



OET 65

TEST REPORT

Product Name	HSPA USB Stick
Model	K3772
FCC ID	QISK3772
Client	Huawei Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.

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GENERAL SUMMARY

Product Name	HSPA USB Stick	Model	K3772
FCC ID	QISK3772		
Report No.	RZA1111-1953SAR01		
Client	Huawei Technologies Co., Ltd.		
Manufacturer	Huawei Technologies Co., Ltd.		
Reference Standard(s)	<p>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.</p> <p>SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001 including DA 02-1438, published June 2002: Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio frequency Emissions.</p> <p>RSS-102 Issue 4 March 2010: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands).</p> <p>KDB 447498 D02 SAR Procedures for Dongle Xmtr v02: SAR Measurement Procedures for USB Dongle Transmitters.</p>		
Conclusion	<p>This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards.</p> <p>General Judgment: Pass</p> <p style="text-align: right;">(Stamp) Date of issue: December 5th, 2011</p>		
Comment	The test result only responds to the measured sample.		

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Director

Revised by 凌敏宝
SAR Manager

Performed by 杨如蔚
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1. General Information

1.1. Notes of the Test Report

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

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

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

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

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1.3. Applicant Information

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1.5. Information of EUT

General Information

Device Type:	Portable Device		
Exposure Category:	Uncontrolled Environment / General Population		
Product Name:	HSPA USB Stick		
IMEI:	861020000015137		
Hardware Version:	CH2E303SM		
Software Version:	22.157.04.00.5011		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Operating Mode(s):	GSM 850/ GSM 1900; (tested) GSM900/ GSM1800; (untested) WCDMA Band I/ WCDMA Band VIII; (untested)		
Test Modulation:	(GSM)GMSK; (WCDMA) QPSK		
Device Class:	B		
GPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
EGPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
Power Class:	GSM 850: 4, tested with power level 5		
	GSM 1900: 1, tested with power level 0		
Test Channel: (Low - Middle - High)	128 - 190 - 251	(GSM 850) (tested)	
	512 - 661 - 810	(GSM 1900) (tested)	
Operating Frequency Range(s):	Mode	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
Used Host Products:	IBM T61 Lenovo Y-450		

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Equipment Under Test (EUT) is a HSPA USB Stick. The EUT has a GSM/WCDMA antenna that is used for Tx/Rx. During SAR test of the EUT, it was connected to a portable computer. SAR is tested for the EUT respectively for GSM 850, and GSM 1900 in this report.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. The Maximum SAR_{1g} Values of Each Tested Mode

Body SAR Configuration

Mode	Channel	Position	Distance(mm)	SAR _{1g} (W/kg)
GPRS 850,1 Tx slot	High/251	Test Position 1	5	1.100
GPRS 1900,3 Tx slots	Low/512	Test Position 1	5	0.963

Extrapolated SAR Values of the highest measured SAR

Mode	Test Position	Channel	Measurement Result		Tune-up procedures MAX Power(dBm)	SAR _{1g} Limit 1.6 W/kg
			Conducted Power(dBm)	SAR _{1g} (W/kg)		Extrapolated Result (W/kg)
GPRS 850,1Txslot	Test Position 1	High/251	32.57	1.100	33	1.214
EGPRS 850,1Txslot	Test Position 1	High/251	32.58	1.090	33	1.201
GPRS 1900,3Txslots	Test Position 1	Low/512	25.11	0.963	26	1.182
EGPRS 1900,3Txslots	Test Position 1	Low/512	25.17	0.869	26	1.052

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1.7. The Maximum Conducted Power of Each Tested Mode

Mode		Maximum Burst Conducted Power (dBm)	Maximum Average Power (dBm)
GSM 850	GPRS(GMSK), 2 Txslots	30.62	24.6
	EGPRS(GMSK), 2 Txslots	30.62	24.6
GSM 1900	GPRS(GMSK), 2 Txslots	27.17	21.15
	EGPRS(GMSK), 2 Txslots	27.18	21.16

Note: The detail Power refers to Table 3 (Conducted Power Measurement Results).

1.8. Test Date

The test is performed from November 25, 2011 to December 2, 2011.

2. Operational Conditions during Test

2.1. General Description of Test Procedures

Connection to the EUT is established via air interface with E5515C, and the EUT is set to maximum output power by E5515C. Using E5515C the power level is set to “5” in SAR of GSM 850, set to “0” in SAR of GSM 1900. 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.

The measurements were performed in combination with two host products (IBM T61 and Lenovo Y-450). IBM T61 laptop has horizontal USB slot, Lenovo Y-450 laptop has vertical USB slot.

2.2. GSM Test Configuration

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

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

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

GSM 850

GPRS (GMSK) :

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

EGPRS(8PSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	1.5
3	4
4	6

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EGPRS(GMSK):

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

GSM 1900

GPRS (GMSK) :

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

EGPRS(8PSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	1.5
3	4
4	6

EGPRS(GMSK):

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

2.3. Test Positions

The measurements were performed in combination with two host products (IBM T61 and Lenovo Y-450). IBM T61 laptop has horizontal USB slot, Lenovo Y-450 laptop has vertical USB slot.

A test distance of 5mm or less, according to KDB 447498 D02, should be considered for the orientation that can satisfy such requirements.

For each channel, the EUT is tested at the following 5 test positions:

- Test Position 1: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT towards to the bottom of the flat phantom. The distance from back side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 6)
- Test Position 2: The EUT is connected to the portable computer through a 19 cm USB cable. The front side of the EUT towards the bottom of the flat phantom. The distance from front side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 7)
- Test Position 3: The EUT is connected to the portable computer with vertical USB slot. The top side of the EUT towards the bottom of the flat phantom. The distance from top side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 8)
- Test Position 4: The EUT is connected to the portable computer through a 19 cm USB cable. The left side of the EUT towards the bottom of the flat phantom. The distance from left side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 9)
- Test Position 5: The EUT is connected to the portable computer with vertical USB slot. The right side of the EUT towards the bottom of the flat phantom. The distance from right side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 10)

2.4. Picture of Host Product

During the test, IBM T61 and Lenovo Y-450 laptop were used as an assistant to help to setup communication. (See Picture 1)



Picture 1-a: IBM T61 Close



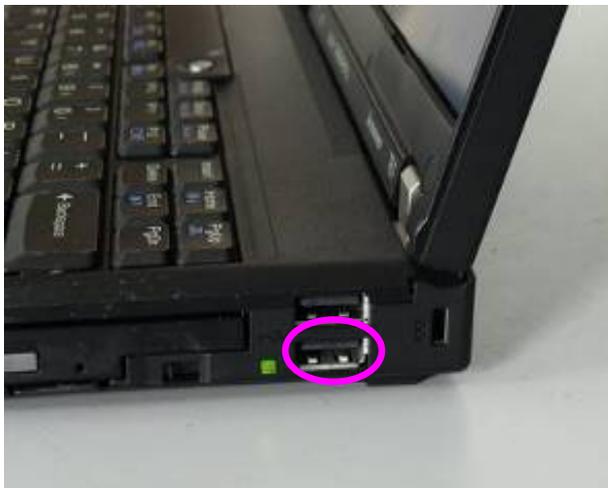
Picture 1-b: IBM T61 Open



Picture 1-c: Lenovo Y-450 Close



Picture 1-d: Lenovo Y-450 Open



Picture 1-e: IBM T61 with horizontal USB slot



Picture 1-f: Lenovo Y-450 with Vertical USB slot



Picture 1-g: a 19 cm USB cable

Picture 1: Computer as a test assistant

3. SAR Measurements System Configuration

3.1. SAR Measurement Set-up

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

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

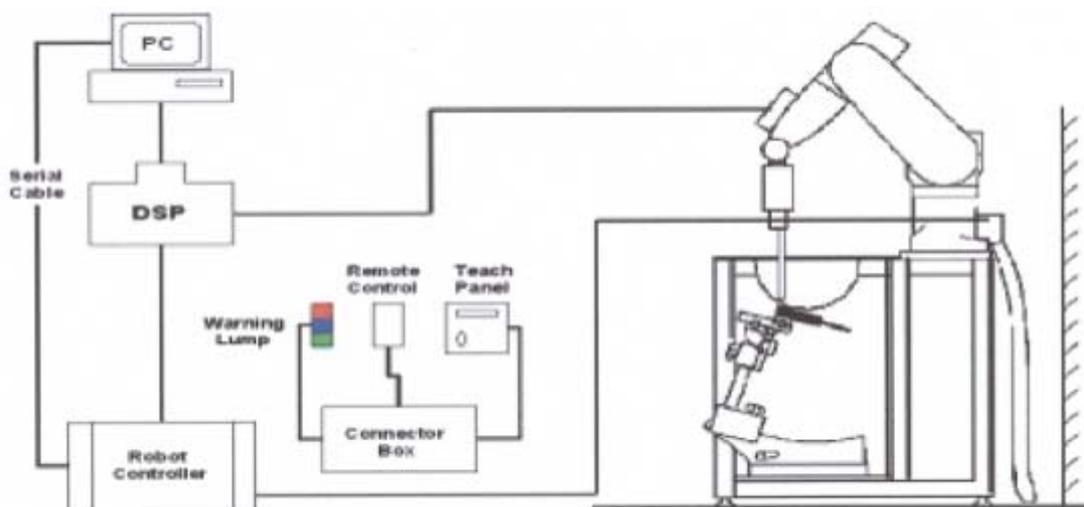


Figure 1. SAR Lab Test Measurement Set-up

3.2. DASY5 E-field Probe System

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

3.2.1. EX3DV4 Probe Specification

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



Figure 2. EX3DV4 E-field Probe



Figure 3. EX3DV4 E-field probe

3.2.2. E-field Probe Calibration

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

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

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

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

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

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

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

3.3. Other Test Equipment

3.3.1. Device Holder for Transmitters

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.) It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI4 and SAM v6.0 Phantoms.

Material: POM, Acrylic glass, Foam

3.3.2. Phantom

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

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



Figure 4. Generic Twin Phantom

3.4. Scanning Procedure

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

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

- **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 10 mm x 10 mm is set. During the scan the distance of the probe to the phantom remains

unchanged.

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

- **Zoom Scan**

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

- **Spatial Peak Detection**

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

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

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

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

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

3.5. Data Storage and Evaluation

3.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DA4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/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 DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

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

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

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

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

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

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

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

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

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)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.

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

with SAR = local specific absorption rate in mW/g

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

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

ρ = equivalent tissue density in g/cm³

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/cm²

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

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

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

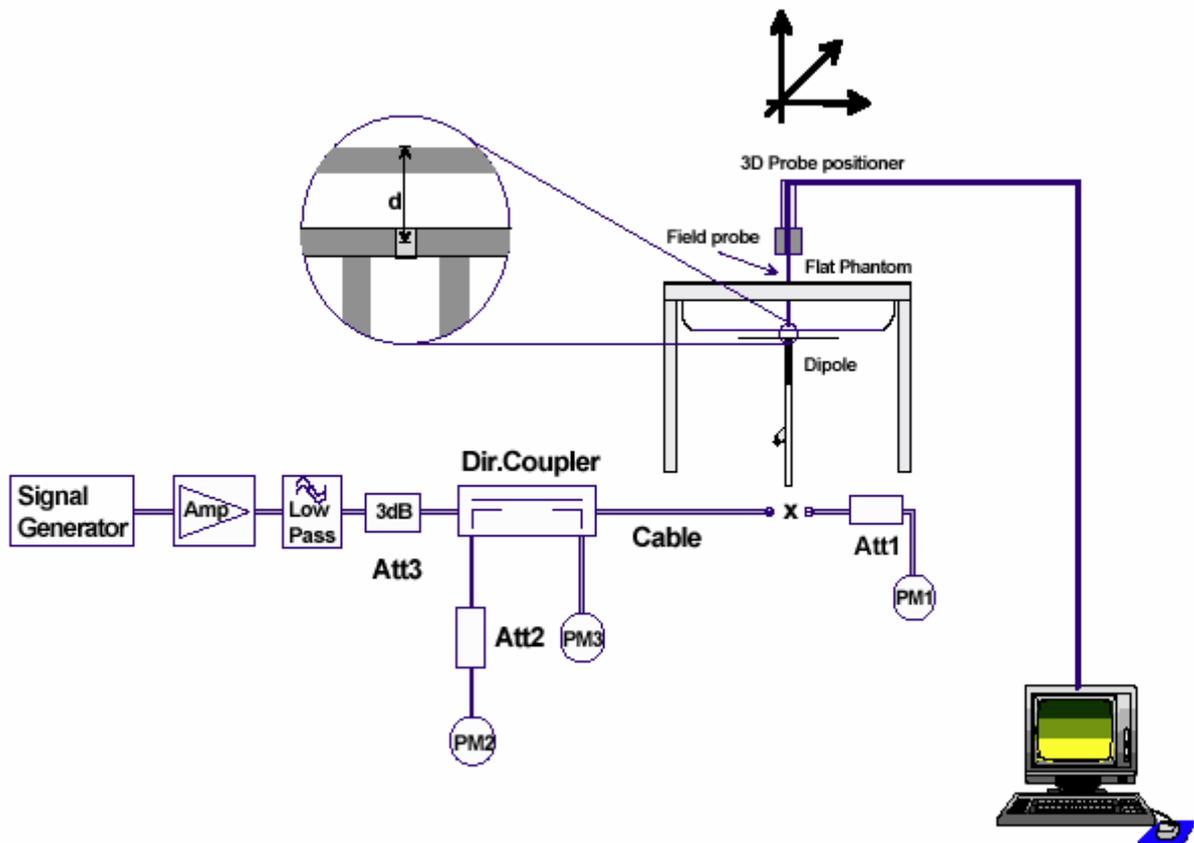


Figure 5. System Check Set-up

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3.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by OET 65.

Table 1: 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. Environmental Requirements

Table 2: The Requirements of the Ambient Conditions

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.

5.2. Applicable Measurement Standards

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

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

KDB 447498 D02 SAR Procedures for Dongle Xmtr v02: SAR Measurement Procedures for USB Dongle Transmitters.

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 3: Conducted Power Measurement Results

GSM 850		Conducted Power(dBm)				Average power(dBm)		
		Channel 128	Channel 190	Channel 251		Channel 128	Channel 190	Channel 251
GPRS (GMSK)	1TXslot	32.59	32.54	32.57	-9.03dB	23.56	23.51	23.54
	2TXslots	30.62	30.58	30.62	-6.02dB	24.6	24.56	24.6
	3TXslots	28.67	28.61	28.66	-4.26dB	24.41	24.35	24.4
	4TXslots	26.68	26.58	26.65	-3.01dB	23.67	23.57	23.64
EGPRS (GMSK)	1TXslot	32.61	32.53	32.58	-9.03dB	23.58	23.5	23.55
	2TXslots	30.61	30.58	30.62	-6.02dB	24.59	24.56	24.6
	3TXslots	28.66	28.6	28.65	-4.26dB	24.4	24.34	24.39
	4TXslots	26.69	26.58	26.66	-3.01dB	23.68	23.57	23.65
EGPRS (8PSK)	1TXslot	26.47	26.53	26.5	-9.03dB	17.44	17.5	17.47
	2TXslots	24.79	24.87	24.81	-6.02dB	18.77	18.85	18.79
	3TXslots	22.65	22.78	22.75	-4.26dB	18.39	18.52	18.49
	4TXslots	20.78	20.67	20.6	-3.01dB	17.77	17.66	17.59
GSM 1900		Conducted Power(dBm)				Average power(dBm)		
		Channel 512	Channel 661	Channel 810		Channel 512	Channel 661	Channel 810
GPRS (GMSK)	1TXslot	29.17	29.19	29.15	-9.03dB	20.14	20.16	20.12
	2TXslots	27.14	27.17	27.12	-6.02dB	21.12	21.15	21.1
	3TXslots	25.11	25.17	25.12	-4.26dB	20.85	20.91	20.86
	4TXslots	23.14	23.12	23.16	-3.01dB	20.13	20.11	20.15
EGPRS (GMSK)	1TXslot	29.19	29.2	29.14	-9.03dB	20.16	20.17	20.11
	2TXslots	27.12	27.14	27.18	-6.02dB	21.1	21.12	21.16
	3TXslots	25.17	25.18	25.15	-4.26dB	20.91	20.92	20.89
	4TXslots	23.14	23.18	23.12	-3.01dB	20.13	20.17	20.11
EGPRS (8PSK)	1TXslot	25.16	25.17	25.13	-9.03dB	16.13	16.14	16.1
	2TXslots	23.39	23.3	23.34	-6.02dB	17.37	17.28	17.32
	3TXslots	21.17	21.11	21.04	-4.26dB	16.91	16.85	16.78
	4TXslots	18.85	18.74	18.7	-3.01dB	15.84	15.73	15.69

Note:1) Division Factors

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

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

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

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

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

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

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

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

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

2) Average power numbers

The maximum power numbers are marks in bold.

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7. Test Results

7.1. Dielectric Performance

Table 4: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp °C
		ϵ_r	σ (s/m)	
824.2MHz (Low)	Target value ±5% window	55.24 52.48 — 58.00	0.97 0.92 — 1.02	/
	Measurement value 2011-12-1	54.3	0.97	21.5
836.6MHz (Middle)	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2011-12-1	54.3	0.98	21.5
848.8MHz (High)	Target value ±5% window	55.20 52.44 — 57.96	0.99 0.94 — 1.04	/
	Measurement value 2011-12-1	54.3	0.99	21.5
1850.2MHz (Low)	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2011-11-25	53.2	1.46	21.7
1880MHz (Middle)	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2011-11-25	53.1	1.47	21.7
1909.8MHz (High)	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2011-11-25	52.9	1.49	21.7

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7.2. System Check

Table 5: System Check for Body Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		Temp	Input Power	Measured SAR _{1g}	1W Normalized SAR _{1g}	1W Target SAR _{1g}	Deviation
		ϵ_r	σ (s/m)	(°C)	(W)	(W/kg)	(W/kg)	(W/kg)	(%)
835MHz	2011-12-1	54.28	0.97	21.5	0.25	2.56	10.24	9.46	1.70
1900 MHz	2011-11-25	53.02	1.48	21.7	0.25	10.28	41.12	41.7	-0.01

Note: 1. The graph results see ANNEX B.

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7.3. Summary of Measurement Results

7.3.1. GSM 850 (GPRS/EGPRS)

Table 6: SAR Values [GSM 850 (GPRS/EGPRS)]

Limit of SAR			10 g Average	1g Average	Power Drift	Graph Results
			2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case Of Body			Measurement Result (W/kg)		Power Drift (dB)	
Test Position	Timeslots	Channel	10 g Average	1 g Average		
IBM T61(Distance 5mm)						
Test Position 1	1 timeslot	High/251	0.662	1.100	-0.048	Figure 8
		Middle/190	0.536	0.884	-0.063	Figure 9
		Low/128	0.415	0.682	0.023	Figure 10
	2 timeslots	High/251	0.645	1.070	0.021	Figure 11
		Middle/190	0.525	0.865	-0.028	Figure 12
		Low/128	0.410	0.673	0.006	Figure 13
	3 timeslots	High/251	0.632	1.050	-0.060	Figure 14
		Middle/190	0.508	0.836	-0.031	Figure 15
		Low/128	0.395	0.648	0.043	Figure 16
	4 timeslots	High/251	0.638	1.050	0.008	Figure 17
		Middle/190	0.512	0.844	0.002	Figure 18
		Low/128	0.398	0.654	-0.013	Figure 19
Test Position 2	1 timeslot	Middle/190	0.239	0.406	-0.007	Figure 20
Lenovo Y-450(Distance 5mm)						
Test Position 3	1 timeslot	Middle/190	0.010	0.014	0.018	Figure 21
Test Position 4	1 timeslot	Middle/190	0.150	0.238	-0.041	Figure 22
Test Position 5	1 timeslot	Middle/190	0.216	0.315	-0.144	Figure 23
Worst Case Position of GPRS with EGPRS (GMSK) (Distance 5mm)						
Test Position 1	1 timeslot	High/251	0.658	1.090	-0.086	Figure 24

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

- 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 (< 0.8W/kg) lower than the SAR limit, testing at the high and low channels is optional.

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

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7.3.2. GSM 1900 (GPRS/EGPRS)

Table 7: SAR Values [GSM 1900 (GPRS/EGPRS)]

Limit of SAR			10 g Average	1g Average	Power Drift	Graph Results
			2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case Of Body			Measurement Result (W/kg)		Power Drift (dB)	
Test Position	Timeslots	Channel	10 g Average	1 g Average		
IBM T61(Distance 5mm)						
Test Position 1	1 timeslot	High/810	0.535	0.830	0.022	Figure 25
		Middle/661	0.535	0.829	0.125	Figure 26
		Low/512	0.543	0.845	-0.021	Figure 27
	2 timeslots	High/810	0.528	0.812	-0.014	Figure 28
		Middle/661	0.529	0.821	-0.010	Figure 29
		Low/512	0.608	0.938	-0.105	Figure 30
	3 timeslots	High/810	0.542	0.838	0.060	Figure 31
		Middle/661	0.547	0.851	0.015	Figure 32
		Low/512	0.612	0.963	-0.094	Figure 33
	4 timeslots	Middle/661	0.504	0.784	-0.011	Figure 34
Test Position 2	3 timeslots	Middle/661	0.433	0.720	-0.044	Figure 35
Lenovo Y-450(Distance 5mm)						
Test Position 3	3 timeslots	Middle/661	0.044	0.049	-0.189	Figure 36
Test Position 4	3 timeslots	Middle/661	0.356	0.645	0.076	Figure 37
Test Position 5	3 timeslots	Middle/661	0.211	0.250	0.022	Figure 38
Worst Case Position of GPRS with EGPRS (GMSK) (Distance 5mm)						
Test Position 1	3 timeslots	Low/512	0.551	0.869	0.101	Figure 39

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

2. 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 (< 0.8W/kg) lower than the SAR limit, testing at the high and low channels is optional.
3. When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

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8. Measurement Uncertainty

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c _i	Standard uncertainty 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	4.92	71
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	∞

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22	-liquid conductivity (measurement uncertainty)	B	2.5	N	1	0.64	1.6	9	
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞	
24	-liquid permittivity (measurement uncertainty)	B	2.5	N	1	0.6	1.5	9	
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						12.12	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		24.24		

9. Main Test Instruments

Table 8: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 12, 2011	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 12, 2011	One year
04	Power sensor	Agilent N8481H	MY50350004	September 25, 2011	One year
05	Signal Generator	HP 8341B	2730A00804	September 12, 2011	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	BTS	E5515C	MY48360988	December 2, 2011	One year
08	E-field Probe	EX3DV4	3816	October 3, 2011	One year
09	DAE	DAE4	905	June 24, 2011	One year
10	Validation Kit 835MHz	D835V2	4d020	August 26, 2011	One year
11	Validation Kit 1900MHz	D1900V2	5d060	August 31, 2011	One year

END OF REPORT BODY

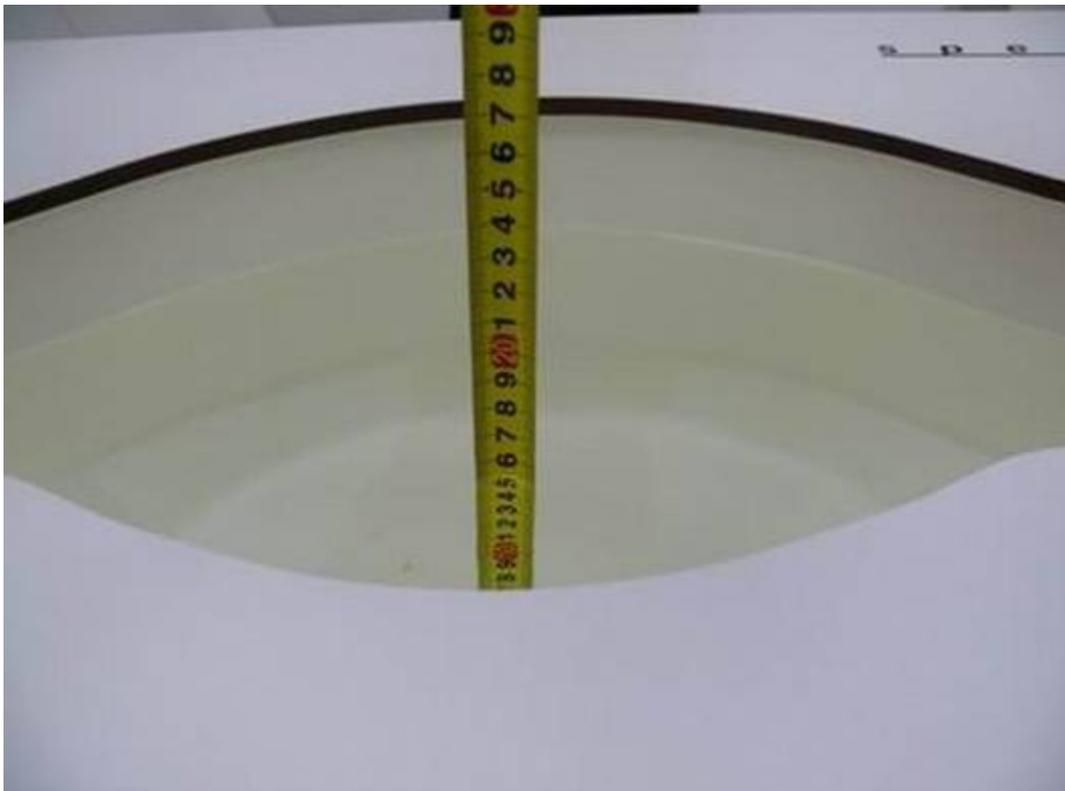
ANNEX A: Test Layout



Picture 2: Specific Absorption Rate Test Layout



Picture 3: Liquid depth in the Flat Phantom (835 MHz, 15.4cm depth)



Picture 4: Liquid depth in the Flat Phantom (1900 MHz, 15.2cm depth)

ANNEX B: System Check Results

System Performance Check at 835 MHz

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

Date/Time: 12/1/2011 4:19:20 PM

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.28$; $\rho = 1000$ kg/m³

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

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 4

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

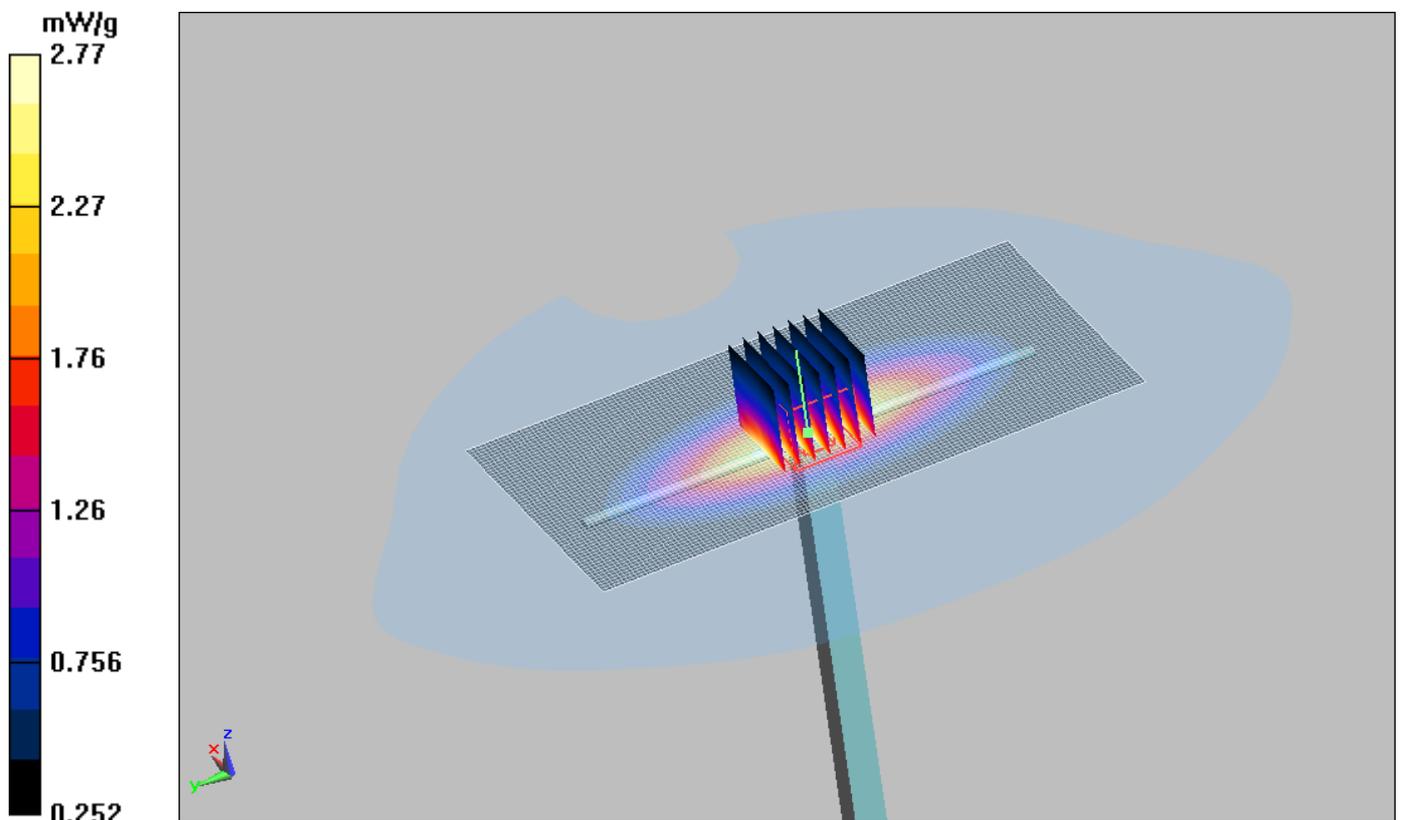


Figure 6 System Performance Check 835MHz 250mW

System Performance Check at 1900 MHz

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

Date/Time: 11/25/2011 1:45:19 PM

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 53.02$; $\rho = 1000$ kg/m³

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

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=150mm, 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) = 10.28 mW/g; SAR(10 g) = 5.50 mW/g

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

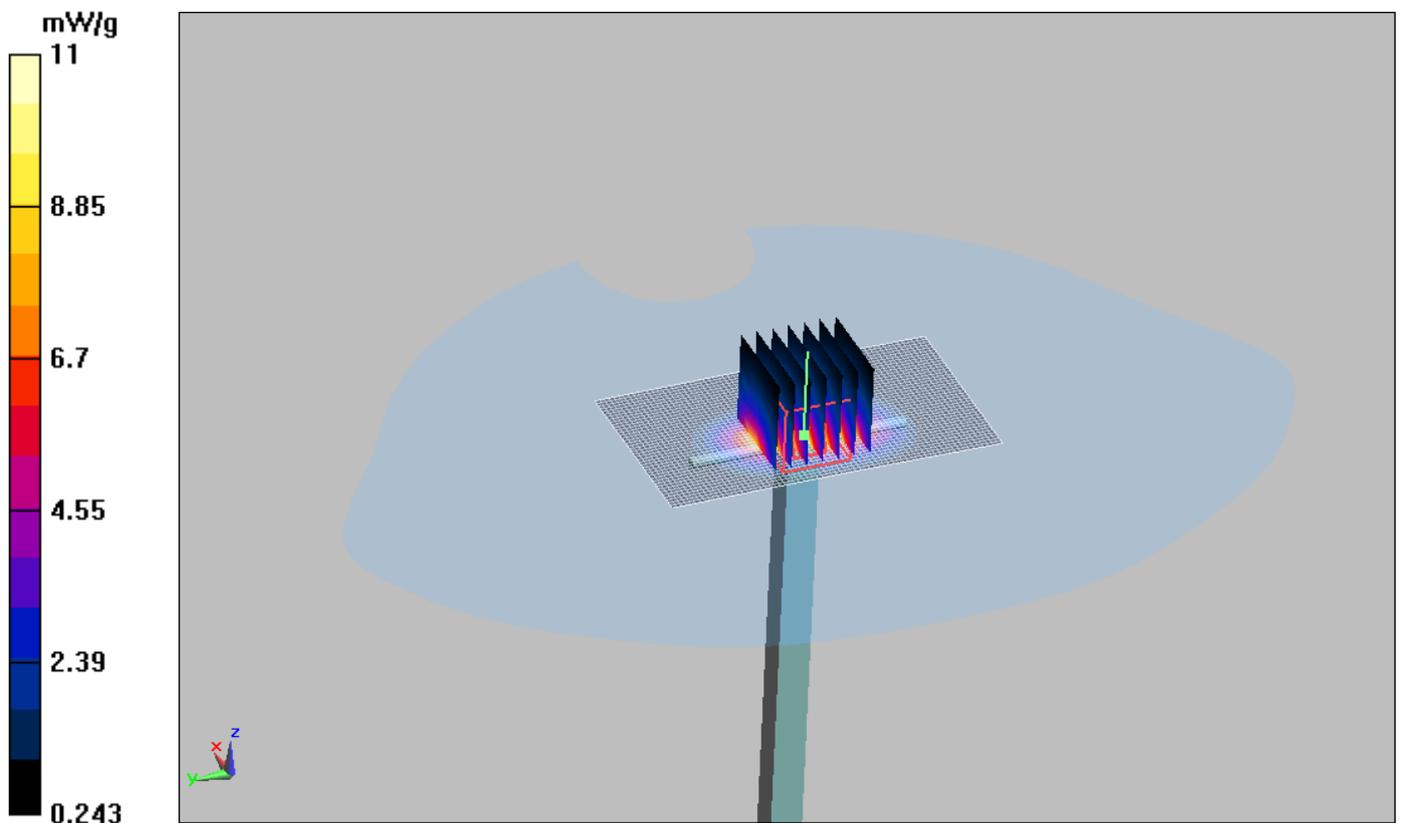


Figure 7 System Performance Check 1900MHz 250mW

ANNEX C: Graph Results

GSM 850 GPRS (1TXslot) with IBM T61 Test Position 1 High

Date/Time: 12/1/2011 7:30:39 PM

Communication System: GPRS 1TX; Frequency: 846.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 847$ MHz; $\sigma = 0.983$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.2 mW/g

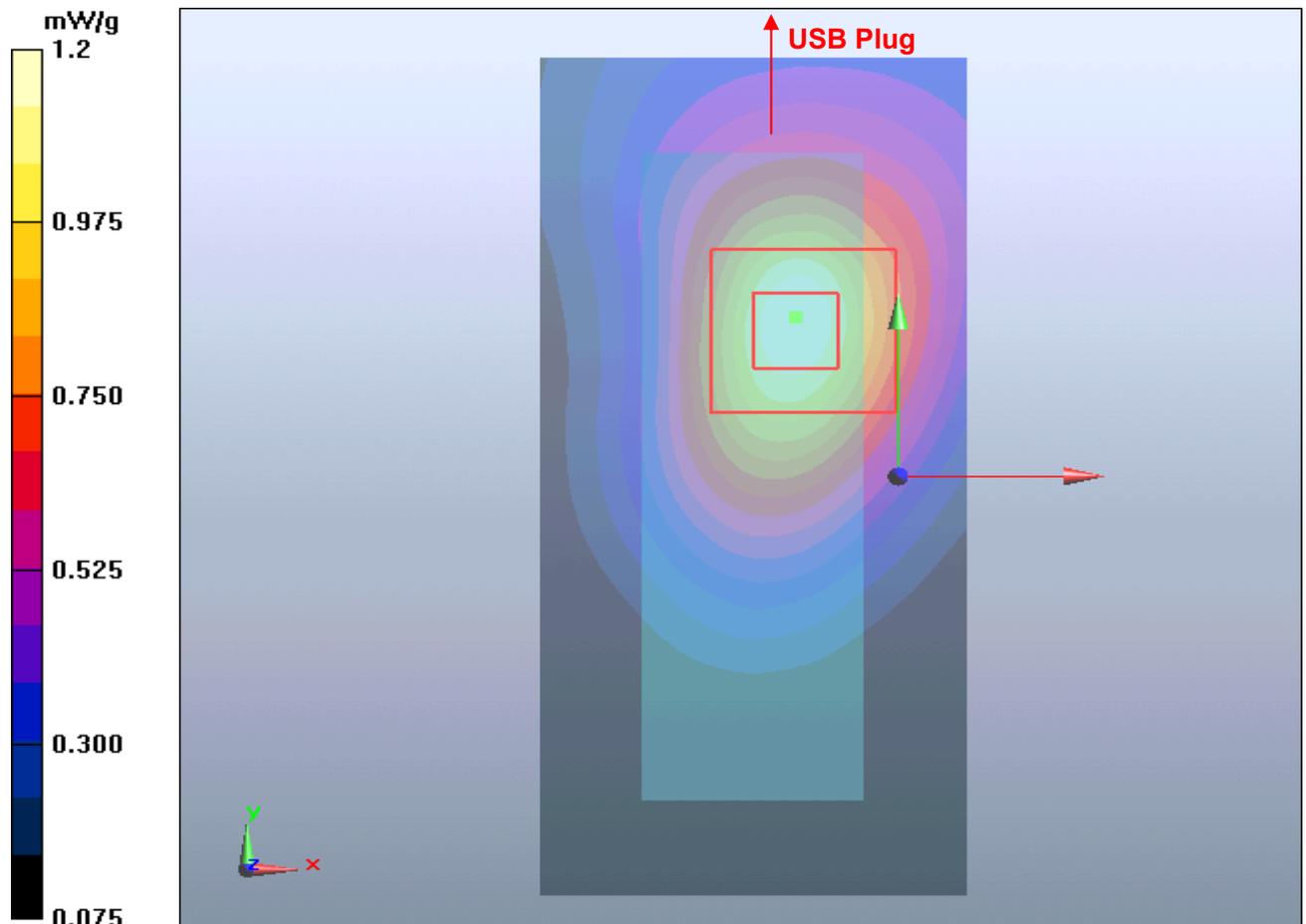
Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 1.74 W/kg

SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.662 mW/g

Maximum value of SAR (measured) = 1.2 mW/g



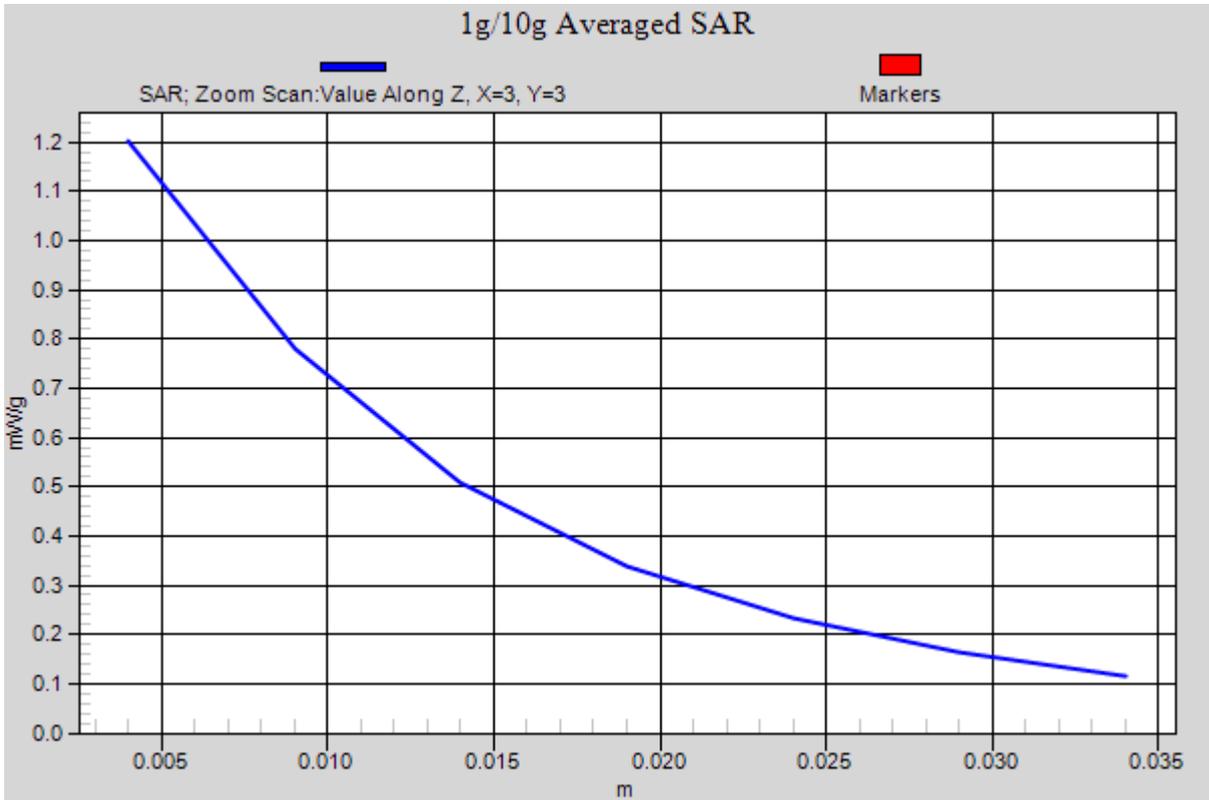


Figure 8 GSM 850 GPRS (1TXslot) with IBM T61 Test Position 1 Channel 251

GSM 850 GPRS (1TXslot) with IBM T61 Test Position 1 Middle

Date/Time: 12/1/2011 7:05:27 PM

Communication System: GPRS 1TX; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.965 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.5 V/m; Power Drift = -0.063 dB

Peak SAR (extrapolated) = 1.4 W/kg

SAR(1 g) = 0.884 mW/g; SAR(10 g) = 0.536 mW/g

Maximum value of SAR (measured) = 0.979 mW/g

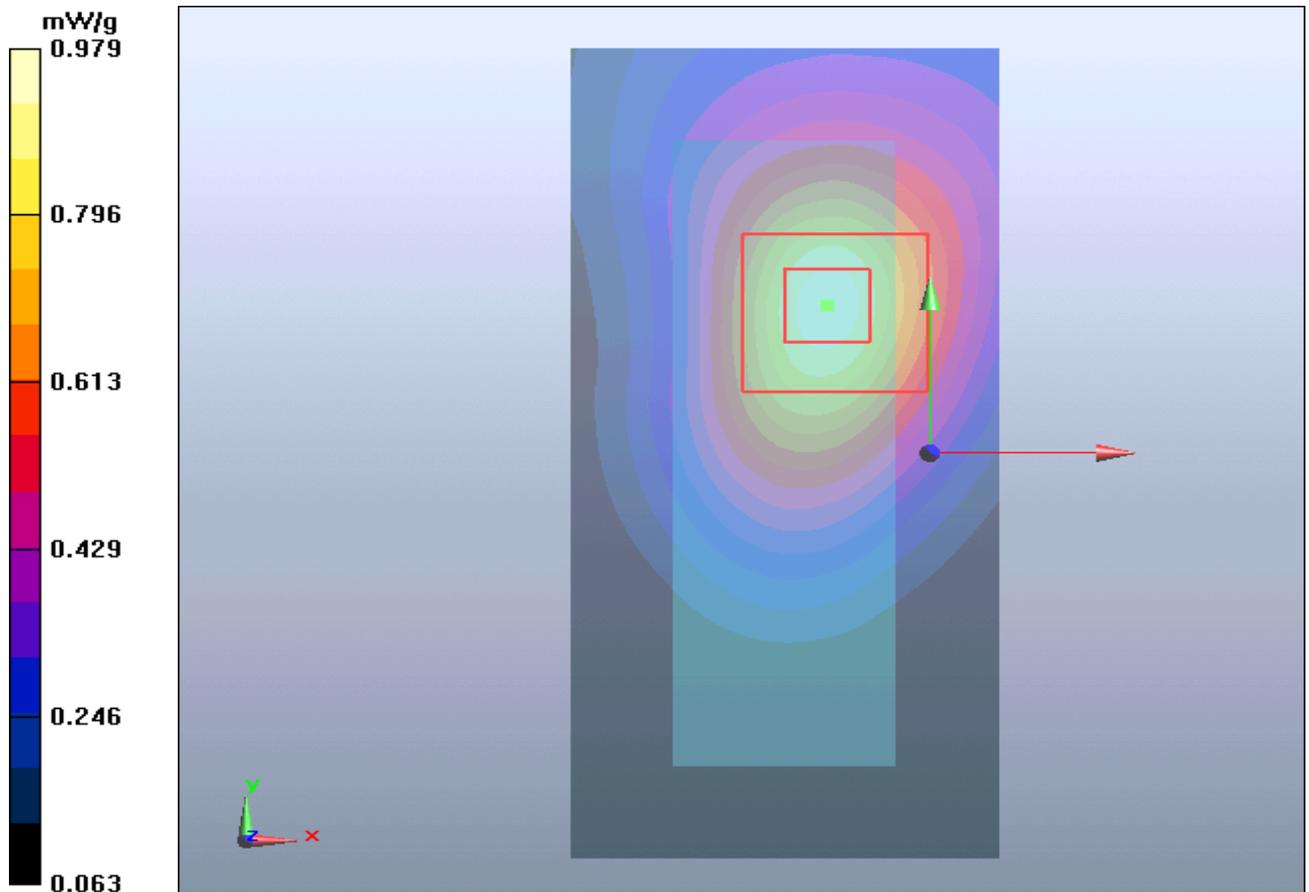


Figure 9 GSM 850 GPRS (1TXslot) with IBM T61 Test Position 1 Channel 190

GSM 850 GPRS (1TXslot) with IBM T61 Test Position 1 Low

Date/Time: 12/1/2011 9:56:19 PM

Communication System: GPRS 1TX; Frequency: 824.2 MHz; Duty Cycle: 1:8.30042

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.967$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.751 mW/g

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.1 V/m; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.682 mW/g; SAR(10 g) = 0.415 mW/g

Maximum value of SAR (measured) = 0.749 mW/g

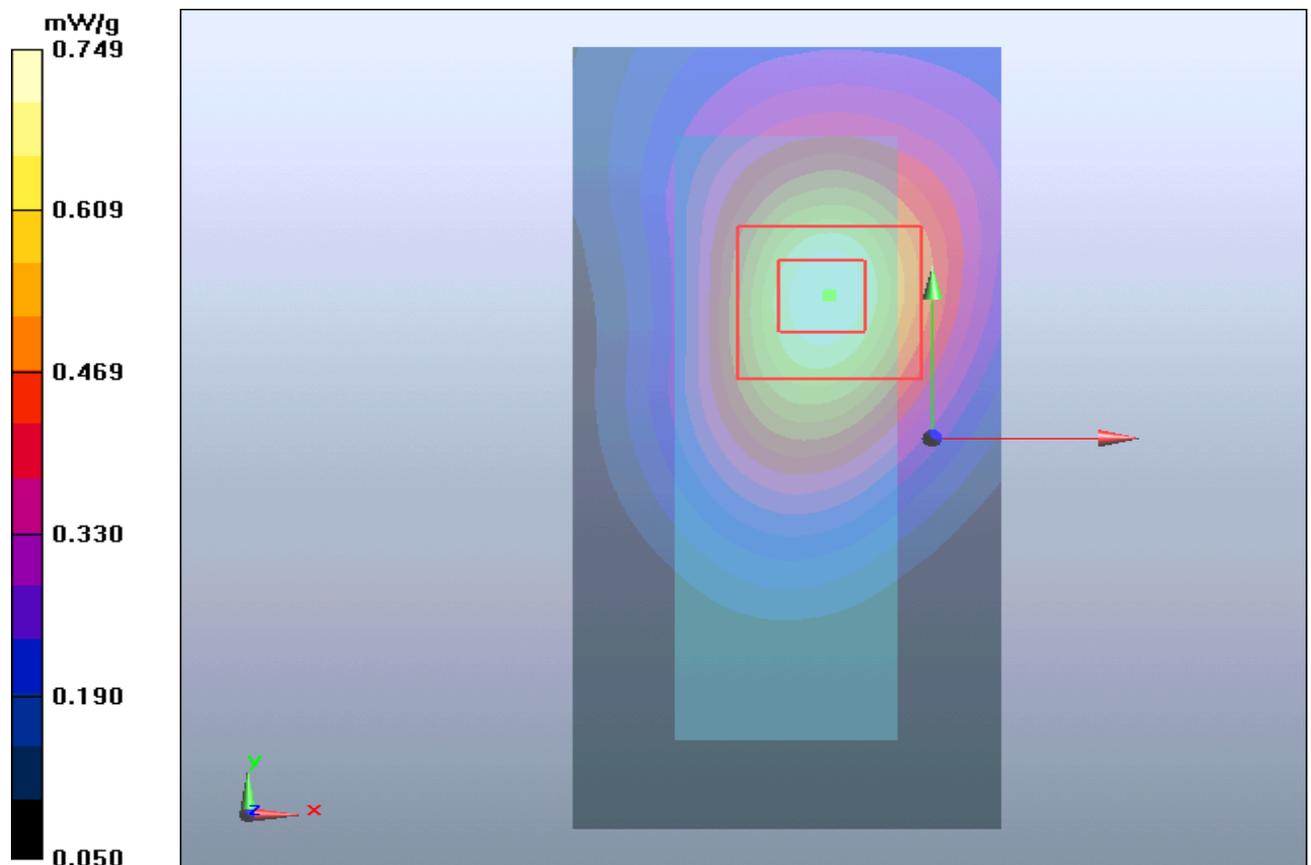


Figure 10 GSM 850 GPRS (1TXslot) with IBM T61 Test Position 1 Channel 128

GSM 850 GPRS (2TXslots) with IBM T61 Test Position 1 High

Date/Time: 12/1/2011 8:51:27 PM

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

Medium parameters used: $f = 849$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.18 mW/g

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.6 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 1.68 W/kg

SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.645 mW/g

Maximum value of SAR (measured) = 1.18 mW/g

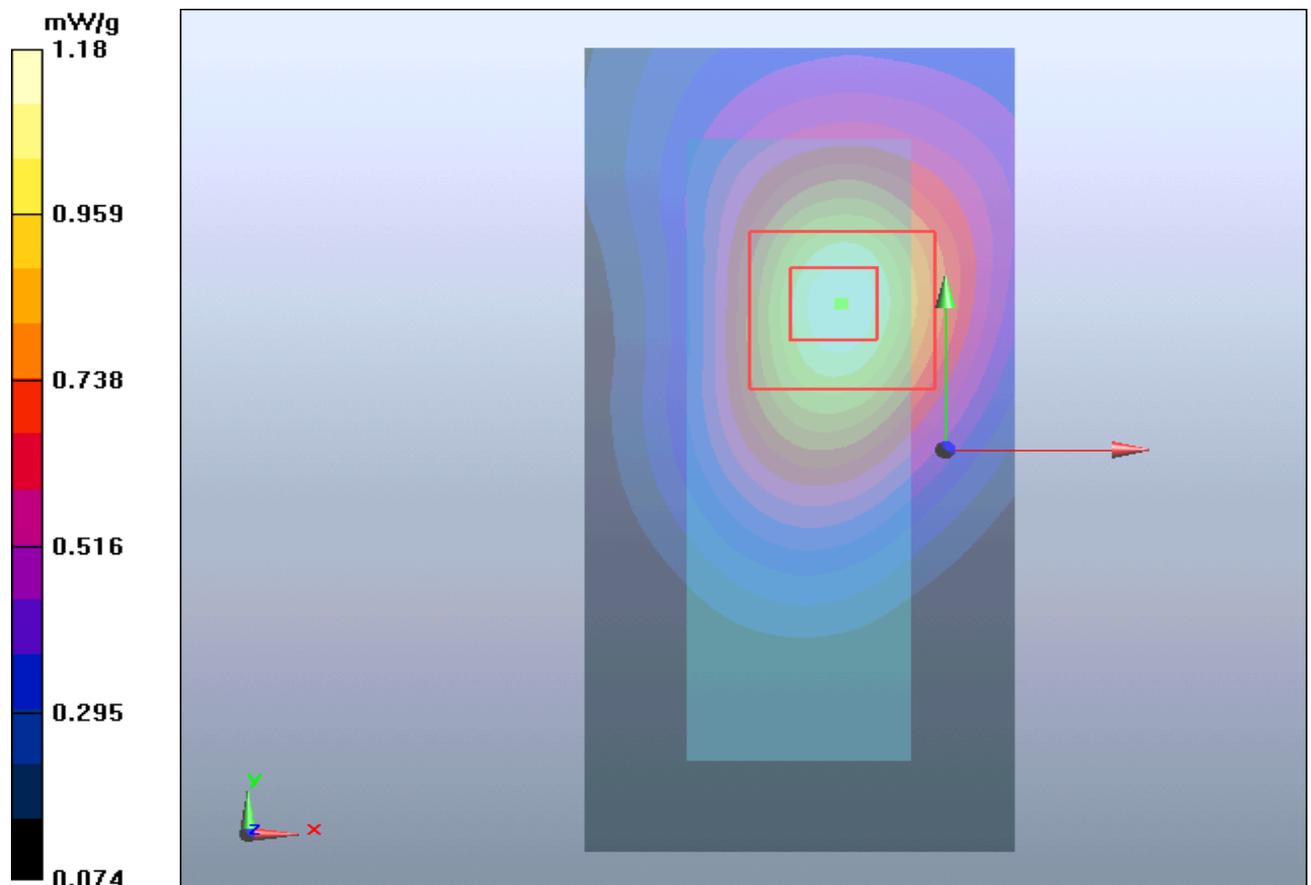


Figure 11 GSM 850 GPRS (2TXslots) with IBM T61 Test Position 1 Channel 251

GSM 850 GPRS (2TXslots) with IBM T61 Test Position 1 Middle

Date/Time: 12/1/2011 5:39:40 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.943 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.6 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 0.865 mW/g; SAR(10 g) = 0.525 mW/g

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

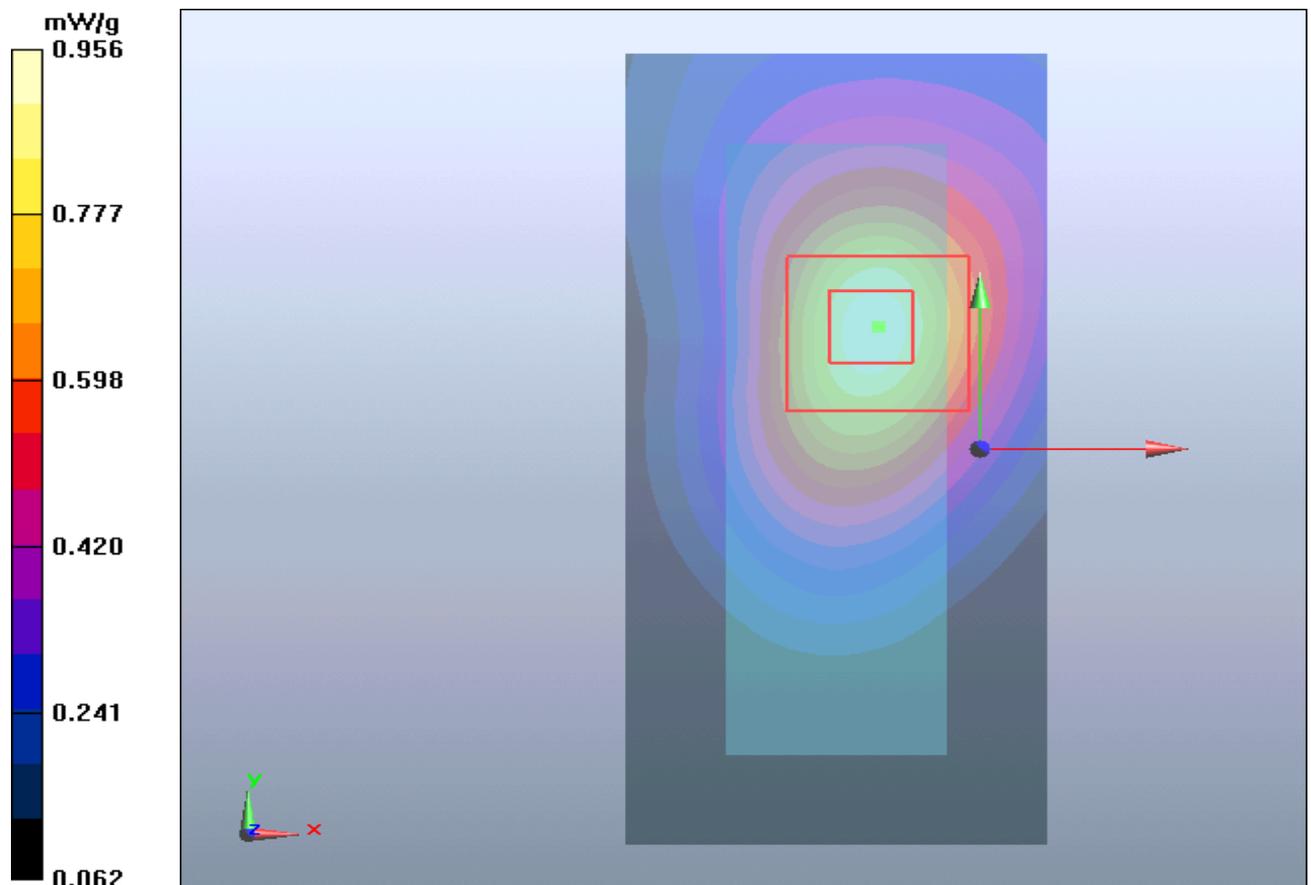


Figure 12 GSM 850 GPRS (2TXslots) with IBM T61 Test Position 1 Channel 190

GSM 850 GPRS (2TXslots) with IBM T61 Test Position 1 Low

Date/Time: 12/1/2011 9:30:51 PM

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

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.967$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.741 mW/g

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 1.06 W/kg

SAR(1 g) = 0.673 mW/g; SAR(10 g) = 0.410 mW/g

Maximum value of SAR (measured) = 0.743 mW/g

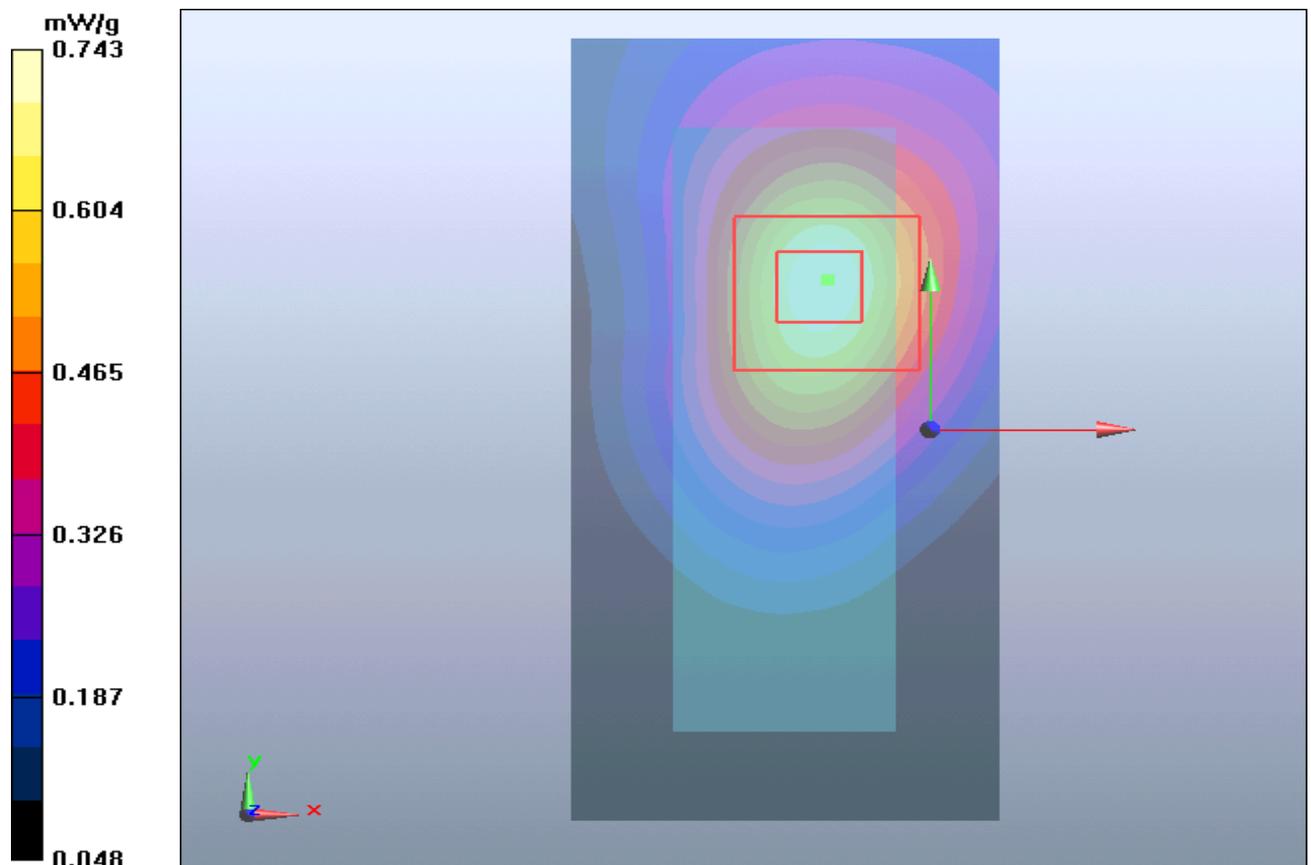


Figure 13 GSM 850 GPRS (2TXslots) with IBM T61 Test Position 1 Channel 128

GSM 850 GPRS (3TXslots) with IBM T61 Test Position 1 High

Date/Time: 12/1/2011 10:22:27 PM

Communication System: GPRS 3TX; Frequency: 848.8 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 849$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

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

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.4 V/m; Power Drift = -0.060 dB

Peak SAR (extrapolated) = 1.66 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.632 mW/g

Maximum value of SAR (measured) = 1.16 mW/g

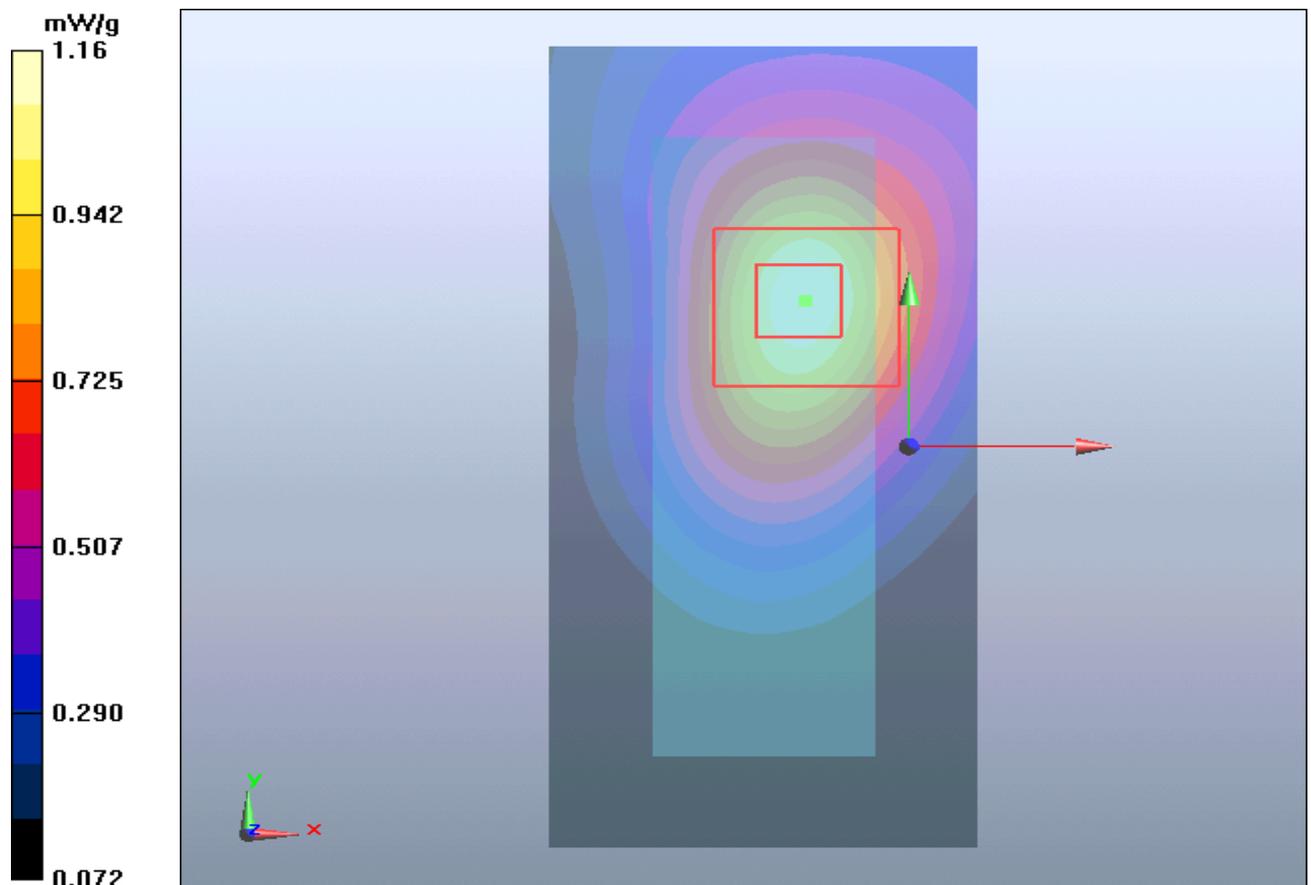


Figure 14 GSM 850 GPRS (3TXslots) with IBM T61 Test Position 1 Channel 251

GSM 850 GPRS (3TXslots) with IBM T61 Test Position 1 Middle

Date/Time: 12/1/2011 7:57:56 PM

Communication System: GPRS 3TX; Frequency: 836.6 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.925 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.6 V/m; Power Drift = -0.031 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.836 mW/g; SAR(10 g) = 0.508 mW/g

Maximum value of SAR (measured) = 0.927 mW/g

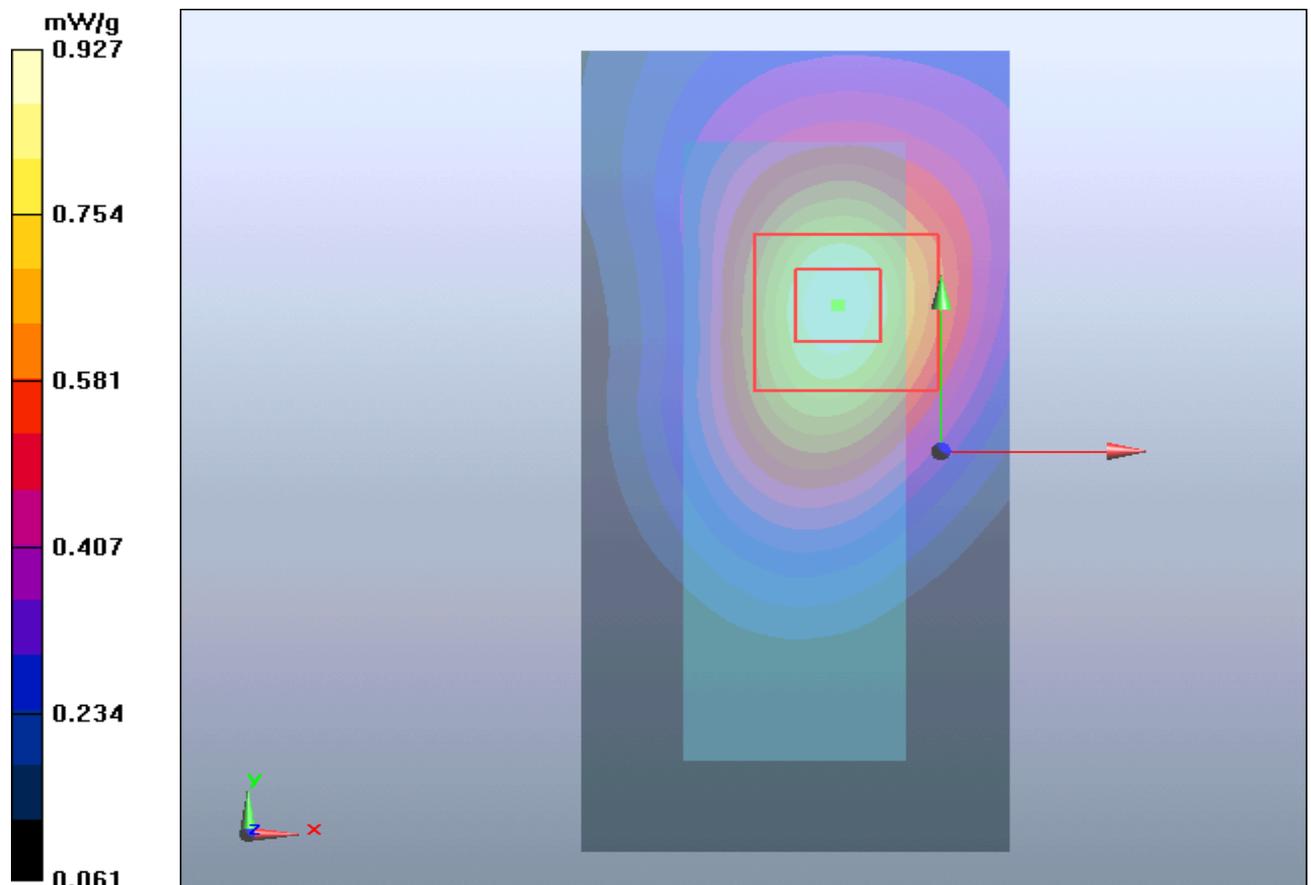


Figure 15 GSM 850 GPRS (3TXslots) with IBM T61 Test Position 1 Channel 190

GSM 850 GPRS (3TXslots) with IBM T61 Test Position 1 Low

Date/Time: 12/1/2011 10:47:25 PM

Communication System: GPRS 3TX; Frequency: 824.2 MHz; Duty Cycle: 1:2.76694

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.967$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.713 mW/g

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.6 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.648 mW/g; SAR(10 g) = 0.395 mW/g

Maximum value of SAR (measured) = 0.715 mW/g

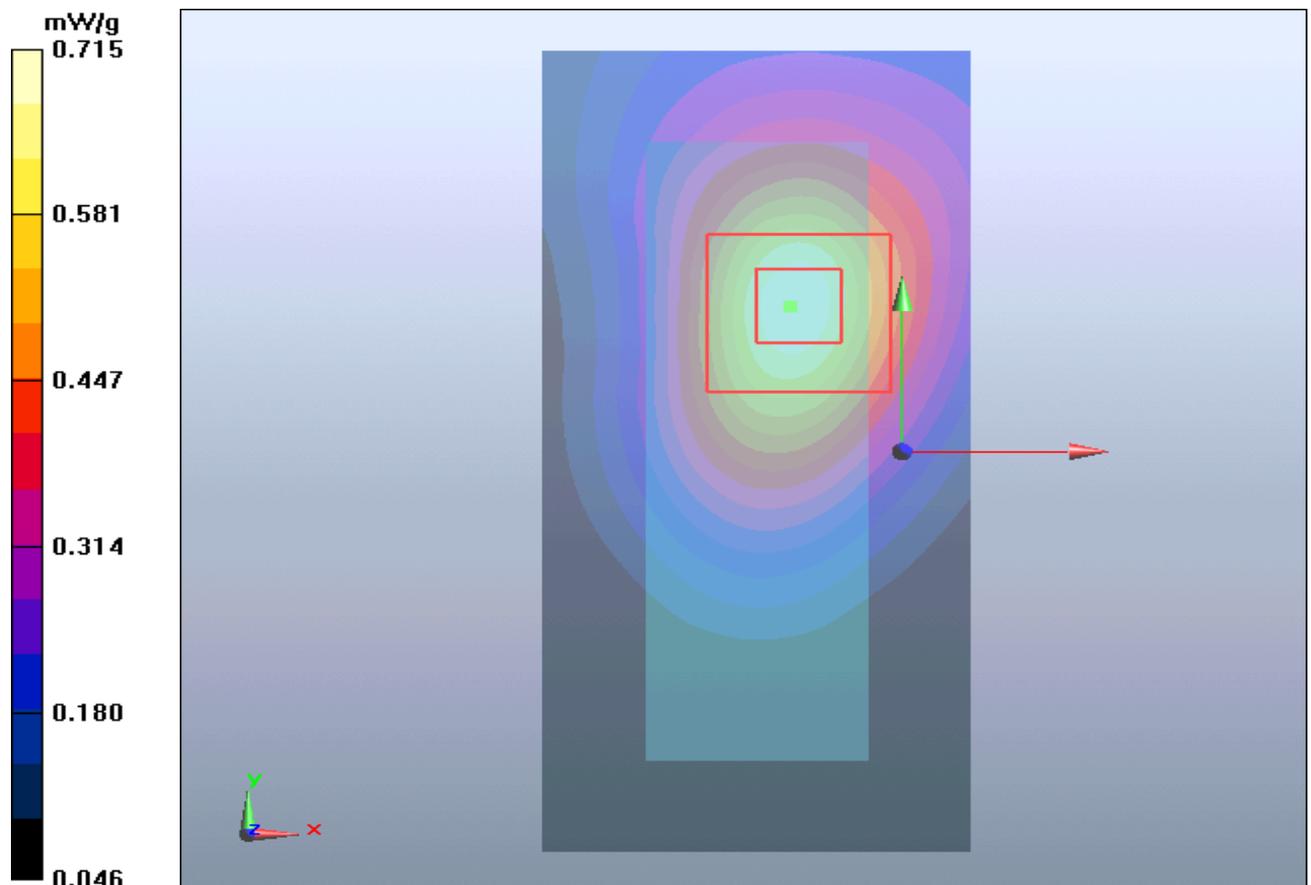


Figure 16 GSM 850 GPRS (3TXslots) with IBM T61 Test Position 1 Channel 128

GSM 850 GPRS (4TXslots) with IBM T61 Test Position 1 High

Date/Time: 12/1/2011 11:12:40 PM

Communication System: GPRS 4TX; Frequency: 848.8 MHz; Duty Cycle: 1:2.07491

Medium parameters used: $f = 849$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

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

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.4 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 1.64 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.638 mW/g

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

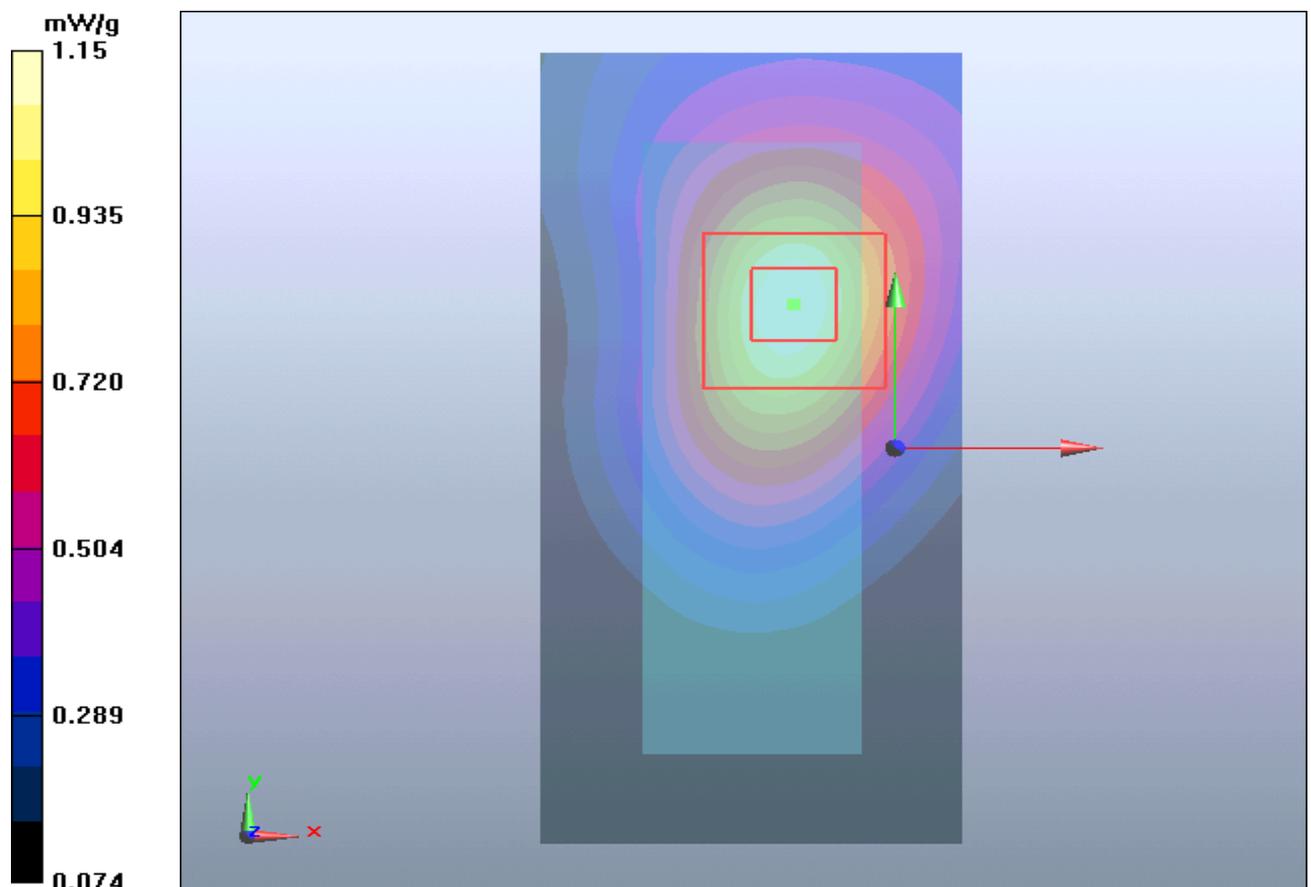


Figure 17 GSM 850 GPRS (4TXslots) with IBM T61 Test Position 1 Channel 251

GSM 850 GPRS (4TXslots) with IBM T61 Test Position 1 Middle

Date/Time: 12/1/2011 8:24:21 PM

Communication System: GPRS 4TX; Frequency: 836.6 MHz; Duty Cycle: 1:2.07491

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.922 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.7 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.844 mW/g; SAR(10 g) = 0.512 mW/g

Maximum value of SAR (measured) = 0.936 mW/g

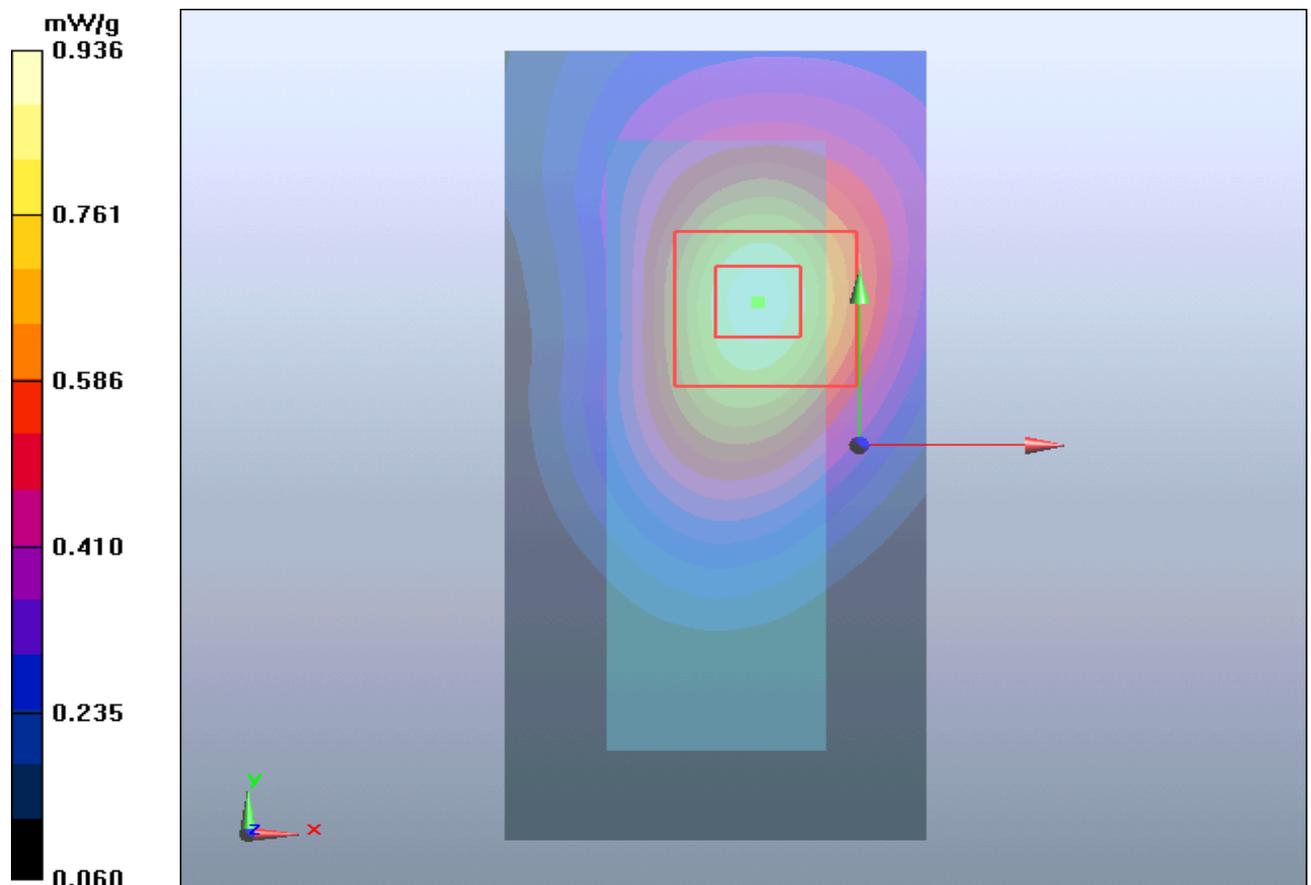


Figure 18 GSM 850 GPRS (4TXslots) with IBM T61 Test Position 1 Channel 190

GSM 850 GPRS (4TXslots) with IBM T61 Test Position 1 Low

Date/Time: 12/1/2011 11:37:08 PM

Communication System: GPRS 4TX; Frequency: 824.2 MHz; Duty Cycle: 1:2.07491

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.967$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.714 mW/g

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.9 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 1.04 W/kg

SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.398 mW/g

Maximum value of SAR (measured) = 0.724 mW/g

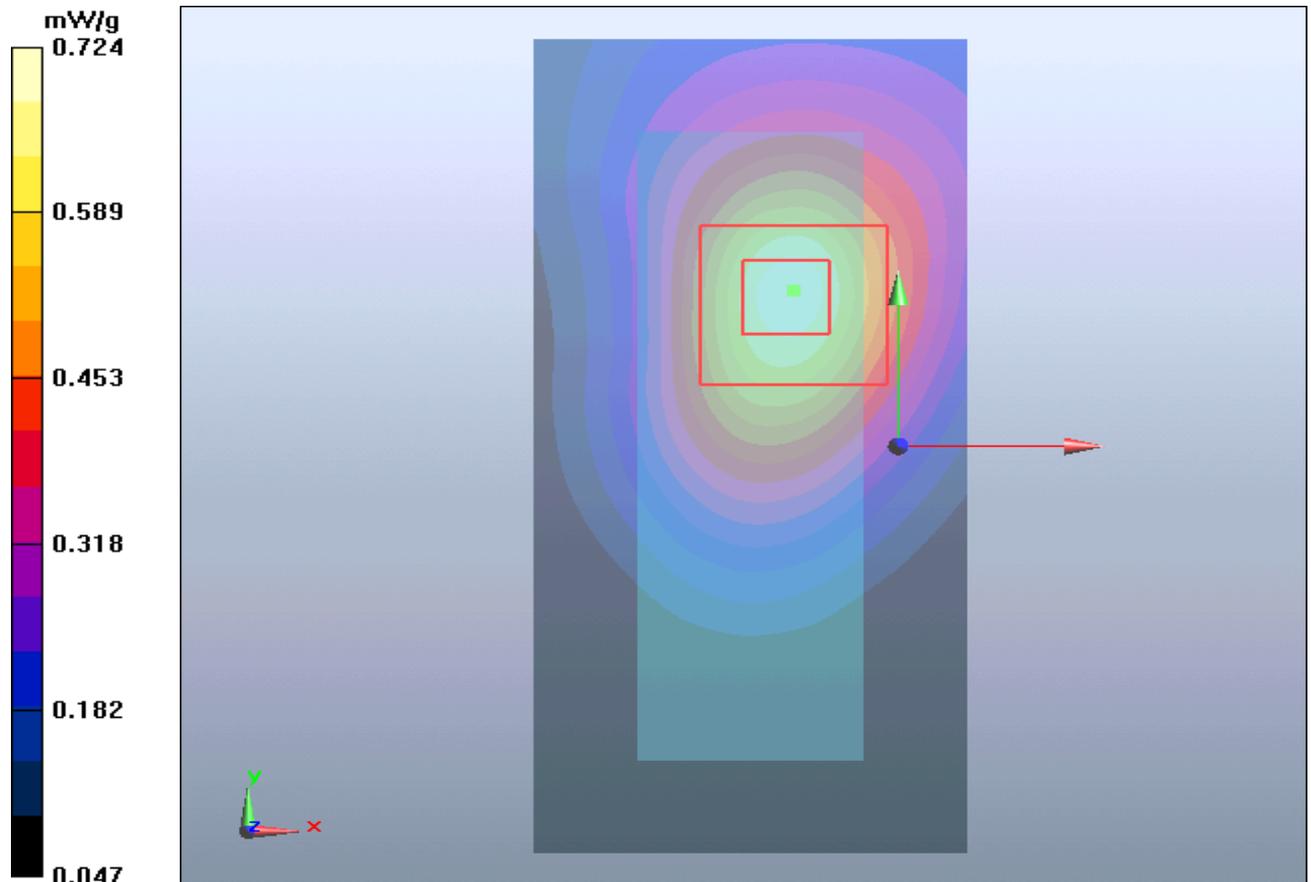


Figure 19 GSM 850 GPRS (4TXslots) with IBM T61 Test Position 1 Channel 128

GSM 850 GPRS (1TXslot) with IBM T61 Test Position 2 Middle

Date/Time: 12/2/2011 9:40:41 AM

Communication System: GPRS 1TX; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 2 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.457 mW/g

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

Reference Value = 13.6 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 0.665 W/kg

SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.239 mW/g

Maximum value of SAR (measured) = 0.450 mW/g

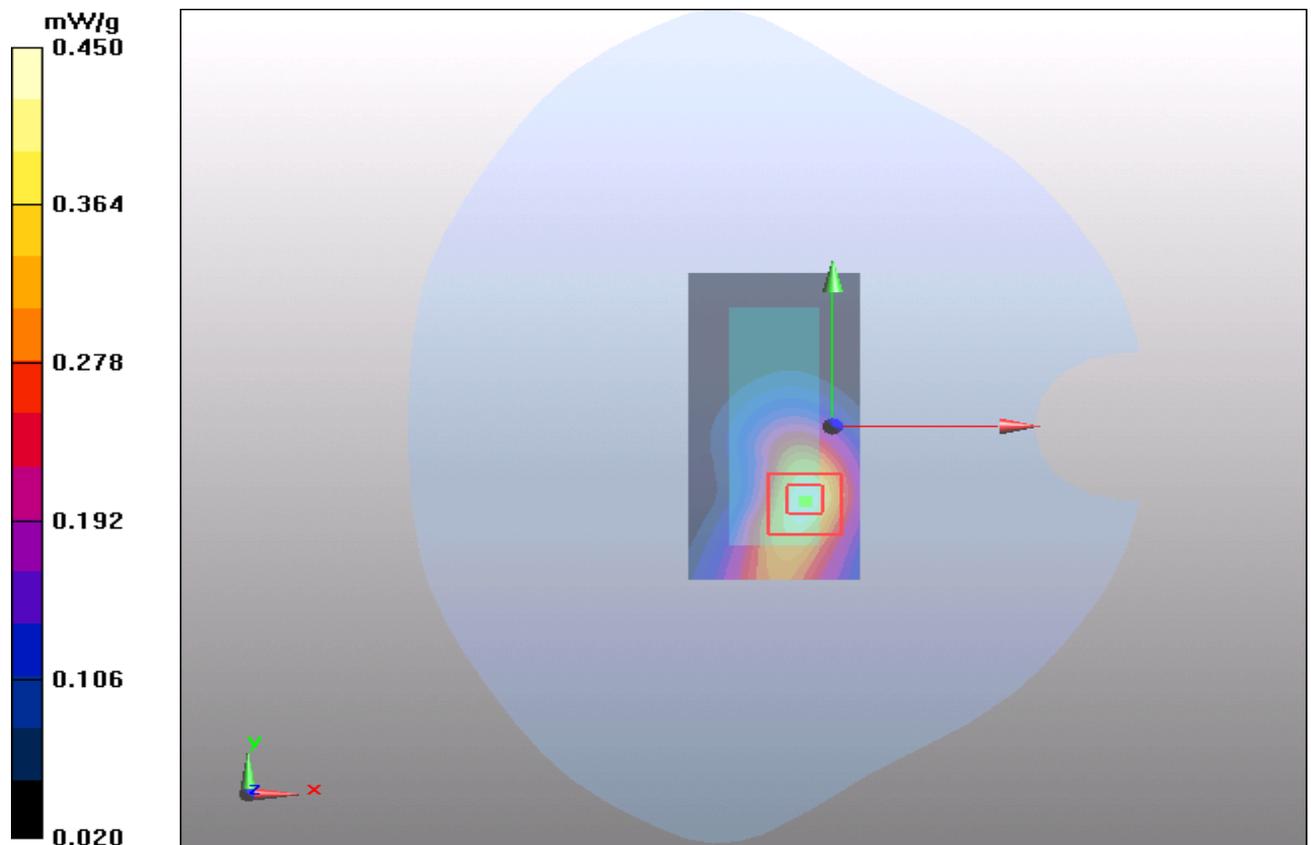


Figure 20 GSM 850 GPRS (1TXslot) with IBM T61 Test Position 2 Channel 190

GSM 850 GPRS (1TXslot) with Lenovo Y-450 Test Position 3 Middle

Date/Time: 12/2/2011 2:55:29 PM

Communication System: GPRS 1TX; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 3 Middle/Area Scan (31x51x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.015 mW/g

Test Position 3 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.87 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 0.018 W/kg

SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.010 mW/g

Maximum value of SAR (measured) = 0.015 mW/g

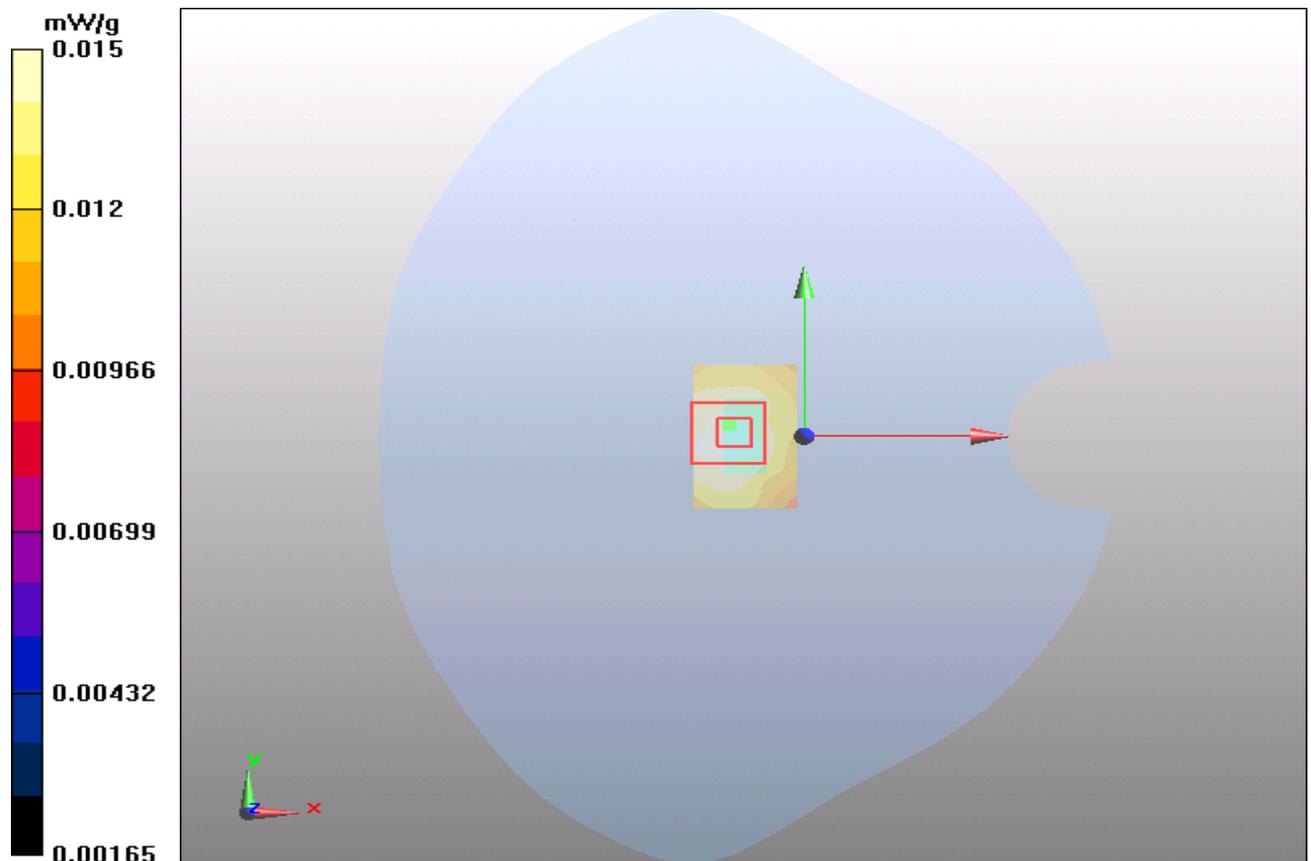


Figure 21 GSM 850 GPRS (1TXslot) with Lenovo Y-450 Test Position 3 Channel 190

GSM 850 GPRS (1TXslot) with Lenovo Y-450 Test Position 4 Middle

Date/Time: 12/2/2011 11:25:55 AM

Communication System: GPRS 1TX; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 4 Middle/Area Scan (41x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.267 mW/g

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

Reference Value = 9.81 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 0.383 W/kg

SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.150 mW/g

Maximum value of SAR (measured) = 0.262 mW/g

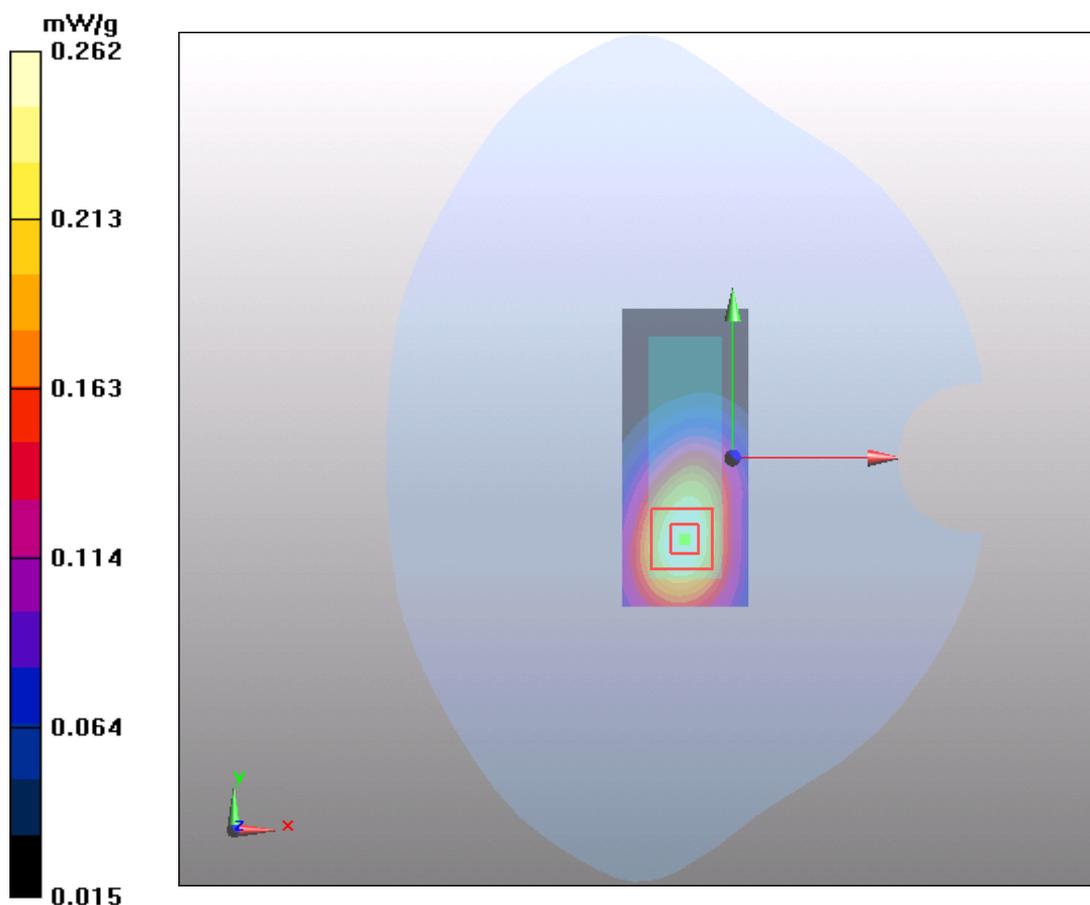


Figure 22 GSM 850 GPRS (1TXslot) with Lenovo Y-450 Test Position 4 Channel 190

GSM 850 GPRS (1TXslot) with Lenovo Y-450 Test Position 5 Middle

Date/Time: 12/2/2011 10:46:12 AM

Communication System: GPRS 1TX; Frequency: 836.6 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 837$ MHz; $\sigma = 0.977$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 5 Middle/Area Scan (41x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.336 mW/g

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

Reference Value = 17 V/m; Power Drift = -0.144 dB

Peak SAR (extrapolated) = 0.451 W/kg

SAR(1 g) = 0.315 mW/g; SAR(10 g) = 0.216 mW/g

Maximum value of SAR (measured) = 0.337 mW/g

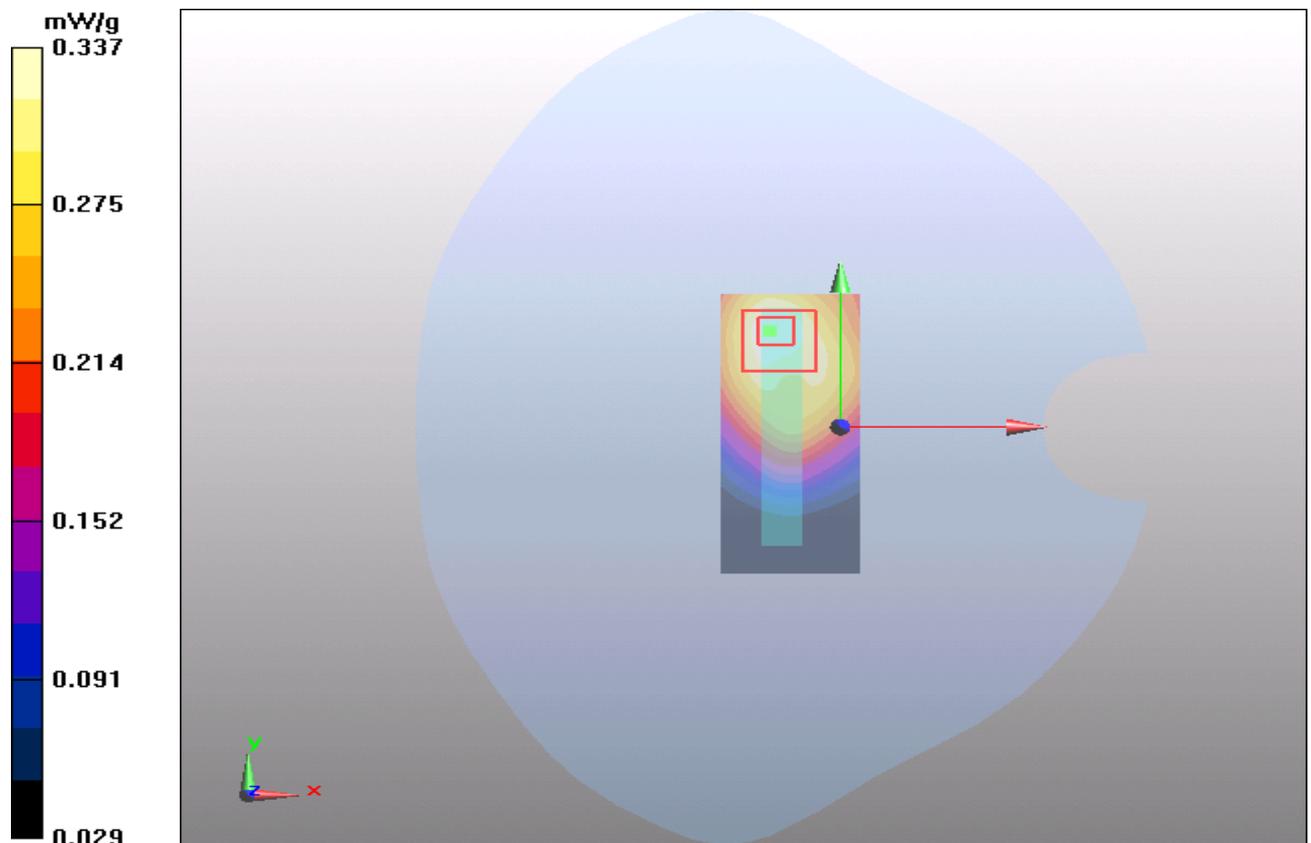


Figure 23 GSM 850 GPRS (1TXslot) with Lenovo Y-450 Test Position 5 Channel 190

GSM 850 EGPRS (1TXslot) with IBM T61 Test Position 1 High

Date/Time: 12/2/2011 3:19:20 PM

Communication System: EGPRS 1TX; Frequency: 848.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 849$ MHz; $\sigma = 0.986$ mho/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.21 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 30.1 V/m; Power Drift = -0.086 dB

Peak SAR (extrapolated) = 1.75 W/kg

SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.658 mW/g

Maximum value of SAR (measured) = 1.21 mW/g

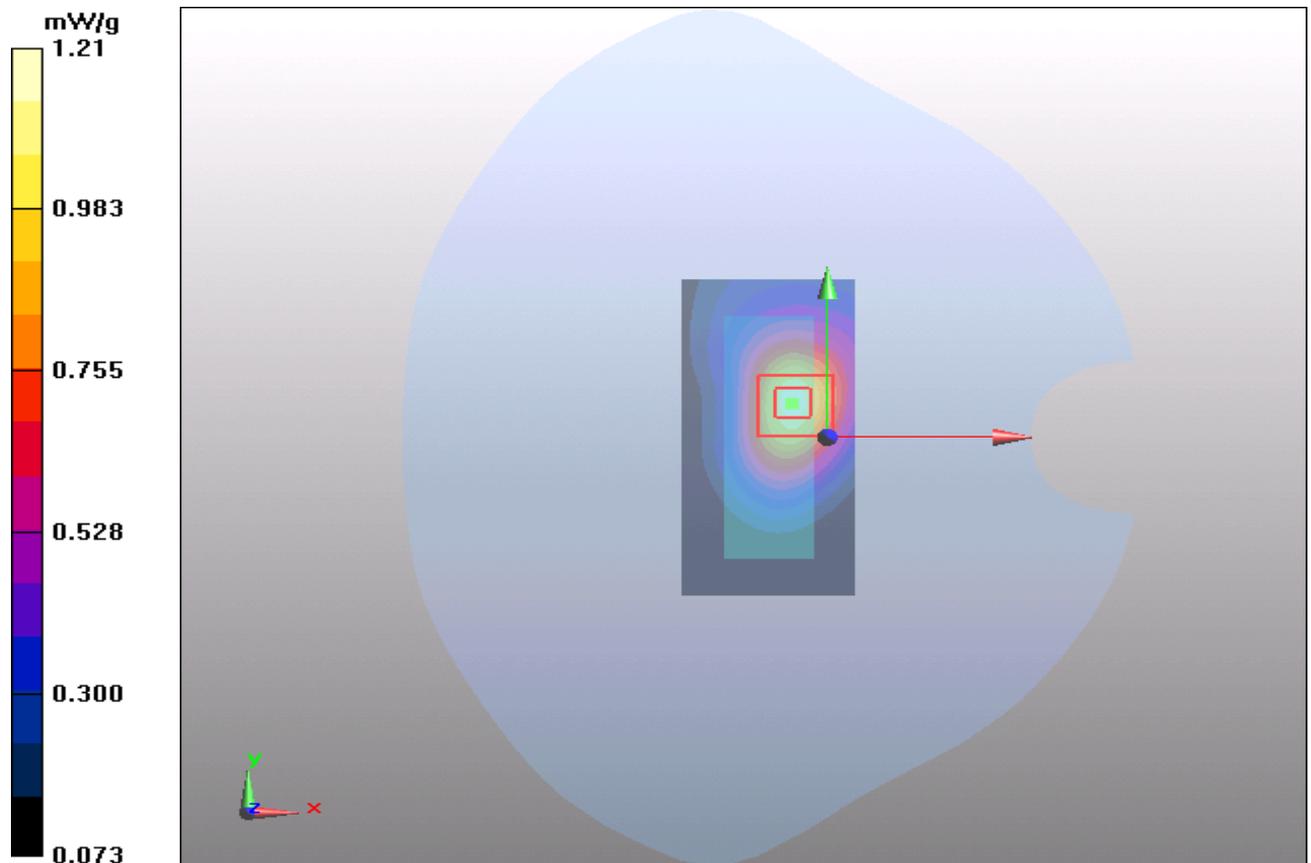


Figure 24 GSM 850 EGPRS (1TXslot) with IBM T61 Test Position 1 Channel 251

GSM 1900 GPRS (1TXslot) with IBM T61 Test Position 1 High

Date/Time: 11/25/2011 7:28:09 PM

Communication System: GPRS 1TX; Frequency: 1909.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.958 mW/g

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.9 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.830 mW/g; SAR(10 g) = 0.535 mW/g

Maximum value of SAR (measured) = 0.907 mW/g

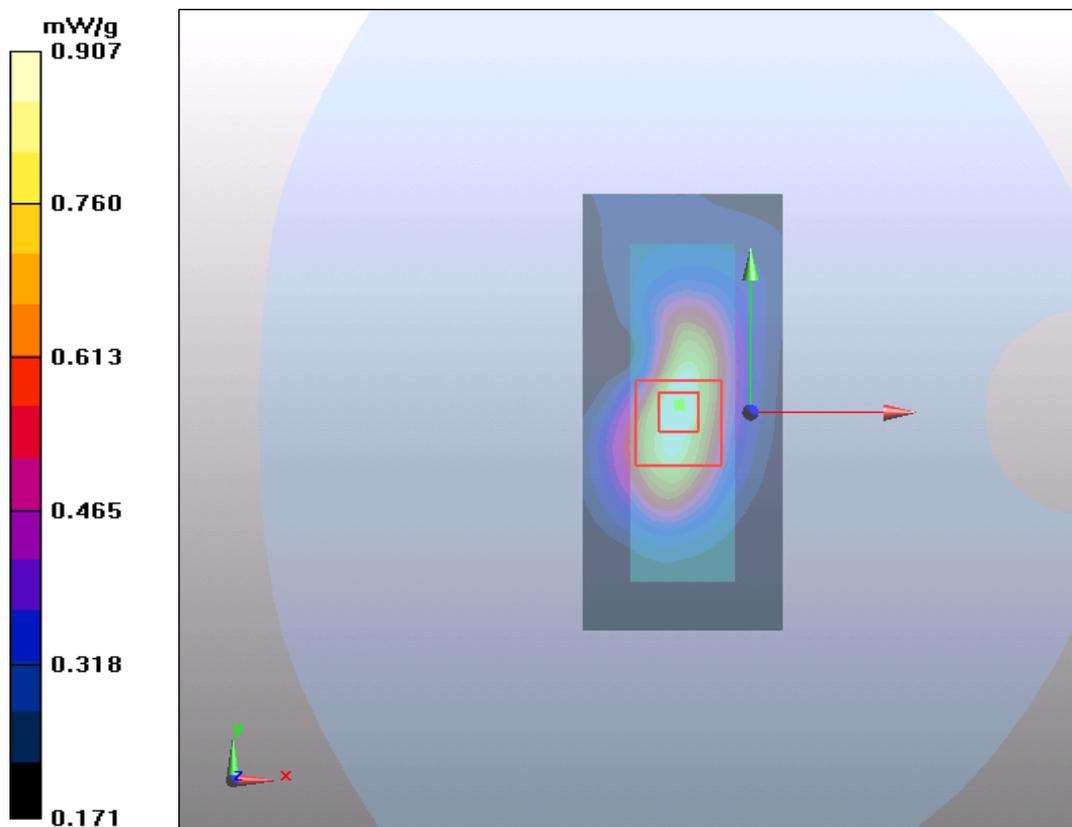


Figure 25 GSM 1900 GPRS (1TXslot) with IBM T61 Test Position 1 Channel 810

GSM 1900 GPRS (1TXslot) with IBM T61 Test Position 1 Middle

Date/Time: 11/25/2011 7:02:57 PM

Communication System: GPRS 1TX; Frequency: 1880 MHz; Duty Cycle: 1:8.30042

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.960 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.9 V/m; Power Drift = 0.125 dB

Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.829 mW/g; SAR(10 g) = 0.535 mW/g

Maximum value of SAR (measured) = 0.902 mW/g

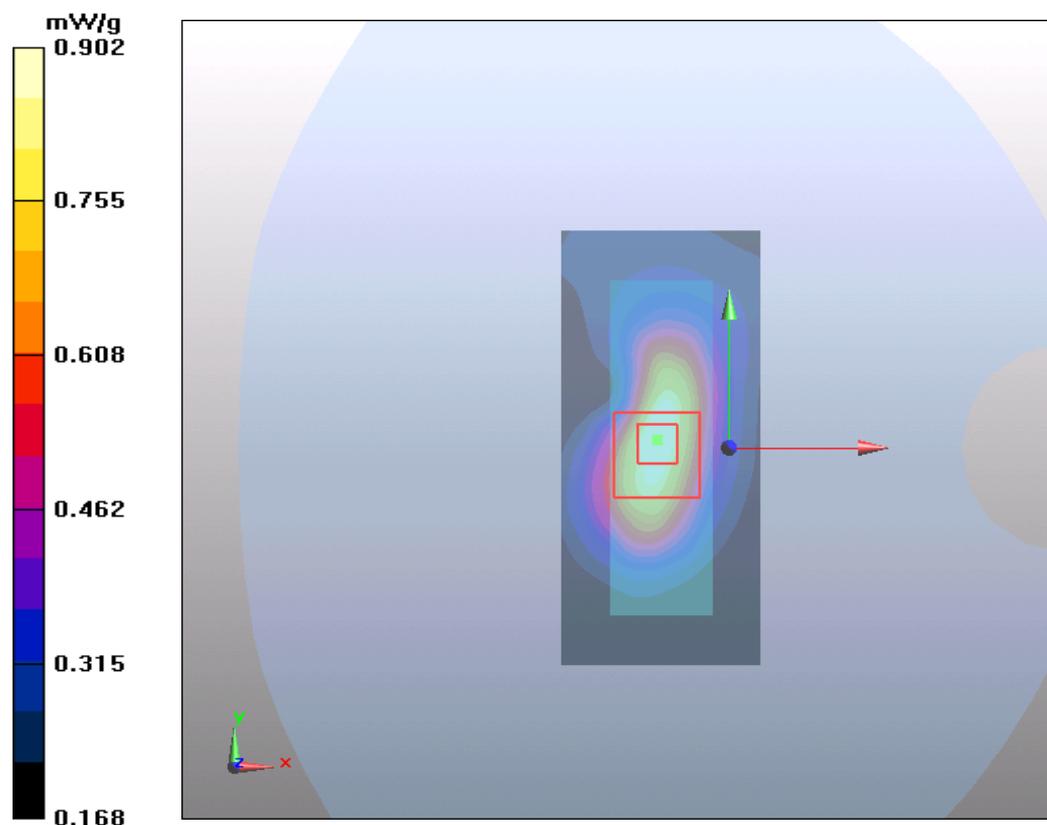


Figure 26 GSM 1900 GPRS (1TXslot) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (1TXslot) with IBM T61 Test Position 1 Low

Date/Time: 11/25/2011 7:53:03 PM

Communication System: GPRS 1TX; Frequency: 1850.2 MHz; Duty Cycle: 1:8.30042

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

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

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.845 mW/g; SAR(10 g) = 0.543 mW/g

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

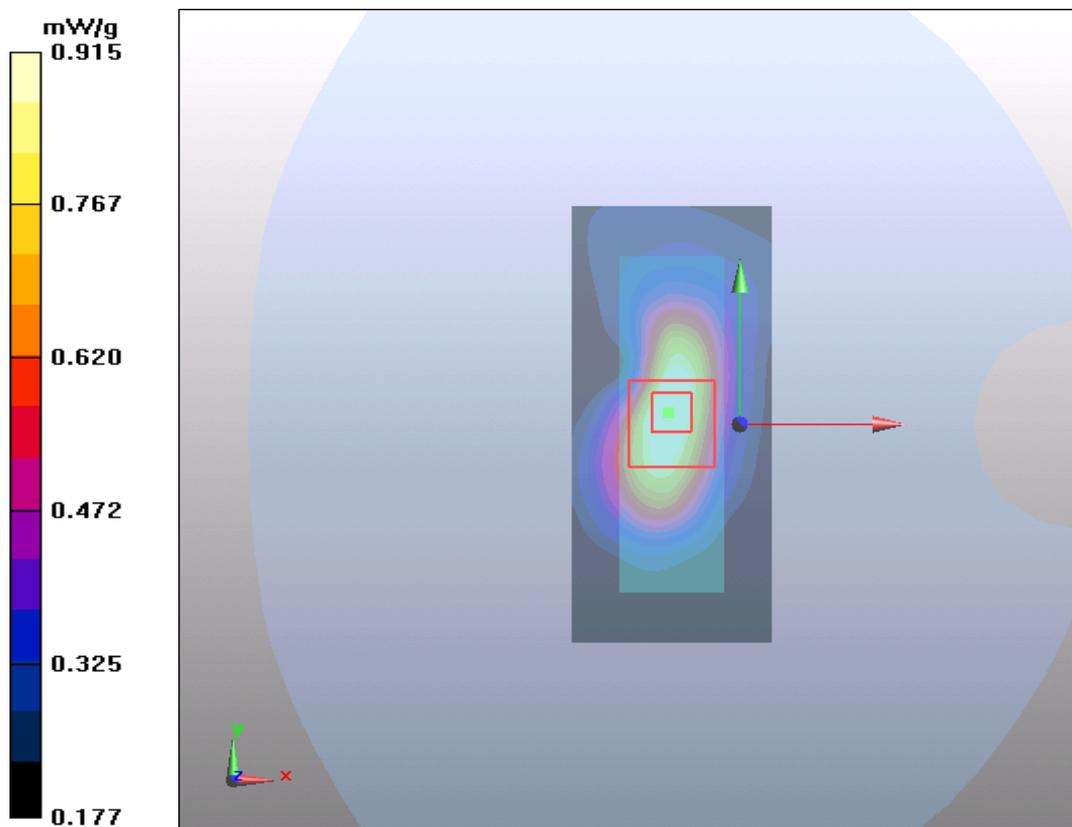


Figure 27 GSM 1900 GPRS (1TXslot) with IBM T61 Test Position 1 Channel 512

GSM 1900 GPRS (2TXslots) with IBM T61 Test Position 1 High

Date/Time: 11/25/2011 5:35:47 PM

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.941 mW/g

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.7 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.812 mW/g; SAR(10 g) = 0.528 mW/g

Maximum value of SAR (measured) = 0.875 mW/g

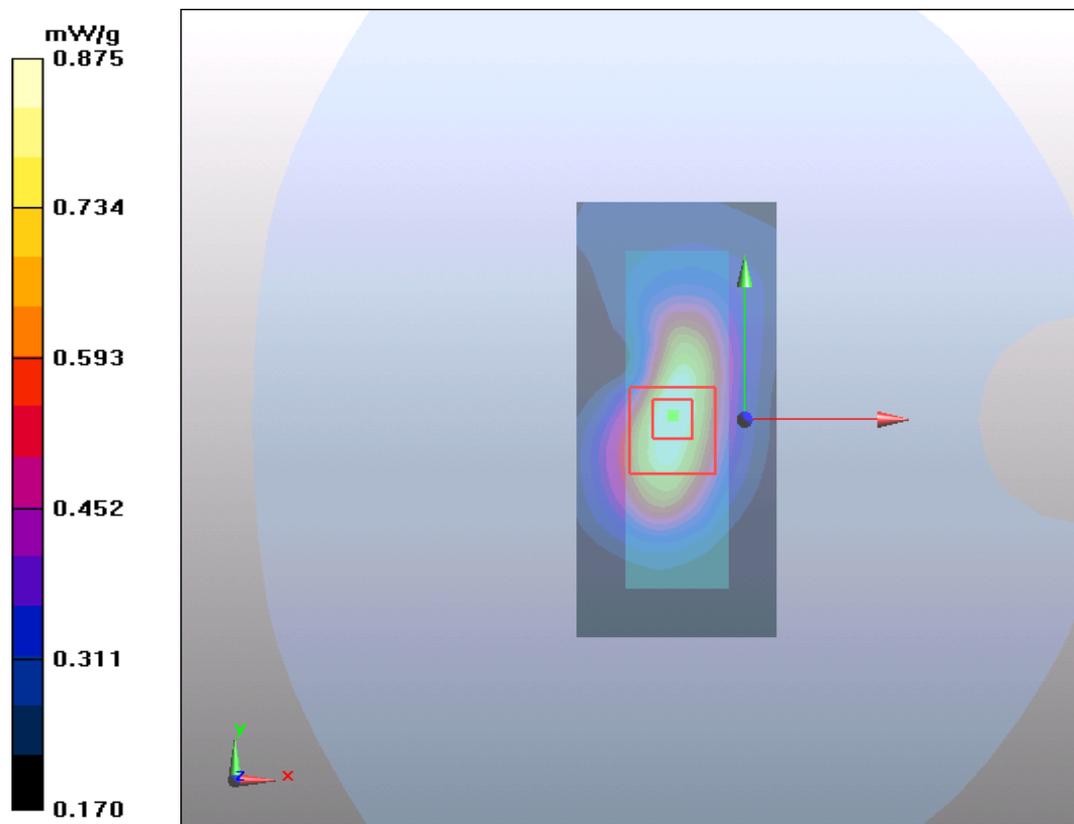


Figure 28 GSM 1900 GPRS (2TXslots) with IBM T61 Test Position 1 Channel 810

GSM 1900 GPRS (2TXslots) with IBM T61 Test Position 1 Middle

Date/Time: 11/25/2011 5:10:33 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

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

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.1 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.32 W/kg

SAR(1 g) = 0.821 mW/g; SAR(10 g) = 0.529 mW/g

Maximum value of SAR (measured) = 0.901 mW/g

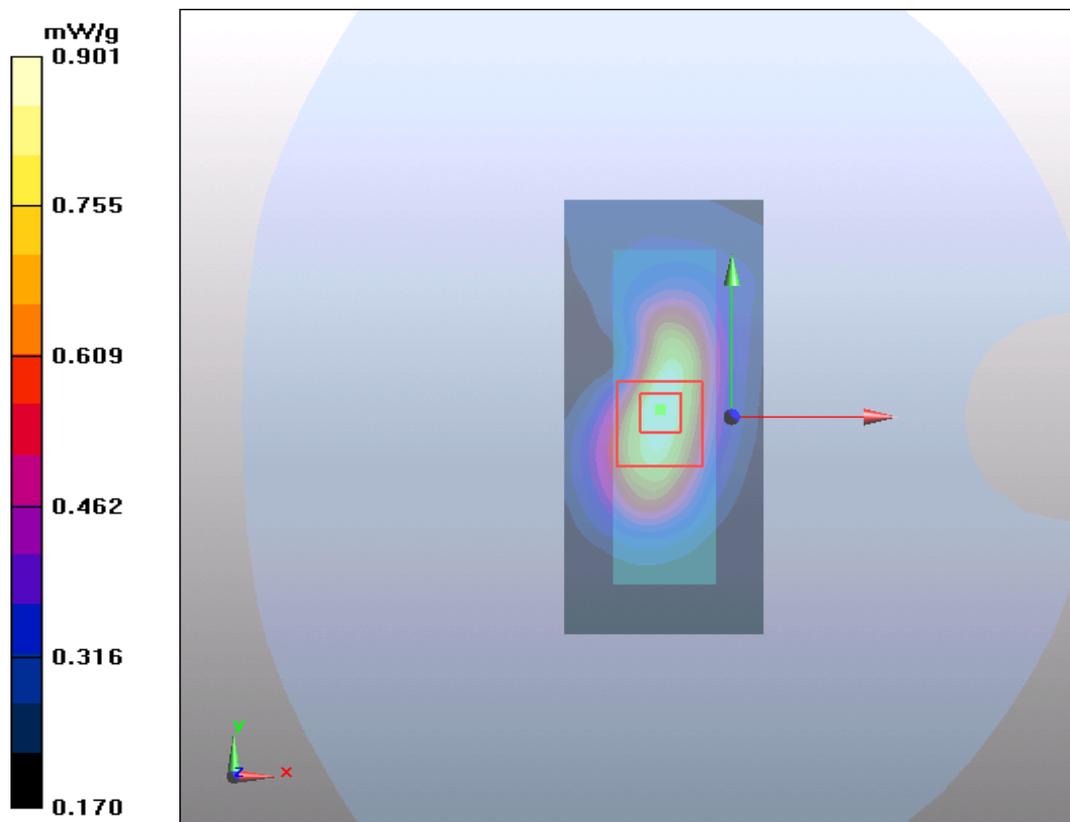


Figure 29 GSM 1900 GPRS (2TXslots) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (2TXslots) with IBM T61 Test Position 1 Low

Date/Time: 11/25/2011 3:26:17 PM

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

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

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.4 V/m; Power Drift = -0.105 dB

Peak SAR (extrapolated) = 1.54 W/kg

SAR(1 g) = 0.938 mW/g; SAR(10 g) = 0.608 mW/g

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

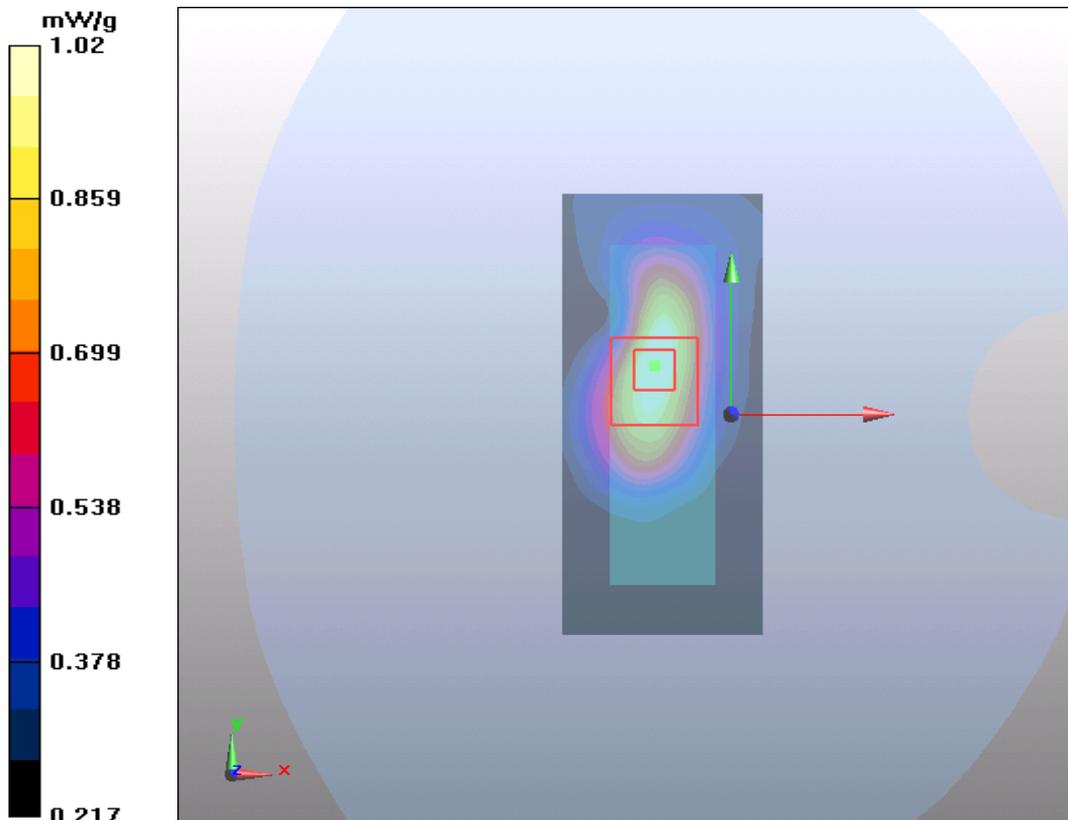


Figure 30 GSM 1900 GPRS (2TXslots) with IBM T61 Test Position 1 Channel 512

GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 1 High

Date/Time: 11/25/2011 6:34:08 PM

Communication System: GPRS 3TX; Frequency: 1909.8 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.969 mW/g

Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.1 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.838 mW/g; SAR(10 g) = 0.542 mW/g

Maximum value of SAR (measured) = 0.911 mW/g

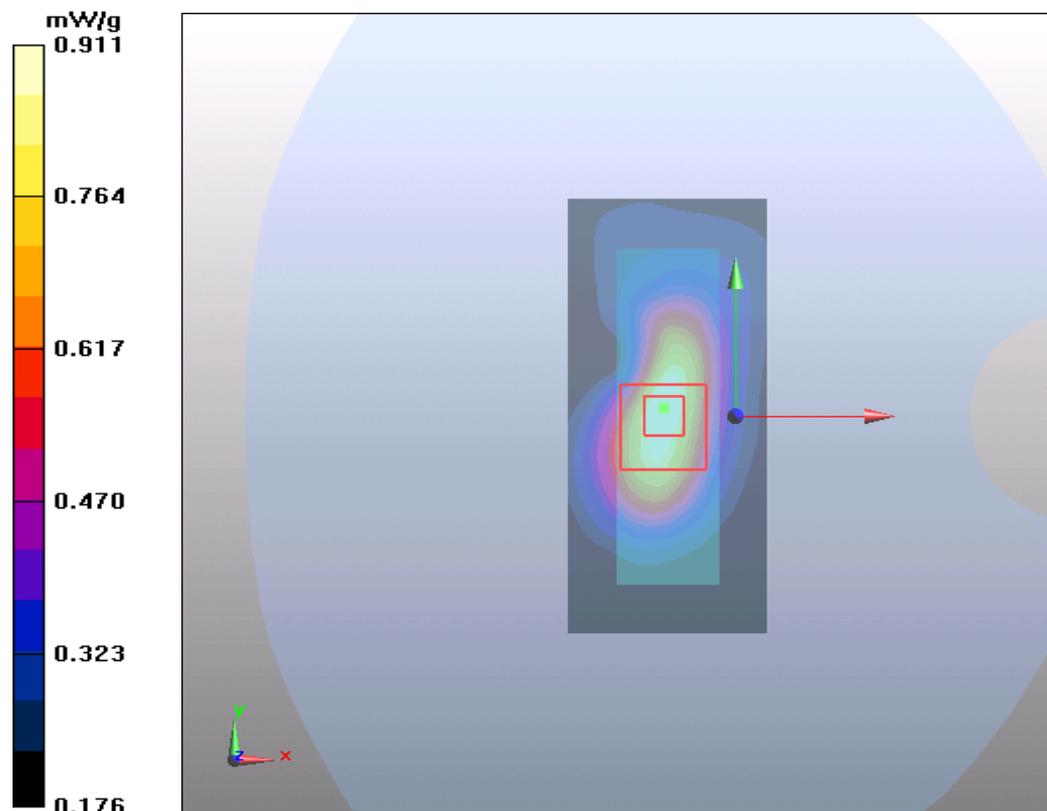


Figure 31 GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 1 Channel 810

GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 1 Middle

Date/Time: 11/25/2011 6:09:09 PM

Communication System: GPRS 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.985 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.4 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 1.39 W/kg

SAR(1 g) = 0.851 mW/g; SAR(10 g) = 0.547 mW/g

Maximum value of SAR (measured) = 0.931 mW/g

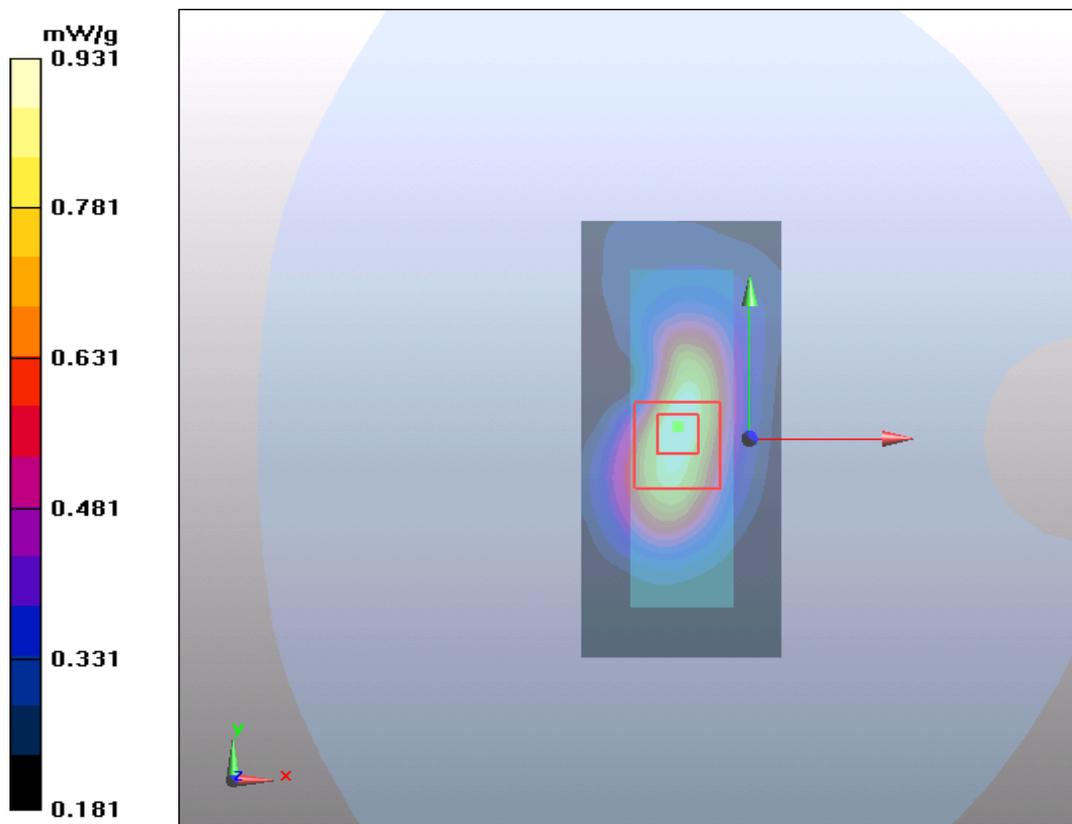


Figure 32 GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 1 Low

Date/Time: 11/25/2011 3:52:41 PM

Communication System: GPRS 3TX; Frequency: 1850.2 MHz; Duty Cycle: 1:2.76694

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

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

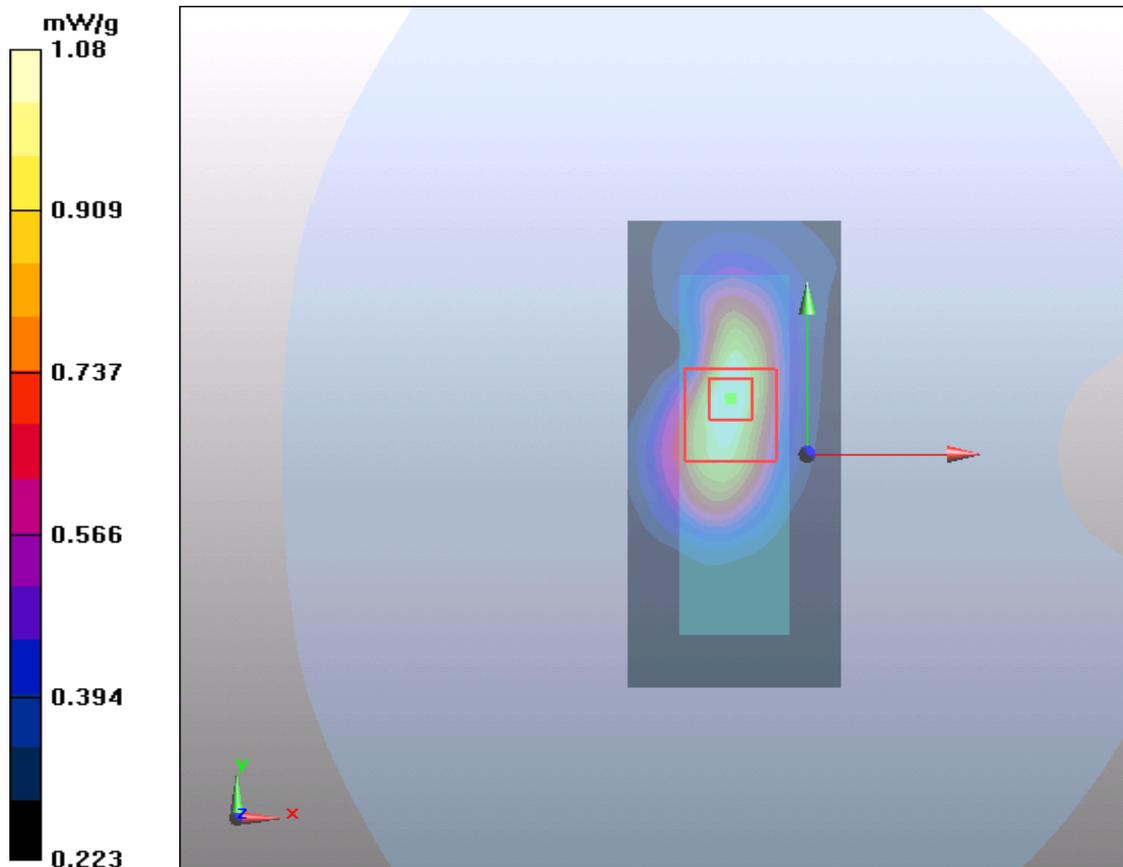
Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.7 V/m; Power Drift = -0.094 dB

Peak SAR (extrapolated) = 1.56 W/kg

SAR(1 g) = 0.963 mW/g; SAR(10 g) = 0.612 mW/g

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



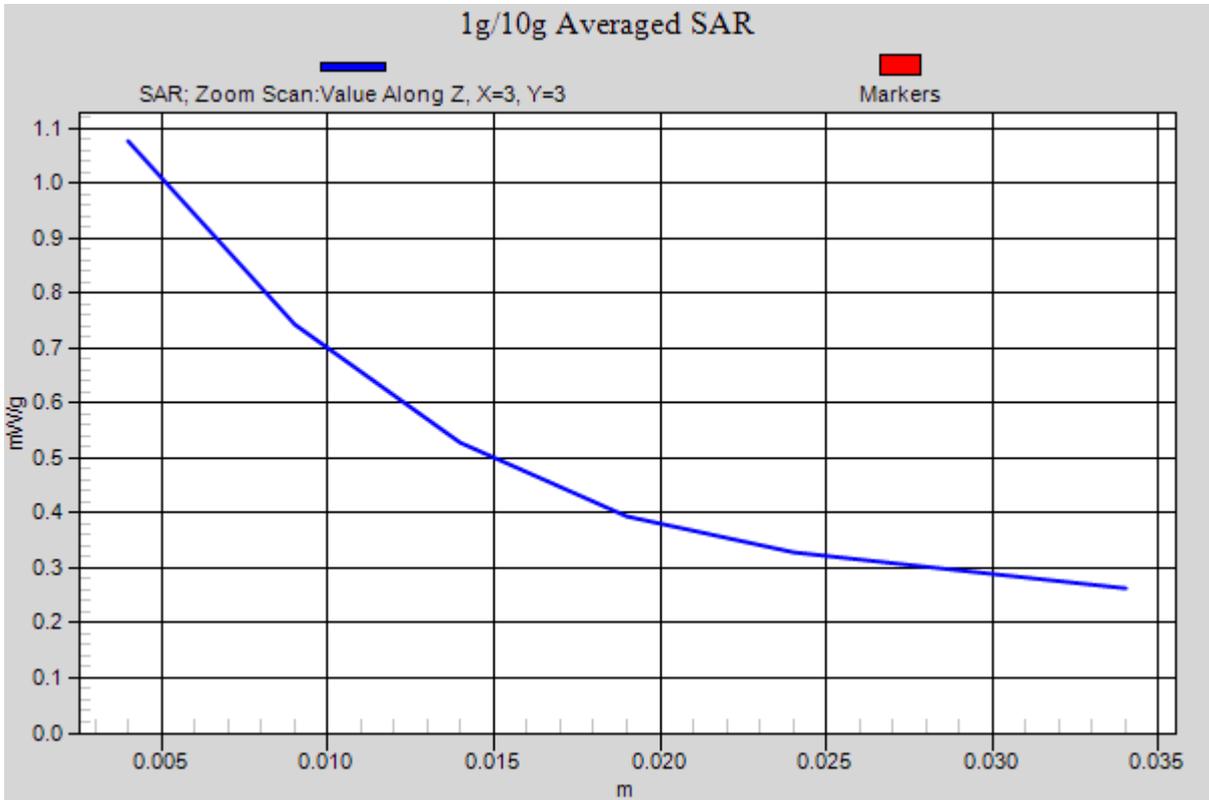


Figure 33 GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 1 Channel 512

GSM 1900 GPRS (4TXslots) with IBM T61 Test Position 1 Middle

Date/Time: 11/25/2011 8:39:50 PM

Communication System: GPRS 4TX; Frequency: 1880 MHz; Duty Cycle: 1:2.07491

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.918 mW/g

Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.3 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.784 mW/g; SAR(10 g) = 0.504 mW/g

Maximum value of SAR (measured) = 0.858 mW/g

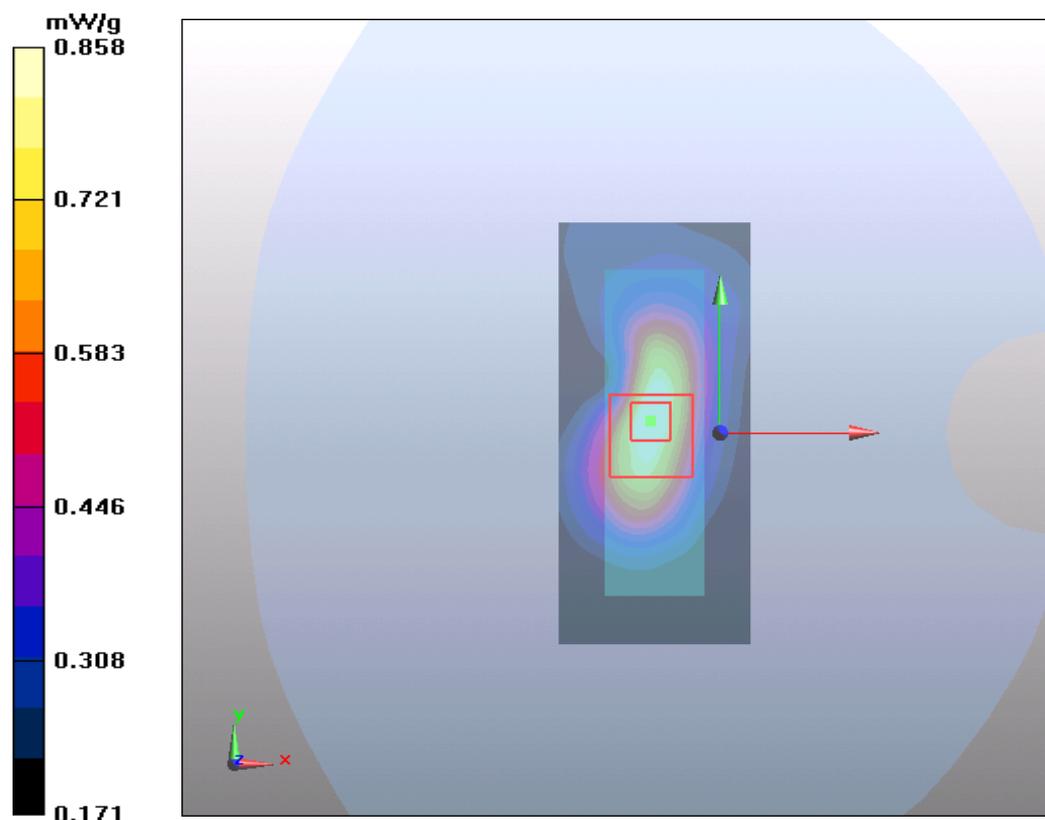


Figure 34 GSM 1900 GPRS (4TXslots) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 2 Middle

Date/Time: 11/25/2011 10:04:50 PM

Communication System: GPRS 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 2 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.817 mW/g

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

Reference Value = 23.2 V/m; Power Drift = -0.044 dB

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.720 mW/g; SAR(10 g) = 0.433 mW/g

Maximum value of SAR (measured) = 0.793 mW/g

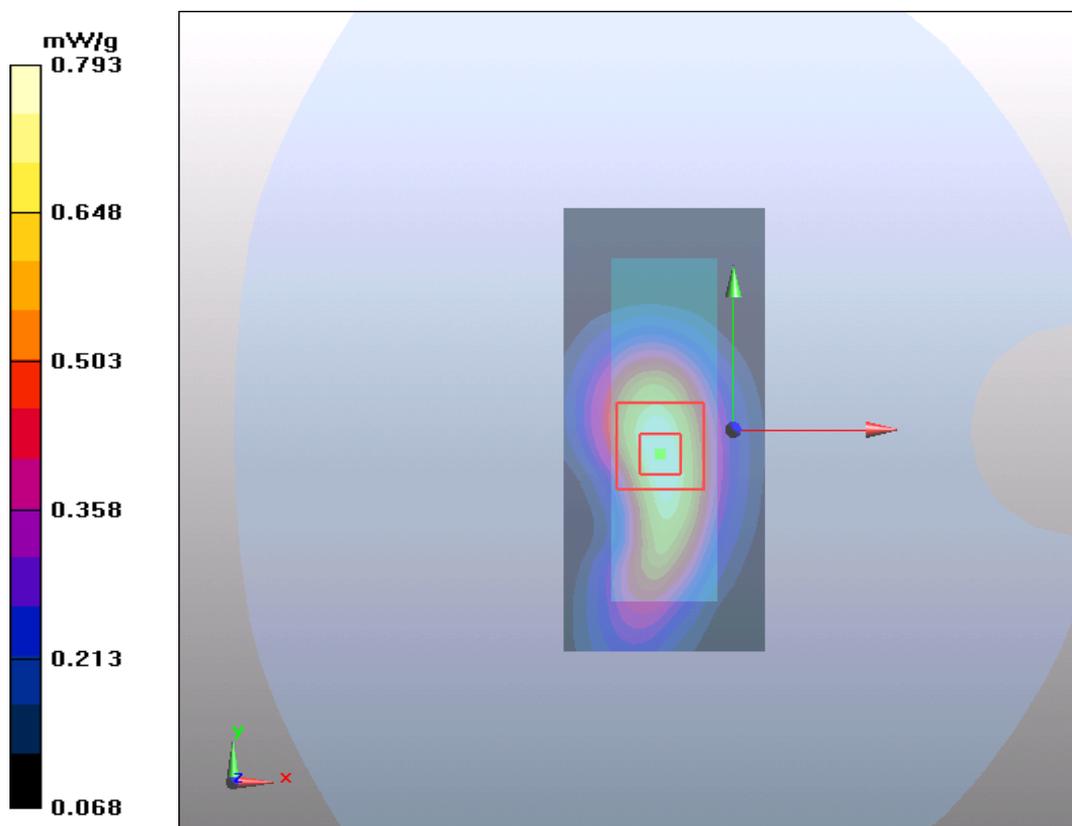


Figure 35 GSM 1900 GPRS (3TXslots) with IBM T61 Test Position 2 Channel 661

GSM 1900 GPRS (3TXslots) with Lenovo Y-450 Test Position 3 Middle

Date/Time: 11/25/2011 11:08:18 PM

Communication System: GPRS 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 3 Middle/Area Scan (31x41x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.051 mW/g

Test Position 3 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.98 V/m; Power Drift = -0.189 dB

Peak SAR (extrapolated) = 0.061 W/kg

SAR(1 g) = 0.049 mW/g; SAR(10 g) = 0.044 mW/g

Maximum value of SAR (measured) = 0.051 mW/g

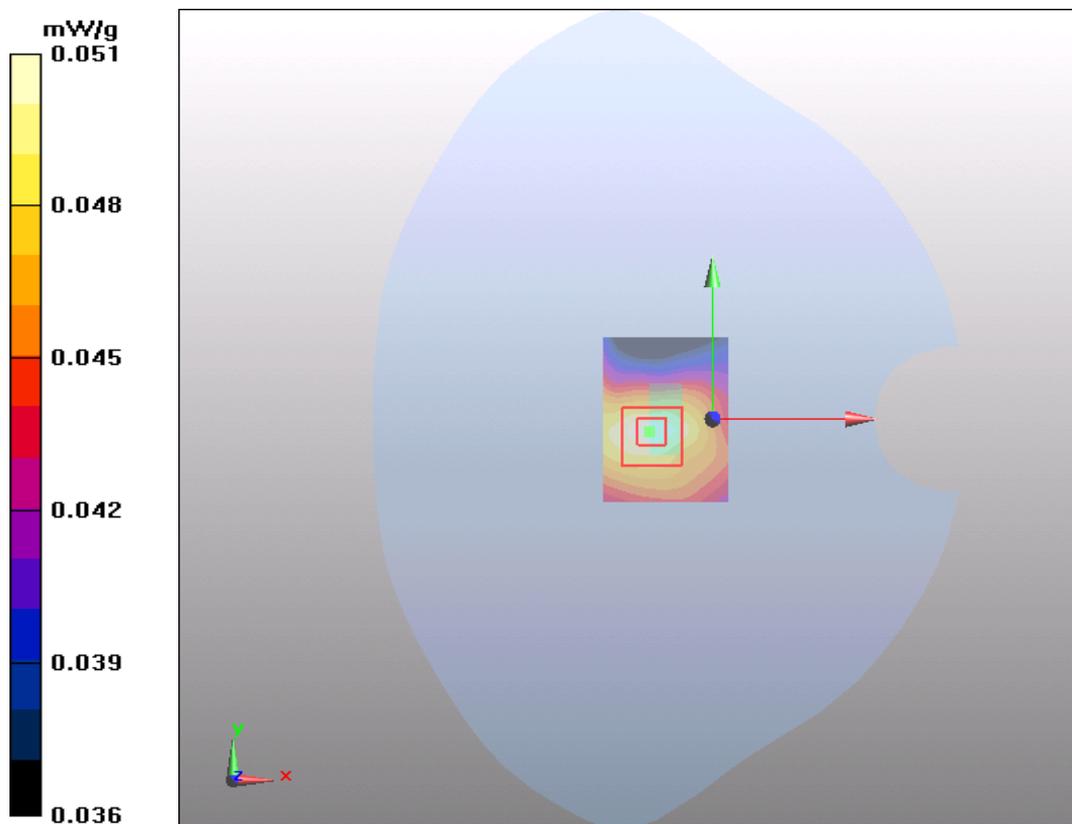


Figure 36 GSM 1900 GPRS (3TXslots) with Lenovo Y-450 Test Position 3 Channel 661

GSM 1900 GPRS (3TXslots) with Lenovo Y-450 Test Position 4 Middle

Date/Time: 11/25/2011 4:46:07 PM

Communication System: GPRS 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 4 Middle/Area Scan (31x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.731 mW/g

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

Reference Value = 21.6 V/m; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 1.11 W/kg

SAR(1 g) = 0.645 mW/g; SAR(10 g) = 0.356 mW/g

Maximum value of SAR (measured) = 0.718 mW/g

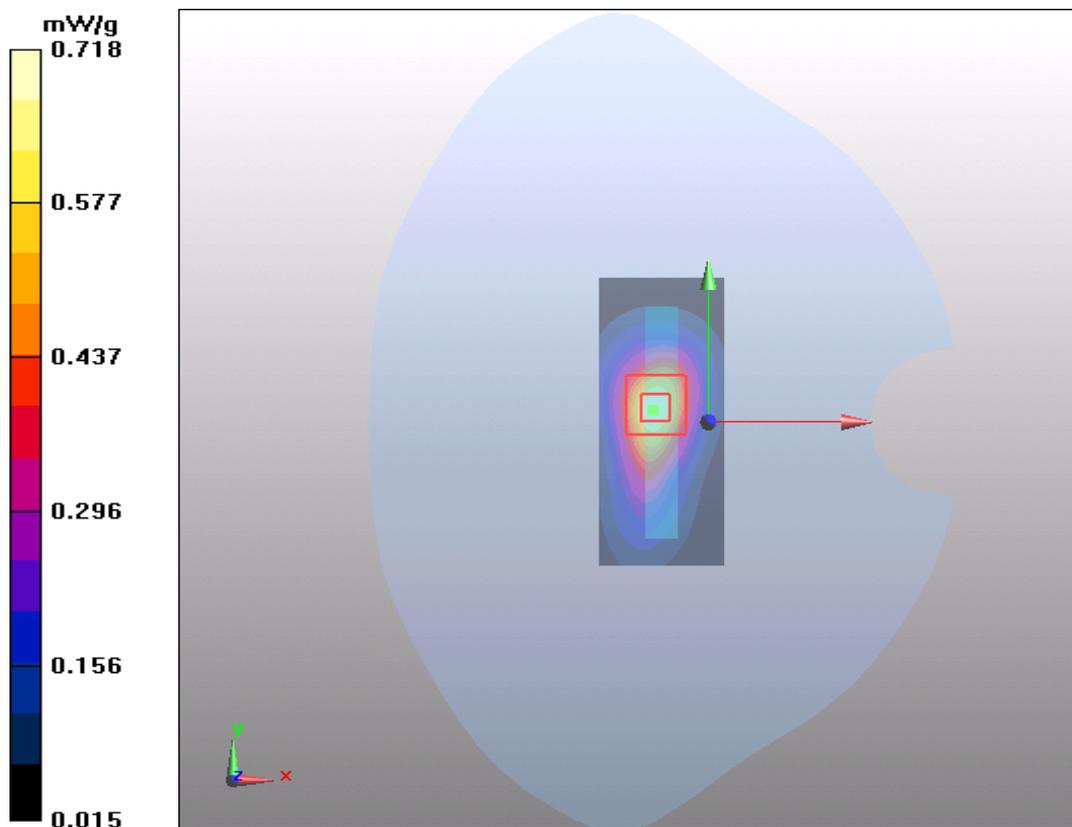


Figure 37 GSM 1900 GPRS (3TXslots) with Lenovo Y-450 Test Position 4 Channel 661

GSM 1900 GPRS (3TXslots) with Lenovo Y-450 Test Position 5 Middle

Date/Time: 11/25/2011 10:35:39 PM

Communication System: GPRS 3TX; Frequency: 1880 MHz; Duty Cycle: 1:2.76694

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 53.1$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 5 Middle/Area Scan (31x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.263 mW/g

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

Reference Value = 12.2 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 0.325 W/kg

SAR(1 g) = 0.250 mW/g; SAR(10 g) = 0.211 mW/g

Maximum value of SAR (measured) = 0.261 mW/g

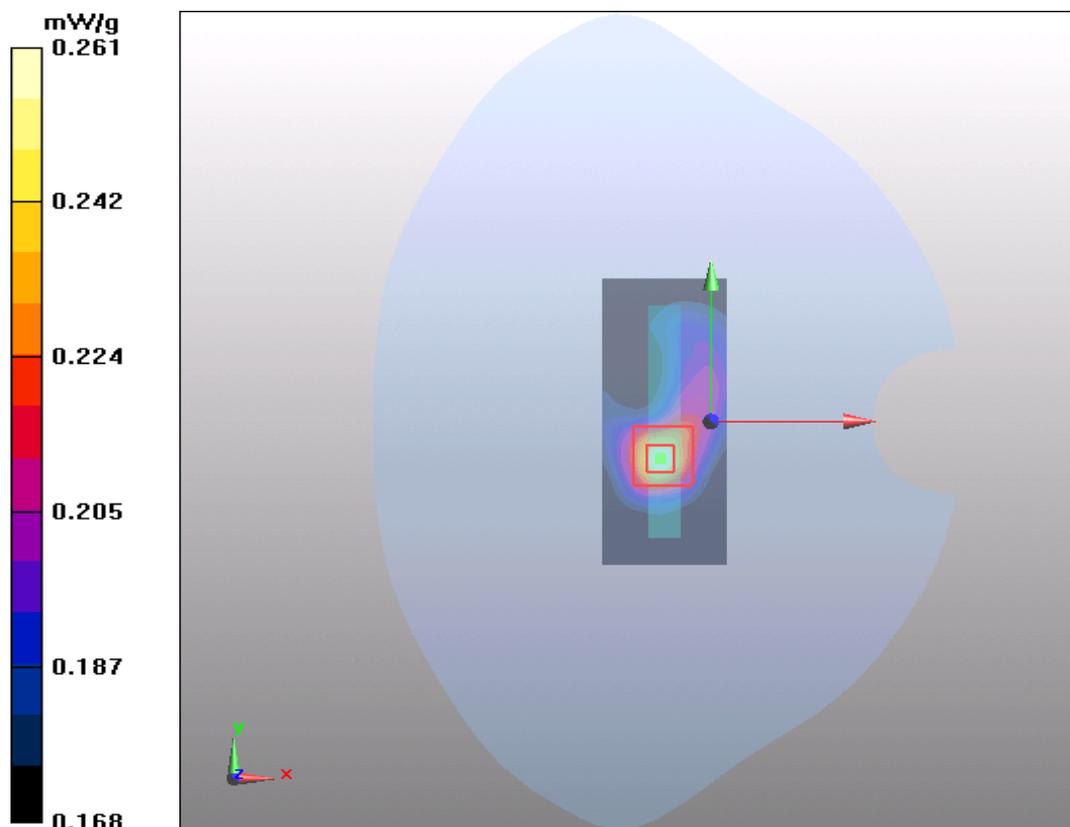


Figure 38 GSM 1900 GPRS (3TXslots) with Lenovo Y-450 Test Position 5 Channel 661

GSM 1900 EGPRS (3TXslots) with IBM T61 Test Position 1 Low

Date/Time: 11/25/2011 9:08:05 PM

Communication System: EGPRS 3TX; Frequency: 1850.2 MHz; Duty Cycle: 1:2.76694

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51) Calibrated: 10/3/2011;

Electronics: DAE4 Sn905; Calibrated: 6/24/2011

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

Test Position 1 Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.983 mW/g

Test Position 1 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.3 V/m; Power Drift = 0.101 dB

Peak SAR (extrapolated) = 1.39 W/kg

SAR(1 g) = 0.869 mW/g; SAR(10 g) = 0.551 mW/g

Maximum value of SAR (measured) = 0.948 mW/g

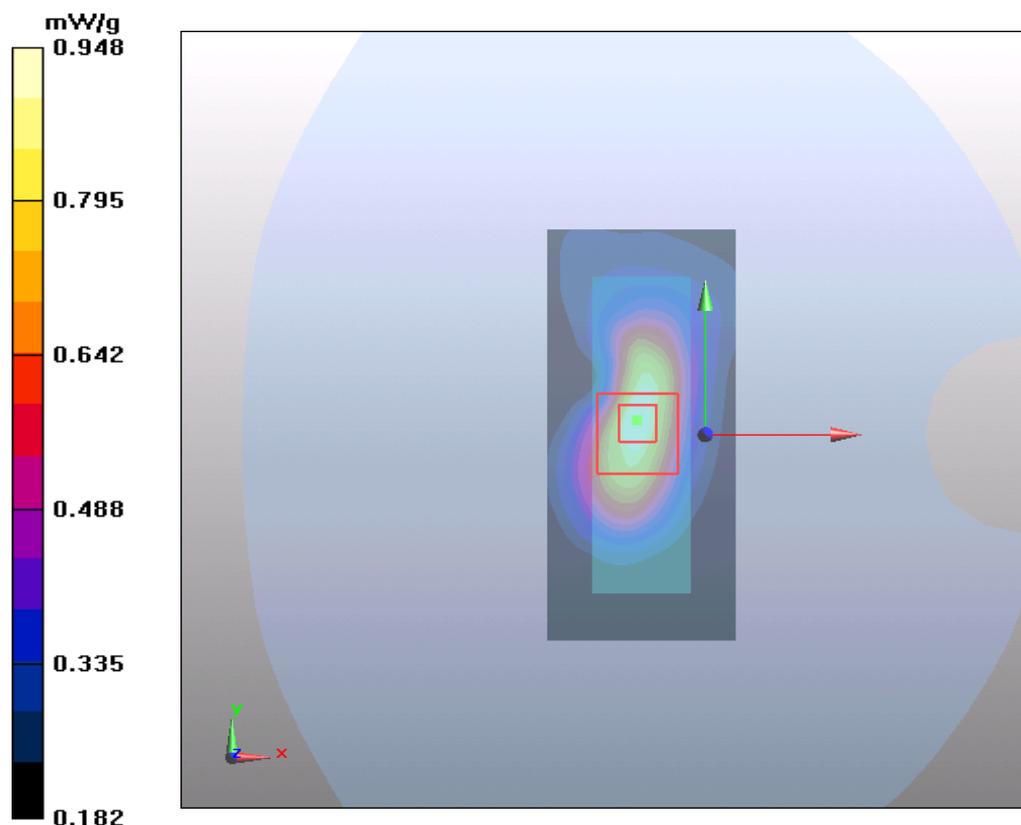


Figure 39 GSM 1900 EGPRS (3TXslots) with IBM T61 Test Position 1 Channel 512

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

Report No. RZA1111-1953SAR01

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ANNEX D: Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client: **TMC Shanghai (Auden)**

Certificate No.: **EX3-3816 Oct11**

CALIBRATION CERTIFICATE	
Object	EX3DV4 - SN:3816
Calibration procedure(s)	QA CAL-01.v8; QA CAL-12.v7; QA CAL-23.v4; QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	October 3, 2011
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>	

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41496087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Jeton Kastali	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Technical Manager	
			Issued: October 3, 2011
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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:3816

October 3, 2011

Probe EX3DV4

SN:3816

Manufactured: September 2, 2011
Calibrated: October 3, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

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

EX3DV4- SN:3816

October 3, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3816

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.48	0.56	0.61	$\pm 10.1 \%$
DCP (mV) ^B	99.8	102.2	102.1	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	111.3	$\pm 2.7 \%$
			Y	0.00	0.00	1.00	127.3	
			Z	0.00	0.00	1.00	127.7	

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

TA Technology (Shanghai) Co., Ltd.

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EX3DV4--SN:3816

October 3, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3816

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^d	Conductivity (S/m) ^e	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	9.97	9.97	9.97	0.11	1.00	± 13.4 %
750	41.9	0.89	9.47	9.47	9.47	0.62	0.78	± 12.0 %
835	41.5	0.90	9.22	9.22	9.22	0.76	0.66	± 12.0 %
1450	40.5	1.20	8.58	8.58	8.58	0.65	0.77	± 12.0 %
1750	40.1	1.37	8.23	8.23	8.23	0.80	0.58	± 12.0 %
1900	40.0	1.40	7.90	7.90	7.90	0.80	0.57	± 12.0 %
2450	39.2	1.80	7.17	7.17	7.17	0.66	0.64	± 12.0 %
2600	39.0	1.96	7.06	7.06	7.06	0.64	0.67	± 12.0 %

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

^d At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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EX3DV4-- SN:3816

October 3, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3816

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	10.83	10.83	10.83	0.02	1.00	± 13.4 %
750	55.5	0.96	9.50	9.50	9.50	0.80	0.70	± 12.0 %
835	55.2	0.97	9.38	9.38	9.38	0.68	0.69	± 12.0 %
1750	53.4	1.49	7.80	7.80	7.80	0.80	0.65	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.80	0.65	± 12.0 %
2450	52.7	1.95	7.19	7.19	7.19	0.80	0.60	± 12.0 %
2600	52.5	2.16	7.14	7.14	7.14	0.80	0.59	± 12.0 %

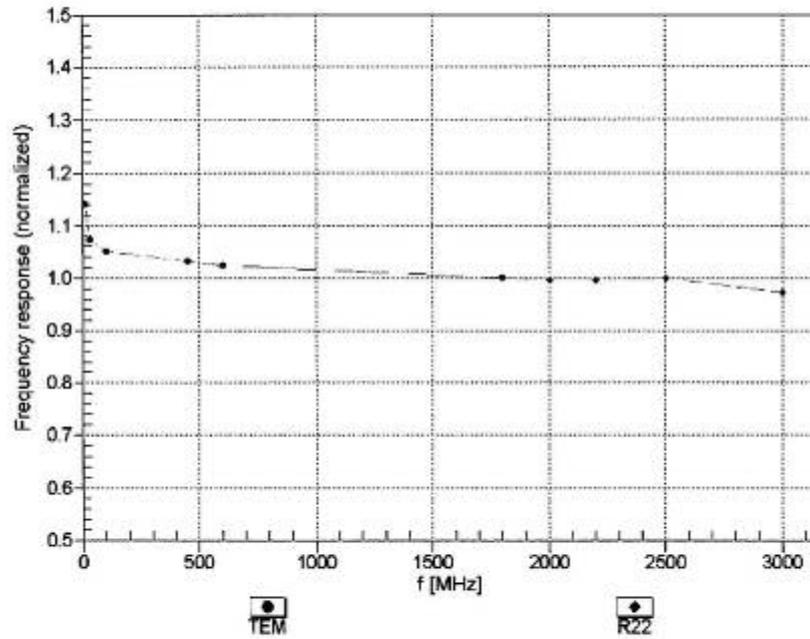
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

EX3DV4- SN:3816

October 3, 2011

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



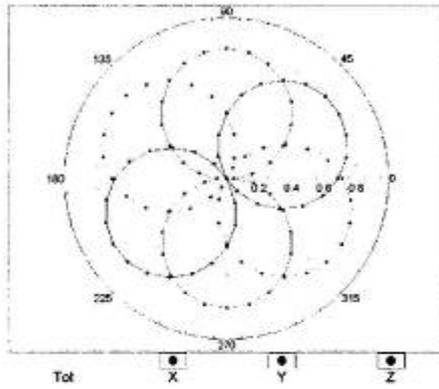
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

EX3DV4- SN:3816

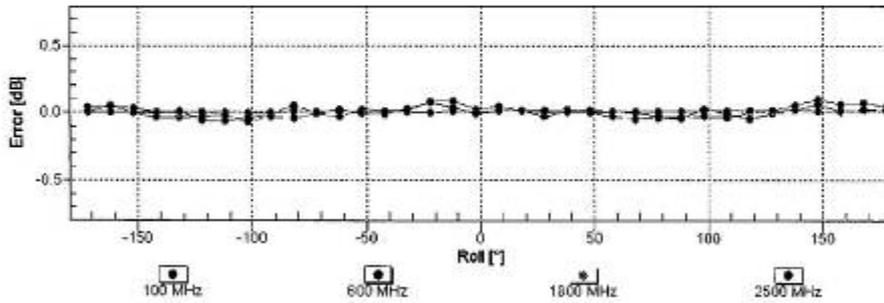
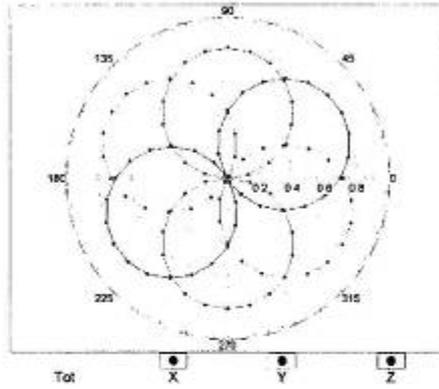
October 3, 2011

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

f=600 MHz, TEM



f=1800 MHz, R22

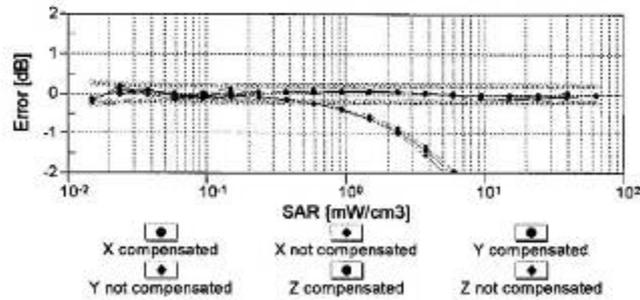
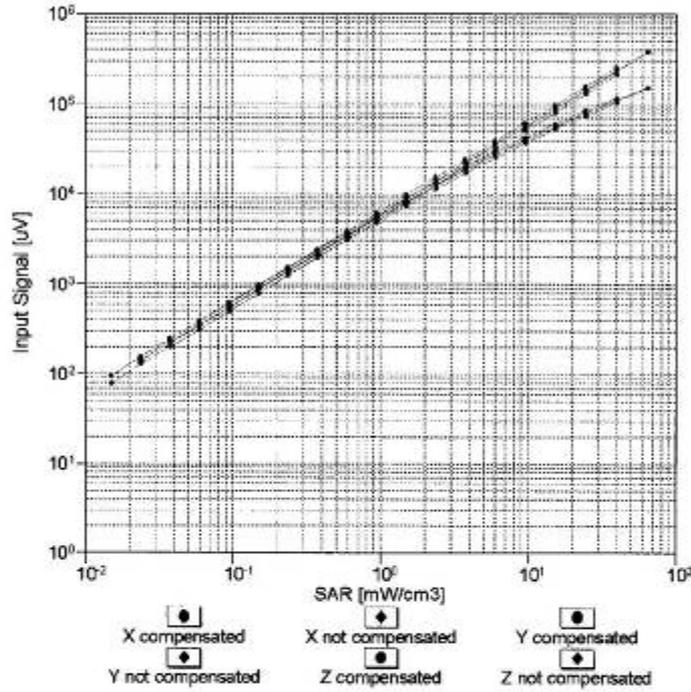


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

EX3DV4-SN:3616

October 3, 2011

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

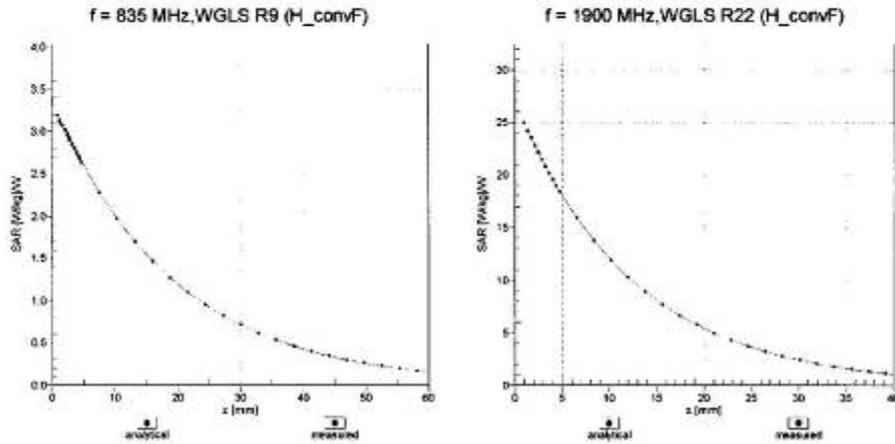


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

EX3DV4- SN:3816

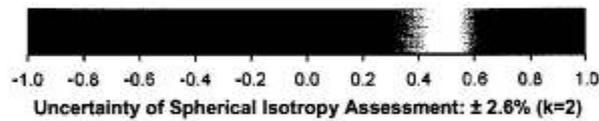
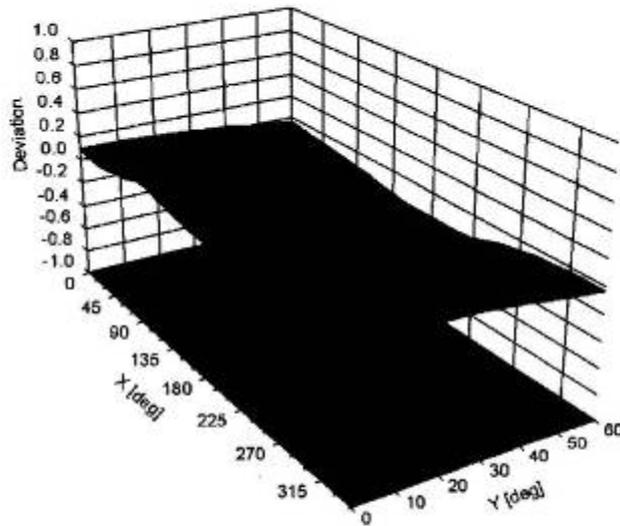
October 3, 2011

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), f = 900 MHz



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

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EX3DV4-- SN:3816

October 3, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3816

Other Probe Parameters

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

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

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ANNEX E: D835V2 Dipole Calibration Certificate

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D835V2-4d020_Aug11**

CALIBRATION CERTIFICATE

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

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

Calibration date: **August 26, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: August 26, 2011

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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:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	41.1 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.34 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.11 mW / g ± 16.5 % (k=2)

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	53.4 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.46 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.26 mW / g ± 16.5 % (k=2)

TA Technology (Shanghai) Co., Ltd.

Test Report

Appendix

Antenna Parameters with Head TSL

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

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

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

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	April 22, 2004

DASY5 Validation Report for Head TSL

Date: 25.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 41.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

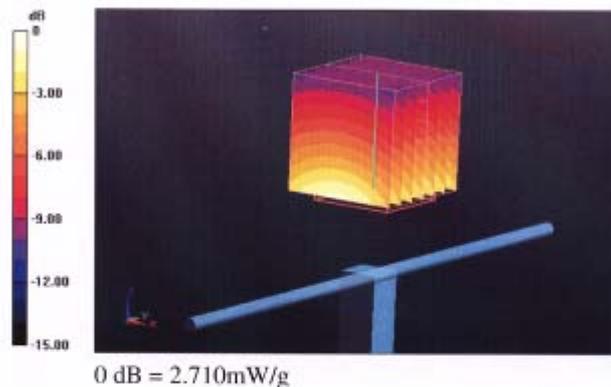
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 3.421 W/kg

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

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

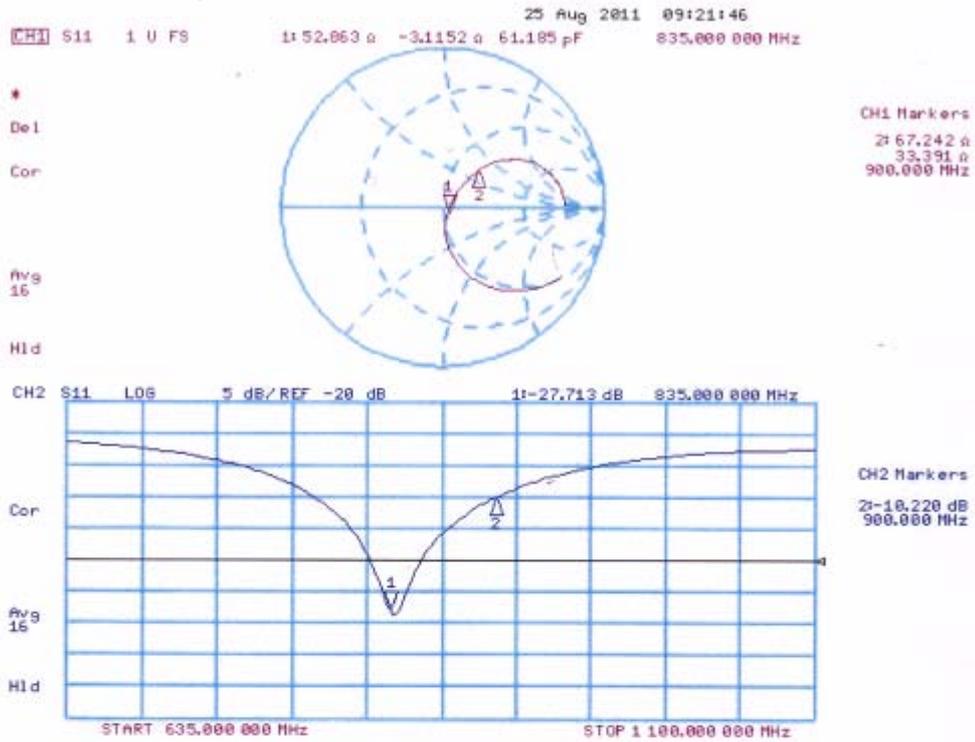


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Report No. RZA1111-1953SAR01

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Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 26.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

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

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

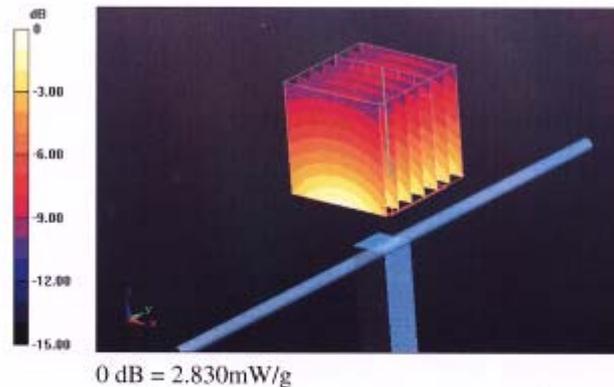
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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

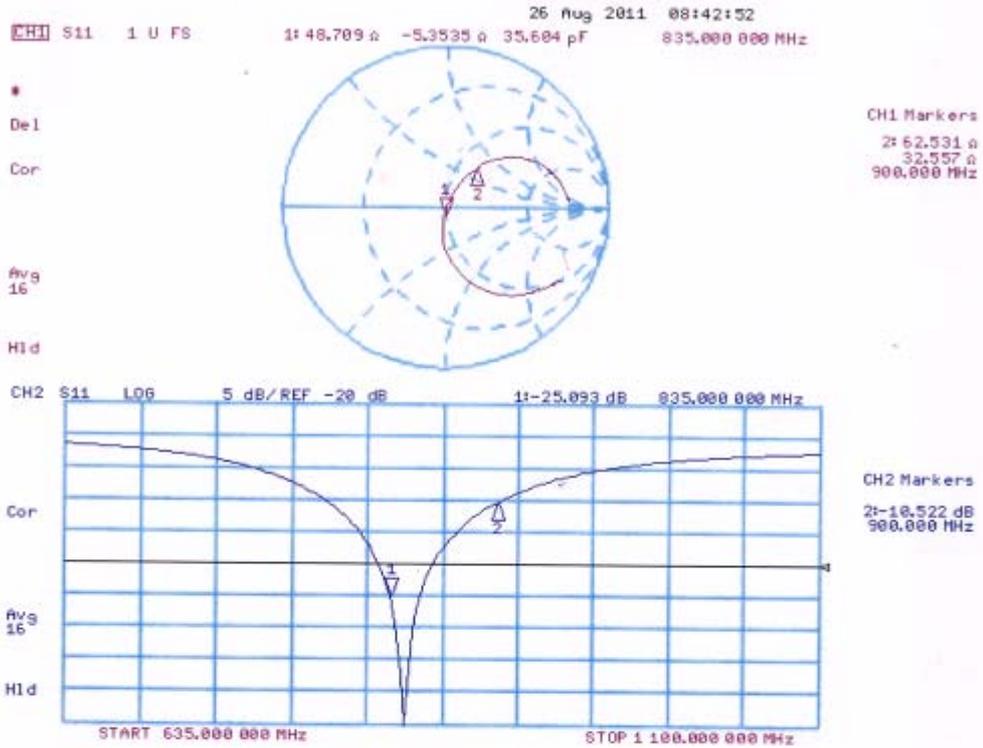
Peak SAR (extrapolated) = 3.509 W/kg

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

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



Impedance Measurement Plot for Body TSL



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

Report No. RZA1111-1953SAR01

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ANNEX F: D1900V2 Dipole Calibration Certificate

**Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D1900V2-5d060_Aug11**

CALIBRATION CERTIFICATE

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

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

Calibration date: **August 31, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: August 31, 2011

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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:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	39.5 ± 6 %	1.42 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

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

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

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 %	1.57 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

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

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.6 Ω + 7.5 j Ω
Return Loss	- 22.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω + 7.9 j Ω
Return Loss	- 21.3 dB

General Antenna Parameters and Design

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

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 10, 2004

DASY5 Validation Report for Head TSL

Date: 30.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

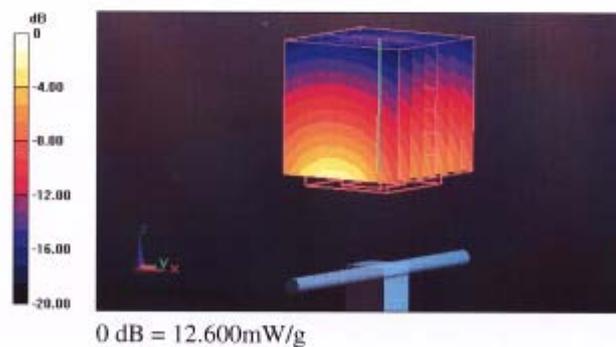
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

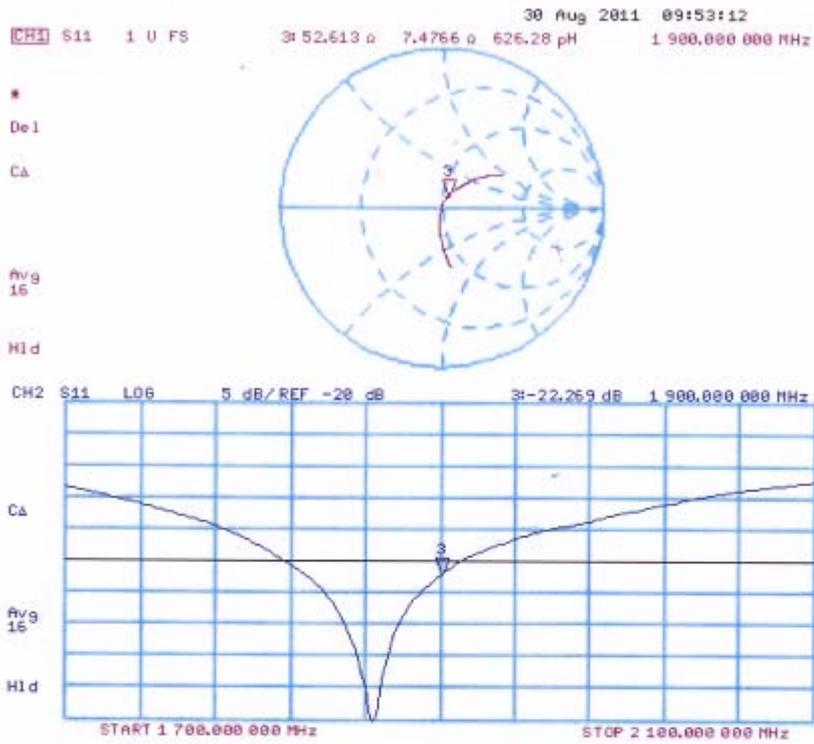
Peak SAR (extrapolated) = 18.535 W/kg

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

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



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 31.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

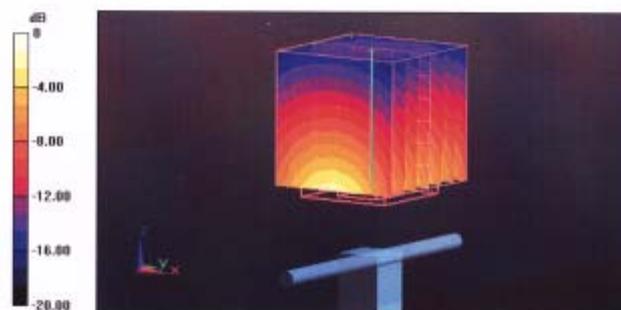
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 18.663 W/kg

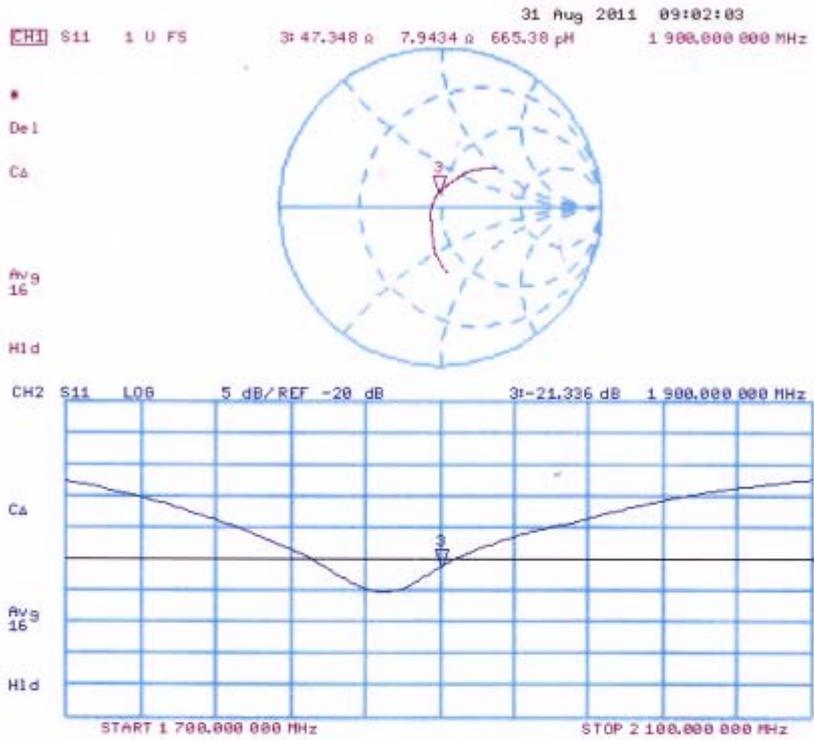
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.55 mW/g

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



0 dB = 13.400mW/g

Impedance Measurement Plot for Body TSL



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Report No. RZA1111-1953SAR01

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ANNEX G: DAE4 Calibration Certificate

**Calibration Laboratory of
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Accreditation No.: **SCS 108**

Client: **Auden**

Certificate No: **DAE4-905_Jun11**

CALIBRATION CERTIFICATE

Object: **DAE4 - SD 000 D04 BK - SN: 905**

Calibration procedure(s): **QA CAL-06.v23
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **June 24, 2011**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0610276	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bornholt	R&D Director	

Issued: June 24, 2011

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Accreditation No.: SCS 108

Glossary

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

Methods Applied and Interpretation of Parameters

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

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DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	404.723 \pm 0.1% (k=2)	405.276 \pm 0.1% (k=2)	404.851 \pm 0.1% (k=2)
Low Range	3.97979 \pm 0.7% (k=2)	4.00079 \pm 0.7% (k=2)	3.99604 \pm 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	270.5 $^{\circ}$ \pm 1 $^{\circ}$
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Test Report

Appendix

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199999.3	-0.37	-0.00
Channel X + Input	20000.19	0.69	0.00
Channel X - Input	-19996.51	2.99	-0.01
Channel Y + Input	199999.5	1.19	0.00
Channel Y + Input	19998.36	-1.14	-0.01
Channel Y - Input	-19998.45	0.65	-0.00
Channel Z + Input	199996.8	-0.50	-0.00
Channel Z + Input	19998.70	-0.80	-0.00
Channel Z - Input	-19998.46	0.84	-0.00

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2000.5	0.40	0.02
Channel X + Input	200.95	1.05	0.53
Channel X - Input	-198.80	1.30	-0.65
Channel Y + Input	1999.8	0.03	0.00
Channel Y + Input	200.33	0.33	0.16
Channel Y - Input	-199.66	0.24	-0.12
Channel Z + Input	1999.6	-0.40	-0.02
Channel Z + Input	200.48	0.58	0.29
Channel Z - Input	-199.45	0.75	-0.37

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	9.95	8.16
	-200	-7.20	-8.32
Channel Y	200	8.57	8.27
	-200	-9.34	-9.57
Channel Z	200	2.10	1.81
	-200	-2.85	-3.06

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	-	4.23	1.16
Channel Y	200	3.16	-	6.20
Channel Z	200	1.04	-1.10	-

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Test Report

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15901	16812
Channel Y	16152	15842
Channel Z	16382	17155

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	-0.02	-0.50	0.97	0.26
Channel Y	-0.92	-2.26	-0.45	0.25
Channel Z	-2.00	-3.19	-0.88	0.45

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

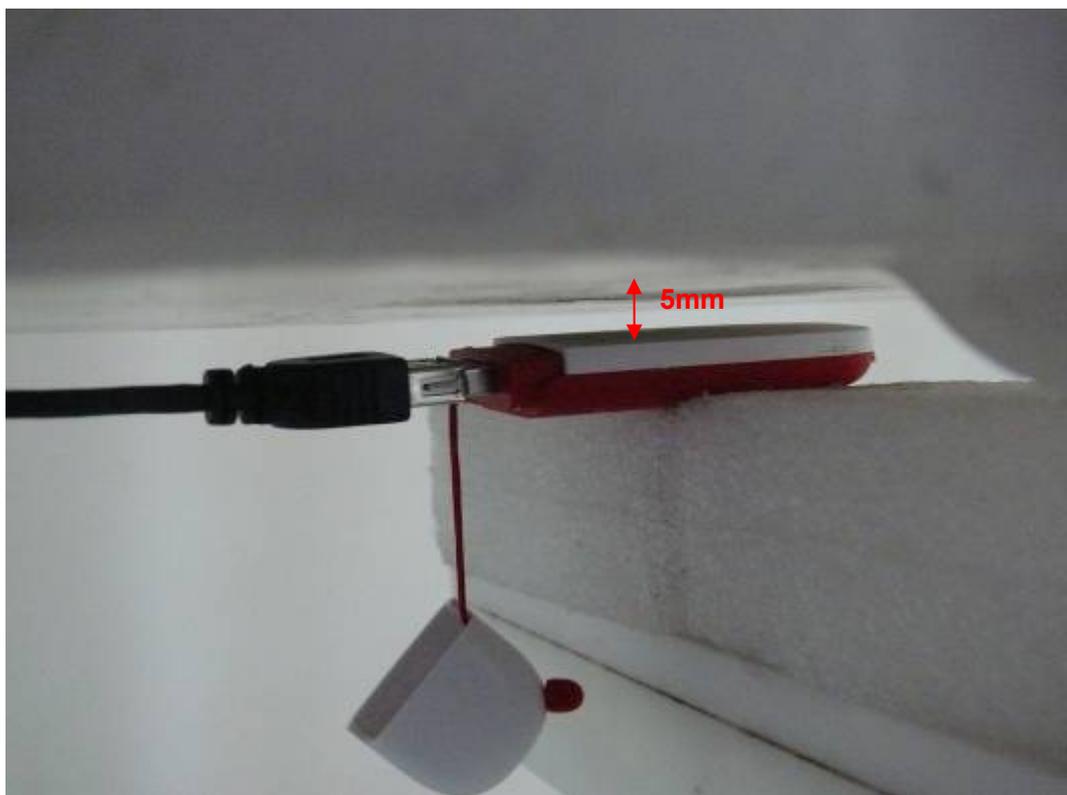
ANNEX H: The EUT Appearances and Test Configuration



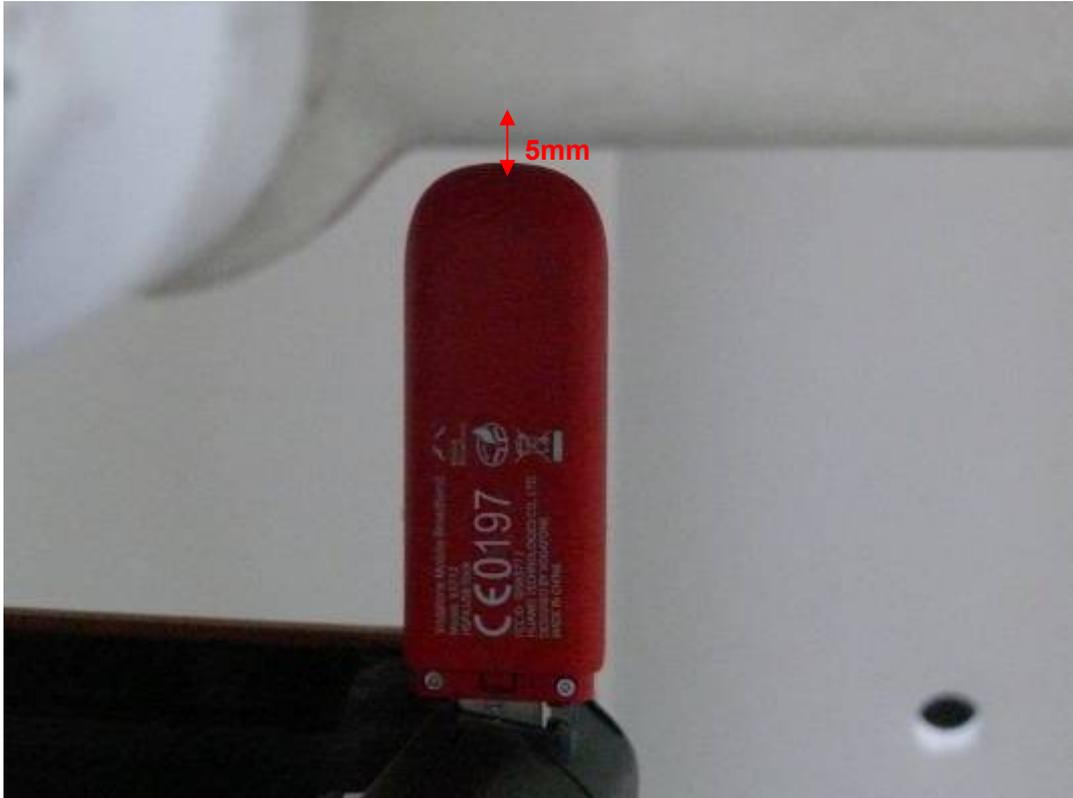
Picture 5: Constituents of the EUT



Picture 6: Test position 1



Picture 7: Test position 2



Picture 8: Test Position 3



Picture 9: Test Position 4



Picture 10: Test Position 5