



Report No.: AGC0085140602FH01
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SAR Test Report

Report No.: AGC00850140602FH01

FCC ID : UOSAM66

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : mobile phone

BRAND NAME : AMGOO

MODEL NAME : AM66

CLIENT : AMGOO TELECOM (Shenzhen) CO.,LTD

DATE OF ISSUE : June 24,2014

STANDARD(S) : IEEE Std. 1528:2003
47CFR § 2.1093
IEEE/ANSI C95.1

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd.



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Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|----------------|-------------|--------------|---------------|-----------------|
| V1.0 | / | June 24,2014 | Valid | Original Report |

The test plans were performed in accordance with IEEE Std. 1528:2003; 47CFR § 2.1093; IEEE/ANSI C95.1 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v05r02
- KDB 648474 D04 SAR Handsets Multi Xmter and Ant v01
- KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- KDB 941225 D01 SAR test for 3G devices v02
- KDB 941225 D02 Guidance for 3GPP R6 and R7 HSPA v02v02
- KDB 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- KDB 941225 D06 Hot Spot SAR v01
- KDB 248227 D01 SAR meas for 802.11 a b g v01r02

| Test Report Certification | |
|---------------------------|---|
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| Manufacturer Address : | 3/F, Block R2-A(North),Gaoxin S. Ave. 4th,Hi-Tech Industrial Park, Nanshan District, Shenzhen, China |
| Product Designation : | mobile phone |
| Brand Name : | AMGOO |
| Model Name : | AM66 |
| Different Description | N/A |
| EUT Voltage : | DC3.7V by battery |
| Applicable Standard : | IEEE Std. 1528:2003 47CFR § 2.1093 IEEE/ANSI C95.1 |
| Test Date : | June 24,2014 |
| Performed Location | Attestation of Global Compliance(Shenzhen) Co., Ltd. 2 F, Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen, China |
| Report Template | AGCRT-US-3G3/SAR (2014-04-01) |

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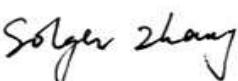
June 24,2014

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1. SUMMARY OF MAXIMUM SAR VALUE

The maximum results of Specific Absorption Rate (SAR) found during testing for EUT are as follows:

Highest Report calculated & scaled SAR Summary

| Exposure Position | Frequency Band | Highest Tested 1g-SAR(W/Kg) | Highest Scaled Maximum SAR(W/Kg) |
|-------------------|----------------|-----------------------------|----------------------------------|
| Head | GSM 835 | 0.379 | 0.477 |
| | PCS 1900 | 0.305 | 0.384 |
| | WCDMA Band II | 0.664 | 0.775 |
| | WCDMA Band V | 0.454 | 0.525 |
| Body- worn | GSM 835 | 0.677 | 0.852 |
| | PCS 1900 | 0.526 | 0.662 |
| | WCDMA Band II | 0.768 | 0.896 |
| | WCDMA Band V | 0.776 | 0.897 |

| Exposure Position | Test Mode | Highest Tested 1g-SAR(W/Kg) | Highest Scaled Maximum SAR(W/Kg) |
|-------------------|-----------|-----------------------------|----------------------------------|
| Body- worn | HOTSPOT | 0.542 | 0.601 |

Highest Simultaneous transmission SAR Summary

| Exposure Position | Frequency Band | Highest calculated 1g-SAR(W/Kg) | Highest Simultaneous SAR(W/Kg) |
|-------------------|-----------------------|---------------------------------|--------------------------------|
| Head | GSM 835+WLAN | 0.808 | 0.808 |
| | PCS 1900+WLAN | 0.715 | |
| | WCDMA Band II+WLAN | 1.105 | 1.105 |
| | WCDMA Band V+WLAN | 0.856 | |
| Body- worn | GSM 835+HOTSPOT | 1.453 | 1.453 |
| | PCS 1900+HOTSPOT | 1.263 | |
| | WCDMA Band II+HOTSPOT | 1.497 | 1.498 |
| | WCDMA Band V+HOTSPOT | 1.498 | |

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/Kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1, and had been tested in accordance with measurement methods and procedures specified in IEEE 1528-2003 and the relevant KDB files like KDB 941225 D01 , KDB 941225 D03 ,KDB 865664 D02....etc.

2. GENERAL INFORMATION

2.1. EUT Description

| General Information | |
|---|--|
| Product Designation | mobile phone |
| Test Model | AM66 |
| Hardware Version | TMAM |
| Software Version | N/A |
| Device Category | Portable |
| RF Exposure Environment | Uncontrolled |
| Antenna Type | Internal |
| GSM and GPRS | |
| Support Band | <input checked="" type="checkbox"/> GSM 850 <input checked="" type="checkbox"/> PCS 1900 (U.S. Bands) <input checked="" type="checkbox"/> GSM 900 <input checked="" type="checkbox"/> DCS 1800 (Non-U.S. Bands) |
| GPRS Type | Class B |
| GPRS Class | Class 12(1Tx+4Rx, 2Tx+3Rx, 3Tx+2Rx, 4Tx+1Rx) |
| TX Frequency Range | GSM 850 : 824.2~848.8MHz; PCS 1900: 1850.2~1909.8MHz; |
| RX Frequency Range | GSM 850 : 869~894MHz PCS 1900: 1930~1990MHz |
| Release Version | R99 |
| Type of modulation | GMSK for GSM/GPRS |
| Antenna Gain | -1.0dBi(GSM/WCDMA 850), -0.8dBi (GSM/WCDMA 1900) |
| Max. Average Power (Max. Peak Power) | GSM850: 31.78dBm(32.46dBm- Peak Power) PCS1900: 28.73Bm(29.44dBm-Peak Power) |

EUT Description(Continue)

| WCDMA | |
|---|--|
| Support Band | U.S. Bands: <input checked="" type="checkbox"/> UMTS FDD Band II <input checked="" type="checkbox"/> UMTS FDD Band V Non-U.S. Bands: <input type="checkbox"/> UMTS FDD Band I <input type="checkbox"/> UMTS FDD Band III <input type="checkbox"/> UMTS FDD Band VIII |
| HS Type | HSPA(HSUPA/HSDPA) |
| TX Frequency Range | WCDMA FDD Band II: 1852.4 -1907.6MHz WCDMA FDD Band V: 826.4-846.6MHz |
| RX Frequency Range | WCDMA FDD Band II: 1930-1990MHz WCDMA FDD Band V: 869-894MHz |
| Release Version | Rel-6 |
| Type of modulation | QPSK |
| Antenna Gain | -1.0dBi(GSM/WCDMA 850), -0.8dBi (GSM/WCDMA 1900) |
| Max. Average Power (Max. Peak Power) | Band II: 22.98dBm (23.44dBm- Peak Power) Band V: 22.88dBm (23.37dBm- Peak Power) |
| Bluetooth | |
| Bluetooth Version | <input type="checkbox"/> V2.0 <input type="checkbox"/> V2.1 <input type="checkbox"/> V2.1+EDR <input checked="" type="checkbox"/> V3.0 <input type="checkbox"/> V3.0+HS <input checked="" type="checkbox"/> V4.0 |
| Operation Frequency | 2402~2480MHz |
| Type of modulation | <input checked="" type="checkbox"/> GFSK <input checked="" type="checkbox"/> Π/4-DQPSK <input checked="" type="checkbox"/> 8-DPSK |
| Avg. Burst Power | -2.18Bm |
| Antenna Gain | 1.0dBi |
| WIFI | |
| WIFI Specification | <input type="checkbox"/> 802.11a <input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20) <input checked="" type="checkbox"/> 802.11n(40) |
| Operation Frequency | 2412~2462MHz |
| Avg. Burst Power | 11b:8.55dBm,11g:4.82dBm,11n(20):4.83dBm,11n(40):4.43dBm |
| Antenna Gain | 1.0dBi |
| Accessories | |
| Battery | Brand name: AMGOO Model No. : AM66 Voltage and Capacitance: 3.7 V & 1200mAh |
| Adapter | Brand name: AMGOO Model No. : CH4 Input: AC 100-240V Output: DC 5V, 600mA |
| Earphone | Brand name: N/A Model No. : N/A |

Note: The sample used for testing is end product.

2.2. Test Procedure

| | |
|---|---|
| 1 | Setup the EUT and simulators as shown on above. |
| 2 | Turn on the power of all equipment. |
| 3 | EUT Communicate with 8960, and test them respectively at U.S. bands |

2.3. Test Environment

Ambient conditions in the laboratory:

| Items | Required | Actual |
|------------------|----------|--------|
| Temperature (°C) | 18-25 | 21± 2 |
| Humidity (%RH) | 30-70 | 55±2 |

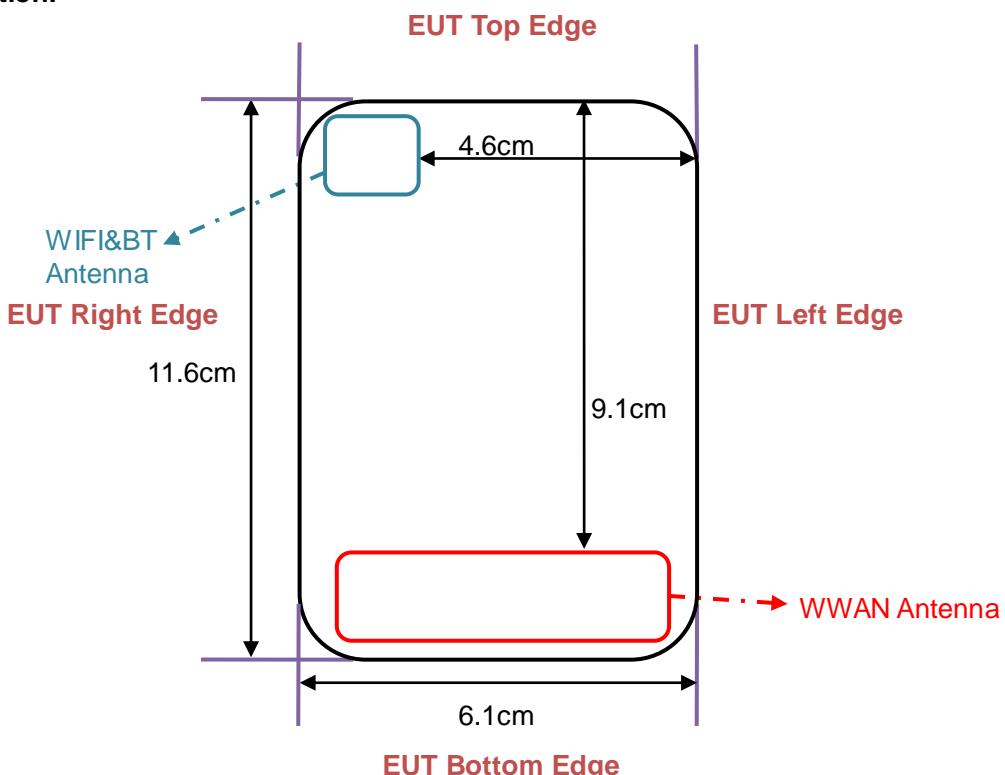
2.4. Test Configuration and setting

The EUT is a model of GSM Portable Mobile Station (MS). It supports GSM/GPRS, WCDMA/HSPA, BT, WIFI, and hotspot mode.

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator were established by air link. The distance between the EUT and the antenna is larger than 50cm, and the output power radiated from the emulator antenna is at least 30db smaller than the output power of EUT.

For WLAN testing, the EUT is configured with the WLAN continuous TX tool through engineering command.

Antenna Location:



The separation distance for antenna to edge:

| Antenna | To Top Side(cm) | To Bottom Side(cm) | To Left Side(cm) | To Right Side(cm) |
|---------|-----------------|--------------------|------------------|-------------------|
| WWAN | 10 | 0.1 | 0.8 | 1.1 |
| BT/WIFI | 0.6 | 9.1 | 4.6 | 0.4 |

The simultaneous transmission possibilities are listed as below:

| Simultaneous TX Combination | Configuration | Head | Body | Hotspot |
|-----------------------------|-------------------------|------|------|---------|
| 1 | GSM835(Voice)+WLAN/BT | Yes | Yes | Yes |
| 2 | PCS 1900(Voice)+WLAN/BT | Yes | Yes | Yes |
| 3 | WCDMA Band II+WLAN/BT | Yes | Yes | Yes |
| 4 | WCDMA Band V+WLAN/BT | Yes | Yes | Yes |

3. SAR MEASUREMENT SYSTEM

3.1. Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in 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 occupational/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 (dv) of given mass density (ρ). The equation description is as below:

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

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

SAR can be obtained using either of the following equations:

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

$$\text{SAR} = c_h \left. \frac{dT}{dt} \right|_{t=0}$$

Where

| | |
|----------|--|
| SAR | is the specific absorption rate in watts per kilogram; |
| E | is the r.m.s. value of the electric field strength in the tissue in volts per meter; |
| σ | is the conductivity of the tissue in siemens per metre; |
| ρ | is the density of the tissue in kilograms per cubic metre; |
| c_h | is the heat capacity of the tissue in joules per kilogram and Kelvin; |

$\left. \frac{dT}{dt} \right|_{t=0}$ is the initial time derivative of temperature in the tissue in kelvins per second

3.2. SAR Measurement Procedure

The EUT is set to transmit at the required power in line with product specification, at each frequency relating to the LOW, MID, and HIGH channel settings.

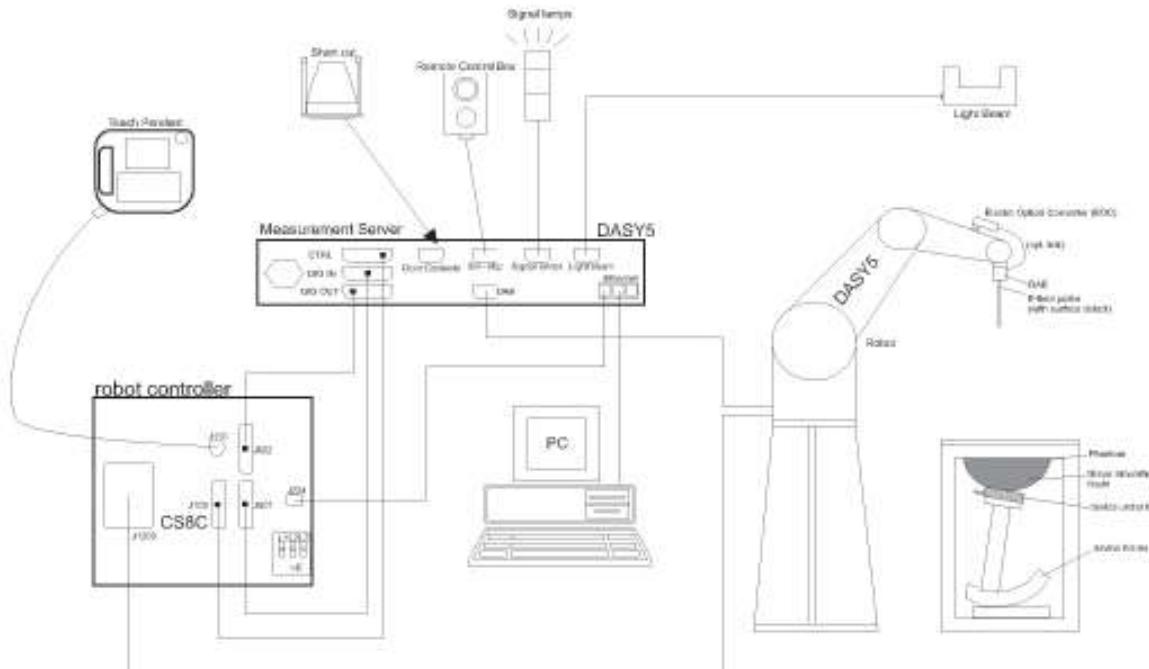
Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

The EUT is placed against the Universal Phantom where the maximum area scan dimensions are larger than the physical size of the resonating antenna. When the scan size is not large enough to cover the peak SAR distribution, it is modified by either extending the area scan size in both the X and Y directions, or the device is shifted within the predefined area.

The area scan is then run to establish the peak SAR location (interpolated resolution set at 1mm^2) which is then used to orient the center of the zoom scan. The zoom scan is then executed and the 1g and 10g averages are derived from the zoom scan volume (interpolated resolution set at 1mm^3).

When multiple peak SAR location were found during the same configuration or test mode, Zoom scan shall performed on each peak SAR location, only the peak point with maximum SAR value will be reported for the configuration or test mode.

3.3. DASY5 System Description



DASY5 System Configurations

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

- (1) A standard high precision 6-axis robot with controller, teach pendant and software.
- (2) A data acquisition electronics (DAE) which attached to the robot arm extension. The DAE consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.
- (3) A dosimetric probe equipped with an optical surface detector system.
- (4) The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital Communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- (5) A Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- (6) A computer running WinXP .
- (7) DASY software.
- (8) Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- (9) Phantoms, device holders and other accessories according to the targeted measurement.

3.3.1. Applications

Predefined procedures and evaluations for automated compliance testing with all worldwide standards, e.g., IEEE 1528, OET 65, IEC 62209-1, IEC 62209-2, EN 50360, EN 50383 and others.

3.3.2. Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for applications utilize a 10mm² step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments. When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE 1528-2003, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan).

3.3.3. Zoom Scan (Cube Scan Averaging)

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of 1000 kg/m³ is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1 g cube is 10mm, with the side length of the 10 g cube 21.5mm. The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications utilize a physical step of 7x7x7 (5mmx5mmx5mm) providing a volume of 30mm in the X & Y axis, and 30mm in the Z axis.

3.3.4. Uncertainty of Inter-/Extrapolation and Averaging

In order to evaluate the uncertainty of the interpolation, extrapolation and averaged SAR calculation algorithms of the Post processor, COMOSAR allows the generation of measurement grids which are artificially predefined by analytically based test functions. Therefore, the grids of area scans and zoom scans can be filled with uncertainty test data, according to the SAR benchmark functions of IEEE 1528. The three analytical functions shown in equations as below are used to describe the possible range of the expected SAR distributions for the tested handsets. The field gradients are covered by the spatially flat distribution f1, the spatially steep distribution f3 and f2 accounts for H-field cancellation on the phantom/tissue surface.

$$f_1(x, y, z) = Ae^{-\frac{z}{2a}} \cos^2 \left(\frac{\pi}{2} \frac{\sqrt{x'^2 + y'^2}}{5a} \right)$$

$$f_2(x, y, z) = Ae^{-\frac{z}{a}} \frac{a^2}{a^2 + x'^2} \left(3 - e^{-\frac{2z}{a}} \right) \cos^2 \left(\frac{\pi}{2} \frac{y'}{3a} \right)$$

$$f_3(x, y, z) = A \frac{a^2}{\frac{a^2}{4} + x'^2 + y'^2} \left(e^{-\frac{2z}{a}} + \frac{a^2}{2(a + 2z)^2} \right)$$

3.4. DASY5 E-Field Probe

The SAR measurement is conducted with the dissymmetric probe manufactured by SPEAG. The probe is specially designed and calibrated for use in liquid with high permittivity. The dissymmetric probe has special calibration in liquid at different frequency. SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN62209-1, IEC 62209, etc.) Under ISO17025. The calibration data are in Appendix D.

3.5. Isotropic E-Field Probe Specification

| | |
|----------------------|--|
| Model | EX3DV4 |
| Manufacture | SPEAG |
| frequency | 0.3GHz-6 GHz Linearity: $\pm 0.2\text{dB}$ (30 MHz-6 GHz) |
| Dynamic Range | 0.01W/Kg-100W/Kg Linearity: $\pm 0.2\text{dB}$ |
| Dimensions | Overall length:337mm Tip diameter:2.5mm Typical distance from probe tip to dipole centers:1mm |
| Application | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |

3.6. Robot

The DASY system uses the high precision robots (DASY5:TX60) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from is used.

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

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



3.7. Light Beam Unit

The light beam switch allows automatic “tooling” of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



3.8. Device Holder

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

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



3.9. Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chip-disk (DASY5: 128MB), RAM (DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



3.10. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

4. TISSUE SIMULATING LIQUID

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 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in 4.2

4.1. The composition of the tissue simulating liquid

| Ingredient | 835MHz | 835MHz | 1900MHz | 1900MHz | 2450MHz | 2450MHz |
|------------------|--------|--------|---------|---------|---------|---------|
| (% Weight) | Head | Body | Head | Body | Head | Body |
| Water | 40.45 | 52.4 | 54.90 | 40.5 | 46.7 | 73.2 |
| Salt | 1.42 | 1.40 | 0.18 | 0.50 | 0.00 | 0.04 |
| Sugar | 57.6 | 45.0 | 0.00 | 58.0 | 0.00 | 0.00 |
| HEC | 0.40 | 1.00 | 0.00 | 0.50 | 0.00 | 0.00 |
| Preventol | 0.10 | 0.20 | 0.00 | 0.50 | 0.00 | 0.00 |
| DGBE | 0.00 | 0.00 | 44.92 | 0.00 | 53.3 | 26.7 |
| TWEEN | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

4.2. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY5 Dielectric Probe Kit and R&S Network Analyzer ZVL6

| Tissue Stimulant Measurement for 835Mhz | | | | | | | | | |
|---|------|---------------------------------------|--|--------------------------------------|--|------------------------|--------------|--|--|
| Fr. (MHz) | Ch. | Dielectric Parameters ($\pm 5\%$) | | | | Tissue Temp [°C] | Test time | | |
| | | head | | body | | | | | |
| | | ϵ_r 41.5 39.425-43.575 | $\delta[\text{s}/\text{m}]$ 0.90 0.855-0.945 | ϵ_r 55.20 52.44-57-96 | $\delta[\text{s}/\text{m}]$ 0.97 0.9215-1.0185 | | | | |
| 835 | Low | 41.27 | 0.91 | 55.14 | 0.95 | 21 | June 24,2014 | | |
| 835 | Mid | 41.58 | 0.88 | 54.87 | 0.98 | 21 | June 24,2014 | | |
| 835 | High | 42.00 | 0.87 | 54.62 | 0.95 | 21 | June 24,2014 | | |

| Tissue Stimulant Measurement for 1900MHz | | | | | | | | | |
|--|------|--------------------------------------|--|--|--|------------------------|--------------|--|--|
| Fr. (MHz) | Ch. | Dielectric Parameters ($\pm 5\%$) | | | | Tissue Temp [°C] | Test time | | |
| | | head | | body | | | | | |
| | | ϵ_r 40.00 38.00-42.00 | $\delta[\text{s}/\text{m}]$ 1.40 1.33-1.47 | ϵ_r 53.30 50.635-55.965 | $\delta[\text{s}/\text{m}]$ 1.52 1.444-1.596 | | | | |
| 1900 | Low | 40.78 | 1.37 | 53.12 | 1.52 | 21 | June 24,2014 | | |
| 1900 | Mid | 39.62 | 1.40 | 53.66 | 1.49 | 21 | June 24,2014 | | |
| 1900 | High | 39.88 | 1.41 | 53.28 | 1.50 | 21 | June 24,2014 | | |

| Tissue Stimulant Measurement for 2450MHz | | | | | | | | | |
|--|------|-------------------------------------|--|---------------------------------------|--|------------------------|--------------|--|--|
| Fr. (MHz) | Ch. | Dielectric Parameters ($\pm 5\%$) | | | | Tissue Temp [°C] | Test time | | |
| | | head | | body | | | | | |
| | | ϵ_r 39.2 37.24-41.16 | $\delta[\text{s}/\text{m}]$ 1.80 1.71-1.89 | ϵ_r 52.7 50.065-55.335 | $\delta[\text{s}/\text{m}]$ 1.95 1.8525-2.0475 | | | | |
| 2450 | Low | -- | -- | 52.66 | 1.92 | 21 | June 24,2014 | | |
| 2450 | Mid | -- | -- | 51.64 | 1.90 | 21 | June 24,2014 | | |
| 2450 | High | -- | -- | 51.57 | 1.88 | 21 | June 24,2014 | | |

4.3. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

| Target Frequency (MHz) | head | | body | |
|---------------------------|--------------|----------------|--------------|----------------|
| | ϵ_r | σ (S/m) | ϵ_r | σ (S/m) |
| 300 | 45.3 | 0.87 | 58.2 | 0.92 |
| 450 | 43.5 | 0.87 | 56.7 | 0.94 |
| 835 | 41.5 | 0.90 | 55.2 | 0.97 |
| 900 | 41.5 | 0.97 | 55.0 | 1.05 |
| 915 | 41.5 | 1.01 | 55.0 | 1.06 |
| 1450 | 40.5 | 1.20 | 54.0 | 1.30 |
| 1610 | 40.3 | 1.29 | 53.8 | 1.40 |
| 1800 – 2000 | 40.0 | 1.40 | 53.3 | 1.52 |
| 2450 | 39.2 | 1.80 | 52.7 | 1.95 |
| 3000 | 38.5 | 2.40 | 52.0 | 2.73 |
| 5800 | 35.3 | 5.27 | 48.2 | 6.00 |

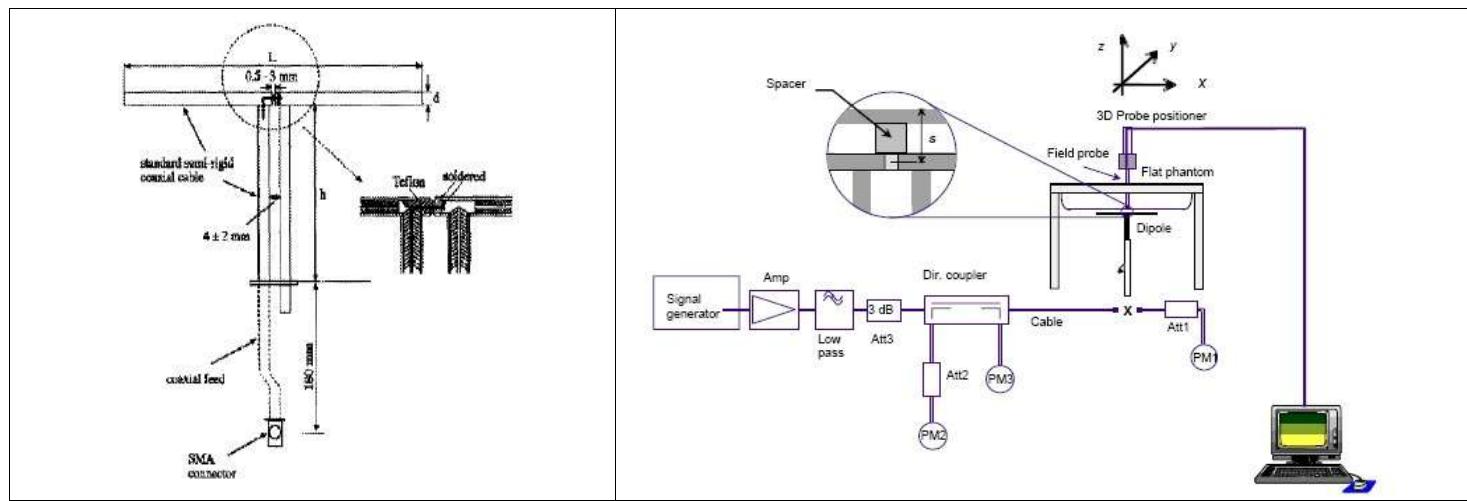
(ϵ_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m³)

5. SAR MEASUREMENT PROCEDURE

5.1. SAR System Validation Procedures

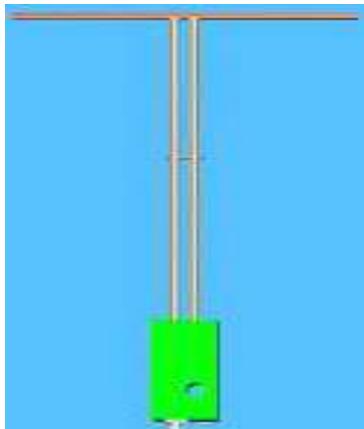
Each DASY5 system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY5 software, enable the user to conduct the system performance check and system validation. System kit includes a dipole, and dipole device holder.

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



5.2. SAR System Validation

5.2.1. Validation Dipoles



The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical Specifications for the dipoles.

| Frequency | L (mm) | h (mm) | d (mm) |
|-----------|--------|--------|--------|
| 900 MHz | 149.0 | 83.3 | 3.6 |
| 1900MHz | 68 | 39.5 | 3.6 |
| 2450MHz | 51.5 | 30.4 | 3.6 |

5.2.2. Validation Result

| System Performance Check at 835 MHz & 1900MHz for Head | | | | | | | | |
|---|--------------------|-------|---------------------------------|---------------|--------------------|------|-------------------|--------------|
| Validation Kit: SN 46/11DIP 0G900-185 & SN 46/11DIP 1G900-187 | | | | | | | | |
| Frequency [MHz] | Target Value(W/Kg) | | Reference Result ($\pm 10\%$) | | Tested Value(W/Kg) | | Tissue Temp. [°C] | Test time |
| | 1g | 10g | 1g | 10g | 1g | 10g | | |
| 835 | 10.70 | 6.72 | 9.63-11.77 | 6.048-7.392 | 10.3 | 6.5 | 21 | June 24,2014 |
| 1900 | 39.65 | 20.24 | 35.685-43.615 | 18.216-22.264 | 40.7 | 20.5 | 21 | June 24,2014 |

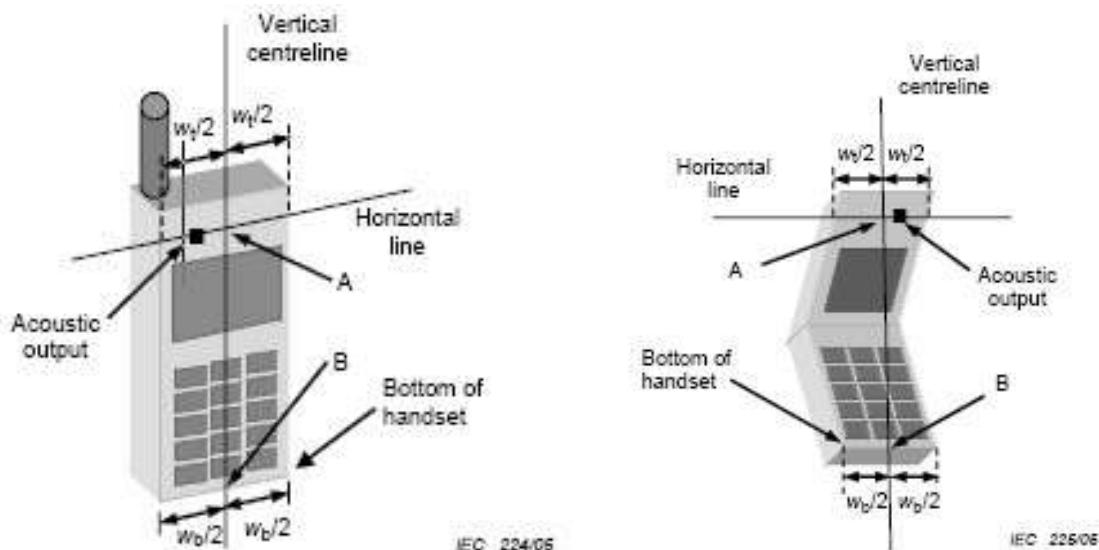
| System Performance Check at 835 MHz & 1900MHz & 2450MHz for Body | | | | | | | | |
|---|--------------------|-------|---------------------------------|---------------|--------------------|------|-------------------|--------------|
| Validation Kit: SN 46/11DIP 0G900-185 & SN 46/11DIP 1G900-187 & SN 46/11DIP 2G450-189 | | | | | | | | |
| Frequency [MHz] | Target Value(W/Kg) | | Reference Result ($\pm 10\%$) | | Tested Value(W/Kg) | | Tissue Temp. [°C] | Test time |
| | 1g | 10g | 1g | 10g | 1g | 10g | | |
| 835 | 11.27 | 7.18 | 10.143-12.397 | 6.462-7.898 | 10.8 | 6.7 | 21 | June 24,2014 |
| 1900 | 40.74 | 21.43 | 36.666-44.814 | 19.287-23.573 | 41.0 | 20.7 | 21 | June 24,2014 |
| 2450 | 54.19 | 24.96 | 48.771-59.609 | 22.464-27.456 | 52.0 | 23.4 | 21 | June 24,2014 |

6. EUT TEST POSITION

This EUT was tested in Right Cheek, Right Titled, Left Cheek, Left Titled, Front Face and Rear Face.

6.1. Define Two Imaginary Lines on the Handset

- (1)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 handset.
- (2)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.
- (3)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 to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



6.2. Cheek Position

- (1) 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 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.
- (2) 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 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



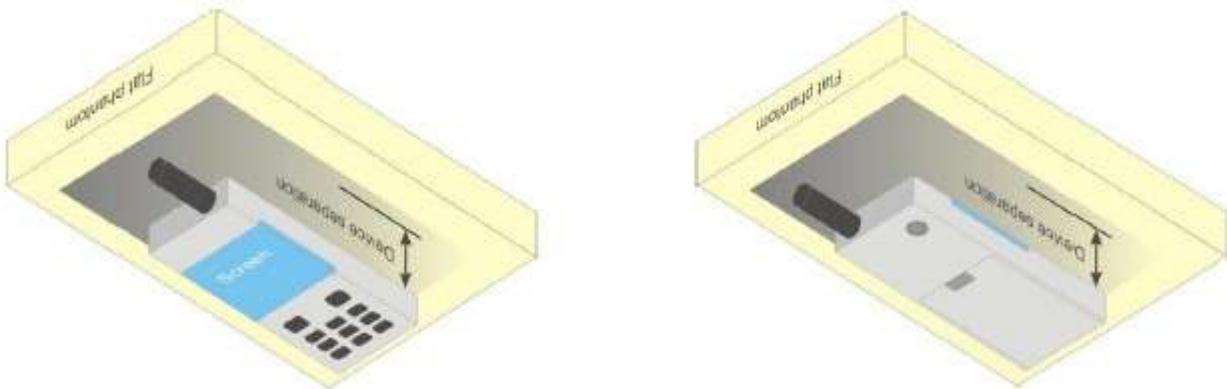
6.3. Title Position

- (1) To position the device in the "cheek" position described above.
- (2) While maintaining the device in 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 with the ear is lost.



6.4. Body Worn Position

- (1) To position the EUT parallel to the phantom surface.
- (2) To adjust the EUT parallel to the flat phantom.
- (3) To adjust the distance between the EUT surface and the flat phantom to **5mm**. (Hotspot mode the distance of **10mm**).



7. SAR EXPOSURE LIMITS

SAR assessments have been made in line with the requirements of IEEE-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1-1992 "Uncontrolled Environments" limits. These limits apply to a location which is deemed as "Uncontrolled Environment" which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

Limits for General Population/Uncontrolled Exposure (W/kg)

| Type Exposure | Uncontrolled Environment Limit |
|---|--------------------------------|
| Spatial Peak SAR (1g cube tissue for brain or body) | 1.60 W/kg |

8. TEST EQUIPMENT LIST

| Equipment description | Manufacturer/ Model | Identification No. | Current calibration date | Next calibration date |
|-------------------------------|------------------------|--------------------------|-----------------------------|--------------------------|
| Stäubli Robot | Stäubli-TX60 | F13/5Q2UD1/A/01 | N/A | N/A |
| Robot Controller | Stäubli-CS8 | 139522 | N/A | N/A |
| E-Field Probe | Speag-EX3DV4 | 3595 | 10/15/2013 | 10/14/2014 |
| SAM Twin Phantom | Speag-SAM | 1790 | N/A | N/A |
| Device Holder | Speag-SD 000 H01 KA | SD 000 H01 KA | N/A | N/A |
| DAE4 | Speag-SD 000 D04 BM | 1398 | 10/10/2013 | 10/09/2014 |
| SAR Software | Speag-DASY5 | DASY52.8 | N/A | N/A |
| Liquid | SATIMO | - | N/A | N/A |
| Radio Communication Tester | R&S-CMU200 | 069Y7-158-13-712 | 02/17/2014 | 02/16/2015 |
| Dipole | SATIMO SID900 | SN46/11 DIP 0G900-185 | 11/14/2013 | 11/13/2015 |
| Dipole | SATIMO SID1900 | SN46/11 DIP 1G900-187 | 11/14/2013 | 11/13/2015 |
| Dipole | SATIMO SID2450 | SN46/11 DIP 2G450-189 | 11/14/2013 | 11/13/2015 |
| Amplifier | Aethercomm | SN 046 | 12/08/2013 | 12/07/2014 |
| Signal Generator | Agilent-E4438C | MY44260051 | 02/23/2014 | 02/22/2015 |
| Power Probe | NRP-Z23 | US38261498 | 02/17/2014 | 02/16/2015 |
| SPECTRUM ANALYZER | Agilent- E4440A | MY44303916 | 10/22/2013 | 10/21/2014 |
| Power Attenuator | BED | DLA-5W | 07/30/2013 | 07/29/2014 |
| Network Analyzer | Rhode & Schwarz ZVA | SN100132 | 02/17/2014 | 02/16/2015 |

Note: Per KDB 865664 Dipole SAR Validation Verification, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

9. MEASUREMENT UNCERTAINTY

DAYS5 Uncertainty

Measurement uncertainty for 30 MHz to 6 GHz averaged over 1 gram / 10 gram.

| Error Description | Uncert. value | Prob. Dist. | Div. | (c_i) 1g | (c_i) 10g | Std. Unc. (1g) | Std. Unc. (10g) | (v_i) v_{eff} |
|---|---------------|-------------|------------|---------------|----------------|-------------------|--------------------|----------------------|
| Measurement System | | | | | | | | |
| Probe Calibration | ±6.55 % | N | 1 | 1 | 1 | ±6.55 % | ±6.55 % | ∞ |
| Axial Isotropy | ±4.7 % | R | $\sqrt{3}$ | 0.7 | 0.7 | ±1.9 % | ±1.9 % | ∞ |
| Hemispherical Isotropy | ±9.6 % | R | $\sqrt{3}$ | 0.7 | 0.7 | ±3.9 % | ±3.9 % | ∞ |
| Boundary Effects | ±2.0 % | R | $\sqrt{3}$ | 1 | 1 | ±1.2 % | ±1.2 % | ∞ |
| Linearity | ±4.7 % | R | $\sqrt{3}$ | 1 | 1 | ±2.7 % | ±2.7 % | ∞ |
| System Detection Limits | ±1.0 % | R | $\sqrt{3}$ | 1 | 1 | ±0.6 % | ±0.6 % | ∞ |
| Readout Electronics | ±0.3 % | N | 1 | 1 | 1 | ±0.3 % | ±0.3 % | ∞ |
| Response Time | ±0.8 % | R | $\sqrt{3}$ | 1 | 1 | ±0.5 % | ±0.5 % | ∞ |
| Integration Time | ±2.6 % | R | $\sqrt{3}$ | 1 | 1 | ±1.5 % | ±1.5 % | ∞ |
| RF Ambient Noise | ±3.0 % | R | $\sqrt{3}$ | 1 | 1 | ±1.7 % | ±1.7 % | ∞ |
| RF Ambient Reflections | ±3.0 % | R | $\sqrt{3}$ | 1 | 1 | ±1.7 % | ±1.7 % | ∞ |
| Probe Positioner | ±0.8 % | R | $\sqrt{3}$ | 1 | 1 | ±0.5 % | ±0.5 % | ∞ |
| Probe Positioning | ±6.7 % | R | $\sqrt{3}$ | 1 | 1 | ±3.9 % | ±3.9 % | ∞ |
| Max. SAR Eval. | ±4.0 % | R | $\sqrt{3}$ | 1 | 1 | ±2.3 % | ±2.3 % | ∞ |
| Test Sample Related | | | | | | | | |
| Device Positioning | ±2.9 % | N | 1 | 1 | 1 | ±2.9 % | ±2.9 % | 145 |
| Device Holder | ±3.6 % | N | 1 | 1 | 1 | ±3.6 % | ±3.6 % | 5 |
| Power Drift | ±5.0 % | R | $\sqrt{3}$ | 1 | 1 | ±2.9 % | ±2.9 % | ∞ |
| Phantom and Setup | | | | | | | | |
| Phantom Uncertainty | ±4.0 % | R | $\sqrt{3}$ | 1 | 1 | ±2.3 % | ±2.3 % | ∞ |
| Liquid Conductivity (target) | ±5.0 % | R | $\sqrt{3}$ | 0.64 | 0.43 | ±1.8 % | ±1.2 % | ∞ |
| Liquid Conductivity (mea.) ^{DAK} | ±2.5 % | R | $\sqrt{3}$ | 0.64 | 0.43 | ±0.9 % | ±0.6 % | ∞ |
| Liquid Permittivity (target) | ±5.0 % | R | $\sqrt{3}$ | 0.6 | 0.49 | ±1.7 % | ±1.4 % | ∞ |
| Liquid Permittivity (mea.) ^{DAK} | ±2.5 % | R | $\sqrt{3}$ | 0.6 | 0.49 | ±0.9 % | ±0.7 % | ∞ |
| Combined Std. Uncertainty | | | | | | ±12.0 % | ±11.8 % | 330 |
| Expanded STD Uncertainty | | | | | | ±24.0 % | ±23.7 % | |

10. CONDUCTED POWER MEASUREMENT

GSM BAND

| Mode | Frequency(MHz) | Avg. Burst Power(dBm) | Duty cycle Factor(dBm) | Frame Power(dBm) |
|-----------------------|----------------|-----------------------|------------------------|------------------|
| Maximum Power <1> | | | | |
| GSM 835 | 824.2 | 31.78 | -9 | 22.78 |
| | 836.6 | 31.69 | -9 | 22.69 |
| | 848.8 | 31.66 | -9 | 22.66 |
| GPRS 835 (1 Slot) | 824.2 | 31.64 | -9 | 22.64 |
| | 836.6 | 31.56 | -9 | 22.56 |
| | 848.8 | 31.42 | -9 | 22.42 |
| GPRS 835 (2 Slot) | 824.2 | 28.82 | -6 | 22.82 |
| | 836.6 | 28.68 | -6 | 22.68 |
| | 848.8 | 28.51 | -6 | 22.51 |
| GPRS 835 (3 Slot) | 824.2 | 26.63 | -4.26 | 22.37 |
| | 836.6 | 26.61 | -4.26 | 22.35 |
| | 848.8 | 26.52 | -4.26 | 22.26 |
| GPRS 835 (4 Slot) | 824.2 | 25.69 | -3 | 22.69 |
| | 836.6 | 25.53 | -3 | 22.53 |
| | 848.8 | 25.43 | -3 | 22.43 |
| PCS 1900 | 1850.2 | 28.73 | -9 | 19.73 |
| | 1880 | 28.67 | -9 | 19.67 |
| | 1909.8 | 28.65 | -9 | 19.65 |
| GPRS 1900 (1 Slot) | 1850.2 | 28.64 | -9 | 19.64 |
| | 1880 | 28.57 | -9 | 19.57 |
| | 1909.8 | 28.48 | -9 | 19.48 |
| GPRS 1900 (2 Slot) | 1850.2 | 25.69 | -6 | 19.69 |
| | 1880 | 25.58 | -6 | 19.58 |
| | 1909.8 | 25.47 | -6 | 19.47 |
| GPRS 1900 (3 Slot) | 1850.2 | 23.98 | -4.26 | 19.72 |
| | 1880 | 23.95 | -4.26 | 19.69 |
| | 1909.8 | 23.86 | -4.26 | 19.6 |
| GPRS 1900 (4 Slot) | 1850.2 | 22.76 | -3 | 19.76 |
| | 1880 | 22.71 | -3 | 19.71 |
| | 1909.8 | 22.64 | -3 | 19.64 |

Note 1:

The Frame Power (Source-based time-averaged Power) is scaled the maximum burst average power based on time slots. The calculated methods are show as following:

Frame Power = Max burst power (1 Up Slot) - 9 dB

Frame Power = Max burst power (2 Up Slot) - 6 dB

Frame Power = Max burst power (3 Up Slot) - 4.26 dB

Frame Power = Max burst power (4 Up Slot) - 3 dB

UMTS BAND II

| Mode | Frequency (MHz) | Avg. Burst Power (dBm) |
|-----------------|-----------------|------------------------|
| WCDMA 1900 RMC | 1852.4 | 22.98 |
| | 1880 | 22.83 |
| | 1907.6 | 22.81 |
| WCDMA 1900 AMR | 1852.4 | 22.19 |
| | 1880 | 22.15 |
| | 1907.6 | 22.11 |
| HSDPA Subtest 1 | 1852.4 | 22.18 |
| | 1880 | 22.15 |
| | 1907.6 | 22.09 |
| HSDPA Subtest 2 | 1852.4 | 22.12 |
| | 1880 | 22.09 |
| | 1907.6 | 22.06 |
| HSDPA Subtest 3 | 1852.4 | 22.16 |
| | 1880 | 22.13 |
| | 1907.6 | 22.09 |
| HSDPA Subtest 4 | 1852.4 | 22.36 |
| | 1880 | 22.23 |
| | 1907.6 | 22.23 |
| HSUPA Subtest 1 | 1852.4 | 22.21 |
| | 1880 | 22.12 |
| | 1907.6 | 22.08 |
| HSUPA Subtest 2 | 1852.4 | 22.25 |
| | 1880 | 22.17 |
| | 1907.6 | 22.15 |
| HSUPA Subtest 3 | 1852.4 | 22.29 |
| | 1880 | 22.16 |
| | 1907.6 | 22.07 |
| HSUPA Subtest 4 | 1852.4 | 22.16 |
| | 1880 | 22.12 |
| | 1907.6 | 22.11 |
| HSUPA Subtest 5 | 1852.4 | 22.29 |
| | 1880 | 22.16 |
| | 1907.6 | 22.13 |

UMTS BAND V

| Mode | Frequency (MHz) | Avg. Burst Power (dBm) |
|--------------------|-----------------|------------------------|
| WCDMA 835 RMC | 826.4 | 22.88 |
| | 836.6 | 22.87 |
| | 846.6 | 22.73 |
| WCDMA 835 AMR | 826.4 | 22.33 |
| | 836.6 | 22.25 |
| | 846.6 | 22.23 |
| HSDPA Subtest 1 | 826.4 | 22.21 |
| | 836.6 | 22.16 |
| | 846.6 | 22.14 |
| HSDPA Subtest 2 | 826.4 | 22.26 |
| | 836.6 | 22.18 |
| | 846.6 | 22.14 |
| HSDPA Subtest 3 | 826.4 | 22.33 |
| | 836.6 | 22.25 |
| | 846.6 | 22.18 |
| HSDPA Subtest 4 | 826.4 | 22.29 |
| | 836.6 | 22.14 |
| | 846.6 | 22.12 |
| HSUPA Subtest 1 | 826.4 | 22.18 |
| | 836.6 | 22.14 |
| | 846.6 | 22.11 |
| HSUPA Subtest 2 | 826.4 | 22.13 |
| | 836.6 | 22.08 |
| | 846.6 | 22.05 |
| HSUPA Subtest 3 | 826.4 | 22.19 |
| | 836.6 | 22.13 |
| | 846.6 | 22.06 |
| HSUPA Subtest 4 | 826.4 | 22.21 |
| | 836.6 | 22.15 |
| | 846.6 | 22.08 |
| HSUPA Subtest 5 | 826.4 | 22.36 |
| | 836.6 | 22.14 |
| | 846.6 | 22.07 |

WIFI

| Mode | Data Rate (Mbps) | Channel | Frequency(MHz) | Avg. Burst Power (dBm) |
|-------------|------------------|---------|----------------|------------------------|
| 802.11b | 1 | 01 | 2412 | 8 |
| | | 06 | 2437 | 8.55 |
| | | 11 | 2462 | 7.95 |
| 802.11g | 6 | 01 | 2412 | 2.94 |
| | | 06 | 2437 | 4.82 |
| | | 11 | 2462 | 4.77 |
| 802.11n(20) | 6.5 | 01 | 2412 | 3.89 |
| | | 06 | 2437 | 4.83 |
| | | 11 | 2462 | 4.82 |
| 802.11n(40) | 13.5 | 03 | 2422 | 2.17 |
| | | 06 | 2437 | 4.43 |
| | | 09 | 2452 | 1.27 |

Bluetooth

| Modulation | Channel | Frequency(MHz) | Average Power (dBm) |
|----------------|---------|----------------|---------------------|
| GFSK | 0 | 2402 | -4 |
| | 39 | 2441 | -2.65 |
| | 78 | 2480 | -2.18 |
| $\pi/4$ -DQPSK | 0 | 2402 | -4.73 |
| | 39 | 2441 | -3.51 |
| | 78 | 2480 | -3.13 |
| 8-DPSK | 0 | 2402 | -4.73 |
| | 39 | 2441 | -3.51 |
| | 78 | 2480 | -3.05 |

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

| UE Transmit Channel Configuration | CM(db) | MPR(db) |
|--|-----------|-------------|
| For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH | 0≤ CM≤3.5 | MAX(CM-1,0) |

Note: CM=1 for $\beta_c/\beta_d=12/15$, $\beta_{hs}/\beta_c=24/15$.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensation for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

11. TEST RESULTS

11.1. SAR Test Results Summary

11.1.1. Test position and configuration

Head SAR was performed with the device configured in the positions according to IEEE1528, and Body SAR was performed with the device 5mm from the phantom; Body SAR was also performed with the headset attached and without. The overall device length and width(11.6cm×6.1cm) are $>9\text{cm} \times 5\text{cm}$, Hotspot mode with a test separation distance of 10mm.

11.1.2. Operation Mode

- According to KDB 447498 D01 v05r01 ,for each exposure position, if the highest 1-g SAR is $\leq 0.8 \text{ W/kg}$, testing for low and high channel is optional.
- Per KDB 865664 D01 v01r01,for each frequency band, if the measured SAR is $\geq 0.8\text{W/Kg}$, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
 - (1) When the original highest measured SAR is $\geq 0.8\text{W/Kg}$, repeat that measurement once.
 - (2) Perform a second repeated measurement only 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 $\geq 1.45 \text{ W/Kg}$.
 - (3) Perform a third repeated measurement only if the original, first and second repeated measurement is $\geq 1.5 \text{ W/Kg}$ and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20 .
- Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call mode is selected to be test.
- According to KDB 648474 D04 v01r01,when the reported SAR for a body-worn accessory measured without a headset connected to the handset is $\leq 1.2\text{W/Kg}$, SAR testing with a headset connected is not required.
- According to 941225 D06, when the overall device length and width are $>9\text{cm} \times 5\text{cm}$, Hotspot mode with a test separation distance of 10mm. For device with form factors smaller than $9\text{cm} \times 5\text{cm}$, Hotspot mode with a test separation distance of 5mm. Body SAR was also performed with the headset attached and without.
- Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows: Maximum Scaling SAR =tested SAR (Max.) $\times [\text{maximum turn-up power (mw)} / \text{maximum measurement output power(mw)}]$

11.1.3. SAR Test Results Summary

| SAR MEASUREMENT | | | | | | | | | | | | | | | |
|--|-------|-----|-----------|---------------------------|-----------------|--------------------------|--------------------------|-------------------|------------|--|--|--|--|--|--|
| Ambient Temperature (°C) : 21 ± 2 | | | | Relative Humidity (%): 55 | | | | | | | | | | | |
| Liquid Temperature (°C) : 21 ± 2 | | | | Depth of Liquid (cm):>15 | | | | | | | | | | | |
| Product: mobile phone | | | | | | | | | | | | | | | |
| Test Mode: GSM835 with GMSK modulation | | | | | | | | | | | | | | | |
| Position | Mode | Ch. | Fr. (MHz) | Power Drift (<±0.2) | SAR (1g) (W/kg) | Max. Turn-up Power (dBm) | Meas. output Power (dBm) | Scaled SAR (W/Kg) | Limit W/kg | | | | | | |
| SIM 1 Card | | | | | | | | | | | | | | | |
| Left Cheek | voice | 190 | 836.6 | 0.12 | 0.379 | 32.69 | 31.69 | 0.477 | 1.6 | | | | | | |
| Left Tilt | voice | 190 | 836.6 | 0.10 | 0.172 | 32.69 | 31.69 | 0.217 | 1.6 | | | | | | |
| Right Cheek | voice | 190 | 836.6 | 0.14 | 0.363 | 32.69 | 31.69 | 0.457 | 1.6 | | | | | | |
| Right Tilt | voice | 190 | 836.6 | 0.16 | 0.150 | 32.69 | 31.69 | 0.189 | 1.6 | | | | | | |
| Body back | voice | 190 | 836.6 | 0.04 | 0.677 | 32.69 | 31.69 | 0.852 | 1.6 | | | | | | |
| Body front | voice | 190 | 836.6 | -0.12 | 0.571 | 32.69 | 31.69 | 0.719 | 1.6 | | | | | | |
| SIM 2 Card | | | | | | | | | | | | | | | |
| Left Cheek | voice | 190 | 836.6 | 0.01 | 0.324 | 32.69 | 31.69 | 0.408 | 1.6 | | | | | | |

Note:

- The test separation of all above table for body part is 5mm.

| SAR MEASUREMENT | | | | | | | | | | | | | | | |
|---|-------|-----|-----------|---------------------------|-----------------|--------------------------|--------------------------|-------------------|------------|--|--|--|--|--|--|
| Ambient Temperature (°C) : 21 ± 2 | | | | Relative Humidity (%): 55 | | | | | | | | | | | |
| Liquid Temperature (°C) : 21 ± 2 | | | | Depth of Liquid (cm):>15 | | | | | | | | | | | |
| Product: mobile phone | | | | | | | | | | | | | | | |
| Test Mode: GSM1900 with GMSK modulation | | | | | | | | | | | | | | | |
| Position | Mode | Ch. | Fr. (MHz) | Power Drift (<±0.2) | SAR (1g) (W/kg) | Max. Turn-up Power (dBm) | Meas. output Power (dBm) | Scaled SAR (W/Kg) | Limit W/kg | | | | | | |
| SIM 1 Card | | | | | | | | | | | | | | | |
| Left Cheek | voice | 661 | 1880.0 | 0.18 | 0.305 | 29.67 | 28.67 | 0.384 | 1.6 | | | | | | |
| Left Tilt | voice | 661 | 1880.0 | -0.00 | 0.090 | 29.67 | 28.67 | 0.113 | 1.6 | | | | | | |
| Right Cheek | voice | 661 | 1880.0 | 0.19 | 0.241 | 29.67 | 28.67 | 0.303 | 1.6 | | | | | | |
| Right Tilt | voice | 661 | 1880.0 | 0.16 | 0.085 | 29.67 | 28.67 | 0.107 | 1.6 | | | | | | |
| Body back | voice | 661 | 1880.0 | 0.11 | 0.526 | 29.67 | 28.67 | 0.662 | 1.6 | | | | | | |
| Body front | voice | 661 | 1880.0 | 0.08 | 0.466 | 29.67 | 28.67 | 0.587 | 1.6 | | | | | | |
| SIM 2 Card | | | | | | | | | | | | | | | |
| Left Cheek | voice | 661 | 1880.0 | 0.09 | 0.283 | 29.67 | 28.67 | 0.356 | 1.6 | | | | | | |

Note:

- The test separation of all above table for body part is 5mm.

| SAR MEASUREMENT | | | | | | | | | | | | | | | |
|---|--------------|------|--------------|----------------------------------|-----------------------|-----------------------------------|-----------------------------------|-------------------------|---------------|--|--|--|--|--|--|
| Ambient Temperature (°C) : 21 ± 2 | | | | Relative Humidity (%): 55 | | | | | | | | | | | |
| Liquid Temperature (°C) : 21 ± 2 | | | | Depth of Liquid (cm):>15 | | | | | | | | | | | |
| Product: mobile phone | | | | | | | | | | | | | | | |
| Test Mode: WCDMA Band II with QPSK modulation | | | | | | | | | | | | | | | |
| Position | Mode | Ch. | Fr. (MHz) | Power Drift ($<\pm 0.2$) | SAR (1g) (W/kg) | Max. Turn-up Power (dBm) | Meas. output Power (dBm) | Scaled SAR (W/Kg) | Limit W/kg | | | | | | |
| SIM 1 Card | | | | | | | | | | | | | | | |
| Left Cheek | RMC 12.2kbps | 9400 | 1880 | -0.17 | 0.664 | 23.50 | 22.83 | 0.775 | 1.6 | | | | | | |
| Left Tilt | RMC 12.2kbps | 9400 | 1880 | 0.11 | 0.223 | 23.50 | 22.83 | 0.260 | 1.6 | | | | | | |
| Right Cheek | RMC 12.2kbps | 9400 | 1880 | 0.12 | 0.577 | 23.50 | 22.83 | 0.673 | 1.6 | | | | | | |
| Right Tilt | RMC 12.2kbps | 9400 | 1880 | 0.12 | 0.243 | 23.50 | 22.83 | 0.284 | 1.6 | | | | | | |
| Body back | RMC 12.2kbps | 9400 | 1880 | 0.19 | 0.768 | 23.50 | 22.83 | 0.896 | 1.6 | | | | | | |
| Body front | RMC 12.2kbps | 9400 | 1880 | 0.04 | 0.599 | 23.50 | 22.83 | 0.699 | 1.6 | | | | | | |

Note:

- The test separation of all above table for body part is 5mm.

| SAR MEASUREMENT | | | | | | | | | | | | | | | |
|--|--------------|------|--------------|----------------------------------|-----------------------|-----------------------------------|-----------------------------------|-------------------------|---------------|--|--|--|--|--|--|
| Ambient Temperature (°C) : 21 ± 2 | | | | Relative Humidity (%): 55 | | | | | | | | | | | |
| Liquid Temperature (°C) : 21 ± 2 | | | | Depth of Liquid (cm):>15 | | | | | | | | | | | |
| Product: mobile phone | | | | | | | | | | | | | | | |
| Test Mode: WCDMA Band V with QPSK modulation | | | | | | | | | | | | | | | |
| Position | Mode | Ch. | Fr. (MHz) | Power Drift ($<\pm 0.2$) | SAR (1g) (W/kg) | Max. Turn-up Power (dBm) | Meas. output Power (dBm) | Scaled SAR (W/Kg) | Limit W/kg | | | | | | |
| SIM 1 Card | | | | | | | | | | | | | | | |
| Left Cheek | RMC 12.2kbps | 4182 | 836.6 | 0.19 | 0.371 | 23.50 | 22.87 | 0.429 | 1.6 | | | | | | |
| Left Tilt | RMC 12.2kbps | 4182 | 836.6 | 0.11 | 0.185 | 23.50 | 22.87 | 0.214 | 1.6 | | | | | | |
| Right Cheek | RMC 12.2kbps | 4182 | 836.6 | 0.06 | 0.454 | 23.50 | 22.87 | 0.525 | 1.6 | | | | | | |
| Right Tilt | RMC 12.2kbps | 4182 | 836.6 | 0.13 | 0.190 | 23.50 | 22.87 | 0.220 | 1.6 | | | | | | |
| Body back | RMC 12.2kbps | 4182 | 836.6 | -0.03 | 0.776 | 23.50 | 22.87 | 0.897 | 1.6 | | | | | | |
| Body front | RMC 12.2kbps | 4182 | 836.6 | -0.14 | 0.655 | 23.50 | 22.87 | 0.757 | 1.6 | | | | | | |

Note:

- The test separation of all above table for body part is 5mm.

| SAR MEASUREMENT | | | | | | | | | | | | | | | | |
|-----------------------------------|------|-----|---------------------------|----------------------------------|-----------------------|-----------------------------------|-----------------------------------|-------------------------|---------------|--|--|--|--|--|--|--|
| Ambient Temperature (°C) : 21 ± 2 | | | Relative Humidity (%): 55 | | | | | | | | | | | | | |
| Liquid Temperature (°C) : 21 ± 2 | | | Depth of Liquid (cm):>15 | | | | | | | | | | | | | |
| Product: mobile phone | | | | | | | | | | | | | | | | |
| Test Mode: Hotspot | | | | | | | | | | | | | | | | |
| Position | Mode | Ch. | Fr. (MHz) | Power Drift ($<\pm 0.2$) | SAR (1g) (W/kg) | Max. Turn-up Power (dBm) | Meas. output Power (dBm) | Scaled SAR (W/Kg) | Limit W/kg | | | | | | | |
| Body back | DTS | 6 | 2437 | 0.11 | 0.542 | 9.0 | 8.55 | 0.601 | 1.6 | | | | | | | |
| Body front | DTS | 6 | 2437 | -0.02 | 0.430 | 9.0 | 8.55 | 0.477 | 1.6 | | | | | | | |

Note:

- According to KDB248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels.
- All of above "DTS" means data transmitters.
- The test separation of all above table for body part is 10mm.

**Simultaneous Multi-band Transmission Evaluation:
Application Simultaneous Transmission information:**

| Position | Simultaneous state |
|----------|------------------------------------|
| Head | 1.WWAN(voice)+WLAN 2.4GHz band |
| | 2.WWAN(voice)+Bluetooth |
| | 3.WWAN(voice)+ HOTSPOT 2.4GHz band |
| Body | 4. WWAN(voice)+WLAN 2.4GHz band |
| | 5. WWAN(voice)+Bluetooth |
| | 6.WWAN(voice)+ HOTSPOT 2.4GHz band |

NOTE:

1. WLAN and BT share the same antenna, and cannot transmit simultaneously.
2. Simultaneous with every transmitter must be the same test position.
3. Based upon KDB 447498 D01 v05, BT SAR is excluded as below table.
4. Based upon KDB 447498 D01 v05, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user; which is 0mm for head SAR AND 5mm for body-worn SAR.
5. If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.
6. For minimum test separation distance \leq 50mm, Bluetooth standalone SAR is excluded according to $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot (\text{f (GHz) /x})] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
7. KDB 447498 / 4.3.2 (2) when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
 - a) $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot (\text{f (GHz) /x}) \text{ W/kg}$ for test separation distances \leq 50 mm;
Where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
 - b) 0.4W/Kg for 1-g SAR and 1.0W/Kg for 10-g SAR, when the separation distance is $>$ 50mm.

| | | Maximum Average Power | | Antenna to user (mm) | SAR exclusion threshold (mW) | SAR testing required (Yes/No) | Head (0mm gap) | Body (5mm gap) |
|------|------|-----------------------|-------|----------------------|------------------------------|-------------------------------|----------------|----------------|
| | | dBm | mW | | | | | |
| BT | Head | -1.18 | 0.762 | 5 | 10 | NO | 0.032 W/kg | 0.032 W/kg |
| | Body | | | 5 | 10 | NO | | |
| WIFI | Head | 9.0 | 7.943 | 5 | 10 | NO | 0.331 W/kg | 0.331 W/kg |
| | Body | | | 5 | 10 | NO | | |

Maximum test results (WWAN) with BT and WIFI SAR:

BT: Head (0 cm gap): 0.032 W/kg and Body (0.5 cm gap): 0.032 W/kg

WIFI: Head (0 cm gap): 0.331 W/kg and Body (0.5 cm gap): 0.331 W/kg

WIFI

| Position | Max. WWAN SAR (W/Kg) | WLAN SAR (W/Kg) | SAR Summation | Limit (W/kg) | SPLSR ≤ 0.04 (Yes/No) |
|---------------------------------|----------------------|-----------------|---------------|--------------|----------------------------|
| GSM850+WLAN 2.4G-DTS | | | | | |
| Left Cheek | 0.477 | 0.331 | 0.808 | 1.6 | No |
| Left Tilt | 0.217 | 0.331 | 0.547 | 1.6 | No |
| Right Cheek | 0.457 | 0.331 | 0.788 | 1.6 | No |
| Right Tilt | 0.189 | 0.331 | 0.520 | 1.6 | No |
| Body back | 0.852 | 0.331 | 1.183 | 1.6 | No |
| Body front | 0.719 | 0.331 | 1.050 | 1.6 | No |
| PCS1900+WLAN 2.4G-DTS | | | | | |
| Left Cheek | 0.384 | 0.331 | 0.715 | 1.6 | No |
| Left Tilt | 0.113 | 0.331 | 0.444 | 1.6 | No |
| Right Cheek | 0.303 | 0.331 | 0.634 | 1.6 | No |
| Right Tilt | 0.107 | 0.331 | 0.438 | 1.6 | No |
| Body back | 0.662 | 0.331 | 0.993 | 1.6 | No |
| Body front | 0.587 | 0.331 | 0.917 | 1.6 | No |
| WCDMA 850+ WLAN 2.4G-DTS | | | | | |
| Left Cheek | 0.775 | 0.331 | 1.105 | 1.6 | No |
| Left Tilt | 0.260 | 0.331 | 0.591 | 1.6 | No |
| Right Cheek | 0.673 | 0.331 | 1.004 | 1.6 | No |
| Right Tilt | 0.284 | 0.331 | 0.614 | 1.6 | No |
| Body back | 0.896 | 0.331 | 1.227 | 1.6 | No |
| Body front | 0.699 | 0.331 | 1.030 | 1.6 | No |
| WCDMA1900+ WLAN 2.4G-DTS | | | | | |
| Left Cheek | 0.429 | 0.331 | 0.760 | 1.6 | No |
| Left Tilt | 0.214 | 0.331 | 0.545 | 1.6 | No |
| Right Cheek | 0.525 | 0.331 | 0.856 | 1.6 | No |
| Right Tilt | 0.220 | 0.331 | 0.550 | 1.6 | No |
| Body back | 0.897 | 0.331 | 1.228 | 1.6 | No |
| Body front | 0.757 | 0.331 | 1.088 | 1.6 | No |

Hotspot

| Position | Max. WWAN SAR (W/Kg) | Hotspot SAR (W/Kg) | SAR Summation | Limit (W/kg) | SPLSR ≤ 0.04 (Yes/No) |
|---------------------------|----------------------|--------------------|---------------|--------------|----------------------------|
| GSM850+ Hotspot | | | | | |
| Body back | 0.852 | 0.601 | 1.453 | 1.6 | No |
| Body front | 0.719 | 0.477 | 1.196 | 1.6 | No |
| PCS1900+Hotspot | | | | | |
| Body back | 0.662 | 0.601 | 1.263 | 1.6 | No |
| Body front | 0.587 | 0.477 | 1.064 | 1.6 | No |
| WCDMA 850+ Hotspot | | | | | |
| Body back | 0.896 | 0.601 | 1.497 | 1.6 | No |
| Body front | 0.699 | 0.477 | 1.176 | 1.6 | No |
| WCDMA1900+ Hotspot | | | | | |
| Body back | 0.897 | 0.601 | 1.498 | 1.6 | No |
| Body front | 0.757 | 0.477 | 1.234 | 1.6 | No |

| BT | | | | | |
|---------------------|----------------------|---------------|---------------|--------------|----------------------------|
| Position | Max. WWAN SAR (W/Kg) | BT SAR (W/Kg) | SAR Summation | Limit (W/kg) | SPLSR ≤ 0.04 (Yes/No) |
| GSM850+BT | | | | | |
| Left Cheek | 0.477 | 0.032 | 0.509 | 1.6 | No |
| Left Tilt | 0.217 | 0.032 | 0.249 | 1.6 | No |
| Right Cheek | 0.457 | 0.032 | 0.489 | 1.6 | No |
| Right Tilt | 0.189 | 0.032 | 0.221 | 1.6 | No |
| Body back | 0.852 | 0.032 | 0.884 | 1.6 | No |
| Body front | 0.719 | 0.032 | 0.751 | 1.6 | No |
| PCS1900+BT | | | | | |
| Left Cheek | 0.384 | 0.032 | 0.416 | 1.6 | No |
| Left Tilt | 0.113 | 0.032 | 0.145 | 1.6 | No |
| Right Cheek | 0.303 | 0.032 | 0.335 | 1.6 | No |
| Right Tilt | 0.107 | 0.032 | 0.139 | 1.6 | No |
| Body back | 0.662 | 0.032 | 0.694 | 1.6 | No |
| Body front | 0.587 | 0.032 | 0.619 | 1.6 | No |
| WCDMA 850+BT | | | | | |
| Left Cheek | 0.775 | 0.032 | 0.807 | 1.6 | No |
| Left Tilt | 0.260 | 0.032 | 0.292 | 1.6 | No |
| Right Cheek | 0.673 | 0.032 | 0.705 | 1.6 | No |
| Right Tilt | 0.284 | 0.032 | 0.316 | 1.6 | No |
| Body back | 0.896 | 0.032 | 0.928 | 1.6 | No |
| Body front | 0.699 | 0.032 | 0.731 | 1.6 | No |
| WCDMA1900+BT | | | | | |
| Left Cheek | 0.429 | 0.032 | 0.461 | 1.6 | No |
| Left Tilt | 0.214 | 0.032 | 0.246 | 1.6 | No |
| Right Cheek | 0.525 | 0.032 | 0.557 | 1.6 | No |
| Right Tilt | 0.220 | 0.032 | 0.252 | 1.6 | No |
| Body back | 0.897 | 0.032 | 0.929 | 1.6 | No |
| Body front | 0.757 | 0.032 | 0.789 | 1.6 | No |

APPENDIX A. SAR SYSTEM VALIDATION DATA

Test Laboratory: AGC Lab

System Check Head 835 MHz

DUT: Dipole 900 MHz Type: SID 900

Date: June 24, 2014

Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1;
Frequency: 835 MHz; Medium parameters used: $f = 835$ MHz; $\sigma = 0.88$ mho/m; $\epsilon_r = 41.58$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (°C): 21, Liquid temperature (°C): 21

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.72, 9.72, 9.72); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/System Check GSM850 Head/Area Scan (81x161x1): Measurement grid: $dx=1.000$ mm, $dy=1.000$ mm,

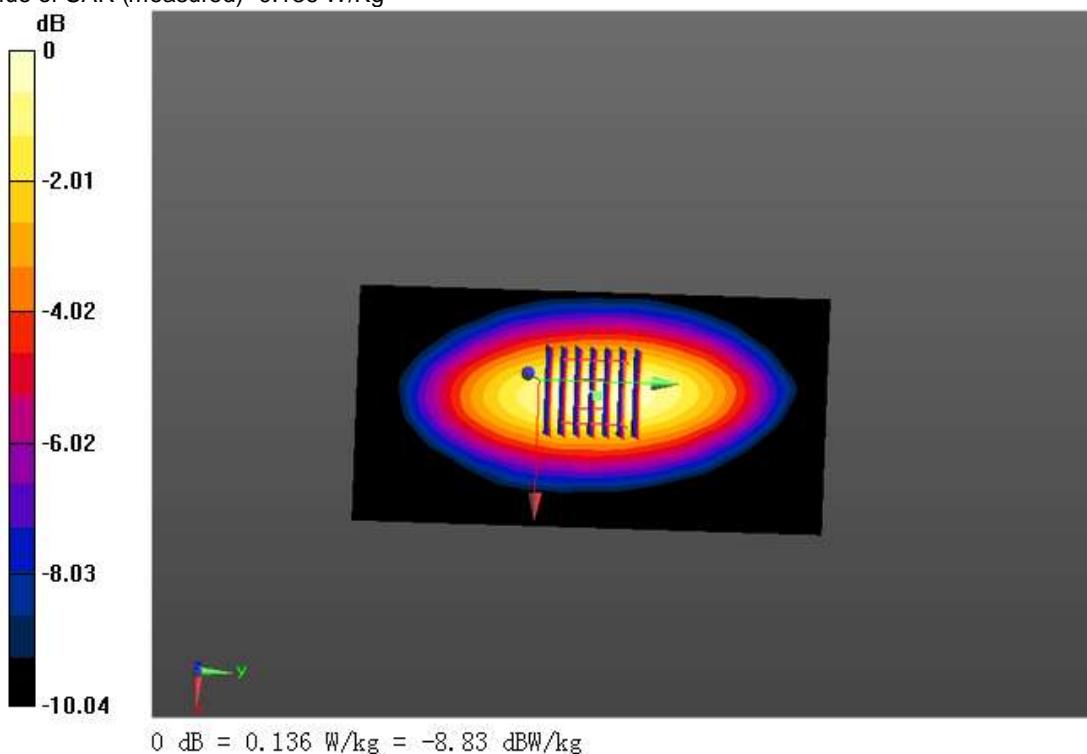
Maximum value of SAR (measured)=0.137 W/Kg

Configuration/System Check GSM850 Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy = 5$ mm, $dz=5$ mm,
Reference Value=11.046 V/m; Power Drift=0.02 dB

Peak SAR (extrapolated) =0.155 W/kg

SAR (1g) =0.103 W/Kg; SAR (10g) =0.065 W/Kg

Maximum value of SAR (measured)=0.136 W/Kg



Test Laboratory: AGC Lab
System Check Body 835 MHz
DUT: Dipole 900 MHz Type: SID 900

Date: June 24,2014

Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1;
Frequency: 835 MHz; Medium parameters used: $f = 835$ MHz; $\sigma=0.98$ mho/m; $\epsilon_r = 54.87$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (°C): 21, Liquid temperature (°C): 21

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.91, 9.91, 9.91); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

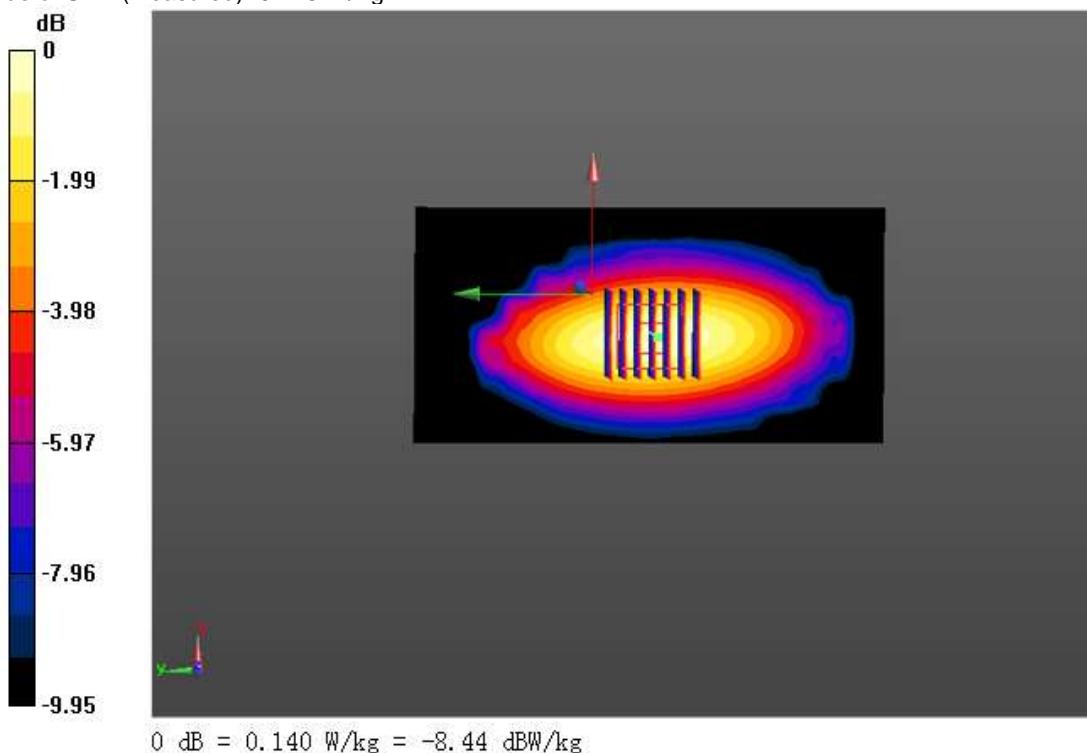
Configuration/System Check GSM850 Body/Area Scan (81x161x1): Measurement grid: $dx=1.000$ mm, $dy=1.000$ mm,
Maximum value of SAR (measured)=0.150 W/Kg

Configuration/System Check GSM850 Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy = 5$ mm, $dz=5$ mm,
Reference Value=11.975 V/m; Power Drift=0.04 dB

Peak SAR (extrapolated) =0.160 W/kg

SAR (1g) =0.108 W/Kg; SAR (10g) =0.067 W/Kg

Maximum value of SAR (measured)=0.140 W/Kg



Test Laboratory: AGC Lab
System Check Head 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900

Date: June 24,2014

Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1;
Frequency: 1900 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma=1.40$ mho/m; $\epsilon_r =39.62$; $\rho= 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (°C): 21, Liquid temperature (°C): 21

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(8.17,8.17,8.17); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

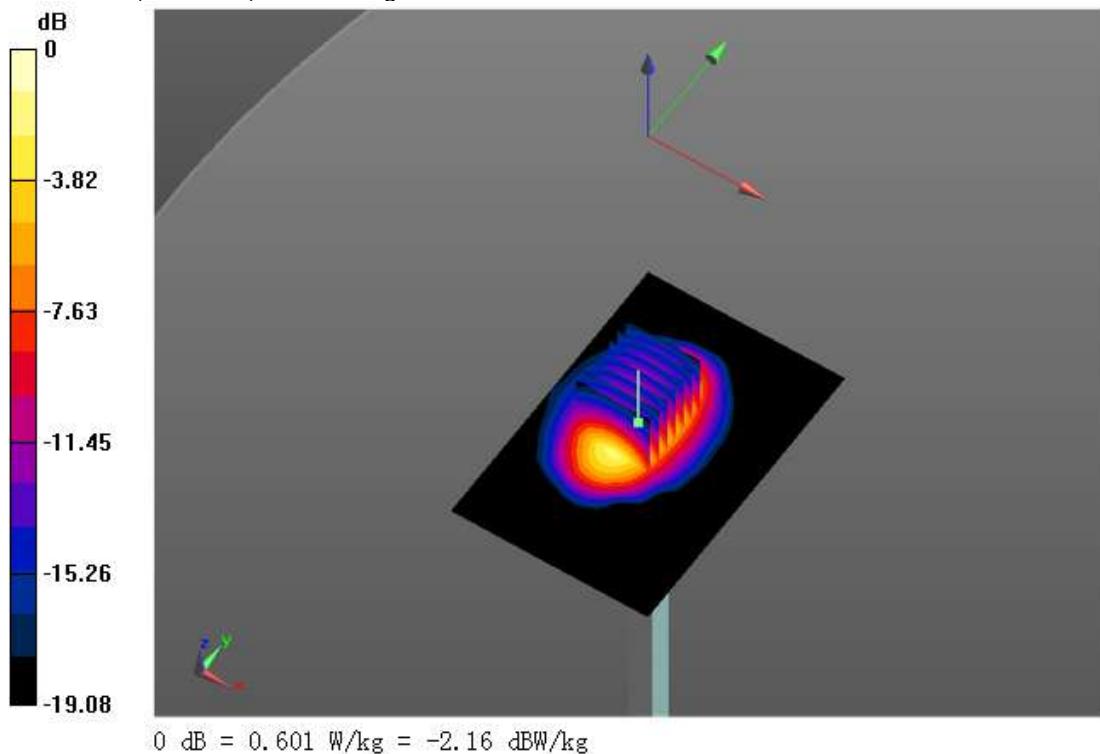
Configuration/System Check PCS 1900 Head/Area Scan (81x121x1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.611 W/Kg

Configuration/System Check PCS1900 Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=14.713 V/m; Power Drift=0.01 dB

Peak SAR (extrapolated) =0.762 W/kg

SAR (1g) =0.407 W/Kg; SAR (10g) =0.205 W/Kg

Maximum value of SAR (measured)=0.601 W/Kg



Test Laboratory: AGC Lab
System Check Body 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900

Date: June 24,2014

Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1;
Frequency: 1900 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma=1.49$ mho/m; $\epsilon_r =53.66$; $\rho= 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (°C): 21, Liquid temperature (°C): 21

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(7.80,7.80,7.80); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

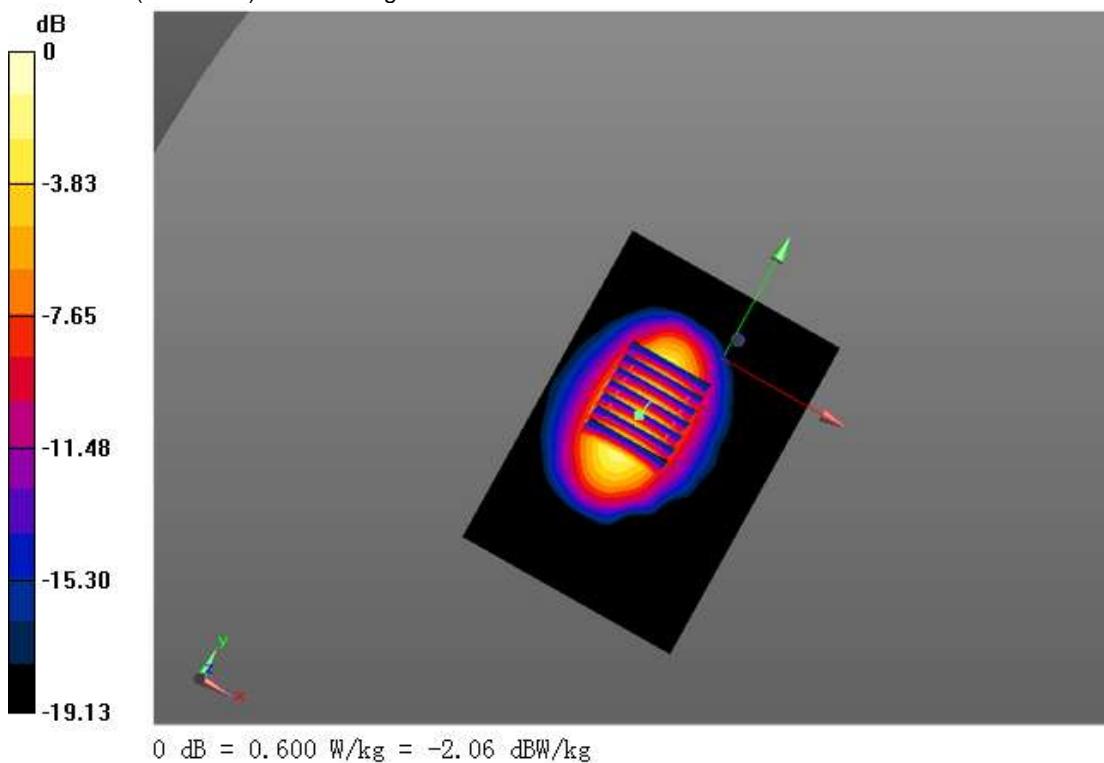
Configuration/System Check PCS1900 Body/Area Scan (81x121x1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.611 W/Kg

Configuration/System Check PCS1900 Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=13.420 V/m; Power Drift=-0.07dB

Peak SAR (extrapolated) =0.798 W/kg

SAR (1g) =0.410 W/Kg; SAR (10g) =0.207 W/Kg

Maximum value of SAR (measured)=0.600 W/Kg



Test Laboratory: AGC Lab
System Check Body 2450 MHz
DUT: Dipole 2450 MHz Type: SID 2450

Date: June 24,2014

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1;
Frequency: 2450 MHz; Medium parameters used: $f = 2450$ MHz; $\sigma = \delta H$ mho/m; $\epsilon_r = \epsilon_r H$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (°C): 21, Liquid temperature (°C): 21

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(7.35,7.35,7.35); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

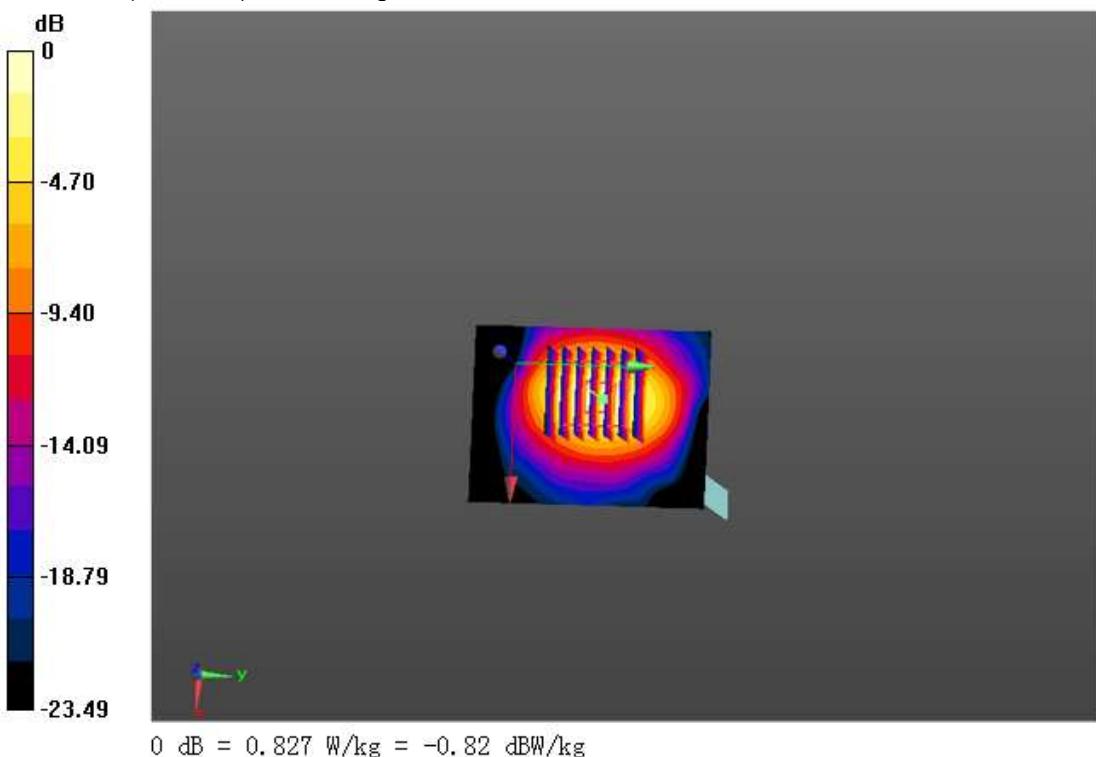
Configuration/System Check 2450MHz Body/Area Scan (61x81x1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.825 W/Kg

Configuration/System Check 2450MHz Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=17.633 V/m; Power Drift=0.05 dB

Peak SAR (extrapolated) =1.14 W/kg

SAR (1g) =0.520 W/Kg; SAR (10g) =0.234 W/Kg

Maximum value of SAR (measured)=0.827 W/Kg



APPENDIX B. SAR MEASUREMENT DATA

Test Laboratory: AGC Lab
GSM 835 Mid-Touch-Left <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24, 2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz); Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 836.6$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$; $\rho= 1000$ kg/m³ ;

Phantom section: Left Section

Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.97, 9.97, 9.97); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-C/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.389 W/kg

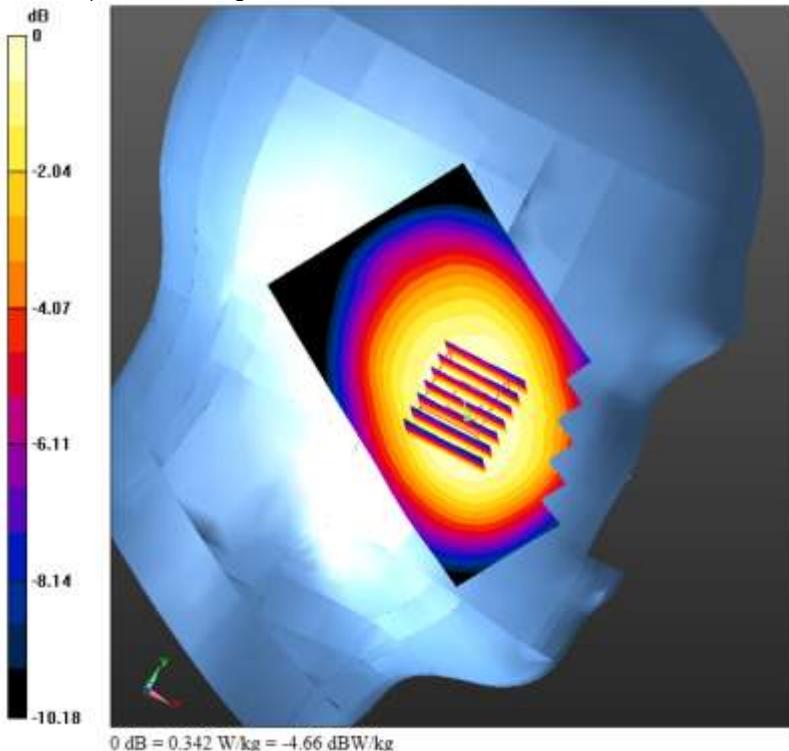
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.067 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.414 W/kg

SAR(1 g) = 0.324 W/kg; SAR(10 g) = 0.238 W/kg

Maximum value of SAR (measured) = 0.342 W/kg



Test Laboratory: AGC Lab
GSM 835 Mid-Tilt-Left <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz);
Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 836.6$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$; $\rho= 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.97, 9.97, 9.97); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-T/Area Scan (81x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.203 W/kg

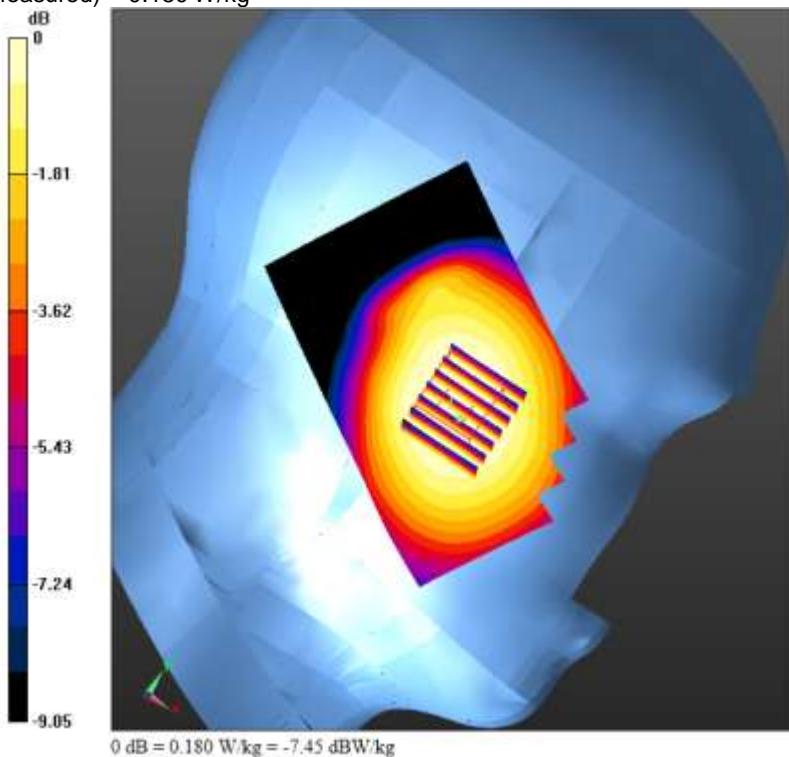
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 4.838 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.208 W/kg

SAR(1 g) = 0.172 W/kg; SAR(10 g) = 0.131 W/kg

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



Test Laboratory: AGC Lab
GSM 835 Mid-Touch-Right <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz);
Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 836.6$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$; $\rho= 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.97, 9.97, 9.97); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-C/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.450 W/kg

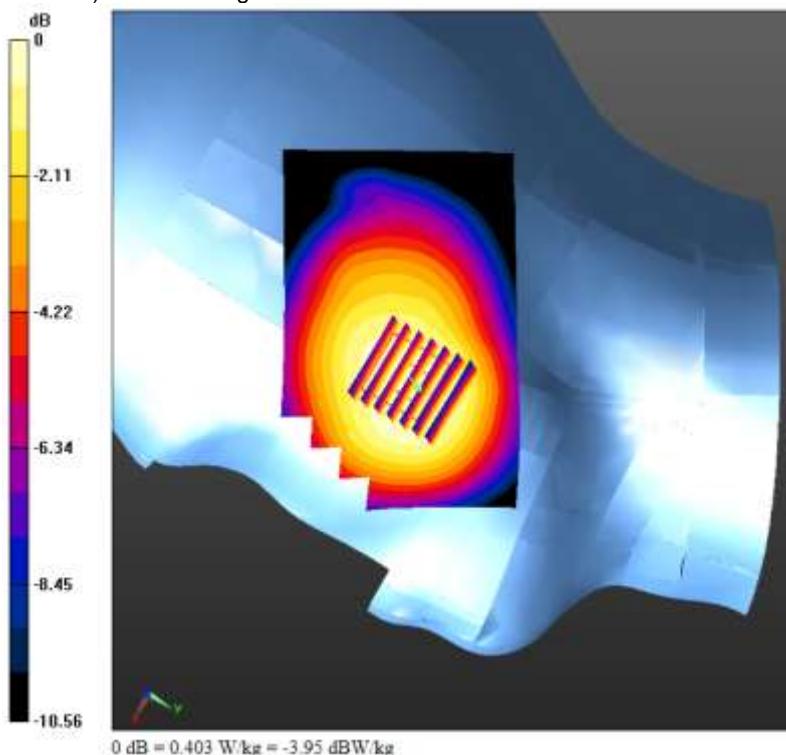
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

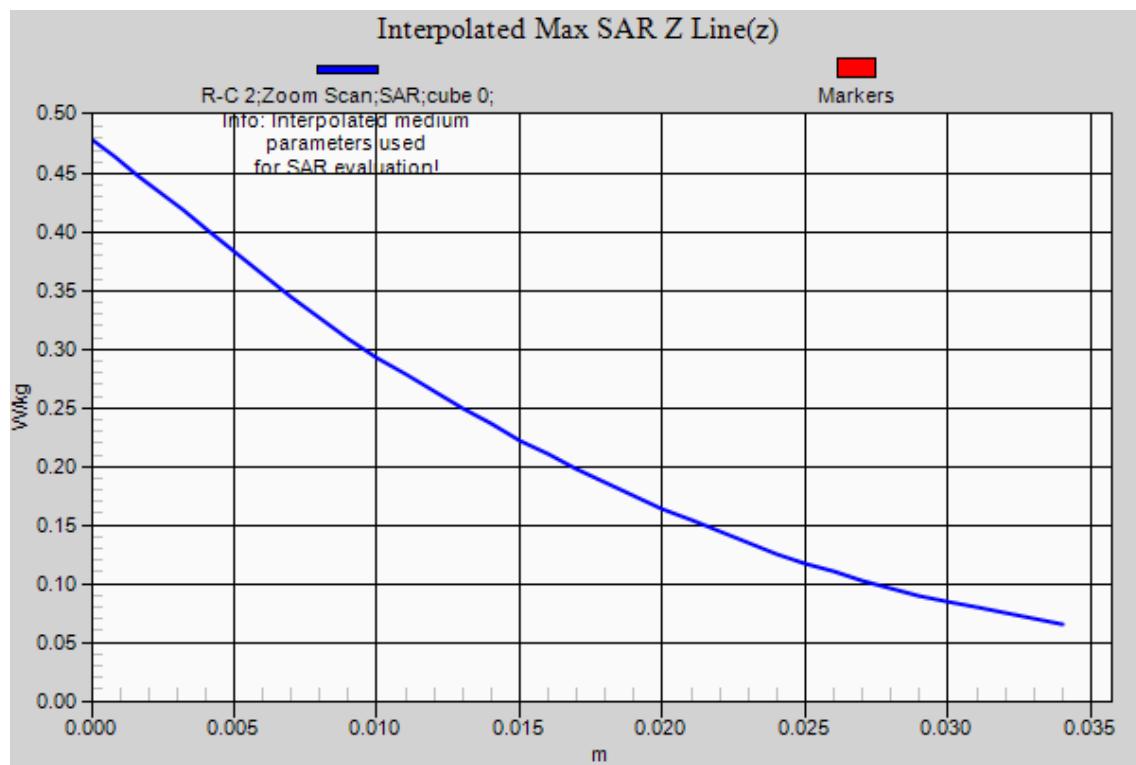
Reference Value = 8.736 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.479 W/kg

SAR(1 g) = 0.379 W/kg; SAR(10 g) = 0.275 W/kg

Maximum value of SAR (measured) = 0.403 W/kg





Test Laboratory: AGC Lab
GSM 835 Mid-Tilt-Right <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz);
Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 836.6$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r = 41.58$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.97, 9.97, 9.97); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-T/Area Scan (81x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.173 W/kg

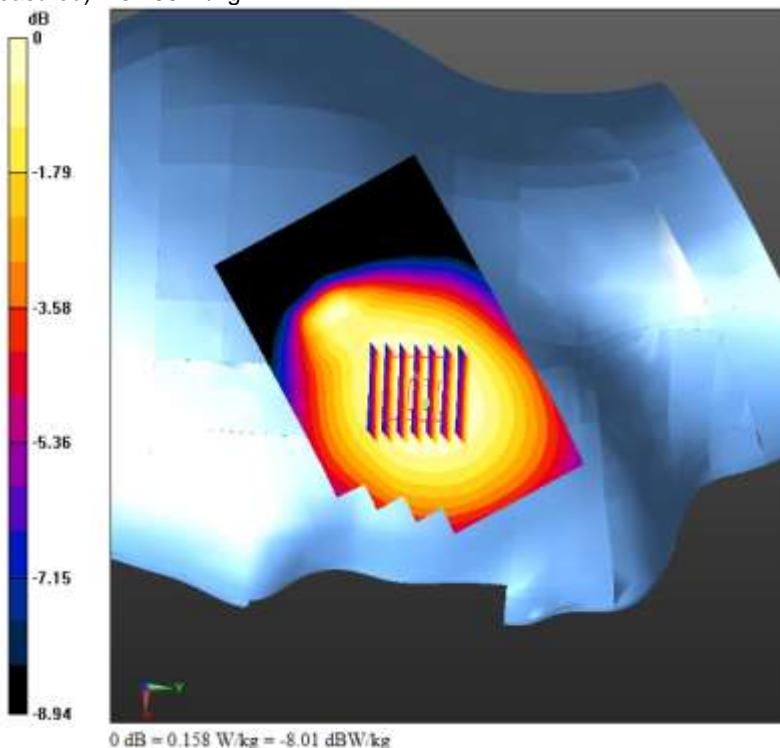
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 4.214 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.180 W/kg

SAR(1 g) = 0.150 W/kg; SAR(10 g) = 0.116 W/kg

Maximum value of SAR (measured) = 0.158 W/kg



Test Laboratory: AGC Lab
GSM 835 Mid-Touch-Right <SIM 2>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz);
Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 836.6$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$; $\rho= 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.97, 9.97, 9.97); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-C-2/Area Scan (81x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.431 W/kg

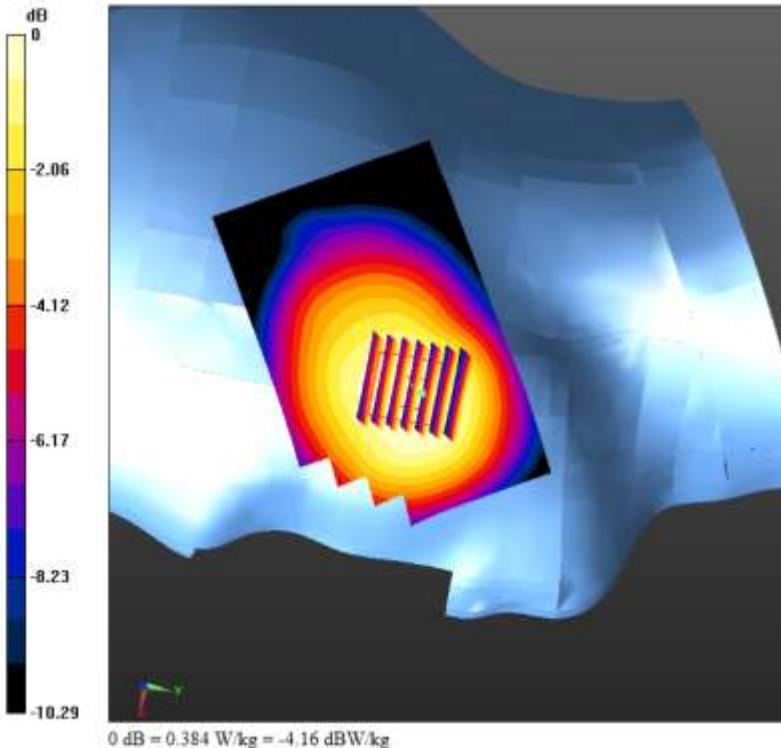
RIGHT HEAD/R-C-2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 7.732 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.453 W/kg

SAR(1 g) = 0.363 W/kg; SAR(10 g) = 0.265 W/kg

Maximum value of SAR (measured) = 0.384 W/kg



Test Laboratory: AGC Lab
GSM 835 Mid- Body- Back
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz);
Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.98 \text{ mho/m}$; $\epsilon_r = 54.87$;
 $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21.0, Liquid temperature ($^{\circ}\text{C}$): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.91, 9.91, 9.91); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QDOVA002AA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (121x81x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.873 W/kg

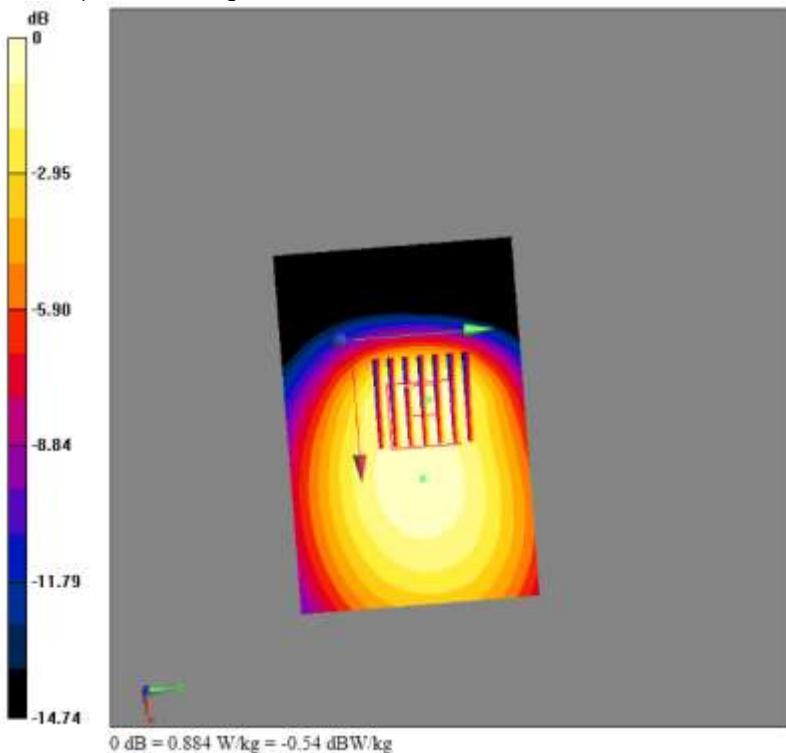
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

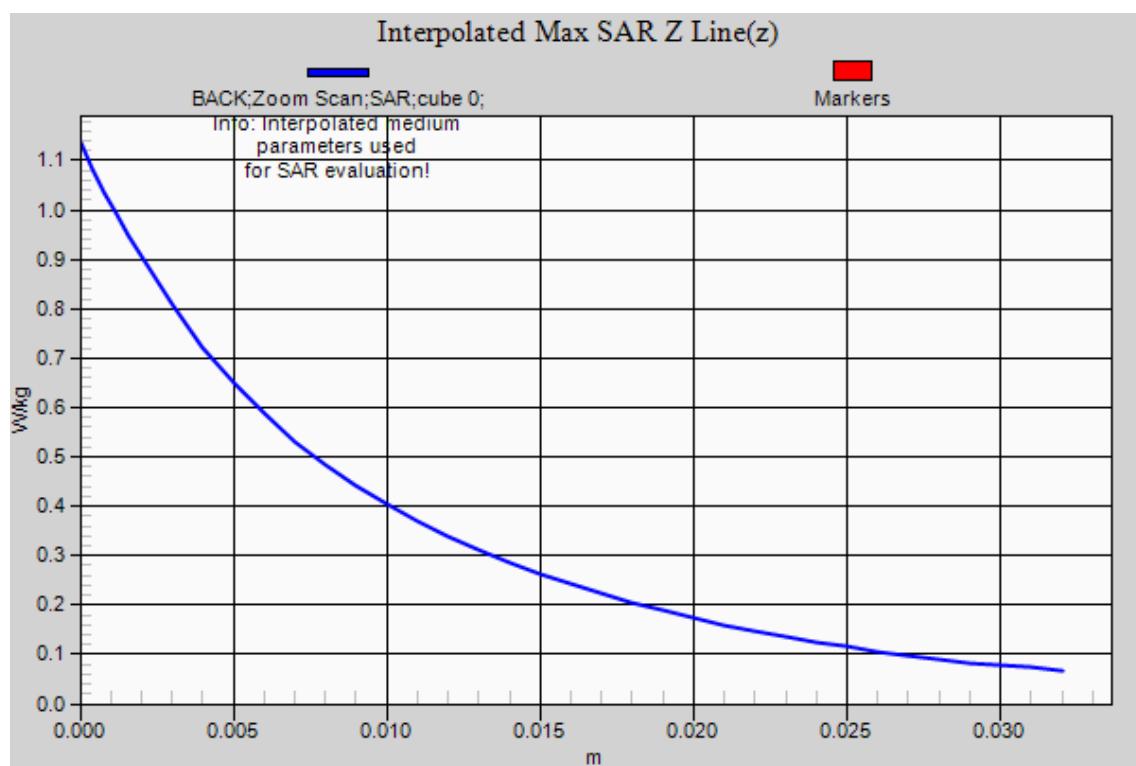
Reference Value = 11.427 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.677 W/kg; SAR(10 g) = 0.464 W/kg

Maximum value of SAR (measured) = 0.884 W/kg





Test Laboratory: AGC Lab
GSM 835 Mid- Body- Front
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz);
Duty Cycle: 1:8.3; Frequency: 836.6 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.98 \text{ mho/m}$; $\epsilon_r = 54.87$;
 $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21.0, Liquid temperature ($^{\circ}\text{C}$): 21.0

DASY Configuration:

- Probe: EX3DV4 - SN3953; ConvF(9.91, 9.91, 9.91); Calibrated: 10/15/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QDOVA002AA;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/FRONT/Area Scan (121x81x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.633 W/kg

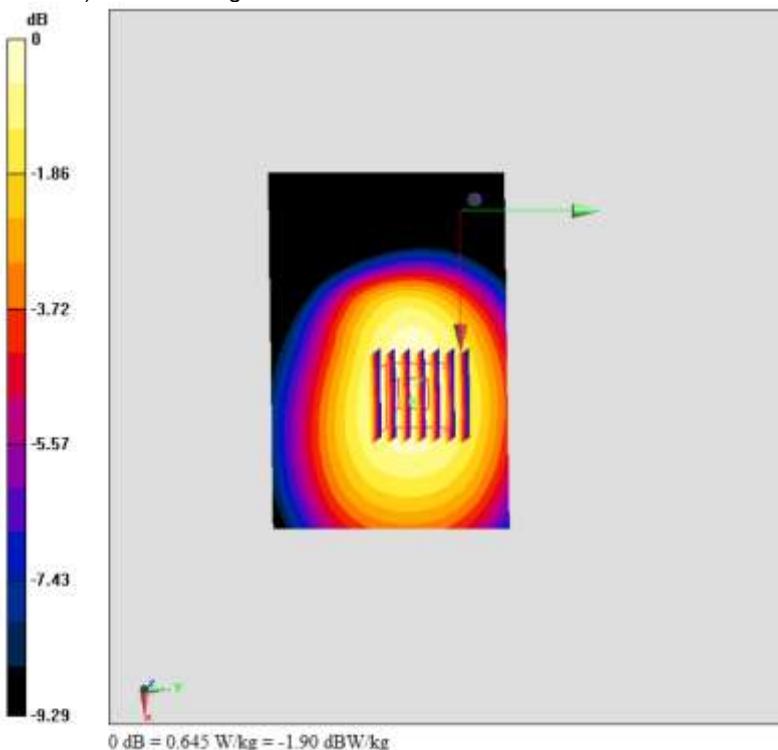
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.393 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.693 W/kg

SAR(1 g) = 0.571 W/kg; SAR(10 g) = 0.432 W/kg

Maximum value of SAR (measured) = 0.645 W/kg



Test Laboratory: AGC Lab
PCS 1900 Mid-Touch-Left <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz); Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$; $\rho = 1000$ kg/m³ ;

Phantom section: Left Section

Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17,8.17,8.17) Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-C/Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.328 W/kg

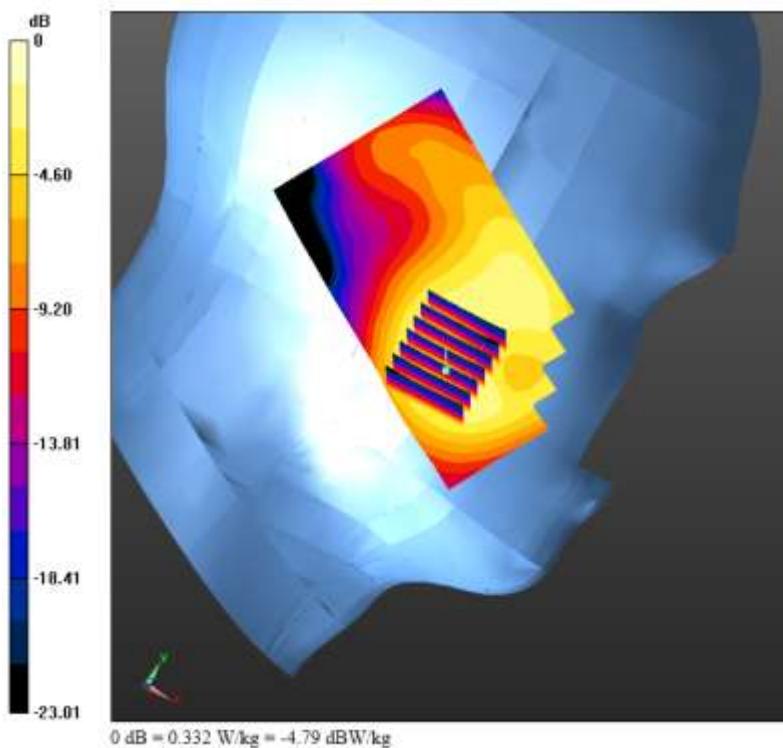
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

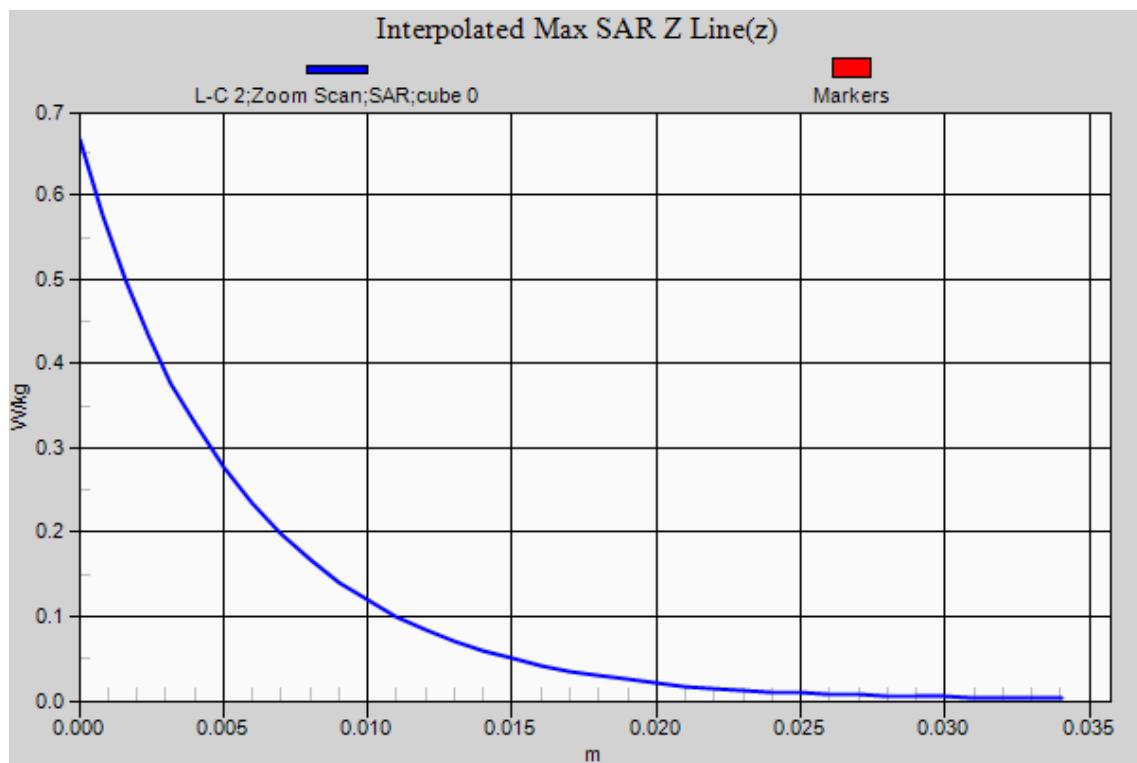
Reference Value = 5.730 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.665 W/kg

SAR(1 g) = 0.305 W/kg; SAR(10 g) = 0.148 W/kg

Maximum value of SAR (measured) = 0.332 W/kg





Test Laboratory: AGC Lab
PCS 1900 Mid-Tilt-Left <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz);
Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17,8.17,8.17) Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-T/Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0977 W/kg

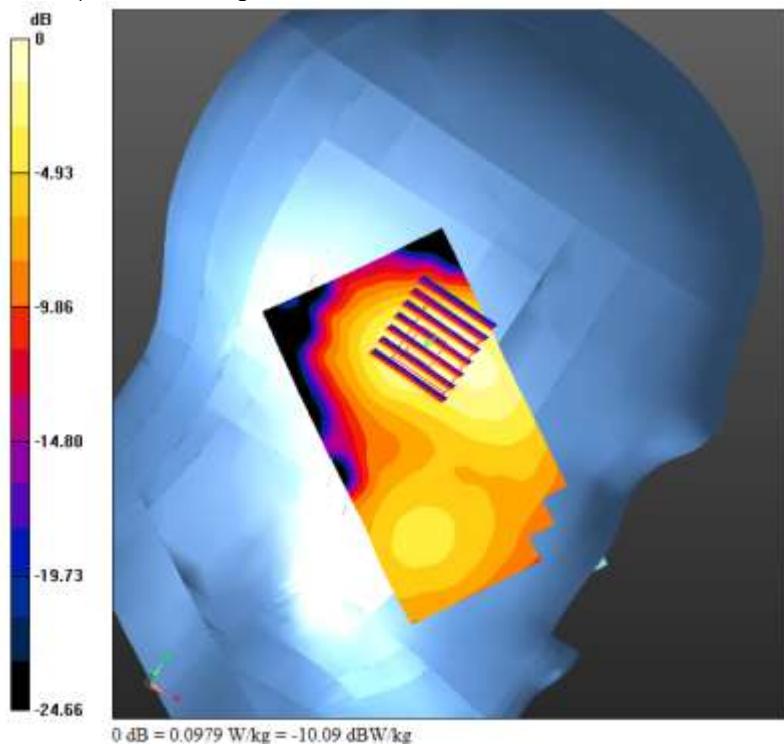
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.526 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.194 W/kg

SAR(1 g) = 0.090 W/kg; SAR(10 g) = 0.044 W/kg

Maximum value of SAR (measured) = 0.0979 W/kg



Test Laboratory: AGC Lab
PCS 1900 Mid-Touch-Right <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz); Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$; $\rho = 1000$ kg/m³ ;

Phantom section: Right Section

Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17,8.17,8.17) Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-C/Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.258 W/kg

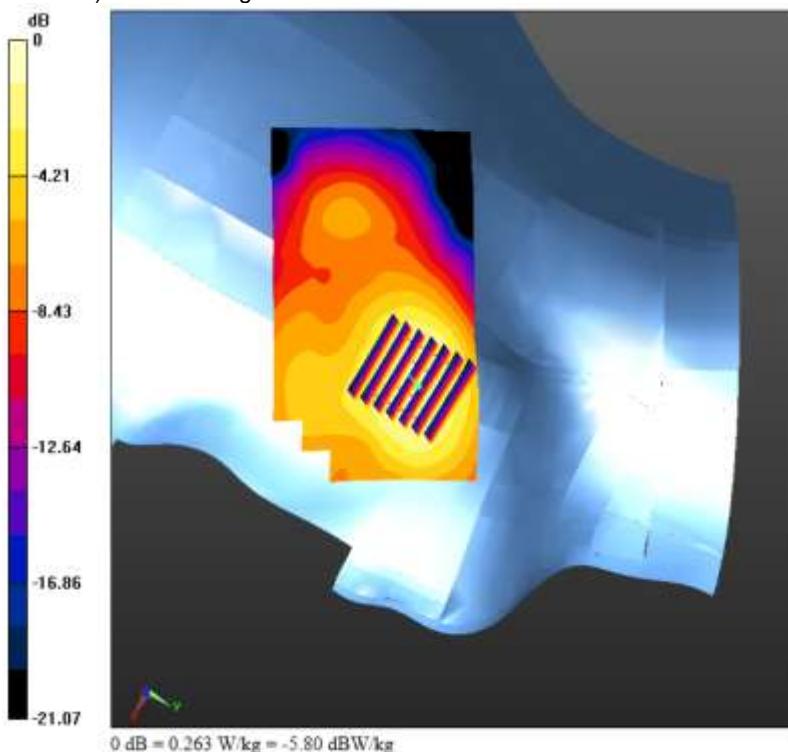
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.487 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.502 W/kg

SAR(1 g) = 0.241 W/kg; SAR(10 g) = 0.121 W/kg

Maximum value of SAR (measured) = 0.263 W/kg



Test Laboratory: AGC Lab
PCS 1900 Mid-Tilt-Right <SIM 1>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz);
Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17,8.17,8.17) Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-T/Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0895 W/kg

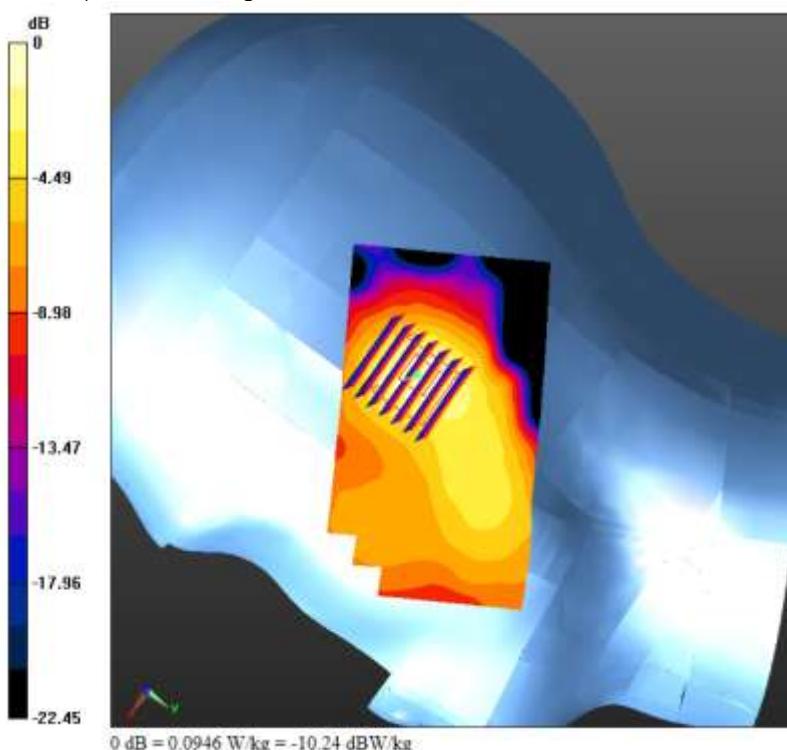
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.113 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.195 W/kg

SAR(1 g) = 0.085 W/kg; SAR(10 g) = 0.039 W/kg

Maximum value of SAR (measured) = 0.0946 W/kg



Test Laboratory: AGC Lab
PCS 1900 Mid-Touch-Left <SIM 2>
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz);
Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;;
 $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17, 8.17, 8.17); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-C-2/Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.306 W/kg

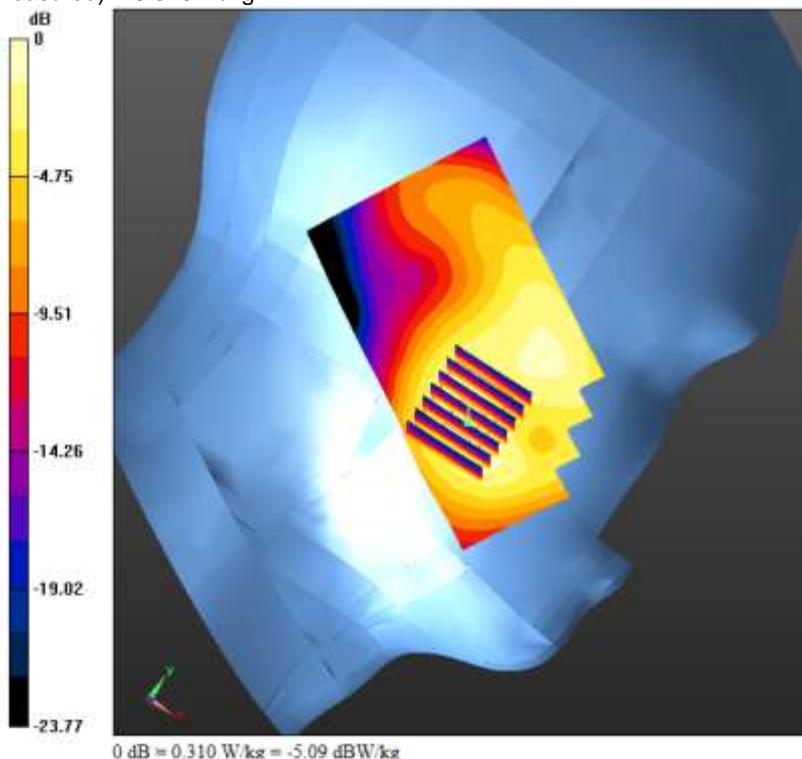
LEFT HEAD/L-C-2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.817 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.616 W/kg

SAR(1 g) = 0.283 W/kg; SAR(10 g) = 0.139 W/kg

Maximum value of SAR (measured) = 0.310 W/kg



Test Laboratory: AGC Lab
PCS 1900 Mid-Body- Back
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz); Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 53.66$; $\rho = 1000$ kg/m³ ;

Phantom section: Flat Section

Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(7.80,7.80,7.80); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (121x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.732 W/kg

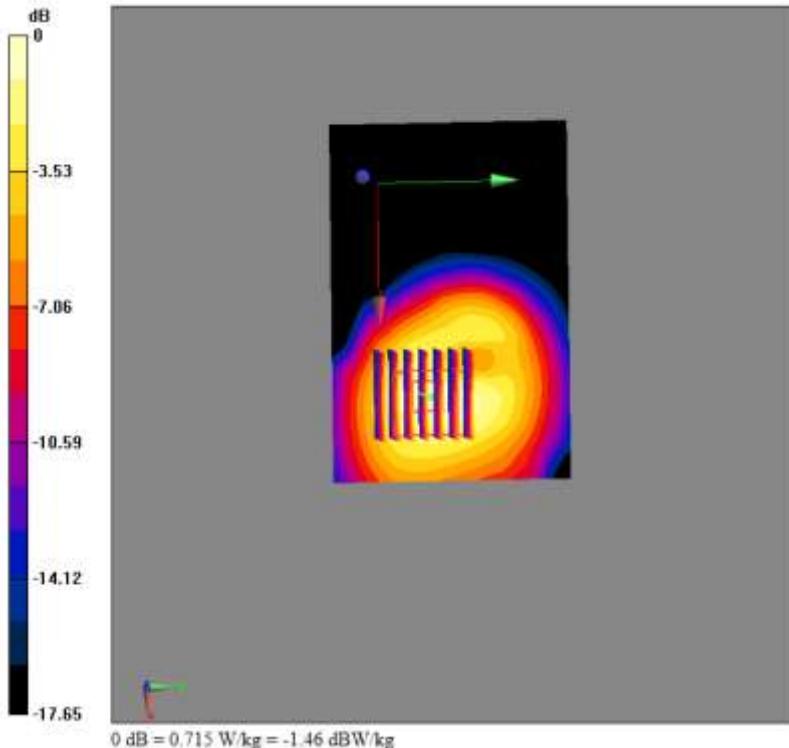
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

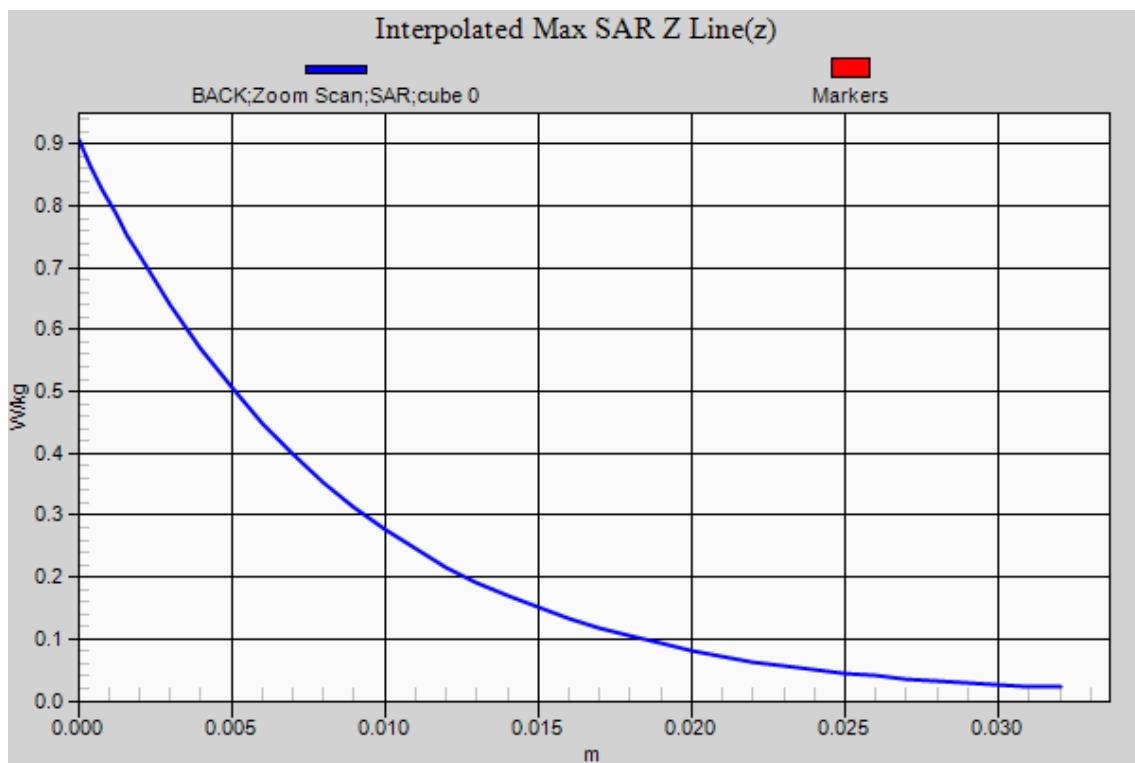
Reference Value = 1.551 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.906 W/kg

SAR(1 g) = 0.526 W/kg; SAR(10 g) = 0.292 W/kg

Maximum value of SAR (measured) = 0.715 W/kg





Test Laboratory: AGC Lab
PCS 1900 Mid-Body -Front
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz); Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 53.66$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(7.80,7.80,7.80); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/FRONT/Area Scan (121x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.618 W/kg

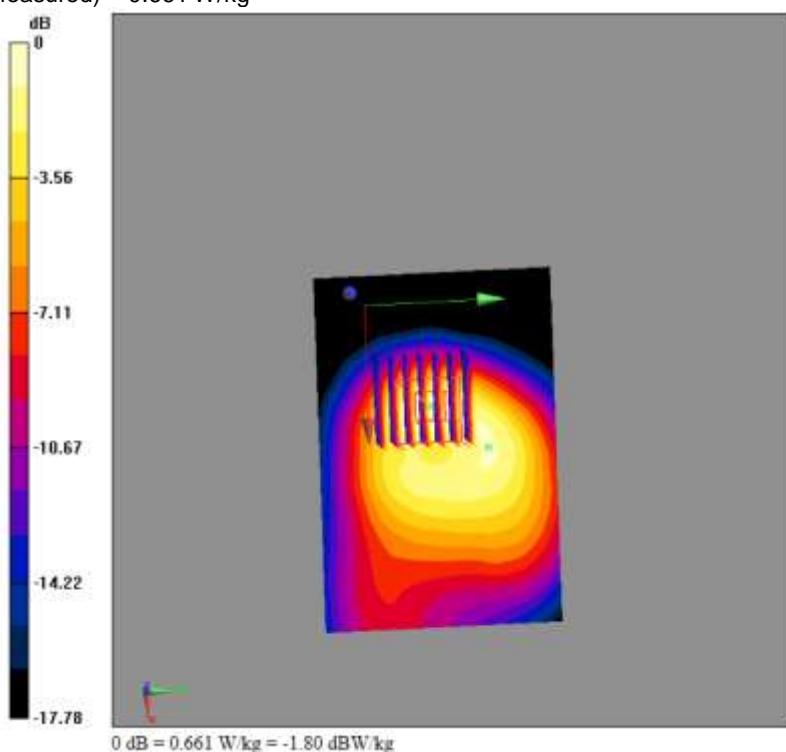
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.090 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.827 W/kg

SAR(1 g) = 0.466 W/kg; SAR(10 g) = 0.241 W/kg

Maximum value of SAR (measured) = 0.661 W/kg



Test Laboratory: AGC Lab
WCDMA Band II Mid-Touch-Left
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 1900 (0); Communication System Band: Band II UTRA/FDD ;
Duty Cycle:1:1; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17, 8.17, 8.17); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-C/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.08 W/kg

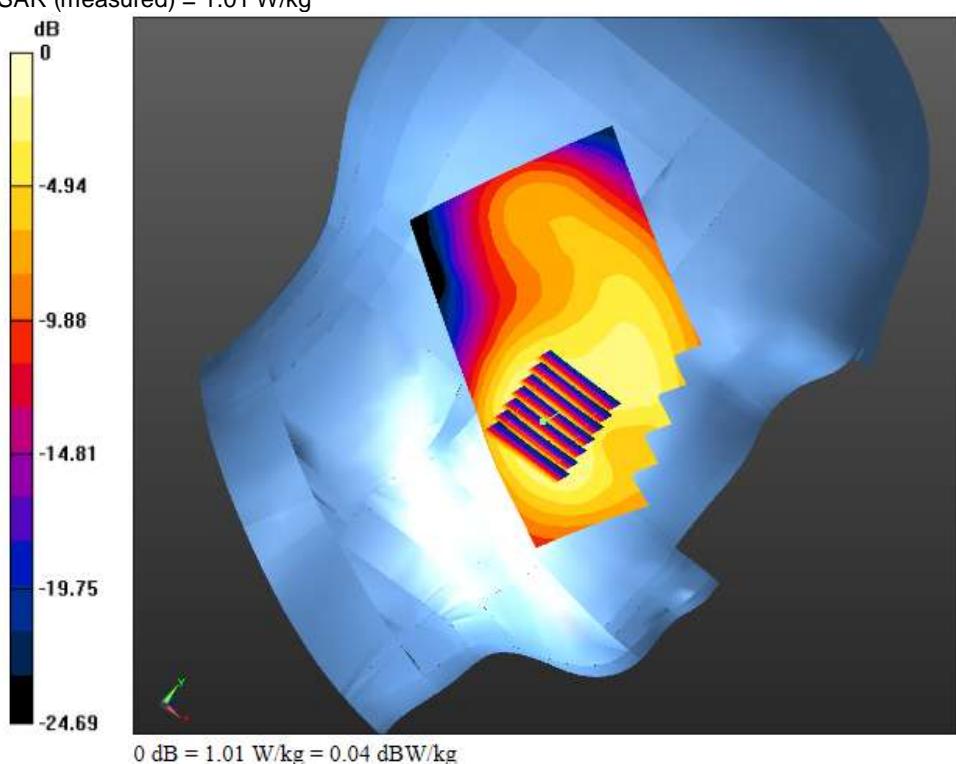
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

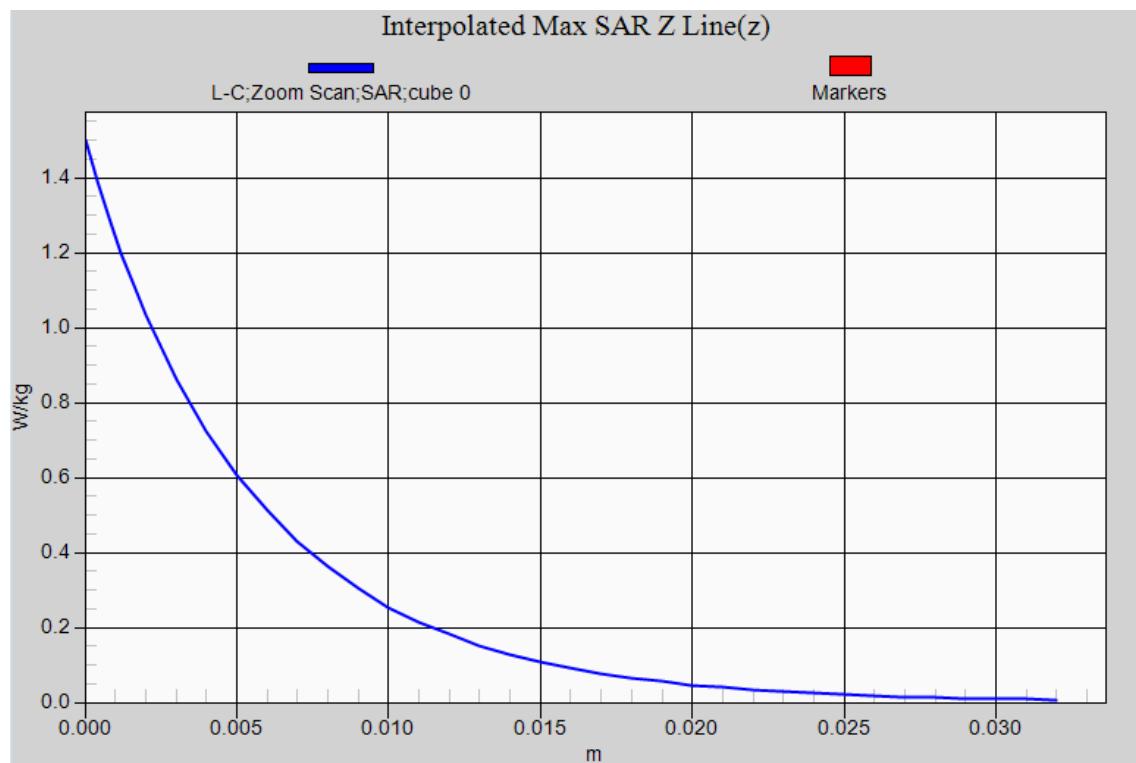
Reference Value = 11.646 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 0.664 W/kg; SAR(10 g) = 0.319 W/kg

Maximum value of SAR (measured) = 1.01 W/kg





Test Laboratory: AGC Lab
WCDMA Band II Mid-Tilt-Left
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 1900 (0); Communication System Band: Band II UTRA/FDD ;
Duty Cycle:1:1; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17, 8.17, 8.17); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-T/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.329 W/kg

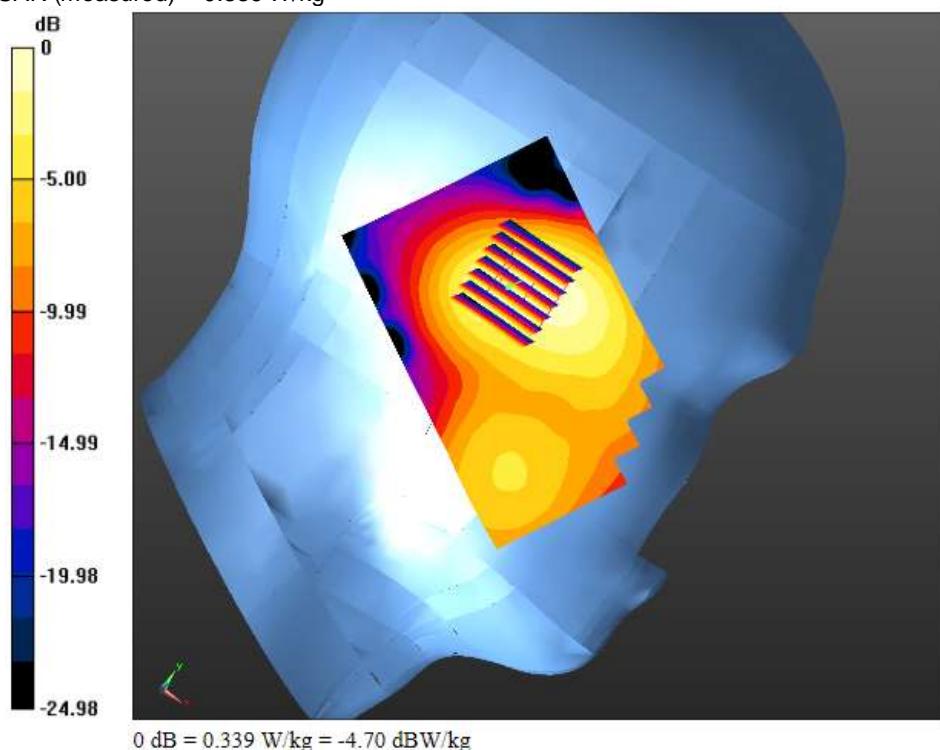
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.918 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.480 W/kg

SAR(1 g) = 0.223 W/kg; SAR(10 g) = 0.111 W/kg

Maximum value of SAR (measured) = 0.339 W/kg



Test Laboratory: AGC Lab
WCDMA Band II Mid-Touch-Right
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 1900 (0); Communication System Band: Band II UTRA/FDD ;
Duty Cycle:1:1; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17, 8.17, 8.17); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-C/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.842 W/kg

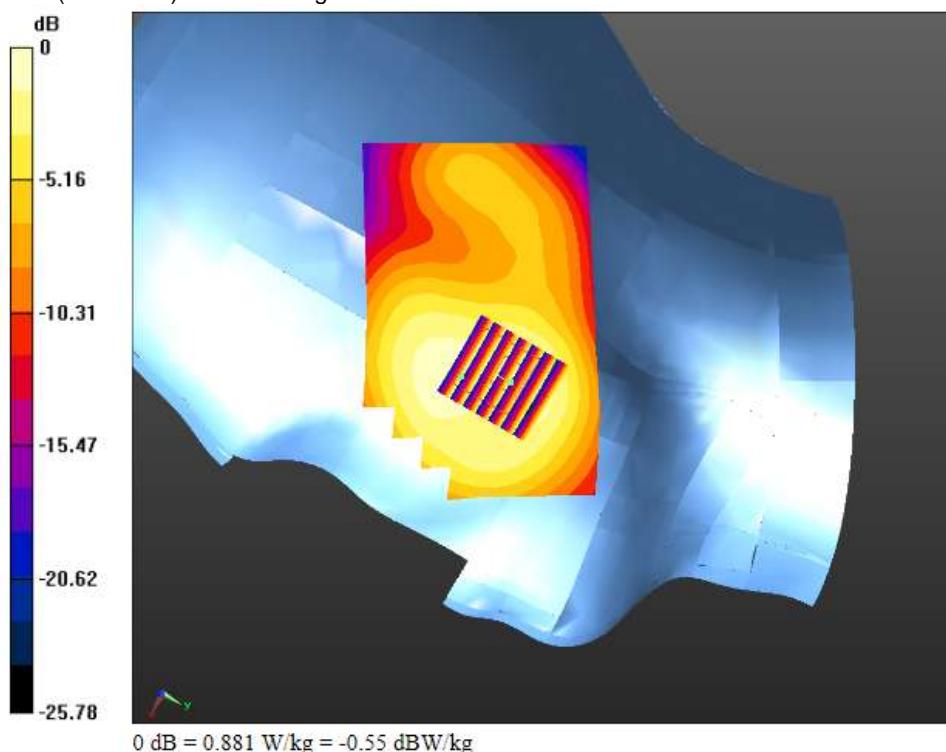
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.474 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.577 W/kg; SAR(10 g) = 0.295 W/kg

Maximum value of SAR (measured) = 0.881 W/kg



Test Laboratory: AGC Lab
WCDMA Band II Mid-Tilt-Right
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 1900 (0); Communication System Band: Band II UTRA/FDD ;
Duty Cycle:1:1; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.62$;
 $\rho = 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(8.17, 8.17, 8.17); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-T/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.368 W/kg

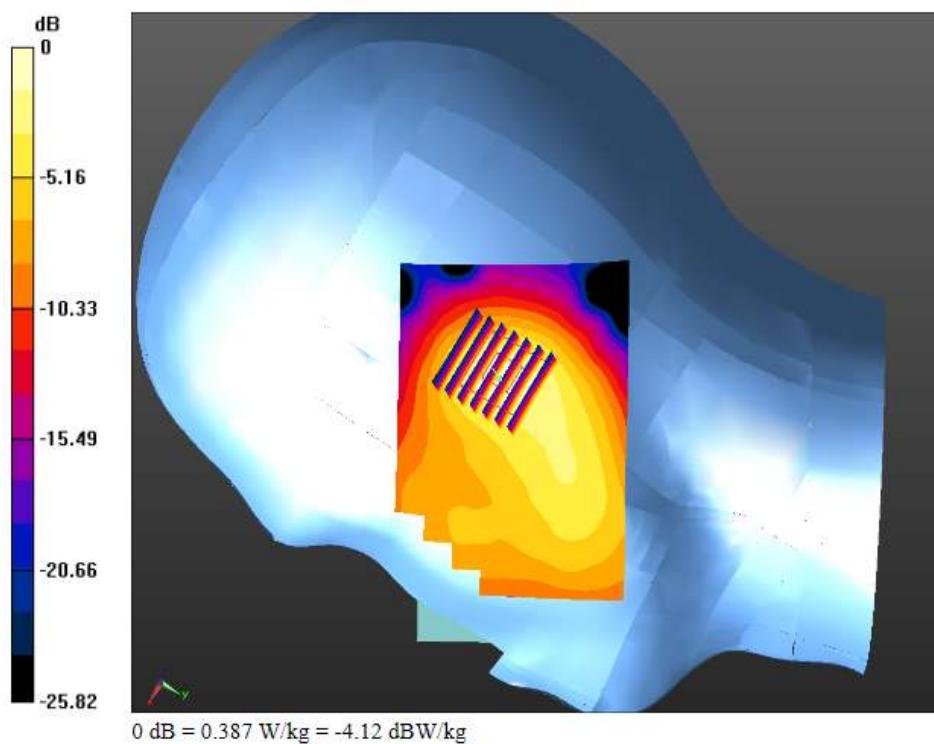
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.359 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.572 W/kg

SAR(1 g) = 0.243 W/kg; SAR(10 g) = 0.110 W/kg

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



Test Laboratory: AGC Lab
WCDMA Band II Mid -Body-Towards Grounds
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 1900 (0); Communication System Band: Band II UTRA/FDD ;
Duty Cycle:1:1; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma=1.49$ mho/m; $\epsilon_r =53.66$;
 $\rho= 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(7.80,7.80,7.80); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (121x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.812 W/kg

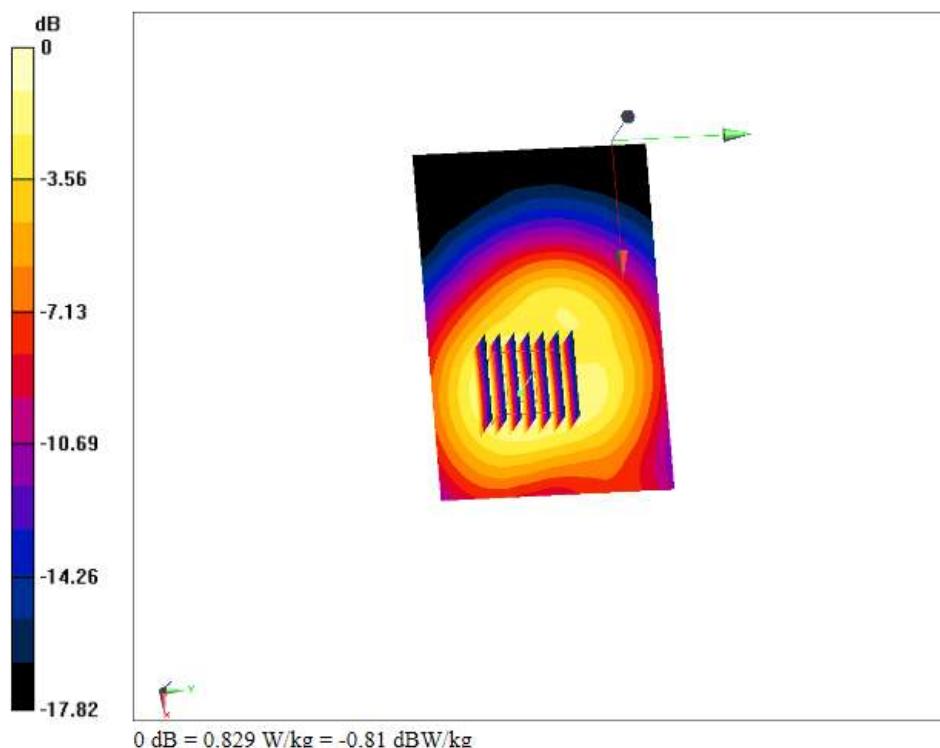
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

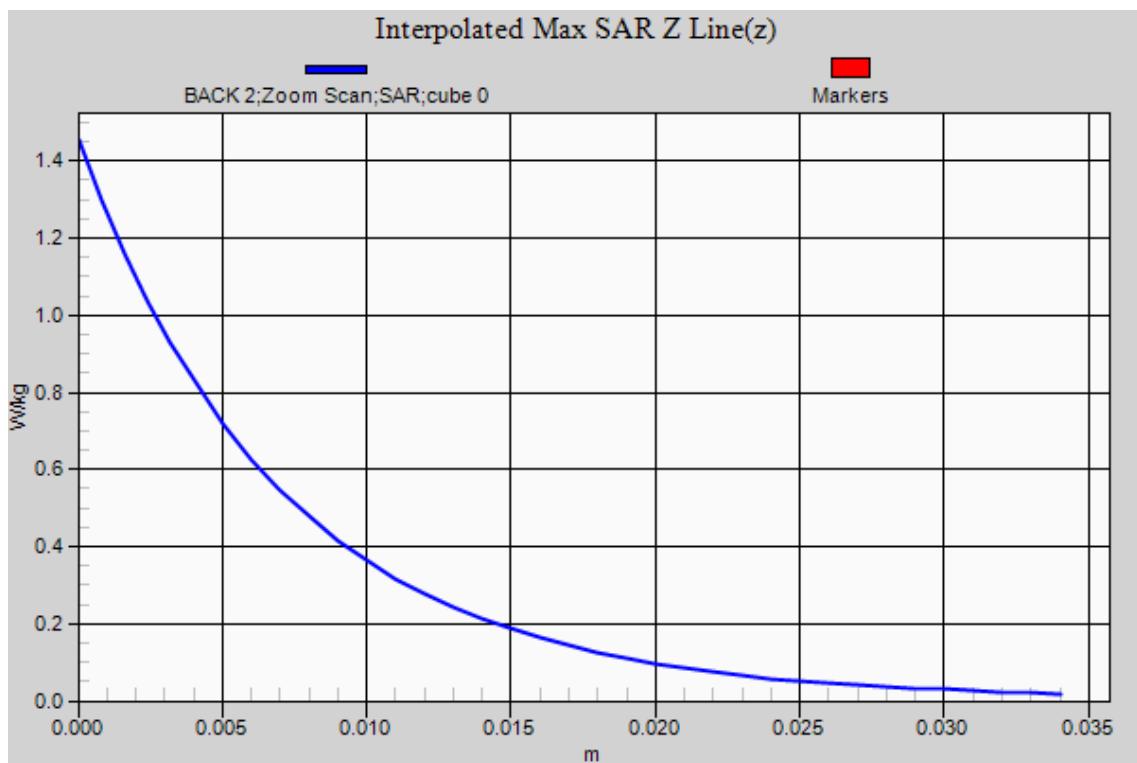
Reference Value = 8.413 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.768 W/kg; SAR(10 g) = 0.419 W/kg

Maximum value of SAR (measured) = 0.829 W/kg





Test Laboratory: AGC Lab
WCDMA Band II Mid-Body-Towards Phantom
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 1900 (0); Communication System Band: Band II UTRA/FDD ;
Duty Cycle:1:1; Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\sigma=1.49$ mho/m; $\epsilon_r =53.66$;
 $\rho=1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 21.0, Liquid temperature (°C): 21.0

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(7.80,7.80,7.80); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/FRONT/Area Scan (121x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.795 W/kg

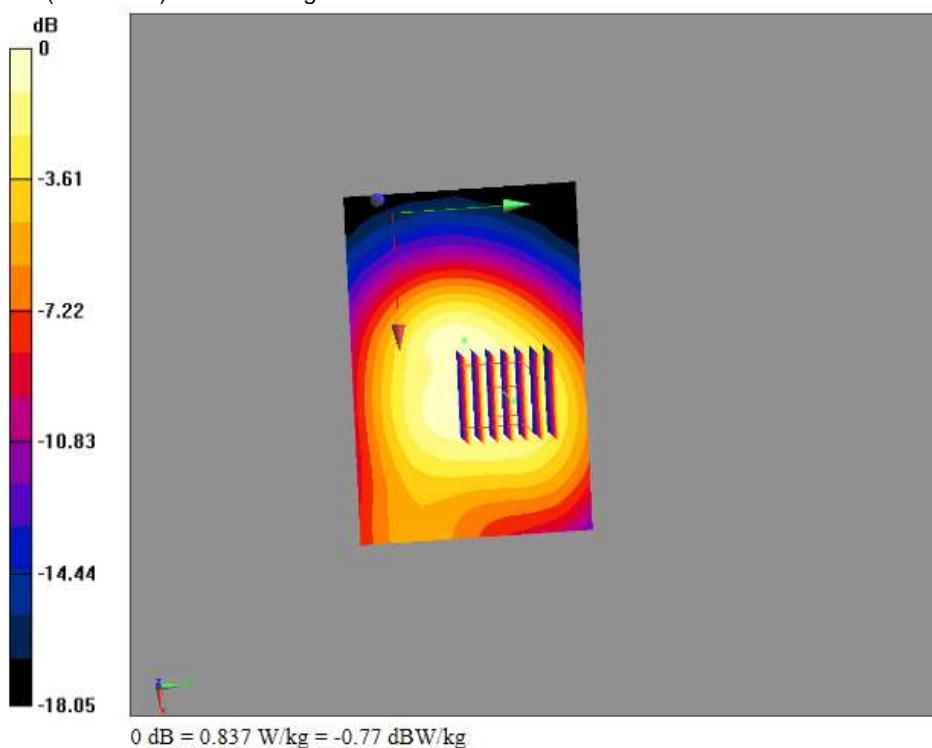
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.185 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.599 W/kg; SAR(10 g) = 0.340 W/kg

Maximum value of SAR (measured) = 0.837 W/kg



Test Laboratory: AGC Lab
WCDMA Band V Mid-Touch-Left
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND V UTRA/FDD;
Duty Cycle:1:1; Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$
 $\rho= 1000$ kg/m³ ;

Phantom section: Left Section

Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(9.97,9.97,9.97); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-C/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.440 W/kg

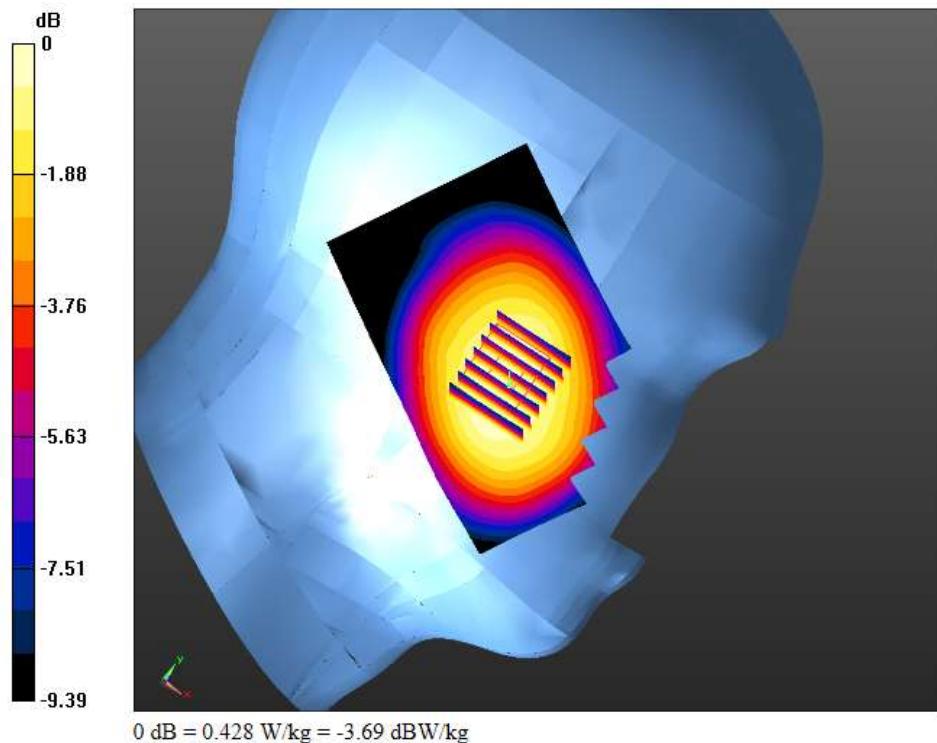
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.774 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.468 W/kg

SAR(1 g) = 0.371 W/kg; SAR(10 g) = 0.272 W/kg

Maximum value of SAR (measured) = 0.428 W/kg



Test Laboratory: AGC Lab
WCDMA Band V Mid-Tilt-Left
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND V UTRA/FDD;
Duty Cycle:1:1; Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$
 $\rho= 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:
Probe: EX3DV4 - SN3953; ConvF(9.97,9.97,9.97); Calibrated: 10/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

LEFT HEAD/L-T/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.219 W/kg

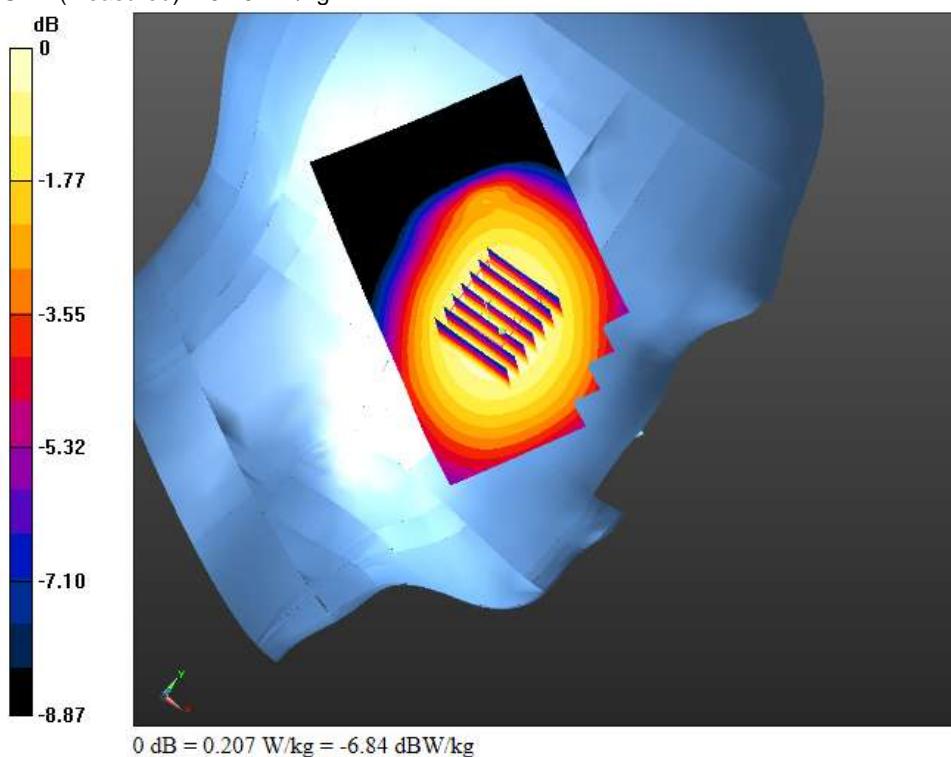
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.924 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.222 W/kg

SAR(1 g) = 0.185 W/kg; SAR(10 g) = 0.141 W/kg

Maximum value of SAR (measured) = 0.207 W/kg



Test Laboratory: AGC Lab
WCDMA Band V Mid-Touch-Right
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND V UTRA/FDD;
Duty Cycle:1:1; Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$
 $\rho= 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:
Probe: EX3DV4 - SN3953; ConvF(9.97,9.97,9.97); Calibrated: 10/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-C/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.540 W/kg

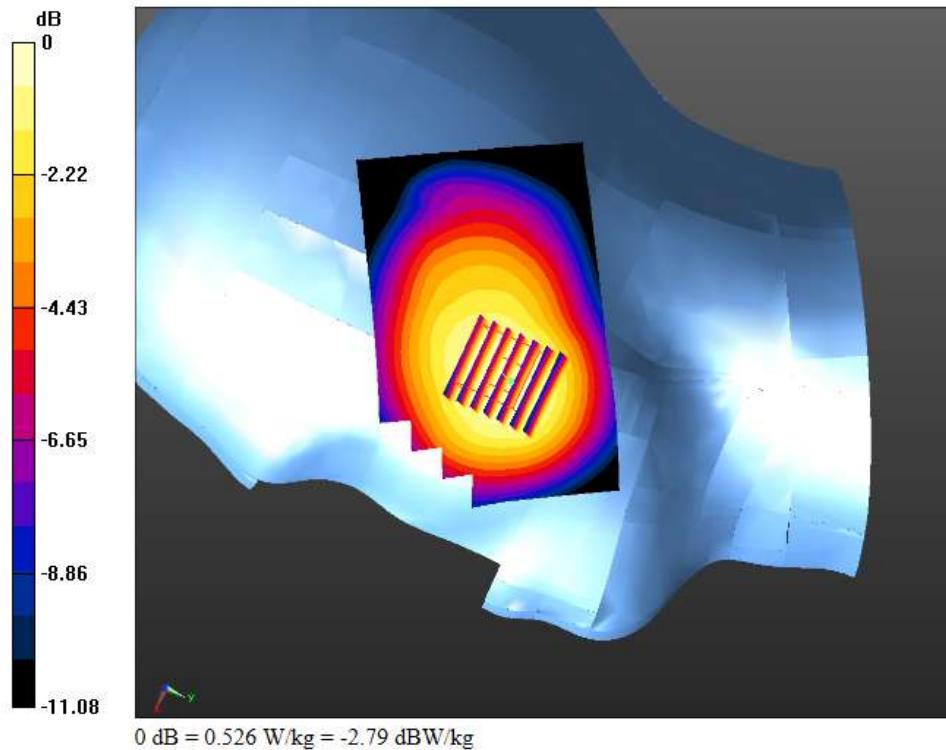
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

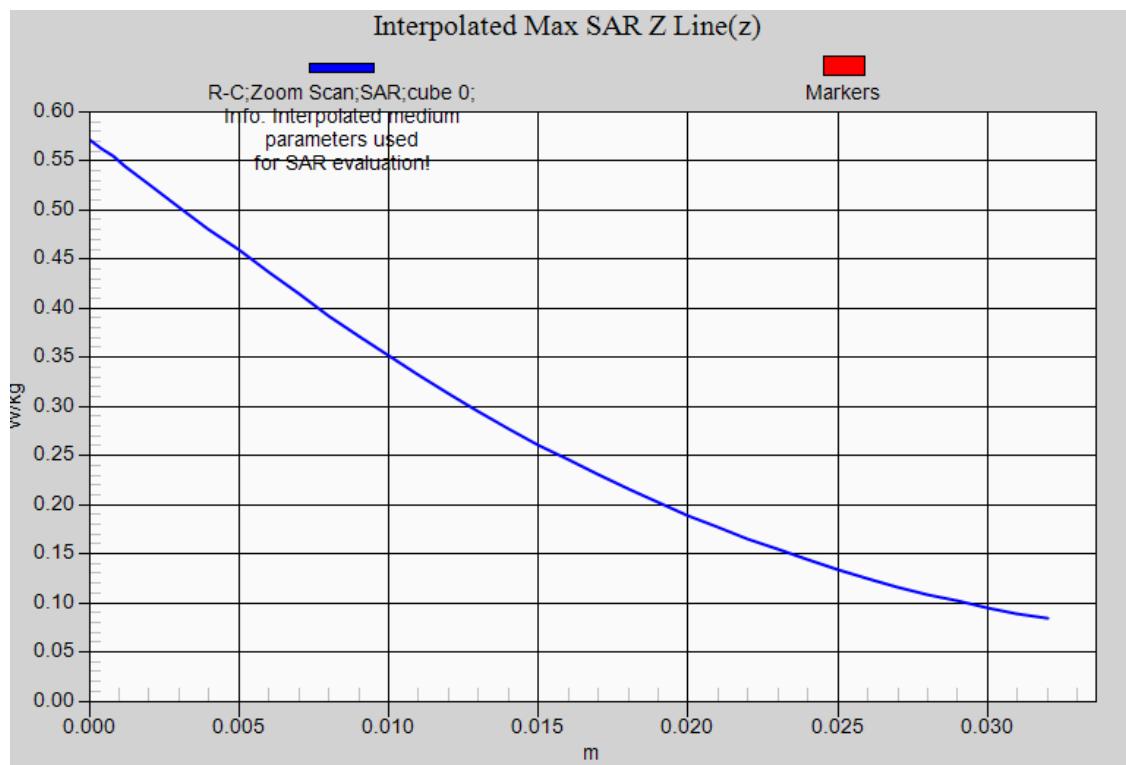
Reference Value = 11.529 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.572 W/kg

SAR(1 g) = 0.454 W/kg; SAR(10 g) = 0.327 W/kg

Maximum value of SAR (measured) = 0.526 W/kg





Test Laboratory: AGC Lab
WCDMA Band V Mid-Tilt-Right
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND V UTRA/FDD;
Duty Cycle:1:1; Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r =41.58$
 $\rho= 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:
Probe: EX3DV4 - SN3953; ConvF(9.97,9.97,9.97); Calibrated: 10/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RIGHT HEAD/R-T/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.218 W/kg

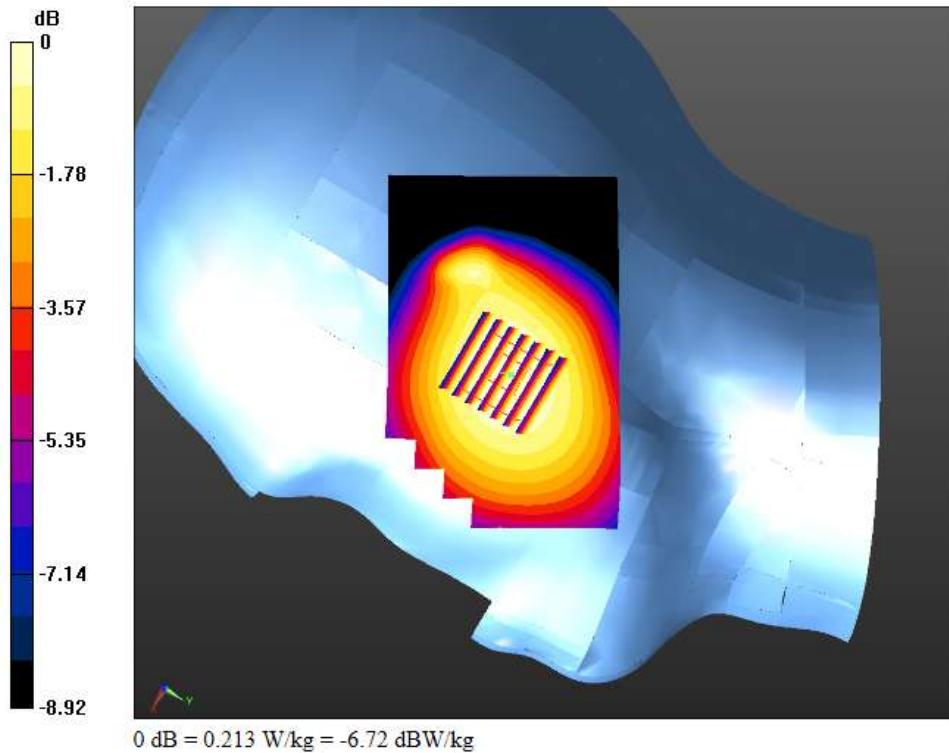
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.939 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.226 W/kg

SAR(1 g) = 0.190 W/kg; SAR(10 g) = 0.146 W/kg

Maximum value of SAR (measured) = 0.213 W/kg



Test Laboratory: AGC Lab

Date: June 24,2014

WCDMA Band V Mid-Body-Towards Grounds

DUT: mobile phone; Type: AM66

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND V UTRA/FDD;
Duty Cycle:1:1; Frequency: 836.6 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\sigma=0.98 \text{ mho/m}$; $\epsilon_r = 54.87$;
 $\rho = 1000 \text{ kg/m}^3$;

Phantom section: Flat Section

Ambient temperature ($^{\circ}\text{C}$):21, Liquid temperature ($^{\circ}\text{C}$):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(9.91,9.91,9.91); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), $z = 1.0, 31.0$

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/BACK/Area Scan (131x101x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.975 W/kg

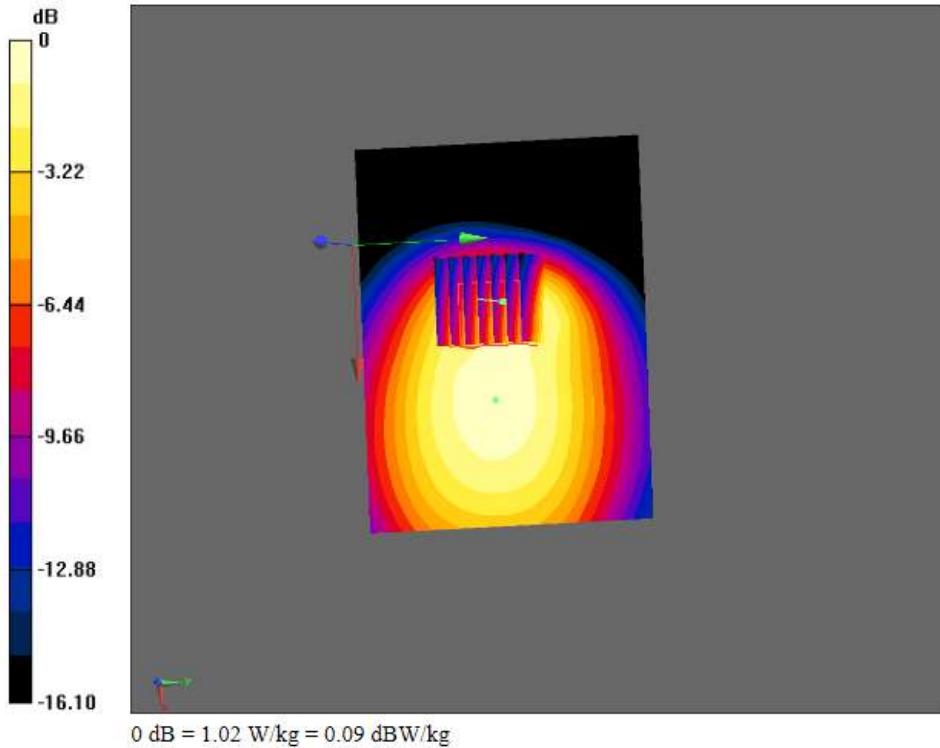
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

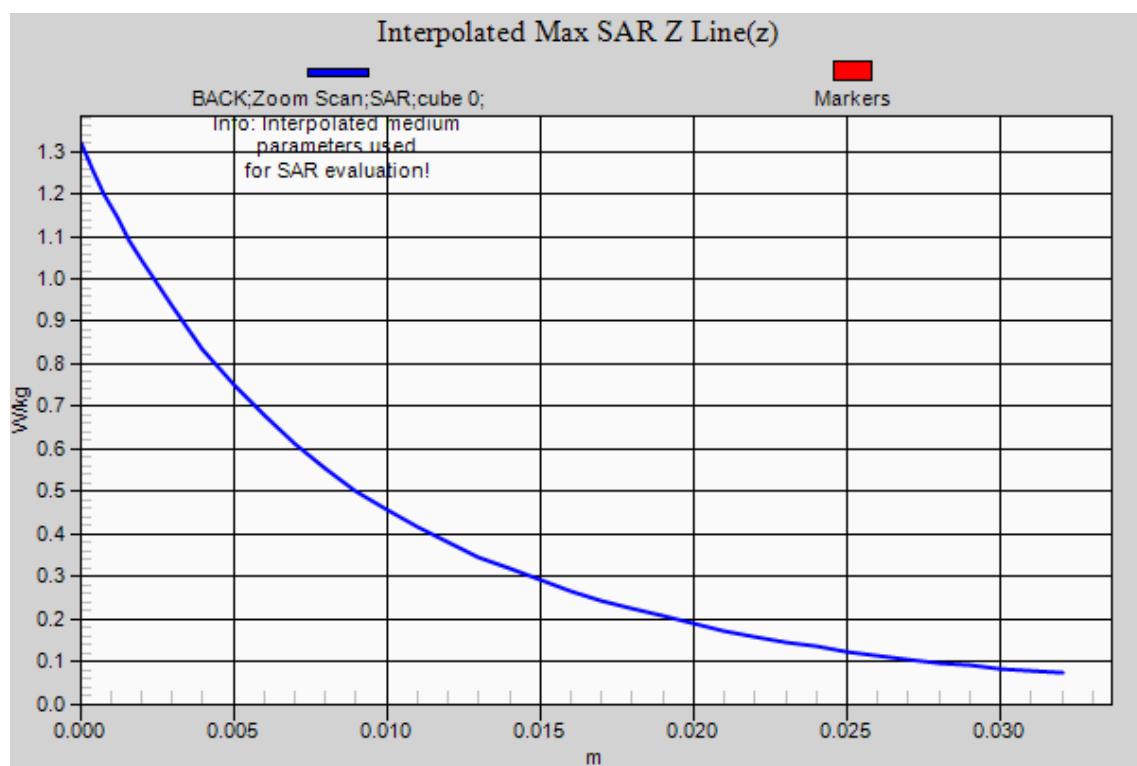
Reference Value = 15.236 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.32 W/kg

SAR(1 g) = 0.776 W/kg; SAR(10 g) = 0.482 W/kg

Maximum value of SAR (measured) = 1.02 W/kg





Test Laboratory: AGC Lab

Date: June 24,2014

WCDMA Band V Mid- Body - Towards Phantom

DUT: mobile phone; Type: AM66

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND V UTRA/FDD;
Duty Cycle:1:1; Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\sigma=0.98$ mho/m; $\epsilon_r =54.87$;
 $\rho= 1000$ kg/m³ ;

Phantom section: Flat Section

Ambient temperature (°C):21, Liquid temperature (°C):21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(9.91,9.91,9.91); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

BODY/FRONT/Area Scan (121x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.708 W/kg

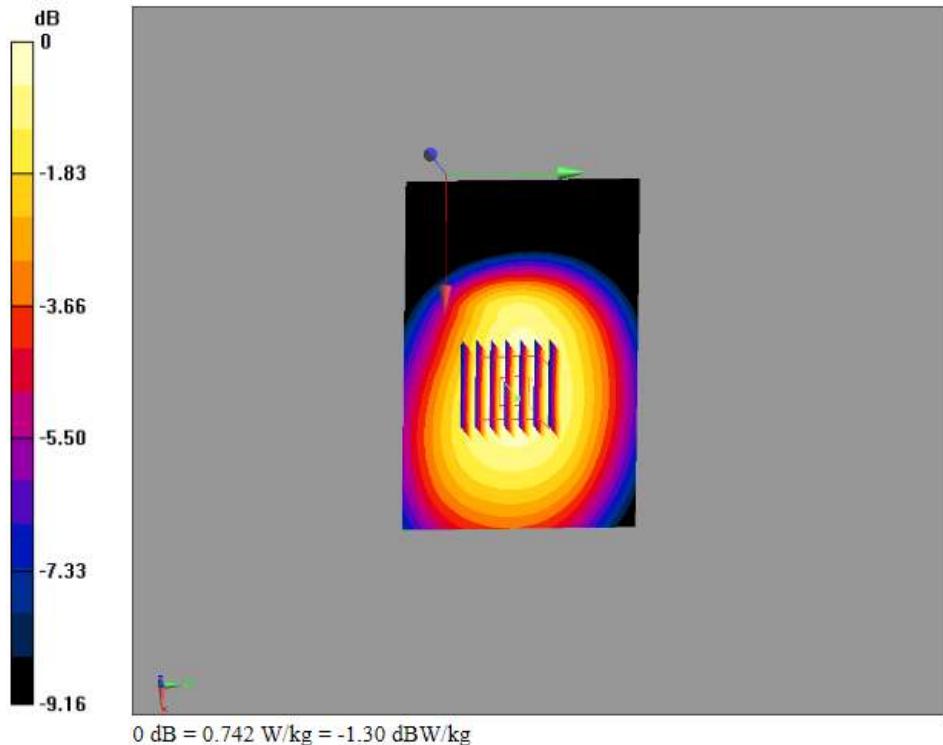
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.372 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.795 W/kg

SAR(1 g) = 0.655 W/kg; SAR(10 g) = 0.497 W/kg

Maximum value of SAR (measured) = 0.742 W/kg



HOTSPOT MODE

Test Laboratory: AGC Lab

Hotspot Mid-Body-Worn- Back

DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WiFi Hotspot (0); Communication System Band: Hotspot; Duty Cycle: 1:1;
Frequency: 2437 MHz; Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.90 \text{ mho/m}$; $\epsilon_r = 51.64$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21, Liquid temperature ($^{\circ}\text{C}$): 21

DASY Configuration:

Probe: EX3DV4 - SN3953; ConvF(7.35,7.35,7.35); Calibrated: 10/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection), $z = 1.0, 31.0$

Electronics: DAE4 Sn1398; Calibrated: 10/10/2013

Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Hotspot/BACK/Area Scan (121x81x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.565 W/kg

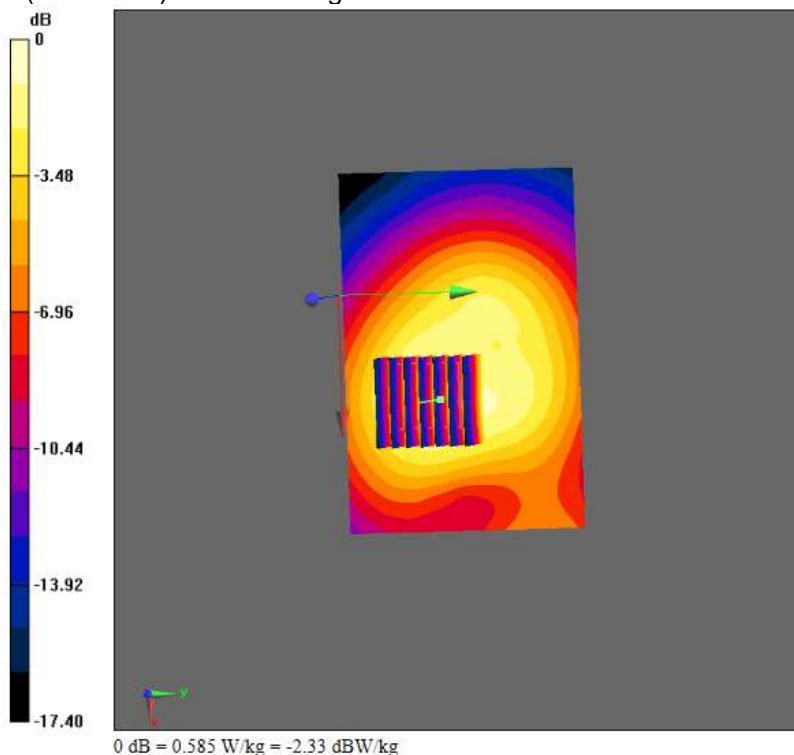
Hotspot/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.992 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.542 W/kg; SAR(10 g) = 0.302 W/kg

Maximum value of SAR (measured) = 0.585 W/kg



Test Laboratory: AGC Lab
Hotspot Mid-Body -Front
DUT: mobile phone; Type: AM66

Date: June 24,2014

Communication System: UID 0, WiFi Hotspot (0); Communication System Band: Hotspot; Duty Cycle: 1:1;
Frequency: 2437 MHz; Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.90 \text{ mho/m}$; $\epsilon_r = 51.64$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21, Liquid temperature ($^{\circ}\text{C}$): 21

DASY Configuration:
Probe: EX3DV4 - SN3953; ConvF(7.35,7.35,7.35); Calibrated: 10/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection), $z = 1.0, 31.0$
Electronics: DAE4 Sn1398; Calibrated: 10/10/2013
Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Hotspot/FRONT/Area Scan (121x81x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 0.580 W/kg

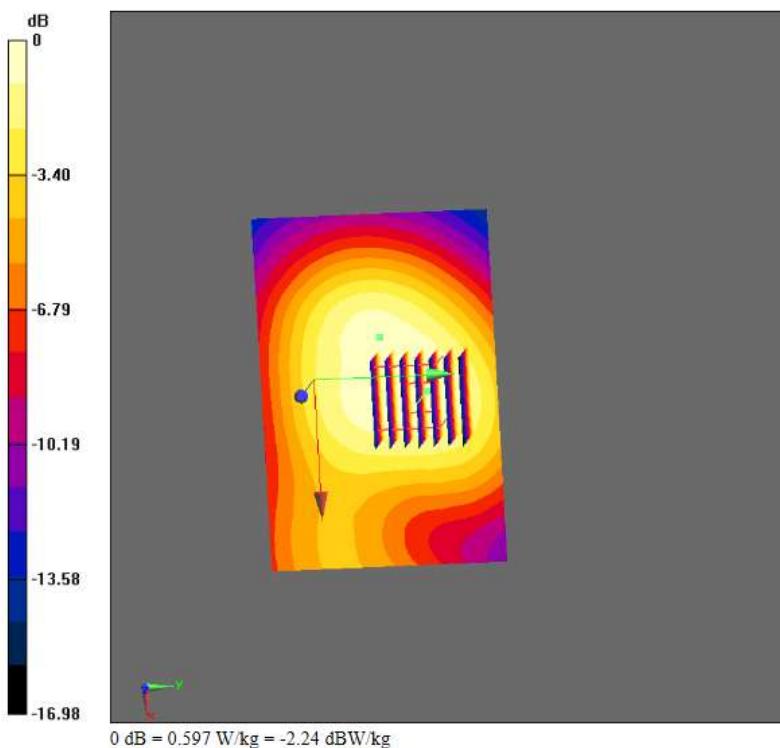
Hotspot/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.859 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.779 W/kg

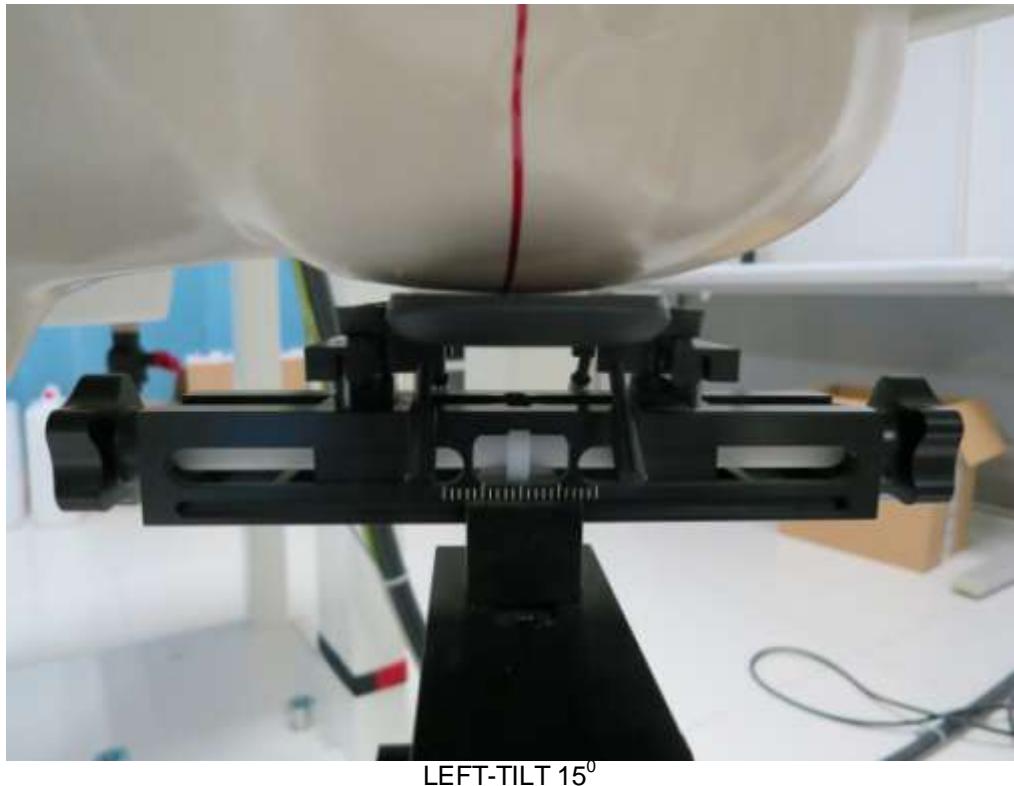
SAR(1 g) = 0.430 W/kg; SAR(10 g) = 0.252 W/kg

Maximum value of SAR (measured) = 0.597 W/kg

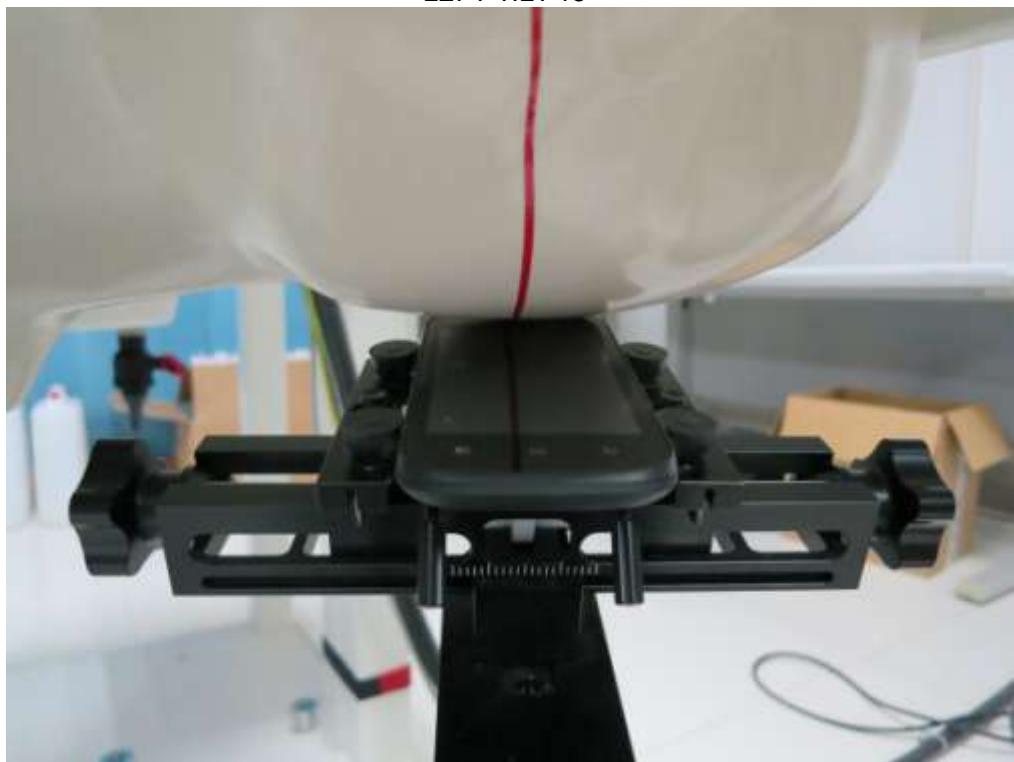


APPENDIX C. TEST SETUP PHOTOGRAPHS & EUT PHOTOGRAPHS

Test Setup Photographs LEFT-CHECK TOUCH

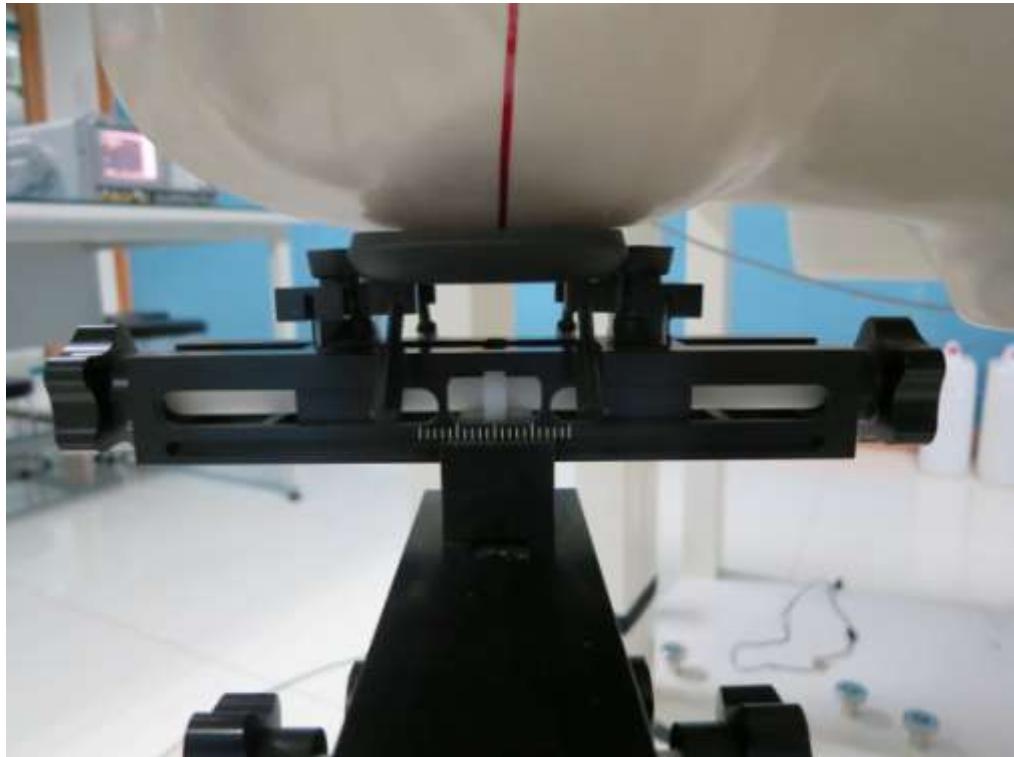


LEFT-CHECK TOUCH

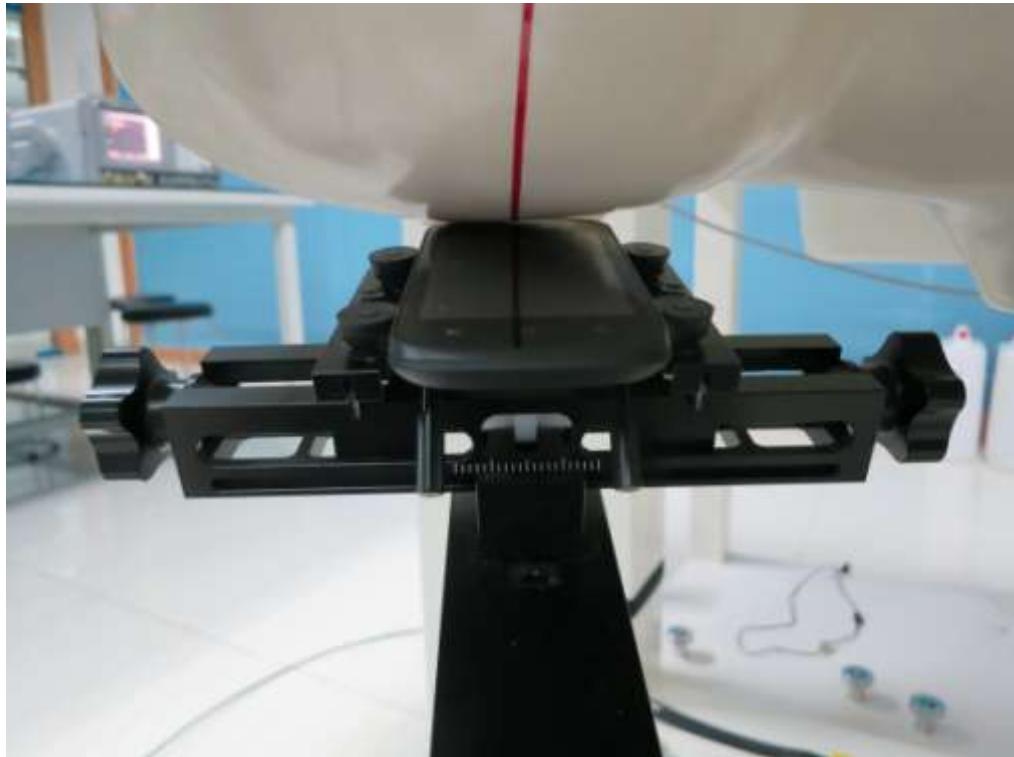


LEFT-TILT 15°

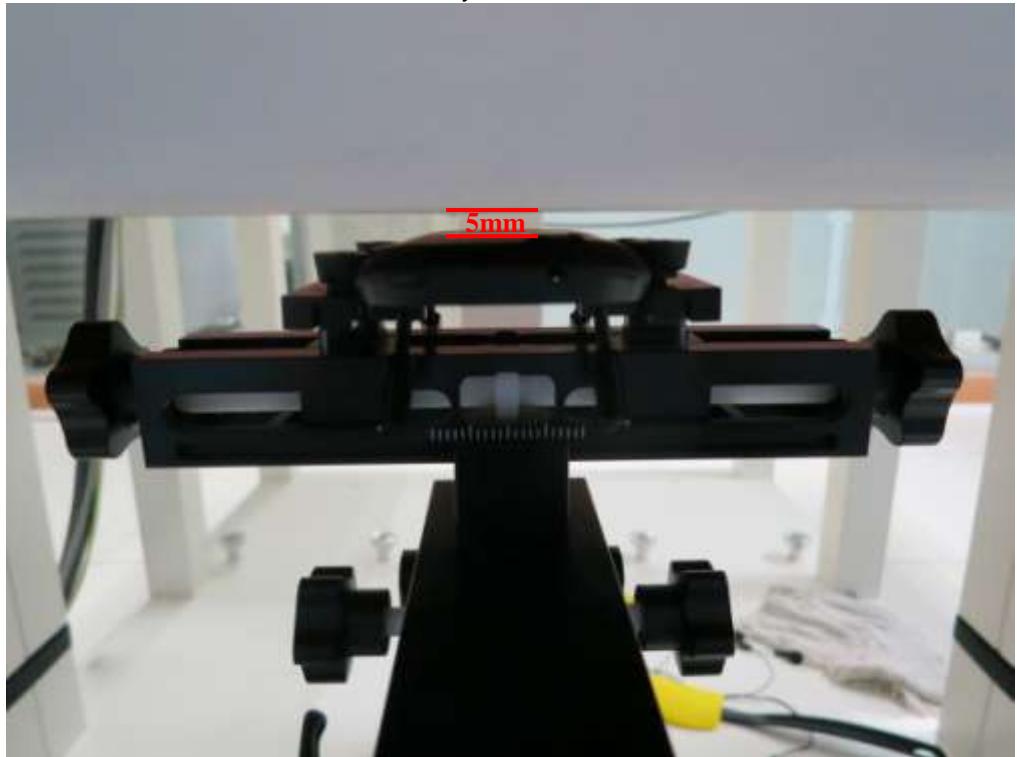
RIGHT-CHECK TOUCH



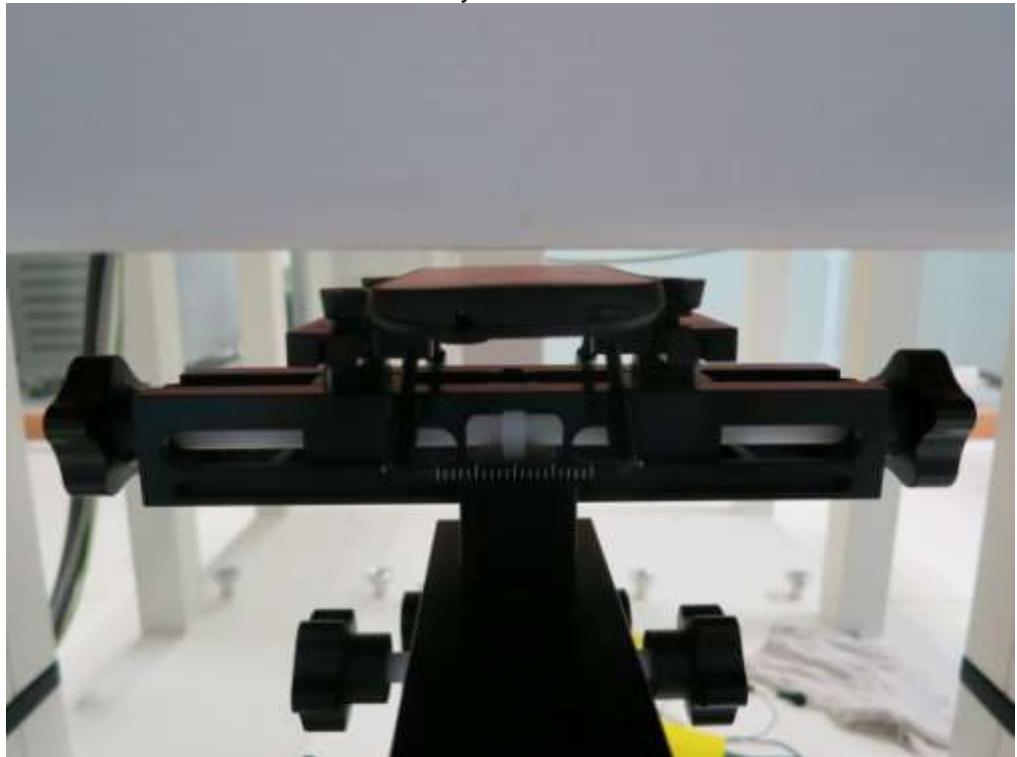
RIGHT-TILT 15⁰



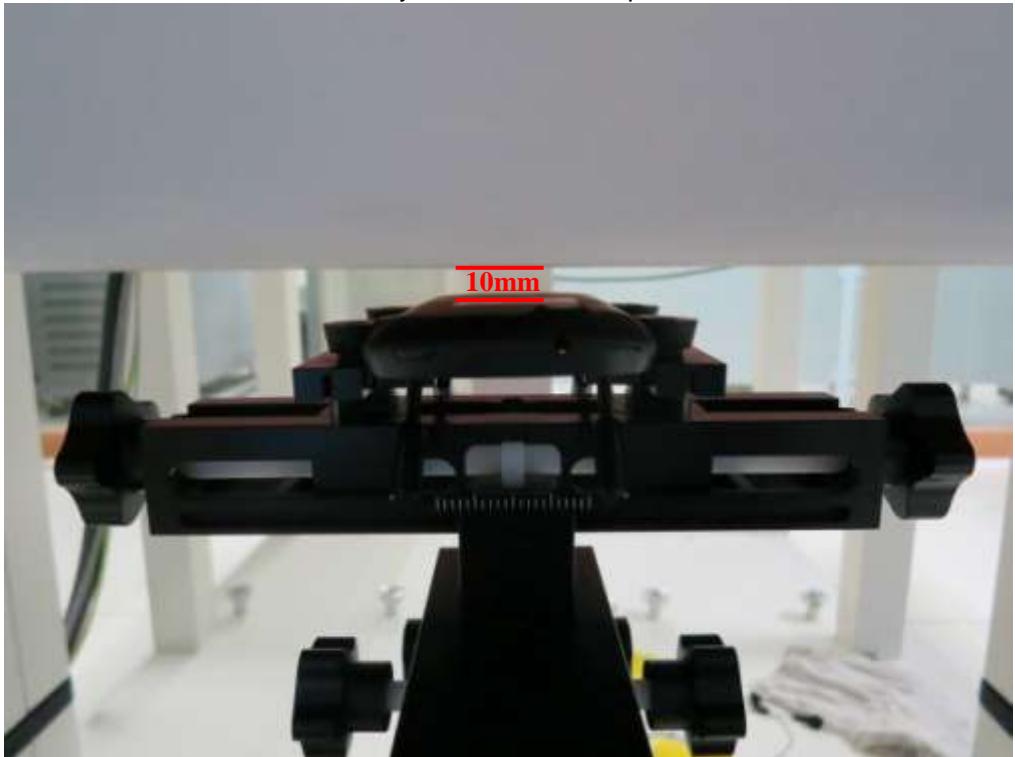
Body Back 5mm



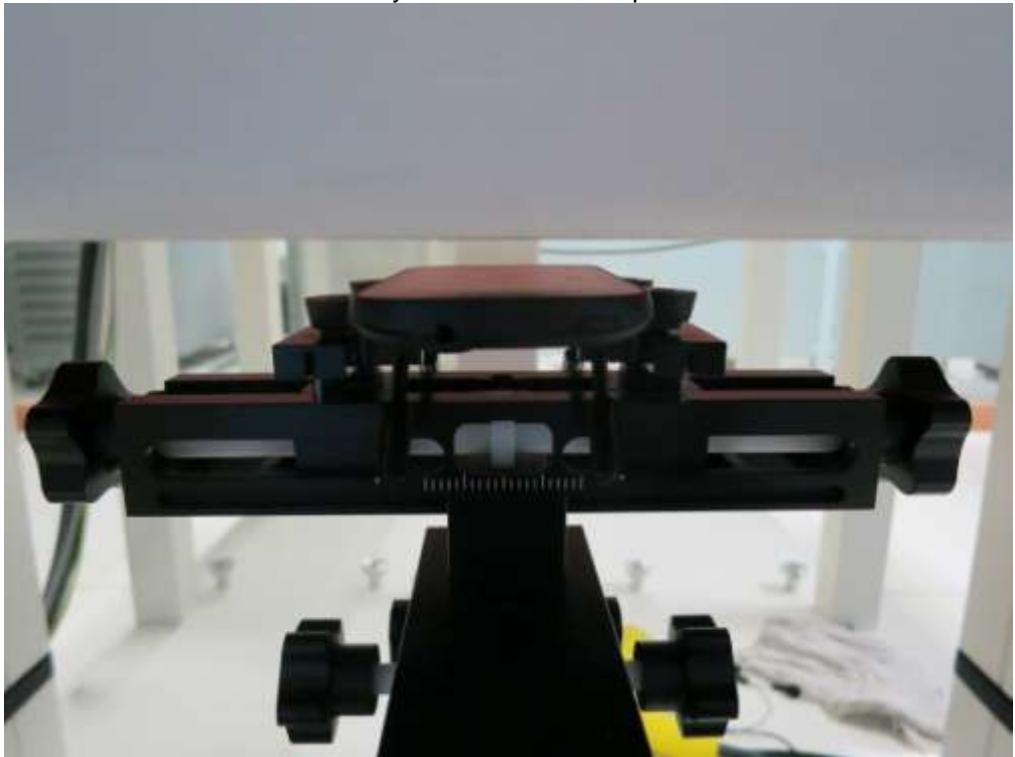
Body Front 5mm



Body Back 10mm--Hotspot



Body Front 10mm—Hotspot



DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

Note : The position used in the measurement were according to IEEE 1528-2003



EUT PHOTOGRAPHS
TOTAL VIEW OF EUT



TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW OF EUT



OPEN VIEW OF EUT-1



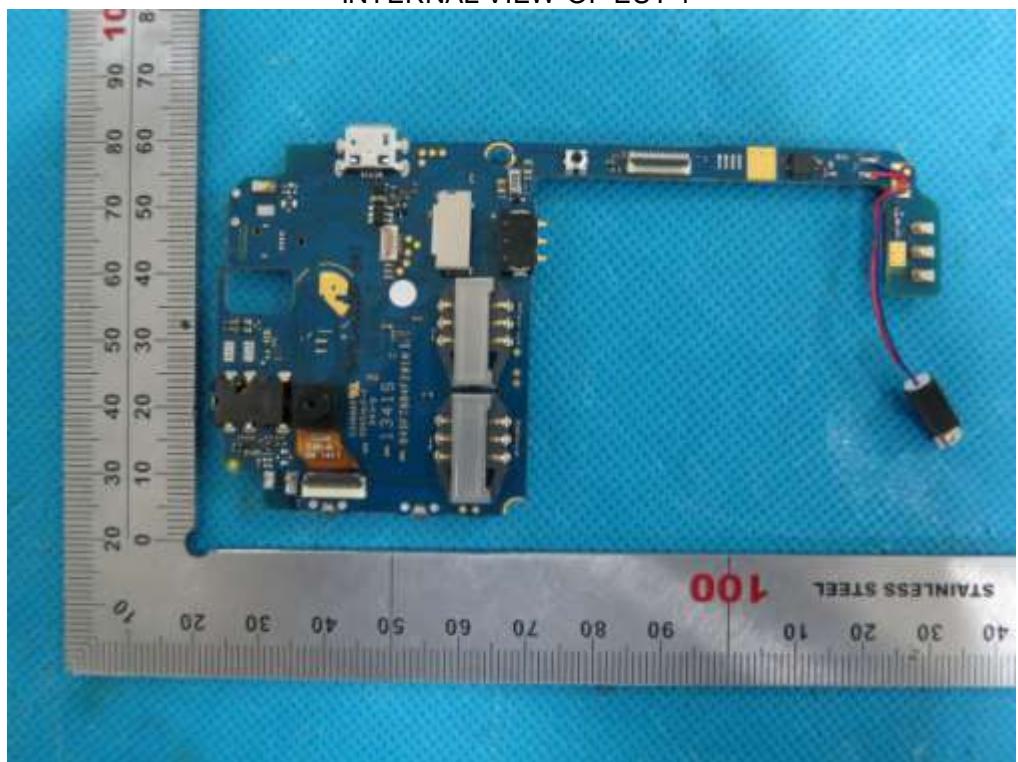
OPEN VIEW OF EUT-2



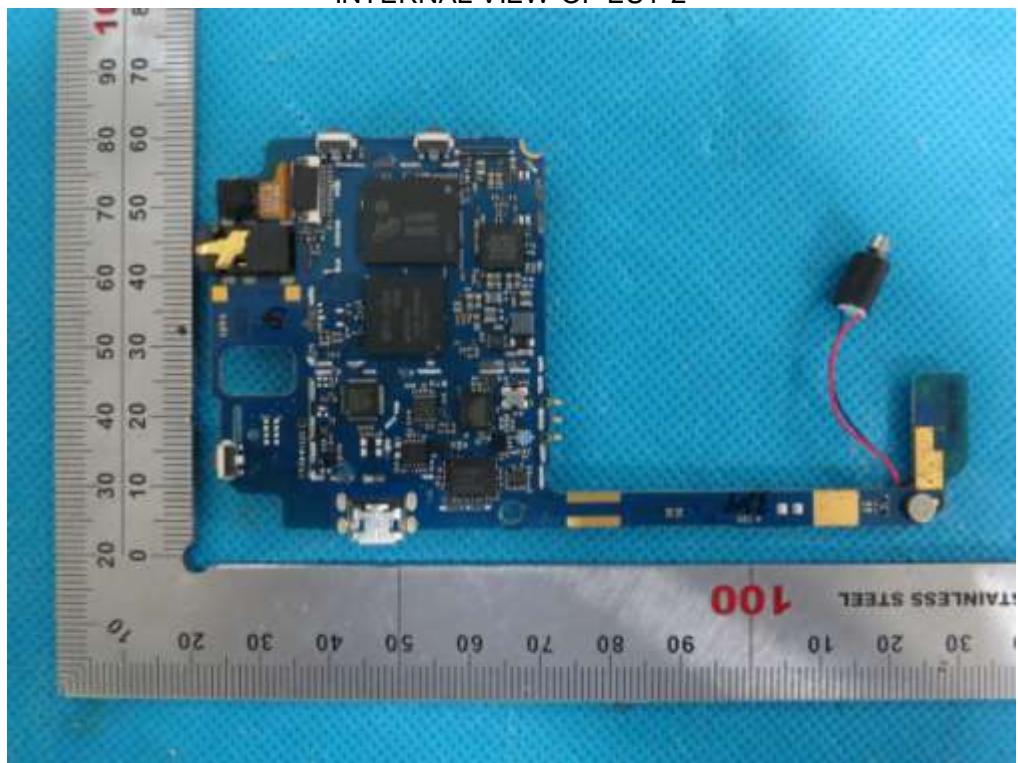
OPEN VIEW OF EUT-3



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



APPENDIX D. PROBE CALIBRATION DATA

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
S 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 AGC-CERT (Auden)

Certificate No: EX3-3953_Oct13

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3953

Calibration procedure(s) QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: October 15, 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 ES30V2 | SN: 3013 | 28-Dec-12 (No. ES3-3013_Dect12) | Dec-13 |
| DAE4 | SN: 660 | 4-Sep-13 (No. DAE4-660_Sep13) | Sep-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-13) | In house check: Oct-14 |

| | | | |
|----------------|----------------------|-----------------------------------|---------------|
| Calibrated by: | Name Leif Klysnar | Function Laboratory Technician | Signature |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: October 15, 2013

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

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



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Accreditation No.: SCS 108

Glossary:

| | |
|------------------------|--|
| TSL | tissue simulating liquid |
| NORM _{x,y,z} | sensitivity in free space |
| ConvF | sensitivity in TSL / NORM _{x,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., $\theta = 0$ is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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:

- NORM_{x,y,z}: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,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 $f \leq 800$ 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 NORM_{x,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.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

EX3DV4 – SN:3953

October 15, 2013

Probe EX3DV4

SN:3953

Manufactured: August 6, 2013
Calibrated: October 15, 2013

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

EX3DV4- SN:3953

October 15, 2013

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3953

Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|--|----------|----------|----------|---------------|
| Norm ($\mu\text{V}/(\text{V/m})^2$) ^A | 0.53 | 0.55 | 0.48 | $\pm 10.1 \%$ |
| DCP (mV) ^B | 97.7 | 98.6 | 97.0 | |

Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB $\sqrt{\mu\text{V}}$ | C | D dB | VR mV | Unc ^E (k=2) |
|-----|---------------------------|---|---------|------------------------------|-----|---------|----------|---------------------------|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 172.9 | $\pm 3.0 \%$ |
| | | Y | 0.0 | 0.0 | 1.0 | | 168.8 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 162.5 | |

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

EX3DV4- SN-3953

October 15, 2013

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3953

Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) ^c | Relative Permittivity ^d | Conductivity (S/m) ^e | ConvF X | ConvF Y | ConvF Z | Alpha ^g | Depth ^h (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 835 | 41.5 | 0.90 | 9.97 | 9.97 | 9.97 | 0.35 | 0.95 | ± 12.0 % |
| 900 | 41.5 | 0.97 | 9.72 | 9.72 | 9.72 | 0.32 | 1.03 | ± 12.0 % |
| 1810 | 40.0 | 1.40 | 8.26 | 8.26 | 8.26 | 0.47 | 0.72 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 8.17 | 8.17 | 8.17 | 0.38 | 0.78 | ± 12.0 % |
| 2100 | 39.8 | 1.49 | 8.35 | 8.35 | 8.35 | 0.45 | 0.71 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 7.39 | 7.39 | 7.39 | 0.46 | 0.70 | ± 12.0 % |
| 5200 | 36.0 | 4.66 | 5.24 | 5.24 | 5.24 | 0.35 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 5.09 | 5.09 | 5.09 | 0.30 | 1.80 | ± 13.1 % |
| 5500 | 35.6 | 4.96 | 4.96 | 4.96 | 4.96 | 0.35 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 4.83 | 4.83 | 4.83 | 0.30 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.67 | 4.67 | 4.67 | 0.40 | 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.

^d At frequencies below 3 GHz, the validity of tissue parameters (ϵ and n) 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 n) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^e Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4- SN:3953

October 15, 2013

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3953

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 ^g | Depth ^g (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 835 | 55.2 | 0.97 | 9.91 | 9.91 | 9.91 | 0.25 | 1.18 | ± 12.0 % |
| 900 | 55.0 | 1.05 | 9.64 | 9.64 | 9.64 | 0.27 | 1.13 | ± 12.0 % |
| 1810 | 53.3 | 1.52 | 7.97 | 7.97 | 7.97 | 0.26 | 1.01 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 7.80 | 7.80 | 7.80 | 0.21 | 1.20 | ± 12.0 % |
| 2100 | 53.2 | 1.62 | 8.06 | 8.06 | 8.06 | 0.36 | 0.82 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 7.35 | 7.35 | 7.35 | 0.80 | 0.55 | ± 12.0 % |
| 5200 | 49.0 | 5.30 | 4.37 | 4.37 | 4.37 | 0.40 | 1.90 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 4.11 | 4.11 | 4.11 | 0.45 | 1.90 | ± 13.1 % |
| 5500 | 48.6 | 5.65 | 3.81 | 3.81 | 3.81 | 0.50 | 1.90 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 3.57 | 3.57 | 3.57 | 0.55 | 1.90 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 3.91 | 3.91 | 3.91 | 0.50 | 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.

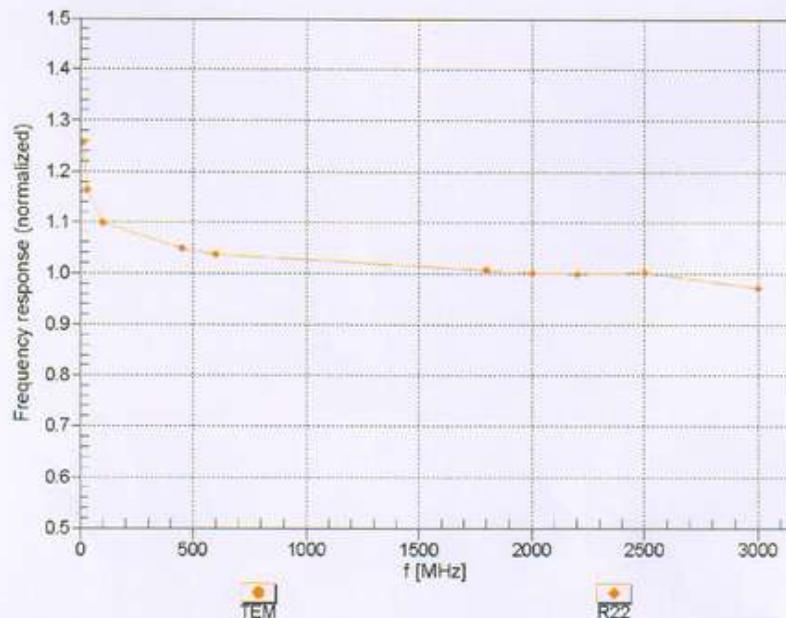
^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^g Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4– SN:3953

October 15, 2013

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



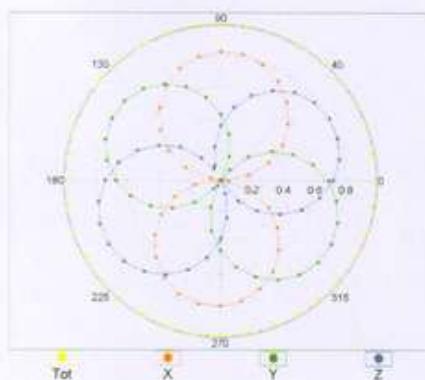
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

EX3DV4– SN:3953

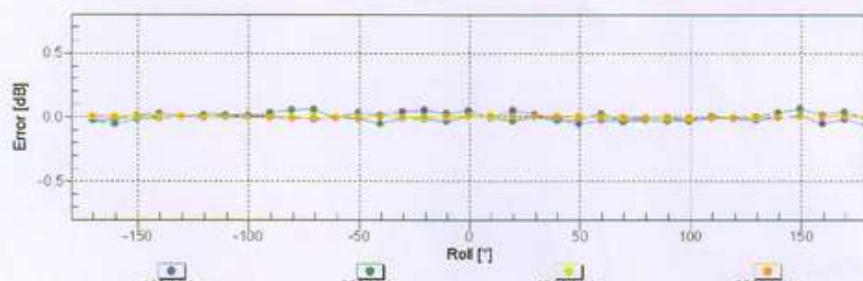
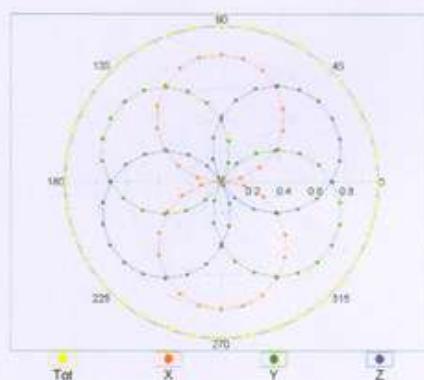
October 15, 2013

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22

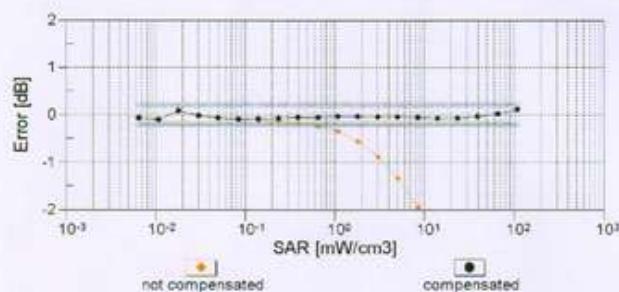
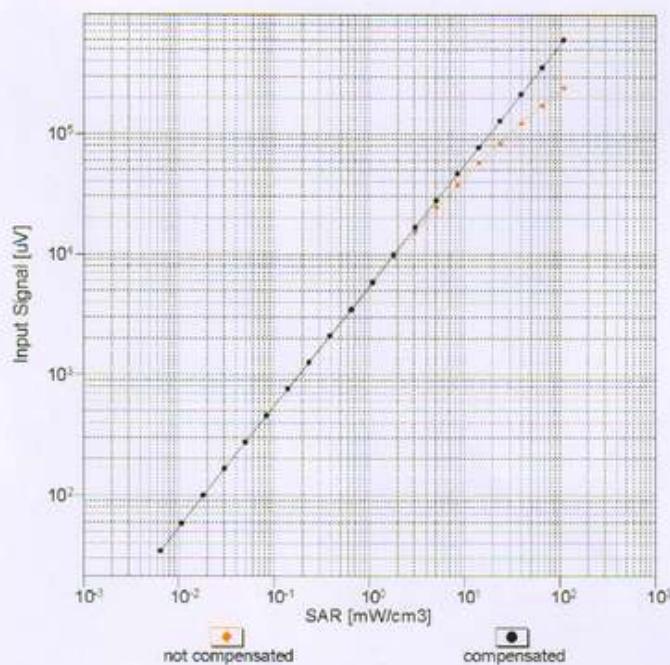


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

EX3DV4— SN:3953

October 15, 2013

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

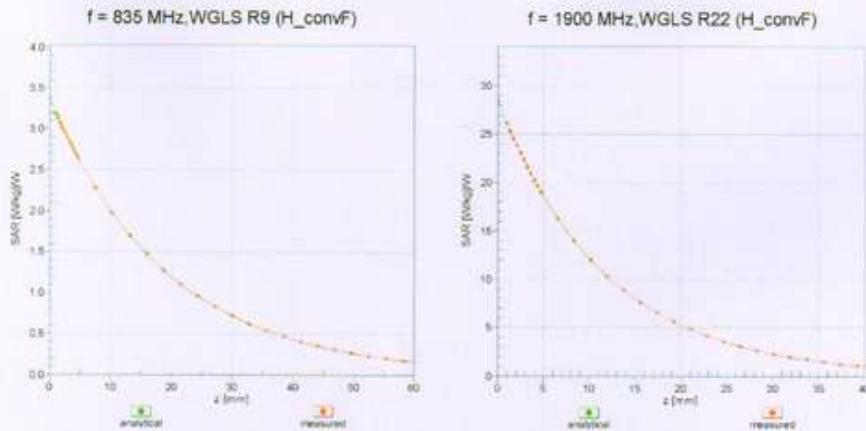


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

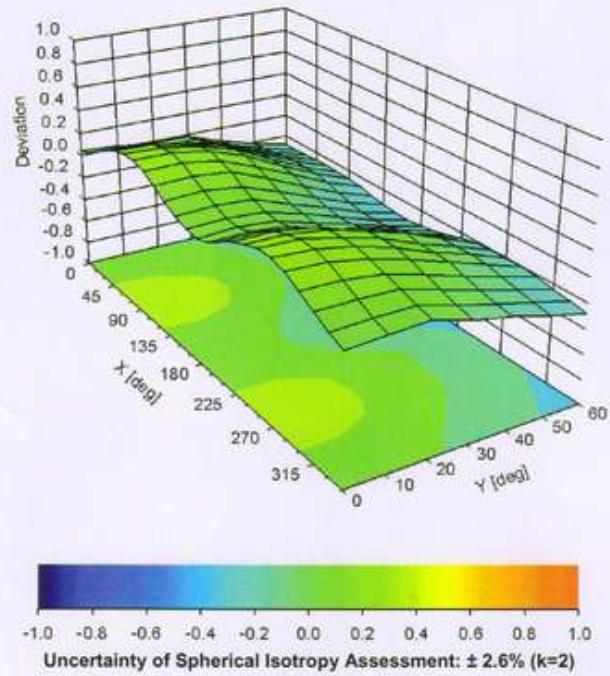
EX3DV4- SN:3953

October 15, 2013

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



EX3DV4- SN:3953

October 15, 2013

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3953

Other Probe Parameters

| | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (") | 29.5 |
| 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 |

APPENDIX E. DAE CALIBRATION DATA

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



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S 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 AGC-CERT (Auden)

Certificate No: DAE4-1398_Oct13

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BM - SN: 1398

Calibration procedure(s) QA CAL-06.v26
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: October 10, 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 |
|-------------------------------|--------------------|----------------------------|------------------------|
| Keithley Multimeter Type 2001 | SN: 0810278 | 01-Oct-13 (No:13978) | Oct-14 |
| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
| Auto DAE Calibration Unit | SE UWS 053 AA 1001 | 07-Jan-13 (in house check) | In house check: Jan-14 |
| Calibrator Box V2.1 | SE UMS 006 AA 1002 | 07-Jan-13 (in house check) | In house check: Jan-14 |

Calibrated by: Name R. Mayoraz Function Technician Signature

Approved by: Fin Bomholt Deputy Technical Manager

Issued: October 10, 2013
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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S 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

Glossary

| | |
|-----------------|---|
| DAE | data acquisition electronics |
| Connector angle | information used in DASY system to align probe sensor X to the robot coordinate system. |

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - *DC Voltage Measurement Linearity*: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - *Common mode sensitivity*: Influence of a positive or negative common mode voltage on the differential measurement.
 - *Channel separation*: Influence of a voltage on the neighbor channels not subject to an input voltage.
 - *AD Converter Values with inputs shorted*: Values on the internal AD converter corresponding to zero input voltage
 - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
 - *Input Offset Current*: Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - *Input resistance*: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - *Low Battery Alarm Voltage*: Typical value for information. Below this voltage, a battery alarm signal is generated.
 - *Power consumption*: Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = $6.1\mu V$, full range = $-100...+300 mV$

Low Range: 1LSB = $61nV$, full range = $-1.....+3mV$

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---------------------|----------------------------|----------------------------|----------------------------|
| High Range | $404.147 \pm 0.02\% (k=2)$ | $404.125 \pm 0.02\% (k=2)$ | $403.593 \pm 0.02\% (k=2)$ |
| Low Range | $3.97351 \pm 1.50\% (k=2)$ | $3.99134 \pm 1.50\% (k=2)$ | $3.96993 \pm 1.50\% (k=2)$ |

Connector Angle

| | |
|---|---------------------------|
| Connector Angle to be used in DASY system | $195.0^\circ \pm 1^\circ$ |
|---|---------------------------|

Appendix

1. DC Voltage Linearity

| High Range | Reading (μ V) | Difference (μ V) | Error (%) |
|-------------------|--------------------|-----------------------|-----------|
| Channel X + Input | 199993.80 | -0.96 | -0.00 |
| Channel X + Input | 20001.48 | 0.96 | 0.00 |
| Channel X - Input | -19998.33 | 1.89 | -0.01 |
| Channel Y + Input | 199993.57 | -0.93 | -0.00 |
| Channel Y + Input | 19999.87 | -0.65 | -0.00 |
| Channel Y - Input | -20000.78 | -0.61 | 0.00 |
| Channel Z + Input | 199994.78 | 0.34 | 0.00 |
| Channel Z + Input | 19999.79 | -0.74 | -0.00 |
| Channel Z - Input | -20001.29 | -1.06 | 0.01 |

| Low Range | Reading (μ V) | Difference (μ V) | Error (%) |
|-------------------|--------------------|-----------------------|-----------|
| Channel X + Input | 2000.47 | -0.40 | -0.02 |
| Channel X + Input | 201.47 | 0.11 | 0.05 |
| Channel X - Input | -198.29 | 0.26 | -0.13 |
| Channel Y + Input | 2001.20 | 0.29 | 0.01 |
| Channel Y + Input | 200.83 | -0.60 | -0.30 |
| Channel Y - Input | -198.98 | -0.44 | 0.22 |
| Channel Z + Input | 2001.13 | 0.29 | 0.01 |
| Channel Z + Input | 200.34 | -1.05 | -0.52 |
| Channel Z - Input | -199.72 | -1.09 | 0.55 |

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Common mode Input Voltage (mV) | High Range Average Reading (μ V) | Low Range Average Reading (μ V) |
|-----------|-----------------------------------|--|---|
| Channel X | 200 | -13.30 | -14.96 |
| | -200 | 15.96 | 14.26 |
| Channel Y | 200 | 8.58 | 8.53 |
| | -200 | -10.64 | -10.82 |
| Channel Z | 200 | 7.29 | 7.35 |
| | -200 | -9.79 | -10.00 |

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Input Voltage (mV) | Channel X (μ V) | Channel Y (μ V) | Channel Z (μ V) |
|-----------|--------------------|----------------------|----------------------|----------------------|
| Channel X | 200 | - | -2.79 | -1.69 |
| Channel Y | 200 | 4.12 | - | -2.08 |
| Channel Z | 200 | 9.54 | 2.38 | - |

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | High Range (LSB) | Low Range (LSB) |
|-----------|------------------|-----------------|
| Channel X | 15962 | 16491 |
| Channel Y | 15951 | 16621 |
| Channel Z | 15854 | 15212 |

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input $10M\Omega$

| | Average (μV) | min. Offset (μV) | max. Offset (μV) | Std. Deviation (μV) |
|-----------|---------------------|-------------------------|-------------------------|----------------------------|
| Channel X | -0.35 | -1.45 | 0.36 | 0.33 |
| Channel Y | -1.44 | -2.26 | -0.41 | 0.33 |
| Channel Z | -2.29 | -3.89 | -0.99 | 0.46 |

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

| | Zeroing (kOhm) | Measuring (MOhm) |
|-----------|----------------|------------------|
| Channel X | 200 | 200 |
| Channel Y | 200 | 200 |
| Channel Z | 200 | 200 |

8. Low Battery Alarm Voltage (Typical values for information)

| Typical values | Alarm Level (VDC) |
|----------------|-------------------|
| Supply (+ Vcc) | +7.9 |
| Supply (- Vcc) | -7.6 |

9. Power Consumption (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|----------------|-------------------|---------------|-------------------|
| Supply (+ Vcc) | +0.01 | +6 | +14 |
| Supply (- Vcc) | -0.01 | -8 | -9 |

APPENDIX F. DIPOLE CALIBRATION DATA



SAR Reference Dipole Calibration Report

Ref: ACR.318.5.13.SATU.A

ATTESTATION OF GLOBAL COMPLIANCE CO. LTD.

1&2F, NO.2 BUILDING, HUAFENG NO.1 INDUSTRIAL
PARK, GUSHU COMMUNITY XIXIANG STREET

BAOAN DISTRICT, SHENZHEN, P.R. CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 900 MHZ

SERIAL NO.: SN 46/11 DIP 0G900-185

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144



11/14/13

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.318.5.13 SATU.A

| | Name | Function | Date | Signature |
|---------------|---------------|-----------------|------------|---------------|
| Prepared by : | Jérôme LUC | Product Manager | 11/14/2013 | |
| Checked by : | Jérôme LUC | Product Manager | 11/14/2013 | |
| Approved by : | Kim RUTKOWSKI | Quality Manager | 11/14/2013 | Kim RUTKOWSKI |

| Distribution : | Customer Name |
|----------------|--|
| | ATTESTATION OF GLOBAL COMPLIANCE CO. LTD. |

| Issue | Date | Modifications |
|-------|------------|-----------------|
| A | 11/14/2013 | Initial release |
| | | |
| | | |
| | | |

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

| Device Under Test | |
|--------------------------------|----------------------------------|
| Device Type | COMOSAR 900 MHz REFERENCE DIPOLE |
| Manufacturer | Satimo |
| Model | SID900 |
| Serial Number | SN 46/11 DIP 0G900-185 |
| Product Condition (new / used) | Used |

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – Satimo COMOSAR Validation Dipole



4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

| Frequency band | Expanded Uncertainty on Return Loss |
|----------------|-------------------------------------|
| 400-6000MHz | 0.1 dB |

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

| Length (mm) | Expanded Uncertainty on Length |
|-------------|--------------------------------|
| 3 - 300 | 0.05 mm |

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

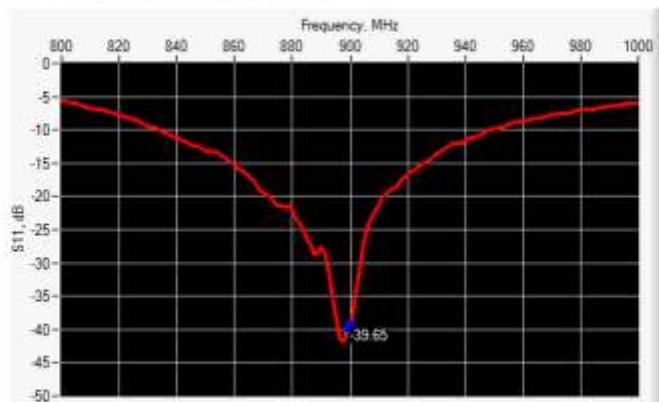
| Scan Volume | Expanded Uncertainty |
|-------------|----------------------|
| 1 g | 20.3 % |
| 10 g | 20.1 % |

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



| Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance |
|-----------------|------------------|------------------|-----------------------------|
| 900 | -39.65 | -20 | $50.5 \Omega - 1.1 j\Omega$ |

6.2 MECHANICAL DIMENSIONS

| Frequency MHz | t mm | | h mm | | d mm | |
|---------------|-------------|----------|-------------|----------|------------|----------|
| | required | measured | required | measured | required | measured |
| 300 | 420.0 ±1 %. | | 250.0 ±1 %. | | 6.35 ±1 %. | |
| 450 | 290.0 ±1 %. | | 166.7 ±1 %. | | 6.35 ±1 %. | |
| 750 | 176.0 ±1 %. | | 100.0 ±1 %. | | 6.35 ±1 %. | |
| 835 | 161.0 ±1 %. | | 89.8 ±1 %. | | 3.6 ±1 %. | |
| 900 | 149.0 ±1 %. | PASS | 89.3 ±1 %. | PASS | 3.6 ±1 %. | PASS |
| 1450 | 89.1 ±1 %. | | 51.7 ±1 %. | | 3.6 ±1 %. | |
| 1500 | 80.5 ±1 %. | | 50.0 ±1 %. | | 3.6 ±1 %. | |
| 1640 | 79.0 ±1 %. | | 45.7 ±1 %. | | 3.6 ±1 %. | |
| 1750 | 75.2 ±1 %. | | 42.9 ±1 %. | | 3.6 ±1 %. | |
| 1800 | 72.0 ±1 %. | | 41.7 ±1 %. | | 3.6 ±1 %. | |
| 1900 | 68.0 ±1 %. | | 39.5 ±1 %. | | 3.6 ±1 %. | |
| 1950 | 66.3 ±1 %. | | 38.5 ±1 %. | | 3.6 ±1 %. | |
| 2000 | 64.5 ±1 %. | | 37.5 ±1 %. | | 3.6 ±1 %. | |
| 2100 | 61.0 ±1 %. | | 35.7 ±1 %. | | 3.6 ±1 %. | |
| 2300 | 55.5 ±1 %. | | 32.6 ±1 %. | | 3.6 ±1 %. | |
| 2450 | 51.5 ±1 %. | | 30.4 ±1 %. | | 3.6 ±1 %. | |
| 2600 | 48.5 ±1 %. | | 28.8 ±1 %. | | 3.6 ±1 %. | |
| 3000 | 41.5 ±1 %. | | 25.0 ±1 %. | | 3.6 ±1 %. | |
| 3500 | 37.0 ±1 %. | | 26.4 ±1 %. | | 3.6 ±1 %. | |
| 3700 | 34.7 ±1 %. | | 26.4 ±1 %. | | 3.6 ±1 %. | |

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 MEASUREMENT CONDITION

| | |
|---|--|
| Software | OPENSAR V4 |
| Phantom | SN 20/09 SAM71 |
| Probe | SN 18/11 EPG122 |
| Liquid | Head Liquid Values: $\epsilon' = 41.8$ sigma: 0.96 |
| Distance between dipole center and liquid | 15.0 mm |
| Area scan resolution | $dx=8\text{mm}/dy=8\text{mm}$ |
| Zoon Scan Resolution | $dx=8\text{mm}/dy=8\text{m}/dz=5\text{mm}$ |
| Frequency | 900 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 21 °C |
| Lab Temperature | 21 °C |
| Lab Humidity | 45% |

7.2 HEAD LIQUID MEASUREMENT

| Frequency MHz | Relative permittivity (ϵ') | | Conductivity (σ) S/m | |
|------------------|---------------------------------------|----------|-------------------------------|----------|
| | required | measured | required | measured |
| 300 | 45.3 ± 5 % | | 0.87 ± 5 % | |
| 450 | 43.5 ± 5 % | | 0.87 ± 5 % | |
| 750 | 41.9 ± 5 % | | 0.89 ± 5 % | |
| 825 | 41.5 ± 5 % | | 0.90 ± 5 % | |
| 900 | 41.5 ± 5 % | PASS | 0.97 ± 5 % | PASS |
| 1450 | 40.5 ± 5 % | | 1.20 ± 5 % | |
| 1500 | 40.4 ± 5 % | | 1.23 ± 5 % | |
| 1640 | 40.2 ± 5 % | | 1.31 ± 5 % | |
| 1750 | 40.1 ± 5 % | | 1.37 ± 5 % | |
| 1800 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 1900 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 1950 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 2000 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 2100 | 39.8 ± 5 % | | 1.49 ± 5 % | |
| 2300 | 39.5 ± 5 % | | 1.67 ± 5 % | |
| 2450 | 39.2 ± 5 % | | 1.80 ± 5 % | |
| 2600 | 39.0 ± 5 % | | 1.96 ± 5 % | |
| 3000 | 38.5 ± 5 % | | 2.40 ± 5 % | |
| 3500 | 37.9 ± 5 % | | 2.91 ± 5 % | |

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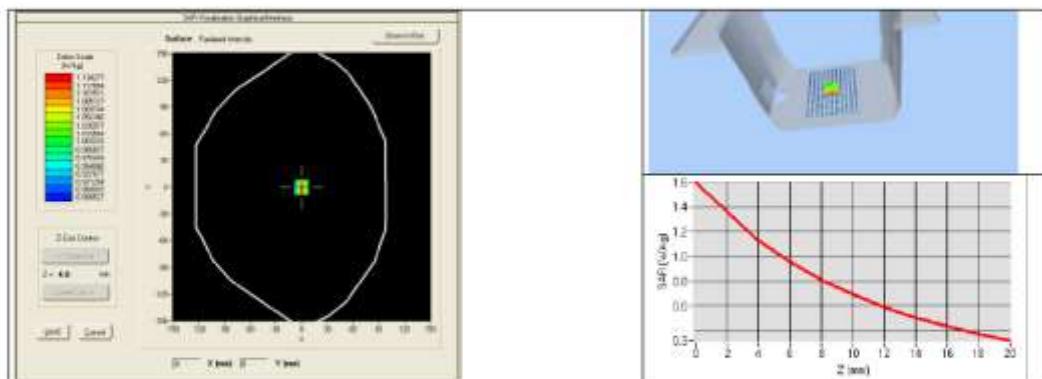
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.318.5.13 SATU A

7.3 MEASUREMENT RESULT

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

| Frequency MHz | 1 g SAR (W/kg/W) | | 10 g SAR (W/kg/W) | |
|------------------|------------------|--------------|-------------------|-------------|
| | required | measured | required | measured |
| 300 | 2.85 | | 1.94 | |
| 450 | 4.56 | | 3.06 | |
| 750 | 8.49 | | 5.55 | |
| 835 | 9.56 | | 6.22 | |
| 900 | 10.9 | 10.70 {1.07} | 6.99 | 6.72 {0.67} |
| 1450 | 29 | | 16 | |
| 1500 | 30.5 | | 16.8 | |
| 1640 | 34.2 | | 18.4 | |
| 1750 | 36.4 | | 19.3 | |
| 1800 | 38.4 | | 20.1 | |
| 1900 | 39.7 | | 20.5 | |
| 1950 | 40.5 | | 20.9 | |
| 2000 | 41.1 | | 21.1 | |
| 2100 | 43.6 | | 21.9 | |
| 2300 | 49.7 | | 23.3 | |
| 2450 | 52.4 | | 24 | |
| 2600 | 55.3 | | 24.6 | |
| 3000 | 63.8 | | 25.7 | |
| 3500 | 67.1 | | 25 | |



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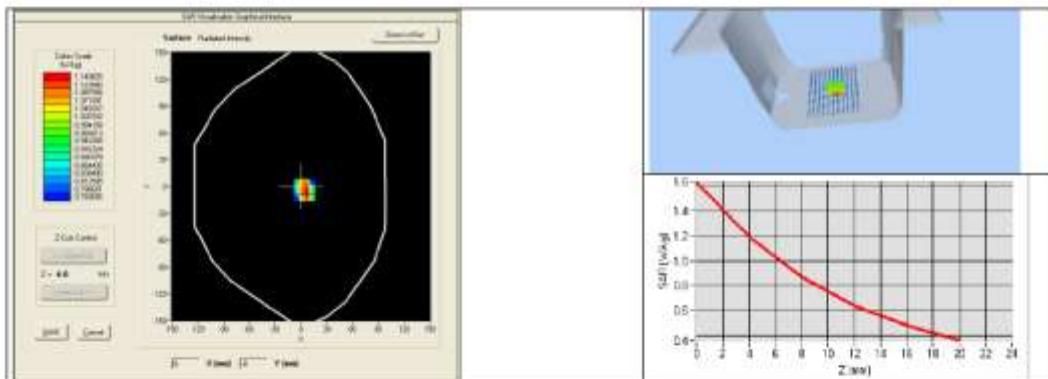
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.318.5.13 SATU.A

7.4 BODY MEASUREMENT RESULT

| | |
|---|---|
| Software | OPENSAR V4 |
| Phantom | SN 20/09 SAM71 |
| Probe | SN 18/11 EPG122 |
| Liquid | Body Liquid Values: $\epsilon' = 56.0$ sigma = 1.04 |
| Distance between dipole center and liquid | 15.0 mm |
| Area scan resolution | dx=8mm/dy=8mm |
| Zoon Scan Resolution | dx=8mm/dy=8m/dz=5mm |
| Frequency | 900 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 21 °C |
| Lab Temperature | 21 °C |
| Lab Humidity | 45 % |

| Frequency MHz | 1 g SAR [W/kg/W] measured | 10 g SAR [W/kg/W] measured |
|------------------|------------------------------|-------------------------------|
| 900 | 11.27 (1.13) | 7.18 (0.72) |



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8 LIST OF EQUIPMENT

| Equipment Summary Sheet | | | | |
|---------------------------------|----------------------|--------------------|---|---|
| Equipment Description | Manufacturer / Model | Identification No. | Current Calibration Date | Next Calibration Date |
| SAM Phantom | Satimo | SN-20/09-SAM71 | Validated. No cal required. | Validated. No cal required. |
| COMOSAR Test Bench | Version 3 | NA | Validated. No cal required. | Validated. No cal required. |
| Network Analyzer | Rhode & Schwarz ZVA | SN100132 | 02/2013 | 02/2016 |
| Calipers | Camera | CALIPER-01 | 12/2010 | 12/2013 |
| Reference Probe | Satimo | EPG122 SN 18/11 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Multimeter | Keithley 2000 | 1188656 | 11/2010 | 11/2013 |
| Signal Generator | Agilent E4438C | MY49070581 | 12/2010 | 12/2013 |
| Amplifier | Aethercomm | SN 046 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter | HP E4418A | US38261498 | 11/2010 | 11/2013 |
| Power Sensor | HP ECP-E26A | US37181460 | 11/2010 | 11/2013 |
| Directional Coupler | Narda 4216-20 | 01386 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Temperature and Humidity Sensor | Control Company | 11-661-9 | 3/2012 | 3/2014 |

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SAR Reference Dipole Calibration Report

Ref: ACR.318.7.13.SATU.A

ATTESTATION OF GLOBAL COMPLIANCE CO. LTD.

1&2F, NO.2 BUILDING, HUAFENG NO.1 INDUSTRIAL
PARK, GUSHU COMMUNITY XIXIANG STREET

BAOAN DISTRICT, SHENZHEN, P.R. CHINA

SATIMO COMOSAR REFERENCE DIPOLE

FREQUENCY: 1900 MHZ

SERIAL NO.: SN 46/11 DIP 1G900-187

Calibrated at SATIMO US

2105 Barrett Park Dr. - Kennesaw, GA 30144



11/14/13

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.318.7.13 SATU A

| | Name | Function | Date | Signature |
|---------------|---------------|-----------------|------------|---------------|
| Prepared by : | Jérôme LUC | Product Manager | 11/14/2013 | |
| Checked by : | Jérôme LUC | Product Manager | 11/14/2013 | |
| Approved by : | Kim RUTKOWSKI | Quality Manager | 11/14/2013 | Kim RUTKOWSKI |

| Distribution : | Customer Name |
|----------------|--|
| | ATTESTATION OF GLOBAL COMPLIANCE CO. LTD. |

| Issue | Date | Modifications |
|-------|------------|-----------------|
| A | 11/14/2013 | Initial release |
| | | |
| | | |
| | | |

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| 7.2 | Head Liquid Measurement | 7 |
| 7.3 | Measurement Result | 8 |
| 7.4 | Body Measurement Result | 9 |
| 8 | List of Equipment | 10 |



1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

| Device Under Test | |
|--------------------------------|-----------------------------------|
| Device Type | COMOSAR 1900 MHz REFERENCE DIPOLE |
| Manufacturer | Satimo |
| Model | SID1900 |
| Serial Number | SN 46/11 DIP 1G900-187 |
| Product Condition (new / used) | Used |

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – Satimo COMOSAR Validation Dipole



4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

| Frequency band | Expanded Uncertainty on Return Loss |
|----------------|-------------------------------------|
| 400-6000MHz | 0.1 dB |

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

| Length (mm) | Expanded Uncertainty on Length |
|-------------|--------------------------------|
| 3 - 300 | 0.05 mm |

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

| Scan Volume | Expanded Uncertainty |
|-------------|----------------------|
| 1 g | 20.3 % |
| 10 g | 20.1 % |

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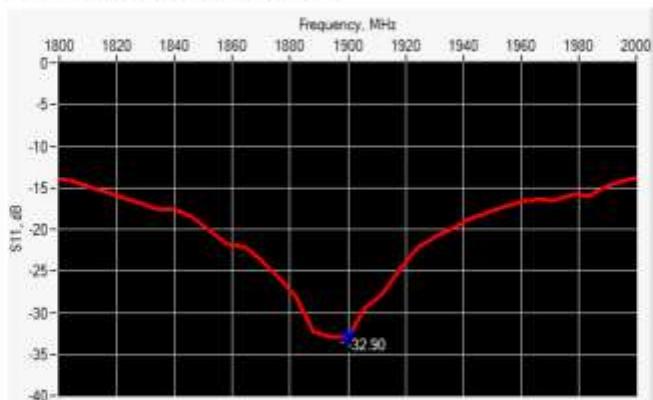


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.3187.13 SATU A

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



| Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance |
|-----------------|------------------|------------------|-----------------------------|
| 1900 | -32.90 | -20 | $48.9 \Omega + 2.3 j\Omega$ |

6.2 MECHANICAL DIMENSIONS

| Frequency MHz | t mm | | h mm | | d mm | |
|---------------|-------------|----------|-------------|----------|------------|----------|
| | required | measured | required | measured | required | measured |
| 300 | 420.0 ±1 %. | | 250.0 ±1 %. | | 6.35 ±1 %. | |
| 450 | 290.0 ±1 %. | | 166.7 ±1 %. | | 6.35 ±1 %. | |
| 750 | 176.0 ±1 %. | | 100.0 ±1 %. | | 6.35 ±1 %. | |
| 835 | 161.0 ±1 %. | | 89.8 ±1 %. | | 3.6 ±1 %. | |
| 900 | 149.0 ±1 %. | | 83.3 ±1 %. | | 3.6 ±1 %. | |
| 1450 | 89.1 ±1 %. | | 51.7 ±1 %. | | 3.6 ±1 %. | |
| 1500 | 80.5 ±1 %. | | 50.0 ±1 %. | | 3.6 ±1 %. | |
| 1640 | 79.0 ±1 %. | | 45.7 ±1 %. | | 3.6 ±1 %. | |
| 1750 | 75.2 ±1 %. | | 42.9 ±1 %. | | 3.6 ±1 %. | |
| 1800 | 72.0 ±1 %. | | 41.7 ±1 %. | | 3.6 ±1 %. | |
| 1900 | 68.0 ±1 %. | PASS | 39.5 ±1 %. | PASS | 3.6 ±1 %. | PASS |
| 1950 | 66.3 ±1 %. | | 38.5 ±1 %. | | 3.6 ±1 %. | |
| 2000 | 64.5 ±1 %. | | 37.5 ±1 %. | | 3.6 ±1 %. | |
| 2100 | 61.0 ±1 %. | | 35.7 ±1 %. | | 3.6 ±1 %. | |
| 2300 | 55.5 ±1 %. | | 32.6 ±1 %. | | 3.6 ±1 %. | |
| 2450 | 51.5 ±1 %. | | 30.4 ±1 %. | | 3.6 ±1 %. | |
| 2600 | 48.5 ±1 %. | | 28.8 ±1 %. | | 3.6 ±1 %. | |
| 3000 | 41.5 ±1 %. | | 25.0 ±1 %. | | 3.6 ±1 %. | |
| 3500 | 37.0 ±1 %. | | 26.4 ±1 %. | | 3.6 ±1 %. | |
| 3700 | 34.7 ±1 %. | | 26.4 ±1 %. | | 3.6 ±1 %. | |

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 MEASUREMENT CONDITION

| | |
|---|---|
| Software | OPEN SAR V4 |
| Phantom | SN 20/09 SAM71 |
| Probe | SN 19/11 EPG122 |
| Liquid | Head Liquid Values: ϵ_r' : 39.8 sigma : 1.43 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | $dx=8mm/dy=8mm$ |
| Zoon Scan Resolution | $dx=8mm/dy=8mm/dz=5mm$ |
| Frequency | 1900 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 21 °C |
| Lab Temperature | 21 °C |
| Lab Humidity | 45% |

7.2 HEAD LIQUID MEASUREMENT

| Frequency MHz | Relative permittivity (ϵ_r') | | Conductivity (σ) S/m | |
|------------------|---|----------|----------------------|----------|
| | required | measured | required | measured |
| 300 | 45.3 ± 5 % | | 0.87 ± 5 % | |
| 450 | 43.5 ± 5 % | | 0.87 ± 5 % | |
| 750 | 41.8 ± 5 % | | 0.89 ± 5 % | |
| 835 | 41.5 ± 5 % | | 0.90 ± 5 % | |
| 900 | 41.5 ± 5 % | | 0.97 ± 5 % | |
| 1450 | 40.5 ± 5 % | | 1.20 ± 5 % | |
| 1500 | 40.4 ± 5 % | | 1.23 ± 5 % | |
| 1640 | 40.2 ± 5 % | | 1.31 ± 5 % | |
| 1750 | 40.1 ± 5 % | | 1.37 ± 5 % | |
| 1800 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 1900 | 40.0 ± 5 % | PASS | 1.40 ± 5 % | PASS |
| 1950 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 2000 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 2100 | 39.8 ± 5 % | | 1.49 ± 5 % | |
| 2300 | 39.5 ± 5 % | | 1.67 ± 5 % | |
| 2450 | 39.2 ± 5 % | | 1.80 ± 5 % | |
| 2600 | 39.0 ± 5 % | | 1.96 ± 5 % | |
| 3000 | 38.5 ± 5 % | | 2.40 ± 5 % | |
| 3500 | 37.9 ± 5 % | | 2.91 ± 5 % | |

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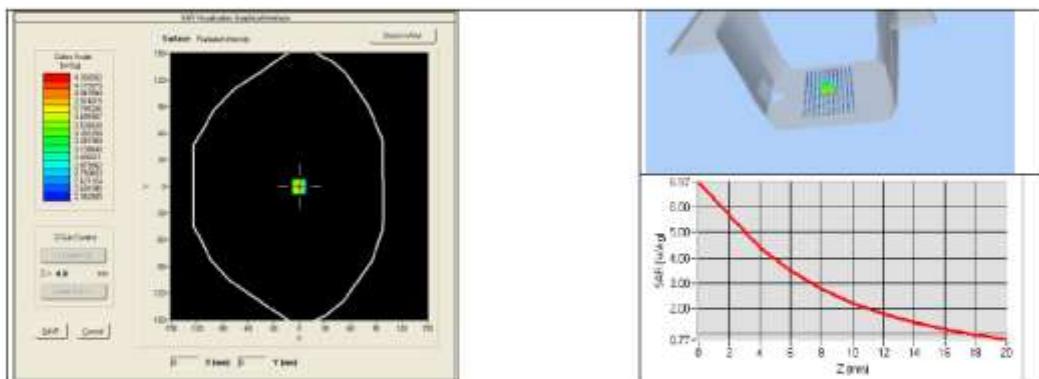
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7.3 MEASUREMENT RESULT

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

| Frequency MHz | 1 g SAR (W/kg/W) | | 10 g SAR (W/kg/W) | |
|------------------|------------------|--------------|-------------------|--------------|
| | required | measured | required | measured |
| 300 | 2.85 | | 1.94 | |
| 450 | 4.58 | | 3.06 | |
| 750 | 8.49 | | 5.55 | |
| 835 | 9.56 | | 6.22 | |
| 900 | 10.9 | | 6.99 | |
| 1450 | 29 | | 16 | |
| 1500 | 30.5 | | 16.8 | |
| 1640 | 34.2 | | 18.4 | |
| 1750 | 36.4 | | 19.3 | |
| 1800 | 38.4 | | 20.1 | |
| 1900 | 39.7 | 39.65 (3.96) | 20.5 | 20.24 (2.02) |
| 1950 | 40.5 | | 20.9 | |
| 2000 | 41.1 | | 21.1 | |
| 2100 | 43.6 | | 21.9 | |
| 2300 | 48.7 | | 23.3 | |
| 2450 | 52.4 | | 24 | |
| 2600 | 55.3 | | 24.6 | |
| 3000 | 63.8 | | 25.7 | |
| 3500 | 67.1 | | 25 | |





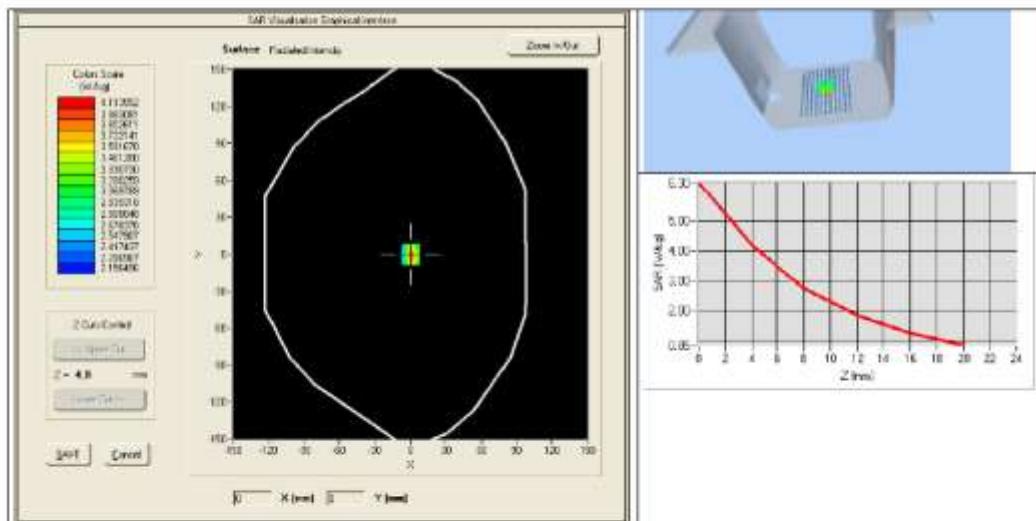
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.312.7.13.SATU.A

7.4 BODY MEASUREMENT RESULT

| | |
|---|--|
| Software | OPENSAR V4 |
| Phantom | SN 20/09 SAM71 |
| Probe | SN 18/11 EPG122 |
| Liquid | Body Liquid Values: ϵ_s' : 52.5 sigma: 1.50 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | $dx=8\text{mm}/dy=8\text{mm}$ |
| Zoon Scan Resolution | $dx=8\text{mm}/dy=8\text{m}/dz=5\text{mm}$ |
| Frequency | 1900 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 21°C |
| Lab Temperature | 21°C |
| Lab Humidity | 45% |

| Frequency MHz | 1 g SAR (W/kg/W) | 10 g SAR (W/kg/W) |
|------------------|------------------|-------------------|
| | measured | measured |
| 1900 | 40.74 (4.07) | 21.43 (2.14) |





8 LIST OF EQUIPMENT

| Equipment Summary Sheet | | | | |
|---------------------------------|----------------------|--------------------|---|---|
| Equipment Description | Manufacturer / Model | Identification No. | Current Calibration Date | Next Calibration Date |
| SAM Phantom | Satimo | SN-20/09-SAM71 | Validated. No cal required. | Validated. No cal required. |
| COMOSAR Test Bench | Version 3 | NA | Validated. No cal required. | Validated. No cal required. |
| Network Analyzer | Rhode & Schwarz ZVA | SN100132 | 02/2013 | 02/2016 |
| Calipers | Carrera | CALIPER-01 | 12/2010 | 12/2013 |
| Reference Probe | Satimo | EPG122 SN 18/11 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Multimeter | Keithley 2000 | 1188656 | 11/2010 | 11/2013 |
| Signal Generator | Agilent E4438C | MY49070581 | 12/2010 | 12/2013 |
| Amplifier | Aethercomm | SN 046 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter | HP E4418A | US38261498 | 11/2010 | 11/2013 |
| Power Sensor | HP ECP-E26A | US37181460 | 11/2010 | 11/2013 |
| Directional Coupler | Narda 4216-20 | 01386 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Temperature and Humidity Sensor | Control Company | 11-661-9 | 3/2012 | 3/2014 |



SAR Reference Dipole Calibration Report

Ref: ACR.318.9.13.SATU.A

ATTESTATION OF GLOBAL COMPLIANCE CO. LTD.

1&2F, NO.2 BUILDING, HUAFENG NO.1 INDUSTRIAL
PARK, GUSHU COMMUNITY XIXIANG STREET
BAOAN DISTRICT, SHENZHEN, P.R. CHINA
SATIMO COMOSAR REFERENCE DIPOLE
FREQUENCY: 2450 MHZ
SERIAL NO.: SN 46/11 DIP 2G450-189

Calibrated at SATIMO US
2105 Barrett Park Dr. - Kennesaw, GA 30144



11/14/13

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref ACR.318.9.13.BATU.A

| | Name | Function | Date | Signature |
|---------------|---------------|-----------------|------------|-----------|
| Prepared by : | Jérôme LUC | Product Manager | 11/14/2013 | |
| Checked by : | Jérôme LUC | Product Manager | 11/14/2013 | |
| Approved by : | Kim RUTKOWSKI | Quality Manager | 11/14/2013 | |

| Distribution : | Customer Name |
|----------------|--|
| | ATTESTATION OF GLOBAL COMPLIANCE CO. LTD. |

| Issue | Date | Modifications |
|-------|------------|-----------------|
| A | 11/14/2013 | Initial release |
| | | |
| | | |
| | | |

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

| Device Under Test | |
|--------------------------------|-----------------------------------|
| Device Type | COMOSAR 2450 MHz REFERENCE DIPOLE |
| Manufacturer | Satimo |
| Model | SID2450 |
| Serial Number | SN 46/11 DIP 2G450-189 |
| Product Condition (new / used) | Used |

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

Satimo's COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – Satimo COMOSAR Validation Dipole



4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

| Frequency band | Expanded Uncertainty on Return Loss |
|----------------|-------------------------------------|
| 400-6000MHz | 0.1 dB |

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

| Length (mm) | Expanded Uncertainty on Length |
|-------------|--------------------------------|
| 3 - 300 | 0.05 mm |

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

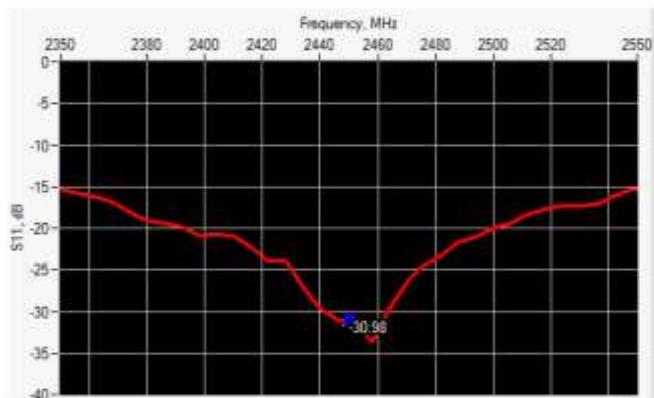
| Scan Volume | Expanded Uncertainty |
|-------------|----------------------|
| 1 g | 20.3 % |
| 10 g | 20.1 % |

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6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



| Frequency (MHz) | Return Loss (dB) | Requirement (dB) | Impedance |
|-----------------|------------------|------------------|-----------------------------|
| 2450 | -30.98 | -20 | $47.3 \Omega + 0.1 j\Omega$ |

6.2 MECHANICAL DIMENSIONS

| Frequency MHz | l mm | | h mm | | d mm | |
|---------------|-----------------|----------|-----------------|----------|----------------|----------|
| | required | measured | required | measured | required | measured |
| 300 | $420.0 \pm 1\%$ | | $250.0 \pm 1\%$ | | $6.35 \pm 1\%$ | |
| 450 | $290.0 \pm 1\%$ | | $166.7 \pm 1\%$ | | $6.35 \pm 1\%$ | |
| 750 | $176.0 \pm 1\%$ | | $100.0 \pm 1\%$ | | $6.35 \pm 1\%$ | |
| 835 | $161.0 \pm 1\%$ | | $89.8 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 900 | $149.0 \pm 1\%$ | | $89.3 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1450 | $89.1 \pm 1\%$ | | $51.7 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1500 | $80.5 \pm 1\%$ | | $50.0 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1640 | $79.0 \pm 1\%$ | | $45.7 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1750 | $75.2 \pm 1\%$ | | $42.9 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1800 | $72.0 \pm 1\%$ | | $41.7 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1900 | $68.0 \pm 1\%$ | | $39.5 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 1950 | $66.3 \pm 1\%$ | | $38.5 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 2000 | $64.5 \pm 1\%$ | | $37.5 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 2100 | $61.0 \pm 1\%$ | | $35.7 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 2300 | $55.5 \pm 1\%$ | | $32.6 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 2450 | $51.5 \pm 1\%$ | PASS | $30.4 \pm 1\%$ | PASS | $9.6 \pm 1\%$ | PASS |
| 2600 | $48.5 \pm 1\%$ | | $28.8 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 3000 | $41.5 \pm 1\%$ | | $25.0 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 3500 | $37.0 \pm 1\%$ | | $26.4 \pm 1\%$ | | $3.6 \pm 1\%$ | |
| 3700 | $34.7 \pm 1\%$ | | $26.4 \pm 1\%$ | | $3.6 \pm 1\%$ | |

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7 VALIDATION MEASUREMENT

The IEEE Std. 1528, OET 65 Bulletin C and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

7.1 MEASUREMENT CONDITION

| | |
|---|---|
| Software | OPENSAR V4 |
| Phantom | SN 20/09 SAM71 |
| Probe | SN 18/11 EPO122 |
| Liquid | Head Liquid Values: ϵ_r' : 38.6 sigma : 1.82 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | $dx=8mm/dy=8mm$ |
| Zoon Scan Resolution | $dx=8mm/dy=8m/dz=5mm$ |
| Frequency | 2450 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 21 °C |
| Lab Temperature | 21 °C |
| Lab Humidity | 45 % |

7.2 HEAD LIQUID MEASUREMENT

| Frequency MHz | Relative permittivity (ϵ_r') | | Conductivity (σ) S/m | |
|------------------|---|----------|----------------------|----------|
| | required | measured | required | measured |
| 300 | 45.3 ± 5 % | | 0.87 ± 5 % | |
| 450 | 43.5 ± 5 % | | 0.87 ± 5 % | |
| 750 | 41.9 ± 5 % | | 0.99 ± 5 % | |
| 835 | 41.5 ± 5 % | | 0.90 ± 5 % | |
| 900 | 41.5 ± 5 % | | 0.97 ± 5 % | |
| 1450 | 40.5 ± 5 % | | 1.20 ± 5 % | |
| 1500 | 40.4 ± 5 % | | 1.23 ± 5 % | |
| 1640 | 40.2 ± 5 % | | 1.31 ± 5 % | |
| 1750 | 40.1 ± 5 % | | 1.37 ± 5 % | |
| 1800 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 1900 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 1950 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 2000 | 40.0 ± 5 % | | 1.40 ± 5 % | |
| 2100 | 39.8 ± 5 % | | 1.49 ± 5 % | |
| 2300 | 39.5 ± 5 % | | 1.67 ± 5 % | |
| 2450 | 39.2 ± 5 % | PASS | 1.80 ± 5 % | PASS |
| 2600 | 39.0 ± 5 % | | 1.96 ± 5 % | |
| 3000 | 38.5 ± 5 % | | 2.40 ± 5 % | |
| 3500 | 37.8 ± 5 % | | 2.91 ± 5 % | |

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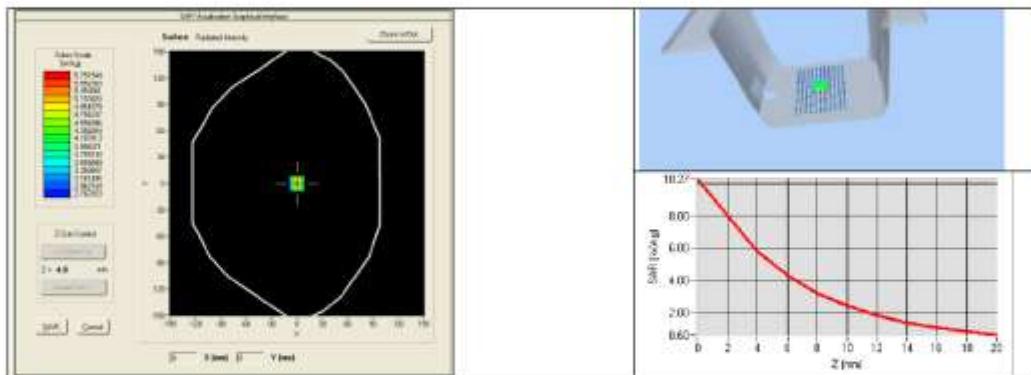
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7.3 MEASUREMENT RESULT

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

| Frequency MHz | 1 g SAR (W/kg/W) | | 10 g SAR (W/kg/W) | |
|------------------|------------------|--------------|-------------------|--------------|
| | required | measured | required | measured |
| 300 | 2.85 | | 1.94 | |
| 450 | 4.58 | | 3.06 | |
| 750 | 8.49 | | 5.55 | |
| 835 | 9.56 | | 6.22 | |
| 900 | 10.9 | | 6.99 | |
| 1450 | 29 | | 16 | |
| 1500 | 30.5 | | 16.8 | |
| 1640 | 34.2 | | 18.4 | |
| 1750 | 36.4 | | 19.3 | |
| 1800 | 38.4 | | 20.1 | |
| 1900 | 39.7 | | 20.5 | |
| 1950 | 40.5 | | 20.9 | |
| 2000 | 41.1 | | 21.1 | |
| 2100 | 43.6 | | 21.9 | |
| 2300 | 48.7 | | 23.3 | |
| 2450 | 52.4 | 54.40 (5.44) | 24 | 23.75 (2.38) |
| 2600 | 55.3 | | 24.6 | |
| 3000 | 63.8 | | 25.7 | |
| 3500 | 67.1 | | 25 | |





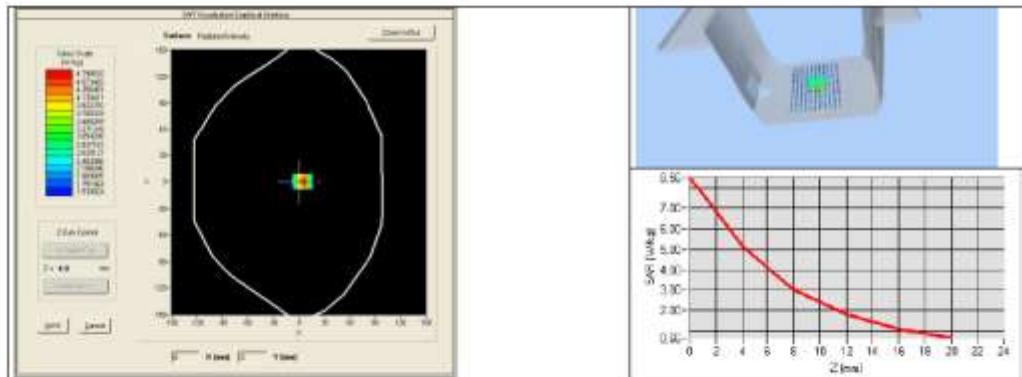
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.318.9.13.SATU A

7.4 BODY MEASUREMENT RESULT

| | |
|---|---|
| Software | OPENSAR V4 |
| Phantom | SN 20/09 SAM71 |
| Probe | SN 18/11 EPG122 |
| Liquid | Body Liquid Values: $\epsilon_r' = 52.0$ sigma = 1.94 |
| Distance between dipole center and liquid | 10.0 mm |
| Area scan resolution | $dx=8\text{mm}/dy=8\text{mm}$ |
| Zoon Scan Resolution | $dx=8\text{mm}/dy=8\text{m}/dz=5\text{mm}$ |
| Frequency | 2450 MHz |
| Input power | 20 dBm |
| Liquid Temperature | 21 °C |
| Lab Temperature | 21 °C |
| Lab Humidity | 45 % |

| Frequency MHz | 1 g SAR (W/kg/W) | 10 g SAR (W/kg/W) |
|------------------|------------------|-------------------|
| | measured | measured |
| 2450 | 54.19 (5.42) | 24.96 (2.50) |



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8 LIST OF EQUIPMENT

| Equipment Summary Sheet | | | | |
|---------------------------------|----------------------|--------------------|---|---|
| Equipment Description | Manufacturer / Model | Identification No. | Current Calibration Date | Next Calibration Date |
| SAM Phantom | Satimo | SN-20/09-SAM71 | Validated. No cal required. | Validated. No cal required. |
| COMOSAR Test Bench | Version 3 | NA | Validated. No cal required. | Validated. No cal required. |
| Network Analyzer | Rhode & Schwarz ZVA | SN100132 | 02/2013 | 02/2016 |
| Calipers | Carrera | CALIPER-01 | 12/2010 | 12/2013 |
| Reference Probe | Satimo | EPG122 SN 18/11 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Multimeter | Keithley 2000 | 1188656 | 11/2010 | 11/2013 |
| Signal Generator | Agilent E4438C | MY49070581 | 12/2010 | 12/2013 |
| Amplifier | Aethercomm | SN 046 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Power Meter | HP E4418A | US38261498 | 11/2010 | 11/2013 |
| Power Sensor | HP ECP-E26A | US37181460 | 11/2010 | 11/2013 |
| Directional Coupler | Narda 4216-20 | 01386 | Characterized prior to test. No cal required. | Characterized prior to test. No cal required. |
| Temperature and Humidity Sensor | Control Company | 11-661-9 | 3/2012 | 3/2014 |