



Report No.: RZA1101-0131SAR01R1



# OET 65

# TEST REPORT

<b>Product Name</b>	GSM Dual-Band GPRS Digital Mobile Phone
<b>Model</b>	ZTE-G R222
<b>FCC ID</b>	Q78-GR222
<b>Client</b>	ZTE CORPORATION

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



## GENERAL SUMMARY

<b>Product Name</b>	GSM Dual-Band GPRS Digital Mobile Phone	<b>Model</b>	ZTE-G R222
<b>Report No.</b>	RZA1101-0131SAR01R1	<b>FCC ID</b>	Q78-GR222
<b>Client</b>	ZTE CORPORATION		
<b>Manufacturer</b>	ZTE CORPORATION		
<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.</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 including DA 02-1438, published June 2002:</b> Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio frequency Emissions.</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> <p style="text-align: right;">(Stamp) Date of issue: February 21<sup>st</sup>, 2011</p>		
<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.

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

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**1.3. Applicant Information**

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### 1.5. Information of EUT

#### General Information

Device Type:	Portable Device		
Exposure Category:	Uncontrolled Environment / General Population		
Product Name:	GSM Dual-Band GPRS Digital Mobile Phone		
IMEI:	865155000005575		
Hardware Version:	g9qA		
Software Version:	EC-R8SM-P109A17V1.0.0		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Supporting Mode(s):	GSM 850/GSM 1900; (tested) GSM 900/GSM 1800;		
Test Modulation:	(GSM)GMSK		
Device Class:	B		
GPRS Multislot Class (12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
Operating Frequency Range(s):	Mode	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
Power Class:	GSM 850: 4, tested with power level 5		
	GSM 1900: 1, tested with power level 0		
Test Channel: (Low - Middle - High)	128 - 190 - 251	(GSM 850)	(tested)
	512 - 661 - 810	(GSM 1900)	(tested)

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### Auxiliary Equipment Details

#### AE1:Battery

Model: Li3710T42P3h553457

Manufacturer: ZTE CORPORATION

SN: 40041012075117520

Equipment Under Test (EUT) is a model of GSM Dual-Band GPRS Digital Mobile Phone. The detail about Mobile phone and Lithium Battery is in chapter 1.5 in this report. SAR is tested for GSM 850 and GSM 1900. The device class of the EUT is class B, not has DTM function. The EUT has a GSM antenna that is used for Tx/Rx.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

### 1.6. The Maximum SAR<sub>1g</sub> Values and Power of each tested Mode

#### Head Configuration

Mode	Channel	Position	SAR <sub>1g</sub> (W/kg)
GSM 850	High/251	Right, Cheek	0.888
GSM 1900	High/810	Left, Cheek	1.040

#### Body Worn Configuration

Mode	Channel	Separation distance	SAR <sub>1g</sub> (W/kg)
GPRS 850, 4 slots	High/251	15mm	1.040
GPRS 1900, 4 slots	Low/512	15mm	0.501

#### Maximum Power

Mode		Max Conducted Power (dBm)	Max Average Power (dBm)
GSM 850	GSM	<b>32.39</b>	<b>23.36</b>
	GPRS,4 time-slots	<b>29.22</b>	<b>26.21</b>
GSM 1900	GSM	<b>29.41</b>	<b>20.38</b>
	GPRS,4 time-slots	<b>26.36</b>	<b>23.35</b>

### 1.7. Test Date

The test is performed from January 30, 2011 to February 9, 2011.

## 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. 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 EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. 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 lever is set to “5” in SAR of GSM 850, set to “0” in SAR of GSM 1900. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot.

**Table 1: The allowed power reduction in the multi-slot configuration**

<b>Number of timeslots in uplink assignment</b>	<b>Permissible nominal reduction of maximum output power,(dB)</b>
1	0
2	0 to 3.0
3	1.8 to 4.8
4	3.0 to 6.0

## **2.3. Test Positions**

### **2.3.1. Against Phantom Head**

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 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".

### **2.3.2. Body Worn Configuration**

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. The distance between the device and the phantom was kept 15mm.

### 3. SAR Measurements System Configuration

#### 3.1. SAR Measurement Set-up

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

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

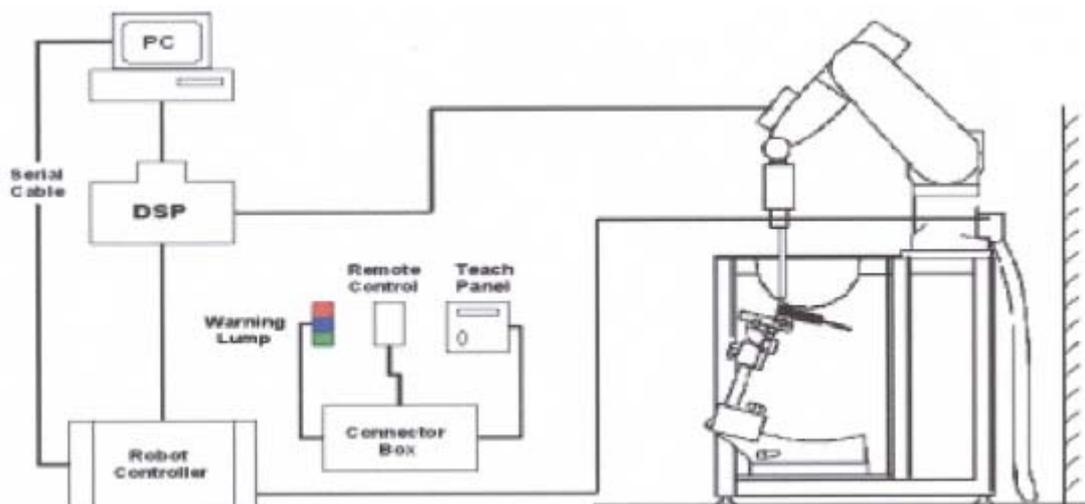


Figure 1 SAR Lab Test Measurement Set-up

### 3.2. DASY5 E-field Probe System

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

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



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



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

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

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

- **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

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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 DASY5 system allows evaluations that combine measured data and robot positions, such as:

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

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum 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 DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DA4”. 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 DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

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

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

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

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

$dcp_i$  = diode compression point (DASY parameter)

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

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

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

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

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

$ConvF$  = sensitivity enhancement in solution

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

$f$  = carrier frequency [GHz]

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

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

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

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

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

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

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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 8 and Table 9.

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

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



Figure 6 System Check Set-up

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### 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 2 and Table 3 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

**Table 2: 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
<b>Dielectric Parameters Target Value</b>	<b>f=835MHz    <math>\epsilon=41.5</math>    <math>\sigma=0.9</math></b>

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

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

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

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

## 4. Laboratory Environment

**Table 4: 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.

### 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 including DA 02-1438, published June 2002:** Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio frequency Emissions

## 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 5: Conducted Power Measurement Results**

GSM 850			Conducted Power(dBm)				Average power(dBm)		
			Channel 128	Channel 190	Channel 251		Channel 128	Channel 190	Channel 251
GSM	Before		32.29	32.39	32.37	-9.03dB	23.26	23.36	23.34
	After		32.28	32.38	32.36	-9.03dB	23.25	23.35	23.33
GPRS (GMSK)	1TXslot	Before	32.35	32.44	32.41	-9.03dB	23.32	23.41	23.38
		After	32.3	32.42	32.4	-9.03dB	23.27	23.39	23.37
	2TXslots	Before	31.58	31.64	31.63	-6.02dB	25.56	25.62	25.61
		After	31.57	31.62	31.61	-6.02dB	25.55	25.6	25.59
	3TXslots	Before	29.96	30.02	30.02	-4.26dB	25.7	25.76	25.76
		After	29.95	30.01	30.01	-4.26dB	25.69	25.75	25.75
	4TXslots	Before	29.15	29.21	29.22	-3.01dB	<b>26.14</b>	<b>26.2</b>	<b>26.21</b>
		After	29.14	29.2	29.21	-3.01dB	26.13	26.19	26.2
GSM 1900			Conducted Power(dBm)				Average power(dBm)		
			Channel 512	Channel 661	Channel 810		Channel 512	Channel 661	Channel 810
GSM	Before		29.21	29.32	29.41	-9.03dB	20.18	20.29	20.38
	After		29.2	29.31	29.4	-9.03dB	20.17	20.28	20.37
GPRS (GMSK)	1TXslot	Before	29.29	29.41	29.5	-9.03dB	20.38	20.38	20.47
		After	29.28	29.4	29.51	-9.03dB	20.37	20.37	20.48
	2TXslots	Before	28.5	28.63	28.74	-6.02dB	22.48	22.61	22.72
		After	28.51	28.62	28.73	-6.02dB	22.49	22.6	22.71
	3TXslots	Before	26.9	27.04	27.15	-4.26dB	22.64	22.78	22.89
		After	26.91	27.03	27.14	-4.26dB	22.65	22.77	22.88
	4TXslots	Before	26.1	26.24	26.36	-3.01dB	<b>23.09</b>	<b>23.23</b>	<b>23.35</b>
		After	26.11	26.23	26.35	-3.01dB	23.1	23.22	23.34

Note:

- 1) Division Factors

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

1 TX- slot = 1 transmit time slot out of 8 time slots

=> conducted power divided by (8/1) => -9.03 dB

2 TX- slot = 2 transmit time slots out of 8 time slots

=> conducted power divided by (8/2) => -6.02 dB

3 TX- slot = 3 transmit time slots out of 8 time slots

=> conducted power divided by (8/3) => -4.26 dB

4 TX- slot = 4 transmit time slots out of 8 time slots

=> conducted power divided by (8/4) => -3.01 dB

2) Average power numbers

The maximum power numbers are marks in bold.

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## 7. Test Results

### 7.1. Dielectric Performance

**Table 6: Dielectric Performance of Head Tissue Simulating Liquid**

Frequency	Description	Dielectric Parameters		Temp ℃
		$\epsilon_r$	$\sigma$ (s/m)	
<b>835MHz (head)</b>	Target value ± 5% window	41.50 39.43 — 43.58	0.90 0.86 — 0.95	/
	Measurement value 2011-1-30	41.76	0.90	21.8
<b>1900MHz (head)</b>	Target value ±5% window	40.00 38.00 — 42.00	1.40 1.33 — 1.47	/
	Measurement value 2011-2-9	39.98	1.41	21.9

**Table 7: Dielectric Performance of Body Tissue Simulating Liquid**

Frequency	Description	Dielectric Parameters		Temp ℃
		$\epsilon_r$	$\sigma$ (s/m)	
<b>835MHz (body)</b>	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2011-1-30	56.25	0.99	21.9
<b>1900MHz (body)</b>	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2011-2-9	52.46	1.52	21.7

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### 7.2. System Check Results

**Table 8: 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 result ±10% window	1.56 1.40 — 1.72	2.39 2.15 — 2.63	41.2	0.89	/
	Measurement value 2011-1-30	1.59	2.41	41.76	0.90	21.8
1900MHz	Recommended result ±10% window	5.22 4.70 — 5.74	10 9.00 — 11.00	39.5	1.44	/
	Measurement value 2011-2-9	5.32	10.28	39.98	1.41	21.9

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 9: 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 result ±10% window	1.63 1.47 — 1.79	2.49 2.24 — 2.74	54.6	0.98	/
	Measurement value 2011-1-30	1.64	2.51	56.25	0.99	21.9
1900 MHz	Recommended result ±10% window	5.52 4.97 — 6.07	10.3 9.27 — 11.33	53.5	1.54	/
	Measurement value 2011-2-9	5.36	10.19	52.46	1.52	21.7

Note: 1. The graph results see ANNEX B.

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

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## Test Report

### 7.3. Summary of Measurement Results

#### 7.3.1. GSM 850 (GPRS)

**Table 10: SAR Values [GSM 850 (GPRS)]**

Limit of SAR		10 g Average	1 g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case		Measurement Result(W/kg)		Power Drift	
Different Test Position	Channel	10 g Average	1 g Average	(dB)	
<b>Test Position of Head</b>					
Left Hand, Touch Cheek	High/251	0.631	0.881	0.120	Figure 11
	Middle/190	0.582	0.812	0.047	Figure 12
	Low/128	0.546	0.763	0.010	Figure 13
Left Hand, Tilt 15 Degree	Middle/190	0.258	0.352	-0.081	Figure 14
Right Hand, Touch Cheek	High/251	0.632	0.888	-0.056	Figure 15
	Middle/190	0.606	0.851	-0.086	Figure 16
	Low/128	0.573	0.799	-0.070	Figure 17
Right Hand, Tilt 15 Degree	Middle/190	0.294	0.404	-0.065	Figure 18
<b>Test Position of Body (Distance 15mm)</b>					
Towards Ground (GSM)	Middle/190	0.327	0.459	0.019	Figure 19
Towards Ground (2Up)	High/251	0.645	0.907	0.014	Figure 20
	Middle/190	0.580	0.811	-0.066	Figure 21
	Low/128	0.565	0.792	-0.042	Figure 22
Towards Ground (3Up)	High/251	0.683	0.960	-0.112	Figure 23
	Middle/190	0.644	0.901	0.016	Figure 24
	Low/128	0.609	0.853	-0.008	Figure 25
Towards Ground (4Up)	High/251	0.742	1.040	-0.060	Figure 26
	Middle/190	0.716	1.000	-0.045	Figure 27
	Low/128	0.671	0.937	-0.026	Figure 28
Towards Phantom (4Up)	High/251	0.741	1.020	-0.035	Figure 29
	Middle/190	0.709	0.976	-0.051	Figure 30
	Low/128	0.656	0.902	-0.065	Figure 31
<b>Worst case position of Body with Earphone (Distance 15mm)</b>					
Towards Ground (GSM)	High/251	0.313	0.441	0.015	Figure 32

Note: 1. The value with blue color is the maximum SAR Value of 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. GSM 1900 (GPRS)

**Table 11: SAR Values [GSM 1900 (GPRS)]**

Limit of SAR		10 g Average	1 g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case		Measurement Result(W/kg)		Power Drift	
Different Test Position	Channel	10 g Average	1 g Average	(dB)	
<b>Test Position of Head</b>					
Left Hand, Touch Cheek	High/810	0.584	1.040	0.015	Figure 33
	Middle/661	0.454	0.798	0.038	Figure 34
	Low/512	0.383	0.683	-0.090	Figure 35
Left Hand, Tilt 15 Degree	Middle/661	0.209	0.336	-0.087	Figure 36
Right Hand, Touch Cheek	Middle/661	0.411(max.cube)	0.685(max.cube)	-0.071	Figure 37
Right Hand, Tilt 15 Degree	Middle/661	0.273	0.459	-0.040	Figure 38
<b>Test Position of Body (Distance 15mm)</b>					
Towards Ground (GSM)	Middle/661	0.162	0.259	-0.109	Figure 39
Towards Ground (2Up)	Middle/661	0.262	0.415	0.021	Figure 40
Towards Ground (3Up)	Middle/661	0.274	0.435	-0.005	Figure 41
Towards Ground (4Up)	High/810	0.244	0.388	-0.005	Figure 42
	Middle/661	0.304	0.485	-0.004	Figure 43
	Low/512	0.320(max.cube)	0.501(max.cube)	-0.173	Figure 44
Towards Phantom (4Up)	Middle/661	0.278(max.cube)	0.450(max.cube)	0.048	Figure 45
<b>Worst case position of Body with Earphone (Distance 15mm)</b>					
Towards Ground (GSM)	Low/512	0.141	0.220	0.029	Figure 46

Note: 1. The value with blue color is the maximum SAR Value of 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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## 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								

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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 12: List of Main Instruments**

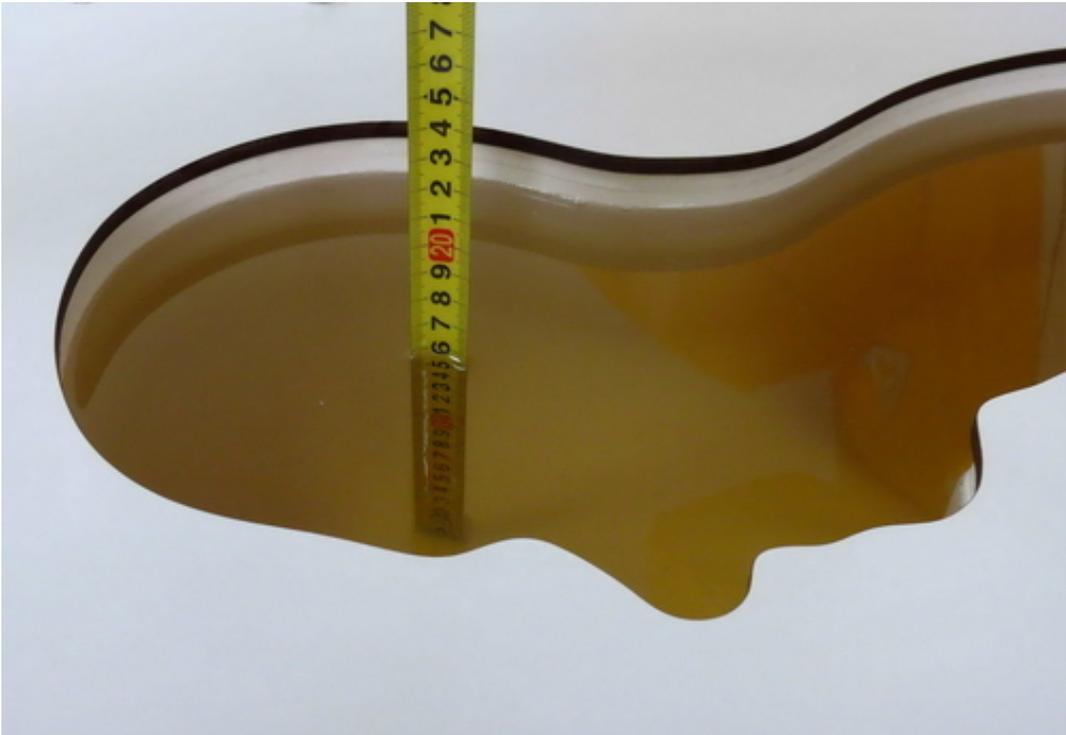
No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 13, 2010	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 13, 2010	One year
04	Power sensor	Agilent N8481H	MY50350004	September 26, 2010	One year
05	Signal Generator	HP 8341B	2730A00804	September 13, 2010	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	Validation Kit 835MHz	D835V2	4d092	January 14, 2010	Two years
09	Validation Kit 1900MHz	D1900V2	5d018	June 15, 2010	Two years
08	BTS	E5515C	MY48360988	December 3, 2010	One year
09	E-field Probe	EX3DV4	3677	November 24, 2010	One year
10	DAE	DAE4	871	November 18, 2010	One year

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

## ANNEX A: Test Layout



Picture 1: Specific Absorption Rate Test Layout



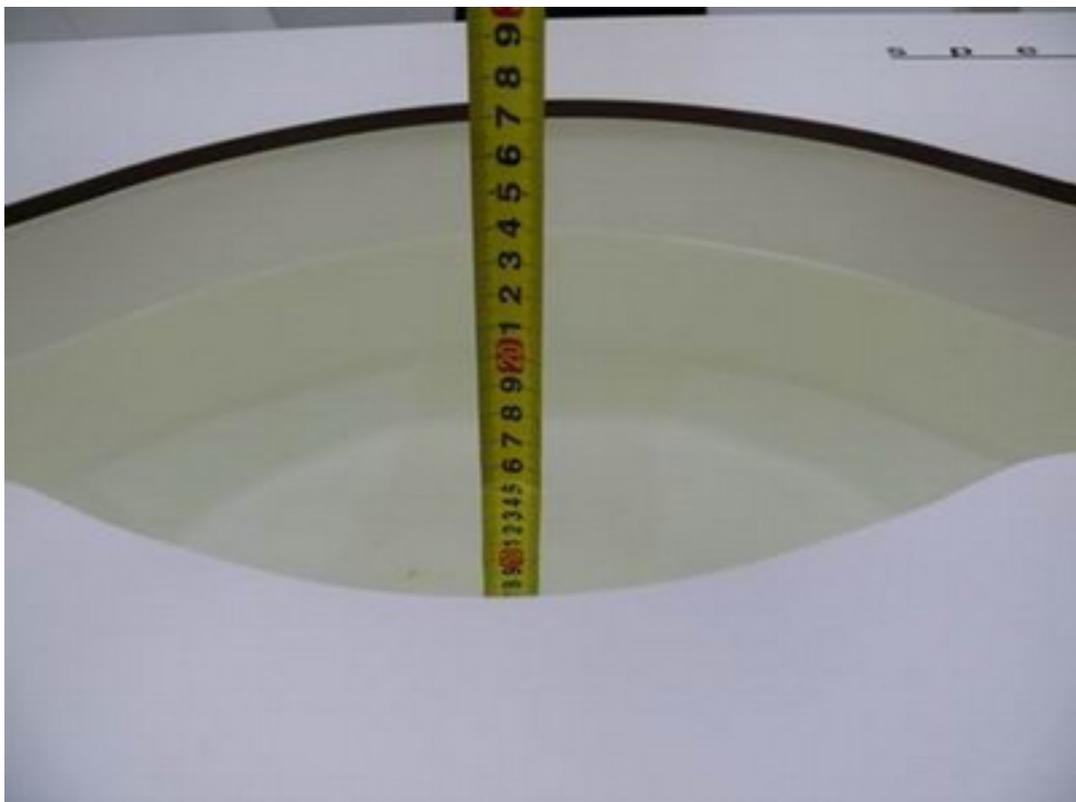
Picture 2: Liquid depth in the head Phantom (835MHz, 15.4cm depth)



Picture 3: Liquid depth in the flat Phantom (835MHz, 15.3cm depth)



Picture 4: liquid depth in the head Phantom (1900 MHz, 15.1cm depth)



Picture 5: Liquid depth in the flat Phantom (1900 MHz, 15.2cm depth)

## ANNEX B: System Check Results

### System Performance Check at 835 MHz Head TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d092

Date/Time: 1/30/2011 8:50:13 AM

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.90$  mho/m;  $\epsilon_r = 41.76$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.8 °C

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**d=15mm, Pin=250mW/Area Scan (101x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.56 mW/g

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

Reference Value = 51.1 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 3.54 W/kg

**SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.59 mW/g**

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

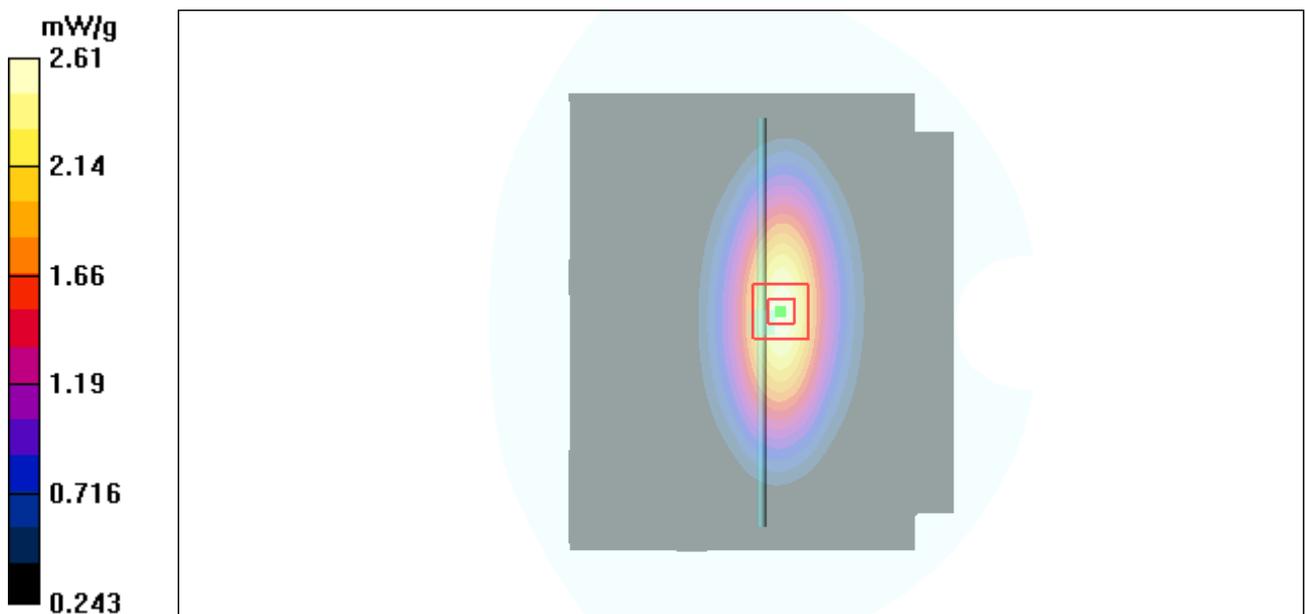


Figure 7 System Performance Check 835MHz 250mW

### System Performance Check at 835 MHz Body TSL

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d092**

Date/Time: 1/30/2011 3:00:20 PM

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 56.25$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.9 °C

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**d=15mm, Pin=250mW/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.72 mW/g

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

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

Peak SAR (extrapolated) = 3.63 W/kg

**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.64 mW/g**

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

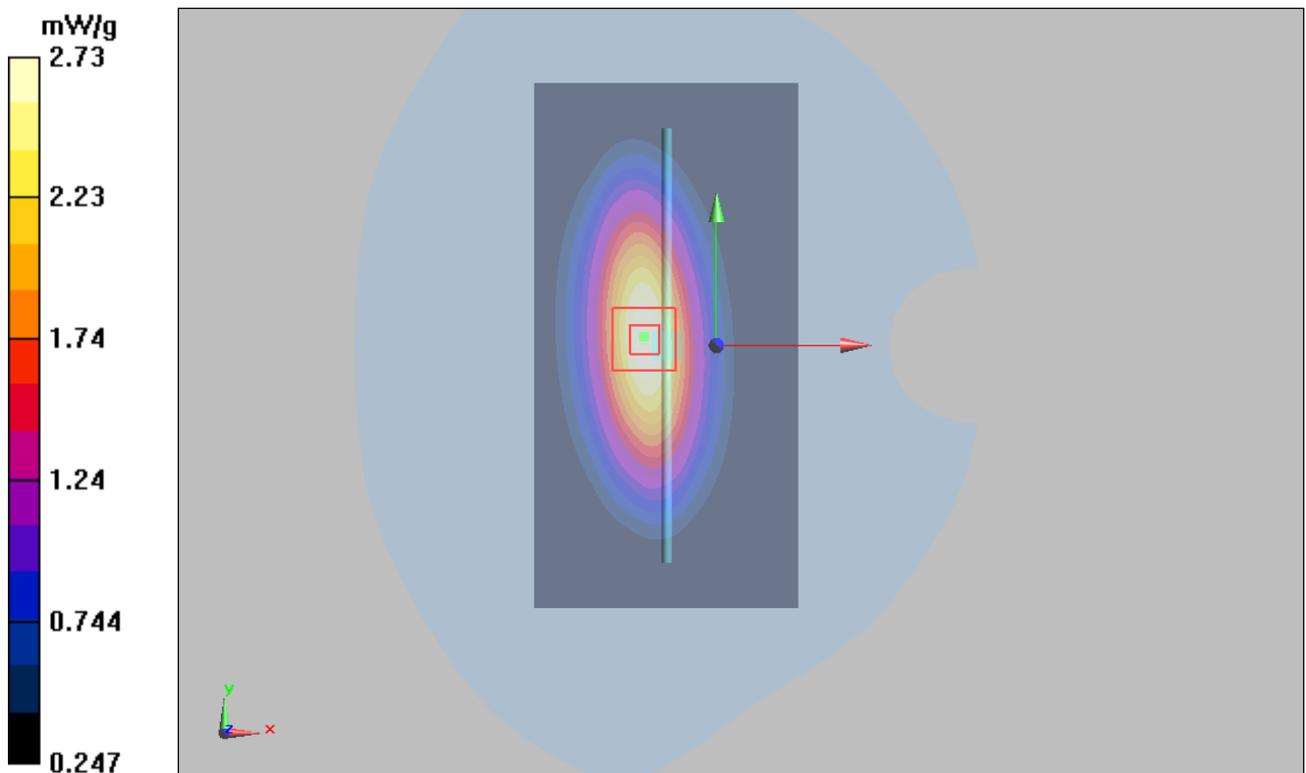


Figure 8 System Performance Check 835MHz 250mW

### System Performance Check at 1900 MHz Head TSL

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

Date/Time: 2/9/2011 1:23:34 AM

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.98$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.9 °C

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**d=10mm, Pin=250mW/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.7 mW/g

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

Reference Value = 81.0 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 18.9 W/kg

**SAR(1 g) = 10.28 mW/g; SAR(10 g) = 5.32 mW/g**

Maximum value of SAR (measured) = 11.5 mW/g

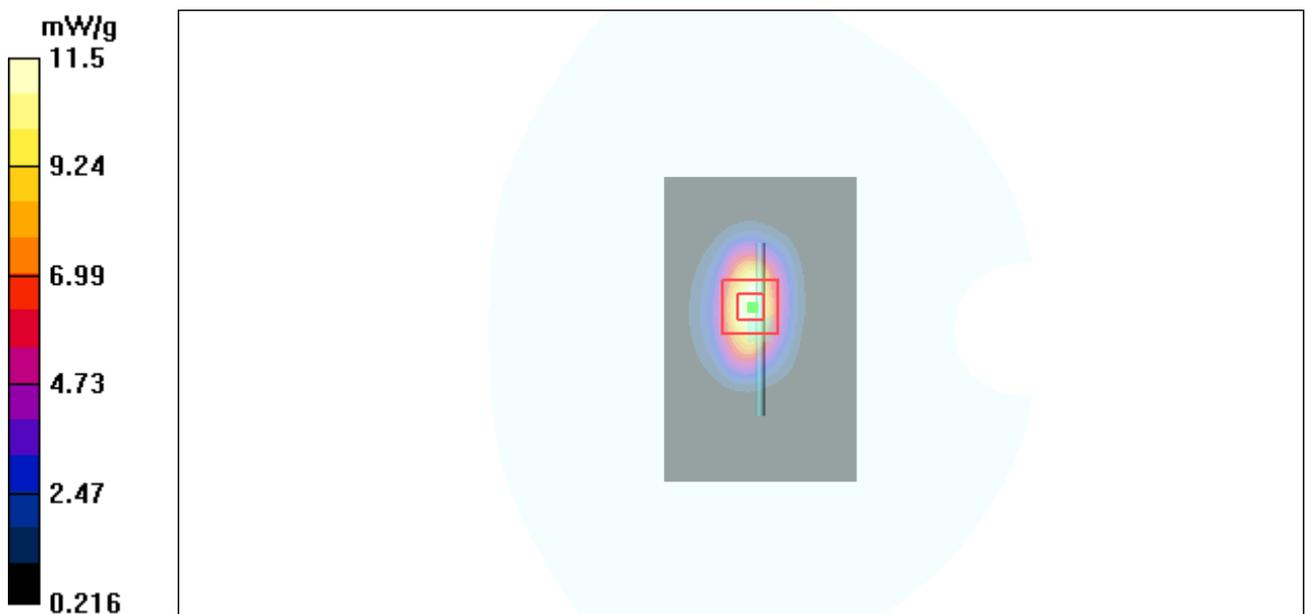


Figure 9 System Performance Check 1900MHz 250mW

### System Performance Check at 1900 MHz Body TSL

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

Date/Time: 2/9/2011 6:32:19 AM

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 52.46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.7 °C

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

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

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

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

Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 10.19 mW/g; SAR(10 g) = 5.36 mW/g**

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

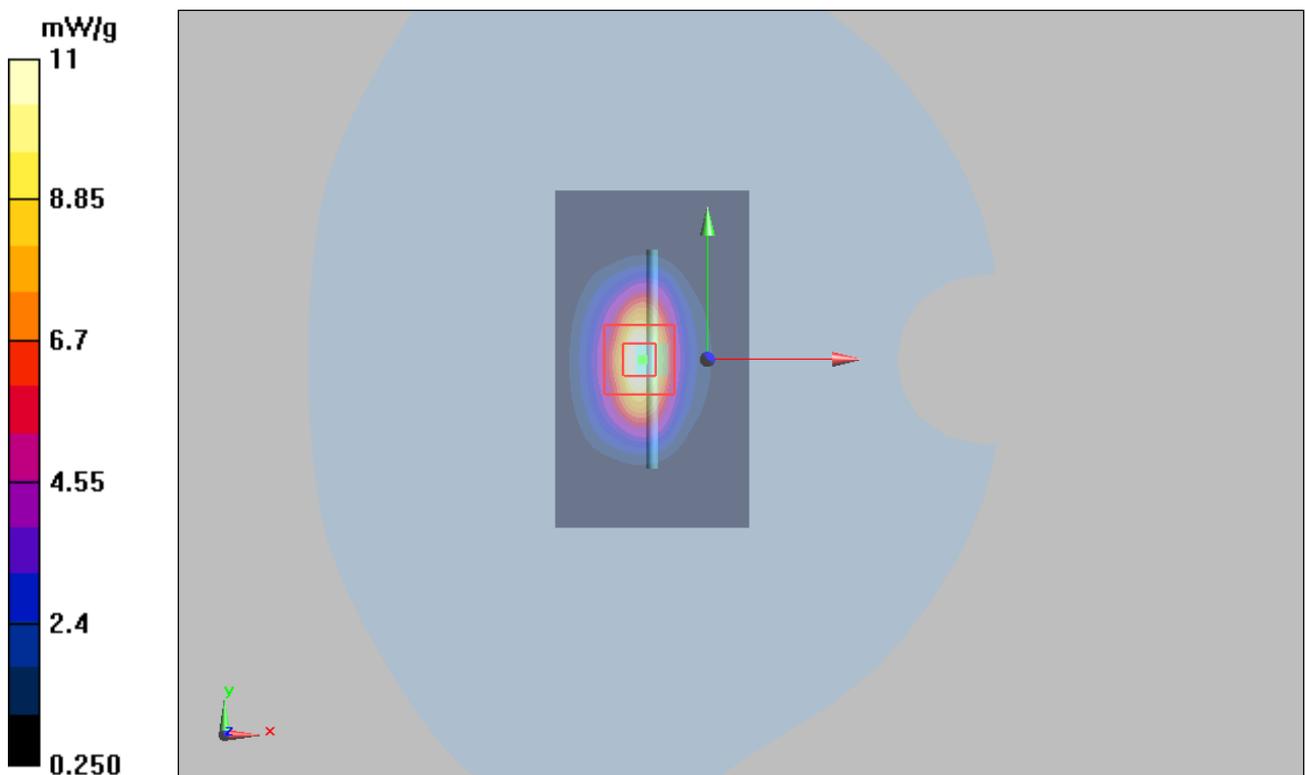


Figure 10 System Performance Check 1900MHz 250mW

## ANNEX C: Graph Results

### GSM 850 Left Cheek High

Date/Time: 1/30/2011 12:46:19 PM

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

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.915$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.956 mW/g

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

Reference Value = 9.41 V/m; Power Drift = 0.120 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.881 mW/g; SAR(10 g) = 0.631 mW/g**

Maximum value of SAR (measured) = 0.929 mW/g

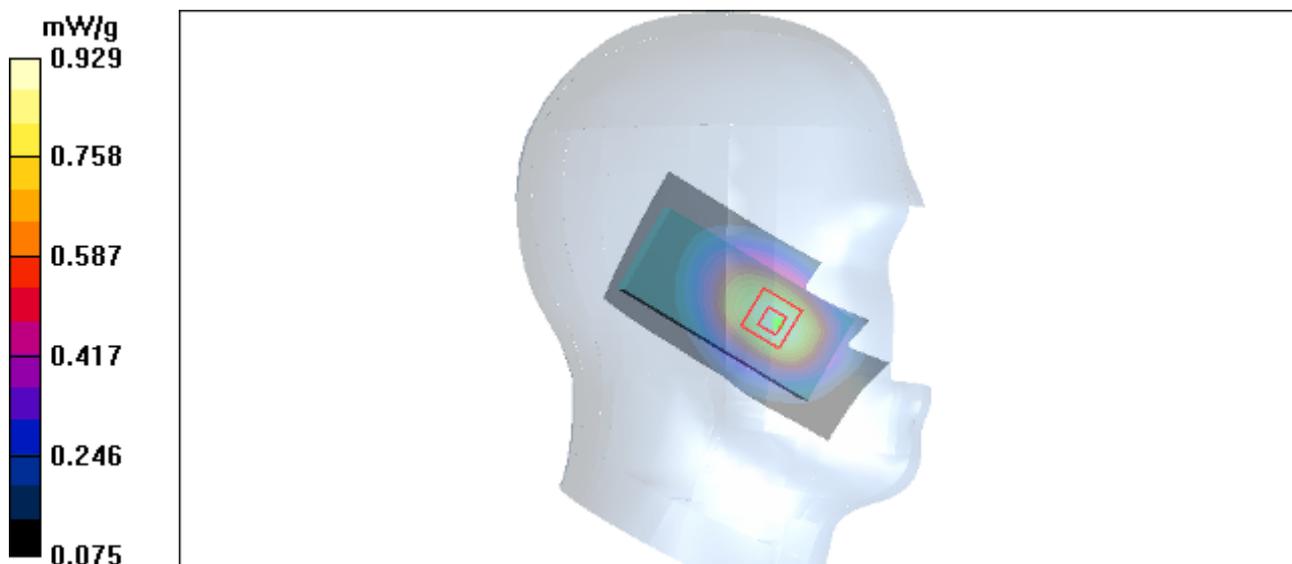


Figure 11 Left Hand Touch Cheek GSM 850 Channel 251

**GSM 850 Left Cheek Middle**

Date/Time: 1/30/2011 11:38:22 AM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.905$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.881 mW/g

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

Reference Value = 8.57 V/m; Power Drift = 0.047 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.812 mW/g; SAR(10 g) = 0.582 mW/g**

Maximum value of SAR (measured) = 0.852 mW/g

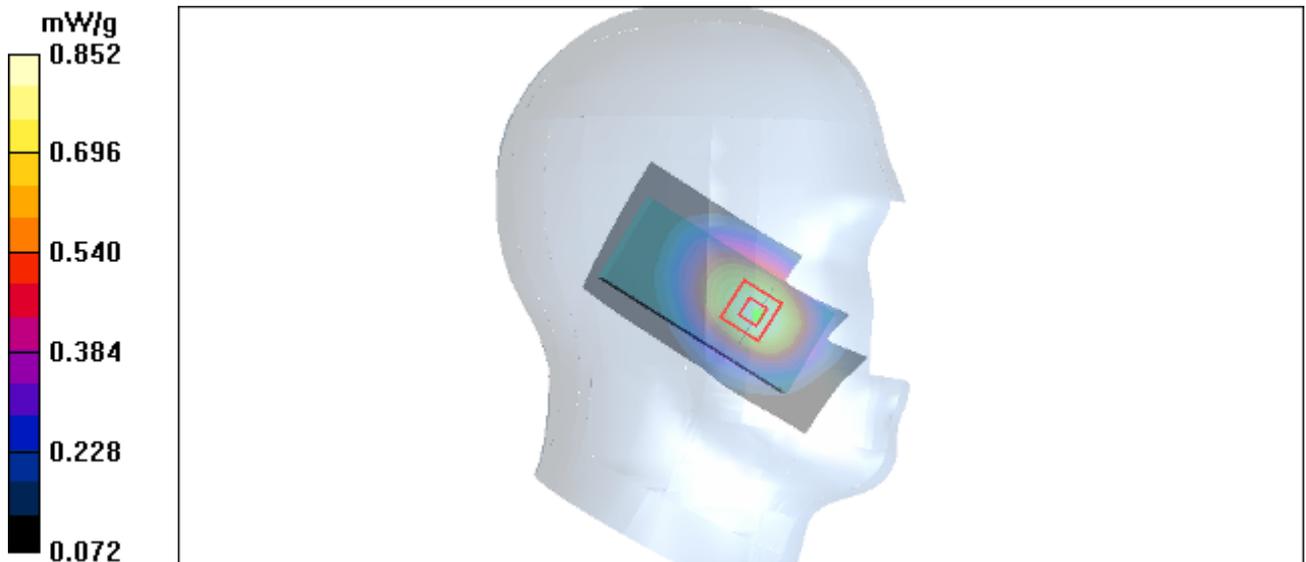


Figure 12 Left Hand Touch Cheek GSM 850 Channel 190

### GSM 850 Left Cheek Low

Date/Time: 1/30/2011 12:33:23 PM

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

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.894$  mho/m;  $\epsilon_r = 41.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.826 mW/g

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

Reference Value = 8.89 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 0.974 W/kg

**SAR(1 g) = 0.763 mW/g; SAR(10 g) = 0.546 mW/g**

Maximum value of SAR (measured) = 0.795 mW/g

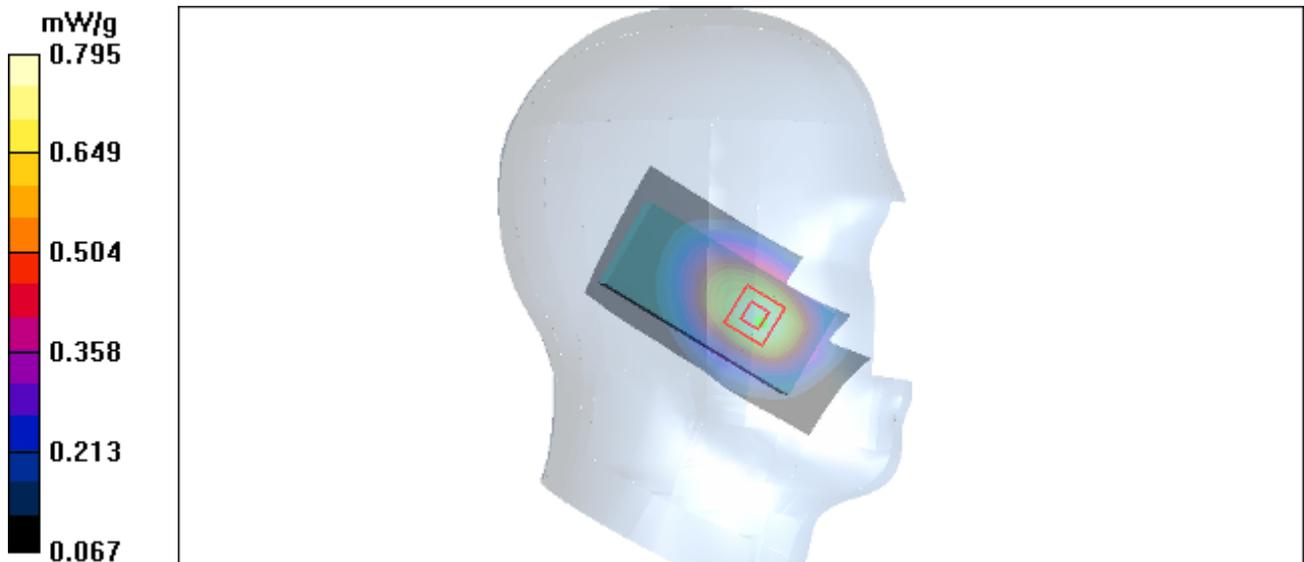


Figure 13 Left Hand Touch Cheek GSM 850 Channel 128

### GSM 850 Left Tilt Middle

Date/Time: 1/30/2011 1:07:18 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.905$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.372 mW/g

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

Reference Value = 10.5 V/m; Power Drift = -0.081 dB

Peak SAR (extrapolated) = 0.442 W/kg

**SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.258 mW/g**

Maximum value of SAR (measured) = 0.377 mW/g

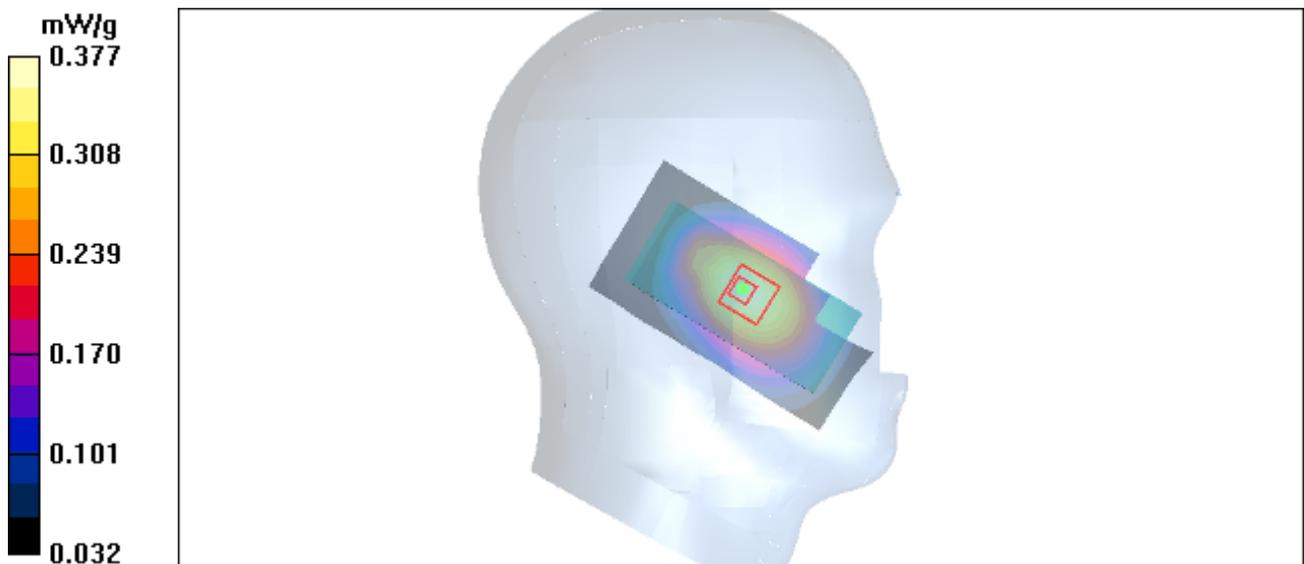


Figure 14 Left Hand Tilt 15° GSM 850 Channel 190

### GSM 850 Right Cheek High

Date/Time: 1/30/2011 11:09:12 AM

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

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.915$  mho/m;  $\epsilon_r = 41.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.950 mW/g

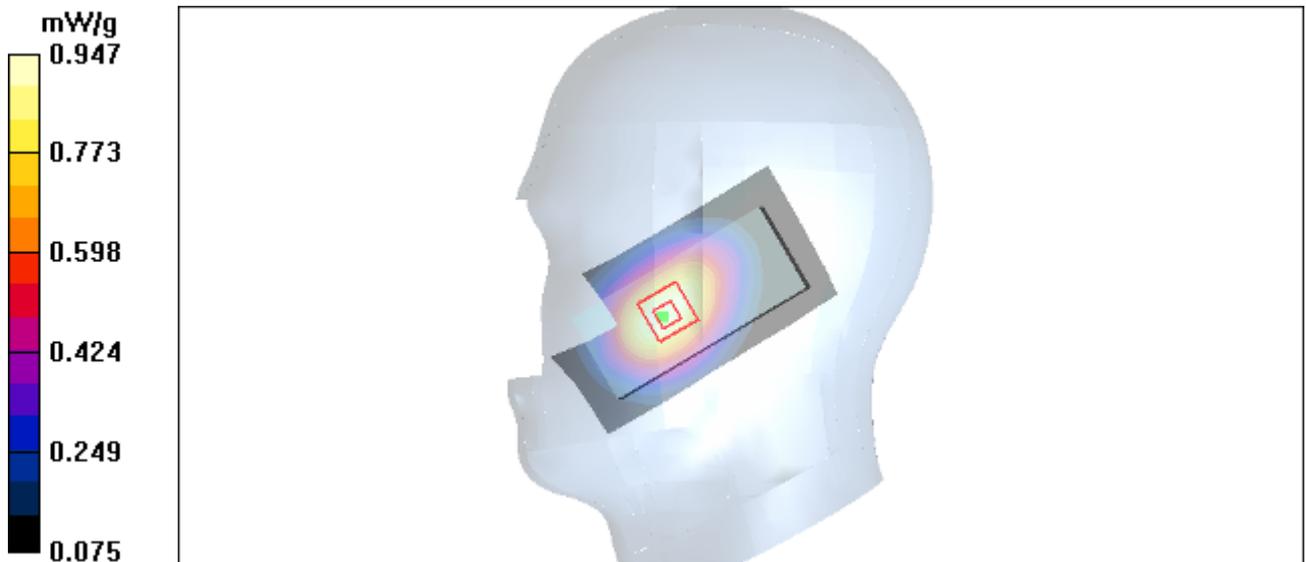
**Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.7 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 1.15 W/kg

**SAR(1 g) = 0.888 mW/g; SAR(10 g) = 0.632 mW/g**

Maximum value of SAR (measured) = 0.947 mW/g



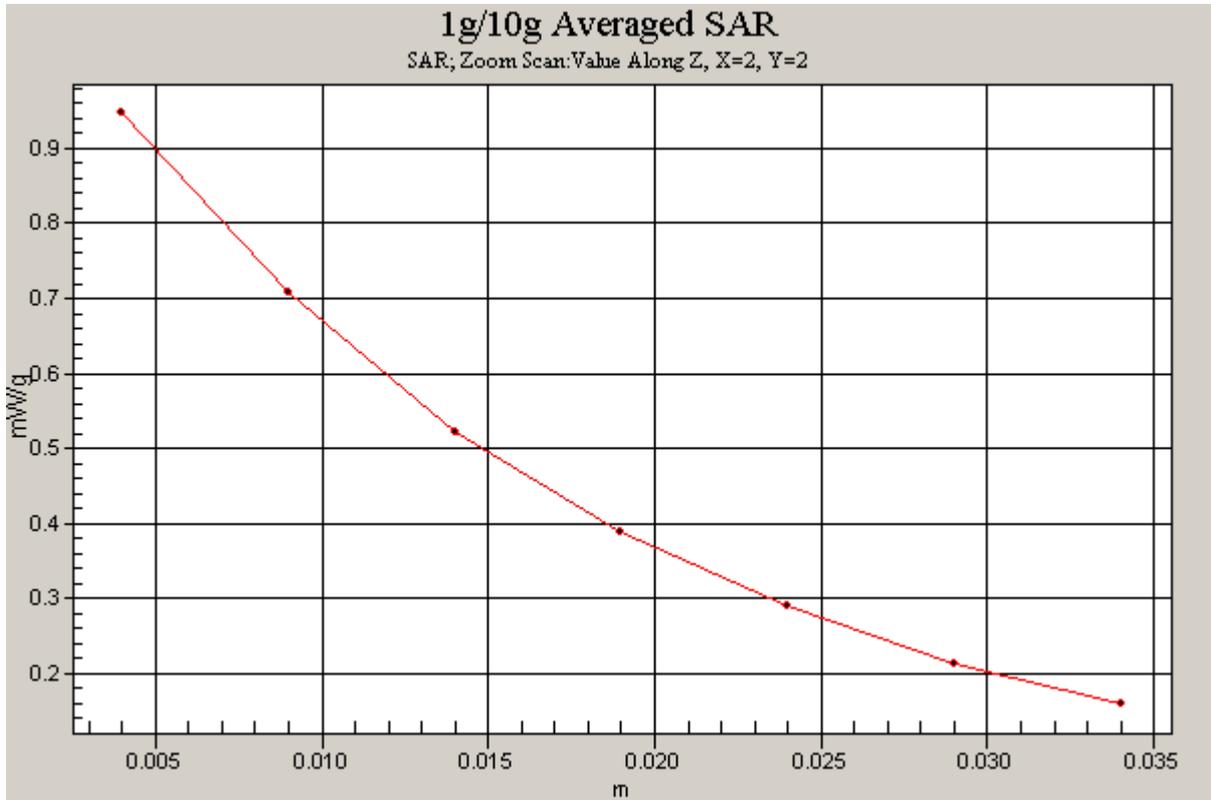


Figure 15 Right Hand Touch Cheek GSM 850 Channel 251

### GSM 850 Right Cheek Middle

Date/Time: 1/30/2011 10:16:56 AM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.905$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.917 mW/g

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

Reference Value = 11.2 V/m; Power Drift = -0.086 dB

Peak SAR (extrapolated) = 1.11 W/kg

**SAR(1 g) = 0.851 mW/g; SAR(10 g) = 0.606 mW/g**

Maximum value of SAR (measured) = 0.909 mW/g

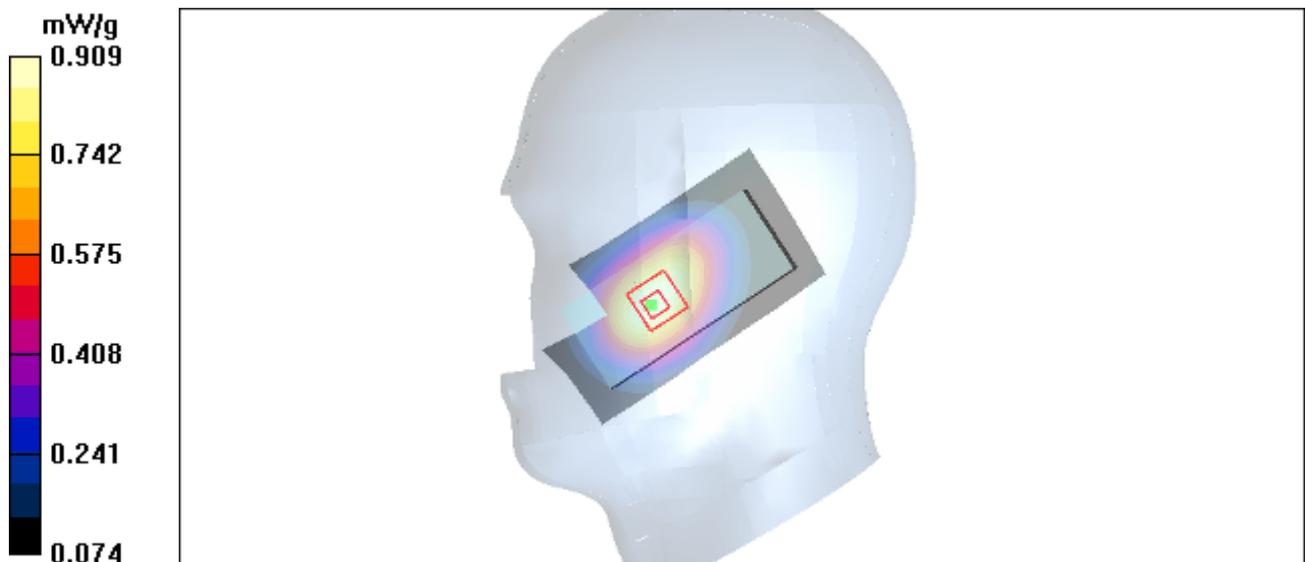


Figure 16 Right Hand Touch Cheek GSM 850 Channel 190

### GSM 850 Right Cheek Low

Date/Time: 1/30/2011 10:56:33 AM

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

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.894$  mho/m;  $\epsilon_r = 41.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

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

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

Reference Value = 10.5 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.799 mW/g; SAR(10 g) = 0.573 mW/g**

Maximum value of SAR (measured) = 0.846 mW/g

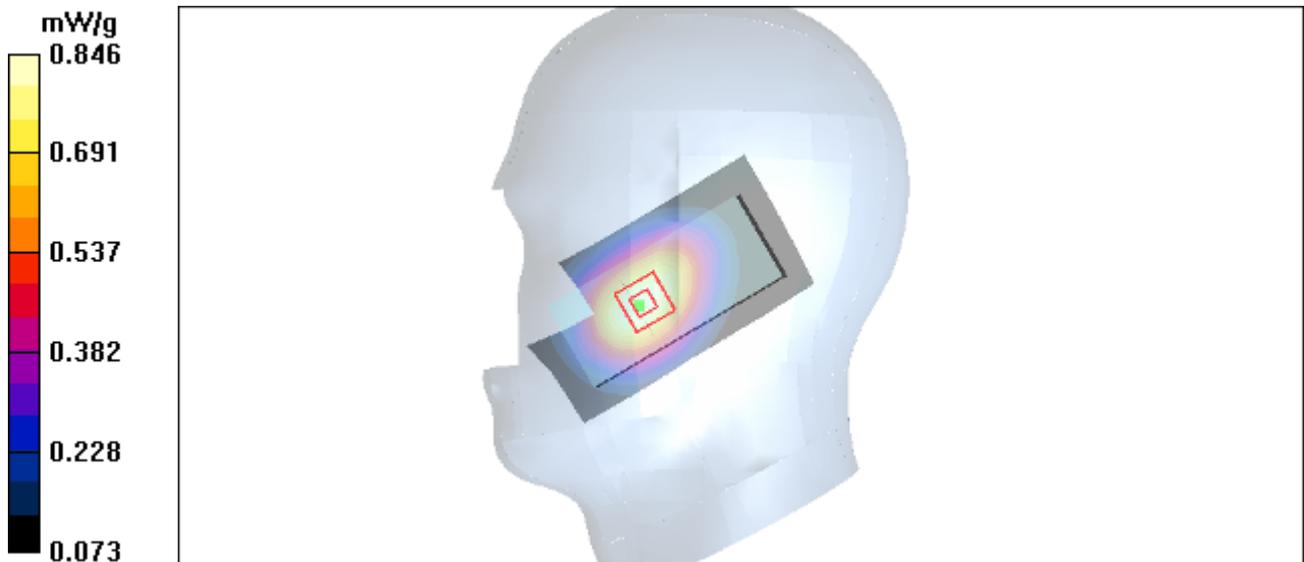


Figure 17 Right Hand Touch Cheek GSM 850 Channel 128

### GSM 850 Right Tilt Middle

Date/Time: 1/30/2011 11:22:49 AM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.905$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(9.5, 9.5, 9.5); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.440 mW/g

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

Reference Value = 13.1 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 0.506 W/kg

**SAR(1 g) = 0.404 mW/g; SAR(10 g) = 0.294 mW/g**

Maximum value of SAR (measured) = 0.433 mW/g

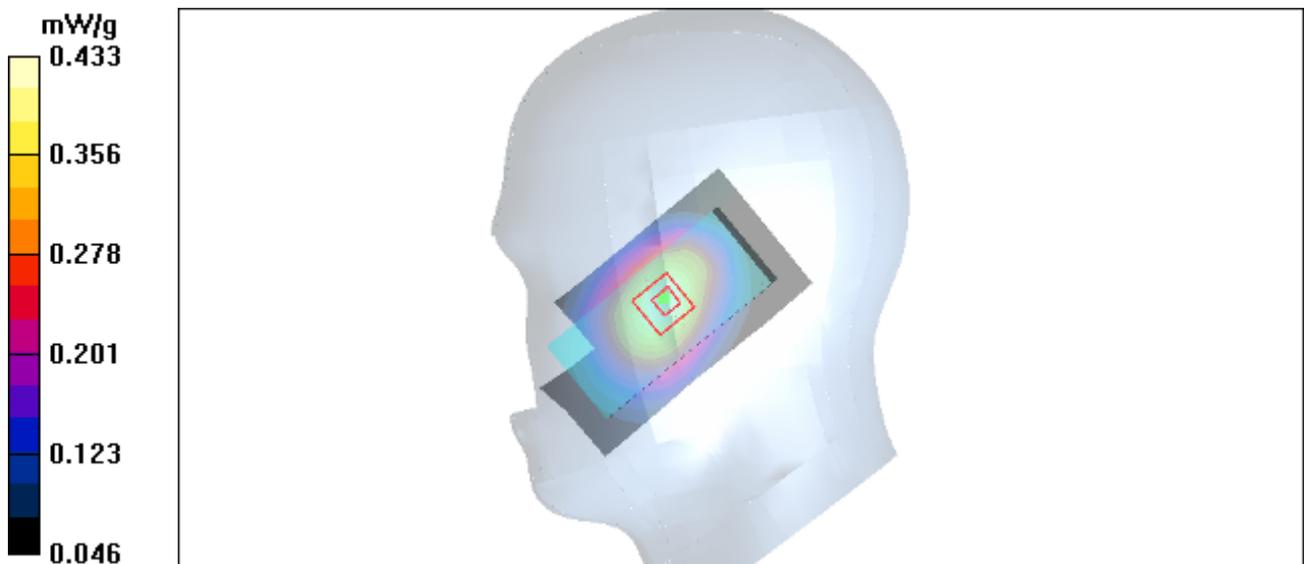


Figure 18 Right Hand Tilt 15° GSM 850 Channel 190

### GSM 850 Towards Ground Middle

Date/Time: 1/30/2011 4:20:21 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.996$  mho/m;  $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.488 mW/g

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

dz=5mm

Reference Value = 9.42 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 0.593 W/kg

**SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.327 mW/g**

Maximum value of SAR (measured) = 0.488 mW/g

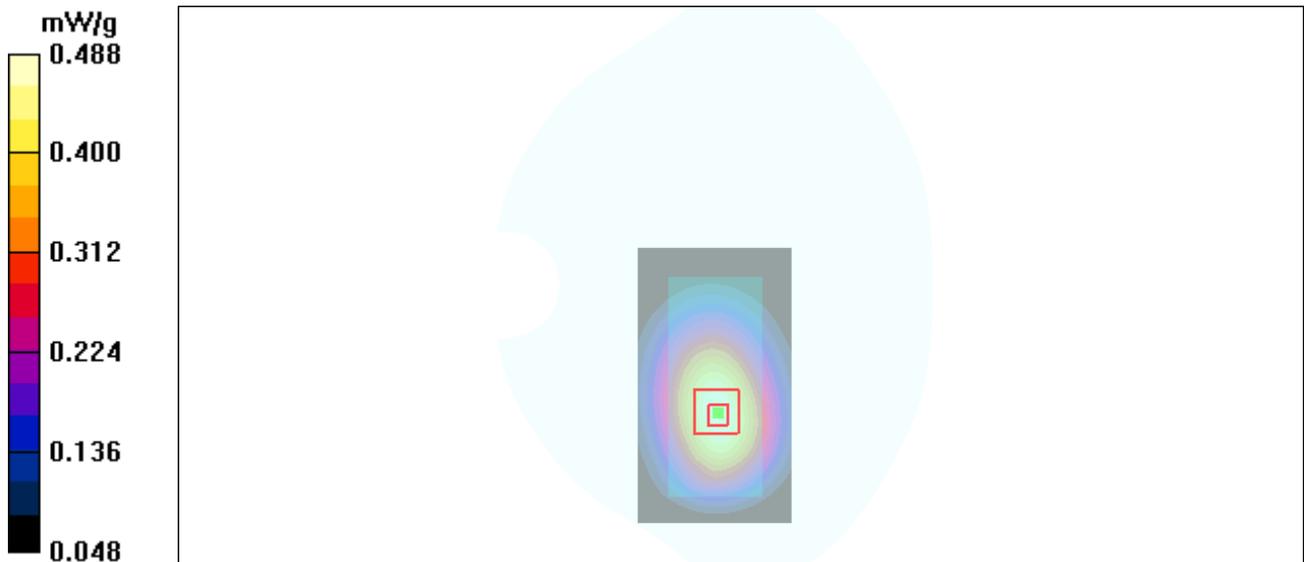


Figure 19 Body, Towards Ground, GSM 850 Channel 190

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

Date/Time: 1/31/2011 12:14:38 PM

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

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.963 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 = 0.014 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.907 mW/g; SAR(10 g) = 0.645 mW/g**

Maximum value of SAR (measured) = 0.967 mW/g

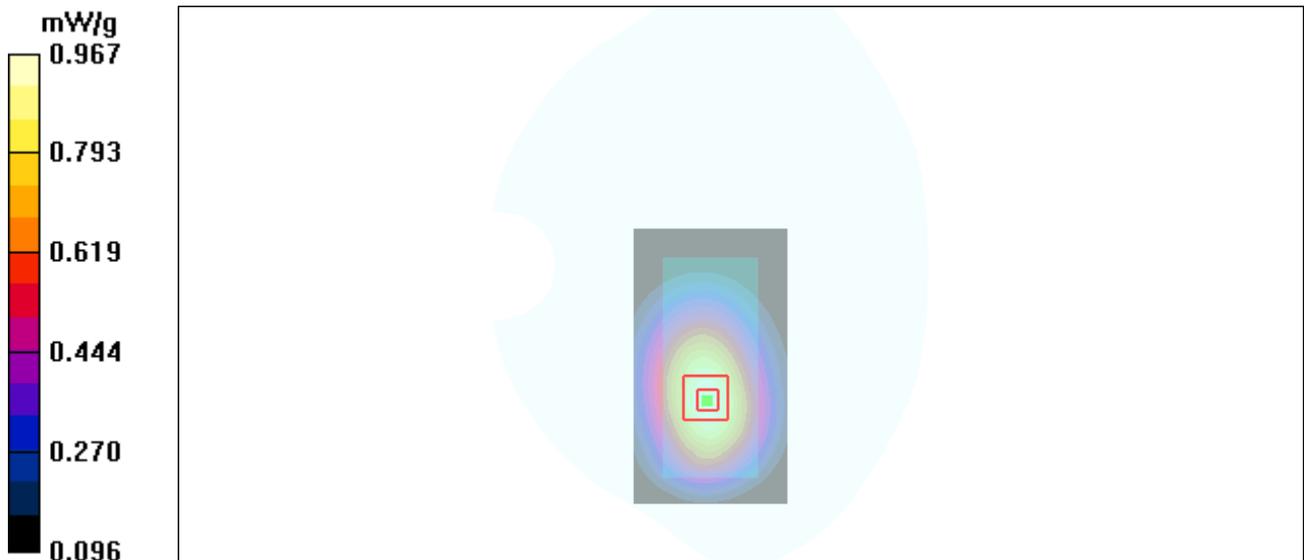


Figure 20 Body, Towards Ground, GSM 850 GPRS (2Up) Channel 251

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

Date/Time: 1/30/2011 4:35:26 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.996$  mho/m;  $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.865 mW/g

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

dz=5mm

Reference Value = 12.7 V/m; Power Drift = -0.066 dB

Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.811 mW/g; SAR(10 g) = 0.580 mW/g**

Maximum value of SAR (measured) = 0.861 mW/g

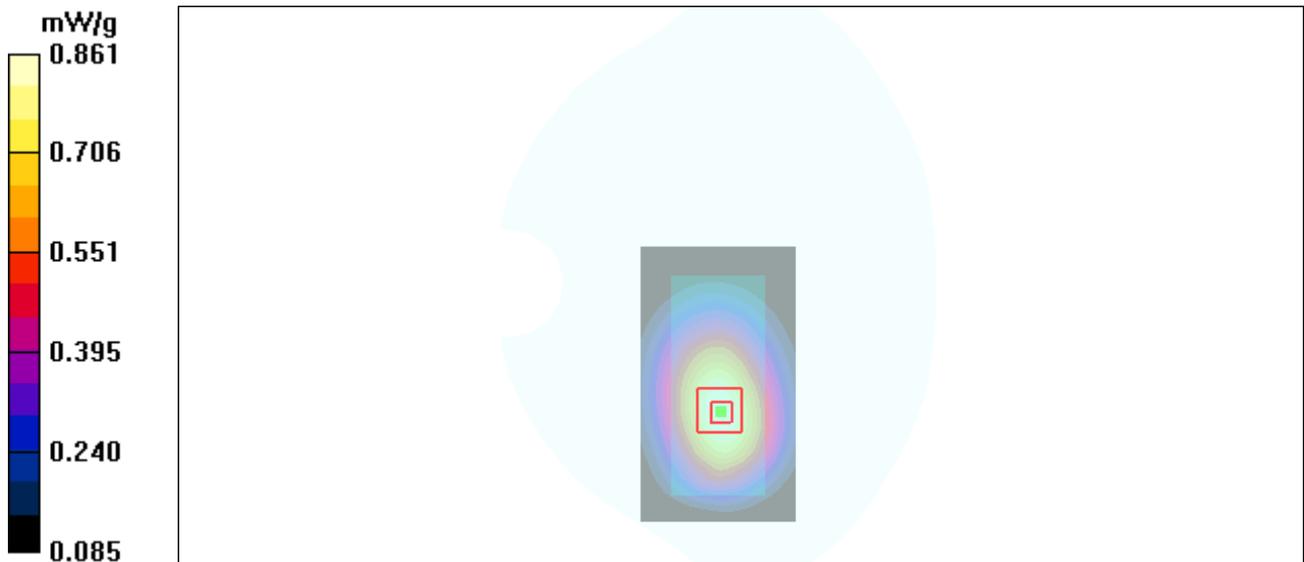


Figure 21 Body, Towards Ground, GSM 850 GPRS (2Up) Channel 190

### GSM 850 GPRS (2Up) Towards Ground Low

Date/Time: 1/31/2011 11:59:06 AM

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

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.985$  mho/m;  $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.844 mW/g

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

Reference Value = 10.8 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 1.01 W/kg

**SAR(1 g) = 0.792 mW/g; SAR(10 g) = 0.565 mW/g**

Maximum value of SAR (measured) = 0.842 mW/g

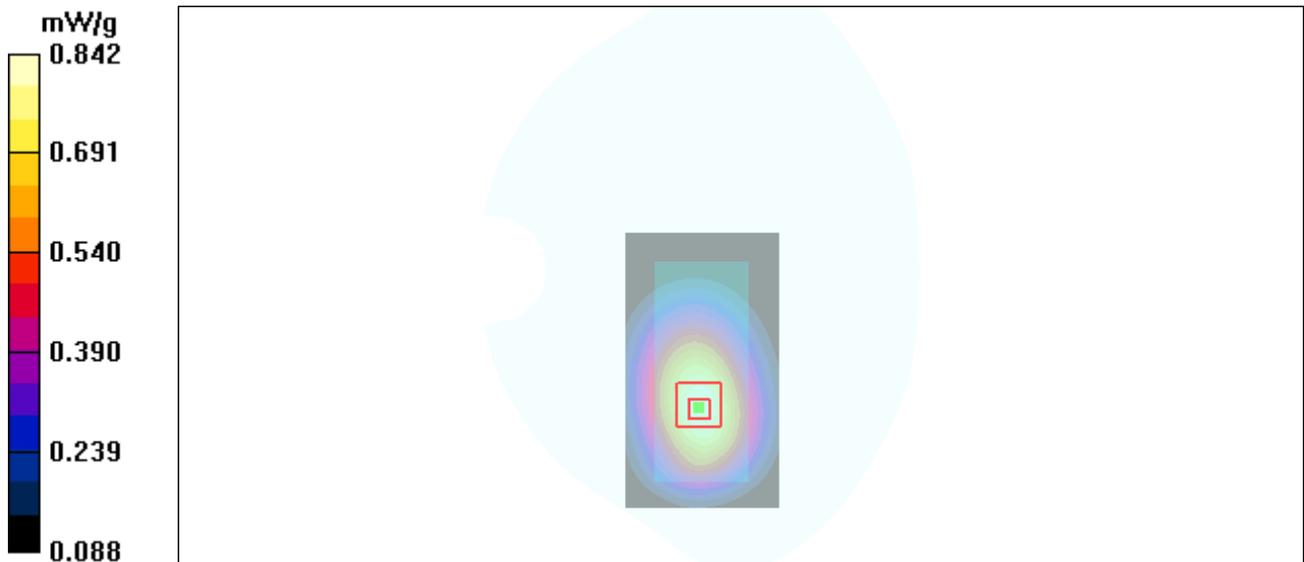


Figure 22 Body, Towards Ground, GSM 850 GPRS (2Up) Channel 128

### GSM 850 GPRS (3Up) Towards Ground High

Date/Time: 1/31/2011 11:22:08 AM

Communication System: GSM850 + GPRS(3Up); Frequency: 848.8 MHz; Duty Cycle: 1:2.767

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 1.03 mW/g

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

Reference Value = 12.1 V/m; Power Drift = -0.112 dB

Peak SAR (extrapolated) = 1.23 W/kg

**SAR(1 g) = 0.960 mW/g; SAR(10 g) = 0.683 mW/g**

Maximum value of SAR (measured) = 1.02 mW/g

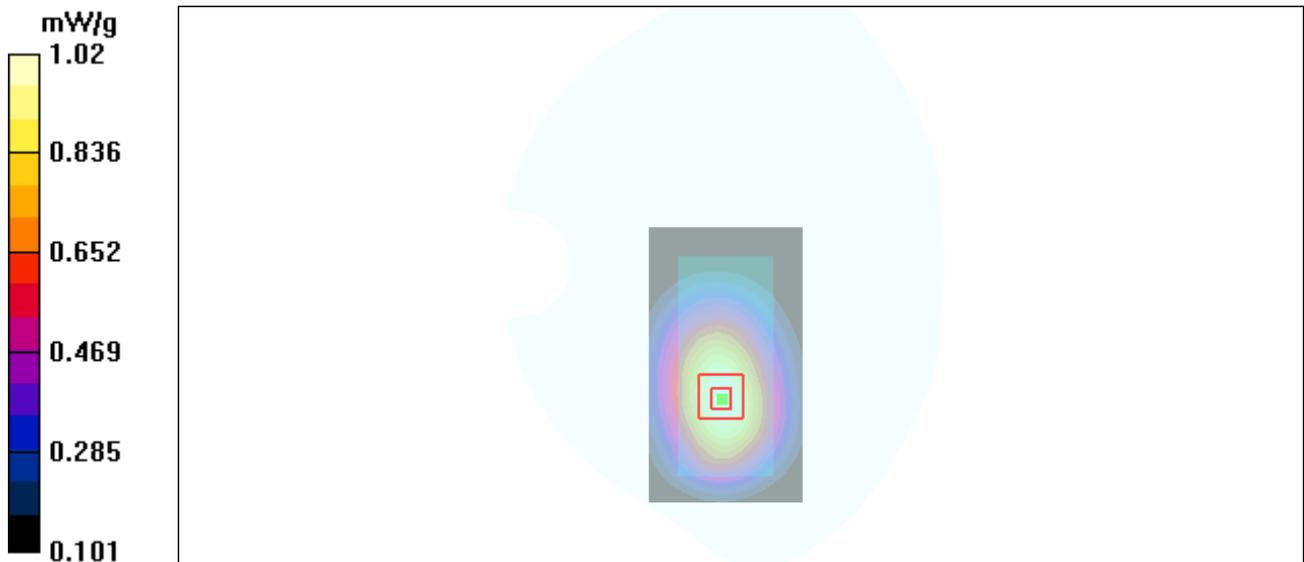


Figure 23 Body, Towards Ground, GSM 850 GPRS (3Up) Channel 251

### GSM 850 GPRS (3Up) Towards Ground Middle

Date/Time: 1/30/2011 4:51:01 PM

Communication System: GSM850 + GPRS(3Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.767

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.996$  mho/m;  $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.955 mW/g

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

dz=5mm

Reference Value = 13.3 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.901 mW/g; SAR(10 g) = 0.644 mW/g**

Maximum value of SAR (measured) = 0.957 mW/g

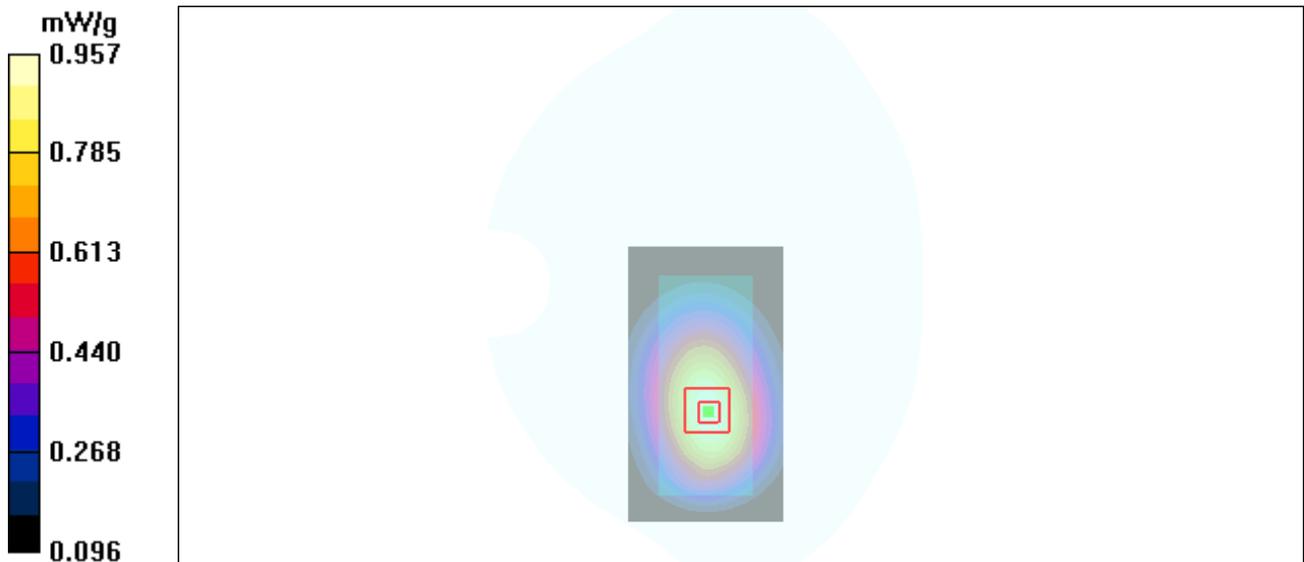


Figure 24 Body, Towards Ground, GSM 850 GPRS (3Up) Channel 190

### GSM 850 GPRS (3Up) Towards Ground Low

Date/Time: 1/31/2011 11:34:48 AM

Communication System: GSM850 + GPRS(3Up); Frequency: 824.2 MHz; Duty Cycle: 1:2.767

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.985$  mho/m;  $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.905 mW/g

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

Reference Value = 11.2 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 1.09 W/kg

**SAR(1 g) = 0.853 mW/g; SAR(10 g) = 0.609 mW/g**

Maximum value of SAR (measured) = 0.908 mW/g

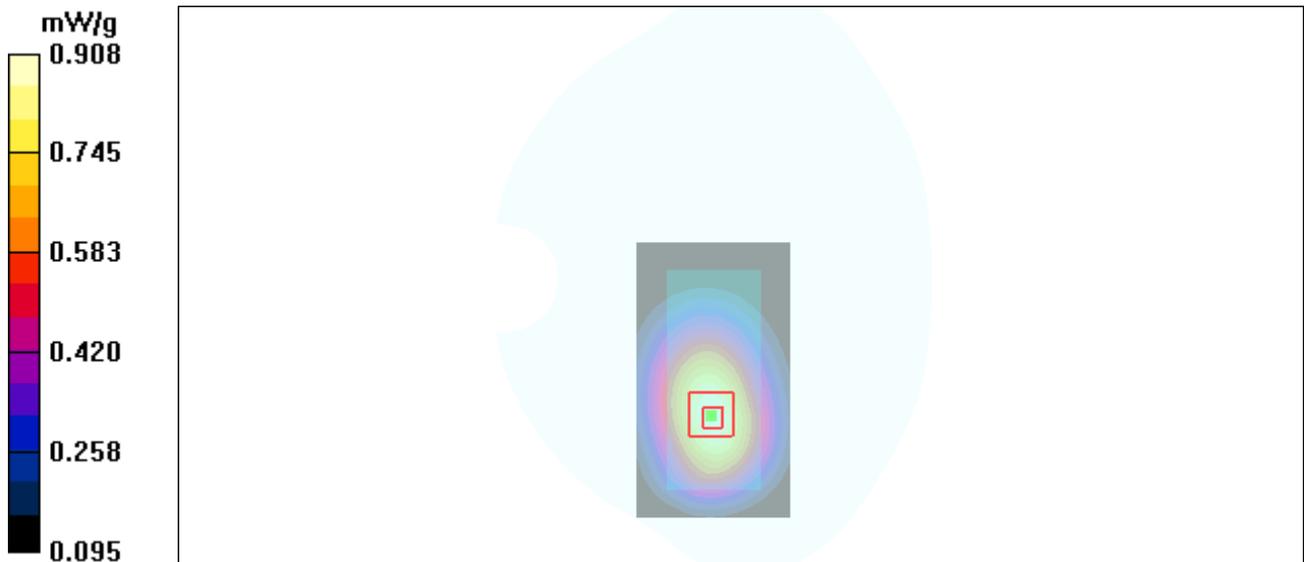


Figure 25 Body, Towards Ground, GSM 850 GPRS (3Up) Channel 128

### GSM 850 GPRS (4Up) Towards Ground High

Date/Time: 1/30/2011 5:16:43 PM

Communication System: GSM850 + GPRS(4Up); Frequency: 848.8 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 1.10 mW/g

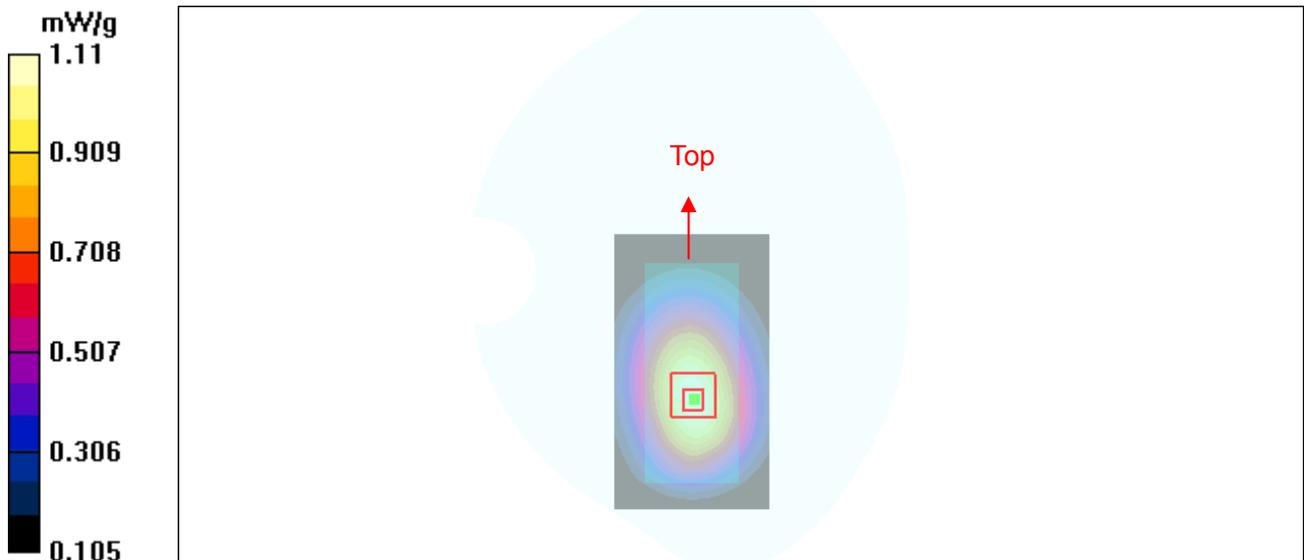
**Towards Ground High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.5 V/m; Power Drift = -0.060 dB

Peak SAR (extrapolated) = 1.33 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.742 mW/g**

Maximum value of SAR (measured) = 1.11 mW/g



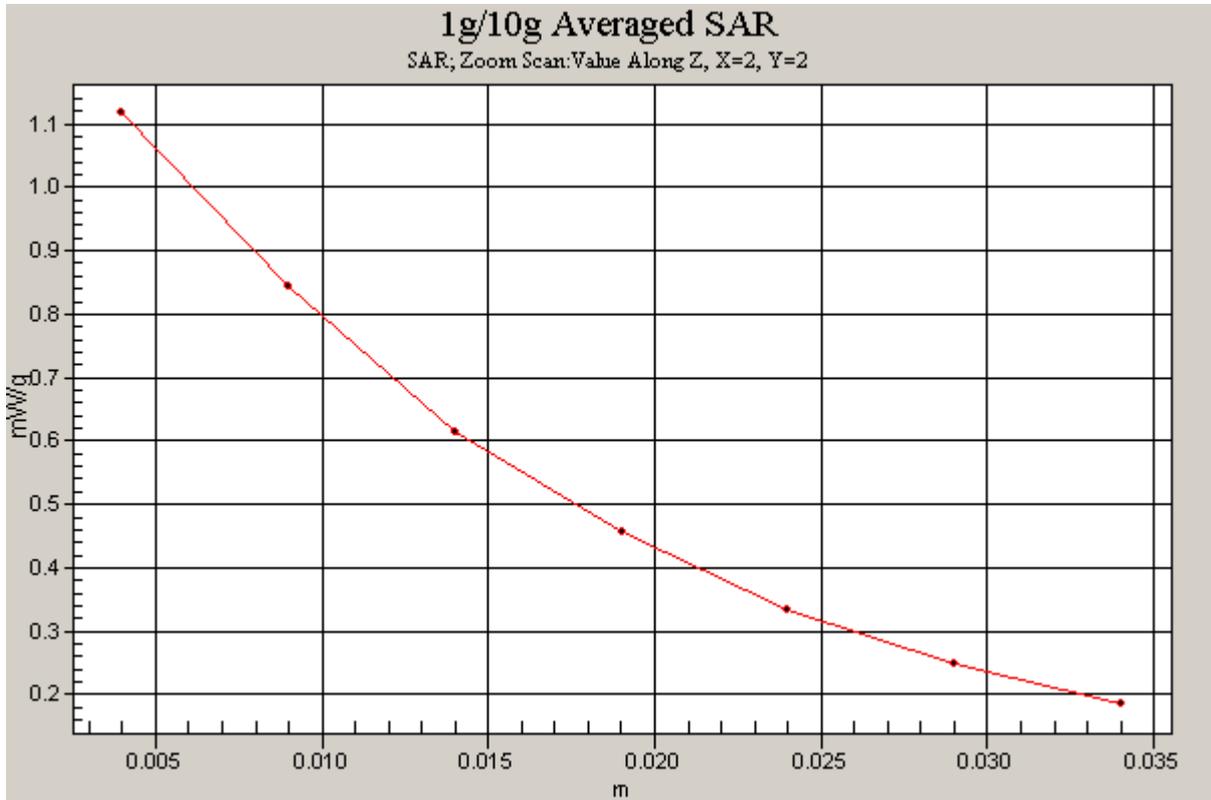


Figure 26 Body, Towards Ground, GSM 850 GPRS (4Up) Channel 251

### GSM 850 GPRS (4Up) Towards Ground Middle

Date/Time: 1/30/2011 5:03:27 PM

Communication System: GSM850 + GPRS(4Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.996$  mho/m;  $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 1.07 mW/g

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

dz=5mm

Reference Value = 14.2 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 1.28 W/kg

**SAR(1 g) = 1 mW/g; SAR(10 g) = 0.716 mW/g**

Maximum value of SAR (measured) = 1.07 mW/g

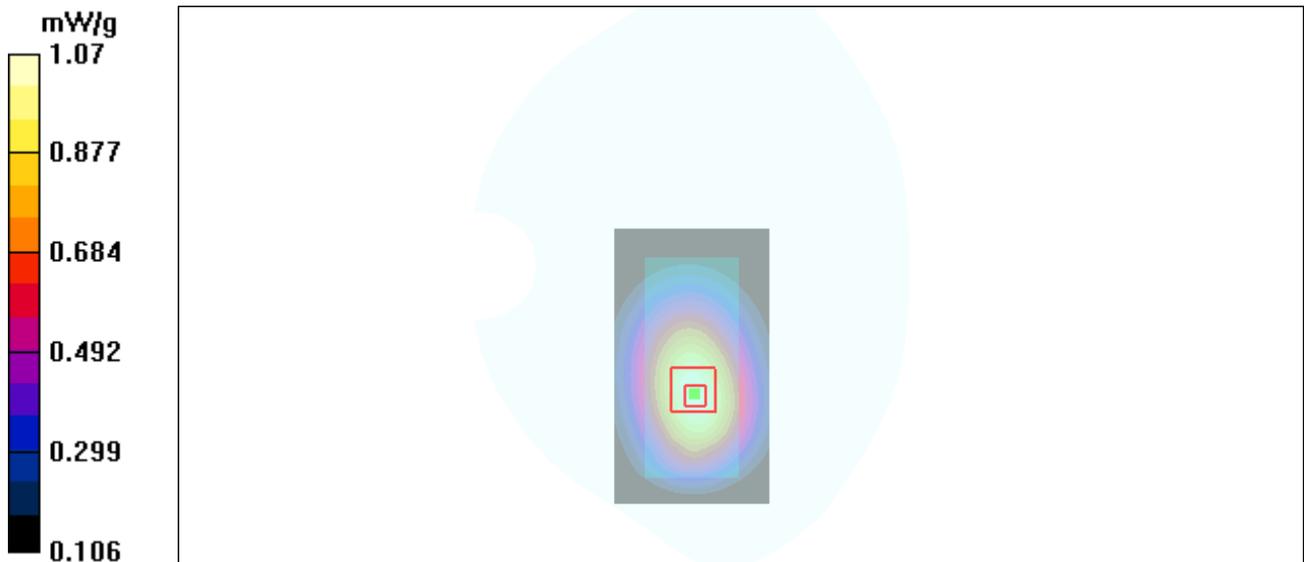


Figure 27 Body, Towards Ground, GSM 850 GPRS (4Up) Channel 190

### GSM 850 GPRS (4Up) Towards Ground Low

Date/Time: 1/31/2011 9:11:57 AM

Communication System: GSM850 + GPRS(4Up); Frequency: 824.2 MHz; Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.985$  mho/m;  $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 1.01 mW/g

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

Reference Value = 13.1 V/m; Power Drift = -0.026 dB

Peak SAR (extrapolated) = 1.20 W/kg

**SAR(1 g) = 0.937 mW/g; SAR(10 g) = 0.671 mW/g**

Maximum value of SAR (measured) = 0.996 mW/g

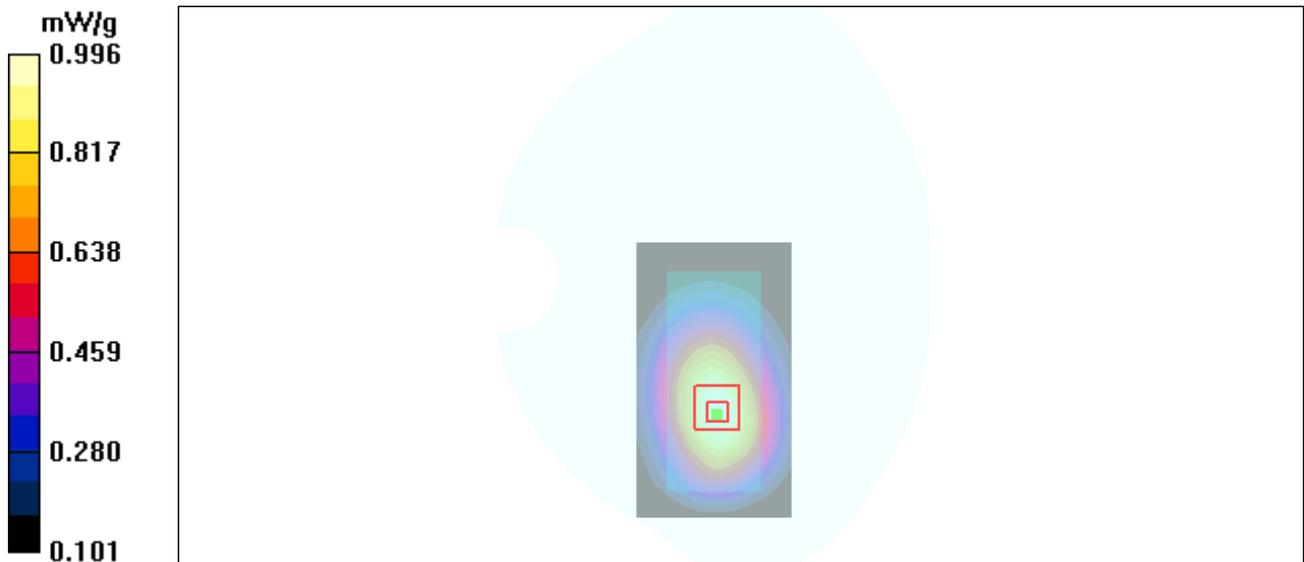


Figure 28 Body, Towards Ground, GSM 850 GPRS (4Up) Channel 128

### GSM 850 GPRS (4Up) Towards Phantom High

Date/Time: 1/31/2011 1:21:05 PM

Communication System: GSM850 + GPRS(4Up); Frequency: 848.8 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 1.10 mW/g

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

dz=5mm

Reference Value = 11.6 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 1.28 W/kg

**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.741 mW/g**

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

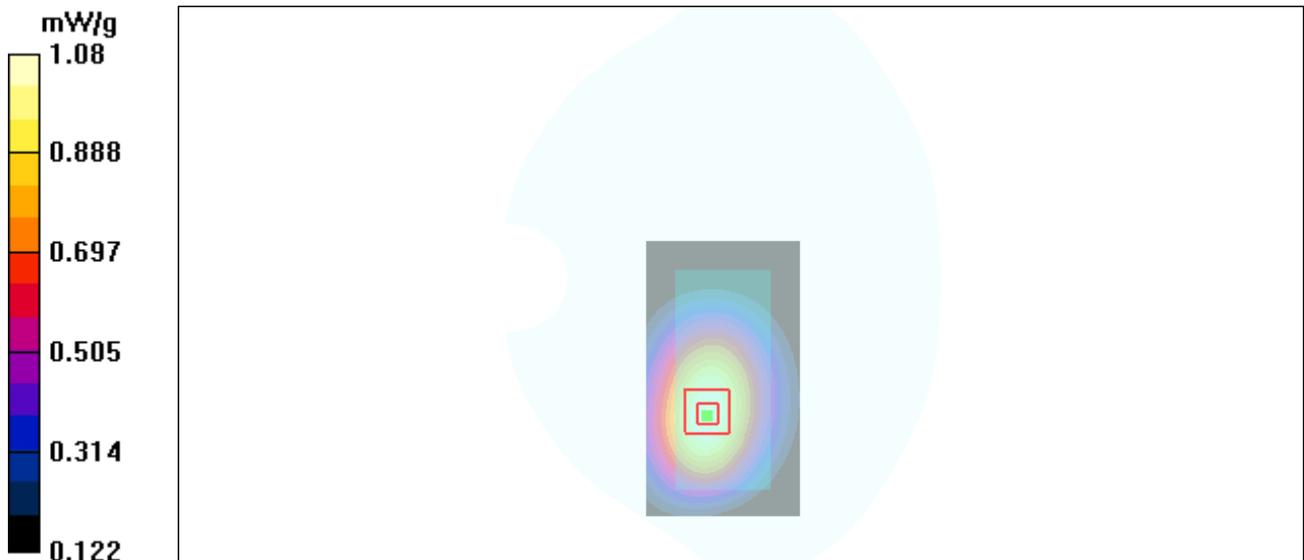


Figure 29 Body, Towards Phantom, GSM 850 GPRS (4Up) Channel 251

### GSM 850 GPRS (4Up) Towards Phantom Middle

Date/Time: 1/31/2011 1:08:01 PM

Communication System: GSM850 + GPRS(4Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.996$  mho/m;  $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

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

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

Reference Value = 11.3 V/m; Power Drift = -0.051 dB

Peak SAR (extrapolated) = 1.22 W/kg

**SAR(1 g) = 0.976 mW/g; SAR(10 g) = 0.709 mW/g**

Maximum value of SAR (measured) = 1.03 mW/g

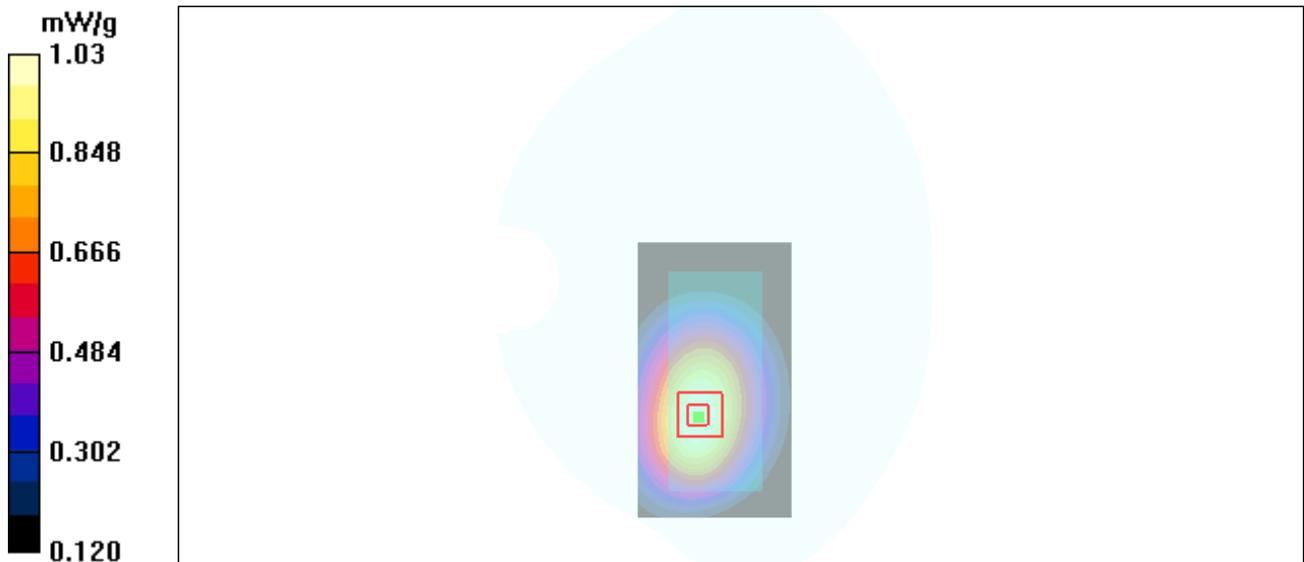


Figure 30 Body, Towards Phantom, GSM 850 GPRS (4Up) Channel 190

### GSM 850 GPRS (4Up) Towards Phantom Low

Date/Time: 1/31/2011 1:46:54 PM

Communication System: GSM850 + GPRS(4Up); Frequency: 824.2 MHz; Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.985$  mho/m;  $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.967 mW/g

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

Reference Value = 11.6 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.902 mW/g; SAR(10 g) = 0.656 mW/g**

Maximum value of SAR (measured) = 0.959 mW/g

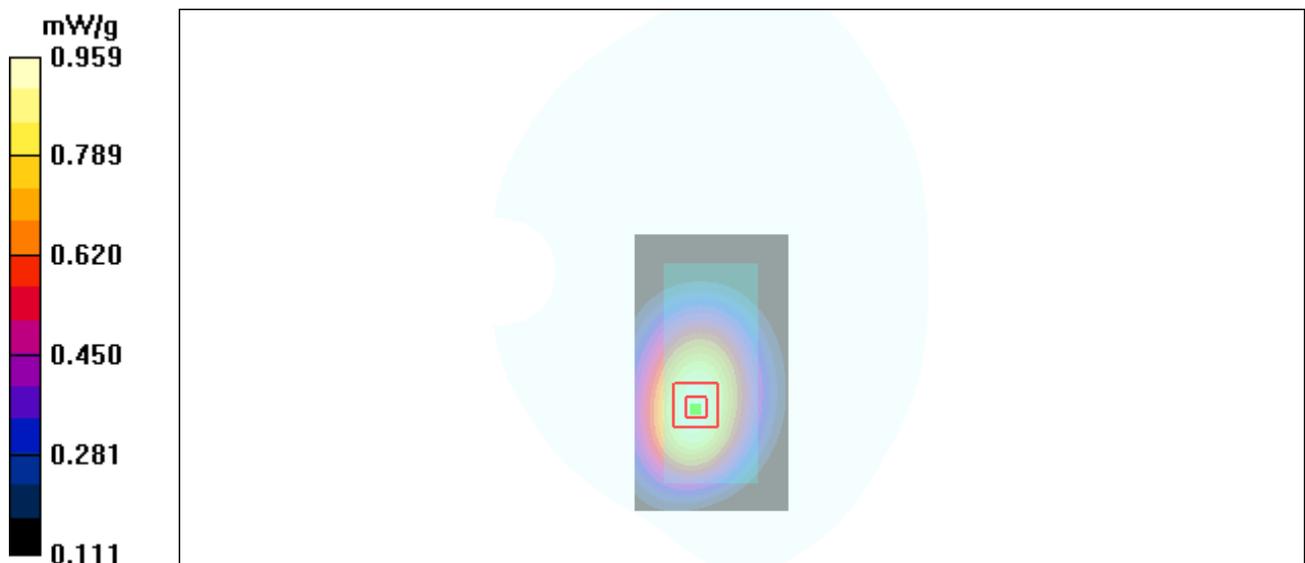


Figure 31 Body, Towards Phantom, GSM 850 GPRS (4Up) Channel 128

### GSM 850 with Earphone Towards Ground High

Date/Time: 1/31/2011 12:51:05 PM

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

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(10.33, 10.33, 10.33); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM1; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**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 = 8.88 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 0.570 W/kg

**SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.313 mW/g**

Maximum value of SAR (measured) = 0.470 mW/g

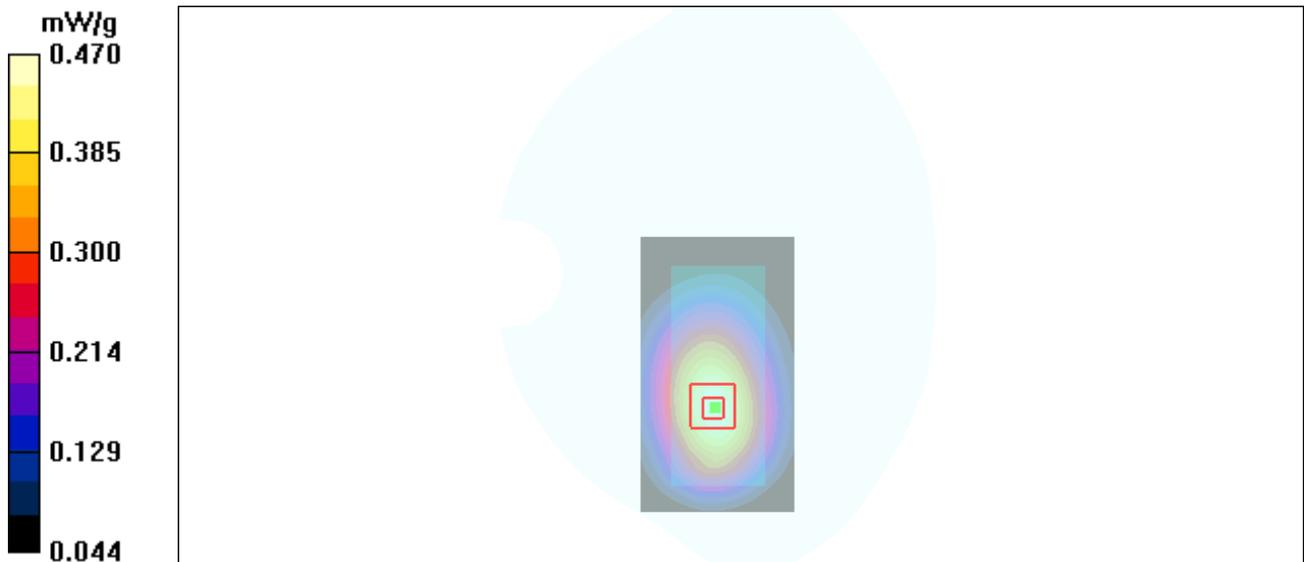


Figure 32 Body with Earphone, Towards Ground, GSM 850 Channel 251

### GSM 1900 Left Cheek High

Date/Time: 2/9/2011 10:47:20 AM

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

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 40$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 1.03 mW/g

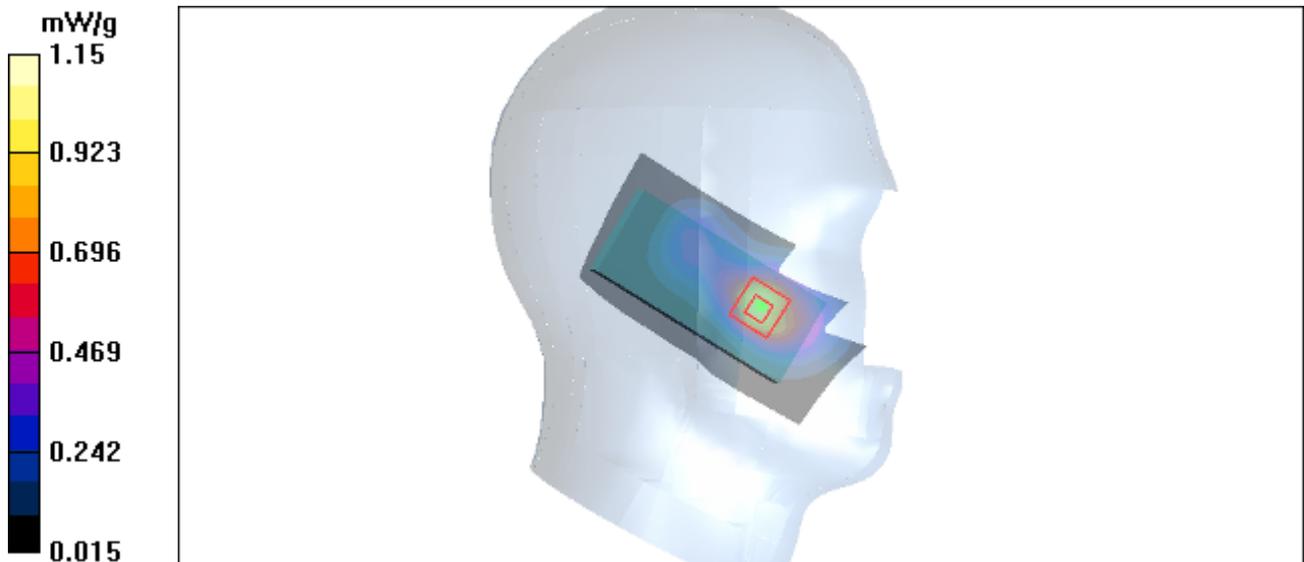
**Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.12 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 1.54 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.584 mW/g**

Maximum value of SAR (measured) = 1.15 mW/g



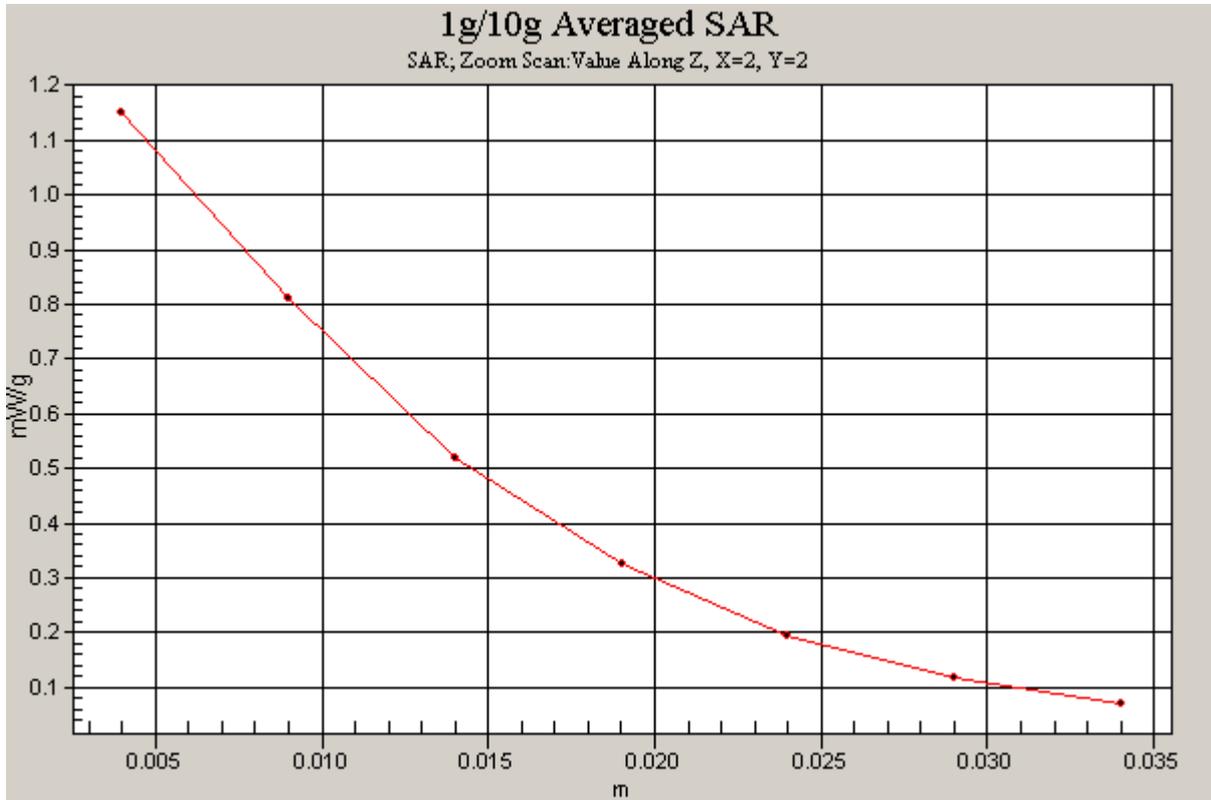


Figure 33 Left Hand Touch Cheek GSM 1900 Channel 810

### GSM 1900 Left Cheek Middle

Date/Time: 2/9/2011 2:52:28 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.815 mW/g

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

Reference Value = 4.88 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 1.15 W/kg

**SAR(1 g) = 0.798 mW/g; SAR(10 g) = 0.454 mW/g**

Maximum value of SAR (measured) = 0.877 mW/g

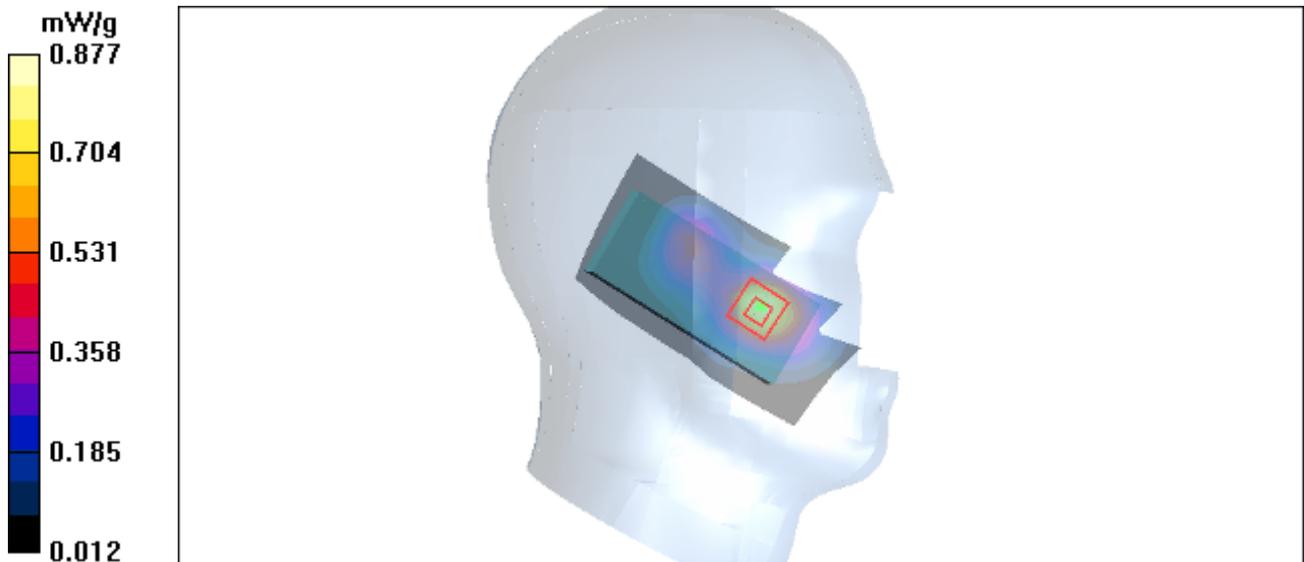


Figure 34 Left Hand Touch Cheek GSM 1900 Channel 661

### GSM 1900 Left Cheek Low

Date/Time: 2/9/2011 11:03:35 AM

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

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 40.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.687 mW/g

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

Reference Value = 4.64 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 0.996 W/kg

**SAR(1 g) = 0.683 mW/g; SAR(10 g) = 0.383 mW/g**

Maximum value of SAR (measured) = 0.735 mW/g

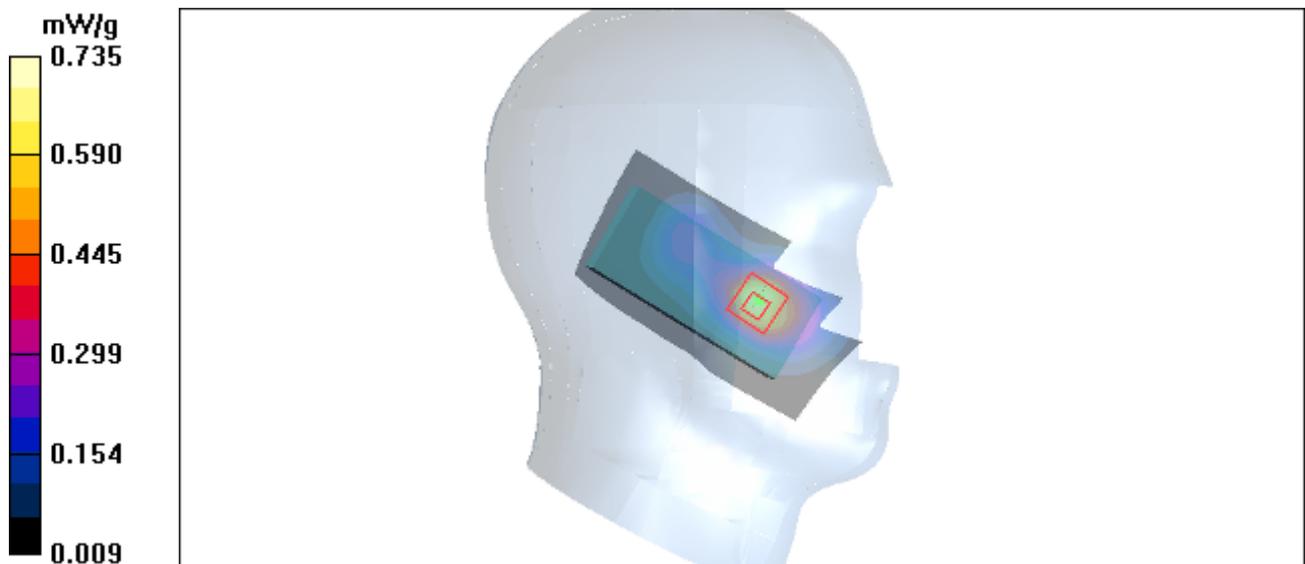


Figure 35 Left Hand Touch Cheek GSM 1900 Channel 512

### GSM 1900 Left Tilt Middle

Date/Time: 2/9/2011 3:06:33 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.420 mW/g

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

Reference Value = 7.16 V/m; Power Drift = -0.087 dB

Peak SAR (extrapolated) = 0.460 W/kg

**SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.209 mW/g**

Maximum value of SAR (measured) = 0.354 mW/g

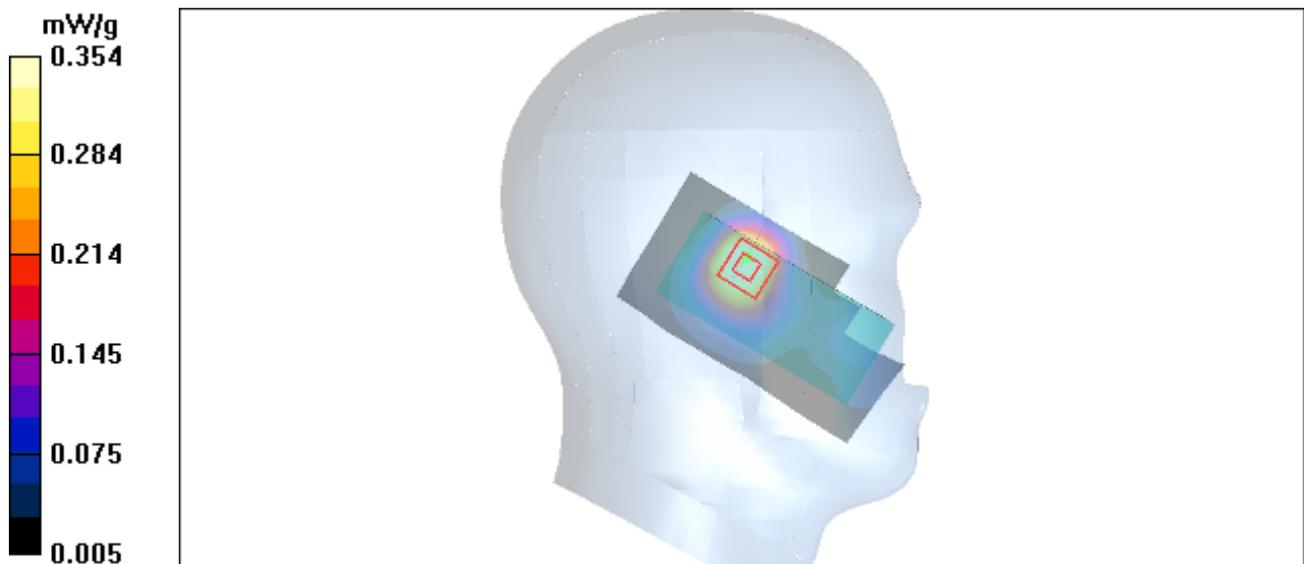


Figure 36 Left Hand Tilt 15° GSM 1900 Channel 661

### GSM 1900 Right Cheek Middle

Date/Time: 2/9/2011 3:26:49 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.781 mW/g

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

Reference Value = 12.5 V/m; Power Drift = -0.071 dB

Peak SAR (extrapolated) = 0.616 W/kg

**SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.287 mW/g**

Maximum value of SAR (measured) = 0.491 mW/g

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

Reference Value = 12.5 V/m; Power Drift = -0.071 dB

Peak SAR (extrapolated) = 0.955 W/kg

**SAR(1 g) = 0.685 mW/g; SAR(10 g) = 0.411 mW/g**

Maximum value of SAR (measured) = 0.745 mW/g

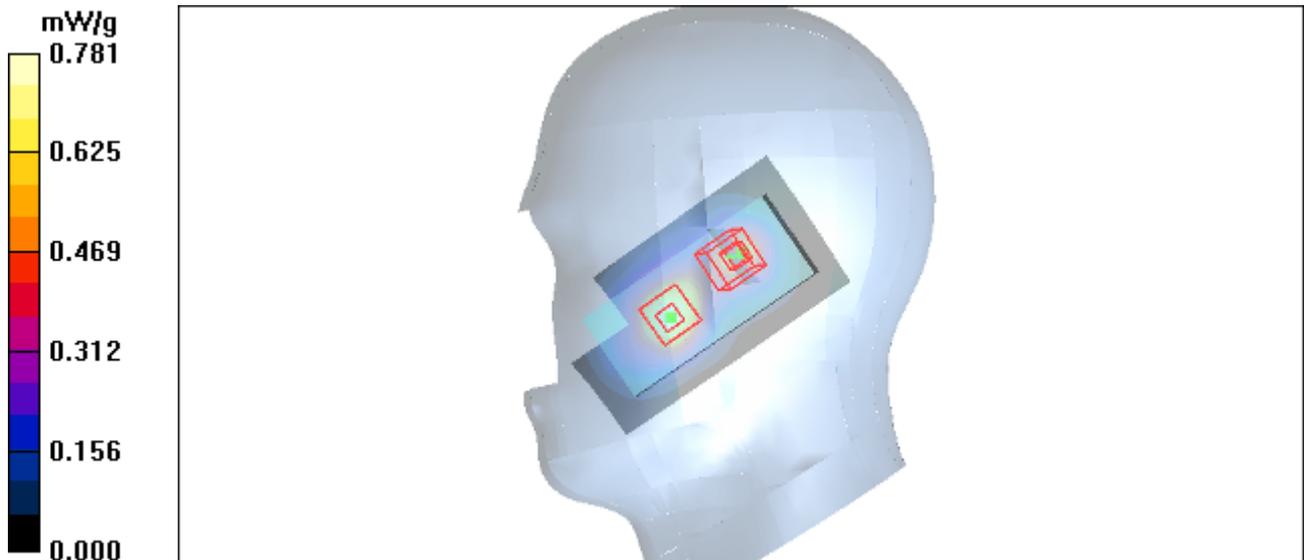


Figure 37 Right Hand Touch Cheek GSM 1900 Channel 661

### GSM 1900 Right Tilt Middle

Date/Time: 2/9/2011 3:57:02 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.94, 7.94, 7.94); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.544 mW/g

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

Reference Value = 17.4 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.660 W/kg

**SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.273 mW/g**

Maximum value of SAR (measured) = 0.501 mW/g

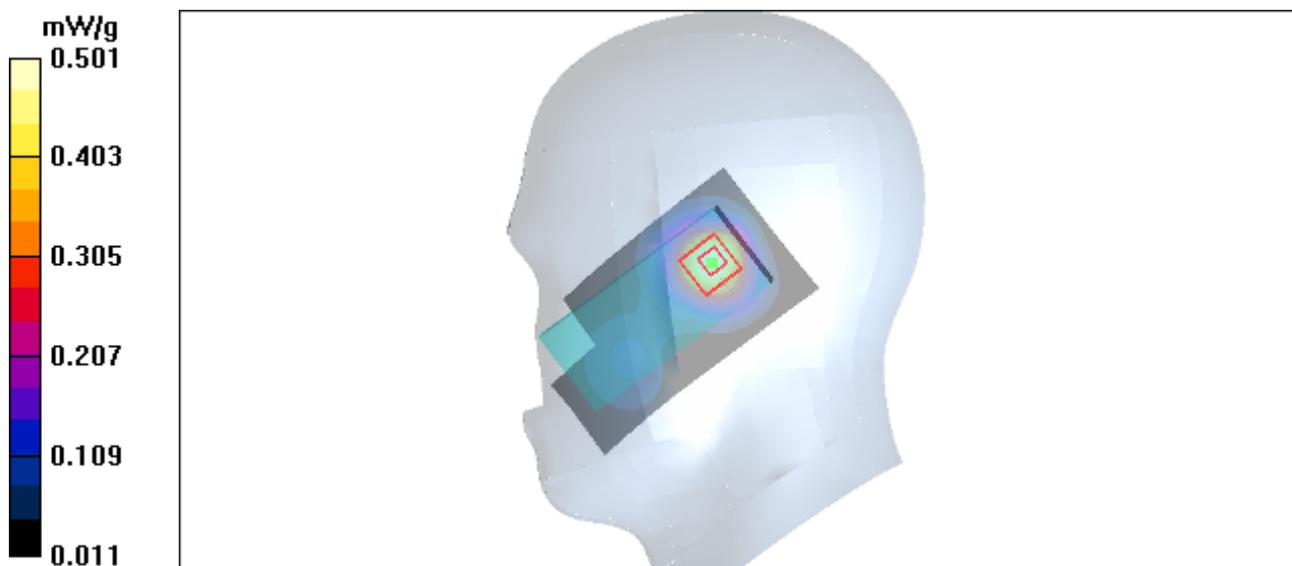


Figure 38 Right Hand Tilt 15° GSM 1900 Channel 661

### GSM 1900 Towards Ground Middle

Date/Time: 2/9/2011 2:23:41 PM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.276 mW/g

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

dz=5mm

Reference Value = 11.3 V/m; Power Drift = -0.109 dB

Peak SAR (extrapolated) = 0.423 W/kg

**SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.162 mW/g**

Maximum value of SAR (measured) = 0.273 mW/g

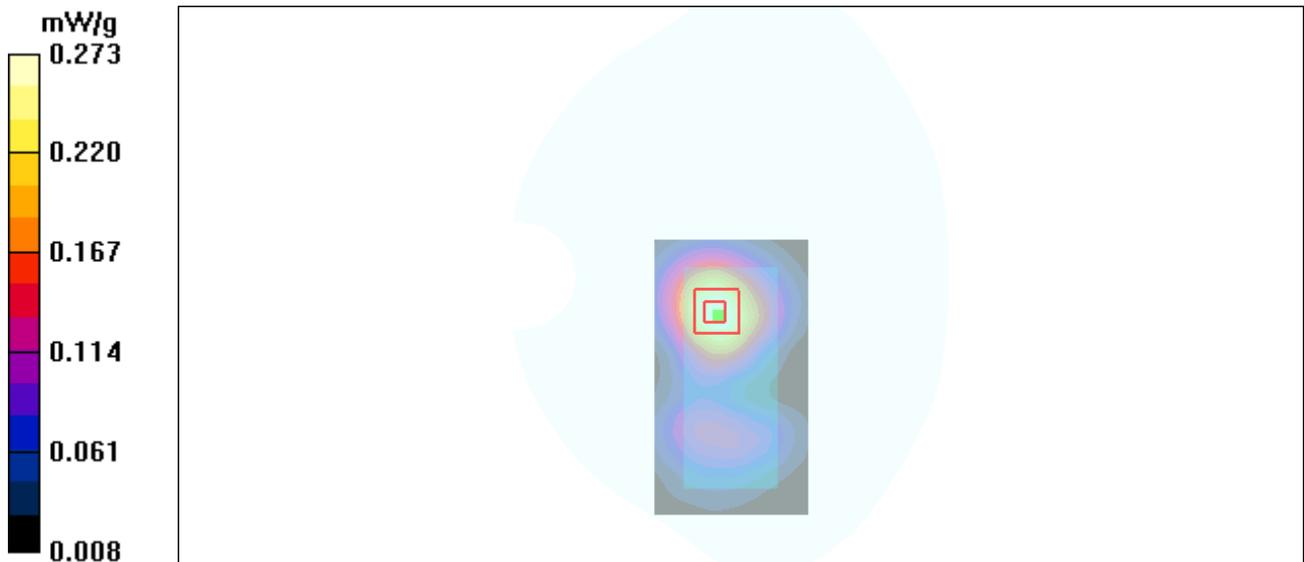


Figure 39 Body, Towards Ground, GSM 1900 Channel 661

### GSM 1900 GPRS (2Up) Towards Ground Middle

Date/Time: 2/9/2011 2:37:19 PM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.448 mW/g

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

Reference Value = 14.2 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 0.678 W/kg

**SAR(1 g) = 0.415 mW/g; SAR(10 g) = 0.262 mW/g**

Maximum value of SAR (measured) = 0.442 mW/g

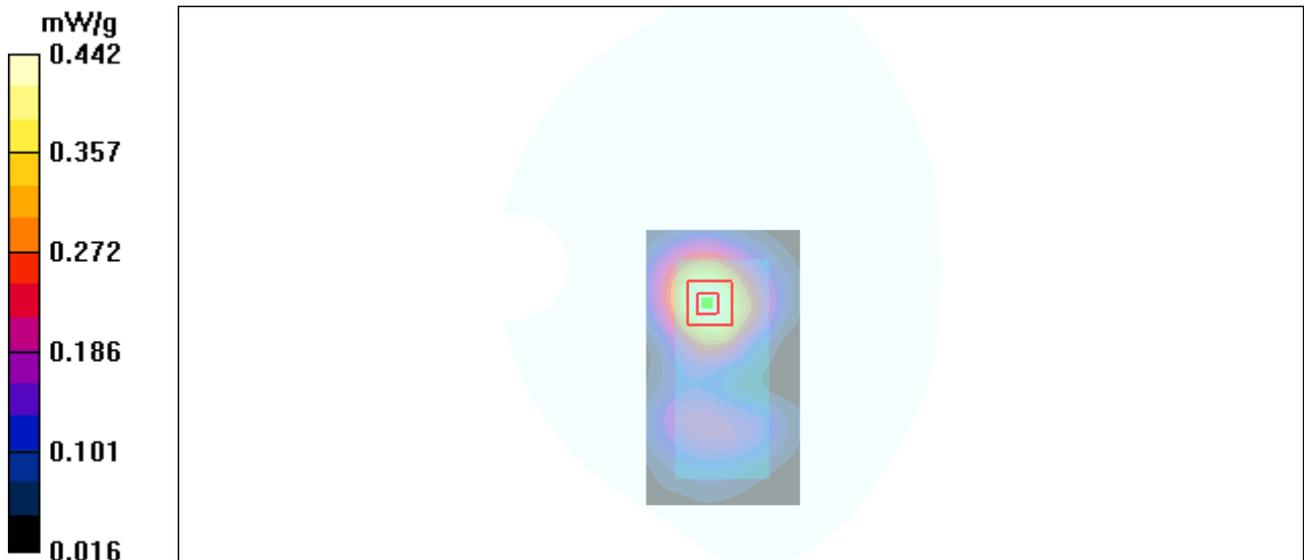


Figure 40 Body, Towards Ground, GSM 1900 GPRS (2Up) Channel 661

### GSM 1900 GPRS (3Up) Towards Ground Middle

Date/Time: 2/9/2011 2:49:45 PM

Communication System: PCS 1900+GPRS(3Up); Frequency: 1880 MHz;Duty Cycle: 1:2.767

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.470 mW/g

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

Reference Value = 14.5 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 0.711 W/kg

**SAR(1 g) = 0.435 mW/g; SAR(10 g) = 0.274 mW/g**

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

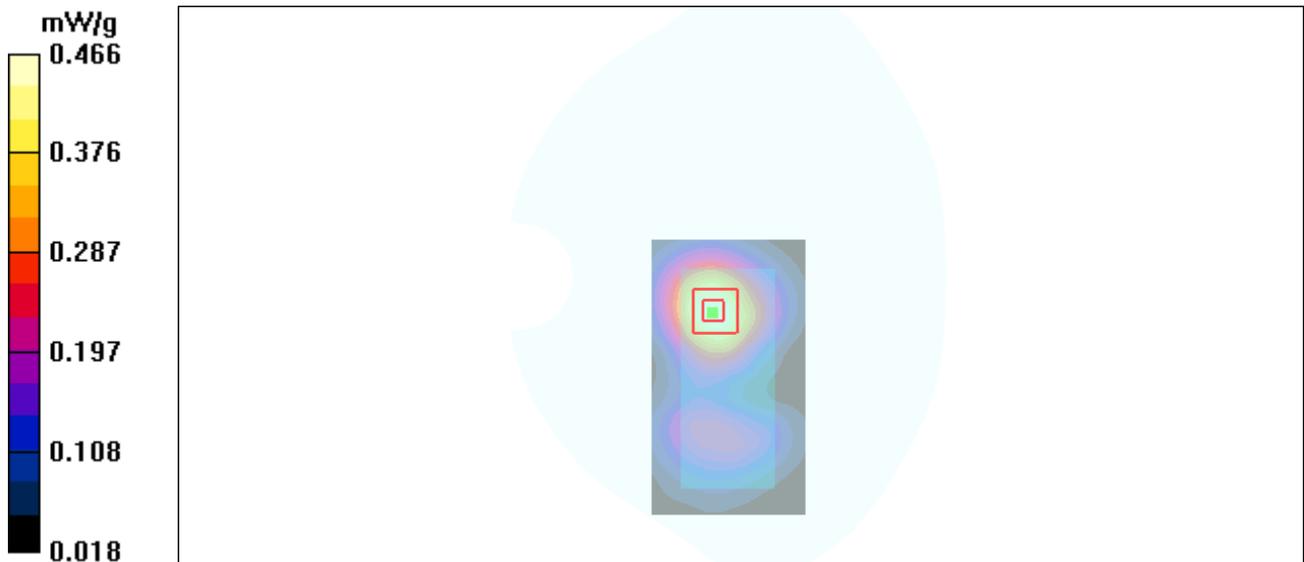


Figure 41 Body, Towards Ground, GSM 1900 GPRS (3Up) Channel 661

### GSM 1900 GPRS (4Up) Towards Ground High

Date/Time: 2/9/2011 3:15:09 PM

Communication System: PCS 1900+GPRS(4Up); Frequency: 1909.8 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.419 mW/g

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

Reference Value = 13.6 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 0.644 W/kg

**SAR(1 g) = 0.388 mW/g; SAR(10 g) = 0.244 mW/g**

Maximum value of SAR (measured) = 0.409 mW/g

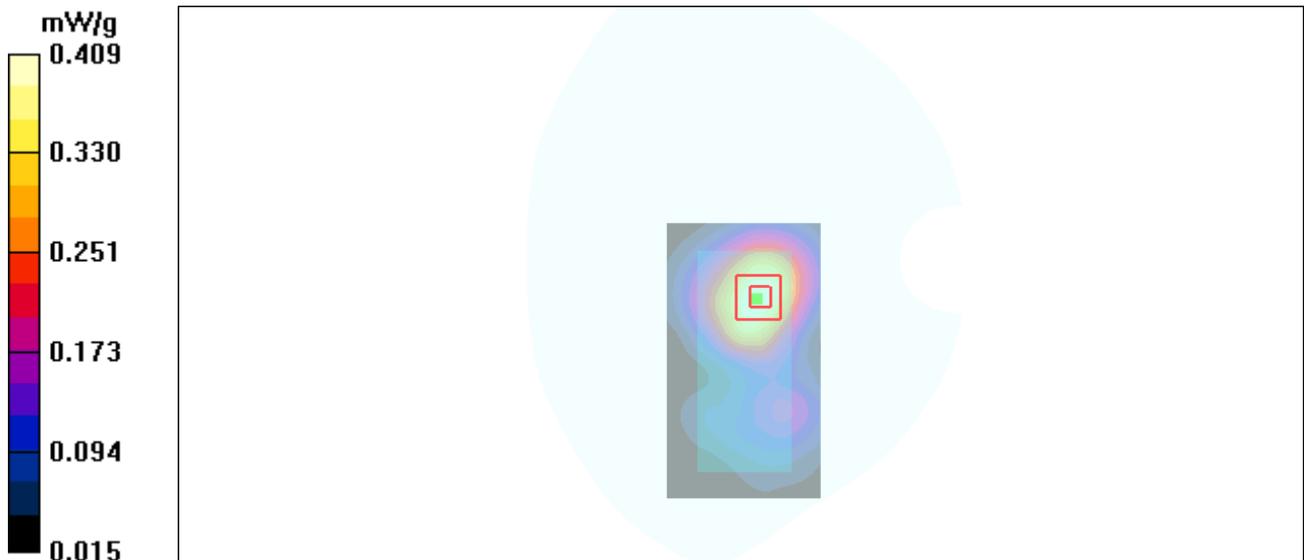


Figure 42 Body, Towards Ground, GSM 1900 GPRS (4Up) Channel 810

### GSM 1900 GPRS (4Up) Towards Ground Middle

Date/Time: 2/9/2011 3:02:12 PM

Communication System: PCS 1900+GPRS(4Up); Frequency: 1880 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.520 mW/g

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

Reference Value = 15.3 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 0.793 W/kg

**SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.304 mW/g**

Maximum value of SAR (measured) = 0.517 mW/g

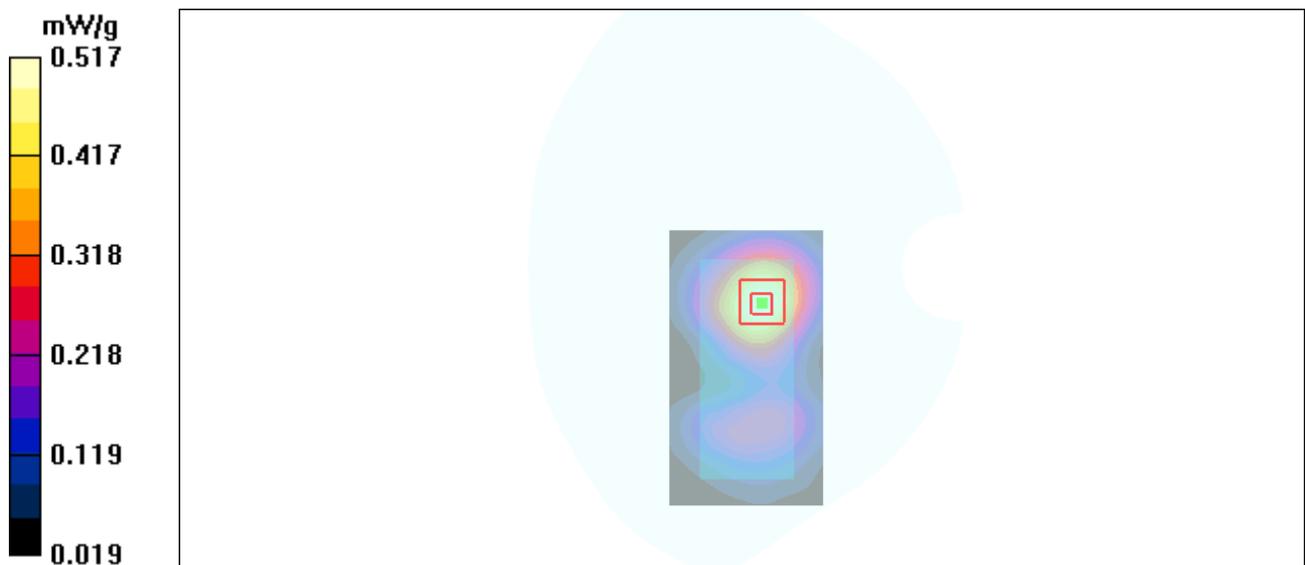


Figure 43 Body, Towards Ground, GSM 1900 GPRS (4Up) Channel 661

### GSM 1900 GPRS (4Up) Towards Ground Low

Date/Time: 2/9/2011 9:23:35 AM

Communication System: PCS 1900+GPRS(4Up); Frequency: 1850.2 MHz; Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.48$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.539 mW/g

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

Reference Value = 15.7 V/m; Power Drift = -0.173 dB

Peak SAR (extrapolated) = 0.574 W/kg

**SAR(1 g) = 0.331 mW/g; SAR(10 g) = 0.200 mW/g**

Maximum value of SAR (measured) = 0.357 mW/g

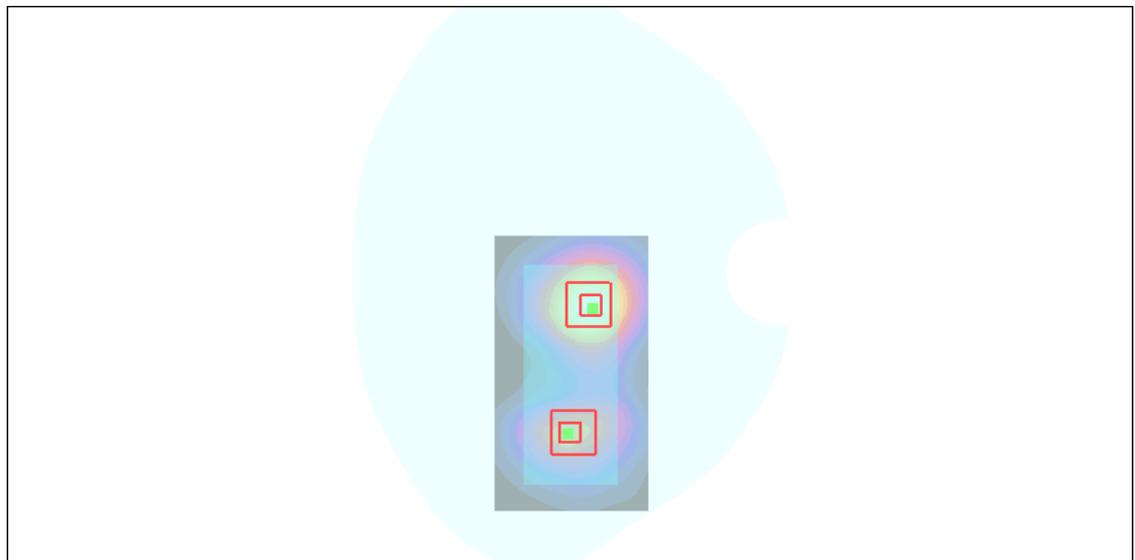
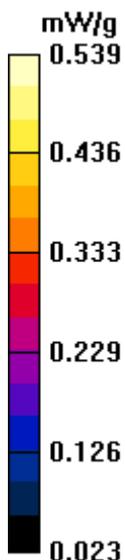
**Towards Ground Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.7 V/m; Power Drift = -0.173 dB

Peak SAR (extrapolated) = 0.790 W/kg

**SAR(1 g) = 0.501 mW/g; SAR(10 g) = 0.320 mW/g**

Maximum value of SAR (measured) = 0.539 mW/g



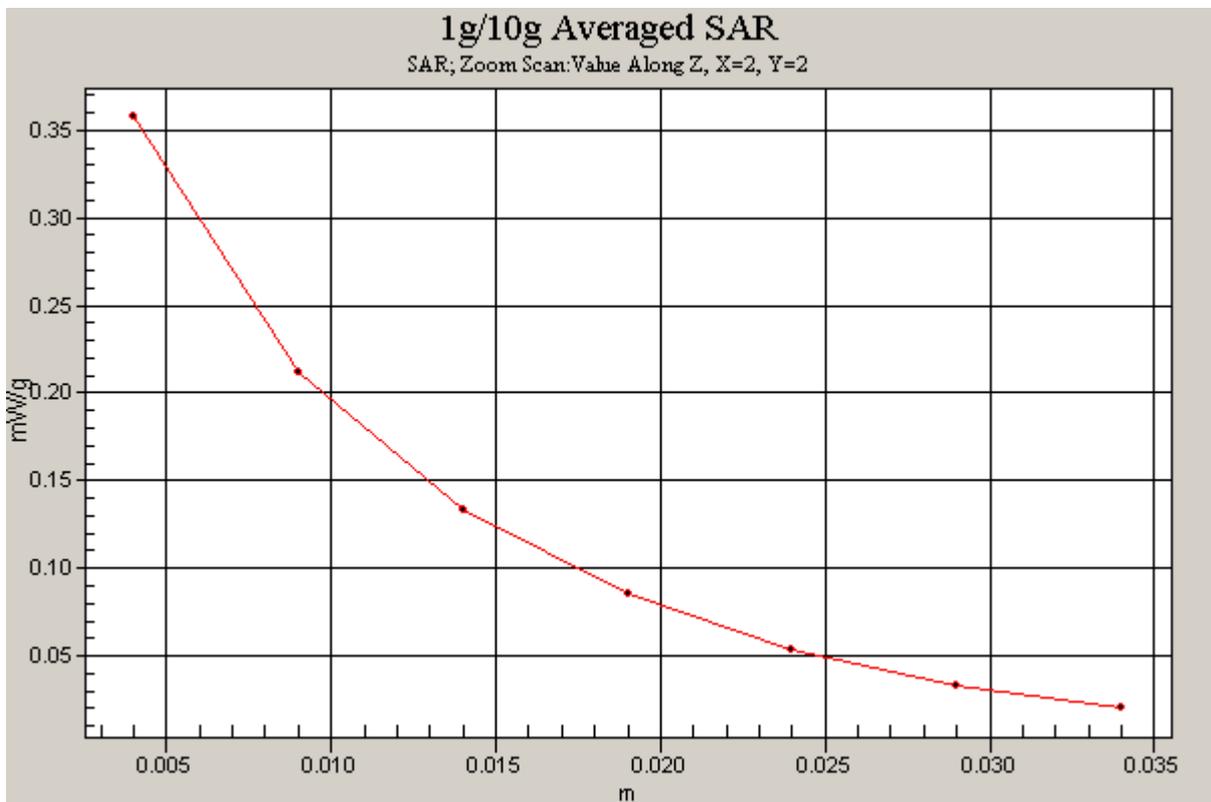
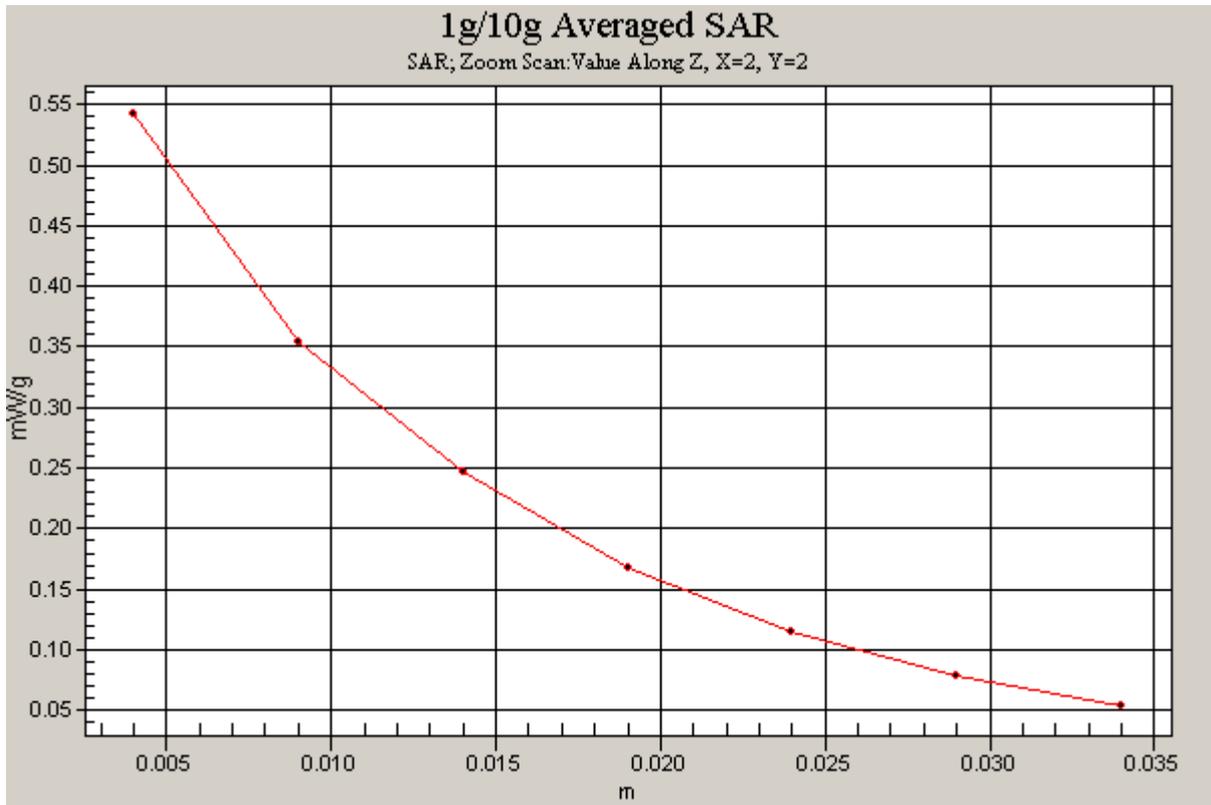


Figure 44 Body, Towards Ground, GSM 1900 GPRS (4Up) Channel 512

### GSM 1900 GPRS (4Up) Towards Phantom Middle

Date/Time: 2/9/2011 10:02:22 AM

Communication System: PCS 1900+GPRS(4Up); Frequency: 1880 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

**Towards Phantom Middle/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.506 mW/g

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

Reference Value = 15.8 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 0.716 W/kg

**SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.277 mW/g**

Maximum value of SAR (measured) = 0.465 mW/g

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

Reference Value = 15.8 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 0.765 W/kg

**SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.278 mW/g**

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

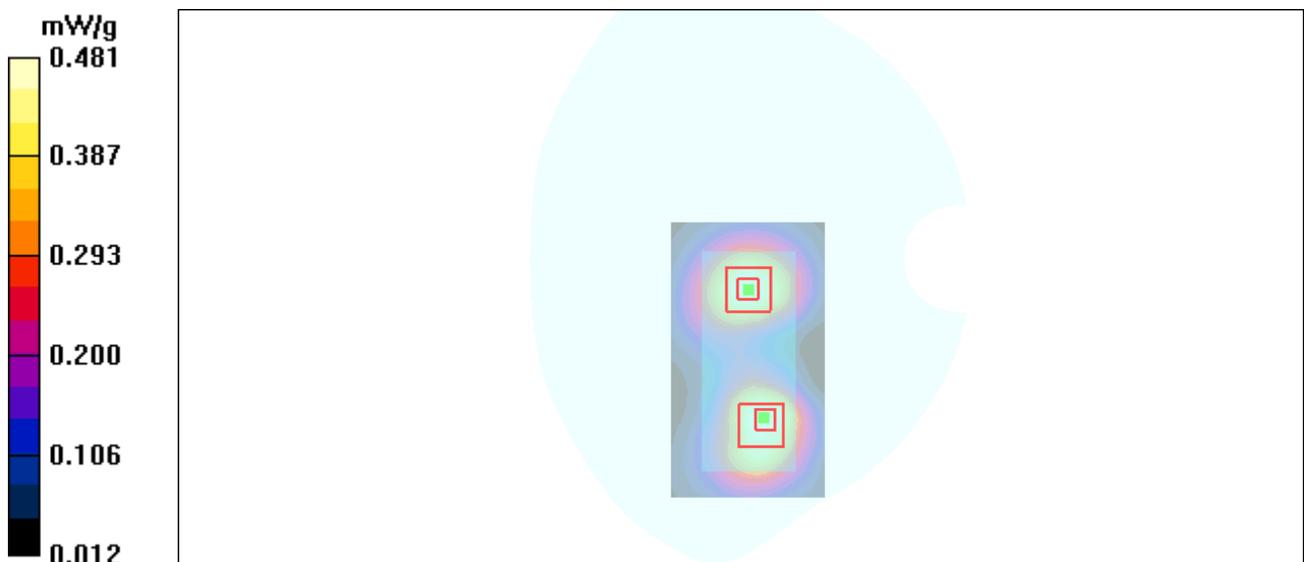


Figure 45 Body, Towards Phantom, GSM 1900 GPRS (4Up) Channel 661

### GSM 1900 with Earphone Towards Ground Low

Date/Time: 2/9/2011 9:43:48 AM

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

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.48$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.77, 7.77, 7.77); Calibrated: 11/24/2010

Electronics: DAE4 Sn871; Calibrated: 11/18/2010

Phantom: SAM2; Type: SAM;

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Maximum value of SAR (interpolated) = 0.235 mW/g

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

Reference Value = 8.11 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 0.349 W/kg

**SAR(1 g) = 0.220 mW/g; SAR(10 g) = 0.141 mW/g**

Maximum value of SAR (measured) = 0.236 mW/g

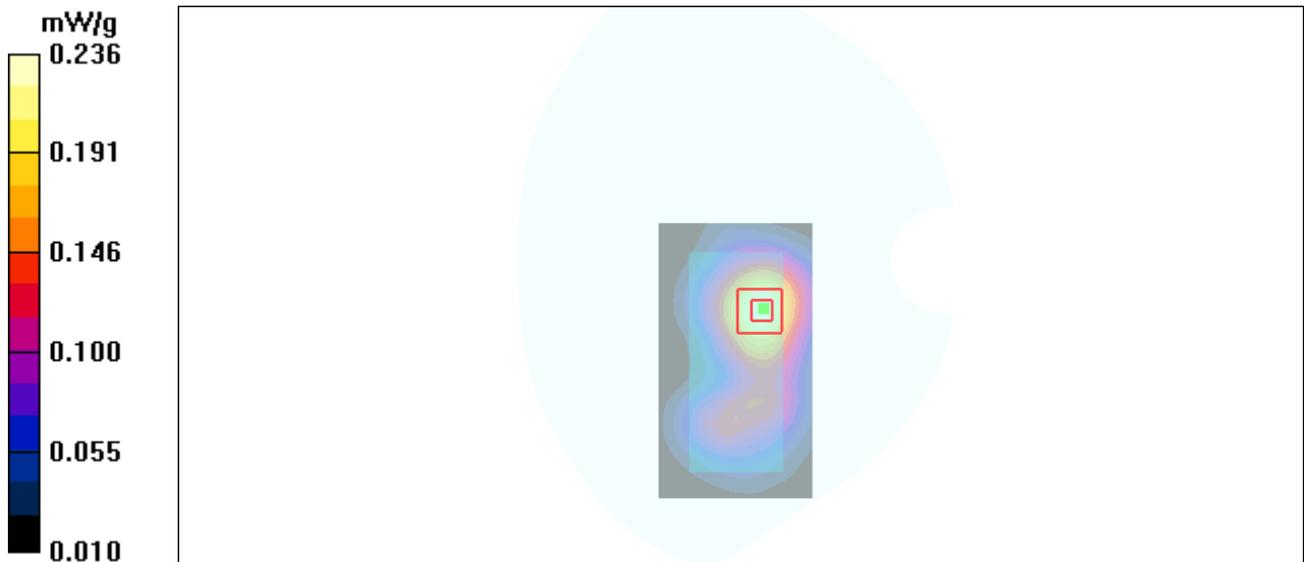


Figure 46 Body with Earphone, Towards Ground, GSM 1900 Channel 512

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

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## ANNEX D: Probe 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 **TA-SH (Auden)**

Certificate No: **EX3-3677\_Nov10**

### CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3677**

Calibration procedure(s): **QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2  
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 24, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498067	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	<b>Katja Pokovic</b>	Function	<b>Technical Manager</b>	Signature	
Approved by:	<b>Niels Kuster</b>	Function	<b>Quality Manager</b>	Signature	

Issued: November 25, 2010

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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



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

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

Accreditation No.: **SCS 108**

### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\phi$	$\phi$ 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<sup>2</sup>-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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  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

November 24, 2010

# Probe EX3DV4

## SN:3677

Manufactured:	September 9, 2008
Last calibrated:	September 23, 2009
Recalibrated:	November 24, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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

EX3DV4 SN:3677

November 24, 2010

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

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.41	0.47	0.39	± 10.1%
DCP (mV) <sup>B</sup>	96.8	98.9	98.8	

### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc <sup>C</sup> (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	143.2	± 2.4 %
			Y	0.00	0.00	1.00	140.9	
			Z	0.00	0.00	1.00	135.8	

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

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

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

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

EX3DV4 SN:3677

November 24, 2010

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

#### Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] <sup>c</sup>	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	10.04	10.04	10.04	0.09	1.00 ± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	9.50	9.50	9.50	0.72	0.64 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	8.22	8.22	8.22	0.72	0.59 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.94	7.94	7.94	0.81	0.57 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	7.32	7.32	7.32	0.47	0.75 ± 11.0%

<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.

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EX3DV4 SN:3677

November 24, 2010

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

### Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] <sup>c</sup>	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	10.62	10.62	10.62	0.02	1.00 ± 13.3%
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	10.14	10.14	10.14	0.59	0.72 ± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	10.33	10.33	10.33	0.20	2.06 ± 11.0%
1450	± 50 / ± 100	54.0 ± 5%	1.30 ± 5%	8.47	8.47	8.47	0.99	0.53 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	8.02	8.02	8.02	0.63	0.67 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.77	7.77	7.77	0.69	0.67 ± 11.0%
2100	± 50 / ± 100	53.2 ± 5%	1.62 ± 5%	8.04	8.04	8.04	0.16	1.44 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	7.46	7.46	7.46	0.99	0.49 ± 11.0%
3500	± 50 / ± 100	51.3 ± 5%	3.31 ± 5%	6.61	6.61	6.61	0.28	1.40 ± 13.1%

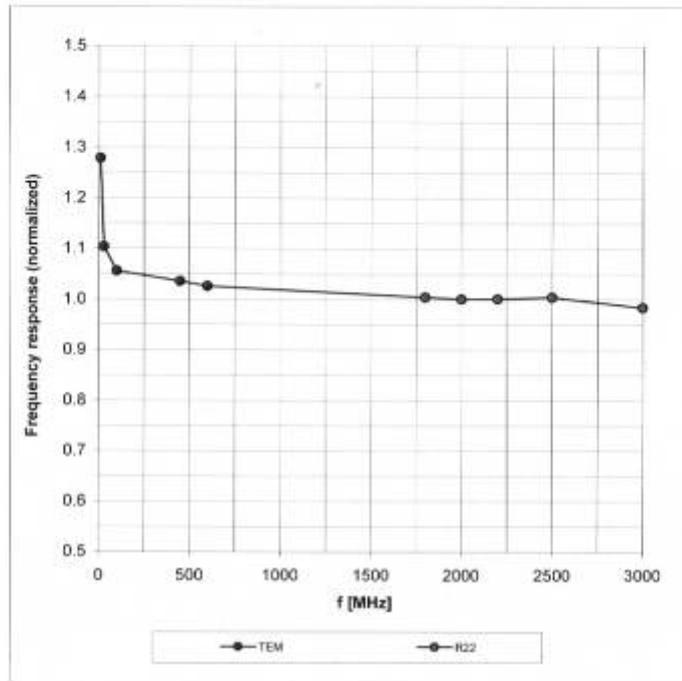
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV4 SN:3677

November 24, 2010

### Frequency Response of E-Field

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

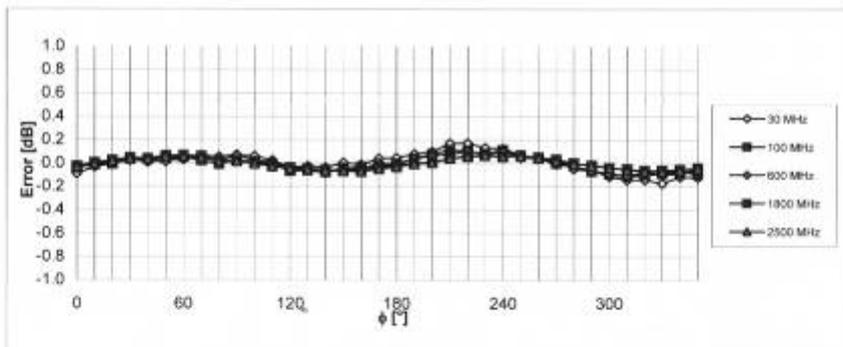
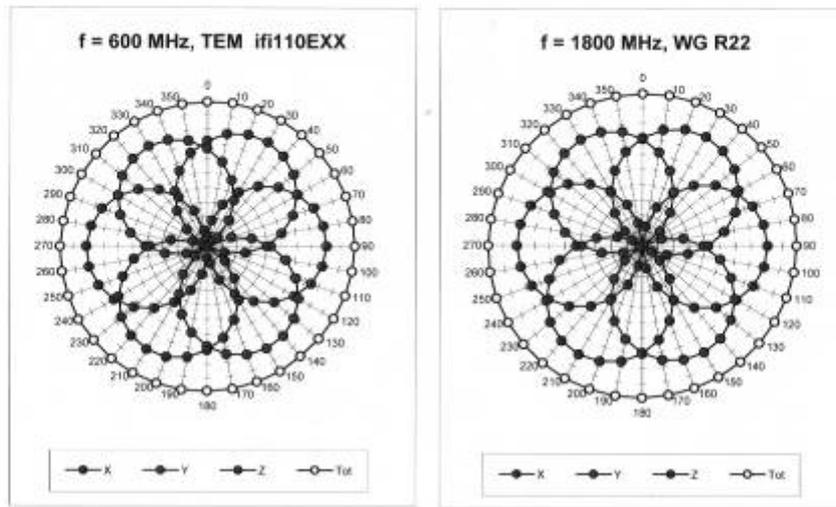


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

EX3DV4 SN:3677

November 24, 2010

Receiving Pattern ( $\phi$ ),  $\vartheta = 0^\circ$

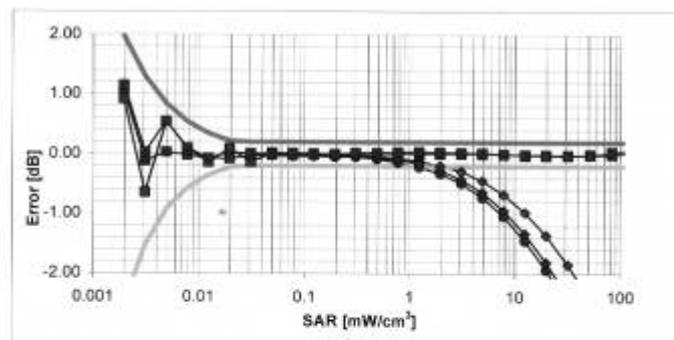
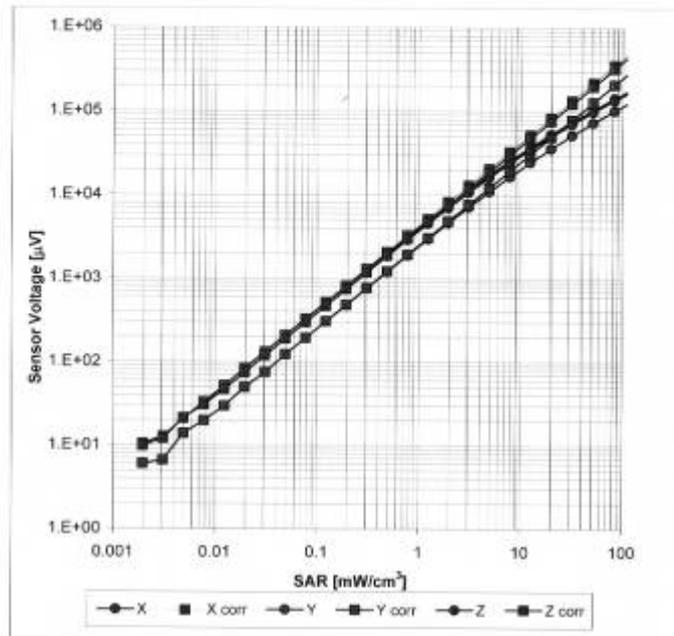


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

EX3DV4 SN:3677

November 24, 2010

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

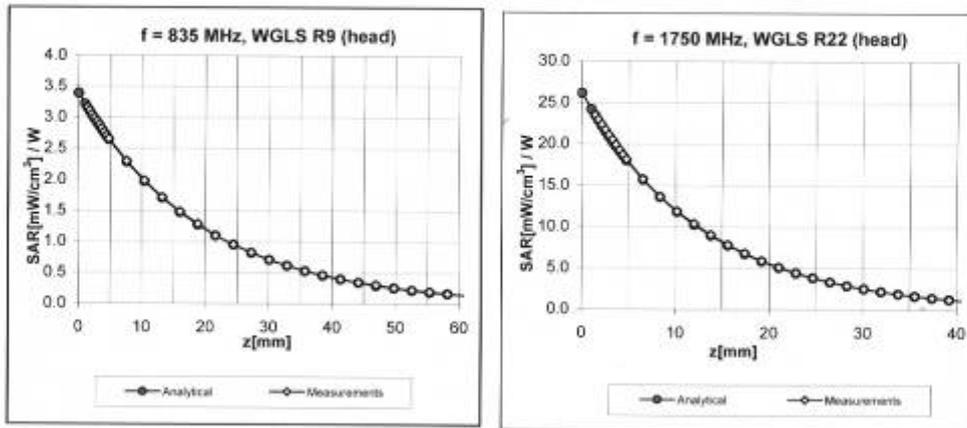


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

EX3DV4 SN:3677

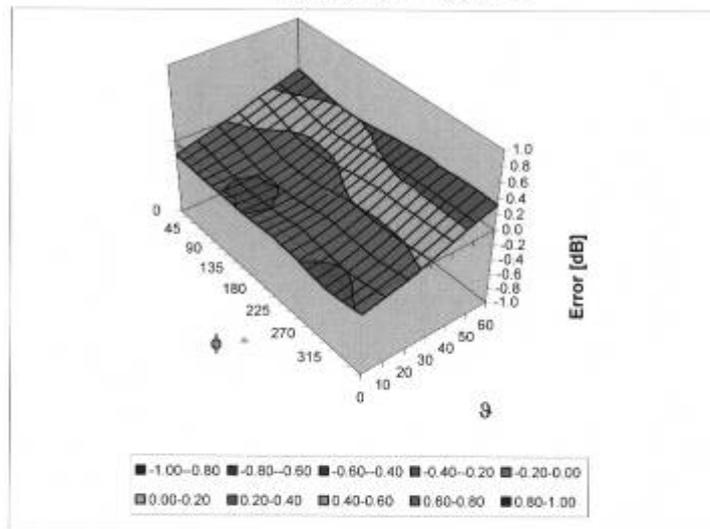
November 24, 2010

### Conversion Factor Assessment



### Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  (k=2)

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

Report No.: RZA1101-0131SAR01R1

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EX3DV4 SN:3677

November 24, 2010

**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### ANNEX E: D835V2 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **Auden**

Certificate No: **D835V2-4d092\_Jan10**

#### CALIBRATION CERTIFICATE

Object: D835V2 - SN: 4d092

Calibration procedure(s): QA CAL-05.v7  
Calibration procedure for dipole validation kits

Calibration date: January 14, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	08-Oct-09 (No. 217-01086)	Oct-10
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 ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-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-09)	in house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-89 (in house check Oct-09)	in house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	in house check: Oct-10

Calibrated by: **Jeton Kastrell** (Name) / **Laboratory Technician** (Function)

Approved by: **Katja Pokovic** (Name) / **Technical Manager** (Function)

Signature:

Issued: January 18, 2010

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  
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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.

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.2 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.5 $\pm$ 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	2.39 mW / g
SAR normalized	normalized to 1W	9.56 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.63 mW / g <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>6.27 mW / g <math>\pm</math> 16.5 % (k=2)</b>

# 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	54.8 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 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	2.49 mW / g
SAR normalized	normalized to 1W	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.86 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	1.63 mW / g
SAR normalized	normalized to 1W	6.52 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.47 mW / g ± 16.5 % (k=2)</b>

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.2 $\Omega$ - 2.8 j $\Omega$
Return Loss	- 30.3 dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 $\Omega$ - 4.5 j $\Omega$
Return Loss	- 25.6 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.392 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	September 15, 2009

**DASY5 Validation Report for Head TSL**

Date/Time: 11.01.2010 12:00:00

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d092**

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

Medium: HSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: I001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**

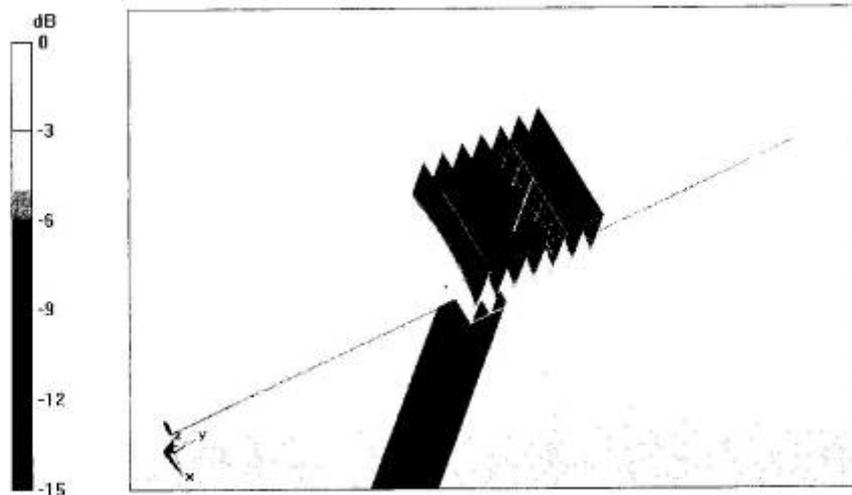
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.5 V/m; Power Drift = -0.00176 dB

Peak SAR (extrapolated) = 3.58 W/kg

**SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g**

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



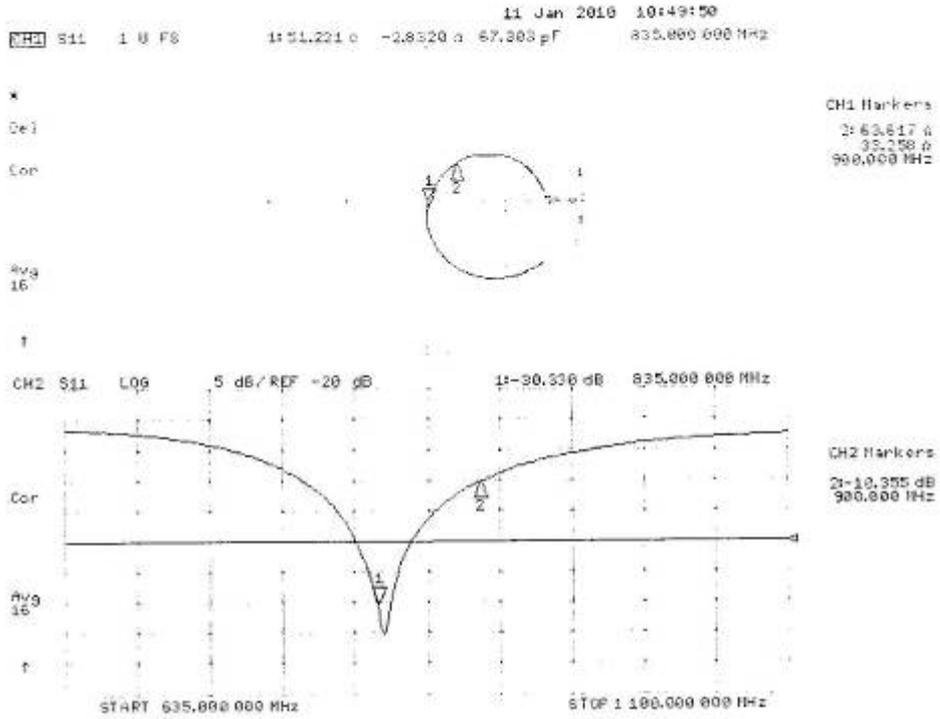
0 dB = 2.77mW/g

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## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body**

Date/Time: 14.01.2010 15:40:17

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d092**

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

Medium: MSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.98 \text{ mho/m}$ ;  $\epsilon_r = 54.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; Convf(5.97, 5.97, 5.97); Calibrated: 26.06.2009
- 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, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

**Pin250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**

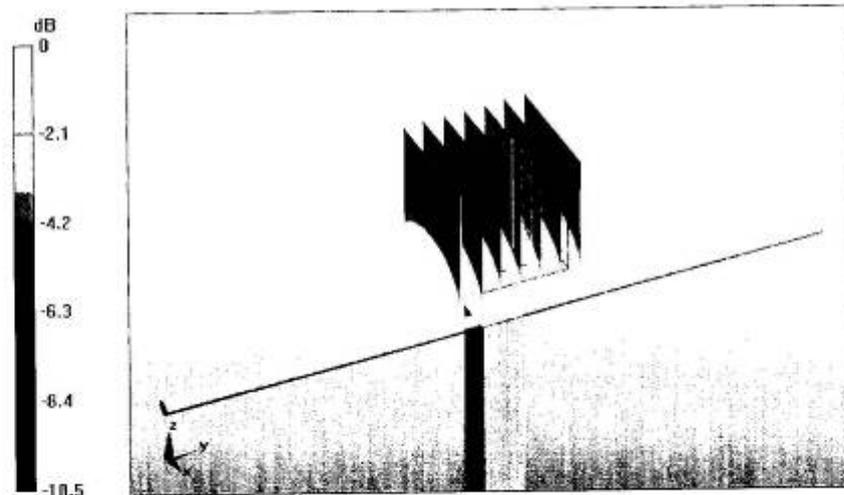
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.9 V/m; Power Drift = 0.013 dB

Peak SAR (extrapolated) = 3.67 W/kg

**SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.63 mW/g**

Maximum value of SAR (measured) = 2.89 mW/g



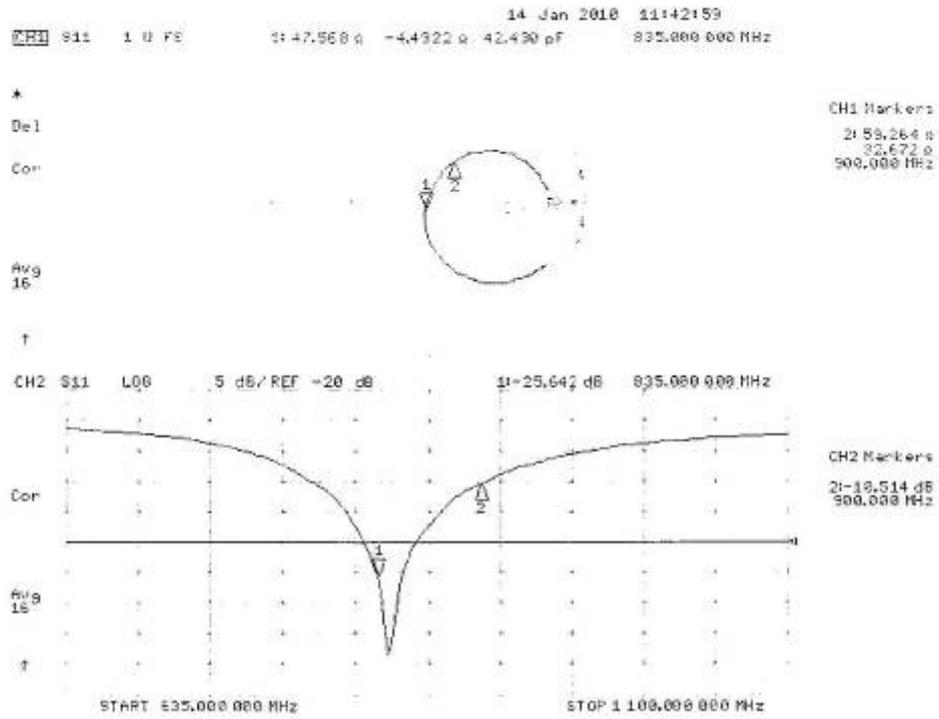
0 dB = 2.89mW/g

# 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 F: D1900V2 Dipole Calibration Certificate

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



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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client: **Audex**

Certificate No.: **D1900V2-5d018\_Jun10**

<b>CALIBRATION CERTIFICATE</b>																																															
Object	D1900V2 - SN: 5d018																																														
Calibration procedure(s)	QA GAL-05.v7 Calibration procedure for dipole validation kits																																														
Calibration date:	June 15, 2010																																														
<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-09 (No. 217-01086)</td> <td>Oct-10</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>08-Oct-09 (No. 217-01086)</td> <td>Oct-10</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5086 (20g)</td> <td>30-Mar-10 (No. 217-01158)</td> <td>Mar-11</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 5047.2 / 06327</td> <td>30-Mar-10 (No. 217-01162)</td> <td>Mar-11</td> </tr> <tr> <td>Reference Probe ES3DV3</td> <td>SN: 3205</td> <td>30-Apr-10 (No. ES3-3205_Apr10)</td> <td>Apr-11</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>10-Jun-10 (No. DAE4-601_Jun10)</td> <td>Jun-11</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-09)</td> <td>In house check: Oct-11</td> </tr> <tr> <td>RF generator R&amp;S SMT-06</td> <td>100005</td> <td>4-Aug-99 (in house check Oct-09)</td> <td>In house check: Oct-11</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585 S4206</td> <td>18-Oct-01 (in house check Oct-09)</td> <td>In house check: Oct-10</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	08-Oct-09 (No. 217-01086)	Oct-10	Power sensor HP 8481A	US37292783	08-Oct-09 (No. 217-01086)	Oct-10	Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11	Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11	Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11	DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11	RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11	Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10
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Calibrated by:	Name Dimitar Iliev	Function Laboratory Technician	Signature 																																												
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 																																												
			Issued: June 17, 2010																																												
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																																															

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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



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

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

### Glossary:

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

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

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.2
<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>	1900 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	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	39.6 ± 6 %	1.44 mho/m ± 6 %
<b>Head TSL temperature during test</b>	(22.5 ± 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	10.0 mW / g
SAR normalized	normalized to 1W	40.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>39.2 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	5.22 mW / g
SAR normalized	normalized to 1W	20.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>20.7 mW / g ± 16.5 % (k=2)</b>

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.3	1.52 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	53.4 ± 6 %	1.54 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(21.7 ± 0.2) °C	----	----

### SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR normalized	normalized to 1W	41.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>40.9 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	5.52 mW / g
SAR normalized	normalized to 1W	22.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>22.0 mW / g ± 16.5 % (k=2)</b>

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 $\Omega$ + 2.6 j $\Omega$
Return Loss	- 29.7 dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 $\Omega$ + 3.2 j $\Omega$
Return Loss	- 27.6 dB

#### General Antenna Parameters and Design

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

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 04, 2002

**DASY5 Validation Report for Head TSL**

Date/Time: 15.06.2010 10:40:45

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;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**

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

Reference Value = 96.7 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 18.4 W/kg

**SAR(1 g) = 10 mW/g; SAR(10 g) = 5.22 mW/g**

Maximum value of SAR (measured) = 12.6 mW/g

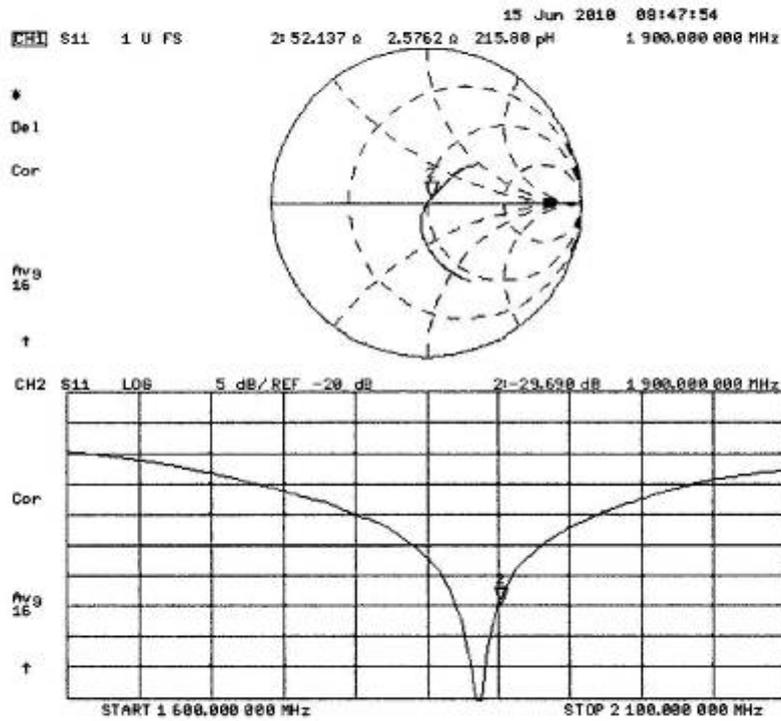


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## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body**

Date/Time: 15.06.2010 14:14:27

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 U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 53.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.1 V/m; Power Drift = 0.055 dB

Peak SAR (extrapolated) = 17.3 W/kg

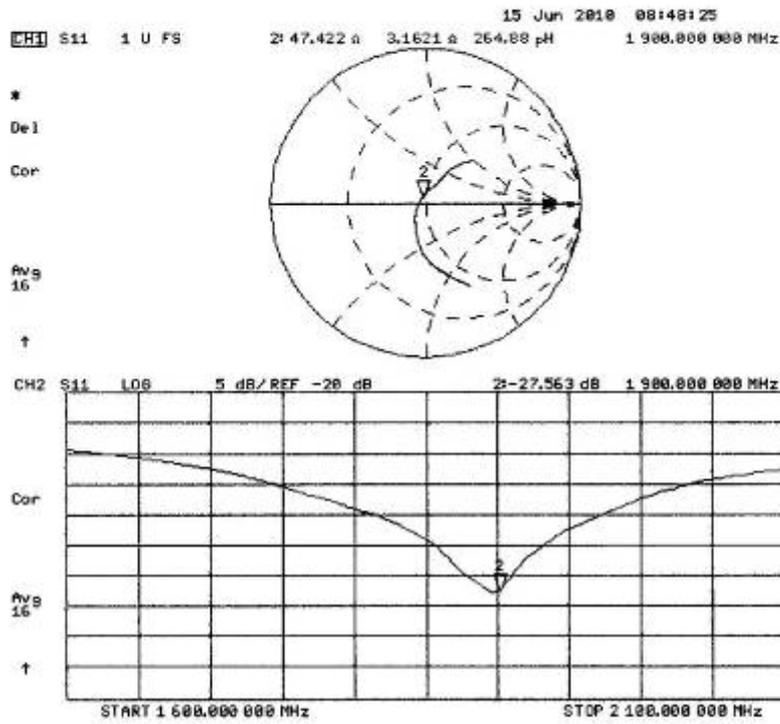
**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.52 mW/g**

Maximum value of SAR (measured) = 12.8 mW/g



0 dB = 12.8mW/g

# Impedance Measurement Plot for Body TSL



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## ANNEX G: DAE4 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 **TA - SH (Auden)**

Certificate No: **DAE4-871\_Nov10**

### CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 871**

Calibration procedure(s) **QA CAL-06.v22  
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **November 18, 2010**

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	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Andrea Guntli	Technician	
Approved by:	Fin Bornholt	R&D Director	

Issued: November 18, 2010

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

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



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

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

Accreditation No.: **SCS 108**

### Glossary

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

### Methods Applied and Interpretation of Parameters

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

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

**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	404.757 $\pm$ 0.1% (k=2)	404.740 $\pm$ 0.1% (k=2)	405.181 $\pm$ 0.1% (k=2)
Low Range	3.98219 $\pm$ 0.7% (k=2)	3.93489 $\pm$ 0.7% (k=2)	3.96831 $\pm$ 0.7% (k=2)

**Connector Angle**

Connector Angle to be used in DASY system	90.0 $^{\circ}$ $\pm$ 1 $^{\circ}$
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# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### 1. DC Voltage Linearity

High Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	200001.2	-1.56	-0.00
Channel X + Input	20000.71	0.71	0.00
Channel X - Input	-19997.87	1.63	-0.01
Channel Y + Input	199994.3	1.99	0.00
Channel Y + Input	19998.92	-1.08	-0.01
Channel Y - Input	-20000.26	-0.76	0.00
Channel Z + Input	200009.2	-1.04	-0.00
Channel Z + Input	19998.70	-1.10	-0.01
Channel Z - Input	-20000.16	-0.76	0.00

Low Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	2000.1	0.16	0.01
Channel X + Input	199.58	-0.52	-0.26
Channel X - Input	-200.79	-0.89	0.45
Channel Y + Input	1999.9	-0.03	-0.00
Channel Y + Input	199.45	-0.55	-0.27
Channel Y - Input	-200.31	-0.41	0.21
Channel Z + Input	2000.1	0.33	0.02
Channel Z + Input	199.13	-0.77	-0.38
Channel Z - Input	-201.47	-1.37	0.69

#### 2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	14.25	12.86
	- 200	-12.68	-14.21
Channel Y	200	-10.04	-10.39
	- 200	9.20	9.17
Channel Z	200	-0.85	-1.40
	- 200	-0.34	-0.31

#### 3. Channel separation

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	2.85	0.69
Channel Y	200	2.41	-	2.73
Channel Z	200	2.54	0.73	-

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

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

	High Range (LSB)	Low Range (LSB)
Channel X	15920	15517
Channel Y	16171	16732
Channel Z	15803	16474

#### 5. Input Offset Measurement

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

Input 10M $\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	0.03	-2.35	0.86	0.43
Channel Y	-0.50	-1.49	-0.49	0.38
Channel Z	-0.92	-2.21	0.14	0.44

#### 6. Input Offset Current

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

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

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

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

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

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

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