



Report No.: RZA1102-0235SAR



# OET 65

# TEST REPORT

<b>Product Name</b>	HUAWEI S7 Tablet
<b>Model</b>	S7-202u
<b>FCC ID</b>	QISS7-202U
<b>Client</b>	Huawei Technologies Co., Ltd.

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



## GENERAL SUMMARY

<b>Product Name</b>	HUAWEI S7 Tablet	<b>Model</b>	S7-202u
<b>FCC ID</b>	QISS7-202U		
<b>Report No.</b>	RZA1102-0235SAR		
<b>Client</b>	Huawei Technologies Co., Ltd.		
<b>Manufacturer</b>	Huawei Technologies Co., Ltd.		
<b>Reference Standard(s)</b>	<p><b>RSS-102 Issue 4 March 2010:</b> Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands).</p> <p><b>IEEE Std C95.1, 1999:</b> IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.</p> <p><b>SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001 including DA 02-1438, published June 2002:</b> Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio frequency Emissions.</p> <p><b>KDB 248227 D01 SAR meas for a b g V01R02:</b> SAR Measurement Procedures for 802.11a/b/g Transmitters.</p> <p><b>KDB 616217 D03 SAR Supp Note and Netbook Laptop V01:</b> SAR Evaluation Considerations for Laptop/Notebook/Netbook and Tablet Computers-Supplement to KDB 616217</p> <p><b>KDB 648474 D01 SAR Handsets Multi Xmitter and Ant, v01r05:</b> SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas.</p>		
<b>Conclusion</b>	<p>This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards.</p> <p>General Judgment: <b>Pass</b></p> <p style="text-align: right;">(Stamp) Date of issue: March 17<sup>th</sup>, 2011</p>		
<b>Comment</b>	The test result only responds to the measured sample.		

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## 1. General Information

### 1.1. Notes of the Test Report

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

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

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

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

### 1.2. Testing Laboratory

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### **1.3. Applicant Information**

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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		
Product Name:	HUAWEI S7 Tablet		
IMEI:	356650040001077		
Hardware Version:	HIDS70IA Ver.C		
Software Version:	S7V100R001C01B01C		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Supporting Mode(s):	GSM 850/GSM 1900; (tested)		
	WCDMA Band II/WCDMA Band V; (tested)		
	WiFi(802.11b/g);		
Test Modulation:	(GSM)GMSK; (WCDMA)QPSK		
Device Class:	B		
HSDPA UE Category:	8		
HSUPA UE Category:	6		
GPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
EGPRS Multislot Class(12):	Max Number of Timeslots in Uplink	4	
	Max Number of Timeslots in Downlink	4	
	Max Total Timeslot	5	
Operating Frequency Range(s):	Mode	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	WCDMA Band II	1852.4 ~ 1907.6	1932.4 ~ 1987.6.
	WCDMA Band V	826.4 ~ 846.6	871.4 ~ 891.6
Power Class:	GSM 850: 4, tested with power level 5		
	GSM 1900: 1, tested with power level 0		
	WCDMA Band II: 3, tested with power control all up bits		
	WCDMA Band V: 3, tested with power control all up bits		
Test Channel: (Low - Middle - High)	128 -190 - 251	(GSM 850) (tested)	
	512 - 661 - 810	(GSM 1900) (tested)	
	9262 - 9400 - 9538	(WCDMA Band II) (tested)	
	4132 - 4183 - 4233	(WCDMA Band V) (tested)	

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### Auxiliary Equipment Details

#### AE1:Battery

Model: HB4G1H  
Manufacturer: Huawei Technologies Co., Ltd.  
SN: LGCAC30HI5307737

Equipment Under Test (EUT) is a HUAWEI S7 Tablet. The detail about EUT and Lithium Battery is in chapter 1.5 in this report. SAR is tested for the EUT respectively for GSM 850, GSM 1900, WCDMA Band II and WCDMA Band V. The EUT has a GSM/WCDMA antenna that is used for Tx/Rx, the second is diversity WWAN antenna that only can be used for Rx. the third is BT/WIFI antenna that can be used for Tx/Rx. the forth is GPS antenna that only can be used for Rx.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

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

#### Body Worn Configuration

Mode	Channel	Position	SAR <sub>1g</sub> (W/kg)
4 slots GPRS 850	Low/128	Test Position 3	<b>1.150</b>
4 slots GPRS 1900	Low/512	Test Position 3	<b>0.925</b>
WCDMA Band II	High/9538	Test Position 3	<b>0.855</b>
WCDMA Band V	Middle/4183	Test Position 2	<b>0.649</b>

#### Maximum Power

Mode		Max Conducted Power (dBm)	Max Average Power (dBm)
GSM 850	GPRS,2 slots	29.50	23.48
	EGPRS, 2 slots	29.50	23.48
GSM 1900	GPRS,2 slots	27.80	21.78
	EGPRS, 2 slots	27.80	21.78
WCDMA Band II		22.91	/
WCDMA Band V		21.62	/

### 1.7. Test Date

The test is performed from March 12, 2011 to March 14, 2011.

## 2. Operational Conditions during Test

### 2.1. General Description of Test Procedures

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 190 and 251 in the case of GSM 850, allocated to 512, 661 and 810 in the case of GSM 1900, allocated to 9262, 9400 and 9538 respectively in the case of WCDMA Band II, allocated to 4132, 4183 and 4233 in the case of WCDMA Band V. The EUT is commanded to operate at maximum transmitting power.

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

### 2.2. GSM Test Configuration

For the body SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. Using E5515C the power lever is set to “5” in SAR of GSM 850, set to “0” in SAR of GSM 1900. The EUT is commanded to operate at maximum transmitting power. The GPRS class is 12 for this EUT; it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5. The EGPRS class is 12 for this EUT; it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5.

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

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

#### **GSM 850**

GPRS (GMSK):

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

EGPRS (8PSK):

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EGPRS (GMSK):

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

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

**GSM 1900**

GPRS (GMSK):

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

EGPRS (8PSK):

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

EGPRS (GMSK):

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

### 2.3. WCDMA Test Configuration

As the SAR body tests for WCDMA Band II and WCDMA band V, 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 1: The configurations for the DPCCH and DPDCH<sub>1</sub>**

	Channel Bit Rate(kbps)	Channel Symbol Rate(kcps)	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 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

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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 2: 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 3: Settings of required H-Set 1 QPSK in HSDPA mode**

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

**Table 4: HSDPA UE category**

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

## 2.5. HSUPA Test Configuration

Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA.<sup>40</sup>

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests.<sup>41</sup> The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA should be configured according to the  $\beta$  values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of 3 G device.

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**Table 5: Sub-Test 5 Setup for Release 6 HSUPA**

Sub-set	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}^{(1)}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (codes)	CM <sup>(2)</sup> (dB)	MPR (dB)	AG <sup>(4)</sup> Index	E-TFCI
1	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	11/15 <sup>(3)</sup>	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}$ : 47/15 $\beta_{ed2}$ : 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	15/15 <sup>(4)</sup>	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.

Note 6:  $\beta_{ed}$  can not be set directly; it is set by Absolute Grant Value.

**Table 6: HSUPA UE category**

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI (ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	11484	5.76
	4	4	10		20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.

UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM. (TS25.306-7.3.0)

## **2.6. Position of Module**

The diagonal display of EUT is 6.94 inches less than 8. According to the UMPC mini-tablet procedures described in October 2010 TCB workshop, the separation distance of 5 mm should be applied to test all sides and edges of the device with an antenna closer than 2.5 cm from the surface or edge. The EUT is tested at the following 6 test positions:

- Test Position 1: The back side of the EUT towards the bottom of the flat phantom distance 5mm. (ANNEX H Picture 5) SAR is required for GSM/WCDMA antenna; because the back side of the EUT with an antenna closer than 2.5 cm from the surface or edge.
- Test Position 2: The front side of the EUT towards the bottom of the flat phantom distance 5mm. (ANNEX H Picture 6) SAR is required for GSM/WCDMA antenna; because the front side of the EUT with an antenna closer than 2.5 cm from the surface or edge.
- Test Position 3: The top side of the EUT towards the bottom of the flat phantom distance 5mm. (ANNEX H Picture 7) SAR is required for GSM/WCDMA antenna; because the top side of the EUT with an antenna closer than 2.5 cm from the surface or edge.
- Test Position 4: The bottom side of the EUT towards the bottom of the flat phantom distance 5mm. (ANNEX H Picture 8) SAR is not required for GSM/WCDMA antenna; because the bottom side of the EUT with an antenna further than 2.5 cm from the surface or edge.
- Test Position 5: The left side of the EUT towards the bottom of the flat phantom distance 5mm. (ANNEX H Picture 9) SAR is required for GSM/WCDMA antenna; because the bottom side of the EUT with an antenna closer than 2.5 cm from the surface or edge.
- Test Position 6: The right side of the EUT towards the bottom of the flat phantom distance 5mm. (ANNEX H Picture 10) SAR is not required for GSM/WCDMA antenna; because the bottom side of the EUT with an antenna further than 2.5 cm from the surface or edge.

### 3. SAR Measurements System Configuration

#### 3.1. SAR Measurement Set-up

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

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

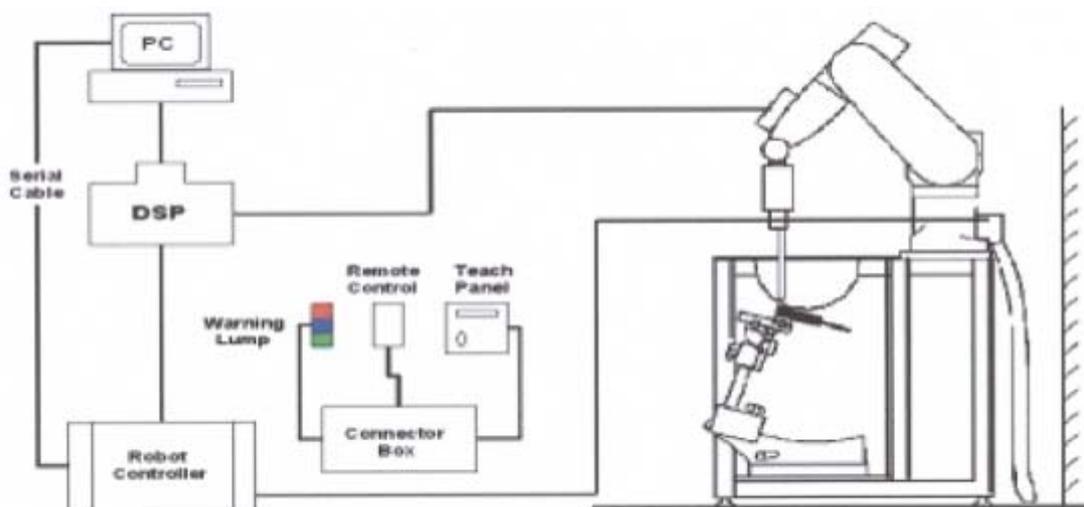


Figure 1. SAR Lab Test Measurement Set-up

### 3.2. DASY5 E-field Probe System

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

#### 3.2.1. EX3DV4 Probe Specification

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



Figure 2. EX3DV4 E-field Probe



Figure 3. EX3DV4 E-field probe

### 3.2.2. E-field Probe Calibration

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

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

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

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

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

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

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

### 3.3. Other Test Equipment

#### 3.3.1. Device Holder for Transmitters

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

**Material:** POM, Acrylic glass, Foam

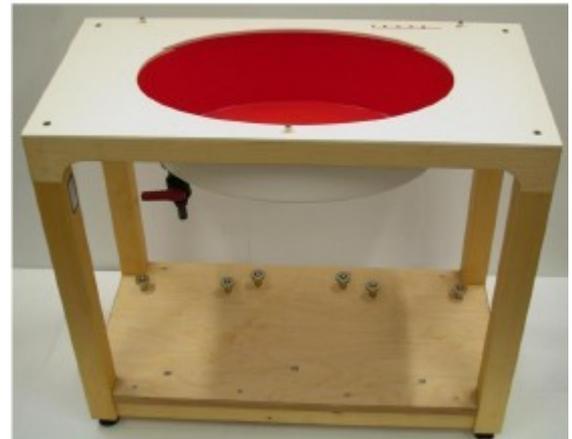
### 3.3.2. Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (Oval Flat) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of wireless portable device usage as well as body mounted usage at the flat phantom region. A cover prevents 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 with the robot.

Shell Thickness  $2 \pm 0.2$  mm

Filling Volume Approx. 30 liters

Dimensions 190×600×400 mm (H×L×W)



**Figure 4.ELI4 Phantom**

### 3.4. Scanning Procedure

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

- The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max.  $\pm 5$  %.
- The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above  $\pm 0.1$ mm). 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  $\pm 30^\circ$ .)
- Area Scan  
The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid

spacing of 10 mm x 10 mm is set. During the scan the distance of the probe to the phantom remains unchanged.

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

- Zoom Scan

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

- Spatial Peak Detection

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

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

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

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

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

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

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

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

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

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

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

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

Probe parameters:	- Sensitivity	Normi, a <sub>i0</sub> , a <sub>i1</sub> , a <sub>i2</sub>
	- Conversion factor	ConvF <sub>i</sub>
	- Diode compression point	Dcp <sub>i</sub>
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

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

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

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

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

$dcp_i$  = diode compression point (DASY parameter)

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

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

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

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

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

$ConvF$  = sensitivity enhancement in solution

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

$f$  = carrier frequency [GHz]

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

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

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

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

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

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

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

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$E_{tot}$  = 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 analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 11.

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

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

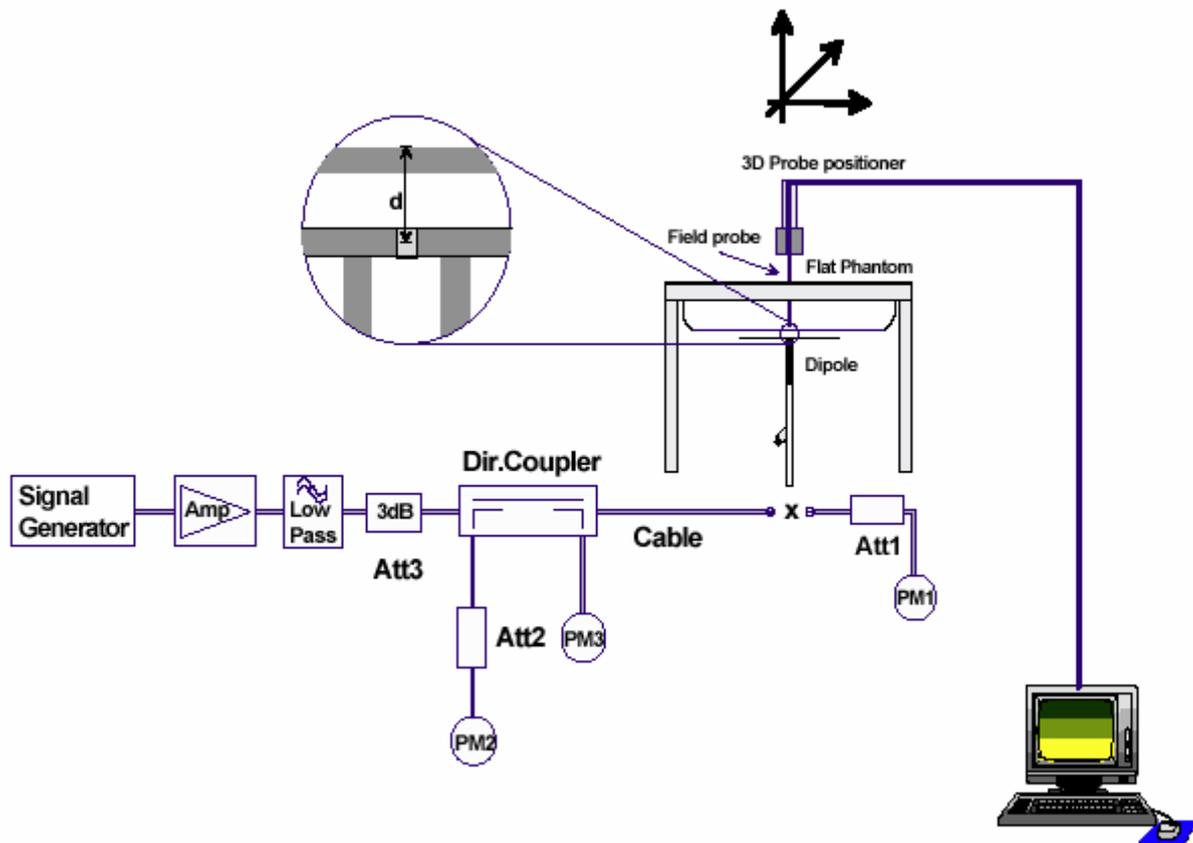


Figure 5. System Check Set-up

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**3.7. Equivalent Tissues**

The liquid is consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 7 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by OET 65.

**Table 7: 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) 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 8: The Ambient Conditions during Test**

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

## 5. Characteristics of the Test

### 5.1. Applicable Limit Regulations

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

### 5.2. Applicable Measurement Standards

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

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

**KDB 248227 D01 SAR meas for a b g V01R02:** SAR Measurement Procedures for 802.11a/b/g Transmitters.

**KDB 616217 D03 SAR Supp Note and Netbook Laptop V01:** SAR Evaluation Considerations for Laptop/Notebook/Netbook and Tablet Computers-Supplement to KDB 616217

**KDB 648474 D01 SAR Handsets Multi Xmitter and Ant, v01r05:** SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas.

## 6. Conducted Output Power Measurement

### 6.1. Summary

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

### 6.2. Conducted Power Results

**Table 9: Conducted Power Measurement Results**

GSM 850			Conducted Power(dBm)					Average power(dBm)		
			Channel 128	Channel 190	Channel 251			Channel 128	Channel 190	Channel 251
<b>GPRS (GMSK)</b>	1TXslot	Before	31.50	31.70	31.60	-9.03dB	22.47	22.67	22.57	
		After	31.50	31.70	31.60	-9.03dB	22.47	22.67	22.57	
	2TXslots	Before	29.40	29.30	29.50	-6.02dB	<b>23.38</b>	<b>23.28</b>	<b>23.48</b>	
		After	29.40	29.30	29.50	-6.02dB	23.38	23.28	23.48	
	3TXslots	Before	27.10	27.40	27.30	-4.26dB	22.84	23.14	23.04	
		After	27.10	27.40	27.30	-4.26dB	22.84	23.14	23.04	
	4TXslots	Before	26.18	26.30	26.15	-3.01dB	23.17	23.29	23.14	
		After	26.18	26.30	26.15	-3.01dB	23.17	23.29	23.14	
<b>EGPRS (GMSK)</b>	1TXslot	Before	31.50	31.70	31.60	-9.03dB	22.47	22.67	22.57	
	2TXslots	Before	29.40	29.30	29.50	-6.02dB	<b>23.38</b>	<b>23.28</b>	<b>23.48</b>	
	3TXslots	Before	27.10	27.40	27.30	-4.26dB	22.84	23.14	23.04	
	4TXslots	Before	26.18	26.3	26.20	-3.01dB	23.17	23.29	23.14	
		After	26.18	26.3	26.20	-3.01dB	23.17	23.29	23.14	
	<b>EGPRS (8PSK)</b>	1TXslot	Before	27.01	27.02	27.01	-9.03dB	17.98	17.99	17.98
2TXslots		Before	24.97	24.87	24.95	-6.02dB	18.95	18.85	18.93	
3TXslots		Before	23.96	23.86	23.94	-4.26dB	19.70	19.60	19.68	
4TXslots		Before	22.90	22.80	22.80	-3.01dB	19.89	19.79	19.79	
GSM 1900			Conducted Power(dBm)					Average power(dBm)		
			Channel 512	Channel 661	Channel 810			Channel 512	Channel 661	Channel 810
<b>GPRS (GMSK)</b>	1TXslot	Before	29.56	29.45	29.08	-9.03dB	20.53	20.42	20.05	
		After	29.56	29.45	29.08	-9.03dB	20.53	20.42	20.05	
	2TXslots	Before	27.80	27.60	27.10	-6.02dB	<b>21.78</b>	<b>21.58</b>	<b>21.08</b>	
		After	27.80	27.60	27.10	-6.02dB	21.78	21.58	21.08	
	3TXslots	Before	25.60	25.50	25.90	-4.26dB	21.34	21.24	21.64	
		After	25.60	25.50	25.90	-4.26dB	21.34	21.24	21.64	

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	4TXslots	Before	24.03	23.90	23.56	-3.01dB	21.02	20.89	20.55
		After	24.03	23.90	23.56	-3.01dB	21.02	20.89	20.55
<b>EGPRS (GMSK)</b>	1TXslot	Before	29.56	29.45	29.08	-9.03dB	20.53	20.42	20.05
	2TXslots	Before	27.80	27.60	27.10	-6.02dB	<b>21.78</b>	<b>21.58</b>	<b>21.08</b>
	3TXslots	Before	25.60	25.50	25.90	-4.26dB	21.34	21.24	21.64
	4TXslots	Before	24.03	23.90	23.56	-3.01dB	21.02	20.89	20.55
		After	24.03	23.90	23.56	-3.01dB	21.02	20.89	20.55
<b>EGPRS (8PSK)</b>	1TXslot	Before	26.41	26.32	26.56	-9.03dB	17.38	17.29	17.53
	2TXslots	Before	24.46	24.33	24.47	-6.02dB	18.44	18.31	18.45
	3TXslots	Before	23.34	23.14	23.56	-4.26dB	19.08	18.88	19.30
	4TXslots	Before	22.32	22.35	22.22	-3.01dB	19.31	19.34	19.21

Note:

1) Division Factors

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

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

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

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

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

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

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

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

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

WCDMA Band II			Conducted Power(dBm)		
			Channel 9262	Channel 9400	Channel 9538
<b>RMC</b>	12.2kbps	Before	21.75	21.72	21.99
		After	21.75	21.72	21.99
	64kbps	Before	21.74	21.71	21.97
	144kbps	Before	21.71	21.72	21.98
	384kbps	Before	21.65	21.71	21.69
<b>HSDPA</b>	Sub-Test 1	Before	22.09	22.19	22.91
		After	22.09	22.19	22.91
	Sub-Test 2	Before	22.30	22.10	22.25
	Sub-Test 3	Before	21.23	22.00	22.05
	Sub-Test 4	Before	22.12	21.80	21.95
<b>HSUPA</b>	Sub-Test 1	Before	20.79	20.42	20.74
	Sub-Test 2	Before	19.66	19.29	19.79
	Sub-Test 3	Before	19.93	19.55	20.07
	Sub-Test 4	Before	20.02	19.68	20.49
	Sub-Test 5	Before	20.66	20.14	20.87
After		20.66	20.14	20.87	

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WCDMA Band V			Conducted Power(dBm)		
			Channel 4132	Channel 4183	Channel 4233
<b>RMC</b>	12.2kbps	Before	21.33	21.59	21.12
		After	21.33	21.59	21.12
	64kbps	Before	21.23	21.62	21.42
	144kbps	Before	21.42	21.29	21.36
	384kbps	Before	21.53	21.53	21.16
<b>HSDPA</b>	Sub-Test 1	Before	21.21	21.44	20.80
		After	21.21	21.44	20.80
	Sub-Test 2	Before	21.05	21.21	20.57
	Sub-Test 3	Before	20.40	20.52	19.95
	Sub-Test 4	Before	20.31	20.53	19.98
<b>HSUPA</b>	Sub-Test 1	Before	20.72	20.84	20.12
	Sub-Test 2	Before	19.69	19.35	19.22
	Sub-Test 3	Before	19.76	19.75	19.35
	Sub-Test 4	Before	19.77	19.80	19.24
	Sub-Test 5	Before	20.70	20.81	20.20
		After	20.70	20.81	20.20

## 7. Test Results

### 7.1. Dielectric Performance

**Table 10: Dielectric Performance of Body Tissue Simulating Liquid**

Frequency	Description	Dielectric Parameters		Temp °C
		$\epsilon_r$	$\sigma$ (s/m)	
835MHz (body)	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2011-3-12	53.84	0.95	21.5
1900MHz (body)	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2011-3-13	52.98	1.55	21.7

### 7.2. System Check

**Table 11: System Check for Body Tissue Simulating Liquid**

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp °C
		10g	1g	$\epsilon_r$	$\sigma$ (s/m)	
835MHz	Recommended result ±10% window	1.63 1.47 — 1.79	2.49 2.24 — 2.74	54.6	0.98	/
	Measurement value 2011-3-12	1.65	2.52	53.84	0.95	21.5
1900 MHz	Recommended result ±10% window	5.52 4.97 — 6.07	10.3 9.27 — 11.33	53.5	1.54	/
	Measurement value 2011-3-13	5.20	9.82	52.98	1.55	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. GSM 850 (GPRS/EGPRS)

**Table 12: SAR Values [GSM 850 (GPRS/EGPRS)]**

Limit of SAR			10 g Average	1g Average	Power Drift	Graph Results
			2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case Of Body			Measurement Result (W/kg)		Power Drift (dB)	
Test Position	Timeslots	Channel	10 g Average	1 g Average		
Test Position 1	1 timeslot	Middle/190	0.326	0.479	0.031	Figure 8
	2 timeslots	Middle/190	0.510	0.749	0.007	Figure 9
	3 timeslots	High/251	0.580	0.842	0.059	Figure 10
		Middle/190	0.608	0.877	0.051	Figure 11
		Low/128	0.660	0.949	-0.071	Figure 12
	4 timeslots	High/251	0.631	0.916	-0.042	Figure 13
		Middle/190	0.629	0.913	-0.004	Figure 14
Low/128		0.671	0.976	-0.055	Figure 15	
Test Position 2	4 timeslots	High/251	0.634	0.946	0.069	Figure 16
		Middle/190	0.687	1.040	-0.056	Figure 17
		Low/128	0.693	1.040	-0.096	Figure 18
Test Position 3	4 timeslots	High/251	0.669	1.030	0.026	Figure 19
		Middle/190	0.758	1.150	-0.190	Figure 20
		Low/128	0.764	1.150	-0.028	Figure 21
Test Position 4	/	/	/	/	/	/
Test Position 5	4 timeslots	Middle/190	0.212	0.343	0.048	Figure 22
Test Position 6	/	/	/	/	/	/
<b>Worst Case Position of GPRS with EGPRS (GMSK)</b>						
Test Position 3	4 timeslots	Low/128	0.718	1.100	-0.057	Figure 23

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

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**Table 13: Extrapolated SAR Values of highest measured SAR [GSM 850 (GPRS/EGPRS)]**

Test Case Of Body			Conducted Power(dBm)	1g Average (W/kg)	Tune-up procedures	1g Average Limit 1.6 W/kg
Test Position	Timeslots	Channel	Measurement Result		MAX Power(dBm)	Extrapolated Result (W/kg)
<b>GPRS</b>						
Test Position 3	4 timeslots	Low/128	26.18	1.150	26.8	1.326
<b>EGPRS (GMSK)</b>						
Test Position 3	4 timeslots	Low/128	26.18	1.100	26.8	1.269

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### 7.3.2. GSM 1900 (GPRS/EGPRS)

**Table 14: SAR Values [GSM 1900 (GPRS/EGPRS)]**

Limit of SAR			10 g Average	1g Average	Power Drift	Graph Results
			2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case Of Body			Measurement Result (W/kg)		Power Drift	
Test Position	Timeslots	Channel	10 g Average	1 g Average	(dB)	
Test Position 1	1 timeslot	Middle/661	0.240	0.407	-0.017	Figure 24
	2 timeslots	Middle/661	0.272	0.487	-0.175	Figure 25
	3 timeslots	Middle/661	0.340	0.575	-0.010	Figure 26
	4 timeslots	Middle/661	0.348	0.605	0.012	Figure 27
Test Position 2	4 timeslots	Middle/661	0.300	0.531	-0.014	Figure 28
Test Position 3	4 timeslots	High/810	0.297	0.558	-0.075	Figure 29
		Middle/661	0.484	0.872	0.050	Figure 30
		Low/512	0.523	0.925	-0.064	Figure 31
Test Position 4	/	/	/	/	/	/
Test Position 5	4 timeslots	Middle/661	0.167	0.298	-0.090	Figure 32
Test Position 6	/	/	/	/	/	/
<b>Worst Case Position of GPRS with EGPRS (GMSK)</b>						
Test Position 3	4 timeslots	Low/512	0.501	0.896	-0.124	Figure 33

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

**Table 15: Extrapolated SAR Values of highest measured SAR [GSM 1900 (GPRS/EGPRS)]**

Test Case Of Body			Conducted Power(dBm)	1g Average (W/kg)	Tune-up procedures	1g Average Limit 1.6 W/kg
Test Position	Timeslots	Channel	Measurement Result		MAX Power(dBm)	Extrapolated Result (W/kg)
<b>GPRS</b>						
Test Position 3	4 timeslots	Low/512	24.03	0.925	25.5	1.298
<b>EGPRS (GMSK)</b>						
Test Position 3	4 timeslots	Low/512	24.03	0.896	25.5	1.257

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**7.3.3. WCDMA Band II (WCDMA/HSDPA/HSUPA)**

**Table 16: SAR Values [WCDMA Band II (WCDMA/HSDPA/HSUPA)]**

Limit of SAR		10 g Average	1g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case Of Body		Measurement Result (W/kg)		Power Drift (dB)	
Test Position	Channel	10 g Average	1 g Average		
Test Position 1	Middle/9400	0.377	0.639	0.018	Figure 34
Test Position 2	Middle/9400	0.348(max.cube)	0.593(max.cube)	-0.044	Figure 35
Test Position 3	High/9538	0.476	0.855	0.139	Figure 36
	Middle/9400	0.416	0.734	-0.022	Figure 37
	Low/9262	0.449	0.792	0.040	Figure 38
Test Position 4	/	/	/	/	/
Test Position 5	Middle/9400	0.121	0.213	-0.147	Figure 39
Test Position 6	/	/	/	/	/
<b>Worst Case Position of RMC with HSDPA</b>					
Test Position 3	High/9538	0.467	0.841	-0.039	Figure 40
<b>Worst Case Position of RMC with HSUPA</b>					
Test Position 3	High/9538	0.370(max.cube)	0.634(max.cube)	-0.020	Figure 41

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.
4. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which was within 2.0dB of the highest peak. The value of the highest cube is given in the table above; the value from the second assessed cube is given in the SAR distribution plots (See ANNEX C).

**Table 17: Extrapolated SAR Values of Highest Measured SAR [WCDMA Band II (WCDMA/HSDPA/HSUPA)]**

Test Case Of Body		Conducted Power(dBm)	1g Average (W/kg)	Tune-up Procedures	1g Average Limit 1.6 W/kg
Test Position	Channel	Measurement Result		MAX Power (dBm)	Extrapolated Result (W/kg)
<b>RMC</b>					
Test Position 3	High/9538	21.99	0.855	23.5	1.211

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### 7.3.4. WCDMA Band V (WCDMA/HSDPA/HSUPA)

**Table 18: SAR Values [WCDMA Band V (WCDMA/HSDPA/HSUPA)]**

Limit of SAR		10 g Average	1g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Test Case Of Body		Measurement Result (W/kg)		Power Drift (dB)	
Test Position	Channel	10 g Average	1 g Average		
Test Position 1	Middle/4183	0.365	0.529	0.049	Figure 42
Test Position 2	High/4233	0.339	0.499	-0.117	Figure 43
	Middle/4183	0.432	0.649	-0.084	Figure 44
	Low/4132	0.367	0.541	-0.178	Figure 45
Test Position 3	Middle/4183	0.374	0.566	-0.089	Figure 46
Test Position 4	/	/	/	/	/
Test Position 5	Middle/4183	0.120	0.192	-0.129	Figure 47
Test Position 6	/	/	/	/	/
<b>Worst Case Position of RMC with HSDPA</b>					
Test Position 2	Middle/4183	0.405	0.598	-0.079	Figure 48
<b>Worst Case Position of RMC with HSUPA</b>					
Test Position 2	Middle/4183	0.300	0.444	-0.029	Figure 49

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.

**Table 19: Extrapolated SAR Values of Highest Measured SAR [WCDMA Band V (WCDMA/HSDPA/HSUPA)]**

Test Case Of Body		Conducted Power(dBm)	1g Average (W/kg)	Tune-up Procedures	1g Average Limit 1.6 W/kg
Test Position	Channel	Measurement Result		MAX Power (dBm)	Extrapolated Result (W/kg)
<b>RMC</b>					
Test Position 2	Middle/4183	21.59	0.649	23.5	1.007

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### 7.3.5. BT/WIFI Function

The distance between BT/WIFI antenna and main antenna is >5cm. The location of the antennas refers to ANNEX H:

#### Output Power Thresholds for Unlicensed Transmitters

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
<b>P<sub>Ref</sub></b>	12	6	5	<b>mW</b>
Device output power should be rounded to the nearest mW to compare with values specified in this table.				

The output power of BT antenna is as following:

Channel	Ch 0 (2402 MHz)	Ch 39 (2441 MHz)	Ch 78 (2480 MHz)
GFSK Test result (dBm)	6.34	6.26	6.31
EDR2M-4_DQPSK Test result (dBm)	4.18	4.09	5.04
EDR3M-8DPSK Test result (dBm)	3.66	3.54	4.54

The output power of WIFI antenna is as following:

Mode	Channel	Data rate (Mbps)	Conducted Power (dBm)		
802.11b	1	1	Before	13.03	
			After	13.03	
		2	Before	12.85	
			5.5	Before	12.87
	6	1	1	Before	13.04
				After	13.04
			2	Before	12.67
				5.5	Before
		11	1	Before	13.04
				After	13.04
			2	Before	12.98
				5.5	Before
802.11g	1	6	Before	11.96	
		9	Before	11.71	
		12	Before	11.64	
		18	Before	11.25	
		24	Before	10.93	
		36	Before	10.61	
		48	Before	10.32	

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	6	54	Before	10.08
		6	Before	11.98
		9	Before	11.75
		12	Before	11.63
		18	Before	11.34
		24	Before	10.97
		36	Before	10.68
		48	Before	10.65
		54	Before	10.13
	11	6	Before	11.92
		9	Before	11.69
		12	Before	11.63
		18	Before	11.34
		24	Before	10.94
		36	Before	10.65
		48	Before	10.26
		54	Before	10.04
	802.11n (HT20)	1	6.5	Before
13			Before	9.65
19.5			Before	9.19
26			Before	8.76
39			Before	8.56
52			Before	8.12
58.5			Before	7.98
65			Before	7.72
6		6.5	Before	10.23
		13	Before	9.62
		19.5	Before	9.10
		26	Before	8.74
		39	Before	8.53
		52	Before	8.10
		58.5	Before	7.99
		65	Before	7.76
11		6.5	Before	10.21
		13	Before	9.62
		19.5	Before	9.21
		26	Before	8.75
		39	Before	8.65
		52	Before	8.13
		58.5	Before	7.95
		65	Before	7.73

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### Stand-alone SAR

According to the output power measurement result and the distance between BT/WIFI antenna and GSM/WCDMA antenna we can draw the conclusion that:

stand-alone SAR are not required for BT, because the output power of BT transmitter is  $\leq 2P_{\text{Ref}}=13.8\text{dBm}$  and its antenna is  $\geq 5\text{cm}$  from other antenna;

stand-alone SAR are not required for WIFI, because the output power of WIFI transmitter is  $\leq 2P_{\text{Ref}}=13.8\text{dBm}$  and its antenna is  $\geq 5\text{cm}$  from other antenna.

### Simultaneous transmit

About BT and GSM/WCDMA antenna, stand-alone SAR are not required for BT and its antenna is  $\geq 5\text{cm}$  from other antenna, so Simultaneous SAR are not required for BT and GSM/WCDMA antenna;

About WIFI and GSM/WCDMA antenna, stand-alone SAR are not required for WIFI and its antenna is  $\geq 5\text{cm}$  from other antenna, so Simultaneous SAR are not required for wifi and GSM/WCDMA antenna;

About BT and WIFI can't simultaneous transmit.

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## 8. Measurement Uncertainty

## 9. Main Test Instruments

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c <sub>i</sub>	Standard uncertainty u <sub>i</sub> (%)	Degree of freedom V <sub>eff</sub> or v <sub>i</sub>
1	System repetivity	A	0.5	N	1	1	0.5	9
Measurement system								
2	-probe calibration	B	5.9	N	1	1	5.9	∞
3	-axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	1.9	∞
4	- Hemispherical isotropy of the probe	B	9.4	R	$\sqrt{3}$	$\sqrt{0.5}$	3.9	∞
6	-boundary effect	B	1.9	R	$\sqrt{3}$	1	1.1	∞
7	-probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
8	- System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	-readout Electronics	B	1.0	N	1	1	1.0	∞
10	-response time	B	0	R	$\sqrt{3}$	1	0	∞
11	-integration time	B	4.32	R	$\sqrt{3}$	1	2.5	∞
12	-noise	B	0	R	$\sqrt{3}$	1	0	∞
13	-RF Ambient Conditions	B	3	R	$\sqrt{3}$	1	1.73	∞
14	-Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
15	-Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
16	-Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Test sample Related								
17	-Test Sample Positioning	A	2.9	N	1	1	4.92	71
18	-Device Holder Uncertainty	A	4.1	N	1	1	4.1	5
19	-Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
Physical parameter								

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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	$\sqrt{3}$	0.64	1.8	$\infty$
22	-liquid conductivity (measurement uncertainty)	B	0.77	N	1	0.64	0.493	9
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	$\infty$
24	-liquid permittivity (measurement uncertainty)	B	0.29	N	1	0.6	0.174	9
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$				11.36		
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		22.72	

**Table 20: List of Main Instruments**

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 13, 2010	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 12, 2011	One year
04	Power sensor	Agilent N8481H	MY50350004	September 26, 2010	One year
05	Signal Generator	HP 8341B	2730A00804	September 13, 2010	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	BTS	E5515C	MY48360988	December 3, 2010	One year
08	E-field Probe	EX3DV4	3677	November 24, 2010	One year
09	DAE	DAE4	871	November 18, 2010	One year
10	Validation Kit 835MHz	D835V2	4d092	January 14, 2010	Two years
11	Validation Kit 1900MHz	D1900V2	5d018	June 15, 2010	Two years

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

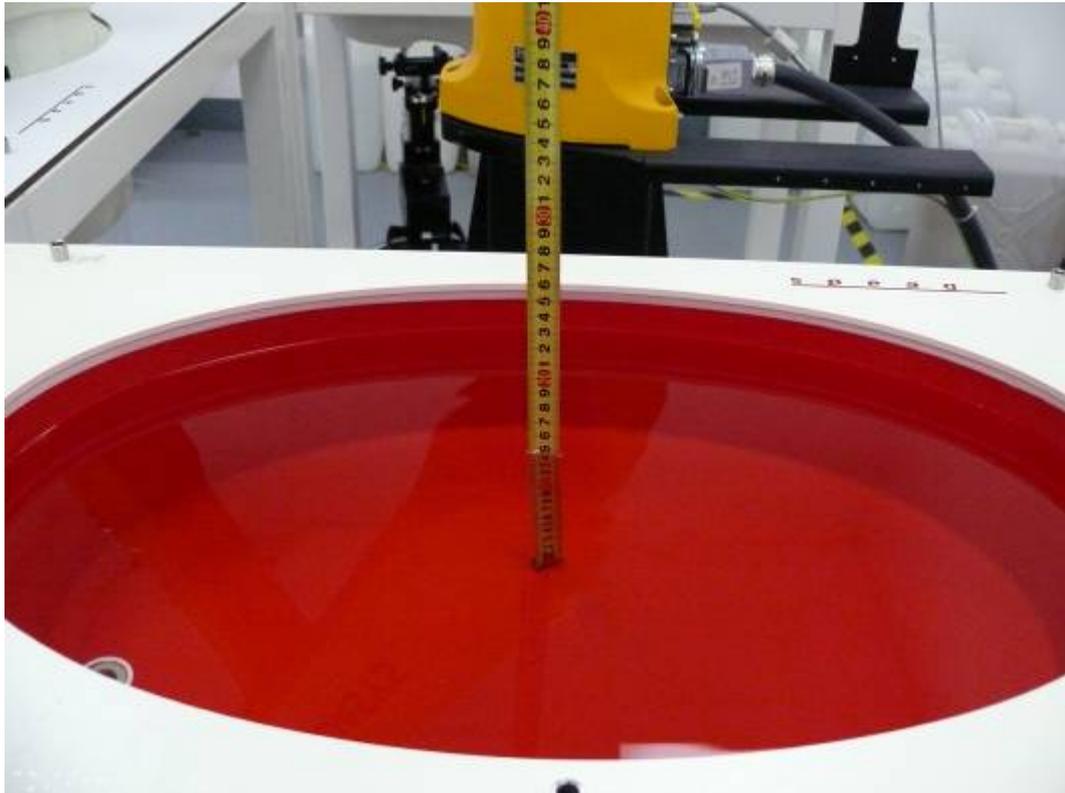
## ANNEX A: Test Layout



Picture 1: Specific Absorption Rate Test Layout



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



Picture 3: Liquid depth in the Flat Phantom (1900 MHz, 15.2cm depth)

## ANNEX B: System Check Results

### System Performance Check at 835 MHz

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

Date/Time: 3/12/2011 4:00:20 AM

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.95$  mho/m;  $\epsilon_r = 53.84$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

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

Maximum value of SAR (interpolated) = 2.72 mW/g

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

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

Peak SAR (extrapolated) = 3.63 W/kg

**SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.65 mW/g**

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

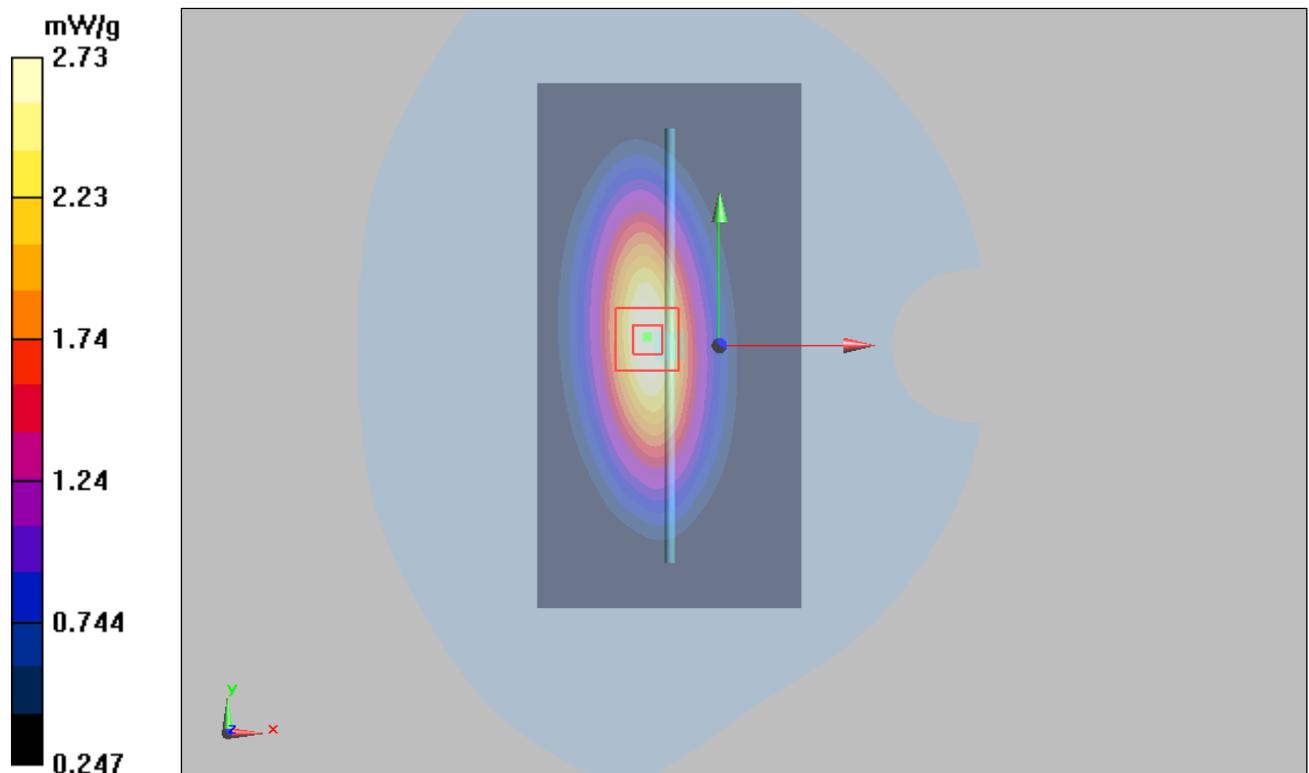


Figure 6 System Performance Check 835MHz 250mW

### System Performance Check at 1900 MHz

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

Date/Time: 3/13/2011 8:02:19 AM

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.98$   $\rho = 1000$  kg/m<sup>3</sup>

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

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

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

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

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

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

Peak SAR (extrapolated) = 17.6 W/kg

**SAR(1 g) = 9.82 mW/g; SAR(10 g) = 5.2 mW/g**

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

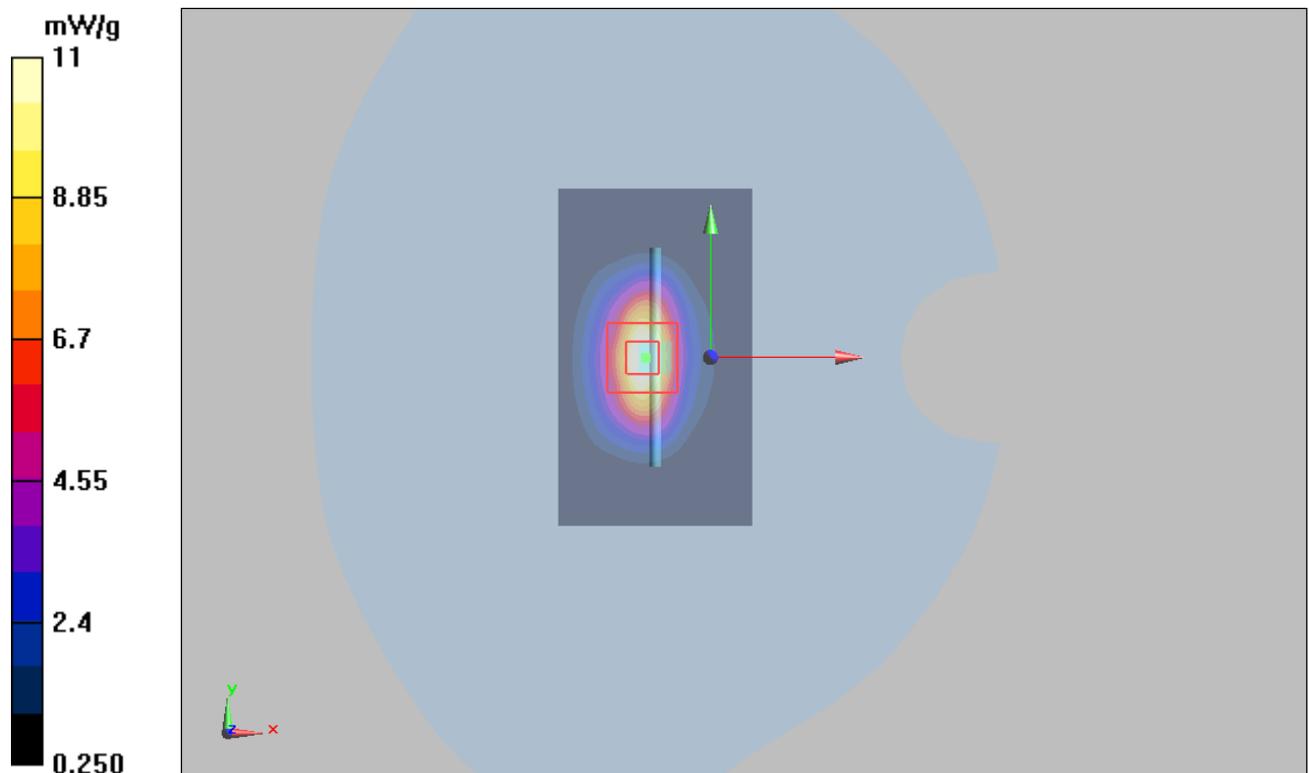


Figure 7 System Performance Check 1900MHz 250mW

## ANNEX C: Graph Results

### GSM 850 GPRS (1Txslot) Test Position 1 Middle

Date/Time: 3/12/2011 5:21:13 AM

Communication System: GSM850 + GPRS(1Up); Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 8.53 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 0.712 W/kg

**SAR(1 g) = 0.479 mW/g; SAR(10 g) = 0.326 mW/g**

Maximum value of SAR (measured) = 0.513 mW/g

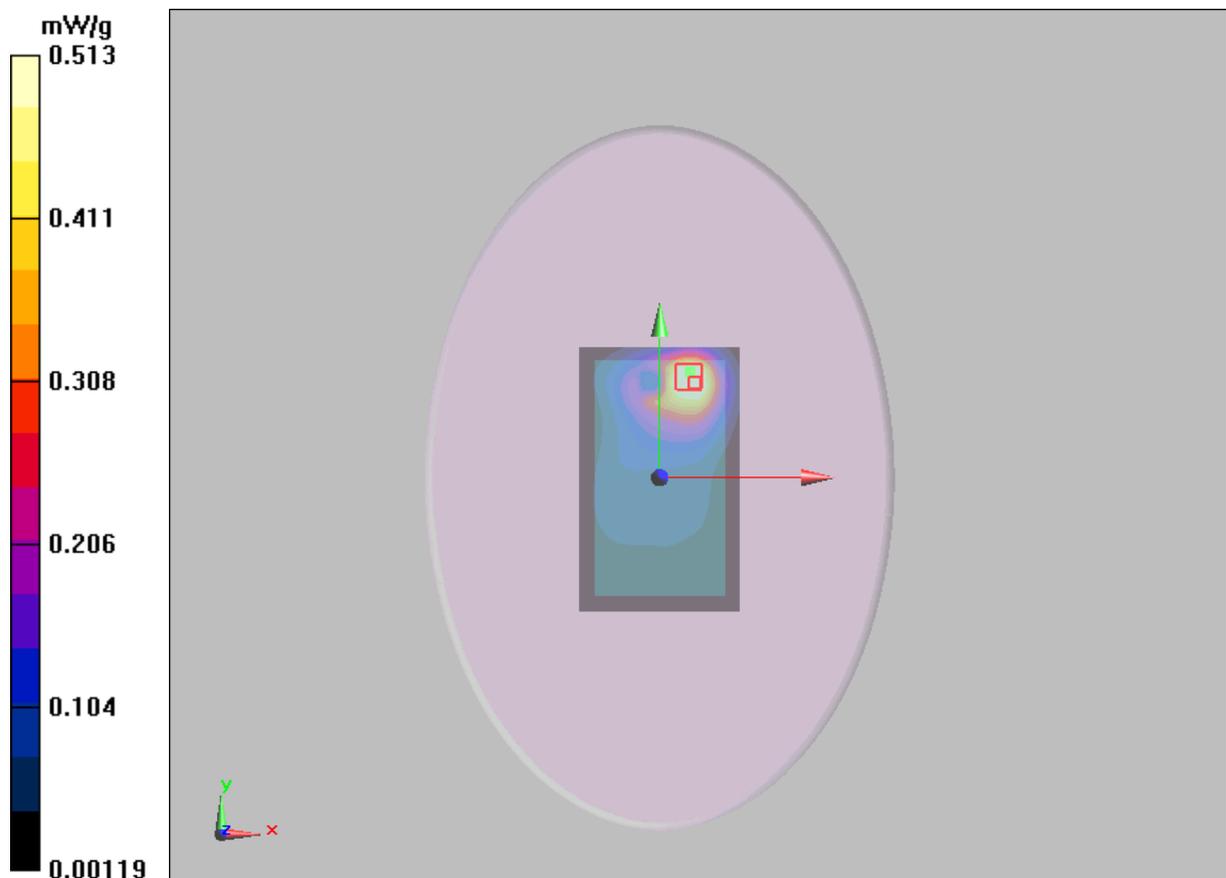


Figure 8 GSM 850 GPRS (1Txslot) Test Position 1 Channel 190

**GSM 850 GPRS (2Txslots) Test Position 1 Middle**

Date/Time: 3/12/2011 5:53:55 AM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 10.7 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.749 mW/g; SAR(10 g) = 0.510 mW/g**

Maximum value of SAR (measured) = 0.798 mW/g

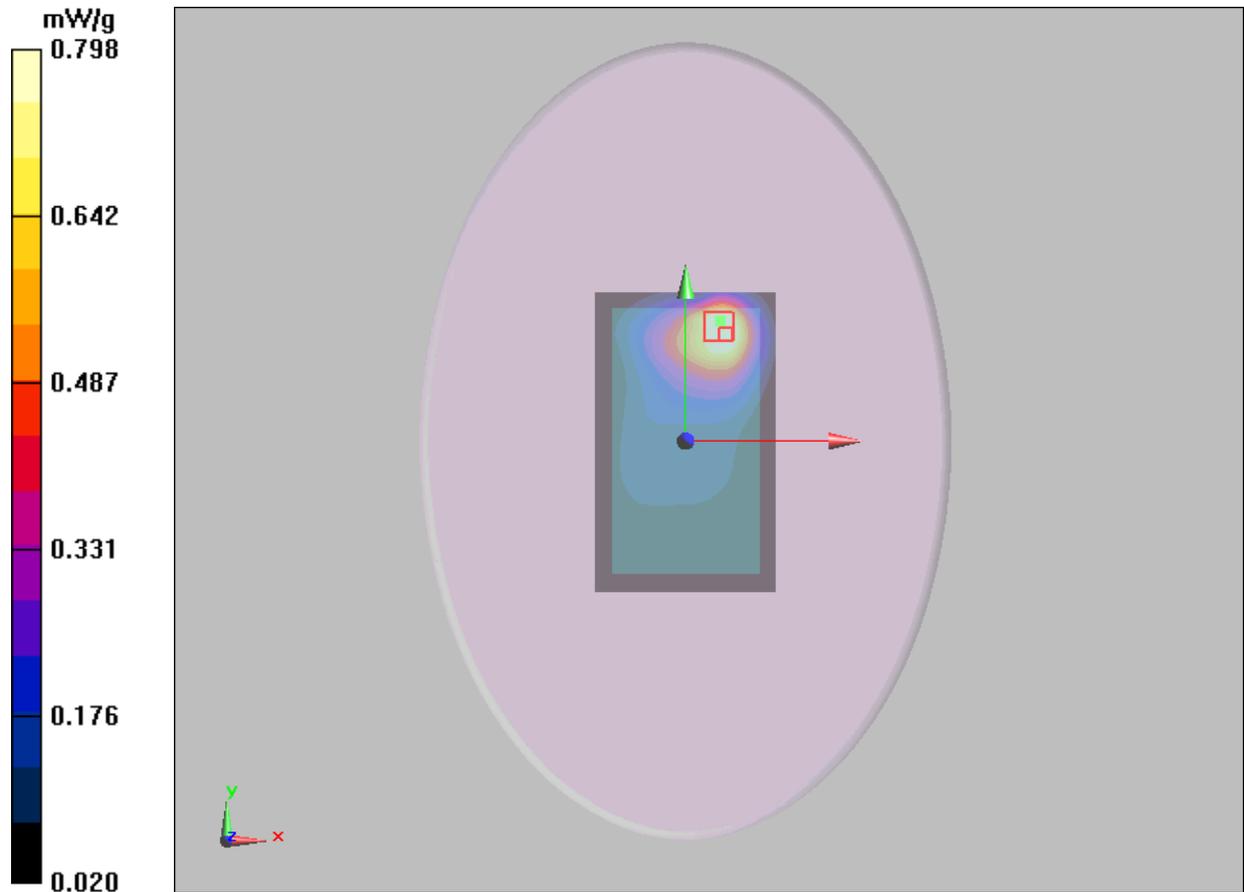


Figure 9 GSM 850 GPRS (2Txslots) Test Position 1 Channel 190

**GSM 850 GPRS (3Txslots) Test Position 1 High**

Date/Time: 3/12/2011 9:57:25 AM

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

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 High/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.972 mW/g

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

Reference Value = 11.1 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.842 mW/g; SAR(10 g) = 0.580 mW/g**

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

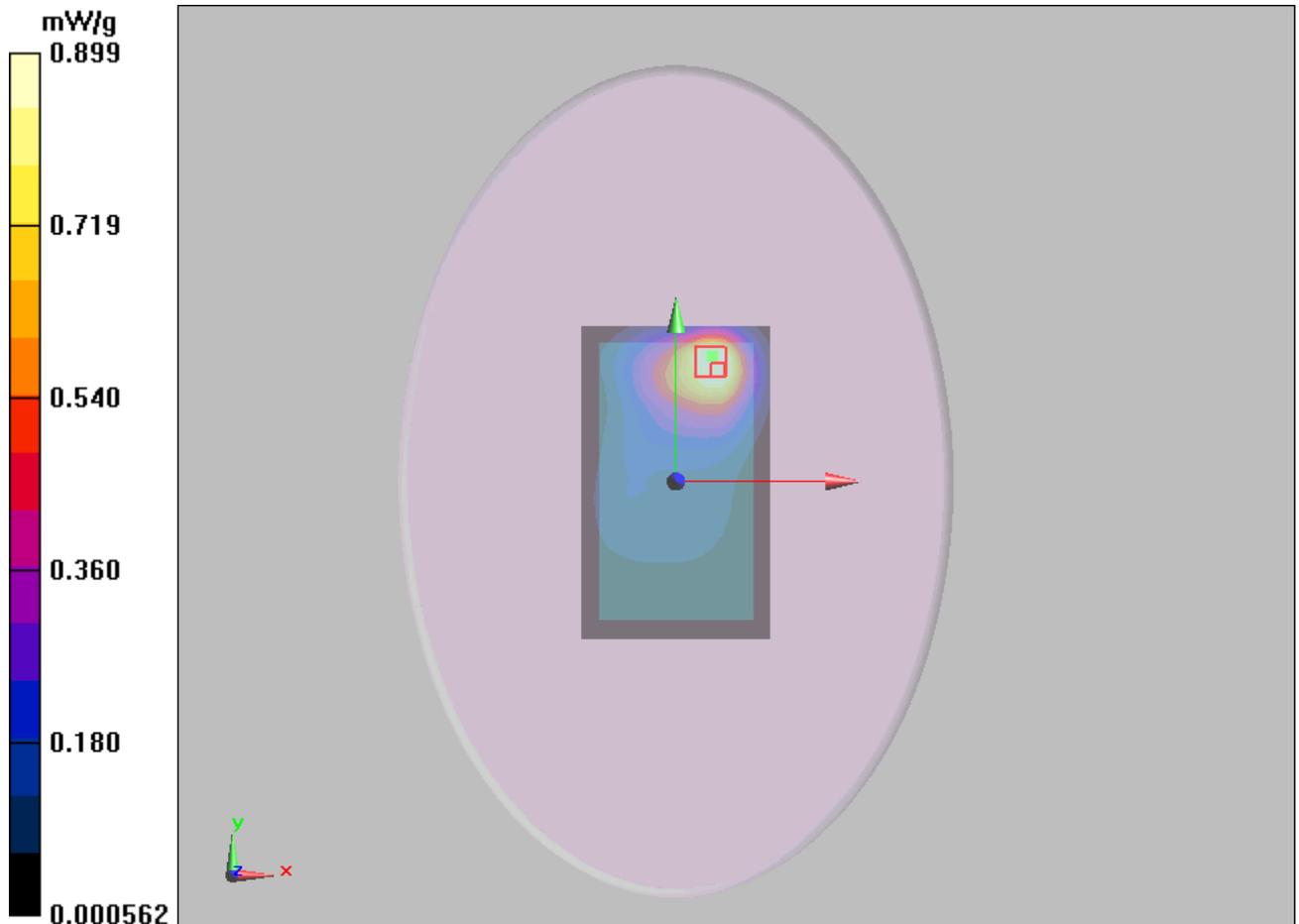


Figure 10 GSM 850 GPRS (3Txslots) Test Position 1 Channel 251

**GSM 850 GPRS (3Txslots) Test Position 1 Middle**

Date/Time: 3/12/2011 9:25:00 AM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 11.5 V/m; Power Drift = 0.051 dB

Peak SAR (extrapolated) = 1.29 W/kg

**SAR(1 g) = 0.877 mW/g; SAR(10 g) = 0.608 mW/g**

Maximum value of SAR (measured) = 0.939 mW/g

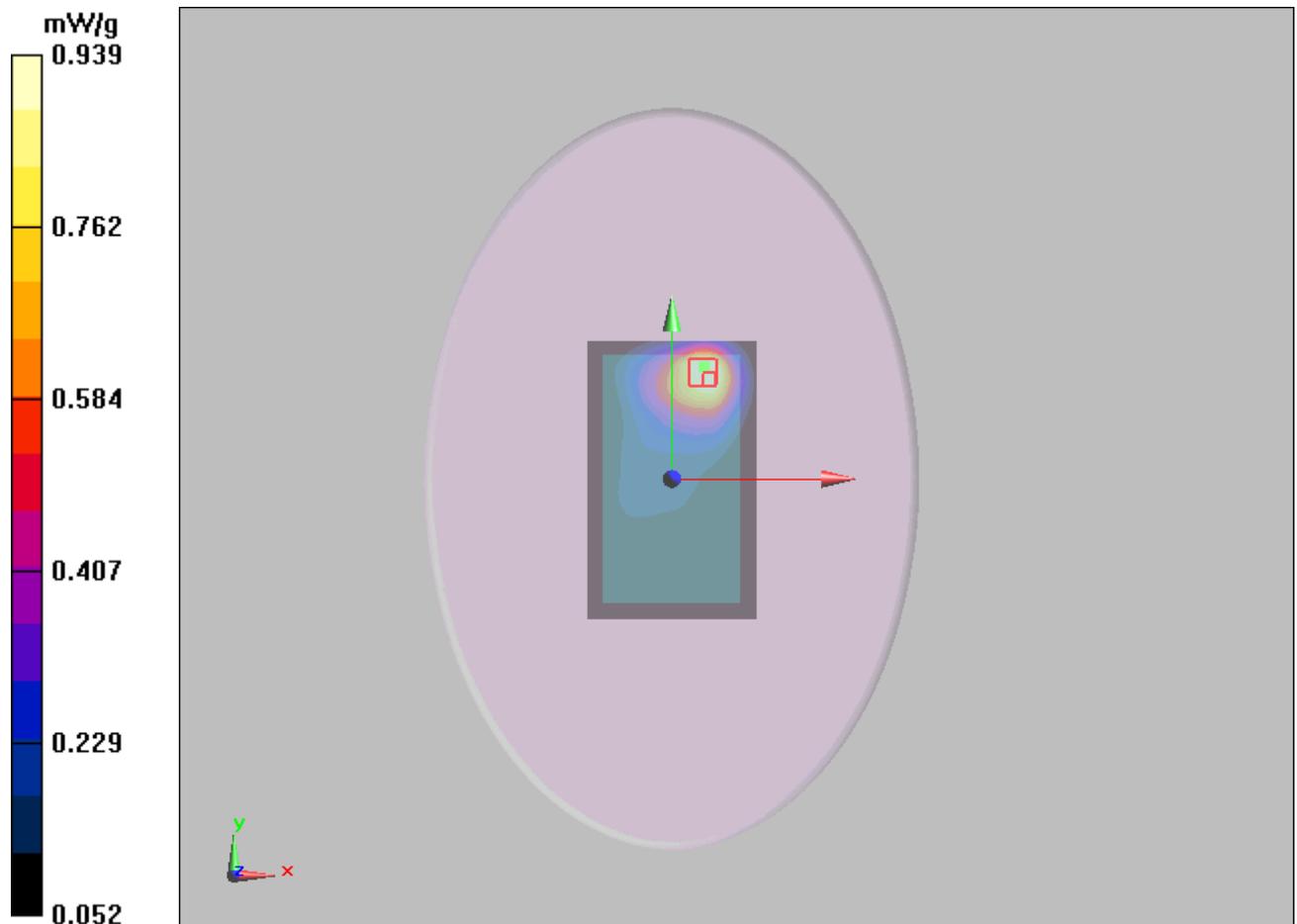


Figure 11 GSM 850 GPRS (3Txslots) Test Position 1 Channel 190

**GSM 850 GPRS (3Txslots) Test Position 1 Low**

Date/Time: 3/12/2011 10:29:16 AM

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

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.942$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Low/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.12 mW/g

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

Reference Value = 12.8 V/m; Power Drift = -0.071 dB

Peak SAR (extrapolated) = 1.39 W/kg

**SAR(1 g) = 0.949 mW/g; SAR(10 g) = 0.660 mW/g**

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

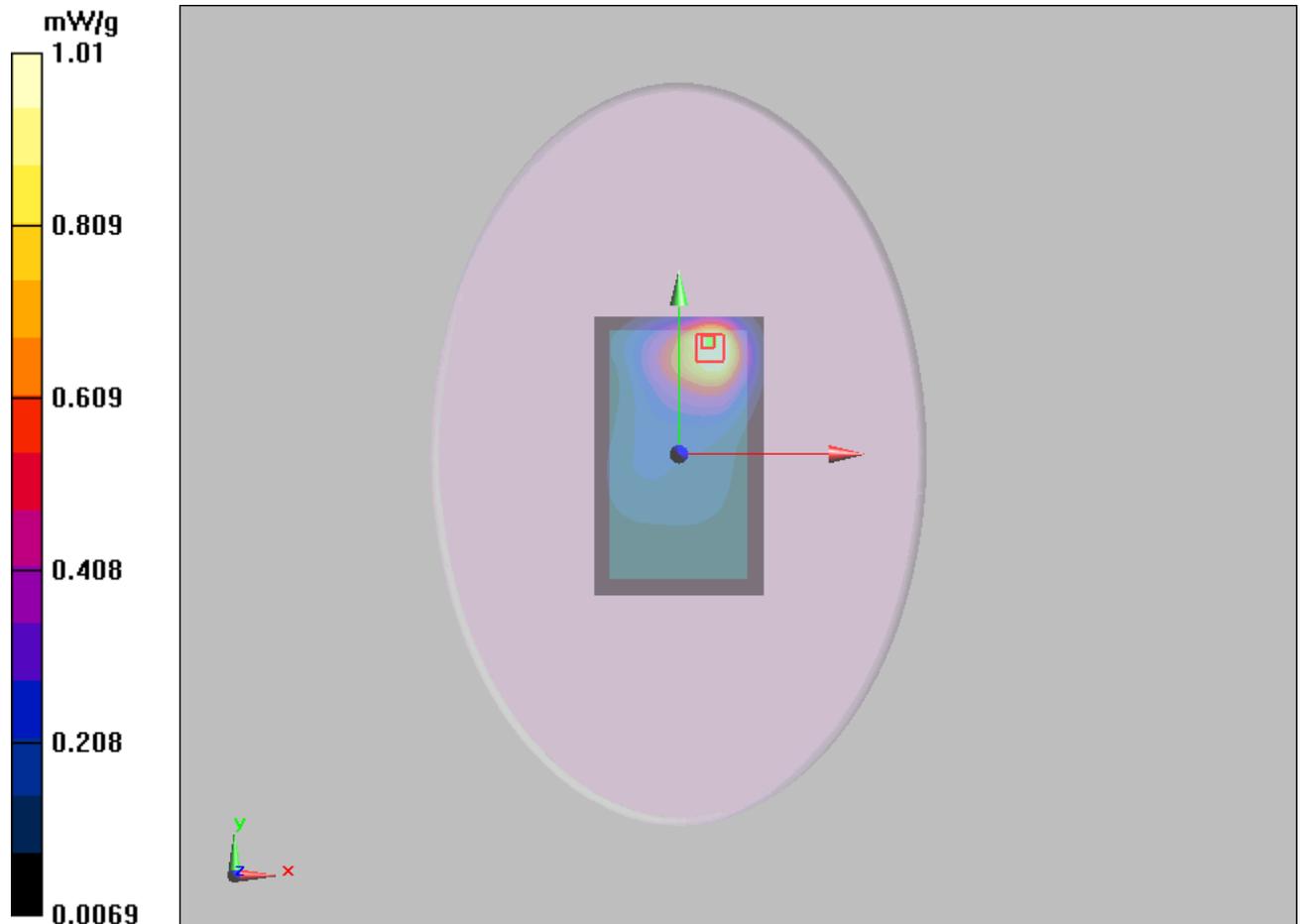


Figure 12 GSM 850 GPRS (3Txslots) Test Position 1 Channel 128

### GSM 850 GPRS (4Txslots) Test Position 1 High

Date/Time: 3/12/2011 10:47:14 AM

Communication System: GSM 850+GPRS(4Up); Frequency: 848.8 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 High/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 11.8 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 1.36 W/kg

**SAR(1 g) = 0.916 mW/g; SAR(10 g) = 0.631 mW/g**

Maximum value of SAR (measured) = 0.975 mW/g

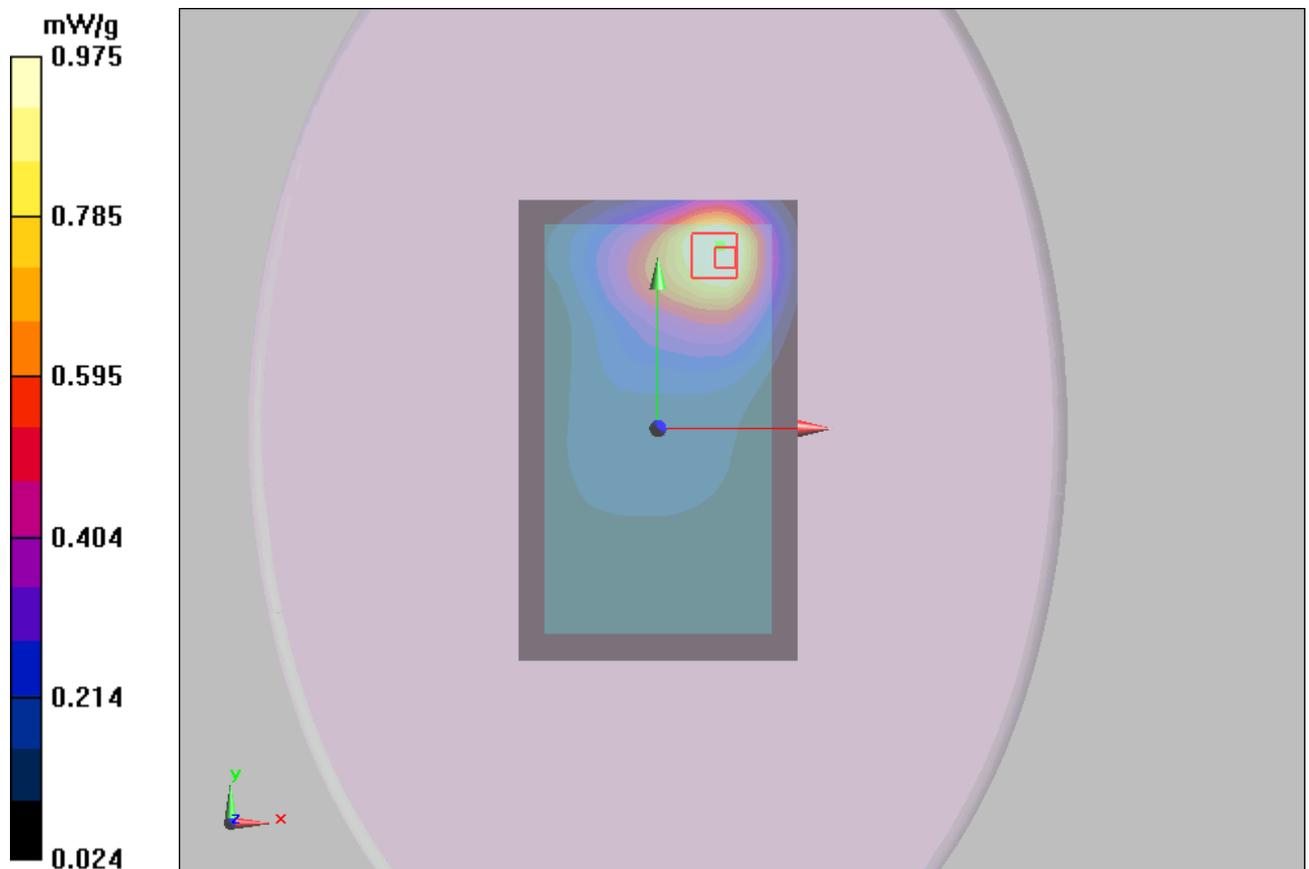


Figure 13 GSM 850 GPRS (4Txslots) Test Position 1 Channel 251

**GSM 850 GPRS (4Txslots) Test Position 1 Middle**

Date/Time: 3/12/2011 8:52:16 AM

Communication System: GSM 850+GPRS(4Up); Frequency: 836.6 MHz;Duty Cycle: 1:2.075

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 12.3 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 1.35 W/kg

**SAR(1 g) = 0.913 mW/g; SAR(10 g) = 0.629 mW/g**

Maximum value of SAR (measured) = 0.977 mW/g

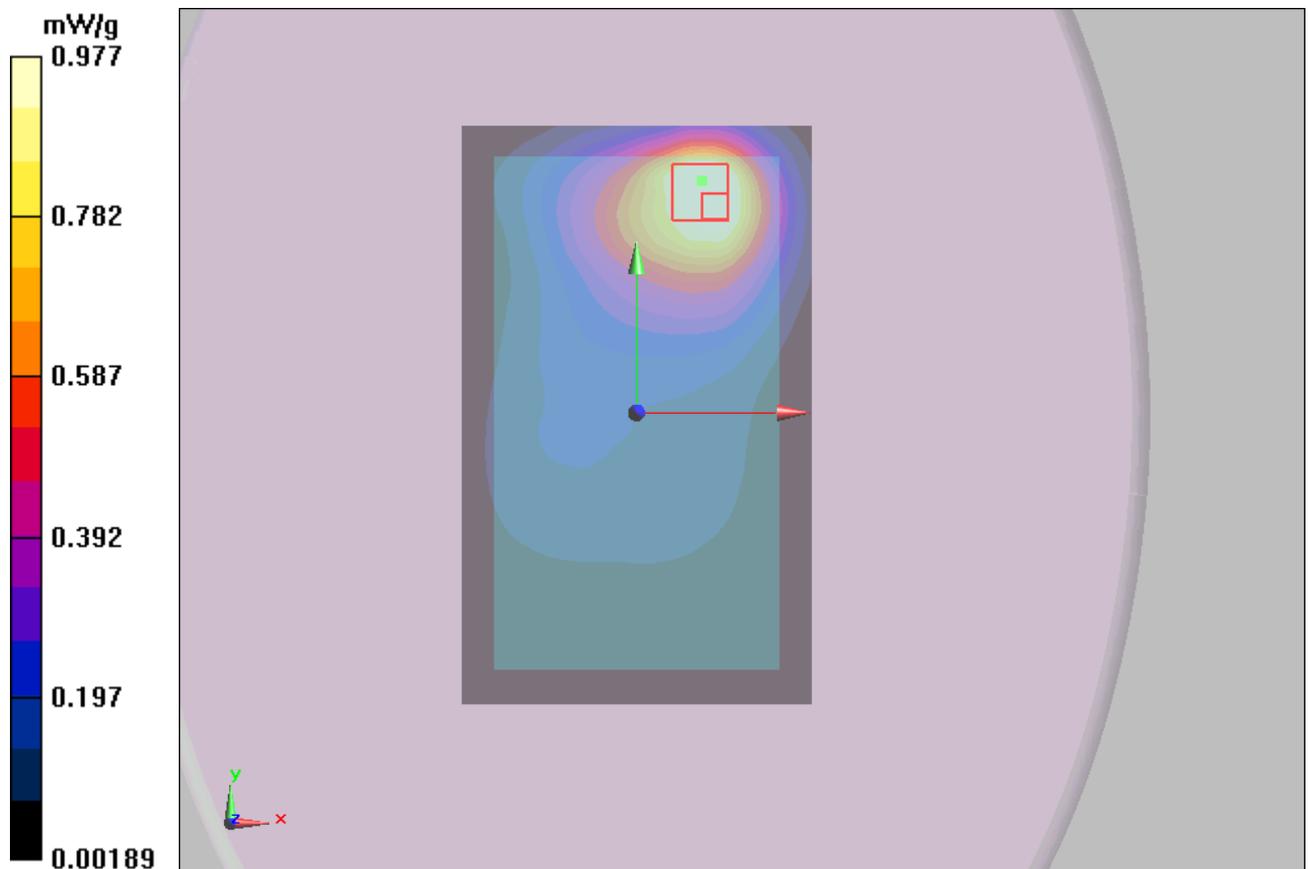


Figure 14 GSM 850 GPRS (4Txslots) Test Position 1 Channel 190

**GSM 850 GPRS (4Txslots) Test Position 1 Low**

Date/Time: 3/12/2011 11:01:41 AM

Communication System: GSM 850+GPRS(4Up); Frequency: 824.2 MHz;Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.942$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Low/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 12.9 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 1.91 W/kg

**SAR(1 g) = 0.976 mW/g; SAR(10 g) = 0.671 mW/g**

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

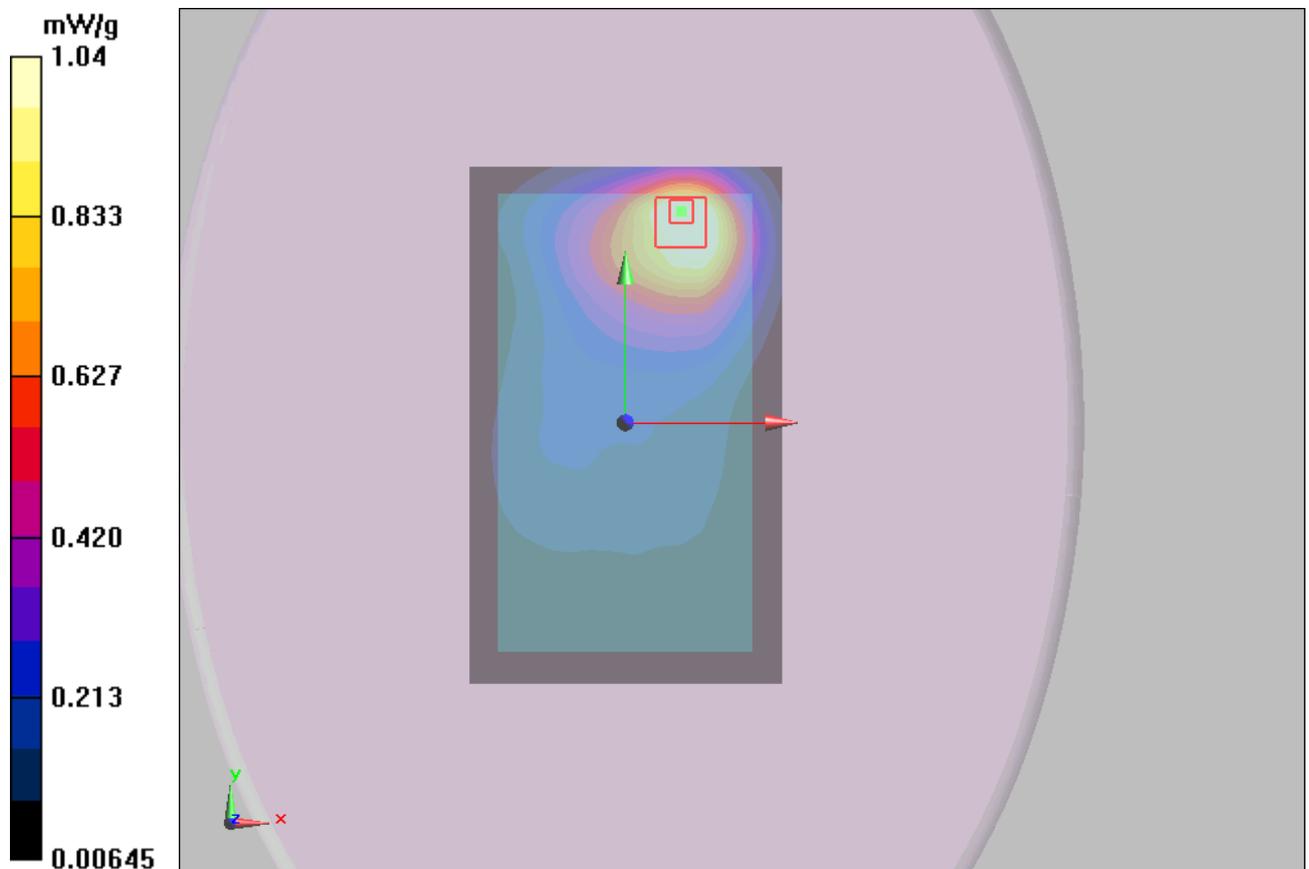


Figure 15 GSM 850 GPRS (4Txslots) Test Position 1 Channel 128

### GSM 850 GPRS (4Txslots) Test Position 2 High

Date/Time: 3/12/2011 3:10:11 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 848.8 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 High/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.976 mW/g

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

Reference Value = 10.2 V/m; Power Drift = 0.069 dB

Peak SAR (extrapolated) = 2.38 W/kg

**SAR(1 g) = 0.946 mW/g; SAR(10 g) = 0.634 mW/g**

Maximum value of SAR (measured) = 0.994 mW/g

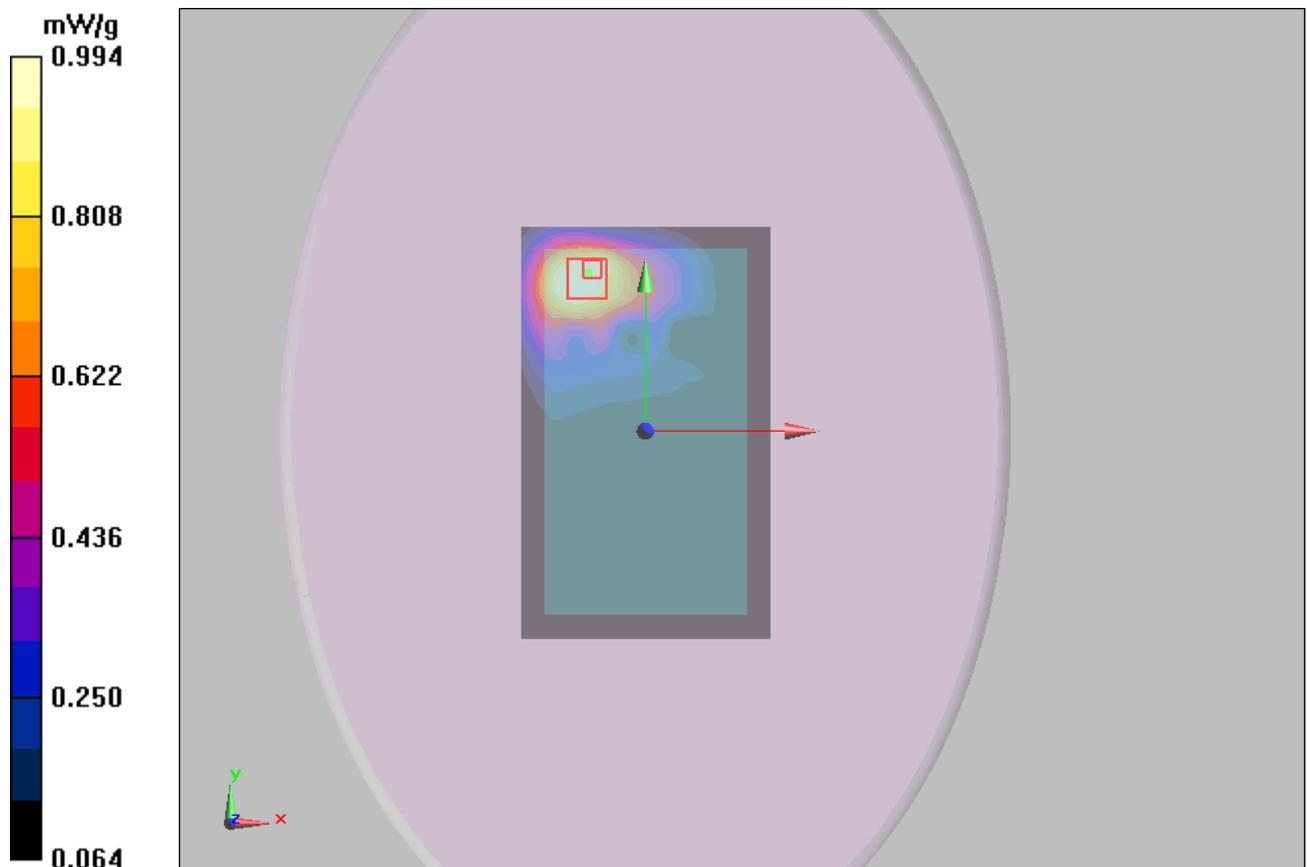


Figure 16 GSM 850 GPRS (4Txslots) Test Position 2 Channel 251

**GSM 850 GPRS (4Txslots) Test Position 2 Middle**

Date/Time: 3/12/2011 12:55:23 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.06 mW/g

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

Reference Value = 11.5 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 1.6 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.687 mW/g**

Maximum value of SAR (measured) = 1.12 mW/g

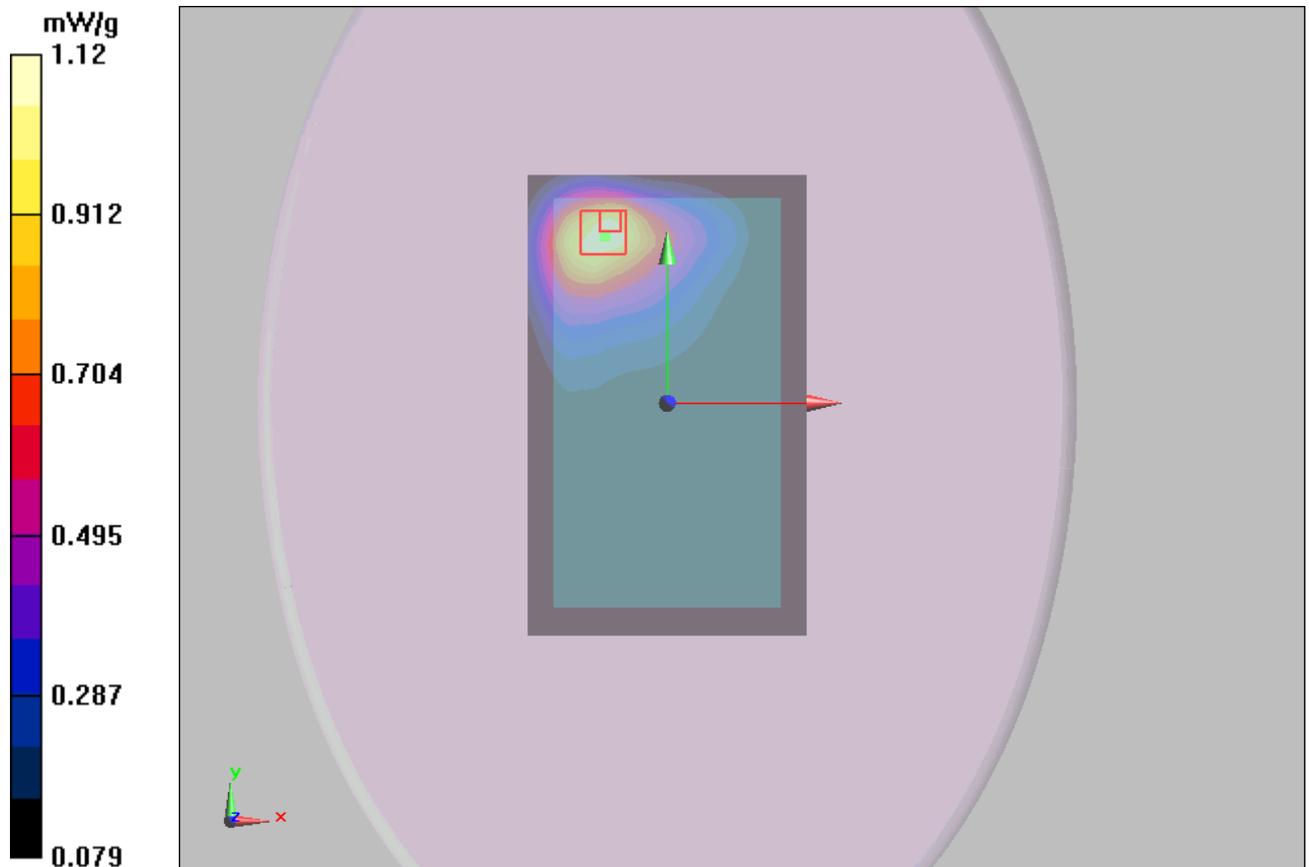


Figure 17 GSM 850 GPRS (4Txslots) Test Position 2 Channel 190

**GSM 850 GPRS (4Txslots) Test Position 2 Low**

Date/Time: 3/12/2011 3:42:52 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 824.2 MHz;Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.942$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Low/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 11.5 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 1.55 W/kg

**SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.693 mW/g**

Maximum value of SAR (measured) = 1.12 mW/g

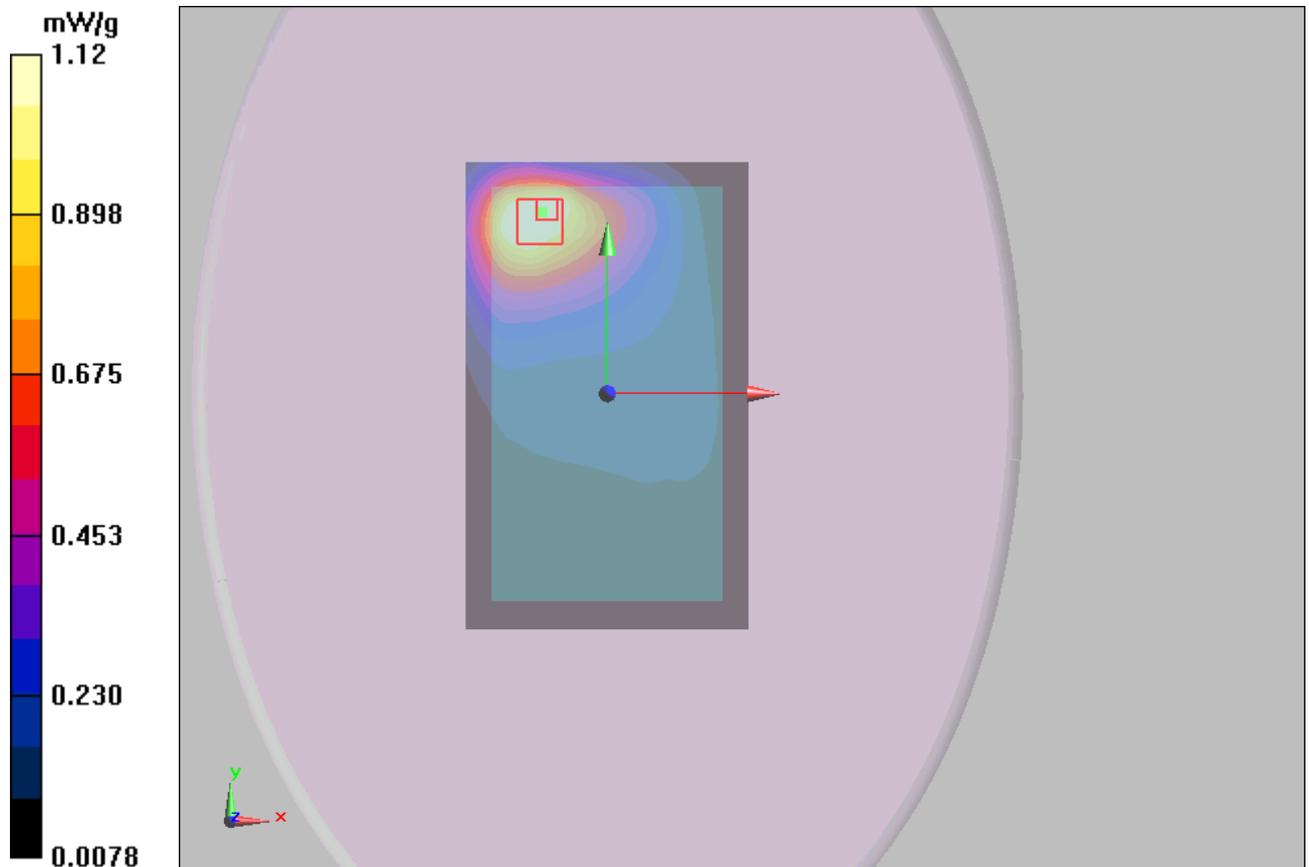


Figure 18 GSM 850 GPRS (4Txslots) Test Position 2 Channel 128

### GSM 850 GPRS (4Txslots) Test Position 3 High

Date/Time: 3/12/2011 6:36:59 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 848.8 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.964$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 High/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 34.9 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 1.45 W/kg

**SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.669 mW/g**

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

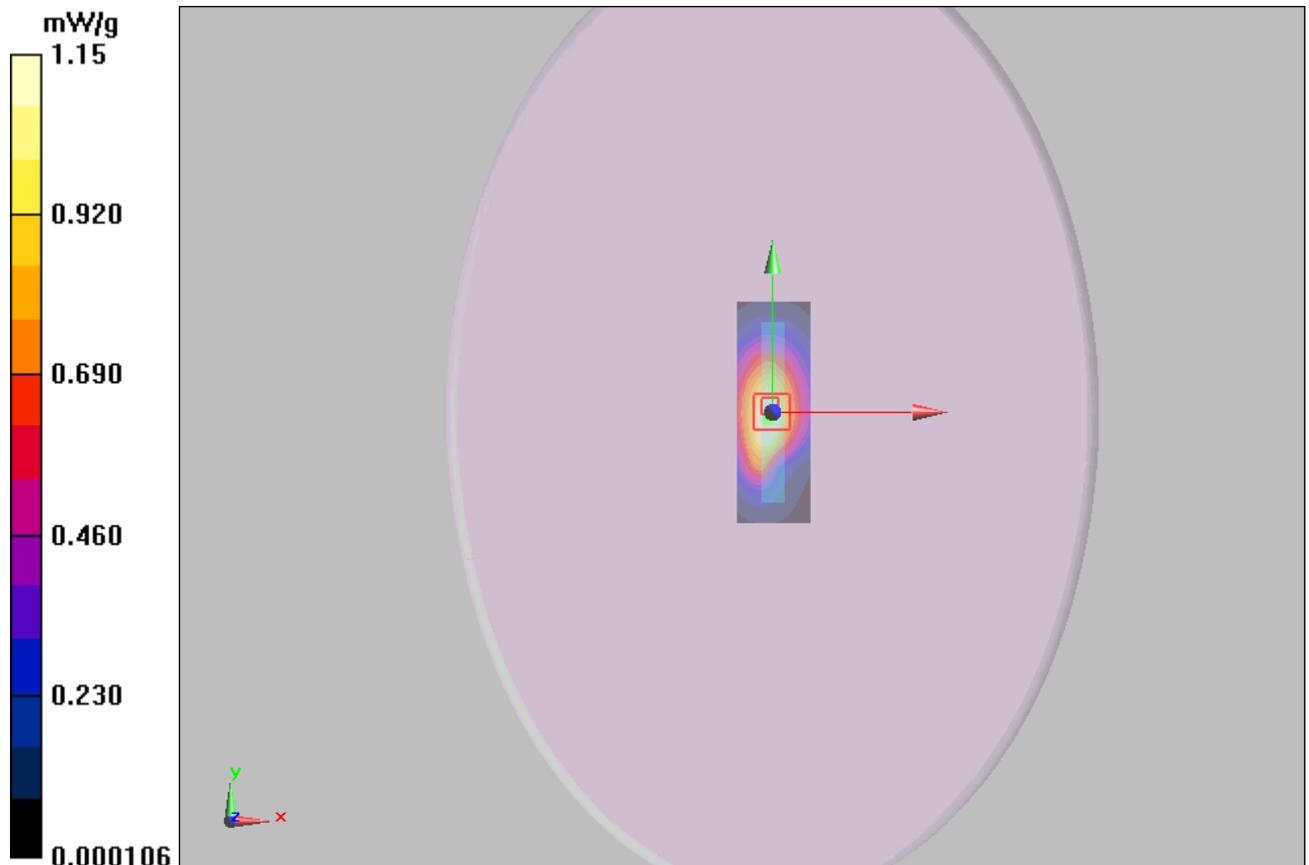


Figure 19 GSM 850 GPRS (4Txslots) Test Position 3 Channel 251

**GSM 850 GPRS (4Txslots) Test Position 3 Middle**

Date/Time: 3/12/2011 6:16:04 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Middle/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.25 mW/g

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

Reference Value = 38.1 V/m; Power Drift = -0.190 dB

Peak SAR (extrapolated) = 1.89 W/kg

**SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.758 mW/g**

Maximum value of SAR (measured) = 1.24 mW/g

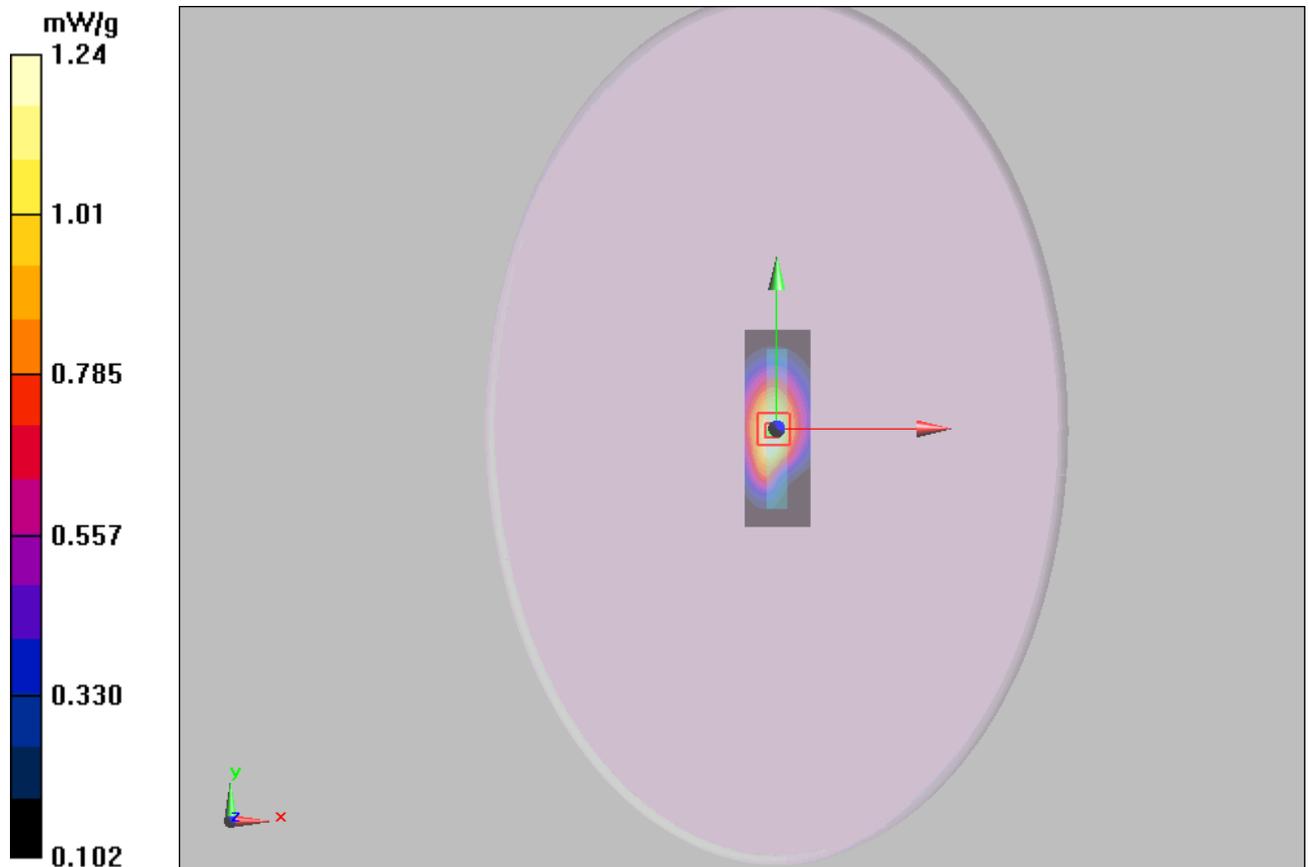


Figure 20 GSM 850 GPRS (4Txslots) Test Position 3 Channel 190

**GSM 850 GPRS (4Txslots) Test Position 3 Low**

Date/Time: 3/12/2011 6:56:34 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 824.2 MHz;Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.942$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Low/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.25 mW/g

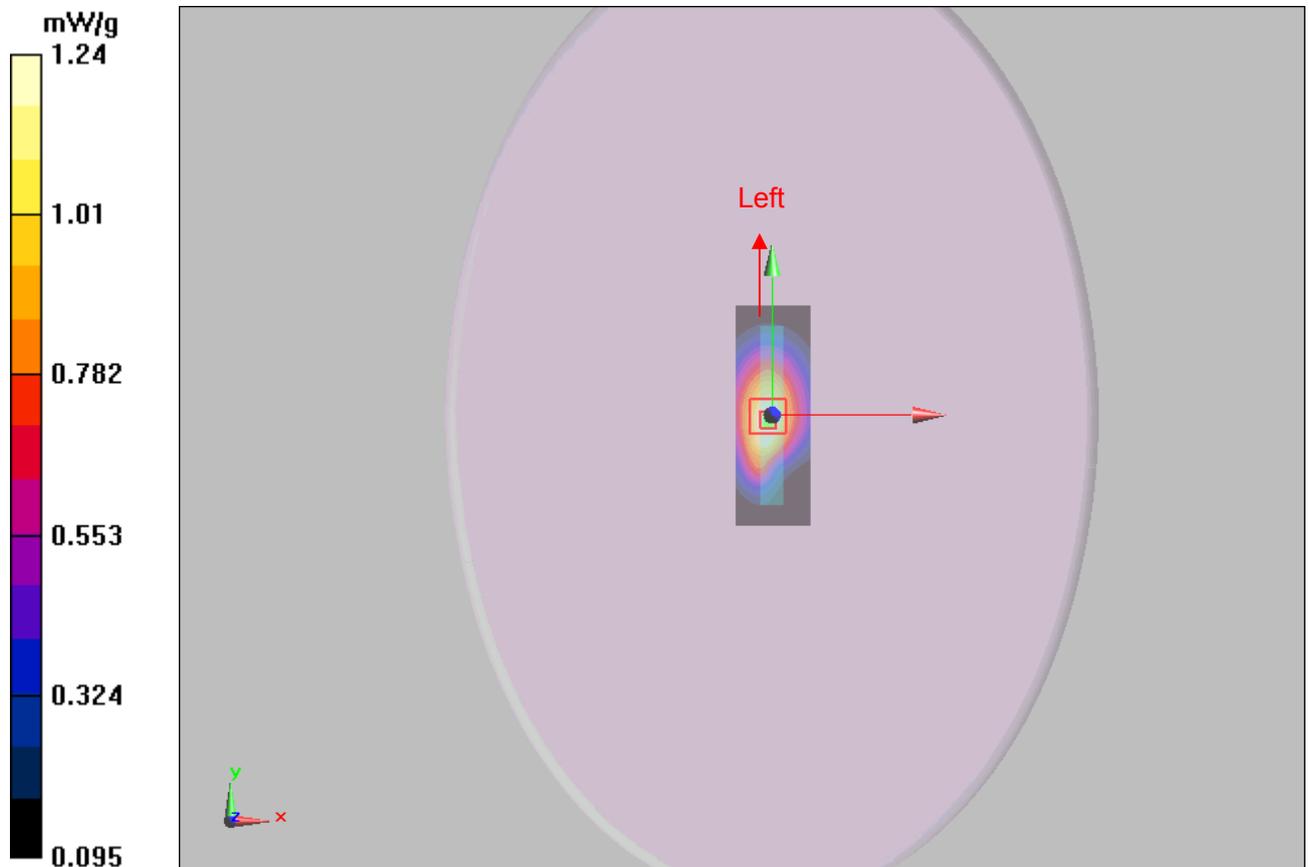
**Test Position 3 Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 36.7 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 1.67 W/kg

**SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.764 mW/g**

Maximum value of SAR (measured) = 1.24 mW/g



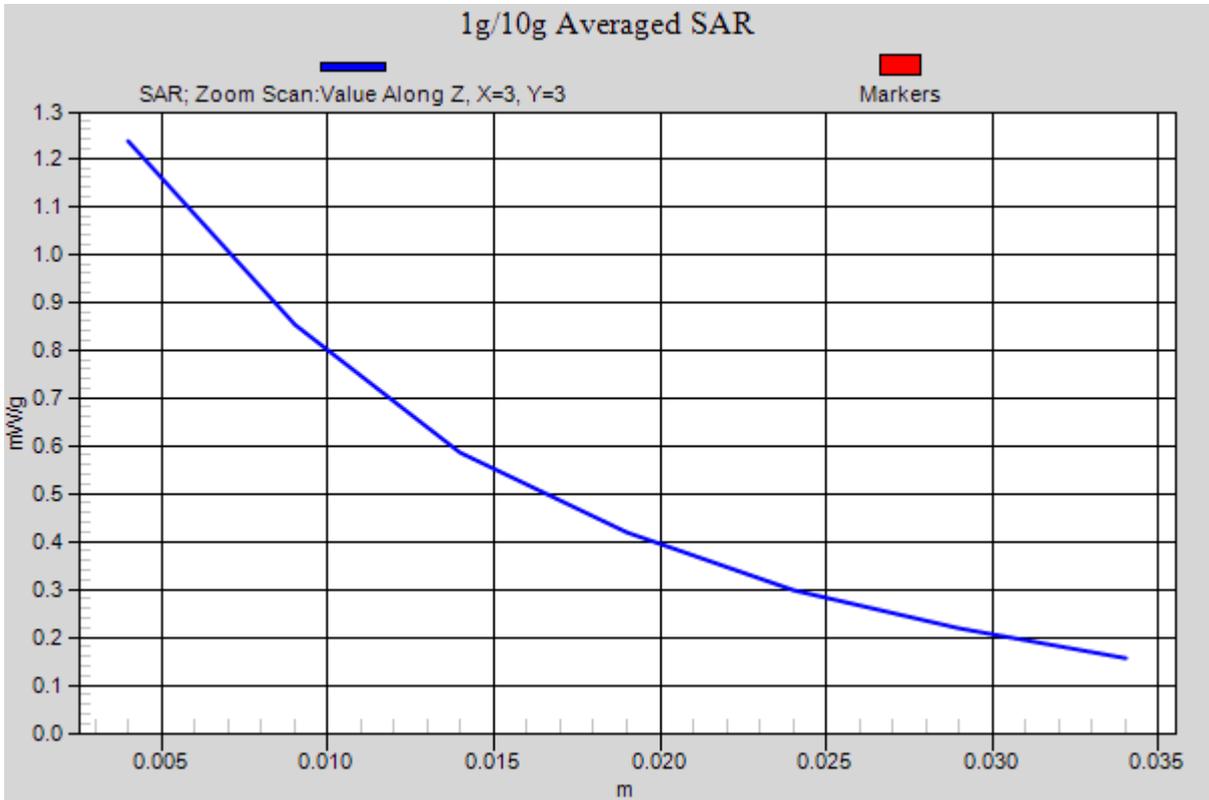


Figure 21 GSM 850 GPRS (4Txslots) Test Position 3 Channel 128

**GSM 850 GPRS (4Txslots) Test Position 5 Middle**

Date/Time: 3/12/2011 7:17:42 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.075

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 5 Middle/Area Scan (31x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.386 mW/g

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

Reference Value = 13.9 V/m; Power Drift = 0.048 dB

Peak SAR (extrapolated) = 0.538 W/kg

**SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.212 mW/g**

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

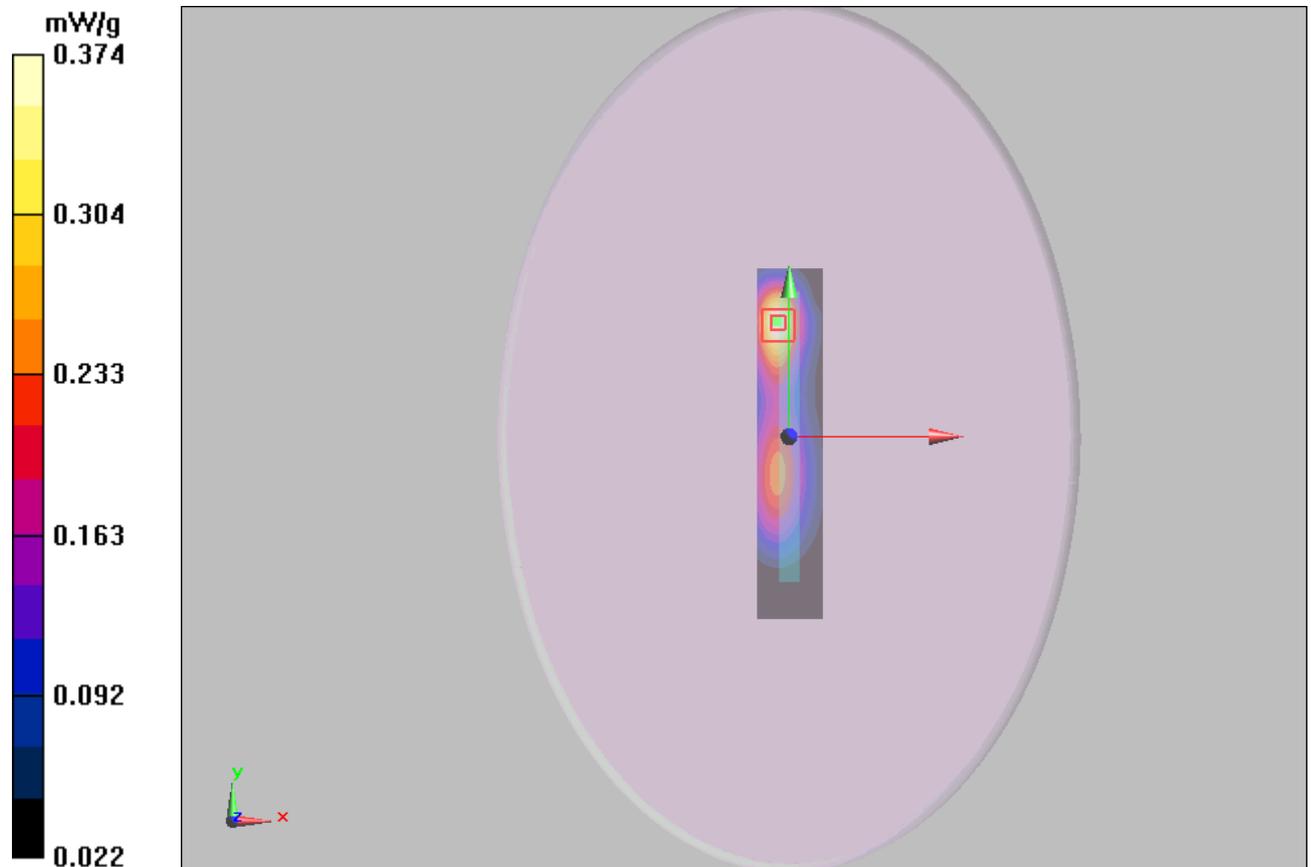


Figure 22 GSM 850 GPRS (4Txslots) Test Position 5 Channel 190

**GSM 850 EGPRS (4Txslots) Test Position 3 Low**

Date/Time: 3/12/2011 8:05:31 PM

Communication System: GSM 850+EGPRS(4Up); Frequency: 824.2 MHz;Duty Cycle: 1:2.075

Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.942$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Low/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 36.8 V/m; Power Drift = -0.057 dB

Peak SAR (extrapolated) = 1.64 W/kg

**SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.718 mW/g**

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

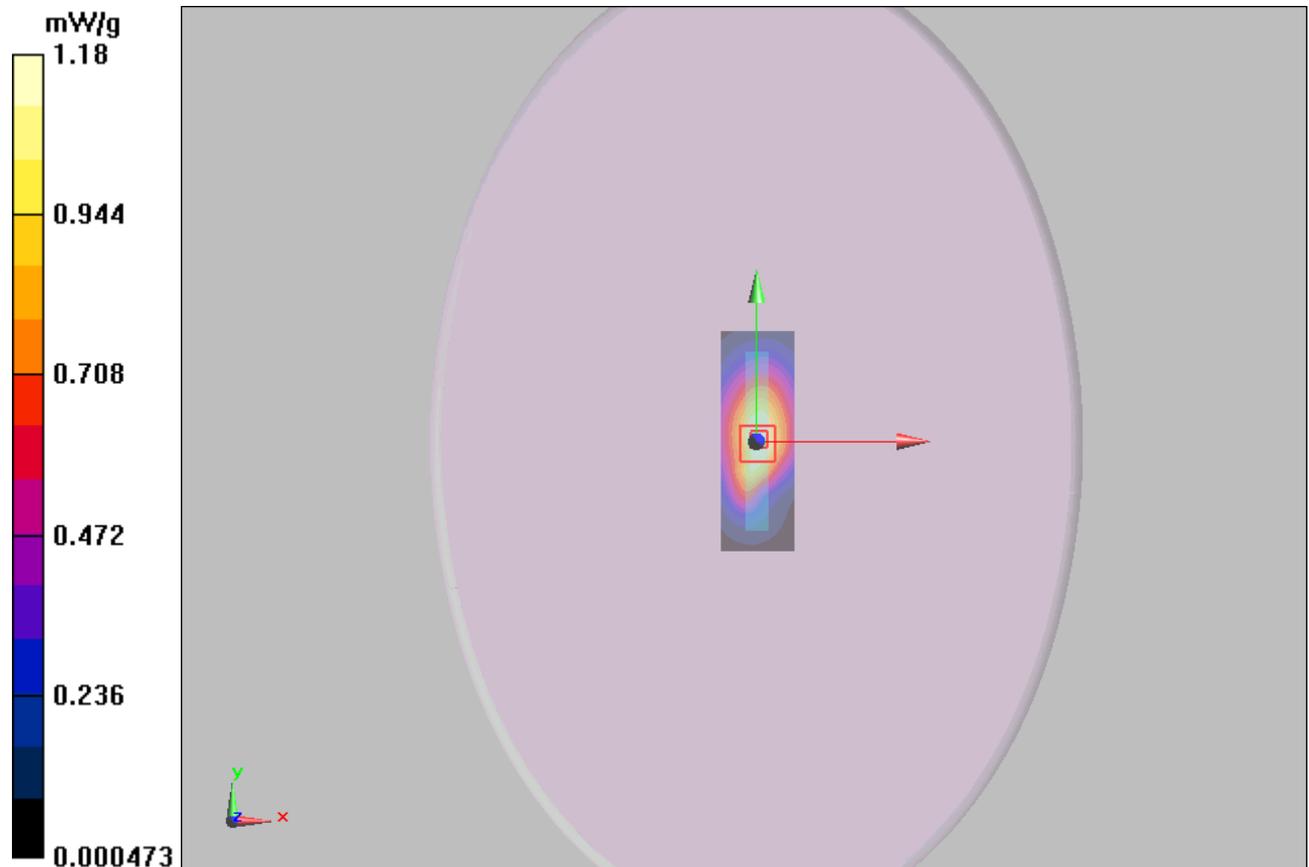


Figure 23 GSM 850 EGPRS (4Txslots) Test Position 3 Channel 128

**GSM 1900 GPRS (1Txslot) Test Position 1 Middle**

Date/Time: 3/13/2011 9:46:27 AM

Communication System: PCS 1900+GPRS(1Up); Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.484 mW/g

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

Reference Value = 5.5 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 0.724 W/kg

**SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.240 mW/g**

Maximum value of SAR (measured) = 0.444 mW/g

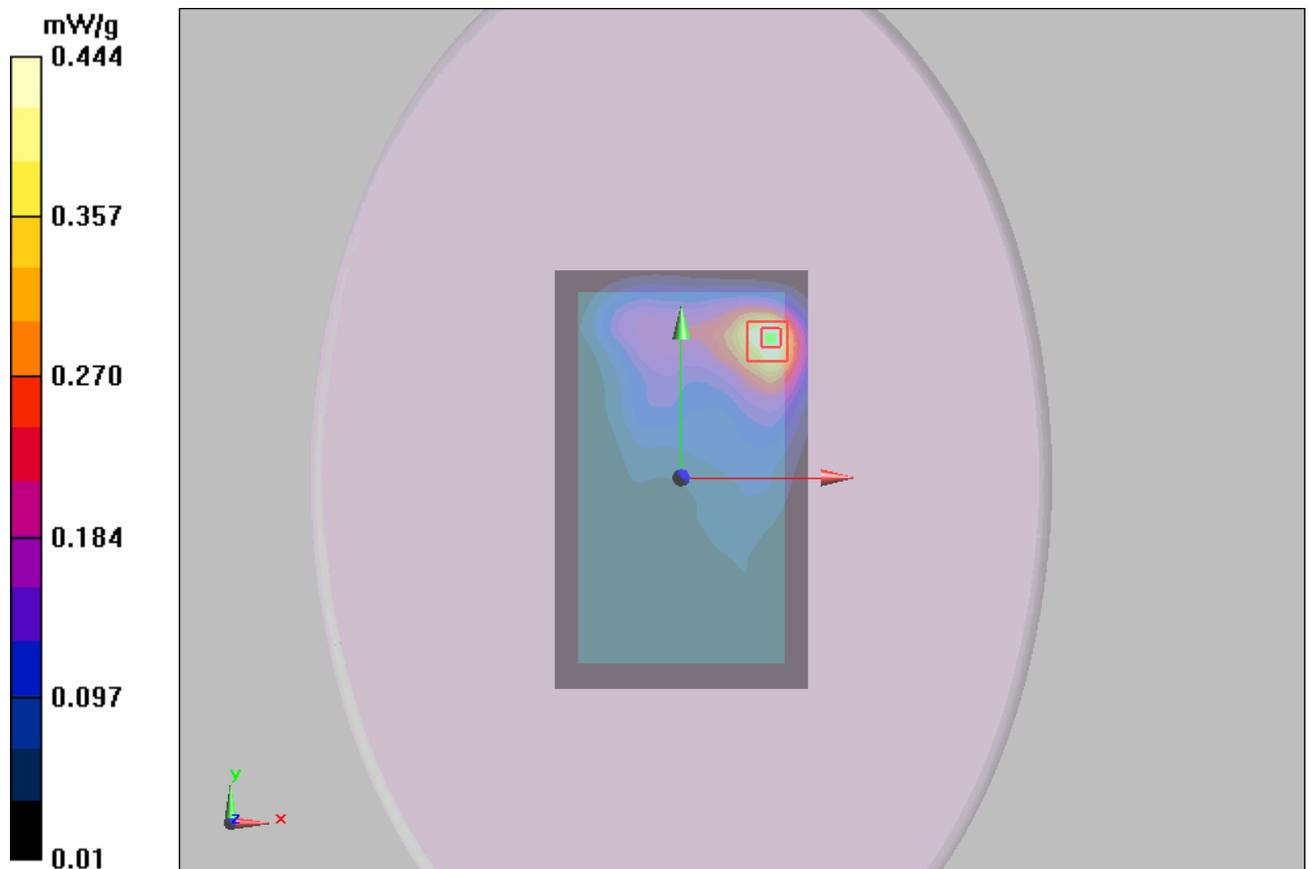


Figure 24 GSM 1900 GPRS (1Txslot) Test Position 1 Channel 661

**GSM 1900 GPRS (2Txslots) Test Position 1 Middle**

Date/Time: 3/13/2011 10:36:21 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.555 mW/g

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

Reference Value = 6.49 V/m; Power Drift = -0.175 dB

Peak SAR (extrapolated) = 0.873 W/kg

**SAR(1 g) = 0.487 mW/g; SAR(10 g) = 0.272 mW/g**

Maximum value of SAR (measured) = 0.531 mW/g

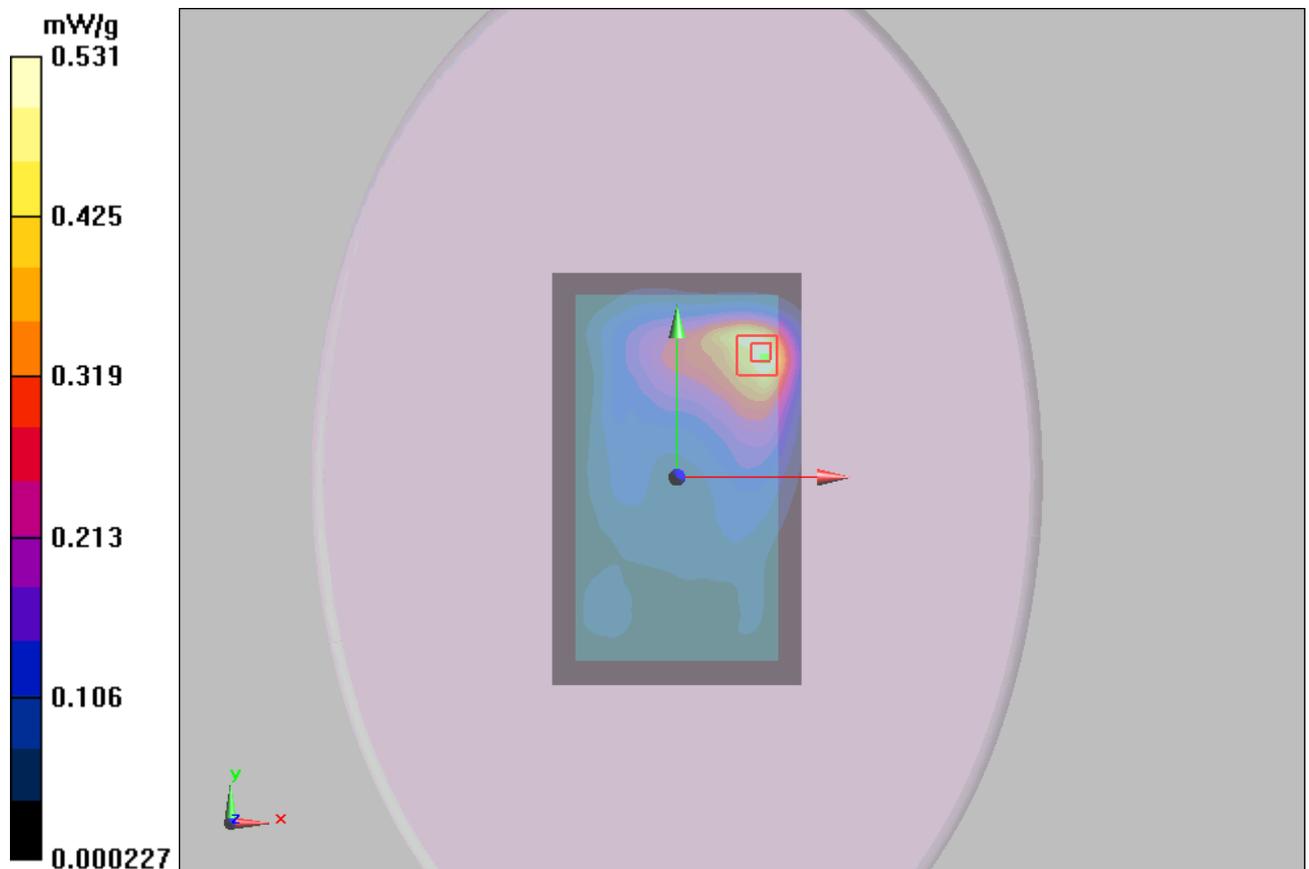


Figure 25 GSM 1900 GPRS (2Txslots) Test Position 1 Channel 661

**GSM 1900 GPRS (3Txslots) Test Position 1 Middle**

Date/Time: 3/13/2011 11:32:00 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.632 mW/g

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

Reference Value = 6.83 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.04 W/kg

**SAR(1 g) = 0.575 mW/g; SAR(10 g) = 0.340 mW/g**

Maximum value of SAR (measured) = 0.618 mW/g

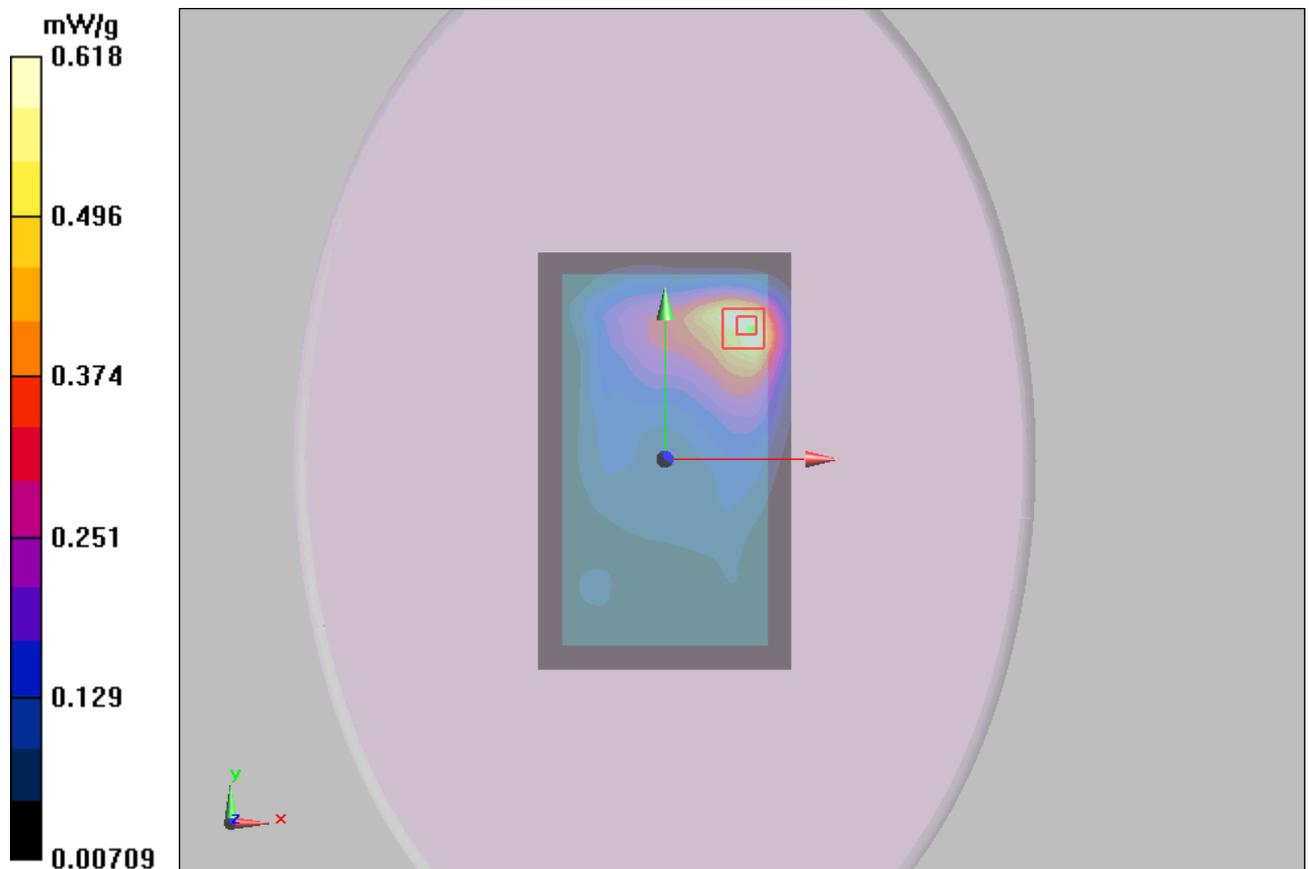


Figure 26 GSM 1900 GPRS (3Txslots) Test Position 1 Channel 661

**GSM 1900 GPRS (4Txslots) Test Position 1 Middle**

Date/Time: 3/13/2011 12:27:21 PM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.679 mW/g

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

Reference Value = 7.15 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 1.46 W/kg

**SAR(1 g) = 0.605 mW/g; SAR(10 g) = 0.348 mW/g**

Maximum value of SAR (measured) = 0.659 mW/g

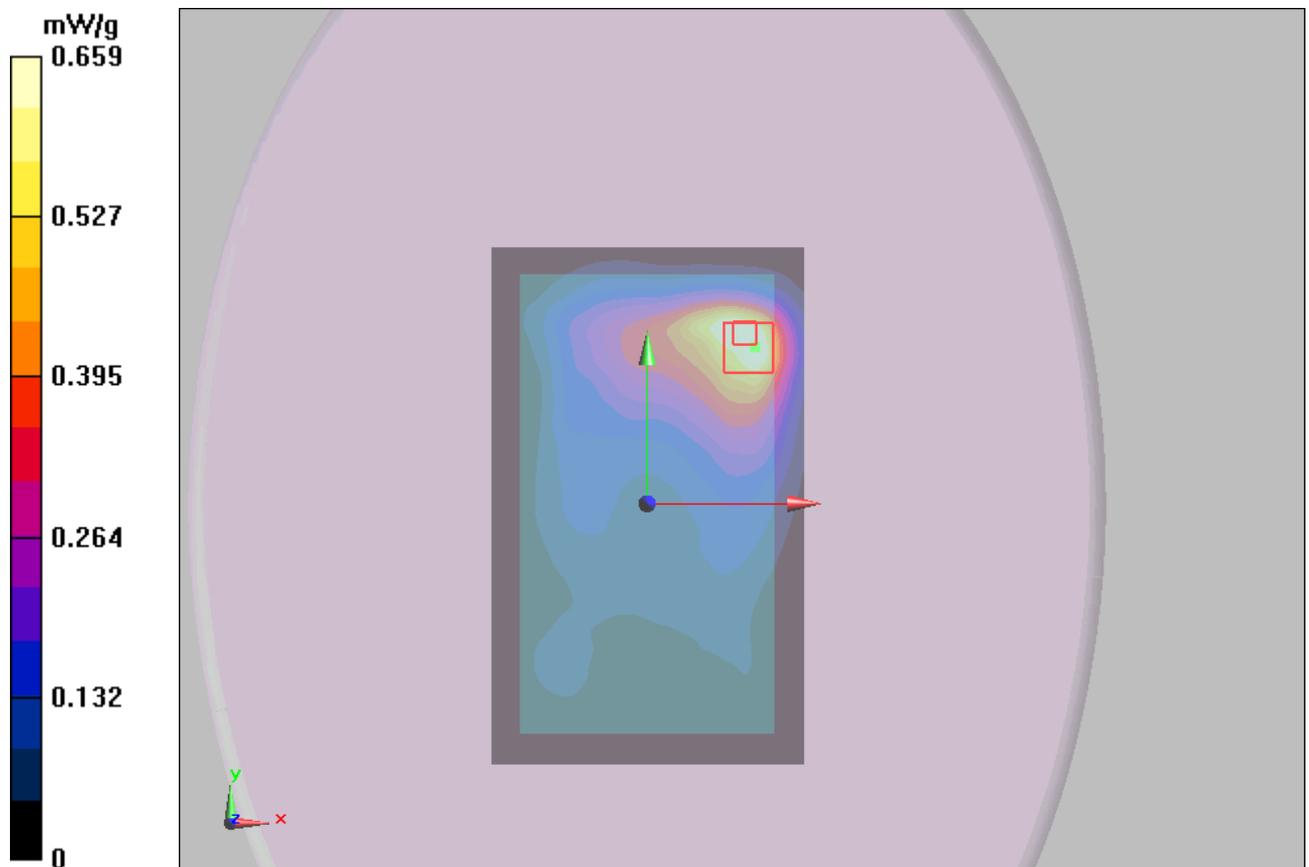


Figure 27 GSM 1900 GPRS (4Txslots) Test Position 1 Channel 661

**GSM 1900 GPRS (4Txslots) Test Position 2 Middle**

Date/Time: 3/13/2011 9:25:55 AM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.629 mW/g

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

Reference Value = 5.86 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 1.31 W/kg

**SAR(1 g) = 0.531 mW/g; SAR(10 g) = 0.300 mW/g**

Maximum value of SAR (measured) = 0.585 mW/g

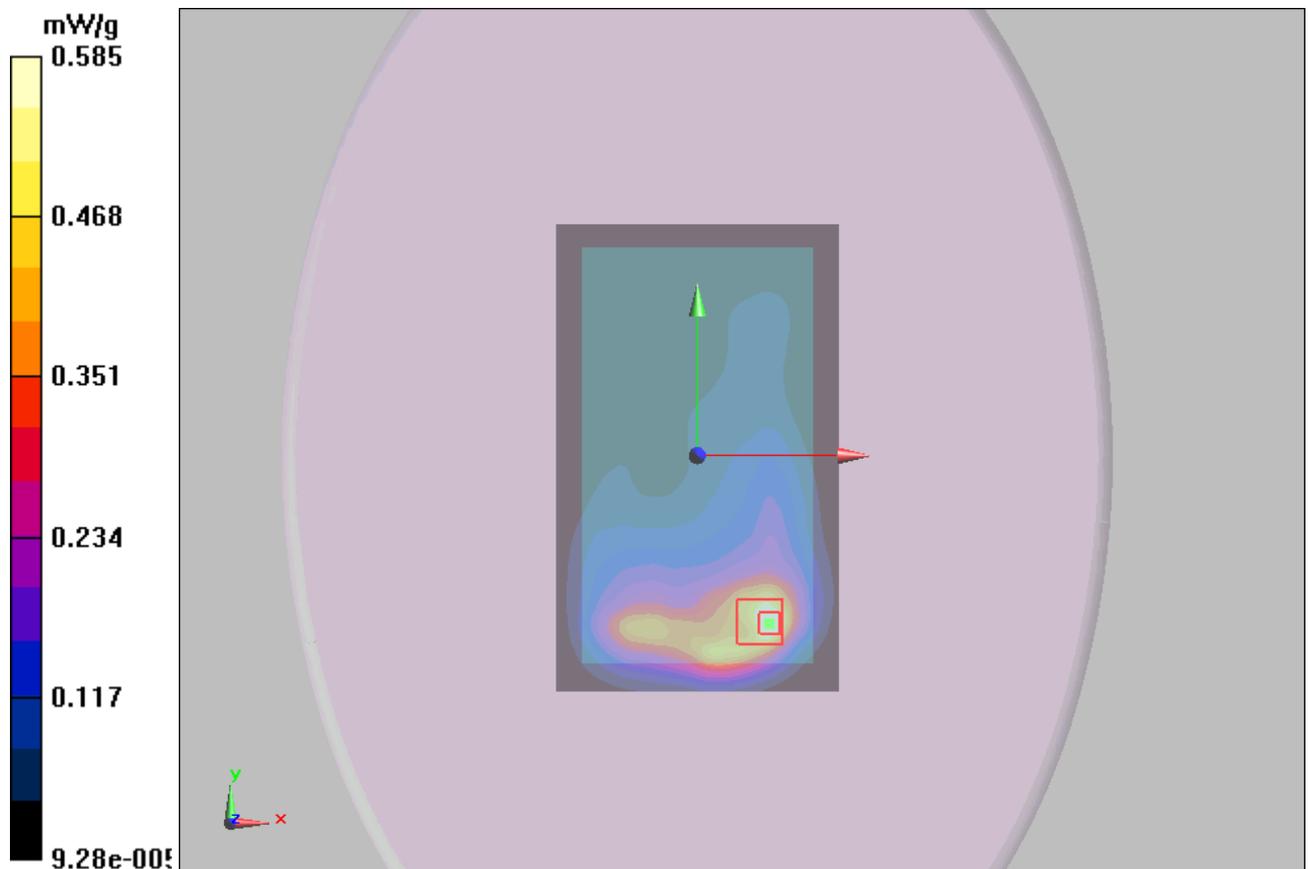


Figure 28 GSM 1900 GPRS (4Txslots) Test Position 2 Channel 661

**GSM 1900 GPRS (4Txslots) Test Position 3 High**

Date/Time: 3/13/2011 2:24:44 PM

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

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.56$  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

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 High/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.663 mW/g

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

Reference Value = 17.7 V/m; Power Drift = -0.075 dB

Peak SAR (extrapolated) = 0.951 W/kg

**SAR(1 g) = 0.558 mW/g; SAR(10 g) = 0.297 mW/g**

Maximum value of SAR (measured) = 0.638 mW/g

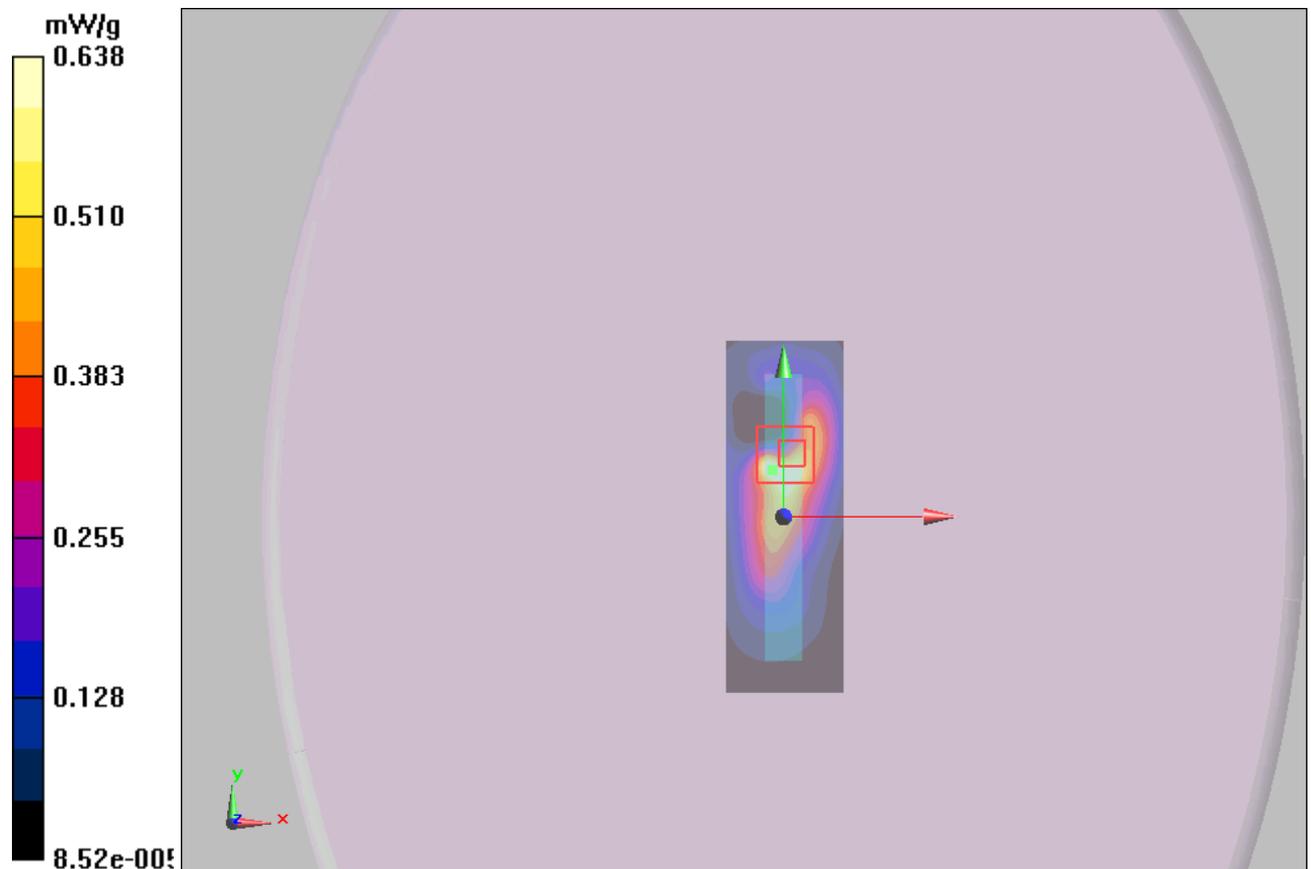


Figure 29 GSM 1900 GPRS (4Txslots) Test Position 3 Channel 810

**GSM 1900 GPRS (4Txslots) Test Position 3 Middle**

Date/Time: 3/13/2011 1:38:51 PM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Middle/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.953 mW/g

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

Reference Value = 19.9 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 1.5 W/kg

**SAR(1 g) = 0.872 mW/g; SAR(10 g) = 0.484 mW/g**

Maximum value of SAR (measured) = 0.970 mW/g

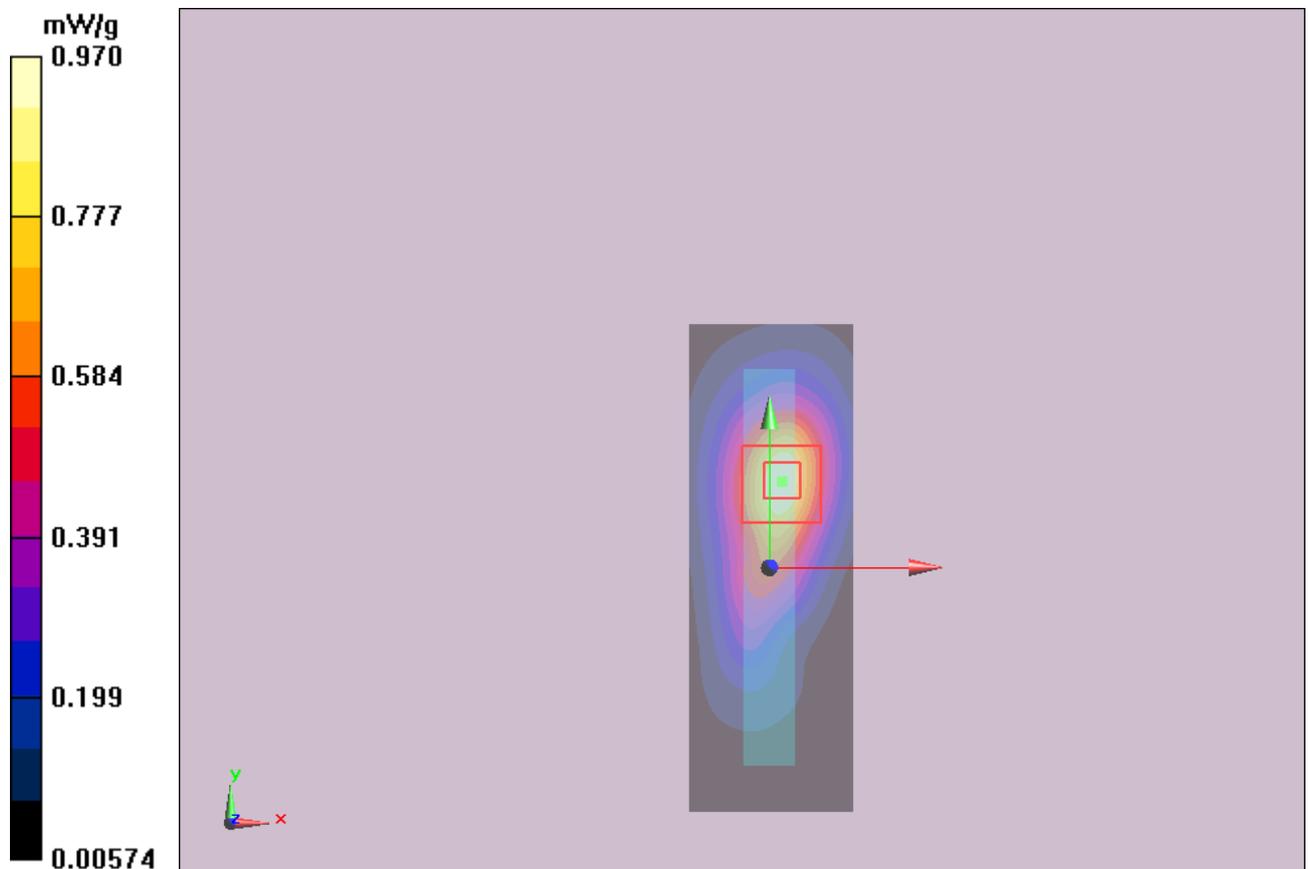


Figure 30 GSM 1900 GPRS (4Txslots) Test Position 3 Channel 661

**GSM 1900 GPRS (4Txslots) Test Position 3 Low**

Date/Time: 3/13/2011 1:51:03 PM

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

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Low/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

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

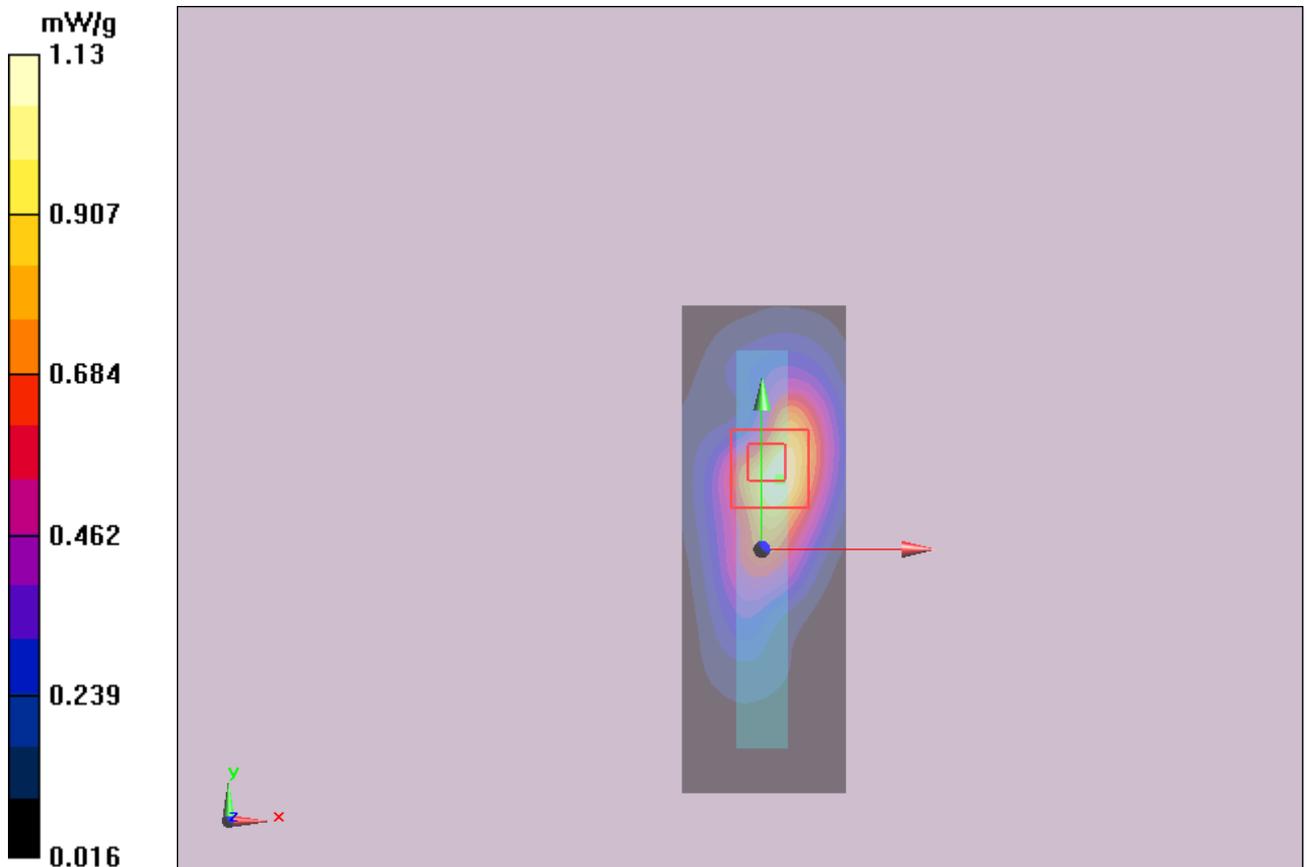
**Test Position 3 Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.4 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 1.65 W/kg

**SAR(1 g) = 0.925 mW/g; SAR(10 g) = 0.523 mW/g**

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



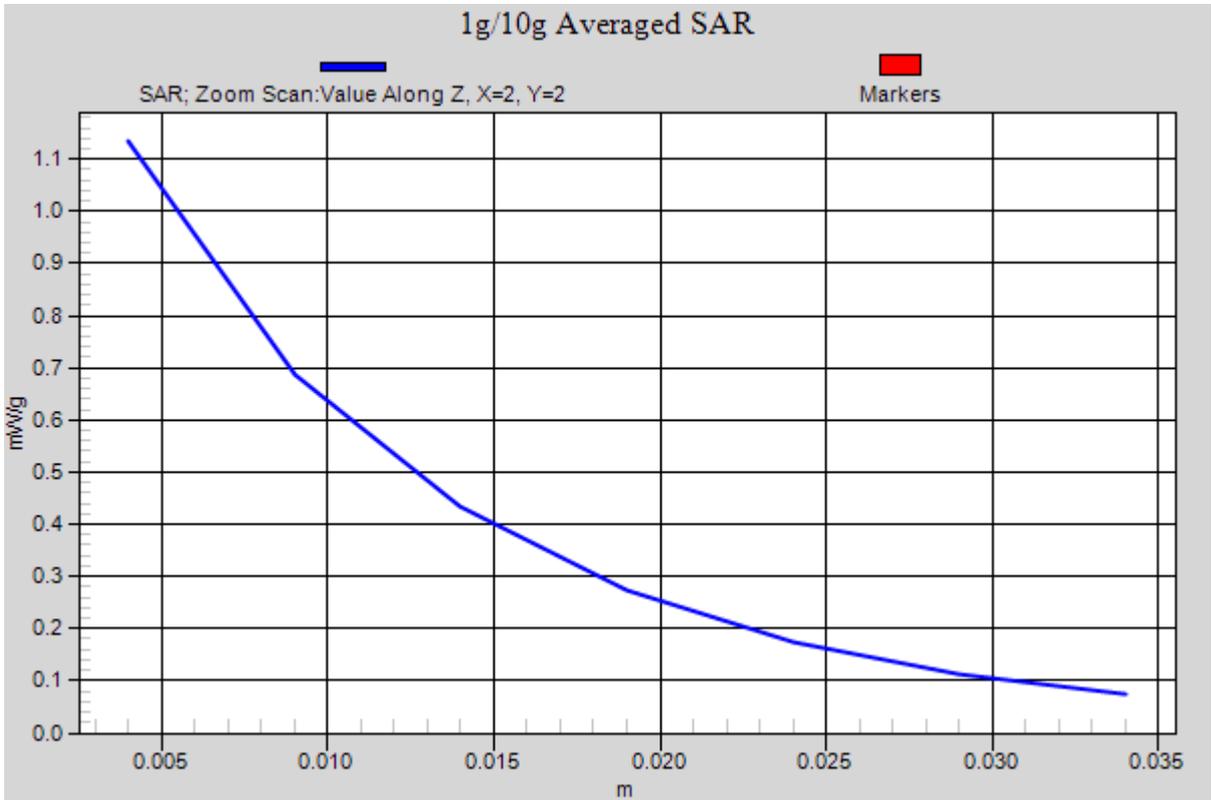


Figure 31 GSM 1900 GPRS (4Txslots) Test Position 3 Channel 512

**GSM 1900 GPRS (4Txslots) Test Position 5 Middle**

Date/Time: 3/13/2011 3:56:13 PM

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 5 Middle/Area Scan (31x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.314 mW/g

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

Reference Value = 12.7 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 0.514 W/kg

**SAR(1 g) = 0.298 mW/g; SAR(10 g) = 0.167 mW/g**

Maximum value of SAR (measured) = 0.324 mW/g

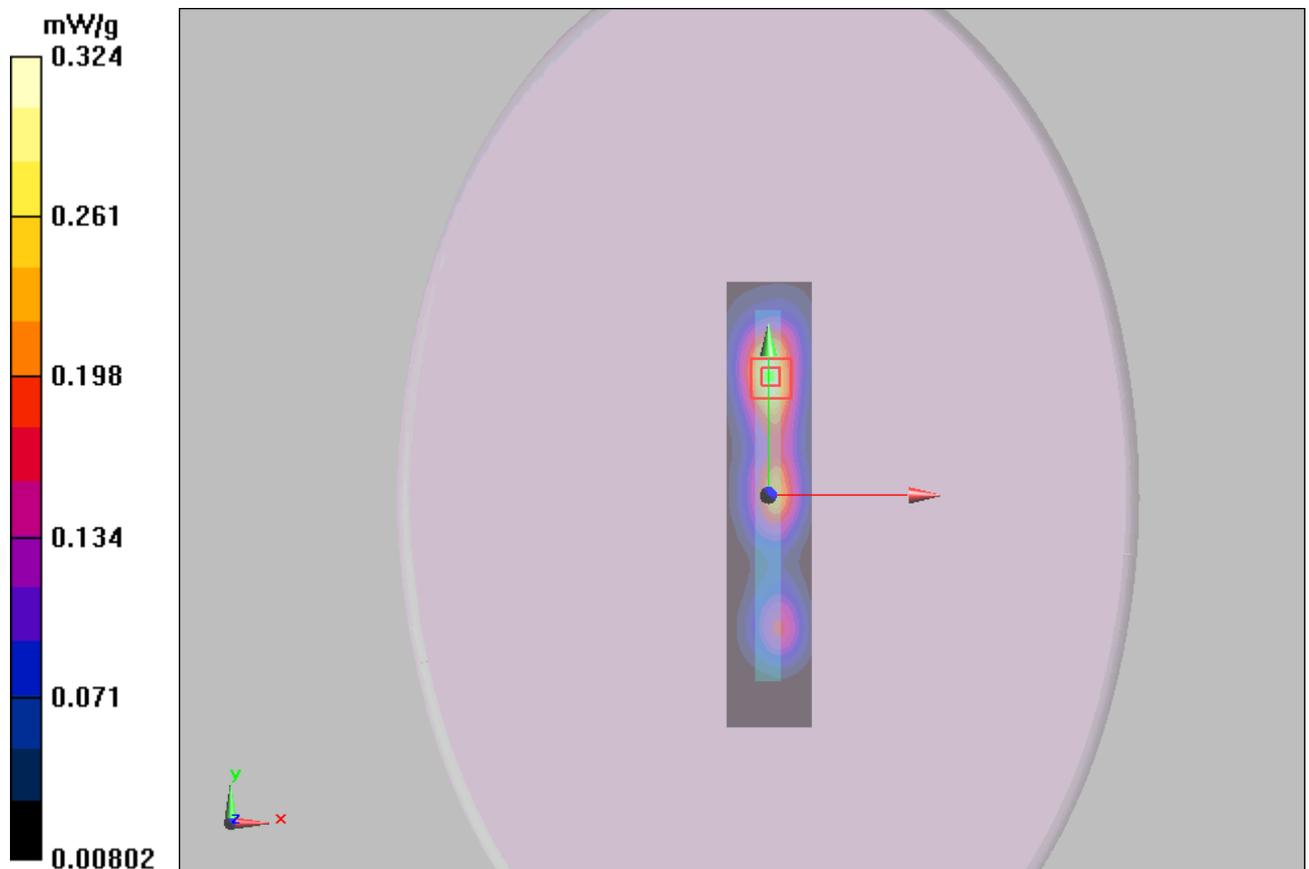


Figure 32 GSM 1900 GPRS (4Txslots) Test Position 5 Channel 661

**GSM 1900 EGPRS (4Txslots) Test Position 3 Low**

Date/Time: 3/13/2011 3:21:15 PM

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

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Low/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.06 mW/g

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

Reference Value = 22.8 V/m; Power Drift = -0.124 dB

Peak SAR (extrapolated) = 1.74 W/kg

**SAR(1 g) = 0.896 mW/g; SAR(10 g) = 0.501 mW/g**

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



Figure 33 GSM 1900 EGPRS (4Txslots) Test Position 3 Channel 512

**WCDMA Band II Test Position 1 Middle**

Date/Time: 3/13/2011 4:20:35 PM

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.779 mW/g

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

Reference Value = 7.09 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 1.15 W/kg

**SAR(1 g) = 0.639 mW/g; SAR(10 g) = 0.377 mW/g**

Maximum value of SAR (measured) = 0.681 mW/g

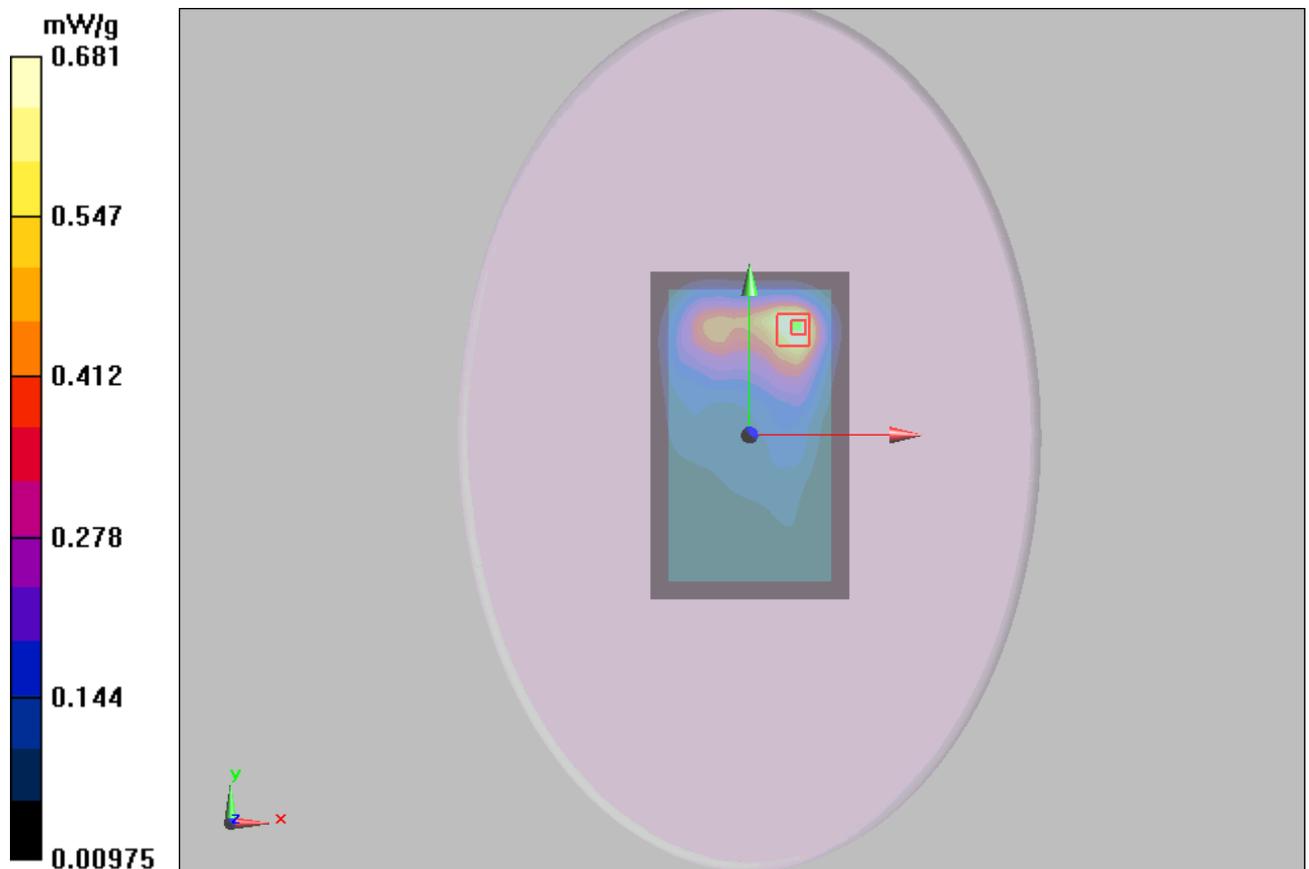


Figure 34 WCDMA Band II Test Position 1 Channel 9400

**WCDMA Band II Test Position 2 Middle**

Date/Time: 3/13/2011 6:26:37 PM

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.747 mW/g

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

Reference Value = 5.56 V/m; Power Drift = -0.044 dB

Peak SAR (extrapolated) = 1.11 W/kg

**SAR(1 g) = 0.593 mW/g; SAR(10 g) = 0.348 mW/g**

Maximum value of SAR (measured) = 0.645 mW/g

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

Reference Value = 5.56 V/m; Power Drift = -0.044 dB

Peak SAR (extrapolated) = 0.956 W/kg

**SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.331 mW/g**

Maximum value of SAR (measured) = 0.591 mW/g

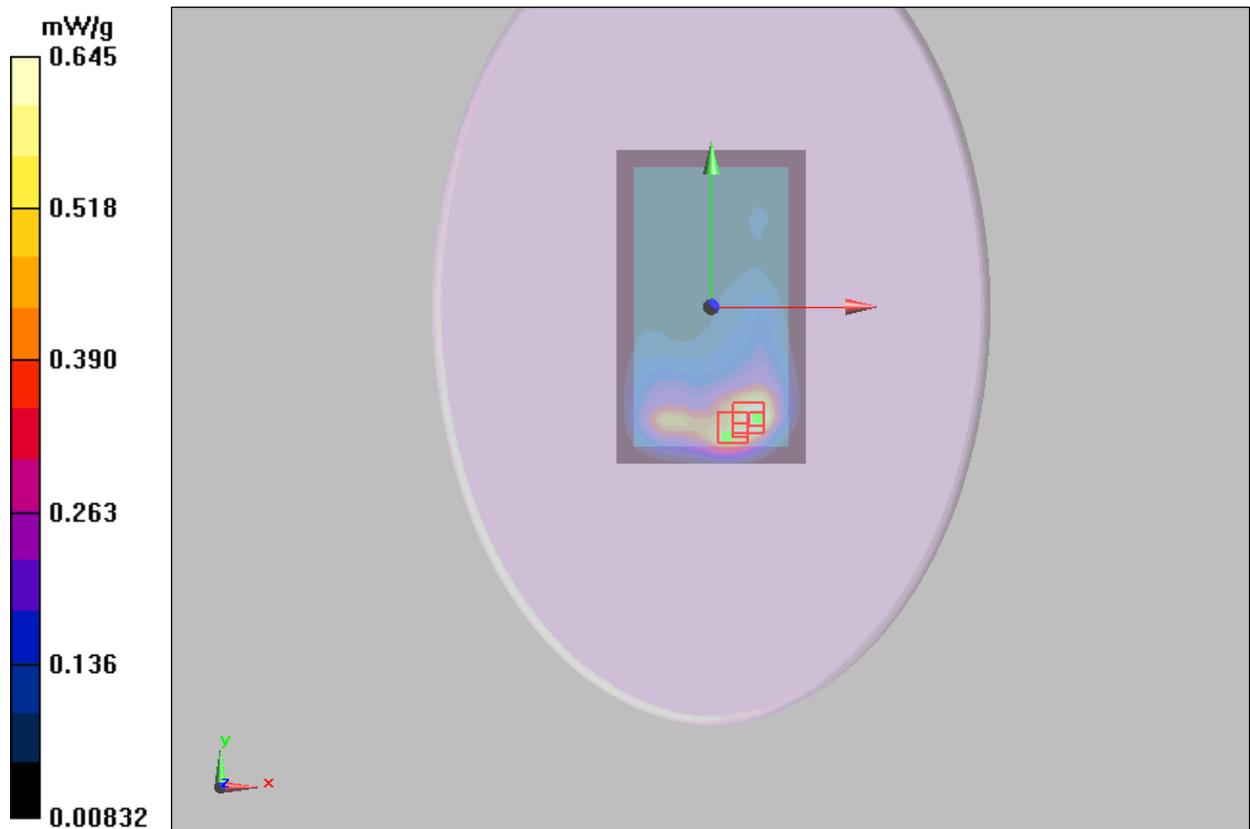


Figure 35 WCDMA Band II Test Position 2 Channel 9400

### WCDMA Band II Test Position 3 High

Date/Time: 3/13/2011 5:46:43 PM

Communication System: WCDMA Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.56$  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

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 High/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.953 mW/g

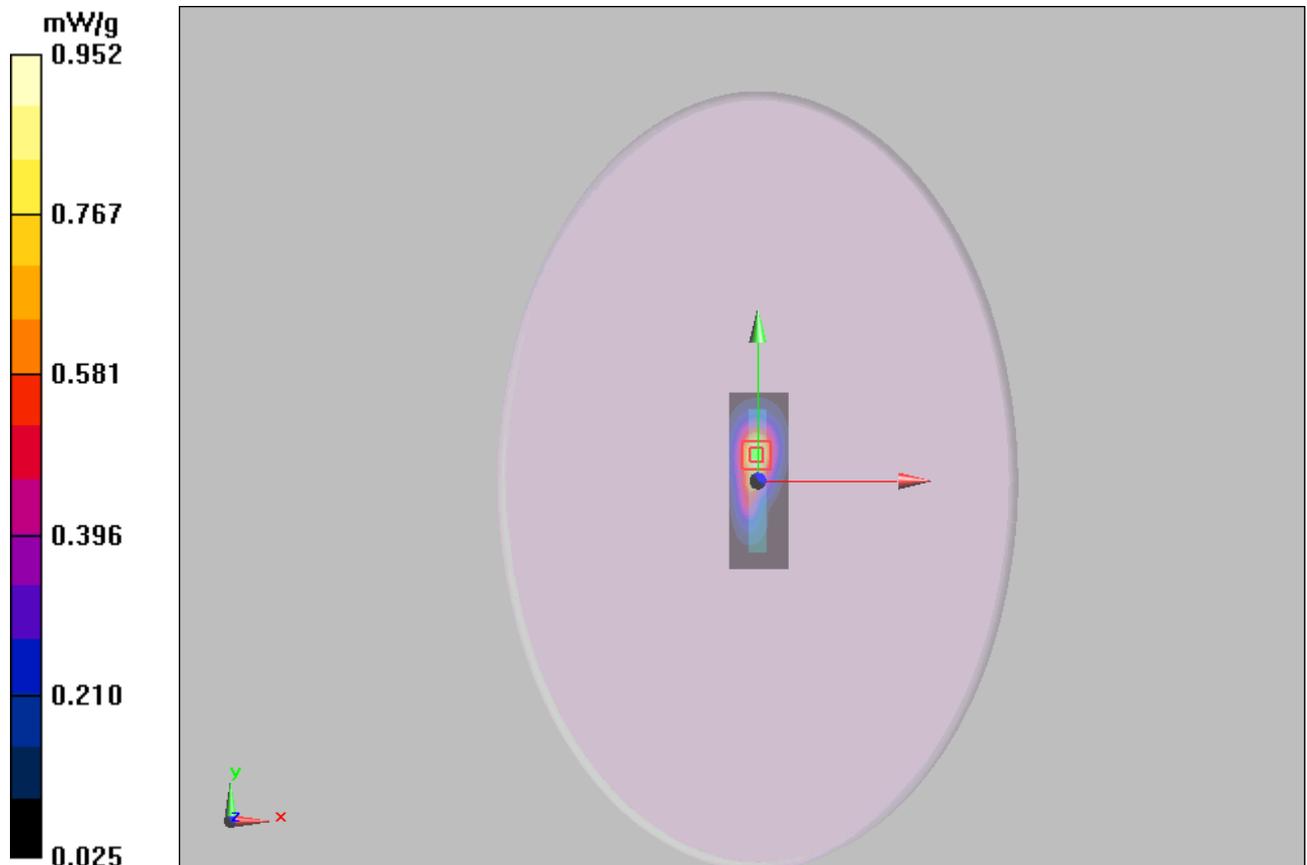
**Test Position 3 High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.4 V/m; Power Drift = 0.139 dB

Peak SAR (extrapolated) = 1.46 W/kg

**SAR(1 g) = 0.855 mW/g; SAR(10 g) = 0.476 mW/g**

Maximum value of SAR (measured) = 0.952 mW/g



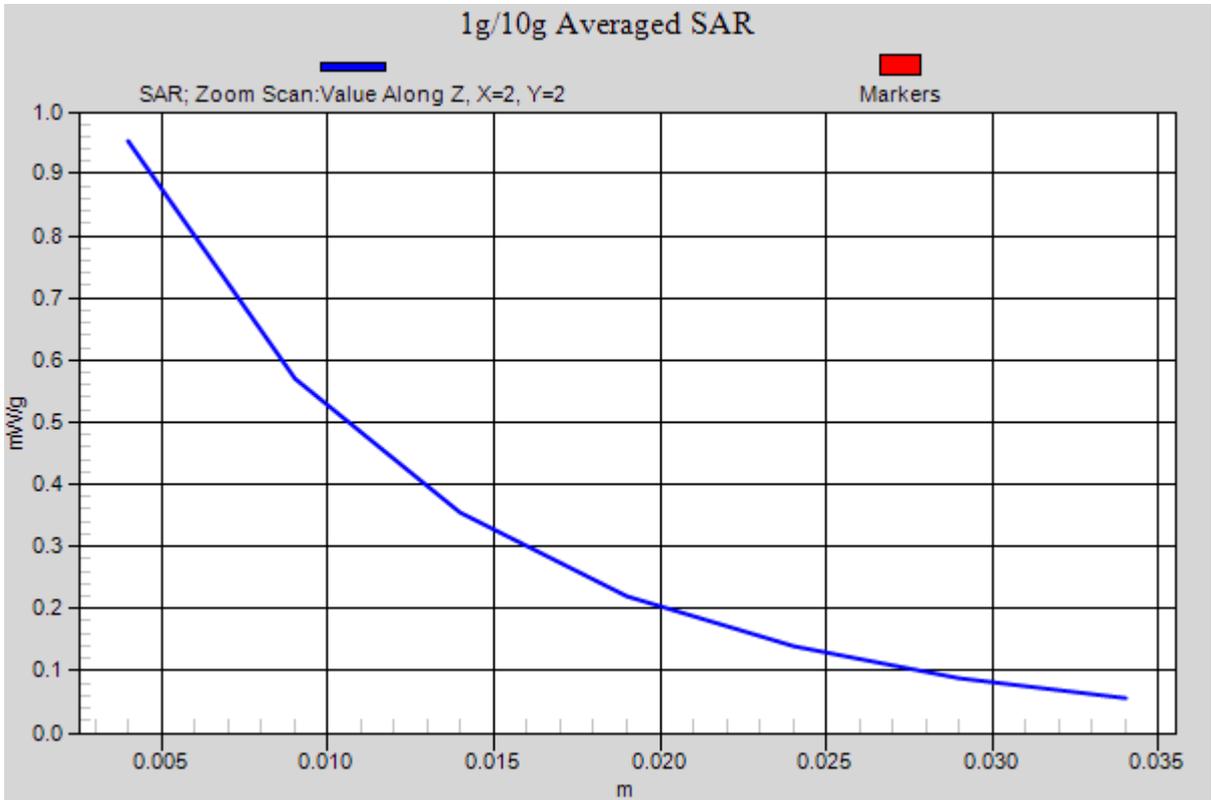


Figure 36 WCDMA Band II Test Position 3 Channel 9538

### WCDMA Band II Test Position 3 Middle

Date/Time: 3/13/2011 5:25:14 PM

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Middle/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.859 mW/g

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

Reference Value = 20.5 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 1.25 W/kg

**SAR(1 g) = 0.734 mW/g; SAR(10 g) = 0.416 mW/g**

Maximum value of SAR (measured) = 0.811 mW/g

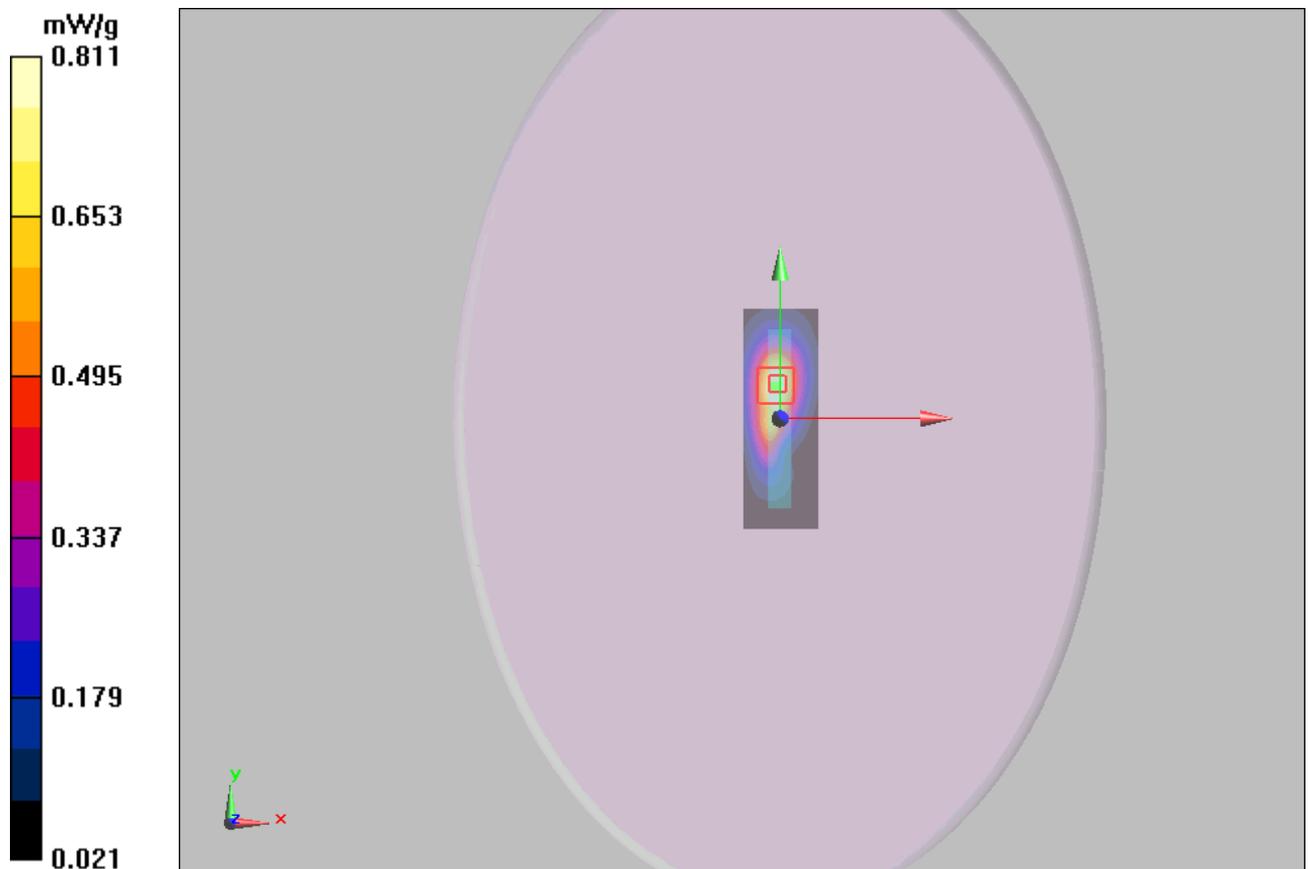


Figure 37 WCDMA Band II Test Position 3 Channel 9400

**WCDMA Band II Test Position 3 Low**

Date/Time: 3/13/2011 5:58:37 PM

Communication System: WCDMA Band II; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Low/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 21.4 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 1.33 W/kg

**SAR(1 g) = 0.792 mW/g; SAR(10 g) = 0.449 mW/g**

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

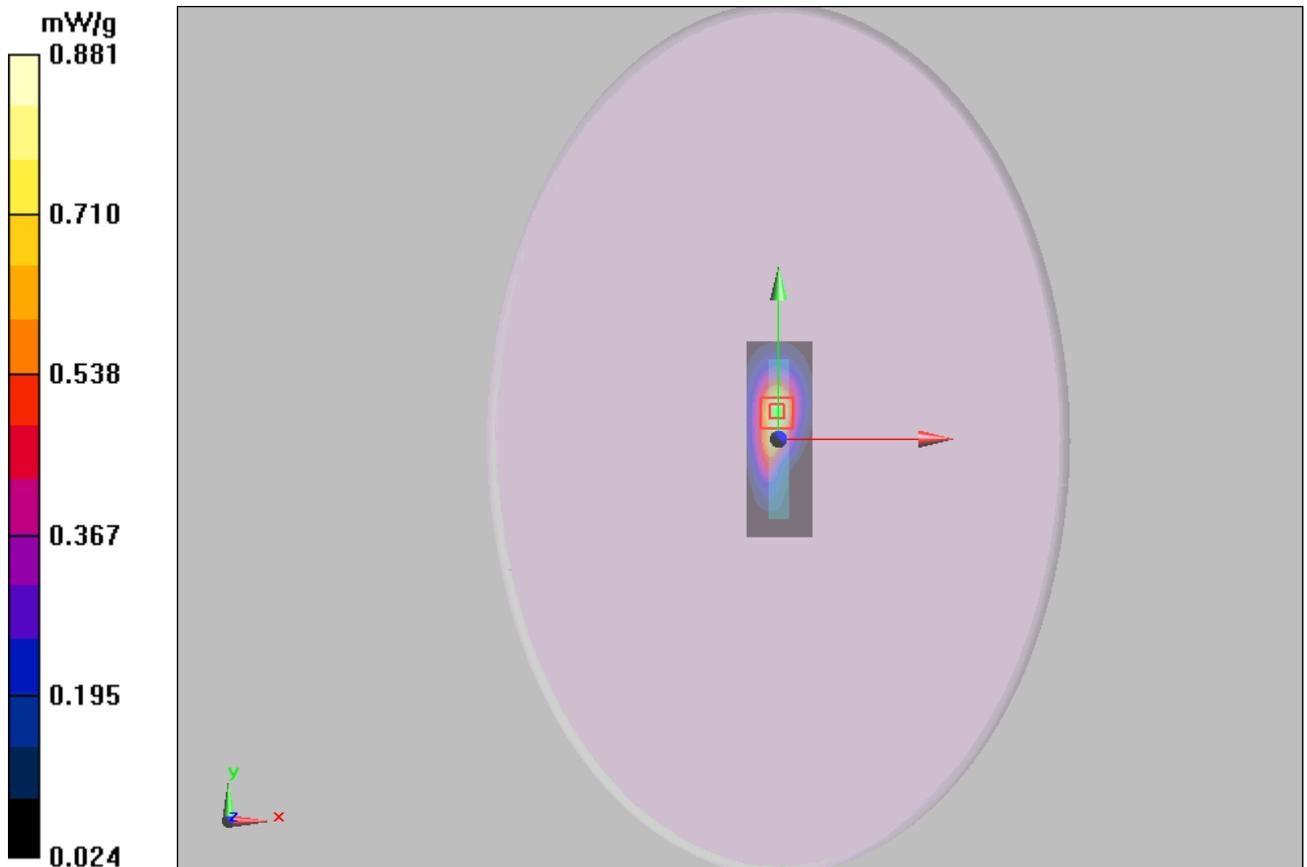


Figure 38 WCDMA Band II Test Position 3 Channel 9262

**WCDMA Band II Test Position 5 Middle**

Date/Time: 3/13/2011 7:03:06 PM

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.53$  mho/m;  $\epsilon_r = 53.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 5 Middle/Area Scan (31x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.241 mW/g

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

Reference Value = 10.4 V/m; Power Drift = -0.147 dB

Peak SAR (extrapolated) = 0.368 W/kg

**SAR(1 g) = 0.213 mW/g; SAR(10 g) = 0.121 mW/g**

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

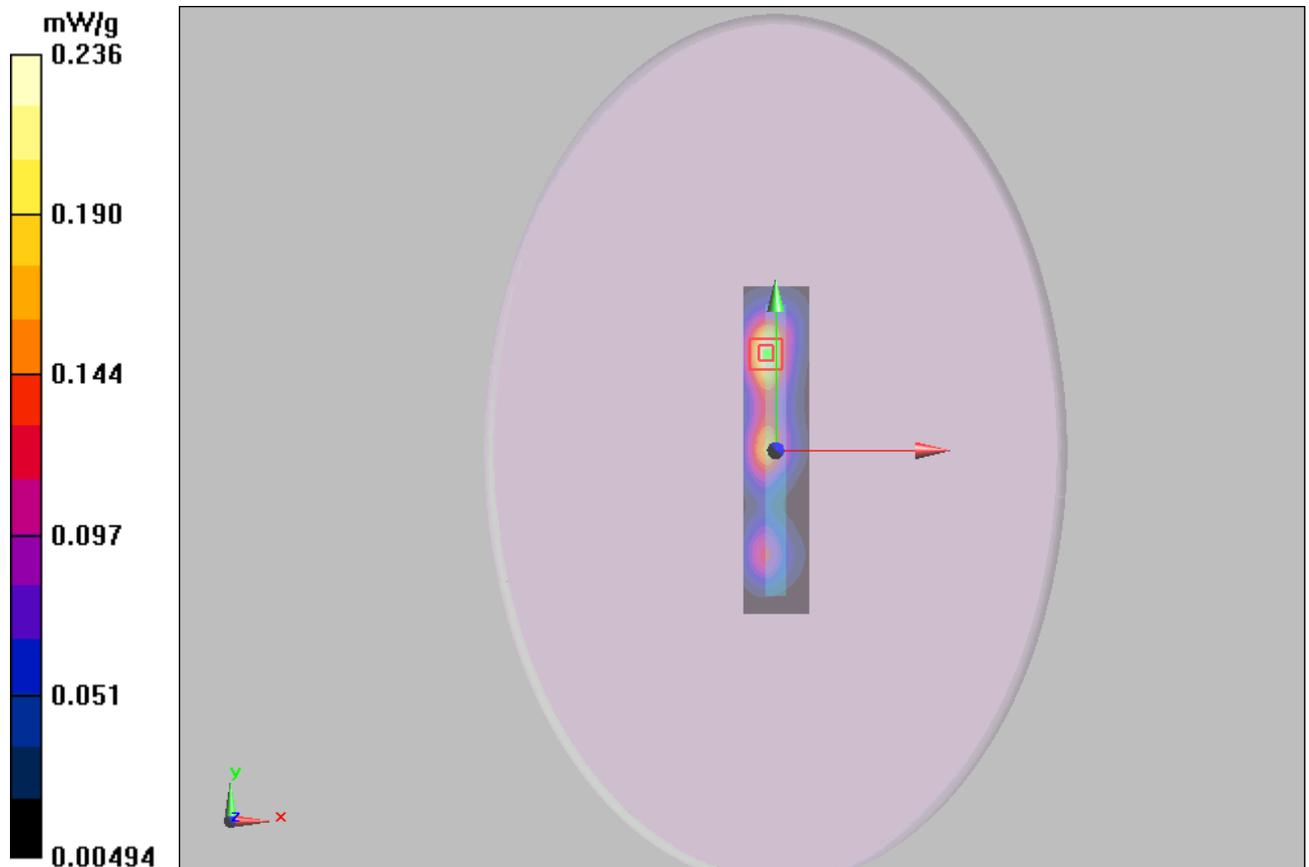


Figure 39 WCDMA Band II Test Position 5 Channel 9400

**WCDMA Band II HSDPA Test Position 3 High**

Date/Time: 3/13/2011 6:11:59 PM

Communication System: WCDMA Band II+HSDPA; Frequency: 1907.6 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.56$  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

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 High/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 20.5 V/m; Power Drift = -0.039 dB

Peak SAR (extrapolated) = 1.44 W/kg

**SAR(1 g) = 0.841 mW/g; SAR(10 g) = 0.467 mW/g**

Maximum value of SAR (measured) = 0.938 mW/g

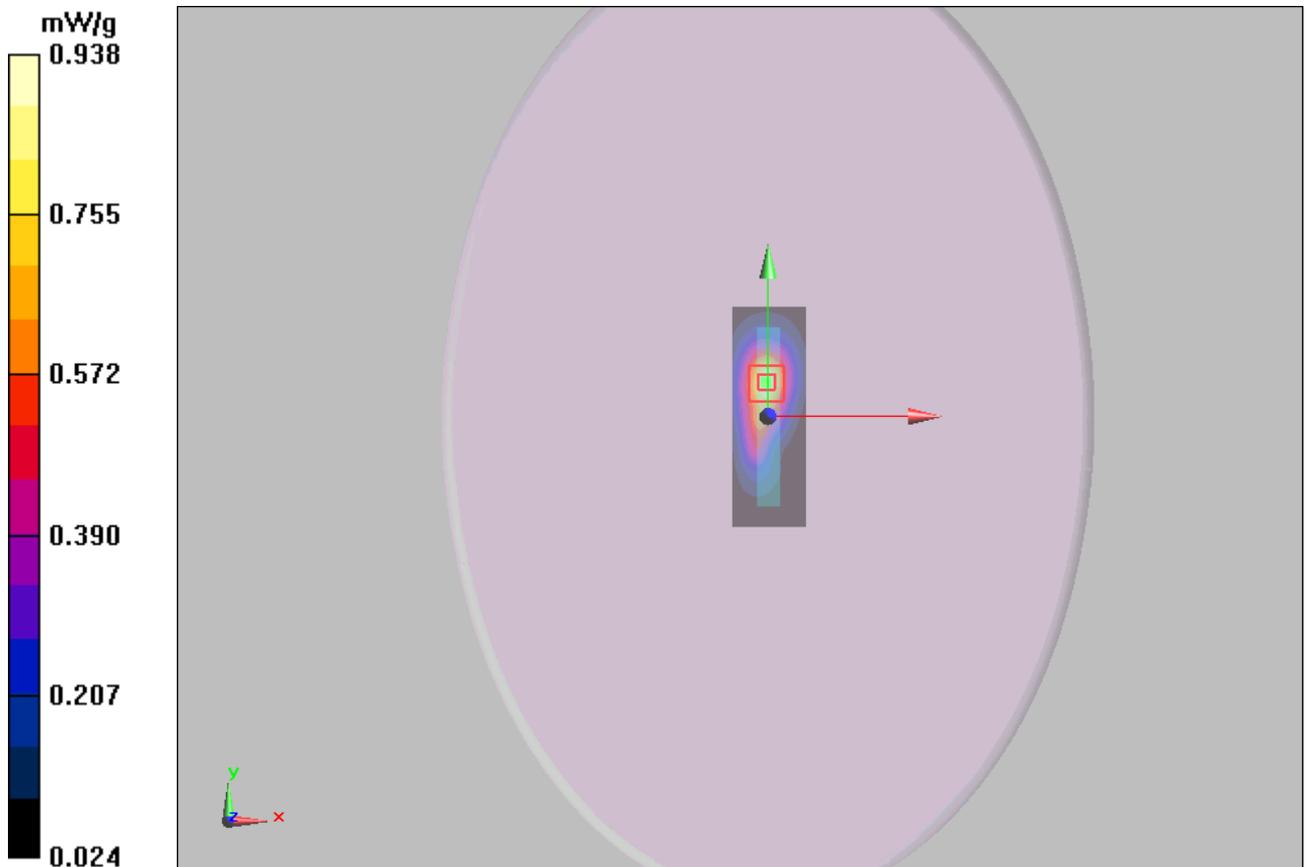


Figure 40 WCDMA Band II HSDPA Test Position 3 Channel 9538

**WCDMA Band II HSUPA Test Position 3 High**

Date/Time: 3/13/2011 7:26:17 PM

Communication System: WCDMA Band II+HSUPA; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.56$  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

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 High/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.730 mW/g

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

Reference Value = 17.3 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.634 mW/g; SAR(10 g) = 0.370 mW/g**

Maximum value of SAR (measured) = 0.705 mW/g

**Test Position 3 High/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.3 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 0.643 W/kg

**SAR(1 g) = 0.349 mW/g; SAR(10 g) = 0.185 mW/g**

Maximum value of SAR (measured) = 0.402 mW/g

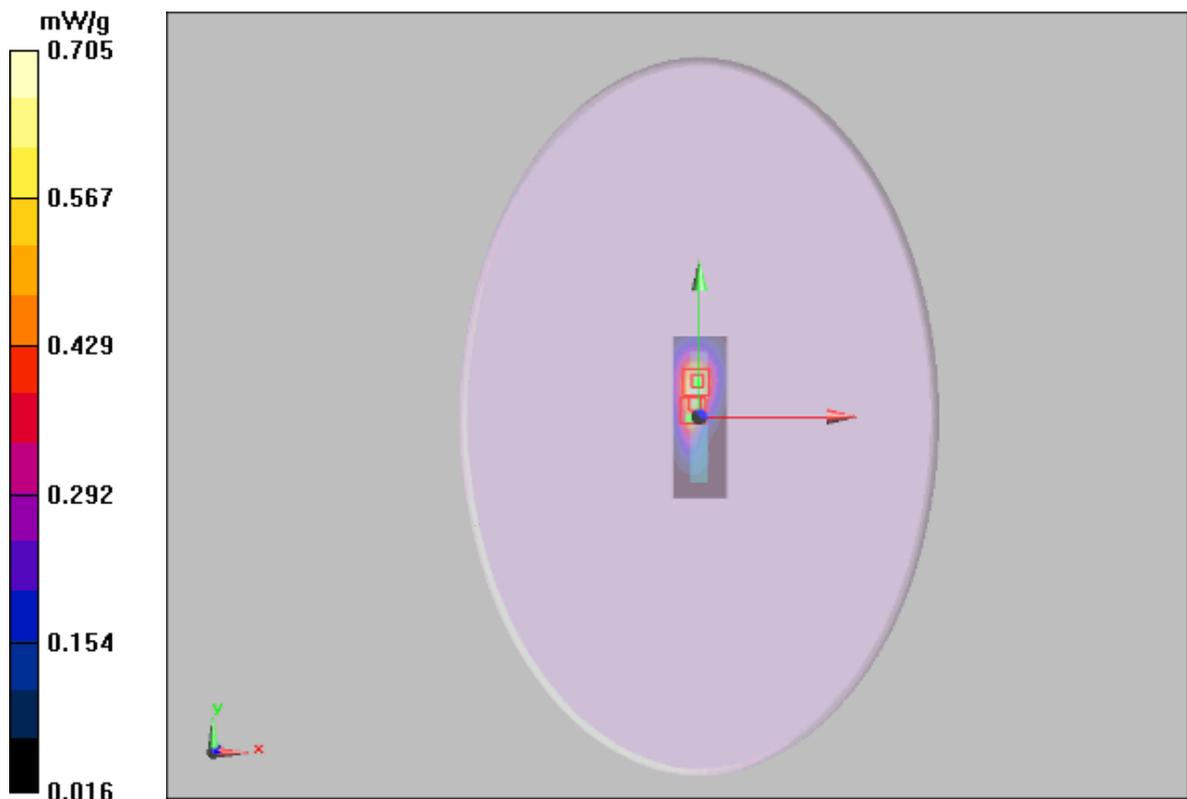


Figure 41 WCDMA Band II HSUPA Test Position 3 Channel 9538

**WCDMA Band V Test Position 1 Middle**

Date/Time: 3/12/2011 11:31:57 AM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 1 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.599 mW/g

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

Reference Value = 8.89 V/m; Power Drift = 0.049 dB

Peak SAR (extrapolated) = 0.786 W/kg

**SAR(1 g) = 0.529 mW/g; SAR(10 g) = 0.365 mW/g**

Maximum value of SAR (measured) = 0.565 mW/g

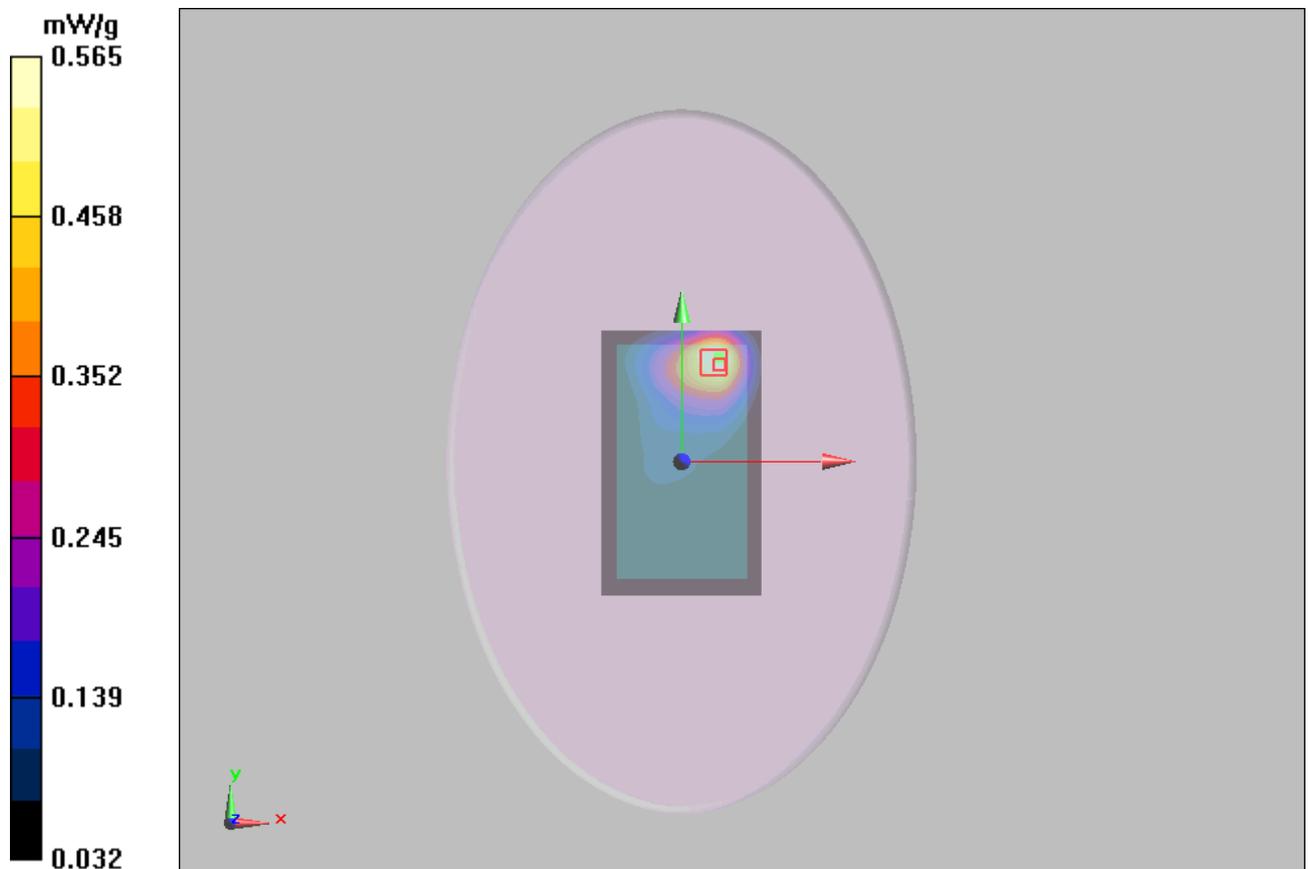


Figure 42 WCDMA Band V Test Position 1 Channel 4183

### WCDMA Band V Test Position 2 High

Date/Time: 3/12/2011 9:00:47 PM

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

Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.961$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 High/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.542 mW/g

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

Reference Value = 7.39 V/m; Power Drift = -0.117 dB

Peak SAR (extrapolated) = 0.736 W/kg

**SAR(1 g) = 0.499 mW/g; SAR(10 g) = 0.339 mW/g**

Maximum value of SAR (measured) = 0.533 mW/g

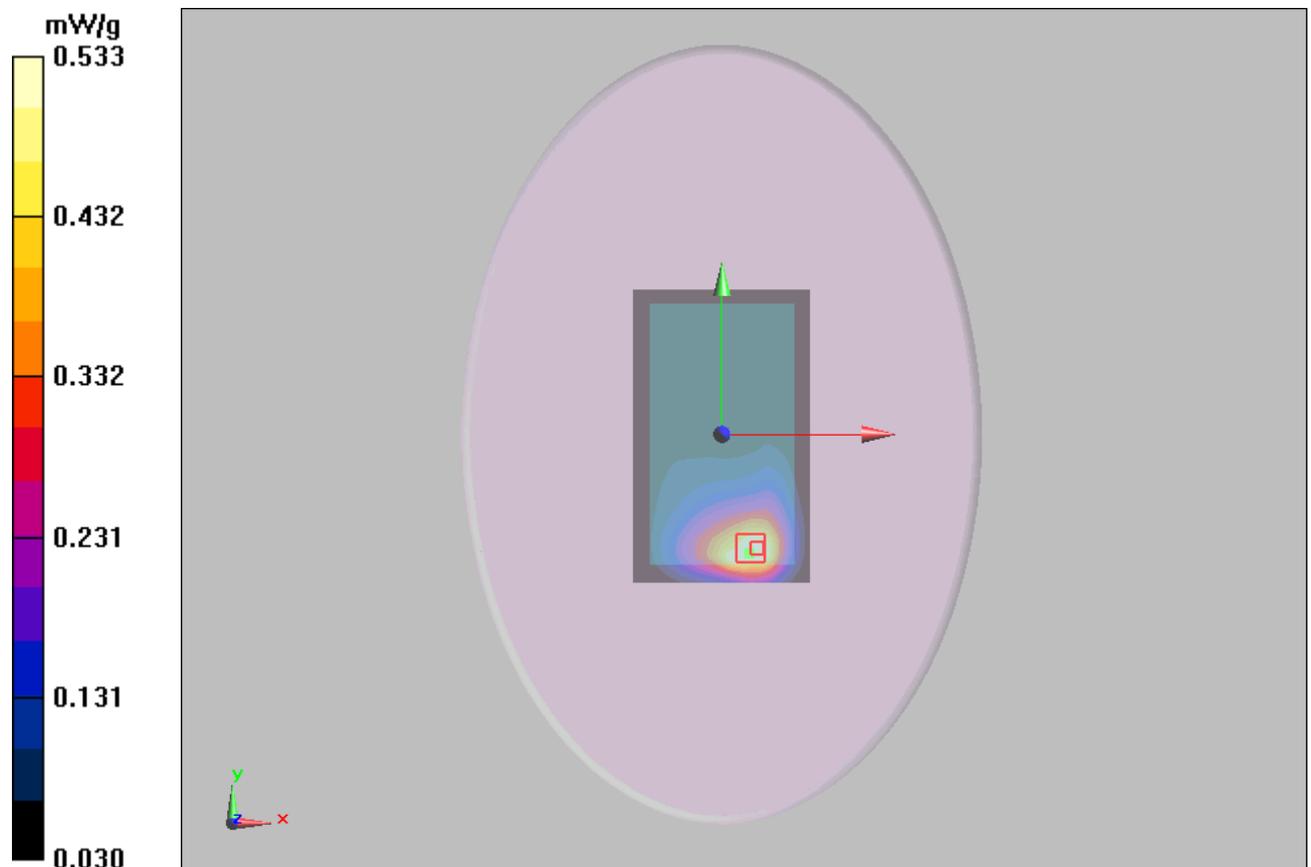


Figure 43 WCDMA Band V Test Position 2 Channel 4233

**WCDMA Band V Test Position 2 Middle**

Date/Time: 3/12/2011 4:29:30 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

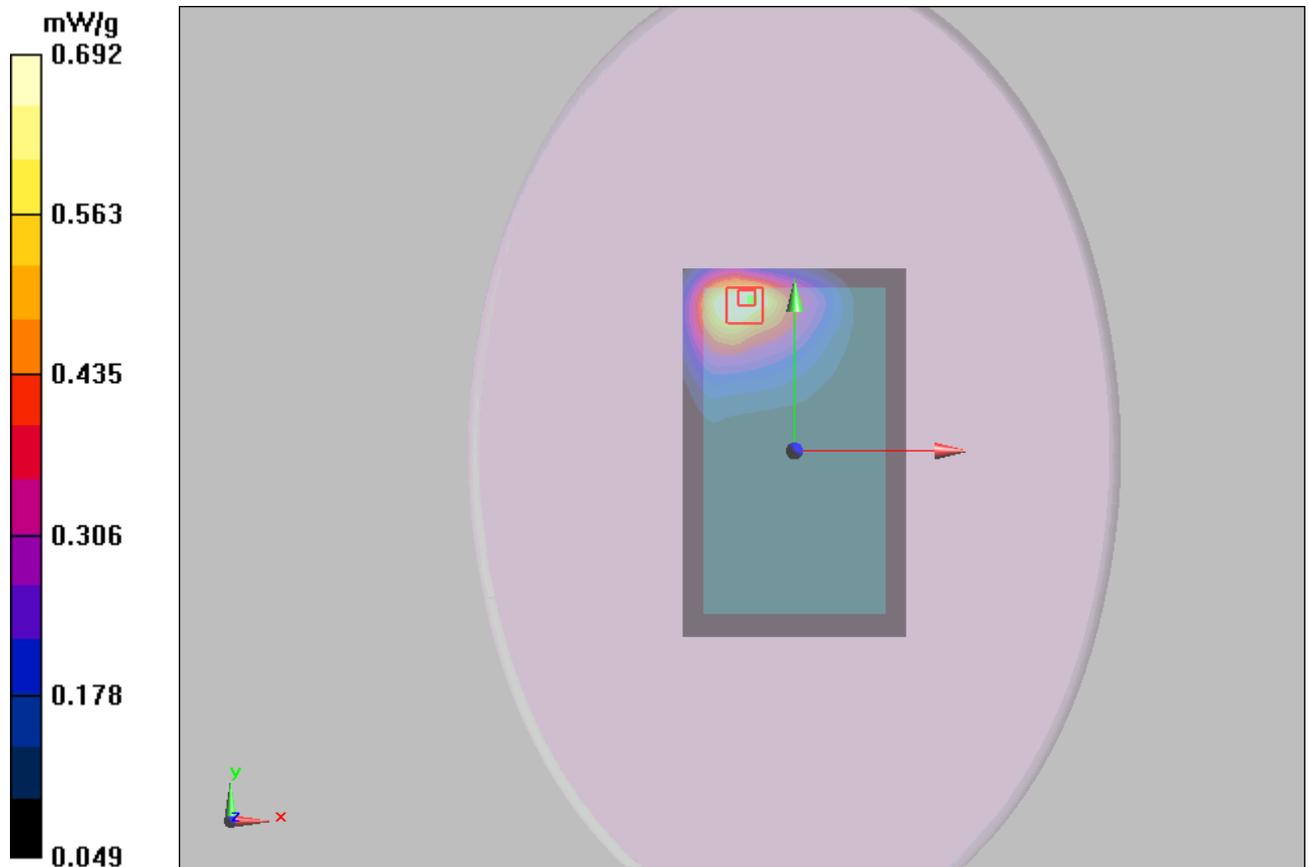
**Test Position 2 Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.13 V/m; Power Drift = -0.084 dB

Peak SAR (extrapolated) = 0.986 W/kg

**SAR(1 g) = 0.649 mW/g; SAR(10 g) = 0.432 mW/g**

Maximum value of SAR (measured) = 0.692 mW/g



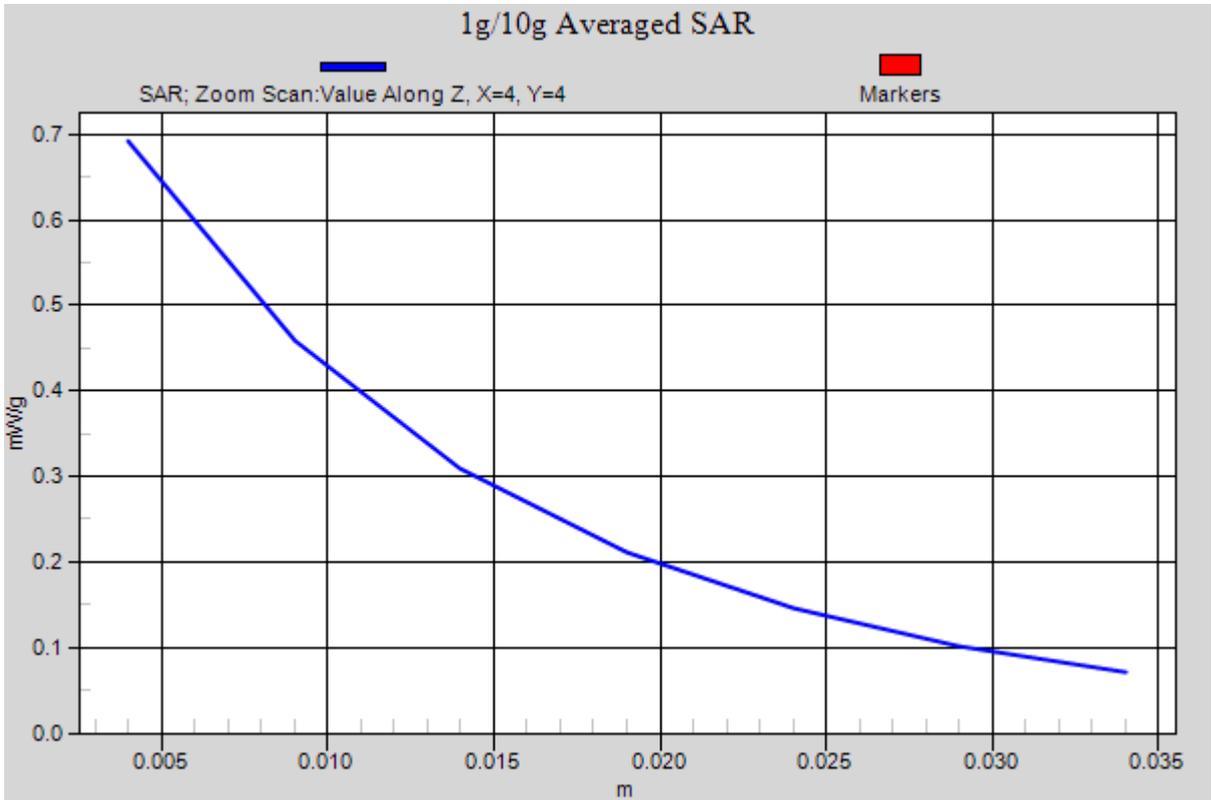


Figure 44 WCDMA Band V Test Position 2 Channel 4183

**WCDMA Band V Test Position 2 Low**

Date/Time: 3/12/2011 9:32:48 PM

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

Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.944$  mho/m;  $\epsilon_r = 54$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Low/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.586 mW/g

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

Reference Value = 7.92 V/m; Power Drift = -0.178 dB

Peak SAR (extrapolated) = 0.790 W/kg

**SAR(1 g) = 0.541 mW/g; SAR(10 g) = 0.367 mW/g**

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

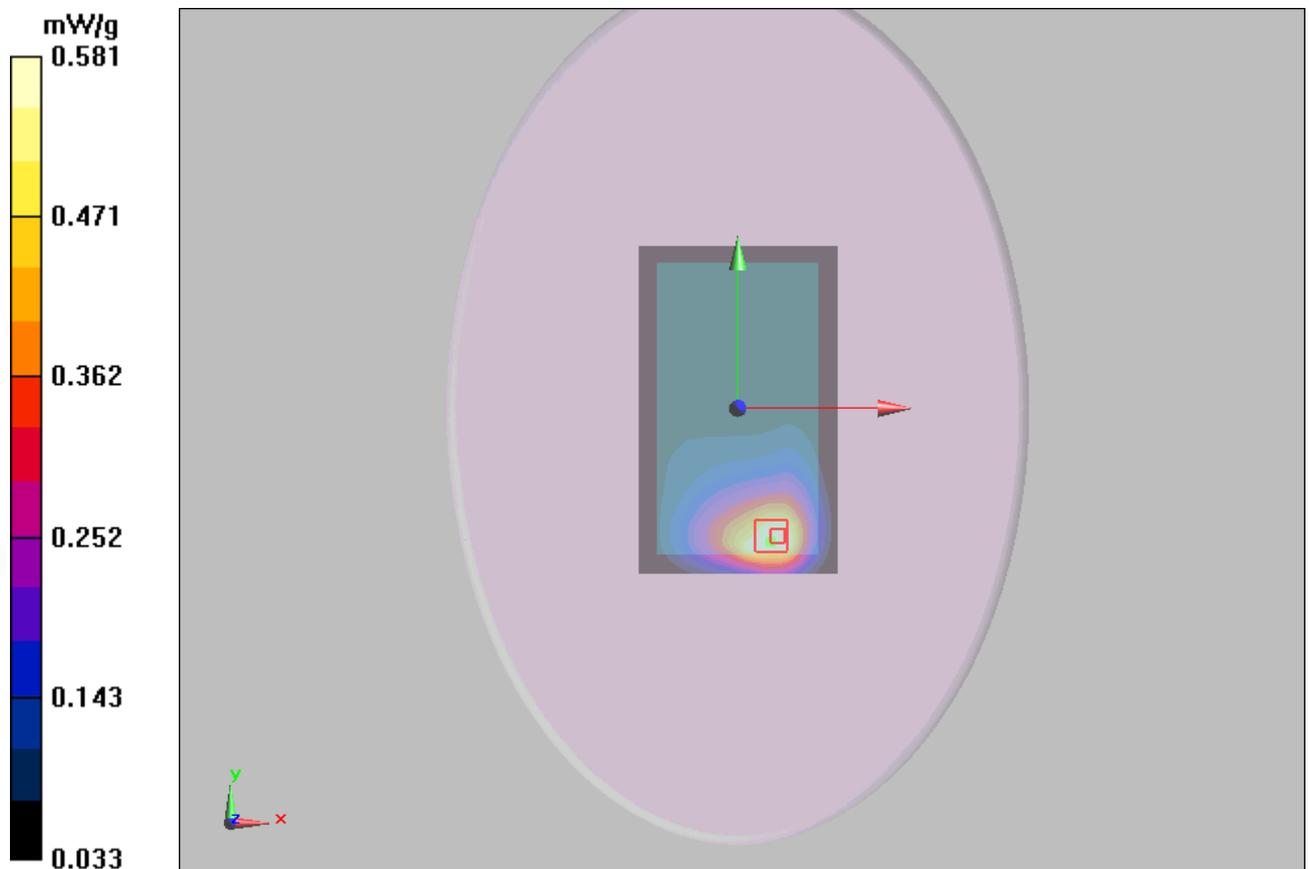


Figure 45 WCDMA Band V Test Position 2 Channel 4132

**WCDMA Band V Test Position 3 Middle**

Date/Time: 3/12/2011 5:41:09 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 3 Middle/Area Scan (31x91x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.615 mW/g

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

Reference Value = 25.6 V/m; Power Drift = -0.089 dB

Peak SAR (extrapolated) = 0.841 W/kg

**SAR(1 g) = 0.566 mW/g; SAR(10 g) = 0.374 mW/g**

Maximum value of SAR (measured) = 0.614 mW/g

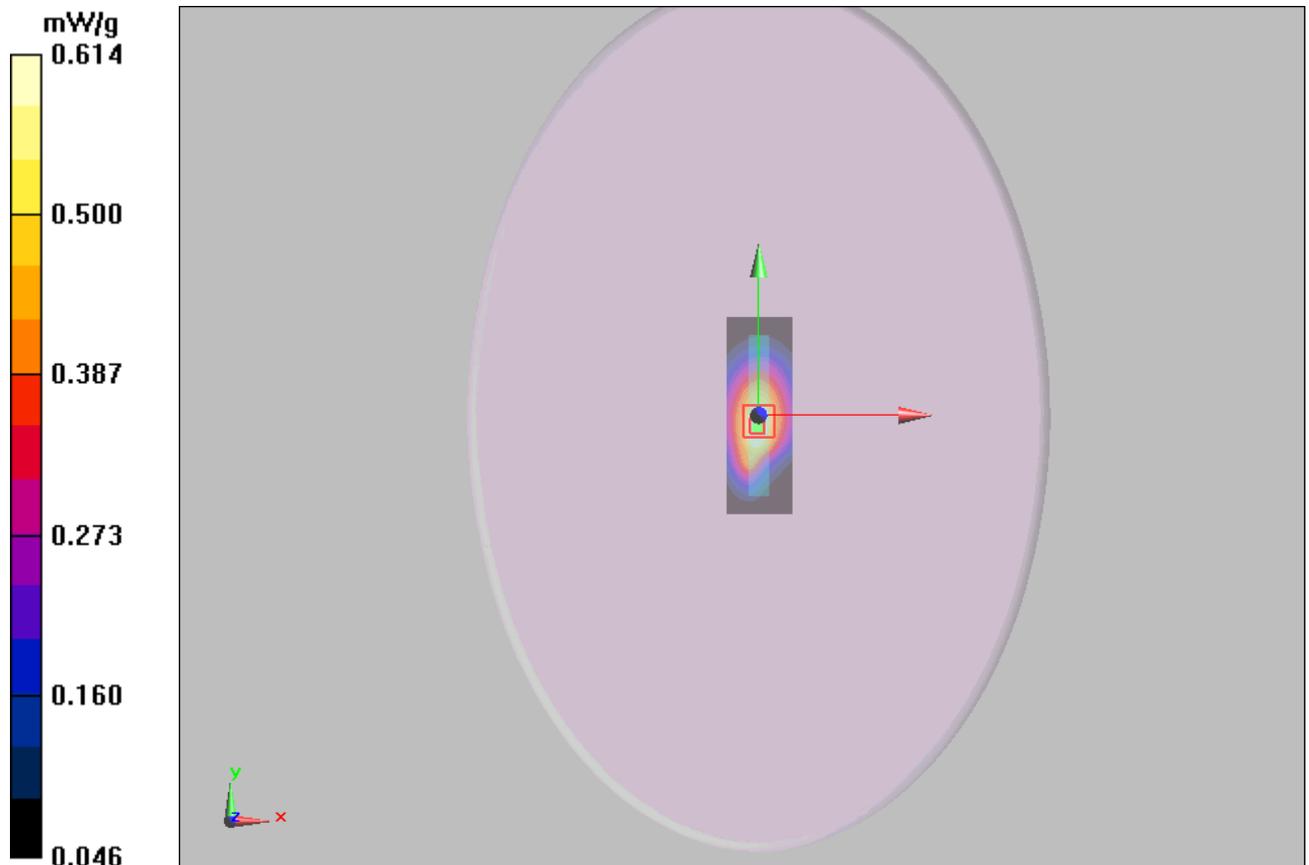


Figure 46 WCDMA Band V Test Position 3 Channel 4183

**WCDMA Band V Test Position 5 Middle**

Date/Time: 3/12/2011 8:32:53 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 5 Middle/Area Scan (31x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.213 mW/g

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

Reference Value = 9.08 V/m; Power Drift = -0.129 dB

Peak SAR (extrapolated) = 0.298 W/kg

**SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.120 mW/g**

Maximum value of SAR (measured) = 0.209 mW/g

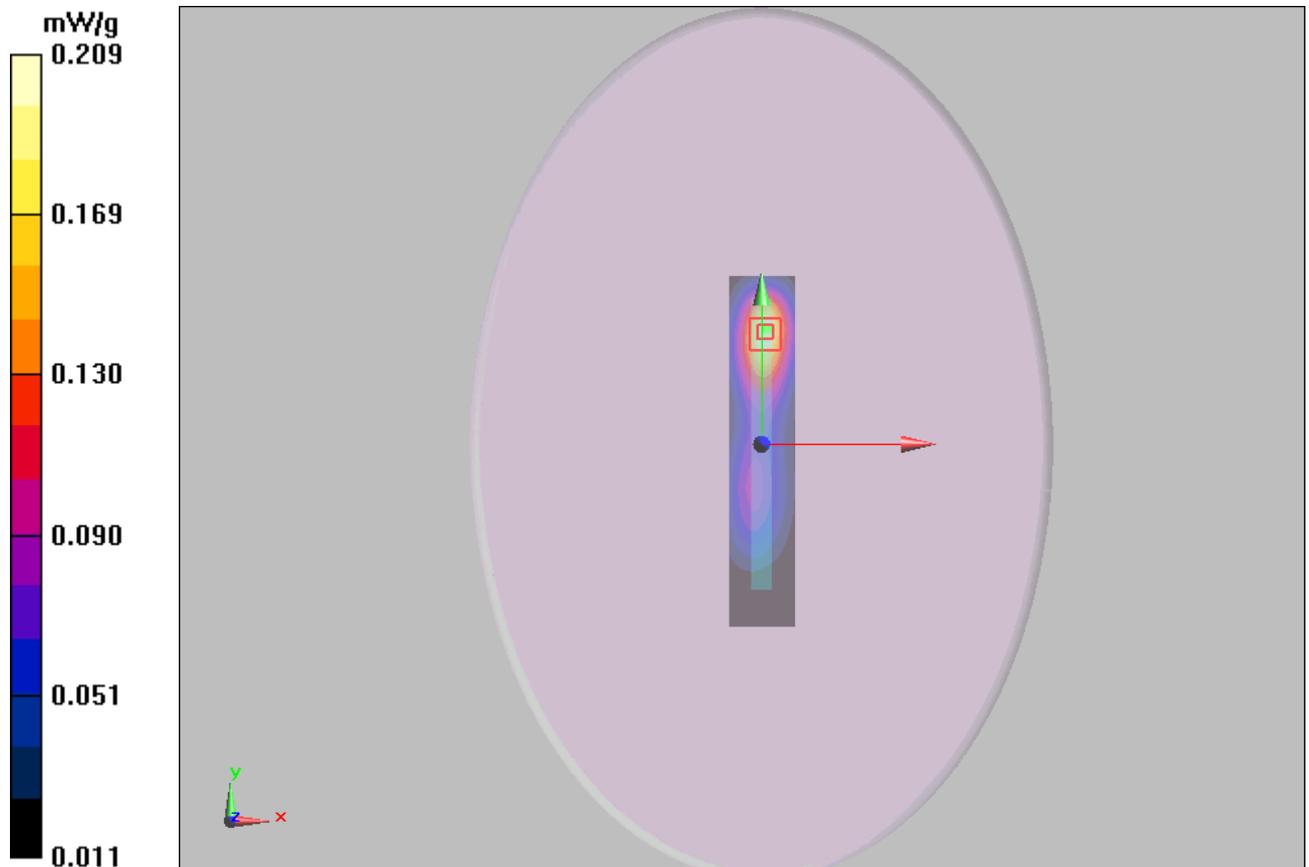


Figure 47 WCDMA Band V Test Position 5 Channel 4183

**WCDMA Band V HSDPA Test Position 2 Middle**

Date/Time: 3/12/2011 10:05:25 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.657 mW/g

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

Reference Value = 8.03 V/m; Power Drift = -0.079 dB

Peak SAR (extrapolated) = 0.876 W/kg

**SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.405 mW/g**

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

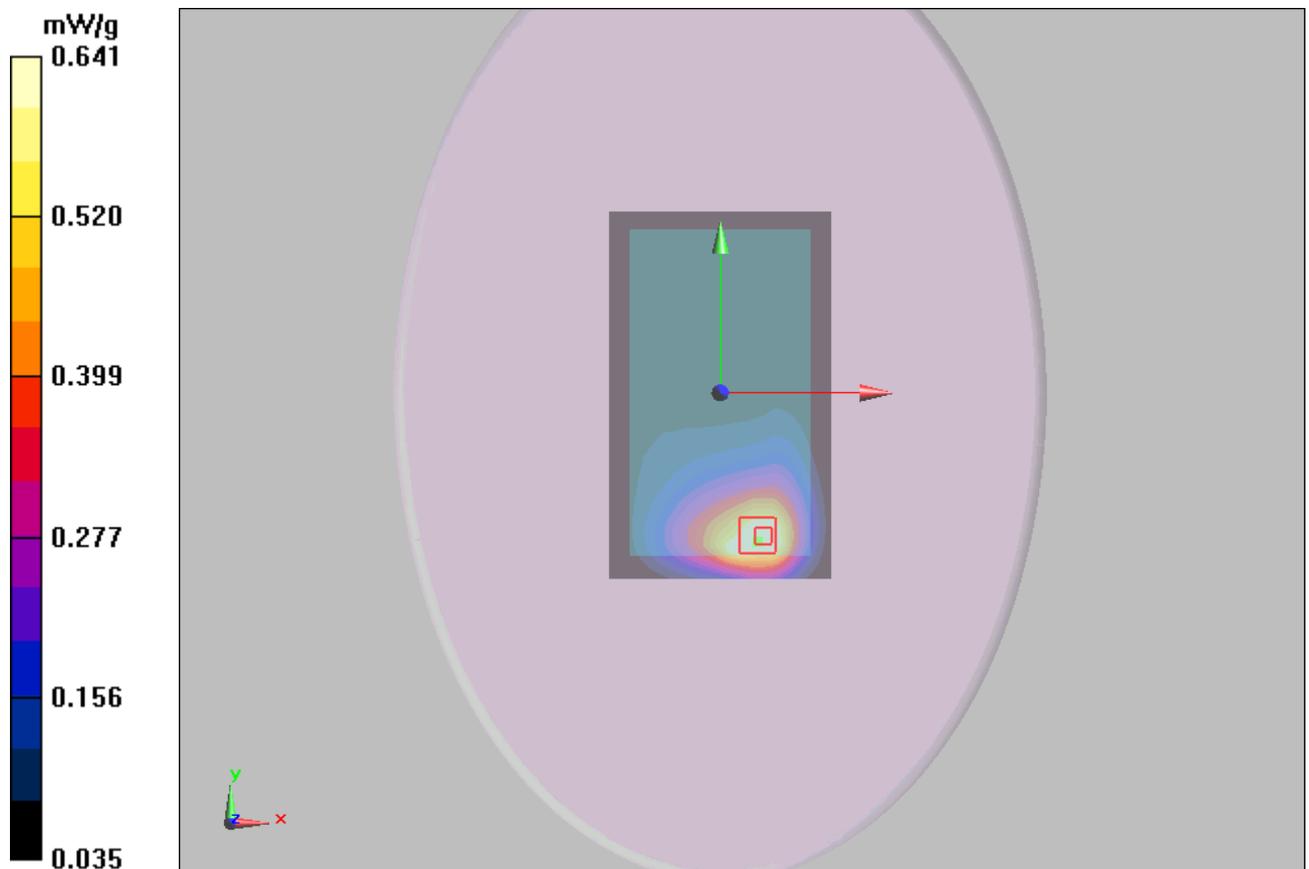


Figure 48 WCDMA Band V HSDPA Test Position 2 Channel 4183

**WCDMA Band V HSUPA Test Position 2 Middle**

Date/Time: 3/12/2011 10:26:44 PM

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

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: ELI 4.0; Type: QDOVA001BA;

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

**Test Position 2 Middle/Area Scan (91x151x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 7.82 V/m; Power Drift = -0.029 dB

Peak SAR (extrapolated) = 0.668 W/kg

**SAR(1 g) = 0.444 mW/g; SAR(10 g) = 0.300 mW/g**

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

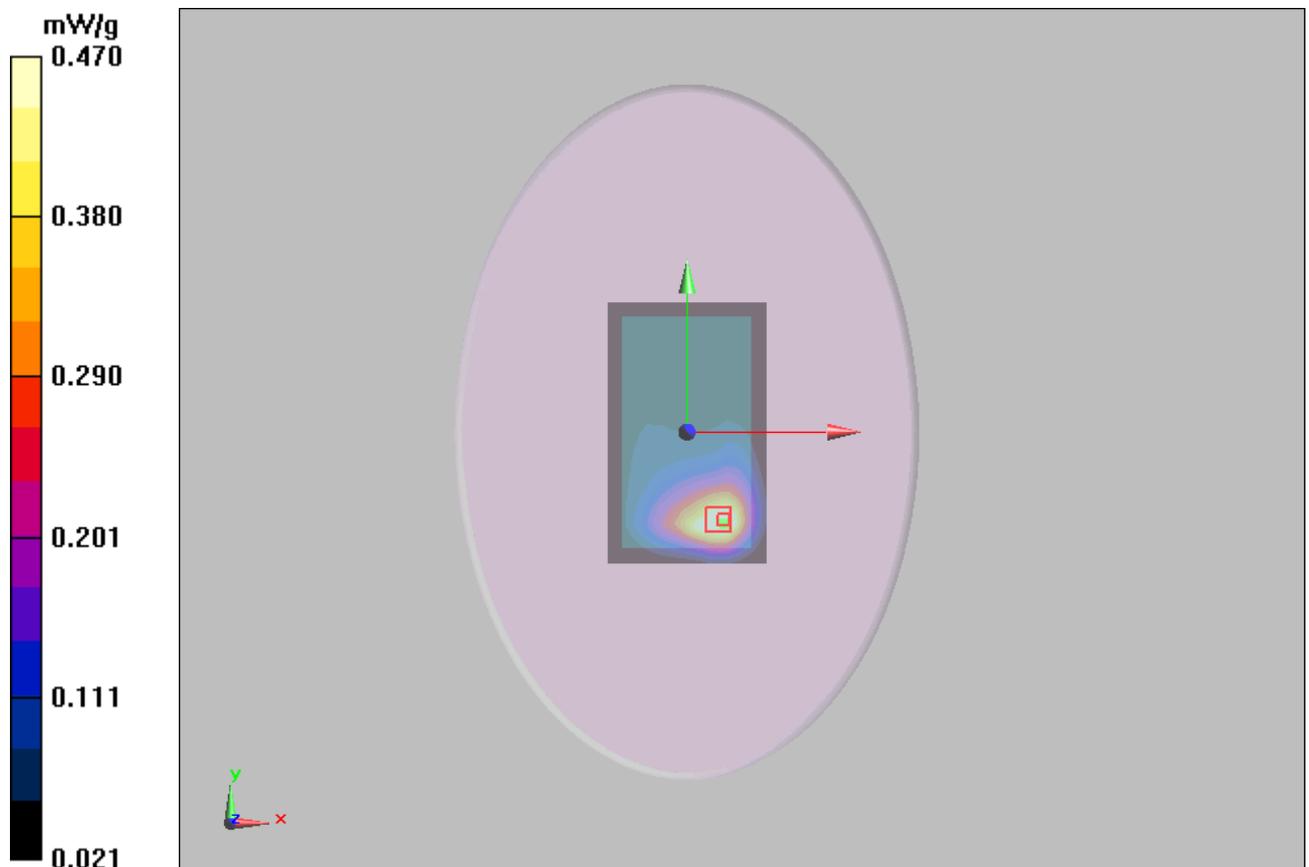


Figure 49 WCDMA Band V HSUPA Test Position 2 Channel 4183

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

## ANNEX D: Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA-SH (Auden)**

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

### CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:3677**

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

Calibration date: **November 24, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: November 25, 2010

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

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



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

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

Accreditation No.: SCS 108

#### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

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

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

#### Methods Applied and Interpretation of Parameters:

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

EX3DV4 SN:3677

November 24, 2010

# Probe EX3DV4

## SN:3677

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

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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

EX3DV4 SN:3677

November 24, 2010

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

### Basic Calibration Parameters

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

### Modulation Calibration Parameters

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

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

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

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

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

EX3DV4 SN:3677

November 24, 2010

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

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

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

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

EX3DV4 SN:3677

November 24, 2010

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

**Calibration Parameter Determined in Body Tissue Simulating Media**

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

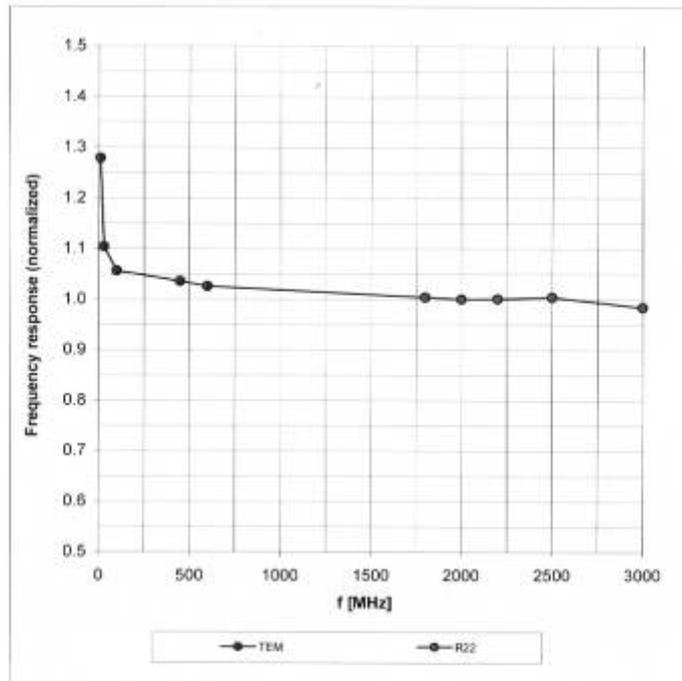
<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV4 SN:3677

November 24, 2010

### Frequency Response of E-Field

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

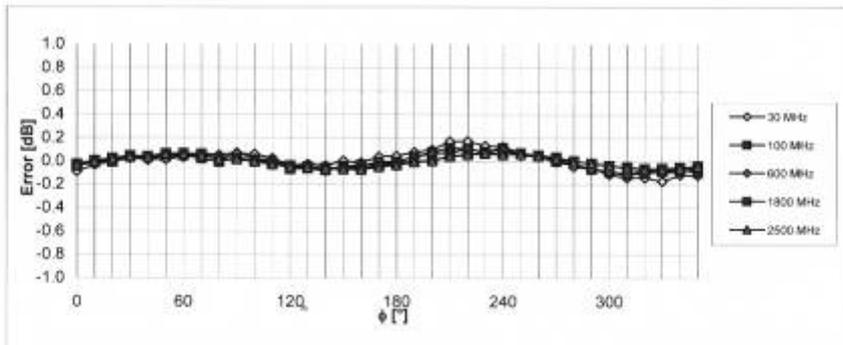
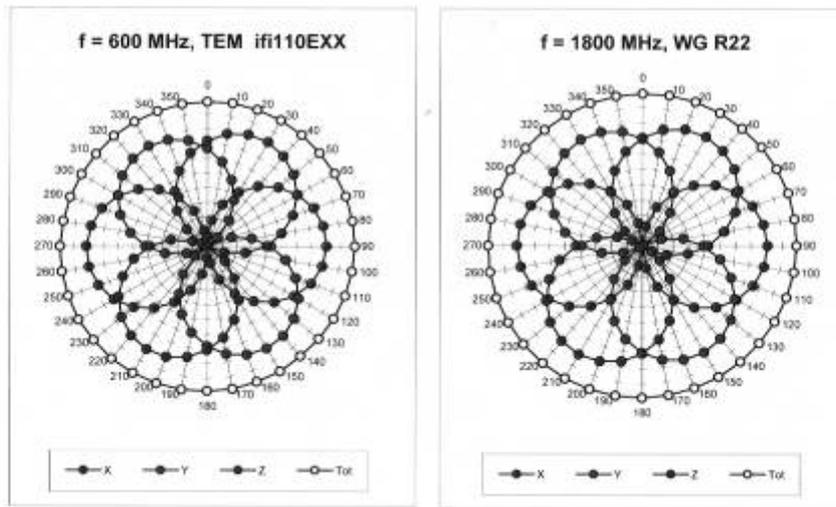


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

EX3DV4 SN:3677

November 24, 2010

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

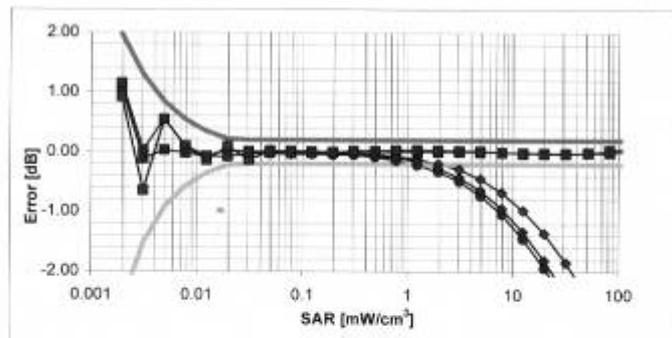
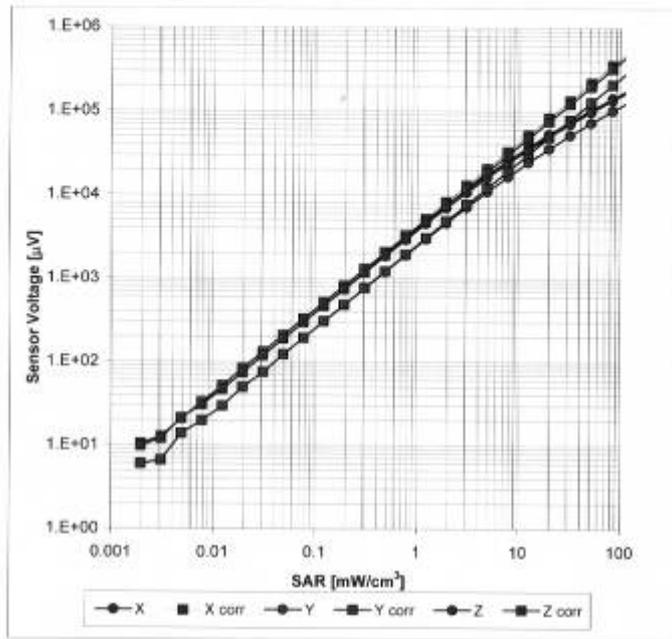


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

EX3DV4 SN:3677

November 24, 2010

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

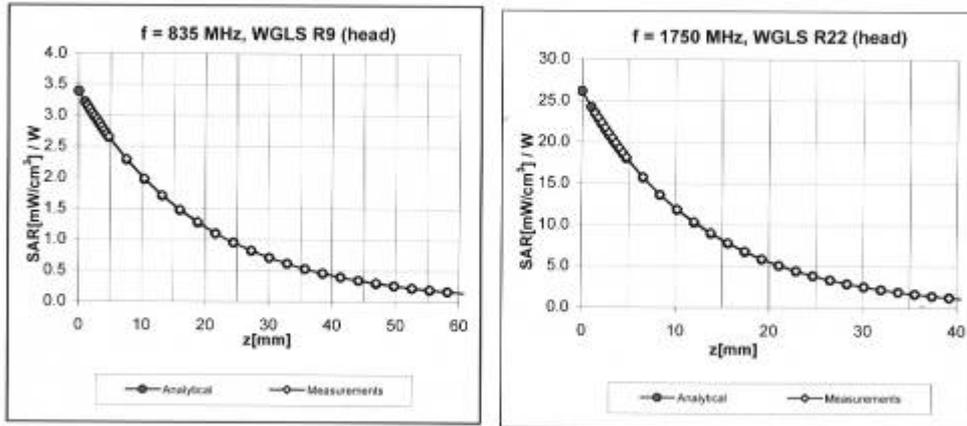


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

EX3DV4 SN:3677

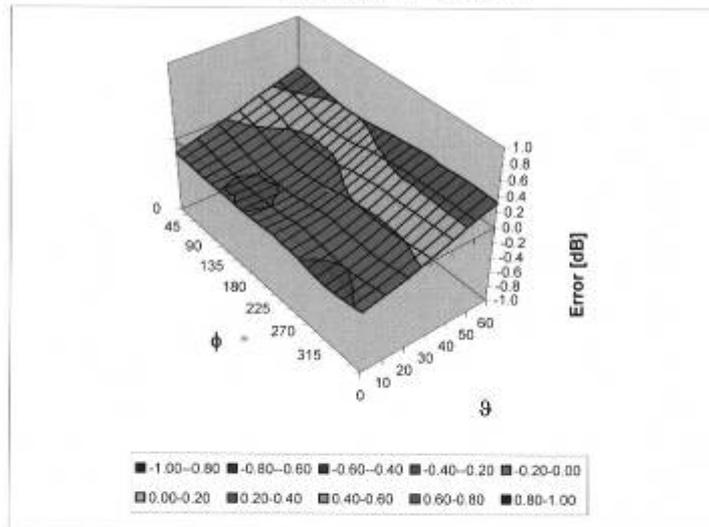
November 24, 2010

### Conversion Factor Assessment



### Deviation from Isotropy in HSL

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



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

EX3DV4 SN:3677

November 24, 2010

### Other Probe Parameters

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

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

Report No. RZA1102-0235SAR

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## ANNEX E: D835V2 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **Auden**

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

<b>CALIBRATION CERTIFICATE</b>			
Object	D835V2 - SN: 4d092		
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits		
Calibration date:	January 14, 2010		
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>			
<b>Primary Standards</b>	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	08-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10
<b>Secondary Standards</b>	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41082317	18-Oct-02 (in house check Oct-09)	in house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-89 (in house check Oct-09)	in house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	in house check: Oct-10
Calibrated by:	Name Jeton Kastrelli	Function Laboratory Technician	Signature 
Approved by:	Name Kajla Pokovic	Function Technical Manager	Signature 
<p>Issued: January 18, 2010</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p>			

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



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

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

Accreditation No.: **SCS 108**

**Glossary:**

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

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

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

**Additional Documentation:**

- d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

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

### Measurement Conditions

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

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

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.2 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	---	---

### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 mW / g
SAR normalized	normalized to 1W	9.56 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.63 mW / g ± 17.0 % (k=2)</b>

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

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

### Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.8 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	---	---

### SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.49 mW / g
SAR normalized	normalized to 1W	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.86 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.63 mW / g
SAR normalized	normalized to 1W	6.52 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.47 mW / g ± 16.5 % (k=2)</b>

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### Antenna Parameters with Head TSL

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

#### Antenna Parameters with Body TSL

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

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.392 ns
----------------------------------	----------

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 15, 2009

**DASY5 Validation Report for Head TSL**

Date/Time: 11.01.2010 12:00:00

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: HSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.89 \text{ mho/m}$ ;  $\epsilon_r = 41.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

**DASY5 Configuration:**

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

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

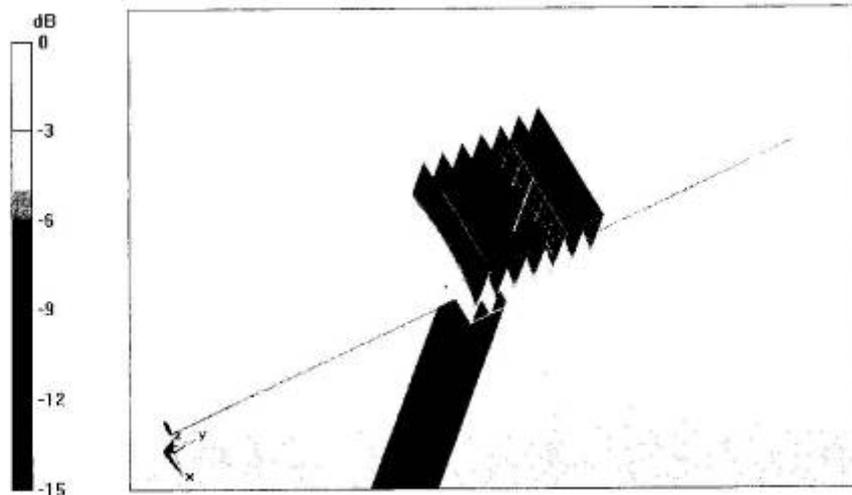
grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 3.58 W/kg

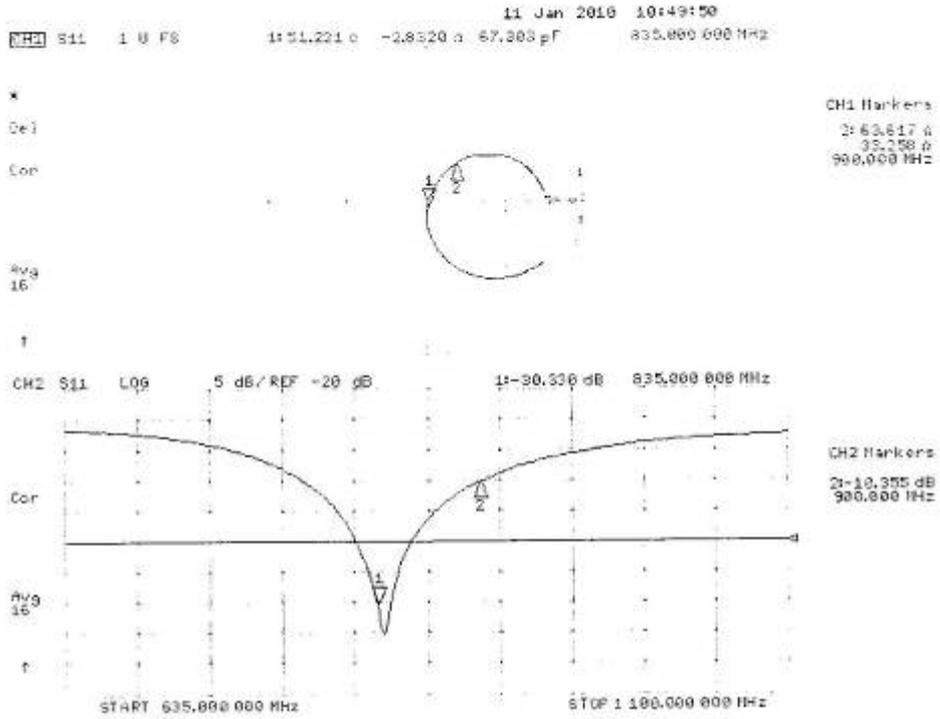
**SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g**

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



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

## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body**

Date/Time: 14.01.2010 15:40:17

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: MSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; Convf(5.97, 5.97, 5.97); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V3.2 Build 157; SEMCAD X Version 14.0 Build 57

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

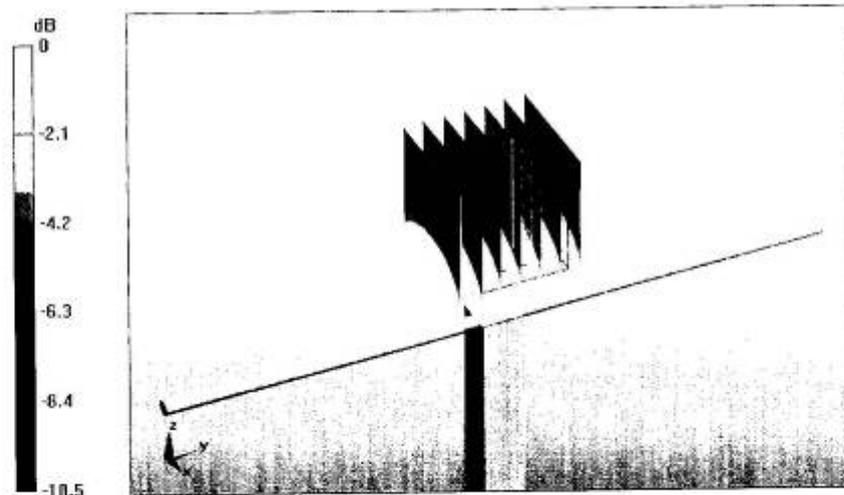
grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 3.67 W/kg

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

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



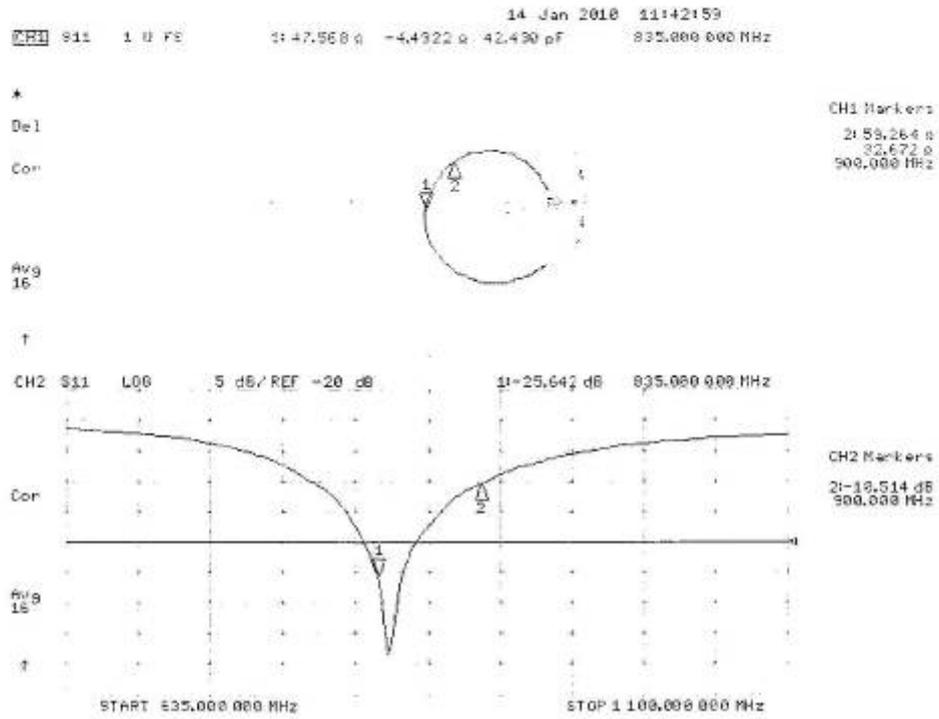
0 dB = 2.89mW/g

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

Report No. RZA1102-0235SAR

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## Impedance Measurement Plot for Body TSL



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

Report No. RZA1102-0235SAR

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## ANNEX F: D1900V2 Dipole Calibration Certificate

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



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

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: **Audiot**

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

<b>CALIBRATION CERTIFICATE</b>																																															
Object	D1900V2 - SN: 5d018																																														
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits																																														
Calibration date:	June 15, 2010																																														
<p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Primary Standards</th> <th style="width: 15%;">ID #</th> <th style="width: 30%;">Cal Date (Certificate No.)</th> <th style="width: 25%;">Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>06-Oct-09 (No. 217-01086)</td> <td>Oct-10</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292763</td> <td>06-Oct-09 (No. 217-01086)</td> <td>Oct-10</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5086 (20g)</td> <td>30-Mar-10 (No. 217-01158)</td> <td>Mar-11</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 5047.2 / 06327</td> <td>30-Mar-10 (No. 217-01162)</td> <td>Mar-11</td> </tr> <tr> <td>Reference Probe ES3DV3</td> <td>SN: 3206</td> <td>30-Apr-10 (No. ES3-3205_Apr10)</td> <td>Apr-11</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>10-Jun-10 (No. DAE4-601_Jun10)</td> <td>Jun-11</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Secondary Standards</th> <th style="width: 15%;">ID #</th> <th style="width: 30%;">Check Date (in house)</th> <th style="width: 25%;">Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power sensor HP 8481A</td> <td>MY41092317</td> <td>18-Oct-02 (in house check Oct-09)</td> <td>In house check: Oct-11</td> </tr> <tr> <td>RF generator R&amp;S SMT-06</td> <td>100006</td> <td>4-Aug-99 (in house check Oct-09)</td> <td>In house check: Oct-11</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585 S4206</td> <td>18-Oct-01 (in house check Oct-09)</td> <td>In house check: Oct-10</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10	Power sensor HP 8481A	US37292763	06-Oct-09 (No. 217-01086)	Oct-10	Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11	Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11	Reference Probe ES3DV3	SN: 3206	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11	DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11	RF generator R&S SMT-06	100006	4-Aug-99 (in house check Oct-09)	In house check: Oct-11	Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10
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Secondary Standards	ID #	Check Date (in house)	Scheduled Check																																												
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11																																												
RF generator R&S SMT-06	100006	4-Aug-99 (in house check Oct-09)	In house check: Oct-11																																												
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10																																												
Calibrated by:	Name Dimitar Iliev	Function Laboratory Technician	Signature 																																												
Approved by:	Name Katja Pokovic	Technical Manager																																													
			Issued: June 17, 2010																																												
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																																															

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No. RZA1102-0235SAR

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



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

Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 108**

### Glossary:

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

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

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

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Measurement Conditions

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

<b>DASY Version</b>	DASY5	V52.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	39.6 ± 6 %	1.44 mho/m ± 6 %
<b>Head TSL temperature during test</b>	(22.5 ± 0.2) °C	----	----

### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR normalized	normalized to 1W	40.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>39.2 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.22 mW / g
SAR normalized	normalized to 1W	20.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>20.7 mW / g ± 16.5 % (k=2)</b>

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

### Body TSL parameters

The following parameters and calculations were applied.

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

### SAR result with Body TSL

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

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

### Appendix

#### Antenna Parameters with Head TSL

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

#### Antenna Parameters with Body TSL

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

#### General Antenna Parameters and Design

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

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 04, 2002

**DASY5 Validation Report for Head TSL**

Date/Time: 15.06.2010 10:40:45

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL U11 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

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

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

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

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

Peak SAR (extrapolated) = 18.4 W/kg

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

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

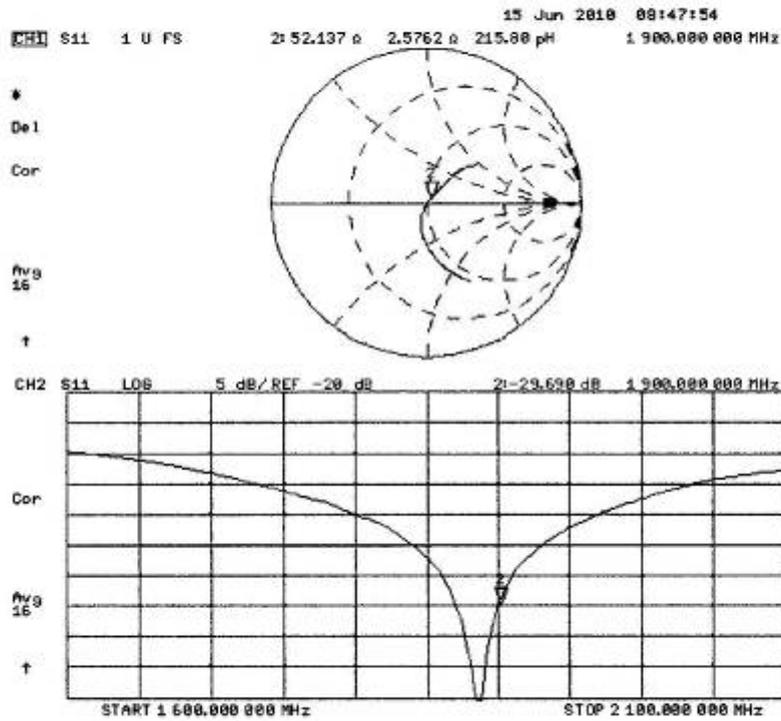


# TA Technology (Shanghai) Co., Ltd. Test Report

Report No. RZA1102-0235SAR

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## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body**

Date/Time: 15.06.2010 14:14:27

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: MSL U11 BB

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

Phantom section: Flat Section

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

DASY5 Configuration:

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

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

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

Peak SAR (extrapolated) = 17.3 W/kg

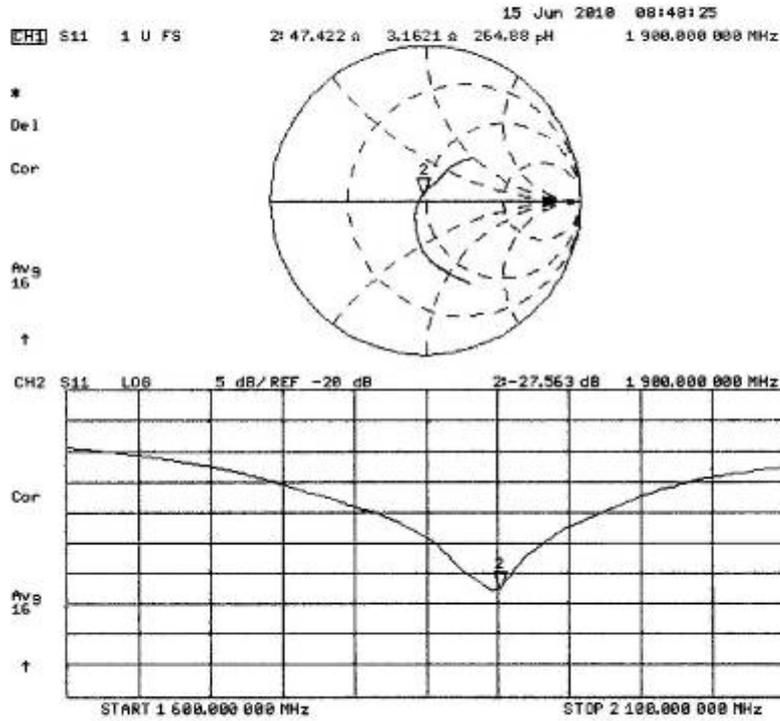
**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.52 mW/g**

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



0 dB = 12.8mW/g

Impedance Measurement Plot for Body TSL



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

Report No. RZA1102-0235SAR

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## ANNEX G: DAE4 Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA - SH (Auden)**

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

### CALIBRATION CERTIFICATE

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

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

Calibration date: **November 18, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

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

Issued: November 18, 2010

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

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



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

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

Accreditation No.: **SCS 108**

### Glossary

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

### Methods Applied and Interpretation of Parameters

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

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

**DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V, full range = -100...+300 mV  
Low Range: 1LSB = 61nV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	404.757 $\pm$ 0.1% (k=2)	404.740 $\pm$ 0.1% (k=2)	405.181 $\pm$ 0.1% (k=2)
Low Range	3.98219 $\pm$ 0.7% (k=2)	3.93489 $\pm$ 0.7% (k=2)	3.96831 $\pm$ 0.7% (k=2)

**Connector Angle**

Connector Angle to be used in DASY system	90.0 $^{\circ}$ $\pm$ 1 $^{\circ}$
---	------------------------------------

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

## Appendix

### 1. DC Voltage Linearity

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

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

### 2. Common mode sensitivity

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

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

### 3. Channel separation

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

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

# TA Technology (Shanghai) Co., Ltd.

## Test Report

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

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

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

#### 5. Input Offset Measurement

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

Input 10M $\Omega$

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

#### 6. Input Offset Current

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

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

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

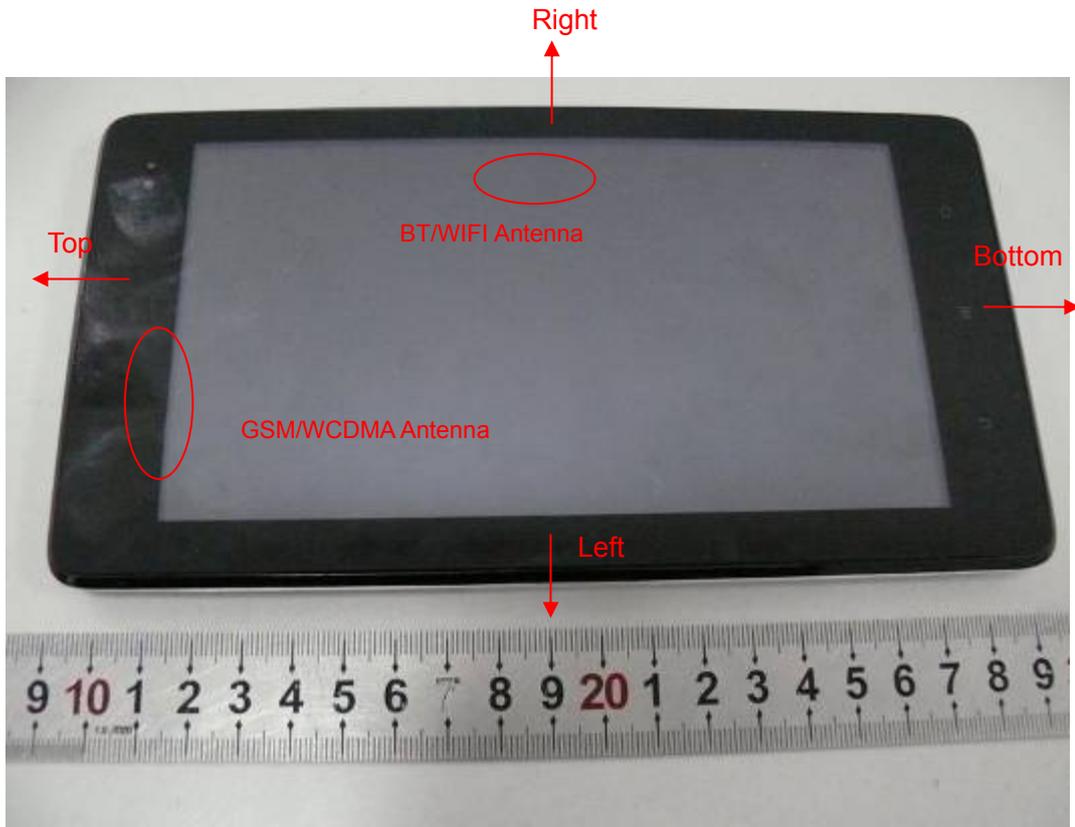
#### 8. Low Battery Alarm Voltage (Typical values for information)

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

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

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

**ANNEX H: The EUT Appearances and Test Configuration**

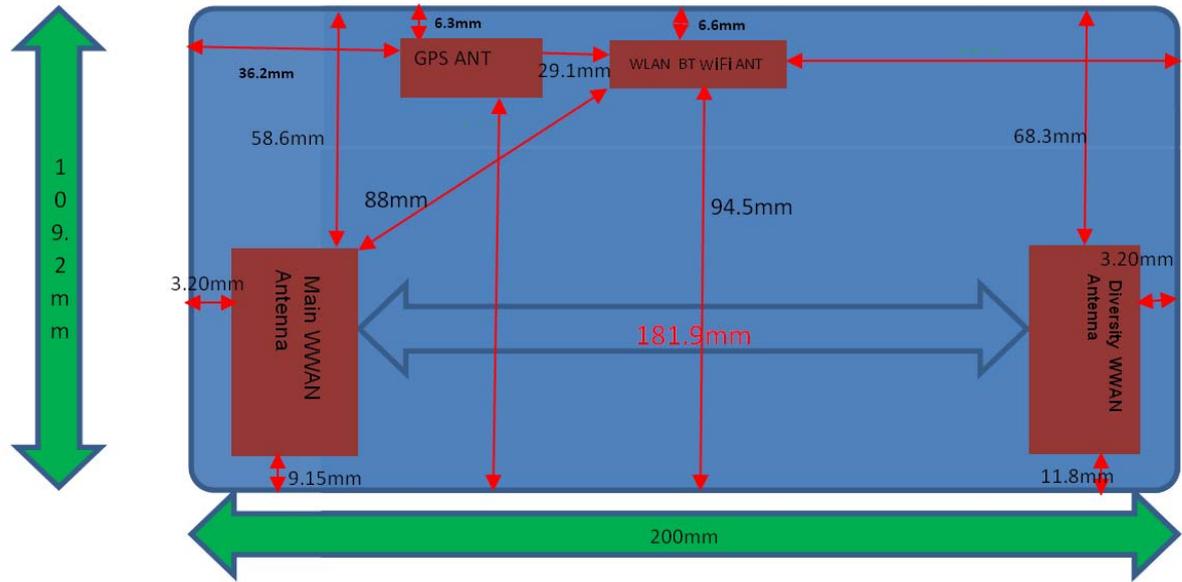


a: Front side

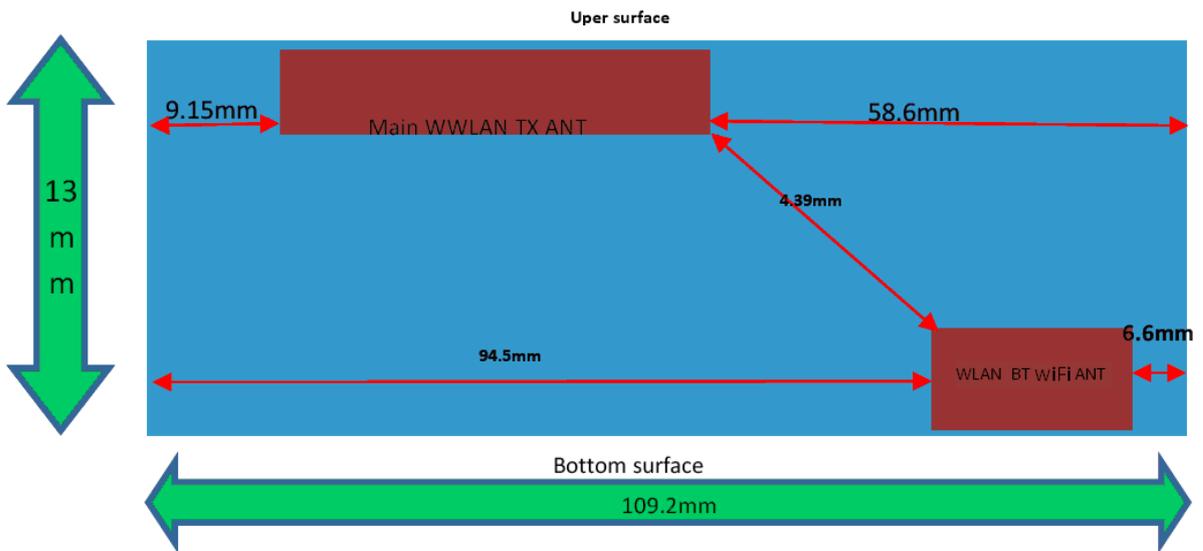


b: Battery

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

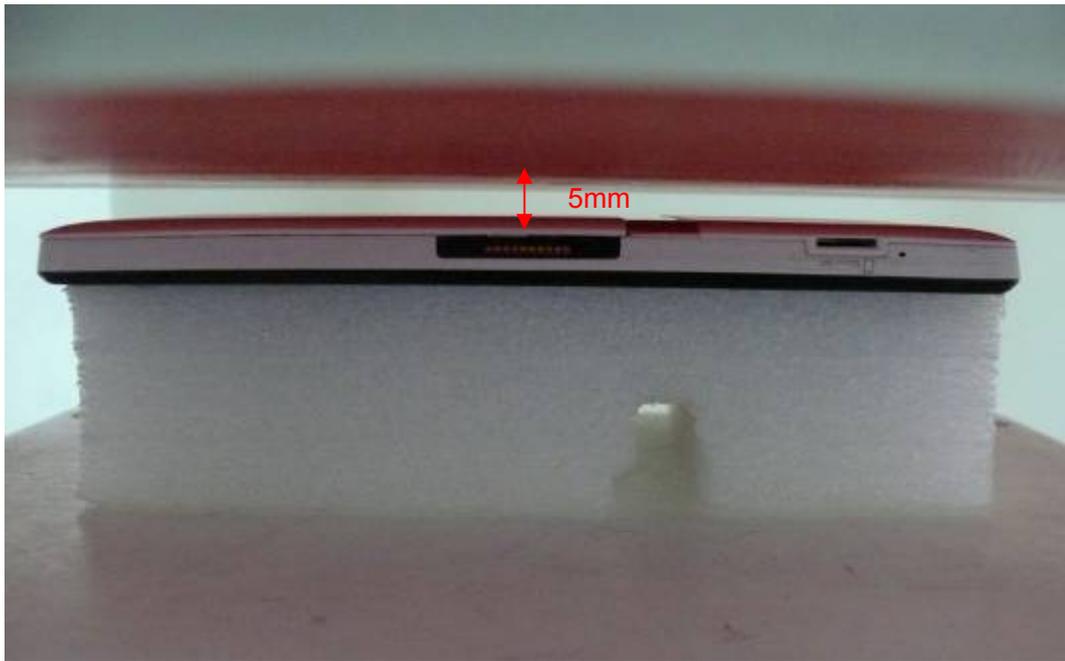


c: Front view

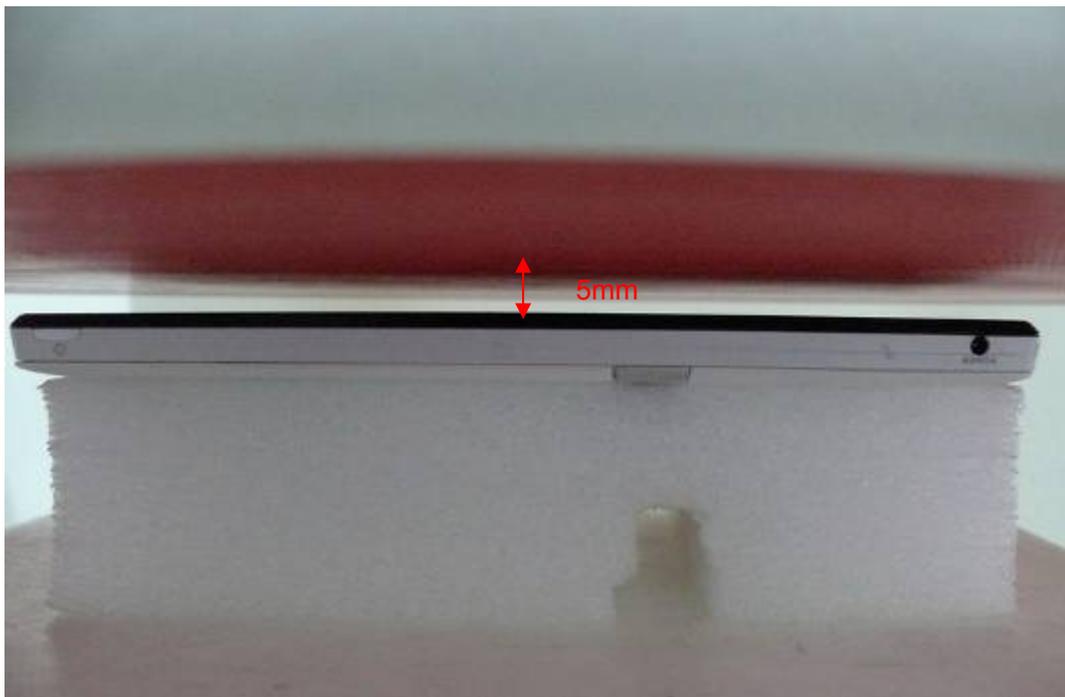


d: Top view

Picture 4: Constituents of the EUT



Picture 5: Test position 1



Picture 6: Test position 2



Picture 7: Test Position 3



Picture 8: Test Position 4

(This is not the most conservative antenna – to – user distance at edge mode. SAR is required only the edge with the most conservative exposure conditions, No SAR)



Picture 9: Test position 5



Picture 10: Test position 6

(This is not the most conservative antenna – to – user distance at edge mode. SAR is required only the edge with the most conservative exposure conditions, No SAR)