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FCC SAR Test Report

Report No. : SA120717C01
Applicant : HTC Corporation
Address : 23, Xinghua Rd., Taoyuan 330, Taiwan, R.O.C.
Product : Windows Phone
FCC ID : NM8PM23100
Brand : HTC
Model No. : PM23100
Standards : FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1991 / IEEE 1528:2003
FCC OET Bulletin 65 Supplement C (Edition 01-01)
KDB 248227 D01 v01r02 / KDB 648474 D01 v01r05 / KDB 941225 D01 v02
KDB 941225 D03 v01 / KDB 941225 D05 v01 / KDB 941225 D06 v01
Date of Testing : Aug. 01, 2012 ~ Sep. 26, 2012

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

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Release Control Record

Issue No.	Reason for Change	Date Issued
R01	Original release	Sep. 28, 2012

1. Summary of Maximum SAR Value

Mode / Band	Test Position	SAR-1g (W/kg)
GSM850	Head	0.287
	Body Worn (1 cm Gap)	0.343
	Hotspot Mode (1 cm Gap)	0.653
GSM1900	Head	0.290
	Body Worn (1 cm Gap)	0.306
	Hotspot Mode (1 cm Gap)	0.351
WCDMA Band V	Head	0.193
	Body Worn (1 cm Gap)	0.228
	Hotspot Mode (1 cm Gap)	0.316
WCDMA Band II	Head	0.689
	Body Worn (1 cm Gap)	0.843
	Hotspot Mode (1 cm Gap)	0.846
CDMA2000 BC0	Head	0.331
	Body Worn (1 cm Gap)	0.597
	Hotspot Mode (1 cm Gap)	0.731
CDMA2000 BC1	Head	0.689
	Body Worn (1 cm Gap)	0.648
	Hotspot Mode (1 cm Gap)	0.744
LTE Band 13	Head	0.646
	Body Worn (1 cm Gap)	0.231
	Hotspot Mode (1 cm Gap)	0.262
WLAN 2.4GHz	Head	0.403
	Body Worn (1 cm Gap)	0.124
	Hotspot Mode (1 cm Gap)	0.106
WLAN 5GHz	Head	0.00528
	Body Worn (1 cm Gap)	0.014
	Hotspot Mode (1 cm Gap)	0.017
Bluetooth	Head	N/A
	Body Worn (1 cm Gap)	N/A
	Hotspot Mode (1 cm Gap)	N/A

Note:

1. The SAR limit (**1.6 W/kg**) for general population/uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1991.
2. Since the Bluetooth maximum power is less than P_{Ref} and maximum SAR for others transmitter is less than 1.2 W/kg, SAR testing for Bluetooth is not required.

2. Description of Equipment Under Test

EUT Type	Windows Phone
FCC ID	NM8PM23100
Brand Name	HTC
Model Name	PM23100
IMEI Code	990000665122968
Tx Frequency Bands (Unit: MHz)	GSM850 : 824 ~ 849 GSM1900 : 1850 ~ 1910 WCDMA Band II : 1850 ~ 1910 WCDMA Band V : 824 ~ 849 CDMA BC0 : 824 ~ 849 CDMA BC1 : 1850 ~ 1910 LTE Band 13 : 777 ~ 787 WLAN : 2400 ~ 2483.5, 5150 ~ 5350, 5470 ~ 5725, 5725 ~ 5850 Bluetooth : 2400 ~ 2483.5
Uplink Modulations	GSM & GPRS : GMSK EDGE : 8PSK WCDMA : QPSK CDMA : QPSK LTE : QPSK, 16QAM 802.11b : DSSS 802.11a/g/n : OFDM Bluetooth : GFSK
Maximum AVG Conducted Power (Unit: dBm)	GSM850 : 33.41 GSM1900 : 31.03 WCDMA Band II : 24.46 WCDMA Band V : 24.31 CDMA BC0 : 24.78 CDMA BC1 : 24.75 LTE Band 13 : 25.16 802.11b : 18.13 802.11g : 13.01 802.11n HT20 (2.4GHz) : 12.05 802.11n HT40 (2.4GHz) : 12.01 802.11a : 13.35 802.11n HT20 (5GHz) : 13.52 802.11n HT40 (5GHz) : 13.34
Antenna Type	Fixed Internal Antenna
EUT Stage	Identical Prototype

Note:

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

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

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

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

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

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

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

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

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

3.2 SPEAG DASY System

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

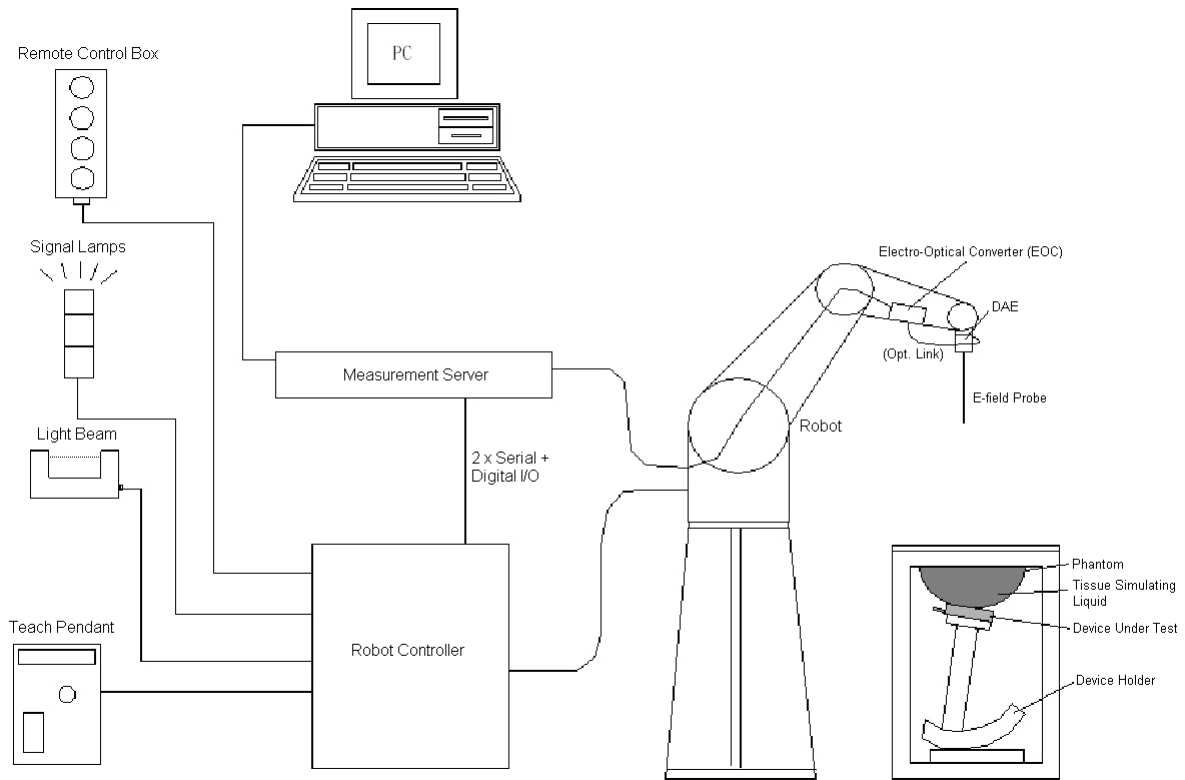


Fig-3.1 DASY System Setup

3.2.1 Robot

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

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



Fig-3.2 DASY4





Fig-3.3 DASY5

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3.2.2 Probes

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

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


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


3.2.3 Data Acquisition Electronics (DAE)

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

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3.2.4 Phantoms

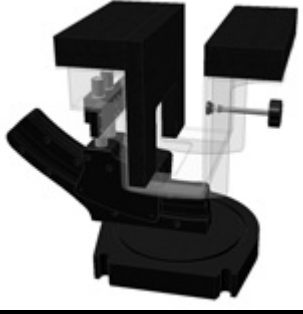
Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	

Model	ELI	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	


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3.2.5 Device Holder

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

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

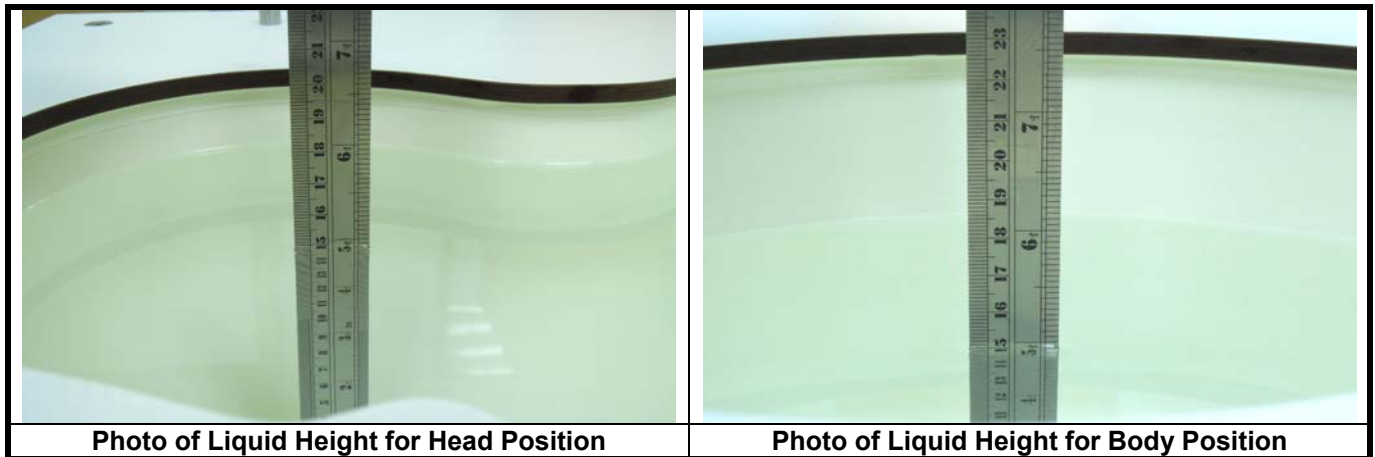
3.2.6 System Validation Dipoles

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

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3.2.7 Tissue Simulating Liquids

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



The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528 and FCC OET 65 Supplement C Appendix C. For the body tissue simulating liquids, the dielectric properties are defined in FCC OET 65 Supplement C Appendix C. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

Table-3.1 Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of $\pm 5\%$	Target Conductivity	Range of $\pm 5\%$
For Head				
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
For Body				
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

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The following table gives the recipes for tissue simulating liquids.

Table-3.2 Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H5G	-	-	-	-	-	17.2	65.5	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B5G	-	-	-	-	-	10.7	78.6	10.7

3.3 SAR System Verification

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

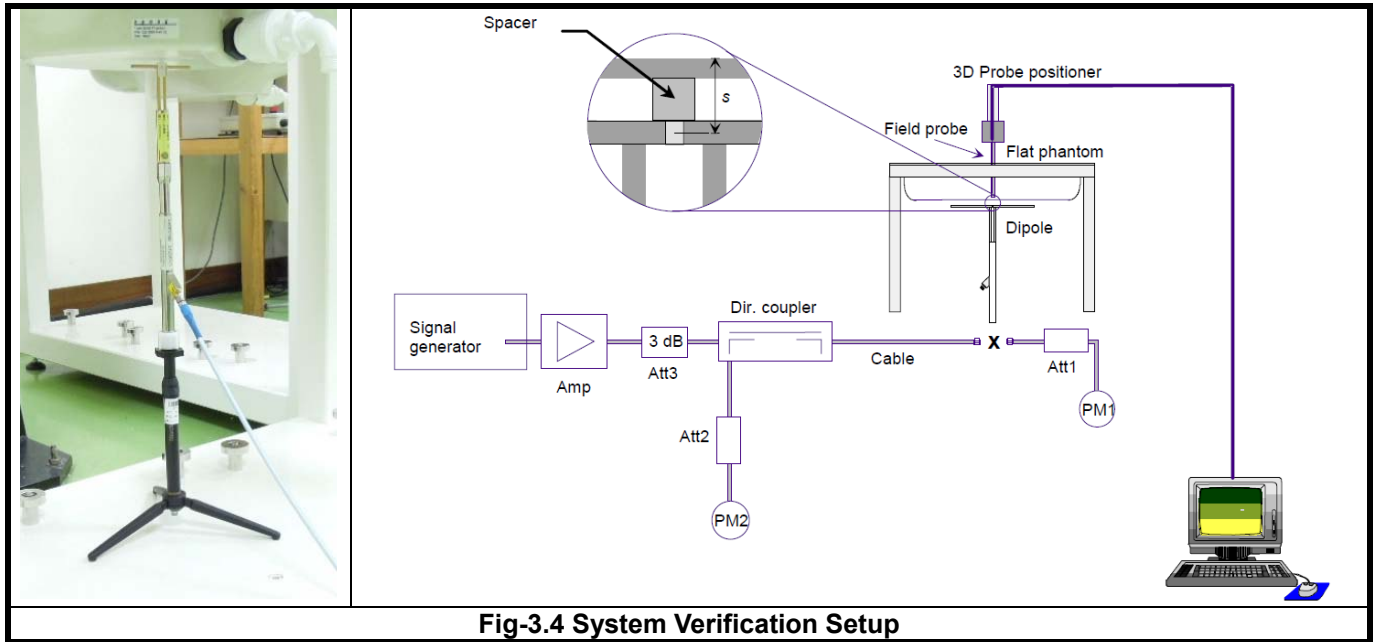


Fig-3.4 System Verification Setup

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

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

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3.4 SAR Measurement Procedure

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

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

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

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

3.4.1 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for below 3 GHz, and 7x7x9 points with step size 4, 4 and 2.5 mm for above 5 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

3.4.2 Volume Scan Procedure

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

3.4.3 Power Drift Monitoring

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

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3.4.4 Spatial Peak SAR Evaluation

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

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

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

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

3.4.5 SAR Averaged Methods

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

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

4. SAR Measurement Evaluation

4.1 EUT Configuration and Setting

The EUT is a data transmitter device that contains two WWAN transmitters (one is for GSM / WCDMA / CDMA2000, and the other is for LTE). Confirming the LTE transmitter follows 3GPP standards, is category 3, BW 10 MHz only, band 13, and supports QPSK / 16QAM modulations. Tested per 3GPP 36.521 maximum transmit procedures for both QPSK / 16QAM. The device has one LTE antenna.

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

Modulation	Channel bandwidth / Transmission bandwidth configuration (RB)	3GPP Requirement (dB)	LTE MPR Setting (dB)
	BW 10 MHz		
QPSK	> 12	<= 1	1
16QAM	<= 12	<= 1	1
16QAM	> 12	<= 2	2

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

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

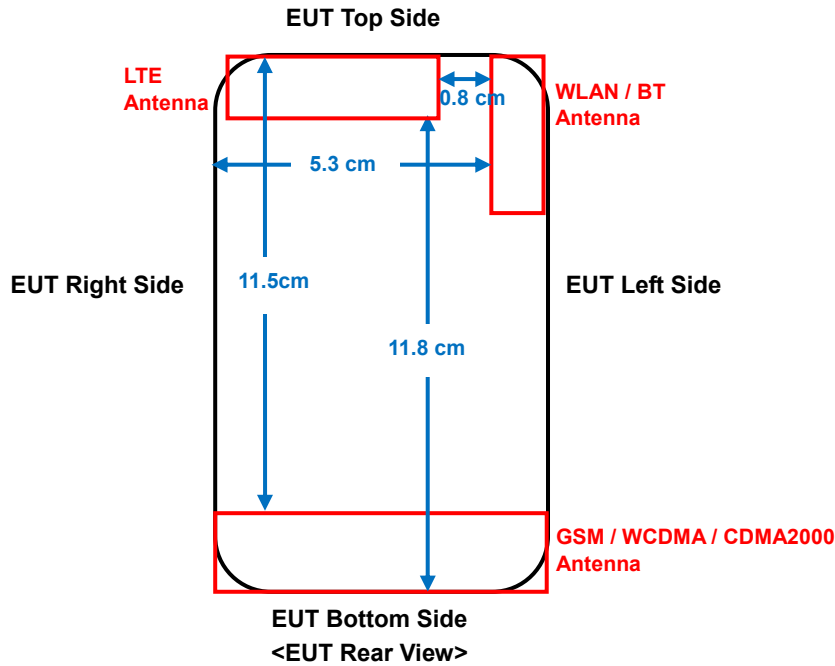
This device has two WWAN antennas and one WLAN/BT antenna design. The capabilities of antenna are shown as below. The EUT adopts so-called Circuit Switch Fallback (CSFB) approach. The definition of CSFB is when using LTE to download data and a voice call coming, this scenario (CSFB) will drop the LTE connection then switching link to voice path (GSM) smoothly. In other words, it is impossible to transmit simultaneously under GSM/WCDMA and LTE network at the same time. Since only one WWAN wireless technology (GSM/WCDMA and LTE) can be used at the same time, LTE band 13 cannot transmit simultaneously with GSM850/1900, and WCDMA Band V/II. The details please refer to the operational description document.

A simultaneous CDMA 1xRTT voice and LTE data connection is referred to as “SVLTE”. The transmitters are independent in respect to the RF chains as each transmitter has dedicated RF circuitry (PA and RF filtering) and a unique transmit antenna. The device also contains an additional antenna associated with receiver diversity or unlicensed transmitters. The LTE Uplink MIMO configuration is 1x2 (1 Uplink antenna and 2 Downlink antennas).

Although the RF circuits are independent for both transmitters, the chipset solution incorporated SVLTE implementation does include electrical connections between the voice and data transmitters such that the device can coordinate the transmit power of both transmitters. That said the transmitters operate independently in the sense that they independently support voice or data connection without interaction between the modems or signaling from the WWAN network.

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<Antenna Location>



This device supports WiFi hotspot function, so body SAR was tested under 1 cm for the surfaces / slide edges where a transmitting antenna is within 2.5 cm from the edge. Since the SAR is required for antenna located within 2.5 cm from edge, SAR testing for each antenna is listed as below.

GSM / WCDMA / CDMA Antenna : Front Face, Rear Face, Left Side, Right Side, Bottom Side

LTE Antenna : Front Face, Rear Face, Left Side, Right Side, Top Side

WLAN / BT Antenna : Front Face, Rear Face, Left Side, Top Side

The simultaneous transmission possibilities are listed as below.

Simultaneous TX Combination	Configuration	Head (Voice / VoIP)	Body Worn (Voice / VoIP)	Hotspot (Data)
1	GSM850 (Voice / Data) + WLAN / BT (Data)	Yes	Yes	Yes
2	GSM1900 (Voice / Data) + WLAN / BT (Data)	Yes	Yes	Yes
3	WCDMA V (Voice / Data) + WLAN / BT (Data)	Yes	Yes	Yes
4	WCDMA II (Voice / Data) + WLAN / BT (Data)	Yes	Yes	Yes
5	CDMA2000 BC0 (Voice / Data) + WLAN / BT (Data)	Yes	Yes	Yes
6	CDMA2000 BC1 (Voice / Data) + WLAN / BT (Data)	Yes	Yes	Yes
7	LTE 13 (Data) + WLAN / BT (Data)	Yes	Yes	Yes
8	CDMA2000 BC0 (Voice) + LTE 13 (Data) + WLAN / BT (Data)	Yes	Yes	Yes
9	CDMA2000 BC1 (Voice) + LTE 13 (Data) + WLAN / BT (Data)	Yes	Yes	Yes

Note : In the SVLTE mode, CDMA 1xRTT and LTE can transmit at maximum power level simultaneously.

The WLAN and BT cannot transmit simultaneously, so there is no co-location test requirement for WLAN and BT.

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

The EUT is communicated with base station simulator (Agilent E5515C is used for GSM/WCDMA/CDMA2000, and Anritsu MT8820C is used for LTE) by air link. During SAR testing, the base station simulator is set to make the EUT to radiate maximum output power.

For GSM850, the power control level is set to 5. For GPRS850 (GMSK, CS1), the power control level is set to 5. For EDGE850 (GMSK: MCS1, 8PSK:MCS9), the power control level is set to 8. For GSM1900, the power control level is set to 0. For GPRS1900 (GMSK, CS1), the power control level is set to 0. For EDGE1900 (GMSK: MCS1, 8PSK:MCS9), the power control level is set to 2. Head SAR is tested under GSM link mode. Body SAR is tested under maximum source-based time-average power mode of GPRS/EDGE.

For WCDMA, head and body SAR is tested under 12.2k RMC mode with power control set all up bits. SAR for AMR is not required since its power is less than 1/4 dB higher than RMC. SAR for HSDPA/HSUPA is not required since its power is less than 1/4 dB higher than RMC without HSDPA/HSUPA.

For CDMA, SAR is tested under EVDO Rev.0 mode using Reverse Data Channel rate of 153.6 kbps in subtype 0/1 Physical Layer Configurations, and the power control set "All Up Bits". SAR for EVDO Rev.A is not required since its power is less than EVDO Rev.0. SAR for 1xRTT is not required since its power is less than 1/4 dB higher than EVDO Rev.0. The steps for system simulator (Agilent E5515C) setup are as below.

1. Set the Sector ID
2. Set the Protocol Release
3. Set the Cell Band and connecting Channel
4. Set the RTAP Rate
5. Set the power control
6. Press "Start Data Connection" button

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For LTE, set the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB in base station simulator. When the EUT has registered and communicated to base station simulator, set the simulator to make EUT transmitting the maximum radiated power. The steps for system simulator (Anritsu MT8820C) setup are as below.

1. Press the “Std” button to select “LTE 22.20S” function
2. Choose the “Screen Select” item to “Fundamental Measurement”
3. Enter the “Common” item
4. Set the Operating Band
5. Set the Channel Bandwidth
6. Set the UL Channel & Frequency
7. Set the Modulation
8. Set the RB number and RB shift
9. Press “Start Call” button when EUT register to the system simulator
10. Set the TX-1 Max. Power to make the EUT transmit maximum output power

For WLAN SAR testing, the EUT has installed WLAN engineering testing software which can provide continuous transmitting RF signal. This RF signal utilized in SAR measurement has almost 100% duty cycle. The data rates for WLAN SAR testing were set in 1 Mbps for 802.11b, 6 Mbps for 802.11g and MCS0 for 802.11n due to the highest RF output power.

4.2 EUT Testing Position

This EUT was tested in **Right Cheek, Right Tilted, Left Cheek, Left Tilted, Front Face, Rear Face, Right Side, Left Side, Top Side** and **Bottom Side** positions as illustrated below:

1. Define two imaginary lines on the handset

- (a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the bottom of the handset.
- (b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
- (c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

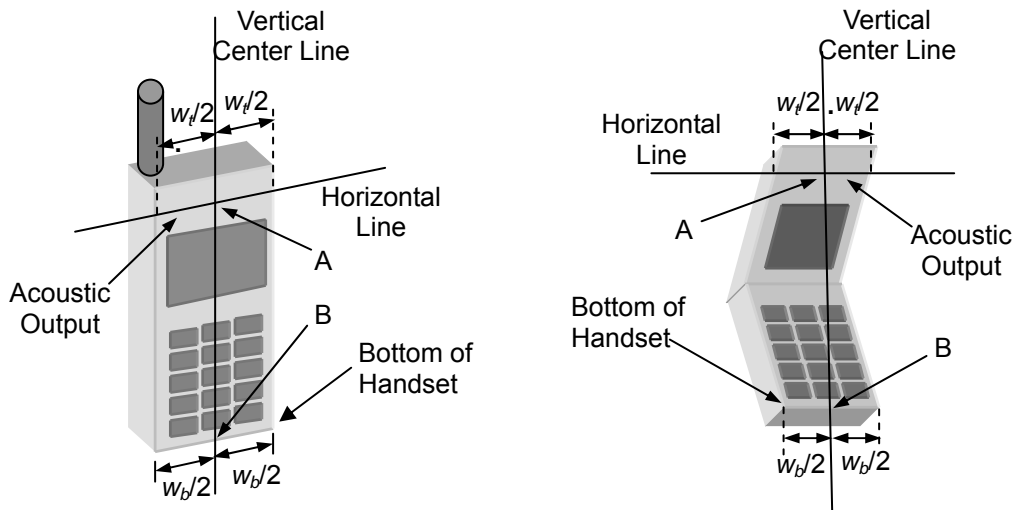


Fig-4.1 Illustration for Handset Vertical and Horizontal Reference Lines

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2. Cheek Position

- (a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- (b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig-4.2).

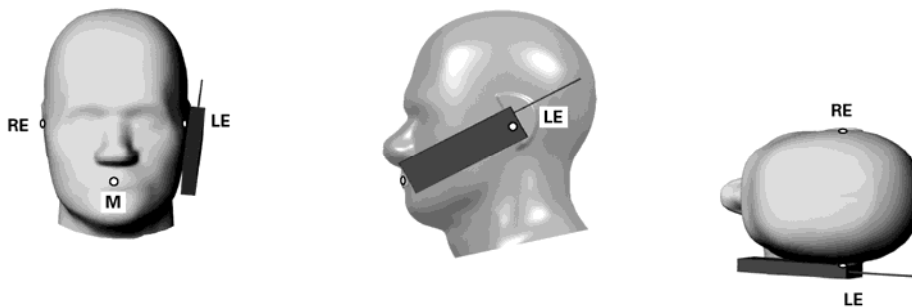


Fig-4.2 Illustration for Cheek Position

3. Tilted Position

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

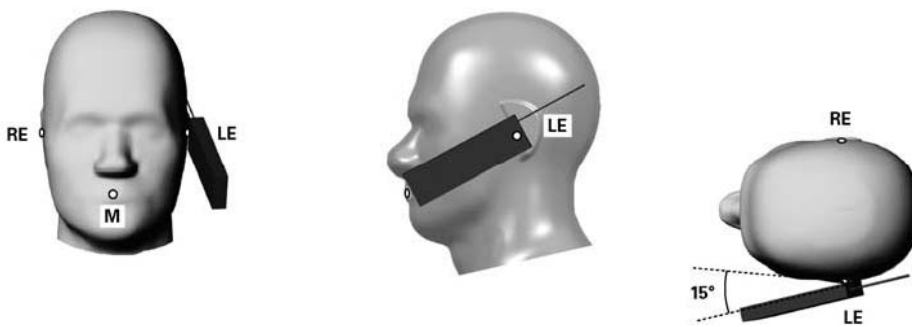
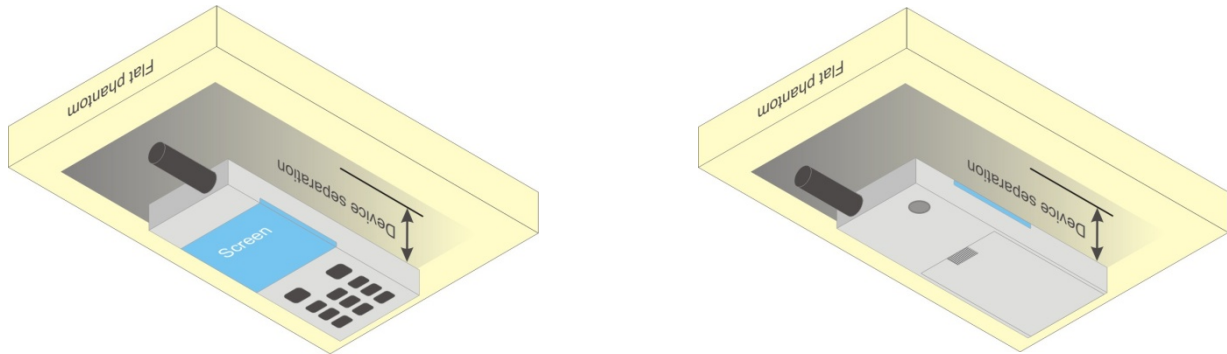


Fig-4.3 Illustration for Tilted Position

4. Body Worn Position

- (a) To position the EUT parallel to the phantom surface.
- (b) To adjust the EUT parallel to the flat phantom.
- (c) To adjust the distance between the EUT surface and the flat phantom to 1 cm.

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

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4.3 Tissue Verification

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

Tissue Type	Frequency (MHz)	Liquid Temp. (°C)	Measured Conductivity (σ)	Measured Permittivity (ϵ_r)	Target Conductivity (σ)	Target Permittivity (ϵ_r)	Conductivity Deviation (%)	Permittivity Deviation (%)	Test Date
H750	750	21.0	0.906	41.293	0.89	41.9	1.80	-1.45	Aug. 08, 2012
H750	750	21.0	0.888	40.092	0.89	41.9	-0.22	-4.32	Aug. 09, 2012
H835	835	21.1	0.917	42.809	0.90	41.5	1.89	3.15	Aug. 03, 2012
H835	835	20.4	0.909	42.30	0.90	41.5	1.00	1.93	Aug. 04, 2012
H1900	1900	21.1	1.433	39.751	1.40	40.0	2.36	-0.62	Aug. 03, 2012
H1900	1900	20.5	1.441	39.728	1.40	40.0	2.93	-0.68	Aug. 04, 2012
H2450	2450	20.3	1.782	40.20	1.80	39.2	-1.00	2.55	Aug. 01, 2012
H5G	5200	21.3	4.687	37.001	4.66	36.0	0.58	2.78	Aug. 03, 2012
H5G	5200	20.3	4.47	36.40	4.66	36.0	-4.08	1.11	Sep. 25, 2012
H5G	5500	21.3	5.064	36.369	4.96	35.6	2.10	2.16	Aug. 03, 2012
H5G	5500	20.3	4.84	36.20	4.96	35.6	-2.42	1.69	Sep. 25, 2012
H5G	5800	21.3	5.422	35.687	5.27	35.3	2.88	1.10	Aug. 03, 2012
H5G	5800	20.3	5.11	35.60	5.27	35.3	-3.04	0.85	Sep. 25, 2012
B750	750	21.0	0.969	55.526	0.96	55.5	0.94	0.05	Aug. 08, 2012
B835	835	21.3	0.980	55.833	0.97	55.2	1.03	1.15	Aug. 01, 2012
B835	835	20.6	0.980	55.843	0.97	55.2	1.03	1.16	Aug. 02, 2012
B1900	1900	21.1	1.551	52.998	1.52	53.3	2.04	-0.57	Aug. 01, 2012
B1900	1900	20.4	1.563	54.687	1.52	53.3	2.83	2.60	Aug. 04, 2012
B1900	1900	21.1	1.550	52.80	1.52	53.3	1.97	-0.94	Aug. 06, 2012
B2450	2450	21.2	2.025	53.072	1.95	52.7	3.85	0.71	Aug. 02, 2012
B5G	5200	20.9	5.278	48.936	5.30	49.0	-0.42	-0.13	Aug. 03, 2012
B5G	5200	20.6	5.28	48.90	5.30	49.0	-0.38	-0.20	Sep. 26, 2012
B5G	5500	20.9	5.717	48.431	5.65	48.6	1.19	-0.35	Aug. 03, 2012
B5G	5500	20.6	5.72	48.40	5.65	48.6	1.24	-0.41	Sep. 26, 2012
B5G	5800	20.9	6.123	47.668	6.00	48.2	2.05	-1.10	Aug. 03, 2012
B5G	5800	20.6	6.12	47.70	6.00	48.2	2.00	-1.04	Sep. 26, 2012

Note:

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within $\pm 5\%$ of the target values. Liquid temperature during the SAR testing must be within $\pm 2^\circ\text{C}$.



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4.4 System Verification

The measuring results for system check are shown as below.

Test Date	Mode	Frequency (MHz)	1W Target SAR-1g (W/kg)	Measured SAR-1g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
Aug. 08, 2012	Head	750	8.44	2.17	8.68	2.84	1013	3650	861
Aug. 09, 2012	Head	750	8.44	2.07	8.28	-1.90	1013	3650	910
Aug. 03, 2012	Head	835	9.46	2.47	9.88	4.44	4d021	3650	910
Aug. 04, 2012	Head	835	9.46	2.27	9.08	-4.02	4d021	3820	861
Aug. 03, 2012	Head	1900	38.90	9.44	37.76	-2.93	5d036	3650	910
Aug. 04, 2012	Head	1900	38.90	9.02	36.08	-7.25	5d036	3820	861
Aug. 01, 2012	Head	2450	52.90	12.80	51.20	-3.21	737	3820	861
Aug. 03, 2012	Head	5200	79.60	8.13	81.30	2.14	1018	3590	579
Sep. 25, 2012	Head	5200	79.60	7.75	77.50	-2.64	1018	3590	579
Aug. 03, 2012	Head	5500	84.70	8.36	83.60	-1.30	1018	3590	579
Sep. 25, 2012	Head	5500	84.70	8.15	81.50	-3.78	1018	3590	579
Aug. 03, 2012	Head	5800	78.60	8.19	81.90	4.20	1018	3590	579
Sep. 25, 2012	Head	5800	78.60	7.71	77.10	-1.91	1018	3590	579
Aug. 08, 2012	Body	750	8.76	2.24	8.96	2.28	1013	3650	861
Aug. 01, 2012	Body	835	9.60	2.35	9.40	-2.08	4d021	3650	910
Aug. 02, 2012	Body	835	9.60	2.38	9.52	-0.83	4d021	3650	910
Aug. 01, 2012	Body	1900	38.90	9.95	39.80	2.31	5d036	3650	910
Aug. 04, 2012	Body	1900	38.90	9.40	37.60	-3.34	5d036	3820	861
Aug. 06, 2012	Body	1900	38.90	10.20	40.80	4.88	5d036	3650	910
Aug. 02, 2012	Body	2450	50.00	12.40	49.60	-0.80	737	3590	579
Aug. 03, 2012	Body	5200	72.70	6.86	68.60	-5.64	1018	3590	579
Sep. 26, 2012	Body	5200	72.70	7.07	70.70	-2.75	1018	3590	579
Aug. 03, 2012	Body	5500	78.30	7.62	76.20	-2.68	1018	3590	579
Sep. 26, 2012	Body	5500	78.30	7.70	77.00	-1.66	1018	3590	579
Aug. 03, 2012	Body	5800	73.40	7.16	71.60	-2.45	1018	3590	579
Sep. 26, 2012	Body	5800	73.40	6.90	69.00	-5.99	1018	3590	579

Note:

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



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4.5 Conducted Power Results

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

Band Channel Frequency (MHz)	GSM850			GSM1900		
	128 824.2	189 836.4	251 848.8	512 1850.2	661 1880.0	810 1909.8
Maximum Burst-Averaged Output Power						
GSM (GMSK, 1 Uplink)	33.41	33.32	33.26	31.03	30.66	30.52
GPRS 8 (GMSK, 1 Uplink)	33.36	33.32	33.25	30.79	30.68	30.54
GPRS 10 (GMSK, 2 Uplink)	31.32	31.22	31.19	29.12	29.05	28.86
GPRS 11 (GMSK, 3 Uplink)	29.41	29.70	29.64	27.61	27.55	27.26
GPRS 12 (GMSK, 4 Uplink)	28.74	28.57	28.44	26.36	26.10	25.62
DTM 9 (GMSK, 2 Uplink)	31.51	31.37	31.28	29.26	29.22	29.31
DTM 11 (GMSK, 3 Uplink)	29.62	29.50	29.91	27.61	27.51	27.25
EDGE 8 (GMSK, 1 Uplink)	33.32	33.25	33.18	30.99	30.68	30.52
EDGE 10 (GMSK, 2 Uplink)	31.12	31.06	31.50	29.13	28.97	28.79
EDGE 11 (GMSK, 3 Uplink)	29.70	29.59	29.49	27.61	27.60	27.21
EDGE 12 (GMSK, 4 Uplink)	28.60	28.46	28.27	26.30	26.05	25.55
EDGE 8 (8PSK, 1 Uplink)	27.46	27.43	27.45	26.89	26.73	26.50
EDGE 10 (8PSK, 2 Uplink)	27.11	27.13	27.18	26.71	26.51	26.27
EDGE 11 (8PSK, 3 Uplink)	26.85	26.82	26.83	26.53	26.28	25.99
EDGE 12 (8PSK, 4 Uplink)	26.45	26.51	26.61	26.27	25.97	25.67
DTM 9 (8PSK, 2 Uplink)	26.83	26.84	27.27	25.98	25.81	25.64
DTM 11 (8PSK, 3 Uplink)	26.73	26.76	26.72	25.84	25.69	25.42
Maximum Frame-Averaged Output Power						
GSM (GMSK, 1 Uplink)	24.41	24.32	24.26	22.03	21.66	21.52
GPRS 8 (GMSK, 1 Uplink)	24.36	24.32	24.25	21.79	21.68	21.54
GPRS 10 (GMSK, 2 Uplink)	25.32	25.22	25.19	23.12	23.05	22.86
GPRS 11 (GMSK, 3 Uplink)	25.15	25.44	25.38	23.35	23.29	23.00
GPRS 12 (GMSK, 4 Uplink)	25.74	25.57	25.44	23.36	23.10	22.62
DTM 9 (GMSK, 2 Uplink)	25.51	25.37	25.28	23.26	23.22	23.31
DTM 11 (GMSK, 3 Uplink)	25.36	25.24	25.65	23.35	23.25	22.99
EDGE 8 (GMSK, 1 Uplink)	24.32	24.25	24.18	21.99	21.68	21.52
EDGE 10 (GMSK, 2 Uplink)	25.12	25.06	25.50	23.13	22.97	22.79
EDGE 11 (GMSK, 3 Uplink)	25.44	25.33	25.23	23.35	23.34	22.95
EDGE 12 (GMSK, 4 Uplink)	25.60	25.46	25.27	23.30	23.05	22.55
EDGE 8 (8PSK, 1 Uplink)	18.46	18.43	18.45	17.89	17.73	17.50
EDGE 10 (8PSK, 2 Uplink)	21.11	21.13	21.18	20.71	20.51	20.27
EDGE 11 (8PSK, 3 Uplink)	22.59	22.56	22.57	22.27	22.02	21.73
EDGE 12 (8PSK, 4 Uplink)	23.45	23.51	23.61	23.27	22.97	22.67
DTM 9 (8PSK, 2 Uplink)	20.83	20.84	21.27	19.98	19.81	19.64
DTM 11 (8PSK, 3 Uplink)	22.47	22.50	22.46	21.58	21.43	21.16

Note: Body SAR testing for GSM/GPRS/EDGE was performed on the maximum frame-averaged power mode.



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Band	WCDMA Band II			WCDMA Band V		
Channel	9262	9400	9538	4132	4182	4233
Frequency (MHz)	1852.4	1880.0	1907.6	826.4	836.4	846.6
RMC 12.2K	24.30	24.03	24.46	24.31	24.12	24.17
HSDPA Subtest-1	23.25	23.39	23.55	23.27	23.17	23.23
HSDPA Subtest-2	23.26	23.44	23.47	23.16	23.21	23.28
HSDPA Subtest-3	22.65	22.84	22.92	22.91	22.66	22.70
HSDPA Subtest-4	22.66	22.81	22.99	22.67	22.64	22.79
HSUPA Subtest-1	22.71	22.72	22.71	22.82	22.67	22.64
HSUPA Subtest-2	20.26	20.29	20.34	19.86	20.19	20.01
HSUPA Subtest-3	21.94	22.28	21.89	21.92	21.89	21.80
HSUPA Subtest-4	22.54	22.83	22.84	22.79	22.59	22.14
HSUPA Subtest-5	23.17	23.29	23.41	23.23	23.30	23.35

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.70	836.52	848.31	1851.25	1880.00	1908.75
1xRTT RC1+SO55	24.65	24.69	24.70	24.57	24.70	24.61
1xRTT RC3+SO55	24.55	24.78	24.59	24.55	24.75	24.56
1xRTT RC3+SO32 (FCH)	24.57	24.71	24.59	24.49	24.72	24.51
1xRTT RC3+SO32 (SCH)	24.59	24.66	24.52	24.49	24.70	24.48
1xEVDO Rev.0 RTAP 153.6	24.46	24.63	24.40	24.51	24.71	24.58
1xEVDO Rev.A RETAP 4096	24.41	24.57	24.38	24.50	24.70	24.48

Band	802.11b			802.11g		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Average Power	17.88	18.13	17.91	13.01	12.96	12.41

Band	802.11n (HT20)			802.11n (HT40)		
Channel	1	6	11	3	6	9
Frequency (MHz)	2412	2437	2462	2422	2437	2452
Average Power	11.98	12.05	11.49	11.93	11.77	12.01



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Band	802.11a							
Channel	36	40	44	48	52	56	60	64
Frequency (MHz)	5180	5200	5220	5240	5260	5280	5300	5320
Average Power	12.88	12.97	13.04	13.21	12.95	13.09	13.24	13.35

Band	802.11a							
Channel	100	104	108	112	116	132	136	140
Frequency (MHz)	5500	5520	5540	5560	5580	5660	5680	5700
Average Power	12.83	12.93	12.97	13.00	13.02	12.86	12.78	12.65

Band	802.11a							
Channel	149	153	157	161	165	-	-	-
Frequency (MHz)	5745	5765	5785	5805	5825	-	-	-
Average Power	12.85	12.76	12.75	12.54	12.44	-	-	-

Band	802.11n (HT20)							
Channel	36	40	44	48	52	56	60	64
Frequency (MHz)	5180	5200	5220	5240	5260	5280	5300	5320
Average Power	13.11	13.16	13.28	13.42	13.15	13.25	13.40	13.52

Band	802.11n (HT20)							
Channel	100	104	108	112	116	132	136	140
Frequency (MHz)	5500	5520	5540	5560	5580	5660	5680	5700
Average Power	13.18	13.20	13.22	13.23	13.24	12.96	12.85	12.73

Band	802.11n (HT20)							
Channel	149	153	157	161	165	-	-	-
Frequency (MHz)	5745	5765	5785	5805	5825	-	-	-
Average Power	13.22	13.12	13.09	12.89	12.79	-	-	-

Band	802.11n (HT40)							
Channel	38	46	54	62	102	134	151	159
Frequency (MHz)	5190	5230	5270	5310	5510	5670	5755	5795
Average Power	12.98	13.13	13.07	13.34	13.06	12.79	13.14	12.96

LTE Band 13								
BW	Modulation	CH	Frequency (MHz)	RB	RB Offset	MPR	Target Power	Measured Power
10 MHz	QPSK	23230	782.0	1	0	0	25.2	25.16
		23230	782.0	1	49	0	25.2	25.08
		23230	782.0	25	12	1	25.2	24.00
		23230	782.0	50	0	1	25.2	23.85
	16QAM	23230	782.0	1	0	1	25.2	23.99
		23230	782.0	1	49	1	25.2	23.97
		23230	782.0	25	12	2	25.2	23.02
		23230	782.0	50	0	2	25.2	22.90



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4.6 SAR Testing Results

4.6.1 SAR Results for Head

Plot No.	Band	Mode	Test Position	Channel	SAR-1g (W/kg)
66	GSM850	GPRS12	Right Cheek	128	0.270
68	GSM850	GPRS12	Right Tilted	128	0.152
69	GSM850	GPRS12	Left Cheek	128	0.287
70	GSM850	GPRS12	Left Tilted	128	0.132
71	GSM1900	GPRS12	Right Cheek	512	0.290
73	GSM1900	GPRS12	Right Tilted	512	0.079
74	GSM1900	GPRS12	Left Cheek	512	0.173
75	GSM1900	GPRS12	Left Tilted	512	0.085
76	WCDMA V	RMC12.2K	Right Cheek	4132	0.185
78	WCDMA V	RMC12.2K	Right Tilted	4132	0.106
79	WCDMA V	RMC12.2K	Left Cheek	4132	0.193
80	WCDMA V	RMC12.2K	Left Tilted	4132	0.085
82	WCDMA II	RMC12.2K	Right Cheek	9538	0.689
84	WCDMA II	RMC12.2K	Right Tilted	9538	0.217
85	WCDMA II	RMC12.2K	Left Cheek	9538	0.380
86	WCDMA II	RMC12.2K	Left Tilted	9538	0.224
56	CDMA2000 BC0	RC3+SO55	Right Cheek	384	0.316
51	CDMA2000 BC0	RC3+SO55	Right Tilted	384	0.193
52	CDMA2000 BC0	RC3+SO55	Left Cheek	384	0.331
53	CDMA2000 BC0	RC3+SO55	Left Tilted	384	0.168
58	CDMA2000 BC1	RC3+SO55	Right Cheek	600	0.689
60	CDMA2000 BC1	RC3+SO55	Right Tilted	600	0.176
61	CDMA2000 BC1	RC3+SO55	Left Cheek	600	0.379
62	CDMA2000 BC1	RC3+SO55	Left Tilted	600	0.142
101	802.11b	-	Right Cheek	6	0.403
102	802.11b	-	Right Tilted	6	0.318
103	802.11b	-	Left Cheek	6	0.232
104	802.11b	-	Left Tilted	6	0.229
111	802.11n	HT20	Right Cheek	48	0.0000035
112	802.11n	HT20	Right Tilted	48	0.000264
113	802.11n	HT20	Left Cheek	48	0.00000359
114	802.11n	HT20	Left Tilted	48	0.0000276
308	802.11a	-	Right Tilted	48	0.000175
115	802.11n	HT20	Right Cheek	64	N/A
116	802.11n	HT20	Right Tilted	64	N/A
117	802.11n	HT20	Left Cheek	64	0.00186
118	802.11n	HT20	Left Tilted	64	0.00179
309	802.11a	-	Left Cheek	64	0.0013
119	802.11n	HT20	Right Cheek	116	N/A
120	802.11n	HT20	Right Tilted	116	N/A
121	802.11n	HT20	Left Cheek	116	0.00528
122	802.11n	HT20	Left Tilted	116	N/A
310	802.11a	-	Left Cheek	116	0.00064
123	802.11n	HT20	Right Cheek	149	0.00185
124	802.11n	HT20	Right Tilted	149	N/A
125	802.11n	HT20	Left Cheek	149	0.0000179
126	802.11n	HT20	Left Tilted	149	0.0000458
311	802.11a	-	Right Cheek	149	0.000296



FCC SAR Test Report

Plot No.	Band	Mode	Test Position	Channel	RB#	RB Offset	SAR-1g (W/kg)
306	LTE 13	QPSK_10M	Right Cheek	23230	25	12	0.365
269	LTE 13	QPSK_10M	Right Cheek	23230	1	0	0.478
265	LTE 13	QPSK_10M	Right Cheek	23230	1	49	0.433
303	LTE 13	QPSK_10M	Right Tilted	23230	25	12	0.345
270	LTE 13	QPSK_10M	Right Tilted	23230	1	0	0.431
266	LTE 13	QPSK_10M	Right Tilted	23230	1	49	0.444
304	LTE 13	QPSK_10M	Left Cheek	23230	25	12	0.471
262	LTE 13	QPSK_10M	Left Cheek	23230	1	0	0.646
267	LTE 13	QPSK_10M	Left Cheek	23230	1	49	0.547
204	LTE 13	QPSK_10M	Left Tilted	23230	25	12	0.397
208	LTE 13	QPSK_10M	Left Tilted	23230	1	0	0.588
268	LTE 13	QPSK_10M	Left Tilted	23230	1	49	0.596
213	LTE 13	16QAM_10M	Left Cheek	23230	25	12	0.292
214	LTE 13	16QAM_10M	Left Cheek	23230	1	0	0.442
215	LTE 13	16QAM_10M	Left Cheek	23230	1	49	0.408

Note:

1. According to KDB 941225, the SAR testing for 100% RB is not required since the maximum SAR of 50% RB is less than 1.45 W/kg.
2. According to KDB 941225, the SAR testing was performed on largest channel bandwidth, and SAR for other channel bandwidths is not required since the maximum power of smaller channel bandwidth is within 1/2 dB higher or lower of measured for the largest channel bandwidth and maximum SAR of largest channel bandwidth is less than 1.45 W/kg.
3. Since GPRS/EDGE/DTM and WLAN of this device supports VOIP capability through 3rd party apps software, we have evaluated data mode for head SAR.
4. SAR testing for 802.11g/n is not required because its maximum power is less than 1/4 dB higher than 802.11b.
5. SAR testing for WLAN 5G is performed on the maximum power mode.
6. The "N/A" means there is no SAR value or the SAR is too low to be measured.



FCC SAR Test Report

A D T

4.6.2 SAR Results for Body

<Body Worn Mode>

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	SAR-1g (W/kg)
10	GSM850	GPRS12	Front Face	1	128	0.233
11	GSM850	GPRS12	Rear Face	1	128	0.343
17	GSM1900	GPRS12	Front Face	1	512	0.264
18	GSM1900	GPRS12	Rear Face	1	512	0.306
24	WCDMA V	RMC12.2K	Front Face	1	4132	0.132
25	WCDMA V	RMC12.2K	Rear Face	1	4132	0.228
31	WCDMA II	RMC12.2K	Front Face	1	9538	0.580
32	WCDMA II	RMC12.2K	Rear Face	1	9538	0.835
90	WCDMA II	RMC12.2K	Rear Face	1	9262	0.810
91	WCDMA II	RMC12.2K	Rear Face	1	9400	0.843
38	CDMA2000 BC0	RC3+SO32	Front Face	1	384	0.313
39	CDMA2000 BC0	RC3+SO32	Rear Face	1	384	0.597
47	CDMA2000 BC1	RC3+SO32	Front Face	1	600	0.648
48	CDMA2000 BC1	RC3+SO32	Rear Face	1	600	0.642
109	802.11b	-	Front Face	1	6	0.112
110	802.11b	-	Rear Face	1	6	0.124
131	802.11n	HT20	Front Face	1	48	N/A
132	802.11n	HT20	Rear Face	1	48	0.014
313	802.11a	HT20	Rear Face	1	48	0.00548
137	802.11n	HT20	Front Face	1	64	N/A
138	802.11n	HT20	Rear Face	1	64	0.011
314	802.11a	-	Rear Face	1	64	0.00653
143	802.11n	HT20	Front Face	1	116	0.00000816
144	802.11n	HT20	Rear Face	1	116	0.012
315	802.11a	-	Rear Face	1	116	0.00835
149	802.11n	HT20	Front Face	1	149	N/A
150	802.11n	HT20	Rear Face	1	149	0.014
317	802.11a	-	Rear Face	1	149	0.00323

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	RB#	RB Offset	SAR-1g (W/kg)
292	LTE 13	QPSK_10M	Front Face	1	23230	25	12	0.139
294	LTE 13	QPSK_10M	Front Face	1	23230	1	0	0.189
296	LTE 13	QPSK_10M	Front Face	1	23230	1	49	0.172
293	LTE 13	QPSK_10M	Rear Face	1	23230	25	12	0.169
295	LTE 13	QPSK_10M	Rear Face	1	23230	1	0	0.231
297	LTE 13	QPSK_10M	Rear Face	1	23230	1	49	0.213
298	LTE 13	16QAM_10M	Rear Face	1	23230	25	12	0.134
299	LTE 13	16QAM_10M	Rear Face	1	23230	1	0	0.19
300	LTE 13	16QAM_10M	Rear Face	1	23230	1	49	0.174



FCC SAR Test Report

Note:

1. According to KDB 941225, the SAR testing for 100% RB is not required since the maximum SAR of 50% RB is less than 1.45 W/kg.
2. According to KDB 941225, the SAR testing was performed on largest channel bandwidth, and SAR for other channel bandwidths is not required since the maximum power of smaller channel bandwidth is within 1/2 dB higher or lower of measured for the largest channel bandwidth and maximum SAR of largest channel bandwidth is less than 1.45 W/kg.
3. Since GPRS/EDGE/DTM, WCDMA and WLAN of this device supports VOIP capability through 3rd party apps software, we have evaluated data mode for body worn mode.
4. SAR testing for 802.11g/n is not required because its maximum power is less than 1/4 dB higher than 802.11b.
5. SAR testing for WLAN 5G is performed on the maximum power mode.
6. The "N/A" means there is no SAR value or the SAR is too low to be measured.



FCC SAR Test Report

<Hotspot Mode>

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	SAR-1g (W/kg)
1	GSM850	GPRS12	Front Face	1	128	0.335
2	GSM850	GPRS12	Rear Face	1	128	0.653
7	GSM850	GPRS12	Left Side	1	128	0.134
8	GSM850	GPRS12	Right Side	1	128	0.125
9	GSM850	GPRS12	Bottom Side	1	128	0.038
12	GSM1900	GPRS12	Front Face	1	512	0.280
13	GSM1900	GPRS12	Rear Face	1	512	0.351
14	GSM1900	GPRS12	Left Side	1	512	0.019
15	GSM1900	GPRS12	Right Side	1	512	0.121
16	GSM1900	GPRS12	Bottom Side	1	512	0.122
19	WCDMA V	RMC12.2K	Front Face	1	4132	0.166
20	WCDMA V	RMC12.2K	Rear Face	1	4132	0.316
21	WCDMA V	RMC12.2K	Left Side	1	4132	0.220
22	WCDMA V	RMC12.2K	Right Side	1	4132	0.145
23	WCDMA V	RMC12.2K	Bottom Side	1	4132	0.039
26	WCDMA II	RMC12.2K	Front Face	1	9538	0.550
27	WCDMA II	RMC12.2K	Rear Face	1	9538	0.846
28	WCDMA II	RMC12.2K	Left Side	1	9538	0.050
29	WCDMA II	RMC12.2K	Right Side	1	9538	0.303
30	WCDMA II	RMC12.2K	Bottom Side	1	9538	0.269
88	WCDMA II	RMC12.2K	Rear Face	1	9262	0.772
89	WCDMA II	RMC12.2K	Rear Face	1	9400	0.823
49	CDMA2000 BC0	RC3+SO32	Front Face	1	384	0.381
34	CDMA2000 BC0	RC3+SO32	Rear Face	1	384	0.731
35	CDMA2000 BC0	RC3+SO32	Left Side	1	384	0.407
36	CDMA2000 BC0	RC3+SO32	Right Side	1	384	0.300
37	CDMA2000 BC0	RC3+SO32	Bottom Side	1	384	0.056
42	CDMA2000 BC1	RC3+SO32	Front Face	1	600	0.656
43	CDMA2000 BC1	RC3+SO32	Rear Face	1	600	0.744
44	CDMA2000 BC1	RC3+SO32	Left Side	1	600	0.041
45	CDMA2000 BC1	RC3+SO32	Right Side	1	600	0.401
46	CDMA2000 BC1	RC3+SO32	Bottom Side	1	600	0.056
105	802.11b	-	Front Face	1	6	0.091
106	802.11b	-	Rear Face	1	6	0.106
107	802.11b	-	Left Side	1	6	0.046
108	802.11b	-	Top Side	1	6	0.068
127	802.11n	HT20	Front Face	1	48	0.000851
128	802.11n	HT20	Rear Face	1	48	0.017
129	802.11n	HT20	Left Side	1	48	N/A
130	802.11n	HT20	Top Side	1	48	N/A
312	802.11a	-	Rear Face	1	48	0.00408
145	802.11n	HT20	Front Face	1	149	N/A
146	802.11n	HT20	Rear Face	1	149	0.00893
147	802.11n	HT20	Left Side	1	149	N/A
148	802.11n	HT20	Top Side	1	149	N/A
316	802.11a	-	Rear Face	1	149	0.00157



FCC SAR Test Report

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	RB#	RB Offset	SAR-1g (W/kg)
273	LTE 13	QPSK_10M	Front Face	1	23230	25	12	0.164
278	LTE 13	QPSK_10M	Front Face	1	23230	1	0	0.233
301	LTE 13	QPSK_10M	Front Face	1	23230	1	49	0.21
274	LTE 13	QPSK_10M	Rear Face	1	23230	25	12	0.189
279	LTE 13	QPSK_10M	Rear Face	1	23230	1	0	0.262
305	LTE 13	QPSK_10M	Rear Face	1	23230	1	49	0.231
275	LTE 13	QPSK_10M	Left Side	1	23230	25	12	0.037
280	LTE 13	QPSK_10M	Left Side	1	23230	1	0	0.053
284	LTE 13	QPSK_10M	Left Side	1	23230	1	49	0.049
276	LTE 13	QPSK_10M	Right Side	1	23230	25	12	0.082
281	LTE 13	QPSK_10M	Right Side	1	23230	1	0	0.112
285	LTE 13	QPSK_10M	Right Side	1	23230	1	49	0.105
277	LTE 13	QPSK_10M	Top Side	1	23230	25	12	0.135
282	LTE 13	QPSK_10M	Top Side	1	23230	1	0	0.191
286	LTE 13	QPSK_10M	Top Side	1	23230	1	49	0.177
287	LTE 13	16QAM_10M	Rear Face	1	23230	25	12	0.131
289	LTE 13	16QAM_10M	Rear Face	1	23230	1	0	0.175
291	LTE 13	16QAM_10M	Rear Face	1	23230	1	49	0.16

Note:

1. According to KDB 941225, the SAR testing for 100% RB is not required since the maximum SAR of 50% RB is less than 1.45 W/kg.
2. According to KDB 941225, the SAR testing was performed on largest channel bandwidth, and SAR for other channel bandwidths is not required since the maximum power of smaller channel bandwidth is within 1/2 dB higher or lower of measured for the largest channel bandwidth and maximum SAR of largest channel bandwidth is less than 1.45 W/kg.
3. SAR testing for 802.11g/n is not required because its maximum power is less than 1/4 dB higher than 802.11b.
4. Only WLAN 5G band 1 and 4 (5.15~5.25 and 5.725~5.85 GHz) support wireless hotspot mode.
5. SAR testing for WLAN 5G is performed on the maximum power mode.
6. The "N/A" means there is no SAR value or the SAR is too low to be measured.

Test Engineer : Jerome Chang, Eli Hsu, and Sam Onn

4.6.3 Simultaneous Multi-band Transmission Evaluation

No.	Configuration (SAR1 + SAR2)	Mode	Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR
1	GSM850 + WLAN	Head	Right Cheek	0.27	0.403	0.673	-
			Right Tilted	0.152	0.318	0.47	-
			Left Cheek	0.287	0.232	0.519	-
			Left Tilted	0.132	0.229	0.361	-
		Body-Worn	Front Face	0.233	0.112	0.345	-
			Rear Face	0.343	0.124	0.467	-
		Hotspot	Front Face	0.335	0.091	0.426	-
			Rear Face	0.653	0.106	0.759	-
			Left Side	0.134	0.046	0.18	-
			Right Side	0.125	0	0.125	-
			Top Side	0	0.068	0.068	-
			Bottom Side	0.038	0	0.038	-
2	GSM1900 + WLAN	Head	Right Cheek	0.29	0.403	0.693	-
			Right Tilted	0.079	0.318	0.397	-
			Left Cheek	0.173	0.232	0.405	-
			Left Tilted	0.085	0.229	0.314	-
		Body-Worn	Front Face	0.264	0.112	0.376	-
			Rear Face	0.306	0.124	0.43	-
		Hotspot	Front Face	0.28	0.091	0.371	-
			Rear Face	0.351	0.106	0.457	-
			Left Side	0.019	0.046	0.065	-
			Right Side	0.121	0	0.121	-
			Top Side	0	0.068	0.068	-
			Bottom Side	0.122	0	0.122	-
3	WCDMA V + WLAN	Head	Right Cheek	0.185	0.403	0.588	-
			Right Tilted	0.106	0.318	0.424	-
			Left Cheek	0.193	0.232	0.425	-
			Left Tilted	0.085	0.229	0.314	-
		Body-Worn	Front Face	0.132	0.112	0.244	-
			Rear Face	0.228	0.124	0.352	-
		Hotspot	Front Face	0.166	0.091	0.257	-
			Rear Face	0.316	0.106	0.422	-
			Left Side	0.22	0.046	0.266	-
			Right Side	0.145	0	0.145	-
			Top Side	0	0.068	0.068	-
			Bottom Side	0.039	0	0.039	-



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No.	Configuration (SAR1 + SAR2)	Mode	Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR
4	WCDMA II + WLAN	Head	Right Cheek	0.689	0.403	1.092	-
			Right Tilted	0.217	0.318	0.535	-
			Left Cheek	0.38	0.232	0.612	-
			Left Tilted	0.224	0.229	0.453	-
		Body-Worn	Front Face	0.58	0.112	0.692	-
			Rear Face	0.843	0.124	0.967	-
		Hotspot	Front Face	0.55	0.091	0.641	-
			Rear Face	0.846	0.106	0.952	-
			Left Side	0.05	0.046	0.096	-
			Right Side	0.303	0	0.303	-
			Top Side	0	0.068	0.068	-
			Bottom Side	0.269	0	0.269	-
5	CDMA BC0 + WLAN	Head	Right Cheek	0.316	0.403	0.719	-
			Right Tilted	0.193	0.318	0.511	-
			Left Cheek	0.331	0.232	0.563	-
			Left Tilted	0.168	0.229	0.397	-
		Body-Worn	Front Face	0.313	0.112	0.425	-
			Rear Face	0.597	0.124	0.721	-
		Hotspot	Front Face	0.381	0.091	0.472	-
			Rear Face	0.731	0.106	0.837	-
			Left Side	0.407	0.046	0.453	-
			Right Side	0.3	0	0.3	-
			Top Side	0	0.068	0.068	-
			Bottom Side	0.056	0	0.056	-
6	CDMA BC1 + WLAN	Head	Right Cheek	0.689	0.403	1.092	-
			Right Tilted	0.176	0.318	0.494	-
			Left Cheek	0.379	0.232	0.611	-
			Left Tilted	0.142	0.229	0.371	-
		Body-Worn	Front Face	0.648	0.112	0.76	-
			Rear Face	0.642	0.124	0.766	-
		Hotspot	Front Face	0.656	0.091	0.747	-
			Rear Face	0.744	0.106	0.85	-
			Left Side	0.041	0.046	0.087	-
			Right Side	0.401	0	0.401	-
			Top Side	0	0.068	0.068	-
			Bottom Side	0.056	0	0.056	-
7	LTE 13 + WLAN	Head	Right Cheek	0.478	0.403	0.881	-
			Right Tilted	0.444	0.318	0.762	-
			Left Cheek	0.646	0.232	0.878	-
			Left Tilted	0.596	0.229	0.825	-
		Body-Worn	Front Face	0.189	0.112	0.301	-
			Rear Face	0.231	0.124	0.355	-
		Hotspot	Front Face	0.233	0.091	0.324	-
			Rear Face	0.262	0.106	0.368	-
			Left Side	0.053	0.046	0.099	-
			Right Side	0.112	0	0.112	-
			Top Side	0.191	0.068	0.259	-
			Bottom Side	0	0	0	-

No.	Configuration (SAR1 + SAR2 + SAR3)	Mode	Position	Max. SAR1	Max. SAR2	Max. SAR3	SAR Summation	SPLSR
8	CDMA BC0 + LTE 13 + WLAN	Head	Right Cheek	0.316	0.478	0.403	1.197	-
			Right Tilted	0.193	0.444	0.318	0.955	-
			Left Cheek	0.331	0.646	0.232	1.209	-
			Left Tilted	0.168	0.596	0.229	0.993	-
		Body-Worn	Front Face	0.313	0.189	0.112	0.614	-
			Rear Face	0.597	0.231	0.124	0.952	-
		Hotspot	Front Face	0.381	0.233	0.091	0.705	-
			Rear Face	0.731	0.262	0.106	1.099	-
			Left Side	0.407	0.053	0.046	0.506	-
			Right Side	0.3	0.112	0	0.412	-
			Top Side	0	0.191	0.068	0.259	-
			Bottom Side	0.056	0	0	0.056	-
		9	CDMA BC1 + LTE 13 + WLAN	Head	Right Cheek	0.689	0.478	0.403
Right Tilted	0.176				0.444	0.318	0.938	-
Left Cheek	0.379				0.646	0.232	1.257	-
Left Tilted	0.142				0.596	0.229	0.967	-
Body-Worn	Front Face			0.648	0.189	0.112	0.949	-
	Rear Face			0.642	0.231	0.124	0.997	-
Hotspot	Front Face			0.656	0.233	0.091	0.98	-
	Rear Face			0.744	0.262	0.106	1.112	-
	Left Side			0.041	0.053	0.046	0.14	-
	Right Side			0.401	0.112	0	0.513	-
	Top Side			0	0.191	0.068	0.259	-
	Bottom Side			0.056	0	0	0.056	-

Note:

1. The maximum SAR summation is calculated based on the same configuration and test position.

Summary:

According to KDB 648474, the simultaneous transmission SAR for WWAN and WLAN was not required, because the SAR summation is less than 1.6 W/kg. The BT standalone SAR and WWAN/BT simultaneous transmission SAR were not required, because the maximum output power of Bluetooth is less than P_{Ref} (10.8 dBm), and maximum WWAN SAR is less than 1.2 W/kg.



5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Kit	SPEAG	D750V3	1013	Apr. 25, 2012	Annual
System Validation Kit	SPEAG	D835V2	4d021	Apr. 20, 2012	Annual
System Validation Kit	SPEAG	D1900V2	5d036	Jan. 26, 2012	Annual
System Validation Kit	SPEAG	D2450V2	737	Jan. 24, 2012	Annual
System Validation Kit	SPEAG	D5GHzV2	1018	Jan. 18, 2012	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3590	Feb. 23, 2012	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3650	Oct. 26, 2011	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3820	Dec. 16, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE3	579	Apr. 27, 2012	Annual
Data Acquisition Electronics	SPEAG	DAE4	861	Aug. 29, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE4	910	Dec. 07, 2011	Annual
SAM Phantom	SPEAG	QD000P40CD	TP-1652	N/A	N/A
SAM Phantom	SPEAG	QD000P40CD	TP-1654	N/A	N/A
SAM Phantom	SPEAG	QD000P40CD	TP-1653	N/A	N/A
ELI Phantom	SPEAG	QDOVA001B	TP-1039	N/A	N/A
ELI Phantom	SPEAG	QDOVA001B	TP-1043	N/A	N/A
Radio Communication Tester	Agilent	E5515C	MY50260642	Oct. 25, 2011	Biennial
Radio Communication Analyzer	Anritsu	MT8820C	6201010284	Aug. 01, 2011	Biennial
ENA Series Network Analyzer	Agilent	E5071C	MY46214281	May 14, 2012	Annual
MXG Analog Signal Generator	Agilent	N5181A	MY50143868	May 06, 2012	Annual
Power Meter	Anritsu	ML2495A	1218009	May 07, 2012	Annual
Power Sensor	Anritsu	MA2411B	1207252	May 07, 2012	Annual
EXA Spectrum Analyzer	Agilent	N9010A	MY52100136	Apr. 23, 2012	Annual
Dielectric Probe Kit	Agilent	85070D	E2-020018	May 14, 2012	Annual
Thermometer	YFE	YF-160A	110600361	Feb. 21, 2012	Annual
Directional Coupler	Woken	0110A056020-10	11122702	Apr. 19, 2012	Annual
Power Amplifier	AR	5S1G4	0339656	Apr. 23, 2012	Annual
Power Amplifier	Mini-Circuit	ZVE-8G	001000422	Apr. 23, 2012	Annual
Attenuator	Woken	00800A1G01L-03	N/A	Apr. 19, 2012	Annual

6. Measurement Uncertainty

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

Uncertainty budget for frequency range 300 MHz to 3 GHz



FCC SAR Test Report

A D T

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (1g)	Vi
Measurement System						
Probe Calibration	6.55	Normal	1	1	± 6.55 %	∞
Axial Isotropy	4.7	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	± 3.9 %	∞
Boundary Effects	2.0	Rectangular	√3	1	± 1.2 %	∞
Linearity	4.7	Rectangular	√3	1	± 2.7 %	∞
System Detection Limits	1.0	Rectangular	√3	1	± 0.6 %	∞
Readout Electronics	0.3	Normal	1	1	± 0.3 %	∞
Response Time	0.8	Rectangular	√3	1	± 0.5 %	∞
Integration Time	2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Noise	3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Reflections	3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	0.8	Rectangular	√3	1	± 0.5 %	∞
Probe Positioning	9.9	Rectangular	√3	1	± 5.7 %	∞
Max. SAR Eval.	4.0	Rectangular	√3	1	± 2.3 %	∞
Test Sample Related						
Device Positioning	3.9	Normal	1	1	± 3.9 %	31
Device Holder	2.7	Normal	1	1	± 2.7 %	19
Power Drift	5.0	Rectangular	√3	1	± 2.9 %	∞
Phantom and Setup						
Phantom Uncertainty	4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	± 1.8 %	∞
Liquid Conductivity (Meas.)	5.0	Normal	1	0.64	± 3.2 %	30
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid Permittivity (Meas.)	5.0	Normal	1	0.6	± 3.0 %	30
Combined Standard Uncertainty					± 13.4 %	
Expanded Uncertainty (K=2)					± 26.8 %	

Uncertainty budget for frequency range 3 GHz to 6 GHz



7. Information on the Testing Laboratories

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

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site. If you have any comments, please feel free to contact us at the following:

Taiwan HwaYa EMC/RF/Safety/Telecom Lab:

Add: No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil., Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

Tel: 886-3-318-3232

Fax: 886-3-327-0892

Taiwan LinKo EMC/RF Lab:

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Fax: 886-2-2605-1924

Taiwan HsinChu EMC/RF Lab:

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Tel: 886-3-593-5343

Fax: 886-3-593-5342

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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Appendix A. SAR Plots of System Verification

The plots for system verification are shown as follows.

System Check_H750_120808

DUT: Dipole 750 MHz; Type: D750V3; SN: 1013

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: H750_0808 Medium parameters used: $f = 750$ MHz; $\sigma = 0.906$ mho/m; $\epsilon_r = 41.293$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.0 °C ; Liquid Temperature : 21.0 °C

DASY5 Configuration:

/"Rtqdg<GZ 5F X6"/"UP 5872="EqpxH"; 04."; 04."; 04="Ecrkdtcvf <4233 B2 48=""

- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.72 mW/g

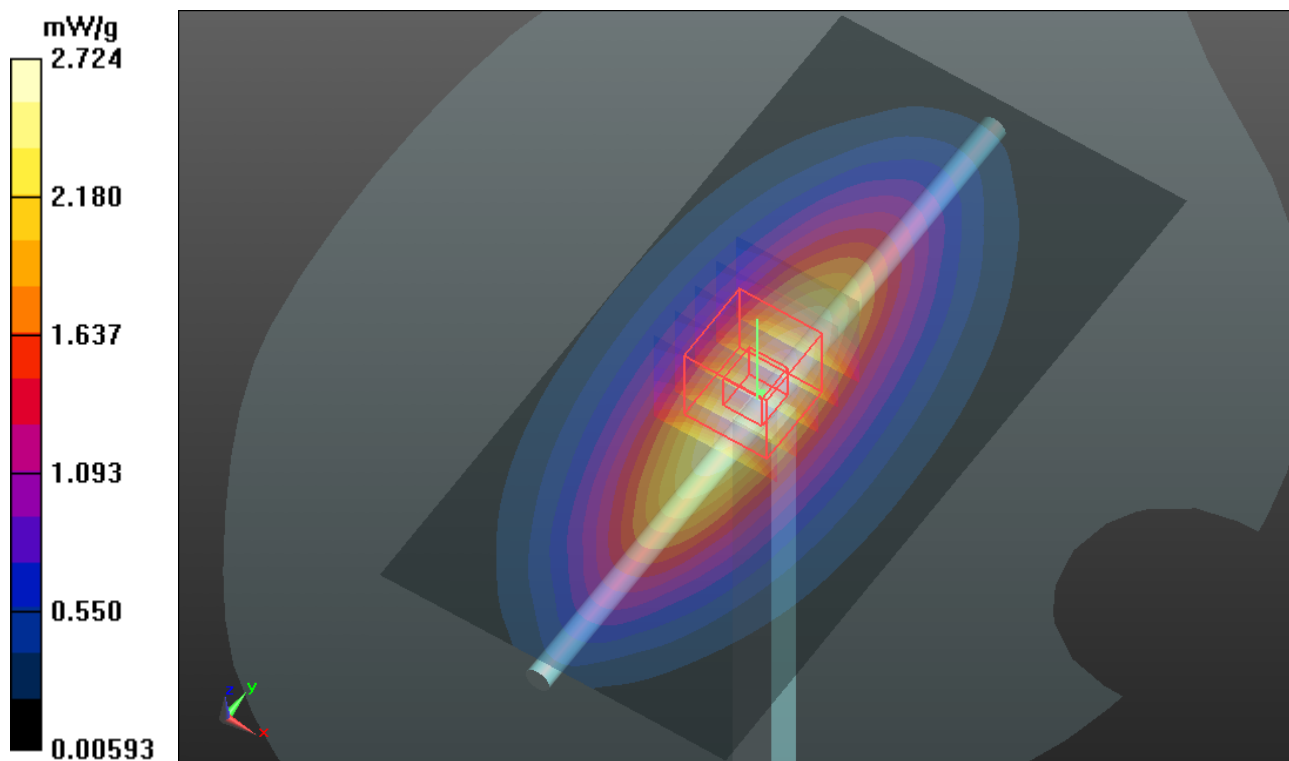
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.948 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.188 mW/g

SAR(1 g) = 2.17 mW/g; SAR(10 g) = 1.46 mW/g

Maximum value of SAR (measured) = 2.73 mW/g



System Check_H750_120809

DUT: Dipole 750 MHz; Type: D750V3; SN: 1013

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: H750_0809 Medium parameters used: $f = 750$ MHz; $\sigma = 0.888$ mho/m; $\epsilon_r = 40.092$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.0 °C ; Liquid Temperature : 21.0 °C

DASY5 Configuration:

/"Rtqdg<GZ5FX6"/"UP5872="EqpxH"; 04.; 04.; 04="Ecrkdtcvf <4233B248=

- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.60 mW/g

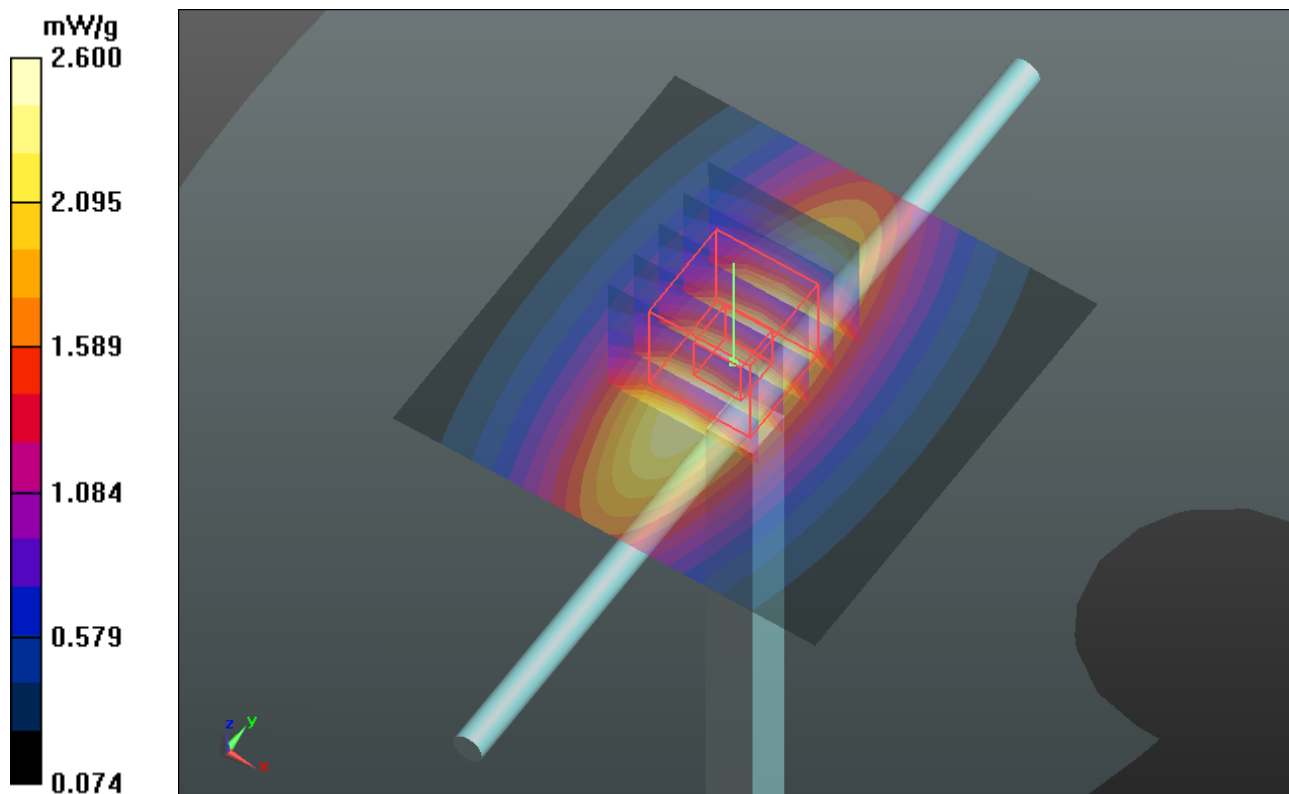
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.942 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.073 mW/g

SAR(1 g) = 2.07 mW/g; SAR(10 g) = 1.38 mW/g

Maximum value of SAR (measured) = 2.61 mW/g



System Check_H835_120803

DUT: Dipole 835 MHz; Type: D835V2; SN: 4d021

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: H835_0803 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.917 \text{ mho/m}$; $\epsilon_r = 42.809$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.0 °C ; Liquid Temperature : 21.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(8.87, 8.87, 8.87); Calibrated: 2011/10/26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.13 mW/g

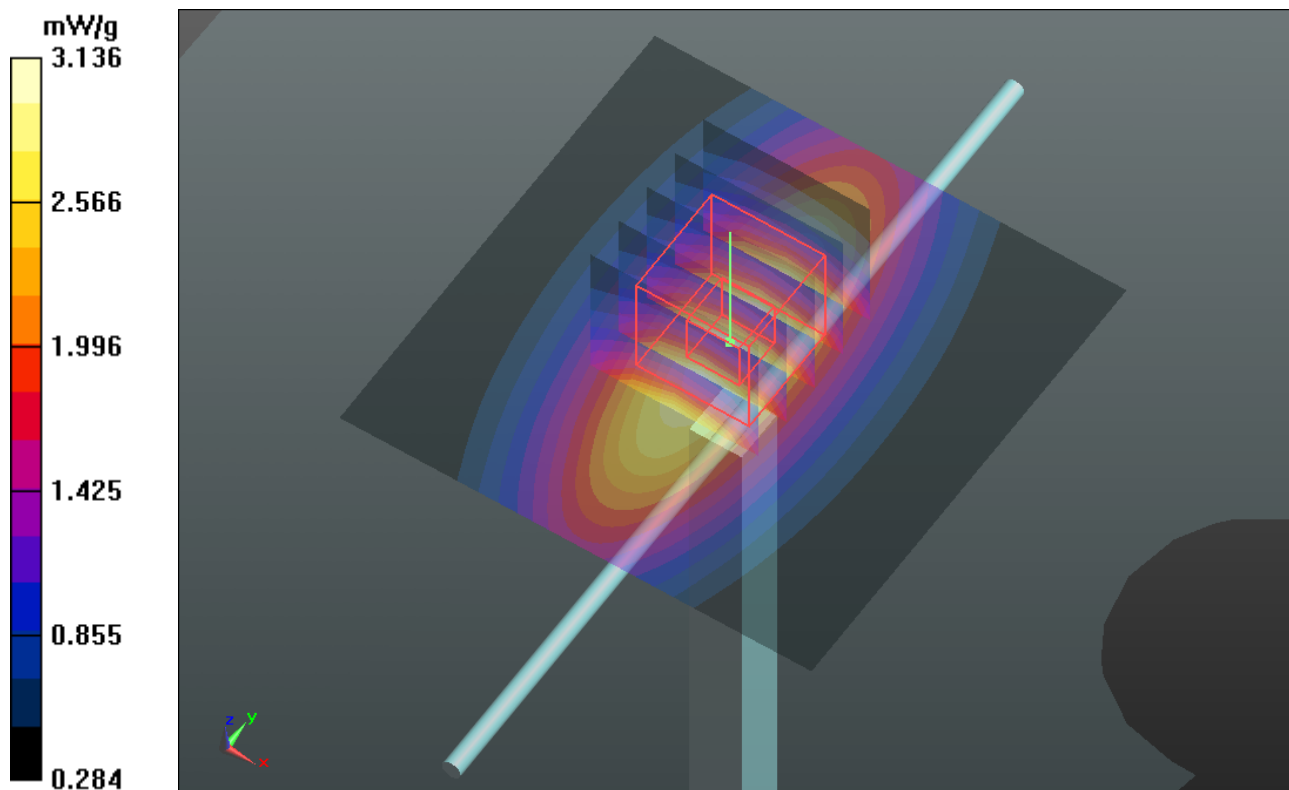
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 56.515 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.650 mW/g

SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.63 mW/g

Maximum value of SAR (measured) = 3.14 mW/g



System Check_H835_120804

DUT: Dipole 835 MHz; Type: D835V2; SN: 4d021

Communication System: WCDMA II; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: H835_0804 Medium parameters used: $f = 835$ MHz; $\sigma = 0.909$ mho/m; $\epsilon_r = 42.3$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.5 °C ; Liquid Temperature : 20.4 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(9.05, 9.05, 9.05); Calibrated: 2011/12/16
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.90 mW/g

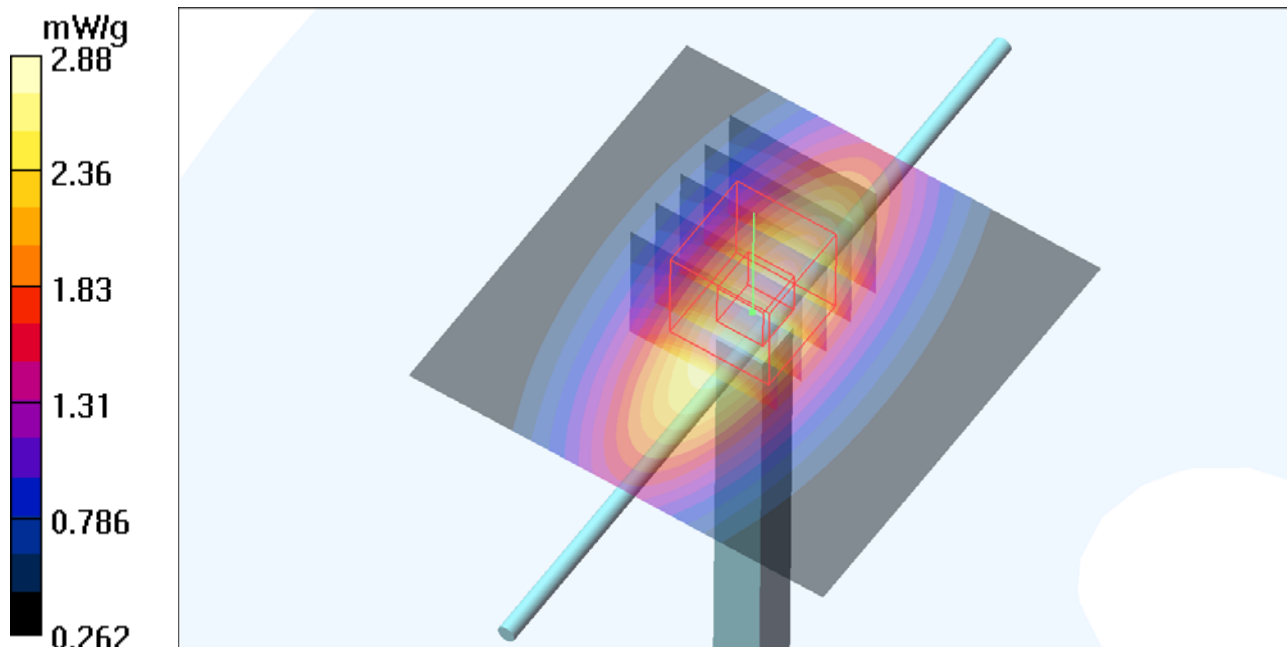
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.4 V/m; Power Drift = -0.025 dB

Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.5 mW/g

Maximum value of SAR (measured) = 2.88 mW/g



System Check_H1900_120803

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: H1900_0803 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.433$ mho/m; $\epsilon_r = 39.751$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.2 °C ; Liquid Temperature : 21.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(7.4, 7.4, 7.4); Calibrated: 2011/10/26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 14.2 mW/g

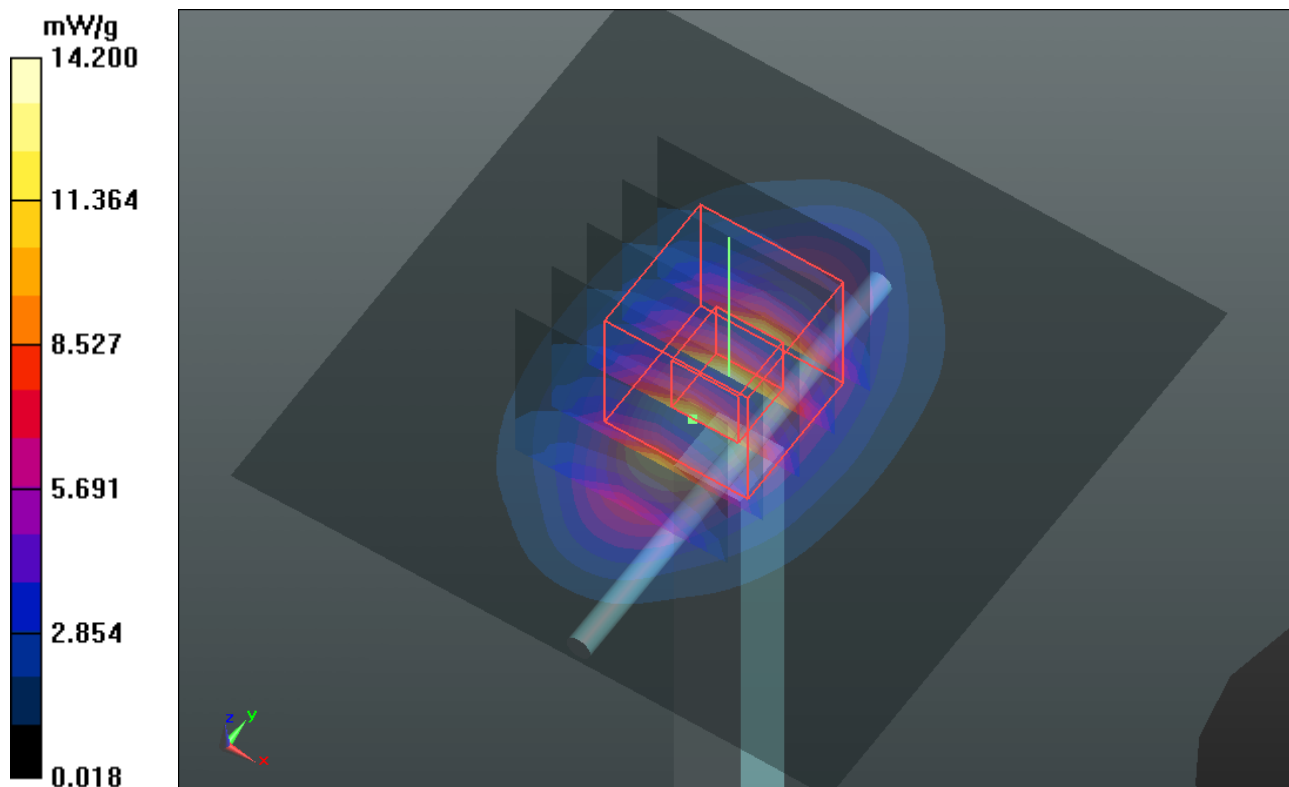
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 99.366 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.984 mW/g

SAR(1 g) = 9.44 mW/g; SAR(10 g) = 4.86 mW/g

Maximum value of SAR (measured) = 13.8 mW/g



System Check_H1900_120804

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: H1900_0804 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.441$ mho/m; $\epsilon_r = 39.728$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.8 °C ; Liquid Temperature : 20.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(8.02, 8.02, 8.02); Calibrated: 2011/12/16;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.4 mW/g

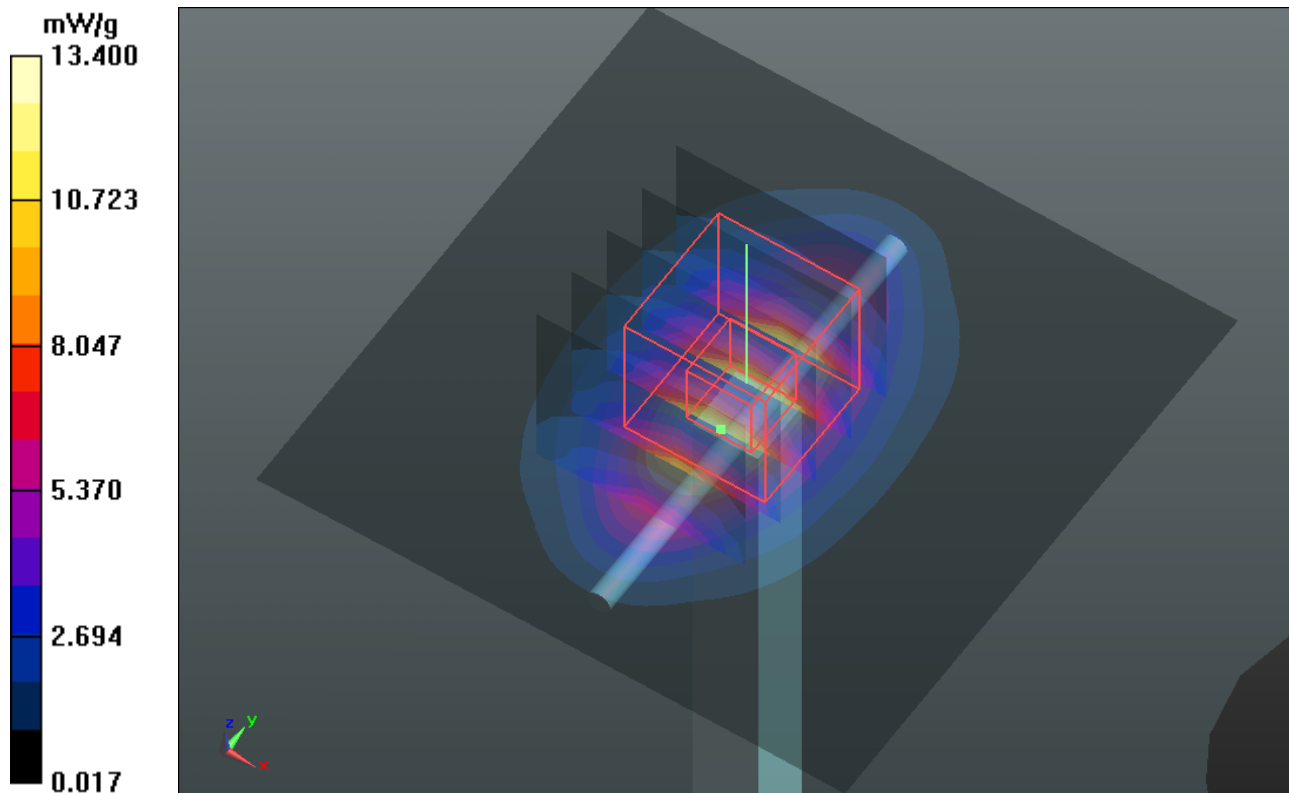
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 96.428 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.888 mW/g

SAR(1 g) = 9.02 mW/g; SAR(10 g) = 4.65 mW/g

Maximum value of SAR (measured) = 13.1 mW/g



System Check_H2450_120801

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: H2450_0801 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.782$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.3 °C; Liquid Temperature : 20.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(7.17, 7.17, 7.17); Calibrated: 2011/12/16;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 22.2 mW/g

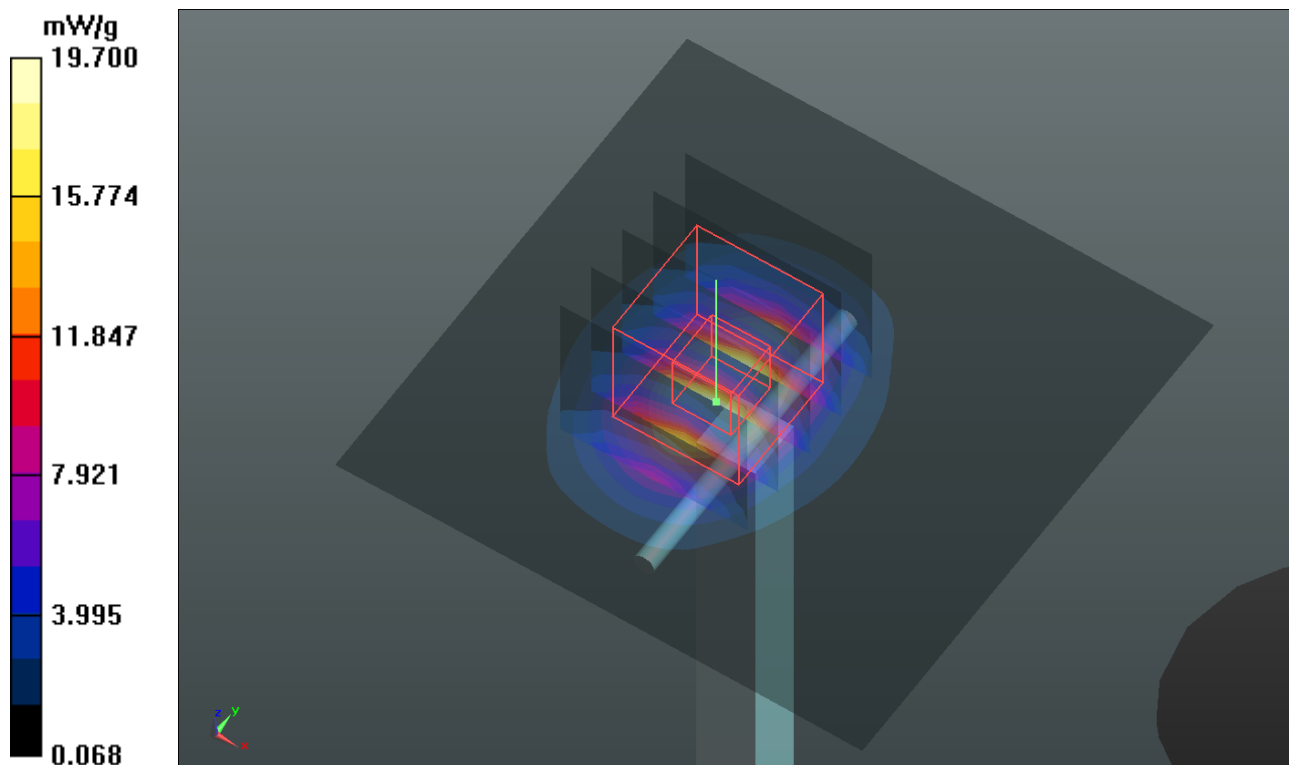
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 104.6 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 27.856 mW/g

SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.85 mW/g

Maximum value of SAR (measured) = 19.7 mW/g



System Check_H5200_120803

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: H5G_120803 Medium parameters used: $f = 5200$ MHz; $\sigma = 4.687$ mho/m; $\epsilon_r = 37.001$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(5.64, 5.64, 5.64); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=100mW, f=5200 MHz/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.0 mW/g

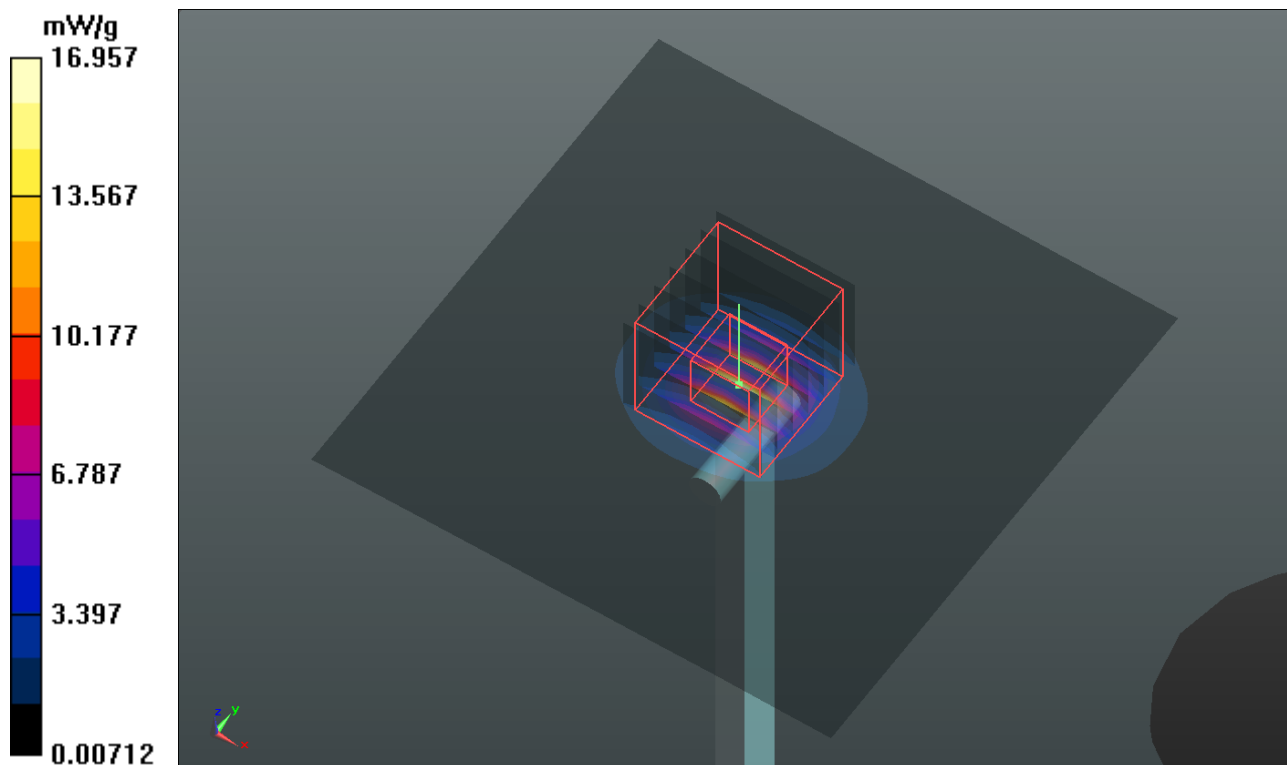
Pin=100mW, f=5200 MHz/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 63.034 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 35.485 mW/g

SAR(1 g) = 8.13 mW/g; SAR(10 g) = 2.29 mW/g

Maximum value of SAR (measured) = 17.6 mW/g



System Check_H5200_120925

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: H5G_0925 Medium parameters used: $f = 5200$ MHz; $\sigma = 4.47$ mho/m; $\epsilon_r = 36.4$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.9 °C; Liquid Temperature : 20.3 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(5.64, 5.64, 5.64); Calibrated: 2012/02/23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 16.2 mW/g

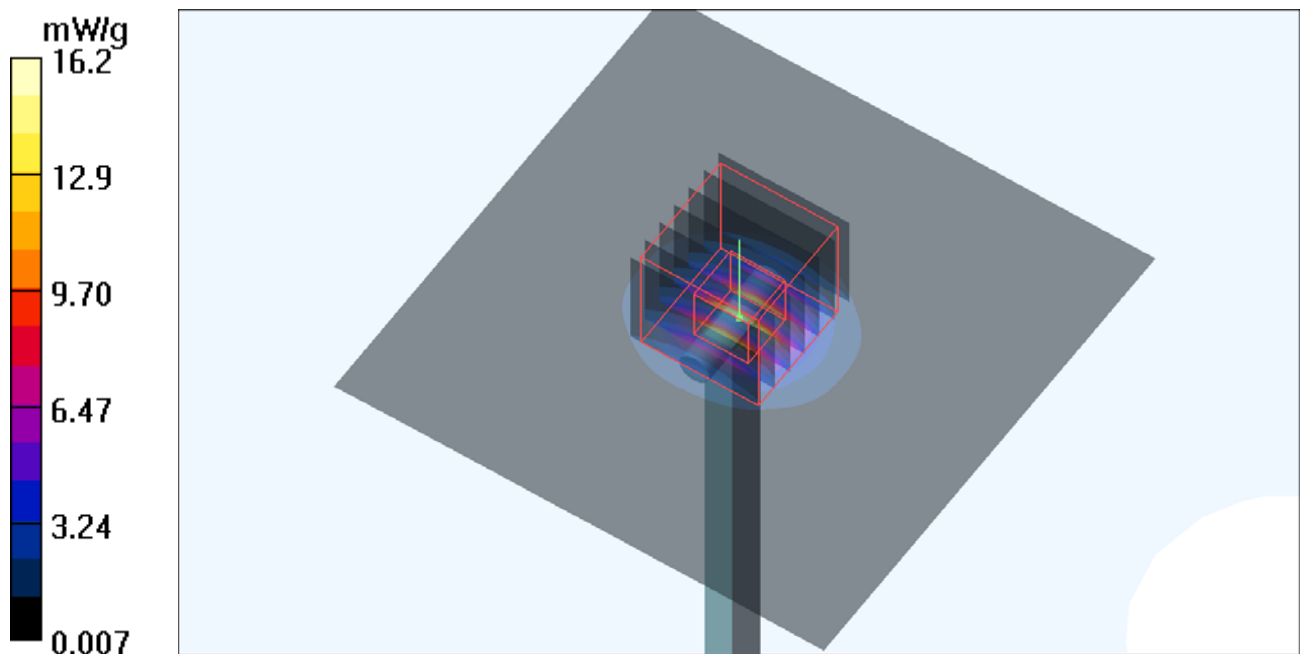
Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 63.0 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 33.8 W/kg

SAR(1 g) = 7.75 mW/g; SAR(10 g) = 2.18 mW/g

Maximum value of SAR (measured) = 16.7 mW/g



System Check_H5500_120803

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: H5G_120803 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.064$ mho/m; $\epsilon_r = 36.369$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(5.13, 5.13, 5.13); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=100mW, f=5500 MHz/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.0 mW/g

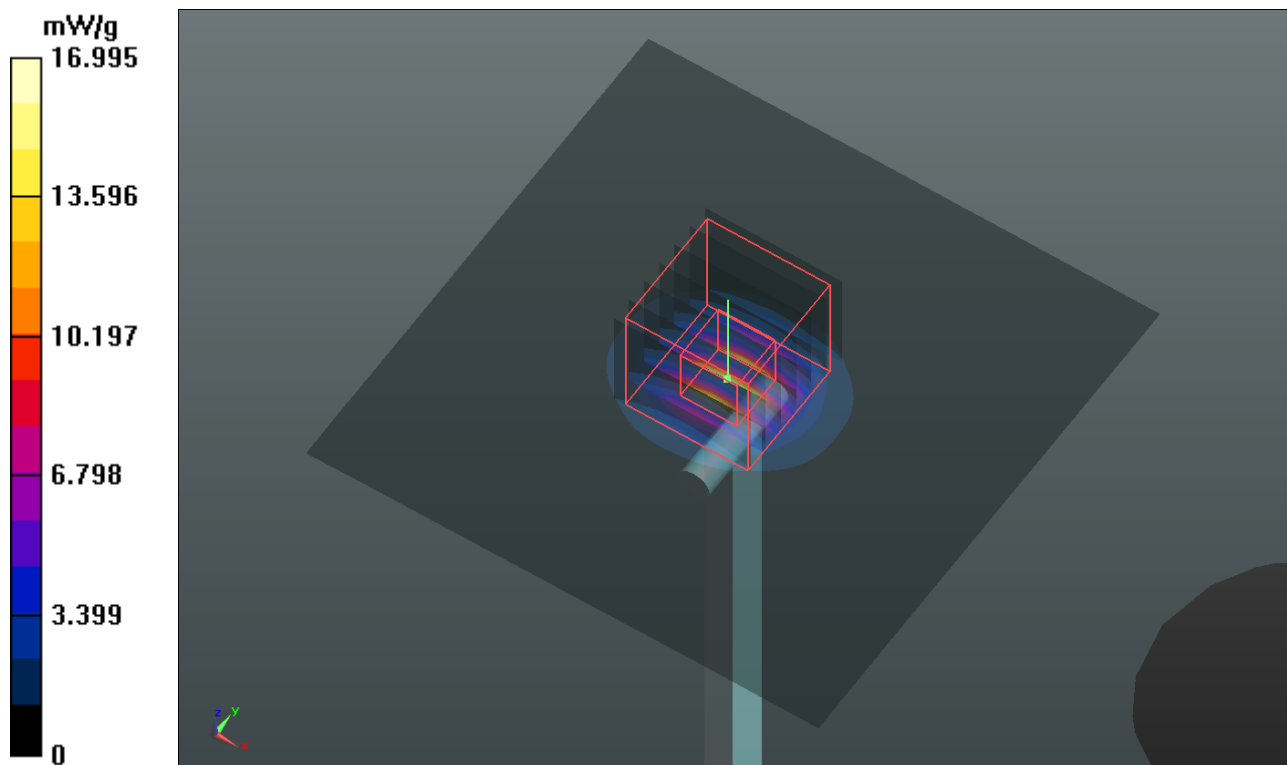
Pin=100mW, f=5500 MHz/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 60.470 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 37.578 mW/g

SAR(1 g) = 8.36 mW/g; SAR(10 g) = 2.32 mW/g

Maximum value of SAR (measured) = 18.2 mW/g



System Check_H5500_120925

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: H5G_0925 Medium parameters used: $f = 5500$ MHz; $\sigma = 4.84$ mho/m; $\epsilon_r = 36.2$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.9 °C ; Liquid Temperature : 20.3 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(5.13, 5.13, 5.13); Calibrated: 2012/02/23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=100mW, f=5500 MHz/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.6 mW/g

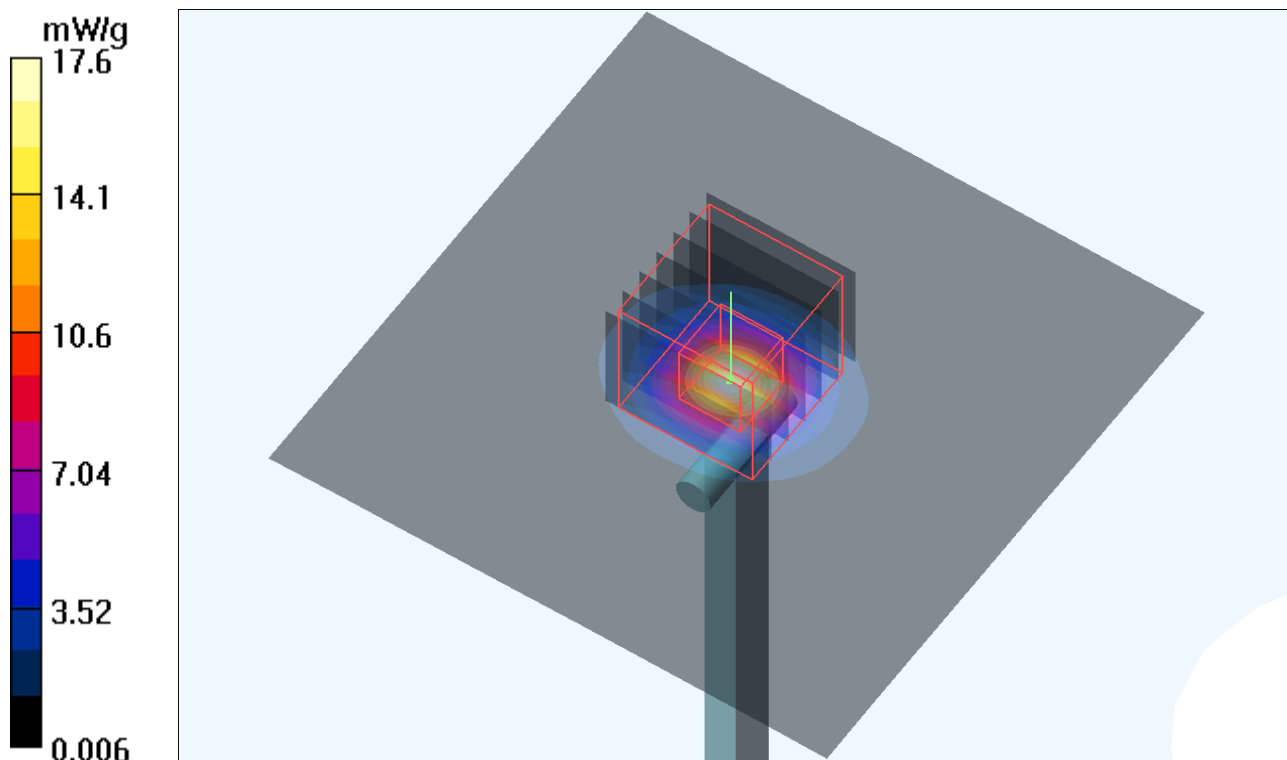
Pin=100mW, f=5500 MHz/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 64.5 V/m; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 36.7 W/kg

SAR(1 g) = 8.15 mW/g; SAR(10 g) = 2.26 mW/g

Maximum value of SAR (measured) = 17.8 mW/g



System Check_H5800_120803

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: H5G_120803 Medium parameters used: $f = 5800$ MHz; $\sigma = 5.422$ mho/m; $\epsilon_r = 35.687$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.79, 4.79, 4.79); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=100mW, f=5800 MHz/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.3 mW/g

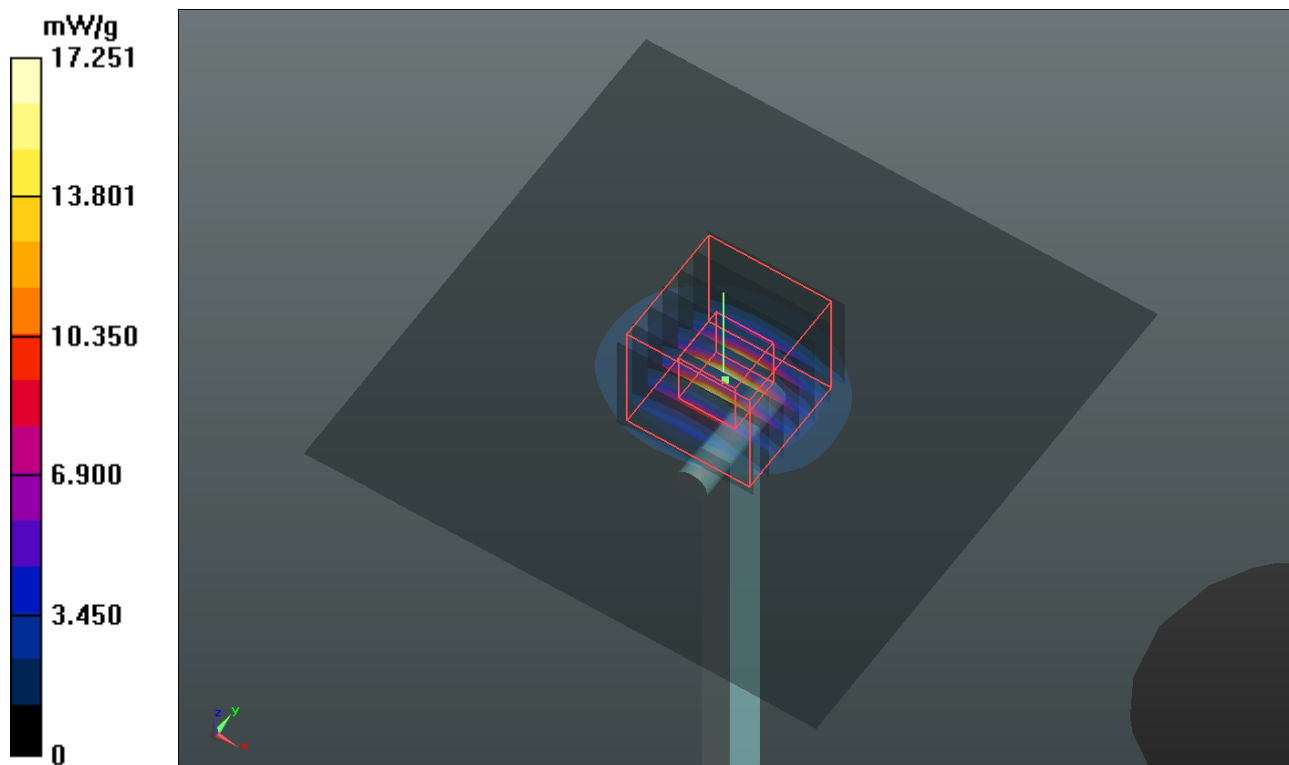
Pin=100mW, f=5800 MHz/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 62.151 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 37.691 mW/g

SAR(1 g) = 8.19 mW/g; SAR(10 g) = 2.22 mW/g

Maximum value of SAR (measured) = 17.3 mW/g



System Check_H5800_120925

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: H5G_0925 Medium parameters used: $f = 5800$ MHz; $\sigma = 5.11$ mho/m; $\epsilon_r = 35.6$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.9 °C; Liquid Temperature : 20.3 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.79, 4.79, 4.79); Calibrated: 2012/02/23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=100mW, f=5800 MHz/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 16.2 mW/g

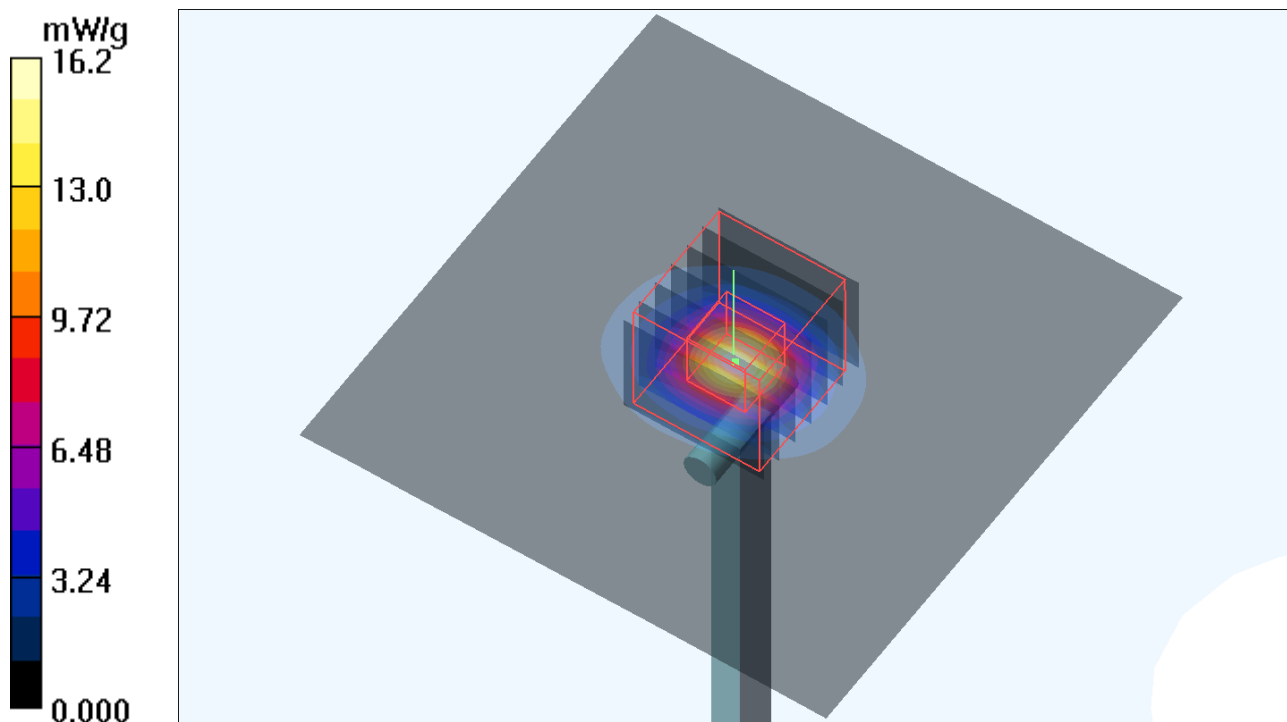
Pin=100mW, f=5800 MHz/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 62.2 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 35.5 W/kg

SAR(1 g) = 7.71 mW/g; SAR(10 g) = 2.09 mW/g

Maximum value of SAR (measured) = 16.3 mW/g



System Check_B750_120808

DUT: Dipole 750 MHz; Type: D750V3; SN: 1013

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: B750_0808 Medium parameters used: $f = 750$ MHz; $\sigma = 0.969$ mho/m; $\epsilon_r = 55.526$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.0 °C ; Liquid Temperature : 21.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(9.21, 9.21, 9.21); Calibrated: 2011/10/26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.73 mW/g

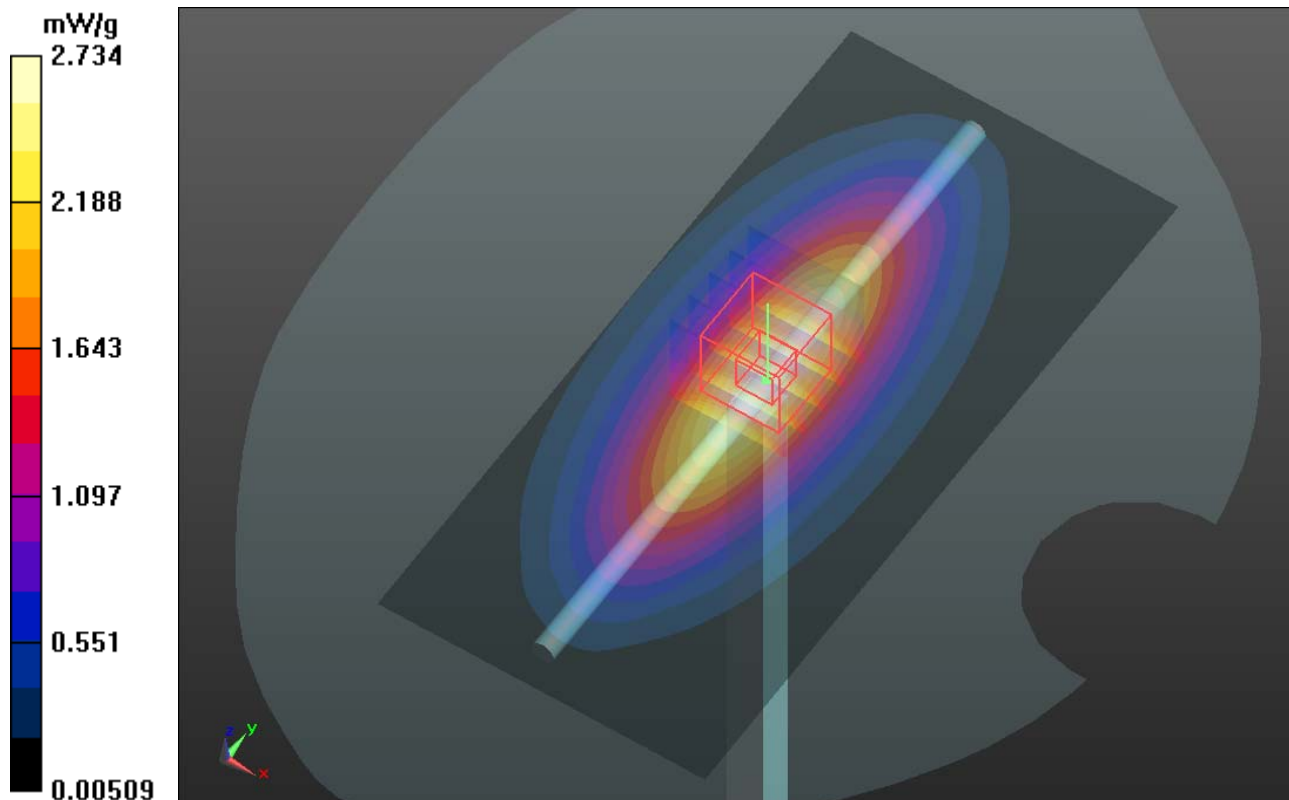
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.471 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.263 mW/g

SAR(1 g) = 2.24 mW/g; SAR(10 g) = 1.5 mW/g

Maximum value of SAR (measured) = 2.81 mW/g



System Check_B835_120801

DUT: Dipole 835 MHz; Type: D835V2; SN: 4d021

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: B835_0801 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.98 \text{ mho/m}$; $\epsilon_r = 55.833$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 22.4 °C ; Liquid Temperature : 21.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(9.12, 9.12, 9.12); Calibrated: 2011/10/26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.99 mW/g

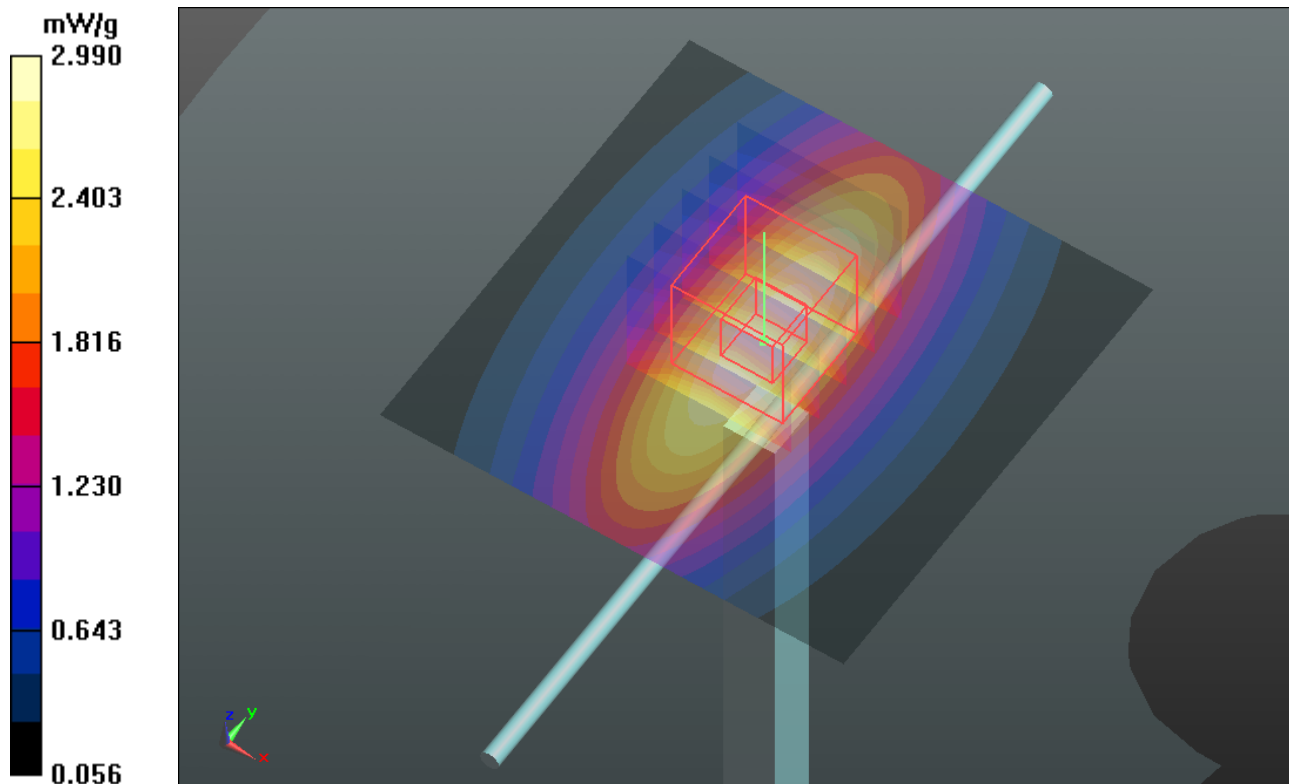
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 53.187 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.480 mW/g

SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.55 mW/g

Maximum value of SAR (measured) = 2.98 mW/g



System Check_B835_120802

DUT: Dipole 835 MHz; Type: D835V2; SN: 4d021

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: B835_0802 Medium parameters used: $f = 835$ MHz; $\sigma = 0.98$ mho/m; $\epsilon_r = 55.843$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.8 °C ; Liquid Temperature : 20.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(9.12, 9.12, 9.12); Calibrated: 2011/10/26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: SAM Phantom_Left; Type: SAM V4.0; Serial: TP 1652
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.02 mW/g

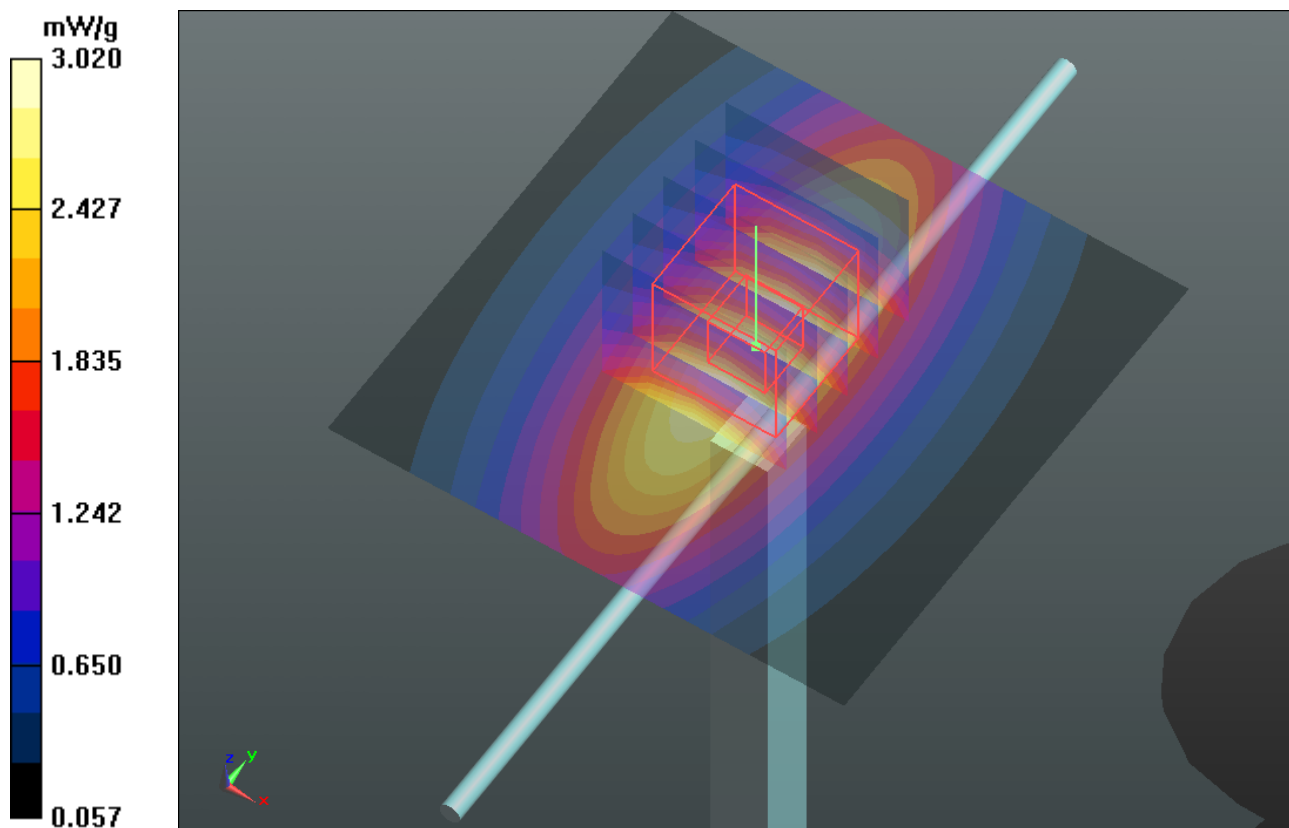
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 53.485 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.515 mW/g

SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.57 mW/g

Maximum value of SAR (measured) = 3.01 mW/g



System Check_B1900_120801

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: B1900_0801 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.551$ mho/m; $\epsilon_r = 52.998$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.0 °C ; Liquid Temperature : 21.1 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(7.46, 7.46, 7.46); Calibrated: 2011/10/26;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 14.6 mW/g

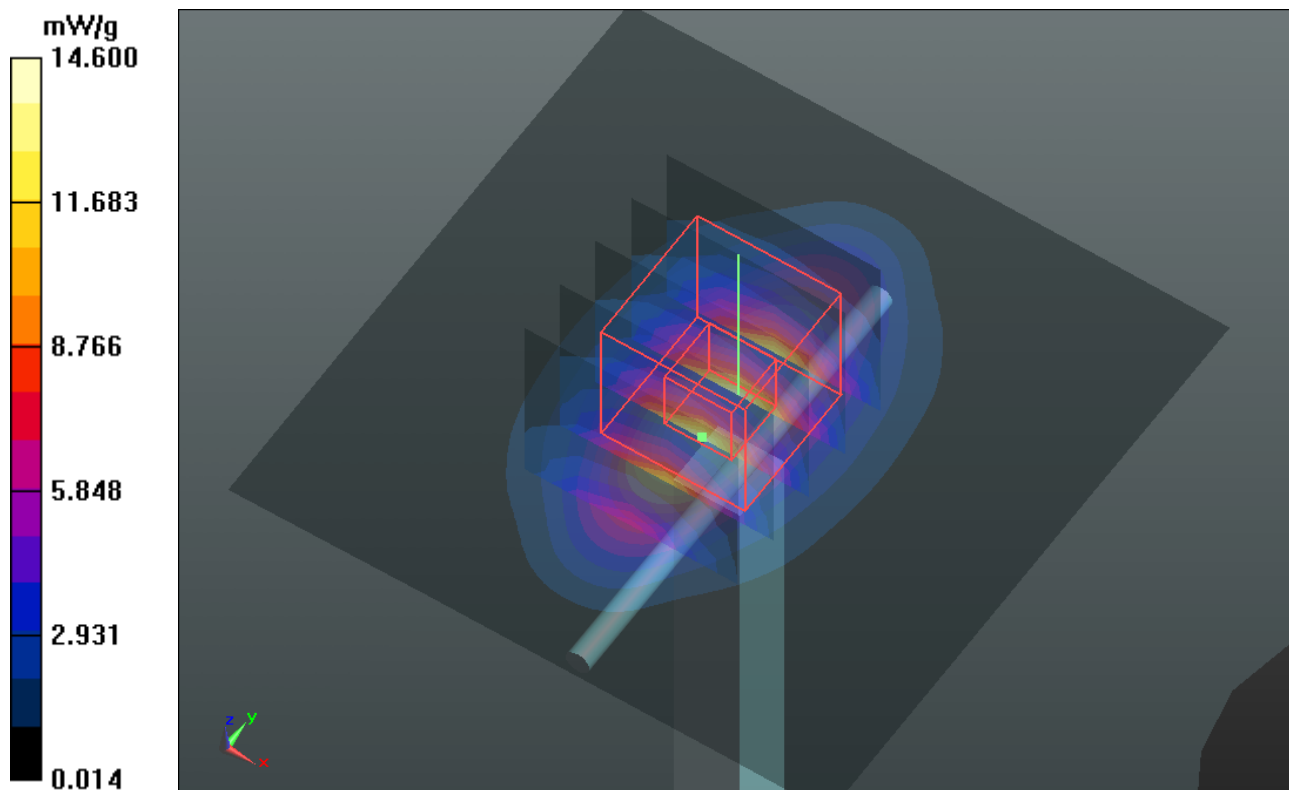
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 97.537 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 17.955 mW/g

SAR(1 g) = 9.95 mW/g; SAR(10 g) = 5.16 mW/g

Maximum value of SAR (measured) = 14.1 mW/g



System Check_B1900_120804

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: B1900_0804 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.563$ mho/m; $\epsilon_r = 54.687$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.6 °C ; Liquid Temperature : 20.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(8.04, 8.04, 8.04); Calibrated: 2011/12/16;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2011/08/29
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.7 mW/g

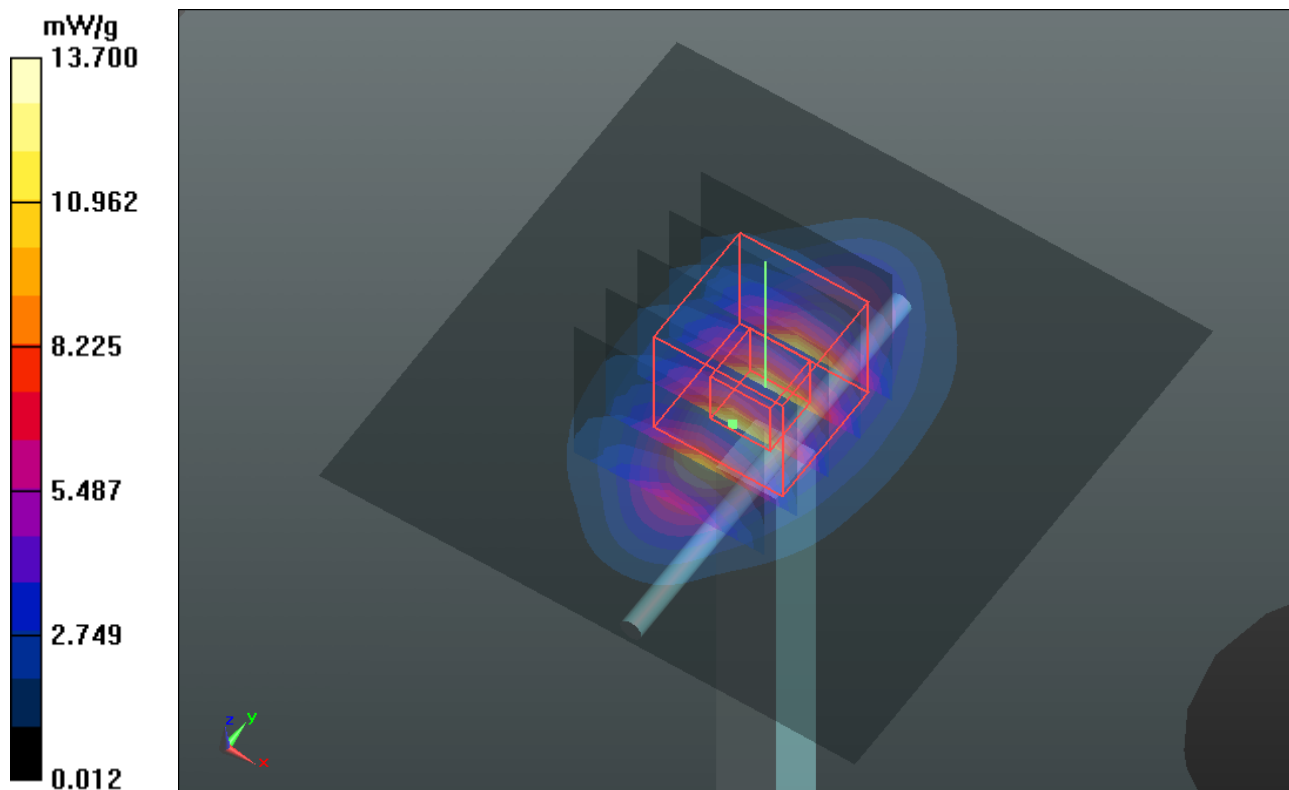
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 95.325 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 16.808 mW/g

SAR(1 g) = 9.4 mW/g; SAR(10 g) = 4.88 mW/g

Maximum value of SAR (measured) = 13.3 mW/g



System Check_B1900_120806

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: B1900_0806 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.0 °C ; Liquid Temperature : 21.1 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(7.46, 7.46, 7.46); Calibrated: 2011/10/26
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2011/12/07
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1039
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 14.9 mW/g

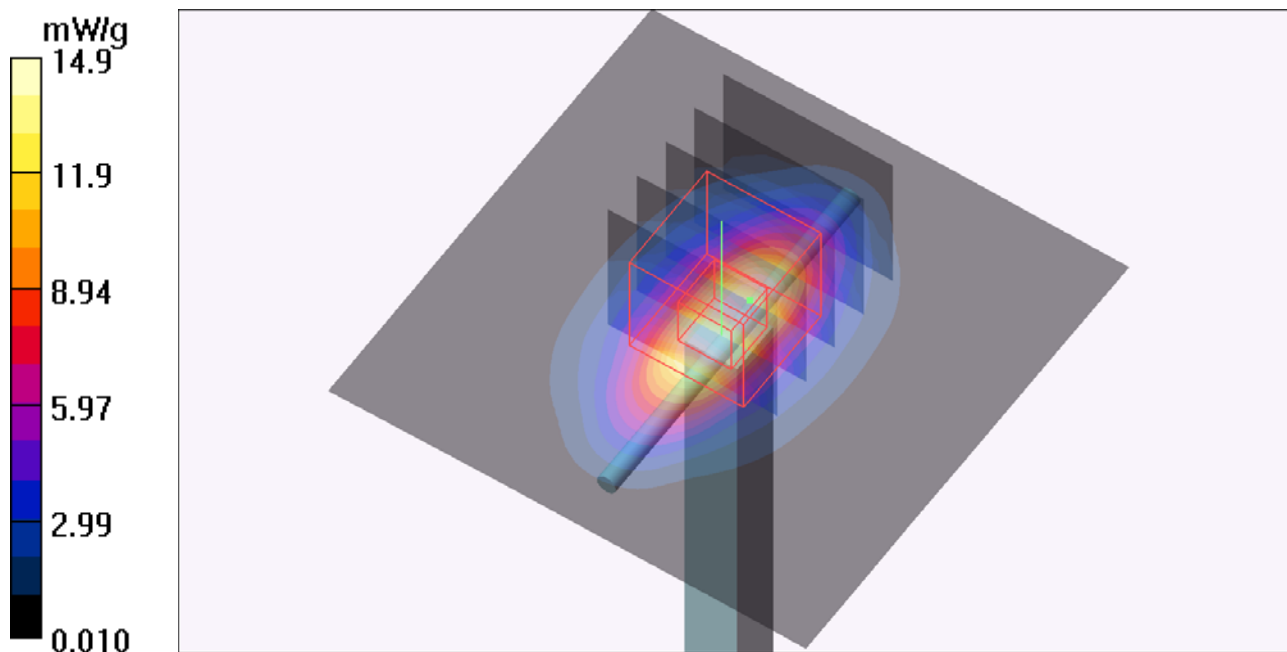
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 98.7 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 18.6 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.27 mW/g

Maximum value of SAR (measured) = 14.7 mW/g



System Check_B2450_120802

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: B2450_120802 Medium parameters used: $f = 2450$ MHz; $\sigma = 2.025$ mho/m; $\epsilon_r = 53.072$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.3 °C ; Liquid Temperature : 21.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(7.8, 7.8, 7.8); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: ELI v4.0; Type: QDOVA001BA; Serial: TP:1043
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 19.6 mW/g

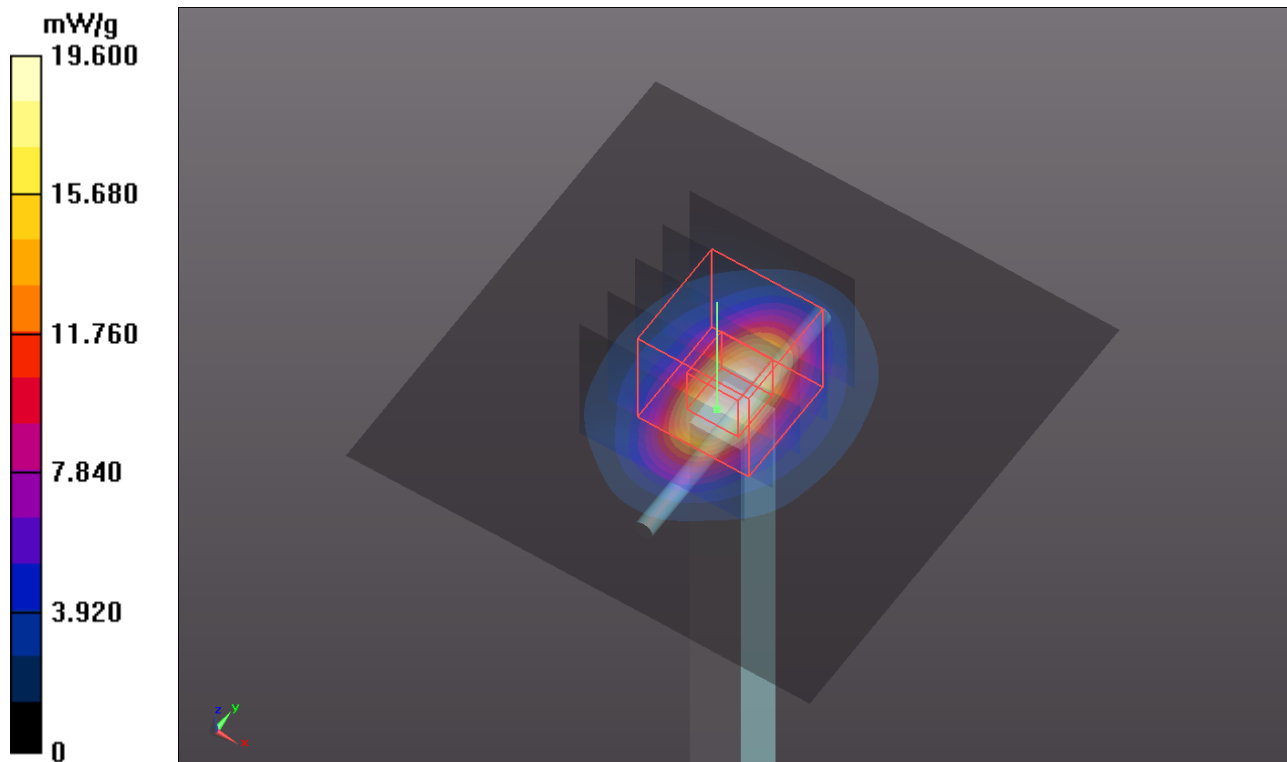
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 99.390 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 25.898 mW/g

SAR(1 g) = 12.4 mW/g; SAR(10 g) = 5.67 mW/g

Maximum value of SAR (measured) = 18.5 mW/g



System Check_B5200_120803

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: B5G_0803 Medium parameters used: $f = 5200$ MHz; $\sigma = 5.278$ mho/m; $\epsilon_r = 48.936$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.8 °C ; Liquid Temperature : 20.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.89, 4.89, 4.89); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 14.2 mW/g

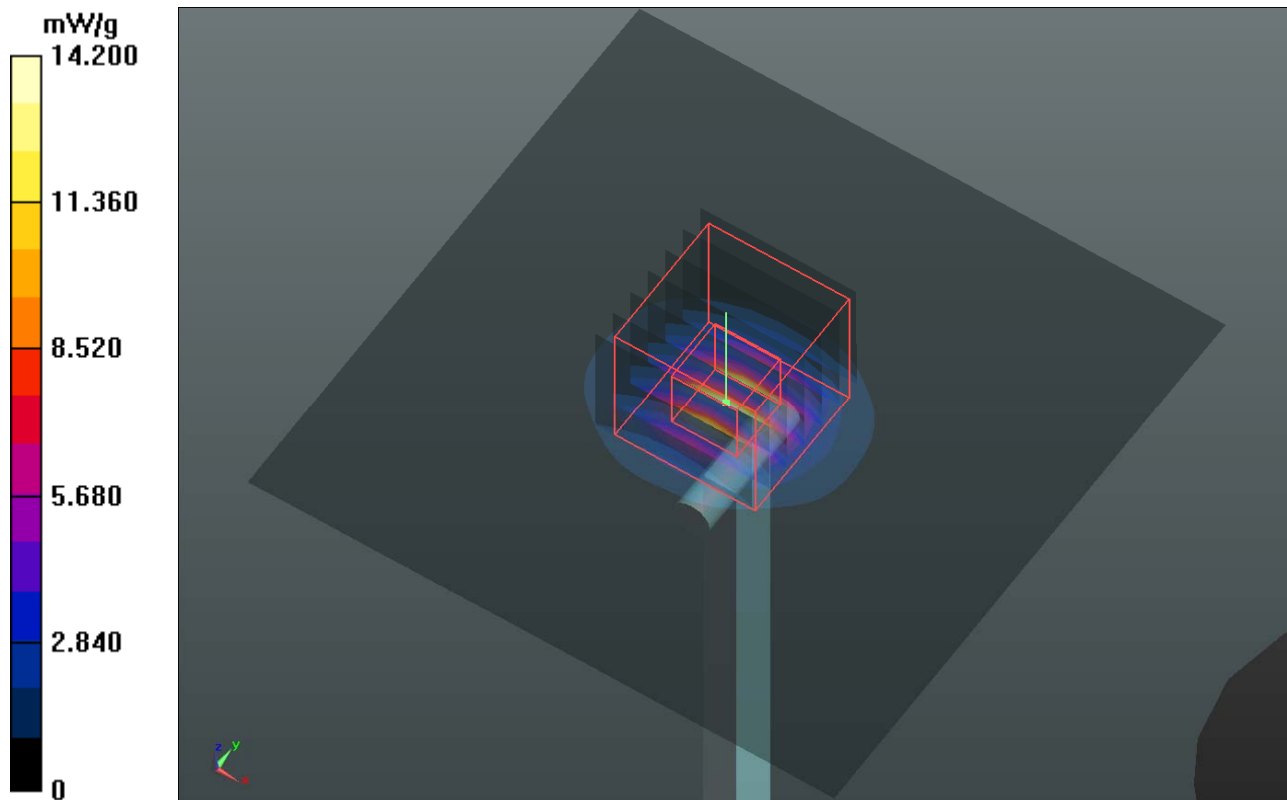
Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 58.610 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 25.651 mW/g

SAR(1 g) = 6.86 mW/g; SAR(10 g) = 1.94 mW/g

Maximum value of SAR (measured) = 14.6 mW/g



System Check_B5200_120926

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: B5G_0926 Medium parameters used: $f = 5200$ MHz; $\sigma = 5.28$ mho/m; $\epsilon_r = 48.9$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.5 °C; Liquid Temperature : 20.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.89, 4.89, 4.89); Calibrated: 2012/02/23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 14.5 mW/g

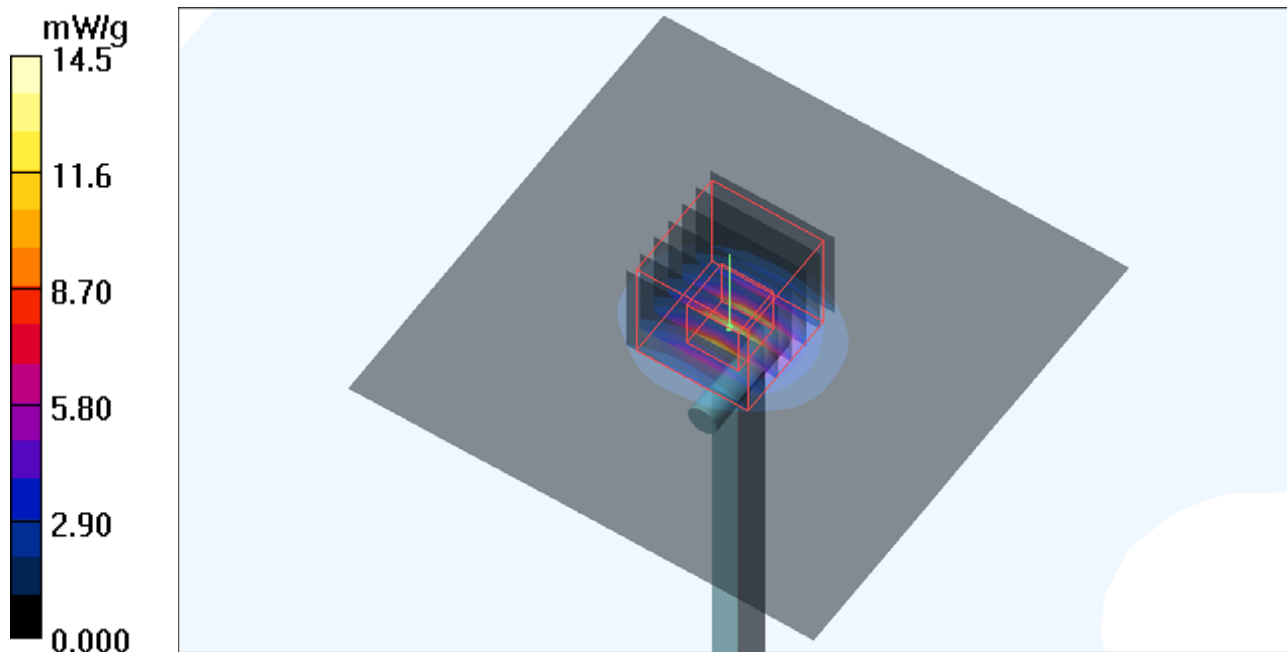
Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 58.8 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 26.6 W/kg

SAR(1 g) = 7.07 mW/g; SAR(10 g) = 1.99 mW/g

Maximum value of SAR (measured) = 15.0 mW/g



System Check_B5500_120803

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: B5G_0803 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.717$ mho/m; $\epsilon_r = 48.431$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.8 °C ; Liquid Temperature : 20.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.35, 4.35, 4.35); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 16.0 mW/g

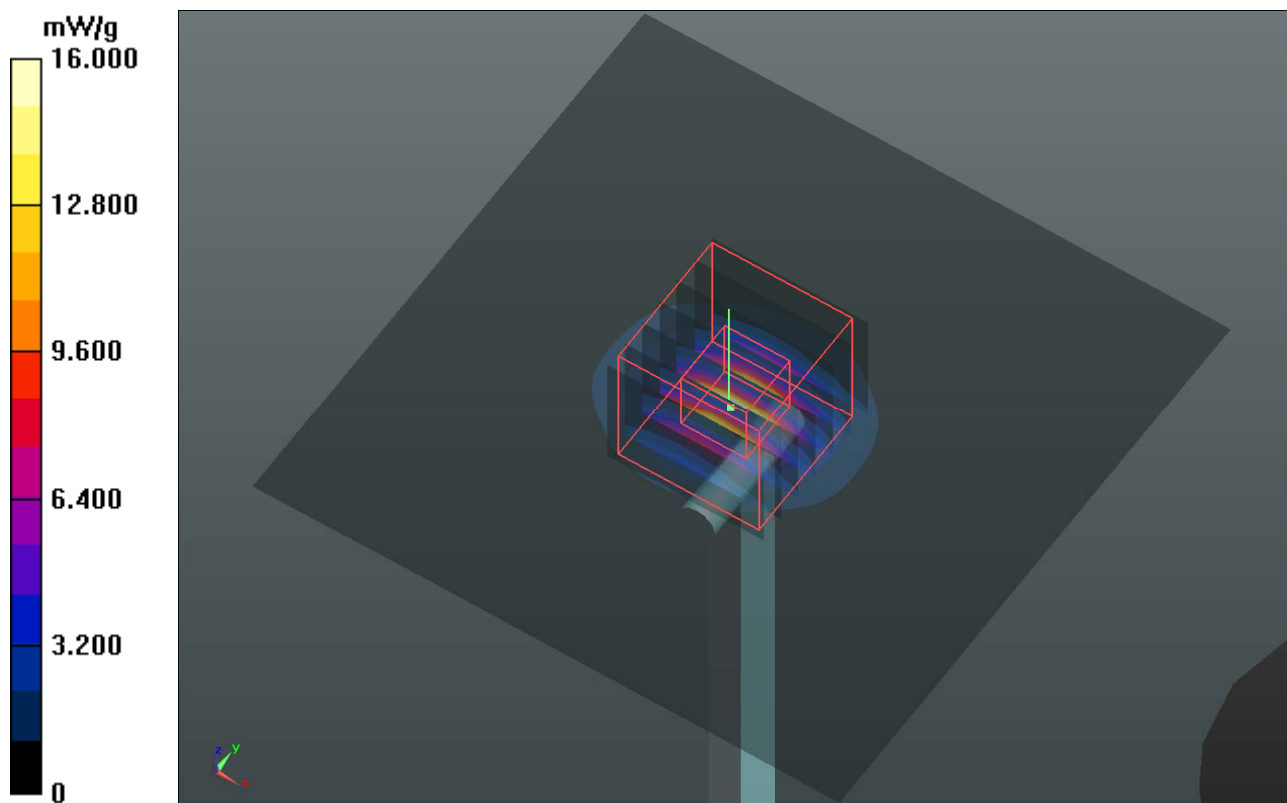
Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 58.876 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 30.835 mW/g

SAR(1 g) = 7.62 mW/g; SAR(10 g) = 2.04 mW/g

Maximum value of SAR (measured) = 16.0 mW/g



System Check_B5500_120926

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: B5G_0926 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.72$ mho/m; $\epsilon_r = 48.4$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.5 °C ; Liquid Temperature : 20.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.35, 4.35, 4.35); Calibrated: 2012/02/23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 16.1 mW/g

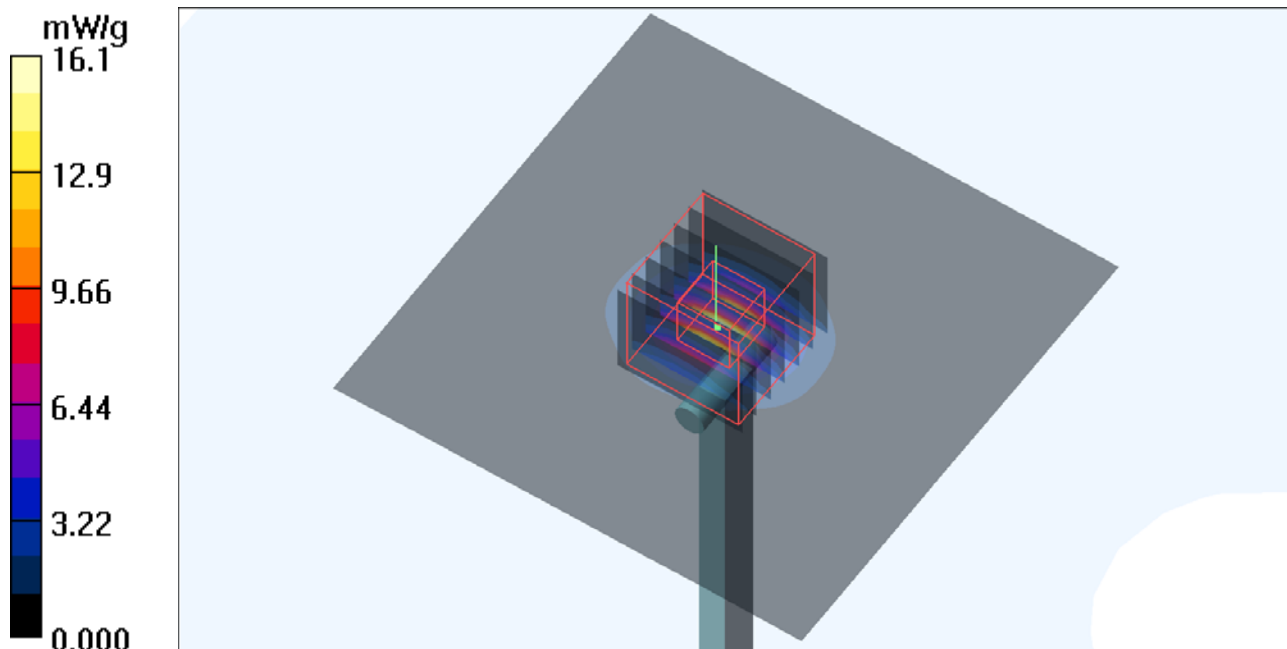
Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 58.1 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 31.2 W/kg

SAR(1 g) = 7.7 mW/g; SAR(10 g) = 2.06 mW/g

Maximum value of SAR (measured) = 16.2 mW/g



System Check_B5800_120803

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: B5G_0803 Medium parameters used: $f = 5800$ MHz; $\sigma = 6.123$ mho/m; $\epsilon_r = 47.668$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.8 °C ; Liquid Temperature : 20.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.54, 4.54, 4.54); Calibrated: 2012/02/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: TP:1653
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 15.1 mW/g

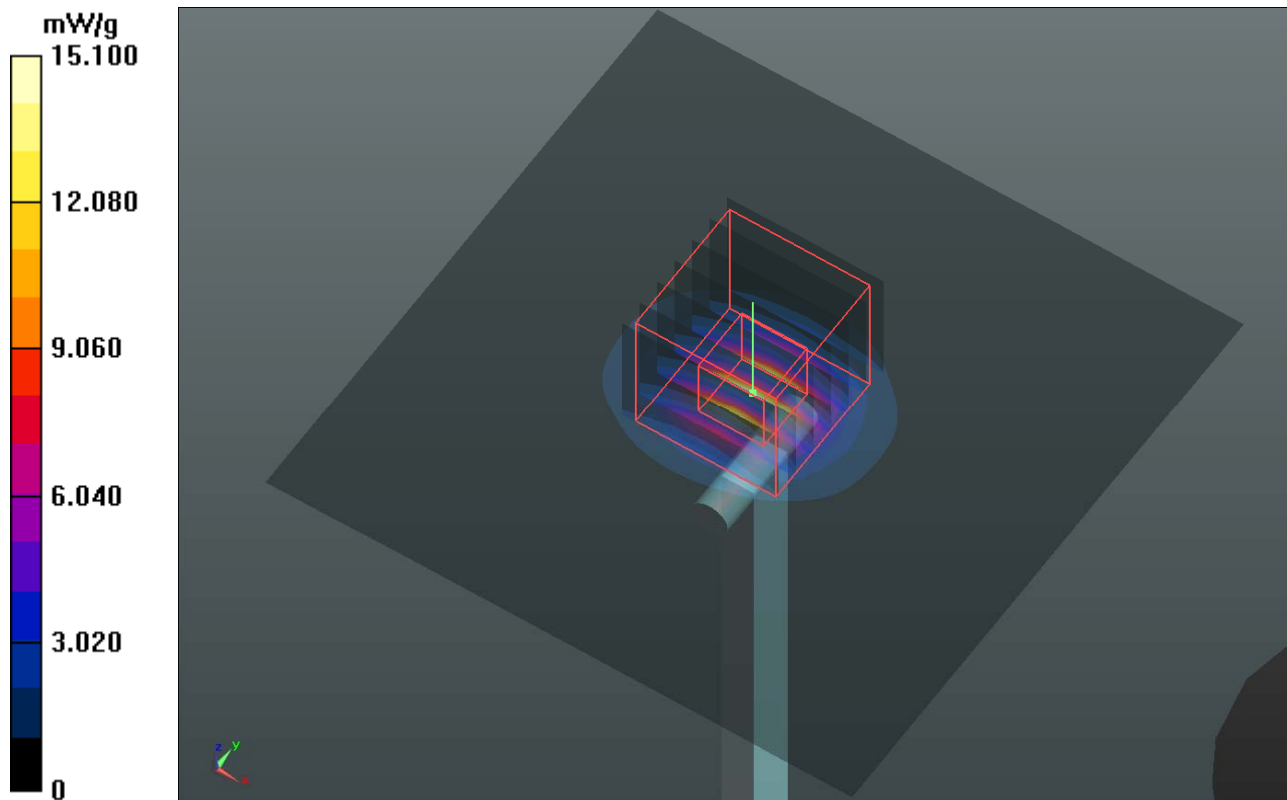
Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 54.983 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 31.502 mW/g

SAR(1 g) = 7.16 mW/g; SAR(10 g) = 1.97 mW/g

Maximum value of SAR (measured) = 15.6 mW/g



System Check_B5800_120926

DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1018

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: B5G_0926 Medium parameters used: $f = 5800$ MHz; $\sigma = 6.12$ mho/m; $\epsilon_r = 47.7$; $\rho = 1000$ kg/m³

Ambient Temperature : 21.5 °C ; Liquid Temperature : 20.6 °C

DASY4 Configuration:

- Probe: EX3DV4 - SN3590; ConvF(4.54, 4.54, 4.54); Calibrated: 2012/02/23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn579; Calibrated: 2012/04/27
- Phantom: SAM Phantom_Front; Type: SAM V4.0; Serial: TP 1654
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 14.6 mW/g

Pin=100mW/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 53.4 V/m; Power Drift = 0.084 dB

Peak SAR (extrapolated) = 30.6 W/kg

SAR(1 g) = 6.9 mW/g; SAR(10 g) = 1.92 mW/g

Maximum value of SAR (measured) = 15.4 mW/g

