g</sub> /mW/g (+/- 10%) | Measured SAR <sub>1g</sub> / mW/g | SAR <sub>1g</sub> dev. | Measured SAR <sub>10g</sub> / mW/g | SAR <sub>10g</sub> dev. | Measured date |
| D750V3<br>S/N: 1041                | ES3DV3<br>S/N: 3320 | 750 MHz<br>MSL  | 8.75                                     | 5.74                                      | 8.32                              | -4.9%                  | 5.56                               | -3.1%                   | 2018-03-02    |
| D835V2<br>S/N: 4d153               | ES3DV3<br>S/N: 3320 | 835 MHz<br>MSL  | 9.53                                     | 6.28                                      | 10.30                             | 8.1%                   | 6.82                               | 8.6%                    | 2018-03-15    |
| D1750V2<br>S/N: 1093               | ES3DV3<br>S/N: 3320 | 1750 MHz<br>MSL | 37.50                                    | 20.30                                     | 37.20                             | -0.8%                  | 19.60                              | -3.4%                   | 2018-03-09    |
| D1900V2<br>S/N: 5d009              | ES3DV3<br>S/N: 3320 | 1900 MHz<br>MSL | 40.70                                    | 21.50                                     | 38.60                             | -5.2%                  | 20.50                              | -4.7%                   | 2018-03-13    |
| D2450V2<br>S/N: 710                | EX3DV4<br>S/N: 3944 | 2450 MHz<br>MSL | 51.10                                    | 24.20                                     | 50.30                             | -1.6%                  | 23.40                              | -3.3%                   | 2018-03-14    |

Table 9: Results system check

### 6.1.14 System check procedure

The system check is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



### 6.1.15 System validation

The system validation is performed in a similar way as a system check. It needs to be performed once a SAR measurement system has been established and allows an evaluation of the system accuracy with all components used together with the specified system. It has to be repeated at least once a year or when new system components are used (DAE, probe, phantom, dipole, liquid type).

In addition to the procedure used during system check a system validation also includes checks of probe isotropy, probe modulation factor and RF signal.

The following table lists the system validations relevant for this test report:

| Frequency (MHz) | DASY SW | Dipole Type /SN | Probe Type / SN | Calibrated signal type(s) | DAE unit Type / SN | body validation |
|-----------------|---------|-----------------|-----------------|---------------------------|--------------------|-----------------|
| 750             | V52.8.7 | D750V2 / 1041   | ES3DV3 / 3320   | CW                        | DAE3 / 413         | 2018-03-02      |
| 835             | V52.8.7 | D835V2 / 4d153  | ES3DV3 / 3320   | CW                        | DAE3 / 413         | 2018-03-06      |
| 1750            | V52.8.7 | D1750V2 / 1093  | ES3DV3 / 3320   | CW                        | DAE3 / 413         | 2018-03-08      |
| 1900            | V52.8.7 | D1900V2 / 5d009 | ES3DV3 / 3320   | CW                        | DAE3 / 413         | 2018-03-12      |
| 2450            | V52.8.7 | D2450V2 / 710   | EX3DV4 / 3944   | CW                        | DAE3/ 477          | 2017-06-20      |

## 7 Detailed Test Results

### 7.1 Conducted power measurements

For the measurements the Rohde & Schwarz Radio Communication Tester CMU 200 and CMW500 were used.

The output power was measured using an integrated RF connector and attached RF cable.

The conducted output power was also checked before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

#### 7.1.1 Conducted power measurements WCDMA FDD V (850 MHz)

| Max. RMS output power 850 MHz (FDD V) / dBm |                     |                     |                     |
|---------------------------------------------|---------------------|---------------------|---------------------|
| mode                                        | CH 4132 / 826.4 MHz | CH 4182 / 836.6 MHz | CH 4233 / 846.6 MHz |
| <b>RMC 12.2 kbit/s</b>                      | <b>23.3</b>         | <b>23.4</b>         | <b>23.4</b>         |
| RMC 64 kbit/s                               | 23.2                | 23.3                | 23.4                |
| RMC 144 kbit/s                              | 23.1                | 23.3                | 23.3                |
| RMC 384 kbit/s                              | 23.2                | 23.2                | 23.3                |
| AMR 4.75 kbit/s                             | 23.2                | 23.3                | 23.3                |
| AMR 5.15 kbit/s                             | 23.1                | 23.2                | 23.2                |
| AMR 5.9 kbit/s                              | 23.2                | 23.4                | 23.3                |
| AMR 6.7 kbit/s                              | 23.2                | 23.3                | 23.3                |
| AMR 7.4 kbit/s                              | 23.1                | 23.4                | 23.2                |
| AMR 7.95 kbit/s                             | 23.2                | 23.4                | 23.2                |
| AMR 10.2 kbit/s                             | 23.2                | 23.3                | 23.3                |
| AMR 12.2 kbit/s                             | 23.2                | 23.2                | 23.4                |
| <b>HSDPA Sub test 1</b>                     | <b>23.2</b>         | <b>23.2</b>         | <b>23.2</b>         |
| HSDPA Sub test 2                            | 22.0                | 22.1                | 22.2                |
| HSDPA Sub test 3                            | 21.5                | 21.6                | 21.8                |
| HSDPA Sub test 4                            | 21.6                | 21.8                | 21.6                |
| HSUPA Sub test 1                            | 23.3                | 23.2                | 23.3                |
| HSUPA Sub test 2                            | 21.1                | 21.1                | 21.2                |
| HSUPA Sub test 3                            | 22.2                | 22.2                | 22.3                |
| HSUPA Sub test 4                            | 21.2                | 21.1                | 21.1                |
| <b>HSUPA Sub test 5</b>                     | <b>23.1</b>         | <b>23.3</b>         | <b>23.2</b>         |

Table 10: Test results conducted power measurement UMTS FDD V 850MHz

**7.1.2 Conducted power measurements WCDMA FDD IV (1700 MHz)**

| Max. RMS output power FDD IV (1700MHz) / dBm |                      |                      |                      |
|----------------------------------------------|----------------------|----------------------|----------------------|
| mode                                         | CH 1312 / 1712.4 MHz | CH 1412 / 1732.4 MHz | CH 1513 / 1752.6 MHz |
| <b>RMC 12.2 kbit/s</b>                       | <b>22.8</b>          | <b>22.8</b>          | <b>22.7</b>          |
| RMC 64 kbit/s                                | 22.6                 | 22.7                 | 22.7                 |
| RMC 144 kbit/s                               | 22.7                 | 22.6                 | 22.6                 |
| RMC 384 kbit/s                               | 22.6                 | 22.6                 | 22.6                 |
| AMR 4.75 kbit/s                              | 22.6                 | 22.8                 | 22.6                 |
| AMR 5.15 kbit/s                              | 22.7                 | 22.6                 | 22.6                 |
| AMR 5.9 kbit/s                               | 22.6                 | 22.7                 | 22.6                 |
| AMR 6.7 kbit/s                               | 22.6                 | 22.7                 | 22.5                 |
| AMR 7.4 kbit/s                               | 22.7                 | 22.7                 | 22.6                 |
| AMR 7.95 kbit/s                              | 22.6                 | 22.7                 | 22.6                 |
| AMR 10.2 kbit/s                              | 22.6                 | 22.7                 | 22.6                 |
| AMR 12.2 kbit/s                              | 22.7                 | 22.7                 | 22.5                 |
| <b>HSDPA Sub test 1</b>                      | <b>22.7</b>          | <b>22.6</b>          | <b>22.5</b>          |
| HSDPA Sub test 2                             | 21.5                 | 21.6                 | 21.5                 |
| HSDPA Sub test 3                             | 21.1                 | 21.0                 | 21.0                 |
| HSDPA Sub test 4                             | 21.1                 | 21.2                 | 20.9                 |
| HSUPA Sub test 1                             | 22.6                 | 22.6                 | 22.5                 |
| HSUPA Sub test 2                             | 20.6                 | 20.7                 | 20.5                 |
| HSUPA Sub test 3                             | 21.7                 | 21.7                 | 21.6                 |
| HSUPA Sub test 4                             | 20.6                 | 20.6                 | 20.5                 |
| <b>HSUPA Sub test 5</b>                      | <b>22.8</b>          | <b>22.8</b>          | <b>22.6</b>          |

Table 11: Test results conducted power measurement UMTS FDD IV 1700MHz

### 7.1.3 Conducted power measurements WCDMA FDD II (1900 MHz)

| Max. RMS output power 1900 MHz (FDD II) / dBm |                     |                   |                   |
|-----------------------------------------------|---------------------|-------------------|-------------------|
|                                               | Channel / frequency |                   |                   |
| mode                                          | 9262 / 1852.4 MHz   | 9400 / 1880.0 MHz | 9538 / 1907.6 MHz |
| <b>RMC 12.2 kbit/s</b>                        | <b>22.7</b>         | <b>22.7</b>       | <b>23.0</b>       |
| RMC 64 kbit/s                                 | 22.5                | 22.6              | 22.8              |
| RMC 144 kbit/s                                | 22.6                | 22.5              | 22.9              |
| RMC 384 kbit/s                                | 22.5                | 22.6              | 22.9              |
| AMR 4.75 kbit/s                               | 22.6                | 22.6              | 22.8              |
| AMR 5.15 kbit/s                               | 22.6                | 22.5              | 22.8              |
| AMR 5.9 kbit/s                                | 22.6                | 22.5              | 22.9              |
| AMR 6.7 kbit/s                                | 22.5                | 22.5              | 22.9              |
| AMR 7.4 kbit/s                                | 22.6                | 22.5              | 22.9              |
| AMR 7.95 kbit/s                               | 22.6                | 22.5              | 22.9              |
| AMR 10.2 kbit/s                               | 22.6                | 22.6              | 22.8              |
| AMR 12.2 kbit/s                               | 22.6                | 22.6              | 22.9              |
| <b>HSDPA Sub test 1</b>                       | <b>22.6</b>         | <b>22.5</b>       | <b>23.0</b>       |
| HSDPA Sub test 2                              | 21.4                | 21.6              | 21.7              |
| HSDPA Sub test 3                              | 21.0                | 21.0              | 21.4              |
| HSDPA Sub test 4                              | 21.0                | 21.0              | 21.2              |
| HSUPA Sub test 1                              | 22.6                | 22.5              | 22.9              |
| HSUPA Sub test 2                              | 20.5                | 20.5              | 20.9              |
| HSUPA Sub test 3                              | 21.4                | 21.6              | 21.9              |
| HSUPA Sub test 4                              | 20.4                | 20.5              | 20.8              |
| <b>HSUPA Sub test 5</b>                       | <b>22.6</b>         | <b>22.5</b>       | <b>22.8</b>       |

Table 12: Test results conducted power measurement UMTS FDD II 1900MHz

Remark: None of the HSDPA/HSUPA settings leads to conducted power values exceeding the conducted power in RMC mode by more than 0.25 dB.

Therefore no additional SAR measurements were performed in HSDPA/HSUPA mode.

## 7.1.4 Test-set-up information for WCDMA / HSPDA / HSUPA

### a) WCDMA RMC

In RMC (reference measurement channel) mode the conducted power at 4 different bit rates was measured. They correspond with the used spreading factors as follows:

| Bit rate              | 12.2 kbit/s | 64 kbit/s | 144 kbit/s | 384 kbit/s |
|-----------------------|-------------|-----------|------------|------------|
| Spreading factor (SF) | 64          | 16        | 8          | 4          |

In RMC mode only DPCCH and DPDCH are active. As bit rate changes do not influence the relative power of any code channel the measured RMS output power remains on the same level which is set to maximum by TPC (Transmit power control) pattern type 'All 1'.

### b) HSDPA

HSDPA adds the HS-DPCCH in uplink as a control channel for high speed data transfer in downlink. In HSDPA mode 4 sub-tests are defined by 3GPP 34.121 according to the following table:

| Sub-test | $\beta_c$            | $\beta_d$            | $\beta_d$ (SF) | $\beta_c/\beta_d$    | $\beta_{hs}^{(1)}$ | CM(dB) <sup>(2)</sup> |
|----------|----------------------|----------------------|----------------|----------------------|--------------------|-----------------------|
| 1        | 2/15                 | 15/15                | 64             | 2/15                 | 4/15               | 0.0                   |
| 2        | 12/15 <sup>(3)</sup> | 15/15 <sup>(3)</sup> | 64             | 12/15 <sup>(3)</sup> | 24/15              | 1.0                   |
| 3        | 15/15                | 8/15                 | 64             | 15/8                 | 30/15              | 1.5                   |
| 4        | 15/15                | 4/15                 | 64             | 15/4                 | 30/15              | 1.5                   |

Note 1:  $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI} = 8 \iff A_{hs} = \beta_{hs}/\beta_c = 30/15 \iff \beta_{hs} = 30/15 * \beta_c$

Note 2 : CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$

Note 3 : For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$

Table 13: Sub-tests for UMTS Release 5 HSDPA

The  $\beta_c$  and  $\beta_d$  gain factors for DPCCH and DPDCH were set according to the values in the above table,  $\beta_{hs}$  for HS-DPCCH is set automatically to the correct value when  $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI} = 8$ . The variation of the  $\beta_c/\beta_d$  ratio causes a power reduction at sub-tests 2 - 4.

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

| Parameter                        | Value       |
|----------------------------------|-------------|
| Nominal average inf. bit rate    | 534 kbit/s  |
| Inter-TTI Distance               | 3 TTI's     |
| Number of HARQ Processes         | 2 Processes |
| Information Bit Payload          | 3202 Bits   |
| MAC-d PDU size                   | 336 Bits    |
| Number Code Blocks               | 1 Block     |
| Binary Channel Bits Per TTI      | 4800 Bits   |
| Total Available SMLs in UE       | 19200 SMLs  |
| Number of SMLs per HARQ Process  | 9600 SMLs   |
| Coding Rate                      | 0.67        |
| Number of Physical Channel Codes | 5           |

Table 14: settings of required H-Set 1 QPSK acc. to 3GPP 34.121

## c) HSUPA

In HSUPA mode additional code channels (E-DPCCH, E-DPDCHn) are added for data transfer in uplink at higher bit rates.

5 sub-tests are defined by 3GPP 34.121 according to the following table:

| Sub-test | $\beta_c$            | $\beta_d$            | $\beta_d$ (SF) | $\beta_c/\beta_d$    | $\beta_{hs}^{(1)}$ | $\beta_{ec}$ | $\beta_{ed}$                               | $\beta_{ec}$ (SF) | $\beta_{ed}$ (code) | CM <sup>(2)</sup> (dB) | MPR (dB) | AG <sup>(4)</sup> Index | E-TFCI |
|----------|----------------------|----------------------|----------------|----------------------|--------------------|--------------|--------------------------------------------|-------------------|---------------------|------------------------|----------|-------------------------|--------|
| 1        | 11/15 <sup>(3)</sup> | 15/15 <sup>(3)</sup> | 64             | 11/15 <sup>(3)</sup> | 22/15              | 209/225      | 1039/225                                   | 4                 | 1                   | 1.0                    | 0.0      | 20                      | 75     |
| 2        | 6/15                 | 15/15                | 64             | 6/15                 | 12/15              | 12/15        | 94/75                                      | 4                 | 1                   | 3.0                    | 2.0      | 12                      | 67     |
| 3        | 15/15                | 9/15                 | 64             | 15/9                 | 30/15              | 30/15        | $\beta_{ed1}:47/15$<br>$\beta_{ed2}:47/15$ | 4                 | 2                   | 2.0                    | 1.0      | 15                      | 92     |
| 4        | 2/15                 | 15/15                | 64             | 2/15                 | 4/15               | 2/15         | 56/75                                      | 4                 | 1                   | 3.0                    | 2.0      | 17                      | 71     |
| 5        | 15/15 <sup>(4)</sup> | 15/15 <sup>(4)</sup> | 64             | 15/15 <sup>(4)</sup> | 30/15              | 24/15        | 134/15                                     | 4                 | 1                   | 1.0                    | 0.0      | 21                      | 81     |

Note 1:  $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI} = 8 \iff A_{hs} = \beta_{hs}/\beta_c = 30/15 \iff \beta_{hs} = 30/15 * \beta_c$   
 Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference  
 Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$   
 Note 4: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$   
 Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g  
 Note 6:  $\beta_{ed}$  can not be set directly; it is set by Absolute Grant Value

Table 15: Subtests for UMTS Release 6 HSUPA

To achieve the settings above some additional procedures were defined by 3GPP 34.121. Those have been included in an application note for the CMU200 and were exactly followed:

- Test mode connection (BS signal tab):  
RMC 12.2 kbit/s + HSPA 34.108 with loop mode 1
- HS-DSCH settings (BS signal tab):
- FRC with H-set 1 QPSK
- ACK-NACK repetition factor = 3
- CQI feedback cycle = 4ms
- CQI repetition factor = 2
- HSUPA-specific signalling settings (UE signal tab):
- E-TFCI table index = 0
- E-DCH minimum set E-TFCI = 9
- Puncturing limit non-max = 0.84
- max. number of channelisation codes = 2x SF4
- Initial Serving Grant Value = Off
- HSDPA and HSUPA Gain factors (UE signal tab)

| Sub-test | $\beta_c$ | $\beta_d$ | $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$ | $\Delta E-DPCCH$ *) |
|----------|-----------|-----------|---------------------------------------------|---------------------|
| 1        | 10        | 15        | 8                                           | 6                   |
| 2        | 6         | 15        | 8                                           | 8                   |
| 3        | 15        | 9         | 8                                           | 8                   |
| 4        | 2         | 15        | 8                                           | 5                   |
| 5        | 14        | 15        | 8                                           | 7                   |

\*) :  $\beta_{ec}$  and  $\beta_{ed}$  ratios (relative to  $\beta_c$  and  $\beta_d$ ) are set by  $\Delta E-DPCCH$

- HSUPA Reference E-TFCIs (UE signal tab > HSUPA gain factors):

| <b>Sub-test</b>               | <b>1, 2, 4, 5</b> |    |    |    |    |
|-------------------------------|-------------------|----|----|----|----|
| Number of E-TFCIs             | 5                 |    |    |    |    |
| Reference E-TFCI              | 11                | 67 | 71 | 75 | 81 |
| Reference E-TFCI power offset | 4                 | 18 | 23 | 26 | 27 |

| <b>Sub-test</b>               | <b>3</b> |    |
|-------------------------------|----------|----|
| Number of E-TFCIs             | 2        |    |
| Reference E-TFCI              | 11       | 92 |
| Reference E-TFCI power offset | 4        | 18 |

- HSUPA-specific generator parameters (BS Signal tab > HSUPA > E-AGCH > AG Pattern)

| <b>Sub-test</b> | <b>Absolute Grant Value (AG Index)</b> |
|-----------------|----------------------------------------|
| 1               | 20                                     |
| 2               | 12                                     |
| 3               | 15                                     |
| 4               | 17                                     |
| 5               | 21                                     |

- Power Level settings (BS Signal tab > Node B-settings):

- Level reference: Output Channel Power (Ior)

- Output Channel Power (Ior): -86 dBm

- Downlink Physical Channel Settings (BS signal tab)

- P-CPICH: -10 dB

- S-CPICH: Off

- P-SCH: -15 dB

- S-SCH : -15 dB

- P-CCPCH: -12 dB

- S-CCPCH: -12 dB

- PICH : -15 dB

- AICH : -12 dB

- DPDCH : -10 dB

- HS-SCCH : -8 dB

- HS-PDSCH : -3 dB

- E-AGCH : -20 dB

- E-RGCH/E-HICH - 20 dB

- E-RGCH Active: Off

The settings above were stored once for each sub-test and recalled before the measurement.

HSUPA test procedure:

To reach maximum output power in HSUPA mode the following procedures were followed:

3 different TPC patterns were defined:

Set 1 : Closed loop with target power 10 dBm

Set 2 : Single Pattern+Alternating with binary pattern '11111' for 1 dB steps 'up'

Set 3 : Single Pattern+Alternating with binary pattern '00000' for 1 dB steps 'down'

After recalling a certain HSUPA sub-test the HSUPA E-AGCH graph with E-TFCI event counter is displayed. After starting with the closed loop command the power is increased in 1 dB steps by activating pattern set 2 until the UE decreases the transmitted E-TFCI.

At this point set 3 is activated once to reduce the output power to the value at which the original E-TFCI, which is required for the sub-test, appears again.

For conducted power measurements the same steps are repeated in the power menu to read out the corresponding maximum RMS output power with the target E-TFCI.

For SAR measurements it is useful to switch to Code Domain Power vs. Time display.

Here the CMU200 shows relative power values (max. and min.) of each code channel which should roughly correspond to the numerators of the gain factors e.g.:

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_{hs}$ | $\beta_{ec}$ | $\beta_{ed}$ |
|----------|-----------|-----------|--------------|--------------|--------------|
| 5        | 15        | 15        | 30           | 24           | 134          |

By this way a surveillance of signalling conditions is possible to make sure that HSUPA code channels are active during the complete SAR measurement.

### 7.1.5 Conducted power measurements LTE FDD 2 1900 MHz

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 1.4                | 18607 /<br>1850.7               | 1 RB low                        | 22.2                   | 21.2   |
|                    |                                 | 1 RB mid                        | 22.1                   | 21.2   |
|                    |                                 | 1 RB high                       | 22.1                   | 21.2   |
|                    |                                 | 50% RB low                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB high                     | 22.0                   | 21.1   |
|                    |                                 | 100% RB                         | 21.0                   | 20.3   |
|                    | 18900 /<br>1880.0               | 1 RB low                        | 22.1                   | 21.5   |
|                    |                                 | 1 RB mid                        | 22.1                   | 21.5   |
|                    |                                 | 1 RB high                       | 22.0                   | 21.5   |
|                    |                                 | 50% RB low                      | 22.1                   | 21.2   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB high                     | 22.1                   | 21.1   |
|                    |                                 | 100% RB                         | 20.9                   | 20.0   |
|                    | 19193 /<br>1909.3               | 1 RB low                        | 22.0                   | 20.9   |
|                    |                                 | 1 RB mid                        | 21.9                   | 20.8   |
|                    |                                 | 1 RB high                       | 22.0                   | 20.9   |
|                    |                                 | 50% RB low                      | 22.0                   | 21.1   |
|                    |                                 | 50% RB mid                      | 21.9                   | 21.1   |
|                    |                                 | 50% RB high                     | 21.9                   | 21.0   |
|                    |                                 | 100% RB                         | 20.8                   | 20.2   |
| 3.0                | 18615 /<br>1851.5               | 1 RB low                        | 22.0                   | 21.5   |
|                    |                                 | 1 RB mid                        | 21.9                   | 21.4   |
|                    |                                 | 1 RB high                       | 21.8                   | 21.3   |
|                    |                                 | 50% RB low                      | 21.0                   | 20.0   |
|                    |                                 | 50% RB mid                      | 20.9                   | 19.9   |
|                    |                                 | 50% RB high                     | 20.9                   | 19.9   |
|                    |                                 | 100% RB                         | 20.9                   | 20.1   |
|                    | 18900 /<br>1880.0               | 1 RB low                        | 22.1                   | 21.1   |
|                    |                                 | 1 RB mid                        | 22.0                   | 20.9   |
|                    |                                 | 1 RB high                       | 22.0                   | 21.0   |
|                    |                                 | 50% RB low                      | 21.0                   | 20.4   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.3   |
|                    |                                 | 50% RB high                     | 21.0                   | 20.3   |
|                    |                                 | 100% RB                         | 20.9                   | 20.0   |
|                    | 19185 /<br>1908.5               | 1 RB low                        | 21.9                   | 20.8   |
|                    |                                 | 1 RB mid                        | 21.7                   | 20.8   |
|                    |                                 | 1 RB high                       | 21.8                   | 20.7   |
|                    |                                 | 50% RB low                      | 21.0                   | 20.1   |
|                    |                                 | 50% RB mid                      | 20.9                   | 20.0   |
|                    |                                 | 50% RB high                     | 20.9                   | 20.0   |
|                    |                                 | 100% RB                         | 20.9                   | 20.0   |

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 5.0                | 18625 /<br>1852.5               | 1 RB low                        | 22.0                   | 21.5   |
|                    |                                 | 1 RB mid                        | 22.0                   | 21.3   |
|                    |                                 | 1 RB high                       | 21.8                   | 21.3   |
|                    |                                 | 50% RB low                      | 21.0                   | 20.3   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.2   |
|                    |                                 | 50% RB high                     | 20.9                   | 20.1   |
|                    |                                 | 100% RB                         | 21.0                   | 20.1   |
|                    | 18900 /<br>1880.0               | 1 RB low                        | 22.1                   | 21.2   |
|                    |                                 | 1 RB mid                        | 22.1                   | 21.1   |
|                    |                                 | 1 RB high                       | 22.0                   | 21.1   |
|                    |                                 | 50% RB low                      | 21.0                   | 20.3   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.2   |
|                    |                                 | 50% RB high                     | 21.0                   | 20.2   |
|                    |                                 | 100% RB                         | 21.0                   | 20.1   |
|                    | 19175 /<br>1907.5               | 1 RB low                        | 22.0                   | 21.1   |
|                    |                                 | 1 RB mid                        | 21.9                   | 21.0   |
|                    |                                 | 1 RB high                       | 21.8                   | 20.9   |
|                    |                                 | 50% RB low                      | 21.1                   | 20.1   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.1   |
|                    |                                 | 50% RB high                     | 20.8                   | 20.0   |
|                    |                                 | 100% RB                         | 21.0                   | 20.0   |
| 10.0               | 18650 /<br>1855                 | 1 RB low                        | 22.2                   | 21.6   |
|                    |                                 | 1 RB mid                        | 21.8                   | 21.4   |
|                    |                                 | 1 RB high                       | 21.8                   | 21.3   |
|                    |                                 | 50% RB low                      | 21.1                   | 20.2   |
|                    |                                 | 50% RB mid                      | 20.9                   | 20.0   |
|                    |                                 | 50% RB high                     | 20.9                   | 20.0   |
|                    |                                 | 100% RB                         | 21.0                   | 20.0   |
|                    | 18900 /<br>1880                 | 1 RB low                        | 22.2                   | 21.4   |
|                    |                                 | 1 RB mid                        | 21.9                   | 21.0   |
|                    |                                 | 1 RB high                       | 21.9                   | 21.0   |
|                    |                                 | 50% RB low                      | 21.1                   | 20.3   |
|                    |                                 | 50% RB mid                      | 21.1                   | 20.2   |
|                    |                                 | 50% RB high                     | 21.0                   | 20.1   |
|                    |                                 | 100% RB                         | 21.1                   | 20.1   |
|                    | 19150 /<br>1905                 | 1 RB low                        | 22.1                   | 21.2   |
|                    |                                 | 1 RB mid                        | 21.8                   | 20.9   |
|                    |                                 | 1 RB high                       | 21.7                   | 20.8   |
|                    |                                 | 50% RB low                      | 21.1                   | 20.1   |
|                    |                                 | 50% RB mid                      | 20.9                   | 20.0   |
|                    |                                 | 50% RB high                     | 20.9                   | 19.9   |
|                    |                                 | 100% RB                         | 20.9                   | 20.0   |

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 15.0               | 18675 /<br>1857.5               | 1 RB low                        | 22.3                   | 21.8   |
|                    |                                 | 1 RB mid                        | 21.8                   | 21.2   |
|                    |                                 | 1 RB high                       | 21.8                   | 21.2   |
|                    |                                 | 50% RB low                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.1   |
|                    |                                 | 50% RB high                     | 21.0                   | 20.0   |
|                    |                                 | 100% RB                         | 21.0                   | 20.1   |
|                    | 18900 /<br>1880.0               | 1 RB low                        | 22.5                   | 21.9   |
|                    |                                 | 1 RB mid                        | 21.9                   | 21.3   |
|                    |                                 | 1 RB high                       | 22.0                   | 21.6   |
|                    |                                 | 50% RB low                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.1   |
|                    |                                 | 50% RB high                     | 21.0                   | 20.1   |
|                    |                                 | 100% RB                         | 21.1                   | 20.1   |
|                    | 19125 /<br>1902.5               | 1 RB low                        | 22.3                   | 21.5   |
|                    |                                 | 1 RB mid                        | 21.9                   | 21.0   |
|                    |                                 | 1 RB high                       | 21.7                   | 20.8   |
|                    |                                 | 50% RB low                      | 21.2                   | 20.2   |
|                    |                                 | 50% RB mid                      | 21.0                   | 20.0   |
|                    |                                 | 50% RB high                     | 20.8                   | 19.9   |
|                    |                                 | 100% RB                         | 21.0                   | 20.0   |
| 20.0               | 18700 /<br>1860                 | 1 RB low                        | <b>22.3</b>            | 21.9   |
|                    |                                 | 1 RB mid                        | 21.6                   | 21.2   |
|                    |                                 | 1 RB high                       | 21.6                   | 21.1   |
|                    |                                 | 50% RB low                      | 21.1                   | 20.3   |
|                    |                                 | 50% RB mid                      | 20.8                   | 19.9   |
|                    |                                 | 50% RB high                     | 20.8                   | 19.9   |
|                    |                                 | 100% RB                         | 21.0                   | 20.0   |
|                    | 18900 /<br>1880                 | 1 RB low                        | <b>22.2</b>            | 21.8   |
|                    |                                 | 1 RB mid                        | 21.7                   | 21.3   |
|                    |                                 | 1 RB high                       | 21.5                   | 21.1   |
|                    |                                 | 50% RB low                      | 21.1                   | 20.2   |
|                    |                                 | 50% RB mid                      | 20.9                   | 20.0   |
|                    |                                 | 50% RB high                     | 20.8                   | 19.9   |
|                    |                                 | 100% RB                         | 21.0                   | 20.1   |
|                    | 19100 /<br>1900                 | 1 RB low                        | <b>22.2</b>            | 21.8   |
|                    |                                 | 1 RB mid                        | 21.7                   | 21.2   |
|                    |                                 | 1 RB high                       | 21.4                   | 21.0   |
|                    |                                 | 50% RB low                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB mid                      | 20.9                   | 20.0   |
|                    |                                 | 50% RB high                     | 20.8                   | 19.9   |
|                    |                                 | 100% RB                         | 21.0                   | 20.1   |

Table 16: Test results conducted power measurement LTE FDD 2 1900MHz.

**7.1.6 Conducted power measurements LTE FDD 4 1700 MHz**

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 1.4                | 19957 /<br>1710.7               | 1 RB low                        | 22.6                   | 21.9   |
|                    |                                 | 1 RB mid                        | 22.5                   | 21.9   |
|                    |                                 | 1 RB high                       | 22.5                   | 22.0   |
|                    |                                 | 50% RB low                      | 22.5                   | 21.6   |
|                    |                                 | 50% RB mid                      | 22.6                   | 21.6   |
|                    |                                 | 50% RB high                     | 22.5                   | 21.6   |
|                    |                                 | 100% RB                         | 21.5                   | 20.5   |
|                    | 20175 /<br>1732.5               | 1 RB low                        | 22.4                   | 21.4   |
|                    |                                 | 1 RB mid                        | 22.3                   | 21.3   |
|                    |                                 | 1 RB high                       | 22.4                   | 21.4   |
|                    |                                 | 50% RB low                      | 22.4                   | 21.5   |
|                    |                                 | 50% RB mid                      | 22.3                   | 21.5   |
|                    |                                 | 50% RB high                     | 22.3                   | 21.5   |
|                    |                                 | 100% RB                         | 21.3                   | 20.6   |
|                    | 20393 /<br>1754.3               | 1 RB low                        | 22.3                   | 21.3   |
|                    |                                 | 1 RB mid                        | 22.2                   | 21.3   |
|                    |                                 | 1 RB high                       | 22.2                   | 21.3   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.3   |
|                    |                                 | 50% RB mid                      | 22.2                   | 21.3   |
|                    |                                 | 50% RB high                     | 22.2                   | 21.3   |
|                    |                                 | 100% RB                         | 21.2                   | 20.5   |
| 3                  | 19965 /<br>1711.5               | 1 RB low                        | 22.5                   | 22.0   |
|                    |                                 | 1 RB mid                        | 22.5                   | 21.9   |
|                    |                                 | 1 RB high                       | 22.4                   | 21.9   |
|                    |                                 | 50% RB low                      | 21.6                   | 20.6   |
|                    |                                 | 50% RB mid                      | 21.5                   | 20.5   |
|                    |                                 | 50% RB high                     | 21.5                   | 20.5   |
|                    |                                 | 100% RB                         | 21.5                   | 20.6   |
|                    | 20175 /<br>1732.5               | 1 RB low                        | 22.4                   | 21.4   |
|                    |                                 | 1 RB mid                        | 22.3                   | 21.3   |
|                    |                                 | 1 RB high                       | 22.3                   | 21.2   |
|                    |                                 | 50% RB low                      | 21.4                   | 20.7   |
|                    |                                 | 50% RB mid                      | 21.3                   | 20.7   |
|                    |                                 | 50% RB high                     | 21.3                   | 20.6   |
|                    |                                 | 100% RB                         | 21.3                   | 20.4   |
|                    | 20385 /<br>1753.5               | 1 RB low                        | 22.2                   | 21.2   |
|                    |                                 | 1 RB mid                        | 22.2                   | 21.2   |
|                    |                                 | 1 RB high                       | 22.1                   | 21.1   |
|                    |                                 | 50% RB low                      | 21.3                   | 20.4   |
|                    |                                 | 50% RB mid                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB high                     | 21.2                   | 20.4   |
|                    |                                 | 100% RB                         | 21.2                   | 20.4   |

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 5                  | 19975 /<br>1712.5               | 1 RB low                        | 22.6                   | 22.0   |
|                    |                                 | 1 RB mid                        | 22.6                   | 21.9   |
|                    |                                 | 1 RB high                       | 22.4                   | 21.8   |
|                    |                                 | 50% RB low                      | 21.5                   | 20.8   |
|                    |                                 | 50% RB mid                      | 21.5                   | 20.7   |
|                    |                                 | 50% RB high                     | 21.4                   | 20.7   |
|                    |                                 | 100% RB                         | 21.5                   | 20.6   |
|                    | 20175 /<br>1732.5               | 1 RB low                        | 22.4                   | 21.5   |
|                    |                                 | 1 RB mid                        | 22.3                   | 21.4   |
|                    |                                 | 1 RB high                       | 22.3                   | 21.3   |
|                    |                                 | 50% RB low                      | 21.4                   | 20.6   |
|                    |                                 | 50% RB mid                      | 21.3                   | 20.5   |
|                    |                                 | 50% RB high                     | 21.3                   | 20.4   |
|                    |                                 | 100% RB                         | 21.3                   | 20.4   |
|                    | 20375 /<br>1752.5               | 1 RB low                        | 22.3                   | 21.4   |
|                    |                                 | 1 RB mid                        | 22.3                   | 21.3   |
|                    |                                 | 1 RB high                       | 22.1                   | 21.2   |
|                    |                                 | 50% RB low                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB mid                      | 21.2                   | 20.4   |
|                    |                                 | 50% RB high                     | 21.1                   | 20.4   |
|                    |                                 | 100% RB                         | 21.2                   | 20.3   |
| 10                 | 20000 /<br>1715.0               | 1 RB low                        | 22.7                   | 22.1   |
|                    |                                 | 1 RB mid                        | 22.4                   | 21.9   |
|                    |                                 | 1 RB high                       | 22.3                   | 21.8   |
|                    |                                 | 50% RB low                      | 21.5                   | 20.7   |
|                    |                                 | 50% RB mid                      | 21.4                   | 20.5   |
|                    |                                 | 50% RB high                     | 21.4                   | 20.5   |
|                    |                                 | 100% RB                         | 21.4                   | 20.6   |
|                    | 20175 /<br>1732.5               | 1 RB low                        | 22.5                   | 21.4   |
|                    |                                 | 1 RB mid                        | 22.2                   | 21.2   |
|                    |                                 | 1 RB high                       | 22.1                   | 21.2   |
|                    |                                 | 50% RB low                      | 21.4                   | 20.6   |
|                    |                                 | 50% RB mid                      | 21.3                   | 20.5   |
|                    |                                 | 50% RB high                     | 21.2                   | 20.4   |
|                    |                                 | 100% RB                         | 21.3                   | 20.5   |
|                    | 20350 /<br>1750.0               | 1 RB low                        | 22.3                   | 21.4   |
|                    |                                 | 1 RB mid                        | 22.1                   | 21.1   |
|                    |                                 | 1 RB high                       | 22.0                   | 21.1   |
|                    |                                 | 50% RB low                      | 21.3                   | 20.4   |
|                    |                                 | 50% RB mid                      | 21.1                   | 20.2   |
|                    |                                 | 50% RB high                     | 21.1                   | 20.2   |
|                    |                                 | 100% RB                         | 21.2                   | 20.3   |

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 15                 | 20025 /<br>1717.5               | 1 RB low                        | 22.9                   | 22.3   |
|                    |                                 | 1 RB mid                        | 22.4                   | 21.9   |
|                    |                                 | 1 RB high                       | 22.4                   | 21.7   |
|                    |                                 | 50% RB low                      | 21.7                   | 20.8   |
|                    |                                 | 50% RB mid                      | 21.5                   | 20.7   |
|                    |                                 | 50% RB high                     | 21.4                   | 20.6   |
|                    |                                 | 100% RB                         | 21.5                   | 20.7   |
|                    | 20175 /<br>1732.5               | 1 RB low                        | 22.8                   | 22.3   |
|                    |                                 | 1 RB mid                        | 22.3                   | 21.8   |
|                    |                                 | 1 RB high                       | 22.2                   | 21.7   |
|                    |                                 | 50% RB low                      | 21.5                   | 20.6   |
|                    |                                 | 50% RB mid                      | 21.3                   | 20.5   |
|                    |                                 | 50% RB high                     | 21.2                   | 20.3   |
|                    |                                 | 100% RB                         | 21.3                   | 20.4   |
|                    | 20325 /<br>1747.5               | 1 RB low                        | 22.6                   | 21.6   |
|                    |                                 | 1 RB mid                        | 22.1                   | 21.2   |
|                    |                                 | 1 RB high                       | 22.1                   | 21.1   |
|                    |                                 | 50% RB low                      | 21.4                   | 20.5   |
|                    |                                 | 50% RB mid                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB high                     | 21.2                   | 20.2   |
|                    |                                 | 100% RB                         | 21.3                   | 20.4   |
| 20                 | 20050 /<br>1720.0               | 1 RB low                        | <b>22.9</b>            | 22.5   |
|                    |                                 | 1 RB mid                        | 22.2                   | 21.9   |
|                    |                                 | 1 RB high                       | 22.0                   | 21.7   |
|                    |                                 | 50% RB low                      | <b>21.7</b>            | 20.8   |
|                    |                                 | 50% RB mid                      | 21.4                   | 20.4   |
|                    |                                 | 50% RB high                     | 21.3                   | 20.4   |
|                    |                                 | 100% RB                         | <b>21.4</b>            | 20.5   |
|                    | 20175 /<br>1732.5               | 1 RB low                        | <b>22.6</b>            | 22.3   |
|                    |                                 | 1 RB mid                        | 22.0                   | 21.7   |
|                    |                                 | 1 RB high                       | 21.8                   | 21.4   |
|                    |                                 | 50% RB low                      | 21.5                   | 20.6   |
|                    |                                 | 50% RB mid                      | 21.2                   | 20.3   |
|                    |                                 | 50% RB high                     | 21.1                   | 20.2   |
|                    |                                 | 100% RB                         | 21.4                   | 20.4   |
|                    | 20300 /<br>1745.0               | 1 RB low                        | <b>22.6</b>            | 22.1   |
|                    |                                 | 1 RB mid                        | 22.0                   | 21.5   |
|                    |                                 | 1 RB high                       | 21.9                   | 21.4   |
|                    |                                 | 50% RB low                      | 21.4                   | 20.5   |
|                    |                                 | 50% RB mid                      | 21.1                   | 20.2   |
|                    |                                 | 50% RB high                     | 21.1                   | 20.2   |
|                    |                                 | 100% RB                         | 21.2                   | 20.4   |

Table 17: Test results conducted power measurement LTE FDD 4 1700 MHz.

**7.1.7 Conducted power measurements LTE FDD 5 850 MHz**

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 1.4                | 20407 /<br>824.7                | 1 RB low                        | 23.3                   | 22.8   |
|                    |                                 | 1 RB mid                        | 23.2                   | 22.7   |
|                    |                                 | 1 RB high                       | 23.3                   | 22.8   |
|                    |                                 | 50% RB low                      | 23.3                   | 22.4   |
|                    |                                 | 50% RB mid                      | 23.2                   | 22.3   |
|                    |                                 | 50% RB high                     | 23.2                   | 22.3   |
|                    |                                 | 100% RB                         | 22.0                   | 21.1   |
|                    | 20525 /<br>836.5                | 1 RB low                        | 23.0                   | 22.2   |
|                    |                                 | 1 RB mid                        | 23.1                   | 22.0   |
|                    |                                 | 1 RB high                       | 23.1                   | 21.9   |
|                    |                                 | 50% RB low                      | 23.0                   | 22.3   |
|                    |                                 | 50% RB mid                      | 23.0                   | 22.3   |
|                    |                                 | 50% RB high                     | 23.0                   | 22.2   |
|                    |                                 | 100% RB                         | 22.0                   | 21.3   |
|                    | 20643 /<br>848.3                | 1 RB low                        | 23.0                   | 22.1   |
|                    |                                 | 1 RB mid                        | 22.9                   | 22.0   |
|                    |                                 | 1 RB high                       | 22.9                   | 22.0   |
|                    |                                 | 50% RB low                      | 22.9                   | 22.0   |
|                    |                                 | 50% RB mid                      | 22.9                   | 22.0   |
|                    |                                 | 50% RB high                     | 22.9                   | 22.0   |
|                    |                                 | 100% RB                         | 21.9                   | 21.1   |
| 3.0                | 20415 /<br>825.5                | 1 RB low                        | 23.2                   | 22.7   |
|                    |                                 | 1 RB mid                        | 23.2                   | 22.7   |
|                    |                                 | 1 RB high                       | 23.1                   | 22.6   |
|                    |                                 | 50% RB low                      | 22.1                   | 21.2   |
|                    |                                 | 50% RB mid                      | 22.2                   | 21.0   |
|                    |                                 | 50% RB high                     | 22.2                   | 21.1   |
|                    |                                 | 100% RB                         | 22.2                   | 21.3   |
|                    | 20525 /<br>836.5                | 1 RB low                        | 22.9                   | 22.1   |
|                    |                                 | 1 RB mid                        | 22.9                   | 22.1   |
|                    |                                 | 1 RB high                       | 22.9                   | 22.0   |
|                    |                                 | 50% RB low                      | 21.9                   | 21.3   |
|                    |                                 | 50% RB mid                      | 21.9                   | 21.2   |
|                    |                                 | 50% RB high                     | 21.9                   | 21.2   |
|                    |                                 | 100% RB                         | 21.9                   | 21.0   |
|                    | 20635 /<br>847.5                | 1 RB low                        | 22.8                   | 21.8   |
|                    |                                 | 1 RB mid                        | 22.8                   | 21.8   |
|                    |                                 | 1 RB high                       | 22.8                   | 21.7   |
|                    |                                 | 50% RB low                      | 21.9                   | 21.0   |
|                    |                                 | 50% RB mid                      | 21.8                   | 20.9   |
|                    |                                 | 50% RB high                     | 21.9                   | 21.0   |
|                    |                                 | 100% RB                         | 21.9                   | 21.0   |

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 5.0                | 20425 /<br>826.5                | 1 RB low                        | 23.2                   | 22.6   |
|                    |                                 | 1 RB mid                        | 23.2                   | 22.6   |
|                    |                                 | 1 RB high                       | 23.1                   | 22.5   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.4   |
|                    |                                 | 50% RB mid                      | 22.2                   | 21.4   |
|                    |                                 | 50% RB high                     | 22.2                   | 21.3   |
|                    |                                 | 100% RB                         | 22.2                   | 21.2   |
|                    | 20525 /<br>836.5                | 1 RB low                        | 23.0                   | 22.0   |
|                    |                                 | 1 RB mid                        | 23.0                   | 22.1   |
|                    |                                 | 1 RB high                       | 22.9                   | 22.0   |
|                    |                                 | 50% RB low                      | 22.0                   | 21.1   |
|                    |                                 | 50% RB mid                      | 22.0                   | 21.1   |
|                    |                                 | 50% RB high                     | 21.9                   | 21.0   |
|                    |                                 | 100% RB                         | 22.0                   | 21.1   |
|                    | 20625 /<br>846.5                | 1 RB low                        | 22.9                   | 21.9   |
|                    |                                 | 1 RB mid                        | 23.0                   | 22.0   |
|                    |                                 | 1 RB high                       | 22.9                   | 21.9   |
|                    |                                 | 50% RB low                      | 22.0                   | 21.0   |
|                    |                                 | 50% RB mid                      | 21.9                   | 21.1   |
|                    |                                 | 50% RB high                     | 21.7                   | 21.0   |
|                    |                                 | 100% RB                         | 21.9                   | 20.9   |
| 10.0               | 20450 / 829                     | 1 RB low                        | <b>23.1</b>            | 22.7   |
|                    |                                 | 1 RB mid                        | 23.0                   | 22.6   |
|                    |                                 | 1 RB high                       | 22.8                   | 22.3   |
|                    |                                 | 50% RB low                      | <b>22.1</b>            | 21.2   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB high                     | 22.0                   | 21.0   |
|                    |                                 | 100% RB                         | 22.1                   | 21.1   |
|                    | 20525 /<br>836.5                | 1 RB low                        | <b>23.0</b>            | 22.2   |
|                    |                                 | 1 RB mid                        | 23.0                   | 22.1   |
|                    |                                 | 1 RB high                       | 22.7                   | 21.8   |
|                    |                                 | 50% RB low                      | 22.0                   | 21.1   |
|                    |                                 | 50% RB mid                      | 21.9                   | 21.1   |
|                    |                                 | 50% RB high                     | 21.9                   | 21.1   |
|                    |                                 | 100% RB                         | 21.9                   | 20.9   |
|                    | 20600 / 844                     | 1 RB low                        | <b>22.8</b>            | 21.8   |
|                    |                                 | 1 RB mid                        | 22.8                   | 21.8   |
|                    |                                 | 1 RB high                       | 22.6                   | 21.6   |
|                    |                                 | 50% RB low                      | 21.8                   | 20.9   |
|                    |                                 | 50% RB mid                      | 21.8                   | 20.8   |
|                    |                                 | 50% RB high                     | 21.9                   | 20.8   |
|                    |                                 | 100% RB                         | 21.9                   | 20.9   |

Table 18: Test results conducted power measurement LTE FDD 5 850 MHz.

**7.1.8 Conducted power measurements LTE FDD 12 700 MHz**

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 1.4                | 23017 /<br>699.7                | 1 RB low                        | 23.3                   | 23.0   |
|                    |                                 | 1 RB mid                        | 23.3                   | 22.9   |
|                    |                                 | 1 RB high                       | 23.4                   | 22.9   |
|                    |                                 | 50% RB low                      | 23.3                   | 22.5   |
|                    |                                 | 50% RB mid                      | 23.4                   | 22.5   |
|                    |                                 | 50% RB high                     | 23.4                   | 22.5   |
|                    |                                 | 100% RB                         | 22.3                   | 21.3   |
|                    | 23095 /<br>707.5                | 1 RB low                        | 23.3                   | 22.3   |
|                    |                                 | 1 RB mid                        | 23.4                   | 22.1   |
|                    |                                 | 1 RB high                       | 23.4                   | 22.3   |
|                    |                                 | 50% RB low                      | 23.3                   | 22.5   |
|                    |                                 | 50% RB mid                      | 23.3                   | 22.5   |
|                    |                                 | 50% RB high                     | 23.2                   | 22.4   |
|                    |                                 | 100% RB                         | 22.2                   | 21.4   |
|                    | 23173 /<br>715.3                | 1 RB low                        | 23.2                   | 22.3   |
|                    |                                 | 1 RB mid                        | 23.2                   | 22.3   |
|                    |                                 | 1 RB high                       | 23.2                   | 22.4   |
|                    |                                 | 50% RB low                      | 23.1                   | 22.3   |
|                    |                                 | 50% RB mid                      | 23.2                   | 22.3   |
|                    |                                 | 50% RB high                     | 23.2                   | 22.3   |
| 3                  | 23025 /<br>700.5                | 1 RB low                        | 23.4                   | 22.9   |
|                    |                                 | 1 RB mid                        | 23.3                   | 22.9   |
|                    |                                 | 1 RB high                       | 23.3                   | 22.9   |
|                    |                                 | 50% RB low                      | 22.4                   | 21.3   |
|                    |                                 | 50% RB mid                      | 22.4                   | 21.2   |
|                    |                                 | 50% RB high                     | 22.3                   | 21.2   |
|                    |                                 | 100% RB                         | 22.3                   | 21.3   |
|                    | 23095 /<br>707.5                | 1 RB low                        | 23.3                   | 22.5   |
|                    |                                 | 1 RB mid                        | 23.3                   | 22.3   |
|                    |                                 | 1 RB high                       | 23.2                   | 22.3   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.5   |
|                    |                                 | 50% RB mid                      | 22.2                   | 21.5   |
|                    |                                 | 50% RB high                     | 22.2                   | 21.4   |
|                    |                                 | 100% RB                         | 22.2                   | 21.1   |
|                    | 23165 /<br>714.5                | 1 RB low                        | 23.0                   | 22.1   |
|                    |                                 | 1 RB mid                        | 23.1                   | 22.1   |
|                    |                                 | 1 RB high                       | 23.1                   | 22.0   |
|                    |                                 | 50% RB low                      | 22.1                   | 21.0   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB high                     | 22.1                   | 21.1   |
|                    |                                 | 100% RB                         | 22.1                   | 21.1   |

| Bandwidth<br>(MHz) | Channel /<br>Frequency<br>(MHz) | Resource<br>block<br>allocation | P <sub>avg</sub> (dBm) |        |
|--------------------|---------------------------------|---------------------------------|------------------------|--------|
|                    |                                 |                                 | QPSK                   | 16-QAM |
| 5                  | 21475 /<br>882.5                | 1 RB low                        | 23.3                   | 22.8   |
|                    |                                 | 1 RB mid                        | 23.5                   | 22.7   |
|                    |                                 | 1 RB high                       | 23.3                   | 22.6   |
|                    |                                 | 50% RB low                      | 22.3                   | 21.5   |
|                    |                                 | 50% RB mid                      | 22.3                   | 21.5   |
|                    |                                 | 50% RB high                     | 22.2                   | 21.4   |
|                    |                                 | 100% RB                         | 22.3                   | 21.2   |
|                    | 23095 /<br>707.5                | 1 RB low                        | 23.2                   | 22.3   |
|                    |                                 | 1 RB mid                        | 23.2                   | 22.4   |
|                    |                                 | 1 RB high                       | 23.1                   | 22.2   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.3   |
|                    |                                 | 50% RB mid                      | 22.2                   | 21.2   |
|                    |                                 | 50% RB high                     | 22.1                   | 21.2   |
|                    |                                 | 100% RB                         | 22.2                   | 21.1   |
|                    | 23155 /<br>713.5                | 1 RB low                        | 23.1                   | 22.3   |
|                    |                                 | 1 RB mid                        | 23.2                   | 22.3   |
|                    |                                 | 1 RB high                       | 23.1                   | 22.1   |
|                    |                                 | 50% RB low                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB high                     | 22.0                   | 21.1   |
|                    |                                 | 100% RB                         | 22.1                   | 21.1   |
| 10                 | 23060 / 704                     | 1 RB low                        | 23.3                   | 22.8   |
|                    |                                 | 1 RB mid                        | <b>23.3</b>            | 22.8   |
|                    |                                 | 1 RB high                       | 23.0                   | 22.6   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.2   |
|                    |                                 | 50% RB mid                      | <b>22.2</b>            | 21.2   |
|                    |                                 | 50% RB high                     | 22.2                   | 21.1   |
|                    |                                 | 100% RB                         | 22.2                   | 21.1   |
|                    | 23095 /<br>707.5                | 1 RB low                        | 23.2                   | 22.3   |
|                    |                                 | 1 RB mid                        | <b>23.2</b>            | 22.2   |
|                    |                                 | 1 RB high                       | 22.9                   | 22.1   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.2   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.2   |
|                    |                                 | 50% RB high                     | 22.1                   | 21.1   |
|                    |                                 | 100% RB                         | 22.1                   | 21.1   |
|                    | 23130 / 711                     | 1 RB low                        | 23.1                   | 22.1   |
|                    |                                 | 1 RB mid                        | <b>23.1</b>            | 22.1   |
|                    |                                 | 1 RB high                       | 23.0                   | 22.0   |
|                    |                                 | 50% RB low                      | 22.2                   | 21.1   |
|                    |                                 | 50% RB mid                      | 22.1                   | 21.1   |
|                    |                                 | 50% RB high                     | 22.0                   | 21.0   |
|                    |                                 | 100% RB                         | 22.1                   | 21.0   |

Table 19: Test results conducted power measurement LTE FDD12 700 MHz.

### 7.1.9 Justification of SAR measurements in LTE mode

According to Chapter 5 'SAR test procedures for LTE devices of FCC KDB Publication 941225 D05 the following test configurations for standalone measurements of the largest channel bandwidth (chapter 5.2) had to be taken into consideration:

#### 5.2.1. QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and *required test channel* combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each *required test channel*. When the *reported SAR* is  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and *required test channels* is not required for 1 RB allocation; otherwise, SAR is required for the remaining *required test channels* and only for the RB offset configuration with the highest output power for that channel.<sup>6</sup> When the *reported SAR* of a *required test channel* is  $> 1.45$  W/kg, SAR is required for all three RB offset configurations for that *required test channel*.

#### 5.2.2. QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.

#### 5.2.3. QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest *reported SAR* for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel and if the *reported SAR* is  $> 1.45$  W/kg, the remaining *required test channels* must also be tested.

#### 5.2.4. Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 5.2.1, 5.2.2 and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is  $> \frac{1}{2}$  dB higher than the same configuration in QPSK or when the *reported SAR* for the QPSK configuration is  $> 1.45$  W/kg.

Testing of other channel bandwidths was not necessary because the output power of equivalent channel configurations was less than  $\frac{1}{2}$  dB larger compared to the largest channel bandwidth and reported SAR was  $< 1.45$  W/kg.

Conducted and radiated measurements were performed with the maximum number of bundled TTIs supported by the DUT (see section 2.4 for details).

### 7.1.10 MPR information in LTE mode

There is a permanently applied MPR implemented by the manufacturer.  
 MPR is enabled for this device according to 3GPP TS36.101.

| Modulation | Channel bandwidth / resource block configuration |          |          |           |           |           | Target MPR | 3 GPP MPR |
|------------|--------------------------------------------------|----------|----------|-----------|-----------|-----------|------------|-----------|
|            | 1.4 MHz                                          | 3 MHz    | 5 MHz    | 10 MHz    | 15 MHz    | 20 MHz    |            |           |
| QPSK       | $> 5$                                            | $> 4$    | $> 8$    | $> 12$    | $> 16$    | $> 18$    | 1          | $\leq 1$  |
| 16QAM      | $\leq 5$                                         | $\leq 4$ | $\leq 8$ | $\leq 12$ | $\leq 16$ | $\leq 18$ | 1          | $\leq 1$  |
| 16QAM      | $> 5$                                            | $> 4$    | $> 8$    | $> 12$    | $> 16$    | $> 18$    | 2          | $\leq 2$  |

Therefore there is no power reduction at 1.4 MHz bandwidth with 50% RB allocation (3 RBs).

Additional differences in conducted power are not caused by implemented MPR but depend on measurement uncertainty and allowable tolerances per 3GPP or tune-up.  
 A-MPR was disabled for all SAR tests.

### 7.1.11 Conducted power measurements WLAN 2450 MHz

| 802.11b |    | maximum average conducted output power [dBm] |       |         |        |
|---------|----|----------------------------------------------|-------|---------|--------|
| Band    | Ch | 1Mbps                                        | 2Mbps | 5.5Mbps | 11Mbps |
| 2450MHz | 1  | 6.0                                          | 6.0   | 5.9     | 5.9    |
|         | 6  | 5.4                                          | 5.4   | 5.3     | 5.3    |
|         | 11 | 5.6                                          | 5.6   | 5.5     | 5.5    |

Table 20: Test results conducted power measurement 802.11b

| 802.11g |    | maximum average conducted output power [dBm] |       |        |        |        |        |        |        |
|---------|----|----------------------------------------------|-------|--------|--------|--------|--------|--------|--------|
| Band    | Ch | 6Mbps                                        | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
| 2450MHz | 1  | 6.1                                          | 6.0   | 5.9    | 6.0    | 5.9    | 5.7    | 5.7    | 5.7    |
|         | 2  | 6.0                                          | 5.9   | 5.8    | 5.9    | 5.8    | 5.6    | 5.6    | 5.6    |
|         | 6  | 6.0                                          | 5.9   | 5.8    | 5.9    | 5.9    | 5.7    | 5.7    | 5.7    |
|         | 10 | 5.7                                          | 5.6   | 5.5    | 5.5    | 5.5    | 5.3    | 5.3    | 5.3    |
|         | 11 | 5.7                                          | 5.6   | 5.5    | 5.5    | 5.5    | 5.3    | 5.3    | 5.3    |

Table 21: Test results conducted power measurement 802.11g

| 802.11n HT-20 |    | maximum average conducted output power [dBm] |                 |                   |                 |                 |                 |                   |                 |
|---------------|----|----------------------------------------------|-----------------|-------------------|-----------------|-----------------|-----------------|-------------------|-----------------|
| Band          | Ch | MCS-0<br>6.5Mbps                             | MCS-1<br>13Mbps | MCS-2<br>19.5Mbps | MCS-3<br>26Mbps | MCS-4<br>39Mbps | MCS-5<br>52Mbps | MCS-6<br>58.5Mbps | MCS-7<br>65Mbps |
| 2450MHz       | 1  | 6.0                                          | 5.9             | 5.9               | 5.9             | 5.8             | 5.8             | 5.7               | 5.5             |
|               | 2  | 5.9                                          | 5.8             | 5.8               | 5.9             | 5.8             | 5.8             | 5.7               | 5.5             |
|               | 6  | 5.8                                          | 5.7             | 5.7               | 5.8             | 5.7             | 5.7             | 5.6               | 5.4             |
|               | 10 | 5.6                                          | 5.5             | 5.5               | 5.6             | 5.4             | 5.5             | 5.4               | 5.2             |
|               | 11 | 5.6                                          | 5.5             | 5.5               | 5.5             | 5.4             | 5.4             | 5.3               | 5.2             |

Table 22: Test results conducted power measurement 802.11n HT-20

| 802.11n HT-40 |    | maximum average conducted output power [dBm] |                 |                   |                 |                 |                  |                    |                  |
|---------------|----|----------------------------------------------|-----------------|-------------------|-----------------|-----------------|------------------|--------------------|------------------|
| Band          | Ch | MCS-0<br>13.5Mbps                            | MCS-1<br>27Mbps | MCS-2<br>40.5Mbps | MCS-3<br>54Mbps | MCS-4<br>81Mbps | MCS-5<br>108Mbps | MCS-6<br>121.5Mbps | MCS-7<br>135Mbps |
| 2450MHz       | 3  | 4.0                                          | 4.3             | 4.2               | 4.3             | 4.3             | 4.2              | 4.2                | 4.2              |
|               | 6  | 5.5                                          | 5.8             | 5.7               | 5.8             | 5.8             | 5.7              | 5.7                | 5.7              |
|               | 9  | 3.6                                          | 3.9             | 3.8               | 3.9             | 3.9             | 3.8              | 3.8                | 3.8              |

Table 23: Test results conducted power measurement 802.11n HT-40

### 7.1.12 Conducted power measurements WLAN 5 GHz

| 802.11a |     | maximum average conducted output power [dBm] |       |        |        |        |        |        |        |
|---------|-----|----------------------------------------------|-------|--------|--------|--------|--------|--------|--------|
| Band    | Ch  | 6Mbps                                        | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
| 5200    | 36  | 0.3                                          | 0.3   | 0.2    | 0.2    | 0.2    | 0.2    | -0.2   | -0.2   |
|         | 40  | 0.3                                          | 0.3   | 0.3    | 0.3    | 0.2    | 0.2    | -0.2   | -0.2   |
|         | 44  | 0.3                                          | 0.3   | 0.3    | 0.2    | 0.2    | 0.2    | -0.2   | -0.2   |
|         | 48  | 0.2                                          | 0.2   | 0.2    | 0.2    | 0.2    | 0.2    | -0.1   | -0.1   |
| 5300    | 52  | 0.5                                          | 0.5   | 0.4    | 0.4    | 0.4    | 0.4    | 0.0    | -0.1   |
|         | 56  | 0.8                                          | 0.8   | 0.7    | 0.7    | 0.6    | 0.6    | 0.1    | 0.1    |
|         | 60  | 0.9                                          | 0.9   | 0.8    | 0.8    | 0.8    | 0.7    | 0.2    | 0.1    |
|         | 64  | 1.1                                          | 1.1   | 1.0    | 1.0    | 1.0    | 1.0    | 0.5    | 0.4    |
| 5600    | 100 | 1.7                                          | 1.7   | 1.6    | 1.6    | 1.6    | 1.6    | 1.1    | 1.1    |
|         | 104 | 1.8                                          | 1.8   | 1.7    | 1.7    | 1.7    | 1.7    | 1.2    | 1.2    |
|         | 108 | 1.7                                          | 1.7   | 1.7    | 1.6    | 1.6    | 1.6    | 1.0    | 0.9    |
|         | 112 | 1.8                                          | 1.8   | 1.7    | 1.7    | 1.7    | 1.7    | 1.2    | 1.2    |
|         | 116 | 2.0                                          | 2.0   | 1.9    | 1.8    | 1.8    | 1.8    | 1.3    | 1.2    |
|         | 120 | 1.9                                          | 1.9   | 1.8    | 1.8    | 1.8    | 1.8    | 1.3    | 1.3    |
|         | 124 | 2.1                                          | 2.1   | 2.0    | 2.0    | 1.9    | 1.9    | 1.4    | 1.4    |
|         | 128 | 2.0                                          | 2.0   | 1.9    | 1.9    | 1.9    | 1.9    | 1.4    | 1.3    |
|         | 132 | 1.9                                          | 1.9   | 1.8    | 1.8    | 1.8    | 1.8    | 1.3    | 1.3    |
|         | 136 | 2.2                                          | 2.2   | 2.1    | 2.1    | 2.0    | 2.0    | 1.5    | 1.5    |
|         | 140 | 2.7                                          | 2.7   | 2.6    | 2.6    | 2.6    | 2.5    | 2.0    | 1.9    |
|         | 144 | 2.7                                          | 2.7   | 2.6    | 2.6    | 2.6    | 2.5    | 2.0    | 1.9    |
| 5800    | 149 | 3.2                                          | 3.2   | 3.1    | 3.1    | 3.1    | 3.1    | 2.6    | 2.5    |
|         | 153 | 2.1                                          | 2.1   | 2.0    | 2.0    | 2.0    | 2.0    | 1.4    | 1.4    |
|         | 157 | 1.3                                          | 1.3   | 1.3    | 1.2    | 1.2    | 1.1    | 1.6    | 1.5    |
|         | 161 | 1.2                                          | 1.2   | 1.2    | 1.1    | 1.1    | 1.1    | 1.6    | 1.5    |
|         | 165 | 0.8                                          | 0.8   | 0.7    | 0.6    | 0.6    | 0.6    | 0.1    | 0.1    |

Table 24: Test results conducted power measurement 802.11a

| 802.11n HT-20 / 802.11ac VHT-20 maximum average conducted output power [dBm] |     |                  |                 |                   |                 |                 |                 |                   |                 |
|------------------------------------------------------------------------------|-----|------------------|-----------------|-------------------|-----------------|-----------------|-----------------|-------------------|-----------------|
| Band [MHz]                                                                   | Ch  | MCS-0<br>6.5Mbps | MCS-1<br>13Mbps | MCS-2<br>19.5Mbps | MCS-3<br>26Mbps | MCS-4<br>39Mbps | MCS-5<br>52Mbps | MCS-6<br>58.5Mbps | MCS-7<br>65Mbps |
| 5200                                                                         | 36  | -0.5             | -0.6            | -0.3              | -0.4            | -0.5            | -0.1            | -0.4              | -0.2            |
|                                                                              | 40  | -0.7             | -0.8            | -0.5              | -0.5            | -0.6            | -0.3            | -0.5              | -0.4            |
|                                                                              | 44  | -0.8             | -0.7            | -0.3              | -0.4            | -0.4            | -0.1            | -0.4              | -0.1            |
|                                                                              | 48  | -0.9             | -0.9            | -0.6              | -0.6            | -0.6            | -0.4            | -0.6              | -0.5            |
| 5300                                                                         | 52  | -0.4             | -0.4            | -0.1              | -0.2            | -0.2            | -0.1            | -0.2              | -0.2            |
|                                                                              | 56  | -0.1             | -0.1            | 0.2               | 0.2             | 0.2             | 0.5             | 0.2               | 0.4             |
|                                                                              | 60  | -0.3             | -0.4            | -0.1              | -0.1            | -0.1            | 0.2             | -0.1              | 0.1             |
|                                                                              | 64  | -0.1             | -0.1            | 0.2               | 0.2             | 0.2             | 0.5             | 0.2               | 0.4             |
| 5600                                                                         | 100 | 0.6              | 0.6             | 0.9               | 0.9             | 0.8             | 1.1             | 0.9               | 1.0             |
|                                                                              | 104 | 0.8              | 0.8             | 1.1               | 1.0             | 1.0             | 1.3             | 1.0               | 1.2             |
|                                                                              | 108 | 0.7              | 0.7             | 1.0               | 1.0             | 0.9             | 1.2             | 1.0               | 1.1             |
|                                                                              | 112 | 0.9              | 0.9             | 1.2               | 1.2             | 1.2             | 1.5             | 1.2               | 1.3             |
|                                                                              | 116 | 1.1              | 1.0             | 1.3               | 1.2             | 1.1             | 1.3             | 1.2               | 1.2             |
|                                                                              | 120 | 1.4              | 1.4             | 1.7               | 1.7             | 1.6             | 1.9             | 1.7               | 1.6             |
|                                                                              | 124 | 1.7              | 1.6             | 1.9               | 1.8             | 1.8             | 1.9             | 1.8               | 1.7             |
|                                                                              | 128 | 1.5              | 1.4             | 1.7               | 1.7             | 1.7             | 1.8             | 1.7               | 1.6             |
|                                                                              | 132 | 1.4              | 1.3             | 1.6               | 1.6             | 1.6             | 1.9             | 1.6               | 1.7             |
|                                                                              | 136 | 1.7              | 1.6             | 1.9               | 1.8             | 1.8             | 2.1             | 1.8               | 2.0             |
|                                                                              | 140 | 1.7              | 1.7             | 2.0               | 1.9             | 1.9             | 2.1             | 1.9               | 1.9             |
|                                                                              | 144 | 1.7              | 1.7             | 2.0               | 1.9             | 1.9             | 2.1             | 1.9               | 1.9             |
| 5800                                                                         | 149 | 1.8              | 1.8             | 2.1               | 2.1             | 2.1             | 2.3             | 2.0               | 2.2             |
|                                                                              | 153 | 1.0              | -0.9            | -0.6              | -0.6            | -0.7            | -0.3            | -0.6              | -0.4            |
|                                                                              | 157 | 0.1              | 0.1             | 0.4               | 0.3             | 0.3             | 0.7             | 0.4               | 0.5             |
|                                                                              | 161 | 0.0              | -0.9            | -0.6              | -0.7            | -0.8            | -0.5            | -0.6              | -0.7            |
|                                                                              | 165 | -0.2             | -0.2            | 0.1               | 0.1             | 0.0             | 0.4             | 0.1               | 0.2             |

Table 25: Test results conducted power measurement 802.11n HT-20 / 802.11ac VHT-20

| 802.11n HT-40 / 802.11ac VHT-40 maximum average conducted output power [dBm] |     |                   |                 |                   |                 |                 |                  |                    |                  |
|------------------------------------------------------------------------------|-----|-------------------|-----------------|-------------------|-----------------|-----------------|------------------|--------------------|------------------|
| Band [MHz]                                                                   | Ch  | MCS-0<br>13.5Mbps | MCS-1<br>27Mbps | MCS-2<br>40.5Mbps | MCS-3<br>54Mbps | MCS-4<br>81Mbps | MCS-5<br>108Mbps | MCS-6<br>121.5Mbps | MCS-7<br>135Mbps |
| 5200                                                                         | 38  | -2.9              | -3.0            | -3.0              | -3.1            | -3.1            | -3.1             | -2.8               | -3.0             |
|                                                                              | 46  | -3.3              | -3.4            | -3.3              | -3.3            | -3.3            | -3.5             | -3.1               | -3.3             |
| 5300                                                                         | 54  | -3.3              | -3.3            | -3.3              | -3.4            | -3.3            | -3.3             | -3.2               | -3.3             |
|                                                                              | 62  | -3.7              | -3.6            | -3.5              | -3.5            | -3.5            | -3.5             | -3.5               | -3.5             |
| 5600                                                                         | 102 | -1.9              | -1.8            | -1.8              | -1.9            | -1.9            | -1.4             | -1.7               | -1.7             |
|                                                                              | 110 | -1.9              | -1.9            | -1.9              | -1.9            | -1.9            | -1.9             | -1.8               | -1.8             |
|                                                                              | 118 | -1.5              | -1.5            | -1.5              | -1.6            | -1.6            | -1.6             | -1.3               | -1.4             |
|                                                                              | 126 | -1.4              | -1.5            | -1.4              | -1.5            | -1.4            | -1.5             | -1.3               | -1.5             |
|                                                                              | 134 | -1.8              | -1.9            | -1.7              | -1.7            | -1.7            | -1.8             | -1.6               | -1.7             |
| 5800                                                                         | 151 | -0.2              | -0.2            | -0.3              | -0.4            | -0.3            | -0.2             | -0.1               | -0.2             |
|                                                                              | 159 | -1.8              | -1.7            | -1.7              | -1.8            | -1.7            | -1.9             | -1.7               | -1.9             |

Table 26: Test results conducted power measurement 802.11n HT-40 / 802.11ac VHT-40

### 7.1.1 Conducted average power measurements Bluetooth 2.4 GHz

| Channel | Frequency (MHz) | GFSK        | upper limit | antenna gain |
|---------|-----------------|-------------|-------------|--------------|
| 0       | 2402            | 6.3         | 7.0         | -0.4         |
| 39      | 2441            | 10.0        | 10.5        | 5.7          |
| 78      | 2480            | <b>15.4</b> | 16.0        | 5.1          |

Table 27: Test results conducted average power measurement Bluetooth 2.4 GHz

### 7.1.2 Standalone SAR Test Exclusion according to FCC KDB 447498 D01

| Standalone SAR test exclusion considerations |             |               |                          |                         |                                          |                                             |                                  |
|----------------------------------------------|-------------|---------------|--------------------------|-------------------------|------------------------------------------|---------------------------------------------|----------------------------------|
| Communication system                         | freq. (MHz) | distance (mm) | P <sub>avg</sub> * (dBm) | P <sub>avg</sub> * (mW) | threshold <sub>1g</sub> comparison value | SAR <sub>1g</sub> test exclusion thresholds | SAR <sub>1g</sub> test exclusion |
| WLAN 5.2 GHz                                 | 5200        | 5             | 1.0                      | 1.3                     | 0.6                                      | 7.5                                         | yes                              |
| WLAN 5.3 GHz                                 | 5300        | 5             | 1.5                      | 1.4                     | 0.7                                      | 7.5                                         | yes                              |
| WLAN 5.6 GHz                                 | 5600        | 5             | 3.0                      | 2.0                     | 0.9                                      | 7.5                                         | yes                              |
| WLAN 5.8 GHz                                 | 5800        | 5             | 3.5                      | 2.2                     | 1.1                                      | 7.5                                         | yes                              |

Table 28: Standalone SAR test exclusion considerations

P<sub>avg</sub>\* - maximum possible output power declared by manufacturer

The **10-g SAR test exclusion thresholds** for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and ≤ **7.5** for 10-g extremity SAR, where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

### 7.1.3 Standalone SAR Test Exclusion according to RSS-102 Issue 5

| Standalone SAR test exclusion considerations |             |               |                          |                         |                                     |                    |
|----------------------------------------------|-------------|---------------|--------------------------|-------------------------|-------------------------------------|--------------------|
| Communication system                         | freq. (MHz) | distance (mm) | P <sub>avg</sub> * (dBm) | P <sub>avg</sub> * (mW) | Exemption Limits <sub>1g</sub> (mW) | SAR test exclusion |
| WLAN 5.2 GHz                                 | 5200        | 5             | 1.0                      | 1.3                     | 2.5                                 | yes                |
| WLAN 5.3 GHz                                 | 5300        | 5             | 1.5                      | 1.4                     | 2.5                                 | yes                |
| WLAN 5.6 GHz                                 | 5600        | 5             | 3.0                      | 2.0                     | 2.5                                 | yes                |
| WLAN 5.8 GHz                                 | 5800        | 5             | 3.5                      | 2.2                     | 2.5                                 | yes                |

Table 29: Standalone SAR test exclusion considerations

P<sub>avg</sub>\* - maximum possible output power declared by manufacturer. Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power.

For limb-worn devices where the **10g** value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of **2.5**. If the operating frequency of the device is between two frequencies located in Table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

## 7.2 SAR test results

### 7.2.1 General description of test procedures

- The DUT is tested using CMU 200 and CMW 500 communications testers as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power.
- Test positions as described in the tables above are in accordance with the specified test standard.
- UMTS was tested in RMC mode with 12.2 kbit/s and TPC bits set to 'all 1'.
- WLAN was tested in 802.11a/b mode with 1 MBit/s and 6 MBit/s.
- Required WLAN test channels were selected according to KDB 248227
- The DUT was tested using a CBT communication tester in BT-test mode to adjust maximum output power, test channels and operating mode.  
(GFSK - DH5 - STATIC PBRS - 76% duty cycle)
- According to IEEE 1528 the SAR test shall be performed at middle channel. Testing of top and bottom channel is optional.
- According to KDB 447498 D01 testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
  - $\leq 0.8 \text{ W/kg}$  or  $2.0 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is  $\leq 100 \text{ MHz}$
  - $\leq 0.6 \text{ W/kg}$  or  $1.5 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
  - $\leq 0.4 \text{ W/kg}$  or  $1.0 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is  $\geq 200 \text{ MHz}$
- IEEE 1528-2013 requires the middle channel to be tested first. This generally applies to wireless devices that are designed to operate in technologies with tight tolerances for maximum output power variations across channels in the band. When the maximum output power variation across the required test channels is  $> \frac{1}{2} \text{ dB}$ , instead of the middle channel, the highest output power channel must be used.

## 7.2.2 Results overview

| measured / extrapolated SAR numbers - Extremities - UMTS FDD II 1900MHz - Limit for 10g: 4W/kg |                |               |          |                              |       |                           |              |                     |                |               |
|------------------------------------------------------------------------------------------------|----------------|---------------|----------|------------------------------|-------|---------------------------|--------------|---------------------|----------------|---------------|
| Ch.                                                                                            | Freq.<br>(MHz) | test<br>cond. | Position | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |              | power<br>drift (dB) | liquid<br>(°C) | dist.<br>(mm) |
|                                                                                                |                |               |          | declared**                   | meas. | meas.                     | extrap.      |                     |                |               |
| Move 5000                                                                                      |                |               |          |                              |       |                           |              |                     |                |               |
| 9538                                                                                           | 1907.6         | RMC           | top      | 23.5                         | 23.0  | 0.156                     | 0.175        | -0.03               | 22.4           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | bottom   | 23.5                         | 23.0  | 0.173                     | 0.194        | 0.06                | 22.4           | 0             |
| 9262                                                                                           | 1852.4         | RMC           | left     | 23.5                         | 22.7  | 1.430                     | 1.719        | -0.10               | 22.4           | 0             |
| 9400                                                                                           | 1880.0         | RMC           | left     | 23.5                         | 22.7  | 1.290                     | 1.551        | -0.11               | 22.4           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | left     | 23.5                         | 23.0  | 1.290                     | 1.447        | -0.10               | 22.4           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | right    | 23.5                         | 23.0  | 0.127                     | 0.142        | -0.15               | 22.4           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | front    | 23.5                         | 23.0  | 0.039                     | 0.043        | 0.19                | 22.4           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | rear     | 23.5                         | 23.0  | 0.105                     | 0.118        | -0.35               | 22.4           | 0             |
| Move 3500                                                                                      |                |               |          |                              |       |                           |              |                     |                |               |
| 9538                                                                                           | 1907.6         | RMC           | top      | 23.5                         | 23.0  | 0.174                     | 0.195        | 0.05                | 21.7           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | bottom   | 23.5                         | 23.0  | 0.215                     | 0.241        | 0.00                | 21.7           | 0             |
| 9262                                                                                           | 1852.4         | RMC           | left     | 23.5                         | 22.7  | <b>2.340</b>              | <b>2.813</b> | 0.00                | 21.7           | 0             |
| 9400                                                                                           | 1880.0         | RMC           | left     | 23.5                         | 22.7  | 2.110                     | 2.537        | 0.00                | 21.7           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | left     | 23.5                         | 23.0  | 2.090                     | 2.345        | 0.01                | 21.7           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | right    | 23.5                         | 23.0  | 0.152                     | 0.171        | -0.16               | 21.7           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | front    | 23.5                         | 23.0  | 0.078                     | 0.088        | 0.08                | 21.7           | 0             |
| 9538                                                                                           | 1907.6         | RMC           | rear     | 23.5                         | 23.0  | 0.021                     | 0.023        | -0.10               | 21.7           | 0             |
| 9262                                                                                           | 1852.4         | RMC           | left*    | 23.5                         | 22.7  | 2.060                     | 2.477        | 0.00                | 21.7           | 0             |

Table 30: Test results SAR UMTS FDD II 1880 MHz (see max. SAR plot on page 65.)

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

\*\* - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Extremities - UMTS FDD IV 1700MHz - Limit for 10g: 4W/kg |                |               |           |                              |       |                           |         |                     |                |               |
|------------------------------------------------------------------------------------------------|----------------|---------------|-----------|------------------------------|-------|---------------------------|---------|---------------------|----------------|---------------|
| Ch.                                                                                            | Freq.<br>(MHz) | test<br>cond. | Position  | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |         | power<br>drift (dB) | liquid<br>(°C) | dist.<br>(mm) |
|                                                                                                |                |               |           | declared**                   | meas. | meas.                     | extrap. |                     |                |               |
| Move 5000                                                                                      |                |               |           |                              |       |                           |         |                     |                |               |
| 1412                                                                                           | 1732.4         | RMC           | top       | 23.0                         | 22.8  | 0.144                     | 0.151   | 0.13                | 20.9           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | bottom    | 23.0                         | 22.8  | 0.303                     | 0.317   | -0.03               | 20.9           | 0             |
| 1312                                                                                           | 1712.4         | RMC           | left      | 23.0                         | 22.8  | 2.270                     | 2.377   | -0.08               | 20.9           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | left      | 23.0                         | 22.8  | 2.360                     | 2.471   | -0.01               | 20.9           | 0             |
| 1513                                                                                           | 1752.6         | RMC           | left      | 23.0                         | 22.7  | 2.140                     | 2.293   | -0.13               | 20.9           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | right     | 23.0                         | 22.8  | 0.271                     | 0.284   | 0.03                | 20.9           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | front     | 23.0                         | 22.8  | 0.045                     | 0.047   | -0.01               | 20.9           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | rear      | 23.0                         | 22.8  | 0.098                     | 0.102   | 0.17                | 20.9           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | left (WC) | 23.0                         | 22.8  | 2.480                     | 2.597   | -0.04               | 20.9           | 0             |
| Move 3500                                                                                      |                |               |           |                              |       |                           |         |                     |                |               |
| 1312                                                                                           | 1712.4         | RMC           | left      | 23.0                         | 22.8  | 1.890                     | 1.979   | -0.14               | 22.4           | 0             |
| 1412                                                                                           | 1732.4         | RMC           | left      | 23.0                         | 22.8  | 2.060                     | 2.157   | -0.19               | 22.4           | 0             |
| 1513                                                                                           | 1752.6         | RMC           | left      | 23.0                         | 22.7  | 2.020                     | 2.164   | -0.11               | 22.4           | 0             |

Table 31: Test results SAR UMTS FDD IV 1700 MHz MHz (see max. SAR plot on page 66.)

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

\*\* - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Extremities - UMTS FDD V 85 MHz - Limit for 10g: 4W/kg |                |               |          |                              |       |                           |              |                     |                |               |
|----------------------------------------------------------------------------------------------|----------------|---------------|----------|------------------------------|-------|---------------------------|--------------|---------------------|----------------|---------------|
| Ch.                                                                                          | Freq.<br>(MHz) | test<br>cond. | Position | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |              | power<br>drift (dB) | liquid<br>(°C) | dist.<br>(mm) |
|                                                                                              |                |               |          | declared**                   | meas. | meas.                     | extrap.      |                     |                |               |
| Move 5000                                                                                    |                |               |          |                              |       |                           |              |                     |                |               |
| 4182                                                                                         | 836.4          | RMC           | top      | 24.0                         | 23.4  | 0.105                     | 0.121        | -0.11               | 23.4           | 0             |
| 4182                                                                                         | 836.4          | RMC           | bottom   | 24.0                         | 23.4  | 0.084                     | 0.097        | -0.04               | 23.4           | 0             |
| 4132                                                                                         | 826.4          | RMC           | left     | 24.0                         | 23.3  | 0.419                     | 0.492        | 0.04                | 23.4           | 0             |
| 4182                                                                                         | 836.4          | RMC           | left     | 24.0                         | 23.4  | 0.403                     | 0.463        | -0.08               | 23.4           | 0             |
| 4233                                                                                         | 846.6          | RMC           | left     | 24.0                         | 23.4  | 0.398                     | 0.457        | -0.01               | 23.4           | 0             |
| 4182                                                                                         | 836.4          | RMC           | right    | 24.0                         | 23.4  | 0.055                     | 0.063        | -0.18               | 23.4           | 0             |
| 4182                                                                                         | 836.4          | RMC           | front    | 24.0                         | 23.4  | 0.029                     | 0.034        | -0.06               | 23.4           | 0             |
| 4182                                                                                         | 836.4          | RMC           | rear     | 24.0                         | 23.4  | 0.018                     | 0.021        | 0.06                | 23.4           | 0             |
| Move 3500                                                                                    |                |               |          |                              |       |                           |              |                     |                |               |
| 4182                                                                                         | 836.4          | RMC           | top      | 24.0                         | 23.4  | 0.205                     | 0.235        | 0.01                | 22.7           | 0             |
| 4182                                                                                         | 836.4          | RMC           | bottom   | 24.0                         | 23.4  | 0.131                     | 0.150        | 0.03                | 22.7           | 0             |
| 4132                                                                                         | 826.4          | RMC           | left     | 24.0                         | 23.3  | <b>0.537</b>              | <b>0.631</b> | -0.16               | 22.7           | 0             |
| 4182                                                                                         | 836.4          | RMC           | left     | 24.0                         | 23.4  | 0.472                     | 0.542        | -0.13               | 22.7           | 0             |
| 4233                                                                                         | 846.6          | RMC           | left     | 24.0                         | 23.4  | 0.423                     | 0.486        | -0.15               | 22.7           | 0             |
| 4182                                                                                         | 836.4          | RMC           | right    | 24.0                         | 23.4  | 0.066                     | 0.076        | -0.15               | 22.7           | 0             |
| 4182                                                                                         | 836.4          | RMC           | front    | 24.0                         | 23.4  | 0.006                     | 0.007        | 0.13                | 22.7           | 0             |
| 4182                                                                                         | 836.4          | RMC           | rear     | 24.0                         | 23.4  | 0.033                     | 0.038        | 0.03                | 22.7           | 0             |

Table 32: Test results SAR UMTS FDD V 850 MHz (see max. SAR plot on page 67)

\*\* - maximum possible output power declared by manufacturer

**measured / extrapolated SAR numbers - Extremities - LTE FDD 2 1900MHz - Limit for 10g: 4W/Kg**

| Ch.                            | Freq.<br>(MHz) | RB<br>offset | Position | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |         | power<br>drift (dB) | liquid<br>(°C) | dist.<br>(mm) |
|--------------------------------|----------------|--------------|----------|------------------------------|-------|---------------------------|---------|---------------------|----------------|---------------|
|                                |                |              |          | declared**                   | meas. | meas.                     | extrap. |                     |                |               |
| 20MHz BW/1RB/QPSK - MOVE5000   |                |              |          |                              |       |                           |         |                     |                |               |
| 18700                          | 1860           | 0            | top      | 22.5                         | 22.3  | 0.140                     | 0.147   | 0.01                | 22.4           | 0             |
| 18700                          | 1860           | 0            | bottom   | 22.5                         | 22.3  | 0.131                     | 0.137   | -0.14               | 22.4           | 0             |
| 18700                          | 1860           | 0            | left     | 22.5                         | 22.3  | 1.270                     | 1.330   | 0.01                | 22.4           | 0             |
| 18900                          | 1880           | 0            | left     | 22.5                         | 22.2  | 1.200                     | 1.286   | 0.01                | 22.4           | 0             |
| 19100                          | 1900           | 0            | left     | 22.5                         | 22.2  | 1.160                     | 1.243   | 0.09                | 22.4           | 0             |
| 18700                          | 1860           | 0            | right    | 22.5                         | 22.3  | 0.155                     | 0.162   | -0.05               | 22.4           | 0             |
| 18700                          | 1860           | 0            | front    | 22.5                         | 22.3  | 0.042                     | 0.044   | -0.16               | 22.4           | 0             |
| 18700                          | 1860           | 0            | rear     | 22.5                         | 22.3  | 0.032                     | 0.033   | -0.02               | 22.4           | 0             |
| 20MHz BW/50RB/QPSK - MOVE5000  |                |              |          |                              |       |                           |         |                     |                |               |
| 19100                          | 1900           | 0            | top      | 21.5                         | 21.2  | 0.100                     | 0.107   | 0.17                | 22.4           | 0             |
| 19100                          | 1900           | 0            | bottom   | 21.5                         | 21.2  | 0.098                     | 0.105   | 0.11                | 22.4           | 0             |
| 19100                          | 1900           | 0            | left     | 21.5                         | 21.2  | 0.925                     | 0.991   | -0.03               | 22.4           | 0             |
| 19100                          | 1900           | 0            | right    | 21.5                         | 21.2  | 0.107                     | 0.115   | 0.11                | 22.4           | 0             |
| 19100                          | 1900           | 0            | front    | 21.5                         | 21.2  | 0.046                     | 0.049   | -0.13               | 22.4           | 0             |
| 19100                          | 1900           | 0            | rear     | 21.5                         | 21.2  | 0.028                     | 0.030   | 0.05                | 22.4           | 0             |
| 20MHz BW/1RB/QPSK - MOVE3500   |                |              |          |                              |       |                           |         |                     |                |               |
| 18700                          | 1860           | 0            | top      | 22.5                         | 22.3  | 0.155                     | 0.162   | 0.05                | 21.7           | 0             |
| 18700                          | 1860           | 0            | bottom   | 22.5                         | 22.3  | 0.238                     | 0.249   | 0.08                | 21.7           | 0             |
| 18700                          | 1860           | 0            | left     | 22.5                         | 22.3  | 2.010                     | 2.105   | 0.06                | 21.7           | 0             |
| 18900                          | 1880           | 0            | left     | 22.5                         | 22.2  | 1.970                     | 2.111   | 0.04                | 21.7           | 0             |
| 19100                          | 1900           | 0            | left     | 22.5                         | 22.2  | 1.980                     | 2.122   | 0.01                | 21.7           | 0             |
| 18700                          | 1860           | 0            | right    | 22.5                         | 22.3  | 0.128                     | 0.134   | -0.13               | 21.7           | 0             |
| 18700                          | 1860           | 0            | front    | 22.5                         | 22.3  | 0.089                     | 0.093   | -0.03               | 21.7           | 0             |
| 18700                          | 1860           | 0            | rear     | 22.5                         | 22.3  | 0.029                     | 0.031   | -0.17               | 21.7           | 0             |
| 18700                          | 1860           | 0            | left*    | 22.5                         | 22.3  | 2.080                     | 2.178   | -0.04               | 21.7           | 0             |
| 20MHz BW/50RB/QPSK - MOVE3500  |                |              |          |                              |       |                           |         |                     |                |               |
| 19100                          | 1900           | 0            | top      | 21.5                         | 21.2  | 0.133                     | 0.143   | 0.10                | 21.7           | 0             |
| 19100                          | 1900           | 0            | bottom   | 21.5                         | 21.2  | 0.160                     | 0.171   | 0.05                | 21.7           | 0             |
| 19100                          | 1900           | 0            | left     | 21.5                         | 21.2  | 1.430                     | 1.532   | 0.09                | 21.7           | 0             |
| 19100                          | 1900           | 0            | right    | 21.5                         | 21.2  | 0.078                     | 0.084   | -0.07               | 21.7           | 0             |
| 19100                          | 1900           | 0            | front    | 21.5                         | 21.2  | 0.066                     | 0.071   | 0.16                | 21.7           | 0             |
| 19100                          | 1900           | 0            | rear     | 21.5                         | 21.2  | 0.020                     | 0.021   | 0.05                | 21.7           | 0             |
| 20MHz BW/100RB/QPSK - MOVE3500 |                |              |          |                              |       |                           |         |                     |                |               |
| 19100                          | 1900           | 0            | top      | 21.5                         | 21.2  | 0.129                     | 0.138   | 0.06                | 21.7           | 0             |
| 19100                          | 1900           | 0            | bottom   | 21.5                         | 21.2  | 0.151                     | 0.162   | -0.04               | 21.7           | 0             |
| 19100                          | 1900           | 0            | left     | 21.5                         | 21.2  | 1.160                     | 1.243   | -0.04               | 21.7           | 0             |
| 19100                          | 1900           | 0            | right    | 21.5                         | 21.2  | 0.077                     | 0.083   | 0.10                | 21.7           | 0             |
| 19100                          | 1900           | 0            | front    | 21.5                         | 21.2  | 0.064                     | 0.068   | 0.07                | 21.7           | 0             |
| 19100                          | 1900           | 0            | rear     | 21.5                         | 21.2  | 0.020                     | 0.021   | -0.02               | 21.7           | 0             |

Table 33: Test results SAR LTE FDD 2 1900 MHz (see max. SAR plot on page 68.)

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

\*\* - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Extremities - LTE FDD 4 1750MHz - Limit for 10g: 4W/Kg |                |              |           |                              |       |                           |              |                     |                |               |
|----------------------------------------------------------------------------------------------|----------------|--------------|-----------|------------------------------|-------|---------------------------|--------------|---------------------|----------------|---------------|
| Ch.                                                                                          | Freq.<br>(MHz) | RB<br>offset | Position  | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |              | power<br>drift (dB) | liquid<br>(°C) | dist.<br>(mm) |
|                                                                                              |                |              |           | declared**                   | meas. | meas.                     | extrap.      |                     |                |               |
| 20MHz BW/1RB/QPSK - MOVE5000                                                                 |                |              |           |                              |       |                           |              |                     |                |               |
| 20050                                                                                        | 1720.0         | 0            | top       | 23.0                         | 22.9  | 0.113                     | 0.116        | 0.14                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | bottom    | 23.0                         | 22.9  | 0.341                     | 0.349        | 0.04                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | left      | 23.0                         | 22.9  | 2.170                     | 2.221        | -0.12               | 20.8           | 0             |
| 20175                                                                                        | 1732.5         | 0            | left      | 23.0                         | 22.6  | 2.190                     | 2.401        | -0.04               | 20.8           | 0             |
| 20300                                                                                        | 1745.0         | 0            | left      | 23.0                         | 22.6  | <b>2.260</b>              | <b>2.478</b> | -0.03               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | right     | 23.0                         | 22.9  | 0.263                     | 0.269        | 0.12                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | front     | 23.0                         | 22.9  | 0.042                     | 0.043        | -0.05               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | rear      | 23.0                         | 22.9  | 0.029                     | 0.030        | 0.00                | 20.8           | 0             |
| 20300                                                                                        | 1745.0         | 0            | left (WC) | 23.0                         | 22.6  | 2.220                     | 2.434        | -0.19               | 20.8           | 0             |
| 20MHz BW/50RB/QPSK - MOVE5000                                                                |                |              |           |                              |       |                           |              |                     |                |               |
| 20050                                                                                        | 1720.0         | 0            | top       | 22.0                         | 21.7  | 0.090                     | 0.096        | 0.18                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | bottom    | 22.0                         | 21.7  | 0.265                     | 0.284        | -0.02               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | left      | 22.0                         | 21.7  | 1.830                     | 1.961        | -0.03               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | right     | 22.0                         | 21.7  | 0.216                     | 0.231        | -0.03               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | front     | 22.0                         | 21.7  | 0.036                     | 0.039        | -0.01               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | rear      | 22.0                         | 21.7  | 0.024                     | 0.026        | -0.02               | 20.8           | 0             |
| 20MHz BW/100RB/QPSK - MOVE5000                                                               |                |              |           |                              |       |                           |              |                     |                |               |
| 20050                                                                                        | 1720.0         | 0            | top       | 22.0                         | 21.4  | 0.087                     | 0.099        | 0.13                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | bottom    | 22.0                         | 21.4  | 0.241                     | 0.277        | 0.06                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | left      | 22.0                         | 21.4  | 1.680                     | 1.929        | -0.03               | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | right     | 22.0                         | 21.4  | 0.219                     | 0.251        | 0.19                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | front     | 22.0                         | 21.4  | 0.039                     | 0.045        | 0.08                | 20.8           | 0             |
| 20050                                                                                        | 1720.0         | 0            | rear      | 22.0                         | 21.4  | 0.024                     | 0.027        | 0.13                | 20.8           | 0             |
| 20MHz BW/1RB/QPSK - MOVE3500                                                                 |                |              |           |                              |       |                           |              |                     |                |               |
| 20050                                                                                        | 1720.0         | 0            | left      | 23.0                         | 22.9  | 1.980                     | 2.026        | -0.02               | 22.4           | 0             |
| 20175                                                                                        | 1732.5         | 0            | left      | 23.0                         | 22.6  | 2.070                     | 2.270        | 0.06                | 22.4           | 0             |
| 20300                                                                                        | 1745.0         | 0            | left      | 23.0                         | 22.6  | 2.090                     | 2.292        | 0.09                | 22.4           | 0             |

Table 34: Test results SAR LTE FDD 4 1750 MHz (see max. SAR plot on page 69.)

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

\*\* - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Extremities - LTE FDD 5 850MHz - Limit for 10g: 4W/Kg |                |              |          |                              |       |                           |              |                     |                |               |
|---------------------------------------------------------------------------------------------|----------------|--------------|----------|------------------------------|-------|---------------------------|--------------|---------------------|----------------|---------------|
| Ch.                                                                                         | Freq.<br>(MHz) | RB<br>offset | Position | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |              | power<br>drift (dB) | liquid<br>(°C) | dist.<br>(mm) |
|                                                                                             |                |              |          | declared**                   | meas. | meas.                     | extrap.      |                     |                |               |
| 10MHz BW/1RB/QPSK - MOVE /5000                                                              |                |              |          |                              |       |                           |              |                     |                |               |
| 20450                                                                                       | 829.0          | 0            | top      | 24.0                         | 23.1  | 0.145                     | 0.178        | 0.02                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | bottom   | 24.0                         | 23.1  | 0.085                     | 0.104        | 0.14                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | left     | 24.0                         | 23.1  | 0.438                     | 0.539        | 0.00                | 22.7           | 0             |
| 20525                                                                                       | 836.5          | 0            | left     | 24.0                         | 23.0  | 0.414                     | 0.521        | 0.03                | 22.7           | 0             |
| 20600                                                                                       | 844.0          | 0            | left     | 24.0                         | 22.8  | 0.361                     | 0.476        | 0.00                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | right    | 24.0                         | 23.1  | 0.051                     | 0.063        | -0.04               | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | front    | 24.0                         | 23.1  | 0.004                     | 0.005        | 0.17                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | rear     | 24.0                         | 23.1  | 0.019                     | 0.024        | -0.19               | 22.7           | 0             |
| 10MHz BW/25RB/QPSK - MOVE /5000                                                             |                |              |          |                              |       |                           |              |                     |                |               |
| 20450                                                                                       | 829.0          | 0            | top      | 23.0                         | 22.8  | 0.107                     | 0.112        | 0.15                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | bottom   | 23.0                         | 22.8  | 0.066                     | 0.069        | 0.05                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | left     | 23.0                         | 22.8  | 0.385                     | 0.403        | 0.08                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | right    | 23.0                         | 22.8  | 0.043                     | 0.045        | 0.05                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | front    | 23.0                         | 22.8  | 0.004                     | 0.005        | 0.15                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | rear     | 23.0                         | 22.8  | 0.016                     | 0.017        | -0.18               | 22.7           | 0             |
| 10MHz BW/1RB/QPSK - MOVE3500                                                                |                |              |          |                              |       |                           |              |                     |                |               |
| 20450                                                                                       | 829.0          | 0            | top      | 24.0                         | 23.1  | 0.217                     | 0.267        | 0.14                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | bottom   | 24.0                         | 23.1  | 0.150                     | 0.185        | -0.04               | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | left     | 24.0                         | 23.1  | <b>0.574</b>              | <b>0.706</b> | -0.09               | 22.7           | 0             |
| 20525                                                                                       | 836.5          | 0            | left     | 24.0                         | 23.0  | 0.512                     | 0.645        | -0.07               | 22.7           | 0             |
| 20600                                                                                       | 844.0          | 0            | left     | 24.0                         | 22.8  | 0.465                     | 0.613        | -0.01               | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | right    | 24.0                         | 23.1  | 0.087                     | 0.107        | 0.09                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | front    | 24.0                         | 23.1  | 0.007                     | 0.009        | 0.04                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | rear     | 24.0                         | 23.1  | 0.032                     | 0.039        | 0.17                | 22.7           | 0             |
| 10MHz BW/25RB/QPSK - MOVE3500                                                               |                |              |          |                              |       |                           |              |                     |                |               |
| 20450                                                                                       | 829.0          | 0            | top      | 23.0                         | 22.8  | 0.174                     | 0.182        | 0.04                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | bottom   | 23.0                         | 22.8  | 0.117                     | 0.123        | 0.07                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | left     | 23.0                         | 22.8  | 0.440                     | 0.461        | -0.03               | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | right    | 23.0                         | 22.8  | 0.064                     | 0.067        | -0.13               | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | front    | 23.0                         | 22.8  | 0.005                     | 0.006        | 0.03                | 22.7           | 0             |
| 20450                                                                                       | 829.0          | 0            | rear     | 23.0                         | 22.8  | 0.025                     | 0.026        | 0.13                | 22.7           | 0             |

Table 35: Test results SAR LTE FDD 5 850 MHz (see max. SAR plot on page 70.)

\*\* - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Extremities - LTE FDD 12 700MHz - Limit for 10g: 4W/Kg |             |           |          |                              |       |                           |              |                  |             |            |
|----------------------------------------------------------------------------------------------|-------------|-----------|----------|------------------------------|-------|---------------------------|--------------|------------------|-------------|------------|
| Ch.                                                                                          | Freq. (MHz) | RB offset | Position | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |              | power drift (dB) | liquid (°C) | dist. (mm) |
|                                                                                              |             |           |          | declared**                   | meas. | meas.                     | extrap.      |                  |             |            |
| 10MHz BW/1RB/QPSK - Move5000                                                                 |             |           |          |                              |       |                           |              |                  |             |            |
| 23060                                                                                        | 704.0       | 25        | top      | 24.0                         | 23.3  | 0.110                     | 0.129        | 0.00             | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 25        | bottom   | 24.0                         | 23.3  | 0.187                     | 0.220        | 0.03             | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 25        | left     | 24.0                         | 23.3  | <b>0.319</b>              | <b>0.375</b> | -0.02            | 22.7        | 0          |
| 23095                                                                                        | 707.5       | 25        | left     | 24.0                         | 23.2  | 0.312                     | 0.375        | 0.01             | 22.7        | 0          |
| 23130                                                                                        | 711.0       | 25        | left     | 24.0                         | 23.1  | 0.263                     | 0.324        | -0.14            | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 25        | right    | 24.0                         | 23.3  | 0.080                     | 0.094        | -0.17            | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 25        | front    | 24.0                         | 23.3  | 0.013                     | 0.015        | 11.00            | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 25        | rear     | 24.0                         | 23.3  | 0.021                     | 0.025        | 0.08             | 22.7        | 0          |
| 10MHz BW/25RB/QPSK - Move5000                                                                |             |           |          |                              |       |                           |              |                  |             |            |
| 23060                                                                                        | 704.0       | 12        | top      | 23.0                         | 22.2  | 0.103                     | 0.124        | 0.07             | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 12        | bottom   | 23.0                         | 22.2  | 0.158                     | 0.190        | 0.06             | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 12        | left     | 23.0                         | 22.2  | 0.311                     | 0.374        | -0.01            | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 12        | right    | 23.0                         | 22.2  | 0.067                     | 0.080        | 0.01             | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 12        | front    | 23.0                         | 22.2  | 0.010                     | 0.012        | 0.14             | 22.7        | 0          |
| 23060                                                                                        | 704.0       | 12        | rear     | 23.0                         | 22.2  | 0.019                     | 0.022        | 0.16             | 22.7        | 0          |
| 10MHz BW/1RB/QPSK - Move3500                                                                 |             |           |          |                              |       |                           |              |                  |             |            |
| 23060                                                                                        | 704.0       | 25        | left     | 24.0                         | 23.3  | 0.247                     | 0.290        | 0.03             | 22.7        | 0          |
| 23095                                                                                        | 707.5       | 25        | left     | 24.0                         | 23.2  | 0.267                     | 0.321        | 0.00             | 22.7        | 0          |
| 23130                                                                                        | 711.0       | 25        | left     | 24.0                         | 23.1  | 0.273                     | 0.336        | -0.03            | 22.7        | 0          |

Table 36: Test results SAR LTE FDD 12 700 MHz (see max. plot on page 71.)

\*\* - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Extremities - WLAN 2450 MHz - Limit for 10g: 4W/Kg |                |               |          |                              |       |                           |              |              |                        |                |               |
|------------------------------------------------------------------------------------------|----------------|---------------|----------|------------------------------|-------|---------------------------|--------------|--------------|------------------------|----------------|---------------|
| Ch.                                                                                      | Freq.<br>(MHz) | test<br>cond. | Position | cond. P <sub>max</sub> (dBm) |       | SAR <sub>10g</sub> (W/kg) |              |              | power<br>drift<br>(dB) | liquid<br>(°C) | dist.<br>(mm) |
|                                                                                          |                |               |          | declared**                   | meas. | meas.                     | extrap.      | 100% DF      |                        |                |               |
| Move5000                                                                                 |                |               |          |                              |       |                           |              |              |                        |                |               |
| 1                                                                                        | 2412           | 1Mbit/s       | top      | 7.0                          | 6.0   | 0.077                     | 0.097        | 0.099        | 0.17                   | 21.9           | 0             |
| 1                                                                                        | 2412           | 1Mbit/s       | bottom   | 7.0                          | 5.4   | 0.013                     | 0.018        | 0.019        | -0.15                  | 21.9           | 0             |
| 1                                                                                        | 2412           | 1Mbit/s       | left     | 7.0                          | 6.0   | 0.129                     | 0.162        | 0.166        | -0.04                  | 21.9           | 0             |
| 6                                                                                        | 2437           | 1Mbit/s       | left     | 7.0                          | 5.4   | 0.125                     | 0.181        | 0.184        | -0.17                  | 21.9           | 0             |
| 11                                                                                       | 2462           | 1Mbit/s       | left     | 7.0                          | 5.6   | 0.124                     | 0.171        | 0.175        | -0.18                  | 21.9           | 0             |
| 1                                                                                        | 2412           | 1Mbit/s       | right    | 7.0                          | 6.0   | 0.002                     | 0.003        | 0.003        | 0.17                   | 21.9           | 0             |
| 1                                                                                        | 2412           | 1Mbit/s       | front    | 7.0                          | 6.0   | 0.010                     | 0.013        | 0.013        | 0.16                   | 21.9           | 0             |
| 1                                                                                        | 2412           | 1Mbit/s       | rear     | 7.0                          | 5.4   | 0.003                     | 0.004        | 0.004        | 0.16                   | 21.9           | 0             |
| Move3500                                                                                 |                |               |          |                              |       |                           |              |              |                        |                |               |
| 6                                                                                        | 2437           | 1Mbit/s       | left     | 7.0                          | 5.4   | <b>0.148</b>              | <b>0.214</b> | <b>0.218</b> | 0.15                   | 21.9           | 0             |

Table 37: Test results body worn SAR WLAN 2.45 GHz (see max. SAR on page 72.)

| measured / extrapolated SAR numbers - Extremities - Bluetooth 2450 MHz - Limit for 10g: 4W/Kg |             |          |                              |          |                           |              |                  |             |            |
|-----------------------------------------------------------------------------------------------|-------------|----------|------------------------------|----------|---------------------------|--------------|------------------|-------------|------------|
| Ch.                                                                                           | Freq. (MHz) | Position | cond. P <sub>max</sub> (dBm) |          | SAR <sub>10g</sub> (W/kg) |              | power drift (dB) | liquid (°C) | dist. (mm) |
|                                                                                               |             |          | declared**                   | measured | measured                  | extrap.      |                  |             |            |
| Move5000                                                                                      |             |          |                              |          |                           |              |                  |             |            |
| 0                                                                                             | 2402        | top      | 16.0                         | 15.4     | 0.879                     | 1.009        | -0.01            | 21.9        | 0          |
| 39                                                                                            | 2441        | top      | 16.0                         | 15.4     | 0.888                     | 1.020        | -0.03            | 21.9        | 0          |
| 78                                                                                            | 2480        | top      | 16.0                         | 15.4     | <b>0.928</b>              | <b>1.065</b> | -0.04            | 21.9        | 0          |
| 78                                                                                            | 2480        | bottom   | 16.0                         | 15.4     | 0.175                     | 0.201        | 0.19             | 21.9        | 0          |
| 78                                                                                            | 2480        | left     | 16.0                         | 15.4     | 0.028                     | 0.032        | 0.11             | 21.9        | 0          |
| 78                                                                                            | 2480        | right    | 16.0                         | 15.4     | 0.751                     | 0.862        | 0.16             | 21.9        | 0          |
| 78                                                                                            | 2480        | front    | 16.0                         | 15.4     | 0.311                     | 0.357        | -0.13            | 21.9        | 0          |
| 78                                                                                            | 2480        | rear     | 16.0                         | 15.4     | 0.017                     | 0.019        | 0.12             | 21.9        | 0          |
| Move3500                                                                                      |             |          |                              |          |                           |              |                  |             |            |
| 0                                                                                             | 2402        | top      | 16.0                         | 15.4     | 0.882                     | 1.013        | -0.02            | 21.9        | 0          |
| 39                                                                                            | 2441        | top      | 16.0                         | 15.4     | 0.821                     | 0.943        | 0.00             | 21.9        | 0          |
| 78                                                                                            | 2480        | top      | 16.0                         | 15.4     | 0.825                     | 0.947        | -0.03            | 21.9        | 0          |
| 78                                                                                            | 2480        | bottom   | 16.0                         | 15.4     | 0.142                     | 0.163        | -0.15            | 21.9        | 0          |
| 78                                                                                            | 2480        | left     | 16.0                         | 15.4     | 0.023                     | 0.027        | -0.18            | 21.9        | 0          |
| 78                                                                                            | 2480        | right    | 16.0                         | 15.4     | 0.745                     | 0.855        | 0.18             | 21.9        | 0          |
| 78                                                                                            | 2480        | front    | 16.0                         | 15.4     | 0.231                     | 0.265        | -0.12            | 21.9        | 0          |
| 78                                                                                            | 2480        | rear     | 16.0                         | 15.4     | 0.019                     | 0.022        | 0.13             | 21.9        | 0          |

Table 38: Test results SAR Bluetooth 2.45 GHz (see max. SAR plot on page 73.)

\*\* - maximum possible output power declared by manufacturer

| Estimated stand alone SAR. |             |               |                        |                       |                                 |
|----------------------------|-------------|---------------|------------------------|-----------------------|---------------------------------|
| Communication system       | freq. (GHz) | distance (mm) | P <sub>avg</sub> (dBm) | P <sub>avg</sub> (mW) | estimated <sub>1-g</sub> (W/kg) |
| WLAN5200                   | 5.2         | 5             | 1                      | 1.3                   | 0.077                           |
| WLAN5300                   | 5.3         | 5             | 1.5                    | 1.4                   | 0.087                           |
| WLAN5600                   | 5.6         | 5             | 3                      | 2.0                   | 0.126                           |
| WLAN5800                   | 5.8         | 5             | 3.5                    | 2.2                   | 0.144                           |

Table 39: Estimated stand alone SAR<sub>max</sub> for Bluetooth 2450MHz

### 7.2.3 Multiple Transmitter Information

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB 447498D01 General RF Exposure Guidance v05.

| reported SAR WWAN, BT and WLAN 2.4GHz, $\Sigma$ SAR evaluation |          |                          |       |       |                        |
|----------------------------------------------------------------|----------|--------------------------|-------|-------|------------------------|
| Frequency band                                                 | Position | SAR <sub>max</sub> /W/kg |       |       | $\Sigma$ SAR<br><4W/kg |
|                                                                |          | WWAN                     | BT    | WLAN  |                        |
| UMTS FDD II                                                    | top      | 0.195                    | 1.065 | 0.099 | 1.359                  |
|                                                                | bottom   | 0.241                    | 0.201 | 0.019 | 0.461                  |
|                                                                | left     | 2.813                    | 0.032 | 0.218 | <b>3.063</b>           |
|                                                                | right    | 0.171                    | 0.862 | 0.003 | 1.036                  |
|                                                                | front    | 0.088                    | 0.357 | 0.011 | 0.456                  |
|                                                                | rear     | 0.118                    | 0.022 | 0.004 | 0.144                  |
|                                                                |          |                          |       |       |                        |
| UMTS FDD IV                                                    | top      | 0.151                    | 1.065 | 0.099 | 1.315                  |
|                                                                | bottom   | 0.317                    | 0.201 | 0.019 | 0.537                  |
|                                                                | left     | 2.597                    | 0.032 | 0.218 | 2.847                  |
|                                                                | right    | 0.284                    | 0.862 | 0.003 | 1.149                  |
|                                                                | front    | 0.047                    | 0.357 | 0.011 | 0.415                  |
|                                                                | rear     | 0.102                    | 0.022 | 0.004 | 0.128                  |
|                                                                |          |                          |       |       |                        |
| UMTS FDD V                                                     | top      | 0.151                    | 1.065 | 0.099 | 1.315                  |
|                                                                | bottom   | 0.317                    | 0.201 | 0.019 | 0.537                  |
|                                                                | left     | 2.597                    | 0.032 | 0.218 | 2.847                  |
|                                                                | right    | 0.271                    | 0.862 | 0.003 | 1.136                  |
|                                                                | front    | 0.045                    | 0.357 | 0.011 | 0.413                  |
|                                                                | rear     | 0.098                    | 0.022 | 0.004 | 0.124                  |
|                                                                |          |                          |       |       |                        |
| LTE FDD 2                                                      | top      | 0.235                    | 1.065 | 0.099 | 1.399                  |
|                                                                | bottom   | 0.150                    | 0.201 | 0.019 | 0.370                  |
|                                                                | left     | 0.631                    | 0.032 | 0.218 | 0.881                  |
|                                                                | right    | 0.076                    | 0.862 | 0.003 | 0.941                  |
|                                                                | front    | 0.034                    | 0.357 | 0.011 | 0.402                  |
|                                                                | rear     | 0.038                    | 0.022 | 0.004 | 0.064                  |
|                                                                |          |                          |       |       |                        |
| LTE FDD 4                                                      | top      | 0.116                    | 1.065 | 0.099 | 1.280                  |
|                                                                | bottom   | 0.349                    | 0.201 | 0.019 | 0.569                  |
|                                                                | left     | 2.478                    | 0.032 | 0.218 | 2.728                  |
|                                                                | right    | 0.263                    | 0.862 | 0.003 | 1.128                  |
|                                                                | front    | 0.042                    | 0.357 | 0.011 | 0.410                  |
|                                                                | rear     | 0.029                    | 0.022 | 0.004 | 0.055                  |
|                                                                |          |                          |       |       |                        |
| LTE FDD 5                                                      | top      | 0.267                    | 1.065 | 0.099 | 1.431                  |
|                                                                | bottom   | 0.185                    | 0.201 | 0.019 | 0.405                  |
|                                                                | left     | 0.706                    | 0.032 | 0.218 | 0.956                  |
|                                                                | right    | 0.107                    | 0.862 | 0.003 | 0.972                  |
|                                                                | front    | 0.009                    | 0.357 | 0.011 | 0.377                  |
|                                                                | rear     | 0.039                    | 0.022 | 0.004 | 0.065                  |
|                                                                |          |                          |       |       |                        |
| LTE FDD 12                                                     | top      | 0.129                    | 1.065 | 0.099 | 1.293                  |
|                                                                | bottom   | 0.220                    | 0.201 | 0.019 | 0.440                  |
|                                                                | left     | 0.385                    | 0.032 | 0.218 | 0.635                  |
|                                                                | right    | 0.094                    | 0.862 | 0.003 | 0.959                  |
|                                                                | front    | 0.015                    | 0.357 | 0.011 | 0.383                  |
|                                                                | rear     | 0.025                    | 0.022 | 0.004 | 0.051                  |
|                                                                |          |                          |       |       |                        |

Table 40: SAR<sub>max</sub> WWAN and WLAN 2.4GHz,  $\Sigma$ SAR<sub>10g</sub> evaluation

| reported SAR WWAN, BT and WLAN5GHz, $\Sigma$ SAR evaluation |          |                          |       |       |                        |
|-------------------------------------------------------------|----------|--------------------------|-------|-------|------------------------|
| Frequency band                                              | Position | SAR <sub>max</sub> /W/kg |       |       | $\Sigma$ SAR<br><4W/kg |
|                                                             |          | WWAN                     | BT    | WLAN  |                        |
| UMTS FDD II                                                 | top      | 0.195                    | 1.065 | 0.144 | 1.404                  |
|                                                             | bottom   | 0.241                    | 0.201 | 0.144 | 0.586                  |
|                                                             | left     | 2.813                    | 0.032 | 0.144 | <b>2.989</b>           |
|                                                             | right    | 0.171                    | 0.862 | 0.144 | 1.177                  |
|                                                             | front    | 0.088                    | 0.357 | 0.144 | 0.589                  |
|                                                             | rear     | 0.118                    | 0.022 | 0.144 | 0.284                  |
| UMTS FDD IV                                                 | top      | 0.151                    | 1.065 | 0.144 | 1.360                  |
|                                                             | bottom   | 0.317                    | 0.201 | 0.144 | 0.662                  |
|                                                             | left     | 2.597                    | 0.032 | 0.144 | 2.773                  |
|                                                             | right    | 0.284                    | 0.862 | 0.144 | 1.290                  |
|                                                             | front    | 0.047                    | 0.357 | 0.144 | 0.548                  |
|                                                             | rear     | 0.102                    | 0.022 | 0.144 | 0.268                  |
| UMTS FDD V                                                  | top      | 0.151                    | 1.065 | 0.144 | 1.360                  |
|                                                             | bottom   | 0.317                    | 0.201 | 0.144 | 0.662                  |
|                                                             | left     | 2.597                    | 0.032 | 0.144 | 2.773                  |
|                                                             | right    | 0.271                    | 0.862 | 0.144 | 1.277                  |
|                                                             | front    | 0.045                    | 0.357 | 0.144 | 0.546                  |
|                                                             | rear     | 0.098                    | 0.022 | 0.144 | 0.264                  |
| LTE FDD 2                                                   | top      | 0.235                    | 1.065 | 0.144 | 1.444                  |
|                                                             | bottom   | 0.150                    | 0.201 | 0.144 | 0.495                  |
|                                                             | left     | 0.631                    | 0.032 | 0.144 | 0.807                  |
|                                                             | right    | 0.076                    | 0.862 | 0.144 | 1.082                  |
|                                                             | front    | 0.034                    | 0.357 | 0.144 | 0.535                  |
|                                                             | rear     | 0.038                    | 0.022 | 0.144 | 0.204                  |
| LTE FDD 4                                                   | top      | 0.116                    | 1.065 | 0.144 | 1.325                  |
|                                                             | bottom   | 0.349                    | 0.201 | 0.144 | 0.694                  |
|                                                             | left     | 2.478                    | 0.032 | 0.144 | 2.654                  |
|                                                             | right    | 0.263                    | 0.862 | 0.144 | 1.269                  |
|                                                             | front    | 0.042                    | 0.357 | 0.144 | 0.543                  |
|                                                             | rear     | 0.029                    | 0.022 | 0.144 | 0.195                  |
| LTE FDD 5                                                   | top      | 0.267                    | 1.065 | 0.144 | 1.476                  |
|                                                             | bottom   | 0.185                    | 0.201 | 0.144 | 0.530                  |
|                                                             | left     | 0.706                    | 0.032 | 0.144 | 0.882                  |
|                                                             | right    | 0.107                    | 0.862 | 0.144 | 1.113                  |
|                                                             | front    | 0.009                    | 0.357 | 0.144 | 0.510                  |
|                                                             | rear     | 0.039                    | 0.022 | 0.144 | 0.205                  |
| LTE FDD 12                                                  | top      | 0.129                    | 1.065 | 0.144 | 1.338                  |
|                                                             | bottom   | 0.220                    | 0.201 | 0.144 | 0.565                  |
|                                                             | left     | 0.385                    | 0.032 | 0.144 | 0.561                  |
|                                                             | right    | 0.094                    | 0.862 | 0.144 | 1.100                  |
|                                                             | front    | 0.015                    | 0.357 | 0.144 | 0.516                  |
|                                                             | rear     | 0.025                    | 0.022 | 0.144 | 0.191                  |

Table 41: SAR<sub>max</sub> WWAN and **WLAN 5GHz**,  $\Sigma$ SAR<sub>10g</sub> evaluation

### Conclusion:

$\Sigma$ SAR < 4 W/kg therefore simultaneous transmissions SAR measurement with the enlarged zoom scan measurement and volume scan post-processing procedures is **not** required.

## 8 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

| Equipment                            | Type             | Manufacturer                    | Serial No. | Last Calibration   | Frequency (months) |
|--------------------------------------|------------------|---------------------------------|------------|--------------------|--------------------|
| Dosimetric E-Field Probe             | ES3DV3           | Schmid & Partner Engineering AG | 3320       | January 15, 2018   | 12                 |
| Dosimetric E-Field Probe             | EX3DV4           | Schmid & Partner Engineering AG | 3944       | May 12, 2017       | 12                 |
| 750 MHz System Validation Dipole     | D750V3           | Schmid & Partner Engineering AG | 1041       | January 16, 2017   | 36                 |
| 835 MHz System Validation Dipole     | D835V2           | Schmid & Partner Engineering AG | 4d153      | May 11, 2017       | 36                 |
| 1750 MHz System Validation Dipole    | D1750V2          | Schmid & Partner Engineering AG | 1093       | May 13, 2015       | 36                 |
| 1900 MHz System Validation Dipole    | D1900V2          | Schmid & Partner Engineering AG | 5d009      | May 10, 2017       | 36                 |
| 2450 MHz System Validation Dipole    | D2450V2          | Schmid & Partner Engineering AG | 710        | August 15, 2016    | 36                 |
| Data acquisition electronics         | DAE3V1           | Schmid & Partner Engineering AG | 413        | January 10, 2018   | 12                 |
| Data acquisition electronics         | DAE3V1           | Schmid & Partner Engineering AG | 477        | May 12, 2017       | 12                 |
| Software                             | DASY52 52.8.7    | Schmid & Partner Engineering AG | ---        | N/A                | --                 |
| SAM Twin Phantom V5.0                | QD 000 P40 C     | Schmid & Partner Engineering AG | 1813       | N/A                | --                 |
| Universal Radio Communication Tester | CMU 200          | Rohde & Schwarz                 | 106826     | January 05, 2018   | 24                 |
| Universal Radio Communication Tester | CMW500           | Rohde & Schwarz                 | 102375     | January 11, 2018   | 24                 |
| Bluetooth Tester                     | CBT              | Rohde & Schwarz                 | 100313     | September 22, 2016 | 24                 |
| Network Analyser 300 kHz to 6 GHz    | 8753ES           | Agilent Technologies)*          | US39174436 | December 14, 2017  | 24                 |
| Dielectric Probe Kit                 | 85070C           | Hewlett Packard                 | US99360146 | N/A                | 12                 |
| Signal Generator                     | 8665A            | Hewlett Packard                 | 2833A00112 | December 14, 2017  | 24                 |
| Signal Generator                     | 8671B            | Hewlett Packard                 | 2823A00656 | January 31, 2017   | 24                 |
| Amplifier                            | 25S1G4 (25 Watt) | Amplifier Reasearch             | 20452      | N/A                | --                 |
| Power Meter                          | NRP              | Rohde & Schwarz                 | 101367     | December 17, 2017  | 24                 |
| Power Meter Sensor                   | NRP Z22          | Rohde & Schwarz                 | 100227     | December 10, 2017  | 12                 |
| Power Meter Sensor                   | NRP Z22          | Rohde & Schwarz                 | 100234     | December 10, 2017  | 12                 |
| Directional Coupler                  | 778D             | Hewlett Packard                 | 19171      | December 10, 2017  | 12                 |

)\* : Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

## 9 Observations

No observations exceeding those reported with the single test cases have been made.

## Annex A: System performance check

Date/Time: 02.03.2018 14:23:33

### SystemPerformanceCheck-D750 MSL 2018-03-02

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1041**

Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz; Communication System PAR: 0 dB; PMF: 1

 Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.959$  S/m;  $\epsilon_r = 55.078$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.28, 6.28, 6.28); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 32.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM front; Type: QD000P40CC; Serial: TP-1041
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL750/d=15mm, Pin=100 mW, dist=3mm/Area Scan (51x51x1):** Interpolated  
 grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 0.963 W/kg

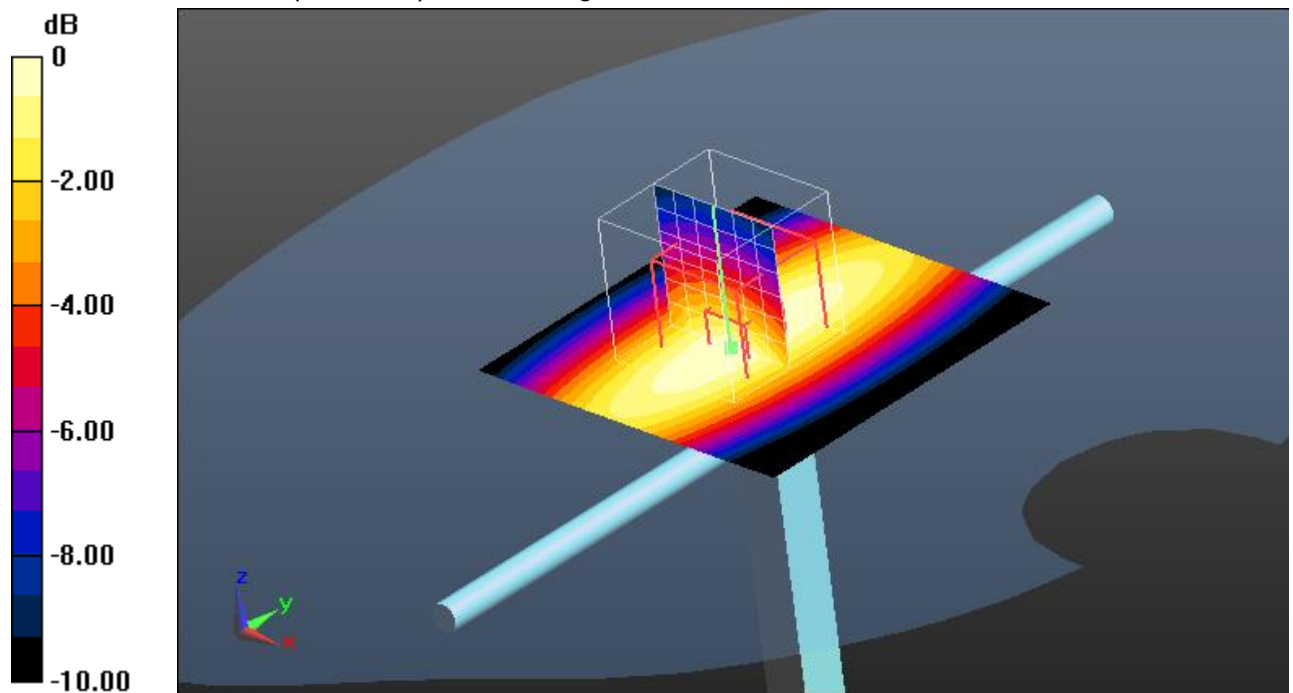
**MSL750/d=15mm, Pin=100 mW, dist=3mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 32.712 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.22 W/kg

**SAR(1 g) = 0.832 W/kg; SAR(10 g) = 0.556 W/kg**

Maximum value of SAR (measured) = 0.965 W/kg



0 dB = 0.965 W/kg = -0.15 dBW/kg

**Additional information:**

ambient temperature: 23.8°C; liquid temperature: 22.7°C

## SystemPerformanceCheck-D835 MSL 2018-03-15

**DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d153**

Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.991$  S/m;  $\epsilon_r = 54.923$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.16, 6.16, 6.16); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 32.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### MSL835/d=15mm, Pin=100 mW, dist=3.0mm/Area Scan (51x51x1): Interpolated

grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 1.17 W/kg

### MSL835/d=15mm, Pin=100 mW, dist=3.0mm/Zoom Scan (7x7x7)/Cube 0:

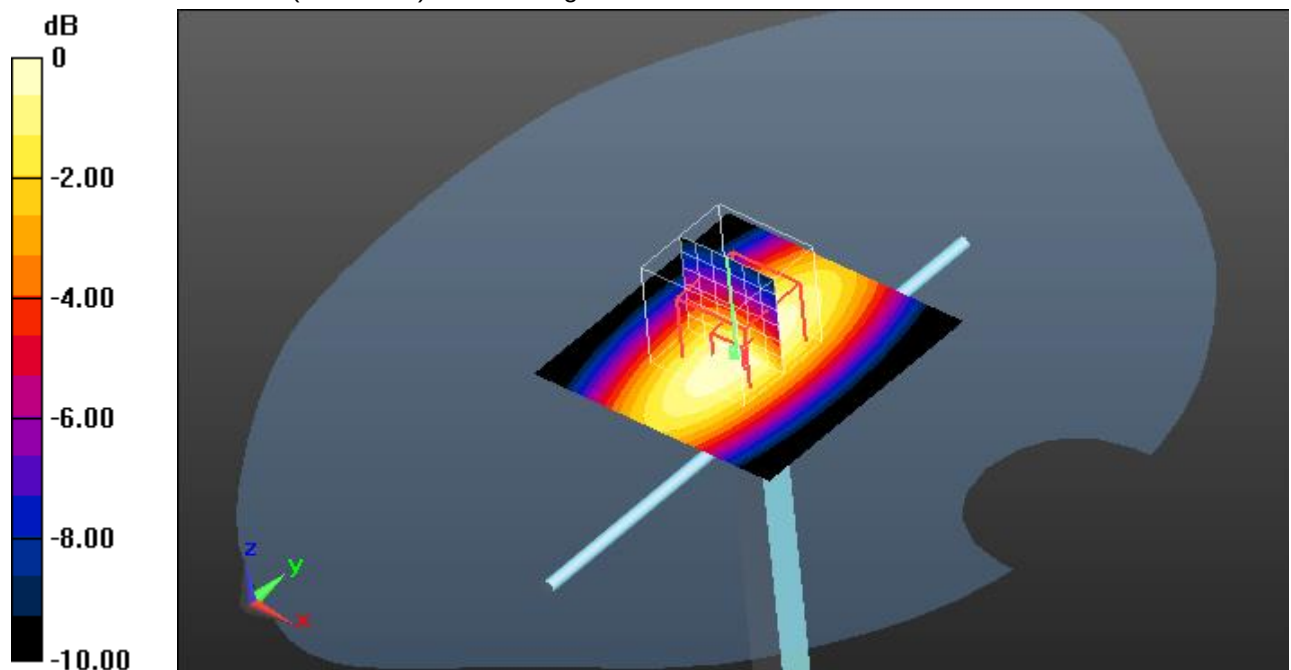
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 36.029 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.50 W/kg

**SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.682 W/kg**

Maximum value of SAR (measured) = 1.20 W/kg



0 dB = 1.20 W/kg = 0.79 dBW/kg

#### Additional information:

ambient temperature: 23.6°C; liquid temperature: 22.7°C

**SystemPerformanceCheck-D1750 MSL 2018-03-09****DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1093**

Communication System: UID 0, CW (0); Communication System Band: D1750 (1750.0 MHz); Frequency: 1750 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.511$  S/m;  $\epsilon_r = 52.762$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.97, 4.97, 4.97); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 32.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL1750/d=10mm, Pin=100mW/Area Scan (51x51x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 5.61 W/kg

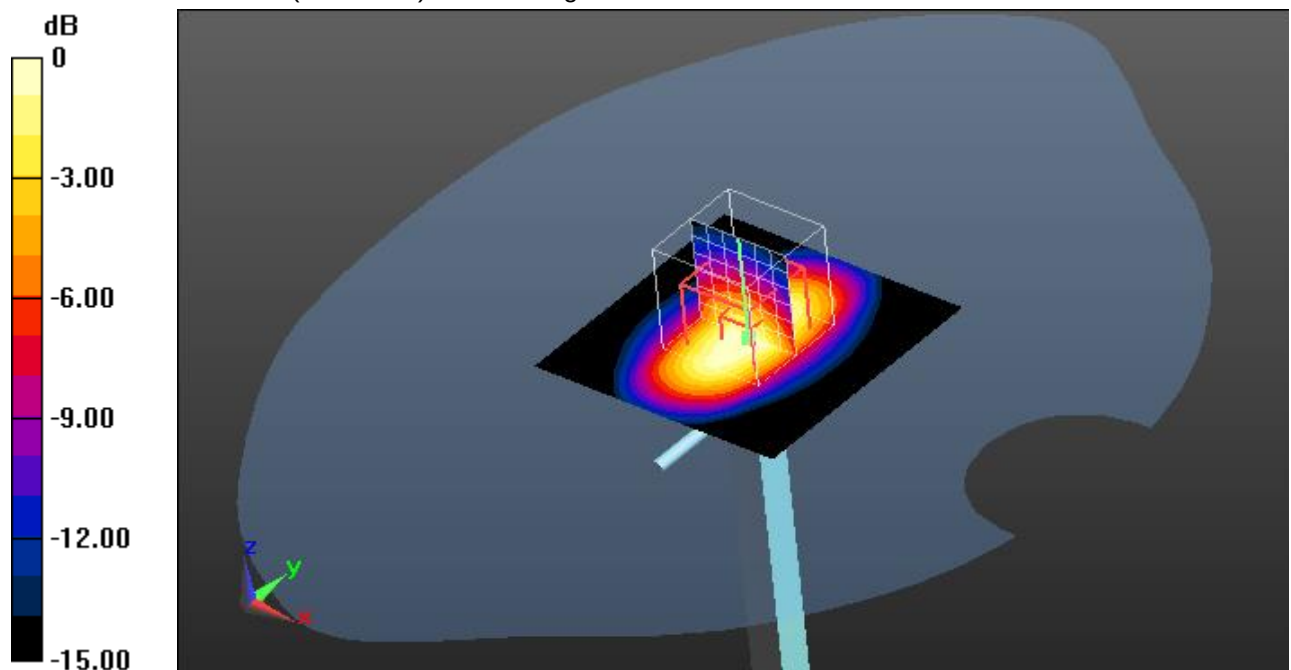
**MSL1750/d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 58.110 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 6.57 W/kg

**SAR(1 g) = 3.72 W/kg; SAR(10 g) = 1.96 W/kg**

Maximum value of SAR (measured) = 4.79 W/kg



0 dB = 4.79 W/kg = 6.80 dBW/kg

**Additional information:**

ambient temperature: 22.6°C; liquid temperature: 20.4°C

Date/Time: 13.03.2018 16:18:34

## SystemPerformanceCheck-D1900 MSL 2018-03-13

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d009**

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Communication System PAR: 0 dB; PMF: 1

 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.518$  S/m;  $\epsilon_r = 51.726$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 32.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL1900/d=10mm, Pin=100mW/Area Scan (51x51x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 5.88 W/kg

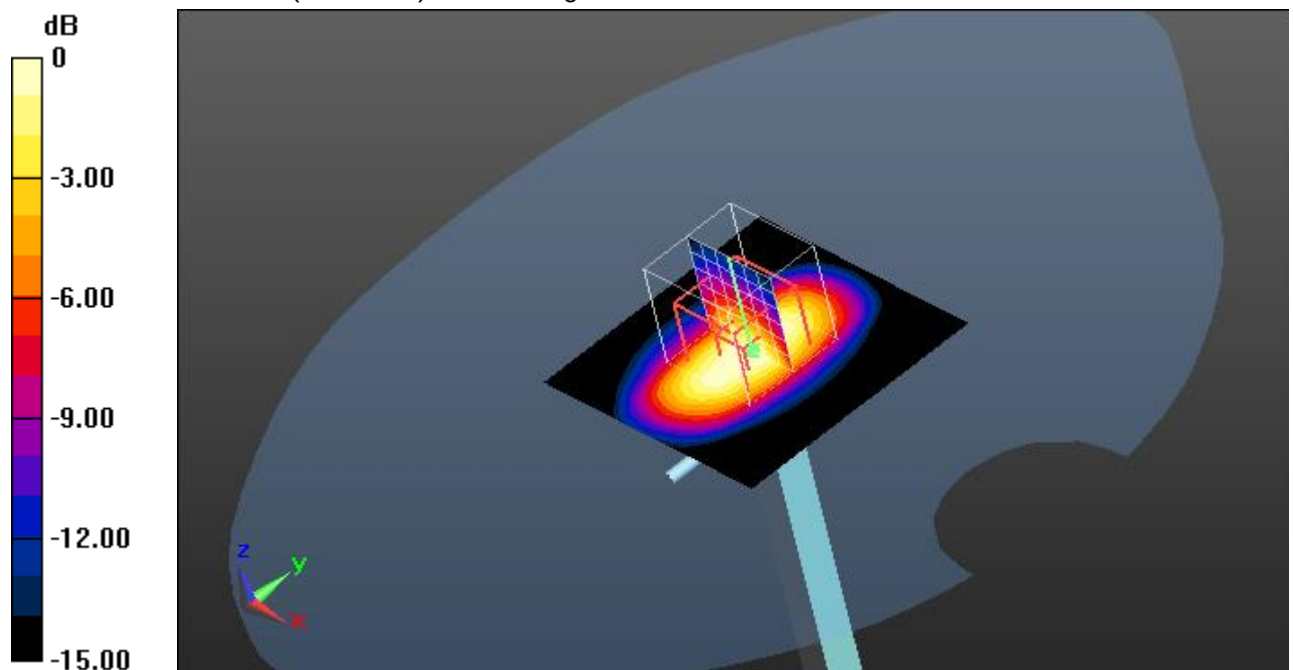
**MSL1900/d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:
 $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 59.384 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 6.64 W/kg

**SAR(1 g) = 3.86 W/kg; SAR(10 g) = 2.05 W/kg**

Maximum value of SAR (measured) = 4.86 W/kg



0 dB = 4.86 W/kg = 6.87 dBW/kg

**Additional information:**

ambient temperature: 22.8°C; liquid temperature: 21.7°C

Date/Time: 14.03.2018 07:38:03

## SystemPerformanceCheck-D2450 MSL 2018-03-14

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 710**

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Communication System PAR: 0 dB; PMF: 1

 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.987$  S/m;  $\epsilon_r = 50.662$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.86, 7.86, 7.86); Calibrated: 12.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE3 Sn477; Calibrated: 12.05.2017
- Phantom: SAM front; Type: QD000P40CC; Serial: TP-1041
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### MSL2450/d=10mm, Pin=100 mW, dist=1.4mm/Area Scan (51x51x1):

Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 10.0 W/kg

### MSL2450/d=10mm, Pin=100 mW, dist=1.4mm/Zoom Scan (7x7x7)/Cube 0:

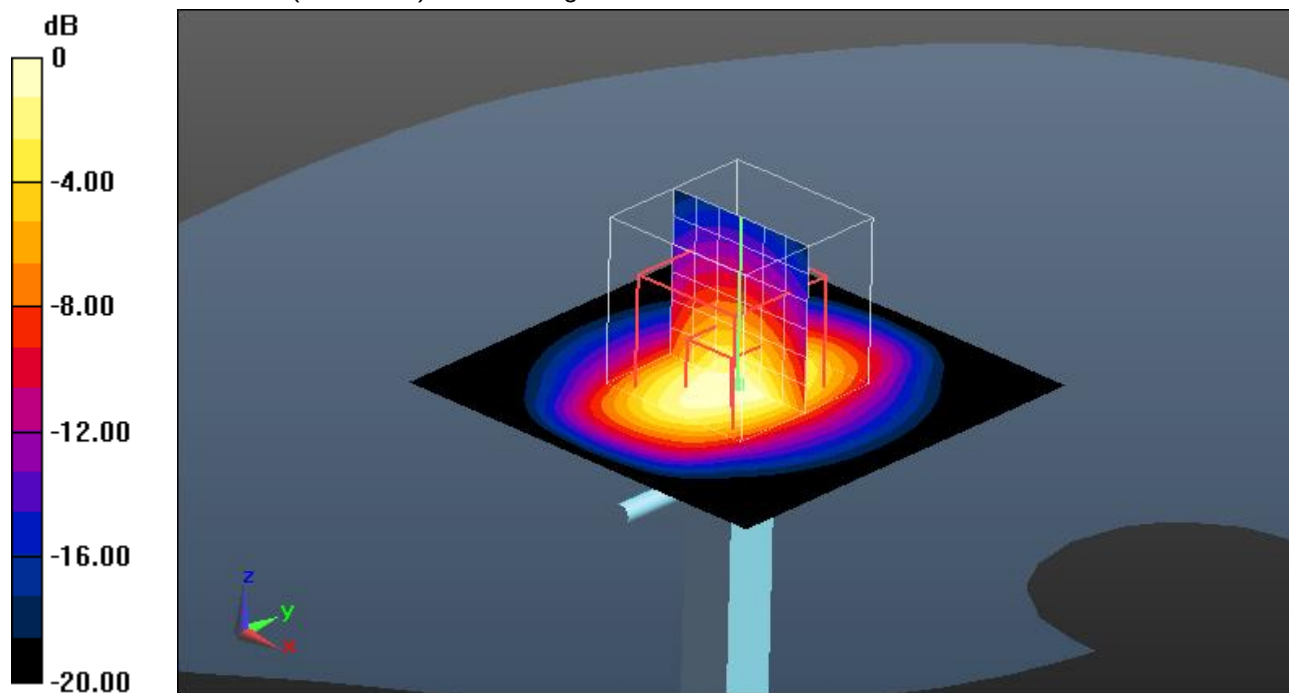
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 67.235 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 10.2 W/kg

**SAR(1 g) = 5.03 W/kg; SAR(10 g) = 2.34 W/kg**

Maximum value of SAR (measured) = 8.26 W/kg



0 dB = 8.26 W/kg = 9.17 dBW/kg

#### Additional information:

ambient temperature: 23.8°C; liquid temperature: 21.9°C

## Annex B: DASY5 measurement results

SAR plots for the **highest measured SAR** in each exposure configuration, wireless mode and frequency band combination according to FCC KDB 865664 D02

Date/Time: 13.03.2018 11:40:48

### FCC\_IEC-62209-2\_UMTS FDD II Move3500

**DUT: Ingenico; Type: Move/3500 CL/4G/WiFi/BT; Serial: 180317303201094402300908**

Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD II; Frequency: 1852.4 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.471$  S/m;  $\epsilon_r = 51.928$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL 1900/Left position - Low/Area Scan (81x151x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 7.09 W/kg

**MSL 1900/Left position - Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:

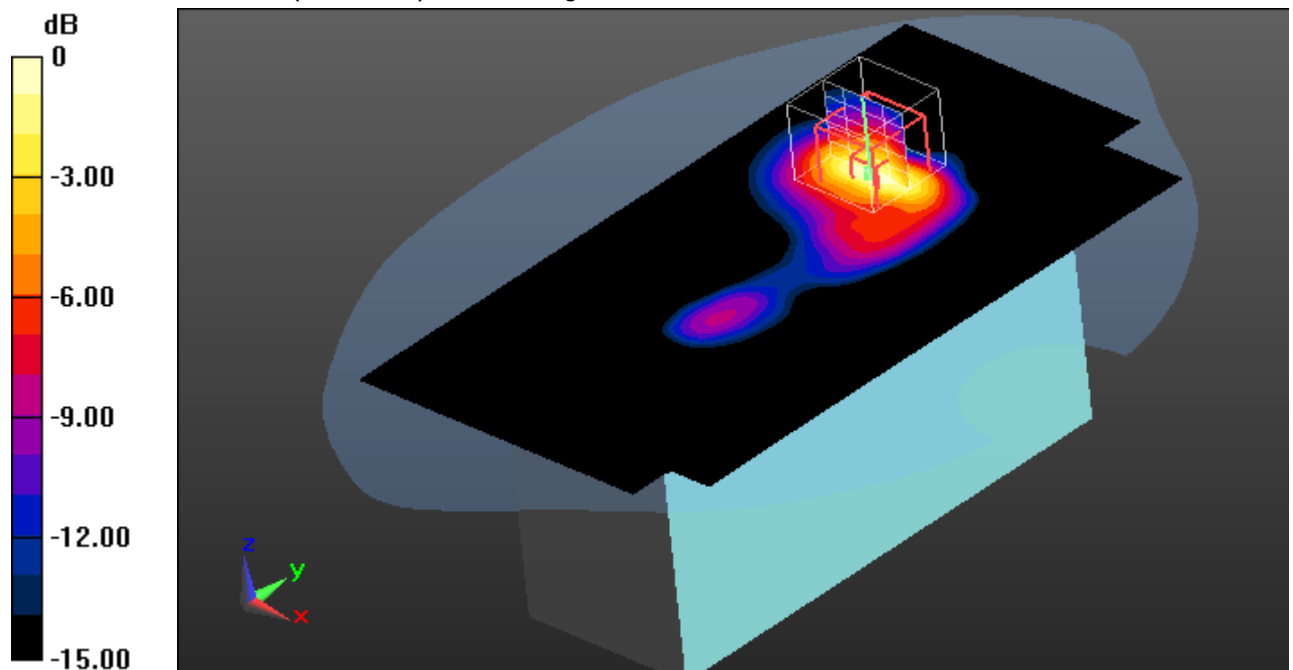
$dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 67.157 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 9.21 W/kg

**SAR(10 g) = 2.34 W/kg**

Maximum value of SAR (measured) = 6.72 W/kg



0 dB = 6.72 W/kg = 8.27 dBW/kg

#### Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.8°C; liquid temperature: 21.7°C

**FCC\_IEC-62209-2\_UMTS FDD IV****DUT: Ingenico; Type: Move/5000 CL/4G/WiFi/BT; Serial: 180317303201083402304887**

Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD IV; Frequency: 1732.4 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.491$  S/m;  $\epsilon_r = 52.783$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.97, 4.97, 4.97); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL 1750/Left position - Middle (WC)/Area Scan (81x151x1):** Interpolated grid: $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 8.80 W/kg

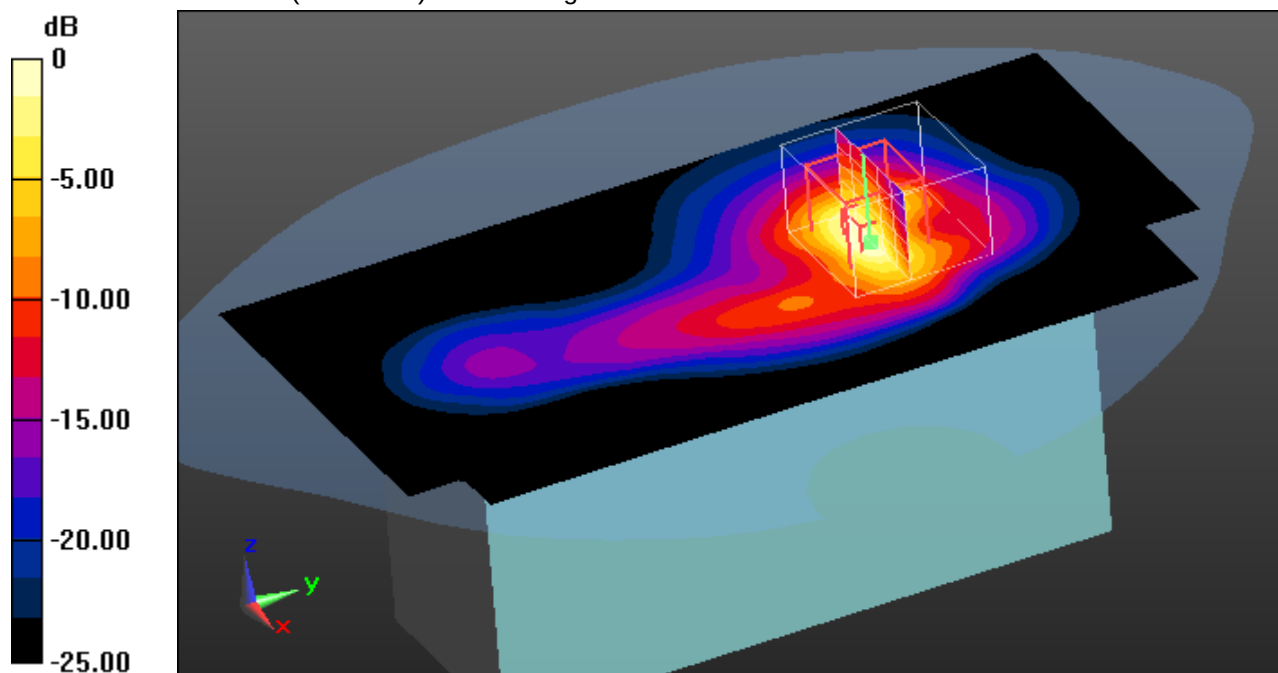
**MSL 1750/Left position - Middle (WC)/Zoom Scan (6x6x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 75.681 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 11.9 W/kg

**SAR(10 g) = 2.48 W/kg**

Maximum value of SAR (measured) = 7.86 W/kg



0 dB = 7.86 W/kg = 8.95 dBW/kg

**Additional information:**

position or distance of DUT to SAM: 0 mm

ambient temperature: 21.8°C; liquid temperature: 20.9°C

## FCC\_IEC-62209-2\_UMTS FDD V Move3500

**DUT: Ingenico; Type: Move/3500 CL/4G/WiFi/BT; Serial: 180317303201094402300908**

Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD V; Frequency: 826.4 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.981$  S/m;  $\epsilon_r = 55.053$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.16, 6.16, 6.16); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL 900/Left position - Low/Area Scan (81x151x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 1.66 W/kg

**MSL 900/Left position - Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:

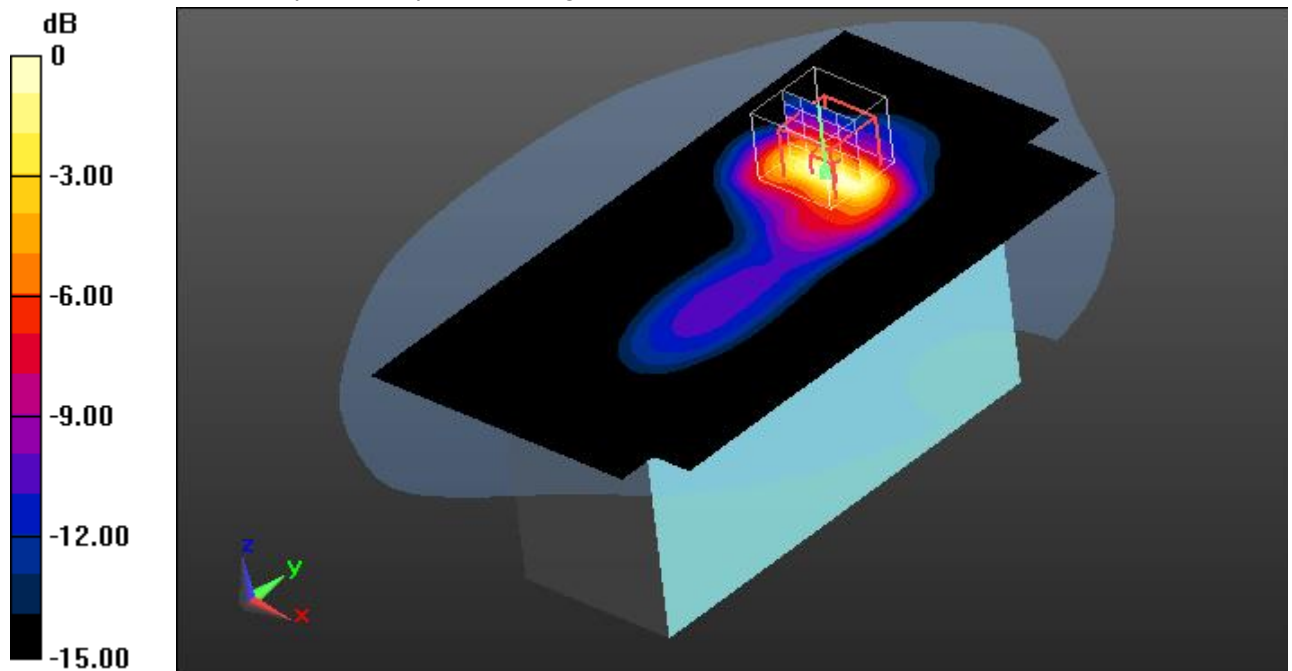
$dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 40.868 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 2.53 W/kg

**SAR(10 g) = 0.537 W/kg**

Maximum value of SAR (measured) = 1.52 W/kg



0 dB = 1.52 W/kg = 1.82 dBW/kg

### Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature: 23.8°C; liquid temperature: 22.7°C

## FCC\_IEC-62209-2\_LTE FDD 2 Move3500

**DUT: Ingenico; Type: Move/3500 CL/4G/WiFi/BT; Serial: 180317303201094402300908**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 2 (1900MHz); Frequency: 1860 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.475$  S/m;  $\epsilon_r = 51.853$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL 1900 - 20MHz BW - 1 RB - 0RB offset/Left position - Low wc/Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.89 W/kg

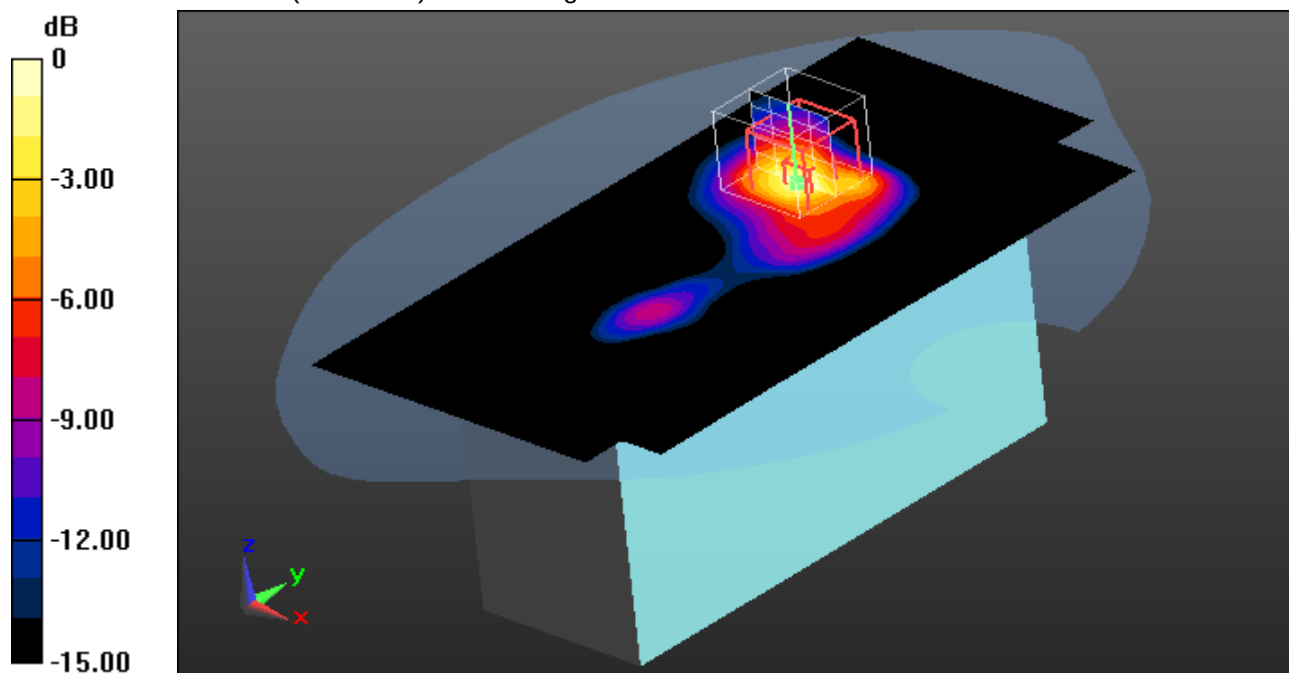
## MSL 1900 - 20MHz BW - 1 RB - 0RB offset/Left position - Low wc/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 53.775 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 9.00 W/kg

**SAR(10 g) = 2.08 W/kg**

Maximum value of SAR (measured) = 5.42 W/kg



0 dB = 5.42 W/kg = 7.34 dBW/kg

### Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.8°C; liquid temperature: 21.7°C

## FCC\_IEC-62209-2\_LTE FDD 4

**DUT: Ingenico; Type: Move/5000 CL/4G/WiFi/BT; Serial: 180317303201083402304887**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 4 (1700MHz); Frequency: 1745 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 1745$  MHz;  $\sigma = 1.505$  S/m;  $\epsilon_r = 52.77$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.97, 4.97, 4.97); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL 1750 - 20MHz BW - 1 RB - 0RB offset/Left position - High/Area Scan

**(81x151x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 6.88 W/kg

## MSL 1750 - 20MHz BW - 1 RB - 0RB offset/Left position - High/Zoom Scan

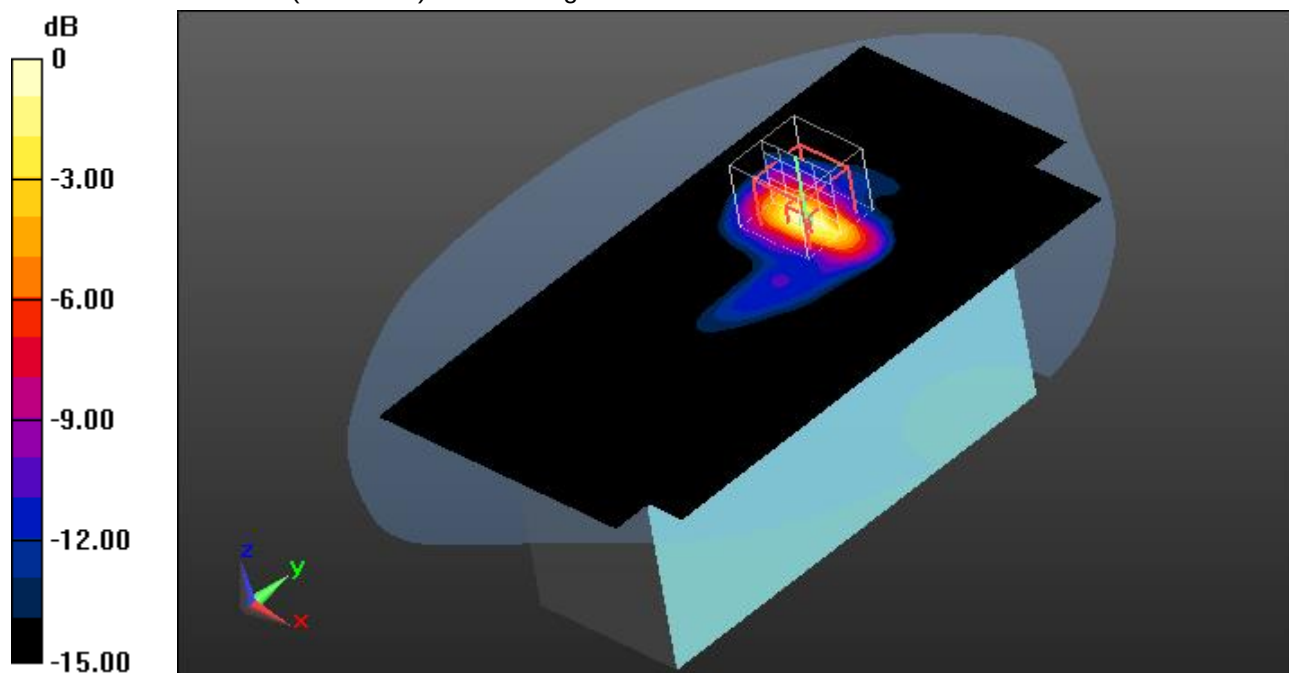
**(5x5x7)/Cube 0:** Measurement grid:  $dx=7.5$ mm,  $dy=7.5$ mm,  $dz=5$ mm

Reference Value = 72.582 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 10.6 W/kg

**SAR(10 g) = 2.26 W/kg**

Maximum value of SAR (measured) = 7.44 W/kg



0 dB = 7.44 W/kg = 8.72 dBW/kg

### Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature: 22.3°C; liquid temperature: 20.8°C

## FCC\_IEC-62209-2\_LTE FDD 5 Move3500

**DUT: Ingenico; Type: Move/3500 CL/4G/WiFi/BT; Serial: 180317303201094402300908**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 5 (850MHz); Frequency: 829 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 829 \text{ MHz}$ ;  $\sigma = 0.984 \text{ S/m}$ ;  $\epsilon_r = 55.016$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.16, 6.16, 6.16); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM; Type: SAM; Serial: 1043
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL 900 - 10MHz BW - 1 RB - 0RB offset/Left position - Low/Area Scan

**(81x151x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) =  $1.51 \text{ W/kg}$

## MSL 900 - 10MHz BW - 1 RB - 0RB offset/Left position - Low/Zoom Scan

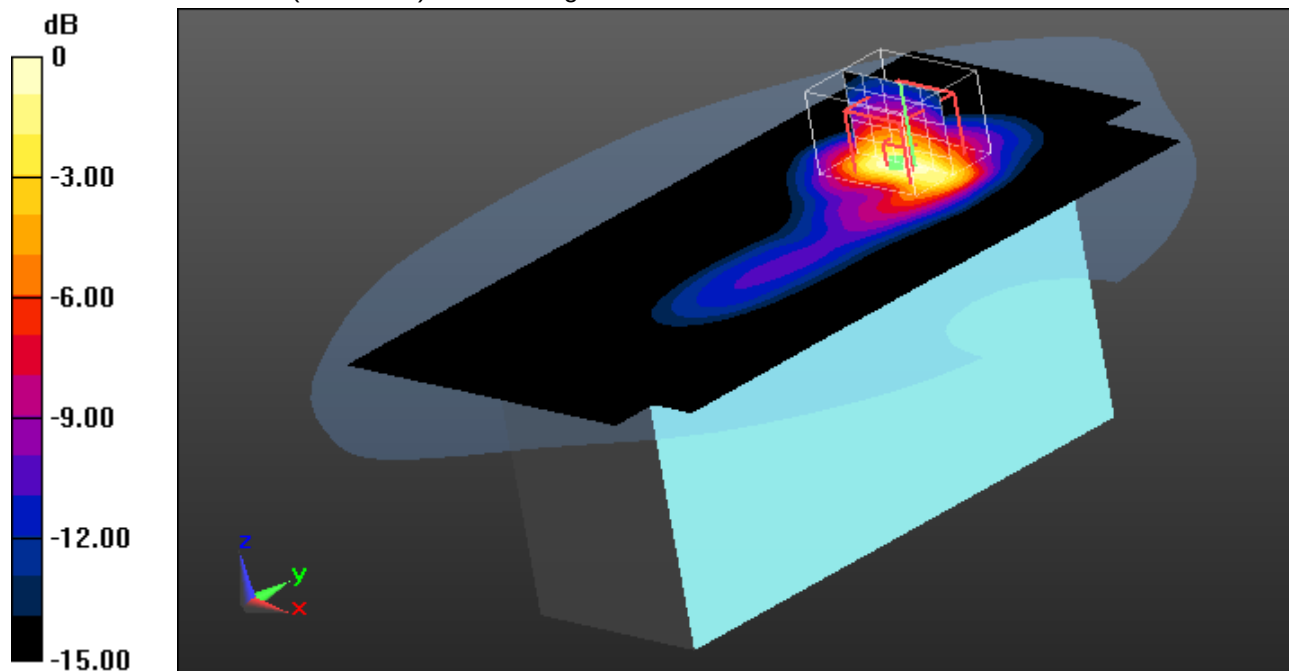
**(6x5x7)/Cube 0:** Measurement grid:  $dx=7.5\text{mm}$ ,  $dy=7.5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $38.723 \text{ V/m}$ ; Power Drift =  $-0.09 \text{ dB}$

Peak SAR (extrapolated) =  $2.72 \text{ W/kg}$

**SAR(10 g) =  $0.574 \text{ W/kg}$**

Maximum value of SAR (measured) =  $1.58 \text{ W/kg}$



0 dB =  $1.58 \text{ W/kg} = 1.99 \text{ dBW/kg}$

### Additional information:

position or distance of DUT to SAM: 0 mm

ambient temperature:  $23.6^\circ\text{C}$ ; liquid temperature:  $22.7^\circ\text{C}$

## FCC\_IEC-62209-2\_LTE FDD 12

**DUT: Ingenico; Type: Move/5000 CL/4G/WiFi/BT; Serial: 180317303201083402304887**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 12 (700MHz); Frequency: 704 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 704 \text{ MHz}$ ;  $\sigma = 0.915 \text{ S/m}$ ;  $\epsilon_r = 55.545$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.28, 6.28, 6.28); Calibrated: 15.01.2018;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 2.0, 27.0$
- Electronics: DAE3 Sn413; Calibrated: 10.01.2018
- Phantom: SAM front; Type: QD000P40CC; Serial: TP-1041
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## HSL 750 - 10MHz BW - 1 RB - 25RB offset/Left position - Low/Area Scan

**(81x151x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.846 \text{ W/kg}$

## HSL 750 - 10MHz BW - 1 RB - 25RB offset/Left position - Low/Zoom Scan

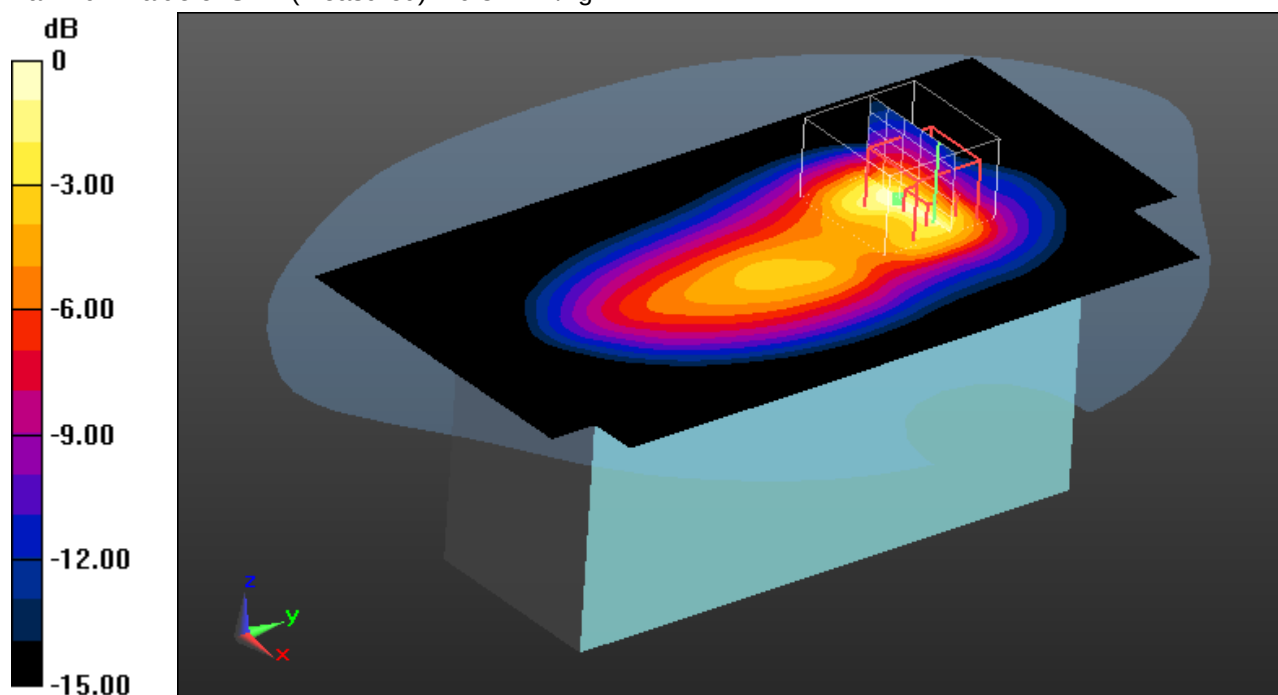
**(6x6x7)/Cube 0:** Measurement grid:  $dx=7.5\text{mm}$ ,  $dy=7.5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $20.221 \text{ V/m}$ ; Power Drift =  $-0.02 \text{ dB}$

Peak SAR (extrapolated) =  $1.38 \text{ W/kg}$

**SAR(10 g) =  $0.319 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.847 \text{ W/kg}$



0 dB =  $0.847 \text{ W/kg}$  =  $-0.72 \text{ dBW/kg}$

### Additional information:

position or distance of DUT to the phantom: 0 mm

ambient temperature:  $23.8^\circ\text{C}$ ; liquid temperature:  $22.7^\circ\text{C}$

## FCC\_IEC-62209-2\_WLAN 2450

**DUT: Ingenico; Type: Move/3500 CL/4G/WiFi/BT; Serial: 180317303201094402300908**

Communication System: UID 0, WLAN 2450 (0); Communication System Band: 2.4 GHz; Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.973$  S/m;  $\epsilon_r = 50.691$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.86, 7.86, 7.86); Calibrated: 12.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 26.0$
- Electronics: DAE3 Sn477; Calibrated: 12.05.2017
- Phantom: SAM front; Type: QD000P40CC; Serial: TP-1041
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL 2450 \_ move 3500/Left position - Middle/Area Scan (81x151x1):

Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 0.482 W/kg

## MSL 2450 \_ move 3500/Left position - Middle/Zoom Scan (8x8x7)/Cube 0:

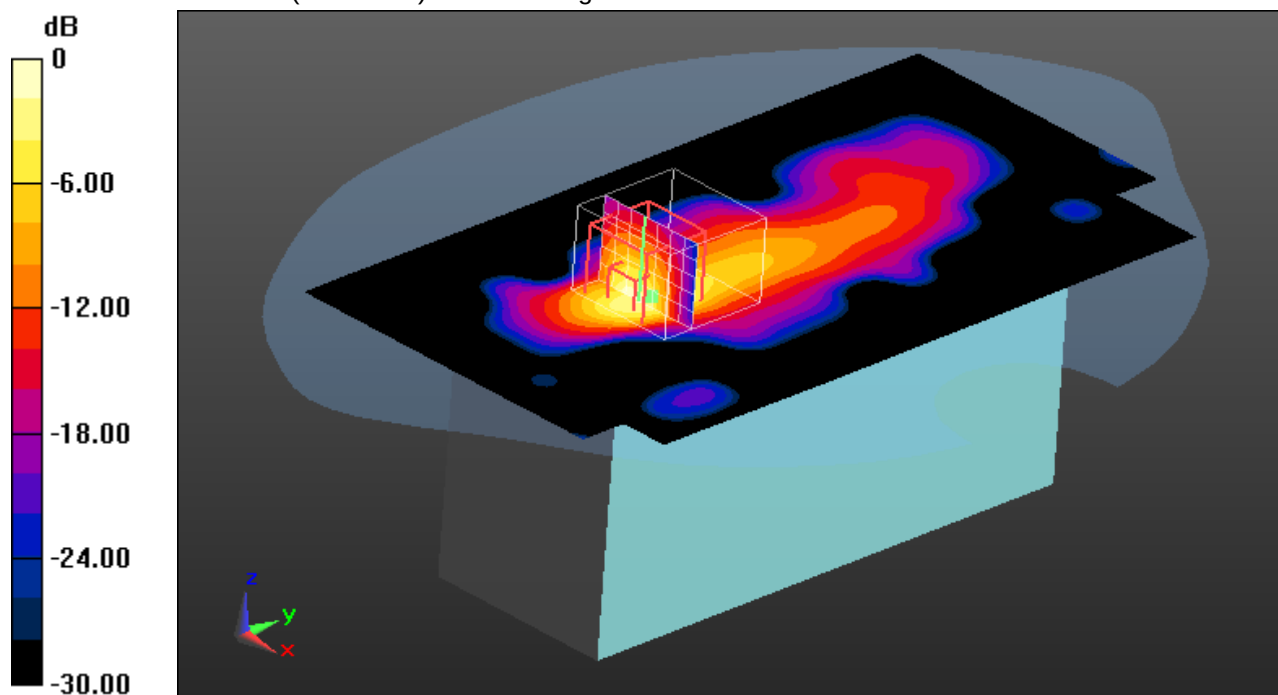
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 15.549 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(10 g) = 0.148 W/kg**

Maximum value of SAR (measured) = 0.720 W/kg



0 dB = 0.720 W/kg = -1.43 dBW/kg

### Additional information:

position or distance of DUT to the phantom: 0 mm

ambient temperature: 23.8°C; liquid temperature: 21.9°C

**FCC\_IEC-62209-2\_BT****DUT: Ingenico; Type: Move/5000 CL/4G/WiFi/BT; Serial: 180317303201083402304879**

Communication System: UID 0, Bluetooth (0); Communication System Band: BT; Frequency: 2480 MHz;

Communication System PAR: 1.16 dB; PMF: 1.14288

Medium parameters used:  $f = 2480$  MHz;  $\sigma = 2.028$  S/m;  $\epsilon_r = 50.541$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: EX3DV4 - SN3944; ConvF(7.86, 7.86, 7.86); Calibrated: 12.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 26.0$
- Electronics: DAE3 Sn477; Calibrated: 12.05.2017
- Phantom: SAM front; Type: QD000P40CC; Serial: TP-1041
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL 2450\_move 5000/Top position - High/Area Scan (81x151x1):** Interpolatedgrid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 2.84 W/kg

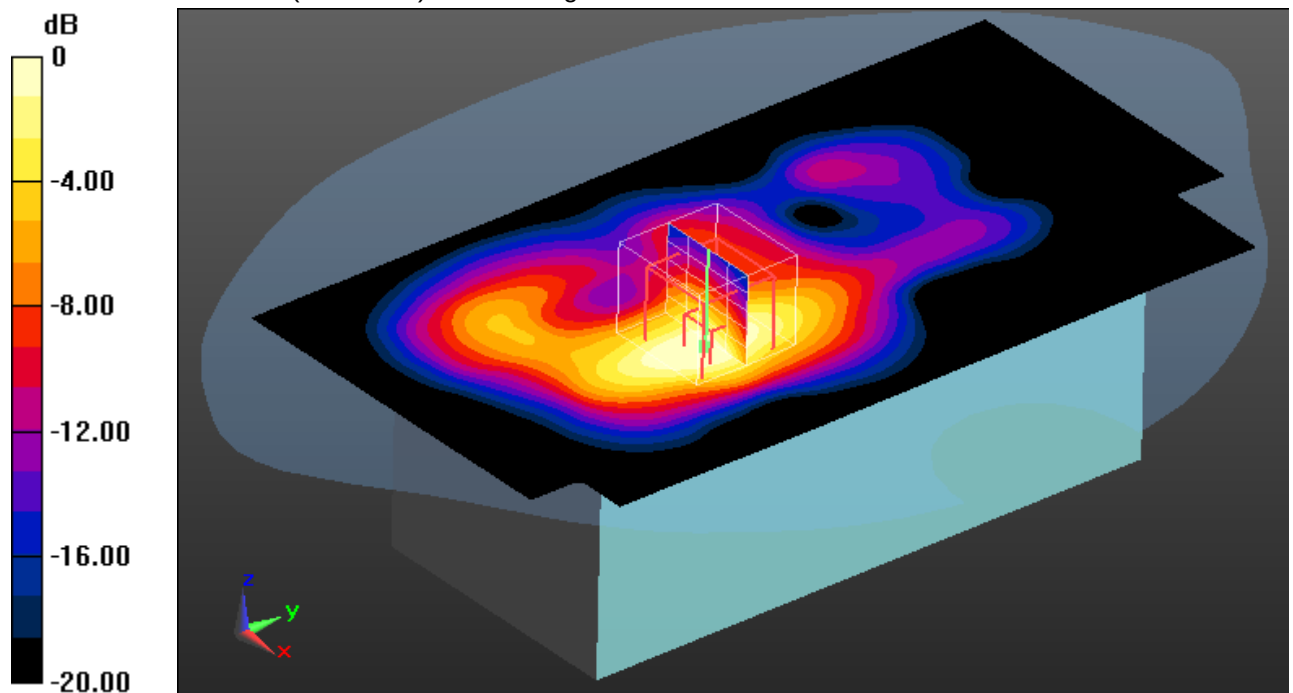
**MSL 2450\_move 5000/Top position - High/Zoom Scan (8x8x7)/Cube 0:**Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 33.866 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 4.05 W/kg

**SAR(10 g) = 0.928 W/kg**

Maximum value of SAR (measured) = 2.45 W/kg



0 dB = 2.45 W/kg = 3.89 dBW/kg

**Additional information:**

position or distance of DUT to the phantom: 0 mm

ambient temperature: 23.8°C; liquid temperature: 21.9°C

## Annex B.1: Liquid depth

Photo 1: Liquid depth 750 MHz body simulating liquid



Photo 2: Liquid depth 850 MHz body simulating liquid



Photo 3: Liquid depth 1750 MHz body simulating liquid

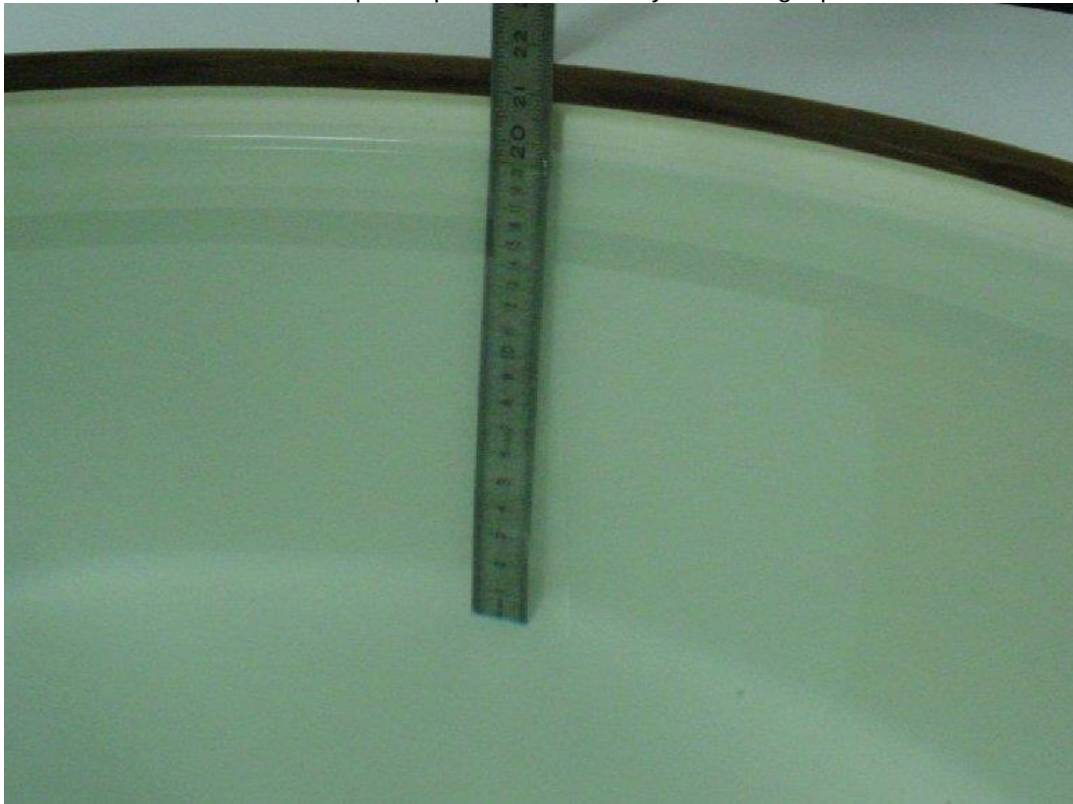


Photo 4: Liquid depth 1900 MHz body simulating liquid

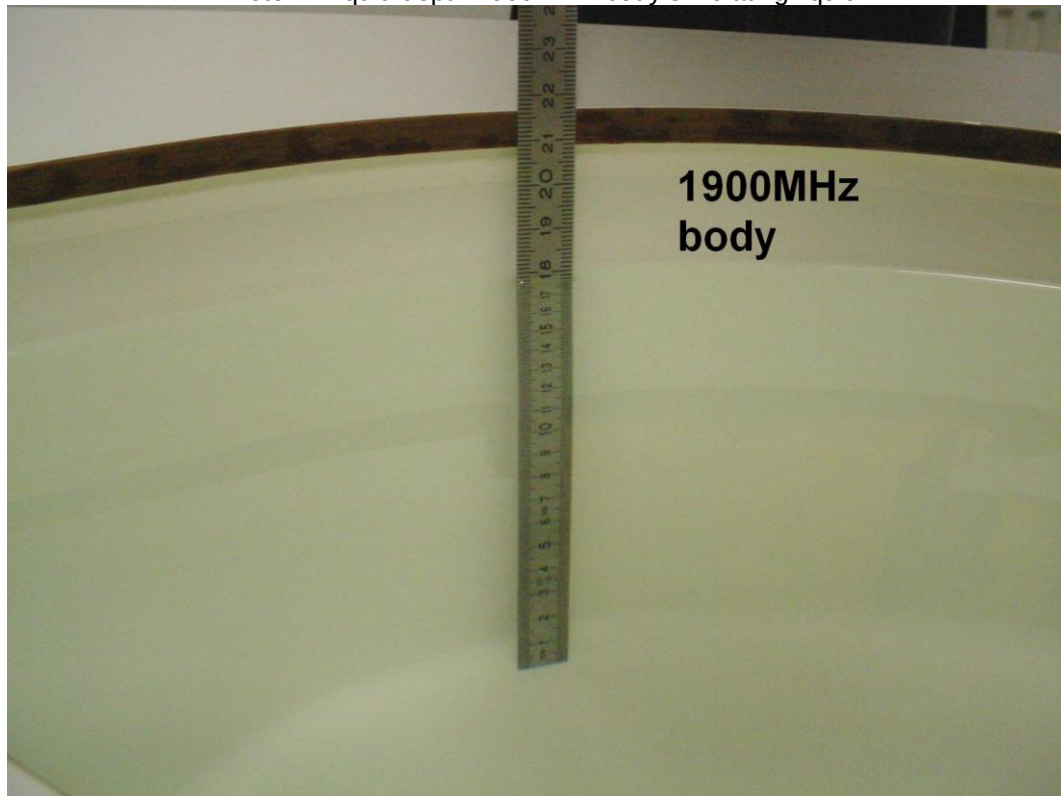
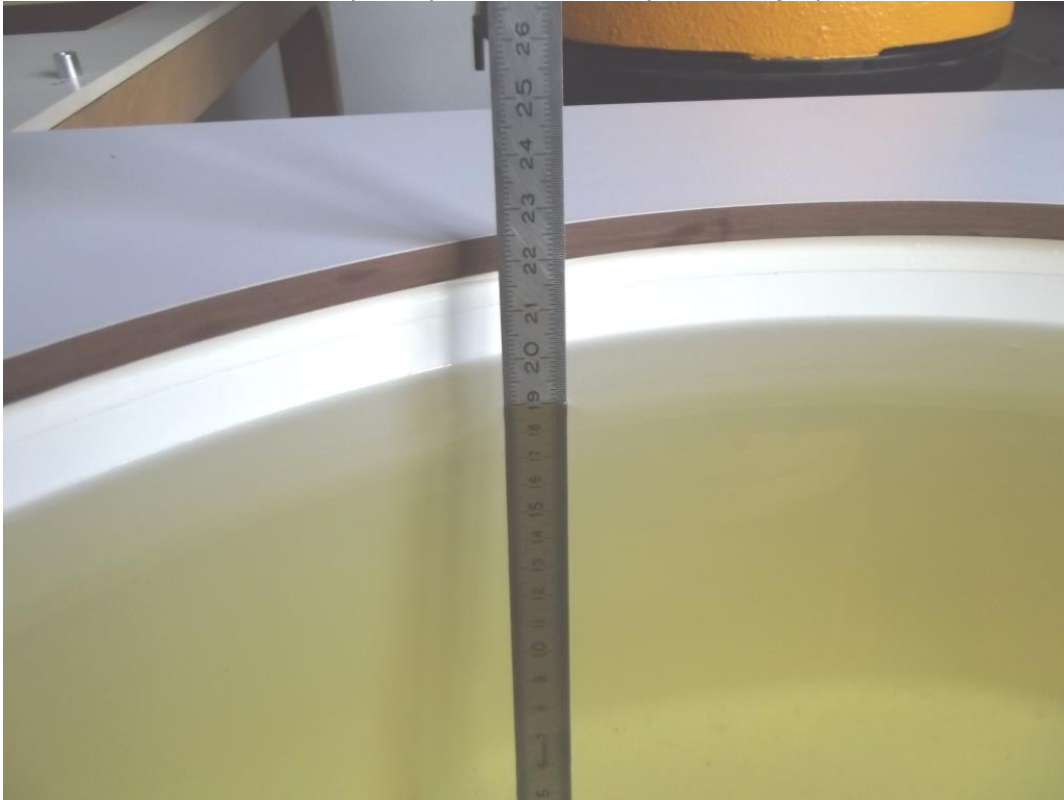


Photo 5: Liquid depth 2450 MHz body simulating liquid



## **Annex C: Photo documentation**

Photo documentation is described in the additional document:

### **Appendix to test report no. 1-5566/17-01-02-A Photo documentation**

## **Annex D: Calibration parameters**

Calibration parameters are described in the additional document:

### **Appendix to test report no. 1-5566/17-01-02-A Calibration data, Phantom certificate and detail information of the DASY5 System**

## **Annex E: RSS-102 Annex A and B**

ICRF documents are described in the additional document:

### **Appendix to test report no. 1-5566/17-01-02-A\_ICRF RF Technical Brief Cover Sheet acc. To RSS-102 Annex A and Declaration of RX Exposure Compliance Annex B**

**Annex F: Document History**

| Version | Applied Changes         | Date of Release |
|---------|-------------------------|-----------------|
|         | Initial Release         | 2018-03-16      |
| -A      | Test Item was completed | 2018-04-03      |

**Annex G: Further Information****Glossary**

|          |   |                                                |
|----------|---|------------------------------------------------|
| BW       | - | Bandwidth                                      |
| DTS      | - | Distributed Transmission System                |
| DUT      | - | Device under Test                              |
| EUT      | - | Equipment under Test                           |
| FCC      | - | Federal Communication Commission               |
| FCC ID   | - | Company Identifier at FCC                      |
| HW       | - | Hardware                                       |
| IC       | - | Industry Canada                                |
| Inv. No. | - | Inventory number                               |
| LTE      | - | Long Term Evolution                            |
| N/A      | - | not applicable                                 |
| OET      | - | Office of Engineering and Technology           |
| RB       | - | resource block(s)                              |
| SAR      | - | Specific Absorption Rate                       |
| S/N      | - | Serial Number                                  |
| SW       | - | Software                                       |
| UNII     | - | Unlicensed National Information Infrastructure |