



TESTING CERT #3478.01



# TEST REPORT

|                           |                                                                                                                                                                                                                                                                                                                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Description           | <b>Mobile Phone</b>                                                                                                                                                                                                                                                                                                            |
| Brand Name                | <b>Unimax Communications</b>                                                                                                                                                                                                                                                                                                   |
| Model Name                | <b>U307TG / MXG308</b>                                                                                                                                                                                                                                                                                                         |
| Serial Number             | <b>S/N: MB27560400023 / MB27560400050</b><br>(see section 4)                                                                                                                                                                                                                                                                   |
| FCC ID                    | <b>P46-UMX35INT</b>                                                                                                                                                                                                                                                                                                            |
| Antenna type              | <b>N/A</b>                                                                                                                                                                                                                                                                                                                     |
| Hardware/Software Version | <b>HW Config: B1.1, B1.2 / SW: 01.37.ww39_p3.2016</b><br><b>Test SW : Phone Tool version 218</b>                                                                                                                                                                                                                               |
| Date of Sample Receipt    | <b>2016-03-09</b>                                                                                                                                                                                                                                                                                                              |
| Date of Test Start/End    | <b>2016-03-09 / 2016-05-1</b>                                                                                                                                                                                                                                                                                                  |
| Features                  | <b>GSM850 / GPRS850 / EDGE850, Multislot Class 12, Power Class 4</b><br><b>GSM1900 / GPRS1900 / EDGE1900, Multislot Class 12, Power Class 1</b><br><b>WCDMA II, V / HSDPA, HSUPA, Power Class 3</b><br><b>WLAN 802.11b/g/n (2.4GHz)</b><br><b>Bluetooth BDR/EDR v2.1 - Bluetooth LE v4.0</b><br><b>GNSS</b><br>(see section 7) |

|                     |                                                            |
|---------------------|------------------------------------------------------------|
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|                               |                                                                    |                      |
|-------------------------------|--------------------------------------------------------------------|----------------------|
| Reference Standards           | <b>FCC 47 CFR Part §2.1093</b><br>(see section 1)                  |                      |
| RF Exposure Environment       | <b>Portable devices - General population/uncontrolled exposure</b> |                      |
|                               | <b>SAR Result</b>                                                  | <b>SAR Limit</b>     |
| Maximum SAR Result & Limit    | <b>1.19 W/kg (1g)</b>                                              | <b>1.6 W/kg (1g)</b> |
| Min. test separation distance | <b>2.14mm</b>                                                      |                      |

|                    |                       |
|--------------------|-----------------------|
| Test Report number | <b>160223-01.TR04</b> |
| Revision Control   | <b>Rev. 01</b>        |

The test results relate only to the samples tested.

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## 1. Standards, reference documents and applicable test methods

1. FCC 47 CFR Part §2.1093 - Radiofrequency radiation exposure evaluation: portable devices.
2. FCC OET KDB 248227 D01 v02r02 – SAR guidance for IEEE 802.11 (Wi-Fi) transmitters.
3. FCC OET KDB 447498 D01 v06 – RF exposure procedures and equipment authorization policies for mobile and portable devices.
4. FCC OET KDB 648474 D04 v01r03– SAR Evaluation Considerations for Wireless Handsets.
5. FCC OET KDB 865664 D01 v01r04 – SAR Measurement Requirements for 100 MHz to 6 GHz.
6. FCC OET KDB 865664 D02 v01r02 – RF Exposure Compliance Reporting and Documentation Considerations
7. FCC OET KDB 941225 D01 v03r01– 3G SAR Measurement Procedures.
8. FCC OET KDB 941225 D06 v02r01– SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities.
9. FCC OET KDB 690783 D01 v01r03 SAR Listings on Equipment Authorization Grants
10. IEEE Std 1528-2013 – IEEE Recommended Practice Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques.
11. R&S Application note 1CM95 – WCDMA RF Measurements with the R&S®CMW500 according to 3GPP TS 34.121.
12. R&S Application note 1CM96 – HSDPA RF Measurements with the R&S®CMW500 in line with 3GPP TS 34.121.
13. R&S Application note 1CM97 – HSUPA RF Measurements with the R&S®CMW500 in line with 3GPP TS 34.121.

## 2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by IC, with IC Assigned Code 1000Y.
- ✓ test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

### 3. Environmental Conditions

- ✓ All tests were performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself, and the following limits were not exceeded during the tests:

|                    |            |
|--------------------|------------|
| Temperature        | 22°C ± 2°C |
| Humidity           | 46% ± 10%  |
| Liquid Temperature | 22°C ± 2°C |

### 4. Test samples

| Sample | Test Item #  | Description                  | Model              | Serial #      | Date of receipt |
|--------|--------------|------------------------------|--------------------|---------------|-----------------|
| #01    | 16022301.S03 | Smartphone<br>Pre-production | U307TG /<br>MXG308 | MB27560400023 | 2016-03-09      |
| #02    | 16022301.S09 | Smartphone<br>Pre-production | U307TG /<br>MXG308 | MB27560400050 | 2016-03-09      |

- ✓ Sample #01 has undergone all tests requested by the applicant, following the standards specified in section 1.
- ✓ Sample #02 has undergone all the conducted power tests requested by the applicant, following the standards specified in section 1.

### 5. Remarks and comments

1. All power measurements for 3G modes (WCDMA, HSDPA and HSUPA) were performed using a R&S CMW500, properly configured according to FCC OET KDB 941225 D01, and the corresponding R&S application notes detailed in *section 1*.
2. Only the plots for the test positions with the highest measured SAR per band/mode are included in Annex C, as required per FCC OET KDB 865664 D02. Bluetooth plots were not reported as the SAR measurement was close to the noise floor measurement.
3. As per FCC OET KDB 648474 D04, when the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, using the same wireless mode test configuration for voice and data, such as WCDMA, LTE and Wi-Fi, and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).

## 6. Document Revision History

| Revision # | Date       | Modified By | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------|------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rev. 00    | 2016-06-01 | Cheiel In   | First Issue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Rev. 01    | 2016-06-22 | R. Quiroz   | <ul style="list-style-type: none"> <li>All EDGE-8PSK information was removed.</li> <li>Device GSM class included in section 7.</li> <li>Liquid recipes specifications included in A.5.</li> <li>Liquid parameters updated in B.3.</li> <li>SAR values corrected in B.4.</li> <li>SAR values included for 2450MHz in B.4.</li> <li>SAR Results included in sections B.5.3 and B.5.5.</li> <li>SAR plots included in Annex C.</li> <li>Dipoles parameters added in Annex E.</li> <li>Liquid level photos included in Annex F.</li> </ul> |

## 7. Equipment Under Test

|                                         |                                                                                                                                                                                                                                                                                |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Brand Name                              | Unimax Communications                                                                                                                                                                                                                                                          |
| Model Name                              | U307TG / MXG308                                                                                                                                                                                                                                                                |
| FCC ID                                  | P46-UMX35INT                                                                                                                                                                                                                                                                   |
| Hardware Version                        | B1.1, B1.2                                                                                                                                                                                                                                                                     |
| Software Version                        | SW: 01.37.ww39_p3.2016                                                                                                                                                                                                                                                         |
| Driver Version                          | 4.31                                                                                                                                                                                                                                                                           |
| Prototype / Production                  | Pre-Production                                                                                                                                                                                                                                                                 |
| Dimension                               | 122 x 65.4 x 11 mm                                                                                                                                                                                                                                                             |
| Operational Conditions                  | Voltage: 3.6 V <sub>DC</sub> to 4.2 V <sub>DC</sub> . Rechargeable Li-ion Battery.                                                                                                                                                                                             |
| Exposure Conditions                     | Held next to the ear<br>Body worn<br>Personal Wireless Router (hotspot)                                                                                                                                                                                                        |
| Supported Radios                        | GSM850 / GPRS850 / EDGE850, GSM Class B, Multislot Class 12, Power Class 4<br>GSM1900 / GPRS1900 / EDGE1900, Multislot Class 12, Power Class 1<br>WCDMA II, V / HSDPA, HSUPA, Power Class 3<br>WLAN 802.11b/g/n (2.4GHz)<br>Bluetooth BDR/EDR v2.1 - Bluetooth LE v4.0<br>GNSS |
| Simultaneous Transmission configuration | WLAN 2.4GHz + Cellular<br>BT + Cellular                                                                                                                                                                                                                                        |
| Antenna Information                     | See Annex F for more detail information                                                                                                                                                                                                                                        |
| Additional Information                  | No proximity sensor is implemented                                                                                                                                                                                                                                             |

### Supported Radios

| Mode              | Duty Cycle |       | Modulation                     | Band    | UL Freq Range (MHz) | Measured Max. Conducted Power (dBm) |
|-------------------|------------|-------|--------------------------------|---------|---------------------|-------------------------------------|
| GSM               | 12.5%      |       | GMSK                           | GSM850  | 824-849             | 32.37                               |
|                   |            |       |                                | PCS1900 | 1850-1910           | 29.59                               |
| (E)GPRS           | 1slot      | 12.5% | GMSK                           | GSM850  | 824-849             | 26.72                               |
|                   | 2slot      | 25.0% |                                |         |                     |                                     |
|                   | 3slot      | 37.5% |                                | PCS1900 | 1850-1910           | 25.34                               |
|                   | 4slot      | 50.0% |                                |         |                     |                                     |
| WCDMA HSPA        | 100%       |       | QPSK<br>16QAM                  | FDD II  | 1850-1910           | 23.45                               |
|                   |            |       |                                | FDD V   | 824-849             | 23.69                               |
| BDR/EDR v2.1      | 77%        |       | GFSK<br>$\pi/4$ DQPSK          | 2.4GHz  | 2400-2483.5         | 5.45                                |
| Bluetooth LE v4.0 | 62%        |       | GFSK                           | 2.4GHz  | 2400-2483.5         | 4.94                                |
| 802.11b/g/n       | 100%       |       | BPSK<br>QPSK<br>16QAM<br>64QAM | 2.4GHz  | 2400-2483.5         | 15.81                               |
| GNSS              | N/A        |       | BPSK                           | L1      | 1575.42             | N/A                                 |

### Maximum Output power tune-up tolerance

| Band    | UL Slot # | Factory Upper Tolerance (dBm) |           |
|---------|-----------|-------------------------------|-----------|
|         |           | GSM-GMSK                      | GPRS-GMSK |
| GSM850  | 1         | 33.00                         | 33.00     |
|         | 2         | -                             | 30.00     |
|         | 3         | -                             | 28.20     |
|         | 4         | -                             | 27.00     |
| GSM1900 | 1         | 30.00                         | 30.00     |
|         | 2         | -                             | 27.00     |
|         | 3         | -                             | 25.20     |
|         | 4         | -                             | 24.00     |

| Mode  | Band   | Factory Upper Tolerance (dBm) |
|-------|--------|-------------------------------|
| WCDMA | FDD II | 23.80                         |
|       | FDD V  | 23.80                         |

| Band          | Mode      | Data Rate | Factory Upper Tolerance (dBm) |
|---------------|-----------|-----------|-------------------------------|
| 2.4GHz<br>DTS | 802.11b   | 1Mbps     | 16.00                         |
|               | 802.11g   | 6Mbps     | 11.00                         |
|               | 802.11n20 | HT0       | 10.00                         |

| Band          | Mode   | Data Rate | Factory Upper Tolerance (dBm) |
|---------------|--------|-----------|-------------------------------|
| 2.4GHz<br>DTS | 802.15 | BDR       | 5.50                          |
|               |        | EDR1/EDR2 | 5.50                          |
|               |        | BLE       | 5.50                          |

## 8. Test Verdicts summary

| Mode         | Band     | Highest Reported SAR (1g) (W/kg) |      | Verdict |
|--------------|----------|----------------------------------|------|---------|
|              |          | Head                             | Body |         |
| GSM / GPRS   | GSM 850  | 0.34                             | 0.73 | P       |
|              | PCS 1900 | 0.39                             | 0.71 | P       |
| WCDMA / HSPA | FDD II   | 0.76                             | 1.19 | P       |
|              | FDD V    | 0.18                             | 0.76 | P       |
| 802.11b/g/n  | 2.4GHz   | 0.31                             | 0.08 | P       |
| Bluetooth    | 2.4GHz   | 0.04                             | 0.03 | P       |

P: Pass

F: Fail

NM: Not Measured

NA: Not Applicable

According to the FCC OET KDB 690783 D01, this is the summary of the values for the Grant Listing:

| Highest Reported SAR (1g) (W/kg) |                 |          |          |
|----------------------------------|-----------------|----------|----------|
| Exposure Condition               | Equipment Class |          |          |
|                                  | PCE             | DTS      | DSS      |
| Head                             | 0.76            | 0.31     | 0.04     |
| Simultaneous Tx Head             | Sum:0.87        | Sum:0.87 | Sum:0.80 |
| Body Worn                        | 1.19            | 0.08     | 0.03     |
| Simultaneous Tx Body             | Sum:1.27        | Sum:1.27 | Sum:1.20 |

Considering the results of the performed test according to FCC 47 CFR Part 2.1093 the item under test is IN COMPLIANCE with the requested specifications specified in *section 1*.

# Annex A. Test & System Description

---

## A.1 SAR Definition

Specific Absorption rate is defined as the time derivative of the incremental energy (dW) absorbed by (dissipated in) and incremental mass (dm) contained in a volume element (dV) of a given density ( $\rho$ ).

$$SAR = \frac{d}{dt} \cdot \left( \frac{dW}{dm} \right) = \frac{d}{dt} \cdot \left( \frac{dW}{\rho \cdot dV} \right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

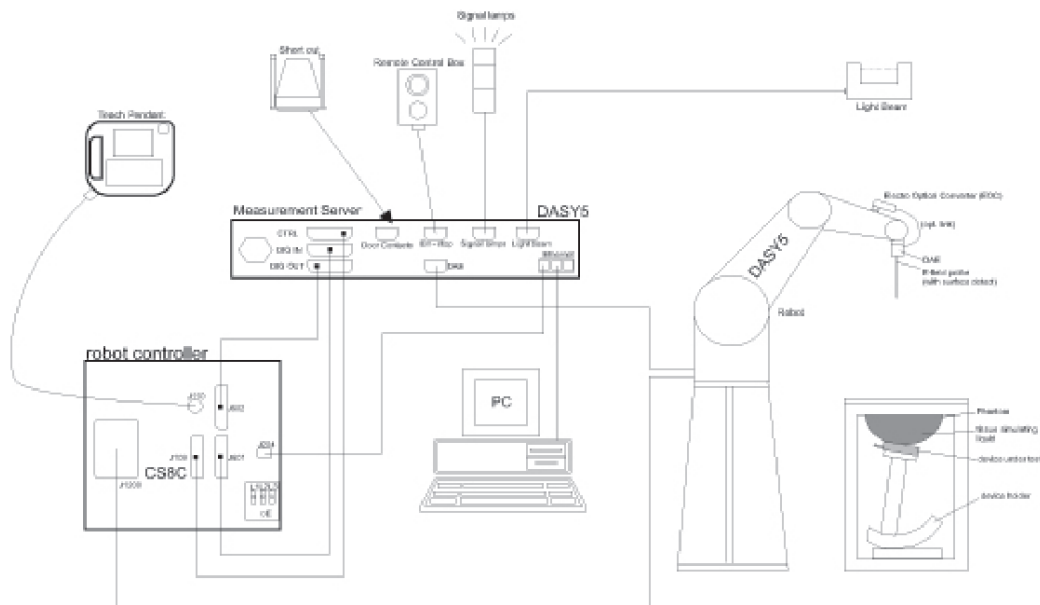
Where:

$\sigma$  = Conductivity of the tissue (S/m)  
 $\rho$  = Mass density of the tissue (kg/m<sup>3</sup>)  
 $E$  = RMS electric field strength (V/m)

## A.2 SPEAG SAR Measurement System

### A.2.1 SAR Measurement Setup

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



- ✓ A standard high precision 6-axis robot (Stäubli TX/RX family) with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisition electronics (DAE)
- ✓ An isotropic field probe optimized and calibrated for the targeted measurements.
- ✓ A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- ✓ The Electro-optical Converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. The EOC signal is transmitted to the measurement server.
- ✓ The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movements interrupts.
- ✓ The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- ✓ A computer running Win7 professional operating system and the DASY5 software.
- ✓ Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- ✓ The phantom, the device holder and other accessories according to the targeted measurement.
- ✓ Tissue simulating liquid.
- ✓ System Validation dipoles.
- ✓ Network emulator or RF test tool

### A.2.2 E-Field Measurement Probe

The probe is constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probe has built-in shielding against static charges and is contained within a PEEK cylindrical enclosure material at the tip.



The probe's characteristics are:

|                                                      |              |
|------------------------------------------------------|--------------|
| Frequency Range                                      | 30MHz – 6GHz |
| Length                                               | 337 mm       |
| Probe tip external diameter                          | 2.5 mm       |
| Typical distance between dipoles and the probe tip   | 1 mm         |
| Axial Isotropy (in human-equivalent liquids)         | ±0.3 dB      |
| Hemispherical Isotropy (in human-equivalent liquids) | ±0.5 dB      |
| Linearity                                            | ±0.2 dB      |
| Maximum operating SAR                                | 100 W/kg     |
| Lower SAR detection threshold                        | 0.001 W/kg   |

### A.2.3 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

The phantom's characteristics are:

|                        |                                            |
|------------------------|--------------------------------------------|
| Material               | Vinylester, glass fiber reinforced (VE-GF) |
| Shell thickness        | 2 mm ± 0.2 mm                              |
| Shell thickness at ERP | 6 ± 0.2 mm                                 |
| Filling volume         | 25 Liters                                  |
| Dimensions             | Length: 1000mm / Width: 500mm              |



### A.2.4 Flat Phantom

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

The phantom's characteristics are:

|                 |                                            |
|-----------------|--------------------------------------------|
| Material        | Vinylester, glass fiber reinforced (VE-GF) |
| Shell thickness | 2 mm $\pm$ 0.2 mm                          |
| Filling volume  | 30 Liters approx.                          |
| Dimensions      | Major axis: 600mm / Minor axis: 400mm      |



### A.2.5 Device Positioner

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of 0.5 mm would produce a SAR uncertainty of 20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.



The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon=3$  and loss tangent  $\delta=0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



A simple but effective and easy-to-use extension for the Mounting Device; facilitates testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.); lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and other Flat Phantoms.

### A.3 Data Evaluation

- **Power Reference measurement**

The robot measures the E field in a specified reference position that can be either the selected section's grid reference point or a user point in this section at 4mm of the inner surface of the phantom, 2mm for frequencies above 3GHz.

- **Area Scan**

Measurement procedures for evaluating SAR from wireless handsets typically start with a coarse measurement grid to determine the approximate location of the local peak SAR values. This is known as the area-scan procedure. The SAR distribution is scanned along the inside surface of one side of the phantom head, at least for an area larger than the projection of the handset and antenna. The distance between the measured points and phantom surface should be less than 8 mm, and should remain constant (with variation less than  $\pm 1$  mm) during the entire scan in order to determine the locations of the local peak SAR with sufficient accuracy. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. If this angle is larger than 30° and the closest point on the probe-tip housing to the phantom surface is closer than a probe diameter, the boundary effect may become larger and polarization dependent. This additional uncertainty needs to be analyzed and accounted for. To achieve this, modified test procedures and additional uncertainty analyses not described in this recommended practice may be required. The measurement and interpolation point spacing should be chosen such as to allow identification of the local peak locations to within one-half of the linear dimension of a side of the zoom-scan volume. Because a local peak having specific amplitude and steep gradients may produce a lower peak spatial-average SAR compared to peaks with slightly lower amplitude and less steep gradients, it is necessary to evaluate these other peaks as well. However, since the spatial gradients of local SAR peaks are a function of the wavelength inside the tissue-equivalent liquid and the incident magnetic field strength, it is not necessary to evaluate local peaks that are less than 2 dB or more below the global maximum peak. Two-dimensional spline algorithms (Brishoual et al. 2001; Press et al., 1996) are typically used to determine the peaks and gradients within the scanned area. If a peak is found at a distance from the scan border of less than one-half the edge dimension of the desired 1 g or 10 g cube, the measurement area should be enlarged if possible.

- **Zoom Scan**

To evaluate the peak spatial-average SAR values for 1 g or 10 g cubes, fine resolution volume scans, called zoom scans, are performed at the peak SAR locations identified during the area scan. The minimum zoom scan volume size should extend at least 1.5 times the edge dimension of a 1 g cube in all directions from the center of the scan volume, for both 1 g and 10 g peak spatial-average SAR evaluations. Along the phantom curved surfaces, the front face of the volume facing the tissue/liquid interface conforms to the curved boundary, to ensure that all SAR peaks are captured. The back face should be equally distorted to maintain the correct averaging mass. The flatness and orientation of the four side faces are unchanged from that of a cube whose orientation is within  $\pm 30^\circ$  of the line normal to the phantom at the center of the cube face next to the phantom surface. The peak local SAR locations that were determined in the area scan (interpolated values) should be used for the centers of the zoom scans. If a scan volume cannot be centered due to proximity of a phantom shape feature, the probe should be tilted to allow scan volume enlargement. If probe tilt is not feasible, the zoom-scan origin may be shifted, but not by more than half of the 1 g or 10 g cube edge dimension.

After the zoom-scan measurement, extrapolations from the closest measured points to the surface, for example along lines parallel to the zoom-scan centerline, and interpolations to a finer resolution between all measured and extrapolated points are performed. Extrapolation algorithm considerations are described in 6.5.3, and 3-D spline methods (Brishoual et al., 2001; Kreyszig, 1983; Press et al., 1996) can be used for interpolation. The peak spatial-average SAR is finally determined by a numerical averaging of the local SAR values in the interpolation grid, using for example a trapezoidal algorithm for the integration (averaging).

In some areas of the phantom, such as the jaw and upper head regions, the angle of the probe with respect to the line normal to the surface may be relatively large, e.g., greater than  $\pm 30^\circ$ , which could increase the boundary effect error to a larger level. In these cases, during the zoom scan a change in the orientation of the probe, the phantom, or both is recommended but not required for the duration of

the zoom scan, so that the angle between the probe axis and the line normal to the surface is within 30° for all measurement points.

- **Power Drift measurement**

The robot re-measures the E-Field in the same reference location measured at the Power Reference. The drift measurement gives the field difference in dB from the first to the last reference reading. This allows a user to monitor the power drift of the device under test that must remain within a maximum variation of  $\pm 5\%$ .

- **Post-processing**

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1528 and IEC 62209-1/2 standards. It can be conducted for 1g and 10g.

The software allows evaluations that combine measured data and robot positions, such as:

- ✓ Maximum search
- ✓ Extrapolation
- ✓ Boundary correction
- ✓ Peak search for averaged SAR

Interpolation between the measured points is performed when the resolution of the grid is not fine enough to compute the average SAR over a given mass.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

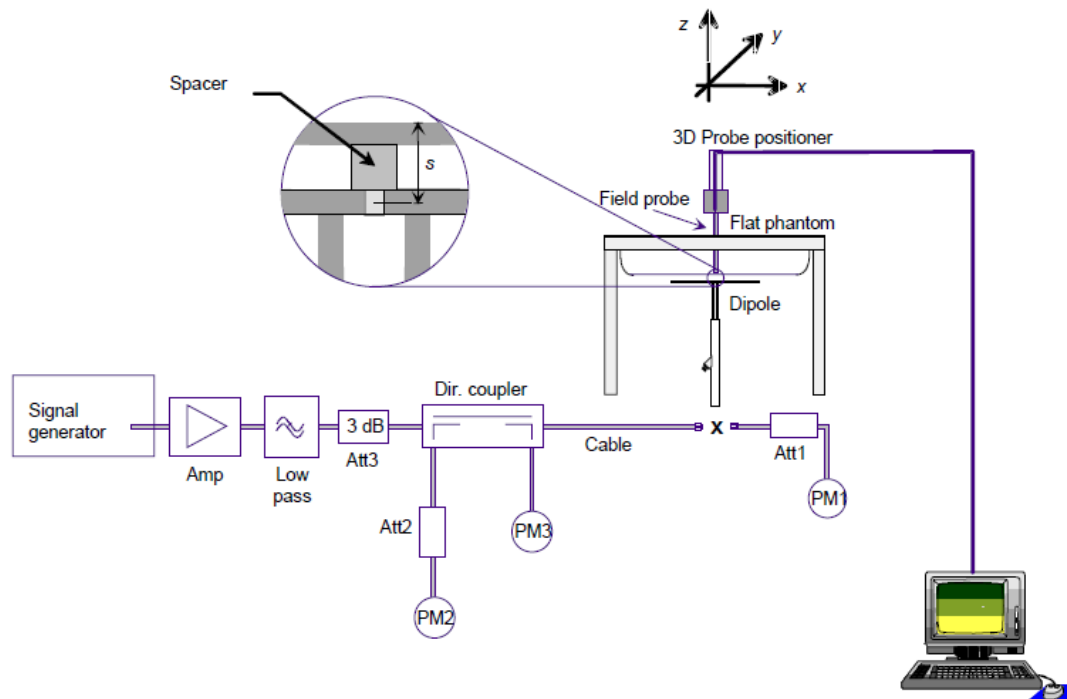
## A.4 System and Liquid Check

### A.4.1 System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results.

The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

In the simplified setup for system check, the EUT is replaced by a calibrated dipole and the power source is replaced by a controlled continuous wave generated by a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the phantom at the correct distance.



The equipment setup is shown below:

- ✓ Signal Generator
- ✓ Amplifier
- ✓ Directional coupler
- ✓ Power meter
- ✓ Calibrated dipole

The output power on dipole port must be set to 20dBm (100mW) and SAR results are normalized to a forward power of 1W to compare the values with the calibration reports results as described at IEEE 1528 and IEC 62209 standards.

## A.4.2 Liquid Check

The dielectric parameters check is done prior to the use of the tissue simulating liquid. The verification is made by comparing the relative permittivity and conductivity to the values recommended by the applicable standards.

The liquid verification was performed using the following test setup:

- ✓ VNA (Vector Network Analyzer)
- ✓ Open-Short-Load calibration kit
- ✓ RF Cable
- ✓ Open-Ended Coaxial probe
- ✓ DAK software tool
- ✓ SAR Liquid
- ✓ De-ionized water
- ✓ Thermometer

These are the target dielectric properties of the tissue-equivalent liquid material as defined in FCC OET KDB 865664 D01.

| Frequency<br>(MHz) | Body SAR     |                | Head SAR     |                |
|--------------------|--------------|----------------|--------------|----------------|
|                    | $\epsilon_r$ | $\sigma$ (S/m) | $\epsilon_r$ | $\sigma$ (S/m) |
| 150                | 61.9         | 0.80           | 52.3         | 0.76           |
| 300                | 58.2         | 0.92           | 45.3         | 0.87           |
| 450                | 56.7         | 0.94           | 43.5         | 0.87           |
| 835                | 55.2         | 0.97           | 41.5         | 0.90           |
| 900                | 55.0         | 1.05           | 41.5         | 0.97           |
| 1450               | 54.0         | 1.30           | 40.5         | 1.20           |
| 1800-2000          | 53.3         | 1.52           | 40.0         | 1.40           |
| 2450               | 52.7         | 1.95           | 39.2         | 1.80           |

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho$  = 1000 kg/m<sup>3</sup>)

The measurement system implement a SAR error compensation algorithm as documented in IEEE Std 1528-2013 (equivalent to draft standard IEEE P1528-2011) to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters (applied to only scale up the measured SAR, and not downward) so, according to FCC OET KDB 865664 D01, the tolerance for  $\epsilon_r$  and  $\sigma$  may be relaxed to  $\pm 10\%$ .

## A.5 Test Equipment List

### SPEAG SAR System

| Device                           | Type/Model                     | Serial Number   | Manufacturer                 | Calibration Date | Calibration Due |
|----------------------------------|--------------------------------|-----------------|------------------------------|------------------|-----------------|
| Dosimetric E-field Probe         | EX3DV4                         | 3978            | SPEAG                        | 2015-06-15       | 2016-06-15      |
| Data Acquisition Electronics     | DAE4                           | 1429            | SPEAG                        | 2015-06-11       | 2016-06-11      |
| Electro-Optical Converter        | EOC60                          | -               | SPEAG                        | NA               | NA              |
| Light Beam Unit                  | LB5 / 80                       | -               | di-soric                     | NA               | NA              |
| 6-axis Robot                     | TX60 L                         | F12/5MZ3A1/A/01 | STAÜBLI                      | NA               | NA              |
| Robot Controller                 | CS8C                           | F12/5MZ3A1/C/01 | STAÜBLI                      | NA               | NA              |
| Measurement Server               | DASY5<br>P/N: SE UMS<br>011 EA | 1444            | SPEAG                        | NA               | NA              |
| SAM Phantom                      | Twin SAM v5.0                  | 1838            | SPEAG                        | NA               | NA              |
| Oval Flat Phantom                | ELI v5.0                       | 1260            | SPEAG                        | NA               | NA              |
| Handset Positioner               | P/N SD 000<br>H01 KA           | -               | SPEAG                        | NA               | NA              |
| Dielectric Probe Kit             | DAKS-3.5                       | 1037            | SPEAG                        | 2014-06-24       | 2016-06-24      |
| Vector Reflectometer             | PLANAR R140                    | 0131013         | Copper Mountain Technologies | 2015-08-06       | 2017-08-06      |
| 835MHz System Validation Dipole  | D835V2                         | 4d192           | SPEAG                        | 2015-01-23       | 2017-01-23      |
| 1900MHz System Validation Dipole | D1900V2                        | 5d197           | SPEAG                        | 2015-01-14       | 2017-01-14      |
| 2450MHz System Validation Dipole | D2450V2                        | 937             | SPEAG                        | 2014-06-24       | 2016-06-24      |
| DASY software                    | -                              | 9-618AE2F1      | SPEAG                        | NA               | NA              |
| DAKS software                    | -                              | 9-2687B491      | SPEAG                        | NA               | NA              |

### Shared Instrumentation

| Device                        | Type/Model              | Serial Number                                | Manufacturer | Calibration Date | Calibration Due |
|-------------------------------|-------------------------|----------------------------------------------|--------------|------------------|-----------------|
| Communication Tester          | CMW500                  | 152720                                       | R&S          | 2015-03-19       | 2017-03-19      |
| Temperature & Humidity Logger | TR-72NW-H +<br>HHA-3151 | Logger:<br>62180216 /<br>Sensor:<br>0202622A | TandD        | 2016-02-01       | 2018-02-01      |
| USB Power Sensor              | NRP-Z81                 | 102278                                       | R&S          | 2015-09-10       | 2017-09-10      |
| USB Power Sensor              | NRP-Z81                 | 102279                                       | R&S          | 2015-09-10       | 2017-09-10      |
| Vector Signal Generator       | ESG E4438C              | MY45092885                                   | Agilent      | NA               | NA              |
| Thermometer                   | TESTO 922               | 33622932                                     | Testo        | 2015-09-29       | 2017-09-29      |
| Power Amplifier               | -                       | MODU-023-B-<br>0001                          | SATIMO       | NA               | NA              |
| Coupler                       | CD0.5-8-20-30           | 1251-002                                     | Amd-group    | NA               | NA              |
| Antenna                       | ANTA39                  | 26/12 ANTA39                                 | SATIMO       | NA               | NA              |
| Vector Network Analyzer       | MS2025B                 | 1301107                                      | Anritsu      | 2015-09-23       | 2017-09-23      |

**Tissue Simulant Liquids**

| TSL       | Manufacturer / Model | Freq Range (MHz) | Main Ingredients                                                              |
|-----------|----------------------|------------------|-------------------------------------------------------------------------------|
| Head 835  | SATIMO HL835         | 800-900          | 1-2 Propanediol (64.81%), H <sub>2</sub> O (34.4%), NaCl (0.79%)              |
| Head 1900 | SATIMO HL1900        | 1800-1900        | Triton X-100 (30.45%), H <sub>2</sub> O (55.36%), NaCl (0.35%), DGBE (13.84%) |
| Head 2450 | SPEAG HSL2450V2      | 2400-2700        | H <sub>2</sub> O (49.75%), NaCl (0.5%), DGBE (49.75%)                         |
| Body 835  | SATIMO BL835         | 800-900          | 1-2 Propanediol (64.81%), H <sub>2</sub> O (34.4%), NaCl (0.79%)              |
| Body 1900 | SATIMO BL1900        | 1800-1900        | Triton X-100 (30.45%), H <sub>2</sub> O (55.36%), NaCl (0.35%), DGBE (13.84%) |
| Body 2450 | SPEAG MSL2450V2      | 2400-2700        | H <sub>2</sub> O (49.75%), NaCl (0.5%), DGBE (49.75%)                         |

## A.6 Measurement Uncertainty Evaluation

| <b>DASY5 Uncertainty Budget</b><br><b>According to IEEE 1528-2013 and IEC 62209-1/2011 (3 - 6 GHz range)</b> |               |             |      |         |          |                |                 |                       |
|--------------------------------------------------------------------------------------------------------------|---------------|-------------|------|---------|----------|----------------|-----------------|-----------------------|
| Error Description                                                                                            | Uncert. value | Prob. Dist. | Div. | (ci) 1g | (ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | (vi) v <sub>eff</sub> |
| Measurement System                                                                                           |               |             |      |         |          |                |                 |                       |
| Probe Calibration                                                                                            | ±6.55 %       | N           | 1    | 1       | 1        | ±6.55 %        | ±6.55 %         | ∞                     |
| Axial Isotropy                                                                                               | ±4.7 %        | R           | √3   | 0.7     | 0.7      | ±1.9 %         | ±1.9 %          | ∞                     |
| Hemispherical Isotropy                                                                                       | ±9.6 %        | R           | √3   | 0.7     | 0.7      | ±3.9 %         | ±3.9 %          | ∞                     |
| Boundary Effects                                                                                             | ±2.0 %        | R           | √3   | 1       | 1        | ±1.2 %         | ±1.2 %          | ∞                     |
| Linearity                                                                                                    | ±4.7 %        | R           | √3   | 1       | 1        | ±2.7 %         | ±2.7 %          | ∞                     |
| System Detection Limits                                                                                      | ±1.0 %        | R           | √3   | 1       | 1        | ±0.6 %         | ±0.6 %          | ∞                     |
| Modulation Response                                                                                          | ±2.4 %        | R           | √3   | 1       | 1        | ±1.4 %         | ±1.4 %          | ∞                     |
| Readout Electronics                                                                                          | ±0.3 %        | N           | 1    | 1       | 1        | ±0.3 %         | ±0.3 %          | ∞                     |
| Response Time                                                                                                | ±0.8 %        | R           | √3   | 1       | 1        | ±0.5 %         | ±0.5 %          | ∞                     |
| Integration Time                                                                                             | ±2.6 %        | R           | √3   | 1       | 1        | ±1.5 %         | ±1.5 %          | ∞                     |
| RF Ambient Noise                                                                                             | ±3.0 %        | R           | √3   | 1       | 1        | ±1.7 %         | ±1.7 %          | ∞                     |
| RF Ambient Reflections                                                                                       | ±3.0 %        | R           | √3   | 1       | 1        | ±1.7 %         | ±1.7 %          | ∞                     |
| Probe Positioner                                                                                             | ±0.8 %        | R           | √3   | 1       | 1        | ±0.5 %         | ±0.5 %          | ∞                     |
| Probe Positioning                                                                                            | ±6.7 %        | R           | √3   | 1       | 1        | ±3.9 %         | ±3.9 %          | ∞                     |
| Max. SAR Eval.                                                                                               | ±4.0 %        | R           | √3   | 1       | 1        | ±2.3 %         | ±2.3 %          | ∞                     |
| Test Sample Related                                                                                          |               |             |      |         |          |                |                 |                       |
| Device Positioning                                                                                           | ±2.9 %        | N           | 1    | 1       | 1        | ±2.9 %         | ±2.9 %          | 145                   |
| Device Holder                                                                                                | ±3.6 %        | N           | 1    | 1       | 1        | ±3.6 %         | ±3.6 %          | 5                     |
| Power Drift                                                                                                  | ±5.0 %        | R           | √3   | 1       | 1        | ±2.9 %         | ±2.9 %          | ∞                     |
| Power Scaling                                                                                                | ±0 %          | R           | √3   | 1       | 1        | ±0.0 %         | ±0.0 %          | ∞                     |
| Phantom and Setup                                                                                            |               |             |      |         |          |                |                 |                       |
| Phantom Uncertainty                                                                                          | ±6.6 %        | R           | √3   | 1       | 1        | ±3.8 %         | ±3.8 %          | ∞                     |
| SAR correction                                                                                               | ±1.9 %        | R           | √3   | 1       | 0.84     | ±1.1 %         | ±0.9 %          | ∞                     |
| Liquid Conductivity (mea.) DAK                                                                               | ±2.5 %        | R           | √3   | 0.78    | 0.71     | ±1.1 %         | ±1.0 %          | ∞                     |
| Liquid Permittivity (mea.) DAK                                                                               | ±2.5 %        | R           | √3   | 0.26    | 0.26     | ±0.3 %         | ±0.4 %          | ∞                     |
| Temp. unc. - Conductivity BB                                                                                 | ±3.4 %        | R           | √3   | 0.78    | 0.71     | ±1.5 %         | ±1.4 %          | ∞                     |
| Temp. unc. - Permittivity BB                                                                                 | ±0.4 %        | R           | √3   | 0.23    | 0.26     | ±0.1 %         | ±0.1 %          | ∞                     |
| Combined Std. Uncertainty                                                                                    |               |             |      |         |          | ±12.3 %        | ±12.2 %         | 748                   |
| <b>Expanded STD Uncertainty</b>                                                                              |               |             |      |         |          | <b>±24.6 %</b> | <b>±24.5 %</b>  |                       |

### SPEAG System Uncertainty budget (IEEE 1528-2013 & IEC 62209-1:2011)

| <b>DASY5 Uncertainty Budget</b><br><b>According to IEC 62209-2/2010 (30 MHz - 6 GHz range)</b> |               |             |      |         |          |                |                 |                       |
|------------------------------------------------------------------------------------------------|---------------|-------------|------|---------|----------|----------------|-----------------|-----------------------|
| Error Description                                                                              | Uncert. value | Prob. Dist. | Div. | (ci) 1g | (ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | (vi) v <sub>eff</sub> |
| Measurement System                                                                             |               |             |      |         |          |                |                 |                       |
| Probe Calibration                                                                              | ±6.55 %       | N           | 1    | 1       | 1        | ±6.55 %        | ±6.55 %         | ∞                     |
| Axial Isotropy                                                                                 | ±4.7 %        | R           | √3   | 0.7     | 0.7      | ±1.9 %         | ±1.9 %          | ∞                     |
| Hemispherical Isotropy                                                                         | ±9.6 %        | R           | √3   | 0.7     | 0.7      | ±3.9 %         | ±3.9 %          | ∞                     |
| Linearity                                                                                      | ±4.7 %        | R           | √3   | 1       | 1        | ±2.7 %         | ±2.7 %          | ∞                     |
| Modulation Response                                                                            | ±2.4 %        | R           | √3   | 1       | 1        | ±1.4 %         | ±1.4 %          | ∞                     |
| System Detection Limits                                                                        | ±1.0 %        | R           | √3   | 1       | 1        | ±0.6 %         | ±0.6 %          | ∞                     |
| Boundary Effects                                                                               | ±2.0 %        | R           | √3   | 1       | 1        | ±1.2 %         | ±1.2 %          | ∞                     |
| Readout Electronics                                                                            | ±0.3 %        | N           | 1    | 1       | 1        | ±0.3 %         | ±0.3 %          | ∞                     |
| Response Time                                                                                  | ±0.8 %        | R           | √3   | 1       | 1        | ±0.5 %         | ±0.5 %          | ∞                     |
| Integration Time                                                                               | ±2.6 %        | R           | √3   | 1       | 1        | ±1.5 %         | ±1.5 %          | ∞                     |
| RF Ambient Noise                                                                               | ±3.0 %        | R           | √3   | 1       | 1        | ±1.7 %         | ±1.7 %          | ∞                     |
| RF Ambient Reflections                                                                         | ±3.0 %        | R           | √3   | 1       | 1        | ±1.7 %         | ±1.7 %          | ∞                     |
| Probe Positioner                                                                               | ±0.8 %        | R           | √3   | 1       | 1        | ±0.5 %         | ±0.5 %          | ∞                     |
| Probe Positioning                                                                              | ±6.7 %        | R           | √3   | 1       | 1        | ±3.9 %         | ±3.9 %          | ∞                     |
| Post-processing                                                                                | ±4.0 %        | R           | √3   | 1       | 1        | ±2.3 %         | ±2.3 %          | ∞                     |
| Test Sample Related                                                                            |               |             |      |         |          |                |                 |                       |
| Device Holder                                                                                  | ±3.6 %        | N           | 1    | 1       | 1        | ±3.6 %         | ±3.6 %          | 5                     |
| Test sample Positioning                                                                        | ±2.9 %        | N           | 1    | 1       | 1        | ±2.9 %         | ±2.9 %          | 145                   |
| Power Scaling                                                                                  | ±0 %          | R           | √3   | 1       | 1        | ±0.0 %         | ±0.0 %          | ∞                     |
| Power Drift                                                                                    | ±5.0 %        | R           | √3   | 1       | 1        | ±2.9 %         | ±2.9 %          | ∞                     |
| Phantom and Setup                                                                              |               |             |      |         |          |                |                 |                       |
| Phantom Uncertainty                                                                            | ±7.9 %        | R           | √3   | 1       | 1        | ±4.4 %         | ±4.4 %          | ∞                     |
| SAR correction                                                                                 | ±1.9 %        | R           | √3   | 1       | 0.84     | ±1.1 %         | ±0.9 %          | ∞                     |
| Liquid Conductivity (mea.) DAK                                                                 | ±2.5 %        | R           | √3   | 0.78    | 0.71     | ±1.1 %         | ±1.0 %          | ∞                     |
| Liquid Permittivity (mea.) DAK                                                                 | ±2.5 %        | R           | √3   | 0.26    | 0.26     | ±0.3 %         | ±0.4 %          | ∞                     |
| Temp. unc. - Conductivity BB                                                                   | ±3.4 %        | R           | √3   | 0.78    | 0.71     | ±1.5 %         | ±1.4 %          | ∞                     |
| Temp. unc. - Permittivity BB                                                                   | ±0.4 %        | R           | √3   | 0.23    | 0.26     | ±0.1 %         | ±0.1 %          | ∞                     |
| Combined Std. Uncertainty                                                                      |               |             |      |         |          | ±12.5 %        | ±12.4 %         | 748                   |
| Expanded STD Uncertainty                                                                       |               |             |      |         |          | ±25.1 %        | ±25.0 %         |                       |

**SPEAG System Uncertainty budget (IEC 62209-2:2010)**

**A.7 RF Exposure Limits**

SAR assessments have been made in line with the requirements of FCC 47 CFR Part §2.1093 on the limitation of exposure of the general population / uncontrolled exposure for portable devices.

| Exposure Type                                                                    | General Population /<br>Uncontrolled Environment |
|----------------------------------------------------------------------------------|--------------------------------------------------|
| Peak spatial-average SAR<br>(averaged over any 1 gram of tissue)                 | <b>1.6 W/kg</b>                                  |
| Whole body average SAR                                                           | <b>0.08 W/kg</b>                                 |
| Peak spatial-average SAR (extremities)<br>(averaged over any 10 grams of tissue) | <b>4.0 W/kg</b>                                  |

# Annex B. Test Results

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## B.1 Test Conditions

### B.1.1 SAR Test positions relative to the phantom

For both voice (GSM, WCDMA) and only-data modes (GPRS, EDGE, HSPA, 802.11b/g/n), the EUT was tested for head and body-worn exposure conditions.

For head tests, the EUT was placed in cheek and tilt position on the right/left side of the SAM phantom.

For body worn<sup>1</sup> tests, according to the hotspot mode described in FCC OET KDB 648474 D04 and FCC OET 941225 D06, all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge was placed against the flat phantom surface using a 10mm separation distance. Considering the antenna location diagrams in *Annex F* the surfaces/edges to be measured are:

- Cellular Antenna: Front Face, Back Face, Left Edge, Right Edge and Bottom Edge.
- WLAN Antenna: Front Face, Back Face, Right Edge, Left Edge and Top Edge.

### B.1.2 Test signal, Output power and Test Frequencies

For cellular (2G,3G) modes, the device was put into operation by using a R&S CMW500 as base station simulator.

For WLAN 802.11b/g/n (2.4GHz) mode, the device was put into operation by using an own control software (Phone Tool version 218) to program the test mode required for select the continuous transmission with 100% duty cycle.

The output power of the device was set to transmit at maximum power for all tests.

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<sup>1</sup> See comment 3 in section 5. *Remarks and comments*

### B.1.3 Evaluation Exclusion and Test Reductions

#### SAR test reduction

##### General SAR test reduction

According to FCC OET KDB 447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- $\leq 0.6$  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
- $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz

##### SAR Test reduction

| Transmission Mode       | SAR test exclusion/reduction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WLAN SAR test reduction |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| DSSS                    | <p>According to FCC OET KDB 248227 D01 v02r02, an <u>initial test configuration</u> is determined for OFDM and DSSS transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. SAR test reduction for subsequent highest output test channels is determined according to reported SAR of the initial test configuration.</p> <p>According to FCC OET KDB 248227 D01 v02r02, SAR is measured for 2.4 GHz 802.11b, SAR test reduction is determined according to the following:</p> <ul style="list-style-type: none"> <li>▪ When the reported SAR of the highest measured maximum output power channel for the exposure configuration is <math>\leq 0.8</math> W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.</li> <li>▪ When the reported SAR is <math>&gt; 0.8</math> W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is <math>&gt; 1.2</math> W/kg, SAR is required for the third channel.</li> </ul> |
| OFDM                    | <p>According to FCC OET KDB 248227 D01 v02r02, SAR is not required for 2.4 GHz OFDM conditions when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is <math>\leq 1.2</math> W/kg</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| WWAN SAR test reduction |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| GPRS<br>EDGE            | <p>According to FCC OET KDB 941225 D01 and FCC Public Notice DA 02-1438, SAR evaluation for low-power modes is required only when the SAR produced for the highest power mode is larger 0.8W/kg.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| HSDPA<br>HSUPA          | <p>According to FCC OET KDB 941225 D01, SAR evaluation is not required when the maximum output power and tune-up tolerance specified for production units in a secondary mode (HSPA) is <math>\leq \frac{1}{4}</math> dB higher than the primary mode (RMC) or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is <math>\leq 1.2</math> W/kg</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| All – Hotspot mode      | <p>According to FCC OET KDB 941225 D06, SAR must be measured for all sides (edges) and surfaces with a transmitting antenna located at <math>\leq 25</math> mm from that surface or edge, for the data modes, wireless technologies and frequency bands supporting hotspot mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## B.2 Conducted Power Measurements

### B.2.1 GSM / GPRS

| Band   | Mode      | # UL slots | Channel | Freq. (MHz) | Burst Averaged Power (dBm) | Calculated Time Averaged Power (dBm) | Factory Upper Tolerance (dBm) |
|--------|-----------|------------|---------|-------------|----------------------------|--------------------------------------|-------------------------------|
| GSM850 | GSM       | 1          | 128     | 824.2       | 32.24                      | 23.21                                | 33.00                         |
|        |           |            | 190     | 836.6       | 32.28                      | 23.25                                | 33.00                         |
|        |           |            | 251     | 848.8       | 32.37                      | 23.34                                | 33.00                         |
|        | GPRS GMSK | 1          | 128     | 824.2       | 32.24                      | 22.44                                | 33.00                         |
|        |           |            | 190     | 836.6       | 32.28                      | 22.55                                | 33.00                         |
|        |           |            | 251     | 848.8       | 32.37                      | 22.57                                | 33.00                         |
|        |           | 2          | 128     | 824.2       | 28.56                      | 22.54                                | 30.00                         |
|        |           |            | 190     | 836.6       | 28.50                      | 22.48                                | 30.00                         |
|        |           |            | 251     | 848.8       | 28.55                      | 22.53                                | 30.00                         |
|        |           | 3          | 128     | 824.2       | 26.71                      | 22.45                                | 28.20                         |
|        |           |            | 190     | 836.6       | 26.67                      | 22.41                                | 28.20                         |
|        |           |            | 251     | 848.8       | 26.68                      | 22.42                                | 28.20                         |
|        |           | 4          | 128     | 824.2       | 25.50                      | 22.49                                | 27.00                         |
|        |           |            | 190     | 836.6       | 25.53                      | 22.52                                | 27.00                         |
|        |           |            | 251     | 848.8       | 25.50                      | 22.49                                | 27.00                         |

Max value

$$\text{Calculated Time Averaged Power} = \text{Burst Averaged Power} - 10 \log \left( \frac{1}{\#UL \text{ Slots}/8} \right)$$

| Band    | Mode      | # UL slots | Channel | Freq. (MHz) | Burst Averaged Power (dBm) | Calculated Time Averaged Power (dBm) | Factory Upper Tolerance (dBm) |
|---------|-----------|------------|---------|-------------|----------------------------|--------------------------------------|-------------------------------|
| GSM1900 | GSM       | 1          | 512     | 1850.2      | 29.10                      | 20.07                                | 30.00                         |
|         |           |            | 661     | 1880        | 29.22                      | 20.19                                | 30.00                         |
|         |           |            | 810     | 1909.8      | 29.59                      | 20.56                                | 30.00                         |
|         | GPRS GMSK | 1          | 512     | 1850.2      | 29.10                      | 20.07                                | 30.00                         |
|         |           |            | 661     | 1880        | 29.22                      | 20.19                                | 30.00                         |
|         |           |            | 810     | 1909.8      | 29.59                      | 20.56                                | 30.00                         |
|         |           | 2          | 512     | 1850.2      | 26.05                      | 20.03                                | 27.00                         |
|         |           |            | 661     | 1880        | 26.06                      | 20.04                                | 27.00                         |
|         |           |            | 810     | 1909.8      | 26.13                      | 20.11                                | 27.00                         |
|         |           | 3          | 512     | 1850.2      | 24.03                      | 20.02                                | 25.20                         |
|         |           |            | 661     | 1880        | 24.08                      | 20.04                                | 25.20                         |
|         |           |            | 810     | 1909.8      | 24.60                      | 20.04                                | 25.20                         |
|         |           | 4          | 512     | 1850.2      | 22.80                      | 19.79                                | 24.00                         |
|         |           |            | 661     | 1880        | 22.86                      | 19.85                                | 24.00                         |
|         |           |            | 810     | 1909.8      | 22.85                      | 19.84                                | 24.00                         |

Max value

$$\text{Calculated Time Averaged Power} = \text{Burst Averaged Power} - 10 \log \left( \frac{1}{\#UL \text{ Slots}/8} \right)$$

## B.2.2 WCDMA / HSPA

| Mode  | Band   | Channel | Frequency(MHz) | Power (dBm)  | Factory Upper Tolerance (dBm) |
|-------|--------|---------|----------------|--------------|-------------------------------|
|       |        |         |                | 12.2kbps RMC |                               |
| WCDMA | FDD II | 9262    | 1852.4         | 23.38        | 23.80                         |
|       |        | 9400    | 1880           | 23.45        | 23.80                         |
|       |        | 9538    | 1907.6         | 23.31        | 23.80                         |
|       | FDD V  | 4132    | 826.4          | 23.69        | 23.80                         |
|       |        | 4175    | 835            | 23.57        | 23.80                         |
|       |        | 4233    | 846.6          | 23.50        | 23.80                         |

Max value

| Mode  | Band   | Channel | Freq. (MHz) | Averaged Power (dBm) |           |           |           |
|-------|--------|---------|-------------|----------------------|-----------|-----------|-----------|
|       |        |         |             | Subtest 1            | Subtest 2 | Subtest 3 | Subtest 4 |
| HSDPA | FDD II | 9262    | 1852.4      | 22.71                | 22.73     | 22.72     | 22.75     |
|       |        | 9400    | 1880        | 22.75                | 22.76     | 22.8      | 22.79     |
|       |        | 9538    | 1907.6      | 22.56                | 22.53     | 22.55     | 22.57     |
|       | FDD V  | 4132    | 826.4       | 23.38                | 23.43     | 23.43     | 23.43     |
|       |        | 4175    | 835         | 23.15                | 23.15     | 23.15     | 23.15     |
|       |        | 4233    | 846.6       | 23.12                | 23.14     | 23.13     | 23.13     |

| Mode  | Band   | Channel | Freq. (MHz) | Averaged Power (dBm) |           |           |           |           |
|-------|--------|---------|-------------|----------------------|-----------|-----------|-----------|-----------|
|       |        |         |             | Subtest 1            | Subtest 2 | Subtest 3 | Subtest 4 | Subtest 5 |
| HSUPA | FDD II | 9262    | 1852.4      | 21.68                | 22.21     | 21.18     | 22.49     | 23.40     |
|       |        | 9400    | 1880        | 21.71                | 22.20     | 21.22     | 22.53     | 23.42     |
|       |        | 9538    | 1907.6      | 21.56                | 22.08     | 21.08     | 22.33     | 23.42     |
|       | FDD V  | 4132    | 826.4       | 22.12                | 22.91     | 21.8      | 23.19     | 22.15     |
|       |        | 4175    | 835         | 22.20                | 22.70     | 21.63     | 22.96     | 23.44     |
|       |        | 4233    | 846.6       | 22.13                | 22.64     | 21.62     | 22.91     | 23.40     |

### B.2.3 WLAN 2.4GHz (DTS)

| Band         | Mode      | Data Rate | Ch # | Freq [MHz] | Main            |                   | SAR Test?       |
|--------------|-----------|-----------|------|------------|-----------------|-------------------|-----------------|
|              |           |           |      |            | Avg Pwr [dBm]   | Tune-up Pwr [dBm] |                 |
| 2.4GHz (DTS) | 802.11b   | 1Mbps     | 1    | 2412       | 15.63           | 16.00             | Yes             |
|              |           |           | 6    | 2437       | 15.81           | 16.00             |                 |
|              |           |           | 11   | 2462       | 15.71           | 16.00             |                 |
|              | 802.11g   | 6Mbps     | 1    | 2412       | NR <sup>1</sup> | 11.00             | No <sup>2</sup> |
|              |           |           | 6    | 2437       |                 | 11.00             |                 |
|              |           |           | 11   | 2462       |                 | 11.00             |                 |
|              | 802.11n20 | HT0       | 1    | 2412       |                 | 10.00             | No <sup>2</sup> |
|              |           |           | 6    | 2437       |                 | 10.00             |                 |
|              |           |           | 11   | 2462       |                 | 10.00             |                 |

#### Initial test configuration

1. NR: Not Required
2. As per FCC OET KDB 248227 D01, conducted output power and SAR testing are not required for 802.11g/n20/n40 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2\text{W/kg}$

### B.2.4 Bluetooth

| Band   | Mode           | Data Rate                 | Channel | Frequency (MHz) | Avg Pwr [dBm] | Max output Pwr [dBm] |
|--------|----------------|---------------------------|---------|-----------------|---------------|----------------------|
| 2.4GHz | Bluetooth v2.1 | Basic rate GFSK           | 0       | 2402            | 5.20          | 5.50                 |
|        |                |                           | 39      | 2441            | 4.76          | 5.50                 |
|        |                |                           | 78      | 2480            | 4.30          | 5.50                 |
|        | Bluetooth v2.1 | Basic rate $\pi/4$ -DQPSK | 0       | 2402            | 5.45          | 5.50                 |
|        |                |                           | 39      | 2441            | 5.08          | 5.50                 |
|        |                |                           | 78      | 2480            | 4.70          | 5.50                 |
|        | Bluetooth v2.1 | Basic rate 8-DPSK         | 0       | 2402            | 5.43          | 5.50                 |
|        |                |                           | 39      | 2441            | 5.07          | 5.50                 |
|        |                |                           | 78      | 2480            | 4.62          | 5.50                 |
|        | Bluetooth v4.0 | Low energy GFSK           | 0       | 2402            | 4.94          | 5.00                 |
|        |                |                           | 19      | 2441            | 4.61          | 5.00                 |
|        |                |                           | 39      | 2480            | 4.21          | 5.00                 |

#### Initial test configuration

### B.3 Tissue Parameters Measurement

#### Head TSL

| Freq.<br>(MHz) | Target Parameters |          | Measured TSL<br>Parameters |          | Deviation (%) |          | Date       |
|----------------|-------------------|----------|----------------------------|----------|---------------|----------|------------|
|                | $\epsilon'$       | $\sigma$ | $\epsilon'$                | $\sigma$ | $\epsilon'$   | $\sigma$ |            |
| 835            | 41.55             | 0.91     | 39.40                      | 0.89     | -5.20         | -2.53    | 2016-03-22 |
| 1900           | 40.00             | 1.40     | 38.59                      | 1.44     | -3.52         | 2.59     | 2016-03-15 |
| 2450           | 39.20             | 1.80     | 35.73                      | 1.93     | -8.85         | 7.39     | 2016-06-14 |

#### Body TSL

| Freq.<br>(MHz) | Target Parameters |          | Measured TSL<br>Parameters |          | Deviation (%) |          | Date       |
|----------------|-------------------|----------|----------------------------|----------|---------------|----------|------------|
|                | $\epsilon'$       | $\sigma$ | $\epsilon'$                | $\sigma$ | $\epsilon'$   | $\sigma$ |            |
| 835            | 55.21             | 0.98     | 53.36                      | 0.99     | -3.34         | 0.52     | 2016-03-23 |
| 1900           | 53.30             | 1.52     | 50.06                      | 1.59     | -6.08         | 4.71     | 2016-03-15 |
| 2450           | 52.70             | 1.95     | 47.69                      | 2.06     | -9.50         | 5.82     | 2016-06-14 |

See Annex D for more details.

### B.4 System Check Measurements

#### Head Measurements

| Frequency<br>(MHz) | Average | Target SAR<br>(W/g) | Measured<br>SAR<br>(W/g) | Drift (%) | Limit (%) | Date       |
|--------------------|---------|---------------------|--------------------------|-----------|-----------|------------|
| 835                | 1g      | 9.17                | 9.07                     | -1.07     | 10        | 2016-03-22 |
|                    | 10g     | 6.00                | 5.93                     | -1.10     |           |            |
| 1900               | 1g      | 40.30               | 38.67                    | -4.05     |           | 2016-03-15 |
|                    | 10g     | 21.20               | 20.18                    | -4.80     |           |            |
| 2450               | 1g      | 52.80               | 55.66                    | 5.41      |           | 2016-06-14 |
|                    | 10g     | 24.80               | 25.53                    | 2.93      |           |            |

#### Body Measurements

| Frequency<br>(MHz) | Average | Target SAR<br>(W/g) | Measured<br>SAR<br>(W/g) | Drift (%) | Limit (%) | Date       |
|--------------------|---------|---------------------|--------------------------|-----------|-----------|------------|
| 835                | 1g      | 9.41                | 9.83                     | 4.48      | 10        | 2016-03-16 |
|                    | 10g     | 6.18                | 6.51                     | 5.30      |           |            |
| 1900               | 1g      | 40.50               | 42.36                    | 4.59      |           | 2016-03-15 |
|                    | 10g     | 21.50               | 21.98                    | 2.22      |           |            |
| 2450               | 1g      | 51.00               | 52.47                    | 2.89      |           | 2016-06-14 |
|                    | 10g     | 24.00               | 24.38                    | 1.58      |           |            |

See Annex C for more details.

## B.5 Cellular SAR Test Results

### B.5.1 GSM / GPRS – GSM 850

#### Head

| Mode            | Channel | Freq (MHz) | Position    | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot#    |
|-----------------|---------|------------|-------------|---------------------|---------------|------------------------|----------|
| GSM / Voice 1UL | 251     | 848.8      | Left Tilt   | 0.63                | 0.136         | 0.16                   |          |
|                 |         |            | Left Touch  | 0.63                | 0.212         | 0.25                   |          |
|                 |         |            | Right Tilt  | 0.63                | 0.162         | 0.19                   |          |
|                 |         |            | Right Touch | 0.63                | 0.298         | 0.34                   | <b>1</b> |

#### Body

| Mode            | Channel | Freq (MHz) | Position    | Dist (mm) | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot #   |
|-----------------|---------|------------|-------------|-----------|---------------------|---------------|------------------------|----------|
| GSM / Voice 1UL | 251     | 848.8      | Front face  | 10        | 0.63                | 0.392         | 0.45                   |          |
|                 |         |            | Back face   |           | 0.63                | 0.635         | 0.73                   | <b>2</b> |
|                 |         |            | Left edge   |           | 0.63                | 0.260         | 0.30                   |          |
|                 |         |            | Right edge  |           | 0.63                | 0.241         | 0.28                   |          |
|                 |         |            | Bottom edge |           | 0.63                | 0.071         | 0.08                   |          |

### B.5.2 GSM / GPRS – PCS 1900

#### Head

| Mode            | Channel | Freq (MHz) | Position    | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot#    |
|-----------------|---------|------------|-------------|---------------------|---------------|------------------------|----------|
| GSM / Voice 1UL | 810     | 1909.8     | Left Tilt   | 0.41                | 0.093         | 0.10                   |          |
|                 |         |            | Left Touch  | 0.41                | 0.207         | 0.23                   |          |
|                 |         |            | Right Tilt  | 0.41                | 0.115         | 0.13                   |          |
|                 |         |            | Right Touch | 0.41                | 0.352         | 0.39                   | <b>3</b> |

#### Body

| Mode            | Channel | Freq (MHz) | Position    | Dist (mm) | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot #   |
|-----------------|---------|------------|-------------|-----------|---------------------|---------------|------------------------|----------|
| GSM / Voice 1UL | 810     | 1909.8     | Front face  | 10        | 0.41                | 0.352         | 0.39                   |          |
|                 |         |            | Back face   |           | 0.41                | 0.648         | 0.71                   | <b>4</b> |
|                 |         |            | Left edge   |           | 0.41                | 0.068         | 0.08                   |          |
|                 |         |            | Right edge  |           | 0.41                | 0.162         | 0.18                   |          |
|                 |         |            | Bottom edge |           | 0.41                | 0.381         | 0.42                   |          |

### B.5.3 WCDMA / HSPA – FDD II

#### Head

| Mode         | Channel | Freq (MHz) | Position    | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot # |
|--------------|---------|------------|-------------|---------------------|---------------|------------------------|--------|
| 12.2kbps RMC | 9400    | 1880       | Left Tilt   | 0.35                | 0.147         | 0.16                   |        |
|              |         |            | Left Touch  | 0.35                | 0.465         | 0.50                   |        |
|              |         |            | Right Tilt  | 0.35                | 0.152         | 0.16                   |        |
|              |         |            | Right Touch | 0.35                | 0.704         | 0.76                   | 5      |

#### Body

| Mode         | Channel | Freq (MHz) | Position    | Dist (mm) | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot # |
|--------------|---------|------------|-------------|-----------|---------------------|---------------|------------------------|--------|
| 12.2kbps RMC | 9400    | 1880       | Front face  | 10        | 0.35                | 0.681         | 0.74                   |        |
|              |         |            | Back face   |           | 0.35                | 1.100         | 1.19                   | 6      |
|              |         |            | Left edge   |           | 0.35                | 0.114         | 0.12                   |        |
|              |         |            | Right edge  |           | 0.35                | 0.282         | 0.31                   |        |
|              |         |            | Bottom edge |           | 0.35                | 0.663         | 0.72                   |        |
| 12.2kbps RMC | 9262    | 1852.4     | Back face   | 10        | 0.42                | 1.040         | 1.15                   |        |
| 12.2kbps RMC | 9538    | 1907.6     | Back face   | 10        | 0.49                | 0.999         | 1.12                   |        |

### B.5.4 WCDMA / HSPA – FDD V

#### Head

| Mode         | Channel | Freq (MHz) | Position    | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot # |
|--------------|---------|------------|-------------|---------------------|---------------|------------------------|--------|
| 12.2kbps RMC | 4132    | 826.4      | Left Tilt   | 0.11                | 0.104         | 0.11                   |        |
|              |         |            | Left Touch  | 0.11                | 0.175         | 0.18                   | 7      |
|              |         |            | Right Tilt  | 0.11                | 0.120         | 0.12                   |        |
|              |         |            | Right Touch | 0.11                | 0.171         | 0.18                   |        |

#### Body

| Mode         | Channel | Freq (MHz) | Position    | Dist (mm) | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot # |
|--------------|---------|------------|-------------|-----------|---------------------|---------------|------------------------|--------|
| 12.2kbps RMC | 4132    | 826.4      | Front face  | 10        | 0.11                | 0.310         | 0.32                   |        |
|              |         |            | Back face   |           | 0.11                | 0.741         | 0.76                   | 8      |
|              |         |            | Left edge   |           | 0.11                | 0.232         | 0.24                   |        |
|              |         |            | Right edge  |           | 0.11                | 0.262         | 0.27                   |        |
|              |         |            | Bottom edge |           | 0.11                | 0.057         | 0.06                   |        |

### B.5.5 802.11b/g/n – 2.4GHz – DTS

#### Head

| Mode          | Channel | Freq (MHz) | Position    | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot #   |
|---------------|---------|------------|-------------|---------------------|---------------|------------------------|----------|
| 802.11b 1Mbps | 6       | 2437       | Left Tilt   | 0.17                | 0.123         | 0.13                   |          |
|               |         |            | Left Touch  | 0.17                | 0.301         | 0.31                   | <b>9</b> |
|               |         |            | Right Tilt  | 0.17                | 0.053         | 0.06                   |          |
|               |         |            | Right Touch | 0.17                | 0.102         | 0.11                   |          |

#### Body

| Mode          | Channel | Freq (MHz) | Position   | Dist (mm) | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot #    |
|---------------|---------|------------|------------|-----------|---------------------|---------------|------------------------|-----------|
| 802.11b 1Mbps | 6       | 2437       | Front face | 10        | 0.17                | 0.040         | 0.04                   |           |
|               |         |            | Back face  |           | 0.17                | 0.078         | 0.08                   | <b>10</b> |
|               |         |            | Left edge  |           | 0.17                | 0.020         | 0.02                   |           |
|               |         |            | Right edge |           | 0.17                | 0.014         | 0.01                   |           |
|               |         |            | Top edge   |           | 0.17                | 0.044         | 0.05                   |           |

### B.5.6 Bluetooth – 2.4GHz – DSSS

#### Head

| Mode        | Channel | Freq (MHz) | Position    | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot # |
|-------------|---------|------------|-------------|---------------------|---------------|------------------------|--------|
| 802.15 EDR1 | 0       | 2402       | Left Tilt   | 0.05                | 0.002         | 0.00                   |        |
|             |         |            | Left Touch  | 0.05                | 0.000         | 0.00                   |        |
|             |         |            | Right Tilt  | 0.05                | 0.004         | 0.00                   |        |
|             |         |            | Right Touch | 0.05                | 0.038         | 0.04                   |        |

#### Body

| Mode        | Channel | Freq (MHz) | Position   | Dist (mm) | Correct Factor (dB) | SAR 1g (W/kg) | Reported SAR 1g (W/kg) | Plot # |
|-------------|---------|------------|------------|-----------|---------------------|---------------|------------------------|--------|
| 802.15 EDR1 | 0       | 2402       | Front face | 10        | 0.05                | 0.000         | 0.00                   |        |
|             |         |            | Back face  |           | 0.05                | 0.007         | 0.01                   |        |
|             |         |            | Left edge  |           | 0.05                | 0.015         | 0.02                   |        |
|             |         |            | Right edge |           | 0.05                | 0.003         | 0.00                   |        |
|             |         |            | Top edge   |           | 0.05                | 0.029         | 0.03                   |        |

## B.6 SAR Measurement Variability

According to FCC OET KDB 865664, SAR Measurement variability is assessed when the maximum initial measured SAR is  $>0.8$  W/kg for a certain band/mode. If the measured SAR value of the initial repeated measurement is  $<1.45$  W/kg with  $<20\%$  variation, only one repeated measurement is required to confirm that the results are not expected to have substantial variations.

| Band / Mode  | Position  | Channel | Freq.<br>(MHz) | Measured<br>SAR 1g<br>(W/kg) | Repeated<br>SAR 1g<br>(W/Kg) | Ratio |
|--------------|-----------|---------|----------------|------------------------------|------------------------------|-------|
| 12.2kbps RMC | Back face | 9400    | 1880           | 1.10                         | 1.09                         | 1.01  |

## B.7 Simultaneous Transmission SAR Evaluation

According to FCC OET KDB 447498 D01, when the sum of 1g SAR for all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

| Position |             | Highest Reported SAR 1g (W/kg) |                      |                    |
|----------|-------------|--------------------------------|----------------------|--------------------|
|          |             | Cellular<br>[PCE]              | WLAN 2.4GHz<br>[DTS] | Bluetooth<br>[DSS] |
| HEAD     | Left Tilt   | 0.16                           | 0.13                 | 0.00               |
|          | Left Touch  | 0.50                           | 0.31                 | 0.00               |
|          | Right Tilt  | 0.19                           | 0.06                 | 0.00               |
|          | Right Touch | 0.76                           | 0.11                 | 0.04               |
| BODY     | Front Face  | 0.74                           | 0.04                 | 0.00               |
|          | Back Face   | 1.19                           | 0.08                 | 0.01               |
|          | Left Edge   | 0.30                           | 0.02                 | 0.02               |
|          | Right Edge  | 0.31                           | 0.01                 | 0.00               |

| Σ SAR 1g (W/Kg)                     |           |            |            |            |            |           |           |            |
|-------------------------------------|-----------|------------|------------|------------|------------|-----------|-----------|------------|
| Simultaneous Tx Antenna Combination | HEAD      |            |            |            | BODY       |           |           |            |
|                                     | Left Tilt | Left Touch | Right Tilt | RightTouch | Front Face | Back Face | Left Edge | Right Edge |
| WLAN 2.4GHz + Cellular              | 0.29      | 0.81       | 0.25       | 0.87       | 0.78       | 1.27      | 0.32      | 0.32       |
| BT + Cellular                       | 0.16      | 0.50       | 0.19       | 0.80       | 0.74       | 1.20      | 0.32      | 0.31       |

Considering the results described above and according to the simultaneous transmission evaluation exclusions described in FCC OET KDB 447498 D01, no SAR to peak location ratio measurements are required.

## Annex C. Test System Plots

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## 1. GSM850, Voice 1UL, CH251 / Head Right Touch

Test Laboratory: Intel WRF Lab; Date/Time: 3/22/2016 12:20:55 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 848.8 MHz; Communication System PAR: 9.191 dB  
Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 0.904$  S/m;  $\epsilon_r = 39.179$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(9.33, 9.33, 9.33); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 33.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

### GSM-850, CH 251 848.8MHz, Head Right Touch /Area Scan (51x101x1):

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

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.333 W/kg

### GSM-850, CH 251 848.8MHz, Head Right Touch/Zoom Scan

**(5x6x9)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=4$ mm

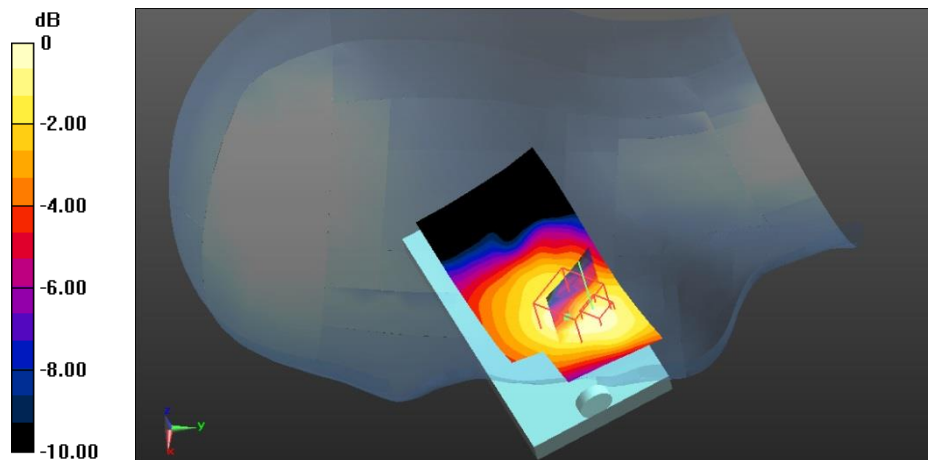
Reference Value = 5.828 V/m; Power Drift = -0.28 dB

Peak SAR (extrapolated) = 0.415 W/kg

**SAR(1 g) = 0.298 W/kg; SAR(10 g) = 0.211 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.330 W/kg



0 dB = 0.330 W/kg = -4.81 dBW/kg

## 2. GSM850, Voice 1UL, CH251 / Body Back Face

Test Laboratory: Intel WRF Lab; Date/Time: 3/16/2016 11:42:24 AM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 848.8 MHz; Communication System PAR: 9.191 dB

Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 1.002$  S/m;  $\epsilon_r = 53.258$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(9.06, 9.06, 9.06); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 33.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASYS2 52.8.8(1222);

### GSM-850, CH 251 848.8MHz, Body Back Face/Area Scan (61x101x1):

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

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.669 W/kg

### GSM-850, CH 251 848.8MHz, Body Back Face /Zoom Scan

**(5x6x9)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=4$ mm

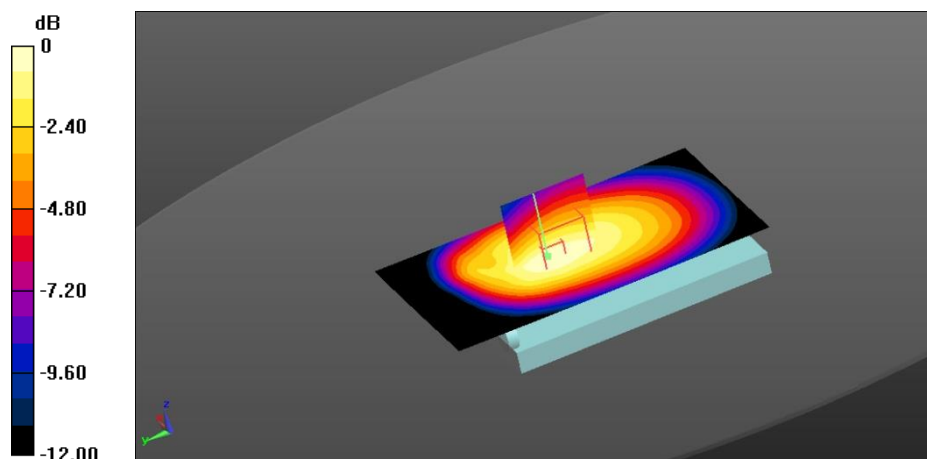
Reference Value = 23.08 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.835 W/kg

**SAR(1 g) = 0.635 W/kg; SAR(10 g) = 0.463 W/kg** (SAR corrected for target medium)

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.671 W/kg



0 dB = 0.671 W/kg = -1.73 dBW/kg

### 3. GSM1900, Voice 1UL, CH810 / Head Right Touch

Test Laboratory: Intel WRF Lab; Date/Time: 3/15/2016 12:04:09 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1909.8 MHz; Communication System PAR: 9.191 dB  
Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.447$  S/m;  $\epsilon_r = 36.155$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(7.69, 7.69, 7.69); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 23.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

#### GSM-1900, CH 810 1909.8MHz, Head Right Touch/Area Scan

**(51x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 0.388 W/kg

#### GSM-1900, CH 810 1909.8MHz, Head Right Touch /Zoom Scan

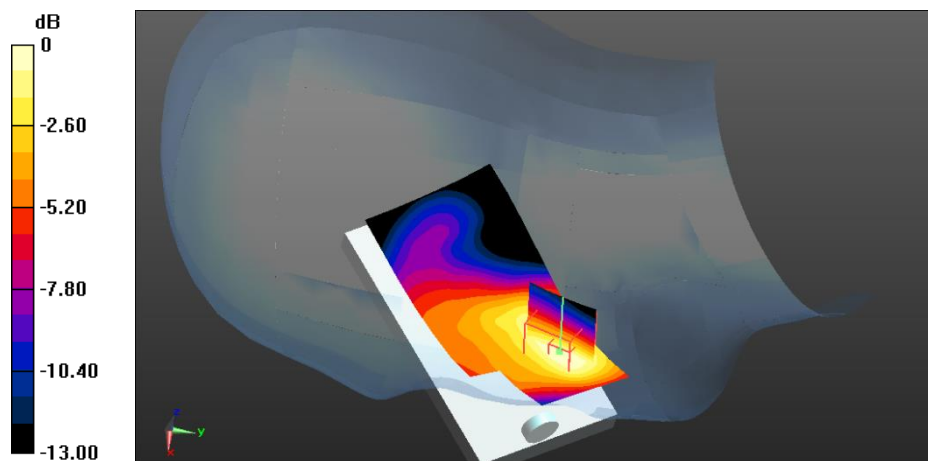
**(5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 5.719 V/m; Power Drift = -0.22 dB

Peak SAR (extrapolated) = 0.582 W/kg

**SAR(1 g) = 0.352 W/kg; SAR(10 g) = 0.204 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 0.387 W/kg



0 dB = 0.387 W/kg = -4.12 dBW/kg

#### 4. GSM1900, Voice 1UL, CH810 / Body Back Face

Test Laboratory: Intel WRF Lab; Date/Time: 3/15/2016 4:08:47 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1909.8 MHz; Communication System PAR: 9.191 dB  
Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.601$  S/m;  $\epsilon_r = 50.013$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(7.45, 7.45, 7.45); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 33.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASY52 52.8.8(1222);

#### GSM 1900-CH 810, 1909.8MHz, Body Back Face /Area Scan

**(61x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 0.731 W/kg

#### GSM1900 -CH 810 - 1909.8MHz Body Back Face /Zoom Scan

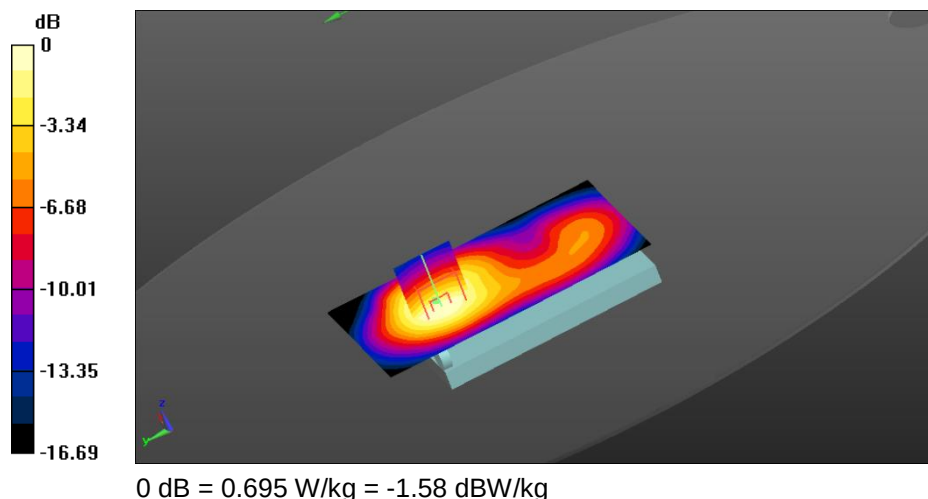
**(5x5x9)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=4$ mm

Reference Value = 9.359 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.07 W/kg

**SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.397 W/kg**

Maximum value of SAR (measured) = 0.695 W/kg



## 5. WCDMA FDD II, 12.2kbps RMC, CH9400 / Head Right Touch

Test Laboratory: Intel WRF Lab; Date/Time: 3/15/2016 10:16:39 AM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic 3G (0); Communication System Band: Band II UTRA/FDD;  
Frequency: 1880 MHz; Communication System PAR: 0 dB  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.42$  S/m;  $\epsilon_r = 36.295$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

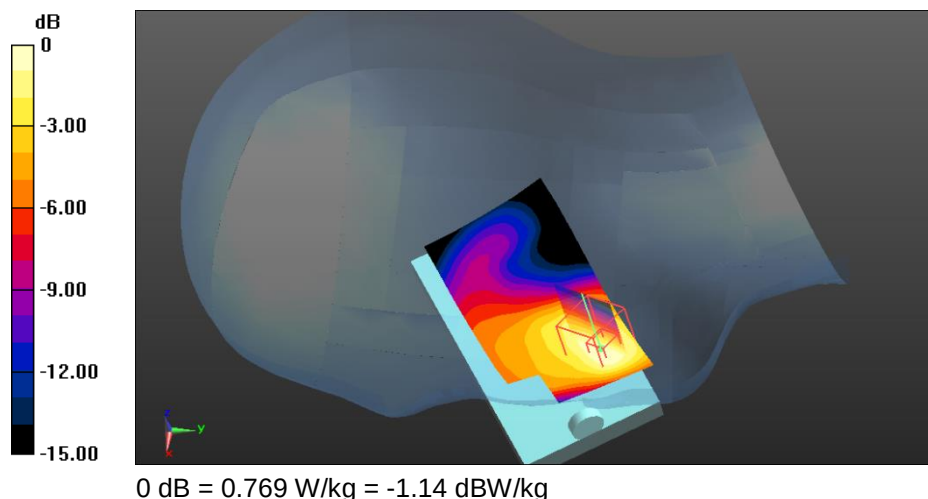
- Probe: EX3DV4 - SN3978; ConvF(7.69, 7.69, 7.69); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 23.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

### WCDMA FDD II, RMC, 12.2kbps, CH 9400, 1880MHz, Head Right Touch/Area Scan (51x101x1):

Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm  
Maximum value of SAR (interpolated) = 0.762 W/kg

### WCDMA FDD II, RMC, 12.2kbps, CH 9400, 1880MHz, Head Right Touch/Zoom Scan (5x5x9)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=4$ mm  
Reference Value = 8.471 V/m; Power Drift = 0.35 dB  
Peak SAR (extrapolated) = 1.16 W/kg  
**SAR(1 g) = 0.704 W/kg; SAR(10 g) = 0.415 W/kg** (SAR corrected for target medium)  
Maximum value of SAR (measured) = 0.769 W/kg



## 6. WCDMA FDD II, 12.2kbps RMC, CH9400 / Body Back Face

Test Laboratory: Intel WRF Lab; Date/Time: 3/15/2016 6:57:01 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic 3G (0); Communication System Band: Band II UTRA/FDD;  
Frequency: 1880 MHz; Communication System PAR: 0 dB  
Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.573$  S/m;  $\epsilon_r = 50.158$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(7.45, 7.45, 7.45); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)),  
Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 33.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASYS 52.8.8(1222);

**WCDMA FDD II, RMC, 12.2kbps, CH 9400, 1880MHz, Body Back-Face/Area Scan 2 (61x101x1):** Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm

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

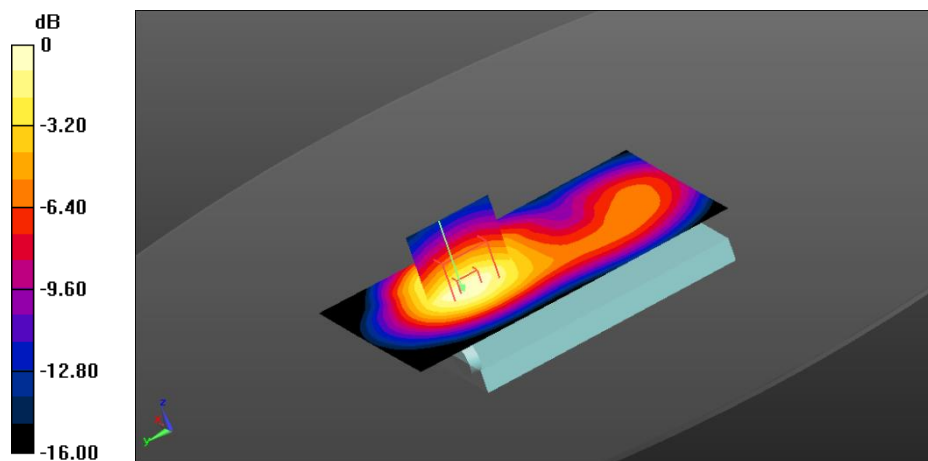
**WCDMA FDD II, RMC, 12.2kbps, CH 9400, 1880MHz, Body Back-Face/Zoom Scan (6x6x9)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=4$ mm

Reference Value = 13.34 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.80 W/kg

**SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.674 W/kg**

Maximum value of SAR (measured) = 1.19 W/kg



0 dB = 1.19 W/kg = 0.76 dBW/kg

## 7. WCDMA FDD V, 12.2kbps RMC, CH4132 / Head Left Touch

Test Laboratory: Intel WRF Lab; Date/Time: 3/22/2016 4:10:51 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic 3G (0); Communication System Band: Band V UTRA/FDD;  
Frequency: 826.4 MHz; Communication System PAR: 0 dB  
Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.877$  S/m;  $\epsilon_r = 39.532$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(9.33, 9.33, 9.33); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 23.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

### WCDMA FDD V, RMC, 12.2kbps, CH 4132, 826.4MHz, Head Left Touch/Area Scan (101x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.171 W/kg

### WCDMA FDD V, RMC, 12.2kbps, CH 4132, 826.4MHz, Head Left Touch/Zoom Scan (6x6x9)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=4mm

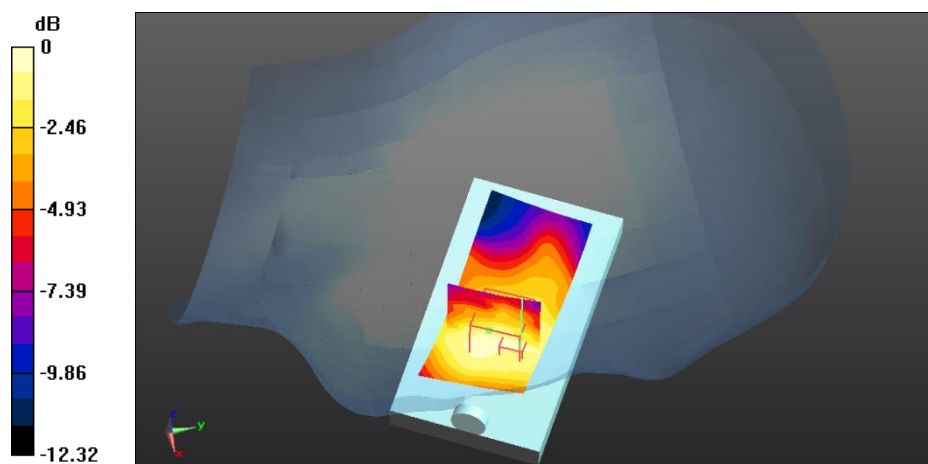
Reference Value = 13.49 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.244 W/kg

**SAR(1 g) = 0.175 W/kg; SAR(10 g) = 0.134 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.180 W/kg



0 dB = 0.180 W/kg = -7.45 dBW/kg

## 8. WCDMA FDD V, 12.2kbps RMC, CH4132 / Body Back Face

Test Laboratory: Intel WRF Lab; Date/Time: 3/16/2016 1:47:36 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, Generic 3G (0); Communication System Band: Band V UTRA/FDD;  
Frequency: 826.4 MHz; Communication System PAR: 0 dB  
Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.978$  S/m;  $\epsilon_r = 53.43$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(9.06, 9.06, 9.06); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)),  
Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 33.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASY52 52.8.8(1222);

### WCDMA FDD V, RMC, 12.2kbps, CH 4132, 826.4MHz, Body Back-Face/Area Scan 2 (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.777 W/kg

### WCDMA FDD V, RMC, 12.2kbps, CH 4132, 826.4MHz, Body Back-Face/Zoom Scan (6x6x9)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=4mm

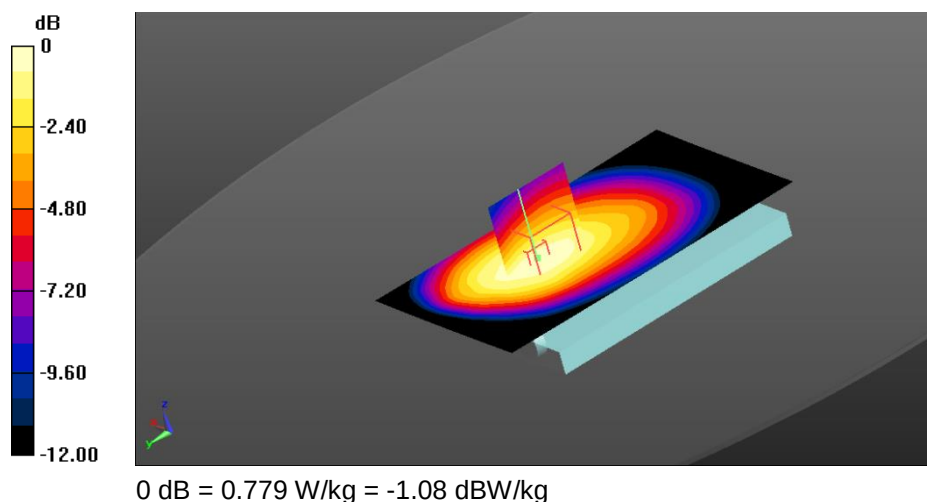
Reference Value = 25.11 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.00 W/kg

**SAR(1 g) = 0.741 W/kg; SAR(10 g) = 0.536 W/kg** (SAR corrected for target medium)

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.779 W/kg



## 9. 2.4GHz - 802.11b, CH6,Head/ Left Touch

Test Laboratory: Intel WRF Lab; Date/Time: 6/14/2016 1:38:54 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, 802.11 (0); Communication System Band: 2.4GHz; Frequency: 2437 MHz; Communication System PAR: 0 dB

Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.918$  S/m;  $\epsilon_r = 35.791$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN7325; ConvF(7.28, 7.28, 7.28); Calibrated: 12/11/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 23.0$
- Electronics: DAE4 Sn1496; Calibrated: 5/17/2016
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

### Head Left 2450MHz \_802.11b - 11Mbps-CH6, 2437MHz, Left Touch/Area Scan (121x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.330 W/kg

### Head Left 2450MHz \_802.11b - 11Mbps-CH6, 2437MHz, Left Touch/Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

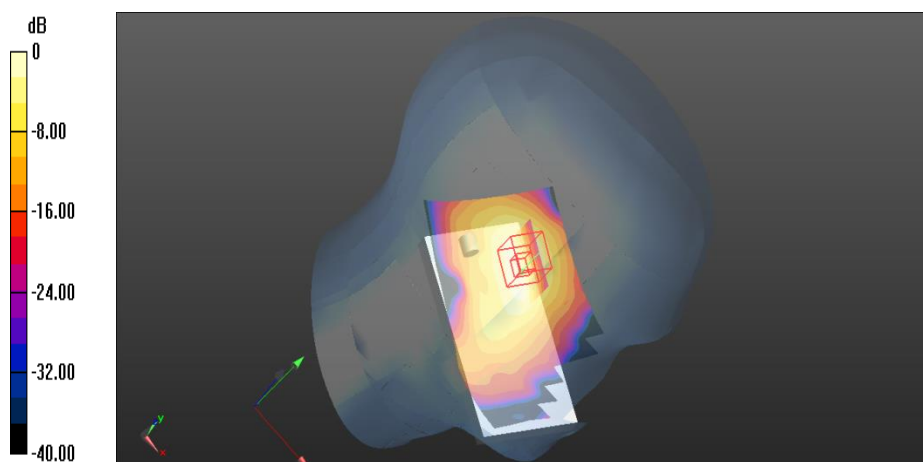
Reference Value = 4.995 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.758 W/kg

**SAR(1 g) = 0.301 W/kg; SAR(10 g) = 0.138 W/kg** (SAR corrected for target medium)

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.335 W/kg



0 dB = 0.335 W/kg = -4.75 dBW/kg

## 10.2.4GHz - 802.11b, CH6, Body/ Back Face

Test Laboratory: Intel WRF Lab; Date/Time: 6/14/2016 3:17:44 PM

**DUT: U307TG ; Type: Handset; Serial: MB27560400023**

Communication System: UID 0, 802.11 (0); Communication System Band: 2.4GHz; Frequency: 2437 MHz; Communication System PAR: 0 dB  
Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 2.046$  S/m;  $\epsilon_r = 47.75$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN7325; ConvF(7.41, 7.41, 7.41); Calibrated: 12/11/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 33.0$
- Electronics: DAE4 Sn1496; Calibrated: 5/17/2016
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASY52 52.8.8(1222);

### DTS\_802.11b-11Mbps-ch6- 2437MHz - Back Face – Main Antenna/Area Scan 2 (81x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0876 W/kg

### DTS\_802.11b-11Mbps-ch6- 2437MHz - Back Face – Main

**Antenna/Zoom Scan 2 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

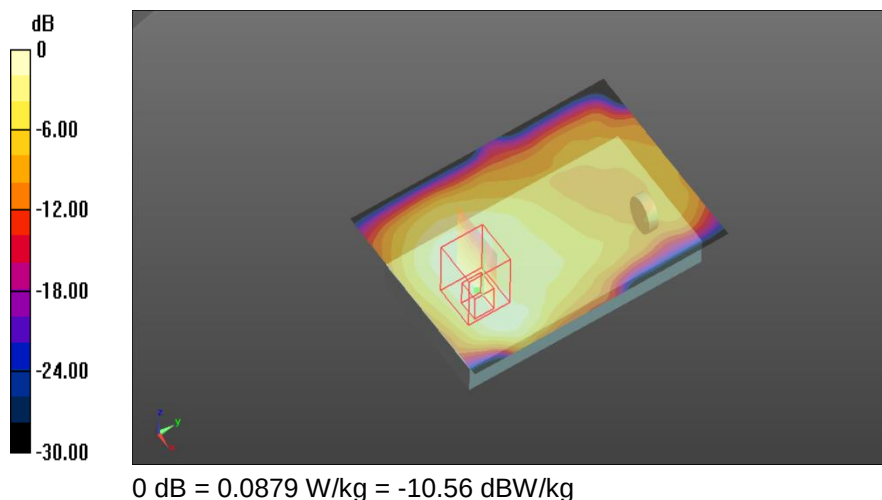
Reference Value = 3.670 V/m; Power Drift = -0.38 dB

Peak SAR (extrapolated) = 0.156 W/kg

**SAR(1 g) = 0.078 W/kg; SAR(10 g) = 0.039 W/kg** (SAR corrected for target medium)

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0879 W/kg



## 11. System Check Head Liquid 835MHz

Test Laboratory: Intel WRF Lab; Date/Time: 3/22/2016 10:08:33 AM

**DUT: Dipole 835 MHz ; Type: D835V2; Serial: 4d192**

Communication System: UID 0, CW (0); Communication System Band: CD835 (835.0 MHz);  
 Frequency: 835 MHz; Communication System PAR: 0 dB  
 Medium parameters used (interpolated):  $f = 835$  MHz;  $\sigma = 0.887$  S/m;  $\epsilon_r = 39.396$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(9.33, 9.33, 9.33); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 31.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

**System check, 835MHz, Head/Area Scan (91x121x1):** Interpolated grid:  
 $dx=1.500$  mm,  $dy=1.500$  mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.964 W/kg

**System check, 835MHz, Head/Zoom Scan (5x5x7)/Cube 0:** Measurement  
 grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

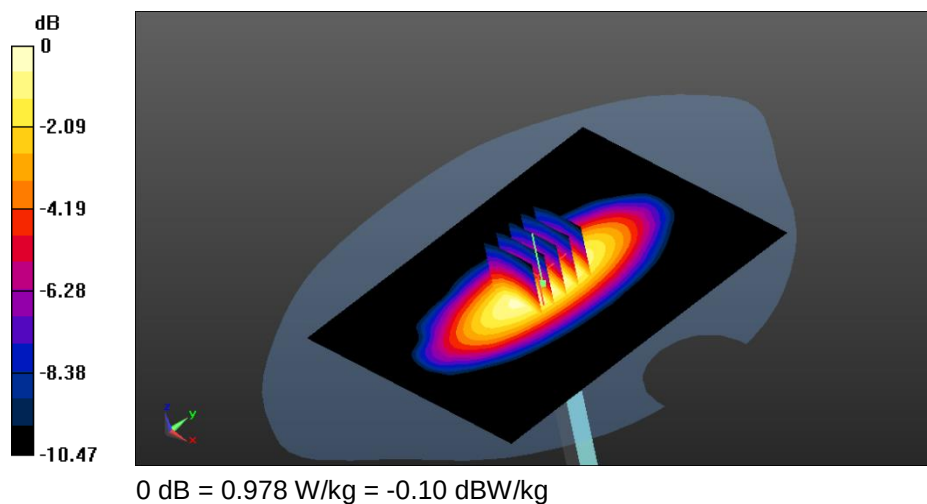
Reference Value = 33.26 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.35 W/kg

**SAR(1 g) = 0.902 W/kg; SAR(10 g) = 0.590 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.978 W/kg



### 13. System Check Body Liquid 835MHz

Test Laboratory: Intel WRF Lab; Date/Time: 3/16/2016 4:02:32 PM

**DUT: Dipole 835 MHz ; Type: D835V2; Serial: 4d192**

Communication System: UID 0, CW (0); Communication System Band: CD835 (835.0 MHz);  
 Frequency: 835 MHz; Communication System PAR: 0 dB  
 Medium parameters used (interpolated):  $f = 835$  MHz;  $\sigma = 0.987$  S/m;  $\epsilon_r = 53.364$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(9.06, 9.06, 9.06); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 31.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASY52 52.8.8(1222);

#### System check, 835MHz, Body/System check/Area Scan (91x121x1):

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

[Info: Interpolated medium parameters used for SAR evaluation.](#)

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

#### System check, 835MHz, Body/Zoom Scan (5x5x7)/Cube 0: Measurement

grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

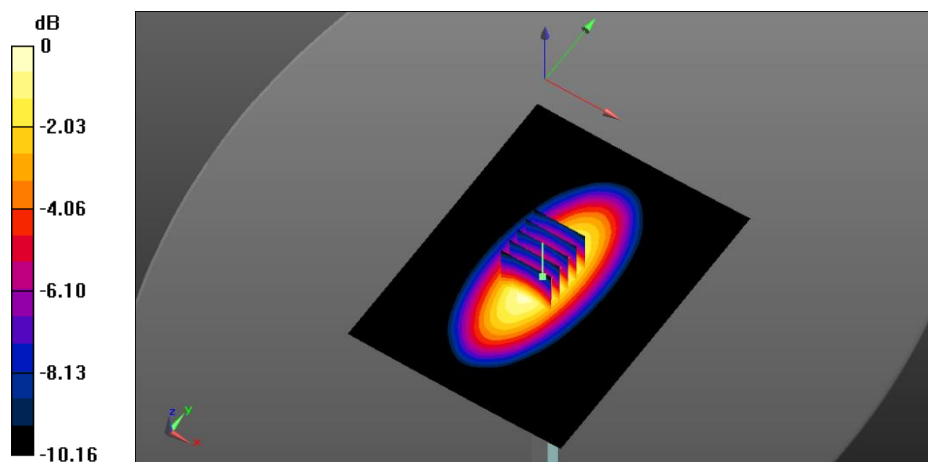
Reference Value = 33.23 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.42 W/kg

**SAR(1 g) = 0.982 W/kg; SAR(10 g) = 0.650 W/kg**

[Info: Interpolated medium parameters used for SAR evaluation.](#)

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



0 dB = 1.06 W/kg = 0.25 dBW/kg

## 14. System Check Head Liquid 1900MHz

Test Laboratory: Intel WRF Lab; Date/Time: 3/15/2016 2:35:54 PM

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial:5d197**

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz);  
Frequency: 1900 MHz; Communication System PAR: 0 dB  
Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.436$  S/m;  $\epsilon_r = 38.593$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

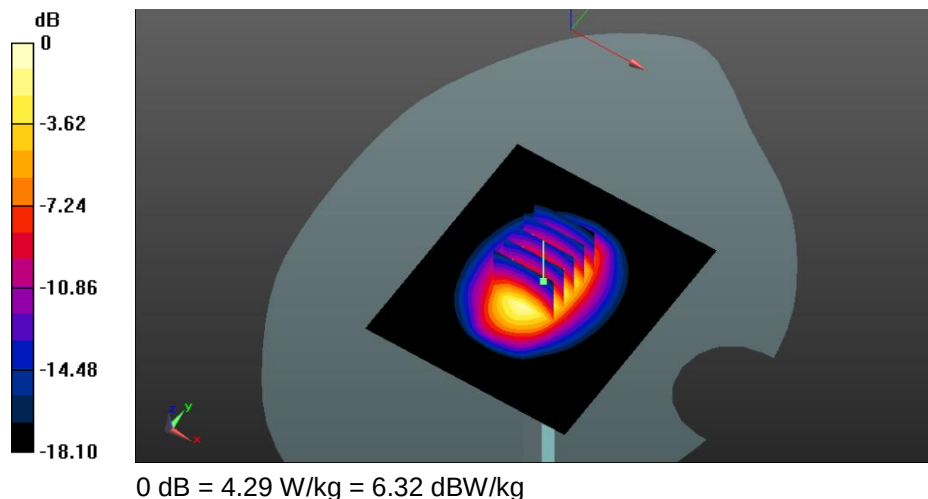
- Probe: EX3DV4 - SN3978; ConvF(7.69, 7.69, 7.69); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 31.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

### System check, 1900MHz, Head/System check/Area Scan 2 (71x81x1):

Interpolated grid:  $dx=1.500$  mm,  $dy=1.500$  mm  
Maximum value of SAR (interpolated) = 4.63 W/kg

### System check, 1900MHz, Head/Zoom Scan (5x5x7)/Cube 0: Measurement

grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm  
Reference Value = 64.81 V/m; Power Drift = -0.26 dB  
Peak SAR (extrapolated) = 7.18 W/kg  
**SAR(1 g) = 3.87 W/kg; SAR(10 g) = 2.02 W/kg** (SAR corrected for target medium)  
Maximum value of SAR (measured) = 4.29 W/kg



## 15. System Check Body Liquid 1900MHz

Test Laboratory: Intel WRF Lab; Date/Time: 3/15/2016 3:10:55 PM

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial:5d197**

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz);  
Frequency: 1900 MHz; Communication System PAR: 0 dB  
Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.592$  S/m;  $\epsilon_r = 50.059$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(7.45, 7.45, 7.45); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 31.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASY52 52.8.8(1222);

**System check, 1900MHz, Body/Area Scan (71x81x1):** Interpolated grid:

$dx=1.500$  mm,  $dy=1.500$  mm

Maximum value of SAR (interpolated) = 4.97 W/kg

**System check, 1900MHz, Body/System check/Zoom Scan**

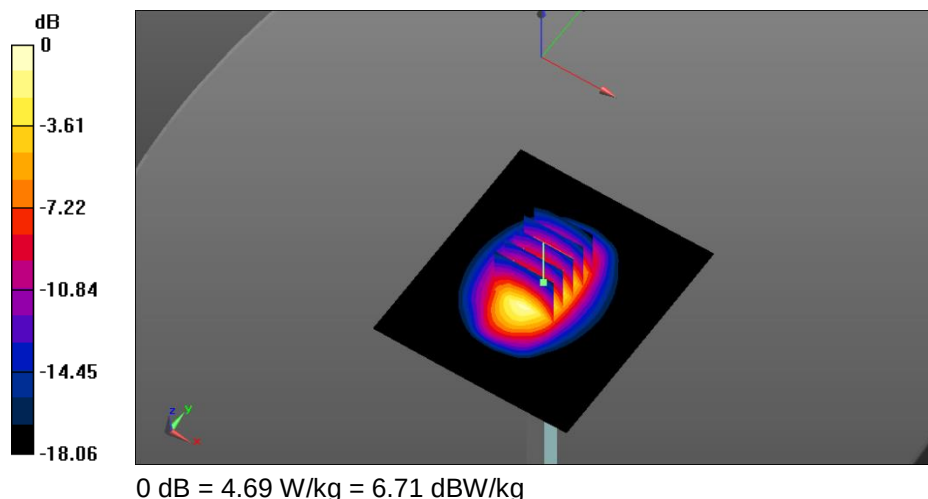
**(5x5x7)/Cube 0:** Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 54.31 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 7.85 W/kg

**SAR(1 g) = 4.24 W/kg; SAR(10 g) = 2.2 W/kg**

Maximum value of SAR (measured) = 4.69 W/kg



## 16. System Check Head Liquid 2450MHz

Test Laboratory: Intel WRF Lab; Date/Time: 6/14/2016 1:36:17 PM

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 937**

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz);

Frequency: 2450 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.933$  S/m;  $\epsilon_r = 35.732$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(6.97, 6.97, 6.97); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = -9.0, 31.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.8(1222);

**System Check-DTS-2450MHz/Area Scan (51x61x1):** Interpolated grid:  $dx=1.200$  mm,  $dy=1.200$  mm

Maximum value of SAR (interpolated) = 6.90 W/kg

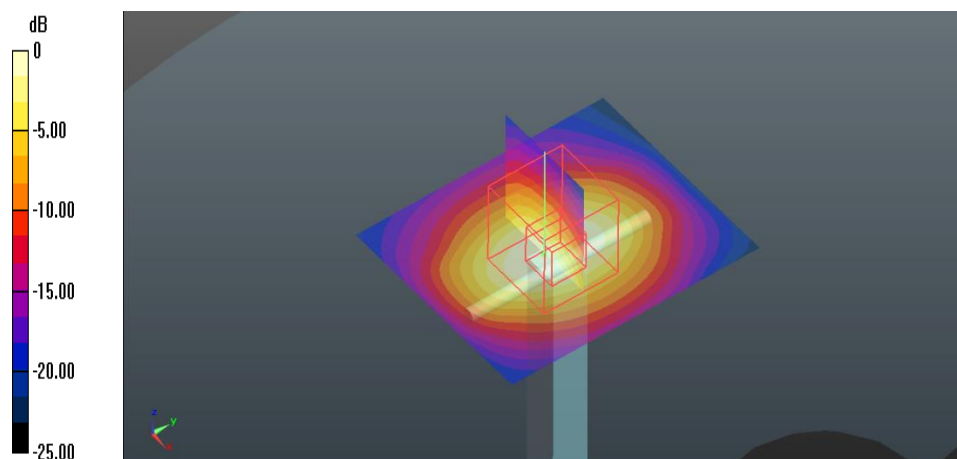
**System Check-DTS-2450MHz/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 56.24 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 12.0 W/kg

**SAR(1 g) = 5.56 W/kg; SAR(10 g) = 2.55 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 6.21 W/kg



0 dB = 6.21 W/kg = 7.93 dBW/kg

## 17. System Check Body Liquid 2450MHz

Test Laboratory: Intel WRF Lab; Date/Time: 6/14/2016 12:43:04 PM

**DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:xxx**

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz);

Frequency: 2450 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.064$  S/m;  $\epsilon_r = 47.694$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3978; ConvF(7.22, 7.22, 7.22); Calibrated: 6/15/2015;
  - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 2mm (Mechanical Surface Detection),  $z = -9.0, 31.0$
- Electronics: DAE4 Sn1429; Calibrated: 6/11/2015
- Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002BA;
- DASY52 52.8.8(1222);

**System Check-DTS-2450MHz/Area Scan (51x61x1):** Interpolated grid:  $dx=1.200$  mm,  $dy=1.200$  mm

Maximum value of SAR (interpolated) = 6.53 W/kg

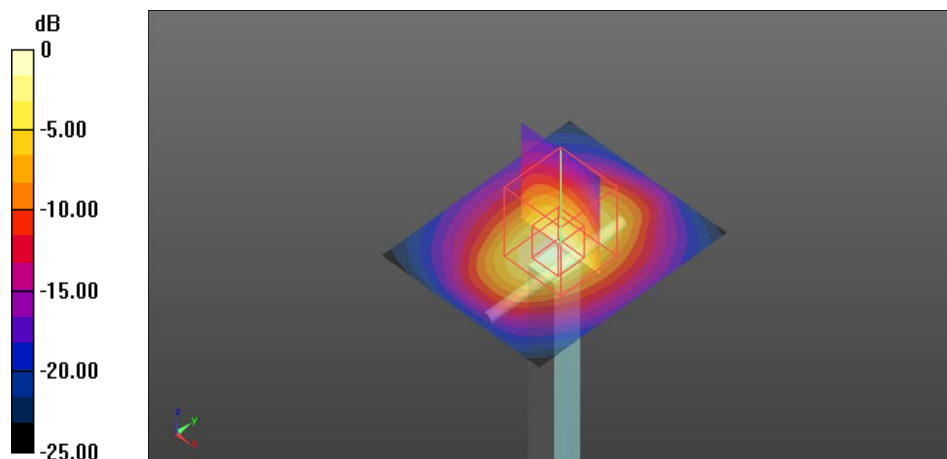
**System Check-DTS-2450MHz/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 62.74 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 10.8 W/kg

**SAR(1 g) = 5.23 W/kg; SAR(10 g) = 2.43 W/kg**

Maximum value of SAR (measured) = 7.92 W/kg

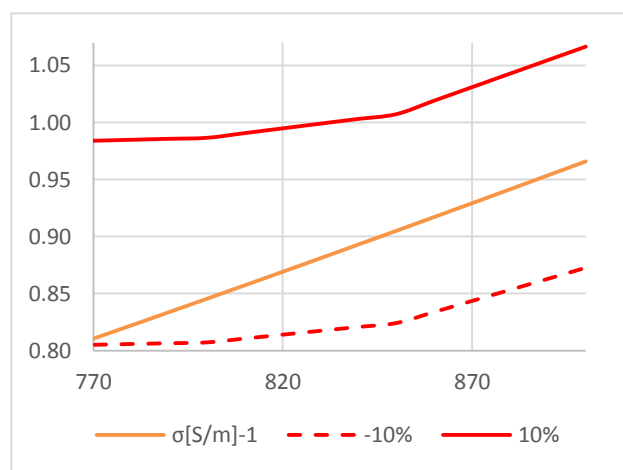
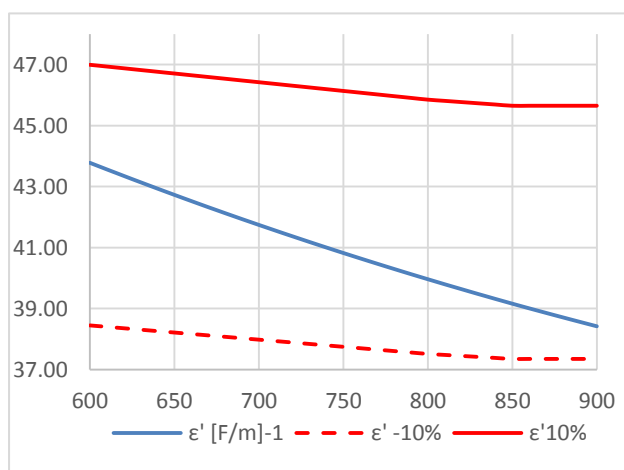


0 dB = 7.92 W/kg = 8.99 dBW/kg

# Annex D. TSL Dielectric Parameters

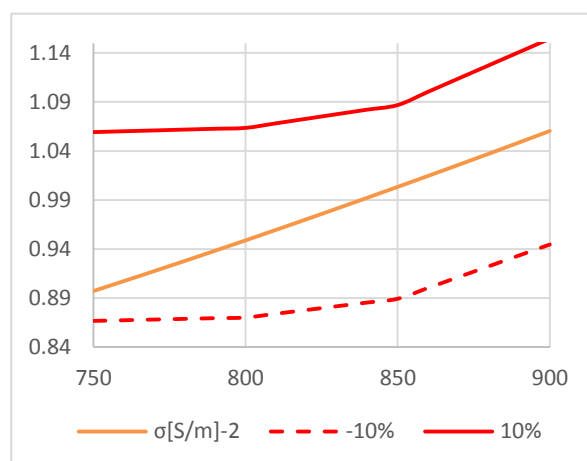
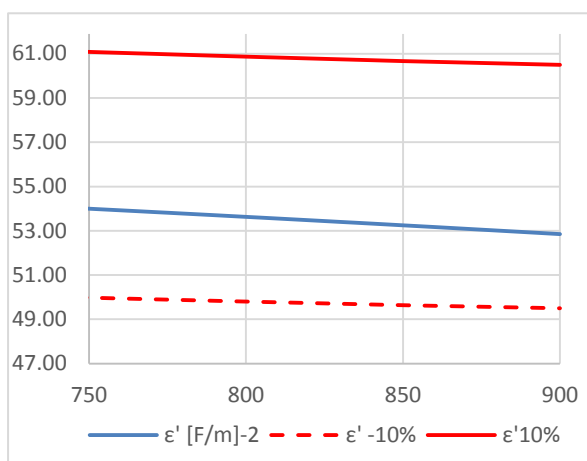
## Head 850MHz

| Freq.<br>(MHz) | Target      |          | Measured    |          |
|----------------|-------------|----------|-------------|----------|
|                | $\epsilon'$ | $\sigma$ | $\epsilon'$ | $\sigma$ |
| 770            | 41.84       | 0.89     | 40.47       | 0.81     |
| 780            | 41.79       | 0.90     | 40.30       | 0.82     |
| 790            | 41.73       | 0.90     | 40.13       | 0.83     |
| 800            | 41.68       | 0.90     | 39.96       | 0.85     |
| 810            | 41.65       | 0.90     | 39.80       | 0.86     |
| 820            | 41.61       | 0.90     | 39.64       | 0.87     |
| 830            | 41.57       | 0.91     | 39.47       | 0.88     |
| 835            | 41.55       | 0.91     | 39.40       | 0.89     |
| 840            | 41.54       | 0.91     | 39.32       | 0.893    |
| 850            | 41.50       | 0.92     | 39.16       | 0.91     |
| 860            | 41.50       | 0.93     | 39.01       | 0.92     |
| 870            | 41.50       | 0.94     | 38.86       | 0.93     |
| 880            | 41.50       | 0.95     | 38.71       | 0.94     |
| 890            | 41.50       | 0.96     | 38.56       | 0.95     |
| 900            | 41.50       | 0.97     | 38.42       | 0.97     |



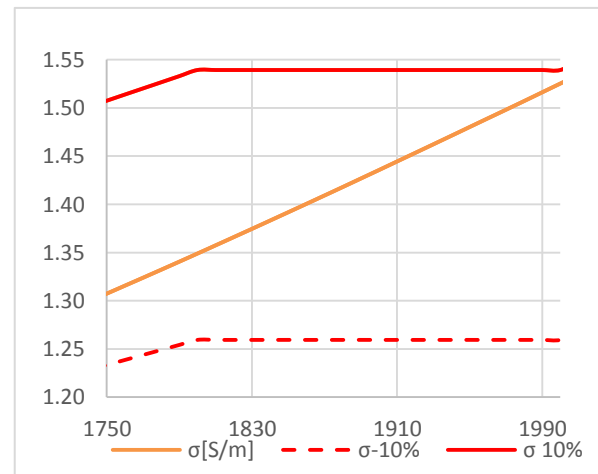
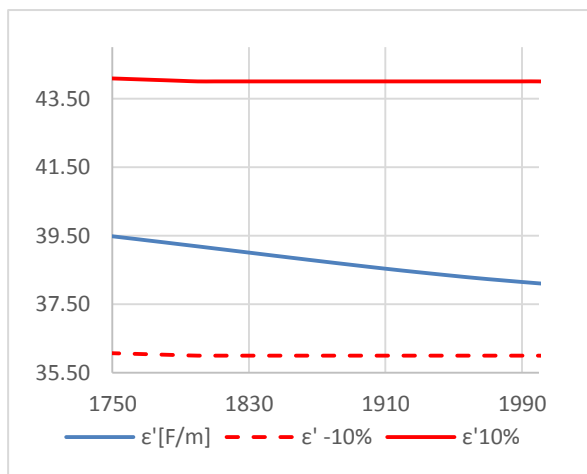
# Body 850 MHz

| Freq.<br>(MHz) | Target      |          | Measured    |          |
|----------------|-------------|----------|-------------|----------|
|                | $\epsilon'$ | $\sigma$ | $\epsilon'$ | $\sigma$ |
| 770            | 55.45       | 0.96     | 53.85       | 0.92     |
| 780            | 55.41       | 0.97     | 53.78       | 0.93     |
| 790            | 55.38       | 0.97     | 53.71       | 0.94     |
| 800            | 55.34       | 0.97     | 53.63       | 0.95     |
| 810            | 55.30       | 0.97     | 53.56       | 0.96     |
| 820            | 55.26       | 0.98     | 53.48       | 0.97     |
| 830            | 55.23       | 0.98     | 53.40       | 0.98     |
| 835            | 55.21       | 0.98     | 53.36       | 0.99     |
| 840            | 55.19       | 0.98     | 53.33       | 0.99     |
| 850            | 55.15       | 0.99     | 53.25       | 1.00     |
| 860            | 55.12       | 1.00     | 53.17       | 1.01     |
| 870            | 55.09       | 1.01     | 53.09       | 1.03     |
| 880            | 55.06       | 1.02     | 53.01       | 1.04     |
| 890            | 55.03       | 1.04     | 52.93       | 1.05     |
| 900            | 55.00       | 1.05     | 52.85       | 1.06     |



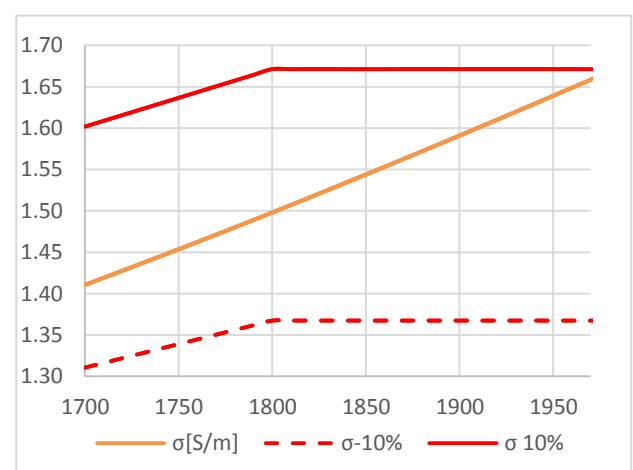
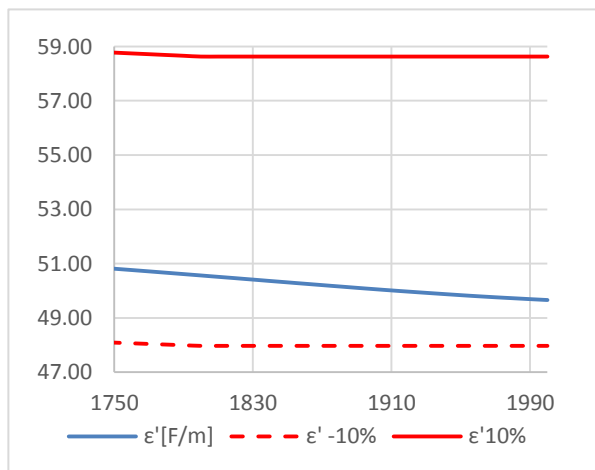
### Head 1900 MHz

| Freq.<br>(MHz) | Target      |          | Measured    |          |
|----------------|-------------|----------|-------------|----------|
|                | $\epsilon'$ | $\sigma$ | $\epsilon'$ | $\sigma$ |
| 1750           | 40.08       | 1.37     | 39.48       | 1.31     |
| 1760           | 40.06       | 1.38     | 39.42       | 1.32     |
| 1770           | 40.05       | 1.38     | 39.37       | 1.32     |
| 1780           | 40.03       | 1.39     | 39.31       | 1.33     |
| 1790           | 40.02       | 1.39     | 39.25       | 1.34     |
| 1800           | 40.00       | 1.40     | 39.19       | 1.35     |
| 1810           | 40.00       | 1.40     | 39.13       | 1.36     |
| 1820           | 40.00       | 1.40     | 39.07       | 1.37     |
| 1830           | 40.00       | 1.40     | 39.01       | 1.37     |
| 1840           | 40.00       | 1.40     | 38.95       | 1.38     |
| 1850           | 40.00       | 1.40     | 38.89       | 1.39     |
| 1860           | 40.00       | 1.40     | 38.83       | 1.40     |
| 1870           | 40.00       | 1.40     | 38.77       | 1.41     |
| 1880           | 40.00       | 1.40     | 38.71       | 1.42     |
| 1890           | 40.00       | 1.40     | 38.65       | 1.43     |
| 1900           | 40.00       | 1.40     | 38.59       | 1.44     |
| 1910           | 40.00       | 1.40     | 38.54       | 1.44     |
| 1920           | 40.00       | 1.40     | 38.48       | 1.45     |
| 1930           | 40.00       | 1.40     | 38.43       | 1.46     |
| 1940           | 40.00       | 1.40     | 38.38       | 1.47     |
| 1950           | 40.00       | 1.40     | 38.33       | 1.48     |
| 1960           | 40.00       | 1.40     | 38.28       | 1.49     |
| 1970           | 40.00       | 1.40     | 38.23       | 1.50     |
| 1980           | 40.00       | 1.40     | 38.19       | 1.51     |
| 1990           | 40.00       | 1.40     | 38.15       | 1.52     |
| 2000           | 40.00       | 1.40     | 38.11       | 1.53     |



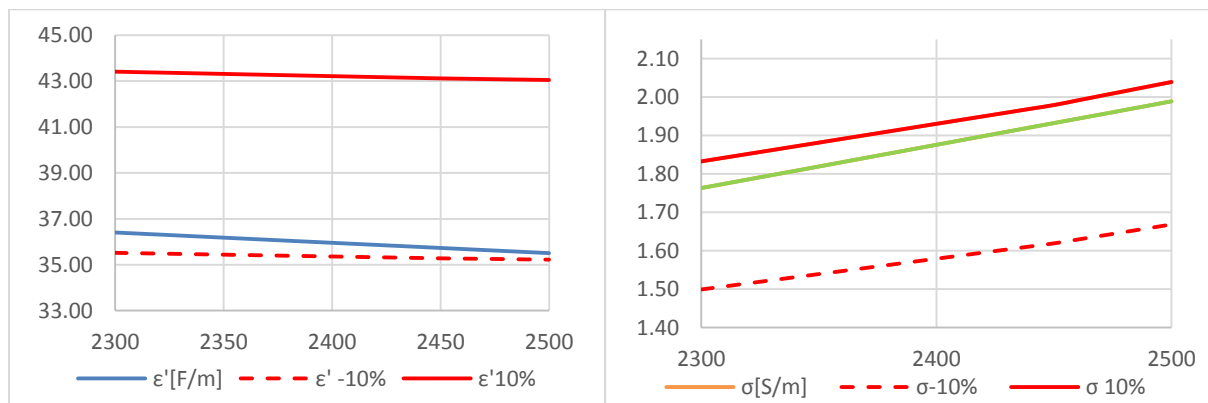
### Body 1900 MHz

| Freq.<br>(MHz) | Target      |          | Measured    |          |
|----------------|-------------|----------|-------------|----------|
|                | $\epsilon'$ | $\sigma$ | $\epsilon'$ | $\sigma$ |
| 1750           | 53.43       | 1.49     | 50.81       | 1.45     |
| 1760           | 53.41       | 1.49     | 50.76       | 1.46     |
| 1770           | 53.38       | 1.50     | 50.71       | 1.47     |
| 1780           | 53.35       | 1.51     | 50.66       | 1.48     |
| 1790           | 53.33       | 1.51     | 50.61       | 1.49     |
| 1800           | 53.30       | 1.52     | 50.56       | 1.50     |
| 1810           | 53.30       | 1.52     | 50.51       | 1.51     |
| 1820           | 53.30       | 1.52     | 50.46       | 1.52     |
| 1830           | 53.30       | 1.52     | 50.41       | 1.53     |
| 1840           | 53.30       | 1.52     | 50.36       | 1.53     |
| 1850           | 53.30       | 1.52     | 50.31       | 1.54     |
| 1860           | 53.30       | 1.52     | 50.26       | 1.55     |
| 1870           | 53.30       | 1.52     | 50.21       | 1.56     |
| 1880           | 53.30       | 1.52     | 50.16       | 1.57     |
| 1890           | 53.30       | 1.52     | 50.11       | 1.58     |
| 1900           | 53.30       | 1.52     | 50.06       | 1.59     |
| 1910           | 53.30       | 1.52     | 50.01       | 1.60     |
| 1920           | 53.30       | 1.52     | 49.97       | 1.61     |
| 1930           | 53.30       | 1.52     | 49.92       | 1.62     |
| 1940           | 53.30       | 1.52     | 49.88       | 1.63     |
| 1950           | 53.30       | 1.52     | 49.84       | 1.64     |
| 1960           | 53.30       | 1.52     | 49.80       | 1.65     |
| 1970           | 53.30       | 1.52     | 49.76       | 1.66     |
| 1980           | 53.30       | 1.52     | 49.73       | 1.67     |
| 1990           | 53.30       | 1.52     | 49.69       | 1.68     |
| 2000           | 53.30       | 1.52     | 49.66       | 1.69     |



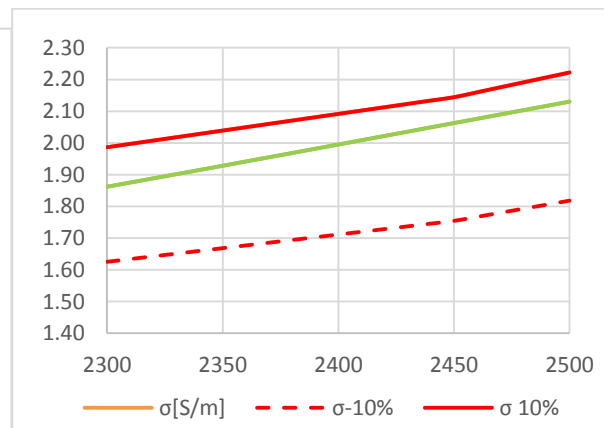
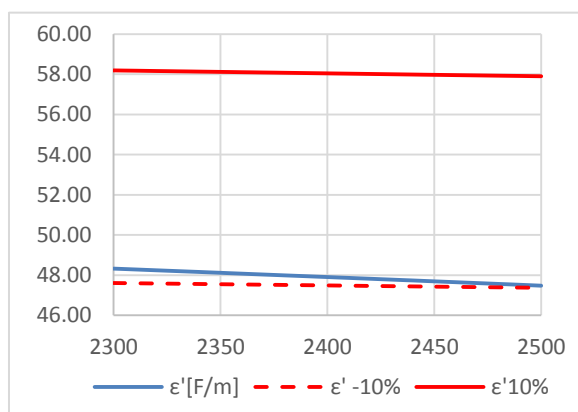
### Head 2450 MHz

| Freq.<br>(MHz) | Target      |          | Measured    |          |
|----------------|-------------|----------|-------------|----------|
|                | $\epsilon'$ | $\sigma$ | $\epsilon'$ | $\sigma$ |
| 2300           | 39.47       | 1.67     | 36.41       | 1.76     |
| 2310           | 39.45       | 1.67     | 36.36       | 1.77     |
| 2320           | 39.43       | 1.68     | 36.32       | 1.79     |
| 2330           | 39.41       | 1.69     | 36.27       | 1.80     |
| 2340           | 39.40       | 1.70     | 36.23       | 1.81     |
| 2350           | 39.38       | 1.71     | 36.18       | 1.82     |
| 2360           | 39.36       | 1.72     | 36.14       | 1.83     |
| 2370           | 39.34       | 1.73     | 36.09       | 1.84     |
| 2380           | 39.32       | 1.74     | 36.05       | 1.85     |
| 2390           | 39.31       | 1.75     | 36.00       | 1.86     |
| 2400           | 39.29       | 1.75     | 35.96       | 1.88     |
| 2410           | 39.27       | 1.76     | 35.91       | 1.89     |
| 2420           | 39.25       | 1.77     | 35.87       | 1.90     |
| 2430           | 39.24       | 1.78     | 35.82       | 1.91     |
| 2440           | 39.22       | 1.79     | 35.78       | 1.92     |
| 2450           | 39.20       | 1.80     | 35.73       | 1.93     |
| 2460           | 39.19       | 1.81     | 35.69       | 1.94     |
| 2470           | 39.17       | 1.82     | 35.64       | 1.95     |
| 2480           | 39.16       | 1.83     | 35.60       | 1.97     |
| 2490           | 39.15       | 1.84     | 35.55       | 1.98     |
| 2500           | 39.14       | 1.85     | 35.51       | 1.99     |



# Body 2450 MHz

| Freq.<br>(MHz) | Target      |          | Measured    |          |
|----------------|-------------|----------|-------------|----------|
|                | $\epsilon'$ | $\sigma$ | $\epsilon'$ | $\sigma$ |
| 2300           | 52.90       | 1.81     | 48.33       | 1.86     |
| 2310           | 52.89       | 1.82     | 48.29       | 1.88     |
| 2320           | 52.87       | 1.82     | 48.24       | 1.89     |
| 2330           | 52.86       | 1.83     | 48.20       | 1.90     |
| 2340           | 52.85       | 1.84     | 48.16       | 1.91     |
| 2350           | 52.83       | 1.85     | 48.12       | 1.93     |
| 2360           | 52.82       | 1.86     | 48.08       | 1.94     |
| 2370           | 52.81       | 1.87     | 48.03       | 1.95     |
| 2380           | 52.79       | 1.88     | 47.99       | 1.97     |
| 2390           | 52.78       | 1.89     | 47.95       | 1.98     |
| 2400           | 52.77       | 1.90     | 47.91       | 2.00     |
| 2410           | 52.75       | 1.91     | 47.86       | 2.01     |
| 2420           | 52.74       | 1.92     | 47.82       | 2.02     |
| 2430           | 52.73       | 1.93     | 47.78       | 2.04     |
| 2440           | 52.71       | 1.94     | 47.74       | 2.05     |
| 2450           | 52.70       | 1.95     | 47.69       | 2.06     |
| 2460           | 52.69       | 1.96     | 47.65       | 2.08     |
| 2470           | 52.67       | 1.98     | 47.61       | 2.09     |
| 2480           | 52.66       | 1.99     | 47.57       | 2.10     |
| 2490           | 52.65       | 2.01     | 47.52       | 2.12     |
| 2500           | 52.64       | 2.02     | 47.48       | 2.13     |



## Annex E. Calibration Certificates

| Device                           | Type/Model | Serial Number | Manufacturer | Calibration Certificate                                                             |
|----------------------------------|------------|---------------|--------------|-------------------------------------------------------------------------------------|
| Dosimetric E-field Probe         | EX3DV4     | 3978          | SPEAG        |  |
| 835MHz System Validation Dipole  | D835V2     | 4d192         | SPEAG        |  |
| 1900MHz System Validation Dipole | D1900V2    | 5d197         | SPEAG        |  |
| 2450MHz System Validation Dipole | D2450V2    | 937           | SPEAG        |  |

### Dipole calibration

According to the KDB 865664 D01, a dipole must be calibrated using a fully validated SAR system according to the tissue dielectric parameters and SAR probe calibration frequency required for device testing. However, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements.

1. When the most recent return-loss result, measured at least annually, deviates by more than 20% from the previous measurement (i.e. value in dB  $\times$  0.2) or not meeting the required 20 dB minimum return-loss requirement.
2. When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5  $\Omega$  from the previous measurement.

The below results show the latest return loss and impedance measurements for each dipole performed by the lab:

| Dipole 835MHz Head TSL  |                  |                        |            |
|-------------------------|------------------|------------------------|------------|
|                         | Return Loss [dB] | Impedance [ $\Omega$ ] | Date       |
| Previous                | -31.50           | 52 -1.8 j              | 2015-01-23 |
| Last                    | -31.00           | 49.8 – 1.4 j           | 2016-01-21 |
| Difference              | 10.87%           | -2.5 + 0.4 j           |            |
| Dipole 835MHz Body TSL  |                  |                        |            |
|                         | Return Loss [dB] | Impedance [ $\Omega$ ] | Date       |
| Previous                | -27.30           | 47.8 – 3.6 j           | 2015-01-23 |
| Last                    | -26.70           | 45.6 – 3.0 j           | 2016-01-21 |
| Difference              | 12.90%           | -2.2 + 0.6 j           |            |
| Dipole 1900MHz Head TSL |                  |                        |            |
|                         | Return Loss [dB] | Impedance [ $\Omega$ ] | Date       |
| Previous                | -24.10           | 53.8 + 5.2 j           | 2015-01-14 |
| Last                    | -23.70           | 51.7 + 2.6 j           | 2016-01-12 |
| Difference              | 8.79%            | -2.1 - 2.6 j           |            |
| Dipole 1900MHz Body TSL |                  |                        |            |
|                         | Return Loss [dB] | Impedance [ $\Omega$ ] | Date       |
| Previous                | -24.50           | 49.5 + 5.9 j           | 2015-01-14 |
| Last                    | -24.05           | 49.3 + 4.1 j           | 2016-01-12 |
| Difference              | 9.85%            | -0.2 - 1.8 j           |            |
| Dipole 2450MHz Head TSL |                  |                        |            |
|                         | Return Loss [dB] | Impedance [ $\Omega$ ] | Date       |
| Previous                | -26.10           | 55.2 + 0.1 j           | 2015-06-22 |
| Last                    | -25.50           | 51.57 + 0.57 j         | 2015-12-18 |
| Difference              | 12.90%           | -3.63 + 0.47 j         |            |
| Dipole 2450MHz Body TSL |                  |                        |            |
|                         | Return Loss [dB] | Impedance [ $\Omega$ ] | Date       |
| Previous                | -30.10           | 51.6 + 2.7 j           | 2014-12-15 |
| Last                    | -29.30           | 49.65 + 0.44 j         | 2015-12-18 |
| Difference              | 16.80%           | -1.95 – 2.26 j         |            |