ilac-MRA

CNAS
TESTING
No. L2264

OET 65

TEST REPORT

Product Name	HSPA/ISDB-T USB Stick
Model	E192Gu-65
FCC ID	QISE192GU-65
Client	Huawei Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Product Name	HSPA/ISDB-T USB Stick	**Model**		E192Gu-65
FCC ID	QISE192GU-65			
Report No.	RZA1010-1559SAR			
Client	Huawei Technologies Co., Ltd.			
Manufacturer	Huawei Technologies Co., Ltd.			
Reference Standard(s)	**IEEE Std C95.1, 1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. **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. **447498 D02 SAR Procedures for Dongle Xmtr v02:** SAR Measurement Procedures for USB Dongle Transmitters.			
Conclusion	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. General Judgment: **Pass** (Stamp) **Date of issue: October 20th, 2010**			
Comment	The test result only responds to the measured sample.			

Approved by _____   **Revised by** _____   **Performed by** _____

Yang Weizhong   Ling Minbao   Xue Chaofeng

TABLE OF CONTENT

1. General Information

1.1. Notes of the Test Report

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

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

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

1.2. Testing Laboratory

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1.4. Manufacturer Information

Company: Huawei Technologies Co., Ltd.

Address: Bantian, Longgang District

City: Shenzhen

Postal Code: 518129

Country: P.R.China

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1.5. Information of EUT

General Information

Device Type :	Portable Device
Exposure Category:	Uncontrolled Environment / General Population
Name of EUT:	HSPA/ISDB-T USB Stick
IMEI or SN:	358141030000087
Hardware Version:	CD1E192M
Software Version:	11.126.10.07.00
Antenna Type:	Internal Antenna
Device Operating Configurations :	

Supporting Mode(s):	GSM 850/ GSM 1900; (tested) WCDMA Band II/ WCDMA Band V; (tested)	
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

	Mode	Tx (MHz)	Rx (MHz)
Operating Frequency Range(s):	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)
Used Host Product:	IBM T61 Lenovo Y-450

Equipment Under Test (EUT) is a HSPA/ISDB-T USB Stick. During SAR test of the EUT, it was connected to a portable computer. SAR is tested for the EUT respectively for GSM 850, GSM 1900, WCDMA Band II and WCDMA Band V in this report. The EUT has GPRS (class 12), EGPRS (class 12), WCDMA, HSDPA and HSUPA functions. The EUT has a GSM/WCDMA antenna which is used for Tx/Rx.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. The Maximum SAR$_{1g}$ Values and Power of each tested band

Body Worn Configuration

Mode	Channel	distance	Position	SAR$_{1g}$ (W/kg)
3 slots GPRS 850	251	5mm	Front side	**0.486**
2 slots GPRS 1900	512	5mm	Front side	**1.010**
WCDMA Band II	9262	5mm	Front side	**0.934**
WCDMA Band V	4233	5mm	Front side	**0.450**

Maximum Power

Mode		Max Conducted Power (dBm)	Max Average Power (dBm)
GSM 850	GPRS,1 time-slot	32.55	23.52
	EGPRS, 1 time-slot	32.54	23.51
GSM 1900	GPRS,3 time-slots	24.82	20.56
	EGPRS, 2 time-slots	26.53	20.51
WCDMA Band II		21.80	/
WCDMA Band V		22.43	/

1.7. Test Date

The test is performed from October 15, 2010 to October 18, 2010.

2. Operational Conditions during Test

2.1. General Description of Test Procedures

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

The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS and EGPRS, The tests in the band of WCDMA Band II and WCDMA Band V are performed in the mode of WCDMA, HSDPA and HSUPA. The measurements were performed in combination with two host products (IBM T61 and Lenovo Y-450). IBM T61 laptop has horizontal USB slot, Lenovo Y-450 laptop has vertical and horizontal USB slot.

2.2. GSM Test Configuration

For the body SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. 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 tests in the band of GSM 850 and GSM 1900 are only performed in the mode of GPRS and EGPRS. 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.

Output power of reductions：

GSM 850

GPRS（GMSK）:

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2.5
3	4.5
4	6

EGPRS(8PSK):

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

EGPRS(GMSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2.5
3	4.5
4	6

GSM 1900

GPRS (GMSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2.5
3	4.5
4	6.5

EGPRS (8PSK):

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

EGPRS (GMSK):

Number of timeslots in uplink assignment	reduction of maximum output power, (dB)
1	0
2	2.5
3	4.5
4	6.5

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 $DPDCH_1$ are as followed (EUT do not support the $DPDCH_{2-n}$)

Table 1: The configurations for the DPCCH and $DPDCH_1$

	Channel Bit Rate(kbps)	Channel Symbol Rate(ksps)	Spreading Factor	Spreading Code Number	Bits/Slot
DPCCH	15	15	256	0	10
$DPDCH_1$	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 $DPDCH_n$, because the maximum output power for each of these other configurations<0.25dB higher than 12.2kbps RMC and the multiple $DPDCH_n$ 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 rate of active CQI slots. DPCCH and DPDCH gain factors($\beta c, \beta d$), and HS-DPCCH power offset parameters($\triangle$ACK, $\triangle$NACK, $\triangle$CQI)should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Table 2: Subtests for UMTS Release 5 HSDPA

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

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

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

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

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

Table 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.[40]

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests.[41]   The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA should be configured according to the β 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.

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

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} [1]	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM [2] (dB)	MPR (dB)	AG[4] Index	E-TFCI
1	11/15[3]	15/15[3]	64	11/15[3]	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	β_{ed1} 47/15 β_{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[4]	15/15[4]	64	15/15[4]	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, ΔNACK and Δ_{CQI} = 8 $\Leftrightarrow$ A_{hs} = β_{hs}/β_c = 30/15 $\Leftrightarrow$ β_{hs} = 30/15 *β_c.

Note 2: CM = 1 for βc/βd =12/15, β_{hs}/β_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 βc/βd 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 βc = 10/15 and βd = 15/15.

Note 4: For subtest 5 the βc/βd 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 βc = 14/15 and βd = 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: βed 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	2	4	10	4	14484	1.4592
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
4	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
6 (No DPDCH)	4	4	10	2 SF2 & 2 SF4	20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	22996	?
7 (No DPDCH)	4	4	10	2 SF2 & 2 SF4	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 in Portable Devices

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

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

For each channel, the EUT is tested at the following 4 test positions:

- Test Position 1: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT towards the bottom of the flat phantom. The distance from back side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 6)

- Test Position 2: The EUT is connected to the portable computer with horizontal USB slot. The front side of the EUT towards the bottom of the flat phantom. The distance from front side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 7)

- Test Position 3: The EUT is connected to the portable computer through a 19 cm USB cable. The left side of the EUT towards the bottom of the flat phantom. The distance from left side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 8)

- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The right side of the EUT towards the bottom of the flat phantom. The distance from right side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX H Picture 9)

2.7. Picture of Host Product

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

Picture 1-a: IBM T61 Close

Picture 1-b: IBM T61 Open

Picture 1-c: Lenovo Y-450 Close

Picture 1-d: Lenovo Y-450 Open

Picture 1-e: IBM T61 with horizontal USB slot

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

Picture 1-g: Lenovo Y-450 with horizontal USB slot

Picture 1-h: a 19 cm USB cable

Picture 1: Computer as a test assistant

3. SAR Measurements System Configuration

3.1. SAR Measurement Set-up

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

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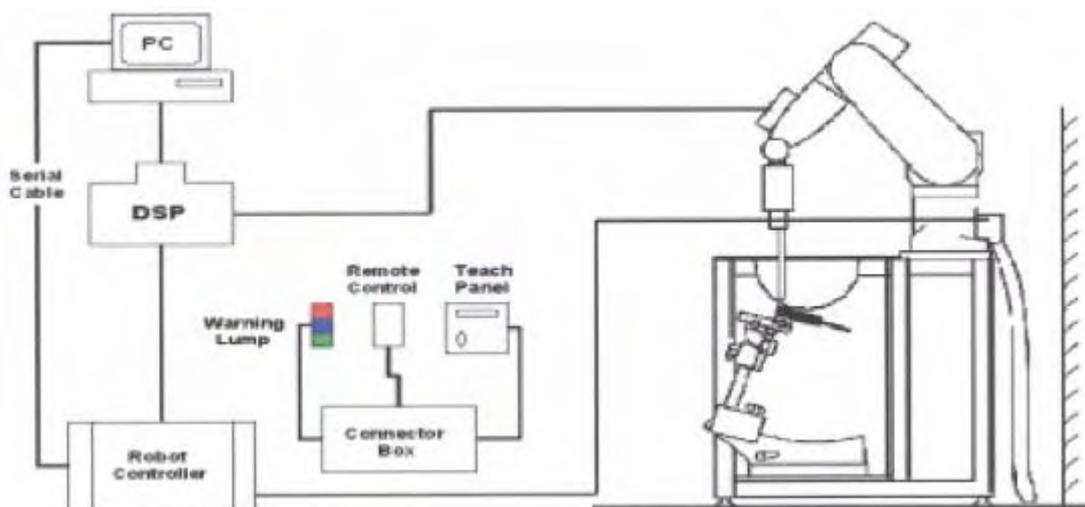- System validation dipoles allowing to validate the proper functioning of the system.

Figure 1. SAR Lab Test Measurement Set-up

3.2. DASY5 E-field Probe System

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

3.2.1. EX3DV4 Probe Specification

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

Calibration
ISO/IEC 17025 calibration service available

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

Figure 2.EX3DV4 E-field Probe

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

Dynamic Range
10 µW/g to > 100 mW/g Linearity:

± 0.2dB (noise: typically < 1 µW/g)

Dimensions
Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

Application
High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

Figure 3. EX3DV4 E-field probe

3.2.2. E-field Probe Calibration

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

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

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

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

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

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

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

3.3. Other Test Equipment

3.3.1. Device Holder for Transmitters

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

Material: POM, Acrylic glass, Foam

3.3.2. Phantom

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

Shell Thickness   2±0.1 mm
Filling Volume   Approx. 20 liters
Dimensions   810 x l000 x 500 mm (H x L x W)
Aailable   Special

Figure 4.Generic Twin Phantom

3.4. Scanning Procedure

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

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

- The "surface check" measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

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

unchanged.

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

- Zoom Scan

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

- Spatial Peak Detection

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

  • maximum search

  • extrapolation

  • boundary correction

  • peak search for averaged SAR

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

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

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

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

3.5. Data Storage and Evaluation

3.5.1. Data Storage

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

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.5.2. Data Evaluation by SEMCAD

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

Probe parameters:	- Sensitivity	Normi, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

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

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

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

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

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

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

cf = crest factor of exciting field   (DASY parameter)

dcp_i = diode compression point   (DASY parameter)

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

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

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

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

$Norm_i$ = sensor sensitivity of channel i   (i = x, y, z)

$[mV/(V/m)^2]$ for E-field Probes

$ConvF$ = sensitivity enhancement in solution

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

f = carrier frequency [GHz]

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

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

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

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

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

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

with SAR = local specific absorption rate in mW/g

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

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

▪   = equivalent tissue density in g/cm^3

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

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

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

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

3.6. System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue 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 12.

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

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.
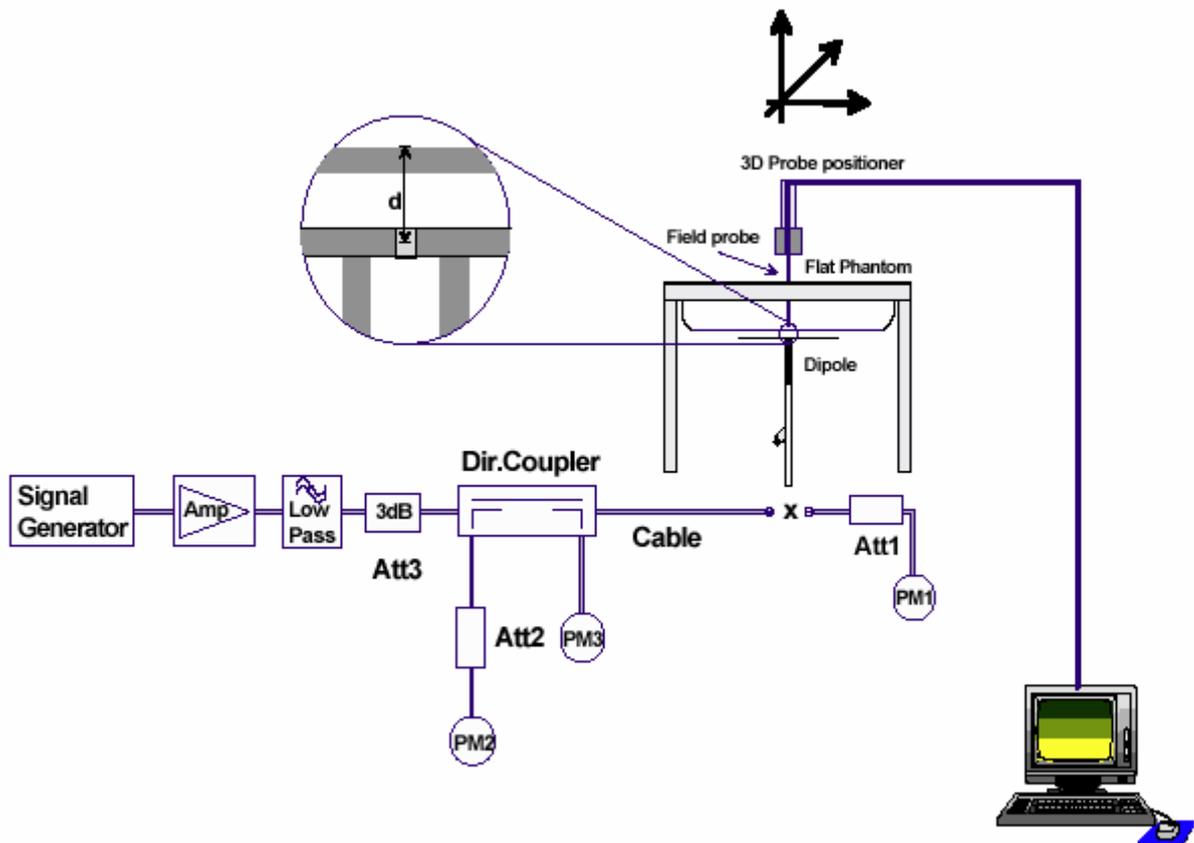
Figure 5. **System Check Set-up**

3.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 8 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 ε=55.2 σ=0.97

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

4. Laboratory Environment

Table 8: The Ambient Conditions during Test

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

5. Characteristics of the Test

5.1. Applicable Limit Regulations

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

5.2. Applicable Measurement Standards

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

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

6. Conducted Output Power Measurement

6.1. Summary

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

6.2. Conducted Power Results

Table 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
GPRS (GMSK)	1TXslot	Before	32.12	32.40	32.54	-9.03dB	23.09	23.37	23.51
		After	32.13	32.41	32.55	-9.03dB	23.10	23.38	23.52
	2TXslots	Before	28.96	29.03	29.04	-6.02dB	22.94	23.01	23.02
		After	28.95	29.02	29.06	-6.02dB	22.93	23.00	23.04
	3TXslots	Before	27.61	27.64	27.63	-4.26dB	23.35	23.38	23.37
		After	27.62	27.63	27.65	-4.26dB	23.36	23.37	23.39
	4TXslots	Before	25.58	25.63	25.60	-3.01dB	22.57	22.62	22.59
		After	25.57	25.62	25.61	-3.01dB	22.56	22.61	22.60
EGPRS (GMSK)	1TXslot	Before	32.12	32.40	32.54	-9.03dB	23.09	23.37	23.51
		After	32.11	32.39	32.52	-9.03dB	23.08	23.36	23.49
	2TXslots	Before	28.96	29.03	29.04	-6.02dB	22.94	23.01	23.02
		After	28.94	29.02	29.05	-6.02dB	22.92	23.00	23.03
	3TXslots	Before	27.01	27.12	27.16	-4.26dB	22.75	22.86	22.90
		After	27.02	27.13	27.15	-4.26dB	22.76	22.87	22.89
	4TXslots	Before	25.44	25.56	25.51	-3.01dB	22.43	22.55	22.50
		After	25.43	25.55	25.50	-3.01dB	22.42	22.54	22.49
EGPRS (8PSK)	1TXslot	Before	26.18	26.24	26.26	-9.03dB	17.15	17.21	17.23
		After	26.16	26.23	26.23	-9.03dB	17.13	17.20	17.20
	2TXslots	Before	24.19	24.27	24.25	-6.02dB	18.17	18.25	18.23
		After	24.18	24.28	24.24	-6.02dB	18.16	18.26	18.22
	3TXslots	Before	22.22	22.13	22.15	-4.26dB	17.96	17.87	17.89
		After	22.23	22.12	22.16	-4.26dB	17.97	17.86	17.90
	4TXslots	Before	20.15	20.17	20.09	-3.01dB	17.14	17.16	17.08
		After	20.16	20.18	20.07	-3.01dB	17.15	17.17	17.06
GSM 1900			Conducted Power(dBm)				Average power(dBm)		

			Channel 512	Channel 661	Channel 810		Channel 512	Channel 661	Channel 810
GPRS (GMSK)	1TXslot	Before	29.03	29.02	28.69	-9.03dB	20.00	19.99	19.66
		After	29.02	29.01	28.67	-9.03dB	19.99	19.98	19.64
	2TXslots	Before	26.50	26.53	26.18	-6.02dB	20.48	20.51	20.16
		After	26.51	26.52	26.19	-6.02dB	20.49	20.50	20.17
	3TXslots	Before	24.65	24.80	24.70	-4.26dB	20.39	20.54	20.44
		After	24.66	24.82	24.71	-4.26dB	20.40	20.56	20.45
	4TXslots	Before	22.65	22.76	22.73	-3.01dB	19.64	19.75	19.72
		After	22.63	22.77	22.72	-3.01dB	19.62	19.76	19.71
EGPRS (GMSK)	1TXslot	Before	29.03	29.02	28.69	-9.03dB	20.00	19.99	19.66
		After	29.02	29.01	28.68	-9.03dB	19.99	19.98	19.65
	2TXslots	Before	26.50	26.53	26.18	-6.02dB	20.48	20.51	20.16
		After	26.51	26.52	26.19	-6.02dB	20.49	20.50	20.17
	3TXslots	Before	24.53	24.62	24.51	-4.26dB	20.27	20.36	20.25
		After	24.52	24.63	24.52	-4.26dB	20.26	20.37	20.26
	4TXslots	Before	22.39	22.48	22.42	-3.01dB	19.38	19.47	19.41
		After	22.37	22.47	22.43	-3.01dB	19.36	19.46	19.42
EGPRS (8PSK)	1TXslot	Before	25.12	25.16	24.81	-9.03dB	16.09	16.13	15.78
		After	25.13	25.15	24.82	-9.03dB	16.10	16.12	15.79
	2TXslots	Before	23.12	23.26	22.92	-6.02dB	17.10	17.24	16.90
		After	23.13	23.25	22.91	-6.02dB	17.11	17.23	16.89
	3TXslots	Before	21.07	21.15	20.99	-4.26dB	16.81	16.89	16.73
		After	21.08	21.16	20.98	-4.26dB	16.82	16.90	16.72
	4TXslots	Before	19.04	19.17	19.03	-3.01dB	16.03	16.16	16.02
		After	19.05	19.18	19.04	-3.01dB	16.04	16.17	16.03

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

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

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

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

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

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

WCDMA Band II			Conducted Power(dBm)		
			Channel 9262	Channel 9400	Channel 9538
RMC	12.2kbps	Before	21.80	21.79	21.78
		After	21.79	21.78	21.77
	64kbps	Before	21.63	21.69	21.76
		After	21.62	21.68	21.75
	144kbps	Before	21.56	21.63	21.36
		After	21.55	21.62	21.35
	384kbps	Before	21.39	21.08	20.92
		After	21.38	21.07	20.91
HSDPA	Sub-Test 1	Before	21.54	21.12	21.62
		After	21.53	21.11	21.61
	Sub-Test 2	Before	21.51	21.20	21.53
		After	21.50	21.21	21.52
	Sub-Test 3	Before	21.45	21.23	21.26
		After	21.44	21.22	21.25
	Sub-Test 4	Before	20.59	20.57	20.43
		After	20.58	20.56	20.42
HSUPA	Sub-Test 1	Before	21.36	21.12	20.90
		After	21.35	21.11	20.91
	Sub-Test 2	Before	20.27	19.93	20.31
		After	20.26	19.92	20.30
	Sub-Test 3	Before	21.21	21.23	21.04
		After	21.20	21.22	21.03
	Sub-Test 4	Before	20.23	20.54	20.16
		After	20.22	20.53	20.15
	Sub-Test 5	Before	21.66	21.31	20.59
		After	21.65	21.30	20.58
WCDMA Band V			Conducted Power(dBm)		
			Channel 4132	Channel 4183	Channel 4233
RMC	12.2kbps	Before	22.31	22.16	22.04
		After	22.30	22.15	22.03
	64kbps	Before	22.41	22.18	22.05
		After	22.40	22.17	22.04
	144kbps	Before	22.43	22.28	22.10
		After	22.42	22.27	22.11
	384kbps	Before	22.35	22.26	22.18
		After	22.34	22.25	22.17
HSDPA	Sub-Test 1	Before	21.86	21.98	21.92
		After	21.85	21.97	21.91

	Sub-Test 2	Before	21.71	21.77	21.63
		After	21.70	21.76	21.62
	Sub-Test 3	Before	21.66	21.58	21.57
		After	21.65	21.57	21.56
	Sub-Test 4	Before	20.67	20.61	20.72
		After	20.66	20.60	20.71
HSUPA	Sub-Test 1	Before	20.88	20.61	20.64
		After	20.87	20.62	20.65
	Sub-Test 2	Before	19.94	19.45	19.61
		After	19.96	19.47	19.62
	Sub-Test 3	Before	20.84	20.59	20.67
		After	20.82	20.58	20.66
	Sub-Test 4	Before	19.96	19.94	19.55
		After	19.94	19.95	19.56
	Sub-Test 5	Before	20.68	20.51	20.53
		After	20.69	20.52	20.52

7. Test Results

7.1. Dielectric Performance

Table 10: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
835MHz (body)	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2010-10-17	55.38	1.00	21.5
1900MHz (body)	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2010-10-15	52.05	1.54	21.5

7.2. System Check

Table 11: System Check for Body Tissue Simulating Liquid

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	1g	ε_r	σ(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 2010-10-17	1.68	2.56	55.38	1.00	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 2010-10-15	5.50	10.28	52.05	1.54	21.5

Note：1. The graph results see ANNEX B.

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

7.3. 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	$\pm$ 0.21 dB	
Test Case Of Body			Measurement Result (W/kg)		Power Drift (dB)	
Test Position	Timeslots	Channel	10 g Average	1 g Average		
IBM T61 (GPRS)						
Test Position 1	1 timeslot	Middle	0.181	0.287	0.090	Figure 8
	2 timeslots	Middle	0.177	0.289	0.097	Figure 9
	3 timeslots	Middle	0.209	0.332	-0.132	Figure 10
	4 timeslots	Middle	0.173	0.276	-0.060	Figure 11
Lenovo Y-450 (GPRS)						
Test Position 2	3 timeslots	High	0.271	0.486	-0.028	Figure 12
		Middle	0.204	0.365	-0.048	Figure 13
		Low	0.156	0.278	-0.059	Figure 14
Test Position 3	3 timeslots	Middle	0.034	0.051	-0.070	Figure 15
Test Position 4	3 timeslots	Middle	0.195	0.310	-0.137	Figure 16
Worst Case Position of GPRS with EGPRS (GMSK)						
Test Position 2	3 timeslots	High	0.252	0.445	-0.079	Figure 17

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 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)
GPRS						
Test Position 2	3 timeslots	High	27.65	0.486	28.2	0.552
EGPRS (GMSK)						
Test Position 2	3 timeslots	High	27.16	0.445	28.2	0.565

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 (dB)	
Test Position	Timeslots	Channel	10 g Average	1 g Average		
IBM T61 (GPRS)						
Test Position 1	1 timeslot	Middle	0.330	0.566	0.080	Figure 18
	2 timeslots	Middle	0.397	0.683	-0.084	Figure 19
	3 timeslots	Middle	0.372	0.638	-0.045	Figure 20
	4 timeslots	Middle	0.313	0.535	-0.068	Figure 21
Lenovo Y-450 (GPRS)						
Test Position 2	2 timeslots	High	0.375	0.731	-0.135	Figure 22
		Middle	0.436	0.851	-0.176	Figure 23
		Low	0.531	1.010	-0.076	Figure 24
Test Position 3	2 timeslots	Middle	0.214	0.509	-0.070	Figure 25
Test Position 4	2 timeslots	Middle	0.308(max.cube)	0.542(max.cube)	-0.032	Figure 26
Worst Case Position of GPRS with EGPRS (GMSK)						
Test Position 2	2 timeslots	Low	0.519	0.985	-0.004	Figure 27

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).

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.

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)
GPRS						
Test Position 2	2 timeslots	Low	26.51	1.010	27.2	1.184
EGPRS (GMSK)						
Test Position 2	2 timeslots	Low	26.51	0.985	27.2	1.155

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	
Test Position	Channel	10 g Average	1 g Average	(dB)	
IBM T61 (RMC)					
Test Position 1	Middle	0.338	0.580	0.081	Figure 28
Lenovo Y-450 (RMC)					
Test Position 2	High	0.385	0.749	-0.140	Figure 29
	Middle	0.352	0.682	-0.036	Figure 30
	Low	0.490	0.934	-0.045	Figure 31
Test Position 3	Middle	0.265	0.461	0.109	Figure 32
Test Position 4	Middle	0.241	0.427	-0.041	Figure 33
Worst Case Position of RMC with HSDPA					
Test Position 2	Low	0.455	0.860	-0.042	Figure 34
Worst Case Position of RMC with HSUPA					
Test Position 2	Low	0.370	0.690	-0.010	Figure 35

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

2. The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB (< 0.8W/kg) lower than the SAR limit, testing at the high and low channels is optional.

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

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)
RMC					
Test Position 2	Low	21.8	0.934	21.8	0.934

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	
Test Position	Channel	10 g Average	1 g Average	(dB)	
IBM T61(RMC)					
Test Position 1	Middle	0.172	0.274	0.041	Figure 36
Lenovo Y-450(RMC)					
Test Position 2	High	0.247	0.440	-0.061	Figure 37
	Middle	0.162	0.291	-0.063	Figure 38
	Low	0.211	0.374	-0.058	Figure 39
Test Position 3	Middle	0.033	0.048	-0.077	Figure 40
Test Position 4	Middle	0.174	0.277	-0.092	Figure 41
Worst Case Position of RMC with HSDPA					
Test Position 2	High	0.257	0.450	-0.056	Figure 42
Worst Case Position of RMC with HSUPA					
Test Position 2	High	0.156	0.275	-0.020	Figure 43

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)
HSDPA					
Test Position 2	High	21.92	0.450	22.8	0.551

8. Measurement Uncertainty

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

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

9. Main Test Instruments

Table 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 13, 2010	One year
04	Power sensor	Agilent 8481H	MY41091316	March 26, 2010	One year
05	Signal Generator	HP 8341B	2730A00804	September 13, 2010	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	Validation Kit 835MHz	D835V2	4d092	January 14, 2010	One year
08	Validation Kit 1900MHz	D1900V2	5d018	June 15, 2010	One year
09	BTS	E5515C	MY48360988	December 4, 2009	One year
10	E-field Probe	EX3DV4	3661	December 30, 2009	One year
11	DAE	DAE4	871	November 11, 2009	One year

END OF REPORT BODY

ANNEX A: Test Layout

Picture 2: Specific Absorption Rate Test Layout

Picture 3: Liquid depth in the Flat Phantom (835 MHz, 15.4cm depth)
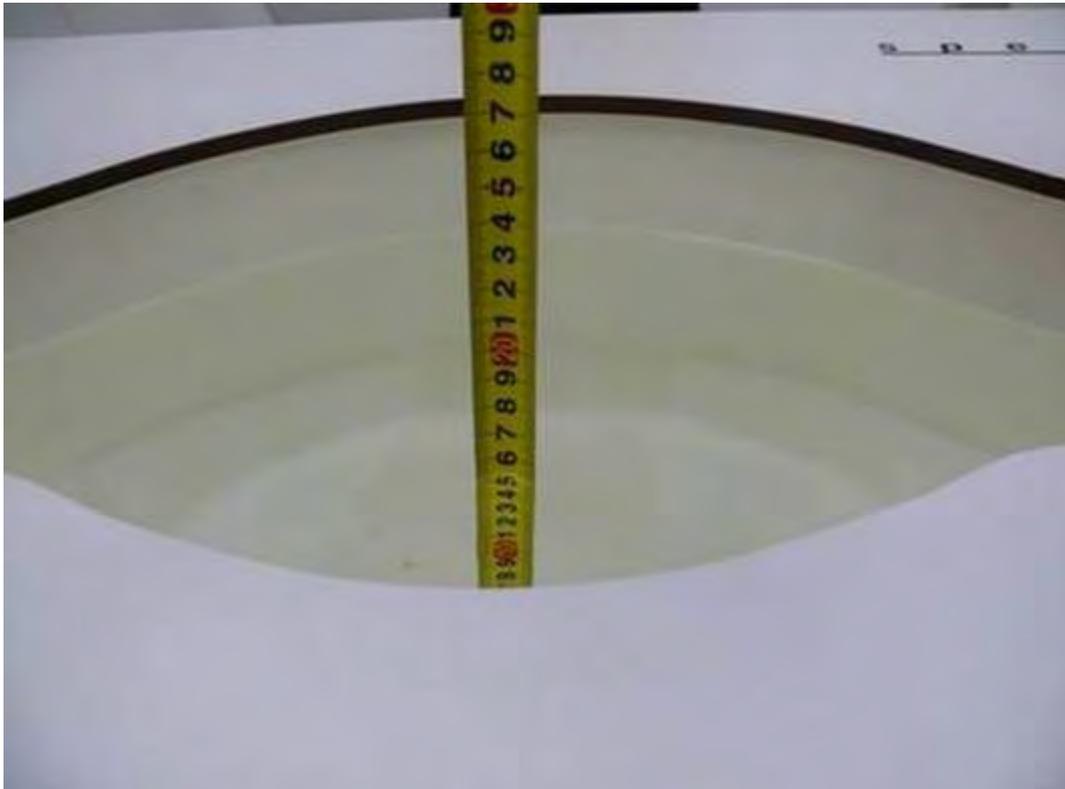
Picture 4: Liquid depth in the Flat Phantom (1900 MHz, 15.2cm depth)

ANNEX B: System Check Results

System Performance Check at 835 MHz

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

Date/Time: 10/17/2010 5:02:20 PM

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

Medium parameters used: f = 835 MHz; σ = 1.00 mho/m; ε_r = 55.38; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

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

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

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

Peak SAR (extrapolated) = 3.68 W/kg

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

Maximum value of SAR (measured) = 2.77 mW/g
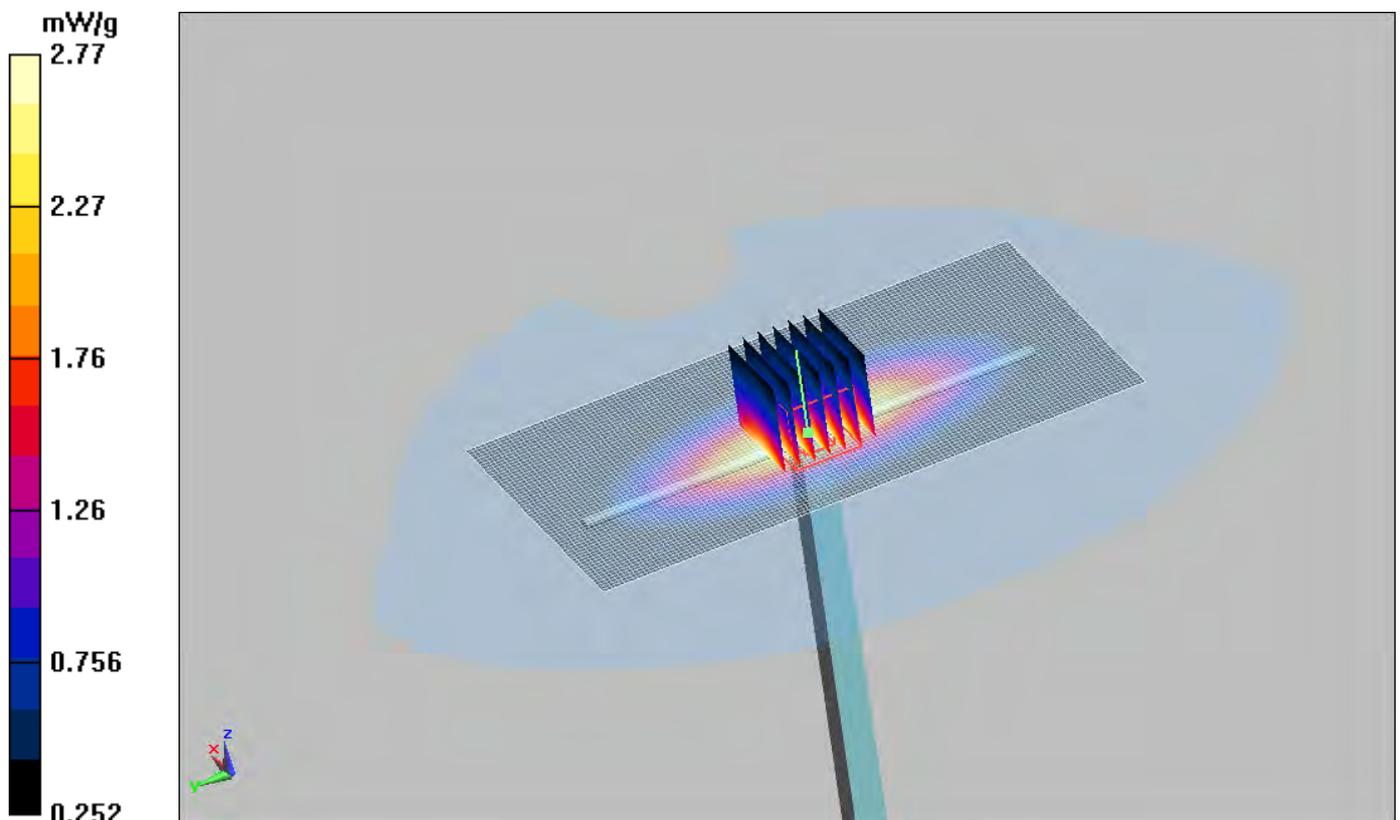
Figure 6 System Performance Check 835MHz 250mW

System Performance Check at 1900 MHz

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

Date/Time: 10/15/2010 6:51:19 PM

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

Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 52.05; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

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

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 10.28 mW/g; SAR(10 g) = 5.50 mW/g

Maximum value of SAR (measured) = 11 mW/g
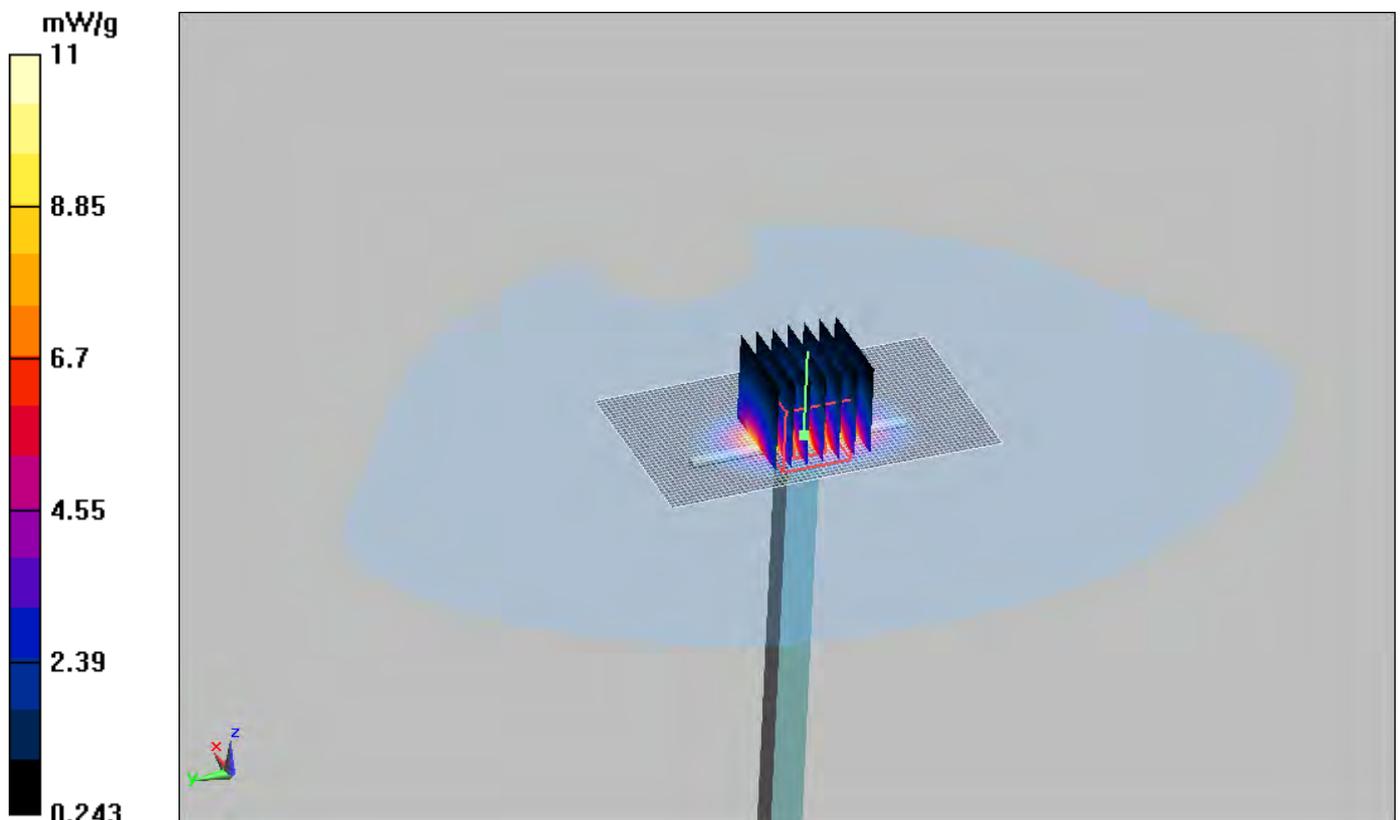
Figure 7 System Performance Check 1900MHz 250mW

ANNEX C: Graph Results

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

Date/Time: 10/17/2010 6:55:13 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.320 mW/g

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

Reference Value = 14.3 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 0.425 W/kg

SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.181 mW/g

Maximum value of SAR (measured) = 0.308 mW/g
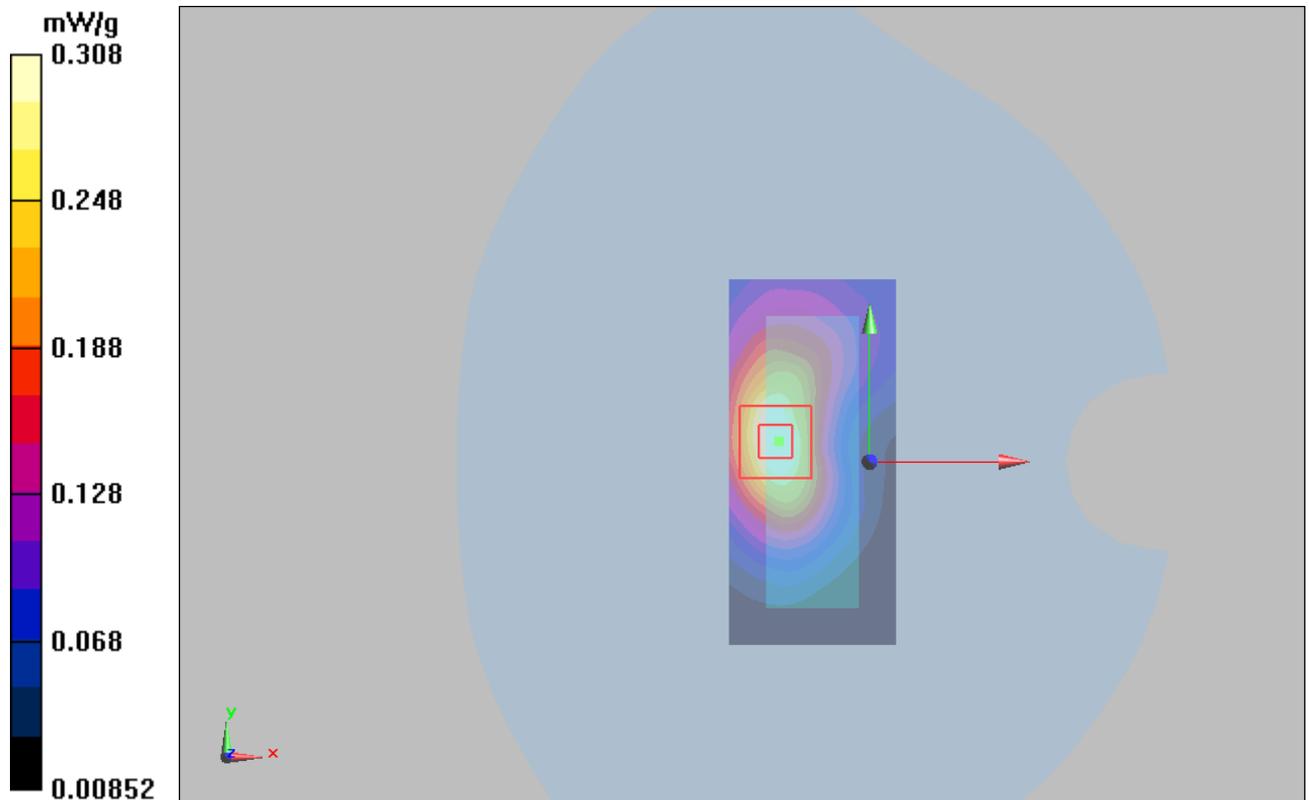
Figure 8 GSM 850 GPRS (1Up) with IBM T61 Test Position 1 Channel 190

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

Date/Time: 10/17/2010 6:31:23 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

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

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

Reference Value = 14.2 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 0.443 W/kg

SAR(1 g) = 0.289 mW/g; SAR(10 g) = 0.177 mW/g

Maximum value of SAR (measured) = 0.314 mW/g
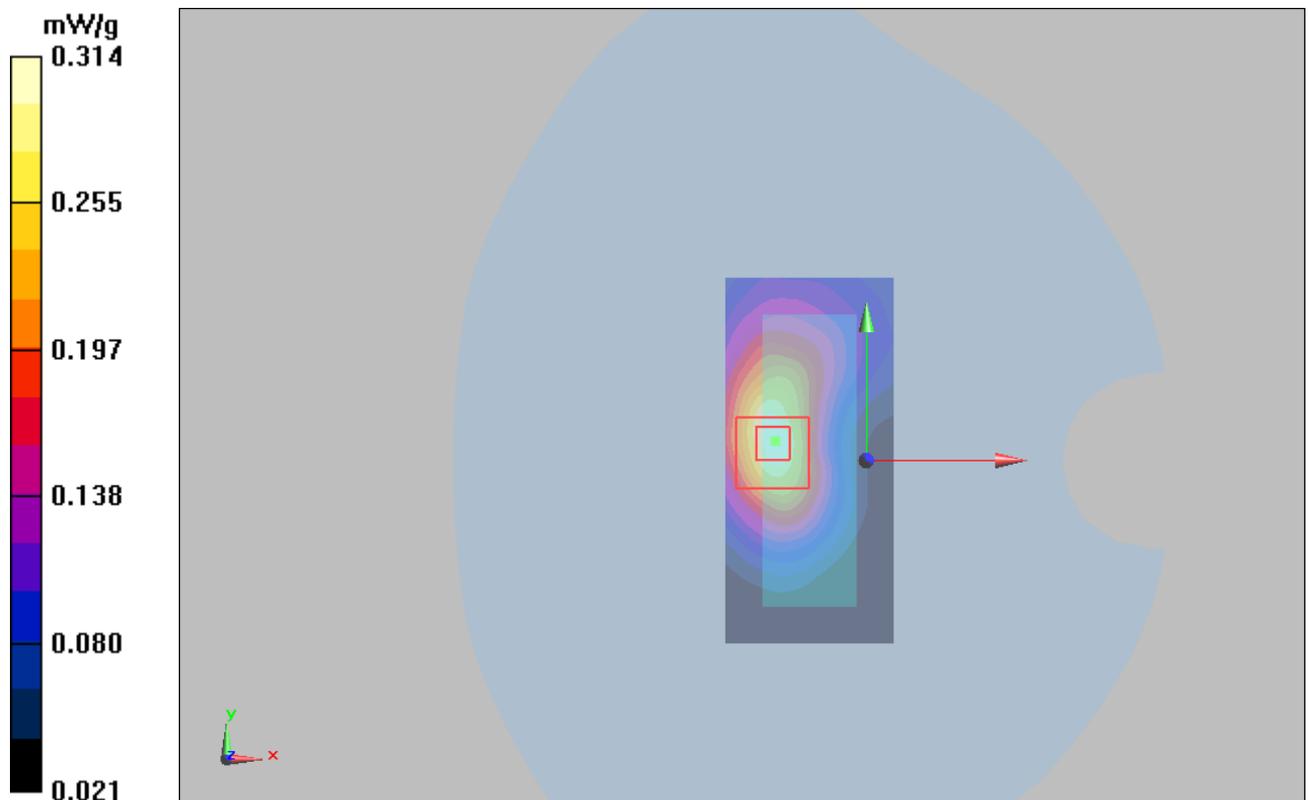
Figure 9 GSM 850 GPRS (2Up) with IBM T61 Test Position 1 Channel 190

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

Date/Time: 10/17/2010 7:12:26 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

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

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

Reference Value = 15.7 V/m; Power Drift = -0.132 dB

Peak SAR (extrapolated) = 0.479 W/kg

SAR(1 g) = 0.332 mW/g; SAR(10 g) = 0.209 mW/g

Maximum value of SAR (measured) = 0.362 mW/g
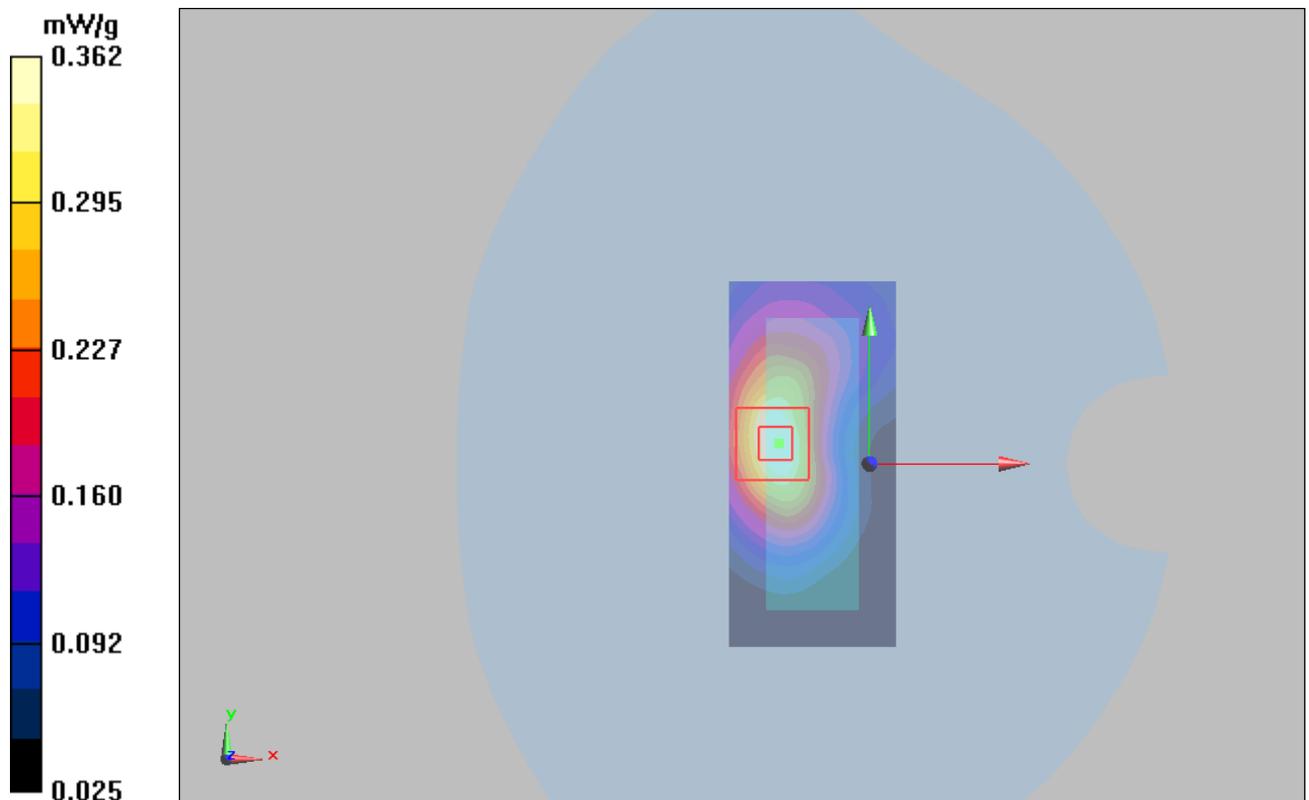
Figure 10 GSM 850 GPRS (3Up) with IBM T61 Test Position 1 Channel 190

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

Date/Time: 10/17/2010 7:29:08 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.308 mW/g

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

Reference Value = 14.1 V/m; Power Drift = -0.060 dB

Peak SAR (extrapolated) = 0.416 W/kg

SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.173 mW/g
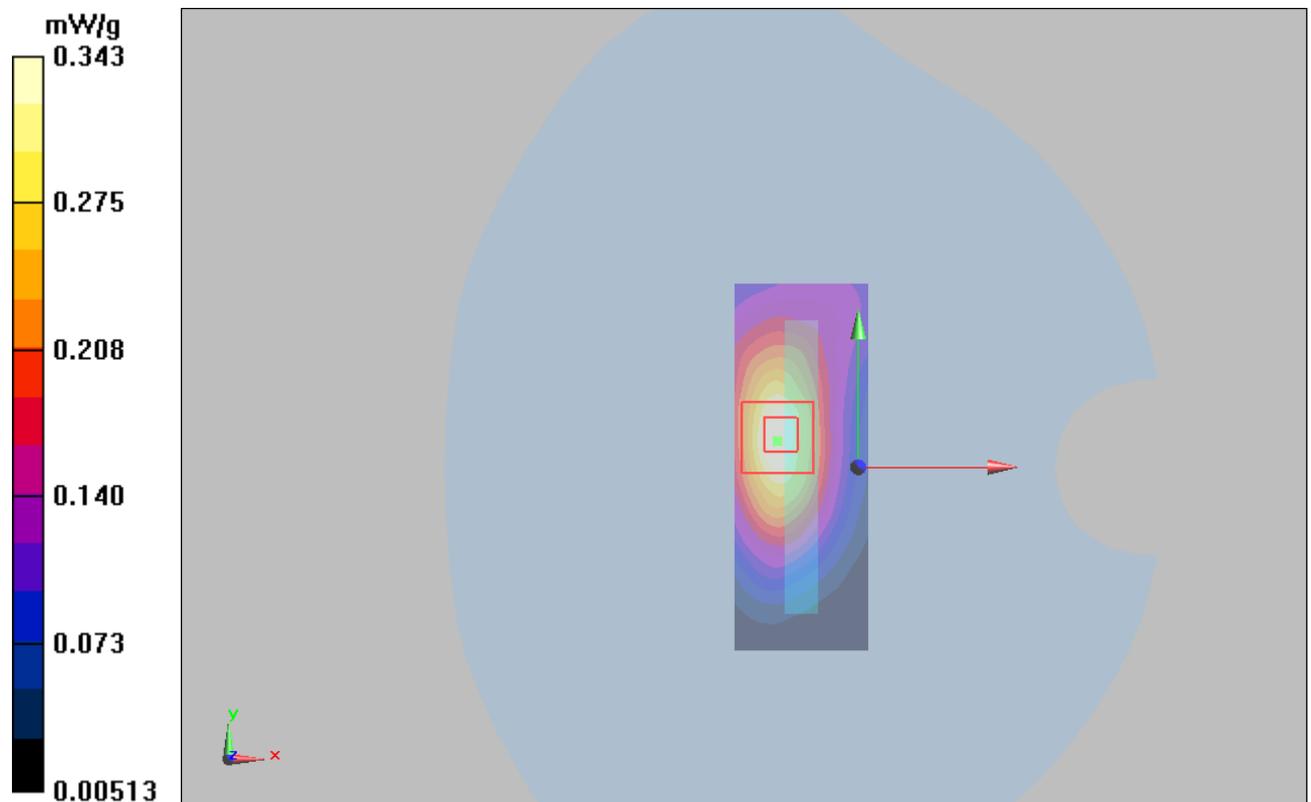
Maximum value of SAR (measured) = 0.300 mW/g
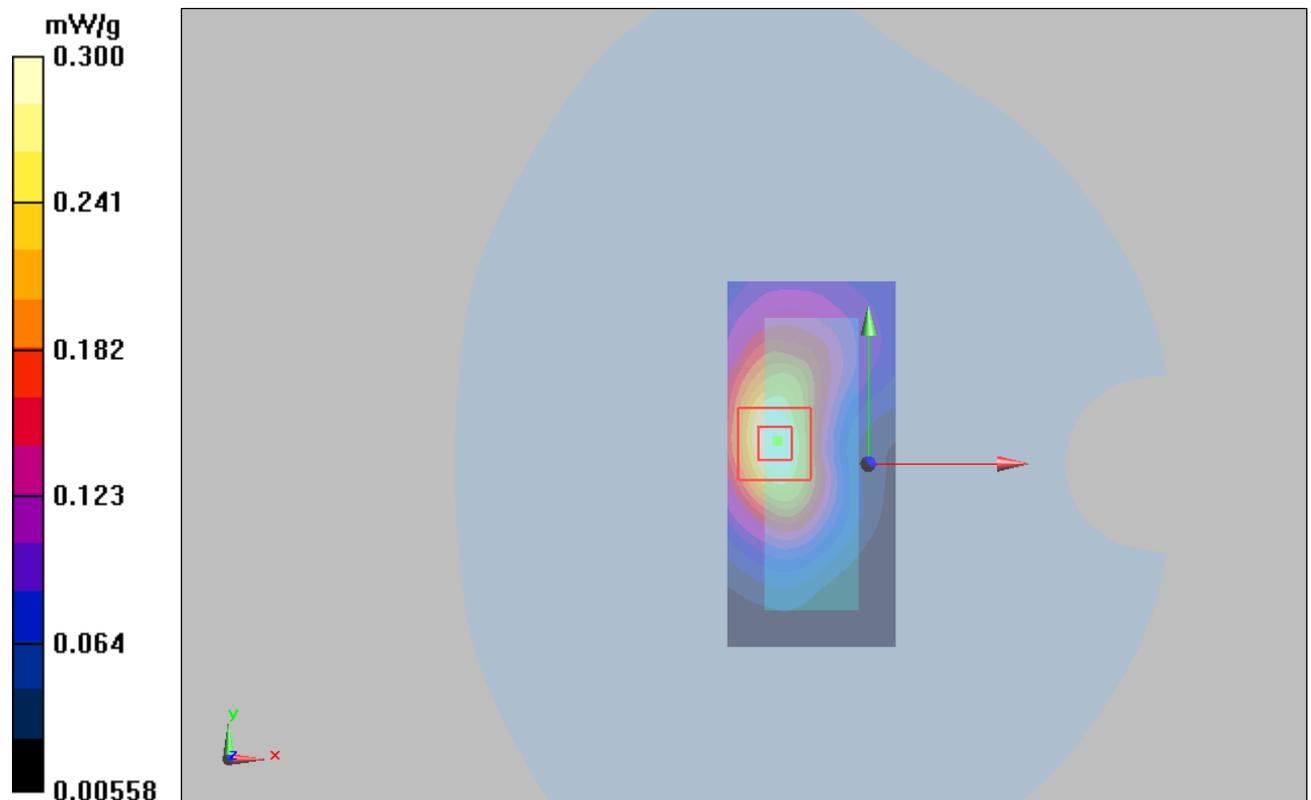
Figure 11 GSM 850 GPRS (4Up) with IBM T61 Test Position 1 Channel 190

GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 2 High

Date/Time: 10/18/2010 10:46:34 AM

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

Medium parameters used: f = 849 MHz; σ = 1.02 mho/m; $ε_r$ = 55.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.538 mW/g

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

Reference Value = 21.5 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 0.847 W/kg

SAR(1 g) = 0.486 mW/g; SAR(10 g) = 0.271 mW/g

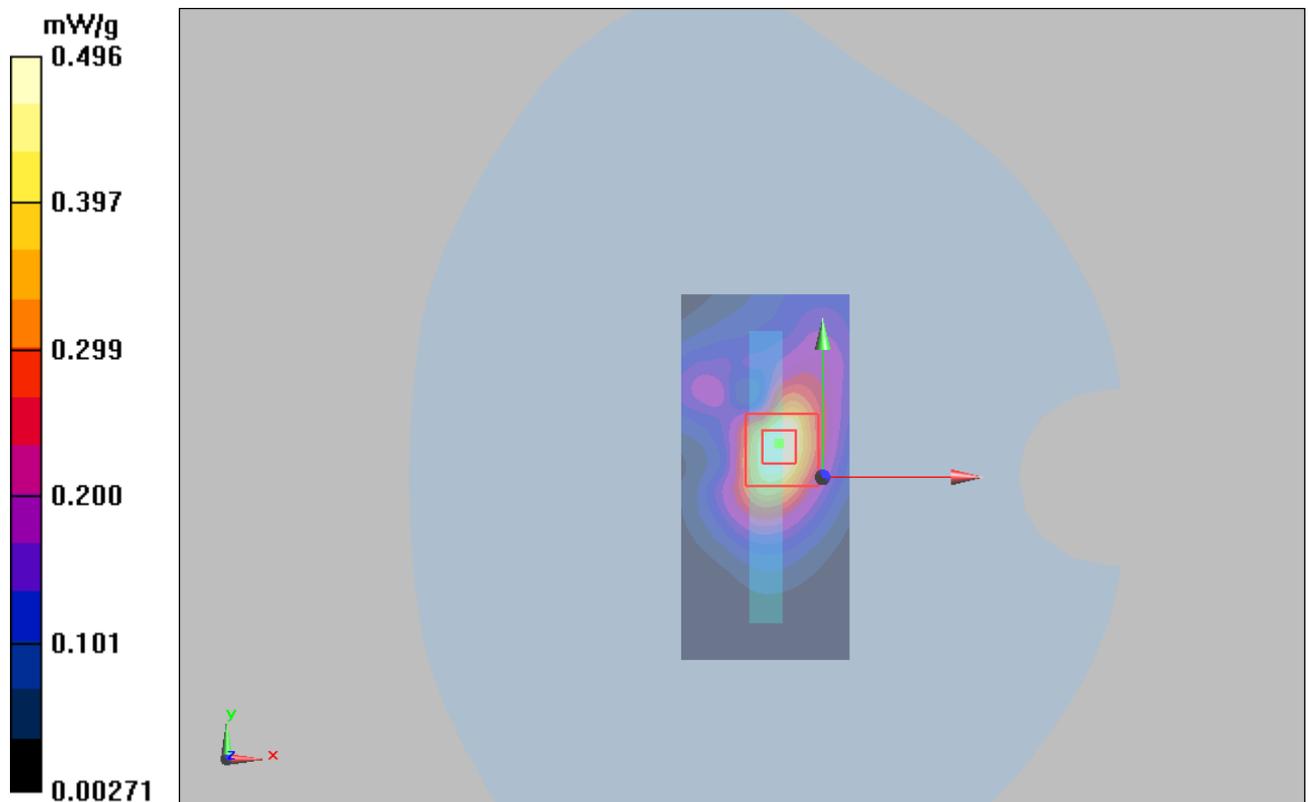Maximum value of SAR (measured) = 0.541 mW/g
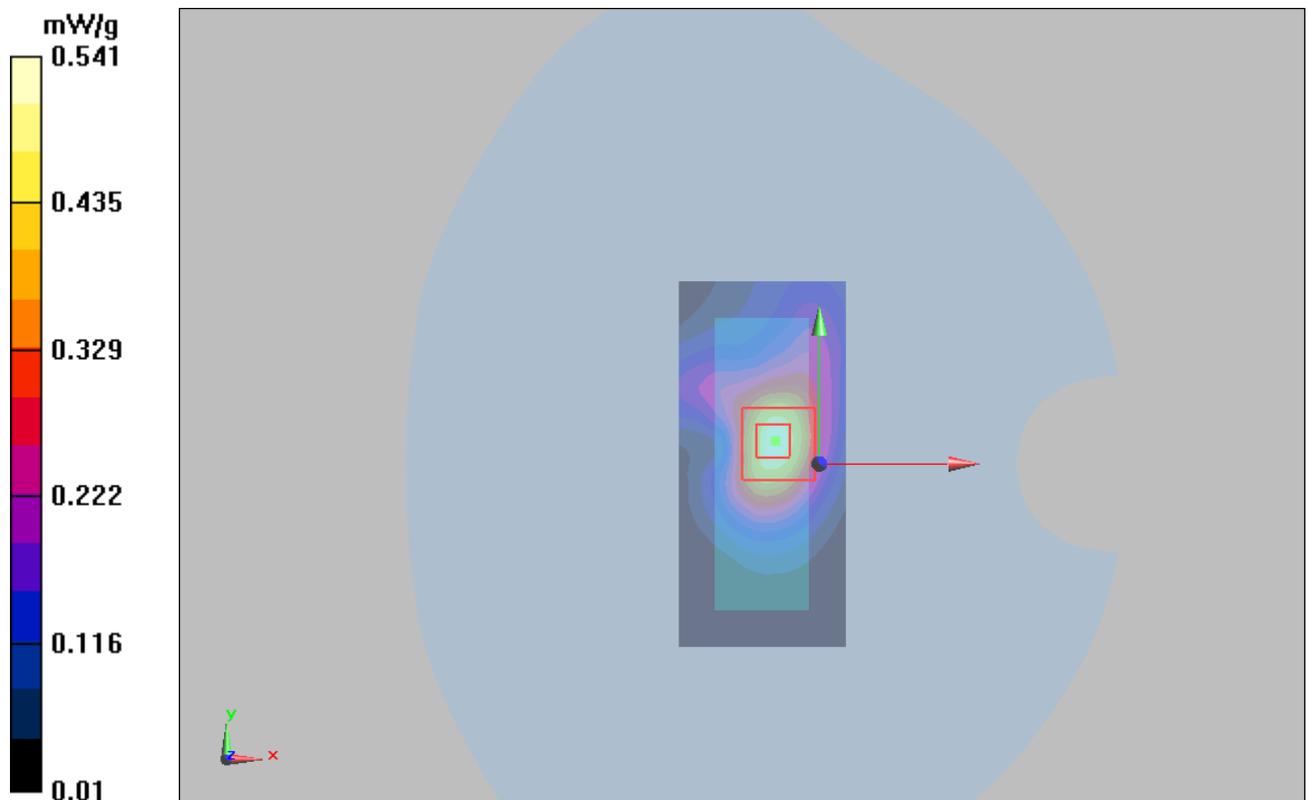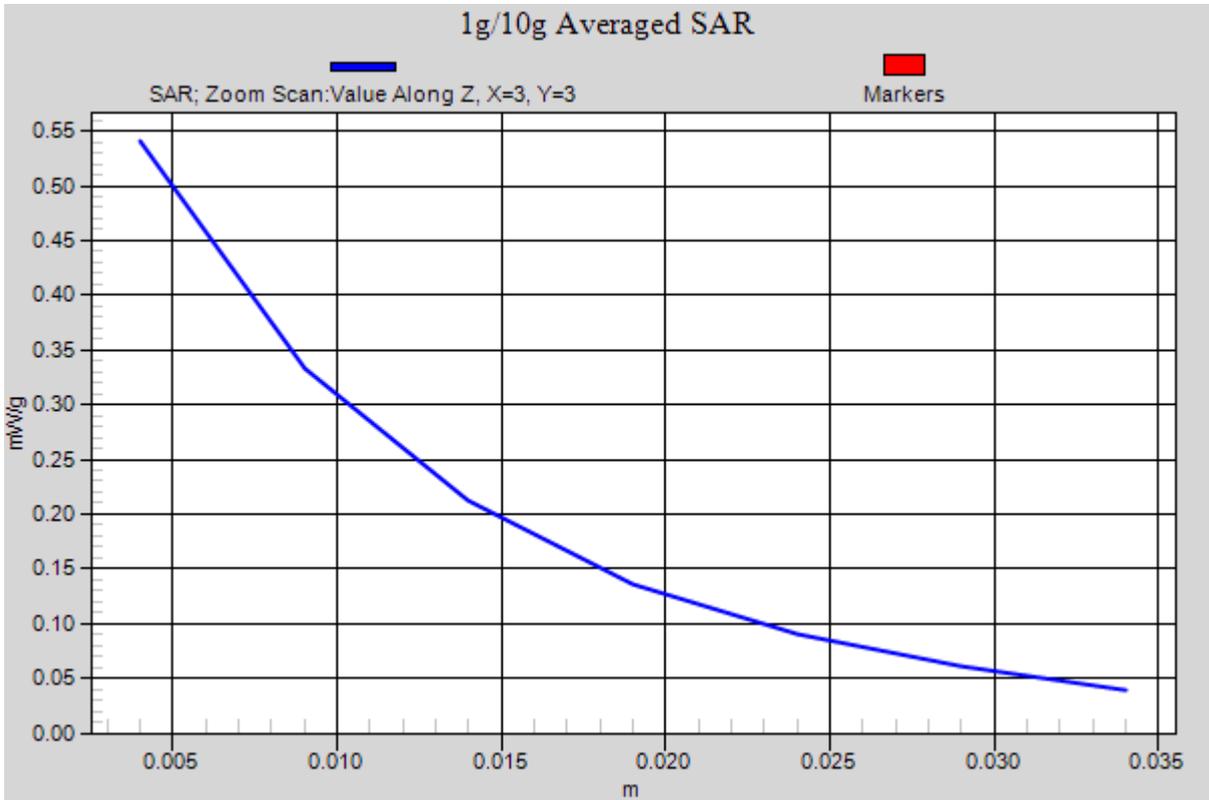
Figure 12 GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 2 Channel 251

GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 2 Middle

Date/Time: 10/18/2010 9:37:34 AM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.418 mW/g

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

Reference Value = 18.4 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 0.629 W/kg

SAR(1 g) = 0.365 mW/g; SAR(10 g) = 0.204 mW/g

Maximum value of SAR (measured) = 0.403 mW/g
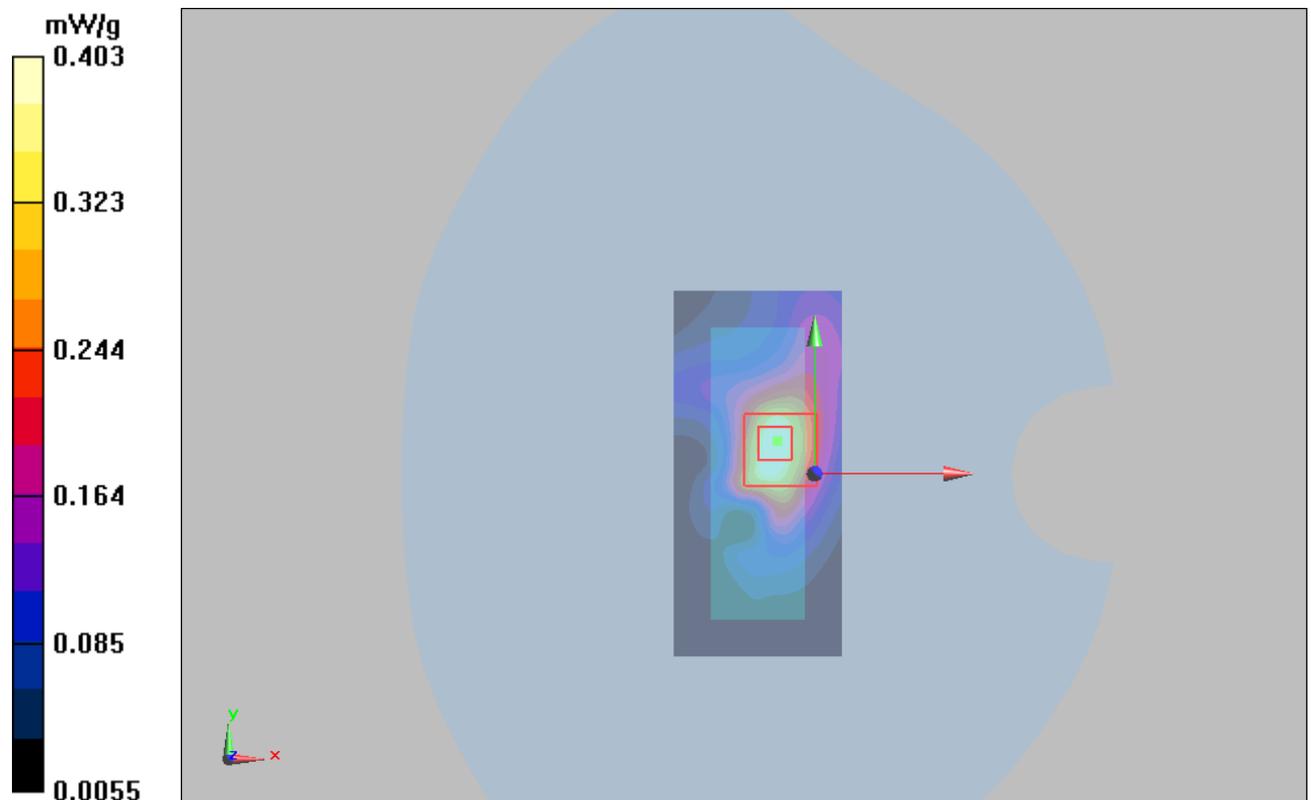
Figure 13 GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 2 Channel 190

GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/18/2010 10:22:42 AM

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

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.992 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.318 mW/g

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

Reference Value = 16.7 V/m; Power Drift = -0.059 dB

Peak SAR (extrapolated) = 0.463 W/kg

SAR(1 g) = 0.278 mW/g; SAR(10 g) = 0.156 mW/g

Maximum value of SAR (measured) = 0.312 mW/g
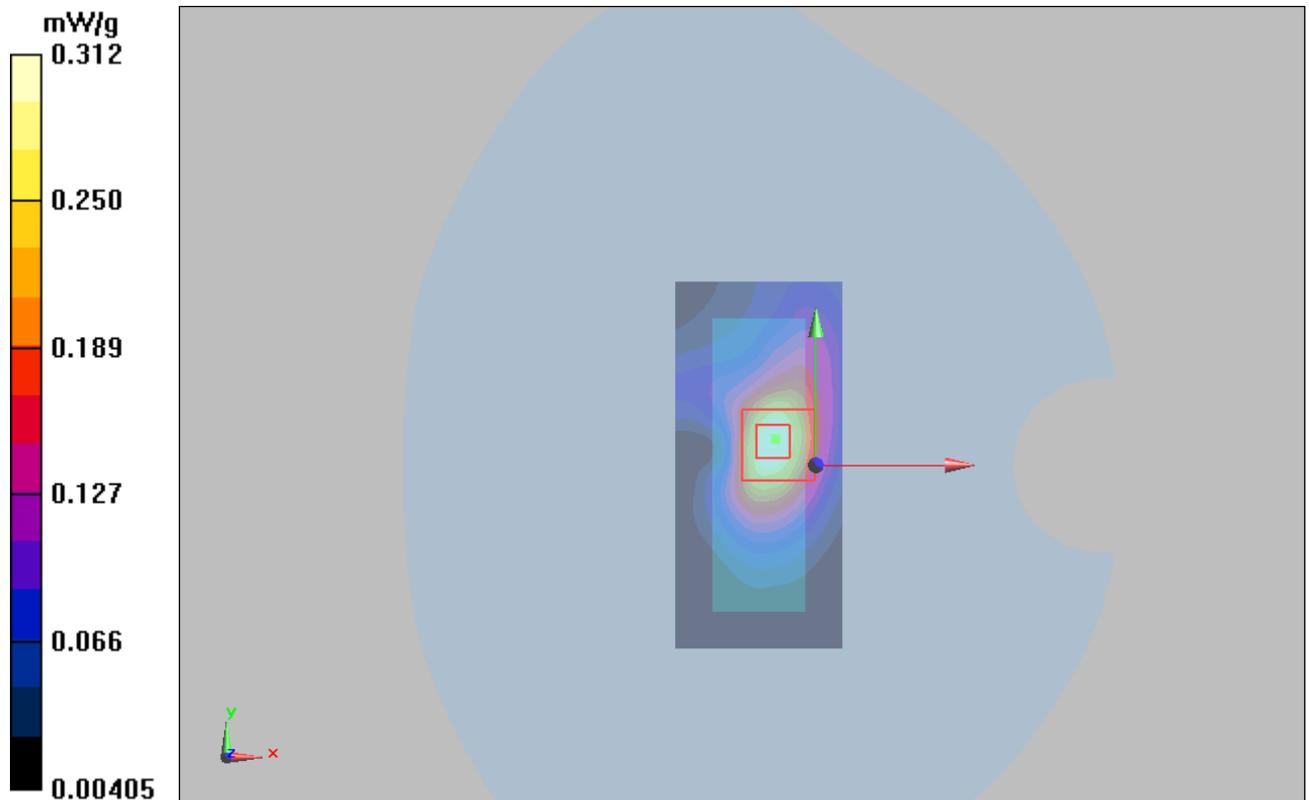
Figure 14 GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 2 Channel 128

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

Date/Time: 10/18/2010 12:40:51 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

Test Position 3 Middle/Area Scan (41x161x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.064 mW/g

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

Reference Value = 4.85 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 0.071 W/kg

SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.054 mW/g
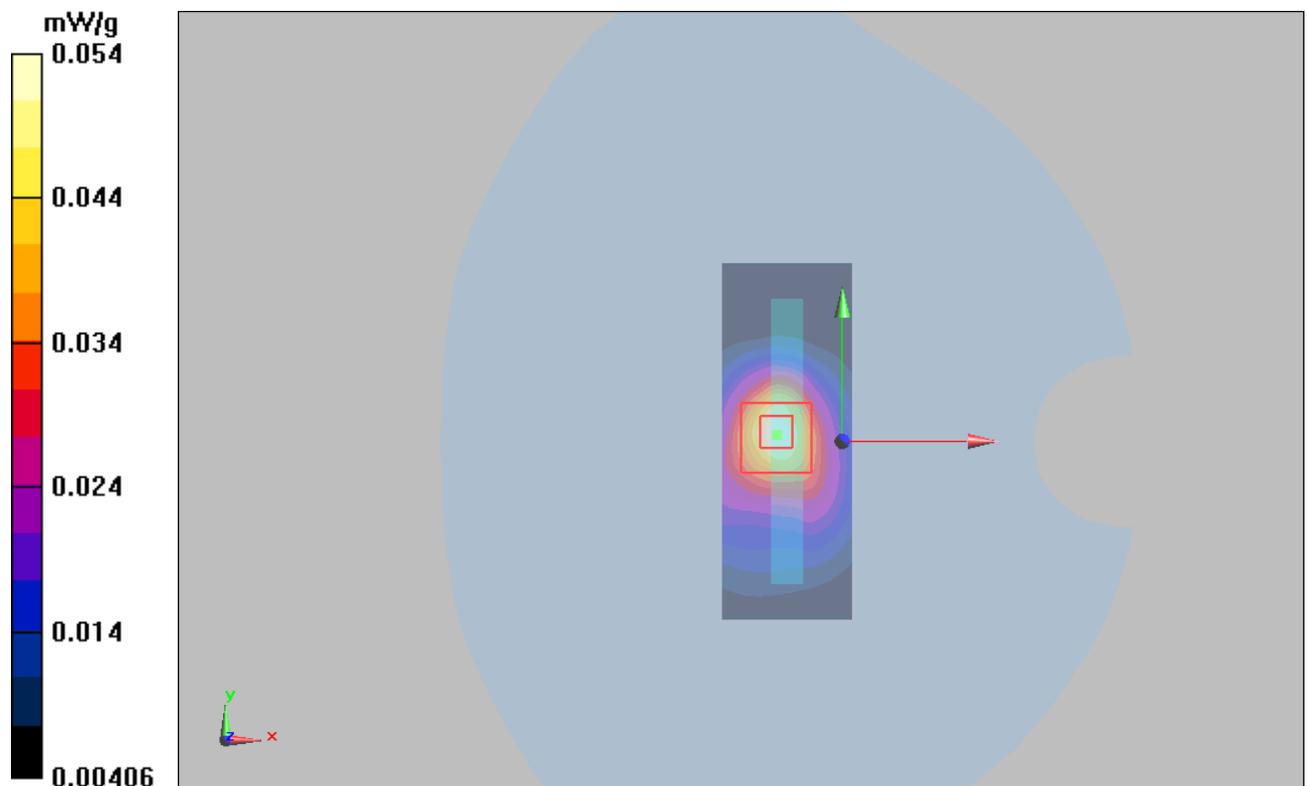
Figure 15 GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 3 Channel 190

GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 4 Middle

Date/Time: 10/18/2010 11:17:11 AM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

Test Position 4 Middle/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.345 mW/g

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

Reference Value = 16.6 V/m; Power Drift = -0.137 dB

Peak SAR (extrapolated) = 0.477 W/kg

SAR(1 g) = 0.310 mW/g; SAR(10 g) = 0.195 mW/g

Maximum value of SAR (measured) = 0.343 mW/g

Figure 16 GSM 850 GPRS (3Up) with Lenovo Y-450 Test Position 4 Channel 190

GSM 850 EGPRS (3Up) with Lenovo Y-450 Test Position 2 High

Date/Time: 10/18/2010 1:33:25 PM

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

Medium parameters used: f = 849 MHz; σ = 1.02 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.536 mW/g

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

Reference Value = 21.2 V/m; Power Drift = -0.079 dB

Peak SAR (extrapolated) = 0.752 W/kg

SAR(1 g) = 0.445 mW/g; SAR(10 g) = 0.252 mW/g

Maximum value of SAR (measured) = 0.496 mW/g

Figure 17 GSM 850 EGPRS (3Up) with Lenovo Y-450 Test Position 2 Channel 251

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

Date/Time: 10/15/2010 9:04:32 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.631 mW/g

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

Reference Value = 16.7 V/m; Power Drift = 0.080 dB

Peak SAR (extrapolated) = 0.878 W/kg

SAR(1 g) = 0.566 mW/g; SAR(10 g) = 0.330 mW/g

Maximum value of SAR (measured) = 0.631 mW/g
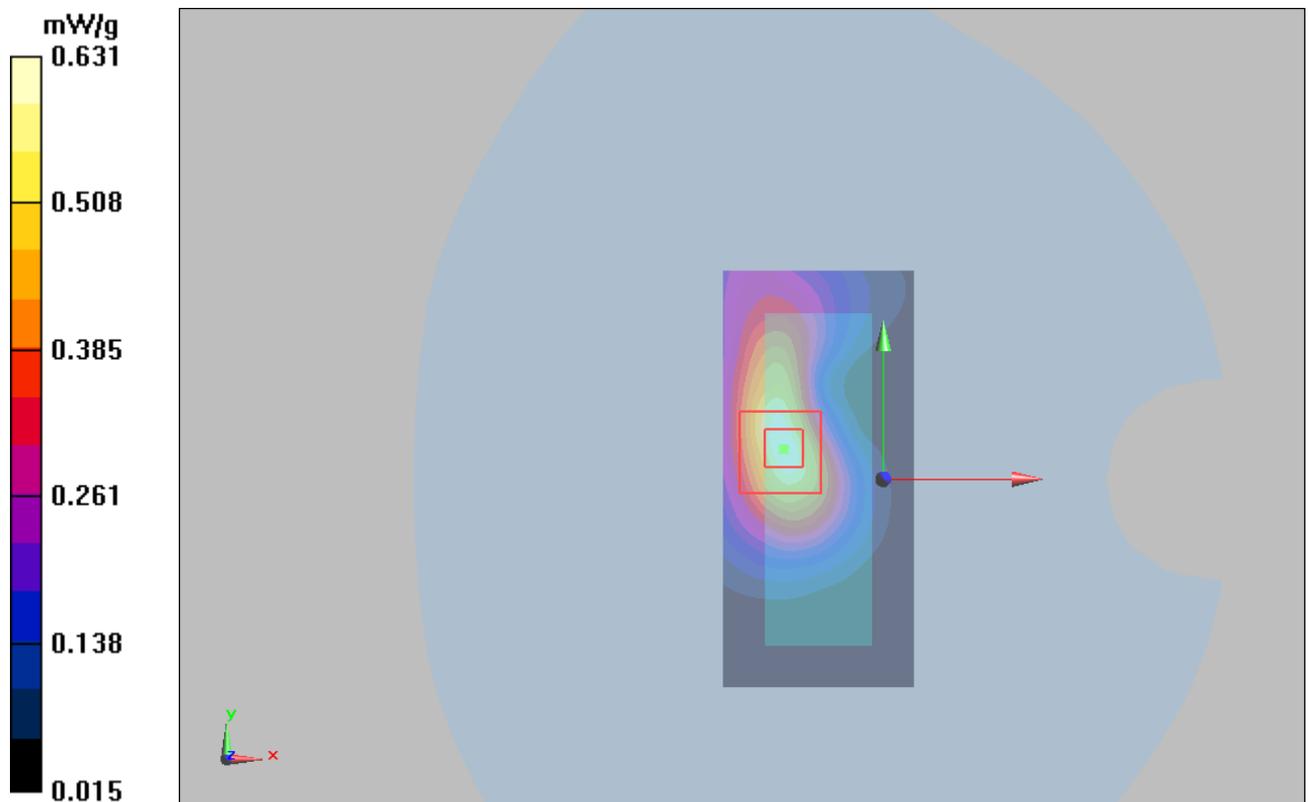
Figure 18 GSM 1900 GPRS (1Up) with IBM T61 Test Position 1 Channel 661

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

Date/Time: 10/15/2010 8:14:45 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 19.4 V/m; Power Drift = -0.084 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.683 mW/g; SAR(10 g) = 0.397 mW/g

Maximum value of SAR (measured) = 0.748 mW/g
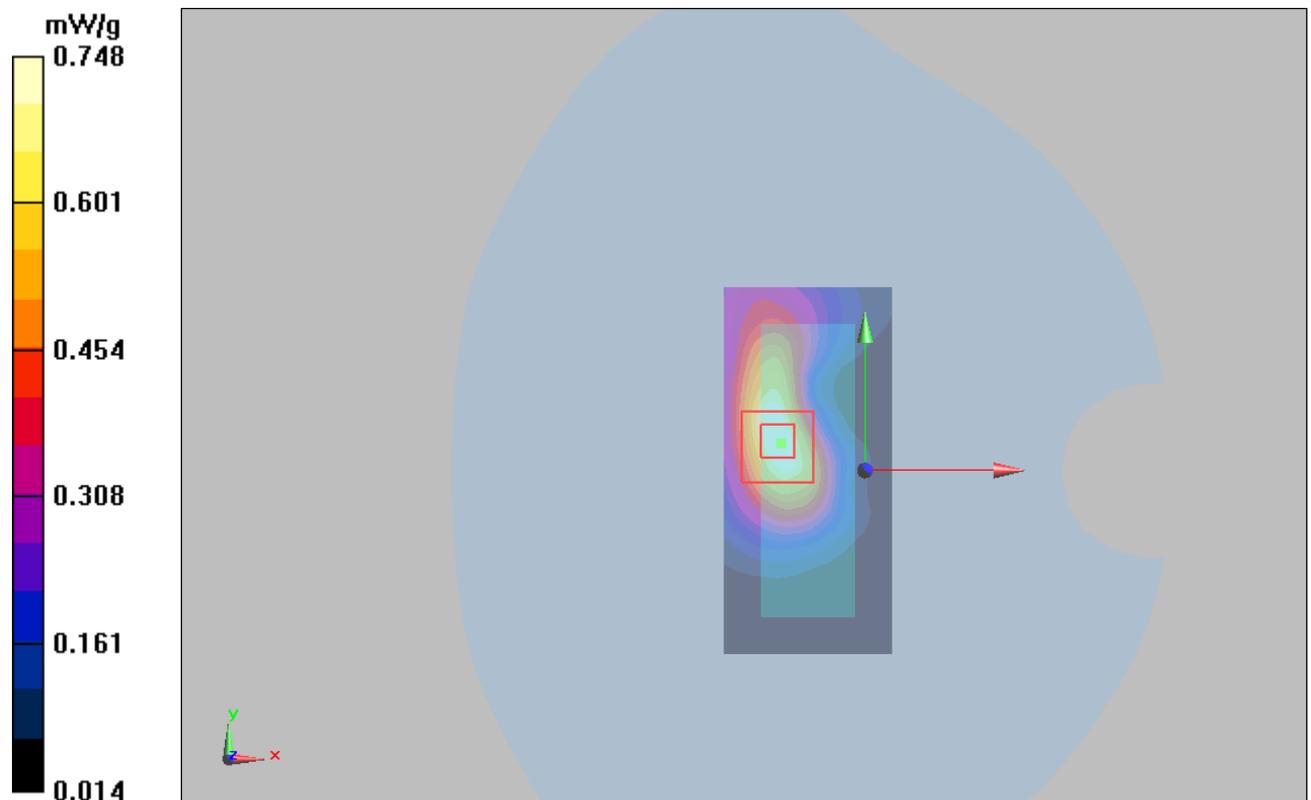
Figure 19 GSM 1900 GPRS (2Up) with IBM T61 Test Position 1 Channel 661

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

Date/Time: 10/15/2010 8:31:34 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 18.7 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.978 W/kg

SAR(1 g) = 0.638 mW/g; SAR(10 g) = 0.372 mW/g

Maximum value of SAR (measured) = 0.702 mW/g
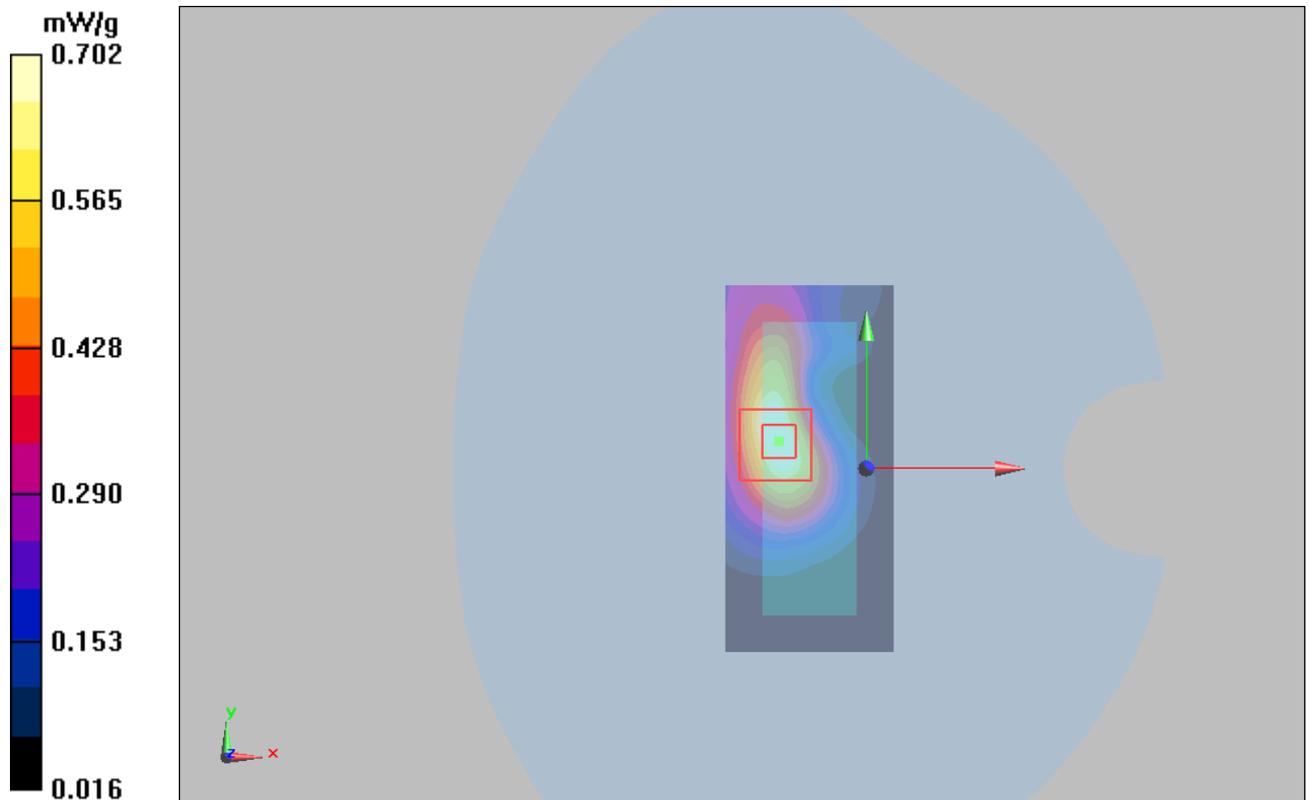
Figure 20 GSM 1900 GPRS (3Up) with IBM T61 Test Position 1 Channel 661

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

Date/Time: 10/15/2010 8:47:55 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; $ε_r$ = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.609 mW/g

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

Reference Value = 16.8 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.313 mW/g

Maximum value of SAR (measured) = 0.583 mW/g
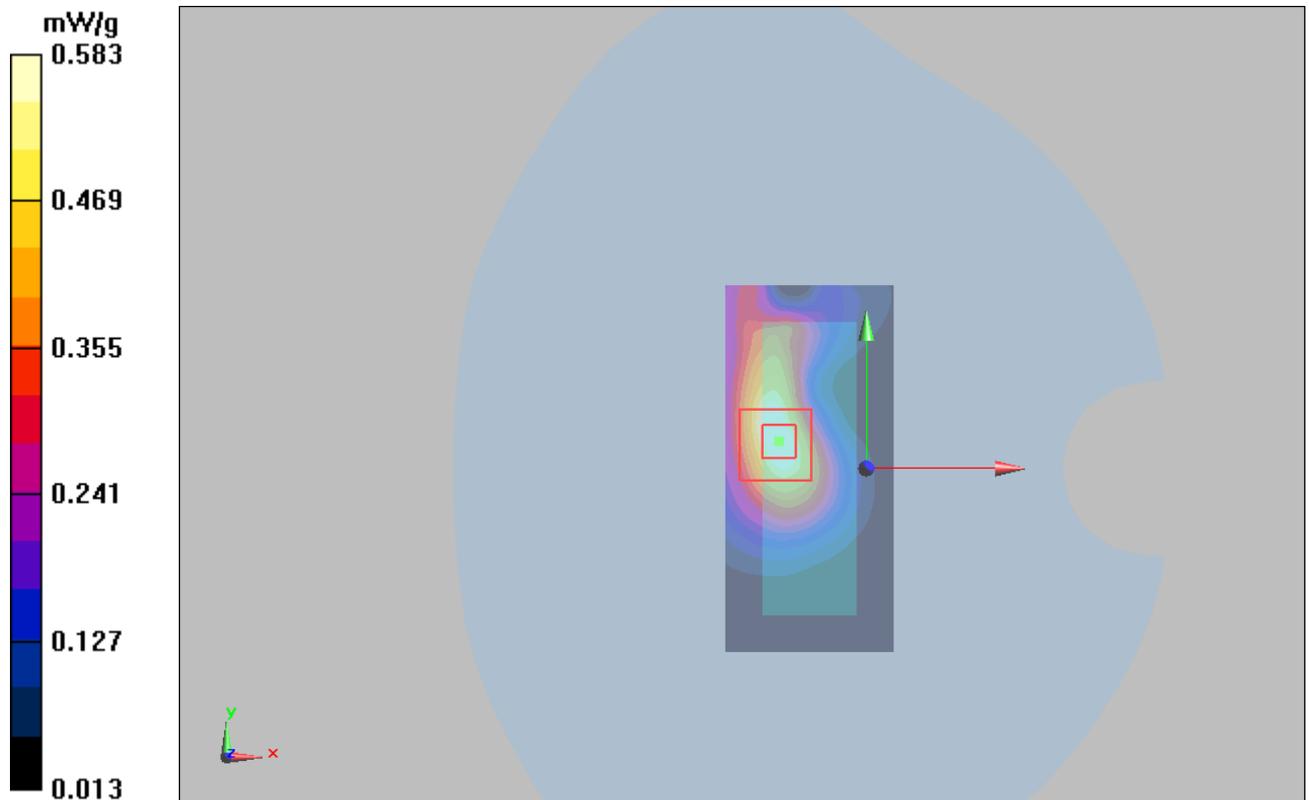
Figure 21 GSM 1900 GPRS (4Up) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 2 High

Date/Time: 10/16/2010 1:56:03 PM

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

Medium parameters used: f = 1910 MHz; σ = 1.56 mho/m; ε_r = 52; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.820 mW/g

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

Reference Value = 16.6 V/m; Power Drift = -0.135 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.731 mW/g; SAR(10 g) = 0.375 mW/g

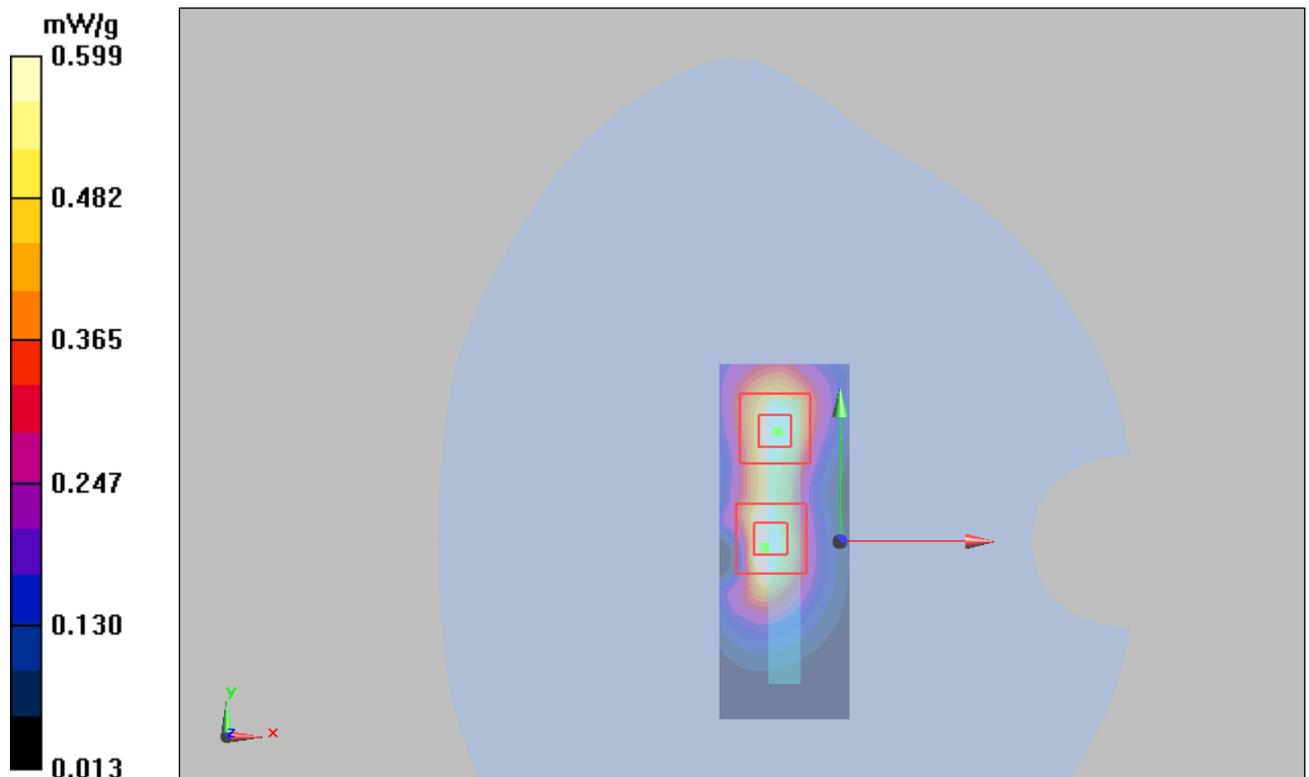Maximum value of SAR (measured) = 0.815 mW/g
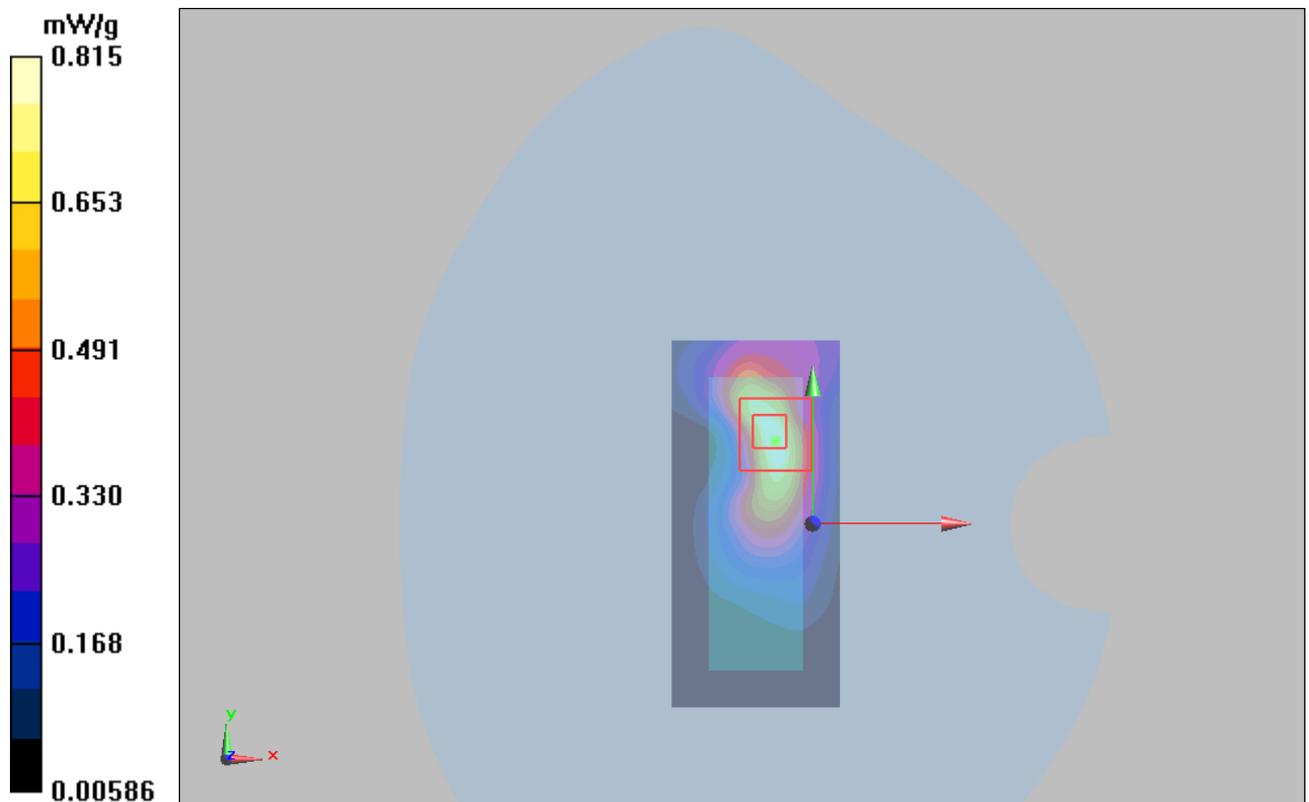
Figure 22 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 2 Channel 810

GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 2 Middle

Date/Time: 10/16/2010 1:07:59 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 18.6 V/m; Power Drift = -0.176 dB

Peak SAR (extrapolated) = 1.47 W/kg

SAR(1 g) = 0.851 mW/g; SAR(10 g) = 0.436 mW/g

Maximum value of SAR (measured) = 0.976 mW/g
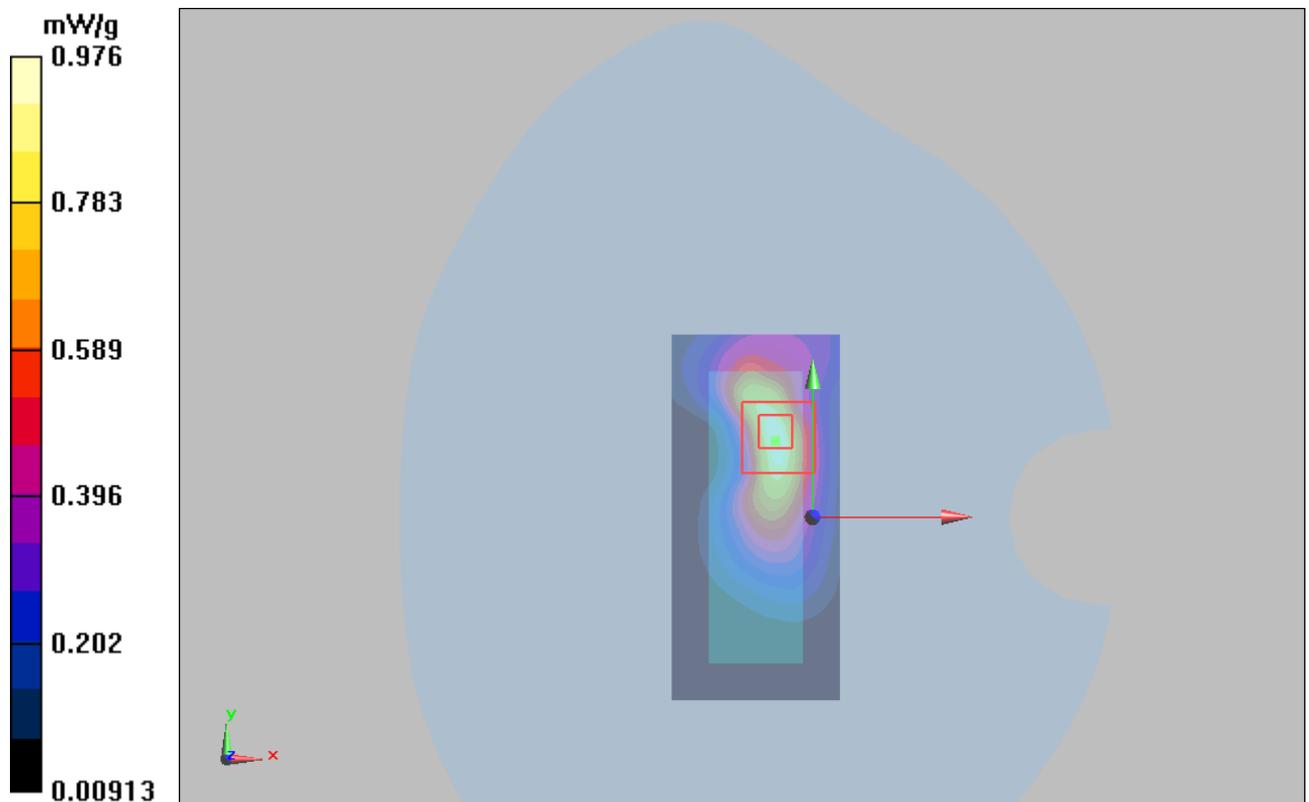
Figure 23 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 2 Channel 661

GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/16/2010 1:31:47 PM

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

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.49 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 20.9 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 1.71 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.531 mW/g

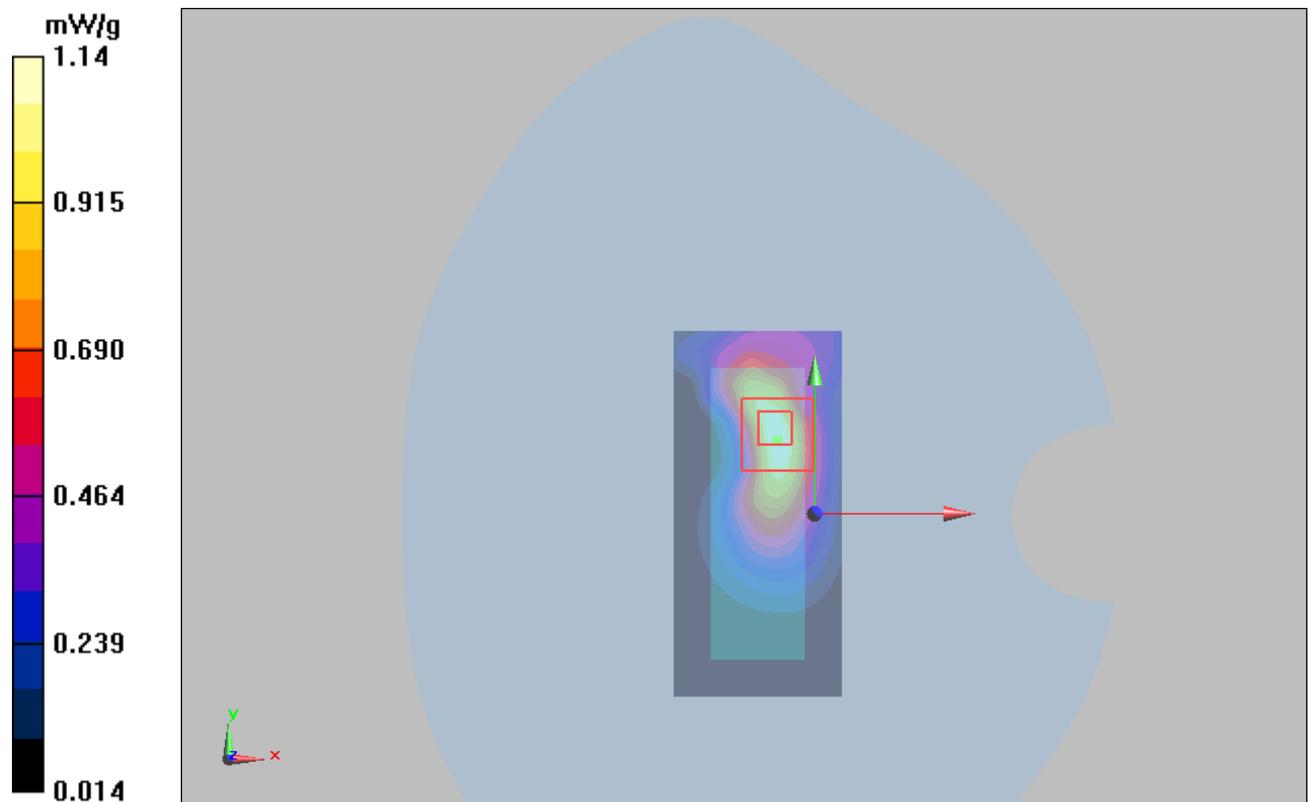Maximum value of SAR (measured) = 1.17 mW/g
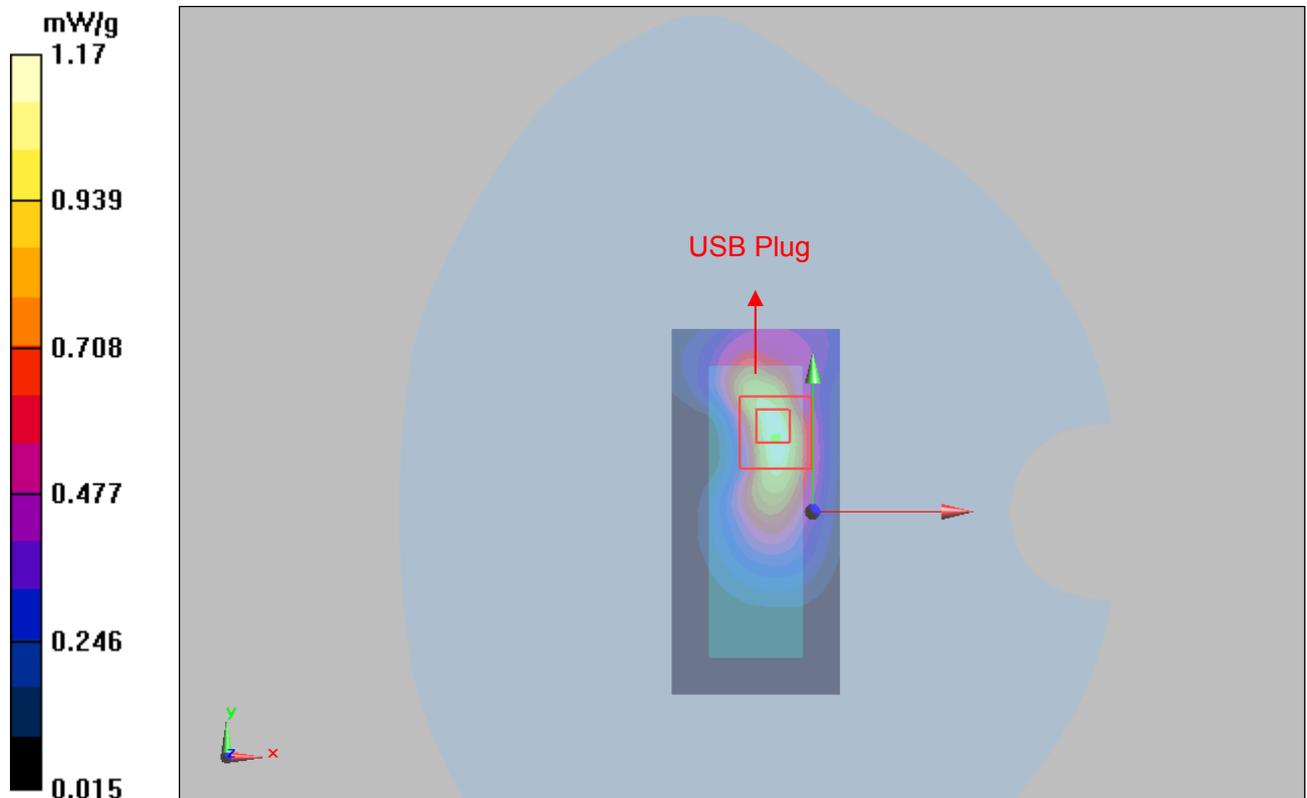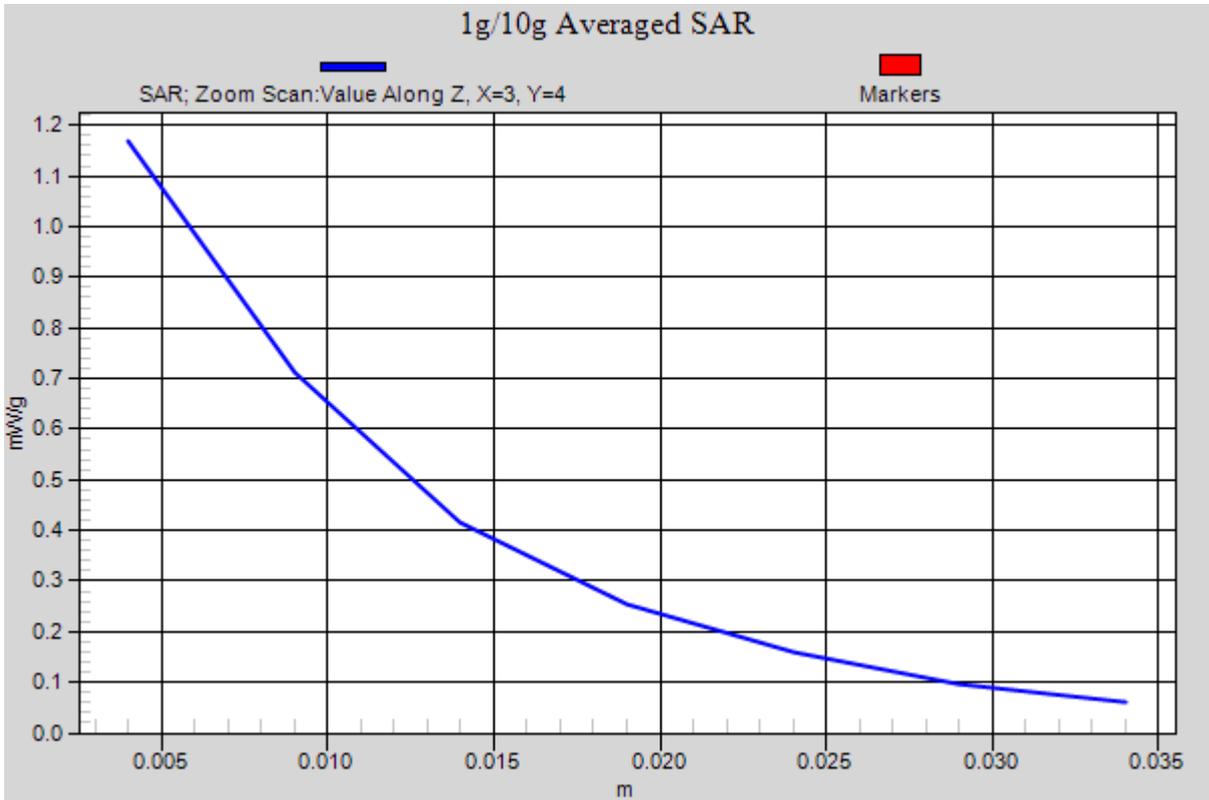
Figure 24 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 2 Channel 512

GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 3 Middle

Date/Time: 10/16/2010 3:29:14 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

Test Position 3 Middle/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.579 mW/g

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

Reference Value = 19 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 1.75 W/kg

SAR(1 g) = 0.509 mW/g; SAR(10 g) = 0.214 mW/g

Maximum value of SAR (measured) = 0.595 mW/g
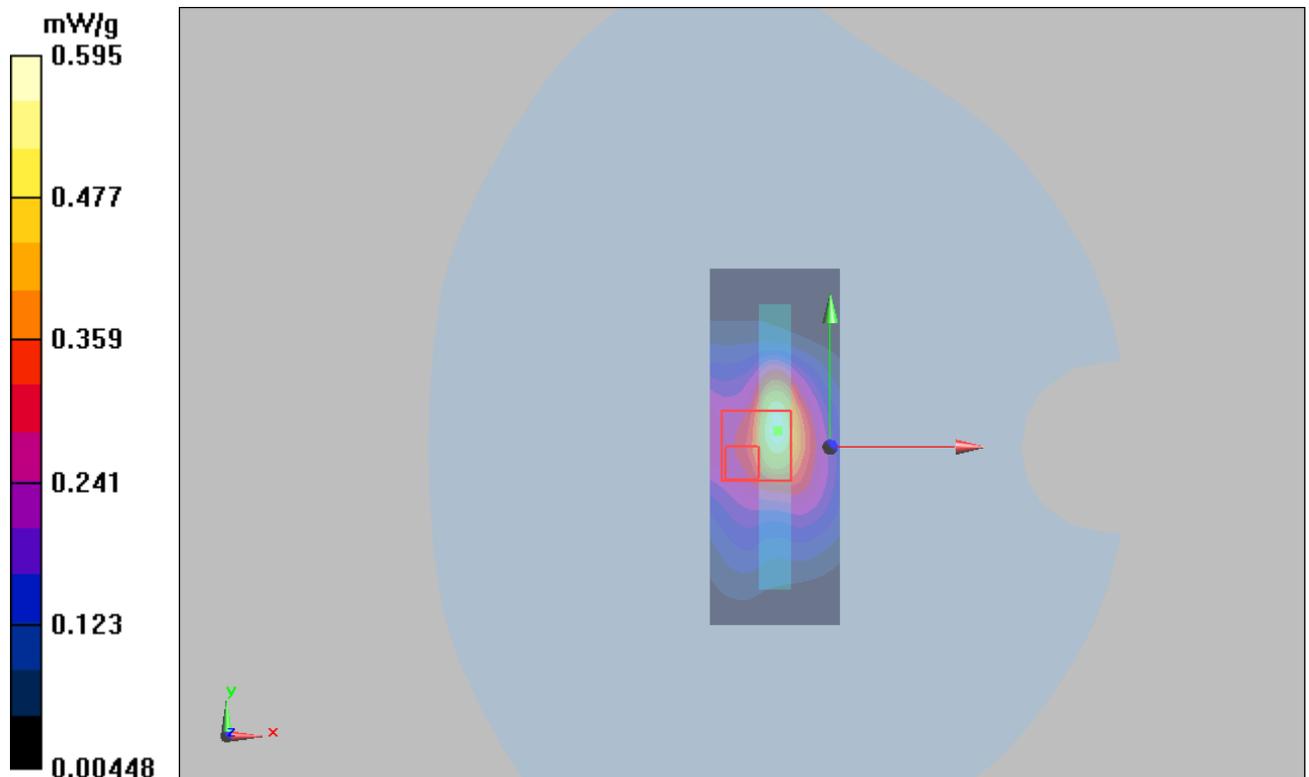
Figure 25 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 3 Channel 661

GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 4 Middle

Date/Time: 10/16/2010 3:02:13 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; $ε_r$ = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

Test Position 4 Middle/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 18.6 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.516 mW/g; SAR(10 g) = 0.291 mW/g

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


Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.6 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.874 W/kg

SAR(1 g) = 0.542 mW/g; SAR(10 g) = 0.308 mW/g

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

Figure 26 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 4 Channel 661

GSM 1900 EGPRS (2Up) with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/16/2010 2:22:32 PM

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

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.49 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 21.1 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 1.66 W/kg

SAR(1 g) = 0.985 mW/g; SAR(10 g) = 0.519 mW/g

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

Figure 27 GSM 1900 EGPRS (2Up) with Lenovo Y-450 Test Position 2 Channel 512

WCDMA Band II with IBM T61 Test Position 1 Middle

Date/Time: 10/15/2010 9:26:43 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; $ε_r$ = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 16.5 V/m; Power Drift = 0.081 dB

Peak SAR (extrapolated) = 0.897 W/kg

SAR(1 g) = 0.580 mW/g; SAR(10 g) = 0.338 mW/g

Maximum value of SAR (measured) = 0.634 mW/g
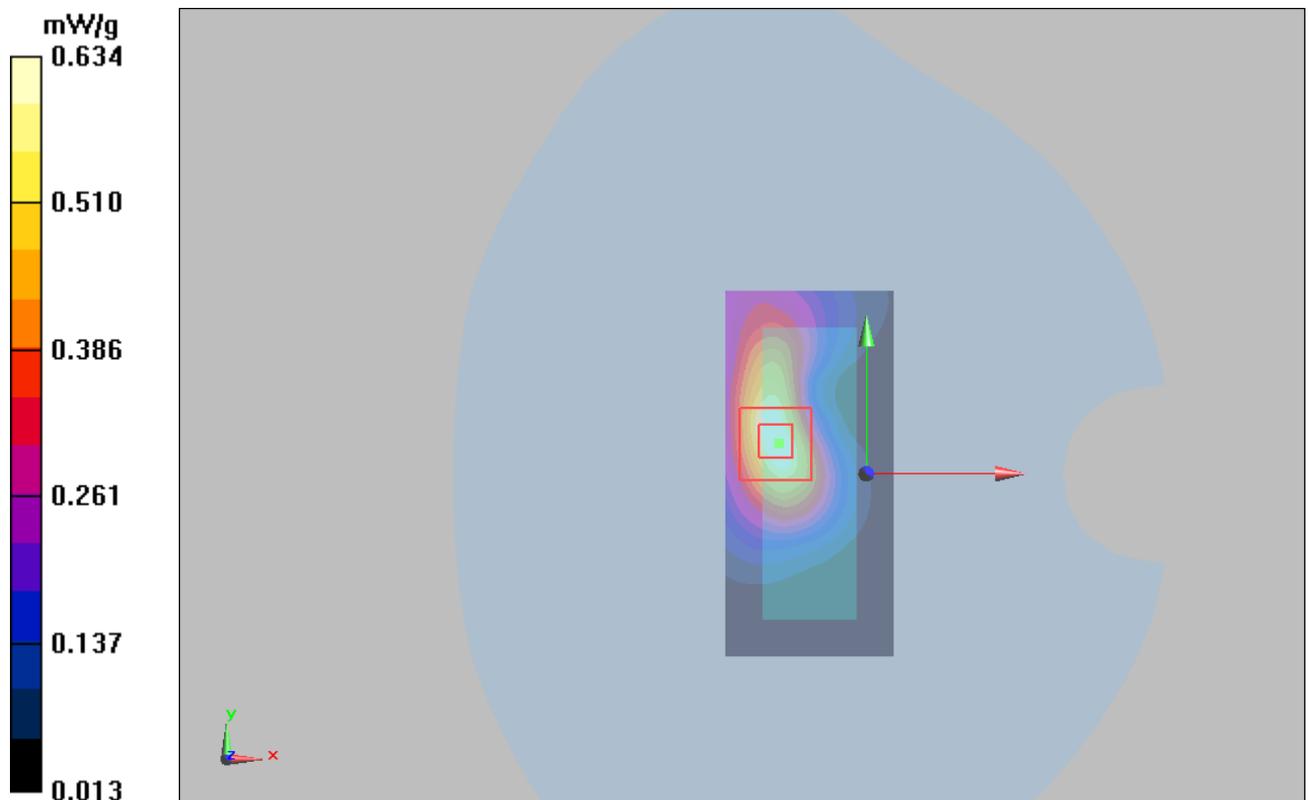
Figure 28 WCDMA Band II with IBM T61 Test Position 1 Channel 9400

WCDMA Band II with Lenovo Y-450 Test Position 2 High

Date/Time: 10/16/2010 12:15:43 PM

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

Medium parameters used: f = 1908 MHz; σ = 1.55 mho/m; ε_r = 52; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.839 mW/g

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

Reference Value = 17 V/m; Power Drift = -0.140 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.749 mW/g; SAR(10 g) = 0.385 mW/g

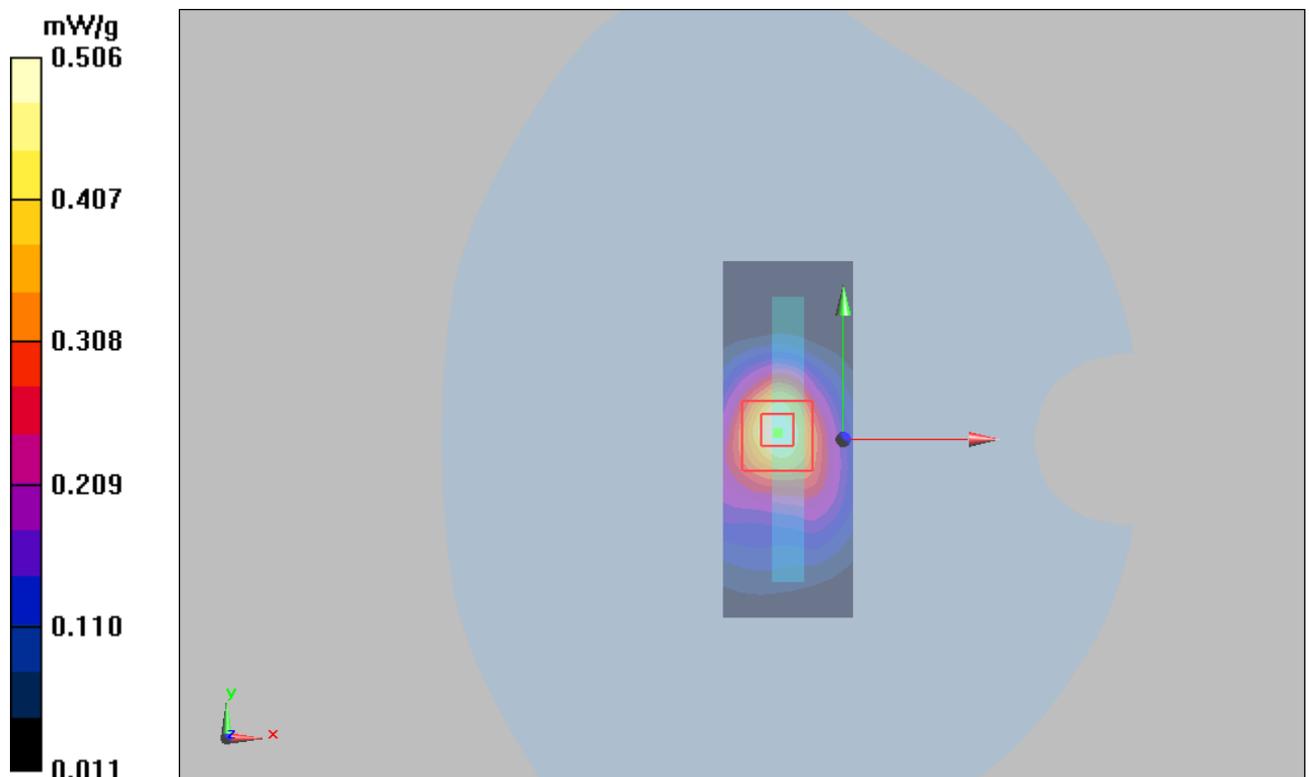Maximum value of SAR (measured) = 0.838 mW/g
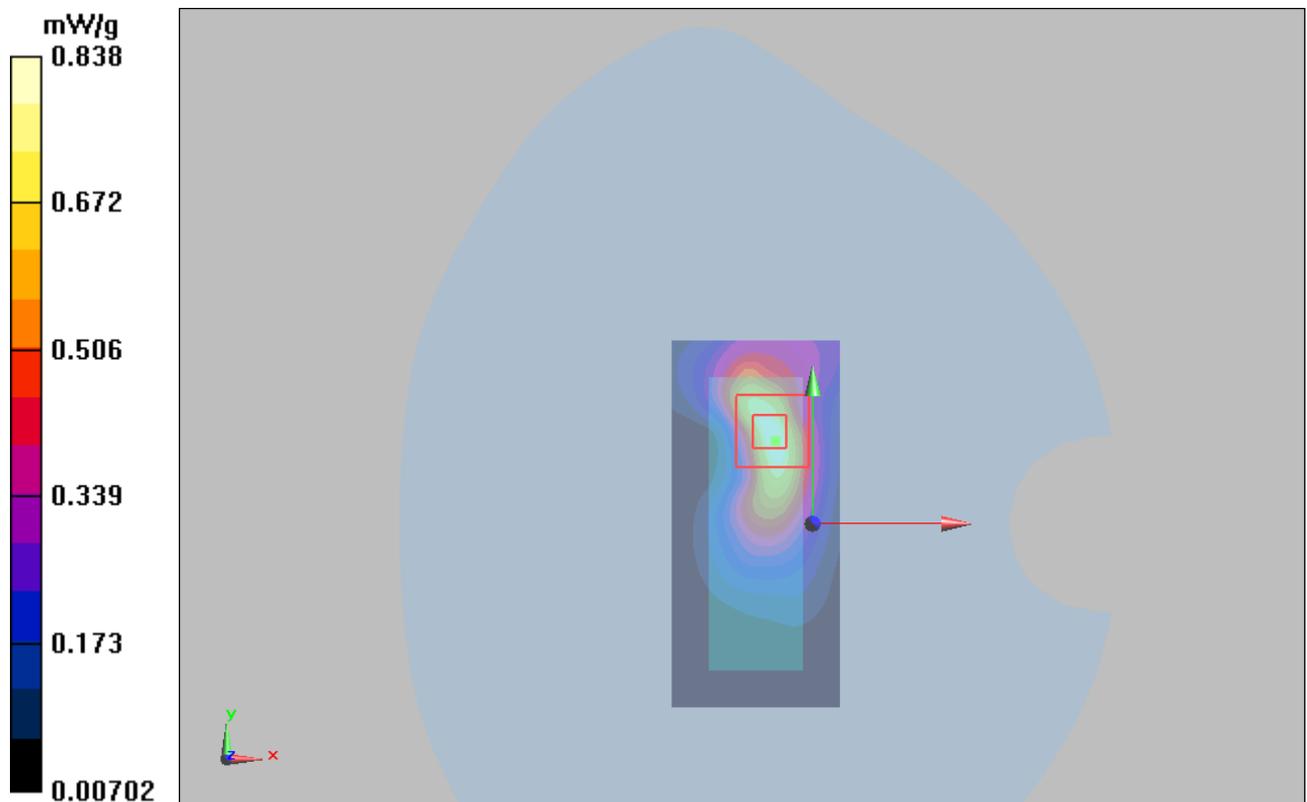
Figure 29 WCDMA Band II with Lenovo Y-450 Test Position 2 Channel 9538

WCDMA Band II with Lenovo Y-450 Test Position 2 Middle

Date/Time: 10/16/2010 11:44:10 AM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.797 mW/g

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

Reference Value = 16.4 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.682 mW/g; SAR(10 g) = 0.352 mW/g

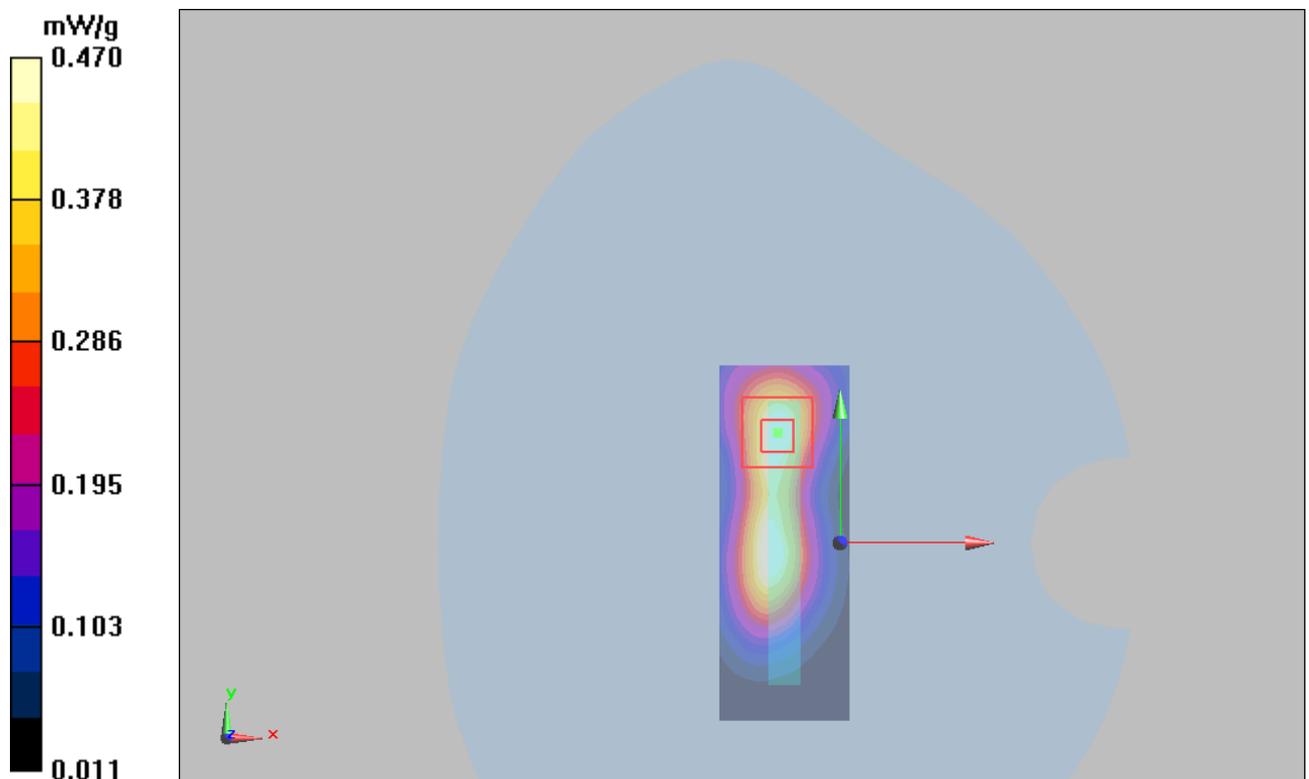Maximum value of SAR (measured) = 0.776 mW/g
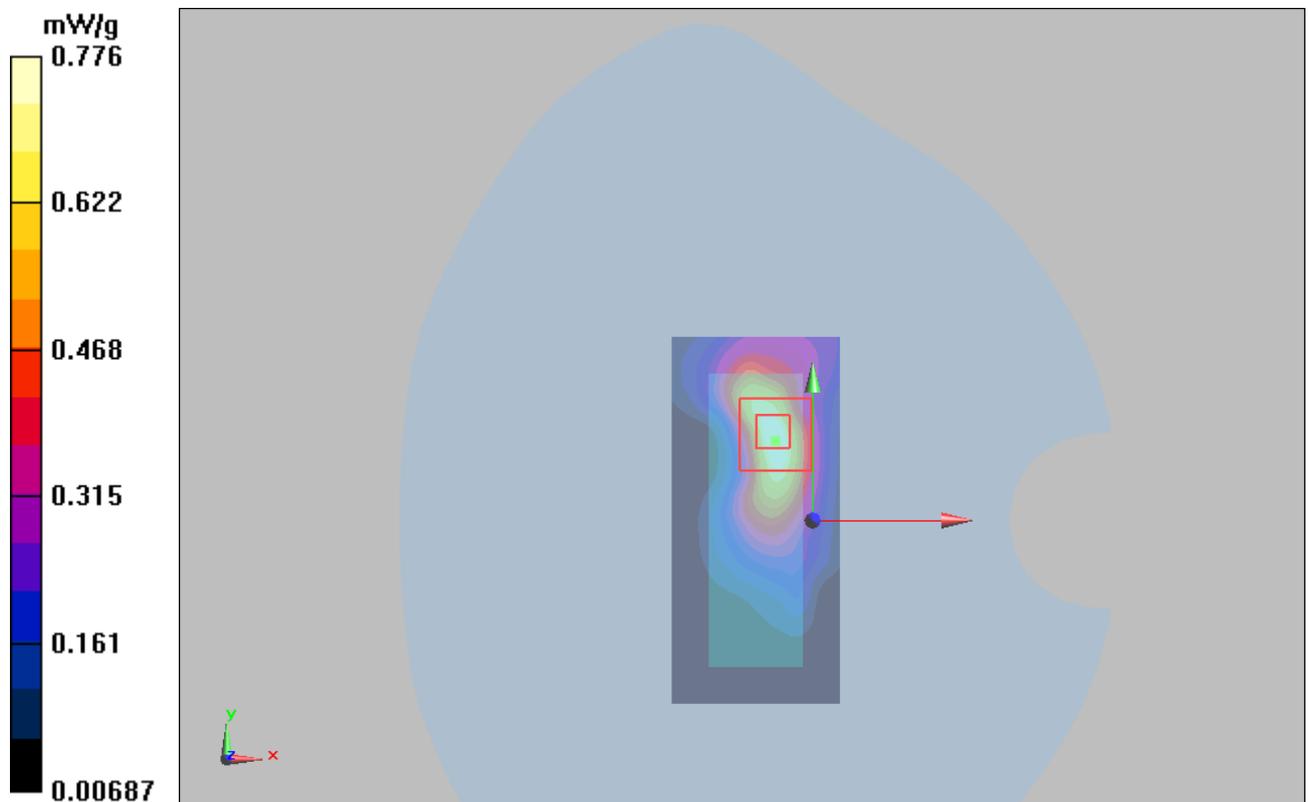
Figure 30 WCDMA Band II with Lenovo Y-450 Test Position 2 Channel 9400

WCDMA Band II with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/16/2010 12:39:49 PM

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

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.49 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 19.6 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 1.58 W/kg

SAR(1 g) = 0.934 mW/g; SAR(10 g) = 0.490 mW/g
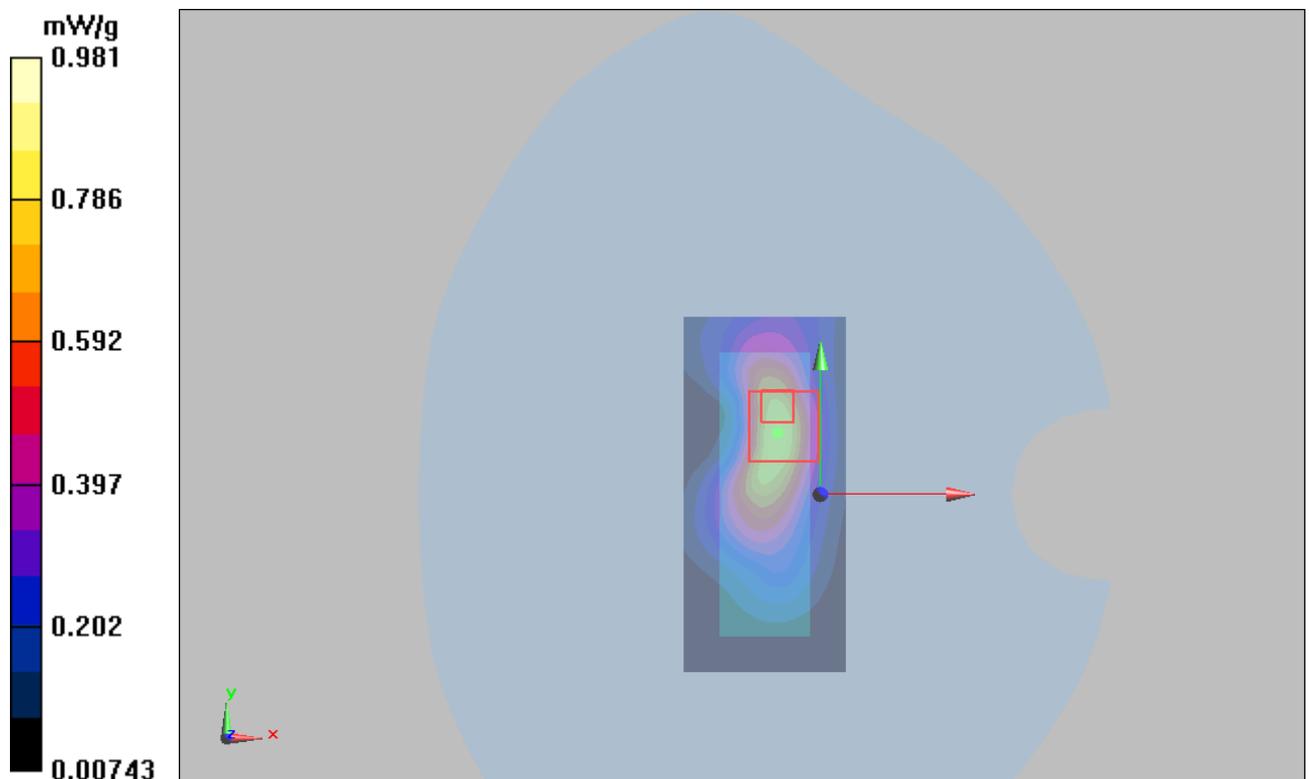
Maximum value of SAR (measured) = 1.08 mW/g
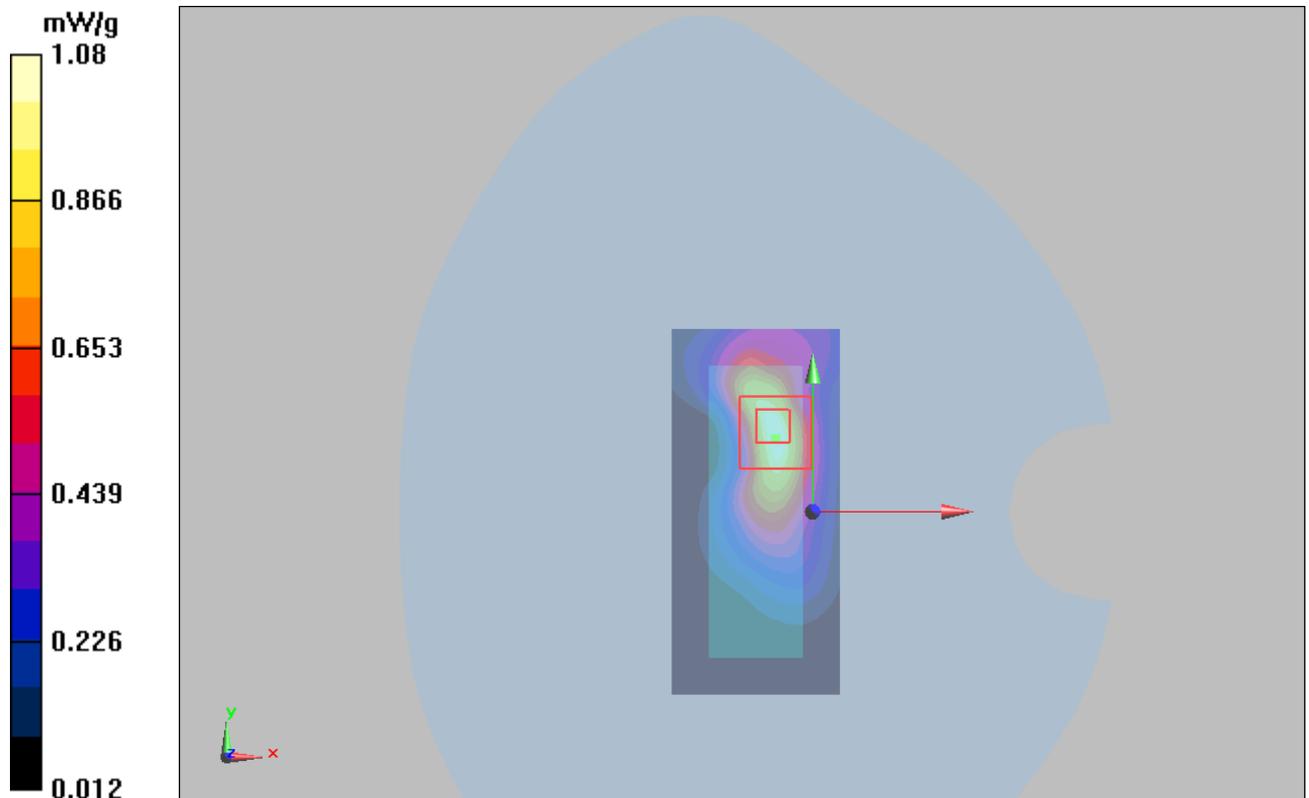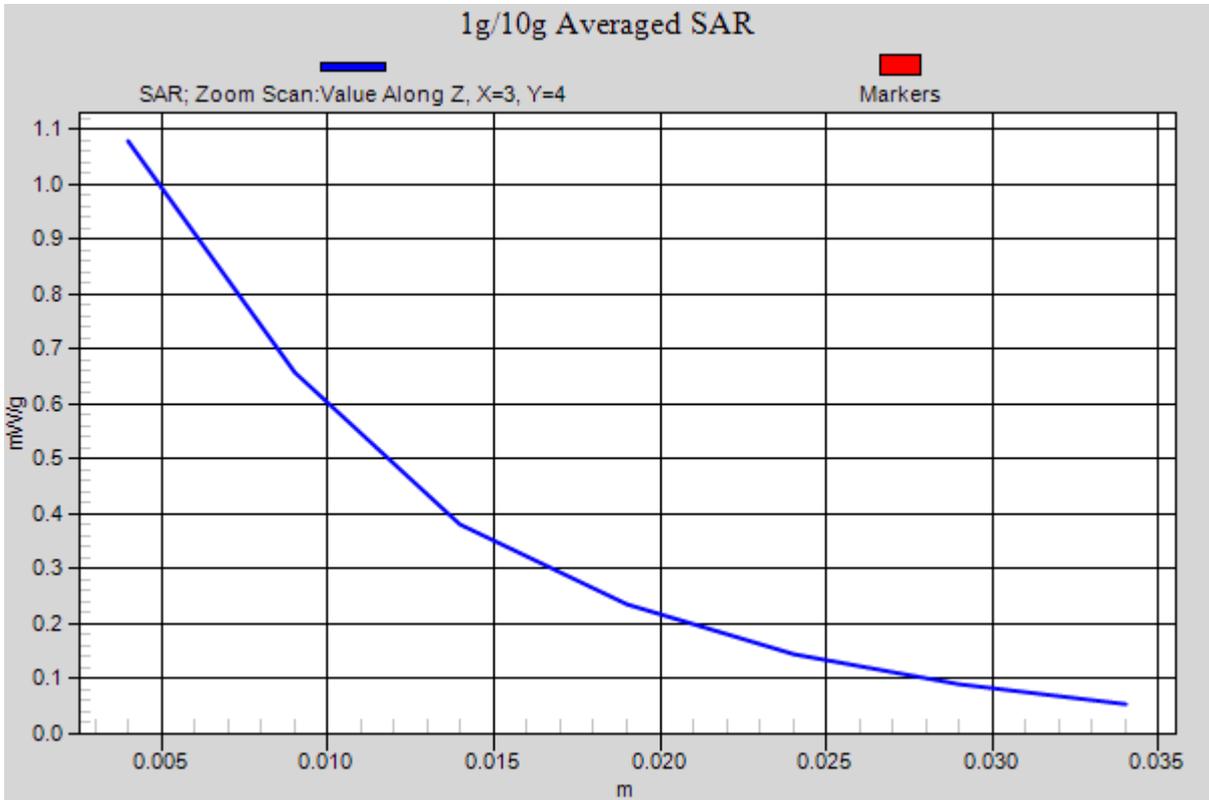
Figure 31 WCDMA Band II with Lenovo Y-450 Test Position 2 Channel 9262

WCDMA Band II with Lenovo Y-450 Test Position 3 Middle

Date/Time: 10/16/2010 3:45:55 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃　　　　Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

Test Position 3 Middle/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.507 mW/g

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

Reference Value = 17.5 V/m; Power Drift = 0.109 dB

Peak SAR (extrapolated) = 0.736 W/kg

SAR(1 g) = 0.461 mW/g; SAR(10 g) = 0.265 mW/g

Maximum value of SAR (measured) = 0.506 mW/g

Figure 32 WCDMA Band II with Lenovo Y-450 Test Position 3 Channel 9400

WCDMA Band II with Lenovo Y-450 Test Position 4 Middle

Date/Time: 10/16/2010 2:43:55 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

Test Position 4 Middle/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 16.7 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 0.687 W/kg

SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.241 mW/g

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

Figure 33 WCDMA Band II with Lenovo Y-450 Test Position 4 Channel 9400

WCDMA Band II HSDPA with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/16/2010 10:26:35 AM

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

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.49 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.831 mW/g

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

Reference Value = 21 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 1.54 W/kg

SAR(1 g) = 0.860 mW/g; SAR(10 g) = 0.455 mW/g

Maximum value of SAR (measured) = 0.981 mW/g

Figure 34 WCDMA Band II HSDPA with Lenovo Y-450 Test Position 2 Channel 9262

WCDMA Band II HSUPA with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/16/2010 4:20:55 PM

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

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.49 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.60, 7.60, 7.60); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.928 mW/g

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

Reference Value = 25 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.690 mW/g; SAR(10 g) = 0.370 mW/g

Maximum value of SAR (measured) = 0.767 mW/g
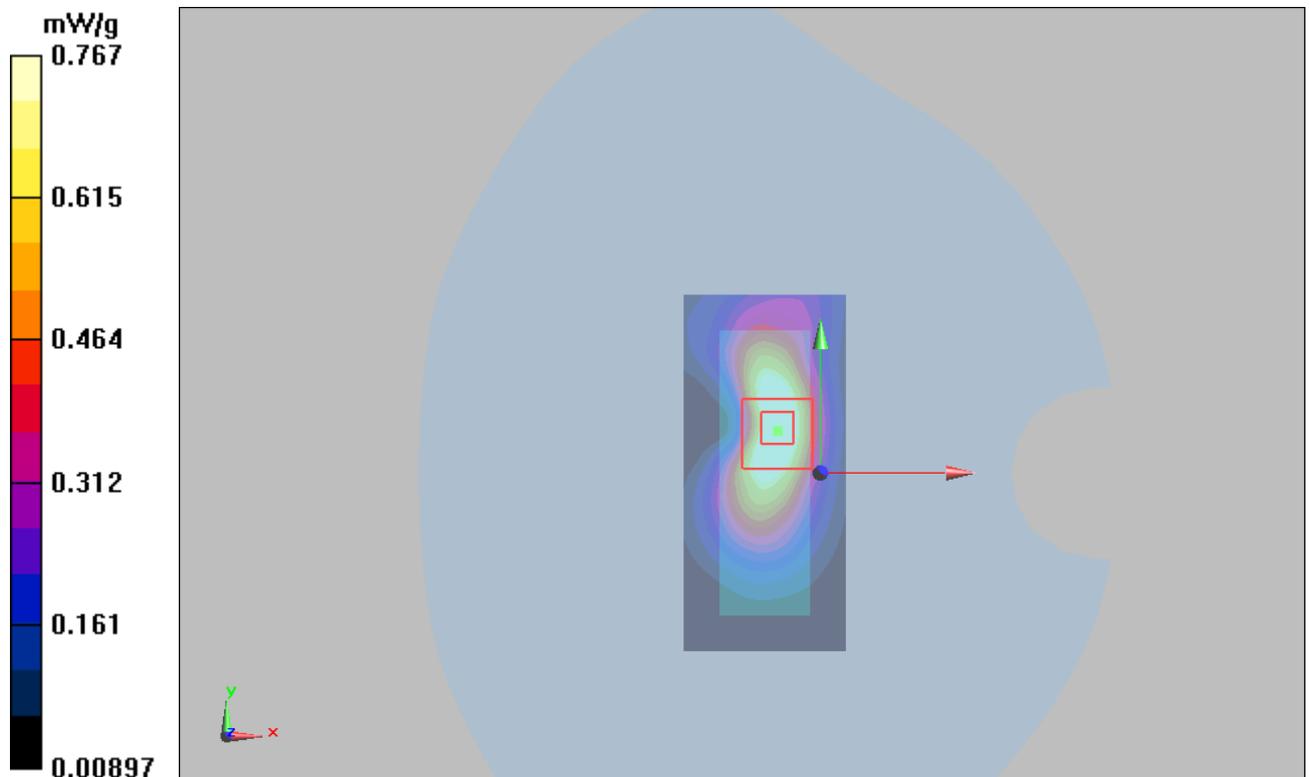
Figure 35 WCDMA Band II HSUPA with Lenovo Y-450 Test Position 2 Channel 9262

WCDMA Band V with IBM T61 Test Position 1 Middle

Date/Time: 10/17/2010 4:55:48 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.303 mW/g

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

Reference Value = 14.1 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 0.408 W/kg

SAR(1 g) = 0.274 mW/g; SAR(10 g) = 0.172 mW/g

Maximum value of SAR (measured) = 0.296 mW/g
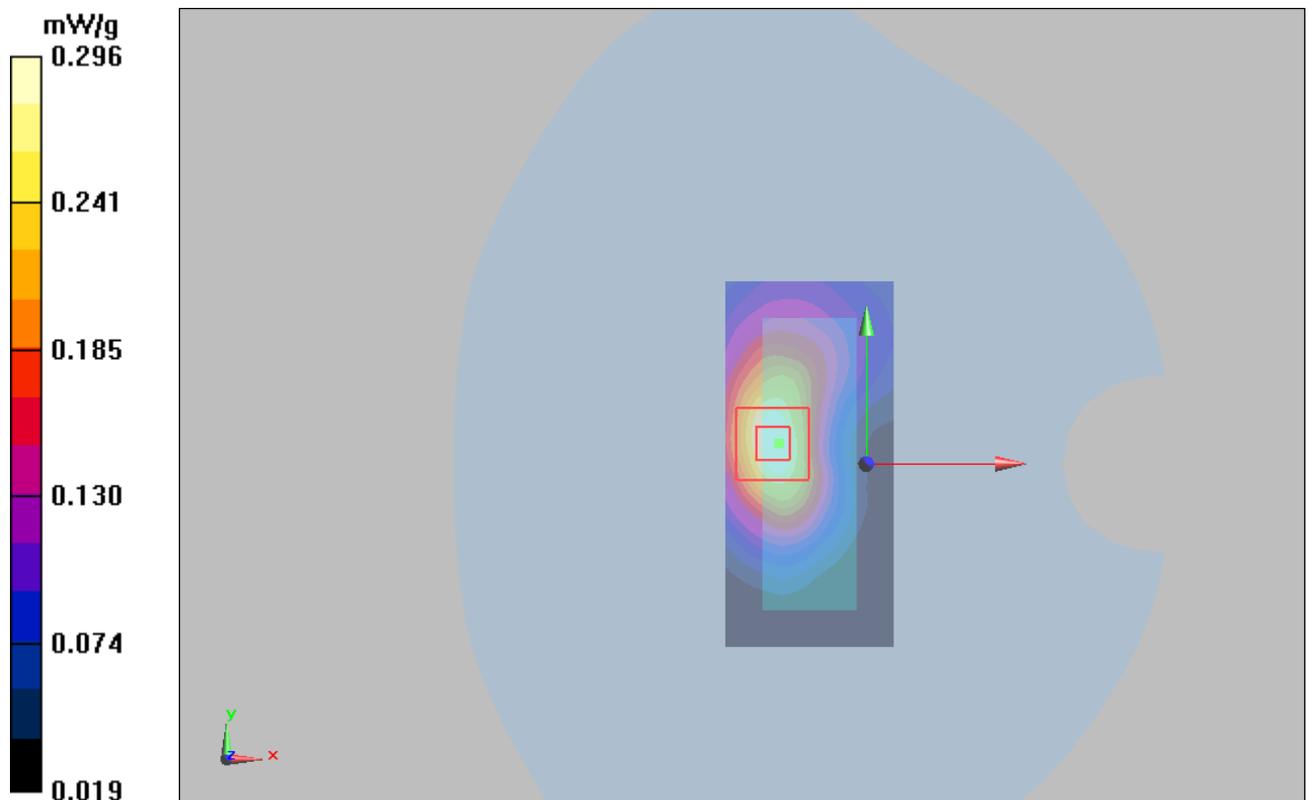
Figure 36 WCDMA Band V with IBM T61 Test Position 1 Channel 4183

WCDMA Band V with Lenovo Y-450 Test Position 2 High

Date/Time: 10/17/2010 6:00:05 PM

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

Medium parameters used: f = 847 MHz; σ = 1.01 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.508 mW/g

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

Reference Value = 18.9 V/m; Power Drift = -0.061 dB

Peak SAR (extrapolated) = 0.739 W/kg

SAR(1 g) = 0.440 mW/g; SAR(10 g) = 0.247 mW/g

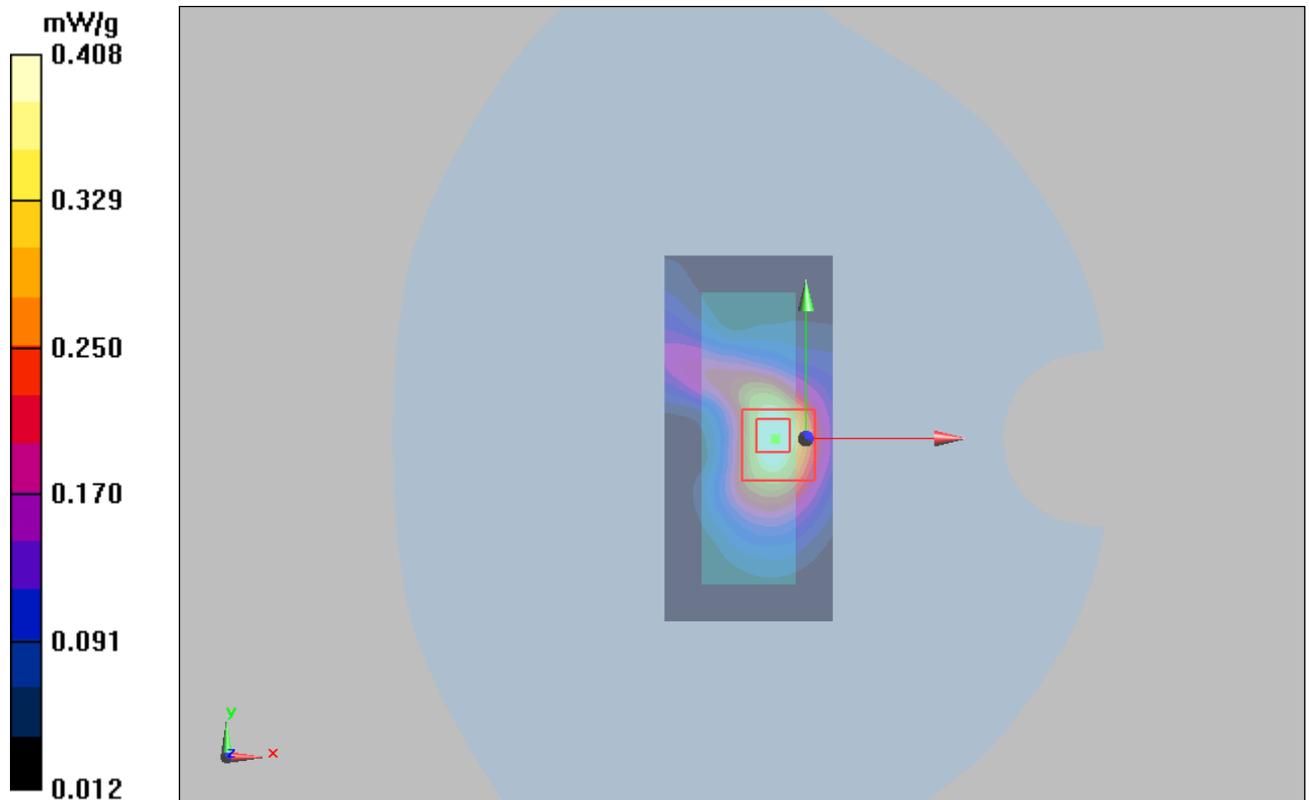Maximum value of SAR (measured) = 0.488 mW/g
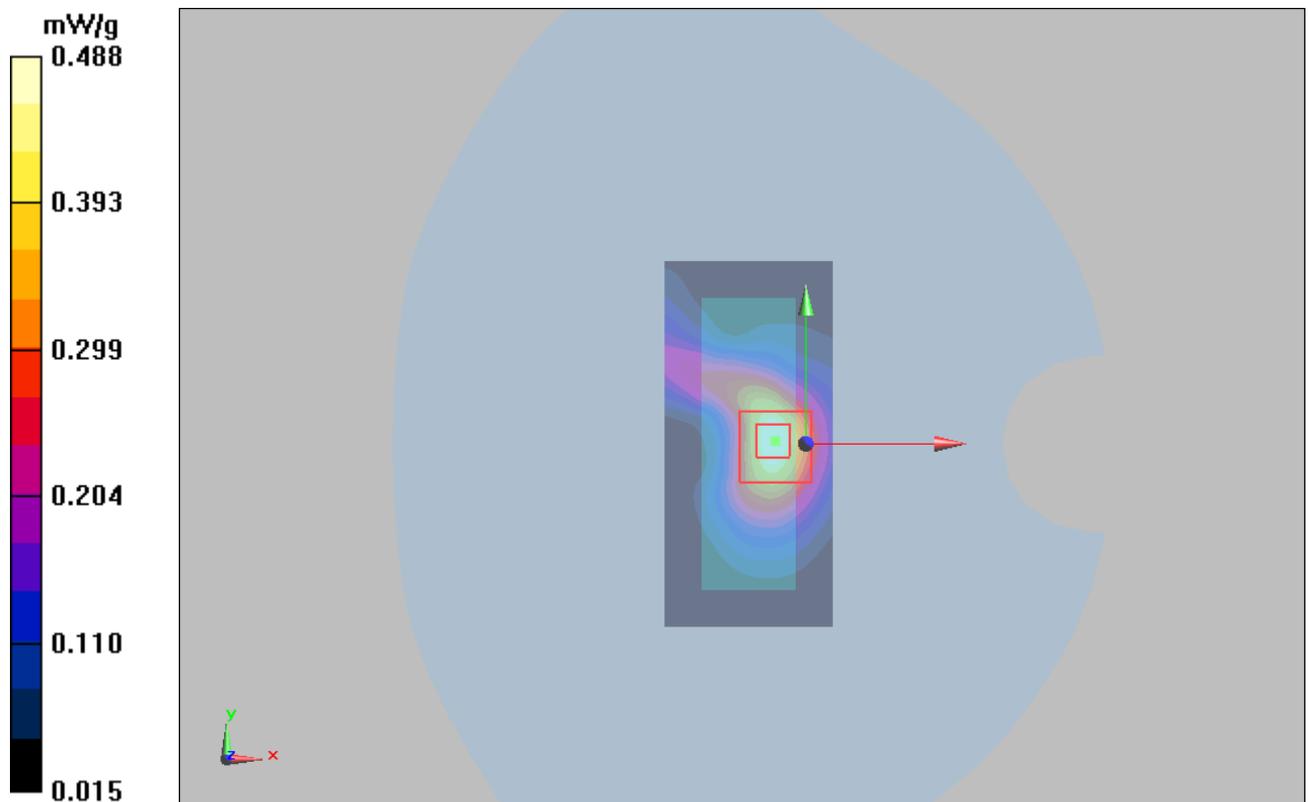
Figure 37 WCDMA Band V with Lenovo Y-450 Test Position 2 Channel 4233

WCDMA Band V with Lenovo Y-450 Test Position 2 Middle

Date/Time: 10/17/2010 5:17:54 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.341 mW/g

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

Reference Value = 15.4 V/m; Power Drift = -0.063 dB

Peak SAR (extrapolated) = 0.504 W/kg

SAR(1 g) = 0.291 mW/g; SAR(10 g) = 0.162 mW/g

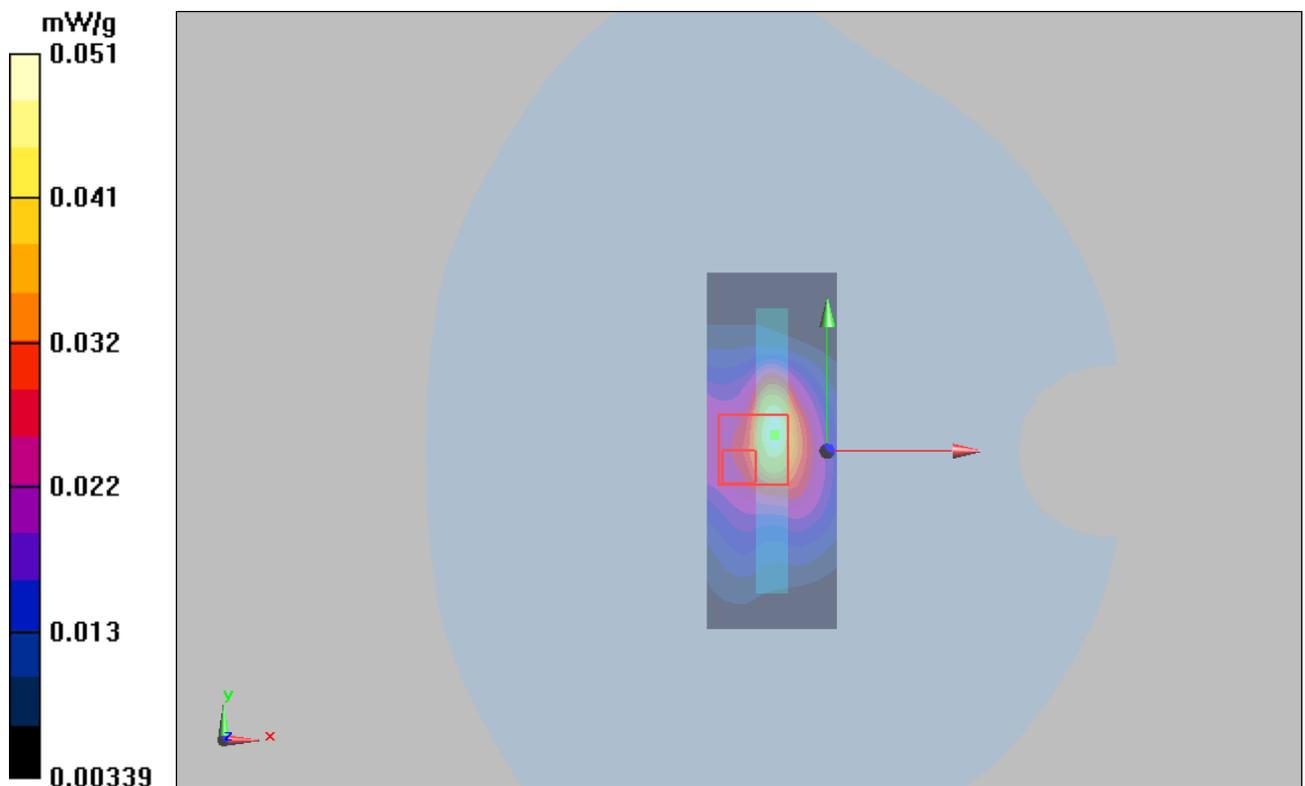Maximum value of SAR (measured) = 0.320 mW/g
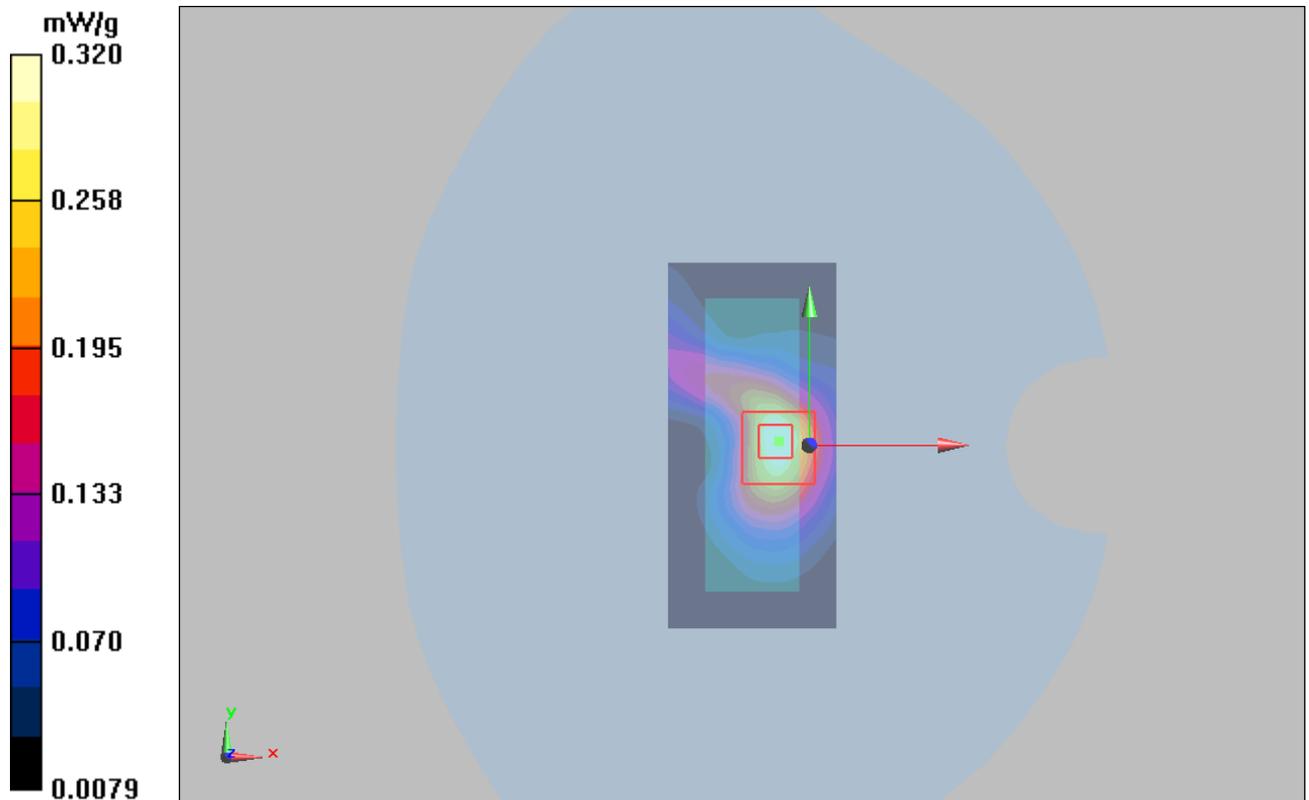
Figure 38 WCDMA Band V with Lenovo Y-450 Test Position 2 Channel 4183

WCDMA Band V with Lenovo Y-450 Test Position 2 Low

Date/Time: 10/17/2010 5:35:18 PM

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

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.994 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

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

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

Reference Value = 17.6 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 0.645 W/kg

SAR(1 g) = 0.374 mW/g; SAR(10 g) = 0.211 mW/g

Maximum value of SAR (measured) = 0.408 mW/g

Figure 39 WCDMA Band V with Lenovo Y-450 Test Position 2 Channel 4132

WCDMA Band V with Lenovo Y-450 Test Position 3 Middle

Date/Time: 10/18/2010 1:10:21 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

Test Position 3 Middle/Area Scan (41x131x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.052 mW/g

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

Reference Value = 5.17 V/m; Power Drift = -0.077 dB

Peak SAR (extrapolated) = 0.067 W/kg

SAR(1 g) = 0.048 mW/g; SAR(10 g) = 0.033 mW/g

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

Figure 40 WCDMA Band V with Lenovo Y-450 Test Position 3 Channel 4183

WCDMA Band V with Lenovo Y-450 Test Position 4 Middle

Date/Time: 10/18/2010 11:41:02 AM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 55.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

Test Position 4 Middle/Area Scan (41x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.308 mW/g

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

Reference Value = 15.7 V/m; Power Drift = -0.092 dB

Peak SAR (extrapolated) = 0.426 W/kg

SAR(1 g) = 0.277 mW/g; SAR(10 g) = 0.174 mW/g
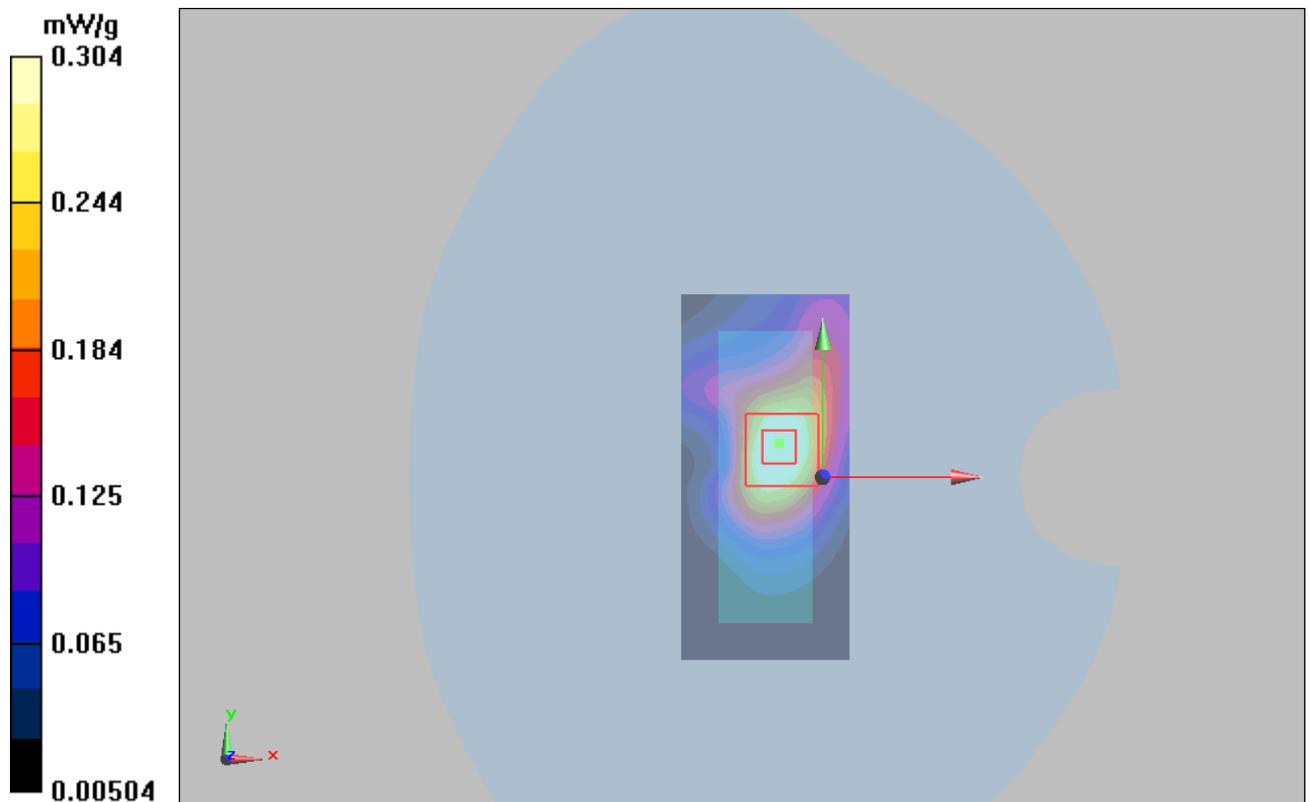
Maximum value of SAR (measured) = 0.304 mW/g
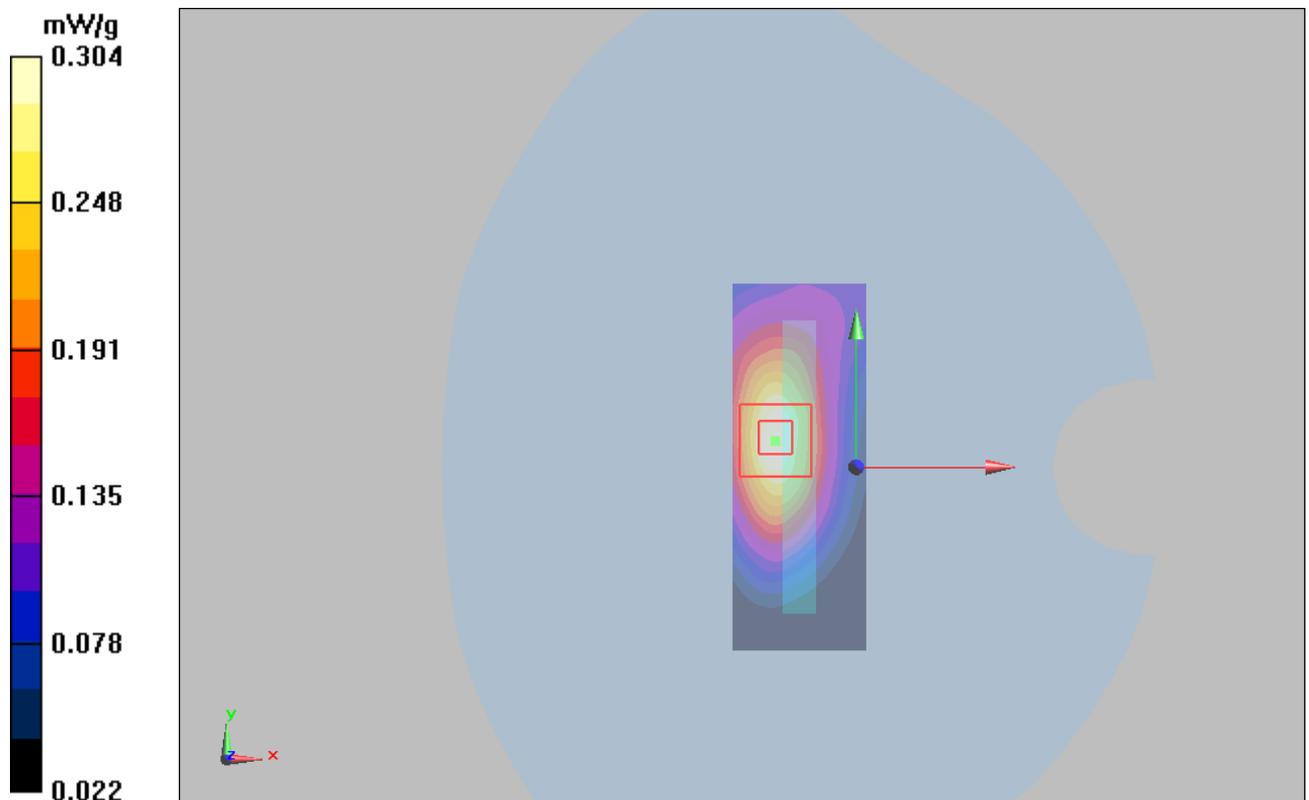
Figure 41 WCDMA Band V with Lenovo Y-450 Test Position 4 Channel 4183

WCDMA Band V HSDPA with Lenovo Y-450 Test Position 2 High

Date/Time: 10/18/2010 2:20:48 PM

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

Medium parameters used: f = 847 MHz; σ = 1.01 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.506 mW/g

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

Reference Value = 21.8 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 0.756 W/kg

SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.257 mW/g

Maximum value of SAR (measured) = 0.490 mW/g
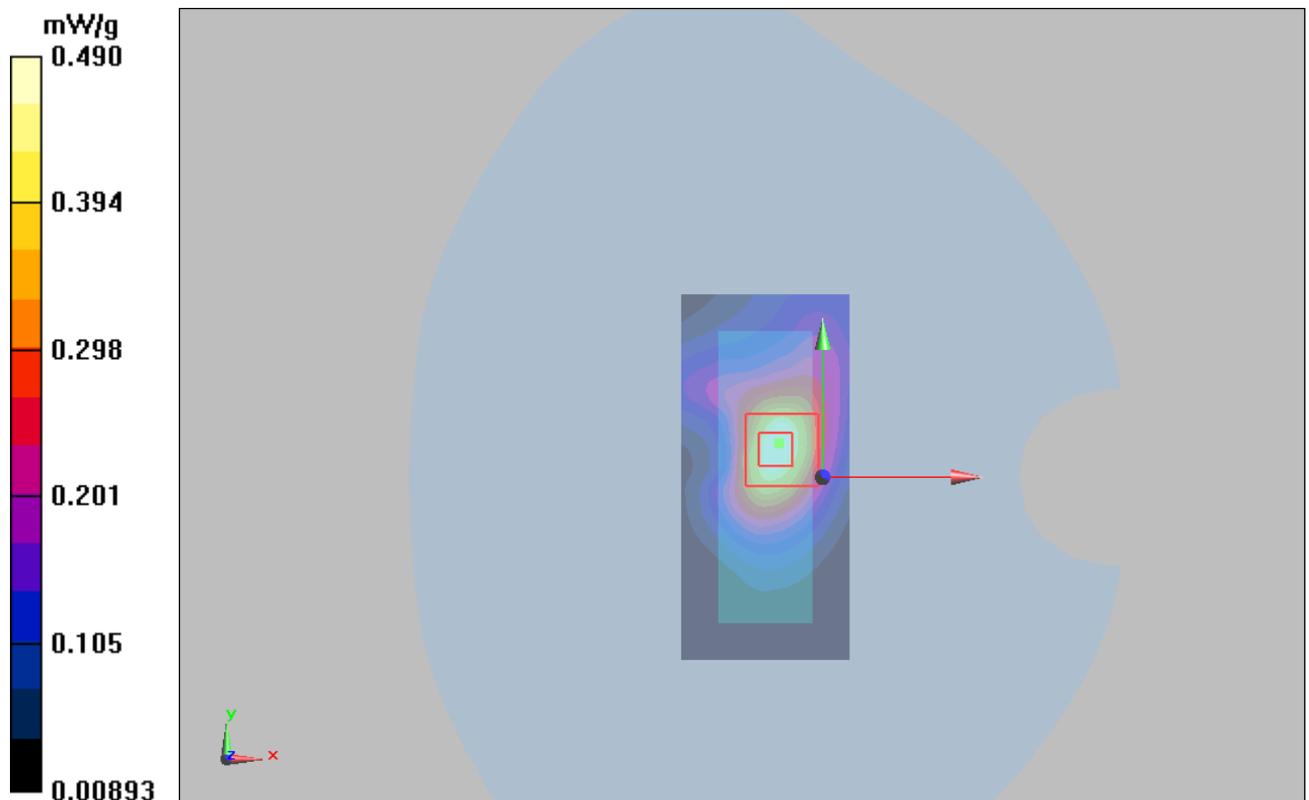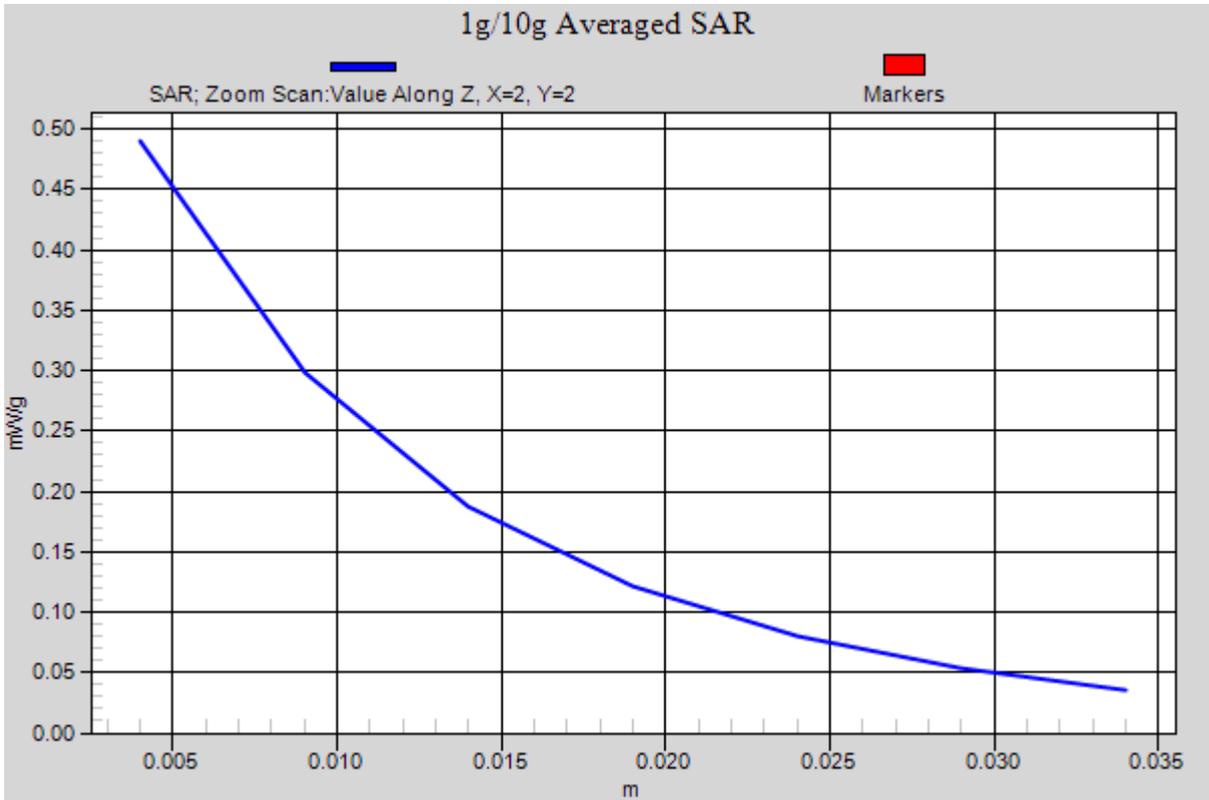
Figure 42 WCDMA Band V HSDPA with Lenovo Y-450 Test Position 2 Channel 4233

WCDMA Band V HSUPA with Lenovo Y-450 Test Position 2 High

Date/Time: 10/18/2010 2:02:24 PM

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

Medium parameters used: f = 847 MHz; σ = 1.01 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃   Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(9.24, 9.24, 9.24); Calibrated: 12/30/2009

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.362 mW/g

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

Reference Value = 18.9 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 0.461 W/kg

SAR(1 g) = 0.275 mW/g; SAR(10 g) = 0.156 mW/g

Maximum value of SAR (measured) = 0.304 mW/g

Figure 43 WCDMA Band V HSUPA with Lenovo Y-450 Test Position 2 Channel 4233

ANNEX D: Probe Calibration Certificate

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

ilac-MRA

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
   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: **EX3-3661_Dec09**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3661
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:	December 30, 2009

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41496087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

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-09)	In house check: Oct10

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

Issued: December 30, 2009

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

Certificate No: EX3-3661_Dec09   Page 1 of 11

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

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

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

Methods Applied and Interpretation of Parameters:

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

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

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

- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z*: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.

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

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

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

EX3DV4 SN:3661   December 30, 2009

Probe EX3DV4

SN:3661

Manufactured: October 20, 2008
Calibrated: December 30, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

EX3DV4 SN:3661   December 30, 2009

DASY - Parameters of Probe: EX3DV4 SN:3661

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	0.46	0.52	0.48	± 10.1%
DCP $(mV)^B$	89.4	91.4	90.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5%
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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

^{A} The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

^{B} Numerical linearization parameter: uncertainty not required.

^{E} Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY - Parameters of Probe: EX3DV4 SN:3661

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	9.34	9.34	9.34	0.69	0.64 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	9.06	9.06	9.06	0.72	0.64 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	8.19	8.19	8.19	0.59	0.63 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.77	7.77	7.77	0.83	0.56 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	7.22	7.22	7.22	0.35	0.83 ± 11.0%
5200	± 50 / ± 100	36.0 ± 5%	4.66 ± 5%	5.01	5.01	5.01	0.45	1.75 ± 13.1%
5500	± 50 / ± 100	35.6 ± 5%	4.96 ± 5%	4.38	4.38	4.38	0.48	1.75 ± 13.1%
5800	± 50 / ± 100	35.3 ± 5%	5.27 ± 5%	4.26	4.26	4.26	0.45	1.75 ± 13.1%

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

and the uncertainty for the indicated frequency band.

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DASY - Parameters of Probe: EX3DV4 SN:3661

Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz]	Validity [MHz]^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	9.24	9.24	9.24	0.54	0.73 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	8.97	8.97	8.97	0.53	0.72 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	7.93	7.93	7.93	0.67	0.65 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.60	7.60	7.60	0.60	0.69 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	7.34	7.34	7.34	0.26	1.12 ± 11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.59	4.59	4.59	0.46	1.75 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	4.11	4.11	4.11	0.46	1.75 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	4.12	4.12	4.12	0.48	1.75 ± 13.1%

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

and the uncertainty for the indicated frequency band.

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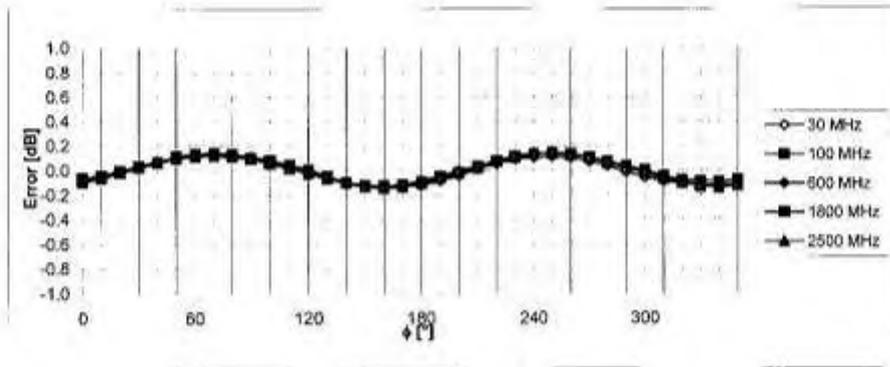## Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)
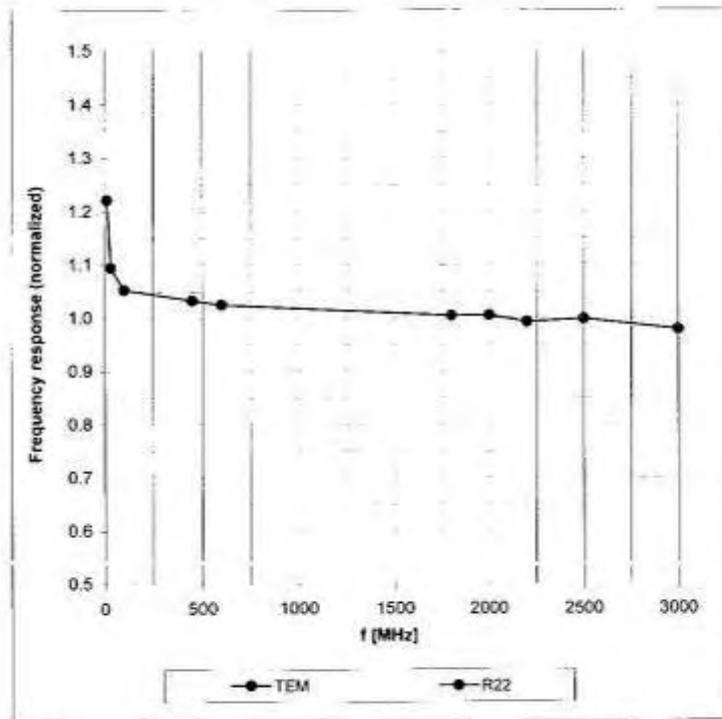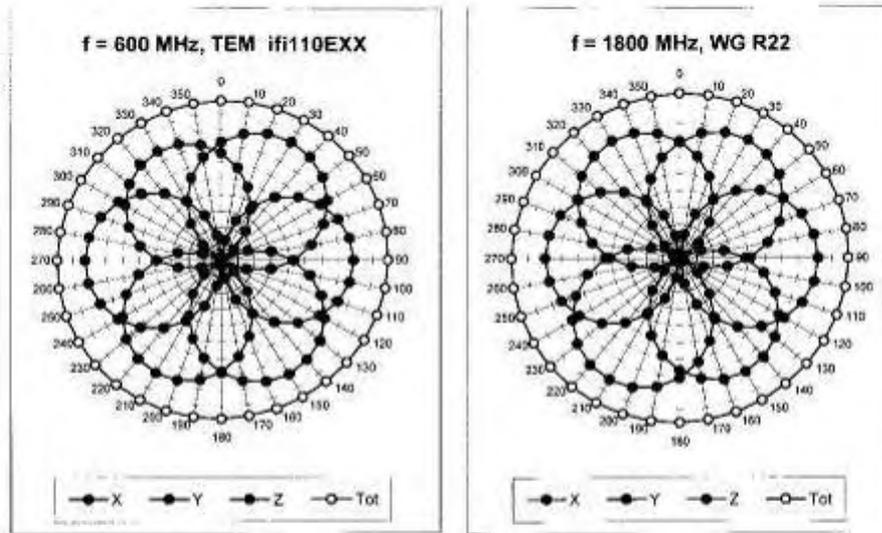

Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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Receiving Pattern (φ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX

f = 1800 MHz, WG R22

Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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Dynamic Range f(SAR_head)
(Waveguide R22, f = 1800 MHz)
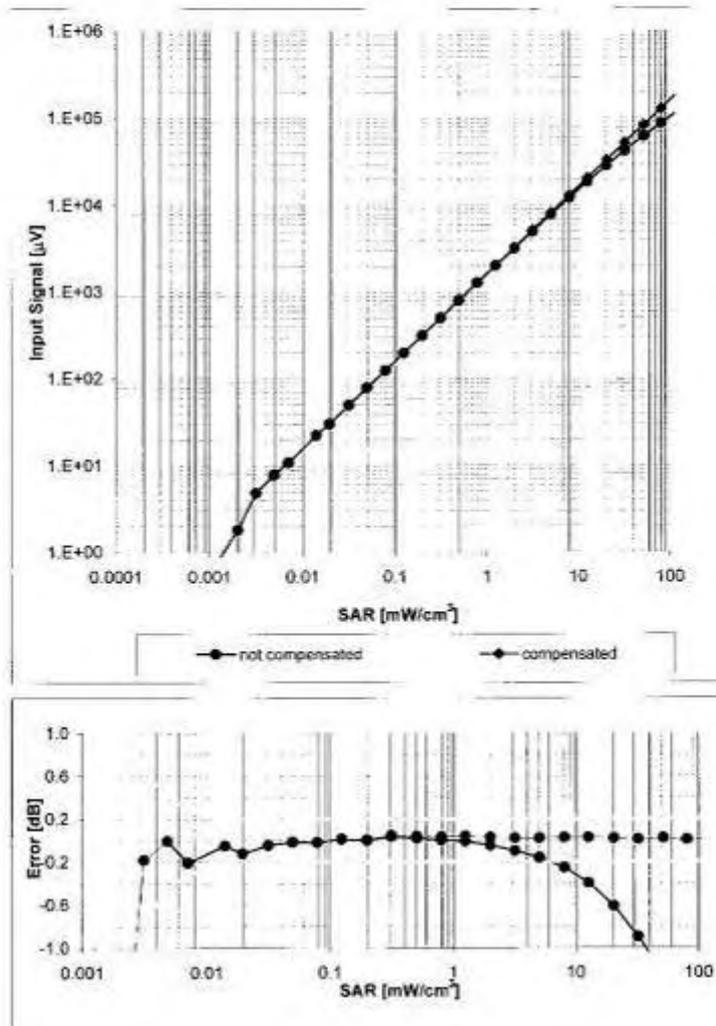
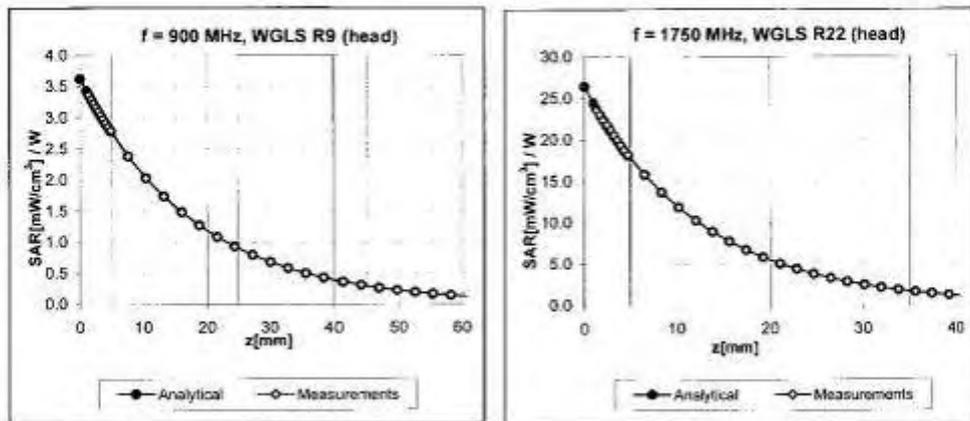
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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Conversion Factor Assessment

Deviation from Isotropy in HSL
Error (φ, ϑ), f = 900 MHz
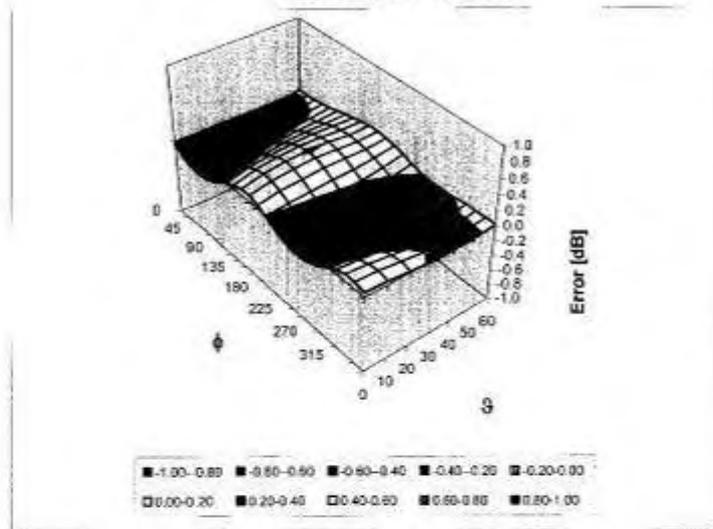
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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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

ANNEX E: D835V2 Dipole Calibration Certificate

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

ilac-MRA

SWISS CALIBRATION

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

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

Accreditation No.: SCS 108

Client   **Auden**   Certificate No: D835V2-4d092_Jan10

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d092
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	January 14, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV3	SN: 3205	26-Jun-09 (No. ES3-3205_Jun09)	Jun-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: January 18, 2010

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

Certificate No: D835V2-4d092_Jan10   Page 1 of 9

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

ilac-MRA

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

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

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.

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^3 (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	9.63 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm^3 (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	6.27 mW /g ± 16.5 % (k=2)

Body TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.6 ± 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^3 (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	9.86 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm^3 (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	6.47 mW / g ± 16.5 % (k=2)