TESTING
No. L2264

TEST REPORT

Product Name	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
Model	HUAWEI U8100-7/U8100-7/IVY
FCC ID	QISU8100-7
Client	HUAWEI Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Product Name	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth	Model	HUAWEI U8100-7 /U8100-7/IVY
Report No.	RZA2010-0427FCC	FCC ID	QISU8100-7
Client	HUAWEI Technologies Co., Ltd.		
Manufacturer	HUAWEI Technologies Co., Ltd.		
Standard(s)	**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. **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 Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions.		
Conclusion	Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: April 20th , 2010**		
Comment	The test result only responds to the measured sample.		

Approved by _____ Revised by _____ Performed by _____

Yang Weizhong Ling Minbao Li Jinchang

TABLE OF CONTENT

1. General Information

1.1. Notes of the test report

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

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

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

1.2. Testing laboratory

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1.4. Manufacturer Information

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City: Shenzhen

Postal Code: 518129

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1.5. Information of EUT

General information

Device type :	portable device
Exposure category:	uncontrolled environment / general population
Product Name:	HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth
SN:	M62AA11020600052
Device operating configurations :	
Operating mode(s):	GSM850; （tested） GSM1900; （tested） WCDMA Band V; （tested）
Test Modulation:	(GSM)GMSK, (WCDMA)QPSK
GPRS multislot class :	10
EGPRS multislot class :	10
Maximum no. of timeslots in uplink:	2
HSDPA UE category:	8
Operating frequency range(s):	<table><tr><td>Band</td><td>Tx (MHz)</td><td>Rx (MHz)</td></tr><tr><td>GSM 850</td><td>824.2 ~ 848.8</td><td>869.2 ~ 893.8</td></tr><tr><td>GSM 1900</td><td>1850.2 ~ 1909.8</td><td>1930.2 ~ 1989.8</td></tr><tr><td>WCDMA Band V</td><td>826.4 ~ 846.6</td><td>871.4 ~ 891.6</td></tr></table>
Power class	GSM 850: 4, tested with power level 5 GSM 1900: 1, tested with power level 0 WCDMA Band V: 3, tested with maximum output power
Test channel (Low –Middle –High)	128 -190 -251 (GSM850) (tested) 512 - 661-810 (GSM1900) (tested) 4132 - 4183-4233 (WCDMA Band V) (tested)
Hardware version:	HD1U811M Ver.B
Software version:	U8107V100R001C00B210
Antenna type:	internal antenna

Auxiliary equipment details

AE1: Battery

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

AE2:Travel Adaptor

Model:	HS-050040U6
Manufacture:	HUAWEI Technologies Co., Ltd.
IMEI or SN:	/

Equipment Under Test (EUT) is a model of HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth with internal antenna. The detail about Mobile phone, Lithium Battery and AC/DC Adapter is in in chapter 1.5 in this report. SAR is tested for GSM850, GSM 1900 and WCDMA Band V.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. Test Date

The test is performed from April 13, 2010 to April 20, 2010.

2. Operational Conditions during Test

2.1. General description of test procedures

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 190 and 251 in the case of GSM 850, allocated to 512, 661 and 810 in the case of GSM 1900, allocated to 4132, 4183 and 4233 in the case of WCDMA Band V. The EUT is commanded to operate at maximum transmitting power.

Connection to the EUT is established via air interface with E5515C, and the EUT is set to maximum output power by E5515C. The antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30 dB.

2.2. GSM Test Configuration

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

2.3. WCDMA Test Configuration

2.3.1. Output power Verification

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

2.3.2. Head SAR Measurements

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

2.3.3. Body SAR Measurements

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

2.4. HSDPA Test Configuration

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

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

Table 1: Subtests for UMTS Release 5 HSDPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (note 4)	15/15 (note 4)	64	12/15 (note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$= 8 $\Leftrightarrow$ A_{hs} = β_{hs}/β_c=30/15 $\Leftrightarrow$ β_{hs}=30/15*β_c

Note2:For the HS-DPCCH power mask requirement test in clause 5.2C,5.7A,and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, $\triangle_{ACK}$ and $\triangle_{NACK}$= 8 ($A_{hs=}$30/15) with β_{hs}=30/15*β_c,and $\triangle_{CQI}$= 7 ($A_{hs=}$24/15) with β_{hs}=24/15*β_c.

Note3: CM=1 forβ_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4:For subtest 2 the $\beta_c\beta_d$ ratio of 12/15 for the TFC during the measurement period(TF1,TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1,TF1) to β_c=11/15 and β_d=15/15.

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

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

Table 3: HSDPA UE category

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

3. SAR Measurements System Configuration

3.1. SAR Measurement Set-up

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY4 measurement server.
- The DASY4 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY4 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.
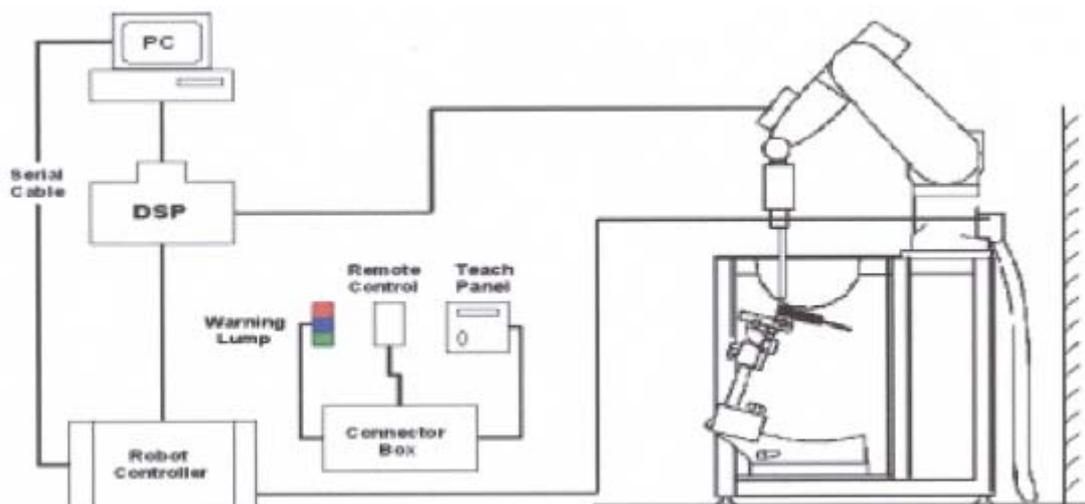
Figure 1. SAR Lab Test Measurement Set-up

3.2. DASY4 E-field Probe System

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

3.2.1. EX3DV4 Probe Specification

Construction   Symmetrical design with triangular core
                    Built-in shielding against static charges
                    PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration   Basic Broad Band Calibration in air
                    Conversion Factors (CF) for HSL 900 and HSL 1750
                    Additional CF for other liquids and frequencies upon request

Figure 2.EX3DV4 E-field Probe

Frequency   10 MHz to > 6 GHz
                    Linearity: ± 0.2 dB
                    (30 MHz to 6 GHz)

Directivity   ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)

Dynamic Range   10 µW/g to > 100 mW/g Linearity:
                    ± 0.2dB (noise: typically < 1 µW/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 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 ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. 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 bellow 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.

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

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.
Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

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 l000 x 500 mm (H x L x W)
Aailable   Special

Figure 5.Generic Twin Phantom

3.4. Scanning procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The "reference" and "drift" measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %.

- The "surface check" measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

  The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.
  After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- Zoom Scan

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

- Spatial Peak Detection

  The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY4 system allows evaluations that combine measured data and robot positions, such as:
  • maximum search
  • extrapolation
  • boundary correction
  • peak search for averaged SAR
  During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.
  Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

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

3.5. Data Storage and Evaluation

3.5.1. Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".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/cm²], [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	$Normi, a_{i0}, a_{i1}, a_{i2}$
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i

| Device parameters: | - Frequency | f |
| | - Crest factor | cf |

| Media parameters: | - Conductivity | |
| | - Density | |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal,

the diode type and the DC-transmission factor from the diode to the evaluation electronics.

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:

$$V_i = U_i + U_i^2 \cdot cf/dcp_i$$

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)

          $[mV/(V/m)^2]$ 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.

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

with SAR = local specific absorption rate in mW/g

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

∎ = conductivity in [mho/m] or [Siemens/m]

∎ = equivalent tissue density in g/cm^3

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^2

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

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

3.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulates, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 10 and table11.

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

System check is performed regularly on all frequency bands where tests are performed with the DASY 4 system.

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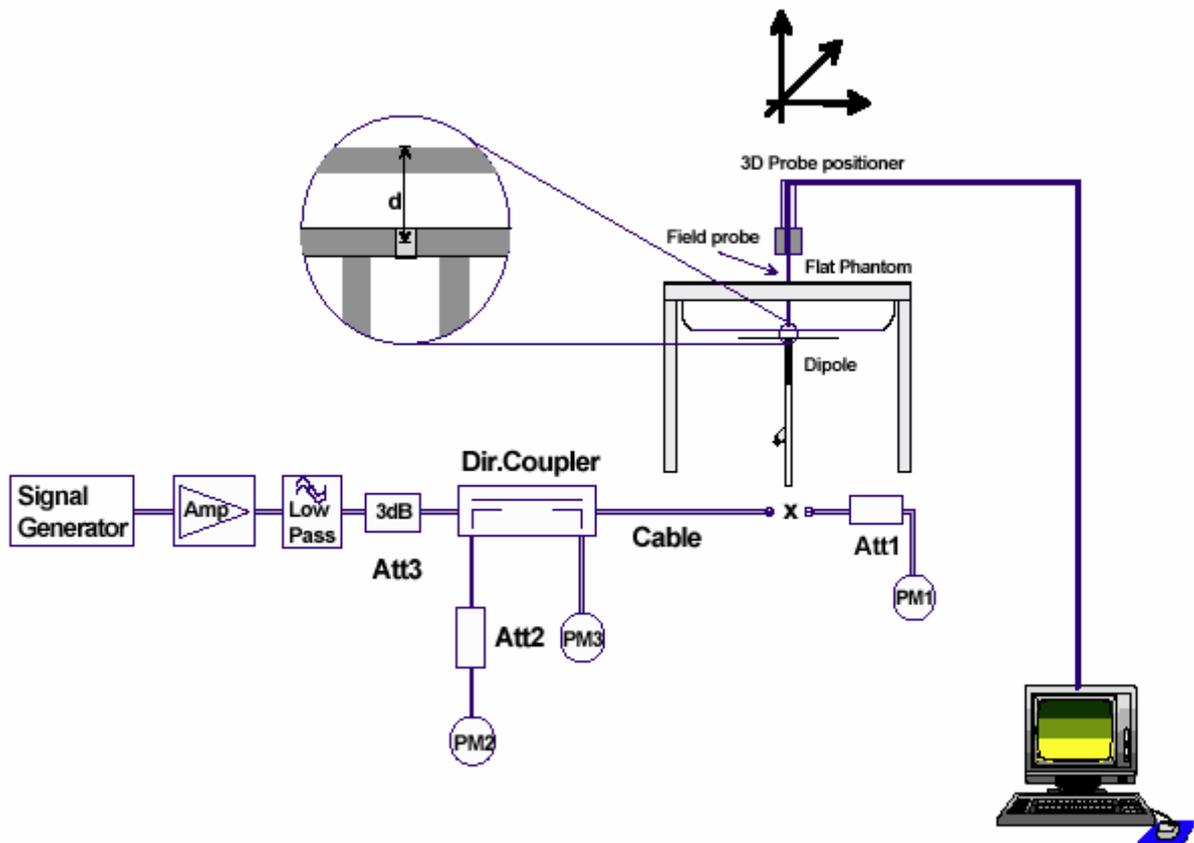
Figure 6. **System Check Set-up**

3.7. Equivalent Tissues

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

Table 4: Composition of the Head Tissue Equivalent Matter

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

MIXTURE%	FREQUENCY(Brain)1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz ε=40.0 σ=1.40

Table 5: Composition of the Body Tissue Equivalent Matter

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

MIXTURE%	FREQUENCY (Body) 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz ε=53.3 σ=1.52

4. Laboratory Environment

Table 6: The Ambient Conditions during Test

Temperature	Min. = 20°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

5. Characteristics of the Test

5.1. Applicable Limit Regulations

IEEE Std C95.1, 1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz.
It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2. Applicable Measurement Standards

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

Supplement c edition 01-01 to OET bulletin 65 Edition 97-01 June 2001 including DA 02-1438, published June 2002: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions.
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6. Conducted Output Power Measurement

6.1. Summary

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

6.2. Conducted Power Results

Table 7: Conducted Power Measurement Results

	Conducted Power		
GSM 850	Channel 128	Channel 190	Channel 251
	(824.2MHz)	(836.6MHz)	(848.8MHz)
Before Test (dBm)	32.51	32.75	32.80
After Test (dBm)	32.52	32.74	32.78
	Conducted Power		
GSM 850+GPRS	Channel 128	Channel 190	Channel 251
	(824.2MHz)	(836.6MHz)	(848.8MHz)
Before Test (dBm)	31.05	31.23	31.29
After Test (dBm)	31.04	31.27	31.27
	Conducted Power		
GSM 850+EGPRS	Channel 128	Channel 190	Channel 251
	(824.2MHz)	(836.6MHz)	(848.8MHz)
Before Test (dBm)	27.23	27.35	27.40
After Test (dBm)	27.27	27.33	27.42
	Conducted Power		
GSM 1900	Channel 512	Channel 661	Channel 810
	(1850.2MHz)	(1880MHz)	(1909.8MHz)
Before Test (dBm)	30.95	30.91	30.82
After Test (dBm)	30.95	30.89	30.85
	Conducted Power		
GSM 1900+GPRS	Channel 512	Channel 661	Channel 810
	(1850.2MHz)	(1880MHz)	(1909.8MHz)
Before Test (dBm)	30.26	30.25	30.20
After Test (dBm)	30.24	30.26	30.20

GSM 1900+EGPRS		Conducted Power		
		Channel 512	Channel 661	Channel 810
		(1850.2MHz)	(1880MHz)	(1909.8MHz)
Before Test (dBm)		26.85	26.82	26.90
After Test (dBm)		26.86	26.81	26.91
WCDMA Band V		**Conducted Power**		
		Channel 4132	Channel 4183	Channel 4233
12.2kbps RMC	Before Test (dBm)	22.81	22.78	22.84
	After Test (dBm)	22.84	22.76	22.81
64kbps RMC	Before Test (dBm)	22.84	22.80	22.80
	After Test (dBm)	22.83	22.76	22.84
144kbps RMC	Before Test (dBm)	22.81	22.76	22.81
	After Test (dBm)	22.84	22.79	22.84
384kbps RMC	Before Test (dBm)	22.81	22.81	22.80
	After Test (dBm)	22.79	22.83	22.83
WCDMA Band V+HSDPA		**Conducted Power**		
		Channel 4132	Channel 4183	Channel 4233
Sub - Test 1	Before Test (dBm)	22.74	22.75	22.67
	After Test (dBm)	22.73	22.77	22.63
Sub - Test 2	Before Test (dBm)	22.04	22.04	21.94
	After Test (dBm)	22.08	22.06	21.98
Sub - Test 3	Before Test (dBm)	20.63	20.52	20.41
	After Test (dBm)	20.67	20.49	20.39
Sub - Test 4	Before Test (dBm)	20.02	20.01	19.88
	After Test (dBm)	20.05	19.98	19.86

7. Test Results

7.1. Dielectric Performance

Table 8: Dielectric Performance of Head Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
835MHz **(head)**	Target value ±5% window	41.50 39.43 — 43.58	0.90 0.86 — 0.95	/
	Measurement value 2010-4-19	42.23	0.92	21.8
1900MHz **(head)**	Target value 5% window	40.0 38 — 42	1.40 1.33 — 1.47	/
	Measurement value 2010-4-18	39.64	1.38	21.9

Table 9: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
835MHz **(body)**	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2010-4-13	54.00	0.99	21.8
1900MHz **(body)**	Target value ±5% window	53.3 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2010-4-15	52.53	1.52	21.9

7.2. System Check Results

Table 10: System Check for Head tissue simulation liquid

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	**1g**	**ε$_r$**	**σ(s/m)**	**℃**
835MHz	Recommended result ±10% window	1.58 1.42 - 1.74	2.42 2.18 - 2.66	40.5	0.89	/
	Measurement value 2010-4-19	1.62	2.48	42.23	0.92	21.9
1900MHz	Recommended result 10% window	5.38 4.84 -5.92	10.3 9.27 -11.33	41	1.42	/
	Measurement value 2010-4-18	5.46	10.6	39.64	1.38	22.1

Note: 1. the graph results see ANNEX B.

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

Table 11: System Check for Body tissue simulation liquid

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	**1g**	**ε$_r$**	**σ(s/m)**	**℃**
835MHz	Recommended result ±10% window	1.68 1.51 - 1.85	2.56 2.30 - 2.82	53	0.99	/
	Measurement value 2010-4-13	1.68	2.56	54.00	0.99	21.9
1900 MHz	Recommended result ±10% window	5.52 4.97- 6.07	10.50 9.45 — 11.55	54.00	1.55	/
	Measurement value 2010-4-15	5.17	9.73	52.53	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.

7.3. Test Results

7.3.1. Summary of Measurement Results (GSM850/GPRS/EGPRS)
Table 12: SAR Values (GSM850/GPRS/EGPRS)

Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift (dB)	Graph Results
		2.0	1.6	$\pm$ 0.21	
Different Test Position	Channel	Measurement Result(W/kg)		Power Drift (dB)	
		10 g Average	1g Average		
Test position of Head					
Left hand, Touch cheek	Middle	0.385	0.517	0.003	Figure 11
Left hand, Tilt 15 Degree	Middle	0.197	0.262	0.072	Figure 12
Right hand, Touch cheek	High	0.528	0.763	-0.140	Figure 13
	Middle	0.437	0.631	-0.072	Figure 14
	Low	0.408	0.588	-0.159	Figure 15
Right hand, Tilt 15 Degree	Middle	0.214	0.282	0.078	Figure 16
Test position of Body (Distance 15mm)					
Towards Ground	High	0.466	0.660	0.030	Figure 17
	Middle	0.374	0.529	0.100	Figure 18
	Low	0.350	0.495	0.094	Figure 19
Towards phantom	Middle	0.288	0.395	0.045	Figure 20
Worst case position of Body with Earphone (Distance 15mm)					
Towards Ground	High	0.350	0.514	0.060	Figure 21
Test position of Body with GPRS (2Up, Distance 15mm)					
Towards Ground	High	0.603	0.852	-0.116	Figure 22
	Middle	0.507	0.715	-0.079	Figure 23
	Low	0.451	0.640	0.164	Figure 24
Towards phantom	Middle	0.409	0.559	-0.054	Figure 25
Worst case position of GPRS with Earphone (2Up, Distance 15mm)					
Towards Ground	High	0.487	0.707	0.016	Figure 26
Worst case position of GPRS with EGPRS(2Up, Distance 15mm)					
Towards Ground	High	0.597	0.864	-0.029	Figure 27

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.

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

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

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)	Graph Results
		2.0	1.6	$\pm$ 0.21	
Different Test Position	Channel	Measurement Result(W/kg)		Power Drift (dB)	
		10 g Average	1 g Average		
Test position of Head					
Left hand, Touch cheek	Middle	0.237	0.397	0.046	Figure 28
Left hand, Tilt 15 Degree	Middle	0.109	0.183	0.044	Figure 29
Right hand, Touch cheek	High	0.406	0.751	-0.007	Figure 30
	Middle	0.376	0.693	0.047	Figure 31
	Low	0.330	0.604	0.044	Figure 32
Right hand, Tilt 15 Degree	Middle	0.102	0.172	0.024	Figure 33
Test position of Body (Distance 15mm)					
Towards Ground	High	0.160	0.273	-0.098	Figure 34
	Middle	0.134	0.229	-0.073	Figure 35
	Low	0.113	0.193	0.029	Figure 36
Towards phantom	Middle	0.081	0.130	-0.115	Figure 37
Worst case position of Body with Earphone (Distance 15mm)					
Towards Ground	High	0.129	0.226	0.016	Figure 38
Test position of Body with GPRS (2Up, Distance 15mm)					
Towards Ground	High	0.303	0.516	-0.008	Figure 39
	Middle	0.255	0.433	-0.023	Figure 40
	Low	0.219	0.376	-0.014	Figure 41
Towards phantom	Middle	0.170(max.cube)	0.271(max.cube)	0.005	Figure 42
Worst case position of GPRS with Earphone (2Up, Distance 15mm)					
Towards Ground	High	0.228	0.402	-0.012	Figure 43
Worst case position of GPRS with EGPRS (2Up, Distance 15mm)					
Towards Ground	High	0.301	0.512	0.027	Figure 44

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).

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

Table 14: SAR Values (WCDMA Band V/WCDMA /HSDPA)

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.21	
Test Case Of Head		Measurement Result(W/kg)		Power	
Different Test Position	Channel	10 g Average	1 g Average	Drift(dB)	
Test position of Head					
Left hand, Touch cheek	Middle	0.427	0.574	-0.006	Figure 45
Left hand, Tilt 15 Degree	Middle	0.228	0.303	0.064	Figure 46
Right hand, Touch cheek	High	0.465	0.662	0.055	Figure 47
	Middle	0.455	0.649	-0.074	Figure 48
	Low	0.435	0.622	0.100	Figure 49
Right hand, Tilt 15 Degree	Middle	0.216	0.286	0.021	Figure 50
Test Case of Body with RMC (Distance 15mm)					
Towards Ground	High	0.388	0.547	0.028	Figure 51
	Middle	0.490	0.692	0.015	Figure 52
	Low	0.386	0.546	0.039	Figure 53
Towards Phantom	Middle	0.292	0.399	0.075	Figure 54
Worst case position of Body with earphone (Distance 15mm)					
Towards Ground	Middle	0.264	0.393	0.101	Figure 55
Worst case position of Body with HSDPA (Distance 15mm)					
Towards Ground	Middle	0.427	0.605	0.060	Figure 56

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.

7.3.4. Summary of Measurement Results (Bluetooth function)

The distance between BT antenna and GSM antenna is >5cm. The location of the antennas inside mobile phone is shown below:
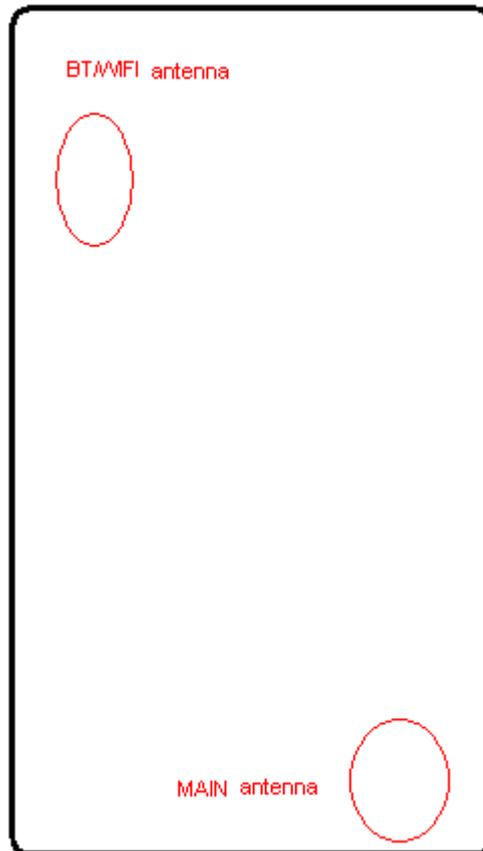
The output power of wifi antenna is as following:

Channel	Channel 1 (2412MHz)	Channel 6 (2437MHz)	Channel 11 (2462MHz)
802.11b(dBm)	12.23	12.52	12.27
802.11g(dBm)	12.36	12.86	12.35

The output power of BT antenna is as following:

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

According to the output power measurement result and the distance between BT/WIFI antenna and WIFI antenna we can draw the conclusion that: stand-alone SAR and simultaneous transmission SAR are not required for BT transmitter, because the output power of BT transmitter is ≤2P_{Ref} and its antenna is ≥5cm from other antenna.

7.4. Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR_{1g} are **0.763** W/kg (head) and **0.864** W/kg (body) that are below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

8. Measurement Uncertainty

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard ncertainty $u_i^{'}$ (%)	Degree of freedom V_{eff} or v_i
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								

20	-phantom	B	4.0	R	$\sqrt{3}$	1	2.3	∞
21	-liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.64	1.8	∞
22	-liquid conductivity (measurement uncertainty)	B	5.0	N	1	0.64	3.2	∞
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
24	-liquid permittivity (measurement uncertainty)	B	5.0	N	1	0.6	3.0	∞
Combined standard uncertainty	$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						12.0	
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$		N		k=2		24.0	

9. Main Test Instruments

Table 15: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 13, 2009	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 13, 2010	One year
04	Power sensor	Agilent 8481H	MY41091316	March 26, 2010	One year
05	Signal Generator	HP 8341B	2730A00804	September 13, 2009	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	BTS	E5515C	MY48360988	December 4, 2009	One year
08	E-field Probe	EX3DV4	3677	September 23, 2009	One year
09	DAE	DAE4	871	November 11, 2009	One year
10	Validation Kit 835MHz	D835V2	4d082	July 13, 2009	One year
11	Validation Kit 1900MHz	D1900V2	5d018	June 26, 2009	One year

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

ANNEX A: Test Layout
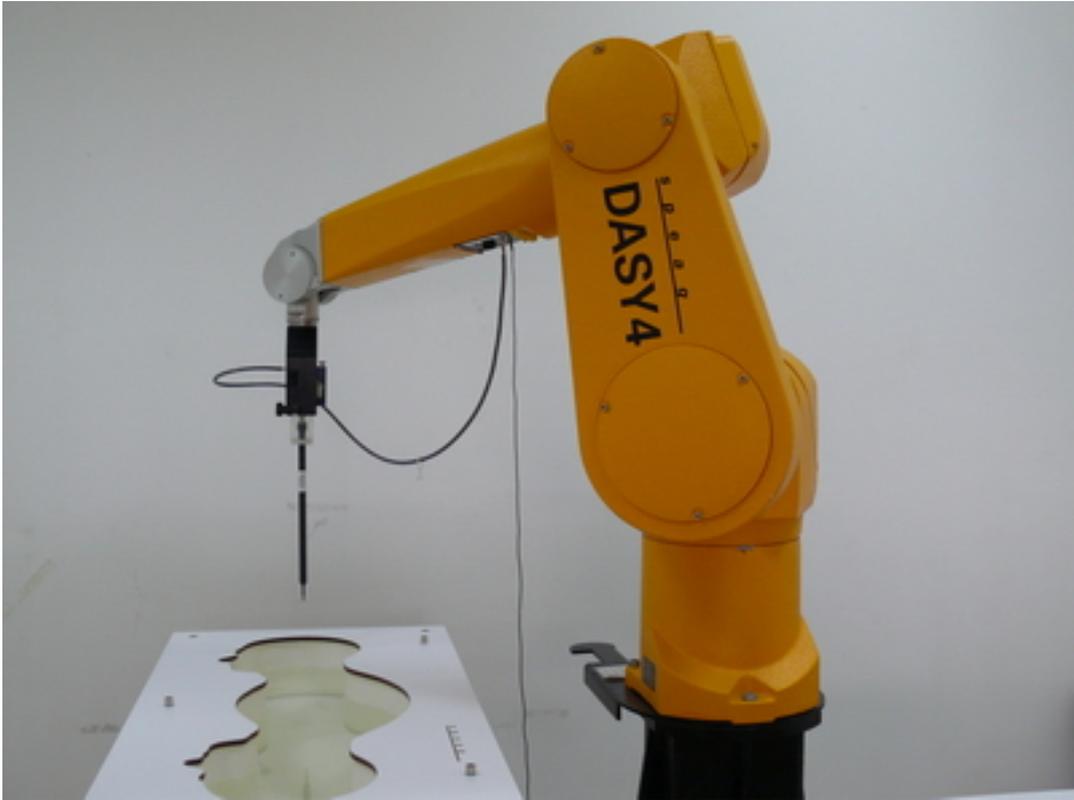
Picture 1: Specific Absorption Rate Test Layout

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

(15.5cm deep)
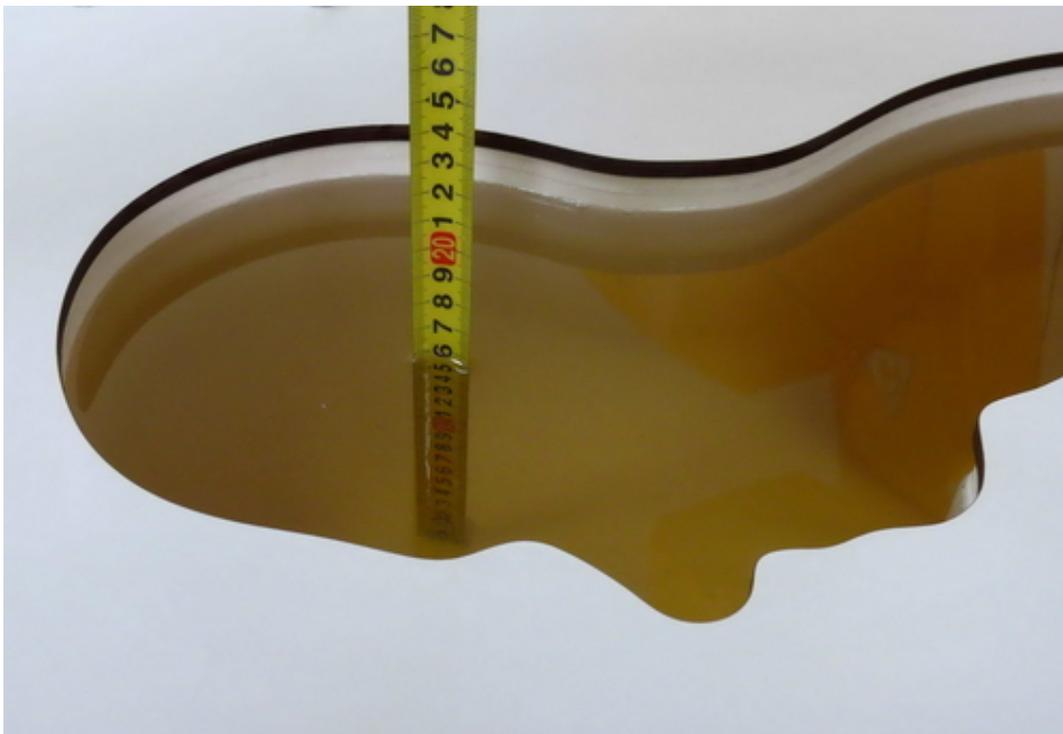
Picture 3: Liquid depth in the head Phantom (835MHz)

(15.7cm deep)

Picture 4: Liquid depth in the flat Phantom (1900 MHz)

(15.4cm deep)

Picture 5: liquid depth in the head Phantom (1900 MHz)

(15.2cm deep)

ANNEX B: System Check Results

System Performance Check at 835 MHz Head TSL

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

Date/Time: 4/19/2010 4:50:02 PM

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

Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 42.23; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

d=15mm, Pin=250mW/Area Scan (41x121x1): Measurement grid: dx=15mm, dy=15mm

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

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

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

Peak SAR (extrapolated) = 3.75 W/kg

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

Maximum value of SAR (measured) = 2.67 mW/g
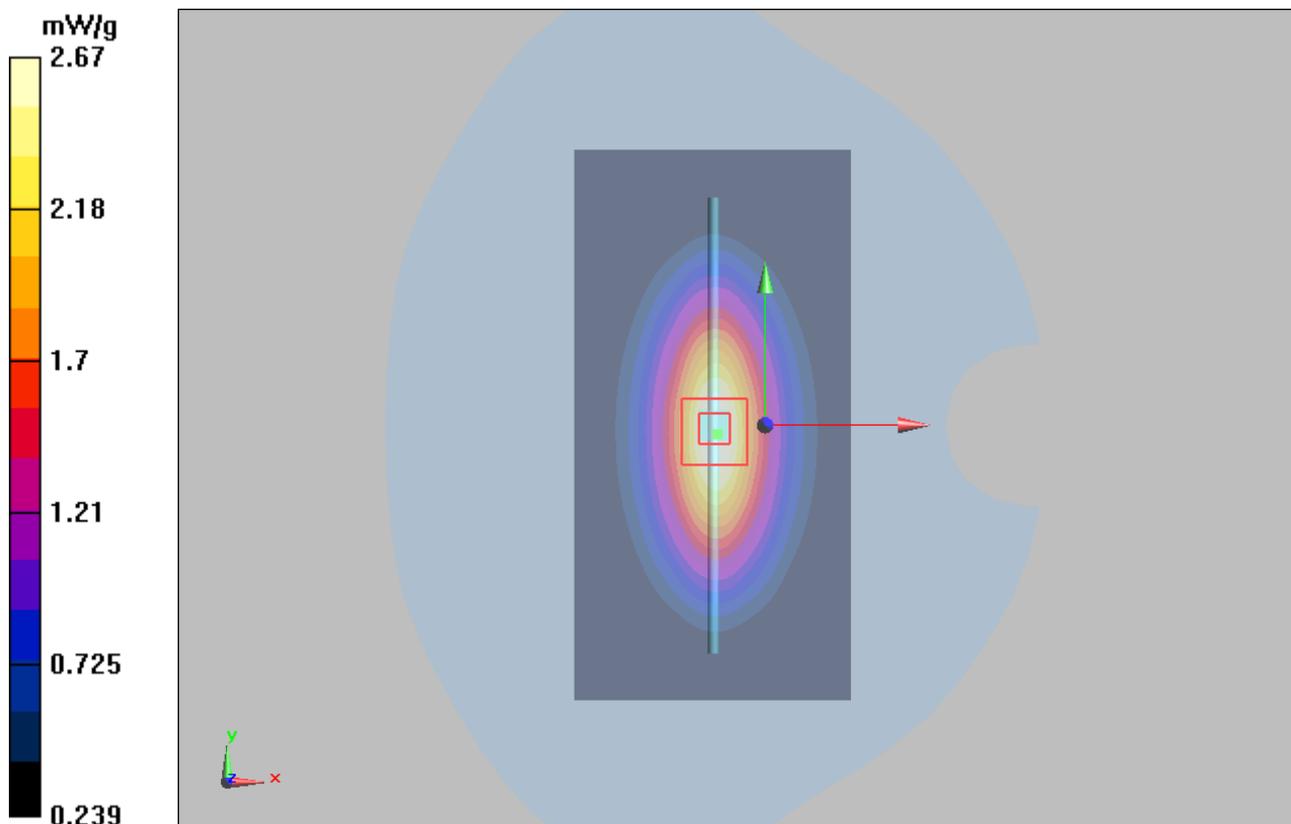
Figure 7 System Performance Check 835MHz 250mW

System Performance Check at 835 MHz Body TSL

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

Date/Time: 4/13/2010 6:4720 AM

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

Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.00; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 2.77 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) = 3.68 W/kg

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

Maximum value of SAR (measured) = 2.77 mW/g
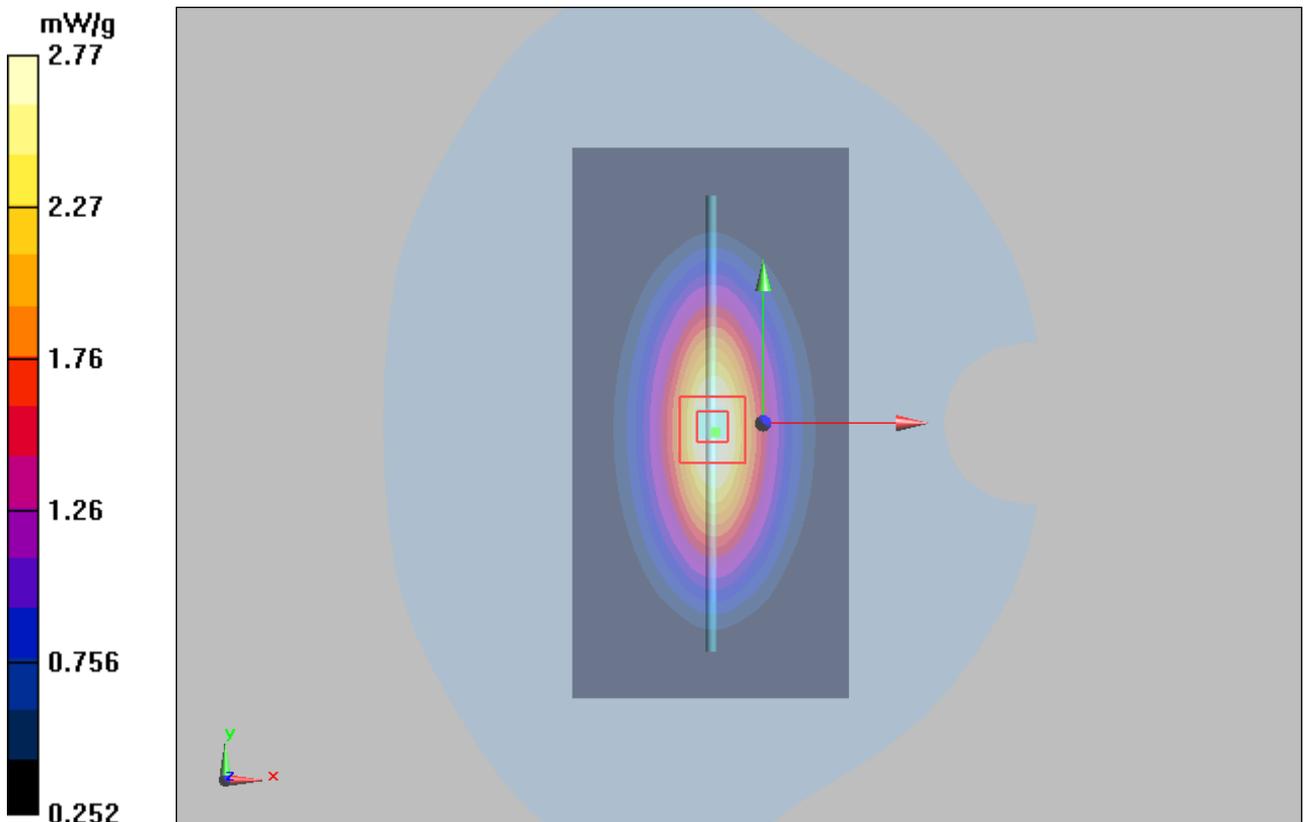
Figure 8 System Performance Check 835MHz 250mW

System Performance Check at 1900 MHz Head TSL

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

Date/Time: 4/18/2010 10:03:04 AM

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

Medium parameters used: f = 1900 MHz; σ = 1.38 mho/m; ε_r = 39.64; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 12.9 mW/g

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

Reference Value = 87.8 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 20.1 W/kg

SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.46 mW/g

Maximum value of SAR (measured) = 11.9 mW/g
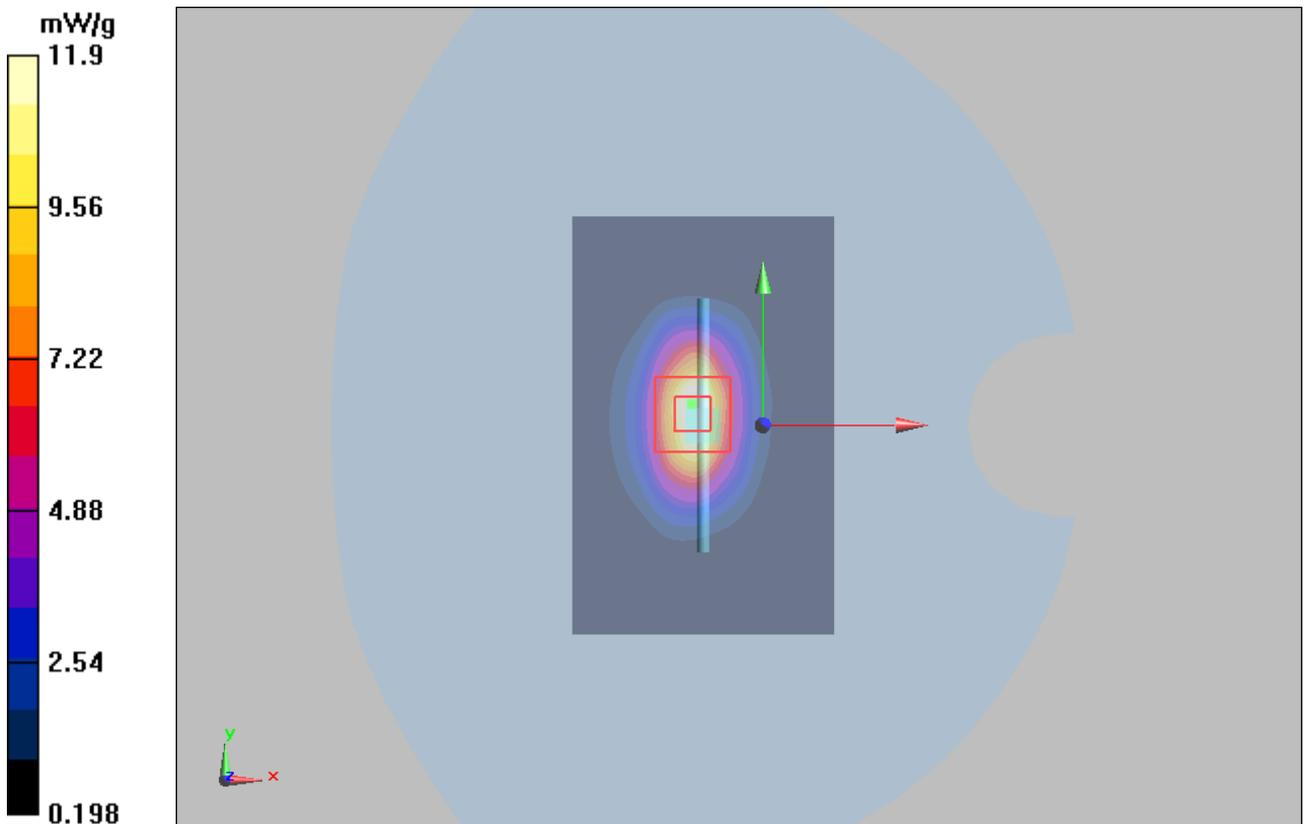
Figure 9 System Performance Check 1900MHz 250mW

System Performance Check at 1900 MHz Body TSL

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

Date/Time: 4/15/2010 6:50:19 PM

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

Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 52.53; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 16.8 W/kg

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

Maximum value of SAR (measured) = 11 mW/g
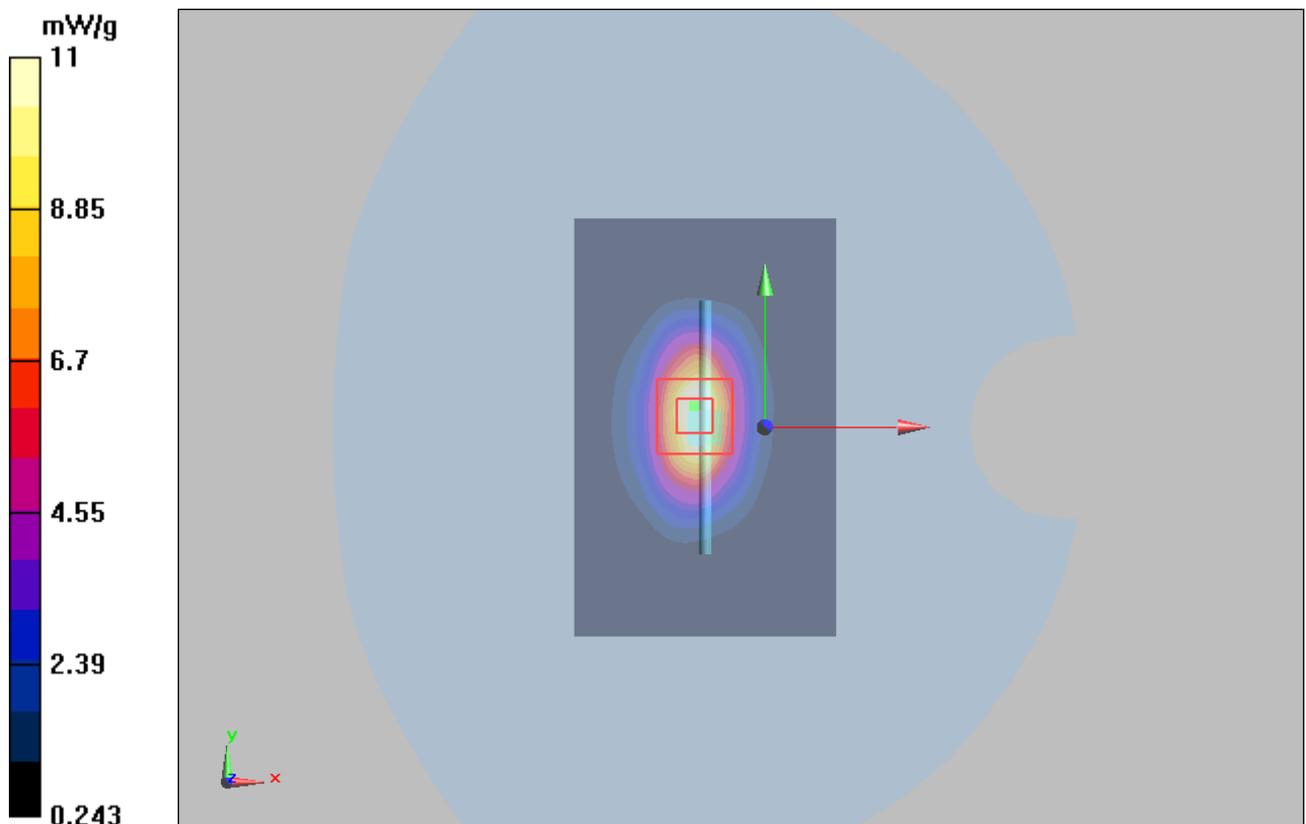
Figure 10 System Performance Check 1900MHz 250mW

ANNEX C: Graph Results

GSM 850 Left Cheek Middle

Date/Time: 4/19/2010 8:31:04 PM

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

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.553 mW/g

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

Reference Value = 8.35 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 0.643 W/kg

SAR(1 g) = 0.517 mW/g; SAR(10 g) = 0.385 mW/g

Maximum value of SAR (measured) = 0.549 mW/g
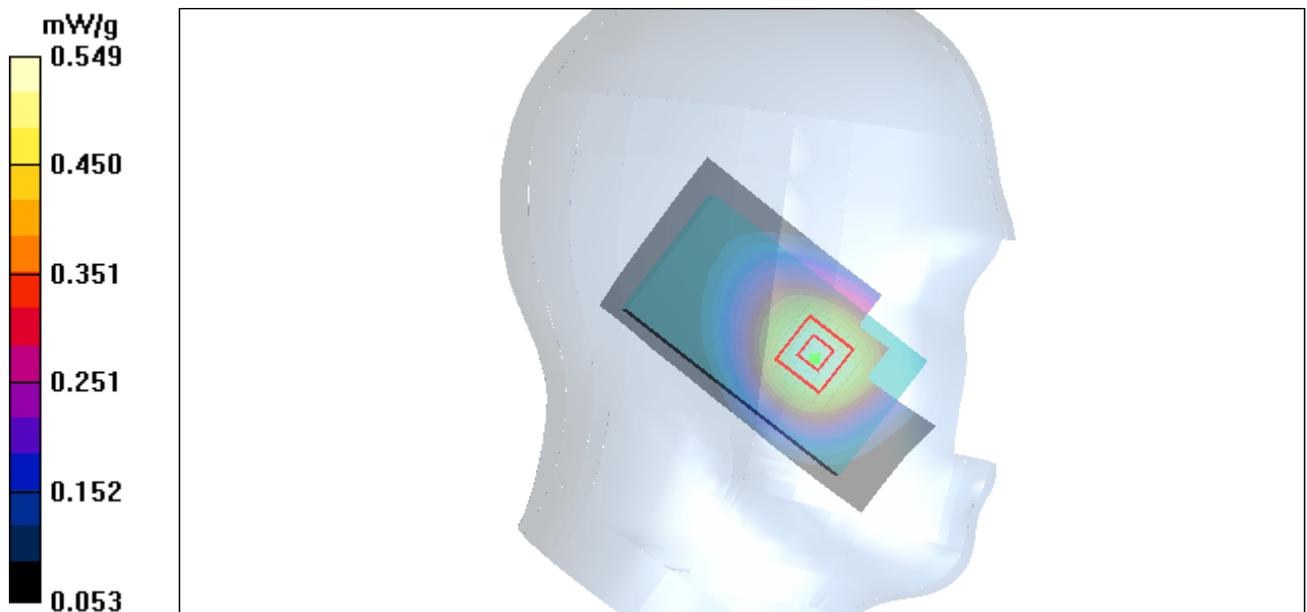
Figure 11 Left Hand Touch Cheek GSM 850 Channel 190

GSM 850 Left Tilt Middle

Date/Time: 4/19/2010 8:51:05 PM

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

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.272 mW/g

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

Reference Value = 11.9 V/m; Power Drift = 0.072 dB

Peak SAR (extrapolated) = 0.324 W/kg

SAR(1 g) = 0.262 mW/g; SAR(10 g) = 0.197 mW/g

Maximum value of SAR (measured) = 0.275 mW/g
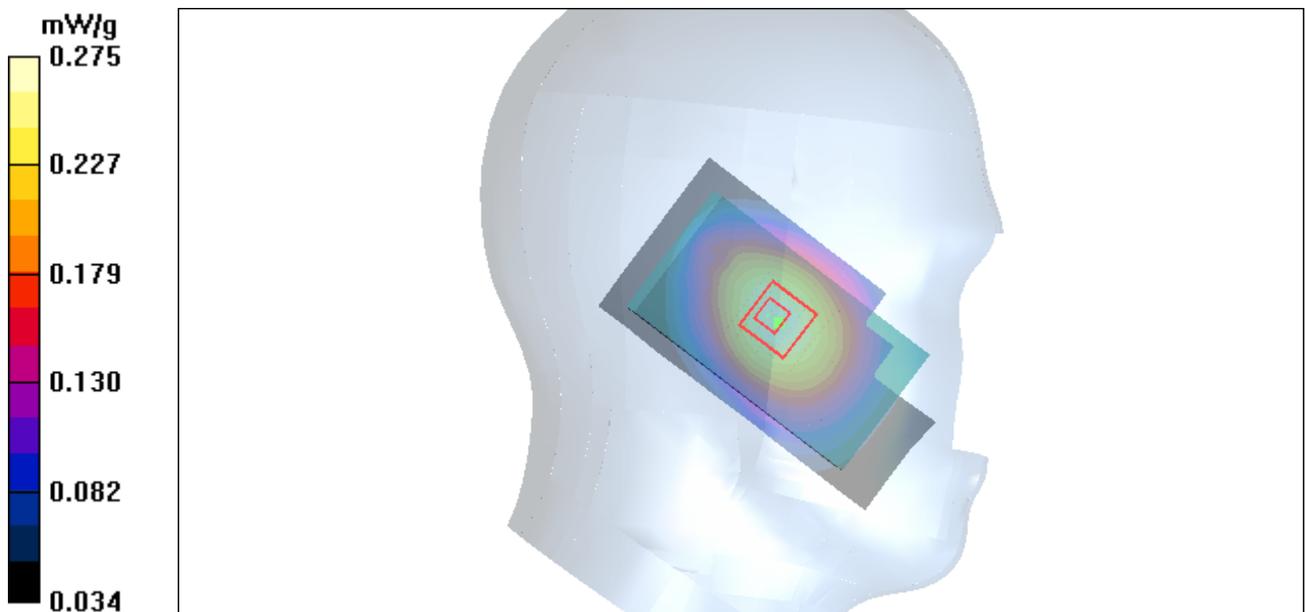
Figure 12 Left Hand Tilt 15° GSM 850 Channel 190

GSM 850 Right Cheek High

Date/Time: 4/19/2010 9:12:19 PM

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

Medium parameters used: f = 849 MHz; σ = 0.936 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.834 mW/g

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

Reference Value = 8.49 V/m; Power Drift = -0.140 dB

Peak SAR (extrapolated) = 1.06 W/kg

SAR(1 g) = 0.763 mW/g; SAR(10 g) = 0.528 mW/g

Maximum value of SAR (measured) = 0.811 mW/g
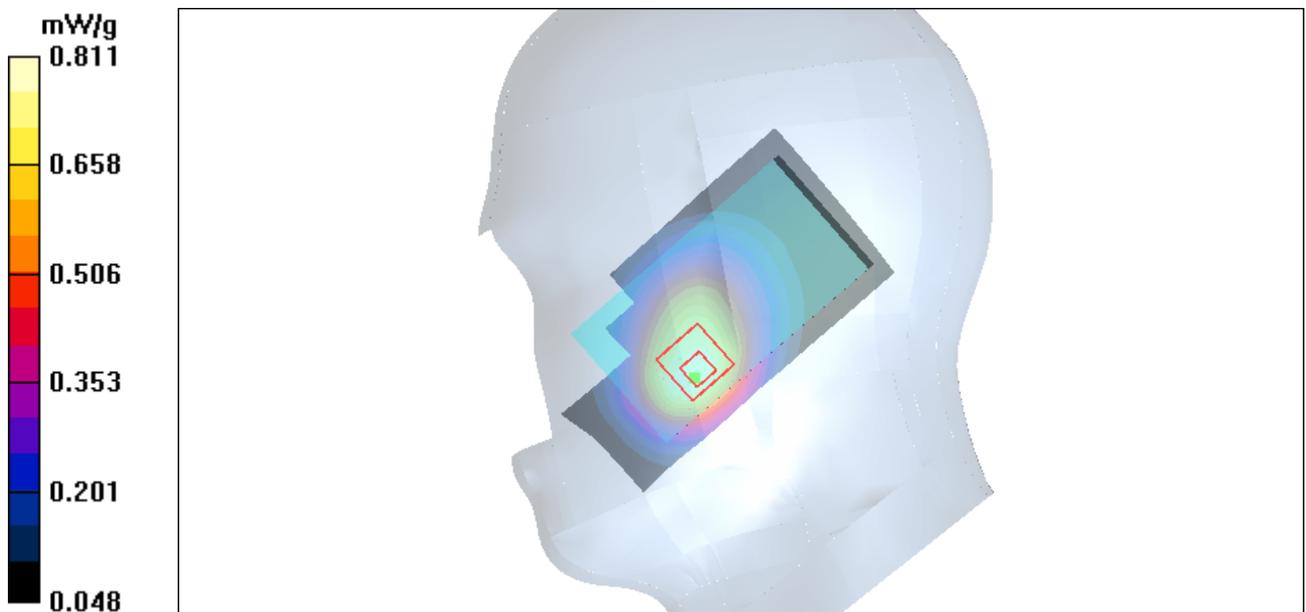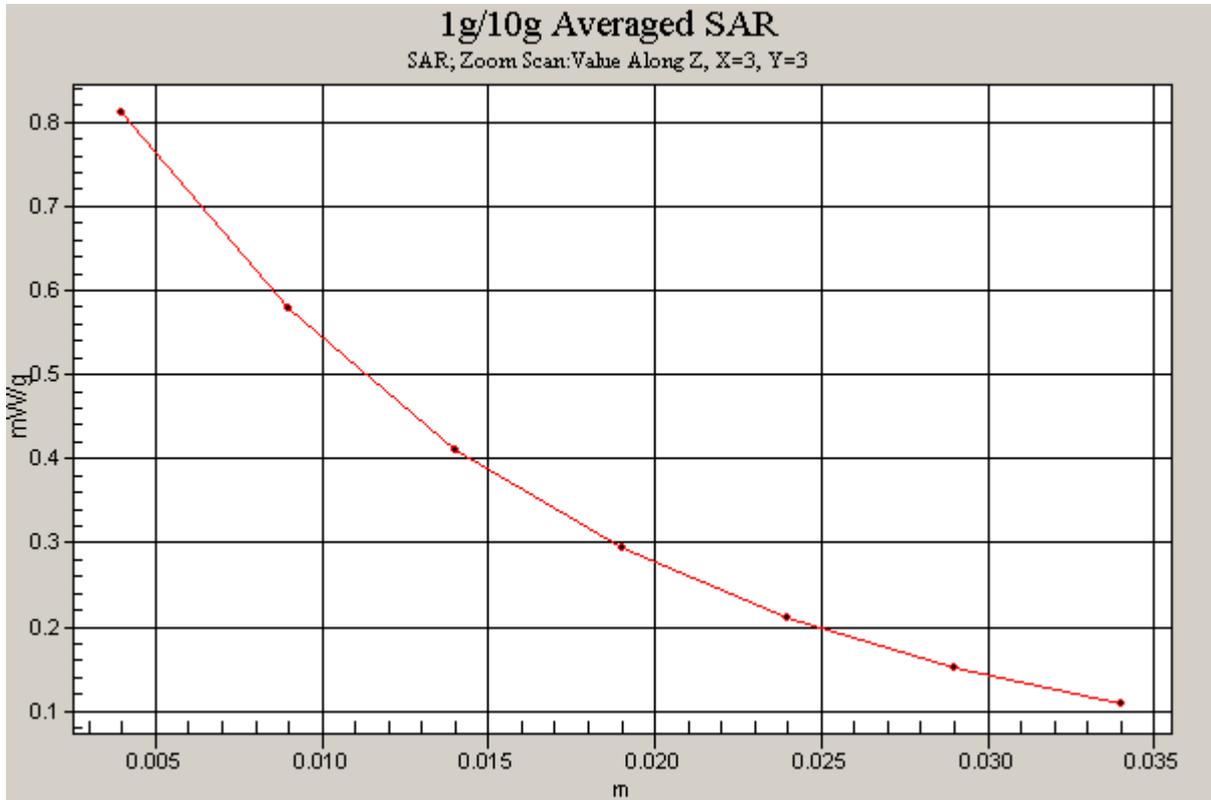
Figure 13 Right Hand Touch Cheek GSM 850 Channel 251

GSM 850 Right Cheek Middle

Date/Time: 4/19/2010 7:25:15 PM

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

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.699 mW/g

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

Reference Value = 8.05 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 0.875 W/kg

SAR(1 g) = 0.631 mW/g; SAR(10 g) = 0.437 mW/g

Maximum value of SAR (measured) = 0.677 mW/g
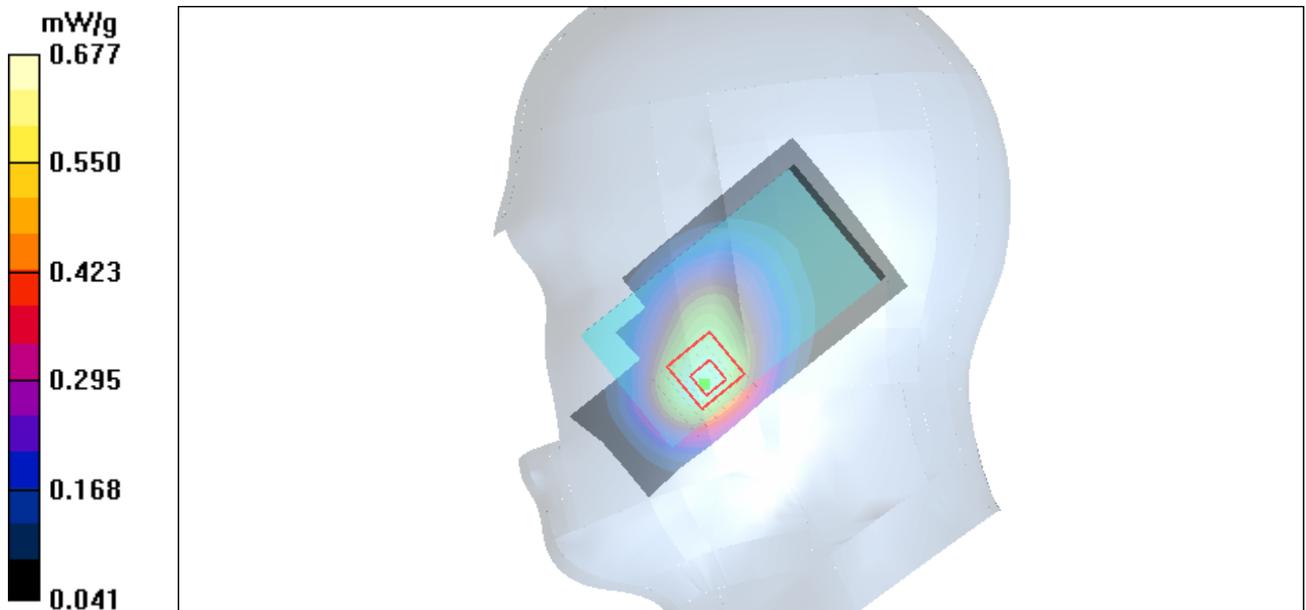
Figure 14 Right Hand Touch Cheek GSM 850 Channel 190

GSM 850 Right Cheek Low

Date/Time: 4/19/2010 9:31:26 PM

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

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.912 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.650 mW/g

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

Reference Value = 7.53 V/m; Power Drift = -0.159 dB

Peak SAR (extrapolated) = 0.815 W/kg

SAR(1 g) = 0.588 mW/g; SAR(10 g) = 0.408 mW/g

Maximum value of SAR (measured) = 0.633 mW/g
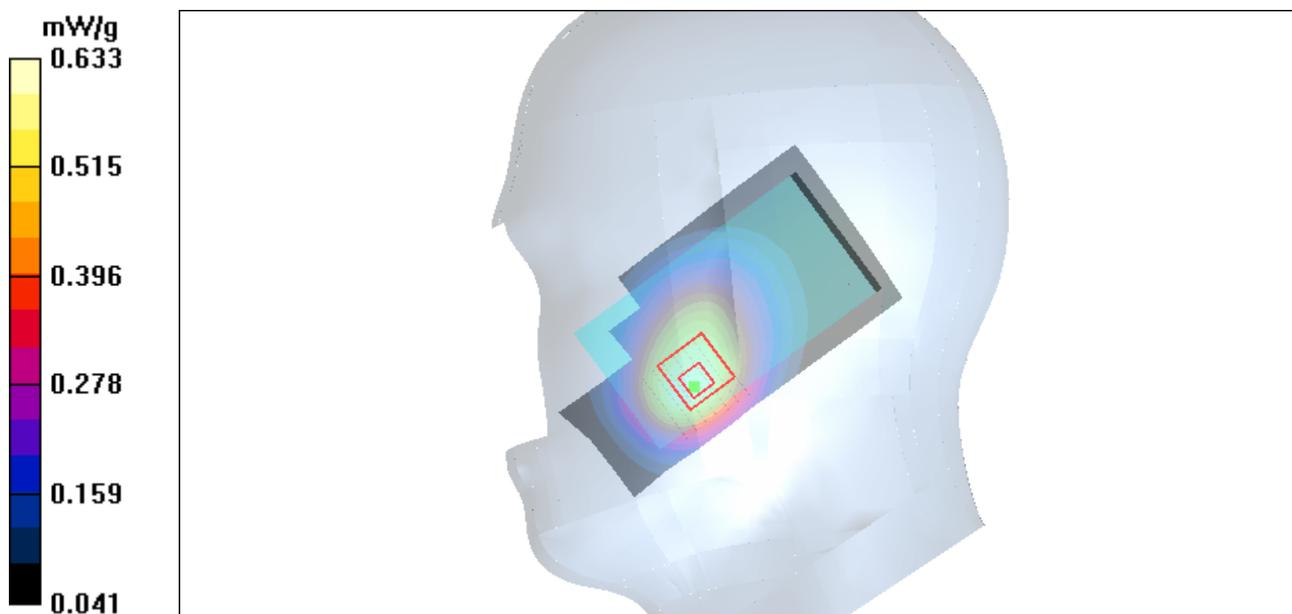
Figure 15 Right Hand Touch Cheek GSM 850 Channel 128

GSM 850 Right Tilt Middle

Date/Time: 4/19/2010 7:44:37 PM

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

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.295 mW/g

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

Reference Value = 11.8 V/m; Power Drift = 0.078 dB

Peak SAR (extrapolated) = 0.345 W/kg

SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.214 mW/g

Maximum value of SAR (measured) = 0.296 mW/g
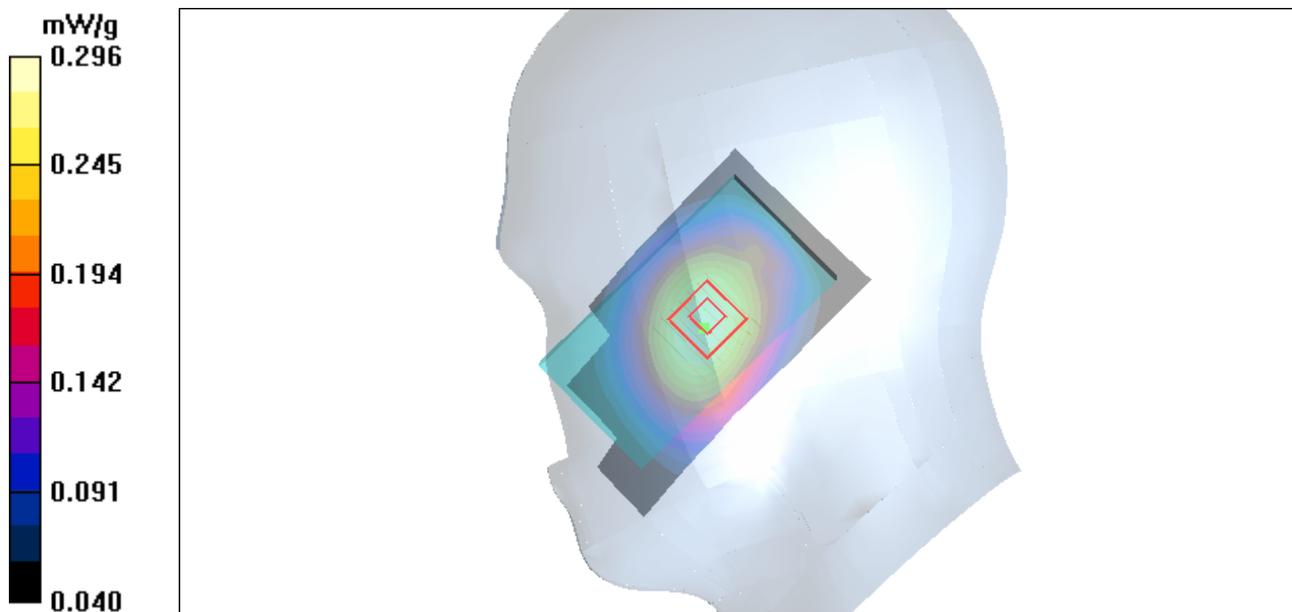
Figure 16 Right Hand Tilt 15° GSM 850 Channel 190

GSM 850 Towards Ground High

Date/Time: 4/13/2010 12:50:14 AM

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

Medium parameters used: f = 849 MHz; σ = 0.978 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.697 mW/g

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

Reference Value = 10.9 V/m; Power Drift = 0.030 dB

Peak SAR (extrapolated) = 0.884 W/kg

SAR(1 g) = 0.660 mW/g; SAR(10 g) = 0.466 mW/g

Maximum value of SAR (measured) = 0.700 mW/g
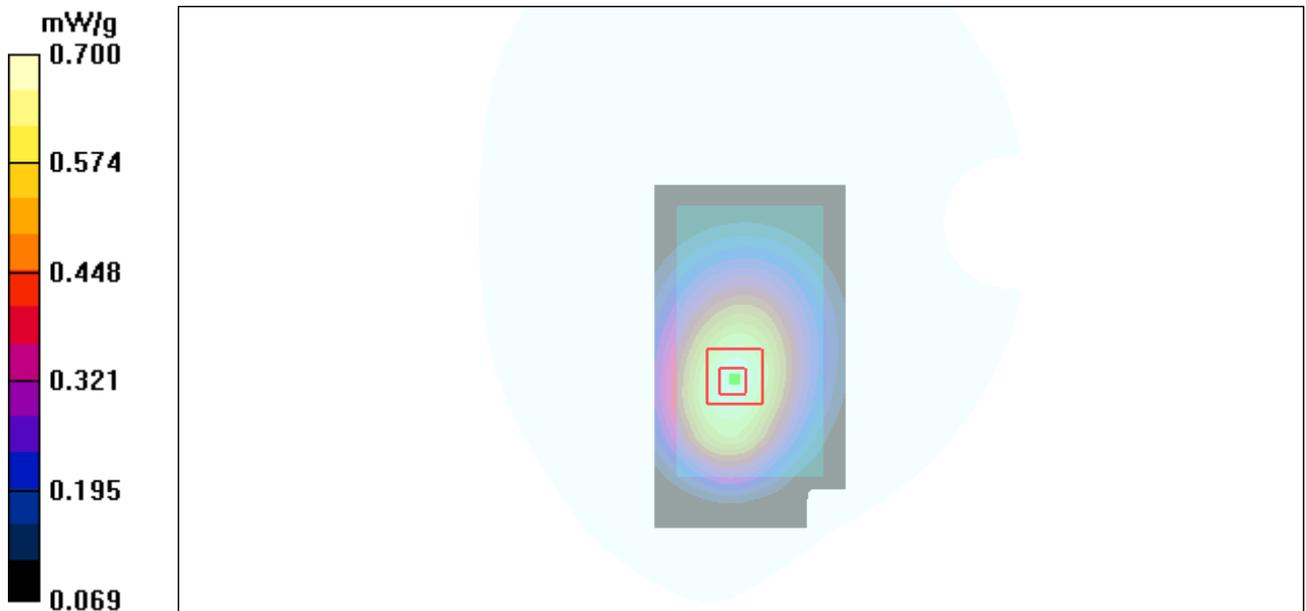
Figure 17 Body, Towards Ground, GSM 850 Channel 251

GSM 850 Towards Ground Middle

Date/Time: 4/13/2010 12:32:30 AM

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

Medium parameters used: f = 837 MHz; σ = 0.964 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.556 mW/g

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

Reference Value = 9.70 V/m; Power Drift = 0.100 dB

Peak SAR (extrapolated) = 0.724 W/kg

SAR(1 g) = 0.529 mW/g; SAR(10 g) = 0.374 mW/g

Maximum value of SAR (measured) = 0.565 mW/g
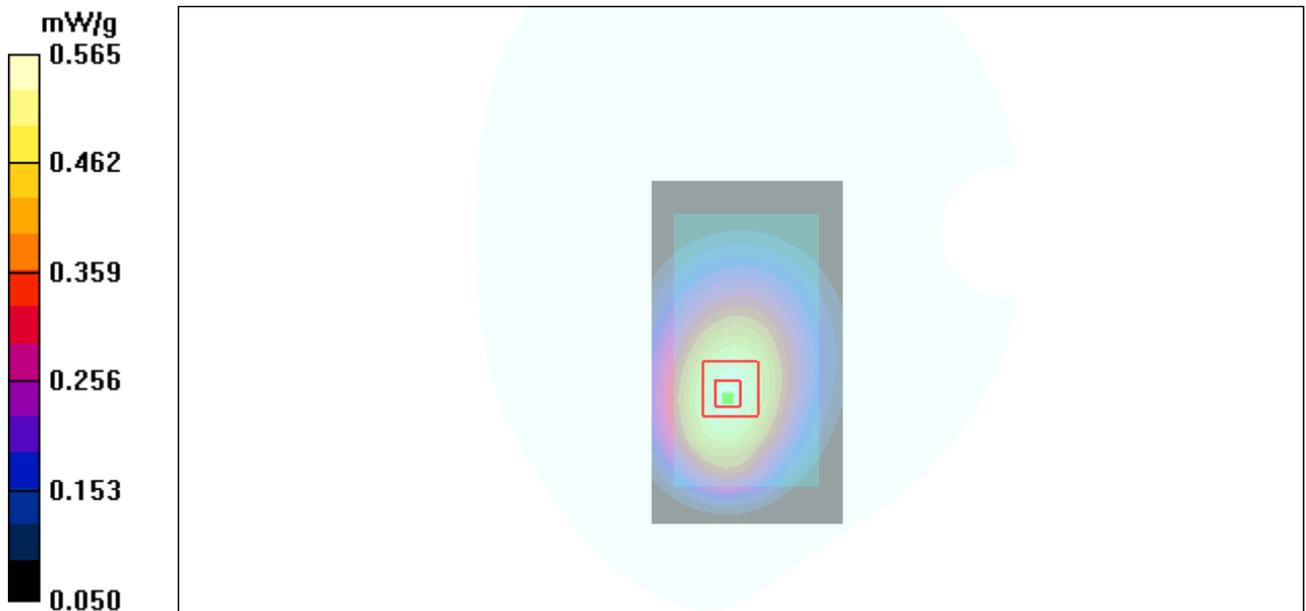
Figure 18 Body, Towards Ground, GSM 850 Channel 190

GSM 850 Towards Ground Low

Date/Time: 4/13/2010 1:07:55 AM

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

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.955 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.521 mW/g

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

Reference Value = 9.33 V/m; Power Drift = 0.094 dB

Peak SAR (extrapolated) = 0.674 W/kg

SAR(1 g) = 0.495 mW/g; SAR(10 g) = 0.350 mW/g

Maximum value of SAR (measured) = 0.526 mW/g
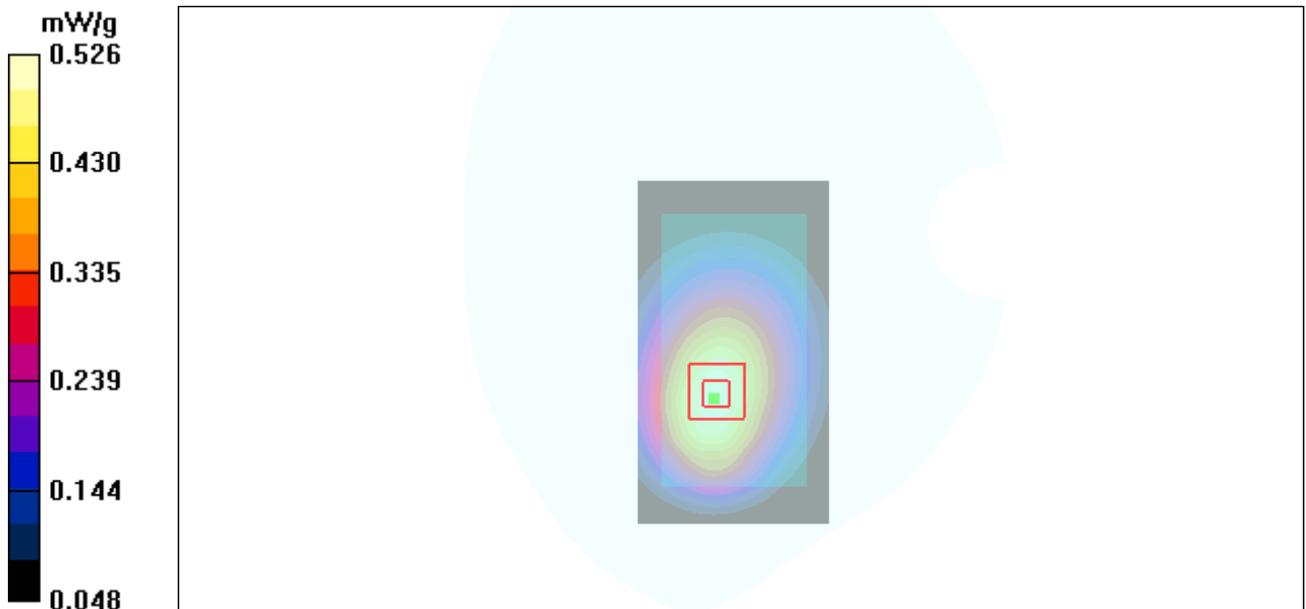
Figure 19 Body, Towards Ground, GSM 850 Channel 128

GSM 850 Towards Phantom Middle

Date/Time: 4/13/2010 10:55:25 PM

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

Medium parameters used: f = 837 MHz; σ = 0.964 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 8.84 V/m; Power Drift = 0.045 dB

Peak SAR (extrapolated) = 0.513 W/kg

SAR(1 g) = 0.395 mW/g; SAR(10 g) = 0.288 mW/g

Maximum value of SAR (measured) = 0.417 mW/g
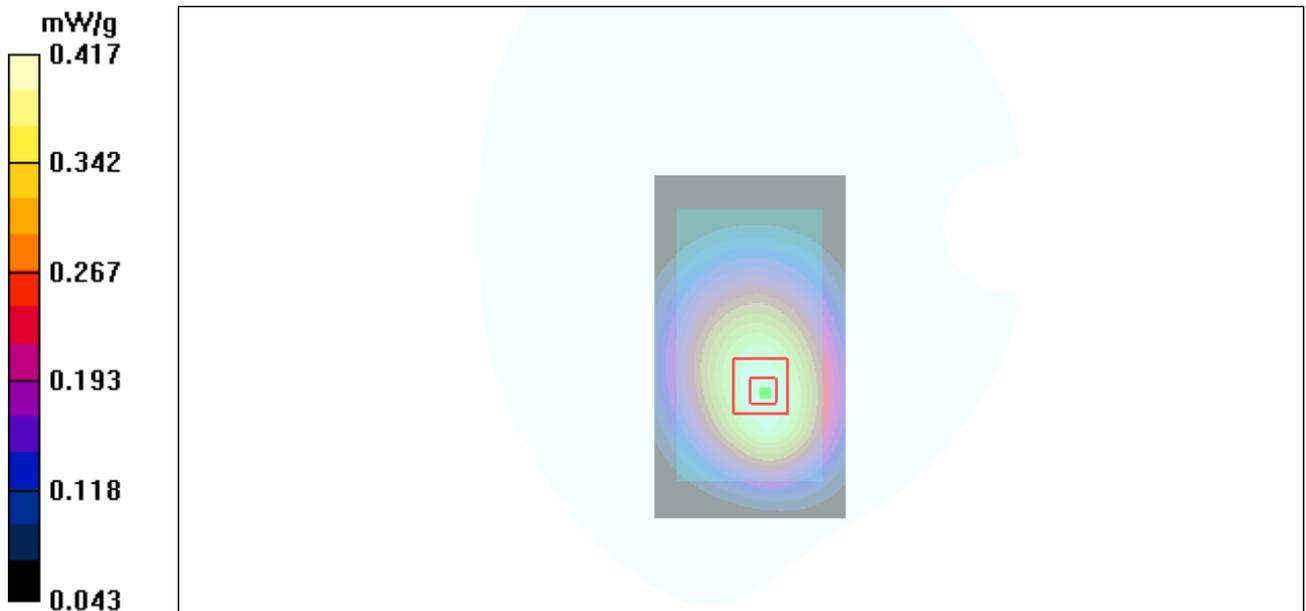
Figure 20 Body, Towards Phantom, GSM 850 Channel 190

GSM 850 with Earphone Towards Ground High

Date/Time: 4/13/2010 1:33:50 AM

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

Medium parameters used: f = 849 MHz; σ = 0.978 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.540 mW/g

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

Reference Value = 8.50 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 0.728 W/kg

SAR(1 g) = 0.514 mW/g; SAR(10 g) = 0.350 mW/g

Maximum value of SAR (measured) = 0.549 mW/g
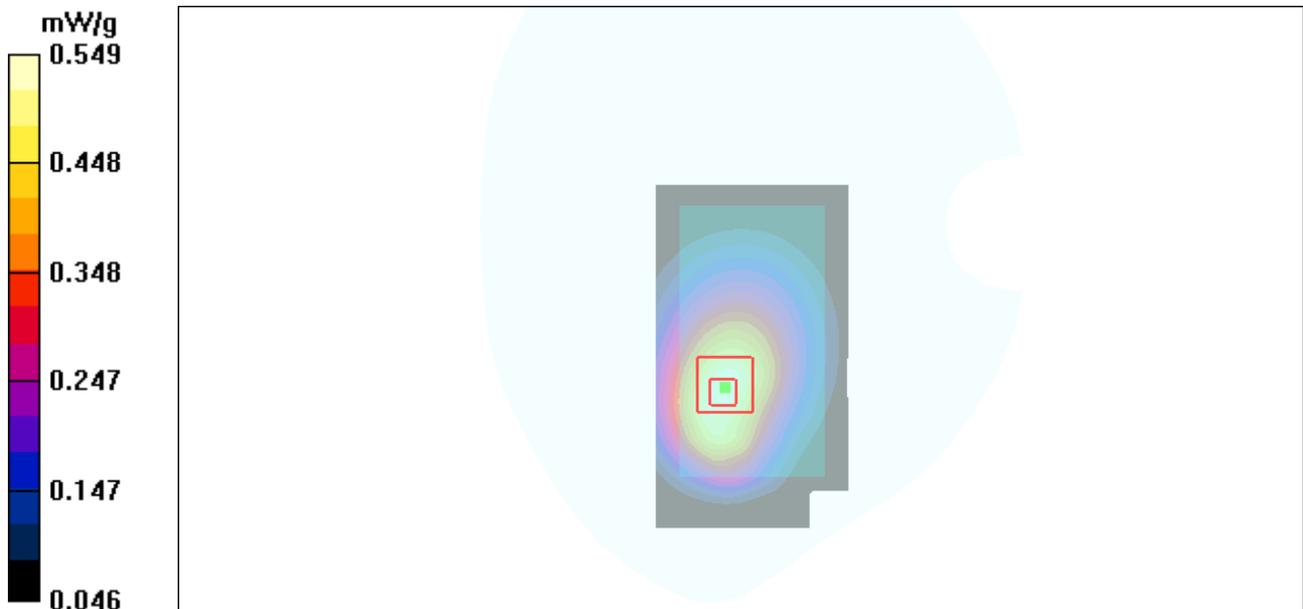
Figure 21 Body with Earphone, Towards Ground, GSM 850 Channel 251

GSM 850 GPRS (2Up) Towards Ground High

Date/Time: 4/13/2010 11:36:04 PM

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

Medium parameters used: f = 849 MHz; σ = 0.978 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.915 mW/g

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

Reference Value = 12.7 V/m; Power Drift = -0.116 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.852 mW/g; SAR(10 g) = 0.603 mW/g

Maximum value of SAR (measured) = 0.911 mW/g
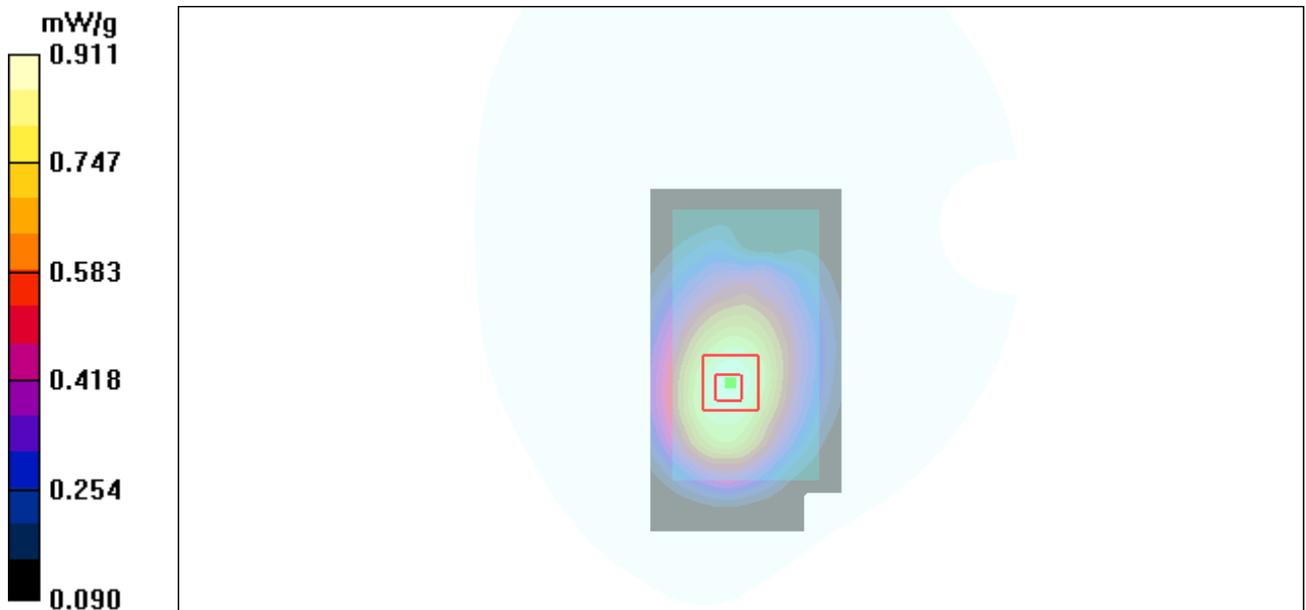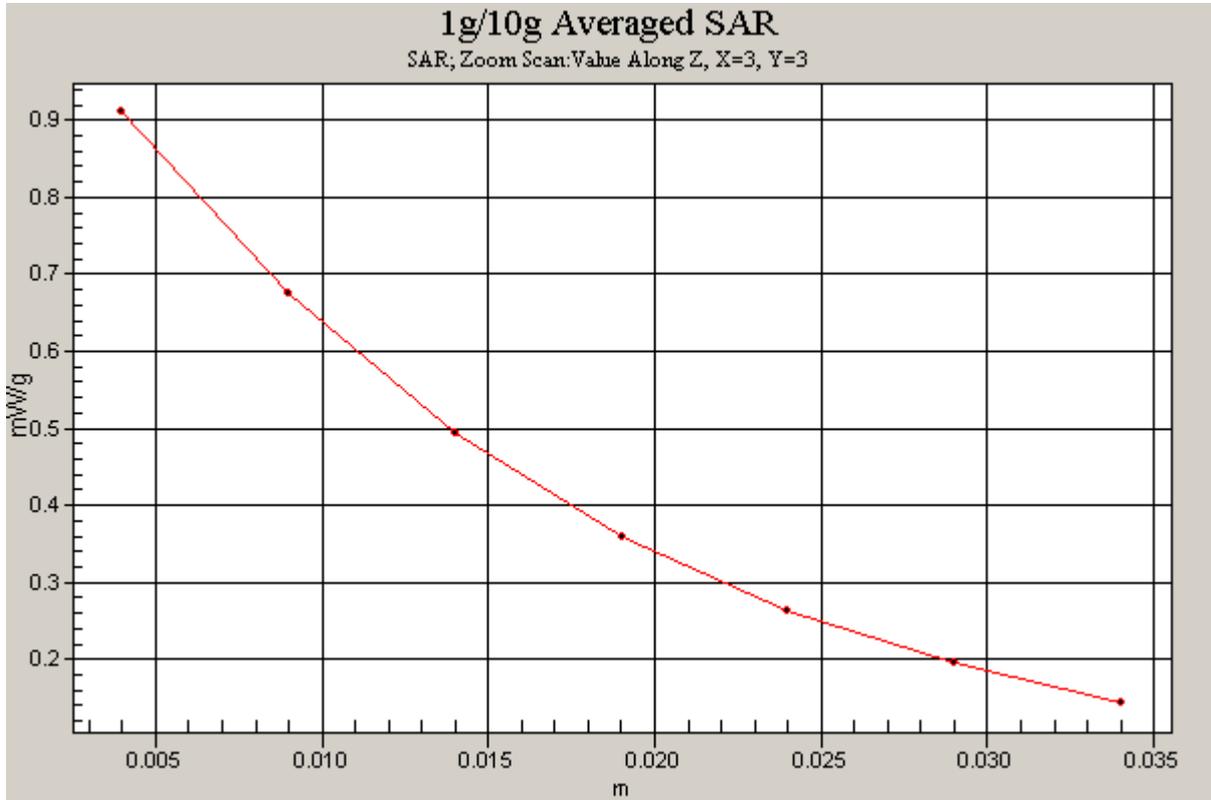
Figure 22 Body, Towards Ground, GSM 850 GPRS (2Up) Channel 251

GSM 850 GPRS (2Up) Towards Ground Middle

Date/Time: 4/13/2010 11:18:38 PM

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

Medium parameters used: f = 837 MHz; σ = 0.964 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.771 mW/g

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

Reference Value = 11.6 V/m; Power Drift = -0.079 dB

Peak SAR (extrapolated) = 0.966 W/kg

SAR(1 g) = 0.715 mW/g; SAR(10 g) = 0.507 mW/g

Maximum value of SAR (measured) = 0.757 mW/g
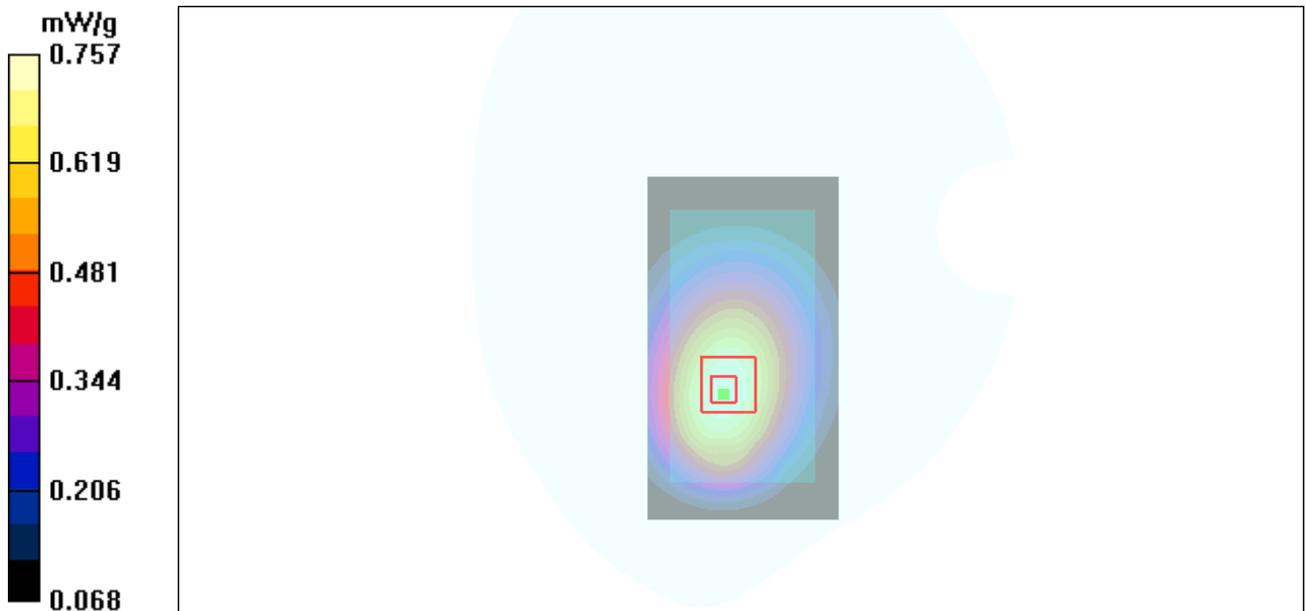
Figure 23 Body, Towards Ground, GSM 850 GPRS (2Up) Channel 190

GSM 850 GPRS (2Up) Towards Ground Low

Date/Time: 4/13/2010 11:53:40 PM

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

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.955 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.674 mW/g

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

Reference Value = 10.6 V/m; Power Drift = 0.164 dB

Peak SAR (extrapolated) = 0.878 W/kg

SAR(1 g) = 0.640 mW/g; SAR(10 g) = 0.451 mW/g

Maximum value of SAR (measured) = 0.678 mW/g
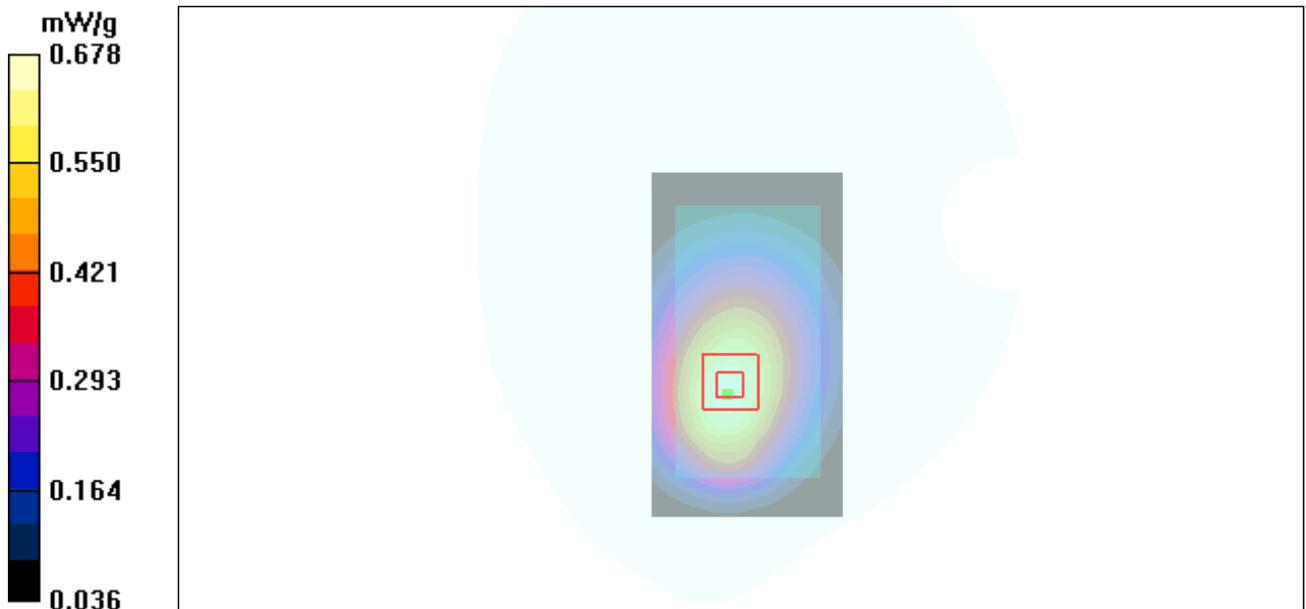
Figure 24 Body**,** Towards Ground, GSM 850 GPRS (2Up) Channel 128

GSM 850 GPRS (2Up) Towards Phantom Middle

Date/Time: 4/13/2010 10:17:11 PM

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

Medium parameters used: f = 837 MHz; σ = 0.964 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃　　　　Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.605 mW/g

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

Reference Value = 10.5 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 0.738 W/kg

SAR(1 g) = 0.559 mW/g; SAR(10 g) = 0.409 mW/g

Maximum value of SAR (measured) = 0.588 mW/g
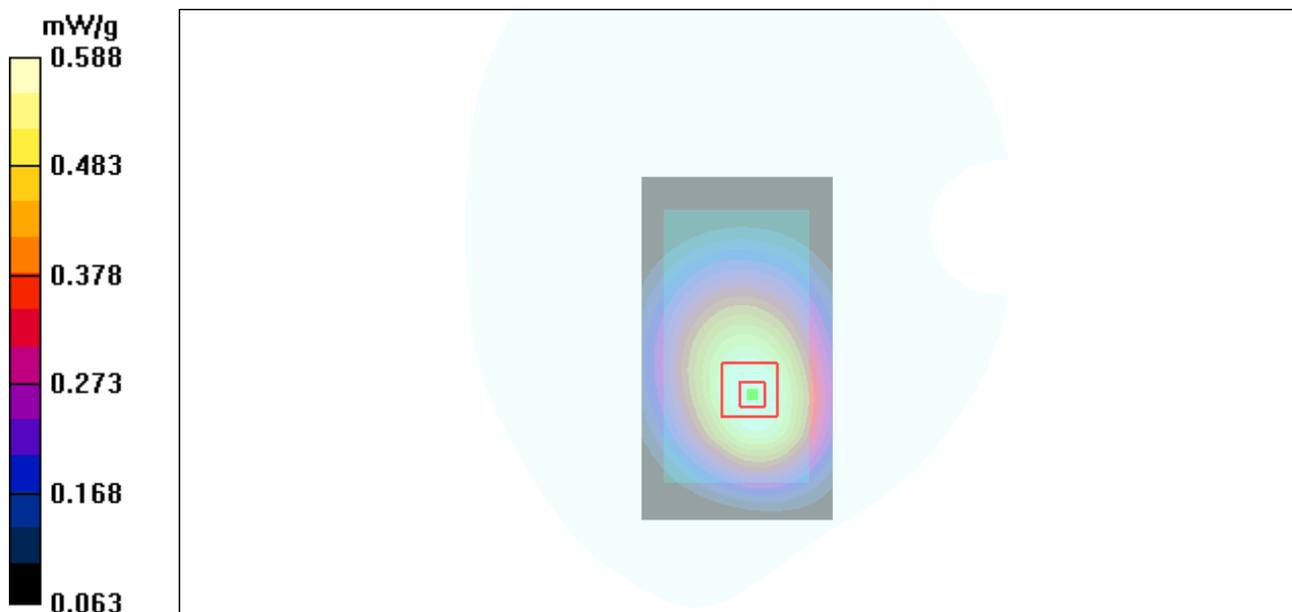
Figure 25 Body, Towards Phantom, GSM 850 GPRS (2Up) Channel 190

GSM 850 GPRS (2Up) with Earphone Towards Ground High

Date/Time: 4/13/2010 2:27:54 AM

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

Medium parameters used: f = 849 MHz; σ = 0.978 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.763 mW/g

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

Reference Value = 8.53 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 0.992 W/kg

SAR(1 g) = 0.707 mW/g; SAR(10 g) = 0.487 mW/g

Maximum value of SAR (measured) = 0.748 mW/g
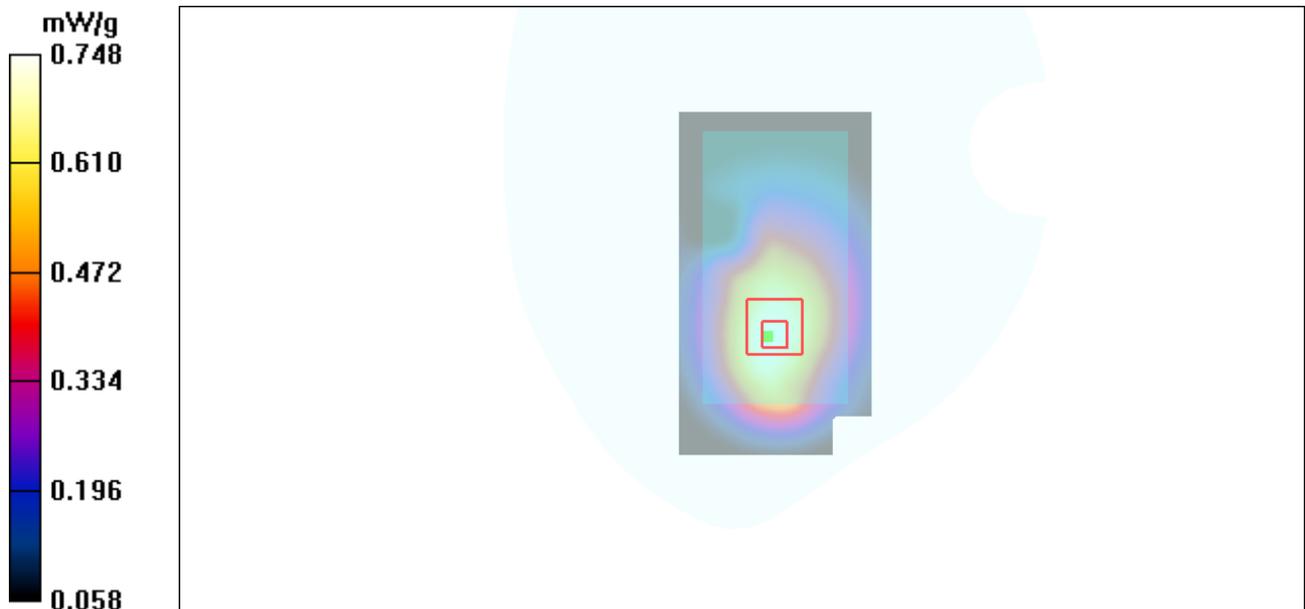
Figure 26 Body with Earphone, Towards Ground, GSM 850 GPRS (2Up) Channel 251

GSM 850 EGPRS (2Up) Towards Ground High

Date/Time: 4/13/2010 12:14:15 AM

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

Medium parameters used: f = 849 MHz; σ = 0.978 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 12.5 V/m; Power Drift = -0.029 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.864 mW/g; SAR(10 g) = 0.597 mW/g

Maximum value of SAR (measured) = 0.905 mW/g
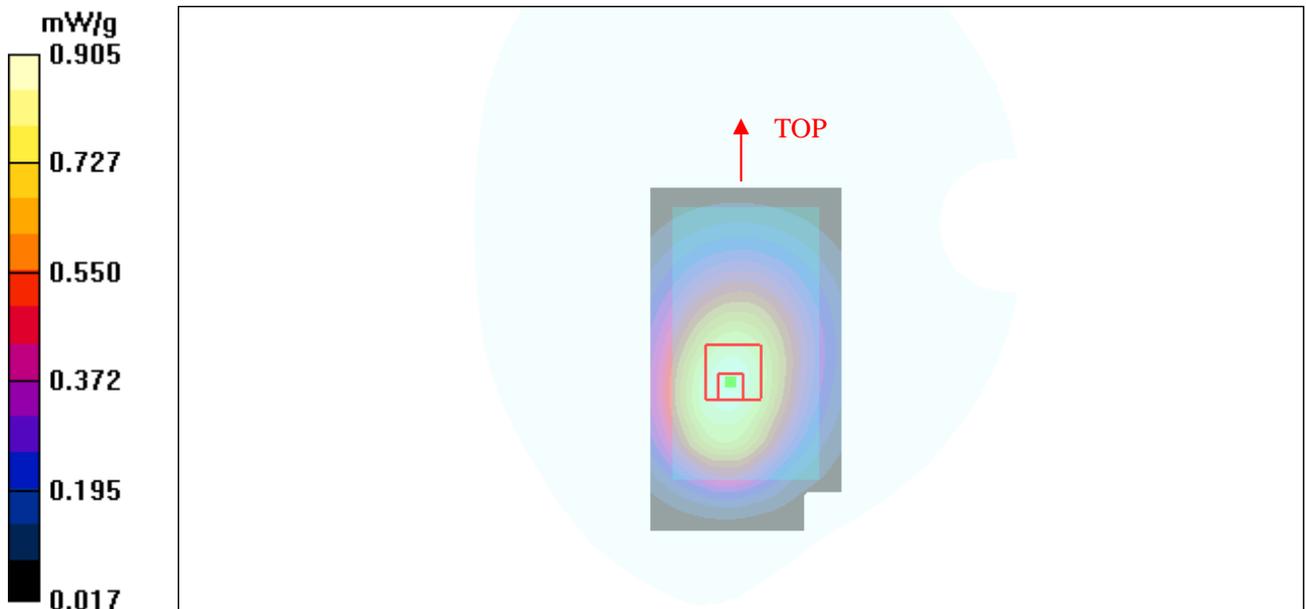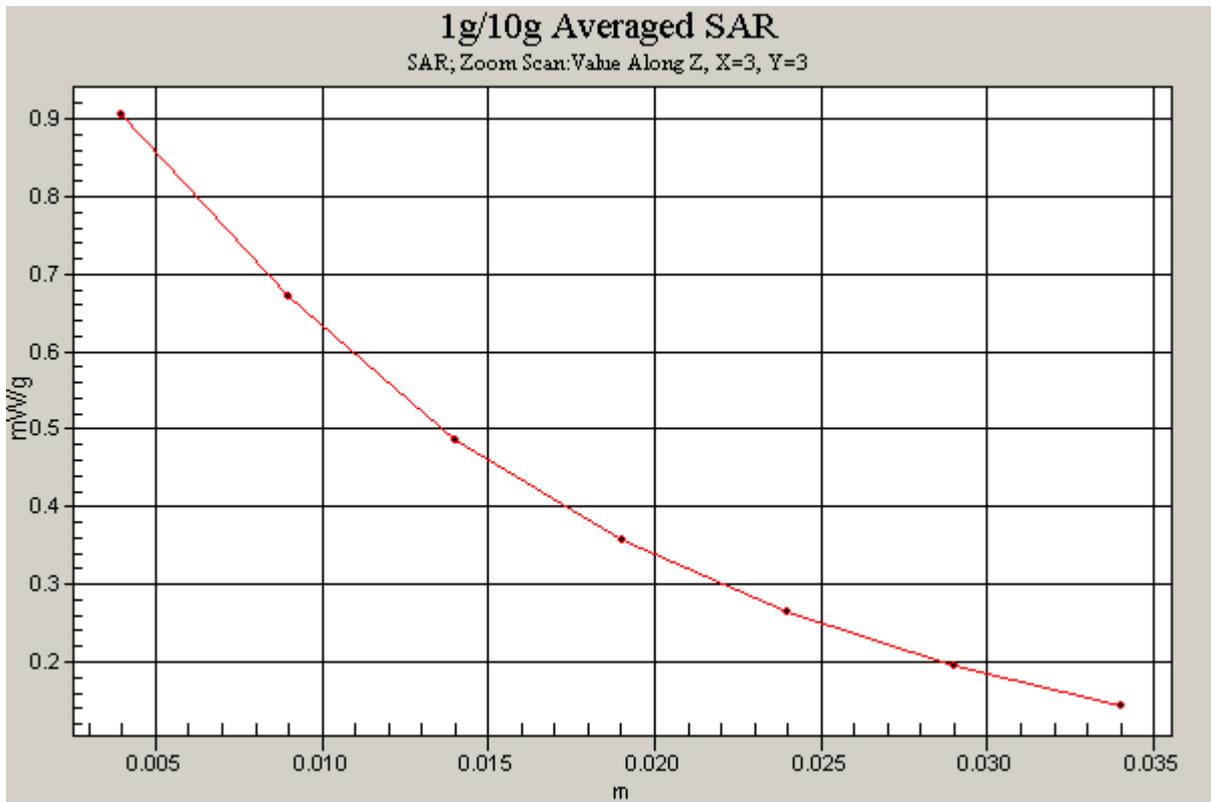
Figure 27 Body, Towards Ground, GSM 850 EGPRS (2Up) Channel 251

GSM 1900 Left Cheek Middle

Date/Time: 4/18/2010 11:45:16 AM

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

Medium parameters used: f = 1880 MHz; σ = 1.4 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.422 mW/g

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

Reference Value = 7.03 V/m; Power Drift = 0.046 dB

Peak SAR (extrapolated) = 0.620 W/kg

SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.237 mW/g

Maximum value of SAR (measured) = 0.431 mW/g
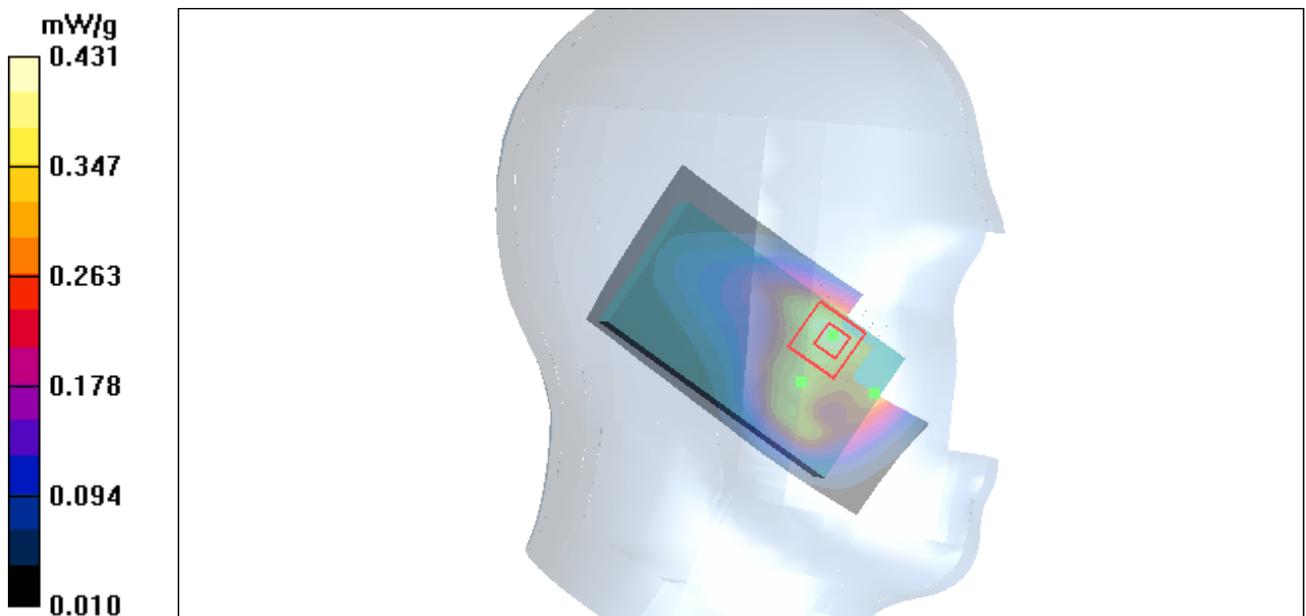
Figure 28 Left Hand Touch Cheek GSM 1900 Channel 661

GSM 1900 Left Tilt Middle

Date/Time: 4/18/2010 12:25:21 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.4 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.198 mW/g

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

Reference Value = 11.3 V/m; Power Drift = 0.044 dB

Peak SAR (extrapolated) = 0.293 W/kg

SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.109 mW/g

Maximum value of SAR (measured) = 0.200 mW/g
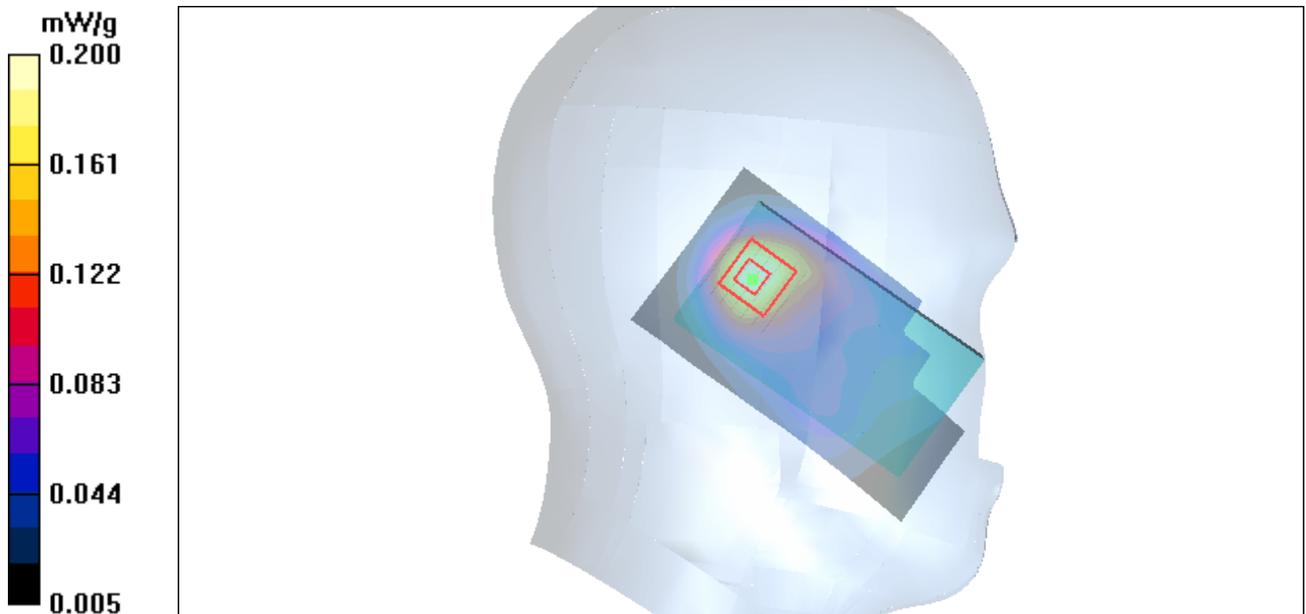
Figure 29 Left Hand Tilt 15° GSM 1900 Channel 661

GSM 1900 Right Cheek High

Date/Time: 4/18/2010 1:34:02 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.43 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.770 mW/g

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

Reference Value = 7.67 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.751 mW/g; SAR(10 g) = 0.406 mW/g

Maximum value of SAR (measured) = 0.855 mW/g
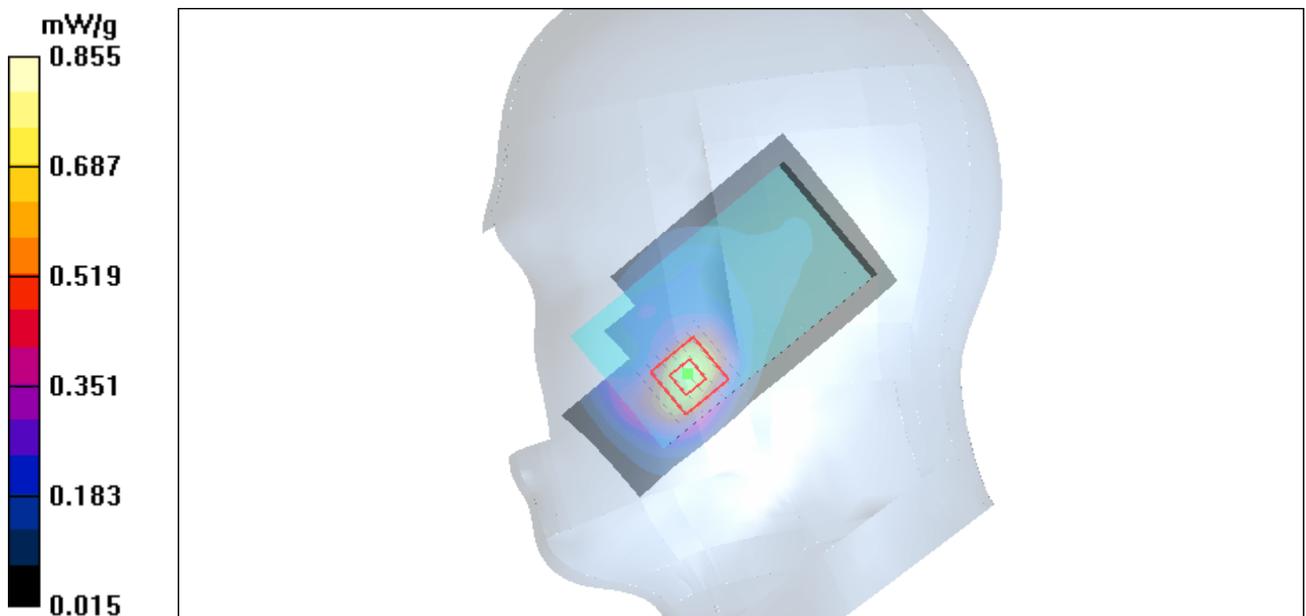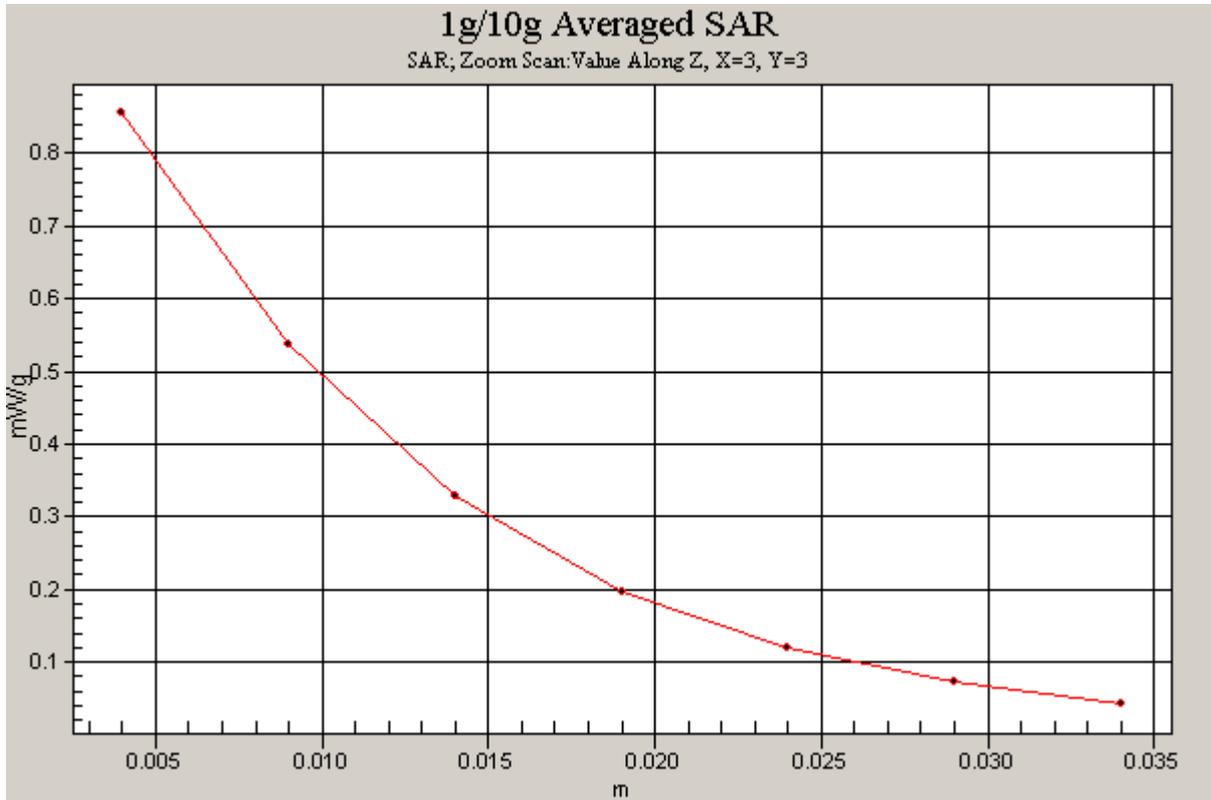
Figure 30 Right Hand Touch Cheek GSM 1900 Channel 810

GSM 1900 Right Cheek Middle

Date/Time: 4/18/2010 12:45:00 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.4 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.709 mW/g

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

Reference Value = 7.19 V/m; Power Drift = 0.047 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.693 mW/g; SAR(10 g) = 0.376 mW/g

Maximum value of SAR (measured) = 0.768 mW/g
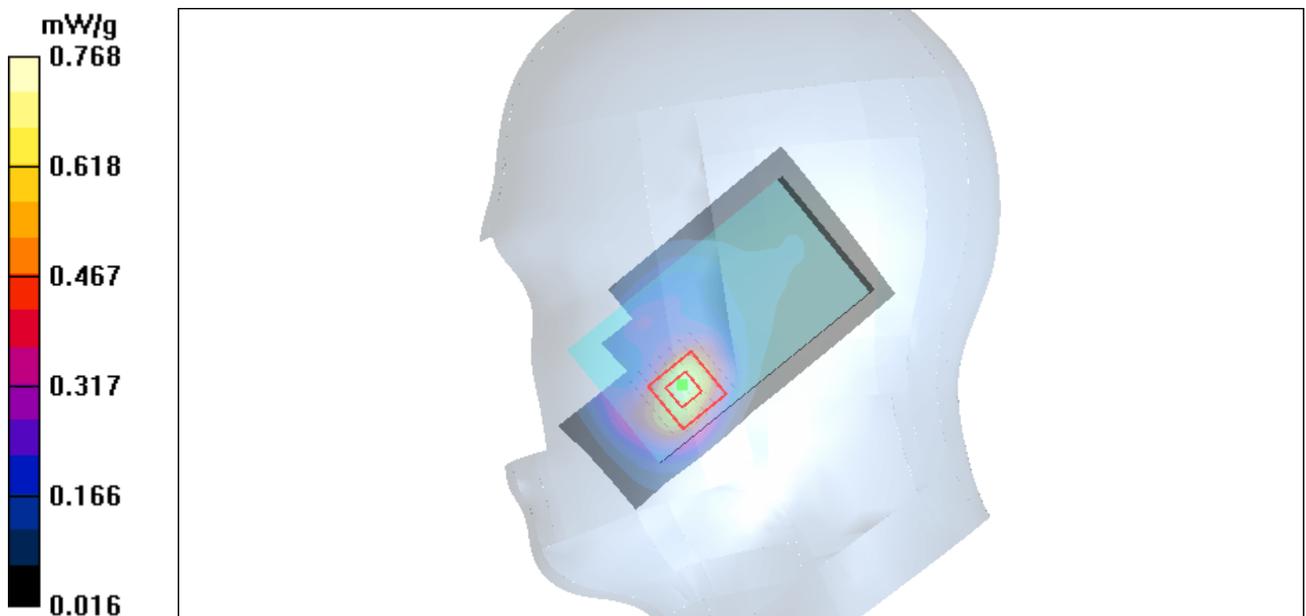
Figure 31 Right Hand Touch Cheek GSM 1900 Channel 661

GSM 1900 Right Cheek Low

Date/Time: 4/18/2010 1:15:01 PM

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

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.37 mho/m; $ε_r$ = 40.7; ρ = 1000 kg/m³

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.608 mW/g

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

Reference Value = 6.76 V/m; Power Drift = 0.044 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.604 mW/g; SAR(10 g) = 0.330 mW/g

Maximum value of SAR (measured) = 0.679 mW/g
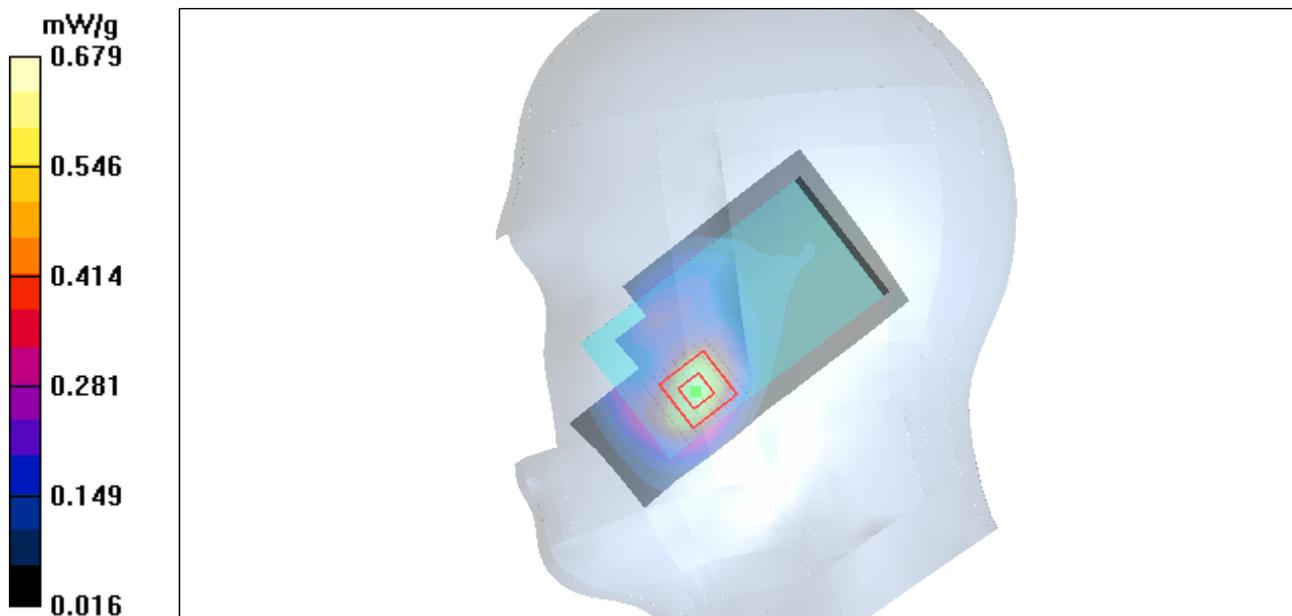
Figure 32 Right Hand Touch Cheek GSM 1900 Channel 512

GSM 1900 Right Tilt Middle

Date/Time: 4/18/2010 1:53:32 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.4 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.198 mW/g

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

Reference Value = 11.3 V/m; Power Drift = 0.024 dB

Peak SAR (extrapolated) = 0.272 W/kg

SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.102 mW/g

Maximum value of SAR (measured) = 0.188 mW/g
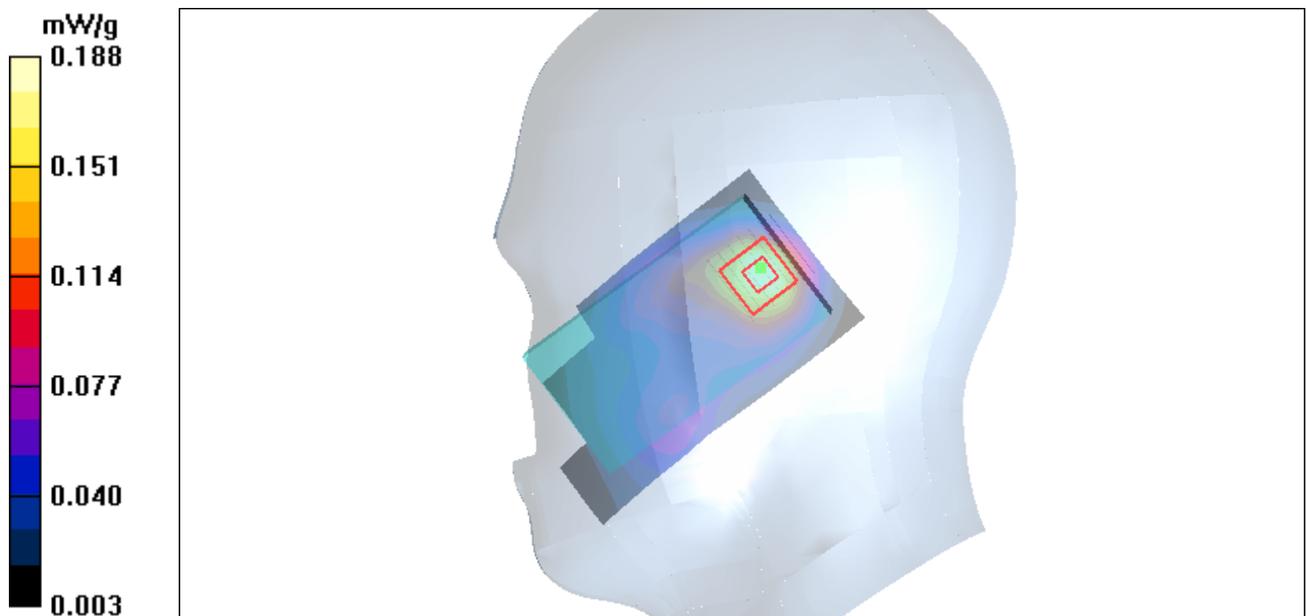
Figure 33 Right Hand Tilt 15° GSM 1900 Channel 661

GSM 1900 Towards Ground High

Date/Time: 4/15/2010 9:43:10 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 5.24 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 0.458 W/kg

SAR(1 g) = 0.273 mW/g; SAR(10 g) = 0.160 mW/g

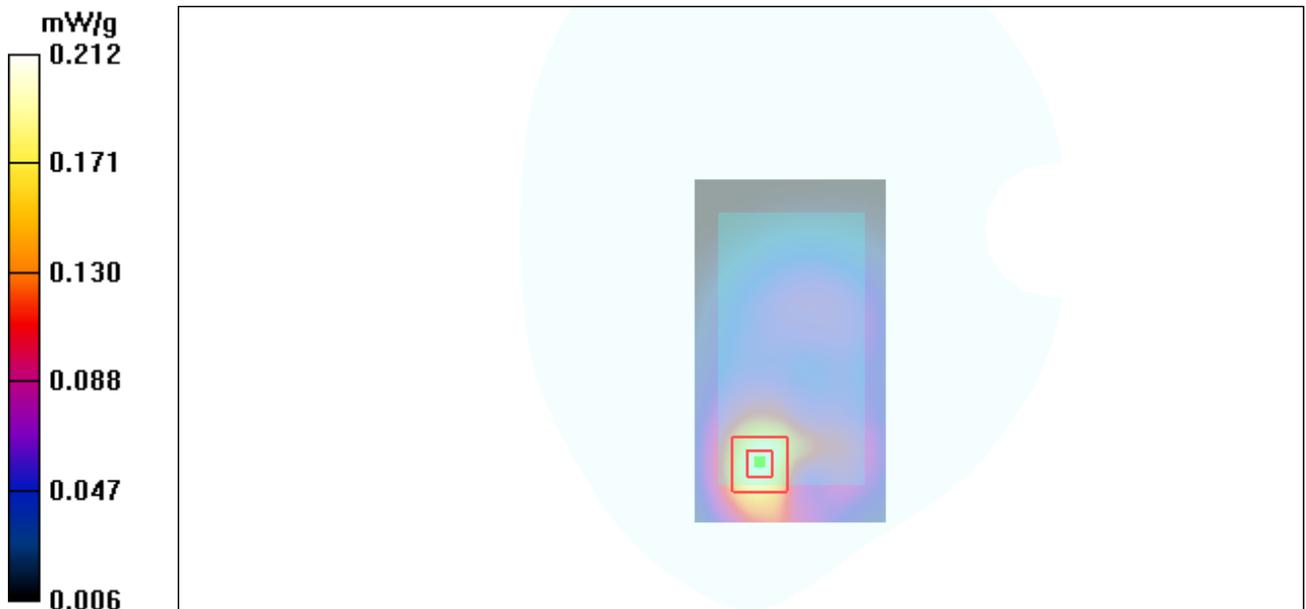Maximum value of SAR (measured) = 0.297 mW/g
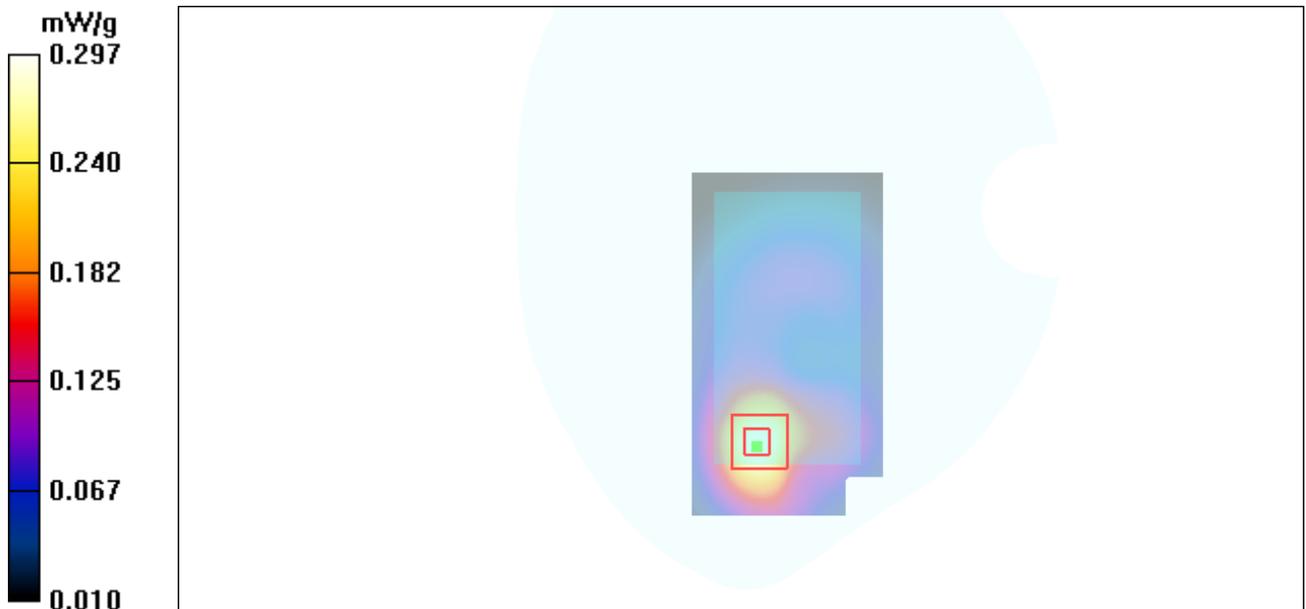
Figure 34 Body, Towards Ground, GSM 1900 Channel 810

GSM 1900 Towards Ground Middle

Date/Time: 4/15/2010 9:06:18 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.244 mW/g

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

Reference Value = 4.86 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.387 W/kg

SAR(1 g) = 0.229 mW/g; SAR(10 g) = 0.134 mW/g

Maximum value of SAR (measured) = 0.251 mW/g
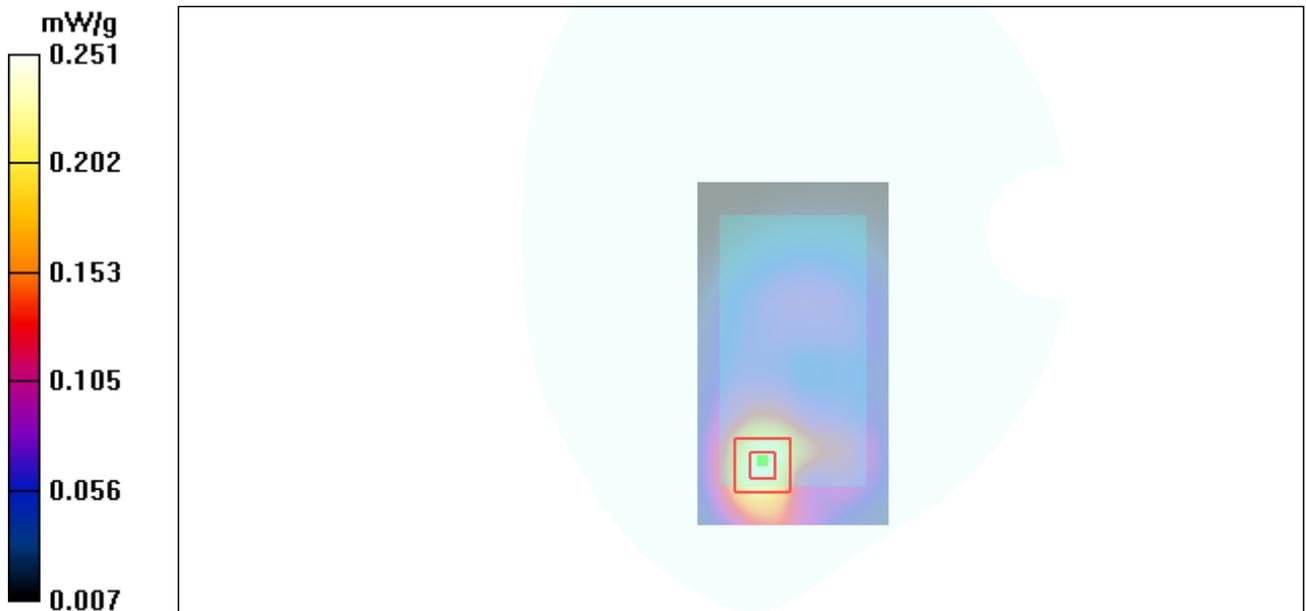
Figure 35 Body, Towards Ground, GSM 1900 Channel 661

GSM 1900 Towards Ground Low

Date/Time: 4/15/2010 9:24:17 PM

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

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.47 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃　　　Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.206 mW/g

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

Reference Value = 4.15 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 0.322 W/kg

SAR(1 g) = 0.193 mW/g; SAR(10 g) = 0.113 mW/g

Maximum value of SAR (measured) = 0.212 mW/g

Figure 36 Body, Towards Ground, GSM 1900 Channel 512

GSM 1900 Towards Phantom Middle

Date/Time: 4/15/2010 8:24:55 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; $ε_r$ = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.145 mW/g

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

Reference Value = 6.10 V/m; Power Drift = -0.115 dB

Peak SAR (extrapolated) = 0.210 W/kg

SAR(1 g) = 0.130 mW/g; SAR(10 g) = 0.081 mW/g

Maximum value of SAR (measured) = 0.141 mW/g
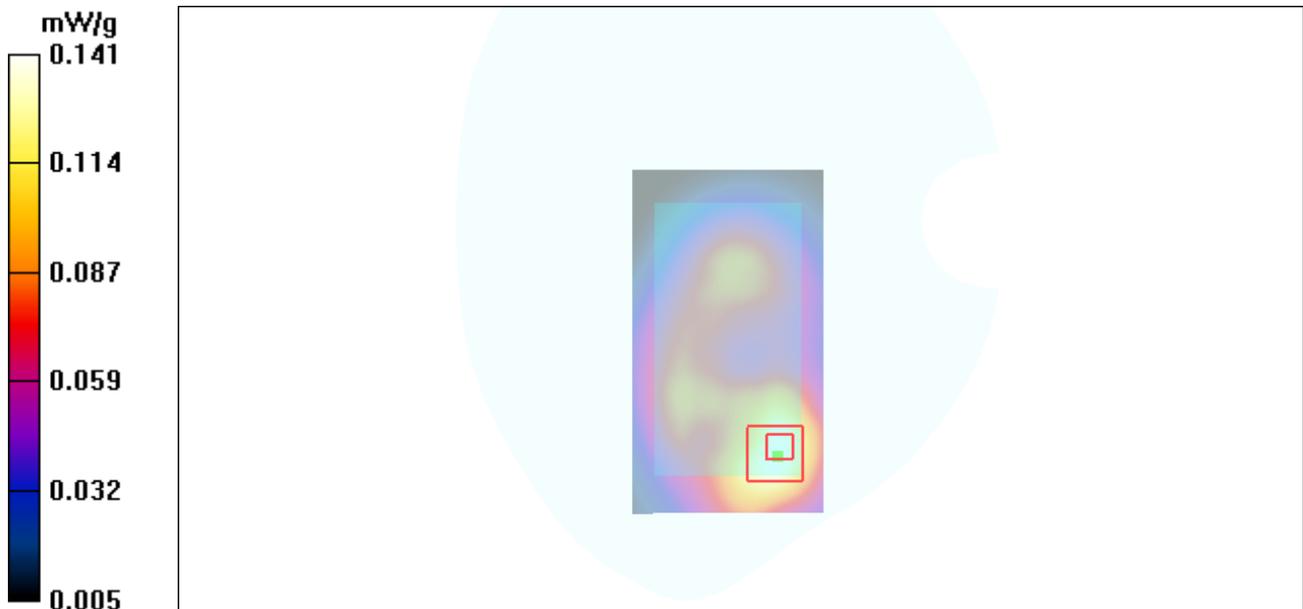
Figure 37 Body, Towards Phantom, GSM 1900 Channel 661

GSM 1900 with Earphone Towards Ground High

Date/Time: 4/15/2010 10:04:51 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃　　　　Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.246 mW/g

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

Reference Value = 5.43 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 0.383 W/kg

SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.129 mW/g

Maximum value of SAR (measured) = 0.247 mW/g
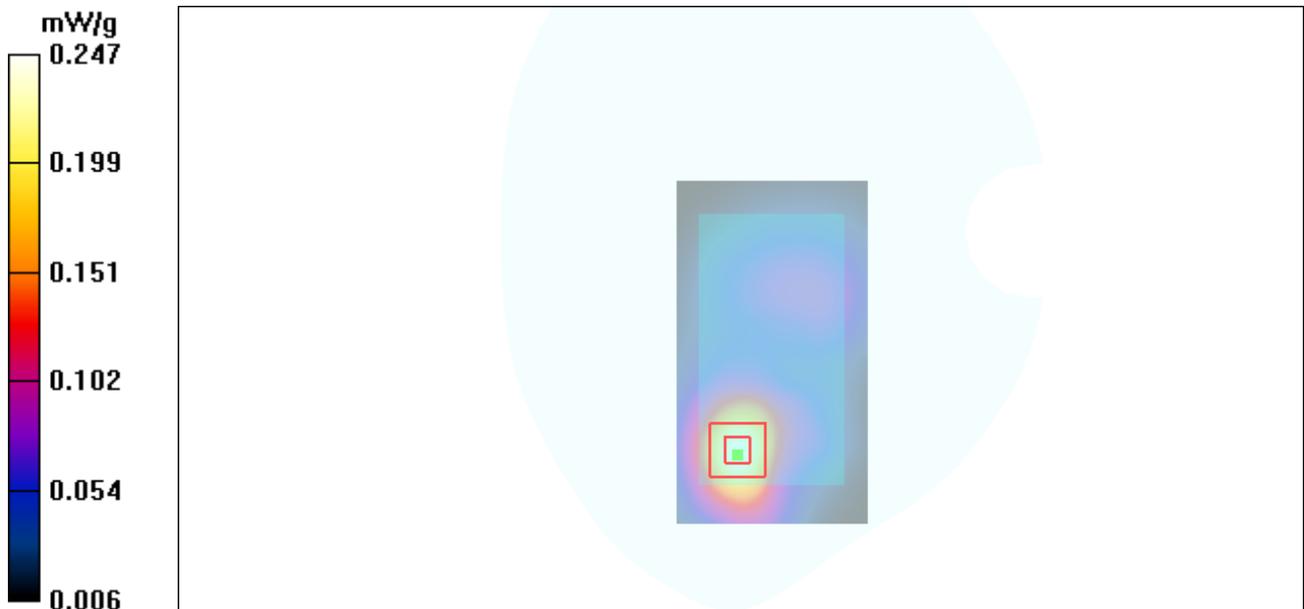
Figure 38 Body with Earphone, Towards Ground, GSM 1900 Channel 810

GSM 1900 GPRS (2Up) Towards Ground High

Date/Time: 4/15/2010 11:00:01 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.549 mW/g

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

Reference Value = 8.81 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 0.859 W/kg

SAR(1 g) = 0.516 mW/g; SAR(10 g) = 0.303 mW/g

Maximum value of SAR (measured) = 0.564 mW/g
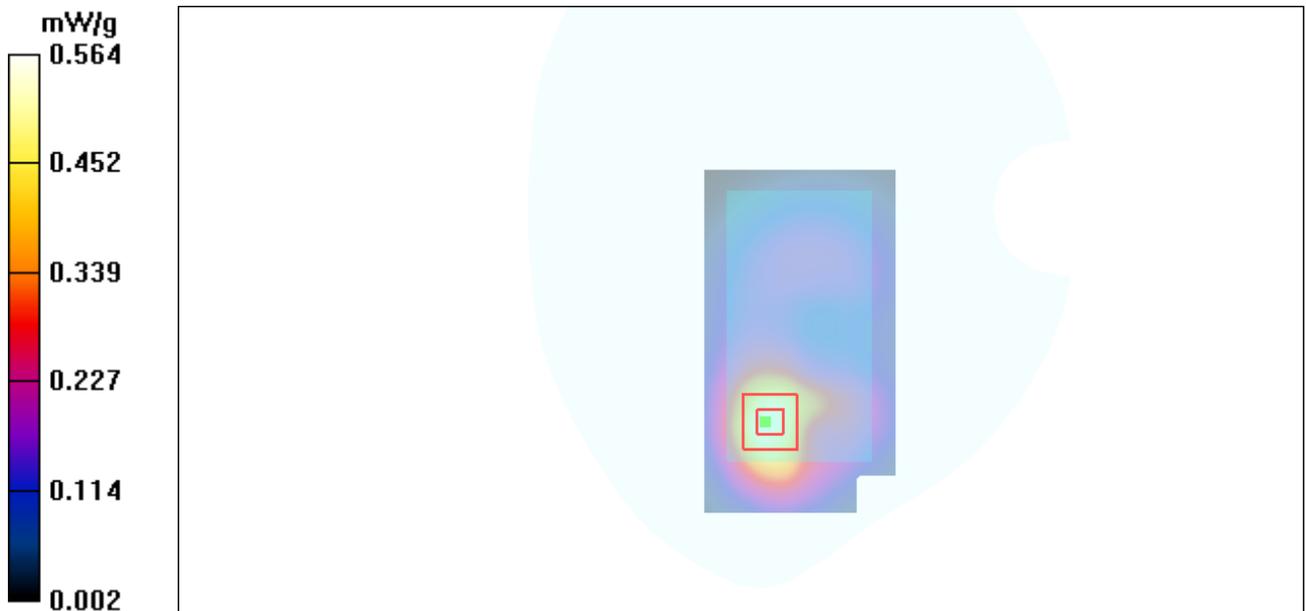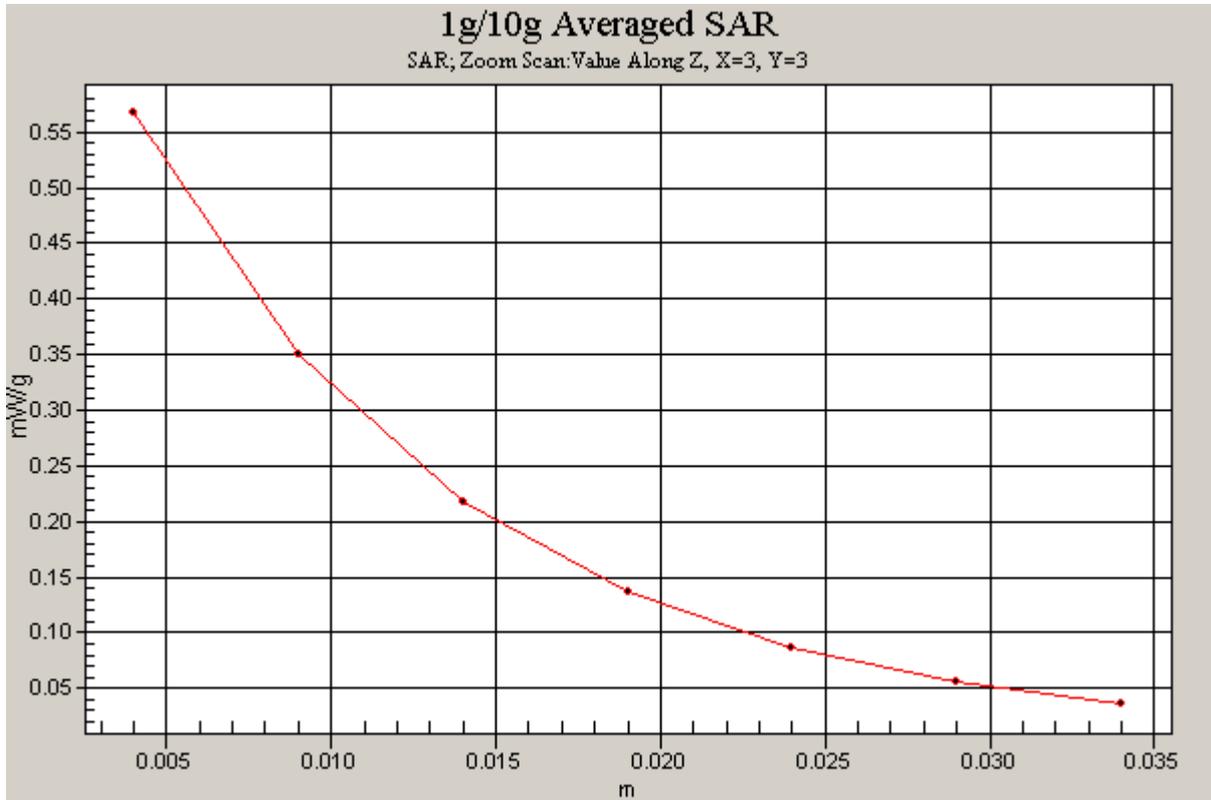
Figure 39 Body, Towards Ground, GSM 1900 GPRS (2Up) Channel 810

GSM 1900 GPRS (2Up) Towards Ground Middle

Date/Time: 4/15/2010 10:24:09 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; $ε_r$ = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 7.95 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 0.718 W/kg

SAR(1 g) = 0.433 mW/g; SAR(10 g) = 0.255 mW/g

Maximum value of SAR (measured) = 0.469 mW/g
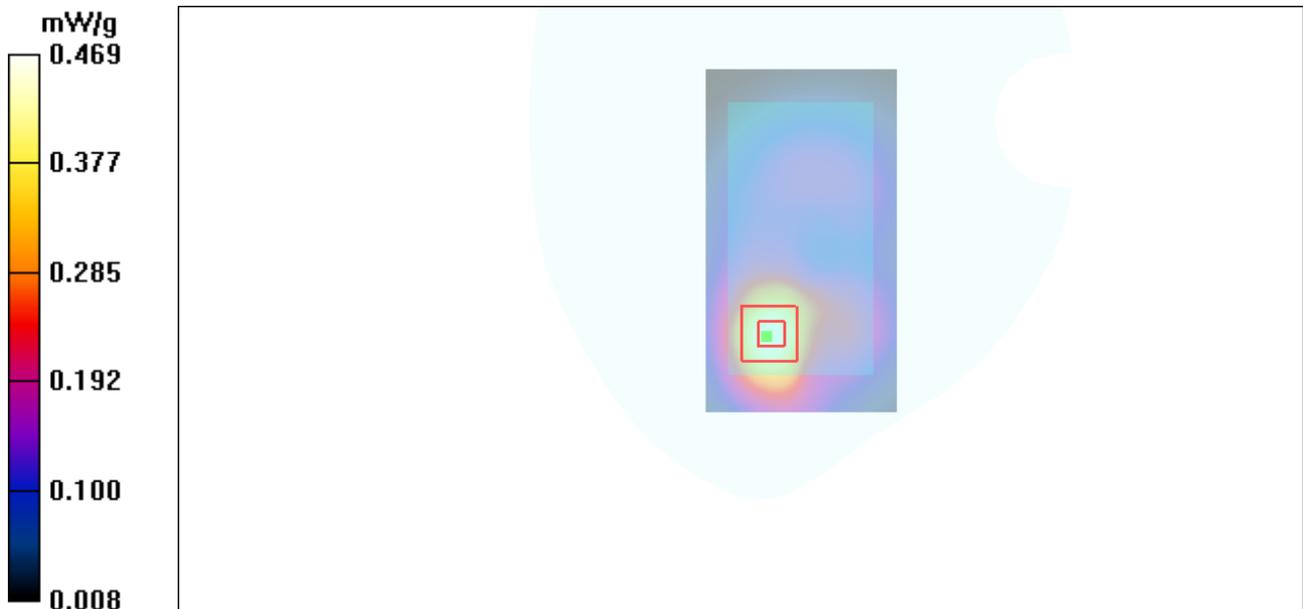
Figure 40 Body, Towards Ground, GSM 1900 GPRS (2Up) Channel 661

GSM 1900 GPRS (2Up) Towards Ground Low

Date/Time: 4/15/2010 10:42:03 PM

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

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.47 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 7.13 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 0.627 W/kg

SAR(1 g) = 0.376 mW/g; SAR(10 g) = 0.219 mW/g

Maximum value of SAR (measured) = 0.410 mW/g
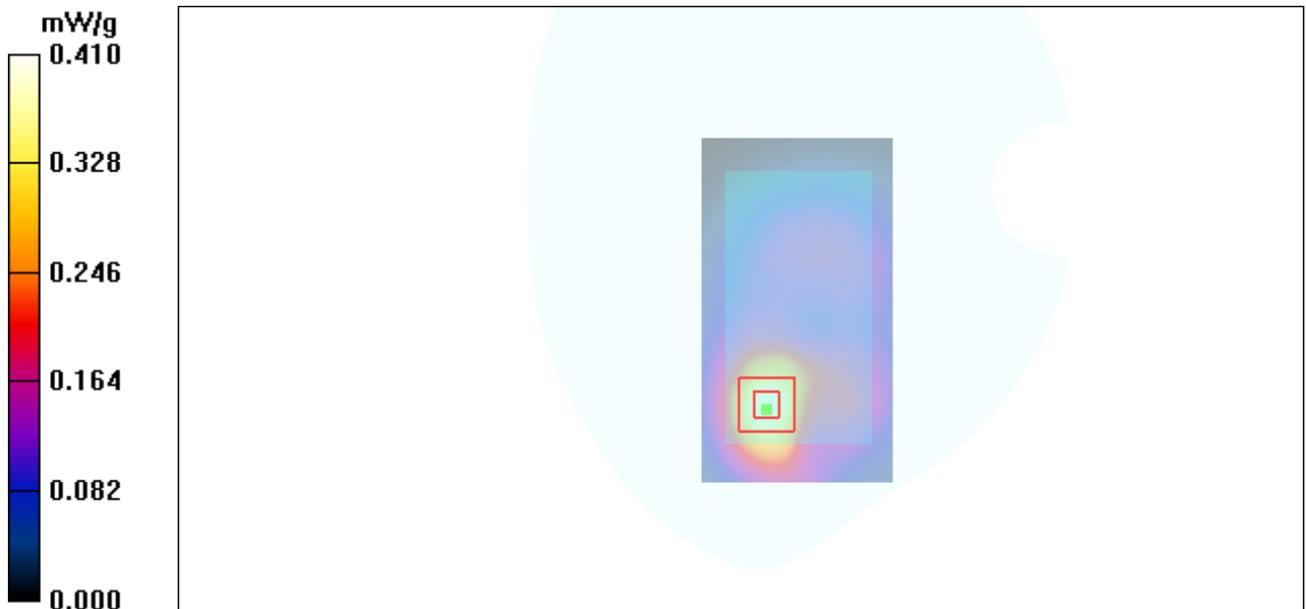
Figure 41 Body, Towards Ground, GSM 1900 GPRS (2Up) Channel 512

GSM 1900 GPRS (2Up) Towards Phantom Middle

Date/Time: 4/16/2010 12:35:19 AM

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

Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; $ε_r$ = 52.5; ρ = 1000 kg/m³

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.302 mW/g

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

Reference Value = 7.81 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.443 W/kg

SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.170 mW/g

Maximum value of SAR (measured) = 0.292 mW/g

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

Reference Value = 7.81 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.303 W/kg

SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.117 mW/g

Maximum value of SAR (measured) = 0.205 mW/g
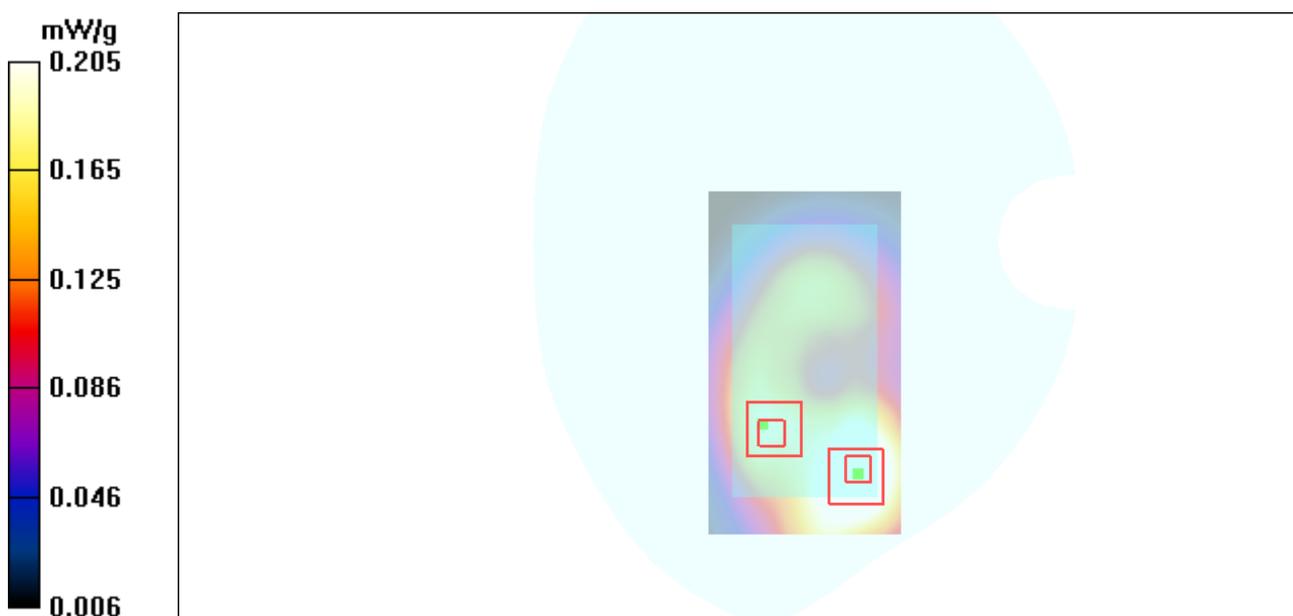
Figure 42 Body, Towards Phantom, GSM 1900 GPRS (2Up) Channel 661

GSM 1900 GPRS (2Up) with Earphone Towards Ground High

Date/Time: 4/15/2010 11:18:43 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.430 mW/g

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

Reference Value = 7.65 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.687 W/kg

SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.228 mW/g

Maximum value of SAR (measured) = 0.442 mW/g
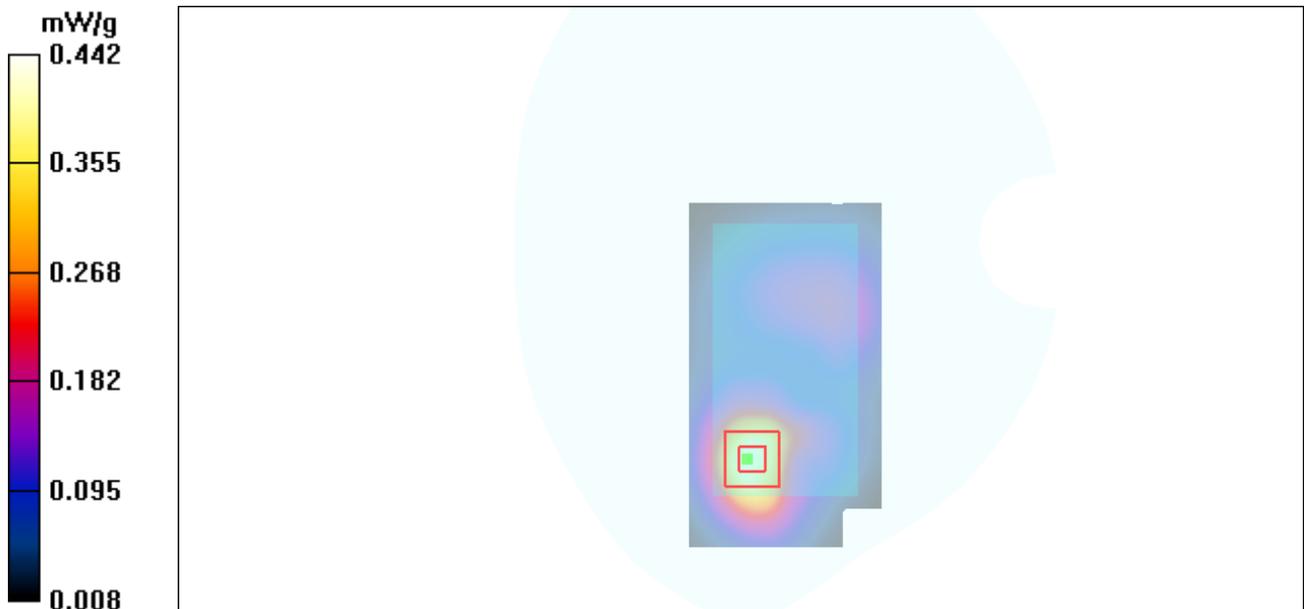
Figure 43 Body with Earphone, Towards Ground, GSM 1900 GPRS (2Up) Channel 810

GSM 1900 EGPRS (2Up) Towards Ground High

Date/Time: 4/15/2010 11:37:01 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.551 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 = 0.027 dB

Peak SAR (extrapolated) = 0.825 W/kg

SAR(1 g) = 0.512 mW/g; SAR(10 g) = 0.301 mW/g

Maximum value of SAR (measured) = 0.564 mW/g
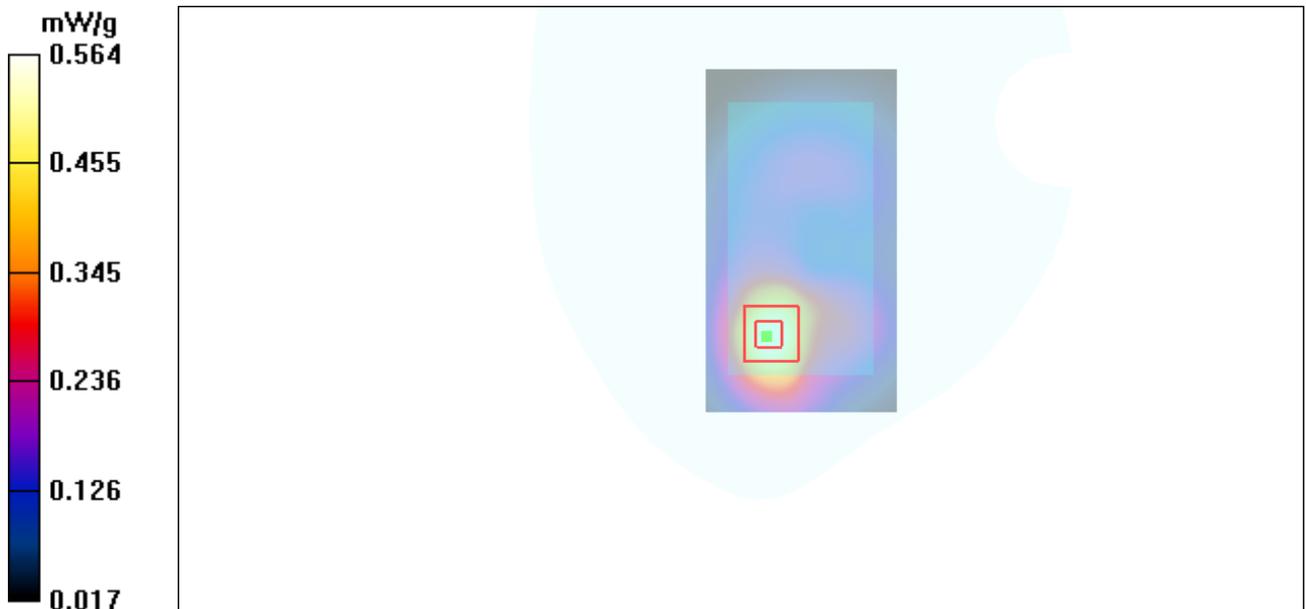
Figure 44 Body, Towards Ground, GSM 1900 EGPRS (2Up) Channel 810

WCDMA Band V Left Cheek Middle

Date/Time: 4/19/2010 10:42:19 PM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

Phantom section: Left Section

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.612 mW/g

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

Reference Value = 7.39 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 0.715 W/kg

SAR(1 g) = 0.574 mW/g; SAR(10 g) = 0.427 mW/g

Maximum value of SAR (measured) = 0.607 mW/g
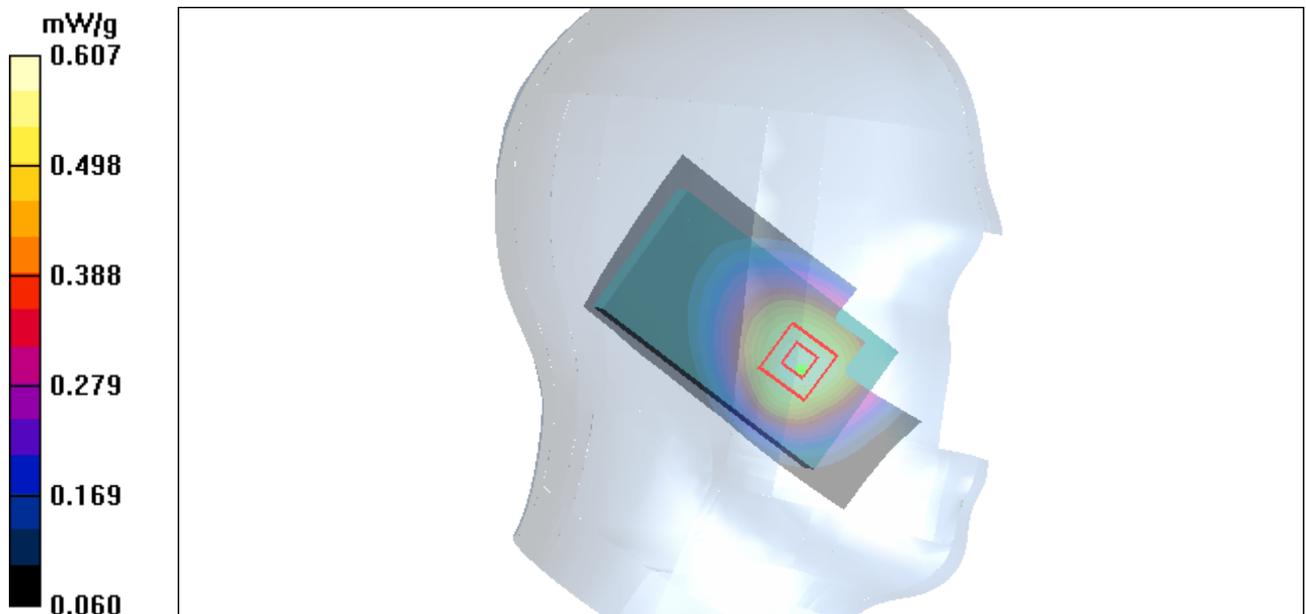
Figure 45 Left Hand Touch Cheek WCDMA Band V Channel 4183

WCDMA Band V Left Tilt Middle

Date/Time: 4/19/2010 11:01:45 PM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

Phantom section: Left Section

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.312 mW/g

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

Reference Value = 12.5 V/m; Power Drift = 0.064 dB

Peak SAR (extrapolated) = 0.375 W/kg

SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.228 mW/g

Maximum value of SAR (measured) = 0.317 mW/g
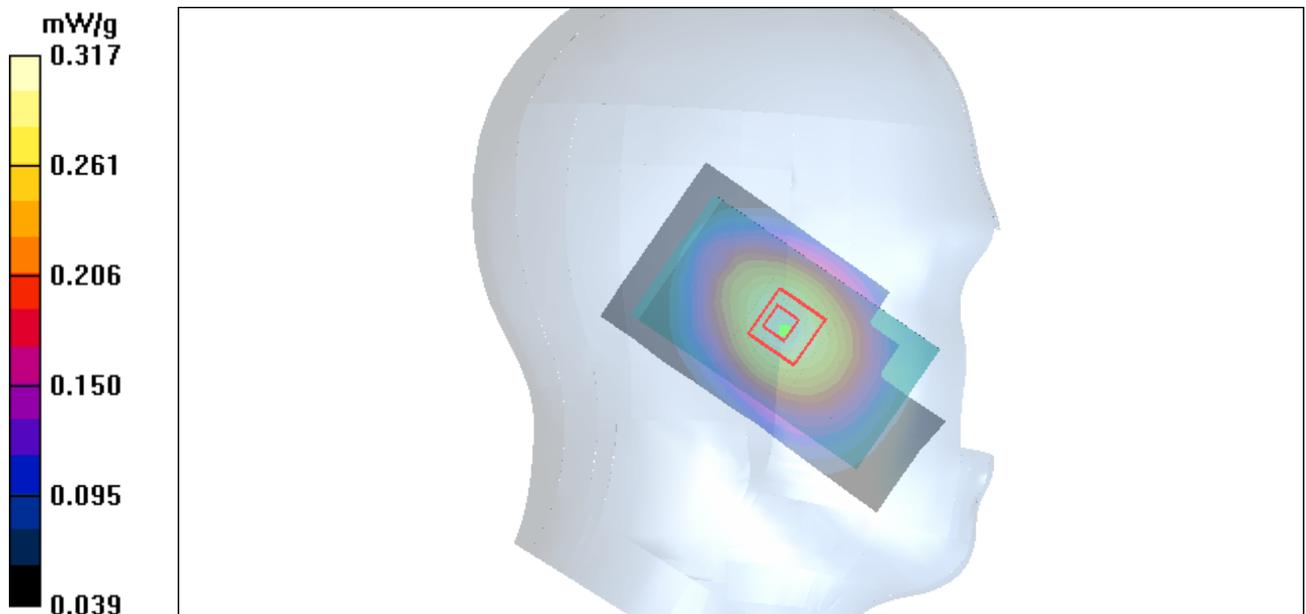
Figure 46 Left Hand Tilt 15° WCDMA Band V Channel 4183

WCDMA Band V Right Cheek High

Date/Time: 4/13/2010 12:42:33 AM

Communication System: WCDMA Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 847 MHz; σ = 0.935 mho/m; $ε_r$ = 42.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

Phantom section: Right Section

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 7.32 V/m; Power Drift = 0.055 dB

Peak SAR (extrapolated) = 0.902 W/kg

SAR(1 g) = 0.662 mW/g; SAR(10 g) = 0.465 mW/g

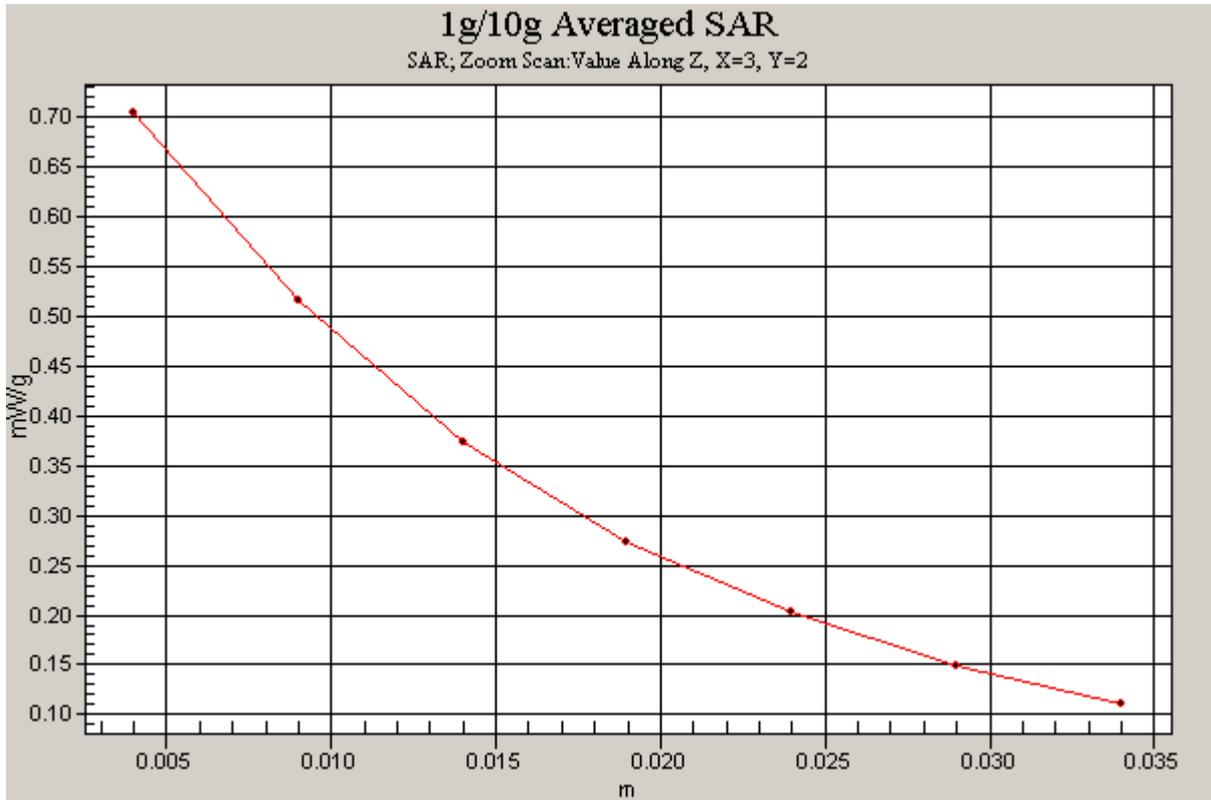Maximum value of SAR (measured) = 0.704 mW/g
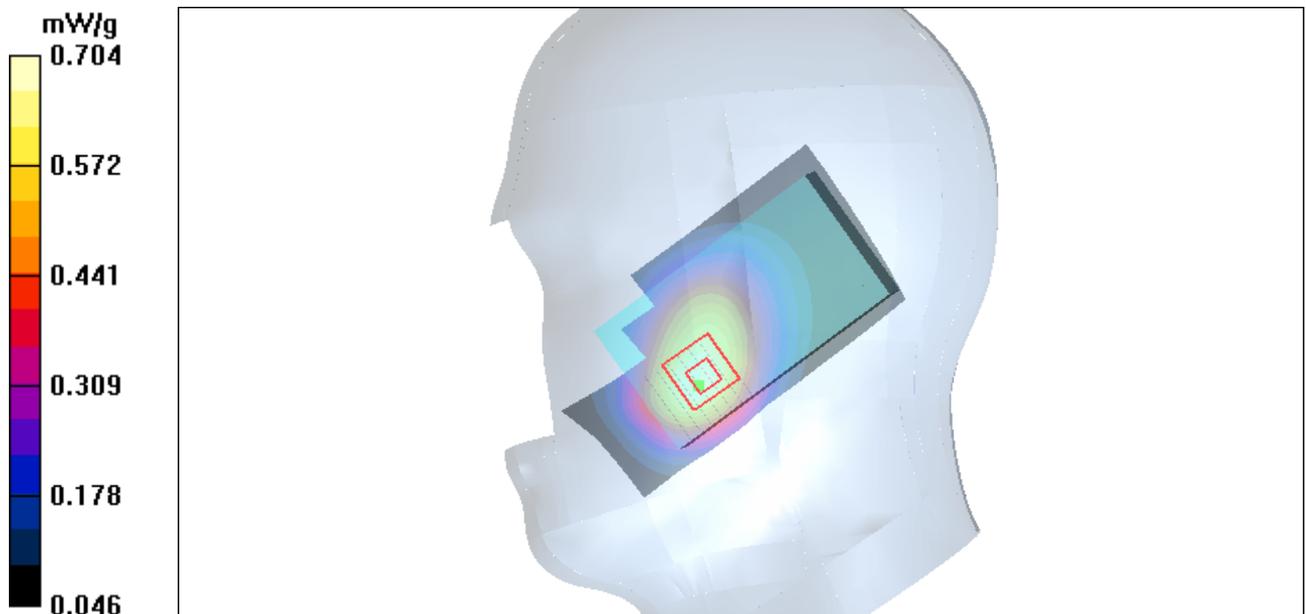
Figure 47 Right Hand Touch Cheek WCDMA Band V Channel 4233

WCDMA Band V Right Cheek Middle

Date/Time: 4/13/2010 12:03:52 AM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

Phantom section: Right Section

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.690 mW/g

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

Reference Value = 7.55 V/m; Power Drift = -0.074 dB

Peak SAR (extrapolated) = 0.887 W/kg

SAR(1 g) = 0.649 mW/g; SAR(10 g) = 0.455 mW/g

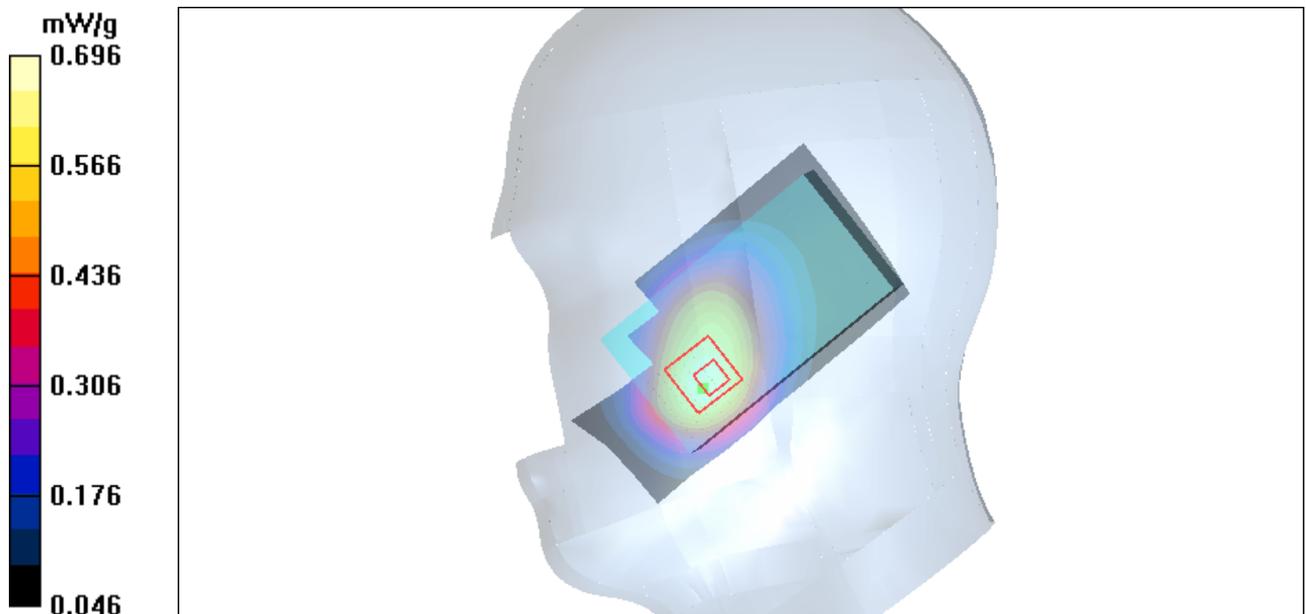Maximum value of SAR (measured) = 0.696 mW/g

Figure 48 Right Hand Touch Cheek WCDMA Band V Channel 4183

WCDMA Band V Right Cheek Low

Date/Time: 4/13/2010 12:23:13 AM

Communication System: WCDMA Band V; Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.914 mho/m; ε_r = 42.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

Phantom section: Right Section

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.669 mW/g

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

Reference Value = 7.35 V/m; Power Drift = 0.100 dB

Peak SAR (extrapolated) = 0.855 W/kg

SAR(1 g) = 0.622 mW/g; SAR(10 g) = 0.435 mW/g

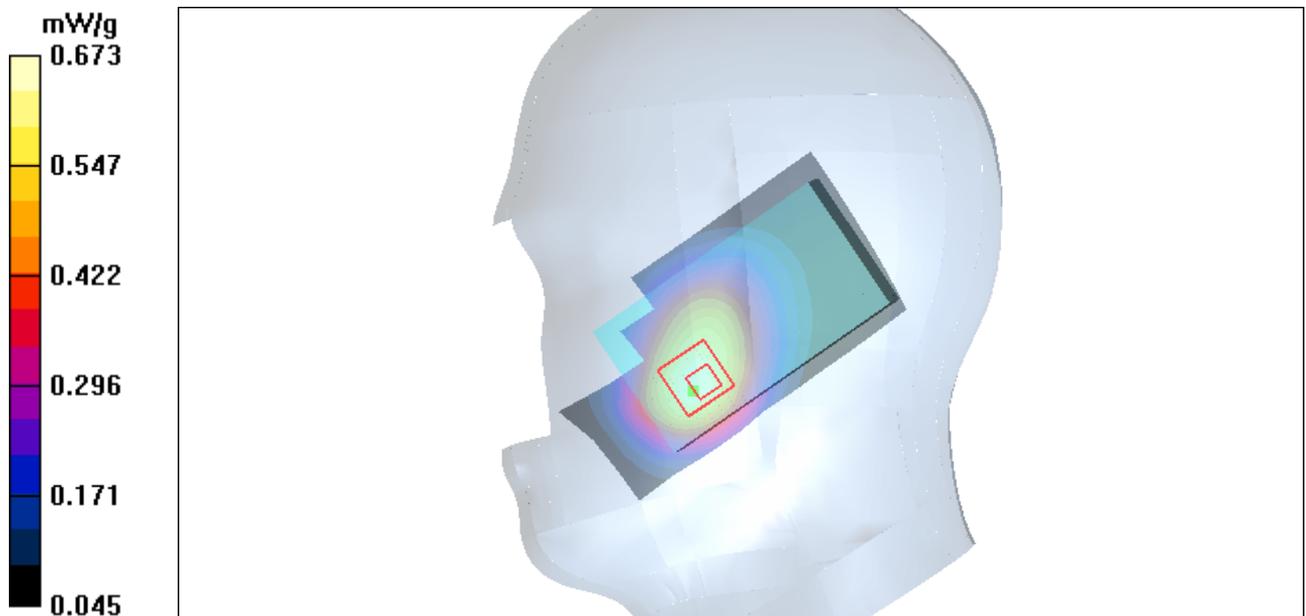Maximum value of SAR (measured) = 0.673 mW/g

Figure 49 Right Hand Touch Cheek WCDMA Band V Channel 4132

WCDMA Band V Right Tilt Middle

Date/Time: 4/19/2010 6:25:08 PM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.924 mho/m; $ε_r$ = 42.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

Phantom section: Right Section

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.299 mW/g

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

Reference Value = 11.5 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 0.359 W/kg

SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.216 mW/g

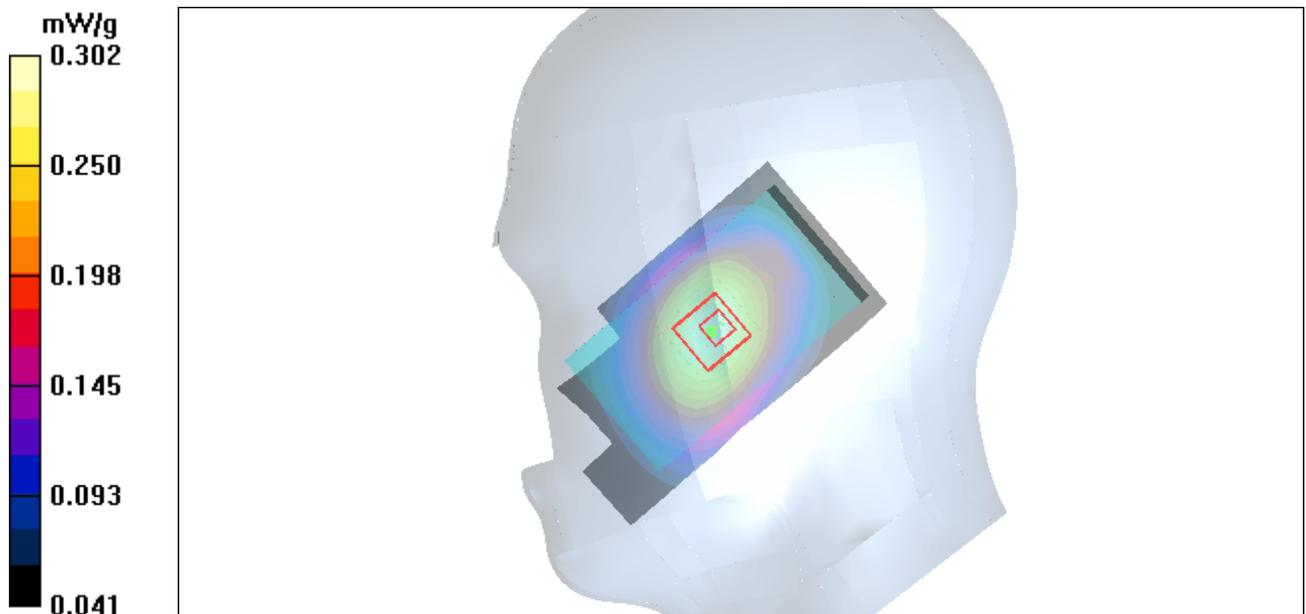Maximum value of SAR (measured) = 0.302 mW/g

Figure 50 Right Hand Tilt 15° WCDMA Band V Channel 4183

WCDMA Band V Towards Ground High

Date/Time: 4/13/2010 11:43:29 AM

Communication System: WCDMA Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 847 MHz; σ = 1 mho/m; $ε_r$ = 53.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

Measurement SW: DASY4, 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) = 0.588 mW/g

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

Reference Value = 11 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 0.723 W/kg

SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.388 mW/g

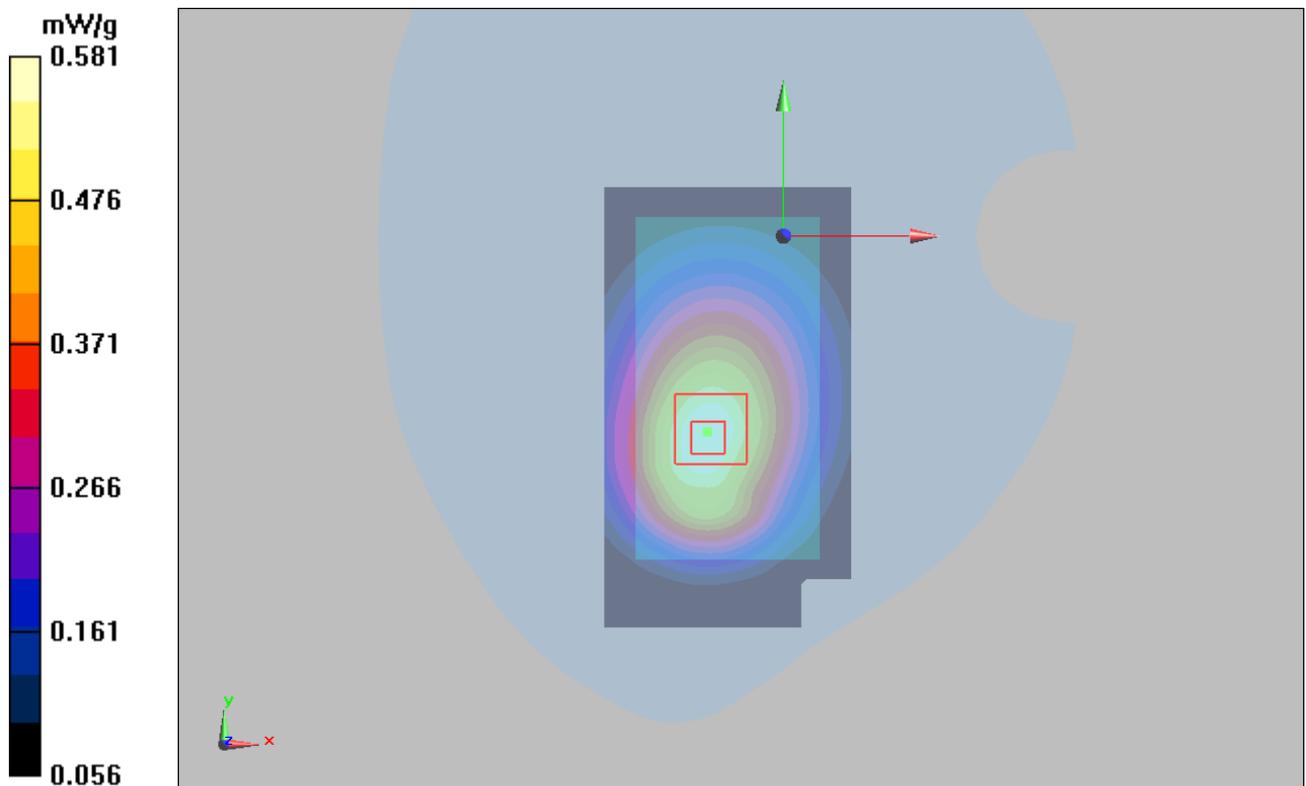Maximum value of SAR (measured) = 0.581 mW/g

Figure 51 Body, Towards Ground, WCDMA Band V Channel 4233

WCDMA Band V Towards Ground Middle

Date/Time: 4/13/2010 9:30:36 AM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.995 mho/m; ε_r = 54; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

Measurement SW: DASY4, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

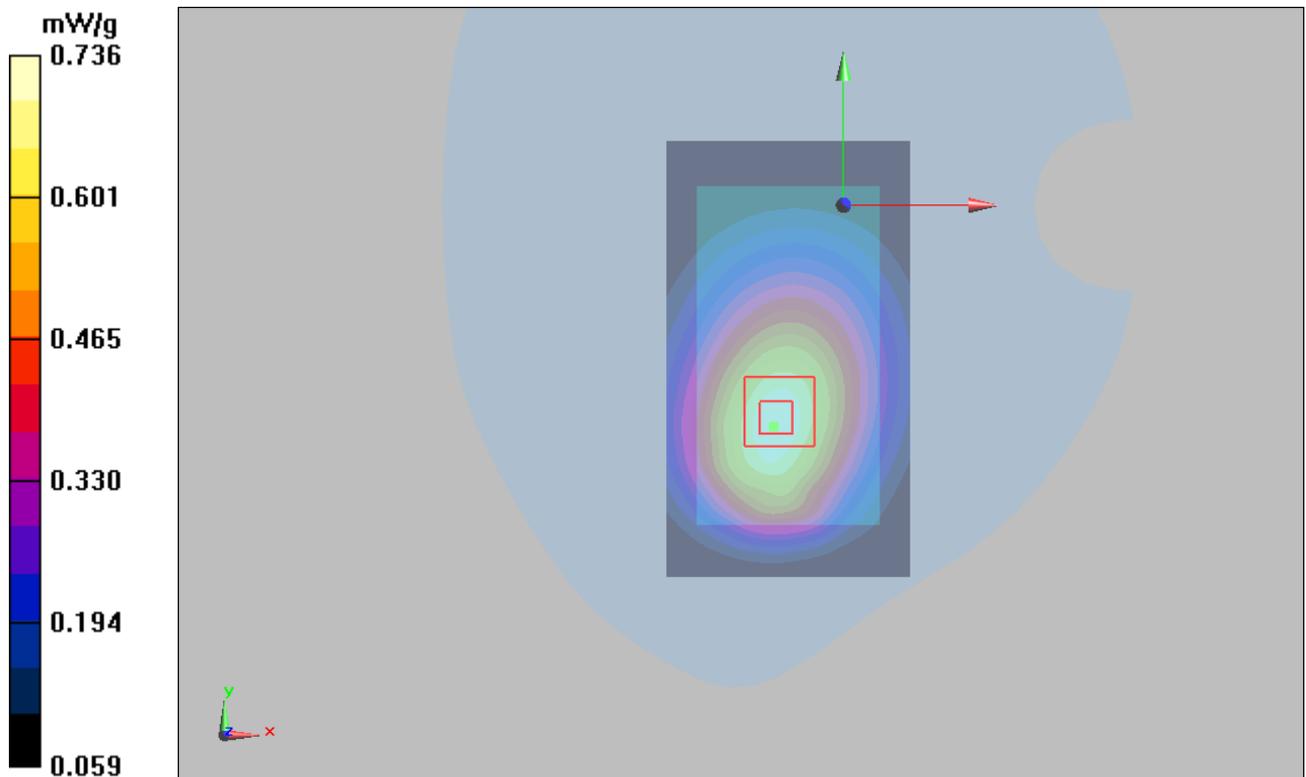Maximum value of SAR (interpolated) = 0.735 mW/g

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

Reference Value = 10.5 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 0.908 W/kg

SAR(1 g) = 0.692 mW/g; SAR(10 g) = 0.490 mW/g

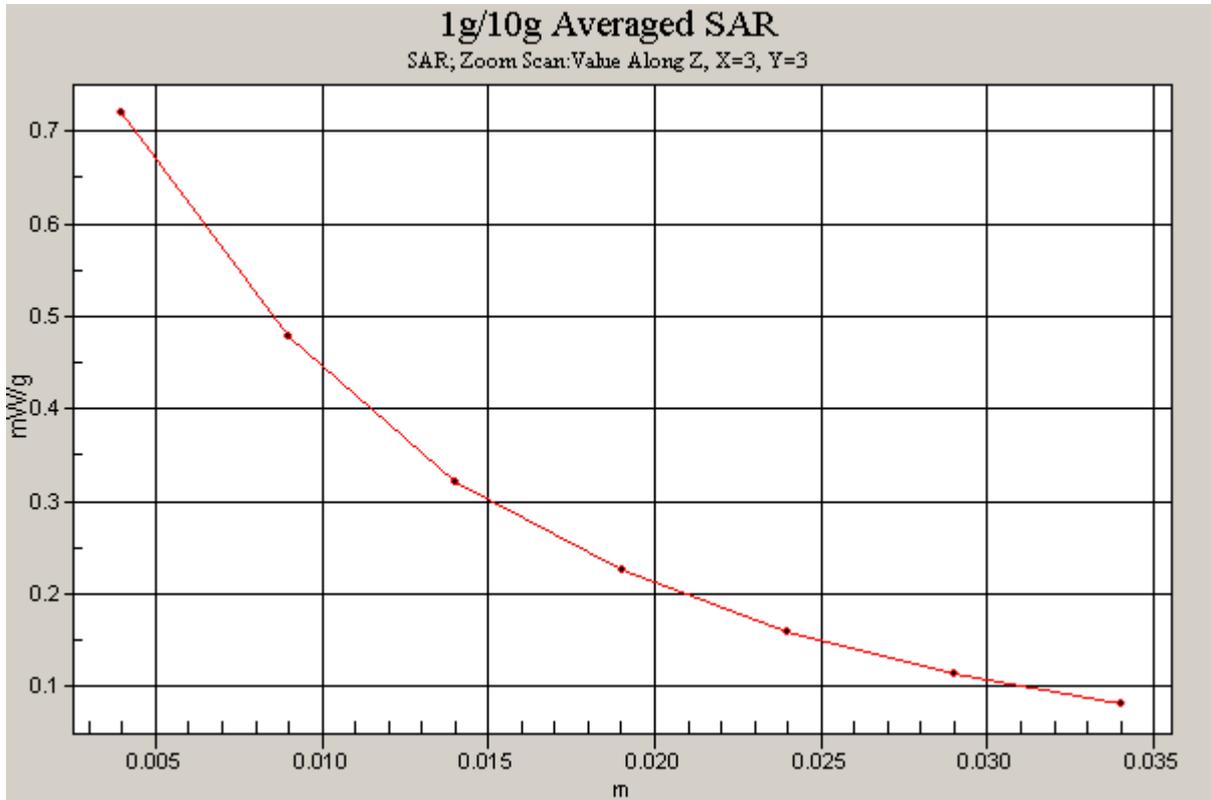Maximum value of SAR (measured) = 0.736 mW/g

Figure 52 Body, Towards Ground, WCDMA Band V Channel 4183

WCDMA Band V Towards Ground Low

Date/Time: 4/13/2010 12:09:17 PM

Communication System: WCDMA Band V; Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.984 mho/m; $ε_r$ = 54.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

Measurement SW: DASY4, 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) = 0.575 mW/g

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

Reference Value = 10.6 V/m; Power Drift = 0.039 dB

Peak SAR (extrapolated) = 0.722 W/kg

SAR(1 g) = 0.546 mW/g; SAR(10 g) = 0.386 mW/g
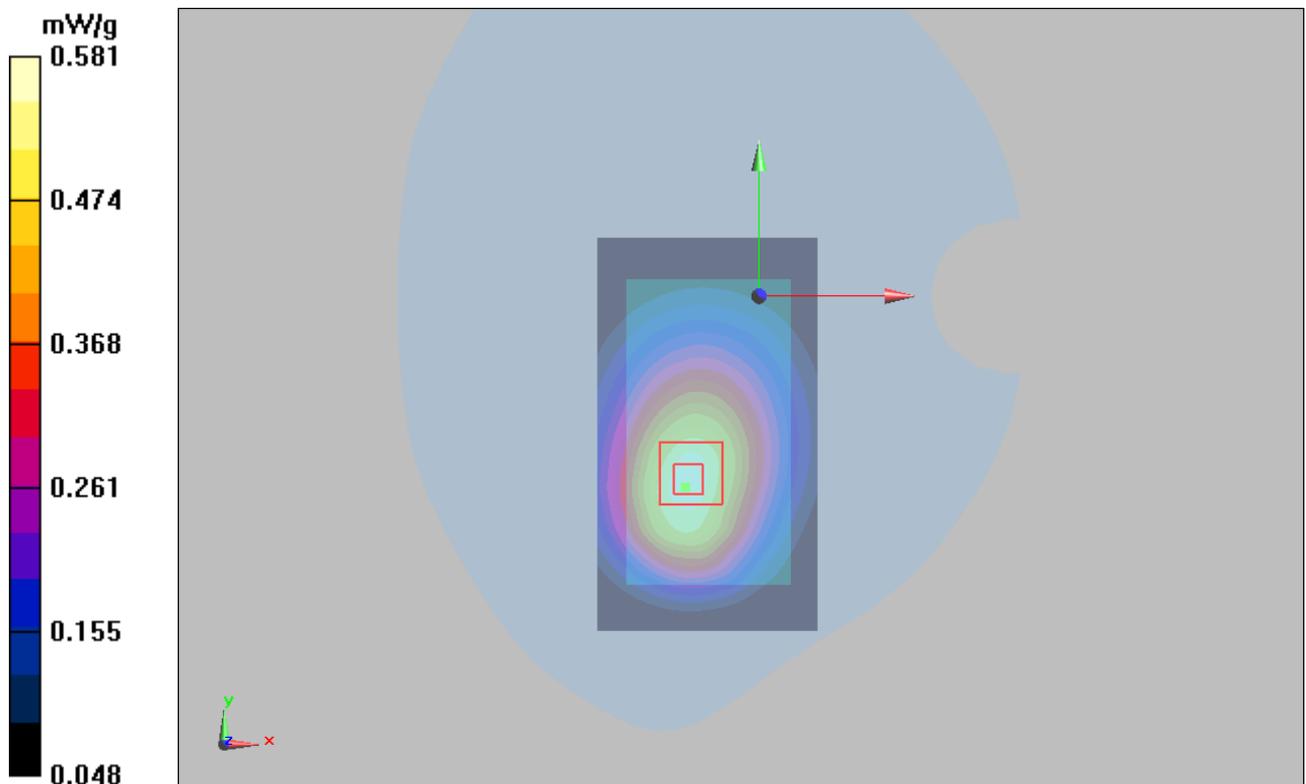
Maximum value of SAR (measured) = 0.581 mW/g

Figure 53 Body, Towards Ground, WCDMA Band V Channel 4132

WCDMA Band V Towards Phantom Middle

Date/Time: 4/13/2010 10:55:24 AM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.995 mho/m; ε_r = 54; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

Measurement SW: DASY4, 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) = 0.423 mW/g

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

Reference Value = 9.31 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 0.505 W/kg

SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.292 mW/g
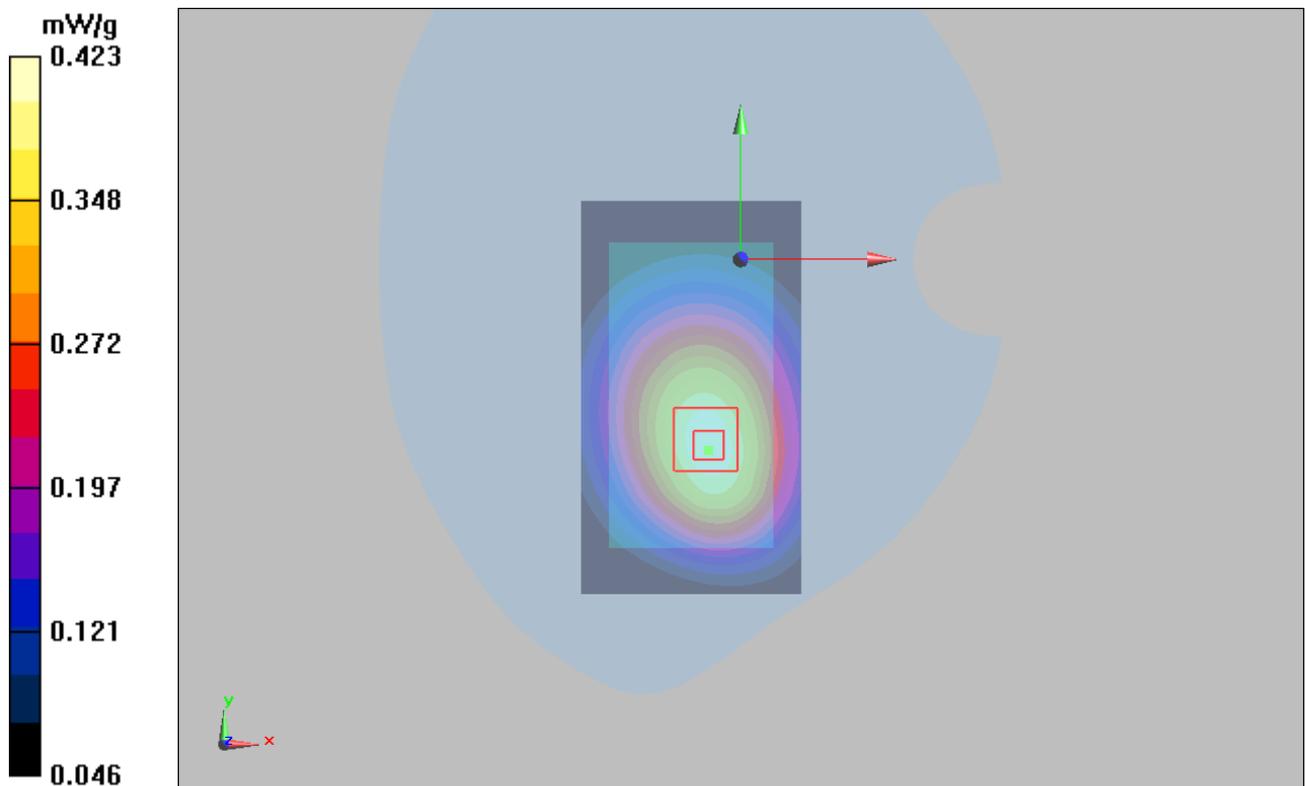
Maximum value of SAR (measured) = 0.423 mW/g

Figure 54 Body, Towards Phantom, WCDMA Band V Channel 4183

WCDMA Band V with Earphone Towards Ground Middle

Date/Time: 4/13/2010 12:57:50 PM

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.995 mho/m; ε_r = 54; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

Measurement SW: DASY4, 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) = 0.415 mW/g

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

Reference Value = 5.53 V/m; Power Drift = 0.101 dB

Peak SAR (extrapolated) = 0.560 W/kg

SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.264 mW/g
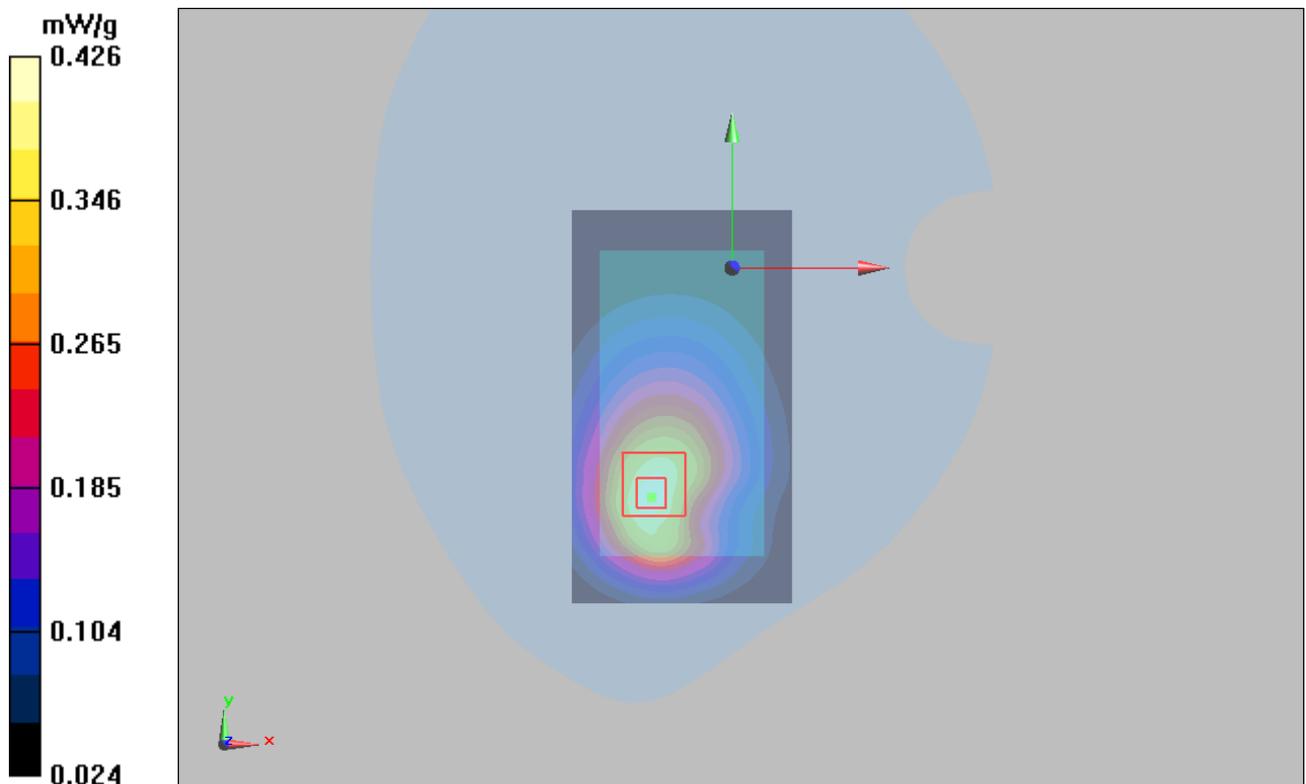
Maximum value of SAR (measured) = 0.426 mW/g

Figure 55 Body, Towards Ground, WCDMA Band V Channel 4183

WCDMA Band V+HSDPA Towards Ground Middle

Date/Time: 4/13/2010 8:37:48 AM

Communication System: WCDMA Band V+HSDPA; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.995 mho/m; ε_r = 54; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY4 Configuration:

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

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

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

Measurement SW: DASY4, 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) = 0.648 mW/g

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

Reference Value = 9.52 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 0.806 W/kg

SAR(1 g) = 0.605 mW/g; SAR(10 g) = 0.427 mW/g

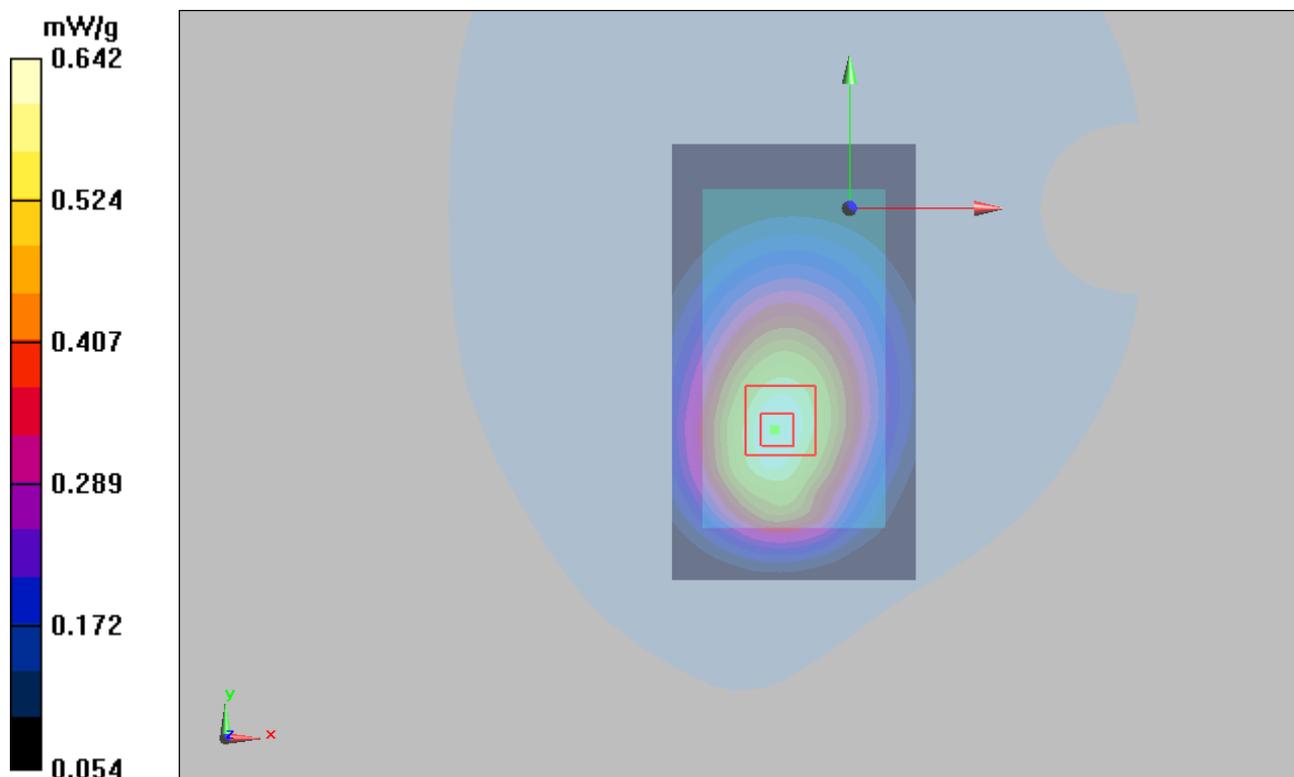Maximum value of SAR (measured) = 0.642 mW/g

Figure 56 Body, Towards Ground, WCDMA Band V HSDPA Channel 4183

ANNEX D: Probe EX3DV4 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)   Accreditation No.: SCS 108
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client   **TA (Auden)**   Certificate No: **EX3-3677_Sep09**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3677
Calibration procedure(s)	QA CAL-01.v6, QA CAL-12.v5, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	September 23, 2009
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 23, 2009

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

Certificate No: EX3-3677_Sep09   Page 1 of 9

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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	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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).

- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.

- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.

- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.

- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.

- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

EX3DV4 SN:3677   **September 23, 2009**

Probe EX3DV4

SN:3677

Manufactured:	September 9, 2008
Last calibrated:	November 7, 2008
Recalibrated:	September 23, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV4 SN:3677

September 23, 2009

DASY - Parameters of Probe: EX3DV4 SN:3677

Sensitivity in Free Space[A]

NormX	$0.42 \pm 10.1\%$	$\mu V/(V/m)^2$
NormY	$0.47 \pm 10.1\%$	$\mu V/(V/m)^2$
NormZ	$0.40 \pm 10.1\%$	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	91 mV
DCP Y	92 mV
DCP Z	93 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL   **900 MHz**   **Typical SAR gradient: 5 % per mm**

		2.0 mm	3.0 mm
Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR_{be} [%]	Without Correction Algorithm	8.2	4.4
SAR_{be} [%]	With Correction Algorithm	0.8	0.5

TSL   **1750 MHz**   **Typical SAR gradient: 10 % per mm**

		2.0 mm	3.0 mm
Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR_{be} [%]	Without Correction Algorithm	7.5	3.9
SAR_{be} [%]	With Correction Algorithm	0.8	0.4

Sensor Offset

Probe Tip to Sensor Center   **1.0** mm

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

EX3DV4 SN:3677   **September 23, 2009**

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)
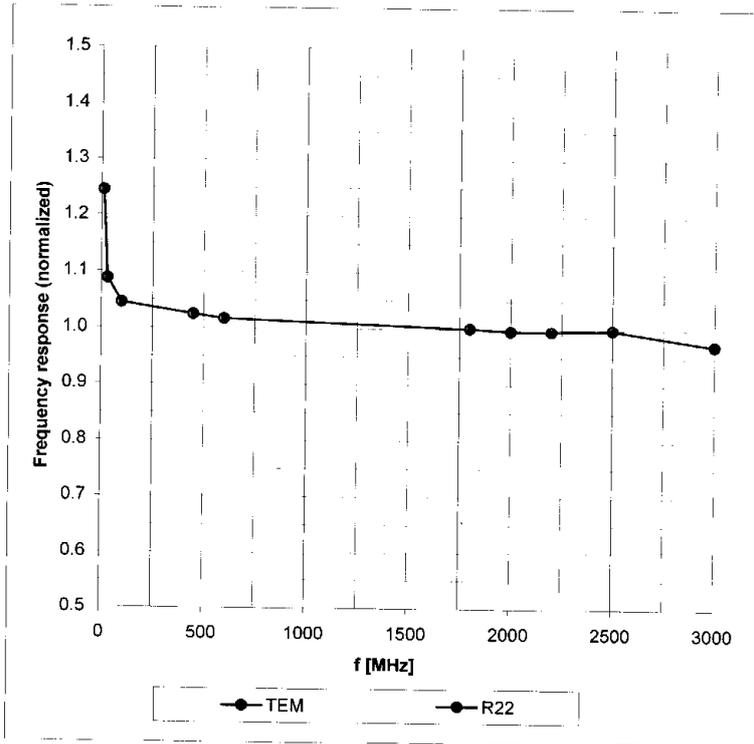
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

EX3DV4 SN:3677

September 23, 2009

Receiving Pattern (φ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX

f = 1800 MHz, WG R22
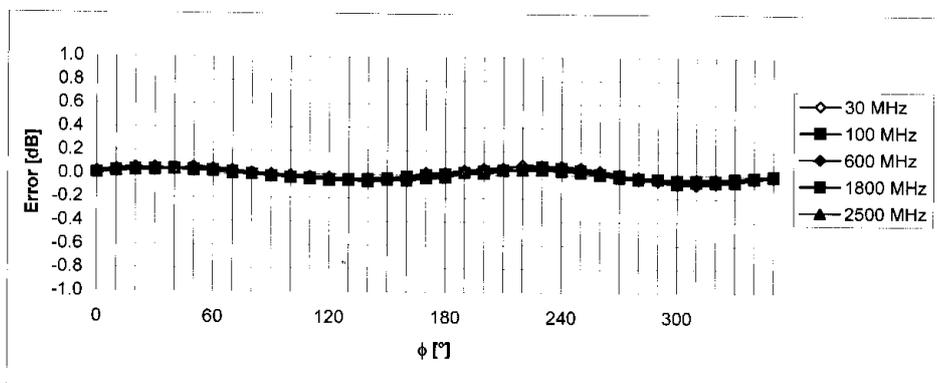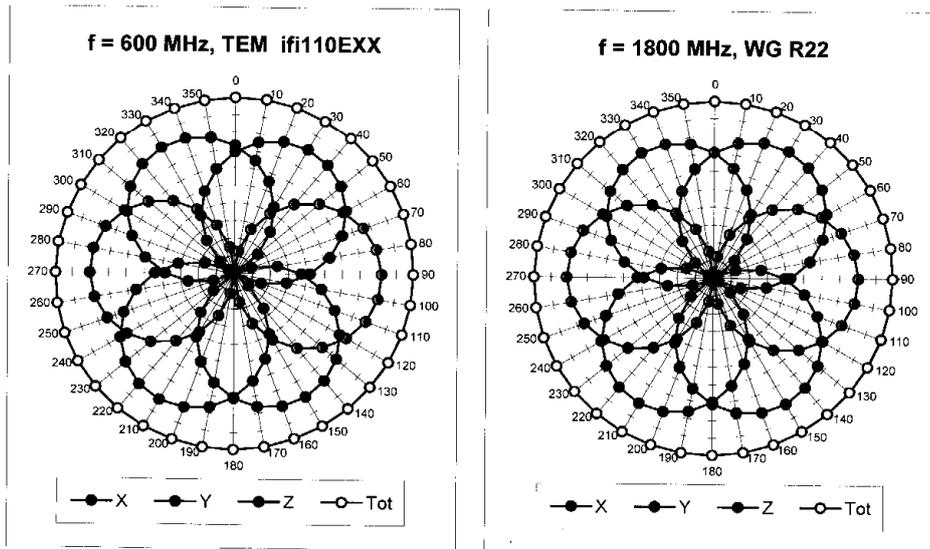
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4 SN:3677

September 23, 2009

Dynamic Range f(SAR$_{head}$)
(Waveguide R22, f = 1800 MHz)

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

EX3DV4 SN:3677   **September 23, 2009**

Conversion Factor Assessment

f = 900 MHz, WGLS R9 (head)   f = 1750 MHz, WGLS R22 (head)

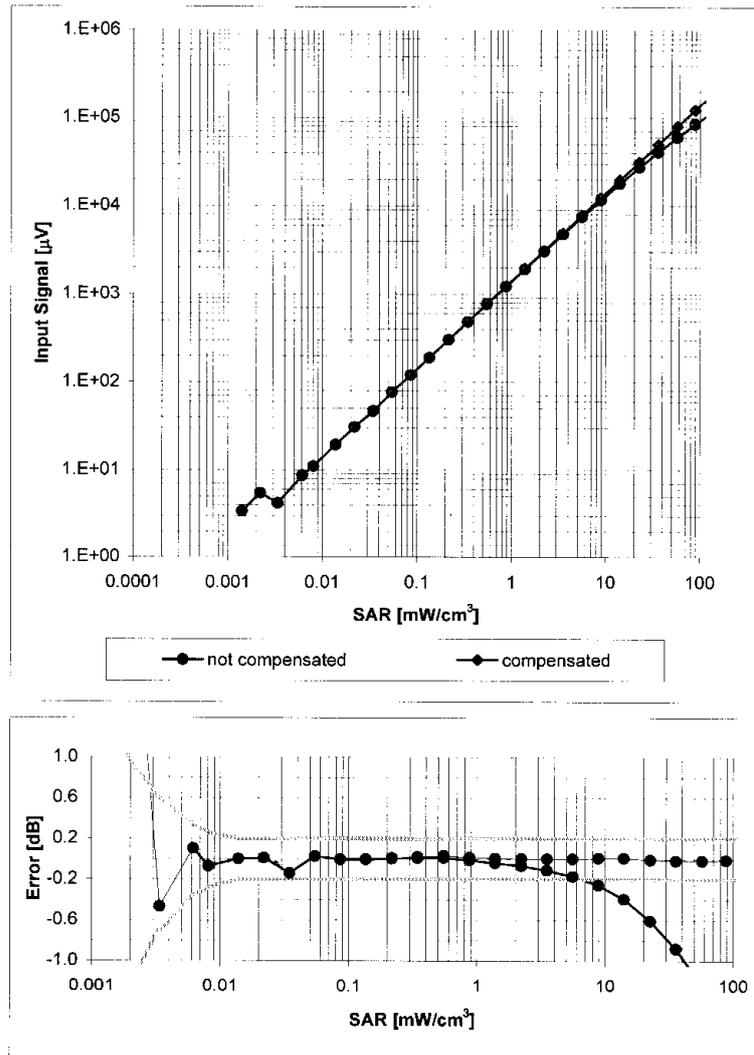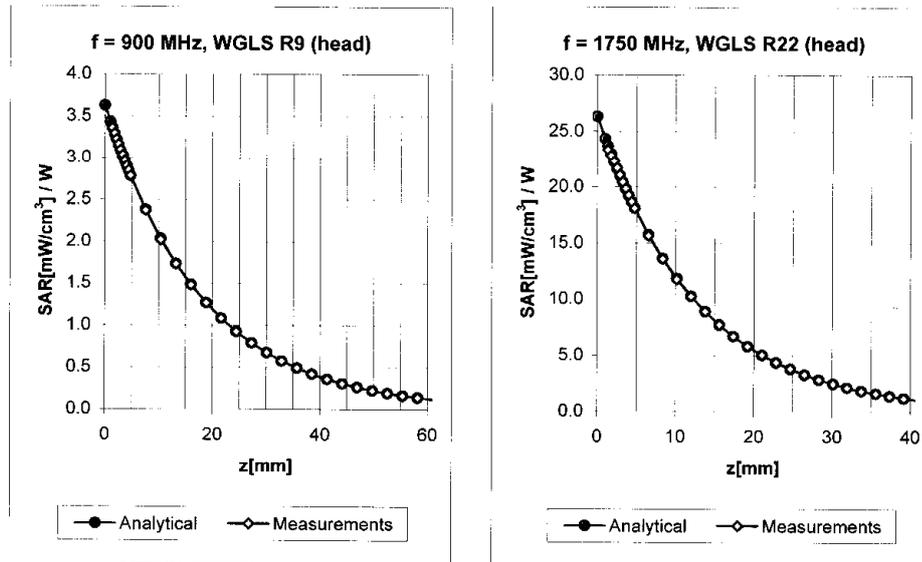| f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.68	0.64	9.20	± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.71	0.62	8.91	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.68	0.62	8.04	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.70	0.60	7.53	± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.32	0.49	10.43	± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.54	0.73	9.11	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.63	0.71	8.89	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.55	0.74	7.70	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.30	1.01	7.62	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.56	0.68	7.28	± 11.0% (k=2)

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

EX3DV4 SN:3677

September 23, 2009

Deviation from Isotropy in HSL
Error (ϕ, ϑ), f = 900 MHz

■-1.00--0.80 ■-0.80--0.60 ■-0.60--0.40 ■-0.40--0.20 ■-0.20-0.00
□0.00-0.20 ■0.20-0.40 ▨0.40-0.60 ■0.60-0.80 ■0.80-1.00
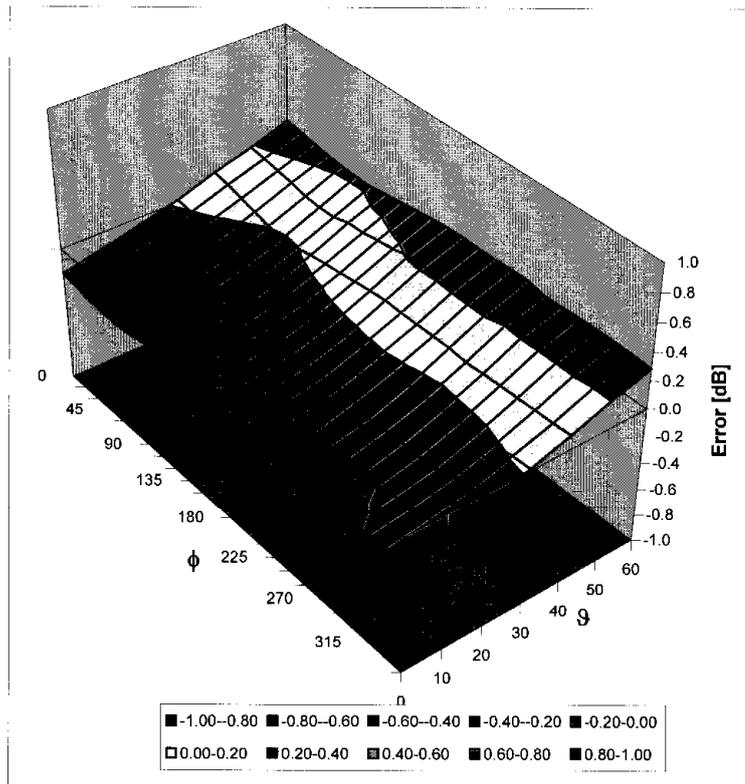
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

ANNEX E: D835V2 Dipole Calibration Certificate

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

ilac-MRA

SWISS CALIBRATION

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Accreditation No.: SCS 108

Client **ATL (Auden)**

Certificate No: **D835V2-4d082_Jul09**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d082
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	July 13, 2009
Condition of the calibrated item	In Tolerance

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-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: July 13, 2009

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

Certificate No: D835V2-4d082_Jul09   Page 1 of 9

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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.

- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.

- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.

- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.

- *SAR measured:* SAR measured at the stated antenna input power.

- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.

- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D835V2-4d082_Jul09   Page 2 of 9

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.4 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(22.2 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 mW / g
SAR normalized	normalized to 1W	9.68 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	9.71 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	6.34 mW /g ± 16.5 % (k=2)

---

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.0 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.56 mW / g
SAR normalized	normalized to 1W	10.2 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**10.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.68 mW / g
SAR normalized	normalized to 1W	6.72 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.61 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω - 2.5 jΩ
Return Loss	- 29.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 4.3 jΩ
Return Loss	- 26.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.390 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 17, 2008

DASY5 Validation Report for Head TSL

Date/Time: 13.07.2009 11:31:45

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 40.5; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 07.03.2009

- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45
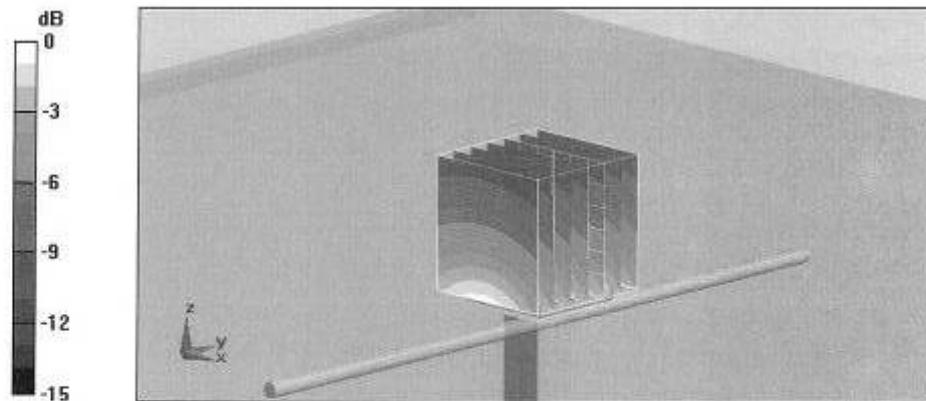
Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.4 V/m; Power Drift = 0.00639 dB
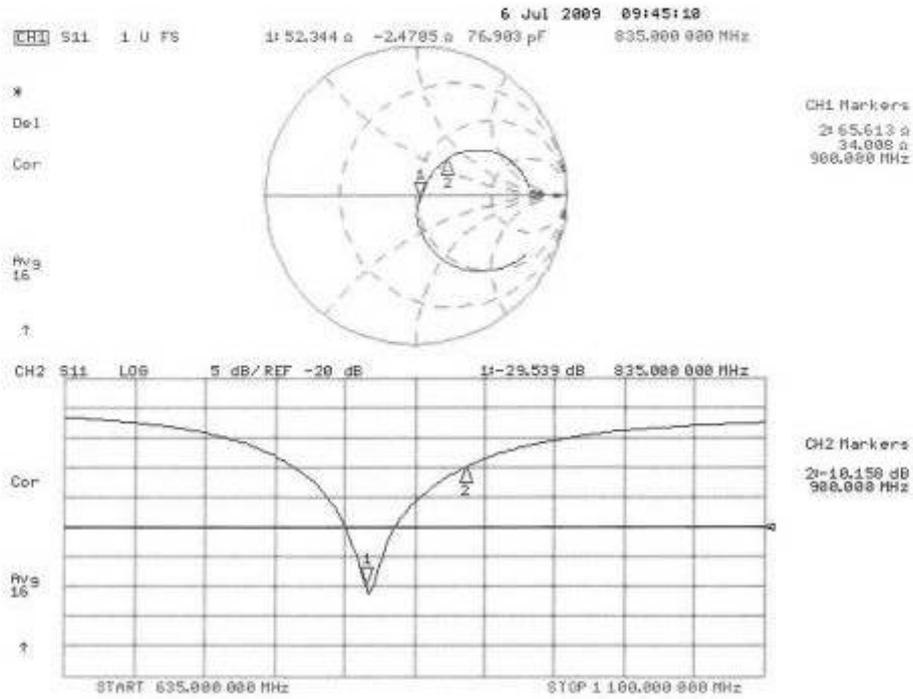Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g
Maximum value of SAR (measured) = 2.8 mW/g

0 dB = 2.8mW/g

Impedance Measurement Plot for Head TSL

DASY5 Validation Report for Body TSL

Date/Time: 13.07.2009 11:50:13

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.79, 5.79, 5.79); Calibrated: 30.04.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 07.03.2009

- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45
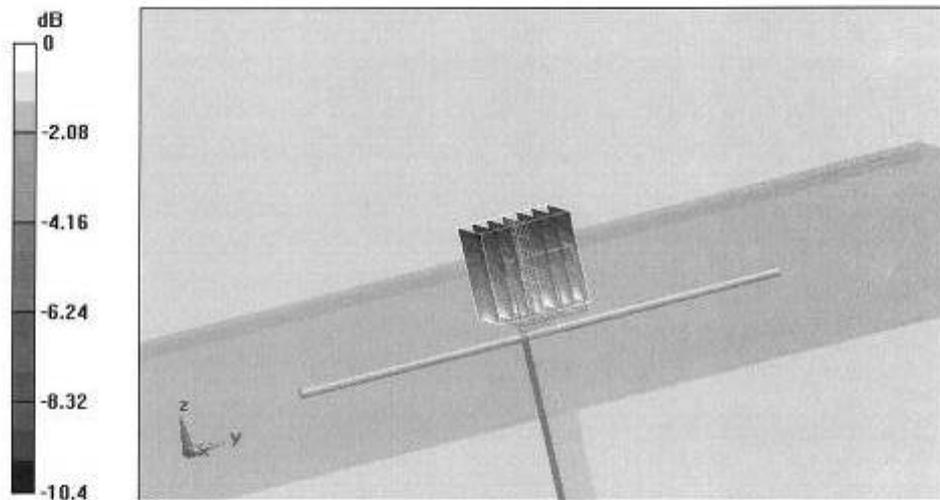
Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.4 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 3.76 W/kg
SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.68 mW/g
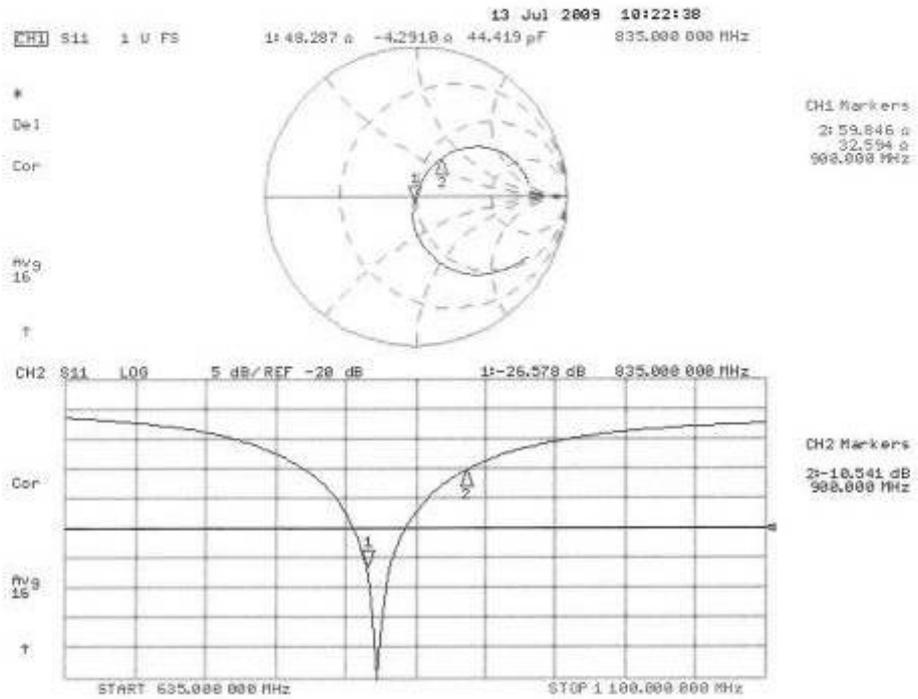Maximum value of SAR (measured) = 2.97 mW/g

0 dB = 2.97mW/g

Impedance Measurement Plot for Body TSL

ANNEX F: D1900V2 Dipole Calibration Certificate

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Accreditation No.: **SCS 108**

Client   **Auden**

Certificate No: **D1900V2-5d018-Jun09**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d018
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	June 26, 2009
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: June 29, 2009

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Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich. Switzerland

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.

- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.

- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.

- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.

- *SAR measured:* SAR measured at the stated antenna input power.

- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.

- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	1.42 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	10.3 mW / g
SAR normalized	normalized to 1W	41.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	41.1 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.38 mW / g
SAR normalized	normalized to 1W	21.5 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	21.5 mW / g ± 16.5 % (k=2)

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.9 ± 6 %	1.55 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 0.2) °C	---	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.5 mW / g
SAR normalized	normalized to 1W	42.0 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**41.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.52 mW / g
SAR normalized	normalized to 1W	22.1 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**22.0 mW / g ± 16.5 % (k=2)**

---

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$51.8\ \Omega + 2.7\ j\Omega$
Return Loss	- 29.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$46.6\ \Omega + 4.3\ j\Omega$
Return Loss	- 24.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 04, 2002

DASY5 Validation Report for Head TSL

Date/Time: 26.06.2009 13:05:15

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U11 BB
Medium parameters used: f = 1900 MHz; σ = 1.42 mho/m; ε_r = 41; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.88, 4.88, 4.88); Calibrated: 30.04.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 07.03.2009

- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

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

Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0 mm, probe 0deg) (7x7x7)/Cube 0:
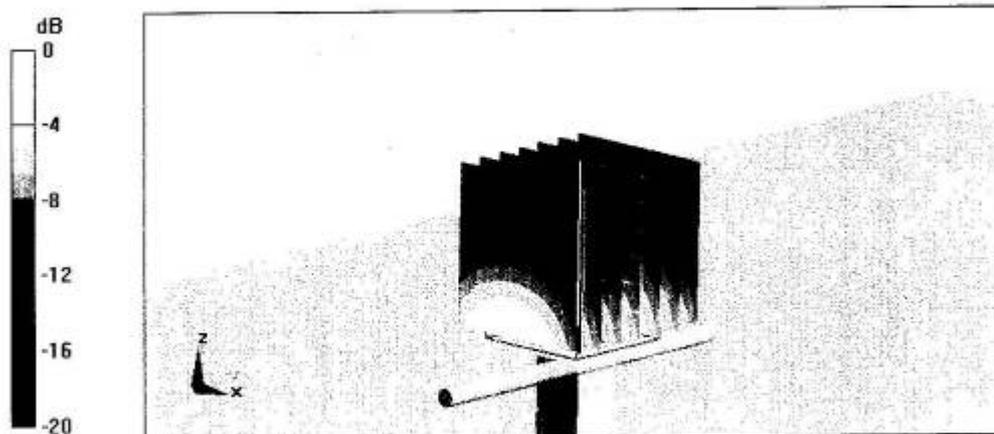Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.6 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.38 mW/g
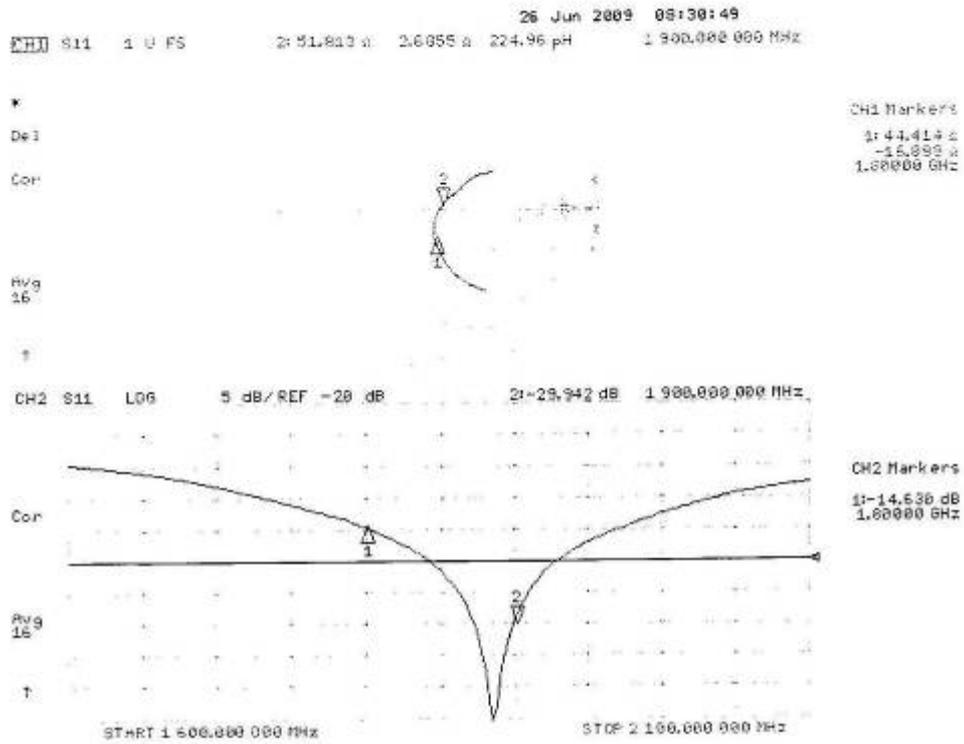Maximum value of SAR (measured) = 12.6 mW/g

0 dB = 12.6mW/g

Impedance Measurement Plot for Head TSL

DASY5 Validation Report for Body TSL

Date/Time: 26.06.2009 14:30:50

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB
Medium parameters used: f = 1900 MHz; σ = 1.55 mho/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.46, 4.46, 4.46); Calibrated: 30.04.2009

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 07.03.2009

- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

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

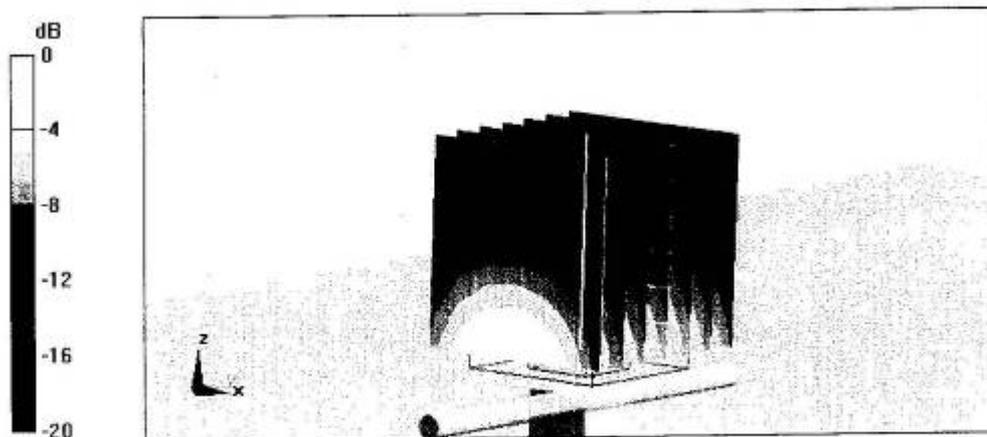**Pin = 250 mW; dip = 10 mm/Zoom Scan (dist=3.0mm, probe 0deg) (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.8 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.52 mW/g
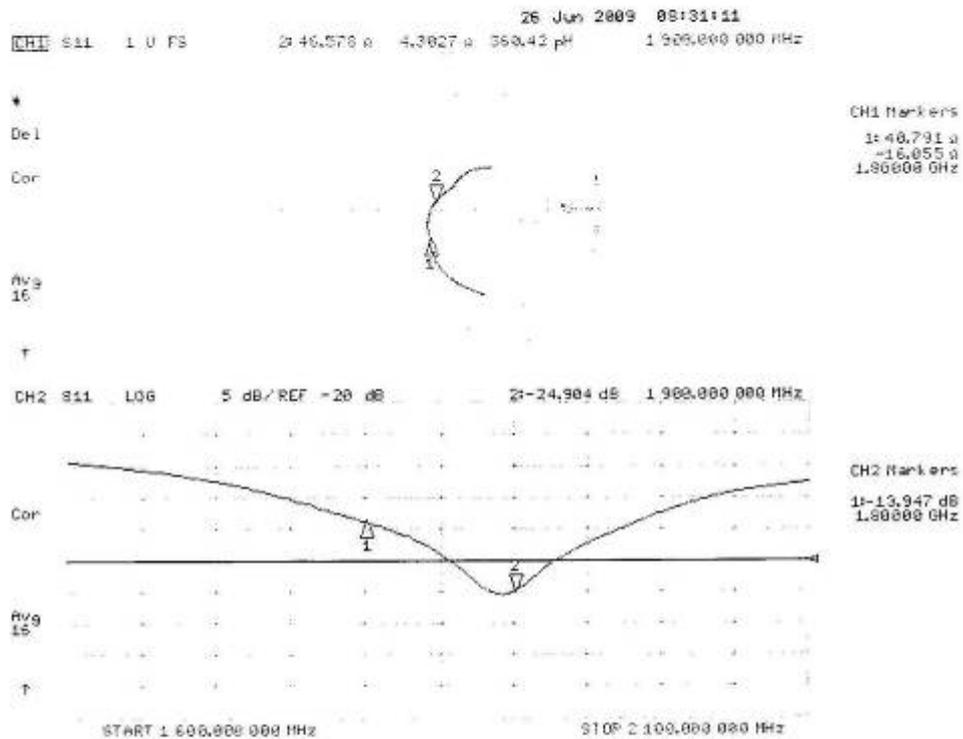Maximum value of SAR (measured) = 13.3 mW/g

0 dB = 13.3mW/g

Impedance Measurement Plot for Body TSL

ANNEX G: DAE4 Calibration Certificate

Calibration Laboratory of
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ilac-MRA

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Accreditation No.: **SCS 108**

Client   **TA – SH (Auden)**   Certificate No: **DAE4-871_Nov09**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 871
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	November 11, 2009

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	05-Jun-09 (in house check)	In house check: Jun-10

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

Issued: November 11, 2009

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Certificate No: DAE4-871_Nov09   Page 1 of 5

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Accreditation No.: **SCS 108**

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Glossary

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

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.

    - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.

    - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.

    - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.

    - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage

    - *Input Offset Measurement:* Output voltage and statistical results over a large number of zero voltage measurements.

    - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.

    - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.

    - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.

    - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1µV ,	full range =	-100…+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1…….+3mV

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

Calibration Factors	X	Y	Z
High Range	404.813 ± 0.1% (k=2)	404.794 ± 0.1% (k=2)	405.237 ± 0.1% (k=2)
Low Range	3.98191 ± 0.7% (k=2)	3.98417 ± 0.7% (k=2)	3.98912 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	90.0 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	199994.0	1.84	0.00
Channel X	+ Input	19999.85	0.05	0.00
Channel X	- Input	-19997.97	1.83	-0.01
Channel Y	+ Input	200010.3	-3.71	-0.00
Channel Y	+ Input	19999.12	-0.48	-0.00
Channel Y	- Input	-20000.18	-0.78	0.00
Channel Z	+ Input	200010.2	-2.80	-0.00
Channel Z	+ Input	19998.54	-0.86	-0.00
Channel Z	- Input	-19999.82	0.00	0.00

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2000.3	0.22	0.01
Channel X	+ Input	200.20	0.30	0.15
Channel X	- Input	-199.89	0.21	-0.10
Channel Y	+ Input	1999.8	-0.13	-0.01
Channel Y	+ Input	200.06	-0.04	-0.02
Channel Y	- Input	-200.43	-0.73	0.36
Channel Z	+ Input	1999.5	-0.57	-0.03
Channel Z	+ Input	199.58	-0.72	-0.36
Channel Z	- Input	-201.11	-1.01	0.51

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	13.79	12.75
	- 200	-12.26	-13.72
Channel Y	200	-11.82	-11.47
	- 200	10.67	10.68
Channel Z	200	-1.08	-1.35
	- 200	0.32	0.12

3. Channel separation

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

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	3.36	1.06
Channel Y	200	1.52	-	3.59
Channel Z	200	2.55	1.41	-

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	15928	16288
Channel Y	16188	15745
Channel Z	15790	16219

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.06	-3.43	1.18	0.52
Channel Y	-0.71	-2.66	0.96	0.57
Channel Z	-0.95	-1.94	0.04	0.41

6. Input Offset Current

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

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.1999	204.4
Channel Y	0.1999	203.6
Channel Z	0.1999	203.8

8. Low Battery Alarm Voltage (verified during pre test)

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

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	−0.01	-8	-9

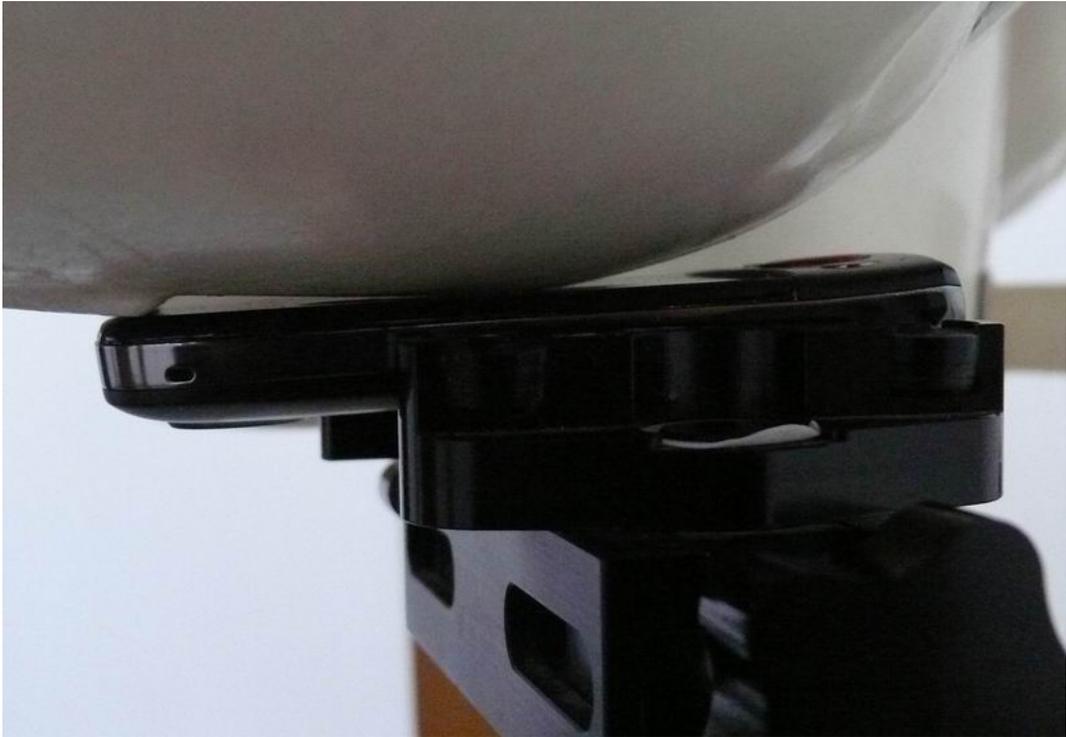## ANNEX H: The EUT Appearances and Test Configuration

Picture 6: Constituents of EUT
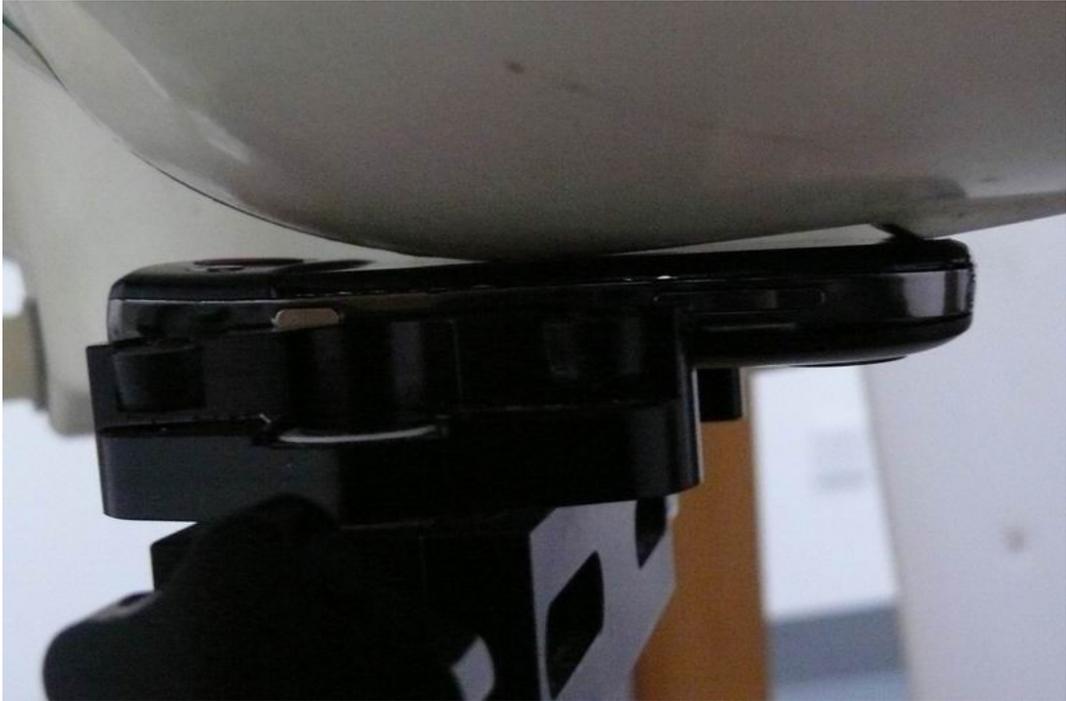
Picture 7: Left Hand Touch Cheek Position

Picture 8: Left Hand Tilt 15 Degree Position

Picture 9: Right Hand Touch Cheek Position

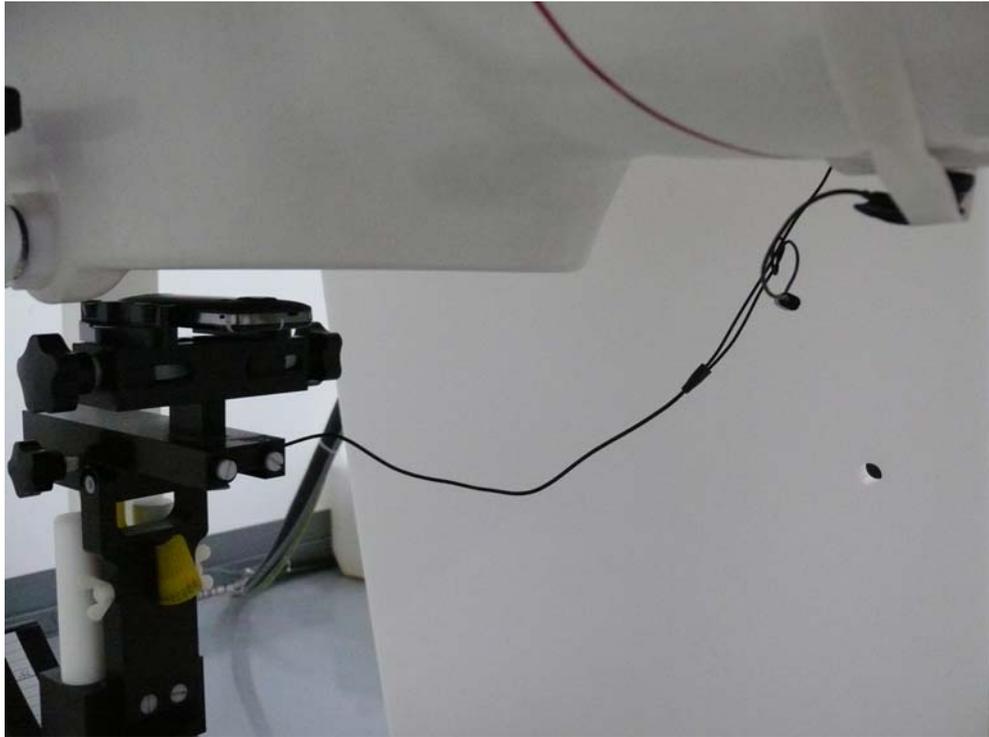Picture 10: Right Hand Tilt 15 Degree Position

Picture 11: Body, The EUT display towards ground, the distance from handset to the bottom of the Phantom is 15mm

Picture 12: Body, The EUT display towards phantom, the distance from handset to the bottom of the Phantom is 15mm

Picture 13: Body with earphone, The EUT display towards ground, the distance from handset to the bottom of the Phantom is 15mm