SAR Test Report

Report No.:AGC01625140801FH01

FCC ID	:	2AB4DP600
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	3G android phone
BRAND NAME	:	IMC
MODEL NAME	:	P600,P300,P500,P800
CLIENT	:	IMPOMERC DE COLOMBIA SAS
DATE OF ISSUE	:	Aug. 20,2014
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	/	Aug. 20,2014	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 Xmiter 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 v02r02
- 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

Applicant Name	:	IMPOMERC DE COLOMBIA SAS
Applicant Address	:	CRA 47 # 84-20 BARRANQILLA/COLOMBIA
Manufacturer Name	:	Shen Zhen Seven Sunshine Technology Ltd.
Manufacturer Address	:	12 Floor, SEG Technology Park, HuaQiang North, Futian District, ShenZhen China
Product Designation	:	3G android phone
Brand Name	:	IMC
Model Name	:	P600,P300,P500,P800
Different Description		All the same, except for the model name. The test model is P600.
EUT Voltage	:	DC3.7V by battery
Applicable Standard	:	IEEE Std. 1528:2003 47CFR § 2.1093 IEEE/ANSI C95.1
Test Date	:	Aug. 19,2014
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)

Tested By: Eric Zhou, Aug. 20,2014

Checked By: Angela Li, Aug. 20,2014

Authorized By: Solger Zhang, Aug. 20,2014

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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 standalone SAR Summary

Exposure Position	Frequency Band	Highest Tested 1g-SAR(W/Kg)	Highest Scaled Maximum SAR(W/Kg)
Head	GSM 835	0.111	**0.153**
	PCS 1900	0.164	**0.219**
	WCDMA Band V	0.132	**0.144**
Body- worn	GSM 835	0.564	**0.777**
	PCS 1900	0.780	**1.043**
	WCDMA Band V	0.661	**0.720**

Exposure Position	Test Mode	Highest Tested 1g-SAR(W/Kg)	Highest Scaled Maximum SAR(W/Kg)
Body-worn	HOTSPOT	0.115	**0.124**

Highest Simultaneous transmission SAR Summary

Exposure Position	Frequency Band	Highest Simultaneous SAR(W/Kg)
Head	GSM 835+ WLAN	**0.567**
	PCS 1900+ WLAN	**0.633**
	WCDMA Band V +WLAN	**0.558**
Body- worn	GSM 835+ WLAN	**0.984**
	PCS 1900+WLAN	**1.250**
	WCDMA Band V + WLAN	**0.927**

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	3G android phone
Test Model	P600
Hardware Version	A6-03
Software Version	N/A
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
GSM and GPRS	
Support Band	☒GSM 850 ☒PCS 1900 (U.S. Bands) ☒GSM 900 ☒DCS 1800 (Non-U.S. Bands)
GPRS Type	Class B
GPRS Class	Class12(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 850), -0.8dBi (PCS 1900)
Max. Average Power (Max. Peak Power)	GSM850: 31.72dBm(32.41dBm- Peak Power) PCS1900: 28.96dBm(29.66dBm-Peak Power)
Bluetooth	
Bluetooth Version	☐V2.0 ☐V2.1 ☐V2.1+EDR ☒V3.0 ☐V3.0+HS ☒V4.0
Operation Frequency	2402~2480MHz
Type of modulation	☒GFSK ☒Π/4-DQPSK ☒8-DPSK
Avg. Burst Power	2.77dBm
Antenna Gain	1.0dBi

EUT Description(Continue)

WCDMA	
Support Band	U.S. Bands: ☐UMTS FDD Band II ☒UMTS FDD Band V Non-U.S. Bands: ☒UMTS FDD Band I ☐UMTS FDD Band III ☐UMTS FDD Band VIII
HS Type	HSPA(HSUPA/HSDPA)
TX Frequency Range	WCDMA FDD Band V: 826.4-846.6MHz
RX Frequency Range	WCDMA FDD Band V: 869-894MHz
Release Version	Rel-6
Type of modulation	QPSK
Antenna Gain	-1.0dBi
Max. Average Power (Max. Peak Power)	Band V: 22.78dBm (23.37dBm- Peak Power)
WIFI	
WIFI Specification	☐802.11a ☒802.11b ☒802.11g ☒802.11n(20) ☒802.11n(40)
Operation Frequency	2412~2462MHz
Avg. Burst Power	11b:9.93dBm,11g:7.35dBm,11n(20):7.27dBm,11n(40):4.43dBm
Antenna Gain	1.0dBi
Accessories	
Battery	Brand name: IMC Model No. : P600 Voltage and Capacitance: 3.7 V & 1800mAh
Adapter	Brand name: IMC Model No. : P600 Input: AC 100-240V, 50/60Hz, 0.15A Output: DC 5V, 500mA
Earphone	Brand name: N/A Model No. : N/A

Note:CMU200 can measure the average power and Peak power at the same time

Product	Type	
	☒ Production unit	☐ Identical Prototype

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

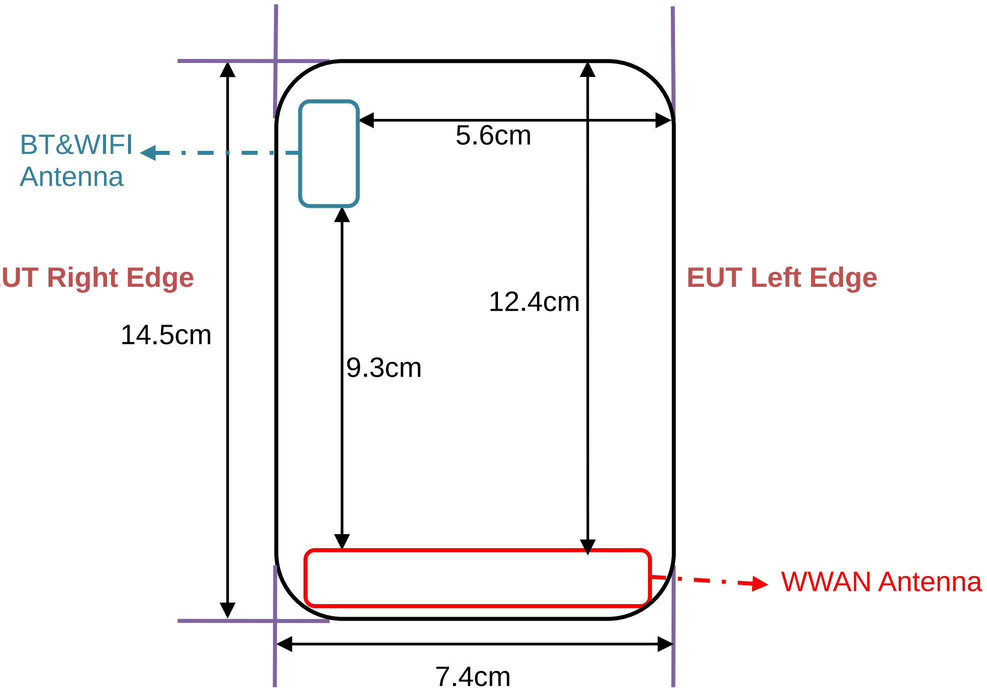
The EUT is a model of GSM Portable Mobile Station (MS). It supports GSM/GPRS,WCDMA/HSPA, BT, WIFI, and support hotspot mode.

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:

EUT Top Edge



EUT Bottom Edge

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	12.4	0.2	0.4	0.7
BT/WIFI	0.8	11.3	5.5	0.5

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 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:

$$\mathrm{SAR} = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{\mathrm{d}W}{\mathrm{d}m}\right) = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{\mathrm{d}W}{\rho \mathrm{d}V}\right)$$

SAR is expressed in units of Watts per kilogram (W/Kg)
SAR can be obtained using either of the following equations:

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

$$\mathrm{SAR} = c_h \left.\frac{\mathrm{d}T}{\mathrm{d}t}\right|_{t=0}$$

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;
$\frac{\mathrm{dT}}{\mathrm{dt}} \mid t = 0$	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.

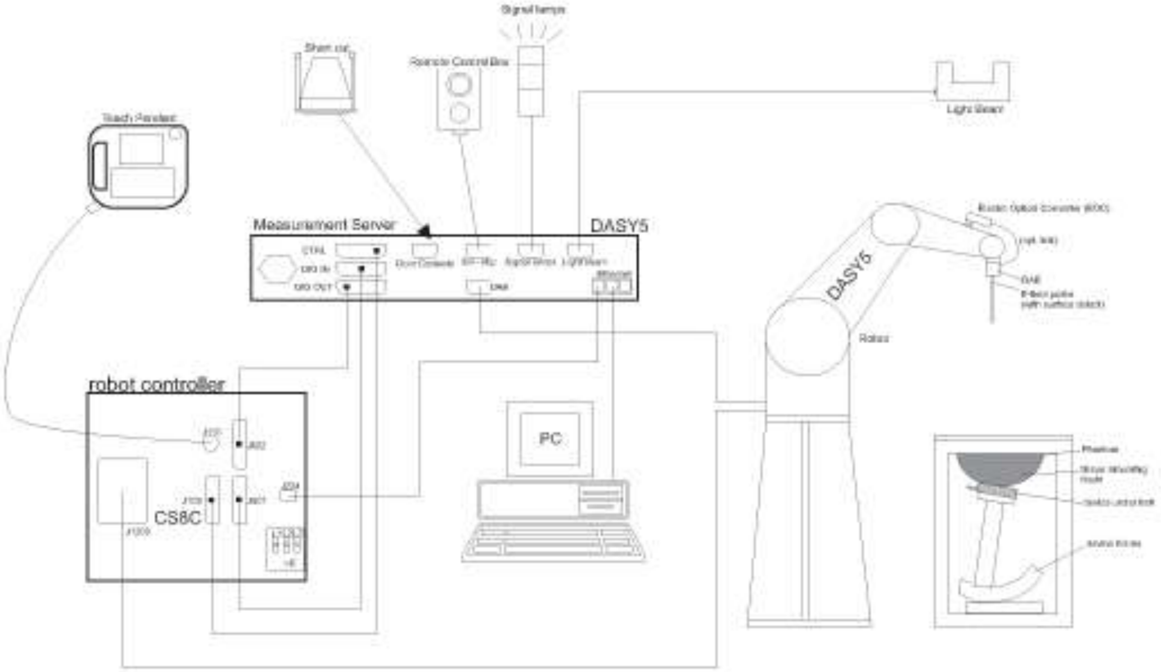
Pre-scans are made on the device to establish the location for the transmitting antenna, using a large area scan in either air or tissue simulation fluid.

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, 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 $10mm^2$ 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/m^3 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

<table>
<tr><td>Model</td><td colspan="2">EX3DV4</td></tr>
<tr><td>Manufacture</td><td colspan="2">SPEAG</td></tr>
<tr><td>frequency</td><td>0.3GHz-6 GHz
Linearity:±0.2dB(300 MHz-6 GHz)</td><td rowspan="3"></td></tr>
<tr><td>Dynamic Range</td><td>0.01W/Kg-100W/Kg
Linearity:±0.2dB</td></tr>
<tr><td>Dimensions</td><td>Overall length:337mm
Tip diameter:2.5mm
Typical distance from probe tip to dipole centers:1mm</td></tr>
<tr><td>Application</td><td colspan="2">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%.</td></tr>
</table>

3.6. Robot

<table>
<tr><td>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</td><td></td></tr>
</table>

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 ε=3 and loss tangent δ = 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 DAYS 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

<table>
<tr>
<td>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</td>
<td></td>
</tr>
</table>

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
(% Weight)	Head	Body	Head	Body	Body
Water	40.45	52.4	54.90	40.5	73.2
Salt	1.42	1.40	0.18	0.50	0.04
Sugar	57.6	45.0	0.00	58.0	0.00
HEC	0.40	1.00	0.00	0.50	0.00
Preventol	0.10	0.20	0.00	0.50	0.00
DGBE	0.00	0.00	44.92	0.00	26.7
TWEEN	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 (±5%)				Tissue Temp [^{o}C]	Test time
		head		body			
		εr 41.5 39.425-43.575	δ[s/m] 0.90 0.855-0.945	εr 55.20 52.44-57-96	δ[s/m] 0.97 0.9215-1.0185		
835	Low	41.33	0.88	55.43	0.96	21	Aug. 19,2014
835	Mid	41.54	0.91	54.96	0.97	21	Aug. 19,2014
835	High	41.45	0.89	55.05	0.95	21	Aug. 19,2014

Tissue Stimulant Measurement for 1900MHz							
Fr. (MHz)	Ch.	Dielectric Parameters (±5%)				Tissue Temp [^{o}C]	Test time
		head		body			
		εr 40.00 38.00-42.00	δ[s/m] 1.40 1.33-1.47	εr 53.30 50.635-55.965	δ[s/m] 1.52 1.444-1.596		
1900	Low	40.41	1.40	53.27	1.53	21	Aug. 19,2014
1900	Mid	40.12	1.42	53.02	1.50	21	Aug. 19,2014
1900	High	40.29	1.38	53.47	1.49	21	Aug. 19,2014

Tissue Stimulant Measurement for 2450MHz					
Fr. (MHz)	Ch.	Dielectric Parameters (±5%)		Tissue Temp [^{o}C]	Test time
		body			
		εr 52.7 50.065-55.335	δ[s/m] 1.95 1.8525-2.0475		
2450	Low	53.00	1.88	21	Aug. 19,2014
2450	Mid	52.66	1.94	21	Aug. 19,2014
2450	High	52.57	1.91	21	Aug. 19,2014

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**	
	εr	**σ (S/m)**	**εr**	**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

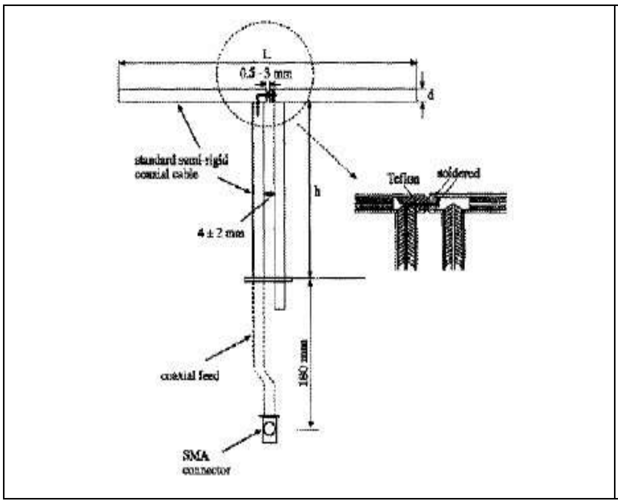
(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

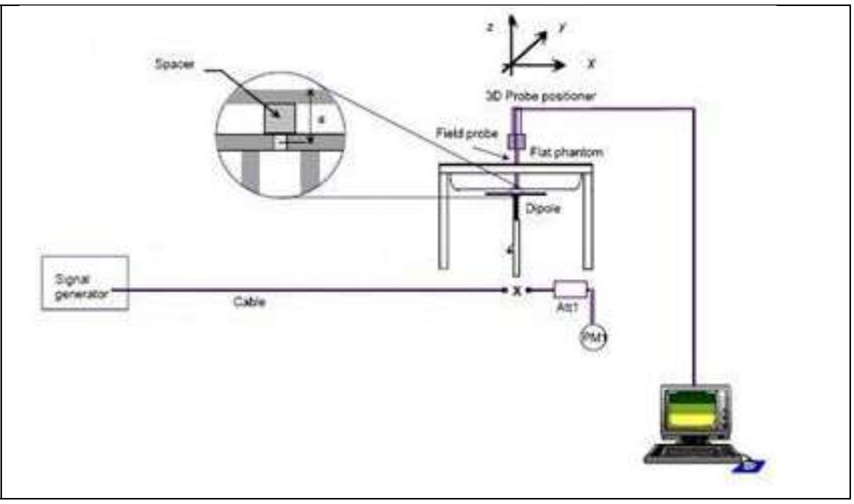
5. SAR MEASUREMENT PROCEDURE

5.1. SAR System Validation Procedures

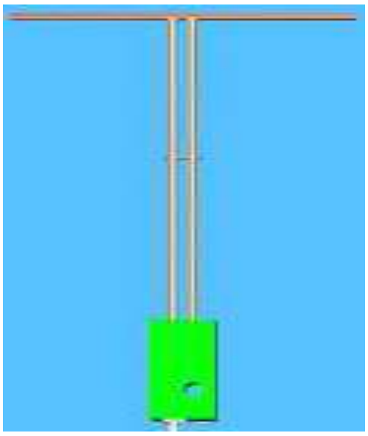
Each DASY5 system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY5 software, enable the user to conduct the system performance check and system validation. System kit includes a dipole, and dipole device holder.

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 (± 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	10.6	6.6	21	Aug. 19,2014
1900	39.65	20.24	35.685-43.615	18.216-22.264	39.5	19.9	21	Aug. 19,2014

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 (± 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	10.7	6.8	21	Aug. 19,2014
1900	40.74	21.43	36.666-44.814	19.287-23.573	41.0	20.2	21	Aug. 19,2014
2450	54.19	24.96	48.771-59.609	22.464-27.456	52.3	23.4	21	Aug. 19,2014

6. EUT TEST POSITION

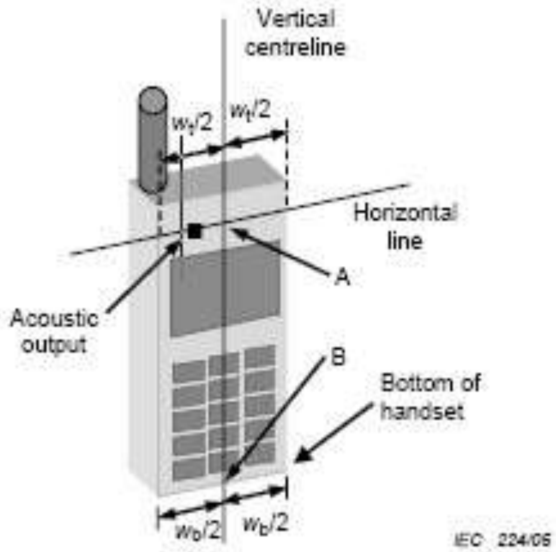
This EUT was tested in **Right Cheek, Right Titled, Left Cheek, Left Titled, Front Face and Rear Face.**

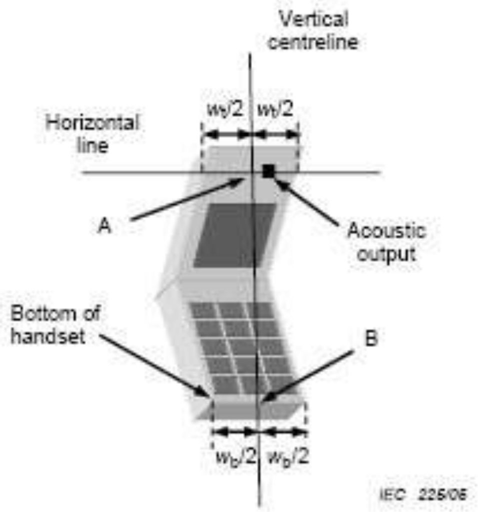
6.1. Define Two Imaginary Lines on the Handset

(1)The vertical centerline passes through two points on the front side of the handset the midpoint of the width wt of the handset at the level of the acoustic output, and the midpoint of the width wb 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 picec 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 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.

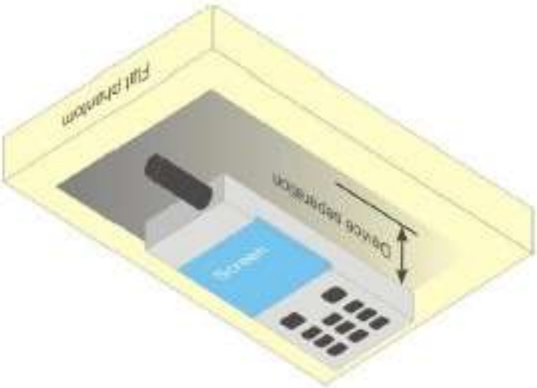
(2) While maintaining the device in the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until with the ear is lost.

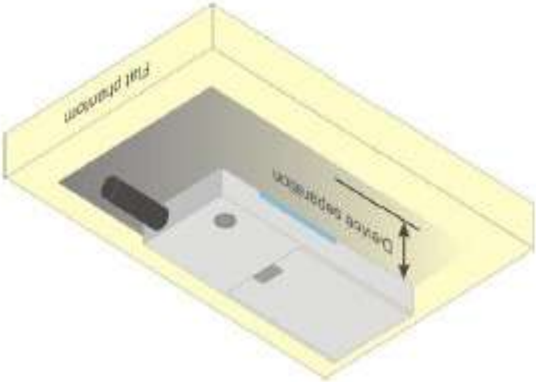
6.4. Body Worn Position

(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 **10mm.** (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
TISSUE Probe	SATIMO	SN 45/11 OCPG45	11/14/2013	11/13/2015
Robot Controller	Stäubli-CS8	139522	N/A	N/A
E-Field Probe	Speag-EX3DV4	3953	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
Signal Generator	Agilent-E4438C	MY44260051	02/23/2014	02/22/2015
Power Sensor	NRP-Z23	US38261498	02/17/2014	02/16/2015
SPECTRUM ANALYZER	Agilent- E4440A	MY44303916	10/22/2013	10/21/2014
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	**31.72**	-9	22.72
	836.6	31.61	-9	22.61
	848.8	31.54	-9	22.54
GPRS 835 （1 Slot）	824.2	31.63	-9	22.63
	836.6	31.56	-9	22.56
	848.8	31.43	-9	22.43
GPRS 835 （2 Slot）	824.2	28.75	-6	22.75
	836.6	28.71	-6	22.71
	848.8	28.64	-6	22.64
GPRS 835 （3 Slot）	824.2	26.78	-4.26	22.52
	836.6	26.72	-4.26	22.46
	848.8	26.67	-4.26	22.41
GPRS 835 （4 Slot）	824.2	25.69	-3	22.69
	836.6	25.76	-3	22.76
	848.8	25.75	-3	22.75
PCS1900	1850.2	**28.96**	-9	19.96
	1880	28.74	-9	19.74
	1909.8	28.62	-9	19.62
GPRS1900 （1 Slot）	1850.2	28.79	-9	19.79
	1880	28.72	-9	19.72
	1909.8	28.65	-9	19.65
GPRS1900 （2 Slot）	1850.2	25.82	-6	19.82
	1880	25.77	-6	19.77
	1909.8	25.63	-6	19.63
GPRS1900 （3 Slot）	1850.2	23.79	-4.26	19.53
	1880	23.72	-4.26	19.46
	1909.8	23.63	-4.26	19.37
GPRS1900 （4 Slot）	1850.2	22.69	-3	19.69
	1880	22.78	-3	19.78
	1909.8	22.65	-3	19.65
Maximum Power <2>				
GSM835	824.2	31.32	-9	22.32
PCS1900	1850.2	28.49	-9	19.49

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 V

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 835 RMC	826.4	**22.78**
	836.6	22.63
	846.6	22.57
WCDMA 835 AMR	826.4	21.41
	836.6	21.38
	846.6	21.26
HSDPA Subtest 1	826.4	21.19
	836.6	21.12
	846.6	21.07
HSDPA Subtest 2	826.4	21.36
	836.6	21.25
	846.6	21.27
HSDPA Subtest 3	826.4	21.14
	836.6	21.26
	846.6	21.28
HSDPA Subtest 4	826.4	21.16
	836.6	21.14
	846.6	21.19
HSUPA Subtest 1	826.4	21.28
	836.6	21.12
	846.6	21.09
HSUPA Subtest 2	826.4	21.15
	836.6	21.18
	846.6	21.12
HSUPA Subtest 3	826.4	21.11
	836.6	21.21
	846.6	20.98
HSUPA Subtest 4	826.4	21.16
	836.6	20.94
	846.6	21.16
HSUPA Subtest 5	826.4	21.12
	836.6	21.25
	846.6	20.95

WIFI

Mode	Data Rate (Mbps)	Channel	Frequency(MHz)	Avg. Burst Power (dBm)
802.11b	1	01	2412	**9.93**
		06	2437	9.67
		11	2462	9.57
802.11g	6	01	2412	7.35
		06	2437	7.26
		11	2462	7.18
802.11n(20)	6.5	01	2412	7.27
		06	2437	7.2
		11	2462	7.15
802.11n(40)	13.5	03	2422	4.43
		06	2437	4.38
		09	2452	4.26

Bluetooth_V3.0

Modulation	Channel	Frequency(MHz)	Average Power (dBm)
GFSK	0	2402	2.55
	39	2441	**2.77**
	78	2480	2.7
π /4-DQPSK	0	2402	1.38
	39	2441	1.74
	78	2480	1.61
8-DPSK	0	2402	1.28
	39	2441	1.73
	78	2480	1.67

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 β_c/β_d=12/15, β_{hs}/β_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 10mm from the phantom; Body SAR was also performed with the headset attached and without. The overall device length and width(14.5cm×7.4cm) are＞9cm×5cm, 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 ≤ 0.8 W/kg, testing for low and high channel is optional.

• Per KDB 865664 D01 v01r01,for each frequency band, if the measured SAR is ≥0.8W/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 ≥0.8W/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 ≥1.45 W/Kg.

(3) Perform a third repeated measurement only if the original, first and second repeated measurement is ≥ 1.5 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 ≤1.2W/Kg, SAR testing with a headset connected is not required.

• According to 941225 D06, when the overall device length and width are＞9cm×5cm, Hotspot mode with a test separation distance of 10mm. For device with form factors smaller than 9cm×5cm, Hotspot mode with a test separation distance of 5mm. Body SAR was also performed with the headset attached and without.

• According to 248227 D01, SAR is not required for 802.11g channels when the maximum average output power is less than 1/4dB higher than measured on the corresponding 802.11b channels.

• 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.) ×[maximum turn-up power (mw)/ 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: 3G android phone									
Test Mode: GSM835 with GMSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**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	0.03	**0.111**	33	31.61	**0.153**	1.6
Left Tilt	voice	190	836.6	0.06	0.045	33	31.61	0.062	1.6
Right Cheek	voice	190	836.6	0.11	0.090	33	31.61	0.124	1.6
Right Tilt	voice	190	836.6	0.09	0.027	33	31.61	0.037	1.6
Body back	voice	190	836.6	0.19	**0.564**	33	31.61	**0.777**	1.6
Body front	voice	190	836.6	0.07	0.132	33	31.61	0.182	1.6
SIM 2 Card									
Left Cheek	voice	190	836.6	0.16	0.093	33	31.61	0.128	1.6

Note:
· When the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 941225.
·The test separation for body is 10mm of all above table.
·The worst mode is voice mode.

SAR MEASUREMENT									
Ambient Temperature (°C) : 21 ± 2				Relative Humidity (%): 55					
Liquid Temperature (°C) : 21 ± 2				Depth of Liquid (cm):>15					
Product: 3G android phone									
Test Mode: GSM1900 with GMSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**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	0.03	**0.164**	30	28.74	**0.219**	1.6
Left Tilt	voice	661	1880.0	-0.10	0.075	30	28.74	0.100	1.6
Right Cheek	voice	661	1880.0	0.13	0.096	30	28.74	0.128	1.6
Right Tilt	voice	661	1880.0	-0.05	0.095	30	28.74	0.127	1.6
Body back	voice	661	1880.0	-0.11	**0.780**	30	28.74	**1.043**	1.6
Body front	voice	661	1880.0	0.05	0.141	30	28.74	0.188	1.6
SIM 2 Card									
Left Cheek	voice	661	1880.0	0.11	0.149	30	28.74	0.199	1.6

Note:
· When the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 941225.
·The test separation for body is 10mm of all above table.
·The worst mode is voice mode.

SAR MEASUREMENT									
Ambient Temperature (°C) : 21 ± 2				Relative Humidity (%): 55					
Liquid Temperature (°C) : 21 ± 2				Depth of Liquid (cm):>15					
Product: 3G android phone									
Test Mode: WCDMA Band V with QPSK modulation									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**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	4183	836.6	0.03	0.112	23	22.63	0.122	1.6
Left Tilt	RMC 12.2kbps	4183	836.6	-0.03	0.043	23	22.63	0.047	1.6
Right Cheek	RMC 12.2kbps	4183	836.6	-0.08	**0.132**	23	22.63	**0.144**	1.6
Right Tilt	RMC 12.2kbps	4183	836.6	0.15	0.063	23	22.63	0.069	1.6
Body back	RMC 12.2kbps	4183	836.6	-0.09	**0.661**	23	22.63	**0.720**	1.6
Body front	RMC 12.2kbps	4183	836.6	0.15	0.147	23	22.63	0.160	1.6

Note:
· When the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 941225.
·The test separation for body is 10mm of all above table.
·The worst mode is voice mode.

SAR MEASUREMENT									
Ambient Temperature (°C) : 21 ± 2				Relative Humidity (%): 55					
Liquid Temperature (°C) : 21 ± 2				Depth of Liquid (cm):>15					
Product: 3G android phone									
Test Mode: Hotspot									
Position	**Mode**	**Ch.**	**Fr. (MHz)**	**Power Drift (<±5%)**	**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	0.03	**0.115**	10	9.67	**0.124**	1.6
Body front	DTS	6	2437	0.11	0.064	10	9.67	0.069	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:

NO	Simultaneous state	Portable Handset			Note
		Head	Body-worn	Hotspot	
1	GSM(voice)+WLAN 2.4GHz (data)	Yes	Yes	-	-
2	WCDMA(voice)+WLAN 2.4GHz (data)	Yes	Yes	-	-
3	GSM(voice)+Bluetooth(data)	Yes	Yes	-	-
4	WCDMA(voice)+Bluetooth(data)	Yes	Yes	-	-
5	GSM(voice)+WLAN 2.4GHz (data)	Yes	Yes	Yes	2.4GHz Hotspot
6	WCDMA(voice)+WLAN 2.4GHz (data)	Yes	Yes	Yes	2.4GHz Hotspot

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 10mm 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≦50mm,Bluetooth standalone SAR is excluded according to *[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm) ·[√f (GHz) /x] ≦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) *(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f (GHz) /x] W/kg for test separation distances≤ 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.*

Estimated SAR		Maximum Average Power		Antenna to user (mm)	SAR exclusion threshold (mW)	SAR testing required （Yes/No）	Head (0mm gap)	Body (10mm gap)
		dBm	mW					
BT	Head	4	2.512	0	10	NO	0.105 W/kg	0.052 W/kg
	Body			10	10	NO		
WIFI	Head	10	10	0	10	NO	0.414 W/kg	0.207 W/kg
	Body			10	10	NO		

Maximum test results (WWAN) with BT and WIFI/ HOTSPOT SAR:
BT: Head (0 cm gap): 0.105 W/kg and Body (1.0 cm gap): 0.052 W/kg
WIFI: Head (0 cm gap): 0.414W/kg and Body (1.0 cm gap): 0.207 W/kg
HOTSPOT: Body (1.0 cm gap): 0.124 W/kg

WIFI

Position	Max. WWAN SAR (W/Kg)	Max. Estimated SAR (W/Kg)	SAR Summation	Limit (W/kg)	SPLSR ≦0.04 (Yes/No)
GSM850+WLAN 2.4G-DTS					
Left Cheek	0.153	0.414	**0.567**	1.6	No
Left Tilt	0.062	0.414	0.476	1.6	No
Right Cheek	0.124	0.414	0.538	1.6	No
Right Tilt	0.037	0.414	0.451	1.6	No
Body back	0.777	0.207	**0.984**	1.6	No
Body front	0.182	0.207	0.389	1.6	No
PCS1900+WLAN 2.4G-DTS					
Left Cheek	0.219	0.414	**0.633**	1.6	No
Left Tilt	0.100	0.414	0.514	1.6	No
Right Cheek	0.128	0.414	0.542	1.6	No
Right Tilt	0.127	0.414	0.541	1.6	No
Body back	1.043	0.207	**1.250**	1.6	No
Body front	0.188	0.207	0.395	1.6	No
WCDMA Band V+WLAN 2.4G-DTS					
Left Cheek	0.122	0.414	0.536	1.6	No
Left Tilt	0.047	0.414	0.461	1.6	No
Right Cheek	0.144	0.414	**0.558**	1.6	No
Right Tilt	0.069	0.414	0.483	1.6	No
Body back	0.720	0.207	**0.927**	1.6	No
Body front	0.160	0.207	0.367	1.6	No

Note:

• According to KDB 447498 D01 General RF Exposure Guidance v05, when the simultaneous transmission SAR is less than1.6 W/Kg, SPLSR assessment is not required.

• SPLSR mean is “The SAR to Peak Location Separation Ratio “

Hotspot

Position	Max. WWAN SAR (W/Kg)	Max. Hotspot SAR (W/Kg)	SAR Summation	Limit (W/kg)	SPLSR ≦0.04 (Yes/No)
GSM850+Hotspot 2.4G-DTS					
Body back	0.777	0.124	**0.901**	1.6	No
Body front	0.182	0.069	0.251	1.6	No
PCS1900+Hotspot 2.4G-DTS					
Body back	1.043	0.124	**1.167**	1.6	No
Body front	0.188	0.069	0.257	1.6	No
WCDMA Band V+ Hotspot 2.4G-DTS					
Body back	0.720	0.124	**0.844**	1.6	No
Body front	0.160	0.069	0.229	1.6	No

Note:

• According to KDB 447498 D01 General RF Exposure Guidance v05, when the simultaneous transmission SAR is less than1.6 W/Kg, SPLSR assessment is not required.

• SPLSR mean is “The SAR to Peak Location Separation Ratio “

BT

Position	Max. WWAN SAR (W/Kg)	Estimated SAR (W/Kg)	SAR Summation	Limit (W/kg)	SPLSR ≦0.04 (Yes/No)
GSM850+Bluetooth-DSS					
Left Cheek	0.153	0.105	**0.258**	1.6	No
Left Tilt	0.062	0.105	0.167	1.6	No
Right Cheek	0.124	0.105	0.229	1.6	No
Right Tilt	0.037	0.105	0.142	1.6	No
Body back	0.777	0.052	**0.829**	1.6	No
Body front	0.182	0.052	0.234	1.6	No
PCS1900+ Bluetooth-DSS					
Left Cheek	0.219	0.105	**0.324**	1.6	No
Left Tilt	0.100	0.105	0.205	1.6	No
Right Cheek	0.128	0.105	0.233	1.6	No
Right Tilt	0.127	0.105	0.232	1.6	No
Body back	1.043	0.052	**1.095**	1.6	No
Body front	0.188	0.052	0.240	1.6	No
WCDMA Band V+ Bluetooth-DSS					
Left Cheek	0.122	0.105	0.227	1.6	No
Left Tilt	0.047	0.105	0.152	1.6	No
Right Cheek	0.144	0.105	**0.249**	1.6	No
Right Tilt	0.069	0.105	0.174	1.6	No
Body back	0.720	0.052	**0.772**	1.6	No
Body front	0.160	0.052	0.212	1.6	No

Note:

• According to KDB 447498 D01 General RF Exposure Guidance v05, when the Sum of the simultaneous transmission SAR is lesser than1.6 W/Kg, SPLSR assessment is not required.

• SPLSR mean is “The SAR to Peak Location Ratio “ .

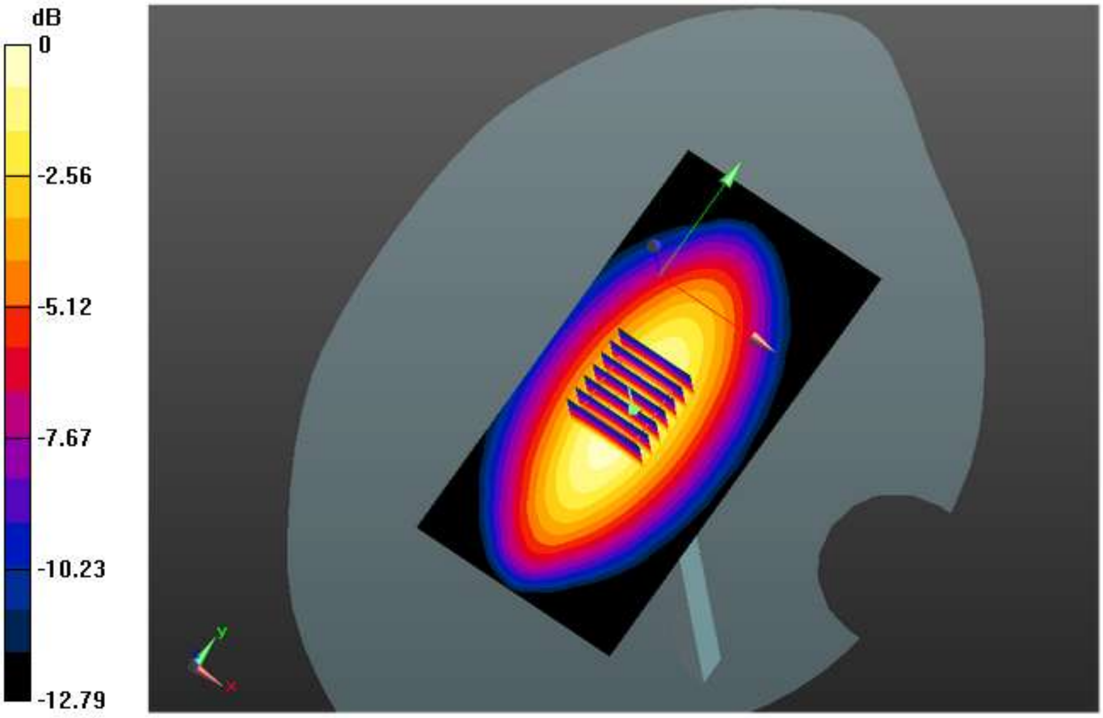
APPENDIX A. SAR SYSTEM VALIDATION DATA

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
System Check Head 835 MHz
DUT: Dipole 900 MHz Type: SID 900
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1;
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.91 mho/m; εr =41.54; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (℃): 21, Liquid temperature (℃): 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 850MHz Head/Area Scan (81×161×1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.140 W/Kg
Configuration/System Check 850MHz Head/Zoom Scan (7×7×7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=12.070 V/m; Power Drift=-0.05 dB
Peak SAR (extrapolated) =0.170 W/kg
SAR (1g) =0.106 W/Kg; SAR (10g) =0.066 W/Kg
Maximum value of SAR (measured)=0.139 W/Kg

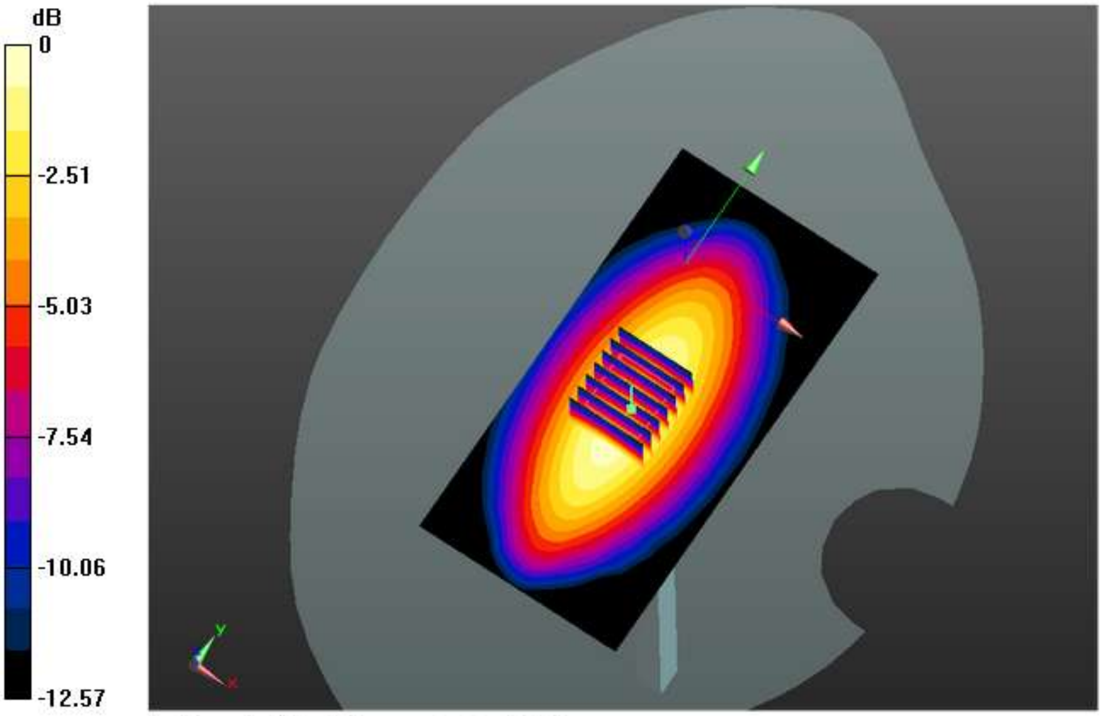


0 dB = 0.139 W/kg = -8.57 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
System Check Body 835 MHz
DUT: Dipole 900 MHz Type: SID 900
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1;
Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.97 mho/m; εr =54.96; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (℃): 21, Liquid temperature (℃): 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 Check850MHz Body/Area Scan (81×161×1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.145 W/Kg
Configuration/System Check 850MHz Body/Zoom Scan (7×7×7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=12.114 V/m; Power Drift=-0.05 dB
Peak SAR (extrapolated) =0.173 W/kg
SAR (1g) =0.107 W/Kg; SAR (10g) =0.068 W/Kg
Maximum value of SAR (measured)=0.144 W/Kg

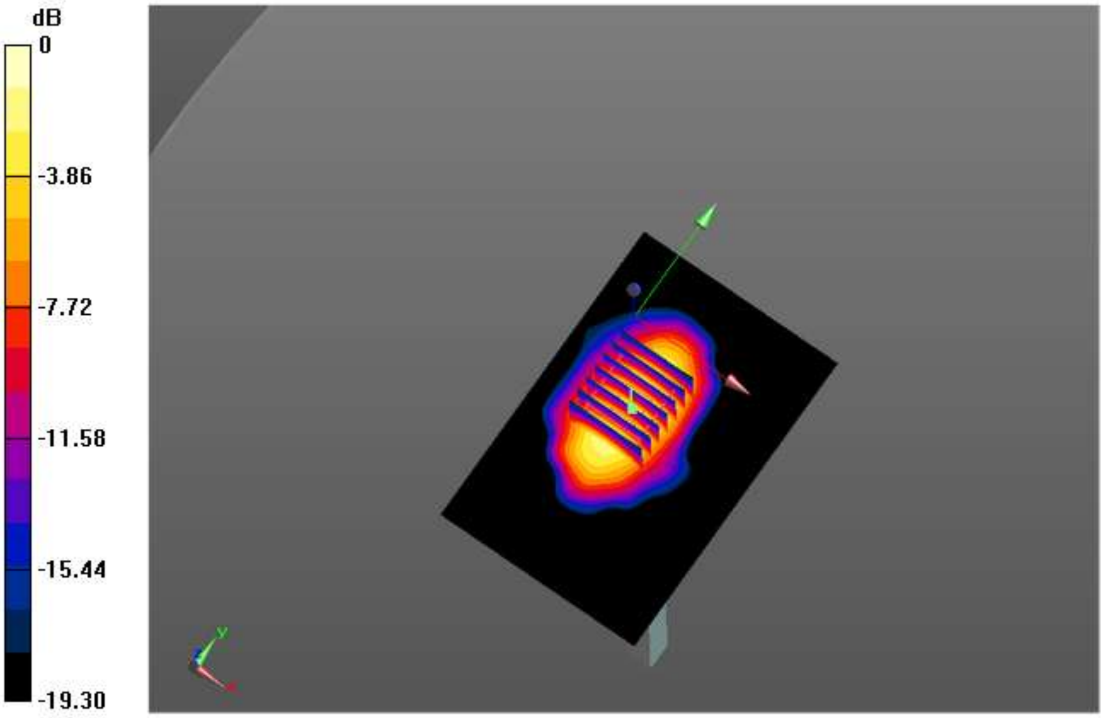


0 dB = 0.144 W/kg = -8.22 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
System Check Head 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1;
Frequency: 1900 MHz; Medium parameters used: f = 1900 MHz; σ=1.42 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (℃): 21, Liquid temperature (℃): 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 1900MHz Head/Area Scan (81×121×1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.597 W/Kg
Configuration/System Check 1900MHz Head/Zoom Scan (7×7×7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=14.879 V/m; Power Drift=0.05 dB
Peak SAR (extrapolated) =0.760 W/kg
SAR (1g) =0.395 W/Kg; SAR (10g) =0.199 W/Kg
Maximum value of SAR (measured)=0.580 W/Kg



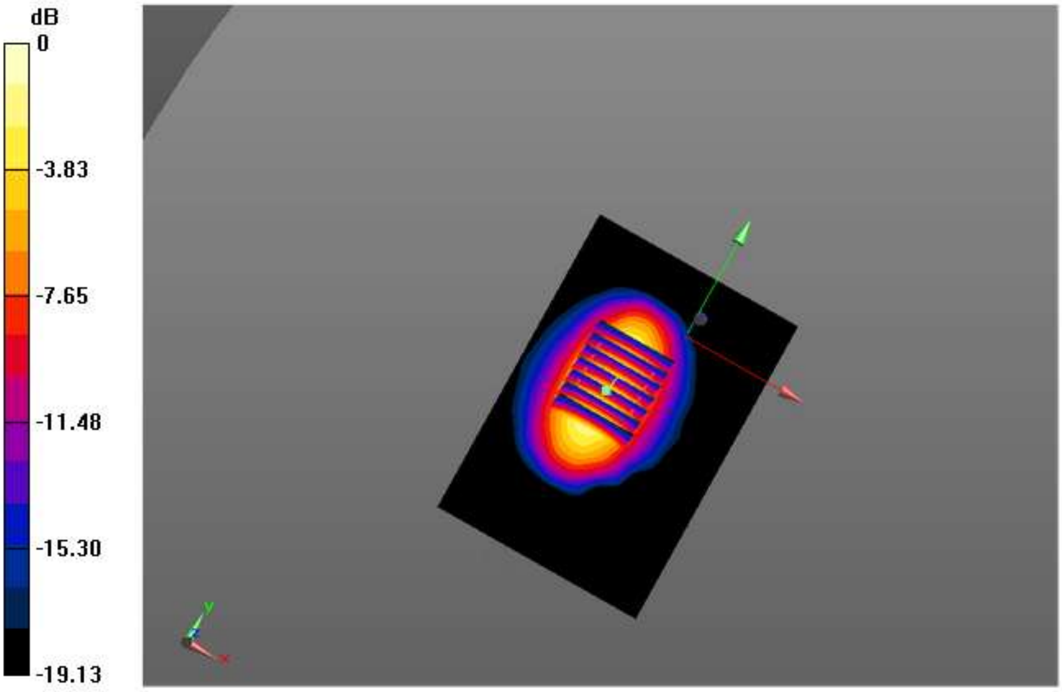
0 dB = 0.580 W/kg = -2.35 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
System Check Body 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900
Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1;
Frequency: 1900 MHz; Medium parameters used: f = 1900 MHz; σ=1.50 mho/m; εr =53.02; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (℃): 21, Liquid temperature (℃): 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 1900MHz Body/Area Scan (81×121×1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.624 W/Kg
Configuration/System Check 1900MHz Body/Zoom Scan (7×7×7)/Cube 0: Measurement grid: dx=5mm, dy =5mm, dz=5mm,
Reference Value=12.261 V/m; Power Drift=0.02 dB
Peak SAR (extrapolated) =0.805 W/kg
SAR (1g) =0.410 W/Kg; SAR (10g) =0.202 W/Kg
Maximum value of SAR (measured)=0.608 W/Kg

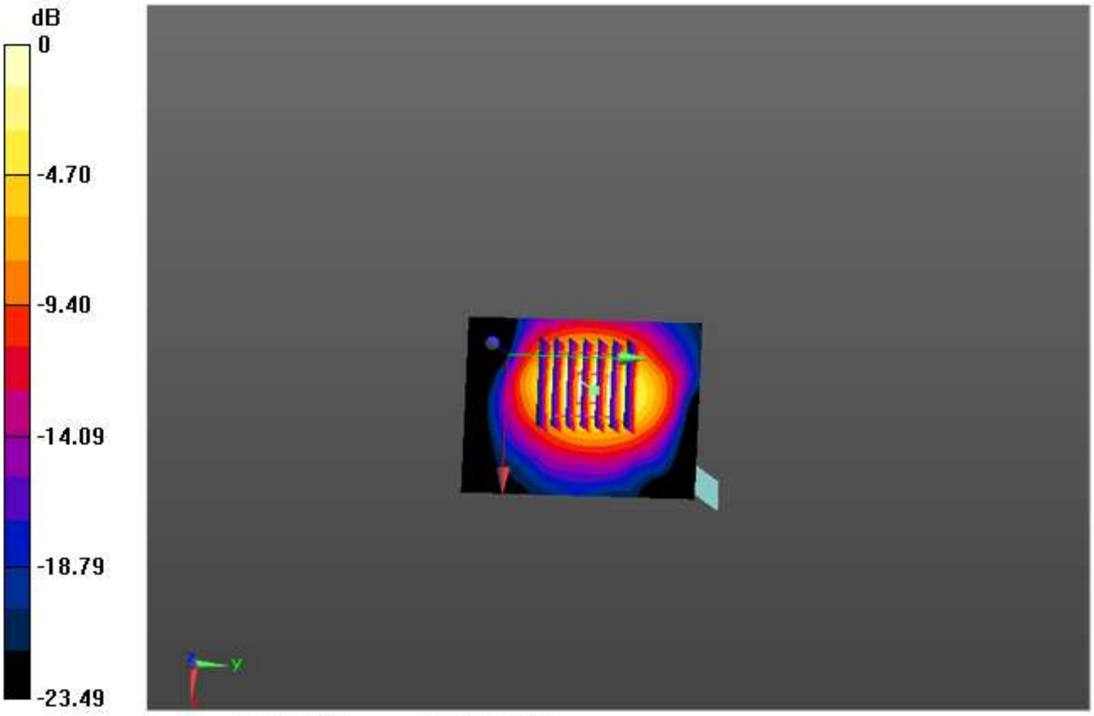


0 dB = 0.608 W/kg = -2.00 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
System Check Body 2450 MHz
DUT: Dipole 2450 MHz Type: SID 2450
Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1;
Frequency: 2450 MHz; Medium parameters used: f = 2450 MHz; σ =1.94 mho/m; εr =52.66; ρ= 1000 kg/m³ ;
Phantom section: Flat Section; Input Power=10dBm
Ambient temperature (℃): 21, Liquid temperature (℃): 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 (61×81×1): Measurement grid: dx=1.000mm, dy=1.000mm,
Maximum value of SAR (measured)=0.825 W/Kg
Configuration/System Check 2000MHz Body/Zoom Scan (7×7×7)/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) =0.523 W/Kg; SAR (10g) =0.234 W/Kg
Maximum value of SAR (measured)=0.827 W/Kg



0 dB = 0.827 W/kg = -0.82 dBW/kg

APPENDIX B. SAR MEASUREMENT DATA

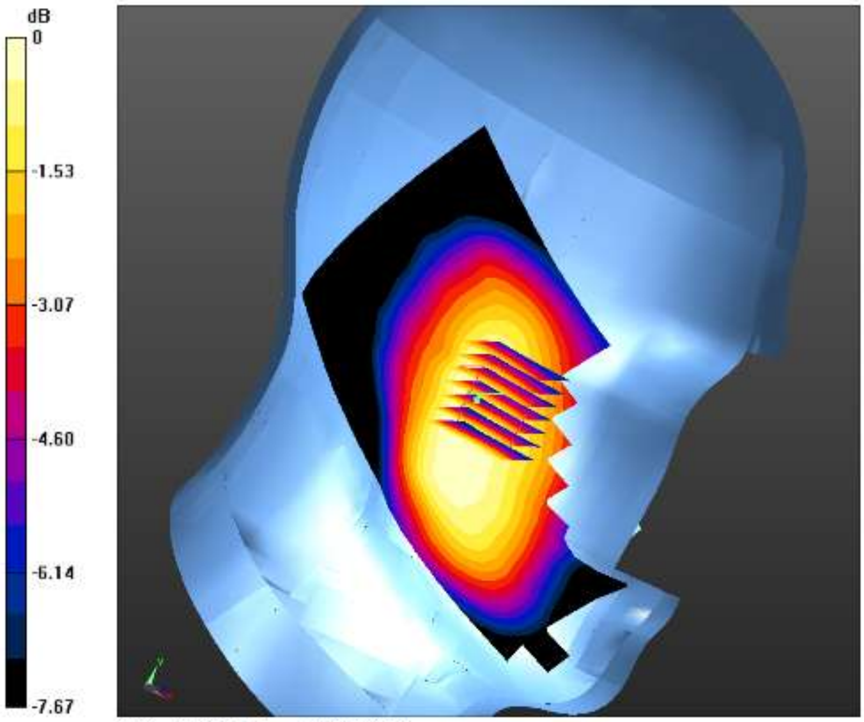
Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid-Touch-Left <SIM 1>
DUT: 3G android phone; Type: P600

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; σ=0.91 mho/m; εr =41.54; ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 21.0

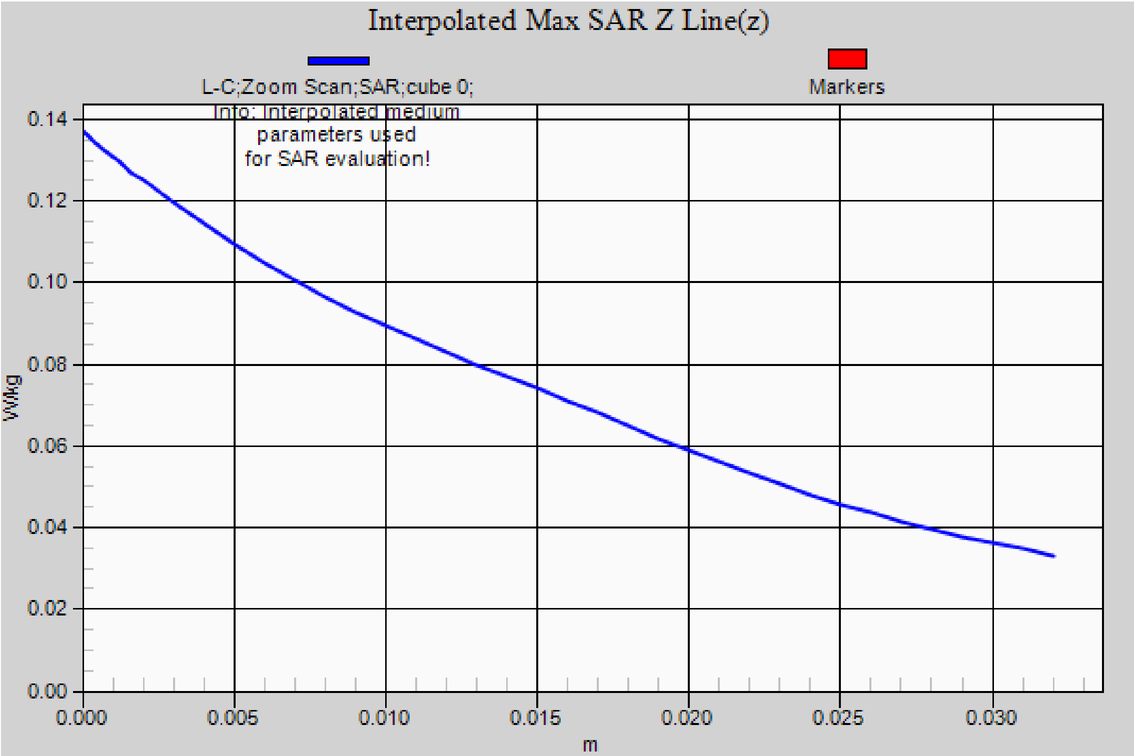
DASY Configuration:

- 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.133 W/kg
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.036 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.137 W/kg
SAR(1 g) = 0.111 W/kg; SAR(10 g) = 0.086 W/kg
Maximum value of SAR (measured) = 0.126 W/kg



0 dB = 0.126 W/kg = -9.00 dBW/kg

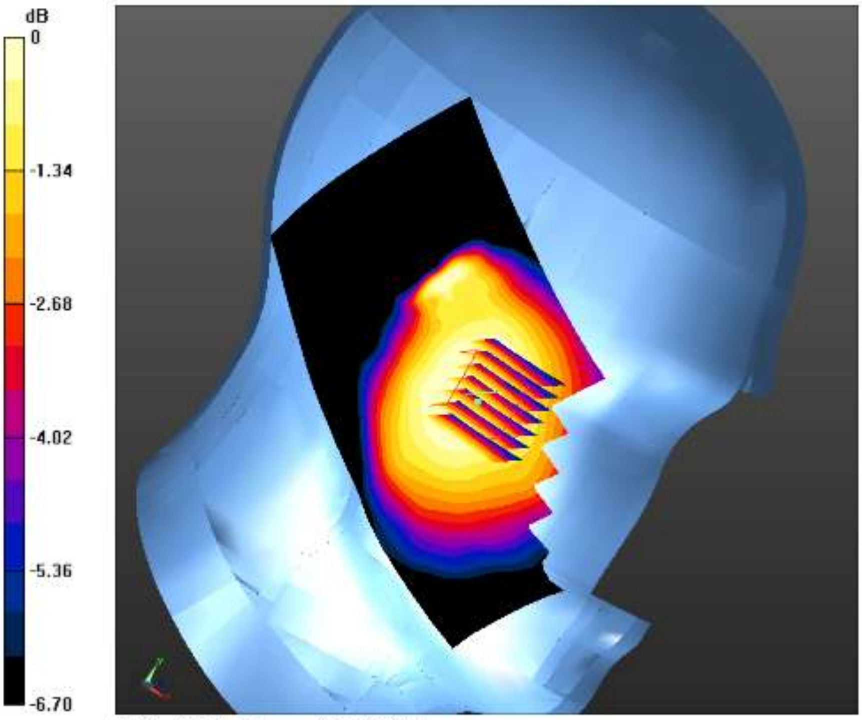

Interpolated Max SAR Z Line(z)
L-C;Zoom Scan;SAR;cube 0;
Info: Interpolated medium parameters used for SAR evaluation!
Markers
W/kg
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid-Tilt-Left <SIM 1>
DUT: 3G android phone; Type: P600

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; σ=0.91 mho/m; εr =41.54; ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0524 W/kg
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.369 V/m; Power Drift = 0.06dB
Peak SAR (extrapolated) = 0.0510 W/kg
SAR(1 g) = 0.045 W/kg; SAR(10 g) = 0.037 W/kg
Maximum value of SAR (measured) = 0.0487 W/kg



0 dB = 0.0487 W/kg = -13.12 dBW/kg

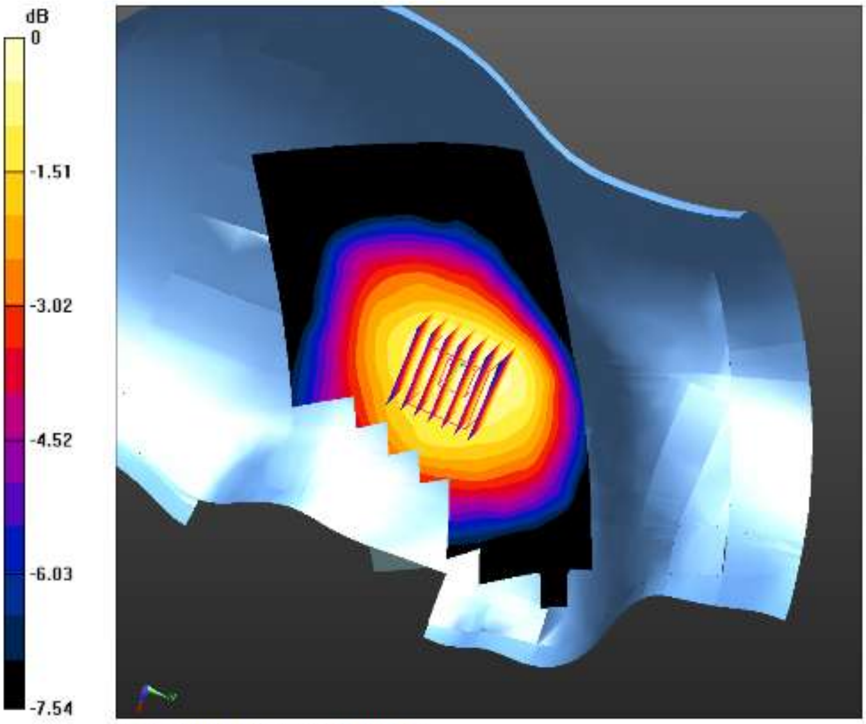
Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid-Touch-Right <SIM 1>
DUT: 3G android phone; Type: P600

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; σ=0.91 mho/m; εr =41.54; ρ= 1000 kg/m³ ;
Phantom section: Right Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.101 W/kg
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.105 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.106 W/kg
SAR(1 g) = 0.090 W/kg; SAR(10 g) = 0.073 W/kg
Maximum value of SAR (measured) = 0.101 W/kg



0 dB = 0.101 W/kg = -9.96 dBW/kg

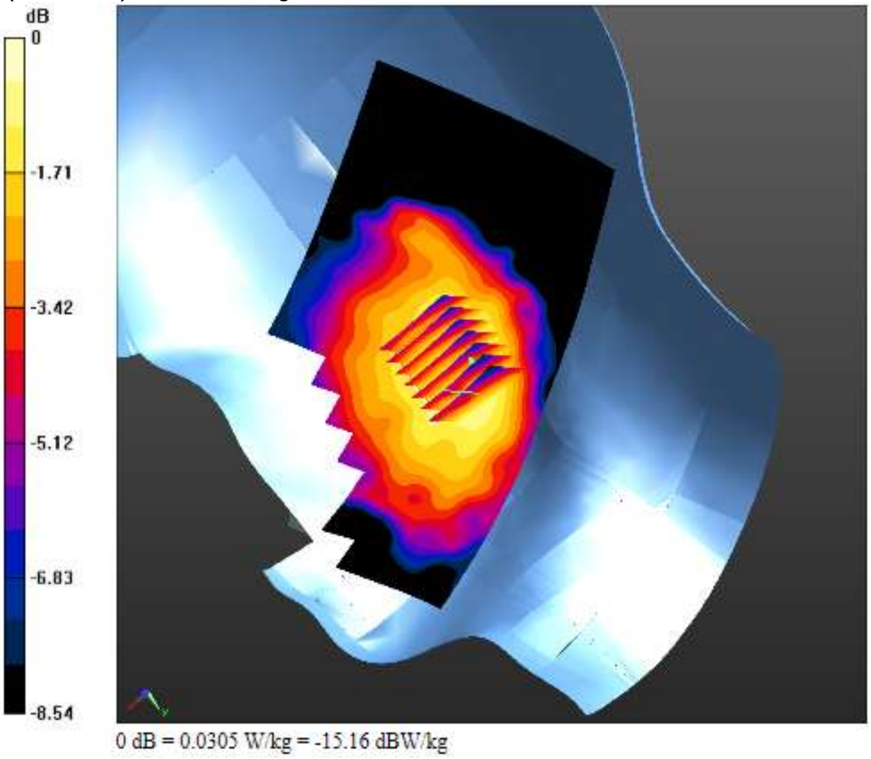
Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid-Tilt-Right <SIM 1>
DUT: 3G android phone; Type: P600

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; σ=0.91 mho/m; εr =41.54; ρ= 1000 kg/m³ ;
Phantom section: Right Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0284 W/kg
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.201 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.0310 W/kg
SAR(1 g) = 0.027 W/kg; SAR(10 g) = 0.022 W/kg
Maximum value of SAR (measured) = 0.0305 W/kg



0 dB = 0.0305 W/kg = -15.16 dBW/kg

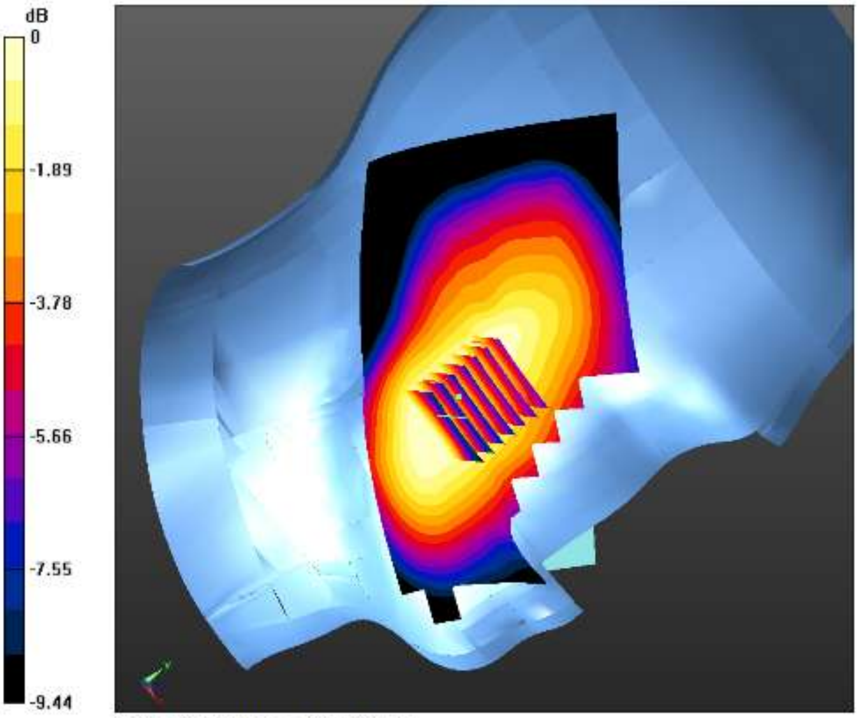
Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid-Touch-Left <SIM 2>
DUT: 3G android phone; Type: P600

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; σ=0.91 mho/m; εr =41.54; ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 2/Area Scan (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.111 W/kg
LEFT HEAD/L-C 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.994 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.118 W/kg
SAR(1 g) = 0.093 W/kg; SAR(10 g) = 0.071 W/kg
Maximum value of SAR (measured) = 0.108 W/kg



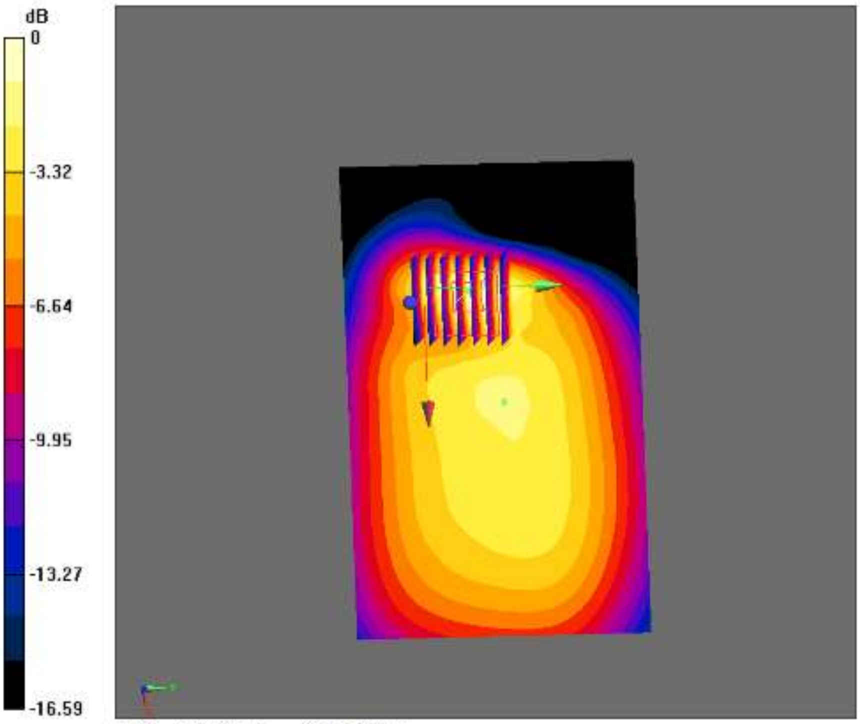
0 dB = 0.108 W/kg = -9.67 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid- Body- Back
DUT: 3G android phone; Type: P600

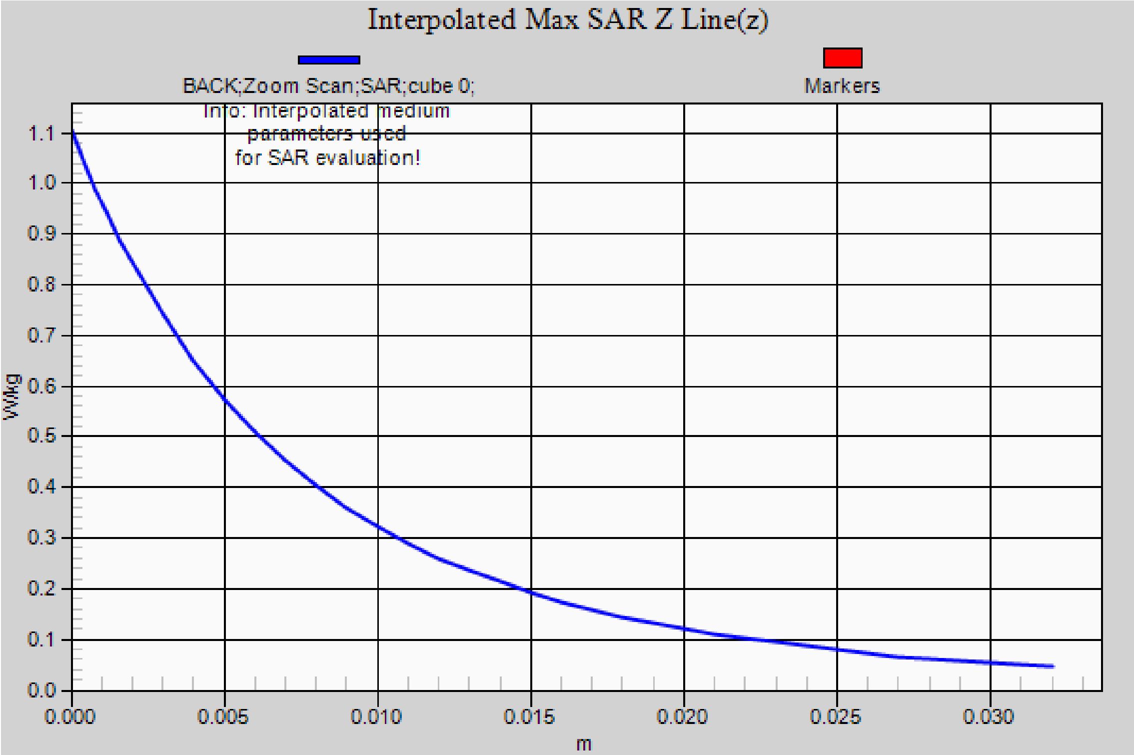
Communication System: UID 0, Generic GSM (0); Communication System Band: GSM 850 (824.2 – 848.8 MHz); Duty Cycle: 1:8.3;Frequency: 836.6 MHz; Medium parameters used: f = 835 MHz; σ= 0.97mho/m; εr = 54.96; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.825 W/kg
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.192 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.564 W/kg; SAR(10 g) = 0.286 W/kg
Maximum value of SAR (measured) = 0.841 W/kg



0 dB = 0.841 W/kg = -0.75 dBW/kg


Interpolated Max SAR Z Line(z)
BACK;Zoom Scan;SAR;cube 0;
Markers
Info: Interpolated medium parameters used for SAR evaluation!
W/kg
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

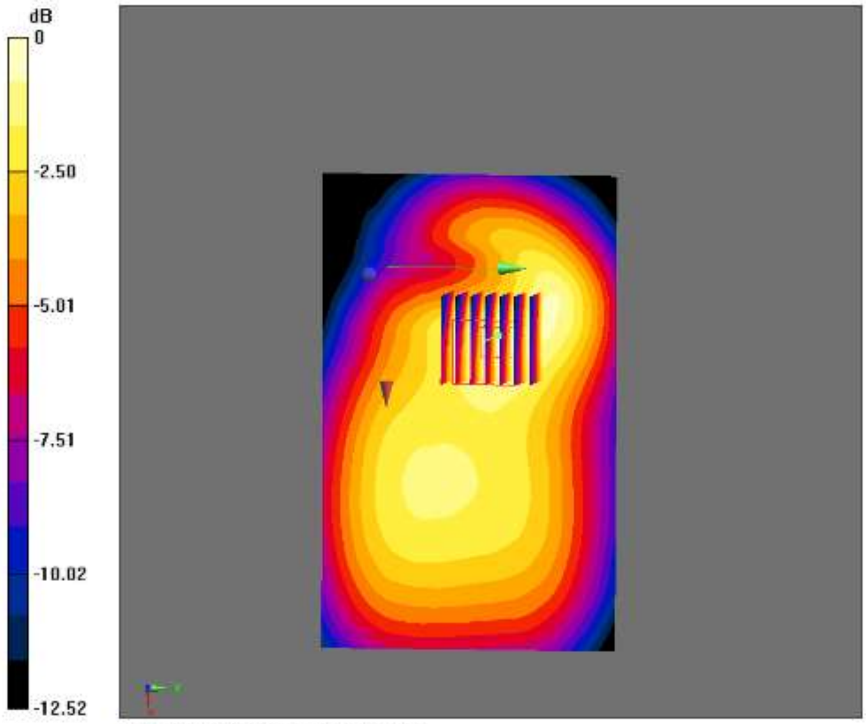
Test Laboratory: AGC Lab **Date: Aug. 19,2014**
GSM 835 Mid- Body- Front
DUT: 3G android phone; Type: P600

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 MHz; σ= 0.97mho/m; εr = 54.96; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.166 W/kg
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.183 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.188 W/kg
SAR(1 g) = 0.132 W/kg; SAR(10 g) = 0.089 W/kg
Maximum value of SAR (measured) = 0.163 W/kg



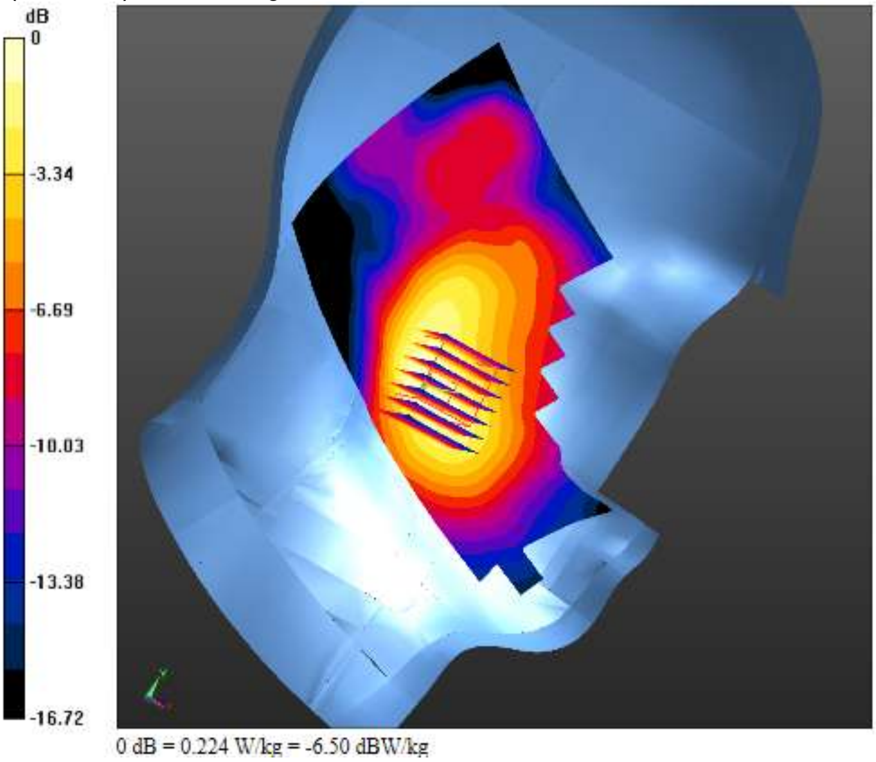
0 dB = 0.163 W/kg = -7.88 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Touch-Left <SIM 1>
DUT: 3G android phone; Type: P600

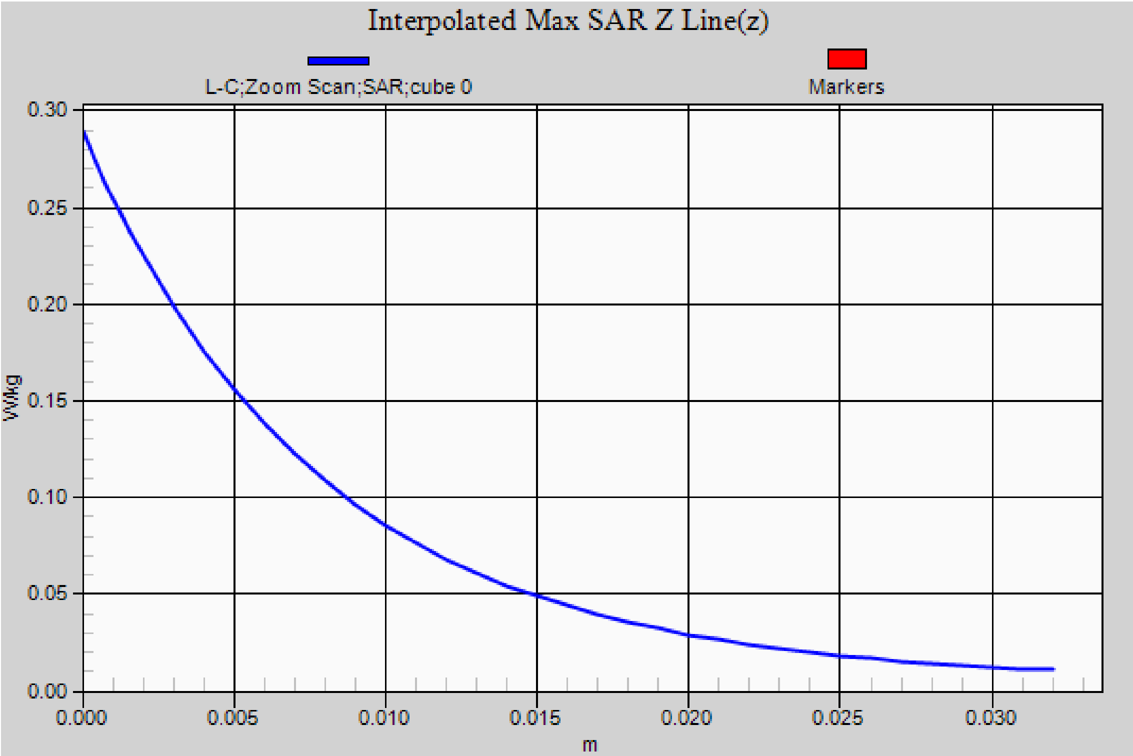
Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz); Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ= 1.42 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.239 W/kg
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.853 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.289 W/kg
SAR(1 g) = 0.164 W/kg; SAR(10 g) = 0.094 W/kg
Maximum value of SAR (measured) = 0.224 W/kg



0 dB = 0.224 W/kg = -6.50 dBW/kg

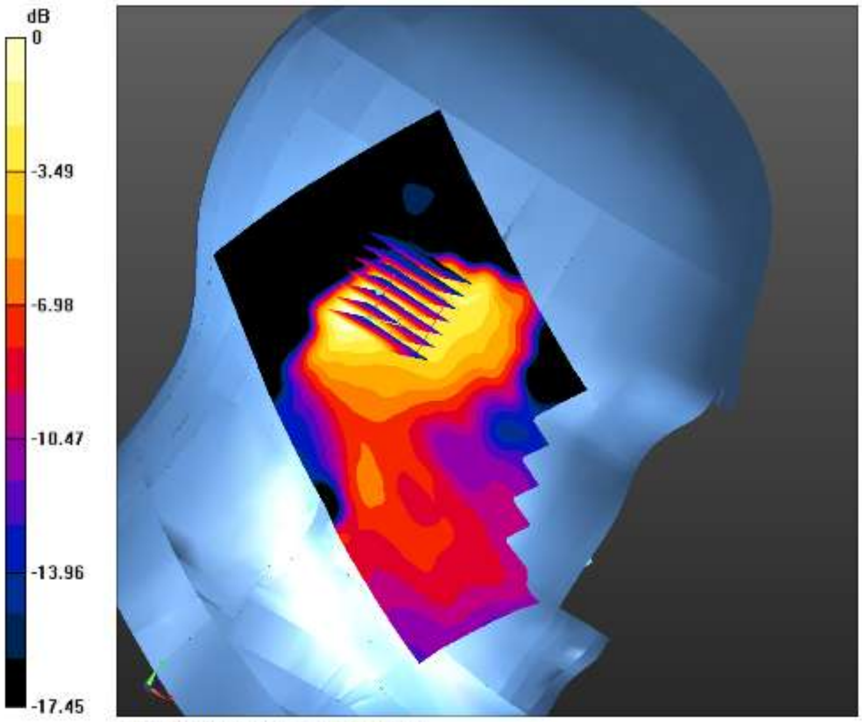

Interpolated Max SAR Z Line(z)
L-C;Zoom Scan;SAR;cube 0
Markers
W/kg
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Tilt-Left <SIM 1>
DUT: 3G android phone; Type: P600

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; σ= 1.42 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.117 W/kg
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.574 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.139 W/kg
SAR(1 g) = 0.075 W/kg; SAR(10 g) = 0.038 W/kg
Maximum value of SAR (measured) = 0.107 W/kg



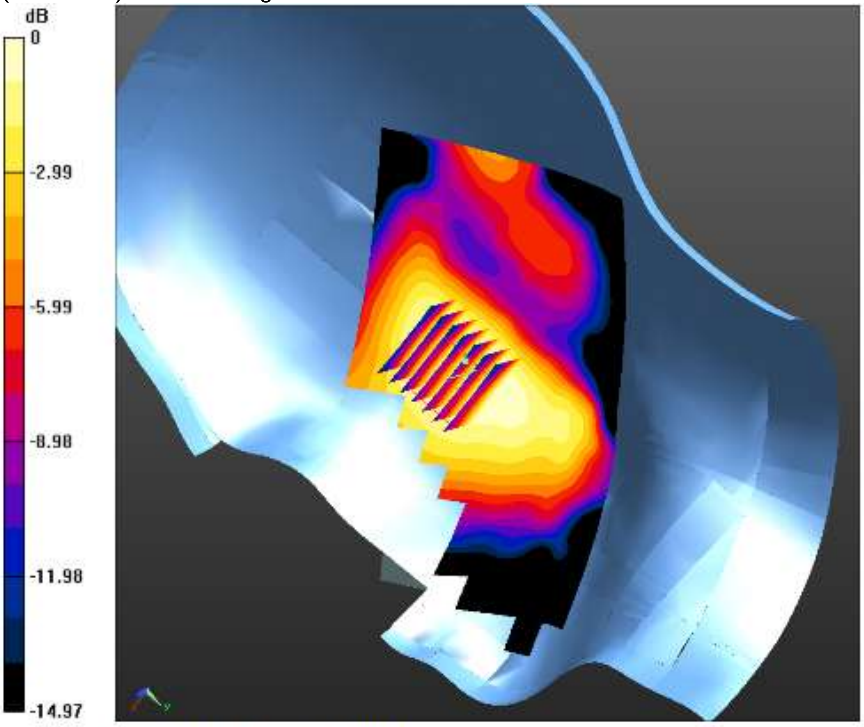
0 dB = 0.107 W/kg = -9.71 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Touch-Right <SIM 1>
DUT: 3G android phone; Type: P600

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; σ= 1.42 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Right Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.127 W/kg
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.150 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.147 W/kg
SAR(1 g) = 0.096 W/kg; SAR(10 g) = 0.062 W/kg
Maximum value of SAR (measured) = 0.122 W/kg



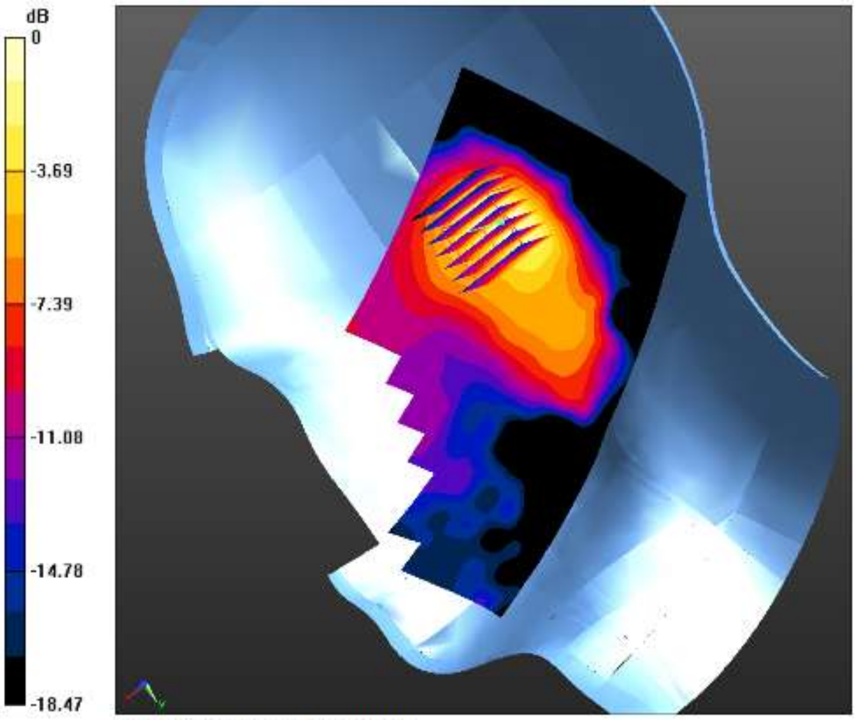
0 dB = 0.122 W/kg = -9.14 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Tilt-Right <SIM 1>
DUT: 3G android phone; Type: P600

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; σ= 1.42 mho/m; εr =40.12; ρ= 1000 kg/m³ ;
Phantom section: Right Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.147 W/kg
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.109 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.181 W/kg
SAR(1 g) = 0.095 W/kg; SAR(10 g) = 0.048 W/kg
Maximum value of SAR (measured) = 0.140 W/kg



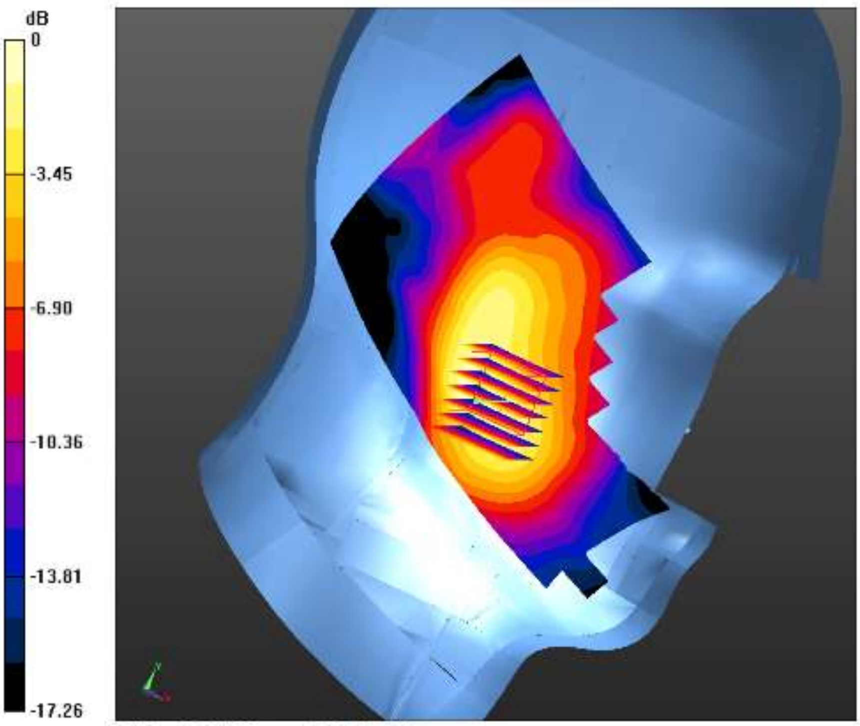
0 dB = 0.140 W/kg = -8.54 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Touch-Left <SIM 2>
DUT: 3G android phone; Type: P600

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; σ= 1.42 mho/m; εr =40.12;; ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.213 W/kg
LEFT HEAD/L-C 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.720 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.261 W/kg
SAR(1 g) = 0.149 W/kg; SAR(10 g) = 0.086 W/kg
Maximum value of SAR (measured) = 0.204 W/kg



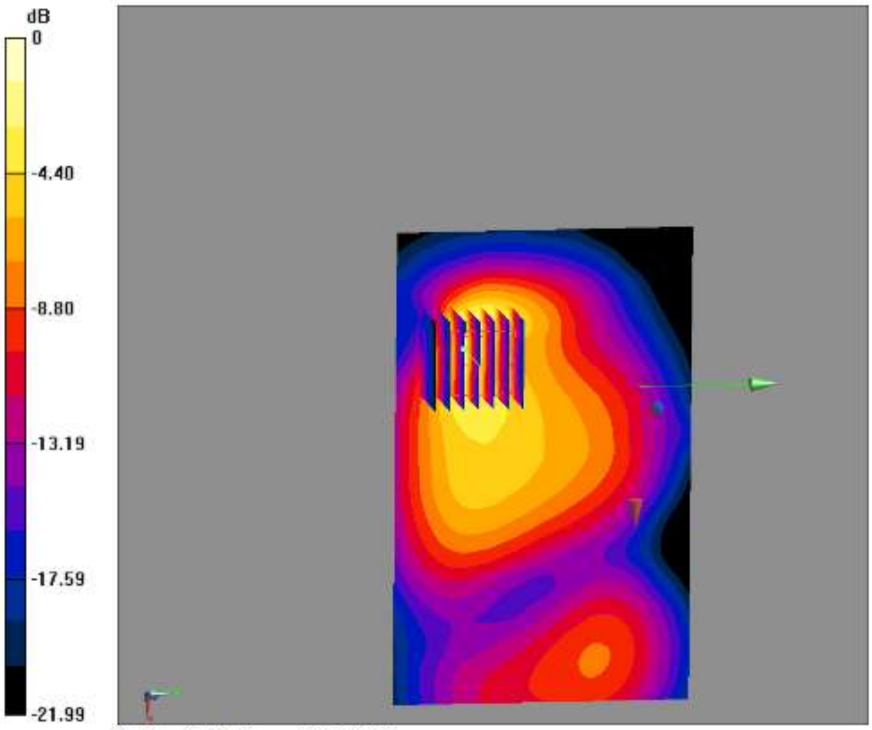
0 dB = 0.204 W/kg = -6.90 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Body- Back
DUT: 3G android phone; Type: P600

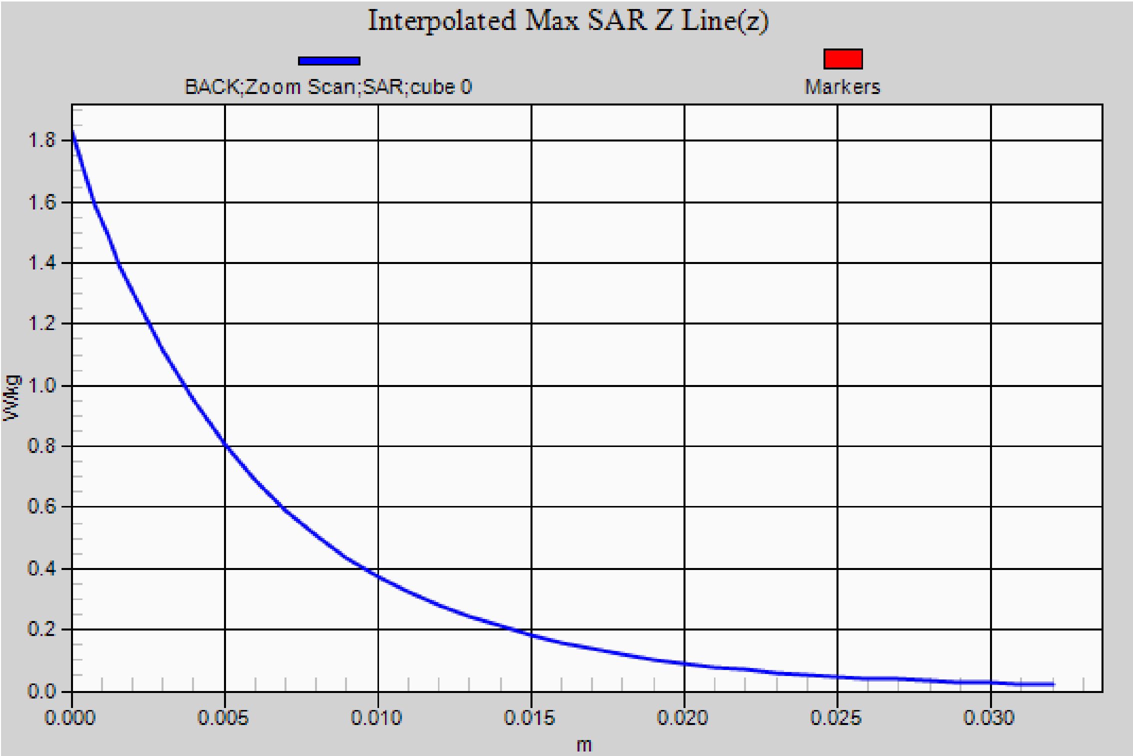
Communication System: UID 0, Generic GSM (0); Communication System Band: PCS 1900 (1850.2 – 1909.8 MHz); Duty Cycle: 1:8.3; Frequency: 1880 MHz; Medium parameters used: f = 1900 MHz; σ= 1.50 mho/m; εr =53.02; ρ= 1000 kg/m^3 ;
Phantom section: Flat Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.41 W/kg
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.607 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 0.780 W/kg; SAR(10 g) = 0.338 W/kg
Maximum value of SAR (measured) = 1.31 W/kg



0 dB = 1.31 W/kg = 1.17 dBW/kg

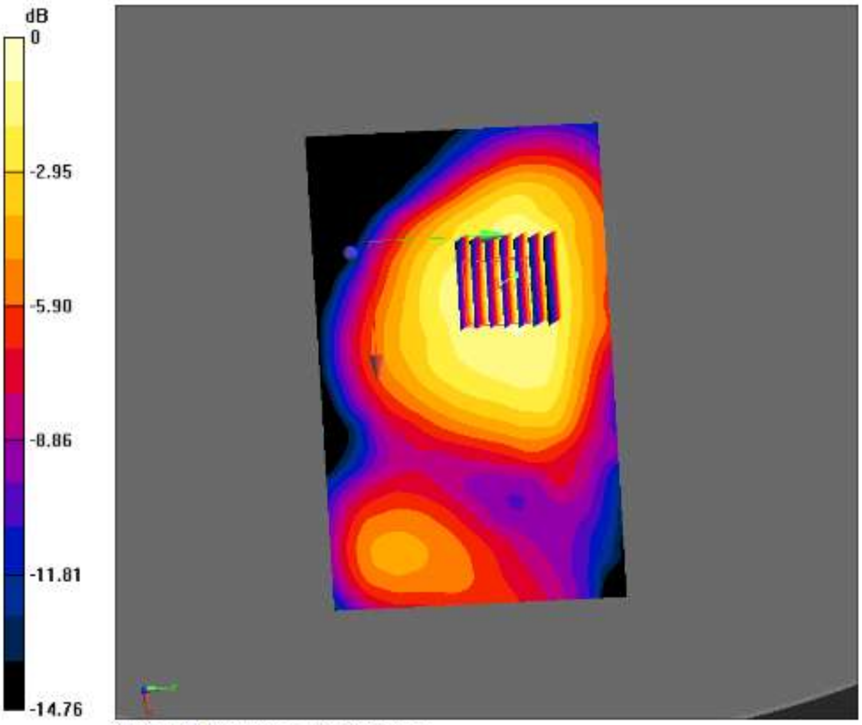

Interpolated Max SAR Z Line(z)
BACK;Zoom Scan;SAR;cube 0
Markers
W/kg
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
PCS 1900 Mid-Body -Front
DUT: 3G android phone; Type: P600

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; σ= 1.50 mho/m; εr =53.02; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21.0, Liquid temperature (℃): 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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.186 W/kg
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.989 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.218 W/kg
SAR(1 g) = 0.141 W/kg; SAR(10 g) = 0.084 W/kg
Maximum value of SAR (measured) = 0.185 W/kg



0 dB = 0.185 W/kg = -7.33 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**

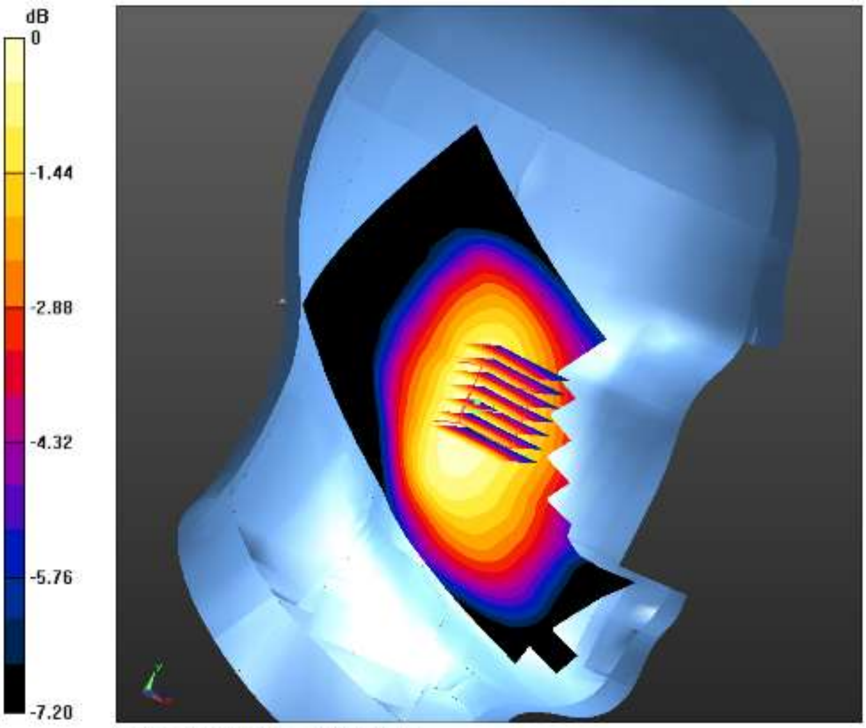
WCDMA Band Ⅴ Mid-Touch-Left

DUT: 3G android phone; Type: P600

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND Ⅴ UTRA/FDD;
Duty Cycle:1:1; Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.91 mho/m; εr =41.54
ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃):21, Liquid temperature (℃):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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.127 W/kg
LEFT HEAD/L-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.904 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.134 W/kg
SAR(1 g) = 0.112 W/kg; SAR(10 g) = 0.088 W/kg
Maximum value of SAR (measured) = 0.125 W/kg



0 dB = 0.125 W/kg = -9.03 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**

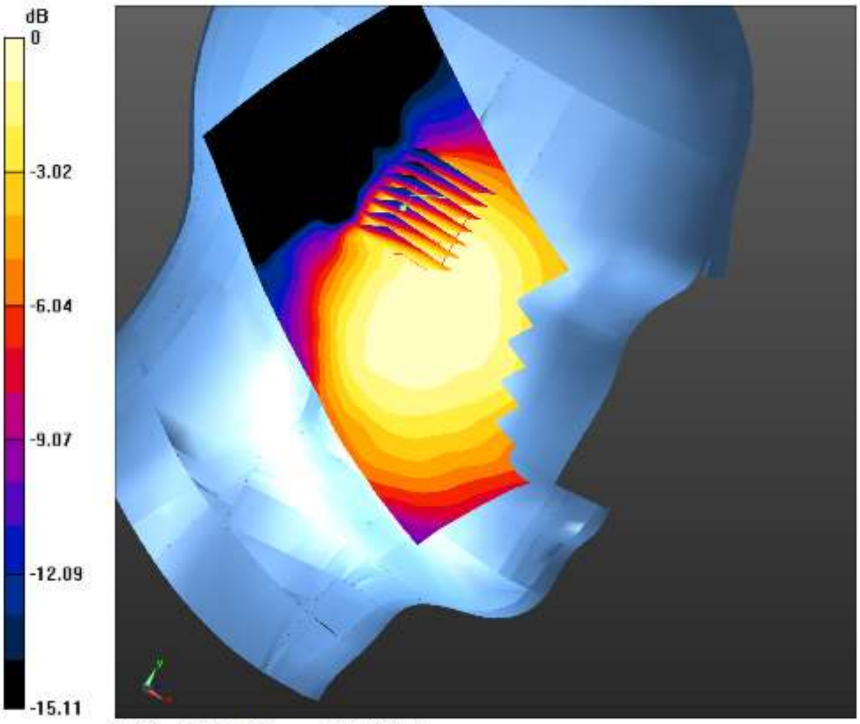
WCDMA Band Ⅴ Mid-Tilt-Left

DUT: 3G android phone; Type: P600

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND Ⅴ UTRA/FDD;
Duty Cycle:1:1; Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.91 mho/m; εr =41.54
ρ= 1000 kg/m³ ;
Phantom section: Left Section
Ambient temperature (℃):21, Liquid temperature (℃):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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0729 W/kg
LEFT HEAD/L-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.087 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.0870 W/kg
SAR(1 g) = 0.043 W/kg; SAR(10 g) = 0.030 W/kg
Maximum value of SAR (measured) = 0.0600 W/kg



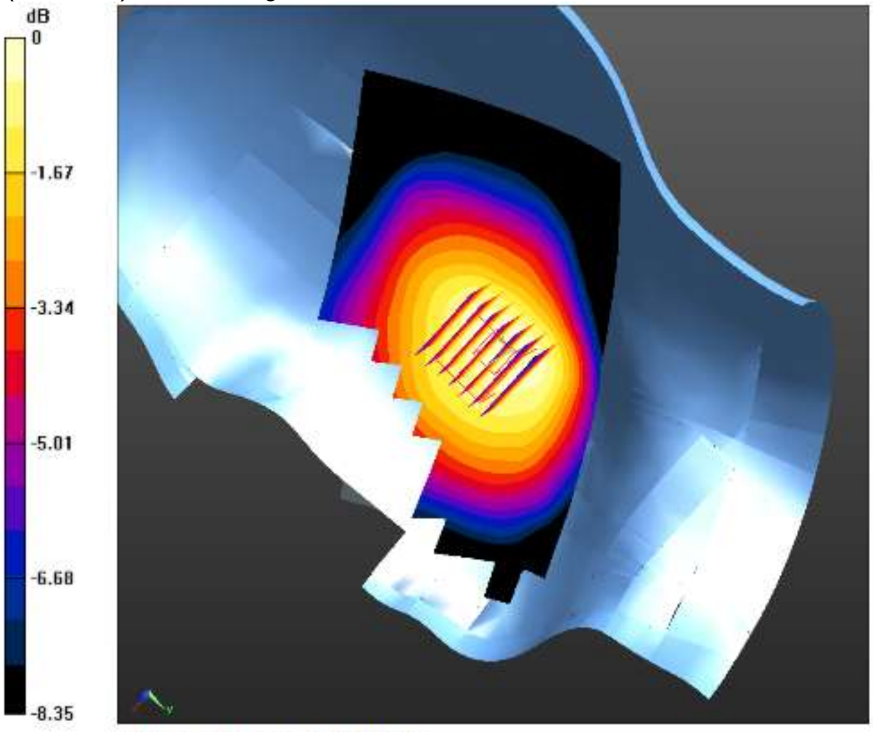
0 dB = 0.0600 W/kg = -12.22 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
WCDMA Band Ⅴ Mid- Touch-Right
DUT: 3G android phone; Type: P600

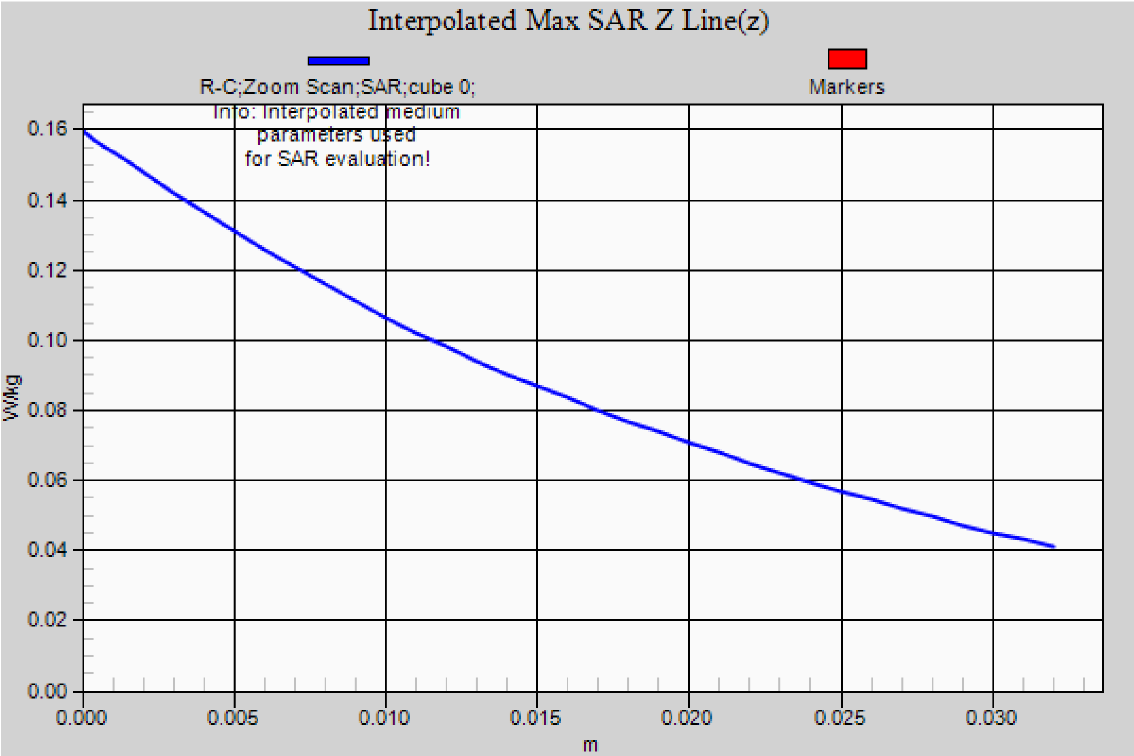
Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND Ⅴ UTRA/FDD;
Duty Cycle:1:1; Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.91 mho/m; εr =41.54
ρ= 1000 kg/m³ ;
Phantom section: Right Section
Ambient temperature (℃):21, Liquid temperature (℃):21

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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.151 W/kg
RIGHT HEAD/R-C/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.570 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.160 W/kg
SAR(1 g) = 0.132 W/kg; SAR(10 g) = 0.104 W/kg
Maximum value of SAR (measured) = 0.148 W/kg



0 dB = 0.148 W/kg = -8.30 dBW/kg


Interpolated Max SAR Z Line(z)
R-C;Zoom Scan;SAR;cube 0;
Markers
Info: Interpolated medium
parameters used
for SAR evaluation!
W/kg
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m

Test Laboratory: AGC Lab **Date: Aug. 19,2014**

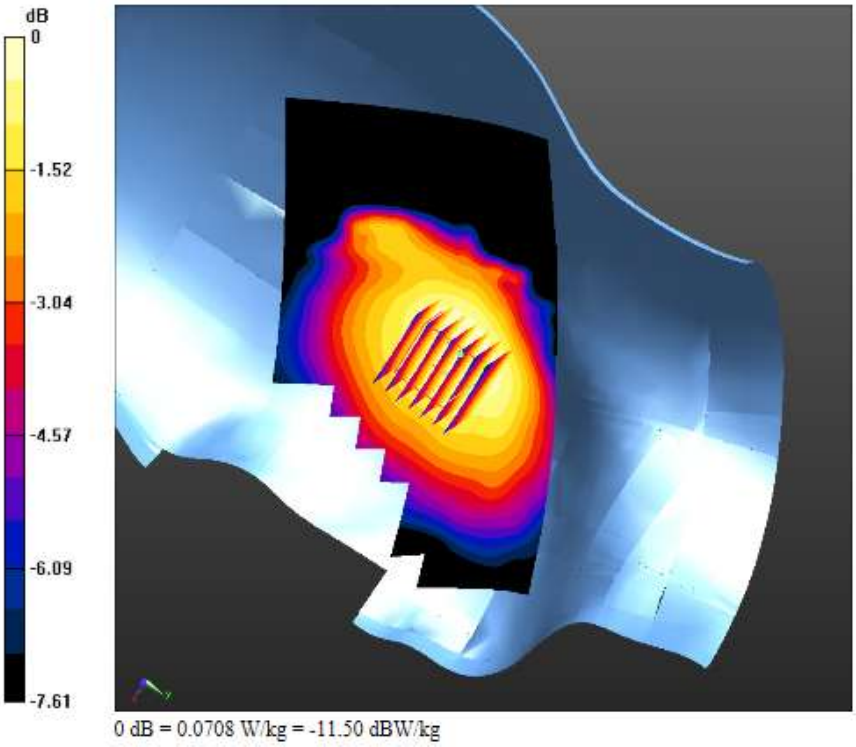
WCDMA Band Ⅴ Mid-Tilt-Right

DUT: 3G android phone; Type: P600

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND Ⅴ UTRA/FDD;
Duty Cycle:1:1; Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.91 mho/m; εr =41.54
ρ= 1000 kg/m³ ;
Phantom section: Right Section
Ambient temperature (℃):21, Liquid temperature (℃):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 (101x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0703 W/kg
RIGHT HEAD/R-T/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.018 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.0760 W/kg
SAR(1 g) = 0.063 W/kg; SAR(10 g) = 0.052 W/kg
Maximum value of SAR (measured) = 0.0708 W/kg



0 dB = 0.0708 W/kg = -11.50 dBW/kg

Test Laboratory: AGC Lab **Date: Aug. 19,2014**

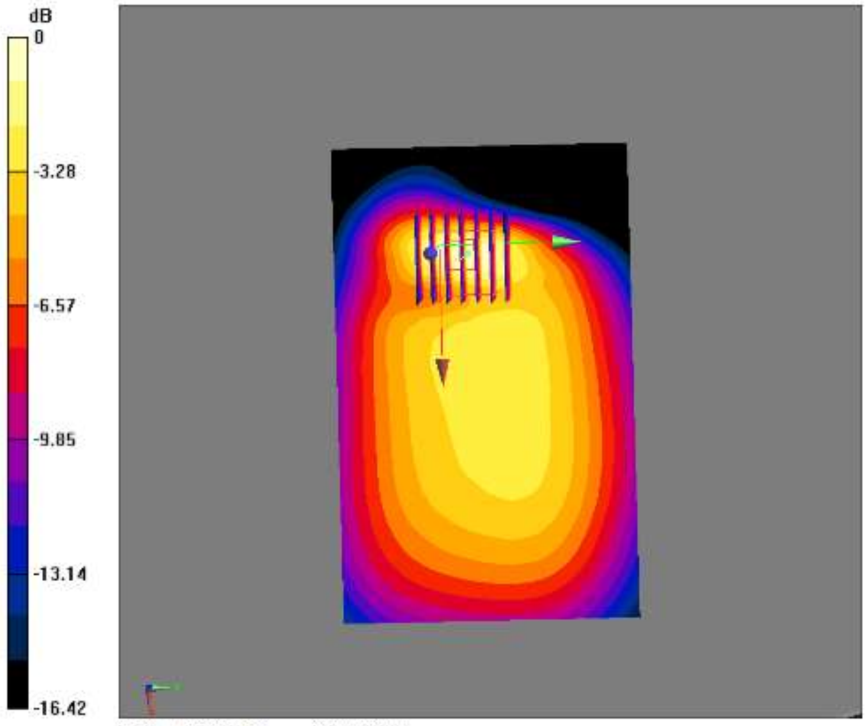
WCDMA Band Ⅴ Mid-Body-Towards Grounds

DUT: 3G android phone; Type: P600

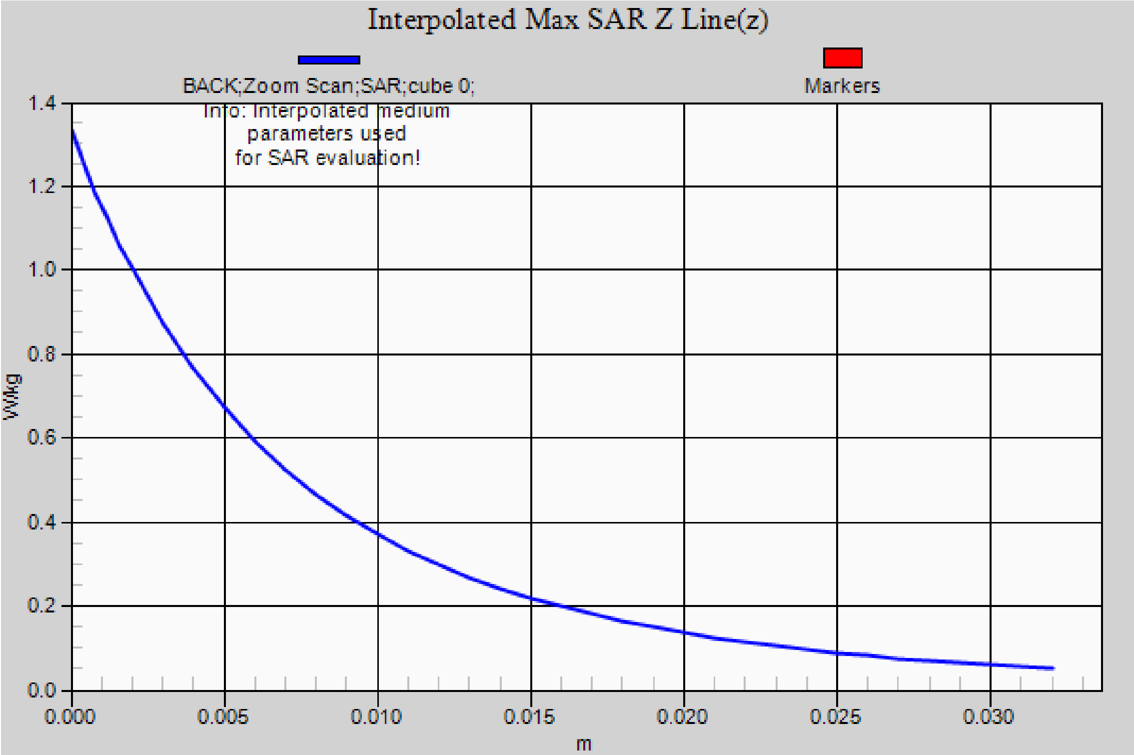
Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND Ⅴ UTRA/FDD;
Duty Cycle:1:1; Frequency: 835 MHz; Medium parameters used: f = 835 MHz;σ=0.97 mho/m; εr =54.96;
ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃):21, Liquid temperature (℃):21

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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.988 W/kg
BODY/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.530 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.661 W/kg; SAR(10 g) = 0.331 W/kg
Maximum value of SAR (measured) = 0.990 W/kg



0 dB = 0.990 W/kg = -0.04 dBW/kg


Interpolated Max SAR Z Line(z)
BACK;Zoom Scan;SAR;cube 0;
Markers
Info: Interpolated medium parameters used for SAR evaluation!
W/kg
m
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030

Test Laboratory: AGC Lab **Date: Aug. 19,2014**

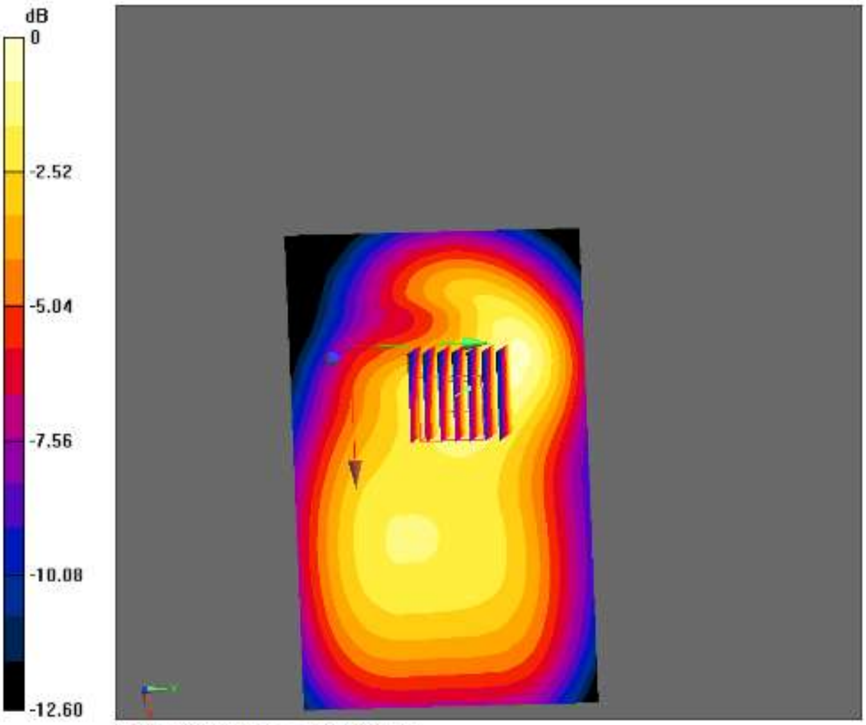
WCDMA Band Ⅴ Mid- Body - Towards Phantom

DUT: 3G android phone; Type: P600

Communication System: UID 0, WCDMA 850 (0); Communication System Band: BAND Ⅴ UTRA/FDD;
Duty Cycle:1:1; Frequency: 835 MHz; Medium parameters used: f = 835 MHz; σ=0.97 mho/m; εr =54.96;
ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃):21, Liquid temperature (℃):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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.189 W/kg
BODY/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.978 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.214 W/kg
SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.098 W/kg
Maximum value of SAR (measured) = 0.184 W/kg



0 dB = 0.184 W/kg = -7.35 dBW/kg

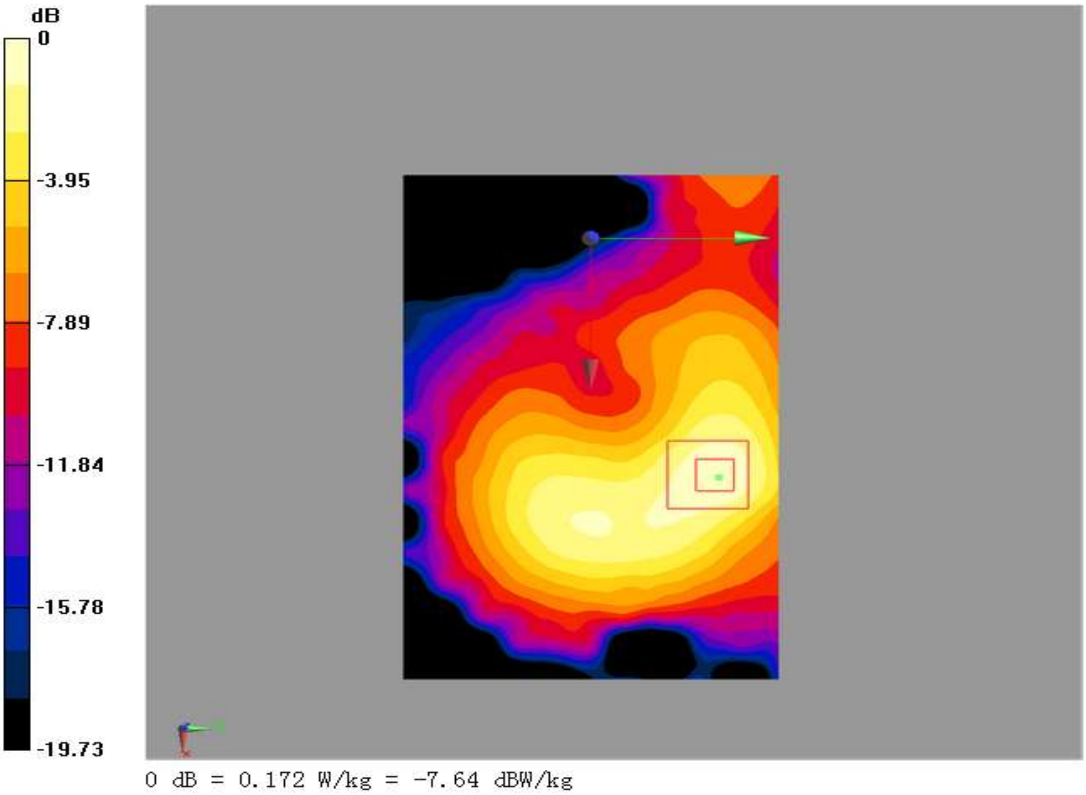
HOTSPOT MODE

Test Laboratory: AGC Lab **Date: Aug. 19,2014**
Hotspot Mid-Body-Worn- Back
DUT: 3G android phone; Type: P600

Communication System: UID 0, WiFi Hotspot (0); Communication System Band: Hotspot; Duty Cycle: 1:1;
Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ=1.94 mho/m; εr =52.66; ρ= 1000 kg/m³ ;
Phantom section: Flat Section
Ambient temperature (℃): 21, Liquid temperature (℃): 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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.168 W/kg
HOTSPOT/BACK/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.486 V/m; Power Drift =0.03 dB
Peak SAR (extrapolated) = 0.238 W/kg
SAR(1 g) = 0.115 W/kg; SAR(10 g) = 0.058 W/kg
Maximum value of SAR (measured) = 0.172 W/kg

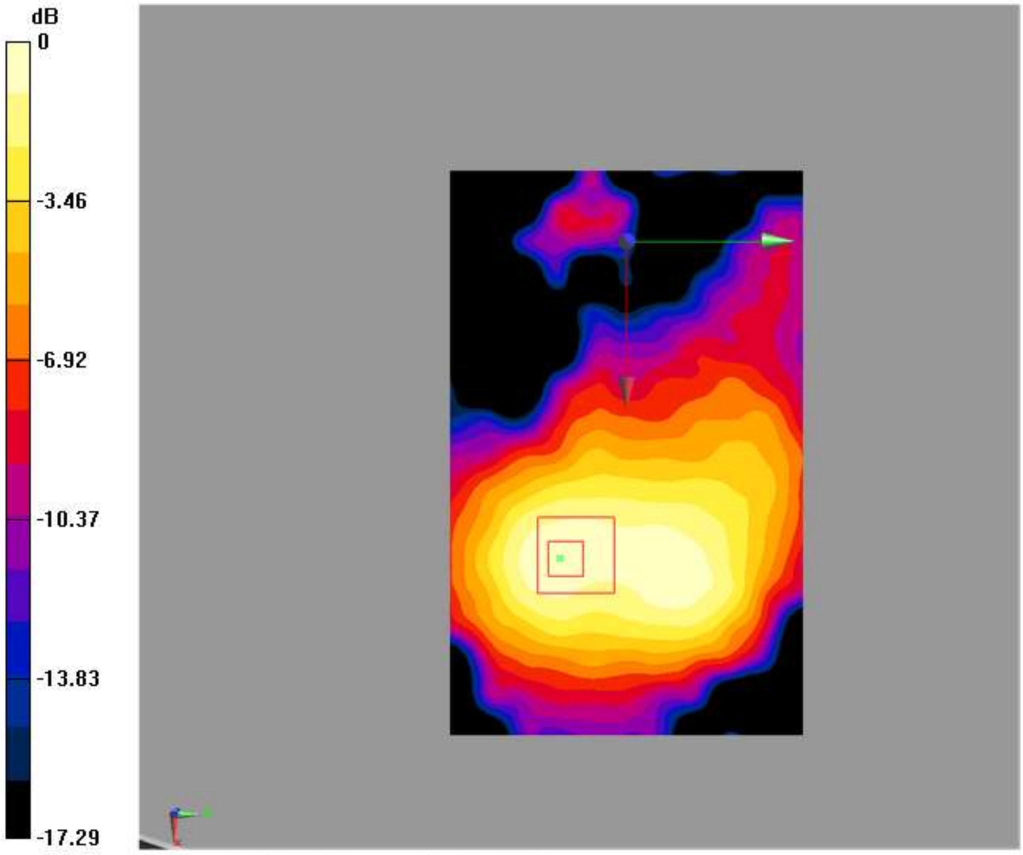


Test Laboratory: AGC Lab **Date: Aug. 19,2014**
Hotspot Mid-Body -Front
DUT: 3G android phone; Type: P600

Communication System: UID 0, WiFi Hotspot (0); Communication System Band: Hotspot; Duty Cycle: 1:1;
Frequency: 2437 MHz; Medium parameters used: f = 2437 MHz; σ=1.94 mho/m; εr =52.66; ρ= 1000 kg/m^3 ;
Phantom section: Flat Section
Ambient temperature (℃): 21, Liquid temperature (℃): 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 (161x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0882 W/kg
HOTSPOT/FRONT/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.722 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.135 W/kg
SAR(1 g) = 0.064 W/kg; SAR(10 g) = 0.027 W/kg
Maximum value of SAR (measured) = 0.0850 W/kg

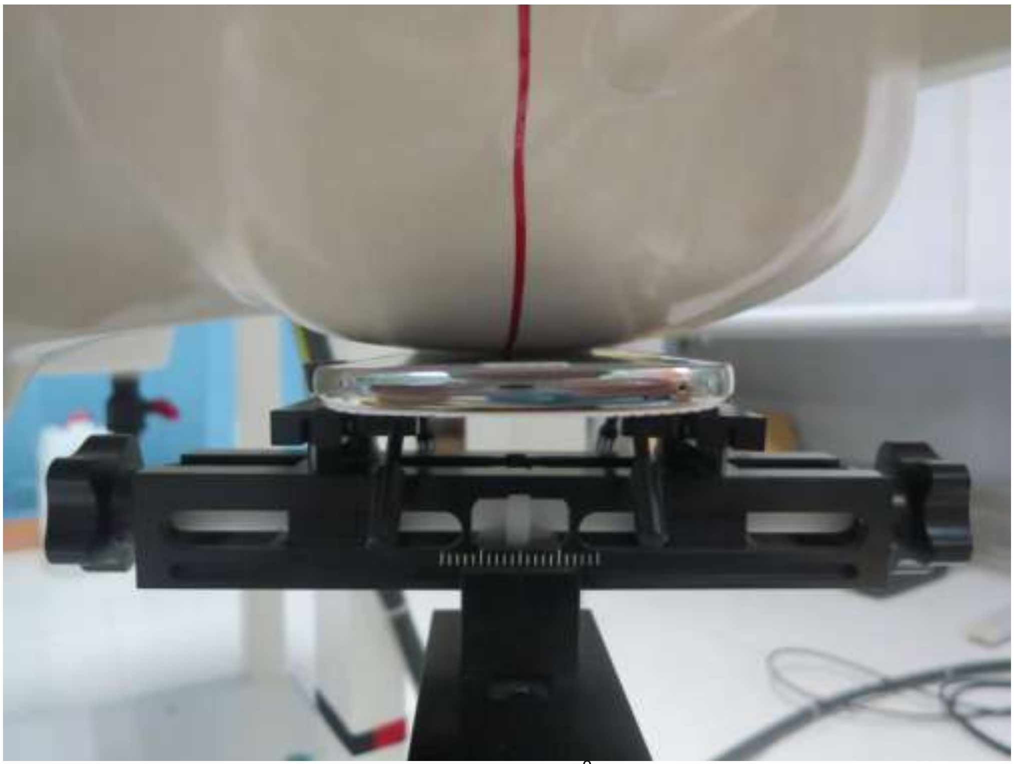


0 dB = 0.0850 W/kg = -10.71 dBW/kg

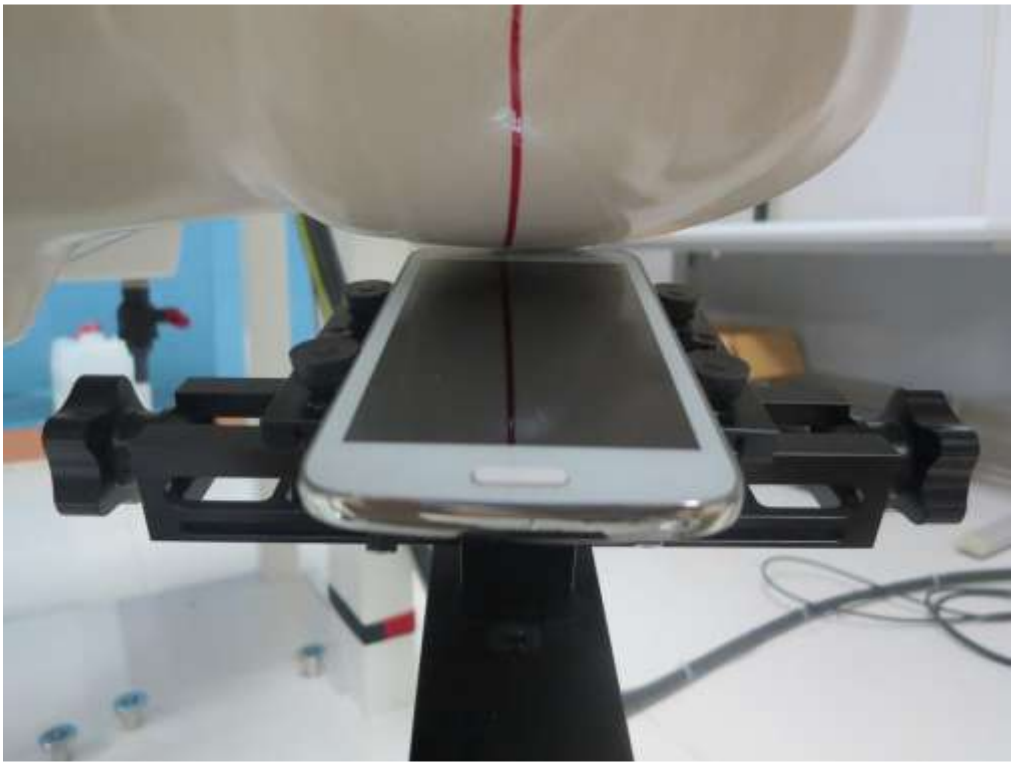
APPENDIX C. TEST SETUP PHOTOGRAPHS &EUT PHOTOGRAPHS

Test Setup Photographs

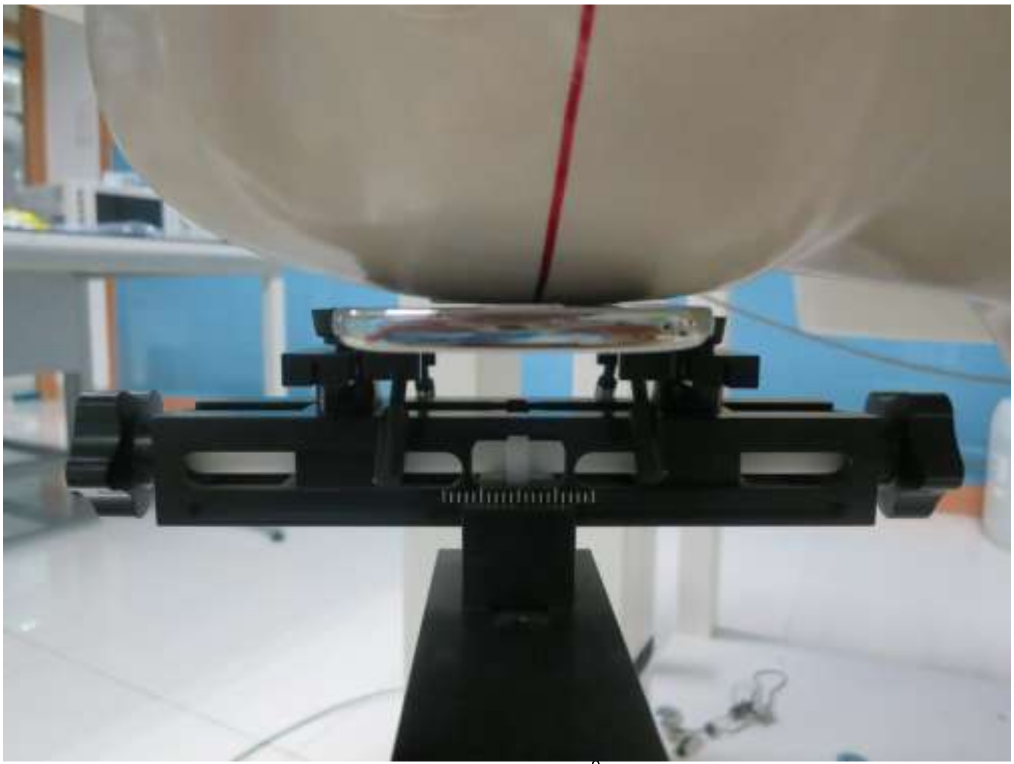
LEFT-CHECK TOUCH



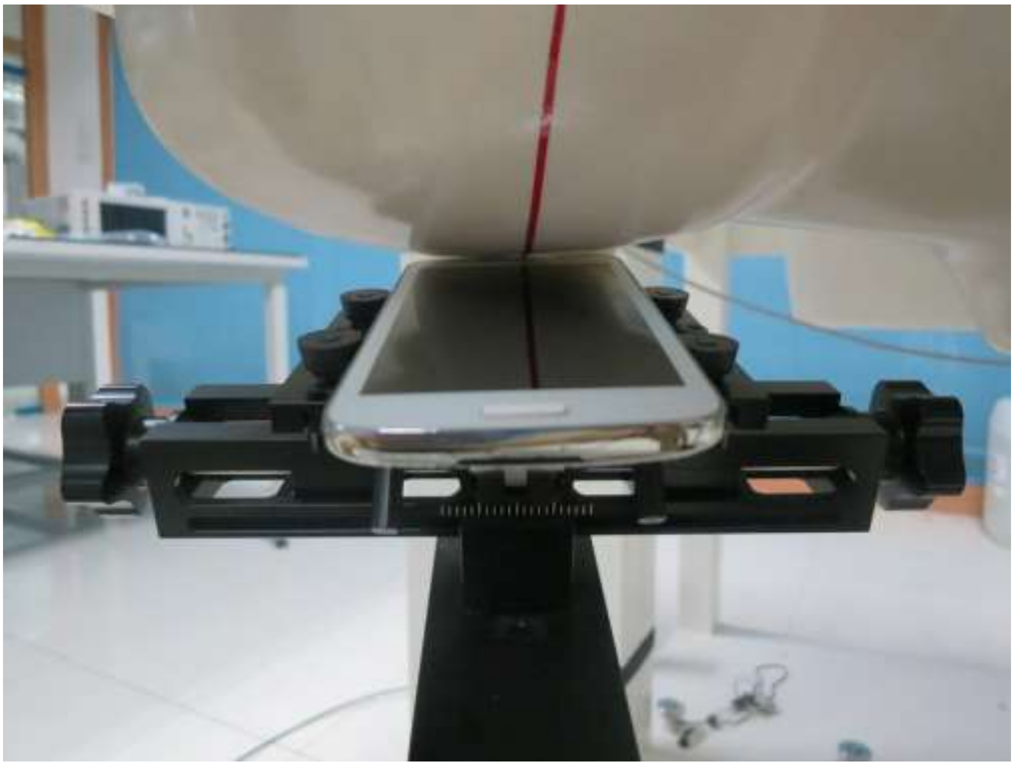
LEFT-TILT 15^0



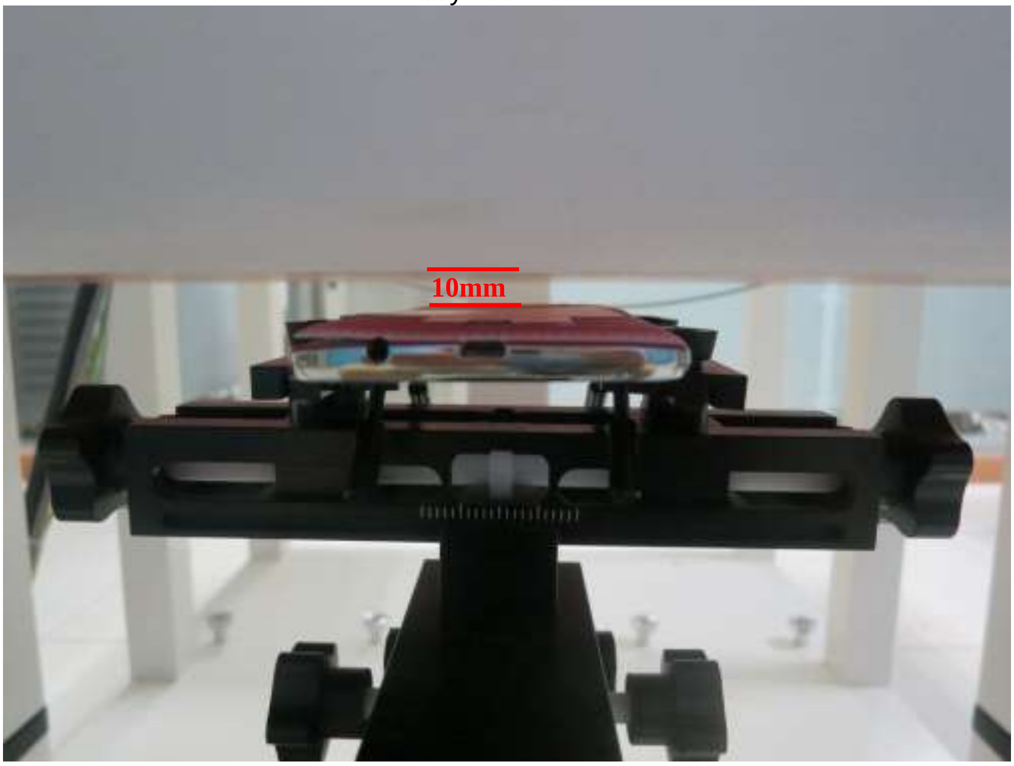
RIGHT-CHECK TOUCH



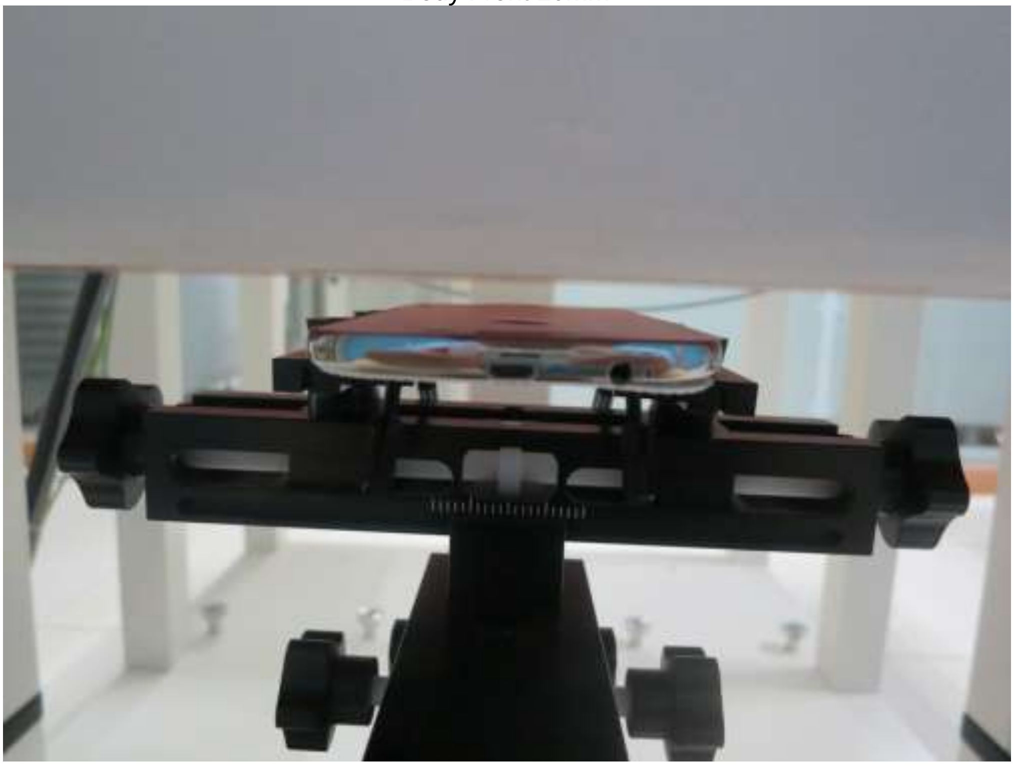
RIGHT-TILT 15^0



Body Back 10mm

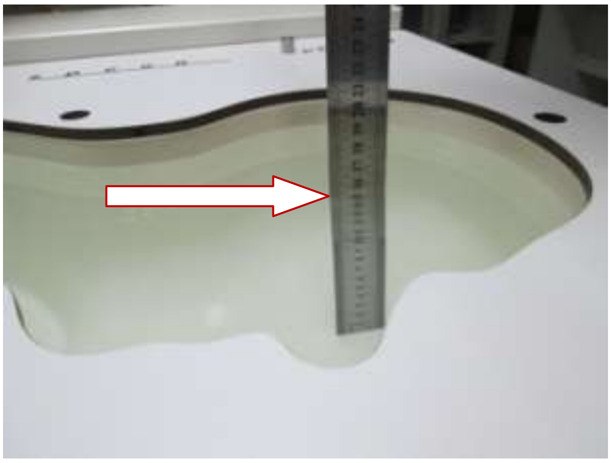


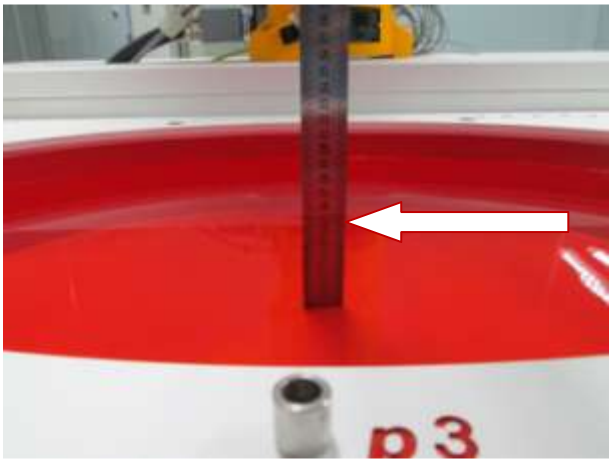
Body Front 10mm



DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

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





EUT PHOTOGRAPHS

All VIEW OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

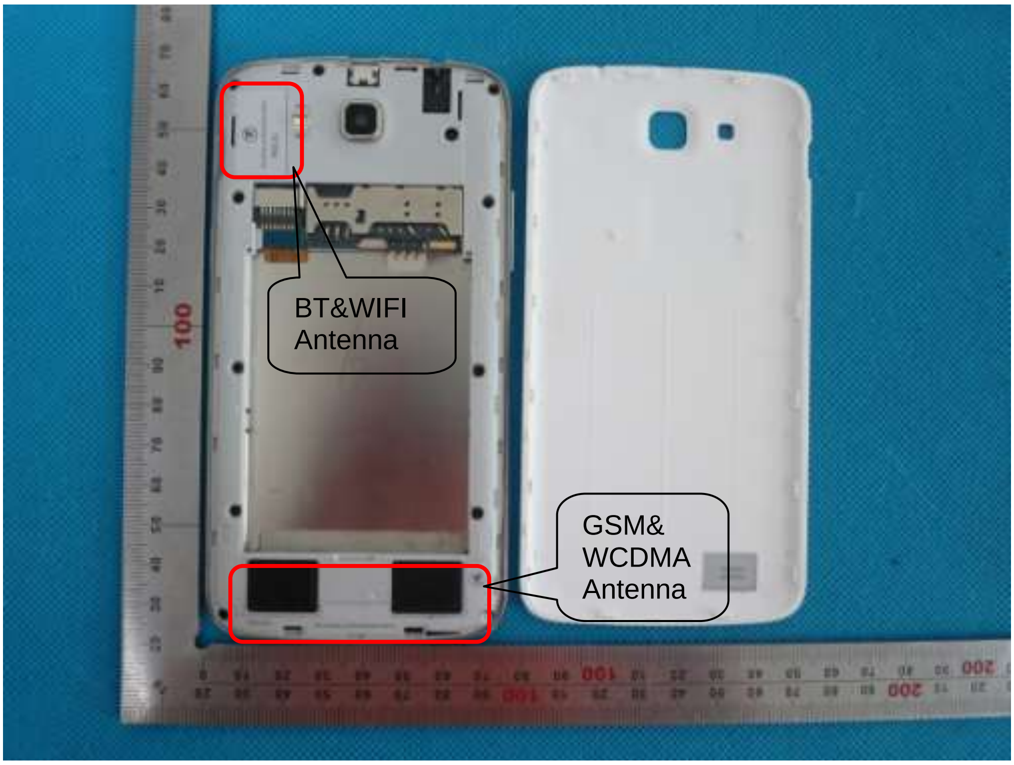
FRONT VIEW OF EUT

BACK VIEW OF EUT

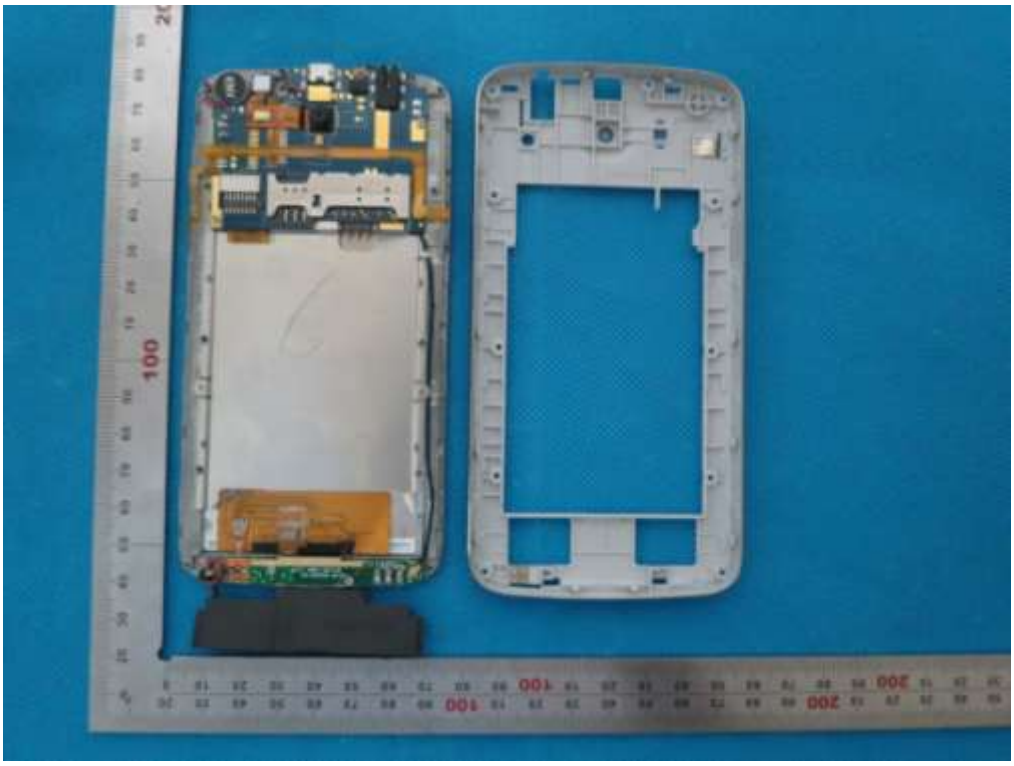
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

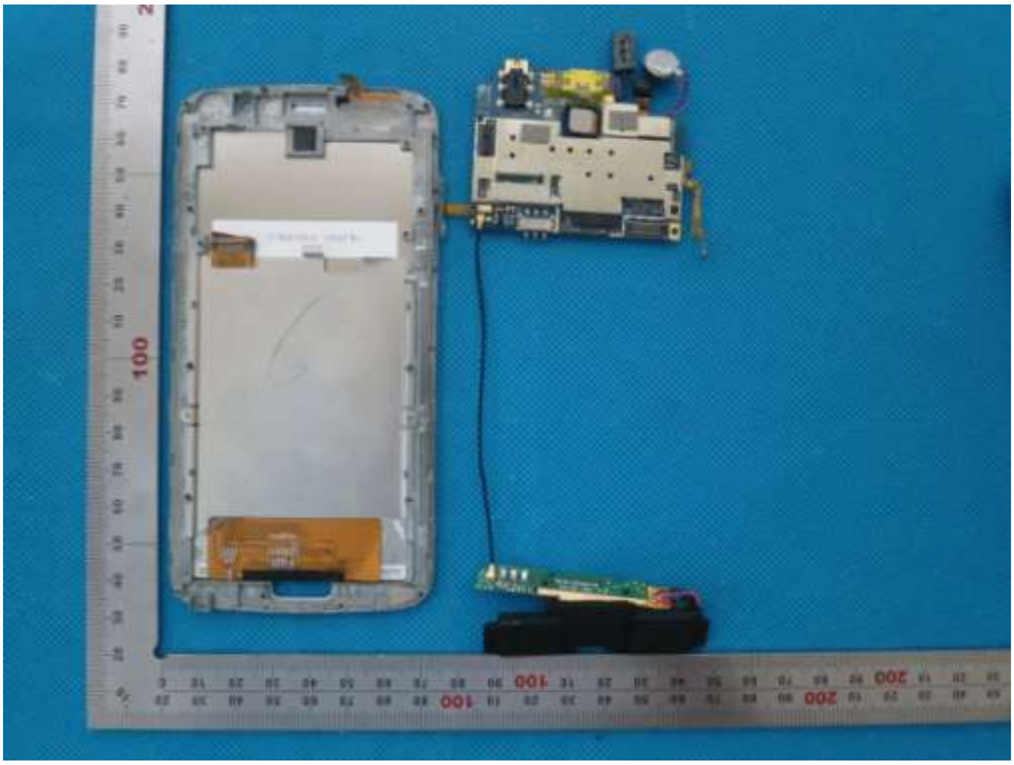
OPEN VIEW OF EUT-1



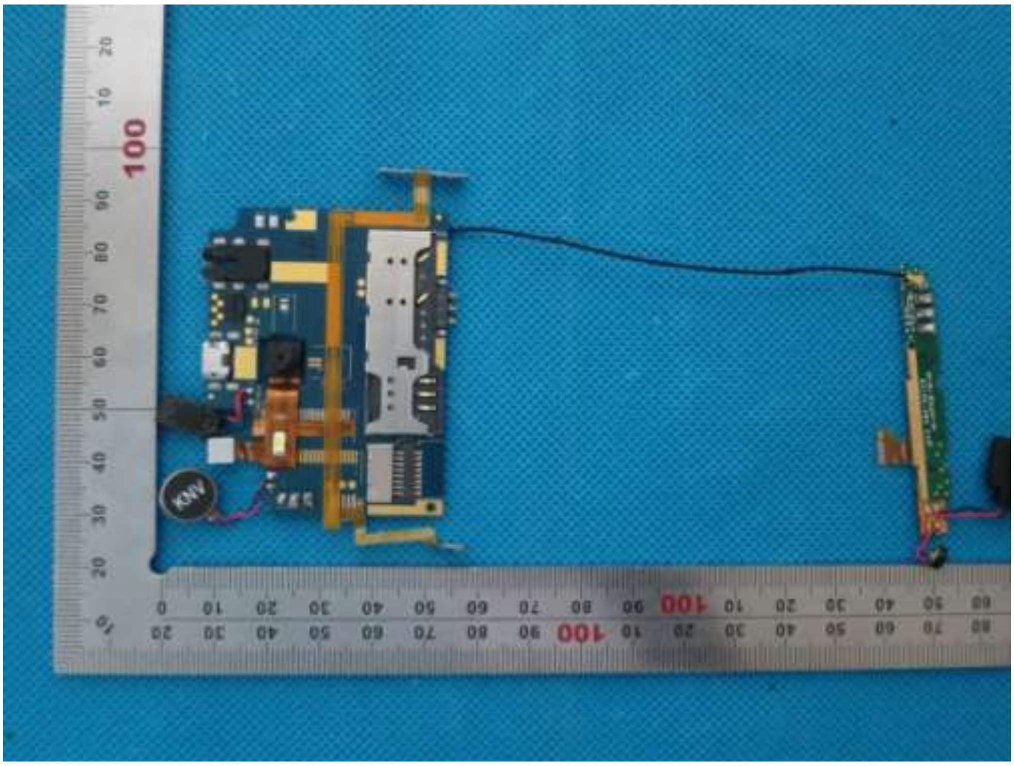
OPEN VIEW OF EUT-2



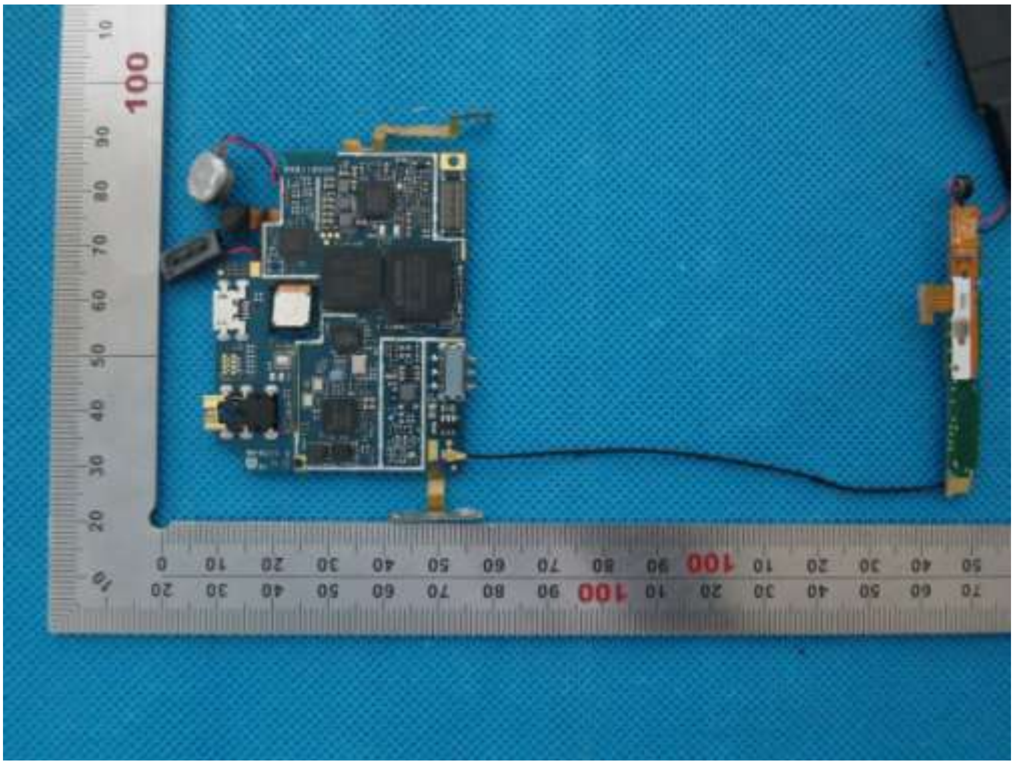
OPEN VIEW OF EUT-3



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
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 ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	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

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	Leif Klysner
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

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

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

Accreditation No.: SCS 108

Glossary:

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

a) 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
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3953

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

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

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.53	0.55	0.48	± 10.1 %
DCP (mV)[B]	97.7	98.6	97.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	172.9	±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 E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (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.
[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.

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

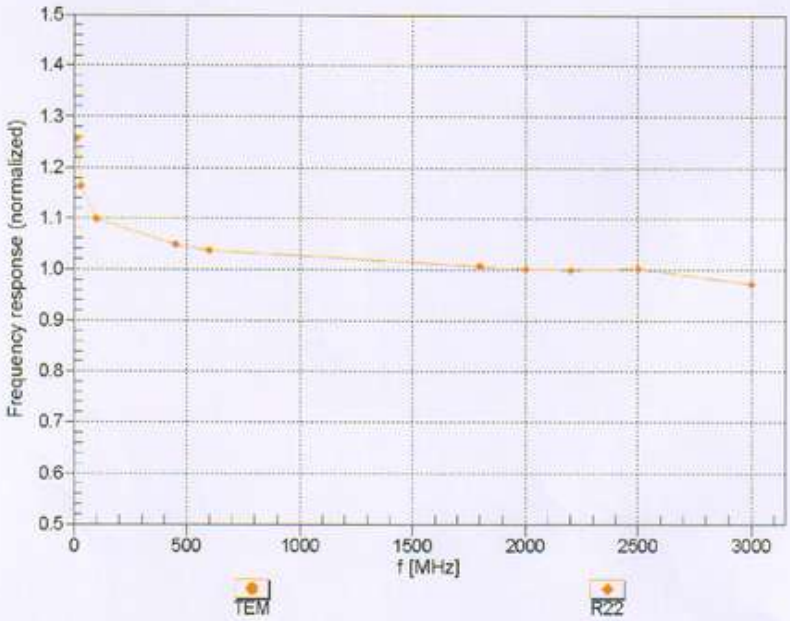
Calibration Parameter Determined in Body Tissue Simulating Media

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.

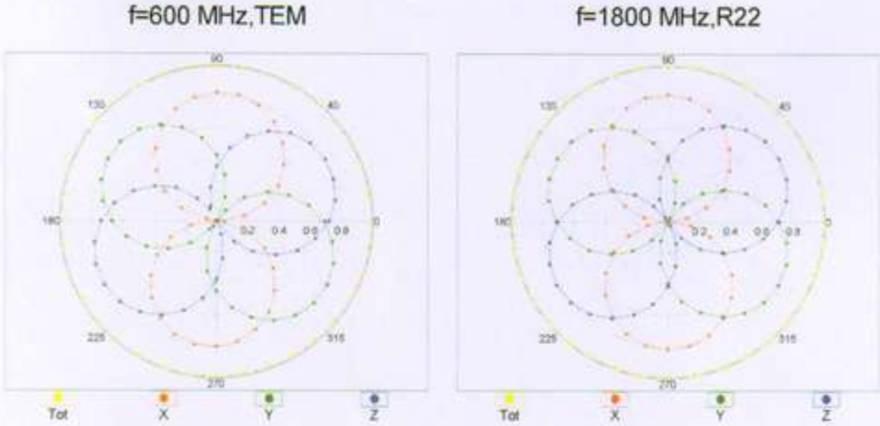
Frequency Response of E-Field

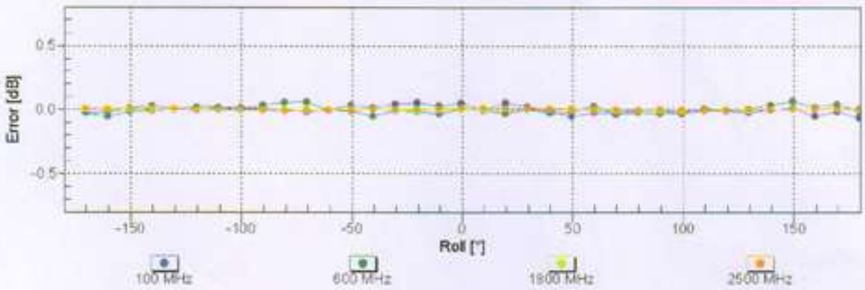
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

Receiving Pattern (ϕ), ϑ = 0°

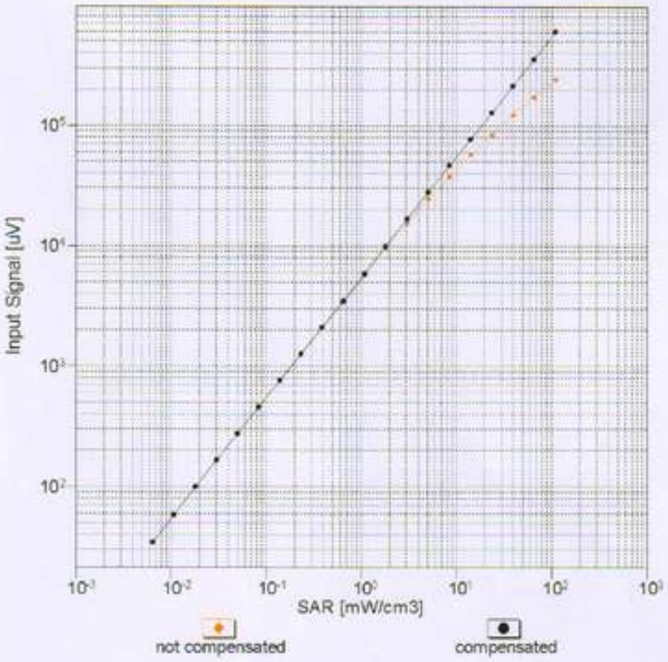


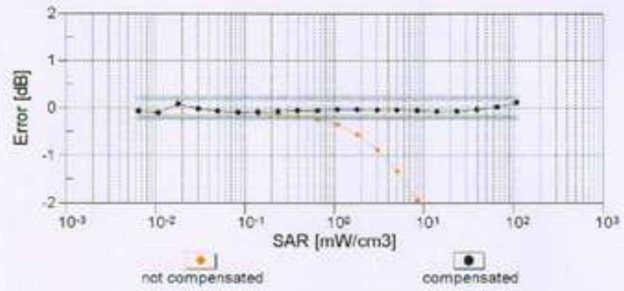


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell , f = 900 MHz)

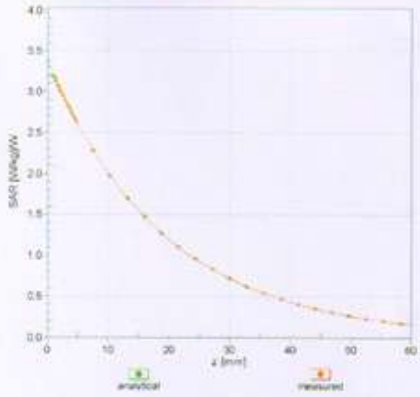




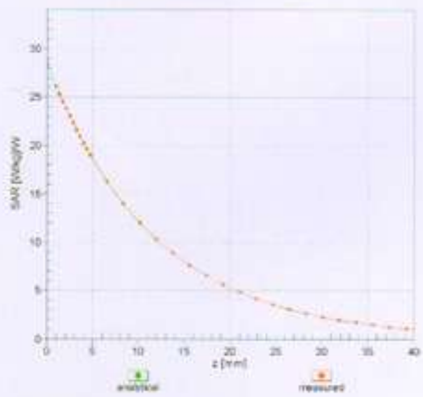
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

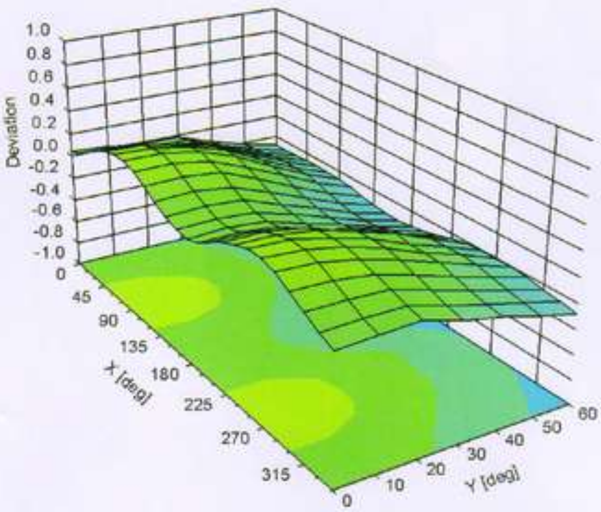


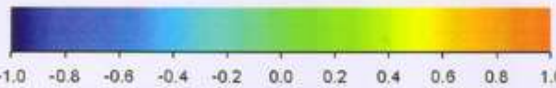
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
 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: **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:13976)	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

	Name	Function	Signature
Calibrated by:	R.Mayoraz	Technician	R. Mayoraz
Approved by:	Fin Bomholt	Deputy Technical Manager	F. Bomholt

Issued: October 10, 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

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**

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 = 6.1µV , 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 ± 0.02% (k=2)	404.125 ± 0.02% (k=2)	403.593 ± 0.02% (k=2)
Low Range	3.97351 ± 1.50% (k=2)	3.99134 ± 1.50% (k=2)	3.96993 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	195.0 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	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 (μV)	Difference (μV)	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 (μV)	Low Range Average Reading (μV)
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 (μV)	Channel Y (μV)	Channel Z (μV)
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 10MΩ

	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

ACCREDITED
Calibration CERT #2246.02

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.

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

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

Issue	*Date*	*Modifications*
A	11/14/2013	Initial release

TABLE OF CONTENTS

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 constucted 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

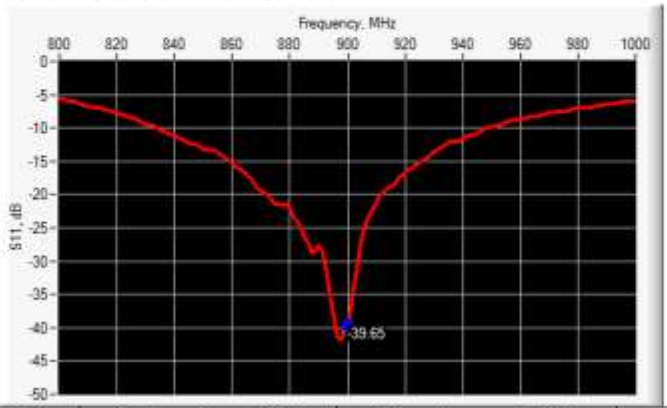
5.3 VALIDATION MEASUREMENT

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 %

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
900	-39.65	-20	50.5 Ω - -1.1 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L 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	83.3 ±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 %.	

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: eps' : 41.8 sigma : 0.96
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 %

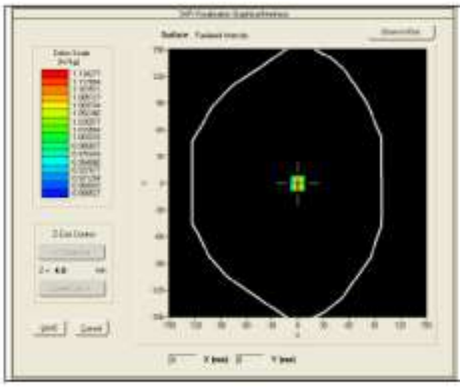
7.2 HEAD LIQUID MEASUREMENT

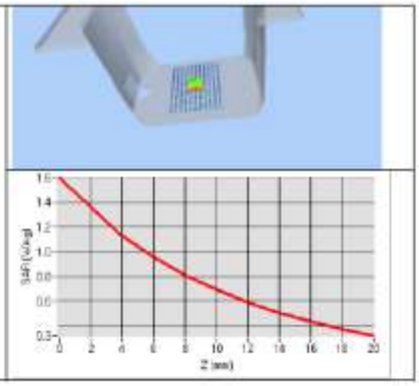
Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %	PASS	0.97 ±5 %	PASS
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±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 %	

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	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	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	

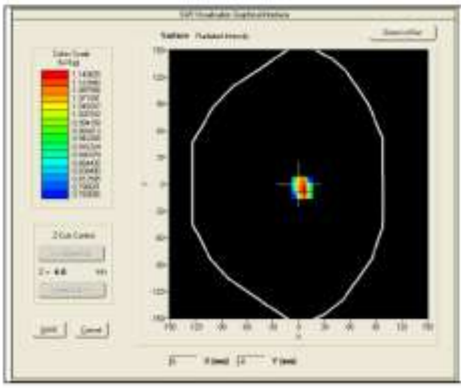


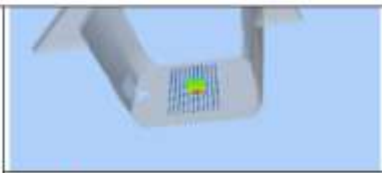


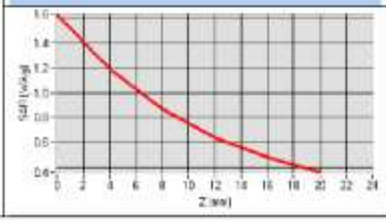
7.4 BODY MEASUREMENT RESULT

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 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)	10 g SAR (W/kg/W)
	measured	measured
900	11.27 (1.13)	7.18 (0.72)







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.318.7.13.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

Calibration CERT #2246.02

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.

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

	Customer Name
Distribution :	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 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 constucted 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

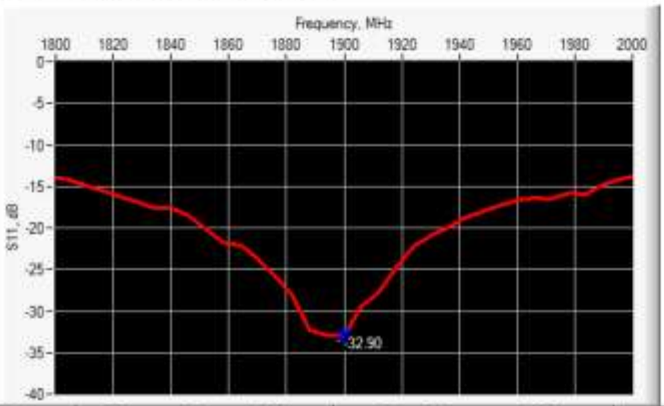
5.3 VALIDATION MEASUREMENT

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 %

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-32.90	-20	48.9 Ω + 2.3 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L 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 %.	

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: eps' : 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=8m/dz=5mm
Frequency	1900 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

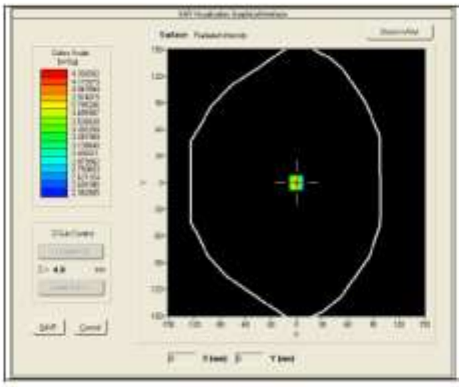
7.2 HEAD LIQUID MEASUREMENT

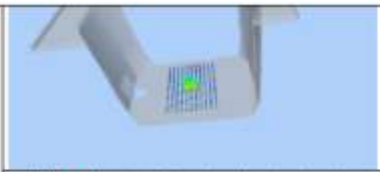
Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		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 %	

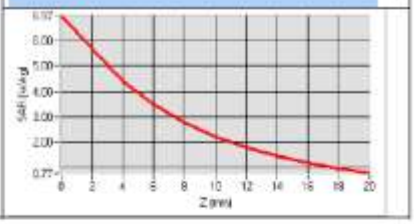
7.3 MEASUREMENT RESULT

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	



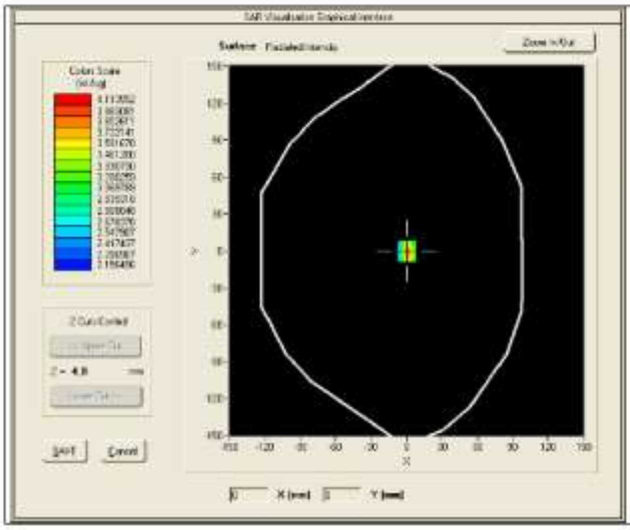


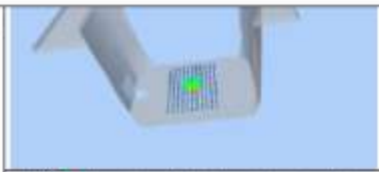


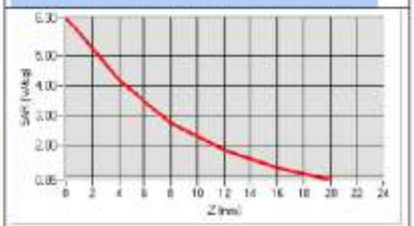
7.4 BODY MEASUREMENT RESULT

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 52.5 sigma : 1.50
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	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

ACCREDITED
Calibration CERT #2246.02

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.

	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

	Customer Name
Distribution :	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 constucted 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

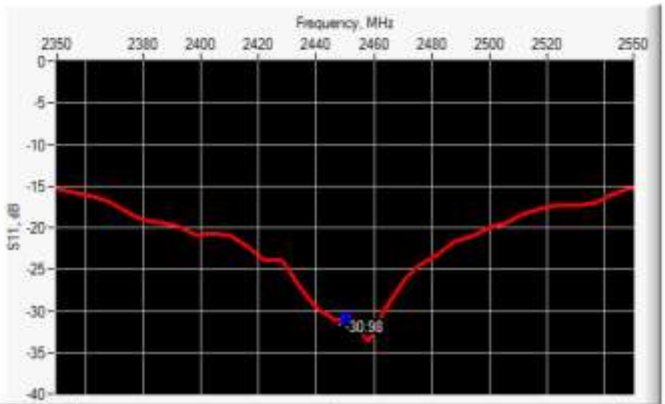
5.3 VALIDATION MEASUREMENT

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 %

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-30.98	-20	47.3 Ω + 0.1 jΩ

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L 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 %.		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 %.	PASS	30.4 ±1 %.	PASS	3.6 ±1 %.	PASS
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 %.	

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: eps' : 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 %

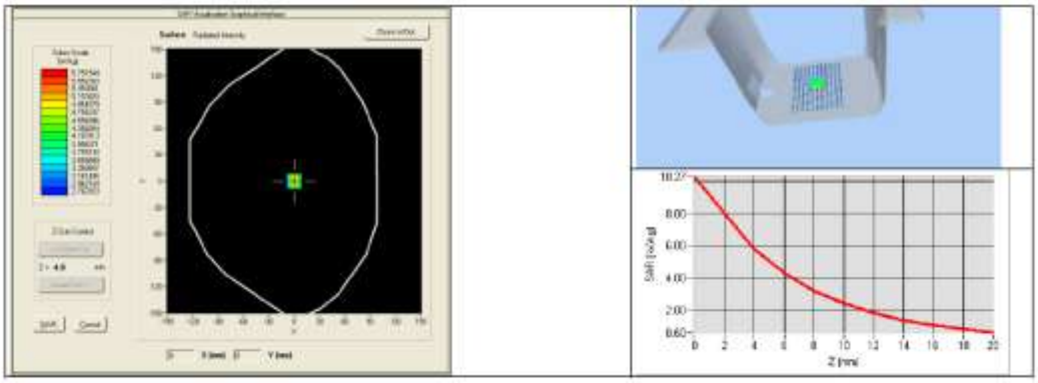
7.2 HEAD LIQUID MEASUREMENT

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 %		0.89 ±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 %		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	37.9 ±5 %		2.91 ±5 %	

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.

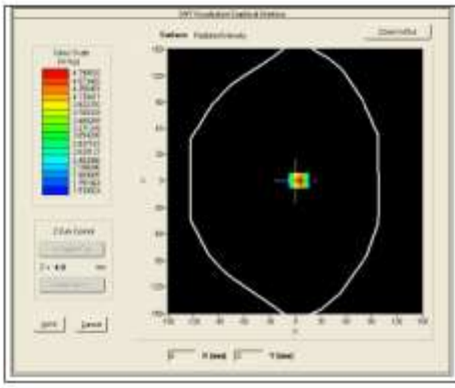
Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	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	

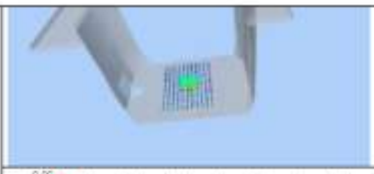


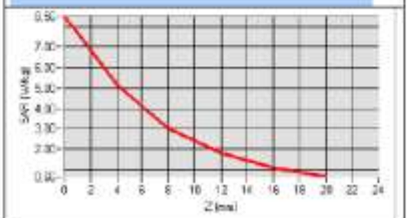
7.4 BODY MEASUREMENT RESULT

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 52.0 sigma : 1.94
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 %

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)







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