



Report No.: RZA2010-0428



# OET 65

# TEST REPORT

<b>Product Name</b>	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
<b>Model</b>	HAUWEI U8100-9/U8100-9/IVY
<b>FCC ID</b>	QISU8100-9
<b>Client</b>	HUAWEI Technologies Co., Ltd.

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



## GENERAL SUMMARY

<b>Product Name</b>	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth	<b>Model</b>	HAUWEI U8100-9/U8100-9/IVY
<b>FCC ID</b>	QISU8100-9	<b>Report No.</b>	RZA2010-0428
<b>Client</b>	HUAWEI Technologies Co., Ltd.		
<b>Manufacturer</b>	HUAWEI Technologies Co., Ltd.		
<b>Reference Standard(s)</b>	<p><b>IEEE Std C95.1, 1999:</b> IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.</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>SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001+DA 02-1438 June 19, 2002:</b> Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions</p> <p><b>RSS-102 Issue 4 March 2010:</b> Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)</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.</p> <p>General Judgment: <b>Pass</b></p> <div style="text-align: right;">  <p>(Stamp) Date of issue: March 29<sup>th</sup>, 2010</p> </div>		
<b>Comment</b>	The test result only responds to the measured sample.		

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## 1. General Information

### 1.1. Notes of the test report

**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.

**TA Technology (Shanghai) Co., Ltd.** is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

This report standalone dose not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of **TA Technology (Shanghai) Co., Ltd.** and the Accreditation Bodies, if it applies.

### 1.2. Testing laboratory

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## 1.3. Applicant Information

Company: HUAWEI Technologies Co., Ltd.  
Address: Bantian, Longgang District  
City: Shenzhen  
Postal Code: 518129  
Country: P.R. China  
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## 1.4. Manufacturer Information

Company: HUAWEI Technologies Co., Ltd.  
Address: Bantian, Longgang District  
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Postal Code: 518129  
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**1.5. Information of EUT**

**General information**

Device type :	portable device		
Exposure category:	uncontrolled environment / general population		
Product Name:	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth		
IMEI or SN:	/		
Device operating configurations :			
Operating mode(s):	GSM850; (tested) GSM1900; (tested) WCDMA Band IV; (tested)		
Test Modulation:	(GSM) GMSK, (WCDMA)QPSK		
GPRS multislot class :	10		
EGPRS multislot class :	10		
Maximum no. of timeslots in uplink:	2		
HSDPA UE category	6		
Operating frequency range(s):	Band	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	WCDMA Band IV	1712.4 ~ 1752.6	2112.4 ~ 2152.2
Power class	GSM 850: 4, tested with power level 5		
	GSM 1900: 1, tested with power level 0		
	WCDMA Band IV: 3, tested with maximum output power		
Test channel (Low –Middle –High)	128 -190 -251 512 - 661-810 1312-1413-1513	(GSM850) (GSM1900) (WCDMA Band IV)	(tested) (tested) (tested)
Hardware version:	HD3U811M Ver.A		
Software version:	U8109V100R001C00B210		
Antenna type:	Internal antenna		

**Auxiliary equipment details**

**AE1: Battery**

Model: HB5A2H  
Manufacture: HUAWEI Technologies Co., Ltd.  
IMEI or SN: YAC9210H10302487

**AE2: Travel Adaptor**

Model: HS-050040U5  
Manufacture: HUAWEI Technologies Co., Ltd.  
IMEI or SN: /

Equipment Under Test (EUT) is a model of HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth with internal antenna. The detail about Mobile phone, Lithium Battery and AC/DC Adapter is in chapter 1.5. in this report. SAR is tested for GSM 850, GSM 1900 and WCDMA Band IV.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

**1.6. Test Date**

The test is performed from March 25, 2010 to March 28, 2010.

## **2. Operational Conditions during Test**

### **2.1. General description of test procedures**

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 190 and 251 in the case of GSM 850, to 512, 661 and 810 in the case of GSM 1900, to 1312, 1413 and 1513 in the case of WCDMA Band IV. The EUT is commanded to operate at maximum transmitting power.

Connection to the EUT is established via air interface with E5515C, and the EUT is set to maximum output power by E5515C. 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.

### **2.2. GSM Test Configuration**

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. Using E5515C the power level is set to "5" in head SAR and body SAR of GSM850, set to "0" in head SAR and body SAR of GSM1900. The tests in the band of GSM850 and GSM1900 are performed in the mode of speech transfer function and GPRS/EGPRS function. Since the GPRS class is 10 or this EUT, it has at most 2 timeslots in uplink. The EGPRS class is 10 for this EUT, it has at most 2 timeslots in uplink.

### **2.3. WCDMA Test Configuration**

#### **2.3.1. Output power Verification**

Maximum output power is verified on the High, Middle and Low channel according to the procedures described in section 5.2 of 3GPP TS 34. 121, using the appropriate RMC or AMR with TPC(transmit power control) set to all "1's" for WCDMA/HSDPA or applying the required inner loop power control procedures to the maximum output power while HSUPA is active. Results for all applicable physical channel configuration (DPCCH, DPDCH<sub>n</sub> and spreading codes, HSDPA, HSPA) should be tabulated in the SAR report. All configuration that are not supported by the DUT or can not be measured due to technical or equipment limitations should be clearly identified.

#### **2.3.2. Head SAR Measurements**

SAR for head exposure configurations in voice mode is measured using a 12.2kbps RMC with TPC bits configured to all "1's". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2kbps AMR is less than 1/4 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2kbps AMR with a 3.4 kbps SRB( Signaling radio bearer) using the exposure configuration that results in the highest SAR in 12.2kbps RMC for that RF channel.

### **2.3.3. Body SAR Measurements**

SAR for body exposure configurations in voice and data modes is measured using 12.2kbps RMC with TPC bits configured to all "1's". SAR for other spreading codes and multiple DPDCH<sub>n</sub>, when supported by the DUT, are not required when the maximum average output of each RF channel, for each spreading code and DPDCH<sub>n</sub> configuration, are less than 1/4 dB higher than those measured in 12.2kbps RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or DPDCH<sub>n</sub> using the exposure configuration that results in the highest SAR with 12.2 kbps RMC. When more than 2 DPDCH<sub>n</sub> are supported by the DUT, it may be necessary to configure additional DPDCH<sub>n</sub> for a DUT using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

### **2.4. HSDPA Test Configuration**

SAR for body exposure configurations is measured according to the "Body SAR Measurements" procedures of that section. In addition, body SAR is also measured for HSDPA when the maximum average output of each RF channel with HSDPA active is at least 1/4 dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.

HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set f. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors ( $\beta_c$ ,  $\beta_d$ ), and HS-DPCCH power offset parameters ( $\Delta_{ACK}$ ,  $\Delta_{NACK}$ ,  $\Delta_{CQI}$ ) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

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**Table 1: Subtests for UMTS Release 5 HSDPA**

Sub-set	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c / \beta_d$	$\beta_{hs}$ (note 1, note 2)	CM (dB) (note 3)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (note 4)	15/15 (note 4)	64	12/15 (note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$   
 Note2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1.A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA,  $\Delta_{ACK}$  and  $\Delta_{NACK} = 8$  ( $A_{hs} = 30/15$ ) with  $\beta_{hs} = 30/15 * \beta_c$ , and  $\Delta_{CQI} = 7$  ( $A_{hs} = 24/15$ ) with  $\beta_{hs} = 24/15 * \beta_c$ .  
 Note3: CM=1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.  
 Note 4: For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

**Table 2: Settings of required H-Set 1 QPSK in HSDPA mode**

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	534
Inter-TTI Distance	TTI's	3
Number of HARQ Processes	Processes	2
Information Bit Payload ( $N_{INF}$ )	Bits	3202
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	4800
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	9600
Coding Rate		0.67
Number of Physical Channel Codes	Codes	5
Modulation	/	QPSK

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**Table 3: HSDPA UE category**

<b>HS-DSCH Category</b>	<b>Maximum HS-DSCH Codes Received</b>	<b>Minimum Inter-TTI Interval</b>	<b>Maximum Transport Bits/HS-DSCH</b>	<b>Total Channel</b>
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

### 3. SAR Measurements System Configuration

#### 3.1. SAR Measurement Set-up

The DASY4 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 DASY4 measurement server.
- The DASY4 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
- DASY4 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.

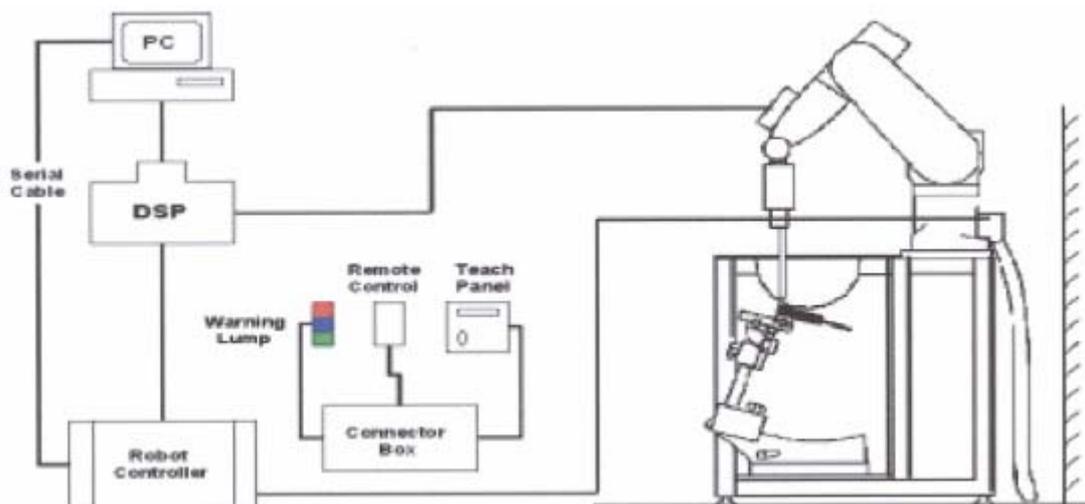


Figure 1. SAR Lab Test Measurement Set-up

### 3.2. DASY4 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.

#### 3.2.1. 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	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835 ,HSL 900, HSL 1750 and HSL 1950 Additional CF for other liquids and frequencies upon request
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

### 3.2.2. 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>).

### 3.3. Other Test Equipment

#### 3.3.1. Device Holder for Transmitters

The DASY device holder is designed to cope with the different positions given in the standard.

It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.



**Figure 4 Device Holder**

### 3.3.2. Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden Figure. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Shell Thickness	2±0.1 mm
Filling Volume	Approx. 20 liters
Dimensions	810 x 1000 x 500 mm (H x L x W)
Available	Special



**Figure 5 Generic Twin Phantom**

### 3.4. Scanning procedure

The DASY4 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 DASY4 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°.)
- 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 of 15 mm x 15 mm is set. During the 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

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

- 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 DASY4 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 and all local maxima within -2 dB of the global maxima for all 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. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

### **3.5. Data Storage and Evaluation**

#### **3.5.1. Data Storage**

The DASY4 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 ".DA5". 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.

#### **3.5.2. 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 DASY4 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.

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

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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

### 3.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates 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 simulates, 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 10 and table 11.

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 DASY4 system.

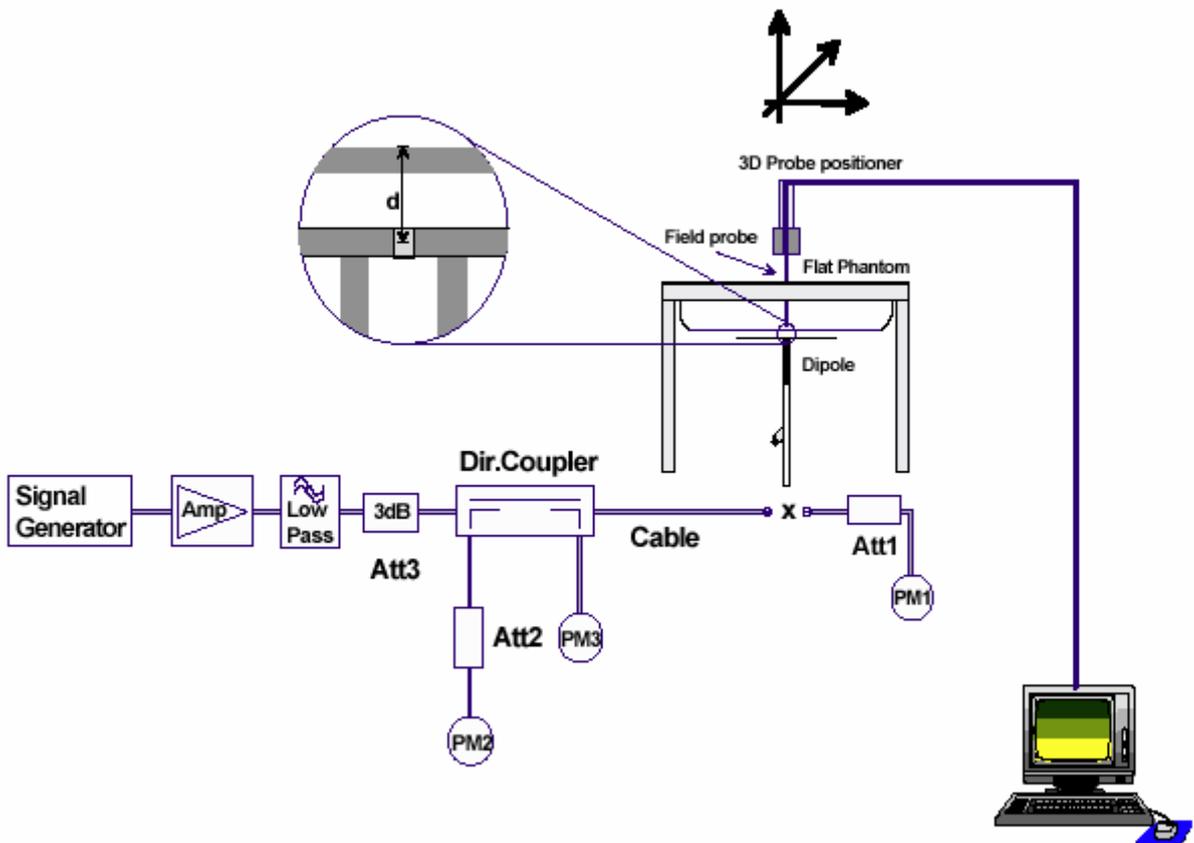


Figure 6 System Check Set-up

### 3.7. Equivalent Tissues

The liquid is consisted of water, salt, Glycol, Sugar, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 4 and Table 5 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

**Table 4: Composition of the Head Tissue Equivalent Matter**

MIXTURE%	FREQUENCY(Brain) 835MHz
Water	41.45
Sugar	56
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz $\epsilon=41.5$ $\sigma=0.9$

MIXTURE%	FREQUENCY(Brain)1750MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1750MHz $\epsilon=40.1$ $\sigma=1.37$

MIXTURE%	FREQUENCY(Brain)1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz $\epsilon=40.0$ $\sigma=1.40$

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**Table 5: 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) 1750MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1750MHz $\epsilon=53.4$ $\sigma=1.49$

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

#### 4. Laboratory Environment

**Table 6: The Ambient Conditions during Test**

Temperature	Min. = 20°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 $\Omega$
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.	

## **5. Characteristics of the Test**

### **5.1. Applicable Limit Regulations**

**IEEE Std C95.1, 1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz.

It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

### **5.2. Applicable Measurement Standards**

**IEEE Std 1528™-2003:** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

**SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001+DA 02-1438 June 19, 2002:** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions

**RSS-102 Issue 4 March 2010:** Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

## 6. Conducted Output Power Measurement

### 6.1. Summary

The DUT is tested using an E5515C communications tester as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted power. Conducted output power was measured using an integrated RF connector and attached RF cable. This result contains conducted output power for the EUT.

### 6.2. Conducted Power Results

**Table 7: Conducted Power Measurement Results**

<b>GSM 850</b>	<b>Conducted Power</b>		
	Channel 128	Channel 190	Channel 251
Before Test (dBm)	32.76	32.83	32.77
After Test (dBm)	32.72	32.84	32.79
<b>GSM 850+GPRS</b>	<b>Conducted Power</b>		
	Channel 128	Channel 190	Channel 251
Before Test (dBm)	32.51	32.39	32.51
After Test (dBm)	32.48	32.38	32.54
<b>GSM 850+EGPRS</b>	<b>Conducted Power</b>		
	Channel 128	Channel 190	Channel 251
Before Test (dBm)	27.72	27.56	27.69
After Test (dBm)	27.69	27.53	27.66
<b>GSM 1900</b>	<b>Conducted Power</b>		
	Channel 512	Channel 661	Channel 810
Before Test (dBm)	29.88	29.94	29.86
After Test (dBm)	29.92	29.96	29.84
<b>GSM 1900+GPRS</b>	<b>Conducted Power</b>		
	Channel 512	Channel 661	Channel 810
Before Test (dBm)	29.84	29.94	29.90
After Test (dBm)	29.88	29.91	29.86
<b>GSM 1900+EGPRS</b>	<b>Conducted Power</b>		
	Channel 512	Channel 661	Channel 810
Before Test (dBm)	26.95	27.03	27.00
After Test (dBm)	26.96	27.01	27.01
<b>WCDMA Band IV</b>	<b>Conducted Power</b>		

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<b>(12.2kbps RMC)</b>	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	23.51	23.34	23.43
After Test (dBm)	23.48	23.33	23.48
<b>WCDMA Band IV (64kbps AMR)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	23.52	23.30	23.29
After Test (dBm)	23.53	23.28	23.26
<b>WCDMA Band IV (144kbps RMC)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	23.49	23.30	23.47
After Test (dBm)	23.46	23.27	23.42
<b>WCDMA Band IV (384kbps RMC)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	23.52	23.33	23.43
After Test (dBm)	23.56	23.33	23.39
<b>HSDPA Band IV (<math>\beta_c/\beta_d=2/15</math>)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	22.98	22.86	22.74
After Test (dBm)	22.99	22.88	22.74
<b>HSDPA Band IV (<math>\beta_c/\beta_d=12/15</math>)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	22.19	22.01	21.97
After Test (dBm)	22.18	22.03	21.92
<b>HSDPA Band IV (<math>\beta_c/\beta_d=15/8</math>)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	20.69	20.52	20.41
After Test (dBm)	20.66	20.49	20.38
<b>HSDPA Band IV (<math>\beta_c/\beta_d=15/4</math>)</b>	<b>Conducted Power</b>		
	Channel 1312	Channel 1450	Channel 1513
Before Test (dBm)	20.09	20.01	19.88
After Test (dBm)	20.12	19.97	19.86

## 7. Test Results

### 7.1. Dielectric Performance

**Table 8: Dielectric Performance of Head Tissue Simulating Liquid**

Frequency	Description	Dielectric Parameters		Temp °C
		$\epsilon_r$	$\sigma$ (s/m)	
<b>835MHz (head)</b>	Target value ± 5% window	41.50 39.43 — 43.58	0.90 0.86 — 0.95	/
	Measurement value 2010-3-25	42.23	0.93	21.8
<b>1750MHz (head)</b>	Target value ± 5% window	40.10 38.10 — 42.11	1.37 1.30 — 1.44	/
	Measurement value 2010-3-26	40.19	1.37	21.8
<b>1900MHz (head)</b>	Target value ±5% window	40.00 38.00 — 42.00	1.40 1.33 — 1.47	/
	Measurement value 2010-3-27	40.09	1.40	21.9

**Table 9: Dielectric Performance of Body Tissue Simulating Liquid**

Frequency	Description	Dielectric Parameters		Temp °C
		$\epsilon_r$	$\sigma$ (s/m)	
<b>835MHz (body)</b>	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2010-3-25	53.79	0.96	21.8
<b>1750MHz (body)</b>	Target value ±5% window	53.40 50.73 — 56.07	1.49 1.42 — 1.56	/
	Measurement value 2010-3-26	53.16	1.52	21.8
<b>1900MHz (body)</b>	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2010-3-27	52.21	1.53	21.9

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### 7.2. System Check Results

**Table 10: System Check for Head tissue simulation liquid**

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	1g	$\epsilon_r$	$\sigma$ (s/m)	°C
835MHz	Recommended value ±10% window	1.58 1.42 — 1.74	2.42 2.18 — 2.66	40.50	0.89	/
	Measurement value 2010-3-25	1.62	2.48	42.23	0.93	21.9
1800MHz	Recommended value ±10% window	5.14 4.63 — 5.65	9.66 8.69 — 10.63	41.1	1.37	/
	Measurement value 2010-3-26	5.01	9.68	40	1.42	21.9
1900MHz	Recommended value ±10% window	5.38 4.84 — 5.92	10.3 9.27 — 11.33	41	1.42	/
	Measurement value 2010-3-27	5.46	10.6	40.09	1.40	22.1

Note: 1. the graph results see ANNEX B.

2. Recommended Values used derive from the calibration certificate and 250 mW is used as feeding power to the calibrated dipole.

**Table 11: System Check for Body tissue simulation liquid**

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	1g	$\epsilon_r$	$\sigma$ (s/m)	°C
835MHz	Recommended value ±10% window	1.68 1.51 — 1.85	2.56 2.3 — 2.82	53	0.99	/
	Measurement value 2010-3-25	1.68	2.56	53.79	0.96	21.9
1800 MHz	Recommended value ±10% window	4.97 4.47 — 5.47	9.31 8.38 — 10.24	54.2	1.49	/
	Measurement value 2010-3-26	5.25	10.1	52.87	1.56	21.9
1900 MHz	Recommended value ±10% window	5.52 4.97 — 6.07	10.5 9.45 — 11.55	54	1.55	/
	Measurement value 2010-3-27	5.17	9.73	52.21	1.53	21.7

Note: 1. The graph results see ANNEX B.

2. Recommended Values used derive from the calibration certificate and 250 mW is used as feeding power to the Calibrated dipole.

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### 7.3. Test Results

#### 7.3.1. Summary of Measurement Results (GSM850/GPRS/EGPRS)

**Table 12: SAR Values (GSM850/GPRS/EGPRS)**

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.21	
Test Case Of Head		Measurement Result(W/kg)		Power Drift(dB)	
Different Test Position	Channel	10 g Average	1 g Average	Power Drift(dB)	
<b>Test position of Head</b>					
Left hand, Touch cheek	Middle	0.474	0.649	-0.068	Figure 13
Left hand, Tilt 15 Degree	Middle	0.240	0.318	-0.084	Figure 14
Right hand, Touch cheek	High	0.597	0.849	0.032	Figure 15
	Middle	0.488	0.690	0.133	Figure 16
	Low	0.427	0.602	-0.062	Figure 17
Right hand, Tilt 15 Degree	Middle	0.229	0.304	0.059	Figure 18
<b>Test position of Body (Distance 15mm)</b>					
Towards Ground	High	0.528	0.753	-0.055	Figure 19
	Middle	0.435	0.621	0.006	Figure 20
	Low	0.379	0.540	0.085	Figure 21
Towards Phantom	Middle	0.325	0.444	-0.186	Figure 22
<b>Worst case position of Body with Earphone (Distance 15mm)</b>					
Towards Ground	High	0.240	0.353	-0.052	Figure 23
<b>Test position of Body with GPRS(2UP) (Distance 15mm)</b>					
Towards Ground	High	0.663	0.941	0.006	Figure 24
	Middle	0.557	0.804	-0.058	Figure 25
	Low	0.507	0.721	0.058	Figure 26
Towards Phantom	Middle	0.433	0.599	0.104	Figure 27
<b>Worst case position of GPRS with EGPRS(2UP) (Distance 15mm)</b>					
Towards Ground	High	0.651	0.921	-0.134	Figure 28

Note: 1. The value with blue color is the maximum SAR Value of test case of head and body in each test band.

2. Upper and lower frequencies were measured at the worst position.
3. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the high and low channels is optional.

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### 7.3.2. Summary of Measurement Results (GSM1900/GPRS/EGPRS)

**Table 13: SAR Values (GSM1900/GPRS/EGPRS)**

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)	Graph Results
		2.0	1.6		
Test Case Of Head		Measurement Result(W/kg)		Power Drift(dB)	
Different Test Position	Channel	10 g Average	1 g Average		
<b>Test position of Head</b>					
Left hand, Touch cheek	Middle	0.185(max.cube)	0.307(max.cube)	0.188	Figure 29
Left hand, Tilt 15 Degree	Middle	0.083	0.144	0.008	Figure 30
Right hand, Touch cheek	High	0.295	0.525	0.035	Figure 31
	Middle	0.239	0.425	0.031	Figure 32
	Low	0.204	0.362	0.068	Figure 33
Right hand, Tilt 15 Degree	Middle	0.069	0.116	0.026	Figure 34
<b>Test position of Body (Distance 15mm)</b>					
Towards Ground	High	0.131	0.222	-0.006	Figure 35
	Middle	0.105	0.179	0.025	Figure 36
	Low	0.084	0.142	0.009	Figure 37
Towards Phantom	Middle	0.063	0.100	-0.146	Figure 38
<b>Worst case position of Body with Earphone (Distance 15mm)</b>					
Towards Ground	High	0.100	0.173	0.132	Figure 39
<b>Test position of Body with GPRS(2UP) (Distance 15mm)</b>					
Towards Ground	High	0.254	0.430	-0.003	Figure 40
	Middle	0.201	0.341	0.003	Figure 41
	Low	0.165	0.282	0.006	Figure 42
Towards Phantom	Middle	0.123(max.cube)	0.196(max.cube)	-0.058	Figure 43
<b>Worst case position of GPRS with EGPRS(2UP) (Distance 15mm)</b>					
Towards Ground	High	0.254	0.430	-0.046	Figure 44

Note: 1. The value with blue color is the maximum SAR Value of test case of head and body in each test band.

2. Upper and lower frequencies were measured at the worst position.
3. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the high and low channels is optional.
4. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which was within 2.0dB of the highest peak. The value of the highest cube is given in the table above; the value from the second assessed cube is given in the SAR distribution plots (See ANNEX C).

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### 7.3.3. Summary of Measurement Results (WCDMA Band IV/WCDMA/HSDPA)

**Table 14: SAR Values (WCDMA Band IV/WCDMA/HSDPA)**

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.21	
Test Case Of Head		Measurement Result(W/kg)		Power Drift(dB)	
Different Test Position	Channel	10 g Average	1 g Average	Power Drift(dB)	
<b>Test position of Head</b>					
Left hand, Touch cheek	High	0.389(max.cube)	0.714(max.cube)	0.056	Figure 45
	Middle	0.443(max.cube)	0.802(max.cube)	-0.146	Figure 46
	Low	0.547(max.cube)	0.988(max.cube)	-0.129	Figure 47
Left hand, Tilt 15 Degree	Middle	0.164(max.cube)	0.267(max.cube)	0.097	Figure 48
Right hand, Touch cheek	High	0.413(max.cube)	0.872(max.cube)	0.088	Figure 49
	Middle	0.489(max.cube)	0.877(max.cube)	0.086	Figure 50
	Low	0.559(max.cube)	1.000(max.cube)	0.090	Figure 51
Right hand, Tilt 15 Degree	Middle	0.161	0.255	0.036	Figure 52
<b>Test position of Body (Distance 15mm)</b>					
Towards Ground	High	0.204	0.384	-0.077	Figure 53
	Middle	0.237	0.409	-0.013	Figure 54
	Low	0.259	0.450	0.052	Figure 55
Towards Phantom	Middle	0.177(Max)	0.288(Max)	0.153	Figure 56
<b>Worst case position of Body with Earphone (Distance 15mm)</b>					
Towards Ground	Low	0.221	0.386	-0.103	Figure 57
<b>Worst case position of Body with HSDPA (Distance 15mm)</b>					
Towards Ground	Low	0.182	0.315	-0.036	Figure 58

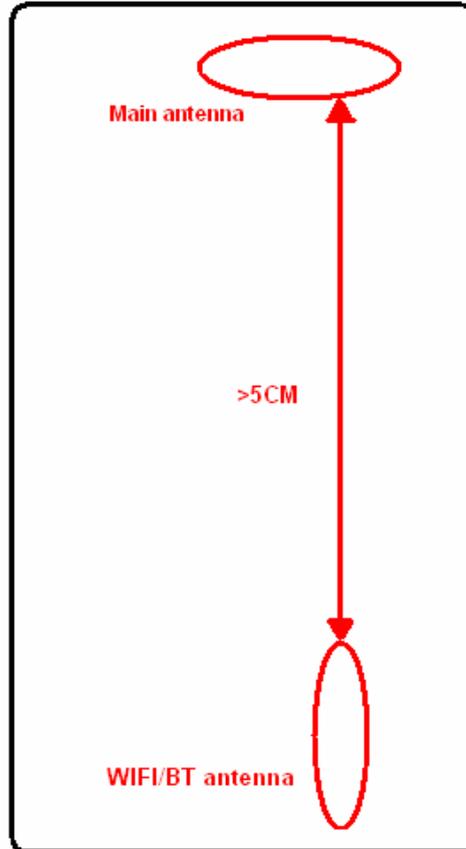
Note: 1. The value with blue color is the maximum SAR Value of test case of head and body in each test band.

2. Upper and lower frequencies were measured at the worst position.
3. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the high and low channels is optional.
4. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which was within 2.0dB of the highest peak. The value of the highest cube is given in the table above; the value from the second assessed cube is given in the SAR distribution plots (See ANNEX C).

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### 7.3.4. Summary of Measurement Results (Bluetooth and Wifi functions)

The distance between BT/WIFI antenna and GSM antenna is >5cm. The location of the antennas inside mobile phone is shown below:



The output power of BT antenna is as following:

Channel	Ch 0 2402 MHz	Ch 39 2441 Mhz	Ch 78 2480 MHz
Peak Conducted Output Power(dBm)	3.09	2.75	1.64

The output power of WIFI antenna is as following:

802.11b	Conducted Power		
	Channel 1 (2412MHz)	Channel 6 (2437MHz)	Channel 11 (2462MHz)
Before Test (dBm)	12.23	12.52	12.27
After Test (dBm)	12.22	12.48	12.31
802.11g	Conducted Power		
	Channel 1 (2412MHz)	Channel 6 (2437MHz)	Channel 11 (2462MHz)
Before Test (dBm)	12.36	12.86	12.35
After Test (dBm)	12.40	12.91	12.38

According to the output power measurement result and the distance between the two antennas, we can draw the conclusion that: stand-alone SAR and simultaneous transmission SAR are not required for BT/WiFi transmitter, because the output power of BT transmitter is  $\leq 2P_{Ref}$  and its antenna is  $\geq 5\text{cm}$  from main antenna.

#### **7.4. Conclusion**

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR<sub>1g</sub> are **1.000** W/kg (head) and **0.941** W/kg (body) that are below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

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**8. Measurement Uncertainty**

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c <sub>i</sub>	Standard uncertainty u <sub>i</sub> (%)	Degree of freedom V <sub>eff</sub> or v <sub>i</sub>
1	System repetivity	A	0.5	N	1	1	0.5	9
Measurement system								
2	probe calibration	B	5.9	N	1	1	5.9	∞
3	axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	1.9	∞
4	Hemispherical isotropy of the probe	B	9.4	R	$\sqrt{3}$	$\sqrt{0.5}$	3.9	∞
6	boundary effect	B	1.9	R	$\sqrt{3}$	1	1.1	∞
7	probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
8	System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	readout Electronics	B	1.0	N	1	1	1.0	∞
10	response time	B	0	R	$\sqrt{3}$	1	0	∞
11	integration time	B	4.32	R	$\sqrt{3}$	1	2.5	∞
12	noise	B	0	R	$\sqrt{3}$	1	0	∞
13	RF Ambient Conditions	B	3	R	$\sqrt{3}$	1	1.73	∞
14	Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
15	Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
16	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Test sample Related								
17	-Test Sample Positioning	A	2.9	N	1	1	2.9	5
18	-Device Holder Uncertainty	A	4.1	N	1	1	4.1	5
19	-Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
Physical parameter								

**TA Technology (Shanghai) Co., Ltd.**  
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20	-phantom	B	4.0	R	$\sqrt{3}$	1	2.3	$\infty$	
21	-liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	$\frac{0.6}{4}$	1.8	$\infty$	
22	-liquid conductivity (measurement uncertainty)	B	5.0	N	1	$\frac{0.6}{4}$	3.2	$\infty$	
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	$\infty$	
24	-liquid permittivity (measurement uncertainty)	B	5.0	N	1	0.6	3.0	$\infty$	
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						12.0	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		24.0		

## 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 13, 2009	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 13, 2010	One year
04	Signal Generator	HP 8341B	2730A00804	September 13, 2009	One year
05	Amplifier	IXA-020	0401	No Calibration Requested	
06	BTS	E5515C	MY48360988	December 4, 2009	One year
07	E-field Probe	EX3DV4	3677	September 23, 2009	One year
08	DAE	DAE4	871	November 11, 2009	One year
09	Validation Kit 835MHz	D835V2	4d082	July 13, 2009	One year
10	Validation Kit 1800MHz	D1800V2	2d052	June 26, 2009	One year
11	Validation Kit 1900MHz	D1900V2	5d018	June 26, 2009	One year

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

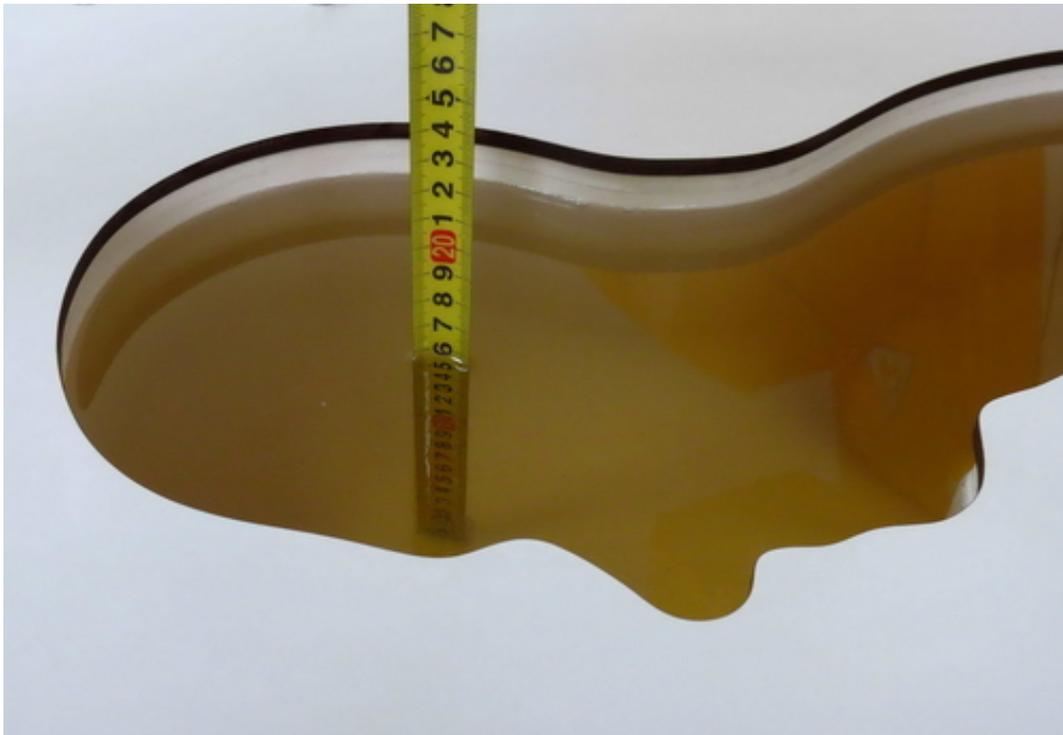
## ANNEX A: Test Layout



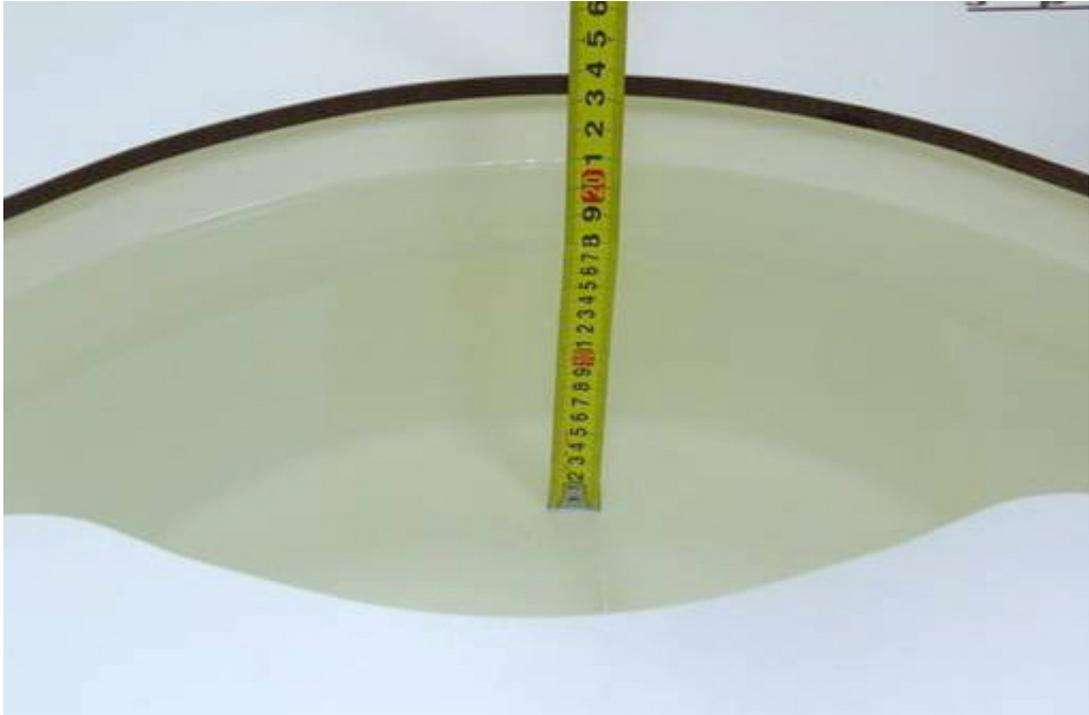
Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the flat Phantom (835MHz)



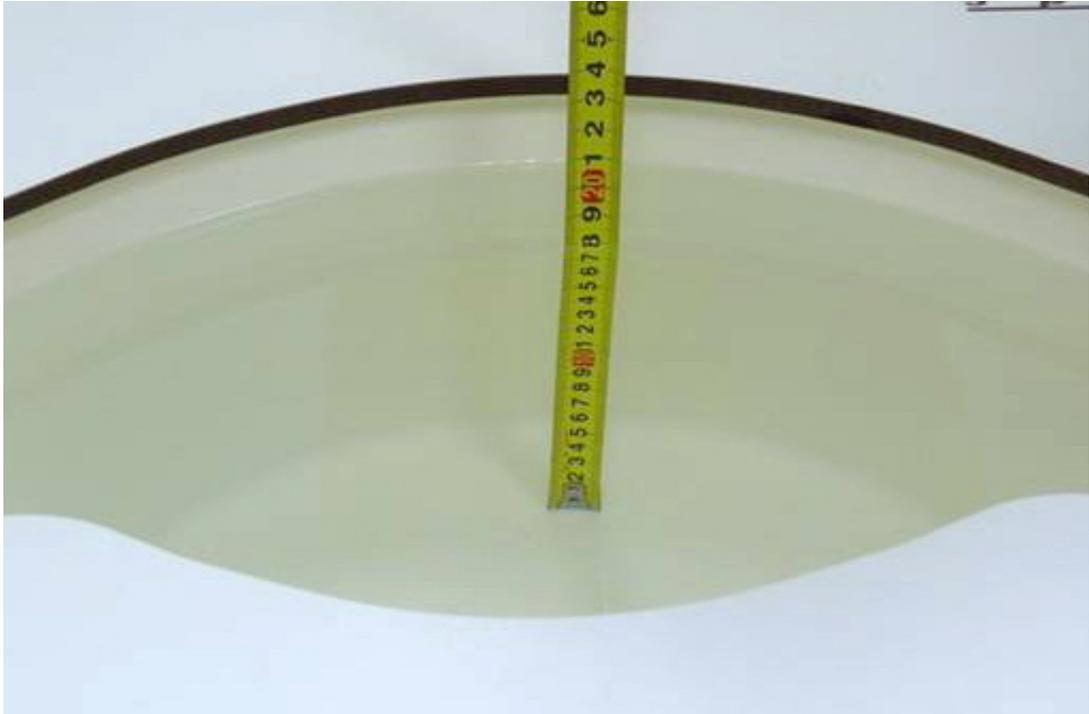
Picture 3: Liquid depth in the head Phantom (835MHz)



Picture 4: Liquid depth in the flat Phantom (1800 MHz)



Picture 5: liquid depth in the head Phantom (1800 MHz)



Picture 6: Liquid depth in the flat Phantom (1900 MHz)



Picture 7: liquid depth in the head Phantom (1900 MHz)

## ANNEX B: System Check Results

### System Performance Check at 835 MHz Head TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082

Date/Time: 3/25/2010 8:27:02 PM

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

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.93 \text{ mho/m}$ ;  $\epsilon_r = 42.23$ ;  $\rho = 1000 \text{ kg/m}^3$

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**835 MHz Dipole/Area Scan (41x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.71 mW/g

**835 MHz Dipole/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.5 V/m; Power Drift = -0.092 dB

Peak SAR (extrapolated) = 3.75 W/kg

**SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.62 mW/g**

Maximum value of SAR (measured) = 2.67 mW/g

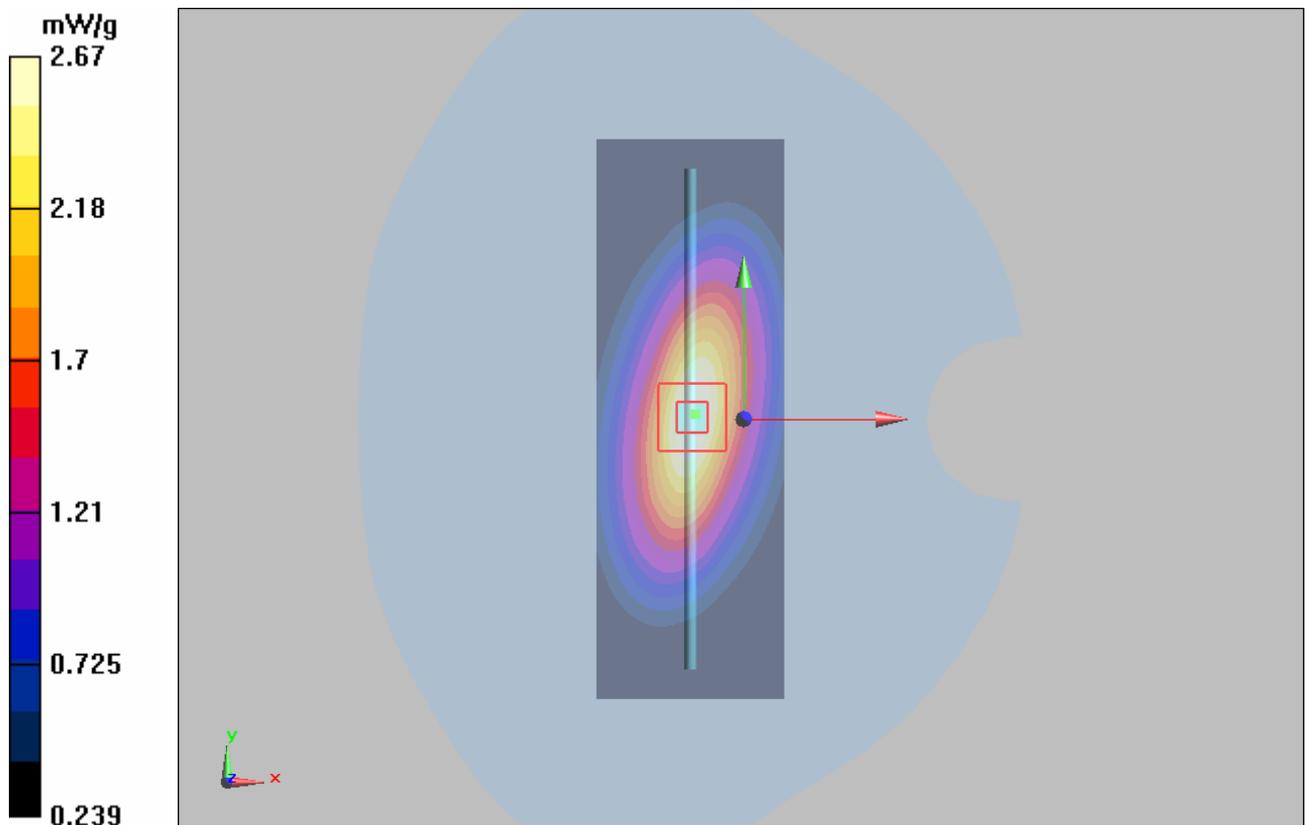


Figure 7 System Performance Check 835MHz 250mW

### System Performance Check at 835 MHz Body TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082

Date/Time: 3/26/2010 5:37:20 PM

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.96$  mho/m;  $\epsilon_r = 53.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**835 MHz Dipole/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.77 mW/g

**835 MHz Dipole/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) = 3.68 W/kg

**SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.68 mW/g**

Maximum value of SAR (measured) = 2.77 mW/g

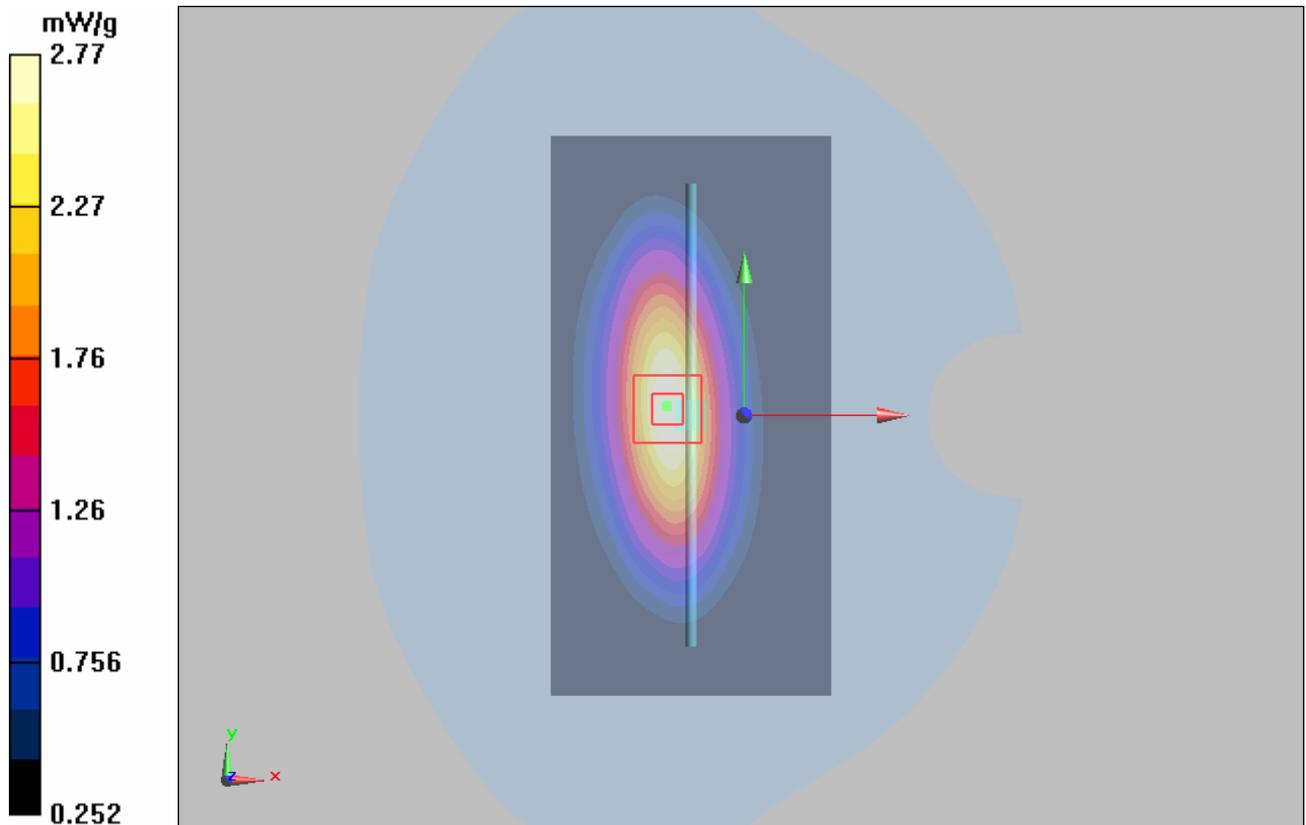


Figure 8 System Performance Check 835MHz 250mW

### System Performance Check at 1800 MHz Head TSL

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d052

Date/Time: 3/26/2010 6:35:04 PM

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.422$  mho/m;  $\epsilon_r = 40$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**1800 MHz Dipole/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.3 mW/g

**1800 MHz Dipole/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 85.3 V/m; Power Drift = 0.080 dB

Peak SAR (extrapolated) = 18.2 W/kg

**SAR(1 g) = 9.68 mW/g; SAR(10 g) = 5.01 mW/g**

Maximum value of SAR (measured) = 10.8 mW/g

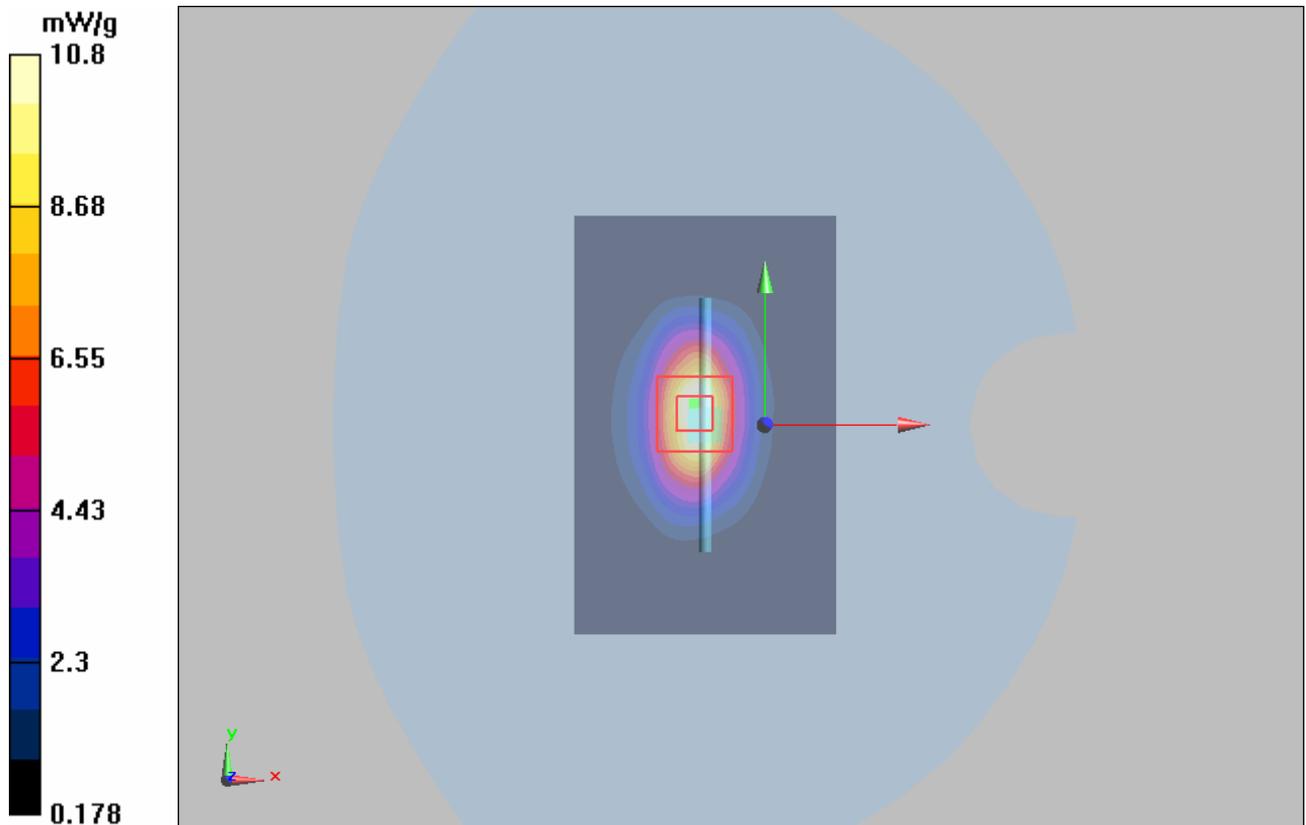


Figure 9 System Performance Check 1800MHz 250mW

### System Performance Check at 1800 MHz Body TSL

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d052

Date/Time: 3/27/2010 2:39:19 PM

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.562$  mho/m;  $\epsilon_r = 52.87$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.7, 7.7, 7.7); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**1800 MHz Dipole/Area Scan (41x71x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.2 mW/g

**1800 MHz Dipole/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 83.2 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 18.5 W/kg

**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.25 mW/g**

Maximum value of SAR (measured) = 11.4 mW/g

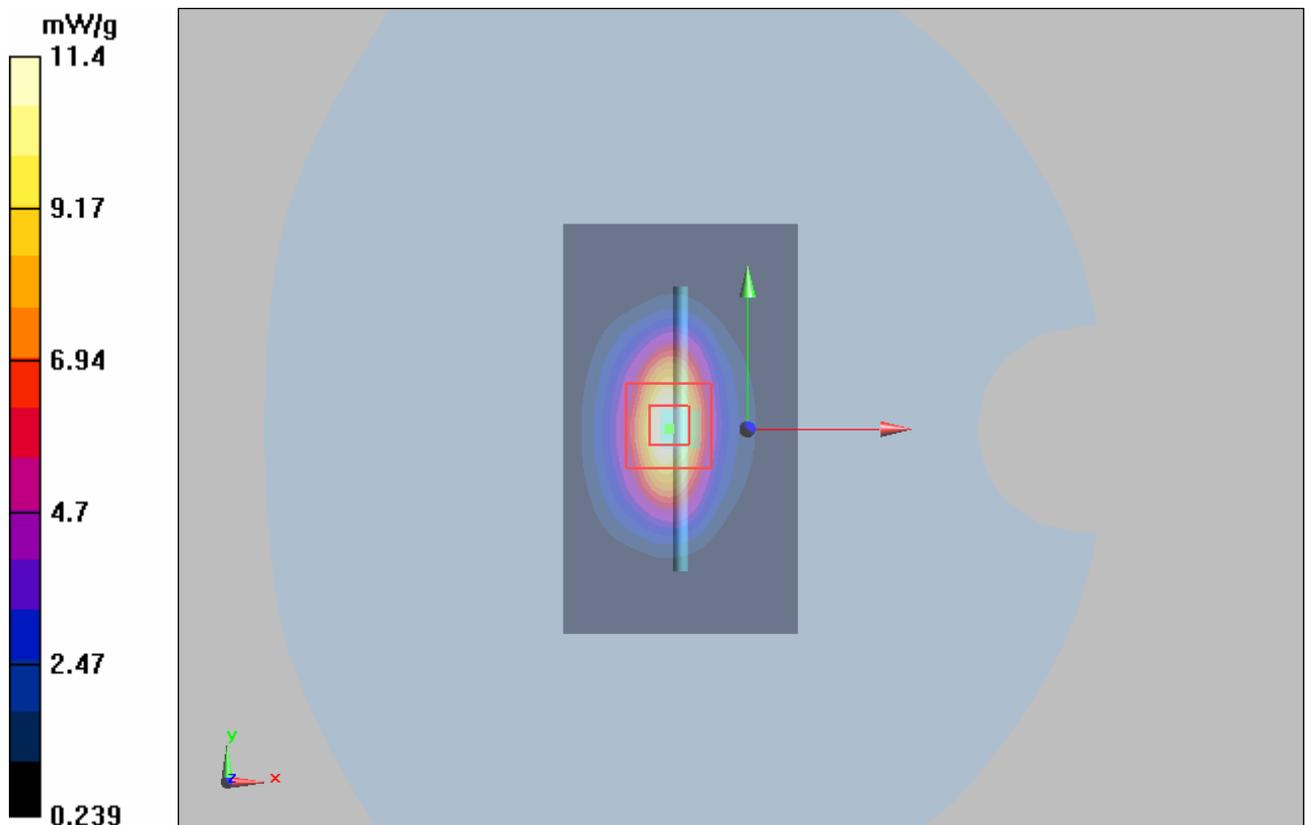


Figure 10 System Performance Check 1800MHz 250mW

**System Performance Check at 1900 MHz Head TSL**

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d018**

Date/Time: 3/27/2010 7:00:04 PM

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

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.402 \text{ mho/m}$ ;  $\epsilon_r = 40.09$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.3 \text{ }^\circ\text{C}$       Liquid Temperature:  $21.5 \text{ }^\circ\text{C}$

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**1900 MHz Dipole/Area Scan (41x71x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) =  $12.9 \text{ mW/g}$

**1900 MHz Dipole/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $87.8 \text{ V/m}$ ; Power Drift =  $0.040 \text{ dB}$

Peak SAR (extrapolated) =  $20.1 \text{ W/kg}$

**SAR(1 g) =  $10.6 \text{ mW/g}$ ; SAR(10 g) =  $5.46 \text{ mW/g}$**

Maximum value of SAR (measured) =  $11.9 \text{ mW/g}$

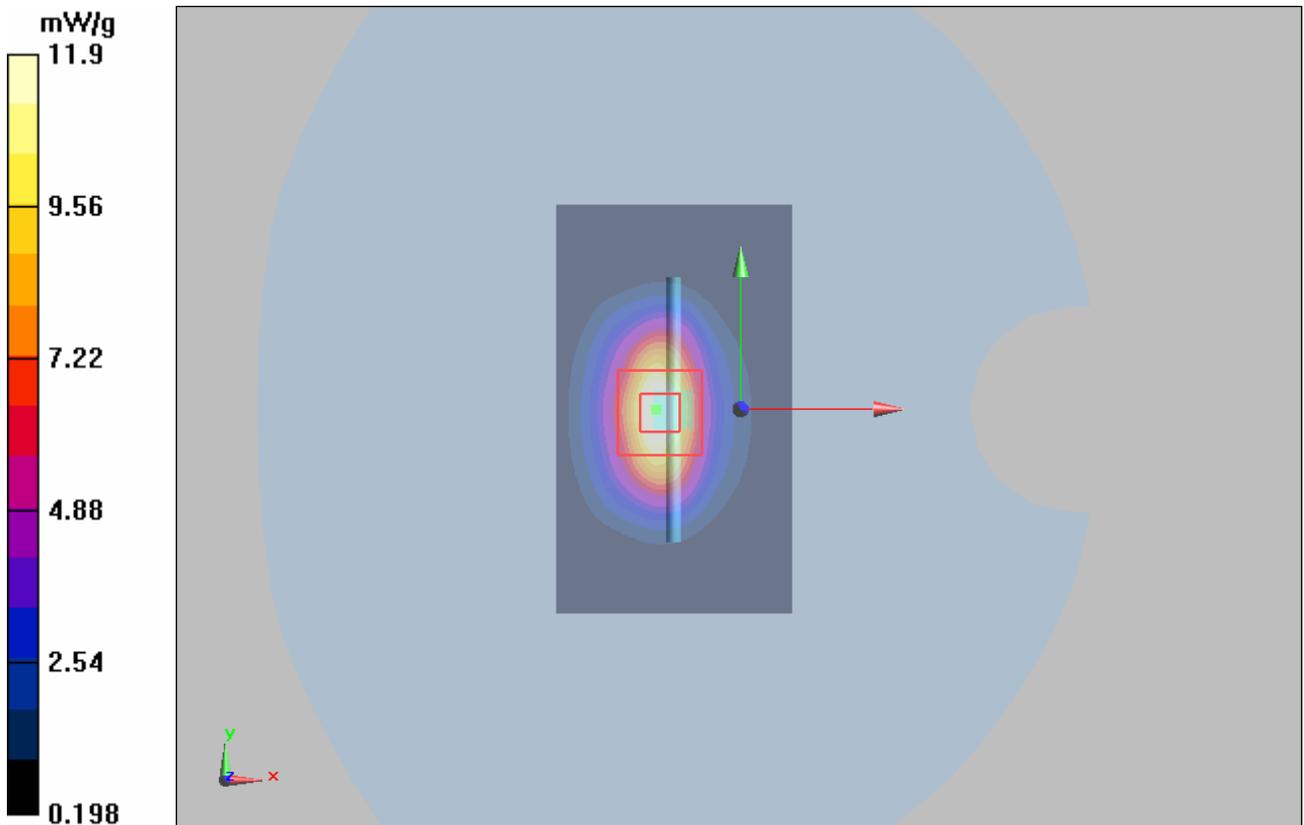


Figure 11 System Performance Check 1900MHz 250mW

### System Performance Check at 1900 MHz Body TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d018

Date/Time: 3/27/2010 10:00:19 PM

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.526$  mho/m;  $\epsilon_r = 52.21$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**1900 MHz Dipole/Area Scan (41x71x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.5 mW/g

**1900 MHz Dipole/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 75.9 V/m; Power Drift = 0.051 dB

Peak SAR (extrapolated) = 16.8 W/kg

**SAR(1 g) = 9.73 mW/g; SAR(10 g) = 5.17 mW/g**

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

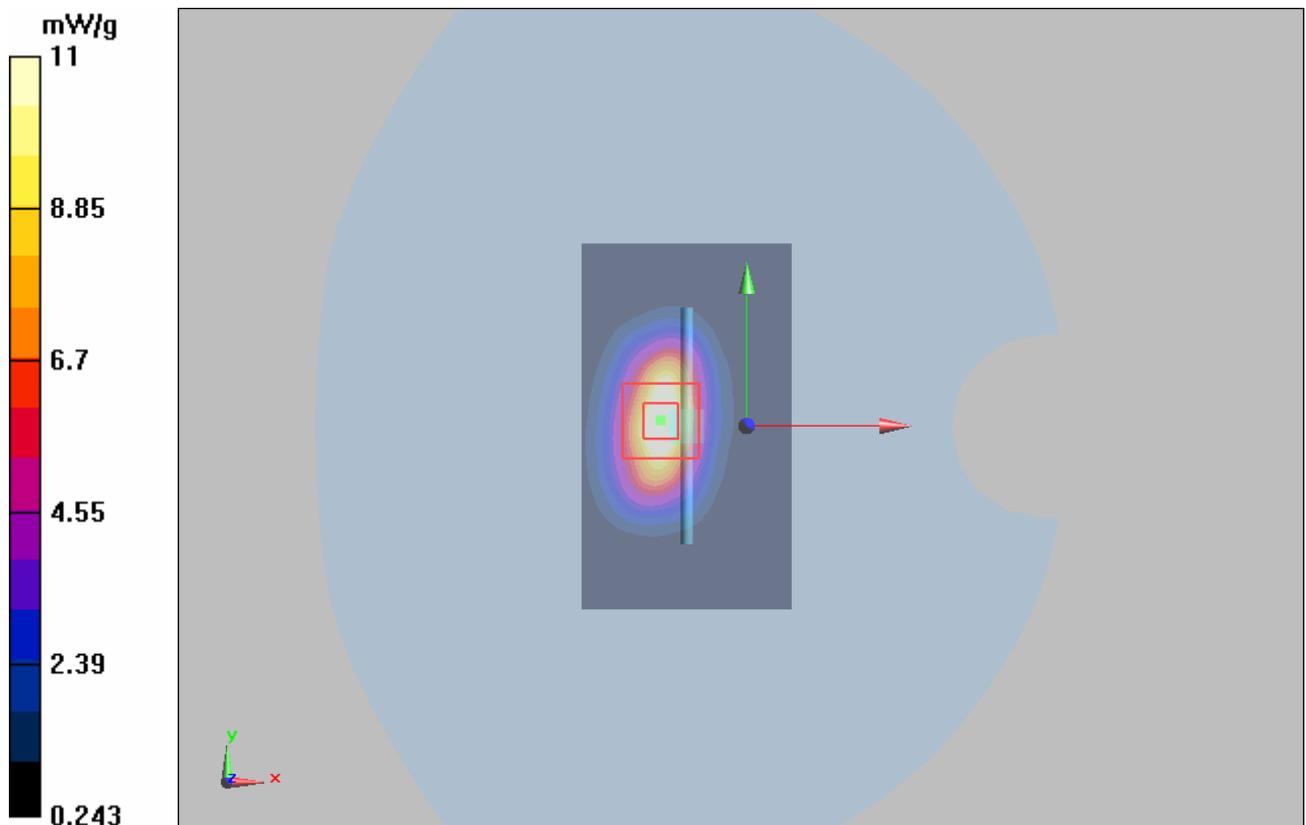


Figure 12 System Performance Check 1900MHz 250mW

## ANNEX C: Graph Results

### GSM 850 Left Cheek Middle

Date/Time: 3/25/2010 10:37:43 PM

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.924$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.707 mW/g

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

Reference Value = 8.69 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 0.839 W/kg

**SAR(1 g) = 0.649 mW/g; SAR(10 g) = 0.474 mW/g**

Maximum value of SAR (measured) = 0.686 mW/g

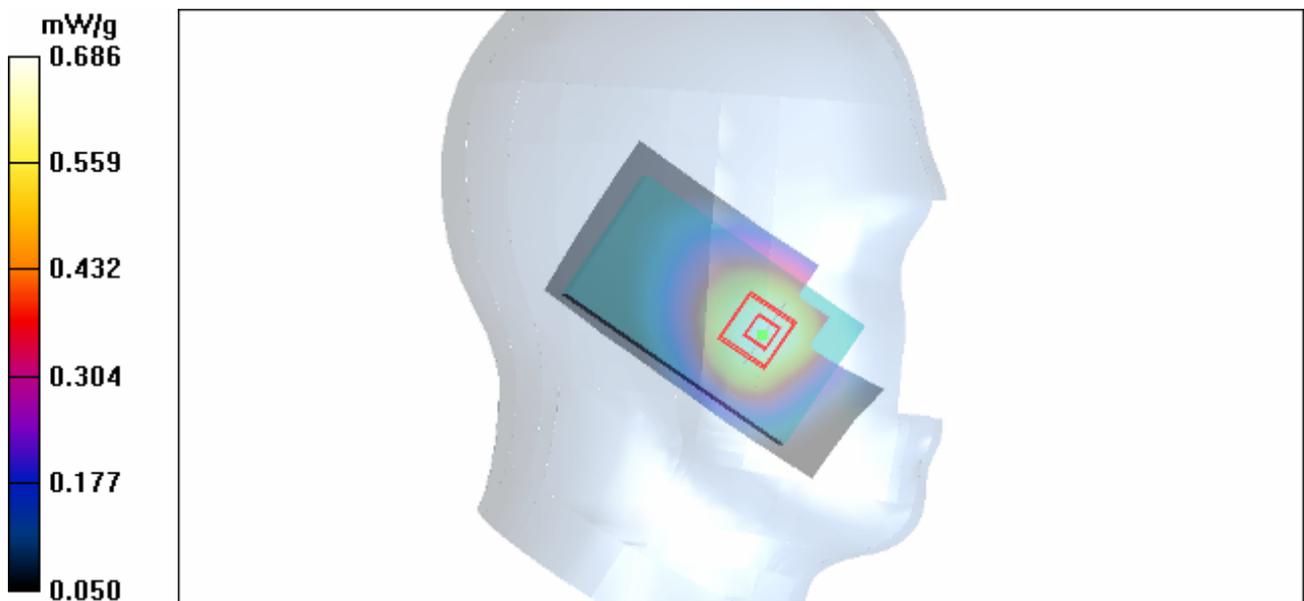


Figure 13 Left Hand Touch Cheek GSM 850 Channel 190

### GSM 850 Left Tilt Middle

Date/Time: 3/25/2010 10:58:45 PM

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.924$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Tilt Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.333 mW/g

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

Reference Value = 12.9 V/m; Power Drift = -0.084 dB

Peak SAR (extrapolated) = 0.398 W/kg

**SAR(1 g) = 0.318 mW/g; SAR(10 g) = 0.240 mW/g**

Maximum value of SAR (measured) = 0.333 mW/g

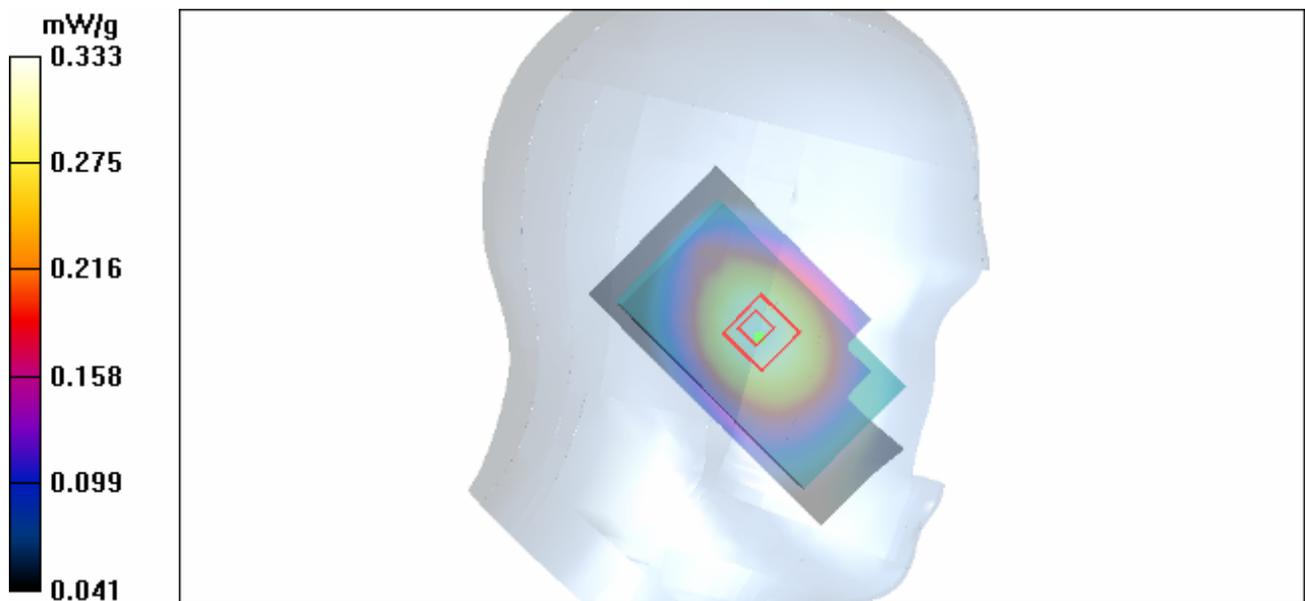


Figure 14 Left Hand Tilt 15° GSM 850 Channel 190

### GSM 850 Right Cheek High

Date/Time: 3/26/2010 10:05:48 AM

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.936$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.912 mW/g

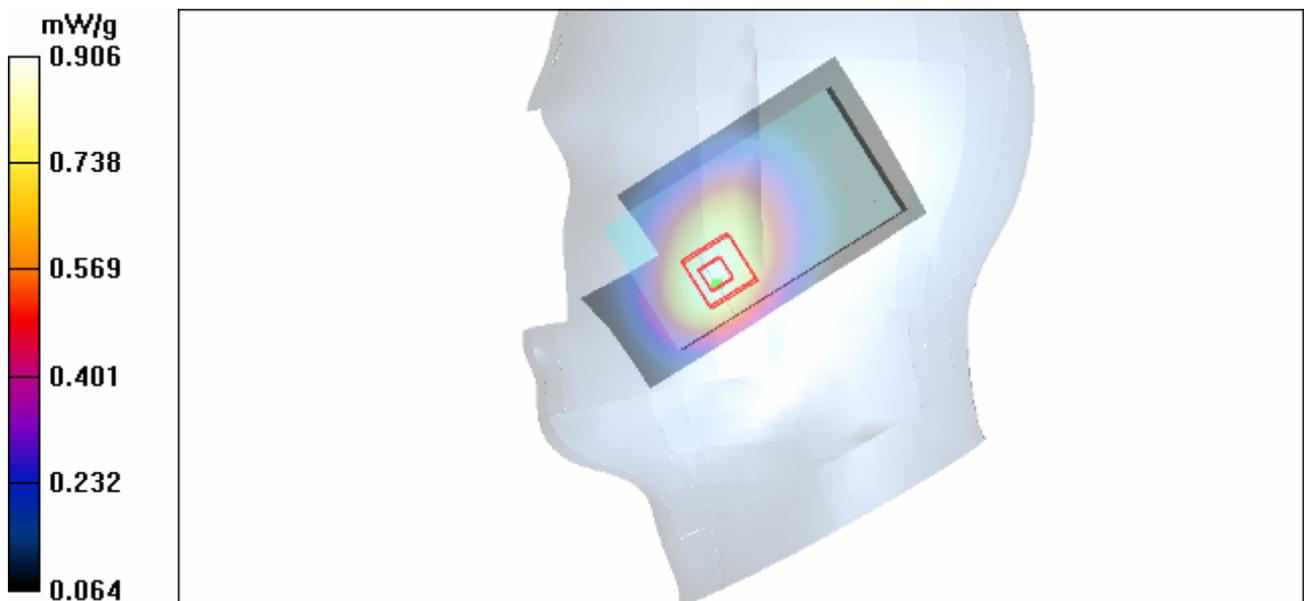
**Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.18 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.849 mW/g; SAR(10 g) = 0.597 mW/g**

Maximum value of SAR (measured) = 0.906 mW/g



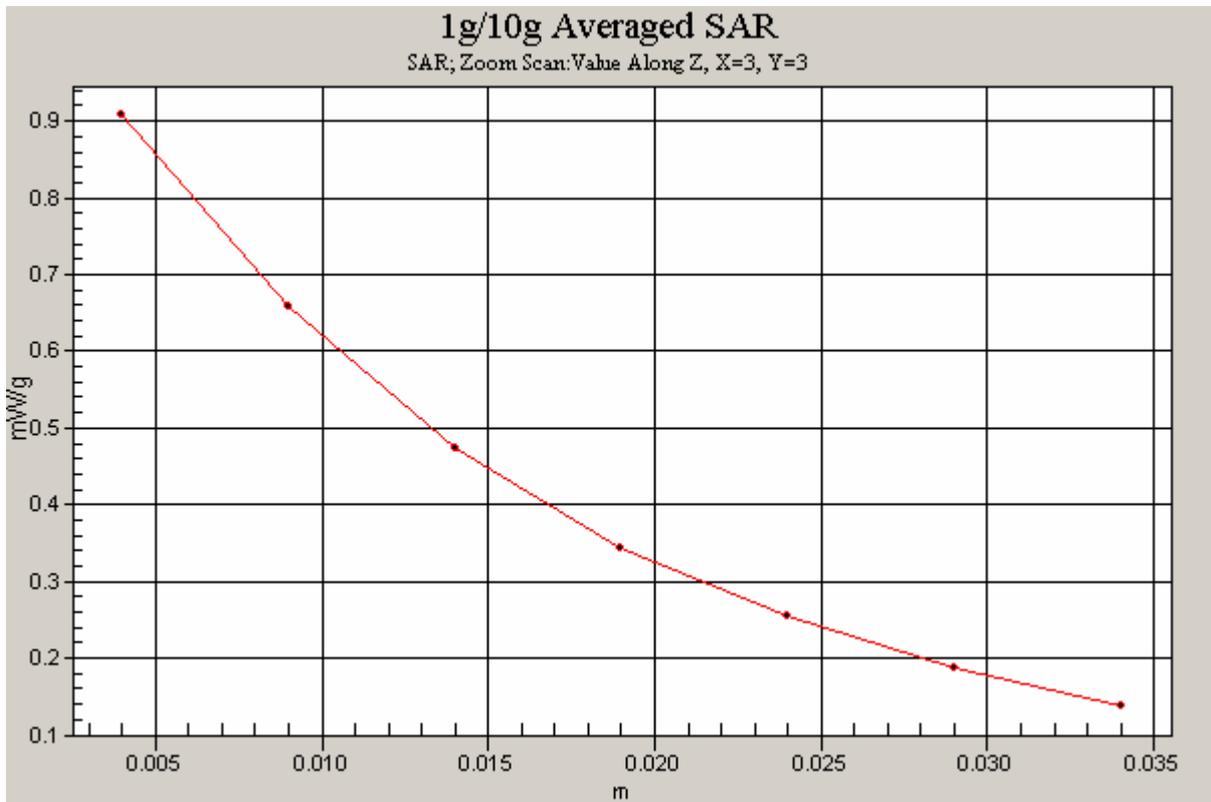


Figure 15 Right Hand Touch Cheek GSM 850 Channel 251

### GSM 850 Right Cheek Middle

Date/Time: 3/26/2010 10:44:52 AM

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.924$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.737 mW/g

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

Reference Value = 7.24 V/m; Power Drift = 0.133 dB

Peak SAR (extrapolated) = 0.947 W/kg

**SAR(1 g) = 0.690 mW/g; SAR(10 g) = 0.488 mW/g**

Maximum value of SAR (measured) = 0.737 mW/g

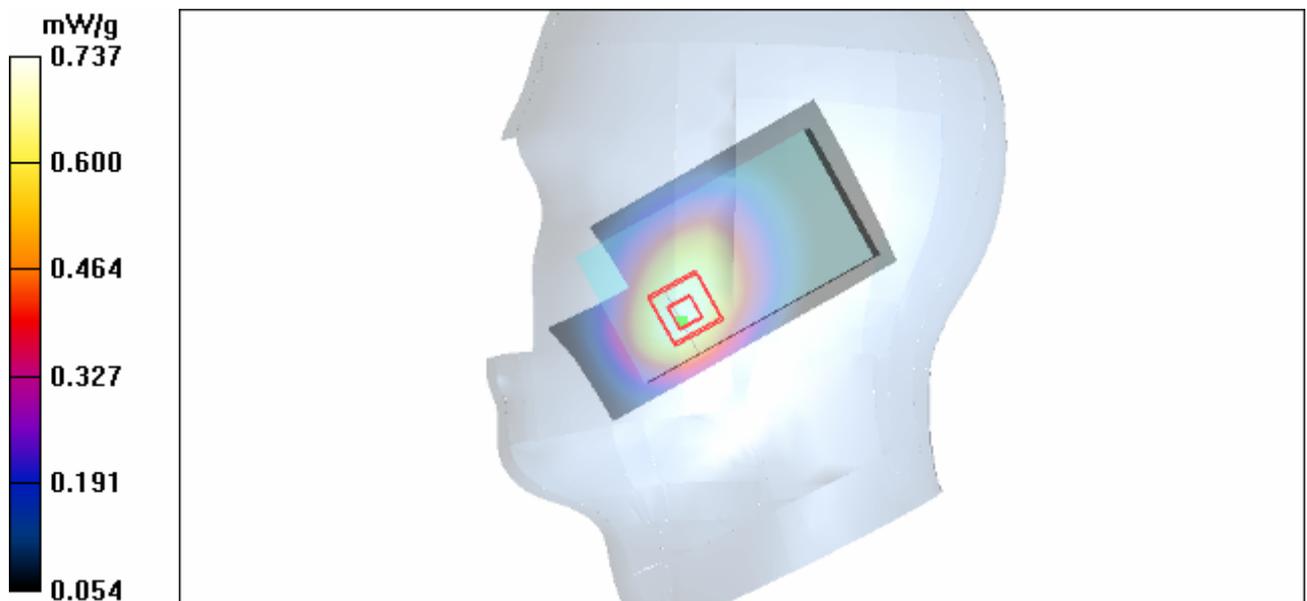


Figure 16 Right Hand Touch Cheek GSM 850 Channel 190

### GSM 850 Right Cheek Low

Date/Time: 3/26/2010 10:25:12 AM

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.912$  mho/m;  $\epsilon_r = 42.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.646 mW/g

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

Reference Value = 7.13 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.822 W/kg

**SAR(1 g) = 0.602 mW/g; SAR(10 g) = 0.427 mW/g**

Maximum value of SAR (measured) = 0.641 mW/g

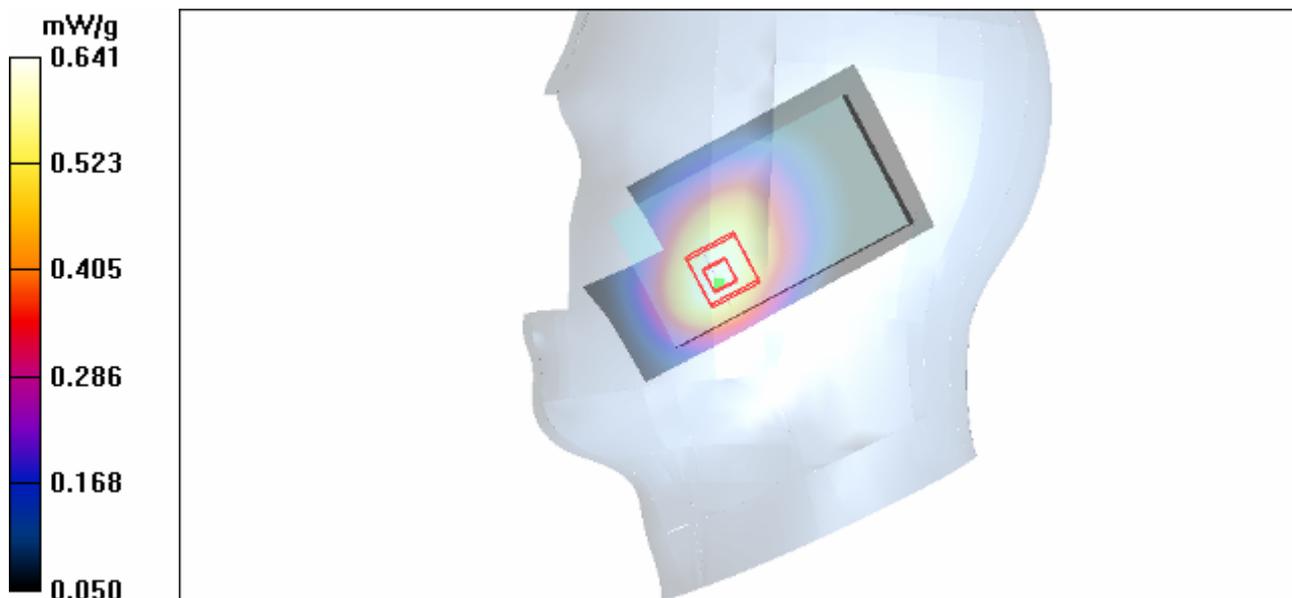


Figure 17 Right Hand Touch Cheek GSM 850 Channel 128

### GSM 850 Right Tilt Middle

Date/Time: 3/26/2010 11:04:47 AM

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.924$  mho/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.2, 9.2, 9.2); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Tilt Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.319 mW/g

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

Reference Value = 10.6 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 0.375 W/kg

**SAR(1 g) = 0.304 mW/g; SAR(10 g) = 0.229 mW/g**

Maximum value of SAR (measured) = 0.317 mW/g

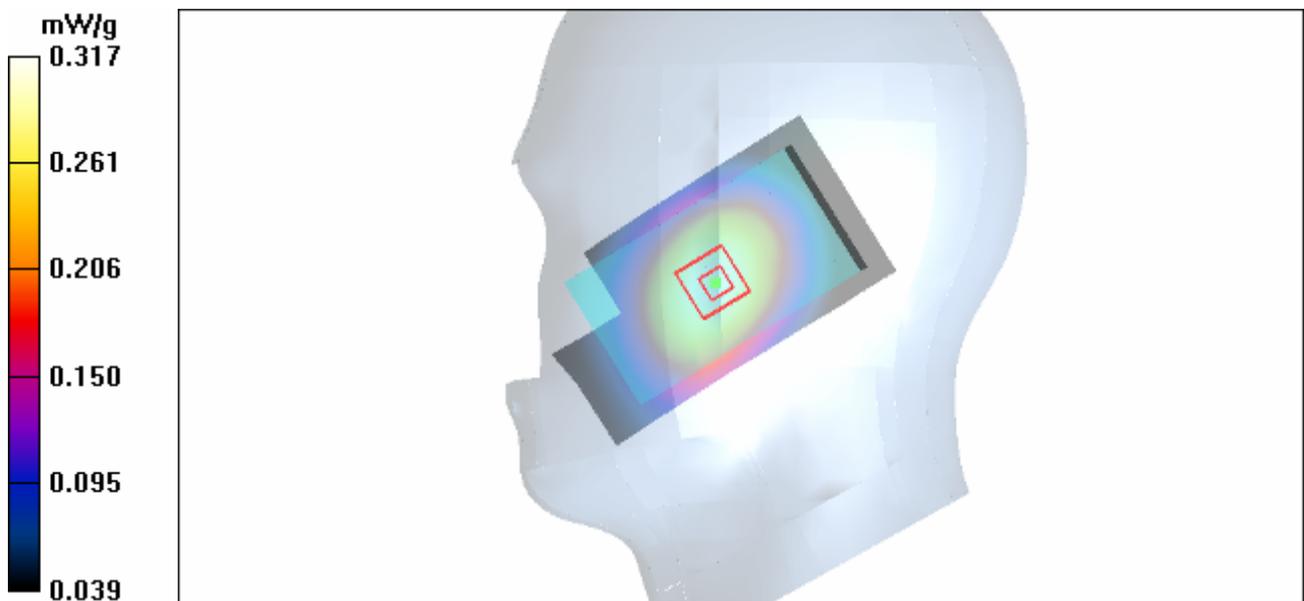


Figure 18 Right Hand Tilt 15° GSM 850 Channel 190

### GSM 850 Towards Ground High

Date/Time: 3/26/2010 8:14:44 PM

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.978$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.807 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.3 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.753 mW/g; SAR(10 g) = 0.528 mW/g**

Maximum value of SAR (measured) = 0.806 mW/g

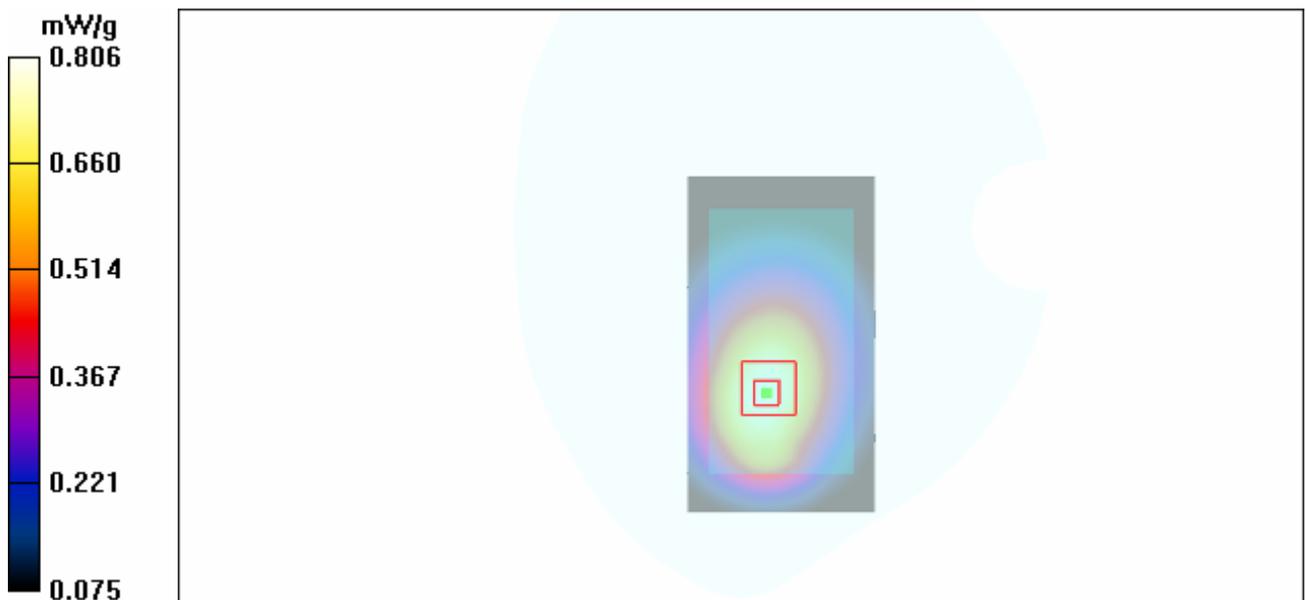


Figure 19 Body, Towards Ground, GSM 850 Channel 251

### GSM 850 Towards Ground Middle

Date/Time: 3/26/2010 7:23:18 PM

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.664 mW/g

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

Reference Value = 9.54 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 0.851 W/kg

**SAR(1 g) = 0.621 mW/g; SAR(10 g) = 0.435 mW/g**

Maximum value of SAR (measured) = 0.662 mW/g

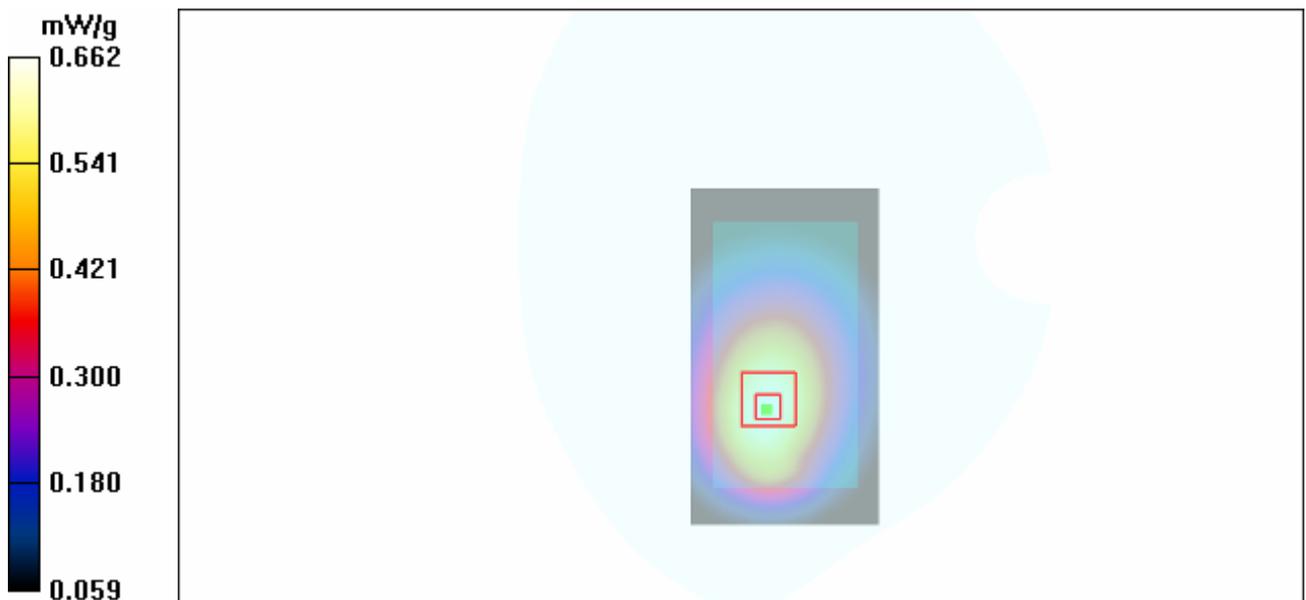


Figure 20 Body, Towards Ground, GSM 850 Channel 190

### GSM 850 Towards Ground Low

Date/Time: 3/26/2010 7:40:56 PM

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.955$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.576 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.78 V/m; Power Drift = 0.085 dB

Peak SAR (extrapolated) = 0.739 W/kg

**SAR(1 g) = 0.540 mW/g; SAR(10 g) = 0.379 mW/g**

Maximum value of SAR (measured) = 0.576 mW/g

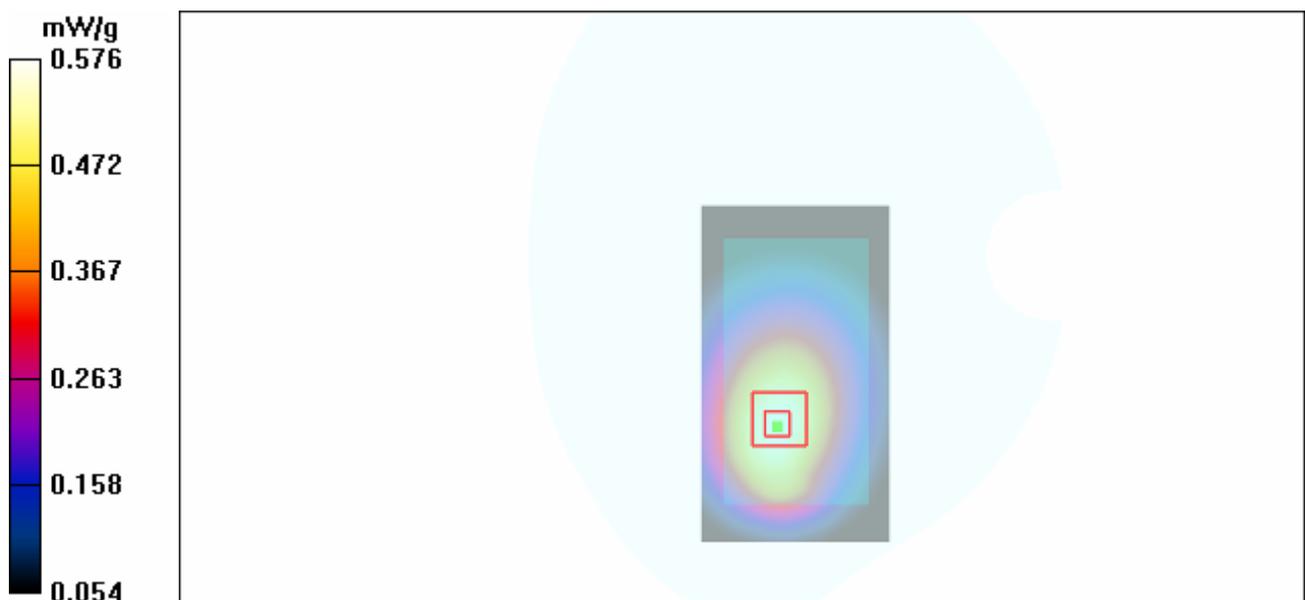


Figure 21 Body, Towards Ground, GSM 850 Channel 128

### GSM 850 Towards Phantom Middle

Date/Time: 3/26/2010 7:04:27 PM

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.482 mW/g

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

Reference Value = 8.43 V/m; Power Drift = -0.186 dB

Peak SAR (extrapolated) = 0.577 W/kg

**SAR(1 g) = 0.444 mW/g; SAR(10 g) = 0.325 mW/g**

Maximum value of SAR (measured) = 0.469 mW/g

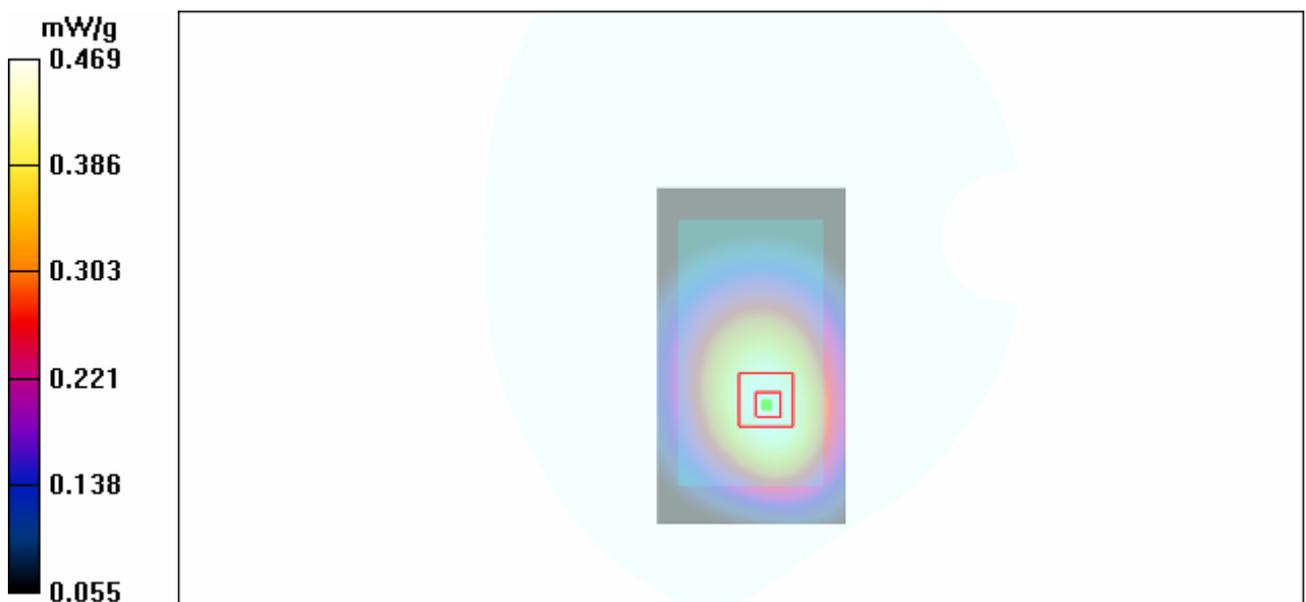


Figure 22 Body, Towards Phantom, GSM 850 Channel 190

### GSM 850 Towards Ground with Earphone High

Date/Time: 3/26/2010 8:32:58 PM

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.978$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.378 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,  
dz=5mm

Reference Value = 6.25 V/m; Power Drift = -0.052 dB

Peak SAR (extrapolated) = 0.499 W/kg

**SAR(1 g) = 0.353 mW/g; SAR(10 g) = 0.240 mW/g**

Maximum value of SAR (measured) = 0.376 mW/g

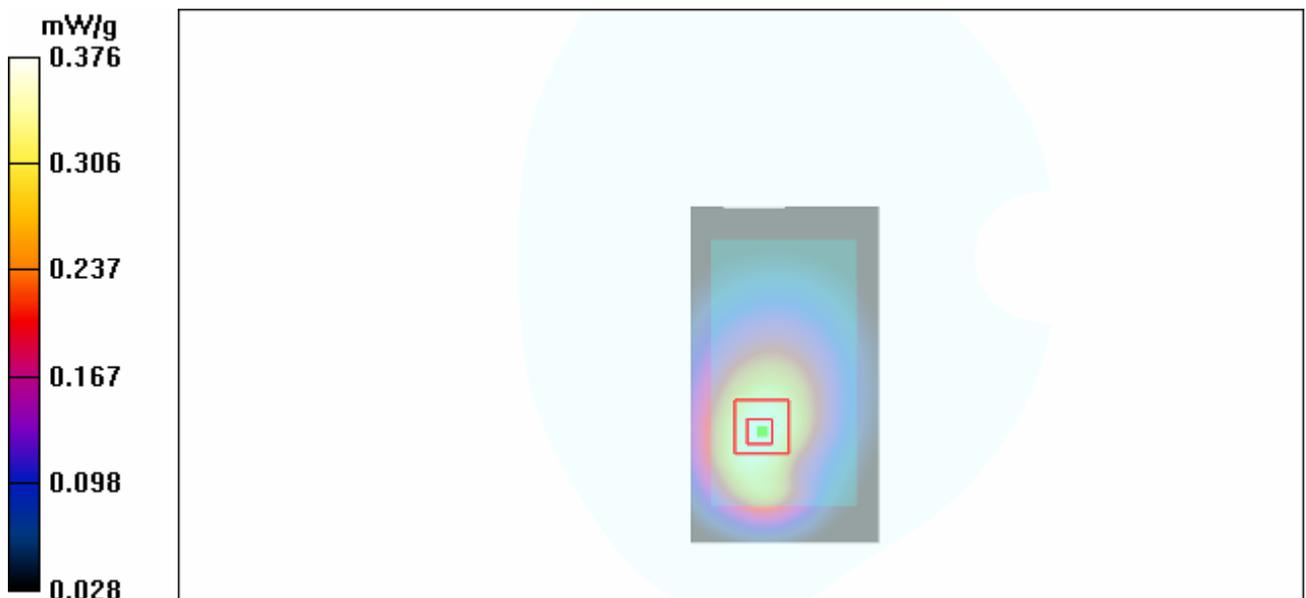


Figure 23 Body with Earphone, Towards Ground, GSM 850 Channel 251

### GSM 850+GPRS(2Up) Towards Ground High

Date/Time: 3/26/2010 9:27:28 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 848.8 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.978$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.00 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,

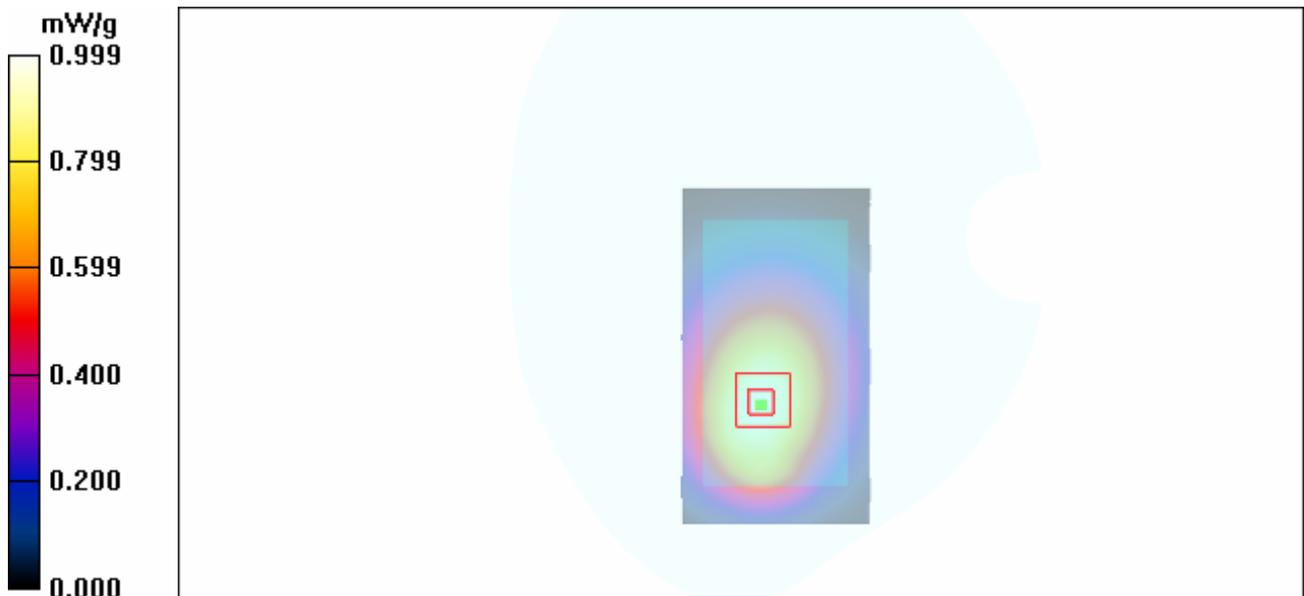
dz=5mm

Reference Value = 11.6 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 1.28 W/kg

**SAR(1 g) = 0.941 mW/g; SAR(10 g) = 0.663 mW/g**

Maximum value of SAR (measured) = 0.999 mW/g



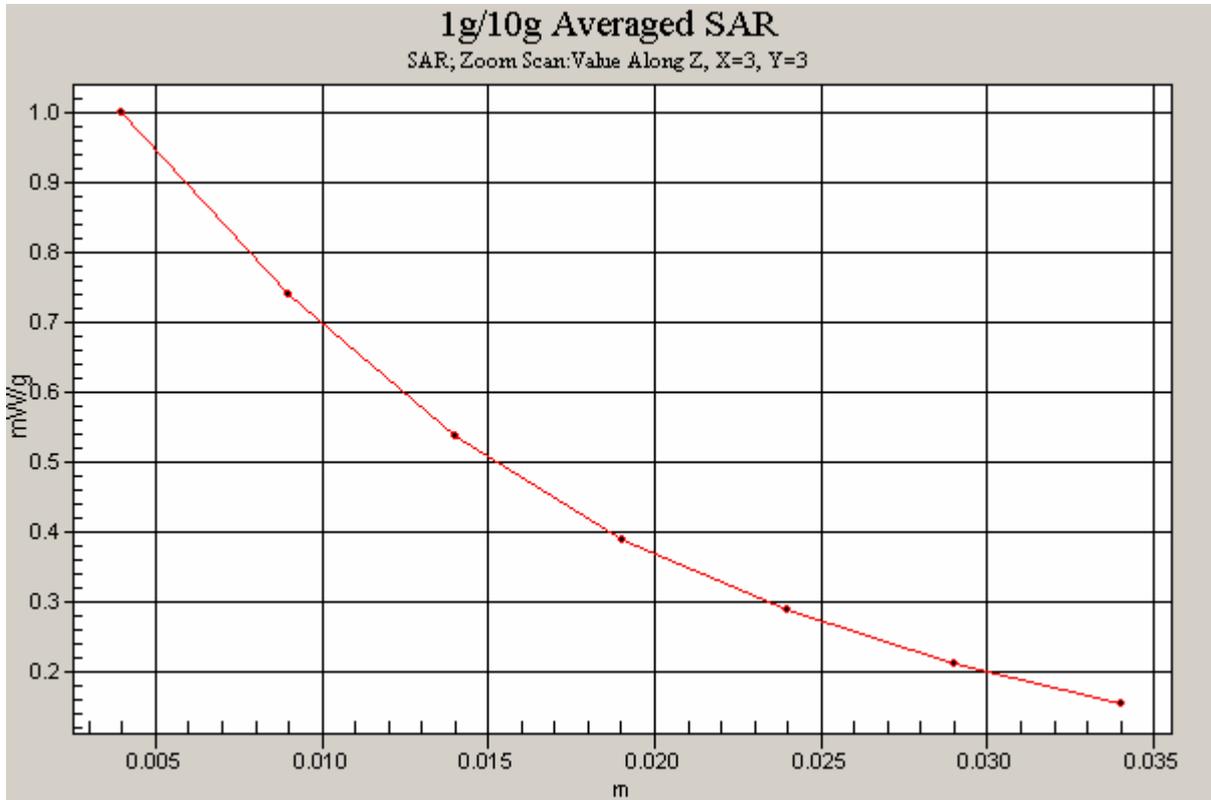


Figure 24 Body, Towards Ground, GSM 850 GPRS(2Up) Channel 251

### GSM 850+GPRS(2Up) Towards Ground Middle

Date/Time: 3/26/2010 8:52:21 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.866 mW/g

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

dz=5mm

Reference Value = 10.7 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 1.08 W/kg

**SAR(1 g) = 0.804 mW/g; SAR(10 g) = 0.557 mW/g**

Maximum value of SAR (measured) = 0.864 mW/g

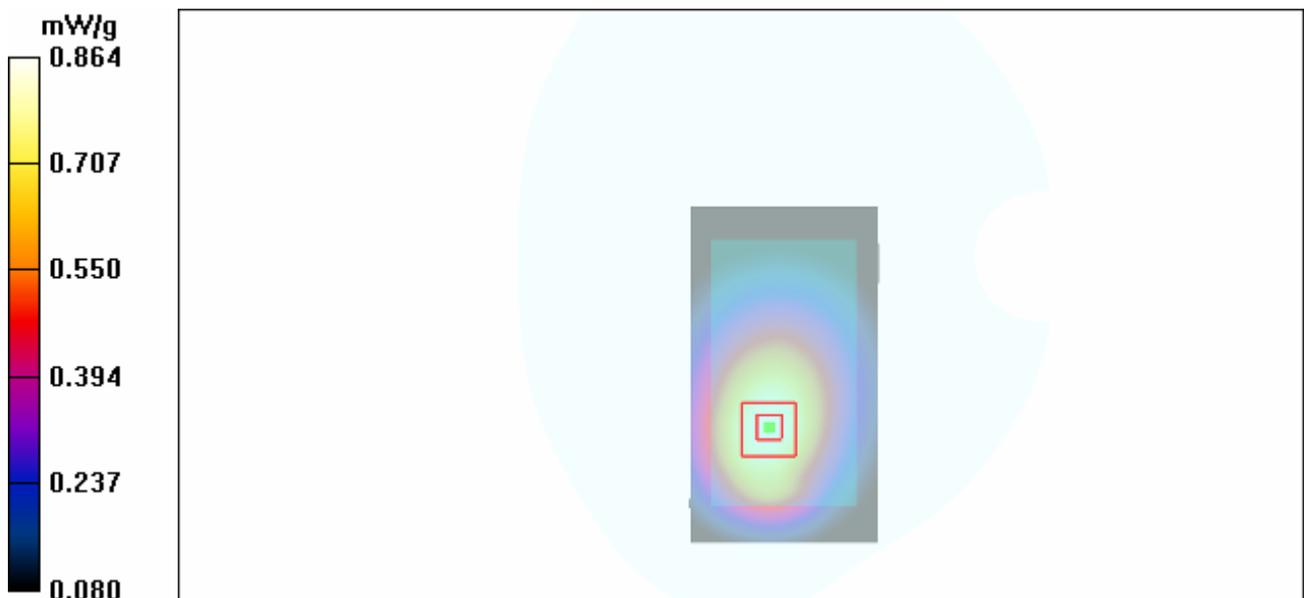


Figure 25 Body, Towards Ground, GSM 850 GPRS(2Up) Channel 190

**GSM 850+GPRS(2Up) Towards Ground Low**

Date/Time: 3/26/2010 9:09:54 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 824.2 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.955$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.761 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.96 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 0.997 W/kg

**SAR(1 g) = 0.721 mW/g; SAR(10 g) = 0.507 mW/g**

Maximum value of SAR (measured) = 0.772 mW/g

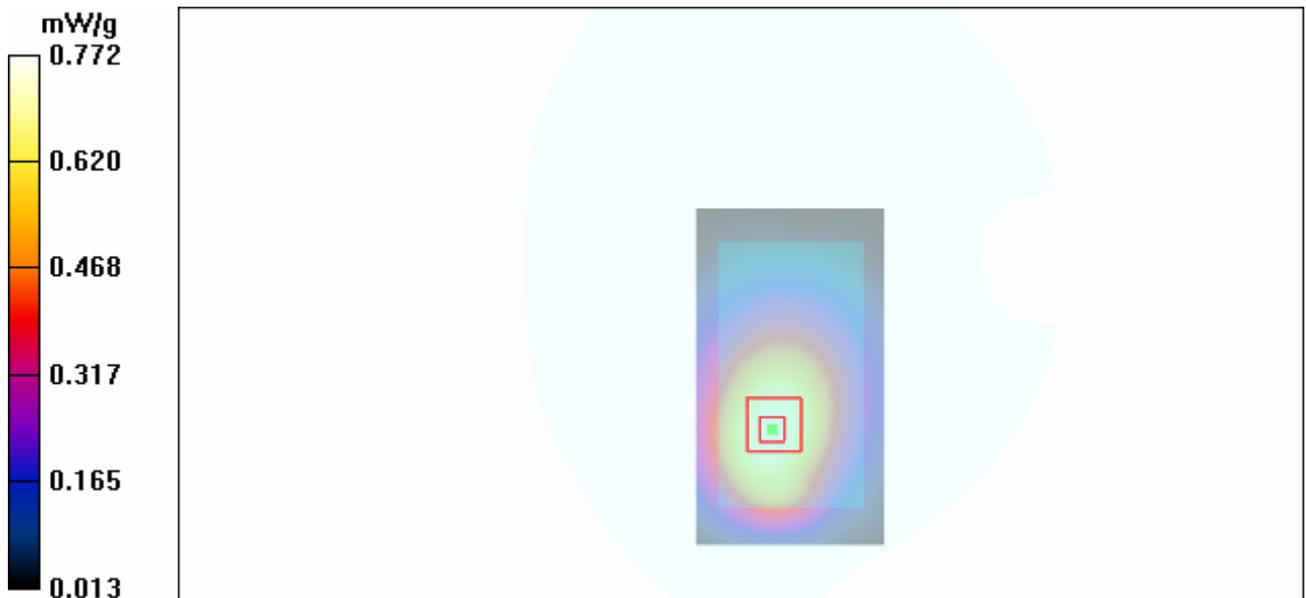


Figure 26 Body, Towards Ground, GSM 850 GPRS(2Up) Channel 128

### GSM 850+GPRS(2Up) Towards Phantom Middle

Date/Time: 3/26/2010 9:45:50 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.624 mW/g

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

Reference Value = 8.15 V/m; Power Drift = 0.104 dB

Peak SAR (extrapolated) = 0.795 W/kg

**SAR(1 g) = 0.599 mW/g; SAR(10 g) = 0.433 mW/g**

Maximum value of SAR (measured) = 0.634 mW/g

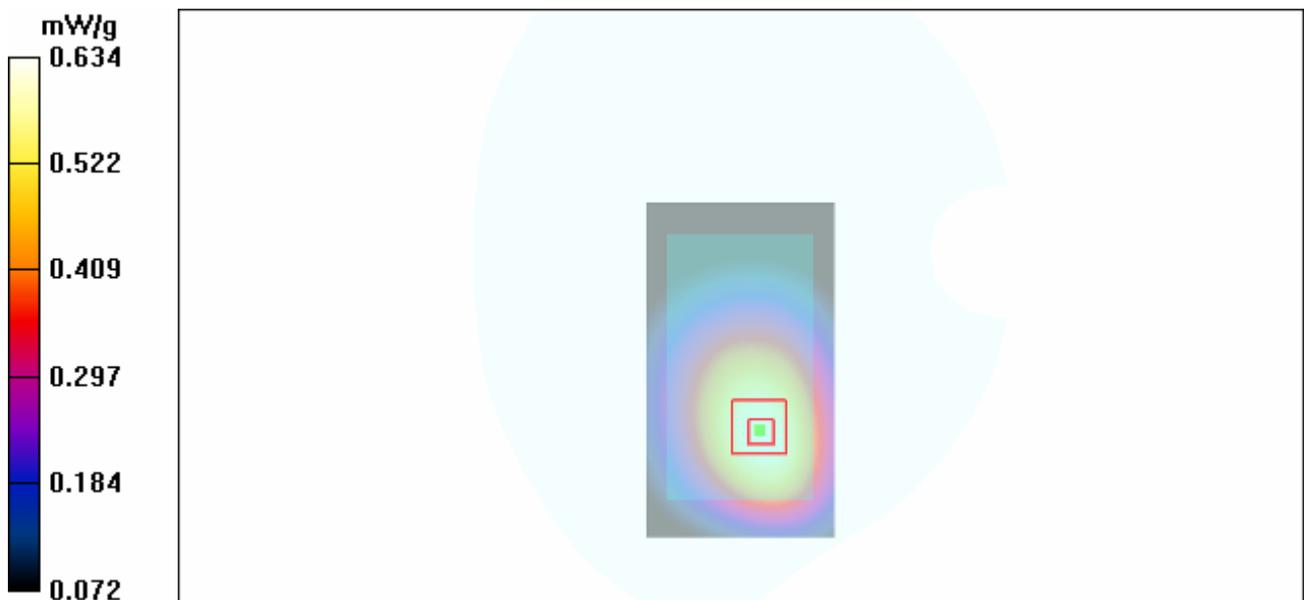


Figure 27 Body, Towards Phantom, GSM 850 Channel 190

### GSM 850+EGPRS(2Up) Towards Ground High

Date/Time: 3/26/2010 10:08:33 PM

Communication System: GSM850 + EGPRS(2Up); Frequency: 848.8 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.978$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.11, 9.11, 9.11); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.991 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,

dz=5mm

Reference Value = 12.3 V/m; Power Drift = -0.134 dB

Peak SAR (extrapolated) = 1.24 W/kg

**SAR(1 g) = 0.921 mW/g; SAR(10 g) = 0.651 mW/g**

Maximum value of SAR (measured) = 0.981 mW/g

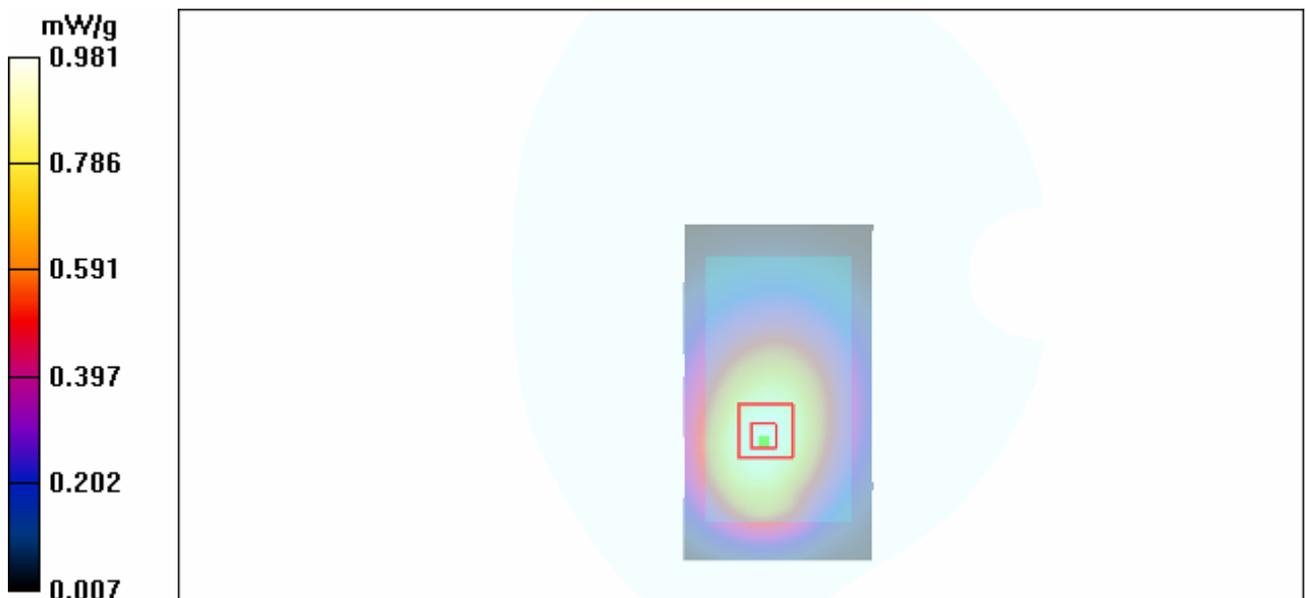


Figure 28 Body, Towards Ground, GSM 850 EGPRS(2Up) Channel 251

### GSM 1900 Left Cheek Middle

Date/Time: 3/27/2010 8:35:08 PM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.332 mW/g

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

Reference Value = 5.31 V/m; Power Drift = 0.188 dB

Peak SAR (extrapolated) = 0.533 W/kg

**SAR(1 g) = 0.291 mW/g; SAR(10 g) = 0.156 mW/g**

Maximum value of SAR (measured) = 0.330 mW/g

**Cheek Middle/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.31 V/m; Power Drift = 0.188 dB

Peak SAR (extrapolated) = 0.481 W/kg

**SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.185 mW/g**

Maximum value of SAR (measured) = 0.340 mW/g

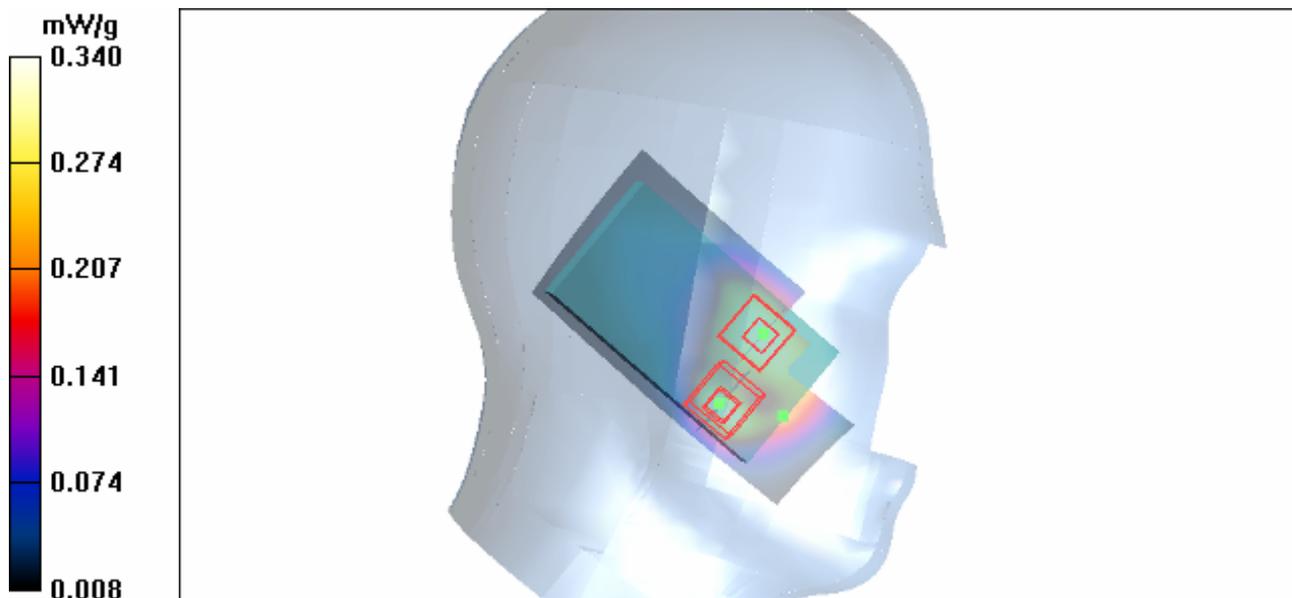


Figure 29 Left Hand Touch Cheek GSM 1900 Channel 661

**GSM 1900 Left Tilt Middle**

Date/Time: 3/27/2010 9:16:15 PM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Tilt Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.163 mW/g

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

Reference Value = 11.0 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 0.236 W/kg

**SAR(1 g) = 0.144 mW/g; SAR(10 g) = 0.083 mW/g**

Maximum value of SAR (measured) = 0.159 mW/g

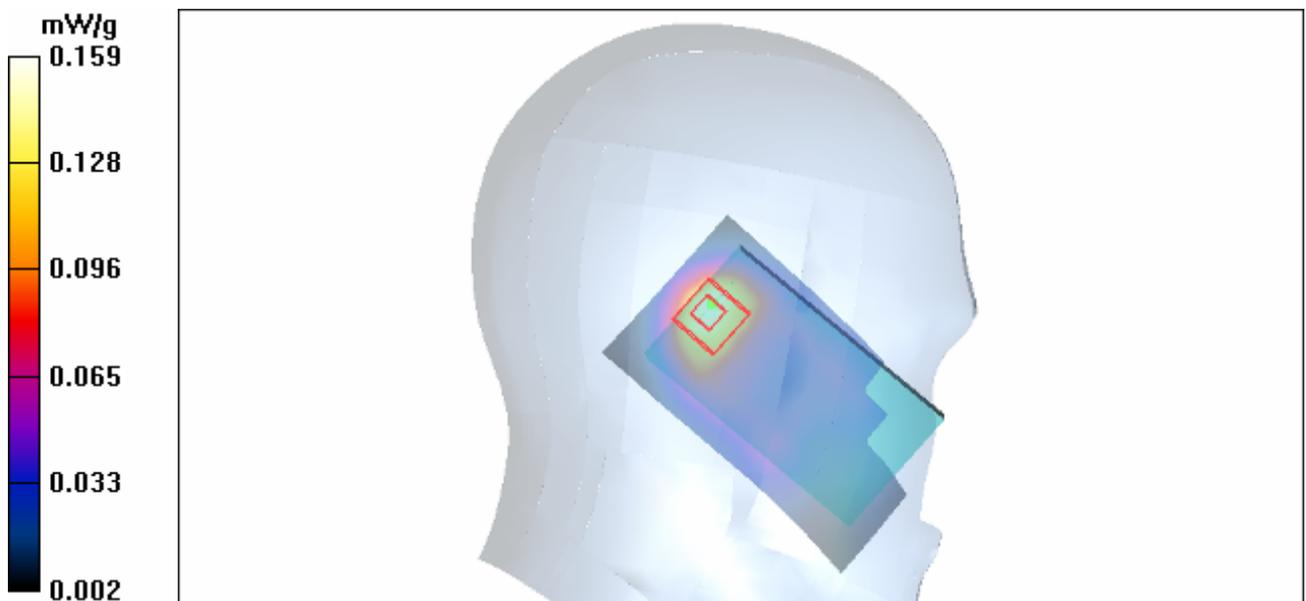


Figure 30 Left Hand Tilt 15° GSM 1900 Channel 661

### GSM 1900 Right Cheek High

Date/Time: 3/27/2010 10:14:35 PM

Communication System: PCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 40$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.583 mW/g

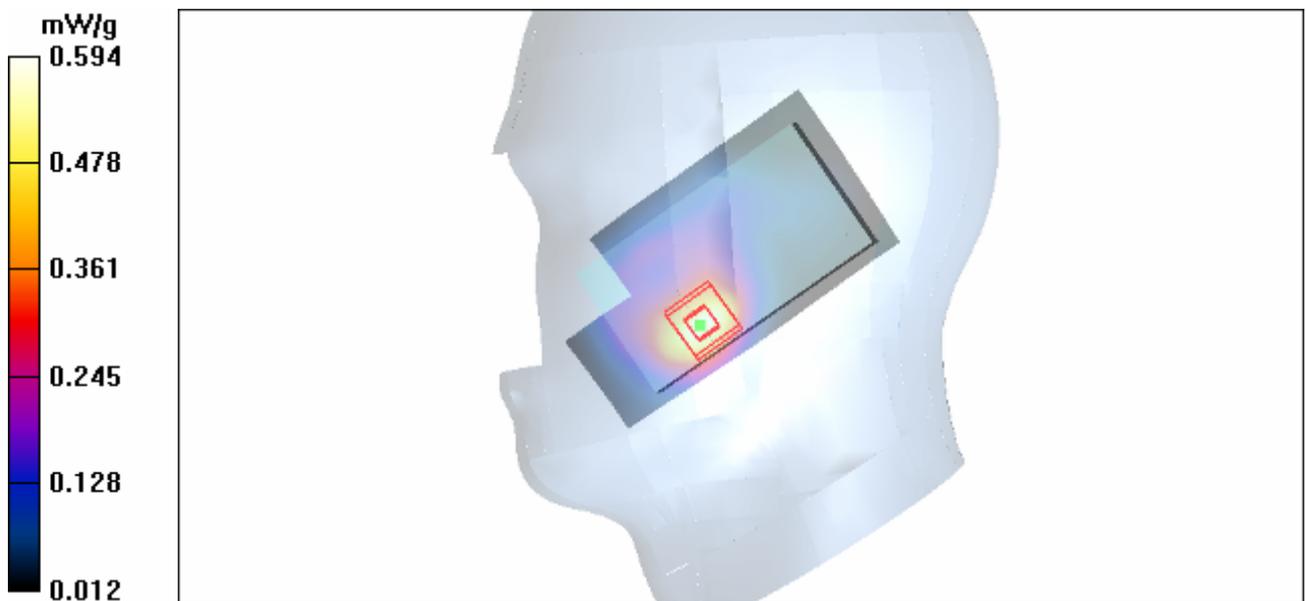
**Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.62 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 0.903 W/kg

**SAR(1 g) = 0.525 mW/g; SAR(10 g) = 0.295 mW/g**

Maximum value of SAR (measured) = 0.594 mW/g



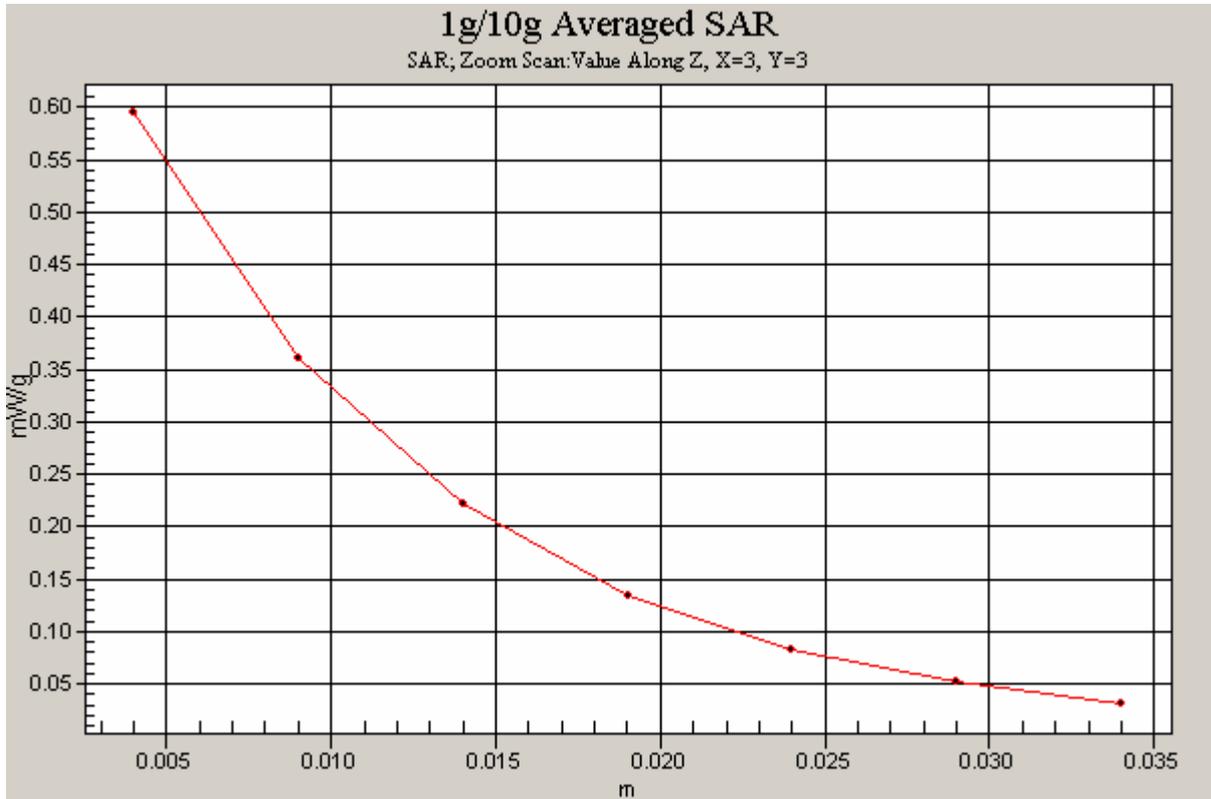


Figure 31 Right Hand Touch Cheek GSM 1900 Channel 885

### GSM 1900 Right Cheek Middle

Date/Time: 3/27/2010 9:36:20 PM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.462 mW/g

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

Reference Value = 5.67 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 0.731 W/kg

**SAR(1 g) = 0.425 mW/g; SAR(10 g) = 0.239 mW/g**

Maximum value of SAR (measured) = 0.481 mW/g

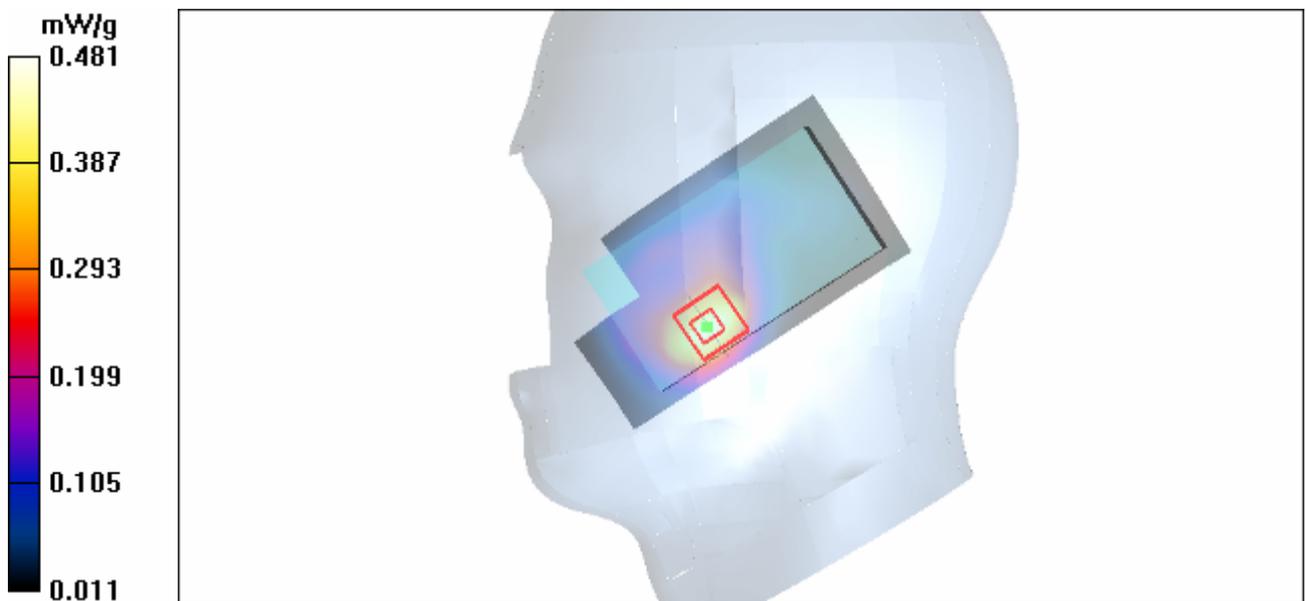


Figure 32 Right Hand Touch Cheek GSM 1900 Channel 661

### GSM 1900 Right Cheek Low

Date/Time: 3/27/2010 9:55:30 PM

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 40.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.396 mW/g

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

Reference Value = 5.29 V/m; Power Drift = 0.068 dB

Peak SAR (extrapolated) = 0.623 W/kg

**SAR(1 g) = 0.362 mW/g; SAR(10 g) = 0.204 mW/g**

Maximum value of SAR (measured) = 0.404 mW/g

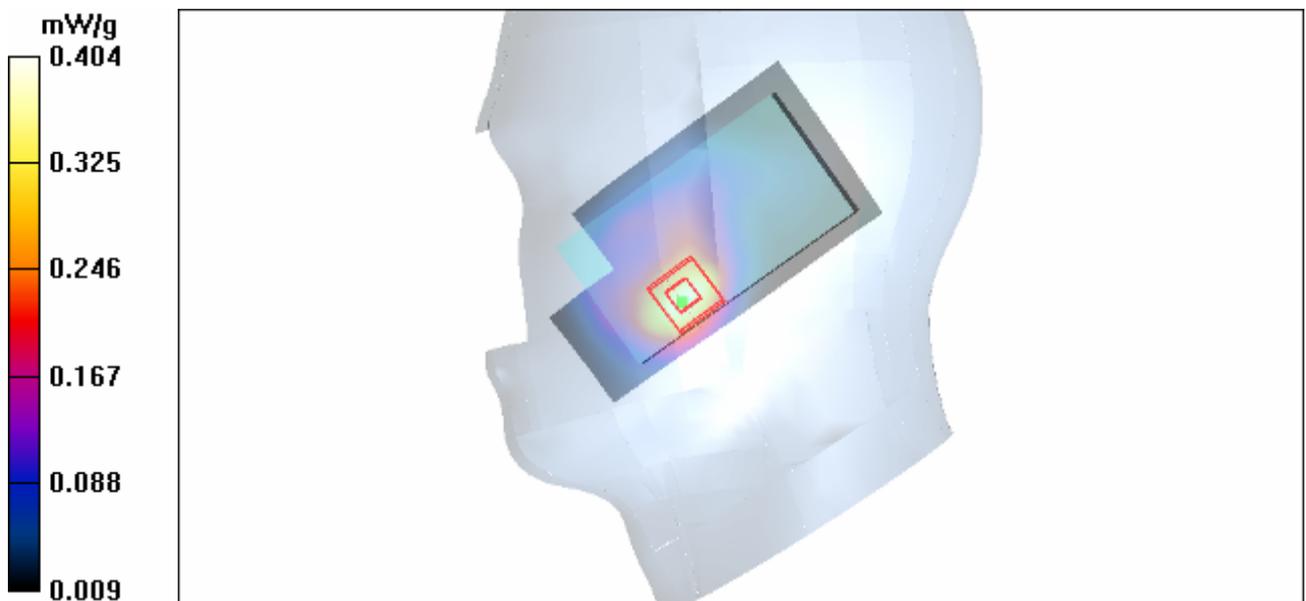


Figure 33 Right Hand Touch Cheek GSM 1900 Channel 512

### GSM 1900 Right Tilt Middle

Date/Time: 3/27/2010 10:34:04 PM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Tilt Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.135 mW/g

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

Reference Value = 9.60 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 0.186 W/kg

**SAR(1 g) = 0.116 mW/g; SAR(10 g) = 0.069 mW/g**

Maximum value of SAR (measured) = 0.128 mW/g

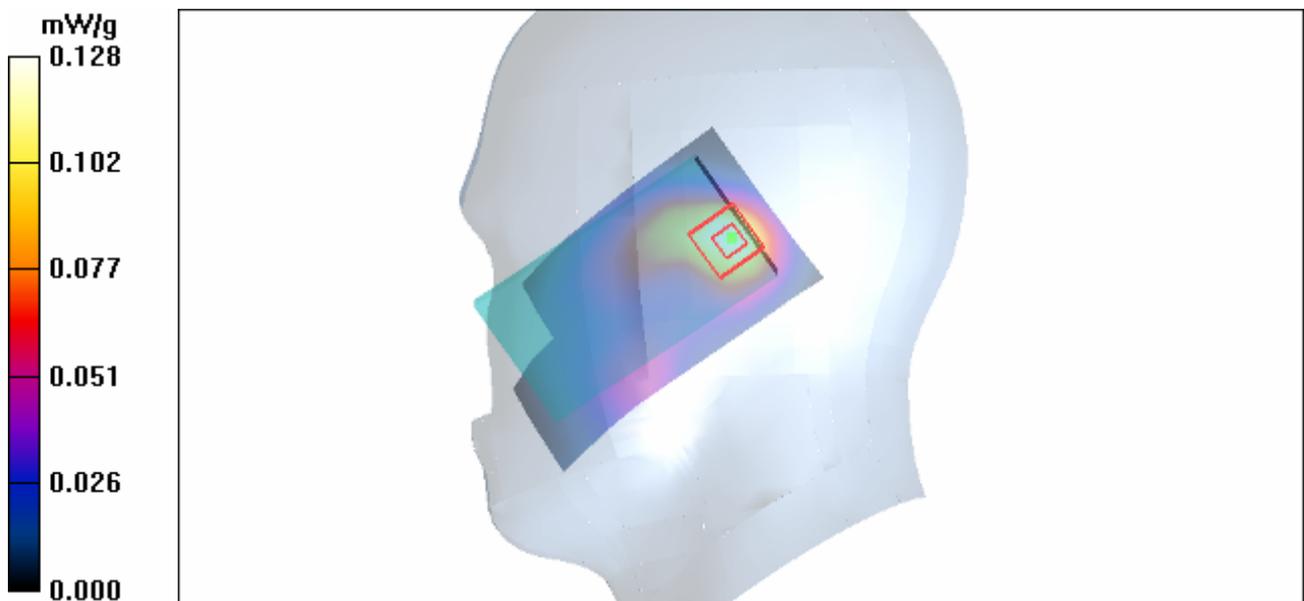


Figure 34 Right Hand Tilt 15° GSM 1900 Channel 661

### GSM 1900 Towards Ground High

Date/Time: 3/28/2010 2:15:54 PM

Communication System: PCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.242 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,

dz=5mm

Reference Value = 6.46 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 0.369 W/kg

**SAR(1 g) = 0.222 mW/g; SAR(10 g) = 0.131 mW/g**

Maximum value of SAR (measured) = 0.240 mW/g

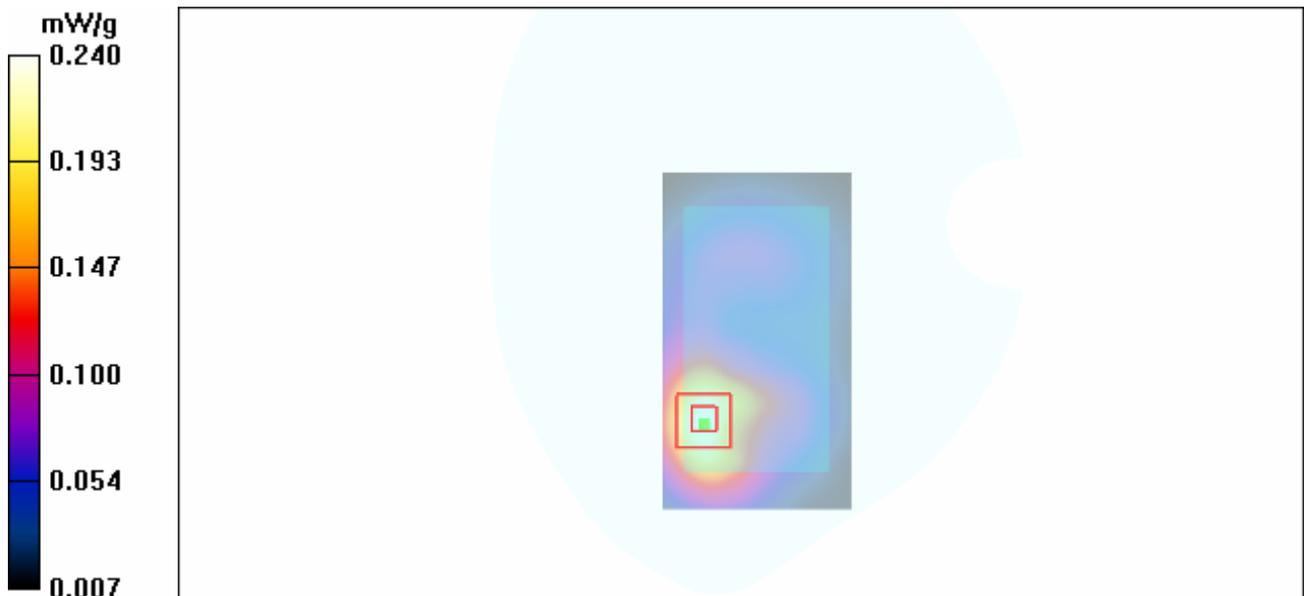


Figure 35 Body, Towards Ground, GSM 1900 Channel 810

### GSM 1900 Towards Ground Middle

Date/Time: 3/27/2010 11:31:41 PM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.190 mW/g

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

Reference Value = 5.58 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 0.303 W/kg

**SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.105 mW/g**

Maximum value of SAR (measured) = 0.194 mW/g

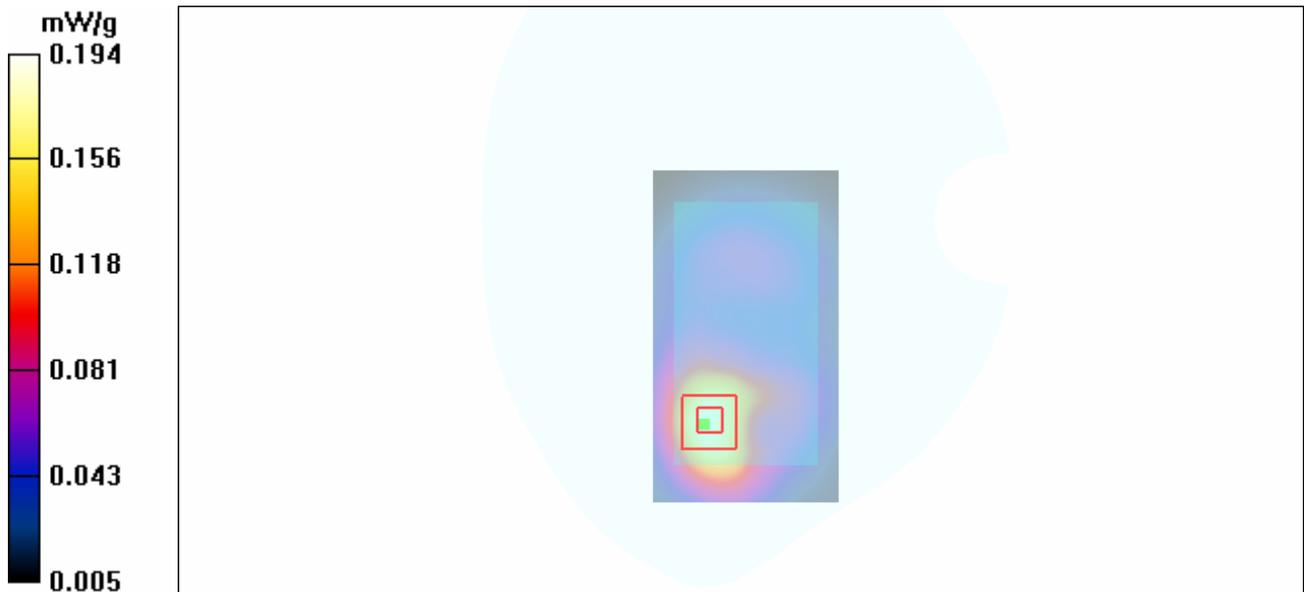


Figure 36 Body, Towards Ground, GSM 1900 Channel 661

### GSM 1900 Towards Ground Low

Date/Time: 3/28/2010 2:34:15 PM

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.154 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.31 V/m; Power Drift = 0.009 dB

Peak SAR (extrapolated) = 0.237 W/kg

**SAR(1 g) = 0.142 mW/g; SAR(10 g) = 0.084 mW/g**

Maximum value of SAR (measured) = 0.154 mW/g

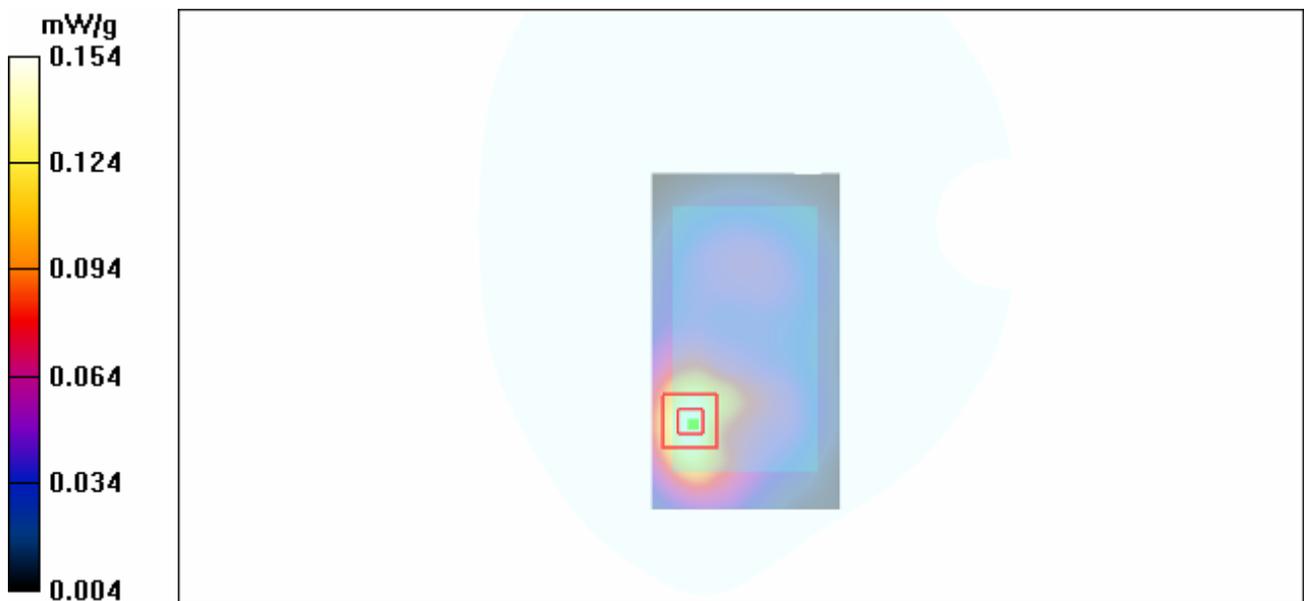


Figure 37 Body, Towards Ground, GSM 1900 Channel 512

### GSM 1900 Towards Phantom Middle

Date/Time: 3/27/2010 11:12:43 PM

Communication System: PCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.111 mW/g

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

Reference Value = 5.83 V/m; Power Drift = -0.146 dB

Peak SAR (extrapolated) = 0.161 W/kg

**SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.063 mW/g**

Maximum value of SAR (measured) = 0.107 mW/g

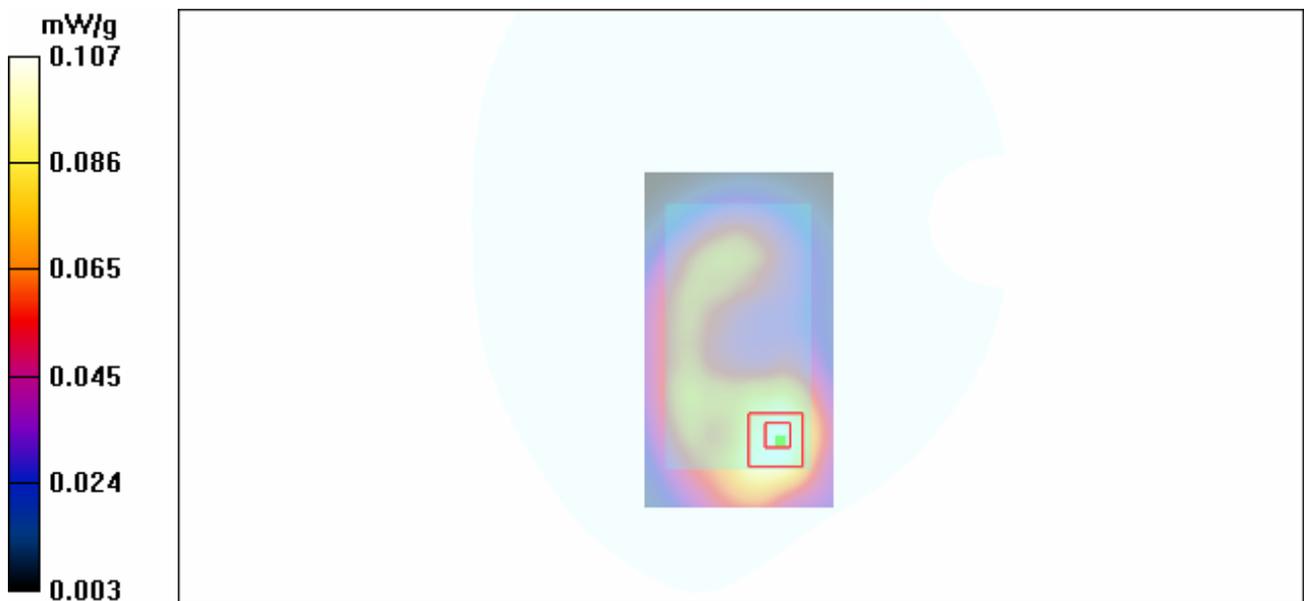


Figure 38 Body, Towards Phantom, GSM 1900 Channel 661

### GSM 1900 Towards Ground with Earphone High

Date/Time: 3/28/2010 3:25:54 PM

Communication System: PCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.191 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.38 V/m; Power Drift = 0.132 dB

Peak SAR (extrapolated) = 0.294 W/kg

**SAR(1 g) = 0.173 mW/g; SAR(10 g) = 0.100 mW/g**

Maximum value of SAR (measured) = 0.189 mW/g

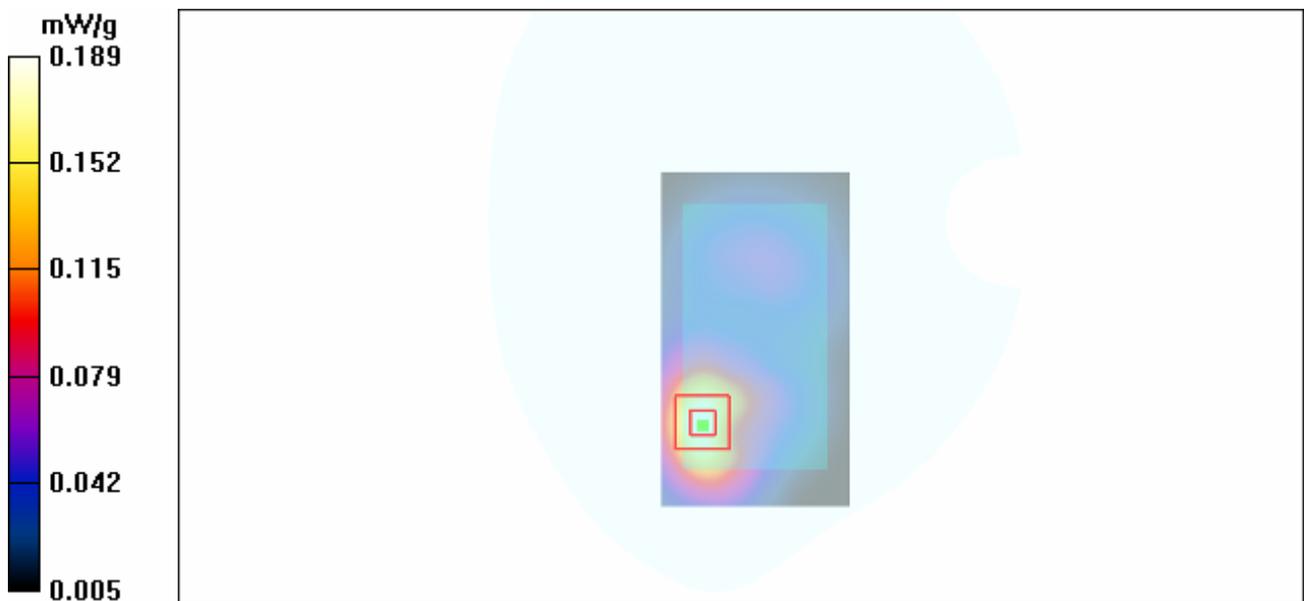


Figure 39 Body with Earphone, Towards Ground, GSM 1900 Channel 810

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

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## GSM 1900+GPRS(2Up) Towards Ground High

Date/Time: 3/28/2010 12:44:03 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1909.8 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.474 mW/g

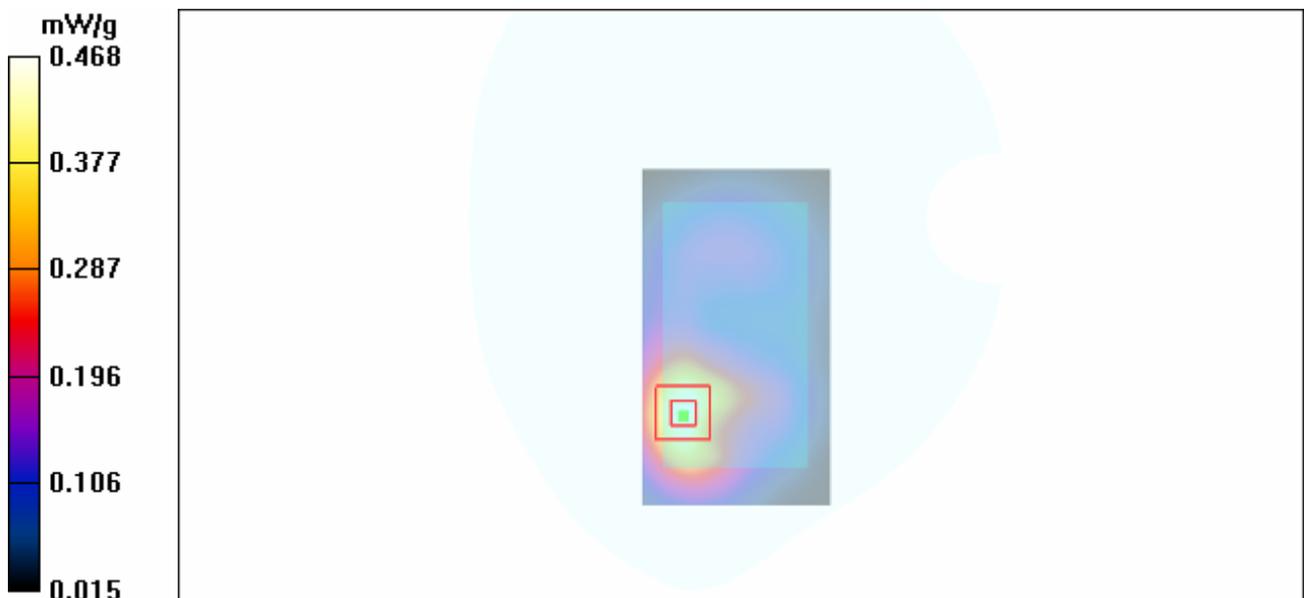
**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.27 V/m; Power Drift = -0.003 dB

Peak SAR (extrapolated) = 0.718 W/kg

**SAR(1 g) = 0.430 mW/g; SAR(10 g) = 0.254 mW/g**

Maximum value of SAR (measured) = 0.468 mW/g



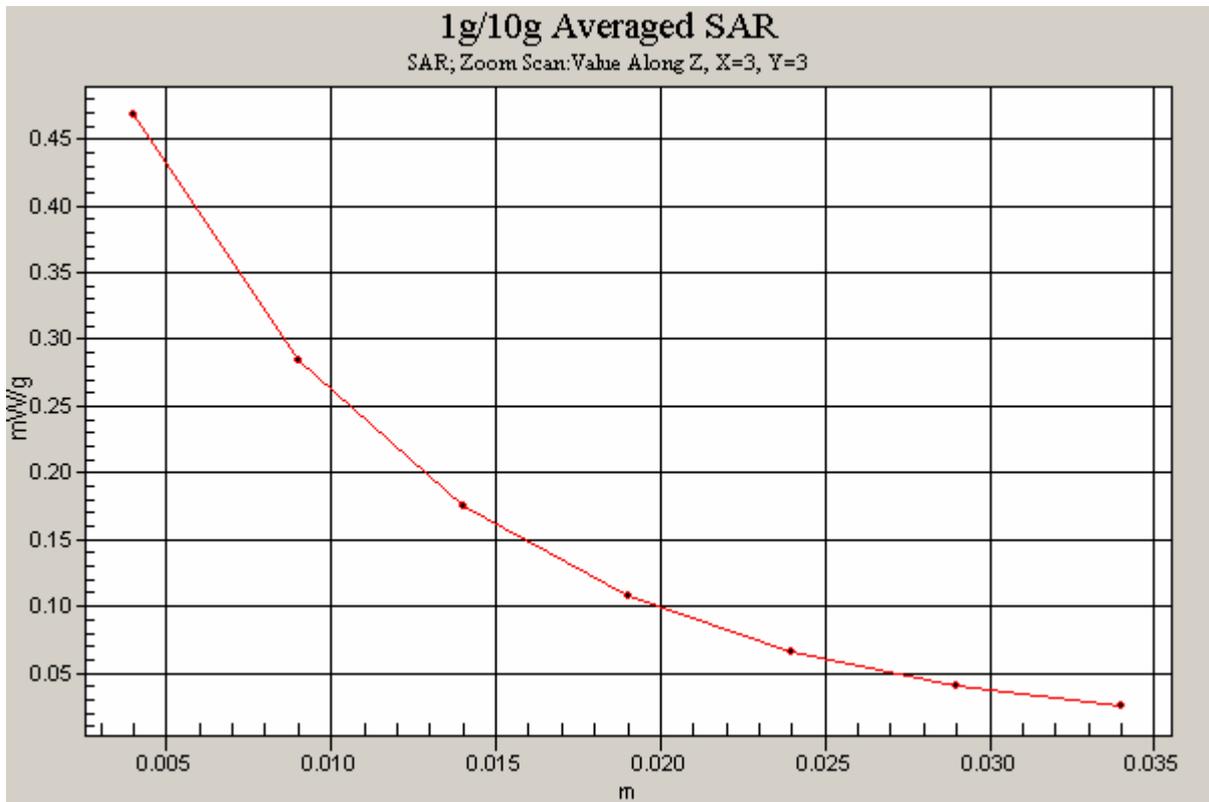


Figure 40 Body, Towards Ground, GSM 1900 GPRS(2up) Channel 810

**GSM 1900+GPRS(2Up) Towards Ground Middle**

Date/Time: 3/28/2010 12:23:37 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.374 mW/g

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

Reference Value = 8.30 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 0.564 W/kg

**SAR(1 g) = 0.341 mW/g; SAR(10 g) = 0.201 mW/g**

Maximum value of SAR (measured) = 0.374 mW/g

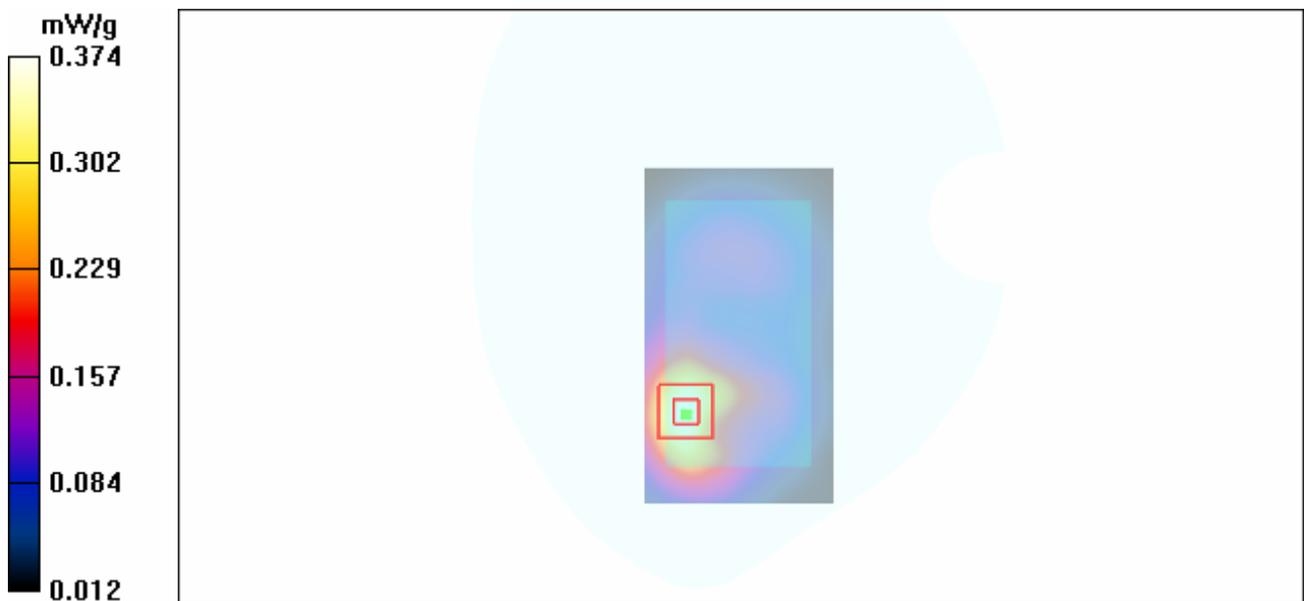


Figure 41 Body, Towards Ground, GSM 1900 GPRS(2up) Channel 661

**GSM 1900+GPRS(2Up) Towards Ground Low**

Date/Time: 3/28/2010 1:05:27 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.303 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.55 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 0.472 W/kg

**SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.165 mW/g**

Maximum value of SAR (measured) = 0.307 mW/g

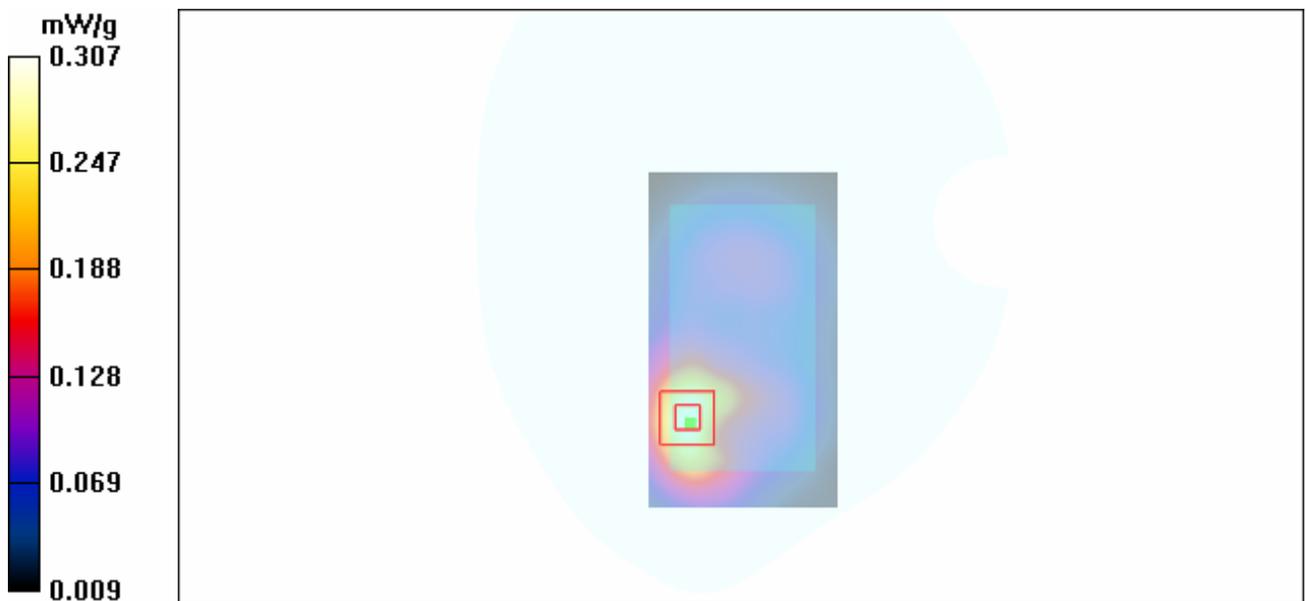


Figure 42 Body, Towards Ground, GSM 1900 GPRS(2up) Channel 512

**GSM 1900+GPRS(2Up) Towards Phantom Middle**

Date/Time: 3/28/2010 11:24:01 AM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.215 mW/g

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

Reference Value = 8.40 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 0.314 W/kg

**SAR(1 g) = 0.196 mW/g; SAR(10 g) = 0.123 mW/g**

Maximum value of SAR (measured) = 0.211 mW/g

**Towards Phantom Middle/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.40 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 0.352 W/kg

**SAR(1 g) = 0.139 mW/g; SAR(10 g) = 0.086 mW/g**

Maximum value of SAR (measured) = 0.161 mW/g

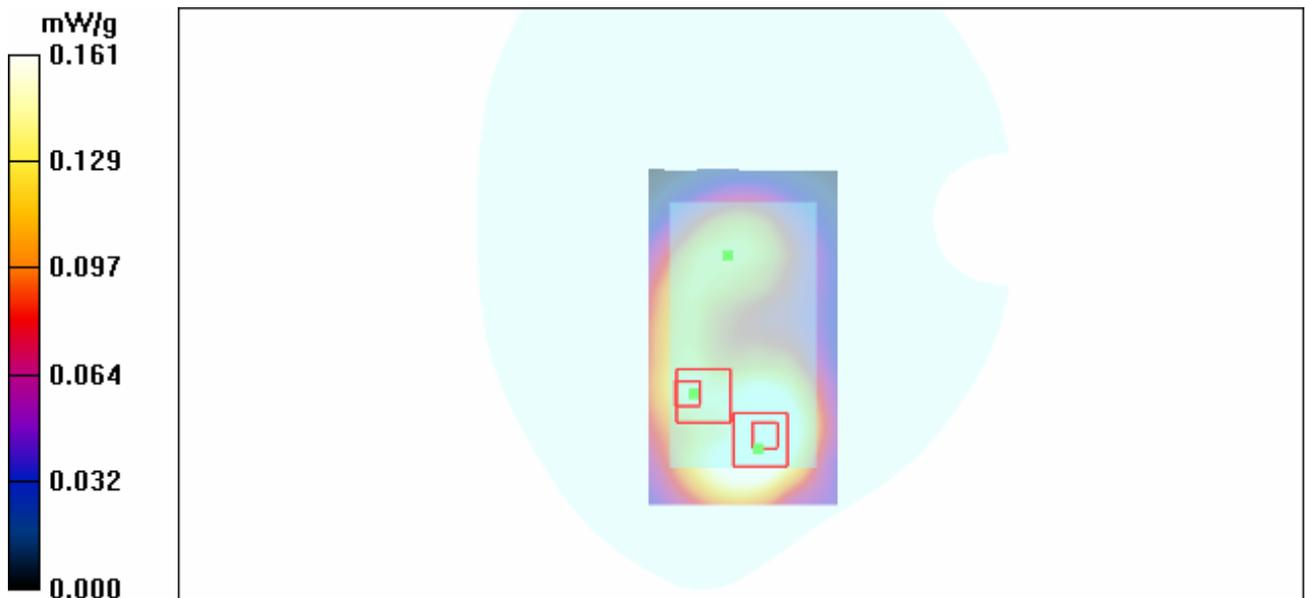


Figure 43 Body, Towards Phantom, GSM 1900 GPRS(2up) Channel 661

### GSM 1900+EGPRS(2Up) Towards Ground High

Date/Time: 3/28/2010 1:38:31 PM

Communication System: PCS 1900+EGPRS(2Up); Frequency: 1909.8 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.62, 7.62, 7.62); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.469 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.27 V/m; Power Drift = -0.046 dB

Peak SAR (extrapolated) = 0.730 W/kg

**SAR(1 g) = 0.430 mW/g; SAR(10 g) = 0.254 mW/g**

Maximum value of SAR (measured) = 0.466 mW/g

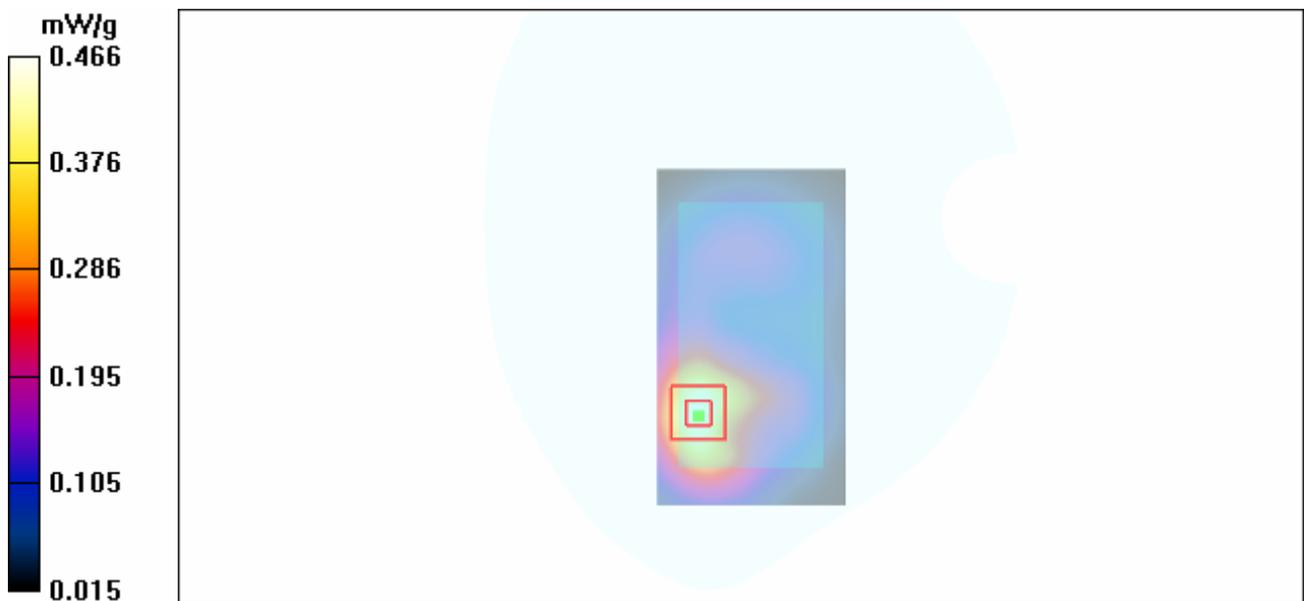


Figure 44 Body, Towards Ground, GSM 1900 EGPRS(2up) Channel 810

### WCDMA Band IV Left Cheek High

Date/Time: 3/27/2010 2:13:05 PM

Communication System: WCDMA Band IV; Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1753$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.732 mW/g

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

Reference Value = 6.89 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 1.18 W/kg

**SAR(1 g) = 0.714 mW/g; SAR(10 g) = 0.389 mW/g**

Maximum value of SAR (measured) = 0.787 mW/g

**Cheek High/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.89 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 0.897 W/kg

**SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.363 mW/g**

Maximum value of SAR (measured) = 0.675 mW/g

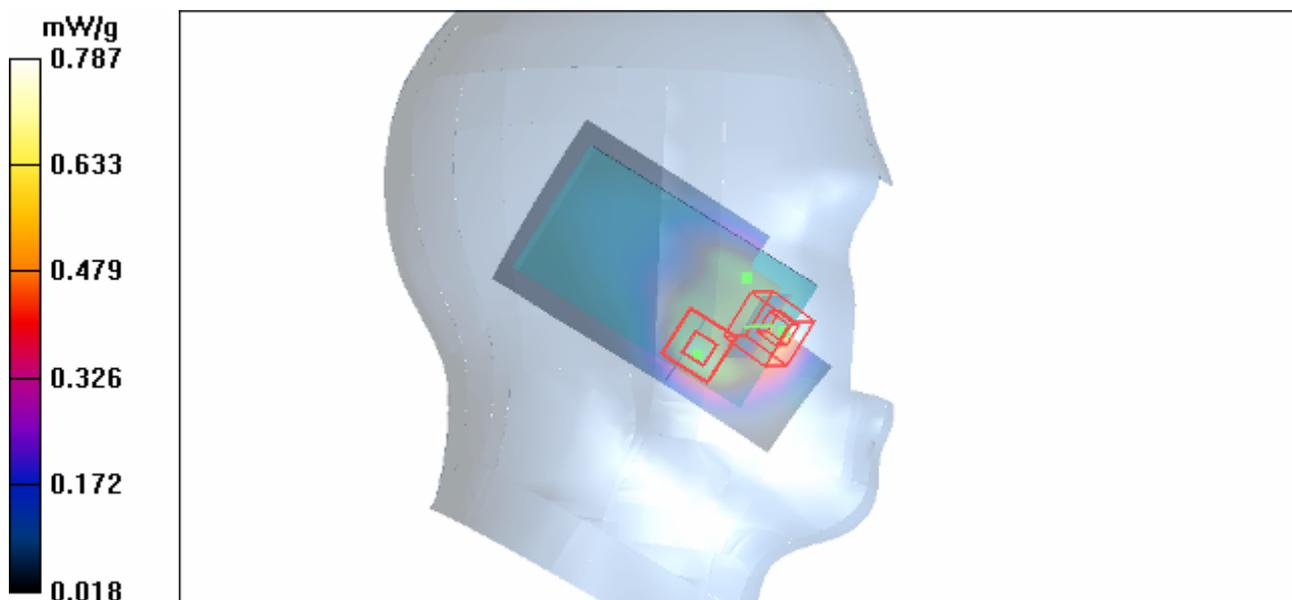


Figure 45 Left Hand Touch Cheek WCDMA Band IV Channel 1513

### WCDMA Band IV Left Cheek Middle

Date/Time: 3/26/2010 10:31:59 PM

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.870 mW/g

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

Reference Value = 7.66 V/m; Power Drift = -0.146 dB

Peak SAR (extrapolated) = 1.34 W/kg

**SAR(1 g) = 0.802 mW/g; SAR(10 g) = 0.443 mW/g**

Maximum value of SAR (measured) = 0.899 mW/g

**Cheek Middle/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.66 V/m; Power Drift = -0.146 dB

Peak SAR (extrapolated) = 1.05 W/kg

**SAR(1 g) = 0.721 mW/g; SAR(10 g) = 0.425 mW/g**

Maximum value of SAR (measured) = 0.788 mW/g

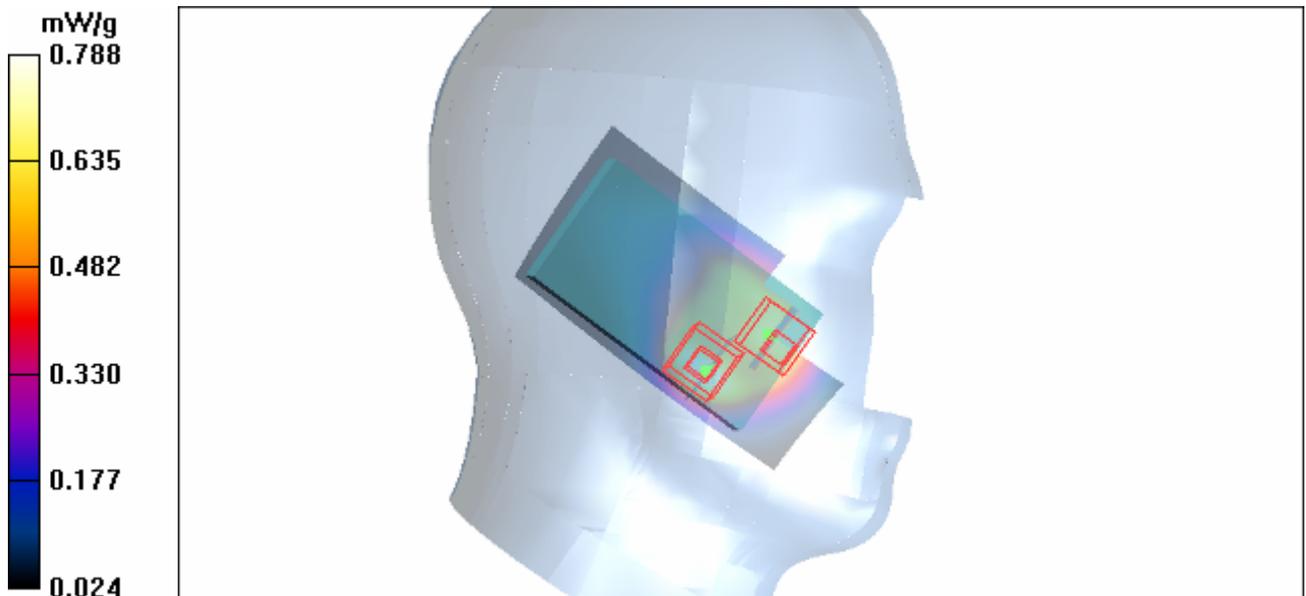


Figure 46 Left Hand Touch Cheek WCDMA Band IV Channel 1413

### WCDMA Band IV Left Cheek Low

Date/Time: 3/27/2010 1:32:25 PM

Communication System: WCDMA Band IV; Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.34$  mho/m;  $\epsilon_r = 40.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.04 mW/g

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

Reference Value = 8.50 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 1.57 W/kg

**SAR(1 g) = 0.988 mW/g; SAR(10 g) = 0.547 mW/g**

Maximum value of SAR (measured) = 1.09 mW/g

**Cheek Low/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.50 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.789 mW/g; SAR(10 g) = 0.467 mW/g**

Maximum value of SAR (measured) = 0.867 mW/g

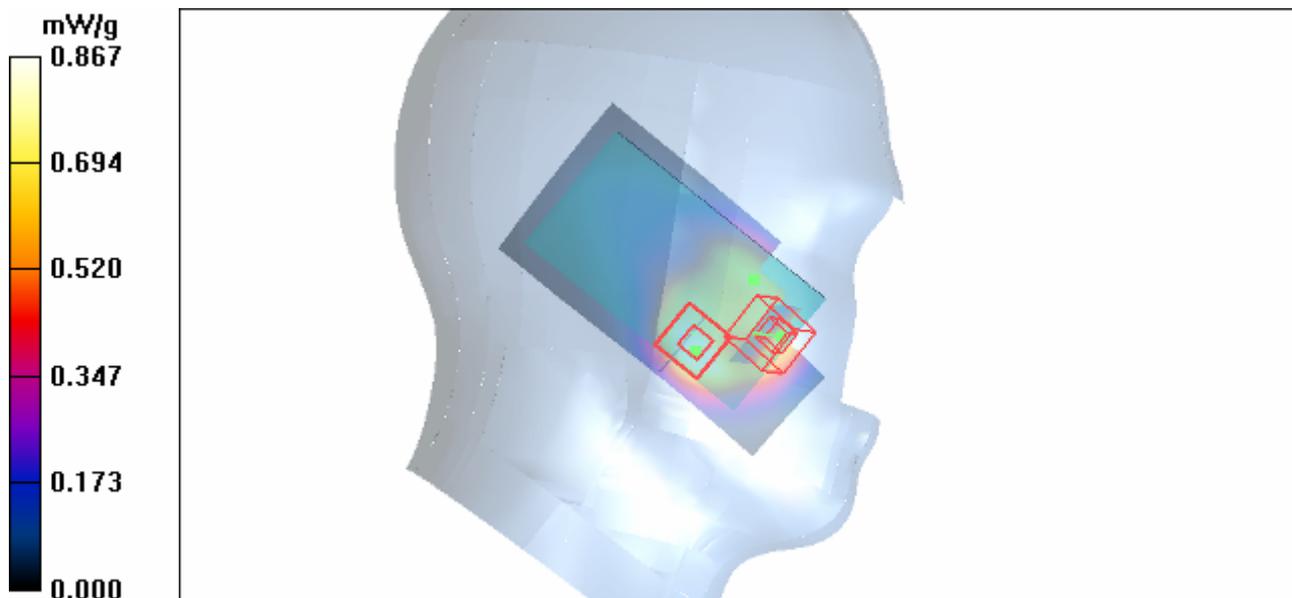


Figure 47 Left Hand Touch Cheek WCDMA Band IV Channel 1312

### WCDMA Band IV Left Tilt Middle

Date/Time: 3/27/2010 3:15:26 PM

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Tilt Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.288 mW/g

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

Reference Value = 14.5 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 0.406 W/kg

**SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.164 mW/g**

Maximum value of SAR (measured) = 0.293 mW/g

**Tilt Middle/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.5 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 0.294 W/kg

**SAR(1 g) = 0.209 mW/g; SAR(10 g) = 0.138 mW/g**

Maximum value of SAR (measured) = 0.225 mW/g

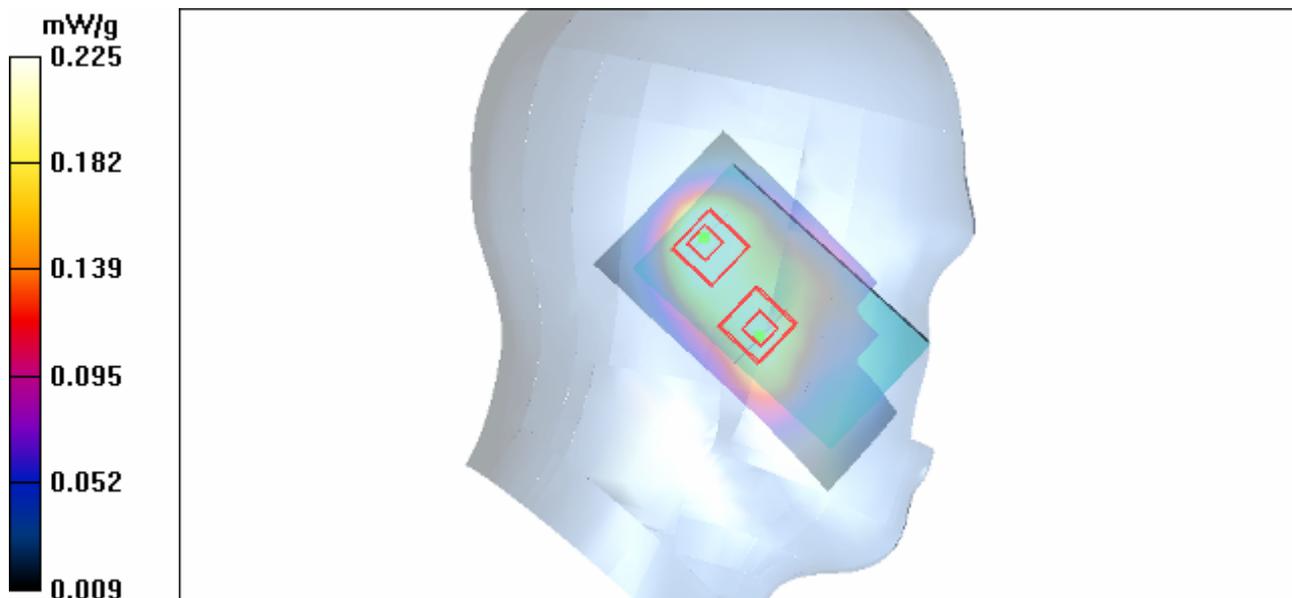


Figure 48 Left Hand Tilt 15° WCDMA Band IV Channel 1413

### WCDMA Band IV Right Cheek High

Date/Time: 3/27/2010 4:52:15 PM

Communication System: WCDMA Band IV; Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1753$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek High/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.857 mW/g

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

Reference Value = 6.51 V/m; Power Drift = 0.088 dB

Peak SAR (extrapolated) = 2.03 W/kg

**SAR(1 g) = 0.872 mW/g; SAR(10 g) = 0.413 mW/g**

Maximum value of SAR (measured) = 0.860 mW/g

**Cheek High/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.51 V/m; Power Drift = 0.088 dB

Peak SAR (extrapolated) = 0.806 W/kg

**SAR(1 g) = 0.529 mW/g; SAR(10 g) = 0.314 mW/g**

Maximum value of SAR (measured) = 0.584 mW/g

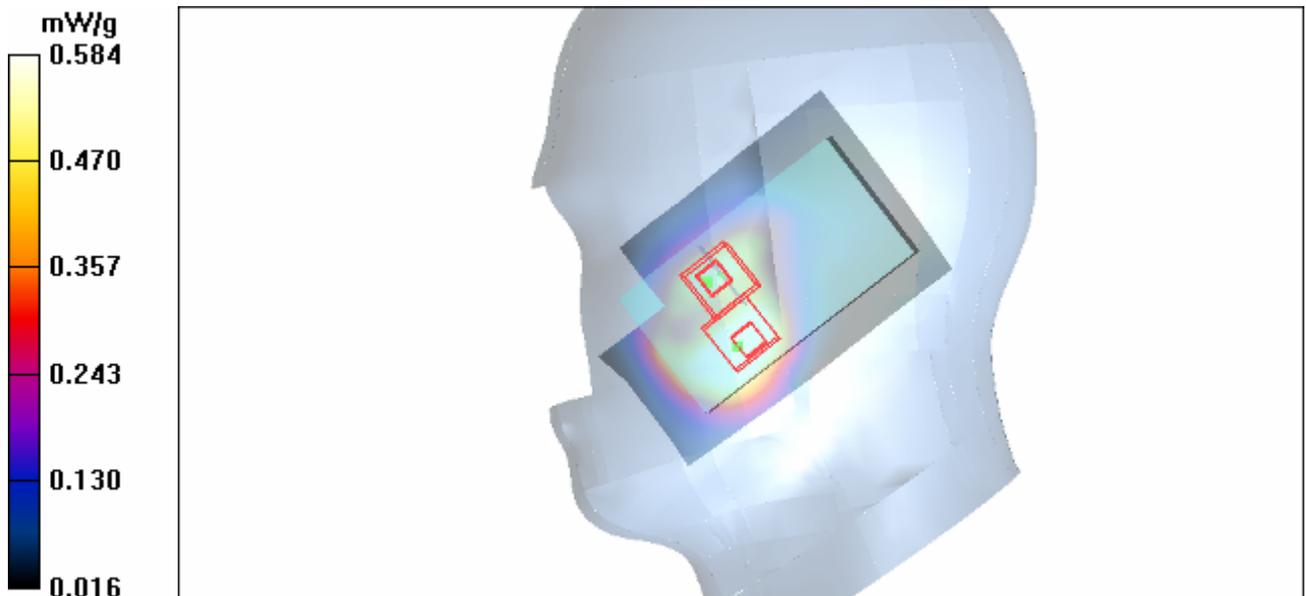


Figure 49 Right Hand Touch Cheek WCDMA Band IV Channel 1513

### WCDMA Band IV Right Cheek Middle

Date/Time: 3/27/2010 3:47:37 PM

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Middle/Area Scan (61x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.921 mW/g

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

Reference Value = 6.77 V/m; Power Drift = 0.086 dB

Peak SAR (extrapolated) = 1.52 W/kg

**SAR(1 g) = 0.877 mW/g; SAR(10 g) = 0.489 mW/g**

Maximum value of SAR (measured) = 0.978 mW/g

**Cheek Middle/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.77 V/m; Power Drift = 0.086 dB

Peak SAR (extrapolated) = 0.934 W/kg

**SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.369 mW/g**

Maximum value of SAR (measured) = 0.685 mW/g

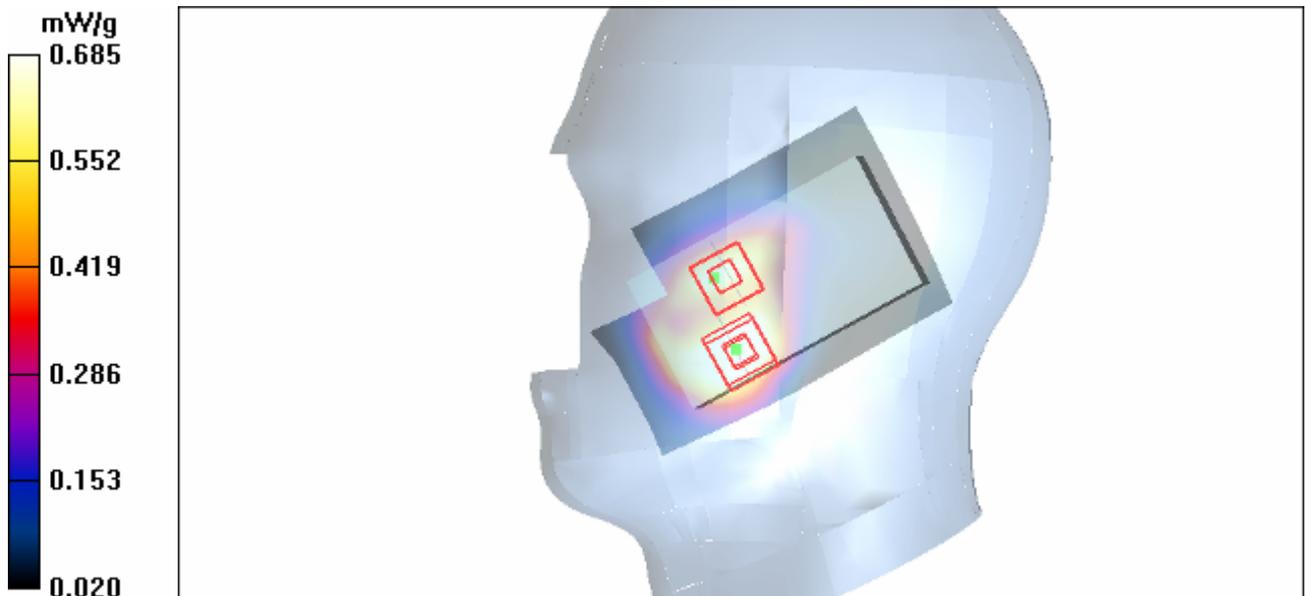


Figure 50 Right Hand Touch Cheek WCDMA Band IV Channel 1413

### WCDMA Band IV Right Cheek Low

Date/Time: 3/27/2010 4:20:12 PM

Communication System: WCDMA Band IV; Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.34$  mho/m;  $\epsilon_r = 40.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Cheek Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.08 mW/g

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

Reference Value = 7.43 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 1.76 W/kg

**SAR(1 g) = 1 mW/g; SAR(10 g) = 0.559 mW/g**

Maximum value of SAR (measured) = 1.13 mW/g

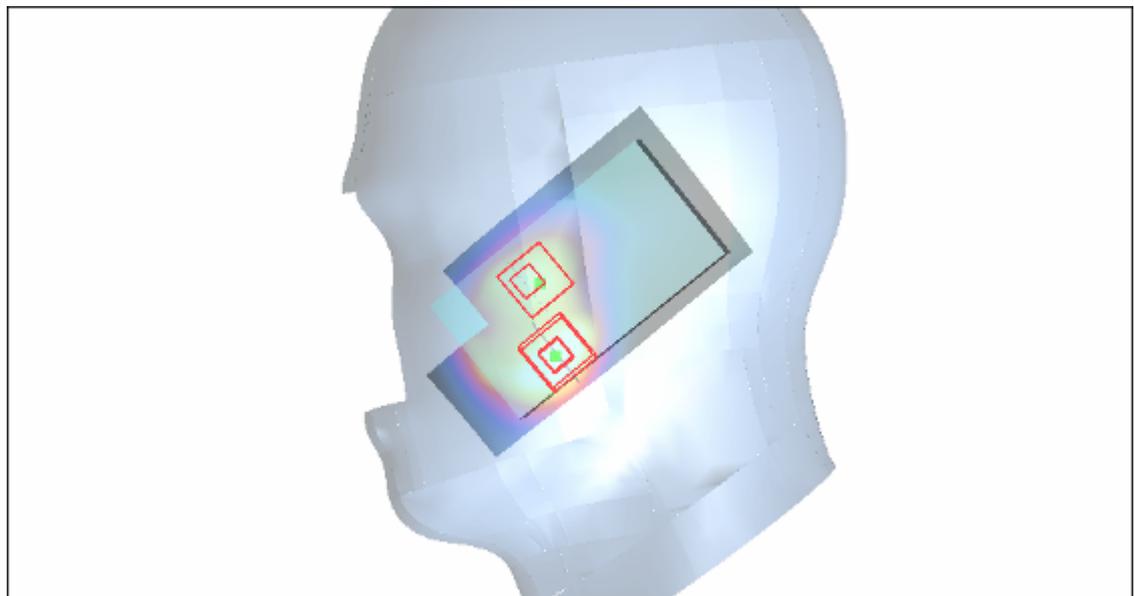
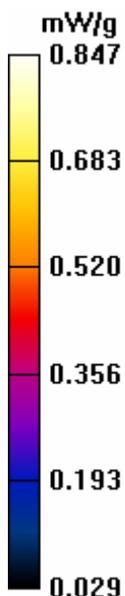
**Cheek Low/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.43 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 1.14 W/kg

**SAR(1 g) = 0.770 mW/g; SAR(10 g) = 0.465 mW/g**

Maximum value of SAR (measured) = 0.847 mW/g



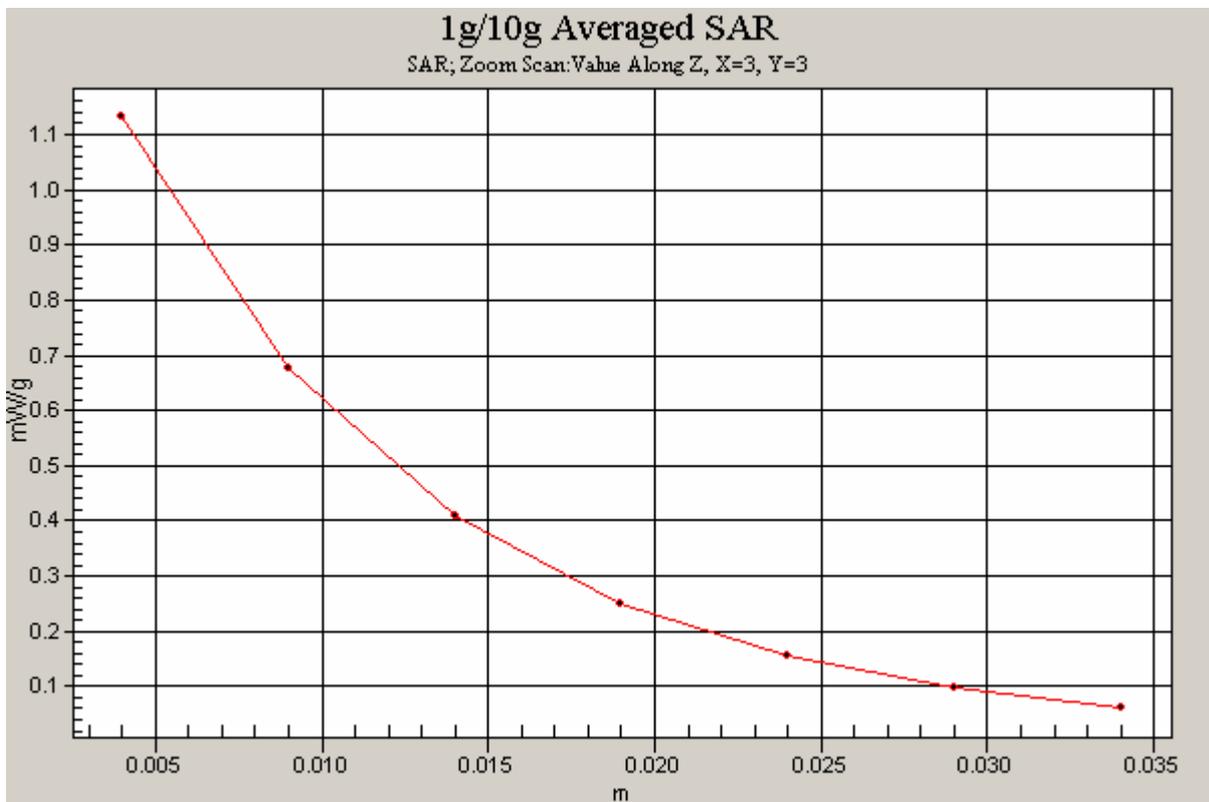
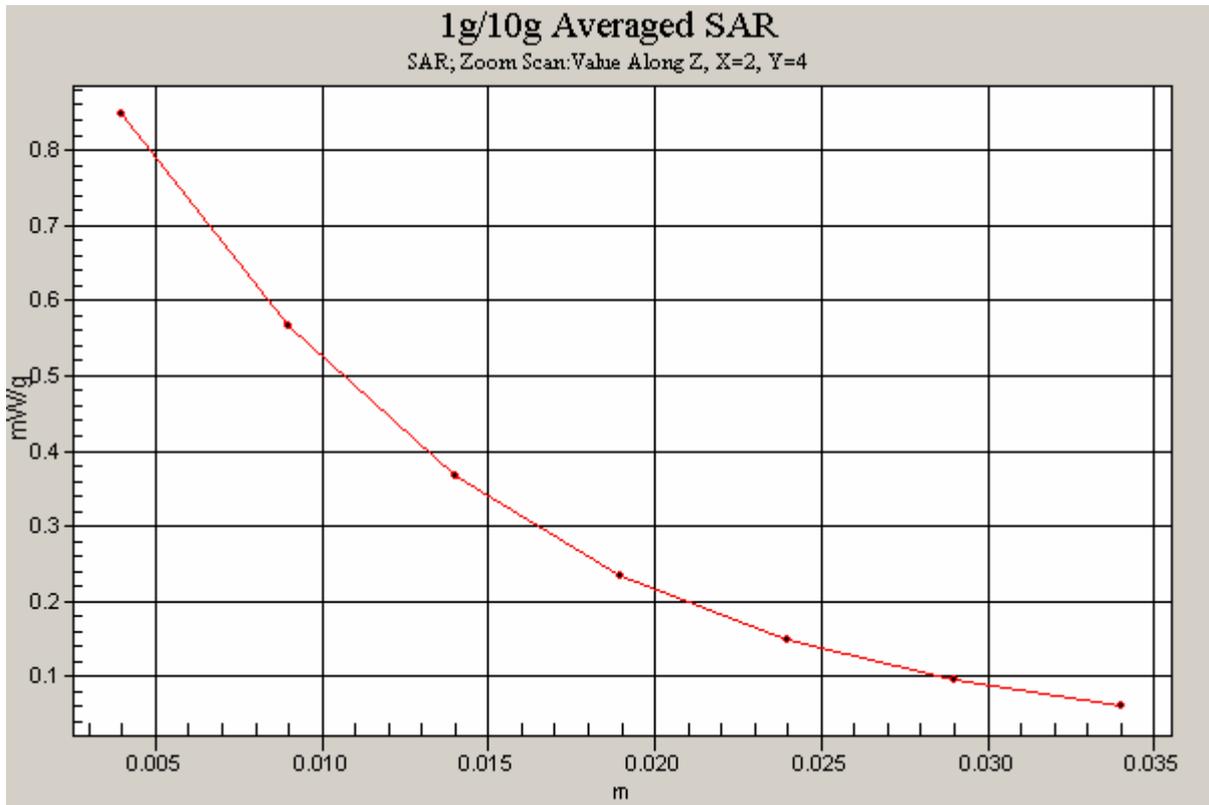


Figure 51 Right Hand Touch Cheek WCDMA Band IV Channel 1312

### WCDMA Band IV Right Tilt Middle

Date/Time: 3/27/2010 5:30:21 PM

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1733$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(8.04, 8.04, 8.04); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Tilt Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.289 mW/g

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

Reference Value = 14.4 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 0.384 W/kg

**SAR(1 g) = 0.255 mW/g; SAR(10 g) = 0.161 mW/g**

Maximum value of SAR (measured) = 0.277 mW/g

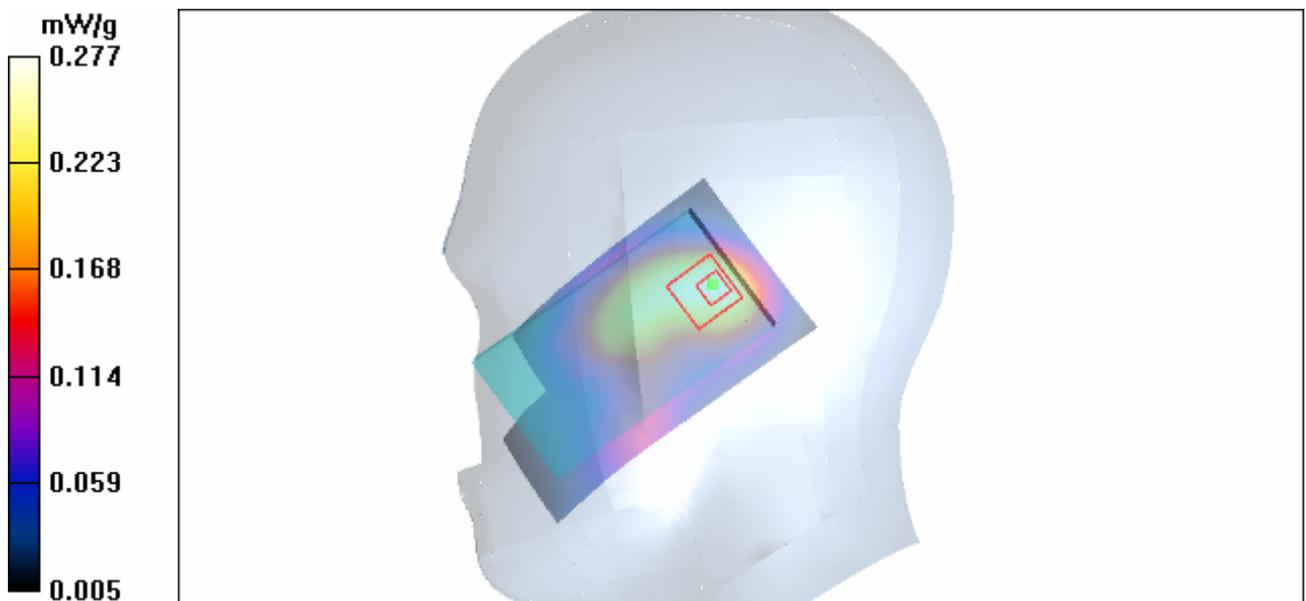


Figure 52 Right Hand Tilt 15° WCDMA Band IV Channel 1413

### WCDMA Band IV Towards Ground High

Date/Time: 3/27/2010 6:55:24 PM

Communication System: WCDMA Band IV; Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1752.6$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.70, 7.70, 7.70); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground High/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.384 mW/g

**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,

dz=5mm

Reference Value = 8.13 V/m; Power Drift = -0.077 dB

Peak SAR (extrapolated) = 0.583 W/kg

**SAR(1 g) = 0.348 mW/g; SAR(10 g) = 0.204 mW/g**

Maximum value of SAR (measured) = 0.375 mW/g

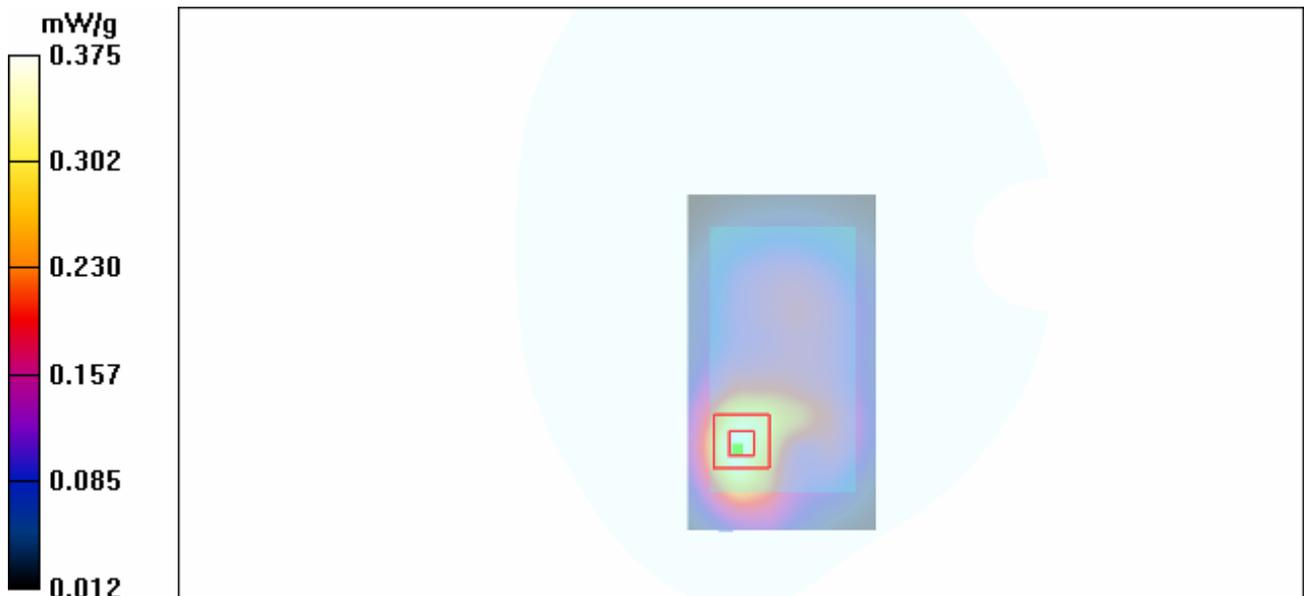


Figure 53 Body, Towards Ground, WCDMA Band IV Channel 1513

### WCDMA Band IV Towards Ground Middle

Date/Time: 3/27/2010 6:33:12 PM

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.6$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.70, 7.70, 7.70); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.443 mW/g

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

dz=5mm

Reference Value = 8.23 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 0.684 W/kg

**SAR(1 g) = 0.409 mW/g; SAR(10 g) = 0.237 mW/g**

Maximum value of SAR (measured) = 0.441 mW/g

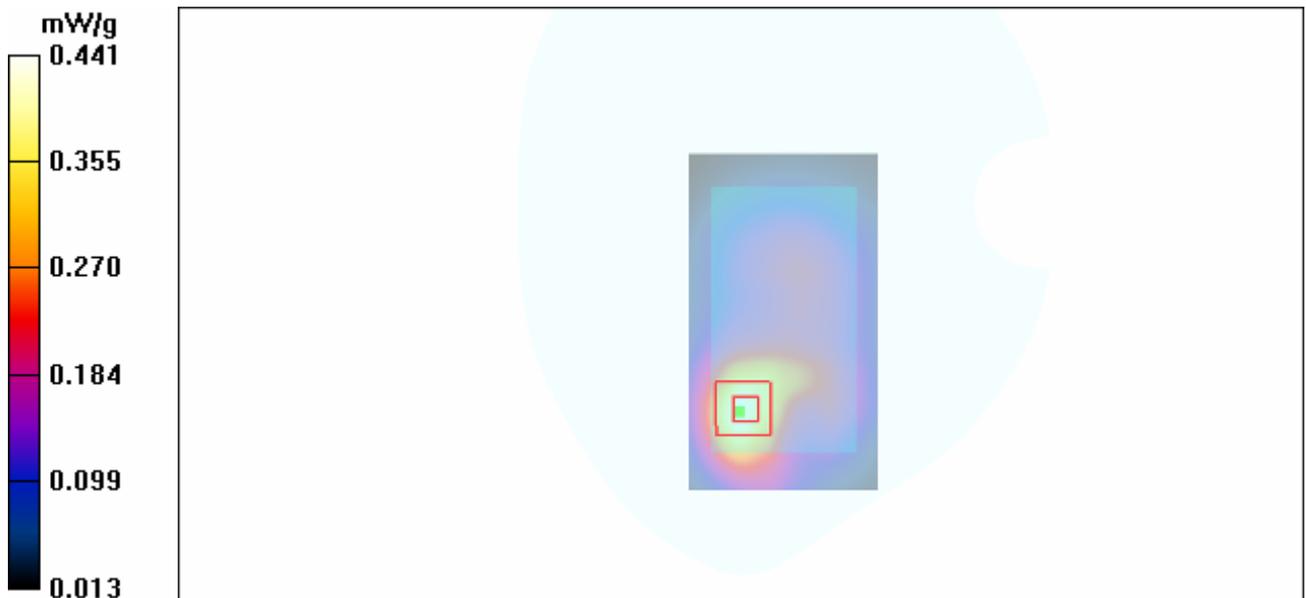


Figure 54 Body, Towards Ground, WCDMA Band IV Channel 1413

### WCDMA Band IV Towards Ground Low

Date/Time: 3/27/2010 7:13:37 PM

Communication System: WCDMA Band IV; Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.70, 7.70, 7.70); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.477 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,

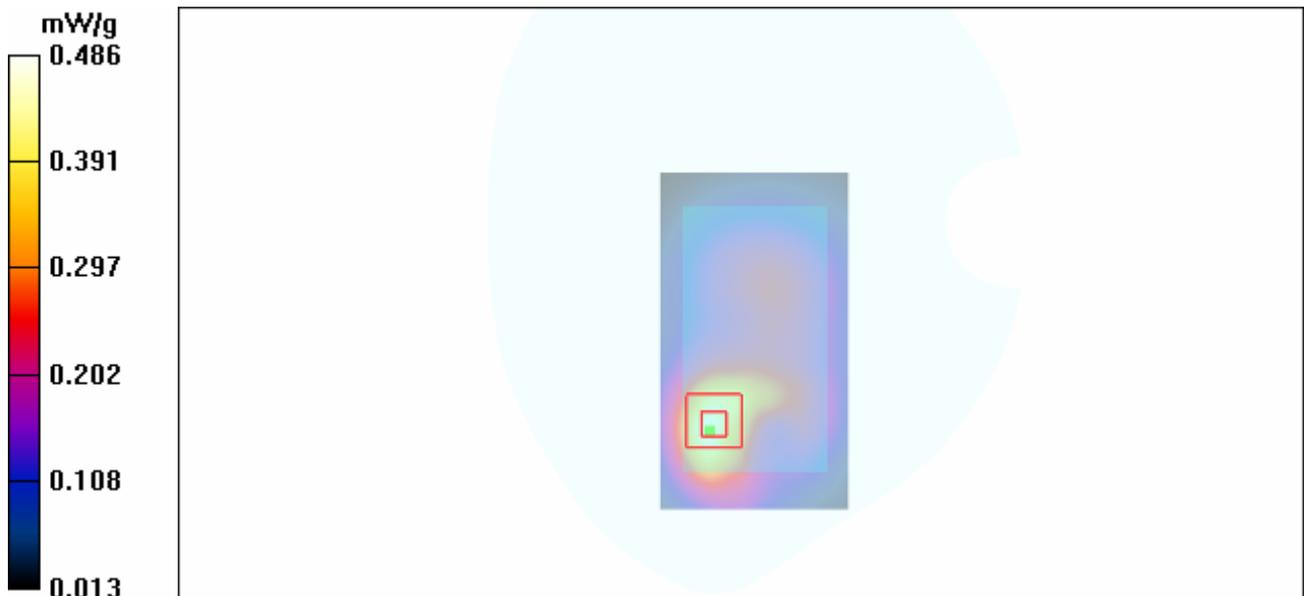
dz=5mm

Reference Value = 9.45 V/m; Power Drift = 0.052 dB

Peak SAR (extrapolated) = 0.761 W/kg

**SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.259 mW/g**

Maximum value of SAR (measured) = 0.486 mW/g



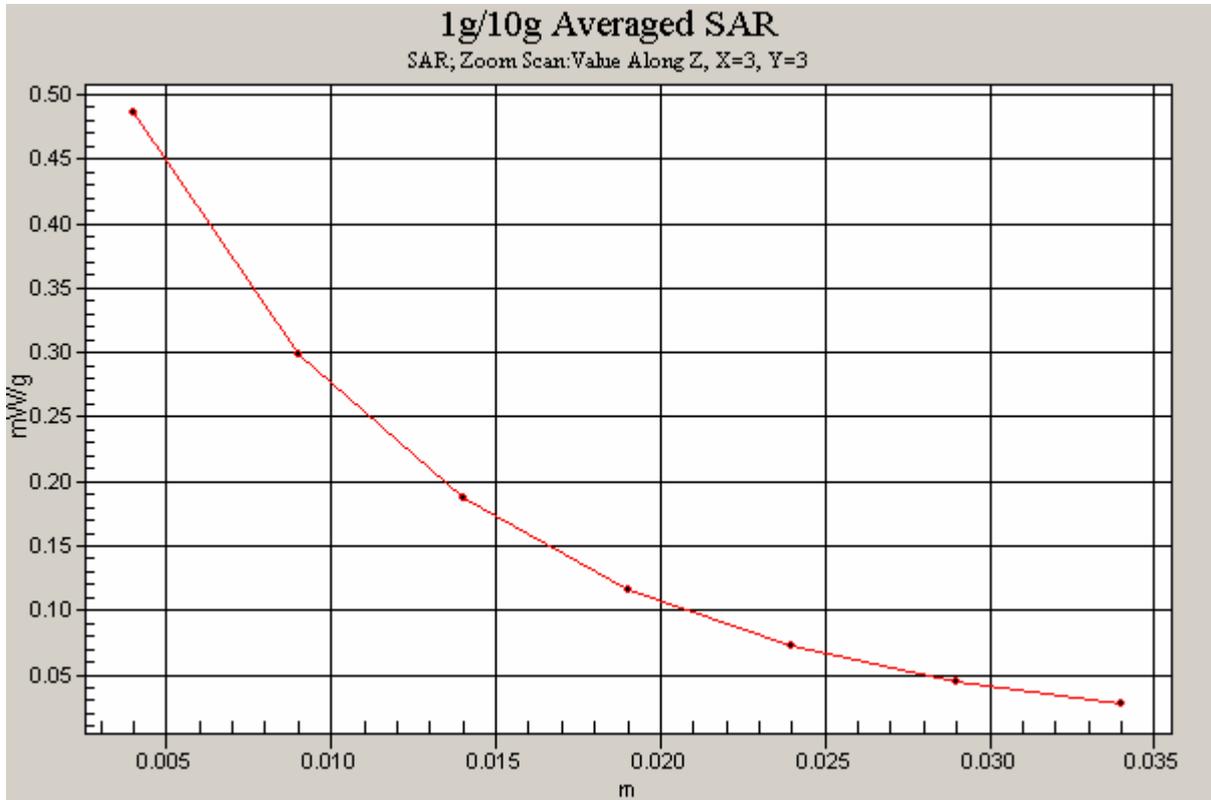


Figure 55 Body, Towards Ground, WCDMA Band IV Channel 1312

### WCDMA Band IV Towards Phantom Middle

Date/Time: 3/27/2010 6:02:34 PM

Communication System: WCDMA Band IV; Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.6$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.70, 7.70, 7.70); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.317 mW/g

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

Reference Value = 8.75 V/m; Power Drift = 0.153 dB

Peak SAR (extrapolated) = 0.447 W/kg

**SAR(1 g) = 0.288 mW/g; SAR(10 g) = 0.177 mW/g**

Maximum value of SAR (measured) = 0.312 mW/g

**Towards Phantom Middle/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.75 V/m; Power Drift = 0.153 dB

Peak SAR (extrapolated) = 0.359 W/kg

**SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.149 mW/g**

Maximum value of SAR (measured) = 0.248 mW/g

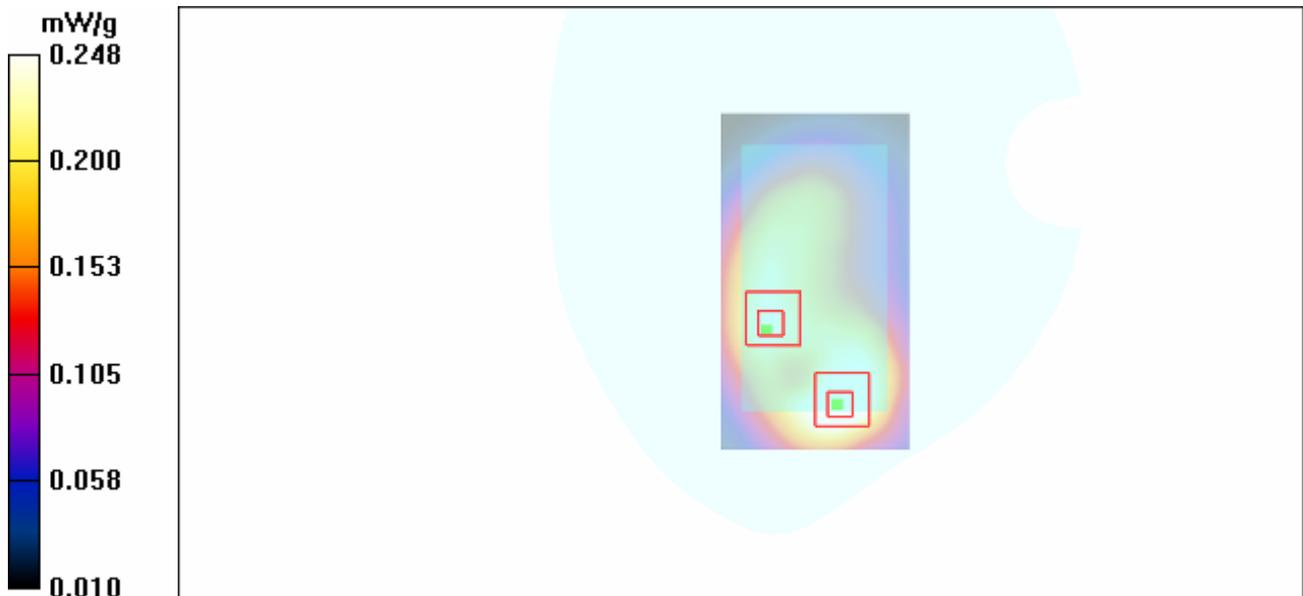


Figure 56 Body, Towards Phantom, WCDMA Band IV Channel 1413

### WCDMA Band IV Towards Ground with Earphone Low

Date/Time: 3/27/2010 7:32:39 PM

Communication System: WCDMA Band IV; Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.70, 7.70, 7.70); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.418 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,

dz=5mm

Reference Value = 9.11 V/m; Power Drift = -0.103 dB

Peak SAR (extrapolated) = 0.648 W/kg

**SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.221 mW/g**

Maximum value of SAR (measured) = 0.423 mW/g

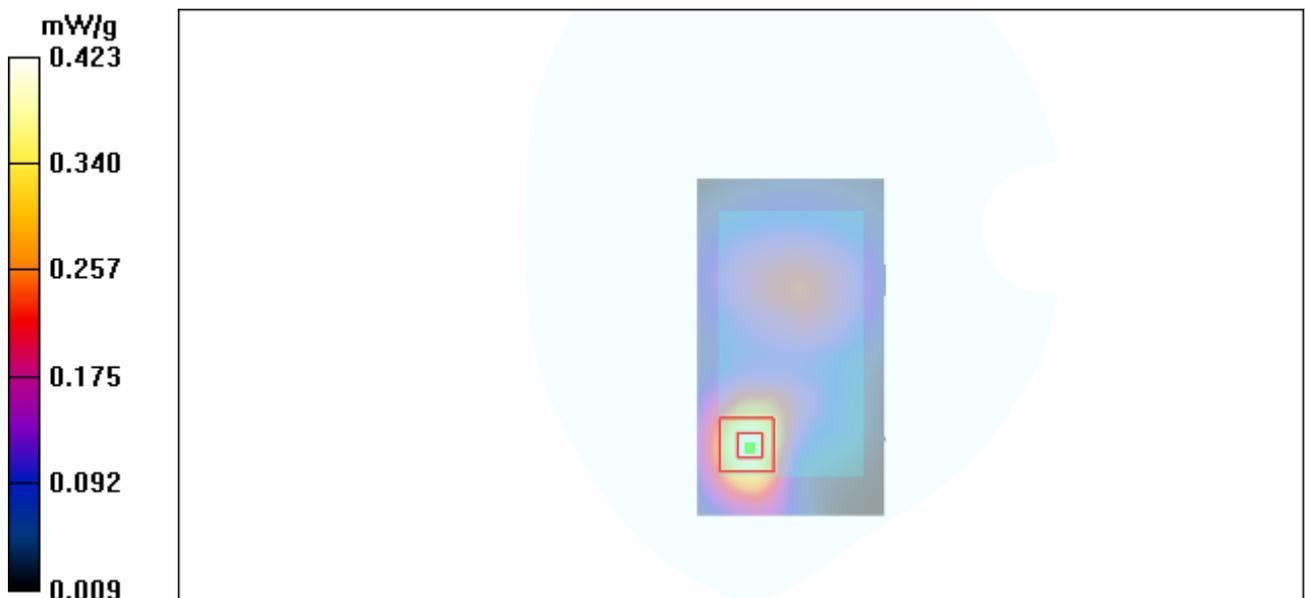


Figure 57 Body with Earphone, Towards Ground, WCDMA Band IV Channel 1312

### WCDMA Band IV+HSDPA Towards Ground Low

Date/Time: 3/27/2010 8:03:10 PM

Communication System: WCDMA Band IV+HSDPA; Frequency: 1712.4 MHz; Duty Cycle: 1:1  
Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.70, 7.70, 7.70); Calibrated: 9/23/2009

Electronics: DAE4 Sn871; Calibrated: 11/11/2009

Phantom: SAM000 T01 ; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Towards Ground Low/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.342 mW/g

**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,  
dz=5mm

Reference Value = 7.66 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 0.526 W/kg

**SAR(1 g) = 0.315 mW/g; SAR(10 g) = 0.182 mW/g**

Maximum value of SAR (measured) = 0.342 mW/g

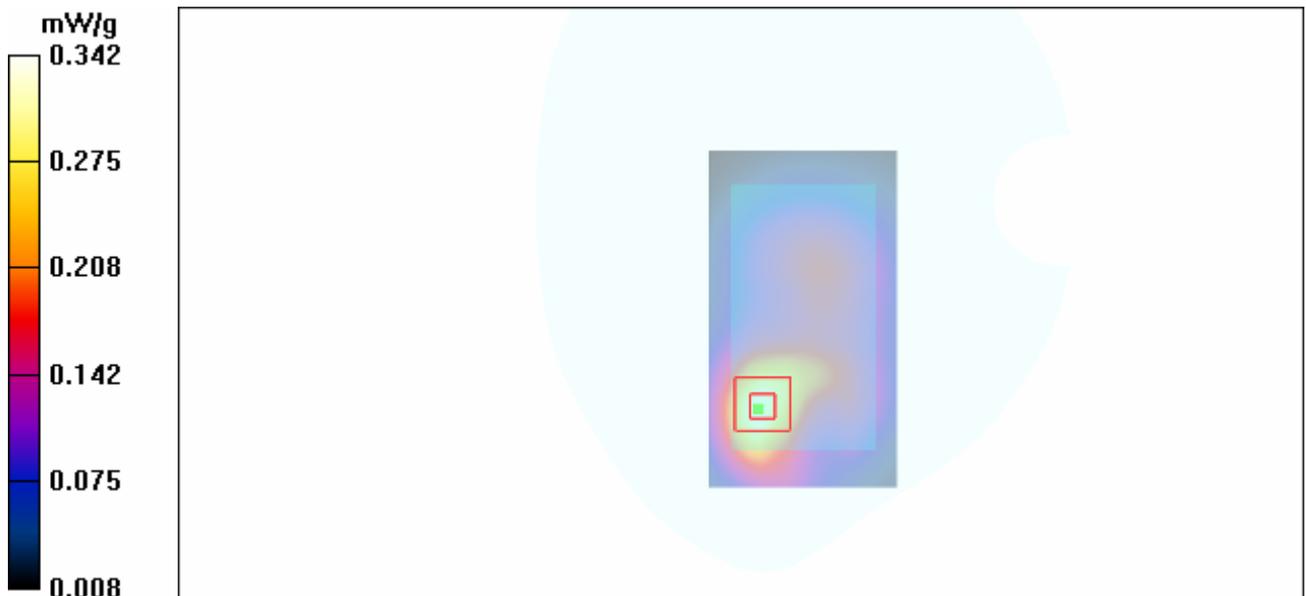


Figure 58 Body, Towards Ground, WCDMA Band IV HSDPA Channel 1312

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

Report No.: RZA2010-0428

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## ANNEX D: Probe 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 (Auden)**

Certificate No: **EX3-3677\_Sep09**

### CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3677**

Calibration procedure(s): **QA CAL-01.v6, QA CAL-12.v5, QA CAL-23.v3 and QA CAL-25.v2 - Calibration procedure for dosimetric E-field probes**

Calibration date: **September 23, 2009**

Condition of the calibrated item: **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by: **Claudio Leubler** (Name), **Laboratory Technician** (Function), *[Signature]* (Signature)

Approved by: **Katja Pokovic** (Name), **Technical Manager** (Function), *[Signature]* (Signature)

Issued: September 23, 2009

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# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RZA2010-0428

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Calibration Laboratory of  
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: **SCS 108**

### Glossary:

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
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

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

- 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

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 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.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<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  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

EX3DV4 SN:3677

September 23, 2009

# Probe EX3DV4

## SN:3677

Manufactured:	September 9, 2008
Last calibrated:	November 7, 2008
Recalibrated:	September 23, 2009

Calibrated for DASYS Systems

(Note: non-compatible with DASYS2 system!)

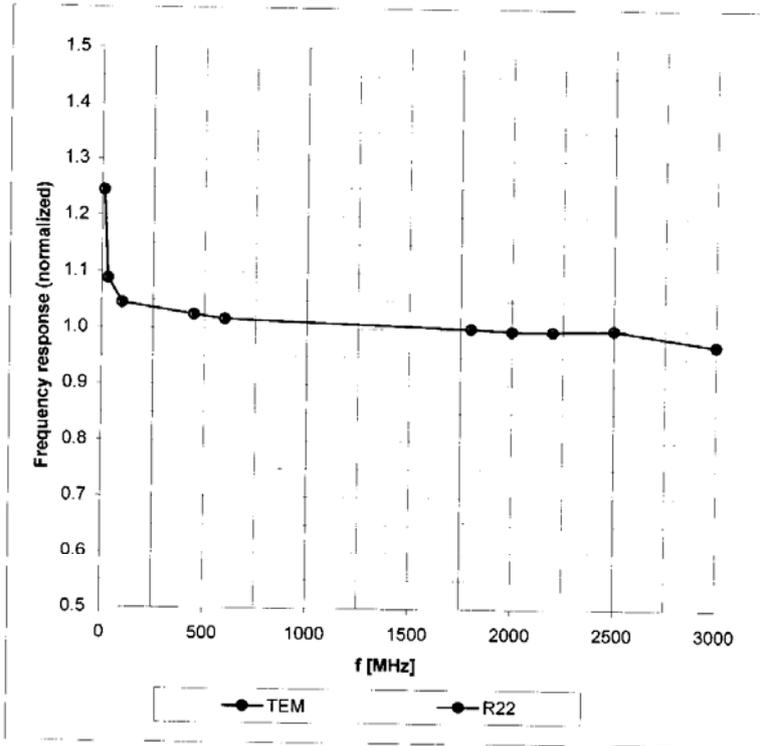


EX3DV4 SN:3677

September 23, 2009

### Frequency Response of E-Field

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

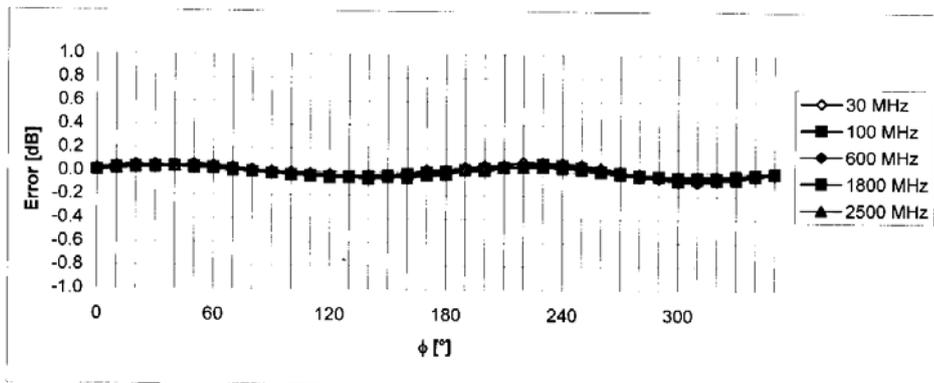
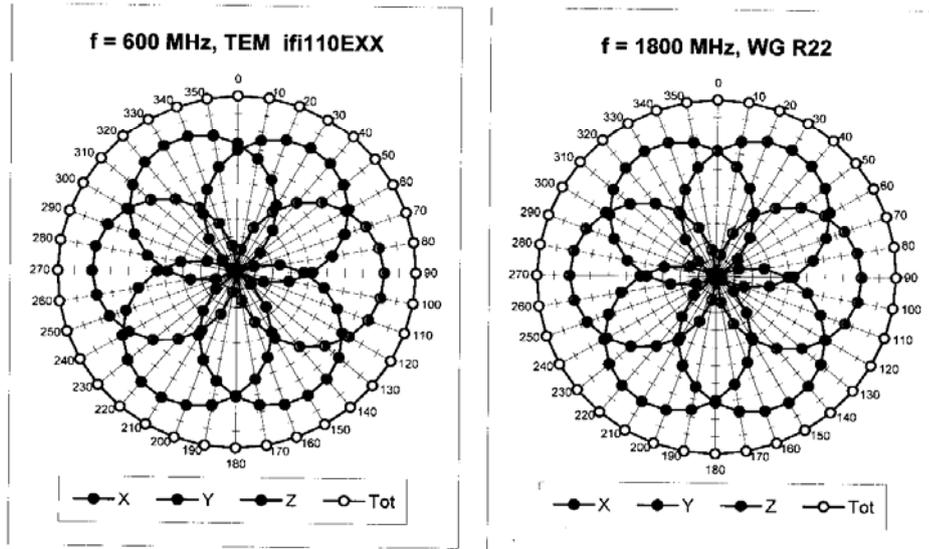


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

EX3DV4 SN:3677

September 23, 2009

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

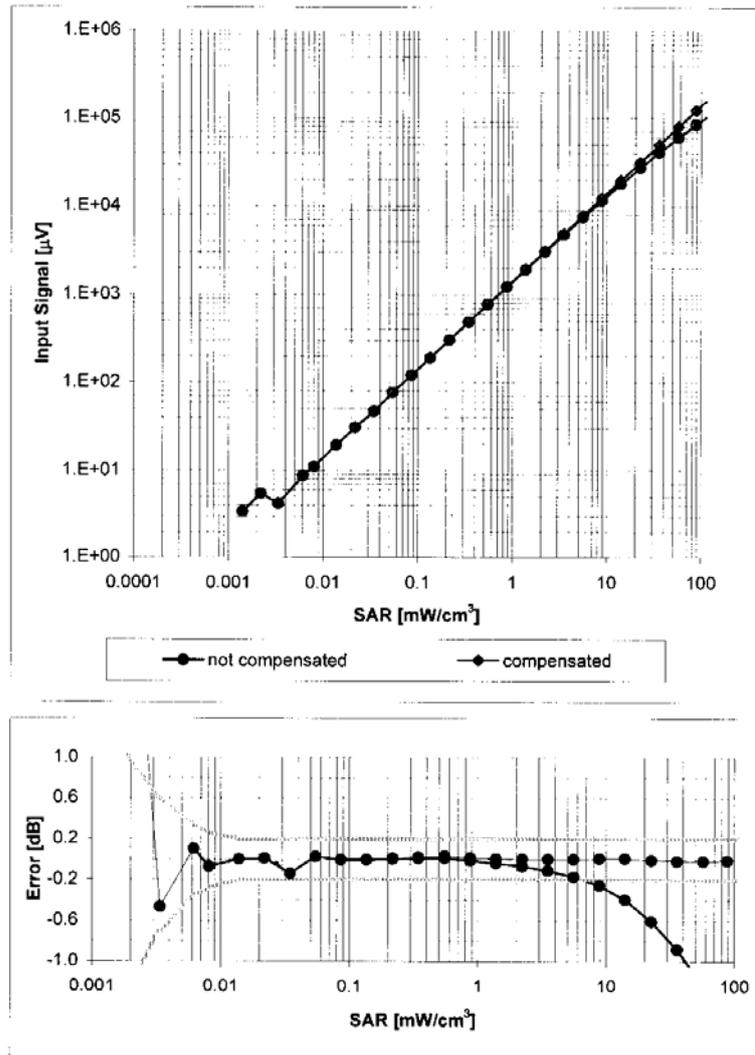


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

EX3DV4 SN:3677

September 23, 2009

**Dynamic Range  $f(SAR_{head})$**   
(Waveguide R22,  $f = 1800$  MHz)

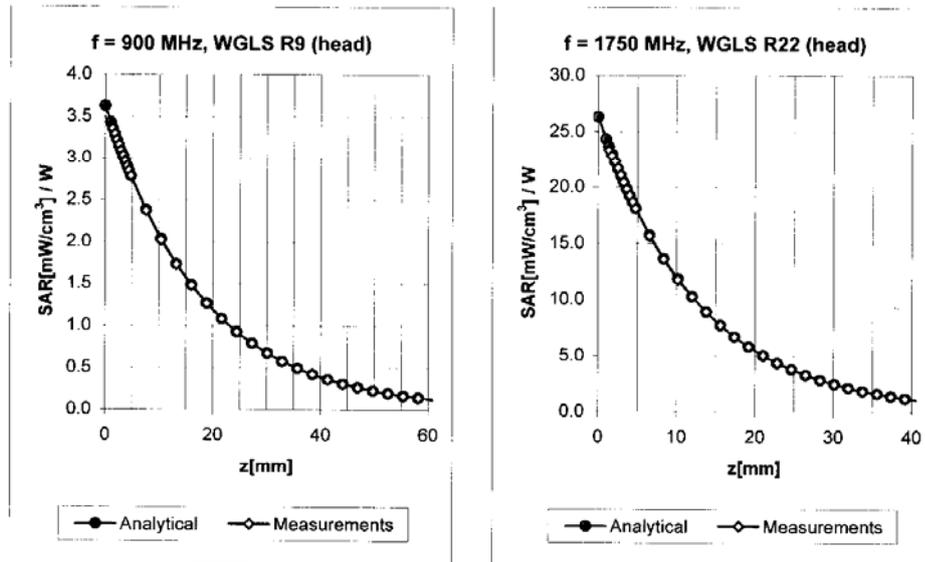


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

EX3DV4 SN:3677

September 23, 2009

### Conversion Factor Assessment



f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.68	0.64	9.20 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.71	0.62	8.91 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.68	0.62	8.04 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.70	0.60	7.53 ± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.32	0.49	10.43 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.54	0.73	9.11 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.63	0.71	8.89 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.55	0.74	7.70 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.30	1.01	7.62 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.56	0.68	7.28 ± 11.0% (k=2)

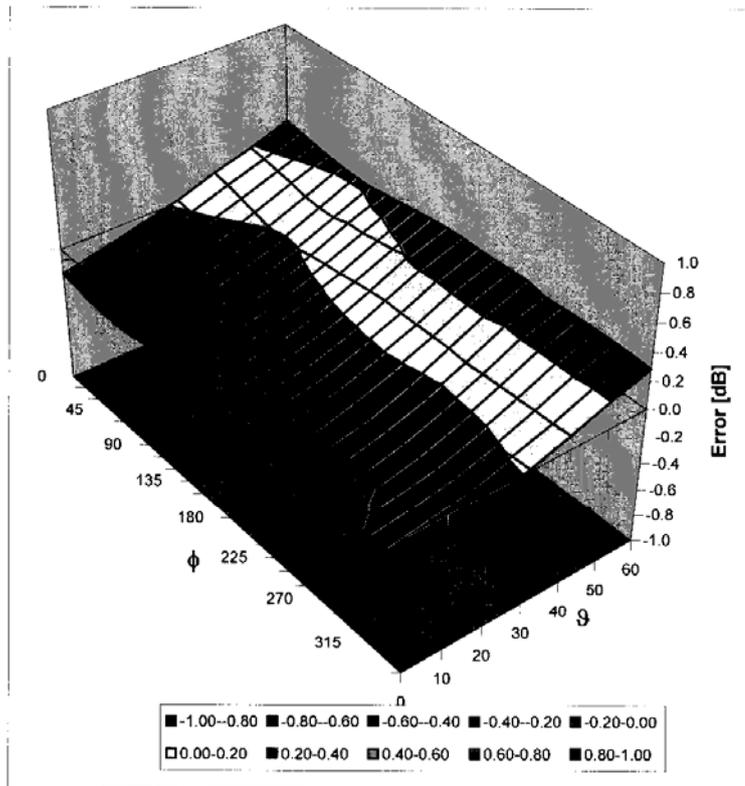
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV4 SN:3677

September 23, 2009

### Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\vartheta$ ),  $f = 900$  MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

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

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## ANNEX E: D835V2 Dipole Calibration Certificate

**Calibration Laboratory of  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **D835V2-4d082\_Jul09**

CALIBRATION CERTIFICATE																																															
Object	D835V2 - SN: 4d082																																														
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits																																														
Calibration date:	July 13, 2009																																														
Condition of the calibrated item	In Tolerance																																														
<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> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Primary Standards</th> <th style="width: 15%;">ID #</th> <th style="width: 35%;">Cal Date (Certificate No.)</th> <th style="width: 20%;">Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>08-Oct-08 (No. 217-00898)</td> <td>Oct-09</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>08-Oct-08 (No. 217-00898)</td> <td>Oct-09</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5086 (20g)</td> <td>31-Mar-09 (No. 217-01025)</td> <td>Mar-10</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 5047.2 / 06327</td> <td>31-Mar-09 (No. 217-01029)</td> <td>Mar-10</td> </tr> <tr> <td>Reference Probe ES3DV2</td> <td>SN: 3025</td> <td>30-Apr-09 (No. ES3-3025_Apr09)</td> <td>Apr-10</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>07-Mar-09 (No. DAE4-601_Mar09)</td> <td>Mar-10</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Secondary Standards</th> <th style="width: 15%;">ID #</th> <th style="width: 35%;">Check Date (in house)</th> <th style="width: 20%;">Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power sensor HP 8481A</td> <td>MY41092317</td> <td>18-Oct-02 (in house check Oct-07)</td> <td>in house check: Oct-09</td> </tr> <tr> <td>RF generator R&amp;S SMT-06</td> <td>100005</td> <td>4-Aug-99 (in house check Oct-07)</td> <td>in house check: Oct-09</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585 S4206</td> <td>18-Oct-01 (in house check Oct-06)</td> <td>in house check: Oct-09</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09	Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09	Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10	Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10	Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10	DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	in house check: Oct-09	RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	in house check: Oct-09	Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-06)	in house check: Oct-09
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Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature 																																												
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 																																												
			Issued: July 13, 2009																																												
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## Test Report

Report No.: RZA2010-0428

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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	V5.0
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V4.9	
<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	40.4 ± 6 %	0.89 mho/m ± 6 %
<b>Head TSL temperature during test</b>	(22.2 ± 0.2) °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	2.42 mW / g
SAR normalized	normalized to 1W	9.68 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>9.71 mW / g ± 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	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>6.34 mW / g ± 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.0 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °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	2.56 mW / g
SAR normalized	normalized to 1W	10.2 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>10.0 mW / g ± 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	1.68 mW / g
SAR normalized	normalized to 1W	6.72 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>6.61 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 $\Omega$ - 2.5 j $\Omega$
Return Loss	- 29.5 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 $\Omega$ - 4.3 j $\Omega$
Return Loss	- 26.6 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.390 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	October 17, 2008

**DASY5 Validation Report for Head TSL**

Date/Time: 13.07.2009 11:31:45

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082**

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

Medium: HSL 900 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

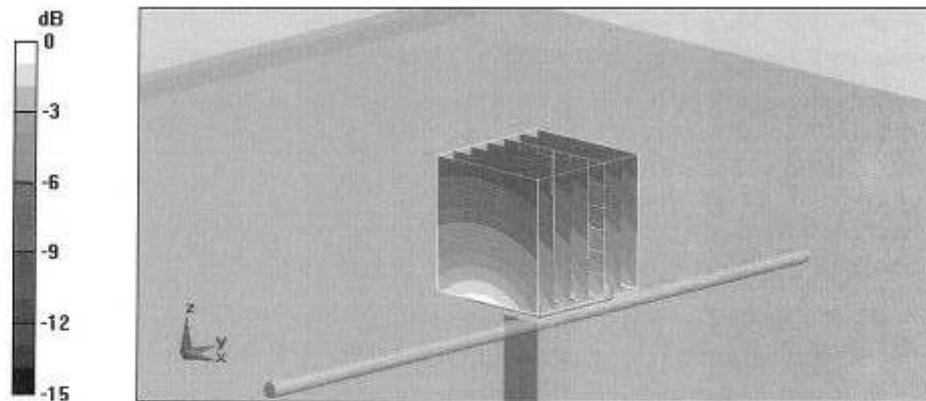
**Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.4 V/m; Power Drift = 0.00639 dB

Peak SAR (extrapolated) = 3.62 W/kg

**SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g**

Maximum value of SAR (measured) = 2.8 mW/g



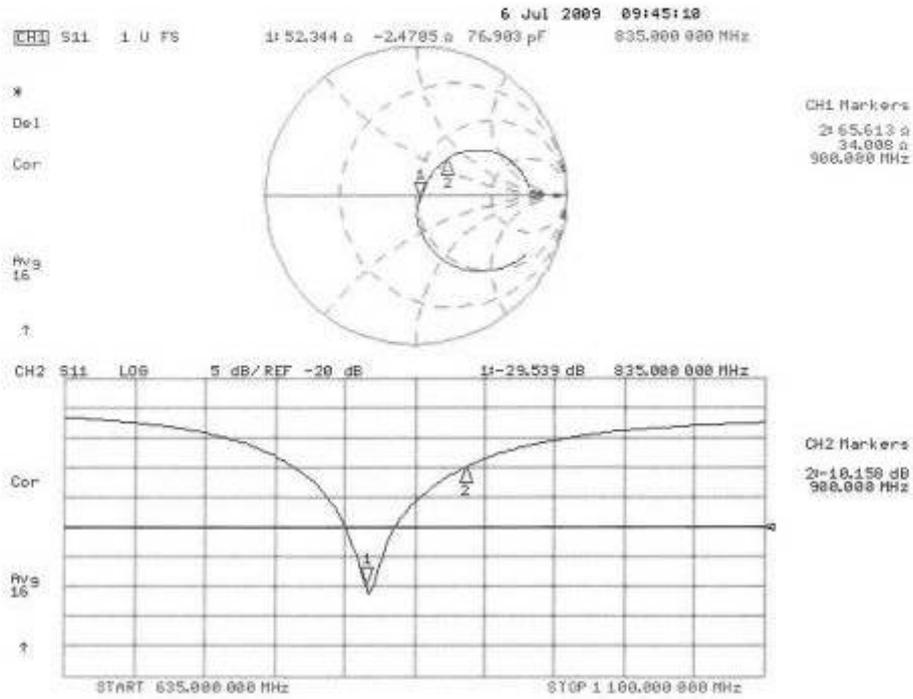
0 dB = 2.8mW/g

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

Report No.: RZA2010-0428

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## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date/Time: 13.07.2009 11:50:13

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082**

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

Medium: MSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

**DASY5 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(5.79, 5.79, 5.79); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

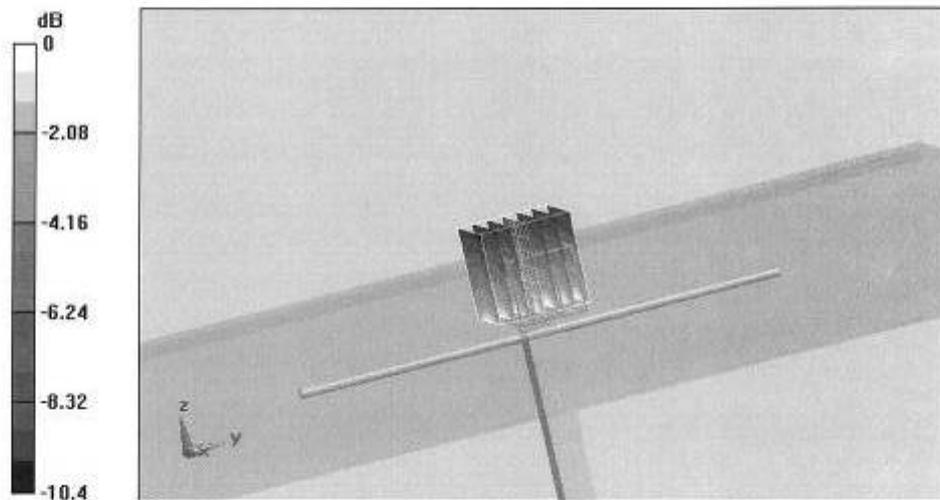
**Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.4 V/m; Power Drift = 0.013 dB

Peak SAR (extrapolated) = 3.76 W/kg

**SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.68 mW/g**

Maximum value of SAR (measured) = 2.97 mW/g



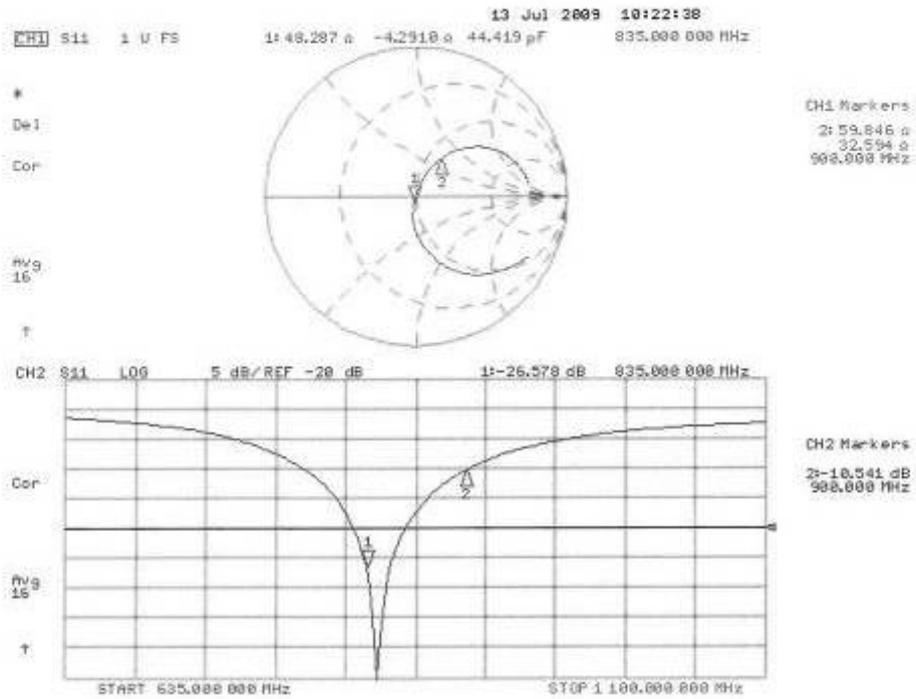
0 dB = 2.97mW/g

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

Report No.: RZA2010-0428

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## Impedance Measurement Plot for Body TSL



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

Report No.: RZA2010-0428

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## ANNEX F: D1800V2 Dipole Calibration Certificate

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



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**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
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Accreditation No.: **SCS 108**

Client **Auden**

Certificate No.: **D1800V2-2d052\_Jun09**

### CALIBRATION CERTIFICATE

Object: **D1800V2 - SN: 2d052**

Calibration procedure(s): **QA CAL-05.v7  
Calibration procedure for dipole validation kits**

Calibration date: **June 26, 2009**

Condition of the calibrated item: **In Tolerance**

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 EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41082317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 54205	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by: **Name: Jeton Kastrati, Function: Laboratory Technician, Signature: [Signature]**

Approved by: **Name: Katja Pokovic, Function: Technical Manager, Signature: [Signature]**

Issued: June 29, 2009

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

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



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

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

Accreditation No.: **SCS 108**

**Glossary:**

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.

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### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V5.0
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1800 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	41.1 $\pm$ 6 %	1.37 mho/m $\pm$ 6 %
<b>Head TSL temperature during test</b>	(22.0 $\pm$ 0.2) °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	9.66 mW /g
SAR normalized	normalized to 1W	38.6 mW /g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>39.4 mW / g <math>\pm</math> 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	5.14 mW /g
SAR normalized	normalized to 1W	20.6 mW /g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>20.8 mW / g <math>\pm</math> 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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

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### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.0 ± 6 %	1.49 mho/m ± 6 %
Body TSL temperature during test	(21.0 ± 0.2) °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	9.31 mW /g
SAR normalized	normalized to 1W	37.2 mW /g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>37.9 mW / g ± 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	4.97 mW /g
SAR normalized	normalized to 1W	19.9 mW /g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>20.1 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	46.8 $\Omega$ - 5.7 $j\Omega$
Return Loss	- 23.5 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	43.0 $\Omega$ - 4.5 $j\Omega$
Return Loss	- 21.0 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.215 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	July 05, 2002

**DASY5 Validation Report for Head TSL**

Date/Time: 26.06.2009 11:56:04

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: SN:2d052**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: HSL U11 BB

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.93, 4.93, 4.93); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3mm, probe 0deg) (7x7x7)/Cube 0:**

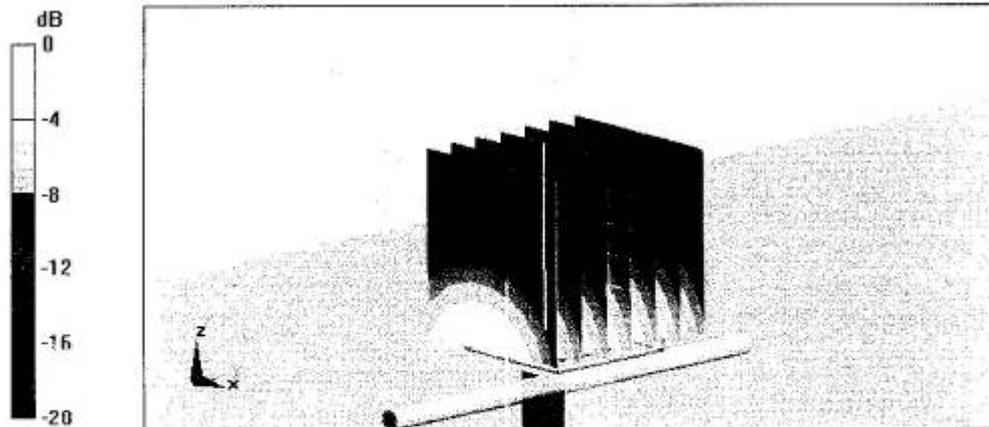
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.3 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 17.3 W/kg

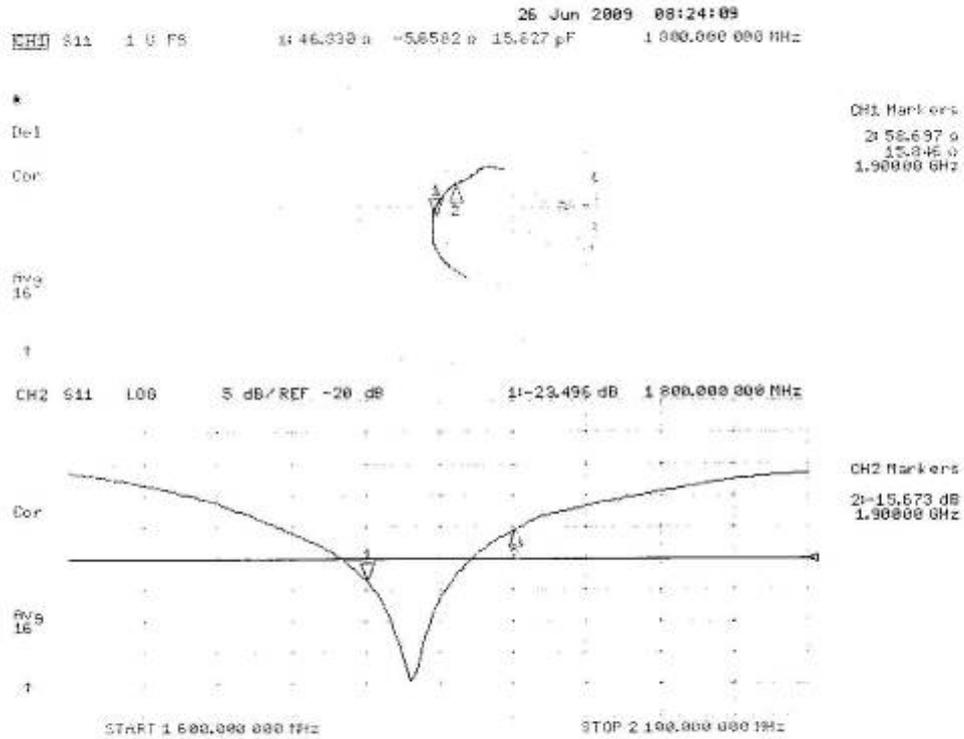
**SAR(1 g) = 9.66 mW/g; SAR(10 g) = 5.14 mW/g**

Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7mW/g

Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date/Time: 23.06.2009 18:19:26

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d052**

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: MSL U10

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 54.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.62, 4.62, 4.62); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0mm, probe 0deg) (7x7x7)/Cube 0:**

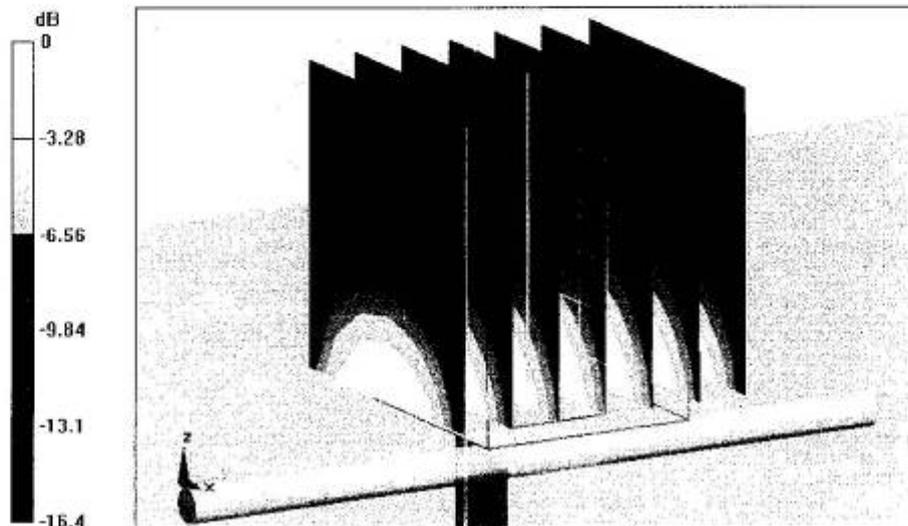
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.3 V/m; Power Drift = -0.00221 dB

Peak SAR (extrapolated) = 16.1 W/kg

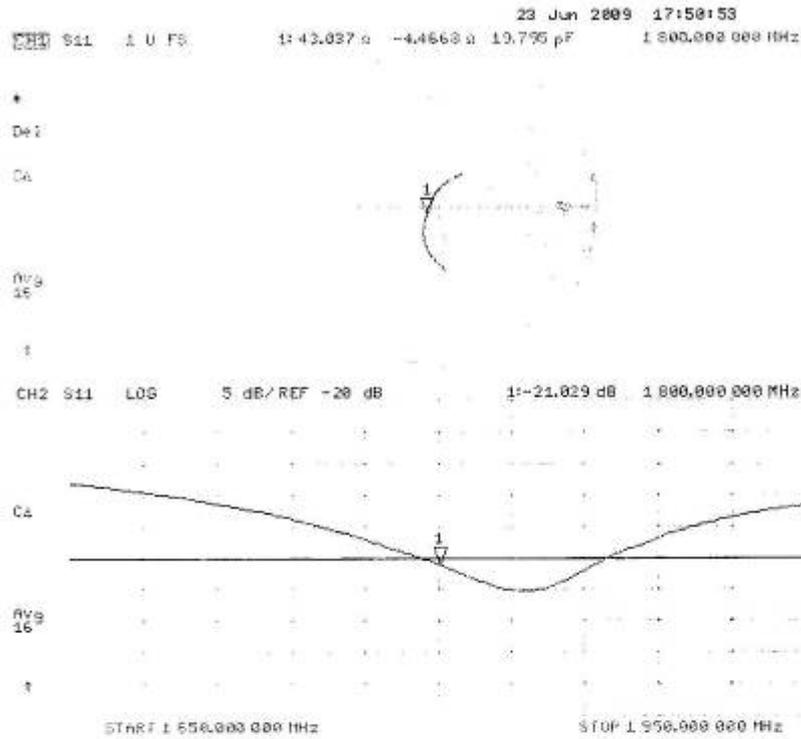
**SAR(1 g) = 9.31 mW/g; SAR(10 g) = 4.97 mW/g**

Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7mW/g

Impedance Measurement Plot for Body TSL



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

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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  
**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**

Client **Auden**

Certificate No: **D1900V2-5d018-Jun09**

### CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d018**

Calibration procedure(s) **QA CAL-05.v7  
Calibration procedure for dipole validation kits**

Calibration date: **June 26, 2009**

Condition of the calibrated item **In Tolerance**

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 EPM-442A	GB37480704	08-Oct-06 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-06 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 64206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: June 29, 2009

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

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



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

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

Accreditation No.: **SCS 108**

**Glossary:**

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

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

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

- d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	1.42 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °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	10.3 mW / g
SAR normalized	normalized to 1W	41.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>41.1 mW / g ± 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	5.38 mW / g
SAR normalized	normalized to 1W	21.5 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>21.5 mW / g ± 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.9 ± 6 %	1.55 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 0.2) °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	10.5 mW / g
SAR normalized	normalized to 1W	42.0 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>41.7 mW / g ± 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	5.52 mW / g
SAR normalized	normalized to 1W	22.1 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>22.0 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.8 $\Omega$ + 2.7 j $\Omega$
Return Loss	- 29.9 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	46.6 $\Omega$ + 4.3 j $\Omega$
Return Loss	- 24.9 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.195 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	June 04, 2002

**DASY5 Validation Report for Head TSL**

Date/Time: 26.06.2009 13:05:15

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d018**

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

Medium: HSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 41$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

**DASY5 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(4.88, 4.88, 4.88); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAB4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0 mm, probe 0deg) (7x7x7)/Cube 0:**

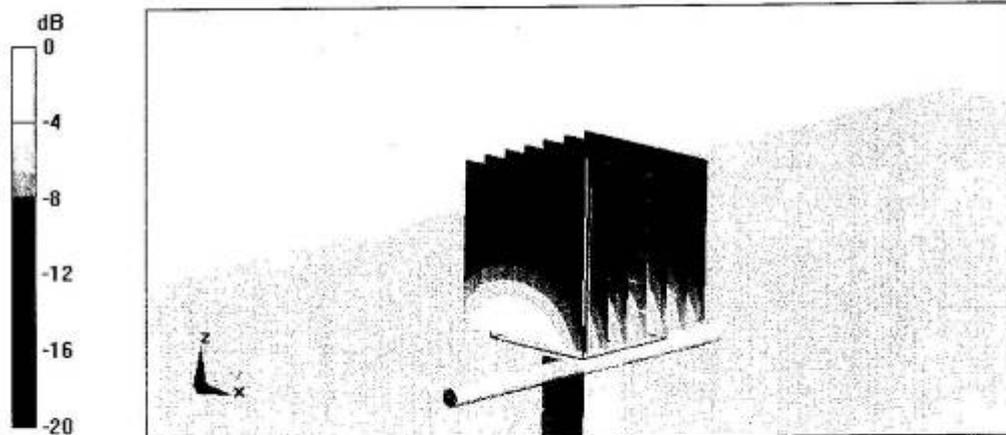
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.6 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 18.7 W/kg

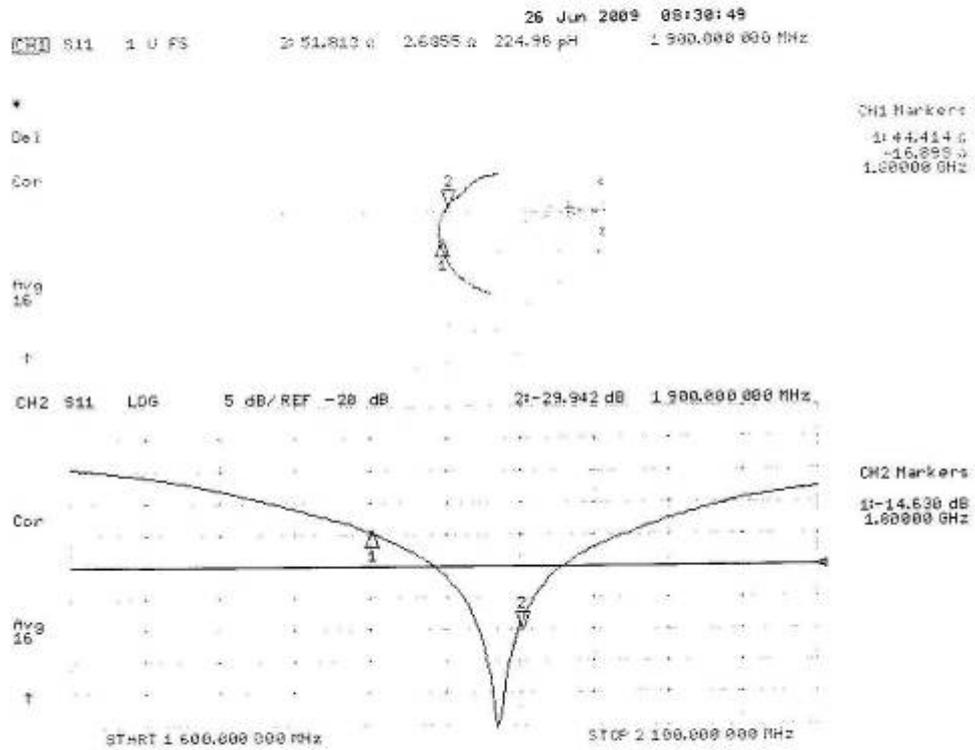
**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.38 mW/g**

Maximum value of SAR (measured) = 12.6 mW/g



0 dB = 12.6mW/g

Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date/Time: 26.06.2009 14:30:50

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d018**

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

Medium: MSL U10 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

**DASY5 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(4.46, 4.46, 4.46); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0mm, probe 0deg) (7x7x7)/Cube 0:**

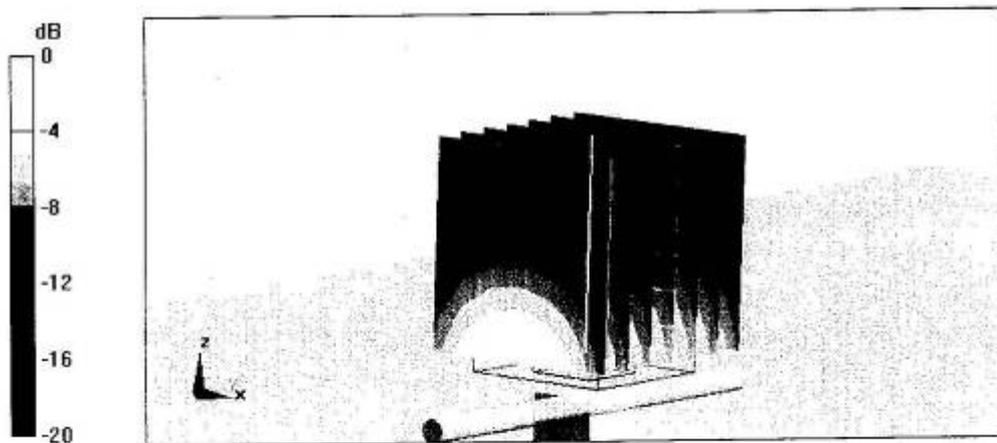
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.8 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 18.9 W/kg

**SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.52 mW/g**

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



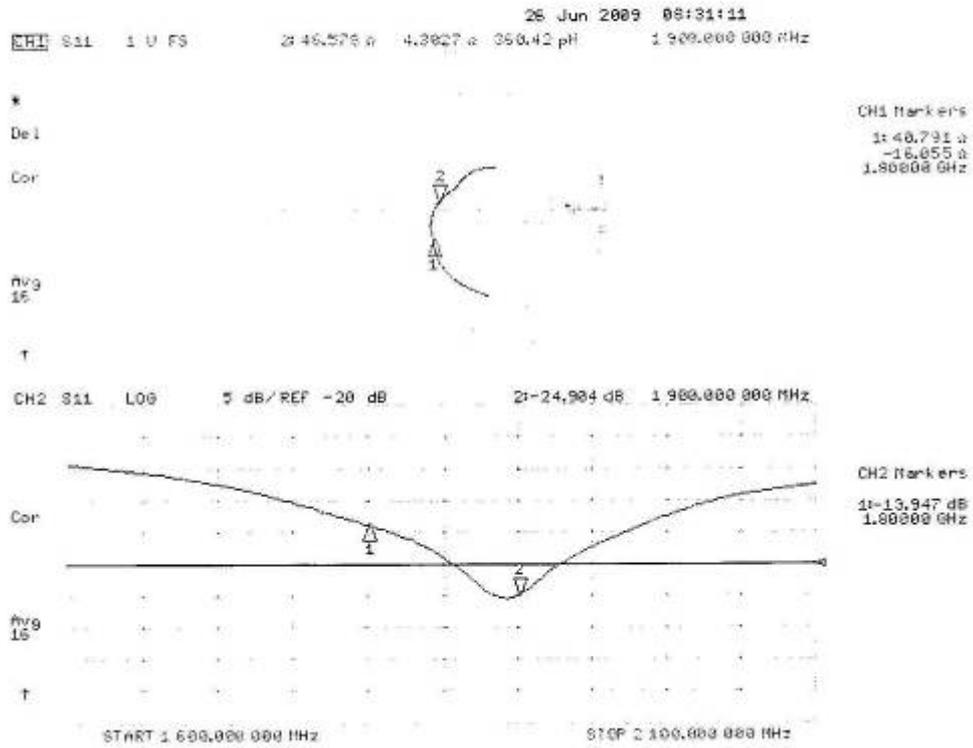
0 dB = 13.3mW/g

# 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 H: DAE4 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 – SH (Auden)**

Certificate No: **DAE4-871\_Nov09**

### CALIBRATION CERTIFICATE

Object: **DAE4 - SD 000 D04 BJ - SN: 871**

Calibration procedure(s): **QA CAL-06.v12  
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **November 11, 2009**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	05-Jun-09 (in house check)	In house check: Jun-10

	Name	Function	Signature
Calibrated by:	Andrea Guntli	Technician	
Approved by:	Fin Bornholt	R&D Director	

Issued: November 11, 2009

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

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



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

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

### Glossary

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

### Methods Applied and Interpretation of Parameters

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	404.813 $\pm$ 0.1% (k=2)	404.794 $\pm$ 0.1% (k=2)	405.237 $\pm$ 0.1% (k=2)
Low Range	3.98191 $\pm$ 0.7% (k=2)	3.98417 $\pm$ 0.7% (k=2)	3.98912 $\pm$ 0.7% (k=2)

### Connector Angle

Connector Angle to be used in DASY system	90.0 $\circ$ $\pm$ 1 $\circ$
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