
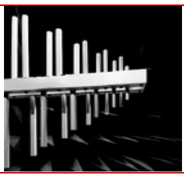
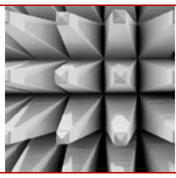

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CETECOM ICT Services
*consulting - testing - certification* >>>

# TEST REPORT

**Test Report No.: 1-6965/13-06-02**

## Testing Laboratory


**CETECOM ICT Services GmbH**
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**Accredited Test Laboratory:**
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

## Applicant


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## Manufacturer


**Sony Mobile Communications AB**
Nya Vattentornet
22188 Lund/SWEDEN


## Test Standard/s

| | |
|---|---|
| IEEE 1528-2003 | 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 4 | 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: | Tablet PC |
| Device type: | portable device |
| **Model name:** | **TM-0043-BV** |
| S/N serial number: | CB51267QLG / CB51267QKB / CB51267QJ4 / CB51267QKM/ CB51267QLS / CB51267QKT / CB51267QJZ / |
| FCC-ID: | PY7TM-0043 |
| IMEI-Number: | 00440245192120-3 / 00440245192117-9 / 00440245192113-8 / 00440245192106-2 / 00440245192114-6 / 00440245192119-5 / 00440245-192122-9 |
| Hardware status: | AP1 |
| Software status: | 17.0.A.0.274 |
| Frequency: | see technical details |
| Antenna: | integrated antenna |
| Battery option: | Integrated Li-polymer battery 3.7V |
| Accessories: | Stereo headset model: MH750; type: AG-0501 |
| Test sample status: | identical prototype |
| Exposure category: | general population / uncontrolled environment |

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

**Test Report authorised:**

DN: cn=Thomas Vogler, o=CETECOM ICT Services GmbH, ou=VOG-100727, email=thomas.vogler@cetecom.com, c=DE
Datum: 2014.01.21 16:53:55 +01'00'

Thomas Vogler
Senior Testing Manager

**Test performed:**

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2014.01.21 15:47:04 +01'00'

Oleksandr Hnatovskiy
Testing Manager

# 1 Table of contents

# 2 General information

## 2.1 Notes and disclaimer

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In no case this test report can be considered as a Letter of Approval.

## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2013-12-17 |
| Date of receipt of test item: | 2013-12-13 |
| Start of test: | 2013-12-30 |
| End of test: | 2014-01-08 |
| Person(s) present during the test: | |

## 2.3 Statement of compliance

The SAR values found for the TM-0043-BV Tablet PC are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1 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 | GPRS/EGPRS mobile station class | GPRS/EGPRS multislot class | (E)GPRS voice mode or DTM | Test channel low | Test channel middle | Test channel high | Maximum output power/dBm )* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ☐ | GSM | 880.2 | 914.8 | 925.2 | 959.8 | GMSK 8-PSK | 4 E2 | 5 | B | 33 | 11 | 975 | 37 | 124 | -- |
| ☐ | GSM DCS | 1710.2 | 1784.8 | 1805.2 | 1879.8 | GMSK 8-PSK | 1 E2 | 0 | B | 33 | 11 | 512 | 698 | 885 | -- |
| ☒ | GSM cellular | 824.2 | 848.8 | 869.2 | 893.8 | GMSK 8-PSK | 4 E2 | 5 | B | 33 | 11 | 128 | 190 | 251 | 33.2 |
| ☒ | GSM PCS | 1850.2 | 1909.8 | 1930.2 | 1989.8 | GMSK 8-PSK | 1 E2 | 0 | B | 33 | 11 | 512 | 661 | 810 | 30.2 |
| ☐ | UMTS FDD I | 1922.4 | 1977.6 | 2112.4 | 2167.6 | QPSK | 3 | max | -- | -- | -- | 9612 | 9750 | 9888 | -- |
| ☒ | UMTS FDD II | 1852.4 | 1907.6 | 1932.4 | 1987.6 | QPSK | 3 | max | -- | -- | -- | 9262 | 9400 | 9538 | 24.2 |
| ☒ | UMTS FDD IV | 1712.4 | 1752.6 | 2112.4 | 2152.6 | QPSK | 3 | max | -- | -- | -- | 1312 | 1412 | 1513 | 24.4 |
| ☒ | UMTS FDD V | 826.4 | 846.6 | 871.4 | 891.6 | QPSK | 3 | max | -- | -- | -- | 4132 | 4182 | 4233 | 24.4 |
| ☐ | UMTS FDD VIII | 882.4 | 912.6 | 927.4 | 957.6 | QPSK | 3 | max | -- | -- | -- | 2712 | 2788 | 2863 | -- |
| ☐ | LTE FDD 1 | 1920 | 1980 | 2110 | 2170 | QPSK | 3 | max | -- | -- | -- | 18100 | 18300 | 18500 | -- |
| ☒ | LTE FDD 2 | 1850 | 1910 | 1930 | 1990 | QPSK | 3 | max | -- | -- | -- | 18700 | 18900 | 19100 | 23.0 |
| ☐ | LTE FDD 3 | 1710 | 1785 | 1805 | 1880 | QPSK | 3 | max | -- | -- | -- | 19300 | 19575 | 19850 | -- |
| ☒ | LTE FDD 4 | 1710 | 1755 | 2110 | 2155 | QPSK | 3 | max | -- | -- | -- | 20050 | 20175 | 20300 | 23.0 |
| ☒ | LTE FDD 5 | 824 | 849 | 869 | 894 | QPSK | 3 | max | -- | -- | -- | 20450 | 20525 | 20600 | 23.2 |
| ☒ | LTE FDD 7 | 2500 | 2570 | 2620 | 2690 | QPSK | 3 | max | -- | -- | -- | 20850 | 21100 | 21350 | 23.0 |
| ☐ | LTE FDD 8 | 880 | 915 | 925 | 960 | QPSK | 3 | max | -- | -- | -- | 21500 | 21625 | 21750 | -- |
| ☐ | WLAN | 2412 | 2472 | 2412 | 2472 | CCK OFDM | -- | max | -- | -- | -- | 1 | 7 | 13 | -- |
| ☒ | WLAN US | 2412 | 2462 | 2412 | 2462 | | -- | max | -- | -- | -- | 1 | 6 | 11 | 10.3 |
| ☒ | WLAN | 5180 | 5240 | 5180 | 5240 | OFDM | -- | max | -- | -- | -- | 36 | -- | -- | 10.2 |
| ☒ | WLAN | 5260 | 5320 | 5260 | 5320 | OFDM | -- | max | -- | -- | -- | 52 | 60 | 64 | 9.7 |
| ☒ | WLAN | 5500 | 5700 | 5500 | 5700 | OFDM | -- | max | -- | -- | -- | -- | 116 | -- | 10.2 |
| ☒ | WLAN | 5745 | 5825 | 5745 | 5825 | OFDM | -- | max | -- | -- | -- | -- | -- | 165 | 10.1 |
| ☐ | BT | 2402 | 2480 | 2402 | 2480 | GFSK | 3 | max | -- | -- | -- | 0 | 39 | 78 | 9.7 |

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

**Features:**

| | |
|---|---|
| GSM bands 2.5 | (GPRS, EDGE) class A, Multislot class 33 (max 4 TS uplink, max 5 TS downlink, max. 6 TS active) DTM class 11 (max 3 TS uplink, max 4 TS downlink, max 5 TS active) |
| Rel 9 HSDPA UE | cat 24 bands 2, 4, 5<br>(QPSK, 16QAM, 64QAM, no MIMO, dual cell, 42.2 Mbps) |
| Rel 9 HSPA UE | cat: 6 bands 2,4,5<br>(QPSK, no 16QAM, 5.76 Mbps) |
| Rel 10 LTE UE | cat: 4 bands 2,5,7,13,17<br>(QPSK, 16QAM, no MIMO, 50Mbps uplink)<br>Maximum TTI bundling: 4 |
| BT BR / BT LE | |
| ANT+ | |
| RFID 13.56 MHz | |

## 2.5 Transmitter and Antenna Operating Configurations

| Simultaneous transmission conditions | | |
|---|---|---|
| GSM / GPRS / EDGE / DTM | + | BT/BLE[1] |
| GSM / GPRS / EDGE / DTM | + | WLAN 2.4GHz |
| GSM / GPRS / EDGE / DTM | + | WLAN 5GHz |
| UMTS / HSPA | + | BT/BLE |
| UMTS / HSPA | + | WLAN 2.4GHz |
| UMTS / HSPA | + | WLAN 5GHz |
| LTE | + | BT/BLE |
| LTE | + | WLAN 2.4GHz |
| LTE | + | WLAN 5GHz |
| GSM / GPRS / EDGE / DTM | + | BT + WLAN 5GHz |
| UMTS / HSPA | + | BT + WLAN 5GHz |
| LTE | + | BT + WLAN 5GHz |

Table 1: Simultaneous transmission conditions

Note: BT and WLAN can be active at the same time, but only with interleaving of packages switched on board level. That means that they don’t transmit at the same time.

BLE[1] - Bluetooth low energy

## 3 Test standards/ procedures references

| Test Standard | Version | Test Standard Description |
|---|---|---|
| IEEE 1528-2003 | 2003-04 | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| IEEE 1528-2013 | 2014-06 | 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 4 | 2010-03 | Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) |
| Canada's Safety Code No. 6 | 99-EHD-237 | 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 | 1992 | 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 | May 28, 2013 | FCC OET SAR measurement requirements 100 MHz to 6 GHz |
| KDB 865664D02v01 | May 28, 2013 | RF Exposure Compliance Reporting and Documentation Considerations |
| KDB 447498D01v05 | May 28, 2013 | Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies |
| KDB 648474D04v01 | May 28, 2013 | SAR Evaluation Considerations for Wireless Handsets |
| KDB 941225D01v02 | April 10, 2007 | SAR Measurements Procedures for 3G Devices |
| KDB 941225D02v01 | December 14, 2009 | 3GPP R6 HSPA and R7 HSPA+ SAR Guidance |
| KDB 941225D02v02 | May 28, 2013 | SAR Guidance for HSPA, HSPA+, DC-HSDPA and 1x-Advanced |
| KDB 941225D05v02 | December 5, 2013 | SAR for LTE Devices |
| KDB 941225D03v01 | December, 2008 | SAR Test Reduction Procedure for GSM/GPRS/EDGE |
| KDB 941225D06v01 | May 28, 2013 | SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities |
| KDB 248227D01v01 | May, 2007 | SAR Measurement Procedures for 802.11 a/b/g Transmitters |
| KDB 450824D01v01 | January, 2007 | SAR Probe Calibration and System Verification considerations for measurements from 150 MHz to 3 GHz |
| KDB 450824D01v01 | March 4, 2012 | Dipole Requirements for SAR System Validation and Verification |
| KDB 616217D03v01 | November13, 2009 | SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens |

## 3.1 RF exposure limits

| Human Exposure | Uncontrolled Environment General Population | Controlled Environment Occupational |
|---|---|---|
| Spatial Peak SAR* (Brain and Trunk) | **1.60 mW/g** | 8.00 mW/g |
| Spatial Average SAR** (Whole Body) | 0.08 mW/g | 0.40 mW/g |
| Spatial Peak SAR*** (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

| | |
|---|---|
| ☒ | **No deviations from the technical specifications ascertained** |
| ☐ | Deviations from the technical specifications ascertained |

| Maximum SAR value reported for 1g (W/kg) | | | | |
|---|---|---|---|---|
| | | **PCE** | **DTS** | **UNII** |
| **body** | | **1.237** | **0.708** | **0.944** |
| **collocated situations** | **ΣSAR evaluation** | **1.589** | | |
| | **$SPLSR_i \leq 0.040$** | **0.028** | | |

## 4.1 SAR measurement variability and measurement uncertainty analysis

This analysis is required for worst case results larger than 0.8 W/kg.

| frequency band | highest original measurement result at worst case position (W/kg) | repeated measurement result at worst case position (W/kg) | ratio <1.2 |
|---|---|---|---|
| GSM 850 | 0.938 | 0.936 | 1.00 |
| UMTS FDD II | 0.868 | 0.890 | 1.03 |
| UMTS FDD IV | 0.811 | 0.807 | 1.00 |
| LTE FDD 7 | 0.788 | 0.784 | 1.01 |

## 5 Test Environment

Ambient temperature: 20 – 24 °C
Tissue Simulating liquid: 20 – 24 °C

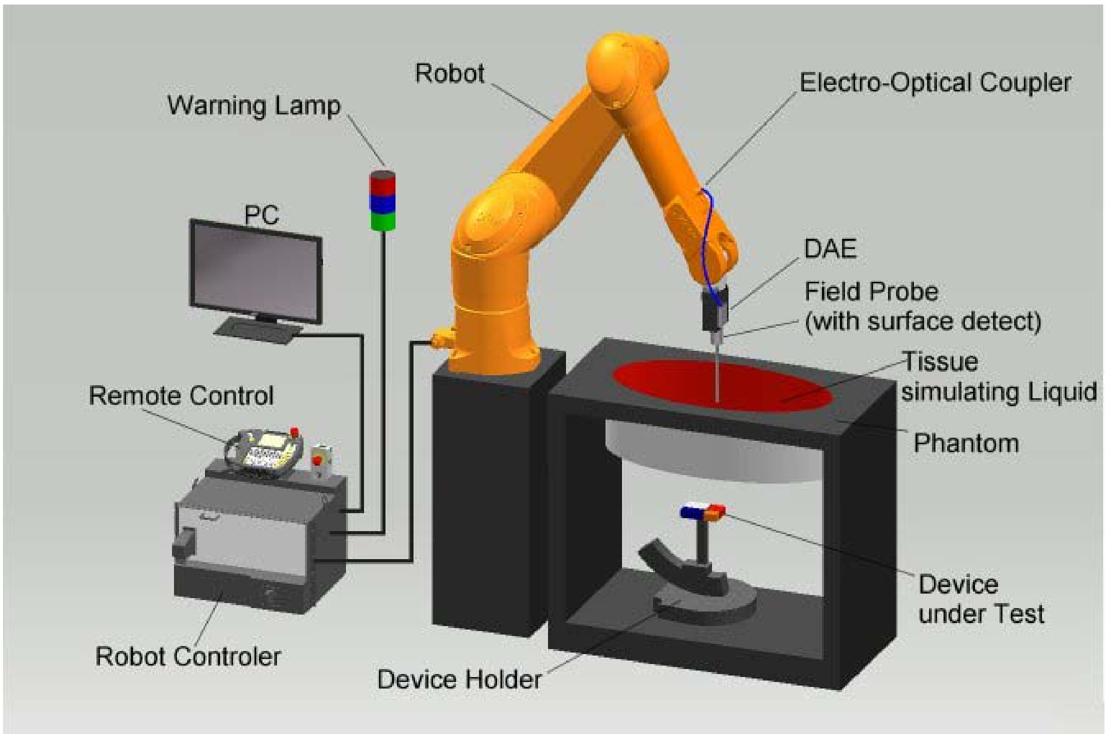
Relative humidity content: 40 – 50 %
Air pressure: not relevant for this kind of testing
Power supply: 230 V / 50 Hz

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

- A standard high precision 6-axis robot (Stäubli RX 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. The probe is equipped with an optical surface detector system.

- 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.
- A unit to operate the optical surface detector which is connected 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 DASY measurement server.
- The DASY 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.
- DASY 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 device holder for handheld mobile phones.
- 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 at the head end of a room with dimensions:
5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.
Picture 1 of the photo documentation shows a complete view of the test environment.
The system allows the measurement of SAR values larger than 0.005 mW/g.

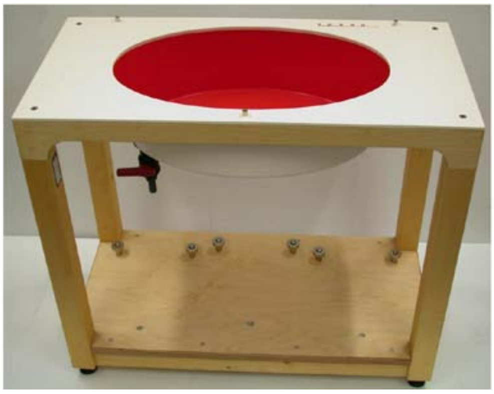
### 6.1.3 Probe description

Isotropic E-Field Probe ET3DV6 for Dosimetric Measurements

| Technical data according to manufacturer information | |
|---|---|
| Construction | Symmetrical design with triangular core<br>Built-in optical fiber for surface detection system<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., glycolether) |
| Calibration | In air from 10 MHz to 2.5 GHz<br>In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy ± 9.5%; k=2) Calibration for other liquids and frequencies upon request |
| Frequency | 10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz) |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.4 dB in HSL (rotation normal to probe axis) |
| Dynamic range | 5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB |
| Optical Surface Detection | ± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (ET3DV6 only) |
| Dimensions | Overall length: 330 mm<br>Tip length: 16 mm<br>Body diameter: 12 mm<br>Tip diameter: 6.8 mm<br>Distance from probe tip to dipole centers: 2.7 mm |
| Application | General dosimetry up to 3 GHz<br>Compliance tests of mobile phones<br>Fast automatic scanning in arbitrary phantoms (ET3DV6) |

## 6.1.4 Phantom description

The used ELI4 Phantom meets the requirements specified in KDB865664 D01 for Specific Absorption Rate (SAR) measurements. The phantom consists of a fibreglass shell integrated in a wooden table.



The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI4 is fully compatible with the standard IEC 62209-2 and all known tissue simulating liquids.

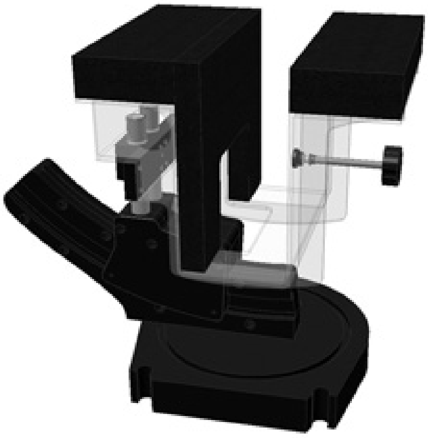
## 6.1.5 Device holder description

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 the device holder without the extension kit described below.

## 6.1.6 Laptop Extension Kit for Device holder

SPEAG released a simple but effective extension for their Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc).



The extension is lightweight and made of POM, PET-G acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner.

### 6.1.7 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 „surface check“ measurement tests the optical surface detection system of the DASY system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- 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 strenth is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. 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 2.

- A „7x7x7 zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5 mm / 4 mm in x and y-direction and 5 mm / 2 mm in z-direction. 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 2. Test results relevant for the specified standard (see section 3) are shown in table form in section 7.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth. A z-axis scan of the measurement with maximum SAR value is shown in annex 2.

## 6.1.8 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 7 x 7 x 7 points. 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 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.

## 6.1.9 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 | $Norm_i$, $a_{i0}$, $a_{i1}$, $a_{i2}$ |
| | - Conversion factor | $ConvF_i$ |
| | - Diode compression point | 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) $[mV/(V/m)^2]$ 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 $g/cm^3$

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 $mW/cm^2$
$E_{tot}$ = total electric field strength in V/m
$H_{tot}$ = total magnetic field strength in A/m

## 6.1.10 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** (% of weight) | **Frequency (MHz)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| frequency band | ☐ 450 | ☐ 750 | ☒ 835 | ☐ 900 | ☐ 1450 | ☒ 1750 | ☒ 1900 | ☒ 2450 | ☒ 5000 |
| Tissue Type | Body | Body | Body | Body | Body | Body | Body | Body | Body |
| Water | 51.16 | 51.7 | 52.4 | 56.0 | 70.97 | 69.91 | 69.91 | 73.2 | 64 - 78 |
| Salt (NaCl) | 1.49 | 0.9 | 1.40 | 0.76 | 0.43 | 0.13 | 0.13 | 0.04 | 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Triton X-100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DGBE | 0.0 | 0.0 | 0.0 | 0.0 | 28.60 | 29.96 | 29.96 | 26.7 | 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
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

| Liquid MSL | Freq. (MHz) | Target **body** tissue | | Measurement **body** tissue | | | | | Measurement date |
|---|---|---|---|---|---|---|---|---|---|
| | | Permittivity | Conductivity [S/m] | Permittivity | Dev. % | Conductivity ε" | Conductivity [S/m] | Dev. % | |
| 850 | 824 | 55.24 | 0.97 | 54.9 | -0.6% | 21.48 | 0.98 | 1.6% | 2014-01-03 |
| | 825 | 55.24 | 0.97 | 54.9 | -0.6% | 21.48 | 0.99 | 1.7% | |
| | 829 | 55.22 | 0.97 | 54.9 | -0.6% | 21.47 | 0.99 | 2.1% | |
| | 835 | 55.20 | 0.97 | 54.8 | -0.7% | 21.44 | 1.00 | 2.6% | |
| | 837 | 55.19 | 0.97 | 54.8 | -0.7% | 21.40 | 1.00 | 2.5% | |
| | 844 | 55.17 | 0.98 | 54.7 | -0.8% | 21.37 | 1.00 | 2.2% | |
| | 847 | 55.16 | 0.98 | 54.7 | -0.8% | 21.35 | 1.01 | 2.1% | |
| | 849 | 55.16 | 0.99 | 54.7 | -0.9% | 21.32 | 1.01 | 2.0% | |
| 1750 | 1712 | 53.53 | 1.46 | 55.6 | 3.9% | 15.23 | 1.45 | -1.0% | 2014-01-02 |
| | 1720 | 53.51 | 1.47 | 55.6 | 3.9% | 15.23 | 1.46 | -0.8% | |
| | 1732 | 53.48 | 1.48 | 55.6 | 3.9% | 15.26 | 1.47 | -0.5% | |
| | 1745 | 53.44 | 1.49 | 55.5 | 3.9% | 15.32 | 1.49 | 0.1% | |
| | 1750 | 53.43 | 1.49 | 55.5 | 3.9% | 15.33 | 1.49 | 0.3% | |
| | 1752 | 53.43 | 1.49 | 55.5 | 3.9% | 15.34 | 1.49 | 0.3% | |
| 1900 | 1850 | 53.30 | 1.52 | 53.0 | -0.6% | 14.20 | 1.46 | -3.9% | 2013-12-30 |
| | 1852 | 53.30 | 1.52 | 53.0 | -0.6% | 14.21 | 1.46 | -3.7% | |
| | 1860 | 53.30 | 1.52 | 52.9 | -0.7% | 14.24 | 1.47 | -3.0% | |
| | 1880 | 53.30 | 1.52 | 53.0 | -0.6% | 14.32 | 1.50 | -1.5% | |
| | 1900 | 53.30 | 1.52 | 52.9 | -0.7% | 14.30 | 1.51 | -0.6% | |
| | 1908 | 53.30 | 1.52 | 52.9 | -0.7% | 14.27 | 1.51 | -0.4% | |
| | 1910 | 53.30 | 1.52 | 52.9 | -0.7% | 14.25 | 1.51 | -0.4% | |
| 2450 | 2412 | 52.75 | 1.91 | 52.0 | -1.5% | 14.28 | 1.92 | 0.1% | 2014-01-06 |
| | 2437 | 52.72 | 1.94 | 52.0 | -1.3% | 14.34 | 1.94 | 0.3% | |
| | 2450 | 52.70 | 1.95 | 52.1 | -1.2% | 14.38 | 1.96 | 0.5% | |
| | 2462 | 52.68 | 1.97 | 52.1 | -1.2% | 14.45 | 1.98 | 0.6% | |
| | 2510 | 52.62 | 2.04 | 51.9 | -1.3% | 14.60 | 2.04 | 0.1% | |
| | 2535 | 52.59 | 2.07 | 51.9 | -1.4% | 14.67 | 2.07 | -0.1% | |
| | 2560 | 52.56 | 2.11 | 51.9 | -1.3% | 14.75 | 2.10 | -0.3% | |
| | 2600 | 52.51 | 2.16 | 51.8 | -1.3% | 14.87 | 2.15 | -0.5% | |
| 5GHz | 5180 | 49.04 | 5.28 | 48.9 | -0.3% | 17.90 | 5.16 | -2.2% | 2014-01-09 |
| | 5200 | 49.01 | 5.30 | 48.9 | -0.2% | 17.88 | 5.17 | -2.4% | |
| | 5320 | 48.85 | 5.44 | 48.7 | -0.4% | 17.97 | 5.32 | -2.2% | |
| | 5500 | 48.61 | 5.65 | 48.3 | -0.6% | 18.17 | 5.56 | -1.6% | |
| | 5520 | 48.58 | 5.67 | 48.2 | -0.7% | 18.17 | 5.58 | -1.7% | |
| | 5580 | 48.50 | 5.74 | 48.2 | -0.6% | 18.27 | 5.67 | -1.2% | |
| | 5620 | 48.44 | 5.79 | 48.0 | -0.9% | 18.27 | 5.71 | -1.3% | |
| | 5680 | 48.36 | 5.86 | 47.9 | -0.9% | 18.33 | 5.79 | -1.1% | |
| | 5745 | 48.27 | 5.94 | 47.8 | -0.9% | 18.37 | 5.87 | -1.1% | |
| | 5800 | 48.20 | 6.00 | 47.7 | -1.0% | 18.45 | 5.95 | -0.8% | |

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

| Relative DASY5 Uncertainty Budget for SAR Tests | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| According to IEEE 1528/2011 and IEC62209-1/2011 (0.3-3GHz range) | | | | | | | | |
| Error Description | Uncertainty Value | Probability Distribution | Divisor | $c_i$ (1g) | $c_i$ (10g) | Standard Uncertainty ± %, (1g) | Standard Uncertainty ± %, (10g) | $v_i^2$ or $v_{eff}$ |
| **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 5: Measurement uncertainties
Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528/2011
and IEC 62209-1/2011 draft 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.

| Relative DASY5 Uncertainty Budget for SAR Tests | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **According to IEC62209-2/2010 (30 MHz - 6 GHz range)** | | | | | | | | |
| Error Description | Uncertainty Value | Probability Distribution | Divisor | $c_i$ (1g) | $c_i$ (10g) | Standard Uncertainty ± %, (1g) | Standard Uncertainty ± %, (10g) | $v_i^2$ or $v_{eff}$ |
| **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 6: Measurement uncertainties. Worst-Case uncertainty budget for DASY5 assessed according to according to IEC 62209-2/2010 standard. The budget is valid for the frequency range 30MHz - 6 GHz and 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 1528-2003, IEC 62209-1 for the 3-6 GHz range | | | | | | | | |
| Error Description | Uncertainty Value | Probability Distribution | Divisor | $c_i$ (1g) | $c_i$ (10g) | Standard Uncertainty ± %, (1g) | Standard Uncertainty ± %, (10g) | $v_i^2$ or $v_{eff}$ |
| **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 % | ∞ |
| 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 % | ∞ |
| Max. SAR evaluation | ± 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 | ± 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 Uncertainty** | | | | | | ± 12.1 % | ± 11.9 % | 330 |
| **Expanded Std. Uncertainty** | | | | | | ± **24.3** % | ± **23.8** % | |

Table 7: Measurement uncertainties
Worst-Case uncertainty budget for DASY5 valid for 3G communication signals and frequency range 3 - 6 GHz. Probe calibration error reflects uncertainty of the EX3D probe. For specific tests and configurations, the uncertainty could be considerable smaller.

| Relative DASY5 Uncertainty Budget for SAR Tests | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| According to IEEE 1528/2011 and IEC62209-1/2011 (3-6GHz range) | | | | | | | | |
| Error Description | Uncertainty Value | Probability Distribution | Divisor | $c_i$ (1g) | $c_i$ (10g) | Standard Uncertainty ± %, (1g) | Standard Uncertainty ± %, (10g) | $v_i^2$ or $v_{eff}$ |
| **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 % | ∞ |
| Max. SAR evaluation | ± 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 | ± 6.6 % | Rectangular | √ 3 | 1 | 1 | ± 3.8 % | ± 3.8 % | ∞ |
| 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** | | | | | | ± 12.4 % | ± 12.4 % | 330 |
| **Expanded Std. Uncertainty** | | | | | | ± **24.9** % | ± **24.8** % | |

Table 8: Measurement uncertainties
Worst-Case uncertainty budget for DASY5 assessed according to IEEE 1528/2011
and IEC 62209-1/2011 draft standards. The budget is valid for the frequency range 3GHz -6GHz 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 for the 0.3 - 3 GHz range | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Source of uncertainty | Uncertainty Value | Probability Distribution | Divisor | $c_i$ (1g) | $c_i$ (10g) | Standard Uncertainty ± %, (1g) | Standard Uncertainty ± %, (10g) | $v_i^2$ or $v_{eff}$ |
| **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. Uncertainty** | | | | | | ± **18.2** % | ± **17.9** % | |

Table 9: Measurement uncertainties of the System Check with DASY5 (0.3-3GHz)

| Uncertainty of a System Performance Check with DASY5 System for the 3 - 6 GHz range | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Source of uncertainty | Uncertainty Value | Probability Distribution | Divisor | $c_i$ (1g) | $c_i$ (10g) | Standard Uncertainty ± %, (1g) | Standard Uncertainty ± %, (10g) | $v_i^2$ or $v_{eff}$ |
| **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 | ± 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 | ± 0.8 % | Rectangular | √ 3 | 1 | 1 | ± 0.5 % | ± 0.5 % | ∞ |
| Probe positioning | ± 6.7 % | Rectangular | √ 3 | 1 | 1 | ± 3.9 % | ± 3.9 % | ∞ |
| 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** | | | | | | ± 10.1 % | ± 10.0 % | 330 |
| **Expanded Std. Uncertainty** | | | | | | ± **20.2** % | ± **19.9** % | |

Table 10: Measurement uncertainties of the System Check with DASY5 (3-6GHz)

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

## 6.1.13 System check

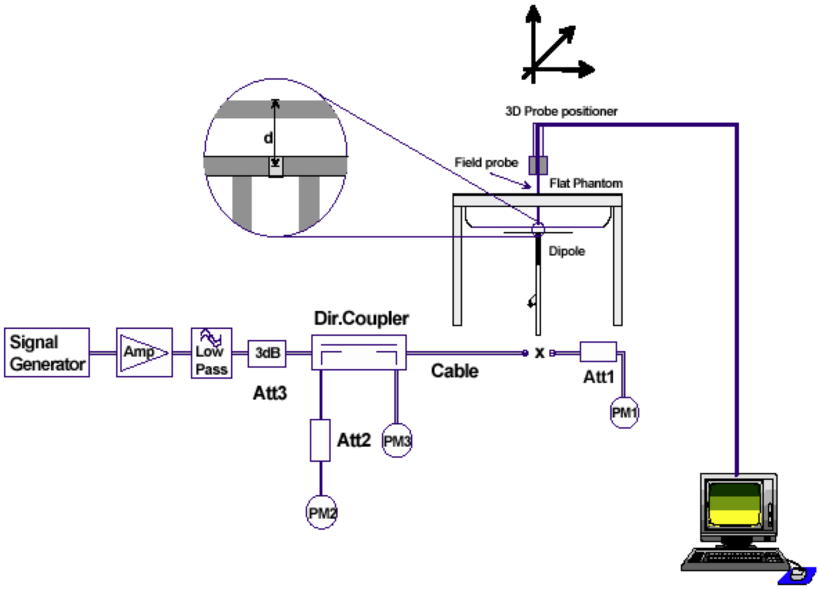
The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE 1528. The following table shows system check results for all frequency bands and tissue liquids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

| System performence check (1000 mW) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| System validation Kit | Frequency | Target $SAR_{1g}$ /mW/g (+/- 10%) | Target $SAR_{10g}$ /mW/g (+/- 10%) | Measured $SAR_{1g}$ mW/g | $SAR_{1g}$ dev. % | Measured $SAR_{10g}$ mW/g | $SAR_{10g}$ dev. % | Measured date |
| D835V2 S/N: 4d153 | 835 MHz body | 9.40 | 6.12 | 9.69 | 3.1% | 6.42 | 4.9% | 2014-01-03 |
| D835V2 S/N: 4d153 | 835 MHz body | 9.40 | 6.12 | 9.45 | 0.5% | 6.25 | 2.1% | 2014-01-04 |
| D1750V2 S/N: 1093 | 1750 MHz body | 37.90 | 20.30 | 35.70 | -5.8% | 19.10 | -5.9% | 2014-01-02 |
| D1900V2 S/N: 5d009 | 1900 MHz body | 40.90 | 21.70 | 38.10 | -6.8% | 20.00 | -7.8% | 2013-12-30 |
| D2450V2 S/N: 710 | 2450 MHz body | 51.20 | 23.90 | 50.80 | -0.8% | 23.40 | -2.1% | 2014-01-07 |
| D2600V2 S/N: 1040 | 2600 MHz body | 56.80 | 25.40 | 56.80 | 0.0% | 25.20 | -0.8% | 2014-01-07 |
| D5GHzV2 S/N: 1055 | 5200 MHz body | 74.20 | 20.80 | 74.10 | -0.1% | 20.90 | 0.5% | 2014-01-09 |
| D5GHzV2 S/N: 1055 | 5500 MHz body | 77.90 | 21.70 | 78.40 | 0.6% | 21.90 | 0.9% | 2014-01-09 |
| D5GHzV2 S/N: 1055 | 5800 MHz body | 73.30 | 20.20 | 69.20 | -5.6% | 19.20 | -5.0% | 2014-01-09 |

Table 11: 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 1000 mW for frequencies below 2 GHz or 100 mW for frequencies above 2 GHz. 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.

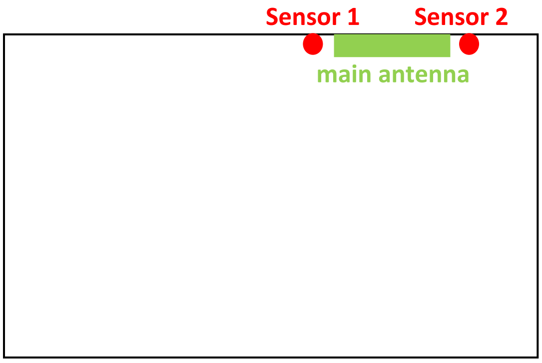
The following table lists the system validations relevant for this test report:

| Probe Calibration Point | Test | DASY | Dipole | Probe | Calibrated signal type(s) | DAE unit | Validation done |
|---|---|---|---|---|---|---|---|
| f / MHz | System | SW | Type / SN | Type / SN | | Type / SN | Body tissue simulant |
| 835 | Saarbrücken / SAR-1 | V52.8.7 | D835V2 / 4d153 | ES3DV3 / 3320 | CW | DAE3/ 413 | 2013-07 |
| 1750 | Saarbrücken / SAR-1 | V52.8.7 | D1750V2 / 1093 | ES3DV3 / 3320 | CW | DAE3 / 413 | 2013-07 |
| 1900 | Saarbrücken / SAR-1 | V52.8.7 | D1900V2 / 5d009 | ES3DV3 / 3320 | CW | DAE3 / 413 | 2013-07 |
| 2450 | Saarbrücken / SAR-1 | V52.8.7 | D2450V2 / 710 | ES3DV3 / 3320 | CW | DAE3 / 413 | 2013-11 |
| 5200 | Saarbrücken / SAR-1 | V52.8.7 | D5GHzV2 / 1055 | EX3DV4 / 3944 | CW | DAE3 / 408 | 2013-12 |
| 5500 | Saarbrücken / SAR-1 | V52.8.7 | D5GHzV2 / 1055 | EX3DV4 / 3944 | CW | DAE3 / 408 | 2013-12 |
| 5800 | Saarbrücken / SAR-1 | V52.8.7 | D5GHzV2 / 1055 | EX3DV4 / 3944 | CW | DAE3 / 408 | 2013-12 |

# 7 Detailed Test Results

## 7.1 Proximity sensor

The DUT is equipped with two proximity sensors to reduce the output power if a person is close to the main antenna. The position of the sensors and antenna are as shown in the graphic.




According to KDB 616217 D04 SAR for laptop and tablets v01r01 the functionality of the sensors has to be approved for different aspects:

- Triggering distances
- Sensor coverage of the relevant area
- Sensor functionality in tilted positions
- Safety mechanisms in case of sensor Malfunction
- Material dependency of the triggering distances

## 7.2 Proximity sensor test result overview

The proximity sensor tests were performed by the applicant itself. The detailed test results are attached in **Annex E: Proximity sensor data.**

Final verdicts of proximity testing are given in the following paragraphs.

### 7.2.1 Power reduction:

When one of the sensors is triggered the power will be reduced according to the following table:

| Operating mode | Power reduction [dB] |
|---|---|
| GSM 850 | > 4.5 |
| GSM 1900 | > 9 |
| UMTS FDD II | > 12.0 |
| UMTS FDD IV | > 12.0 |
| UMTS FDD V | > 5.5 |
| LTE FDD 2 | > 11.5 |
| LTE FDD 4 | > 11 |
| LTE FDD 5 | > 4.5 |
| LTE FDD 7 | > 11.5 |

More detailed information can be seen in **CONDUCTED MEASUREMENTS RESULTS.**

### 7.2.2 Resulting test positions for SAR measurements.

The smallest separation distance determined during triggering distance, sensor coverage and tilt angle test is selected for SAR measurements. Final verdict of safety distance:

| position | triggering distance | coverage | tilting | resulting measurement distance for SAR |
|---|---|---|---|---|
| **top edge** | 15 | 15 | 15 | **15 mm** |
| **rear** | 16 | 16 | --- | **16 mm** |

### 7.2.3 Safety measures in case of sensor malfunctions

The operational description contains information explaining how the device remains compliant in the event of a sensor malfunction.

## 7.3 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was 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.

Note: CMU200 measures GSM peak and average output power for active timeslots.
For SAR the time based average power is relevant. The difference in-between depends on the duty cycle of the TDMA signal:

| ***No. of timeslots*** | ***1*** | ***2*** | ***3*** | ***4*** |
|---|---|---|---|---|
| Duty Cycle | 1 : 8 | 1: 4 | 1 : 2.66 | 1 : 2 |
| time based avg. power compared to slotted avg. power | - 9 dB | - 6 dB | - 4.25 dB | - 3 dB |

The signalling modes differ as follows :

| ***mode*** | ***coding scheme*** | ***modulation*** |
|---|---|---|
| GPRS | CS1 to CS4 | GMSK |
| EGPRS (EDGE) | MCS1 to MCS4 | GMSK |
| EGPRS (EDGE) | MCS5 to MCS9 | 8PSK |

Apart from modulation change (GMSK/8PSK) coding schemes differ in code rate without influence on the RF signal. Therefore one coding scheme per mode was selected for conducted power measurements.

## 7.3.1 Conducted power measurements GSM 850 MHz

| Channel / frequency | modulation | timeslots | slotted avg. Power (dBm) | | | calculated time based avg. Power (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | full | **back off** | **diff.** | full | **back off** |
| 128 / 824.2 MHz | GMSK | 1 | 33.2 | **28.7** | 4.5 | 24.2 | **19.7** |
| 190 / 836.6 MHz | GMSK | 1 | 33.2 | **28.6** | 4.6 | 24.2 | **19.6** |
| 251 / 848.0 MHz | GMSK | 1 | 33.2 | **28.5** | 4.7 | 24.2 | **19.5** |
| 128 / 824.2 MHz | GMSK | 2 | 31.0 | 25.1 | 5.9 | 25.0 | 19.1 |
| 190 / 836.6 MHz | GMSK | 2 | 30.9 | 24.9 | 6.0 | 24.9 | 18.9 |
| 251 / 848.0 MHz | GMSK | 2 | 30.8 | 24.8 | 6.0 | 24.8 | 18.8 |
| 128 / 824.2 MHz | GMSK | 3 | 29.2 | 23.7 | 5.5 | 24.95 | 19.45 |
| 190 / 836.6 MHz | GMSK | 3 | 29.2 | 23.5 | 5.7 | 24.95 | 19.25 |
| 251 / 848.0 MHz | GMSK | 3 | 29.1 | 23.4 | 5.7 | 24.85 | 19.15 |
| 128 / 824.2 MHz | GMSK | 4 | **28.2** | 21.5 | 6.7 | **25.2** | 18.5 |
| 190 / 836.6 MHz | GMSK | 4 | **28.1** | 21.3 | 6.8 | **25.1** | 18.3 |
| 251 / 848.0 MHz | GMSK | 4 | **28.0** | 21.1 | 6.9 | **25.0** | 18.1 |
| 128 / 824.2 MHz | 8PSK | 1 | 27.8 | 27.6 | 0.2 | 18.8 | 18.6 |
| 190 / 836.6 MHz | 8PSK | 1 | 27.6 | 27.4 | 0.2 | 18.6 | 18.4 |
| 251 / 848.0 MHz | 8PSK | 1 | 27.5 | 27.3 | 0.2 | 18.5 | 18.3 |
| 128 / 824.2 MHz | 8PSK | 2 | 25.8 | 24.0 | 1.8 | 19.8 | 18.0 |
| 190 / 836.6 MHz | 8PSK | 2 | 25.7 | 23.8 | 1.9 | 19.7 | 17.8 |
| 251 / 848.0 MHz | 8PSK | 2 | 25.6 | 23.7 | 1.9 | 19.6 | 17.7 |
| 128 / 824.2 MHz | 8PSK | 3 | 24.9 | 22.6 | 2.3 | 20.65 | 18.35 |
| 190 / 836.6 MHz | 8PSK | 3 | 24.8 | 22.4 | 2.4 | 20.55 | 18.15 |
| 251 / 848.0 MHz | 8PSK | 3 | 24.8 | 22.3 | 2.5 | 20.55 | 18.05 |
| 128 / 824.2 MHz | 8PSK | 4 | 22.9 | 21.2 | 1.7 | 19.9 | 18.2 |
| 190 / 836.6 MHz | 8PSK | 4 | 22.7 | 21.0 | 1.7 | 19.7 | 18.0 |
| 251 / 848.0 MHz | 8PSK | 4 | 22.6 | 20.8 | 1.8 | 19.6 | 17.8 |

Table 12: Test results conducted power measurement GSM 850 MHz

| Channel / frequency | modulation | slotted avg. power | time based avg. Power (calculated) |
|---|---|---|---|
| 128 / 824.2 MHz | GMSK + 1 GMSK | 31.1 dBm | 25.1 dBm |
| 190 / 836.6 MHz | GMSK + 1 GMSK | 31.0 dBm | 25.0 dBm |
| 251 / 848.8 MHz | GMSK + 1 GMSK | 31.0 dBm | 25.0 dBm |
| 128 / 824.2 MHz | GMSK + 2 GMSK | 29.4 dBm | **25.2 dBm** |
| 190 / 836.6 MHz | GMSK + 2 GMSK | 29.3 dBm | **25.1 dBm** |
| 251 / 848.8 MHz | GMSK + 2 GMSK | 29.3 dBm | **25.1 dBm** |
| 128 / 824.2 MHz | GMSK + 1 8PSK | 26.4 dBm | 20.4 dBm |
| 190 / 836.6 MHz | GMSK + 1 8PSK | 26.3 dBm | 20.3 dBm |
| 251 / 848.8 MHz | GMSK + 1 8PSK | 26.3 dBm | 20.3 dBm |
| 128 / 824.2 MHz | GMSK + 2 8PSK | 25.9 dBm | 21.7 dBm |
| 190 / 836.6 MHz | GMSK + 2 8PSK | 25.8 dBm | 21.6 dBm |
| 251 / 848.8 MHz | GMSK + 2 8PSK | 25.8 dBm | 21.6 dBm |

Table 13: Test results conducted power measurement GSM DTM 850 MHz

| Channel / frequency | modulation | slotted avg. power | time based avg. Power (calculated) |
|---|---|---|---|
| 128 / 824.2 MHz | GMSK + 1 GMSK | 25.0 dBm | 19.0 dBm |
| 190 / 836.6 MHz | GMSK + 1 GMSK | 25.0 dBm | 19.0 dBm |
| 251 / 848.8 MHz | GMSK + 1 GMSK | 25.0 dBm | 19.0 dBm |
| 128 / 824.2 MHz | GMSK + 2 GMSK | 23.9 dBm | **19.7 dBm** |
| 190 / 836.6 MHz | GMSK + 2 GMSK | 23.8 dBm | **19.6 dBm** |
| 251 / 848.8 MHz | GMSK + 2 GMSK | 23.6 dBm | **19.4 dBm** |
| 128 / 824.2 MHz | GMSK + 1 8PSK | 25.3 dBm | 19.3 dBm |
| 190 / 836.6 MHz | GMSK + 1 8PSK | 25.2 dBm | 19.2 dBm |
| 251 / 848.8 MHz | GMSK + 1 8PSK | 25.2 dBm | 19.2 dBm |
| 128 / 824.2 MHz | GMSK + 2 8PSK | 23.5 dBm | 19.3 dBm |
| 190 / 836.6 MHz | GMSK + 2 8PSK | 23.4 dBm | 19.2 dBm |
| 251 / 848.8 MHz | GMSK + 2 8PSK | 23.4 dBm | 19.2 dBm |

Table 14: Test results conducted power measurement GSM DTM 850 MHz back off

### 7.3.2 Conducted power measurements GSM 1900 MHz

| Channel / frequency | modulation | timeslots | slotted avg. Power (dBm) | | | calculated time based avg. Power (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | full | **back off** | **diff.** | full | **back off** |
| 512 / 1850.2 MHz | GMSK | 1 | 30.1 | 20.7 | 9.4 | 21.1 | 11.7 |
| 661 / 1880.0 MHz | GMSK | 1 | 30.2 | 20.6 | 9.6 | 21.2 | 11.6 |
| 810 / 1909.8 MHz | GMSK | 1 | 30.1 | 20.6 | 9.5 | 21.1 | 11.6 |
| 512 / 1850.2 MHz | GMSK | 2 | 27.2 | **17.9** | 9.3 | 21.2 | **11.9** |
| 661 / 1880.0 MHz | GMSK | 2 | 27.2 | **17.8** | 9.4 | 21.2 | **11.8** |
| 810 / 1909.8 MHz | GMSK | 2 | 27.1 | **17.9** | 9.2 | 21.1 | **11.9** |
| 512 / 1850.2 MHz | GMSK | 3 | 26.4 | 15.9 | 10.5 | 22.15 | 11.65 |
| 661 / 1880.0 MHz | GMSK | 3 | 26.2 | 15.8 | 10.4 | 21.95 | 11.55 |
| 810 / 1909.8 MHz | GMSK | 3 | 26.2 | 16.0 | 10.2 | 21.95 | 11.75 |
| 512 / 1850.2 MHz | GMSK | 4 | **25.4** | 14.7 | 10.7 | **22.4** | 11.7 |
| 661 / 1880.0 MHz | GMSK | 4 | **25.2** | 14.7 | 10.5 | **22.2** | 11.7 |
| 810 / 1909.8 MHz | GMSK | 4 | **25.2** | 14.8 | 10.4 | **22.2** | 11.8 |
| 512 / 1850.2 MHz | 8PSK | 1 | 26.5 | 20.5 | 6.0 | 17.5 | 11.5 |
| 661 / 1880.0 MHz | 8PSK | 1 | 26.4 | 20.4 | 6.0 | 17.4 | 11.4 |
| 810 / 1909.8 MHz | 8PSK | 1 | 26.4 | 20.6 | 5.8 | 17.4 | 11.6 |
| 512 / 1850.2 MHz | 8PSK | 2 | 24.5 | 17.4 | 7.1 | 18.5 | 11.4 |
| 661 / 1880.0 MHz | 8PSK | 2 | 24.4 | 17.3 | 7.1 | 18.4 | 11.3 |
| 810 / 1909.8 MHz | 8PSK | 2 | 24.3 | 17.4 | 6.9 | 18.3 | 11.4 |
| 512 / 1850.2 MHz | 8PSK | 3 | 23.6 | 15.7 | 7.9 | 19.35 | 11.45 |
| 661 / 1880.0 MHz | 8PSK | 3 | 23.5 | 15.6 | 7.9 | 19.25 | 11.35 |
| 810 / 1909.8 MHz | 8PSK | 3 | 23.5 | 15.7 | 7.8 | 19.25 | 11.45 |
| 512 / 1850.2 MHz | 8PSK | 4 | 22.5 | 14.3 | 8.2 | 19.5 | 11.3 |
| 661 / 1880.0 MHz | 8PSK | 4 | 22.4 | 14.2 | 8.2 | 19.4 | 11.2 |
| 810 / 1909.8 MHz | 8PSK | 4 | 22.4 | 14.4 | 8.0 | 19.4 | 11.4 |

Table 15: Test results conducted power measurement GSM 1900 MHz

| Channel / frequency | modulation | slotted avg. power | time based avg. Power (calculated) |
|---|---|---|---|
| 512 / 1850.2 MHz | GMSK + 1 GMSK | 27.2 dBm | 21.2 dBm |
| 661 / 1880.0 MHz | GMSK + 1 GMSK | 27.1 dBm | 21.1 dBm |
| 810 / 1909.8 MHz | GMSK + 1 GMSK | 27.1 dBm | 21.1 dBm |
| 512 / 1850.2 MHz | GMSK + 2 GMSK | 26.5 dBm | **22.25 dBm** |
| 661 / 1880.0 MHz | GMSK + 2 GMSK | 26.4 dBm | **22.15 dBm** |
| 810 / 1909.8 MHz | GMSK + 2 GMSK | 26.3 dBm | **22.05 dBm** |
| 512 / 1850.2 MHz | GMSK + 1 8PSK | 24.9 dBm | 18.9 dBm |
| 661 / 1880.0 MHz | GMSK + 1 8PSK | 24.8 dBm | 18.8 dBm |
| 810 / 1909.8 MHz | GMSK + 1 8PSK | 24.7 dBm | 18.7 dBm |
| 512 / 1850.2 MHz | GMSK + 2 8PSK | 24.6 dBm | 20.35 dBm |
| 661 / 1880.0 MHz | GMSK + 2 8PSK | 24.5 dBm | 20.25 dBm |
| 810 / 1909.8 MHz | GMSK + 2 8PSK | 24.5 dBm | 20.25 dBm |

Table 16: Test results conducted power measurement GSM DTM 1900 MHz

| Channel / frequency | modulation | slotted avg. power | time based avg. Power (calculated) |
|---|---|---|---|
| 512 / 1850.2 MHz | GMSK + 1 GMSK | 17.8 dBm | 11.8 dBm |
| 661 / 1880.0 MHz | GMSK + 1 GMSK | 17.6 dBm | 11.6 dBm |
| 810 / 1909.8 MHz | GMSK + 1 GMSK | 17.7 dBm | 11.7 dBm |
| 512 / 1850.2 MHz | GMSK + 2 GMSK | 16.1 dBm | **11.85 dBm** |
| 661 / 1880.0 MHz | GMSK + 2 GMSK | 16.0 dBm | **11.75 dBm** |
| 810 / 1909.8 MHz | GMSK + 2 GMSK | 16.1 dBm | **11.85 dBm** |
| 512 / 1850.2 MHz | GMSK + 1 8PSK | 17.8 dBm | 11.8 dBm |
| 661 / 1880.0 MHz | GMSK + 1 8PSK | 17.7 dBm | 11.7 dBm |
| 810 / 1909.8 MHz | GMSK + 1 8PSK | 17.6 dBm | 11.6 dBm |
| 512 / 1850.2 MHz | GMSK + 2 8PSK | 16.0 dBm | 11.75 dBm |
| 661 / 1880.0 MHz | GMSK + 2 8PSK | 15.9 dBm | 11.65 dBm |
| 810 / 1909.8 MHz | GMSK + 2 8PSK | 16.0 dBm | 11.75 dBm |

Table 17: Test results conducted power measurement GSM DTM 1900 MHz back off

### 7.3.3 Justification of SAR measurements in GSM mode

SAR measurements were performed in the configuration with highest calculated time based averaged output power.

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

| Max. RMS output power FDD II (1900MHz) / dBm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Channel / frequency | | | | | | | | |
| | 9262 / 1852.4 MHz | | | 9400 / 1880.0 MHz | | | 9538 / 1907.6 MHz | | |
| mode | full | **back off** | **diff.** | full | **back off** | **diff.** | full | **back off** | **diff.** |
| **RMC 12.2 kbit/s** | **23.9** | **11.4** | **12.5** | **23.7** | **11.3** | **12.4** | **24.2** | **11.1** | **13.1** |
| RMC 64 kbit/s | 23.9 | 11.4 | 12.5 | 23.7 | 11.3 | 12.4 | 24.2 | 11.1 | 13.1 |
| RMC 144 kbit/s | 23.8 | 11.4 | 12.4 | 23.7 | 11.3 | 12.4 | 24.2 | 11.1 | 13.1 |
| RMC 384 kbit/s | 23.8 | 11.4 | 12.4 | 23.7 | 11.3 | 12.4 | 24.2 | 11.1 | 13.1 |
| AMR 4.75 kbit/s | 23.8 | **11.4** | 12.4 | 23.7 | **11.2** | 12.5 | 24.2 | **11** | 13.2 |
| AMR 5.15 kbit/s | 23.8 | 11.3 | 12.5 | 23.7 | 11.2 | 12.5 | 24.1 | 11 | 13.1 |
| AMR 5.9 kbit/s | 23.8 | 11.3 | 12.5 | 23.7 | 11.2 | 12.5 | 24.2 | 11 | 13.2 |
| AMR 6.7 kbit/s | 23.8 | 11.3 | 12.5 | 23.7 | 11.2 | 12.5 | 24.2 | 11 | 13.2 |
| AMR 7.4 kbit/s | 23.8 | 11.4 | 12.4 | 23.7 | 11.2 | 12.5 | 24.2 | 11 | 13.2 |
| AMR 7.95 kbit/s | 23.8 | 11.4 | 12.4 | 23.7 | 11.2 | 12.5 | 24.1 | 11 | 13.1 |
| AMR 10.2 kbit/s | 23.8 | 11.4 | 12.4 | 23.7 | 11.2 | 12.5 | 24.2 | 11 | 13.2 |
| AMR 12.2 kbit/s | 23.8 | 11.3 | 12.5 | 23.7 | 11.2 | 12.5 | 24.2 | 11 | 13.2 |
| **HSDPA Sub test 1** | **23.6** | **11.2** | **12.4** | **23.6** | **11.1** | **12.5** | **24** | **10.9** | **13.1** |
| HSDPA Sub test 2 | 22.5 | 10 | 12.5 | 22.3 | 9.9 | 12.4 | 23.9 | 9.7 | 14.2 |
| HSDPA Sub test 3 | 21.9 | 9.7 | 12.2 | 21.5 | 9.6 | 11.9 | 23.2 | 9.5 | 13.7 |
| HSDPA Sub test 4 | 22 | 9.7 | 12.3 | 21.5 | 9.5 | 12 | 23.3 | 9.3 | 14 |
| **DC-HSDPA Sub test 1** | **23.5** | **11.1** | **12.4** | **23.5** | **11.0** | **12.5** | **23.9** | **10.9** | **13.0** |
| DC-HSDPA Sub test 2 | 23.4 | 11.0 | 12.4 | 23.5 | 11.1 | 12.4 | 23.9 | 10.8 | 13.1 |
| DC-HSDPA Sub test 3 | 23.0 | 10.6 | 12.4 | 23.0 | 10.5 | 12.5 | 23.4 | 10.4 | 13.0 |
| DC-HSDPA Sub test 4 | 23.0 | 10.5 | 12.5 | 23.0 | 10.5 | 12.5 | 23.4 | 10.3 | 13.1 |
| HSUPA Sub test 1 | 23.6 | 11.3 | 12.3 | 23.6 | 11 | 12.6 | 24 | 10.7 | 13.3 |
| HSUPA Sub test 2 | 21.8 | 9.2 | 12.6 | 21.9 | 8.9 | 13 | 22 | 8.8 | 13.2 |
| HSUPA Sub test 3 | 22.8 | 9.9 | 12.9 | 22.8 | 9.7 | 13.1 | 23.2 | 10 | 13.2 |
| HSUPA Sub test 4 | 21.6 | 9.5 | 12.1 | 22 | 9 | 13 | 22.2 | 8.9 | 13.3 |
| **HSUPA Sub test 5** | **23.5** | **11.2** | **12.3** | **23.6** | **11.1** | **12.5** | **24.1** | **10.7** | **13.4** |

Table 18: Test results conducted power measurement UMTS FDD II 1900MHz

## 7.3.5 Conducted power measurements WCDMA FDD IV (1700 MHz)

| Max. RMS output power FDD IV (1700MHz) / dBm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Channel / frequency | | | | | | | | |
| | 1312 / 1712.4 MHz | | | 1412 / 1732.4 MHz | | | 1513 / 1752.6 MHz | | |
| mode | full | back off | diff. | full | back off | diff. | full | back off | diff. |
| **RMC 12.2 kbit/s** | **23.9** | **11.6** | **12.3** | **24.4** | **11.8** | **12.6** | **23.9** | **11.7** | **12.2** |
| RMC 64 kbit/s | 23.8 | 11.6 | 12.2 | 24.4 | 11.8 | 12.6 | 23.9 | 11.7 | 12.2 |
| RMC 144 kbit/s | 23.8 | 11.6 | 12.2 | 24.4 | 11.8 | 12.6 | 23.9 | 11.7 | 12.2 |
| RMC 384 kbit/s | 23.8 | 11.6 | 12.2 | 24.3 | 11.8 | 12.5 | 23.9 | 11.7 | 12.2 |
| AMR 4.75 kbit/s | 23.8 | 11.5 | 12.3 | 24.2 | 11.7 | 12.5 | 23.8 | 11.6 | 12.2 |
| AMR 5.15 kbit/s | 23.8 | 11.5 | 12.3 | 24.2 | 11.7 | 12.5 | 23.8 | 11.6 | 12.2 |
| AMR 5.9 kbit/s | 23.8 | 11.5 | 12.3 | 24.2 | 11.7 | 12.5 | 23.8 | 11.6 | 12.2 |
| AMR 6.7 kbit/s | 23.8 | 11.5 | 12.3 | 24.3 | 11.7 | 12.6 | 23.9 | 11.7 | 12.2 |
| AMR 7.4 kbit/s | 23.7 | 11.5 | 12.2 | 24.2 | 11.7 | 12.5 | 23.9 | 11.6 | 12.3 |
| AMR 7.95 kbit/s | 23.7 | 11.6 | 12.1 | 24.2 | 11.7 | 12.5 | 23.9 | 11.6 | 12.3 |
| AMR 10.2 kbit/s | 23.8 | 11.5 | 12.3 | 24.3 | 11.7 | 12.6 | 23.8 | 11.6 | 12.2 |
| AMR 12.2 kbit/s | 23.8 | 11.5 | 12.3 | 24.2 | 11.7 | 12.5 | 23.9 | 11.6 | 12.3 |
| **HSDPA Sub test 1** | **23.8** | **11.4** | **12.4** | **24.3** | **11.6** | **12.7** | **23.9** | **11.4** | **12.5** |
| HSDPA Sub test 2 | 22.6 | 10.1 | 12.5 | 23 | 10.4 | 12.6 | 22.6 | 10.1 | 12.5 |
| HSDPA Sub test 3 | 22.2 | 9.5 | 12.7 | 22.4 | 9.9 | 12.5 | 22.2 | 9.6 | 12.6 |
| HSDPA Sub test 4 | 22 | 9.7 | 12.3 | 22.3 | 10.1 | 12.2 | 22.3 | 9.8 | 12.5 |
| **DC-HSDPA Sub test 1** | **23.8** | **11.4** | **12.4** | **24.3** | **11.6** | **12.7** | **23.9** | **11.4** | **12.5** |
| DC-HSDPA Sub test 2 | 23.7 | 11.3 | 12.4 | 24.2 | 11.5 | 12.7 | 23.8 | 11.3 | 12.5 |
| DC-HSDPA Sub test 3 | 23.3 | 10.9 | 12.4 | 23.8 | 11.1 | 12.7 | 23.4 | 10.9 | 12.5 |
| DC-HSDPA Sub test 4 | 23.2 | 10.9 | 12.3 | 23.7 | 11.1 | 12.6 | 23.4 | 11.8 | 12.6 |
| HSUPA Sub test 1 | 23.6 | 11.3 | 12.3 | 24.2 | 11.7 | 12.5 | 23.8 | 11.2 | 12.6 |
| HSUPA Sub test 2 | 21.9 | 9.3 | 12.6 | 22.3 | 9.5 | 12.8 | 22.0 | 10.5 | 11.5 |
| HSUPA Sub test 3 | 22.6 | 10.2 | 12.4 | 22.9 | 10.5 | 12.4 | 23.0 | 10.6 | 12.4 |
| HSUPA Sub test 4 | 21.8 | 9.5 | 12.3 | 22.5 | 9.6 | 12.9 | 22.2 | 9.6 | 12.6 |
| **HSUPA Sub test 5** | **23.7** | **11.1** | **12.6** | **24.3** | **11.6** | **12.7** | **23.7** | **10.3** | **13.4** |

Table 19: Test results conducted power measurement UMTS FDD IV 1700MHz

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

| Max. RMS output power 850 MHz (FDD V) / dBm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Channel / frequency | | | | | | | | |
| | 4132 / 826.4 MHz | | | 4182 / 836.6 MHz | | | 4233 / 846.6 MHz | | |
| mode | full | **back off** | **diff.** | full | **back off** | **diff.** | full | **back off** | **diff.** |
| **RMC 12.2 kbit/s** | **24.3** | **18.3** | **6** | **24.4** | **18.4** | **6** | **24.3** | **18.4** | **5.9** |
| RMC 64 kbit/s | 24.2 | 18.3 | 5.9 | 24.3 | 18.4 | 5.9 | 24.3 | 18.3 | 6 |
| RMC 144 kbit/s | 24.3 | 18.3 | 6 | 24.3 | 18.4 | 5.9 | 24.2 | 18.3 | 5.9 |
| RMC 384 kbit/s | 24.3 | 18.3 | 6 | 24.3 | 18.4 | 5.9 | 24.2 | 18.4 | 5.8 |
| AMR 4.75 kbit/s | 24.2 | 18.3 | 5.9 | 24.3 | 18.3 | 6 | 24.1 | 18.4 | 5.7 |
| AMR 5.15 kbit/s | 24.2 | 18.3 | 5.9 | 24.2 | 18.3 | 5.9 | 24.1 | 18.2 | 5.9 |
| AMR 5.9 kbit/s | 24.2 | 18.3 | 5.9 | 24.2 | 18.3 | 5.9 | 24.2 | 18.3 | 5.9 |
| AMR 6.7 kbit/s | 24.3 | 18.3 | 6 | 24.3 | 18.2 | 6.1 | 24.2 | 18.3 | 5.9 |
| AMR 7.4 kbit/s | 24.3 | 18.3 | 6 | 24.2 | 18.3 | 5.9 | 24.1 | 18.2 | 5.9 |
| AMR 7.95 kbit/s | 24.3 | 18.3 | 6 | 24.2 | 18.3 | 5.9 | 24.2 | 18.2 | 6 |
| AMR 10.2 kbit/s | 24.3 | 18.3 | 6 | 24.2 | 18.3 | 5.9 | 24.1 | 18.3 | 5.8 |
| AMR 12.2 kbit/s | 24.1 | 18.3 | 5.8 | 24.2 | 18.3 | 5.9 | 24.2 | 18.3 | 5.9 |
| **HSDPA Sub test 1** | **24.3** | **17.8** | **6.5** | **24.4** | **17.8** | **6.6** | **24.2** | **17.8** | **6.4** |
| HSDPA Sub test 2 | 22.9 | 16.2 | 6.7 | 23 | 16.3 | 6.7 | 22.8 | 16.2 | 6.6 |
| HSDPA Sub test 3 | 21.7 | 15.5 | 6.2 | 21.8 | 15.6 | 6.2 | 21.6 | 15.6 | 6 |
| HSDPA Sub test 4 | 21.5 | 15 | 6.5 | 21.3 | 15 | 6.3 | 21.7 | 15.1 | 6.6 |
| **DC-HSDPA Sub test 1** | **24.2** | **17.7** | **6.5** | **24.3** | **17.7** | **6.6** | **24.1** | **17.6** | **6.5** |
| DC-HSDPA Sub test 2 | 24.2 | 17.7 | 6.5 | 24.3 | 17.6 | 6.7 | 24.1 | 17.5 | 6.5 |
| DC-HSDPA Sub test 3 | 23.7 | 17.2 | 6.5 | 23.9 | 17.3 | 6.6 | 23.7 | 17.2 | 6.5 |
| DC-HSDPA Sub test 4 | 23.6 | 17.1 | 6.5 | 23.9 | 17.2 | 6.7 | 23.6 | 17.1 | 6.5 |
| HSUPA Sub test 1 | 23.9 | 17.4 | 6.5 | 23.8 | 17.4 | 6.4 | 23.9 | 17.6 | 6.3 |
| HSUPA Sub test 2 | 22.7 | 16.6 | 6.1 | 22.8 | 16.0 | 6.8 | 22.7 | 16.5 | 6.2 |
| HSUPA Sub test 3 | 23.1 | 15.9 | 7.2 | 23.1 | 15.3 | 7.8 | 23.3 | 15.2 | 7.1 |
| HSUPA Sub test 4 | 22.9 | 16.7 | 6.2 | 22.7 | 16.1 | 6.6 | 22.9 | 6.6 | 6.3 |
| **HSUPA Sub test 5** | **24** | **17.6** | **6.4** | **23.8** | **17.6** | **6.2** | **23.9** | **17.4** | **6.5** |

Table 20: Test results conducted power measurement UMTS FDD V 850MHz

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.

## 7.3.7 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)** (2) |
|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 |
| 2 | 12/15(3) | 15/15(3) | 64 | 12/15(3) | 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 $\Longleftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 $\Longleftrightarrow$ $\beta_{hs}$ = 30/15 * $\beta_c$<br>Note 2 : CM = 1 for $\beta_c/\beta_d$ = 12/15, $\beta_{hs}/\beta_c$ = 24/15<br>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 21: 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 22: settings of required H-Set 1 QPSK acc. to 3GPP 34.121

c) DC-HSDPA (3GPP Release 8)

Dual Cell – HSDPA has been signalized using the following settings for connection setup:

| Parameter<br>During Connection Setup | Value |
|---|---|
| P-CPICH_Ec/Ior | -10 dB |
| P-CCPCH | -12 |
| SCH_Ec/Ior | -12 |
| PICH_Ec/Ior | -15 |
| HS-PDSCH | off |
| HS-SCCH_1 | off |
| DPCH_Ec/Ior | -5 |
| OCNS_Ec/Ior | -3.1 |

Table 23: Downlink Physical Channels according to 3GPP 34.121 Table E.5.0

The fixed reference channel has been set to H-set 12 according to 3GPP TS 34.121 Table C.8.1.12:

| Parameter | Unit | Value |
|---|---|---|
| Nominal Average Inf. Bit Rate | kbit/s | 60 |
| Inter-TTI Distance | TTI's | 1 |
| Information Bit Payload ($N_{INF}$) | Bits | 120 |
| Number Code Blocks | Blocks | 1 |
| Binary Channel Bits Per TTI | Bits | 960 |
| Total Available SML's in UE | SML's | 19200 |
| Number of SML's per HARQ Process | SML's | 3200 |
| Coding Rate | | 0.15 |
| Number of Physical Channel Codecs | Codecs | 1 |
| Modulation | | QPSK |
| Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.<br>Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used. | | |

Table 24: H-Set 12 QPSK configuration

The same Sub-test settings as for Release 5 HSDPA were used for the tests.

d) 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 (2) (dB) | MPR (dB) | AG (4) Index | E-TFCI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/15 (3) | 15/15 (3) | 64 | 11/15 (3) | 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 (4) | 15/15 (4) | 64 | 15/15 (4) | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

Note 1: $\Delta_{ACK}$, $\Delta_{NACK}$, $\Delta_{CQI}$ = 8 ⟸⟹ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 ⟸⟹ $\beta_{hs}$ = 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 25: 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*** | $\beta_c$ | $\beta_d$ | $\Delta_{ACK}$, $\Delta_{NACK}$, $\Delta_{CQI}$ | **ΔE–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 ΔE–DPCCH

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

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

| ***Sub-test*** | **3** | |
|---|---|---|
| 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)

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

- Power Level settings (BS Signal tab > Node B-settings):
- Level reference : Output Channel Power (lor)
- Output Channel Power (lor) : -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.

## 7.3.8 Conducted power measurements LTE FDD 2 1900 MHz

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB |
|---|---|---|---|---|---|---|---|---|
| | | | QPSK | QPSK | | 16-QAM | 16-QAM | |
| 1.4 | 18607 / 1850.7 | 1 RB low | 22.9 | 9.6 | 13.3 | 22.1 | 9.5 | 12.6 |
| | | 1 RB mid | 22.9 | 9.8 | 13.1 | 22.0 | 9.7 | 12.3 |
| | | 1 RB high | 23.0 | 9.7 | 13.3 | 22.1 | 9.7 | 12.4 |
| | | 50% RB low | 22.9 | 9.7 | 13.2 | 21.9 | 9.6 | 12.3 |
| | | 50% RB mid | 22.9 | 9.7 | 13.2 | 21.9 | 9.6 | 12.3 |
| | | 50% RB high | 22.9 | 9.7 | 13.2 | 21.9 | 9.6 | 12.3 |
| | | 100% RB | 22.0 | 9.7 | 12.3 | 20.7 | 9.3 | 11.4 |
| | 18900 / 1880.0 | 1 RB low | 22.9 | 9.2 | 13.7 | 21.8 | 8.9 | 12.9 |
| | | 1 RB mid | 22.9 | 9.5 | 13.4 | 21.8 | 9.1 | 12.7 |
| | | 1 RB high | 22.9 | 9.4 | 13.5 | 21.8 | 9.0 | 12.8 |
| | | 50% RB low | 22.8 | 9.4 | 13.4 | 22.0 | 9.2 | 12.8 |
| | | 50% RB mid | 22.8 | 9.5 | 13.3 | 22.0 | 9.3 | 12.7 |
| | | 50% RB high | 22.8 | 9.5 | 13.3 | 22.0 | 9.2 | 12.8 |
| | | 100% RB | 21.8 | 9.4 | 12.4 | 21.0 | 9.2 | 11.8 |
| | 19193 / 1909.3 | 1 RB low | 22.9 | 9.0 | 13.9 | 21.9 | 8.8 | 13.1 |
| | | 1 RB mid | 22.8 | 9.0 | 13.8 | 21.8 | 8.8 | 13.0 |
| | | 1 RB high | 22.8 | 8.8 | 14.0 | 21.9 | 8.6 | 13.3 |
| | | 50% RB low | 22.8 | 9.0 | 13.8 | 21.8 | 8.8 | 13.0 |
| | | 50% RB mid | 22.8 | 9.0 | 13.8 | 21.7 | 8.7 | 13.0 |
| | | 50% RB high | 22.9 | 8.9 | 14.0 | 21.8 | 8.7 | 13.1 |
| | | 100% RB | 21.8 | 9.0 | 12.8 | 21.0 | 8.8 | 12.2 |
| 3.0 | 18615 / 1851.5 | 1 RB low | 23.0 | 9.8 | 13.2 | 22.0 | 9.9 | 12.1 |
| | | 1 RB mid | 22.9 | 9.9 | 13.0 | 22.1 | 9.9 | 12.2 |
| | | 1 RB high | 22.9 | 9.9 | 13.0 | 22.1 | 9.9 | 12.2 |
| | | 50% RB low | 21.9 | 9.7 | 12.2 | 20.7 | 9.3 | 11.4 |
| | | 50% RB mid | 21.9 | 9.7 | 12.2 | 20.7 | 9.4 | 11.3 |
| | | 50% RB high | 21.9 | 9.8 | 12.1 | 20.7 | 9.4 | 11.3 |
| | | 100% RB | 21.9 | 9.7 | 12.2 | 20.9 | 9.5 | 11.4 |
| | 18900 / 1880.0 | 1 RB low | 22.9 | 9.6 | 13.3 | 21.7 | 9.4 | 12.3 |
| | | 1 RB mid | 22.8 | 9.5 | 13.3 | 21.7 | 9.1 | 12.6 |
| | | 1 RB high | 22.8 | 9.6 | 13.2 | 21.7 | 9.3 | 12.4 |
| | | 50% RB low | 21.9 | 9.4 | 12.5 | 21.1 | 9.2 | 11.9 |
| | | 50% RB mid | 21.8 | 9.4 | 12.4 | 21.0 | 9.2 | 11.8 |
| | | 50% RB high | 21.8 | 9.5 | 12.3 | 20.9 | 9.3 | 11.6 |
| | | 100% RB | 21.9 | 9.4 | 12.5 | 20.8 | 9.0 | 11.8 |
| | 19185 / 1908.5 | 1 RB low | 22.9 | 9.7 | 13.2 | 21.7 | 9.5 | 12.2 |
| | | 1 RB mid | 22.9 | 9.2 | 13.7 | 21.6 | 9.0 | 12.6 |
| | | 1 RB high | 22.9 | 9.0 | 13.9 | 21.6 | 8.6 | 13.0 |
| | | 50% RB low | 21.8 | 9.4 | 12.4 | 20.8 | 9.2 | 11.6 |
| | | 50% RB mid | 21.8 | 9.2 | 12.6 | 20.9 | 9.0 | 11.9 |
| | | 50% RB high | 21.8 | 9.0 | 12.8 | 20.9 | 8.8 | 12.1 |
| | | 100% RB | 21.8 | 9.3 | 12.5 | 20.9 | 9.0 | 11.9 |

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) QPSK | $P_{avg}$ (dBm) back off QPSK | dev. dB | $P_{avg}$ (dBm) 16-QAM | $P_{avg}$ (dBm) back off 16-QAM | dev. dB |
|---|---|---|---|---|---|---|---|---|
| 5.0 | 18625 / 1852.5 | 1 RB low | 22.9 | 9.8 | 13.1 | 21.9 | 9.7 | 12.2 |
| | | 1 RB mid | 22.9 | 9.8 | 13.1 | 21.9 | 9.8 | 12.1 |
| | | 1 RB high | 22.9 | 9.7 | 13.2 | 21.9 | 9.7 | 12.2 |
| | | 50% RB low | 21.9 | 9.8 | 12.1 | 20.9 | 9.5 | 11.4 |
| | | 50% RB mid | 21.9 | 9.8 | 12.1 | 20.9 | 9.6 | 11.3 |
| | | 50% RB high | 22.0 | 9.8 | 12.2 | 21.0 | 9.5 | 11.5 |
| | | 100% RB | 22.0 | 9.7 | 12.3 | 20.9 | 9.4 | 11.5 |
| | 18900 / 1880.0 | 1 RB low | 22.8 | 9.6 | 13.2 | 22.1 | 10.1 | 12.0 |
| | | 1 RB mid | 22.7 | 9.4 | 13.3 | 22.2 | 9.8 | 12.4 |
| | | 1 RB high | 22.7 | 9.4 | 13.3 | 22.1 | 9.9 | 12.2 |
| | | 50% RB low | 21.9 | 9.5 | 12.4 | 20.9 | 9.2 | 11.7 |
| | | 50% RB mid | 21.9 | 9.4 | 12.5 | 20.9 | 9.1 | 11.8 |
| | | 50% RB high | 21.8 | 9.5 | 12.3 | 20.8 | 9.1 | 11.7 |
| | | 100% RB | 21.9 | 9.5 | 12.4 | 20.9 | 9.0 | 11.9 |
| | 19175 / 1907.5 | 1 RB low | 22.9 | 10.0 | 12.9 | 21.7 | 9.9 | 11.8 |
| | | 1 RB mid | 22.8 | 9.6 | 13.2 | 21.6 | 9.3 | 12.3 |
| | | 1 RB high | 22.9 | 9.0 | 13.9 | 21.7 | 8.7 | 13.0 |
| | | 50% RB low | 21.8 | 9.7 | 12.1 | 20.9 | 9.7 | 11.2 |
| | | 50% RB mid | 21.8 | 9.7 | 12.1 | 20.9 | 9.4 | 11.5 |
| | | 50% RB high | 21.9 | 9.3 | 12.6 | 21.0 | 8.9 | 12.1 |
| | | 100% RB | 21.8 | 9.6 | 12.2 | 21.0 | 9.4 | 11.6 |
| 10.0 | 18650 / 1855 | 1 RB low | 22.9 | 10.0 | 12.9 | 22.1 | 9.9 | 12.2 |
| | | 1 RB mid | 22.8 | 9.7 | 13.1 | 22.0 | 9.6 | 12.4 |
| | | 1 RB high | 22.8 | 9.8 | 13.0 | 22.0 | 9.8 | 12.2 |
| | | 50% RB low | 22.0 | 9.8 | 12.2 | 21.0 | 9.5 | 11.5 |
| | | 50% RB mid | 22.0 | 9.6 | 12.4 | 20.9 | 9.3 | 11.6 |
| | | 50% RB high | 21.9 | 9.7 | 12.2 | 20.9 | 9.4 | 11.5 |
| | | 100% RB | 22.0 | 9.8 | 12.2 | 20.9 | 9.5 | 11.4 |
| | 18900 / 1880 | 1 RB low | 22.8 | 9.8 | 13.0 | 21.7 | 9.4 | 12.3 |
| | | 1 RB mid | 22.9 | 9.4 | 13.5 | 21.8 | 9.1 | 12.7 |
| | | 1 RB high | 22.9 | 9.5 | 13.4 | 21.6 | 9.2 | 12.4 |
| | | 50% RB low | 21.9 | 9.6 | 12.3 | 21.0 | 9.4 | 11.6 |
| | | 50% RB mid | 21.8 | 9.4 | 12.4 | 21.0 | 9.1 | 11.9 |
| | | 50% RB high | 21.8 | 9.5 | 12.3 | 20.9 | 9.2 | 11.7 |
| | | 100% RB | 21.7 | 9.6 | 12.1 | 20.8 | 9.3 | 11.5 |
| | 19150 / 1905 | 1 RB low | 22.9 | 10.3 | 12.6 | 21.6 | 10.1 | 11.5 |
| | | 1 RB mid | 23.0 | 10.0 | 13.0 | 21.7 | 9.8 | 11.9 |
| | | 1 RB high | 23.0 | 9.2 | 13.8 | 21.7 | 8.8 | 12.9 |
| | | 50% RB low | 21.8 | 10.2 | 11.6 | 20.9 | 10.0 | 10.9 |
| | | 50% RB mid | 21.8 | 10.1 | 11.7 | 20.9 | 9.8 | 11.1 |
| | | 50% RB high | 21.9 | 9.7 | 12.2 | 20.9 | 9.5 | 11.4 |
| | | 100% RB | 21.9 | 10.1 | 11.8 | 20.9 | 9.9 | 11.0 |

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) QPSK | $P_{avg}$ (dBm) back off QPSK | dev. dB | $P_{avg}$ (dBm) 16-QAM | $P_{avg}$ (dBm) back off 16-QAM | dev. dB |
|---|---|---|---|---|---|---|---|---|
| 15.0 | 18675 / 1857.5 | 1 RB low | 22.9 | 9.8 | 13.1 | 22.1 | 9.6 | 12.5 |
| | | 1 RB mid | 22.8 | 9.7 | 13.1 | 22.0 | 9.6 | 12.4 |
| | | 1 RB high | 22.9 | 9.6 | 13.3 | 22.1 | 9.5 | 12.6 |
| | | 50% RB low | 21.9 | 9.6 | 12.3 | 20.9 | 9.4 | 11.5 |
| | | 50% RB mid | 21.9 | 9.6 | 12.3 | 20.9 | 9.2 | 11.7 |
| | | 50% RB high | 21.9 | 9.5 | 12.4 | 20.9 | 9.1 | 11.8 |
| | | 100% RB | 22.0 | 9.6 | 12.4 | 21.0 | 9.3 | 11.7 |
| | 18900 / 1880.0 | 1 RB low | 22.8 | 9.6 | 13.2 | 22.3 | 9.6 | 12.7 |
| | | 1 RB mid | 22.8 | 9.5 | 13.3 | 22.2 | 9.5 | 12.7 |
| | | 1 RB high | 22.9 | 9.3 | 13.6 | 22.4 | 9.4 | 13.0 |
| | | 50% RB low | 21.9 | 9.5 | 12.4 | 20.9 | 9.2 | 11.7 |
| | | 50% RB mid | 21.8 | 9.4 | 12.4 | 20.8 | 9.0 | 11.8 |
| | | 50% RB high | 21.9 | 9.3 | 12.6 | 20.9 | 9.0 | 11.9 |
| | | 100% RB | 21.9 | 9.4 | 12.5 | 20.9 | 9.1 | 11.8 |
| | 19125 / 1902.5 | 1 RB low | 22.8 | 9.5 | 13.3 | 21.5 | 9.3 | 12.2 |
| | | 1 RB mid | 22.9 | 10.2 | 12.7 | 21.7 | 9.9 | 11.8 |
| | | 1 RB high | 22.9 | 9.0 | 13.9 | 21.7 | 8.7 | 13.0 |
| | | 50% RB low | 21.8 | 10.0 | 11.8 | 20.8 | 9.7 | 11.1 |
| | | 50% RB mid | 21.8 | 10.1 | 11.7 | 20.9 | 9.9 | 11.0 |
| | | 50% RB high | 21.8 | 9.9 | 11.9 | 20.8 | 9.7 | 11.1 |
| | | 100% RB | 21.8 | 9.9 | 11.9 | 20.8 | 9.7 | 11.1 |
| 20.0 | 18700 / 1860 | 1 RB low | **22.9** | 9.3 | 13.6 | 21.9 | 9.3 | 12.6 |
| | | 1 RB mid | 22.8 | 9.6 | 13.2 | 21.9 | 9.6 | 12.3 |
| | | 1 RB high | 22.9 | 9.0 | 13.9 | 21.9 | 9.1 | 12.8 |
| | | 50% RB low | 21.9 | 9.3 | 12.6 | 20.9 | 9.0 | 11.9 |
| | | 50% RB mid | 21.9 | 9.5 | 12.4 | 20.9 | 9.1 | 11.8 |
| | | 50% RB high | **22.0** | 9.2 | 12.8 | 20.9 | 8.9 | 12.0 |
| | | 100% RB | **21.9** | 9.3 | 12.6 | 20.9 | 9.0 | 11.9 |
| | 18900 / 1880 | 1 RB low | 22.8 | 9.1 | 13.7 | 22.1 | 9.0 | 13.1 |
| | | 1 RB mid | 22.8 | 9.5 | 13.3 | 21.9 | 9.4 | 12.5 |
| | | 1 RB high | 22.7 | 9.0 | 13.7 | 22.0 | 8.9 | 13.1 |
| | | 50% RB low | 21.8 | 9.2 | 12.6 | 20.9 | 8.9 | 12.0 |
| | | 50% RB mid | 21.8 | 9.4 | 12.4 | 20.8 | 9.0 | 11.8 |
| | | 50% RB high | 21.9 | 9.0 | 12.9 | 20.9 | 8.7 | 12.2 |
| | | 100% RB | 21.9 | 9.2 | 12.7 | 20.9 | 8.8 | 12.1 |
| | 19100 / 1900 | 1 RB low | 22.6 | 8.8 | 13.8 | 21.8 | 9.0 | 12.8 |
| | | 1 RB mid | 22.8 | **10.2** | 12.6 | 21.9 | 10.5 | 11.4 |
| | | 1 RB high | 22.8 | 8.6 | 14.2 | 22.0 | 8.8 | 13.2 |
| | | 50% RB low | 21.8 | 9.4 | 12.4 | 20.8 | 9.2 | 11.6 |
| | | 50% RB mid | 21.9 | **9.9** | 12.0 | 20.9 | 9.7 | 11.2 |
| | | 50% RB high | 21.8 | 9.8 | 12.0 | 20.9 | 9.5 | 11.4 |
| | | 100% RB | 21.8 | **9.6** | 12.2 | 20.9 | 9.4 | 11.5 |

Table 26: Test results conducted power measurement LTE FDD 2 1900 MHz.

## 7.3.9 Conducted power measurements LTE FDD 4 1700 MHz

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB |
|---|---|---|---|---|---|---|---|---|
| | | | QPSK | QPSK | | 16-QAM | 16-QAM | |
| 1.4 | 19957 / 1710.7 | 1 RB low | 22.7 | 10.5 | 12.2 | 21.9 | 10.8 | 11.1 |
| | | 1 RB mid | 22.7 | 10.7 | 12.0 | 22.0 | 11.0 | 11.0 |
| | | 1 RB high | 22.9 | 10.6 | 12.3 | 22.1 | 10.8 | 11.3 |
| | | 50% RB low | 22.8 | 10.6 | 12.2 | 21.7 | 10.7 | 11.0 |
| | | 50% RB mid | 22.7 | 10.7 | 12.0 | 21.7 | 10.8 | 10.9 |
| | | 50% RB high | 22.7 | 10.6 | 12.1 | 21.7 | 10.7 | 11.0 |
| | | 100% RB | 21.8 | 10.6 | 11.2 | 20.6 | 10.4 | 10.2 |
| | 20175 / 1732.5 | 1 RB low | 22.8 | 10.5 | 12.3 | 21.6 | 10.3 | 11.3 |
| | | 1 RB mid | 22.8 | 10.7 | 12.1 | 21.6 | 10.5 | 11.1 |
| | | 1 RB high | 22.8 | 10.6 | 12.2 | 21.7 | 10.4 | 11.3 |
| | | 50% RB low | 22.7 | 10.6 | 12.1 | 22.0 | 10.6 | 11.4 |
| | | 50% RB mid | 22.7 | 10.8 | 11.9 | 21.9 | 10.7 | 11.2 |
| | | 50% RB high | 22.8 | 10.7 | 12.1 | 21.9 | 10.6 | 11.3 |
| | | 100% RB | 21.8 | 10.6 | 11.2 | 20.9 | 10.5 | 10.4 |
| | 20393 / 1754.3 | 1 RB low | 22.8 | 10.2 | 12.6 | 22.0 | 10.2 | 11.8 |
| | | 1 RB mid | 22.7 | 10.3 | 12.4 | 21.8 | 10.3 | 11.5 |
| | | 1 RB high | 22.9 | 10.1 | 12.8 | 22.0 | 10.1 | 11.9 |
| | | 50% RB low | 22.8 | 10.2 | 12.6 | 21.7 | 10.2 | 11.5 |
| | | 50% RB mid | 22.9 | 10.3 | 12.6 | 21.7 | 10.3 | 11.4 |
| | | 50% RB high | 22.9 | 10.2 | 12.7 | 21.7 | 10.2 | 11.5 |
| | | 100% RB | 21.8 | 10.3 | 11.5 | 20.9 | 10.3 | 10.6 |
| 3.0 | 19965 / 1711.5 | 1 RB low | 22.7 | 10.8 | 11.9 | 21.8 | 11.0 | 10.8 |
| | | 1 RB mid | 22.8 | 10.7 | 12.1 | 22.0 | 10.9 | 11.1 |
| | | 1 RB high | 23.0 | 10.8 | 12.2 | 22.1 | 11.0 | 11.1 |
| | | 50% RB low | 21.7 | 10.6 | 11.1 | 20.6 | 10.4 | 10.2 |
| | | 50% RB mid | 21.7 | 10.7 | 11.0 | 20.6 | 10.5 | 10.1 |
| | | 50% RB high | 21.8 | 10.6 | 11.2 | 20.7 | 10.4 | 10.3 |
| | | 100% RB | 21.8 | 10.6 | 11.2 | 20.8 | 10.6 | 10.2 |
| | 20175 / 1732.5 | 1 RB low | 22.8 | 10.9 | 11.9 | 21.6 | 10.6 | 11.0 |
| | | 1 RB mid | 22.7 | 10.8 | 11.9 | 21.5 | 10.6 | 10.9 |
| | | 1 RB high | 22.8 | 10.8 | 12.0 | 21.6 | 10.5 | 11.1 |
| | | 50% RB low | 21.8 | 10.6 | 11.2 | 20.9 | 10.6 | 10.3 |
| | | 50% RB mid | 21.8 | 10.7 | 11.1 | 20.9 | 10.6 | 10.3 |
| | | 50% RB high | 21.8 | 10.7 | 11.1 | 20.9 | 10.6 | 10.3 |
| | | 100% RB | 21.8 | 10.7 | 11.1 | 20.7 | 10.4 | 10.3 |
| | 20385 / 1753.5 | 1 RB low | 22.9 | 10.4 | 12.5 | 21.7 | 10.5 | 11.2 |
| | | 1 RB mid | 22.8 | 10.3 | 12.5 | 21.6 | 10.2 | 11.4 |
| | | 1 RB high | 22.9 | 10.3 | 12.6 | 21.6 | 10.2 | 11.4 |
| | | 50% RB low | 21.8 | 10.3 | 11.5 | 20.8 | 10.3 | 10.5 |
| | | 50% RB mid | 21.8 | 10.3 | 11.5 | 20.8 | 10.2 | 10.6 |
| | | 50% RB high | 21.7 | 10.3 | 11.4 | 20.9 | 10.3 | 10.6 |
| | | 100% RB | 21.8 | 10.3 | 11.5 | 20.9 | 10.1 | 10.8 |

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB |
|---|---|---|---|---|---|---|---|---|
| | | | QPSK | QPSK | | 16-QAM | 16-QAM | |
| 5.0 | 19975 / 1712.5 | 1 RB low | 22.7 | 10.7 | 12.0 | 21.6 | 10.9 | 10.7 |
| | | 1 RB mid | 22.9 | 10.6 | 12.3 | 21.9 | 10.9 | 11.0 |
| | | 1 RB high | 22.8 | 10.7 | 12.1 | 21.8 | 10.9 | 10.9 |
| | | 50% RB low | 21.7 | 10.7 | 11.0 | 20.8 | 10.7 | 10.1 |
| | | 50% RB mid | 21.9 | 10.6 | 11.3 | 20.9 | 10.6 | 10.3 |
| | | 50% RB high | 22.0 | 10.7 | 11.3 | 21.0 | 10.7 | 10.3 |
| | | 100% RB | 21.9 | 10.7 | 11.2 | 20.8 | 10.6 | 10.2 |
| | 20175 / 1732.5 | 1 RB low | 22.6 | 10.8 | 11.8 | 22.2 | 11.2 | 11.0 |
| | | 1 RB mid | 22.7 | 10.7 | 12.0 | 22.0 | 11.2 | 10.8 |
| | | 1 RB high | 22.8 | 10.4 | 12.4 | 22.1 | 11.1 | 11.0 |
| | | 50% RB low | 21.8 | 10.7 | 11.1 | 20.8 | 10.5 | 10.3 |
| | | 50% RB mid | 21.8 | 10.6 | 11.2 | 20.7 | 10.4 | 10.3 |
| | | 50% RB high | 21.8 | 10.7 | 11.1 | 20.8 | 10.4 | 10.4 |
| | | 100% RB | 21.8 | 10.8 | 11.0 | 20.8 | 10.4 | 10.4 |
| | 20375 / 1752.5 | 1 RB low | 22.8 | 10.1 | 12.7 | 21.5 | 10.0 | 11.5 |
| | | 1 RB mid | 22.8 | 10.3 | 12.5 | 21.5 | 10.2 | 11.3 |
| | | 1 RB high | 22.9 | 10.2 | 12.7 | 21.7 | 10.2 | 11.5 |
| | | 50% RB low | 21.8 | 10.2 | 11.6 | 20.8 | 10.1 | 10.7 |
| | | 50% RB mid | 21.7 | 10.4 | 11.3 | 20.8 | 10.3 | 10.5 |
| | | 50% RB high | 21.8 | 10.3 | 11.5 | 20.8 | 10.2 | 10.6 |
| | | 100% RB | 21.8 | 10.3 | 11.5 | 20.9 | 10.3 | 10.6 |
| 10.0 | 20000 / 1715.0 | 1 RB low | 22.7 | 10.9 | 11.8 | 21.9 | 11.1 | 10.8 |
| | | 1 RB mid | 22.8 | 10.7 | 12.1 | 22.0 | 10.9 | 11.1 |
| | | 1 RB high | 22.8 | 11.2 | 11.6 | 22.0 | 11.4 | 10.6 |
| | | 50% RB low | 21.9 | 10.7 | 11.2 | 20.9 | 10.6 | 10.3 |
| | | 50% RB mid | 21.9 | 10.6 | 11.3 | 20.9 | 10.6 | 10.3 |
| | | 50% RB high | 21.9 | 10.8 | 11.1 | 20.8 | 10.7 | 10.1 |
| | | 100% RB | 21.9 | 10.8 | 11.1 | 20.9 | 10.7 | 10.2 |
| | 20175 / 1732.5 | 1 RB low | 22.8 | 10.6 | 12.2 | 21.6 | 10.6 | 11.0 |
| | | 1 RB mid | 22.7 | 10.7 | 12.0 | 21.5 | 10.5 | 11.0 |
| | | 1 RB high | 22.7 | 10.5 | 12.2 | 21.6 | 10.4 | 11.2 |
| | | 50% RB low | 21.8 | 10.8 | 11.0 | 20.8 | 10.6 | 10.2 |
| | | 50% RB mid | 21.7 | 10.6 | 11.1 | 20.9 | 10.5 | 10.4 |
| | | 50% RB high | 21.7 | 10.4 | 11.3 | 20.8 | 10.5 | 10.3 |
| | | 100% RB | 21.9 | 10.8 | 11.1 | 20.8 | 10.4 | 10.4 |
| | 20350 / 1750.0 | 1 RB low | 22.8 | 10.3 | 12.5 | 21.5 | 10.3 | 11.2 |
| | | 1 RB mid | 22.8 | 10.1 | 12.7 | 21.5 | 9.9 | 11.6 |
| | | 1 RB high | 23.0 | 10.5 | 12.5 | 21.7 | 10.3 | 11.4 |
| | | 50% RB low | 21.8 | 10.1 | 11.7 | 20.7 | 10.1 | 10.6 |
| | | 50% RB mid | 21.7 | 10.1 | 11.6 | 20.8 | 10.0 | 10.8 |
| | | 50% RB high | 21.8 | 10.3 | 11.5 | 20.8 | 10.2 | 10.6 |
| | | 100% RB | 21.8 | 10.3 | 11.5 | 20.8 | 10.1 | 10.7 |

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) QPSK | $P_{avg}$ (dBm) back off QPSK | dev. dB | $P_{avg}$ (dBm) 16-QAM | $P_{avg}$ (dBm) back off 16-QAM | dev. dB |
|---|---|---|---|---|---|---|---|---|
| 15.0 | 20025 / 1717.5 | 1 RB low | 22.7 | 10.7 | 12.0 | 22.0 | 10.9 | 11.1 |
| | | 1 RB mid | 22.7 | 10.8 | 11.9 | 21.9 | 11.0 | 10.9 |
| | | 1 RB high | 22.8 | 10.5 | 12.3 | 22.0 | 10.7 | 11.3 |
| | | 50% RB low | 21.9 | 10.7 | 11.2 | 20.9 | 10.6 | 10.3 |
| | | 50% RB mid | 21.8 | 10.7 | 11.1 | 20.8 | 10.7 | 10.1 |
| | | 50% RB high | 21.9 | 10.9 | 11.0 | 20.9 | 10.8 | 10.1 |
| | | 100% RB | 21.9 | 10.7 | 11.2 | 20.9 | 10.8 | 10.1 |
| | 20175 / 1732.5 | 1 RB low | 22.8 | 10.3 | 12.5 | 22.1 | 10.6 | 11.5 |
| | | 1 RB mid | 22.7 | 10.7 | 12.0 | 22.1 | 10.9 | 11.2 |
| | | 1 RB high | 22.8 | 10.3 | 12.5 | 22.3 | 10.6 | 11.7 |
| | | 50% RB low | 21.8 | 10.6 | 11.2 | 20.7 | 10.3 | 10.4 |
| | | 50% RB mid | 21.8 | 10.7 | 11.1 | 20.7 | 10.4 | 10.3 |
| | | 50% RB high | 21.7 | 10.3 | 11.4 | 20.7 | 10.1 | 10.6 |
| | | 100% RB | 21.9 | 10.3 | 11.6 | 20.9 | 10.3 | 10.6 |
| | 20325 / 1747.5 | 1 RB low | 22.8 | 10.0 | 12.8 | 21.6 | 9.9 | 11.7 |
| | | 1 RB mid | 22.8 | 10.1 | 12.7 | 21.6 | 10.0 | 11.6 |
| | | 1 RB high | 22.8 | 10.3 | 12.5 | 21.7 | 10.1 | 11.6 |
| | | 50% RB low | 21.8 | 10.1 | 11.7 | 20.8 | 10.1 | 10.7 |
| | | 50% RB mid | 21.8 | 10.0 | 11.8 | 20.8 | 10.0 | 10.8 |
| | | 50% RB high | 21.8 | 10.2 | 11.6 | 20.8 | 10.1 | 10.7 |
| | | 100% RB | 21.8 | 10.1 | 11.7 | 20.8 | 10.1 | 10.7 |
| 20.0 | 20050 / 1720.0 | 1 RB low | 22.6 | 10.1 | 12.5 | 21.8 | 10.5 | 11.3 |
| | | 1 RB mid | 22.7 | **11.0** | 11.7 | 21.8 | 11.4 | 10.4 |
| | | 1 RB high | **22.8** | 10.2 | 12.6 | 21.8 | 10.4 | 11.4 |
| | | 50% RB low | **22.0** | 10.4 | 11.6 | 21.0 | 10.3 | 10.7 |
| | | 50% RB mid | 21.9 | **10.8** | 11.1 | 20.9 | 10.7 | 10.2 |
| | | 50% RB high | 21.8 | 10.3 | 11.5 | 20.9 | 10.2 | 10.7 |
| | | 100% RB | **22.0** | **10.2** | 11.8 | 21.0 | 10.1 | 10.9 |
| | 20175 / 1732.5 | 1 RB low | 22.6 | 10.1 | 12.5 | 21.9 | 10.4 | 11.5 |
| | | 1 RB mid | 22.6 | 10.7 | 11.9 | 21.9 | 10.9 | 11.0 |
| | | 1 RB high | 22.7 | 9.6 | 13.1 | 22.0 | 9.9 | 12.1 |
| | | 50% RB low | 21.7 | 10.0 | 11.7 | 20.7 | 10.0 | 10.7 |
| | | 50% RB mid | 21.8 | 10.5 | 11.3 | 20.8 | 10.3 | 10.5 |
| | | 50% RB high | 21.7 | 10.0 | 11.7 | 20.7 | 9.8 | 10.9 |
| | | 100% RB | 21.8 | 10.0 | 11.8 | 20.8 | 9.9 | 10.9 |
| | 20300 / 1745.0 | 1 RB low | 22.6 | 9.8 | 12.8 | 21.8 | 10.1 | 11.7 |
| | | 1 RB mid | 22.6 | 10.2 | 12.4 | 21.8 | 10.6 | 11.2 |
| | | 1 RB high | 22.7 | 9.8 | 12.9 | 21.9 | 10.1 | 11.8 |
| | | 50% RB low | 21.7 | 10.0 | 11.7 | 20.9 | 9.9 | 11.0 |
| | | 50% RB mid | 21.8 | 10.1 | 11.7 | 20.8 | 10.0 | 10.8 |
| | | 50% RB high | 21.8 | 9.9 | 11.9 | 20.8 | 9.8 | 11.0 |
| | | 100% RB | 21.7 | 9.9 | 11.8 | 20.8 | 9.9 | 10.9 |

Table 27: Test results conducted power measurement LTE FDD 4 1700 MHz.

## 7.3.10 Conducted power measurements LTE FDD 5 850 MHz

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) QPSK | $P_{avg}$ (dBm) back off QPSK | dev. dB | $P_{avg}$ (dBm) 16-QAM | $P_{avg}$ (dBm) back off 16-QAM | dev. dB |
|---|---|---|---|---|---|---|---|---|
| 1.4 | 20407 / 824.7 | 1 RB low | 22.9 | 17.0 | 5.9 | 22.1 | 17.1 | 5.0 |
| | | 1 RB mid | 22.9 | 16.9 | 6.0 | 22.0 | 17.0 | 5.0 |
| | | 1 RB high | 23.0 | 16.8 | 6.2 | 22.0 | 17.0 | 5.0 |
| | | 50% RB low | 22.9 | 17.0 | 5.9 | 21.8 | 16.9 | 4.9 |
| | | 50% RB mid | 22.9 | 17.0 | 5.9 | 21.6 | 16.9 | 4.7 |
| | | 50% RB high | 22.8 | 17.0 | 5.8 | 21.8 | 16.9 | 4.9 |
| | | 100% RB | 22.0 | 17.0 | 5.0 | 20.8 | 16.9 | 3.9 |
| | 20525 / 836.5 | 1 RB low | 23.0 | 16.7 | 6.3 | 21.9 | 16.5 | 5.4 |
| | | 1 RB mid | 23.1 | 16.6 | 6.5 | 21.9 | 16.5 | 5.4 |
| | | 1 RB high | 23.1 | 16.8 | 6.3 | 21.9 | 16.6 | 5.3 |
| | | 50% RB low | 23.0 | 16.7 | 6.3 | 22.3 | 16.9 | 5.4 |
| | | 50% RB mid | 23.0 | 16.7 | 6.3 | 22.3 | 16.9 | 5.4 |
| | | 50% RB high | 23.1 | 16.7 | 6.4 | 22.2 | 16.9 | 5.3 |
| | | 100% RB | 22.1 | 16.8 | 5.3 | 21.1 | 16.9 | 4.2 |
| | 20643 / 848.3 | 1 RB low | 23.0 | 16.8 | 6.2 | 22.2 | 16.8 | 5.4 |
| | | 1 RB mid | 23.0 | 16.7 | 6.3 | 22.1 | 16.8 | 5.3 |
| | | 1 RB high | 23.0 | 16.8 | 6.2 | 22.1 | 16.8 | 5.3 |
| | | 50% RB low | 23.0 | 16.9 | 6.1 | 22.0 | 16.8 | 5.2 |
| | | 50% RB mid | 23.0 | 16.8 | 6.2 | 21.9 | 16.8 | 5.1 |
| | | 50% RB high | 23.0 | 16.9 | 6.1 | 22.0 | 16.8 | 5.2 |
| | | 100% RB | 22.1 | 16.9 | 5.2 | 21.1 | 16.9 | 4.2 |
| 3.0 | 20415 / 825.5 | 1 RB low | 22.9 | 17.0 | 5.9 | 22.1 | 17.1 | 5.0 |
| | | 1 RB mid | 22.8 | 16.8 | 6.0 | 21.9 | 16.9 | 5.0 |
| | | 1 RB high | 22.8 | 16.9 | 5.9 | 22.2 | 16.9 | 5.3 |
| | | 50% RB low | 21.9 | 17.0 | 4.9 | 20.6 | 16.8 | 3.8 |
| | | 50% RB mid | 21.8 | 16.8 | 5.0 | 20.5 | 16.7 | 3.8 |
| | | 50% RB high | 21.9 | 16.8 | 5.1 | 20.6 | 16.7 | 3.9 |
| | | 100% RB | 21.9 | 17.0 | 4.9 | 21.0 | 17.0 | 4.0 |
| | 20525 / 836.5 | 1 RB low | 23.0 | 16.6 | 6.4 | 21.9 | 16.5 | 5.4 |
| | | 1 RB mid | 22.9 | 16.7 | 6.2 | 21.8 | 16.5 | 5.3 |
| | | 1 RB high | 22.8 | 16.7 | 6.1 | 21.7 | 16.6 | 5.1 |
| | | 50% RB low | 21.9 | 16.7 | 5.2 | 21.1 | 16.7 | 4.4 |
| | | 50% RB mid | 21.9 | 16.7 | 5.2 | 21.1 | 16.8 | 4.3 |
| | | 50% RB high | 22.0 | 16.8 | 5.2 | 21.2 | 16.8 | 4.4 |
| | | 100% RB | 22.1 | 16.6 | 5.5 | 21.0 | 16.6 | 4.4 |
| | 20635 / 847.5 | 1 RB low | 23.0 | 16.8 | 6.2 | 22.0 | 16.7 | 5.3 |
| | | 1 RB mid | 23.0 | 16.9 | 6.1 | 21.8 | 16.6 | 5.2 |
| | | 1 RB high | 23.1 | 16.9 | 6.2 | 21.9 | 16.7 | 5.2 |
| | | 50% RB low | 22.0 | 16.8 | 5.2 | 21.0 | 16.8 | 4.2 |
| | | 50% RB mid | 22.0 | 16.9 | 5.1 | 21.0 | 16.8 | 4.2 |
| | | 50% RB high | 22.0 | 16.8 | 5.2 | 21.0 | 16.9 | 4.1 |
| | | 100% RB | 22.0 | 16.9 | 5.1 | 21.1 | 16.9 | 4.2 |

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB |
|---|---|---|---|---|---|---|---|---|
| | | | QPSK | QPSK | | 16-QAM | 16-QAM | |
| 5.0 | 20425 / 826.5 | 1 RB low | 22.9 | 17.0 | 5.9 | 22.1 | 16.9 | 5.2 |
| | | 1 RB mid | 22.9 | 16.8 | 6.1 | 21.9 | 16.8 | 5.1 |
| | | 1 RB high | 23.0 | 17.0 | 6.0 | 22.0 | 17.0 | 5.0 |
| | | 50% RB low | 21.8 | 17.0 | 4.8 | 20.8 | 17.0 | 3.8 |
| | | 50% RB mid | 21.9 | 16.9 | 5.0 | 20.9 | 16.9 | 4.0 |
| | | 50% RB high | 22.0 | 17.0 | 5.0 | 21.0 | 17.0 | 4.0 |
| | | 100% RB | 22.0 | 16.9 | 5.1 | 20.9 | 16.9 | 4.0 |
| | 20525 / 836.5 | 1 RB low | 22.9 | 16.7 | 6.2 | 22.4 | 17.1 | 5.3 |
| | | 1 RB mid | 22.9 | 16.7 | 6.2 | 22.3 | 17.1 | 5.2 |
| | | 1 RB high | 22.8 | 16.7 | 6.1 | 22.2 | 17.0 | 5.2 |
| | | 50% RB low | 22.0 | 16.6 | 5.4 | 21.0 | 16.6 | 4.4 |
| | | 50% RB mid | 21.9 | 16.6 | 5.3 | 21.0 | 16.6 | 4.4 |
| | | 50% RB high | 21.7 | 16.7 | 5.0 | 20.8 | 16.7 | 4.1 |
| | | 100% RB | 22.1 | 16.6 | 5.5 | 21.0 | 16.6 | 4.4 |
| | 20625 / 846.5 | 1 RB low | 23.1 | 16.7 | 6.4 | 21.9 | 16.5 | 5.4 |
| | | 1 RB mid | 22.9 | 16.7 | 6.2 | 21.8 | 16.5 | 5.3 |
| | | 1 RB high | 23.0 | 16.9 | 6.1 | 21.8 | 16.7 | 5.1 |
| | | 50% RB low | 22.0 | 16.8 | 5.2 | 21.1 | 16.8 | 4.3 |
| | | 50% RB mid | 22.0 | 16.7 | 5.3 | 21.0 | 16.8 | 4.2 |
| | | 50% RB high | 22.0 | 16.8 | 5.2 | 21.0 | 16.9 | 4.1 |
| | | 100% RB | 22.0 | 16.9 | 5.1 | 21.2 | 16.9 | 4.3 |
| 10.0 | 20450 / 829 | 1 RB low | **23.0** | **17.0** | 6.0 | 22.2 | 17.1 | 5.1 |
| | | 1 RB mid | 22.9 | 16.9 | 6.0 | 22.1 | 17.0 | 5.1 |
| | | 1 RB high | 23.0 | 16.9 | 6.1 | 22.2 | 17.0 | 5.2 |
| | | 50% RB low | 22.0 | **16.9** | 5.1 | 21.1 | 17.0 | 4.1 |
| | | 50% RB mid | 22.0 | 16.8 | 5.2 | 21.0 | 16.9 | 4.1 |
| | | 50% RB high | 22.1 | 16.7 | 5.4 | 21.0 | 16.7 | 4.3 |
| | | 100% RB | 21.9 | 16.8 | 5.1 | 21.0 | 16.8 | 4.2 |
| | 20525 / 836.5 | 1 RB low | 23.0 | 16.7 | 6.3 | 21.8 | 16.5 | 5.3 |
| | | 1 RB mid | 22.9 | 16.7 | 6.2 | 21.7 | 16.5 | 5.2 |
| | | 1 RB high | **23.0** | **16.8** | 6.2 | 21.6 | 16.6 | 5.0 |
| | | 50% RB low | 22.0 | **16.7** | 5.3 | 21.1 | 16.8 | 4.3 |
| | | 50% RB mid | 21.9 | 16.6 | 5.3 | 21.1 | 16.7 | 4.4 |
| | | 50% RB high | 21.9 | 16.7 | 5.2 | 20.8 | 16.8 | 4.0 |
| | | 100% RB | 21.9 | 16.7 | 5.2 | 21.0 | 16.8 | 4.2 |
| | 20600 / 844 | 1 RB low | 23.1 | 16.7 | 6.4 | 21.8 | 16.5 | 5.3 |
| | | 1 RB mid | **23.2** | 16.8 | 6.4 | 21.7 | 16.5 | 5.2 |
| | | 1 RB high | 23.0 | **16.9** | 6.1 | 21.9 | 16.7 | 5.2 |
| | | 50% RB low | 21.8 | **16.8** | 5.0 | 20.9 | 16.7 | 4.2 |
| | | 50% RB mid | 21.9 | 16.8 | 5.1 | 20.9 | 16.7 | 4.2 |
| | | 50% RB high | **22.1** | 16.8 | 5.3 | 21.1 | 16.8 | 4.3 |
| | | 100% RB | **22.0** | 16.8 | 5.2 | 21.0 | 16.8 | 4.2 |

Table 28: Test results conducted power measurement LTE FDD 5 850 MHz.

## 7.3.11 Conducted power measurements LTE FDD 7 2600 MHz

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB | $P_{avg}$ (dBm) | $P_{avg}$ (dBm) back off | dev. dB |
|---|---|---|---|---|---|---|---|---|
| | | | QPSK | QPSK | | 16-QAM | 16-QAM | |
| 5.0 | 20775 / 2502.5 | 1 RB low | 22.9 | 9.6 | 13.3 | 22.0 | 9.9 | 12.1 |
| | | 1 RB mid | 23.0 | 9.6 | 13.4 | 21.9 | 10.0 | 11.9 |
| | | 1 RB high | 22.9 | 9.7 | 13.2 | 21.8 | 10.0 | 11.8 |
| | | 50% RB low | 21.9 | 9.6 | 12.3 | 21.0 | 9.7 | 11.3 |
| | | 50% RB mid | 21.9 | 9.6 | 12.3 | 21.0 | 9.7 | 11.3 |
| | | 50% RB high | 21.8 | 9.7 | 12.1 | 20.8 | 9.8 | 11.0 |
| | | 100% RB | 21.9 | 9.6 | 12.3 | 20.8 | 9.7 | 11.1 |
| | 21100 / 2535 | 1 RB low | 22.9 | 9.6 | 13.3 | 22.2 | 10.4 | 11.8 |
| | | 1 RB mid | 22.8 | 9.6 | 13.2 | 22.1 | 10.5 | 11.6 |
| | | 1 RB high | 22.9 | 9.7 | 13.2 | 22.1 | 10.5 | 11.6 |
| | | 50% RB low | 21.9 | 9.7 | 12.2 | 21.0 | 9.7 | 11.3 |
| | | 50% RB mid | 22.0 | 9.7 | 12.3 | 20.8 | 9.7 | 11.1 |
| | | 50% RB high | 21.9 | 9.7 | 12.2 | 20.9 | 9.7 | 11.2 |
| | | 100% RB | 21.9 | 9.7 | 12.2 | 20.8 | 9.6 | 11.2 |
| | 21425 / 2567.5 | 1 RB low | 22.9 | 10.0 | 12.9 | 21.7 | 9.9 | 11.8 |
| | | 1 RB mid | 22.8 | 9.9 | 12.9 | 21.7 | 9.8 | 11.9 |
| | | 1 RB high | 22.8 | 9.7 | 13.1 | 21.6 | 9.6 | 12.0 |
| | | 50% RB low | 21.8 | 10.0 | 11.8 | 21.0 | 9.9 | 11.1 |
| | | 50% RB mid | 21.8 | 10.0 | 11.8 | 20.9 | 9.8 | 11.1 |
| | | 50% RB high | 21.9 | 9.8 | 12.1 | 20.9 | 9.7 | 11.2 |
| | | 100% RB | 21.7 | 9.9 | 11.8 | 21.0 | 9.9 | 11.1 |
| 10.0 | 20800 / 2505 | 1 RB low | 23.0 | 9.9 | 13.1 | 22.2 | 10.1 | 12.1 |
| | | 1 RB mid | 22.9 | 9.8 | 13.1 | 22.0 | 10.2 | 11.8 |
| | | 1 RB high | 22.9 | 9.8 | 13.1 | 22.0 | 10.2 | 11.8 |
| | | 50% RB low | 21.9 | 9.7 | 12.2 | 20.8 | 9.8 | 11.0 |
| | | 50% RB mid | 21.8 | 9.7 | 12.1 | 20.8 | 9.8 | 11.0 |
| | | 50% RB high | 21.8 | 9.7 | 12.1 | 20.9 | 9.9 | 11.0 |
| | | 100% RB | 21.8 | 9.7 | 12.1 | 20.8 | 9.8 | 11.0 |
| | 21100 / 2535 | 1 RB low | 22.9 | 9.8 | 13.1 | 21.9 | 9.9 | 12.0 |
| | | 1 RB mid | 22.9 | 9.7 | 13.2 | 21.5 | 9.7 | 11.8 |
| | | 1 RB high | 23.0 | 9.9 | 13.1 | 21.7 | 9.9 | 11.8 |
| | | 50% RB low | 21.7 | 9.7 | 12.0 | 21.0 | 9.8 | 11.2 |
| | | 50% RB mid | 21.8 | 9.7 | 12.1 | 20.7 | 9.8 | 10.9 |
| | | 50% RB high | 22.0 | 9.8 | 12.2 | 20.8 | 9.9 | 10.9 |
| | | 100% RB | 21.9 | 9.7 | 12.2 | 20.9 | 9.7 | 11.2 |
| | 21400 / 2565 | 1 RB low | 22.9 | 10.0 | 12.9 | 21.6 | 9.9 | 11.7 |
| | | 1 RB mid | 22.9 | 10.1 | 12.8 | 21.9 | 9.9 | 12.0 |
| | | 1 RB high | 22.8 | 9.9 | 12.9 | 21.6 | 9.7 | 11.9 |
| | | 50% RB low | 21.7 | 10.1 | 11.6 | 20.8 | 10.0 | 10.8 |
| | | 50% RB mid | 21.9 | 10.0 | 11.9 | 20.8 | 9.9 | 10.9 |
| | | 50% RB high | 21.7 | 10.0 | 11.7 | 20.7 | 9.8 | 10.9 |
| | | 100% RB | 21.9 | 10.1 | 11.8 | 20.7 | 10.0 | 10.7 |

| Bandwidth (MHz) | Channel / Frequency (MHz) | Resource block allocation | $P_{avg}$ (dBm) QPSK | $P_{avg}$ (dBm) back off QPSK | dev. dB | $P_{avg}$ (dBm) 16-QAM | $P_{avg}$ (dBm) back off 16-QAM | dev. dB |
|---|---|---|---|---|---|---|---|---|
| 15.0 | 20825 / 2507.5 | 1 RB low | 23.0 | 9.7 | 13.3 | 22.2 | 9.8 | 12.4 |
| | | 1 RB mid | 22.8 | 9.6 | 13.2 | 21.9 | 9.9 | 12.0 |
| | | 1 RB high | 22.8 | 9.5 | 13.3 | 22.0 | 9.8 | 12.2 |
| | | 50% RB low | 21.8 | 9.6 | 12.2 | 20.8 | 9.7 | 11.1 |
| | | 50% RB mid | 21.8 | 9.6 | 12.2 | 20.9 | 9.7 | 11.2 |
| | | 50% RB high | 21.9 | 9.4 | 12.5 | 20.9 | 9.5 | 11.4 |
| | | 100% RB | 21.9 | 9.5 | 12.4 | 20.8 | 9.6 | 11.2 |
| | 21100 / 2535 | 1 RB low | 22.9 | 9.6 | 13.3 | 22.2 | 10.0 | 12.2 |
| | | 1 RB mid | 22.8 | 9.7 | 13.1 | 22.2 | 10.2 | 12.0 |
| | | 1 RB high | 22.8 | 9.7 | 13.1 | 22.3 | 10.1 | 12.2 |
| | | 50% RB low | 22.0 | 9.6 | 12.4 | 20.8 | 9.6 | 11.2 |
| | | 50% RB mid | 21.9 | 9.6 | 12.3 | 20.8 | 9.6 | 11.2 |
| | | 50% RB high | 21.9 | 9.7 | 12.2 | 20.8 | 9.6 | 11.2 |
| | | 100% RB | 21.9 | 9.6 | 12.3 | 20.9 | 9.6 | 11.3 |
| | 21375 / 2562.5 | 1 RB low | 22.9 | 9.5 | 13.4 | 21.6 | 9.5 | 12.1 |
| | | 1 RB mid | 23.0 | 9.9 | 13.1 | 21.7 | 9.8 | 11.9 |
| | | 1 RB high | 22.8 | 9.7 | 13.1 | 21.6 | 9.5 | 12.1 |
| | | 50% RB low | 21.9 | 9.7 | 12.2 | 20.8 | 9.7 | 11.1 |
| | | 50% RB mid | 21.7 | 9.9 | 11.8 | 20.8 | 9.8 | 11.0 |
| | | 50% RB high | 22.1 | 10.0 | 12.1 | 21.1 | 9.9 | 11.2 |
| | | 100% RB | 21.6 | 9.9 | 11.7 | 20.9 | 9.7 | 11.2 |
| 20.0 | 20850 / 2510 | 1 RB low | 22.8 | 9.1 | 13.7 | 22.1 | 9.5 | 12.6 |
| | | 1 RB mid | **22.9** | 9.5 | 13.4 | 22.0 | 10.2 | 11.8 |
| | | 1 RB high | 22.8 | 9.0 | 13.8 | 21.8 | 9.5 | 12.3 |
| | | 50% RB low | 21.8 | 9.3 | 12.5 | 20.8 | 9.5 | 11.3 |
| | | 50% RB mid | 21.9 | 9.4 | 12.5 | 20.9 | 9.5 | 11.4 |
| | | 50% RB high | **22.0** | 9.2 | 12.8 | 20.7 | 9.1 | 11.6 |
| | | 100% RB | 21.8 | 9.1 | 12.7 | 20.9 | 9.3 | 11.6 |
| | 21100 / 2535 | 1 RB low | 22.7 | 9.0 | 13.7 | 21.8 | 9.5 | 12.3 |
| | | 1 RB mid | **22.8** | 9.8 | 13.0 | 22.0 | 10.2 | 11.8 |
| | | 1 RB high | 22.8 | 8.9 | 13.9 | 22.0 | 9.2 | 12.8 |
| | | 50% RB low | **21.9** | 9.4 | 12.5 | 20.8 | 9.3 | 11.5 |
| | | 50% RB mid | 21.8 | 9.6 | 12.2 | 21.0 | 9.6 | 11.4 |
| | | 50% RB high | 21.8 | 9.4 | 12.4 | 20.8 | 9.3 | 11.5 |
| | | 100% RB | 21.8 | 9.4 | 12.4 | 20.7 | 9.3 | 11.4 |
| | 21350 / 2560 | 1 RB low | 22.7 | 8.9 | 13.8 | 21.9 | 9.4 | 12.5 |
| | | 1 RB mid | **22.7** | **9.9** | 12.8 | 22.0 | 10.4 | 11.6 |
| | | 1 RB high | 22.7 | 9.2 | 13.5 | 22.0 | 9.6 | 12.4 |
| | | 50% RB low | 21.8 | 9.2 | 12.6 | 20.7 | 9.2 | 11.5 |
| | | 50% RB mid | 21.8 | **9.7** | 12.1 | 20.9 | 9.8 | 11.1 |
| | | 50% RB high | **21.9** | 9.7 | 12.2 | 20.9 | 9.6 | 11.3 |
| | | 100% RB | **21.9** | **9.4** | 12.5 | 20.9 | 9.3 | 11.6 |

Table 29: Test results conducted power measurement LTE FDD 7 2600 MHz.

### 7.3.12 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 ≤ 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.6 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 ≤ 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 > ½ 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 ½ dB larger compared to the largest channel bandwidth and reported SAR was < 1.45 W/kg

### 7.3.13 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 | ≤ 1 |
| 16QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | 1 | ≤ 1 |
| 16QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | 2 | ≤ 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.

## 7.4 Conducted power measurements

### 7.4.1 Conducted power measurements WLAN 2.4 GHz

| 802.11b | | maximum average conducted output power [dBm] | | | |
|---|---|---|---|---|---|
| **Band** | **Ch** | **1Mbps** | **2Mbps** | **5.5Mbps** | **11Mbps** |
| 2450MHz | 1 | 10.3 | 10.1 | 10.2 | 10.1 |
| | 6 | **10.3** | 10.3 | 10.1 | 10.0 |
| | 11 | 10.3 | 10.3 | 10.2 | 10.2 |

Table 30: 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 | 9.6 | 9.8 | 9.5 | 9.5 | 9.4 | 9.2 | 8.8 | 8.7 |
| | 6 | 9.6 | 9.5 | 9.6 | 9.4 | 9.2 | 9.3 | 8.8 | 8.5 |
| | 11 | 9.8 | 9.7 | 9.4 | 9.3 | 9.2 | 9.2 | 8.8 | 8.6 |

Table 31: Test results conducted power measurement 802.11g

| 802.11n HT-20 | | maximum average conducted output power [dBm] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Band** | **Ch** | **MCS-0 6.5Mbps** | **MCS-1 13Mbps** | **MCS-2 19.5Mbps** | **MCS-3 26Mbps** | **MCS-4 39Mbps** | **MCS-5 52Mbps** | **MCS-6 58.5Mbps** | **MCS-7 65Mbps** |
| 2450MHz | 1 | 9.7 | 9.6 | 9.4 | 9.4 | 9.2 | 8.7 | 8.9 | 8.5 |
| | 6 | 9.7 | 9.6 | 9.4 | 9.0 | 8.8 | 8.6 | 8.5 | 8.8 |
| | 11 | 9.7 | 9.4 | 9.4 | 9.2 | 9.2 | 8.8 | 8.7 | 8.5 |

Table 32: Test results conducted power measurement 802.11n HT-20

## 7.4.2 Conducted power measurements WLAN 5 GHz

| 802.11a | | maximum average conducted output power [dBm] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Band [MHz] | Ch | 6Mbps | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
| 5200 | 36 | **10.2** | 10.1 | 10.0 | 9.8 | 9.7 | 9.7 | 9.2 | 9.4 |
| | 40 | 9.6 | 9.7 | 9.7 | 9.3 | 9.2 | 9.1 | 9.0 | 8.9 |
| | 44 | 9.6 | 9.5 | 9.4 | 9.2 | 9.3 | 9.1 | 8.7 | 8.9 |
| | 48 | 9.4 | 9.3 | 9.2 | 9.1 | 9.1 | 8.9 | 8.8 | 8.7 |
| 5300 | 52 | 9.3 | 9.3 | 9.2 | 9.2 | 8.9 | 8.9 | 8.6 | 8.4 |
| | 56 | 9.4 | 9.3 | 9.1 | 9.1 | 8.8 | 8.5 | 8.3 | 8.2 |
| | 60 | 9.5 | 9.4 | 9.4 | 9.2 | 9.0 | 8.8 | 8.6 | 8.5 |
| | 64 | **9.7** | 9.6 | 9.3 | 9.2 | 9.0 | 8.7 | 8.6 | 8.5 |
| 5600 | 100 | 10.1 | 10.1 | 9.8 | 9.8 | 9.8 | 9.5 | 9.3 | 9.3 |
| | 104 | 10.0 | 10.1 | 9.9 | 9.9 | 9.8 | 9.5 | 8.9 | 9.0 |
| | 108 | 10.1 | 9.9 | 9.6 | 9.8 | 9.5 | 9.5 | 9.2 | 9.3 |
| | 112 | 10.2 | 10.1 | 10.0 | 9.5 | 9.6 | 9.4 | 9.1 | 9.2 |
| | 116 | **10.2** | 10.1 | 9.9 | 9.9 | 9.6 | 9.4 | 9.0 | 9.1 |
| | 120 | 9.9 | 10.0 | 10.0 | 9.8 | 9.5 | 9.3 | 9.1 | 9.1 |
| | 124 | 10.0 | 9.8 | 9.9 | 9.7 | 9.5 | 9.1 | 9.0 | 8.9 |
| | 128 | 10.0 | 10.0 | 9.9 | 9.8 | 9.8 | 9.6 | 9.2 | 9.4 |
| | 132 | 10.2 | 10.1 | 9.8 | 9.9 | 9.5 | 9.3 | 9.2 | 9.0 |
| | 136 | 10.2 | 10.1 | 9.9 | 9.9 | 9.7 | 9.5 | 9.3 | 9.2 |
| | 140 | 10.1 | 9.8 | 9.8 | 9.8 | 9.7 | 9.6 | 9.3 | 9.2 |
| 5800 | 149 | **10.1** | 9.9 | 9.9 | 9.7 | 9.8 | 9.6 | 9.2 | 9.4 |
| | 153 | 9.9 | 9.8 | 9.7 | 9.6 | 9.6 | 9.3 | 9.1 | 9.2 |
| | 157 | 10.0 | 9.8 | 10.0 | 9.8 | 9.6 | 9.4 | 9.0 | 9.1 |
| | 161 | 9.9 | 9.8 | 9.8 | 9.6 | 9.7 | 9.2 | 9.1 | 9.0 |
| | 165 | 9.8 | 10.0 | 10.0 | 9.8 | 9.6 | 9.4 | 9.3 | 9.0 |

Table 33: 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 6.5Mbps | MCS-1 13Mbps | MCS-2 19.5Mbps | MCS-3 26Mbps | MCS-4 39Mbps | MCS-5 52Mbps | MCS-6 58.5Mbps | MCS-7 65Mbps | MCS-8 78Mbps |
| 5200 | 36 | 9.6 | 9.5 | 9.3 | 9.3 | 9.0 | 8.5 | 8.8 | 8.7 | 8.4 |
| | 40 | 9.3 | 9.2 | 9.1 | 8.8 | 8.6 | 8.4 | 8.3 | 8.2 | 8.3 |
| | 44 | 9.1 | 9.0 | 8.9 | 8.8 | 8.6 | 8.4 | 8.2 | 8.3 | 8.3 |
| | 48 | 9.0 | 8.9 | 8.6 | 8.6 | 8.3 | 8.0 | 8.1 | 8.3 | 7.9 |
| 5300 | 52 | 9.1 | 8.9 | 8.8 | 8.8 | 8.2 | 8.1 | 8.2 | 7.9 | 8.0 |
| | 56 | 9.0 | 8.7 | 8.7 | 8.5 | 8.3 | 8.2 | 8.1 | 8.0 | 8.1 |
| | 60 | 8.9 | 8.7 | 8.6 | 8.6 | 8.4 | 8.2 | 8.2 | 8.3 | 8.1 |
| | 64 | 9.2 | 8.7 | 8.5 | 8.6 | 8.4 | 8.2 | 8.1 | 8.0 | 8.1 |
| 5600 | 100 | 9.6 | 9.4 | 9.5 | 9.2 | 9.0 | 8.8 | 8.5 | 8.7 | 8.7 |
| | 104 | 9.6 | 9.5 | 9.3 | 9.0 | 9.0 | 8.8 | 8.8 | 8.7 | 8.7 |
| | 108 | 9.6 | 9.5 | 9.3 | 9.0 | 9.0 | 8.6 | 8.6 | 8.5 | 8.5 |
| | 112 | 9.5 | 9.3 | 9.1 | 8.9 | 8.6 | 8.8 | 8.7 | 8.6 | 8.7 |
| | 116 | 9.7 | 9.5 | 9.4 | 9.1 | 8.9 | 8.7 | 8.6 | 8.5 | 8.6 |
| | 120 | 9.4 | 9.5 | 8.9 | 9.1 | 8.9 | 8.7 | 8.6 | 8.6 | 8.6 |
| | 124 | 9.5 | 9.3 | 8.9 | 8.9 | 8.7 | 8.7 | 8.4 | 8.5 | 8.6 |
| | 128 | 9.4 | 9.2 | 9.4 | 9.3 | 8.8 | 8.8 | 8.7 | 8.7 | 8.7 |
| | 132 | 9.4 | 9.3 | 9.2 | 9.4 | 9.2 | 8.6 | 8.9 | 8.3 | 8.5 |
| | 136 | 9.3 | 9.4 | 9.2 | 9.0 | 8.9 | 8.7 | 8.6 | 8.6 | 8.6 |
| | 140 | 9.6 | 9.7 | 9.1 | 9.1 | 9.3 | 8.6 | 9.0 | 8.7 | 8.5 |
| 5800 | 149 | 9.3 | 9.4 | 9.3 | 9.3 | 9.0 | 8.6 | 8.5 | 8.4 | 8.5 |
| | 153 | 9.4 | 9.3 | 9.1 | 9.2 | 8.9 | 8.7 | 8.6 | 8.6 | 8.6 |
| | 157 | 9.5 | 9.3 | 9.2 | 9.0 | 8.8 | 8.7 | 8.5 | 8.5 | 8.6 |
| | 161 | 9.6 | 9.4 | 9.3 | 8.9 | 8.9 | 8.5 | 8.7 | 8.5 | 8.4 |
| | 165 | 9.5 | 9.4 | 9.0 | 9.1 | 8.9 | 8.7 | 8.4 | 8.5 | 8.6 |

Table 34: 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** 13.5Mbps | **MCS-1** 27Mbps | **MCS-2** 40.5Mbps | **MCS-3** 54Mbps | **MCS-4** 81Mbps | **MCS-5** 108Mbps | **MCS-6** 121.5Mbps | **MCS-7** 135Mbps | **MCS-8** 121.5Mbps | **MCS-9** 135Mbps |
| 5200 | 38 | 9.1 | 9.1 | 8.5 | 8.4 | 8.1 | 7.8 | 7.7 | 7.7 | 9.1 | 9.1 |
| | 46 | 9.0 | 8.6 | 8.3 | 8.1 | 8.0 | 7.4 | 7.2 | 7.1 | 9.0 | 8.6 |
| 5300 | 54 | 9.0 | 8.4 | 8.4 | 8.0 | 7.7 | 7.4 | 7.3 | 7.3 | 9.0 | 8.4 |
| | 62 | 9.1 | 8.7 | 8.2 | 7.9 | 7.6 | 7.5 | 7.4 | 7.4 | 9.1 | 8.7 |
| 5600 | 102 | 9.3 | 9.0 | 8.8 | 8.8 | 8.4 | 8.4 | 8.0 | 8.3 | 9.3 | 9.0 |
| | 118 | 9.3 | 9.1 | 8.8 | 8.9 | 8.6 | 8.1 | 8.0 | 7.7 | 9.3 | 9.1 |
| | 134 | 9.5 | 9.3 | 9.0 | 8.6 | 8.3 | 8.1 | 8.0 | 7.9 | 9.5 | 9.3 |
| 5800 | 151 | 9.5 | 9.3 | 8.8 | 8.8 | 8.5 | 8.3 | 8.0 | 8.0 | 9.5 | 9.3 |
| | 159 | 9.2 | 9.0 | 9.0 | 8.4 | 8.4 | 8.1 | 8.0 | 7.9 | 9.2 | 9.0 |

Table 35: Test results conducted power measurement 802.11n HT-40 / 802.11ac VHT-40

| 802.11ac VHT-80 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | maximum average conducted output power [dBm] | | | | | | | | | |
| **Band** | **Ch** | **MCS-0** 29.3Mbps | **MCS-1** 58.5Mbps | **MCS-2** 87.8Mbps | **MCS-3** 117Mbps | **MCS-4** 175.5Mbps | **MCS-5** 234Mbps | **MCS-6** 263.3Mbps | **MCS-7** 292.5Mbps | **MCS-8** 351Mbps | **MCS-9** 390Mbps |
| 5200 | 42 | **9.5** | 9.1 | 8.7 | 8.2 | 7.7 | 8.2 | 7.9 | 7.5 | 7.5 | 7.3 |
| 5300 | 58 | **9.4** | 8.8 | 8.8 | 8.7 | 8.0 | 7.8 | 7.7 | 7.7 | 7.5 | 7.5 |
| 5600 | 106 | **9.2** | 8.7 | 8.4 | 8.0 | 7.6 | 7.4 | 7.2 | 7.3 | 7.1 | 7.0 |
| | 122 | 8.9 | 8.9 | 8.5 | 8.2 | 7.9 | 7.6 | 7.5 | 7.6 | 7.4 | 7.3 |
| 5800 | 155 | **9.3** | 8.8 | 8.5 | 8.4 | 8.0 | 7.7 | 7.6 | 7.7 | 7.5 | 7.4 |

Table 36: Test results conducted power measurement 802.11ac VHT-80

### 7.4.3 Standalone SAR Test Exclusion

| Standalone SAR test exclusion considerations for **Body** position | | | | | |
|---|---|---|---|---|---|
| Communication system | freq. (MHz) | $P_{avg}$* (dBm) | $P_{avg}$* (mW) | **threshold$_{1\text{-}g}$ comparison value** | SAR test exclusion |
| GSM 850 | 835 | 25.2 | 331.1 | 60.5 | no |
| GSM 1900 | 1900 | 22.7 | 186.2 | 51.3 | no |
| UMTS FDD II | 1900 | 24.5 | 281.8 | 77.7 | no |
| UMTS FDD IV | 1750 | 24.5 | 281.8 | 74.6 | no |
| UMTS FDD V | 835 | 24.5 | 281.8 | 51.5 | no |
| LTE FDD 2 | 1880 | 24.0 | 251.2 | 68.9 | no |
| LTE FDD 4 | 1750 | 24.0 | 251.2 | 66.5 | no |
| LTE FDD 5 | 835 | 24.0 | 251.2 | 45.9 | no |
| LTE FDD 7 | 2535 | 24.0 | 251.2 | 80.0 | no |
| LTE FDD 13 | 782 | 24.0 | 251.2 | 44.4 | no |
| LTE FDD 17 | 710 | 24.0 | 251.2 | 42.3 | no |
| WLAN 2450 | 2450 | 11.5 | 14.1 | 4.4 | no |
| WLAN 5.2 GHz | 5200 | 11.5 | 14.1 | 6.4 | no |
| WLAN 5.3 GHz | 5300 | 11.5 | 14.1 | 6.5 | no |
| WLAN 5.6 GHz | 5600 | 11.5 | 14.1 | 6.7 | no |
| WLAN 5.8 GHz | 5800 | 11.5 | 14.1 | 6.8 | no |
| Bluetooth 2450 | 2450 | 9.7 | 9.3 | 2.9 | yes |

Table 37: Standalone SAR test exclusion considerations in **body position with 0mm distance**

$P_{avg}$* - maximum possible output power declared by manufacturer

The **1-g SAR test exclusion thresholds** for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [√f(GHz)] ≤ **3.0** for 1-g 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

### 7.4.4 SAR measurement positions

| SAR measurement positions | | | | | | |
|---|---|---|---|---|---|---|
| mode | front | rear | left edge | right edge | top edge | bottom edge |
| GSM 850 | no | yes | no | yes | yes | no |
| GSM 1900 | no | yes | no | yes | yes | no |
| UMTS FDD II | no | yes | no | yes | yes | no |
| UMTS FDD IV | no | yes | no | yes | yes | no |
| UMTS FDD V | no | yes | no | yes | yes | no |
| LTE FDD 2 | no | yes | no | yes | yes | no |
| LTE FDD 4 | no | yes | no | yes | yes | no |
| LTE FDD 5 | no | yes | no | yes | yes | no |
| LTE FDD 7 | no | yes | no | yes | yes | no |
| WLAN 2450 | no | yes | no | no | yes | no |
| WLAN 5.2 GHz | no | yes | no | no | yes | no |
| WLAN 5.3 GHz | no | yes | no | no | yes | no |
| WLAN 5.6 GHz | no | yes | no | no | yes | no |
| WLAN 5.8 GHz | no | yes | no | no | yes | no |

Note:
The distance of the antennas (see Annexe Photo documentation) to all adjacent edges SAR test exclusion for adjacent edges is possible according to KDB 447498 D01v05 chapter 4.3.1 2) or Appendix A/B.

| Adjacent edge SAR test exclusion considerations | | | | | | |
|---|---|---|---|---|---|---|
| Communication system | freq. (MHz) | $P_{avg}$* (dBm) | $P_{avg}$* (mW) | distance (mm) | **exclusion threshold$_{1g}$ (mW)** | SAR test exclusion |
| GSM 835 | 835 | 25.2 | **331.1** | 157.0 | **515.4** | yes |
| GSM 1900 | 1880 | 22.7 | **186.2** | 157.0 | **343.5** | yes |
| UMTS FDD II | 1880 | 24.5 | **281.8** | 157.0 | **343.5** | yes |
| UMTS FDD IV | 1750 | 24.5 | **281.8** | 157.0 | **356.0** | yes |
| UMTS FDD V | 835 | 24.5 | **281.8** | 157.0 | **515.4** | yes |
| LTE FDD 2 | 1880 | 24.0 | **251.2** | 157.0 | **343.5** | yes |
| LTE FDD 4 | 1750 | 24.0 | **251.2** | 157.0 | **356.0** | yes |
| LTE FDD 5 | 835 | 24.0 | **251.2** | 157.0 | **515.4** | yes |
| LTE FDD 7 | 2535 | 24.0 | **251.2** | 157.0 | **295.8** | yes |
| WLAN 2450 | 2450 | 11.5 | **14.1** | 24.9 | **47.6** | yes |
| WLAN 5.2 GHz | 5200 | 11.5 | **14.1** | 24.9 | **32.7** | yes |
| WLAN 5.3 GHz | 5300 | 11.5 | **14.1** | 24.9 | **32.4** | yes |
| WLAN 5.6 GHz | 5600 | 11.5 | **14.1** | 24.9 | **31.5** | yes |
| WLAN 5.8 GHz | 5800 | 11.5 | **14.1** | 24.9 | **31.0** | yes |
| Bluetooth 2450 | 2450 | 9.7 | **9.3** | 24.9 | **47.6** | yes |

Table 38: Adjacent edge SAR test exclusion considerations

## 7.5 SAR test results

### 7.5.1 Results overview

| measured / extrapolated SAR numbers - body worn - GSM 850 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | time slots | dist. (mm) | modulation | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | | declared** | measured | measured | extrapolated | measured | |
| 190 | 836.6 | 4 | 16 | GMSK | default | rear | 28.2 | 28.1 | 0.315 | 0.322 | 0.209 | 21.5 |
| 190 | 836.6 | 4 | 15 | GMSK | default | top edge | 28.2 | 28.1 | 0.111 | 0.114 | 0.080 | 21.5 |
| 190 | 836.6 | 4 | 0 | GMSK | default | right edge | 28.2 | 28.1 | 0.277 | 0.283 | 0.182 | 21.5 |
| 128 | 824.2 | 1 | 0 | GMSK | backoff | rear | 29.9 | 28.7 | **0.938** | **1.237** | 0.517 | 21.5 |
| 190 | 836.6 | 1 | 0 | GMSK | backoff | rear | 29.9 | 28.6 | 0.780 | 1.052 | 0.431 | 21.5 |
| 251 | 848.8 | 1 | 0 | GMSK | backoff | rear | 29.9 | 28.5 | 0.631 | 0.871 | 0.349 | 21.5 |
| 190 | 836.6 | 1 | 0 | GMSK | backoff | top edge | 29.9 | 28.6 | 0.189 | 0.255 | 0.091 | 21.5 |
| 128 | 824.2 | 1 | 0 | GMSK | backoff | rear | 29.9 | 28.7 | 0.933 | 1.230 | **0.519** | 21.5 |
| 128 | 824.2 | 1 | 0 | GMSK | backoff | rear | 29.9 | 28.7 | 0.934 | 1.231 | 0.519 | 21.5 |
| 128 | 824.2 | 1 | 0 | GMSK | backoff | rear | 29.9 | 28.7 | 0.936 | 1.234 | 0.518 | 21.5 |

Table 39: Test results body worn SAR GSM 850 MHz (see max. SAR plot in Annex B.1: GSM850 page 83)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - GSM 1900 MHz | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | time slots | dist. (mm) | modulation | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | | declared** | measured | measured | extrapolated | measured | |
| 661 | 1880.0 | 4 | 16 | GMSK | default | rear | 25.7 | 25.2 | 0.281 | 0.315 | 0.163 | 21.1 |
| 661 | 1880.0 | 4 | 15 | GMSK | default | top edge | 25.7 | 25.2 | 0.357 | 0.401 | 0.206 | 21.1 |
| 661 | 1880.0 | 4 | 0 | GMSK | default | right edge | 25.7 | 25.2 | 0.040 | 0.045 | 0.023 | 21.1 |
| 512 | 1850 | 2 | 0 | GMSK | backoff | rear | 19.3 | 17.9 | 0.339 | 0.468 | 0.153 | 21.1 |
| 661 | 1880.0 | 2 | 0 | GMSK | backoff | rear | 19.3 | 17.8 | **0.562** | **0.794** | **0.248** | 21.1 |
| 810 | 1910 | 2 | 0 | GMSK | backoff | rear | 19.3 | 17.9 | 0.378 | 0.522 | 0.165 | 21.1 |
| 661 | 1880.0 | 2 | 0 | GMSK | backoff | top edge | 19.3 | 17.8 | 0.338 | 0.477 | 0.148 | 21.1 |

Table 40: Test results body worn SAR GSM 1900 MHz (see max. SAR plot in Annex B.2: GSM1900 page 84)

** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - UMTS FDD II 1880 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | test condition | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 9262 | 1852.4 | RMC | 16 | default | rear | 24.5 | 23.9 | **0.868** | 0.997 | **0.506** | 21.1 |
| 9400 | 1880.0 | RMC | 16 | default | rear | 24.5 | 23.7 | 0.852 | **1.024** | 0.490 | 21.1 |
| 9538 | 1907.6 | RMC | 16 | default | rear | 24.5 | 24.2 | 0.868 | 0.930 | 0.493 | 21.1 |
| 9262 | 1852.4 | RMC | 15 | default | top edge | 24.5 | 23.9 | 0.859 | 0.986 | 0.499 | 21.1 |
| 9400 | 1880.0 | RMC | 15 | default | top edge | 24.5 | 23.7 | 0.799 | 0.961 | 0.458 | 21.1 |
| 9538 | 1907.6 | RMC | 15 | default | top edge | 24.5 | 24.2 | 0.930 | 0.997 | 0.520 | 22.1 |
| 9400 | 1880.0 | RMC | 0 | default | right edge | 24.5 | 23.7 | 0.154 | 0.185 | 0.089 | 21.1 |
| 9262 | 1852.4 | RMC | 0 | backoff | rear | 11.5 | 11.4 | 0.671 | 0.687 | 0.297 | 21.1 |
| 9400 | 1880.0 | RMC | 0 | backoff | rear | 11.5 | 11.3 | 0.595 | 0.623 | 0.262 | 21.1 |
| 9538 | 1907.6 | RMC | 0 | backoff | rear | 11.5 | 11.1 | 0.488 | 0.535 | 0.214 | 21.1 |
| 9400 | 1880.0 | RMC | 0 | backoff | top edge | 11.5 | 11.3 | 0.376 | 0.394 | 0.166 | 21.1 |
| 9262 | 1852.4 | RMC | 16 | default | rear | 24.5 | 23.9 | 0.890 | 1.022 | 0.517 | 21.1 |

Table 41: Test results body worn SAR UMTS FDD II 1880 MHz (see max. SAR plot in Annex B.3: UMTS FDD II page 85)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - UMTS FDD IV 1700 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | test condition | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 1312 | 1712 | RMC | 16 | default | rear | 24.5 | 23.9 | 0.761 | 0.874 | 0.446 | 21.5 |
| 1413 | 1732 | RMC | 16 | default | rear | 24.5 | 24.4 | 0.800 | 0.819 | 0.471 | 21.5 |
| 1513 | 1753 | RMC | 16 | default | rear | 24.5 | 23.9 | **0.811** | **0.931** | **0.478** | 21.5 |
| 1413 | 1732 | RMC | 15 | default | top edge | 24.5 | 24.4 | 0.706 | 0.722 | 0.429 | 21.5 |
| 1413 | 1732 | RMC | 0 | default | right edge | 24.5 | 24.4 | 0.228 | 0.233 | 0.138 | 21.5 |
| 1413 | 1732 | RMC | 0 | backoff | rear | 12.5 | 11.8 | 0.647 | 0.760 | 0.288 | 21.5 |
| 1413 | 1732 | RMC | 0 | backoff | top edge | 12.5 | 11.8 | 0.226 | 0.266 | 0.106 | 21.5 |
| 1513 | 1753 | RMC | 16 | default | rear* | 24.5 | 23.9 | 0.807 | 0.927 | 0.475 | 21.5 |

Table 42: Test results body worn SAR UMTS FDD IV 1700 MHz MHz (see max. SAR plot in Annex B.4: UMTS FDD IV page 87)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - UMTS FDD V 850 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | test condition | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 4182 | 836.4 | RMC | 16 | default | rear | 24.5 | 24.4 | 0.239 | 0.245 | 0.159 | 21.5 |
| 4182 | 836.4 | RMC | 15 | default | top edge | 24.5 | 24.4 | 0.109 | 0.112 | 0.079 | 21.5 |
| 4182 | 836.4 | RMC | 0 | default | right edge | 24.5 | 24.4 | 0.264 | 0.270 | 0.169 | 21.5 |
| 4132 | 826.4 | RMC | 0 | backoff | rear | 18.5 | 18.3 | **0.560** | **0.586** | **0.315** | 21.5 |
| 4182 | 836.4 | RMC | 0 | backoff | rear | 18.5 | 18.4 | 0.549 | 0.562 | 0.308 | 21.5 |
| 4233 | 846.6 | RMC | 0 | backoff | rear | 18.5 | 18.4 | 0.526 | 0.538 | 0.298 | 21.5 |
| 4182 | 836.4 | RMC | 0 | backoff | top edge | 18.5 | 18.4 | 0.169 | 0.173 | 0.081 | 21.5 |

Table 43: Test results body worn SAR UMTS FDD V 850 MHz (see max. SAR plot in Annex B.5: UMTS FDD V page 88)
** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - LTE FDD 2 1900 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | RB offset | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 20MHz BW/1RB/QPSK | | | | | | | | | | | |
| 18700 | 1860 | low | 16 | default | rear | 24.0 | 22.9 | 0.518 | 0.667 | 0.306 | 21.2 |
| 18700 | 1860 | low | 15 | default | top edge | 24.0 | 22.9 | 0.521 | 0.671 | 0.303 | 21.2 |
| 18900 | 1880 | low | 15 | default | top edge | 24.0 | 22.8 | 0.574 | 0.757 | **0.332** | 21.2 |
| 19100 | 1900 | high | 15 | default | top edge | 24.0 | 22.8 | **0.581** | **0.766** | 0.331 | 21.2 |
| 18700 | 1860 | low | 0 | default | right edge | 24.0 | 22.9 | 0.141 | 0.182 | 0.082 | 21.2 |
| 19100 | 1900 | middle | 0 | backoff | rear | 10.5 | 10.2 | 0.424 | 0.454 | 0.186 | 21.2 |
| 19100 | 1900 | middle | 0 | backoff | top edge | 10.5 | 10.2 | 0.339 | 0.363 | 0.148 | 21.2 |
| 20MHz BW/50RB/QPSK | | | | | | | | | | | |
| 18700 | 1860 | high | 16 | default | rear | 23.0 | 22.0 | 0.338 | 0.426 | 0.195 | 21.2 |
| 18700 | 1860 | high | 15 | default | top edge | 23.0 | 22.0 | 0.451 | 0.568 | 0.256 | 21.2 |
| 18700 | 1860 | high | 0 | default | right edge | 23.0 | 22.0 | 0.109 | 0.137 | 0.063 | 21.2 |

Table 44: Test results body worn SAR LTE FDD 2 1900 MHz (see max. SAR plot in Annex B.6: LTE FDD 2 page 89)

** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - LTE FDD 4 1750 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | RB offset | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 20MHz BW/1RB/QPSK | | | | | | | | | | | |
| 20050 | 1720.0 | high | 16 | default | rear | 24.0 | 22.8 | 0.556 | 0.733 | 0.328 | 21.5 |
| 20175 | 1732.5 | high | 16 | default | rear | 24.0 | 22.7 | **0.559** | **0.754** | **0.330** | 21.5 |
| 20300 | 1745.0 | high | 16 | default | rear | 24.0 | 22.7 | **0.559** | **0.754** | **0.330** | 21.5 |
| 20050 | 1720.0 | high | 15 | default | top edge | 24.0 | 22.8 | 0.539 | 0.711 | 0.326 | 21.5 |
| 20050 | 1720.0 | high | 0 | default | right edge | 24.0 | 22.8 | 0.162 | 0.214 | 0.098 | 21.5 |
| 20050 | 1720.0 | middle | 0 | backoff | rear | 11.5 | 11.0 | 0.325 | 0.365 | 0.147 | 21.5 |
| 20050 | 1720.0 | middle | 0 | backoff | top edge | 11.5 | 11.0 | 0.142 | 0.159 | 0.068 | 21.5 |
| 20MHz BW/50RB/QPSK | | | | | | | | | | | |
| 20050 | 1720.0 | low | 16 | default | rear | 23.0 | 22.0 | 0.418 | 0.526 | 0.245 | 21.5 |
| 20050 | 1720.0 | low | 15 | default | top edge | 23.0 | 22.0 | 0.424 | 0.534 | 0.256 | 21.5 |
| 20050 | 1720.0 | low | 0 | default | right edge | 23.0 | 22.0 | 0.109 | 0.137 | 0.067 | 21.5 |
| 20050 | 1720.0 | middle | 0 | backoff | rear | 11.5 | 10.8 | 0.320 | 0.376 | 0.146 | 21.5 |
| 20050 | 1720.0 | middle | 0 | backoff | top edge | 11.5 | 10.8 | 0.208 | 0.244 | 0.098 | 21.5 |

Table 45: Test results body worn SAR LTE FDD 4 1750 MHz (see max. SAR plot in Annex B.7: LTE FDD 4 page 90)

** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - LTE FDD 5 850 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | RB offset | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 10MHz BW/1RB/QPSK | | | | | | | | | | | |
| 20600 | 844.0 | middle | 16 | default | rear | 24.0 | 23.2 | 0.198 | 0.238 | 0.132 | 21.5 |
| 20600 | 844.0 | middle | 15 | default | top edge | 24.0 | 23.2 | 0.082 | 0.099 | 0.060 | 21.5 |
| 20600 | 844.0 | middle | 0 | default | right edge | 24.0 | 23.2 | 0.216 | 0.260 | 0.132 | 21.5 |
| 20450 | 829.0 | low | 0 | backoff | rear | 17.9 | 17.0 | 0.428 | 0.527 | 0.244 | 21.5 |
| 20450 | 829.0 | low | 0 | backoff | top edge | 17.9 | 17.0 | 0.135 | 0.166 | 0.064 | 21.5 |
| 10MHz BW/25RB/QPSK | | | | | | | | | | | |
| 20600 | 844.0 | high | 16 | default | rear | 23.0 | 22.1 | 0.157 | 0.193 | 0.105 | 21.5 |
| 20600 | 844.0 | high | 15 | default | top edge | 23.0 | 22.1 | 0.065 | 0.080 | 0.047 | 21.5 |
| 20600 | 844.0 | high | 0 | default | right edge | 23.0 | 22.1 | 0.177 | 0.218 | 0.107 | 21.5 |
| 20450 | 829.0 | low | 0 | backoff | rear | 17.9 | 16.9 | 0.429 | 0.540 | 0.242 | 21.5 |
| 20525 | 836.5 | low | 0 | backoff | rear | 17.9 | 16.7 | 0.442 | **0.583** | 0.245 | 21.5 |
| 20600 | 844.0 | low | 0 | backoff | rear | 17.9 | 16.8 | **0.449** | 0.578 | **0.251** | 21.5 |
| 20450 | 829.0 | low | 0 | backoff | top edge | 17.9 | 16.9 | 0.133 | 0.167 | 0.063 | 21.5 |

Table 46: Test results body worn SAR LTE FDD 5 850 MHz (see max. SAR plot in Annex B.8: LTE FDD 5 page 92)

** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - LTE FDD7 2600 MHz | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | RB offset | dist. (mm) | power level | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | | declared** | measured | measured | extrapolated | measured | |
| 20MHz BW/1RB/QPSK | | | | | | | | | | | |
| 20850 | 2510 | middle | 16 | default | rear | 24.0 | 22.9 | 0.407 | 0.524 | 0.214 | 22.1 |
| 20850 | 2510 | middle | 15 | default | top edge | 24.0 | 22.9 | 0.546 | 0.703 | 0.266 | 22.1 |
| 20850 | 2510 | middle | 0 | default | right edge | 24.0 | 22.9 | 0.745 | 0.960 | 0.273 | 22.1 |
| 21100 | 2535 | middle | 0 | default | right edge | 24.0 | 22.8 | 0.757 | 0.998 | 0.273 | 21.8 |
| 21350 | 2560 | middle | 0 | default | right edge | 24.0 | 22.7 | **0.788** | **1.063** | **0.283** | 21.8 |
| 21350 | 2560 | middle | 0 | backoff | rear | 10.5 | 9.9 | 0.629 | 0.722 | 0.230 | 21.8 |
| 21350 | 2560 | middle | 0 | backoff | top edge | 10.5 | 9.9 | 0.270 | 0.310 | 0.102 | 21.8 |
| 21350 | 2560 | middle | 0 | default | right edge* | 24.0 | 22.7 | 0.784 | 1.058 | 0.280 | 21.8 |
| 20MHz BW/50RB/QPSK | | | | | | | | | | | |
| 20850 | 2510 | high | 16 | default | rear | 23.0 | 22.0 | 0.312 | 0.393 | 0.163 | 22.1 |
| 20850 | 2510 | high | 15 | default | top edge | 23.0 | 22.0 | 0.403 | 0.507 | 0.195 | 22.1 |
| 20850 | 2510 | high | 0 | default | right edge | 23.0 | 22.0 | 0.568 | 0.715 | 0.207 | 22.1 |
| 21350 | 2560 | middle | 0 | backoff | rear | 10.5 | 9.7 | 0.582 | 0.700 | 0.216 | 21.8 |
| 21350 | 2560 | middle | 0 | backoff | top edge | 10.5 | 9.7 | 0.255 | 0.307 | 0.096 | 21.8 |
| 20MHz BW/100RB/QPSK | | | | | | | | | | | |
| 21350 | 2560 | low | 16 | default | rear | 23.0 | 21.9 | 0.324 | 0.417 | 0.167 | 22.1 |
| 21350 | 2560 | low | 15 | default | top edge | 23.0 | 21.9 | 0.360 | 0.464 | 0.172 | 22.1 |
| 20850 | 2510 | low | 0 | default | right edge | 23.0 | 21.8 | 0.580 | 0.765 | 0.211 | 21.8 |
| 21100 | 2535 | low | 0 | default | right edge | 23.0 | 21.8 | 0.575 | 0.758 | 0.206 | 21.8 |
| 21350 | 2560 | low | 0 | default | right edge | 23.0 | 21.9 | 0.637 | 0.821 | 0.225 | 22.1 |
| 21350 | 2560 | low | 0 | backoff | rear | 10.5 | 9.4 | 0.542 | 0.698 | 0.201 | 21.8 |
| 21350 | 2560 | low | 0 | backoff | top edge | 10.5 | 9.4 | 0.226 | 0.291 | 0.085 | 21.8 |

Table 47: Test results body worn SAR LTE FDD 7 2600 MHz (see max. SAR plot in Annex B.9: LTE FDD 7 page 94)

* - repeated at the highest SAR measurement according to the FCC KDB 865664
** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - body worn - WLAN 2450 MHz | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | Test condition | dist. (mm) | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | declared** | measured | measured | extrapolated | measured | |
| 6 | 2437 | 1Mbit/s | 16 | rear | 11.5 | 10.3 | 0.032 | 0.042 | 0.016 | 20.4 |
| 6 | 2437 | 1Mbit/s | 15 | top edge | 11.5 | 10.3 | 0.015 | 0.019 | 0.007 | 20.4 |
| 1 | 2412 | 1Mbit/s | 0 | rear | 11.5 | 10.3 | 0.467 | 0.616 | 0.170 | 20.4 |
| 6 | 2437 | 1Mbit/s | 0 | rear | 11.5 | 10.3 | 0.446 | 0.588 | 0.163 | 20.4 |
| 11 | 2462 | 1Mbit/s | 0 | rear | 11.5 | 10.3 | **0.537** | **0.708** | **0.191** | 20.4 |
| 6 | 2437 | 1Mbit/s | 0 | top edge | 11.5 | 10.3 | 0.160 | 0.211 | 0.067 | 20.4 |

Table 48: Test results body worn SAR WLAN 2450 MHz (see max. SAR plot in Annex B.10: WLAN 2450MHz page 95)
** - maximum possible output power declared by manufacturer

| measured / extrapolated SAR numbers - Body worn - WLAN 5 GHz | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ch. | Freq. (MHz) | Test conditio | distance (mm) | Position | cond. $P_{max}$ (dBm) | | $SAR_{1g}$ results(W/kg) | | $SAR_{10g}$ (W/kg) | liquid (°C) |
| | | | | | declared** | measured | measured | extrapolated | measured | |
| 36 | 5180 | 6Mbit/s | 0 | rear | 11.5 | 10.2 | 0.462 | 0.623 | 0.148 | 21.4 |
| 64 | 5320 | 6Mbit/s | 0 | rear | 11.5 | 9.7 | 0.359 | 0.543 | 0.110 | 21.4 |
| 116 | 5580 | 6Mbit/s | 0 | rear | 11.5 | 10.2 | 0.494 | 0.666 | 0.100 | 21.4 |
| 149 | 5745 | 6Mbit/s | 0 | rear | 11.5 | 10.1 | 0.404 | 0.558 | 0.082 | 21.4 |
| 36 | 5180 | 6Mbit/s | 0 | top edge | 11.5 | 10.2 | 0.355 | 0.479 | 0.106 | 21.4 |
| 64 | 5320 | 6Mbit/s | 0 | top edge | 11.5 | 9.7 | 0.335 | 0.507 | 0.092 | 21.4 |
| 104 | 5520 | 6Mbit/s | 0 | top edge | 11.5 | 10.0 | **0.668** | **0.944** | **0.159** | 21.4 |
| 116 | 5580 | 6Mbit/s | 0 | top edge | 11.5 | 10.2 | 0.596 | 0.804 | 0.146 | 21.4 |
| 124 | 5620 | 6Mbit/s | 0 | top edge | 11.5 | 10.0 | 0.500 | 0.706 | 0.120 | 21.4 |
| 136 | 5680 | 6Mbit/s | 0 | top edge | 11.5 | 10.2 | 0.459 | 0.619 | 0.109 | 21.4 |
| 149 | 5745 | 6Mbit/s | 0 | top edge | 11.5 | 10.1 | 0.308 | 0.425 | 0.077 | 21.4 |
| 104 | 5520 | 6Mbit/s | 16 | rear | 11.5 | 10.0 | 0.025 | 0.035 | 0.012 | 21.4 |
| 104 | 5520 | 6Mbit/s | 15 | top edge | 11.5 | 10.0 | 0.030 | 0.042 | 0.014 | 21.4 |

Table 49: Test results body worn SAR WLAN 5 GHz (see max. SAR plot in Annex B.11: WLAN 5GHz page 96)
** - maximum possible output power declared by manufacturer

| Estimated stand alone SAR. | | | | | |
|---|---|---|---|---|---|
| Communication system | freq. (GHz) | distance (mm) | $P_{avg}$ (dBm) | $P_{avg}$ (mW) | estimated$_{1-g}$ (W/kg) |
| Bluetooth 2450 | 2.45 | 5 | 9.7 | 9.3 | 0.390 |
| Bluetooth 2450 | 2.45 | 15 | 9.7 | 9.3 | 0.130 |
| Bluetooth 2450 | 2.45 | 16 | 9.7 | 9.3 | 0.122 |

Table 28: Estimated stand alone $SAR_{max}$ for Bluetooth 2450MHz body worn

## 7.5.2 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.
- Tests in body position were performed in that configuration, which generates the highest time based averaged output power (see conducted power results).
- 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. According to KDB 248227 the SAR testing for 802.11g/n/ac is not required since the maximum power of 802.11g/n/ac is less ¼ dB higher than maximum power of 802.11a/b.
- Required WLAN test channels were selected according to KDB 248227
- The device was tested in different scenarios that depended on the activation of a power back off triggered by the proximity sensor.
  - Scenario1: Rear position with 16mm distance without power reduction
  - Scenario2: Top position with 15mm distance without power reduction
  - Scenario3: Rear position with 0mm distance with power reduction
  - Scenario4: Top position with 0mm distance with power reduction
  - Scenario5: Right side position with 0mm distance without power reduction
- 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:
  - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
  - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
  - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
- IEEE 1528-2003 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 > ½ dB, instead of the middle channel, the highest output power channel must be used.

## 7.5.3 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** and **WLAN 2.4GHz**, **ΣSAR** evaluation, **SPLSRi** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency band | Position | SARmax /W/kg | | **ΣSAR** | distance | **ratio** |
| | | WWAN | WLAN | <1.6W/kg | **Ri**, mm | ≤ 0.040 |
| GSM 850 | rear 16mm | 0.322 | 0.042 | 0.364 | | |
| GSM 850 | top edge 15mm | 0.114 | 0.019 | 0.133 | | |
| GSM 850 | rear 0mm | 1.237 | 0.708 | **1.945** | 158.5 | 0.017 |
| GSM 850 | top edge 0mm | 0.255 | 0.211 | 0.466 | | |
| GSM 1900 | rear 16mm | 0.315 | 0.042 | 0.357 | | |
| GSM 1900 | top edge 15mm | 0.401 | 0.019 | 0.420 | | |
| GSM 1900 | rear 0mm | 0.794 | 0.708 | 1.502 | | |
| GSM 1900 | top edge 0mm | 0.477 | 0.211 | 0.688 | | |
| UMTS FDD II | rear 16mm | 1.024 | 0.042 | 1.066 | | |
| UMTS FDD II | top edge 15mm | 0.961 | 0.019 | 0.980 | | |
| UMTS FDD II | rear 0mm | 0.687 | 0.708 | 1.395 | | |
| UMTS FDD II | top edge 0mm | 0.394 | 0.211 | 0.605 | | |
| UMTS FDD IV | rear 16mm | 0.931 | 0.042 | 0.973 | | |
| UMTS FDD IV | top edge 15mm | 0.722 | 0.019 | 0.741 | | |
| UMTS FDD IV | rear 0mm | 0.760 | 0.708 | 1.468 | | |
| UMTS FDD IV | top edge 0mm | 0.266 | 0.211 | 0.477 | | |
| UMTS FDD V | rear 16mm | 0.245 | 0.042 | 0.287 | | |
| UMTS FDD V | top edge 15mm | 0.112 | 0.019 | 0.131 | | |
| UMTS FDD V | rear 0mm | 0.586 | 0.708 | 1.294 | | |
| UMTS FDD V | top edge 0mm | 0.173 | 0.211 | 0.384 | | |
| LTE FDD 2 | rear 16mm | 0.667 | 0.042 | 0.709 | | |
| LTE FDD 2 | top edge 15mm | 0.766 | 0.019 | 0.785 | | |
| LTE FDD 2 | rear 0mm | 0.454 | 0.708 | 1.162 | | |
| LTE FDD 2 | top edge 0mm | 0.363 | 0.211 | 0.574 | | |
| LTE FDD 4 | rear 16mm | 0.754 | 0.042 | 0.796 | | |
| LTE FDD 4 | top edge 15mm | 0.711 | 0.019 | 0.730 | | |
| LTE FDD 4 | rear 0mm | 0.376 | 0.708 | 1.084 | | |
| LTE FDD 4 | top edge 0mm | 0.244 | 0.211 | 0.455 | | |
| LTE FDD 5 | rear 16mm | 0.238 | 0.042 | 0.280 | | |
| LTE FDD 5 | top edge 15mm | 0.099 | 0.019 | 0.118 | | |
| LTE FDD 5 | rear 0mm | 0.583 | 0.708 | 1.291 | | |
| LTE FDD 5 | top edge 0mm | 0.167 | 0.211 | 0.378 | | |
| LTE FDD 7 | rear 16mm | 0.524 | 0.042 | 0.566 | | |
| LTE FDD 7 | top edge 15mm | 0.703 | 0.019 | 0.722 | | |
| LTE FDD 7 | rear 0mm | 0.722 | 0.708 | 1.430 | | |
| LTE FDD 7 | top edge 0mm | 0.310 | 0.211 | 0.521 | | |

Table 50: $SAR_{max}$ WWAN and **WLAN 2.4GHz**, ΣSAR evaluation, **$SPLSR_i$**

| reported SAR **WWAN** and **WLAN 5GHz**, **ΣSAR** evaluation, **SPLSRi** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency band | Position | SARmax /W/kg | | **ΣSAR** | distance | **ratio** |
| | | WWAN | WLAN | <1.6W/kg | **Ri**, mm | ≤ 0.040 |
| GSM 850 | rear 16mm | 0.322 | 0.035 | 0.357 | | |
| GSM 850 | top edge 15mm | 0.114 | 0.042 | 0.156 | | |
| GSM 850 | rear 0mm | 1.237 | 0.666 | **1.903** | 156.2 | 0.017 |
| GSM 850 | top edge 0mm | 0.255 | 0.944 | 1.199 | | |
| GSM 1900 | rear 16mm | 0.315 | 0.035 | 0.350 | | |
| GSM 1900 | top edge 15mm | 0.401 | 0.042 | 0.443 | | |
| GSM 1900 | rear 0mm | 0.794 | 0.666 | 1.460 | | |
| GSM 1900 | top edge 0mm | 0.477 | 0.944 | 1.421 | | |
| UMTS FDD II | rear 16mm | 1.024 | 0.035 | 1.059 | | |
| UMTS FDD II | top edge 15mm | 0.961 | 0.042 | 1.003 | | |
| UMTS FDD II | rear 0mm | 0.687 | 0.666 | 1.353 | | |
| UMTS FDD II | top edge 0mm | 0.394 | 0.944 | 1.338 | | |
| UMTS FDD IV | rear 16mm | 0.931 | 0.035 | 0.966 | | |
| UMTS FDD IV | top edge 15mm | 0.722 | 0.042 | 0.764 | | |
| UMTS FDD IV | rear 0mm | 0.760 | 0.666 | 1.426 | | |
| UMTS FDD IV | top edge 0mm | 0.266 | 0.944 | 1.210 | | |
| UMTS FDD V | rear 16mm | 0.245 | 0.035 | 0.280 | | |
| UMTS FDD V | top edge 15mm | 0.112 | 0.042 | 0.154 | | |
| UMTS FDD V | rear 0mm | 0.586 | 0.666 | 1.252 | | |
| UMTS FDD V | top edge 0mm | 0.173 | 0.944 | 1.117 | | |
| LTE FDD 2 | rear 16mm | 0.667 | 0.035 | 0.702 | | |
| LTE FDD 2 | top edge 15mm | 0.766 | 0.042 | 0.808 | | |
| LTE FDD 2 | rear 0mm | 0.454 | 0.666 | 1.120 | | |
| LTE FDD 2 | top edge 0mm | 0.363 | 0.944 | 1.307 | | |
| LTE FDD 4 | rear 16mm | 0.754 | 0.035 | 0.789 | | |
| LTE FDD 4 | top edge 15mm | 0.711 | 0.042 | 0.753 | | |
| LTE FDD 4 | rear 0mm | 0.376 | 0.666 | 1.042 | | |
| LTE FDD 4 | top edge 0mm | 0.244 | 0.944 | 1.188 | | |
| LTE FDD 5 | rear 16mm | 0.238 | 0.035 | 0.273 | | |
| LTE FDD 5 | top edge 15mm | 0.099 | 0.042 | 0.141 | | |
| LTE FDD 5 | rear 0mm | 0.583 | 0.666 | 1.249 | | |
| LTE FDD 5 | top edge 0mm | 0.167 | 0.944 | 1.111 | | |
| LTE FDD 7 | rear 16mm | 0.524 | 0.035 | 0.559 | | |
| LTE FDD 7 | top edge 15mm | 0.703 | 0.042 | 0.745 | | |
| LTE FDD 7 | rear 0mm | 0.722 | 0.666 | 1.388 | | |
| LTE FDD 7 | top edge 0mm | 0.310 | 0.944 | 1.254 | | #DIV/0! |

Table 51: $SAR_{max}$ WWAN and **WLAN 5GHz**, ΣSAR evaluation, **SPLSR**$_i$

| reported SAR **WWAN** and **Bluetooth 2.4GHz**, **ΣSAR** evaluation, **SPLSRi** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency band | Position | SARmax /W/kg | | **ΣSAR** | distance | **ratio** |
| | | WWAN | Bluetooth | <1.6W/kg | **Ri**, mm | ≤ 0.040 |
| GSM 850 | rear 16mm | 0.322 | 0.122 | 0.444 | | |
| GSM 850 | top edge 15mm | 0.114 | 0.130 | 0.244 | | |
| GSM 850 | rear 0mm | 1.237 | 0.390 | **1.627** | 125.0 | 0.017 |
| GSM 850 | top edge 0mm | 0.255 | 0.390 | 0.645 | | |
| GSM 1900 | rear 16mm | 0.315 | 0.122 | 0.437 | | |
| GSM 1900 | top edge 15mm | 0.401 | 0.130 | 0.531 | | |
| GSM 1900 | rear 0mm | 0.794 | 0.390 | 1.184 | | |
| GSM 1900 | top edge 0mm | 0.477 | 0.390 | 0.867 | | |
| UMTS FDD II | rear 16mm | 1.024 | 0.122 | 1.146 | | |
| UMTS FDD II | top edge 15mm | 0.961 | 0.130 | 1.091 | | |
| UMTS FDD II | rear 0mm | 0.687 | 0.390 | 1.077 | | |
| UMTS FDD II | top edge 0mm | 0.394 | 0.390 | 0.784 | | |
| UMTS FDD IV | rear 16mm | 0.931 | 0.122 | 1.053 | | |
| UMTS FDD IV | top edge 15mm | 0.722 | 0.130 | 0.852 | | |
| UMTS FDD IV | rear 0mm | 0.760 | 0.390 | 1.150 | | |
| UMTS FDD IV | top edge 0mm | 0.266 | 0.390 | 0.656 | | |
| UMTS FDD V | rear 16mm | 0.245 | 0.122 | 0.367 | | |
| UMTS FDD V | top edge 15mm | 0.112 | 0.130 | 0.242 | | |
| UMTS FDD V | rear 0mm | 0.586 | 0.390 | 0.976 | | |
| UMTS FDD V | top edge 0mm | 0.173 | 0.390 | 0.563 | | |
| LTE FDD 2 | rear 16mm | 0.667 | 0.122 | 0.789 | | |
| LTE FDD 2 | top edge 15mm | 0.766 | 0.130 | 0.896 | | |
| LTE FDD 2 | rear 0mm | 0.454 | 0.390 | 0.844 | | |
| LTE FDD 2 | top edge 0mm | 0.363 | 0.390 | 0.753 | | |
| LTE FDD 4 | rear 16mm | 0.754 | 0.122 | 0.876 | | |
| LTE FDD 4 | top edge 15mm | 0.711 | 0.130 | 0.841 | | |
| LTE FDD 4 | rear 0mm | 0.376 | 0.390 | 0.766 | | |
| LTE FDD 4 | top edge 0mm | 0.244 | 0.390 | 0.634 | | |
| LTE FDD 5 | rear 16mm | 0.238 | 0.122 | 0.360 | | |
| LTE FDD 5 | top edge 15mm | 0.099 | 0.130 | 0.229 | | |
| LTE FDD 5 | rear 0mm | 0.583 | 0.390 | 0.973 | | |
| LTE FDD 5 | top edge 0mm | 0.167 | 0.390 | 0.557 | | |
| LTE FDD 7 | rear 16mm | 0.524 | 0.122 | 0.646 | | |
| LTE FDD 7 | top edge 15mm | 0.703 | 0.130 | 0.833 | | |
| LTE FDD 7 | rear 0mm | 0.722 | 0.390 | 1.112 | | |
| LTE FDD 7 | top edge 0mm | 0.310 | 0.390 | 0.700 | | |

Table 52: $SAR_{max}$ WWAN and **Bluetooth 2450MHz**, ΣSAR evaluation
Minimum antenna separation distance between MAIN antenna and WLAN / Bluetooth antenna – **125 mm**

| reported SAR **WWAN, WLAN 5GHz** and **BT2450MHz**, **ΣSAR** evaluation, **SPLSRi** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency band | Position | SARmax /W/kg | | | **ΣSAR** | distance | **ratio** |
| | | WWAN | WLAN | BT | <1.6W/kg | **Ri**, mm | ≤ 0.040 |
| GSM 850 | rear 16mm | 0.322 | 0.035 | 0.122 | 0.479 | | |
| GSM 850 | top edge 15mm | 0.114 | 0.042 | 0.130 | 0.286 | | |
| GSM 850 | rear 0mm | 1.237 | 0.666 | 0.390 | **2.293** | 125.0 | 0.028 |
| GSM 850 | top edge 0mm | 0.255 | 0.944 | 0.390 | **1.589** | | |
| GSM 1900 | rear 16mm | 0.315 | 0.035 | 0.122 | 0.472 | | |
| GSM 1900 | top edge 15mm | 0.401 | 0.042 | 0.130 | 0.573 | | |
| GSM 1900 | rear 0mm | 0.794 | 0.666 | 0.390 | **1.850** | 125.0 | 0.020 |
| GSM 1900 | top edge 0mm | 0.477 | 0.944 | 0.390 | **1.811** | 125.0 | 0.019 |
| UMTS FDD II | rear 16mm | 1.024 | 0.035 | 0.122 | 1.181 | | |
| UMTS FDD II | top edge 15mm | 0.961 | 0.042 | 0.130 | 1.133 | | |
| UMTS FDD II | rear 0mm | 0.687 | 0.666 | 0.390 | **1.743** | 125.0 | 0.018 |
| UMTS FDD II | top edge 0mm | 0.394 | 0.944 | 0.390 | **1.728** | 125.0 | 0.018 |
| UMTS FDD IV | rear 16mm | 0.931 | 0.035 | 0.122 | 1.088 | | |
| UMTS FDD IV | top edge 15mm | 0.722 | 0.042 | 0.130 | 0.894 | | |
| UMTS FDD IV | rear 0mm | 0.760 | 0.666 | 0.390 | **1.816** | 125.0 | 0.020 |
| UMTS FDD IV | top edge 0mm | 0.266 | 0.944 | 0.390 | **1.600** | 125.0 | 0.016 |
| WCDMA FDD V | rear 16mm | 0.245 | 0.035 | 0.122 | 0.402 | | |
| WCDMA FDD V | top edge 15mm | 0.112 | 0.042 | 0.130 | 0.284 | | |
| WCDMA FDD V | rear 0mm | 0.586 | 0.666 | 0.390 | **1.642** | 125.0 | 0.017 |
| WCDMA FDD V | top edge 0mm | 0.173 | 0.944 | 0.390 | 1.507 | | |
| LTE FDD 2 | rear 16mm | 0.667 | 0.035 | 0.122 | 0.824 | | |
| LTE FDD 2 | top edge 15mm | 0.766 | 0.042 | 0.130 | 0.938 | | |
| LTE FDD 2 | rear 0mm | 0.454 | 0.666 | 0.390 | 1.510 | | |
| LTE FDD 2 | top edge 0mm | 0.363 | 0.944 | 0.390 | **1.697** | 125.0 | 0.018 |
| LTE FDD 4 | rear 16mm | 0.754 | 0.035 | 0.122 | 0.911 | | |
| LTE FDD 4 | top edge 15mm | 0.711 | 0.042 | 0.130 | 0.883 | | |
| LTE FDD 4 | rear 0mm | 0.376 | 0.666 | 0.390 | 1.432 | | |
| LTE FDD 4 | top edge 0mm | 0.244 | 0.944 | 0.390 | 1.578 | | |
| LTE FDD 5 | rear 16mm | 0.238 | 0.035 | 0.122 | 0.395 | | |
| LTE FDD 5 | top edge 15mm | 0.099 | 0.042 | 0.130 | 0.271 | | |
| LTE FDD 5 | rear 0mm | 0.583 | 0.666 | 0.390 | **1.639** | 125.0 | 0.017 |
| LTE FDD 5 | top edge 0mm | 0.167 | 0.944 | 0.390 | 1.501 | | |
| LTE FDD 7 | rear 16mm | 0.524 | 0.035 | 0.122 | 0.681 | | |
| LTE FDD 7 | top edge 15mm | 0.703 | 0.042 | 0.130 | 0.875 | | |
| LTE FDD 7 | rear 0mm | 0.722 | 0.666 | 0.390 | **1.778** | 125.0 | 0.019 |
| LTE FDD 7 | top edge 0mm | 0.310 | 0.944 | 0.390 | **1.644** | 125.0 | 0.017 |

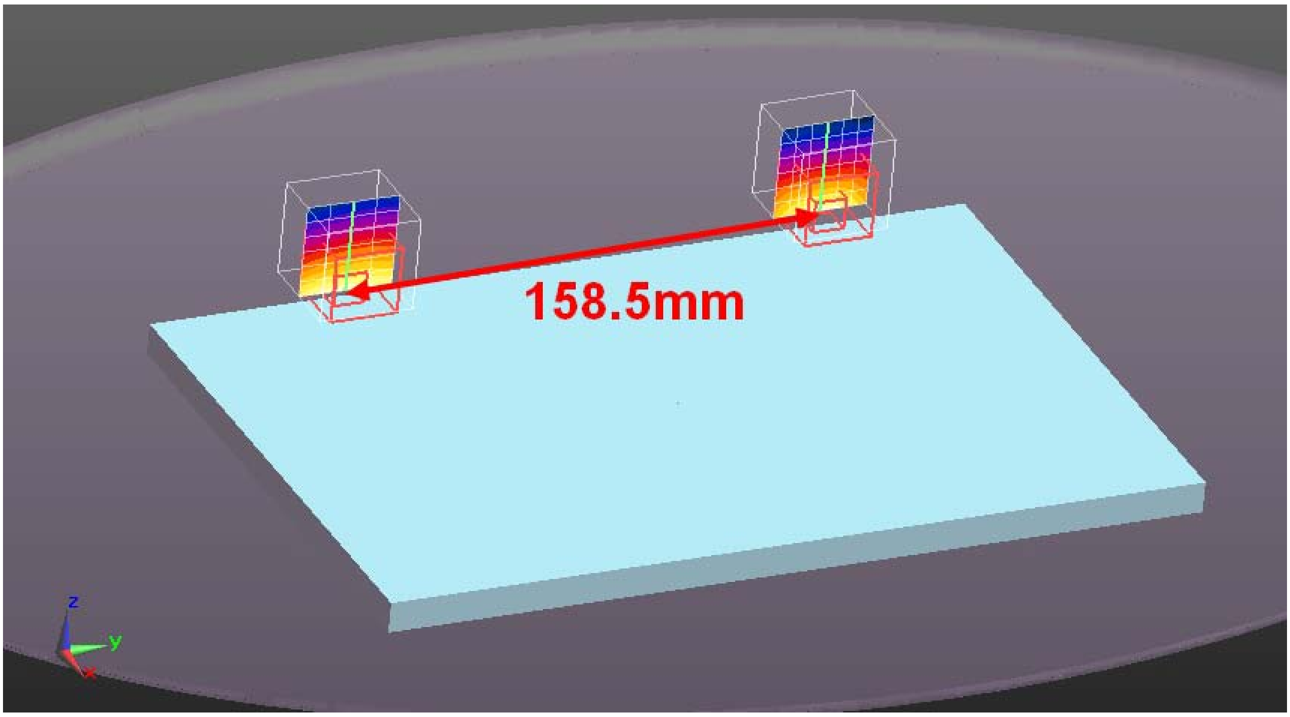
Table 53: $SAR_{max}$ **WWAN, WLAN 5GHz** and **Bluetooth 2450MHz**, ΣSAR evaluation
Minimum antenna separation distance between MAIN antenna and WLAN / Bluetooth antenna – **125 mm**

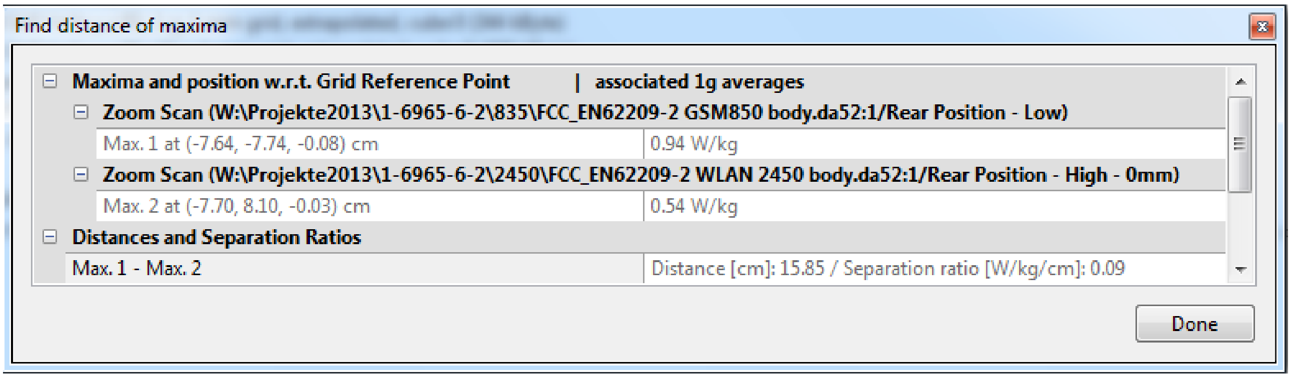
## Conclusion:

ΣSAR > 1.6 W/kg, but SAR-to-(peak-locations spacing) **ratio** (**$SPLSR_i$**) is less than **0.04** therefore simultaneous transmissions SAR measurement with the enlarged zoom scan measurement and volume scan post-processing procedures is **not** required.

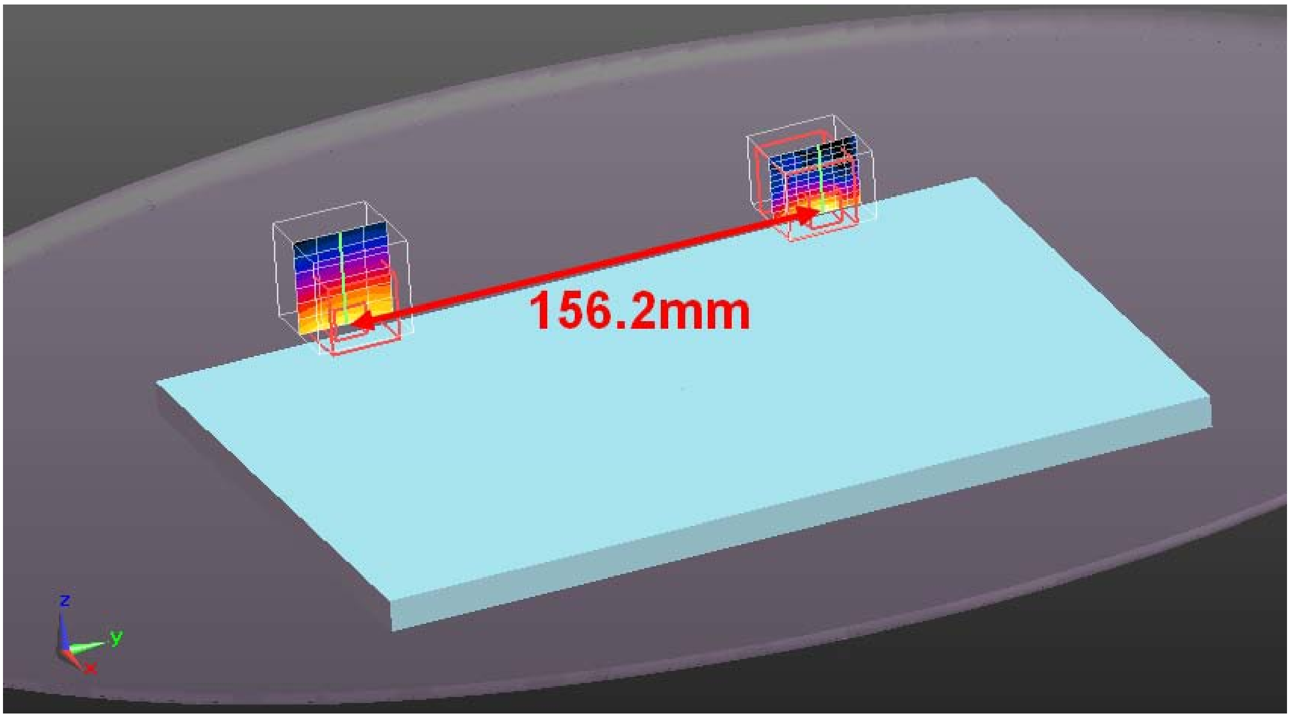
### 7.5.4 SAR peak location separation

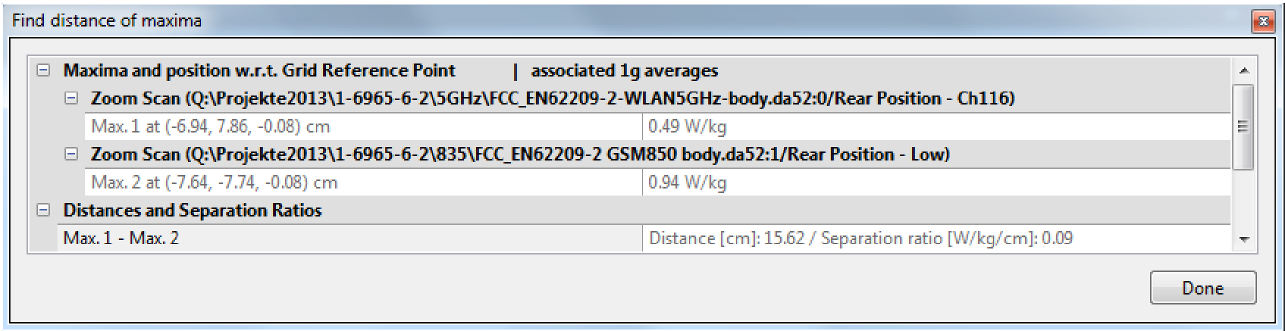
GSM850 + WLAN2450 rear



GSM850 + WLAN5GHz rear



## 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 | June 04, 2013 | 12 |
| Dosimetric E-Field Probe | EX3DV4 | Schmid & Partner Engineering AG | 3944 | August 02, 2013 | 12 |
| 835 MHz System Validation Dipole | D835V2 | Schmid & Partner Engineering AG | 4d153 | June 06, 2013 | 24 |
| 1750 MHz System Validation Dipole | D1750V2 | Schmid & Partner Engineering AG | 1093 | June 06, 2013 | 24 |
| 1900 MHz System Validation Dipole | D1900V2 | Schmid & Partner Engineering AG | 5d009 | May 15, 2013 | 24 |
| 2450 MHz System Validation Dipole | D2450V2 | Schmid & Partner Engineering AG | 710 | August 13, 2012 | 24 |
| 2600 MHz System Validation Dipole | D2600V2 | Schmid & Partner Engineering AG | 1040 | August 15, 2013 | 24 |
| 5 GHz System Validation Dipole | D5GHzV 2 | Schmid & Partner Engineering AG | 1055 | August 19, 2013 | 24 |
| Data acquisition electronics | DAE3V1 | Schmid & Partner Engineering AG | 408 | September 30, 2013 | 12 |
| Data acquisition electronics | DAE3V1 | Schmid & Partner Engineering AG | 413 | January 11, 2013 | 12 |
| Software | DASY52 52.8.7 | Schmid & Partner Engineering AG | --- | N/A | -- |
| Phantom ELI 4.0 | QDOVA0 01BA | Schmid & Partner Engineering AG | 1046 | N/A | -- |
| Universal Radio Communication Tester | CMU 200 | Rohde & Schwarz | 106826 | January 16, 2013 | 24 |
| Universal Radio Communication Tester | CMW500 | Rohde & Schwarz | 102375 | January 16, 2013 | 24 |
| Network Analyser 300 kHz to 6 GHz | 8753ES | Hewlett Packard)* | US39174436 | February 24, 2012 | 24 |
| Dielectric Probe Kit | 85070C | Hewlett Packard | US99360146 | N/A | 12 |
| Signal Generator | 8671B | Hewlett Packard | 2823A00656 | January 15, 2013 | 24 |
| Amplifier | 25S1G4 (25 Watt) | Amplifier Reasearch | 20452 | N/A | -- |
| Power Meter | NRP | Rohde & Schwarz | 101367 | January 15, 2013 | 24 |
| Power Meter Sensor | NRP Z22 | Rohde & Schwarz | 100227 | January 14, 2013 | 12 |
| Power Meter Sensor | NRP Z22 | Rohde & Schwarz | 100234 | January 14, 2013 | 12 |
| Directional Coupler | 778D | Hewlett Packard | 19171 | January 14, 2013 | 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: 03.01.2014 08:51:09

## SystemPerformanceCheck-D835 body 2014-01-03

**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; $\sigma$ = 0.996 S/m; $\varepsilon_r$ = 54.794; $\rho$ = 1000 kg/m$^3$

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(6.29, 6.29, 6.29); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL835/d=10mm, Pin=1000 mW, dist=4.0mm/Area Scan (51x51x1):

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

Maximum value of SAR (interpolated) = 10.4 W/kg

## MSL835/d=10mm, Pin=1000 mW, dist=4.0mm/Zoom Scan (7x7x7)/Cube 0:

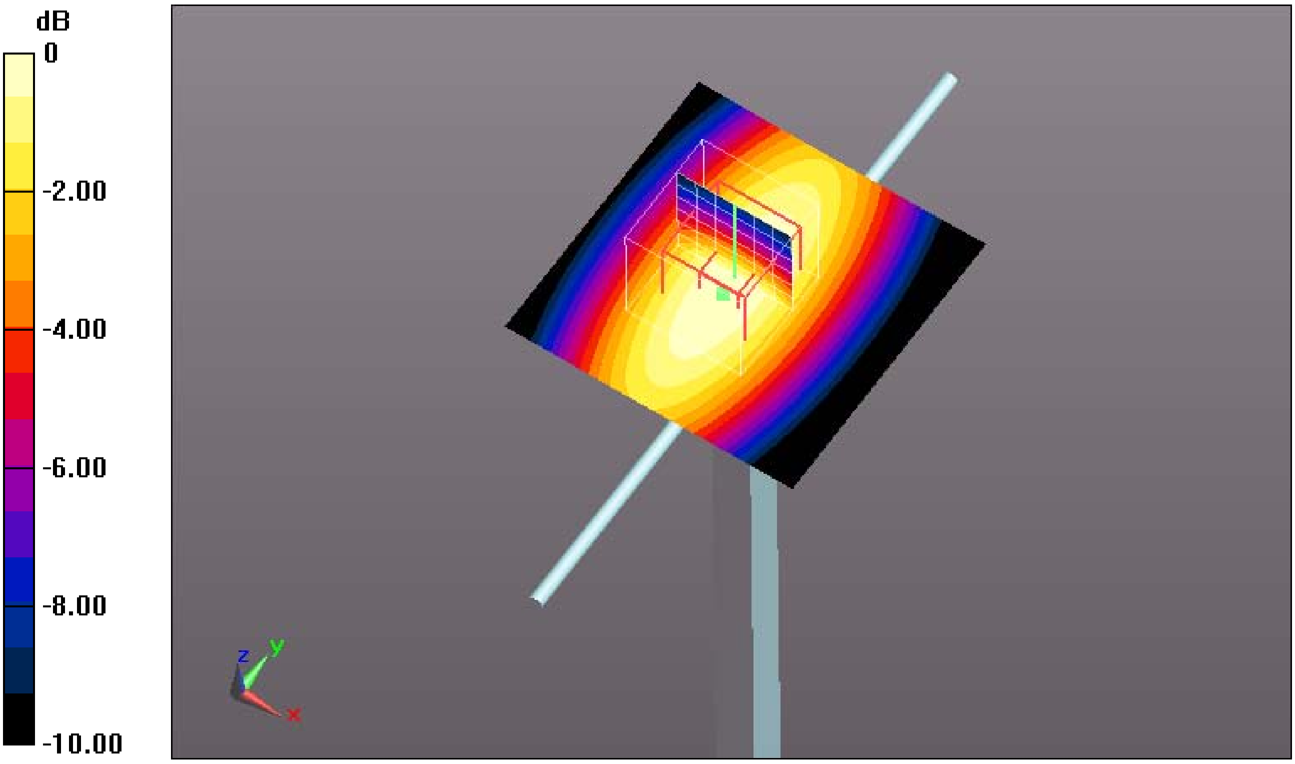
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.7 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 14.1 W/kg

**SAR(1 g) = 9.69 W/kg; SAR(10 g) = 6.42 W/kg**

Maximum value of SAR (measured) = 10.4 W/kg




0 dB = 10.4 W/kg = 10.17 dBW/kg

**Additional information:**

ambient temperature: 22.1°C; liquid temperature: 21.5°C

Date/Time: 04.01.2014 11:58:03

# SystemPerformanceCheck-D835 body 2014-01-04

**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; σ = 0.996 S/m; $\varepsilon_r$ = 54.794; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:

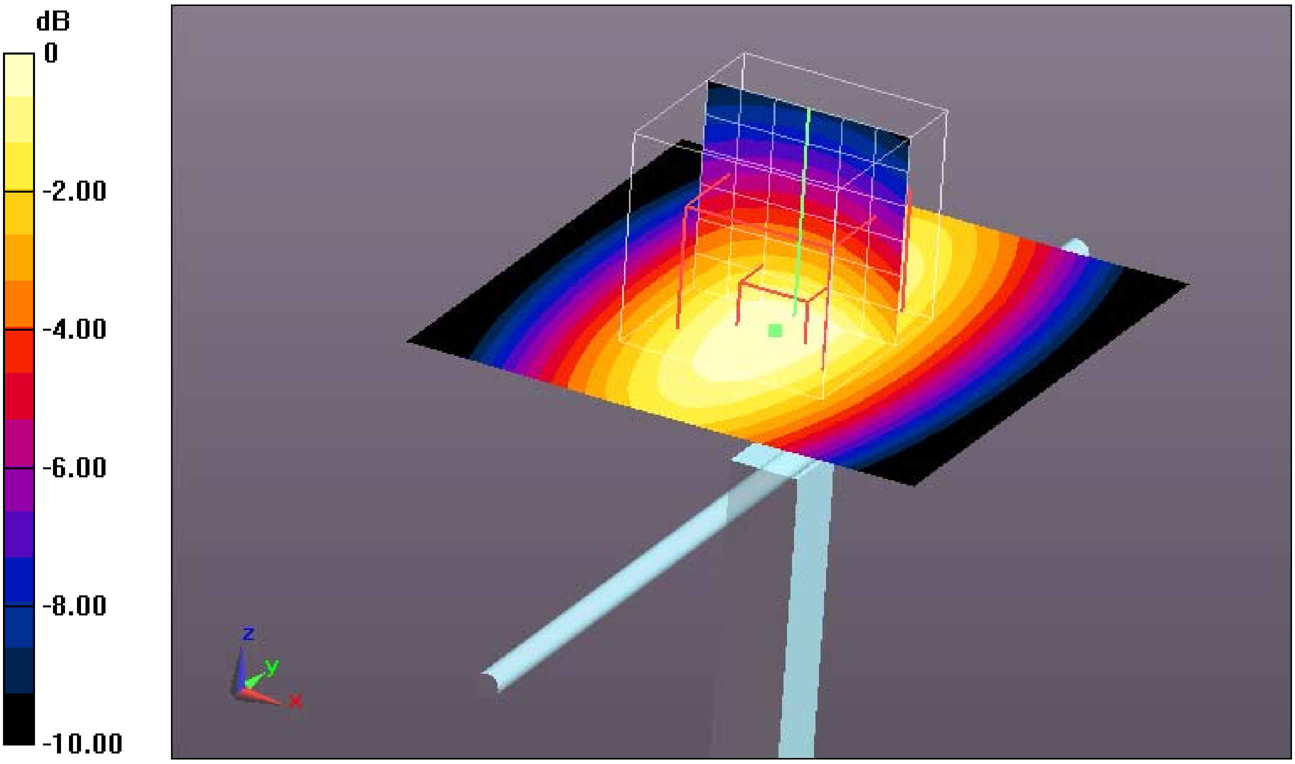
- Probe: ES3DV3 - SN3320; ConvF(6.29, 6.29, 6.29); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL835/d=10mm, Pin=1000 mW, dist=4.0mm/Area Scan (51x51x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 10.1 W/kg

## MSL835/d=10mm, Pin=1000 mW, dist=4.0mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.9 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 13.9 W/kg
**SAR(1 g) = 9.45 W/kg; SAR(10 g) = 6.25 W/kg**
Maximum value of SAR (measured) = 10.2 W/kg




0 dB = 10.2 W/kg = 10.09 dBW/kg

**Additional information:**
ambient temperature: 22.1°C; liquid temperature: 21.5°C

Date/Time: 02.01.2014 19:59:35

## SystemPerformanceCheck-D1750 body 2014-01-02

**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; σ = 1.492 S/m; $\varepsilon_r$ = 55.535; ρ = 1000 kg/m$^3$

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(5.04, 5.04, 5.04); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL1750/d=10mm, Pin=1000 mW, dist=4.0mm/Area Scan (51x51x1):

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

Maximum value of SAR (interpolated) = 49.8 W/kg

## MSL1750/d=10mm, Pin=1000 mW, dist=4.0mm/Zoom Scan (7x7x7)/Cube 0:

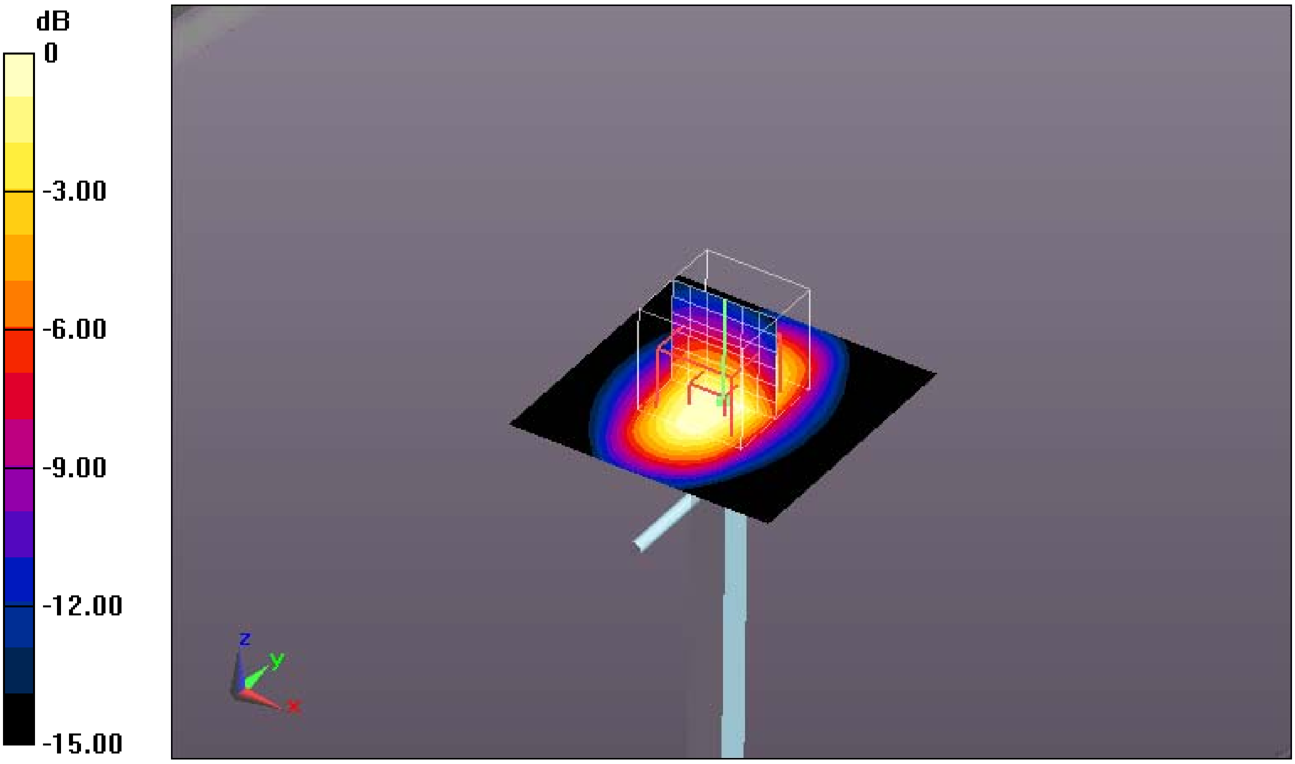
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 168.4 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 63.5 W/kg

**SAR(1 g) = 35.7 W/kg; SAR(10 g) = 19.1 W/kg**

Maximum value of SAR (measured) = 40.0 W/kg




0 dB = 40.0 W/kg = 16.02 dBW/kg

**Additional information:**

ambient temperature: 22.1°C; liquid temperature: 21.5°C

Date/Time: 30.12.2013 11:51:30

## SystemPerformanceCheck-D1900 body 2013-12-30

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

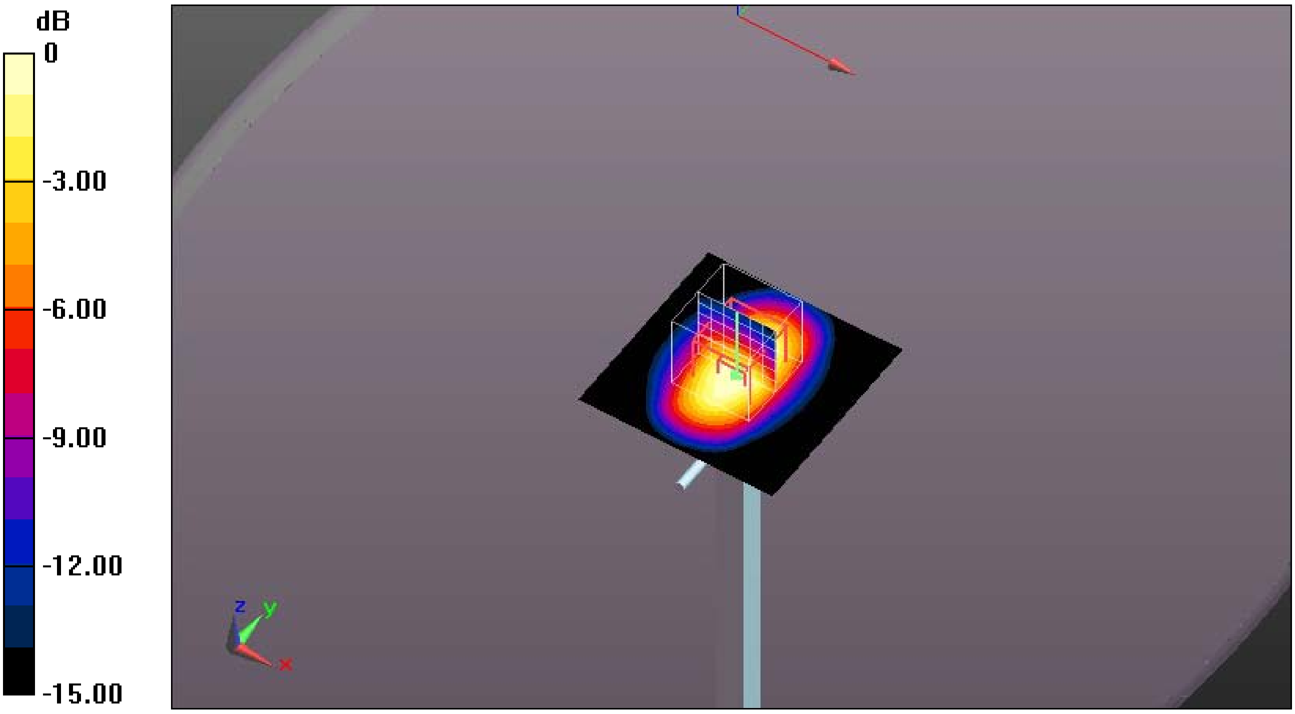
Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.512 S/m; $\varepsilon_r$ = 52.94; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL1900/d=10mm, Pin=1000 mW, dist=4.0mm/Area Scan (51x51x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 53.1 W/kg

## MSL1900/d=10mm, Pin=1000 mW, dist=4.0mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 171.6 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 68.4 W/kg
**SAR(1 g) = 38.1 W/kg; SAR(10 g) = 20 W/kg**
Maximum value of SAR (measured) = 43.1 W/kg




0 dB = 43.1 W/kg = 16.34 dBW/kg

**Additional information:**
ambient temperature: 21.5°C; liquid temperature: 21.0°C

Date/Time: 07.01.2014 12:59:14

## SystemPerformanceCheck-D2450 body 2014-01-07

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

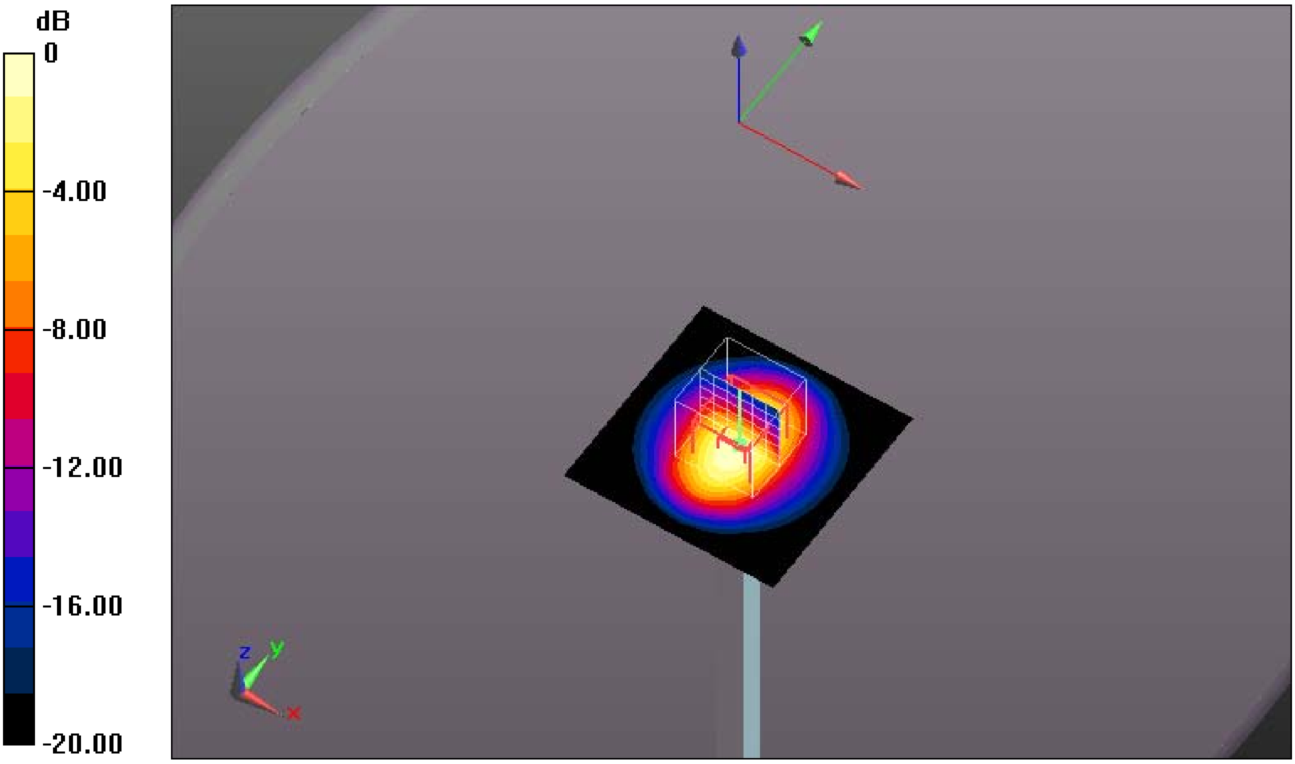
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.96 S/m; $\varepsilon_r$ = 52.083; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.36, 4.36, 4.36); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL2450_2600/d=10mm, Pin=1000 mW, dist=4.0mm/Area Scan (81x81x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 58.7 W/kg

## MSL2450_2600/d=10mm, Pin=1000 mW, dist=4.0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 175.4 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 106 W/kg
**SAR(1 g) = 50.8 W/kg; SAR(10 g) = 23.4 W/kg**
Maximum value of SAR (measured) = 58.4 W/kg




0 dB = 58.4 W/kg = 17.66 dBW/kg

**Additional information:**
ambient temperature: 21.8°C; liquid temperature: 21.1°C

Date/Time: 07.01.2014 11:57:21

## SystemPerformanceCheck-D2600 body 2014-01-07

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1040**

Communication System: UID 0, CW (0); Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2600 MHz; σ = 2.151 S/m; $\varepsilon_r$ = 51.828; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:

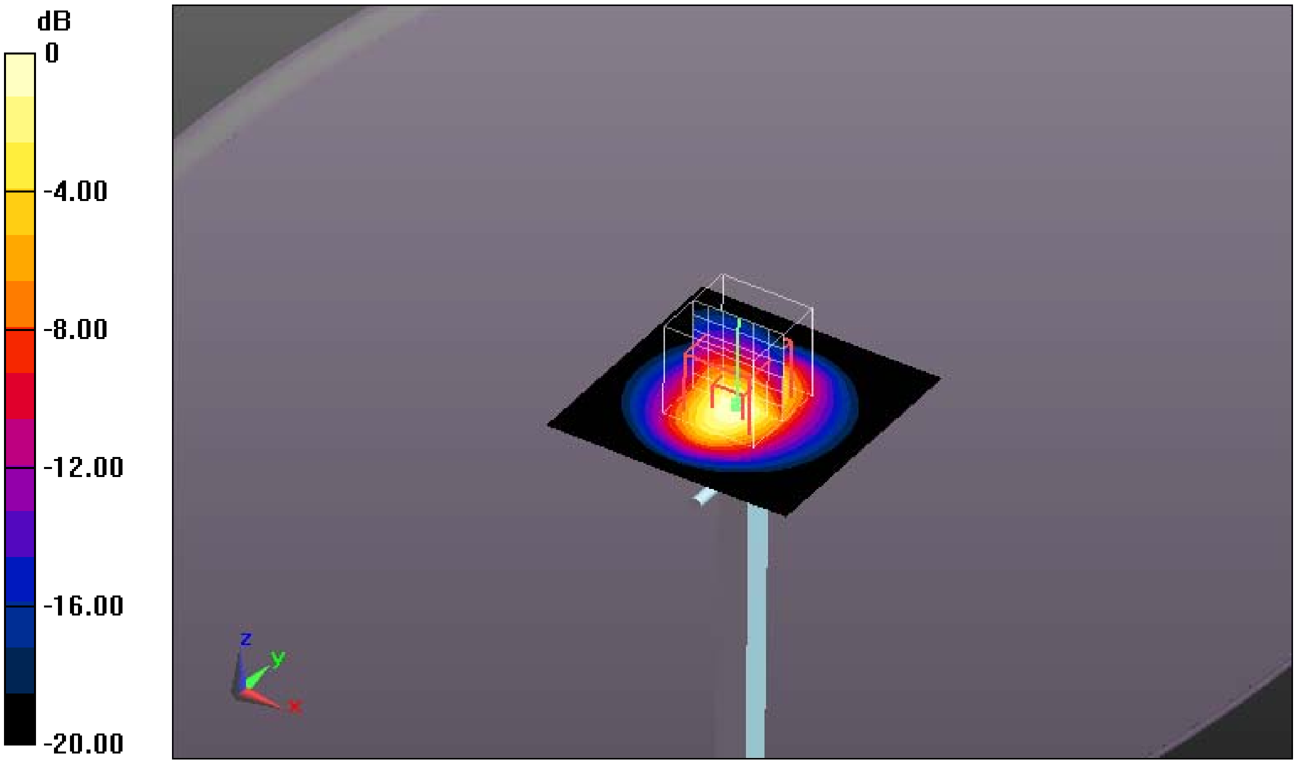
- Probe: EX3DV4 - SN3944; ConvF(7.27, 7.27, 7.27); Calibrated: 02.08.2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL2450_2600/d=10mm, Pin=1000 mW, dist=2.0mm/Area Scan (81x81x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 89.1 W/kg

## MSL2450_2600/d=10mm, Pin=1000 mW, dist=2.0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 204.0 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 123 W/kg
**SAR(1 g) = 56.8 W/kg; SAR(10 g) = 25.2 W/kg**
Maximum value of SAR (measured) = 89.3 W/kg




0 dB = 89.3 W/kg = 19.51 dBW/kg

**Additional information:**
ambient temperature: 22.0°C; liquid temperature: 21.8°C

Date/Time: 09.01.2014 13:25:20

## SystemPerformanceCheck-D5GHz body 2014-01-09

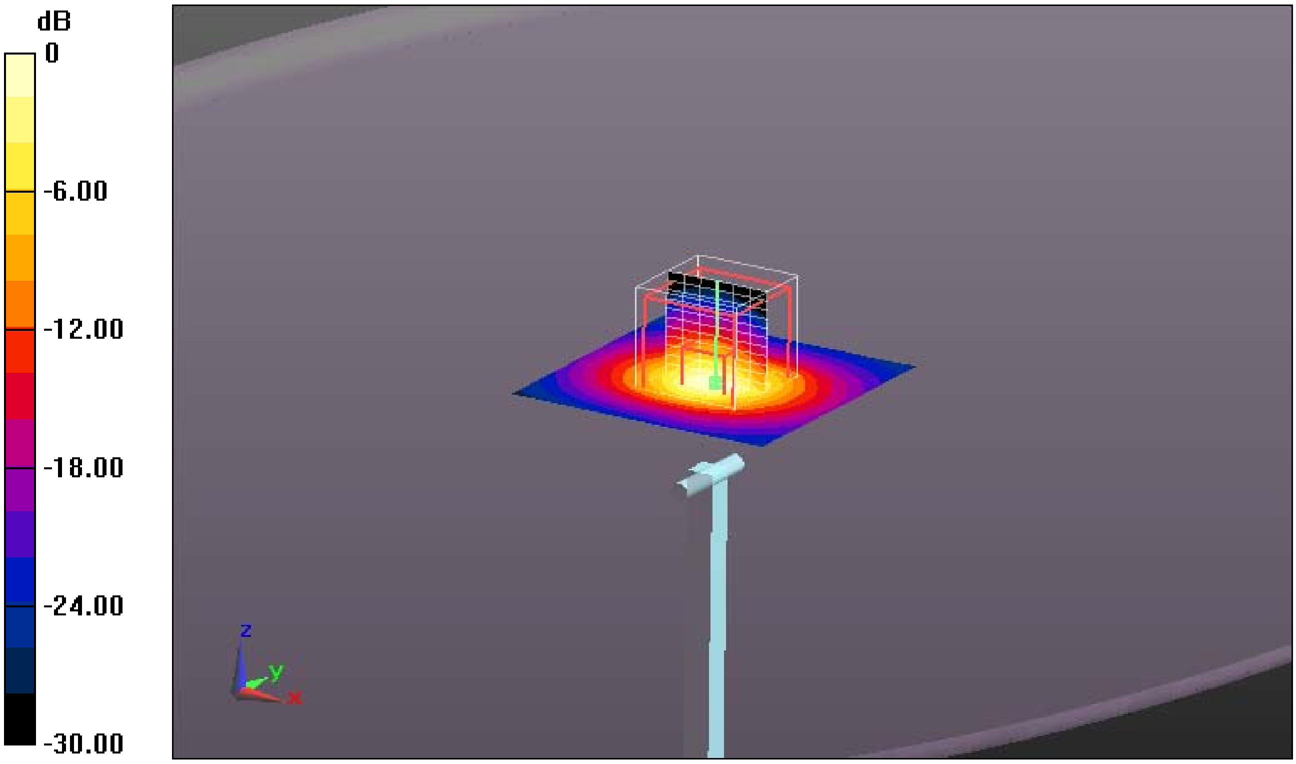
**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1055**
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5200 MHz; $\sigma$ = 5.172 S/m; $\varepsilon_r$ = 48.926; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(4.47, 4.47, 4.47); Calibrated: 02.08.2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE3 Sn408; Calibrated: 30.09.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### MSL 5GHz/d=10mm, Pin=100mW 5.2GHz/Area Scan (61x61x1): Interpolated grid:

dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.8 W/kg

### MSL 5GHz/d=10mm, Pin=100mW 5.2GHz/Zoom Scan (7x7x12)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.794 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 29.4 W/kg
**SAR(1 g) = 7.41 W/kg; SAR(10 g) = 2.09 W/kg**
Maximum value of SAR (measured) = 15.2 W/kg




0 dB = 15.2 W/kg = 11.82 dBW/kg

**Additional information:**
ambient temperature: 22.4°C; liquid temperature: 21.4°C

Date/Time: 09.01.2014 13:49:53

# SystemPerformanceCheck-D5GHz body 2014-01-09

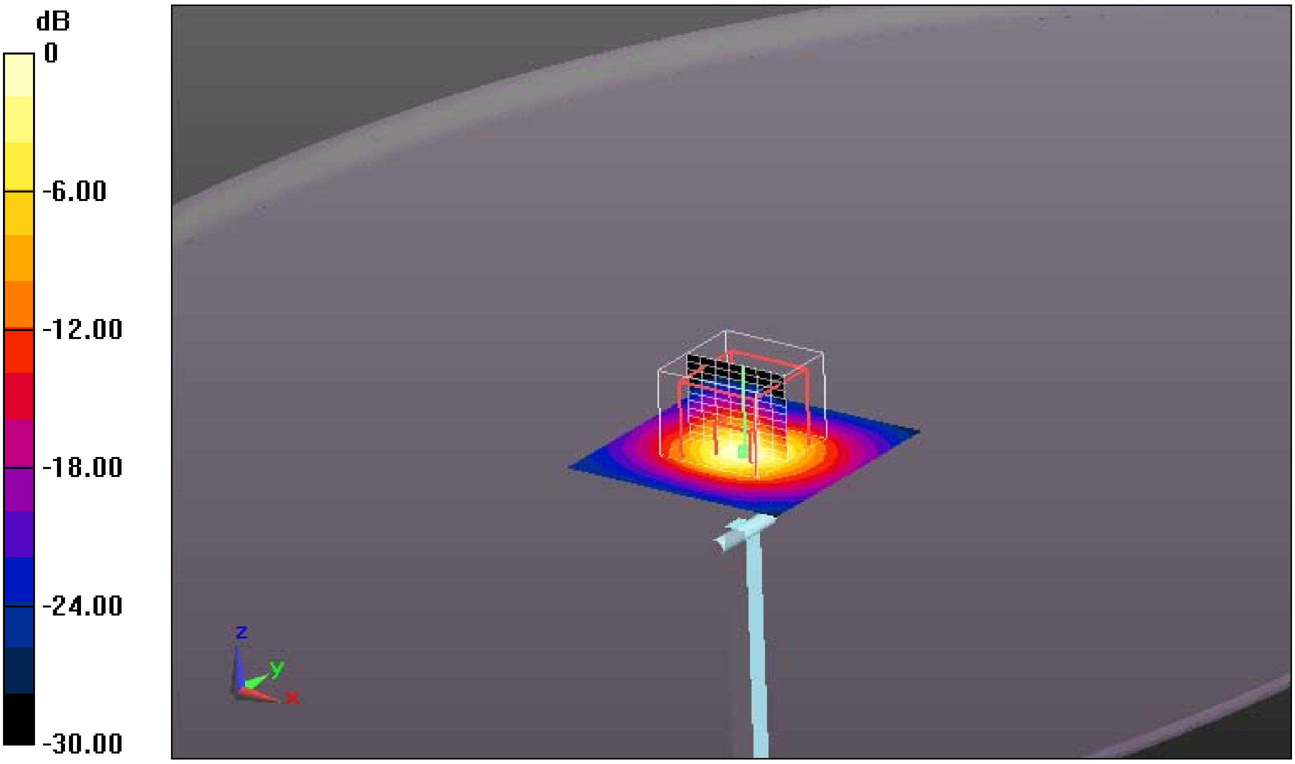
**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1055**
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; $\sigma$ = 5.558 S/m; $\varepsilon_r$ = 48.337; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(4.09, 4.09, 4.09); Calibrated: 02.08.2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE3 Sn408; Calibrated: 30.09.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL 5GHz/d=10mm, Pin=100mW 5.5GHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 17.1 W/kg

## MSL 5GHz/d=10mm, Pin=100mW 5.5GHz/Zoom Scan (8x8x12)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.061 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 32.5 W/kg
**SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.19 W/kg**
Maximum value of SAR (measured) = 16.3 W/kg




0 dB = 16.3 W/kg = 12.12 dBW/kg

**Additional information:**
ambient temperature: 22.4°C; liquid temperature: 21.4°C

Date/Time: 09.01.2014 14:16:15

# SystemPerformanceCheck-D5GHz body 2014-01-09

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1055**

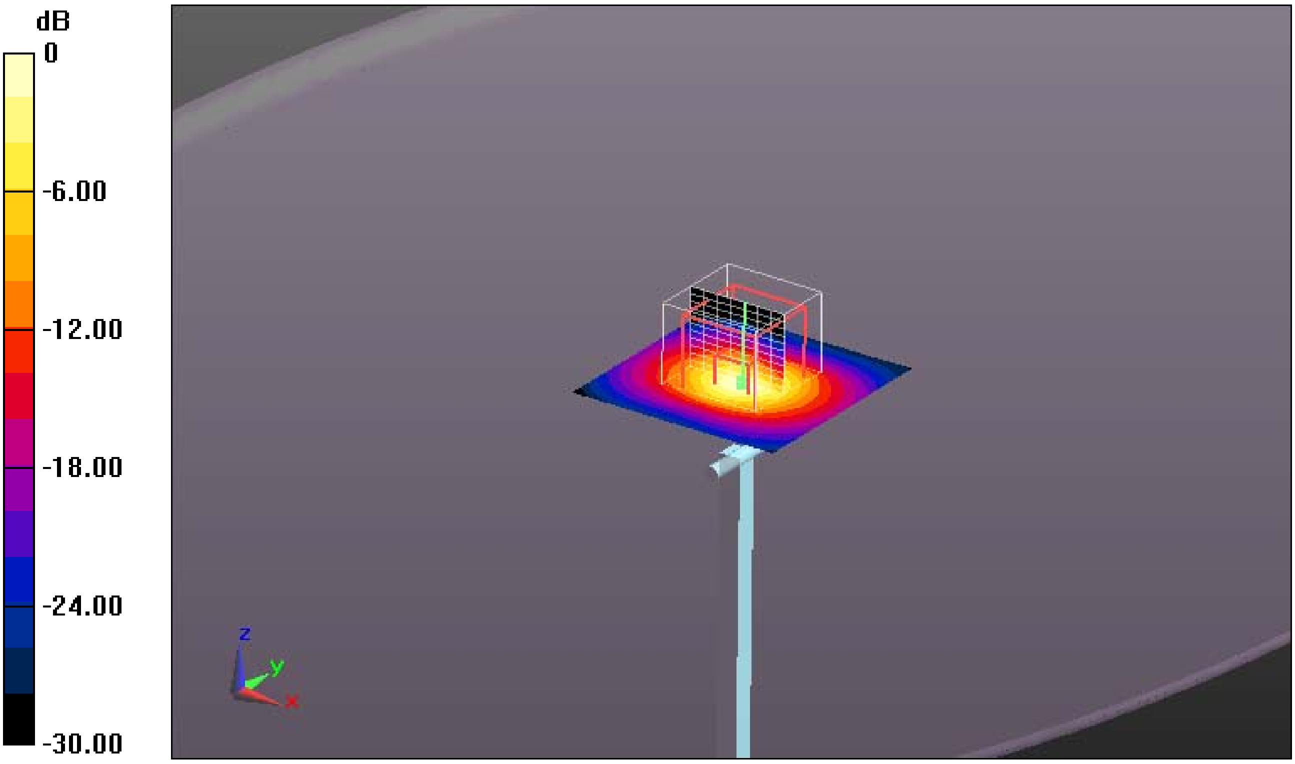
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5800 MHz; $\sigma$ = 5.952 S/m; $\varepsilon_r$ = 47.705; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(4.2, 4.2, 4.2); Calibrated: 02.08.2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE3 Sn408; Calibrated: 30.09.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL 5GHz/d=10mm, Pin=100mW 5.8GHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

## MSL 5GHz/d=10mm, Pin=100mW 5.8GHz/Zoom Scan (8x8x12)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 54.493 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 30.5 W/kg
**SAR(1 g) = 6.92 W/kg; SAR(10 g) = 1.92 W/kg**
Maximum value of SAR (measured) = 15.0 W/kg




0 dB = 15.0 W/kg = 11.76 dBW/kg

**Additional information:**
ambient temperature: 22.4°C; liquid temperature: 21.4°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

## Annex B.1: GSM850

Date/Time: 04.01.2014 16:08:09

### FCC_EN62209-2 GSM850 body

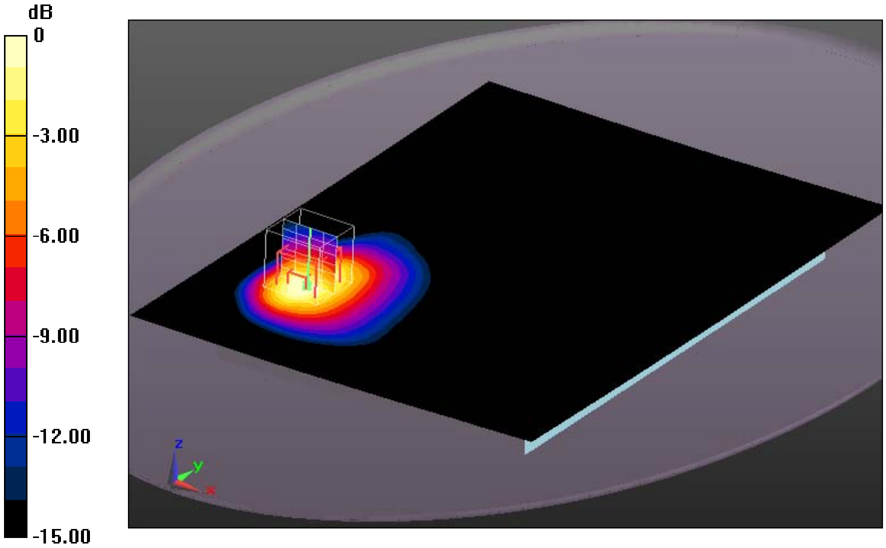
**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QKB**
Communication System: UID 0, GSM/GPRS 1TS (0); Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 824.2 MHz; Communication System PAR: 9.191 dB; PMF: 2.88104
Medium parameters used (interpolated): f = 824.2 MHz; $\sigma$ = 0.985 S/m; $\varepsilon_r$ = 54.922; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(6.29, 6.29, 6.29); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

### MSL835 - 0mm - power backoff/Rear Position - Low/Area Scan (151x211x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.06 W/kg

### MSL835 - 0mm - power backoff/Rear Position - Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 30.295 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.86 W/kg
**SAR(1 g) = 0.938 W/kg; SAR(10 g) = 0.517 W/kg**
Maximum value of SAR (measured) = 0.977 W/kg




0 dB = 0.977 W/kg = -0.10 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0 mm
ambient temperature: 22.1°C; liquid temperature: 21.5°C

## Annex B.2: GSM1900

Date/Time: 30.12.2013 12:28:49

# FCC_EN62209-2-GSM1900 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QKB**

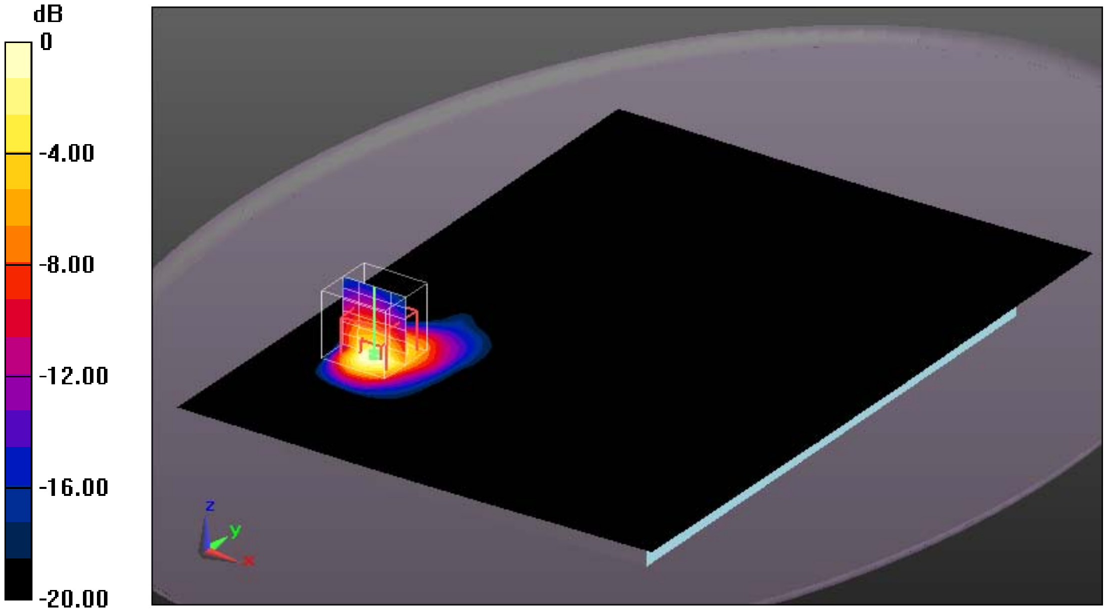
Communication System: UID 0, GSM/GPRS 2TS (0); Communication System Band: GSM 1900; Frequency: 1880 MHz; Communication System PAR: 6.021 dB; PMF: 2.00009
Medium parameters used: f = 1880 MHz; σ = 1.498 S/m; $\varepsilon_r$ = 52.963; ρ = 1000 kg/$m^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL1900 power backoff - 2TS - 0mm/Rear Position - Middle/Area Scan (151x211x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.825 W/kg

## MSL1900 power backoff - 2TS - 0mm/Rear Position - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 14.938 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.18 W/kg
**SAR(1 g) = 0.562 W/kg; SAR(10 g) = 0.248 W/kg**
Maximum value of SAR (measured) = 0.669 W/kg




0 dB = 0.669 W/kg = -1.75 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0 mm
ambient temperature: 21.5°C; liquid temperature: 21.1°C

## Annex B.3: UMTS FDD II

Date/Time: 30.12.2013 16:30:48

# FCC_EN62209-2-UMTS FDD II body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QJ4**

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; σ = 1.465 S/m; $\varepsilon_r$ = 52.955; ρ = 1000 kg/$m^3$

Phantom section: Flat Section

Measurement Standard: DASY5

DASY5 Configuration:

- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL1900 default power/Rear Position - Low 16mm/Area Scan (151x211x1):

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

Maximum value of SAR (interpolated) = 0.940 W/kg

## MSL1900 default power/Rear Position - Low 16mm/Zoom Scan (5x5x7)/Cube 0:

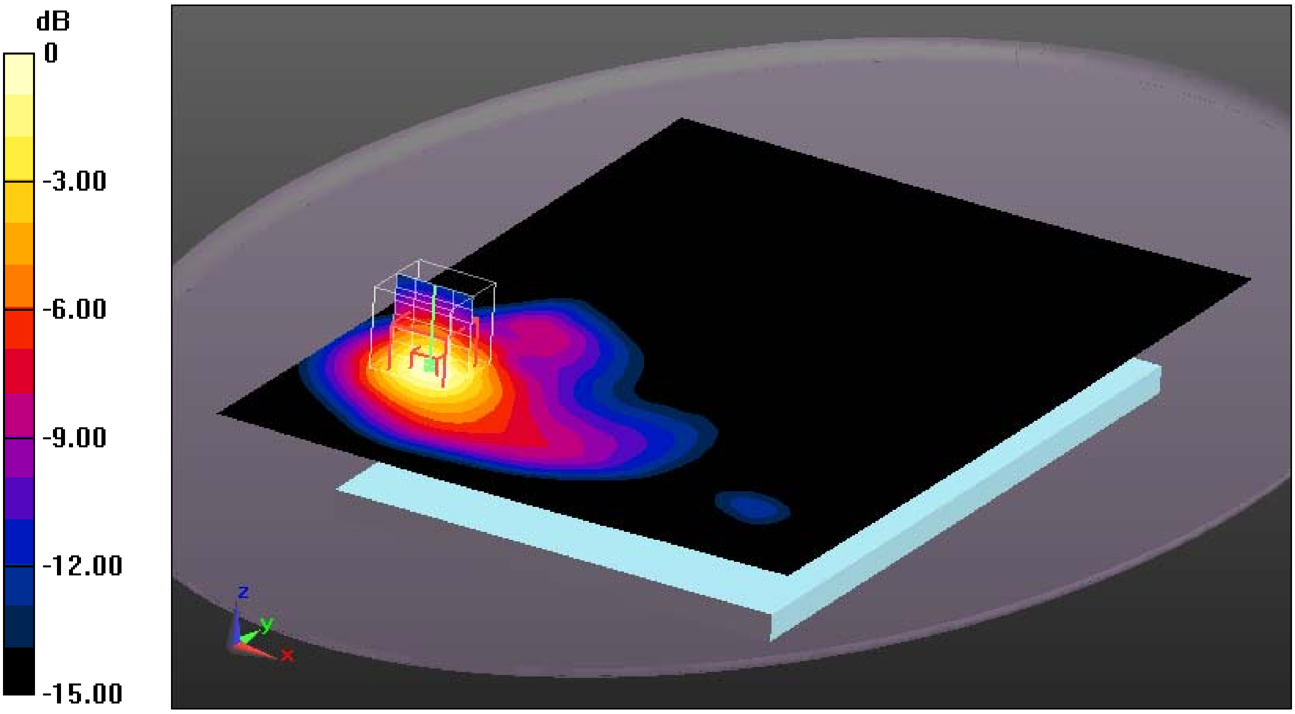
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 23.920 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.42 W/kg

**SAR(1 g) = 0.868 W/kg; SAR(10 g) = 0.506 W/kg**

Maximum value of SAR (measured) = 0.957 W/kg




0 dB = 0.957 W/kg = -0.19 dBW/kg

**Additional information:**

position or distance of DUT to SAM: 16 mm

ambient temperature: 21.5°C; liquid temperature: 21.1°C

Date/Time: 30.12.2013 16:03:43

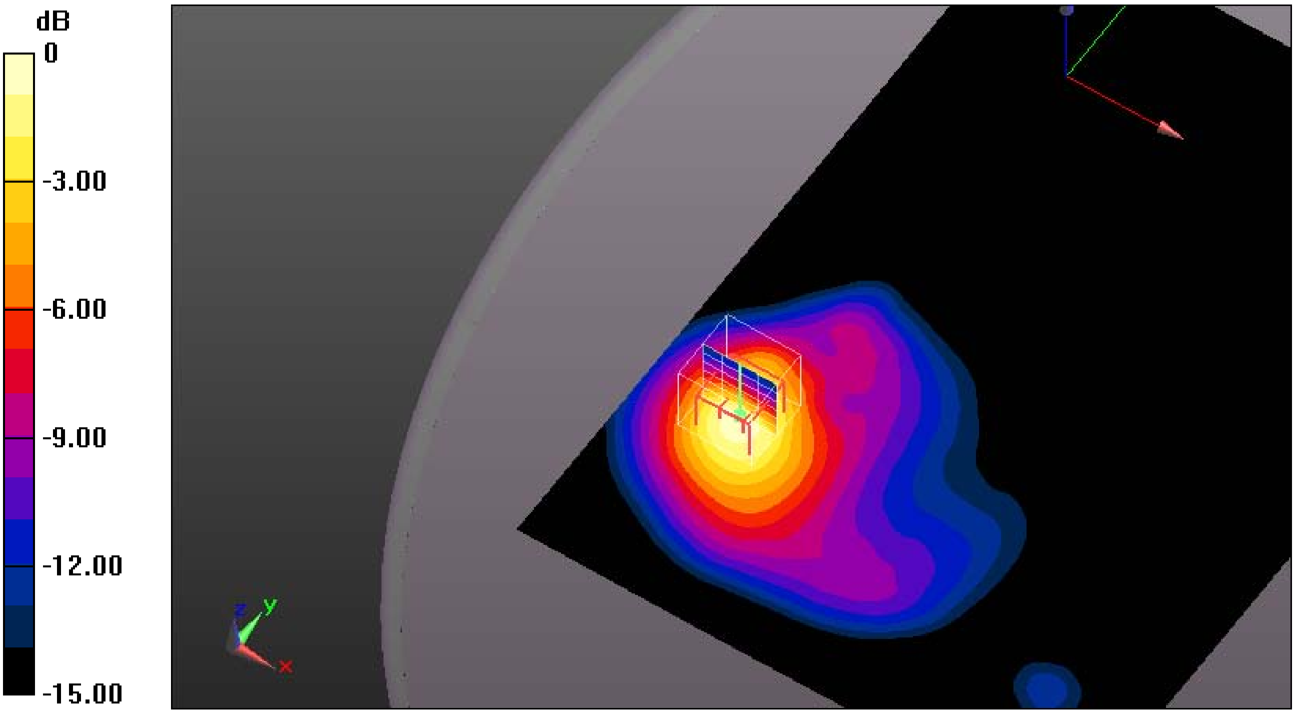
## FCC_EN62209-2-UMTS FDD II body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QJ4**

Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD II; Frequency: 1880 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1880 MHz; σ = 1.498 S/m; $\varepsilon_r$ = 52.963; ρ = 1000 kg/$m^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL1900 default power/Rear Position - Middle 16mm/Area Scan (151x211x1): 
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.913 W/kg

## MSL1900 default power/Rear Position - Middle 16mm/Zoom Scan (5x5x7)/Cube 0: 
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.633 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.41 W/kg
**SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.490 W/kg**
Maximum value of SAR (measured) = 0.949 W/kg




0 dB = 0.949 W/kg = -0.23 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 16 mm
ambient temperature: 21.5°C; liquid temperature: 21.1°C

## Annex B.4: UMTS FDD IV

Date/Time: 02.01.2014 23:19:54

# FCC_EN62209-2-UMTS FDD IV body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QJ4**

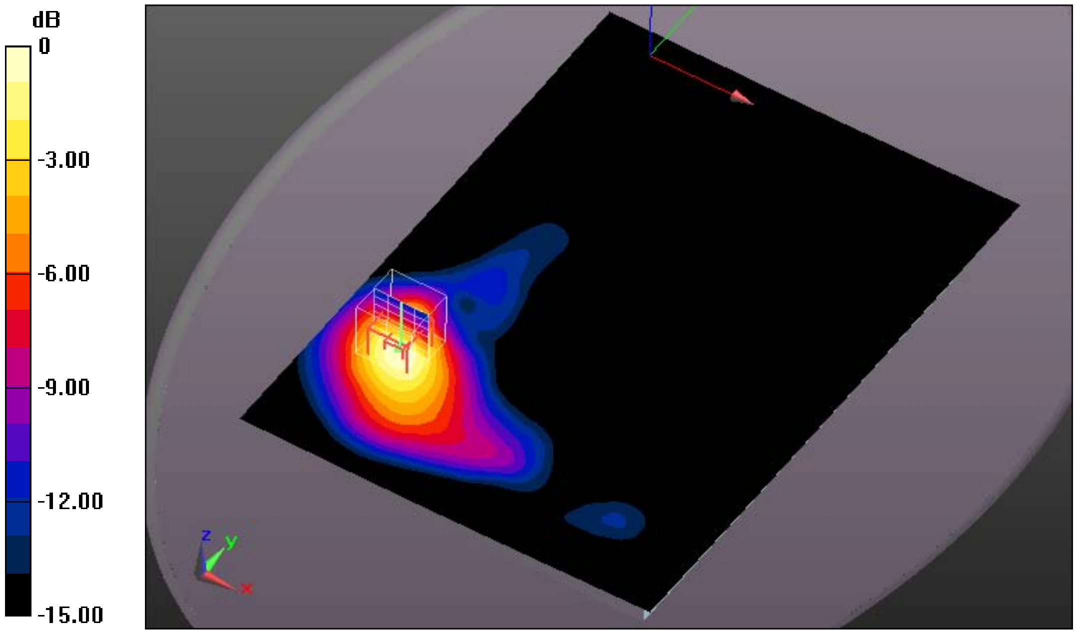
Communication System: UID 0, UMTS FDD (0); Communication System Band: UMTS FDD IV; Frequency: 1752.6 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1753 MHz; $\sigma$ = 1.497 S/m; $\varepsilon_r$ = 55.525; $\rho$ = 1000 $kg/m^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(5.04, 5.04, 5.04); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL1750 - default power/Rear Position - High - 16mm/Area Scan (151x211x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.905 W/kg

## MSL1750 - default power/Rear Position - High - 16mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 22.837 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.32 W/kg
**SAR(1 g) = 0.811 W/kg; SAR(10 g) = 0.478 W/kg**
Maximum value of SAR (measured) = 0.895 W/kg




0 dB = 0.895 W/kg = -0.48 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 16 mm
ambient temperature: 22.0°C; liquid temperature: 21.5°C

## Annex B.5: UMTS FDD V

Date/Time: 03.01.2014 19:06:28

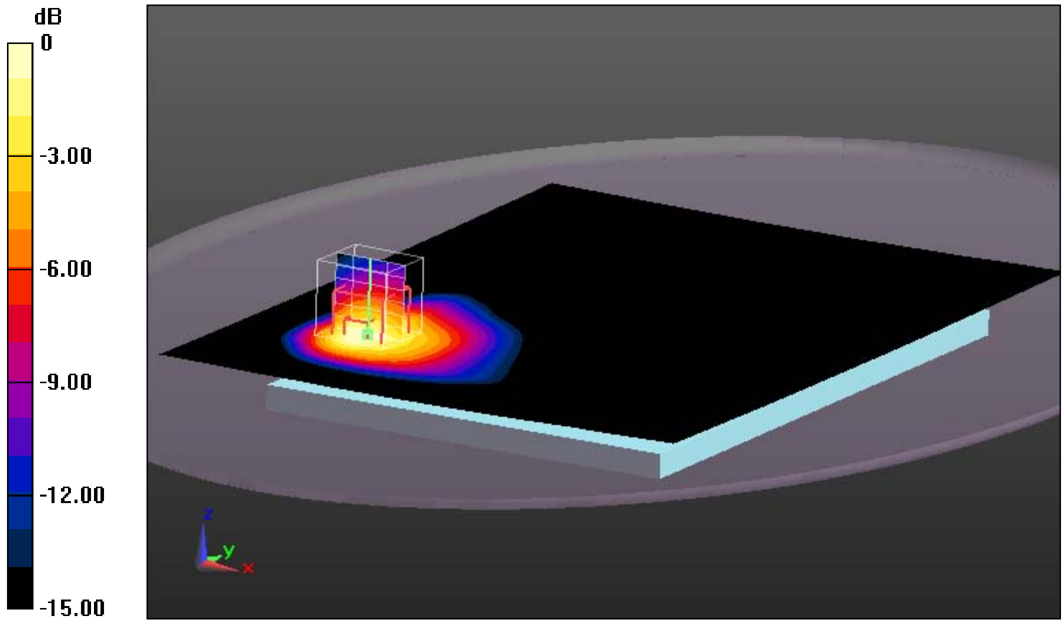
# FCC_EN62209-2-UMTS FDD V body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QKM**

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; σ = 0.987 S/m; $\varepsilon_r$ = 54.903; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(6.29, 6.29, 6.29); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL835 - 10MHz BW -power backoff/Rear Position - Low/Area Scan (151x211x1): 
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.642 W/kg

## MSL835 - 10MHz BW -power backoff/Rear Position - Low/Zoom Scan (5x5x7)/Cube 0: 
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 24.390 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.11 W/kg
**SAR(1 g) = 0.560 W/kg; SAR(10 g) = 0.315 W/kg**
Maximum value of SAR (measured) = 0.586 W/kg




0 dB = 0.586 W/kg = -2.32 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0 mm
ambient temperature: 22.1°C; liquid temperature: 21.5°C

## Annex B.6: LTE FDD 2

Date/Time: 31.12.2013 10:38:14

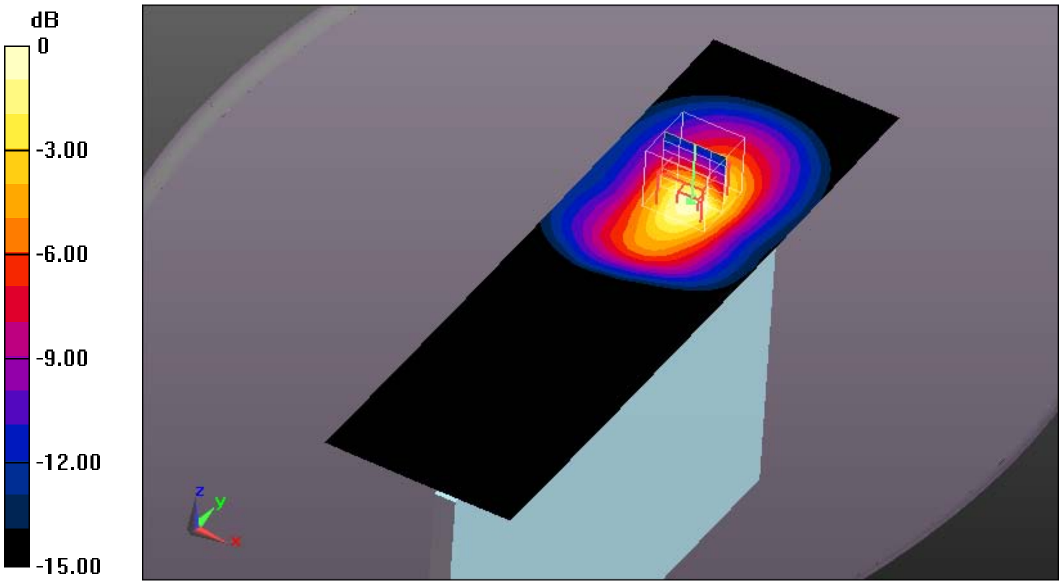
# FCC_EN62209-2-LTE FDD 2 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QLS**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 2 (1900MHz); Frequency: 1900 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.512 S/m; $\varepsilon_r$ = 52.94; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.78, 4.78, 4.78); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL1900 - QPSK - 20MHz BW - 1RB - default power 2/Top Side Position - High - 15mm - 99RB offset/Area Scan (61x211x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.614 W/kg

**MSL1900 - QPSK - 20MHz BW - 1RB - default power 2/Top Side Position - High - 15mm - 99RB offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.873 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.959 W/kg
**SAR(1 g) = 0.581 W/kg; SAR(10 g) = 0.331 W/kg**
Maximum value of SAR (measured) = 0.644 W/kg




0 dB = 0.644 W/kg = -1.91 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 15 mm
ambient temperature: 21.8°C; liquid temperature: 21.2°C

## Annex B.7: LTE FDD 4

Date/Time: 02.01.2014 10:22:29

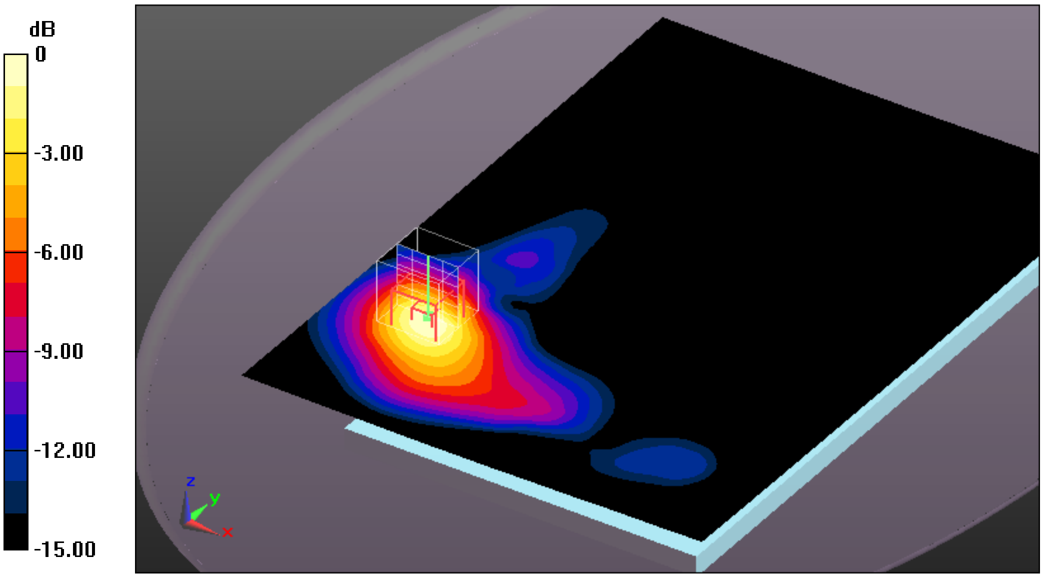
# FCC_EN62209-2-LTE FDD 4 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QLS**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 4 (1700MHz); Frequency: 1732.5 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.472 S/m; $\varepsilon_r$ = 55.548; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(5.04, 5.04, 5.04); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL1750 - QPSK - 20MHz BW - 1RB -default power/Rear Position - Mid - 16mm - 99RB offset/Area Scan (151x211x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.601 W/kg

**MSL1750 - QPSK - 20MHz BW - 1RB -default power/Rear Position - Mid - 16mm - 99RB offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.232 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.909 W/kg
**SAR(1 g) = 0.559 W/kg; SAR(10 g) = 0.330 W/kg**
Maximum value of SAR (measured) = 0.614 W/kg




0 dB = 0.614 W/kg = -2.12 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 16 mm
ambient temperature: 22.0°C; liquid temperature: 21.5°C

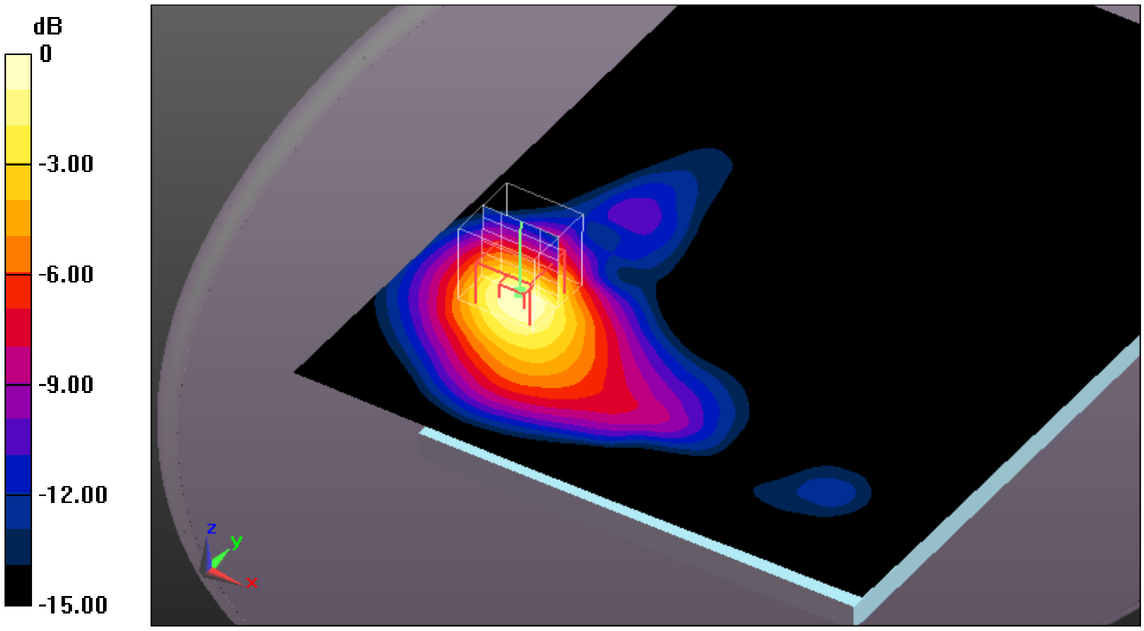
Date/Time: 02.01.2014 10:42:47

## FCC_EN62209-2-LTE FDD 4 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QLS**
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; $\sigma$ = 1.487 S/m; $\varepsilon_r$ = 55.54; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(5.04, 5.04, 5.04); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL1750 - QPSK - 20MHz BW - 1RB -default power/Rear Position - High - 16mm - 99RB offset/Area Scan (151x211x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.601 W/kg

**MSL1750 - QPSK - 20MHz BW - 1RB -default power/Rear Position - High - 16mm - 99RB offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.200 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.910 W/kg
**SAR(1 g) = 0.559 W/kg; SAR(10 g) = 0.330 W/kg**
Maximum value of SAR (measured) = 0.612 W/kg




0 dB = 0.612 W/kg = -2.13 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 16 mm
ambient temperature: 22.0°C; liquid temperature: 21.5°C

## Annex B.8: LTE FDD 5

Date/Time: 03.01.2014 15:27:41

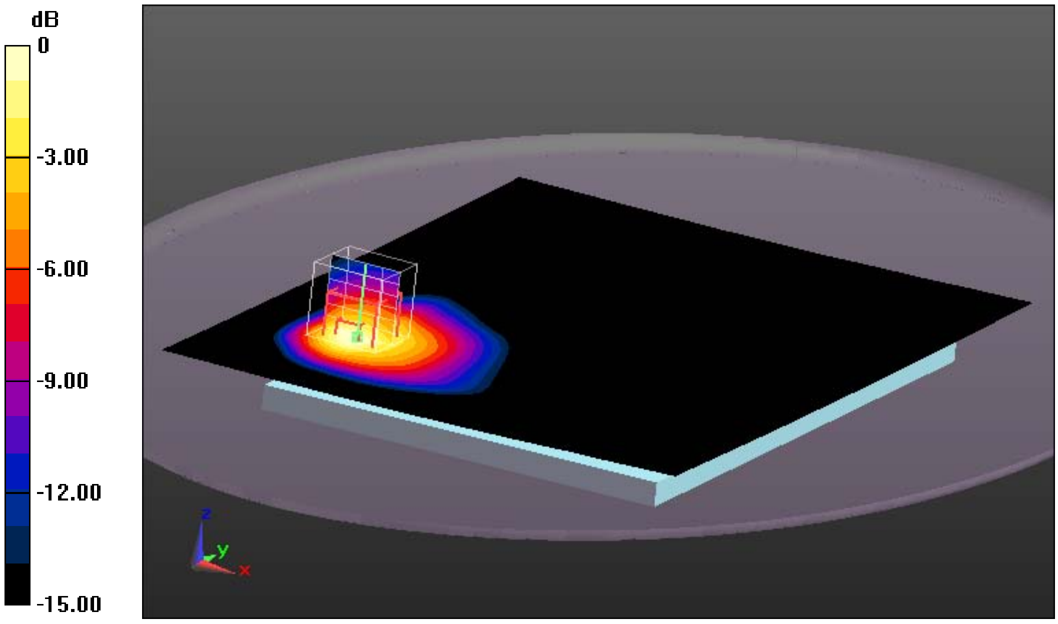
# FCC_EN62209-2-LTE FDD 5 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QKT**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 5 (850MHz); Frequency: 836.5 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.996 S/m; $\varepsilon_r$ = 54.819; ρ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(6.29, 6.29, 6.29); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL835 - QPSK - 10MHz BW - 25RB -Power backoff -0 mm/Rear Position - Mid - 0mm - 0RB offset/Area Scan (151x211x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.497 W/kg

**MSL835 - QPSK - 10MHz BW - 25RB -Power backoff - 0 mm/Rear Position - Mid - 0RB offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 21.526 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.875 W/kg
**SAR(1 g) = 0.442 W/kg; SAR(10 g) = 0.245 W/kg**
Maximum value of SAR (measured) = 0.470 W/kg




0 dB = 0.470 W/kg = -3.28 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0 mm
ambient temperature: 22.1°C; liquid temperature: 21.5°C

Date/Time: 03.01.2014 15:48:48

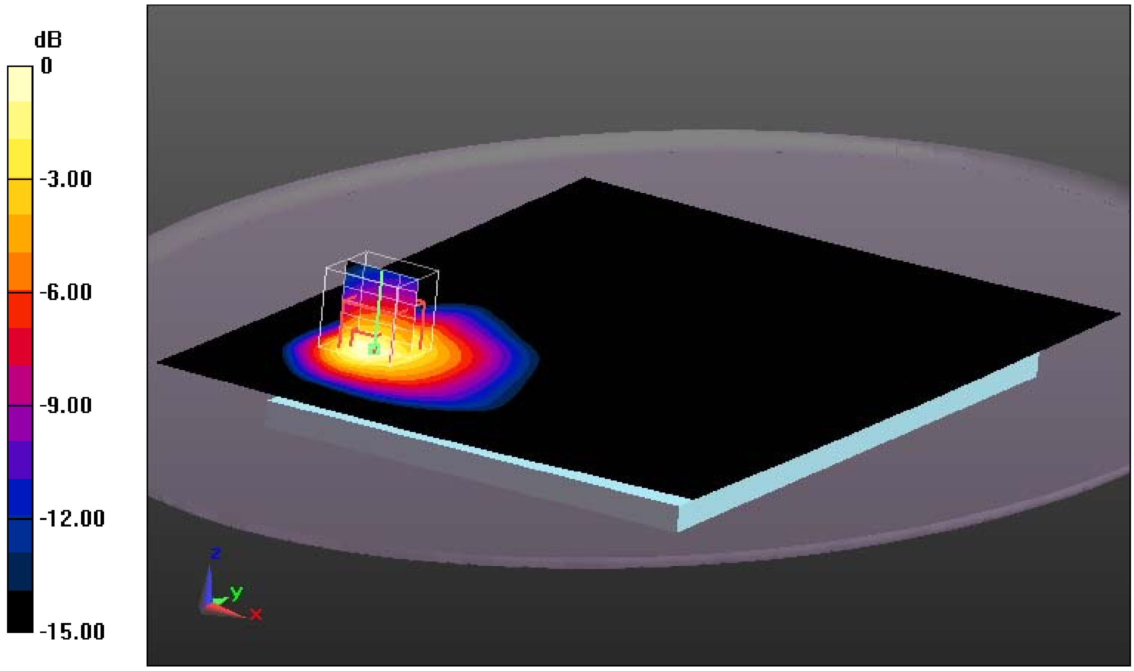
## FCC_EN62209-2-LTE FDD 5 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QKT**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 5 (850MHz); Frequency: 844 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 844 MHz; $\sigma$ = 1.003 S/m; $\varepsilon_r$ = 54.729; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(6.29, 6.29, 6.29); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL835 - QPSK - 10MHz BW - 25RB -Power backoff -0 mm/Rear Position - High - 0mm - 0RB offset/Area Scan (151x211x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.503 W/kg

**MSL835 - QPSK - 10MHz BW - 25RB -Power backoff -0 mm/Rear Position - High - 0mm - 0RB offset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 21.577 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.888 W/kg
**SAR(1 g) = 0.449 W/kg; SAR(10 g) = 0.251 W/kg**
Maximum value of SAR (measured) = 0.477 W/kg




0 dB = 0.477 W/kg = -3.21 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0 mm
ambient temperature: 22.1°C; liquid temperature: 21.5°C

## Annex B.9: LTE FDD 7

Date/Time: 07.01.2014 10:32:36

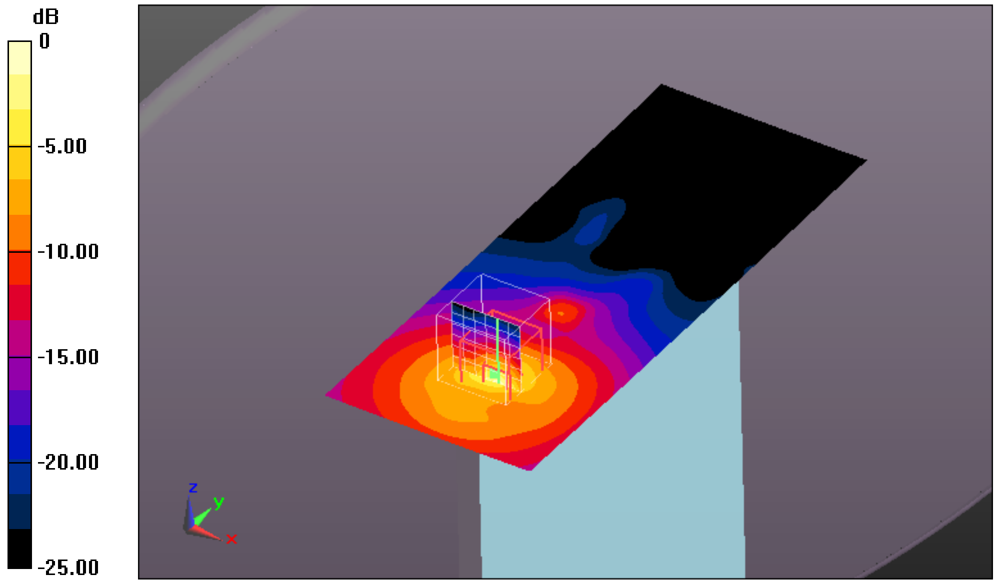
# FCC_EN62209-2 LTE FDD 7 body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QLS**

Communication System: UID 0, LTE FDD (0); Communication System Band: LTE 7 (2600MHz); Frequency: 2560 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2560 MHz; $\sigma$ = 2.101 S/m; $\varepsilon_r$ = 51.883; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(7.27, 7.27, 7.27); Calibrated: 02.08.2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL2450_2600- QPSK - 1 RB - 20MHz BW - default power/Right Side Position - High - 0mm - 50RB offset/Area Scan (61x151x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.886 W/kg

**MSL2450_2600- QPSK - 1 RB - 20MHz BW - default power/Right Side Position - High - 0mm - 50RB offset/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.044 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.16 W/kg
**SAR(1 g) = 0.788 W/kg; SAR(10 g) = 0.283 W/kg**
Maximum value of SAR (measured) = 1.43 W/kg




0 dB = 1.43 W/kg = 1.55 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0mm
ambient temperature: 22.0°C; liquid temperature: 21.8°C

## Annex B.10: WLAN 2450MHz

Date/Time: 07.01.2014 22:26:15

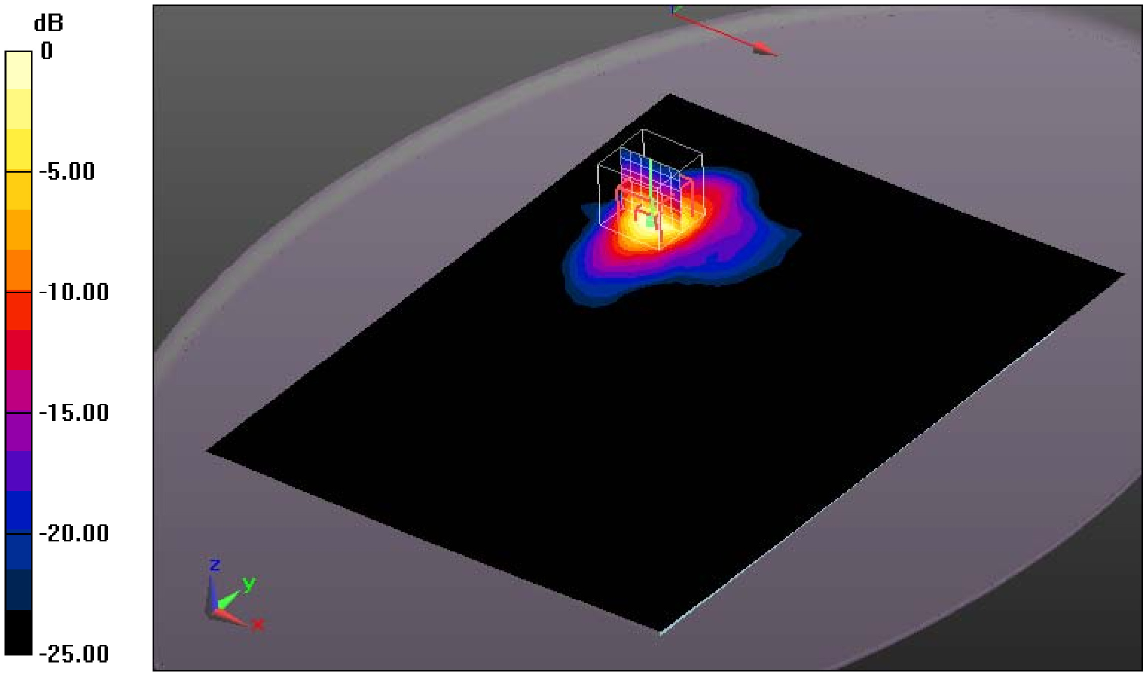
# FCC_EN62209-2 WLAN 2450 body

**DUT: Sony; Type: TM-0040-BV; Serial: CB51267QJZ**

Communication System: UID 0, WLAN 2450 (0); Communication System Band: 2.4 GHz; Frequency: 2462 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2462 MHz; $\sigma$ = 1.979 S/m; $\varepsilon_r$ = 52.071; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: ES3DV3 - SN3320; ConvF(4.36, 4.36, 4.36); Calibrated: 04.06.2013;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), z = 2.0, 32.0
- Electronics: DAE3 Sn413; Calibrated: 11.01.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**MSL2450/Rear Position - High - 0mm/Area Scan (231x311x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.654 W/kg

**MSL2450/Rear Position - High - 0mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.649 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.83 W/kg
**SAR(1 g) = 0.537 W/kg; SAR(10 g) = 0.191 W/kg**
Maximum value of SAR (measured) = 0.628 W/kg




0 dB = 0.628 W/kg = -2.02 dBW/kg

**Additional information:**
position or distance of DUT to SAM : 0 mm
ambient temperature: 21.0 °C; liquid temperature: 20.4 °C

## Annex B.11: WLAN 5GHz

Date/Time: 09.01.2014 23:31:07

# FCC_EN62209-2-WLAN5GHz-body

**DUT: Sony; Type: TM-0043-BV; Serial: CB51267QJZ**

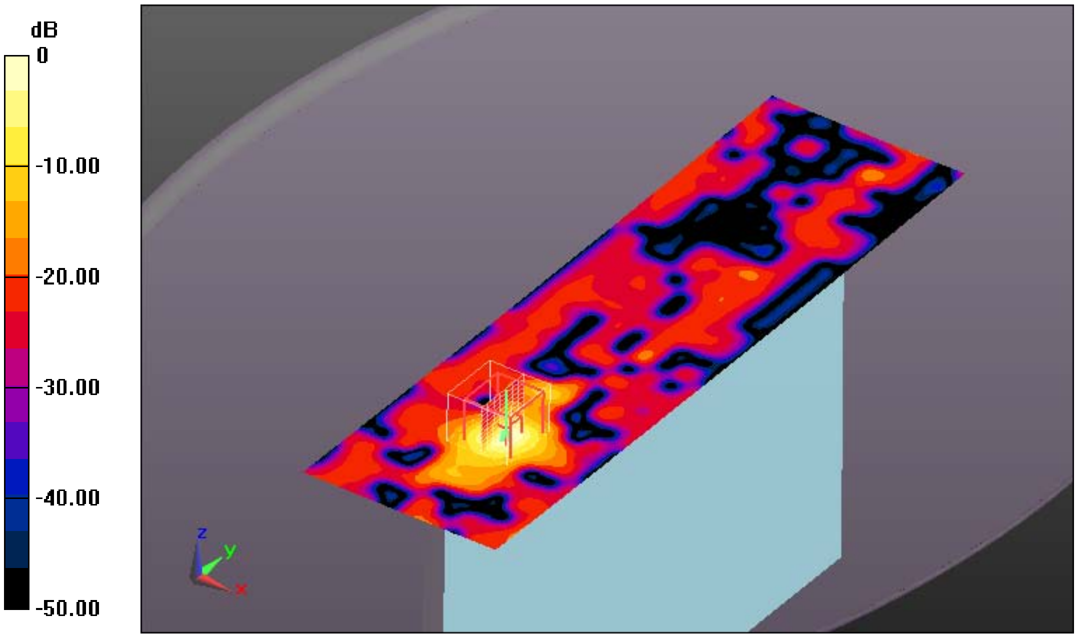
Communication System: UID 0, WLAN 5GHz (0); Communication System Band: 5 GHz Band; Frequency: 5520 MHz; Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5520 MHz; $\sigma$ = 5.579 S/m; $\varepsilon_r$ = 48.23; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5
DASY5 Configuration:
- Probe: EX3DV4 - SN3944; ConvF(4.09, 4.09, 4.09); Calibrated: 02.08.2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE3 Sn408; Calibrated: 30.09.2013
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1046
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## MSL5GHz/Top Side Position - Ch104/Area Scan (91x311x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

## MSL5GHz/Top Side Position - Ch104/Zoom Scan (8x8x12)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 14.129 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 3.20 W/kg
**SAR(1 g) = 0.668 W/kg; SAR(10 g) = 0.159 W/kg**
Maximum value of SAR (measured) = 1.50 W/kg




0 dB = 1.50 W/kg = 1.76 dBW/kg

**Additional information:**
position or distance of DUT to SAM: 0mm
ambient temperature: 22.4°C; liquid temperature: 21.4°C

## Annex B.12: Liquid depth

Photo 1: Liquid depth 850 MHz body simulating liquid

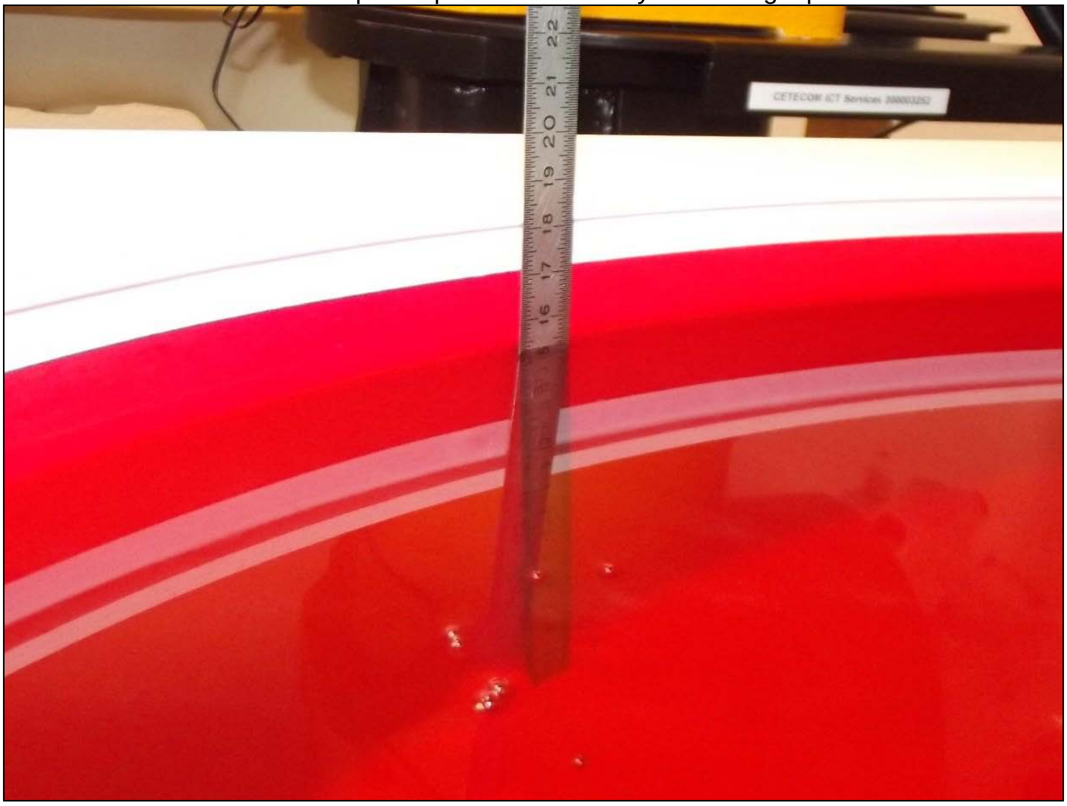


Photo 2: Liquid depth 1750 MHz body simulating liquid

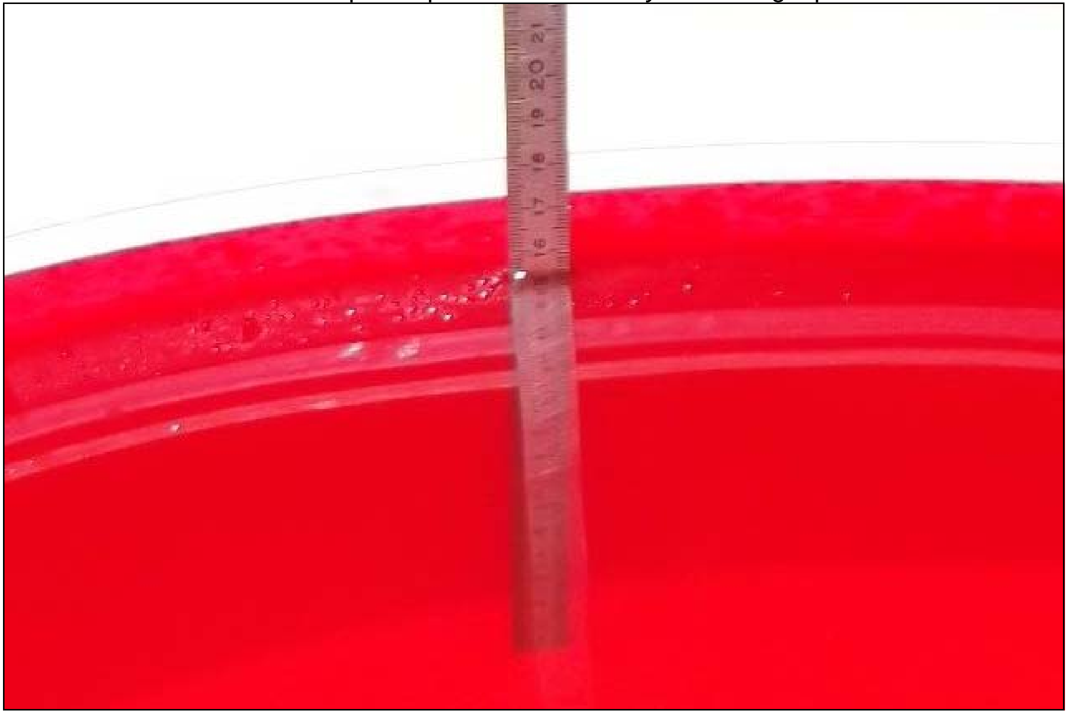


Photo 3: Liquid depth 1900 MHz body simulating liquid

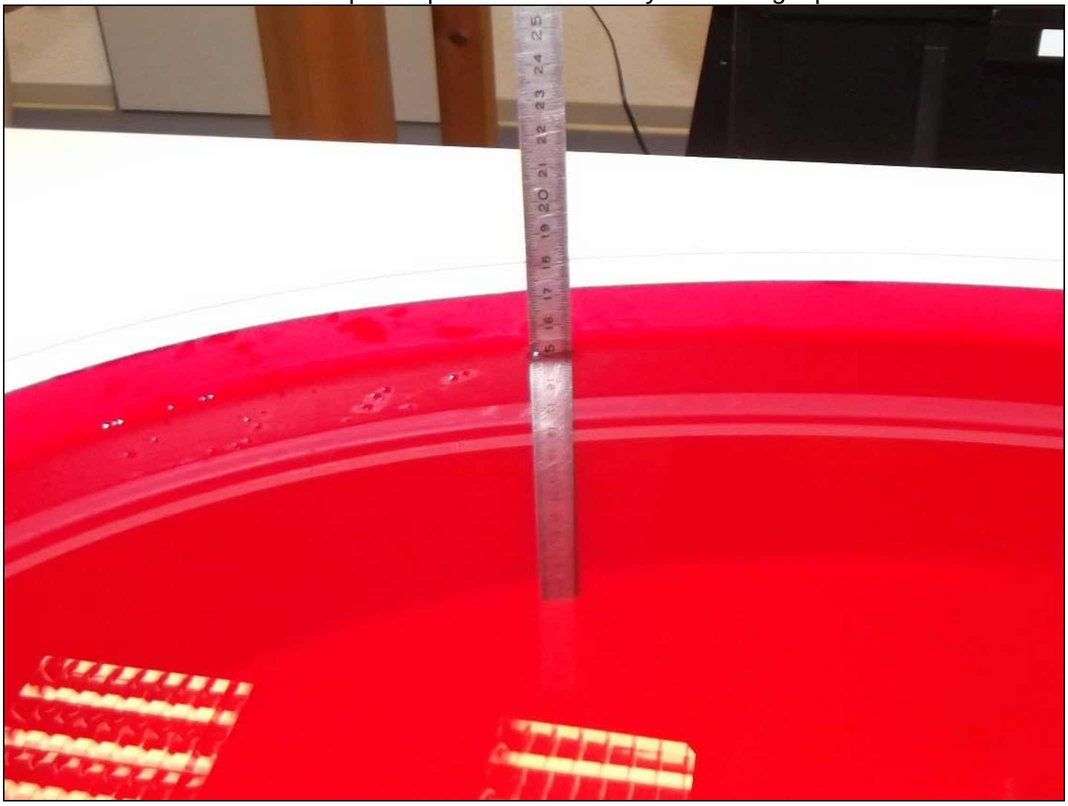


Photo 4: Liquid depth 2450 MHz body simulating liquid

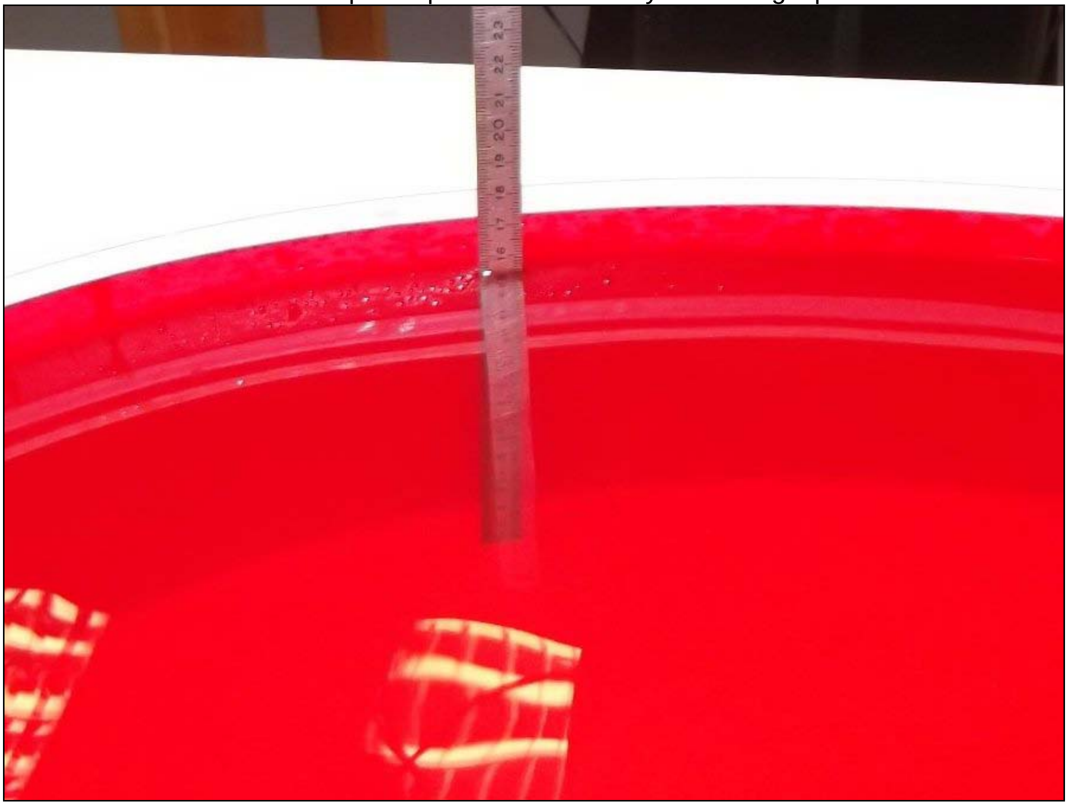
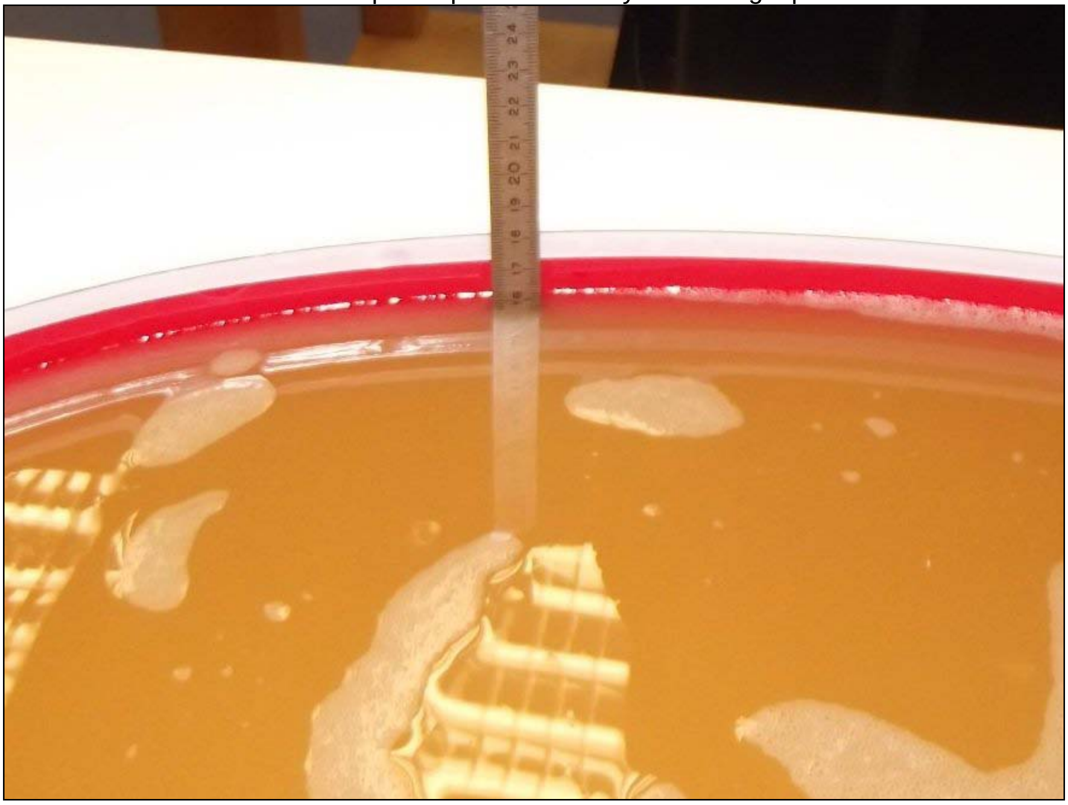


Photo 5: Liquid depth 5 GHz body simulating liquid



## Annex C: Photo documentation

Photo documentation is described in the additional document:

### Appendix to test report no. 1-6965/13-06-02 Photo documentation

## Annex D: Calibration parameters

Calibration parameters are described in the additional document:

### Appendix to test report no. 1-6965/13-06-02
### Calibration data, Phantom certificate
### and detail information of the DASY5 System

## Annex E: Proximity sensor data

According to KDB 616217 D04 SAR for laptop and tablets v01r01 the functionality of the sensors has to be approved for different aspects:

- Triggering distances
- Sensor coverage of the relevant area
- Sensor functionality in tilted positions
- Safety mechanisms in case of sensor Malfunction
- Material dependency of the triggering distances

are described in the additional document:

### Appendix to test report no. 1-6965/13-06-02
### Proximity sensor data

## Annex F: Document History

| Version | Applied Changes | Date of Release |
|---|---|---|
| | Initial Release | 2014-01-21 |
| | | |

## 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 |
| PCE | - | Personal Consumption Expenditure |
| OET | - | Office of Engineering and Technology |
| RB | - | resource block(s) |
| SAR | - | Specific Absorption Rate |
| S/N | - | Serial Number |
| $SPLSR_i$ | - | SAR-to-(peak-locations spacing) ratio |
| SW | - | Software |
| UNII | - | Unlicensed National Information Infrastructure |