



Report No.: RZA2010-0692



OET 65

TEST REPORT

Product Name	HSPA USB Stick
Model	E173u-6
FCC ID	QISE173U-6
Client	Huawei Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.



GENERAL SUMMARY

Product Name	HSPA USB Stick	Model	E173u-6
FCC ID	QISE173U-6		
Report No.	RZA2010-0692		
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 Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions KDB 447498 D02 -2009.11.13		
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: May 24th, 2010		
Comment	The test result only responds to the measured sample.		

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1. General Information

1.1. Notes of the test report

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

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

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

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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 USB Stick		
IMEI or SN:	352214040004187		
Device operating configurations :			
Operating mode(s):	GSM850; (tested) GSM1900; (tested) WCDMA Band II; (tested) WCDMA Band V; (tested)		
Test modulation:	(GSM)GMSK, (WCDMA) QPSK		
GPRS multislot class :	12		
EGPRS multislot class:	12		
HSDPA UE category	8		
HSUPA UE category	6		
Operating frequency range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	WCDMA Band 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 maximum output power		
	WCDMA Band V: 3, tested with maximum output power		
Test channel (Low –Middle –High)	128 -190 - 251 (GSM850) (tested) 512 - 661 - 810 (GSM1900) (tested) 9262 - 9400 - 9538 (WCDMA Band II) (tested) 4132 - 4183 - 4233 (WCDMA Band V) (tested)		
Hardware version:	CD1E153M		
Software version:	11.126.82.00.00		
Antenna type:	Internal antenna		
Used host products:	IBM T61 Lenovo Y450		

Equipment Under Test (EUT) is a HSPA USB Stick with internal antenna. During SAR test of the EUT, it was connected to a portable computer. SAR is tested for the EUT respectively for GSM 850, GSM1900, WCDMA Band II and WCDMA Band V. The EUT have GPRS (class 12), EGPRS (class 12), and WCDMA/HSDPA/HSUPA functions.

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Since the EUT only has the data transfer function, but does not have the voice transfer function, 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/HSUPA, The measurements were performed in combination with two different host products (IBM T61, Lenovo Y450). IBM T61 laptop has horizontal and vertical USB slots, Lenovo Y450 laptop has vertical USB slot.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. Test Date

The test is performed from May 21, 2010 to May 22, 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.

Since the EUT only has the data transfer function, but does not have the voice transfer function, 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/HSUPA. The measurements were performed in combination with two different host products (IBM T61, Lenovo Y450). IBM T61 laptop has horizontal and vertical USB slots, Lenovo Y450 laptop has vertical USB slot.

2.2. GSM Test Configuration

For the body SAR tests for GSM 850, GSM 1900, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate at maximum transmitting power. Since the EUT only has the data transfer function, but does not have the speech transfer function. The tests in the band of GSM 850, GSM 1900 are 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. The EGPRS class is 12 for this EUT; it has at most 4 timeslots in uplink.

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

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

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power,(dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

2.3. 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(β_c, β_d), and HS-DPCCH power offset parameters(ACK, NACK, 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: ACK, NACK and CQI = 8 $\Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

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

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

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

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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

2.4. 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	$\beta_{hs}^{(1)}$	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} , Δ_{NACK} and $\Delta_{CQI} = 8$ __ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ __ $\beta_{hs} = 30/15 * \beta_c$.

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

DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the

signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the

signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

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

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

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

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.
UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM.
(TS25.306-7.3.0)

2.5. Position of module in Portable devices

The measurements were performed in combination with two host products (IBM T61, Lenovo Y450). IBM T61 laptop has horizontal and vertical USB slots, Lenovo Y450 laptop has vertical USB slot.

A test distance of 5mm or less, according to KDB 447498 D02 -2009.11.13, 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 portable computer is towards the bottom of the flat phantom, and the back side of the EUT towards the bottom of the flat phantom. (ANNEX H Picture 6)
- Test Position 2: The EUT is connected to the portable computer through a 19 cm USB cable. The front side of the EUT towards the bottom of the flat phantom. (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. (ANNEX H Picture 8)
- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The back side of the portable computer is towards the bottom of the flat phantom, and the right side of the EUT towards the bottom of the flat phantom. (ANNEX H Picture 9)

2.6. Picture of host product

During the test, IBM T61 and Lenovo Y450 laptops 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 Y450 Close



Picture 1-d: Lenovo Y450 Open



Picture 1-e: IBM T61 with horizontal USB slot



Picture 1-f: IBM T61 with Vertical USB slot

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Picture 1-g: Lenovo Y450 with Vertical 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 DASY4 system for performing compliance tests consists of the following items:

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

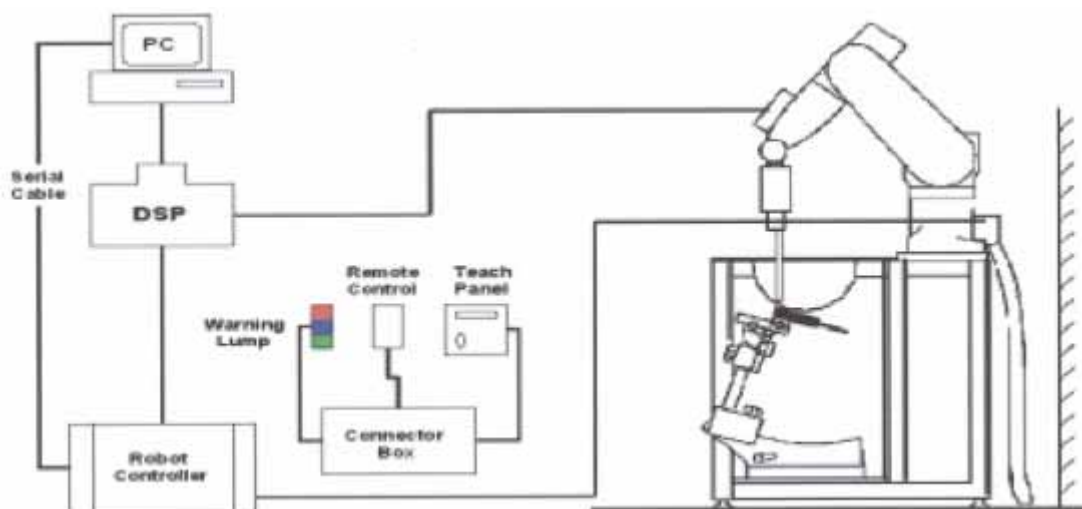


Figure 1. SAR Lab Test Measurement Set-up

3.2. DASY4 E-field Probe System

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

3.2.1. EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 900 and HSL 1750 Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.



Figure 2. EX3DV4 E-field Probe



Figure 3. EX3DV4 E-field probe

3.2.2. E-field Probe Calibration

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

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

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

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

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/m^3).

3.3. Other Test Equipment

3.3.1. Device Holder for Transmitters

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

Material: POM, Acrylic glass, Foam

3.3.2. Phantom

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

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



Figure 4. Generic Twin Phantom

3.4. Scanning procedure

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

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

- **Area Scan**

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

unchanged.

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

- **Zoom Scan**

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

- **Spatial Peak Detection**

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

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

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

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

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

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

3.5. Data Storage and Evaluation

3.5.1. Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA5". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

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

3.5.2. Data Evaluation by SEMCAD

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

Probe parameters:	- Sensitivity	Normi, a _{i0} , a _{i1} , a _{i2}
	- Conversion factor	ConvF _i
	- Diode compression point	Dcp _i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

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

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

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

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

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

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

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

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

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

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

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

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

$ConvF$ = sensitivity enhancement in solution

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

f = carrier frequency [GHz]

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

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

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

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

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

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

with SAR = local specific absorption rate in mW/g

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

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

ρ = equivalent tissue density in g/cm³

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

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

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

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

3.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 11.

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

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

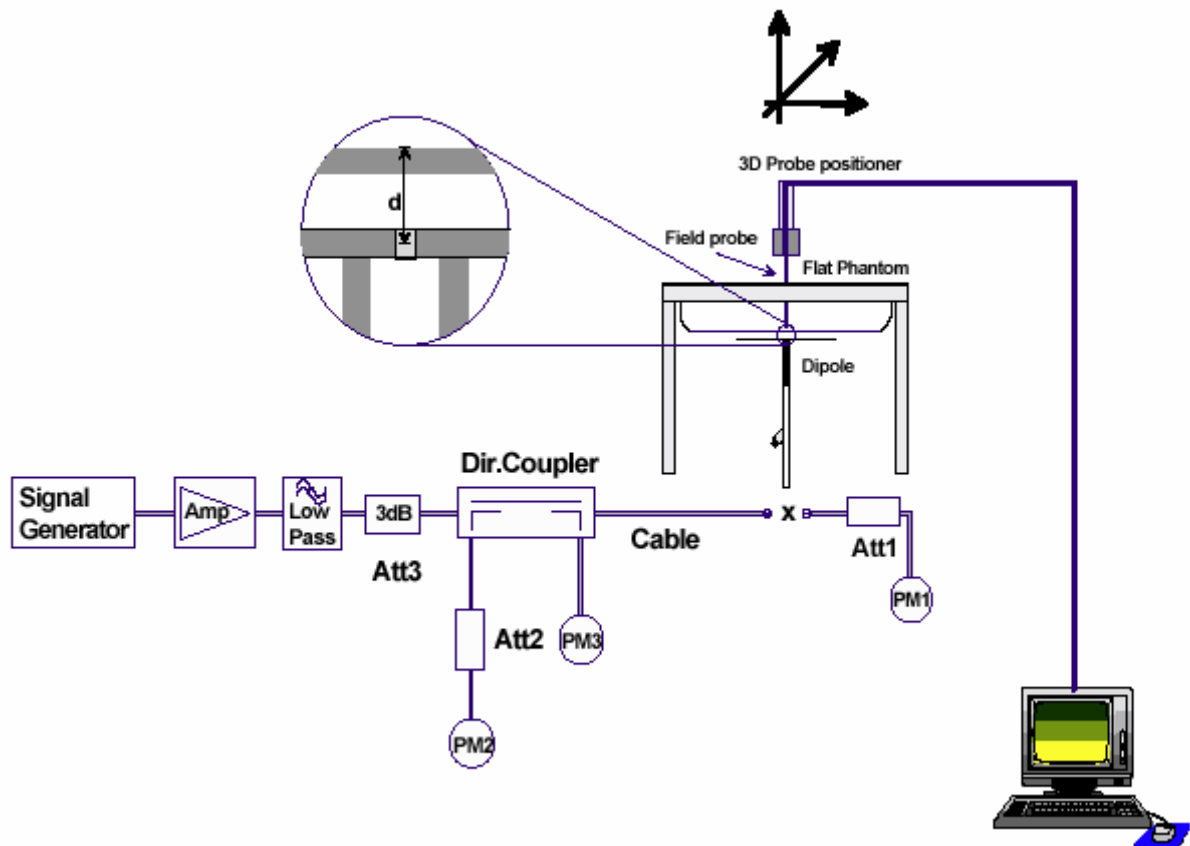


Figure 5. System Check Set-up

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3.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 9 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by OET 65.

Table 7: Composition of the Body Tissue Equivalent Matter

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

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

4. Laboratory Environment

Table 8: The Ambient Conditions during Test

Temperature	Min. = 20°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 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 Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions

KDB 447498 D02 -2009.11.13

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6. Conducted Output Power Measurement

6.1. Summary

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

6.2. Conducted Power Results

Table 9: Conducted Power Measurement Results

GSM 850+GPRS		Conducted Power		
		Channel 128	Channel 192	Channel 251
		(824.2MHz)	(837MHz)	(848.8MHz)
1 timeslot	Before Test (dBm)	31.62	31.58	31.47
	After Test (dBm)	31.60	31.57	31.45
2 timeslots	Before Test (dBm)	28.80	28.53	28.42
	After Test (dBm)	28.77	28.52	28.40
3 timeslots	Before Test (dBm)	27.88	27.62	27.49
	After Test (dBm)	27.87	27.60	27.47
4 timeslots	Before Test (dBm)	25.87	25.61	25.48
	After Test (dBm)	25.86	25.61	25.47
GSM 850+EGPRS		Conducted Power		
		Channel 128	Channel 192	Channel 251
		(824.2MHz)	(837MHz)	(848.8MHz)
1 timeslot	Before Test (dBm)	26.12	26.01	25.70
	After Test (dBm)	26.11	26.01	25.68
2 timeslots	Before Test (dBm)	25.48	25.19	25.12
	After Test (dBm)	25.47	25.18	25.11
3 timeslots	Before Test (dBm)	23.49	23.28	23.08
	After Test (dBm)	23.46	23.27	23.07
4 timeslots	Before Test (dBm)	21.44	21.25	21.05
	After Test (dBm)	21.43	21.25	21.03
GSM 1900+GPRS		Conducted Power		
		Channel 512	Channel 661	Channel 810
		(1850.2MHz)	(1880MHz)	(1909.8MHz)
1 timeslot	Before Test (dBm)	28.69	28.66	28.65
	After Test (dBm)	28.68	28.65	28.64
2 timeslots	Before Test (dBm)	27.56	27.59	27.56
	After Test (dBm)	27.55	27.58	27.55
3 timeslots	Before Test (dBm)	25.72	25.76	25.75
	After Test (dBm)	25.70	25.75	25.74
4 timeslots	Before Test (dBm)	23.67	23.72	23.68
	After Test (dBm)	23.66	23.71	23.67

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GSM 1900+EGPRS		Conducted Power		
		Channel 512	Channel 661	Channel 810
		(1850.2MHz)	(1880MHz)	(1909.8MHz)
1 timeslot	Before Test (dBm)	24.78	24.80	24.92
	After Test (dBm)	24.77	24.79	24.90
2 timeslots	Before Test (dBm)	24.44	24.46	24.44
	After Test (dBm)	24.43	24.45	24.43
3 timeslots	Before Test (dBm)	22.78	22.86	22.81
	After Test (dBm)	22.77	22.85	22.80
4 timeslots	Before Test (dBm)	20.70	20.80	20.77
	After Test (dBm)	20.70	20.79	20.76
WCDMA Band II		Conducted Power		
		Channel 9262	Channel 9400	Channel 9538
		(1852.4MHz)	(1880MHz)	(1907.6MHz)
12.2kbps RMC	Before Test (dBm)	22.08	21.52	21.41
	After Test (dBm)	22.08	21.51	21.40
64kbps RMC	Before Test (dBm)	22.04	21.49	21.39
	After Test (dBm)	22.03	21.48	21.38
144kbps RMC	Before Test (dBm)	22.13	21.57	21.47
	After Test (dBm)	22.12	21.55	21.45
384kbps RMC	Before Test (dBm)	22.06	21.61	21.49
	After Test (dBm)	22.05	21.60	21.48
WCDMA Band II+HSDPA		Conducted Power		
		Channel 9262	Channel 9400	Channel 9538
		(1852.4MHz)	(1880MHz)	(1907.6MHz)
Sub Test - 1	Before Test (dBm)	22.06	21.55	21.46
	After Test (dBm)	22.05	21.53	21.45
Sub Test - 2	Before Test (dBm)	21.12	20.88	20.91
	After Test (dBm)	21.10	20.87	20.90
Sub Test - 3	Before Test (dBm)	21.04	20.86	20.62
	After Test (dBm)	21.03	20.85	20.60
Sub Test - 4	Before Test (dBm)	21.13	20.69	20.54
	After Test (dBm)	21.12	20.68	20.53
WCDMA Band II+HSUPA		Conducted Power		
		Channel 9262	Channel 9400	Channel 9538
		(1852.4MHz)	(1880MHz)	(1907.6MHz)
Sub Test - 1	Before Test (dBm)	21.38	19.73	19.31
	After Test (dBm)	21.37	19.72	19.30
Sub Test - 2	Before Test (dBm)	19.56	18.69	19.05
	After Test (dBm)	19.55	18.68	19.04
Sub Test - 3	Before Test (dBm)	19.97	19.53	18.52
	After Test (dBm)	19.96	19.52	18.51
Sub Test - 4	Before Test (dBm)	19.85	19.01	19.11
	After Test (dBm)	19.82	19.00	19.10

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Sub Test - 5	Before Test (dBm)	20.79	19.57	19.53
	After Test (dBm)	20.78	19.56	19.50
WCDMA Band V		Conducted Power		
		Channel 4132	Channel 4182	Channel 4233
		(826.4MHz)	(836.4MHz)	(846.6MHz)
12.2kbps RMC	Before Test (dBm)	22.09	22.05	21.67
	After Test (dBm)	22.07	22.01	21.66
64kbps RMC	Before Test (dBm)	22.03	22.04	21.63
	After Test (dBm)	22.02	22.03	21.62
144kbps RMC	Before Test (dBm)	22.13	22.11	21.69
	After Test (dBm)	22.12	22.10	21.67
384kbps RMC	Before Test (dBm)	22.07	21.99	21.73
	After Test (dBm)	22.05	21.98	21.70
WCDMA Band V+HSDPA		Conducted Power		
		Channel 4132	Channel 4182	Channel 4233
		(826.4MHz)	(836.4MHz)	(846.6MHz)
Sub Test - 1	Before Test (dBm)	22.08	22.03	21.77
	After Test (dBm)	22.07	22.00	21.75
Sub Test - 2	Before Test (dBm)	21.57	21.27	21.01
	After Test (dBm)	21.55	21.25	21.00
Sub Test - 3	Before Test (dBm)	21.11	21.03	20.71
	After Test (dBm)	21.09	21.00	20.70
Sub Test - 4	Before Test (dBm)	21.03	21.12	20.75
	After Test (dBm)	21.02	21.11	20.72
WCDMA Band V+HSUPA		Conducted Power		
		Channel 4132	Channel 4182	Channel 4233
		(826.4MHz)	(836.4MHz)	(846.6MHz)
Sub Test - 1	Before Test (dBm)	20.88	20.61	19.73
	After Test (dBm)	20.87	20.60	19.70
Sub Test - 2	Before Test (dBm)	19.23	19.52	18.83
	After Test (dBm)	19.20	19.51	18.83
Sub Test - 3	Before Test (dBm)	19.80	19.64	18.88
	After Test (dBm)	19.79	19.62	18.86
Sub Test - 4	Before Test (dBm)	19.51	19.83	18.95
	After Test (dBm)	19.50	19.81	18.93
Sub Test - 5	Before Test (dBm)	19.83	19.55	19.71
	After Test (dBm)	19.82	19.53	19.70

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7. Test Results

7.1. Dielectric Performance

Table 10: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ϵ_r	$\sigma(\text{s/m})$	
835MHz (body)	Target value $\pm 5\%$ window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	/
	Measurement value 2010-5-21	55.39	1.00	21.5
1900MHz (body)	Target value $\pm 5\%$ window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	/
	Measurement value 2010-5-22	52.29	1.56	21.7

7.2. System check

Table 11: System check

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	1g	ϵ_r	$\sigma(\text{s/m})$	
835MHz	Recommended result $\pm 10\%$ window	1.68 1.51 - 1.85	2.56 2.30 - 2.82	53	0.99	/
	Measurement value 2010-5-21	1.68	2.56	55.39	1.00	21.9
1900 MHz	Recommended result $\pm 10\%$ window	5.52 4.97—6.07	10.50 9.45 — 11.55	54	1.55	/
	Measurement value 2010-5-22	5.17	9.73	52.29	1.56	21.7

Note : 1. The graph results see ANNEX B.

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

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7.3. Summary of Measurement Results

7.3.1. GSM 850(GPRS/EGPRS)

Table 12: SAR Values [GSM850 (GPRS/EGPRS)]

Limit of SAR (W/kg)			10 g Average	1g Average	Power Drift(dB)	Graph Results
			2.0	1.6	± 0.21	
Test Case Of Body			Measurement Result (W/kg)		Power Drift(dB)	
Different Test Position	Different Timeslots	Channel	10 g Average	1 g Average	Power Drift(dB)	
IBM T61						
Test Position 1	1 timeslots	Middle	0.356	0.596	-0.061	Figure 8
	2 timeslots	Middle	0.357	0.591	-0.082	Figure 9
	3 timeslots	High	0.476	0.788	-0.008	Figure 10
		Middle	0.422	0.704	-0.067	Figure 11
		Low	0.353	0.579	-0.036	Figure 12
	4 timeslots	Middle	0.362	0.598	0.005	Figure 13
Test Position 2	3 timeslots	Middle	0.220	0.386	-0.106	Figure 14
Test Position 3	3 timeslots	Middle	0.207(max.cube)	0.319(max.cube)	-0.131	Figure 15
Lenovo Y450						
Test Position 4	3 timeslots	Middle	0.193(max.cube)	0.279(max.cube)	-0.062	Figure 16
Worst case position of GPRS with EGPRS						
Test Position 1	3 timeslots	High	0.468	0.784	-0.004	Figure 17

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

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

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

Limit of SAR (W/kg)			Conducted Power	1g Average	Tune-up procedures Power(dBm)	1g Average
				1.6		1.6
Test Case Of Body			Measurement Result (dBm)	Measurement Result (W/kg)		Extrapolated Result (W/kg)
Different Test Position	Different Timeslots	Channel				
IBM T61						
Test Position 1	3 timeslots	High	27.49	0.788	28.2	0.928

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7.3.2. GSM 1900(GPRS/EGPRS)

Table 14: SAR Values [GSM1900 (GPRS/EGPRS)]

Limit of SAR (W/kg)			10 g Average	1g Average	Power Drift(dB)	Graph Results
			2.0	1.6	± 0.21	
Test Case Of Body			Measurement Result (W/kg)		Power Drift(dB)	
Different Test Position	Different Timeslots	Channel	10 g Average	1 g Average		
IBM T61						
Test Position 1	1 timeslot	High	0.548	1.040	-0.002	Figure 18
		Middle	0.500	0.946	0.017	Figure 19
		Low	0.391	0.747	0.043	Figure 20
	2 timeslots	High	0.725	1.370	-0.050	Figure 21
		Middle	0.672(max.cube)	1.280(max.cube)	-0.017	Figure 22
		Low	0.515	1.010	0.027	Figure 23
	3 timeslots	High	0.646	1.230	-0.106	Figure 24
		Middle	0.605	1.150	-0.106	Figure 25
		Low	0.479	0.911	0.025	Figure 26
	4 timeslots	High	0.543	1.030	-0.059	Figure 27
		Middle	0.489	0.924	-0.195	Figure 28
		Low	0.392	0.747	0.015	Figure 29
Test Position 2	2 timeslots	High	0.677	1.190	-0.058	Figure 30
		Middle	0.631	1.180	-0.196	Figure 31
		Low	0.555	0.976	-0.115	Figure 32
Lenovo Y450						
Test Position 3	2 timeslots	High	0.494	0.920	0.063	Figure 33
		Middle	0.454	0.862	-0.055	Figure 34
		Low	0.350	0.623	0.080	Figure 35
Test Position 4	2 timeslots	Middle	0.171	0.314	-0.090	Figure 36
Worst case position of GPRS with EGPRS						
Test Position 1	2 timeslots	High	0.676	1.310	0.045	Figure 37

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

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

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

Limit of SAR (W/kg)			Conducted Power	1g Average	Tune-up procedures Power(dBm)	1g Average
				1.6		1.6
Test Case Of Body			Measurement Result (dBm)	Measurement Result (W/kg)		Extrapolated Result (W/kg)
Different Test Position	Different Timeslots	Channel				
IBM T61						
Test Position 1	2 timeslots	High	27.56	1.37	27.7	1.42

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

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

Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift(dB)	Graph Results
		2.0	1.6	± 0.21	
Test Case Of Body		Measurement Result (W/kg)		Power Drift(dB)	
Different Test Position	Channel	10 g Average	1 g Average	Power Drift(dB)	
IBM T61					
Test Position 1	High	0.467	0.901	0.034	Figure 38
	Middle	0.470	0.902	0.012	Figure 39
	Low	0.440	0.837	0.110	Figure 40
Test Position 2	Middle	0.397(max.cube)	0.702(max.cube)	-0.064	Figure 41
Lenovo Y450					
Test Position 3	Middle	0.401	0.742	-0.056	Figure 42
Test Position 4	Middle	0.139	0.254	-0.123	Figure 43
Worst case position of RMC with HSDPA					
Test Position 1	Middle	0.491(max.cube)	0.898(max.cube)	0.021	Figure 44
Worst case position of RMC with HSUPA					
Test Position 1	Middle	0.405(max.cube)	0.737(max.cube)	-0.107	Figure 45

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

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

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Table 17: Extrapolated SAR Values of highest measured SAR [WCDMA Band II]

Limit of SAR (W/kg)		Conducted Power	1g Average	Tune-up procedures Power(dBm)	1g Average
			1.6		1.6
Test Case Of Body		Measurement Result (dBm)	Measurement Result (W/kg)		Extrapolated Result (W/kg)
Different Test Position	Channel				
IBM T61					
Test Position 1	Middle	21.52	0.902	22.3	1.08

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

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

Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift(dB)	Graph Results
		2.0	1.6	± 0.21	
Test Case Of Body		Measurement Result (W/kg)		Power Drift(dB)	
Different Test Position	Channel	10 g Average	1 g Average	Power Drift(dB)	
IBM T61					
Test Position 1	High	0.391	0.654	0.058	Figure 46
	Middle	0.362	0.604	0.011	Figure 47
	Low	0.300	0.499	0.077	Figure 48
Test Position 2	Middle	0.235	0.407	-0.169	Figure 49
Lenovo Y450					
Test Position 3	Middle	0.207	0.334	-0.058	Figure 50
Test Position 4	Middle	0.158	0.233	0.166	Figure 51
Worst case position of RMC with HSDPA					
Test Position 1	High	0.375	0.628	-0.065	Figure 52
Worst case position of RMC with HSUPA					
Test Position 1	High	0.250	0.419	-0.082	Figure 53

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

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

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Table 19: Extrapolated SAR Values of highest measured SAR [WCDMA Band V]

Limit of SAR (W/kg)		Conducted Power	1g Average	Tune-up procedures Power(dBm)	1g Average
			1.6		1.6
Test Case Of Body		Measurement Result (dBm)	Measurement Result (W/kg)		Extrapolated Result (W/kg)
Different Test Position	Channel				
IBM T61					
Test Position 1	High	21.67	0.654	22.3	0.756

7.4. Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized Extrapolated SAR_{1g} is **1.420 W/kg** that is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

[illegible]

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

END OF REPORT BODY

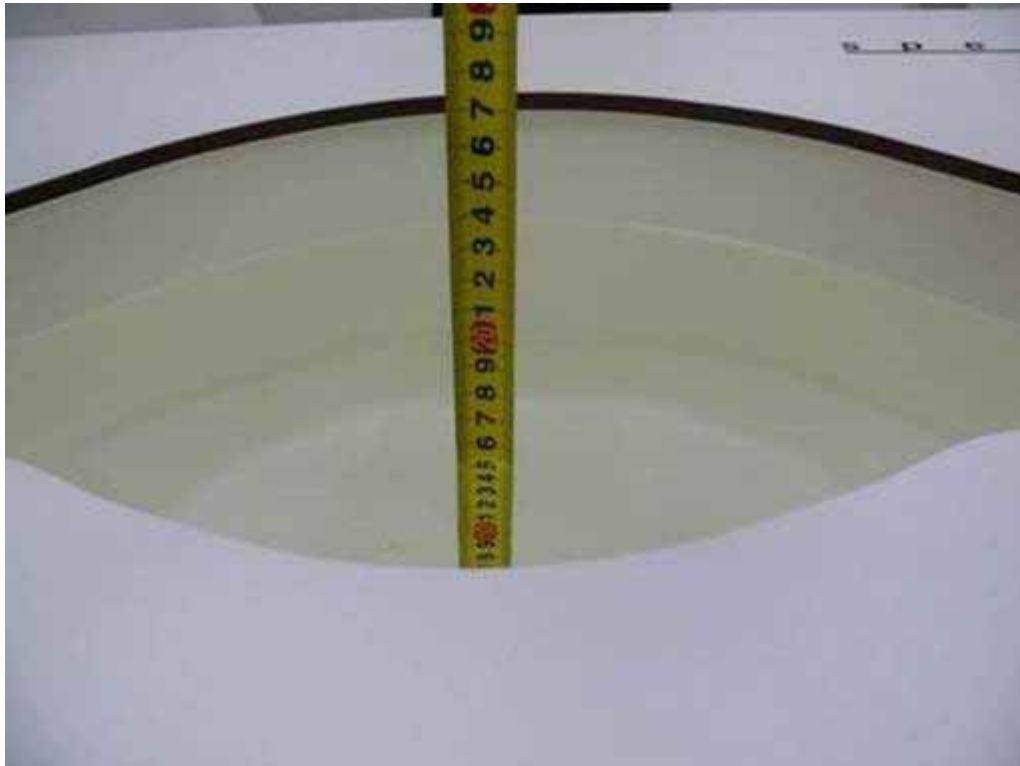
ANNEX A: Test Layout



Picture 2: Specific Absorption Rate Test Layout



Picture 3: Liquid depth in the Flat Phantom (835 MHz)
(15.2cm deep)



Picture 4: Liquid depth in the Flat Phantom (1900 MHz)
(15.3cm deep)

ANNEX B: System Check Results

System Performance Check at 835 MHz

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

Date/Time: 5/21/2010 8:22:20 PM

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

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.00 \text{ mho/m}$; $\epsilon_r = 55.39$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3

Liquid Temperature: 21.5

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 3.68 W/kg

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

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

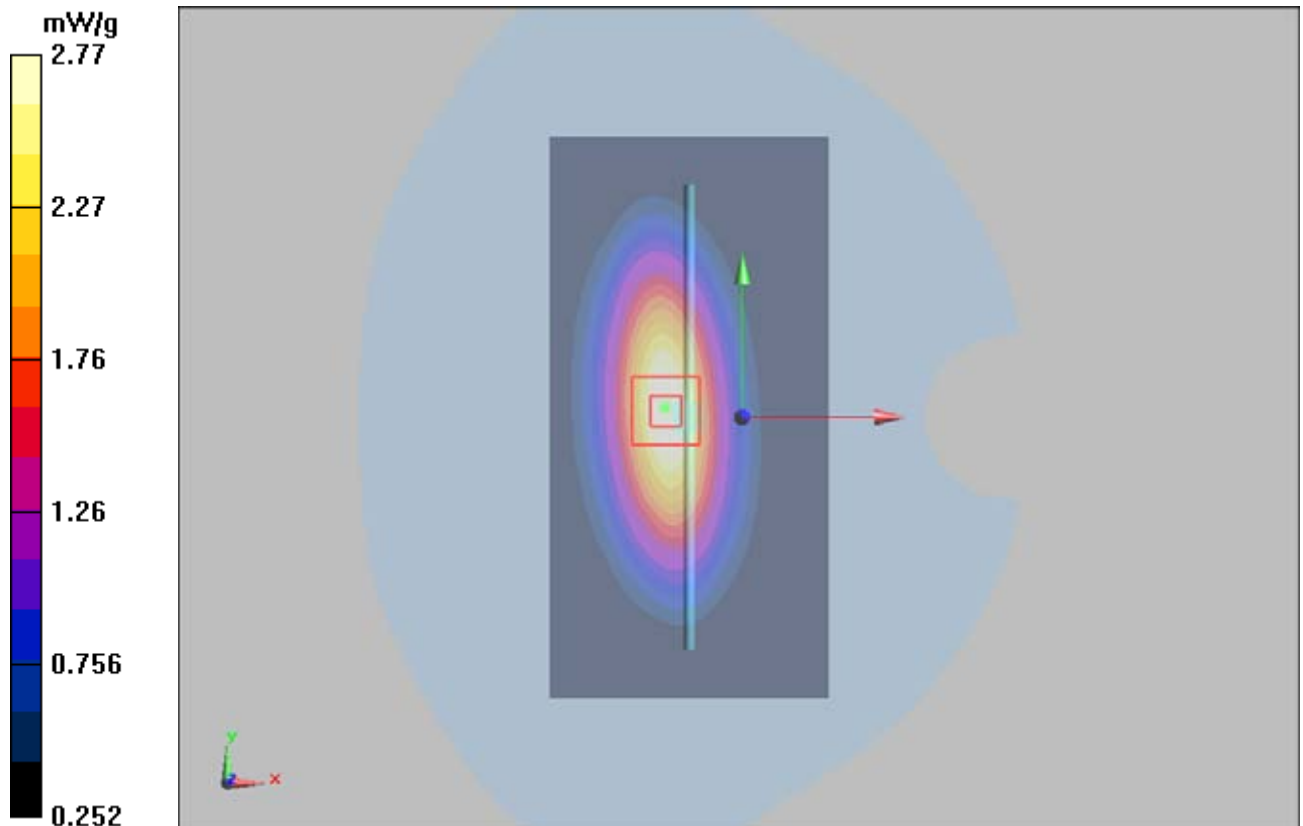


Figure 6 Z-Scan at power reference point (system Check at 835 MHz dipole)

System Performance Check at 1900 MHz

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

Date/Time: 5/22/2010 12:06:19 PM

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.29$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 16.8 W/kg

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

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

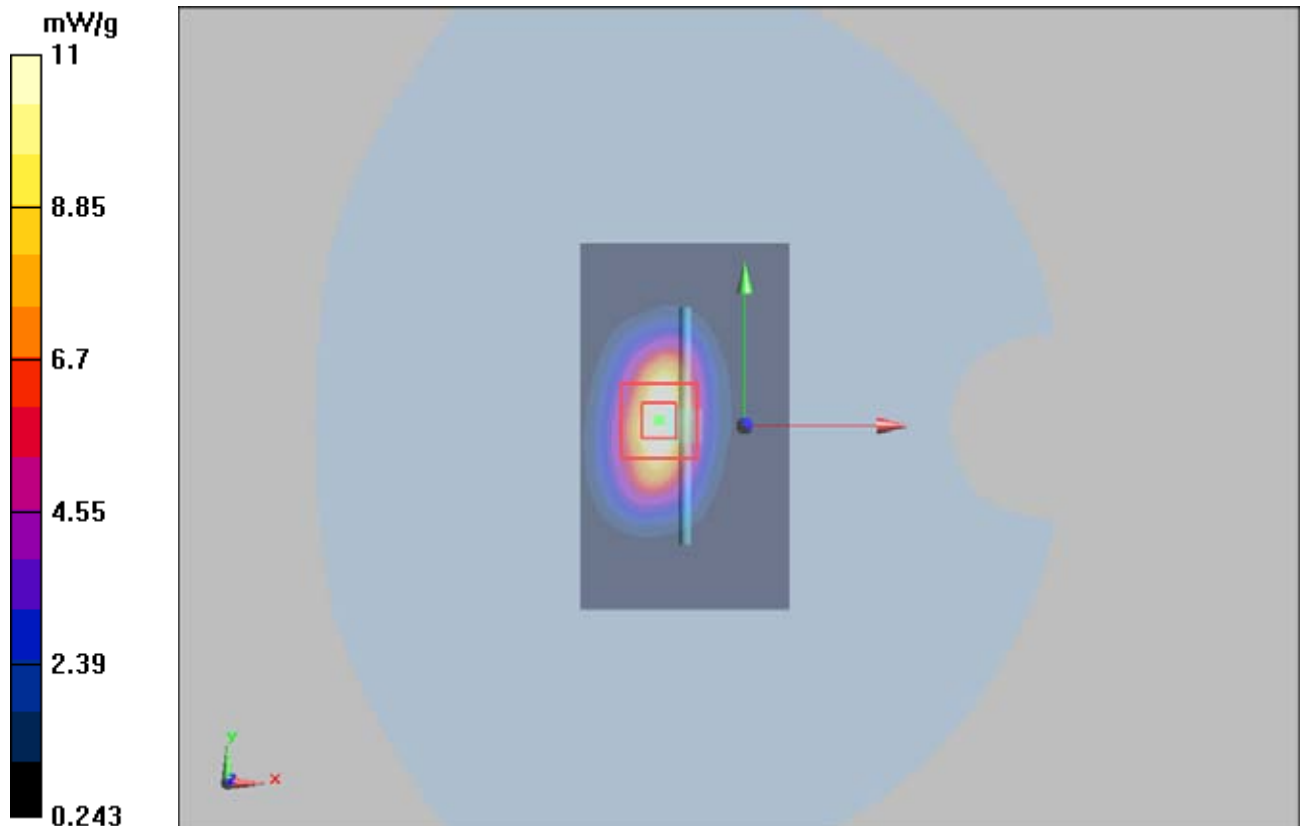


Figure 7 Z-Scan at power reference point (system Check at 1900 MHz dipole)

ANNEX C: Graph Results

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

Date/Time: 5/21/2010 9:54:53 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 22.5 V/m; Power Drift = -0.061 dB

Peak SAR (extrapolated) = 0.956 W/kg

SAR(1 g) = 0.596 mW/g; SAR(10 g) = 0.356 mW/g

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

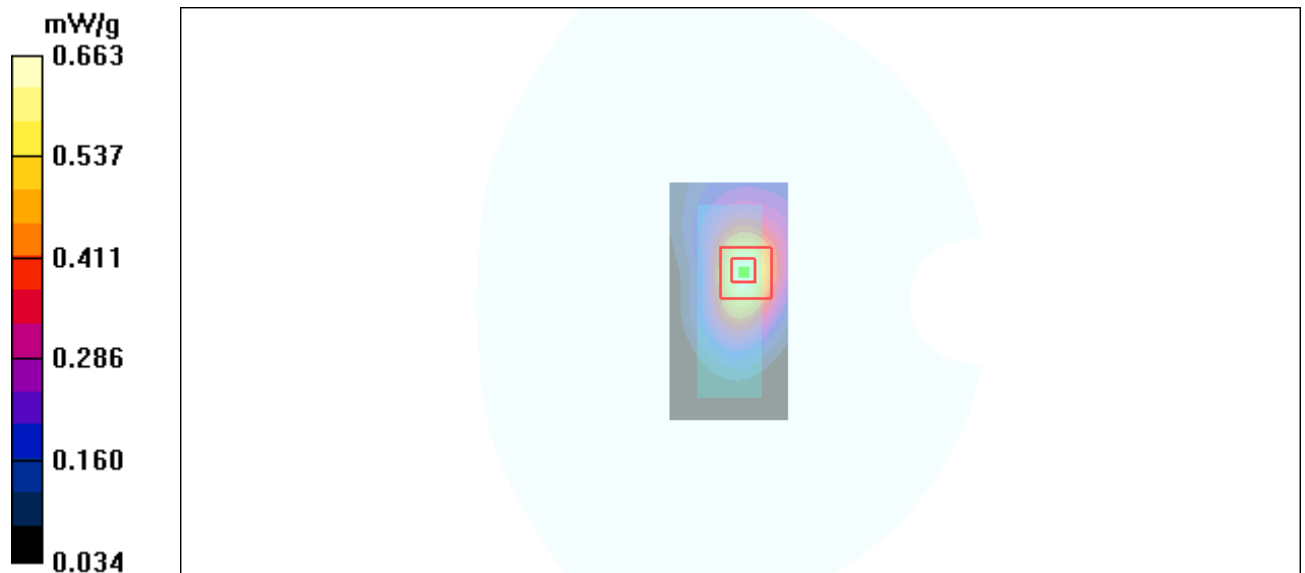


Figure 8 GSM 850 GPRS (1 timeslots in uplink) with IBM T61 Test Position 1 Channel 190

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

Date/Time: 5/21/2010 10:13:03 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 22.5 V/m; Power Drift = -0.082 dB

Peak SAR (extrapolated) = 0.943 W/kg

SAR(1 g) = 0.591 mW/g; SAR(10 g) = 0.357 mW/g

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

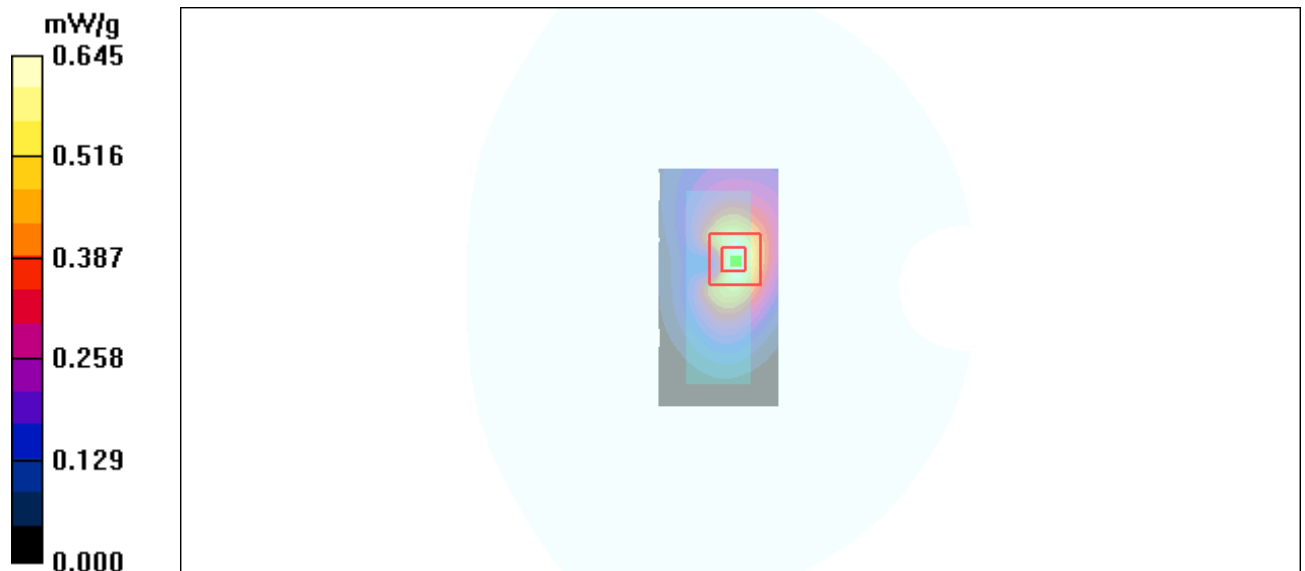


Figure 9 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 190

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GSM 850 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 High Frequency

Date/Time: 5/22/2010 12:00:38 PM

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

Medium parameters used: $f = 849 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 0.877 mW/g

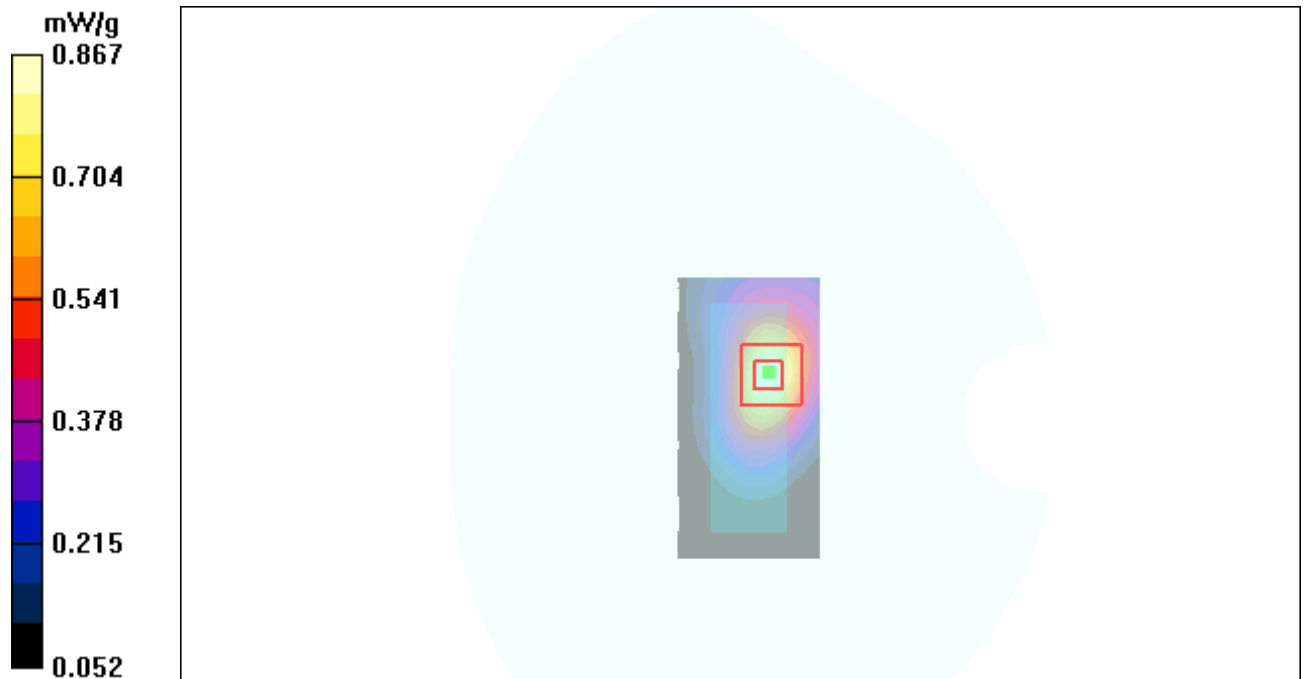
Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.4 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.788 mW/g; SAR(10 g) = 0.476 mW/g

Maximum value of SAR (measured) = 0.867 mW/g



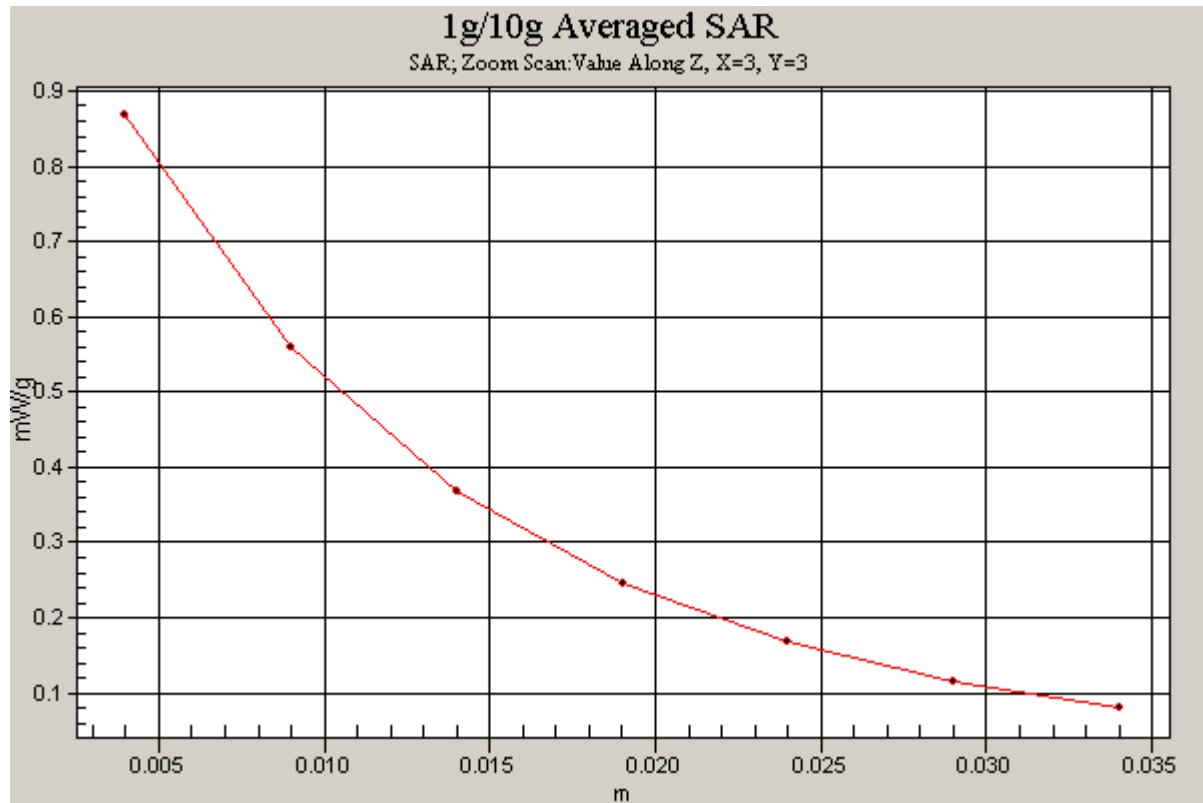


Figure 10 GSM 850 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 251

GSM 850 GPRS (3 timeslot in uplink) with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/21/2010 10:31:24 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.777 mW/g

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

Reference Value = 24.5 V/m; Power Drift = -0.067 dB

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 0.704 mW/g; SAR(10 g) = 0.422 mW/g

Maximum value of SAR (measured) = 0.775 mW/g

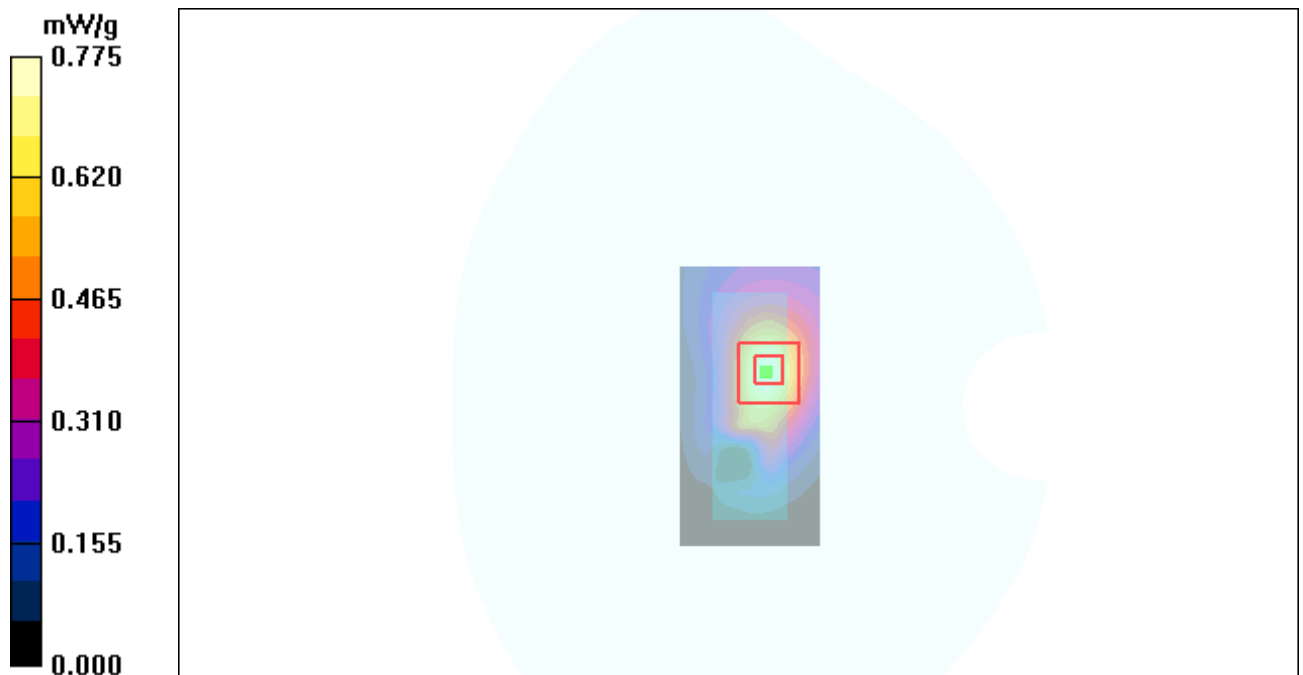


Figure 11 GSM 850 GPRS (3 timeslot in uplink) with IBM T61 Test Position 1 Channel 190

GSM 850 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Low Frequency

Date/Time: 5/22/2010 11:36:42 AM

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

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.653 mW/g

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

Reference Value = 21.3 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.579 mW/g; SAR(10 g) = 0.353 mW/g

Maximum value of SAR (measured) = 0.643 mW/g

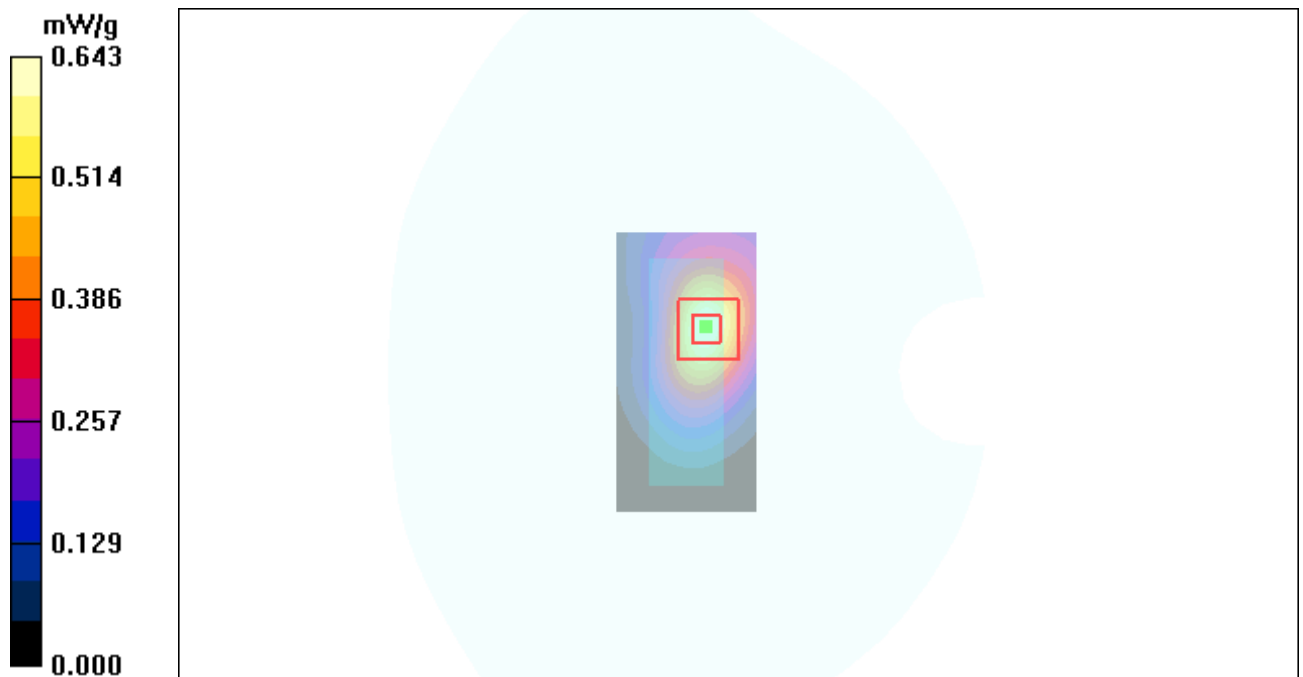


Figure 12 GSM 850 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 128

GSM 850 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/21/2010 10:50:18 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.651 mW/g

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

Reference Value = 22.5 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.953 W/kg

SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.362 mW/g

Maximum value of SAR (measured) = 0.658 mW/g

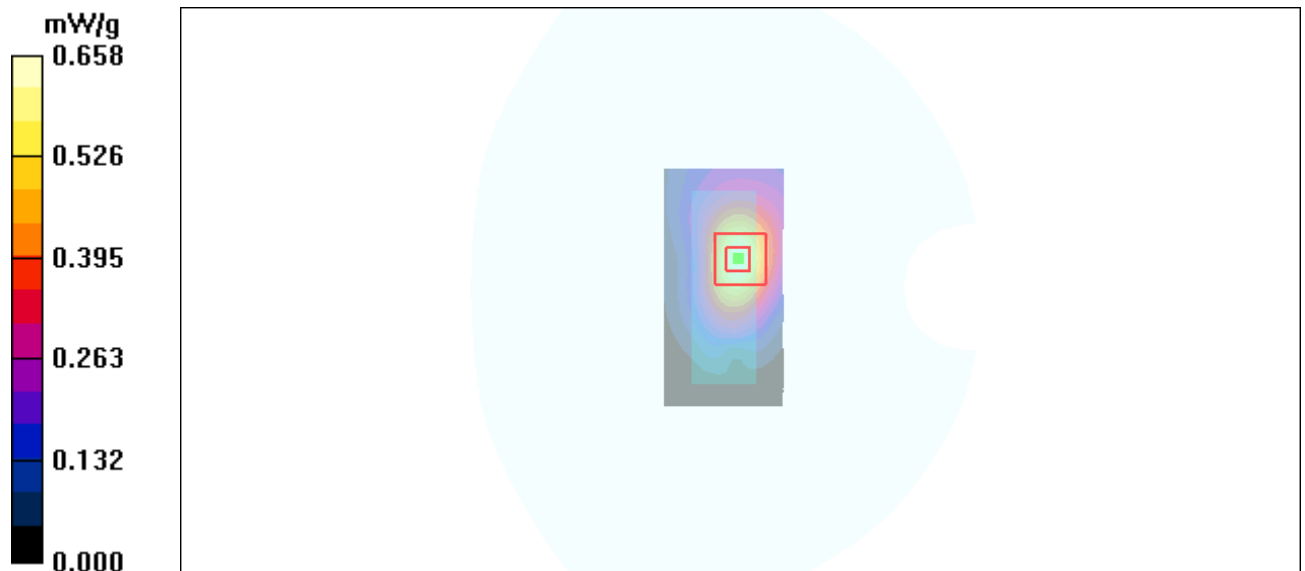


Figure 13 GSM 850 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 190

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

Date/Time: 5/21/2010 11:11:26 PM

Communication System: GSM 850+GPRS(4Up); Frequency: 836.6 MHz; Duty Cycle: 1:2.767

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 2 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.426 mW/g

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

Reference Value = 14.1 V/m; Power Drift = -0.106 dB

Peak SAR (extrapolated) = 0.675 W/kg

SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.220 mW/g

Maximum value of SAR (measured) = 0.431 mW/g

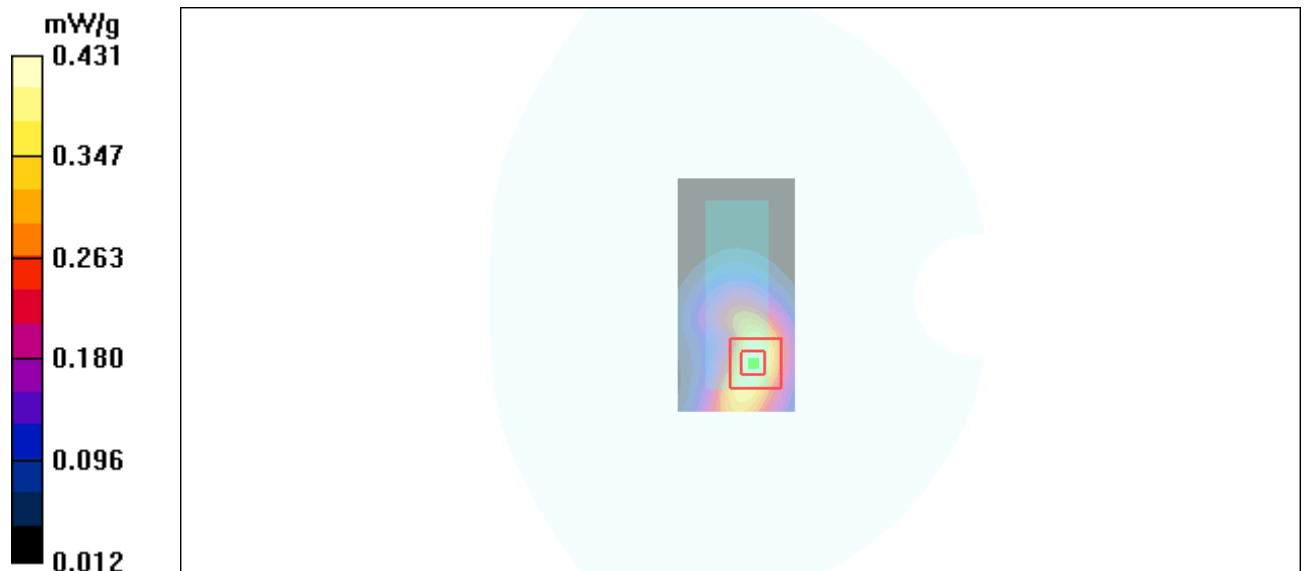


Figure 14 GSM 850 GPRS (3 timeslots in uplink) with IBM T61 Test Position 2 Channel 190

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

Date/Time: 5/21/2010 11:41:19 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.310 mW/g

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

Reference Value = 13.8 V/m; Power Drift = -0.131 dB

Peak SAR (extrapolated) = 0.470 W/kg

SAR(1 g) = 0.279 mW/g; SAR(10 g) = 0.168 mW/g

Maximum value of SAR (measured) = 0.309 mW/g

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

Reference Value = 13.8 V/m; Power Drift = -0.131 dB

Peak SAR (extrapolated) = 0.617 W/kg

SAR(1 g) = 0.319 mW/g; SAR(10 g) = 0.207 mW/g

Maximum value of SAR (measured) = 0.355 mW/g

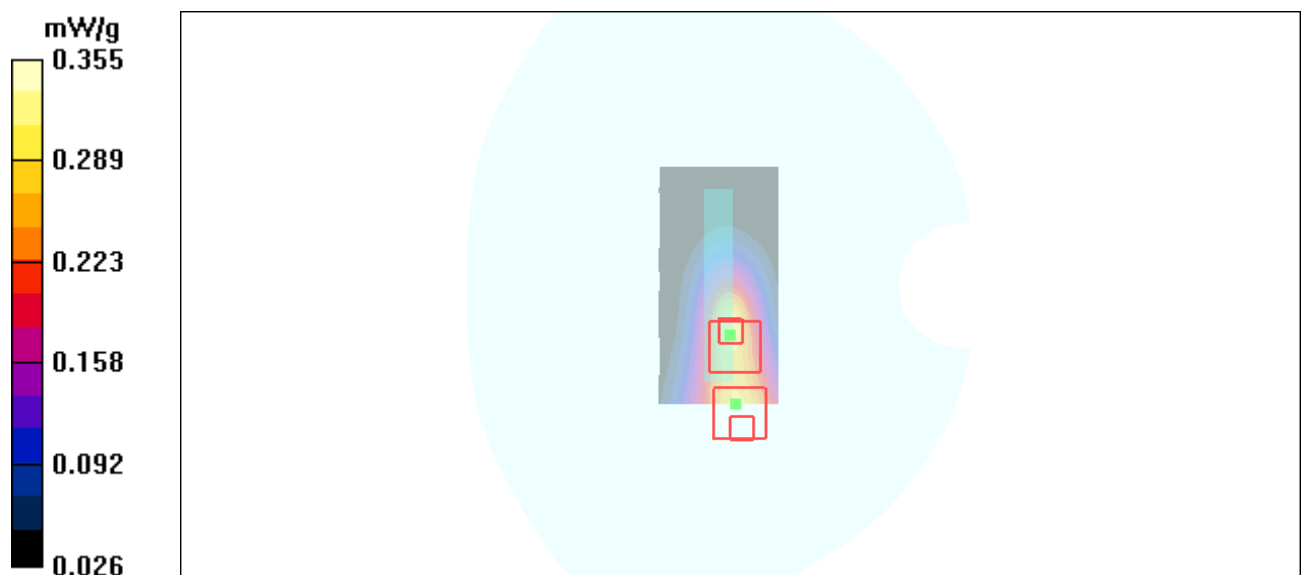


Figure 15 GSM 850 GPRS (3 timeslots in uplink) with IBM T61 Test Position 3 Channel 190

GSM 850 GPRS (3 timeslots in uplink) with Lenovo Y450 Test Position 4 Middle Frequency

Date/Time: 5/22/2010 10:56:07 AM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 4 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 16.2 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.402 W/kg

SAR(1 g) = 0.279 mW/g; SAR(10 g) = 0.193 mW/g

Maximum value of SAR (measured) = 0.298 mW/g

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

Reference Value = 16.2 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.409 W/kg

SAR(1 g) = 0.268 mW/g; SAR(10 g) = 0.181 mW/g

Maximum value of SAR (measured) = 0.296 mW/g

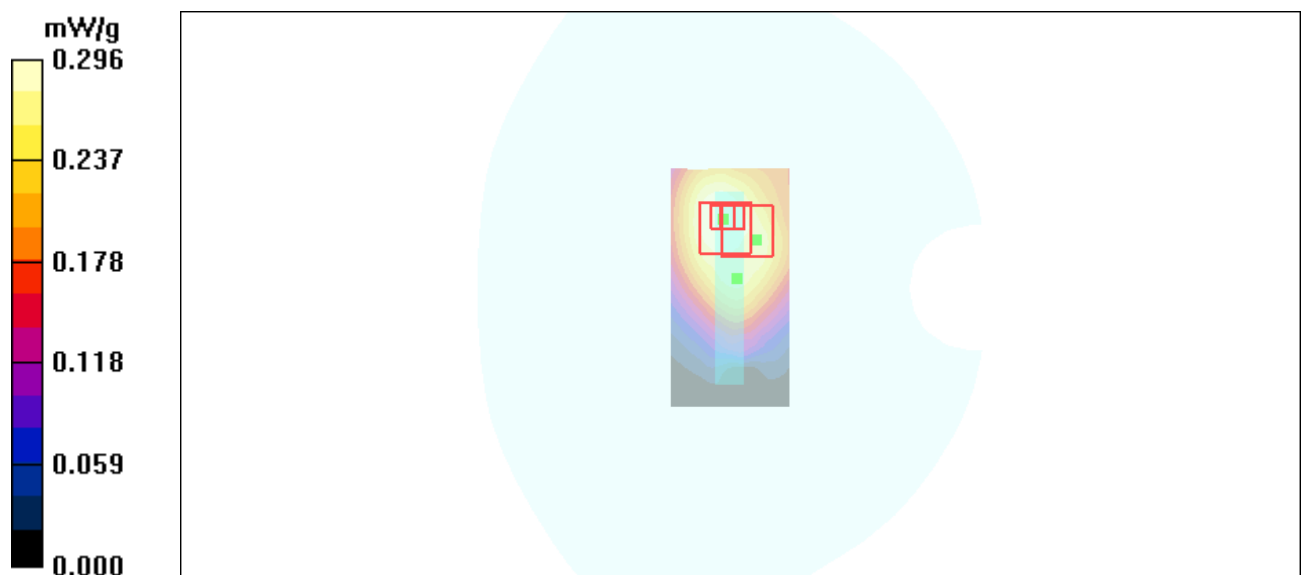


Figure 16 GSM 850 GPRS (3 timeslots in uplink) with Lenovo Y450 Test Position 4 Channel 190

GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 High Frequency

Date/Time: 5/22/2010 12:21:34 PM

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

Medium parameters used: $f = 849$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.870 mW/g

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

Reference Value = 24.3 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 1.26 W/kg

SAR(1 g) = 0.784 mW/g; SAR(10 g) = 0.468 mW/g

Maximum value of SAR (measured) = 0.862 mW/g

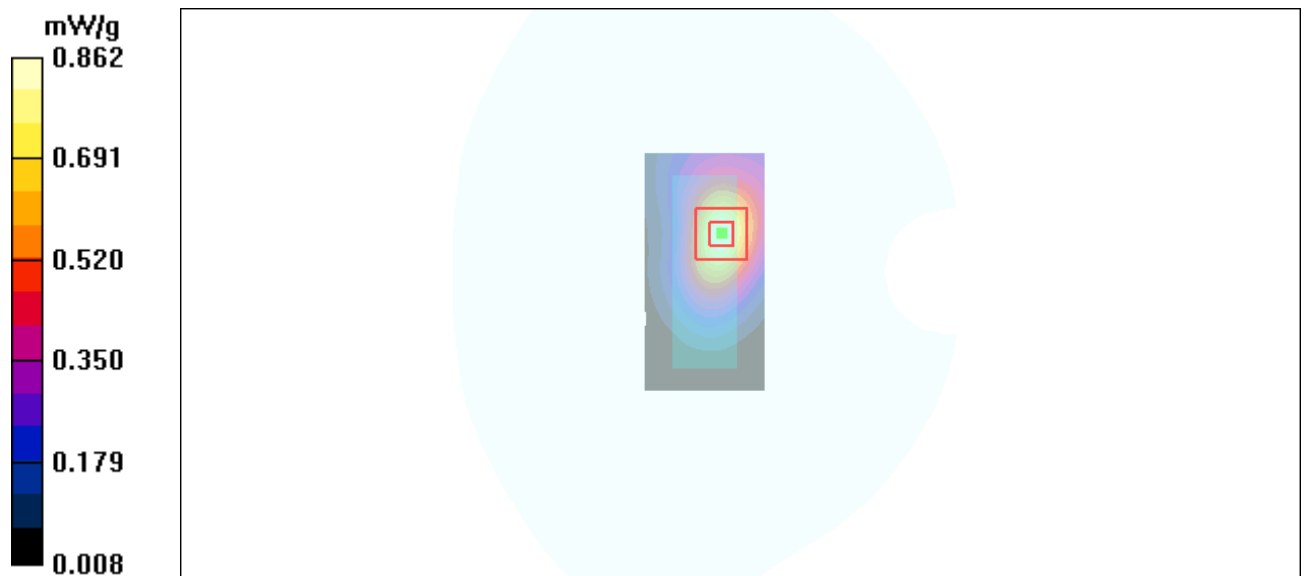


Figure 17 GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 251

GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 High Frequency

Date/Time: 5/22/2010 3:52:25 PM

Communication System: PCS 1900+GPRS(1Up); Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 26.1 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 1.98 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.548 mW/g

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

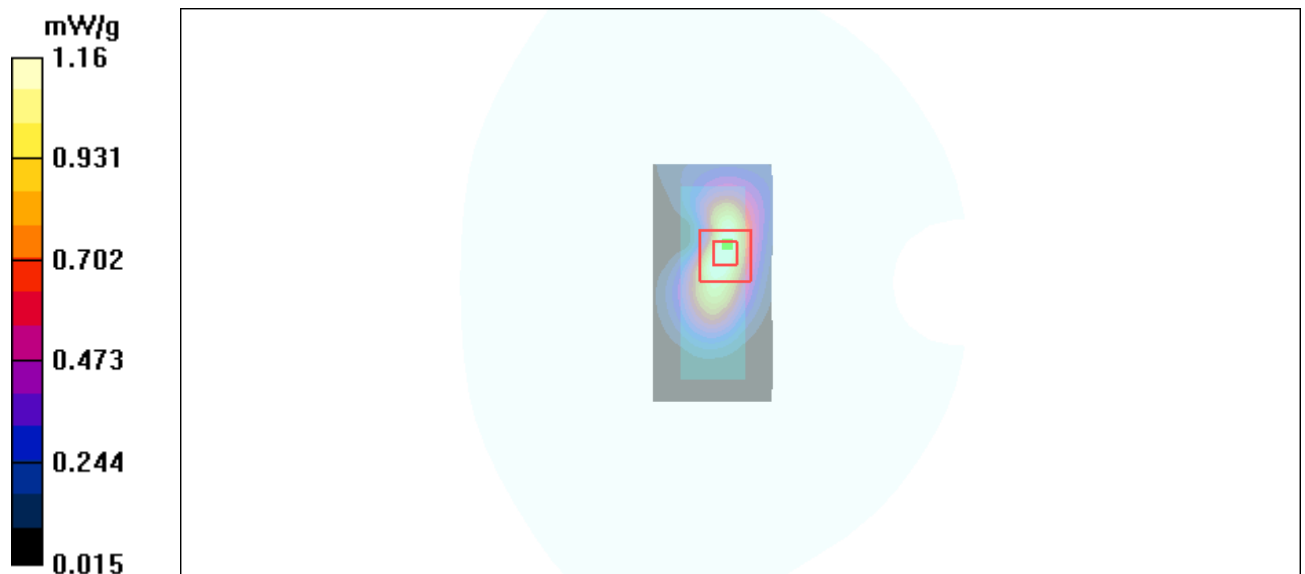


Figure 18 GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 810

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

Date/Time: 5/22/2010 3:14:07 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.10 mW/g

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

Reference Value = 24.5 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 1.77 W/kg

SAR(1 g) = 0.946 mW/g; SAR(10 g) = 0.500 mW/g

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

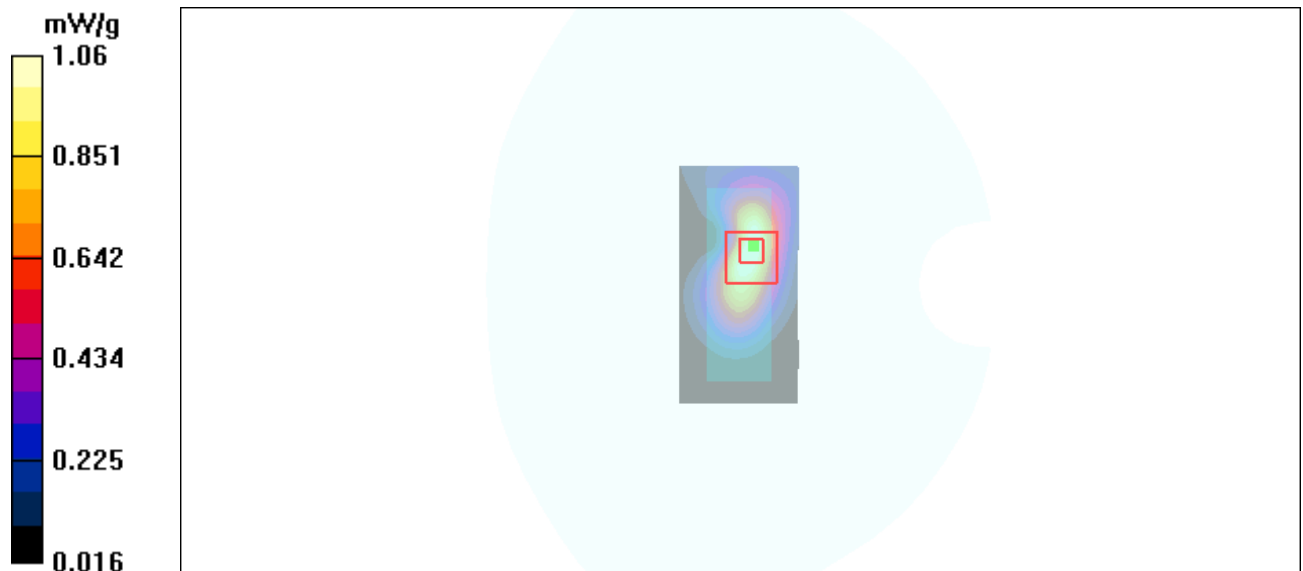


Figure 19 GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Low Frequency

Date/Time: 5/22/2010 3:33:46 PM

Communication System: PCS 1900+GPRS(1Up); Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

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

Peak SAR (extrapolated) = 1.42 W/kg

SAR(1 g) = 0.747 mW/g; SAR(10 g) = 0.391 mW/g

Maximum value of SAR (measured) = 0.844 mW/g

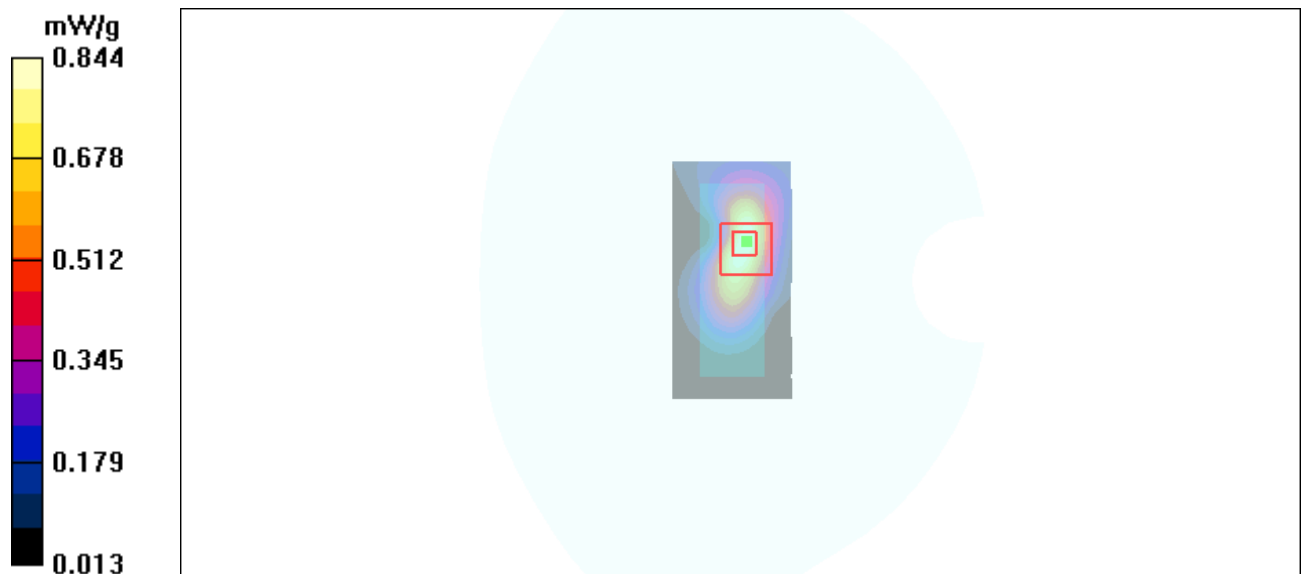


Figure 20 GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 512

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

Date/Time: 5/22/2010 1:40:55 PM

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.59 mW/g

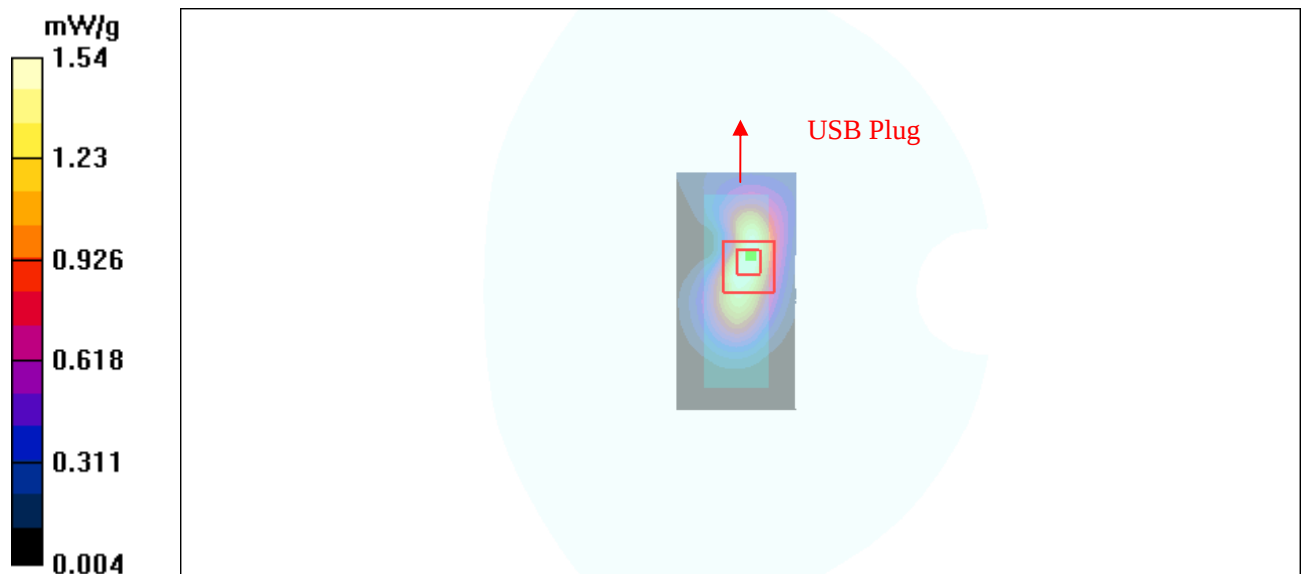
Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 30.1 V/m; Power Drift = -0.050 dB

Peak SAR (extrapolated) = 2.59 W/kg

SAR(1 g) = 1.37 mW/g; SAR(10 g) = 0.725 mW/g

Maximum value of SAR (measured) = 1.54 mW/g



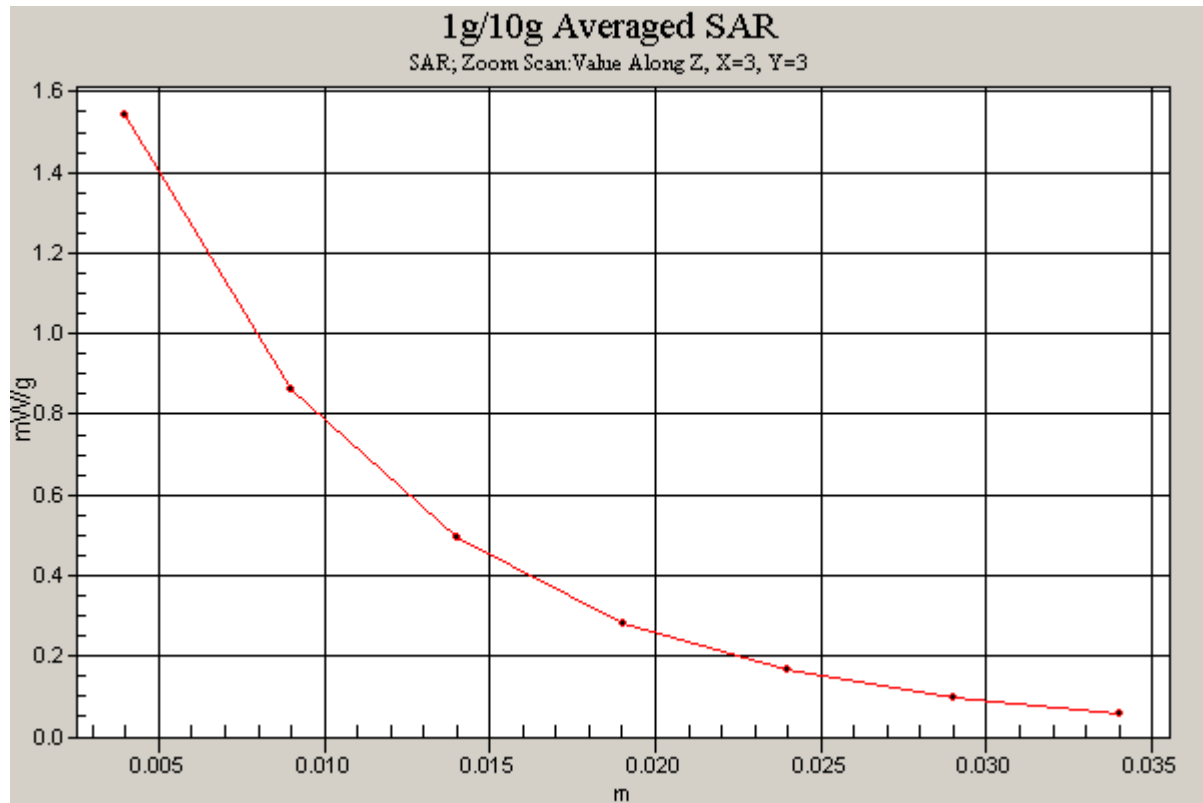


Figure 21 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

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

Date/Time: 5/22/2010 12:49:37 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.86 mW/g

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

Reference Value = 28.4 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 2.44 W/kg

SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.672 mW/g

Maximum value of SAR (measured) = 1.39 mW/g

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

Reference Value = 28.4 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 2.30 W/kg

SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.635 mW/g

Maximum value of SAR (measured) = 1.41 mW/g

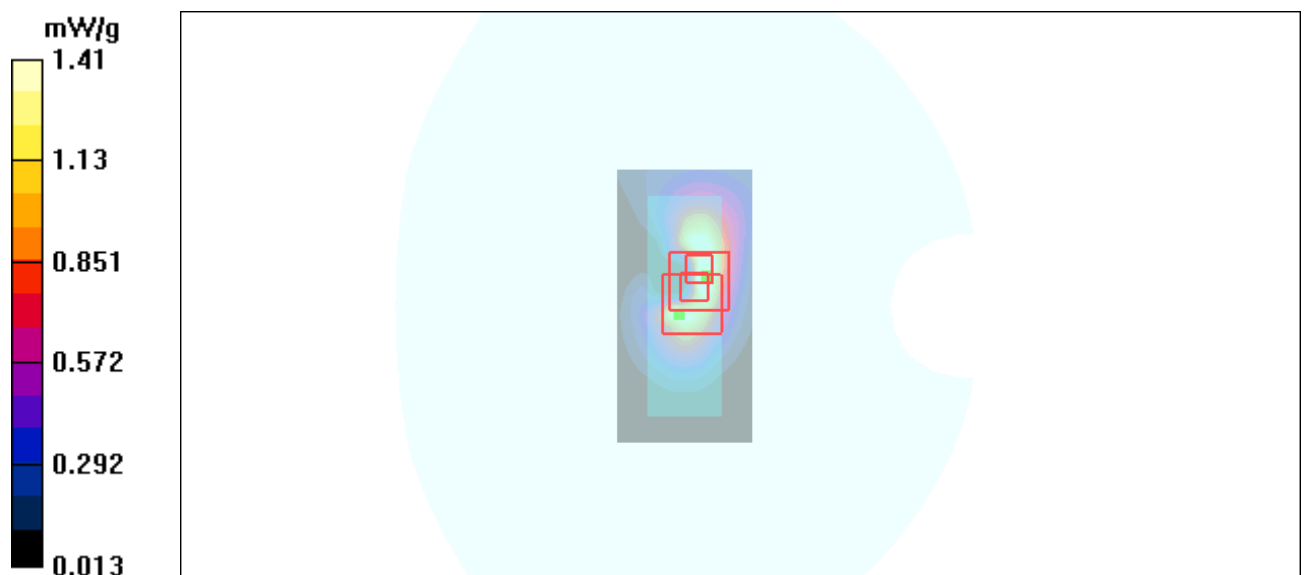


Figure 22 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 661

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

Date/Time: 5/22/2010 1:22:13 PM

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 25.2 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 1.90 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.515 mW/g

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

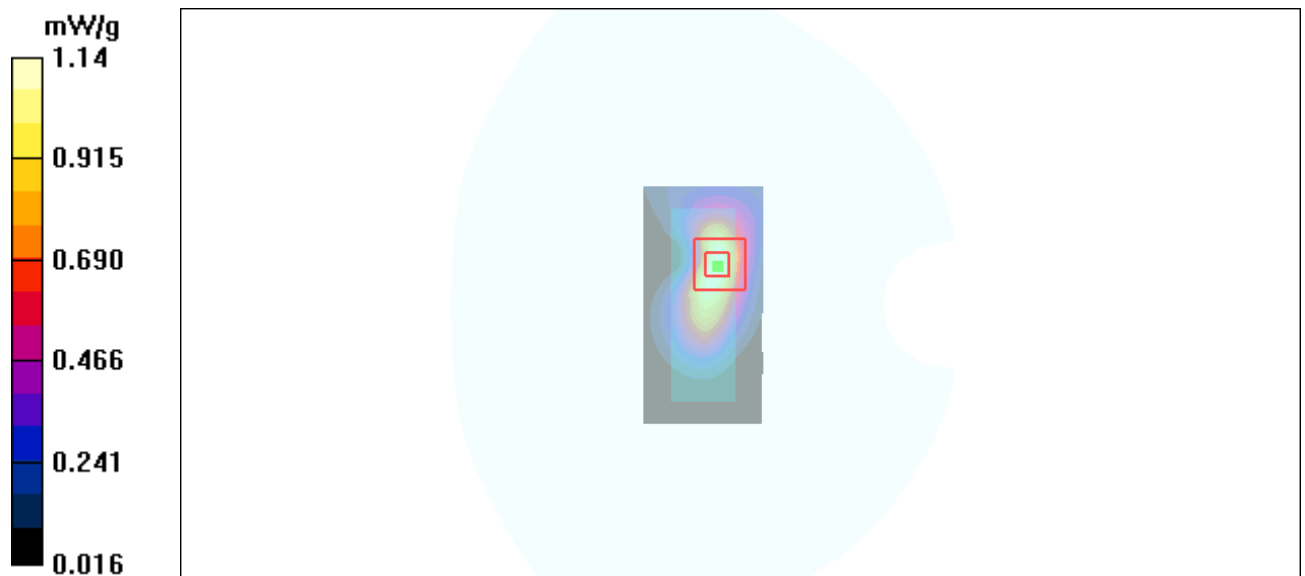


Figure 23 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 512

GSM 1900 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 High Frequency

Date/Time: 5/22/2010 2:38:23 PM

Communication System: PCS 1900+GPRS(3Up); Frequency: 1909.8 MHz; Duty Cycle: 1:2.767

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.44 mW/g

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

Reference Value = 28.7 V/m; Power Drift = -0.106 dB

Peak SAR (extrapolated) = 2.31 W/kg

SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.646 mW/g

Maximum value of SAR (measured) = 1.38 mW/g

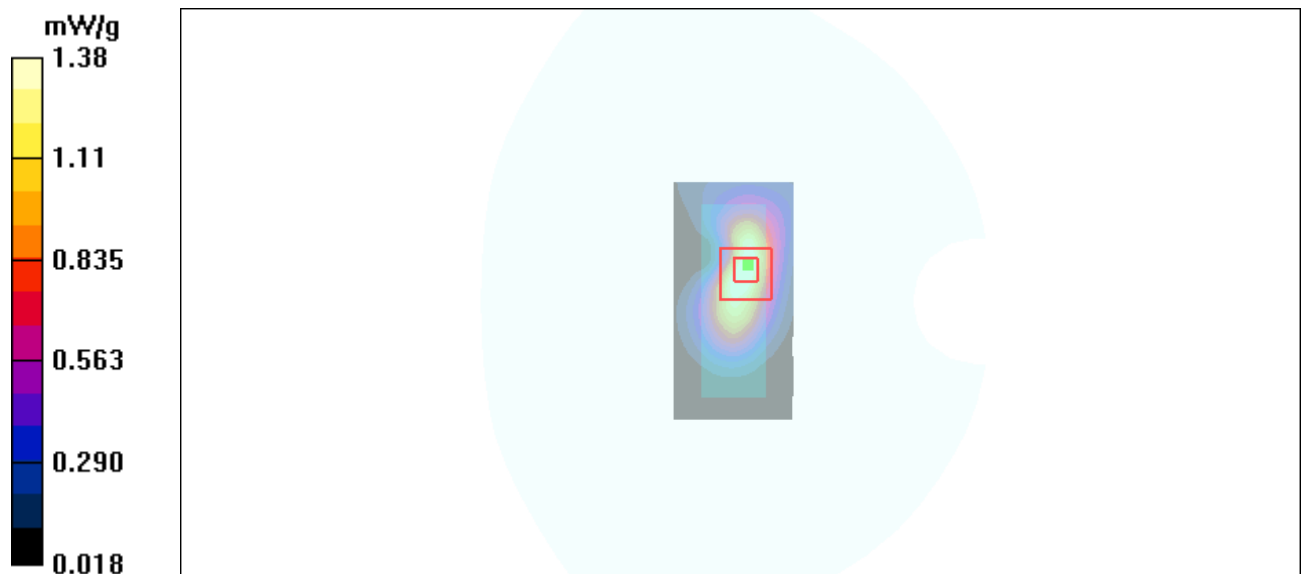


Figure 24 GSM 1900 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

GSM 1900 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/22/2010 1:59:41 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.34 mW/g

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

Reference Value = 27.2 V/m; Power Drift = -0.106 dB

Peak SAR (extrapolated) = 2.17 W/kg

SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.605 mW/g

Maximum value of SAR (measured) = 1.30 mW/g

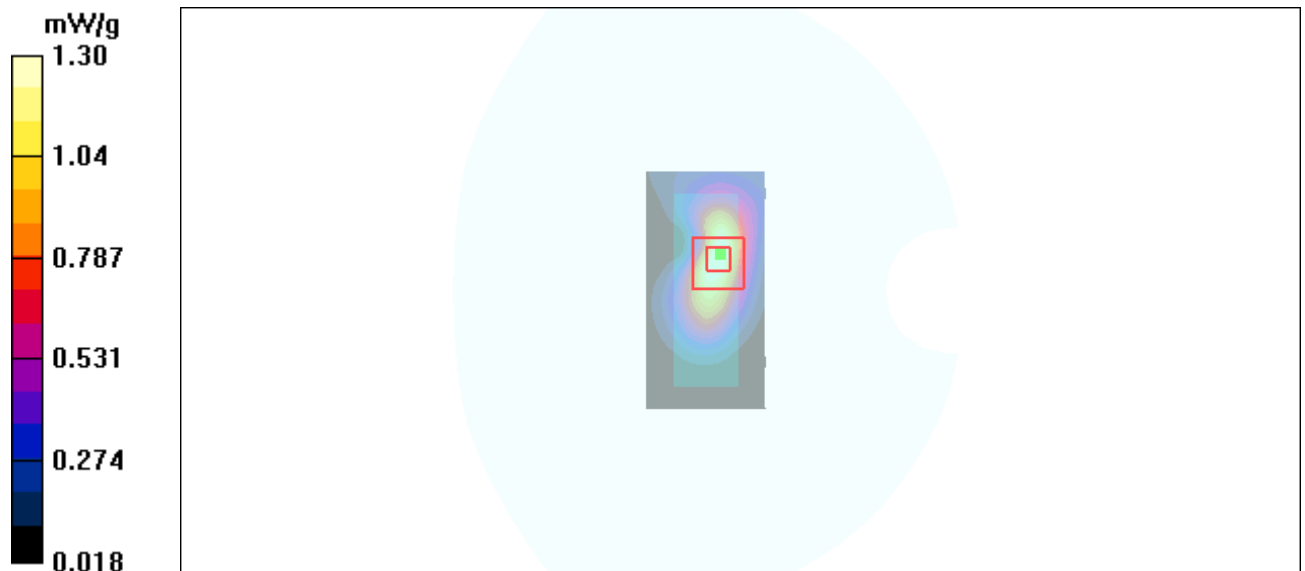


Figure 25 GSM 1900 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Low Frequency

Date/Time: 5/22/2010 2:19:26 PM

Communication System: PCS 1900+GPRS(3Up); Frequency: 1850.2 MHz; Duty Cycle: 1:2.767

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 24.1 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 2.30 W/kg

SAR(1 g) = 0.911 mW/g; SAR(10 g) = 0.479 mW/g

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

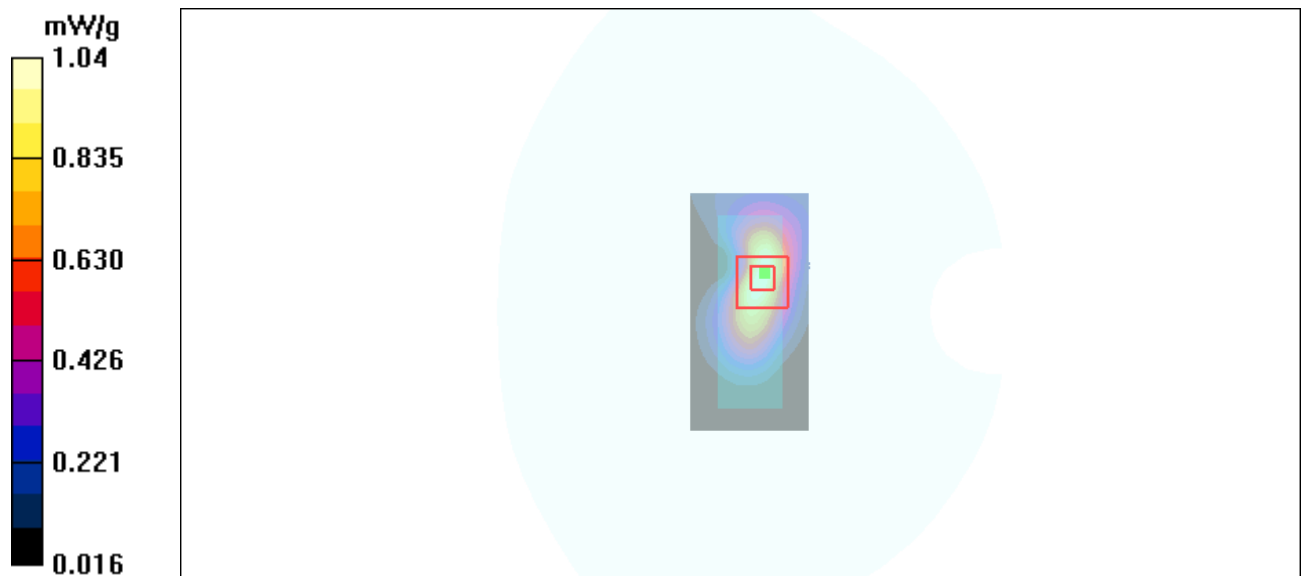


Figure 26 GSM 1900 GPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 512

GSM 1900 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 High Frequency

Date/Time: 5/22/2010 4:52:58 PM

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 26.1 V/m; Power Drift = -0.059 dB

Peak SAR (extrapolated) = 1.91 W/kg

SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.543 mW/g

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

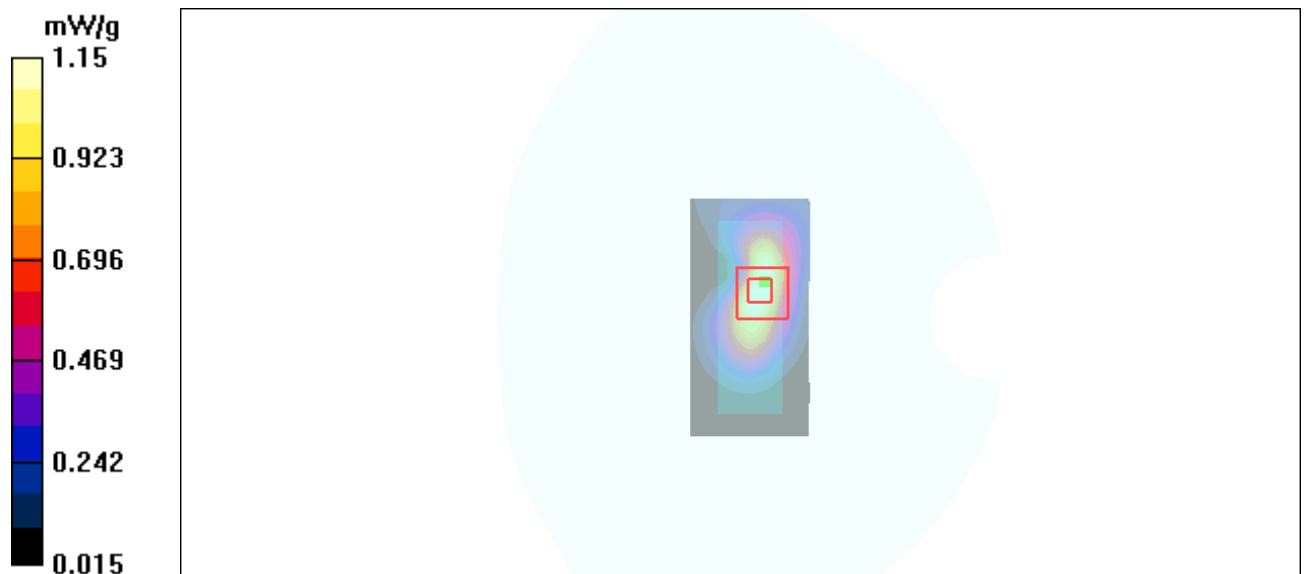


Figure 27 GSM 1900 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

GSM 1900 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/22/2010 4:12:34 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 24.8 V/m; Power Drift = -0.195 dB

Peak SAR (extrapolated) = 1.75 W/kg

SAR(1 g) = 0.924 mW/g; SAR(10 g) = 0.489 mW/g

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

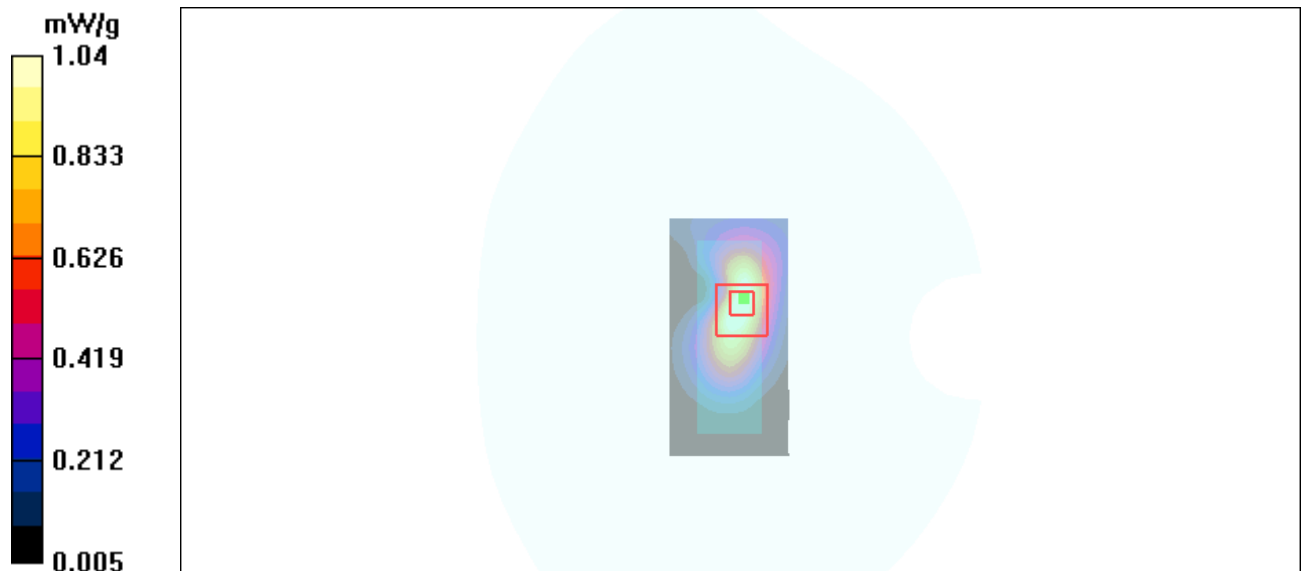


Figure 28 GSM 1900 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 661

GSM 1900 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Low Frequency

Date/Time: 5/22/2010 4:34:09 PM

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.867 mW/g

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

Reference Value = 21.8 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 1.41 W/kg

SAR(1 g) = 0.747 mW/g; SAR(10 g) = 0.392 mW/g

Maximum value of SAR (measured) = 0.845 mW/g

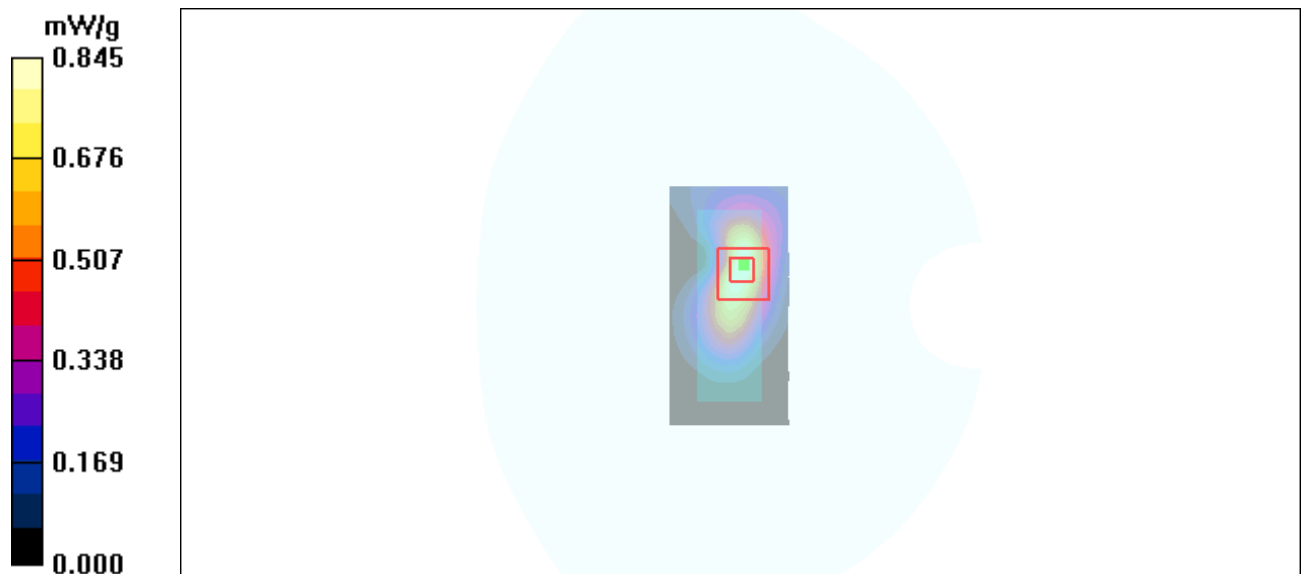


Figure 29 GSM 1900 GPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 512

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

Date/Time: 5/22/2010 6:15:27 PM

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 2 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.33 mW/g

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

Reference Value = 29.2 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 1.92 W/kg

SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.677 mW/g

Maximum value of SAR (measured) = 1.30 mW/g

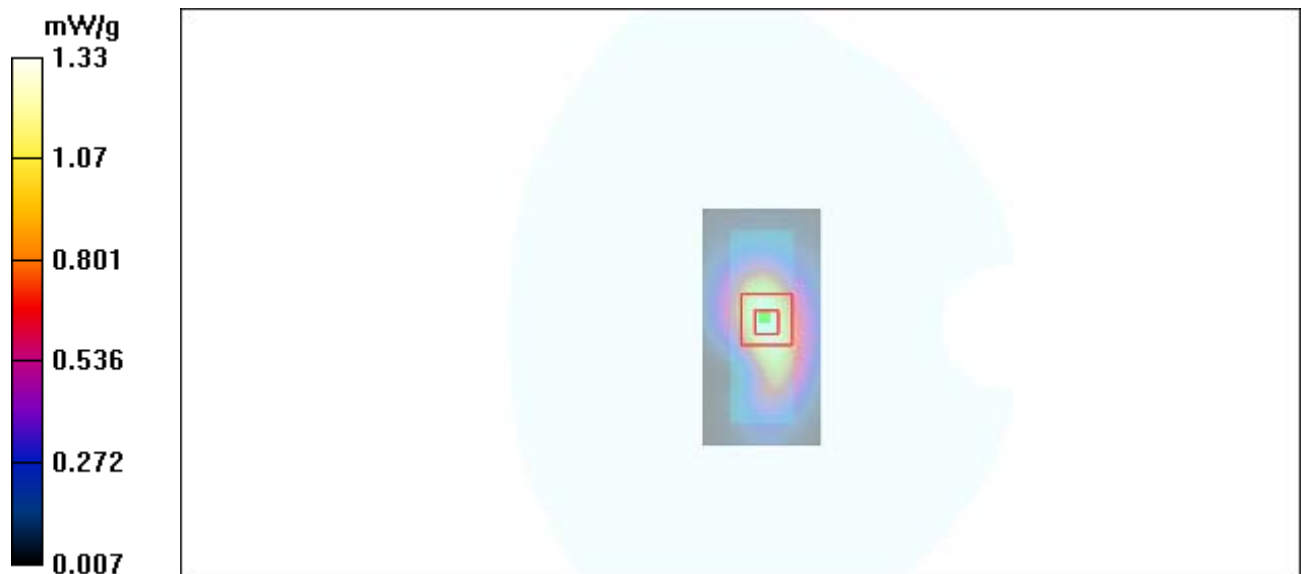


Figure 30 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 2 Channel 810

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

Date/Time: 5/22/2010 5:23:36 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 2 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.36 mW/g

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

Reference Value = 30.3 V/m; Power Drift = -0.196 dB

Peak SAR (extrapolated) = 2.03 W/kg

SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.631 mW/g

Maximum value of SAR (measured) = 1.32 mW/g

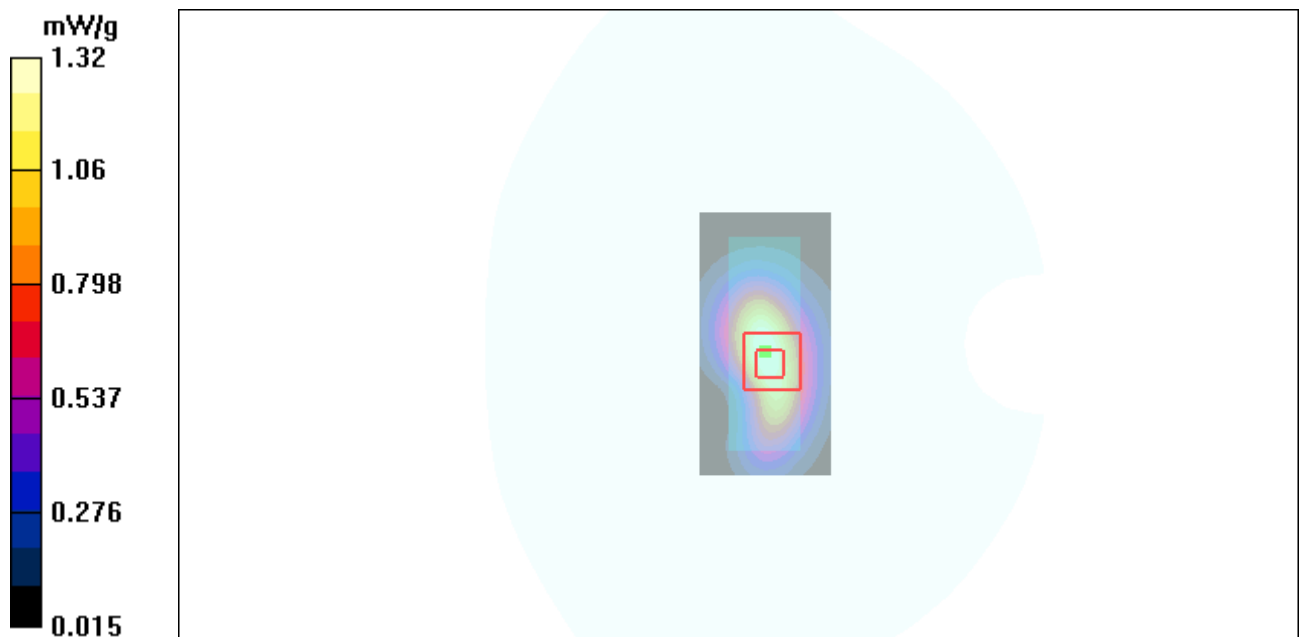


Figure 31 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 2 Channel 661

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

Date/Time: 5/22/2010 5:56:47 PM

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 2 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 27.4 V/m; Power Drift = -0.115 dB

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.976 mW/g; SAR(10 g) = 0.555 mW/g

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

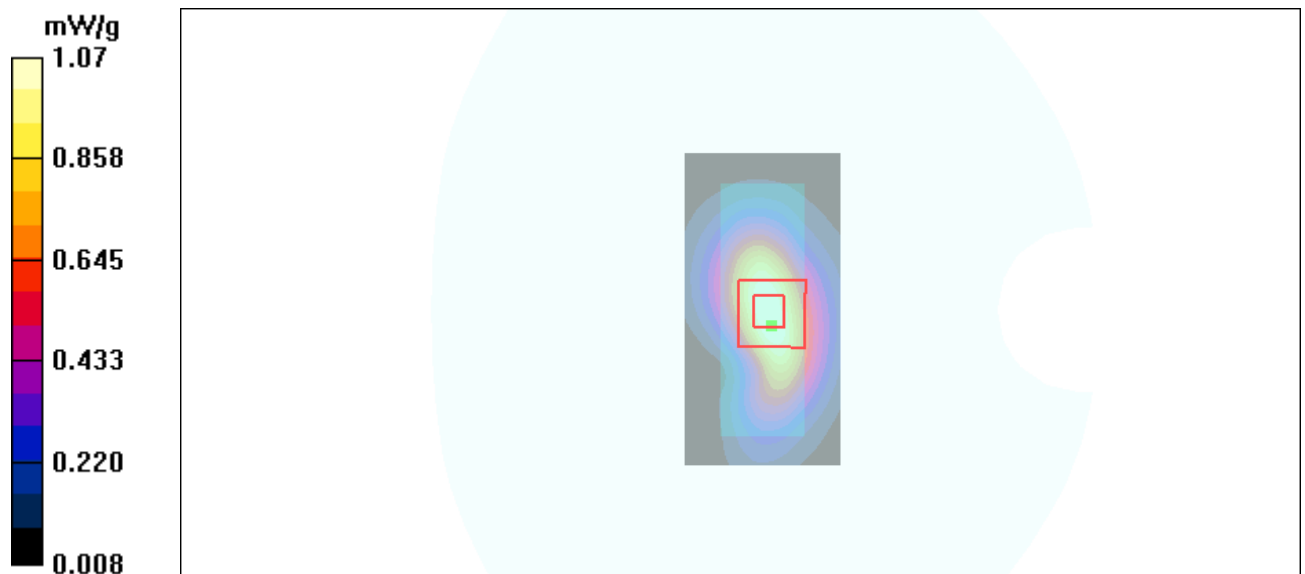


Figure 32 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 2 Channel 512

GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 3 High Frequency

Date/Time: 5/22/2010 7:26:43 PM

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 High/Area Scan (41x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 26.0 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 0.920 mW/g; SAR(10 g) = 0.494 mW/g

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

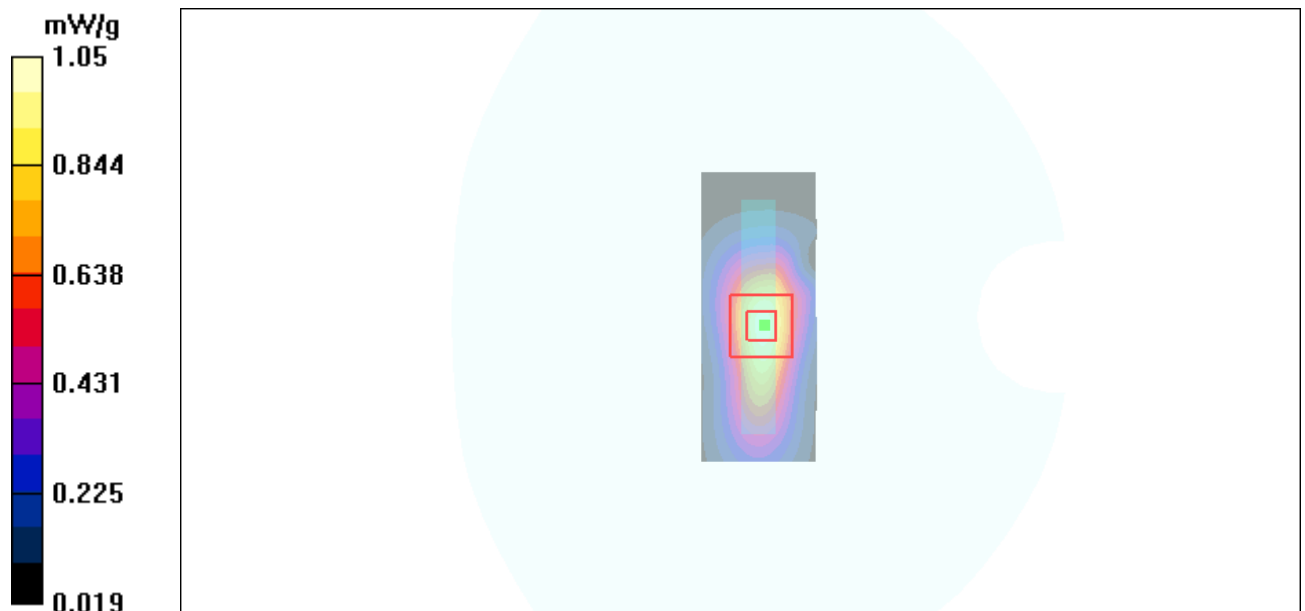


Figure 33 GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 3 Channel 810

GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 3 Middle Frequency

Date/Time: 5/22/2010 6:41:24 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 Middle/Area Scan (41x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.984 mW/g

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

Reference Value = 25.5 V/m; Power Drift = -0.055 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.862 mW/g; SAR(10 g) = 0.454 mW/g

Maximum value of SAR (measured) = 0.961 mW/g

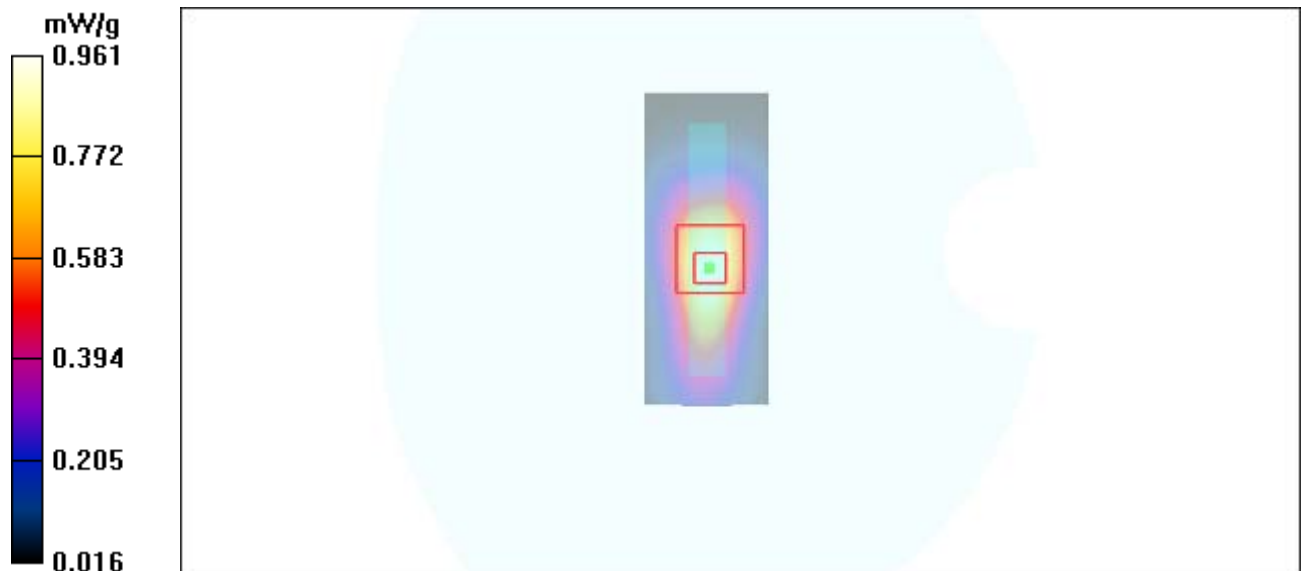


Figure 34 GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 3 Channel 661

GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 3 Low Frequency

Date/Time: 5/22/2010 7:08:21 PM

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.49$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 Low/Area Scan (41x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.734 mW/g

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

Reference Value = 21.6 V/m; Power Drift = 0.080 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.623 mW/g; SAR(10 g) = 0.350 mW/g

Maximum value of SAR (measured) = 0.720 mW/g

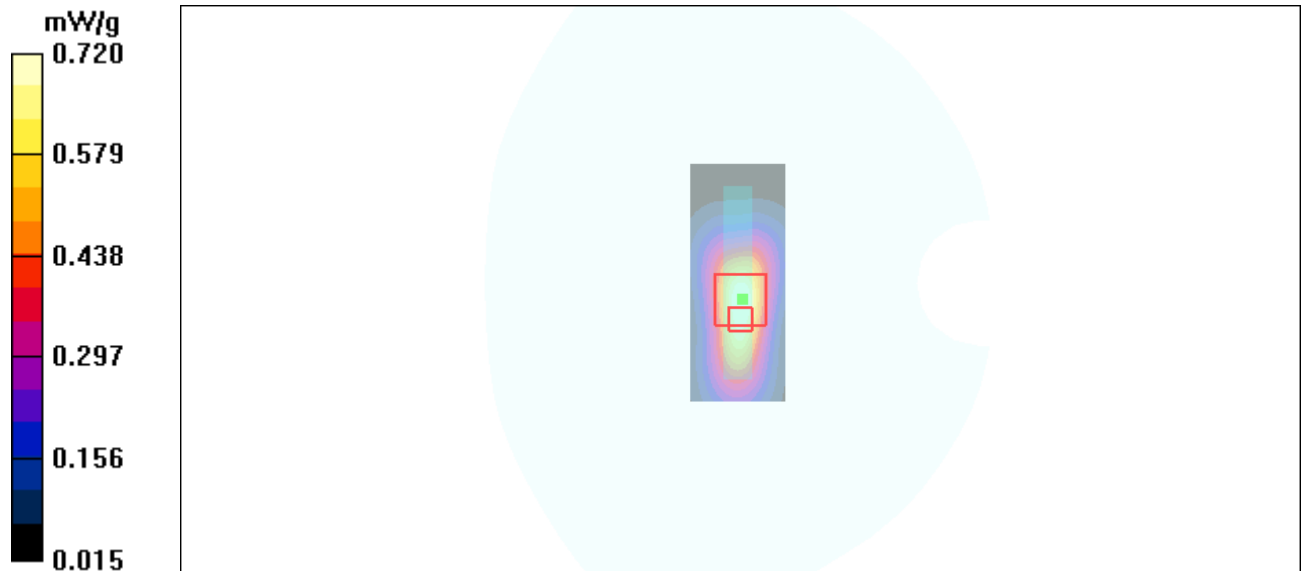


Figure 35 GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 3 Channel 512

GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 4 Middle Frequency

Date/Time: 5/23/2010 10:44:17 AM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

Maximum value of SAR (interpolated) = 0.368 mW/g

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

Reference Value = 12.2 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 0.554 W/kg

SAR(1 g) = 0.314 mW/g; SAR(10 g) = 0.171 mW/g

Maximum value of SAR (measured) = 0.349 mW/g

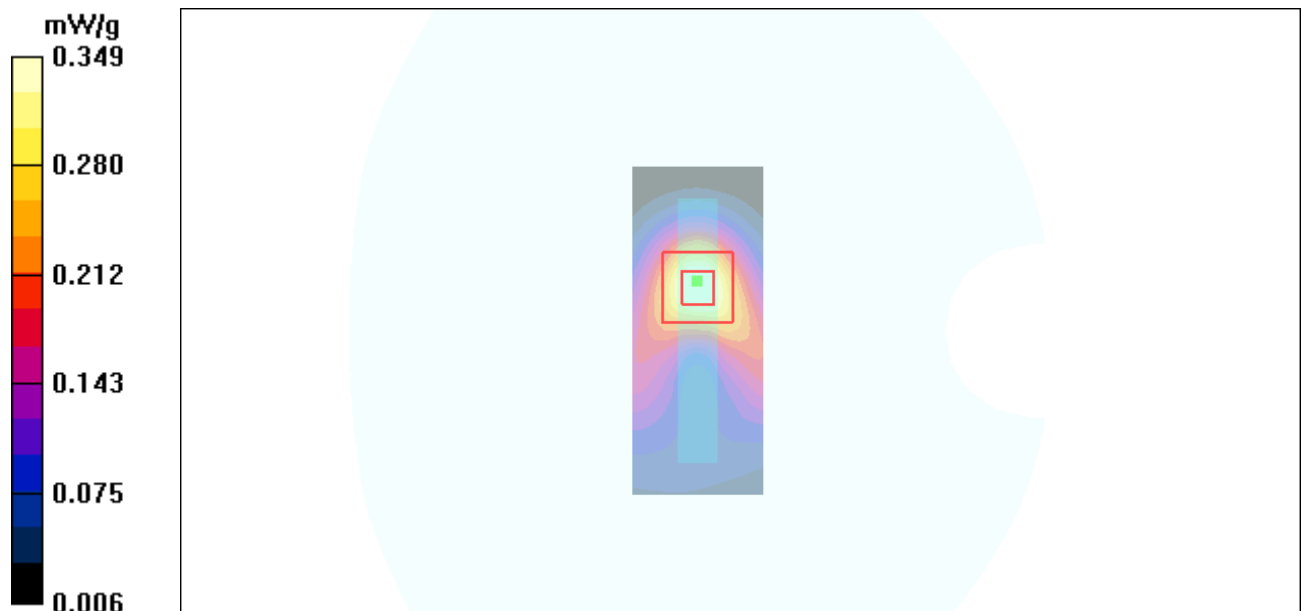


Figure 36 GSM 1900 GPRS (2 timeslots in uplink) with Lenovo Y450 Test Position 4 Channel 661

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

Date/Time: 5/23/2010 1:53:16 PM

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High /Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.48 mW/g

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

Reference Value = 29.5 V/m; Power Drift = 0.045 dB

Peak SAR (extrapolated) = 2.50 W/kg

SAR(1 g) = 1.31 mW/g; SAR(10 g) = 0.676 mW/g

Maximum value of SAR (measured) = 1.47 mW/g

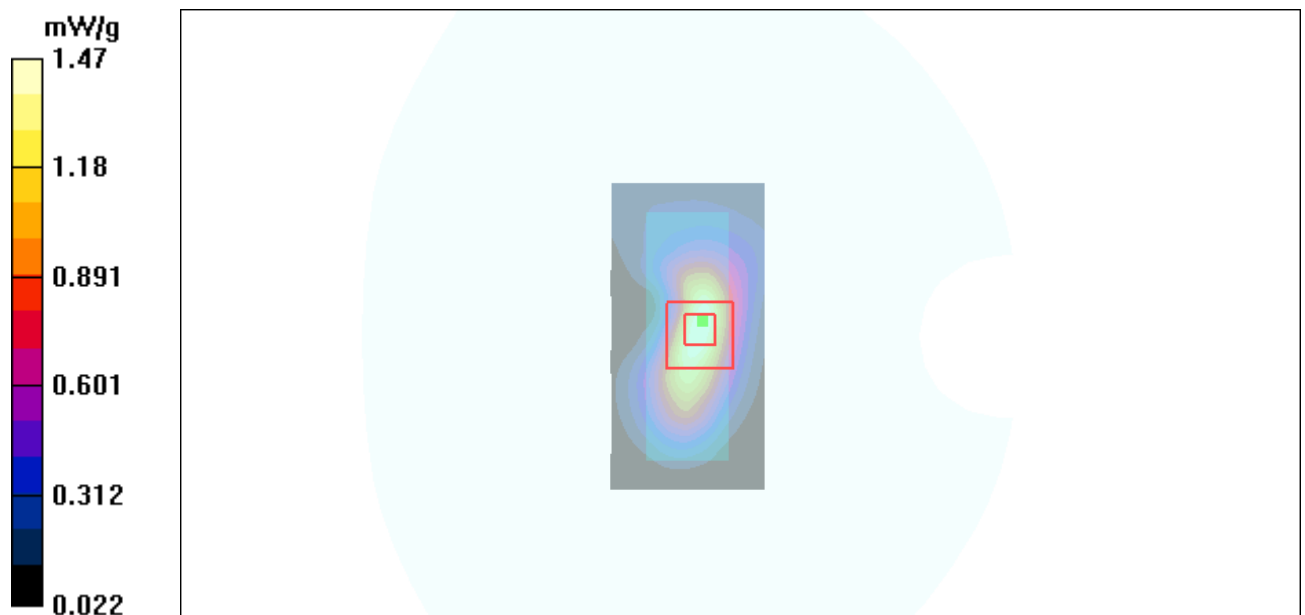


Figure 37 GSM 1900 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

WCDMA Band II with IBM T61 Test Position 1 High Frequency

Date/Time: 5/23/2010 7:14:34 AM

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

Medium parameters used: $f = 1908$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 19.4 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 1.71 W/kg

SAR(1 g) = 0.901 mW/g; SAR(10 g) = 0.467 mW/g

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

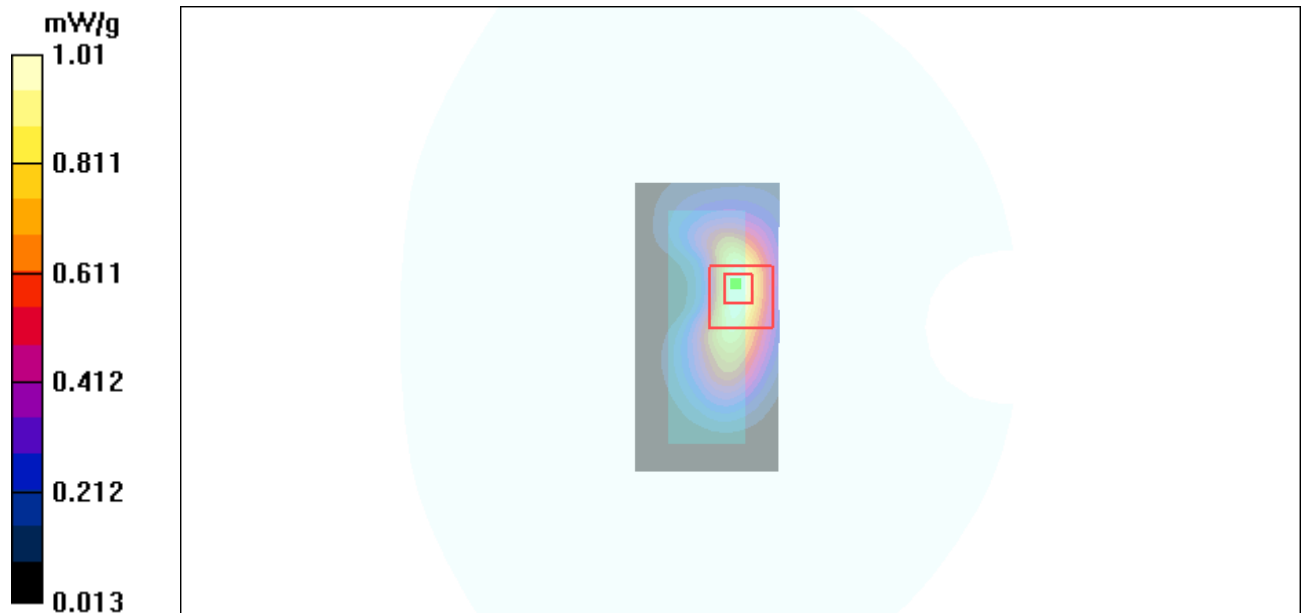


Figure 38 WCDMA Band II with IBM T61 Test Position 1 Channel 9538

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WCDMA Band II with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/23/2010 7:35:43 AM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

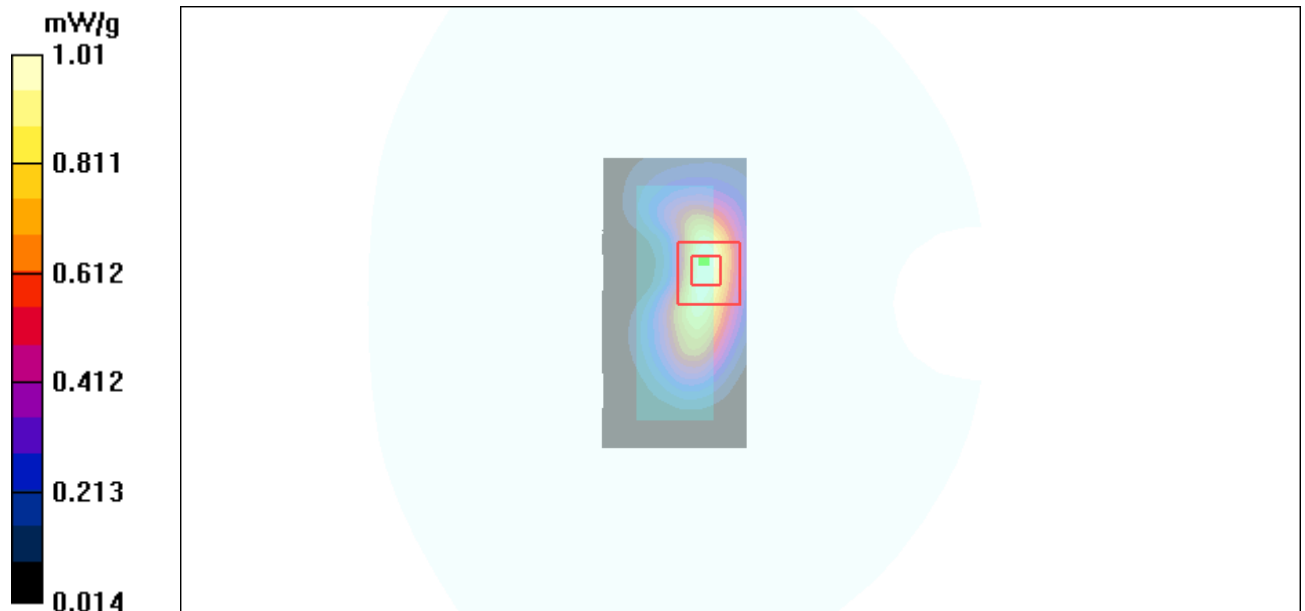
Test Position 1 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.5 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 1.70 W/kg

SAR(1 g) = 0.902 mW/g; SAR(10 g) = 0.470 mW/g

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



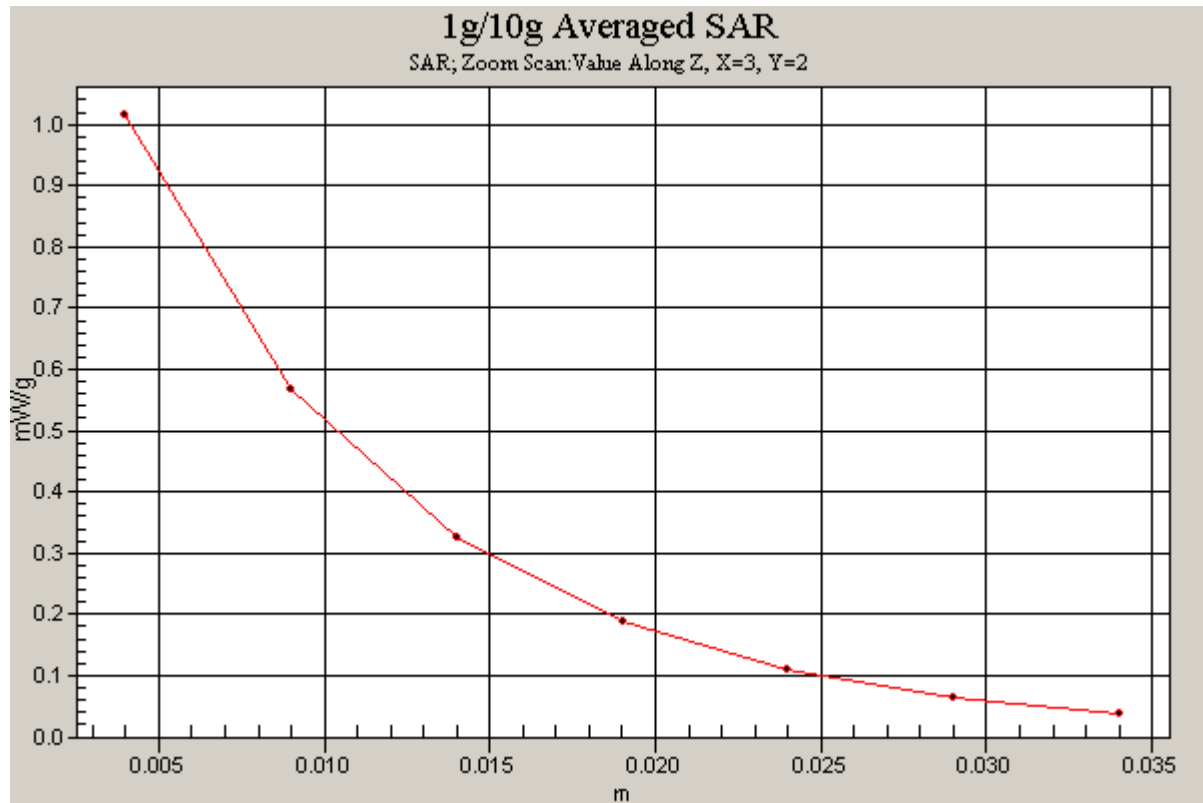


Figure 39 WCDMA Band II with IBM T61 Test Position 1 Channel 9400

WCDMA Band II with IBM T61 Test Position 1 Low Frequency

Date/Time: 5/23/2010 7:56:08 AM

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

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.966 mW/g

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

Reference Value = 19.4 V/m; Power Drift = 0.110 dB

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.837 mW/g; SAR(10 g) = 0.440 mW/g

Maximum value of SAR (measured) = 0.950 mW/g

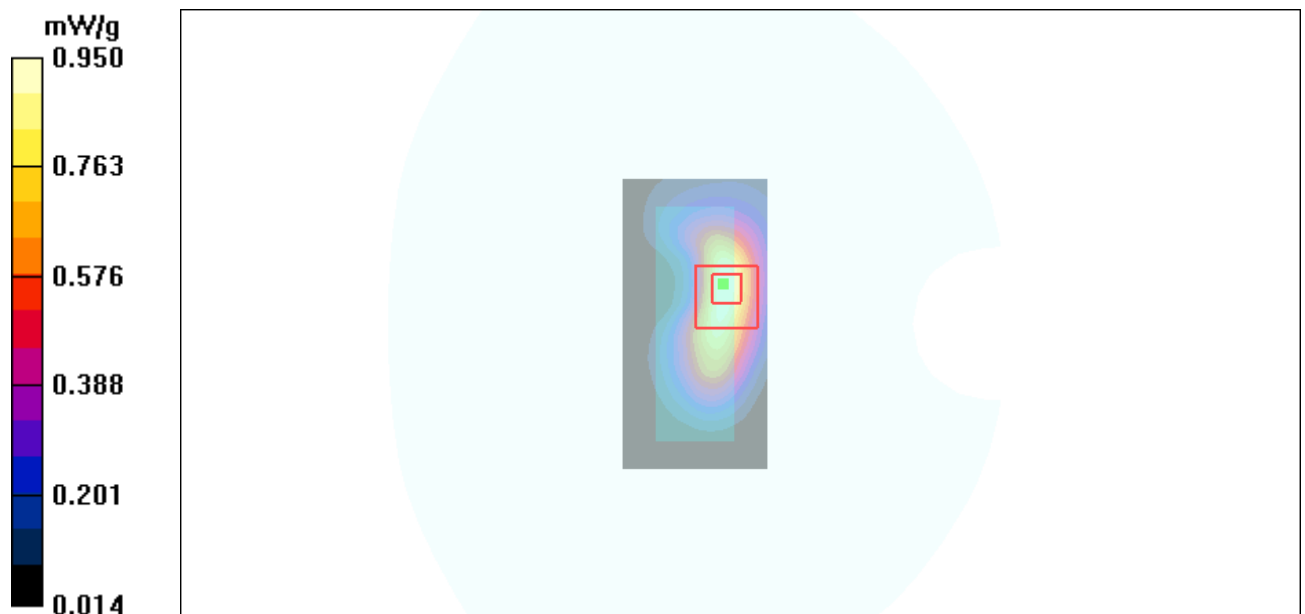


Figure 40 WCDMA Band II with IBM T61 Test Position 1 Channel 9262

WCDMA Band II with IBM T61 Test Position 2 Middle Frequency

Date/Time: 5/23/2010 8:36:51 AM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 2 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.776 mW/g

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

Reference Value = 23.7 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.702 mW/g; SAR(10 g) = 0.397 mW/g

Maximum value of SAR (measured) = 0.777 mW/g

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

Reference Value = 23.7 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.691 mW/g; SAR(10 g) = 0.361 mW/g

Maximum value of SAR (measured) = 0.790 mW/g

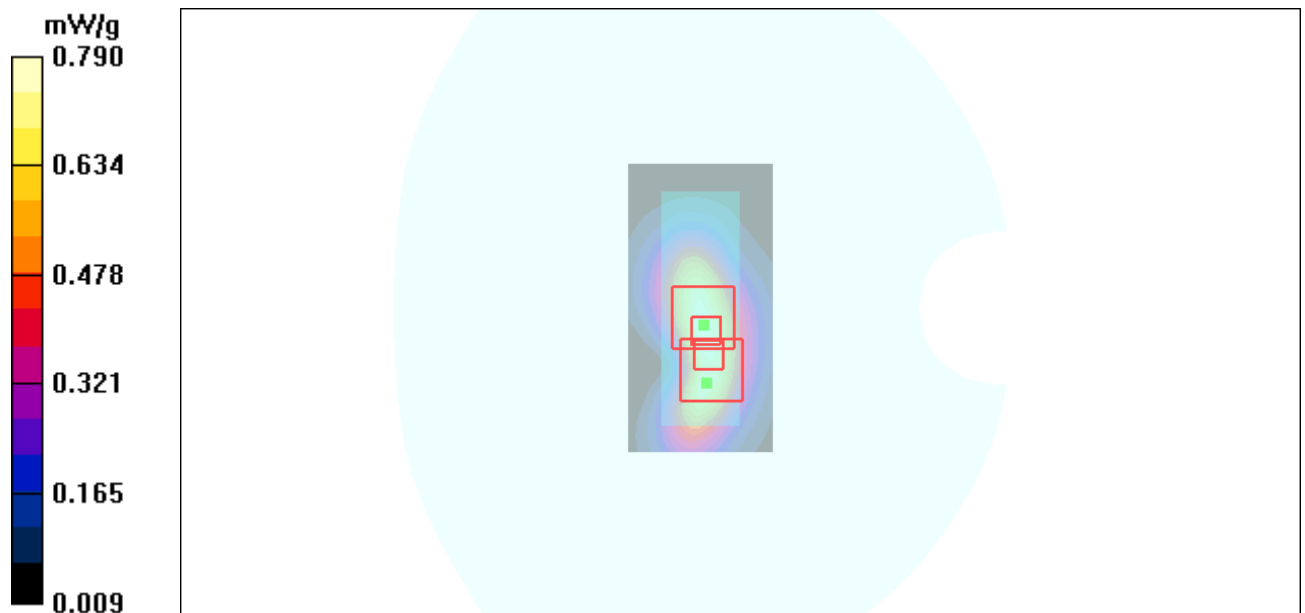


Figure 41 WCDMA Band II with IBM T61 Test Position 2 Channel 9400

WCDMA Band II with Lenovo Y450 Test Position 3 Middle Frequency

Date/Time: 5/23/2010 11:27:46 AM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.825 mW/g

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

Reference Value = 24.0 V/m; Power Drift = -0.056 dB

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.742 mW/g; SAR(10 g) = 0.401 mW/g

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

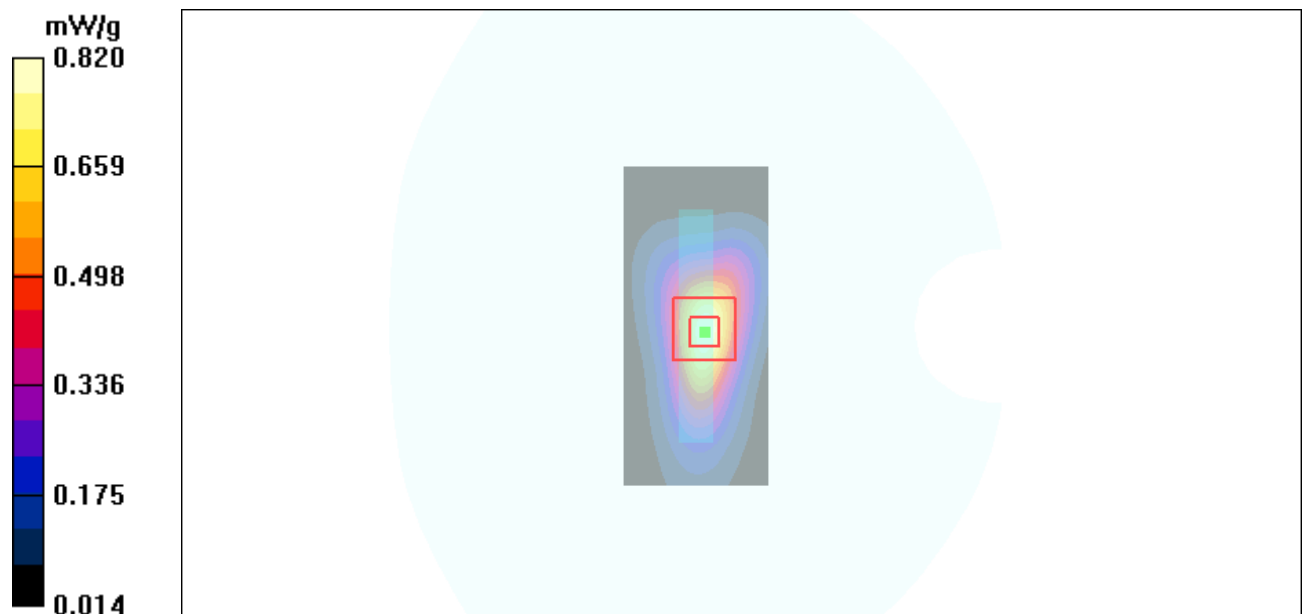


Figure 42 WCDMA Band II with Lenovo Y450 Test Position 3 Channel 9400

WCDMA Band II with Lenovo Y450 Test Position 4 Middle Frequency

Date/Time: 5/23/2010 11:04:29 AM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 4 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.280 mW/g

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

Reference Value = 10.3 V/m; Power Drift = -0.123 dB

Peak SAR (extrapolated) = 0.450 W/kg

SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.139 mW/g

Maximum value of SAR (measured) = 0.286 mW/g

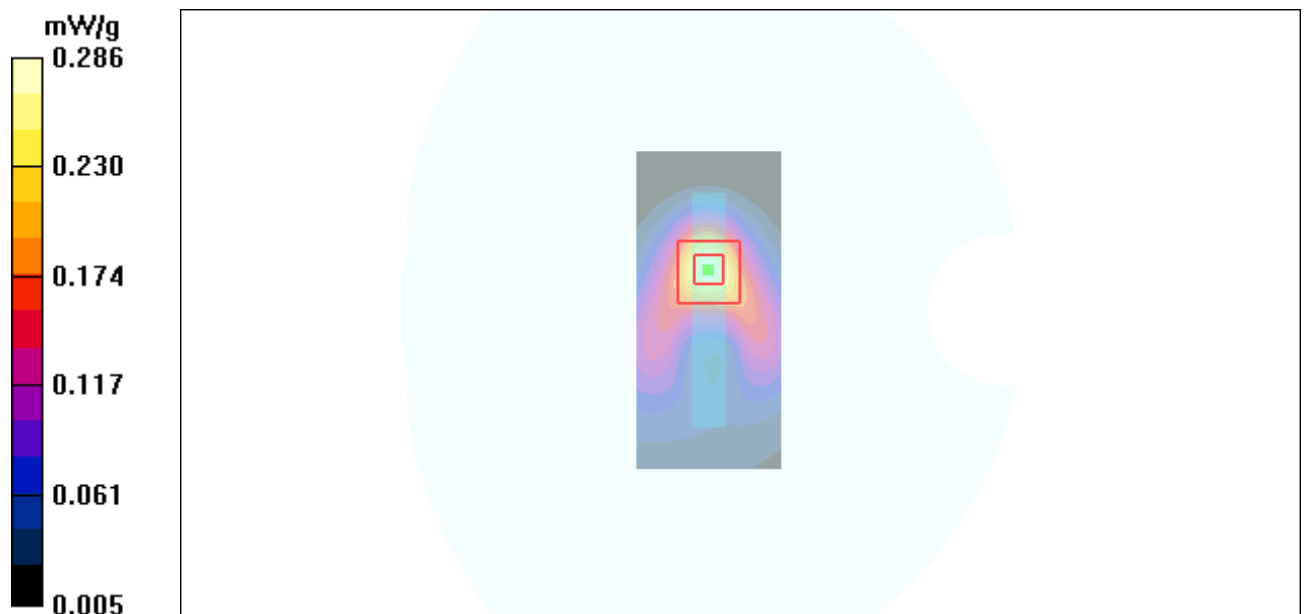


Figure 43 WCDMA Band II with Lenovo Y450 Test Position 4 Channel 9400

WCDMA Band II+HSDPA with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/23/2010 1:08:38 PM

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

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 52.3$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 0.837 mW/g

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

Reference Value = 22.3 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 1.51 W/kg

SAR(1 g) = 0.898 mW/g; SAR(10 g) = 0.491 mW/g

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

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

Reference Value = 22.3 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.826 mW/g; SAR(10 g) = 0.404 mW/g

Maximum value of SAR (measured) = 0.966 mW/g

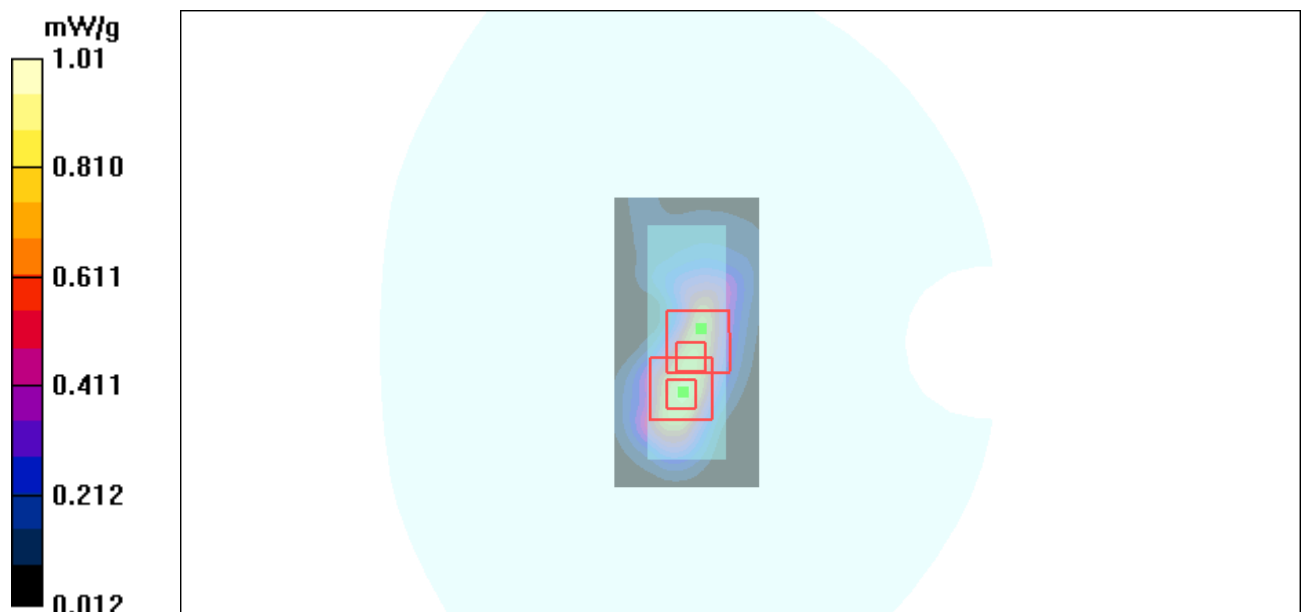


Figure 44 WCDMA Band II+HSDPA with IBM T61 Test Position 1 Channel 9400

WCDMA Band II+HSUPA with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/23/2010 12:04:03 PM

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.865 mW/g

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

Reference Value = 20.8 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.737 mW/g; SAR(10 g) = 0.405 mW/g

Maximum value of SAR (measured) = 0.823 mW/g

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

Reference Value = 20.8 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.686 mW/g; SAR(10 g) = 0.341 mW/g

Maximum value of SAR (measured) = 0.796 mW/g

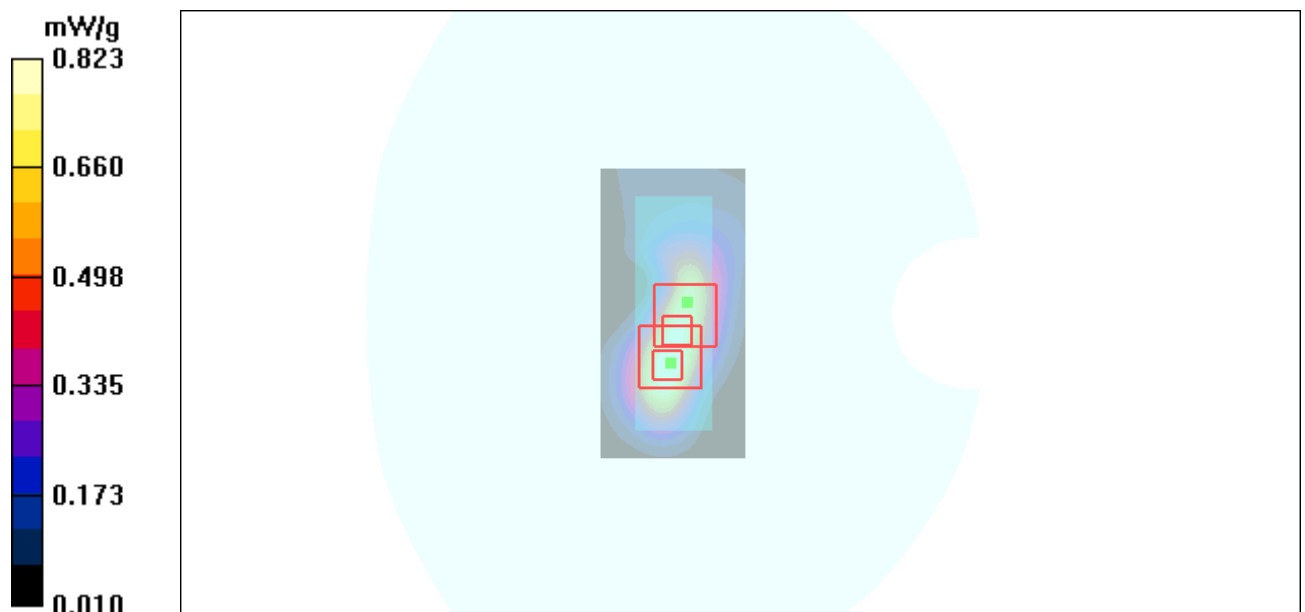


Figure 45 WCDMA Band II+HSUPA with IBM T61 Test Position 1 Channel 9400

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WCDMA Band V with IBM T61 Test Position 1 High Frequency

Date/Time: 5/23/2010 3:57:01 PM

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

Medium parameters used: $f = 847 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 0.722 mW/g

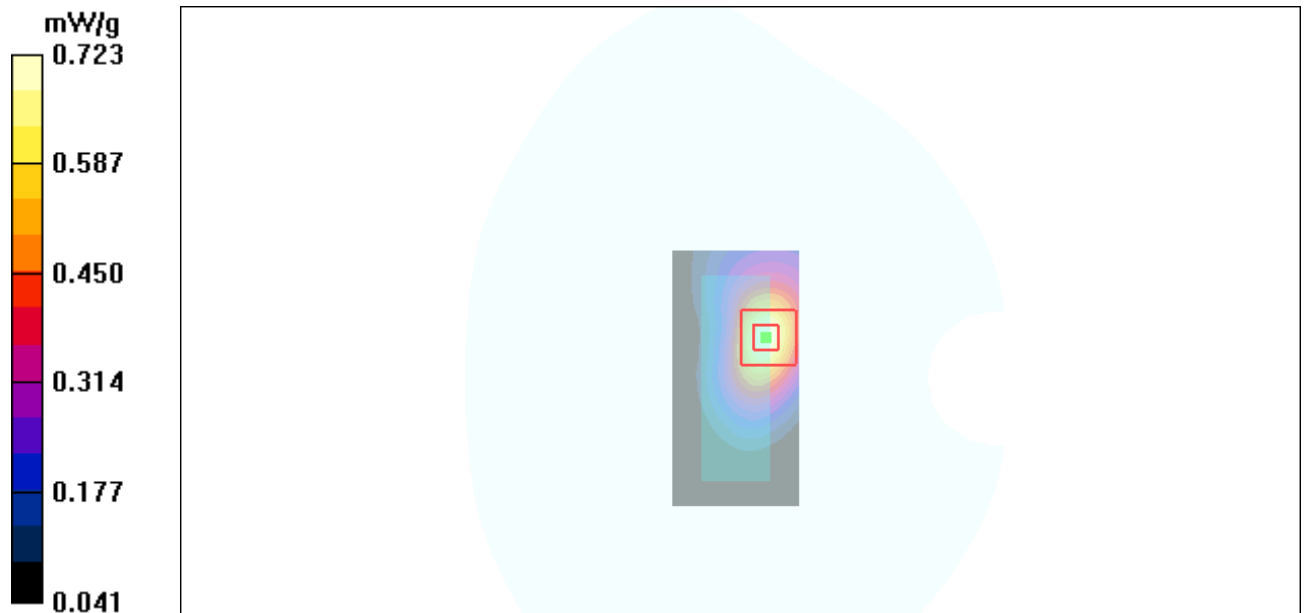
Test Position 1 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.8 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 1.05 W/kg

SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.391 mW/g

Maximum value of SAR (measured) = 0.723 mW/g



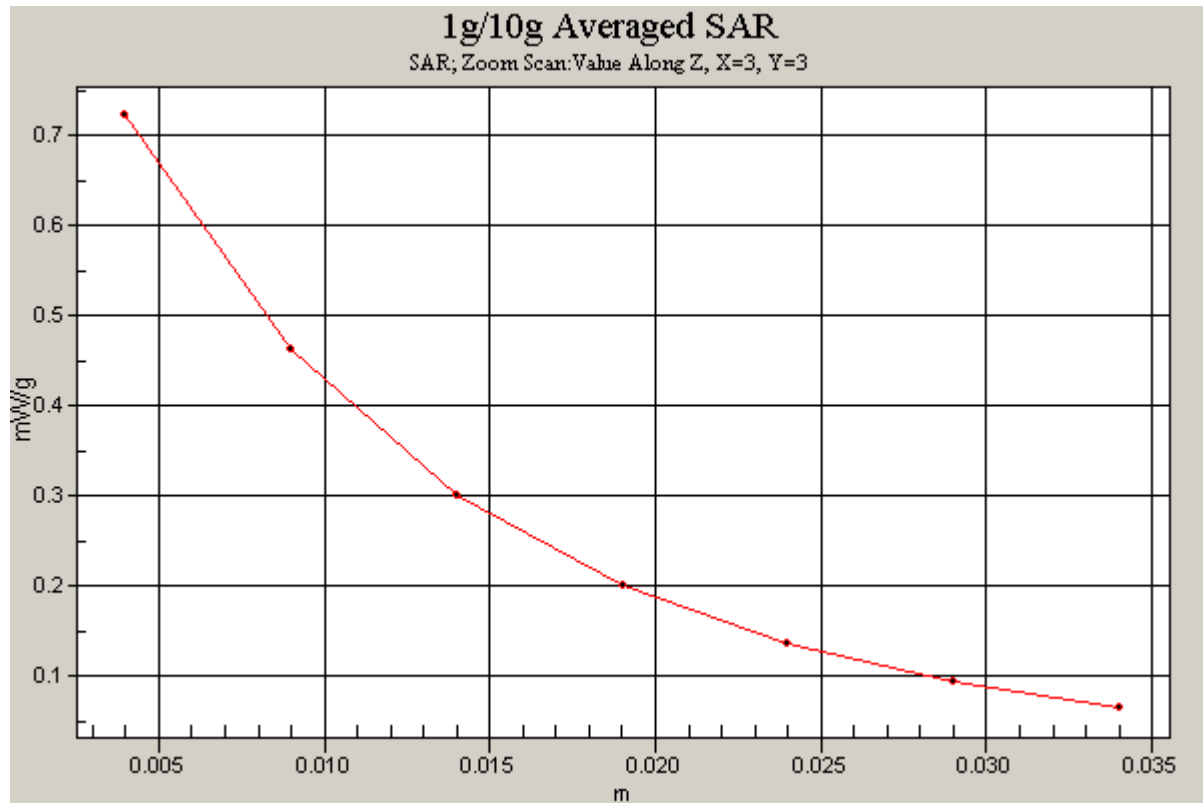


Figure 46 WCDMA Band V with IBM T61 Test Position 1 Channel 4233

WCDMA Band V with IBM T61 Test Position 1 Middle Frequency

Date/Time: 5/23/2010 3:39:02 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.636 mW/g

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

Reference Value = 18.8 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 0.967 W/kg

SAR(1 g) = 0.604 mW/g; SAR(10 g) = 0.362 mW/g

Maximum value of SAR (measured) = 0.665 mW/g

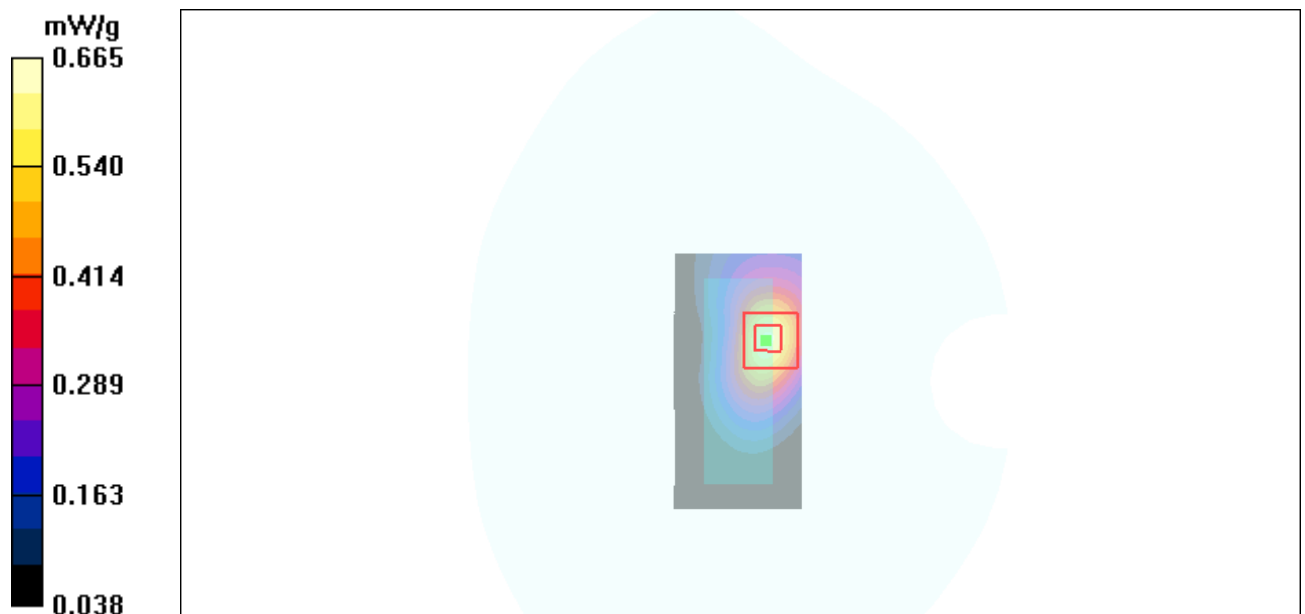


Figure 47 WCDMA Band V with IBM T61 Test Position 1 Channel 4183

WCDMA Band V with IBM T61 Test Position 1 Low Frequency

Date/Time: 5/23/2010 4:15:04 PM

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

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.992$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 Low/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 17.5 V/m; Power Drift = 0.077 dB

Peak SAR (extrapolated) = 0.795 W/kg

SAR(1 g) = 0.499 mW/g; SAR(10 g) = 0.300 mW/g

Maximum value of SAR (measured) = 0.550 mW/g

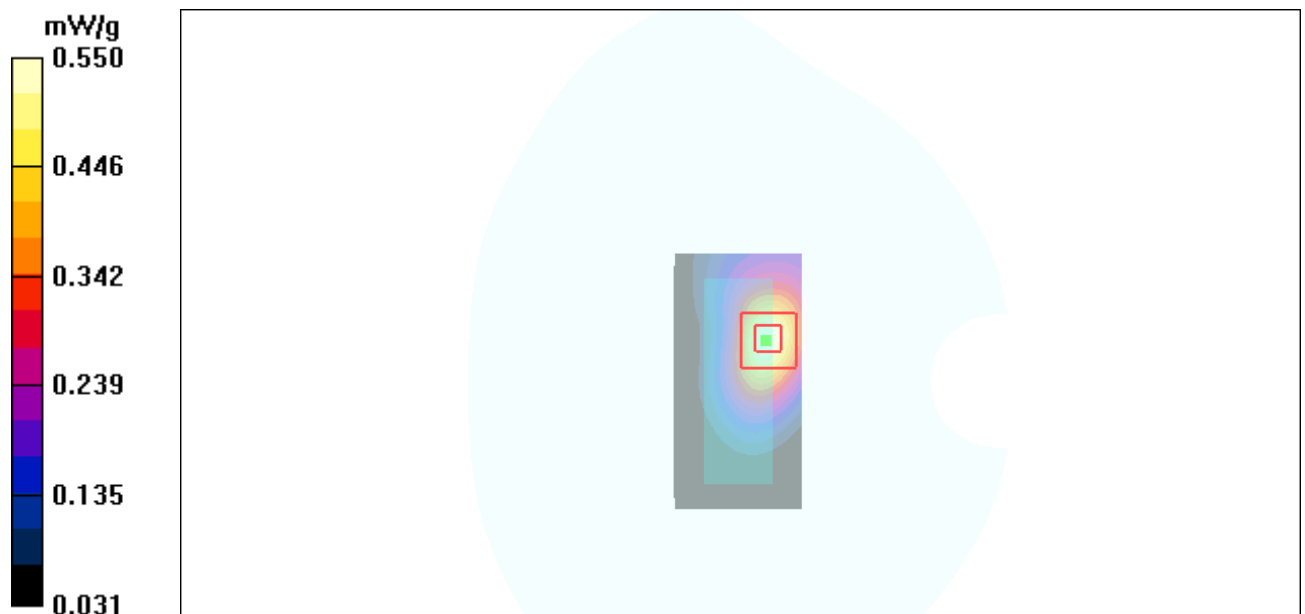


Figure 48 WCDMA Band V with IBM T61 Test Position 1 Channel 4132

WCDMA Band V with IBM T61 Test Position 2 Middle Frequency

Date/Time: 5/23/2010 3:17:35 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3 Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 2 Middle/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.455 mW/g

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

Reference Value = 13.3 V/m; Power Drift = -0.169 dB

Peak SAR (extrapolated) = 0.686 W/kg

SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.235 mW/g

Maximum value of SAR (measured) = 0.449 mW/g

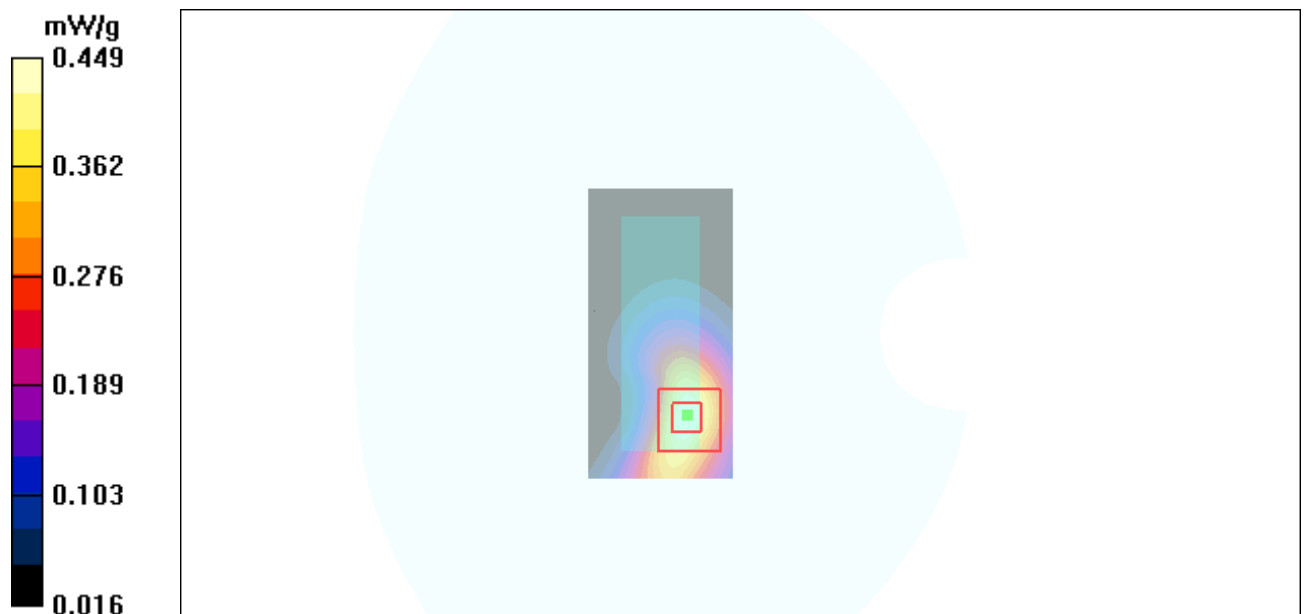


Figure 49 WCDMA Band V with IBM T61 Test Position 2 Channel 4183

WCDMA Band V with Lenovo Y450 Test Position 3 Middle Frequency

Date/Time: 5/23/2010 2:51:38 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.361 mW/g

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

Reference Value = 13.2 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 0.521 W/kg

SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.207 mW/g

Maximum value of SAR (measured) = 0.368 mW/g

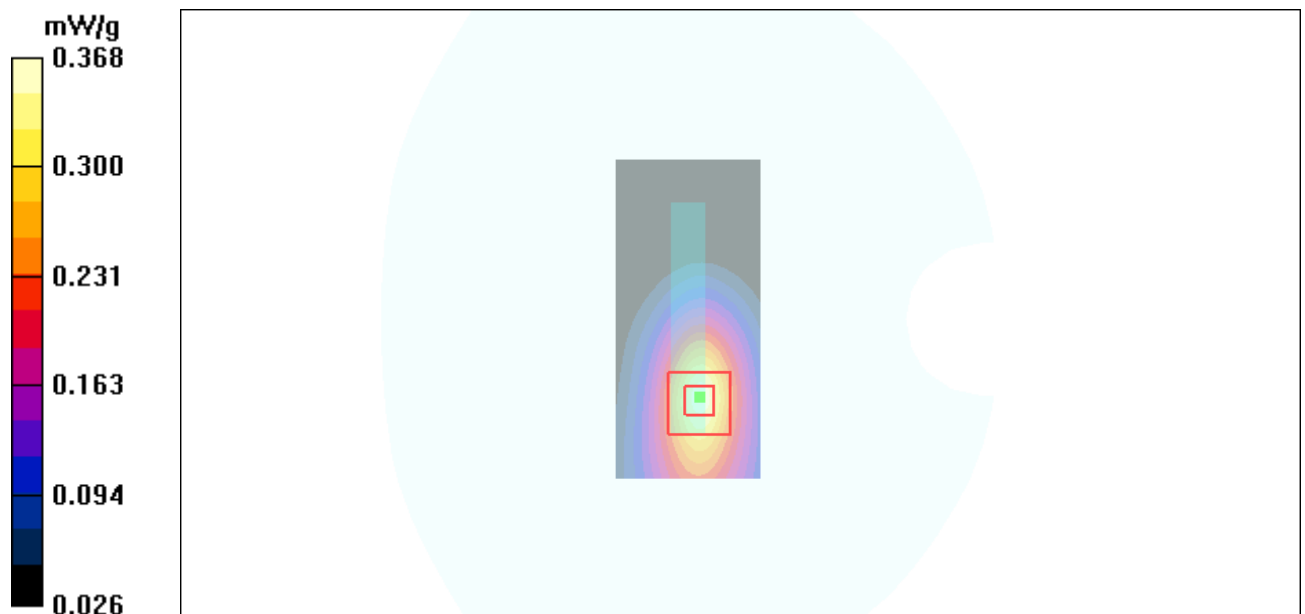


Figure 50 WCDMA Band V with Lenovo Y450 Test Position 3 Channel 4183

WCDMA Band V with Lenovo Y450 Test Position 4 Middle Frequency

Date/Time: 5/23/2010 2:25:50 PM

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 4 Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.232 mW/g

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

Reference Value = 15.3 V/m; Power Drift = 0.166 dB

Peak SAR (extrapolated) = 0.347 W/kg

SAR(1 g) = 0.233 mW/g; SAR(10 g) = 0.158 mW/g

Maximum value of SAR (measured) = 0.248 mW/g

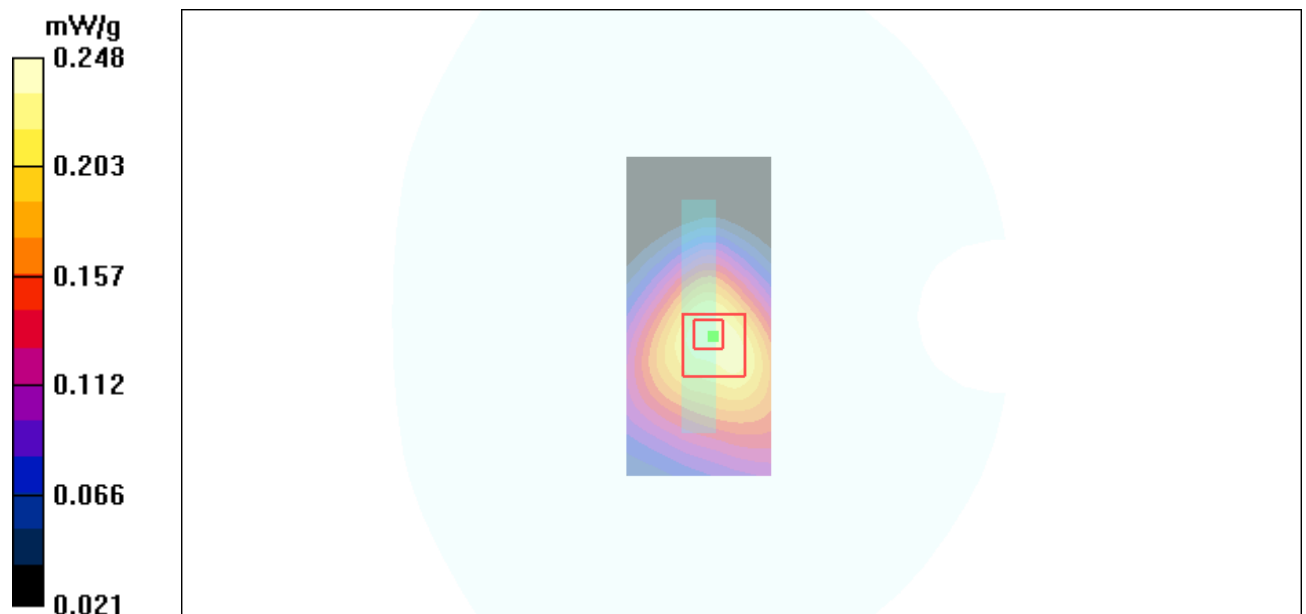


Figure 51 WCDMA Band V with Lenovo Y450 Test Position 4 Channel 4183

WCDMA Band V +HSDPA with IBM T61 Test Position 1 High Frequency

Date/Time: 5/23/2010 4:51:03 PM

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

Medium parameters used: $f = 847 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 55.3$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 0.670 mW/g

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

Reference Value = 19.7 V/m; Power Drift = -0.065 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.375 mW/g

Maximum value of SAR (measured) = 0.694 mW/g

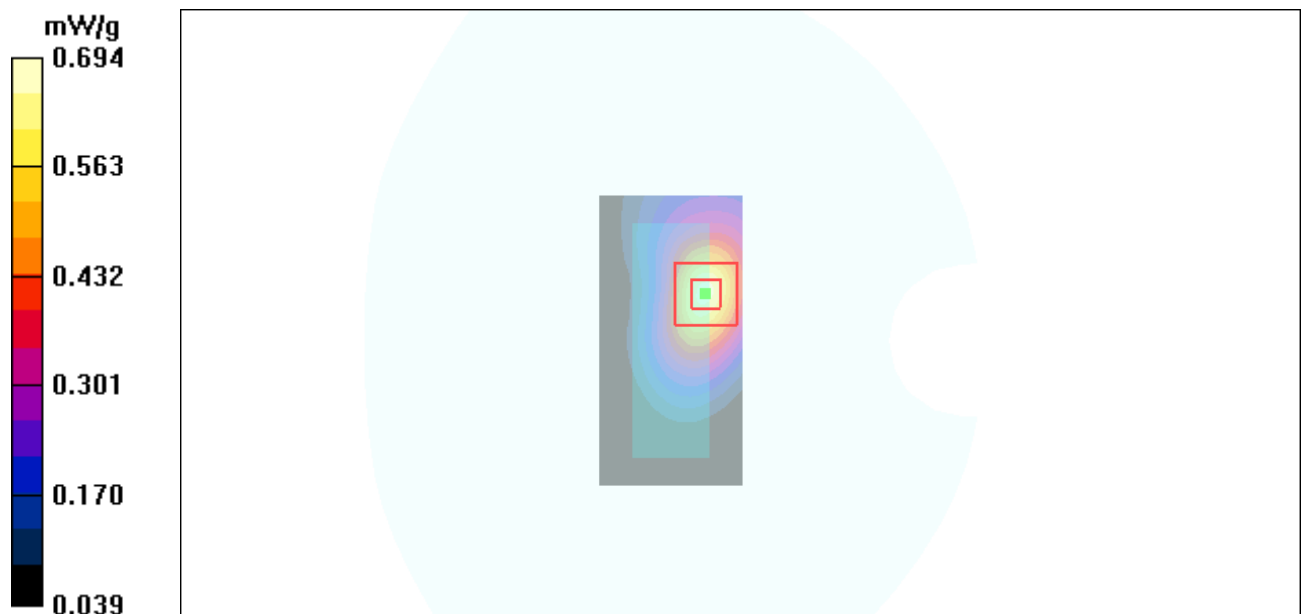


Figure 52 WCDMA Band V +HSDPA with IBM T61 Test Position 1 Channel 4233

WCDMA Band V +HSUPA with IBM T61 Test Position 1 High Frequency

Date/Time: 5/23/2010 5:19:48 PM

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

Medium parameters used: $f = 847$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.3

Liquid Temperature: 21.5

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 1 High/Area Scan (51x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.509 mW/g

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

Reference Value = 17.0 V/m; Power Drift = -0.082 dB

Peak SAR (extrapolated) = 0.674 W/kg

SAR(1 g) = 0.419 mW/g; SAR(10 g) = 0.250 mW/g

Maximum value of SAR (measured) = 0.461 mW/g

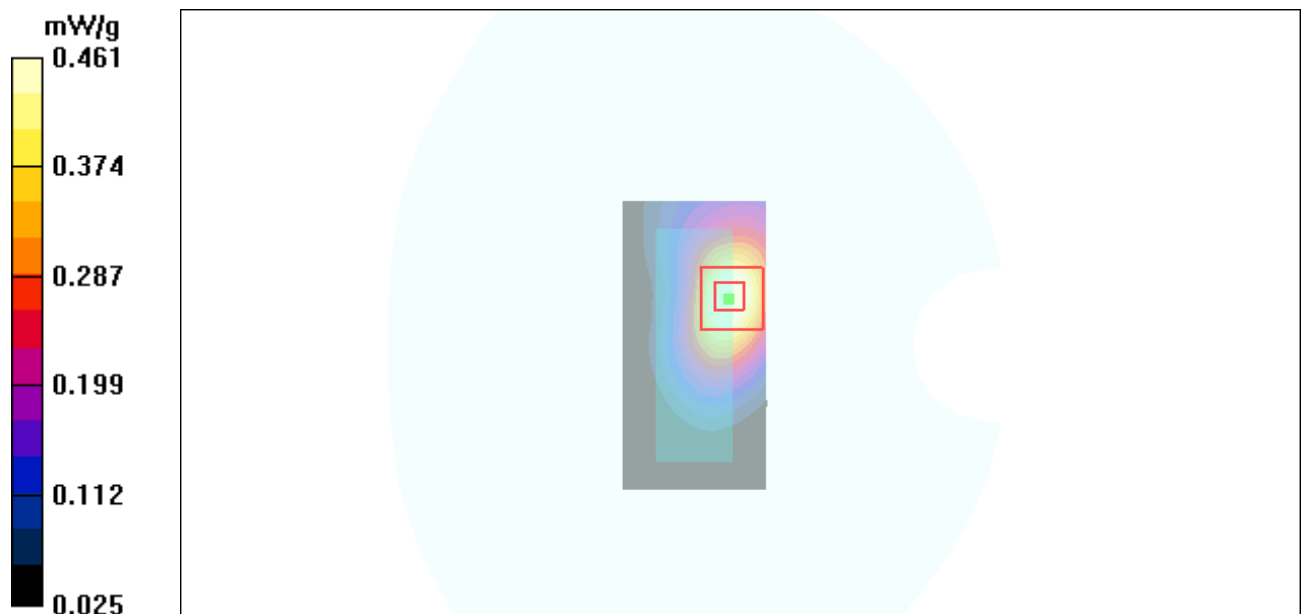


Figure 53 WCDMA Band V +HSUPA with IBM T61 Test Position 1 Channel 4233

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ANNEX D: Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **TA (Auden)**

Certificate No: **EX3-3677_Sep09**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3677**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v5, QA CAL-23.v3 and QA CAL-25.v2 - Calibration procedure for dosimetric E-field probes**

Calibration date: **September 23, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: September 23, 2009

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

Certificate No: EX3-3677_Sep09

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



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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

EX3DV4 SN:3677

September 23, 2009

Probe EX3DV4

SN:3677

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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EX3DV4 SN:3677

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DASY - Parameters of Probe: EX3DV4 SN:3677

Sensitivity in Free Space^A

Diode Compression^B

NormX	0.42 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	91 mV
NormY	0.47 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	92 mV
NormZ	0.40 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	93 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

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

TSL 1750 MHz Typical SAR gradient: 10 % per mm

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

Sensor Offset

Probe Tip to Sensor Center **1.0 mm**

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

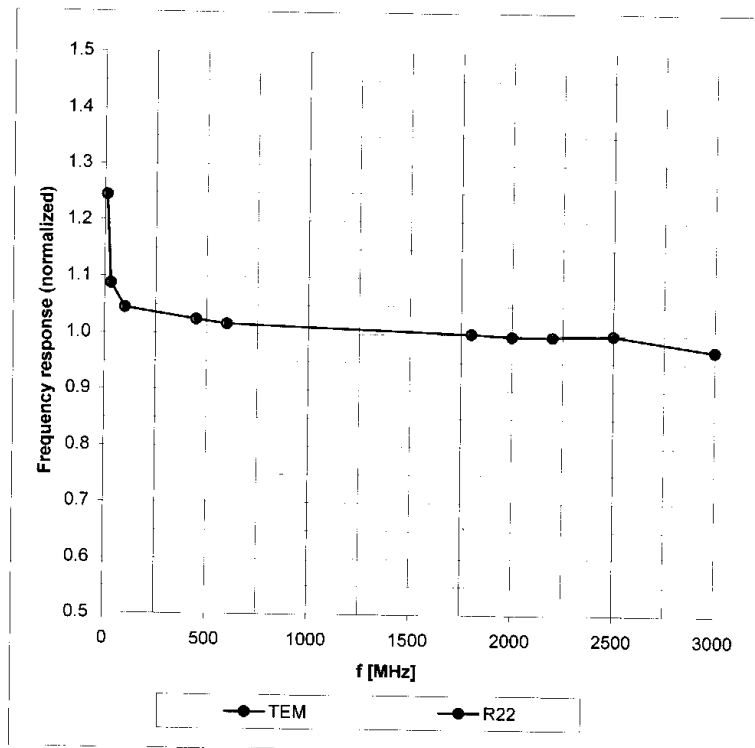
^B Numerical linearization parameter: uncertainty not required.

EX3DV4 SN:3677

September 23, 2009

Frequency Response of E-Field

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



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

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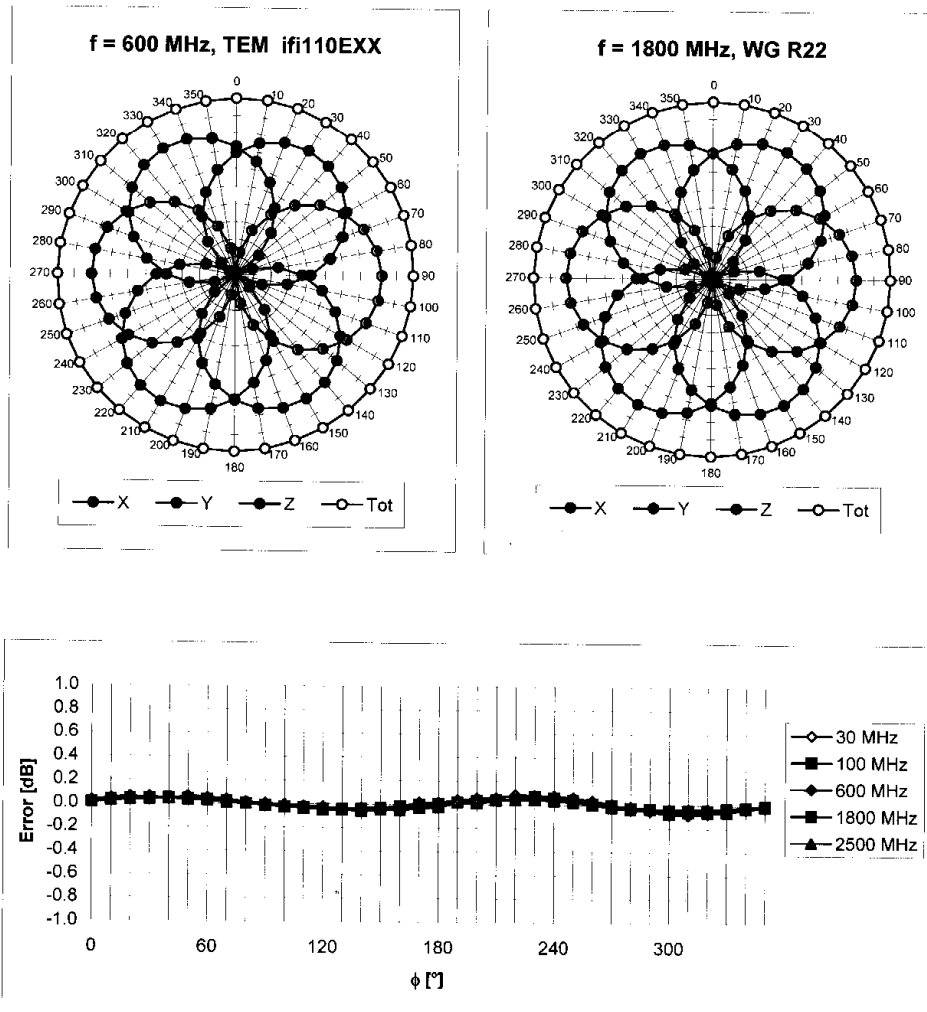
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EX3DV4 SN:3677

September 23, 2009

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



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

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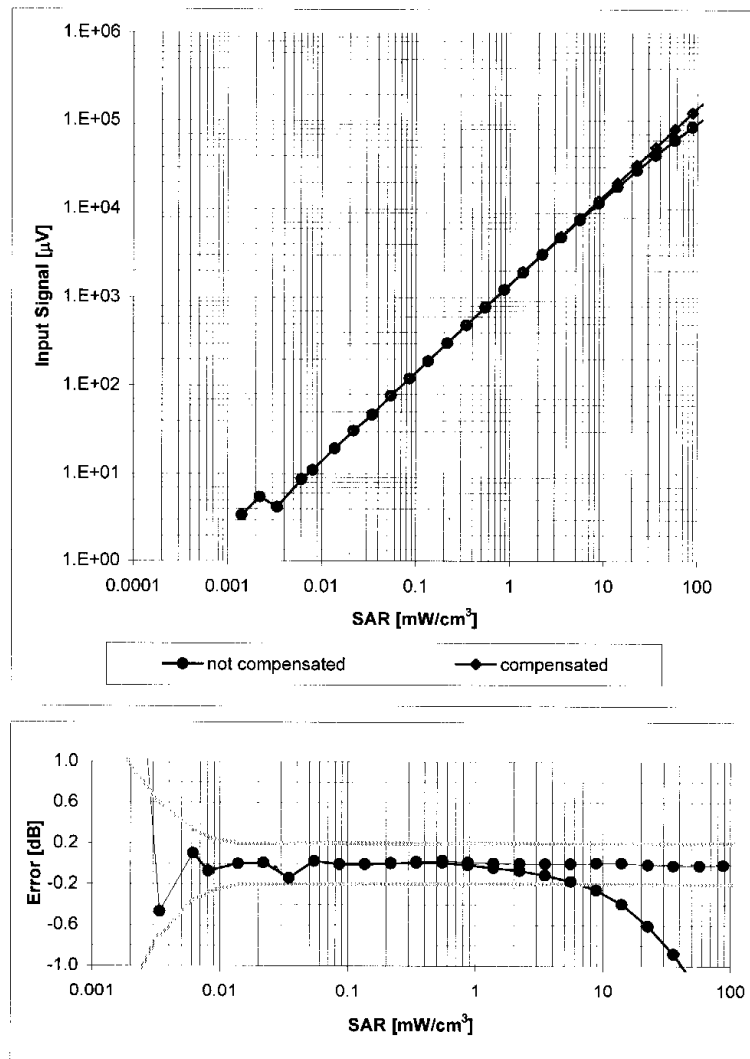
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EX3DV4 SN:3677

September 23, 2009

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

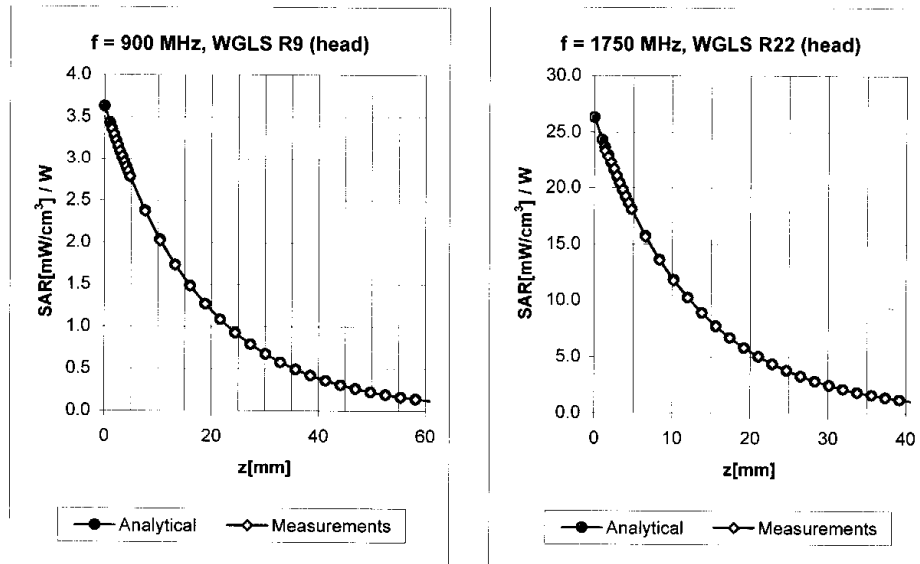


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

EX3DV4 SN:3677

September 23, 2009

Conversion Factor Assessment



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

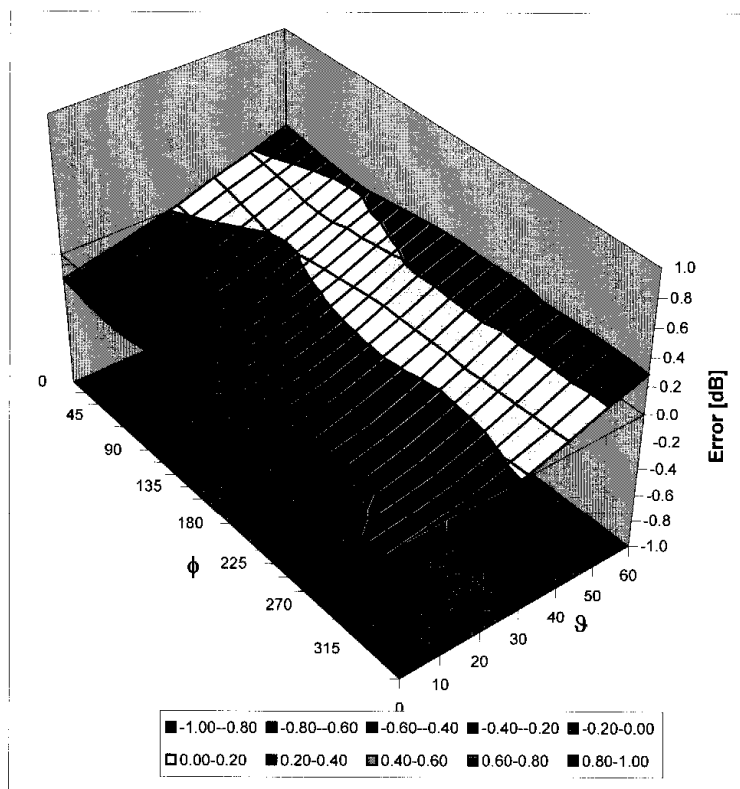
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV4 SN:3677

September 23, 2009

Deviation from Isotropy in HSL

Error (ϕ , ϑ), $f = 900$ MHz



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

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ANNEX E: D835V2 Dipole Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **ATL (Auden)**

Certificate No: **D835V2-4d082_Jul09**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d082**

Calibration procedure(s) **QA CAL-05.v7**
Calibration procedure for dipole validation kits

Calibration date: **July 13, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	in house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	in house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	in house check: Oct-09

Calibrated by: **Name** **Function** **Signature**
Jeton Kastrati **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: July 13, 2009

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

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.4 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.2 $\pm$ 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	2.42 mW / g
SAR normalized	normalized to 1W	9.68 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	9.71 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 mW / g
SAR normalized	normalized to 1W	6.32 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.34 mW / g $\pm$ 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.0 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.56 mW / g
SAR normalized	normalized to 1W	10.2 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	10.0 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.68 mW / g
SAR normalized	normalized to 1W	6.72 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	6.61 mW / g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω - 2.5 j Ω
Return Loss	- 29.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 4.3 j Ω
Return Loss	- 26.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.390 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 17, 2008

DASY5 Validation Report for Head TSL

Date/Time: 13.07.2009 11:31:45

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL 900 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

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

Reference Value = 57.4 V/m; Power Drift = 0.00639 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.58 mW/g

Maximum value of SAR (measured) = 2.8 mW/g

