# FCC SAR Test Report

| | | |
|---|---|---|
| **Report No.** | : | **SA131114C03** |
| **Applicant** | : | **Kyocera Communications, Inc. c/o Kyocera Corporation** |
| **Address** | : | **8611 Balboa Ave. San Diego, CA 92123** |
| **Product** | : | **Kyocera Phone** |
| **FCC ID** | : | **V65C6730** |
| **Brand** | : | **Kyocera** |
| **Model No.** | : | **C6730** |
| **Standards** | : | **FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1992 / IEEE 1528:2003<br>IEEE 1528a-2005 / KDB 865664 D01 v01r02<br>KDB 248227 D01 v01r02 / KDB 447498 D01 v05r01 / KDB 648474 D04 v01r02<br>KDB 941225 D01 v02 / KDB 941225 D05 v02r03 / KDB 941225 D06 v01r01** |
| **Sample Received Date** | : | **Nov. 14, 2013** |
| **Date of Testing** | : | **Dec. 06, 2013 ~ Dec. 12, 2013** |

**CERTIFICATION:** The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch – Lin Kou Laboratories**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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2021

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# Release Control Record

| Issue No. | Reason for Change | Date Issued |
|---|---|---|
| R01 | Initial release | Dec. 23, 2013 |
| | | |
| | | |
| | | |

# 1. Summary of Maximum SAR Value

| Equipment Class | Mode | Highest Reported Head $SAR_{1g}$ (W/kg) | Highest Reported Body-Worn $SAR_{1g}$ (1.0 cm Gap) (W/kg) | Highest Reported Hotspot $SAR_{1g}$ (1.0 cm Gap) (W/kg) |
|---|---|---|---|---|
| PCE | CDMA BC0 | 0.52 | 0.76 | 0.76 |
| | CDMA BC1 | 0.86 | 1.08 | 1.11 |
| | CDMA BC10 | 0.48 | 0.70 | 0.70 |
| | LTE 25 | 0.60 | 0.71 | 0.71 |
| | LTE 26 | 0.41 | 0.39 | 0.39 |
| | LTE 41 | 0.63 | 0.27 | 0.27 |
| DTS | 2.4G WLAN | 0.30 | 0.16 | 0.16 |
| DSS | Bluetooth | N/A | N/A | N/A |
| DXX | NFC | N/A | N/A | N/A |
| Highest Simultaneous Transmission SAR | | Head (W/kg) | Body-Worn (W/kg) | Hotspot (W/kg) |
| PCE+DTS | | 1.16 | 1.24 | 1.24 |
| PCE+DSS | | N/A | 1.12 | N/A |

**Note:**

1. The SAR limit **(Head & Body: $SAR_{1g}$ 1.6 W/kg)** for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992.

## 2. Description of Equipment Under Test

| | |
|---|---|
| **EUT Type** | Kyocera Phone |
| **FCC ID** | V65C6730 |
| **Brand Name** | Kyocera |
| **Model Name** | C6730 |
| **Tx Frequency Bands (Unit: MHz)** | CDMA BC0 : 824.7 ~ 848.31<br>CDMA BC1 : 1851.25 ~ 1908.75<br>CDMA BC10 : 817.9 ~ 823.1<br>LTE Band 25 : 1851.5 ~ 1913.5<br>LTE Band 26 : 814.7 ~ 848.3<br>LTE Band 41 : 2501 ~ 2685<br>WLAN : 2412 ~ 2462<br>Bluetooth : 2402 ~ 2480<br>NFC : 13.56 |
| **Uplink Modulations** | CDMA : QPSK<br>LTE : QPSK, 16QAM<br>802.11b : DSSS<br>802.11g/n : OFDM<br>Bluetooth : GFSK<br>NFC : ASK |
| **Maximum Tune-up Conducted Power (Unit: dBm)** | CDMA BC0 : 25.2<br>CDMA BC1 : 25.2<br>CDMA BC10 : 25.2<br>LTE Band 25 : 24.2<br>LTE Band 26 : 23.7<br>LTE Band 41 : 24.2<br>WLAN 2.4G : 19.0<br>Bluetooth : 2.5 |
| **Antenna Type** | Fixed Internal Antenna |
| **EUT Stage** | Identical Prototype |

**Note:**

1. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

**List of Accessory:**

| | | |
|---|---|---|
| **Battery** | **Brand Name** | Kyocera |
| | **Model Name** | SCP-59LBPS |
| | **Power Rating** | 3.8Vdc, 2000mAh |
| | **Type** | Li-ion |

# 3. SAR Measurement System

## 3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

## 3.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4/5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

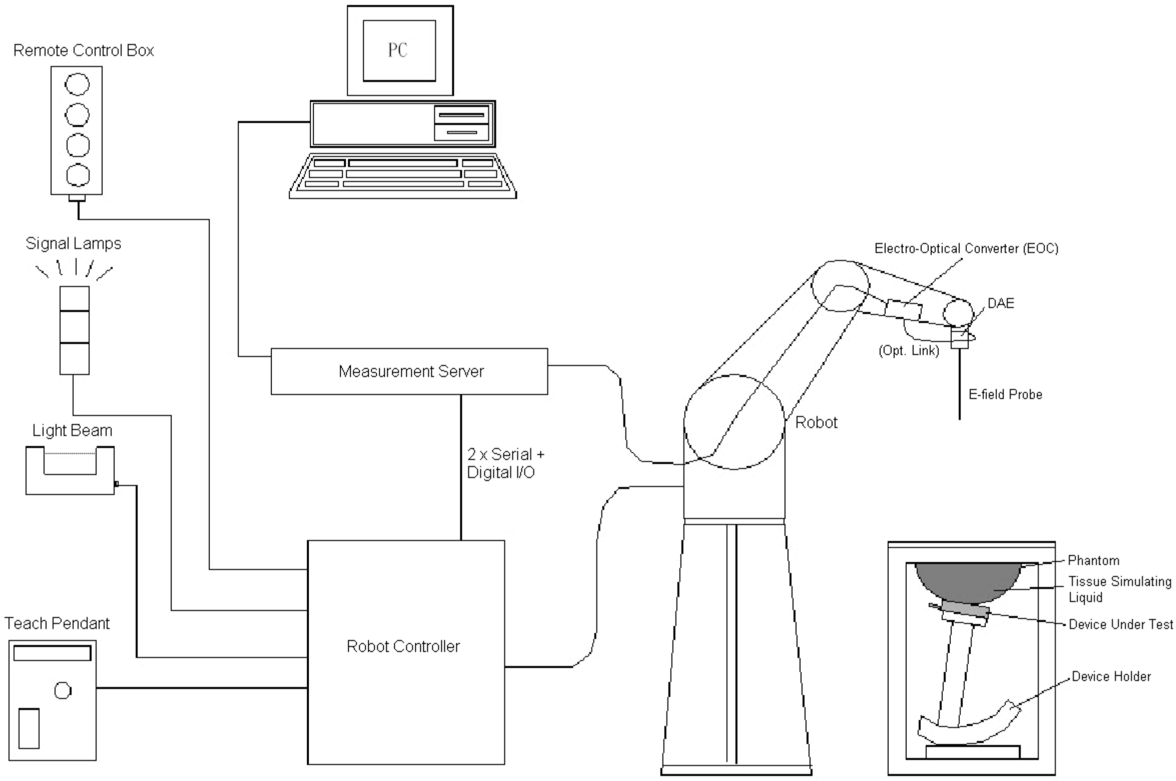



**Fig-3.1 DASY System Setup**

### 3.2.1 Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

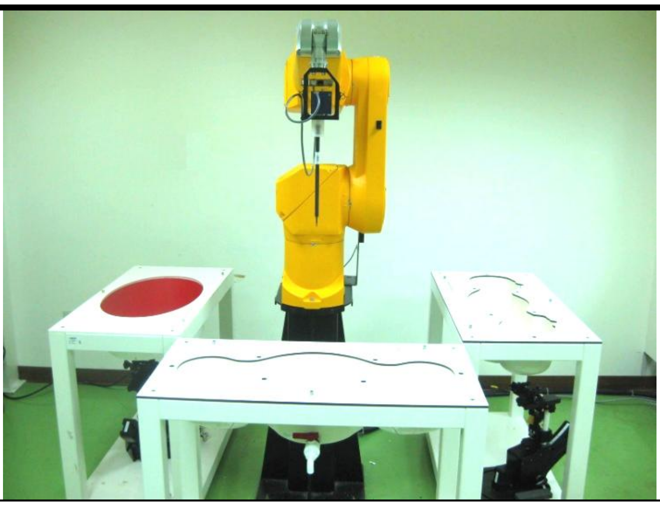


**Fig-3.2 DASY4**

**Fig-3.3 DASY5**

### 3.2.2 Probes

The SAR measurement is conducted with the dosimetric probe. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

| Model | EX3DV4 |  |
|---|---|---|
| Construction | Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE). | |
| Frequency | 10 MHz to 6 GHz<br>Linearity: ± 0.2 dB | |
| Directivity | ± 0.3 dB in HSL (rotation around probe axis)<br>± 0.5 dB in tissue material (rotation normal to probe axis) | |
| Dynamic Range | 10 µW/g to 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 µW/g) | |
| Dimensions | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm | |

| Model | ES3DV3 |  |
|---|---|---|
| Construction | Symmetrical design with triangular core. Interleaved sensors. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE). | |
| Frequency | 10 MHz to 4 GHz<br>Linearity: ± 0.2 dB | |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.3 dB in tissue material (rotation normal to probe axis) | |
| Dynamic Range | 5 µW/g to 100 mW/g<br>Linearity: ± 0.2 dB | |
| Dimensions | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.0 mm | |

### 3.2.3 Data Acquisition Electronics (DAE)

| Model | DAE3, DAE4 |  |
|---|---|---|
| Construction | Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop. | |
| Measurement Range | -100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV) | |
| Input Offset Voltage | < 5µV (with auto zero) | |
| Input Bias Current | < 50 fA | |
| Dimensions | 60 x 60 x 68 mm | |

### 3.2.4 Phantoms

| | |
|---|---|
| **Model** | Twin SAM |
| **Construction** | 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. |
| **Material** | Vinylester, glass fiber reinforced (VE-GF) |
| **Shell Thickness** | 2 ± 0.2 mm (6 ± 0.2 mm at ear point) |
| **Dimensions** | Length: 1000 mm<br>Width: 500 mm<br>Height: adjustable feet |
| **Filling Volume** | approx. 25 liters |

| | |
|---|---|
| **Model** | ELI |
| **Construction** | 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. |
| **Material** | Vinylester, glass fiber reinforced (VE-GF) |
| **Shell Thickness** | 2.0 ± 0.2 mm (bottom plate) |
| **Dimensions** | Major axis: 600 mm<br>Minor axis: 400 mm |
| **Filling Volume** | approx. 30 liters |

### 3.2.5 Device Holder

| | | |
|---|---|---|
| **Model** | Mounting Device |  |
| **Construction** | In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). | |
| **Material** | POM | |

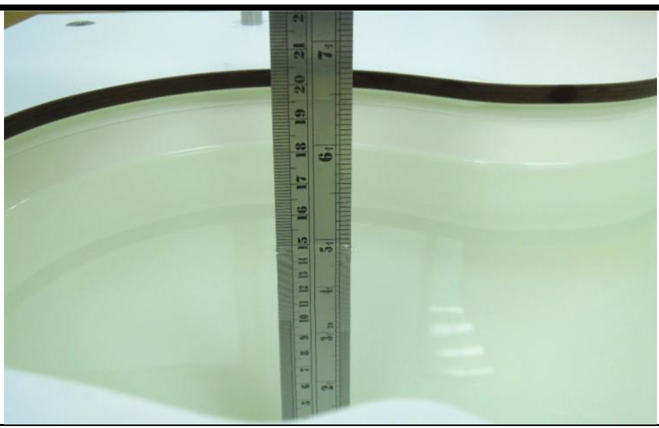
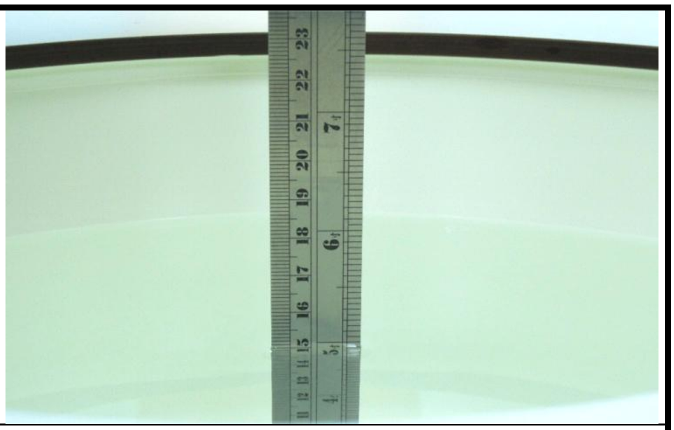
| | | |
|---|---|---|
| **Model** | Laptop Extensions Kit |  |
| **Construction** | Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. | |
| **Material** | POM, Acrylic glass, Foam | |

### 3.2.6 System Validation Dipoles

| | | |
|---|---|---|
| **Model** | D-Serial |  |
| **Construction** | Symmetrical dipole with l/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions. | |
| **Frequency** | 750 MHz to 5800 MHz | |
| **Return Loss** | > 20 dB | |
| **Power Capability** | > 100 W (f < 1GHz), > 40 W (f > 1GHz) | |

### 3.2.7 Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in Table-3.1.

|  |  |
|---|---|
| **Photo of Liquid Height for Head Position** | **Photo of Liquid Height for Body Position** |

The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528, and KDB 865664 D01 Appendix A. For the body tissue simulating liquids, the dielectric properties are defined in KDB 865664 D01 Appendix A. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

Table-3.1 Targets of Tissue Simulating Liquid

| Frequency (MHz) | Target Permittivity | Range of ±5% | Target Conductivity | Range of ±5% |
|---|---|---|---|---|
| **For Head** | | | | |
| 750 | 41.9 | 39.8 ~ 44.0 | 0.89 | 0.85 ~ 0.93 |
| 835 | 41.5 | 39.4 ~ 43.6 | 0.90 | 0.86 ~ 0.95 |
| 900 | 41.5 | 39.4 ~ 43.6 | 0.97 | 0.92 ~ 1.02 |
| 1450 | 40.5 | 38.5 ~ 42.5 | 1.20 | 1.14 ~ 1.26 |
| 1640 | 40.3 | 38.3 ~ 42.3 | 1.29 | 1.23 ~ 1.35 |
| 1750 | 40.1 | 38.1 ~ 42.1 | 1.37 | 1.30 ~ 1.44 |
| 1800 | 40.0 | 38.0 ~ 42.0 | 1.40 | 1.33 ~ 1.47 |
| 1900 | 40.0 | 38.0 ~ 42.0 | 1.40 | 1.33 ~ 1.47 |
| 2000 | 40.0 | 38.0 ~ 42.0 | 1.40 | 1.33 ~ 1.47 |
| 2300 | 39.5 | 37.5 ~ 41.5 | 1.67 | 1.59 ~ 1.75 |
| 2450 | 39.2 | 37.2 ~ 41.2 | 1.80 | 1.71 ~ 1.89 |
| 2600 | 39.0 | 37.1 ~ 41.0 | 1.96 | 1.86 ~ 2.06 |
| 3500 | 37.9 | 36.0 ~ 39.8 | 2.91 | 2.76 ~ 3.06 |
| 5200 | 36.0 | 34.2 ~ 37.8 | 4.66 | 4.43 ~ 4.89 |
| 5300 | 35.9 | 34.1 ~ 37.7 | 4.76 | 4.52 ~ 5.00 |
| 5500 | 35.6 | 33.8 ~ 37.4 | 4.96 | 4.71 ~ 5.21 |
| 5600 | 35.5 | 33.7 ~ 37.3 | 5.07 | 4.82 ~ 5.32 |
| 5800 | 35.3 | 33.5 ~ 37.1 | 5.27 | 5.01 ~ 5.53 |
| **For Body** | | | | |
| 750 | 55.5 | 52.7 ~ 58.3 | 0.96 | 0.91 ~ 1.01 |
| 835 | 55.2 | 52.4 ~ 58.0 | 0.97 | 0.92 ~ 1.02 |
| 900 | 55.0 | 52.3 ~ 57.8 | 1.05 | 1.00 ~ 1.10 |
| 1450 | 54.0 | 51.3 ~ 56.7 | 1.30 | 1.24 ~ 1.37 |
| 1640 | 53.8 | 51.1 ~ 56.5 | 1.40 | 1.33 ~ 1.47 |
| 1750 | 53.4 | 50.7 ~ 56.1 | 1.49 | 1.42 ~ 1.56 |
| 1800 | 53.3 | 50.6 ~ 56.0 | 1.52 | 1.44 ~ 1.60 |
| 1900 | 53.3 | 50.6 ~ 56.0 | 1.52 | 1.44 ~ 1.60 |
| 2000 | 53.3 | 50.6 ~ 56.0 | 1.52 | 1.44 ~ 1.60 |
| 2300 | 52.9 | 50.3 ~ 55.5 | 1.81 | 1.72 ~ 1.90 |
| 2450 | 52.7 | 50.1 ~ 55.3 | 1.95 | 1.85 ~ 2.05 |
| 2600 | 52.5 | 49.9 ~ 55.1 | 2.16 | 2.05 ~ 2.27 |
| 3500 | 51.3 | 48.7 ~ 53.9 | 3.31 | 3.14 ~ 3.48 |
| 5200 | 49.0 | 46.6 ~ 51.5 | 5.30 | 5.04 ~ 5.57 |
| 5300 | 48.9 | 46.5 ~ 51.3 | 5.42 | 5.15 ~ 5.69 |
| 5500 | 48.6 | 46.2 ~ 51.0 | 5.65 | 5.37 ~ 5.93 |
| 5600 | 48.5 | 46.1 ~ 50.9 | 5.77 | 5.48 ~ 6.06 |
| 5800 | 48.2 | 45.8 ~ 50.6 | 6.00 | 5.70 ~ 6.30 |

The following table gives the recipes for tissue simulating liquids.

**Table-3.2 Recipes of Tissue Simulating Liquid**

| Tissue Type | Bactericide | DGBE | HEC | NaCl | Sucrose | Triton X-100 | Water | Diethylene Glycol Mono-hexylether |
|---|---|---|---|---|---|---|---|---|
| H750 | 0.2 | - | 0.2 | 1.5 | 56.0 | - | 42.1 | - |
| H835 | 0.2 | - | 0.2 | 1.5 | 57.0 | - | 41.1 | - |
| H900 | 0.2 | - | 0.2 | 1.4 | 58.0 | - | 40.2 | - |
| H1450 | - | 43.3 | - | 0.6 | - | - | 56.1 | - |
| H1640 | - | 45.8 | - | 0.5 | - | - | 53.7 | - |
| H1750 | - | 47.0 | - | 0.4 | - | - | 52.6 | - |
| H1800 | - | 44.5 | - | 0.3 | - | - | 55.2 | - |
| H1900 | - | 44.5 | - | 0.2 | - | - | 55.3 | - |
| H2000 | - | 44.5 | - | 0.1 | - | - | 55.4 | - |
| H2300 | - | 44.9 | - | 0.1 | - | - | 55.0 | - |
| H2450 | - | 45.0 | - | 0.1 | - | - | 54.9 | - |
| H2600 | - | 45.1 | - | 0.1 | - | - | 54.8 | - |
| H3500 | - | 8.0 | - | 0.2 | - | 20.0 | 71.8 | - |
| H5G | - | - | - | - | - | 17.2 | 65.5 | 17.3 |
| B750 | 0.2 | - | 0.2 | 0.8 | 48.8 | - | 50.0 | - |
| B835 | 0.2 | - | 0.2 | 0.9 | 48.5 | - | 50.2 | - |
| B900 | 0.2 | - | 0.2 | 0.9 | 48.2 | - | 50.5 | - |
| B1450 | - | 34.0 | - | 0.3 | - | - | 65.7 | - |
| B1640 | - | 32.5 | - | 0.3 | - | - | 67.2 | - |
| B1750 | - | 31.0 | - | 0.2 | - | - | 68.8 | - |
| B1800 | - | 29.5 | - | 0.4 | - | - | 70.1 | - |
| B1900 | - | 29.5 | - | 0.3 | - | - | 70.2 | - |
| B2000 | - | 30.0 | - | 0.2 | - | - | 69.8 | - |
| B2300 | - | 31.0 | - | 0.1 | - | - | 68.9 | - |
| B2450 | - | 31.4 | - | 0.1 | - | - | 68.5 | - |
| B2600 | - | 31.8 | - | 0.1 | - | - | 68.1 | - |
| B3500 | - | 28.8 | - | 0.1 | - | - | 71.1 | - |
| B5G | - | - | - | - | - | 10.7 | 78.6 | 10.7 |

## 3.3 SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

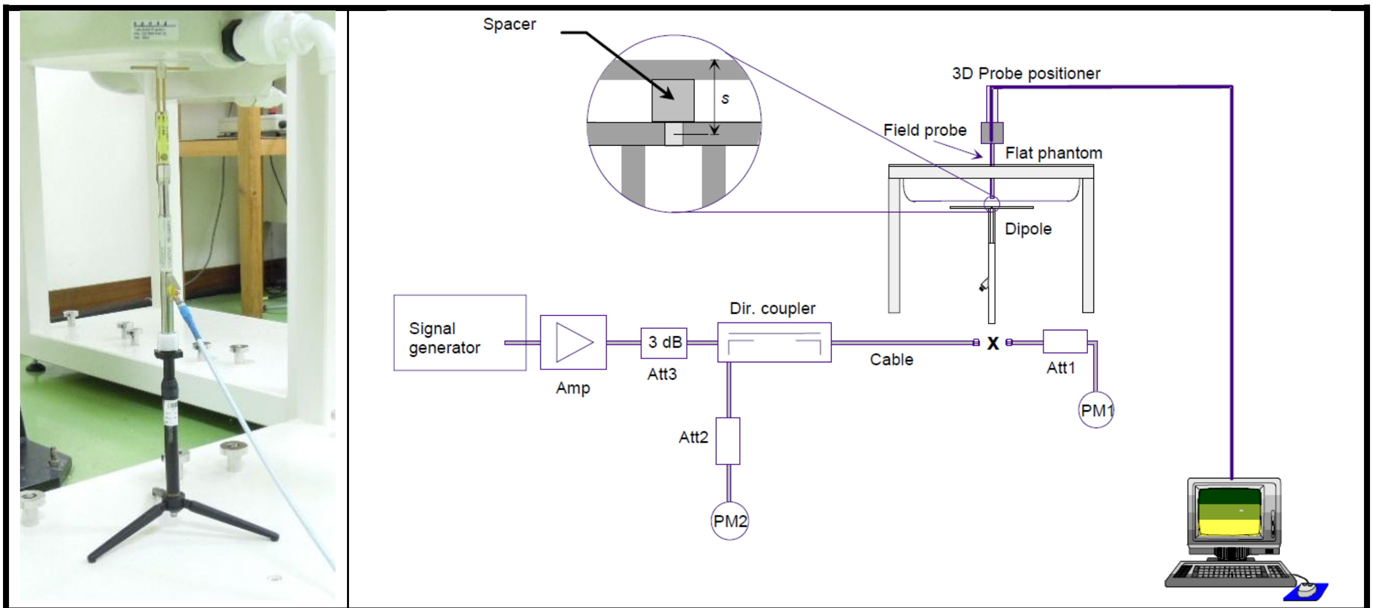



**Fig-3.4 System Verification Setup**

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The power meter PM1 measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

## 3.4 SAR Measurement Procedure

According to the SAR test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit maximum output power
(b) Measure conducted output power through RF cable
(c) Place the EUT in the specific position of phantom
(d) Perform SAR testing steps on the DASY system
(e) Record the SAR value

### 3.4.1 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01 v01r02, the resolution for Area and Zoom scan is specified in the table below.

| Items | <= 2 GHz | 2-3 GHz | 3-4 GHz | 4-5 GHz | 5-6 GHz |
|---|---|---|---|---|---|
| Area Scan ($\Delta x$, $\Delta y$) | <= 15 mm | <= 12 mm | <= 12 mm | <= 10 mm | <= 10 mm |
| Zoom Scan ($\Delta x$, $\Delta y$) | <= 8 mm | <= 5 mm | <= 5 mm | <= 4 mm | <= 4 mm |
| Zoom Scan ($\Delta z$) | <= 5 mm | <= 5 mm | <= 4 mm | <= 3 mm | <= 2 mm |
| Zoom Scan Volume | >= 30 mm | >= 30 mm | >= 28 mm | >= 25 mm | >= 22 mm |

**Note:**

When zoom scan is required and report SAR is <= 1.4 W/kg, the zoom scan resolution of $\Delta x$ / $\Delta y$ (2-3GHz: <= 8 mm, 3-4GHz: <= 7 mm, 4-6GHz: <= 5 mm) may be applied.

### 3.4.2 Volume Scan Procedure

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

### 3.4.3 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

### 3.4.4 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

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

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

### 3.4.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

# 4. SAR Measurement Evaluation

## 4.1 EUT Configuration and Setting

The EUT is a voice/data transmitter device that contains one WWAN transmitter (CDMA2000 / LTE), and two WWAN antennas. Confirming the LTE transmitter follows 3GPP standards, is category 3, FDD-LTE band 25 (BW 3/5/10 MHz), FDD-LTE band 26 (BW 1.4/3/5/10 MHz), TDD-LTE band 41 (BW 10/15/20 MHz), supports QPSK / 16QAM modulations, and supports data transmission only. Tested per 3GPP 36.521 maximum transmit procedures for both QPSK / 16QAM.

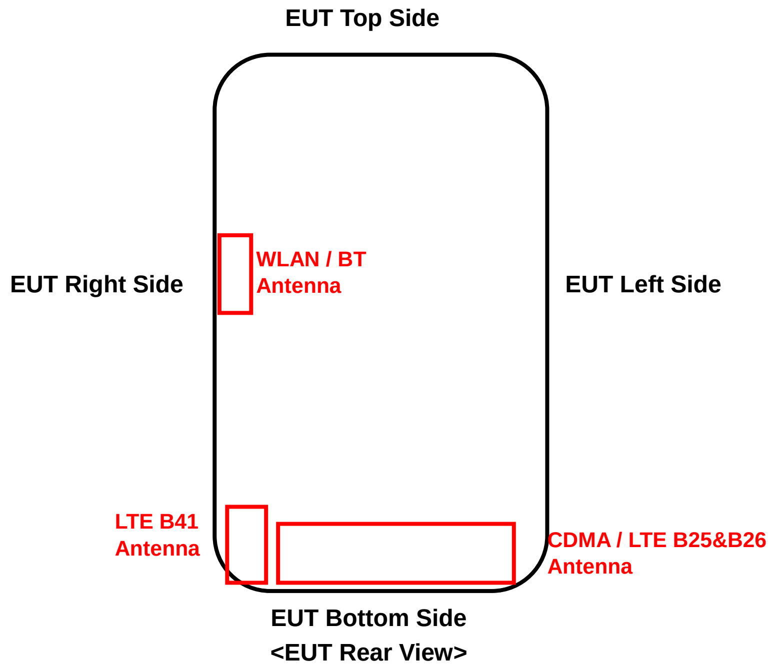
**LTE Maximum Power Reduction in accordance with 3GPP 36.101:** Power Reduction in accordance to 3GPP is active all times during LTE operation.

| Modulation | Channel Bandwidth / RB Configurations | | | | | | LTE MPR Setting (dB) |
|---|---|---|---|---|---|---|---|
| | BW 1.4 MHz | BW 3 MHz | BW 5 MHz | BW 10 MHz | BW 15 MHz | BW 20 MHz | |
| **QPSK** | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | 1 |
| **16QAM** | <= 5 | <= 4 | <= 8 | <= 12 | <= 16 | <= 18 | 1 |
| **16QAM** | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | 2 |

**Note:** MPR is according to the standard and implemented in the circuit (mandatory).

In addition, the device is compliant with A-MPR requirements defined in 36.101 section 6.2.4 that may be required to meet 3GPP Adjacent Channel Leakage Ratio (“ACLR”) requirements. A-MPR was disabled for all FCC compliance testing.

**<Antenna Location>**




The separation distance for antenna to edge:

| Antenna | To Top Side (mm) | To Bottom Side (mm) | To Left Side (mm) | To Right Side (mm) |
|---|---|---|---|---|
| CDMA / LTE B25&B26 | 121.3 | 5 | 5 | 9 |
| LTE B41 | 119.3 | 6 | 48 | 5 |
| WLAN / BT | 43 | 62.5 | 57.33 | 5 |

The simultaneous transmission possibilities are listed as below.

| Simultaneous TX Combination | Configuration | Head (Voice / VoIP) | Body Worn (Voice / VoIP) | Hotspot (Data) |
|---|---|---|---|---|
| 1 | CDMA2000 BC0 (Voice / Data) + WLAN (Data) | Yes | Yes | Yes |
| 2 | CDMA2000 BC1 (Voice / Data) + WLAN (Data) | Yes | Yes | Yes |
| 3 | CDMA2000 BC10 (Voice / Data) + WLAN (Data) | Yes | Yes | Yes |
| 4 | LTE 25 (Data) + WLAN (Data) | Yes | Yes | Yes |
| 5 | LTE 26 (Data) + WLAN (Data) | Yes | Yes | Yes |
| 6 | LTE 41 (Data) + WLAN (Data) | Yes | Yes | Yes |
| 7 | CDMA2000 BC0 (Voice / Data) + BT (Data) | No | Yes | No |
| 8 | CDMA2000 BC1 (Voice / Data) + BT (Data) | No | Yes | No |
| 9 | CDMA2000 BC10 (Voice / Data) + BT (Data) | No | Yes | No |
| 10 | LTE 25 (Data) + BT (Data) | No | Yes | No |
| 11 | LTE 26 (Data) + BT (Data) | No | Yes | No |
| 12 | LTE 41 (Data) + BT (Data) | No | Yes | No |

**Note :**

1. WLAN and Bluetooth cannot transmit simultaneously.

For WWAN SAR testing, the EUT was linked and controlled by base station emulator (Agilent E5515C). Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

For CDMA, SAR is tested under 1xRTT mode using RC3 with the EUT configured to transmit at full rate using Loopback Service Option SO55 on head position, and RC3 with the EUT configured using TDSO/SO32, to transmit at full rate on FCH with all other code channels disabled on body position. SAR for RC1 is not required when the maximum power is less than 1/4 dB higher than RC3. SAR for multiple code channels (FCH+$SCH_n$) is not required when the maximum power is less than 1/4 dB higher than that measured with FCH only. SAR for EVDO Rev.0 is not required when the maximum power is less than 1/4 dB higher than RC3 (1xRTT). SAR for EVDO Rev.A is not required when the maximum power is less than Rev.0 or less than 1/4 dB higher than RC3. The steps for system simulator (Agilent E5515C) setup are as below.
1. Set the System ID and Network ID
2. Set the Cell Band and connecting Channel
3. Set the power control to All Up Bits
4. Press “Originate Call” button

For CDMA, hotspot SAR is tested under EVDO Rev.0 mode using Reverse Data Channel rate of 153.6 kbps in subtype 0/1 Physical Layer Configurations, and the power control set “All Up Bits”. SAR for EVDO Rev.A is not required since its power is less than EVDO Rev.0. SAR for 1xRTT is not required since its power is less than 1/4 dB higher than EVDO Rev.0. The steps for system simulator (Agilent E5515C) setup are as below.
1. Set the Sector ID
2. Set the Protocol Release
3. Set the Cell Band and connecting Channel
4. Set the RTAP Rate
5. Set the power control
6. Press “Start Data Connection” button

For LTE, set the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB in base station simulator. When the EUT has registered and communicated to base station simulator, set the simulator to make EUT transmitting the maximum radiated power. The steps for system simulator (Anritsu MT8820C) setup are as below.
1. Press the “Std” button to select “LTE 22.20S” function
2. Choose the “Screen Select” item to “Fundamental Measurement”
3. Enter the “Common” item
4. Set the Operating Band
5. Set the Channel Bandwidth
6. Set the UL Channel & Frequency
7. Set the Modulation
8. Set the RB number and RB shift
9. Press “Start Call” button when EUT register to the system simulator
10. Set the TX-1 Max. Power to make the EUT transmit maximum output power

In addition, the TDD-LTE for this device supports Uplink-Downlink configuration 0 to 6. Therefore, SAR is tested with fixed periodic duty at the highest duty factor using Uplink-Downlink configuration 0 with special sub-frame configuration 5 per KDB 941225 D05 and 3GPP TS 36.211.

For WLAN SAR testing, the EUT has installed WLAN engineering testing software which can provide continuous transmitting RF signal. According to KDB 248227 D01, WLAN SAR should tested at the lowest data rate, and testing at higher data rate is not required when the maximum average output power is less than 1/4 dB higher than those measured at the lowest data rate. Since the WLAN power at lowest data rate has highest output power, WLAN SAR for this device was performed at the lowest data rate as set in 1 Mbps for 802.11b. This RF signal utilized in SAR measurement has almost 100% duty cycle, and the duty factor is 1 during WLAN SAR testing.

## 4.2 EUT Testing Position

According to KDB 648474 D04, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

### 4.2.1 Head Exposure Conditions

Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2003 using the SAM phantom illustrated as below.

1. Define two imaginary lines on the handset

(a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width $w_t$ of the handset at the level of the acoustic output, and the midpoint of the width $w_b$ of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

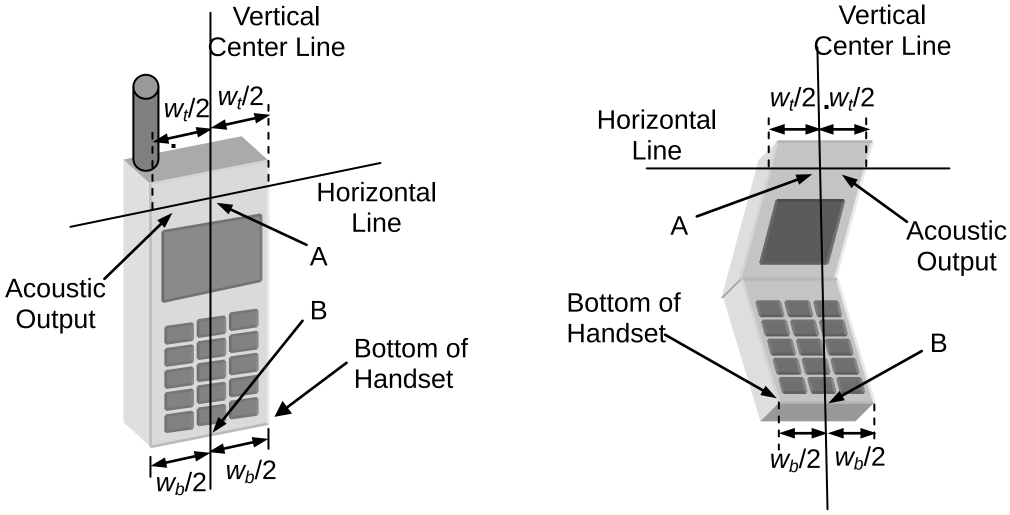



**Fig-4.1 Illustration for Handset Vertical and Horizontal Reference Lines**

2. Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig-4.2).

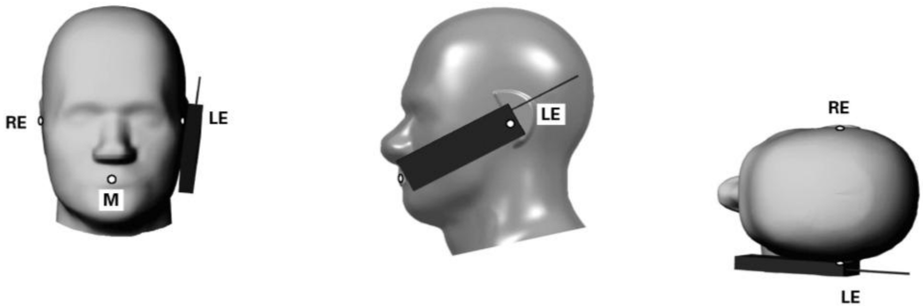



**Fig-4.2 Illustration for Cheek Position**

3. Tilted Position

(a) To position the device in the “cheek” position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig-4.3).

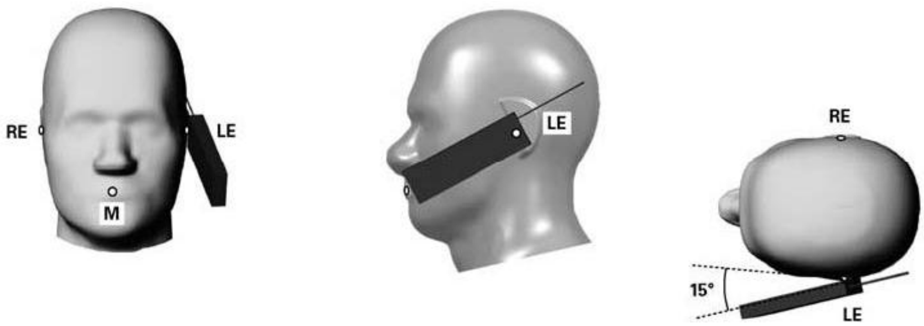



**Fig-4.3 Illustration for Tilted Position**

### 4.2.2 Body-Worn Accessory Exposure Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 D01 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required.

A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance <= 5 mm to support compliance.

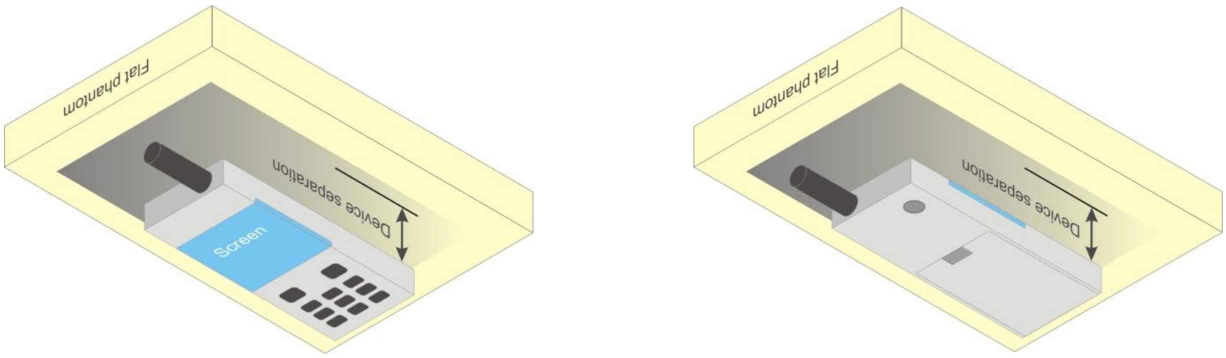
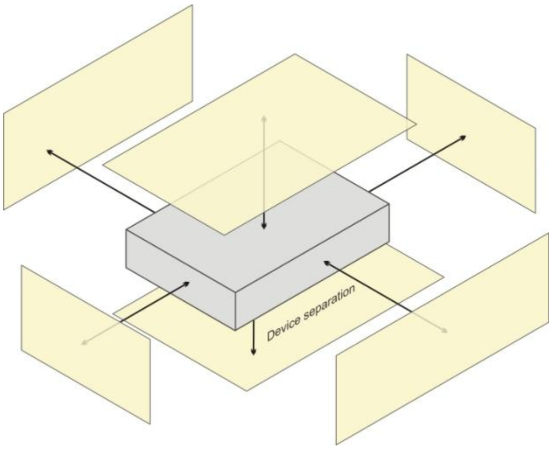



**Fig-4.4 Illustration for Body Worn Position**

### 4.2.3 Hotspot Mode Exposure conditions

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225 D06. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode 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).




Based on the antenna location shown on section 4.1 of this report, the SAR testing required for hotspot mode is listed as below.

| Antenna | Front Face | Rear Face | Left Side | Right Side | Top Side | Bottom Side |
|---|---|---|---|---|---|---|
| CDMA / LTE B25&B26 | V | V | V | V | - | V |
| LTE B41 | V | V | - | V | - | V |
| WLAN / BT | V | V | - | V | - | - |

### 4.2.4 SAR Test Exclusions

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

$$\frac{\text{Max. Tune up Power}_{(mW)}}{\text{Min. Test Separation Distance}_{(mm)}} \times \sqrt{f_{(GHz)}} \leq 3.0 \text{ for SAR-1g}, \leq 7.5 \text{ for SAR-10g}$$

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

| Mode | Max. Tune-up Power (dBm) | Max. Tune-up Power (mW) | Body-Worn | | |
|---|---|---|---|---|---|
| | | | Ant. to Surface (mm) | Calculated Result | Require SAR Testing? |
| BT | 2.5 | 2 | 10 | 0.3 | No |

## 4.3 Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

| Test Date | Tissue Type | Frequency (MHz) | Liquid Temp. (℃) | Measured Conductivity (σ) | Measured Permittivity ($\varepsilon_r$) | Target Conductivity (σ) | Target Permittivity ($\varepsilon_r$) | Conductivity Deviation (%) | Permittivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|---|
| Dec. 07, 2013 | Head | 835 | 20.5 | 0.888 | 42.814 | 0.90 | 41.5 | -1.33 | 3.17 |
| Dec. 06, 2013 | Head | 1900 | 20.7 | 1.406 | 39.596 | 1.40 | 40.0 | 0.43 | -1.01 |
| Dec. 12, 2013 | Head | 2450 | 20.7 | 1.871 | 37.468 | 1.80 | 39.2 | 3.94 | -4.42 |
| Dec. 07, 2013 | Head | 2600 | 21.2 | 2.049 | 37.739 | 1.96 | 39.0 | 4.54 | -3.23 |
| Dec. 09, 2013 | Body | 835 | 20.8 | 0.972 | 54.017 | 0.97 | 55.2 | 0.21 | -2.14 |
| Dec. 11, 2013 | Body | 835 | 20.7 | 0.973 | 54.214 | 0.97 | 55.2 | 0.31 | -1.79 |
| Dec. 09, 2013 | Body | 1900 | 20.7 | 1.552 | 52.952 | 1.52 | 53.3 | 2.11 | -0.65 |
| Dec. 12, 2013 | Body | 2450 | 20.5 | 1.989 | 51.463 | 1.95 | 52.7 | 2.00 | -2.35 |
| Dec. 10, 2013 | Body | 2600 | 20.2 | 2.196 | 52.352 | 2.16 | 52.5 | 1.67 | -0.28 |

**Note:**

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within ±5% of the target values. Liquid temperature during the SAR testing must be within ±2 ℃.

## 4.4 System Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01 v01r01. The validation status in tabulated summary is as below.

| Test Date | Probe S/N | Calibration Point | | Measured Conductivity (σ) | Measured Permittivity ($\varepsilon_r$) | Validation for CW | | | Validation for Modulation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sensitivity Range | Probe Linearity | Probe Isotropy | Modulation Type | Duty Factor | PAR |
| Dec. 07, 2013 | 3650 | Head | 835 | 0.888 | 42.814 | Pass | Pass | Pass | N/A | N/A | N/A |
| Dec. 06, 2013 | 3650 | Head | 1900 | 1.406 | 39.596 | Pass | Pass | Pass | N/A | N/A | N/A |
| Dec. 12, 2013 | 3864 | Head | 2450 | 1.871 | 37.468 | Pass | Pass | Pass | OFDM | N/A | Pass |
| Dec. 07, 2013 | 3650 | Head | 2600 | 2.049 | 37.739 | Pass | Pass | Pass | N/A | N/A | N/A |
| Dec. 09, 2013 | 3650 | Body | 835 | 0.972 | 54.017 | Pass | Pass | Pass | N/A | N/A | N/A |
| Dec. 11, 2013 | 3650 | Body | 835 | 0.973 | 54.214 | Pass | Pass | Pass | N/A | N/A | N/A |
| Dec. 09, 2013 | 3650 | Body | 1900 | 1.552 | 52.952 | Pass | Pass | Pass | N/A | N/A | N/A |
| Dec. 12, 2013 | 3650 | Body | 2450 | 1.989 | 51.463 | Pass | Pass | Pass | OFDM | N/A | Pass |
| Dec. 10, 2013 | 3650 | Body | 2600 | 2.196 | 52.352 | Pass | Pass | Pass | N/A | N/A | N/A |

## 4.5 System Verification

The measuring result for system verification is tabulated as below.

| Test Date | Mode | Frequency (MHz) | 1W Target SAR-1g (W/kg) | Measured SAR-1g (W/kg) | Normalized to 1W SAR-1g (W/kg) | Deviation (%) | Dipole S/N | Probe S/N | DAE S/N |
|---|---|---|---|---|---|---|---|---|---|
| Dec. 07, 2013 | Head | 835 | 9.68 | 2.29 | 9.16 | -5.37 | 4d121 | 3650 | 360 |
| Dec. 06, 2013 | Head | 1900 | 40.60 | 10.1 | 40.40 | -0.49 | 5d036 | 3650 | 360 |
| Dec. 12, 2013 | Head | 2450 | 52.50 | 12.8 | 51.20 | -2.48 | 737 | 3864 | 1277 |
| Dec. 07, 2013 | Head | 2600 | 57.80 | 15.0 | 60.00 | 3.81 | 1020 | 3650 | 360 |
| Dec. 09, 2013 | Body | 835 | 9.69 | 2.49 | 9.96 | 2.79 | 4d121 | 3650 | 360 |
| Dec. 11, 2013 | Body | 835 | 9.69 | 2.39 | 9.56 | -1.34 | 4d121 | 3650 | 360 |
| Dec. 09, 2013 | Body | 1900 | 41.00 | 10.2 | 40.80 | -0.49 | 5d036 | 3650 | 360 |
| Dec. 12, 2013 | Body | 2450 | 49.60 | 13.3 | 53.20 | 7.26 | 737 | 3650 | 360 |
| Dec. 10, 2013 | Body | 2600 | 55.80 | 12.9 | 51.60 | -7.53 | 1020 | 3650 | 360 |

**Note:**

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.

## 4.6 Maximum Output Power

### 4.6.1 Maximum Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

| Mode | CDMA BC0 | CDMA BC1 | CDMA BC10 |
|---|---|---|---|
| 1xRTT / EVDO | 25.2 | 25.2 | 25.2 |

| Mode | LTE 25 | LTE 26 | LTE 41 |
|---|---|---|---|
| QPSK / 16QAM | 24.2 | 23.7 | 24.2 |

| Mode | 2.4G WLAN |
|---|---|
| 802.11b | 19.0 |
| 802.11g | 18.0 |
| 802.11n HT20 | 18.0 |

| Mode | Bluetooth |
|---|---|
| All | 2.5 |

### 4.6.2 Measured Conducted Power Result

The measuring conducted average power (Unit: dBm) is shown as below.

| Band | CDMA BC0 | | | CDMA BC1 | | |
|---|---|---|---|---|---|---|
| Channel | 1013 | 384 | 777 | 25 | 600 | 1175 |
| Frequency (MHz) | 824.70 | 836.52 | 848.31 | 1851.25 | 1880.00 | 1908.75 |
| 1xRTT RC1+SO55 | 24.73 | 24.84 | 24.61 | 24.84 | 24.64 | 24.62 |
| 1xRTT RC3+SO55 | 24.74 | **24.85** | 24.62 | **24.85** | 24.65 | 24.63 |
| 1xRTT RC3+SO32 (FCH) | 24.72 | 24.83 | 24.60 | 24.82 | 24.62 | 24.60 |
| 1xRTT RC3+SO32 (SCH) | 24.67 | 24.78 | 24.55 | 24.80 | 24.60 | 24.58 |
| 1xEVDO Rev.0 RTAP 153.6 | 24.61 | 24.72 | 24.49 | 24.78 | 24.58 | 24.56 |
| 1xEVDO Rev.A RETAP 4096 | 24.59 | 24.70 | 24.47 | 24.69 | 24.49 | 24.47 |

| Band | CDMA BC10 | | |
|---|---|---|---|
| Channel | 476 | 580 | 684 |
| Frequency (MHz) | 817.9 | 820.5 | 823.1 |
| 1xRTT RC1+SO55 | 24.85 | 24.92 | 24.89 |
| 1xRTT RC3+SO55 | 24.88 | **24.95** | 24.92 |
| 1xRTT RC3+SO32 (FCH) | 24.83 | 24.90 | 24.87 |
| 1xRTT RC3+SO32 (SCH) | 24.81 | 24.88 | 24.85 |
| 1xEVDO Rev.0 RTAP 153.6 | 24.74 | 24.81 | 24.78 |
| 1xEVDO Rev.A RETAP 4096 | 24.73 | 24.80 | 24.77 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26055 | Mid CH 26365 | High CH 26675 | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| | | | | Frequency 1851.5 MHz | Frequency 1882.5 MHz | Frequency 1913.5 MHz | |
| 25 / 3M | QPSK | 1 | 0 | 22.75 | 23.06 | 22.79 | 0 |
| | | 1 | 7 | 22.69 | 23.12 | 22.71 | 0 |
| | | 1 | 14 | 22.61 | 23.02 | 22.78 | 0 |
| | | 8 | 0 | 21.51 | 21.85 | 21.65 | 1 |
| | | 8 | 3 | 21.60 | 21.87 | 21.71 | 1 |
| | | 8 | 7 | 21.60 | 21.77 | 21.54 | 1 |
| | | 15 | 0 | 21.57 | 21.81 | 21.71 | 1 |
| | 16QAM | 1 | 0 | 21.65 | 21.96 | 21.69 | 1 |
| | | 1 | 7 | 21.59 | 22.02 | 21.61 | 1 |
| | | 1 | 14 | 21.51 | 21.92 | 21.59 | 1 |
| | | 8 | 0 | 20.62 | 20.75 | 20.66 | 2 |
| | | 8 | 3 | 20.57 | 20.77 | 20.62 | 2 |
| | | 8 | 7 | 20.51 | 20.67 | 20.55 | 2 |
| | | 15 | 0 | 20.58 | 20.71 | 20.63 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26065 Frequency 1852.5 MHz | Mid CH 26365 Frequency 1882.5 MHz | High CH 26665 Frequency 1912.5 MHz | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| 25 / 5M | QPSK | 1 | 0 | 22.87 | 23.18 | 22.91 | 0 |
| | | 1 | 12 | 22.81 | 23.24 | 22.83 | 0 |
| | | 1 | 24 | 22.73 | 23.14 | 22.61 | 0 |
| | | 12 | 0 | 21.63 | 21.97 | 21.60 | 1 |
| | | 12 | 6 | 21.60 | 21.99 | 21.55 | 1 |
| | | 12 | 13 | 21.53 | 21.89 | 21.66 | 1 |
| | | 25 | 0 | 21.58 | 21.93 | 21.60 | 1 |
| | 16QAM | 1 | 0 | 21.77 | 22.08 | 21.81 | 1 |
| | | 1 | 12 | 21.71 | 22.14 | 21.73 | 1 |
| | | 1 | 24 | 21.63 | 22.04 | 21.51 | 1 |
| | | 12 | 0 | 20.53 | 20.87 | 20.65 | 2 |
| | | 12 | 6 | 20.61 | 20.89 | 20.73 | 2 |
| | | 12 | 13 | 20.62 | 20.79 | 20.64 | 2 |
| | | 25 | 0 | 20.55 | 20.83 | 20.65 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26090 Frequency 1855.0 MHz | Mid CH 26365 Frequency 1882.5 MHz | High CH 26640 Frequency 1910.0 MHz | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| 25 / 10M | QPSK | 1 | 0 | 22.98 | 23.29 | 23.02 | 0 |
| | | 1 | 24 | 22.92 | **23.35** | 22.94 | 0 |
| | | 1 | 49 | 22.84 | 23.25 | 22.72 | 0 |
| | | 25 | 0 | 21.74 | 22.08 | 21.71 | 1 |
| | | 25 | 12 | 21.71 | 22.10 | 21.66 | 1 |
| | | 25 | 25 | 21.64 | 22.00 | 21.77 | 1 |
| | | 50 | 0 | 21.69 | 22.04 | 21.71 | 1 |
| | 16QAM | 1 | 0 | 21.88 | 22.19 | 21.92 | 1 |
| | | 1 | 24 | 21.82 | 22.25 | 21.84 | 1 |
| | | 1 | 49 | 21.74 | 22.15 | 21.62 | 1 |
| | | 25 | 0 | 20.64 | 20.98 | 20.61 | 2 |
| | | 25 | 12 | 20.61 | 21.00 | 20.56 | 2 |
| | | 25 | 25 | 20.54 | 20.90 | 20.67 | 2 |
| | | 50 | 0 | 20.59 | 20.94 | 20.61 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26697 Frequency 814.7 MHz | Mid CH 26865 Frequency 831.0 MHz | High CH 27033 Frequency 848.3 MHz | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| 26 / 1.4M | QPSK | 1 | 0 | 22.24 | 21.91 | 22.03 | 0 |
| | | 1 | 2 | 22.20 | 22.03 | 22.45 | 0 |
| | | 1 | 5 | 22.28 | 22.10 | 22.43 | 0 |
| | | 3 | 0 | 22.17 | 21.99 | 22.09 | 0 |
| | | 3 | 1 | 22.06 | 21.91 | 22.24 | 0 |
| | | 3 | 3 | 21.95 | 21.91 | 22.14 | 0 |
| | | 6 | 0 | 21.33 | 20.91 | 21.07 | 1 |
| | 16QAM | 1 | 0 | 21.23 | 21.00 | 21.05 | 1 |
| | | 1 | 2 | 21.19 | 21.02 | 21.32 | 1 |
| | | 1 | 5 | 21.27 | 21.09 | 21.33 | 1 |
| | | 3 | 0 | 21.16 | 20.98 | 21.09 | 1 |
| | | 3 | 1 | 21.05 | 20.91 | 21.31 | 1 |
| | | 3 | 3 | 20.97 | 20.91 | 21.20 | 1 |
| | | 6 | 0 | 20.32 | 19.92 | 20.17 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26705 Frequency 815.5 MHz | Mid CH 26865 Frequency 831.0 MHz | High CH 27025 Frequency 847.5 MHz | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| 26 / 3M | QPSK | 1 | 0 | 22.25 | 21.91 | 22.15 | 0 |
| | | 1 | 7 | 22.21 | 22.04 | 22.57 | 0 |
| | | 1 | 14 | 22.29 | 22.11 | 22.55 | 0 |
| | | 8 | 0 | 21.32 | 20.91 | 21.21 | 1 |
| | | 8 | 3 | 21.31 | 20.96 | 21.36 | 1 |
| | | 8 | 7 | 21.45 | 21.07 | 21.26 | 1 |
| | | 15 | 0 | 21.34 | 20.91 | 21.19 | 1 |
| | 16QAM | 1 | 0 | 21.24 | 20.91 | 21.05 | 1 |
| | | 1 | 7 | 21.20 | 21.03 | 21.47 | 1 |
| | | 1 | 14 | 21.28 | 21.10 | 21.45 | 1 |
| | | 8 | 0 | 20.31 | 19.91 | 20.11 | 2 |
| | | 8 | 3 | 20.30 | 19.95 | 20.28 | 2 |
| | | 8 | 7 | 20.44 | 20.06 | 20.16 | 2 |
| | | 15 | 0 | 20.33 | 19.92 | 20.09 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26715 Frequency 816.5 MHz | Mid CH 26865 Frequency 831.0 MHz | High CH 27015 Frequency 846.5 MHz | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| 26 / 5M | QPSK | 1 | 0 | 22.26 | 21.93 | 22.28 | 0 |
| | | 1 | 12 | 22.22 | 22.05 | 22.70 | 0 |
| | | 1 | 24 | 22.30 | 22.12 | 22.68 | 0 |
| | | 12 | 0 | 21.33 | 20.91 | 21.34 | 1 |
| | | 12 | 6 | 21.32 | 20.97 | 21.49 | 1 |
| | | 12 | 13 | 21.46 | 21.08 | 21.39 | 1 |
| | | 25 | 0 | 21.35 | 20.95 | 21.32 | 1 |
| | 16QAM | 1 | 0 | 21.25 | 20.95 | 21.18 | 1 |
| | | 1 | 12 | 21.21 | 21.04 | 21.60 | 1 |
| | | 1 | 24 | 21.29 | 21.11 | 21.58 | 1 |
| | | 12 | 0 | 20.32 | 19.95 | 20.24 | 2 |
| | | 12 | 6 | 20.31 | 19.96 | 20.39 | 2 |
| | | 12 | 13 | 20.45 | 20.07 | 20.29 | 2 |
| | | 25 | 0 | 20.34 | 19.96 | 20.22 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 26740 Frequency 819.0 MHz | Mid CH 26865 Frequency 831.0 MHz | High CH 26990 Frequency 844.0 MHz | 3GPP MPR (dB) |
|---|---|---|---|---|---|---|---|
| 26 / 10M | QPSK | 1 | 0 | 21.95 | 21.92 | 22.39 | 0 |
| | | 1 | 24 | 22.08 | 22.08 | **22.81** | 0 |
| | | 1 | 49 | 22.15 | 22.15 | 22.79 | 0 |
| | | 25 | 0 | 20.91 | 20.93 | 21.45 | 1 |
| | | 25 | 12 | 21.00 | 21.00 | 21.60 | 1 |
| | | 25 | 25 | 21.11 | 21.11 | 21.50 | 1 |
| | | 50 | 0 | 20.93 | 20.96 | 21.43 | 1 |
| | 16QAM | 1 | 0 | 20.92 | 20.96 | 21.29 | 1 |
| | | 1 | 24 | 20.98 | 21.07 | 21.71 | 1 |
| | | 1 | 49 | 21.05 | 21.14 | 21.69 | 1 |
| | | 25 | 0 | 19.93 | 19.92 | 20.35 | 2 |
| | | 25 | 12 | 20.02 | 19.99 | 20.50 | 2 |
| | | 25 | 25 | 20.01 | 20.10 | 20.40 | 2 |
| | | 50 | 0 | 19.96 | 19.92 | 20.33 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 39700 Frequency 2501.0 MHz | Mid CH 40160 Frequency 2547.0 MHz | Mid CH 40620 Frequency 2593.0 MHz | Mid CH 41080 Frequency 2639.0 MHz | High CH 41540 Frequency 2685.0 MHz | 3PGG MPR (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 41 / 10M | QPSK | 1 | 0 | 23.27 | 23.09 | 23.19 | 23.39 | 23.54 | 0 |
| | | 1 | 24 | 23.44 | 23.23 | 23.39 | 23.47 | 23.53 | 0 |
| | | 1 | 49 | 23.11 | 22.88 | 22.97 | 23.13 | 23.17 | 0 |
| | | 25 | 0 | 22.43 | 22.06 | 22.09 | 22.37 | 22.45 | 1 |
| | | 25 | 12 | 22.29 | 21.93 | 22.23 | 22.31 | 22.34 | 1 |
| | | 25 | 25 | 22.16 | 21.84 | 22.13 | 22.15 | 22.14 | 1 |
| | | 50 | 0 | 22.19 | 21.88 | 22.15 | 22.31 | 22.37 | 1 |
| | 16QAM | 1 | 0 | 22.17 | 21.99 | 22.09 | 22.29 | 22.44 | 1 |
| | | 1 | 24 | 22.34 | 22.13 | 22.29 | 22.37 | 22.43 | 1 |
| | | 1 | 49 | 22.01 | 21.87 | 21.87 | 22.03 | 22.07 | 1 |
| | | 25 | 0 | 21.33 | 20.96 | 20.99 | 21.27 | 21.35 | 2 |
| | | 25 | 12 | 21.19 | 20.83 | 21.13 | 21.21 | 21.24 | 2 |
| | | 25 | 25 | 21.06 | 20.85 | 21.03 | 21.05 | 21.04 | 2 |
| | | 50 | 0 | 21.09 | 20.88 | 21.05 | 21.21 | 21.27 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 39725 Frequency 2503.5 MHz | Mid CH 40173 Frequency 2548.3 MHz | Mid CH 40620 Frequency 2593.0 MHz | Mid CH 41068 Frequency 2637.8 MHz | High CH 41515 Frequency 2682.5 MHz | 3PGG MPR (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 41 / 15M | QPSK | 1 | 0 | 23.40 | 23.22 | 23.32 | 23.52 | 23.67 | 0 |
| | | 1 | 37 | 23.57 | 23.36 | 23.52 | 23.60 | 23.66 | 0 |
| | | 1 | 74 | 23.24 | 22.90 | 23.10 | 23.26 | 23.30 | 0 |
| | | 36 | 0 | 22.56 | 22.19 | 22.22 | 22.50 | 22.58 | 1 |
| | | 36 | 19 | 22.42 | 22.06 | 22.36 | 22.44 | 22.47 | 1 |
| | | 36 | 39 | 22.29 | 21.97 | 22.26 | 22.28 | 22.27 | 1 |
| | | 75 | 0 | 22.32 | 21.90 | 22.28 | 22.44 | 22.50 | 1 |
| | 16QAM | 1 | 0 | 22.30 | 22.12 | 22.22 | 22.42 | 22.57 | 1 |
| | | 1 | 37 | 22.47 | 22.26 | 22.42 | 22.50 | 22.56 | 1 |
| | | 1 | 74 | 22.14 | 21.89 | 22.00 | 22.16 | 22.20 | 1 |
| | | 36 | 0 | 21.46 | 21.09 | 21.12 | 21.40 | 21.48 | 2 |
| | | 36 | 19 | 21.32 | 20.96 | 21.26 | 21.34 | 21.37 | 2 |
| | | 36 | 39 | 21.19 | 20.87 | 21.16 | 21.18 | 21.17 | 2 |
| | | 75 | 0 | 21.22 | 20.90 | 21.18 | 21.34 | 21.40 | 2 |

| Band / BW | Modulation | RB Size | RB Offset | Low CH 39750 Frequency 2506.0 MHz | Mid CH 40185 Frequency 2549.5 MHz | Mid CH 40620 Frequency 2593.0 MHz | Mid CH 41055 Frequency 2636.5 MHz | High CH 41490 Frequency 2680.0 MHz | 3PGG MPR (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 41 / 20M | QPSK | 1 | 0 | 23.51 | 23.33 | 23.43 | 23.63 | **23.78** | 0 |
| | | 1 | 50 | 23.68 | 23.47 | 23.63 | 23.71 | 23.77 | 0 |
| | | 1 | 99 | 23.35 | 23.01 | 23.21 | 23.37 | 23.41 | 0 |
| | | 50 | 0 | 22.67 | 22.30 | 22.33 | 22.61 | 22.69 | 1 |
| | | 50 | 25 | 22.53 | 22.17 | 22.47 | 22.55 | 22.58 | 1 |
| | | 50 | 50 | 22.40 | 22.08 | 22.37 | 22.39 | 22.38 | 1 |
| | | 100 | 0 | 22.43 | 22.01 | 22.39 | 22.55 | 22.61 | 1 |
| | 16QAM | 1 | 0 | 22.41 | 22.23 | 22.33 | 22.53 | 22.68 | 1 |
| | | 1 | 50 | 22.58 | 22.37 | 22.53 | 22.61 | 22.67 | 1 |
| | | 1 | 99 | 22.25 | 21.91 | 22.11 | 22.27 | 22.31 | 1 |
| | | 50 | 0 | 21.57 | 21.20 | 21.23 | 21.51 | 21.59 | 2 |
| | | 50 | 25 | 21.43 | 21.07 | 21.37 | 21.45 | 21.48 | 2 |
| | | 50 | 50 | 21.30 | 20.98 | 21.27 | 21.29 | 21.28 | 2 |
| | | 100 | 0 | 21.33 | 20.91 | 21.29 | 21.45 | 21.51 | 2 |

<WLAN 2.4G>

| Mode | 802.11b | | |
|---|---|---|---|
| Channel / Frequency (MHz) | 1 (2412) | 6 (2437) | 11 (2462) |
| Average Power | 17.67 | **18.93** | 18.20 |
| **Mode** | **802.11g** | | |
| **Channel / Frequency (MHz)** | **1 (2412)** | **6 (2437)** | **11 (2462)** |
| Average Power | 14.72 | **17.84** | 15.01 |
| **Mode** | **802.11n (HT20)** | | |
| **Channel / Frequency (MHz)** | **1 (2412)** | **6 (2437)** | **11 (2462)** |
| Average Power | 14.67 | **17.82** | 14.95 |

## 4.7 SAR Testing Results

### 4.7.1 SAR Results for Head

| Plot No. | Band | Mode | Test Position | Ch. | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Power Drift (dB) | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| | CDMA BC0 | RC3+SO55 | Right Cheek | 384 | 25.2 | 24.85 | 1.08 | -0.08 | 0.45 | 0.49 |
| | CDMA BC0 | RC3+SO55 | Right Tilted | 384 | 25.2 | 24.85 | 1.08 | 0.05 | 0.329 | 0.36 |
| 01 | CDMA BC0 | RC3+SO55 | Left Cheek | 384 | 25.2 | 24.85 | 1.08 | 0.12 | 0.479 | **0.52** |
| | CDMA BC0 | RC3+SO55 | Left Tilted | 384 | 25.2 | 24.85 | 1.08 | 0.16 | 0.362 | 0.39 |
| | CDMA BC1 | RC3+SO55 | Right Cheek | 25 | 25.2 | 24.85 | 1.08 | -0.15 | 0.435 | 0.47 |
| | CDMA BC1 | RC3+SO55 | Right Tilted | 25 | 25.2 | 24.85 | 1.08 | -0.01 | 0.29 | 0.31 |
| 02 | CDMA BC1 | RC3+SO55 | Left Cheek | 25 | 25.2 | 24.85 | 1.08 | -0.02 | 0.79 | **0.86** |
| | CDMA BC1 | RC3+SO55 | Left Tilted | 25 | 25.2 | 24.85 | 1.08 | 0.07 | 0.271 | 0.29 |
| | CDMA BC1 | RC3+SO55 | Left Cheek | 600 | 25.2 | 24.65 | 1.14 | 0.07 | 0.654 | 0.74 |
| | CDMA BC1 | RC3+SO55 | Left Cheek | 1175 | 25.2 | 24.63 | 1.14 | 0.10 | 0.655 | 0.75 |
| | CDMA BC10 | RC3+SO55 | Right Cheek | 580 | 25.2 | 24.95 | 1.06 | -0.11 | 0.39 | 0.41 |
| | CDMA BC10 | RC3+SO55 | Right Tilted | 580 | 25.2 | 24.95 | 1.06 | 0.07 | 0.267 | 0.28 |
| 03 | CDMA BC10 | RC3+SO55 | Left Cheek | 580 | 25.2 | 24.95 | 1.06 | 0.12 | 0.453 | **0.48** |
| | CDMA BC10 | RC3+SO55 | Left Tilted | 580 | 25.2 | 24.95 | 1.06 | 0.02 | 0.316 | 0.33 |
| | 802.11b | - | Right Cheek | 6 | 19.0 | 18.93 | 1.02 | -0.13 | 0.147 | 0.15 |
| | 802.11b | - | Right Tilted | 6 | 19.0 | 18.93 | 1.02 | -0.13 | 0.043 | 0.04 |
| 07 | 802.11b | - | Left Cheek | 6 | 19.0 | 18.93 | 1.02 | 0.09 | 0.292 | **0.30** |
| | 802.11b | - | Left Tilted | 6 | 19.0 | 18.93 | 1.02 | 0.02 | 0.074 | 0.08 |

**Note:**

1. SAR is performed on the highest power channel. When the reported SAR value of highest power channel is <= 0.8 W/kg, SAR testing for optional channel is not required.
2. According to KDB 248227, when the extrapolated maximum peak SAR for the maximum output power channel is <= 1.6 W/kg and the 1g averaged SAR is <= 0.8 W/kg, WLAN SAR testing for other channels is not required.
3. SAR testing for 802.11g/n is not required when its maximum power is less than 1/4 dB higher than 802.11b.

| Plot No. | Band | Mode | Test Position | Ch. | RB# | RB Offset | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Power Drift (dB) | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE 25 | QPSK / 10M | Right Cheek | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | -0.08 | 0.299 | 0.36 |
| | LTE 25 | QPSK / 10M | Right Tilted | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.00 | 0.183 | 0.22 |
| 04 | LTE 25 | QPSK / 10M | Left Cheek | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | -0.06 | 0.496 | **0.60** |
| | LTE 25 | QPSK / 10M | Left Tilted | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.07 | 0.194 | 0.24 |
| | LTE 25 | QPSK / 10M | Right Cheek | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | -0.04 | 0.224 | 0.29 |
| | LTE 25 | QPSK / 10M | Right Tilted | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | -0.04 | 0.14 | 0.18 |
| | LTE 25 | QPSK / 10M | Left Cheek | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.03 | 0.372 | 0.48 |
| | LTE 25 | QPSK / 10M | Left Tilted | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | -0.04 | 0.148 | 0.19 |
| | LTE 26 | QPSK / 10M | Right Cheek | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.01 | 0.317 | 0.39 |
| | LTE 26 | QPSK / 10M | Right Tilted | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.03 | 0.241 | 0.30 |
| 05 | LTE 26 | QPSK / 10M | Left Cheek | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | 0.06 | 0.334 | **0.41** |
| | LTE 26 | QPSK / 10M | Left Tilted | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | 0.06 | 0.271 | 0.33 |
| | LTE 26 | QPSK / 10M | Right Cheek | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.04 | 0.242 | 0.31 |
| | LTE 26 | QPSK / 10M | Right Tilted | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.15 | 0.187 | 0.24 |
| | LTE 26 | QPSK / 10M | Left Cheek | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.10 | 0.26 | 0.33 |
| | LTE 26 | QPSK / 10M | Left Tilted | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.03 | 0.212 | 0.27 |
| 06 | LTE 41 | QPSK / 20M | Right Cheek | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.06 | 0.57 | **0.63** |
| | LTE 41 | QPSK / 20M | Right Tilted | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.03 | 0.115 | 0.13 |
| | LTE 41 | QPSK / 20M | Left Cheek | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.10 | 0.265 | 0.29 |
| | LTE 41 | QPSK / 20M | Left Tilted | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.05 | 0.175 | 0.19 |
| | LTE 41 | QPSK / 20M | Right Cheek | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.04 | 0.382 | 0.43 |
| | LTE 41 | QPSK / 20M | Right Tilted | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.17 | 0.076 | 0.09 |
| | LTE 41 | QPSK / 20M | Left Cheek | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.04 | 0.178 | 0.20 |
| | LTE 41 | QPSK / 20M | Left Tilted | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.08 | 0.12 | 0.13 |

**Note:**

1. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 1RB configuration is less than 0.8 W/kg.
2. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 50% RB configuration is less than 0.8 W/kg.
3. According to KDB 941225, LTE SAR testing for 100% RB is not required when the maximum power of 100% RB is less than the maximum power of 1RB and 50% RB, and the highest reported SAR for 1RB and 50% RB is less than 0.8 W/kg.
4. According to KDB 941225, LTE SAR testing for 16QAM is not required when the maximum power of 16QAM is less 1/2 dB higher than QPSK, and the highest reported SAR of QPSK is less than 1.45 W/kg.
5. According to KDB 941225, LTE SAR testing for smaller channel bandwidth is not required when the maximum power of smaller channel bandwidth is less 1/2 dB higher than largest channel bandwidth, and the highest reported SAR of largest channel bandwidth is less than 1.45 W/kg.

### 4.7.2 SAR Results for Body-Worn (Separation Distance is 1.0 cm Gap)

| Plot No. | Band | Mode | Test Position | Ch. | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Power Drift (dB) | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| | CDMA BC0 | RTAP 153.6 | Front Face | 384 | 25.2 | 24.72 | 1.12 | 0.15 | 0.67 | 0.75 |
| 08 | CDMA BC0 | RTAP 153.6 | Rear Face | 384 | 25.2 | 24.72 | 1.12 | 0.10 | 0.682 | 0.76 |
| | CDMA BC1 | RTAP 153.6 | Front Face | 25 | 25.2 | 24.78 | 1.10 | -0.06 | 0.697 | 0.77 |
| 09 | CDMA BC1 | RTAP 153.6 | Rear Face | 25 | 25.2 | 24.78 | 1.10 | 0.12 | 0.977 | 1.08 |
| | CDMA BC1 | RTAP 153.6 | Rear Face | 600 | 25.2 | 24.58 | 1.15 | 0.04 | 0.848 | 0.98 |
| | CDMA BC1 | RTAP 153.6 | Rear Face | 1175 | 25.2 | 24.56 | 1.16 | 0.08 | 0.757 | 0.88 |
| | CDMA BC1 | RTAP 153.6 | Rear Face | 25 | 25.2 | 24.78 | 1.10 | 0.06 | 0.948 | 1.04 |
| | CDMA BC10 | RTAP 153.6 | Front Face | 580 | 25.2 | 24.81 | 1.09 | 0.09 | 0.636 | 0.70 |
| 10 | CDMA BC10 | RTAP 153.6 | Rear Face | 580 | 25.2 | 24.81 | 1.09 | -0.03 | 0.643 | 0.70 |
| | 802.11b | - | Front Face | 6 | 19.0 | 18.93 | 1.02 | 0.03 | 0.067 | 0.07 |
| 14 | 802.11b | - | Rear Face | 6 | 19.0 | 18.93 | 1.02 | 0.07 | 0.158 | 0.16 |

**Note:**

1. SAR is performed on the highest power channel. When the reported SAR value of highest power channel is <= 0.8 W/kg, SAR testing for optional channel is not required.
2. According to KDB 248227, when the extrapolated maximum peak SAR for the maximum output power channel is <= 1.6 W/kg and the 1g averaged SAR is <= 0.8 W/kg, WLAN SAR testing for other channels is not required.
3. SAR testing for 802.11g/n is not required when its maximum power is less than 1/4 dB higher than 802.11b.

| Plot No. | Band | Mode | Test Position | Ch. | RB# | RB Offset | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Power Drift (dB) | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE 25 | QPSK / 10M | Front Face | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.16 | 0.396 | 0.48 |
| 11 | LTE 25 | QPSK / 10M | Rear Face | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.01 | 0.581 | 0.71 |
| | LTE 25 | QPSK / 10M | Front Face | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.16 | 0.304 | 0.39 |
| | LTE 25 | QPSK / 10M | Rear Face | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.08 | 0.484 | 0.62 |
| | LTE 26 | QPSK / 10M | Front Face | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.05 | 0.312 | 0.38 |
| 12 | LTE 26 | QPSK / 10M | Rear Face | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.05 | 0.319 | 0.39 |
| | LTE 26 | QPSK / 10M | Front Face | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.04 | 0.185 | 0.24 |
| | LTE 26 | QPSK / 10M | Rear Face | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | -0.03 | 0.187 | 0.24 |
| 13 | LTE 41 | QPSK / 20M | Front Face | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.00 | 0.245 | 0.27 |
| | LTE 41 | QPSK / 20M | Rear Face | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.13 | 0.227 | 0.25 |
| | LTE 41 | QPSK / 20M | Front Face | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | -0.13 | 0.179 | 0.20 |
| | LTE 41 | QPSK / 20M | Rear Face | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.02 | 0.173 | 0.19 |

**Note:**

1. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 1RB configuration is less than 0.8 W/kg.
2. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 50% RB configuration is less than 0.8 W/kg.
3. According to KDB 941225, LTE SAR testing for 100% RB is not required when the maximum power of 100% RB is less than the maximum power of 1RB and 50% RB, and the highest reported SAR for 1RB and 50% RB is less than 0.8 W/kg.
4. According to KDB 941225, LTE SAR testing for 16QAM is not required when the maximum power of 16QAM is less 1/2 dB higher than QPSK, and the highest reported SAR of QPSK is less than 1.45 W/kg.
5. According to KDB 941225, LTE SAR testing for smaller channel bandwidth is not required when the maximum power of smaller channel bandwidth is less 1/2 dB higher than largest channel bandwidth, and the highest reported SAR of largest channel bandwidth is less than 1.45 W/kg.

### 4.7.3 SAR Results for Hotspot (Separation Distance is 1.0 cm Gap)

| Plot No. | Band | Mode | Test Position | Ch. | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Power Drift (dB) | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| | CDMA BC0 | RTAP 153.6 | Front Face | 384 | 25.2 | 24.72 | 1.12 | 0.15 | 0.67 | 0.75 |
| 08 | CDMA BC0 | RTAP 153.6 | Rear Face | 384 | 25.2 | 24.72 | 1.12 | 0.10 | 0.682 | **0.76** |
| | CDMA BC0 | RTAP 153.6 | Left Side | 384 | 25.2 | 24.72 | 1.12 | 0.03 | 0.562 | 0.63 |
| | CDMA BC0 | RTAP 153.6 | Right Side | 384 | 25.2 | 24.72 | 1.12 | -0.06 | 0.642 | 0.72 |
| | CDMA BC0 | RTAP 153.6 | Bottom Side | 384 | 25.2 | 24.72 | 1.12 | 0.12 | 0.085 | 0.09 |
| | CDMA BC1 | RTAP 153.6 | Front Face | 25 | 25.2 | 24.78 | 1.10 | -0.06 | 0.697 | 0.77 |
| | CDMA BC1 | RTAP 153.6 | Rear Face | 25 | 25.2 | 24.78 | 1.10 | 0.12 | 0.977 | 1.08 |
| | CDMA BC1 | RTAP 153.6 | Left Side | 25 | 25.2 | 24.78 | 1.10 | -0.09 | 0.608 | 0.67 |
| | CDMA BC1 | RTAP 153.6 | Right Side | 25 | 25.2 | 24.78 | 1.10 | 0.06 | 0.105 | 0.12 |
| 15 | CDMA BC1 | RTAP 153.6 | Bottom Side | 25 | 25.2 | 24.78 | 1.10 | 0.10 | 1.01 | **1.11** |
| | CDMA BC1 | RTAP 153.6 | Rear Face | 600 | 25.2 | 24.58 | 1.15 | 0.04 | 0.848 | 0.98 |
| | CDMA BC1 | RTAP 153.6 | Rear Face | 1175 | 25.2 | 24.56 | 1.16 | 0.08 | 0.757 | 0.88 |
| | CDMA BC1 | RTAP 153.6 | Bottom Side | 600 | 25.2 | 24.58 | 1.15 | 0.09 | 0.908 | 1.05 |
| | CDMA BC1 | RTAP 153.6 | Bottom Side | 1175 | 25.2 | 24.56 | 1.16 | 0.09 | 0.87 | 1.01 |
| | CDMA BC1 | RTAP 153.6 | Bottom Side | 25 | 25.2 | 24.78 | 1.10 | 0.05 | 0.991 | 1.09 |
| | CDMA BC10 | RTAP 153.6 | Front Face | 580 | 25.2 | 24.81 | 1.09 | 0.09 | 0.636 | 0.70 |
| 10 | CDMA BC10 | RTAP 153.6 | Rear Face | 580 | 25.2 | 24.81 | 1.09 | -0.03 | 0.643 | **0.70** |
| | CDMA BC10 | RTAP 153.6 | Left Side | 580 | 25.2 | 24.81 | 1.09 | 0.01 | 0.535 | 0.59 |
| | CDMA BC10 | RTAP 153.6 | Right Side | 580 | 25.2 | 24.81 | 1.09 | 0.12 | 0.568 | 0.62 |
| | CDMA BC10 | RTAP 153.6 | Bottom Side | 580 | 25.2 | 24.81 | 1.09 | 0.04 | 0.067 | 0.07 |
| | 802.11b | - | Front Face | 6 | 19.0 | 18.93 | 1.02 | 0.03 | 0.067 | 0.07 |
| 14 | 802.11b | - | Rear Face | 6 | 19.0 | 18.93 | 1.02 | 0.07 | 0.158 | **0.16** |
| | 802.11b | - | Right Side | 6 | 19.0 | 18.93 | 1.02 | -0.03 | 0.143 | 0.15 |

**Note:**

1. SAR is performed on the highest power channel. When the reported SAR value of highest power channel is <= 0.8 W/kg, SAR testing for optional channel is not required.
2. According to KDB 248227, when the extrapolated maximum peak SAR for the maximum output power channel is <= 1.6 W/kg and the 1g averaged SAR is <= 0.8 W/kg, WLAN SAR testing for other channels is not required.
3. SAR testing for 802.11g/n is not required when its maximum power is less than 1/4 dB higher than 802.11b.

| Plot No. | Band | Mode | Test Position | Ch. | RB# | RB Offset | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Power Drift (dB) | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LTE 25 | QPSK / 10M | Front Face | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.16 | 0.396 | 0.48 |
| 11 | LTE 25 | QPSK / 10M | Rear Face | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.01 | 0.581 | 0.71 |
| | LTE 25 | QPSK / 10M | Left Side | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | -0.12 | 0.326 | 0.40 |
| | LTE 25 | QPSK / 10M | Right Side | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.18 | 0.055 | 0.07 |
| | LTE 25 | QPSK / 10M | Bottom Side | 26365 | 1 | 24 | 24.2 | 23.35 | 1.22 | 0.05 | 0.568 | 0.69 |
| | LTE 25 | QPSK / 10M | Front Face | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.16 | 0.304 | 0.39 |
| | LTE 25 | QPSK / 10M | Rear Face | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.08 | 0.484 | 0.62 |
| | LTE 25 | QPSK / 10M | Left Side | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.02 | 0.244 | 0.31 |
| | LTE 25 | QPSK / 10M | Right Side | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.10 | 0.041 | 0.05 |
| | LTE 25 | QPSK / 10M | Bottom Side | 26365 | 25 | 12 | 23.2 | 22.10 | 1.29 | 0.10 | 0.478 | 0.62 |
| | LTE 26 | QPSK / 10M | Front Face | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.05 | 0.312 | 0.38 |
| 12 | LTE 26 | QPSK / 10M | Rear Face | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.05 | 0.319 | 0.39 |
| | LTE 26 | QPSK / 10M | Left Side | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.13 | 0.288 | 0.35 |
| | LTE 26 | QPSK / 10M | Right Side | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | -0.04 | 0.313 | 0.38 |
| | LTE 26 | QPSK / 10M | Bottom Side | 26990 | 1 | 24 | 23.7 | 22.81 | 1.23 | 0.09 | 0.037 | 0.05 |
| | LTE 26 | QPSK / 10M | Front Face | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.04 | 0.185 | 0.24 |
| | LTE 26 | QPSK / 10M | Rear Face | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | -0.03 | 0.187 | 0.24 |
| | LTE 26 | QPSK / 10M | Left Side | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.02 | 0.161 | 0.21 |
| | LTE 26 | QPSK / 10M | Right Side | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.01 | 0.181 | 0.23 |
| | LTE 26 | QPSK / 10M | Bottom Side | 26990 | 25 | 12 | 22.7 | 21.60 | 1.29 | 0.06 | 0.02 | 0.03 |
| 13 | LTE 41 | QPSK / 20M | Front Face | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.00 | 0.245 | 0.27 |
| | LTE 41 | QPSK / 20M | Rear Face | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.13 | 0.227 | 0.25 |
| | LTE 41 | QPSK / 20M | Right Side | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | -0.05 | 0.233 | 0.26 |
| | LTE 41 | QPSK / 20M | Bottom Side | 41490 | 1 | 0 | 24.2 | 23.78 | 1.10 | 0.10 | 0.07 | 0.08 |
| | LTE 41 | QPSK / 20M | Front Face | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | -0.13 | 0.179 | 0.20 |
| | LTE 41 | QPSK / 20M | Rear Face | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.02 | 0.173 | 0.19 |
| | LTE 41 | QPSK / 20M | Right Side | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | 0.05 | 0.159 | 0.18 |
| | LTE 41 | QPSK / 20M | Bottom Side | 41490 | 50 | 0 | 23.2 | 22.69 | 1.12 | -0.07 | 0.047 | 0.05 |

**Note:**

1. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 1RB configuration is less than 0.8 W/kg.
2. According to KDB 941225, LTE SAR testing for remaining RB offset configurations and required test channels is not required when the reported SAR of highest power 50% RB configuration is less than 0.8 W/kg.
3. According to KDB 941225, LTE SAR testing for 100% RB is not required when the maximum power of 100% RB is less than the maximum power of 1RB and 50% RB, and the highest reported SAR for 1RB and 50% RB is less than 0.8 W/kg.
4. According to KDB 941225, LTE SAR testing for 16QAM is not required when the maximum power of 16QAM is less 1/2 dB higher than QPSK, and the highest reported SAR of QPSK is less than 1.45 W/kg.
5. According to KDB 941225, LTE SAR testing for smaller channel bandwidth is not required when the maximum power of smaller channel bandwidth is less 1/2 dB higher than largest channel bandwidth, and the highest reported SAR of largest channel bandwidth is less than 1.45 W/kg.

#### 4.7.4 SAR Measurement Variability

According to KDB 865664 D01 v01r01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is >= 0.80 W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20, or when the original or repeated measurement is >= 1.45 W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20, and the original, first or second repeated measurement is >= 1.5 W/kg, perform a third repeated measurement.

| Band | Mode | Test Position | Ch. | Original Measured SAR-1g (W/kg) | 1st Repeated SAR-1g (W/kg) | L/S Ratio | 2nd Repeated SAR-1g (W/kg) | L/S Ratio | 3rd Repeated SAR-1g (W/kg) | L/S Ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| CDMA BC1 | RTAP 153.6 | Rear Face | 25 | 0.977 | 0.948 | 1.03 | N/A | N/A | N/A | N/A |
| CDMA BC1 | RTAP 153.6 | Bottom Side | 25 | 1.01 | 0.991 | 1.02 | N/A | N/A | N/A | N/A |

### 4.7.5 Simultaneous Multi-band Transmission Evaluation

**<Estimated SAR Calculation>**

According to KDB 447498 D01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of <= 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(\text{mW})}}{\text{Min. Test Separation Distance}_{(\text{mm})}} \times \frac{\sqrt{f_{(\text{GHz})}}}{7.5}$$

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

| Mode / Band | Frequency (GHz) | Max. Tune-up Power (dBm) | Test Position | Separation Distance (mm) | Estimated SAR (W/kg) |
|---|---|---|---|---|---|
| BT (DSS) | 2.48 | 2.5 | Body-worn | 10 | 0.04 |

**Note:**

1. The separation distance is determined from the outer housing of the EUT to the user.
2. When standalone SAR testing is not required, an estimated SAR can be applied to determine simultaneous transmission SAR test exclusion.

**<SAR Summation Analysis>**

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of $SAR_{1g}$ of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit ($SAR_{1g}$ 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of $SAR_{1g}$ is greater than the SAR limit ($SAR_{1g}$ 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

| No. | Conditions (SAR1 + SAR2) | Exposure Condition | Test Position | Max. SAR1 | Max. SAR2 | SAR Summation | SPLSR Analysis |
|---|---|---|---|---|---|---|---|
| 1 | CDMA BC0 + WLAN (DTS) | Head | Right Cheek | 0.49 | 0.15 | 0.64 | Σ SAR < 1.6, Not required |
| | | | Right Tilted | 0.36 | 0.04 | 0.40 | Σ SAR < 1.6, Not required |
| | | | Left Cheek | 0.52 | 0.30 | 0.82 | Σ SAR < 1.6, Not required |
| | | | Left Tilted | 0.39 | 0.08 | 0.47 | Σ SAR < 1.6, Not required |
| | | Body-Worn | Front Face | 0.75 | 0.07 | 0.82 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.76 | 0.16 | 0.92 | Σ SAR < 1.6, Not required |
| | | Hotspot | Front Face | 0.75 | 0.07 | 0.82 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.76 | 0.16 | 0.92 | Σ SAR < 1.6, Not required |
| | | | Left Side | 0.63 | - | 0.63 | Σ SAR < 1.6, Not required |
| | | | Right Side | 0.72 | 0.15 | 0.87 | Σ SAR < 1.6, Not required |
| | | | Top Side | - | - | 0.00 | Σ SAR < 1.6, Not required |
| | | | Bottom Side | 0.09 | - | 0.09 | Σ SAR < 1.6, Not required |
| 2 | CDMA BC0 + BT (DSS) | Body-Worn | Front Face | 0.75 | 0.04 | 0.79 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.76 | 0.04 | 0.80 | Σ SAR < 1.6, Not required |

| No. | Conditions (SAR1 + SAR2) | Exposure Condition | Test Position | Max. SAR1 | Max. SAR2 | SAR Summation | SPLSR Analysis |
|---|---|---|---|---|---|---|---|
| 3 | CDMA BC1 + WLAN (DTS) | Head | Right Cheek | 0.47 | 0.15 | 0.62 | Σ SAR < 1.6, Not required |
| | | | Right Tilted | 0.31 | 0.04 | 0.35 | Σ SAR < 1.6, Not required |
| | | | Left Cheek | 0.86 | 0.30 | 1.16 | Σ SAR < 1.6, Not required |
| | | | Left Tilted | 0.29 | 0.08 | 0.37 | Σ SAR < 1.6, Not required |
| | | Body-Worn | Front Face | 0.77 | 0.07 | 0.84 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 1.08 | 0.16 | 1.24 | Σ SAR < 1.6, Not required |
| | | Hotspot | Front Face | 0.77 | 0.07 | 0.84 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 1.08 | 0.16 | 1.24 | Σ SAR < 1.6, Not required |
| | | | Left Side | 0.67 | - | 0.67 | Σ SAR < 1.6, Not required |
| | | | Right Side | 0.12 | 0.15 | 0.27 | Σ SAR < 1.6, Not required |
| | | | Top Side | - | - | 0.00 | Σ SAR < 1.6, Not required |
| | | | Bottom Side | 1.11 | - | 1.11 | Σ SAR < 1.6, Not required |
| 4 | CDMA BC1 + BT (DSS) | Body-Worn | Front Face | 0.77 | 0.04 | 0.81 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 1.08 | 0.04 | 1.12 | Σ SAR < 1.6, Not required |

| No. | Conditions (SAR1 + SAR2) | Exposure Condition | Test Position | Max. SAR1 | Max. SAR2 | SAR Summation | SPLSR Analysis |
|---|---|---|---|---|---|---|---|
| 5 | CDMA BC10 + WLAN (DTS) | Head | Right Cheek | 0.41 | 0.15 | 0.56 | Σ SAR < 1.6, Not required |
| | | | Right Tilted | 0.28 | 0.04 | 0.32 | Σ SAR < 1.6, Not required |
| | | | Left Cheek | 0.48 | 0.30 | 0.78 | Σ SAR < 1.6, Not required |
| | | | Left Tilted | 0.33 | 0.08 | 0.41 | Σ SAR < 1.6, Not required |
| | | Body-Worn | Front Face | 0.70 | 0.07 | 0.77 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.70 | 0.16 | 0.86 | Σ SAR < 1.6, Not required |
| | | Hotspot | Front Face | 0.70 | 0.07 | 0.77 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.70 | 0.16 | 0.86 | Σ SAR < 1.6, Not required |
| | | | Left Side | 0.59 | - | 0.59 | Σ SAR < 1.6, Not required |
| | | | Right Side | 0.62 | 0.15 | 0.77 | Σ SAR < 1.6, Not required |
| | | | Top Side | - | - | 0.00 | Σ SAR < 1.6, Not required |
| | | | Bottom Side | 0.07 | - | 0.07 | Σ SAR < 1.6, Not required |
| 6 | CDMA BC10 + BT (DSS) | Body-Worn | Front Face | 0.70 | 0.04 | 0.74 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.70 | 0.04 | 0.74 | Σ SAR < 1.6, Not required |

| No. | Conditions (SAR1 + SAR2) | Exposure Condition | Test Position | Max. SAR1 | Max. SAR2 | SAR Summation | SPLSR Analysis |
|---|---|---|---|---|---|---|---|
| 7 | LTE B25 + WLAN (DTS) | Head | Right Cheek | 0.36 | 0.15 | 0.51 | Σ SAR < 1.6, Not required |
| | | | Right Tilted | 0.22 | 0.04 | 0.26 | Σ SAR < 1.6, Not required |
| | | | Left Cheek | 0.60 | 0.30 | 0.90 | Σ SAR < 1.6, Not required |
| | | | Left Tilted | 0.24 | 0.08 | 0.32 | Σ SAR < 1.6, Not required |
| | | Body-Worn | Front Face | 0.48 | 0.07 | 0.55 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.71 | 0.16 | 0.87 | Σ SAR < 1.6, Not required |
| | | Hotspot | Front Face | 0.48 | 0.07 | 0.55 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.71 | 0.16 | 0.87 | Σ SAR < 1.6, Not required |
| | | | Left Side | 0.40 | - | 0.40 | Σ SAR < 1.6, Not required |
| | | | Right Side | 0.07 | 0.15 | 0.22 | Σ SAR < 1.6, Not required |
| | | | Top Side | - | - | 0.00 | Σ SAR < 1.6, Not required |
| | | | Bottom Side | 0.69 | - | 0.69 | Σ SAR < 1.6, Not required |
| 8 | LTE B25 + BT (DSS) | Body-Worn | Front Face | 0.48 | 0.04 | 0.52 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.71 | 0.04 | 0.75 | Σ SAR < 1.6, Not required |

| No. | Conditions (SAR1 + SAR2) | Exposure Condition | Test Position | Max. SAR1 | Max. SAR2 | SAR Summation | SPLSR Analysis |
|---|---|---|---|---|---|---|---|
| 9 | LTE B26 + WLAN (DTS) | Head | Right Cheek | 0.39 | 0.15 | 0.54 | Σ SAR < 1.6, Not required |
| | | | Right Tilted | 0.30 | 0.04 | 0.34 | Σ SAR < 1.6, Not required |
| | | | Left Cheek | 0.41 | 0.30 | 0.71 | Σ SAR < 1.6, Not required |
| | | | Left Tilted | 0.33 | 0.08 | 0.41 | Σ SAR < 1.6, Not required |
| | | Body-Worn | Front Face | 0.38 | 0.07 | 0.45 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.39 | 0.16 | 0.55 | Σ SAR < 1.6, Not required |
| | | Hotspot | Front Face | 0.38 | 0.07 | 0.45 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.39 | 0.16 | 0.55 | Σ SAR < 1.6, Not required |
| | | | Left Side | 0.35 | - | 0.35 | Σ SAR < 1.6, Not required |
| | | | Right Side | 0.38 | 0.15 | 0.53 | Σ SAR < 1.6, Not required |
| | | | Top Side | - | - | - | Σ SAR < 1.6, Not required |
| | | | Bottom Side | 0.05 | - | 0.05 | Σ SAR < 1.6, Not required |
| 10 | LTE B26 + BT (DSS) | Body-Worn | Front Face | 0.38 | 0.04 | 0.42 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.39 | 0.04 | 0.43 | Σ SAR < 1.6, Not required |

| No. | Conditions (SAR1 + SAR2) | Exposure Condition | Test Position | Max. SAR1 | Max. SAR2 | SAR Summation | SPLSR Analysis |
|---|---|---|---|---|---|---|---|
| 11 | LTE B41 + WLAN (DTS) | Head | Right Cheek | 0.63 | 0.15 | 0.78 | Σ SAR < 1.6, Not required |
| | | | Right Tilted | 0.13 | 0.04 | 0.17 | Σ SAR < 1.6, Not required |
| | | | Left Cheek | 0.29 | 0.30 | 0.59 | Σ SAR < 1.6, Not required |
| | | | Left Tilted | 0.19 | 0.08 | 0.27 | Σ SAR < 1.6, Not required |
| | | Body-Worn | Front Face | 0.27 | 0.07 | 0.34 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.25 | 0.16 | 0.41 | Σ SAR < 1.6, Not required |
| | | Hotspot | Front Face | 0.27 | 0.07 | 0.34 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.25 | 0.16 | 0.41 | Σ SAR < 1.6, Not required |
| | | | Left Side | - | - | 0.00 | Σ SAR < 1.6, Not required |
| | | | Right Side | 0.26 | 0.15 | 0.41 | Σ SAR < 1.6, Not required |
| | | | Top Side | - | - | 0.00 | Σ SAR < 1.6, Not required |
| | | | Bottom Side | 0.08 | - | 0.08 | Σ SAR < 1.6, Not required |
| 12 | LTE B41 + BT (DSS) | Body-Worn | Front Face | 0.27 | 0.04 | 0.31 | Σ SAR < 1.6, Not required |
| | | | Rear Face | 0.25 | 0.04 | 0.29 | Σ SAR < 1.6, Not required |

**Test Engineer：** Way Huang, and Jim Lei

# 5. Calibration of Test Equipment

| Equipment | Manufacturer | Model | SN | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|
| System Validation Kit | SPEAG | D835V2 | 4d121 | Apr. 25, 2013 | Annual |
| System Validation Kit | SPEAG | D1900V2 | 5d036 | Jan. 21, 2013 | Annual |
| System Validation Kit | SPEAG | D2450V2 | 737 | Jan. 21, 2013 | Annual |
| System Validation Kit | SPEAG | D2600V2 | 1020 | Jan. 18, 2013 | Annual |
| Dosimetric E-Field Probe | SPEAG | EX3DV4 | 3650 | Apr. 30, 2013 | Annual |
| Dosimetric E-Field Probe | SPEAG | EX3DV4 | 3864 | Jul. 31, 2013 | Annual |
| Data Acquisition Electronics | SPEAG | DAE3 | 360 | Jan. 30, 2013 | Annual |
| Data Acquisition Electronics | SPEAG | DAE4 | 1277 | Jul. 26, 2013 | Annual |
| SAM Phantom | SPEAG | QD000P40CD | TP-1652 | N/A | N/A |
| SAM Phantom | SPEAG | QD000P40CD | TP-1653 | N/A | N/A |
| SAM Phantom | SPEAG | QD000P40CD | TP-1654 | N/A | N/A |
| ELI Phantom | SPEAG | QDOVA002AA | 1206 | N/A | N/A |
| Radio Communication Tester | Agilent | E5515C | MY50266628 | Nov. 22, 2012 | Biennial |
| Radio Communication Analyzer | Anritsu | MT8820C | 6201010285 | Aug. 06, 2013 | Biennial |
| ENA Series Network Analyzer | Agilent | E5071C | MY46214281 | Jun. 10, 2013 | Annual |
| MXG Analog Signal Generator | Agilent | N5181A | MY50143868 | Jun. 06, 2013 | Annual |
| Power Meter | Anritsu | ML2495A | 1218009 | Jun. 11, 2013 | Annual |
| Power Sensor | Anritsu | MA2411B | 1207252 | Jun. 11, 2013 | Annual |
| EXA Spectrum Analyzer | Agilent | N9010A | MY52100136 | Jun. 26, 2013 | Annual |
| Dielectric Probe Kit | Agilent | 85070D | E2-020018 | May 13, 2013 | Annual |
| Thermometer | YFE | YF-160A | 110600361 | Feb. 20, 2013 | Annual |
| Directional Coupler | Woken | 0110A05602O-10 | 11122702 | Apr. 18, 2013 | Annual |
| Power Amplifier | AR | 5S1G4 | 0339656 | Apr. 18, 2013 | Annual |
| Power Amplifier | Mini-Circuit | ZVE-8G | 001000422 | Apr. 18, 2013 | Annual |
| Attenuator | Woken | 00800A1G01L-03 | N/A | Apr. 18, 2013 | Annual |

# 6. Measurement Uncertainty

| Error Description | Uncertainty Value (±%) | Probability Distribution | Divisor | Ci (1g) | Standard Uncertainty (1g) | Vi |
|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | |
| Probe Calibration | 6.0 | Normal | 1 | 1 | ± 6.0 % | ∞ |
| Axial Isotropy | 4.7 | Rectangular | √3 | 0.7 | ± 1.9 % | ∞ |
| Hemispherical Isotropy | 9.6 | Rectangular | √3 | 0.7 | ± 3.9 % | ∞ |
| Boundary Effects | 1.0 | Rectangular | √3 | 1 | ± 0.6 % | ∞ |
| Linearity | 4.7 | Rectangular | √3 | 1 | ± 2.7 % | ∞ |
| System Detection Limits | 1.0 | Rectangular | √3 | 1 | ± 0.6 % | ∞ |
| Readout Electronics | 0.6 | Normal | 1 | 1 | ± 0.6 % | ∞ |
| Response Time | 0.0 | Rectangular | √3 | 1 | ± 0.0 % | ∞ |
| Integration Time | 1.7 | Rectangular | √3 | 1 | ± 1.0 % | ∞ |
| RF Ambient Noise | 3.0 | Rectangular | √3 | 1 | ± 1.7 % | ∞ |
| RF Ambient Reflections | 3.0 | Rectangular | √3 | 1 | ± 1.7 % | ∞ |
| Probe Positioner | 0.5 | Rectangular | √3 | 1 | ± 0.3 % | ∞ |
| Probe Positioning | 2.9 | Rectangular | √3 | 1 | ± 1.7 % | ∞ |
| Max. SAR Eval. | 2.3 | Rectangular | √3 | 1 | ± 1.3 % | ∞ |
| **Test Sample Related** | | | | | | |
| Device Positioning | 3.9 | Normal | 1 | 1 | ± 3.9 % | 31 |
| Device Holder | 2.7 | Normal | 1 | 1 | ± 2.7 % | 19 |
| Power Drift | 5.0 | Rectangular | √3 | 1 | ± 2.9 % | ∞ |
| **Phantom and Setup** | | | | | | |
| Phantom Uncertainty | 4.0 | Rectangular | √3 | 1 | ± 2.3 % | ∞ |
| Liquid Conductivity (Target) | 5.0 | Rectangular | √3 | 0.64 | ± 1.8 % | ∞ |
| Liquid Conductivity (Meas.) | 5.0 | Normal | 1 | 0.64 | ± 3.2 % | 29 |
| Liquid Permittivity (Target) | 5.0 | Rectangular | √3 | 0.6 | ± 1.7 % | ∞ |
| Liquid Permittivity (Meas.) | 5.0 | Normal | 1 | 0.6 | ± 3.0 % | 29 |
| **Combined Standard Uncertainty** | | | | | ± 11.7 % | |
| **Expanded Uncertainty (K=2)** | | | | | **± 23.4 %** | |

**Uncertainty budget for frequency range 300 MHz to 3 GHz**

# 7. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Taiwan HwaYa EMC/RF/Safety/Telecom Lab:**
Add: No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil., Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.
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Fax: 886-3-327-0892

**Taiwan LinKo EMC/RF Lab:**
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Fax: 886-2-2605-1924

**Taiwan HsinChu EMC/RF Lab:**
Add: No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Vil., Chiung Lin Township, Hsinchu County 307, Taiwan, R.O.C.
Tel: 886-3-593-5343
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**Email:** service.adt@tw.bureauveritas.com
**Web Site:** www.adt.com.tw

The road map of all our labs can be found in our web site also.

**---END---**

# Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/07

## System Check_H835_131207

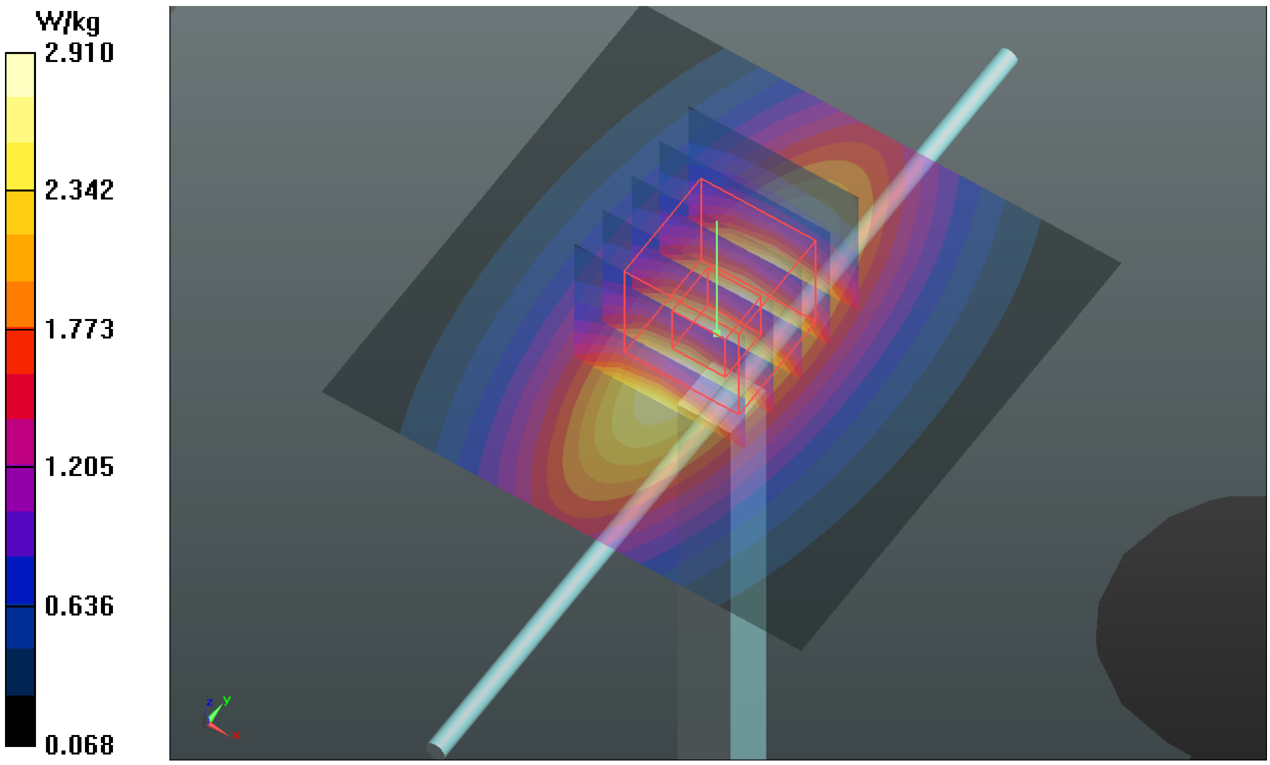
**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: H835_1207 Medium parameters used: f = 835 MHz; $\sigma$ = 0.888 S/m; $\varepsilon_r$ = 42.814; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.37, 9.37, 9.37); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.91 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.220 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.44 W/kg
**SAR(1 g) = 2.29 W/kg; SAR(10 g) = 1.5 W/kg**
Maximum value of SAR (measured) = 2.92 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/06

## System Check_H1900_131206

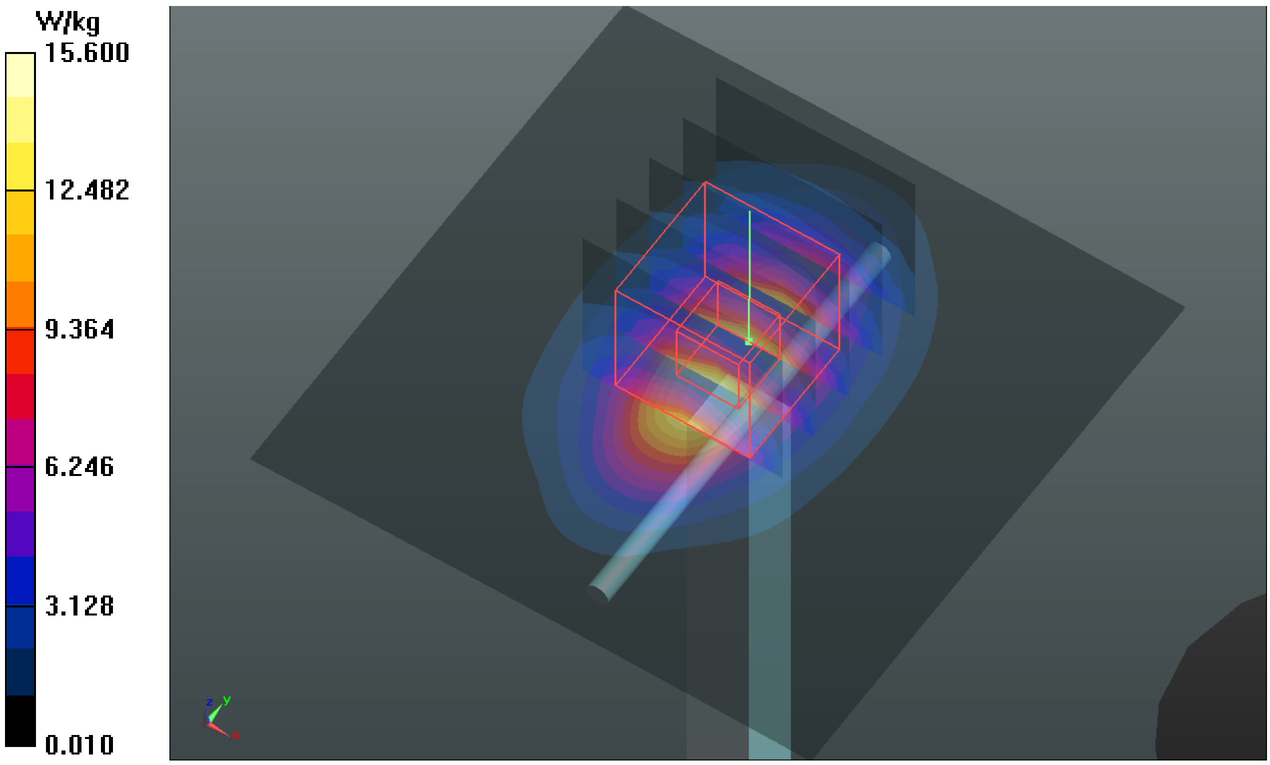
**DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: H1900_1206 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.406 S/m; $\varepsilon_r$ = 39.596; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：21.1 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.73, 7.73, 7.73); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1653
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.6 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 102.6 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.3 W/kg
**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.31 W/kg**
Maximum value of SAR (measured) = 14.2 W/kg



## System Check_H2450_131212

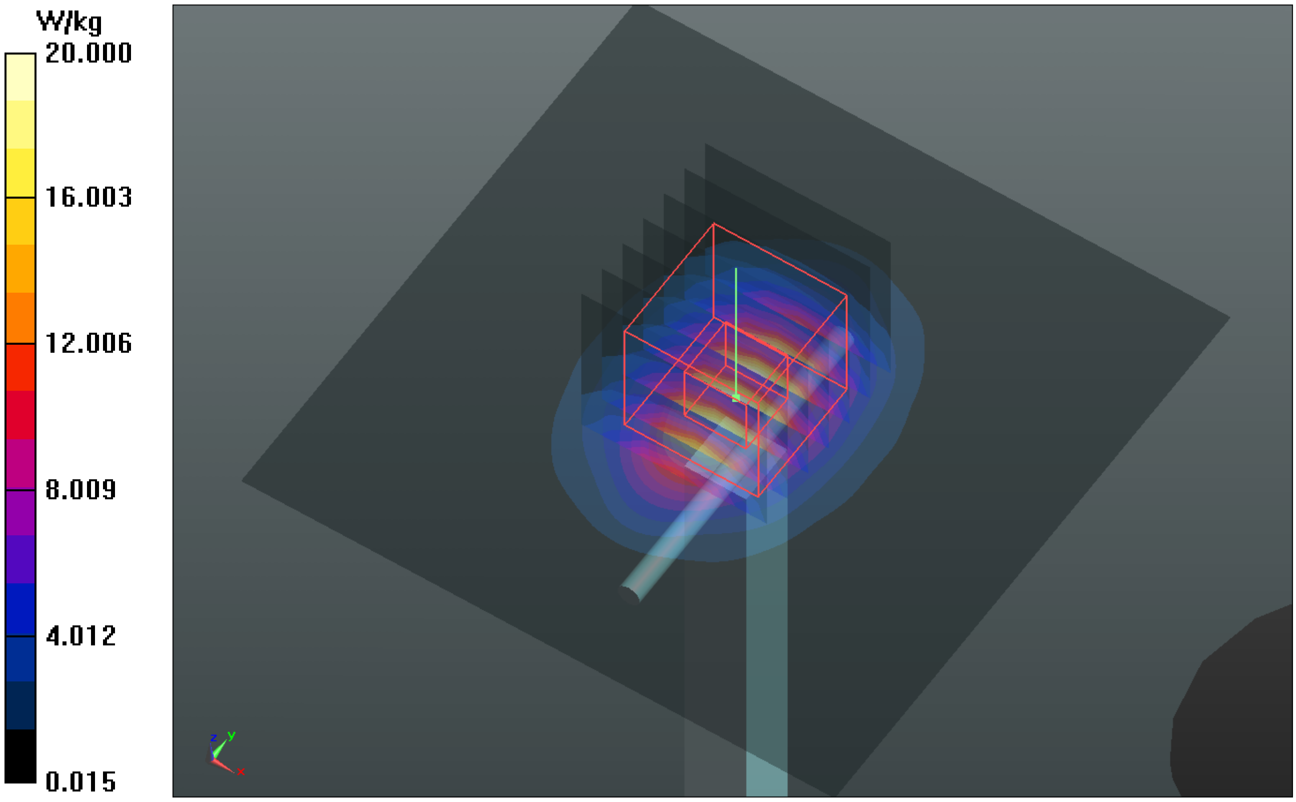
### DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: H2450_1212 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.871 S/m; $\varepsilon_r$ = 37.468; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.6 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(7.47, 7.47, 7.47); Calibrated: 2013/07/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2013/07/26
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 20.0 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.0 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 27.4 W/kg
**SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.82 W/kg**
Maximum value of SAR (measured) = 19.9 W/kg



## System Check_H2600_131207

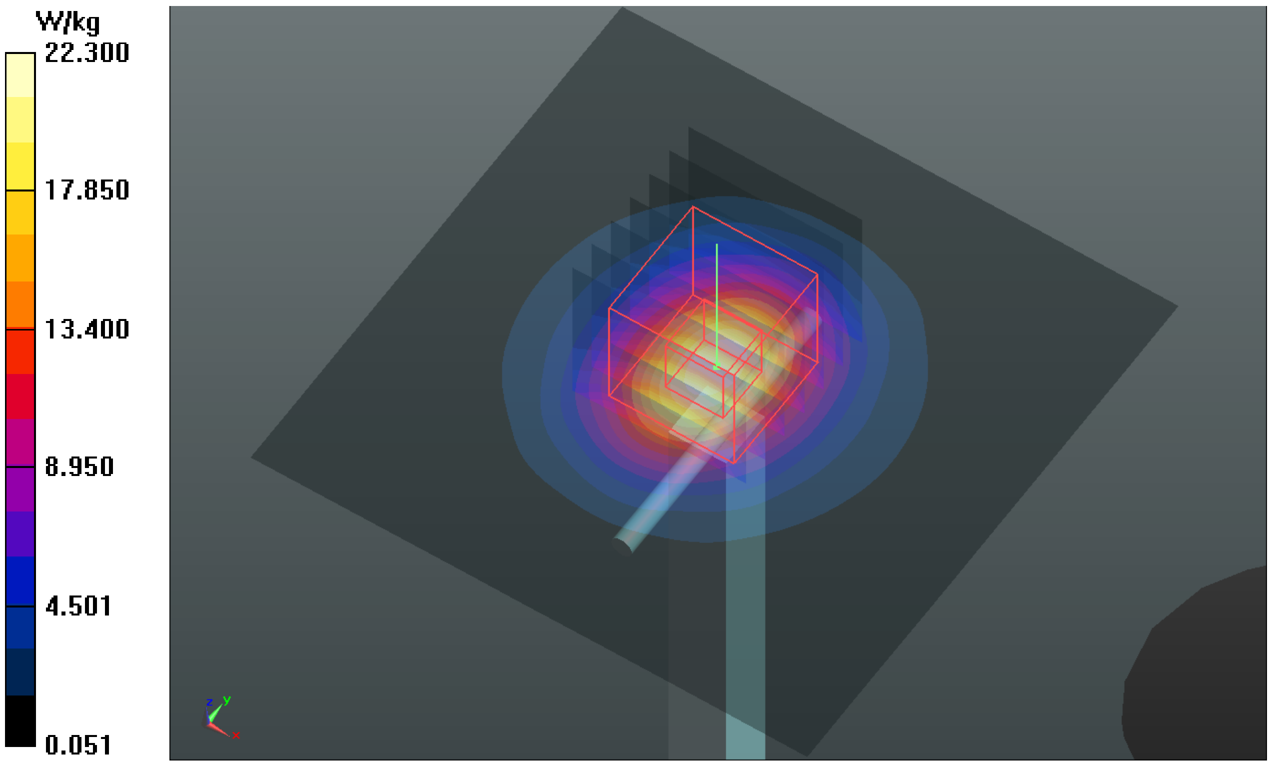
**DUT: Dipole 2600 MHz; Type: D2600V2; SN: 1020**

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: H2600_1207 Medium parameters used: f = 2600 MHz; $\sigma$ = 2.049 S/m; $\varepsilon_r$ = 37.739; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.7 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(6.85, 6.85, 6.85); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 22.3 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.3 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 30.9 W/kg
**SAR(1 g) = 15 W/kg; SAR(10 g) = 7.14 W/kg**
Maximum value of SAR (measured) = 22.7 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/09

## System Check_B835_131209

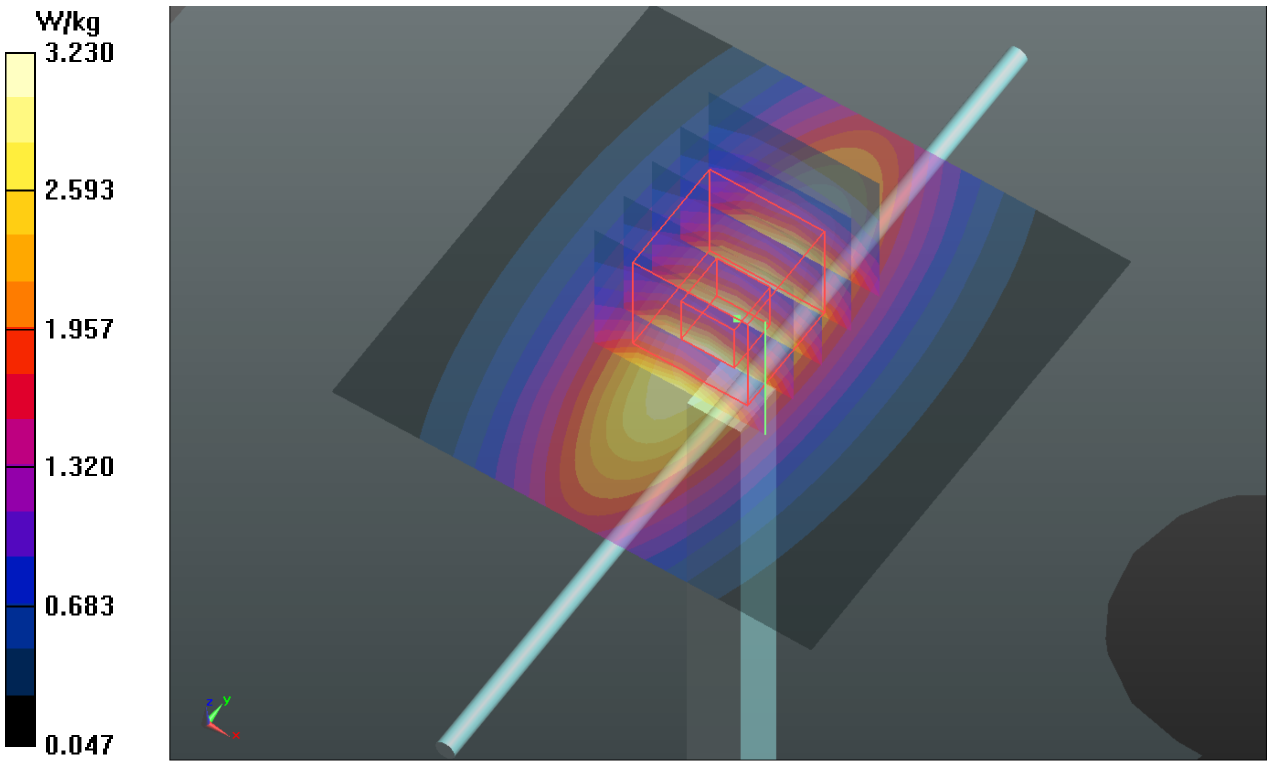
### DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: B835_1209 Medium parameters used: f = 835 MHz; $\sigma$ = 0.972 S/m; $\varepsilon_r$ = 54.017; $\rho$ = 1000 $kg/m^3$
Ambient Temperature：21.3 ℃; Liquid Temperature：20.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.35, 9.35, 9.35); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.23 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.280 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 3.76 W/kg
**SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.64 W/kg**
Maximum value of SAR (measured) = 3.15 W/kg



## System Check_B835_131211

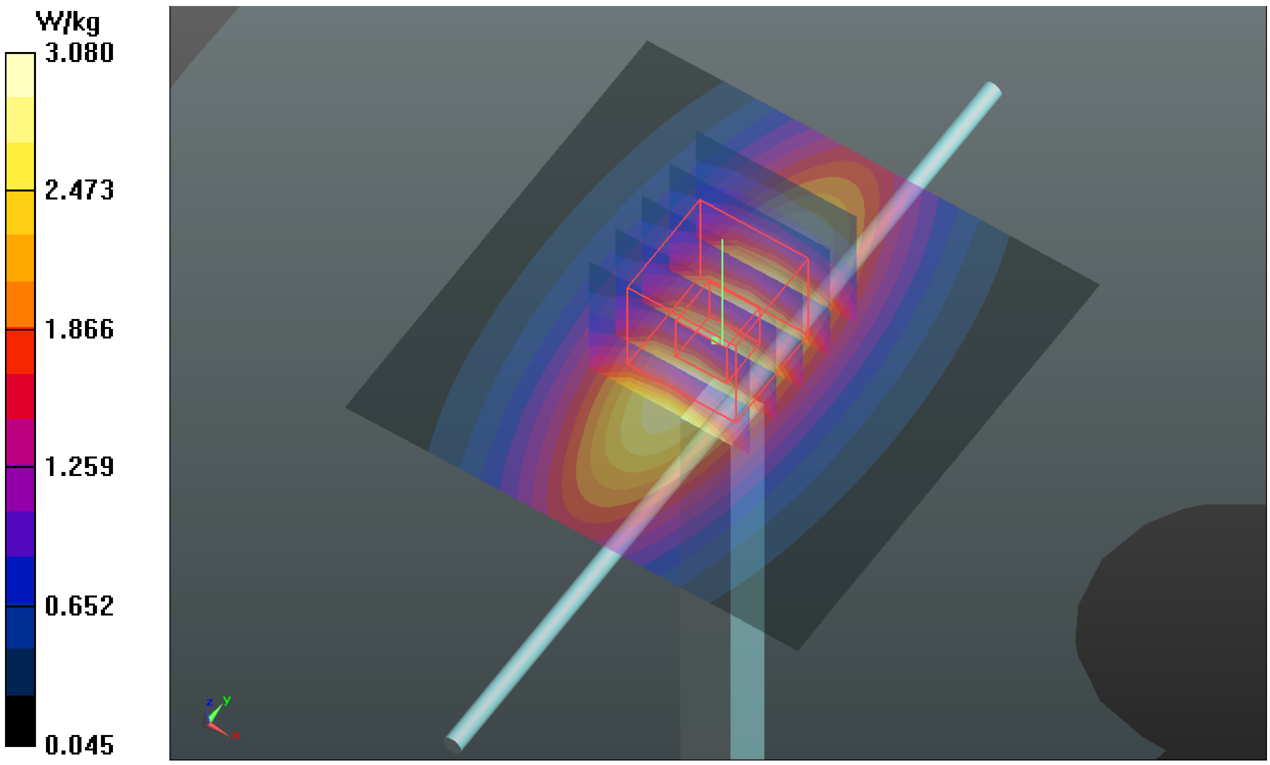
**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: B835_1211 Medium parameters used: f = 835 MHz; $\sigma$ = 0.973 S/m; $\varepsilon_r$ = 54.214; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：21.6 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.35, 9.35, 9.35); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.08 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.794 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.61 W/kg
**SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.57 W/kg**
Maximum value of SAR (measured) = 3.03 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/09

## System Check_B1900_131209

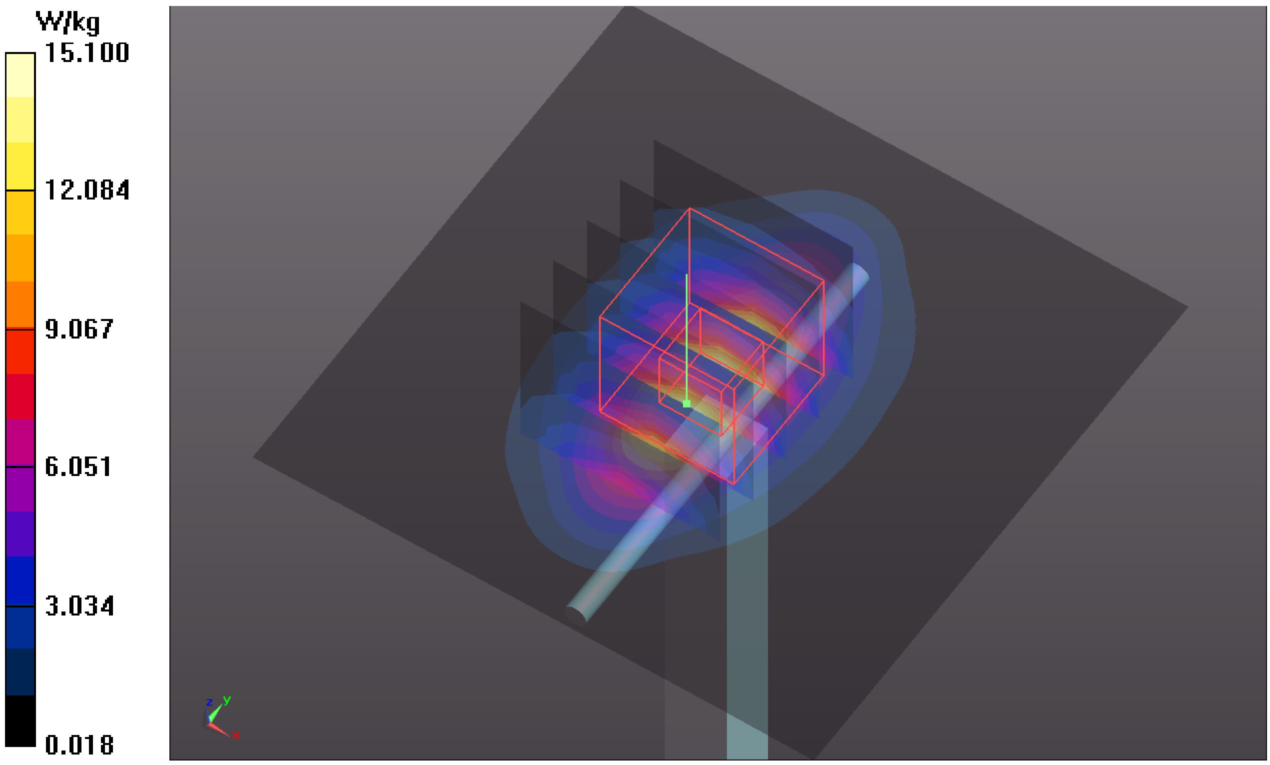
### DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: B1900_1209 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.552 S/m; $\varepsilon_r$ = 51.952; $\rho$ = 1000 kg/$m^3$
Ambient Temperature : 21.2 ℃; Liquid Temperature : 20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.39, 7.39, 7.39); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: TP:1206
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.1 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 98.383 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 18.3 W/kg
**SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.29 W/kg**
Maximum value of SAR (measured) = 14.3 W/kg



## System Check_B2450_131212

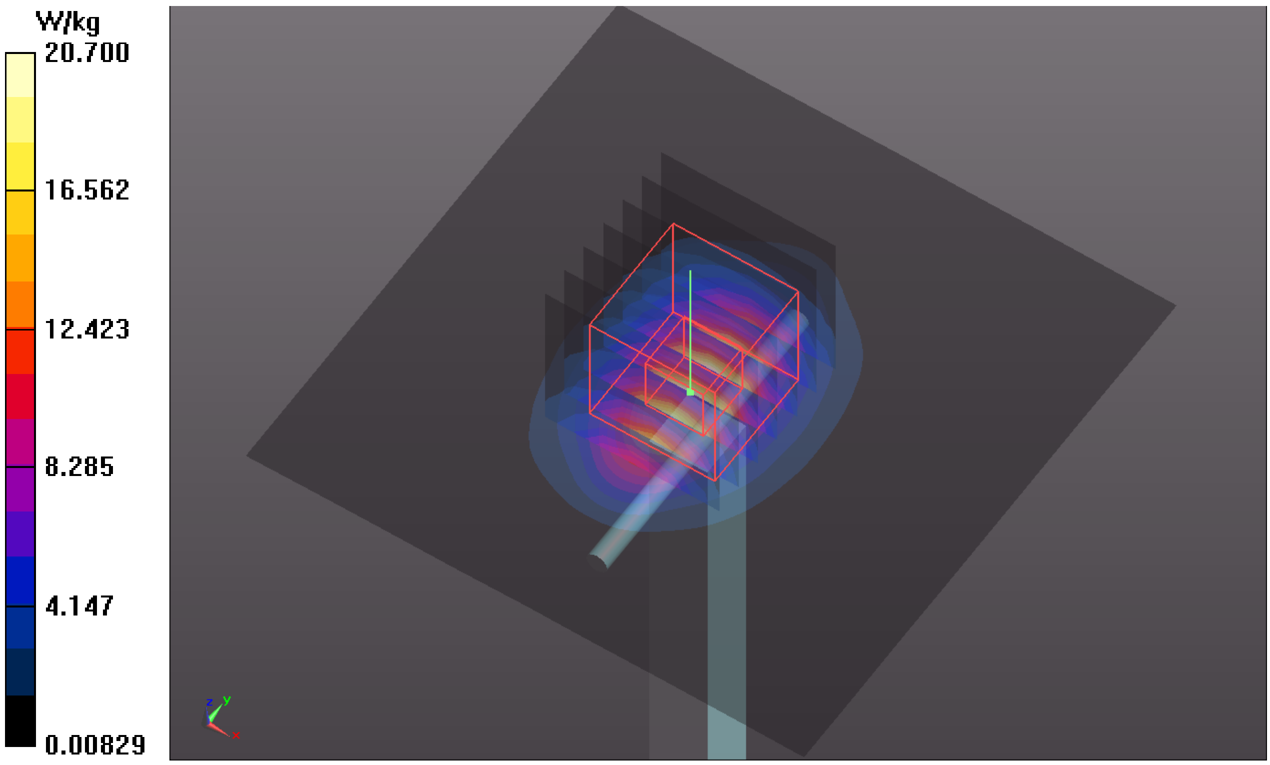
**DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: B2450_1212 Medium parameters used: f = 2450 MHz; σ = 1.989 S/m; $\varepsilon_r$ = 51.463; ρ = 1000 kg/m$^3$
Ambient Temperature：21.3 ℃; Liquid Temperature：20.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.09, 7.09, 7.09); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: TP:1206
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 20.7 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.5 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.7 W/kg
**SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg**
Maximum value of SAR (measured) = 20.4 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab    Date: 2013/12/10

# System Check_B2600_131210

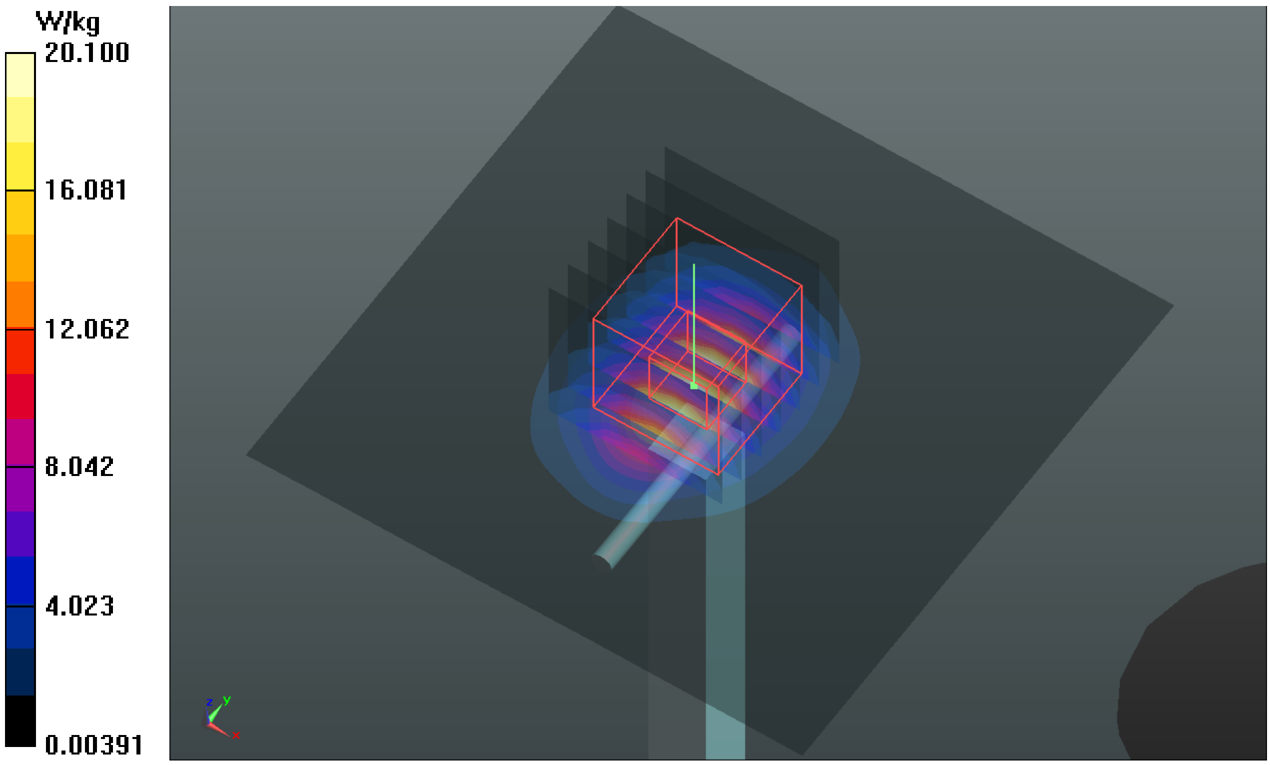
**DUT: Dipole 2600 MHz; Type: D2600V2; SN: 1020**

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: B2600_1210 Medium parameters used: f = 2600 MHz; $\sigma$ = 2.196 S/m; $\varepsilon_r$ = 52.352; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：20.7 ℃; Liquid Temperature：20.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(6.91, 6.91, 6.91); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1653
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 20.1 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.452 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.4 W/kg
**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.68 W/kg**
Maximum value of SAR (measured) = 20.4 W/kg



# Appendix B. SAR Plots of SAR Measurement

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab                    Date: 2013/12/07

## P01 CDMA2000 BC0_RC3+SO55_Left Cheek_Ch384

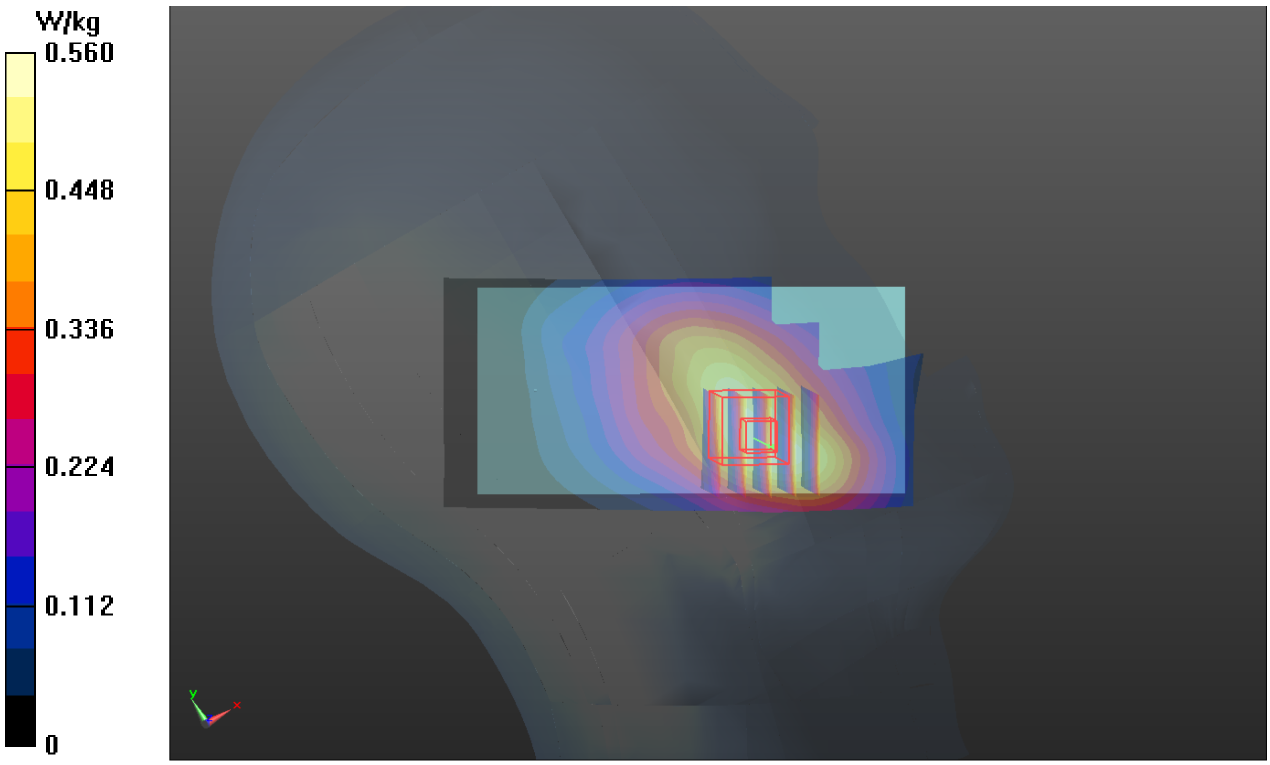
**DUT: 131114C03**

Communication System: CDMA2000; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: H835_1207 Medium parameters used: f = 837 MHz; $\sigma$ = 0.89 S/m; $\varepsilon_r$ = 42.79; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.37, 9.37, 9.37); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (51x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.560 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.558 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.658 W/kg
**SAR(1 g) = 0.479 W/kg; SAR(10 g) = 0.348 W/kg**
Maximum value of SAR (measured) = 0.574 W/kg



# P02 CDMA2000 BC1_RC3+SO55_Left Cheek_Ch25

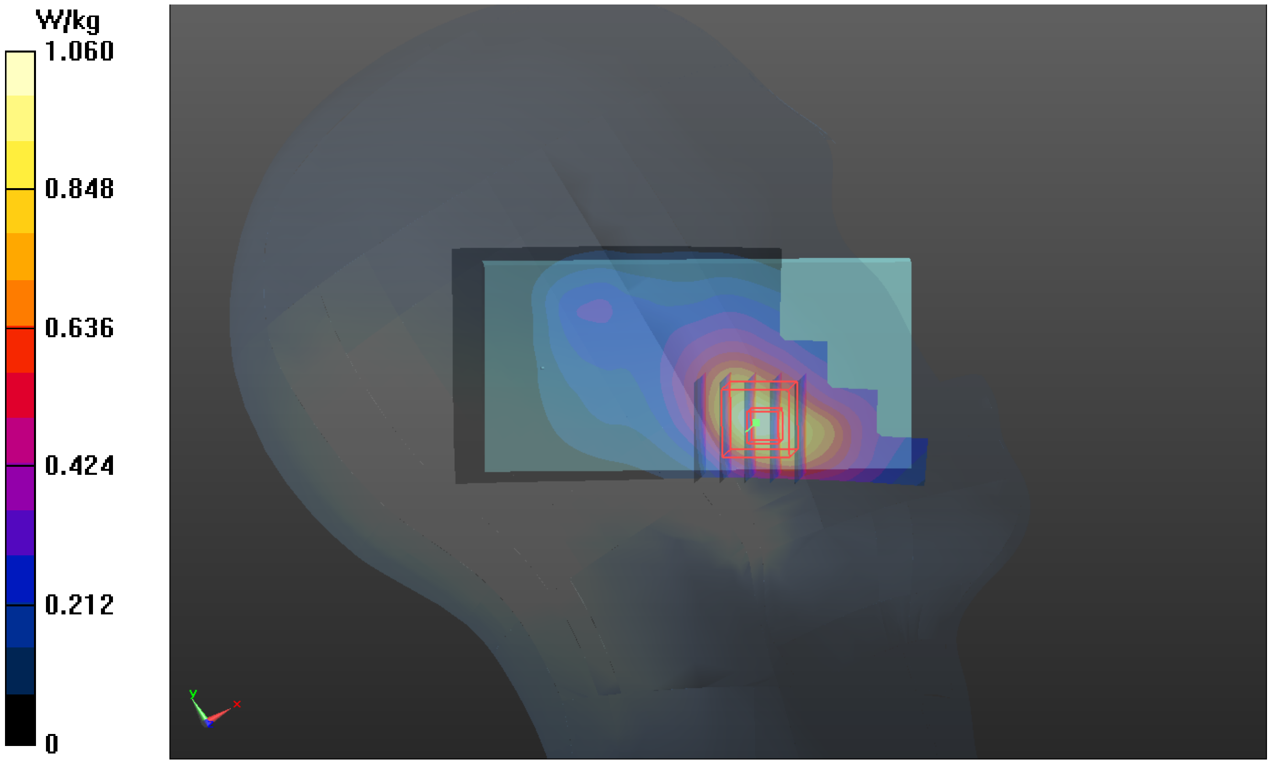
**DUT: 131114C03**

Communication System: CDMA2000; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium: H1900_1206 Medium parameters used: f = 1851.25 MHz; $\sigma$ = 1.339 S/m; $\varepsilon_r$ = 39.873; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.1 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.73, 7.73, 7.73); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1653
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (51x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.06 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.341 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.14 W/kg
**SAR(1 g) = 0.790 W/kg; SAR(10 g) = 0.507 W/kg**
Maximum value of SAR (measured) = 0.978 W/kg



# P03 CDMA2000 BC10_RC3+SO55_Left Cheek_Ch580

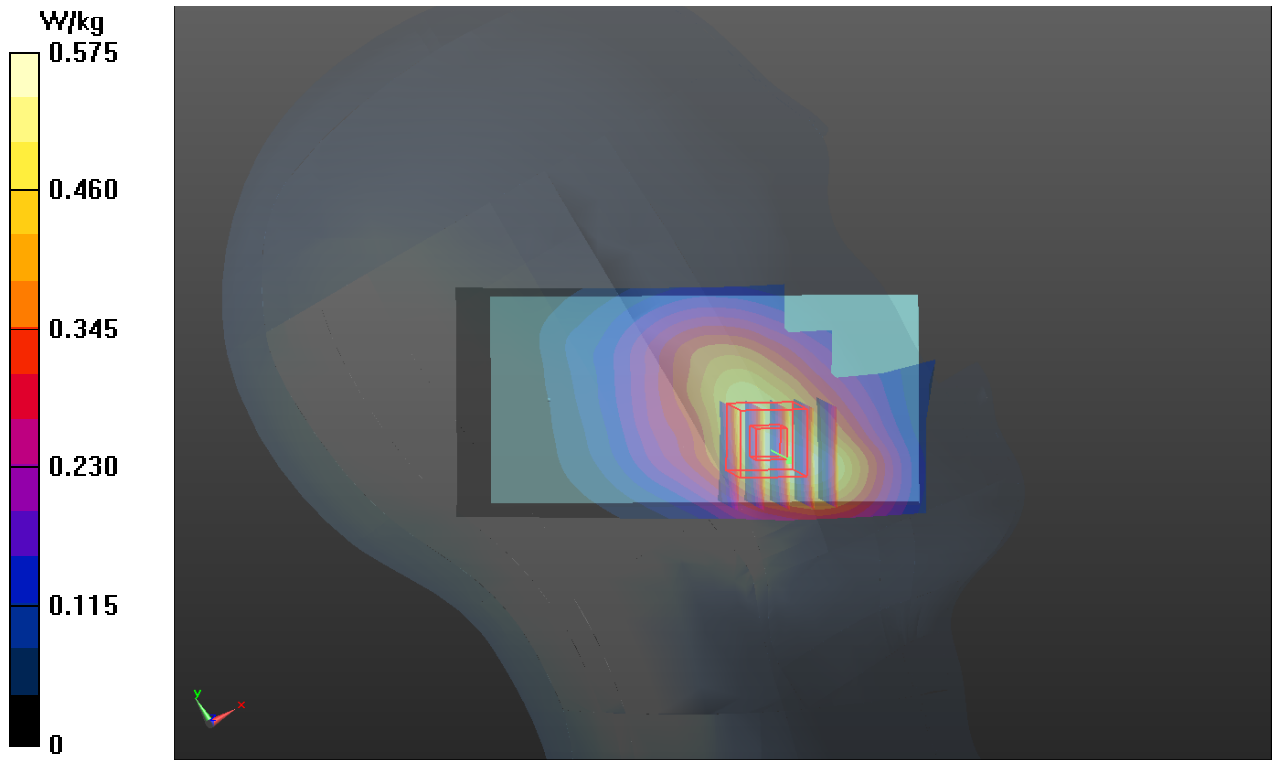
**DUT: 131114C03**

Communication System: CDMA2000; Frequency: 820.5 MHz;Duty Cycle: 1:1
Medium: H835_1207 Medium parameters used: f = 820.5 MHz; $\sigma$ = 0.873 S/m; $\varepsilon_r$ = 42.975; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.37, 9.37, 9.37); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (51x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.575 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.844 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.612 W/kg
**SAR(1 g) = 0.453 W/kg; SAR(10 g) = 0.331 W/kg**
Maximum value of SAR (measured) = 0.536 W/kg



# P04 LTE 25_QPSK_10M_Left Cheek_Ch26365_1RB_OS24

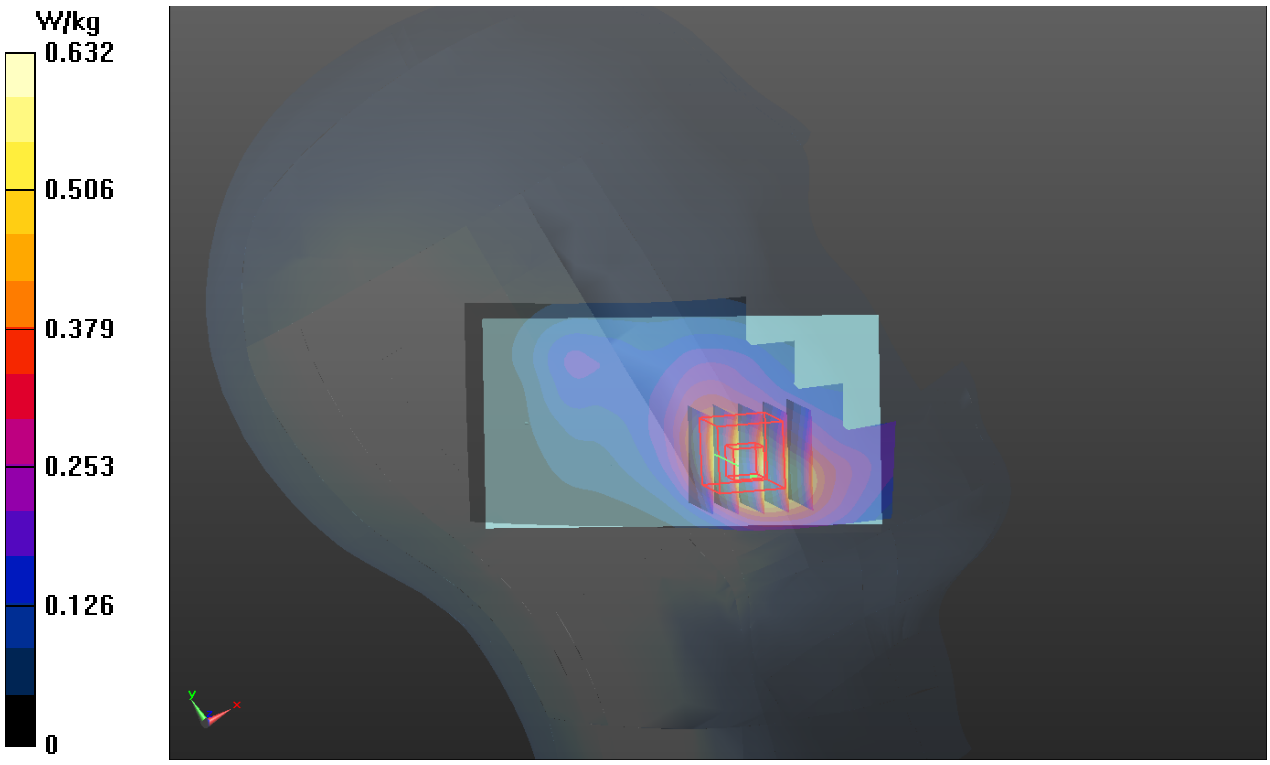
**DUT: 131119C06**

Communication System: LTE; Frequency: 1882.5 MHz;Duty Cycle: 1:1
Medium: H1900_1206 Medium parameters used: f = 1882.5 MHz; $\sigma$ = 1.381 S/m; $\varepsilon_r$ = 39.693; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.1 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.73, 7.73, 7.73); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1653
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (51x91x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.632 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.867 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.719 W/kg
**SAR(1 g) = 0.496 W/kg; SAR(10 g) = 0.315 W/kg**
Maximum value of SAR (measured) = 0.616 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/07

## P05 LTE 26_QPSK_10M_Left Cheek_Ch26990_1RB_OS24

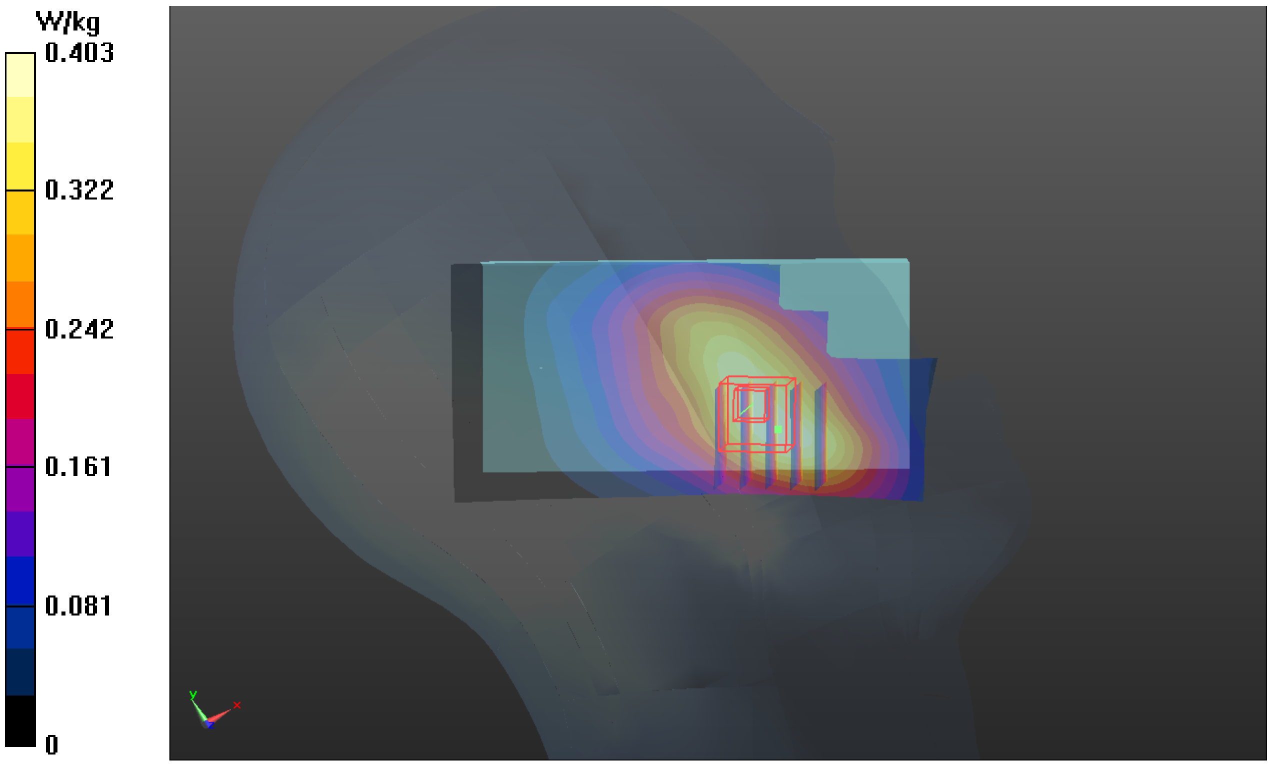
### DUT: 131114C03

Communication System: LTE; Frequency: 844 MHz;Duty Cycle: 1:1
Medium: H835_1207 Medium parameters used: f = 844 MHz; $\sigma = 0.898$ S/m; $\varepsilon_r = 42.704$; $\rho = 1000$ kg/m$^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.37, 9.37, 9.37); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (51x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.403 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.622 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.443 W/kg
**SAR(1 g) = 0.334 W/kg; SAR(10 g) = 0.246 W/kg**
Maximum value of SAR (measured) = 0.391 W/kg



# P06 LTE 41_QPSK_20M_Right Cheek_Ch41490_1RB_OS0

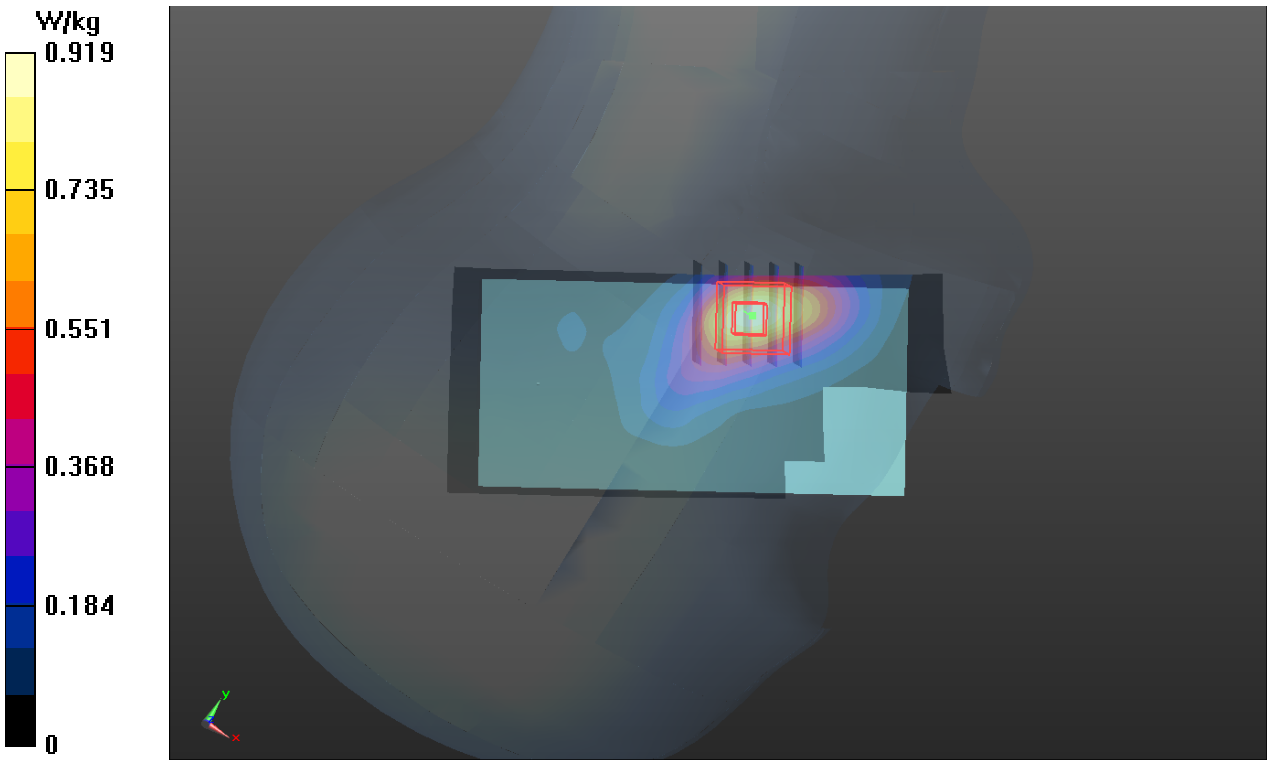
## DUT: 131114C03

Communication System: LTE TDD CF0; Frequency: 2680 MHz;Duty Cycle: 1:1.58
Medium: H2600_1207 Medium parameters used: f = 2680 MHz; $\sigma$ = 2.146 S/m; $\varepsilon_r$ = 37.441; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.7 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(6.85, 6.85, 6.85); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (61x131x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.919 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.710 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.11 W/kg
**SAR(1 g) = 0.570 W/kg; SAR(10 g) = 0.288 W/kg**
Maximum value of SAR (measured) = 0.831 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab    Date: 2013/12/12

## P07 802.11b_Left Cheek_Ch6

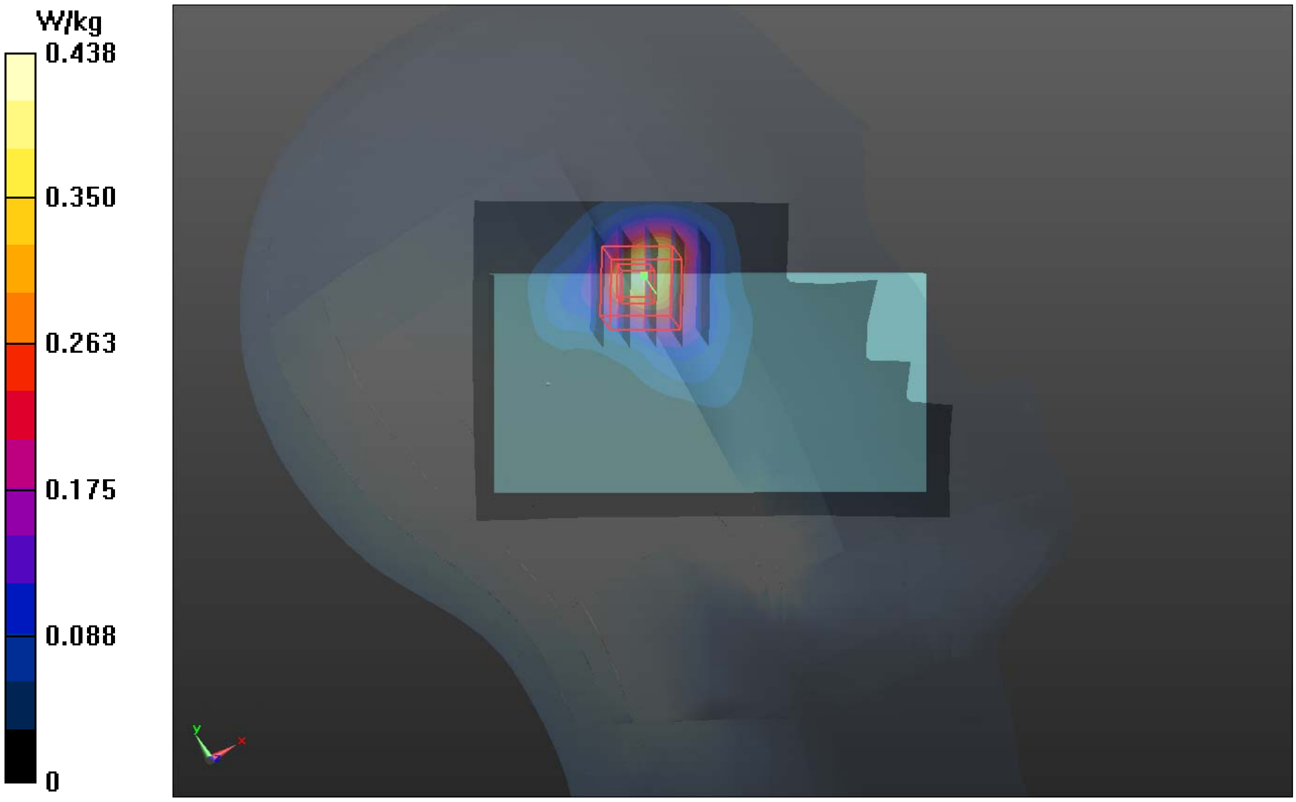
### DUT: 131114C03

Communication System: WLAN_2.4G; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: H2450_1212 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.856 S/m; $\varepsilon_r$ = 37.516; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：21.6 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3864; ConvF(7.47, 7.47, 7.47); Calibrated: 2013/07/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2013/07/26
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (81x121x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.438 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.815 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.665 W/kg
**SAR(1 g) = 0.292 W/kg; SAR(10 g) = 0.131 W/kg**
Maximum value of SAR (measured) = 0.458 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/11

## P08 CDMA2000 BC0_RTAP 153.6_Rear Face_1cm_Ch384

**DUT: 131114C03**

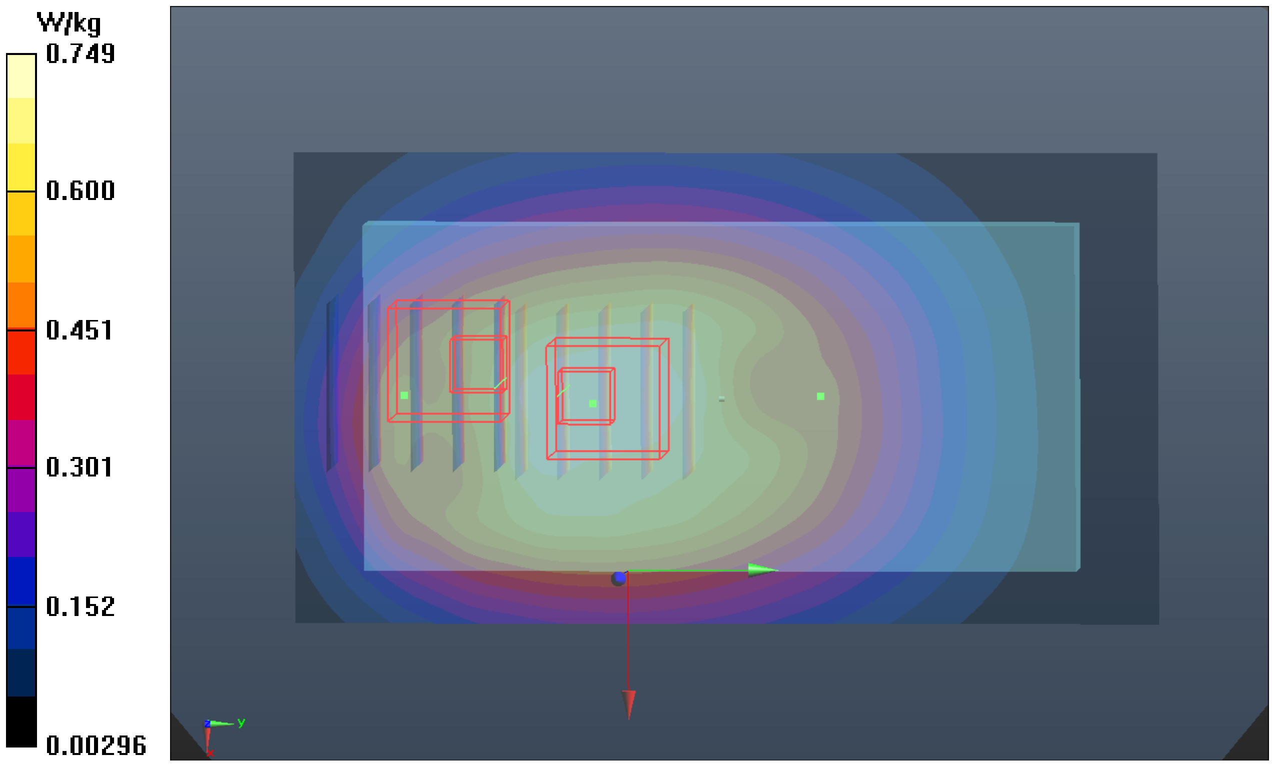
Communication System: CDMA2000; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: B835_1211 Medium parameters used: f = 837 MHz; $\sigma$ = 0.975 S/m; $\varepsilon_r$ = 54.195; $\rho$ = 1000 $kg/m^3$
Ambient Temperature：21.6 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.35, 9.35, 9.35); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (61x111x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.749 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.398 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.911 W/kg
**SAR(1 g) = 0.682 W/kg; SAR(10 g) = 0.510 W/kg**
Maximum value of SAR (measured) = 0.804 W/kg

**- Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.398 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.828 W/kg
**SAR(1 g) = 0.513 W/kg; SAR(10 g) = 0.325 W/kg**
Maximum value of SAR (measured) = 0.708 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/09

# P09 CDMA2000 BC1_RTAP 153.6_Rear Face_1cm_Ch25

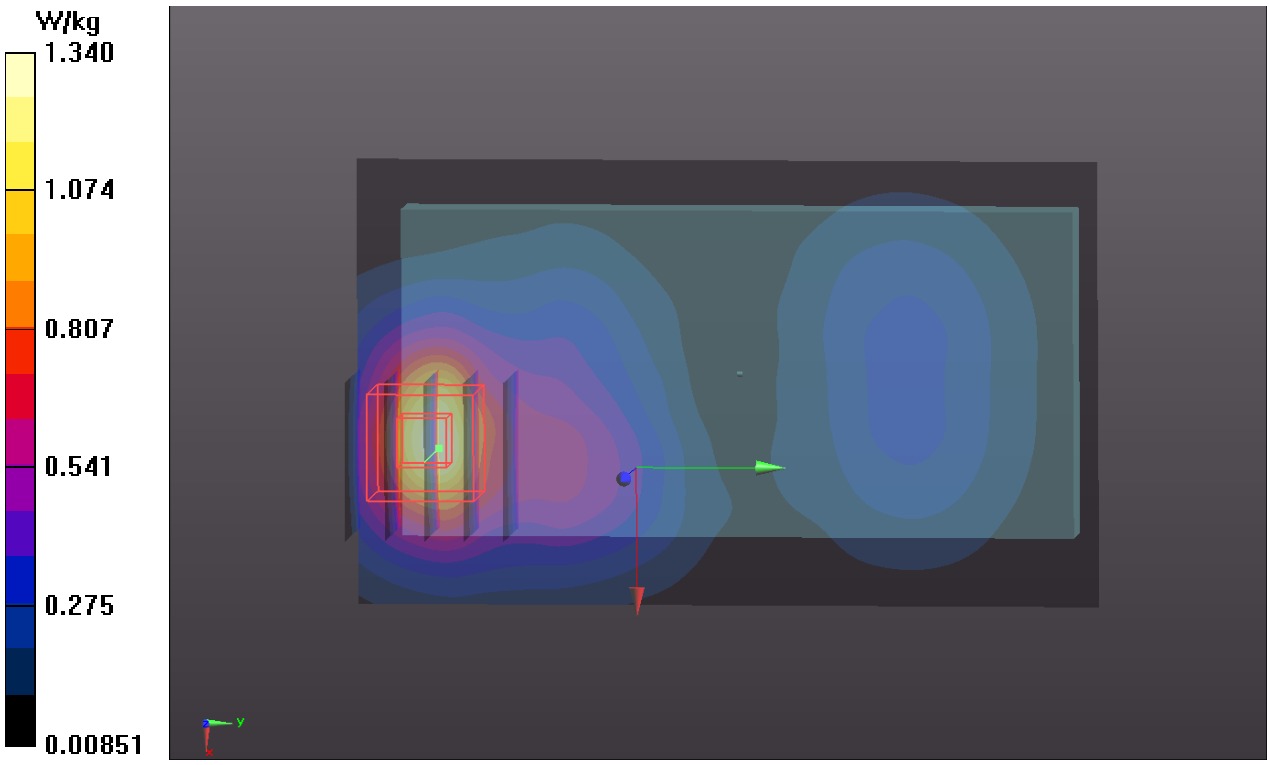
**DUT: 131114C03**

Communication System: CDMA2000; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium: B1900_1209 Medium parameters used: f = 1851.25 MHz; σ = 1.49 S/m; $\varepsilon_r$ = 52.12; ρ = 1000 kg/m$^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.39, 7.39, 7.39); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: TP:1206
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.34 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.273 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.70 W/kg
**SAR(1 g) = 0.977 W/kg; SAR(10 g) = 0.526 W/kg**
Maximum value of SAR (measured) = 1.32 W/kg



# P10 CDMA2000 BC10_RTAP 153.6_Rear Face_1cm_Ch580

**DUT: 131114C03**

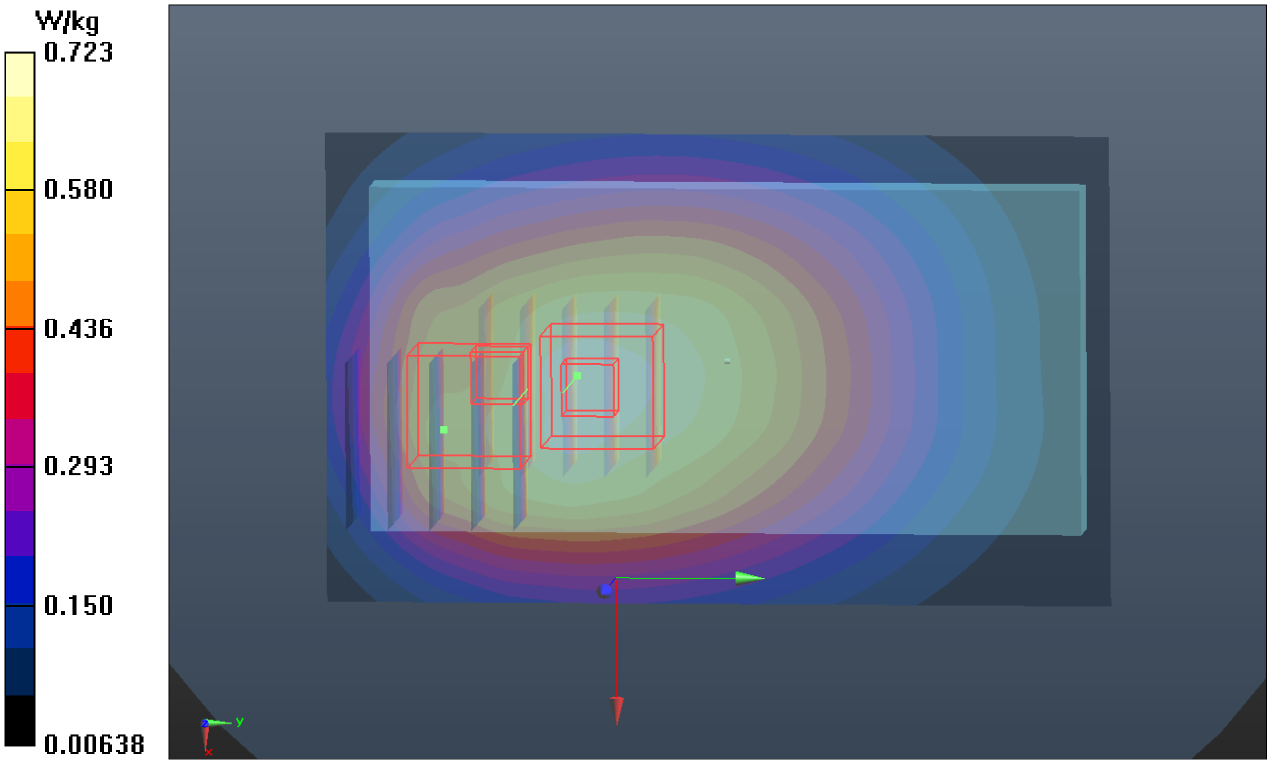
Communication System: CDMA2000; Frequency: 820.5 MHz;Duty Cycle: 1:1
Medium: B835_1211 Medium parameters used: f = 820.5 MHz; σ = 0.957 S/m; $\varepsilon_r$ = 54.331; ρ = 1000 kg/m$^3$
Ambient Temperature：21.6 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.35, 9.35, 9.35); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.723 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.557 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.861 W/kg
**SAR(1 g) = 0.643 W/kg; SAR(10 g) = 0.479 W/kg**
Maximum value of SAR (measured) = 0.757 W/kg

**- Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.557 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.841 W/kg
**SAR(1 g) = 0.503 W/kg; SAR(10 g) = 0.313 W/kg**
Maximum value of SAR (measured) = 0.697 W/kg



# P11 LTE 25_QPSK_10M_Rear Face_1cm_Ch26365_1RB_OS24

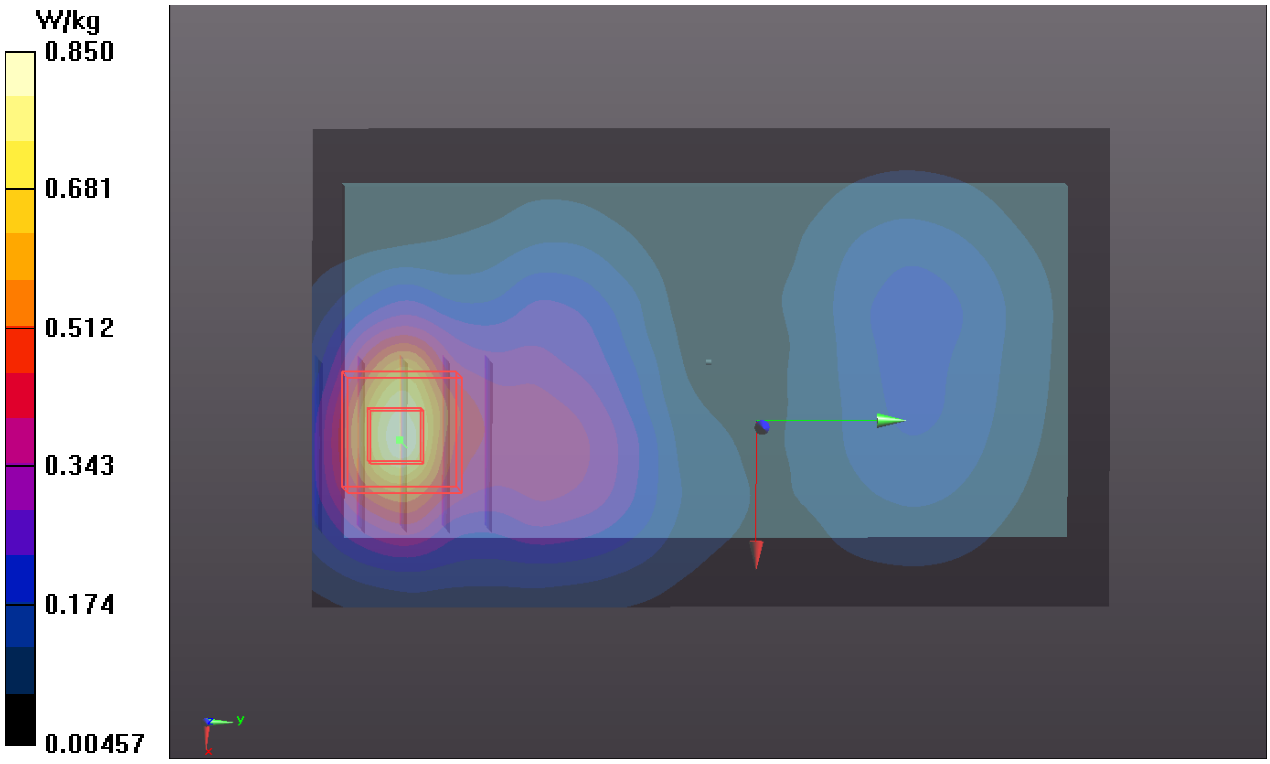
## DUT: 131114C03

Communication System: LTE; Frequency: 1882.5 MHz;Duty Cycle: 1:1
Medium: B1900_1209 Medium parameters used: f = 1882.5 MHz; $\sigma$ = 1.529 S/m; $\varepsilon_r$ = 52.006; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.39, 7.39, 7.39); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: TP:1206
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (61x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.850 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.726 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.04 W/kg
**SAR(1 g) = 0.581 W/kg; SAR(10 g) = 0.309 W/kg**
Maximum value of SAR (measured) = 0.826 W/kg



## P12 LTE 26_QPSK_10M_Rear Face_1cm_Ch26990_1RB_OS24

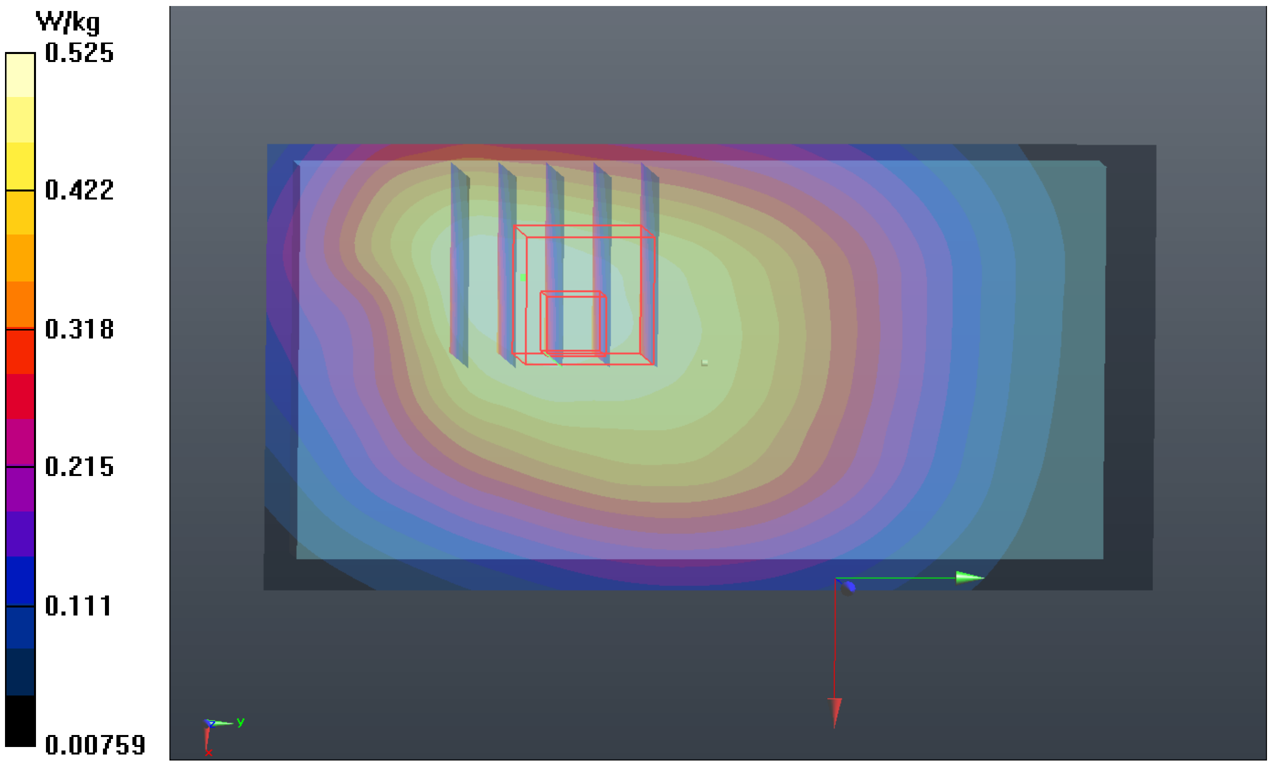
**DUT: 131114C03**

Communication System: LTE; Frequency: 844 MHz;Duty Cycle: 1:1
Medium: B835_1209 Medium parameters used: f = 844 MHz; $\sigma = 0.982$ S/m; $\varepsilon_r = 53.928$; $\rho = 1000$ $kg/m^3$
Ambient Temperature：21.3 ℃; Liquid Temperature：20.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.35, 9.35, 9.35); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (51x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.525 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.403 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.440 W/kg
**SAR(1 g) = 0.319 W/kg; SAR(10 g) = 0.227 W/kg**
Maximum value of SAR (measured) = 0.390 W/kg



# P13 LTE 41_QPSK_20M_Front Face_1cm_Ch41490_1RB_OS0

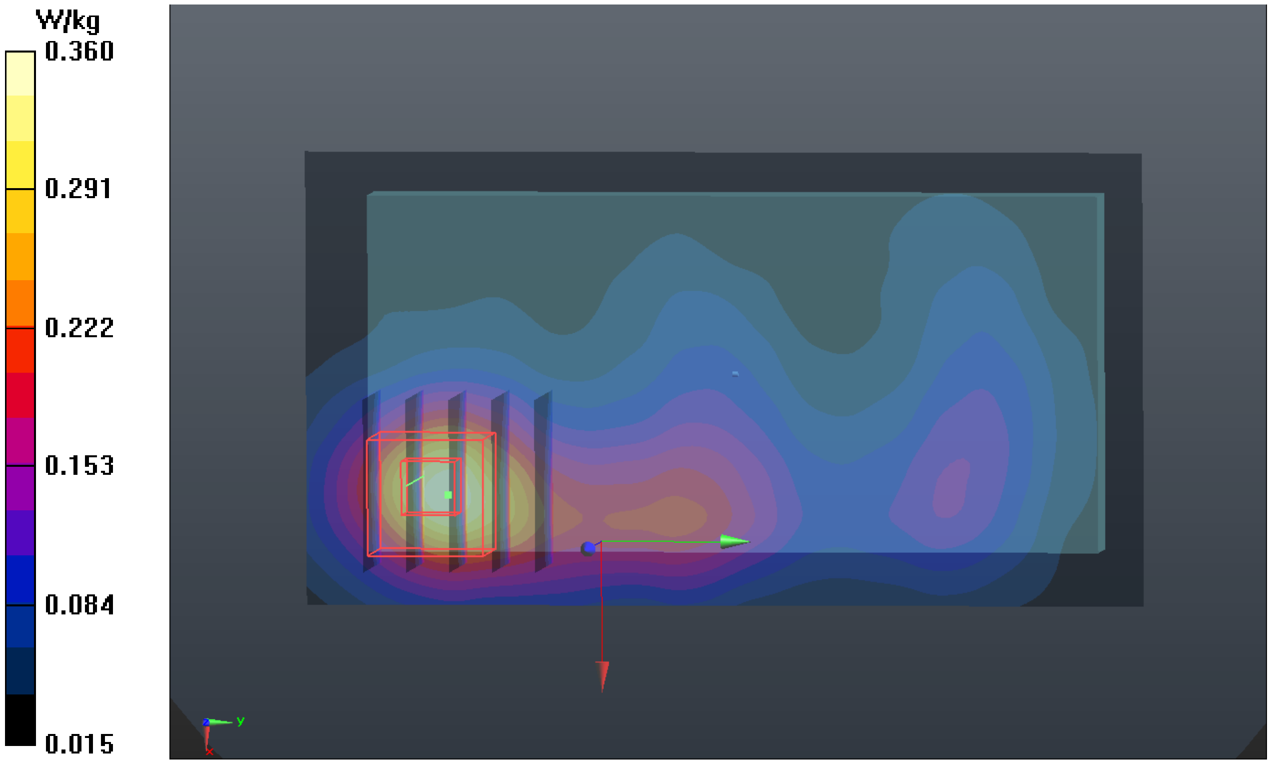
**DUT: 131114C03**

Communication System: LTE; Frequency: 2680 MHz;Duty Cycle: 1:1
Medium: B2600_1210 Medium parameters used: f = 2680 MHz; $\sigma$ = 2.307 S/m; $\varepsilon_r$ = 52.122; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：20.7 ℃; Liquid Temperature：20.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(6.91, 6.91, 6.91); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1653
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (71x131x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.360 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.510 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.466 W/kg
**SAR(1 g) = 0.245 W/kg; SAR(10 g) = 0.122 W/kg**
Maximum value of SAR (measured) = 0.356 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2013/12/12

# P14 802.11b_Rear Face_1cm_Ch6

## DUT: 131114C03

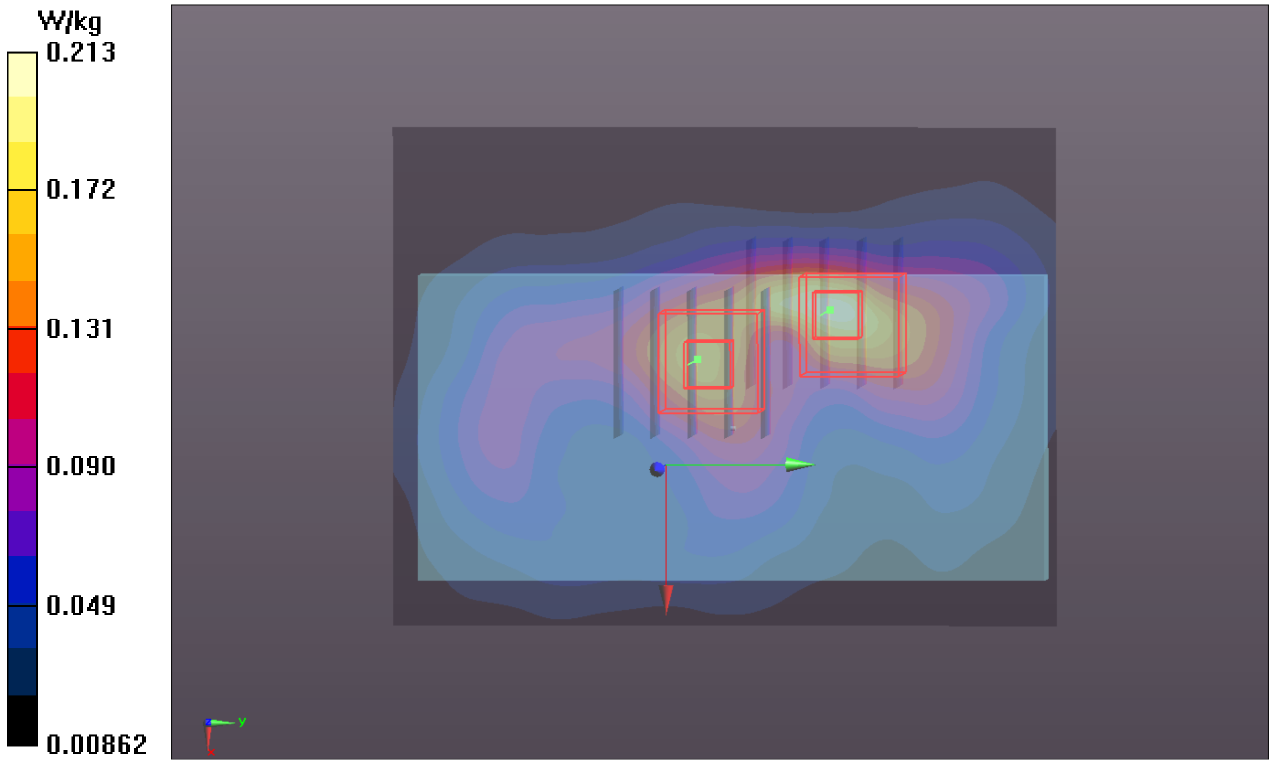
Communication System: WLAN_2.4G; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: B2450_1212 Medium parameters used: f = 2437 MHz; $\sigma$ = 1.968 S/m; $\varepsilon_r$ = 51.462; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：21.3 ℃; Liquid Temperature：20.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.09, 7.09, 7.09); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: TP:1206
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (91x121x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.213 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.644 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.335 W/kg
**SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.085 W/kg**
Maximum value of SAR (measured) = 0.239 W/kg

**- Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.644 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.260 W/kg
**SAR(1 g) = 0.129 W/kg; SAR(10 g) = 0.074 W/kg**
Maximum value of SAR (measured) = 0.183 W/kg



# P15 CDMA2000 BC1_RTAP 153.6_Bottom Side_1cm_Ch25

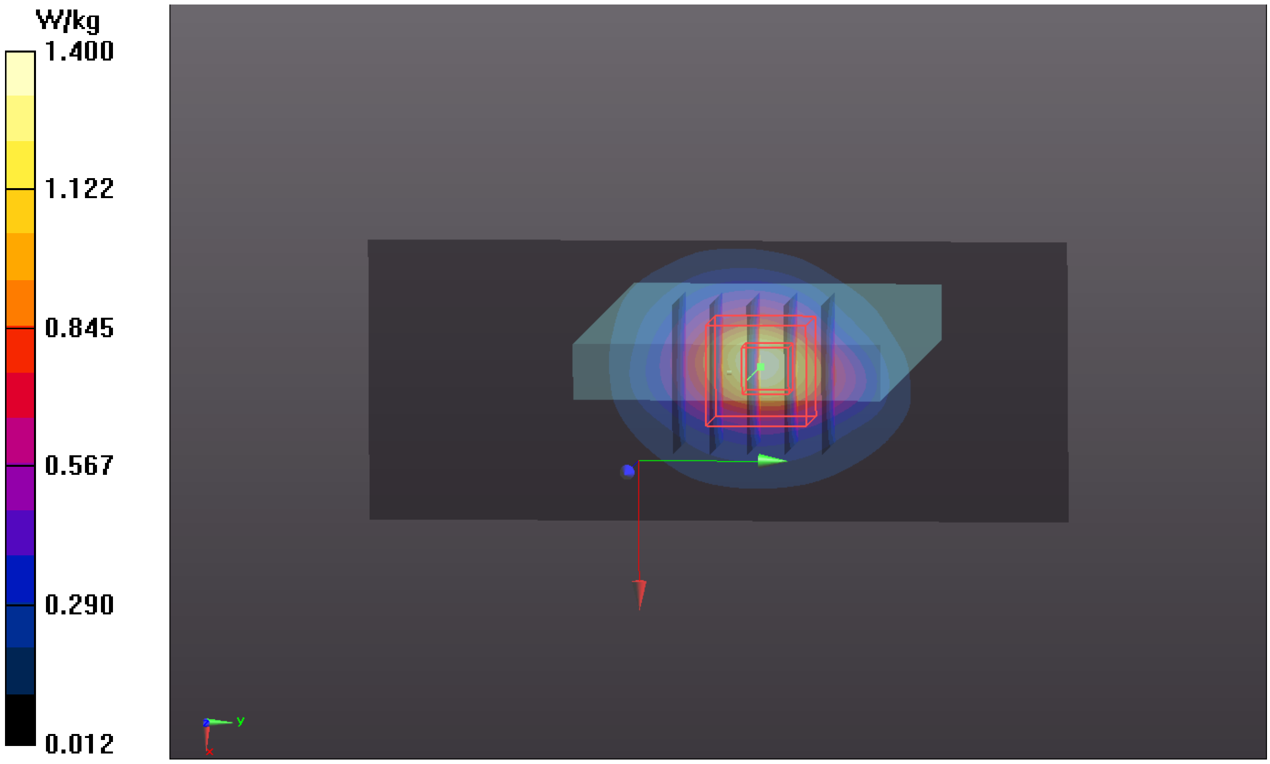
**DUT: 131114C03**

Communication System: CDMA2000; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium: B1900_1209 Medium parameters used: f = 1851.25 MHz; σ = 1.49 S/m; $\varepsilon_r$ = 52.12; ρ = 1000 kg/$m^3$
Ambient Temperature：21.2 ℃; Liquid Temperature：20.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.39, 7.39, 7.39); Calibrated: 2013/04/30;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2013/01/30
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: TP:1206
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**- Area Scan (41x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.40 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.450 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.70 W/kg
**SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.544 W/kg**
Maximum value of SAR (measured) = 1.36 W/kg



# Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** **Schweizerischer Kalibrierdienst**
**C** **Service suisse d'étalonnage**
**S** **Servizio svizzero di taratura**
**Swiss Calibration Service**

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

**Client** **B.V. ADT (Auden)**

**Certificate No: D835V2-4d121_Apr13**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D835V2 - SN: 4d121 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | April 25, 2013 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Power sensor HP 8481A | US37292783 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-13 (No. 217-01736) | Apr-14 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739) | Apr-14 |
| Reference Probe ES3DV3 | SN: 3205 | 28-Dec-12 (No. ES3-3205_Dec12) | Dec-13 |
| DAE4 | SN: 909 | 11-Sep-12 (No. DAE4-909_Sep12) | Sep-13 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: April 26, 2013

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.6 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 835 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.90 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.8 ± 6 % | 0.94 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.51 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.68 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.62 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.30 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.97 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.0 ± 6 % | 1.01 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.51 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.69 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.64 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.38 W/kg ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.4 Ω - 2.1 jΩ |
| Return Loss | - 30.2 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.4 Ω - 3.8 jΩ |
| Return Loss | - 26.6 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.395 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | June 29, 2010 |

## DASY5 Validation Report for Head TSL

Date: 25.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121**

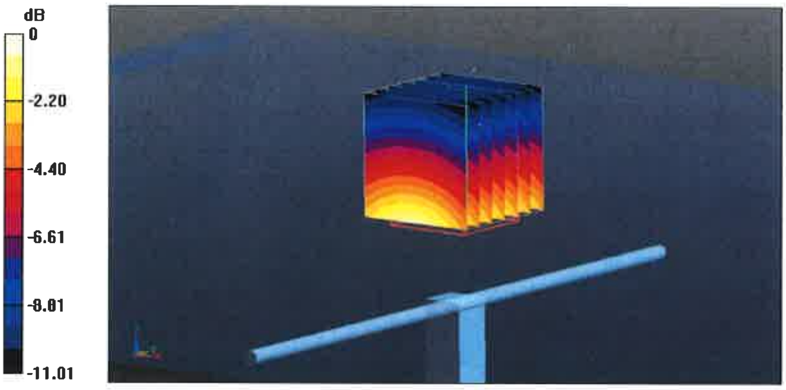
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.94$ S/m; $\varepsilon_r = 40.8$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.05, 6.05, 6.05); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 11.09.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

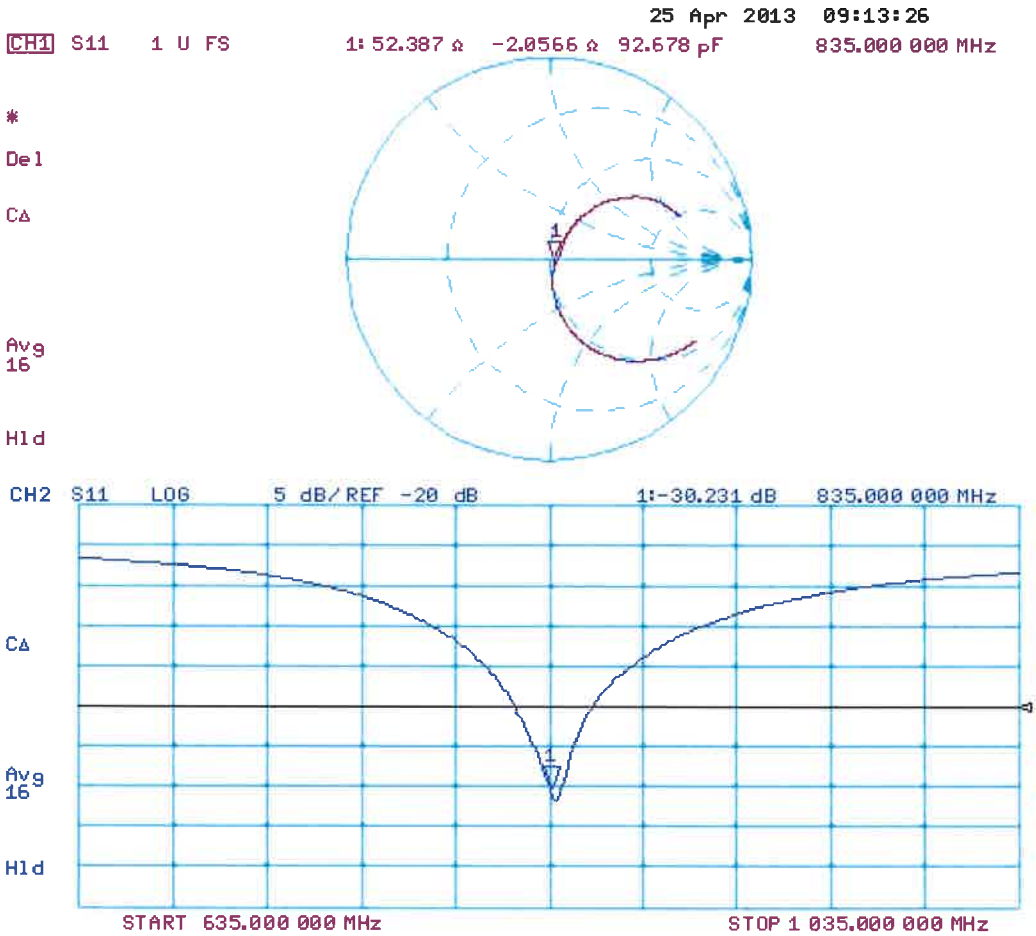
### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.380 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.86 W/kg
**SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.62 W/kg**
Maximum value of SAR (measured) = 2.94 W/kg




0 dB = 2.94 W/kg = 4.68 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 24.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121**

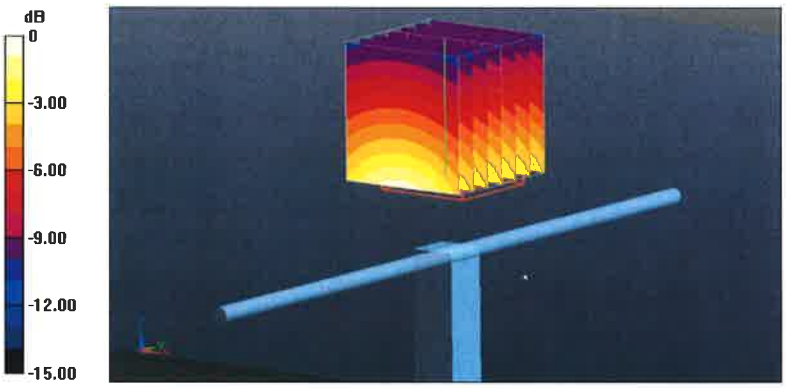
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 1.01 S/m; $\varepsilon_r$ = 54; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 11.09.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

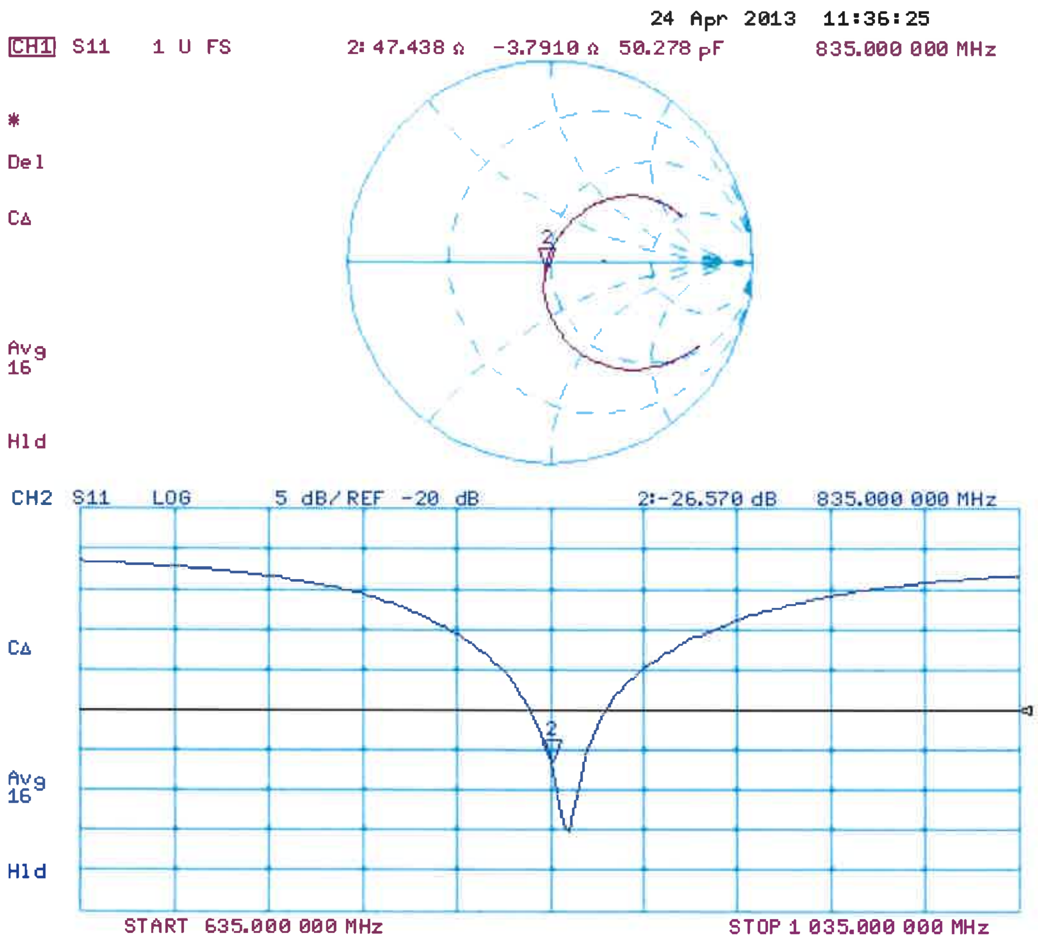
## Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.573 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.72 W/kg
**SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.64 W/kg**
Maximum value of SAR (measured) = 2.93 W/kg




0 dB = 2.93 W/kg = 4.67 dBW/kg

## Impedance Measurement Plot for Body TSL



**Calibration Laboratory of**
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**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** **Schweizerischer Kalibrierdienst**
**C** **Service suisse d'étalonnage**
**S** **Servizio svizzero di taratura**
**Swiss Calibration Service**

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

**Client** **B.V. ADT (Auden)**

**Certificate No: D1900V2-5d036_Jan13**

# CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d036

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: January 21, 2013

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Power sensor HP 8481A | US37292783 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 27-Mar-12 (No. 217-01530) | Apr-13 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 27-Mar-12 (No. 217-01533) | Apr-13 |
| Reference Probe ES3DV3 | SN: 3205 | 28-Dec-12 (No. ES3-3205_Dec12) | Dec-13 |
| DAE4 | SN: 601 | 27-Jun-12 (No. DAE4-601_Jun12) | Jun-13 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe El-Naouq | Laboratory Technician | Israe El-Naouq |
| Approved by: | Fin Bomholt | Deputy Technical Manager | F. Bomholt |

Issued: January 22, 2013

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.5 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.4 ± 6 % | 1.38 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.1 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **40.6 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.31 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **21.3 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 52.2 ± 6 % | 1.52 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.3 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **41.0 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.42 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.6 W/kg ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 51.1 Ω + 5.0 jΩ |
| Return Loss | - 26.0 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.5 Ω + 5.2 jΩ |
| Return Loss | - 24.5 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.197 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | May 08, 2003 |

## DASY5 Validation Report for Head TSL

Date: 21.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036**

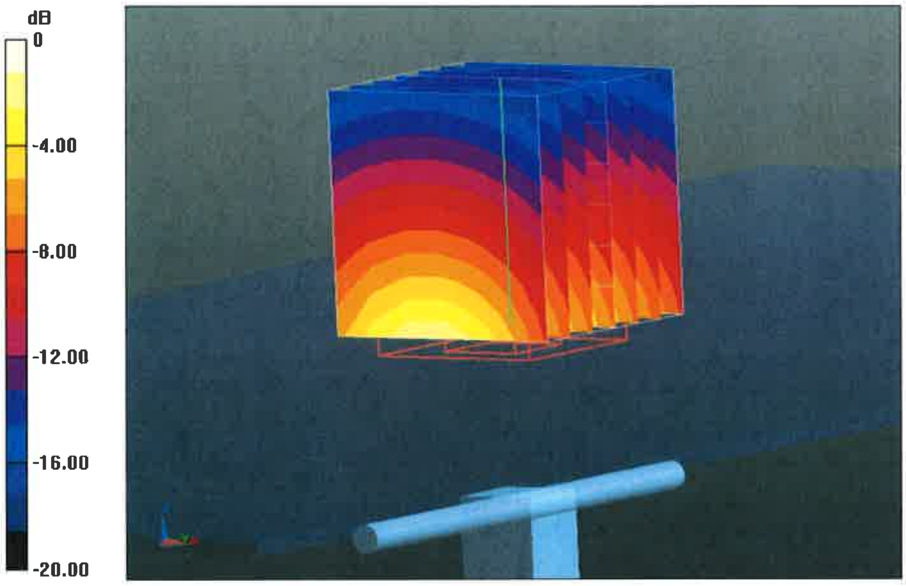
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.38$ S/m; $\varepsilon_r = 39.4$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

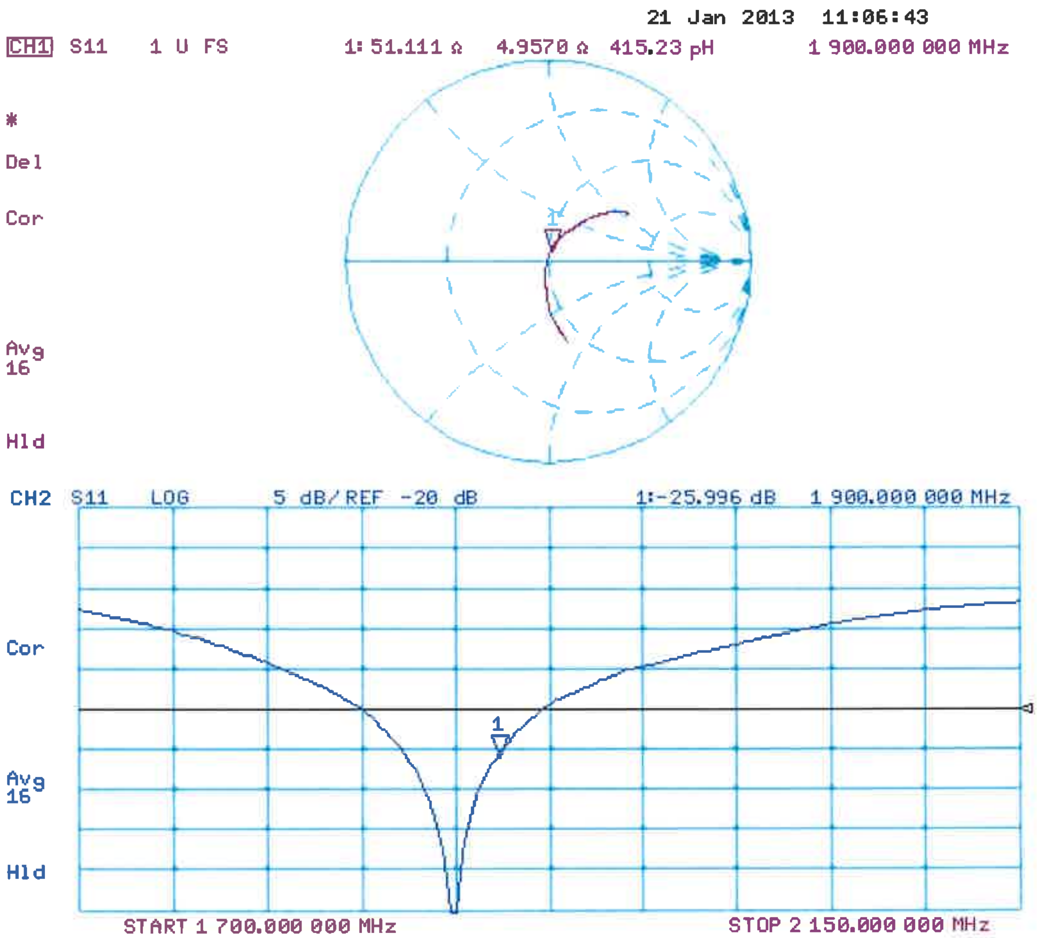
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.363 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.4 W/kg
**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.31 W/kg**
Maximum value of SAR (measured) = 12.6 W/kg




0 dB = 12.6 W/kg = 11.00 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 21.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036**

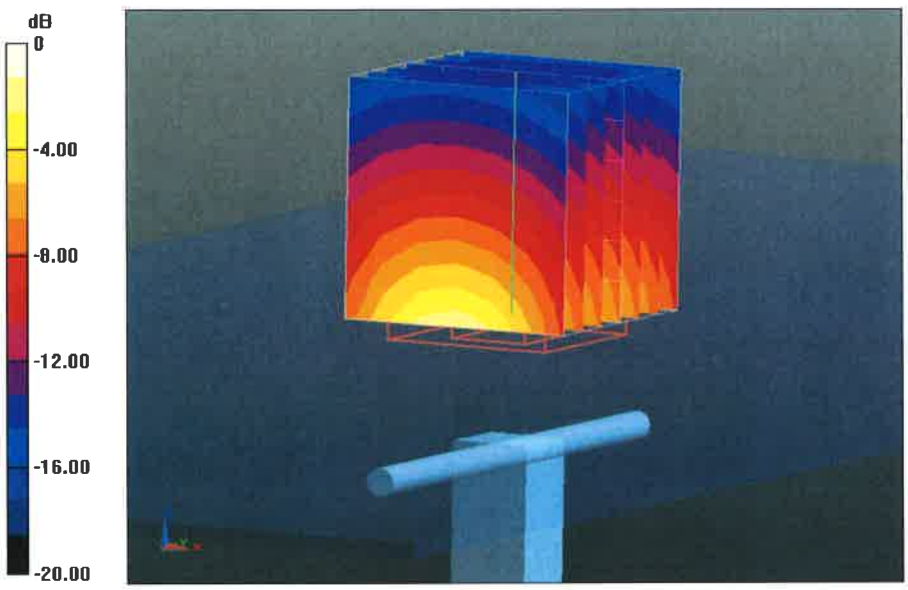
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.52$ S/m; $\varepsilon_r = 52.2$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

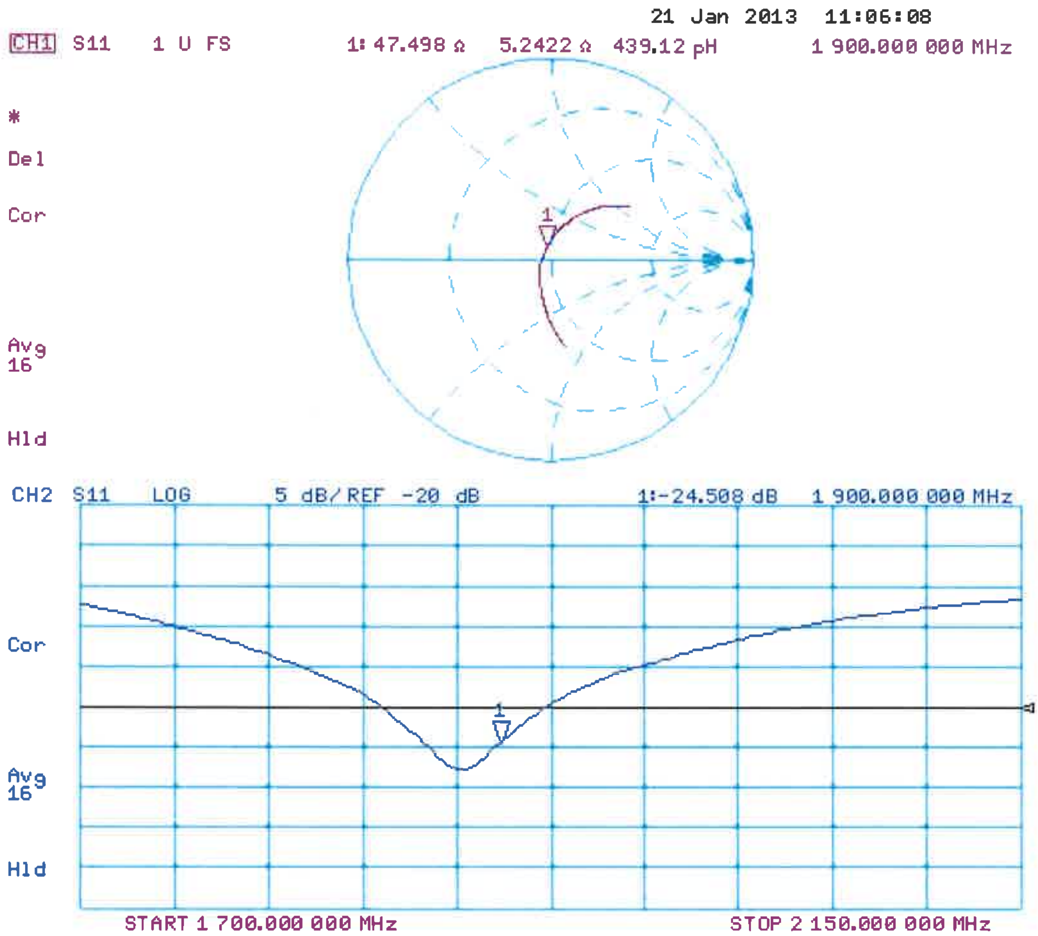
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.692 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.0 W/kg
**SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.42 W/kg**
Maximum value of SAR (measured) = 13.0 W/kg




0 dB = 13.0 W/kg = 11.14 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Accreditation No.: SCS 108**

**Client** **B.V. ADT (Auden)**

**Certificate No: D2450V2-737_Jan13**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN: 737 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | January 21, 2013 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Power sensor HP 8481A | US37292783 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 27-Mar-12 (No. 217-01530) | Apr-13 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 27-Mar-12 (No. 217-01533) | Apr-13 |
| Reference Probe ES3DV3 | SN: 3205 | 28-Dec-12 (No. ES3-3205_Dec12) | Dec-13 |
| DAE4 | SN: 601 | 27-Jun-12 (No. DAE4-601_Jun12) | Jun-13 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | Leif Klysner |
| Approved by: | Fin Bomholt | Deputy Technical Manager | F. Bomholt |

Issued: January 21, 2013

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.5 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 2450 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.2 | 1.80 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 37.9 ± 6 % | 1.85 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.4 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **52.5 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.17 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.4 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.7 | 1.95 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 50.5 ± 6 % | 2.01 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 12.7 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **49.6 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.86 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **23.1 W/kg ± 16.5 % (k=2)** |

## Appendix

## Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 53.4 Ω + 3.7 jΩ |
| Return Loss | - 26.3 dB |

## Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.1 Ω + 5.3 jΩ |
| Return Loss | - 25.5 dB |

## General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.161 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

## Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | August 26, 2003 |

## DASY5 Validation Report for Head TSL

Date: 21.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 737**

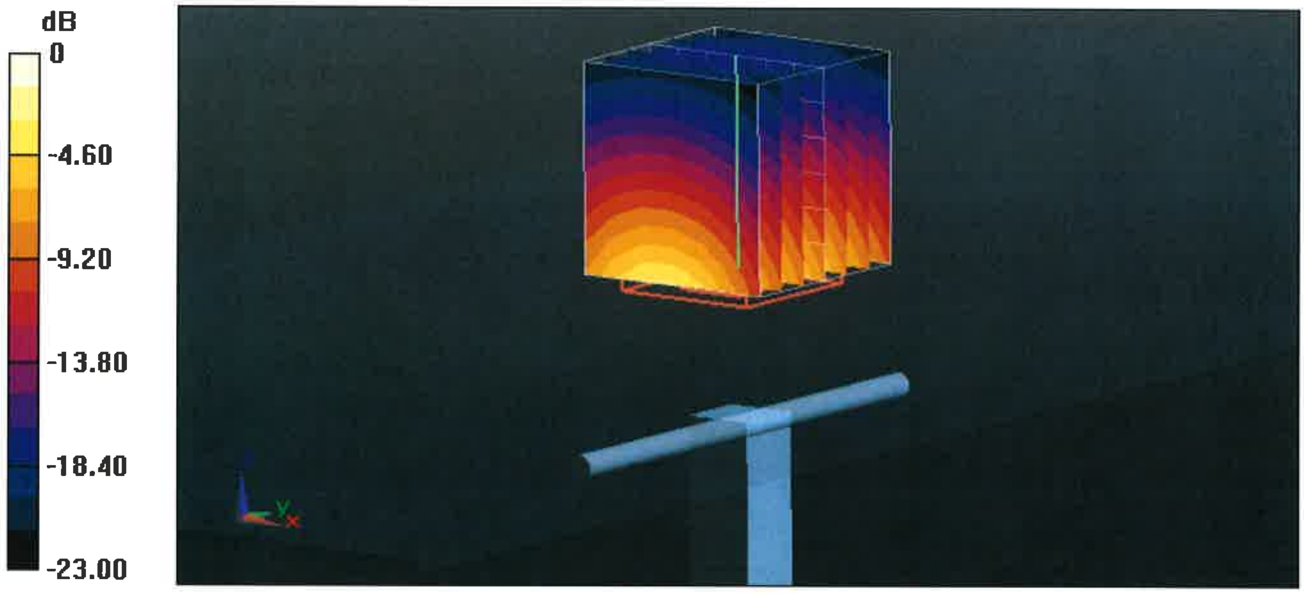
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.85 S/m; $\varepsilon_r$ = 37.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

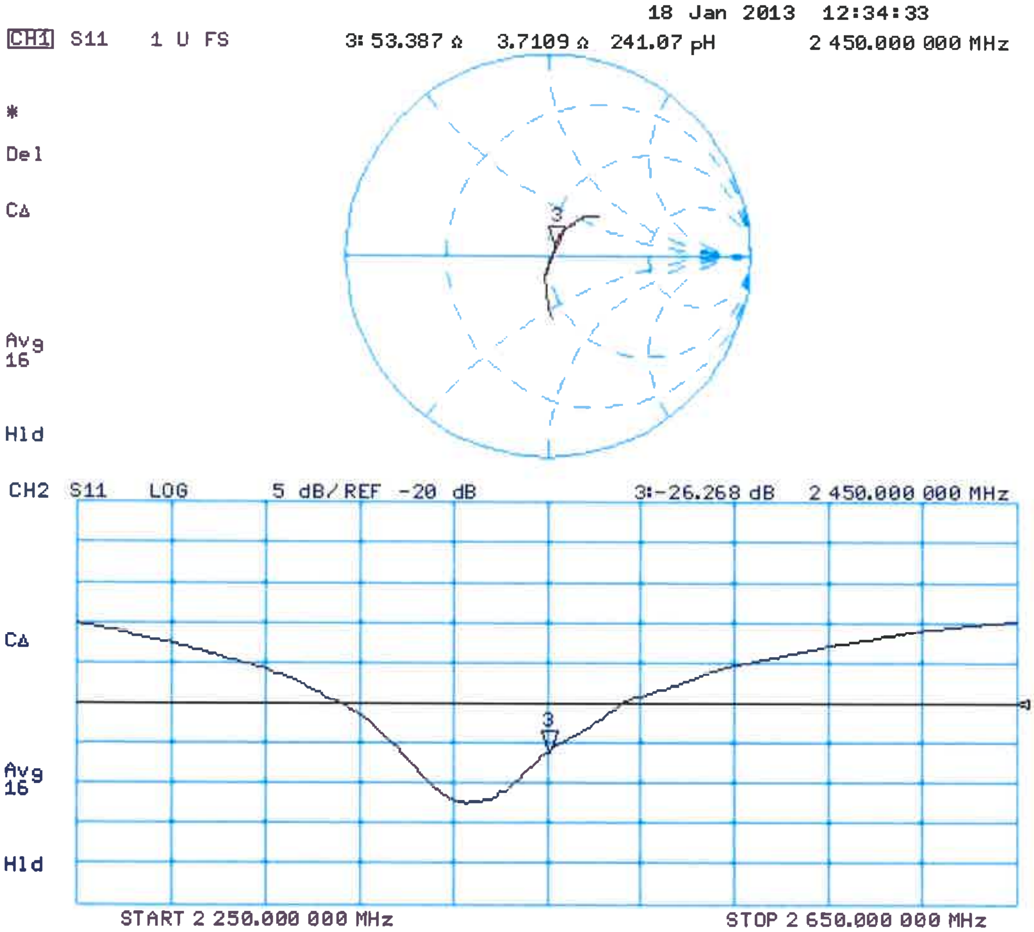
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.892 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 28.0 W/kg
**SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.17 W/kg**
Maximum value of SAR (measured) = 17.2 W/kg




0 dB = 17.2 W/kg = 12.36 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 18.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 737**

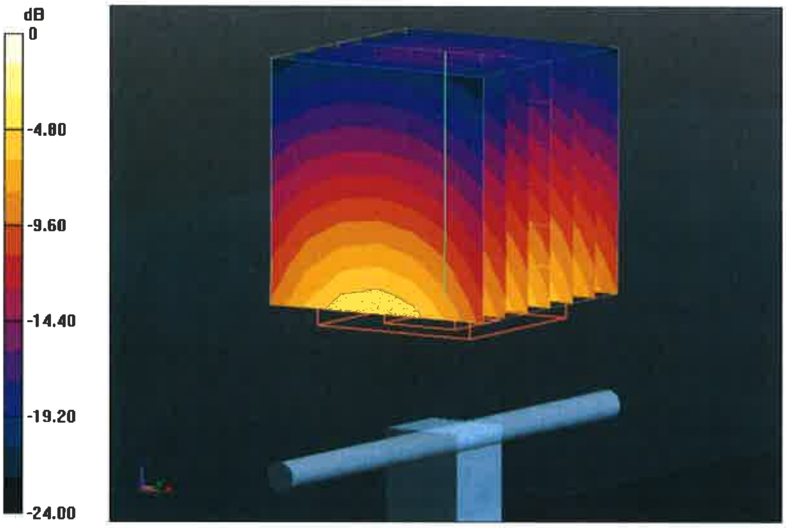
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 2.01 S/m; $\varepsilon_r$ = 50.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

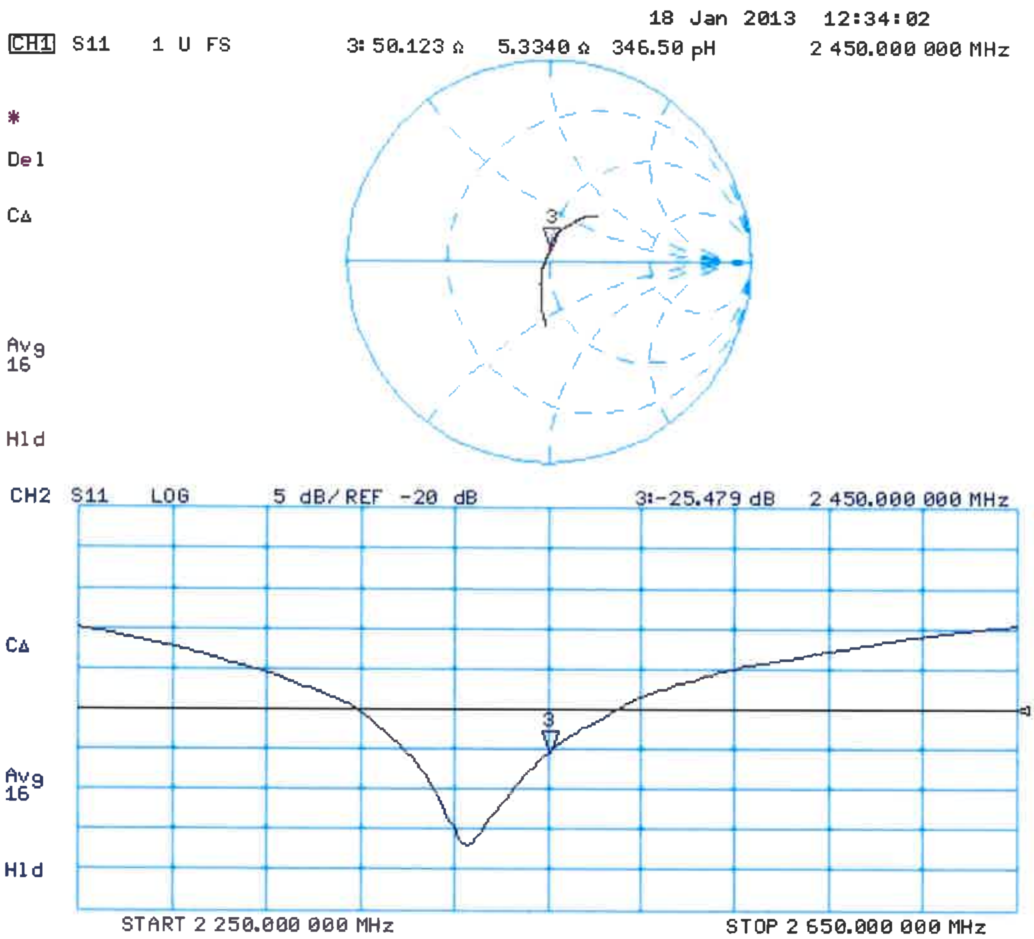
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.076 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 26.9 W/kg
**SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.86 W/kg**
Maximum value of SAR (measured) = 16.8 W/kg




0 dB = 16.8 W/kg = 12.25 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Accreditation No.: SCS 108**

**Client** **B.V. ADT (Auden)**

**Certificate No: D2600V2-1020_Jan13**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2600V2 - SN: 1020 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | January 18, 2013 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Power sensor HP 8481A | US37292783 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 27-Mar-12 (No. 217-01530) | Apr-13 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 27-Mar-12 (No. 217-01533) | Apr-13 |
| Reference Probe ES3DV3 | SN: 3205 | 28-Dec-12 (No. ES3-3205_Dec12) | Dec-13 |
| DAE4 | SN: 601 | 27-Jun-12 (No. DAE4-601_Jun12) | Jun-13 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe El-Naouq | Laboratory Technician | Israe El-Naouq |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: January 18, 2013

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, “IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions”, Supplement C (Edition 01-01) to Bulletin 65

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.5 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 2600 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.0 | 1.96 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 37.4 ± 6 % | 2.02 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 14.8 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **57.8 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.58 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **26.0 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.5 | 2.16 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 50.1 ± 6 % | 2.19 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 14.2 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **55.8 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.25 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.7 W/kg ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 48.4 Ω - 4.3 jΩ |
| Return Loss | - 26.5 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 45.2 Ω - 3.4 jΩ |
| Return Loss | - 24.2 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.152 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | May 13, 2008 |

## DASY5 Validation Report for Head TSL

Date: 18.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1020**

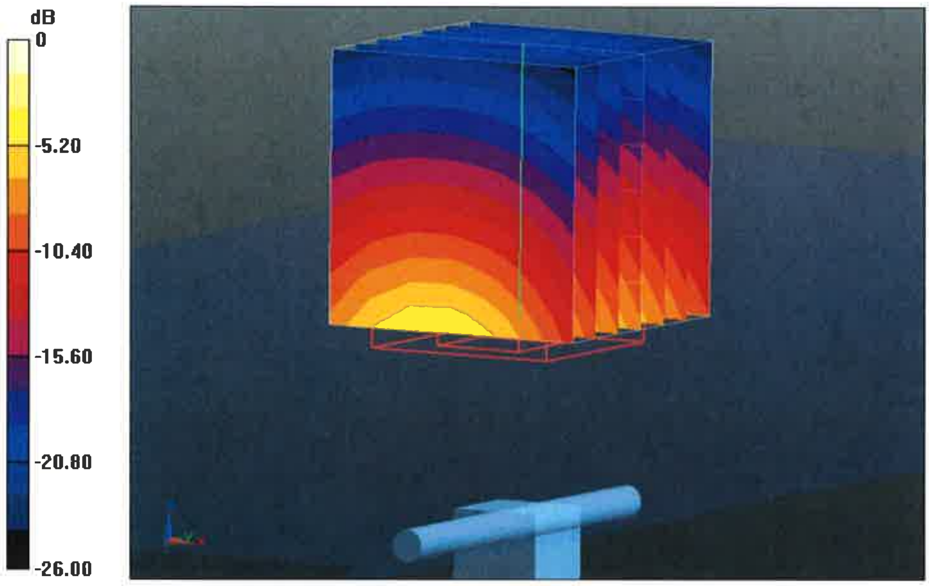
Communication System: CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; $\sigma$ = 2.02 S/m; $\varepsilon_r$ = 37.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

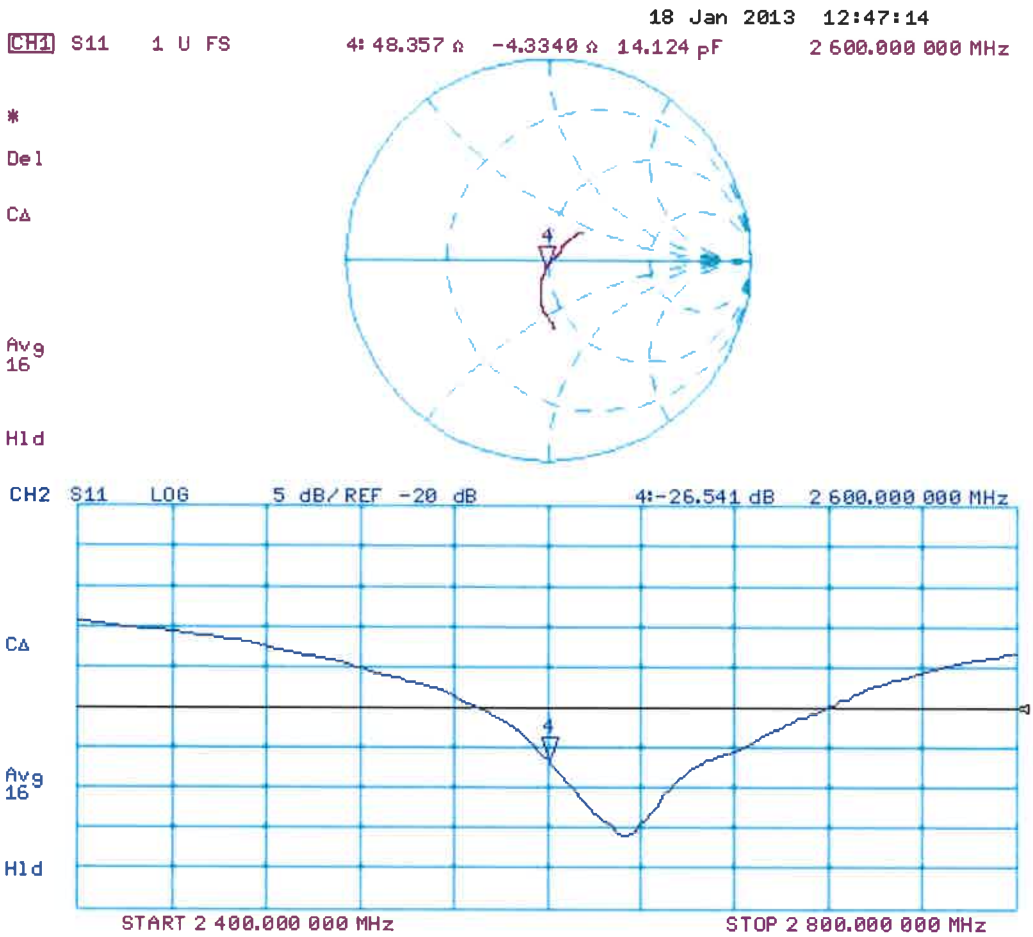
## Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.1 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 32.3 W/kg
**SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.58 W/kg**
Maximum value of SAR (measured) = 19.0 W/kg




0 dB = 19.0 W/kg = 12.79 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 18.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1020**

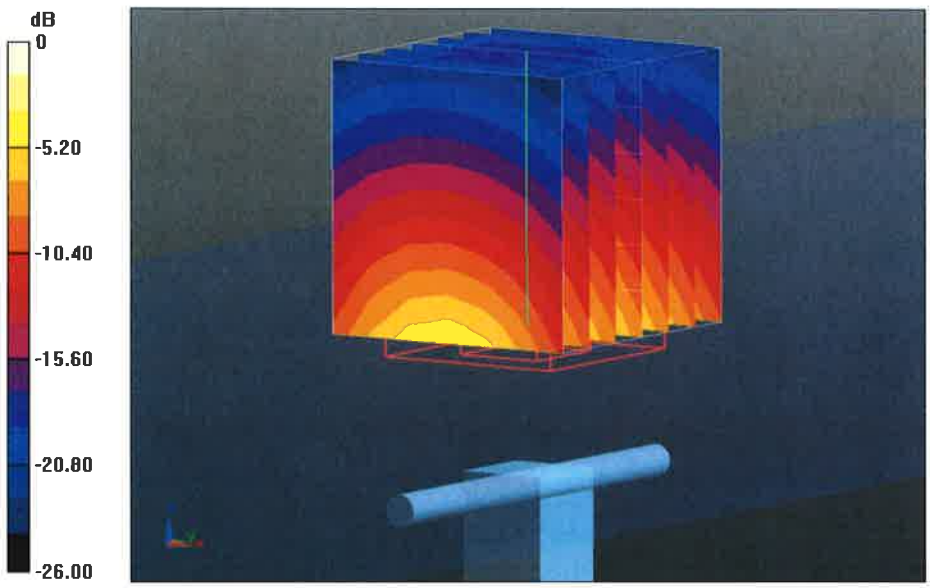
Communication System: CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; $\sigma$ = 2.19 S/m; $\varepsilon_r$ = 50.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.32, 4.32, 4.32); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

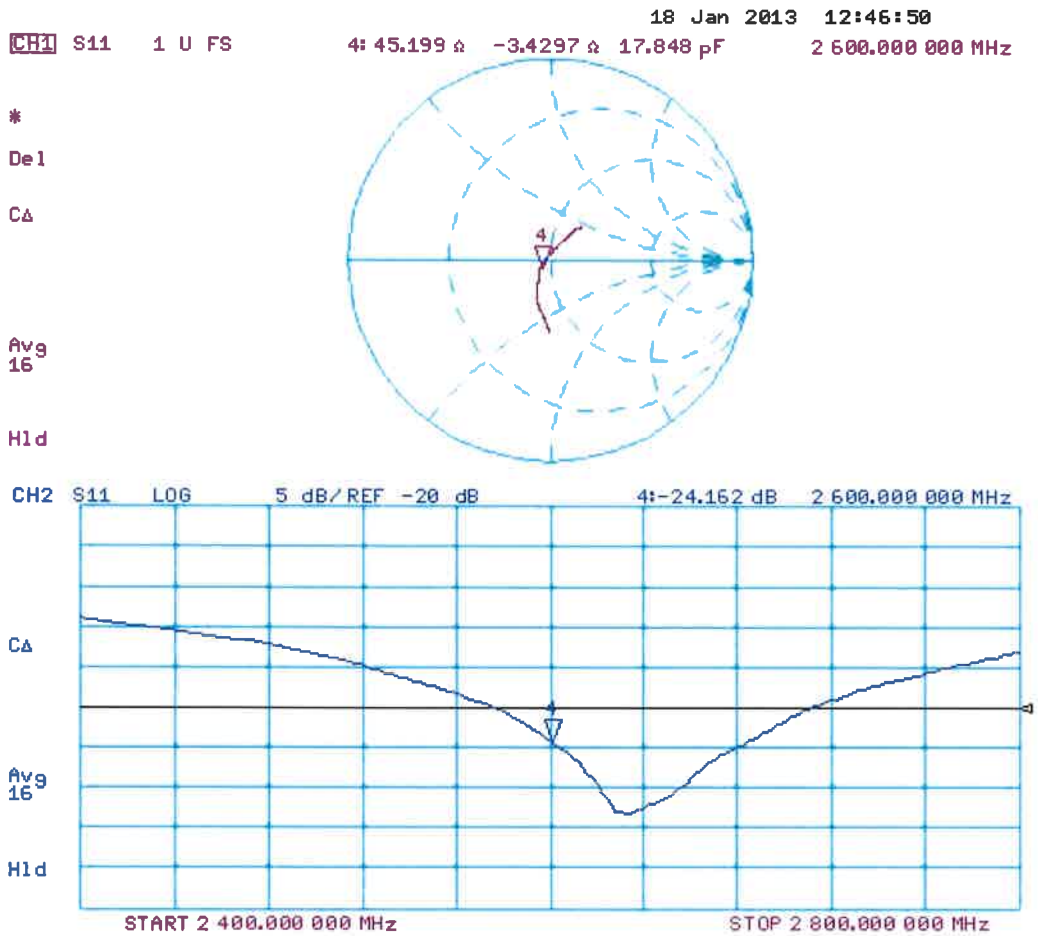
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.715 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 31.3 W/kg
**SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.25 W/kg**
Maximum value of SAR (measured) = 18.8 W/kg




0 dB = 18.8 W/kg = 12.74 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Accreditation No.: SCS 108**

**Client** **B.V. ADT (Auden)**

**Certificate No: EX3-3650_Apr13**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | EX3DV4 - SN:3650 |
| Calibration procedure(s) | QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | April 30, 2013 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 04-Apr-13 (No. 217-01733) | Apr-14 |
| Power sensor E4412A | MY41498087 | 04-Apr-13 (No. 217-01733) | Apr-14 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 04-Apr-13 (No. 217-01737) | Apr-14 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735) | Apr-14 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738) | Apr-14 |
| Reference Probe ES3DV2 | SN: 3013 | 28-Dec-12 (No. ES3-3013_Dec12) | Dec-13 |
| DAE4 | SN: 660 | 31-Jan-13 (No. DAE4-660_Jan13) | Jan-14 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Apr-13) | In house check: Apr-15 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Israe El-Naouq | Laboratory Technician | Israe El-Naouq |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: May 1, 2013

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**Accreditation No.: SCS 108**

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C, D | modulation dependent linearization parameters |
| Polarization $\varphi$ | $\varphi$ rotation around probe axis |
| Polarization $\vartheta$ | $\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the $E^2$-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z*: *A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe EX3DV4

## SN:3650

| | |
|---|---|
| Manufactured: | March 18, 2008 |
| Repaired: | April 22, 2013 |
| Calibrated: | April 30, 2013 |

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 0.39 | 0.37 | 0.40 | ± 10.1 % |
| DCP (mV)[B] | 99.0 | 98.4 | 98.6 | |

## Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB$\sqrt{\mu V}$ | C | D dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 103.4 | ±3.5 % |
| | | Y | 0.0 | 0.0 | 1.0 | | 132.3 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 108.8 | |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

## Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 41.9 | 0.89 | 9.69 | 9.69 | 9.69 | 0.41 | 0.87 | ± 12.0 % |
| 835 | 41.5 | 0.90 | 9.37 | 9.37 | 9.37 | 0.66 | 0.67 | ± 12.0 % |
| 900 | 41.5 | 0.97 | 9.22 | 9.22 | 9.22 | 0.46 | 0.72 | ± 12.0 % |
| 1450 | 40.5 | 1.20 | 8.04 | 8.04 | 8.04 | 0.31 | 1.01 | ± 12.0 % |
| 1640 | 40.3 | 1.29 | 8.07 | 8.07 | 8.07 | 0.40 | 0.80 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 7.91 | 7.91 | 7.91 | 0.80 | 0.50 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 7.73 | 7.73 | 7.73 | 0.35 | 0.88 | ± 12.0 % |
| 2000 | 40.0 | 1.40 | 7.59 | 7.59 | 7.59 | 0.80 | 0.57 | ± 12.0 % |
| 2300 | 39.5 | 1.67 | 7.34 | 7.34 | 7.34 | 0.67 | 0.62 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 6.99 | 6.99 | 6.99 | 0.47 | 0.74 | ± 12.0 % |
| 2600 | 39.0 | 1.96 | 6.85 | 6.85 | 6.85 | 0.48 | 0.78 | ± 12.0 % |
| 3500 | 37.9 | 2.91 | 6.96 | 6.96 | 6.96 | 0.85 | 0.62 | ± 13.1 % |
| 5200 | 36.0 | 4.66 | 5.20 | 5.20 | 5.20 | 0.35 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 5.07 | 5.07 | 5.07 | 0.30 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 4.57 | 4.57 | 4.57 | 0.40 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.56 | 4.56 | 4.56 | 0.45 | 1.80 | ± 13.1 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

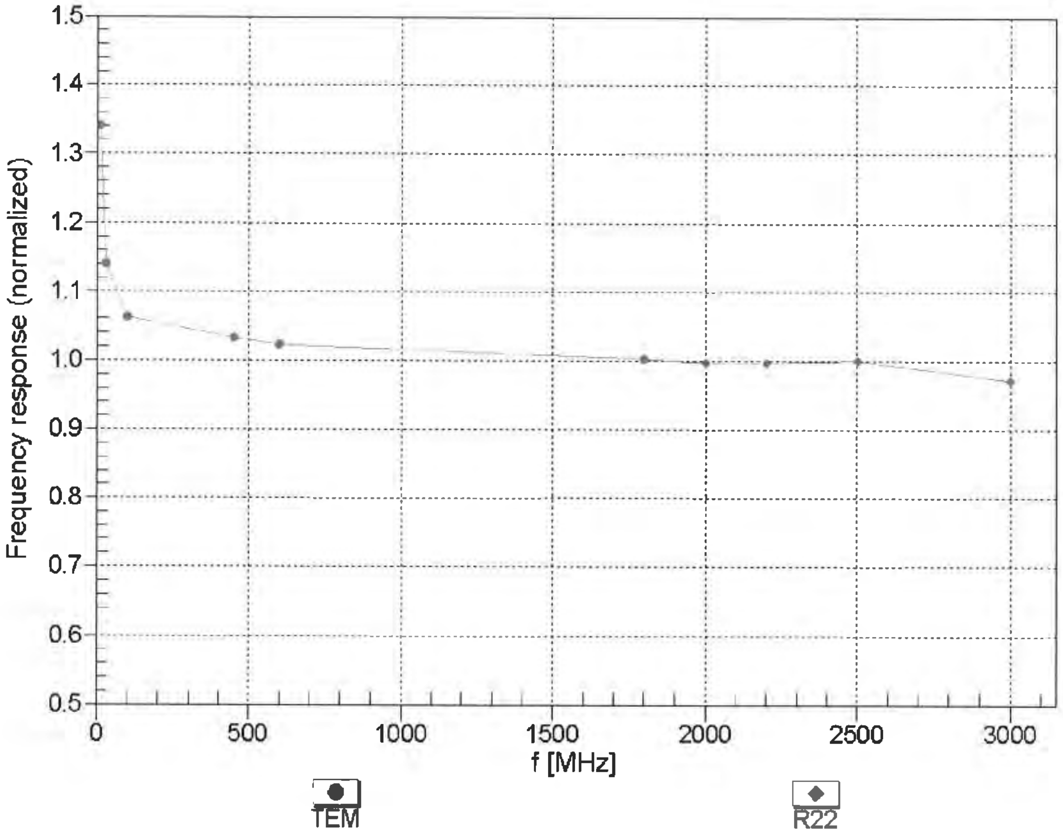
## Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 55.5 | 0.96 | 9.51 | 9.51 | 9.51 | 0.73 | 0.64 | ± 12.0 % |
| 835 | 55.2 | 0.97 | 9.35 | 9.35 | 9.35 | 0.80 | 0.50 | ± 12.0 % |
| 900 | 55.0 | 1.05 | 9.23 | 9.23 | 9.23 | 0.78 | 0.62 | ± 12.0 % |
| 1450 | 54.0 | 1.30 | 8.40 | 8.40 | 8.40 | 0.80 | 0.50 | ± 12.0 % |
| 1640 | 53.8 | 1.40 | 8.36 | 8.36 | 8.36 | 0.80 | 0.62 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 7.57 | 7.57 | 7.57 | 0.74 | 0.66 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 7.39 | 7.39 | 7.39 | 0.40 | 0.86 | ± 12.0 % |
| 2000 | 53.3 | 1.52 | 7.57 | 7.57 | 7.57 | 0.51 | 0.77 | ± 12.0 % |
| 2300 | 52.9 | 1.81 | 6.73 | 6.73 | 6.73 | 0.51 | 0.73 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 7.09 | 7.09 | 7.09 | 0.80 | 0.50 | ± 12.0 % |
| 2600 | 52.5 | 2.16 | 6.91 | 6.91 | 6.91 | 0.80 | 0.50 | ± 12.0 % |
| 3500 | 51.3 | 3.31 | 6.58 | 6.58 | 6.58 | 0.38 | 1.16 | ± 13.1 % |
| 5200 | 49.0 | 5.30 | 4.51 | 4.51 | 4.51 | 0.45 | 1.90 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 4.31 | 4.31 | 4.31 | 0.45 | 1.90 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 4.00 | 4.00 | 4.00 | 0.45 | 1.90 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 4.21 | 4.21 | 4.21 | 0.55 | 1.90 | ± 13.1 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

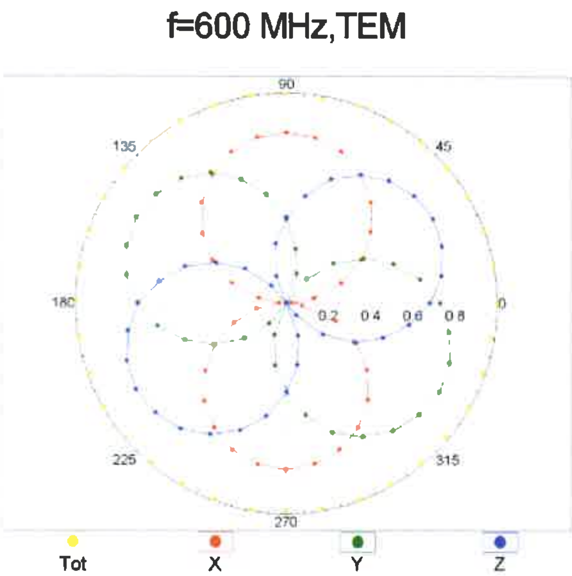
[F] At frequencies below 3 GHz, the validity of tissue parameters ($\varepsilon$ and $\sigma$) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ($\varepsilon$ and $\sigma$) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

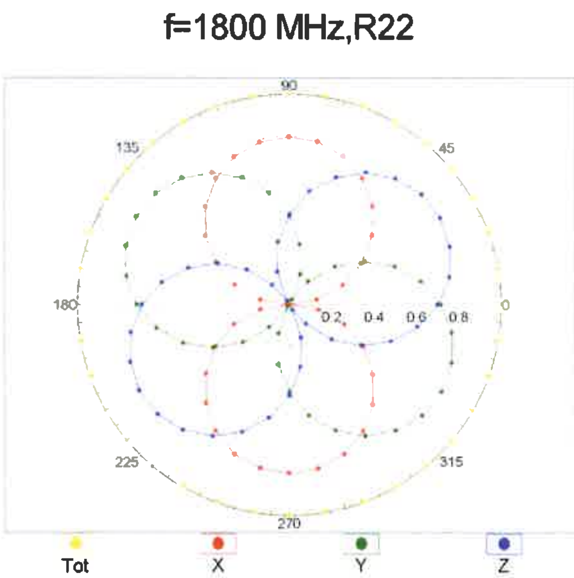
# Frequency Response of E-Field
## (TEM-Cell:ifi110 EXX, Waveguide: R22)

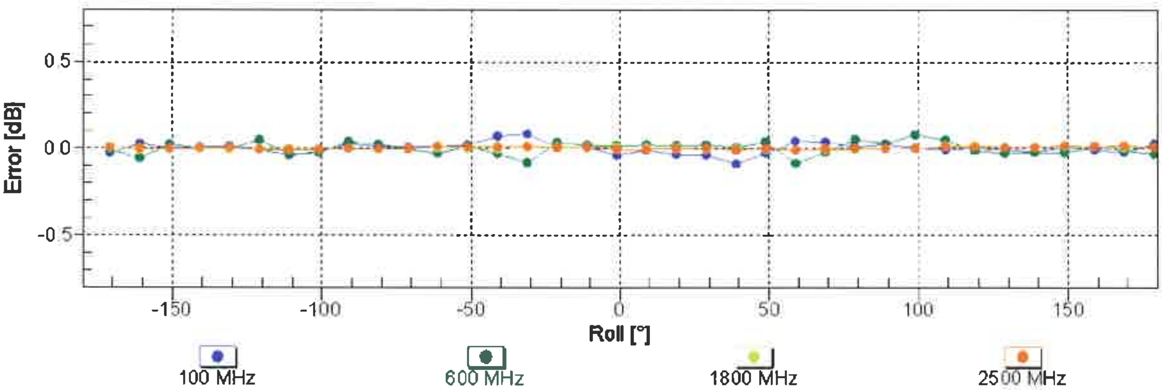



**Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)**

# Receiving Pattern (ϕ), ϑ = 0°

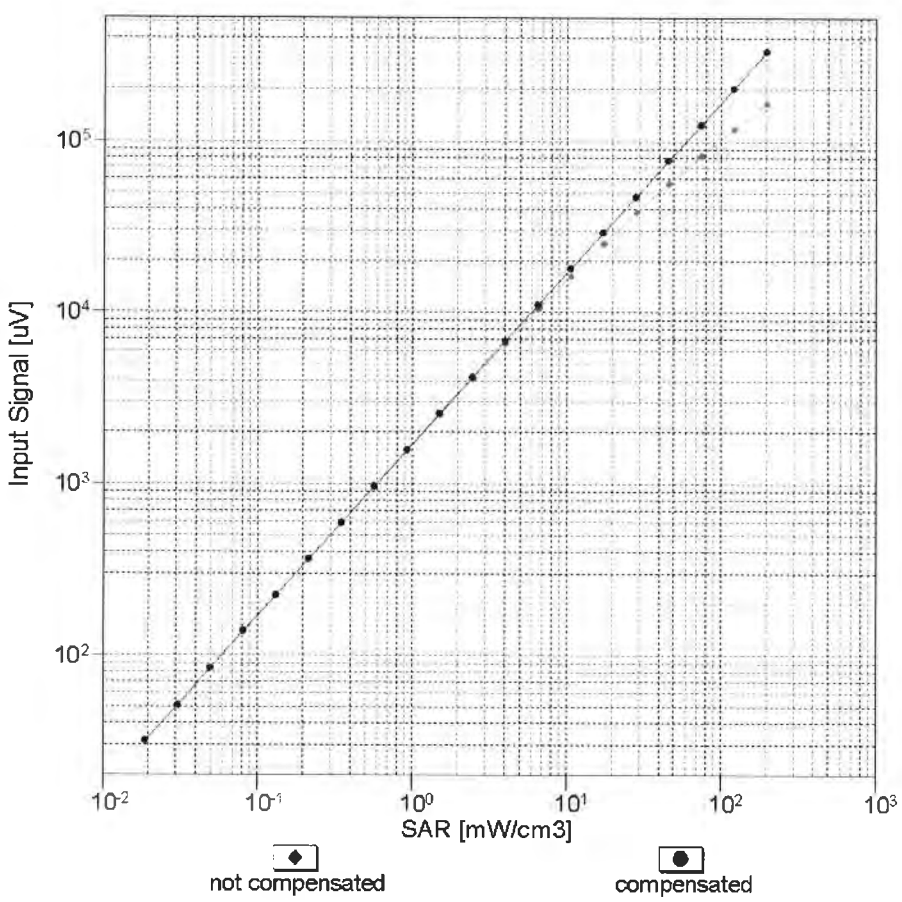


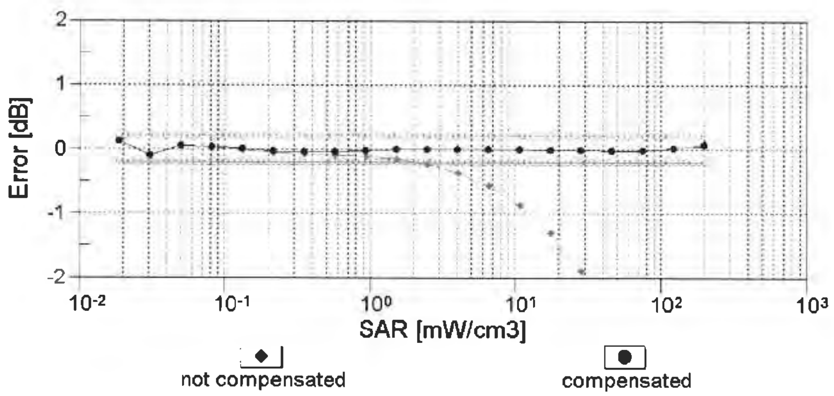




**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

# Dynamic Range f($SAR_{head}$)
**(TEM cell , f = 900 MHz)**

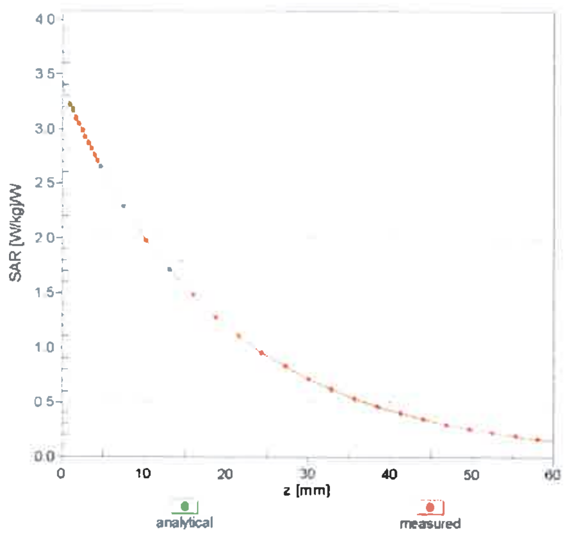


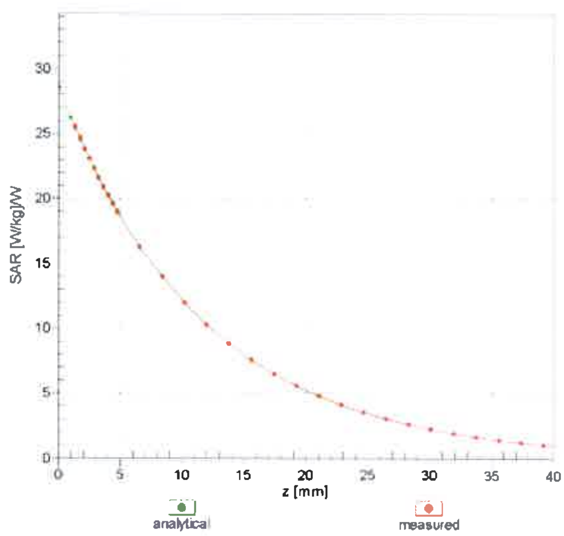

**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

# Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

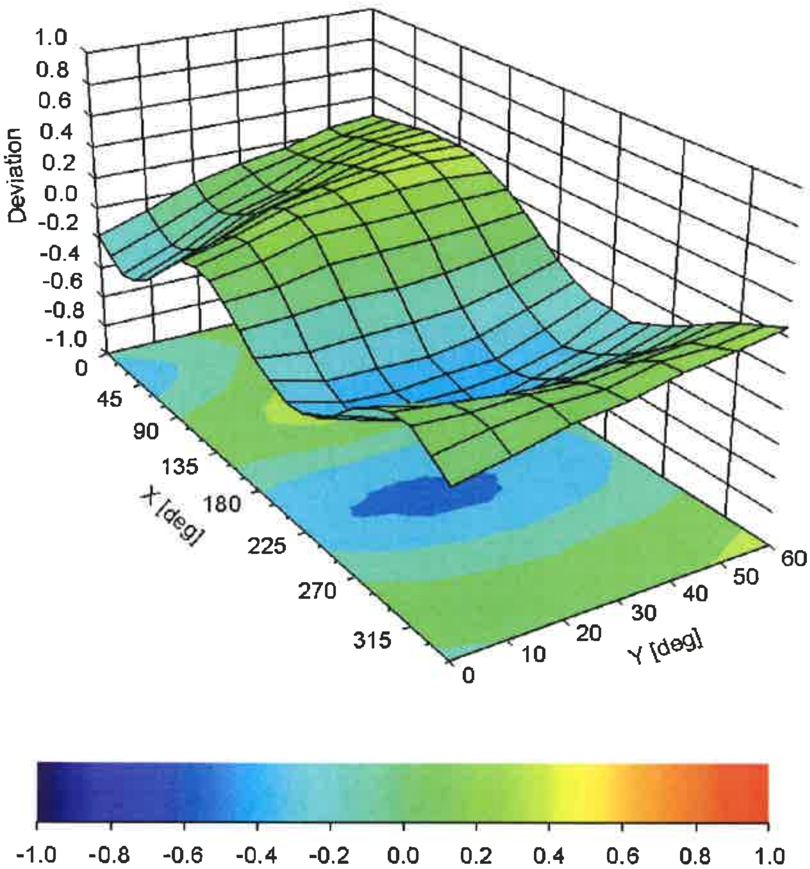



f = 1900 MHz,WGLS R22 (H_convF)




# Deviation from Isotropy in Liquid

**Error (ϕ, ϑ), f = 900 MHz**




**Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)**

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

## Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | -21.1 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5 mm |
| Probe Tip to Sensor X Calibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 1 mm |
| Probe Tip to Sensor Z Calibration Point | 1 mm |
| Recommended Measurement Distance from Surface | 2 mm |

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

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**Swiss Calibration Service**

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**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

**Client** **B.V. ADT (Auden)**

**Certificate No: EX3-3864_Jul13/2**

# CALIBRATION CERTIFICATE (Replacement of No: EX3-3864_Jul13)

| | |
|---|---|
| Object | EX3DV4 - SN:3864 |
| Calibration procedure(s) | QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4<br>Calibration procedure for dosimetric E-field probes |
| Calibration date: | July 31, 2013 |

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 04-Apr-13 (No. 217-01733) | Apr-14 |
| Power sensor E4412A | MY41498087 | 04-Apr-13 (No. 217-01733) | Apr-14 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 04-Apr-13 (No. 217-01737) | Apr-14 |
| Reference 20 dB Attenuator | SN: S5277 (20x) | 04-Apr-13 (No. 217-01735) | Apr-14 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 04-Apr-13 (No. 217-01738) | Apr-14 |
| Reference Probe ES3DV2 | SN: 3013 | 28-Dec-12 (No. ES3-3013_Dec12) | Dec-13 |
| DAE4 | SN: 660 | 31-Jan-13 (No. DAE4-660_Jan13) | Jan-14 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Apr-13) | In house check: Apr-15 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 13, 2013

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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**S** **Schweizerischer Kalibrierdienst**
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**Accreditation No.: SCS 108**

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C, D | modulation dependent linearization parameters |
| Polarization φ | φ rotation around probe axis |
| Polarization ϑ | ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the $E^2$-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe EX3DV4

## SN:3864

Manufactured: February 2, 2012
Calibrated: July 31, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 0.47 | 0.44 | 0.49 | ± 10.1 % |
| DCP (mV)[B] | 96.0 | 100.3 | 98.7 | |

## Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB$\sqrt{\mu V}$ | C | D dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 155.8 | ±2.5 % |
| | | Y | 0.0 | 0.0 | 1.0 | | 150.7 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 119.2 | |

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

## Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 41.9 | 0.89 | 10.41 | 10.41 | 10.41 | 0.42 | 0.78 | ± 12.0 % |
| 835 | 41.5 | 0.90 | 9.96 | 9.96 | 9.96 | 0.26 | 0.98 | ± 12.0 % |
| 900 | 41.5 | 0.97 | 9.77 | 9.77 | 9.77 | 0.16 | 1.53 | ± 12.0 % |
| 1450 | 40.5 | 1.20 | 9.33 | 9.33 | 9.33 | 0.20 | 1.50 | ± 12.0 % |
| 1640 | 40.3 | 1.29 | 8.52 | 8.52 | 8.52 | 0.36 | 0.85 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 8.49 | 8.49 | 8.49 | 0.25 | 0.95 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 8.20 | 8.20 | 8.20 | 0.52 | 0.67 | ± 12.0 % |
| 2000 | 40.0 | 1.40 | 8.32 | 8.32 | 8.32 | 0.57 | 0.63 | ± 12.0 % |
| 2300 | 39.5 | 1.67 | 7.76 | 7.76 | 7.76 | 0.34 | 0.84 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 7.47 | 7.47 | 7.47 | 0.37 | 0.81 | ± 12.0 % |
| 2600 | 39.0 | 1.96 | 7.26 | 7.26 | 7.26 | 0.32 | 0.94 | ± 12.0 % |
| 3500 | 37.9 | 2.91 | 6.87 | 6.87 | 6.87 | 0.33 | 1.23 | ± 13.1 % |
| 5200 | 36.0 | 4.66 | 5.33 | 5.33 | 5.33 | 0.31 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 5.13 | 5.13 | 5.13 | 0.30 | 1.80 | ± 13.1 % |
| 5500 | 35.6 | 4.96 | 4.96 | 4.96 | 4.96 | 0.33 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 4.78 | 4.78 | 4.78 | 0.34 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.67 | 4.67 | 4.67 | 0.38 | 1.80 | ± 13.1 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters ($\varepsilon$ and $\sigma$) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ($\varepsilon$ and $\sigma$) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

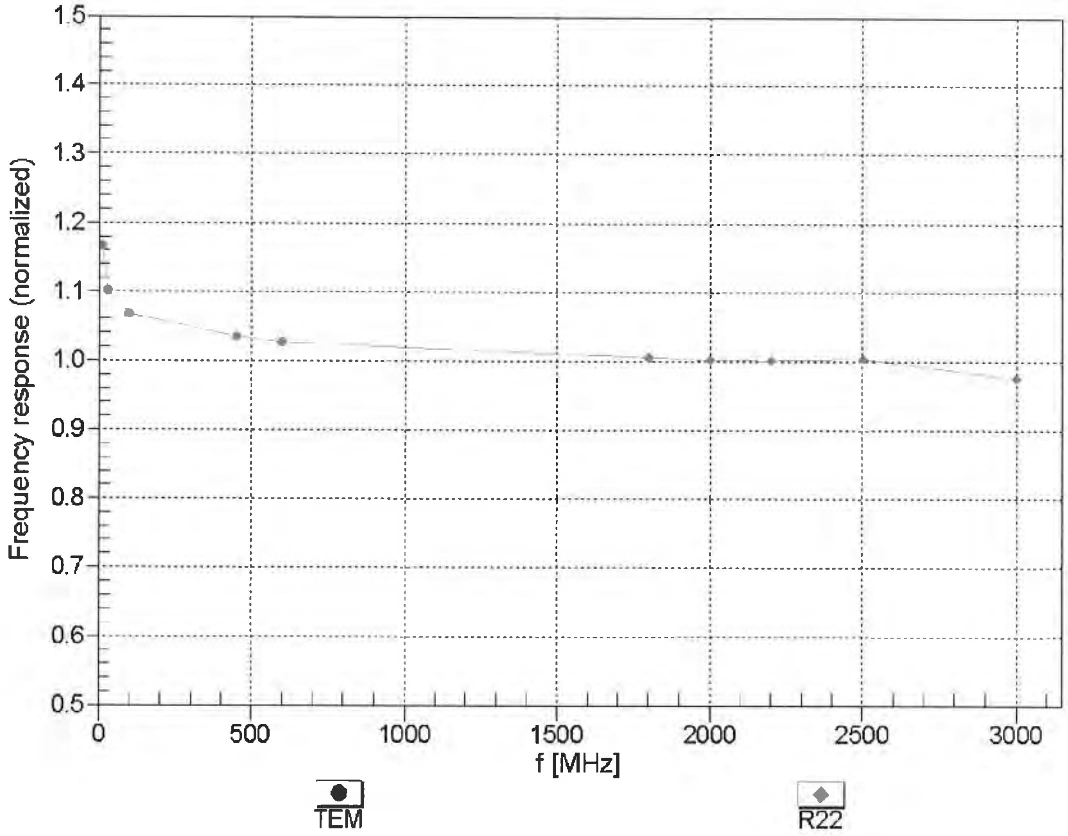
# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

## Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 750 | 55.5 | 0.96 | 10.15 | 10.15 | 10.15 | 0.23 | 1.32 | ± 12.0 % |
| 835 | 55.2 | 0.97 | 10.14 | 10.14 | 10.14 | 0.37 | 0.91 | ± 12.0 % |
| 900 | 55.0 | 1.05 | 9.90 | 9.90 | 9.90 | 0.29 | 1.09 | ± 12.0 % |
| 1450 | 54.0 | 1.30 | 8.39 | 8.39 | 8.39 | 0.22 | 1.23 | ± 12.0 % |
| 1640 | 53.8 | 1.40 | 8.53 | 8.53 | 8.53 | 0.80 | 0.61 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 8.10 | 8.10 | 8.10 | 0.58 | 0.70 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 7.87 | 7.87 | 7.87 | 0.23 | 1.10 | ± 12.0 % |
| 2000 | 53.3 | 1.52 | 8.00 | 8.00 | 8.00 | 0.27 | 1.04 | ± 12.0 % |
| 2300 | 52.9 | 1.81 | 7.67 | 7.67 | 7.67 | 0.74 | 0.58 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 7.40 | 7.40 | 7.40 | 0.76 | 0.55 | ± 12.0 % |
| 2600 | 52.5 | 2.16 | 7.26 | 7.26 | 7.26 | 0.80 | 0.50 | ± 12.0 % |
| 3500 | 51.3 | 3.31 | 6.47 | 6.47 | 6.47 | 0.38 | 1.13 | ± 13.1 % |
| 5200 | 49.0 | 5.30 | 4.49 | 4.49 | 4.49 | 0.40 | 1.90 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 4.01 | 4.01 | 4.01 | 0.42 | 1.90 | ± 13.1 % |
| 5500 | 48.6 | 5.65 | 3.90 | 3.90 | 3.90 | 0.50 | 1.90 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 3.69 | 3.69 | 3.69 | 0.53 | 1.90 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 3.93 | 3.93 | 3.93 | 0.54 | 1.90 | ± 13.1 % |

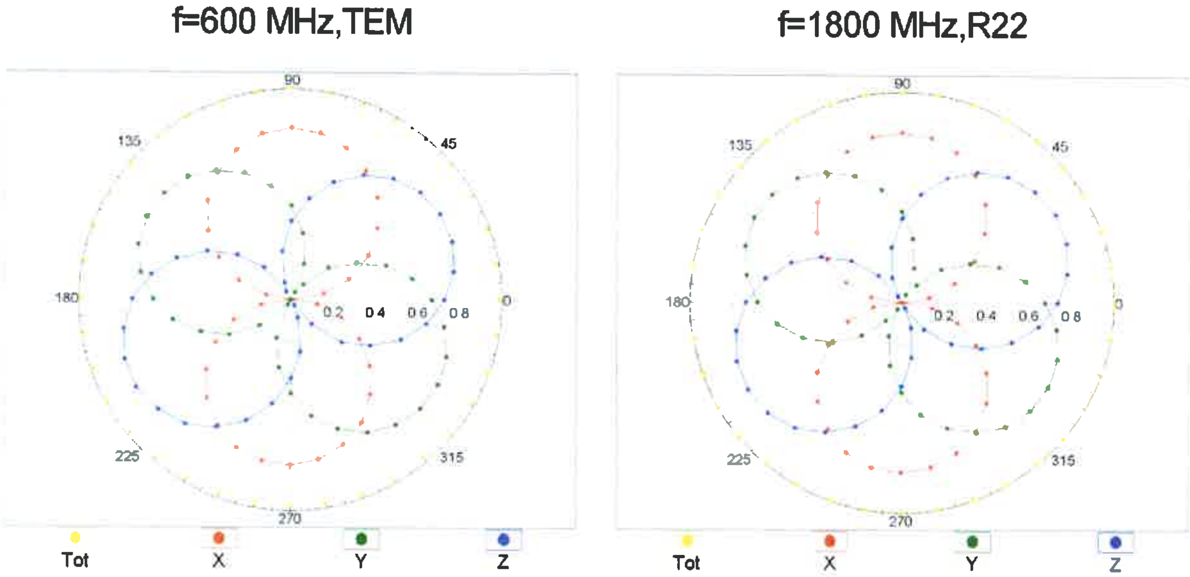
[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

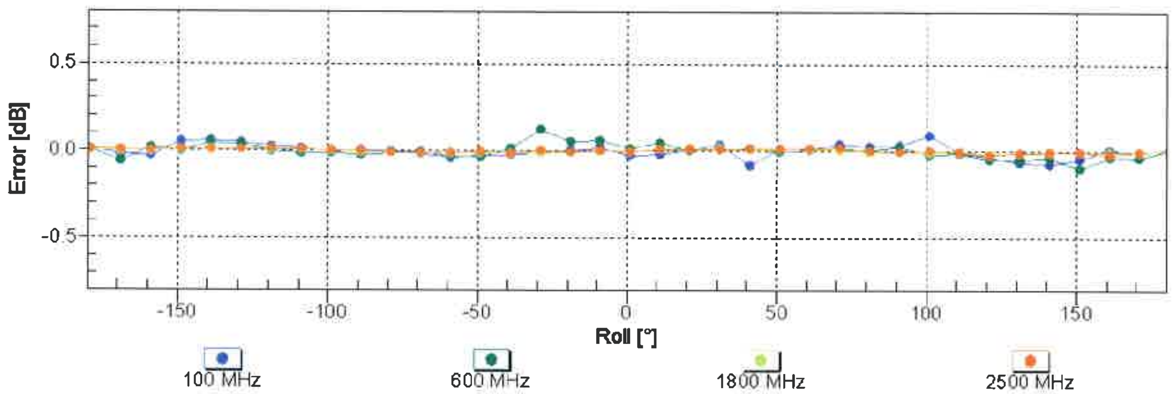
# Frequency Response of E-Field
## (TEM-Cell:ifi110 EXX, Waveguide: R22)




**Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)**

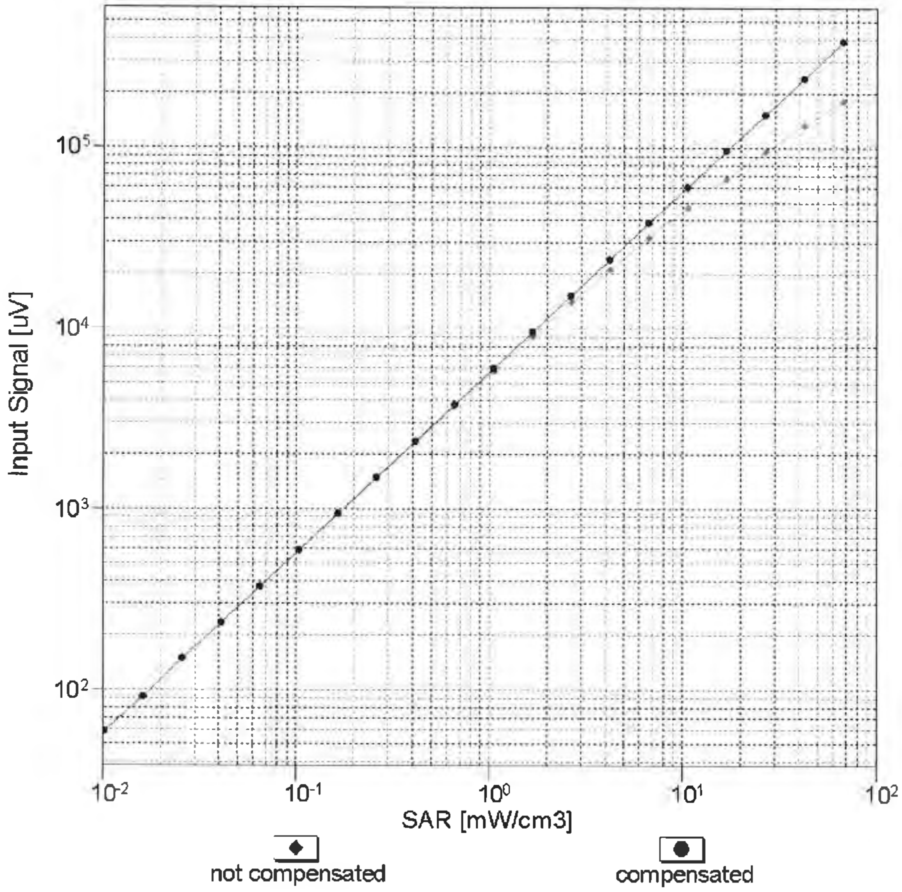
# Receiving Pattern (ϕ), ϑ = 0°

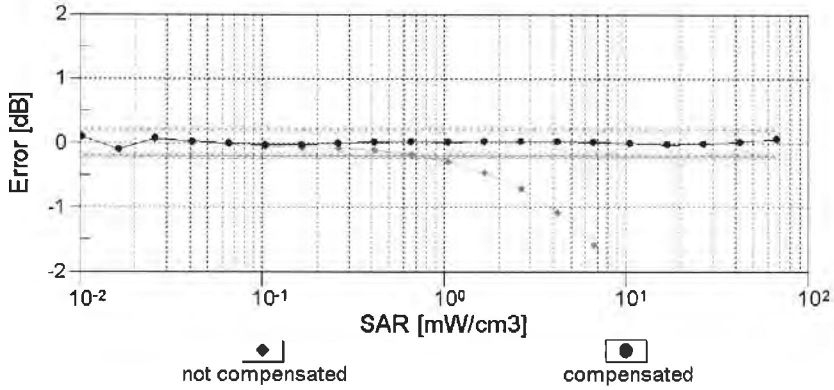



**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

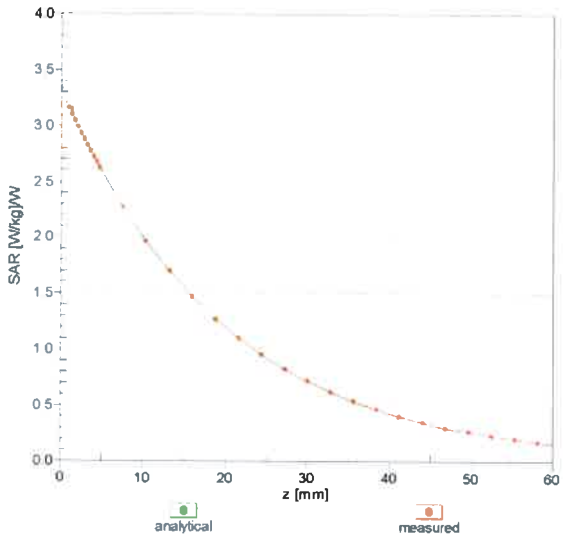
# Dynamic Range f($SAR_{head}$)
## (TEM cell , f = 900 MHz)

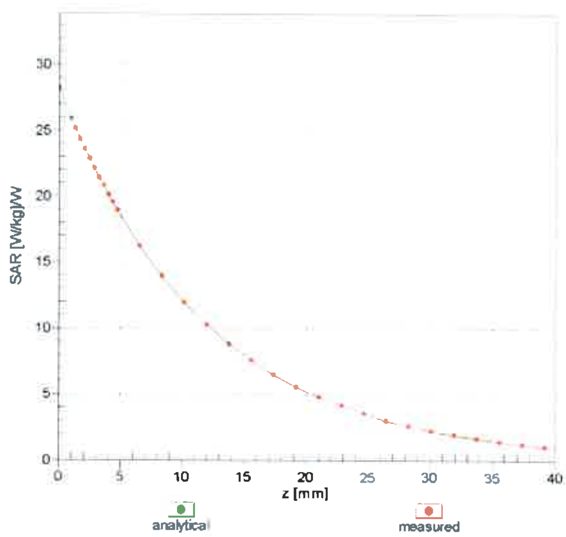



**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

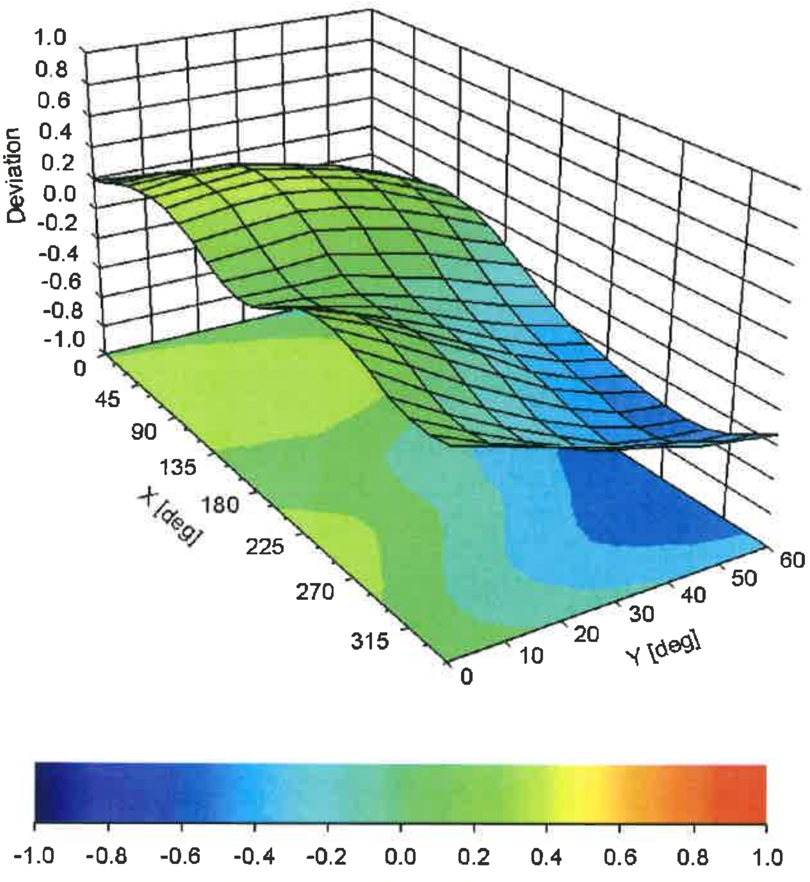
# Conversion Factor Assessment




# Deviation from Isotropy in Liquid

**Error (ϕ, ϑ), f = 900 MHz**




**Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)**

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3864

## Other Probe Parameters

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | -119 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5 mm |
| Probe Tip to Sensor X Calibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 1 mm |
| Probe Tip to Sensor Z Calibration Point | 1 mm |
| Recommended Measurement Distance from Surface | 2 mm |