



Report No.: RZA2009-1103



# OET 65

# TEST REPORT

<b>Product Name</b>	webConnect Jet
<b>Model</b>	UMG1691
<b>FCC ID</b>	QISE1691
<b>Client</b>	Huawei Technologies Co., Ltd.

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



## GENERAL SUMMARY

<b>Product Name</b>	webConnect Jet	<b>Model</b>	UMG1691
<b>FCC ID</b>	QISE1691	<b>Report No.</b>	RZA2009 -1103
<b>Client</b>	HUAWEI Technologies Co., Ltd.		
<b>Manufacturer</b>	HUAWEI Technologies Co., Ltd.		
<b>Standard(s)</b>	<p><b>ANSI/IEEE C95.1-1999:</b> IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.</p> <p><b>OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:</b> Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.</p> <p><b>IEC 62209-2:2008(106/162/CDV):</b> Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)for wireless communication devices used in close proximity to the human body .( frequency rang of 30MHz to 6GHz )</p> <p><b>tracking number: 153646</b></p>		
<b>Conclusion</b>	<p>Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.</p> <p>General Judgment: <b>Pass</b></p> <div style="text-align: right;">               (Stamp)  <b>Date of issue: September 2<sup>nd</sup>, 2009</b> </div>		
<b>Comment</b>	The test result only responds to the measured sample.		

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## 1. General Information

### 1.1. Notes of the test report

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

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

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### **1.4. Manufacturer Information**

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### 1.5. Information of EUT

#### General information

Device type :	portable device		
Exposure category:	uncontrolled environment / general population		
Device operating configurations :			
Operating mode(s):	GSM850; ( tested ) GSM1900; ( tested ) WCDMA Band IV; ( tested )		
Test Modulation:	(GSM) GMSK (WCDMA)QPSK		
S/N or IMEI	QC2AB10981000054		
GPRS mobile station class :	B		
GPRS multislot class :	10		
EGPRS multislot class:	12		
Maximum no. of timeslots in uplink:	4		
HSDPA UE category	8		
Operating frequency range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM1900:	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	WCDMA Band IV	1712.4 ~ 1752.6	2112.4 ~ 2152.2
Power class	GSM 850: 4, tested with power level 5		
	GSM 1900: 1, tested with power level 0		
	WCDMA Band IV: 3, tested with maximum output power		
Test channel (Low –Middle –High)	128 -192 - 251	(GSM850)	
	512 - 661 - 810	(GSM1900)	
	1312 - 1412 - 1513	(WCDMA Band IV)	
Hardware version:	CD98TCPU		
Software version:	11.126.07.04.420		
Antenna type:	Internal antenna		
Used host products:	IBM T61		
	BenQ Joy book R55V		

Equipment Under Test (EUT) is a model of webConnect Jet. During SAR test of the EUT, it was connected to a portable computer. The tests in the band of GSM 850 , GSM 1900 and WCDMA Band IV are performed in the mode of GPRS, EGPRS, WCDMA, and HSDPA .The measurements were performed in combination with two different host products (IBM T61, BenQ Joy book R55V). IBM T61 laptop has vertical USB slot and horizontal USB slot , BenQ Joy book R55V laptop has horizontal USB slot.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

## **1.6. Test Date**

The test is performed from August 26, 2009 to August 27, 2009.

## 2. Operational Conditions 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. The antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30 dB.

### 2.2. GSM Test Configuration

For the body SAR tests for GSM 850, 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 EUT only has the data transfer function, but does not have the speech transfer function.

The tests in the band of GSM 850, GSM 1900 are performed in the mode of GPRS and EGPRS. The GPRS class is 10 for this EUT; it has at most 2 timeslots in uplink. The EGPRS class is 12 for this EUT; it has at most 4 timeslots in uplink. 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:

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

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

For this EUT, the tests for GSM 850 GPRS and GSM 1900 GPRS band will be performed under the following 2 setups at one same test position:

- 1) using 1 timeslot in uplink with the power of maximum power
- 2) using 2 timeslots in uplink with the power reduced 2dB

After drawn the worst case, the tests will be continued to perform with the same EUT setup for the Whole tests for GSM850 EGPRS and GSM1900 EGPRS.

### 2.3. WCDMA Test Configuration

As the SAR body tests for WCDMA Band IV, we established the radio link through call processing. The maximum output power were verified on high, middle and low channels for each test band according to 3GPP TS 34.121 with the following configuration:

- 1) 12.2kbps RMC, 64,144,384 kbps RMC with TPC set to all "all '1's"
- 2) Test loop Mode 1

For the output power, the configurations for the DPCCH and DPDCH<sub>1</sub> are as followed (EUT do not support the DPDCH<sub>2-n</sub>)

**Table 2: The configurations for the DPCCH and DPDCH<sub>1</sub>**

	Channel Bit Rate(kbps)	Channel Symbol Rate(kps)	Spreading Factor	Spreading Code Number	Bits/Slot
DPCCH	15	15	256	0	10
DPDCH <sub>1</sub>	15	15	256	64	10
	30	30	128	32	20
	60	60	64	16	40
	120	120	32	8	80
	240	240	16	4	160
	480	480	8	2	320
	960	960	4	1	640

SAR is tested with 12.2kps RMC and not required for other spreading codes (64,144, and 384 kbps RMC) and multiple DPDCH<sub>n</sub>, because the maximum output power for each of these other configurations < 0.25dB higher than 12.2kbps RMC and the multiple DPDCH<sub>n</sub> is not applicable for the EUT.

### 2.4. HSDPA Test Configuration

SAR for body exposure configurations is measured according to the "Body SAR Measurements" procedures of 3G device. In addition, body SAR is also measured for HSDPA when the maximum average output of each RF channel with HSDPA active is at least 1/4 dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.

HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and

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stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors( $\beta_c, \beta_d$ ), and HS-DPCCH power offset parameters( $\Delta_{ACK}$ ,  $\Delta_{NACK}$ ,  $\Delta_{CQI}$ ) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

**Table 3: Subtests for UMTS Release 5 HSDPA**

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

Note1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

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

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

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

**Table 4: Settings of required H-Set 1 QPSK in HSDPA mode**

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

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**Table 5: HSDPA UE category**

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

## **2.5. Position of module in Portable devices**

The measurements were performed in combination with two host products (IBMT61, BenQ Joy book R55V). IBM T61 laptop has vertical USB slot and horizontal USB slot, BenQ Joy book R55V laptop has horizontal USB slot.

A test distance of 5mm or less, according to KDB 447498, 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 front side of the EUT towards the bottom of the flat phantom. (ANNEX I Picture 7-a)
- Test Position 2: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT towards the bottom of the flat phantom. (ANNEX I Picture 7-b)
- Test Position 3: The EUT is connected to the portable computer with horizontal USB slot. The top side of the EUT towards the bottom of the flat phantom. (ANNEX I Picture 7-c)
- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The left side of the EUT towards the bottom of the flat phantom. (ANNEX I Picture 7-d)
- 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. (ANNEX I Picture 7-e)

## 2.6. Picture of host product

During the test, IBM T61 and BenQ Joy book R55V 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: BenQ Joy book R55V Close



Picture 1-d: BenQ Joy book R55V Open



Picture 1-e: BenQ Joy book R55V with horizontal USB slot



Picture 1-f: IBM T61 with horizontal USB slot



Picture 1-g: IBM T61 with Vertical USB slot

**Picture 1: Computer as a test assistant**

### 3. SAR Measurements System Configuration

#### 3.1. SAR Measurement Set-up

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

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

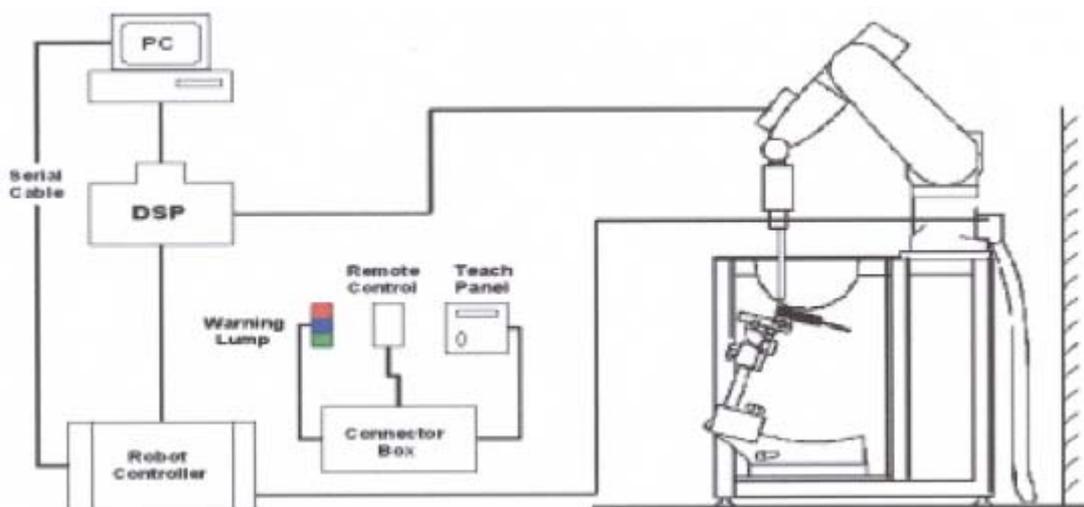


Figure 1. SAR Lab Test Measurement Set-up

### 3.2. DASY 4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

#### 3.2.1. ET3DV6 Probe Specification

**Construction** Symmetrical design with triangular core  
Built-in optical fiber for surface detection  
System (ET3DV6 only) Built-in shielding  
against static charges PEEK enclosure  
material (resistant to organic solvents,  
e.q., glycol)

**Calibration** In air from 10 MHz to 3 GHz  
In brain and muscle simulating tissue at  
frequencies of 450MHz, 900MHz, 1750  
MHz, 1950MHz and 2450 MHz.  
(accuracy±8%)  
Calibration for other liquids and  
frequencies upon request

**Frequency** 10 MHz to 2.5 GHz; Linearity: ±0.2 dB  
(30 MHz to 2.5 GHz)

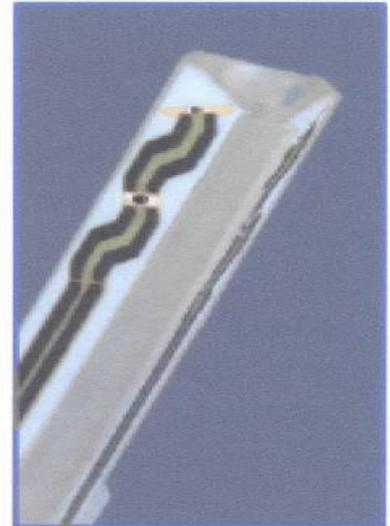
**Directivity** ±0.2 dB in brain tissue  
(rotation around probe axis)  
±0.4 dB in brain tissue  
(rotation around probe axis)

**Dynamic Range** 5u W/g to > 100mW/g; Linearity: ±0.2dB

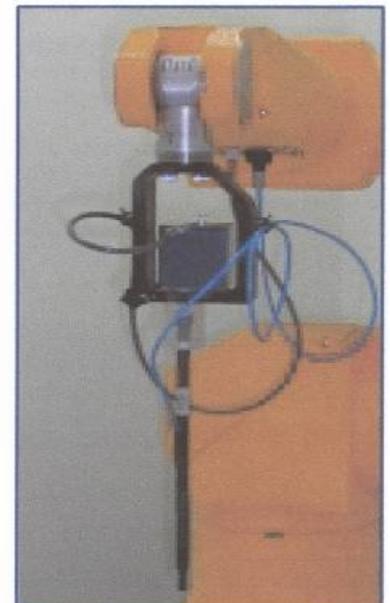
**Surface Detection** ±0.2 mm repeatability in air and clear  
liquids over diffuse reflecting surface  
(ET3DV6 only)

**Dimensions** Overall length: 330mm  
Tip length: 16mm  
Body diameter: 12mm  
Tip diameter: 6.8mm  
Distance from probe tip to dipole centers:  
2.7mm

**Application** General dosimetry up to 2.5GHz  
Compliance tests of mobile phones  
Fast automatic scanning in arbitrary  
phantoms



**Figure 2 ET3DV6 E-field Probe**



**Figure 3 ET3DV6 E-field probe**

### 3.2.2. E-field Probe Calibration

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

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

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

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

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

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

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

### 3.3. Other Test Equipment

#### 3.3.1. Device Holder for Transmitters

The DASY device holder is designed to cope with the die rent positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.



**Figure 4. Device Holder**

### 3.3.2. Phantom

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

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



**Figure 5. Generic Twin Phantom**

### 3.4. Scanning procedure

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

- The "reference" and "drift" measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %.
- The "surface check" measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains

unchanged.

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

- **Zoom Scan**

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

- **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY4 system allows evaluations that combine measured data and robot positions, such as:

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

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

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

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

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

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

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

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

#### **3.5.2. Data Evaluation by SEMCAD**

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

Probe parameters:	- Sensitivity	Normi, ai <sub>0</sub> , ai <sub>1</sub> , ai <sub>2</sub>
	- Conversion factor	ConvF <sub>i</sub>
	- Diode compression point	Dcp <sub>i</sub>
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

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

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

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

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

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

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

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

$dcp_i$  = diode compression point (DASY parameter)

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

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

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

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

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

$ConvF$  = sensitivity enhancement in solution

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

$f$  = carrier frequency [GHz]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### 3.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. 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 10.

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 DASY 4 system.

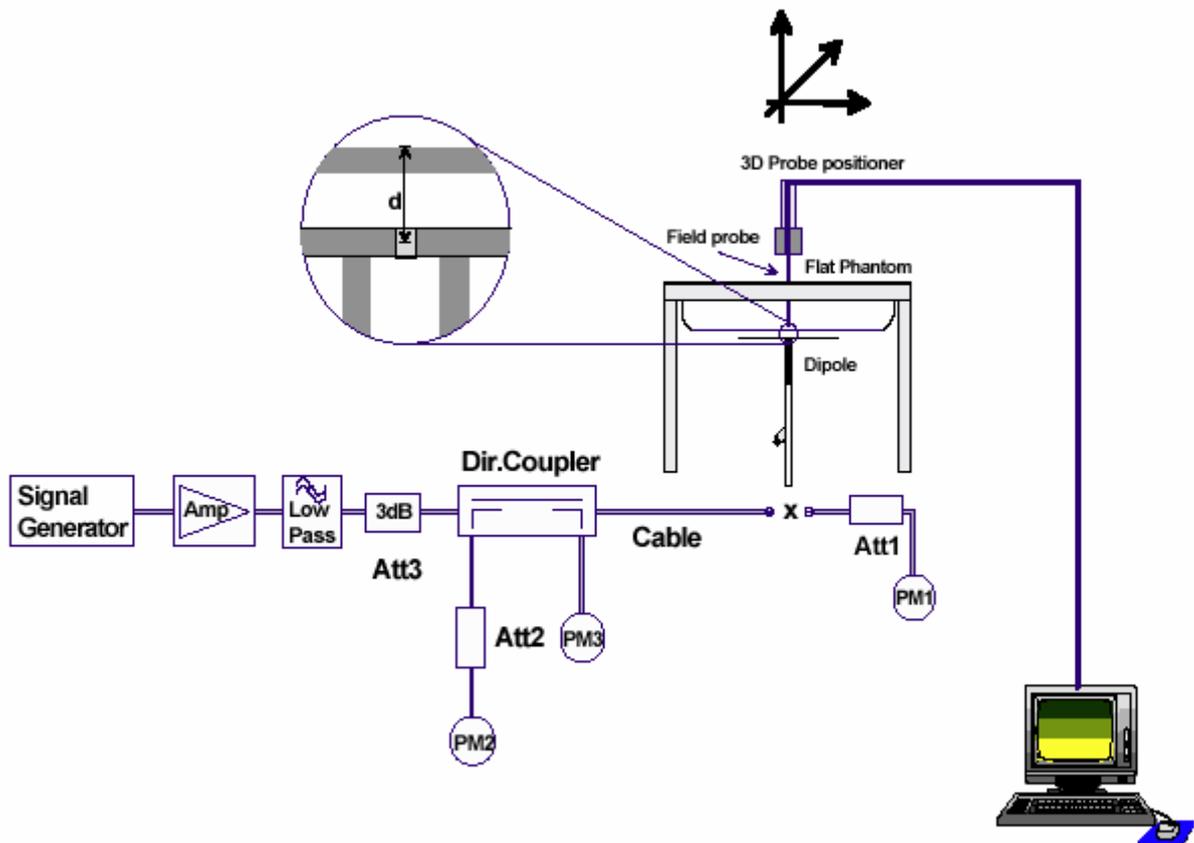


Figure 6. System Check Set-up

### 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 6 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by OET 65.

**Table 6: Composition of the Body Tissue Equivalent Matter**

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

MIXTURE%	FREQUENCY(Body)1800MHz
Water	69.91
Glycol	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1800MHz $\epsilon=53.3$ $\sigma=1.52$

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

## 4. Laboratory Environment

**Table 7: The Ambient Conditions during Test**

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

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

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

**ANSI/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**

**OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.

**IEC 62209-2:2008(106/162/CDV):** Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body .( frequency rang of 30MHz to 6GHz ).

## 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 peak 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 8: Conducted Power Measurement Results**

GSM 850+GPRS		Conducted Power		
		Channel 128	Channel 192	Channel 251
		(824.2MHz)	(837MHz)	(848.8MHz)
1 timeslot	Before Test (dBm)	32.21	32.26	32.17
	After Test (dBm)	32.20	32.25	32.16
2 timeslots	Before Test (dBm)	30.10	30.08	29.93
	After Test (dBm)	30.11	30.07	29.94
GSM 850+EGPRS		Conducted Power		
		Channel 128	Channel 192	Channel 251
		(824.2MHz)	(837MHz)	(848.8MHz)
1 timeslot	Before Test (dBm)	26.23	25.85	25.59
	After Test (dBm)	26.22	25.84	25.58
2 timeslots	Before Test (dBm)	23.98	24.08	23.90
	After Test (dBm)	23.97	24.07	23.91
3 timeslots	Before Test (dBm)	21.87	21.92	21.87
	After Test (dBm)	21.86	21.91	21.86
4 timeslots	Before Test (dBm)	19.83	19.86	19.74
	After Test (dBm)	19.82	19.85	19.75
GSM 1900+GPRS		Conducted Power		
		Channel 512	Channel 661	Channel 810
		(1850.2MHz)	(1880MHz)	(1909.8MHz)
1 timeslot	Before Test (dBm)	29.28	29.20	29.13
	After Test (dBm)	29.27	29.21	29.12
2 timeslots	Before Test (dBm)	27.20	27.10	27.03

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	After Test (dBm)	27.21	27.11	27.02
GSM 1900+EGPRS		Conducted Power		
		Channel 512	Channel 661	Channel 810
		(1850.2MHz)	(1880MHz)	(1909.8MHz)
1 timeslot	Before Test (dBm)	25.01	25.43	25.27
	After Test (dBm)	25.00	25.42	25.26
2 timeslots	Before Test (dBm)	22.99	22.92	22.82
	After Test (dBm)	22.98	22.91	22.81
3 timeslots	Before Test (dBm)	20.96	20.85	20.81
	After Test (dBm)	20.95	20.84	20.80
4 timeslots	Before Test (dBm)	19.00	18.89	18.82
	After Test (dBm)	19.01	18.88	18.81
WCDMA Band IV		Conducted Power		
		Channel 1312	Channel 1412	Channel 1513
		(1712.4MHz)	(1732.4MHz)	(1752.6MHz)
12.2kbps RMC	Before Test (dBm)	21.52	21.70	21.66
	After Test (dBm)	21.51	21.71	21.65
64kbps RMC	Before Test (dBm)	21.61	21.69	21.68
	After Test (dBm)	21.60	21.68	21.67
144kbps RMC	Before Test (dBm)	21.59	21.76	21.63
	After Test (dBm)	21.58	21.75	21.62
384kbps RMC	Before Test (dBm)	21.60	21.74	21.69
	After Test (dBm)	21.61	21.73	21.68
WCDMA Band IV+HSDPA		Conducted Power		
		Channel 1312	Channel 1412	Channel 1513
		(1712.4MHz)	(1732.4MHz)	(1752.6MHz)
Sub Test - 1	Before Test (dBm)	21.43	21.75	21.41
	After Test (dBm)	21.42	21.74	21.40
Sub Test - 2	Before Test (dBm)	20.89	21.25	20.85
	After Test (dBm)	20.88	21.26	20.84
Sub Test - 3	Before Test (dBm)	20.62	21.07	20.67
	After Test (dBm)	20.61	21.06	20.66
Sub Test - 4	Before Test (dBm)	20.60	21.14	20.62
	After Test (dBm)	20.61	21.15	20.61

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## 7. Test Results

### 7.1. Dielectric Performance

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

Frequency	Description	Dielectric Parameters		Temp °C
		$\epsilon_r$	$\sigma$ (s/m)	
<b>835MHz (body)</b>	Target value ±5% window	55.20 52.44 – 57.96	0.97 0.92 – 1.02	/
	Measurement value 2009-8-26	55.07	1.02	21.5
<b>1800MHz (body)</b>	Target value ±5% window	53.3 50.64 – 55.97	1.52 1.44 – 1.60	/
	Measurement value 2009-8-26	52.7	1.52	21.9
<b>1900MHz (body)</b>	Target value ±5% window	53.30 50.64 – 55.97	1.52 1.44 – 1.60	/
	Measurement value 2009-8-27	52.65	1.53	21.7

### 7.2. System Check

**Table 10: System Check for Body tissue stimulant**

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp °C
		10g	1g	$\epsilon_r$	$\sigma$ (s/m)	
<b>835MHz</b>	Recommended result ±10% window	1.58 1.42 – 1.74	2.41 2.17 – 2.65	54.60	0.99	/
	Measurement value 2009-8-26	1.59	2.42	55.07	1.02	21.9
<b>1800 MHz</b>	Recommended result ±10% window	5.28 4.75 – 5.81	10.20 9.18 – 11.22	52.10	1.49	/
	Measurement value 2009-8-26	5.27	9.96	52.7	1.52	22.1
<b>1900 MHz</b>	Recommended result ±10% window	5.18 4.66 – 5.70	10.20 9.18 – 11.22	52.90	1.55	/
	Measurement value 2009-8-27	5.15	10.01	52.65	1.53	21.7

Note: 1. The graph results see ANNEX B.

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

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### 7.3. Summary of Measurement Results

#### 7.3.1. GSM850 (GPRS/EGPRS)

**Table 11: SAR Values [GSM850 (GPRS/EGPRS)]**

Limit of SAR (W/kg)			10 g Average	1g Average	Power Drift(dB)	Graph Results
			2.0	1.6	± 0.21	
Test Case Of Body			Measurement Result (W/kg)		Power Drift(dB)	
Different Test Position	Different Timeslots	Channel	10 g Average	1 g Average		
IBM T61 (180 degree)						
Test Position 1	2 timeslots	High	0.562	0.952	0.091	Figure 13
		Middle	0.621	1.050	-0.099	Figure 15
		Low	0.607	1.020	-0.111	Figure 17
	1 timeslot	Middle	0.555	0.922	-0.045	Figure 19
Test Position 3	2 timeslots	Middle	0.045	0.118	-0.073	Figure 21
Test Position 4	2 timeslots	Middle	0.236	0.358	0.038	Figure 23
Test Position 5	2 timeslots	Middle	0.362	0.584	0.009	Figure 25
BenQ Joy book R55V (180 degree)						
Test Position 2	2 timeslots	Middle	0.428	0.687	0.108	Figure 27
Worst case position of GPRS with EGPRS (180 degree)						
Test Position 1	1 timeslot	Middle	0.545	0.903	-0.153	Figure 29
	2 timeslots	Middle	0.610	1.020	-0.034	Figure 31
	3 timeslots	Middle	0.549	0.920	-0.069	Figure 33
	4 timeslots	Middle	0.552	0.922	-0.087	Figure 35

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. Upper and lower frequencies were measured at the worst case.

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**Table 12: SAR Values [GSM850, enhanced energy coupling at increased separation distances]**

Different Test Position	Distance of EUT to Phantom	Channel	Measurement Result (W/kg)	50% of initial position SAR (W/kg)	125% of initial position SAR (W/kg)
Test Position 1	initial position	Middle	1.180	0.590	1.475
	5mm		0.651		
	10mm		0.353		

- Note: 1. The probe tip location is fixed at the distance of one half the probe tip diameter from the phantom surface.
2. when the device position with the highest point SAR is > 25% of that measured at the initial position, a complete 1-g SAR evaluation is required for this configuration.
3. A single point SAR is measured for each of these device positions until the SAR is less than 50% of that measured at the initial position.

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**7.3.2. GSM1900 (GPRS/EGPRS)**

**Table 13: [GSM1900 (GPRS/EGPRS)]**

Limit of SAR (W/kg)			10 g Average	1g Average	Power Drift(dB)	Graph Results
			2.0	1.6	± 0.21	
Test Case Of Body			Measurement Result (W/kg)		Power Drift(dB)	
Different Test Position	Different Timeslots	Channel	10 g Average	1 g Average		
IBM T61 ( Angle 180 degree )						
Test Position 1	2 timeslots	High	0.419	0.768	-0.089	Figure 37
		Middle	0.379	0.701	-0.149	Figure 39
		Low	0.361	0.660	-0.129	Figure 41
	1 timeslot	Middle	0.340	0.625	-0.029	Figure 43
Test Position 3	2 timeslots	Middle	0.056	0.108	-0.099	Figure 45
Test Position 4	2 timeslots	Middle	0.225	0.418	-0.065	Figure 47
Test Position 5	2 timeslots	Middle	0.277	0.539	-0.117	Figure 49
BenQ Joy book R55V ( Angle 180 degree )						
Test Position 2	2 timeslots	Middle	0.354	0.635	-0.094	Figure 51
Worst case position of GPRS with EGPRS ( Angle 180 degree )						
Test Position 1	1 timeslot	High	0.374	0.685	-0.110	Figure 53
	2 timeslots	High	0.424	0.778	-0.061	Figure 55
	3 timeslots	High	0.392	0.719	-0.020	Figure 57
	4 timeslots	High	0.320	0.590	0.195	Figure 59

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. Upper and lower frequencies were measured at the worst case.

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**Table 14: SAR Values [GSM1900, enhanced energy coupling at increased separation distances]**

Different Test Position	Distance of EUT to Phantom	Channel	Measurement Result (W/kg)	50% of initial position SAR (W/kg)	125% of initial position SAR (W/kg)
Test Position 1	initial position	High	0.843	0.422	1.054
	5mm		0.452		
	10mm		0.301		

- Note: 1. The probe tip location is fixed at the distance of one half the probe tip diameter from the phantom surface.
2. when the device position with the highest point SAR is > 25% of that measured at the initial position, a complete 1-g SAR evaluation is required for this configuration.
3. A single point SAR is measured for each of these device positions until the SAR is less than 50% of that measured at the initial position.

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### 7.3.3. WCDMA Band IV (WCDMA/HSDPA)

**Table 15: SAR Values [WCDMA Band IV (WCDMA/HSDPA)]**

Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.21	
Test Case Of Body		Measurement Result (W/kg)		Power Drift (dB)	
		10 g Average	1 g Average		
Different Test Position	Channel				
IBM T61 ( Angle 180 degree )					
Test Position 1	High	0.563	0.993	0.080	Figure 61
	Middle	0.589	1.050	0.166	Figure 63
	Low	0.412	0.734	0.025	Figure 65
Test Position 3	Middle	0.060	0.108	-0.098	Figure 67
Test Position 4	Middle	0.326	0.578	0.157	Figure 69
Test Position 5	Middle	0.334	0.598	0.161	Figure 71
BenQ Joy book R55V ( Angle 180 degree )					
Test Position 2	Middle	0.436	0.757	0.144	Figure 73
Worst case position of RMC with HSDPA ( Angle 180 degree )					
Test Position 1	Middle	0.601	1.070	0.048	Figure 75

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. Upper and lower frequencies were measured at the worst case.

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**Table 16: SAR Values [WCDMA Band IV, enhanced energy coupling at increased separation distances]**

Different Test Position	Distance of EUT to Phantom	Channel	Measurement Result (W/kg)	50% of initial position SAR (W/kg)	125% of initial position SAR (W/kg)
Test Position 1	initial position	Middle	1.185	0.593	1.481
	5mm		0.456		

Note: 1. The probe tip location is fixed at the distance of one half the probe tip diameter from the phantom surface.

2. when the device position with the highest point SAR is > 25% of that measured at the initial position, a complete 1-g SAR evaluation is required for this configuration.

3. A single point SAR is measured for each of these device positions until the SAR is less than 50% of that measured at the initial position.

**7.4. Conclusion**

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR<sub>1g</sub> is 1.07 W/kg that is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

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**8. Measurement Uncertainty**

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

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

## 9. Main Test Instruments

Table 17: List of Main Instruments

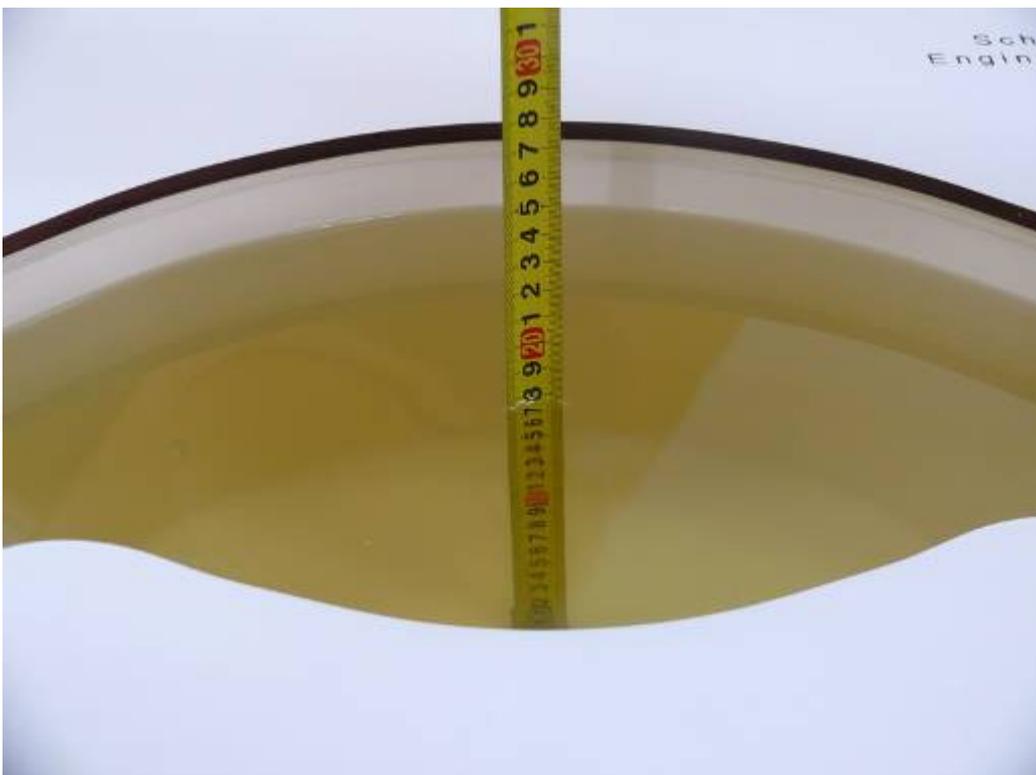
No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 14, 2008	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 14, 2009	One year
04	Power sensor	Agilent 8481H	MY41091316	March 14, 2009	One year
05	Signal Generator	HP 8341B	2730A00804	September 14, 2008	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	Validation Kit 835MHz	D835V2	4d020	July 15, 2009	One year
08	Validation Kit 1800MHz	D1800V2	2d055	February 16, 2009	One year
09	Validation Kit 1900MHz	D1900V2	5d060	July 15, 2009	One year
10	BTS	E5515C	GB46490218	September 14, 2008	One year
11	E-field Probe	ET3DV6	1737	November 25, 2008	One year
12	DAE	DAE4	452	November 18, 2008	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)



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



Picture 5: Liquid depth in the Flat Phantom (1900 MHz)

## ANNEX B: System Check Results

### System Performance Check at 835 MHz

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

Date/Time: 8/26/2009 7:15:49 AM

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55.07$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 – SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=15mm, Pin=250mW/Area Scan (101x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.94 mW/g

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

Reference Value = 55.7 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 3.59 W/kg

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

Maximum value of SAR (measured) = 2.92 mW/g

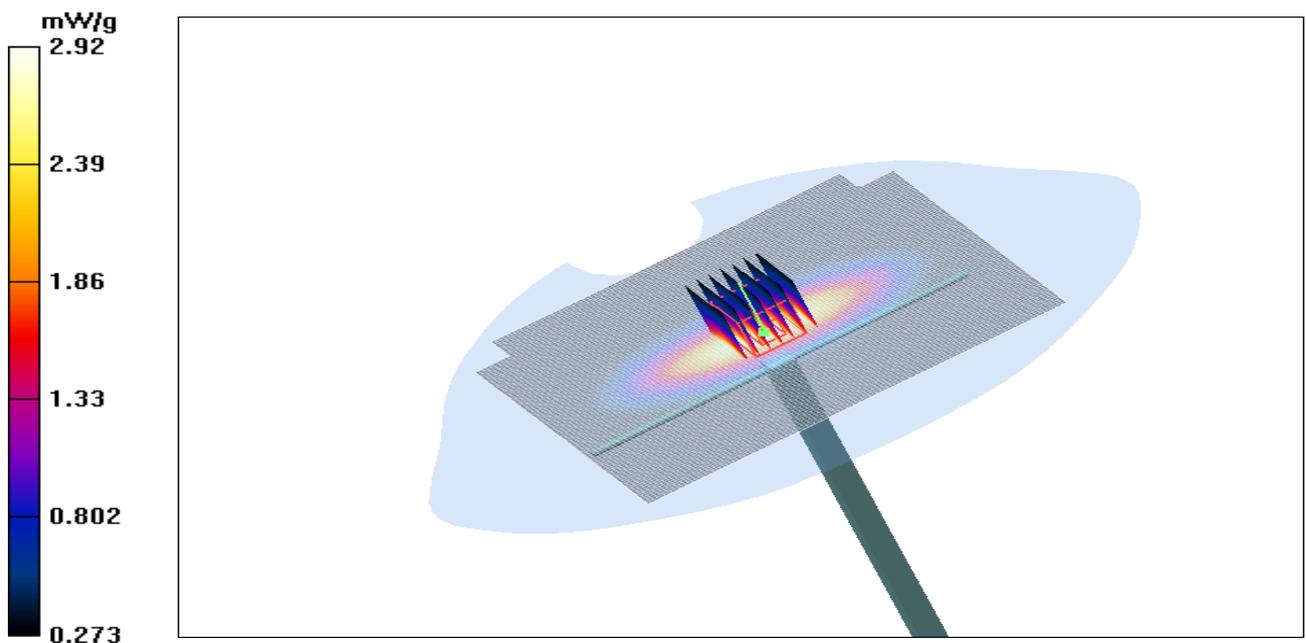


Figure 7 System Performance Check 835MHz 250mW

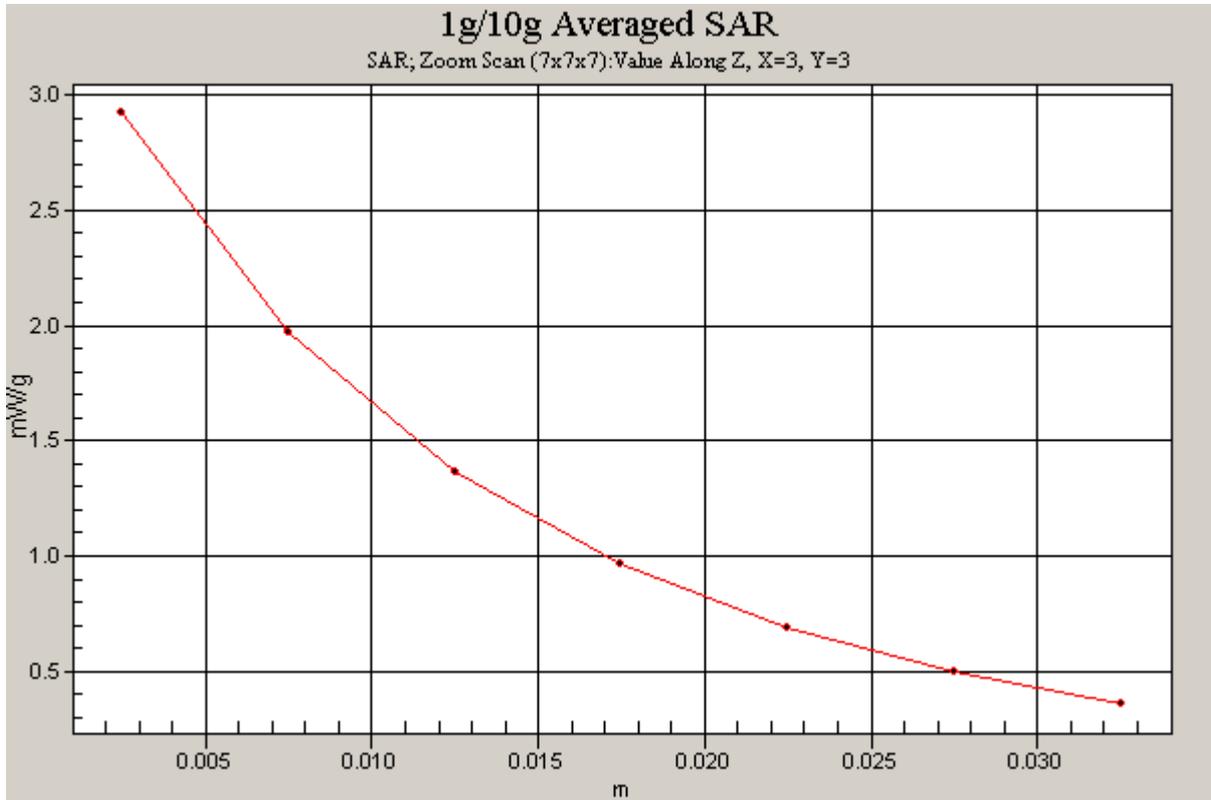


Figure 8 Z-Scan at power reference point (system Check at 835 MHz dipole)

### System Performance Check at 1800 MHz

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d055

Date/Time: 8/26/2009 3:30:45 PM

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

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 186

**d=10mm, Pin=250mW/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 89.9 V/m; Power Drift = -0.095 dB

Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.27 mW/g**

Maximum value of SAR (measured) = 11.2 mW/g

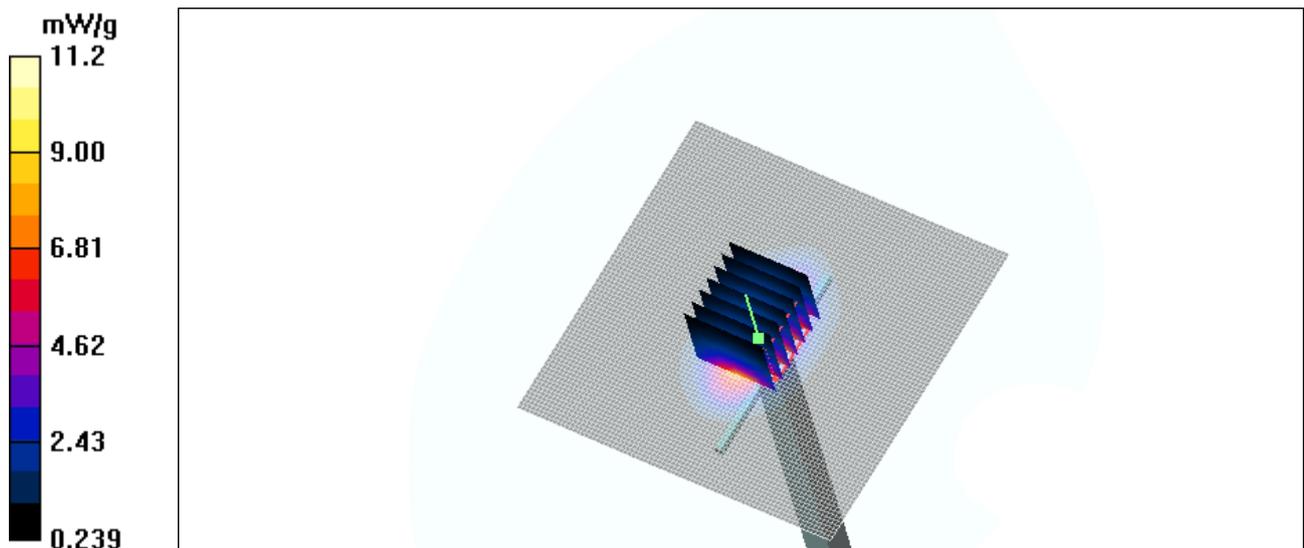


Figure 9 System Performance Check 1800MHz 250mW

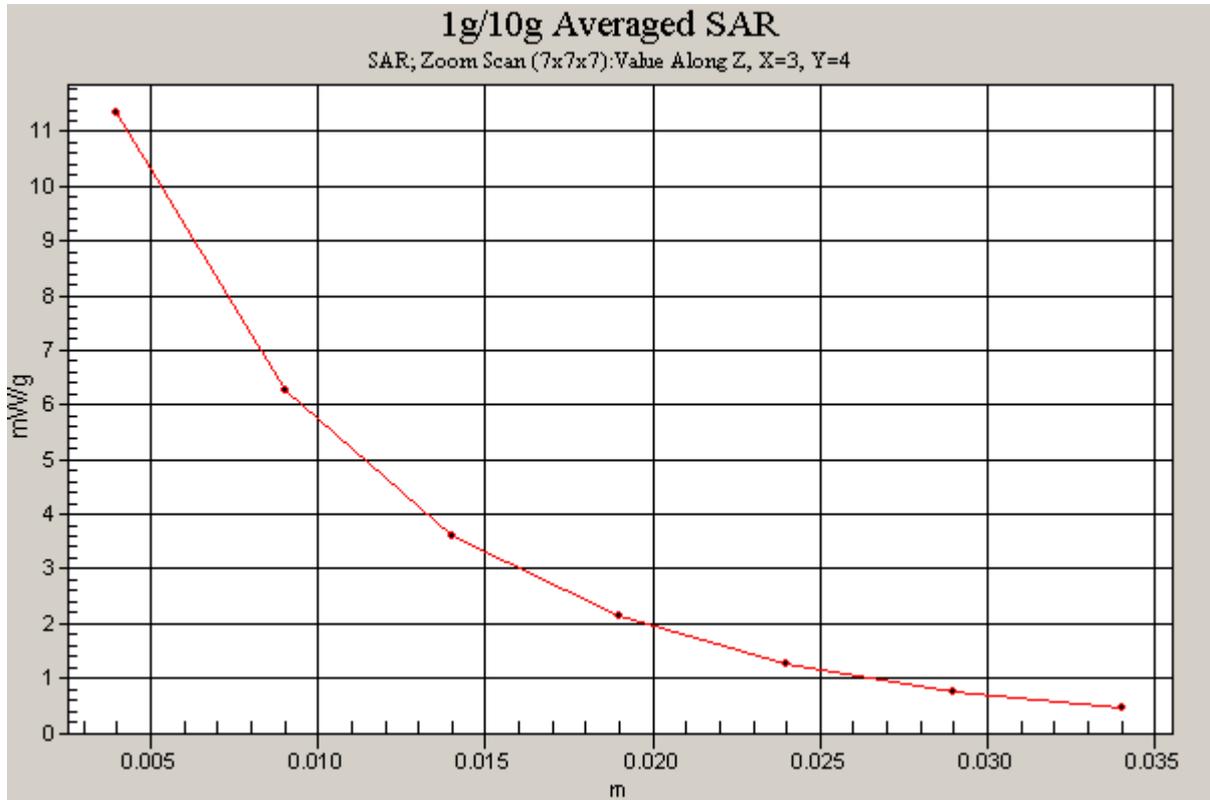


Figure 10 Z-Scan at power reference point (system Check at 1800 MHz dipole)

### System Performance Check at 1900 MHz

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

Date/Time: 8/27/2009 9:21:49 AM

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.65$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 – SN1737; ConvF(4.60, 4.60, 4.60); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**d=10mm, Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 86.0 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 18.9 W/kg

**SAR(1 g) = 10.01 mW/g; SAR(10 g) = 5.15 mW/g**

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

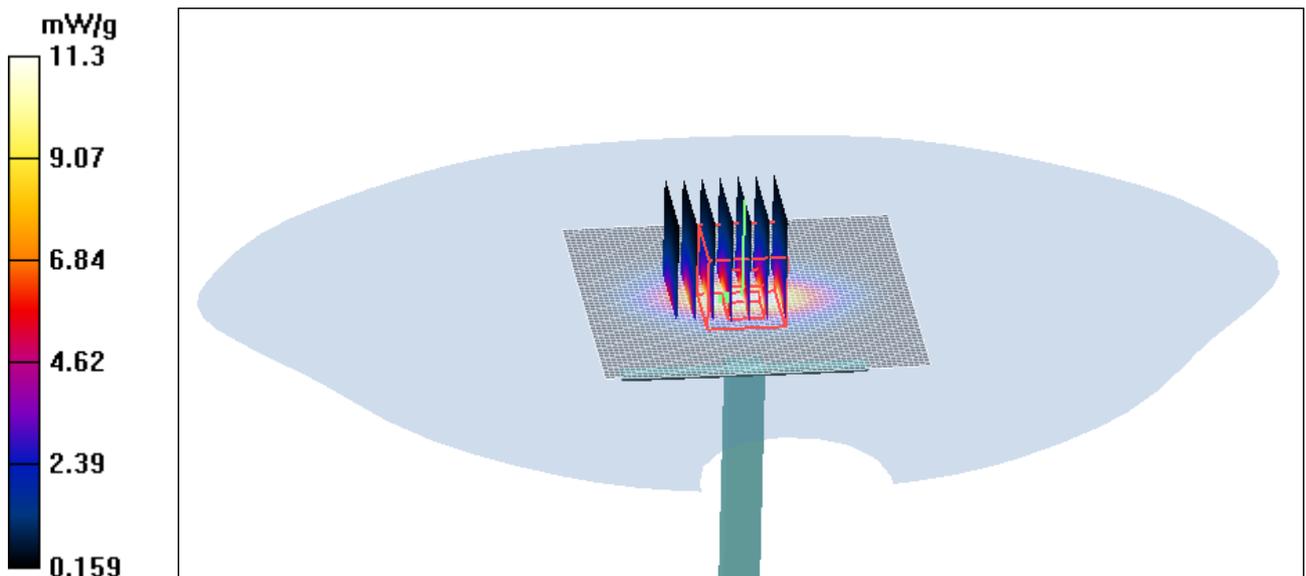


Figure 11 System Performance Check 1900MHz 250mW

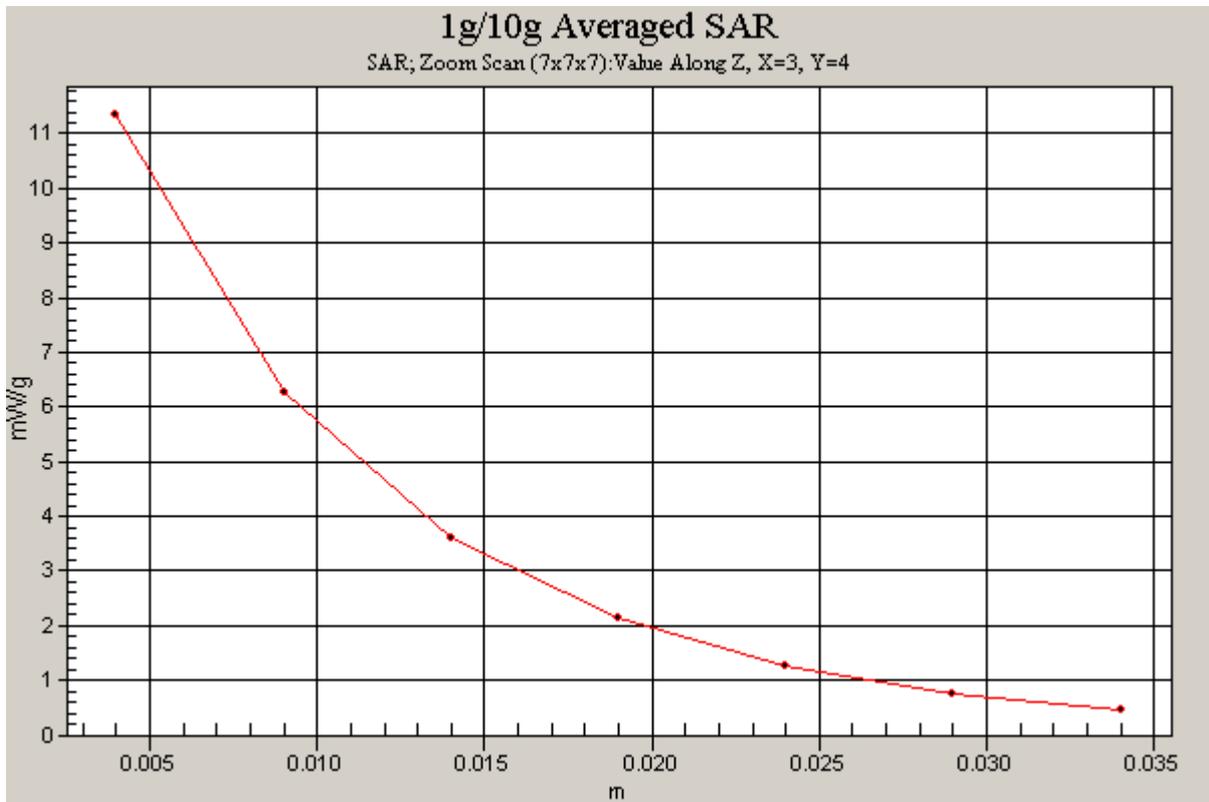


Figure 12 Z-Scan at power reference point (system Check at 1900 MHz dipole)

## ANNEX C: Graph Results

### GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 High

Date/Time: 8/26/2009 12:47:47 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 848.8 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.03$  mho/m;  $\epsilon_r = 54.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 32.7 V/m; Power Drift = 0.091 dB

Peak SAR (extrapolated) = 1.72 W/kg

**SAR(1 g) = 0.952 mW/g; SAR(10 g) = 0.562 mW/g**

Maximum value of SAR (measured) = 1.05 mW/g

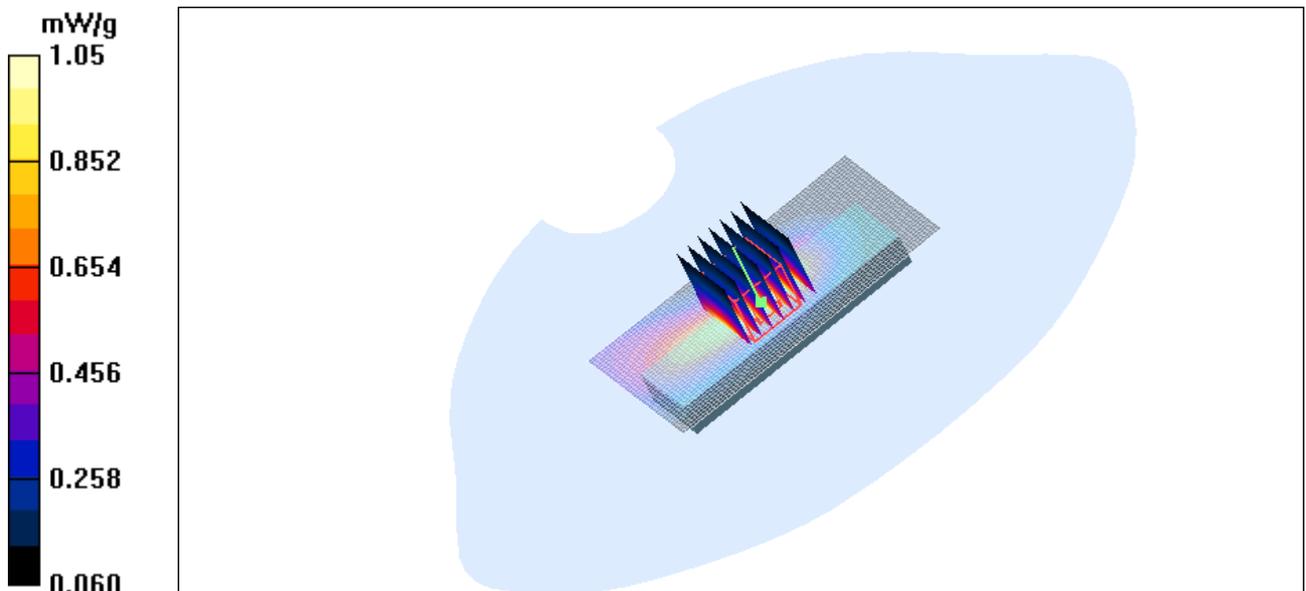


Figure 13 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 251

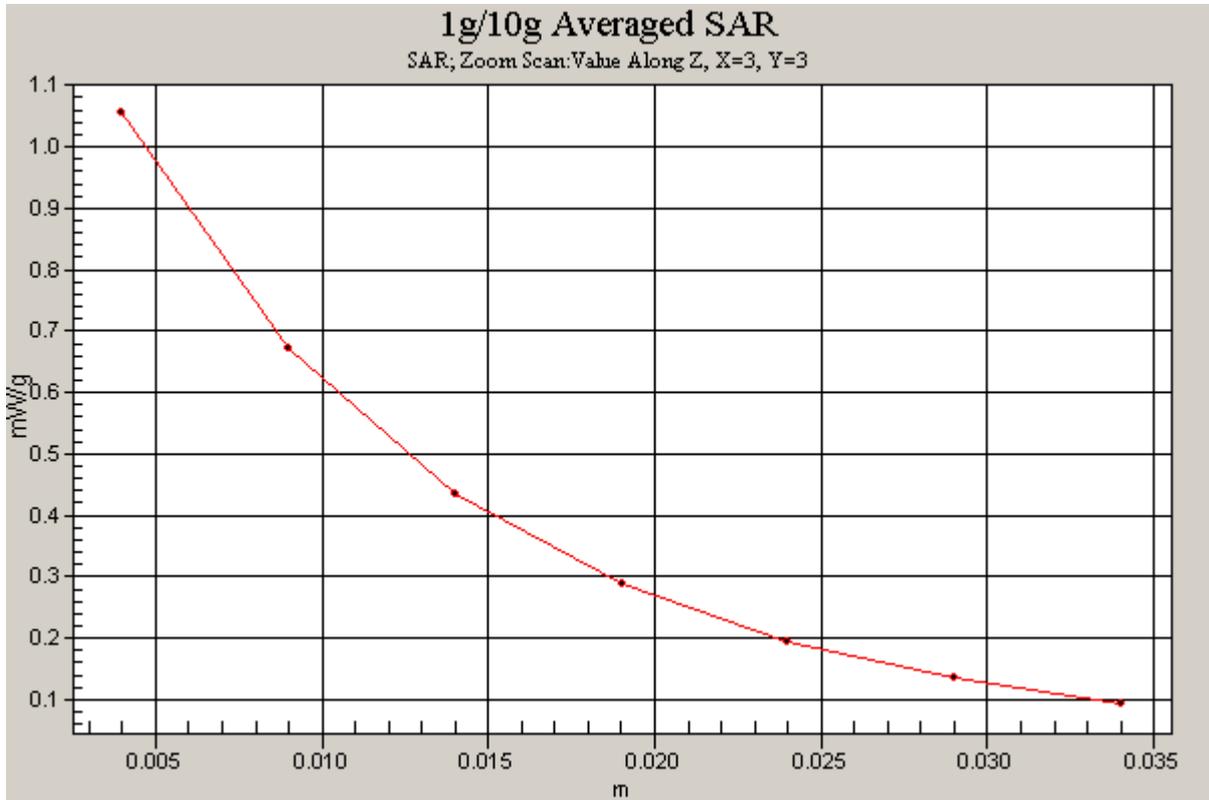


Figure 14 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61  
Test Position 1 Channel 251]

**GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/26/2009 12:31:26 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 55$ ;  $\rho = 1000 \text{ kg/m}^3$

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.17 mW/g

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

dz=5mm

Reference Value = 35.7 V/m; Power Drift = -0.099 dB

Peak SAR (extrapolated) = 1.72 W/kg

**SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.621 mW/g**

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

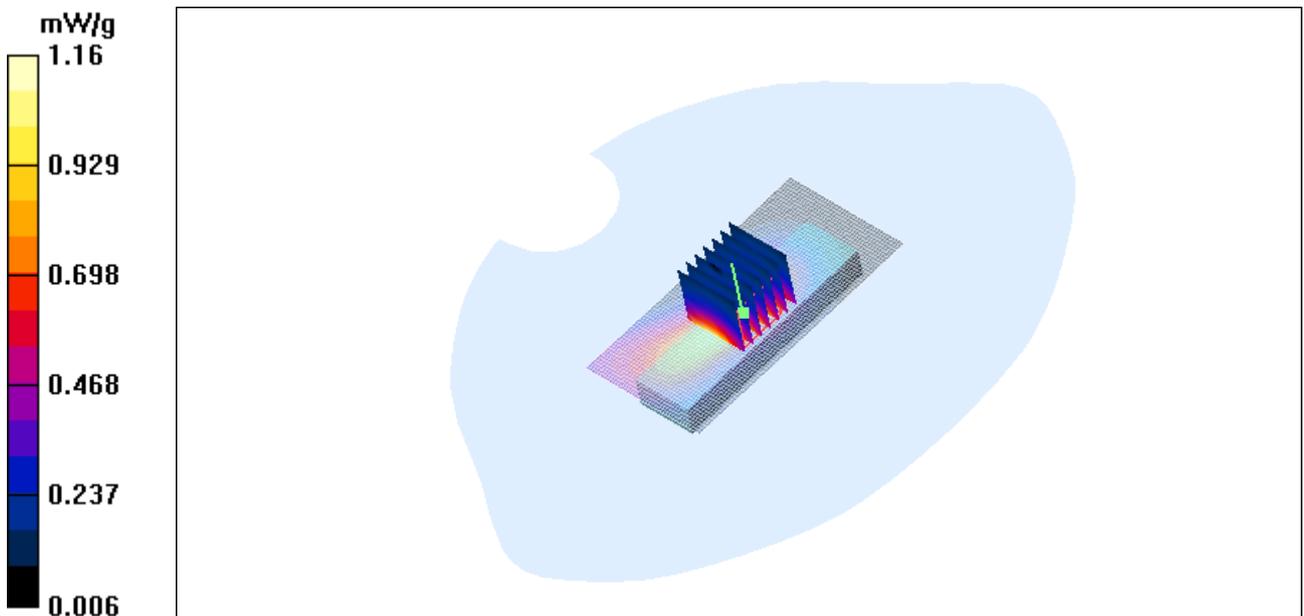


Figure 15 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

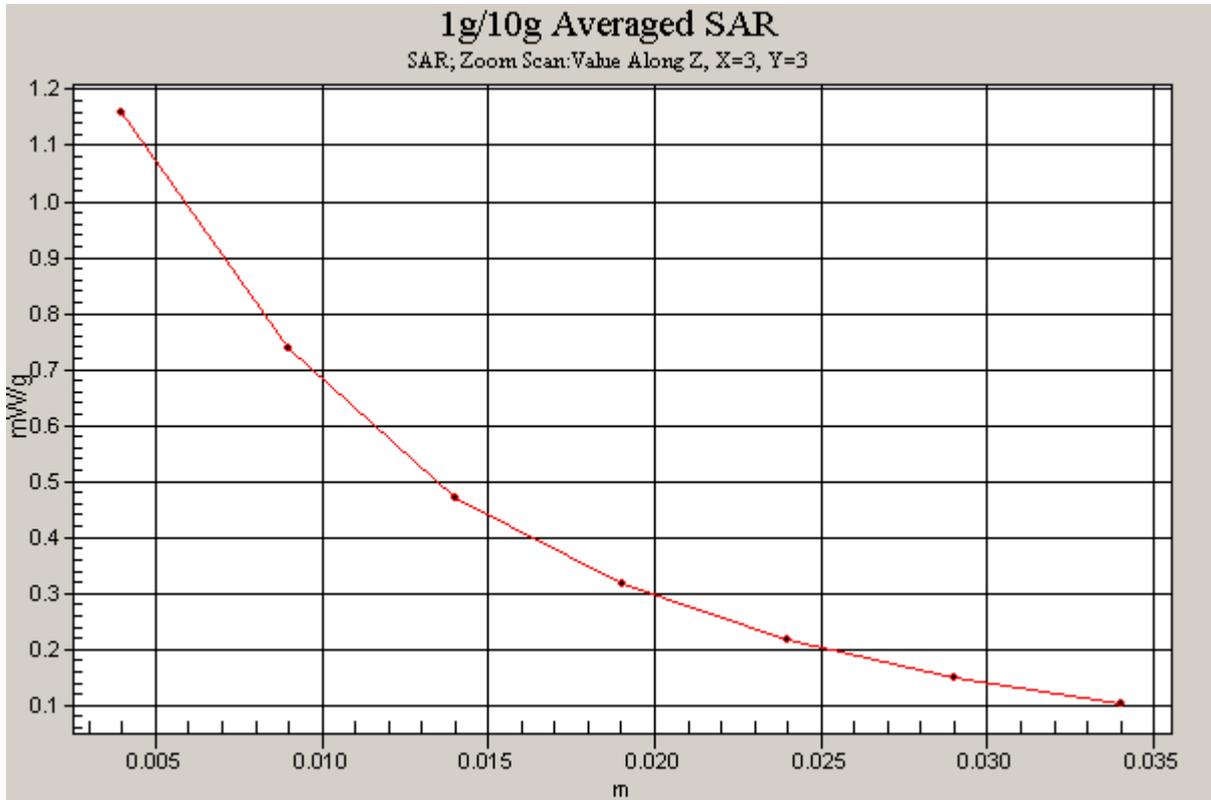


Figure 16 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61  
Test Position 1 Channel 192]

**GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Low**

Date/Time: 8/26/2009 1:04:13 PM

Communication System: GSM850 + GPRS(2Up); Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 1.01$  mho/m;  $\epsilon_r = 55.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Low/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.14 mW/g

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

Reference Value = 35.2 V/m; Power Drift = -0.111 dB

Peak SAR (extrapolated) = 1.66 W/kg

**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.607 mW/g**

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

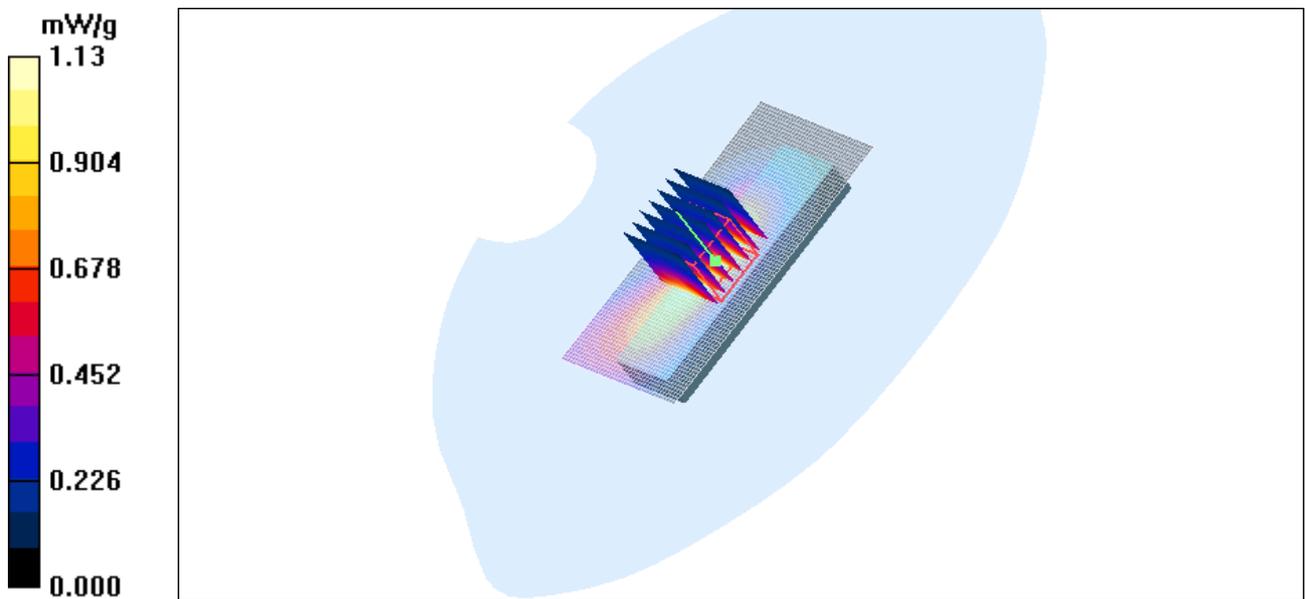


Figure 17 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 128

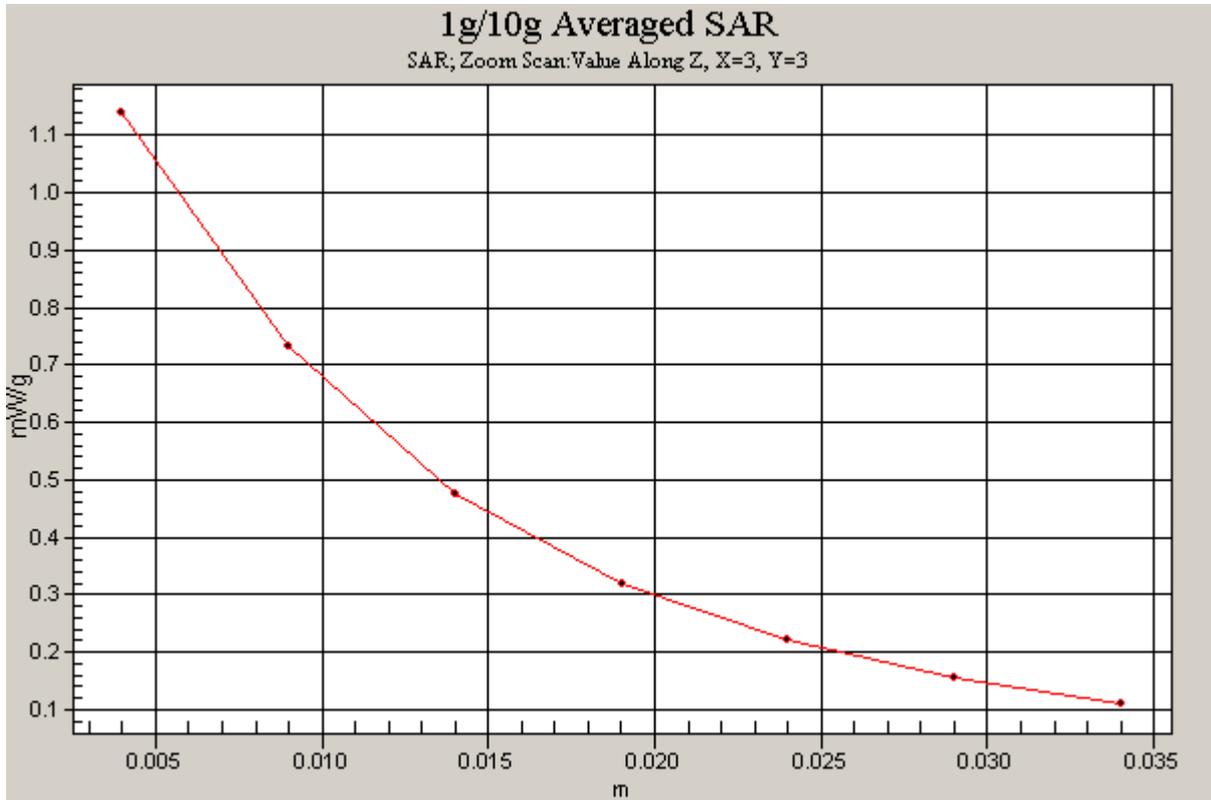


Figure 18 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61  
Test Position 1 Channel 128]

**GSM 850 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/26/2009 12:07:05 PM

Communication System: GSM850 + GPRS(1Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

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

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

dz=5mm

Reference Value = 30.8 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 1.48 W/kg

**SAR(1 g) = 0.922 mW/g; SAR(10 g) = 0.555 mW/g**

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

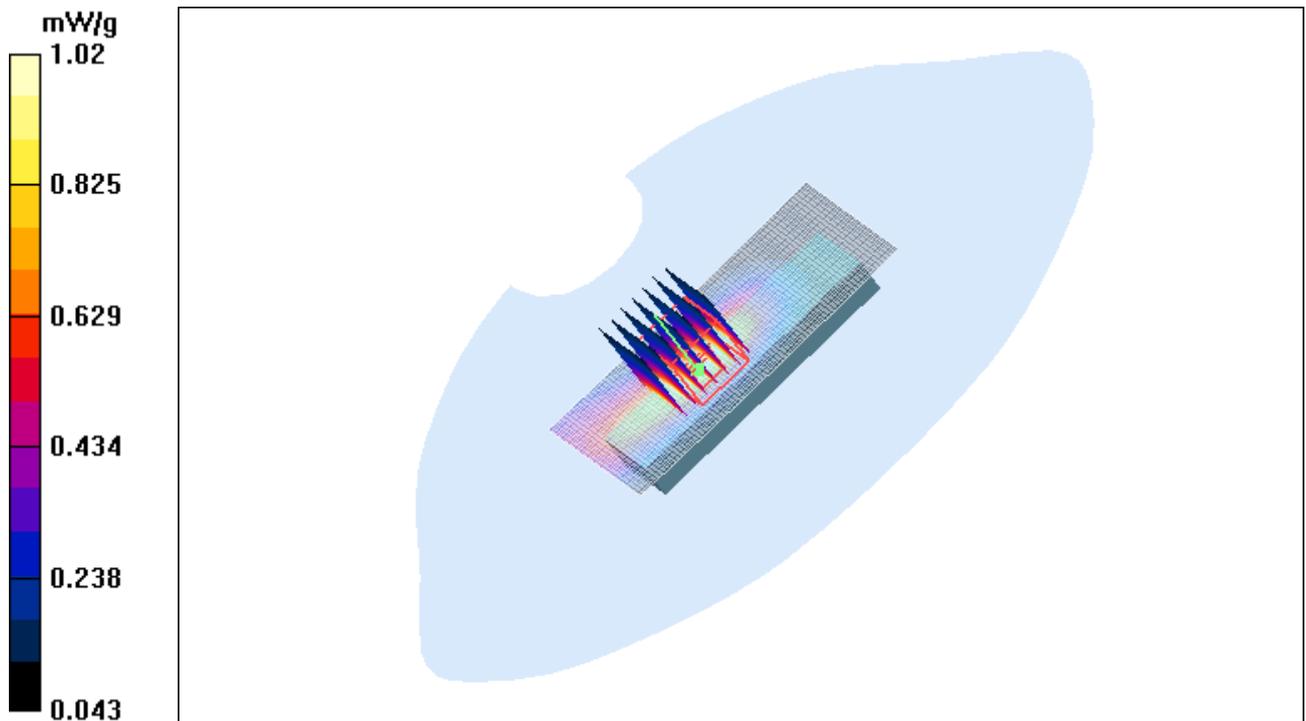


Figure 19 GSM 850 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 192

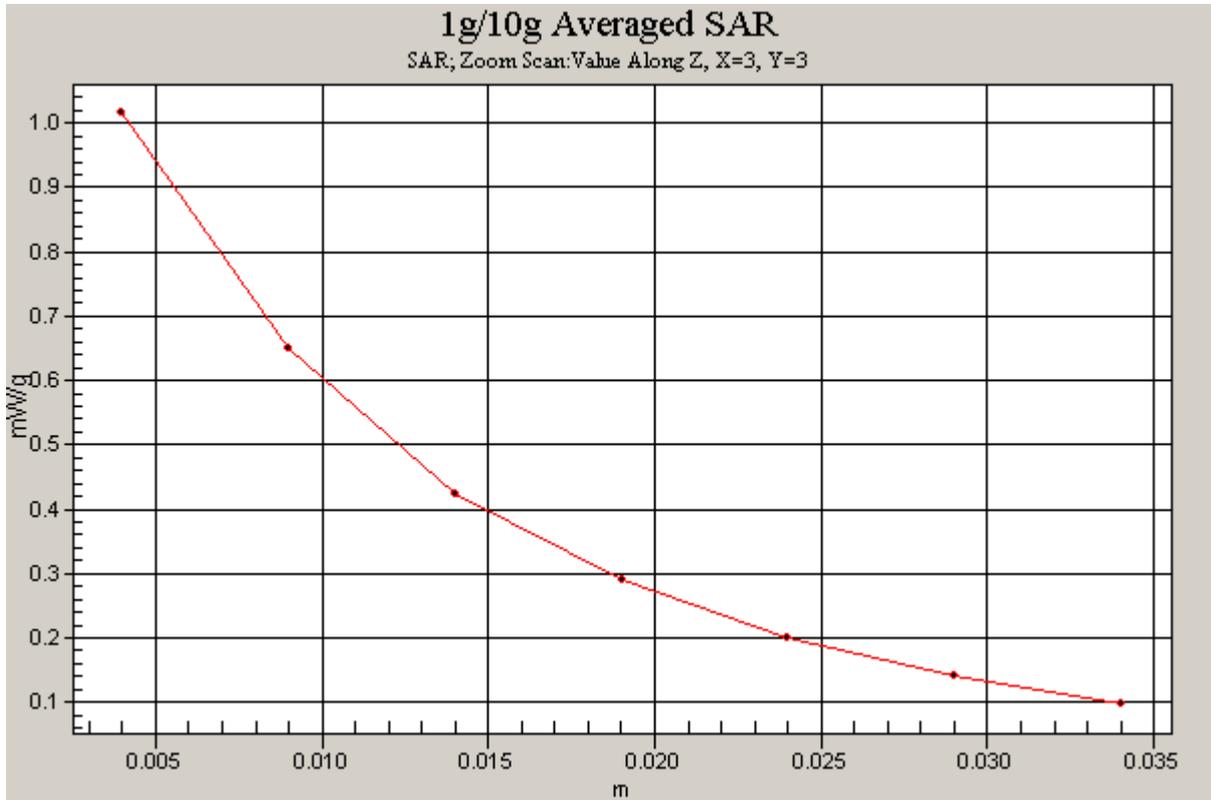


Figure 20 Z-Scan at power reference point [GSM 850 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel192]

**GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Middle**

Date/Time: 8/26/2009 10:31:42 AM

Communication System: GSM850 + GPRS(2Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 3 Middle/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.125 mW/g

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

Reference Value = 13.2 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.471 W/kg

**SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.045 mW/g**

Maximum value of SAR (measured) = 0.131 mW/g

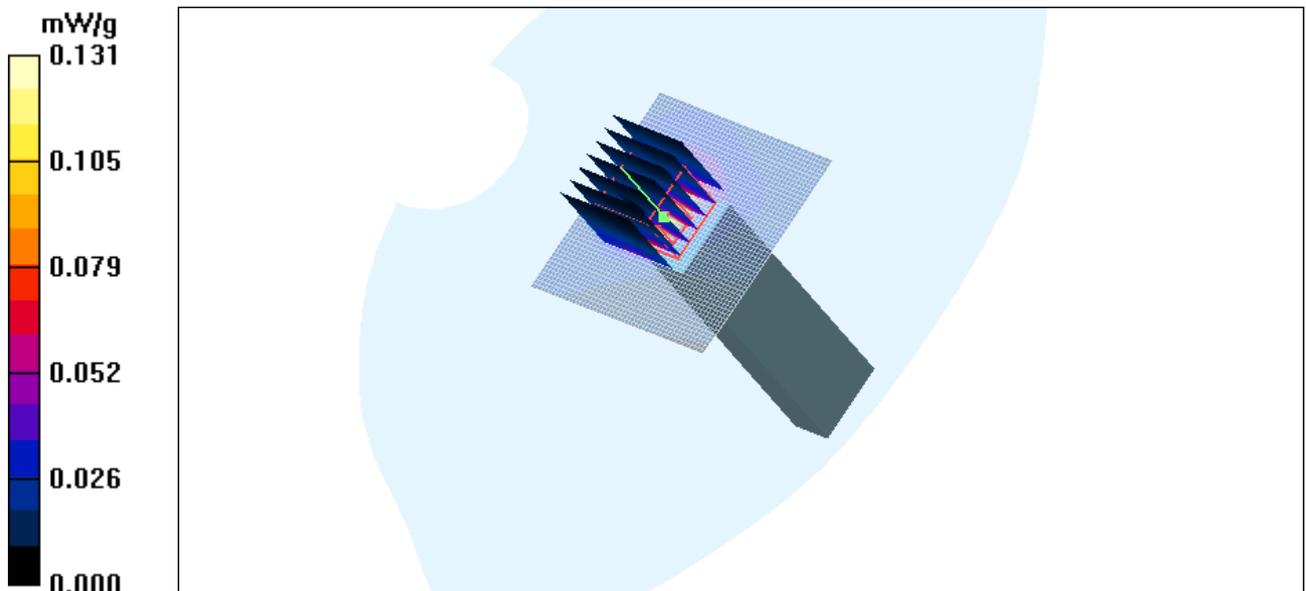


Figure 21 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Channel 192

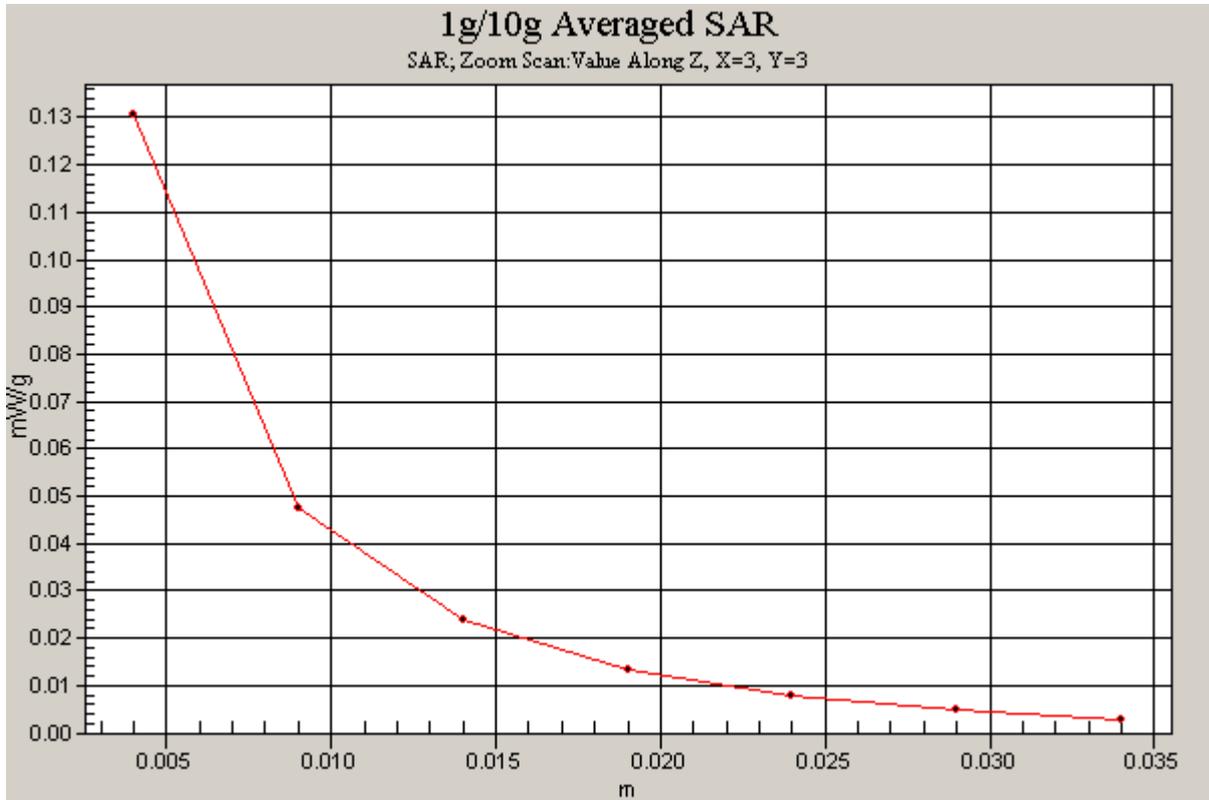


Figure 22 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61  
Test Position 3 Channel 192]

**GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Middle**

Date/Time: 8/26/2009 10:08:22 AM

Communication System: GSM850 + GPRS(2Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 4 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.400 mW/g

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

Reference Value = 15.1 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.537 W/kg

**SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.236 mW/g**

Maximum value of SAR (measured) = 0.379 mW/g

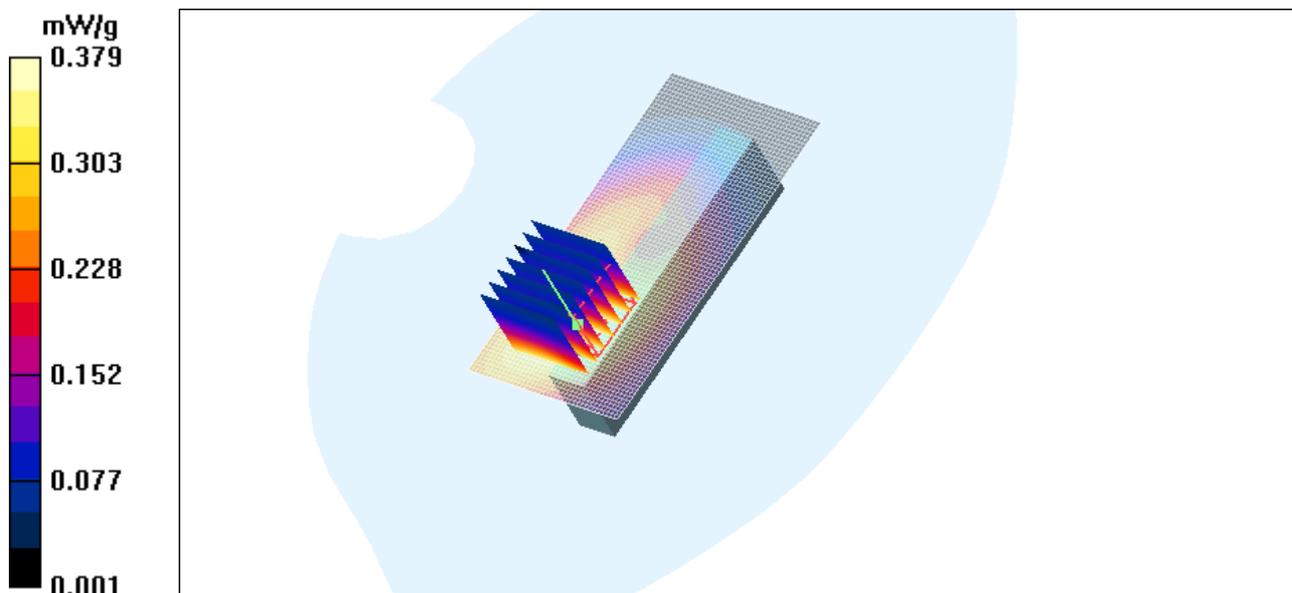


Figure 23 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Channel 192

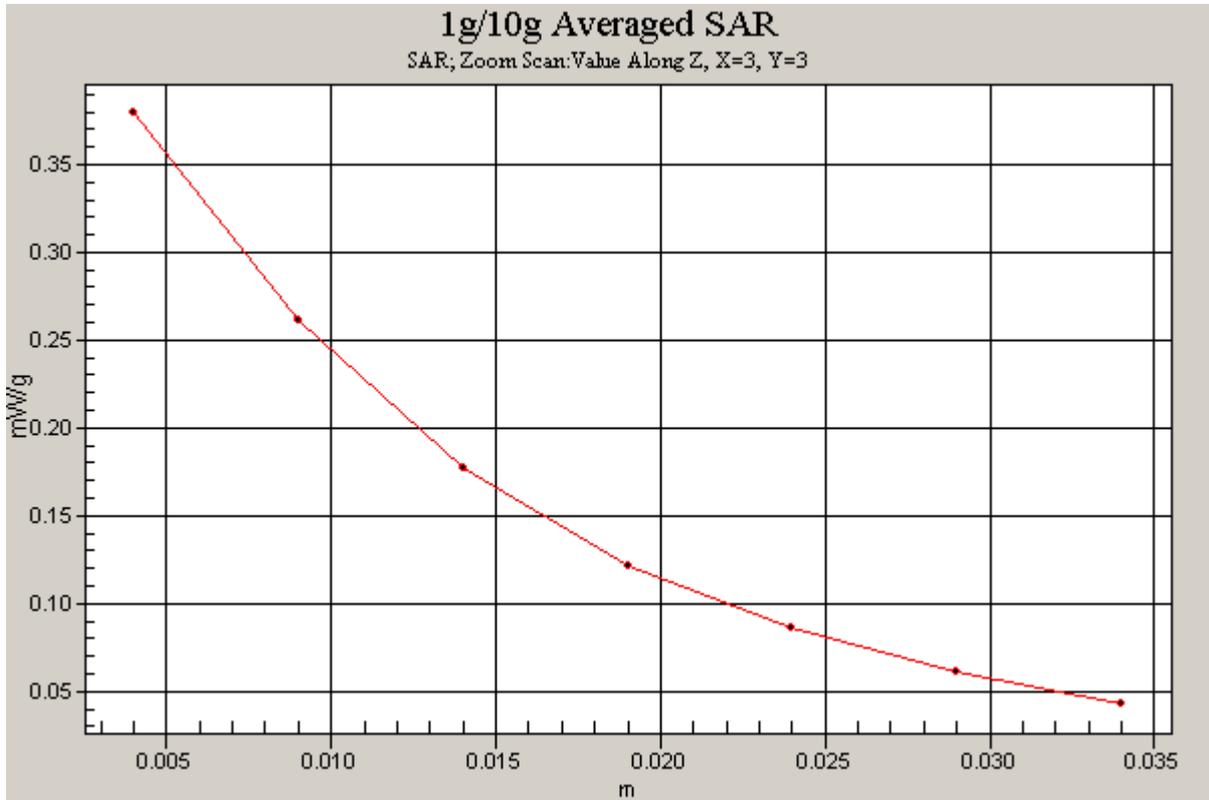


Figure 24 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61  
Test Position 4 Channel 192]

**GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Middle**

Date/Time: 8/26/2009 11:00:59 AM

Communication System: GSM850 + GPRS(2Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 5 Middle 2/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.625 mW/g

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

Reference Value = 24.9 V/m; Power Drift = 0.009 dB

Peak SAR (extrapolated) = 0.930 W/kg

**SAR(1 g) = 0.584 mW/g; SAR(10 g) = 0.362 mW/g**

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

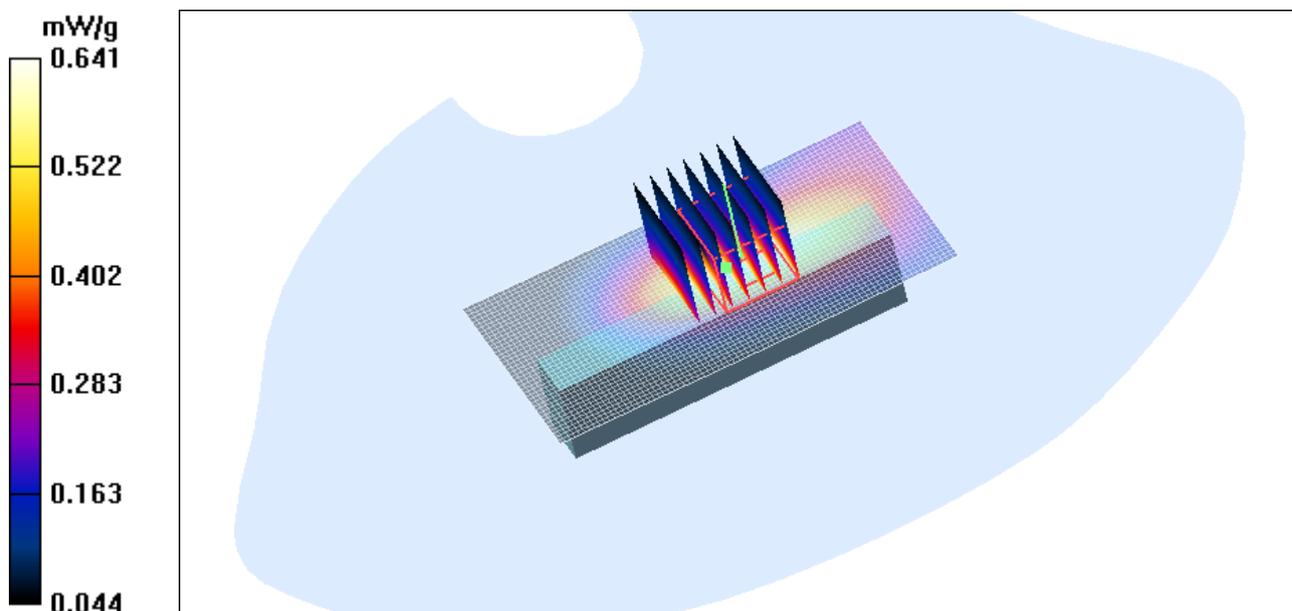


Figure 25 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Channel 192

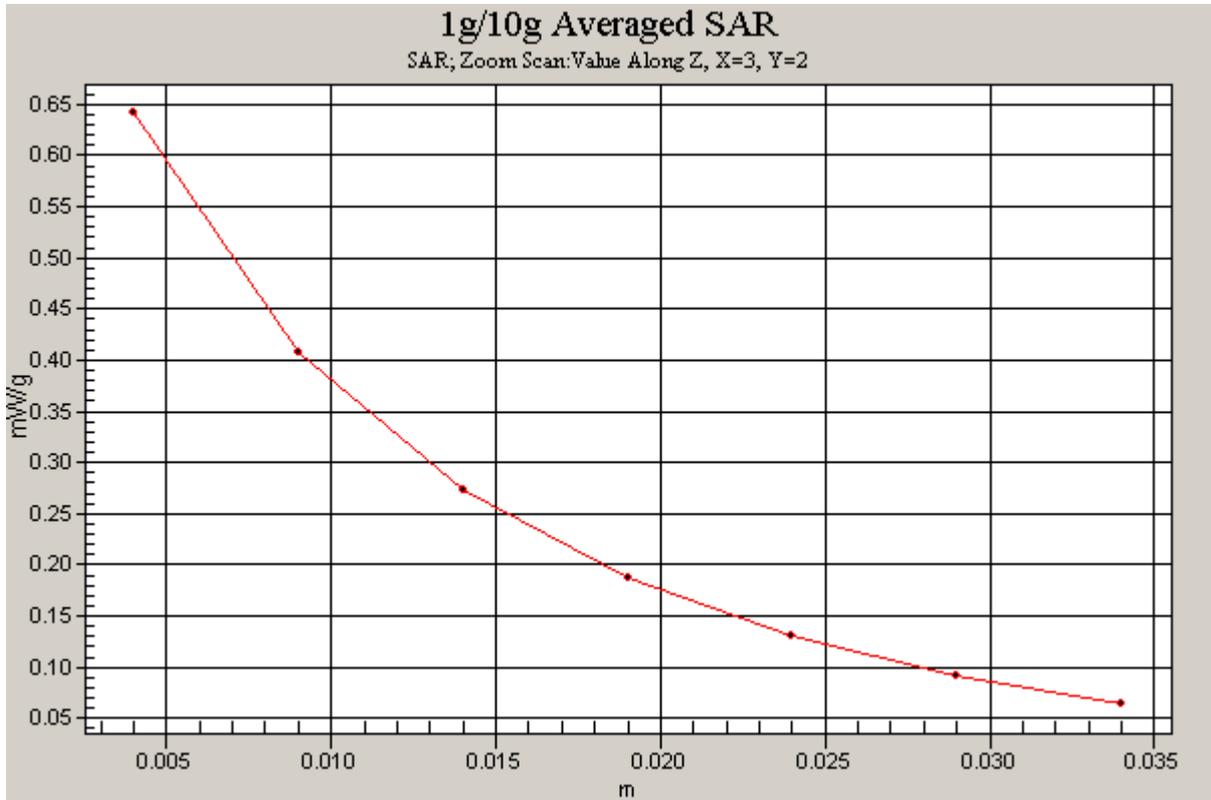


Figure 26 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61  
Test Position 5 Channel 192]

**GSM 850 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Middle**

Date/Time: 8/26/2009 11:21:07 AM

Communication System: GSM850 + GPRS(2Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 2 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.783 mW/g

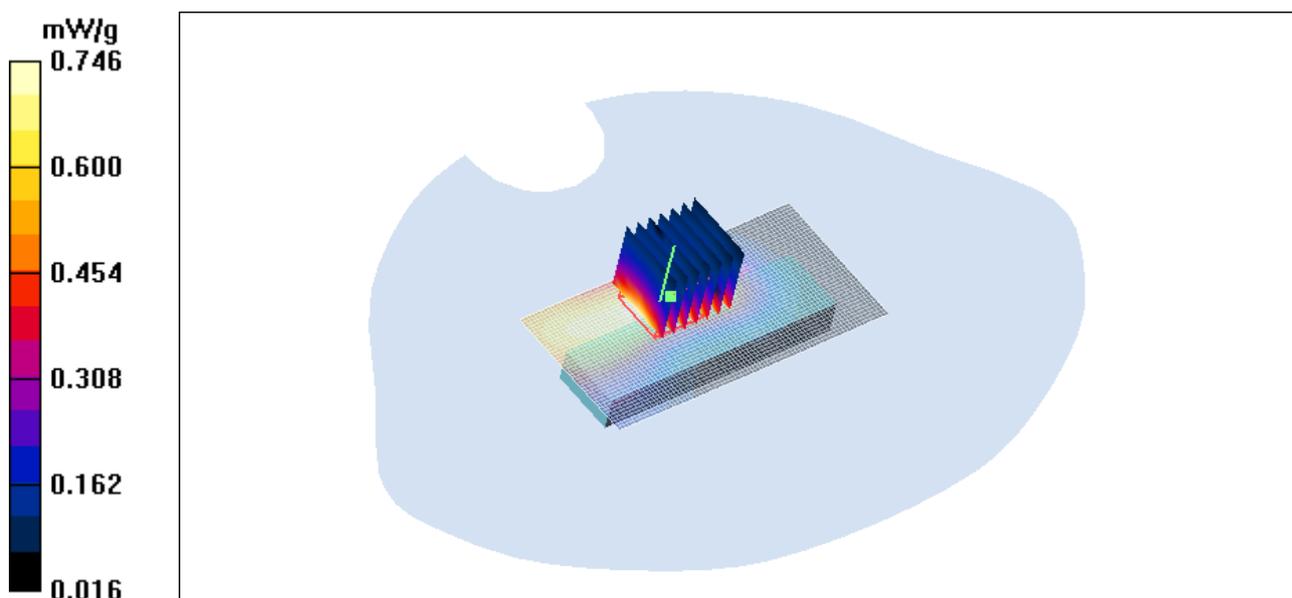
**Test Position 2 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.4 V/m; Power Drift = 0.108 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(1 g) = 0.687 mW/g; SAR(10 g) = 0.428 mW/g**

Maximum value of SAR (measured) = 0.746 mW/g



**Figure 27 GSM 850 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 192**

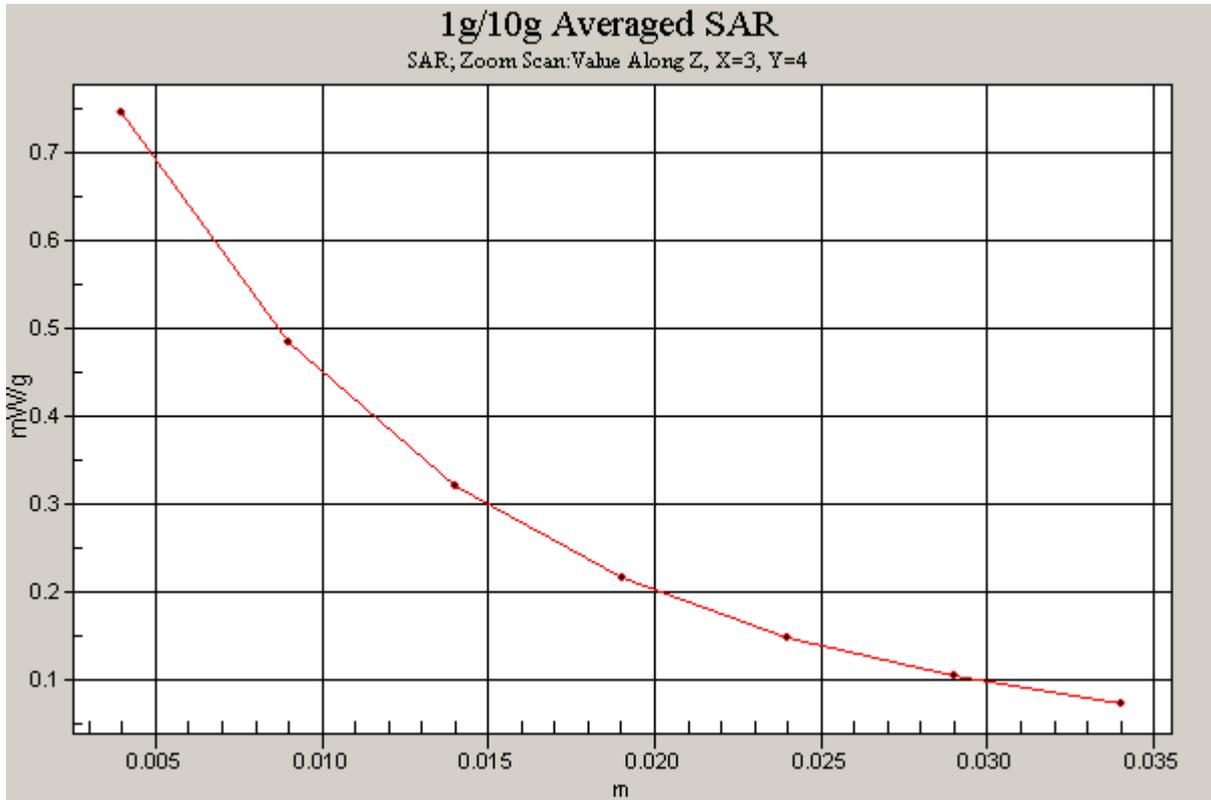


Figure 28 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 192]

**GSM 850 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/26/2009 11:45:59 AM

Communication System: GSM850 + EGPRS(1Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.968 mW/g

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

Reference Value = 30.9 V/m; Power Drift = -0.153 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.903 mW/g; SAR(10 g) = 0.545 mW/g**

Maximum value of SAR (measured) = 0.993 mW/g

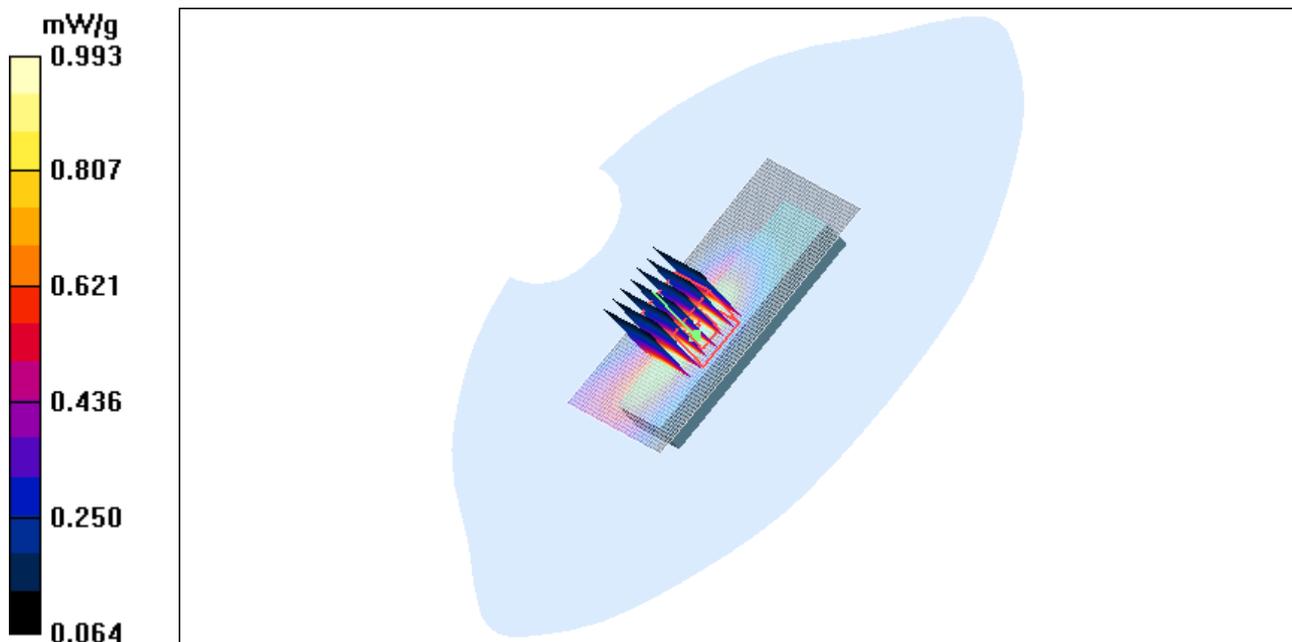


Figure 29 GSM 850 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 192

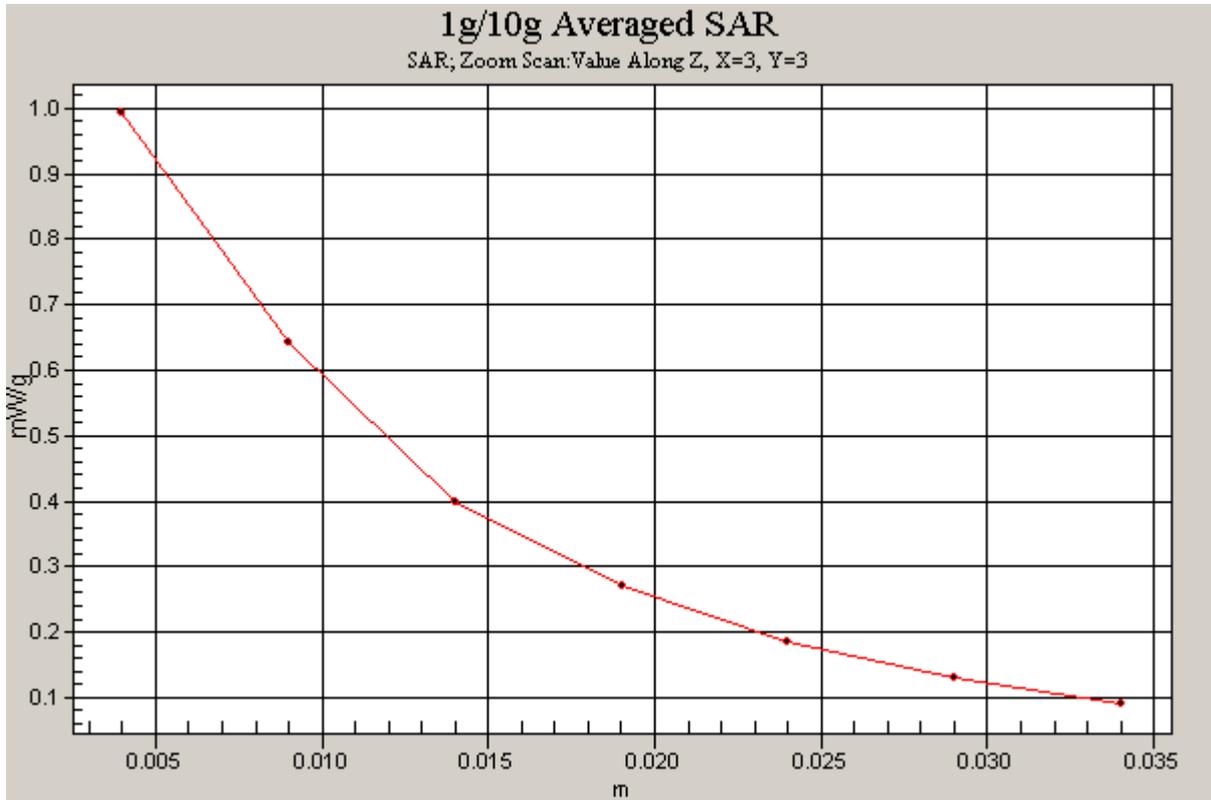


Figure 30 Z-Scan at power reference point [GSM 850 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 192]

**GSM 850 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/26/2009 1:23:30 PM

Communication System: GSM850 +EGPRS(2Up); Frequency: 837 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 55$ ;  $\rho = 1000 \text{ kg/m}^3$

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) =  $1.13 \text{ mW/g}$

**Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,

$dz=5\text{mm}$

Reference Value =  $34.6 \text{ V/m}$ ; Power Drift =  $-0.034 \text{ dB}$

Peak SAR (extrapolated) =  $1.67 \text{ W/kg}$

**SAR(1 g) =  $1.02 \text{ mW/g}$ ; SAR(10 g) =  $0.610 \text{ mW/g}$**

Maximum value of SAR (measured) =  $1.12 \text{ mW/g}$

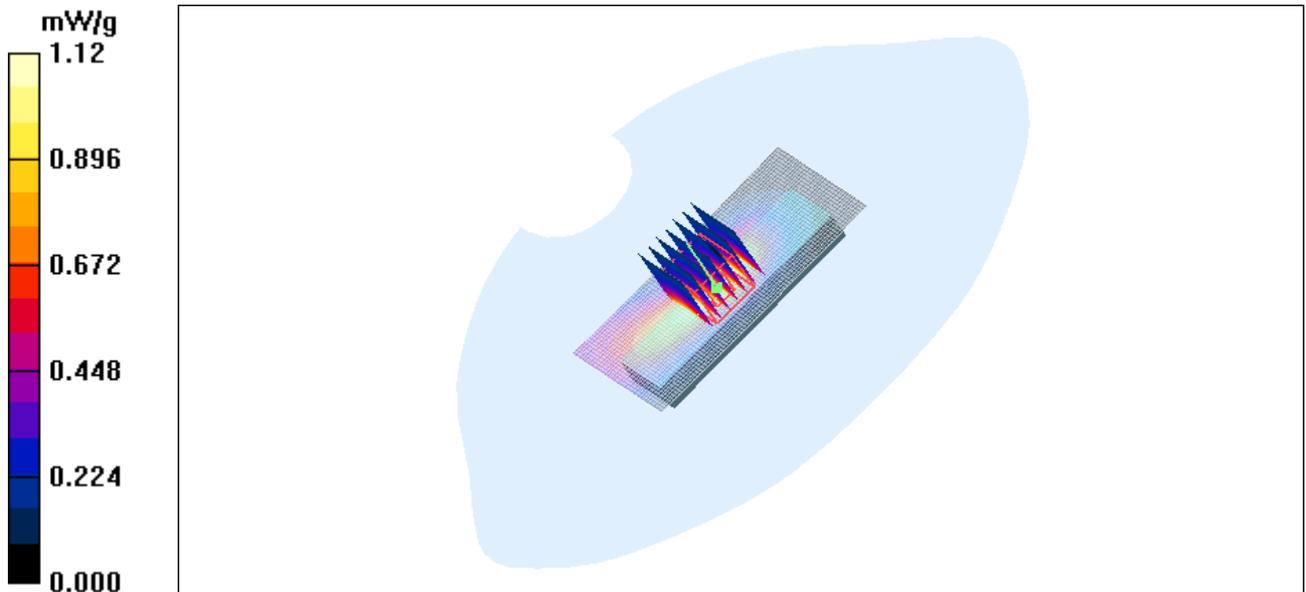


Figure 31 GSM 850 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

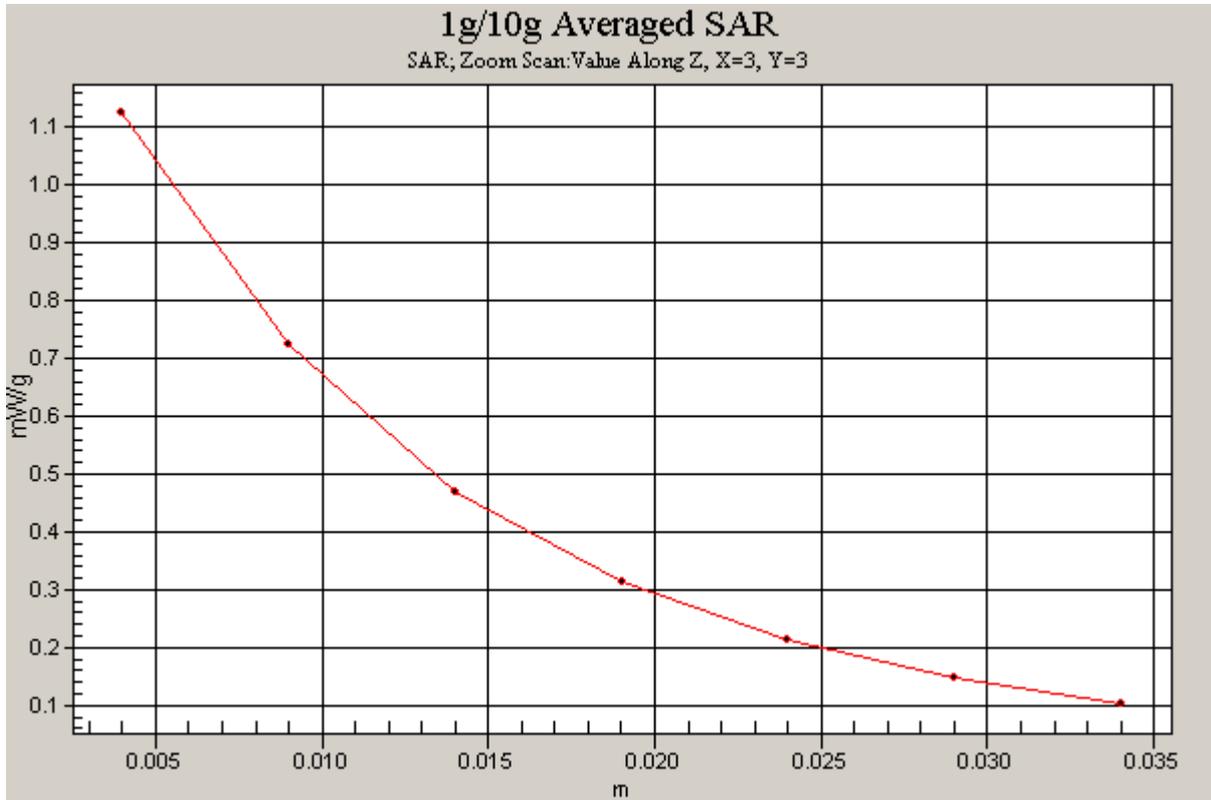


Figure 32 Z-Scan at power reference point [GSM 850 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 192]

**GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/26/2009 1:41:22 PM

Communication System: GSM850 + EGPRS(3Up); Frequency: 837 MHz; Duty Cycle: 1:2.67

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 55$ ;  $\rho = 1000 \text{ kg/m}^3$

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) =  $1.03 \text{ mW/g}$

**Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,

$dz=5\text{mm}$

Reference Value =  $33.0 \text{ V/m}$ ; Power Drift =  $-0.069 \text{ dB}$

Peak SAR (extrapolated) =  $1.48 \text{ W/kg}$

**SAR(1 g) =  $0.920 \text{ mW/g}$ ; SAR(10 g) =  $0.549 \text{ mW/g}$**

Maximum value of SAR (measured) =  $1.02 \text{ mW/g}$

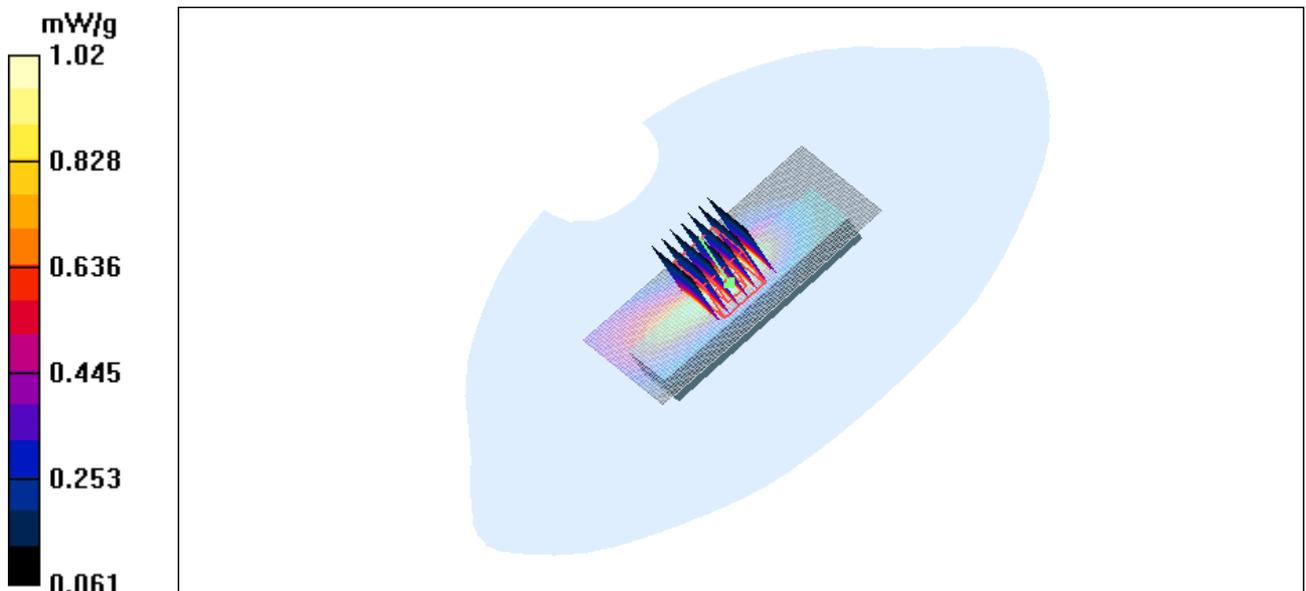


Figure 33 GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

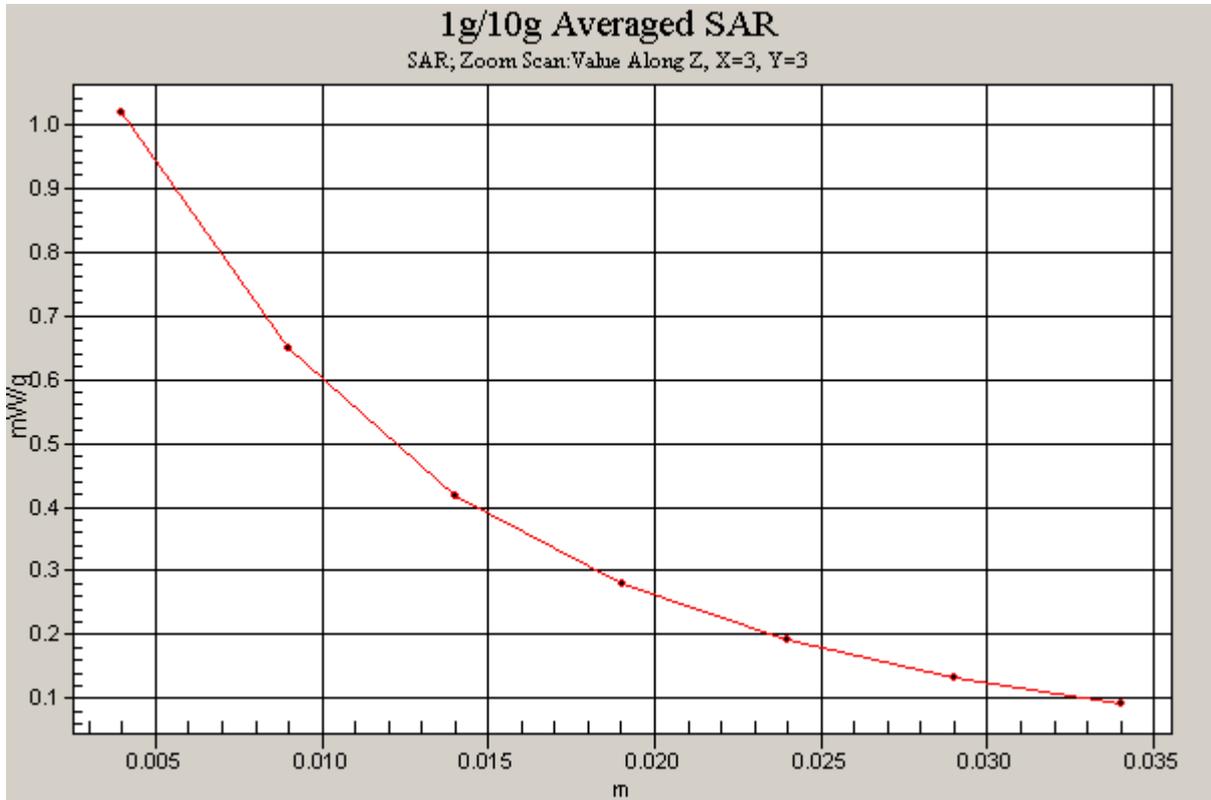


Figure 34 Z-Scan at power reference point [GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 192]

**GSM 850 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/26/2009 2:00:26 PM

Communication System: GSM850 + EGPRS(4Up); Frequency: 837 MHz; Duty Cycle: 1:2

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 1.02 \text{ mho/m}$ ;  $\epsilon_r = 55$ ;  $\rho = 1000 \text{ kg/m}^3$

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(6.14, 6.14, 6.14); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (interpolated) =  $1.03 \text{ mW/g}$

**Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,

$dz=5\text{mm}$

Reference Value =  $33.2 \text{ V/m}$ ; Power Drift =  $-0.087 \text{ dB}$

Peak SAR (extrapolated) =  $1.50 \text{ W/kg}$

**SAR(1 g) =  $0.922 \text{ mW/g}$ ; SAR(10 g) =  $0.552 \text{ mW/g}$**

Maximum value of SAR (measured) =  $1.01 \text{ mW/g}$

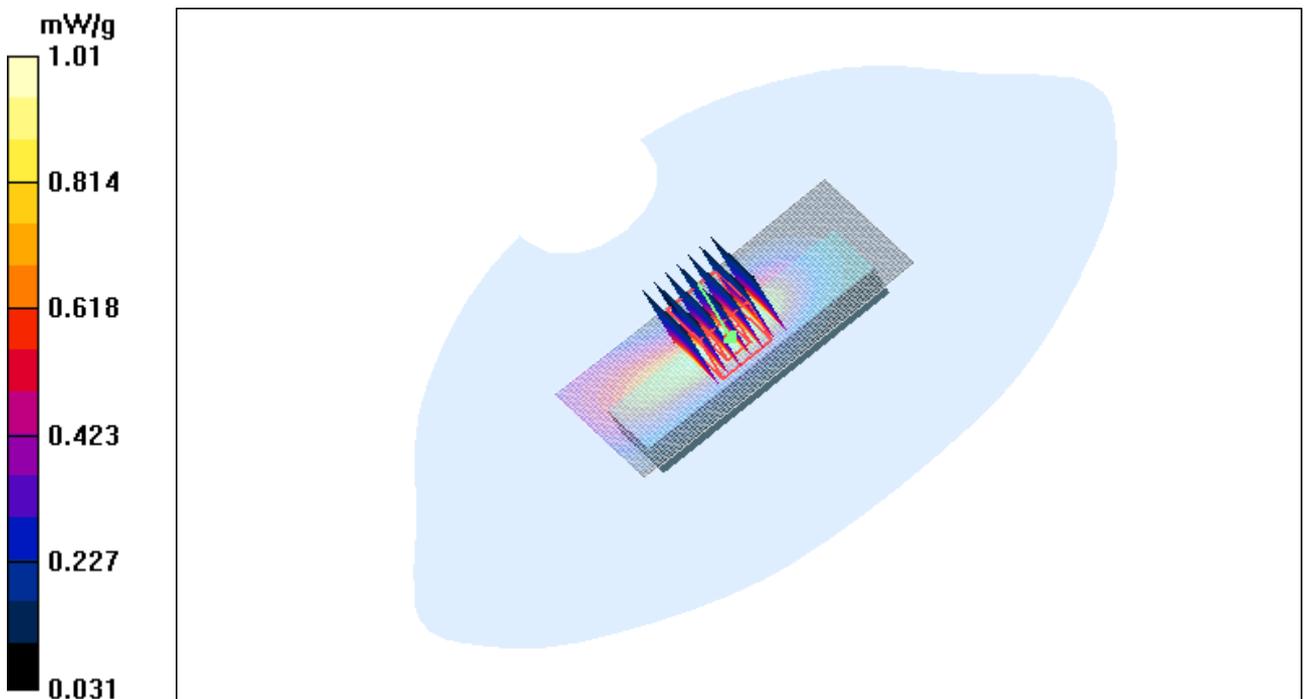


Figure 35 GSM 850 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

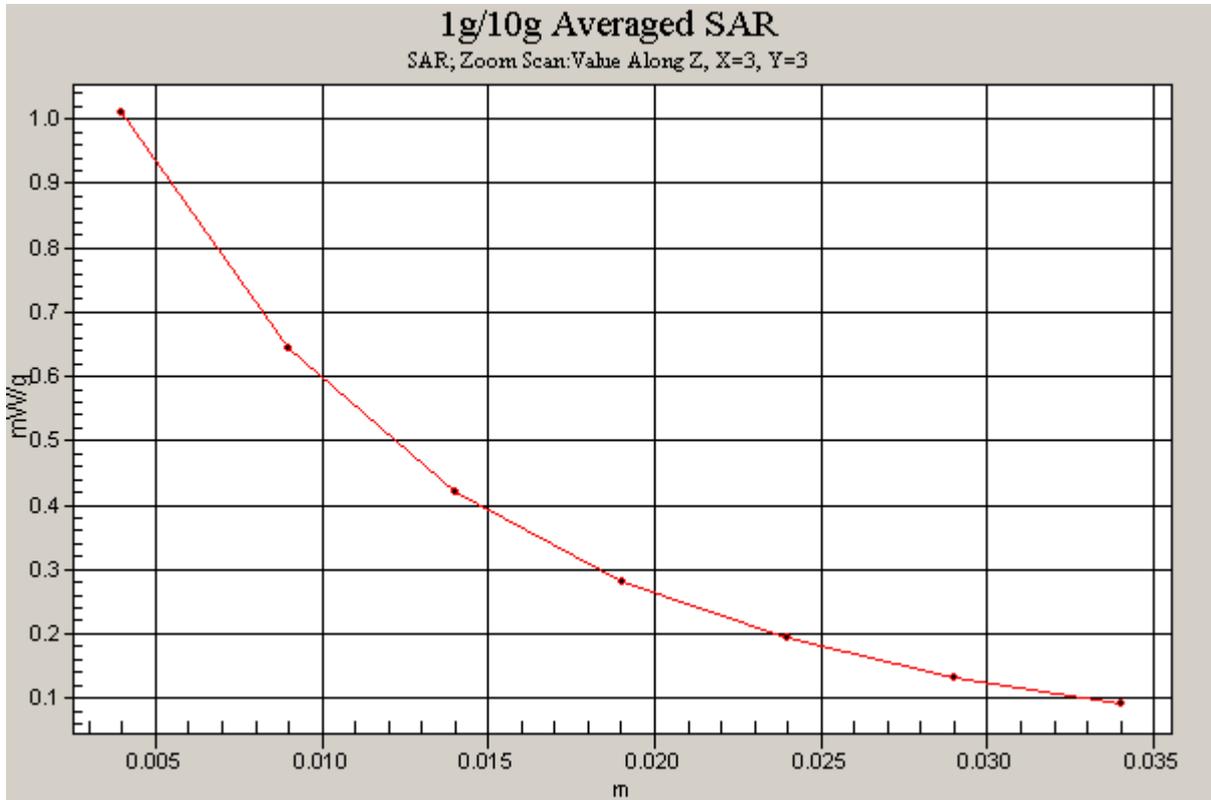


Figure 36 Z-Scan at power reference point [GSM 850 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 192]

**GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 High**

Date/Time: 8/27/2009 3:43:56 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1909.8 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High 2/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.863 mW/g

**Test Position 1 High 2/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.9 V/m; Power Drift = -0.089 dB

Peak SAR (extrapolated) = 1.37 W/kg

**SAR(1 g) = 0.768 mW/g; SAR(10 g) = 0.419 mW/g**

Maximum value of SAR (measured) = 0.840 mW/g

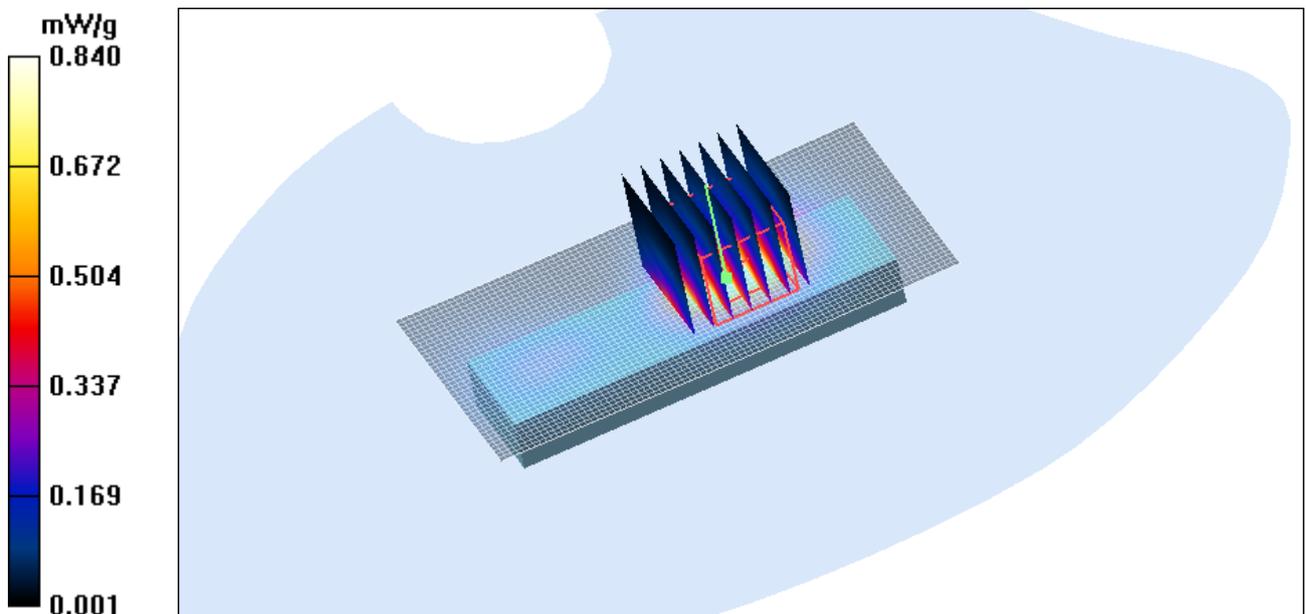


Figure 37 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

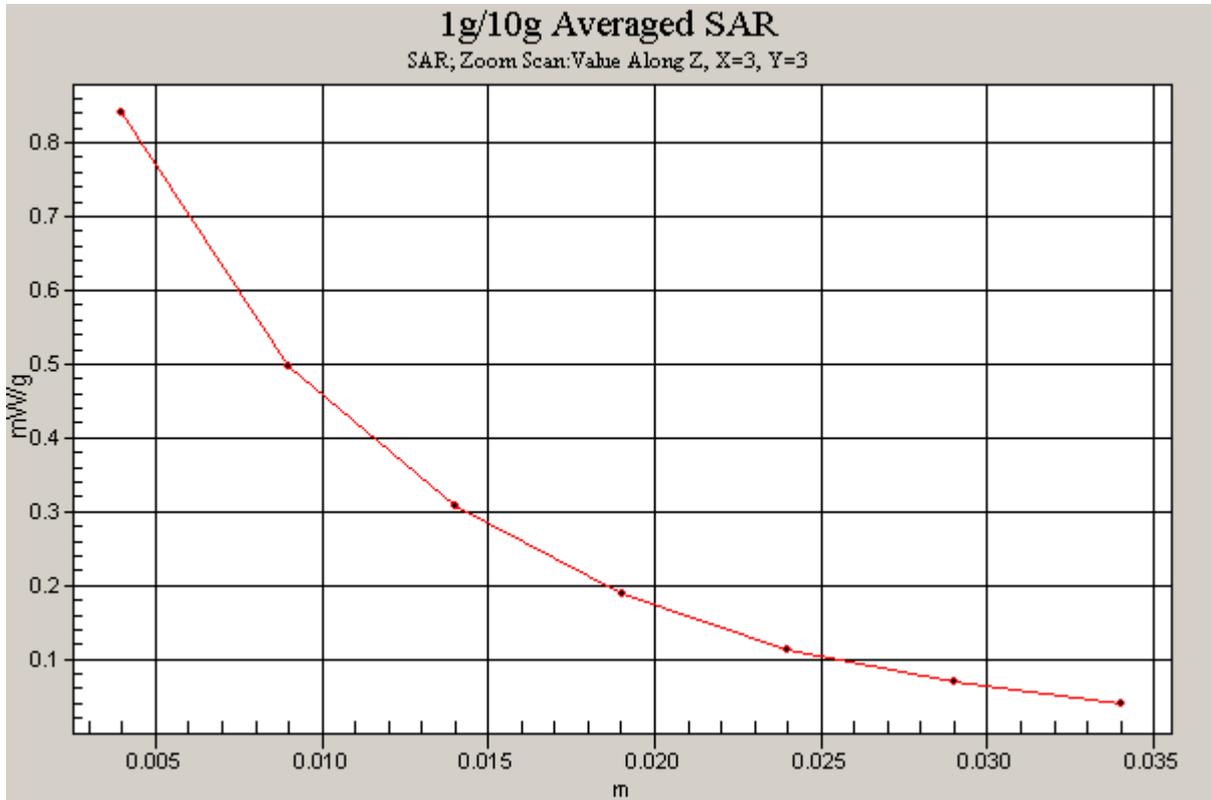


Figure 38 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

**GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/27/2009 2:37:24 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.804 mW/g

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

Reference Value = 18.6 V/m; Power Drift = -0.149 dB

Peak SAR (extrapolated) = 1.22 W/kg

**SAR(1 g) = 0.701 mW/g; SAR(10 g) = 0.379 mW/g**

Maximum value of SAR (measured) = 0.785 mW/g

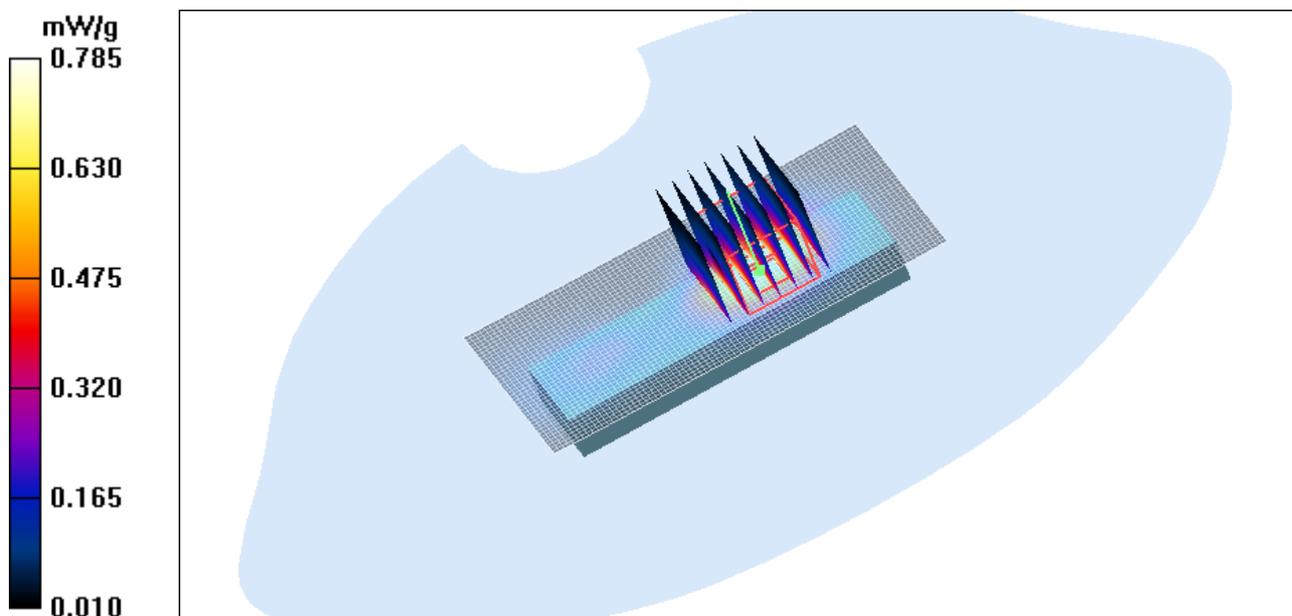


Figure 39 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 661

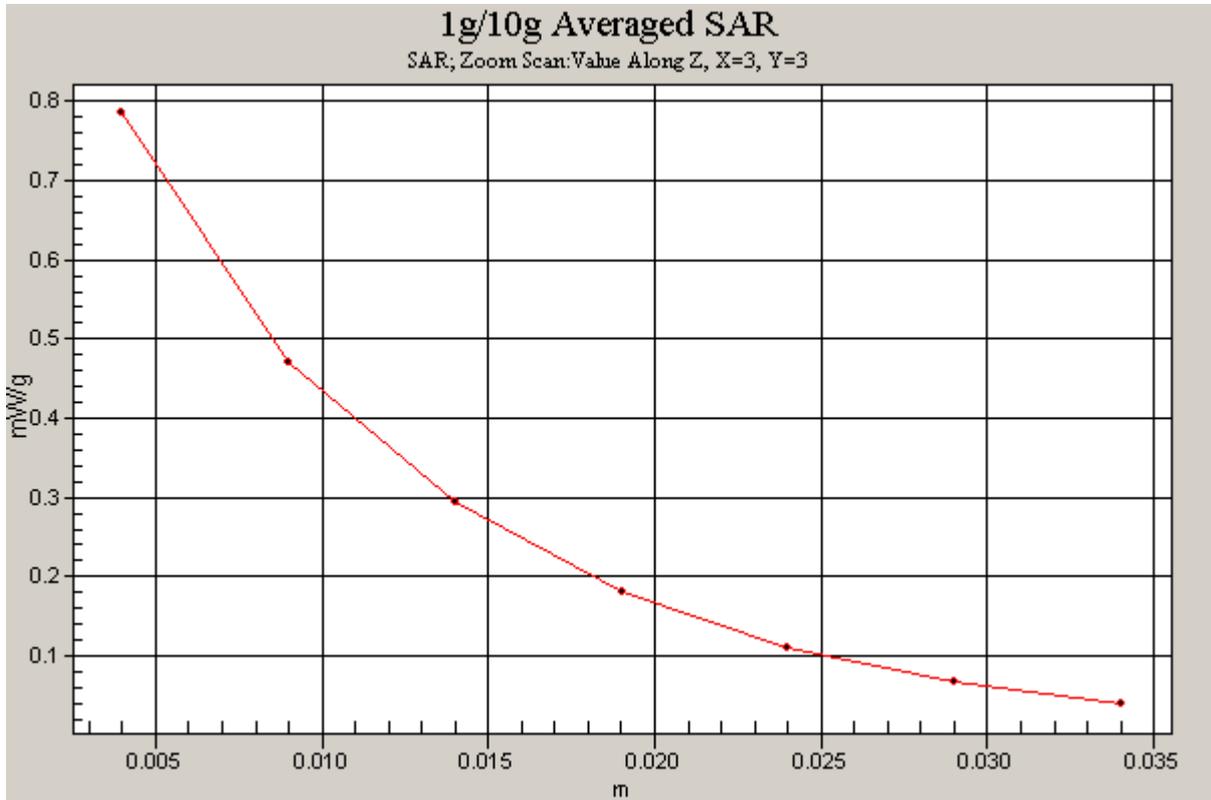


Figure 40 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 661]

**GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Low**

Date/Time: 8/27/2009 3:26:42 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1850.2 MHz; Duty Cycle: 1:4

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Low/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.766 mW/g

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

Reference Value = 19.4 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 1.15 W/kg

**SAR(1 g) = 0.660 mW/g; SAR(10 g) = 0.361 mW/g**

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

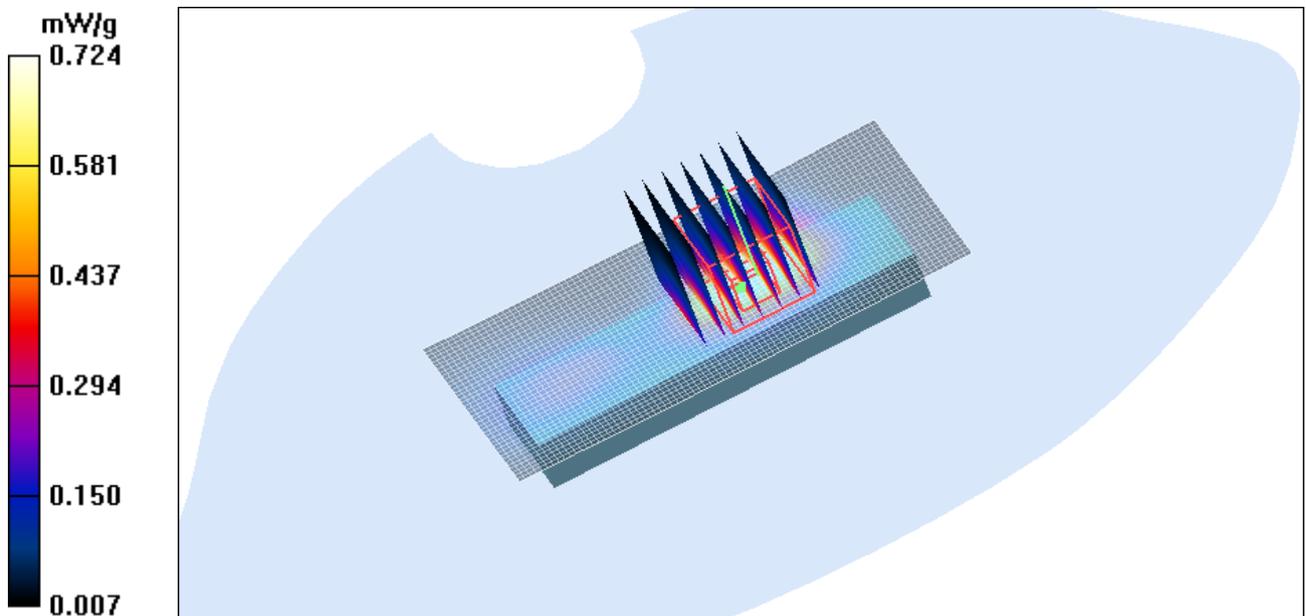


Figure 41 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 512

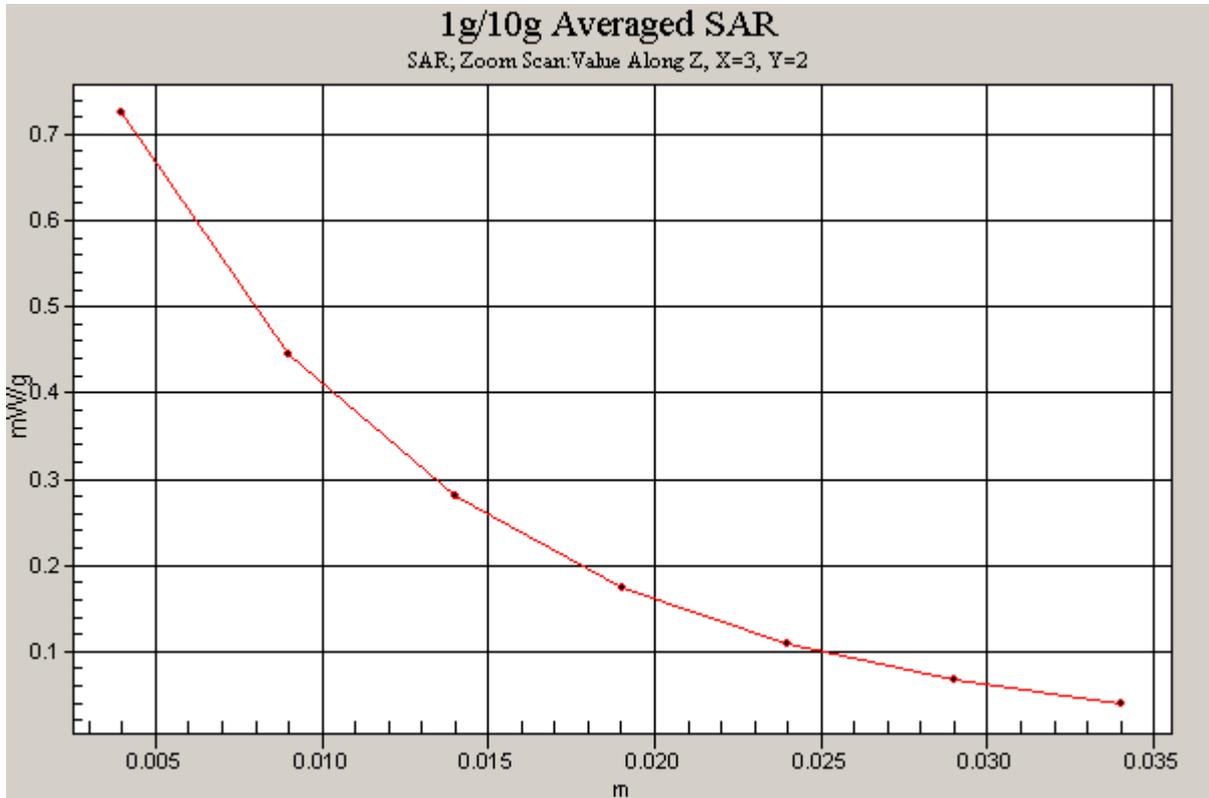


Figure 42 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 512]

**GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Middle**

Date/Time: 8/27/2009 12:28:04 PM

Communication System: PCS 1900+GPRS(1Up); Frequency: 1880 MHz; Duty Cycle: 1:8

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.757 mW/g

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

Reference Value = 17.0 V/m; Power Drift = -0.029 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.625 mW/g; SAR(10 g) = 0.340 mW/g**

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

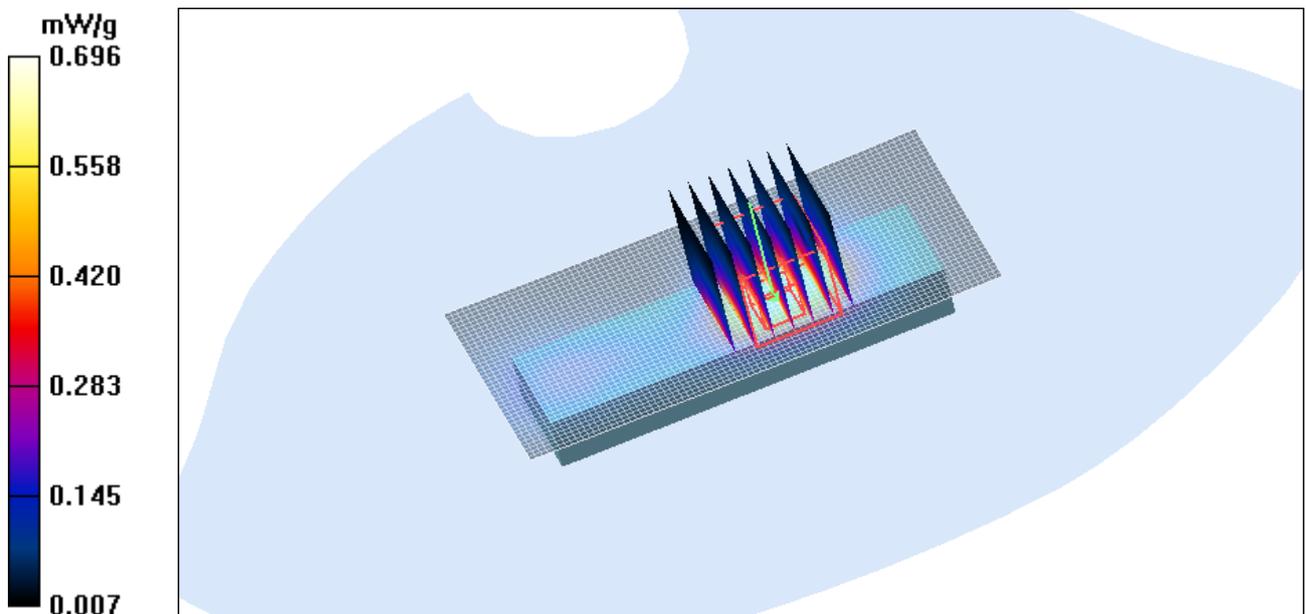


Figure 43 GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 661

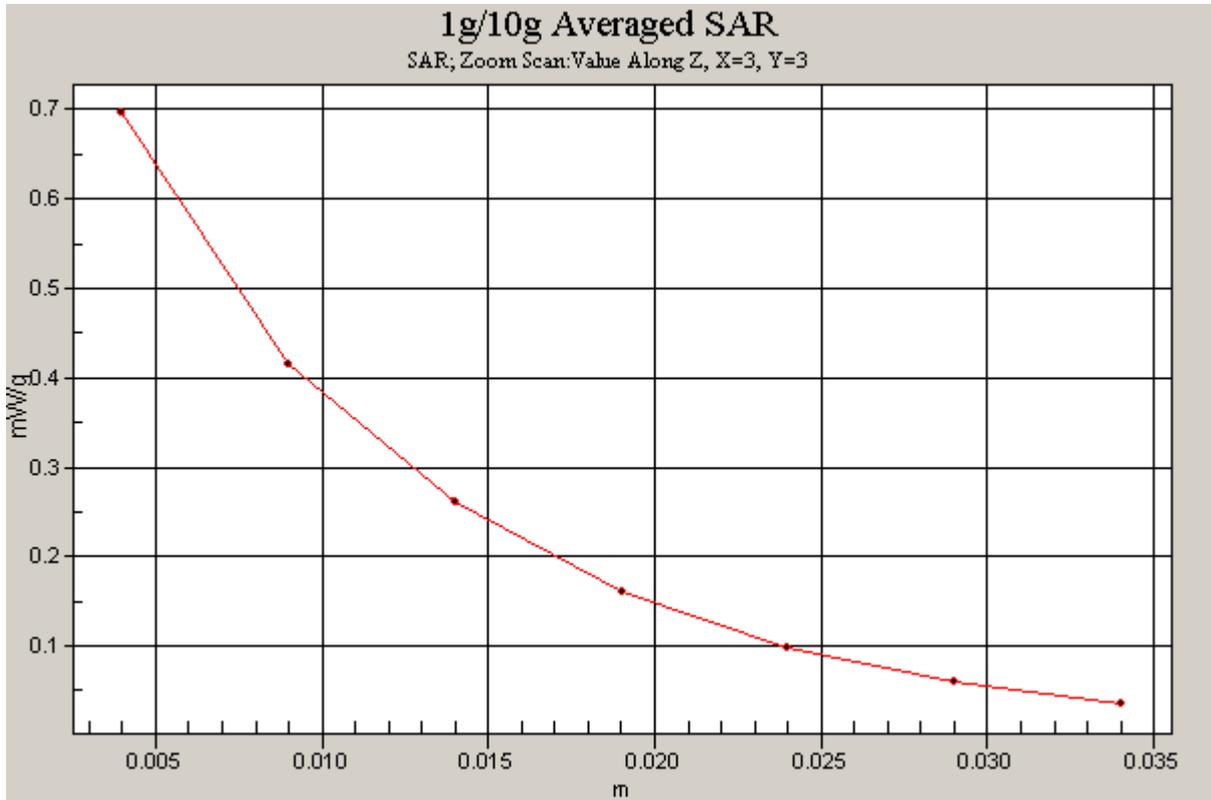


Figure 44 Z-Scan at power reference point [GSM 1900 GPRS (1 timeslot in uplink) with IBM T61  
Test Position 1 Channel 661]

**GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Middle**

Date/Time: 8/27/2009 1:08:19 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 3 Middle/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

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

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

dz=5mm

Reference Value = 8.66 V/m; Power Drift = -0.099 dB

Peak SAR (extrapolated) = 0.241 W/kg

**SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.056 mW/g**

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

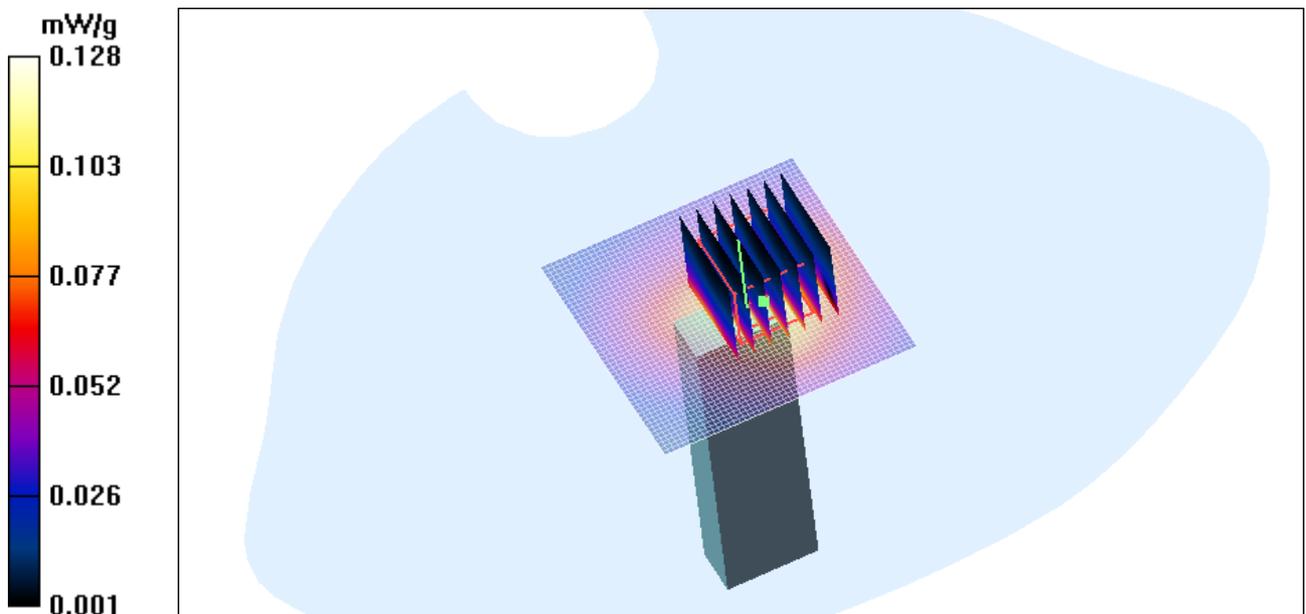


Figure 45 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Channel 661

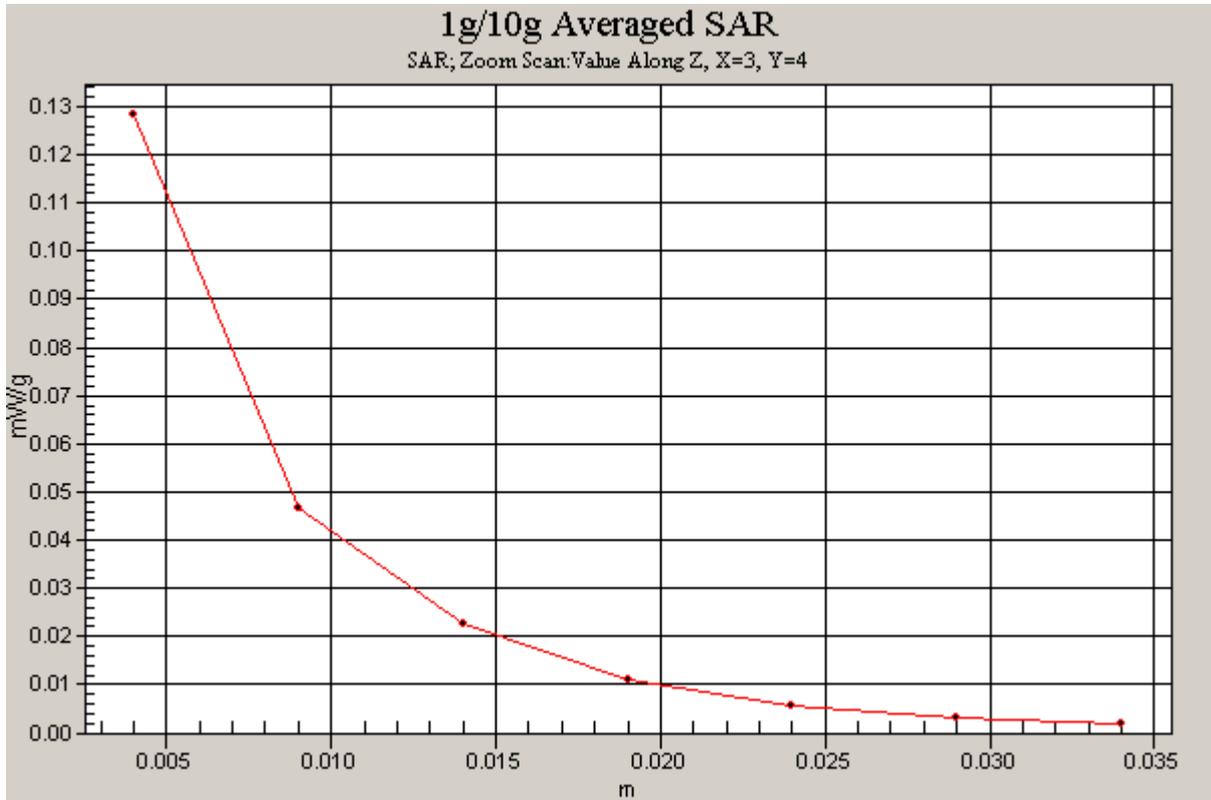


Figure 46 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Channel 661]

**GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Middle**

Date/Time: 8/27/2009 2:02:56 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 4 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.479 mW/g

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

Reference Value = 12.1 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 0.780 W/kg

**SAR(1 g) = 0.418 mW/g; SAR(10 g) = 0.225 mW/g**

Maximum value of SAR (measured) = 0.456 mW/g

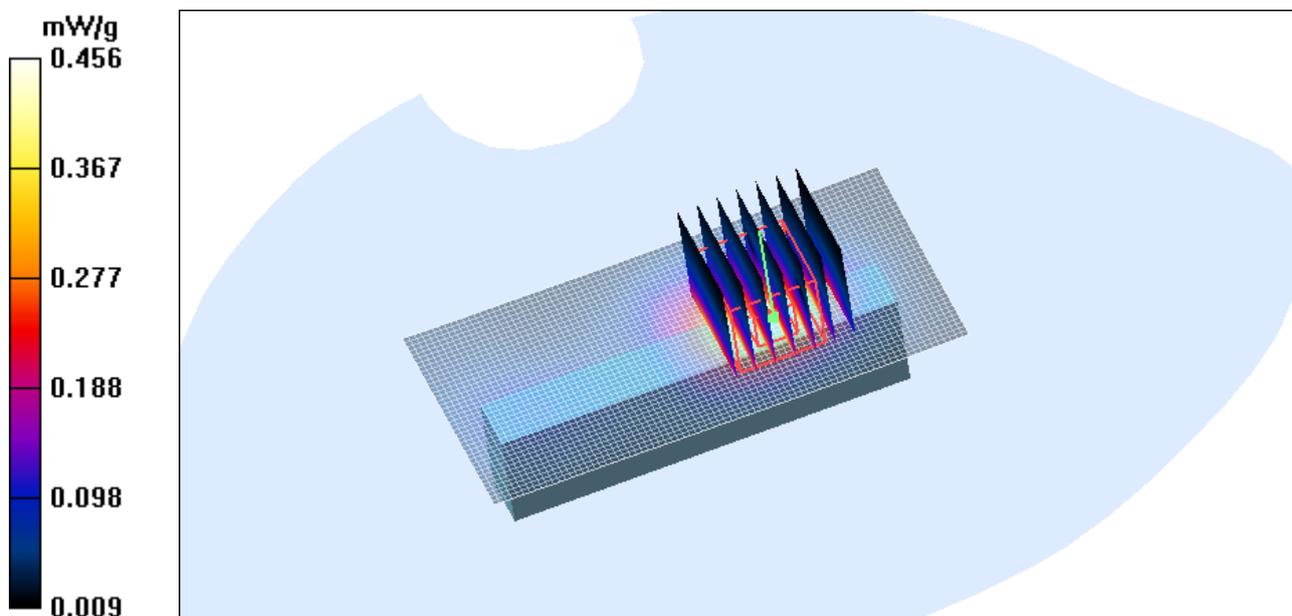


Figure 47 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Channel 661

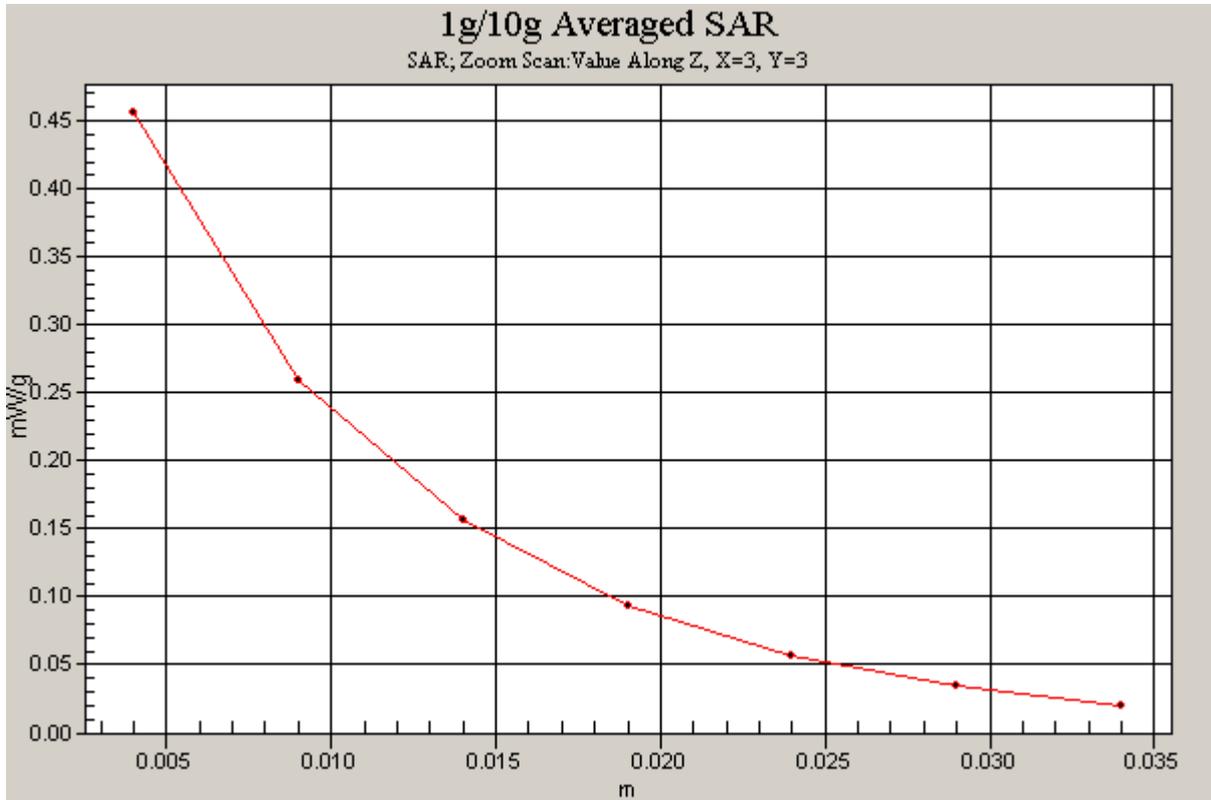


Figure 48 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Channel 661]

**GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Middle**

Date/Time: 8/27/2009 1:31:42 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 5 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.626 mW/g

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

Reference Value = 15.5 V/m; Power Drift = -0.117 dB

Peak SAR (extrapolated) = 1.07 W/kg

**SAR(1 g) = 0.539 mW/g; SAR(10 g) = 0.277 mW/g**

Maximum value of SAR (measured) = 0.589 mW/g

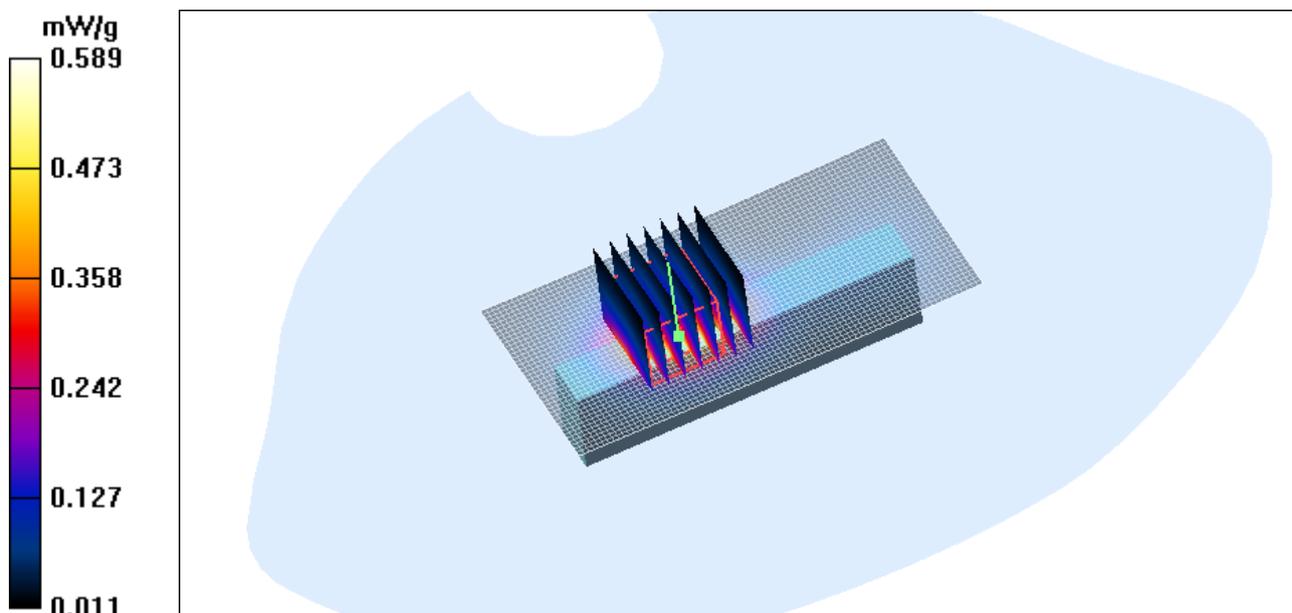


Figure 49 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Channel 661

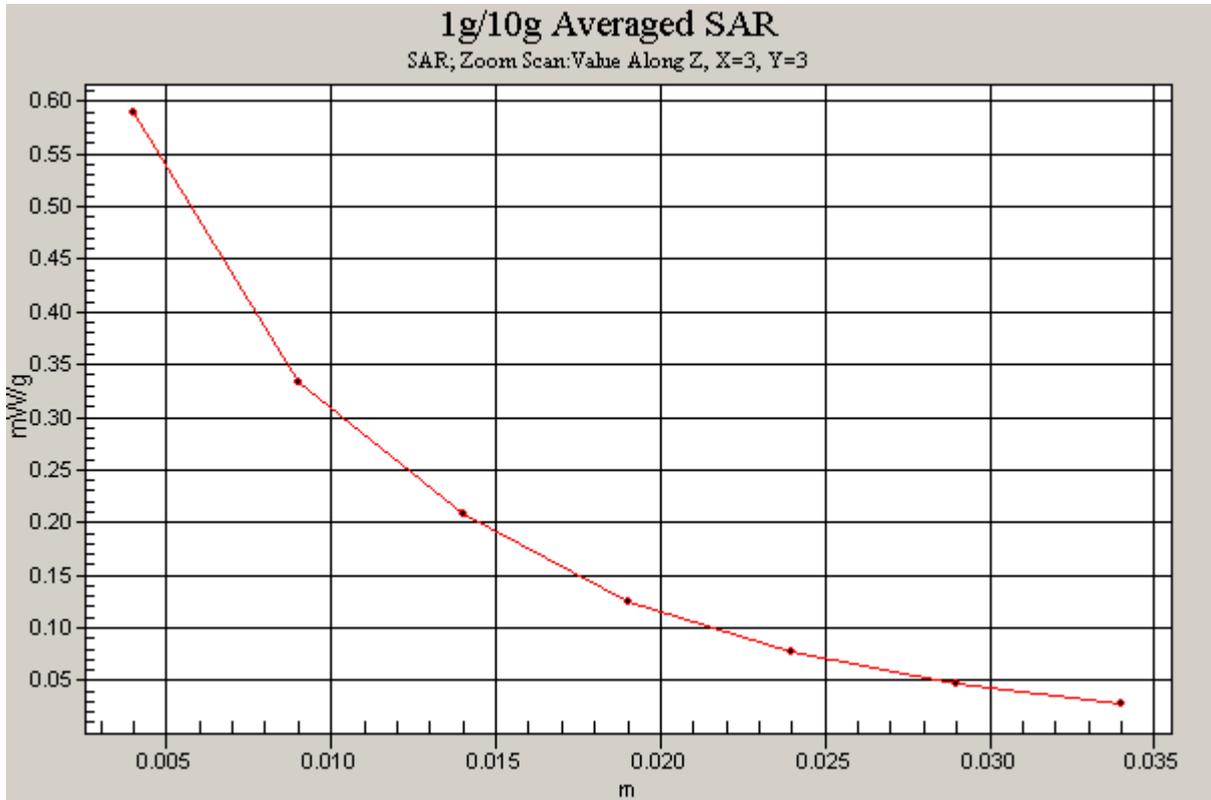


Figure 50 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Channel 661]

**GSM 1900 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Middle**

Date/Time: 8/27/2009 12:04:46 PM

Communication System: PCS 1900+GPRS(2Up); Frequency: 1880 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 2 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.727 mW/g

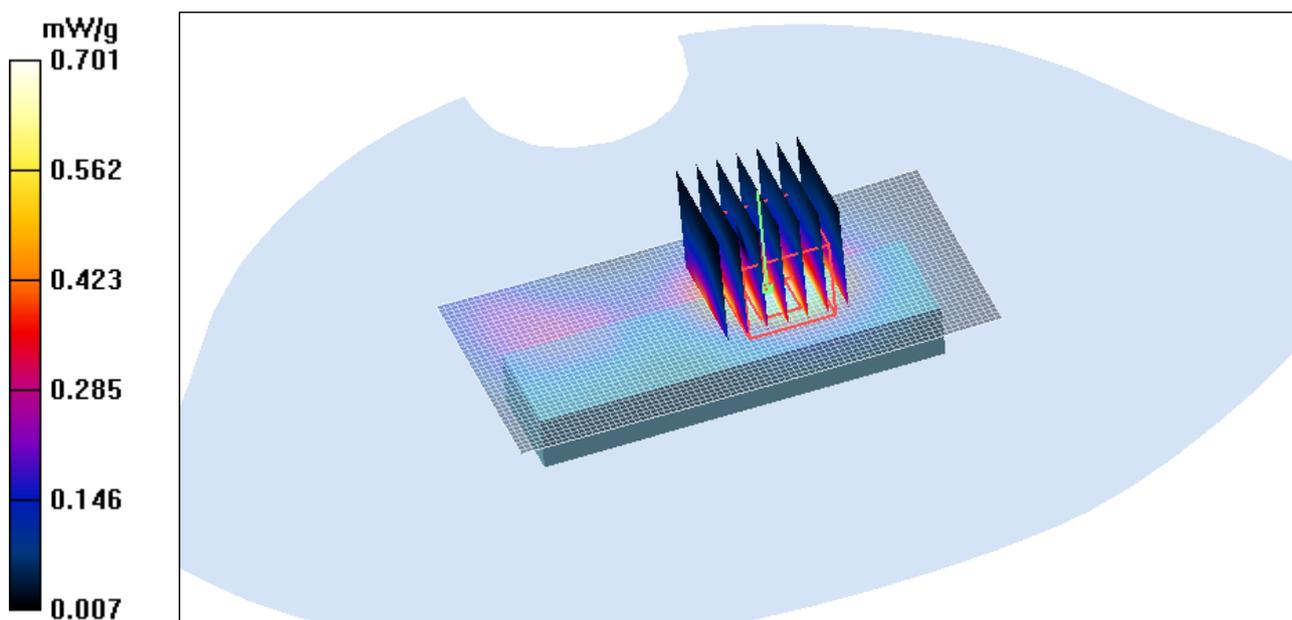
**Test Position 2 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.2 V/m; Power Drift = -0.094 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.635 mW/g; SAR(10 g) = 0.354 mW/g**

Maximum value of SAR (measured) = 0.701 mW/g



**Figure 51 GSM 1900 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 661**

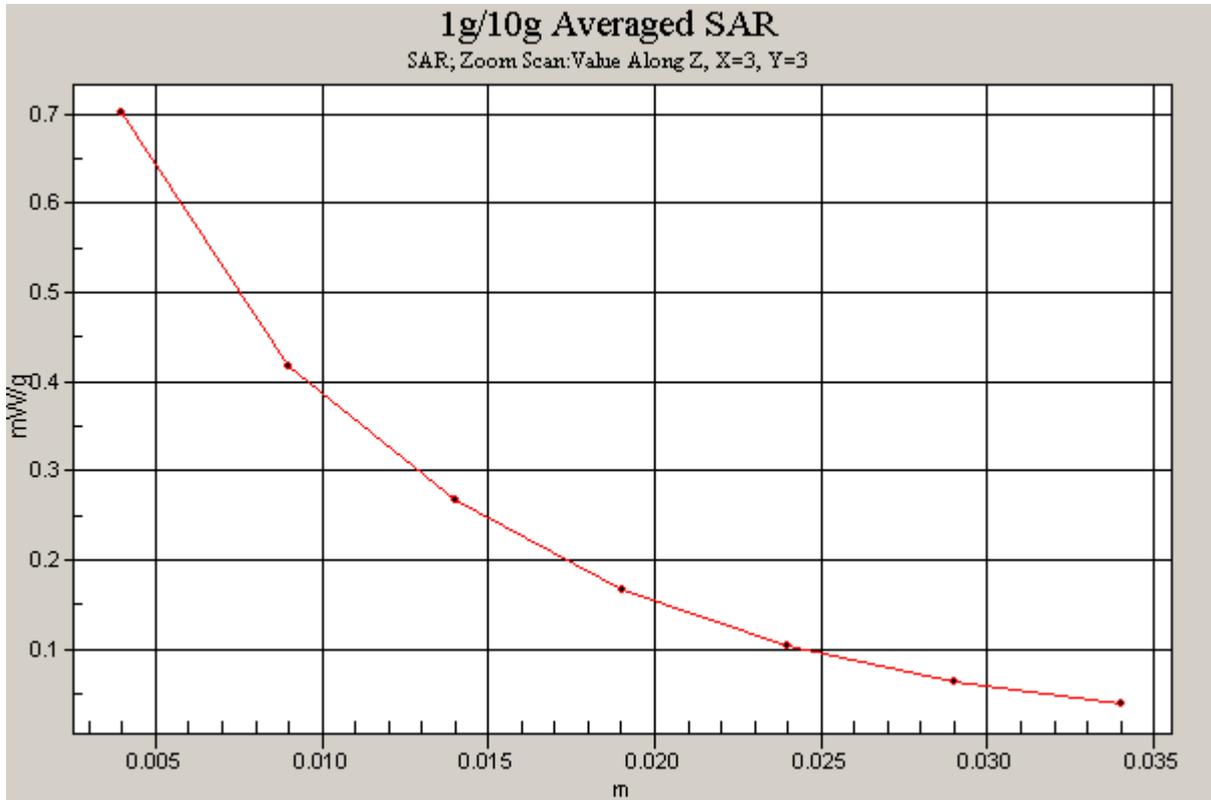


Figure 52 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 661]

**GSM 1900 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 High**

Date/Time: 8/27/2009 12:46:39 PM

Communication System: PCS 1900+EGPRS(1Up); Frequency: 1909.8 MHz; Duty Cycle: 1:8

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.838 mW/g

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

Reference Value = 17.6 V/m; Power Drift = -0.110 dB

Peak SAR (extrapolated) = 1.19 W/kg

**SAR(1 g) = 0.685 mW/g; SAR(10 g) = 0.374 mW/g**

Maximum value of SAR (measured) = 0.754 mW/g

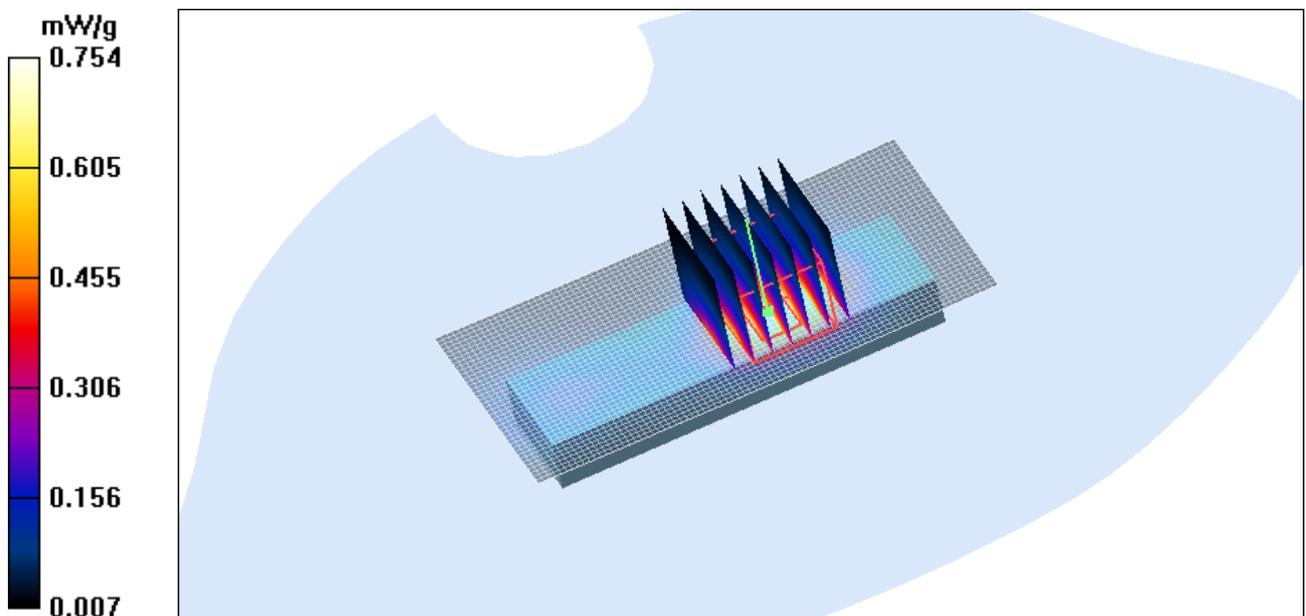


Figure 53 GSM 1900 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 810

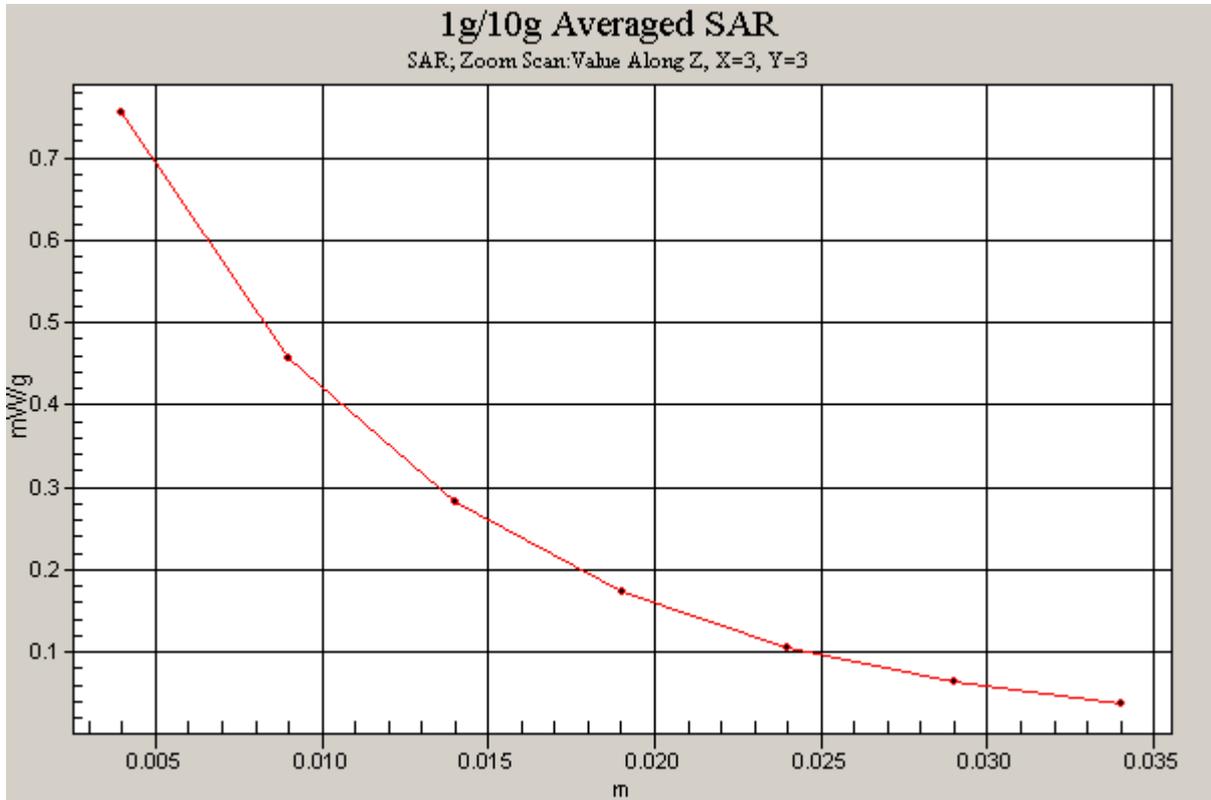


Figure 54 Z-Scan at power reference point [GSM 1900 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 810]

**GSM 1900 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 High**

Date/Time: 8/27/2009 4:04:03 PM

Communication System: PCS 1900+EGPRS(2Up); Frequency: 1909.8 MHz; Duty Cycle: 1:4

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.849 mW/g

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

Reference Value = 20.0 V/m; Power Drift = -0.061 dB

Peak SAR (extrapolated) = 1.38 W/kg

**SAR(1 g) = 0.778 mW/g; SAR(10 g) = 0.424 mW/g**

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

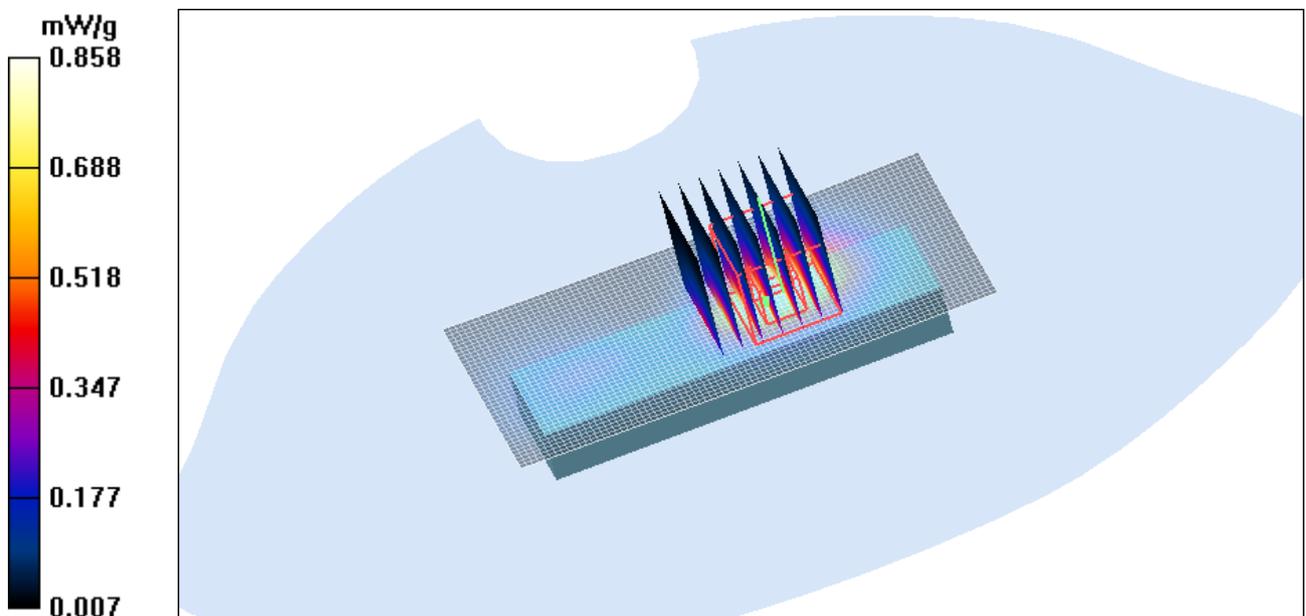


Figure 55 GSM 1900 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

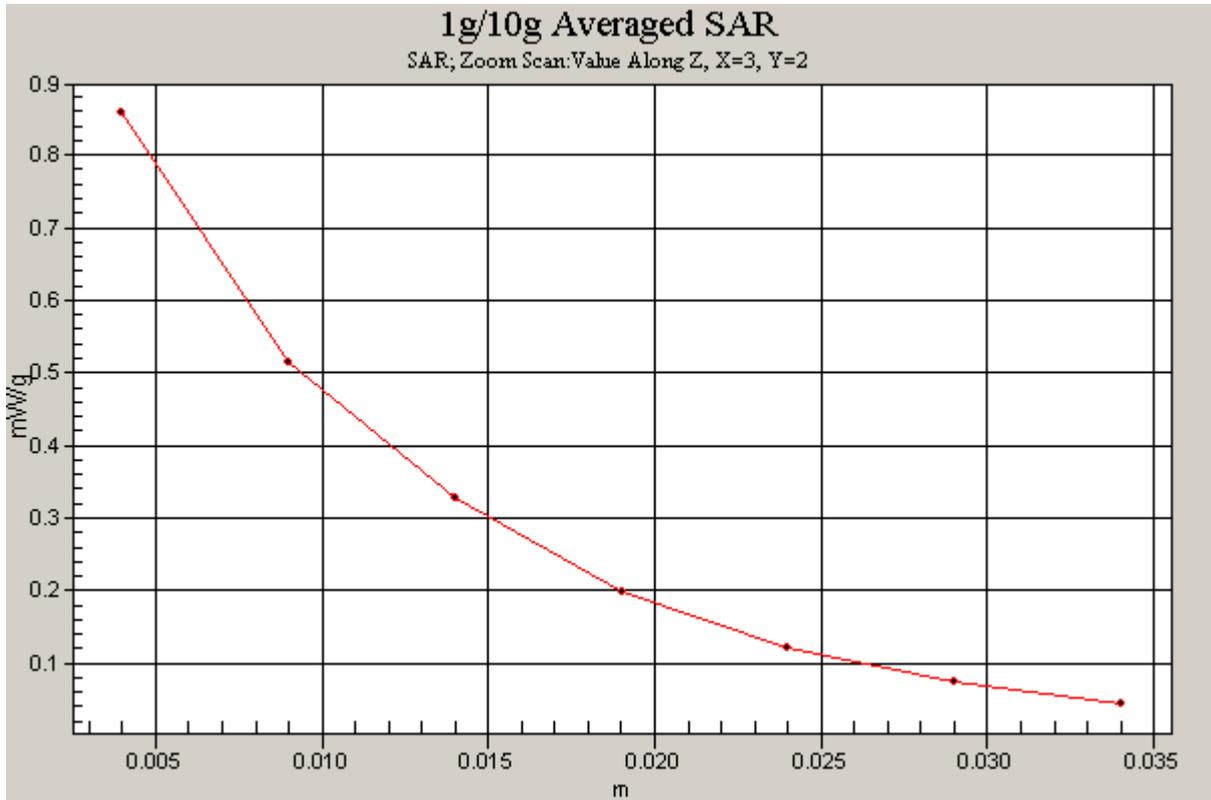


Figure 56 Z-Scan at power reference point [GSM 1900 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

**GSM 1900 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 High**

Date/Time: 8/27/2009 4:21:11 PM

Communication System: PCS 1900+EGPRS(3Up); Frequency: 1909.8 MHz; Duty Cycle: 1:2.67

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 19.1 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 1.28 W/kg

**SAR(1 g) = 0.719 mW/g; SAR(10 g) = 0.392 mW/g**

Maximum value of SAR (measured) = 0.782 mW/g

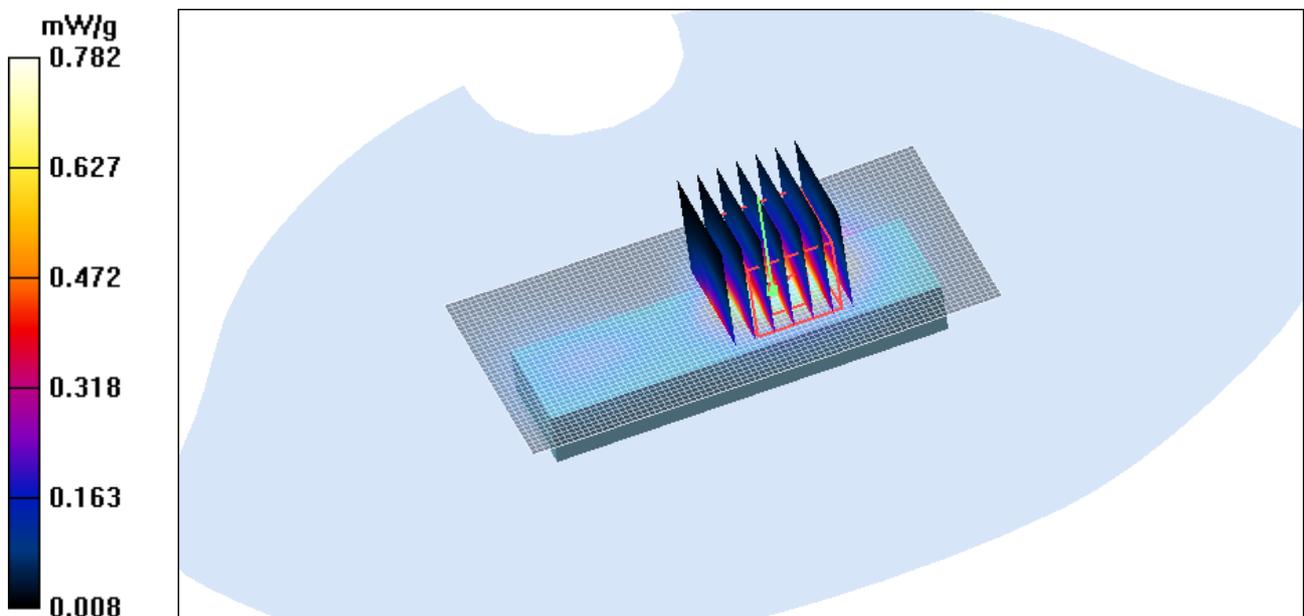


Figure 57 GSM 1900 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

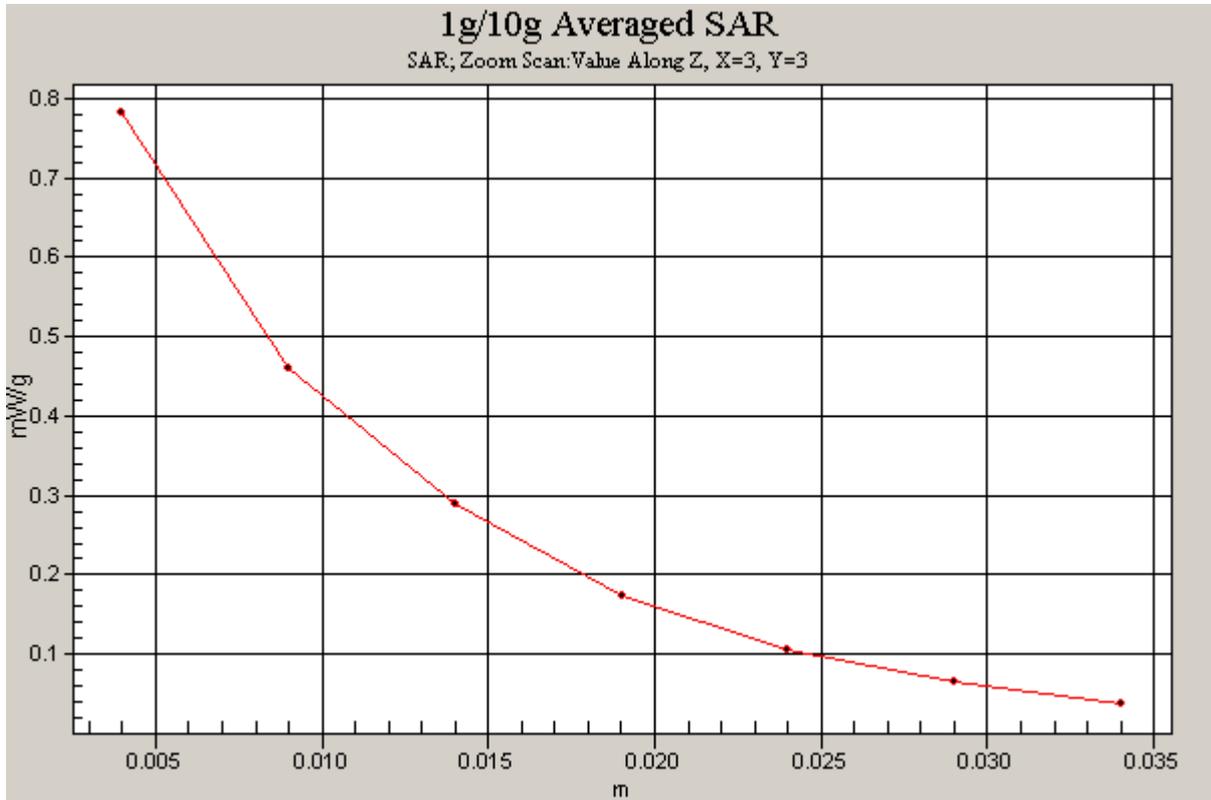


Figure 58 Z-Scan at power reference point [GSM 1900 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

**GSM 1900 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 High**

Date/Time: 8/27/2009 4:42:40 PM

Communication System: PCS 1900+EGPRS(4Up); Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.6, 4.6, 4.6); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.652 mW/g

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

Reference Value = 16.3 V/m; Power Drift = 0.195 dB

Peak SAR (extrapolated) = 1.05 W/kg

**SAR(1 g) = 0.590 mW/g; SAR(10 g) = 0.320 mW/g**

Maximum value of SAR (measured) = 0.644 mW/g

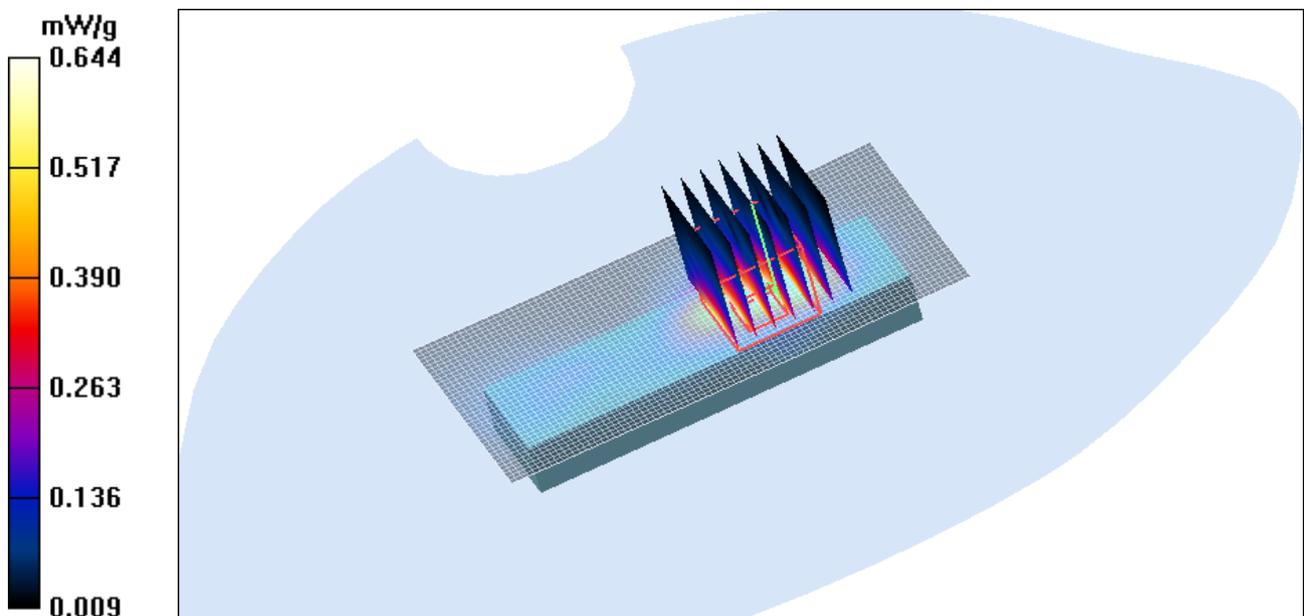


Figure 59 GSM 1900 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

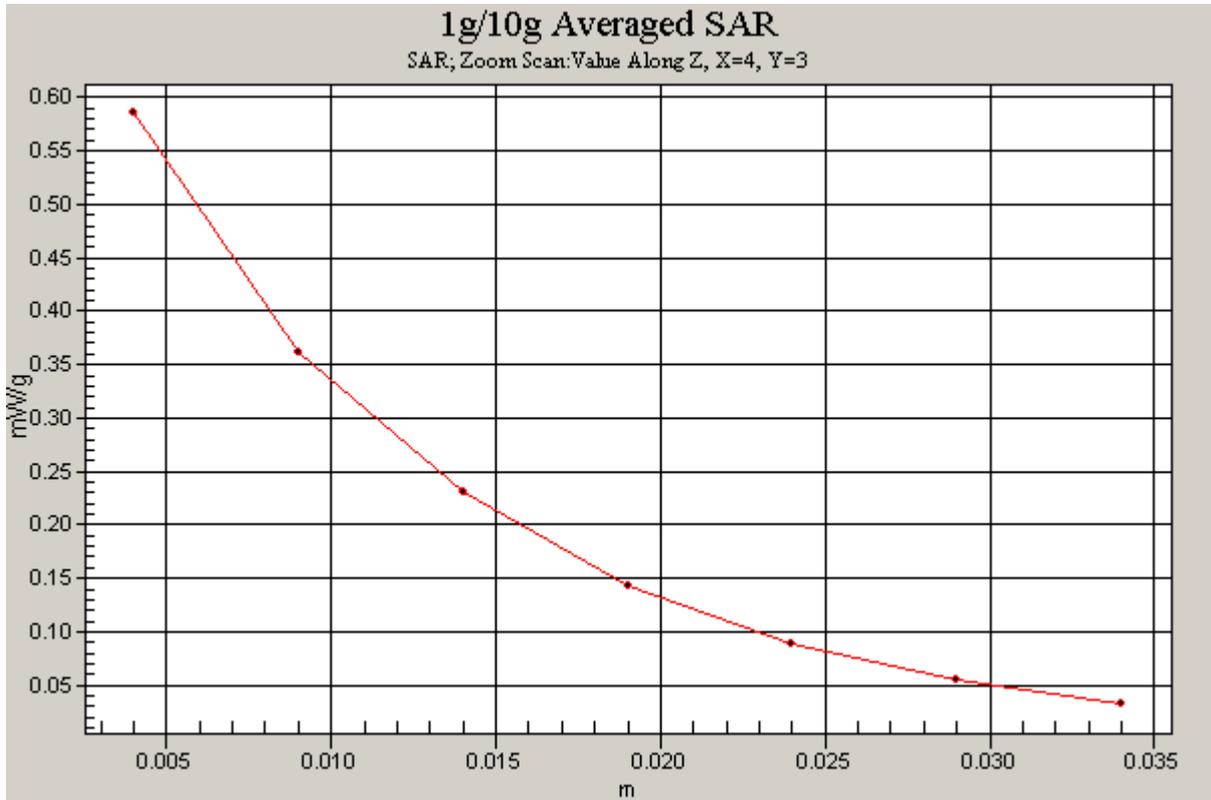


Figure 60 Z-Scan at power reference point [GSM 1900 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

### WCDMA Band IV with IBM T61 Test Position 1 High

Date/Time: 8/26/2009 6:55:57 PM

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

Medium parameters used (interpolated):  $f = 1752.6$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 High/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

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 = 22.8 V/m; Power Drift = 0.080 dB

Peak SAR (extrapolated) = 1.57 W/kg

**SAR(1 g) = 0.993 mW/g; SAR(10 g) = 0.563 mW/g**

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

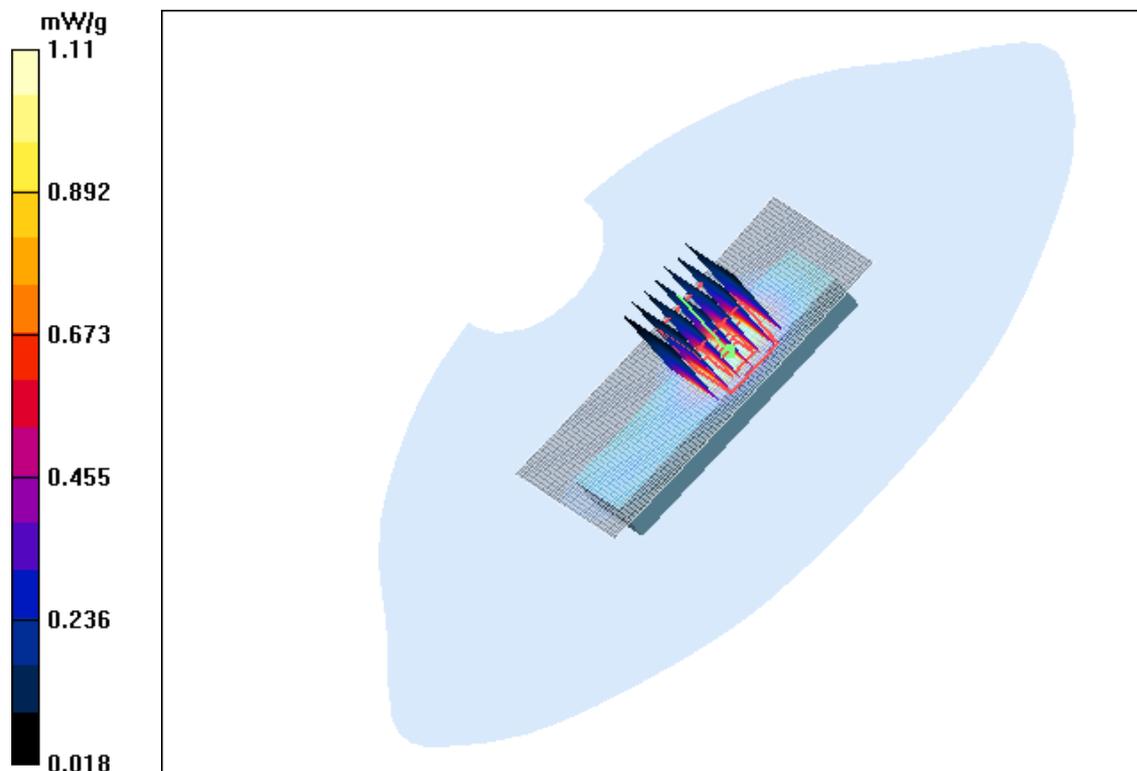


Figure 61 WCDMA Band IV with IBM T61 Test Position 1 Channel 1513

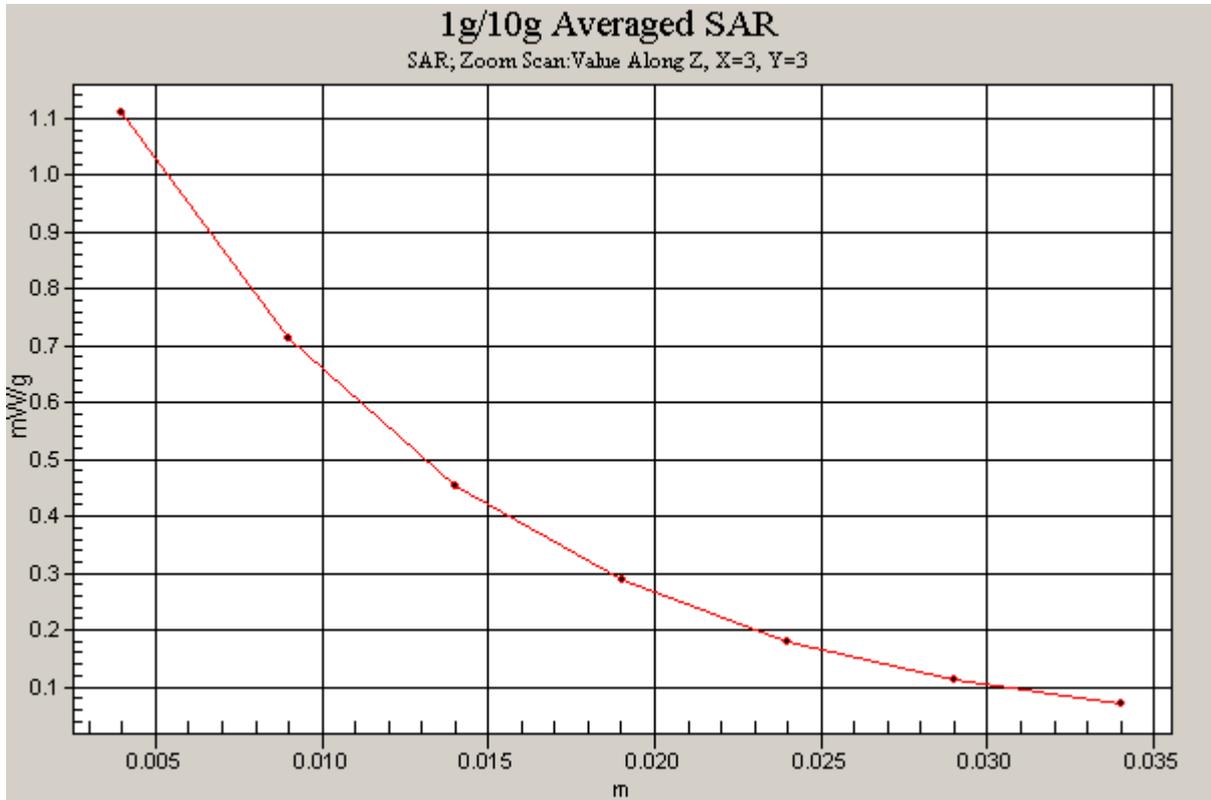


Figure 62 Z-Scan at power reference point [WCDMA Band IV with IBM T61 Test Position 1 Channel 1513]

### WCDMA Band IV with IBM T61 Test Position 1 Middle

Date/Time: 8/26/2009 6:34:04 PM

Communication System: WCDMA Band IV; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle /Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.23 mW/g

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

Reference Value = 25.0 V/m; Power Drift = 0.166 dB

Peak SAR (extrapolated) = 1.67 W/kg

**SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.589 mW/g**

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

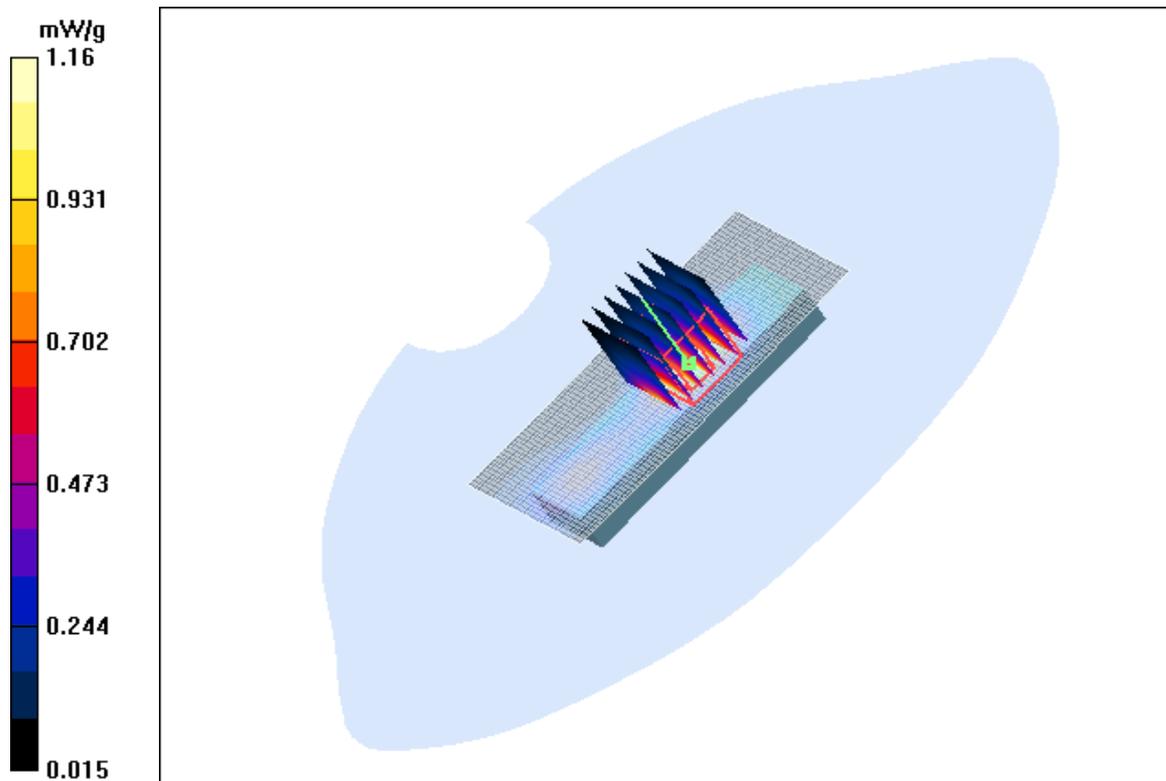


Figure 63 WCDMA Band IV with IBM T61 Test Position 1 Channel 1412

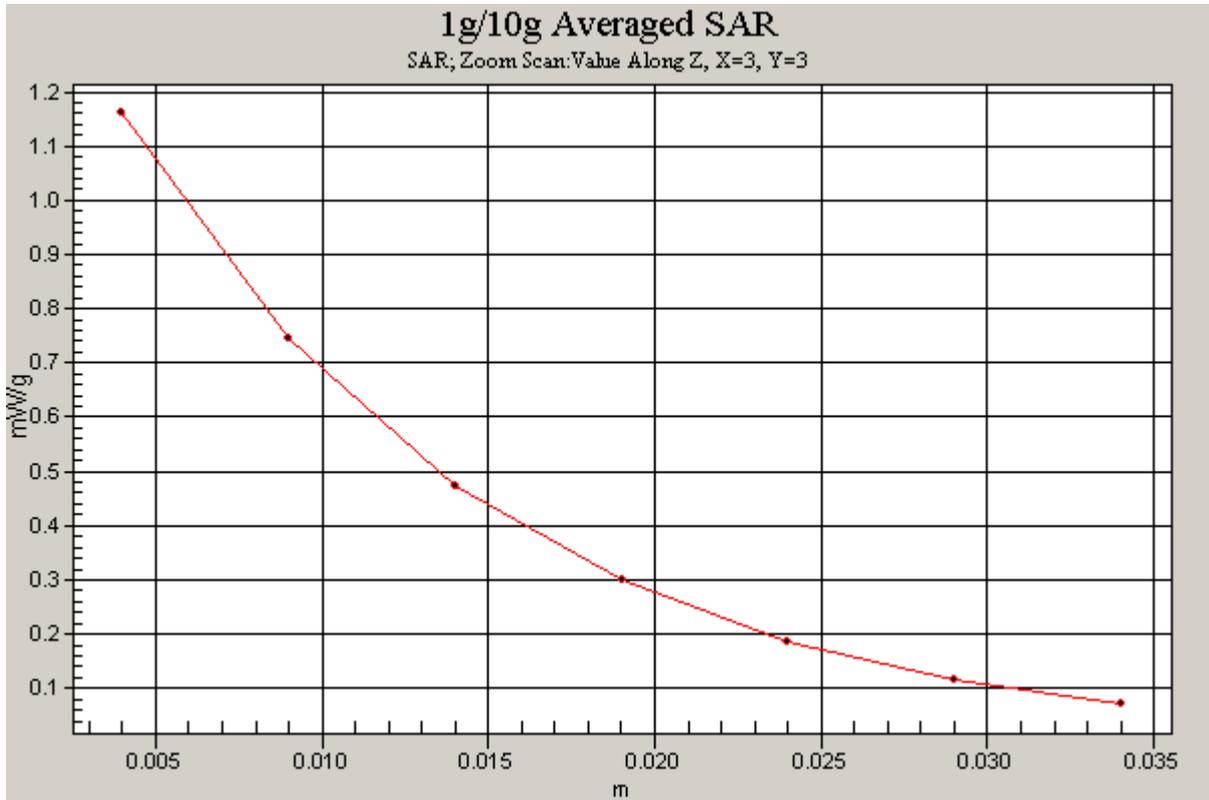


Figure 64 Z-Scan at power reference point [WCDMA Band IV with IBM T61 Test Position 1 Channel 1412]

**WCDMA Band IV with IBM T61 Test Position 1 Low**

Date/Time: 8/26/2009 7:17:10 PM

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

Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Low /Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 21.4 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.734 mW/g; SAR(10 g) = 0.412 mW/g**

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

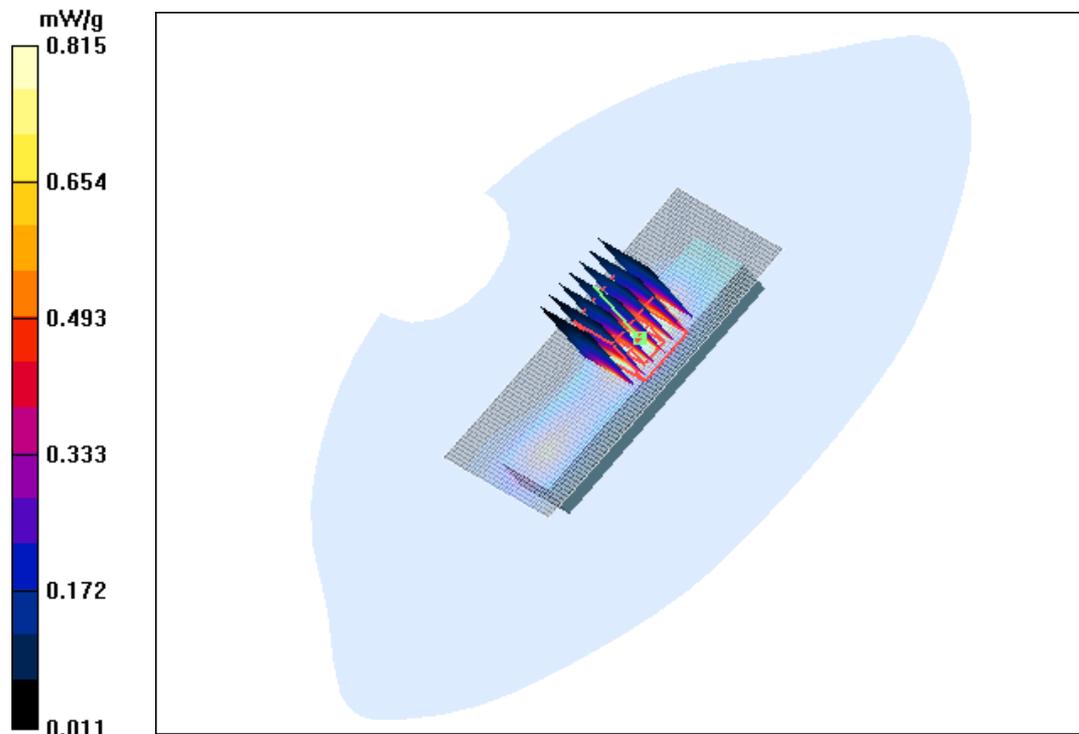


Figure 65 WCDMA Band IV with IBM T61 Test Position 1 Channel 1312

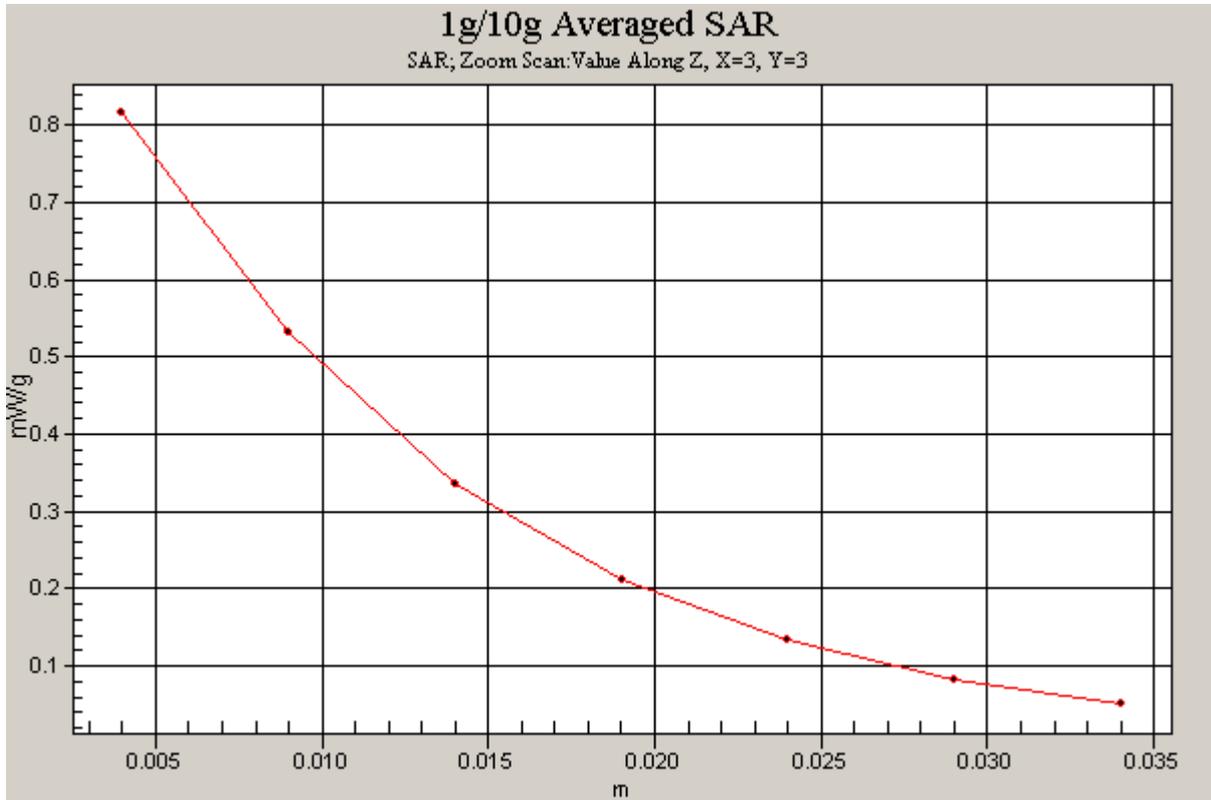


Figure 66 Z-Scan at power reference point [WCDMA Band IV with IBM T61 Test Position 1 Channel 1312]

### WCDMA Band IV with IBM T61 Test Position 3 Middle

Date/Time: 8/26/2009 9:39:38 PM

Communication System: WCDMA Band IV; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 3 Middle /Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.122 mW/g

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

Reference Value = 9.21 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 0.320 W/kg

**SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.060 mW/g**

Maximum value of SAR (measured) = 0.120 mW/g

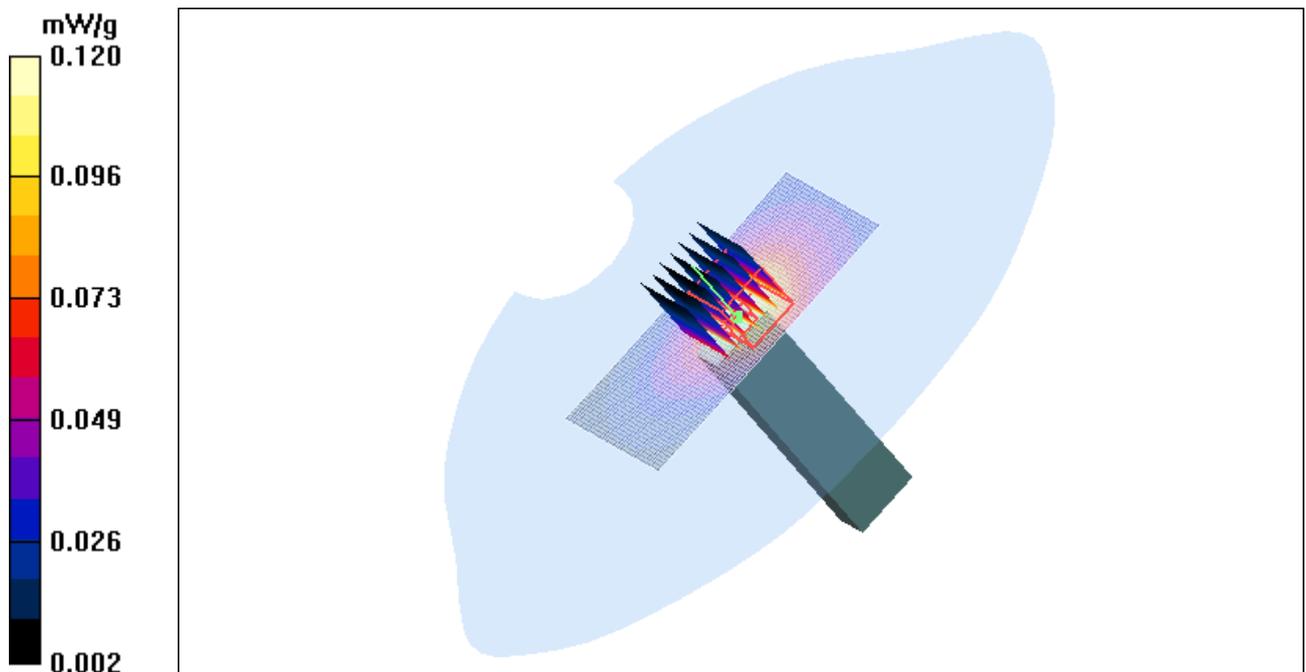


Figure 67 WCDMA Band IV with IBM T61 Test Position 3 Channel 1412

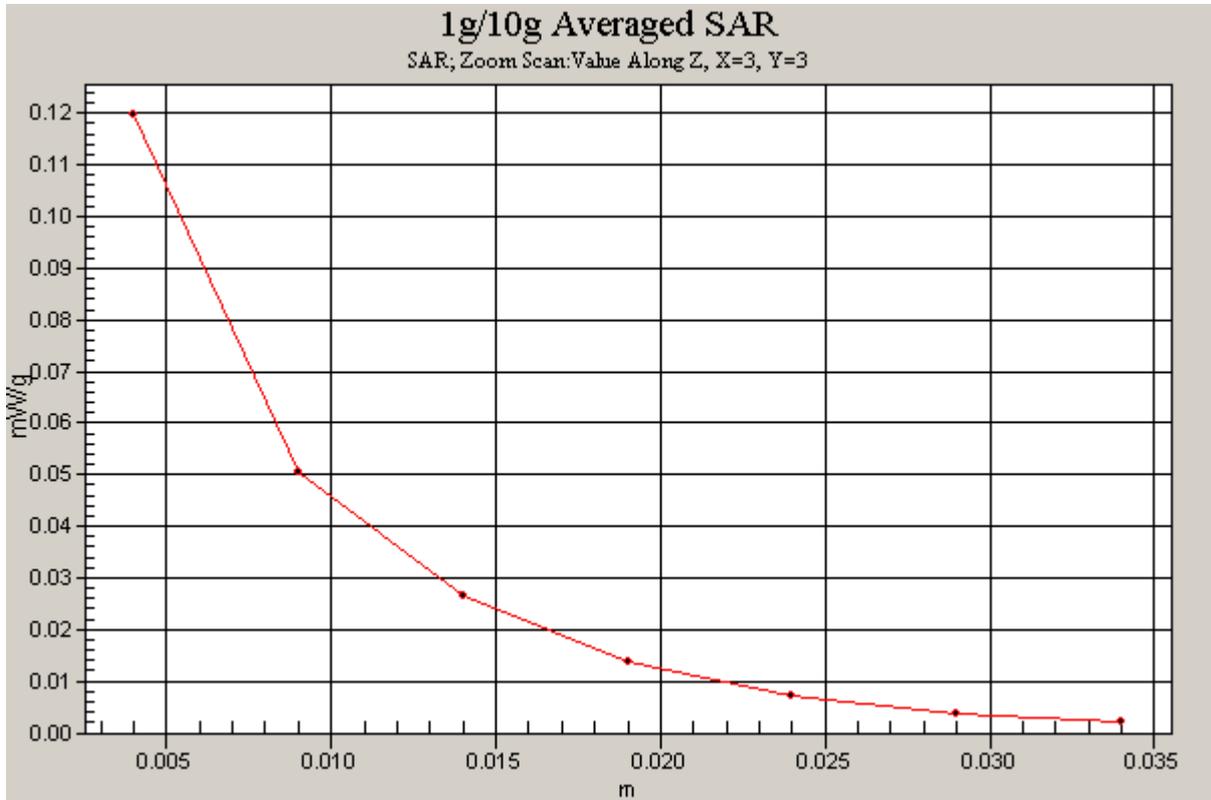


Figure 68 Z-Scan at power reference point [WCDMA Band IV with IBM T61 Test Position 3  
Channel 1412]

### WCDMA Band IV with IBM T61 Test Position 4 Middle

Date/Time: 8/26/2009 8:41:29 PM

Communication System: WCDMA Band IV; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 4 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.627 mW/g

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

Reference Value = 19.3 V/m; Power Drift = 0.157 dB

Peak SAR (extrapolated) = 0.972 W/kg

**SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.326 mW/g**

Maximum value of SAR (measured) = 0.647 mW/g

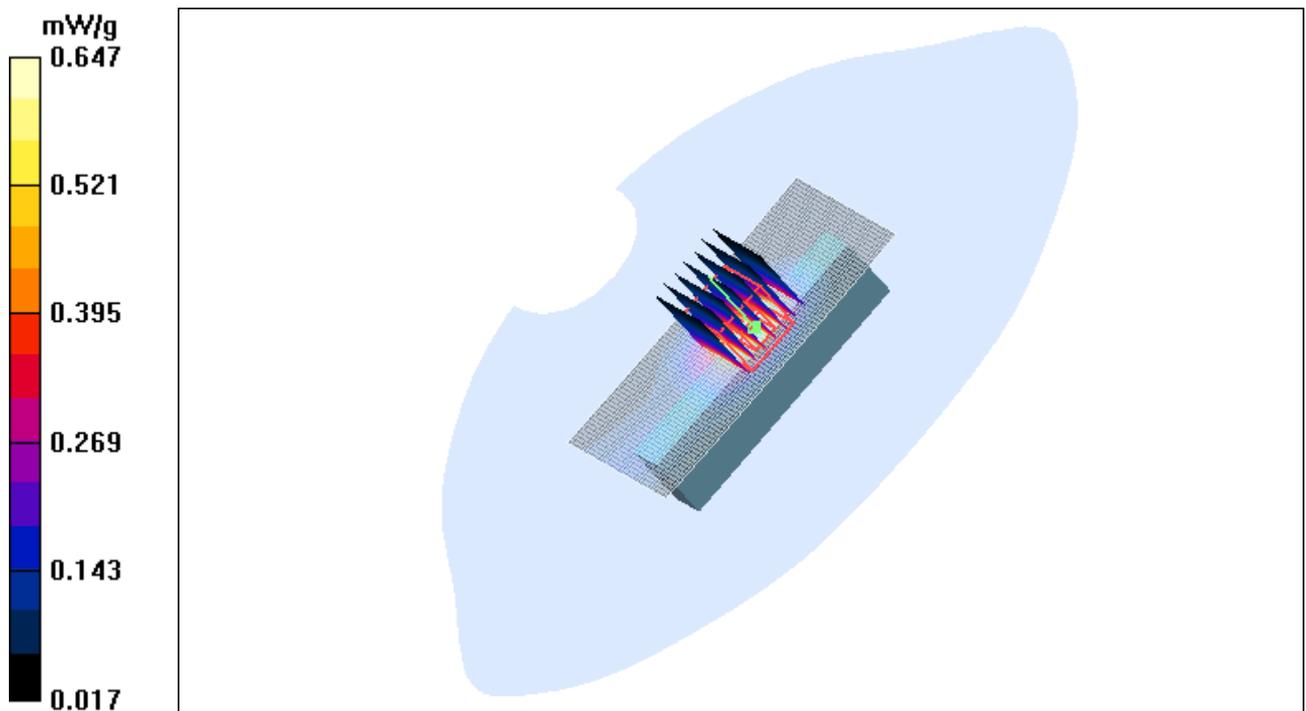


Figure 69 WCDMA Band IV with IBM T61 Test Position 4 Channel 1412

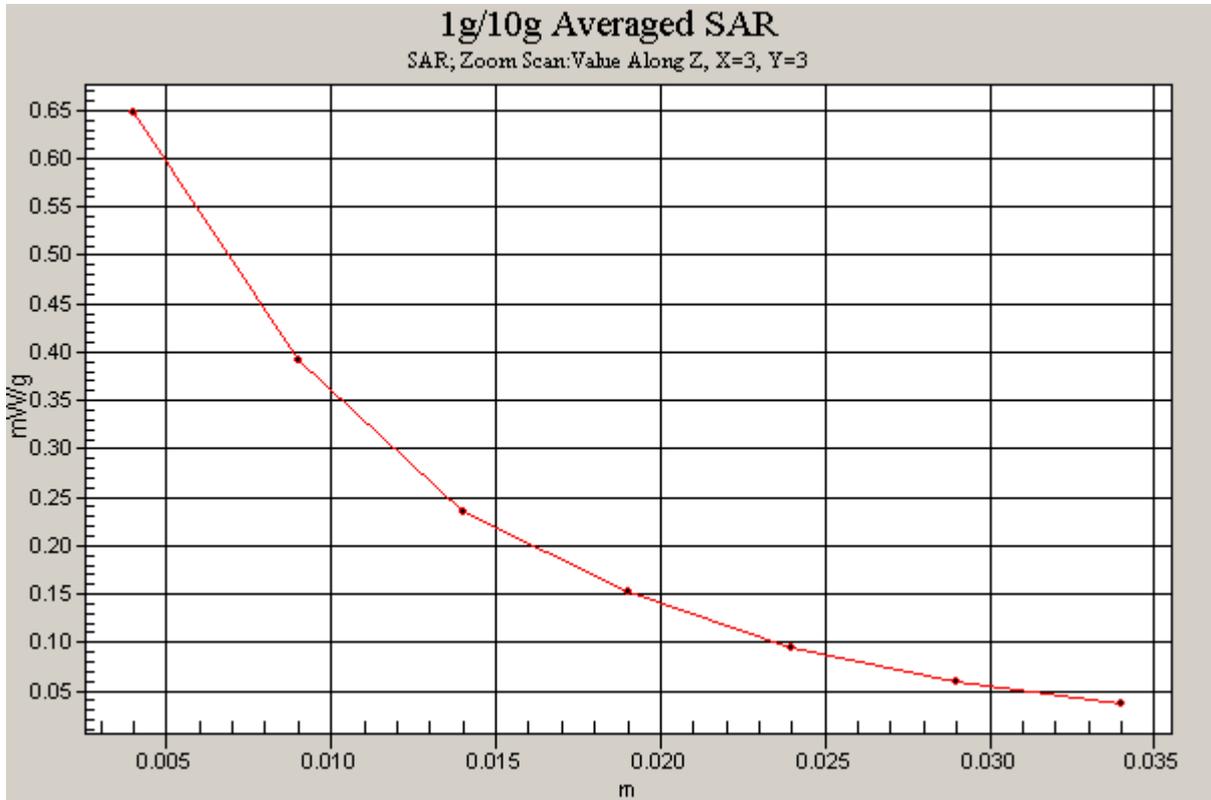


Figure 70 Z-Scan at power reference point [WCDMA Band IV with IBM T61 Test Position 4 Channel 1412]

### WCDMA Band IV with IBM T61 Test Position 5 Middle

Date/Time: 8/26/2009 8:15:45 PM

Communication System: WCDMA Band IV; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 5 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.689 mW/g

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

dz=5mm

Reference Value = 21.7 V/m; Power Drift = 0.161 dB

Peak SAR (extrapolated) = 1.01 W/kg

**SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.334 mW/g**

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

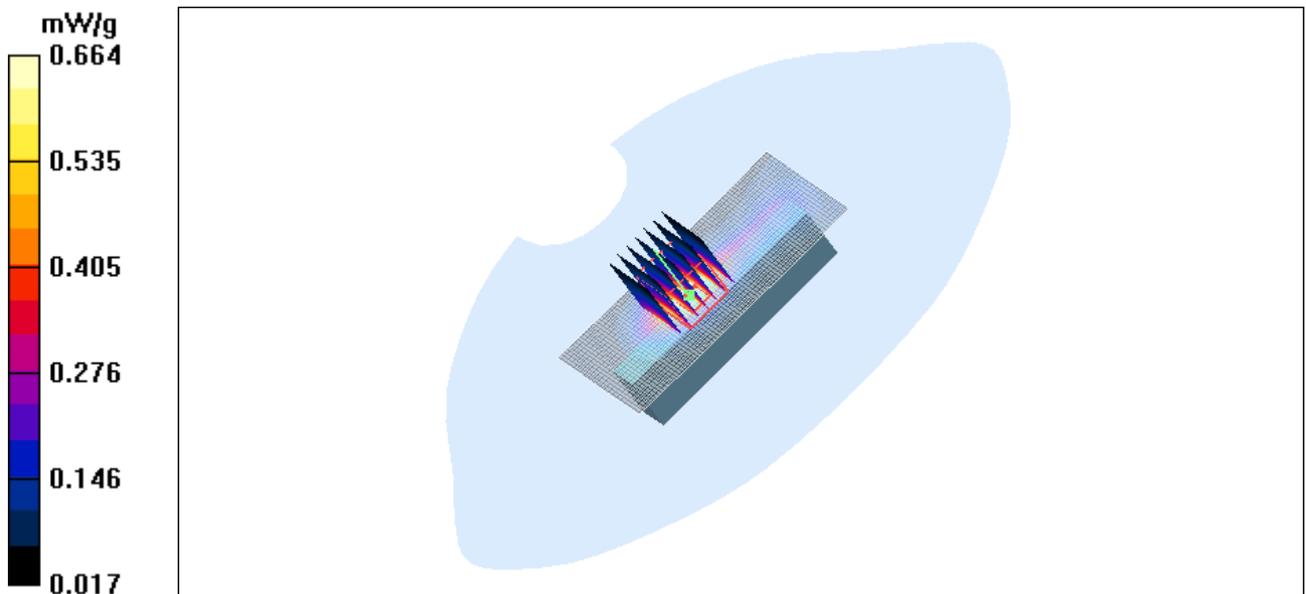


Figure 71 WCDMA Band IV with IBM T61 Test Position 5 Channel 1412

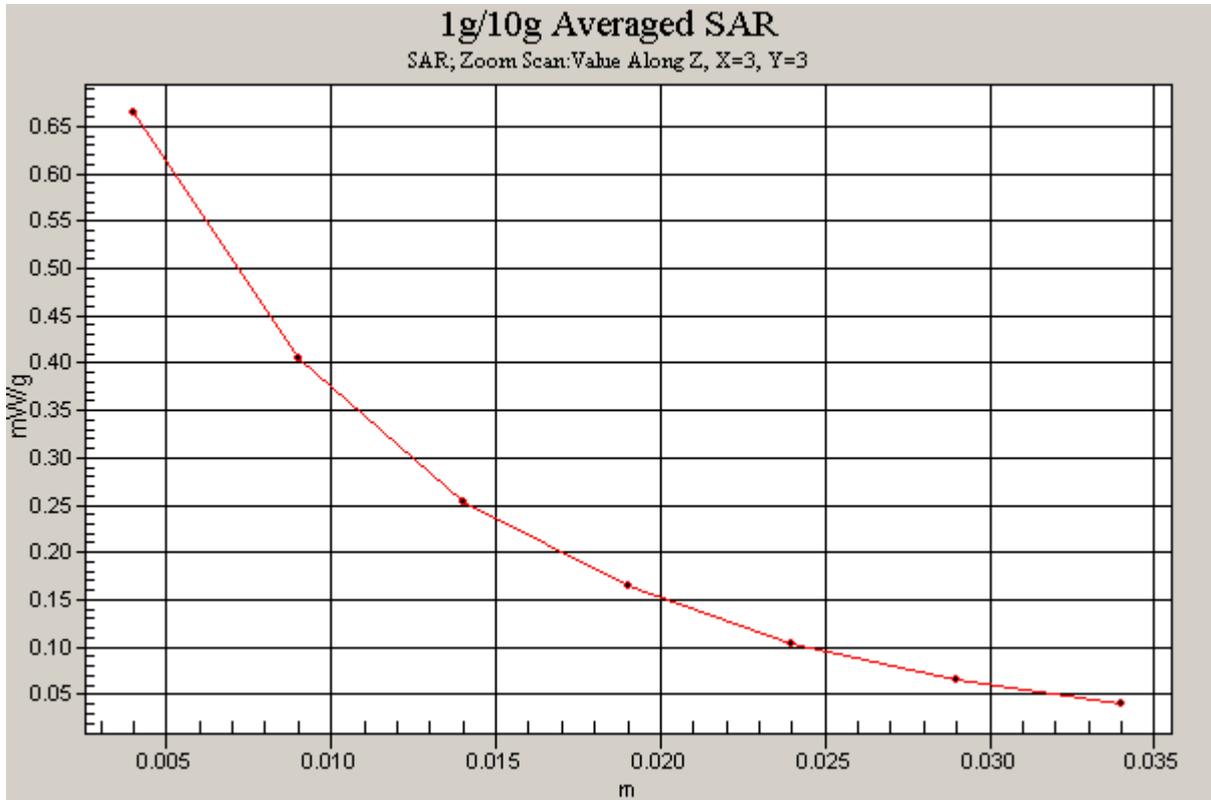


Figure 72 Z-Scan at power reference point [WCDMA Band IV with IBM T61 Test Position 5 Channel 1412]

**WCDMA Band IV with BenQ Joybook R55V Test Position 2 Middle**

Date/Time: 8/26/2009 10:27:04 PM

Communication System: WCDMA Band IV; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 2 Middle 2/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.854 mW/g

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

Reference Value = 24.9 V/m; Power Drift = 0.144 dB

Peak SAR (extrapolated) = 1.20 W/kg

**SAR(1 g) = 0.757 mW/g; SAR(10 g) = 0.436 mW/g**

Maximum value of SAR (measured) = 0.832 mW/g

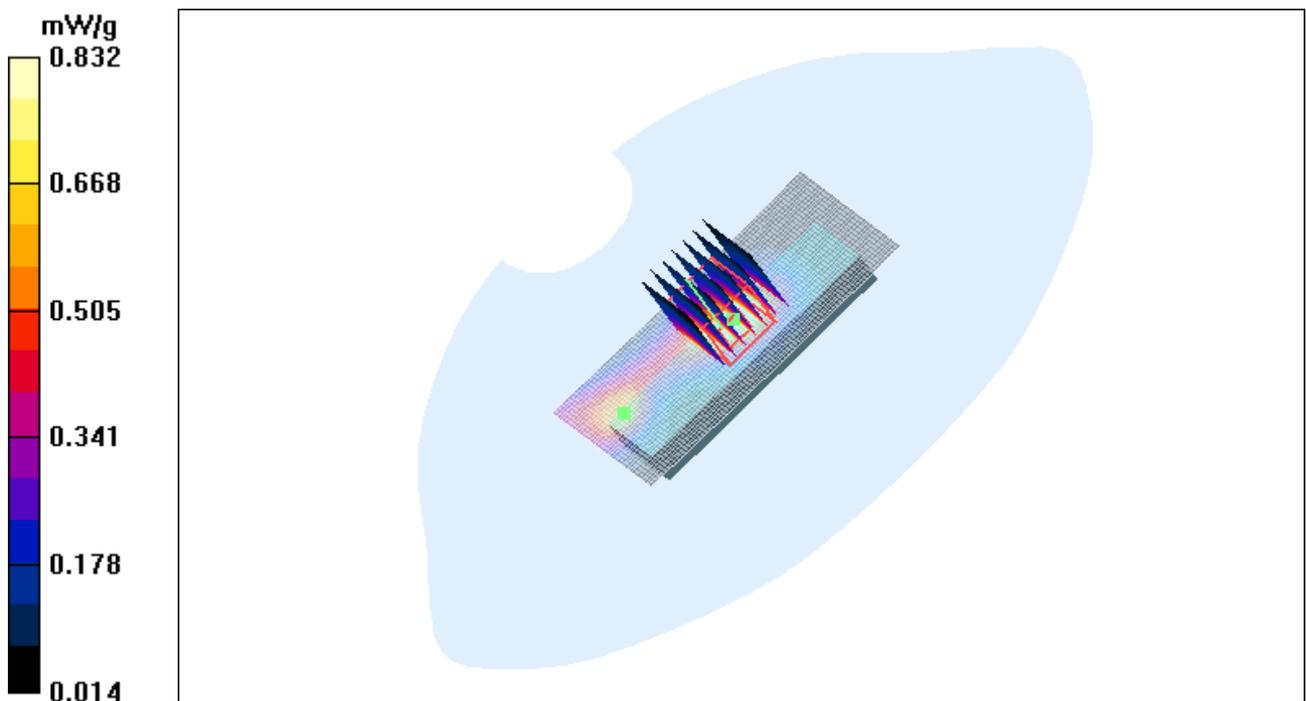


Figure 73 WCDMA Band IV with BenQ Joybook R55V Test Position 2 Channel 1412

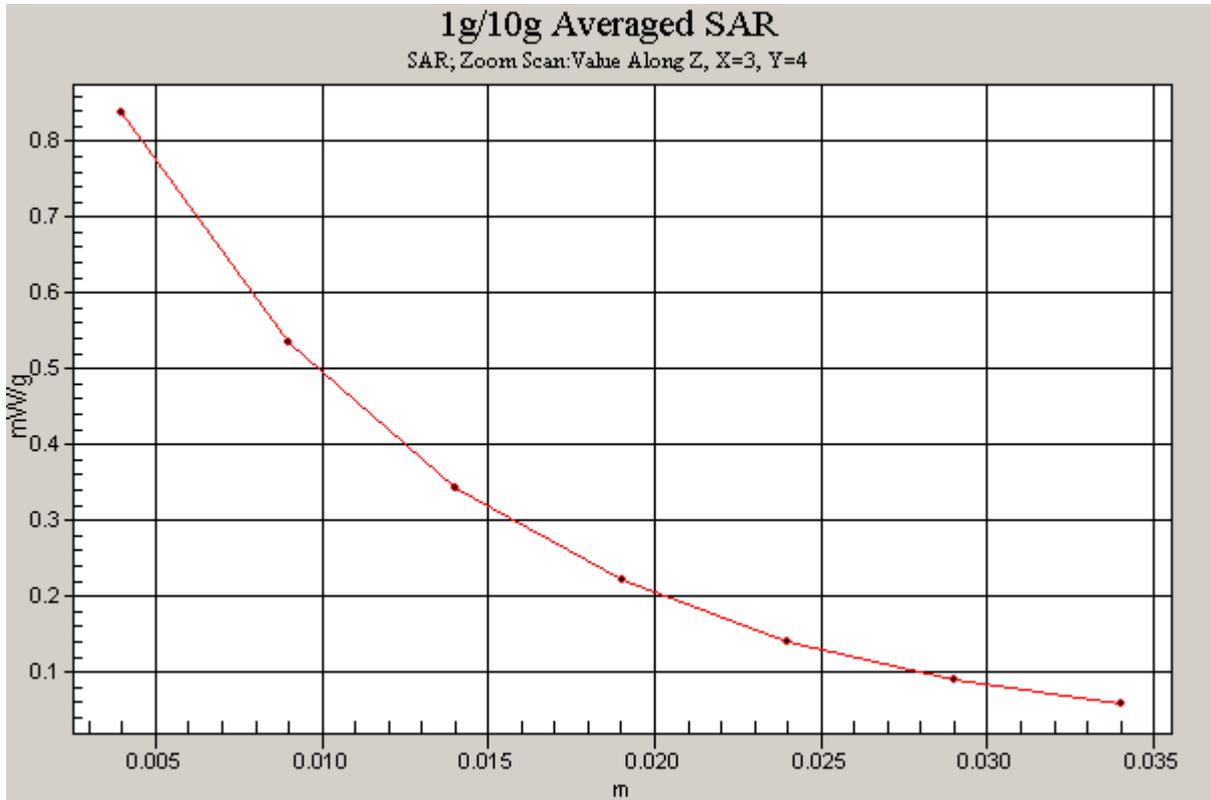


Figure 74 Z-Scan at power reference point [WCDMA Band IV with BenQ Joybook R55V Test Position 2 Channel 1412]

### WCDMA Band IV + HSDPA with IBM T61 Test Position 1 Middle

Date/Time: 8/26/2009 10:55:10 PM

Communication System: WCDMA Band IV+HSDPA; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1732.4$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 52.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(4.84, 4.84, 4.84); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

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

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

**Test Position 1 Middle/Area Scan (41x81x1):** Measurement grid: dx=15mm, dy=15mm

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 = 26.7 V/m; Power Drift = 0.048 dB

Peak SAR (extrapolated) = 1.72 W/kg

**SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.601 mW/g**

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

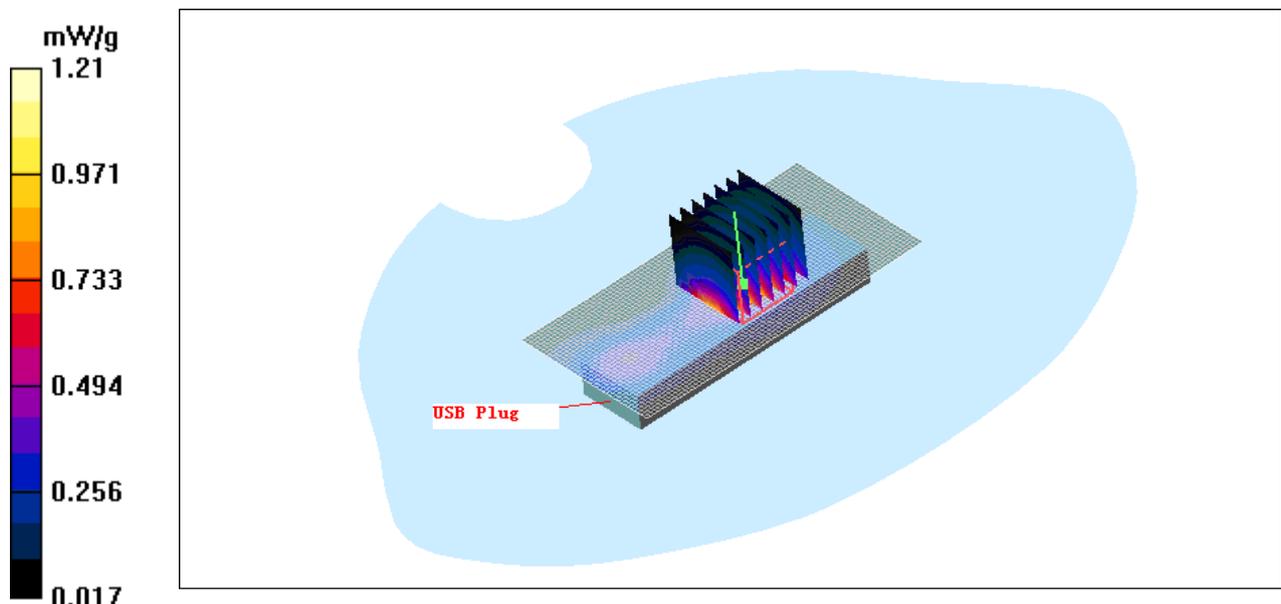


Figure 75 WCDMA Band IV+ HSDPA with IBM T61 Test Position 1 Channel 1412

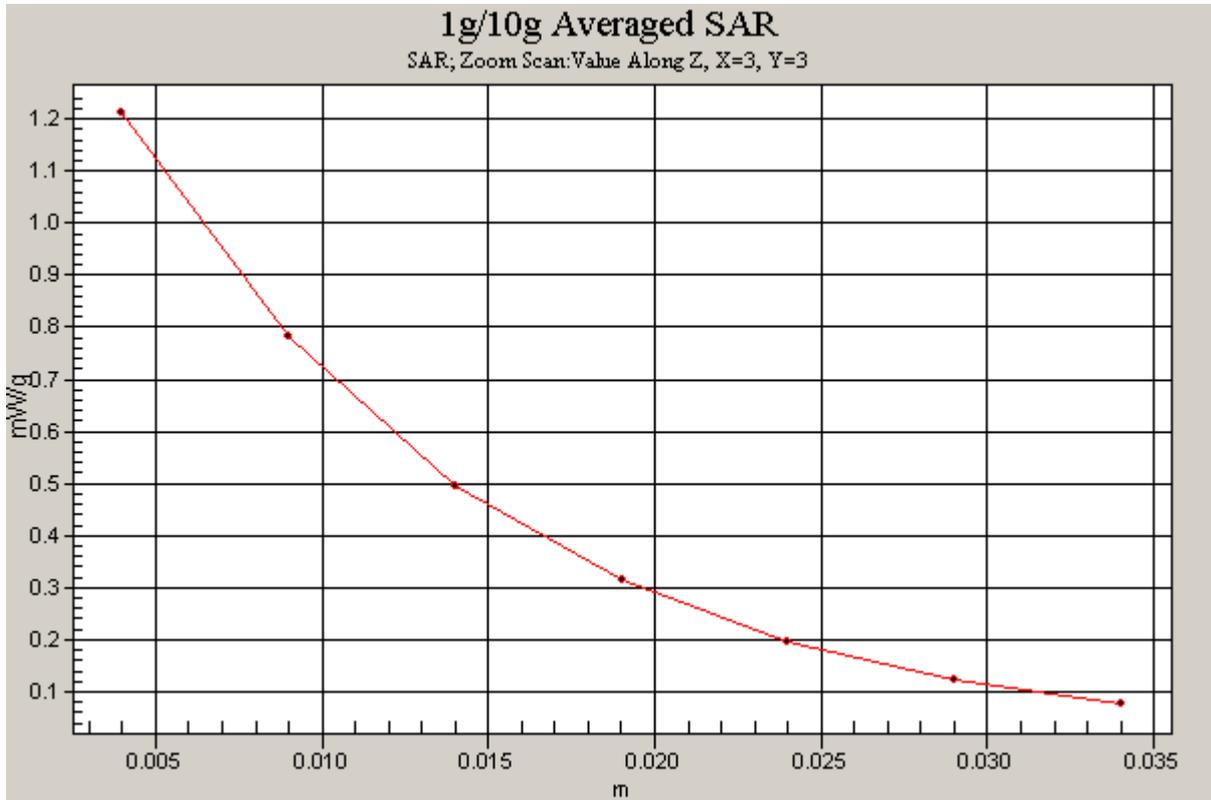


Figure 76 Z-Scan at power reference point [WCDMA Band IV+ HSDPA with IBM T61 Test Position 1 Channel 1412]

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

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## ANNEX D: Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA Shanghai (Auden)**

Certificate No: **ET3-1737\_Nov08**

### CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1737
Calibration procedure(s)	QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	November 25, 2008
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642UD1700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

Calibrated by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: November 25, 2008

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

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



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

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

Accreditation No.: SCS 108

#### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

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

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

#### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 SN:1737

November 25, 2008

# Probe ET3DV6

## SN:1737

Manufactured:	September 27, 2002
Last calibrated:	February 19, 2007
Repaired:	November 18, 2008
Recalibrated:	November 25, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

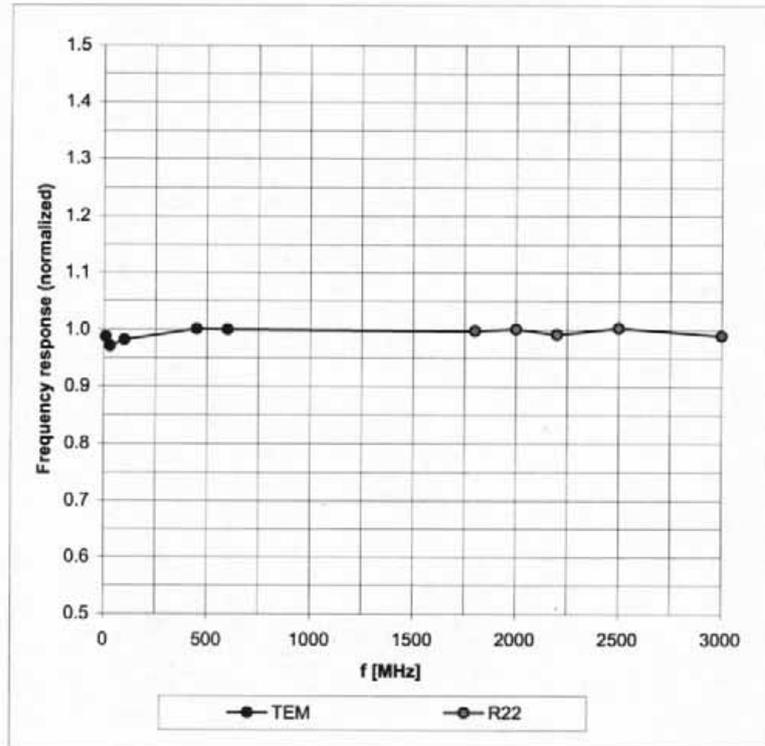


ET3DV6 SN:1737

November 25, 2008

### Frequency Response of E-Field

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

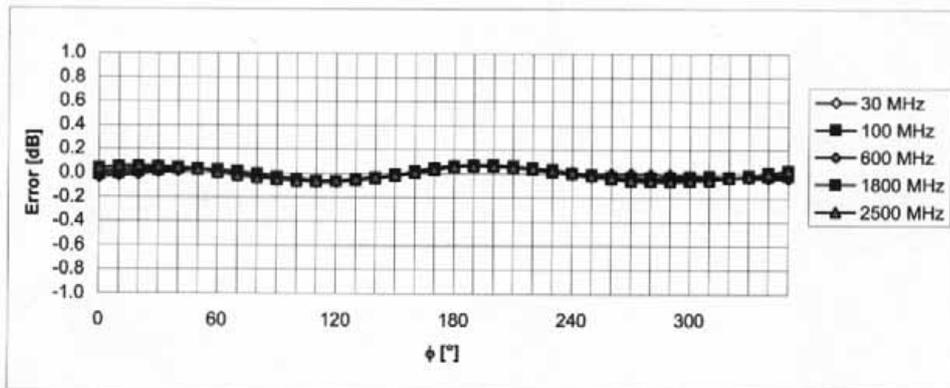
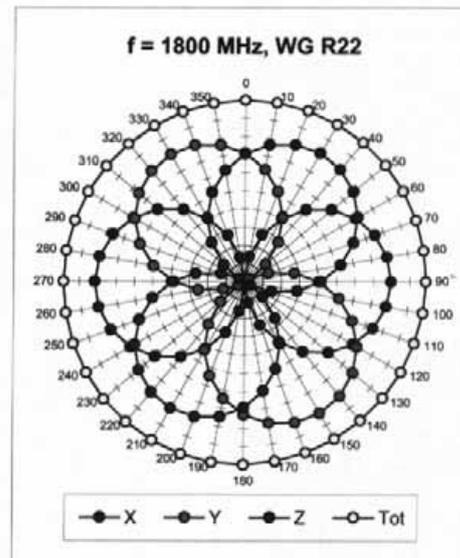
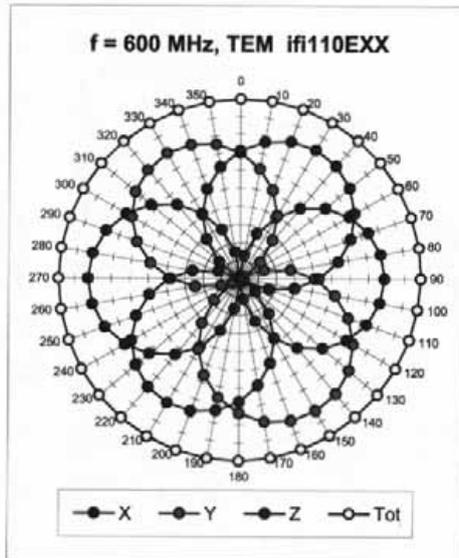


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

ET3DV6 SN:1737

November 25, 2008

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

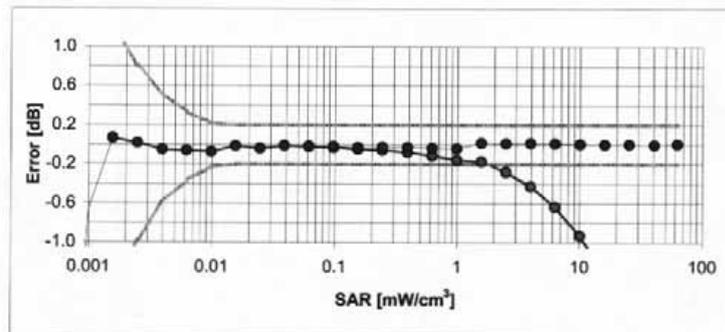
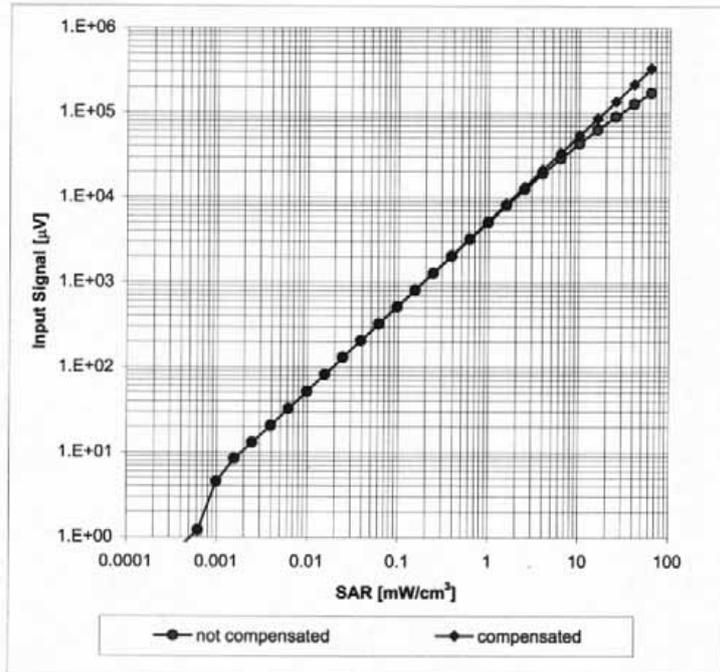


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

ET3DV6 SN:1737

November 25, 2008

**Dynamic Range  $f(SAR_{head})$**   
(Waveguide R22,  $f = 1800$  MHz)

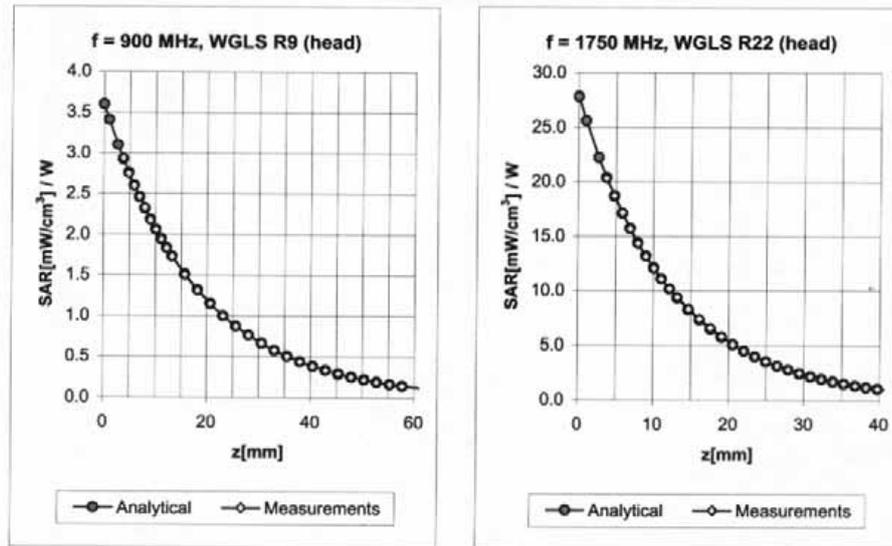


Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

ET3DV6 SN:1737

November 25, 2008

### Conversion Factor Assessment



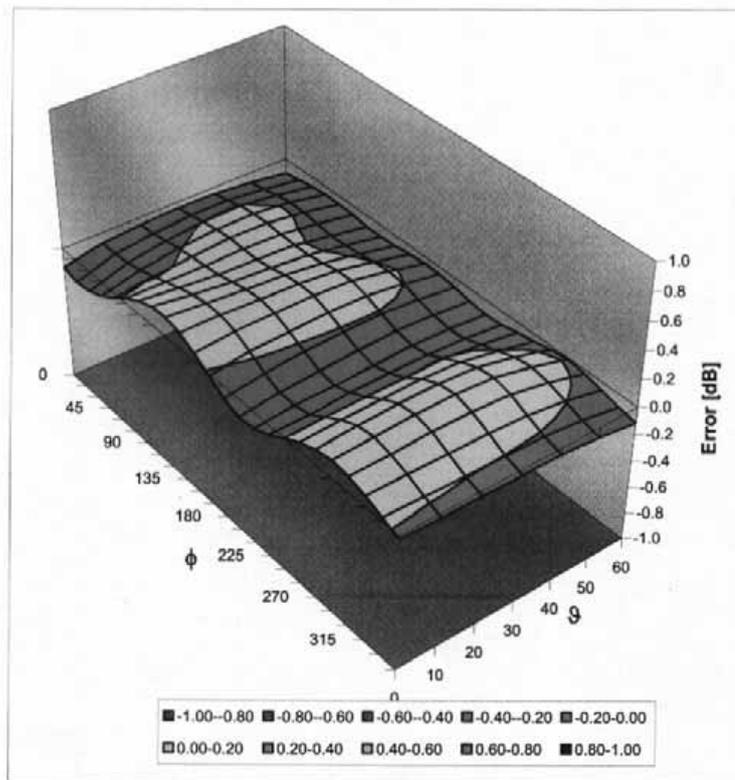
f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.36	1.84	7.20 ± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.25	3.53	6.33 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.27	3.53	6.14 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.56	2.77	5.35 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.72	4.89 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.51	1.60	4.39 ± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.27	1.80	7.52 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.36	2.75	6.14 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.43	2.51	5.98 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.99	1.74	4.84 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.99	1.50	4.60 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.98	1.42	3.91 ± 11.0% (k=2)

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

ET3DV6 SN:1737

November 25, 2008

**Deviation from Isotropy in HSL**  
Error ( $\phi$ ,  $\theta$ ),  $f = 900$  MHz



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

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

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**ANNEX E: D835V2 Dipole Calibration Certificate**

信息产业部通信计量中心  
Telecommunication Metrology Center of MII



Client

TA

Certificate No: D835V2-4d020\_Jul09

**CALIBRATION CERTIFICATE**

Object	D835V2 - SN: 4d020
Calibration Procedure(s)	TMC-XZ-01-027 Calibration procedure for dipole validation kits
Calibration date:	July 15, 2009
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	101253	19-Jun-09 (TMC, No.JZ09-248)	Jun-10
Power sensor NRV-Z5	100333	19-Jun-09 (TMC, No. JZ09-248)	Jun-10
Reference Probe ES3DV3	SN 3149	08-Dec-08(SPEAG, No.ES3-3149_Dec08)	Dec-09
DAE4	SN 771	21-Nov-08(SPEAG, No.DAE4-771_Nov08)	Nov-09
RF generator E4438C	MY45092879	18-Jun-09(TMC, No.JZ09-302)	Jun-10
Network Analyzer 8753E	US38433212	03-Aug-08(TMC, No.JZ08-056)	Aug-09

	Name	Function	Signature
Calibrated by:	Lin Hao	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: July 15, 2009

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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### Glossary:

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

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

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

### Additional Documentation:

- d) DASY System Handbook

### Methods Applied and Interpretation of Parameters:

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

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

### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V5.0
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	2mm Oval Phantom ELI4	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	835 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.90 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	41.2 ± 6 %	0.91 mho/m ± 6 %
<b>Head TSL temperature during test</b>	(21.7 ± 0.2) °C	----	----

### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 mW / g
SAR normalized	normalized to 1W	9.60 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>9.2 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.55 mW / g
SAR normalized	normalized to 1W	6.20 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>6.07 mW / g ± 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.2	0.97 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	54.6 ± 6%	0.99 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(21.9 ± 0.2) °C	----	----

### SAR result with Body TSL

SAR averaged over 1 $cm^3$ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.41 mW / g
SAR normalized	normalized to 1W	9.64 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>9.28 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 $cm^3$ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>6.19 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 $\Omega$ -3.7 j $\Omega$
Return Loss	- 25.9dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.4 $\Omega$ - 5.1 j $\Omega$
Return Loss	-25.6dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 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

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

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Date/Time: 2009-7-15 14:54:13

**Test Laboratory: TMC, Beijing, China**

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

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

Medium: Head 835MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.34, 6.34, 6.34); Calibrated: 08.12.08
- Electronics: DAE4 Sn771; Calibration: 21.11.08
- Phantom: 2mm Oval Phantom ELI4; Type: QDOVA001BB
- Measurement SW: DASY5, V5.0 Build 119.9; Postprocessing SW: SEMCAD, V13.2 Build 87

**Pin=250mW; d=15mm/Zoom Scan (7x7x7)/Cube 0:**

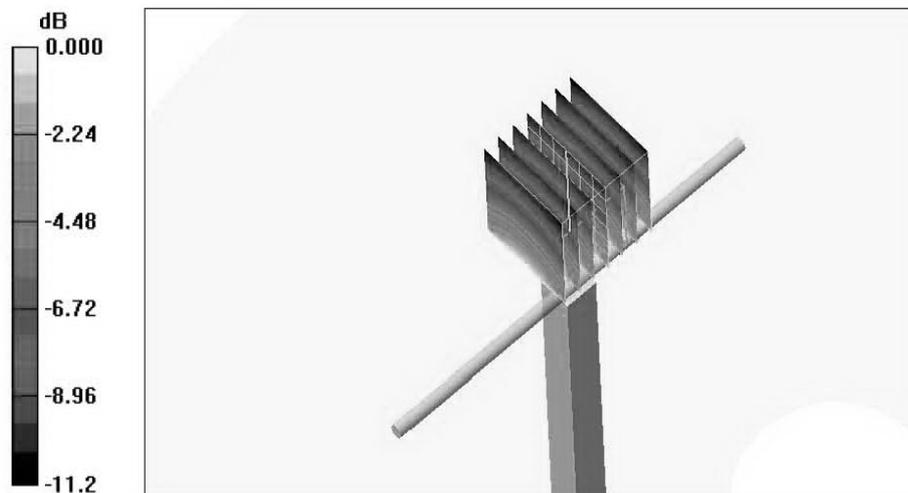
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.2 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 3.16 W/kg

**SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.55 mW/g**

Maximum value of SAR (measured) = 2.74 mW/g



Impedance Measurement Plot for Head TSL

