



# SAR TEST REPORT

<b>Product Name</b>	HUAWEI MediaPad Youth 2
<b>Model Name</b>	S7-721g
<b>FCC ID</b>	QISS7-721G
<b>Client</b>	Huawei Technologies Co., Ltd.
<b>Manufacturer</b>	Huawei Technologies Co., Ltd.
<b>Date of issue</b>	March 26, 2014

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**GENERAL SUMMARY**

<b>Reference Standard(s)</b>	<p><b>FCC 47CFR §2.1093</b> Radiofrequency Radiation Exposure Evaluation: Portable Devices</p> <p><b>ANSI C95.1, 1992:</b> Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.(IEEE Std C95.1-1991)</p> <p><b>IEEE Std 1528™-2003:</b> IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.</p> <p><b>RSS-102 Issue 4 March 2010:</b> Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands).</p> <p><b>KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03:</b> SAR Measurement Requirements for 100 MHz to 6 GHz</p> <p><b>KDB 447498 D01 General RF Exposure Guidance v05r02:</b> Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies</p> <p><b>KDB 941225 D03 SAR Test Reduction GSM/GPRS/EDGE v01:</b> Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE</p> <p><b>KDB 616217 D04 SAR for laptop and tablets v01r01:</b> SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers</p>
<b>Conclusion</b>	<p>This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards for the tested bands only.</p> <p>General Judgment: <b>Pass</b></p>
<b>Comment</b>	<p>The test result only responds to the measured sample.</p>

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## 1. General Information

### 1.1. Notes of the Test Report

**TA Technology (Shanghai) Co., Ltd.** has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

**TA Technology (Shanghai) Co., Ltd.** guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

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If the electronic report is inconsistent with the printed one, it should be subject to the latter.

### 1.2. Testing Laboratory

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### 1.3. Applicant Information

Company: Huawei Technologies Co., Ltd.  
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### 1.4. Manufacturer Information

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### 1.5. Information of EUT

#### General Information

Device Type:	Portable Device		
Exposure Category:	Uncontrolled Environment / General Population		
IMEI:	004401721058069		
Hardware Version:	SH1S7721UM		
Software Version:	S7-721gV100R001C001		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Tested Mode(s):	GSM 850/ GSM 1900; Bluetooth; WiFi(802.11b/g/n HT20);		
Test Modulation:	(GSM)GMSK;(WiFi)BPSK		
Device Class:	B		
GPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
EGPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
Power Class:	GSM 850: 4		
	GSM 1900: 1		
Power Level:	GSM 850: tested with power level 5		
	GSM 1900: tested with power level 0		
Test Channel: (Low - Middle - High)	128 -190 - 251 512 - 661 - 810 0-39-78 1-6-11	(GSM 850) (GSM 1900) (Bluetooth) (802.11b/g/n HT20)	
Test Frequency Range(s):	Mode	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	Bluetooth	2402 ~ 2480	2402 ~ 2480
	WIFI	2412 ~ 2462	2412 ~ 2462

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Equipment Under Test (EUT) has a GSM antenna that is used for Tx/Rx, the second is BT/WIFI antenna that can be used for Tx/Rx.

S7-721g is a variant model of S7-722u. SAR values duplicated from S7-722u for S7-721g, the report number of S7-722u is RHA1403-0025SAR. The detailed product change description please refers to the ANNEX K.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

### 1.6. The Maximum Reported SAR<sub>1g</sub>

#### Body SAR Configuration

Mode	Test Position	Channel /Frequency(MHz)	Limit SAR <sub>1g</sub> 1.6 W/kg	
			Measured SAR <sub>1g</sub> (W/kg)	Reported SAR <sub>1g</sub> (W/kg)
2Txslots GPRS 850	Test Position 1	251/848.8	0.986	1.153
2Txslots GPRS 1900	Test Position 1	810/1909.8	1.180	1.492
WiFi(802.11b)	Test Position 1	6/2437	0.304	0.323

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**1.7. Maximum Conducted Power of Each Tested Mode**

<b>Mode</b>		<b>Maximum Burst Conducted Power (dBm)</b>	<b>Maximum Average Power (dBm)</b>
GSM 850	GPRS(GMSK), 2Txslots	31.11	25.09
	EGPRS(GMSK), 2Txslots	31.11	25.09
GSM 1900	GPRS(GMSK), 2Txslots	27.75	21.73
	EGPRS(GMSK), 2Txslots	27.75	21.73

<b>Mode</b>	<b>Maximum Conducted Power (dBm)</b>
WiFi(802.11b)	14.93

Note: The detail Power refers to Table 12 (Conducted Power Measurement Results).

**1.8. Test Date**

The test performed from March 10, 2014 to March 17, 2014.

## 2. SAR Measurements System Configuration

### 2.1. SAR Measurement Set-up

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

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

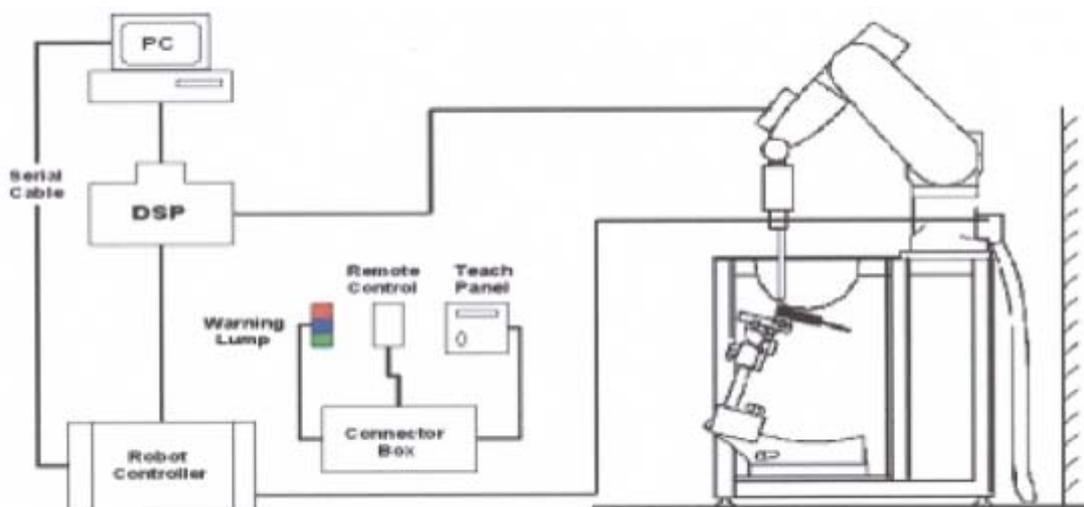


Figure 1. SAR Lab Test Measurement Set-up

## 2.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

### 2.2.1. EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to > 6 GHz Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)
Directivity	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 $\mu$ W/g to > 100 mW/g Linearity:  $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.



**Figure 2. EX3DV4 E-field Probe**



**Figure 3. EX3DV4 E-field probe**

### 2.2.2. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than  $\pm 10\%$ . The spherical isotropy was evaluated and found to be better than  $\pm 0.25\text{dB}$ . The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\text{SAR} = C \frac{\Delta T}{\Delta t}$$

Where:  $\Delta t$  = Exposure time (30 seconds),  
C = Heat capacity of tissue (brain or muscle),  
 $\Delta T$  = Temperature increase due to RF exposure.  
Or

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

Where:  
 $\sigma$  = Simulated tissue conductivity,  
 $\rho$  = Tissue density (kg/m<sup>3</sup>).

## 2.3. Other Test Equipment

### 2.3.1. Device Holder for Transmitters

**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. The extension is fully compatible with the Twin SAM, ELI4 and SAM v6.0 Phantoms.

**Material:** POM, Acrylic glass, Foam

### 2.3.2. Phantom

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

Shell Thickness	2±0.2 mm
Filling Volume	Approx. 30 liters
Dimensions	190×600×0 mm (H x L x W)



**Figure 4.ELI4 Phantom**

### 2.4. Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.
- The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

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- **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing is set according to FCC KDB Publication 865664. During scan the distance of the probe to the phantom remains unchanged.

After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- **Zoom Scan**

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

- **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum SAR distributions.

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. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

**Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01**

Frequency	Maximum Area Scan Resolution (mm) ( $\Delta x_{area}, \Delta y_{area}$ )	Maximum Zoom Scan Resolution (mm) ( $\Delta x_{zoom}, \Delta y_{zoom}$ )	Maximum Zoom Scan Spatial Resolution (mm) $\Delta z_{zoom}(n)$	Minimum Zoom Scan Volume (mm) (x,y,z)
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≥ 22

## 2.5. Data Storage and Evaluation

### 2.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DAE4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm<sup>2</sup>], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 2.5.2. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, a <sub>i0</sub> , a <sub>i1</sub> , a <sub>i2</sub>
	- Conversion factor	ConvF <sub>i</sub>
	- Diode compression point	Dcp <sub>i</sub>
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

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If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot c f / d c p_i$$

With  $V_i$  = compensated signal of channel i (i = x, y, z)

$U_i$  = input signal of channel i (i = x, y, z)

$cf$  = crest factor of exciting field (DASY parameter)

$dcp_i$  = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:  $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes:  $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$

With  $V_i$  = compensated signal of channel i (i = x, y, z)

$Norm_i$  = sensor sensitivity of channel i (i = x, y, z)  
[mV/(V/m)<sup>2</sup>] for E-field Probes

$ConvF$  = sensitivity enhancement in solution

$a_{ij}$  = sensor sensitivity factors for H-field probes

$f$  = carrier frequency [GHz]

$E_i$  = electric field strength of channel i in V/m

$H_i$  = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

with  $SAR$  = local specific absorption rate in mW/g

$E_{tot}$  = total field strength in V/m

$\sigma$  = conductivity in [mho/m] or [Siemens/m]

$\rho$  = equivalent tissue density in g/cm<sup>3</sup>

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with  $P_{pwe}$  = equivalent power density of a plane wave in mW/cm<sup>2</sup>

$E_{tot}$  = total electric field strength in V/m

$H_{tot}$  = total magnetic field strength in A/m

### 3. Laboratory Environment

**Table 2: The Requirements of the Ambient Conditions**

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards.	
Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

## 4. Tissue-equivalent Liquid

### 4.1. Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, salt, Glycol, Sugar, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. Table 3 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB 865664 D01.

**Table 3: Composition of the Body Tissue Equivalent Matter**

MIXTURE%	FREQUENCY(Body) 835MHz		
Water	52.5		
Sugar	45		
Salt	1.4		
Preventol	0.1		
Cellulose	1.0		
Dielectric Parameters Target Value	f=835MHz	$\epsilon=55.2$	$\sigma=0.97$

MIXTURE%	FREQUENCY (Body) 1900MHz		
Water	69.91		
Glycol monobutyl	29.96		
Salt	0.13		
Dielectric Parameters Target Value	f=1900MHz	$\epsilon=53.3$	$\sigma=1.52$

MIXTURE%	FREQUENCY(Body) 2450MHz		
Water	73.2		
Glycol	26.7		
Salt	0.1		
Dielectric Parameters Target Value	f=2450MHz	$\epsilon=52.70$	$\sigma=1.95$

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**4.2. Tissue-equivalent Liquid Properties**

**Table 4: Dielectric Performance of Tissue Simulating Liquid**

Frequency	Test Date	Temp °C	Measured Dielectric Parameters		Target Dielectric Parameters		Limit (Within ±5%)	
			$\epsilon_r$	$\sigma$ (s/m)	$\epsilon_r$	$\sigma$ (s/m)	Dev $\epsilon_r$ (%)	Dev $\sigma$ (%)
<b>835MHz (body)</b>	2014-3-10	21.5	55.9	0.98	55.2	0.97	1.27	1.03
<b>1900MHz (body)</b>	2014-3-14	21.5	52.6	1.51	53.3	1.52	-1.31	-0.66
<b>2450MHz (body)</b>	2014-3-17	21.5	52.1	1.99	52.7	1.95	-1.14	2.05

## 5. System Check

### 5.1. Description of System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 5.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system ( $\pm 10\%$ ).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.

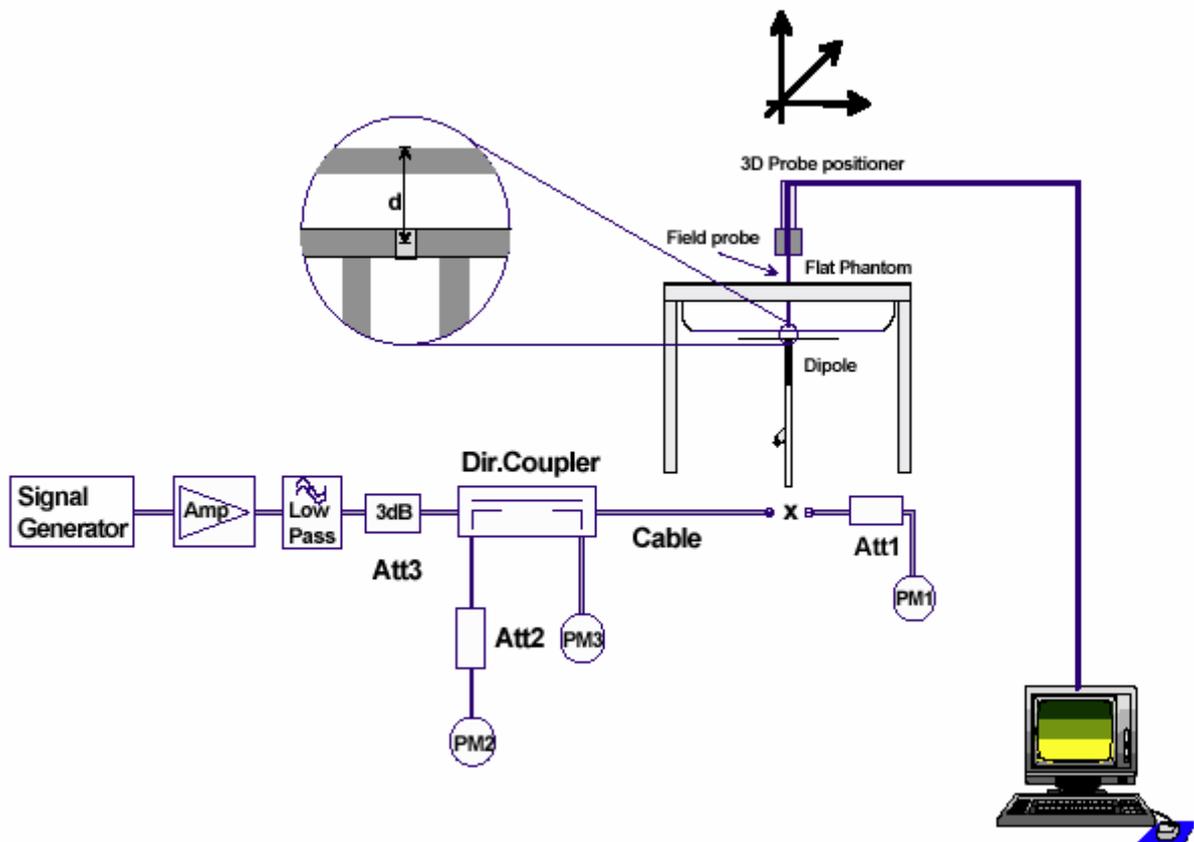


Figure 5. System Check Set-up

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## Justification for Extended SAR Dipole Calibrations

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (< - 20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB 865664 D01:

Dipole D835V2 SN: 4d020				
Body Liquid				
Date of Measurement	Return Loss(dB)	$\Delta$ %	Impedance ( $\Omega$ )	$\Delta\Omega$
8/26/2011	-25.1	/	48.7	/
8/25/2012	-24.3	3.2%	50.6	1.9 $\Omega$
8/24/2013	-24.7	1.6%	51.1	2.4 $\Omega$

Dipole D1900V2 SN: 5d060				
Body Liquid				
Date of Measurement	Return Loss(dB)	$\Delta$ %	Impedance ( $\Omega$ )	$\Delta\Omega$
8/31/2011	-21.3	/	47.3	/
8/30/2012	-20.9	1.9%	45.9	1.4 $\Omega$
8/29/2013	-20.4	4.4%	44.8	2.5 $\Omega$

Dipole D2450V2 SN: 786				
Body Liquid				
Date of Measurement	Return Loss(dB)	$\Delta$ %	Impedance ( $\Omega$ )	$\Delta\Omega$
8/29/2011	-29.0	/	50.4	/
8/28/2012	-29.9	3.1%	52.1	1.7 $\Omega$
8/27/2013	-28.2	2.8%	52.7	2.3 $\Omega$

## 5.2. System Check Results

**Table 5: System Check in Body Tissue Simulating Liquid**

Frequency	Test Date	Dielectric Parameters		Temp ( $^{\circ}$ C)	250mW Measured SAR <sub>1g</sub>	1W Normalized SAR <sub>1g</sub>	1W Target SAR <sub>1g</sub>	Limit ( $\pm$ 10% Deviation)
		$\epsilon_r$	$\sigma$ (s/m)					
<b>835MHz</b>	2014-3-10	55.9	0.98	21.5	2.52	10.08	9.46	6.55%
<b>1900MHz</b>	2014-3-14	52.6	1.51	21.5	9.82	39.28	41.7	-5.80%
<b>2450MHz</b>	2014-3-17	52.1	1.99	21.5	13.20	52.80	51.7	2.13%

Note: 1. The graph results see ANNEX B.  
2. Target Values used derive from the calibration certificate

## 6. Operational Conditions during Test

### 6.1. General Description of Test Procedures

Connection to the EUT is established via air interface with E5515C, and the EUT is set to maximum output power by E5515C. Using E5515C the power level is set to “5” in SAR of GSM 850, set to “0” in SAR of GSM 1900, power control is set “All Up Bits” of UMTS. The antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30 dB.

### 6.2. Test Configuration

#### 6.2.1. GSM Test Configuration

For the body SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate at maximum transmitting power. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. Since the EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

GSM 850

GPRS (GMSK) :

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2
3	4
4	6

EGPRS(8PSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2
	4
	6

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EGPRS(GMSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2
3	4
4	6

GSM 1900

GPRS (GMSK) :

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2
3	4
4	6

EGPRS(8PSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2
	4
	6

EGPRS(GMSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2
3	4
4	6

### **6.2.2. WIFI Test Configuration**

For WLAN SAR testing, WLAN engineering testing software installed on the DUT can provide continuous transmitting RF signal. The Tx power is set to 8 for 802.11 b mode by software, This RF signal utilized in SAR measurement has almost 100% duty cycle and its crest factor is 1.

For the 802.11b/g/n SAR tests, a communication link is set up with the test mode software for WIFI mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. Testing at higher data rates is not required when the maximum average output power is less than 0.25dB higher than those measured at the lowest data rate.

802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g/n modes are tested on the maximum average output channel;

SAR is not required for 802.11g/n channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

### **6.3. Measurement Variability**

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

- 1) When the original highest measured SAR is  $\geq 0.80$  W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was  $> 1.20$  or when the original or repeated measurement was  $\geq 1.45$  W/kg (~ 10% from the 1-g SAR limit).
- 3) A third repeated measurement was performed only if the original, first or second repeated measurement was  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .
- 4) Repeated measurements are not required when the original highest measured SAR is  $< 0.80$  W/kg

## 6.4. Test Positions

### 6.4.1. Test Positions Requirements

The overall diagonal dimension of the display section of a tablet is 22 cm > 20 cm, Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. SAR evaluation for the front surface of tablet display screens are generally not necessary. The SAR Exclusion Threshold in KDB 447498 D01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

### 6.4.2. SAR test reduction and exclusion guidance

(1) The SAR exclusion threshold for distances <50mm is defined by the following equation:

$$\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} * \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

(2) The SAR exclusion threshold for distances >50mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

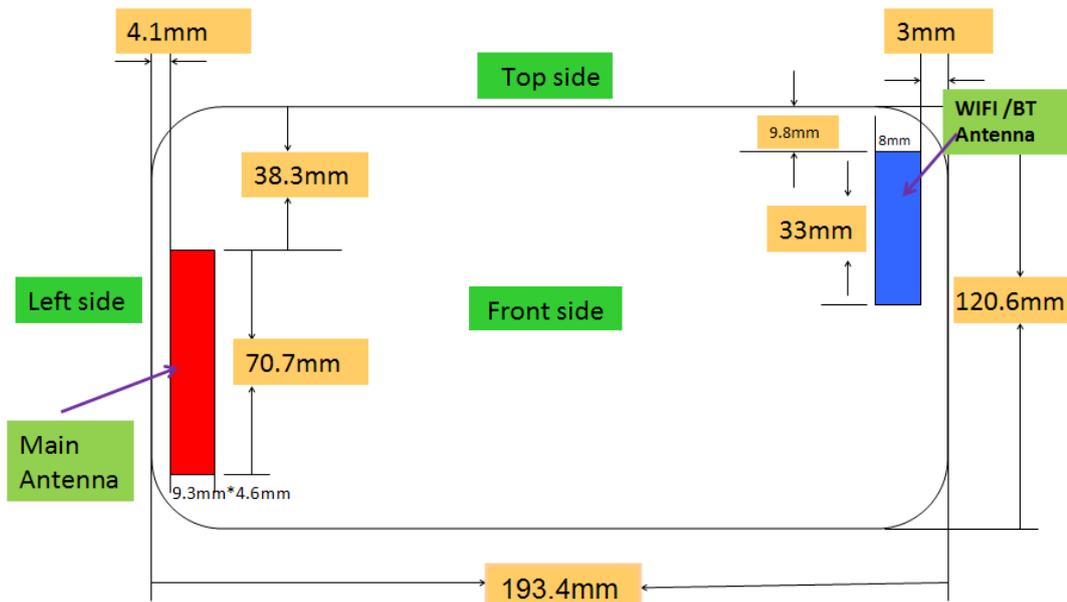
a) at 100 MHz to 1500 MHz

$$[\text{Power allowed at numeric Threshold at 50 mm in step 1}] + (\text{test separation distance} - 50 \text{ mm}) \cdot (f_{\text{(MHz)}}/150) \text{ mW}$$

b) at > 1500 MHz and ≤ 6 GHz

$$[\text{Power allowed at numeric Threshold at 50 mm in step 1}] + (\text{test separation distance} - 50 \text{ mm}) \cdot 10 \text{ mW}$$

The location of the antennas inside EUT is shown in ANNEX J:



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- Test Position 1: The back surface of the EUT towards to the bottom of the flat phantom. (ANNEX J).  
SAR is required for GSM/ WiFi antenna in this position.  
SAR is not required for BT antenna in this position.  
Test Position 1 Evaluation  $_{(GSM\ 850)} = [10^{((31.5-6.02)/10)}/5] * (0.8488^{1/2}) = 65.1 > 3.0$   
Test Position 1 Evaluation  $_{(GSM\ 1900)} = [10^{((28.5-6.02)/10)}/5] * (1.9098^{1/2}) = 48.9 > 3.0$   
Test Position 1 Evaluation  $_{(WiFi)} = [10^{(15/10)}/5] * (2.462^{1/2}) = 9.9 > 3.0$   
Test Position 1 Evaluation  $_{(BT)} = [10^{(0/10)}/5] * (2.480^{1/2}) = 0.31 < 3.0$
- Test Position 2: The left edge of the EUT towards the bottom of the flat phantom. (ANNEX J).  
SAR is required for GSM/ antenna in this position.  
SAR is not required for BT/WIFI antenna in this position.  
Test Position 2 Evaluation  $_{(GSM\ 850)} = [10^{((31.5-6.02)/10)}/5] * (0.8488^{1/2}) = 65.1 > 3.0$   
Test Position 2 Evaluation  $_{(GSM\ 1900)} = [10^{((28.5-6.02)/10)}/5] * (1.9098^{1/2}) = 48.9 > 3.0$   
Test Position 2 Evaluation  $_{(WiFi)} = 96 + (182.4-50)*10 = 1420mW = 31.52\ dBm > 15\ dBm\ (max.power)$   
Test Position 2 Evaluation  $_{(BT)} = 96 + (182.4-50)*10 = 1420mW = 31.52\ dBm > 0\ dBm\ (max.power)$
- Test Position 3: The right edge of the EUT towards the bottom of the flat phantom. (ANNEX J).  
SAR is required for WIFI antenna in this position.  
SAR is not required for BT/GSM antenna in this position.  
Test Position 3 evaluation  $_{(GSM\ 850)} = 164 + (180-50)*(848.8/150) = 899.6mW = 29.54\ dBm > (31.5-6.02)\ dBm = 25.48\ dBm\ (max.power)$   
Test Position 3 evaluation  $_{(GSM\ 1900)} = 109 + (180-50)*10 = 1409mW = 31.5\ dBm > (28.5-6.02)\ dBm = 22.48(max.power)$   
Test Position 3 evaluation  $_{(WiFi)} = [10^{(15/10)}/5] * (2.462^{1/2}) = 9.9 > 3.0$   
Test Position 3 evaluation  $_{(BT)} = [10^{(0/10)}/5] * (2.480^{1/2}) = 0.31 < 3.0$
- Test Position 4: The top edge of the EUT towards the bottom of the flat phantom. (ANNEX J).  
SAR is required for WIFI/GSM/ antenna in this position.  
SAR is not required for BT antenna in this position.  
Test Position 4 Evaluation  $_{(GSM\ 850)} = [10^{((31.5-6.02)/10)}/38.3] * (0.8488^{1/2}) = 8.5 > 3.0$   
Test Position 4 Evaluation  $_{(GSM\ 1900)} = [10^{((28.5-6.02)/10)}/38.3] * (1.9098^{1/2}) = 6.4 > 3.0$   
Test Position 4 Evaluation  $_{(WiFi)} = [10^{(15/10)}/9.8] * (2.462^{1/2}) = 5.06 > 3.0$   
Test Position 4 Evaluation  $_{(BT)} = [10^{(0/10)}/9.8] * (2.480^{1/2}) = 0.16 < 3.0$
- Test Position 5: The bottom edge of the EUT towards the bottom of the flat phantom. . (ANNEX J).  
SAR is required for GSM antenna in this position.  
SAR is not required for BT/WIFI antenna in this position.  
Test Position 5 Evaluation  $_{(GSM\ 850)} = [10^{((31.5-6.02)/10)}/5] * (0.8488^{1/2}) = 65.1 > 3.0$   
Test Position 5 Evaluation  $_{(GSM\ 1900)} = [10^{((28.5-6.02)/10)}/5] * (1.9098^{1/2}) = 48.9 > 3.0$   
Test Position 5 Evaluation  $_{(WiFi)} = 96 + (77.8-50)*10 = 374mW = 25.73\ dBm > 15\ dBm\ (max.power)$   
Test Position 5 Evaluation  $_{(BT)} = 96 + (77.8-50)*10 = 374mW = 25.73\ dBm > 0\ dBm\ (max.power)$

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**7. Test Results**

**7.1. Conducted Power Results**

**Table 6: Conducted Power Measurement Results**

GSM 850		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel 128	Channel 190	Channel 251		Channel 128	Channel 190	Channel 251
GSM		33.19	33.25	33.21	-9.03dB	24.16	24.22	24.18
GPRS (GMSK)	1Txslot	33.05	33.16	33.11	-9.03dB	24.02	24.13	24.08
	2Txslots	31.11	30.92	30.82	-6.02dB	<b>25.09</b>	<b>24.90</b>	<b>24.80</b>
	3Txslots	28.86	28.71	28.48	-4.26dB	24.60	24.45	24.22
	4Txslots	26.79	26.62	26.51	-3.01dB	23.78	23.61	23.50
EGPRS (GMSK)	1Txslot	33.05	33.16	33.11	-9.03dB	24.02	24.13	24.08
	2Txslots	31.11	30.92	30.82	-6.02dB	<b>25.09</b>	<b>24.90</b>	<b>24.80</b>
	3Txslots	28.86	28.71	28.48	-4.26dB	24.60	24.45	24.22
	4Txslots	26.79	26.62	26.51	-3.01dB	23.78	23.61	23.50
EGPRS (8PSK)	1Txslot	27.17	27.19	27.30	-9.03dB	18.14	18.16	18.27
	2Txslots	24.49	24.45	24.05	-6.02dB	<b>18.47</b>	<b>18.43</b>	<b>18.03</b>
	3Txslots	22.52	22.44	22.09	-4.26dB	18.26	18.18	17.83
	4Txslots	20.88	20.83	20.85	-3.01dB	17.87	17.82	17.84
GSM 1900		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel 512	Channel 661	Channel 810		Channel 512	Channel 661	Channel 810
GSM		30.42	30.47	30.30	-9.03dB	21.39	21.44	21.27
GPRS (GMSK)	1Txslot	30.05	30.08	29.96	-9.03dB	21.02	21.05	20.93
	2Txslots	27.75	27.67	27.48	-6.02dB	<b>21.73</b>	<b>21.65</b>	<b>21.46</b>
	3Txslots	25.47	25.25	24.96	-4.26dB	21.21	20.99	20.70
	4Txslots	23.39	23.14	22.87	-3.01dB	20.38	20.13	19.86
EGPRS (GMSK)	1Txslot	30.05	30.08	29.96	-9.03dB	21.02	21.05	20.93
	2Txslots	27.75	27.67	27.48	-6.02dB	<b>21.73</b>	<b>21.65</b>	<b>21.46</b>
	3Txslots	25.47	25.25	24.96	-4.26dB	21.21	20.99	20.70
	4Txslots	23.39	23.14	22.87	-3.01dB	20.38	20.13	19.86
EGPRS (8PSK)	1Txslot	25.35	25.28	25.29	-9.03dB	16.32	16.25	16.26
	2Txslots	23.22	23.17	23.11	-6.02dB	<b>17.20</b>	<b>17.15</b>	<b>17.09</b>
	3Txslots	21.20	21.20	21.24	-4.26dB	16.94	16.94	16.98
	4Txslots	19.15	19.14	19.12	-3.01dB	16.14	16.13	16.11

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Note:

1) Division Factors

To average the power, the division factor is as follows:

- 1Txslot = 1 transmit time slot out of 8 time slots  
=> conducted power divided by (8/1) => -9.03 dB
- 2Txslots = 2 transmit time slots out of 8 time slots  
=> conducted power divided by (8/2) => -6.02 dB
- 3Txslots = 3 transmit time slots out of 8 time slots  
=> conducted power divided by (8/3) => -4.26 dB
- 4Txslots = 4 transmit time slots out of 8 time slots  
=> conducted power divided by (8/4) => -3.01 dB

2) Average power numbers

The maximum power numbers are marks in bold.

The average output power of BT antenna is as following:

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz
GFSK(dBm)	-2.91	-1.99	-2.48

The average output power of WIFI antenna is as following:

WIFI Antenna

WIFI Mode	Channel	Data rate (Mbps)	AV Power (dBm)
11b	1	1	14.72
		2	14.68
		5.5	14.59
		11	14.45
	6	1	14.74
		2	14.62
		5.5	14.55
		11	14.49
	11	1	14.73
		2	14.52
		5.5	14.93
		11	14.84
11g	1	6	13.05
		9	12.75
		12	12.35
		18	11.97

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		24	11.68
		36	11.16
		48	10.59
		54	10.41
	6	6	13.04
		9	13.78
		12	13.41
		18	12.95
		24	12.47
		36	12.01
		48	11.48
		54	11.36
	11	6	13.33
		9	13.35
		12	13.04
		18	13.62
		24	13.04
		36	12.64
48		12.05	
54		11.96	
11n HT20	1	MCS0	12.23
		MCS1	11.64
		MCS2	11.39
		MCS3	10.81
		MCS4	10.39
		MCS5	10.02
		MCS6	10.68
	6	MCS7	10.35
		MCS0	12.17
		MCS1	12.47
		MCS2	12.26
		MCS3	11.71
		MCS4	11.01
		MCS5	10.69
MCS6	10.31		

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		MCS7	10.12
	11	MCS0	11.75
		MCS1	12.15
		MCS2	12.61
		MCS3	12.03
		MCS4	11.67
		MCS5	11.28
		MCS6	10.97
		MCS7	10.82

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### 7.2. SAR Test Results

#### 7.2.1. GSM 850 (GPRS/EGPRS)

**Table 7: SAR Values [GSM 850 (GPRS/EGPRS), Original]**

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR <sub>1g</sub> 1.6 W/kg			
						Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	Graph Results
Test Position 1	251/848.8	2Txslots	1:4.14	31.5	30.82	0.027	0.917	1.17	1.072	Figure 9
	190/836.6	2Txslots	1:4.14	31.5	30.92	-0.020	0.838	1.14	0.958	Figure 10
	128/824.2	2Txslots	1:4.14	31.5	31.11	0.070	0.770	1.09	0.842	Figure 11
Test Position 2	190/836.6	2Txslots	1:4.14	31.5	30.92	0.020	0.469	1.14	0.536	Figure12
Test Position 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Test Position 4	190/836.6	2Txslots	1:4.14	31.5	30.92	0.110	0.082	1.14	0.094	Figure13
Test Position 5	190/836.6	2Txslots	1:4.14	31.5	30.92	0.020	0.120	1.14	0.137	Figure14
<b>Worst Case Position of Body (1<sup>st</sup> Repeated SAR, Distance 0mm)</b>										
Test Position 1	251/848.8	2Txslots	1:4.14	31.5	30.82	-0.058	0.888	1.17	1.039	Figure15

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

3. When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

4. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

5. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

**Table 8: SAR Measurement Variability Results [GSM 850 (GPRS/EGPRS), Original]**

Test Position	Timeslots	Channel/ Frequency (MHz)	Measured SAR (1g)	1 <sup>st</sup> Repeated SAR (1g)	Ratio	2 <sup>nd</sup> Repeated SAR (1g)	3 <sup>rd</sup> Repeated SAR (1g)
Test Position 1	2Txslots	251/848.8	0.917	0.888	1.03	NA	NA

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

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**Table 9: SAR Values [GSM 850 (GPRS), Variant]**

Test Position	Channel/Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR <sub>1g</sub> 1.6 W/kg			
						Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	Graph Results
Test Position 1	251/848.8	2Txslots	1:4.14	31.5	30.82	0.033	0.977	1.17	1.143	Figure 26
<b>Worst Case Position of Body (1<sup>st</sup> Repeated SAR, Distance 0mm)</b>										
Test Position 1	251/848.8	2Txslots	1:4.14	31.5	30.82	0.03	0.986	1.17	1.153	Figure 27

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3. When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.
4. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.
5. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

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### 7.2.2. GSM 1900 (GPRS/EGPRS)

**Table 10: SAR Values [GSM 1900 (GPRS/EGPRS), Original]**

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR <sub>1g</sub> 1.6 W/kg			
						Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	Graph Results
Test Position 1	810/1909.8	2Txslots	1:4.14	28.5	27.48	-0.140	1.180	1.26	1.492	Figure16
	661/1880	2Txslots	1:4.14	28.5	27.67	0.055	0.995	1.21	1.205	Figure17
	512/1850	2Txslots	1:4.14	28.5	27.75	0.062	0.730	1.19	0.868	Figure18
Test Position 2	661/1880	2Txslots	1:4.14	28.5	27.67	0.028	0.483	1.21	0.585	Figure19
Test Position 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Test Position 4	661/1880	2Txslots	1:4.14	28.5	27.67	0.040	0.011	1.21	0.013	Figure20
Test Position 5	661/1880	2Txslots	1:4.14	28.5	27.67	0.030	0.195	1.21	0.236	Figure21
<b>Worst Case Position of Body (1<sup>st</sup> Repeated SAR, Distance 0mm)</b>										
Test Position 1	810/1909.8	2Txslots	1:4.14	28.5	27.48	0.043	1.140	1.26	1.442	Figure 22

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3. When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.
4. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.
5. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

**Table 11: SAR Measurement Variability Results [GSM 1900 (GPRS/EGPRS), Original]**

Test Position	Timeslots	Channel/ Frequency (MHz)	Measured SAR (1g)	1 <sup>st</sup> Repeated SAR (1g)	Ratio	2 <sup>nd</sup> Repeated SAR (1g)	3 <sup>rd</sup> Repeated SAR (1g)
Test Position 1	2Txslots	810/1909.8	1.18	1.14	1.04	NA	NA

- Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
- 3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
- 4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

# TA Technology (Shanghai) Co., Ltd.

## Test Report

**Table 12: SAR Values [GSM 1900 (GPRS/EGPRS), Variant]**

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit SAR <sub>1g</sub> 1.6 W/kg			
						Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	Graph Results
Test Position 1	810/1909.8	2Txslots	1:4.14	28.5	27.48	0.068	1.16	1.26	1.467	Figure 28
<b>Worst Case Position of Body (1<sup>st</sup> Repeated SAR, Distance 0mm)</b>										
Test Position 1	810/1909.8	2Txslots	1:4.14	28.5	27.48	0.120	1.14	1.26	1.442	Figure 29

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

3. When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

4. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

5. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### 7.2.3. WIFI (802.11b, WIFI)

**Table 13: SAR Values (802.11b) , Original**

Test Position	Channel/ Frequency (MHz)	Mode	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit of SAR 1.6 W/kg			
						Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	Graph Results
Test Position 1	6/2437	DSSS	1:1	15	14.74	0.041	0.304	1.06	0.323	Figure 23
Test Position 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Test Position 3	6/2437	DSSS	1:1	15	14.74	0.100	0.114	1.06	0.121	Figure 24
Test Position 4	6/2437	DSSS	1:1	15	14.74	0.095	0.086	1.06	0.091	Figure 25
Test Position 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3. KDB 248227-SAR is not required for 802.11g/n channels when the maximum average output power is less than ¼ dB higher than measured on the corresponding 802.11b channels.
4. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

**Table 14: SAR Values (802.11b), Variant**

Test Position	Channel/ Frequency (MHz)	Mode	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ± 0.21dB	Limit of SAR 1.6 W/kg			
						Drift (dB)	Measured SAR <sub>1g</sub> (W/kg)	Scaling Factor	Reported SAR <sub>1g</sub> (W/kg)	Graph Results
Test Position 1	6/2437	DSSS	1:1	15	14.74	0.044	0.302	1.06	0.321	Figure 30

Note: 1. The value with blue color is the maximum SAR Value of each test band.

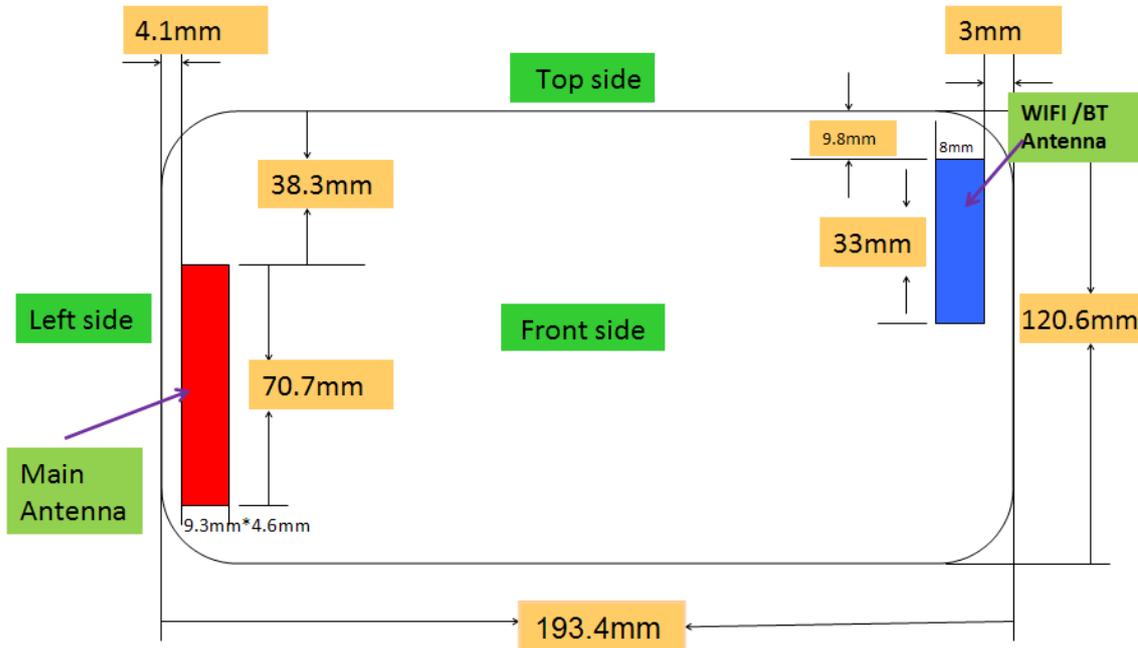
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3. WLAN antenna is located at top edge, near to left edge ; antenna-to- Bottom/Right edge distance is more than 2.5 cm (see ANNEX J). Based upon KDB941225 D06, when the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
4. KDB 248227-SAR is not required for 802.11g/n channels when the maximum average output power is less than ¼ dB higher than measured on the corresponding 802.11b channels.
5. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

**7.3. Simultaneous Transmission Conditions**

Air-Interface	Band (MHz)	Type	Simultaneous Transmissions	Voice Over Digital Transport (Data)
GSM	850	VO	Yes WIFI or BT	NA
	1900	VO	Yes WIFI or BT	NA
	GPRS /EGPRS	DT	Yes WIFI or BT	NA
WIFI	2450	DT	Yes GSM,GPRS,EGPRS,	Yes
Bluetooth (BT)	2400	DT	Yes GSM,GPRS,EGPRS,	NA
Note: VO Voice Service only DT Digital Transport				

The location of the antennas inside EUT is shown in ANNEX J:



**Estimated SAR**

(1) for test separation distances ≤ 50 mm

When standalone SAR is not required to be measured per FCC KDB 447498 D01, the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter for test separation distances ≤ 50 mm.

$$\text{Estimated SAR} = \frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} * \frac{\sqrt{f \text{ (GHz)}}}{7.5}$$

(2) for test separation distances >50 mm

**0.4 W/kg for 1-g SAR**

Body Estimated SAR<sub>Max. BT. Test Position 1</sub> =  $[10^{(0/10)}/5] * (2.48^{0.5}/7.5) = 0.042\text{W/kg}$

Body Estimated SAR<sub>Max. BT. Test Position 2</sub> ≤ 0.4W/kg

Body Estimated SAR<sub>Max. BT. Test Position 3</sub> =  $[10^{(0/10)}/5] * (2.48^{0.5}/7.5) = 0.042\text{W/kg}$

Body Estimated SAR<sub>Max. BT. Test Position 4</sub> =  $[10^{(0/10)}/9.8] * (2.48^{0.5}/7.5) = 0.021\text{W/kg}$

Body Estimated SAR<sub>Max. BT. Test Position 5</sub> ≤ 0.4W/kg

Per FCC KDB 447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio} = \frac{(\text{SAR}_1 + \text{SAR}_2)^{1.5}}{(\text{min. test separation distance, mm})} < 0.04$$

# TA Technology (Shanghai) Co., Ltd. Test Report

### GSM/UMTS&WIFI Mode

Reported SAR <sub>1g</sub> (W/kg)	GSM 850	GSM 1900	WIFI	MAX. Σ SAR <sub>1g</sub>
Test Position 1	1.153	<b>1.492</b>	<b>0.323</b>	<b>1.815</b>
Test Position 2	0.536	<b>0.585</b>	<b>0.4</b>	0.985
Test Position 3	0.4	<b>0.4</b>	<b>0.121</b>	0.521
Test Position 4	<b>0.094</b>	0.013	<b>0.091</b>	0.185
Test Position 5	0.137	<b>0.236</b>	<b>0.4</b>	0.636
Note: 1.The value with blue color is the maximum ΣSAR <sub>1g</sub> Value. 2. MAX. ΣSAR <sub>1g</sub> = Reported SAR <sub>Max.WIFI</sub> + Reported SAR <sub>Max.UMTS</sub>				

MAX. ΣSAR<sub>1g</sub> = 1.815W/kg > 1.6 W/kg, so the SAR to peak location separation ratio should be considered

Reported SAR <sub>1g</sub> (W/kg)	GSM 850	GSM 1900	WIFI	MAX. Σ SAR <sub>1g</sub>
Test Position 1	1.153	/	0.323	1.476
	/	1.492	0.323	<b>1.815</b>
Note: 1.The value with red color is the SAR <sub>1g</sub> >1.6 W/kg. 2. when the MAX. Σ SAR <sub>1g</sub> potio>1.6 W/kg in a position, simultaneous transmission conditions of other bands also need consideration in this position.				

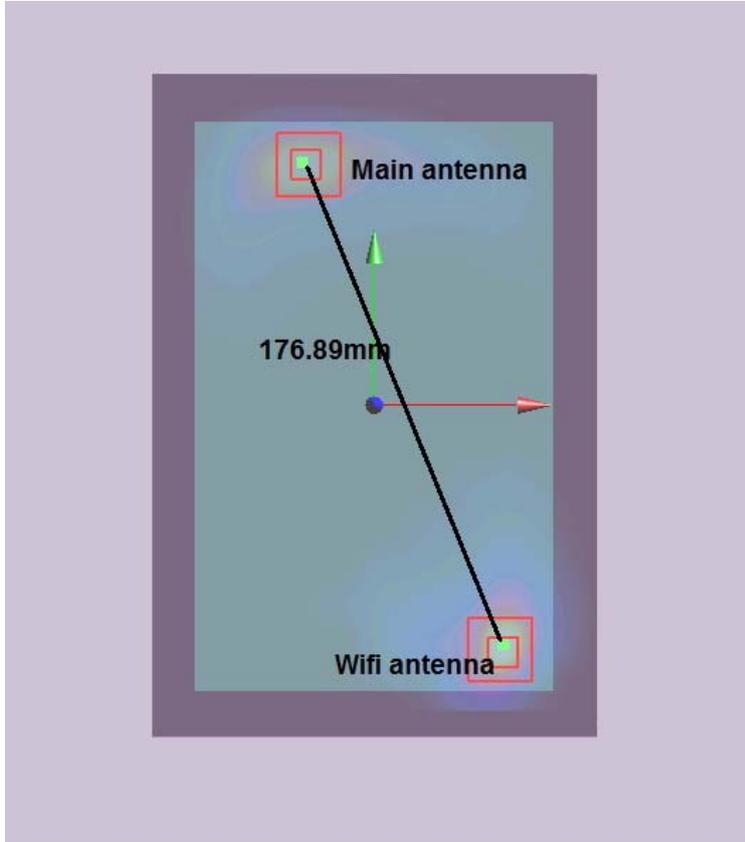
# TA Technology (Shanghai) Co., Ltd. Test Report

( $SAR_{Max}=1.815W/kg$ )

The position SARGSM 1900is ( $x1= -24, y1= 82.5, z1=-178.7$ ),

The position SARMax.WIFIis ( $x2= 43.5, y2=-81, z2=-178.7$ )

so the distance between the $SAR_{Max.GSM 1900}$ and $SAR_{Max.WIFI}$ is $176.89mm$ .



Ratio= $[(\text{Reported } SAR_{Max.GSM}) 1.492W/kg+(\text{Reported } SAR_{Max.WIFI}) 0.323W/kg]^{3/2}/\text{Peak SAR Location Separation}$   
 $=1.815^{3/2}/176.89 = 0.01 < 0.04$

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### GSM&BT Mode

Reported SAR <sub>1g</sub> (W/kg)	GSM 850	GSM 1900	BT	MAX. Σ SAR <sub>1g</sub>
Test Position 1	1.072	<b>1.492</b>	<b>0.042</b>	1.534
Test Position 2	0.536	<b>0.585</b>	<b>0.400</b>	0.985
Test Position 3	0.4	<b>0.4</b>	<b>0.042</b>	0.442
Test Position 4	<b>0.094</b>	0.013	<b>0.021</b>	0.115
Test Position 5	0.137	<b>0.236</b>	<b>0.400</b>	0.636
Note: 1.The value with blue color is the maximum ΣSAR <sub>1g</sub> Value. 2. MAX. ΣSAR <sub>1g</sub> = Reported SAR <sub>Max.WIFI</sub> + Reported SAR <sub>Max.UMTS</sub>				

MAX. ΣSAR<sub>1g</sub> = 1.534W/kg < 1.6 W/kg, So the Simultaneous SAR are not required for BT and GSM/UMTS antenna.

WIFI antenna and BT antenna cannot transmit simultaneously.

## **8. Measurement Uncertainty**

The measured SAR were  $<1.5$  W/kg for all frequency bands, therefore per KDB Publication 865664 D01v01r03, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2003 is not required in SAR reports

**\*\*\*END OF REPORT \*\*\***

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

**9. Main Test Instruments**

**Table 15: List of Main Instruments**

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 10, 2013	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 9, 2014	One year
04	Power sensor	Agilent N8481H	MY50350004	September 23, 2013	One year
05	Power sensor	E9327A	US40441622	January 1, 2014	One year
06	Signal Generator	HP 8341B	2730A00804	September 9, 2013	One year
07	Dual directional coupler	778D-012	50519	March 25, 2013	One year
08	Dual directional coupler	777D	50146	March 25, 2013	One year
09	Amplifier	IXA-020	0401	No Calibration Requested	
10	BTS	E5515C	MY48360988	November 26, 2013	One year
11	E-field Probe	EX3DV4	3677	November 28, 2013	One year
12	DAE	DAE4	1317	January 16, 2014	One year
13	Validation Kit 835MHz	D835V2	4d020	August 26, 2011	Three years
14	Validation Kit 1900MHz	D1900V2	5d060	August 31, 2011	Three years
15	Validation Kit 2450MHz	D2450V2	786	August 29, 2011	Three years
16	Temperature Probe	JM222	AA1009129	March 9, 2014	One year
17	Hygrothermograph	WS-1	64591	September 26, 2013	One year

\*\*\*END OF REPORT \*\*\*

## ANNEX A: Test Layout



Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the Flat Phantom (835 MHz, 15.4cm depth)



Picture 3: Liquid depth in the Flat Phantom (1900 MHz, 15.1cm depth)



Picture 4: Liquid depth in the Flat Phantom (2450 MHz, 15.3cm depth)

## ANNEX B: System Check Results

### System Performance Check at 835 MHz

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020

Date/Time: 3/10/2014 10:45:37 PM

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 55.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Sensor-Surface: 4mm (Mechanical Surface Detection)

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

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

**d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 50.9 V/m; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 3.63 W/kg

**SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.65 mW/g**

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

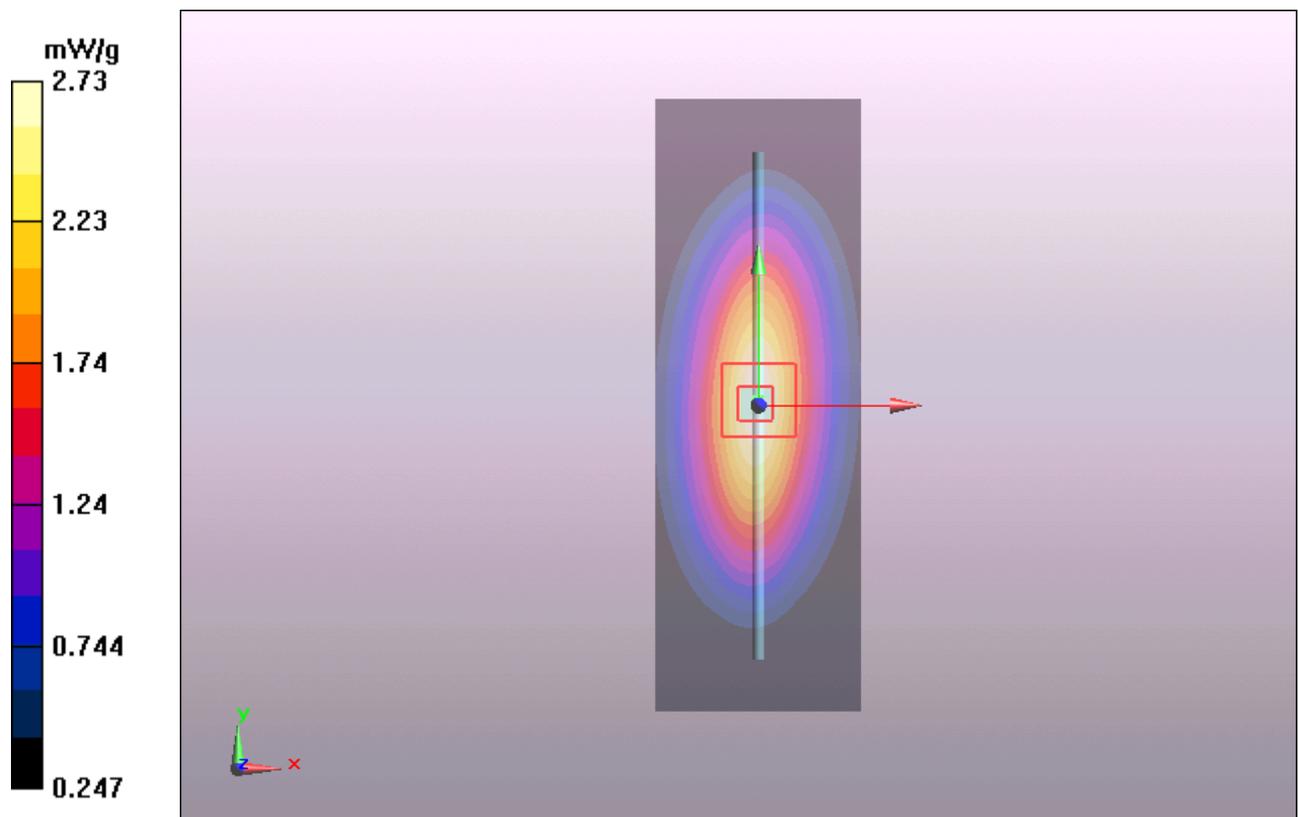


Figure 6 System Performance Check 835MHz 250mW

### System Performance Check at 1900 MHz

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060**

Date/Time: 3/14/2014 10:51:01 AM

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.9 mW/g

**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 80.8 V/m; Power Drift = -0.063 dB

Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 9.82 mW/g; SAR(10 g) = 5.2 mW/g**

Maximum value of SAR (measured) = 11 mW/g

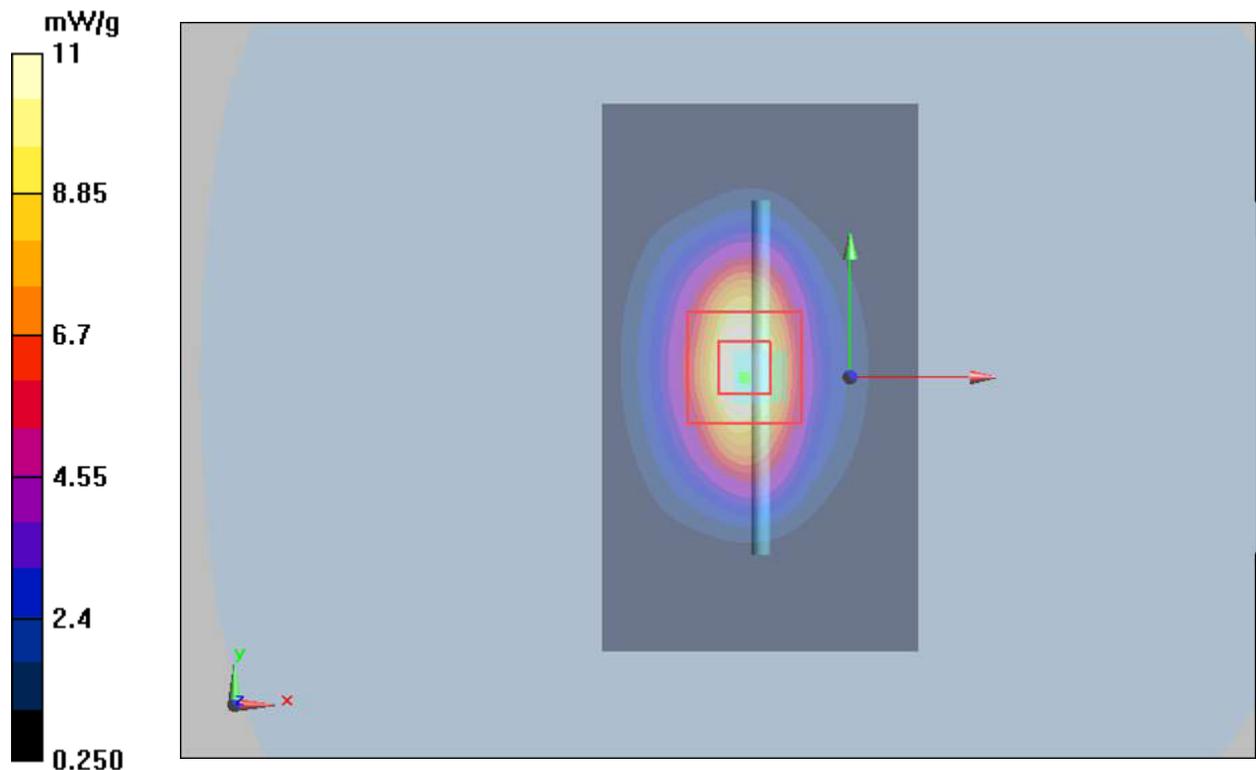


Figure 7 System Performance Check 1900MHz 250Mw

**System Performance Check at 2450 MHz**

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786**

Date/Time: 3/17/2014 7:32:19 PM

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

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 52.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.61, 7.61, 7.61); Calibrated: 11/28/2013

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=12mm, dy=12mm

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

**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.4 V/m; Power Drift = -0.093 dB

Peak SAR (extrapolated) = 26.1 W/kg

**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.27 mW/g**

Maximum value of SAR (measured) = 15 mW/g

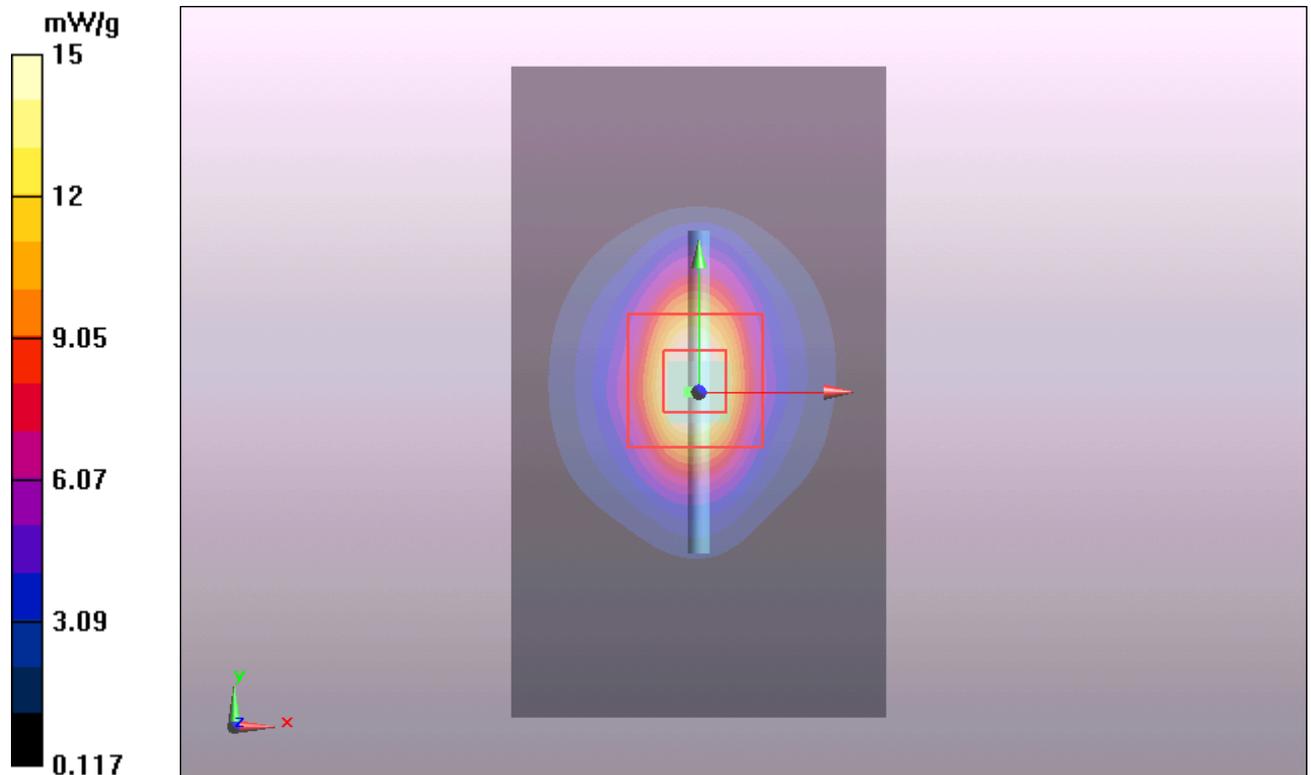


Figure 8 System Performance Check 2450MHz 250mW

## ANNEX C: Graph Results (Original)

### GSM 850 GPRS (2TXslots) with Test Position 1 High

Date/Time: 3/11/2014 12:46:43 AM

Communication System: GPRS 2TX (0); Frequency: 848.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.006$  S/m;  $\epsilon_r = 55.736$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 High/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.939 W/kg

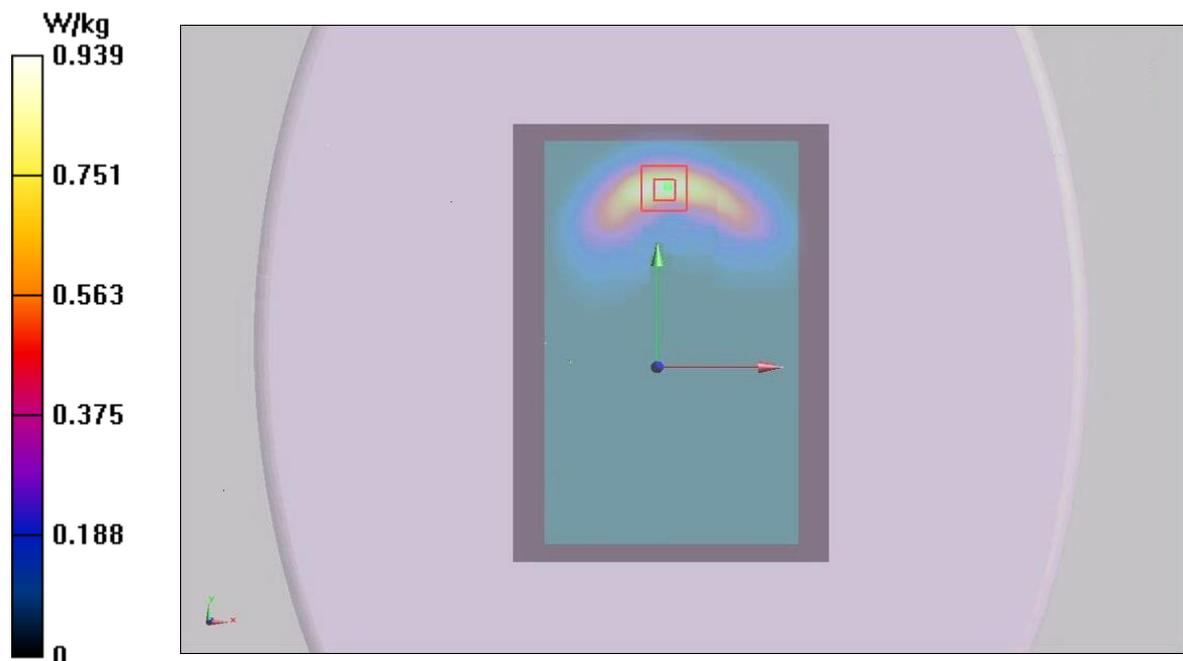
**Test Position 1 High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.133 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 1.69 W/kg

**SAR(1 g) = 0.917 W/kg; SAR(10 g) = 0.491 W/kg**

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



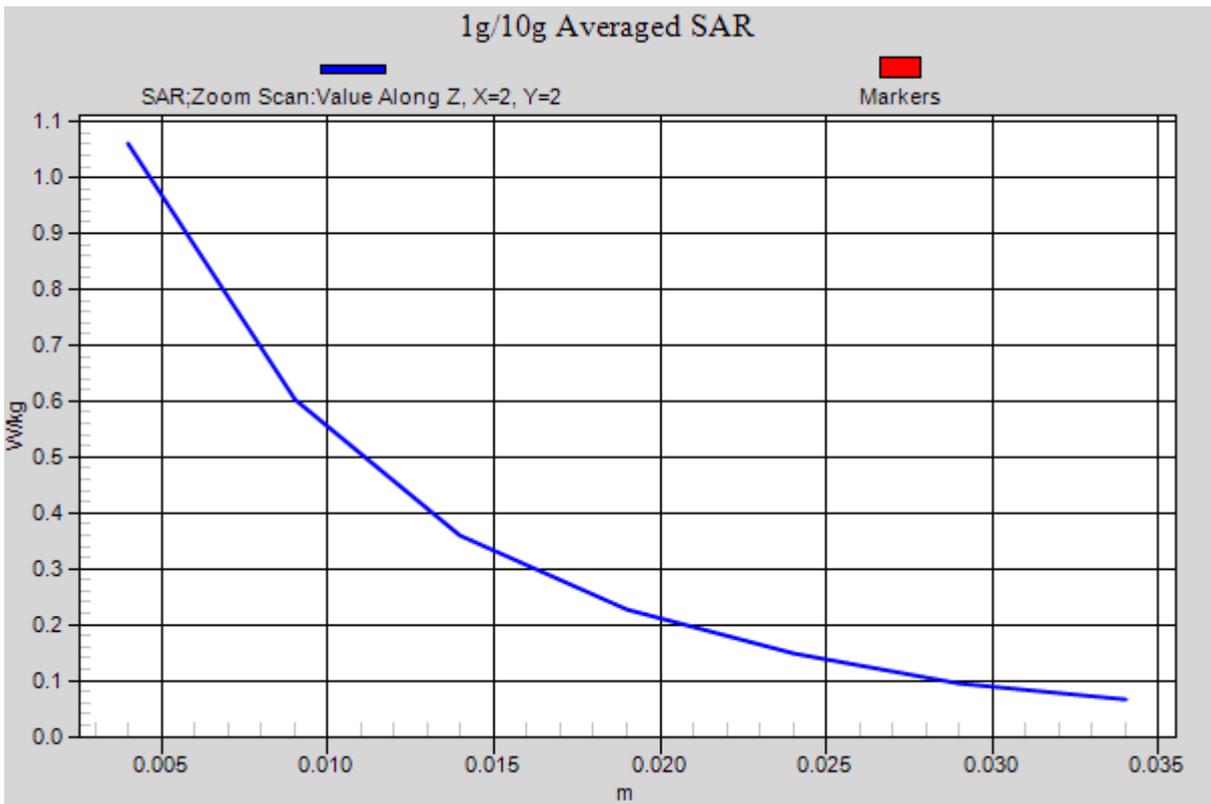


Figure 9 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 251

**GSM 850 GPRS (2TXslots) with Test Position 1 Middle**

Date/Time: 3/11/2014 12:18:41 AM

Communication System: GPRS 2TX (0); Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.992$  S/m;  $\epsilon_r = 55.882$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 Middle/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.869 W/kg

**Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.079 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.55 W/kg

**SAR(1 g) = 0.838 W/kg; SAR(10 g) = 0.441 W/kg**

Maximum value of SAR (measured) = 0.993 W/kg

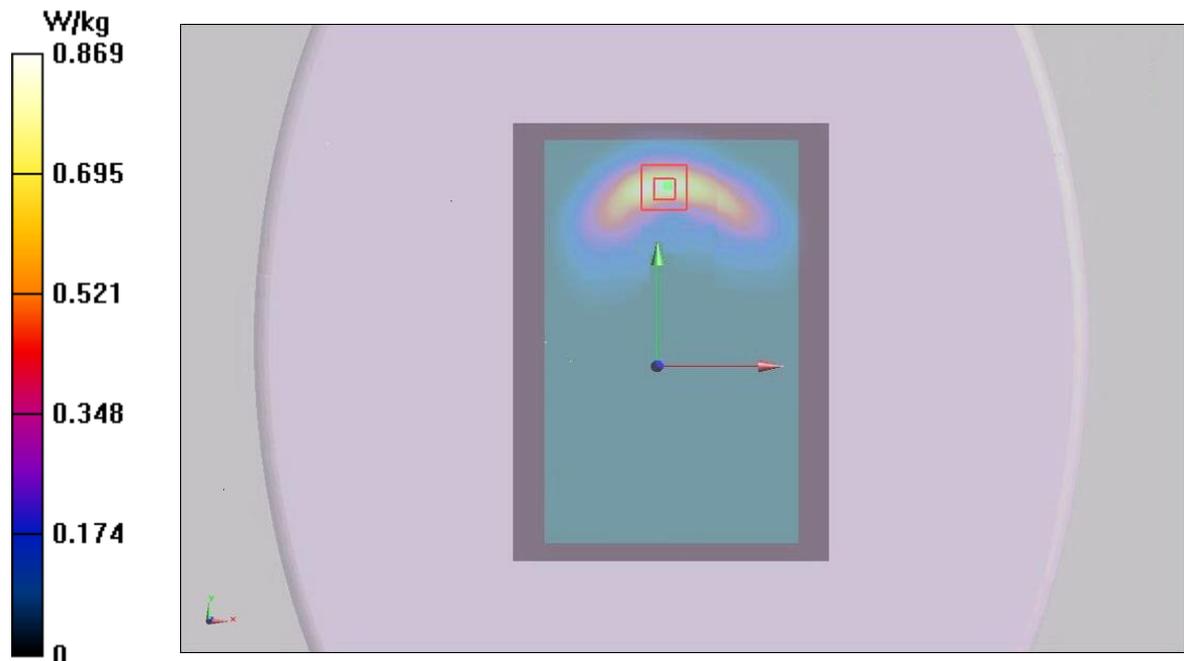


Figure 10 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 190

**GSM 850 GPRS (2TXslots) with Test Position 1 Low**

Date/Time: 3/11/2014 1:14:07 AM

Communication System: GPRS 2TX (0); Frequency: 824.2 MHz; Duty Cycle: 1:4.14954

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.978$  S/m;  $\epsilon_r = 55.938$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 Low/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.808 W/kg

**Test Position 1 Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.804 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.770 W/kg; SAR(10 g) = 0.415 W/kg**

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

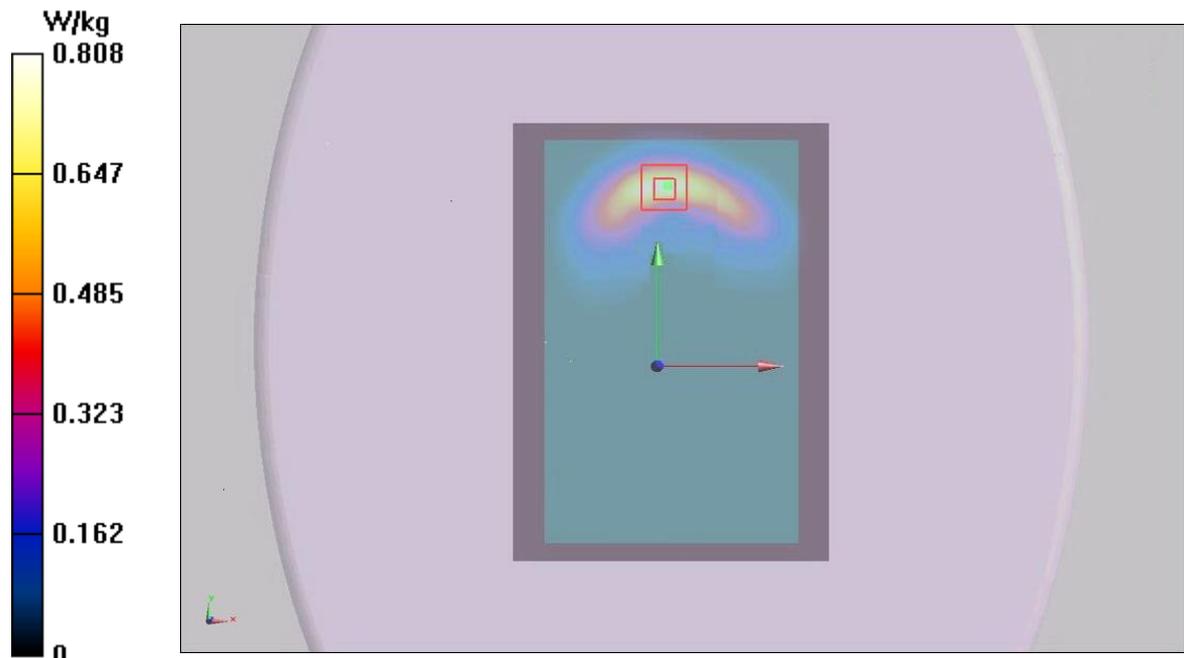


Figure 11 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 128

**GSM 850 GPRS (2TXslots) with Test Position 2 Middle**

Date/Time: 3/11/2014 2:05:36 AM

Communication System: GPRS 2TX (0); Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.992$  S/m;  $\epsilon_r = 55.882$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 2 Middle/Area Scan (10x141x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.503 W/kg

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

Reference Value = 16.577 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 0.743 W/kg

**SAR(1 g) = 0.469 W/kg; SAR(10 g) = 0.285 W/kg**

Maximum value of SAR (measured) = 0.516 W/kg

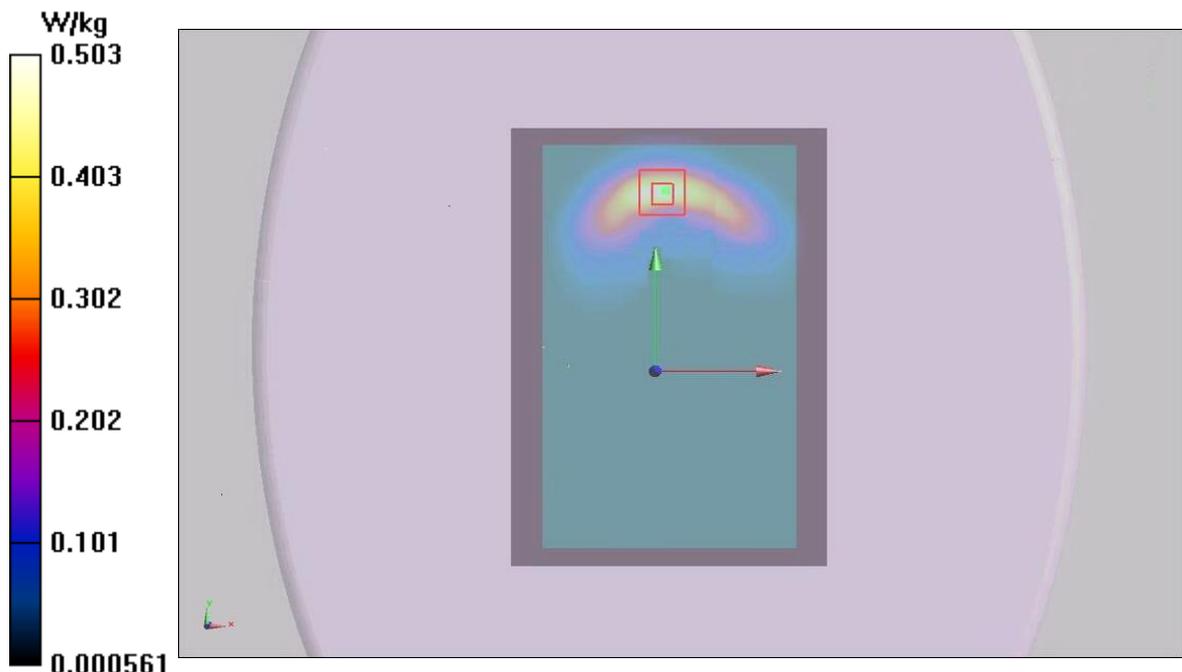


Figure 12 GSM 850 GPRS (2TXslots) with Test Position 2 Channel 190

**GSM 850 GPRS (2TXslots) with Test Position 4 Middle**

Date/Time: 3/11/2014 1:45:59 AM

Communication System: GPRS 2TX (0); Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.992$  S/m;  $\epsilon_r = 55.882$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 4 Middle/Area Scan (31x151x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.0817 W/kg

**Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.121 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.140 W/kg

**SAR(1 g) = 0.082 W/kg; SAR(10 g) = 0.051 W/kg**

Maximum value of SAR (measured) = 0.0910 W/kg

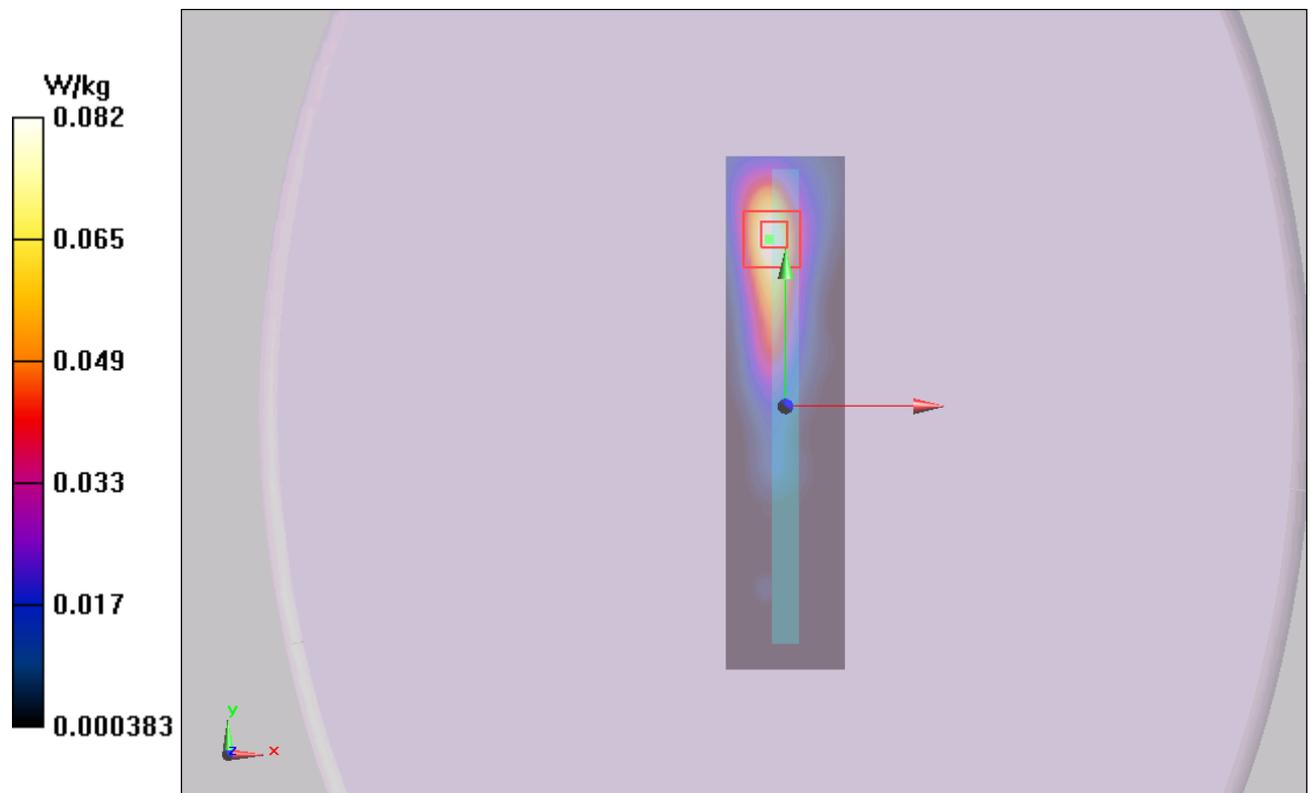


Figure 13 GSM 850 GPRS (2TXslots) with Test Position 4 Channel 190

**GSM 850 GPRS (2TXslots) with Test Position 5 Middle**

Date/Time: 3/11/2014 2:45:58 AM

Communication System: GPRS 2TX (0); Frequency: 836.6 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.992$  S/m;  $\epsilon_r = 55.882$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 5 Middle/Area Scan (31x151x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.120 W/kg

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

dz=5mm

Reference Value = 8.152 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 0.207 W/kg

**SAR(1 g) = 0.120 W/kg; SAR(10 g) = 0.073 W/kg**

Maximum value of SAR (measured) = 0.123 W/kg

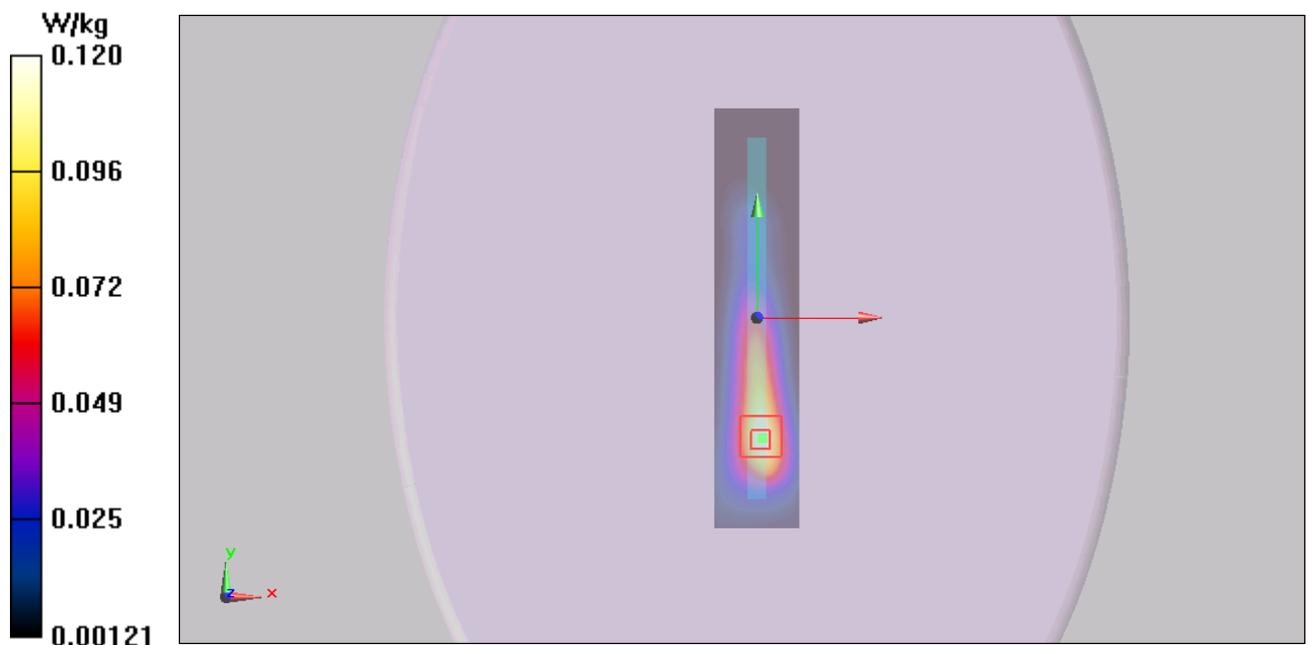


Figure 14 GSM 850 GPRS (2TXslots) with Test Position 5 Channel 190

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## GSM 850 GPRS (2TXslots) with Test Position 1 High (1<sup>st</sup> Repeated SAR)

Date/Time: 3/11/2014 2:27:16 AM

Communication System: GPRS 2TX (0); Frequency: 848.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.006$  S/m;  $\epsilon_r = 55.736$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 High/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.926 W/kg

**Test Position 1 High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.464 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 1.64 W/kg

**SAR(1 g) = 0.888 W/kg; SAR(10 g) = 0.481 W/kg**

Maximum value of SAR (measured) = 0.972 W/kg

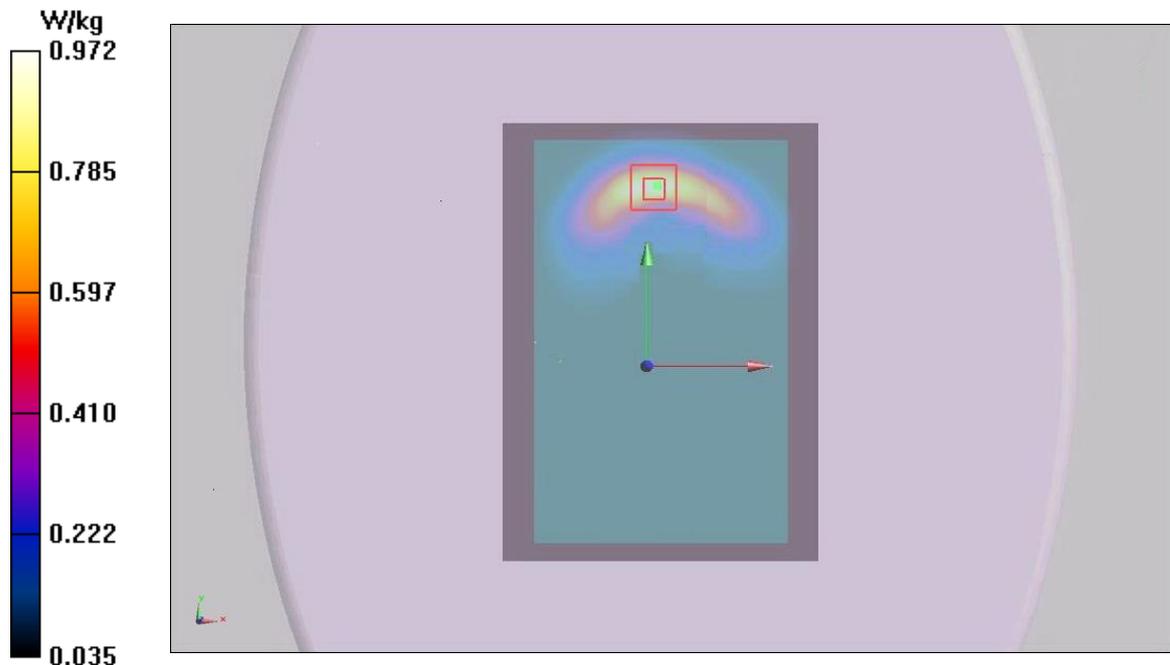


Figure 15 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 251

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## GSM 1900 GPRS (2TXslots) with Test Position 1 High

Date/Time: 3/14/2014 1:34:20 PM

Communication System: GPRS 2TX (0); Frequency: 1909.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.531$  S/m;  $\epsilon_r = 52.629$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 High/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.38 W/kg

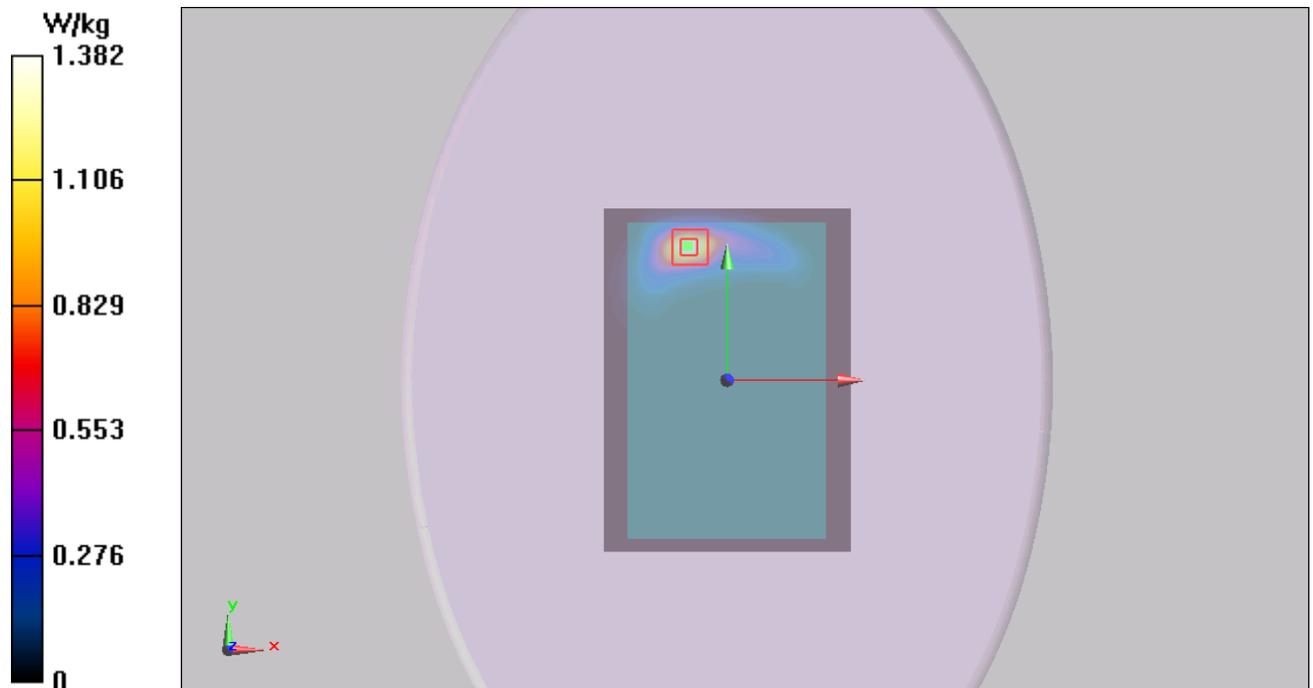
**Test Position 1 High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.902 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 4.22 W/kg

**SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.512 W/kg**

Maximum value of SAR (measured) = 1.31 W/kg



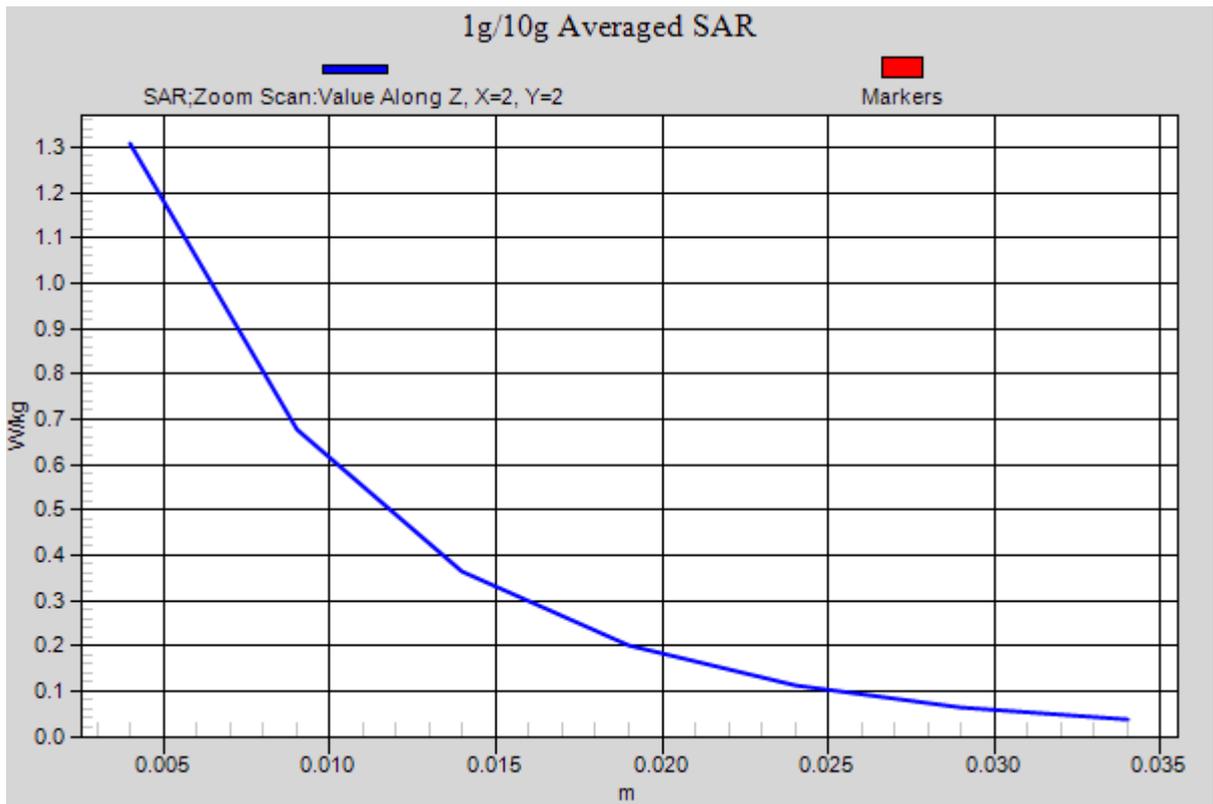


Figure 16 GSM 1900 GPRS (2TXslots) with Test Position 1 Channel 810

**GSM 1900 GPRS (2TXslots) with Test Position 1 Middle**

Date/Time: 3/14/2014 12:06:02 PM

Communication System: GPRS 2TX (0); Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.493$  S/m;  $\epsilon_r = 52.676$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 Middle/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

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

**Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.796 V/m; Power Drift = 0.055 dB

Peak SAR (extrapolated) = 2.05 W/kg

**SAR(1 g) = 0.995 W/kg; SAR(10 g) = 0.457 W/kg**

Maximum value of SAR (measured) = 1.11 W/kg

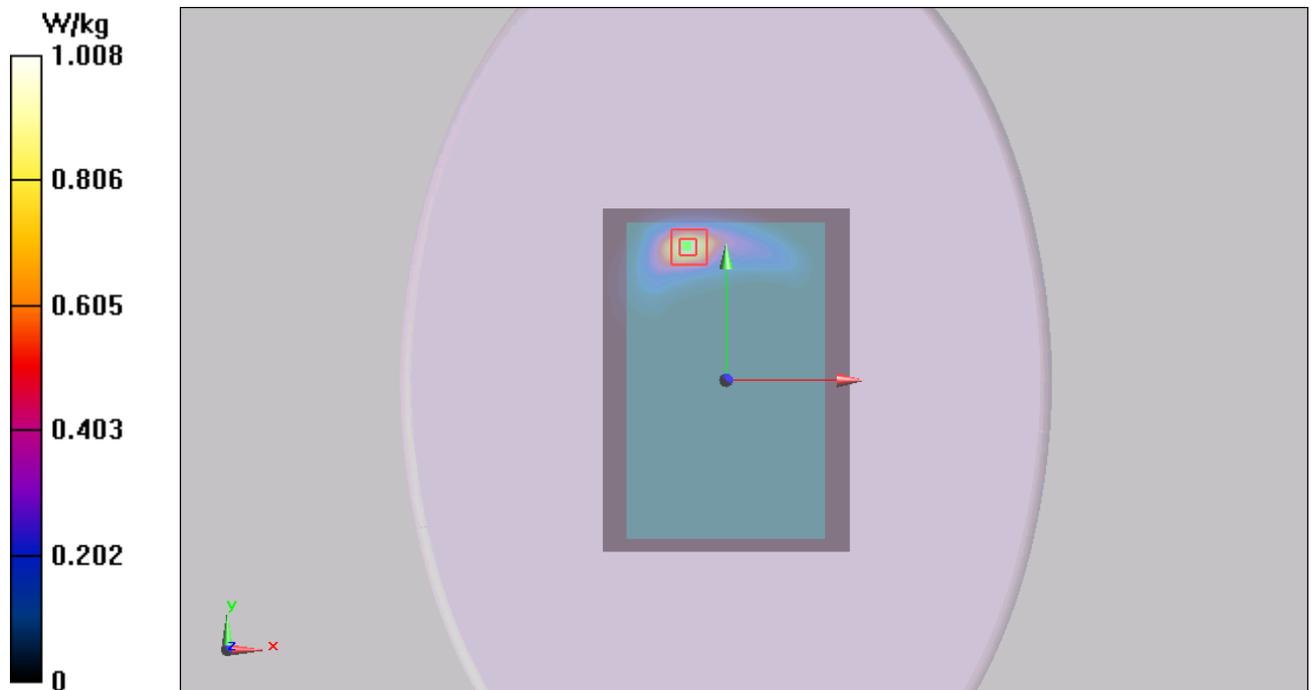


Figure 17 GSM 1900 GPRS (2TXslots) with Test Position 1 Channel 661

**GSM 1900 GPRS (2TXslots) with Test Position 1 Low**

Date/Time: 3/14/2014 2:02:56 PM

Communication System: GPRS 2TX (0); Frequency: 1850.2 MHz; Duty Cycle: 1:4.14954

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.462$  S/m;  $\epsilon_r = 52.753$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 Low/Area Scan (101x141x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.900 W/kg

**Test Position 1 Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.832 V/m; Power Drift = 0.062 dB

Peak SAR (extrapolated) = 1.43 W/kg

**SAR(1 g) = 0.730 W/kg; SAR(10 g) = 0.347 W/kg**

Maximum value of SAR (measured) = 0.856 W/kg

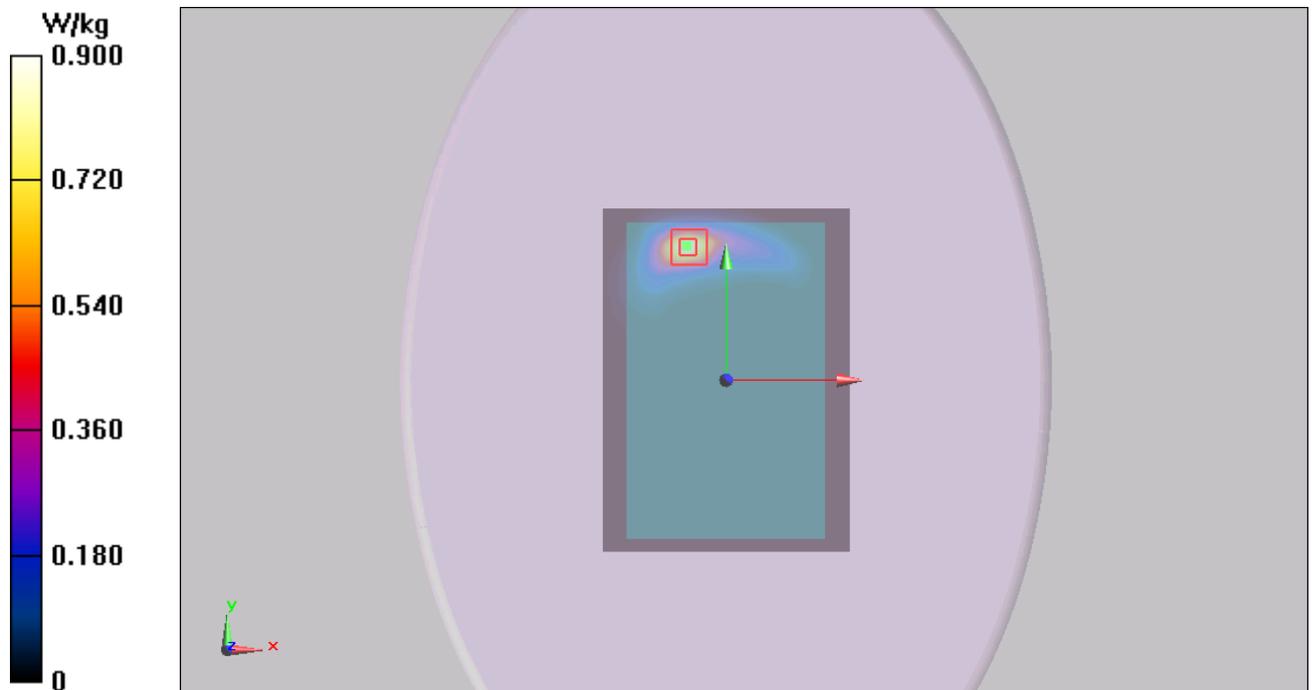


Figure 18 GSM 1900 GPRS (2TXslots) with Test Position 1 Channel 512

**GSM 1900 GPRS (2TXslots) with Test Position 2 Middle**

Date/Time: 3/14/2014 2:22:48 PM

Communication System: GPRS 2TX (0); Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.493$  S/m;  $\epsilon_r = 52.676$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 2 Middle/Area Scan (31x141x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.499 W/kg

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

Reference Value = 13.417 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 0.955 W/kg

**SAR(1 g) = 0.483 W/kg; SAR(10 g) = 0.226 W/kg**

Maximum value of SAR (measured) = 0.535 W/kg



Figure 19 GSM 1900 GPRS (2TXslots) with Test Position 3 Channel 661

**GSM 1900 GPRS (2TXslots) with Test Position 4 Middle**

Date/Time: 3/14/2014 2:44:10 PM

Communication System: GPRS 2TX (0); Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.493$  S/m;  $\epsilon_r = 52.676$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 4 Middle/Area Scan (31x141x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.0126 W/kg

**Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.249 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.0180 W/kg

**SAR(1 g) = 0.011 W/kg; SAR(10 g) = 0.00638 W/kg**

Maximum value of SAR (measured) = 0.0119 W/kg

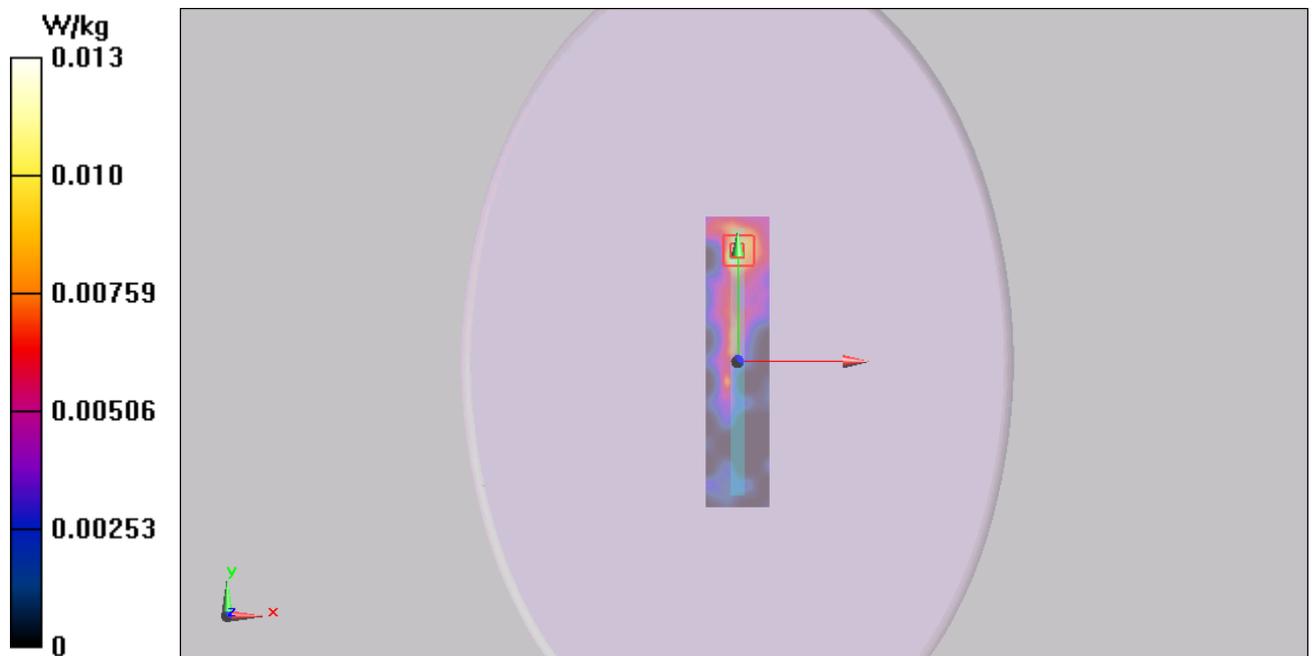


Figure 20 GSM 1900 GPRS (2TXslots) with Test Position 4 Channel 661

**GSM 1900 GPRS (2TXslots) with Test Position 5 Middle**

Date/Time: 3/14/2014 3:28:10 PM

Communication System: GPRS 2TX (0); Frequency: 1880 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.493$  S/m;  $\epsilon_r = 52.676$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 5 Middle/Area Scan (31x151x1):** Interpolated grid: dx=10mm, dy=10mm

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

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

Reference Value = 7.193 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 0.370 W/kg

**SAR(1 g) = 0.195 W/kg; SAR(10 g) = 0.103 W/kg**

Maximum value of SAR (measured) = 0.212 W/kg

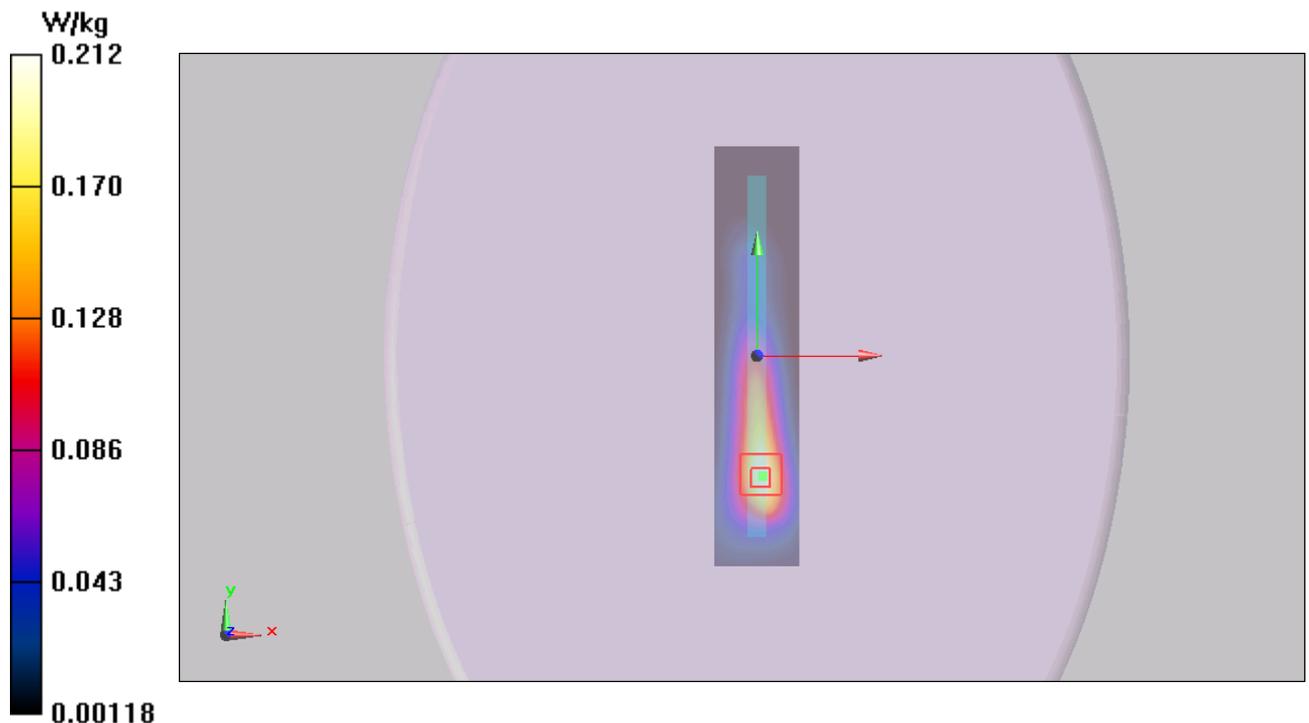


Figure 21 GSM 1900 GPRS (2TXslots) with Test Position 5 Channel 661

**GSM 1900 GPRS (2TXslots) with Test Position 1 High (1<sup>st</sup> Repeated SAR)**

Date/Time: 3/14/2014 3:09:47 PM

Communication System: GPRS 2TX (0); Frequency: 1909.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.531$  S/m;  $\epsilon_r = 52.629$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 High/Area Scan (101x151x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.28 W/kg

**Test Position 1 High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.465 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 2.29 W/kg

**SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.530 W/kg**

Maximum value of SAR (measured) = 1.27 W/kg

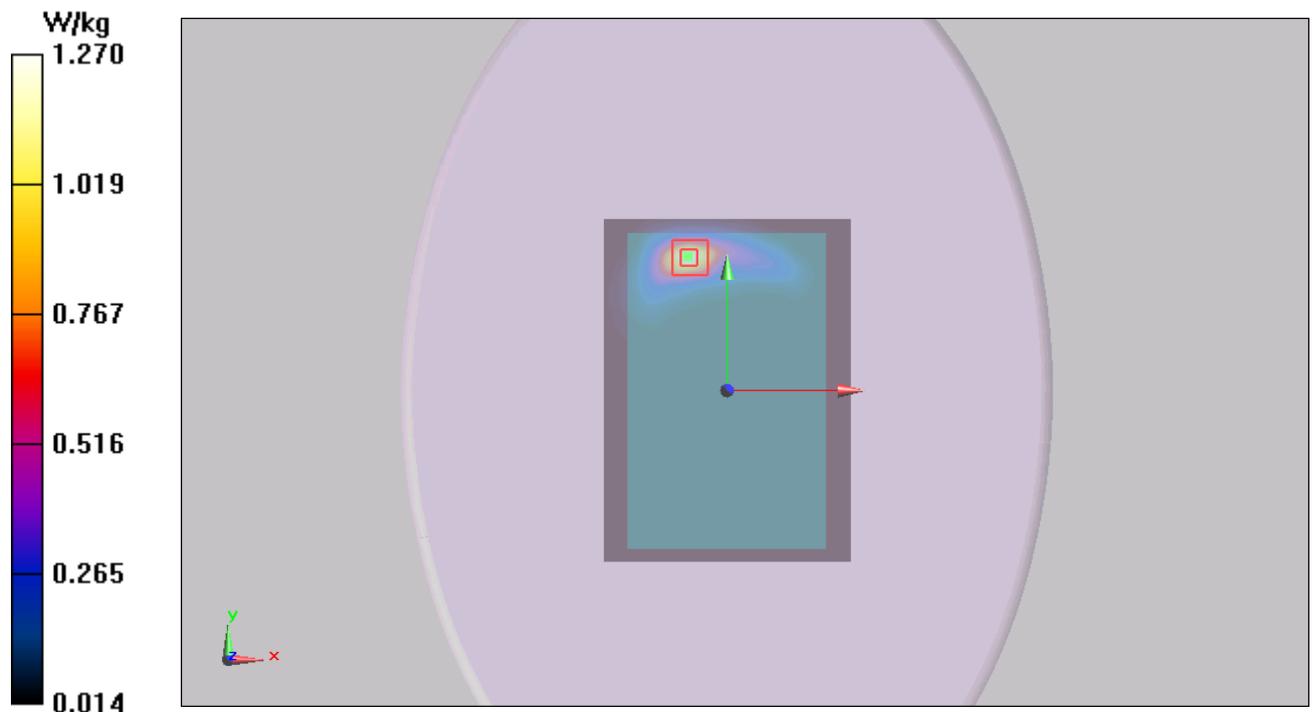


Figure 22 GSM 1900 GPRS (2TXslots) with Test Position 1 Channel 810

### 802.11b Test Position 1 Middle

Date/Time: 3/17/2014 9:04:22 PM

Communication System: 802.11b (0); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.977$  S/m;  $\epsilon_r = 52.177$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.61, 7.61, 7.61); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 1 Middle/Area Scan (101x151x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.364 W/kg

**Test Position 1 Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.682 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 0.771 W/kg

**SAR(1 g) = 0.304 W/kg; SAR(10 g) = 0.128 W/kg**

Maximum value of SAR (measured) = 0.337 W/kg



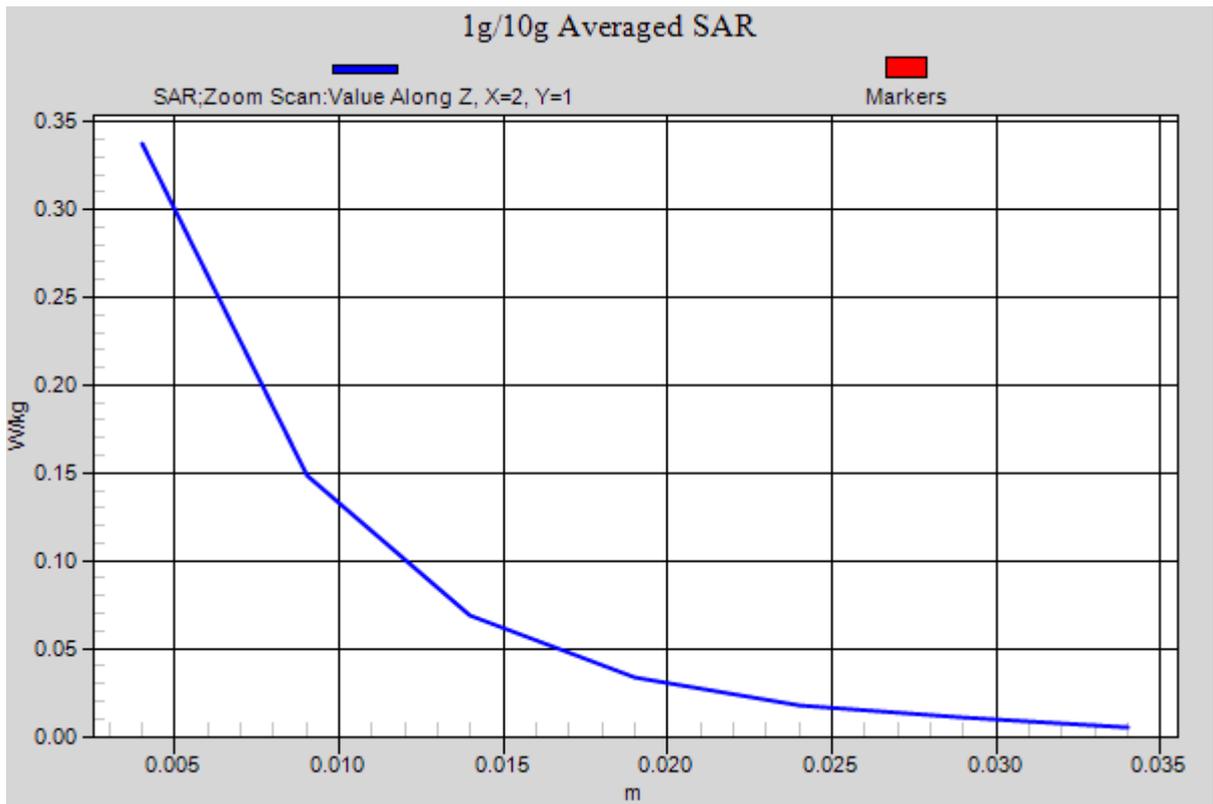


Figure 23 802.11b Test Position 1 Channel 6

**802.11b Test Position 4 Middle**

Date/Time: 3/17/2014 9:33:47 PM

Communication System: 802.11b (0); Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.977$  S/m;  $\epsilon_r = 52.177$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature:22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.61, 7.61, 7.61); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 4 Middle/Area Scan (31x121x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.121 W/kg

**Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.198 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.250 W/kg

**SAR(1 g) = 0.114 W/kg; SAR(10 g) = 0.051 W/kg**

Maximum value of SAR (measured) = 0.135 W/kg

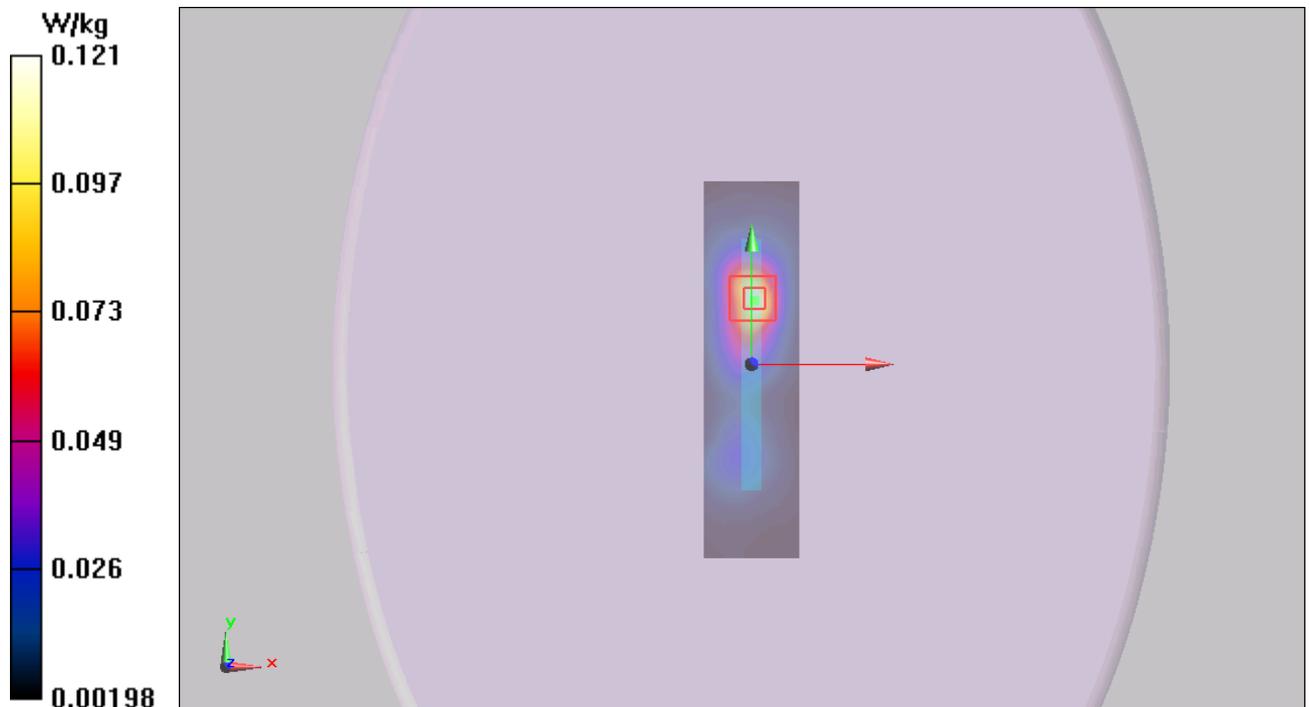


Figure 24 802.11b Test Position 4 Channel 6

**802.11b Test Position 5 Middle**

Date/Time: 3/17/2014 10:14:11 PM

Communication System: 802.11b (0); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.977$  S/m;  $\epsilon_r = 52.177$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.61, 7.61, 7.61); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Test Position 5 Middle/Area Scan (31x151x1):** Interpolated grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.0968 W/kg

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

Reference Value = 2.594 V/m; Power Drift = 0.095 dB

Peak SAR (extrapolated) = 0.191 W/kg

**SAR(1 g) = 0.086 W/kg; SAR(10 g) = 0.038 W/kg**

Maximum value of SAR (measured) = 0.0955 W/kg

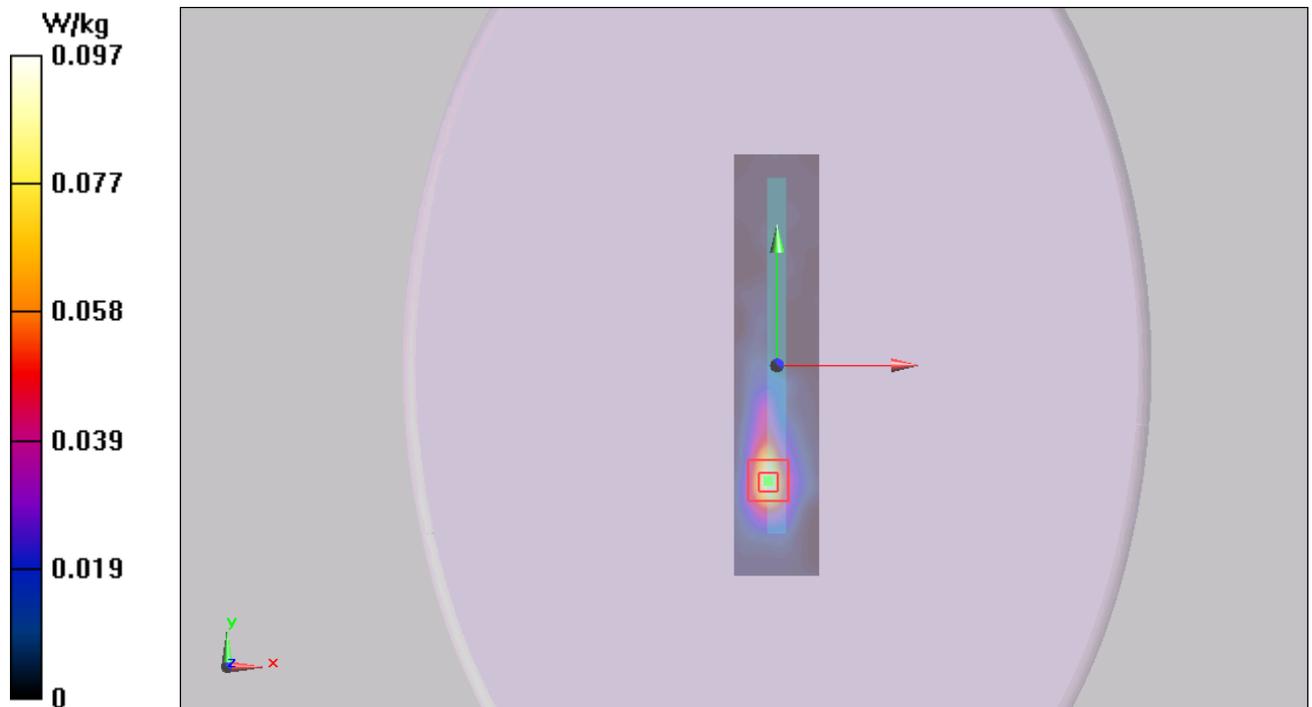


Figure 25 802.11b Test Position 5 Channel 6

## ANNEX D: Graph Results (Variant)

### GSM 850 GPRS (2TXslots) with Test Position 1 High

Date/Time: 3/11/2014 6:16:10 AM

Communication System: GPRS 2TX; Frequency: 848.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.006$  S/m;  $\epsilon_r = 55.736$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Back Side High/Area Scan (101x151x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.12 W/kg

**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.669 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 1.71 W/kg

**SAR(1 g) = 0.977 W/kg; SAR(10 g) = 0.527 W/kg**

Maximum value of SAR (measured) = 1.13 W/kg



Figure 26 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 251

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## GSM 850 GPRS (2TXslots) with Test Position 1 High (1<sup>st</sup> Repeated SAR)

Date/Time: 3/11/2014 6:47:37 PM

Communication System: GPRS 2TX; Frequency: 848.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.006$  S/m;  $\epsilon_r = 55.736$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.51, 9.51, 9.51); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Back Side High/Area Scan (101x151x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.07 W/kg

**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.747 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.79 W/kg

**SAR(1 g) = 0.986 W/kg; SAR(10 g) = 0.537 W/kg**

Maximum value of SAR (measured) = 1.13 W/kg



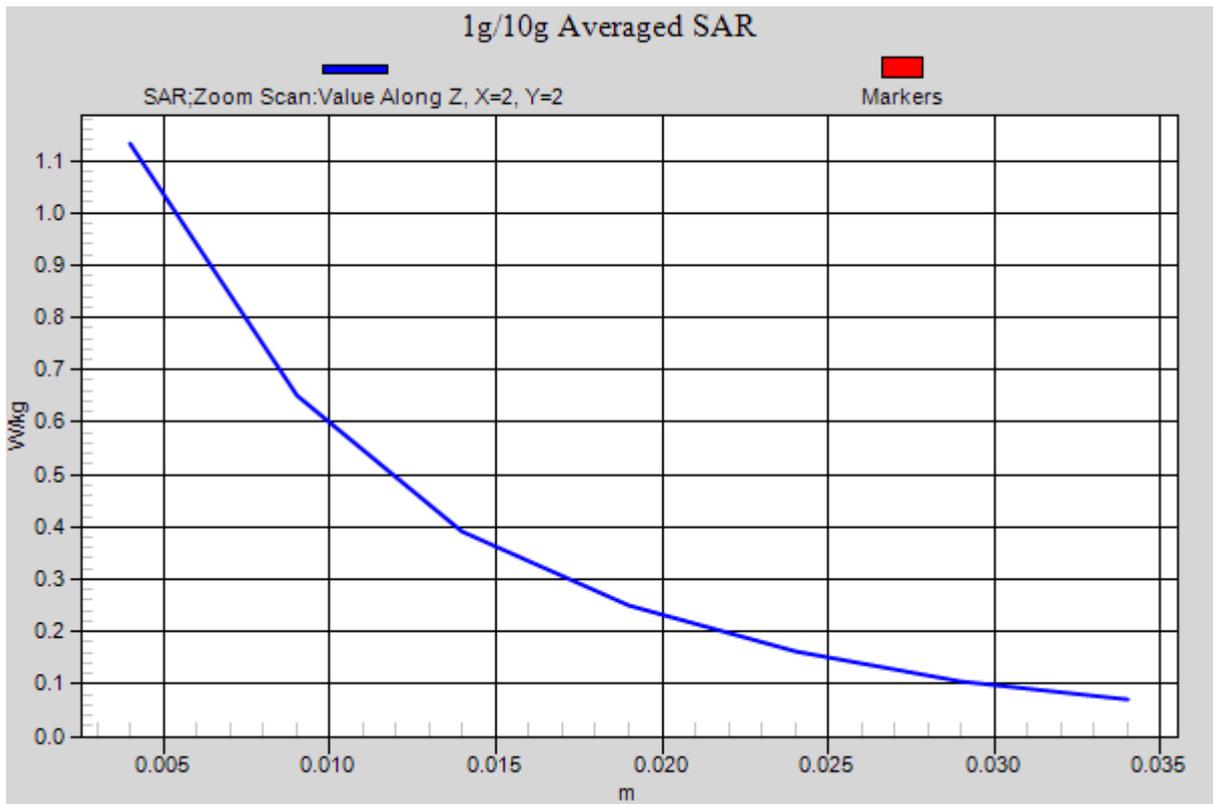


Figure 27 GSM 850 GPRS (2TXslots) with Test Position 1 Channel 251

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## GSM 1900 GPRS (2TXslots) with Test Position 1 High

Date/Time: 3/14/2014 8:27:41 PM

Communication System: GPRS 2TX; Frequency: 1909.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.531$  S/m;  $\epsilon_r = 52.629$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Back Side High/Area Scan (101x151x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.35 W/kg

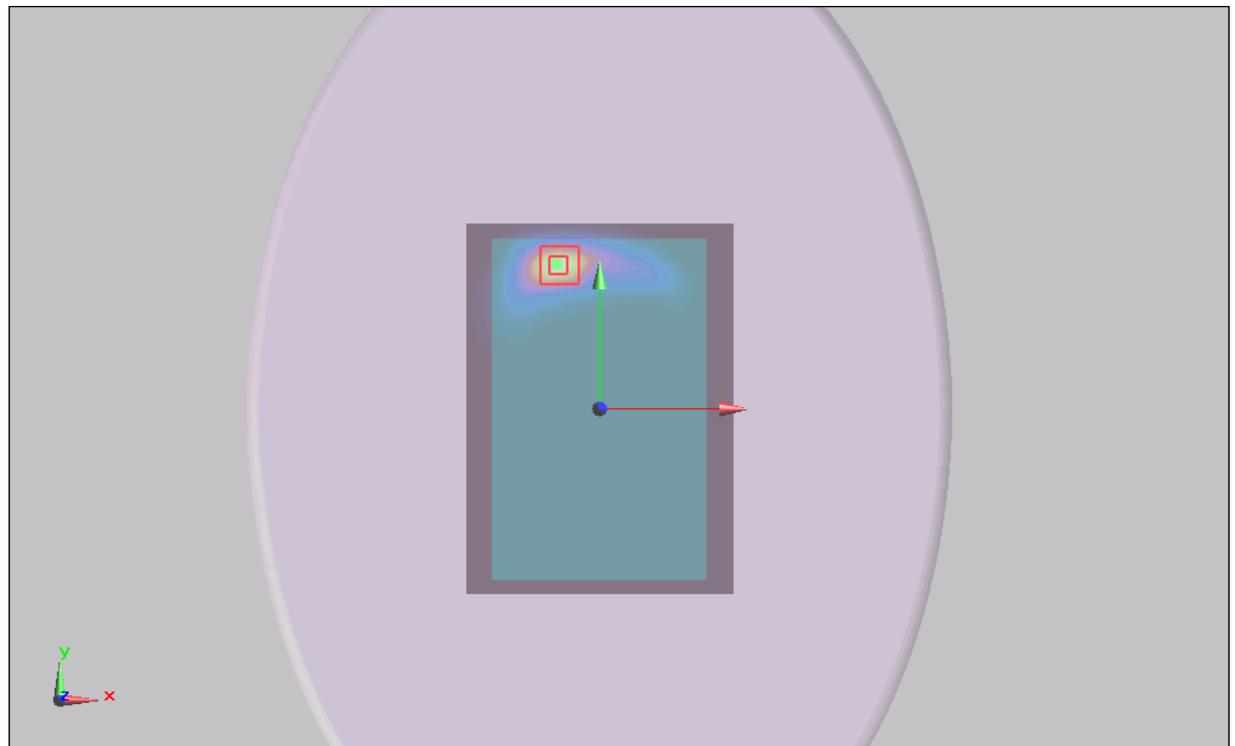
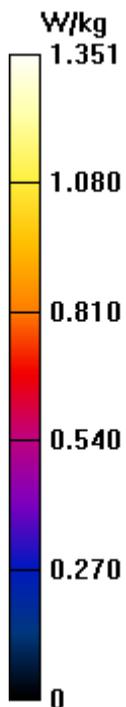
**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.557 V/m; Power Drift = 0.068 dB

Peak SAR (extrapolated) = 2.28 W/kg

**SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.551 W/kg**

Maximum value of SAR (measured) = 1.36 W/kg



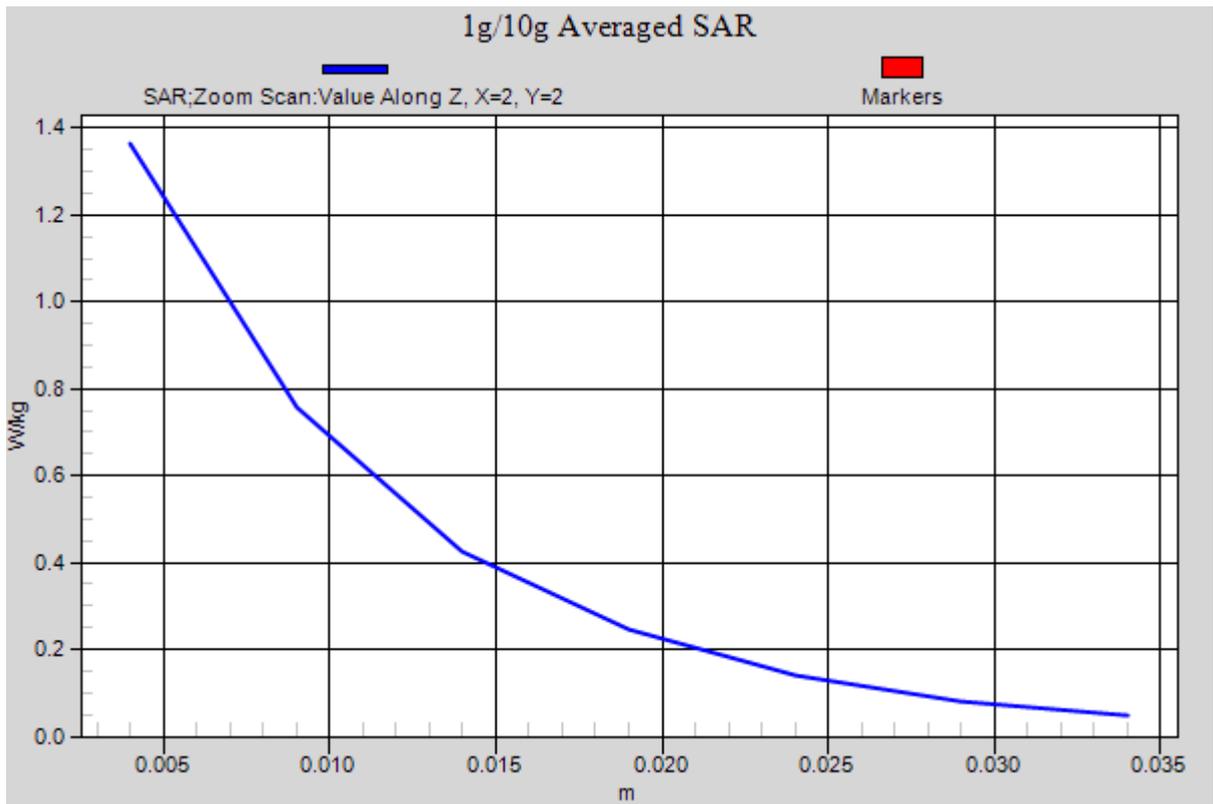


Figure 28 GSM 1900 GPRS (2TXslots) with Test Position 1 Channel 810

**GSM 1900 GPRS (2TXslots) with Test Position 1 High (1<sup>st</sup> Repeated SAR)**

Date/Time: 3/18/2014 8:57:10 PM

Communication System: GPRS 2TX; Frequency: 1909.8 MHz; Duty Cycle: 1:4.14954

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.531$  S/m;  $\epsilon_r = 52.629$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.63, 7.63, 7.63); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Back Side High/Area Scan (101x151x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.12 W/kg

**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.265 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 2.26 W/kg

**SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.545 W/kg**

Maximum value of SAR (measured) = 1.16 W/kg

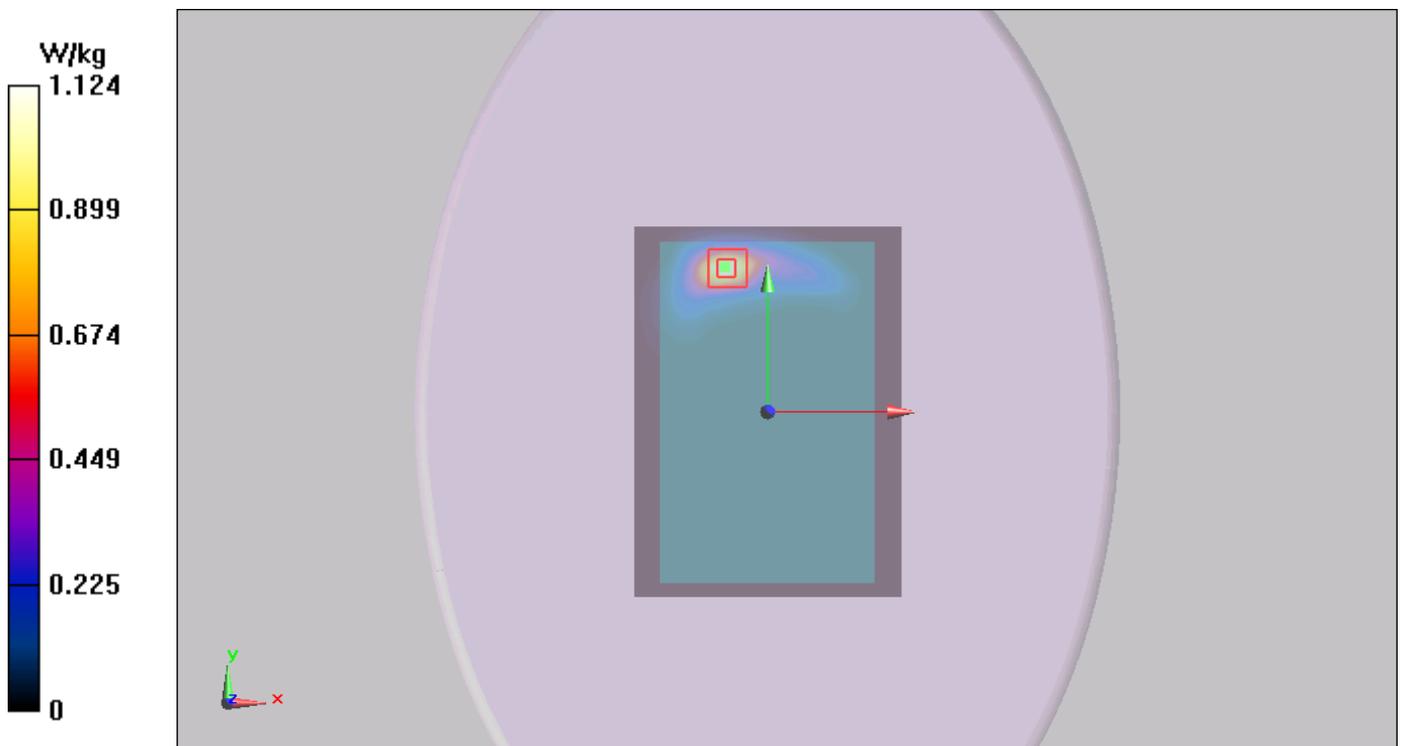


Figure 29 GSM 1900 GPRS (2TXslots) with Test Position 1 Channel 810

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## 802.11b Test Position 1 Middle

Date/Time: 3/17/2014 10:04:46 PM

Communication System: 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.977$  S/m;  $\epsilon_r = 52.177$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.61, 7.61, 7.61); Calibrated: 11/28/2013;

Electronics: DAE4 Sn1317; Calibrated: 1/16/2014

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Back Side Middle/Area Scan (101x151x1):** Interpolated grid: dx=12m, dy=12m

Maximum value of SAR (interpolated) = 0.364 W/kg

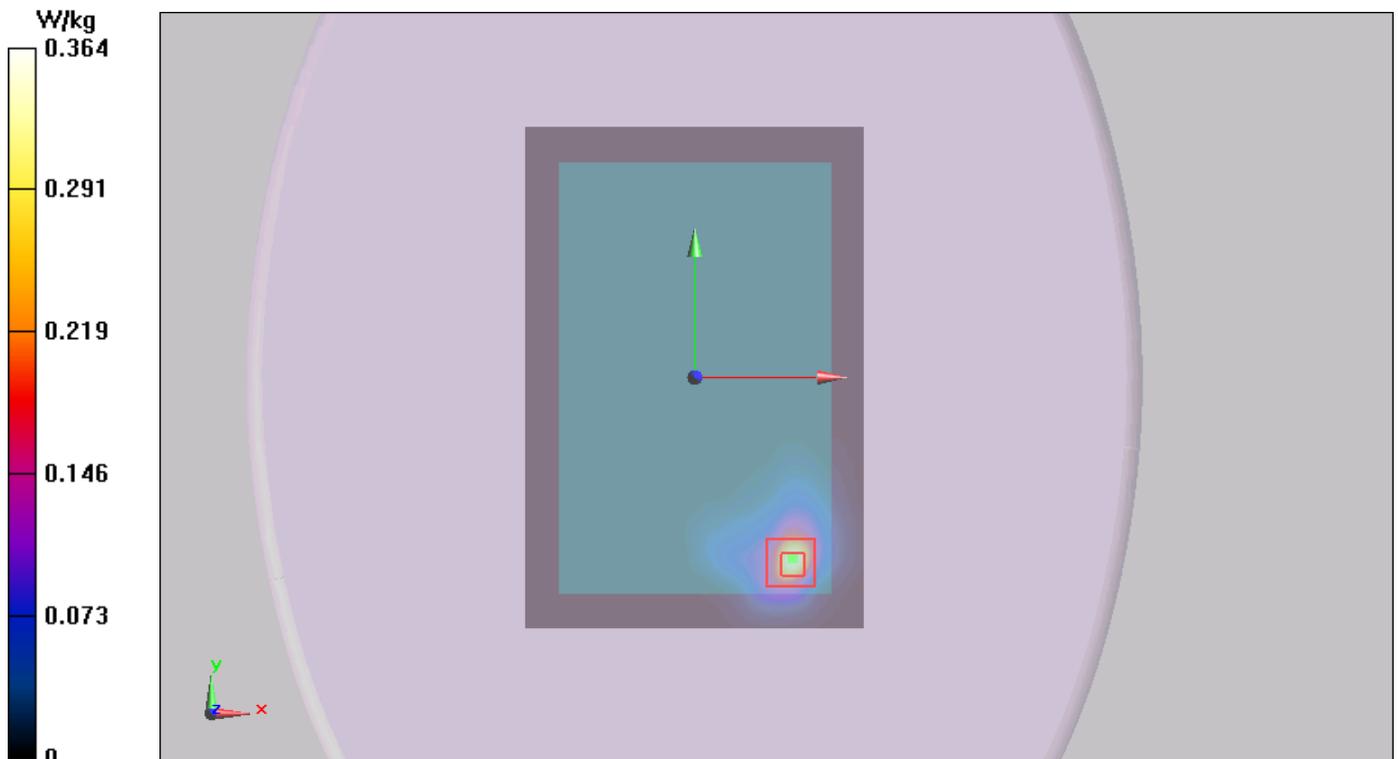
**Back Side Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.837 V/m; Power Drift = 0.044 dB

Peak SAR (extrapolated) = 0.762 W/kg

**SAR(1 g) = 0.302 W/kg; SAR(10 g) = 0.128 W/kg**

Maximum value of SAR (measured) = 0.337 W/kg



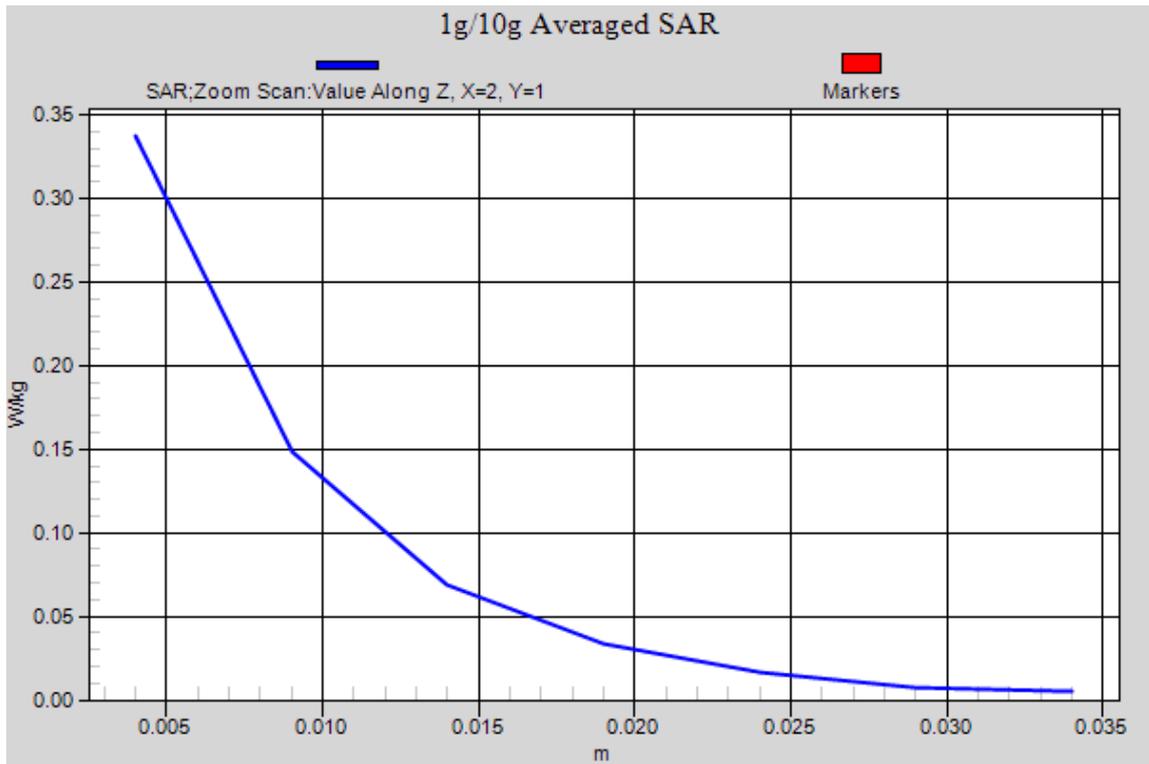


Figure 30 802.11b Test Position 1 Channel 6

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## ANNEX E: Probe Calibration Certificate



In Collaboration with  
**s p e a g**  
CALIBRATION LABORATORY



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Client **TA-ShangHai**

Certificate No: **J13-2-2971**

### CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3677**

Calibration Procedure(s) **TMC-OS-E-02-195  
Calibration Procedures for Dosimetric E-field Probes**

Calibration date: **November 28, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-13 (TMC, No.JW13-044)	Jun-14
Power sensor NRP-Z91	101547	01-Jul-13 (TMC, No.JW13-044)	Jun-14
Power sensor NRP-Z91	101548	01-Jul-13 (TMC, No.JW13-044)	Jun-14
Reference10dBAttenuator	BT0520	12-Dec-12(TMC,No.JZ12-867)	Dec-14
Reference20dBAttenuator	BT0267	12-Dec-12(TMC,No.JZ12-866)	Dec-14
Reference Probe EX3DV4	SN 3846	03-Sep-13(SPEAG.No.EX3-3846_Sep13)	Sep-14
DAE4	SN 777	22-Feb-13 (SPEAG, DAE4-777_Feb13)	Feb -14
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	01-Jul-13 (TMC, No.JW13-045)	Jun-14
Network Analyzer E5071C	MY46110673	15-Feb-13 (TMC, No.JZ13-781)	Feb-14

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the Laboratory	

Issued: November 29, 2013

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



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#### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization $\Phi$	$\Phi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i $\theta=0$ is normal to probe axis

#### Calibration is Performed According to the Following Standards:

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

#### Methods Applied and Interpretation of Parameters:

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



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# Probe EX3DV4

SN: 3677

Calibrated: November 28, 2013

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



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## DASY – Parameters of Probe: EX3DV4 - SN: 3677

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.38	0.44	0.38	±10.8%
DCP(mV) <sup>B</sup>	99.8	100.9	101.9	

### Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB, $\mu\text{V}$	C	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	93.3	±2.6%
		Y	0.0	0.0	1.0		101.7	
		Z	0.0	0.0	1.0		92.1	

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

<sup>A</sup> The uncertainties of Norm X, Y, Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 5 and Page 6).

<sup>B</sup> Numerical linearization parameter; uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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## DASY – Parameters of Probe: EX3DV4 - SN: 3677

### Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.94	9.94	9.94	0.16	1.13	± 12%
850	41.5	0.92	9.41	9.41	9.41	0.11	1.47	± 12%
1750	40.1	1.37	8.22	8.22	8.22	0.14	2.11	± 12%
1900	40.0	1.40	8.15	8.15	8.15	0.14	2.34	± 12%
2100	39.8	1.49	7.87	7.87	7.87	0.13	3.21	± 12%
2450	39.2	1.80	7.64	7.64	7.64	0.39	0.95	± 12%
5200	36.0	4.66	5.73	5.73	5.73	0.95	0.62	± 13%
5300	35.9	4.76	5.68	5.68	5.68	0.87	0.67	± 13%
5500	35.6	4.96	5.62	5.62	5.62	0.97	0.62	± 13%
5600	35.5	5.07	5.29	5.29	5.29	0.89	0.63	± 13%
5800	35.3	5.27	5.29	5.29	5.29	1.02	0.61	± 13%

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

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



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## DASY – Parameters of Probe: EX3DV4 - SN: 3677

### Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.72	9.72	9.72	0.11	1.97	± 12%
850	55.2	0.99	9.51	9.51	9.51	0.15	1.55	± 12%
1750	53.4	1.49	7.77	7.77	7.77	0.14	3.23	± 12%
1900	53.3	1.52	7.63	7.63	7.63	0.15	2.81	± 12%
2100	53.2	1.62	7.97	7.97	7.97	0.16	4.09	± 12%
2450	52.7	1.95	7.61	7.61	7.61	0.45	0.92	± 12%
5200	49.0	5.30	4.72	4.72	4.72	0.66	1.10	± 13%
5300	48.9	5.42	4.67	4.67	4.67	0.64	1.19	± 13%
5500	48.6	5.65	4.34	4.34	4.34	0.73	0.80	± 13%
5600	48.5	5.77	4.29	4.29	4.29	0.74	0.81	± 13%
5800	48.2	6.00	4.46	4.46	4.46	0.78	0.80	± 13%

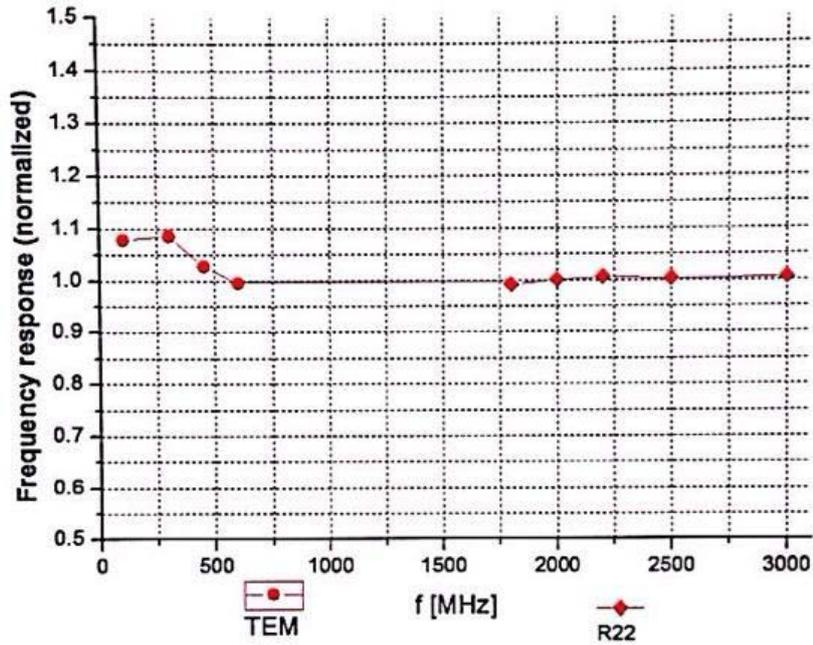
<sup>C</sup> Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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



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



Uncertainty of Frequency Response of E-field:  $\pm 7.5\%$  (k=2)

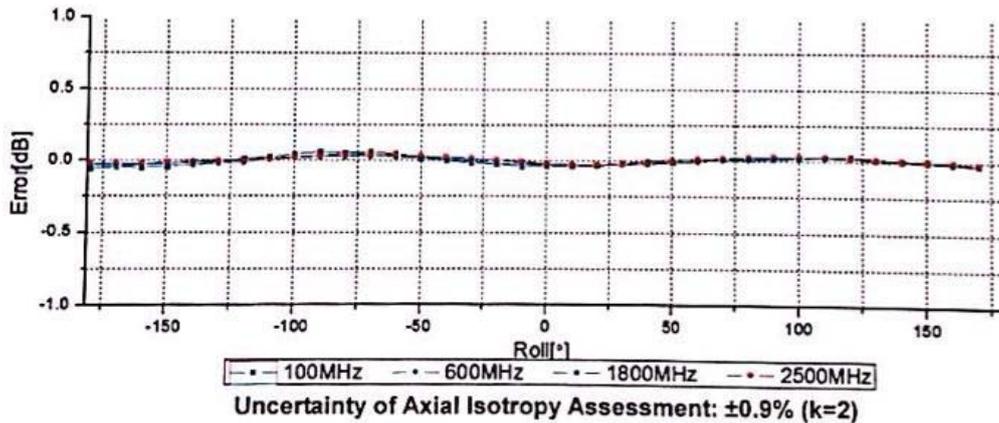
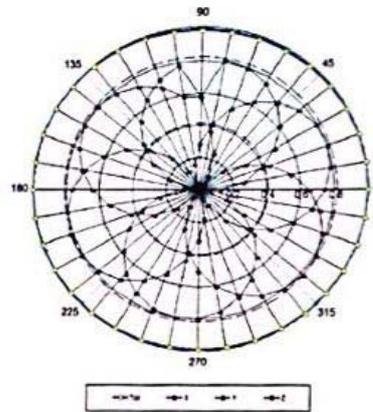
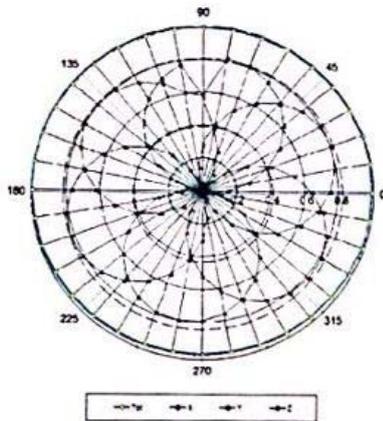


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Receiving Pattern ( $\Phi$ ),  $\theta=0^\circ$

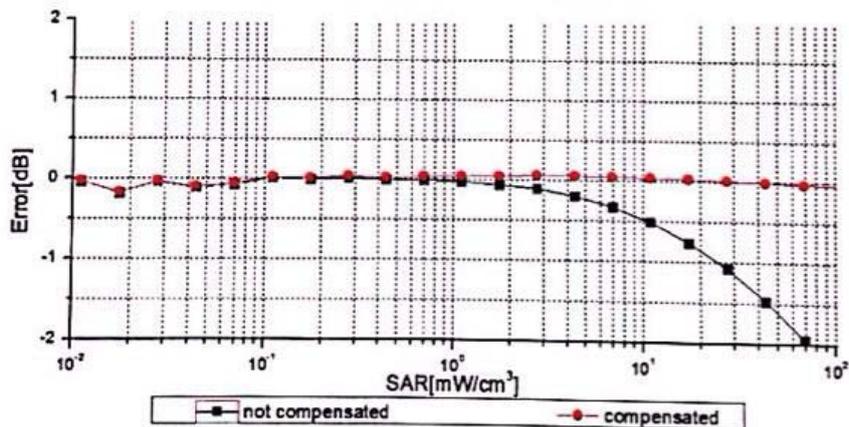
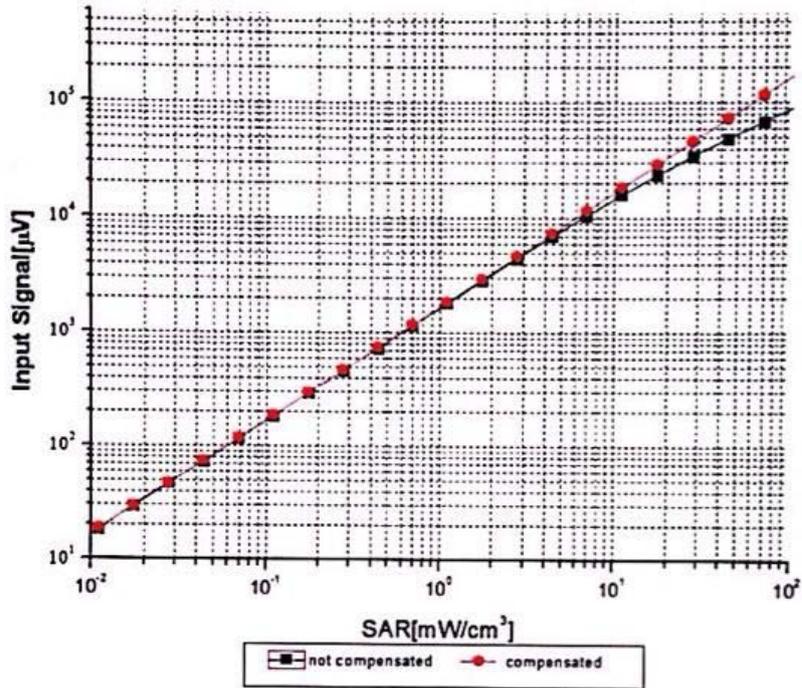
f=600 MHz, TEM

f=1800 MHz, R22





**Dynamic Range f(SAR<sub>head</sub>)  
(TEM cell, f = 900 MHz)**



Uncertainty of Linearity Assessment:  $\pm 0.9\%$  ( $k=2$ )

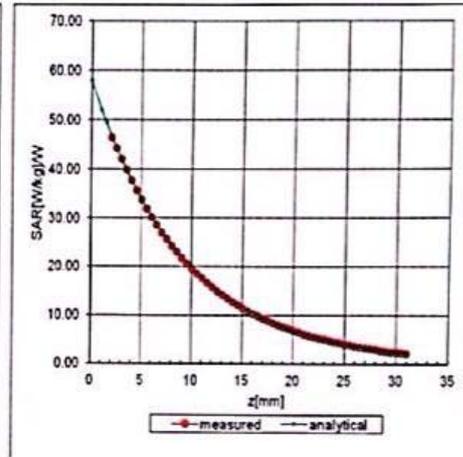
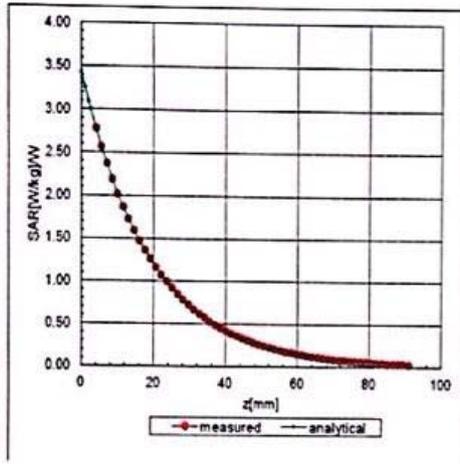


Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
 Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504  
 E-mail: Info@emcite.com Http://www.emcite.com

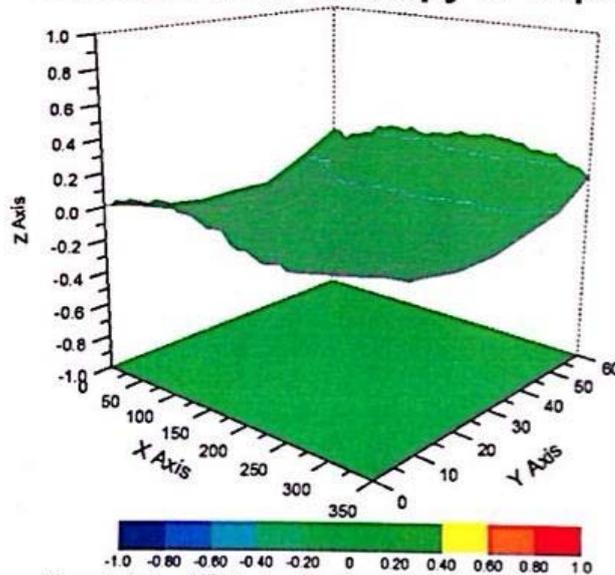
### Conversion Factor Assessment

f=850 MHz, WGLS R9(H\_convF)

f=2450 MHz, WGLS R26(H\_convF)



### Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.8\%$  (K=2)



Add: No. 52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504  
E-mail: Info@emcite.com Http://www.emcite.com

## DASY - Parameters of Probe: EX3DV4 - SN: 3677

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	117
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	2mm

# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RHA1403-0026SAR

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## ANNEX F: D835V2 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D835V2-4d020\_Aug11**

### CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d020**

Calibration procedure(s): **QA CAL-05.v8  
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **August 26, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 26, 2011

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No. RHA1403-0026SAR

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



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

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

### Glossary:

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

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

# TA Technology (Shanghai) Co., Ltd. Test Report

### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.6.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	835 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.90 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	41.1 ± 6 %	0.89 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

### SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	2.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.34 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>6.11 mW / g ± 16.5 % (k=2)</b>

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.2	0.97 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	53.4 ± 6 %	0.99 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	----	----

### SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	2.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.46 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	1.59 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.26 mW / g ± 16.5 % (k=2)</b>

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 $\Omega$ - 3.1 $j\Omega$
Return Loss	- 27.7 dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 $\Omega$ - 5.4 $j\Omega$
Return Loss	- 25.1 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	April 22, 2004

**DASY5 Validation Report for Head TSL**

Date: 25.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020**

Communication System: CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.930 V/m; Power Drift = 0.03 dB

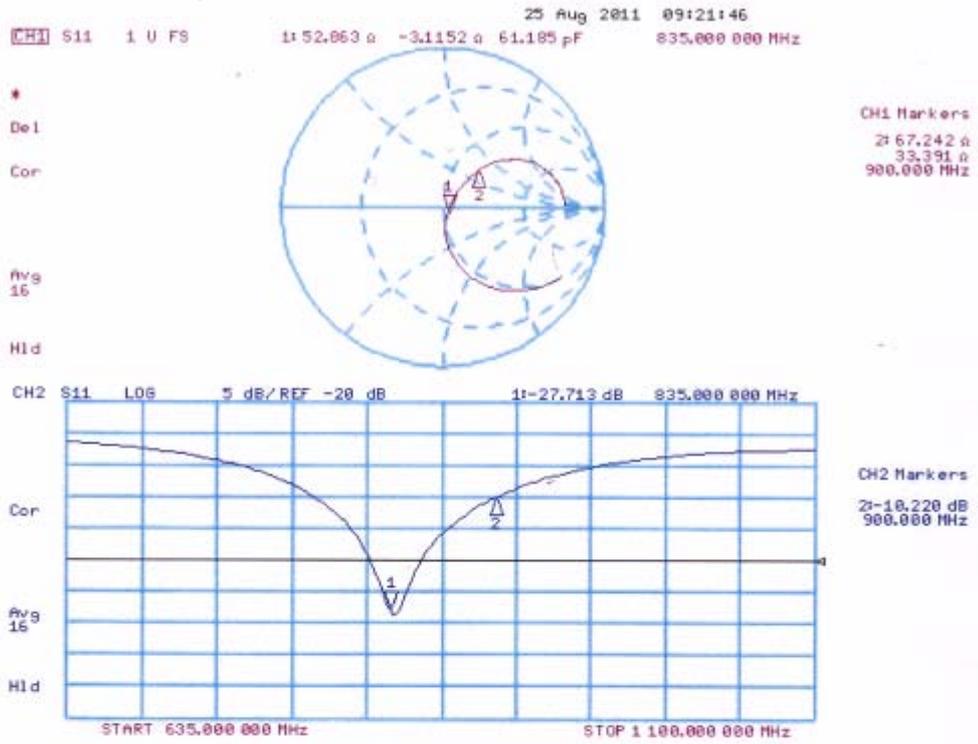
Peak SAR (extrapolated) = 3.421 W/kg

**SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.52 mW/g**

Maximum value of SAR (measured) = 2.708 mW/g



Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 26.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020**

Communication System: CW; Frequency: 835 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.99 \text{ mho/m}$ ;  $\epsilon_r = 53.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

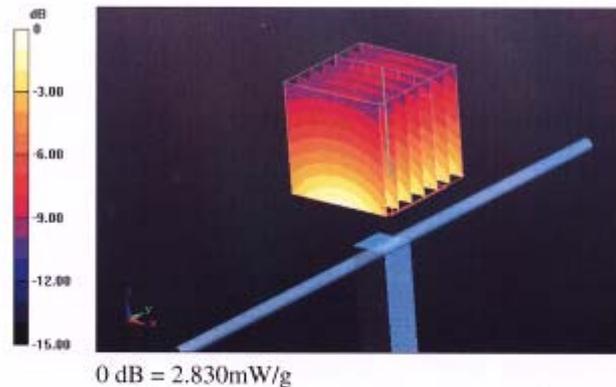
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 55.406 V/m; Power Drift = 0.02 dB

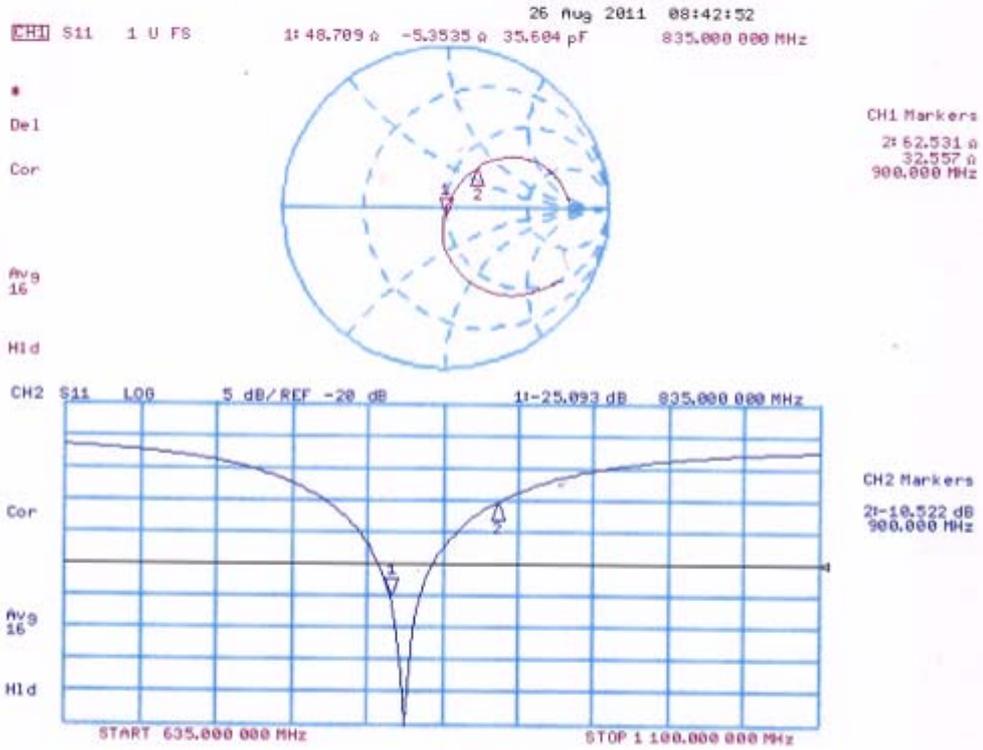
Peak SAR (extrapolated) = 3.509 W/kg

**SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.59 mW/g**

Maximum value of SAR (measured) = 2.827 mW/g



Impedance Measurement Plot for Body TSL



# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RHA1403-0026SAR

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## ANNEX G: D1900V2 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D1900V2-5d060\_Aug11**

### CALIBRATION CERTIFICATE

Object: **D1900V2 - SN: 5d060**

Calibration procedure(s): **QA CAL-05.v8  
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **August 31, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 31, 2011

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

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



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

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

**Glossary:**

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

**Calibration is Performed According to the Following Standards:**

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

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.6.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz $\pm$ 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	39.5 $\pm$ 6 %	1.42 mho/m $\pm$ 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>40.3 mW / g <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>21.1 mW / g <math>\pm</math> 16.5 % (k=2)</b>

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.3	1.52 mho/m
<b>Measured Body TSL parameters</b>	(22.0 $\pm$ 0.2) °C	53.9 $\pm$ 6 %	1.57 mho/m $\pm$ 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	----	----

### SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>41.7 mW / g <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.55 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>22.0 mW / g <math>\pm</math> 16.5 % (k=2)</b>

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	52.6 $\Omega$ + 7.5 j $\Omega$
Return Loss	- 22.3 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	47.3 $\Omega$ + 7.9 j $\Omega$
Return Loss	- 21.3 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.194 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	December 10, 2004

**DASY5 Validation Report for Head TSL**

Date: 30.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

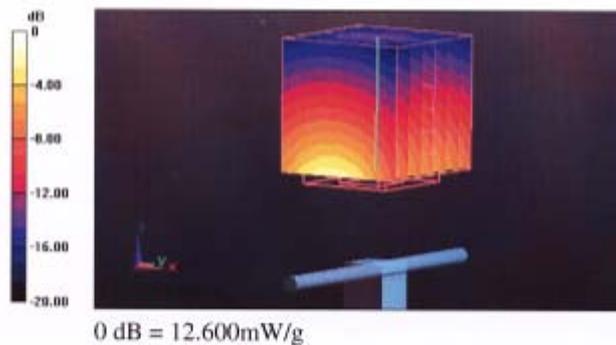
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.636 V/m; Power Drift = 0.07 dB

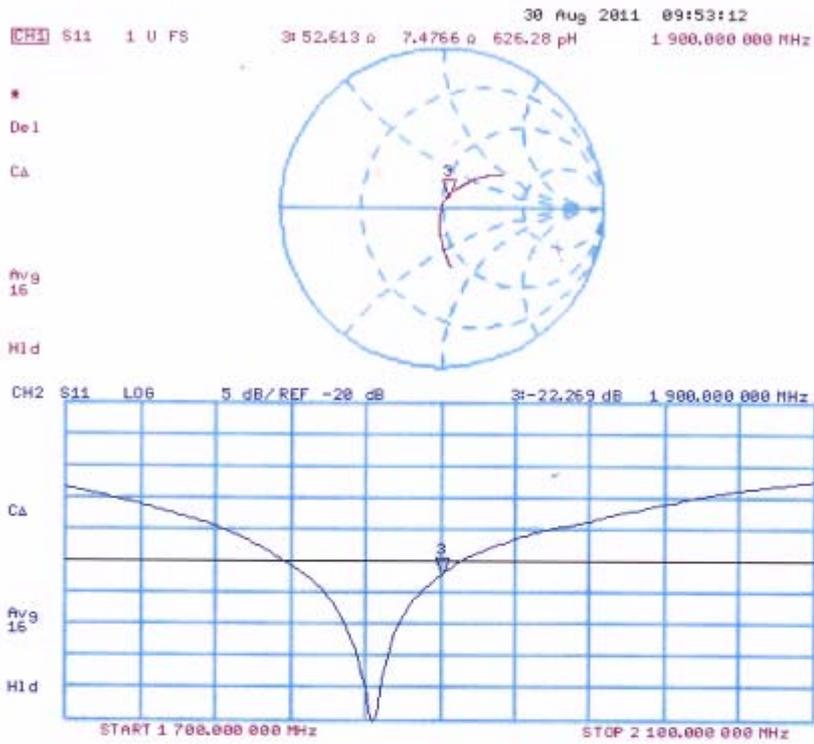
Peak SAR (extrapolated) = 18.535 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.3 mW/g**

Maximum value of SAR (measured) = 12.600 mW/g



Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 31.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

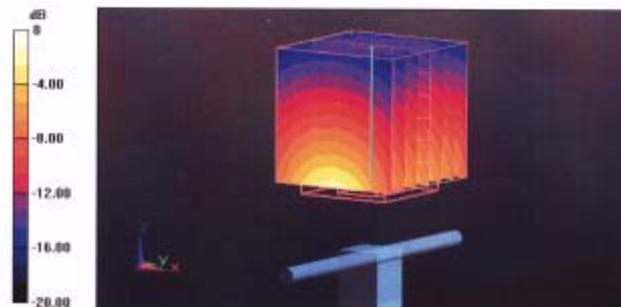
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.435 V/m; Power Drift = -0.0099 dB

Peak SAR (extrapolated) = 18.663 W/kg

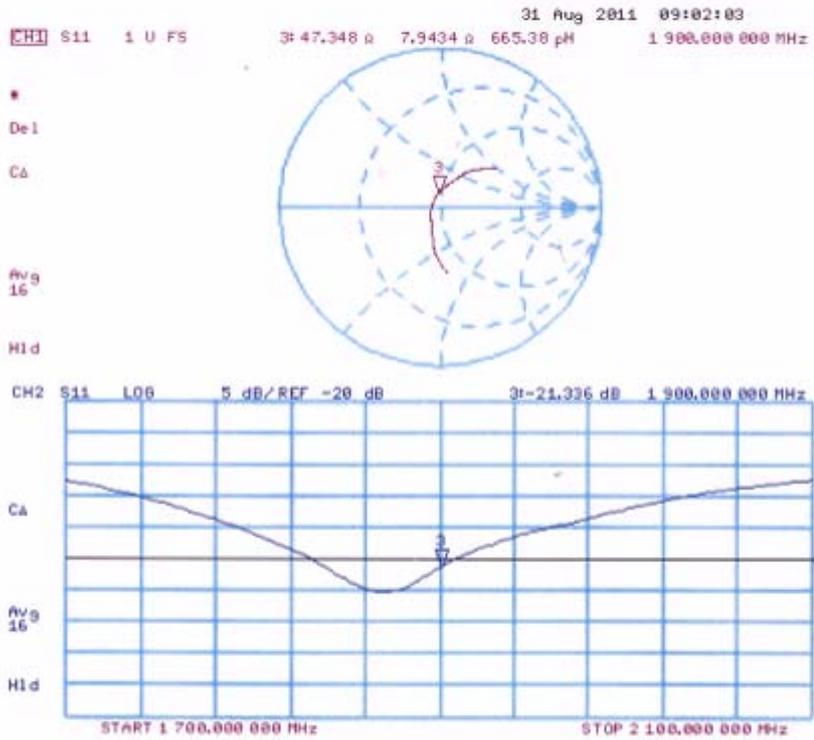
**SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.55 mW/g**

Maximum value of SAR (measured) = 13.397 mW/g



0 dB = 13.400mW/g

Impedance Measurement Plot for Body TSL



# TA Technology (Shanghai) Co., Ltd. Test Report

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## ANNEX H: D2450V2 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D2450V2-786\_Aug11**

### CALIBRATION CERTIFICATE

Object: **D2450V2 - SN: 786**

Calibration procedure(s): **QA CAL-05.v8  
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **August 29, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name <b>Dimce Iliev</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Technical Manager <b>Technical Manager</b>	

Issued: August 29, 2011

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

# TA Technology (Shanghai) Co., Ltd.

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



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

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

### Glossary:

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

### Calibration is Performed According to the Following Standards:

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

# TA Technology (Shanghai) Co., Ltd. Test Report

### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.6.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	2450 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	39.2	1.80 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	38.4 ± 6 %	1.85 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

### SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	13.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>53.8 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	6.41 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>25.4 mW / g ± 16.5 % (k=2)</b>

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	52.7	1.95 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	51.8 ± 6 %	2.02 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	----	----

### SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>51.7 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	6.10 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>24.2 mW / g ± 16.5 % (k=2)</b>

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	$55.0 \Omega + 2.4 j\Omega$
Return Loss	- 25.5 dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.4 \Omega + 3.5 j\Omega$
Return Loss	- 29.0 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.154 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 06, 2005

**DASY5 Validation Report for Head TSL**

Date: 29.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786**

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.85$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

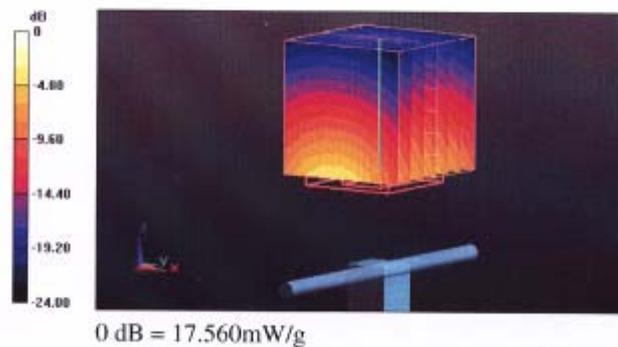
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.5 V/m; Power Drift = 0.06 dB

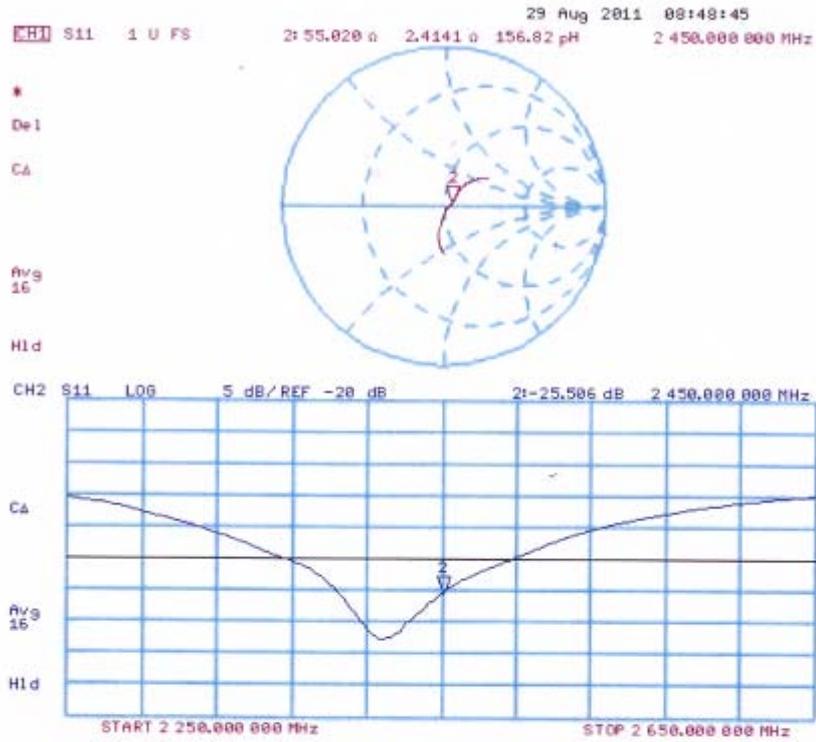
Peak SAR (extrapolated) = 28.303 W/kg

**SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.41 mW/g**

Maximum value of SAR (measured) = 17.561 mW/g



Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 29.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786**

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.02$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

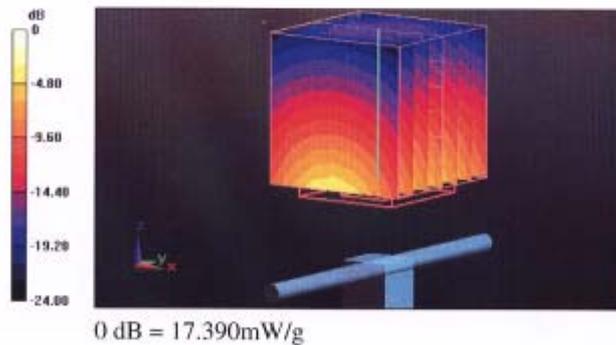
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.118 V/m; Power Drift = 0.0072 dB

Peak SAR (extrapolated) = 27.129 W/kg

**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.1 mW/g**

Maximum value of SAR (measured) = 17.387 mW/g

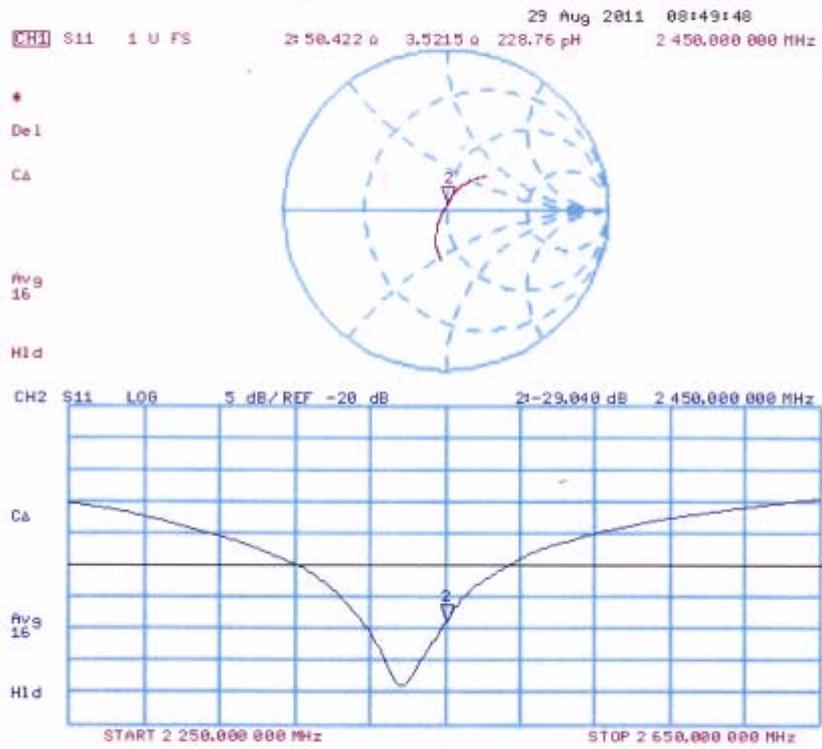


# TA Technology (Shanghai) Co., Ltd. Test Report

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## Impedance Measurement Plot for Body TSL



# TA Technology (Shanghai) Co., Ltd. Test Report

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## ANNEX I: DAE4 Calibration Certificate



In Collaboration with  
**s p e a g**  
CALIBRATION LABORATORY

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504  
E-mail: [info@emcite.com](mailto:info@emcite.com) Http://www.emcite.com



Client : **TA(Shanghai)**

Certificate No: **J14-2-0052**

<b>CALIBRATION CERTIFICATE</b>			
Object	DAE4 - SN: 1317		
Calibration Procedure(s)	TMC-OS-E-01-198 Calibration Procedure for the Data Acquisition Electronics (DAEx)		
Calibration date:	January 16, 2014		
<p>This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity&lt;70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Documenting Process Calibrator 753	1971018	01-July-13 (TMC, No:JW13-049)	July-14
Calibrated by:	Name Yu Zongying	Function SAR Test Engineer	Signature 
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	
<p>Issued: January 16, 2014</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p>			

TA Technology (Shanghai) Co., Ltd.  
Test Report

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**Glossary:**

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

**Methods Applied and Interpretation of Parameters:**

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

# TA Technology (Shanghai) Co., Ltd. Test Report

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In Collaboration with  
**s p e a g**  
CALIBRATION LABORATORY

Add: No 52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504  
E-mail: [Info@emcite.com](mailto:Info@emcite.com) Http://www.emcite.com

### DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV, full range = -100...+300 mV

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

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

Calibration Factors	X	Y	Z
High Range	404.058 ± 0.15% (k=2)	404.060 ± 0.15% (k=2)	403.954 ± 0.15% (k=2)
Low Range	3.99002 ± 0.7% (k=2)	3.99910 ± 0.7% (k=2)	3.98303 ± 0.7% (k=2)

### Connector Angle

Connector Angle to be used in DASY system	119° ± 1°
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# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### 1. DC Voltage Linearity

High Range		Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X	+ Input	199996.94	-1.27	-0.00
Channel X	+ Input	20000.14	-0.07	-0.00
Channel X	- Input	-19997.83	3.06	-0.02
Channel Y	+ Input	199996.34	-1.76	-0.00
Channel Y	+ Input	19997.45	-2.66	-0.01
Channel Y	- Input	-20000.85	0.11	-0.00
Channel Z	+ Input	199999.43	1.31	0.00
Channel Z	+ Input	19998.09	-2.03	-0.01
Channel Z	- Input	-20000.38	0.66	-0.00

Low Range		Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X	+ Input	2000.20	-0.38	-0.02
Channel X	+ Input	201.23	0.09	0.04
Channel X	- Input	-197.80	0.90	-0.45
Channel Y	+ Input	2000.37	-0.14	-0.01
Channel Y	+ Input	200.23	-0.93	-0.46
Channel Y	- Input	-199.71	-0.91	0.46
Channel Z	+ Input	2000.07	-0.47	-0.02
Channel Z	+ Input	200.24	-0.94	-0.47
Channel Z	- Input	-199.53	-0.70	0.35

#### 2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	10.10	8.39
	- 200	-6.31	-7.87
Channel Y	200	7.67	7.42
	- 200	-9.57	-9.68
Channel Z	200	2.03	1.67
	- 200	-2.67	-3.15

#### 3. Channel separation

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	5.61	-1.03
Channel Y	200	9.77	-	7.17
Channel Z	200	9.96	6.56	-

# TA Technology (Shanghai) Co., Ltd.

## Test Report

#### 4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15897	16637
Channel Y	16146	15425
Channel Z	16377	16752

#### 5. Input Offset Measurement

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

Input 10M $\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	0.62	-0.20	1.36	0.34
Channel Y	-0.89	-1.83	-0.02	0.33
Channel Z	-0.59	-2.34	1.15	0.60

#### 6. Input Offset Current

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

#### 7. Input Resistance (Typical values for information)

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

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

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

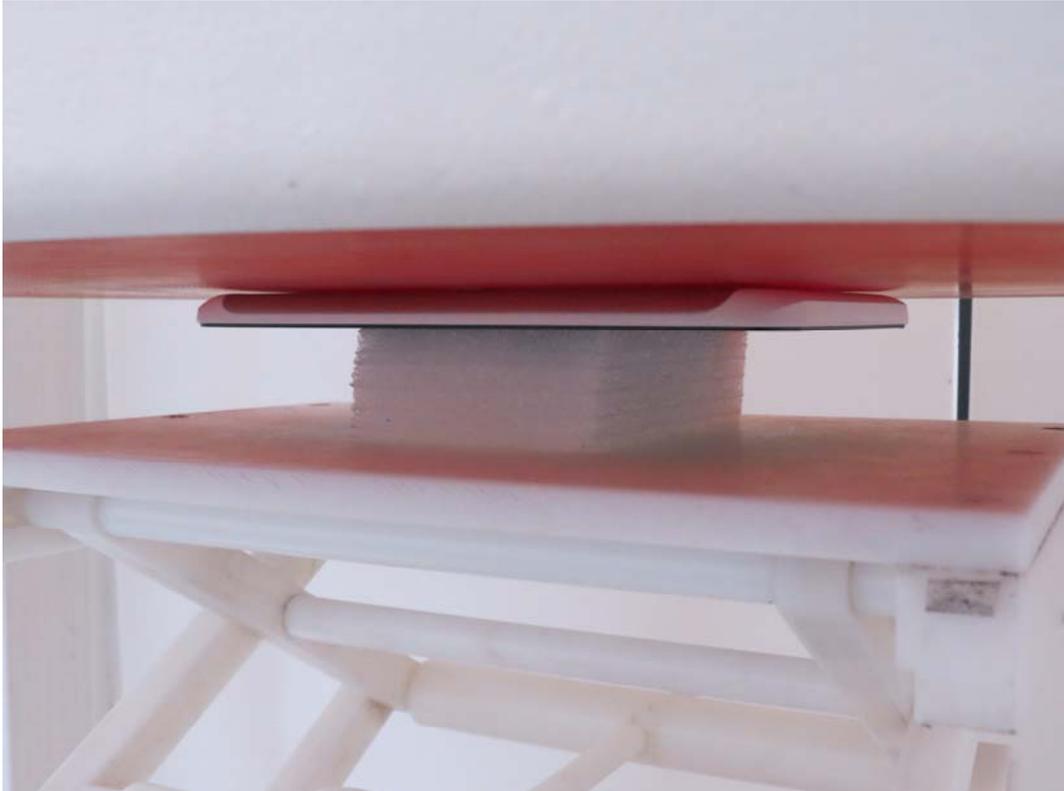
#### 9. Power Consumption (Typical values for information)

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

**ANNEX J: The EUT Appearances and Test Configuration**



Picture 5: Constituents of the EUT (Original)



**Picture 6: Test position 1 (Original)**



**Picture 7: Test Position 2 (Original)**



**Picture 8: Test Position 3 (Original)**



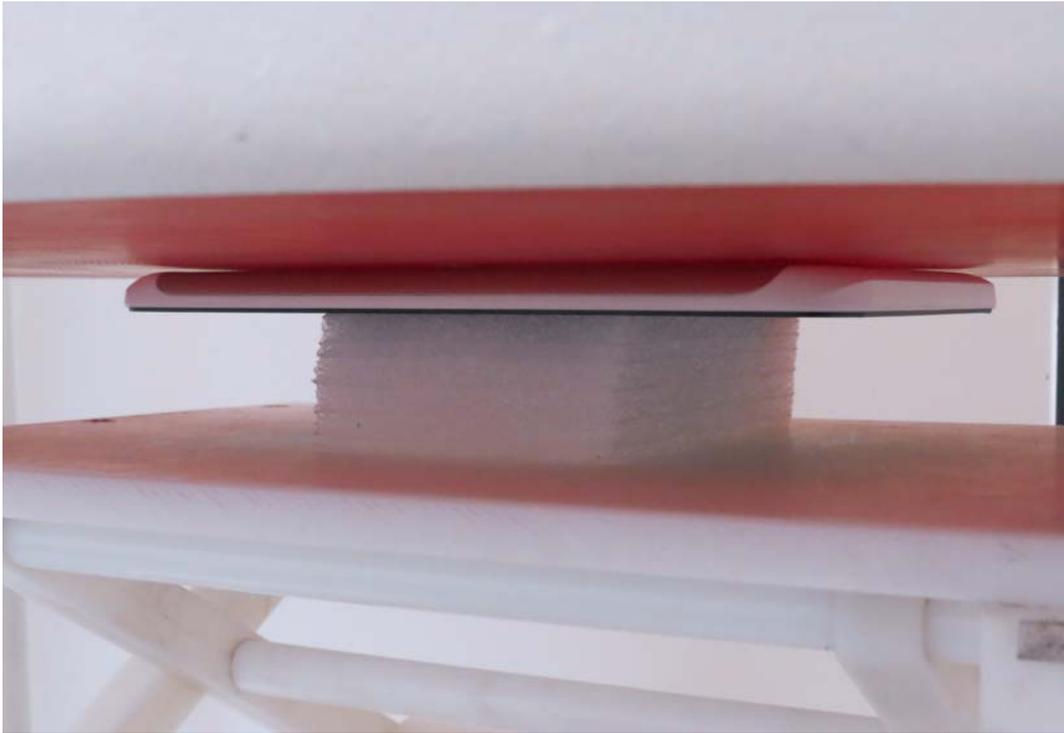
**Picture 9: Test Position 4 (Original)**



**Picture 10: Test Position 5 (Original)**



Picture 11: Constituents of the EUT (Variant)



**Picture 12: Test Position 1 (Variant)**

## **ANNEX K Product Change Description**

The differences between S7-722u ,S7-721g is :

	S7-722u	S7-721g
PCB	the same	the same
WIFI/BT 2.4G	the same	the same
GSM850/1900	the same	the same
WCDMA1900/850	support	Not support by software