**ilac-MRA**

**CNAS**

TESTING
No. L2264

# OET 65

# TEST   REPORT

| | |
|---|---|
| **Product Name** | HSDPA USB MODEM |
| **Model** | MF631 |
| **FCC ID** | Q78-ZTEMF631 |
| **Client** | ZTE CORPORATION |

# TA Technology (Shanghai) Co., Ltd.

# GENERAL SUMMARY

| Product Name | HSDPA USB MODEM | Model | MF631 |
|---|---|---|---|
| **FCC ID** | Q78-ZTEMF631 | | |
| **Report No.** | RZA2010-1302-R1 | | |
| **Client** | ZTE CORPORATION | | |
| **Manufacturer** | ZTE CORPORATION | | |
| **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.<br><br>**SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001 including DA 02-1438, published June 2002:** Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio frequency Emissions.<br><br>**447498 D02 SAR Procedures for Dongle Xmtr v02:** SAR Measurement Procedures for USB Dongle Transmitters. | | |
| **Conclusion** | This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards.<br><br>General Judgment:   **Pass**<br><br>(Stamp)<br>Date of issue: September 30th, 2010 | | |
| **Comment** | The test result only responds to the measured sample. | | |

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

Yang Weizhong              Ling Minbao                   Xue Chaofeng

# TABLE OF CONTENT

# 1. General Information

## 1.1. Notes of the Test Report

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

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

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

## 1.2. Testing Laboratory

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## 1.3. Applicant Information

| | |
|---|---|
| Company: | ZTE CORPORATION |
| Address: | ZTE Plaza, Keji Road South, Hi-Tech Industrial Park,Nanshan District,Shenzhen, Guangdong, 518057, P.R. China |
| City: | Shenzhen |
| Postal Code: | 518057 |
| Country: | P.R. China |
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| Fax: | / |

## 1.4. Manufacturer Information

| | |
|---|---|
| Company: | ZTE CORPORATION |
| Address: | ZTE Plaza, Keji Road South, Hi-Tech Industrial Park,Nanshan District,Shenzhen, Guangdong, 518057, P.R. China |
| City: | Shenzhen |
| Postal Code: | 518057 |
| Country: | P.R. China |
| Telephone: | 86-21-68895196 |
| Fax: | / |

## 1.5. Information of EUT

**General Information**

| Device Type : | Portable Device | | |
|---|---|---|---|
| Exposure Category: | Uncontrolled Environment / General Population | | |
| Name of EUT: | HSDPA USB MODEM | | |
| IMEI or SN: | / | | |
| Hardware Version: | dg1B | | |
| Software Version: | BD_MF631F3V1.0.0B01 | | |
| Antenna Type: | Internal Antenna | | |
| Device Operating Configurations : | | | |
| Supporting Mode(s): | GSM 850/ GSM 1900; (tested) <br> WCDMA Band II/ WCDMA Band V; (tested) | | |
| Test Modulation: | (GSM)GMSK; (WCDMA) QPSK | | |
| GPRS Multislot Class (10): | Max Number of Timeslots in Uplink | 2 | |
| | Max Number of Timeslots in Downlink | 4 | |
| | Max Total Timeslot | 5 | |
| EGPRS Multislot Class (12): | Max Number of Timeslots in Uplink | 4 | |
| | Max Number of Timeslots in Downlink | 4 | |
| | Max Total Timeslot | 5 | |
| HSDPA UE Category: | 8 | | |
| HSUPA UE Category: | 6 | | |
| Operating Frequency Range(s): | Band | Tx (MHz) | Rx (MHz) |
| | GSM 850 | 824.2 ~ 848.8 | 869.2 ~ 893.8 |
| | GSM 1900 | 1850.2 ~ 1909.8 | 1930.2 ~ 1989.8 |
| | WCDMA Band II | 1852.4 ~ 1907.6 | 1932.4 ~ 1987.6. |
| | WCDMA Band V | 826.4 ~ 846.6 | 871.4 ~ 891.6 |
| Power Class: | GSM 850: 4, tested with power level 5 | | |
| | GSM 1900: 1, tested with power level 0 | | |
| | WCDMA Band II: 3, tested with power control all up bits | | |
| | WCDMA Band V: 3, tested with power control all up bits | | |
| Test Channel: <br> (Low - Middle - High) | 128 -190 - 251          (GSM 850) (tested) <br> 512 - 661 - 810        (GSM 1900) (tested) <br> 9262 - 9400 - 9538    (WCDMA Band II) (tested) <br> 4132 - 4183 - 4233    (WCDMA Band V) (tested) | | |
| Used Host Product: | IBM T61 <br> Lenovo Y-450 | | |

Equipment Under Test (EUT) is a HSDPA USB MODEM with internal antenna.It can be rotated from 0 degree to 270 degree, During SAR test of the EUT, it was connected to a portable computer. SAR is tested for the EUT respectively for GSM 850, GSM 1900, WCDMA Band II and WCDMA Band V in this report. The EUT has GPRS (class 10), EGPRS (class 12), WCDMA, HSDPA and HSUPA functions.

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 and HSUPA. The measurements were performed in combination with two host products (IBM T61 and Lenovo Y-450). IBM T61 laptop has horizontal USB slot, Lenovo Y-450 laptop has vertical USB slot. The EUT has a GSM/WCDMA antenna that is used for Tx/Rx.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

## 1.6. The Maximum SAR$_{1g}$ Values and Conducted Power of Each Tested Band

**SAR Values**

| Band | Channel | Position | SAR$_{1g}$ (W/kg) |
|---|---|---|---|
| GSM 850 | 190 | Back Side | **0.907** |
| GSM 1900 | 810 | Front Side | **0.918** |
| WCDMA Band II | 9538 | Front Side | **1.170** |
| WCDMA Band V | 4132 | Back Side | **0.644** |

**Maximum Power**

| Band | | Maximum Conducted Power (dBm) | Maximum Average Power (dBm) |
|---|---|---|---|
| GSM 850 | GPRS,2 time-slots | **30.80** | **24.78** |
| | EGPRS,2 time-slots | **30.84** | **24.82** |
| GSM 1900 | GPRS,2 time-slots | **27.44** | **21.42** |
| | EGPRS,4 time-slots | **24.67** | **21.66** |
| WCDMA Band II | | **21.76** | / |
| WCDMA Band V | | **22.02** | / |

## 1.7. Test Date

The test is performed from August 30, 2010 to August 31, 2010 and on September 30, 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. Using E5515C the power lever is set to "5" in SAR of GSM 850, set to "0" in SAR of GSM 1900, power control is set "All Up Bits" of WCDMA. 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 and HSUPA. The measurements were performed in combination with two host products (IBM T61 and Lenovo Y-450). IBM T61 laptop has horizontal USB slot, Lenovo Y-450 laptop has vertical USB slot.

### 2.2. GSM Test Configuration

For the body SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate at maximum transmitting power. Since the EUT only has the data transfer function, but does not have the speech transfer function. The tests in the band of GSM 850 and GSM 1900 are only performed in the mode of GPRS and EGPRS. The GPRS class is 10 for this EUT; it has at most 2 timeslots in uplink. The EGPRS class is 12 for this EUT; it has at most 4 timeslots in uplink.

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

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

**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. WCDMA Test Configuration

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

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

For the output power, the configurations for the DPCCH and $DPDCH_1$ are as followed (EUT do not support the $DPDCH_{2-n}$)

**Table 2: The configurations for the DPCCH and $DPDCH_1$**

|  | Channel Bit Rate(kbps) | Channel Symbol Rate(ksps) | Spreading Factor | Spreading Code Number | Bits/Slot |
|---|---|---|---|---|---|
| DPCCH | 15 | 15 | 256 | 0 | 10 |
| $DPDCH_1$ | 15 | 15 | 256 | 64 | 10 |
|  | 30 | 30 | 128 | 32 | 20 |
|  | 60 | 60 | 64 | 16 | 40 |
|  | 120 | 120 | 32 | 8 | 80 |
|  | 240 | 240 | 16 | 4 | 160 |
|  | 480 | 480 | 8 | 2 | 320 |
|  | 960 | 960 | 4 | 1 | 640 |

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

## 2.4. HSDPA Test Configuration

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

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

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

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

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

Note1: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$= 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, $\triangle_{ACK}$ and $\triangle_{NACK}$= 8 ( $A_{hs=}$30/15) with $\beta_{hs}$=30/15*$\beta_c$,and $\triangle_{CQI}$= 7 ( $A_{hs=}$24/15) with $\beta_{hs}$=24/15*$\beta_c$.

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

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

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

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

**Table 5: HSDPA UE category**

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

## 2.5. HSUPA Test Configuration

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

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

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

| Sub-set | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$ [1] | $\beta_{ec}$ | $\beta_{ed}$ | $\beta_{ed}$ (SF) | $\beta_{ed}$ (codes) | CM [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 | $\beta_{ed1}$ 47/15 $\beta_{ed2}$ 47/15 | 4 | 2 | 2.0 | 1.0 | 15 | 92 |
| 4 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 2/15 | 56/75 | 4 | 1 | 3.0 | 2.0 | 17 | 71 |
| 5 | 15/15 [4] | 15/15 [4] | 64 | 15/15 [4] | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

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

Note 2: CM = 1 for $\beta c/\beta d$ =12/15, $\underline{\beta_{hs}}/\underline{\beta_c}$ =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 βc/βd ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the

signaled gain factors for the reference TFC (TF1, TF1) to βc = 10/15 and βd = 15/15.

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

signaled gain factors for the reference TFC (TF1, TF1) to βc = 14/15 and βd = 15/15.

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

Note 6: βed can not be set directly; it is set by Absolute Grant Value.

**Table 7: HSUPA UE category**

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

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

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

## 2.6. Position of Module in Portable Devices

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

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

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

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

● Test Position 2: The EUT is connected to the portable computer through a 19 cm USB cable. The front side of the EUT towards the bottom of the flat phantom. The distance from front side of the EUT to the bottom of the flat phantom is 5mm. (ANNEX I Picture 7)

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

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

● Test Position 5: The EUT is connected to the portable computer with horizontal USB slot. The top side of the EUT towards the bottom of the flat phantom. The distance from right side of the EUT to the bottom of the flat phantom is 0mm. (ANNEX I Picture 10)

## 2.7. Picture of Host Product

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


Picture 1-a: IBM T61 Close


Picture 1-b: IBM T61 Open
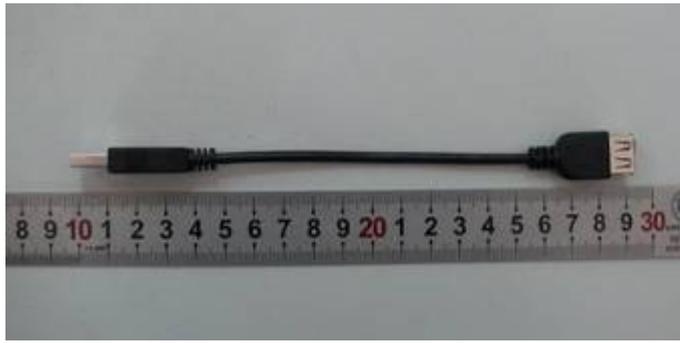

Picture 1-c: Lenovo Y-450 Close


Picture 1-d: Lenovo Y-450 Open


Picture 1-e: IBM T61 with horizontal USB slot


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

Picture 1-g: a 19 cm USB cable

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

# 3. SAR Measurements System Configuration

## 3.1. SAR Measurement Set-up

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

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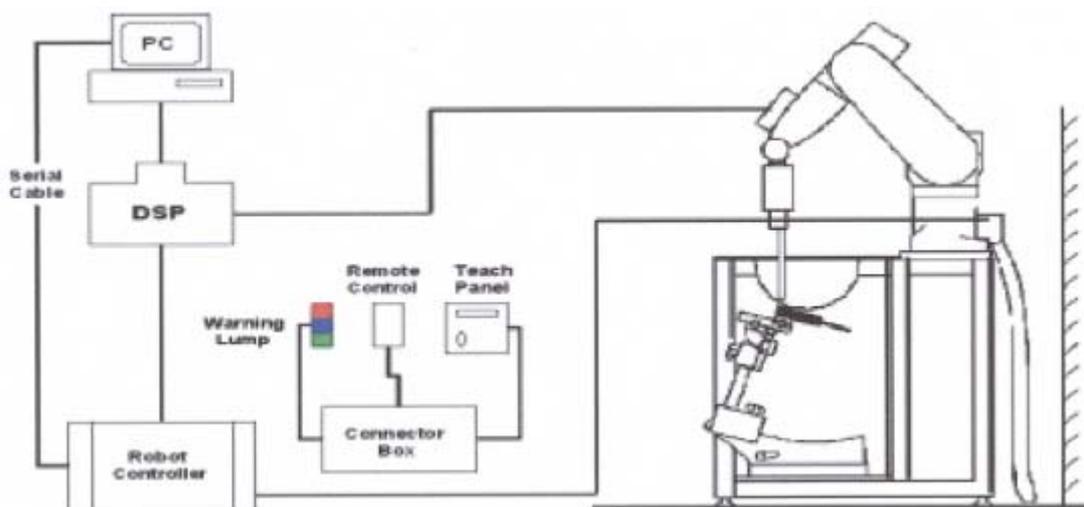- System validation dipoles allowing to validate the proper functioning of the system.



**Figure 1. SAR Lab Test Measurement Set-up**

## 3.2. DASY5 E-field Probe System

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

### 3.2.1. EX3DV4 Probe Specification

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

Calibration      ISO/IEC 17025 calibration service available

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



**Figure 2.EX3DV4 E-field Probe**

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

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

± 0.2dB (noise: typically < 1 µW/g)

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

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



**Figure 3. EX3DV4 E-field probe**

### 3.2.2. E-field Probe Calibration

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

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

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

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

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

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

Where:
$\sigma$ = Simulated tissue conductivity,
$\rho$ = Tissue density (kg/m3).

## 3.3. Other Test Equipment

### 3.3.1. Device Holder for Transmitters

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

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

### 3.3.2. Phantom

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

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



**Figure 4.Generic Twin Phantom**

## 3.4. Scanning Procedure

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

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

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

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

unchanged.

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

●   Zoom Scan

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

●   Spatial Peak Detection

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

• maximum search

• extrapolation

• boundary correction

• peak search for averaged SAR

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

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

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

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

## 3.5. Data Storage and Evaluation

### 3.5.1. Data Storage

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

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

### 3.5.2. Data Evaluation by SEMCAD

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

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

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

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

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

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

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

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

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

         $dcp_i$ = diode compression point       (DASY parameter)

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

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

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

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

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

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

         $ConvF$        = sensitivity enhancement in solution

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

         $f$             = carrier frequency [GHz]

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

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

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

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

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

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

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

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

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

$\blacksquare$ = equivalent tissue density in g/cm$^3$

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

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

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

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

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

## 3.6. System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 12.

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

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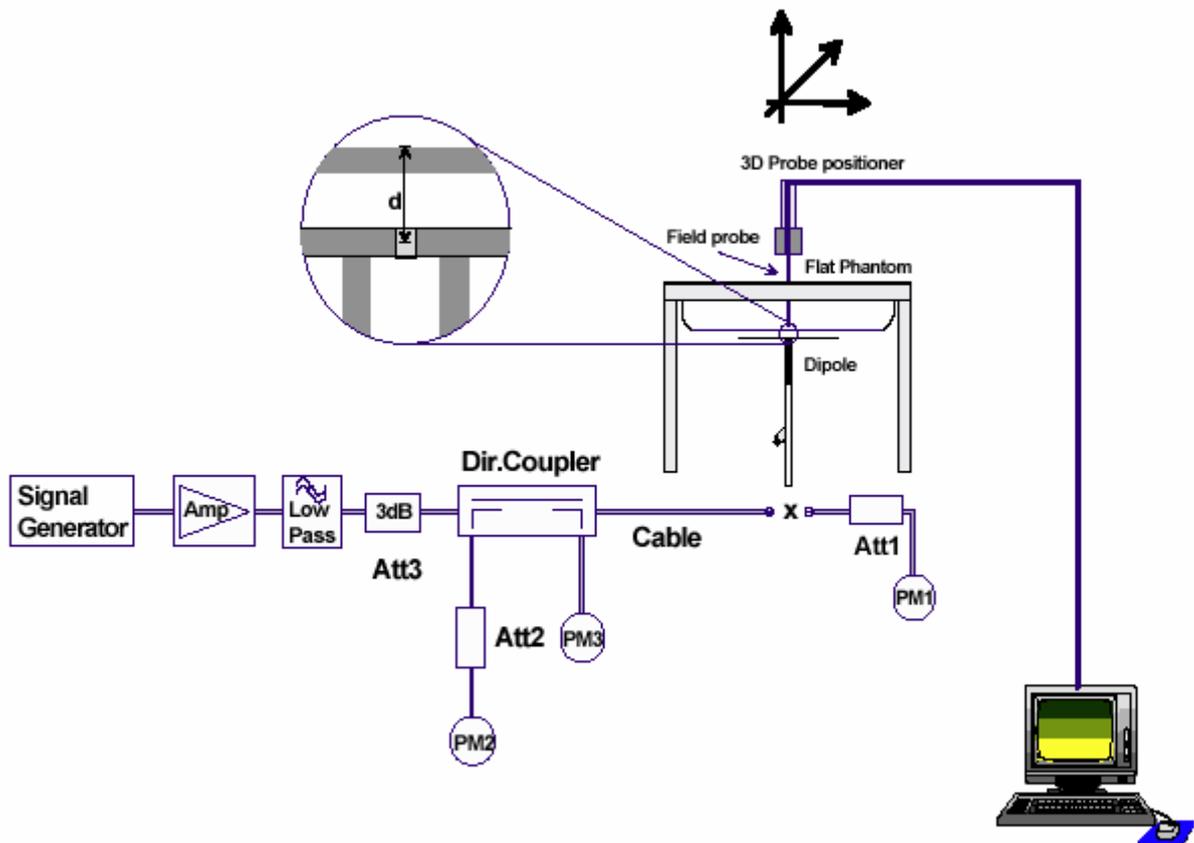


**Figure 5**. **System Check Set-up**

## 3.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 8 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by OET 65.

**Table 8: Composition of the Body Tissue Equivalent Matter**

| MIXTURE% | FREQUENCY(Body) 835MHz |
|---|---|
| Water | 52.5 |
| Sugar | 45 |
| Salt | 1.4 |
| Preventol | 0.1 |
| Cellulose | 1.0 |
| Dielectric Parameters Target Value | f=835MHz    ε=55.2    σ=0.97 |

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

# 4. Laboratory Environment

**Table 9: The Ambient Conditions during Test**

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

## 5. Characteristics of the Test

### 5.1. Applicable Limit Regulations

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

### 5.2. Applicable Measurement Standards

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

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

## 6. Conducted Output Power Measurement

### 6.1. Summary

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

### 6.2. Conducted Power Results

**Table 10: Conducted Power Measurement Results**

| WCDMA Band II | | Conducted Power(dBm) | | |
|---|---|---|---|---|
| | | Channel 9262 | Channel 9400 | Channel 9538 |
| 12.2kbps RMC | Before | 21.56 | 21.55 | 21.76 |
| | After | 21.55 | 21.53 | 21.75 |
| 64kbps RMC | Before | 21.56 | 21.54 | 21.76 |
| | After | 21.54 | 21.55 | 21.75 |
| 144kbps RMC | Before | 21.56 | 21.55 | 21.74 |
| | After | 21.55 | 21.54 | 21.76 |
| 384kbps RMC | Before | 21.56 | 21.54 | 21.75 |
| | After | 21.54 | 21.53 | 21.74 |
| **WCDMA Band II HSDPA** | | Conducted Power(dBm) | | |
| | | Channel 9262 | Channel 9400 | Channel 9538 |
| Sub - Test 1 | Before | 21.44 | 21.55 | 21.74 |
| | After | 21.43 | 21.54 | 21.73 |
| Sub - Test 2 | Before | 21.35 | 21.46 | 21.62 |
| | After | 21.34 | 21.45 | 21.61 |
| Sub - Test 3 | Before | 20.98 | 21.09 | 21.27 |
| | After | 20.97 | 21.08 | 21.25 |
| Sub - Test 4 | Before | 20.87 | 21.04 | 21.20 |
| | After | 20.86 | 21.02 | 21.18 |
| **WCDMA Band II HSUPA** | | Conducted Power(dBm) | | |
| | | Channel 9262 | Channel 9400 | Channel 9538 |
| Sub - Test 1 | Before | 20.01 | 20.22 | 20.30 |
| | After | 20.00 | 20.21 | 20.38 |
| Sub - Test 2 | Before | 18.33 | 18.47 | 18.50 |

| | | | | |
|---|---|---|---|---|
| | After | 18.32 | 18.46 | 18.51 |
| Sub - Test 3 | Before | 19.15 | 19.45 | 19.47 |
| | After | 19.14 | 19.44 | 19.49 |
| Sub - Test 4 | Before | 18.45 | 18.51 | 18.52 |
| | After | 18.44 | 18.50 | 18.51 |
| Sub - Test 5 | Before | 20.14 | 20.40 | 20.46 |
| | After | 20.12 | 20.38 | 20.45 |

| **WCDMA Band V** | | **Conducted Power(dBm)** | | |
|---|---|---|---|---|
| | | Channel 4132 | Channel 4183 | Channel 4233 |
| 12.2kbps RMC | Before | 22.02 | 21.80 | 21.91 |
| | After | 22.01 | 21.79 | 21.90 |
| 64kbps RMC | Before | 22.00 | 21.78 | 21.89 |
| | After | 22.02 | 21.80 | 21.90 |
| 144kbps RMC | Before | 22.00 | 21.79 | 21.88 |
| | After | 22.01 | 21.78 | 21.89 |
| 384kbps RMC | Before | 22.01 | 21.80 | 21.90 |
| | After | 22.00 | 21.78 | 21.89 |

| **WCDMA Band V HSDPA** | | **Conducted Power(dBm)** | | |
|---|---|---|---|---|
| | | Channel 4132 | Channel 4183 | Channel 4233 |
| Sub - Test 1 | Before | 21.98 | 21.80 | 21.89 |
| | After | 21.97 | 21.79 | 21.87 |
| Sub - Test 2 | Before | 21.86 | 21.78 | 21.83 |
| | After | 21.85 | 21.76 | 21.82 |
| Sub - Test 3 | Before | 21.44 | 21.30 | 21.38 |
| | After | 21.43 | 21.28 | 21.37 |
| Sub - Test 4 | Before | 21.40 | 21.28 | 21.33 |
| | After | 21.38 | 21.27 | 21.31 |

| **WCDMA Band V HSUPA** | | **Conducted Power(dBm)** | | |
|---|---|---|---|---|
| | | Channel 4132 | Channel 4183 | Channel 4233 |
| Sub - Test 1 | Before | 20.53 | 20.99 | 20.16 |
| | After | 20.52 | 20.97 | 20.15 |
| Sub - Test 2 | Before | 18.75 | 18.72 | 18.48 |
| | After | 18.74 | 18.78 | 18.47 |
| Sub - Test 3 | Before | 19.81 | 19.70 | 19.46 |
| | After | 19.80 | 19.72 | 19.49 |

| | | | | |
|---|---|---|---|---|
| Sub - Test 4 | Before | 18.77 | 18.74 | 18.47 |
| | After | 18.75 | 18.75 | 18.46 |
| Sub - Test 5 | Before | 20.72 | 20.62 | 20.41 |
| | After | 20.71 | 20.60 | 20.40 |

**Average power**

| GSM 850 GPRS | | Conducted Power(dBm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Channel 128 | Channel 190 | Channel 251 | | Channel 128 | Channel 190 | Channel 251 |
| 1TXslot | Before | 32.16 | 32.31 | 32.39 | -9.03dB | 23.13 | 23.28 | 23.36 |
| | After | 32.15 | 32.30 | 32.27 | -9.03dB | 23.12 | 23.27 | 23.35 |
| 2TXslots | Before | 30.57 | 30.73 | 30.80 | -6.02dB | **24.55** | **24.71** | **24.78** |
| | After | 30.55 | 30.72 | 30.79 | -6.02dB | 24.54 | 24.70 | 24.77 |

| GSM 850 EGPRS (GMSK) | | Conducted Power(dBm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Channel 128 | Channel 190 | Channel 251 | | Channel 128 | Channel 190 | Channel 251 |
| 1TXslot | Before | 32.08 | 32.26 | 32.43 | -9.03dB | 23.05 | 23.23 | 23.40 |
| | After | 32.07 | 32.25 | 32.41 | -9.03dB | 23.03 | 23.20 | 23.39 |
| 2TXslots | Before | 30.48 | 30.67 | 30.84 | -6.02dB | **24.46** | **24.65** | **24.82** |
| | After | 30.47 | 30.65 | 30.83 | -6.02dB | 24.45 | 24.64 | 24.81 |
| 3TXslots | Before | 28.54 | 28.71 | 28.88 | -4.26 dB | 24.28 | 24.45 | 24.62 |
| | After | 28.53 | 28.70 | 28.86 | -4.26 dB | 24.27 | 24.44 | 24.60 |
| 4TXslots | Before | 27.42 | 27.56 | 27.73 | -3.01 dB | 24.41 | 24.55 | 24.72 |
| | After | 27.41 | 27.55 | 27.71 | -3.01 dB | 24.40 | 24.54 | 24.70 |

| GSM 1900 GPRS | | Conducted Power(dBm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Channel 512 | Channel 661 | Channel 810 | | Channel 512 | Channel 661 | Channel 810 |
| 1TXslot | Before | 28.97 | 29.25 | 29.37 | -9.03dB | 19.94 | 20.22 | 20.34 |
| | After | 28.96 | 29.23 | 29.36 | -9.03dB | 19.93 | 20.21 | 20.32 |
| 2TXslots | Before | 27.10 | 27.33 | 27.44 | -6.02dB | **21.08** | **21.31** | **21.42** |
| | After | 27.09 | 27.32 | 27.42 | -6.02dB | 21.07 | 21.30 | 21.40 |

| GSM 1900 EGPRS (GMSK) | | Conducted Power(dBm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Channel 512 | Channel 661 | Channel 810 | | Channel 512 | Channel 661 | Channel 810 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1TXslot | Before | 28.91 | 29.15 | 29.24 | -9.03dB | 19.88 | 20.12 | 20.21 |
| | After | 28.90 | 29.13 | 29.23 | -9.03dB | 19.87 | 20.11 | 20.20 |
| 2TXslots | Before | 27.02 | 27.23 | 27.29 | -6.02dB | 21.00 | 21.21 | 21.27 |
| | After | 27.01 | 27.22 | 27.27 | -6.02dB | 20.99 | 21.20 | 21.25 |
| 3TXslots | Before | 25.58 | 25.77 | 25.80 | -4.26 dB | 21.32 | 21.51 | 21.54 |
| | After | 25.57 | 25.76 | 25.79 | -4.26 dB | 21.31 | 21.50 | 21.52 |
| 4TXslots | Before | 24.47 | 24.65 | 24.67 | -3.01 dB | **21.46** | **21.64** | **21.66** |
| | After | 24.46 | 24.64 | 24.66 | -3.01 dB | 21.45 | 21.63 | 21.64 |

Note:

1) Division Factors

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

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

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

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

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

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

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

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

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

2) Average power numbers

   The maximum power numbers are marks in bold.

3) For SAR testing the EUT was set to multislot class based on the maximum averaged
   conducted power.

## 7. Test Results

### 7.1. Dielectric Performance

**Table 11: Dielectric Performance of Body Tissue Simulating Liquid**

| Frequency | Description | Dielectric Parameters | | Temp |
|---|---|---|---|---|
| | | $\varepsilon_r$ | $\sigma$(s/m) | ℃ |
| **835MHz (body)** | Target value ±5% window | 55.20 52.44 — 57.96 | 0.97 0.92 — 1.02 | / |
| | Measurement value 2010-8-31 | 54.79 | 1.00 | 21.5 |
| | Measurement value 2010-9-30 | 55.38 | 1.01 | 21.6 |
| **1900MHz (body)** | Target value ±5% window | 53.30 50.64 — 55.97 | 1.52 1.44 — 1.60 | / |
| | Measurement value 2010-8-30 | 51.95 | 1.56 | 21.7 |
| | Measurement value 2010-9-30 | 51.92 | 1.53 | 21.9 |

### 7.2. System Check

**Table 12: System Check for Body Tissue Simulating Liquid**

| Frequency | Description | SAR(W/kg) | | Dielectric Parameters | | Temp |
|---|---|---|---|---|---|---|
| | | 10g | 1g | $\varepsilon_r$ | $\sigma$(s/m) | ℃ |
| **835MHz** | Recommended result ±10% window | 1.63 1.47 — 1.79 | 2.49 2.24 — 2.74 | 54.6 | 0.98 | / |
| | Measurement value 2010-8-31 | 1.68 | 2.56 | 54.79 | 1.00 | 21.5 |
| | Measurement value 2010-9-30 | 1.62 | 2.48 | 55.38 | 1.01 | 21.6 |
| **1900 MHz** | Recommended result ±10% window | 5.52 4.97 — 6.07 | 10.3 9.27 — 11.33 | 53.5 | 1.54 | / |
| | Measurement value 2010-8-30 | 5.50 | 10.28 | 51.95 | 1.56 | 21.7 |
| | Measurement value 2010-9-30 | 5.32 | 10.15 | 51.92 | 1.53 | 21.9 |

Note：1. The graph results see ANNEX B.

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

## 7.3. Summary of Measurement Results

### 7.3.1. GSM 850 (GPRS/EGPRS)

**Table 13: SAR Values [GSM 850 (GPRS/EGPRS)]**

| Limit of SAR | | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|---|
| | | | 2.0 W/kg | 1.6 W/kg | ± 0.21 dB | |
| Test Case Of Body | | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Different Test Position | Different Timeslots | Channel | 10 g Average | 1 g Average | | |
| **IBM T61** | | | | | | |
| Test Position 1 | 2 timeslots | High | 0.562 | 0.854 | -0.073 | Figure 10 |
| | | Middle | 0.579 | 0.876 | -0.064 | Figure 11 |
| | | Low | 0.572 | 0.864 | -0.186 | Figure 12 |
| Test Position 2 | 2 timeslots | Middle | 0.269 | 0.457 | -0.166 | Figure 13 |
| Test Position 5 | 2 timeslots | Middle | 0.098 | 0.320 | -0.198 | Figure 14 |
| **Lenovo Y-450** | | | | | | |
| Test Position 3 | 2 timeslots | Middle | 0.205 | 0.358 | -0.096 | Figure 15 |
| Test Position 4 | 2 timeslots | Middle | 0.364 | 0.552 | -0.070 | Figure 16 |
| **Worst Case Position of GPRS with EGPRS (GMSK)** | | | | | | |
| Test Position 1 | 2 timeslots | Middle | 0.600 | 0.907 | -0.000 | Figure 17 |

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

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

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

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

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

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

| Limit of SAR | | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|---|
| | | | 2.0 W/kg | 1.6 W/kg | ± 0.21 dB | |
| Test Case Of Body | | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Different Test Position | Different Timeslots | Channel | 10 g Average | 1 g Average | | |
| **IBM T61** | | | | | | |
| Test Position 1 | 2 timeslots | Middle | 0.410 | 0.735 | -0.192 | Figure 18 |
| Test Position 2 | 2 timeslots | High | 0.442 | 0.810 | -0.016 | Figure 19 |
| | | Middle | 0.370(max.cube) | 0.771(max.cube) | 0.049 | Figure 20 |
| | | Low | 0.358 | 0.668 | 0.029 | Figure 21 |
| Test Position 5 | 2 timeslots | Middle | 0.163 | 0.365 | 0.043 | Figure 22 |
| **Lenovo Y-450** | | | | | | |
| Test Position 3 | 2 timeslots | Middle | 0.167 | 0.338 | 0.150 | Figure 23 |
| Test Position 4 | 2 timeslots | Middle | 0.265 | 0.469 | -0.152 | Figure 24 |
| **Worst Case Position of GPRS with EGPRS (GMSK)** | | | | | | |
| Test Position 2 | 4 timeslots | High | 0.504 | 0.918 | -0.035 | Figure 25 |

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

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

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

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

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

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

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

| Limit of SAR | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|
| | | 2.0 W/kg | 1.6 W/kg | ± 0.21 dB | |
| Test Case Of Body | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Different Test Position | Channel | 10 g Average | 1 g Average | | |
| **IBM T61** | | | | | |
| Test Position 1 | High | 0.632 | 1.130 | 0.010 | Figure 26 |
| | Middle | 0.575 | 1.030 | 0.080 | Figure 27 |
| | Low | 0.474 | 0.846 | -0.185 | Figure 28 |
| Test Position 2 | High | 0.624 | 1.150 | 0.141 | Figure 29 |
| | Middle | 0.581 | 1.080 | 0.037 | Figure 30 |
| | Low | 0.476 | 0.883 | -0.084 | Figure 31 |
| Test Position 5 | Middle | 0.228 | 0.550 | 0.037 | Figure 32 |
| **Lenovo Y-450** | | | | | |
| Test Position 3 | Middle | 0.250 | 0.500 | 0.071 | Figure 33 |
| Test Position 4 | Middle | 0.426 | 0.754 | -0.179 | Figure 34 |
| **Worst Case Position of RMC with HSDPA** | | | | | |
| Test Position 2 | High | 0.634 | 1.170 | 0.065 | Figure 35 |
| **Worst Case Position of RMC with HSUPA** | | | | | |
| Test Position 2 | High | 0.467 | 0.863 | -0.046 | Figure 36 |

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

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

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

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

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

| Limit of SAR | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|
| | | 2.0 W/kg | 1.6 W/kg | ± 0.21 dB | |
| Test Case Of Body | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Different Test Position | Channel | 10 g Average | 1 g Average | | |
| **IBM T61** | | | | | |
| Test Position 1 | High | 0.401 | 0.609 | -0.101 | Figure 37 |
| | Middle | 0.414 | 0.626 | -0.182 | Figure 38 |
| | Low | 0.428 | 0.644 | -0.000 | Figure 39 |
| Test Position 2 | Middle | 0.224 | 0.380 | 0.002 | Figure 40 |
| Test Position 5 | Middle | 0.058 | 0.183 | 0.050 | Figure 41 |
| **Lenovo Y-450** | | | | | |
| Test Position 3 | Middle | 0.164 | 0.287 | -0.137 | Figure 42 |
| Test Position 4 | Middle | 0.240 | 0.367 | -0.038 | Figure 43 |
| **Worst Case Position of RMC with HSDPA** | | | | | |
| Test Position 1 | Low | 0.423 | 0.635 | -0.068 | Figure 44 |
| **Worst Case Position of RMC with HSUPA** | | | | | |
| Test Position 1 | Low | 0.371 | 0.565 | -0.050 | Figure 45 |

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

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

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

## 8. Measurement Uncertainty

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

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

## 9. Main Test Instruments

**Table 17: List of Main Instruments**

| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|-----|------|------|---------------|------------------|--------------|
| 01 | Network analyzer | Agilent 8753E | US37390326 | September 13, 2009 | One year |
|    |                  |               |            | September 13, 2010 | One year |
| 02 | Dielectric Probe Kit | Agilent 85070E | US44020115 | No Calibration Requested | |
| 03 | Power meter | Agilent E4417A | GB41291714 | March 13, 2010 | One year |
| 04 | Power sensor | Agilent 8481H | MY41091316 | March 26, 2010 | One year |
| 05 | Signal Generator | HP 8341B | 2730A00804 | September 13, 2009 | One year |
|    |                  |          |            | September 13, 2010 | One year |
| 06 | Amplifier | IXA-020 | 0401 | No Calibration Requested | |
| 07 | Validation Kit 835MHz | D835V2 | 4d092 | January 14, 2010 | One year |
| 08 | Validation Kit 1900MHz | D1900V2 | 5d018 | June 15, 2010 | One year |
| 09 | BTS | E5515C | MY48360988 | December 4, 2009 | One year |
| 10 | E-field Probe | EX3DV4 | 3677 | September 23, 2009 | One year |
| 11 | E-field Probe | EX3DV4 | 3661 | December 30, 2009 | One year |
| 12 | DAE | DAE4 | 871 | November 11, 2009 | One year |

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

## ANNEX A: Test Layout



**Picture 2: Specific Absorption Rate Test Layout**

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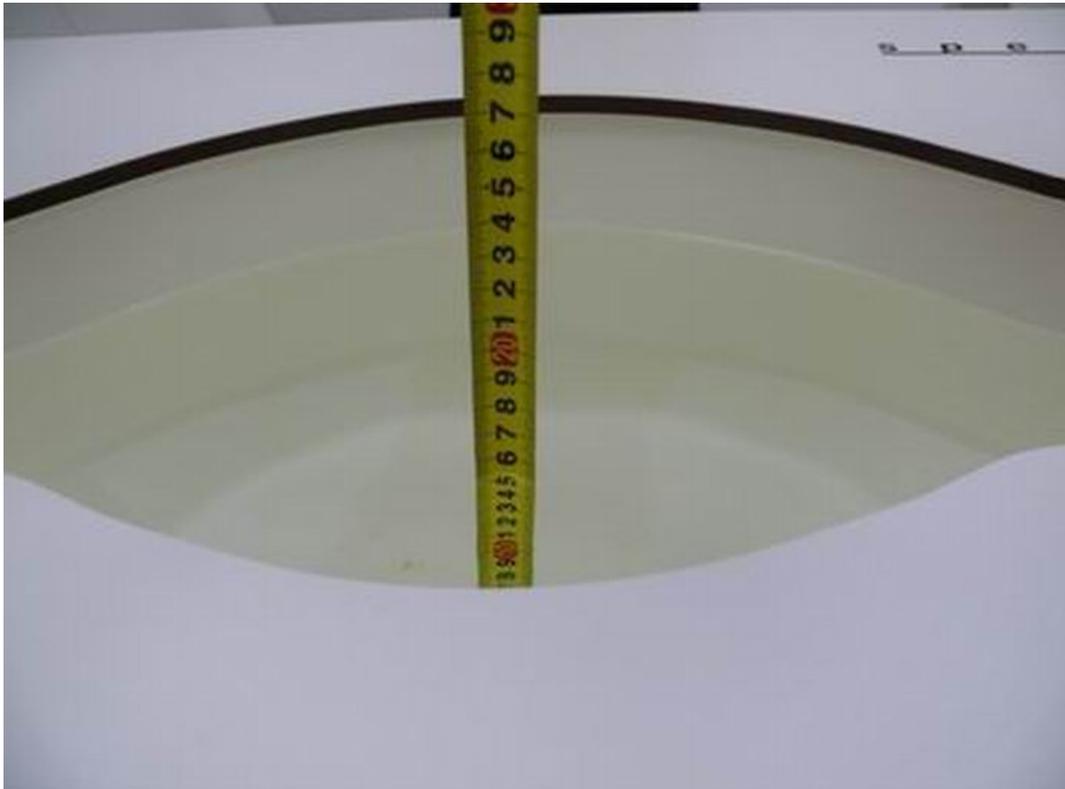


**Picture 4: Liquid depth in the Flat Phantom (1900 MHz, 15.2cm depth)**

## ANNEX B: System Check Results

### System Performance Check at 835 MHz
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d092**

Date/Time: 8/31/2010 8:30:20 AM

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

Medium parameters used: f = 835 MHz; σ = 1.00 mho/m; $ε_r$ = 54.79; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

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

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

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

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

Peak SAR (extrapolated) = 3.68 W/kg

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

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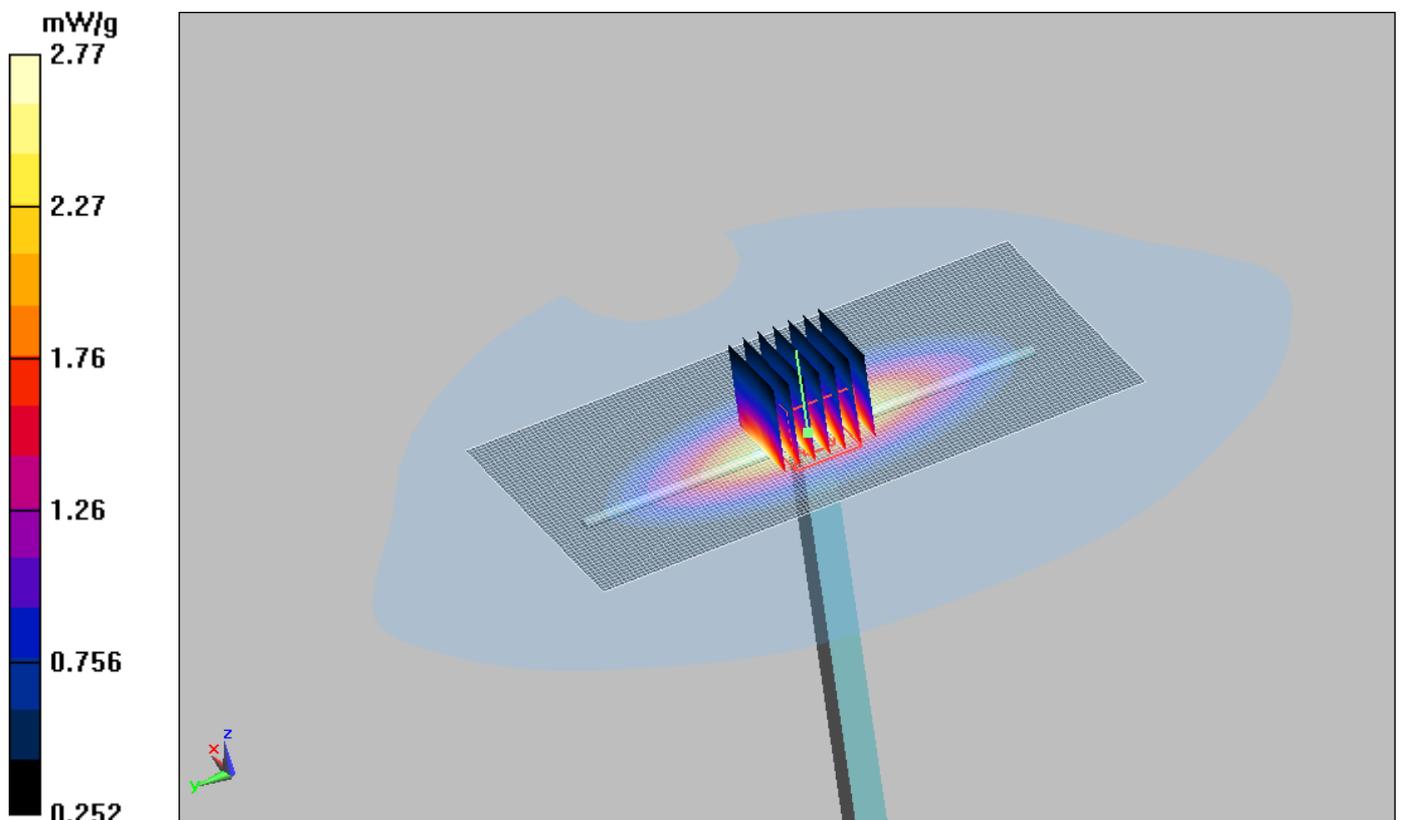


**Figure 6 System Performance Check 835MHz 250mW**

## System Performance Check at 835 MHz

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

Date/Time: 9/30/2010 8:02:02 AM

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

Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; $\varepsilon_r$ = 55.38; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 2.71 mW/g

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

Reference Value = 55.5 V/m; Power Drift = -0.092 dB

Peak SAR (extrapolated) = 3.75 W/kg

**SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.62 mW/g**

Maximum value of SAR (measured) = 2.67 mW/g
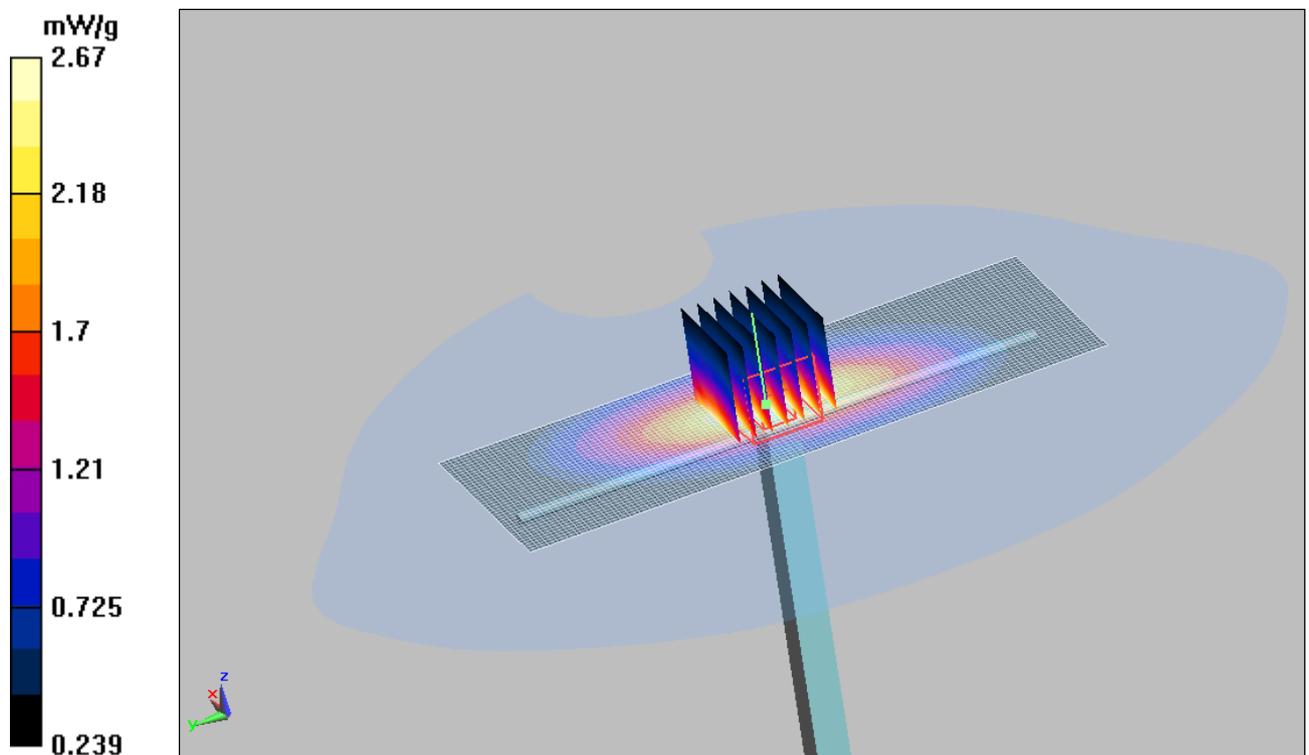


**Figure 7 System Performance Check 835MHz 250mW**

## System Performance Check at 1900 MHz

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

Date/Time: 8/30/2010 9:55:19 AM

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

Medium parameters used: f = 1900 MHz; $\sigma$ = 1.56 mho/m; $\varepsilon_r$ = 51.95; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


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

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


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

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

Peak SAR (extrapolated) = 16.8 W/kg

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

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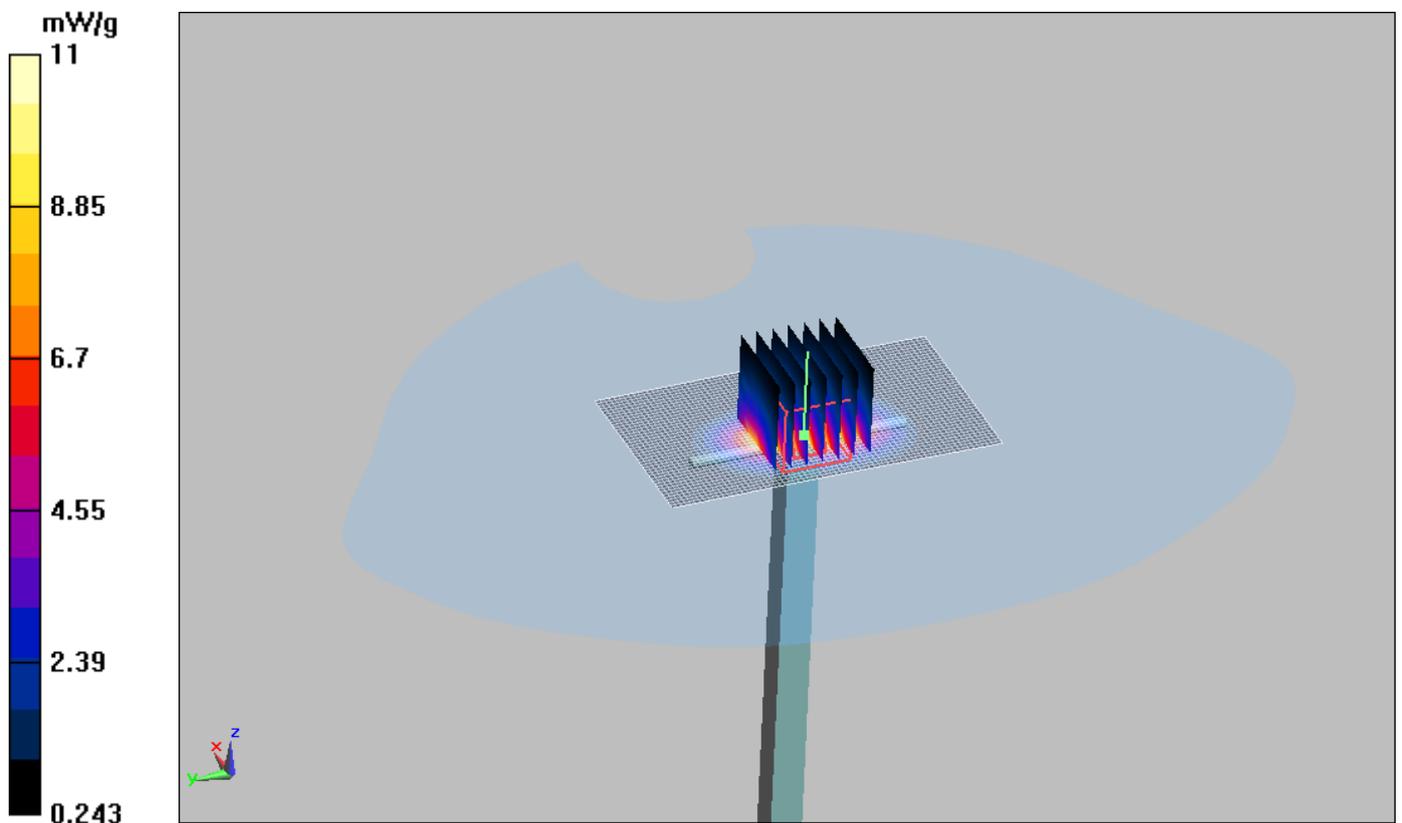


**Figure 8 System Performance Check 1900MHz 250mW**

**System Performance Check at 1900 MHz**

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

Date/Time: 9/30/2010 9:28:40 AM

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

Medium parameters used: f = 1900 MHz; $\sigma$ = 1.53 mho/m; $\varepsilon_r$ = 51.92; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3661; ConvF(7.6, 7.6, 7.6); Calibrated: 12/30/2009

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

Phantom: SAM2; Type: SAM;

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

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

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

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

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

Peak SAR (extrapolated) = 16.8 W/kg

**SAR(1 g) = 10.15 mW/g; SAR(10 g) = 5.32 mW/g**

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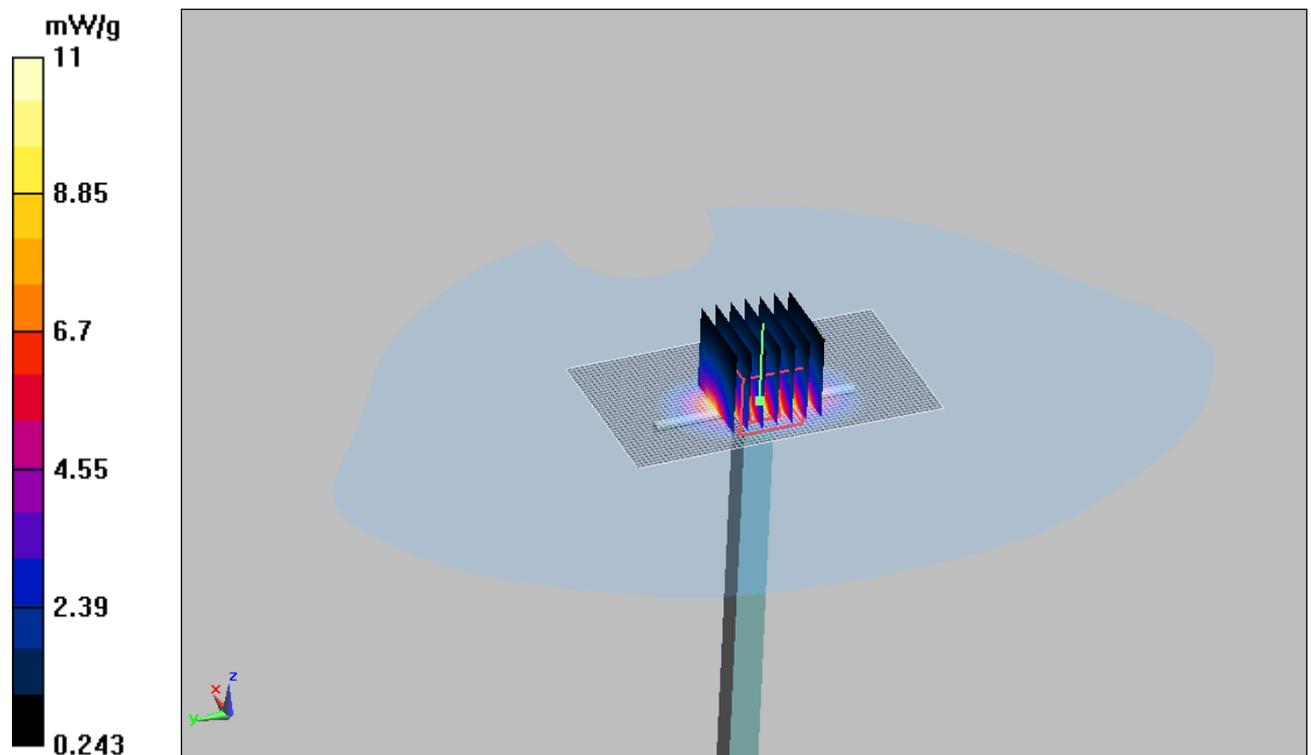


**Figure 9 System Performance Check 1900MHz 250mW**

## ANNEX C: Graph Results

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

Date/Time: 8/31/2010 10:35:29 AM

Communication System: GSM850 + GPRS(2Up); Frequency: 848.8 MHz;Duty Cycle: 1:4.15c

Medium parameters used: f = 849 MHz; σ = 1.01 mho/m; $\varepsilon_r$ = 54.6; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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


**Test Position 1 High/Area Scan (41x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.951 mW/g


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

Reference Value = 19.2 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 1.23 W/kg

**SAR(1 g) = 0.854 mW/g; SAR(10 g) = 0.562 mW/g**

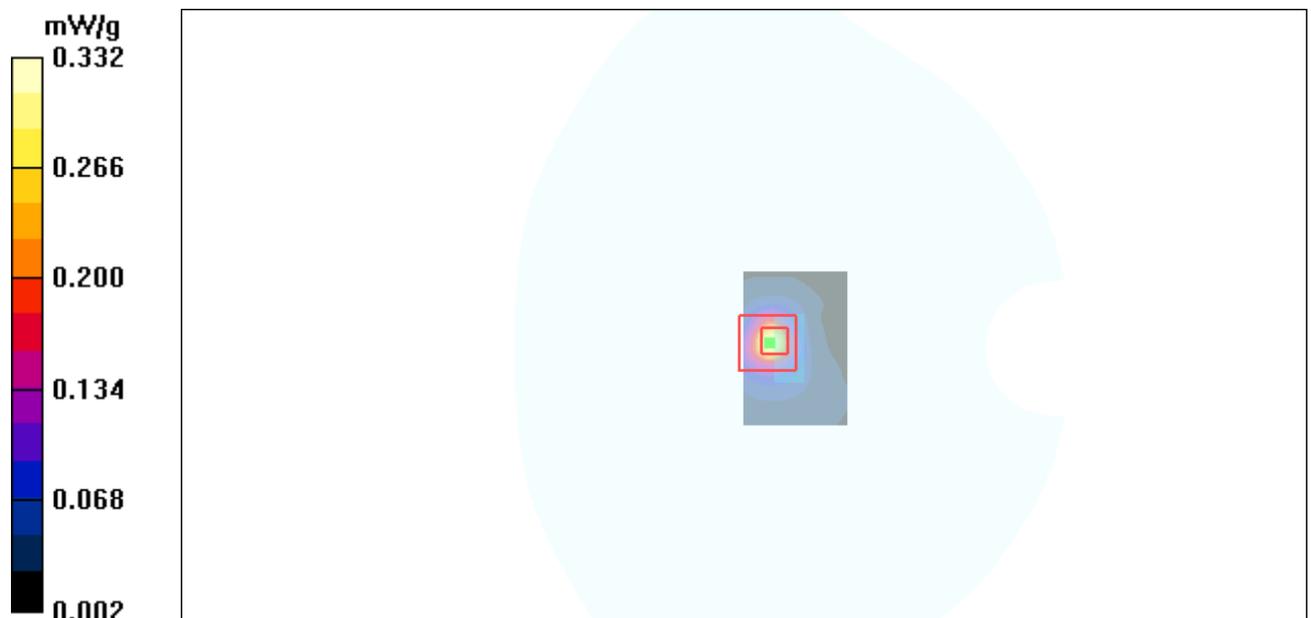Maximum value of SAR (measured) = 0.913 mW/g
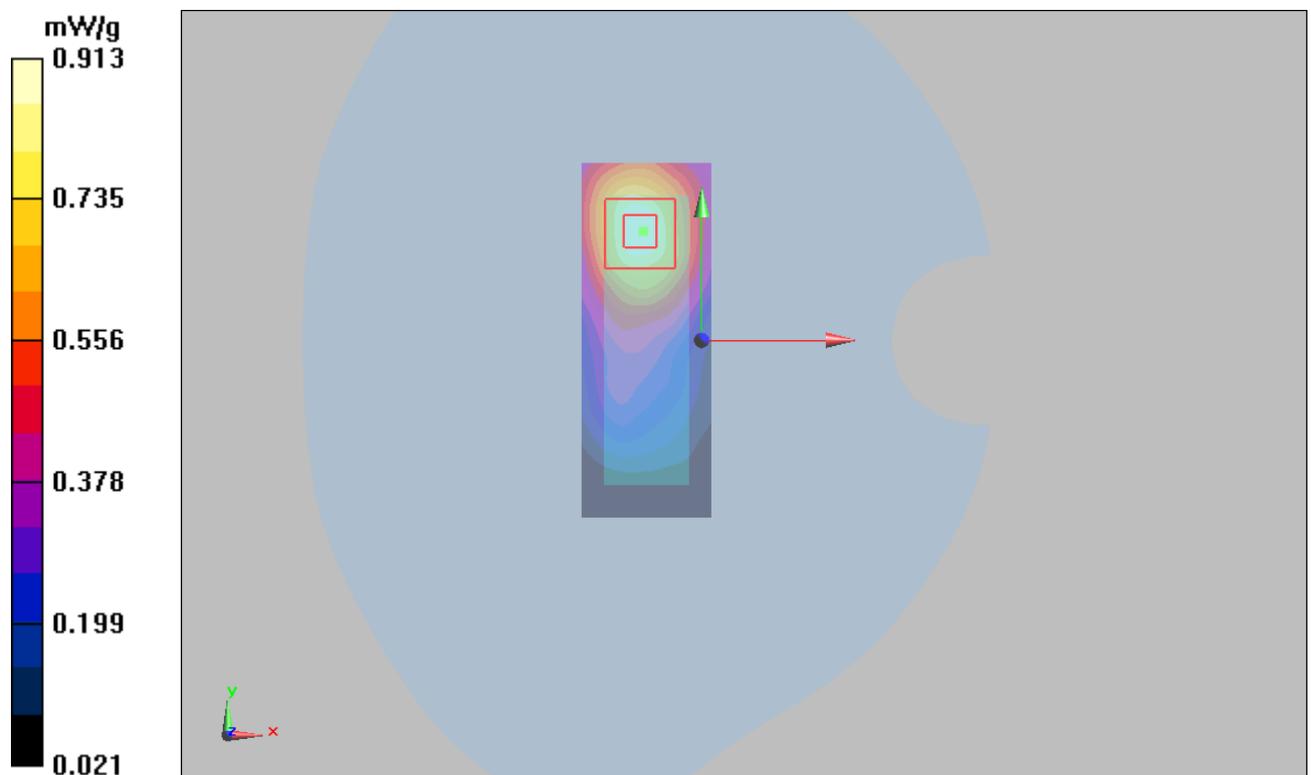


**Figure 10 GSM 850 GPRS (2Up) with IBM T61 Test Position 1 Channel 251**

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

Date/Time: 8/31/2010 9:50:23 AM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃       Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 1 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 21.1 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 1.27 W/kg

**SAR(1 g) = 0.876 mW/g; SAR(10 g) = 0.579 mW/g**

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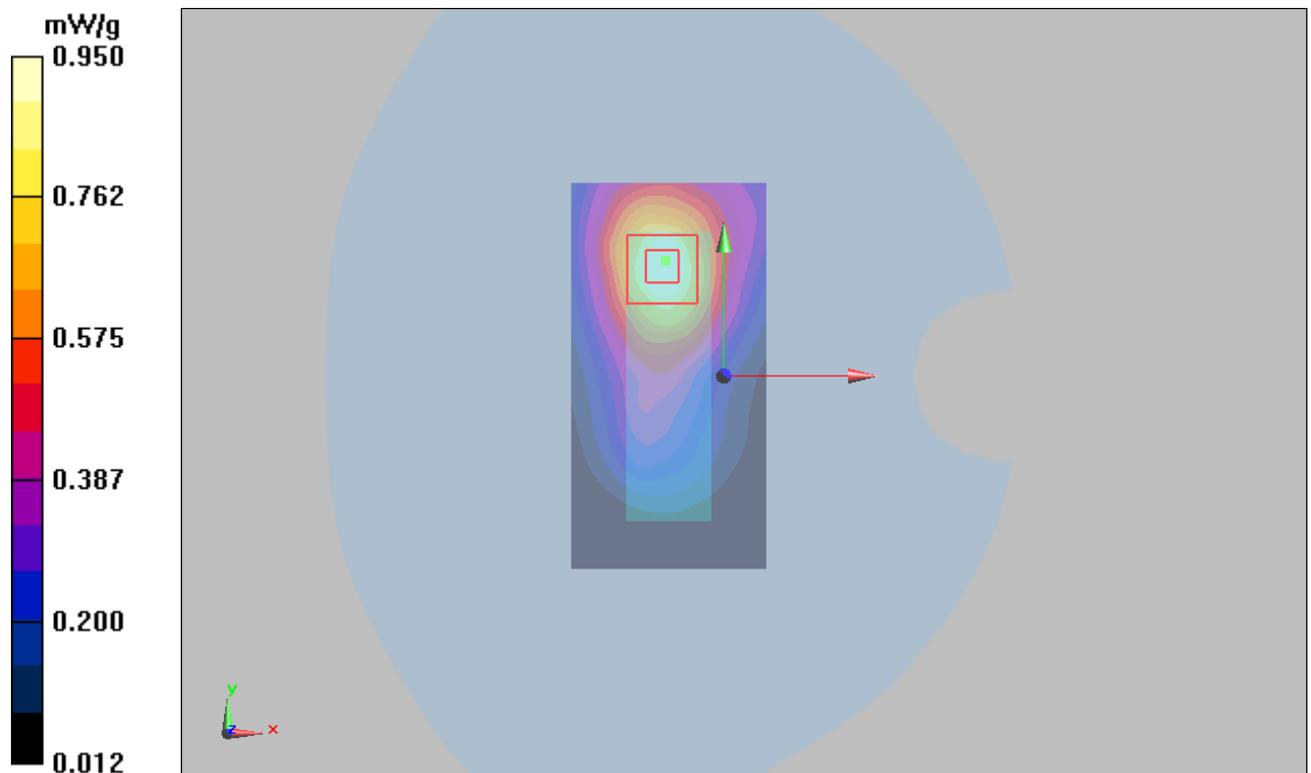


**Figure 11 GSM 850 GPRS (2Up) with IBM T61 Test Position 1 Channel 190**

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

Date/Time: 8/31/2010 10:14:36 AM

Communication System: GSM850 + GPRS(2Up); Frequency: 824.2 MHz;Duty Cycle: 1:4.15

Medium parameters used (interpolated): f = 824.2 MHz; $\sigma$ = 0.987 mho/m; $\varepsilon_r$ = 54.9; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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


**Test Position 1 Low/Area Scan (41x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.962 mW/g


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

Reference Value = 20.3 V/m; Power Drift = -0.186 dB

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.864 mW/g; SAR(10 g) = 0.572 mW/g**
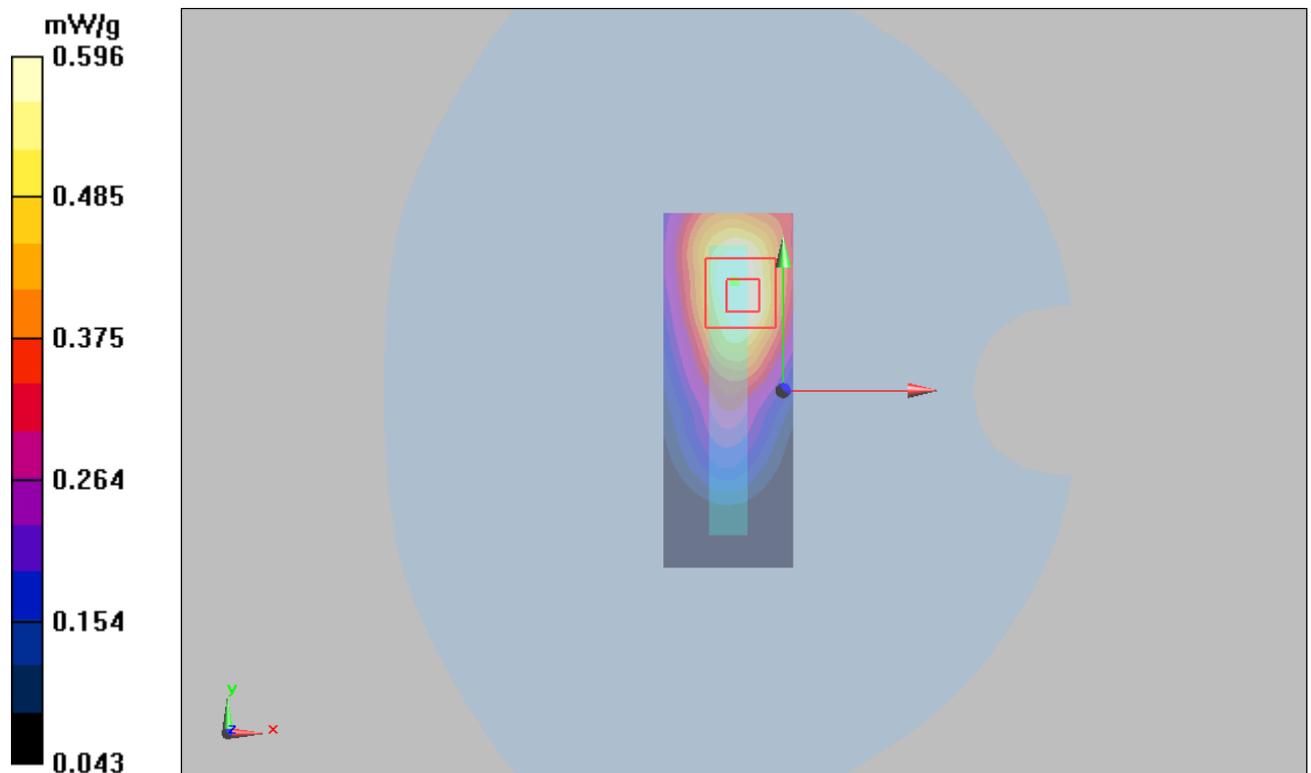
Maximum value of SAR (measured) = 0.926 mW/g
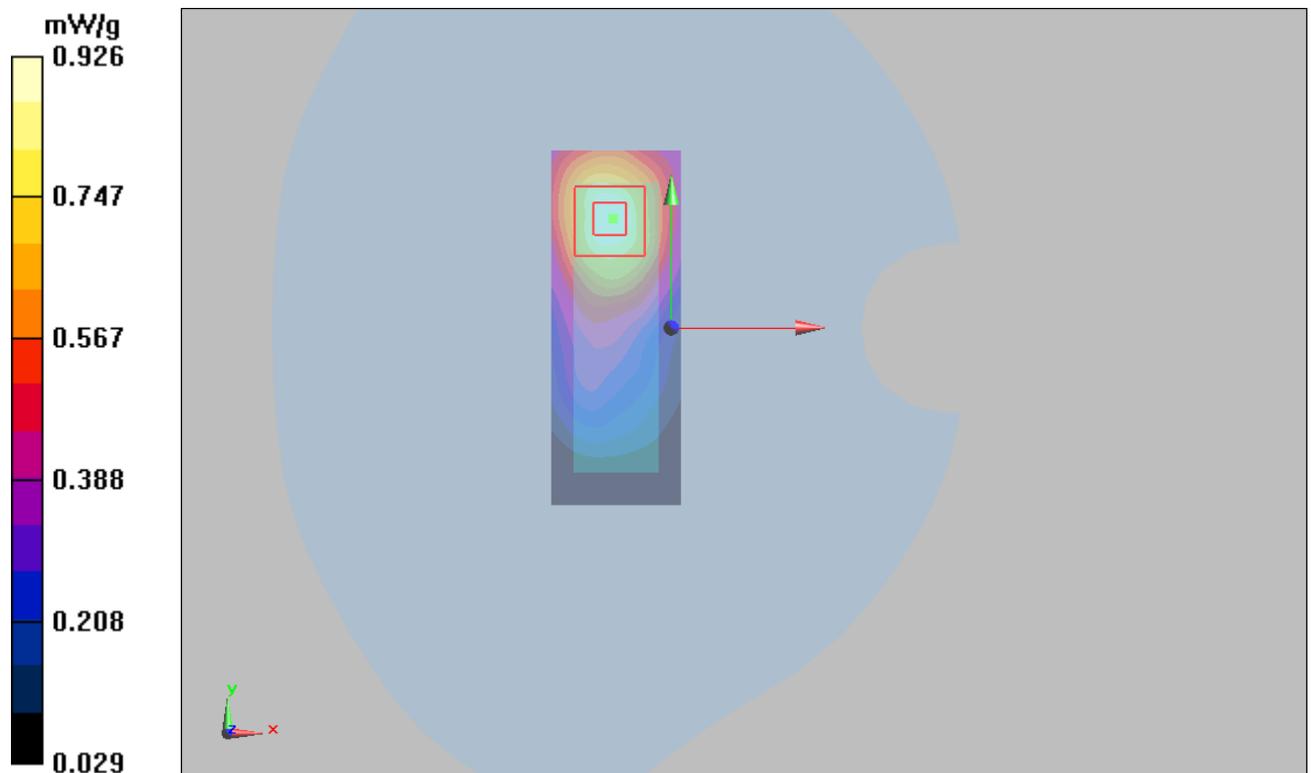


**Figure 12 GSM 850 GPRS (2Up) with IBM T61 Test Position 1 Channel 128**

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

Date/Time: 8/31/2010 1:07:07 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $\varepsilon_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃      Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 2 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 19.2 V/m; Power Drift = -0.166 dB

Peak SAR (extrapolated) = 0.752 W/kg

**SAR(1 g) = 0.457 mW/g; SAR(10 g) = 0.269 mW/g**

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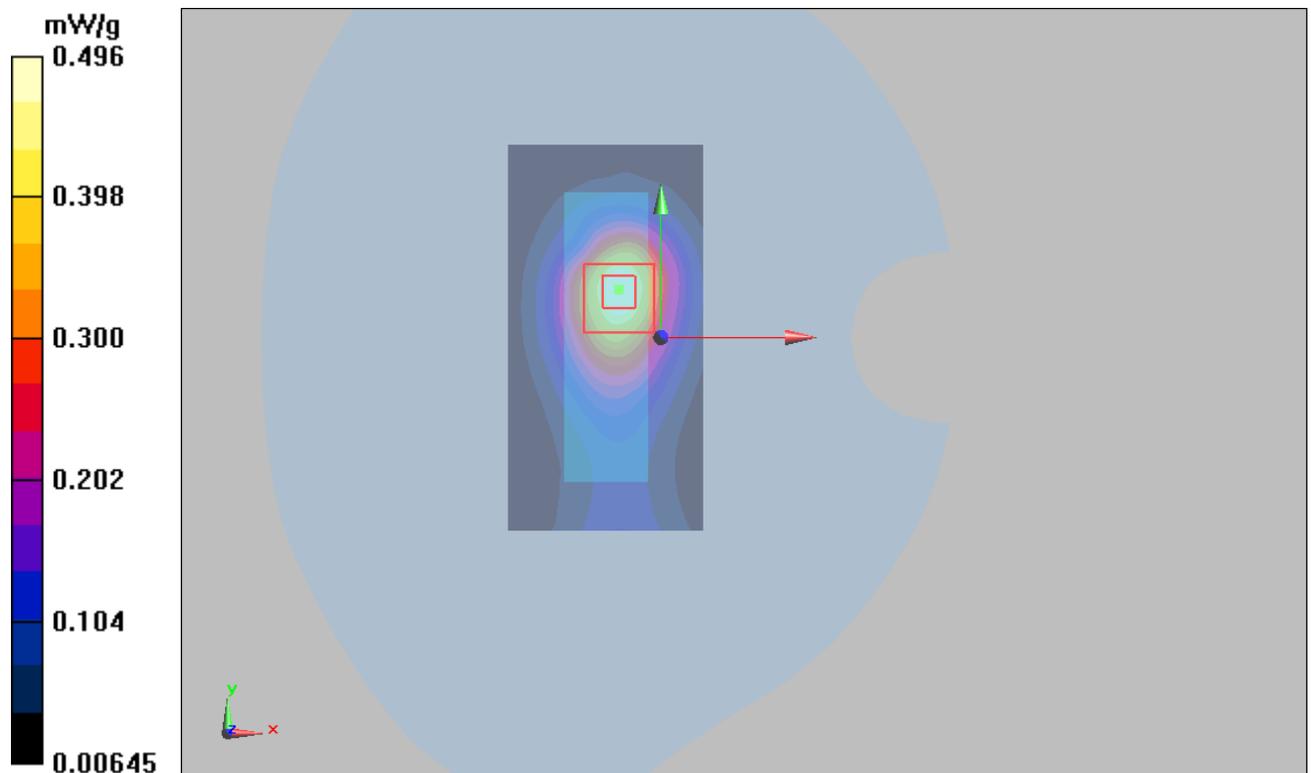


**Figure 13 GSM 850 GPRS (2Up) with IBM T61 Test Position 2 Channel 190**

## GSM 850 GPRS (2Up) with IBM T61 Test Position 5 Middle

Date/Time: 9/30/2010 3:02:39 PM

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

Medium parameters used: f = 837 MHz; $\sigma$ = 1.01 mho/m; $\varepsilon_r$ = 55.3; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 5 Middle/Area Scan (41x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.313 mW/g

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

Reference Value = 15.0 V/m; Power Drift = -0.198 dB

Peak SAR (extrapolated) = 1.93 W/kg

**SAR(1 g) = 0.320 mW/g; SAR(10 g) = 0.098 mW/g**

Maximum value of SAR (measured) = 0.332 mW/g



**Figure 14 GSM 850 GPRS (2Up) with IBM T61 Test Position 5 Channel 190**

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

Date/Time: 8/31/2010 2:26:16 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 3 Middle/Area Scan (51x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.421 mW/g

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

Reference Value = 15.1 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 0.601 W/kg

**SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.205 mW/g**

Maximum value of SAR (measured) = 0.390 mW/g
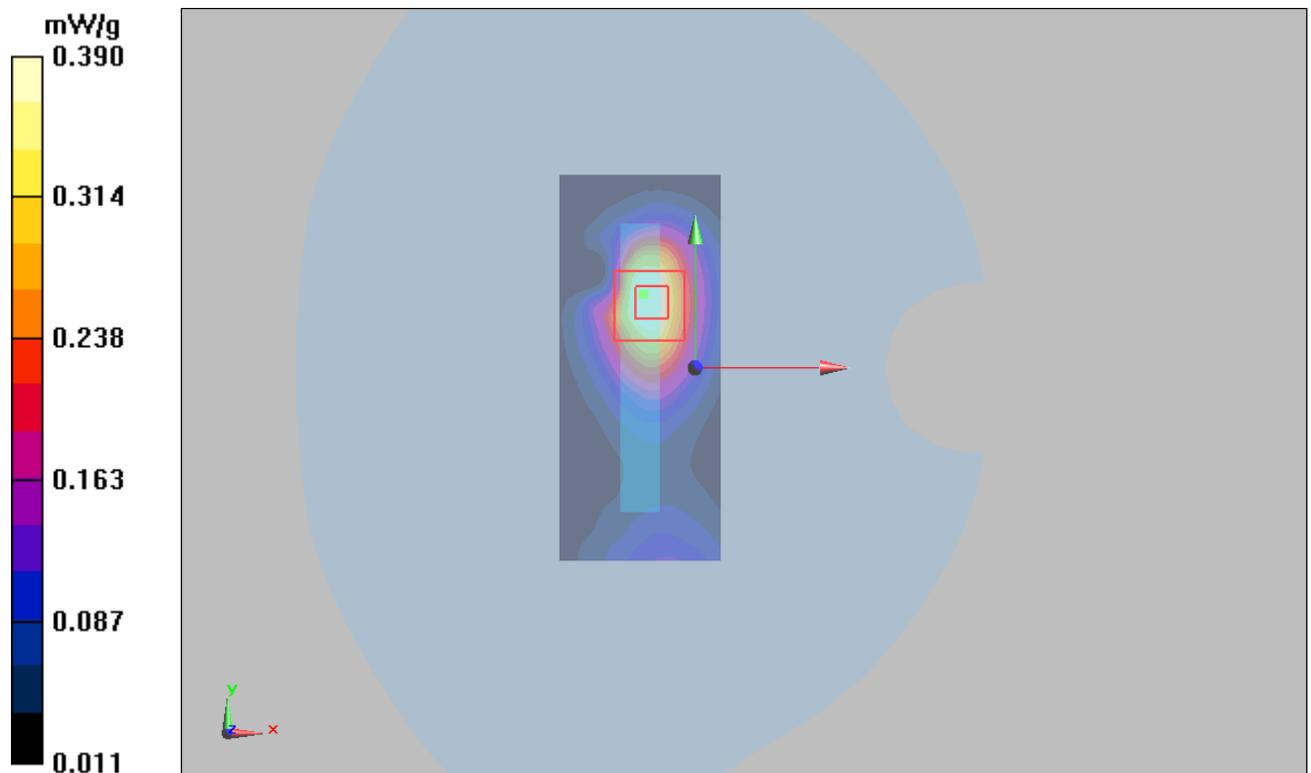


**Figure 15 GSM 850 GPRS (2Up) with Lenovo Y-450 Test Position 3 Channel 190**

**GSM 850 GPRS (2Up) with Lenovo Y-450 Test Position 4 Middle**

Date/Time: 8/31/2010 11:00:51 AM

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

Medium parameters used: f = 837 MHz; $\sigma$ = 1 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

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

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

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

Reference Value = 18.8 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 0.788 W/kg

**SAR(1 g) = 0.552 mW/g; SAR(10 g) = 0.364 mW/g**

Maximum value of SAR (measured) = 0.596 mW/g



**Figure 16 GSM 850 GPRS (2Up) with Lenovo Y-450 Test Position 4 Channel 190**

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

Date/Time: 8/31/2010 2:54:37 PM

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

Medium parameters used: f = 837 MHz; $\sigma$ = 1 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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


**Test Position 1 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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


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

Reference Value = 23.7 V/m; Power Drift = -0.000 dB

Peak SAR (extrapolated) = 1.32 W/kg

**SAR(1 g) = 0.907 mW/g; SAR(10 g) = 0.600 mW/g**

Maximum value of SAR (measured) = 0.990 mW/g
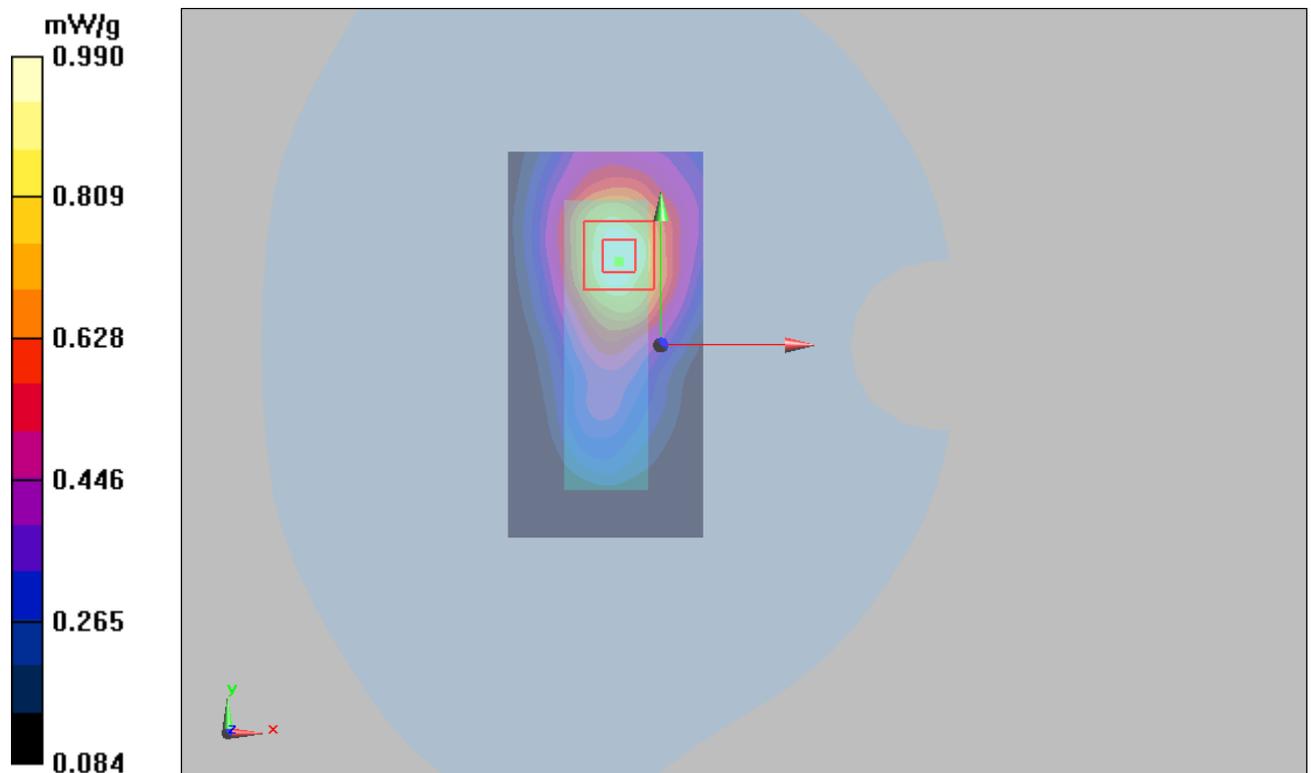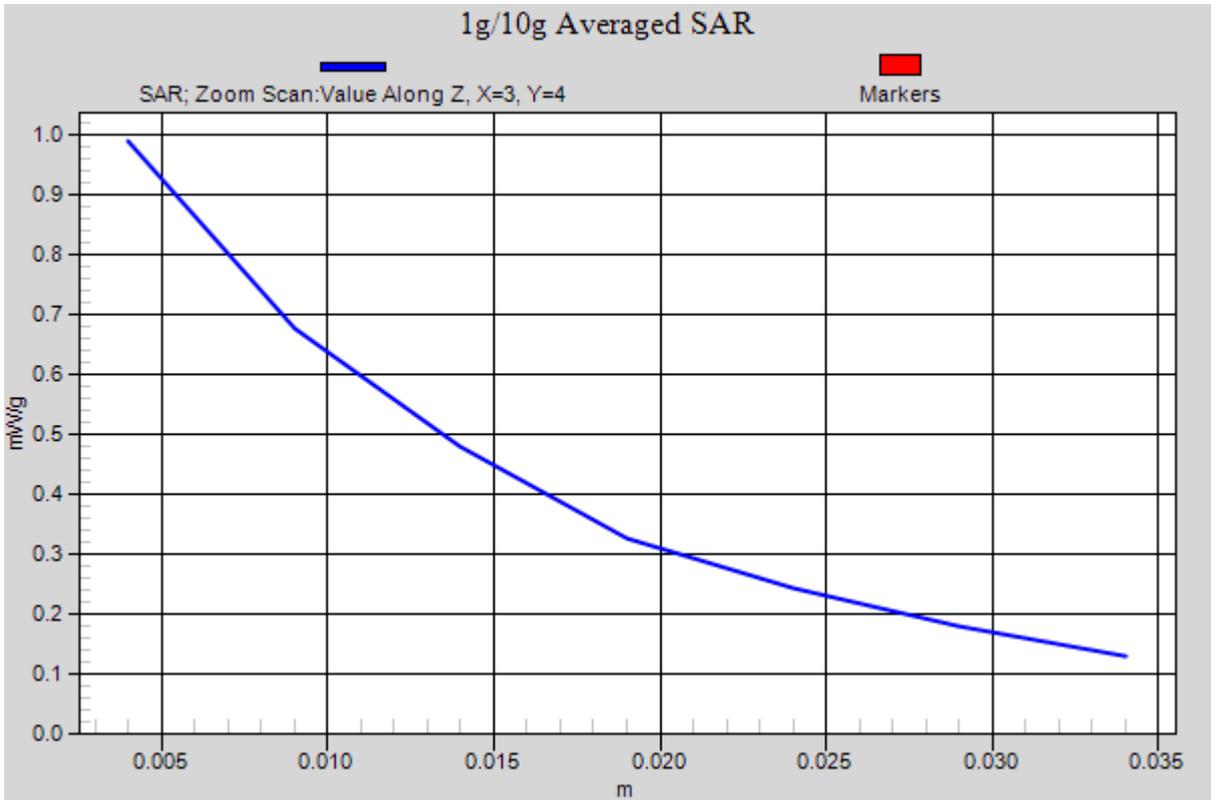
**Figure 17 GSM 850 EGPRS (2Up) with IBM T61 Test Position 1 Channel 190**

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

Date/Time: 8/30/2010 4:19:12 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; $\varepsilon_r$ = 52; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


**Test Position 1 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.835 mW/g


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

Reference Value = 11.3 V/m; Power Drift = -0.192 dB

Peak SAR (extrapolated) = 1.22 W/kg

**SAR(1 g) = 0.735 mW/g; SAR(10 g) = 0.410 mW/g**

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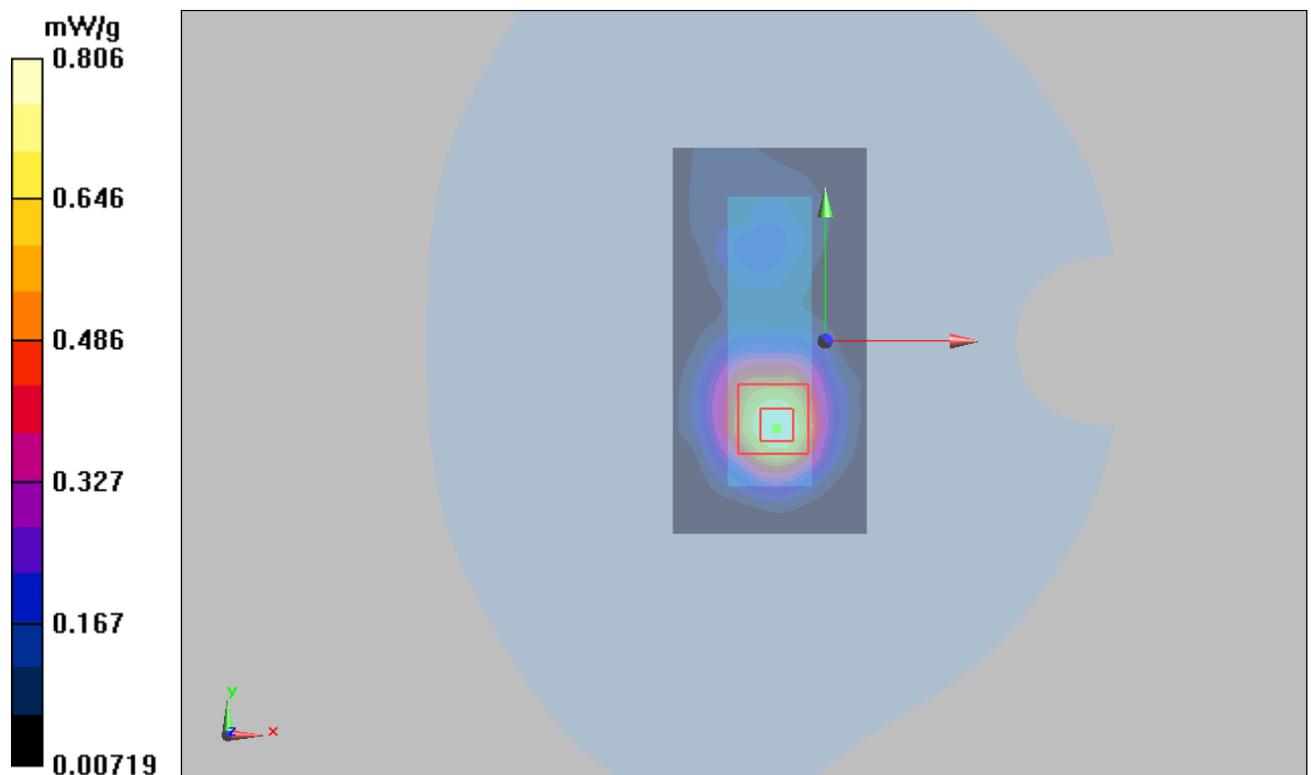


**Figure 18 GSM 1900 GPRS (2Up) with IBM T61 Test Position 1 Channel 661**

## GSM 1900 GPRS (2Up) with IBM T61 Test Position 2 High

Date/Time: 8/30/2010 8:56:11 PM

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

Medium parameters used: f = 1910 MHz; $\sigma$ = 1.57 mho/m; $\varepsilon_r$ = 51.9; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃      Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 2 High/Area Scan (41x111x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 17.7 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 1.34 W/kg

**SAR(1 g) = 0.810 mW/g; SAR(10 g) = 0.442 mW/g**

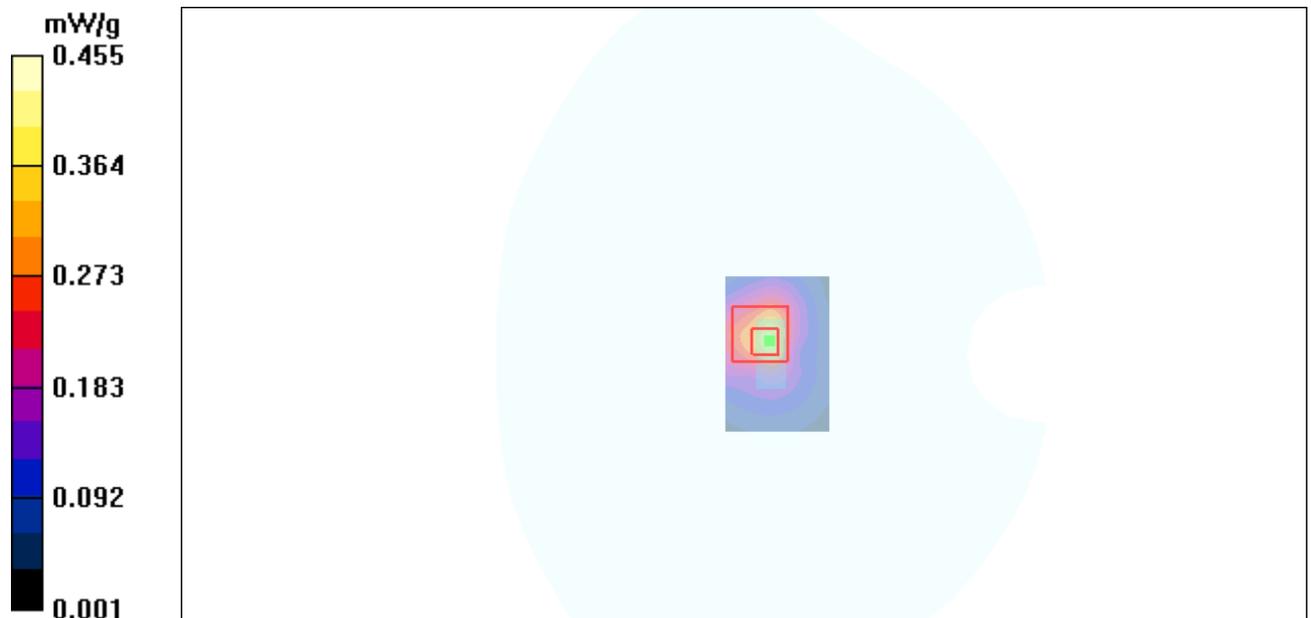Maximum value of SAR (measured) = 0.910 mW/g
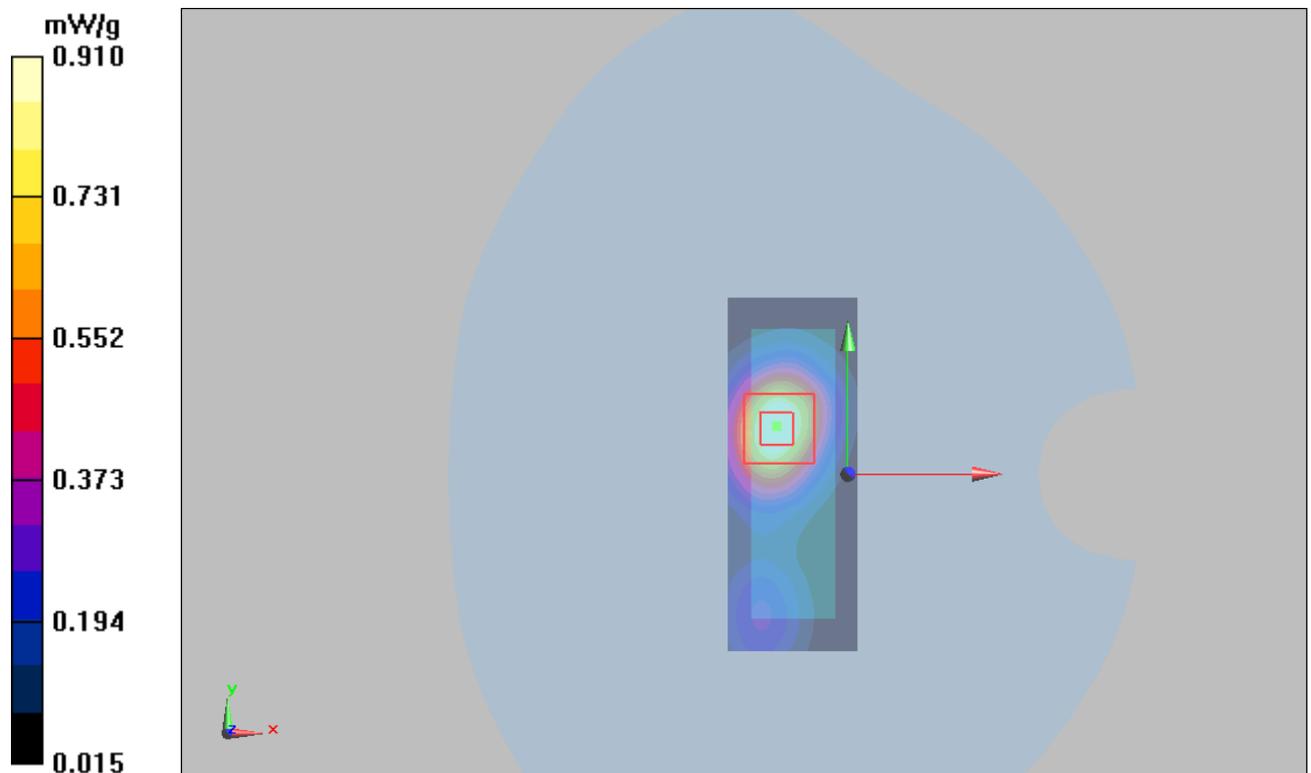


**Figure 19 GSM 1900 GPRS (2Up) with IBM T61 Test Position 2 Channel 810**

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

Date/Time: 8/30/2010 5:16:00 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; $\varepsilon_r$ = 52; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


**Test Position 2 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 15.1 V/m; Power Drift = 0.049 dB

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.767 mW/g; SAR(10 g) = 0.414 mW/g**

Maximum value of SAR (measured) = 0.851 mW/g


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

Reference Value = 15.1 V/m; Power Drift = 0.049 dB

Peak SAR (extrapolated) = 1.29 W/kg

**SAR(1 g) = 0.771 mW/g; SAR(10 g) = 0.370 mW/g**

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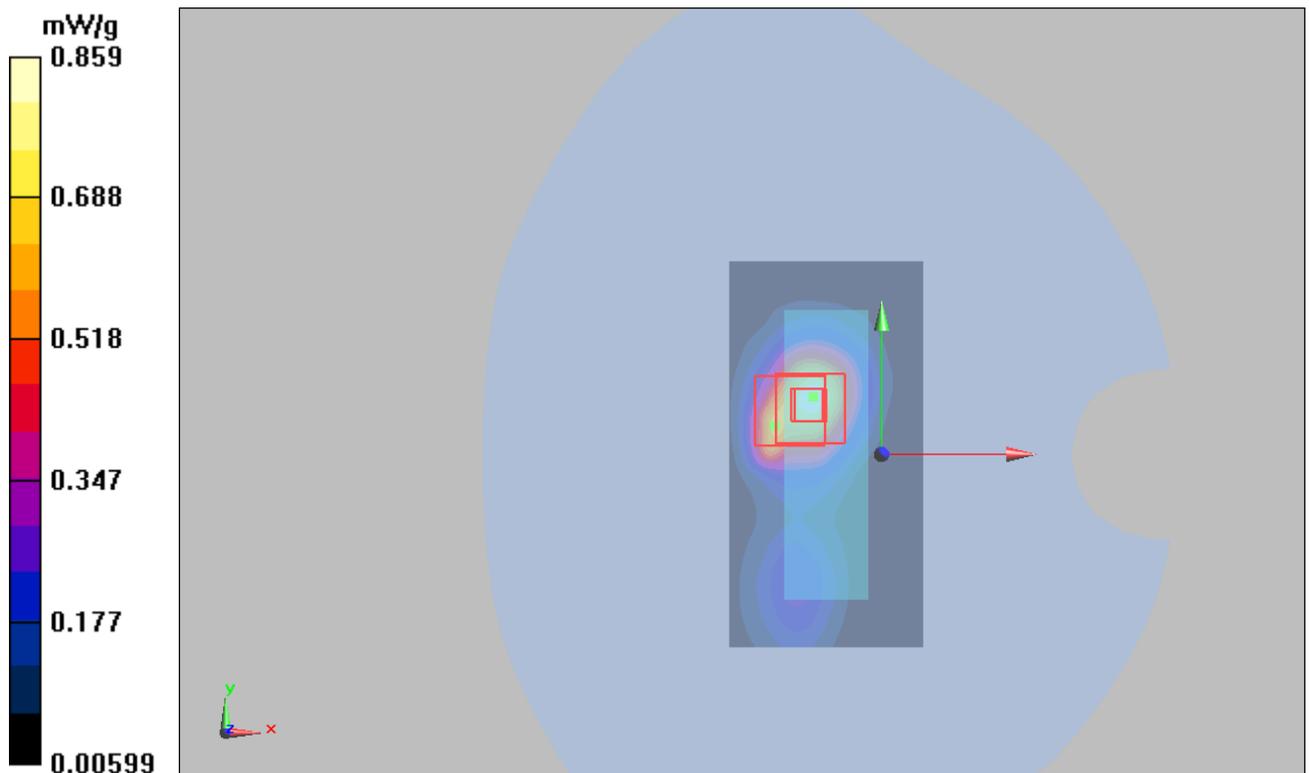


**Figure 20 GSM 1900 GPRS (2Up) with IBM T61 Test Position 2 Channel 661**

## GSM 1900 GPRS (2Up) with IBM T61 Test Position 2 Low

Date/Time: 8/30/2010 8:35:07 PM

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

Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.51 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 2 Low/Area Scan (41x111x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 14.8 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.668 mW/g; SAR(10 g) = 0.358 mW/g**

Maximum value of SAR (measured) = 0.744 mW/g
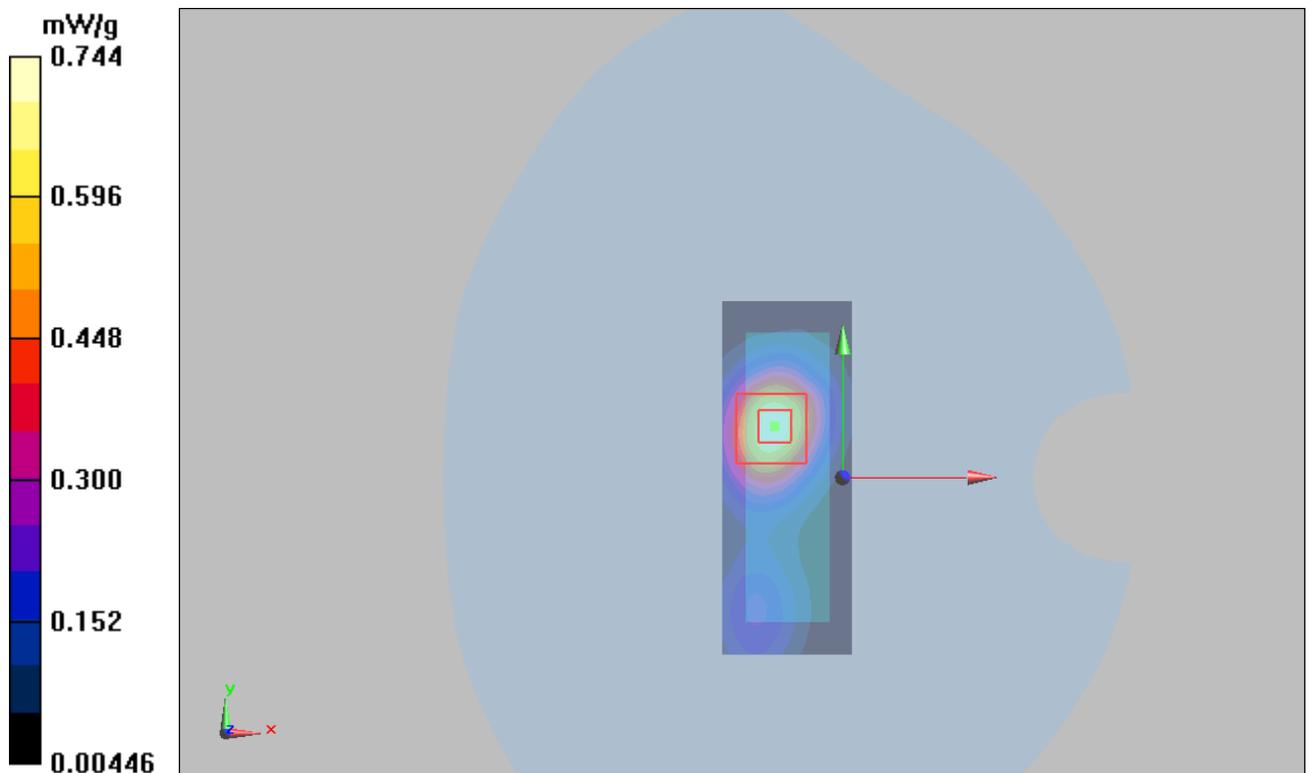


**Figure 21 GSM 1900 GPRS (2Up) with IBM T61 Test Position 2 Channel 512**

## GSM 1900 GPRS (2Up) with IBM T61 Test Position 5 Middle

Date/Time: 9/30/2010 4:24:04 PM

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

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m³

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 5 Middle/Area Scan (41x61x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 17.2 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.928 W/kg

**SAR(1 g) = 0.365 mW/g; SAR(10 g) = 0.163 mW/g**

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



**Figure 22 GSM 1900 GPRS (2Up) with IBM T61 Test Position 5 Channel 661**

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

Date/Time: 8/30/2010 9:24:02 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; $\varepsilon_r$ = 52; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃      Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


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

Maximum value of SAR (interpolated) = 0.395 mW/g


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

Reference Value = 9.09 V/m; Power Drift = 0.150 dB

Peak SAR (extrapolated) = 0.611 W/kg

**SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.167 mW/g**

Maximum value of SAR (measured) = 0.385 mW/g
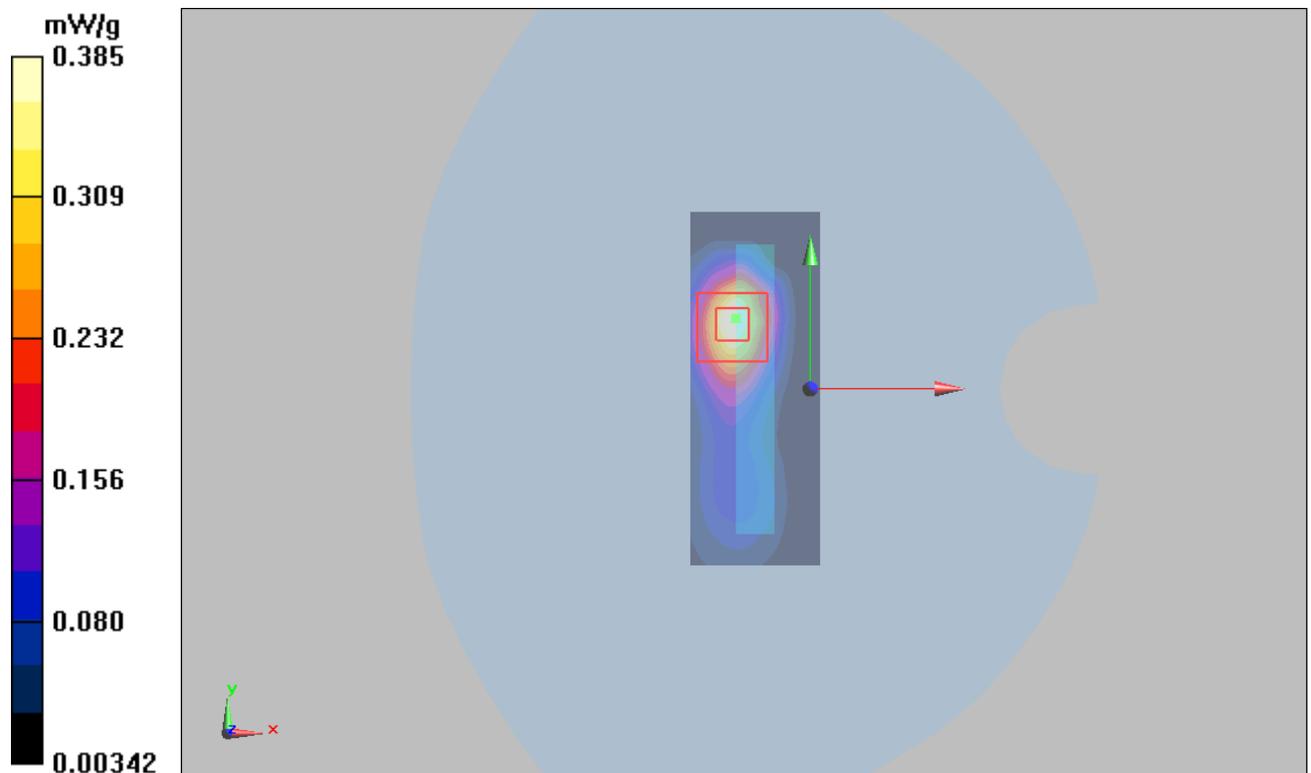


**Figure 23 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 3 Channel 661**

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

Date/Time: 8/30/2010 10:35:46 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; $ε_r$ = 52; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


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

Maximum value of SAR (interpolated) = 0.537 mW/g


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

Reference Value = 12.1 V/m; Power Drift = -0.152 dB

Peak SAR (extrapolated) = 0.744 W/kg

**SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.265 mW/g**

Maximum value of SAR (measured) = 0.512 mW/g
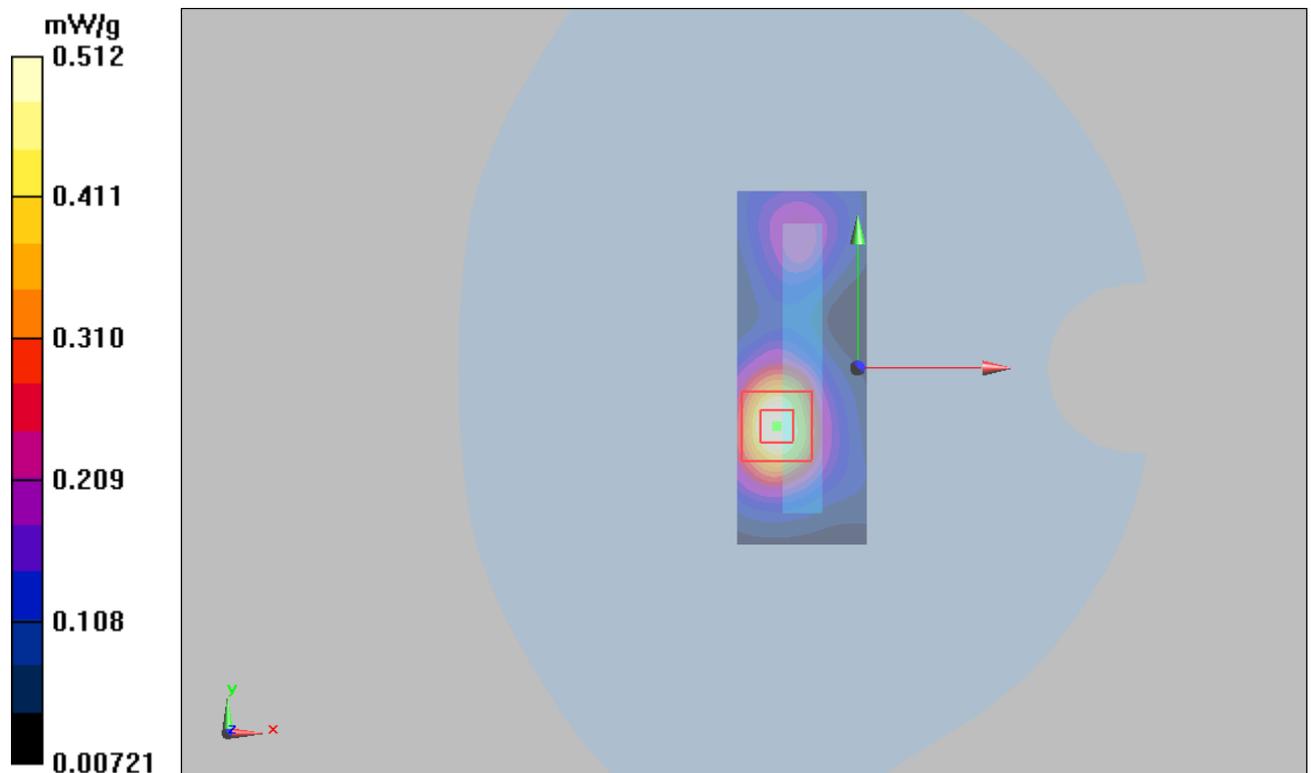


**Figure 24 GSM 1900 GPRS (2Up) with Lenovo Y-450 Test Position 4 Channel 661**

## GSM 1900 EGPRS (4Up) with IBM T61 Test Position 2 High

Date/Time: 8/30/2010 11:15:24 AM

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

Medium parameters used: f = 1910 MHz; σ = 1.57 mho/m; $ε_r$ = 51.9; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃      Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 2 High/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 14.8 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 1.56 W/kg

**SAR(1 g) = 0.918 mW/g; SAR(10 g) = 0.504 mW/g**

Maximum value of SAR (measured) = 1.05 mW/g
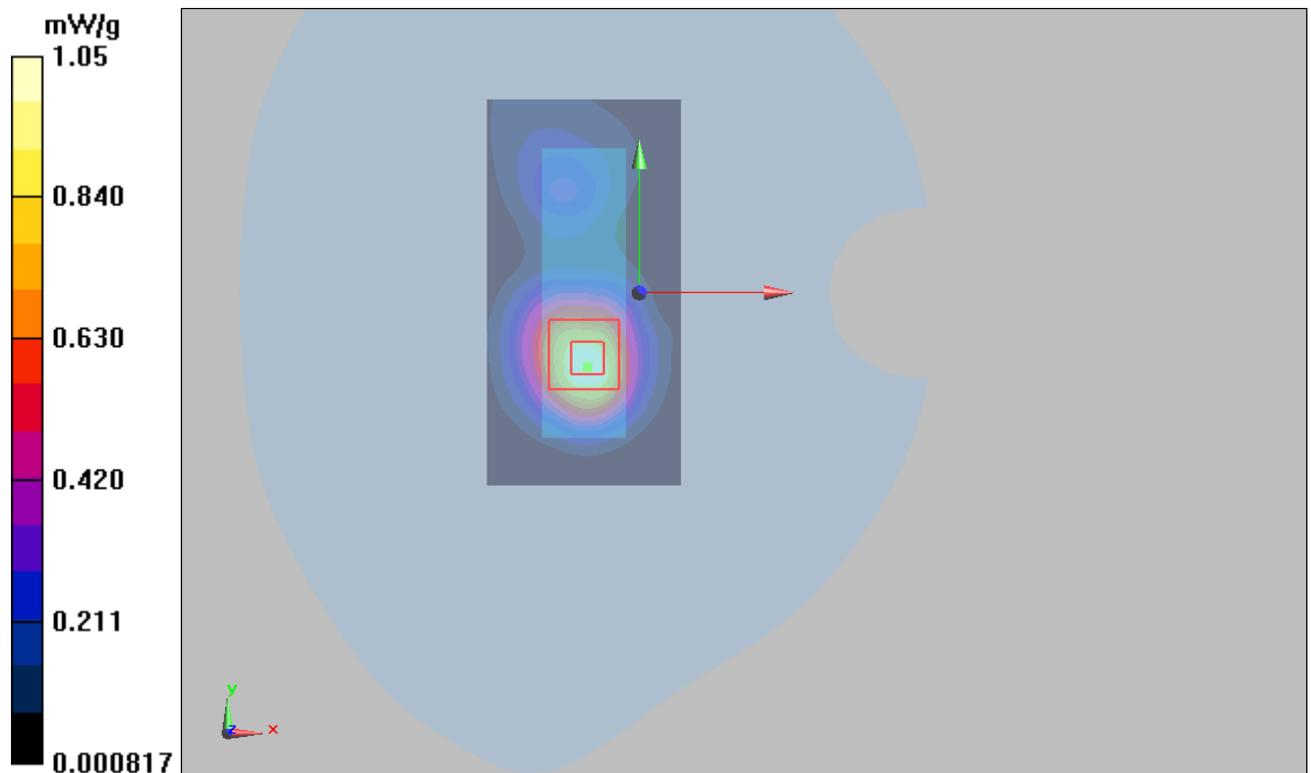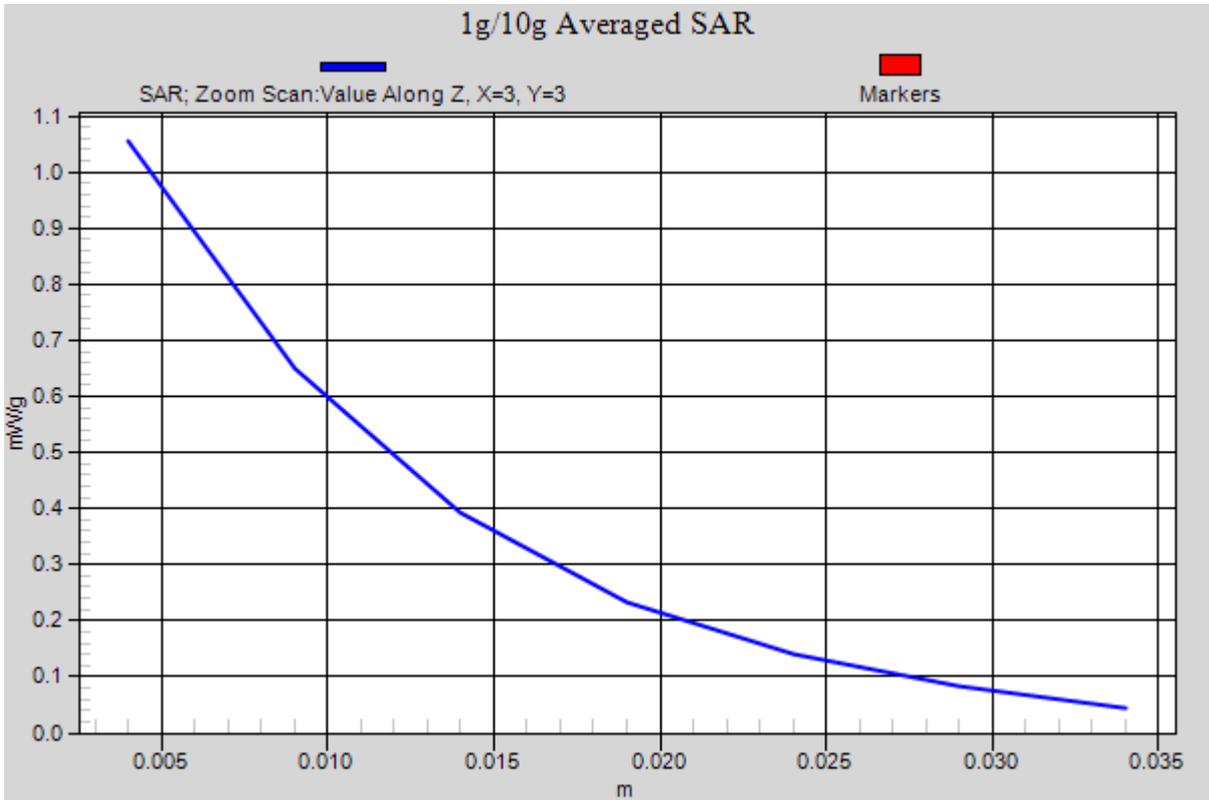
**Figure 25 GSM 1900 EGPRS (4Up) with IBM T61 Test Position 2 Channel 810**

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

Date/Time: 8/30/2010 1:24:56 PM

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

Medium parameters used: f = 1908 MHz; $\sigma$ = 1.57 mho/m; $\varepsilon_r$ = 51.9; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 1 High/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 11.4 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 1.89 W/kg

**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.632 mW/g**
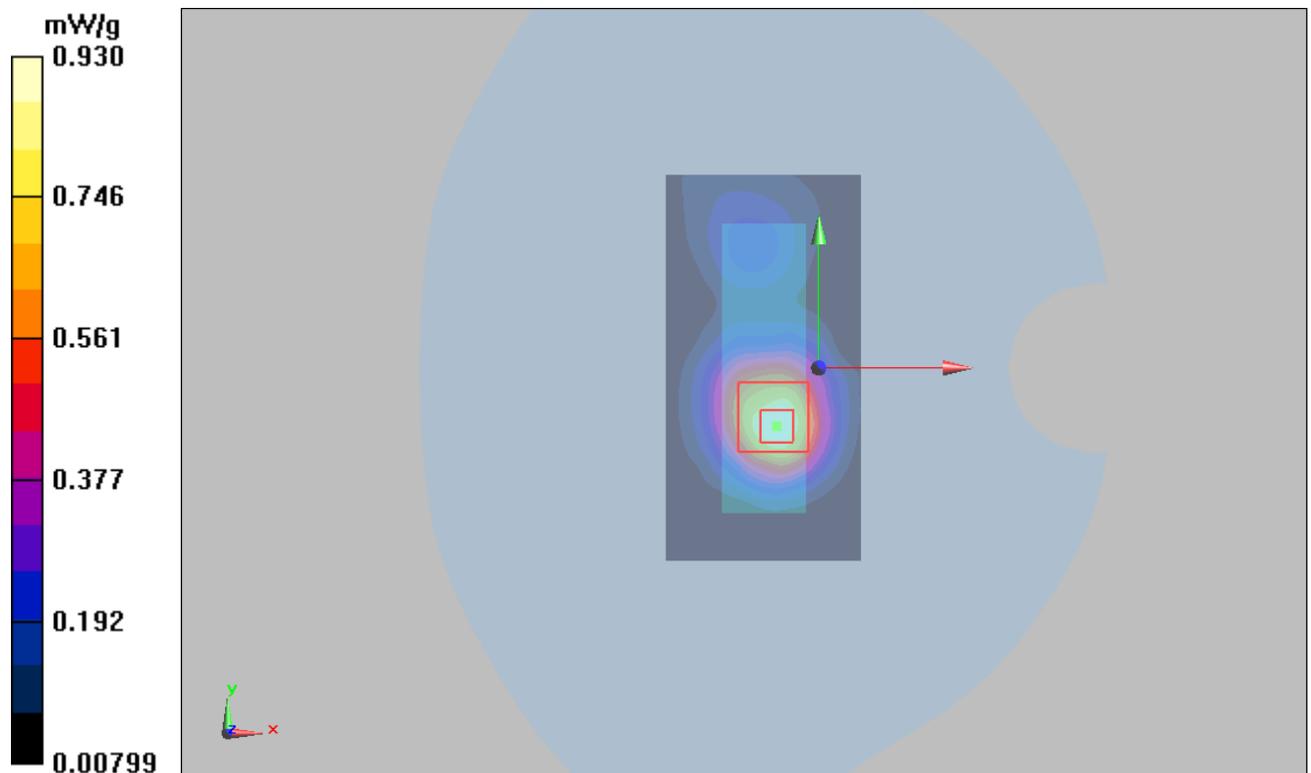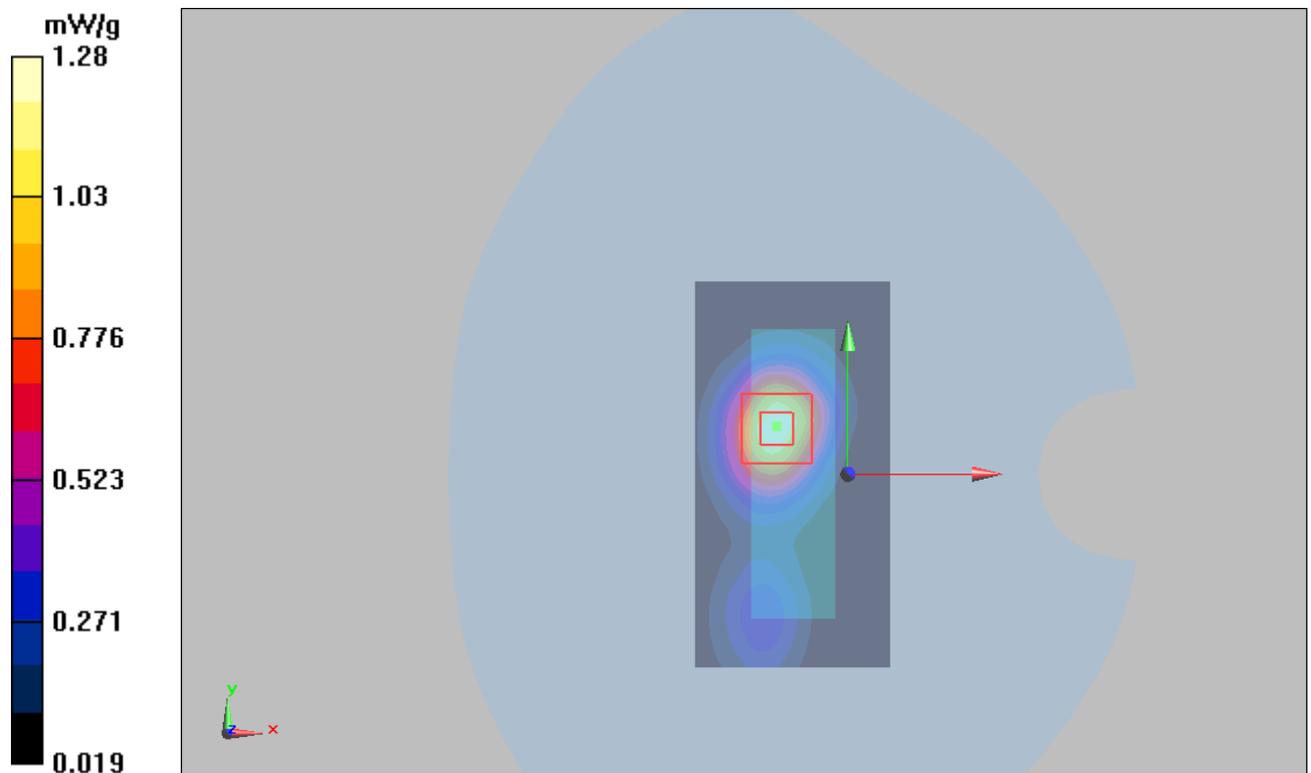
Maximum value of SAR (measured) = 1.25 mW/g
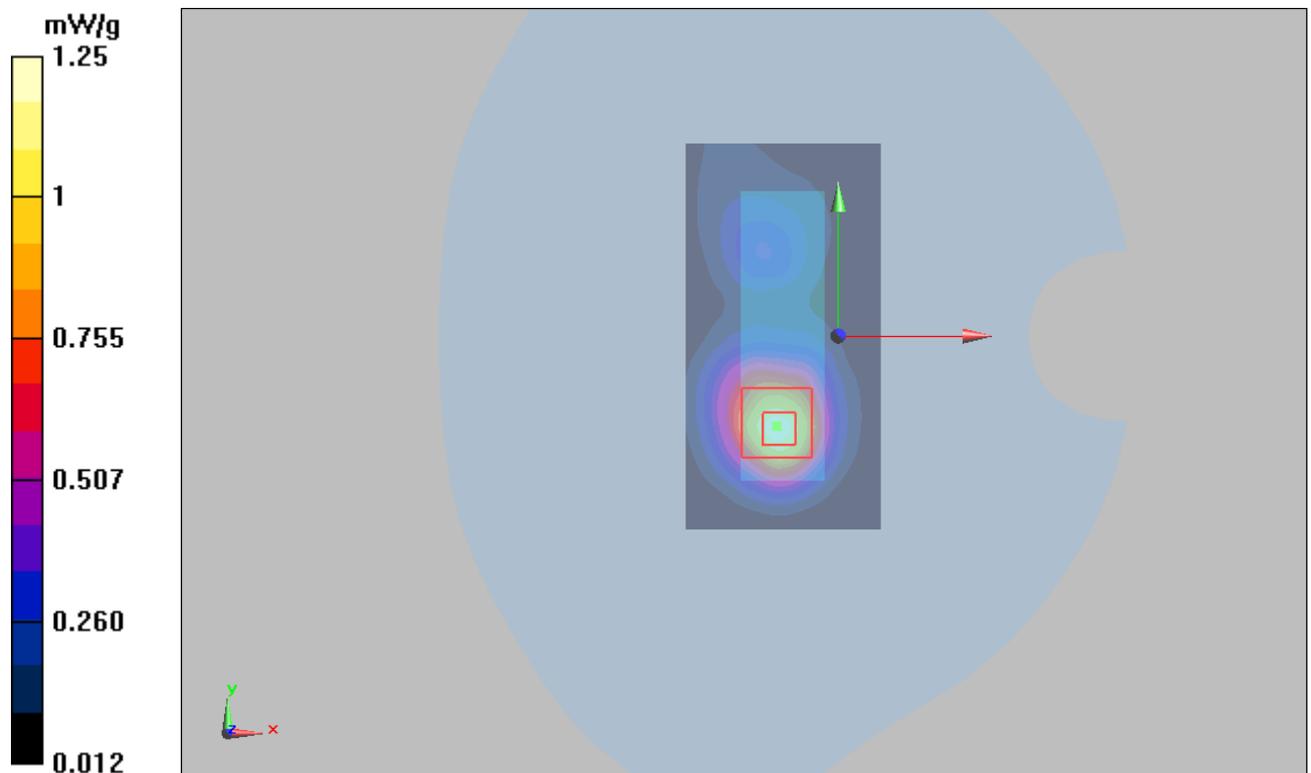


**Figure 26 WCDMA Band II with IBM T61 Test Position 1 Channel 9538**

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

Date/Time: 8/30/2010 2:11:33 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; $ε_r$ = 52; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


**Test Position 1 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.16 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 = 0.080 dB

Peak SAR (extrapolated) = 1.73 W/kg

**SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.575 mW/g**
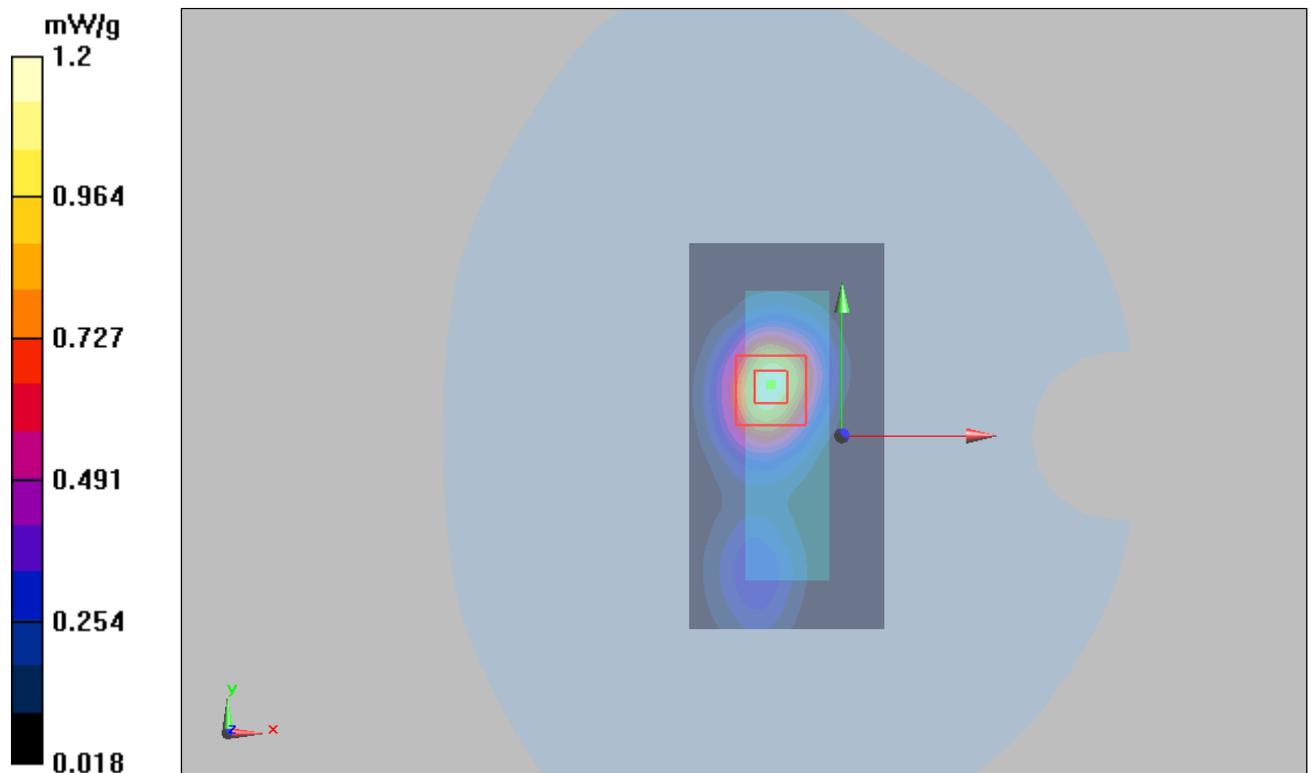
Maximum value of SAR (measured) = 1.13 mW/g
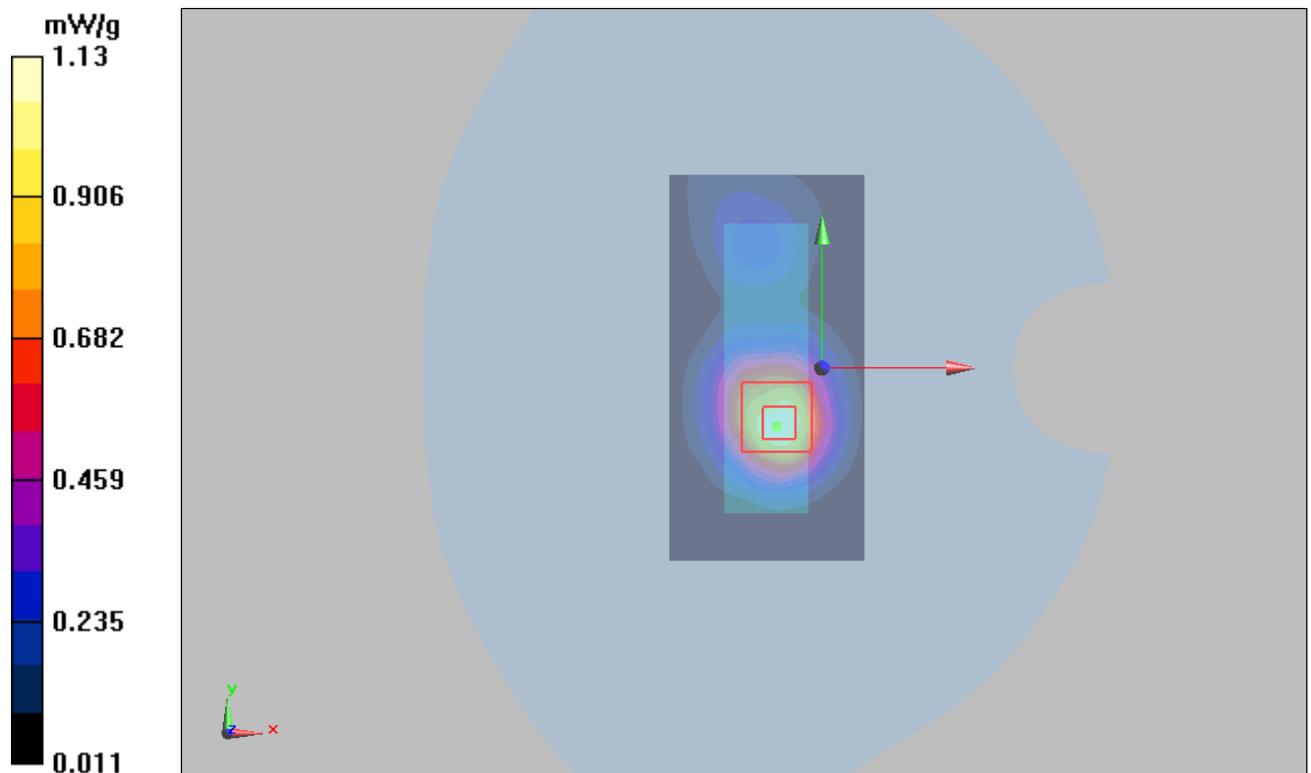


**Figure 27 WCDMA Band II with IBM T61 Test Position 1 Channel 9400**

## WCDMA Band II with IBM T61 Test Position 1 Low

Date/Time: 8/30/2010 2:35:53 PM

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

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.51 mho/m; $\varepsilon_r$ = 52.1; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃       Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 1 Low/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 17.8 V/m; Power Drift = -0.185 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.846 mW/g; SAR(10 g) = 0.474 mW/g**

Maximum value of SAR (measured) = 0.930 mW/g



**Figure 28 WCDMA Band II with IBM T61 Test Position 1 Channel 9262**

**WCDMA Band II with IBM T61 Test Position 2 High**

Date/Time: 8/30/2010 6:47:47 PM

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

Medium parameters used: f = 1908 MHz; σ = 1.57 mho/m; $\varepsilon_r$ = 51.9; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


**Test Position 2 High/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.31 mW/g


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

Reference Value = 19.8 V/m; Power Drift = 0.141 dB

Peak SAR (extrapolated) = 1.89 W/kg

**SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.624 mW/g**

Maximum value of SAR (measured) = 1.28 mW/g



**Figure 29 WCDMA Band II with IBM T61 Test Position 2 Channel 9538**

## WCDMA Band II with IBM T61 Test Position 2 Middle

Date/Time: 8/30/2010 6:21:30 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; $\varepsilon_r$ = 52; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃     Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 2 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 18.4 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 1.79 W/kg

**SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.581 mW/g**
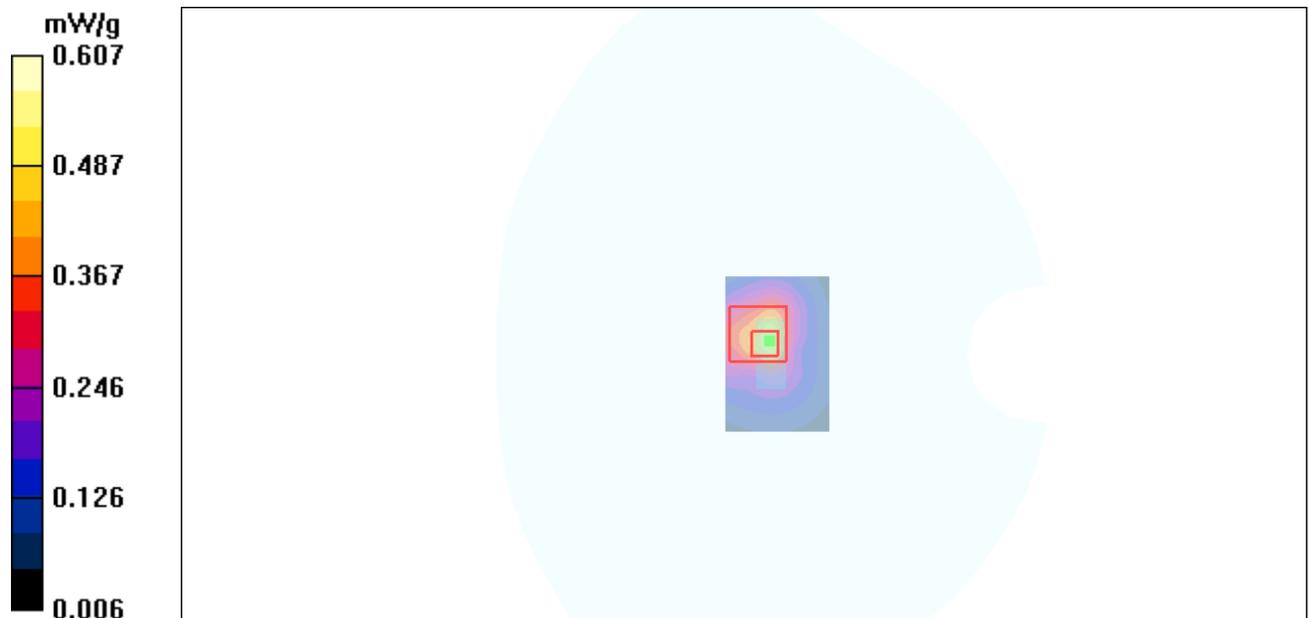
Maximum value of SAR (measured) = 1.2 mW/g



**Figure 30 WCDMA Band II with IBM T61 Test Position 2 Channel 9400**

**WCDMA Band II with IBM T61 Test Position 2 Low**

Date/Time: 8/30/2010 7:12:10 PM

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

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.51 mho/m; $ε_r$ = 52.1; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 2 Low/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

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

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

Reference Value = 17.2 V/m; Power Drift = -0.084 dB

Peak SAR (extrapolated) = 1.47 W/kg

**SAR(1 g) = 0.883 mW/g; SAR(10 g) = 0.476 mW/g**

Maximum value of SAR (measured) = 0.987 mW/g
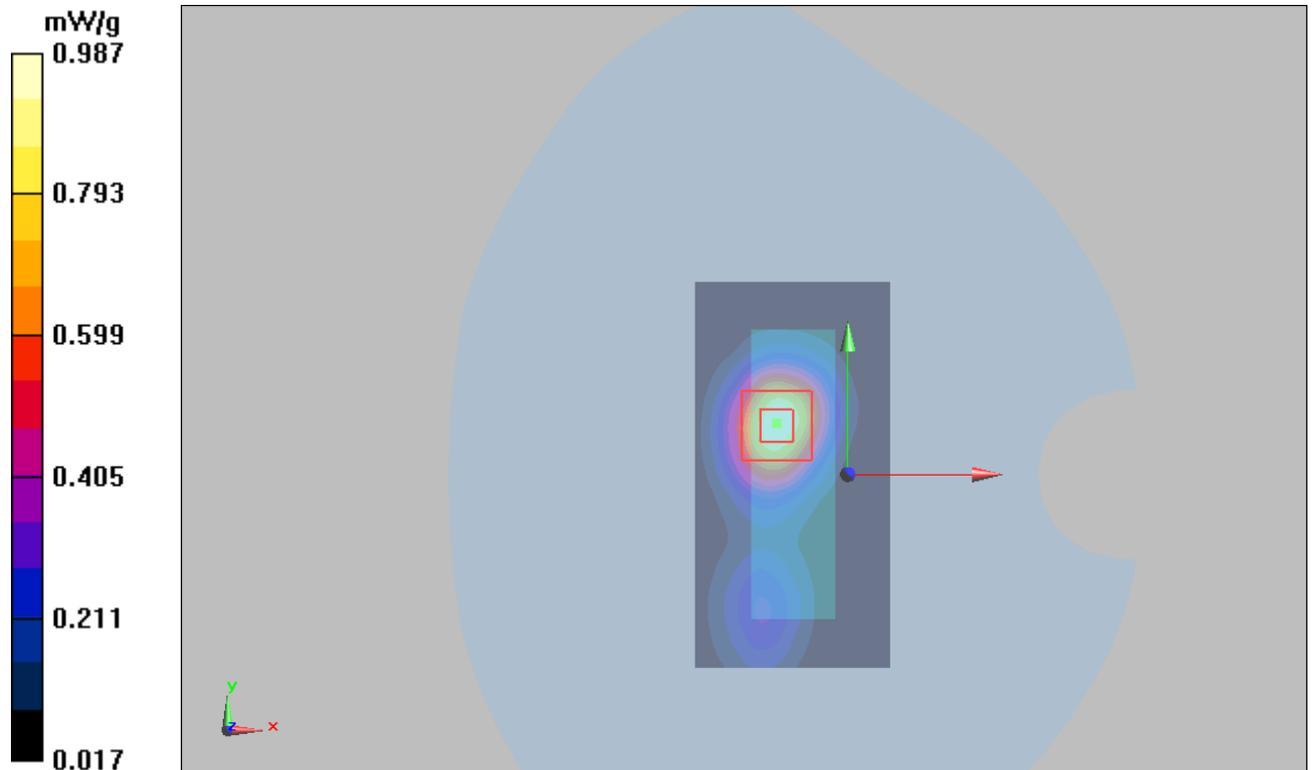


**Figure 31 WCDMA Band II with IBM T61 Test Position 2 Channel 9262**

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

Date/Time: 9/30/2010 4:08:14 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; $ε_r$ = 52.1; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

**Test Position 5 Middle/Area Scan (41x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.494 mW/g

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

Reference Value = 19.4 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 2.36 W/kg

**SAR(1 g) = 0.550 mW/g; SAR(10 g) = 0.228 mW/g**
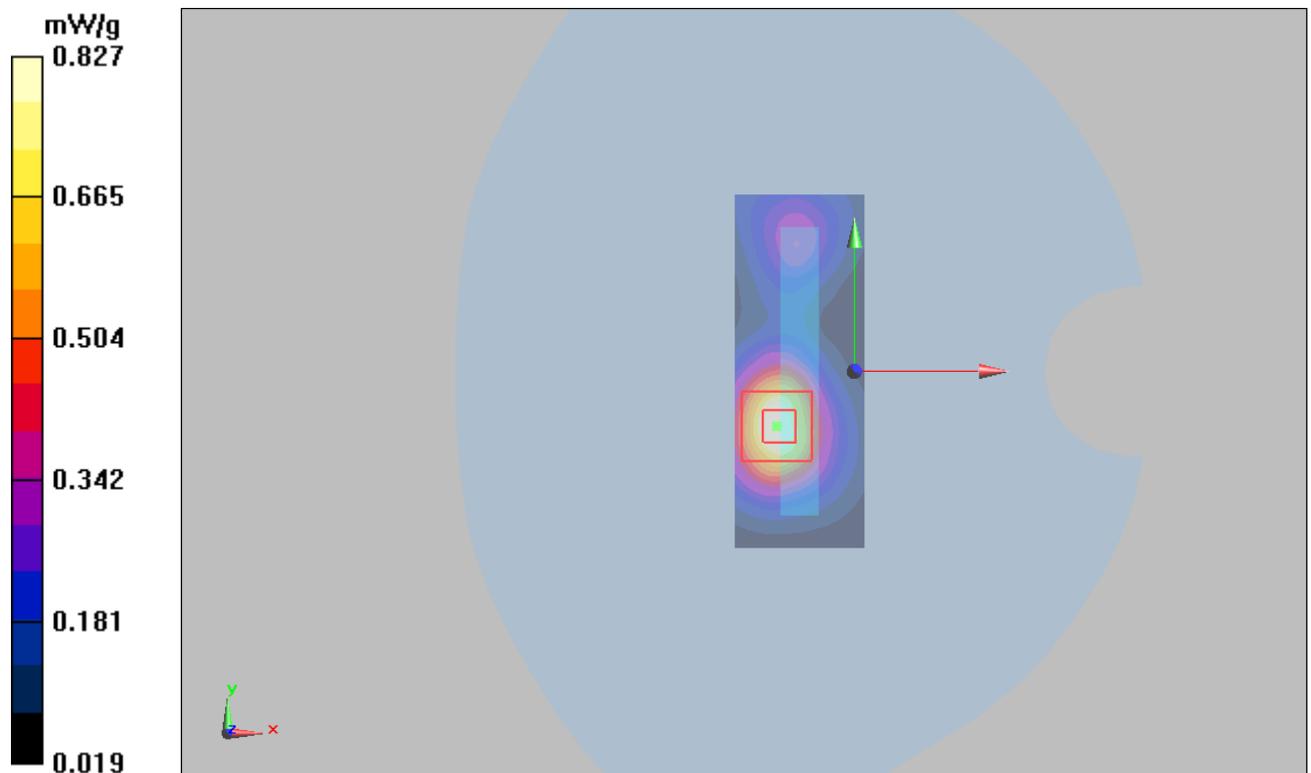
Maximum value of SAR (measured) = 0.607 mW/g



**Figure 32 WCDMA Band II with IBM T61 Test Position 5 Channel 9400**

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

Date/Time: 8/30/2010 9:46:48 PM

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

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.54 mho/m; $\varepsilon_r$ = 52; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.563 mW/g

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

Reference Value = 10.8 V/m; Power Drift = 0.071 dB

Peak SAR (extrapolated) = 0.899 W/kg

**SAR(1 g) = 0.500 mW/g; SAR(10 g) = 0.250 mW/g**

Maximum value of SAR (measured) = 0.572 mW/g
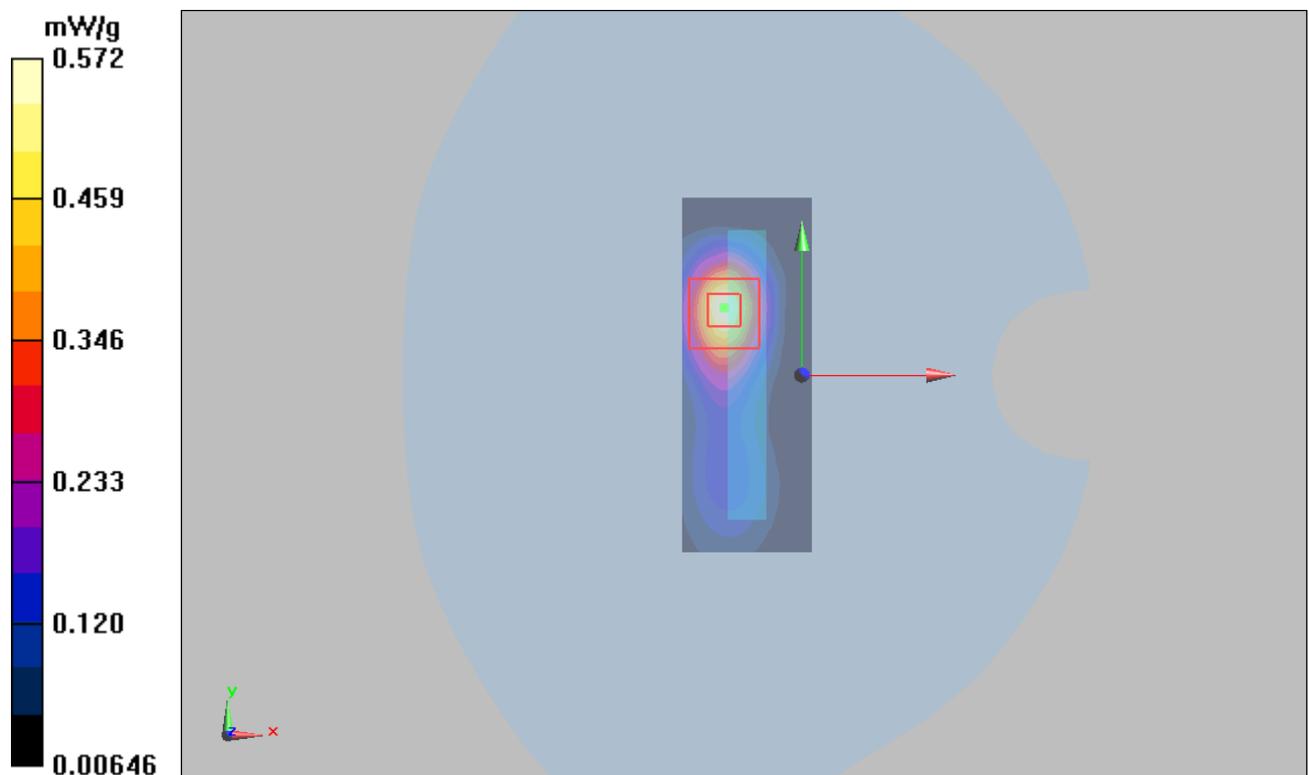


**Figure 33 WCDMA Band II with Lenovo Y-450 Test Position 3 Channel 9400**

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

Date/Time: 8/30/2010 10:10:39 PM

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

Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; $\varepsilon_r$ = 52; ρ = 1000 kg/m³

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.861 mW/g

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

Reference Value = 15.7 V/m; Power Drift = -0.179 dB

Peak SAR (extrapolated) = 1.19 W/kg

**SAR(1 g) = 0.754 mW/g; SAR(10 g) = 0.426 mW/g**

Maximum value of SAR (measured) = 0.827 mW/g



**Figure 34 WCDMA Band II with Lenovo Y-450 Test Position 4 Channel 9400**

**WCDMA Band II HSDPA with IBM T61 Test Position 2 High**

Date/Time: 8/30/2010 8:10:49 PM

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

Medium parameters used: f = 1908 MHz; σ = 1.57 mho/m; $ε_r$ = 51.9; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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


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

Maximum value of SAR (interpolated) = 1.3 mW/g


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

Reference Value = 19.9 V/m; Power Drift = 0.065 dB

Peak SAR (extrapolated) = 1.94 W/kg

**SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.634 mW/g**
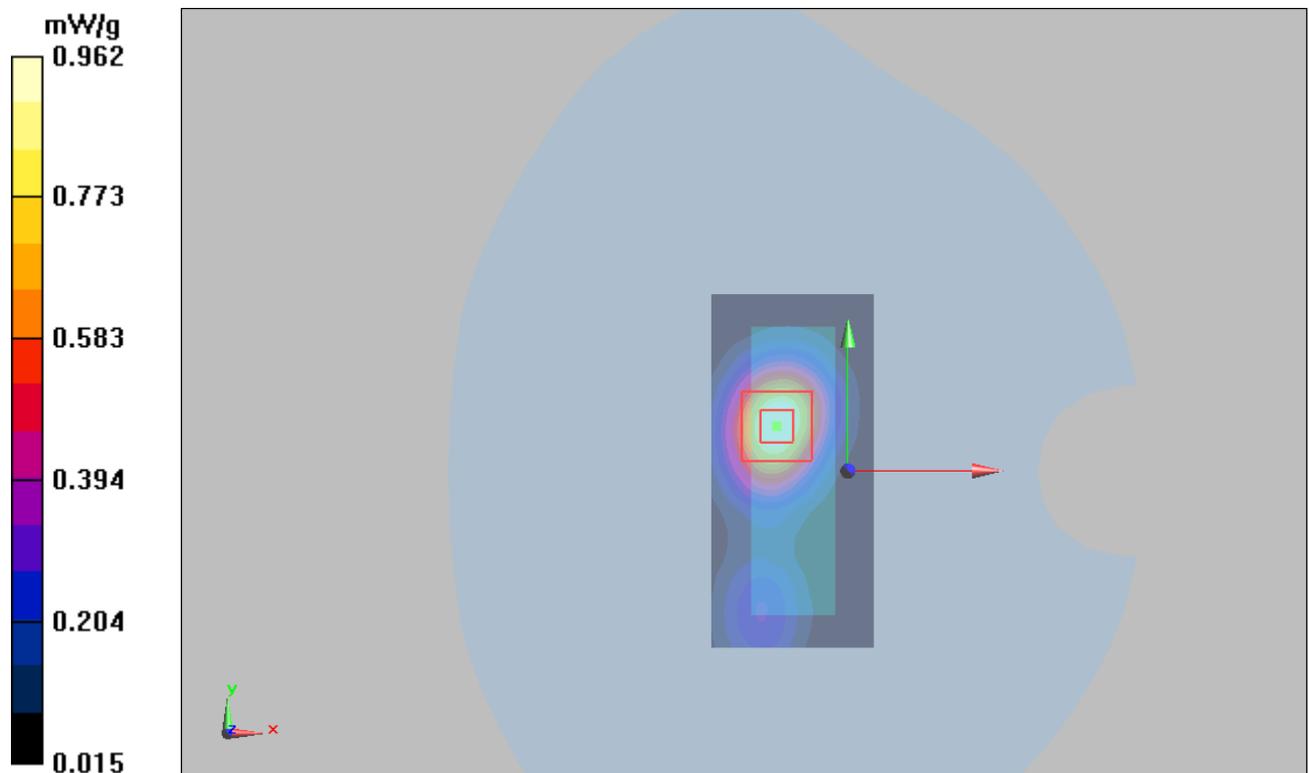
Maximum value of SAR (measured) = 1.31 mW/g
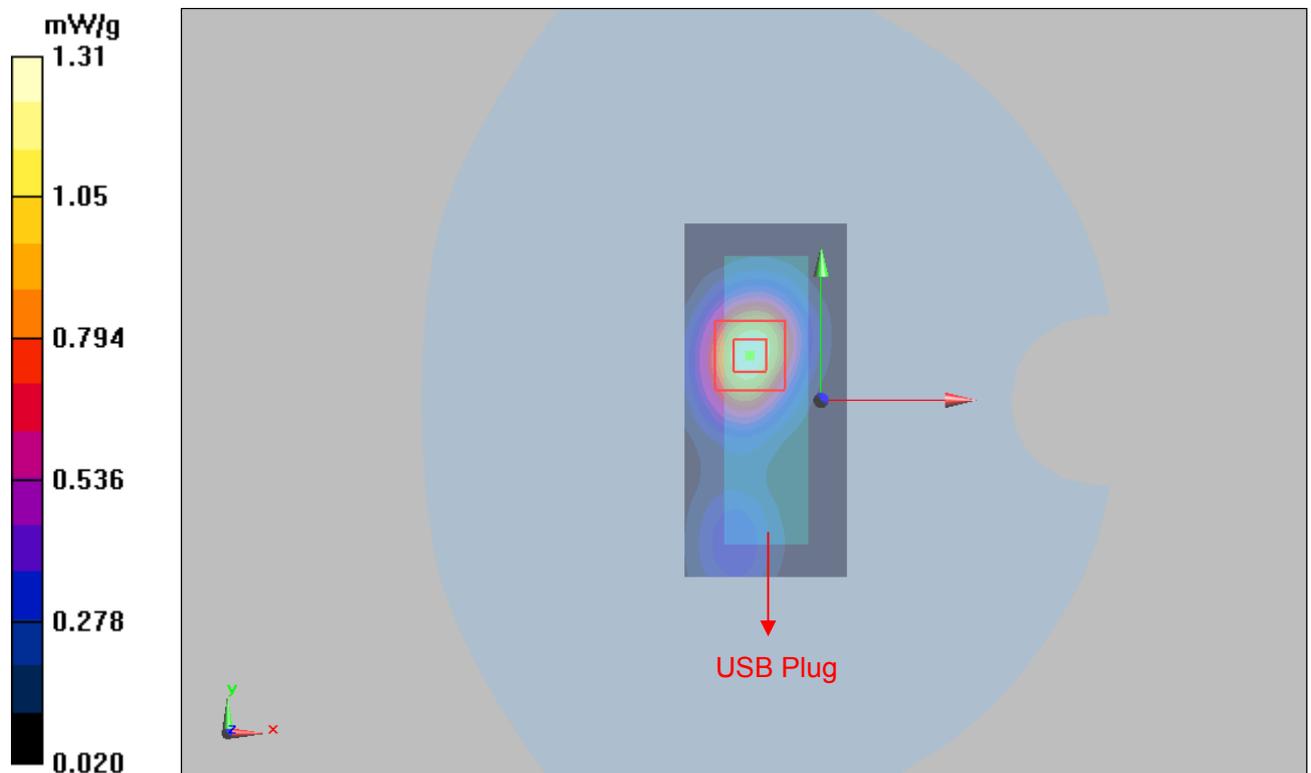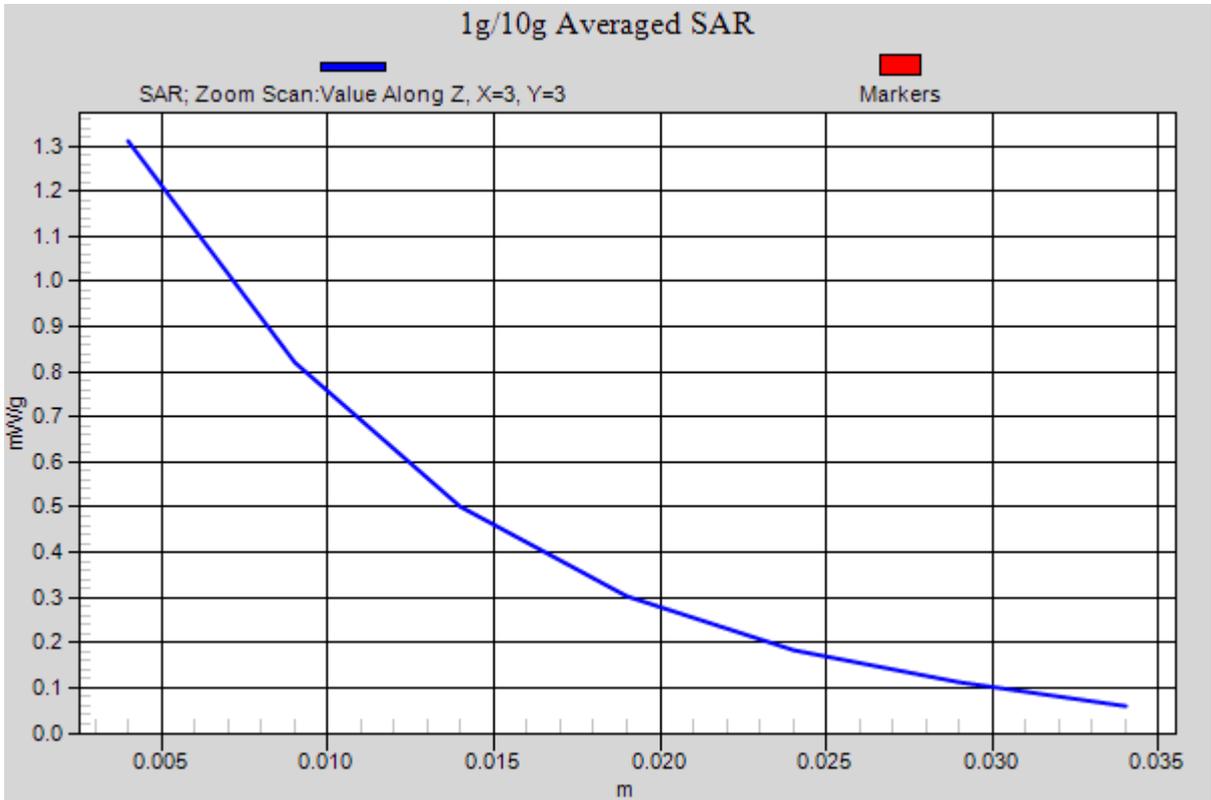
**Figure 35 WCDMA Band II HSDPA with IBM T61 Test Position 2 Channel 9538**

## WCDMA Band II HSUPA with IBM T61 Test Position 2 High

Date/Time: 8/30/2010 7:45:31 PM

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

Medium parameters used: f = 1908 MHz; σ = 1.57 mho/m; $\varepsilon_r$ = 51.9; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM2; Type: SAM;

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

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

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

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

Reference Value = 18.3 V/m; Power Drift = -0.046 dB

Peak SAR (extrapolated) = 1.42 W/kg

**SAR(1 g) = 0.863 mW/g; SAR(10 g) = 0.467 mW/g**

Maximum value of SAR (measured) = 0.962 mW/g
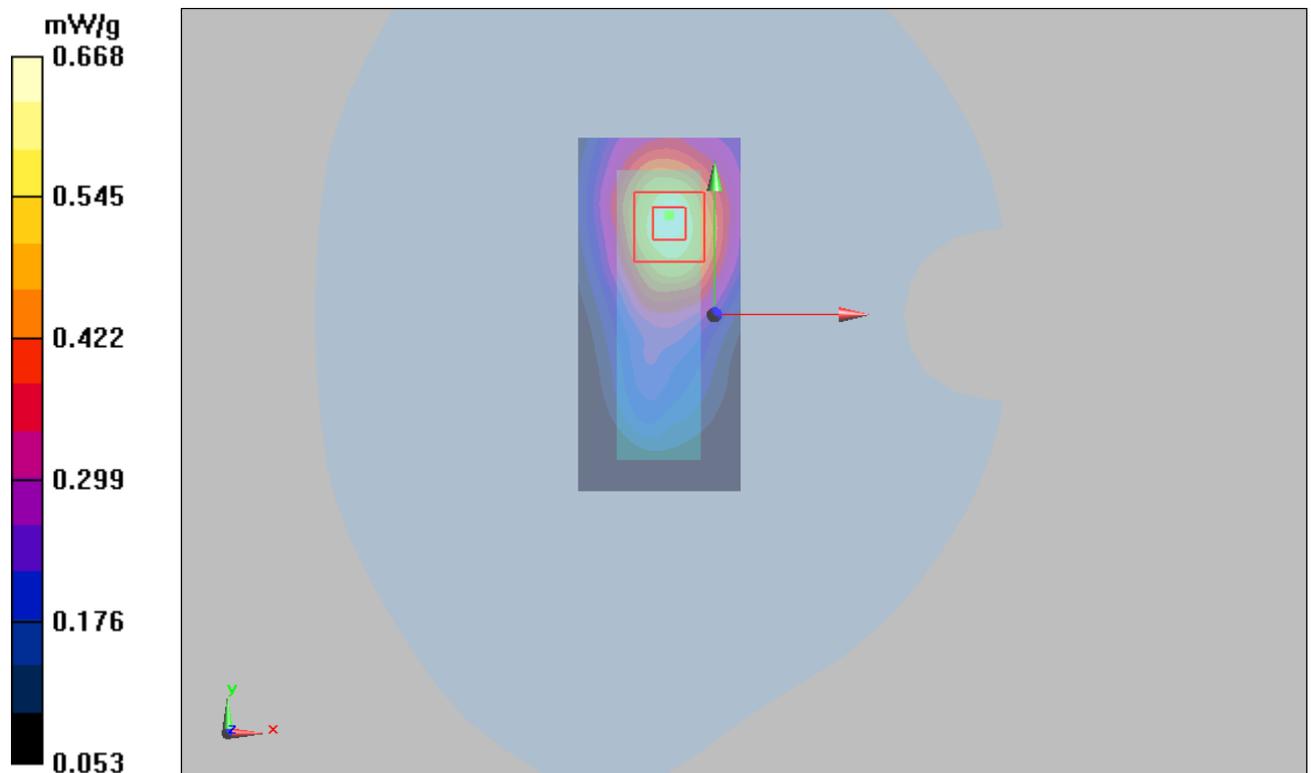


**Figure 36 WCDMA Band II HSUPA with IBM T61 Test Position 2 Channel 9538**

**WCDMA Band V with IBM T61 Test Position 1 High**

Date/Time: 8/31/2010 3:49:05 PM

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

Medium parameters used: f = 847 MHz; σ = 1.01 mho/m; $\varepsilon_r$ = 54.7; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.656 mW/g

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

Reference Value = 17.9 V/m; Power Drift = -0.101 dB

Peak SAR (extrapolated) = 0.876 W/kg

**SAR(1 g) = 0.609 mW/g; SAR(10 g) = 0.401 mW/g**
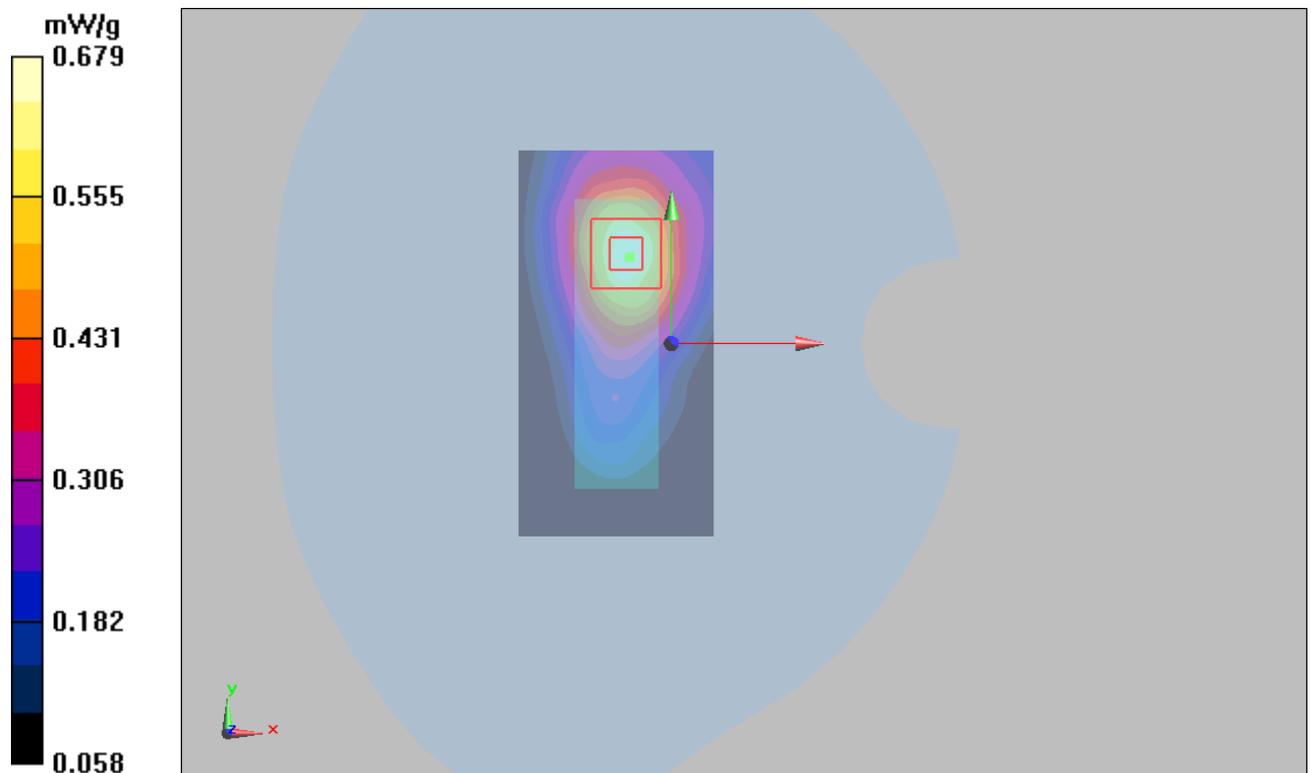
Maximum value of SAR (measured) = 0.668 mW/g



**Figure 37 WCDMA Band V with IBM T61 Test Position 1 Channel 4233**

**WCDMA Band V with IBM T61 Test Position 1 Middle**

Date/Time: 8/31/2010 4:11:56 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 1 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.678 mW/g

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

Reference Value = 18.5 V/m; Power Drift = -0.182 dB

Peak SAR (extrapolated) = 0.903 W/kg

**SAR(1 g) = 0.626 mW/g; SAR(10 g) = 0.414 mW/g**

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



**Figure 38 WCDMA Band V with IBM T61 Test Position 1 Channel 4183**

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

Date/Time: 8/31/2010 3:21:20 PM

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

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.99 mho/m; $\varepsilon_r$ = 54.9; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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


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

Maximum value of SAR (interpolated) = 0.699 mW/g


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

Reference Value = 19 V/m; Power Drift = -0.000 dB

Peak SAR (extrapolated) = 0.911 W/kg

**SAR(1 g) = 0.644 mW/g; SAR(10 g) = 0.428 mW/g**

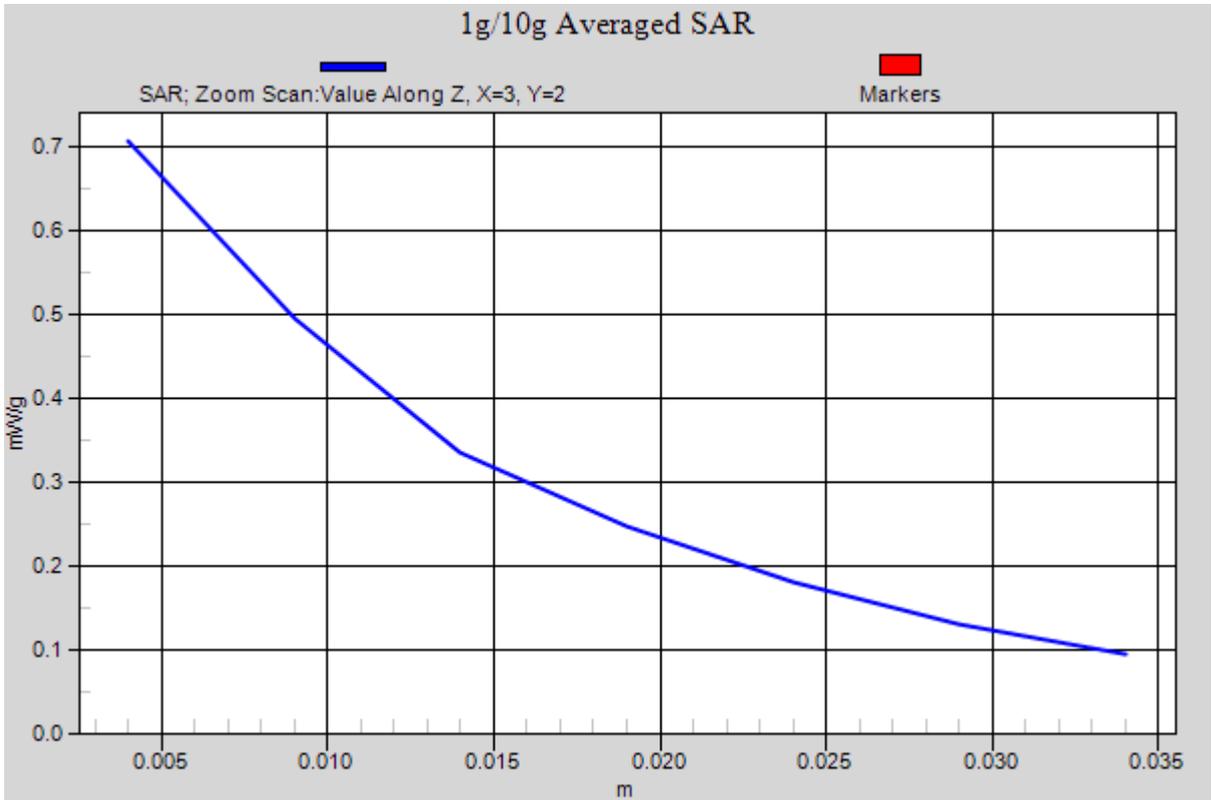Maximum value of SAR (measured) = 0.706 mW/g
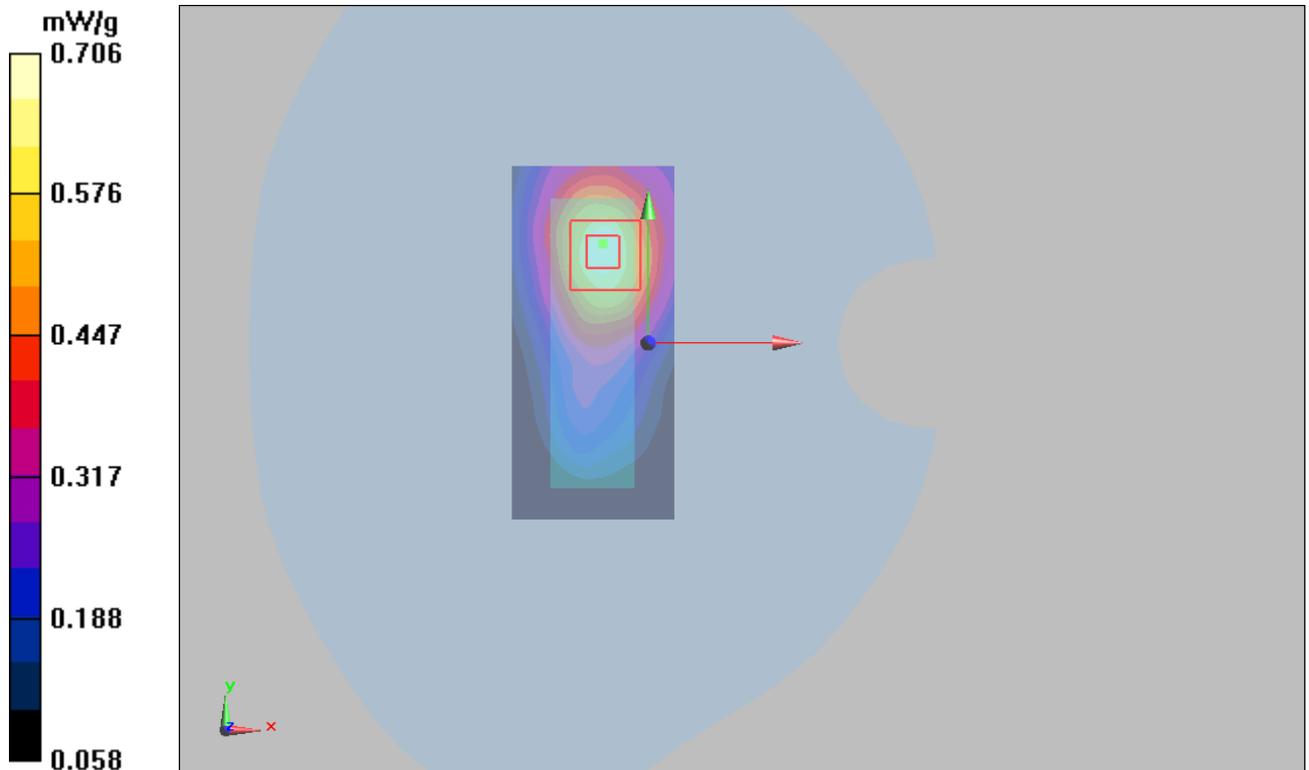
**Figure 39 WCDMA Band V with IBM T61 Test Position 1 Channel 4132**

**WCDMA Band V with IBM T61 Test Position 2 Middle**

Date/Time: 8/31/2010 1:32:52 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 2 Middle/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.425 mW/g

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

Reference Value = 17.3 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 0.617 W/kg

**SAR(1 g) = 0.380 mW/g; SAR(10 g) = 0.224 mW/g**

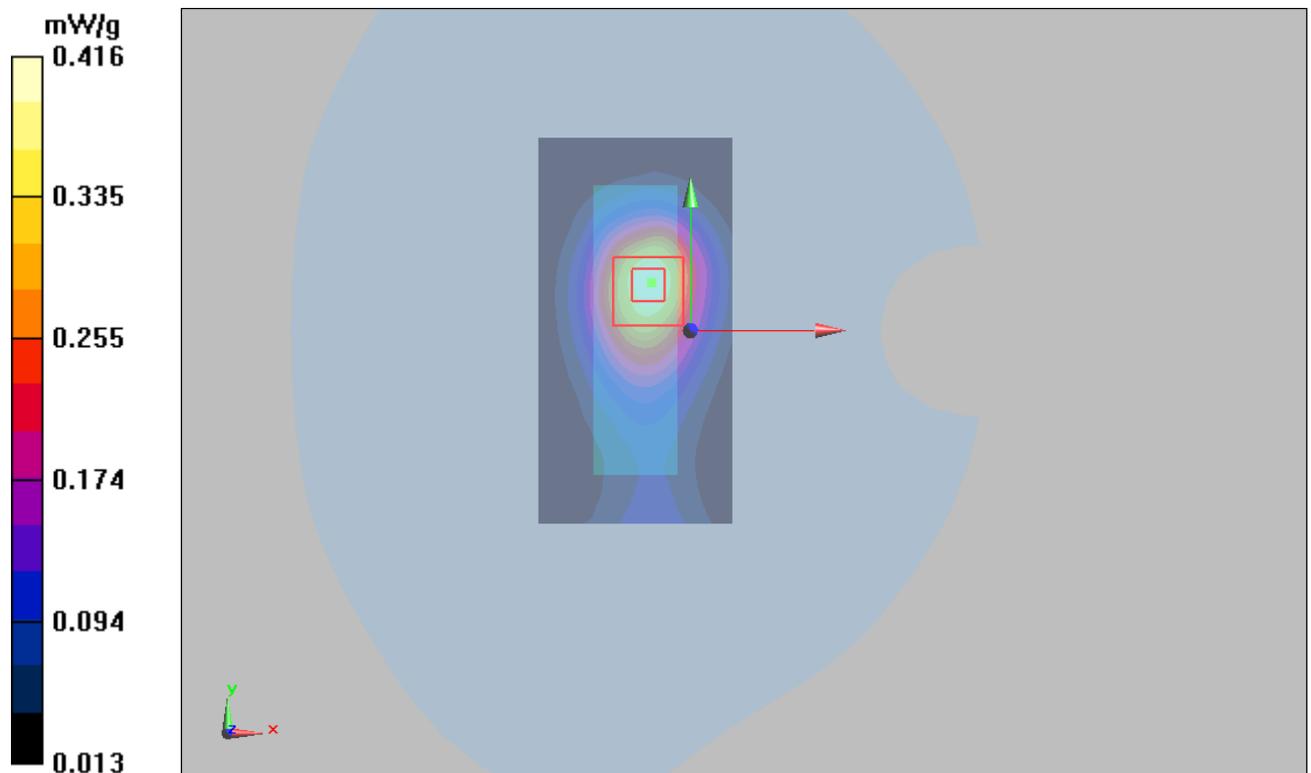Maximum value of SAR (measured) = 0.416 mW/g



**Figure 40 WCDMA Band V with IBM T61 Test Position 2 Channel 4183**

**WCDMA Band V with IBM T61 Test Position 5 Middle**

Date/Time: 9/30/2010 3:40:19 PM

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

Medium parameters used: f = 837 MHz; σ = 1.01 mho/m; $\varepsilon_r$ = 55.3; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

**Test Position 5 Middle/Area Scan (41x61x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.192 mW/g

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

Reference Value = 9.52 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 1.03 W/kg

**SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.058 mW/g**
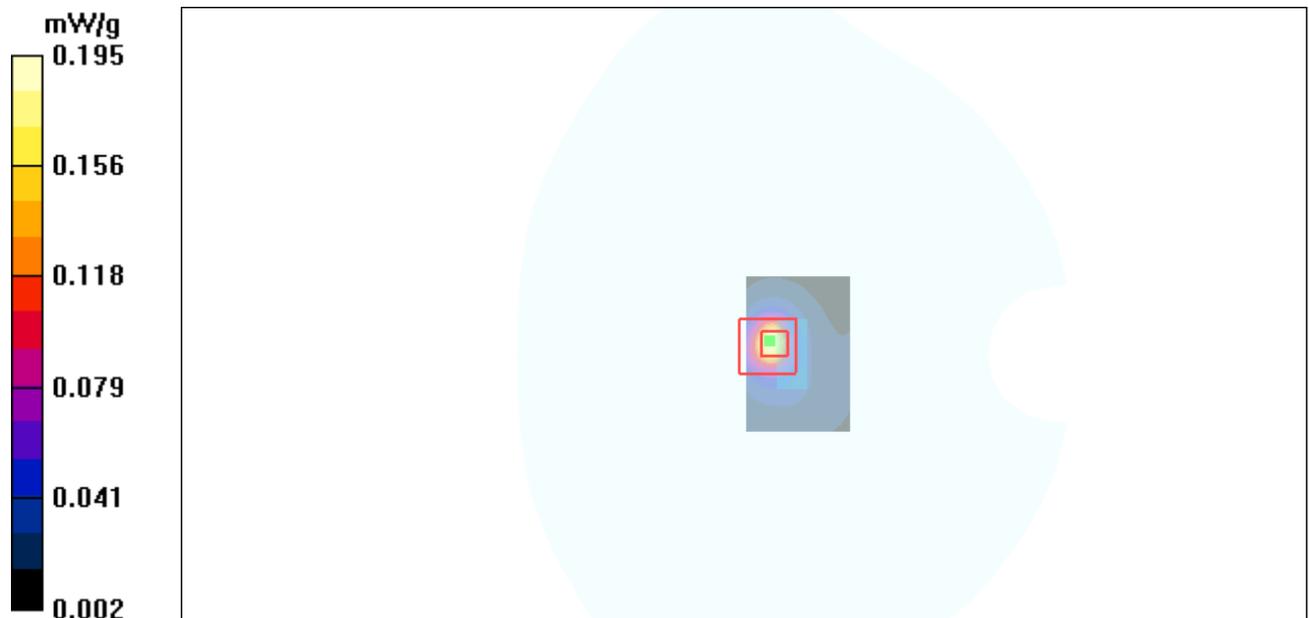
Maximum value of SAR (measured) = 0.195 mW/g



**Figure 41 WCDMA Band V with IBM T61 Test Position 5** Channel 4183

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

Date/Time: 8/31/2010 2:01:45 PM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $ε_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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


**Test Position 3 Middle/Area Scan (51x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.315 mW/g


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

Reference Value = 13.4 V/m; Power Drift = -0.137 dB

Peak SAR (extrapolated) = 0.479 W/kg

**SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.164 mW/g**
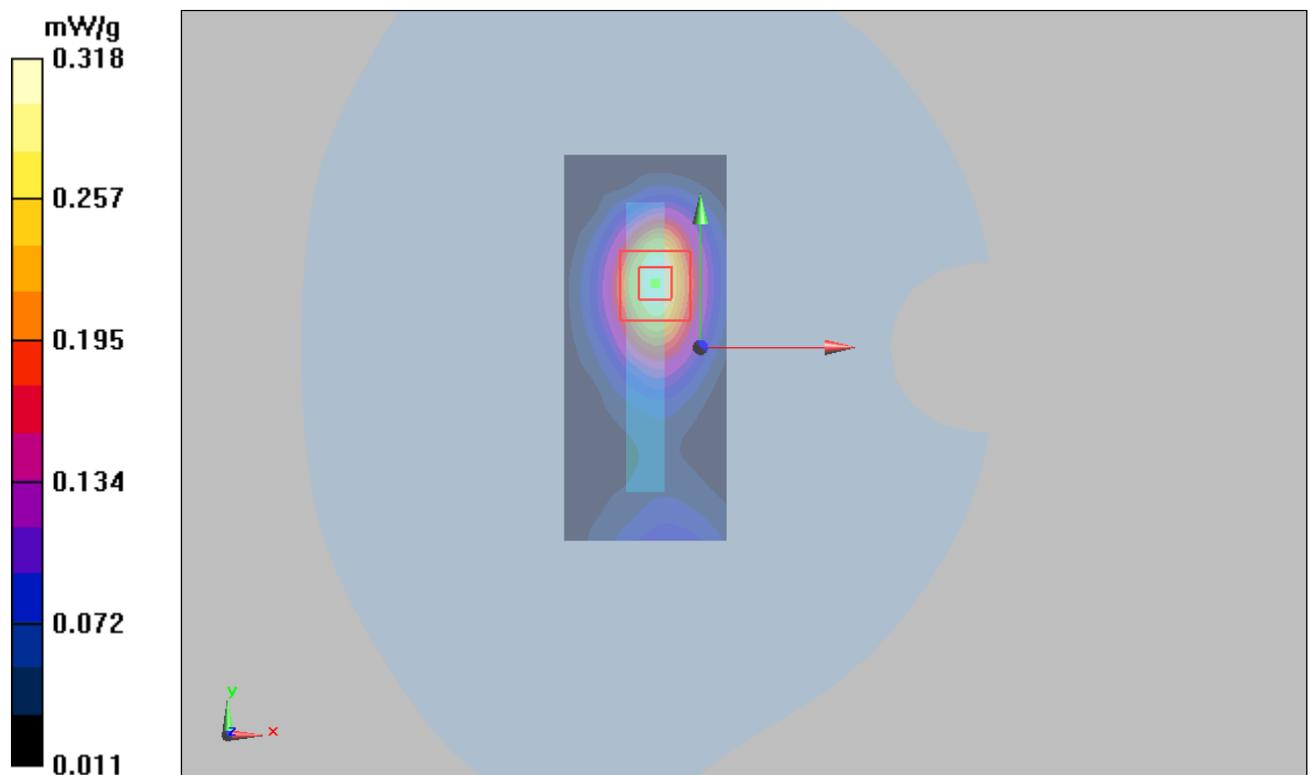
Maximum value of SAR (measured) = 0.318 mW/g



**Figure 42 WCDMA Band V with Lenovo Y-450 Test Position 3 Channel 4183**

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

Date/Time: 8/31/2010 11:26:11 AM

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

Medium parameters used: f = 837 MHz; σ = 1 mho/m; $\varepsilon_r$ = 54.8; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

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

Maximum value of SAR (interpolated) = 0.399 mW/g

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

Reference Value = 15 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 0.534 W/kg

**SAR(1 g) = 0.367 mW/g; SAR(10 g) = 0.240 mW/g**
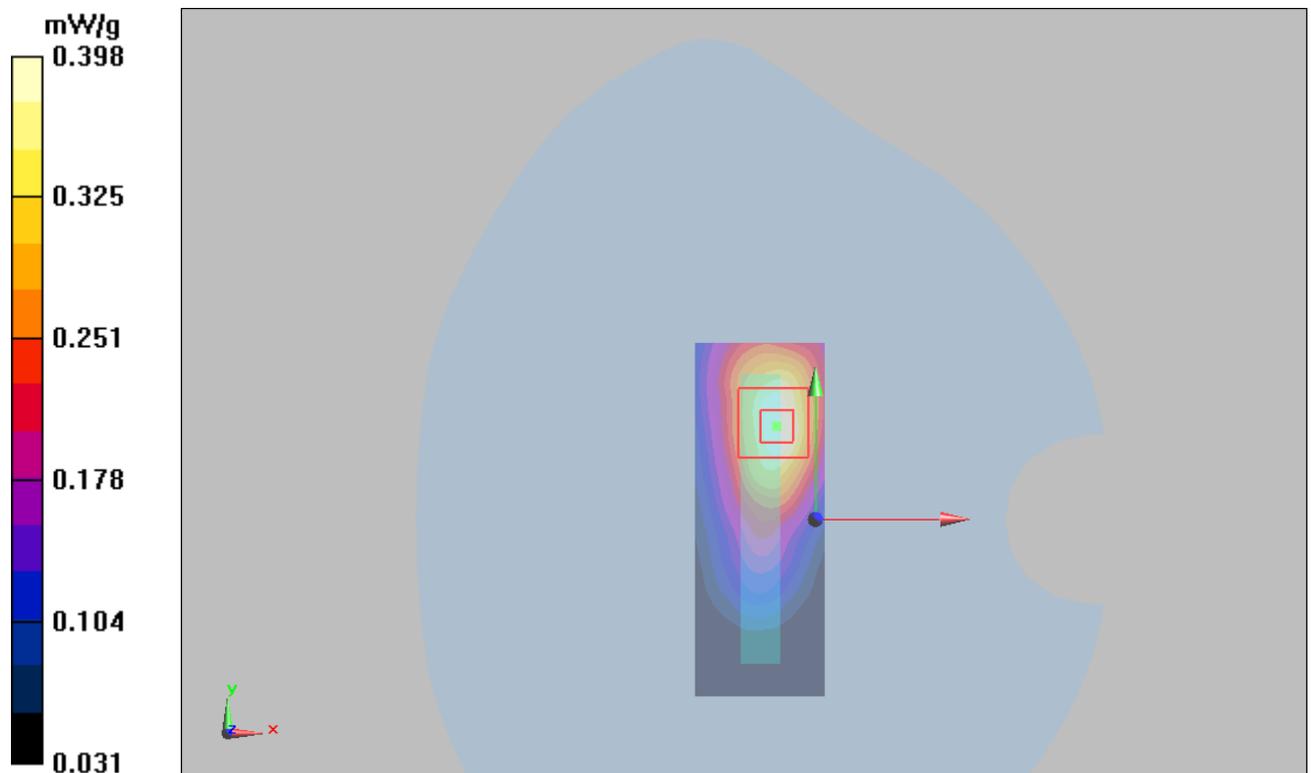
Maximum value of SAR (measured) = 0.398 mW/g



**Figure 43 WCDMA Band V with Lenovo Y-450 Test Position 4 Channel 4183**

## WCDMA Band V HSDPA with IBM T61 Test Position 1 Low

Date/Time: 8/31/2010 5:12:00 PM

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

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.99 mho/m; $\varepsilon_r$ = 54.9; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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

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

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

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

Reference Value = 19 V/m; Power Drift = -0.068 dB

Peak SAR (extrapolated) = 0.899 W/kg

**SAR(1 g) = 0.635 mW/g; SAR(10 g) = 0.423 mW/g**

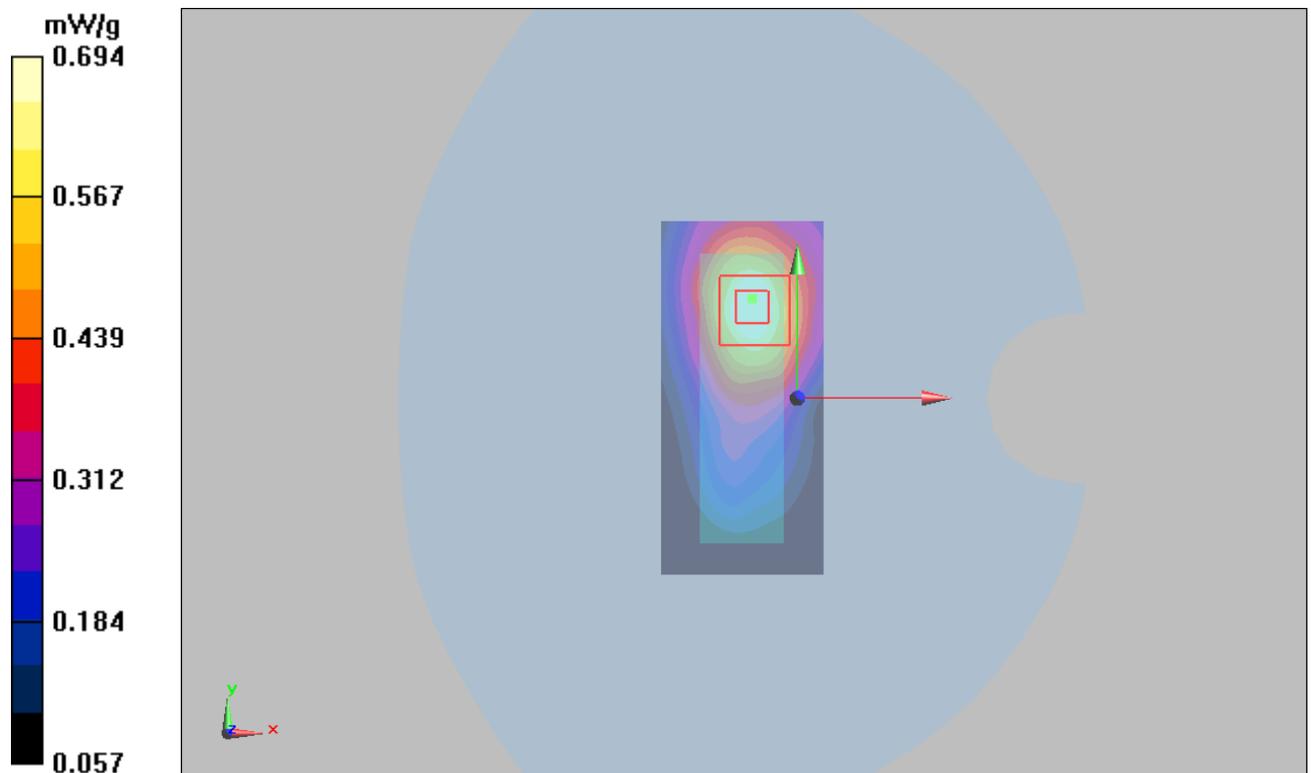Maximum value of SAR (measured) = 0.694 mW/g



**Figure 44 WCDMA Band V HSDPA with IBM T61 Test Position 1 Channel 4132**

**WCDMA Band V HSUPA with IBM T61 Test Position 1 Low**

Date/Time: 8/31/2010 4:45:31 PM

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

Medium parameters used (interpolated): f = 826.4 MHz; $\sigma$ = 0.99 mho/m; $\varepsilon_r$ = 54.9; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃        Liqiud Temperature: 21.5℃

DASY5 Configuration:

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

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

Phantom: SAM1; Type: SAM;

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


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

Maximum value of SAR (interpolated) = 0.595 mW/g


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

Reference Value = 17.4 V/m; Power Drift = -0.050 dB

Peak SAR (extrapolated) = 0.831 W/kg

**SAR(1 g) = 0.565 mW/g; SAR(10 g) = 0.371 mW/g**
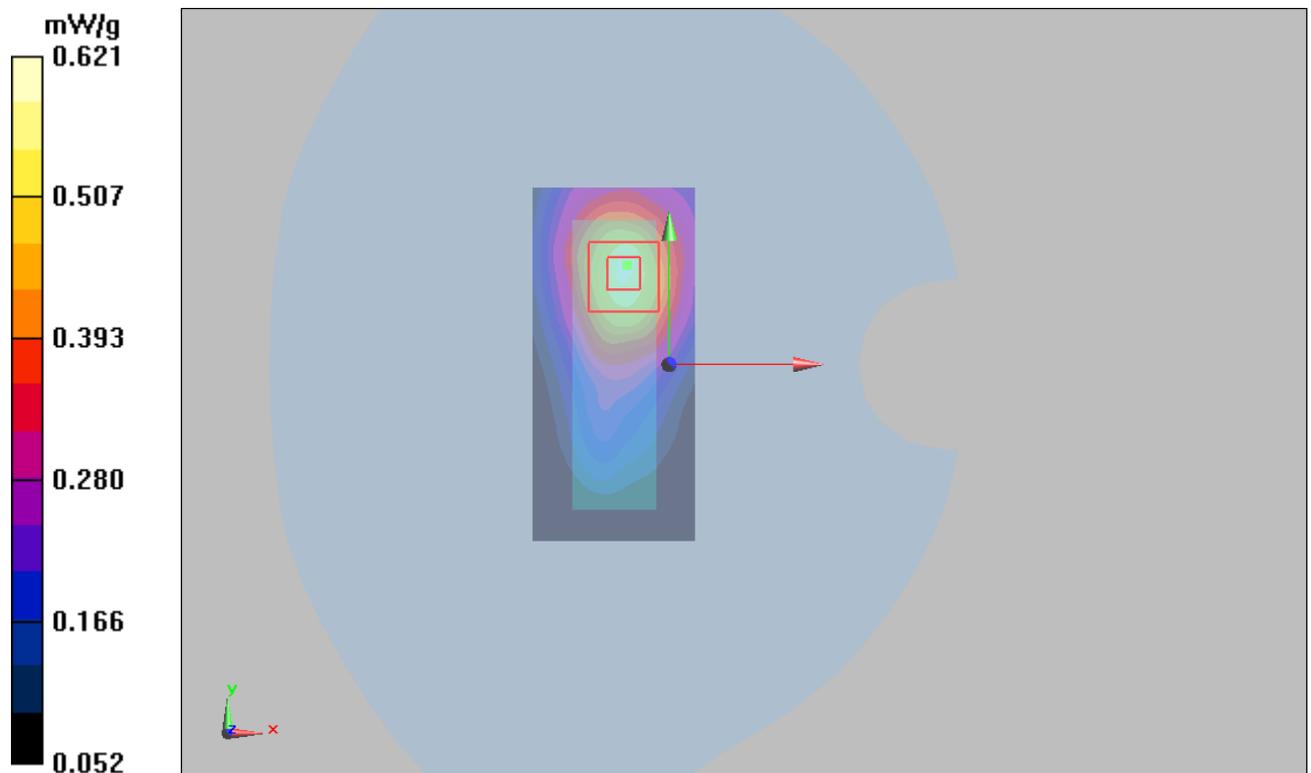
Maximum value of SAR (measured) = 0.621 mW/g



**Figure 45 WCDMA Band V HSUPA with IBM T61 Test Position 1 Channel 4132**