



Report No.: RZA2010-0130



OET 65

TEST REPORT

| | |
|---------------------|-------------------------------|
| Product Name | webConnect Jet |
| Model | UMG1691 |
| FCC ID | QISE1691 |
| Client | Huawei Technologies Co., Ltd. |

TA Technology (Shanghai) Co., Ltd.



GENERAL SUMMARY

| | | | |
|---------------------|--|-------------------|--------------|
| Product Name | webConnect Jet | Model | UMG1691 |
| FCC ID | QISE1691 | Report No. | RZA2010-0130 |
| Client | HUAWEI Technologies Co., Ltd. | | |
| Manufacturer | HUAWEI Technologies Co., Ltd. | | |
| Standard(s) | <p>ANSI/IEEE C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.</p> <p>OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.</p> <p>IEC 62209-2:2008(106/162/CDV): Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)for wireless communication devices used in close proximity to the human body .(frequency rang of 30MHz to 6GHz)</p> <p>tracking number: 153646</p> | | |
| Conclusion | <p>Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.</p> <p>General Judgment: Pass</p> <div style="text-align: right;">  (Stamp) Date of issue: January 29th, 2010 </div> | | |
| Comment | The test result only responds to the measured sample. | | |

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1. General Information

1.1. Notes of the test report

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

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

This report standalone 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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1.5. Information of EUT

General information

| | | | |
|-------------------------------------|--|-----------------|-----------------|
| Device type : | portable device | | |
| Exposure category: | uncontrolled environment / general population | | |
| Device operating configurations : | | | |
| Operating mode(s): | GSM850; (tested) GSM1900; (tested) WCDMA Band IV; (tested) | | |
| Test Modulation: | (GSM) GMSK (WCDMA)QPSK | | |
| S/N or IMEI | QC2AB10981000054 | | |
| GPRS mobile station class : | B | | |
| GPRS multislots class : | 10 | | |
| EGPRS multislots class: | 12 | | |
| Maximum no. of timeslots in uplink: | 4 | | |
| HSDPA UE category | 8 | | |
| HSUPA UE category | 6 | | |
| Operating frequency range(s) | Band | Tx (MHz) | Rx (MHz) |
| | GSM850 | 824.2 ~ 848.8 | 869.2 ~ 893.8 |
| | GSM1900: | 1850.2 ~ 1909.8 | 1930.2 ~ 1989.8 |
| | WCDMA Band IV | 1712.4 ~ 1752.6 | 2112.4 ~ 2152.2 |
| Power class | GSM 850: 4, tested with power level 5 | | |
| | GSM 1900: 1, tested with power level 0 | | |
| | WCDMA Band IV: 3, tested with maximum output power | | |
| Test channel (Low –Middle –High) | 128 -192 - 251 (GSM850) 512 - 661 - 810 (GSM1900) 1312 - 1412 - 1513 (WCDMA Band IV) | | |
| Hardware version: | CD98TCPU | | |
| Software version: | 11.126.07.04.420 | | |
| Antenna type: | Internal antenna | | |
| Used host products: | IBM T61 | | |
| | BenQ Joy book R55V | | |

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

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. Test Date

The test is performed from August 26, 2009 to August 27, 2009 and January 26, 2010.

2. Operational Conditions Test

2.1. General description of test procedures

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

2.2. GSM Test Configuration

For the body SAR tests for GSM 850, GSM 1900, a communication link is set up with a System Simulator (SS) by air link. The EUT is commanded to operate at maximum transmitting power. Since the EUT only has the data transfer function, but does not have the speech transfer function.

The tests in the band of GSM 850, GSM 1900 are performed in the mode of GPRS and EGPRS. The GPRS class is 10 for this EUT; it has at most 2 timeslots in uplink. The EGPRS class is 12 for this EUT; it has at most 4 timeslots in uplink. According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

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

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

2.3. WCDMA Test Configuration

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

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

For the output power, the configurations for the DPCCH and DPDCH₁ are as followed (EUT do not support the DPDCH_{2-n})

Table 2: The configurations for the DPCCH and DPDCH₁

| | Channel Bit Rate(kbps) | Channel Symbol Rate(ksp/s) | 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 (β_c, β_d), and HS-DPCCH power offset parameters ($\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Table 3: Subtests for UMTS Release 5 HSDPA

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

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| | (note 4) | (note 4) | | (note 4) | | | |
|---|----------|----------|----|----------|-------|-----|-----|
| 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: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI}=8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c=30/15 \Leftrightarrow \beta_{hs}=30/15*\beta_c$

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

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

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

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 |

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

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

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

DPCCH the MPR is based on the relative CM difference.

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

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

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

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setting the

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

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

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

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 | 11484 | 5.76 |
| | 4 | 4 | 10 | SF4 | 20000 | 2.00 |
| 7 (No DPDCH) | 4 | 8 | 2 | 2 SF2 & 2 | 22996 | ? |
| | 4 | 4 | 10 | SF4 | 20000 | ? |

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

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

2.6. Position of module in Portable devices

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

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

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

- Test Position 1: The EUT is connected to the portable computer with horizontal USB slot. The front side of the EUT towards the bottom of the flat phantom. (ANNEX L Picture 6-a)
- Test Position 2: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT towards the bottom of the flat phantom. (ANNEX L Picture 6-b)
- Test Position 3: The EUT is connected to the portable computer with horizontal USB slot. The top side of the EUT towards the bottom of the flat phantom. (ANNEX L Picture 6-c)
- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The left side of the EUT towards the bottom of the flat phantom. (ANNEX L Picture 6-d)
- Test Position 5: The EUT is connected to the portable computer with vertical USB slot. The right side of the EUT towards the bottom of the flat phantom. (ANNEX L Picture 6-e)

2.7. Picture of host product

During the test, IBM T61 and BenQ Joy book R55V laptop were used as an assistant to help to setup communication. (See Picture 1)



Picture 1-a: IBM T61 Close



Picture 1-b: IBM T61 Open



Picture 1-c: BenQ Joy book R55V Close



Picture 1-d: BenQ Joy book R55V Open



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



Picture 1-f: IBM T61 with horizontal USB slot



Picture 1-g: IBM T61 with Vertical USB slot

Picture 1: Computer as a test assistant

3. SAR Measurements System Configuration

3.1. SAR Measurement Set-up

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

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

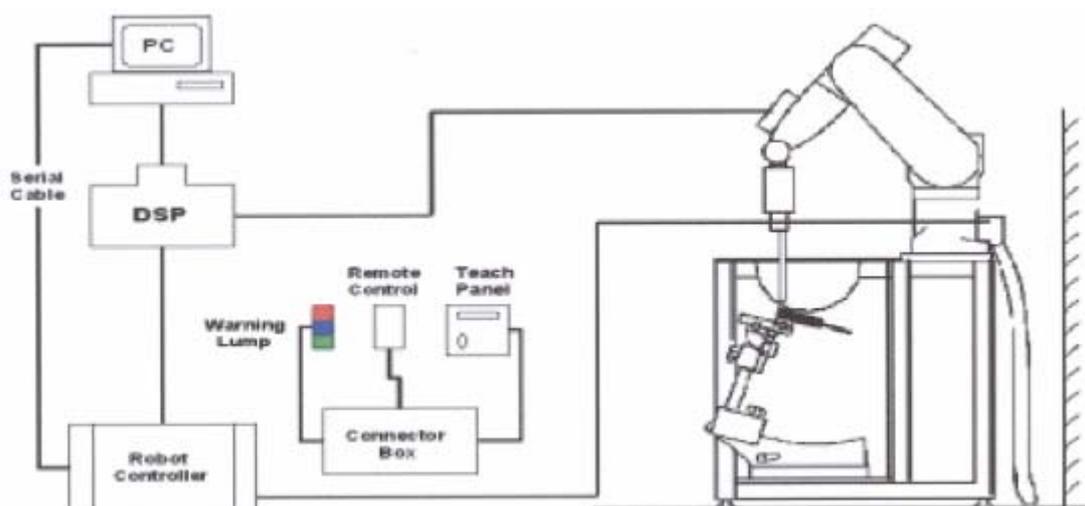


Figure 1. SAR Lab Test Measurement Set-up

3.2. DASY 4 E-field Probe System

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

3.2.1. ET3DV6 Probe Specification

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

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

Frequency 10 MHz to 2.5 GHz; Linearity: \pm 0.2 dB
(30 MHz to 2.5 GHz)

Directivity \pm 0.2 dB in brain tissue
(rotation around probe axis)
 \pm 0.4 dB in brain tissue
(rotation around probe axis)

Dynamic Range 5u W/g to > 100mW/g; Linearity: \pm 0.2dB
Surface Detection \pm 0.2 mm repeatability in air and clear
liquids over diffuse reflecting surface
(ET3DV6 only)

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

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

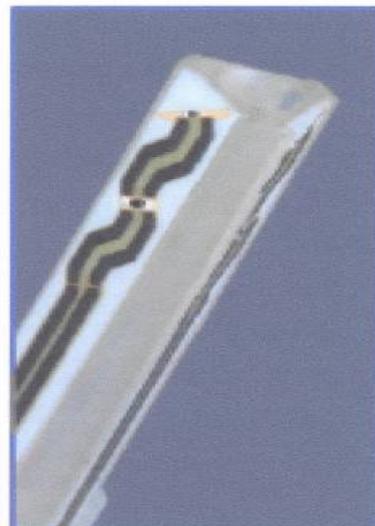


Figure 2 ET3DV6 E-field Probe



Figure 3 ET3DV6 E-field probe

3.2.2. EX3DV4 Probe Specification

| | |
|---------------|---|
| Construction | Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835 ,HSL 900, HSL 1750 and HSL 1950 Additional CF for other liquids and frequencies upon request |
| Frequency | 10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz) |
| Directivity | ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis) |
| Dynamic Range | 10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g) |
| Dimensions | Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm |
| Application | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |



Figure 4. EX3DV4 E-field Probe



Figure 5. EX3DV4 E-field probe

3.2.3. E-field Probe Calibration

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

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

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

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

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

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

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

3.3. Other Test Equipment

3.3.1. Device Holder for Transmitters

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

Material: POM, Acrylic glass, Foam

3.3.2. Phantom

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

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



Figure 6. Generic Twin Phantom

3.4. Scanning procedure

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

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

spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.

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

- Zoom Scan

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

- Spatial Peak Detection

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

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

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

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

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

3.5. Data Storage and Evaluation

3.5.1. Data Storage

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

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

3.5.2. Data Evaluation by SEMCAD

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

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

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

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

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.

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

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

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

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

ρ = equivalent tissue density in g/cm³

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

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

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

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

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

3.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 10.

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

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

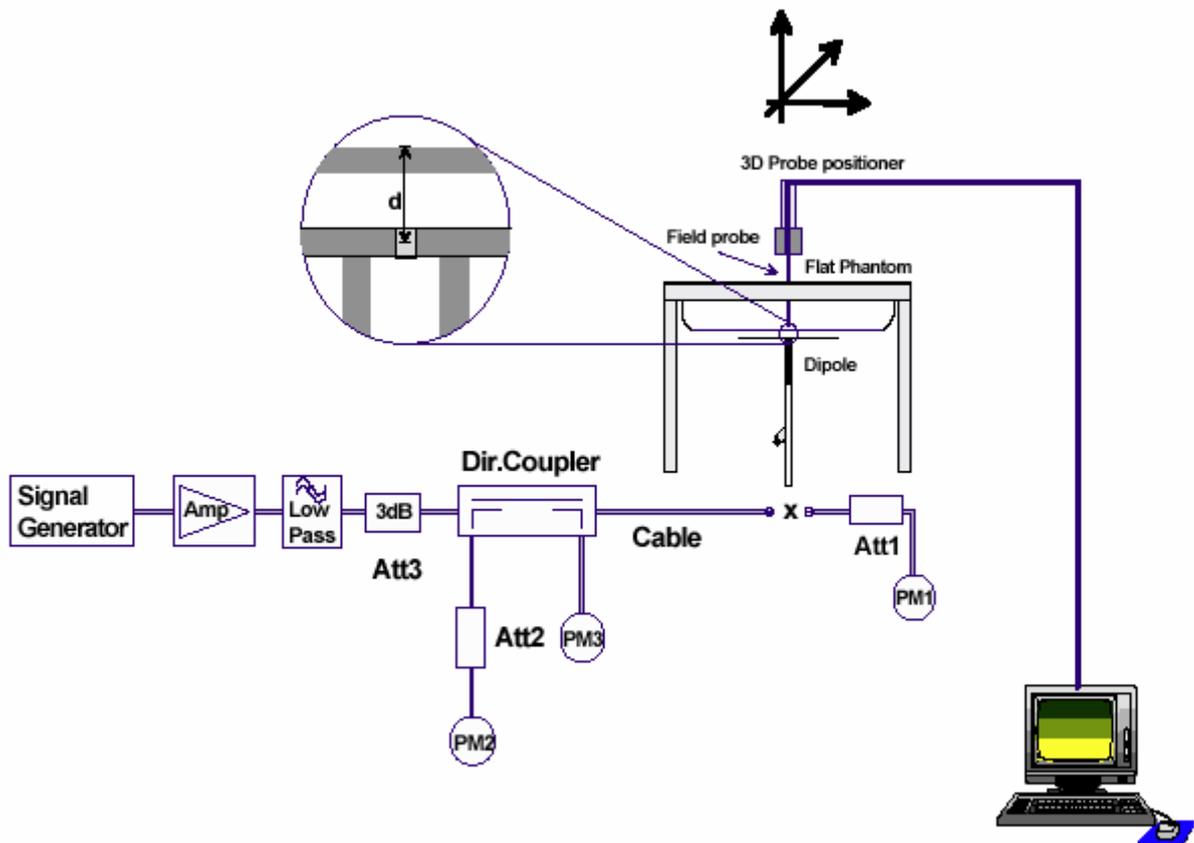


Figure 7. System Check Set-up

3.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 6 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by OET 65.

Table 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 $\epsilon=55.2$ $\sigma=0.97$ |

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

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

4. Laboratory Environment

Table 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

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

5.2. Applicable Measurement Standards

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

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

6. Conducted Output Power Measurement

6.1. Summary

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

6.2. Conducted Power Results

Table 10: Conducted Power Measurement Results

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

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| | | | | |
|---------------------|-------------------|-----------------|--------------|--------------|
| 1 timeslot | Before Test (dBm) | 29.28 | 29.20 | 29.13 |
| | After Test (dBm) | 29.27 | 29.21 | 29.12 |
| 2 timeslots | Before Test (dBm) | 27.20 | 27.10 | 27.03 |
| | After Test (dBm) | 27.21 | 27.11 | 27.02 |
| GSM 1900+EGPRS | | Conducted Power | | |
| | | Channel 512 | Channel 661 | Channel 810 |
| | | (1850.2MHz) | (1880MHz) | (1909.8MHz) |
| 1 timeslot | Before Test (dBm) | 25.01 | 25.43 | 25.27 |
| | After Test (dBm) | 25.00 | 25.42 | 25.26 |
| 2 timeslots | Before Test (dBm) | 22.99 | 22.92 | 22.82 |
| | After Test (dBm) | 22.98 | 22.91 | 22.81 |
| 3 timeslots | Before Test (dBm) | 20.96 | 20.85 | 20.81 |
| | After Test (dBm) | 20.95 | 20.84 | 20.80 |
| 4 timeslots | Before Test (dBm) | 19.00 | 18.89 | 18.82 |
| | After Test (dBm) | 19.01 | 18.88 | 18.81 |
| WCDMA Band IV | | Conducted Power | | |
| | | Channel 1312 | Channel 1412 | Channel 1513 |
| | | (1712.4MHz) | (1732.4MHz) | (1752.6MHz) |
| 12.2kbps RMC | Before Test (dBm) | 21.52 | 21.70 | 21.66 |
| | After Test (dBm) | 21.51 | 21.71 | 21.65 |
| 64kbps RMC | Before Test (dBm) | 21.61 | 21.69 | 21.68 |
| | After Test (dBm) | 21.60 | 21.68 | 21.67 |
| 144kbps RMC | Before Test (dBm) | 21.59 | 21.76 | 21.63 |
| | After Test (dBm) | 21.58 | 21.75 | 21.62 |
| 384kbps RMC | Before Test (dBm) | 21.60 | 21.74 | 21.69 |
| | After Test (dBm) | 21.61 | 21.73 | 21.68 |
| WCDMA Band IV+HSDPA | | Conducted Power | | |
| | | Channel 1312 | Channel 1412 | Channel 1513 |
| | | (1712.4MHz) | (1732.4MHz) | (1752.6MHz) |
| Sub Test - 1 | Before Test (dBm) | 21.43 | 21.75 | 21.41 |
| | After Test (dBm) | 21.42 | 21.74 | 21.40 |

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| | | | | |
|---------------------|-------------------|-----------------|--------------|--------------|
| Sub Test - 2 | Before Test (dBm) | 20.89 | 21.25 | 20.85 |
| | After Test (dBm) | 20.88 | 21.26 | 20.84 |
| Sub Test - 3 | Before Test (dBm) | 20.62 | 21.07 | 20.67 |
| | After Test (dBm) | 20.61 | 21.06 | 20.66 |
| Sub Test - 4 | Before Test (dBm) | 20.60 | 21.14 | 20.62 |
| | After Test (dBm) | 20.61 | 21.15 | 20.61 |
| WCDMA Band IV+HSUPA | | Conducted Power | | |
| | | Channel 1312 | Channel 1412 | Channel 1513 |
| | | (1712.4MHz) | (1732.4MHz) | (1752.6MHz) |
| Sub Test - 1 | Before Test (dBm) | 19.25 | 20.06 | 19.71 |
| | After Test (dBm) | 19.24 | 20.05 | 19.70 |
| Sub Test - 2 | Before Test (dBm) | 17.91 | 18.62 | 17.89 |
| | After Test (dBm) | 17.90 | 18.61 | 17.88 |
| Sub Test - 3 | Before Test (dBm) | 18.63 | 19.14 | 18.77 |
| | After Test (dBm) | 18.62 | 19.13 | 18.78 |
| Sub Test - 4 | Before Test (dBm) | 19.79 | 18.80 | 19.99 |
| | After Test (dBm) | 19.78 | 18.81 | 19.98 |
| Sub Test - 5 | Before Test (dBm) | 19.53 | 19.95 | 19.82 |
| | After Test (dBm) | 19.52 | 19.94 | 19.81 |

7. Test Results

7.1. Dielectric Performance

Table 11: Dielectric Performance of Body Tissue Simulating Liquid

| Frequency | Description | Dielectric Parameters | | Temp ℃ |
|---------------------------|--------------------------------|------------------------|---------------------|-----------|
| | | ϵ_r | σ (s/m) | |
| 835MHz (body) | Target value ±5% window | 55.20 52.44 – 57.96 | 0.97 0.92 – 1.02 | / |
| | Measurement value 2009-8-26 | 55.07 | 1.02 | 21.5 |
| 1800MHz (body) | Target value ±5% window | 53.3 50.64 – 55.97 | 1.52 1.44 – 1.60 | / |
| | Measurement value 2009-8-26 | 52.7 | 1.52 | 21.9 |
| | Measurement value 2010-1-26 | 51.96 | 1.57 | 21.9 |
| 1900MHz (body) | Target value ±5% window | 53.30 50.64 – 55.97 | 1.52 1.44 – 1.60 | / |
| | Measurement value 2009-8-27 | 52.65 | 1.53 | 21.7 |

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7.2. System Check

Table 12: System Check for Body tissue stimulant

| Frequency | Description | SAR(W/kg) | | Dielectric Parameters | | Temp |
|-----------|-----------------------------------|---------------------|-----------------------|-----------------------|----------------|------|
| | | 10g | 1g | ϵ_r | σ (s/m) | °C |
| 835MHz | Recommended result ±10% window | 1.58 1.42 – 1.74 | 2.41 2.17 – 2.65 | 54.60 | 0.99 | / |
| | Measurement value 2009-8-26 | 1.59 | 2.42 | 55.07 | 1.02 | 21.9 |
| 1800 MHz | Recommended result ±10% window | 5.28 4.75 – 5.81 | 10.20 9.18 – 11.22 | 52.10 | 1.49 | / |
| | Measurement value 2009-8-26 | 5.27 | 9.96 | 52.7 | 1.52 | 22.1 |
| | Recommended result ±10% window | 4.97 4.47 – 5.47 | 9.31 8.38 – 10.24 | 54.2 | 1.49 | / |
| | Measurement value 2010-1-26 | 5.14 | 9.46 | 51.96 | 1.57 | 22.1 |
| 1900 MHz | Recommended result ±10% window | 5.18 4.66 – 5.70 | 10.20 9.18 – 11.22 | 52.90 | 1.55 | / |
| | Measurement value 2009-8-27 | 5.15 | 10.01 | 52.65 | 1.53 | 21.7 |

Note: 1. the graph results see ANNEX B.

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

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7.3. Summary of Measurement Results

7.3.1. GSM850 (GPRS/EGPRS)

Table 13: SAR Values [GSM850 (GPRS/EGPRS)]

| Limit of SAR (W/kg) | | | 10 g Average | 1g Average | Power Drift(dB) | Graph Results |
|---|---------------------|---------|---------------------------|-------------|-----------------|---------------|
| | | | 2.0 | 1.6 | ± 0.21 | |
| Test Case Of Body | | | Measurement Result (W/kg) | | Power Drift(dB) | |
| Different Test Position | Different Timeslots | Channel | 10 g Average | 1 g Average | | |
| IBM T61 (180 degree) | | | | | | |
| Test Position 1 | 2 timeslots | High | 0.562 | 0.952 | 0.091 | Figure 16 |
| | | Middle | 0.621 | 1.050 | -0.099 | Figure 18 |
| | | Low | 0.607 | 1.020 | -0.111 | Figure 20 |
| | 1 timeslot | Middle | 0.555 | 0.922 | -0.045 | Figure 22 |
| Test Position 3 | 2 timeslots | Middle | 0.045 | 0.118 | -0.073 | Figure 24 |
| Test Position 4 | 2 timeslots | Middle | 0.236 | 0.358 | 0.038 | Figure 26 |
| Test Position 5 | 2 timeslots | Middle | 0.362 | 0.584 | 0.009 | Figure 28 |
| BenQ Joy book R55V (180 degree) | | | | | | |
| Test Position 2 | 2 timeslots | Middle | 0.428 | 0.687 | 0.108 | Figure 30 |
| Worst case position of GPRS with EGPRS (180 degree) | | | | | | |
| Test Position 1 | 1 timeslot | Middle | 0.545 | 0.903 | -0.153 | Figure 32 |
| | 2 timeslots | Middle | 0.610 | 1.020 | -0.034 | Figure 34 |
| | 3 timeslots | Middle | 0.549 | 0.920 | -0.069 | Figure 36 |
| | 4 timeslots | Middle | 0.552 | 0.922 | -0.087 | Figure 38 |

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

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

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Table 14: SAR Values [GSM850, enhanced energy coupling at increased separation distances]

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

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

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7.3.2. GSM1900 (GPRS/EGPRS)

Table 15: [GSM1900 (GPRS/EGPRS)]

| Limit of SAR (W/kg) | | | 10 g Average | 1g Average | Power Drift(dB) | Graph Results |
|---|---------------------|---------|---------------------------|-------------|-----------------|---------------|
| | | | 2.0 | 1.6 | ± 0.21 | |
| Test Case Of Body | | | Measurement Result (W/kg) | | Power Drift(dB) | |
| Different Test Position | Different Timeslots | Channel | 10 g Average | 1 g Average | | |
| IBM T61 (Angle 180 degree) | | | | | | |
| Test Position 1 | 2 timeslots | High | 0.419 | 0.768 | -0.089 | Figure 40 |
| | | Middle | 0.379 | 0.701 | -0.149 | Figure 42 |
| | | Low | 0.361 | 0.660 | -0.129 | Figure 44 |
| | 1 timeslot | Middle | 0.340 | 0.625 | -0.029 | Figure 46 |
| Test Position 3 | 2 timeslots | Middle | 0.056 | 0.108 | -0.099 | Figure 48 |
| Test Position 4 | 2 timeslots | Middle | 0.225 | 0.418 | -0.065 | Figure 50 |
| Test Position 5 | 2 timeslots | Middle | 0.277 | 0.539 | -0.117 | Figure 52 |
| BenQ Joy book R55V (Angle 180 degree) | | | | | | |
| Test Position 2 | 2 timeslots | Middle | 0.354 | 0.635 | -0.094 | Figure 54 |
| Worst case position of GPRS with EGPRS (Angle 180 degree) | | | | | | |
| Test Position 1 | 1 timeslot | High | 0.374 | 0.685 | -0.110 | Figure 56 |
| | 2 timeslots | High | 0.424 | 0.778 | -0.061 | Figure 58 |
| | 3 timeslots | High | 0.392 | 0.719 | -0.020 | Figure 60 |
| | 4 timeslots | High | 0.320 | 0.590 | 0.195 | Figure 62 |

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

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

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Table 16: SAR Values [GSM1900, enhanced energy coupling at increased separation distances]

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

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

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

Table 17: SAR Values [WCDMA Band IV (WCDMA/HSDPA/HSUPA)]

| Limit of SAR (W/kg) | | 10 g Average | 1g Average | Power Drift (dB) | Graph Results |
|---------------------------------------|---------|---------------------------|-------------|------------------|---------------|
| | | 2.0 | 1.6 | ± 0.21 | |
| Test Case Of Body | | Measurement Result (W/kg) | | Power Drift (dB) | |
| | | 10 g Average | 1 g Average | | |
| Different Test Position | Channel | | | | |
| IBM T61 | | | | | |
| Test Position 1 | High | 0.563 | 0.993 | 0.080 | Figure 64 |
| | Middle | 0.589 | 1.050 | 0.166 | Figure 66 |
| | Low | 0.412 | 0.734 | 0.025 | Figure 68 |
| Test Position 3 | Middle | 0.060 | 0.108 | -0.098 | Figure 70 |
| Test Position 4 | Middle | 0.326 | 0.578 | 0.157 | Figure 72 |
| Test Position 5 | Middle | 0.334 | 0.598 | 0.161 | Figure 74 |
| BenQ Joy book R55V | | | | | |
| Test Position 2 | Middle | 0.436 | 0.757 | 0.144 | Figure 76 |
| Worst case position of RMC with HSDPA | | | | | |
| Test Position 1 | Middle | 0.601 | 1.070 | 0.048 | Figure 78 |
| Worst case position of RMC with HSUPA | | | | | |
| Test Position 1 | Middle | 0.471 | 0.854 | 0.051 | Figure 80 |

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

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

Table 18: SAR Values [WCDMA Band IV, enhanced energy coupling at increased separation distances]

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

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

7.4. Conclusion

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

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8. Measurement Uncertainty

| No. | source | Type | Uncertainty Value (%) | Probability Distribution | k | c_i | Standard uncertainty u_i (%) | Degree of freedom V_{eff} or v_i |
|---------------------|---|------|-----------------------|--------------------------|------------|--------------|--------------------------------|--------------------------------------|
| 1 | System repetivity | A | 0.5 | N | 1 | 1 | 0.5 | 9 |
| Measurement system | | | | | | | | |
| 2 | probe calibration | B | 5.9 | N | 1 | 1 | 5.9 | ∞ |
| 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 | | | | | | | | |

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| | | | | | | | | | |
|--|--|--|-----|---|------------|-----------------|------|----------|--|
| 20 | -phantom | B | 4.0 | R | $\sqrt{3}$ | 1 | 2.3 | ∞ | |
| 21 | -liquid conductivity (deviation from target) | B | 5.0 | R | $\sqrt{3}$ | $\frac{0.6}{4}$ | 1.8 | ∞ | |
| 22 | -liquid conductivity (measurement uncertainty) | B | 5.0 | N | 1 | $\frac{0.6}{4}$ | 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 | | |

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9. Main Test Instruments

Table 19: List of Main Instruments

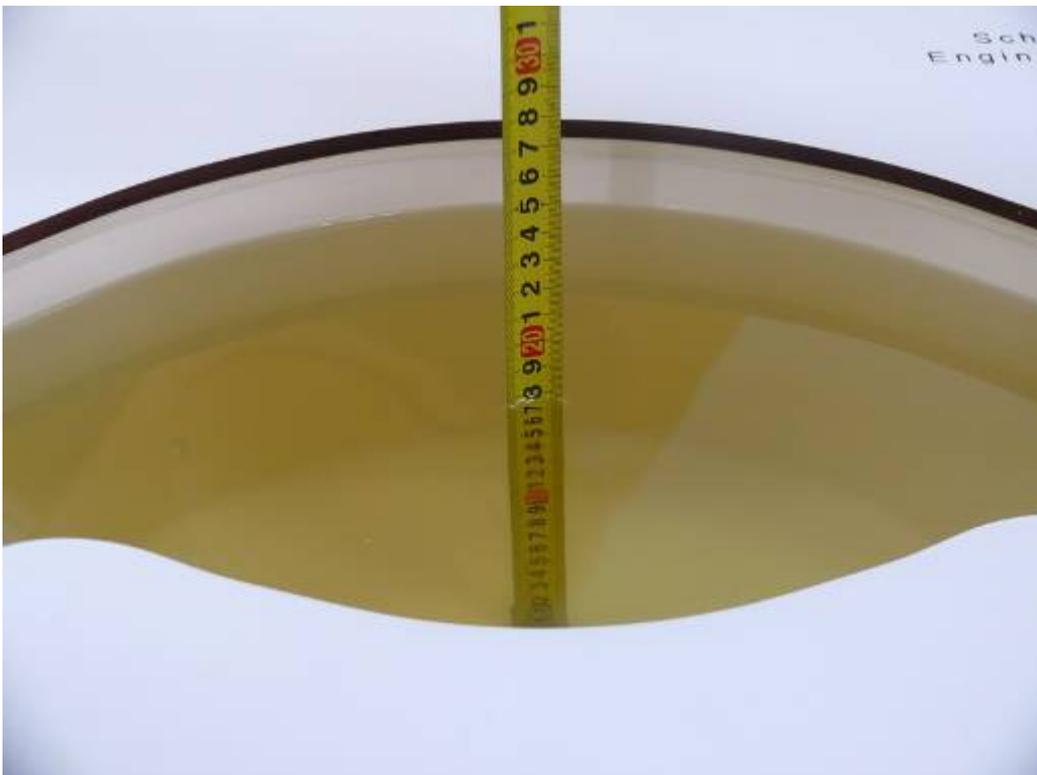
| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|-----|------------------------|----------------|---------------|--------------------------|--------------|
| 01 | Network analyzer | Agilent 8753E | US37390326 | September 14, 2008 | One year |
| 02 | Network analyzer | Agilent 8753E | US37390326 | September 13, 2009 | One year |
| 03 | Dielectric Probe Kit | Agilent 85070E | US44020115 | No Calibration Requested | |
| 04 | Power meter | Agilent E4417A | GB41291714 | March 14, 2009 | One year |
| 05 | Power sensor | Agilent 8481H | MY41091316 | March 14, 2009 | One year |
| 06 | Signal Generator | HP 8341B | 2730A00804 | September 14, 2008 | One year |
| 07 | Signal Generator | HP 8341B | 2730A00804 | September 13, 2009 | One year |
| 08 | Amplifier | IXA-020 | 0401 | No Calibration Requested | |
| 09 | Validation Kit 835MHz | D835V2 | 4d020 | July 15, 2009 | One year |
| 10 | Validation Kit 1800MHz | D1800V2 | 2d055 | February 16, 2009 | One year |
| 11 | Validation Kit 1800MHz | D1800V2 | 2d052 | June 26, 2009 | One year |
| 12 | Validation Kit 1900MHz | D1900V2 | 5d060 | July 15, 2009 | One year |
| 13 | BTS | E5515C | GB46490218 | September 14, 2008 | One year |
| 14 | BTS | E5515C | MY48360988 | December 4, 2009 | One year |
| 15 | E-field Probe | ET3DV6 | 1737 | November 25, 2008 | One year |
| 16 | E-field Probe | EX3DV4 | 3677 | September 23, 2009 | One year |
| 17 | DAE | DAE4 | 452 | November 18, 2008 | One year |
| 18 | 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)



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



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

ANNEX B: System Check Results

System Performance Check at 835 MHz

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

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

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

Medium parameters used: $f = 835$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55.07$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 3.59 W/kg

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

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

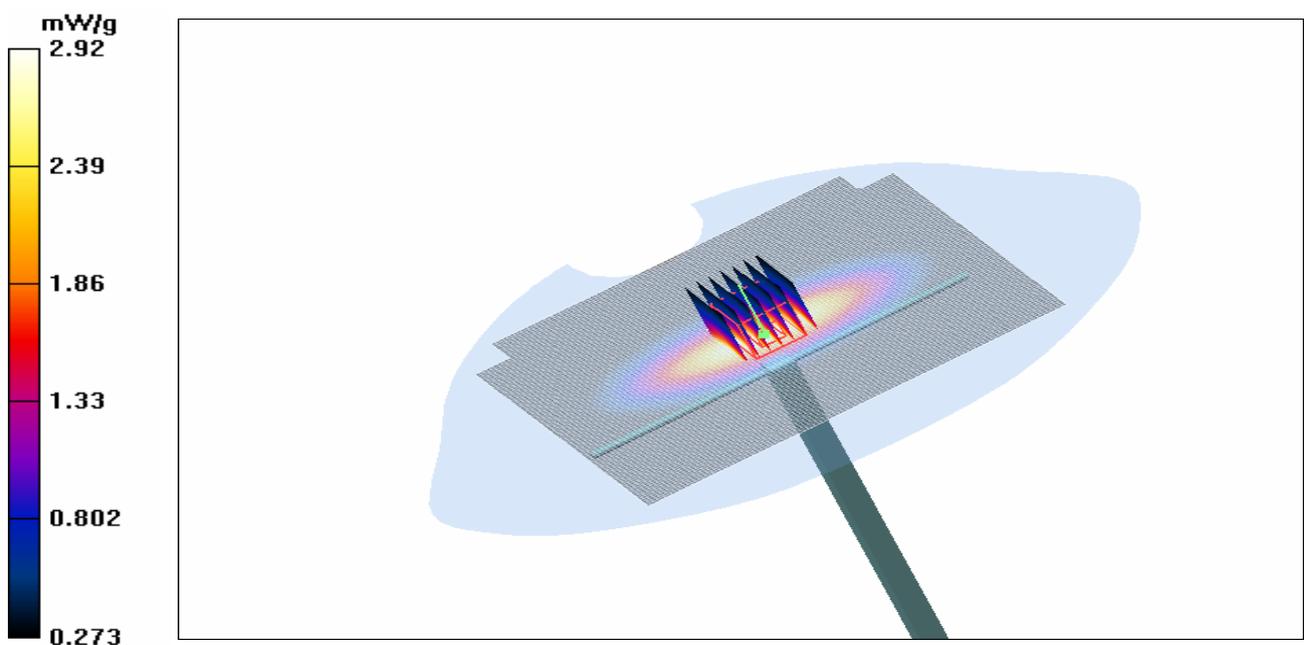


Figure 8 System Performance Check 835MHz 250mW

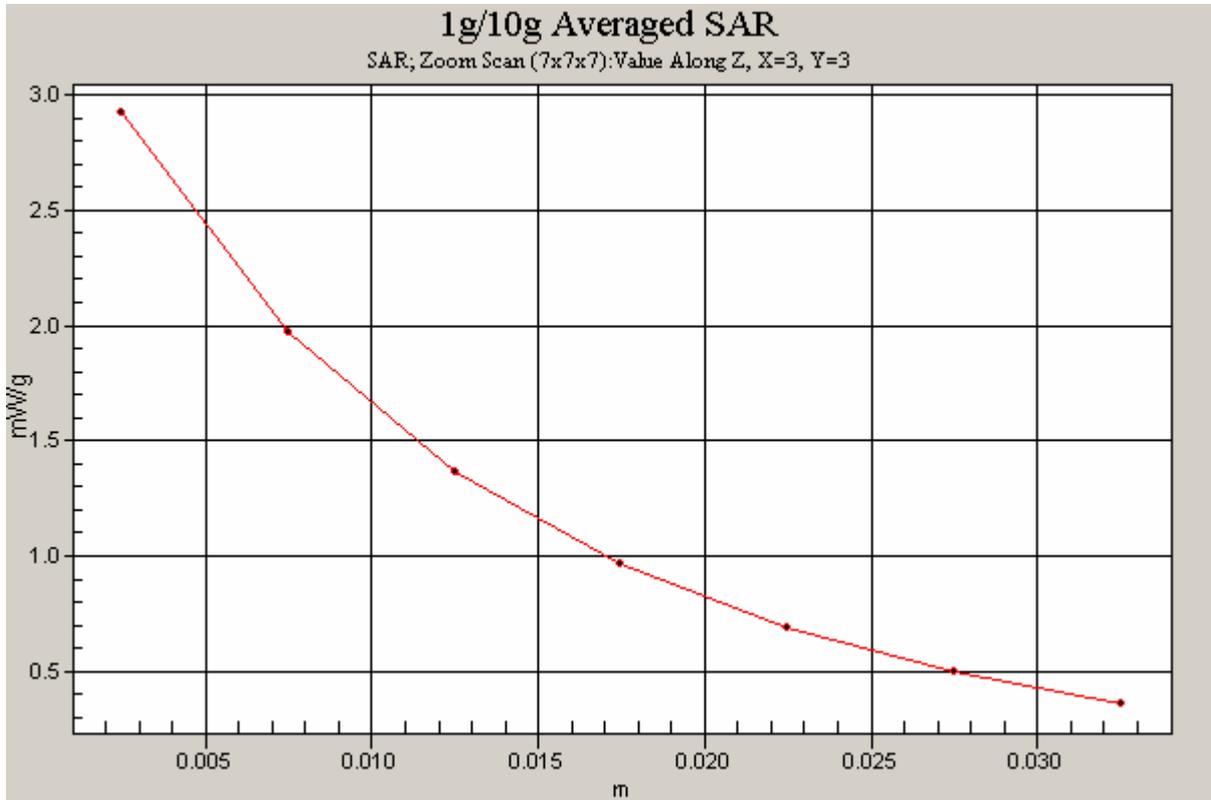


Figure 9 Z-Scan at power reference point (system Check at 835 MHz dipole)

System Performance Check at 1800 MHz

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

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

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

Medium parameters used: $f = 1800$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 17.6 W/kg

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

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

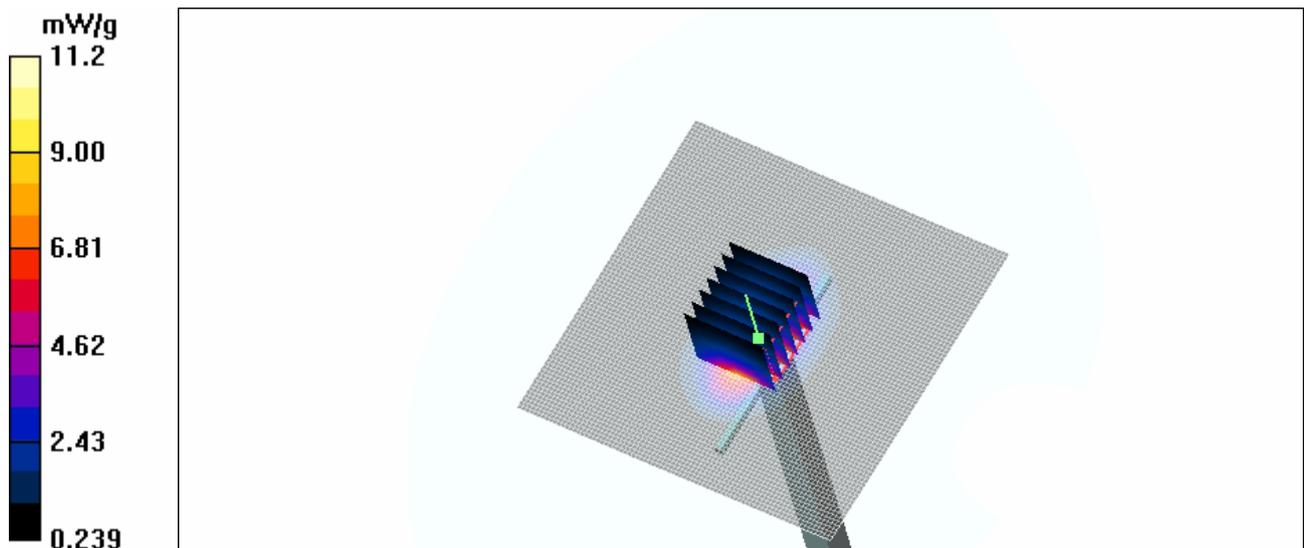


Figure 10 System Performance Check 1800MHz 250mW

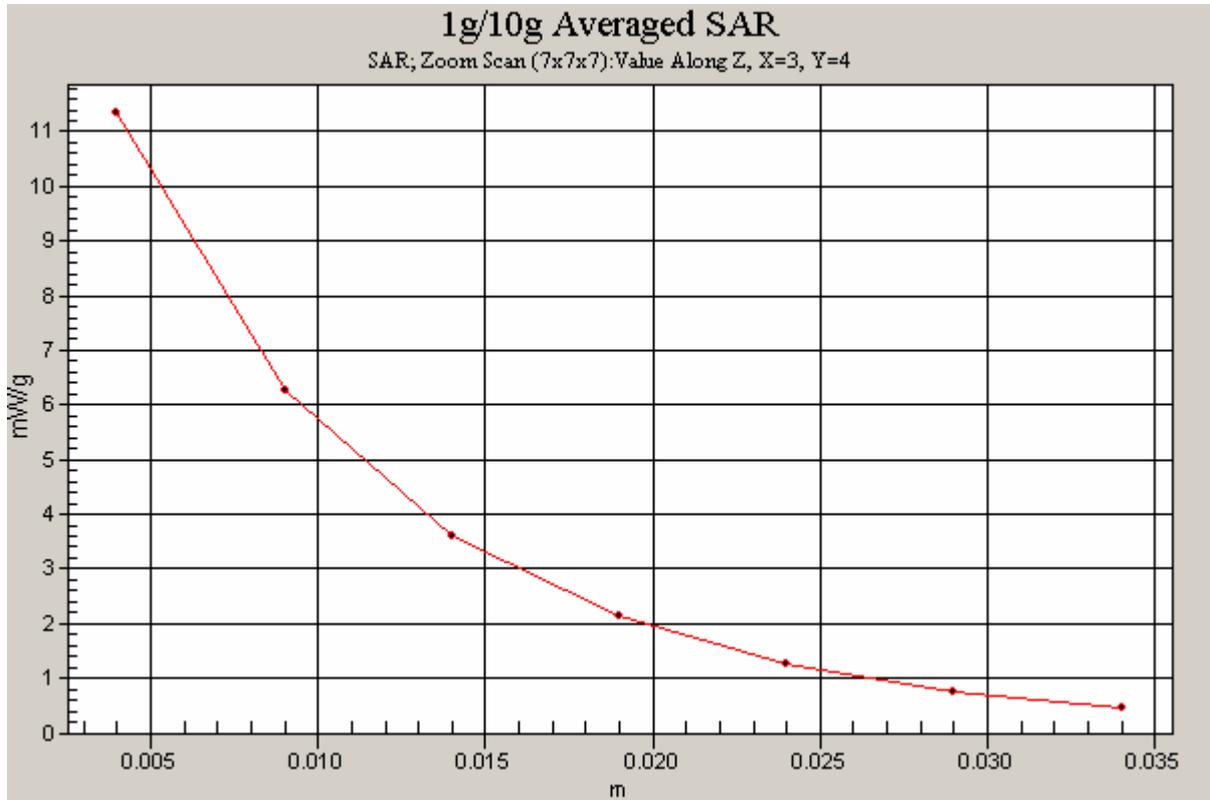


Figure 11 Z-Scan at power reference point (system Check at 1800 MHz dipole)

System Performance Check at 1800 MHz

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d052

Date/Time: 1/26/2010 1:04:02 PM

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

Medium parameters used: $f = 1800$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 51.96$; $\rho = 1000$ kg/m³

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

DASY4 Configuration:

Probe: EX3DV4 - SN3677; ConvF(7.7, 7.7, 7.7); Calibrated: 9/23/2009

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

Phantom: SAM2; Type: SAM;

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

1800 MHz Dipole /Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.1 mW/g

1800 MHz Dipole /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 75.3 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 15.4 W/kg

SAR(1 g) = 9.46 mW/g; SAR(10 g) = 5.14 mW/g

Maximum value of SAR (measured) = 10.7 mW/g

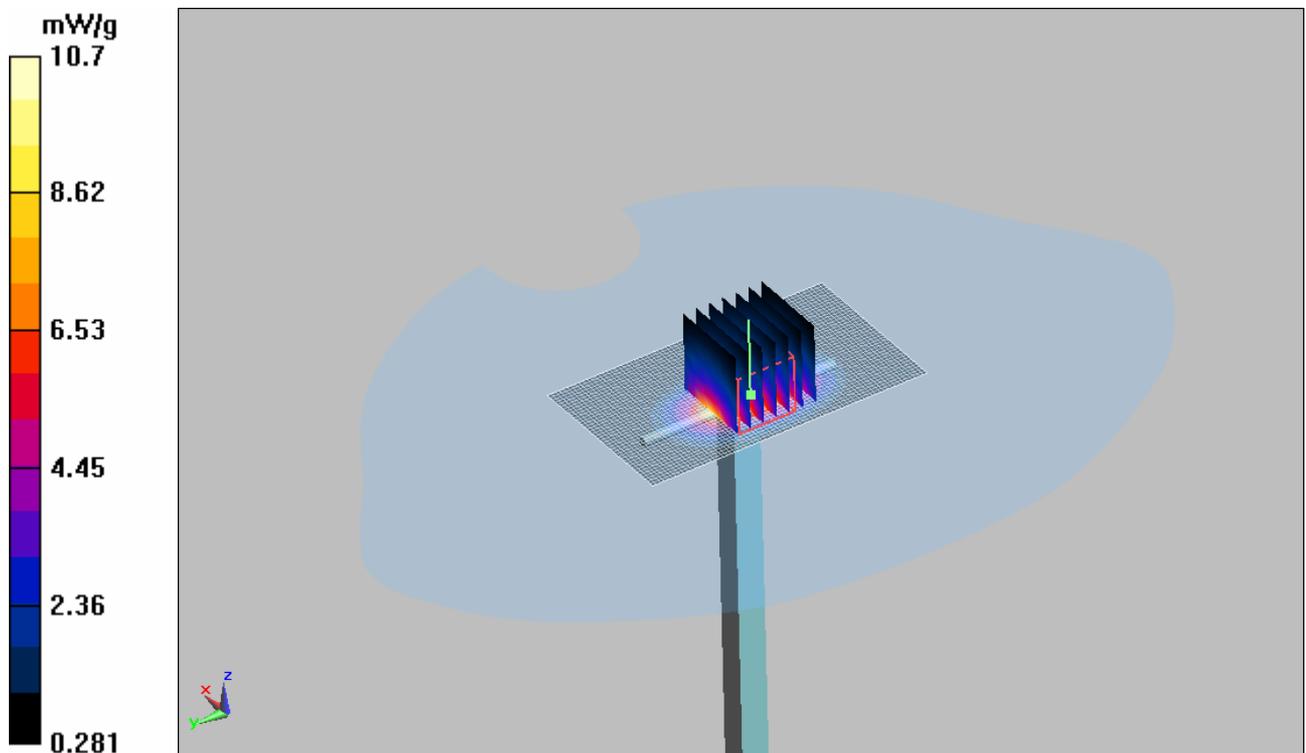


Figure 12 System Performance Check 1800MHz 250mW

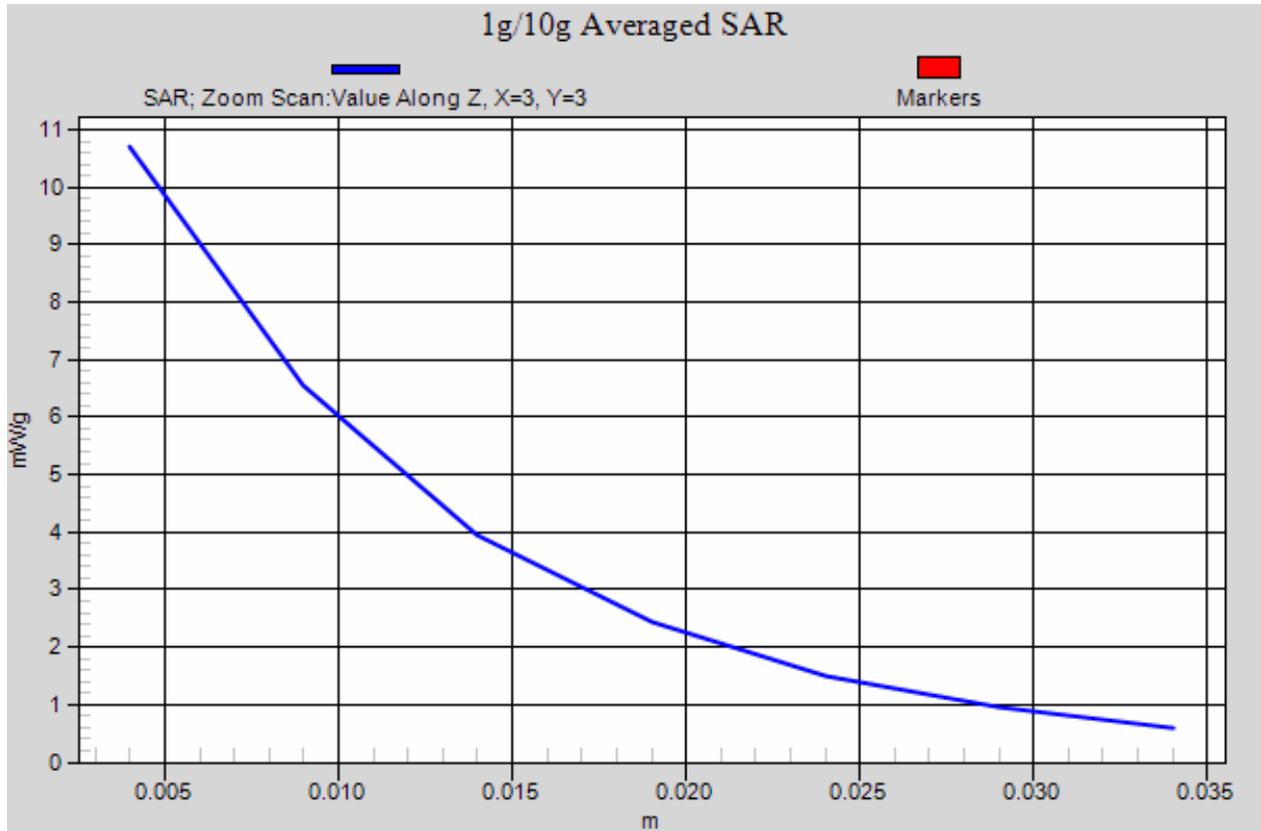


Figure 13 Z-Scan at power reference point (system Check at 1800 MHz dipole)

System Performance Check at 1900 MHz

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

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

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.65$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 18.9 W/kg

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

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

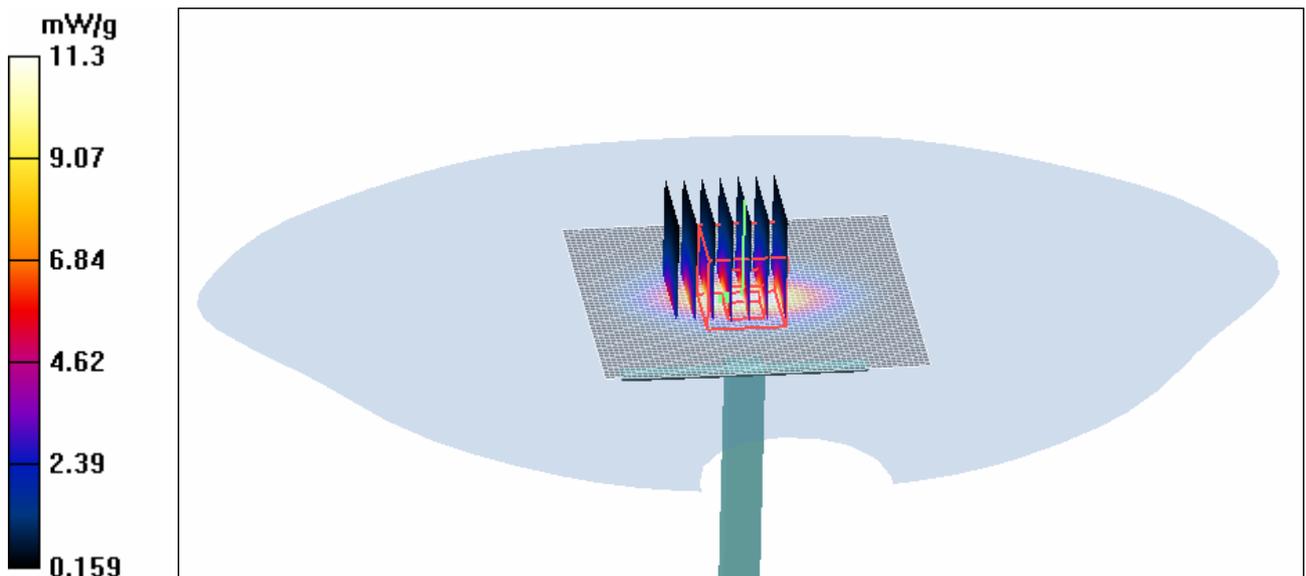


Figure 14 System Performance Check 1900MHz 250mW

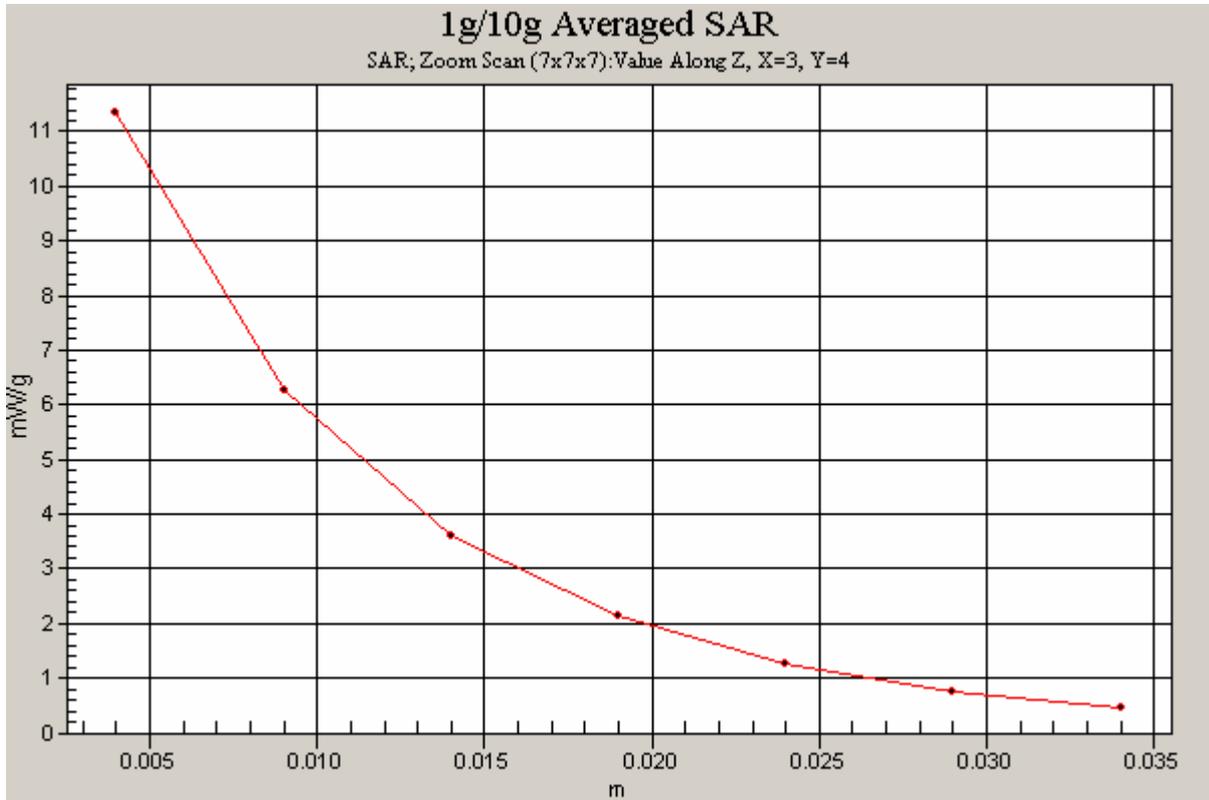


Figure 15 Z-Scan at power reference point (system Check at 1900 MHz dipole)

ANNEX C: Graph Results

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

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

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

Medium parameters used: $f = 849$ MHz; $\sigma = 1.03$ mho/m; $\epsilon_r = 54.9$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.72 W/kg

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

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

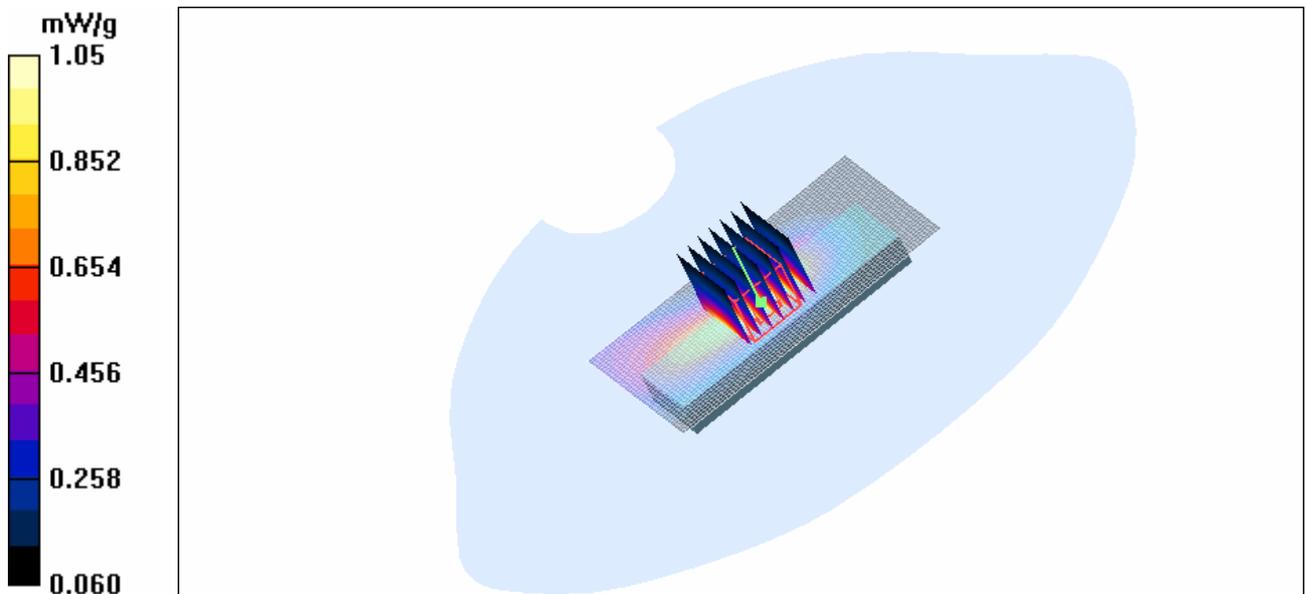


Figure 16 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 251

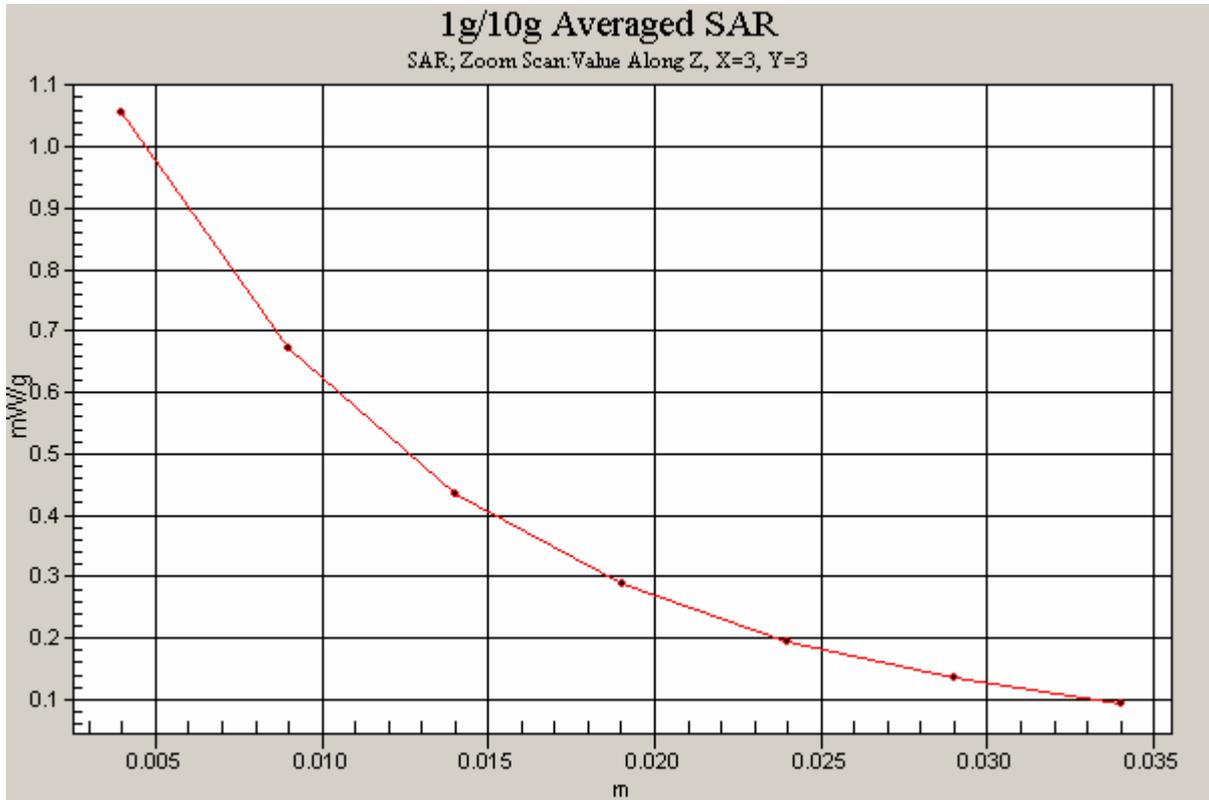


Figure 17 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61
Test Position 1 Channel 251]

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

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

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

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

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

$dz=5\text{mm}$

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

Peak SAR (extrapolated) = 1.72 W/kg

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

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

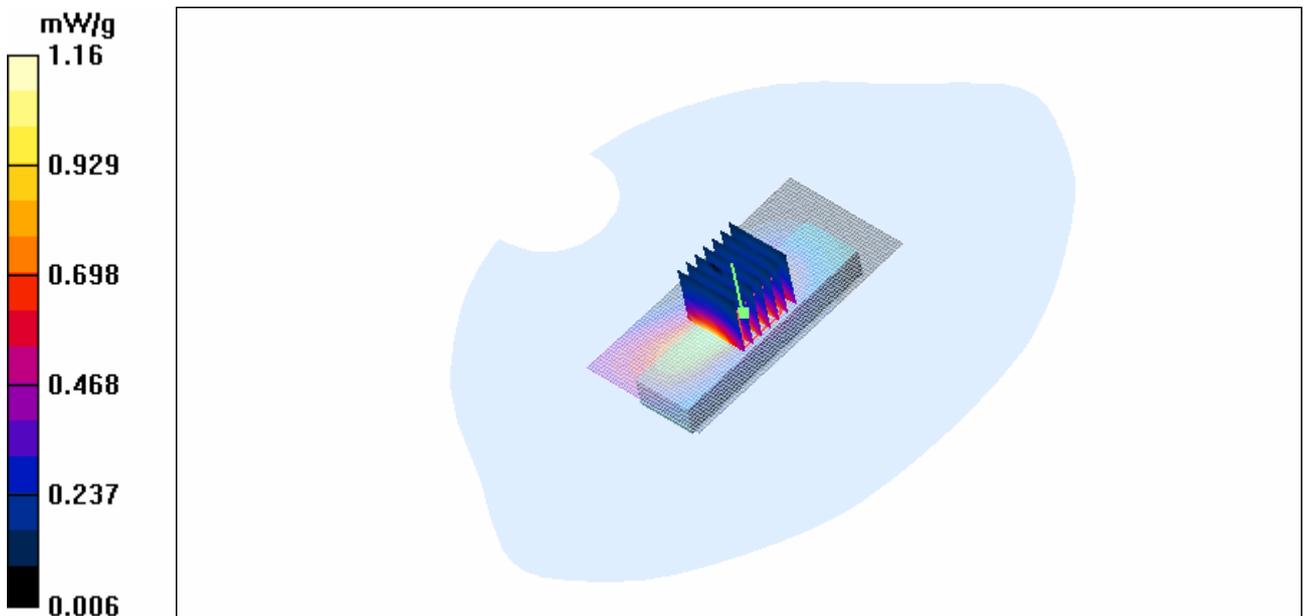


Figure 18 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

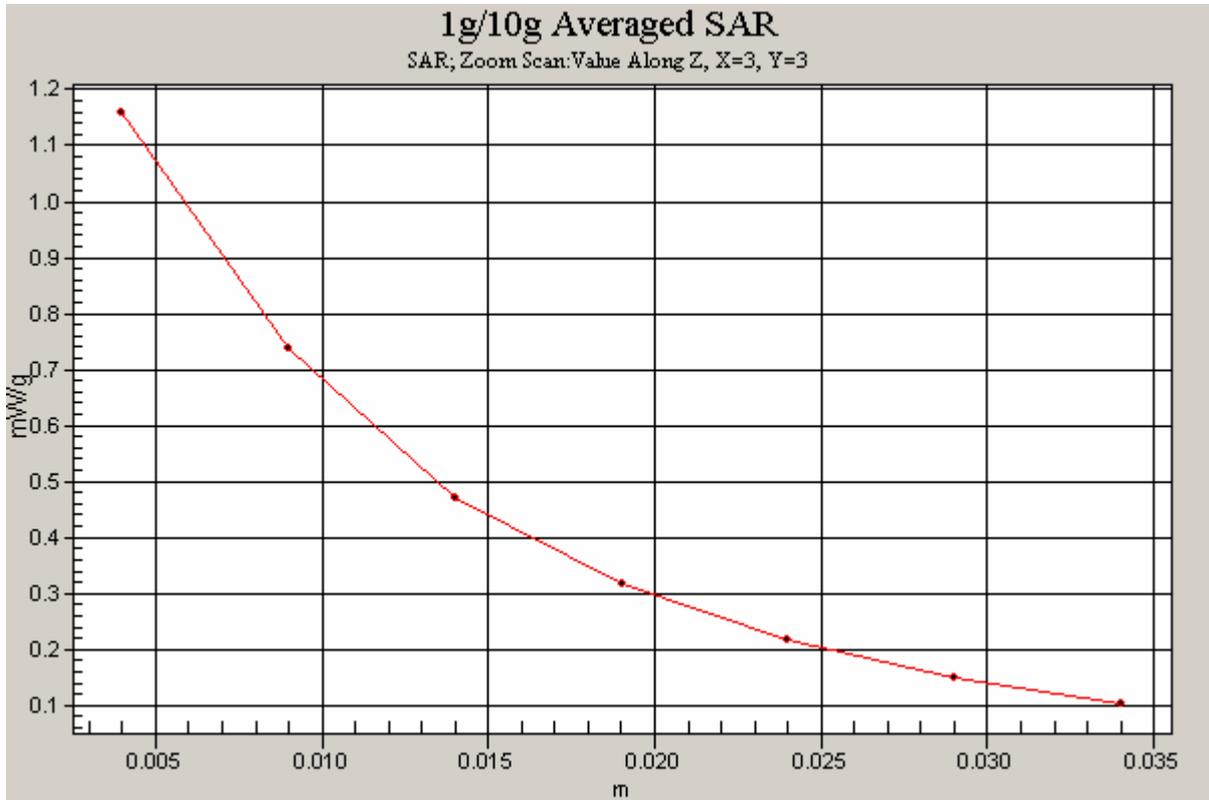


Figure 19 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61
Test Position 1 Channel 192]

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

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

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

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.66 W/kg

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

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

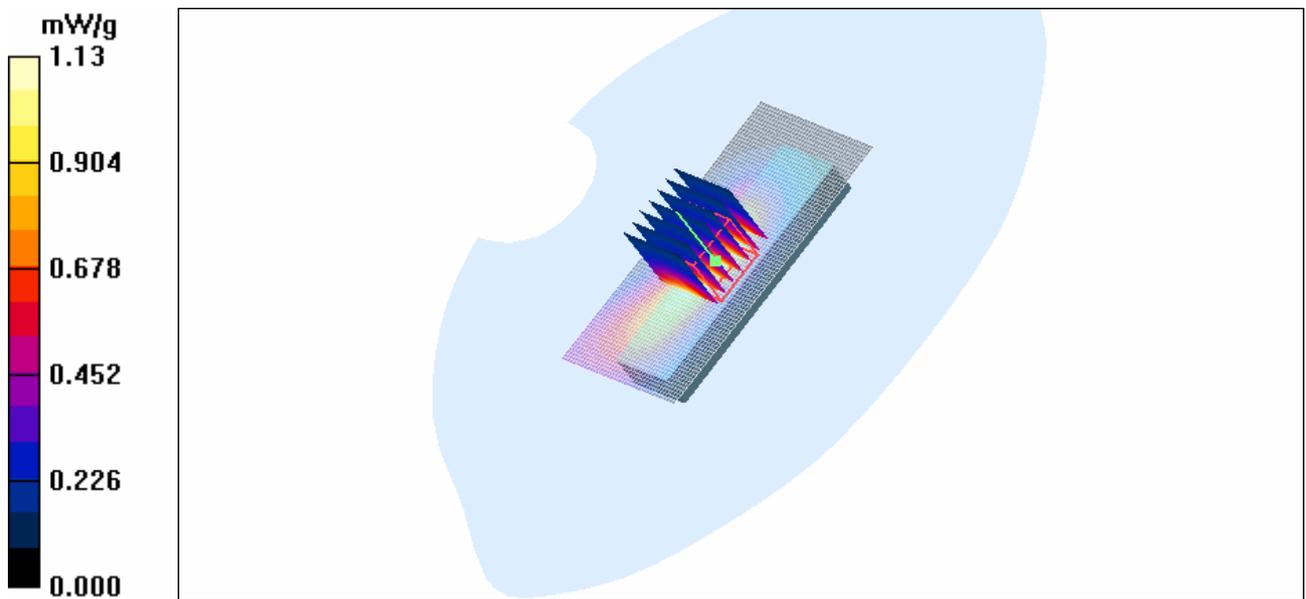


Figure 20 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 128

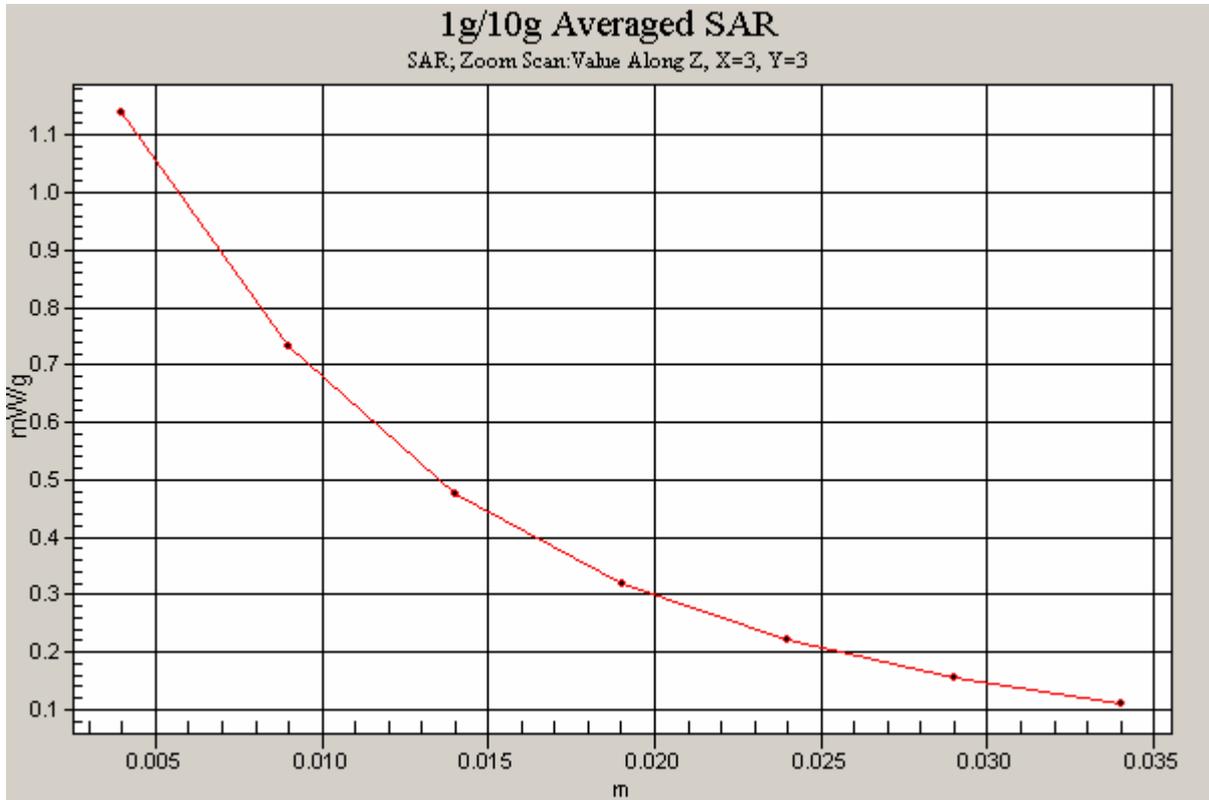


Figure 21 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61
Test Position 1 Channel 128]

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

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

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

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

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.48 W/kg

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

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

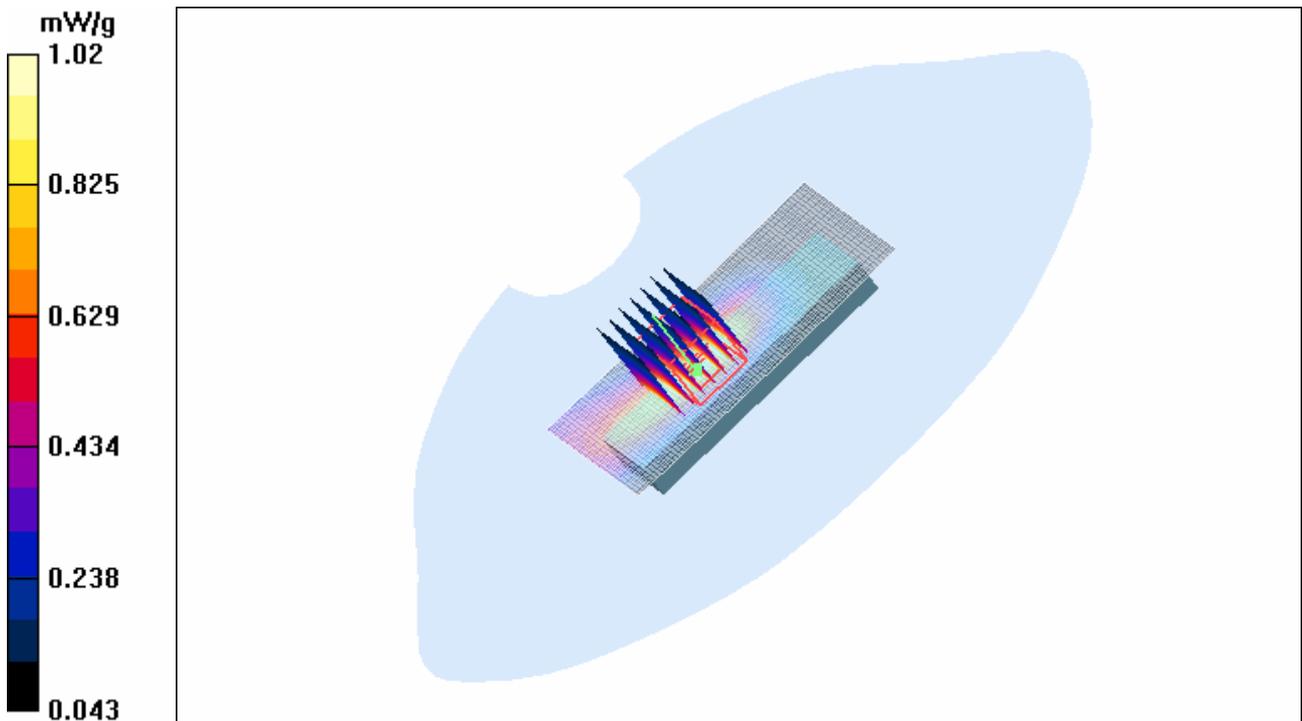


Figure 22 GSM 850 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 192

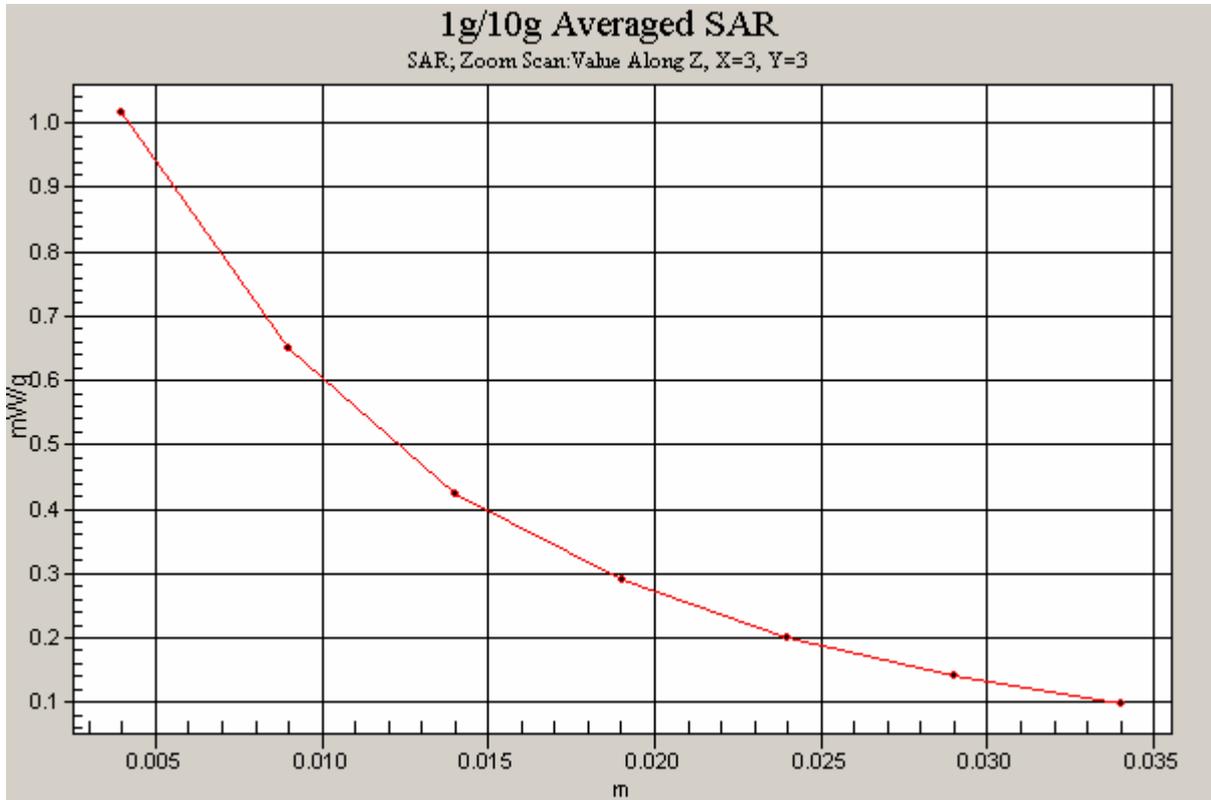


Figure 23 Z-Scan at power reference point [GSM 850 GPRS (1 timeslot in uplink) with IBM T61
Test Position 1 Channel192]

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

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

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

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

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

Test Position 3 Middle/Area Scan (51x51x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

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

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

Peak SAR (extrapolated) = 0.471 W/kg

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

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

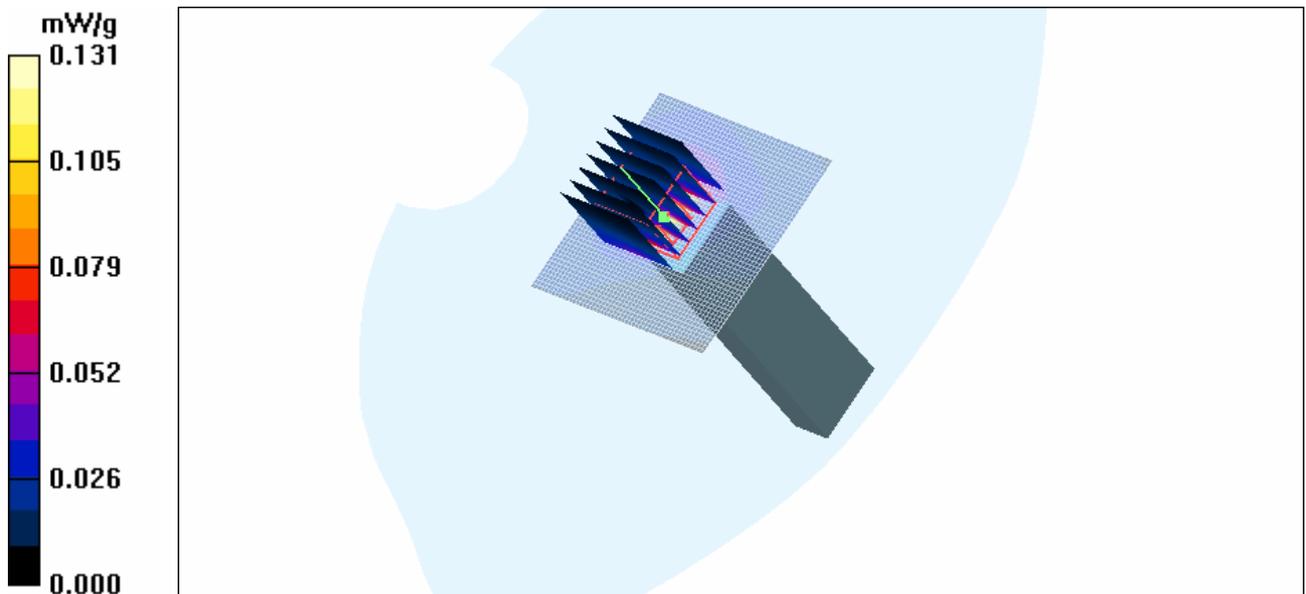


Figure 24 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Channel 192

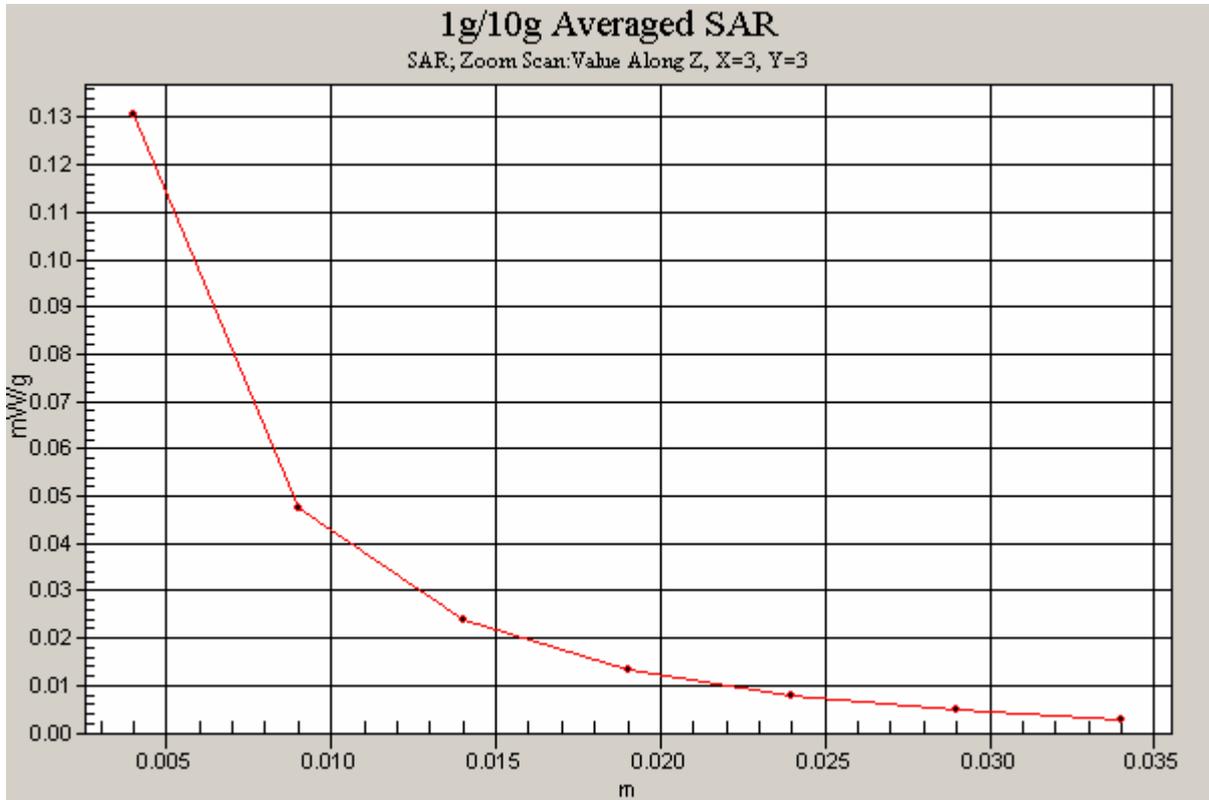


Figure 25 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61
Test Position 3 Channel 192]

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

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

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 0.537 W/kg

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

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

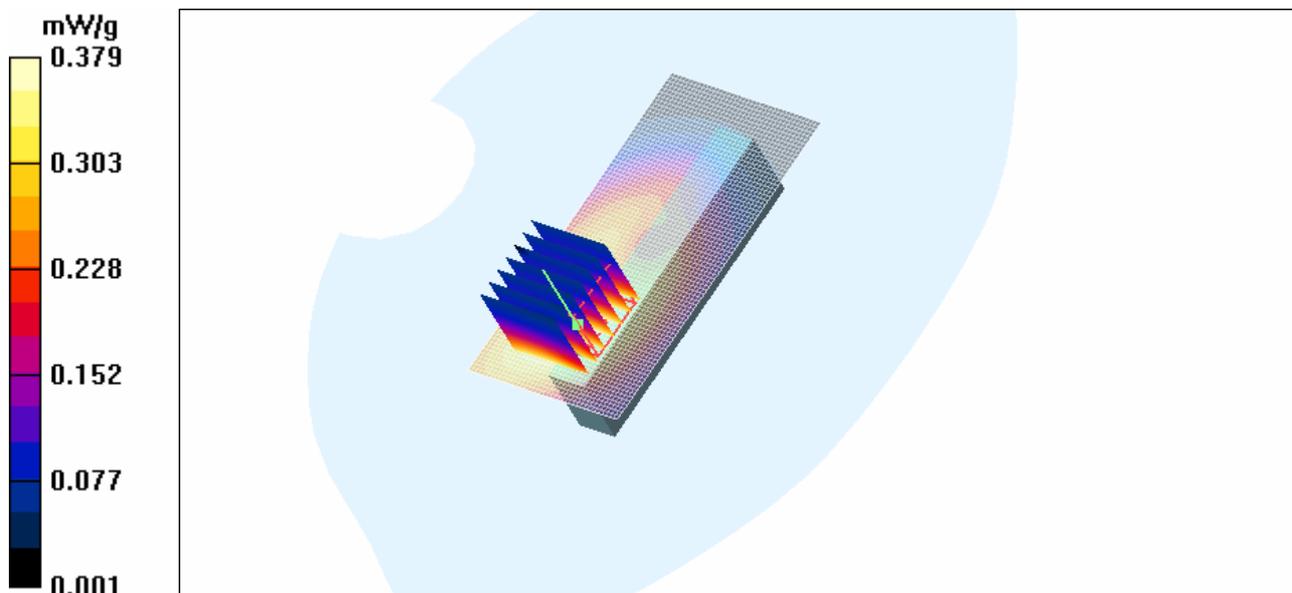


Figure 26 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Channel 192

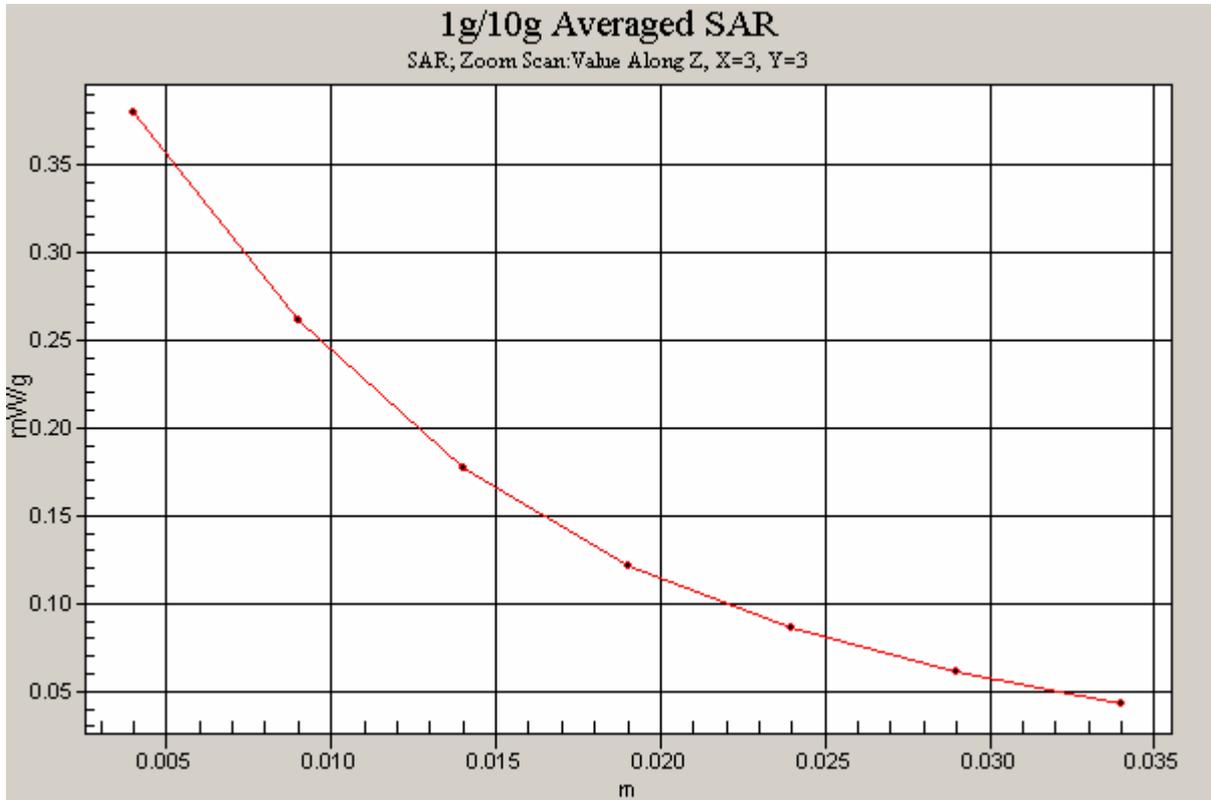


Figure 27 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61
Test Position 4 Channel 192]

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

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

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 0.930 W/kg

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

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

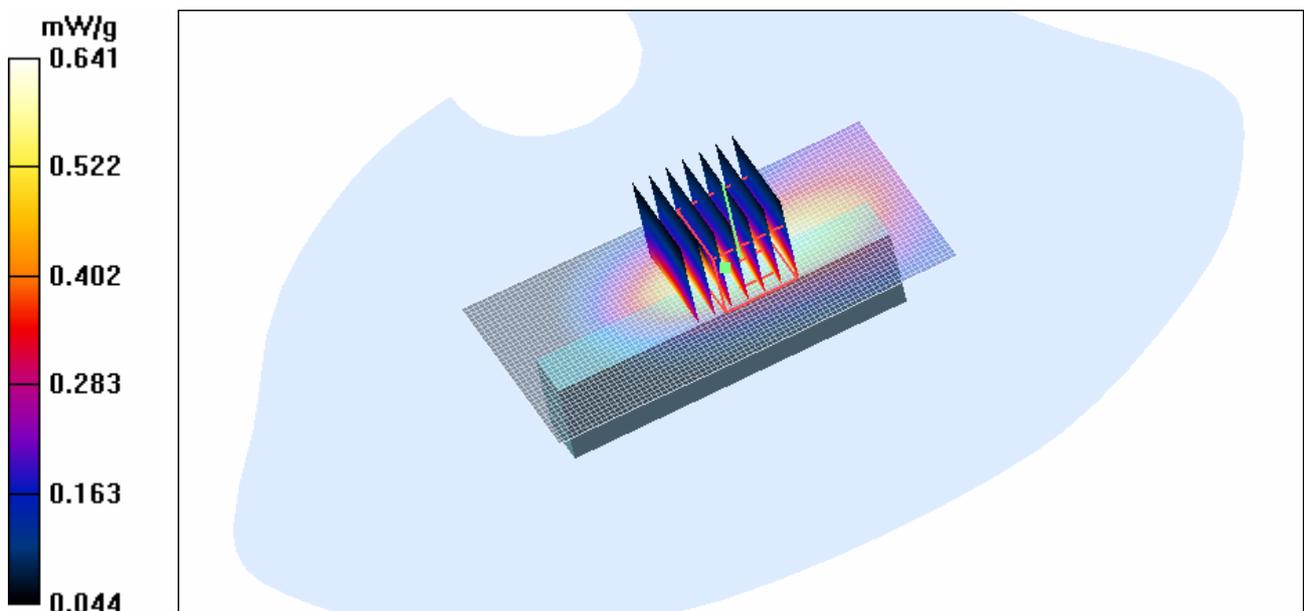


Figure 28 GSM 850 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Channel 192

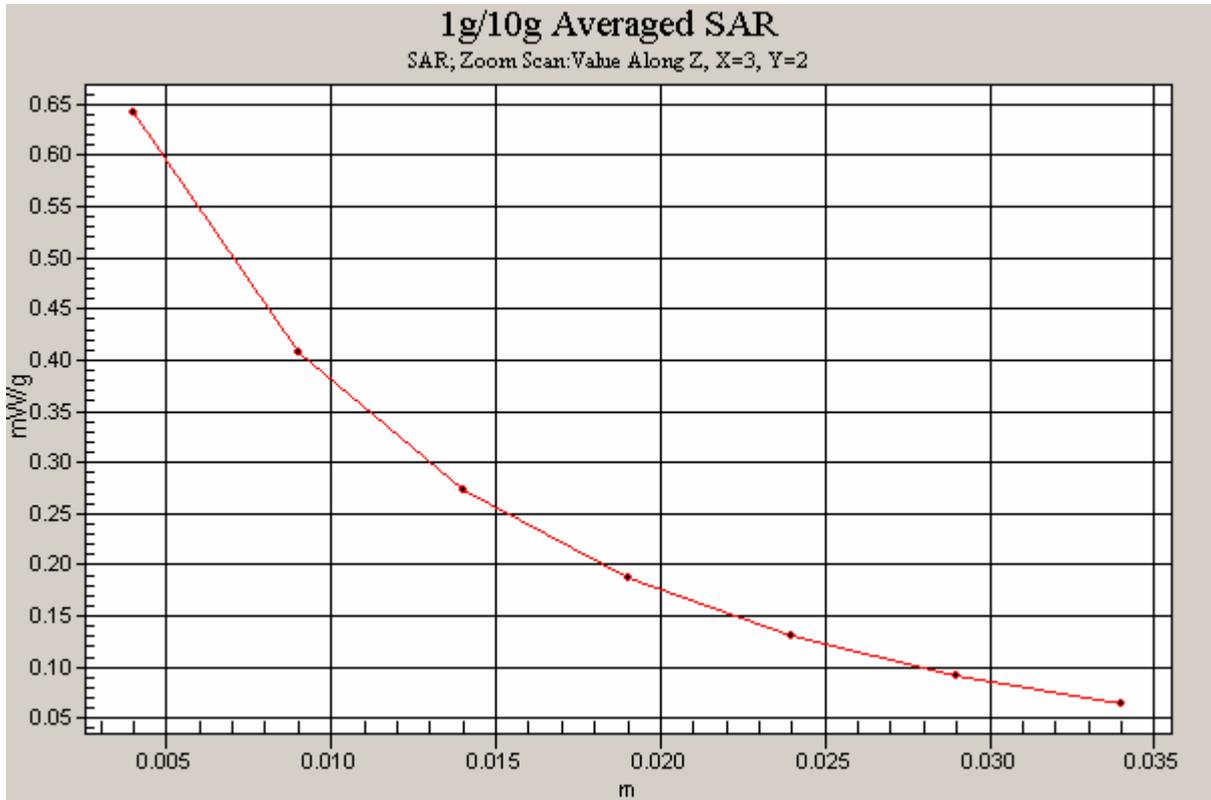


Figure 29 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with IBM T61
Test Position 5 Channel 192]

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

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

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.06 W/kg

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

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

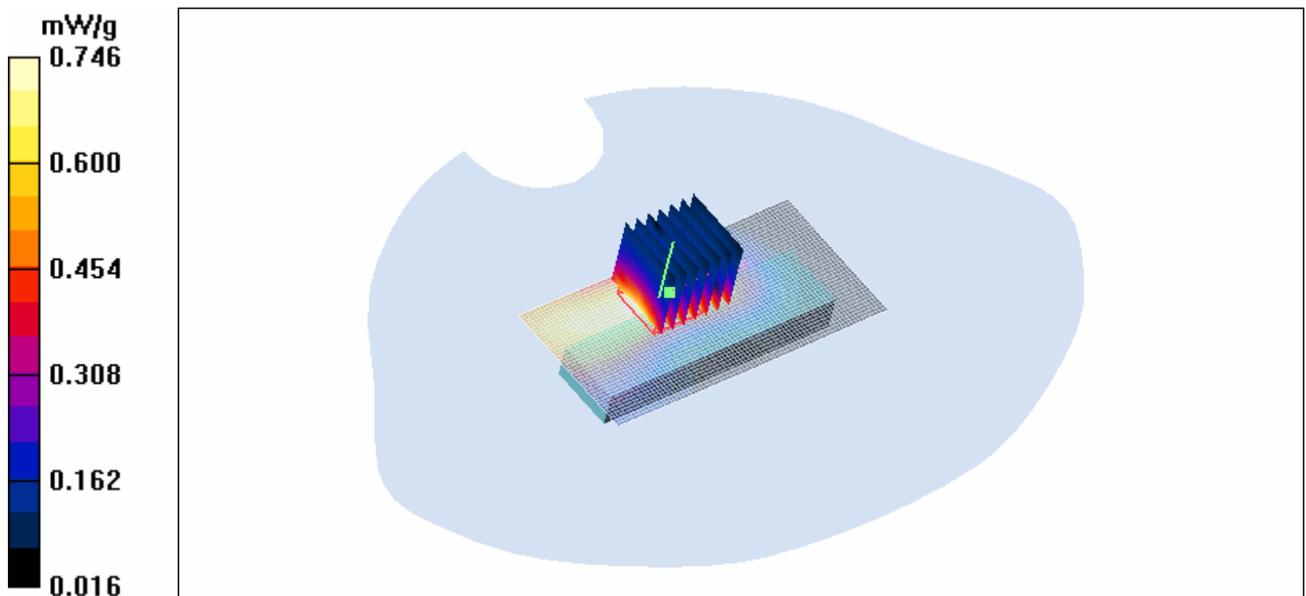


Figure 30 GSM 850 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 192

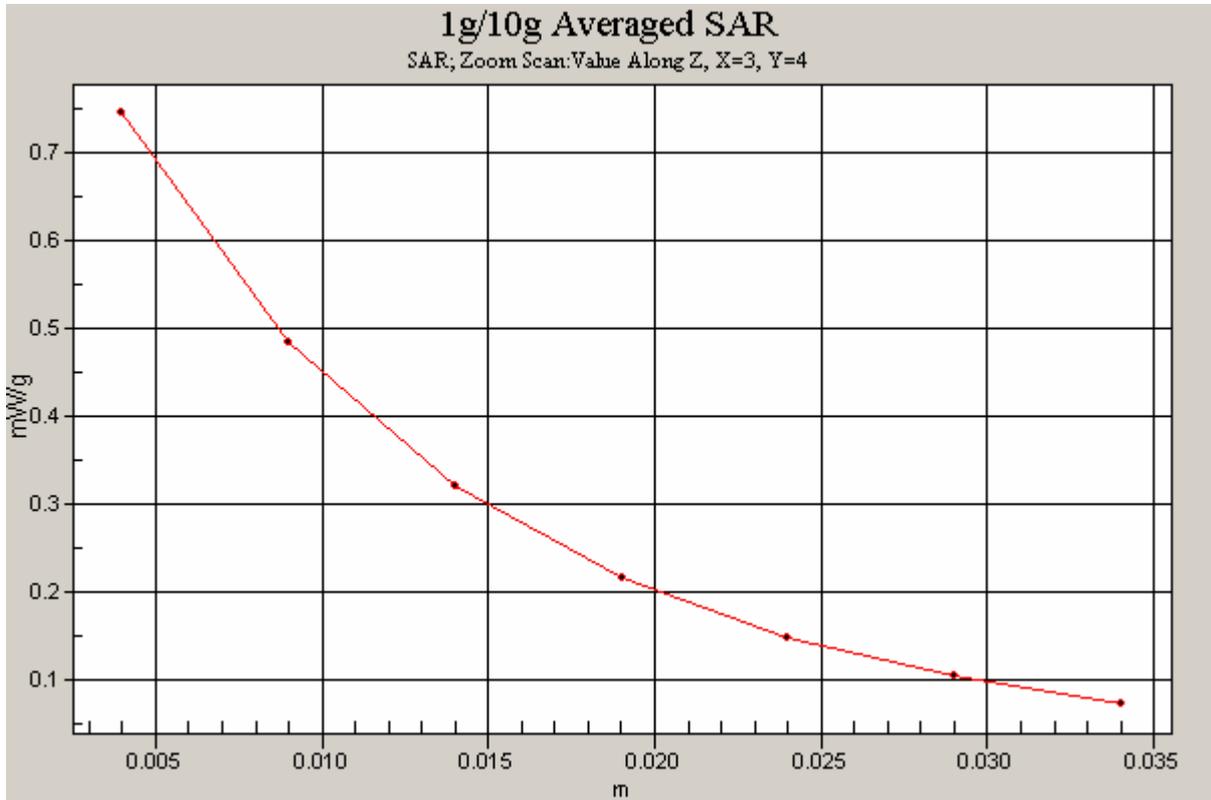


Figure 31 Z-Scan at power reference point [GSM 850 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 192]

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

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

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.41 W/kg

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

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

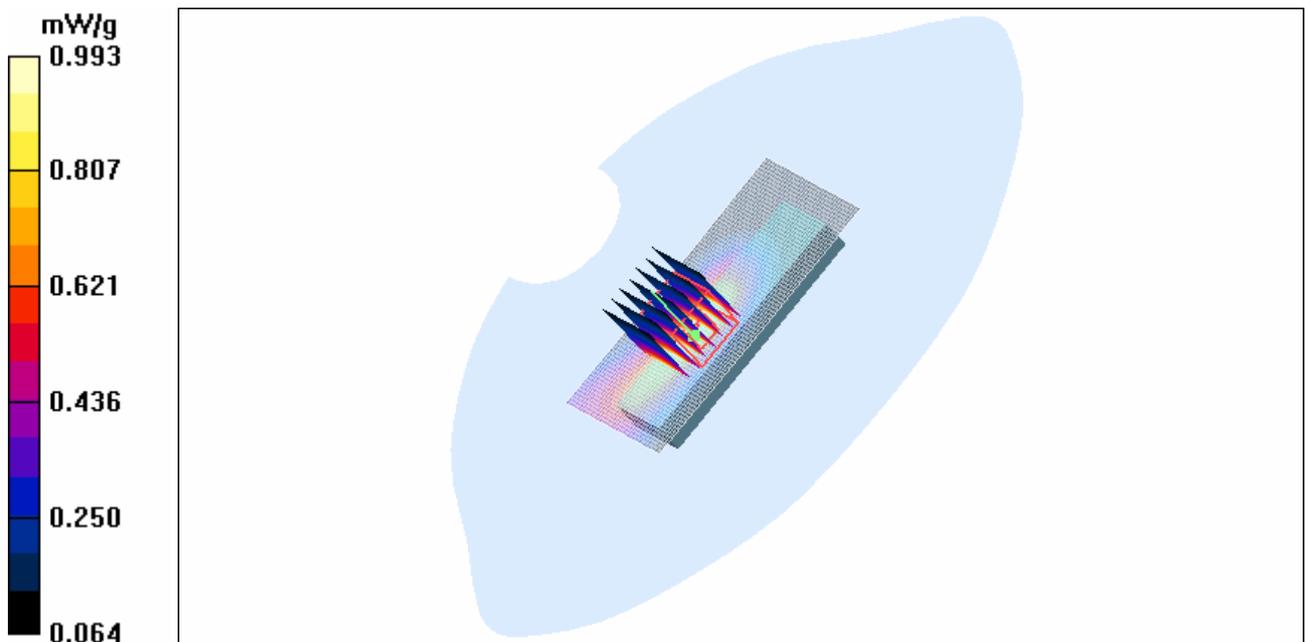


Figure 32 GSM 850 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 192

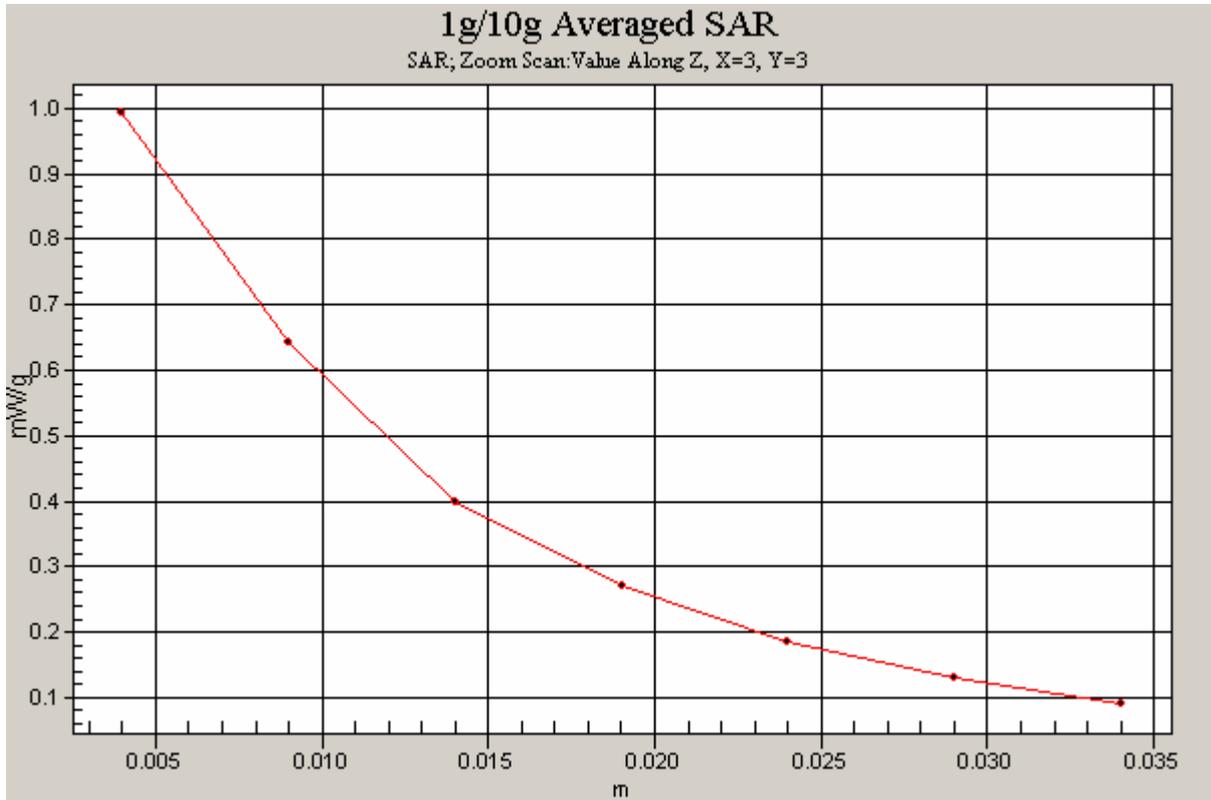


Figure 33 Z-Scan at power reference point [GSM 850 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 192]

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

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

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

Medium parameters used: $f = 837$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

dz=5mm

Reference Value = 34.6 V/m; Power Drift = -0.034 dB

Peak SAR (extrapolated) = 1.67 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.610 mW/g

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

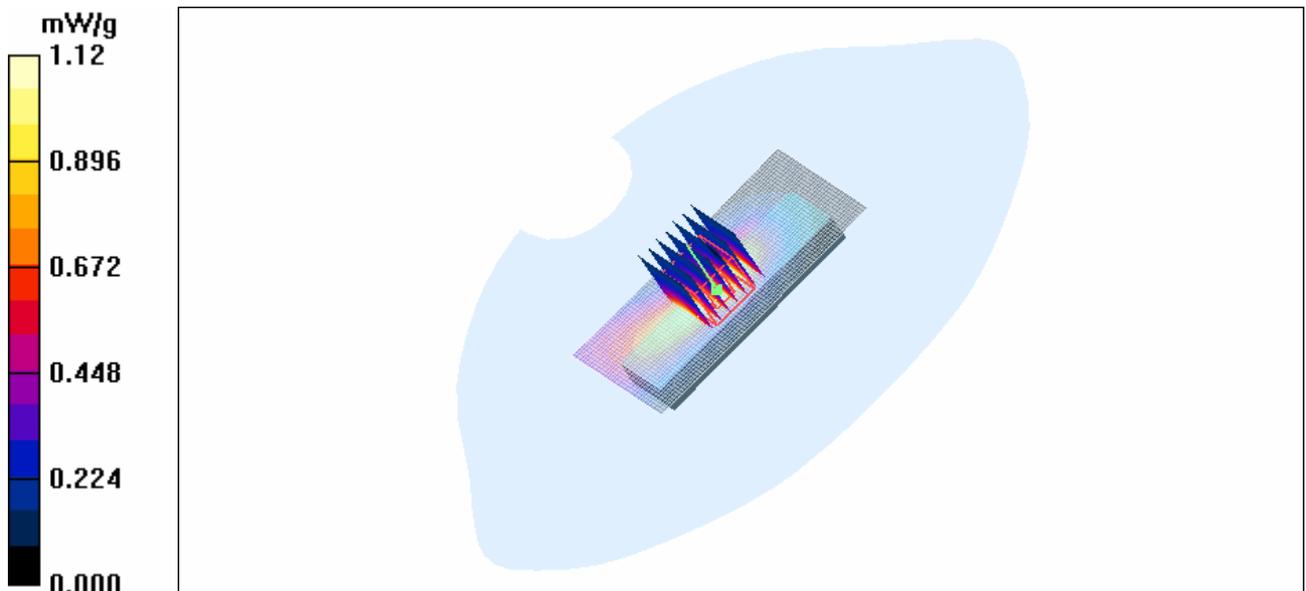


Figure 34 GSM 850 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

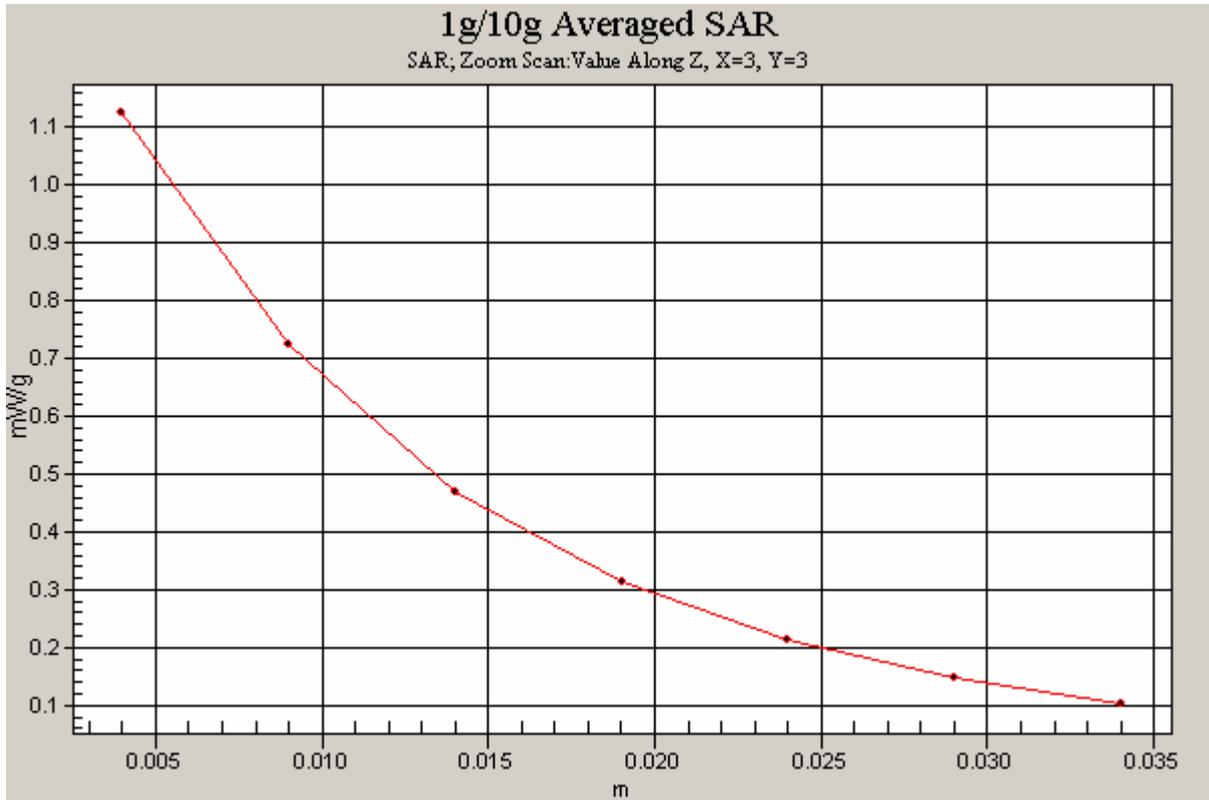


Figure 35 Z-Scan at power reference point [GSM 850 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 192]

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

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

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

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

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 33.0 V/m ; Power Drift = -0.069 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.920 mW/g ; SAR(10 g) = 0.549 mW/g

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

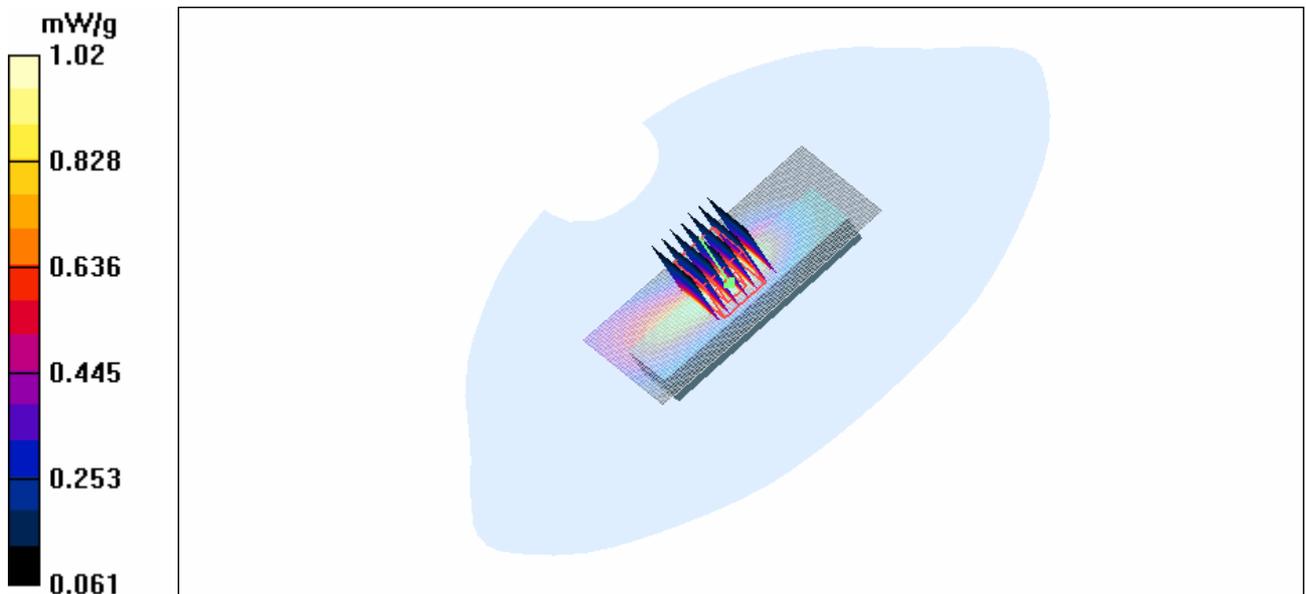


Figure 36 GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

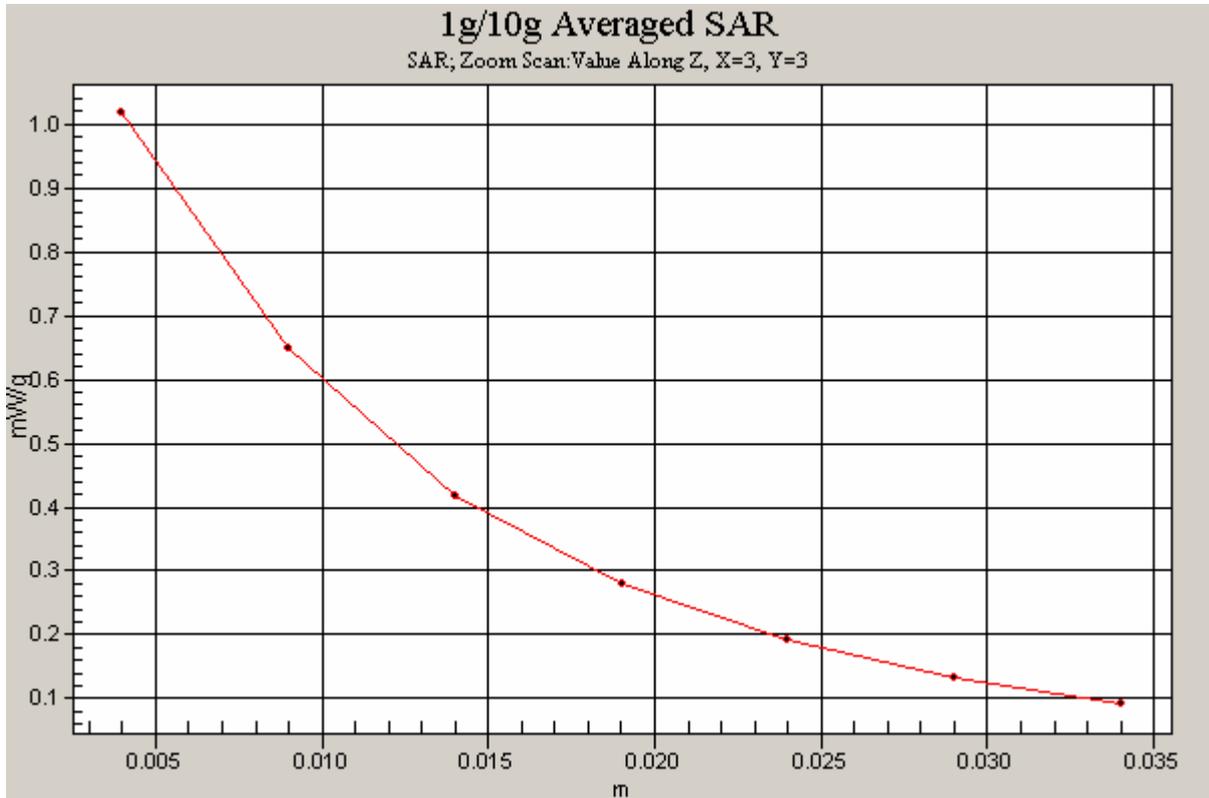


Figure 37 Z-Scan at power reference point [GSM 850 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 192]

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

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

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

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

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

Reference Value = 33.2 V/m; Power Drift = -0.087 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 0.922 mW/g; SAR(10 g) = 0.552 mW/g

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

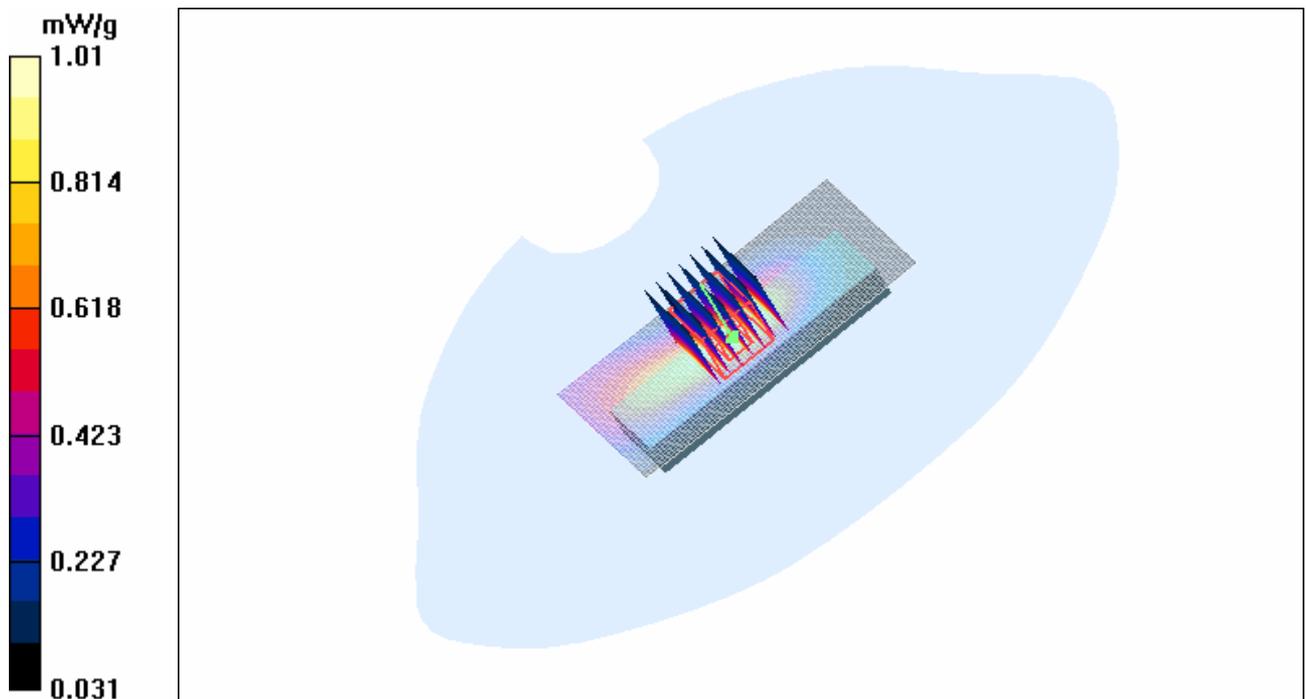


Figure 38 GSM 850 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 192

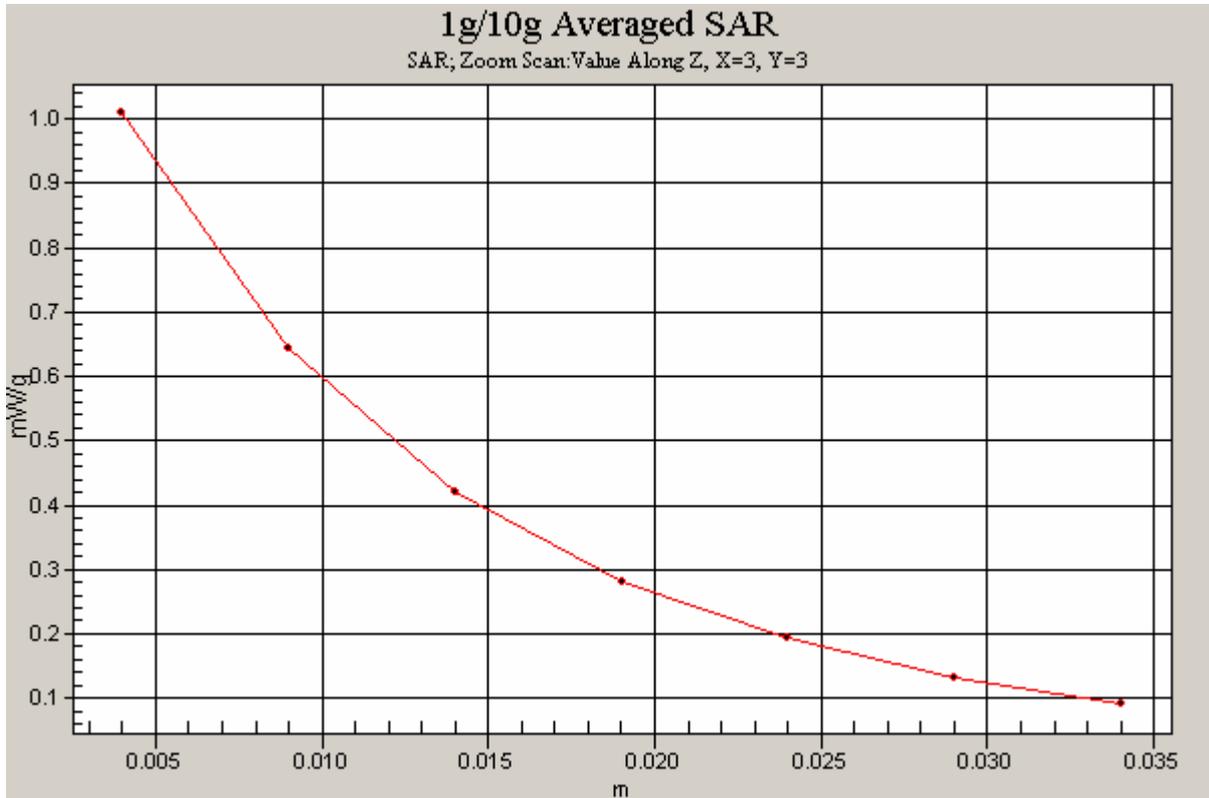


Figure 39 Z-Scan at power reference point [GSM 850 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 192]

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

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

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.37 W/kg

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

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

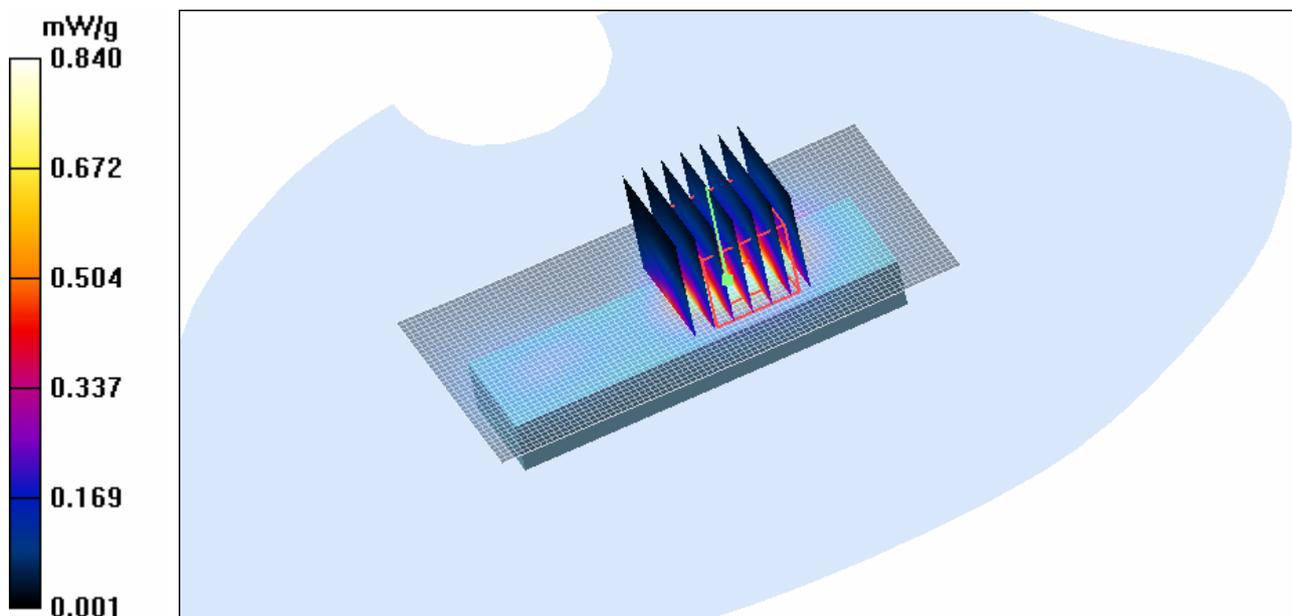


Figure 40 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

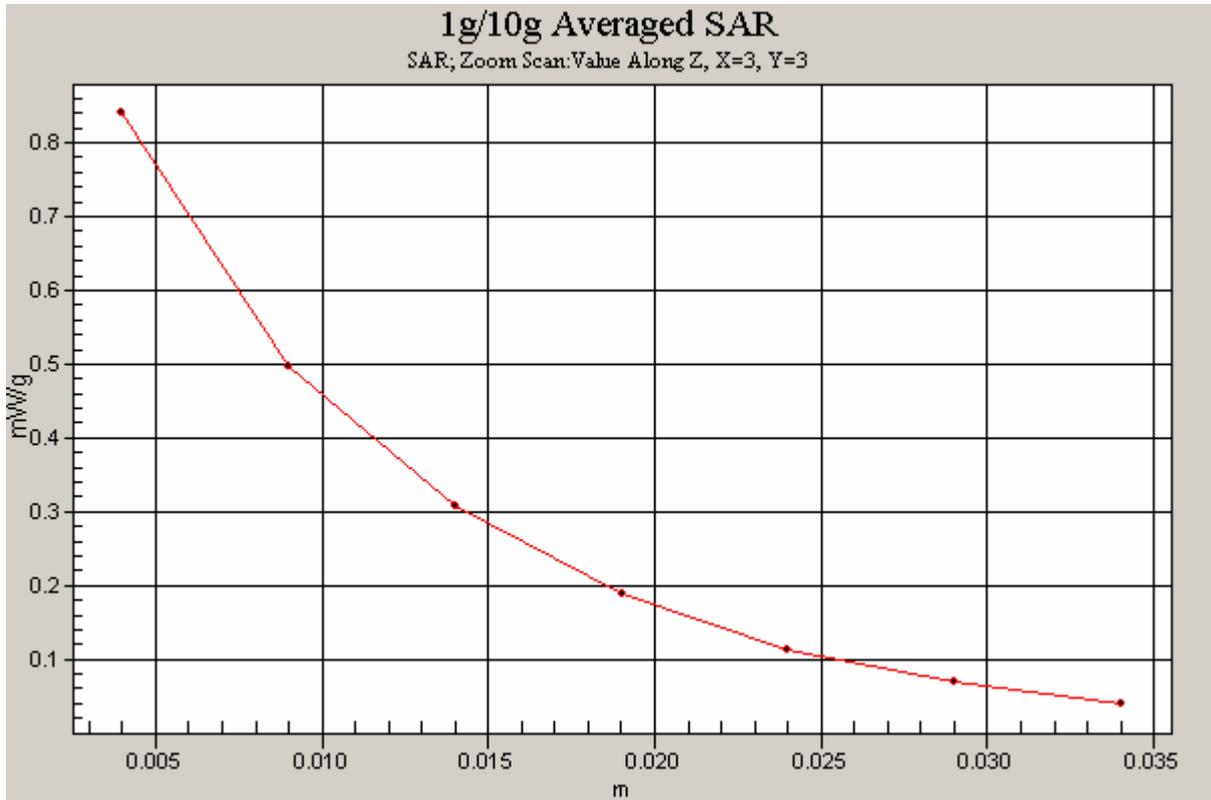


Figure 41 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

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

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

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.22 W/kg

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

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

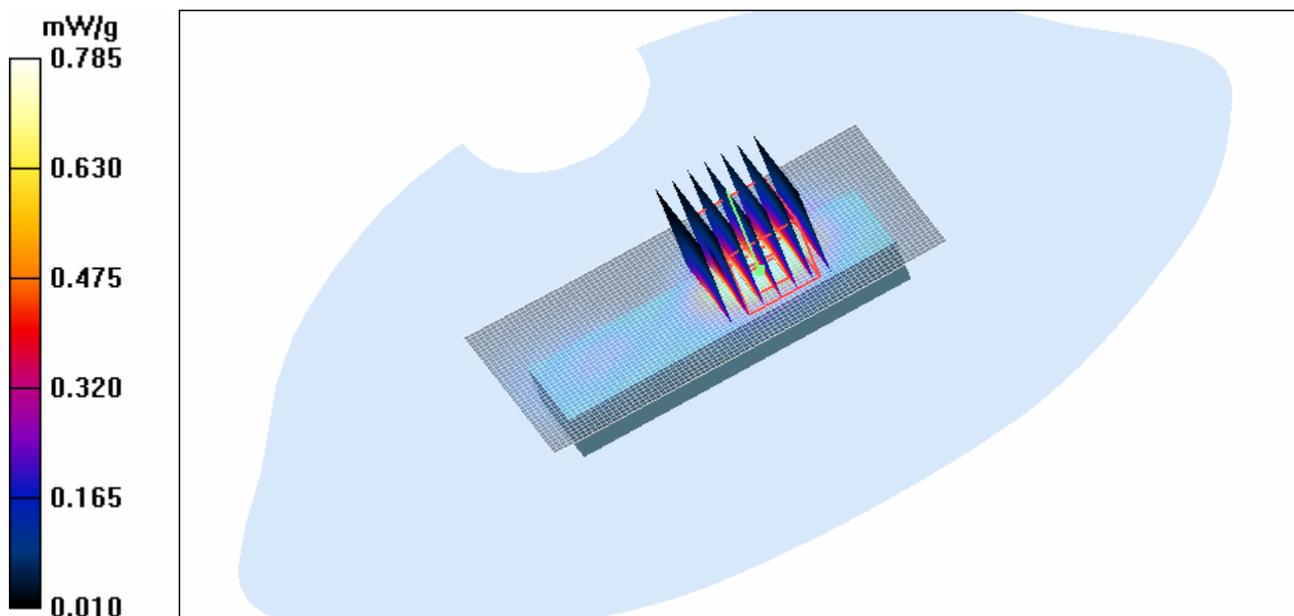


Figure 42 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 661

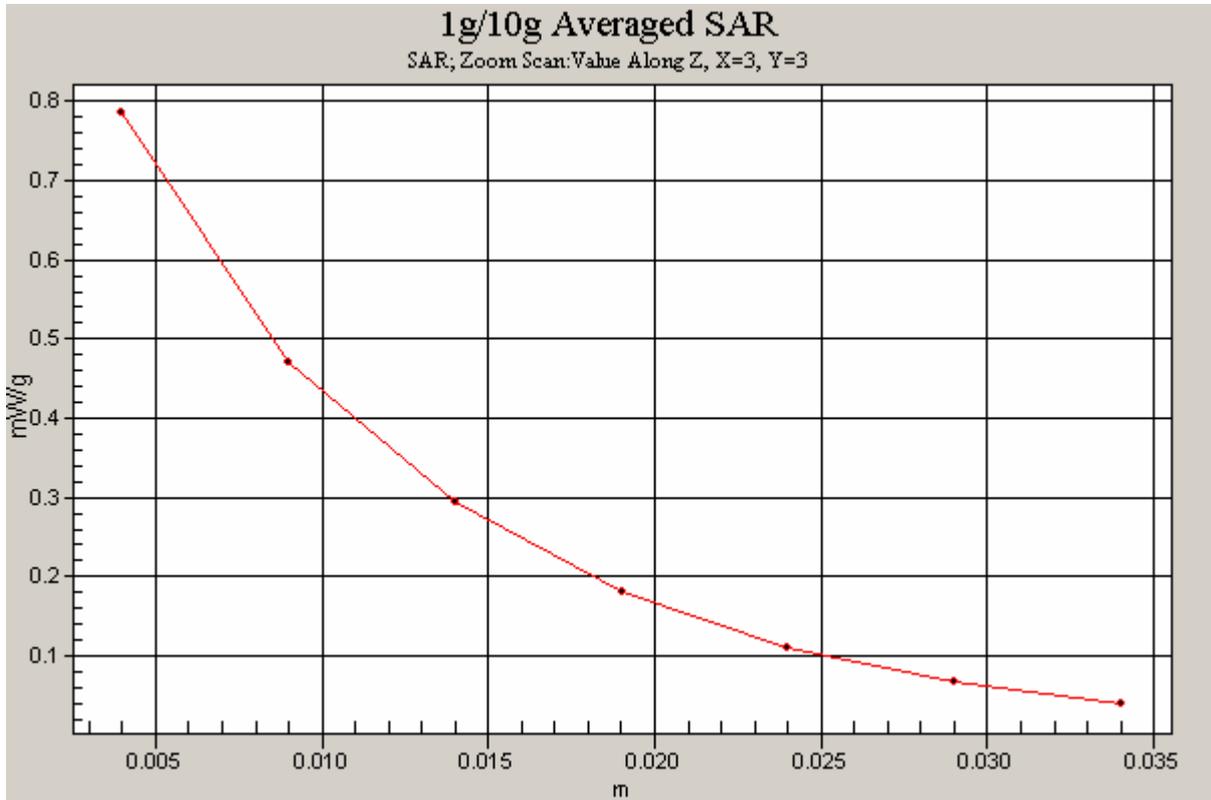


Figure 43 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 661]

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

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

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

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.15 W/kg

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

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

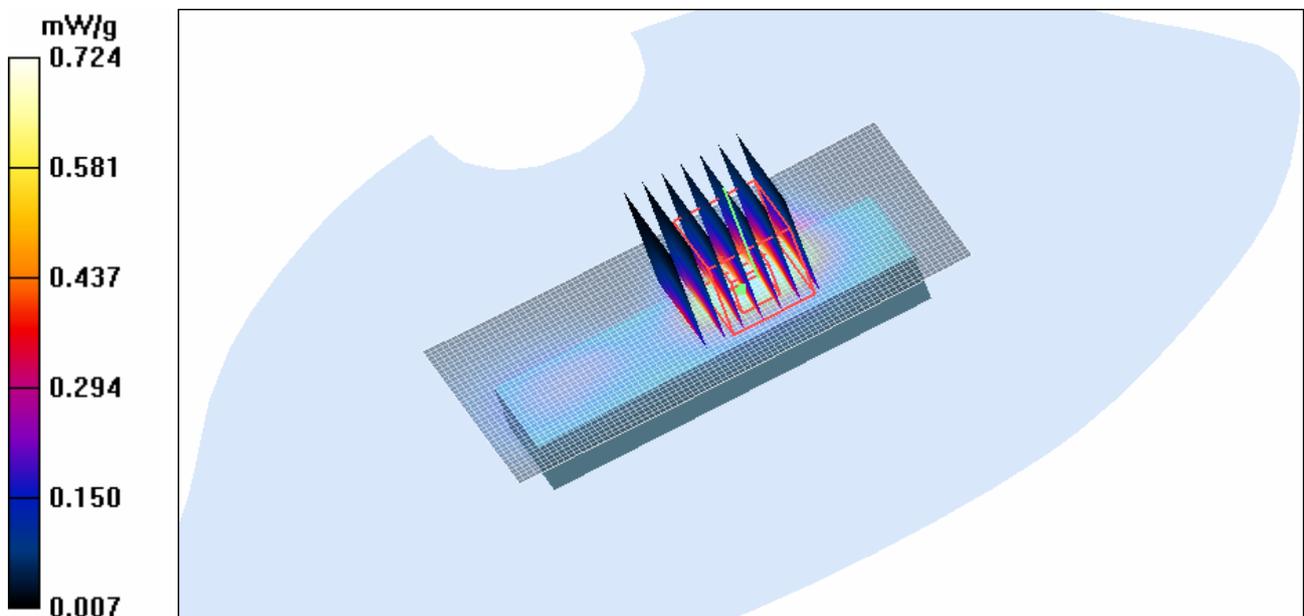


Figure 44 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 512

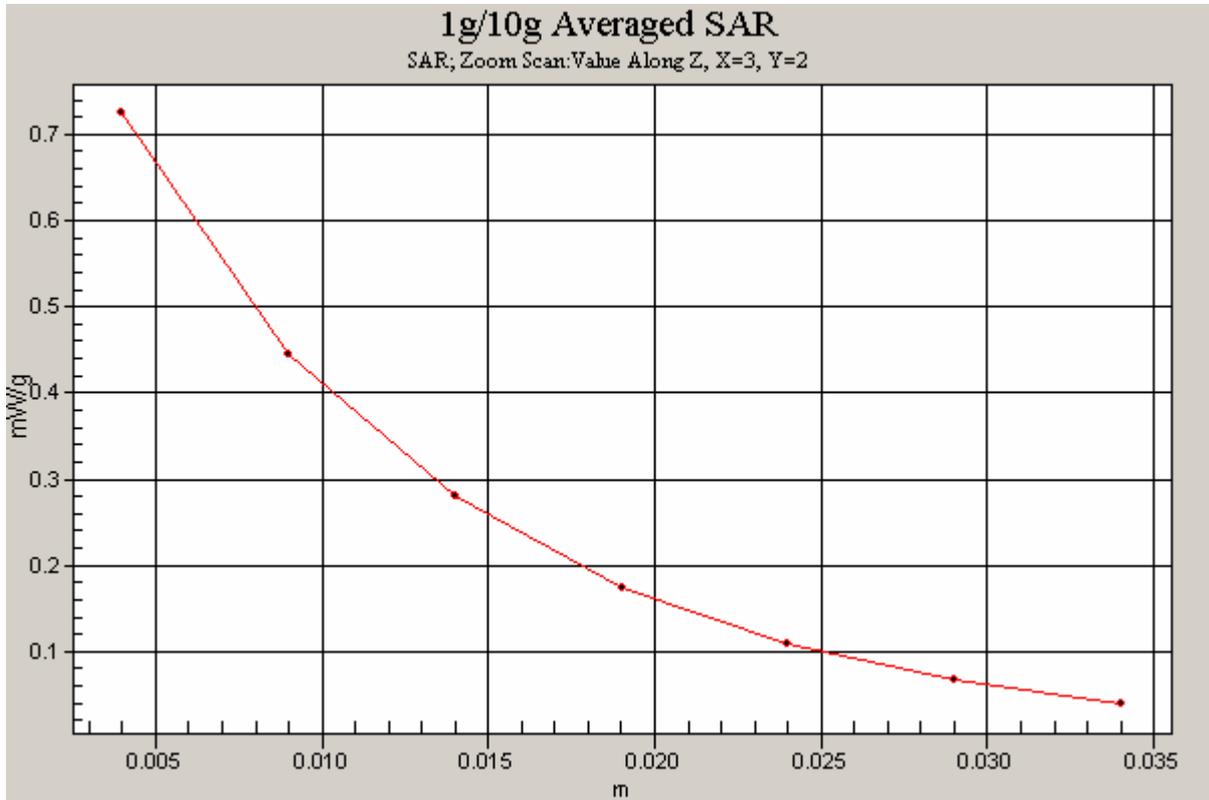


Figure 45 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 512]

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

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

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.12 W/kg

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

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

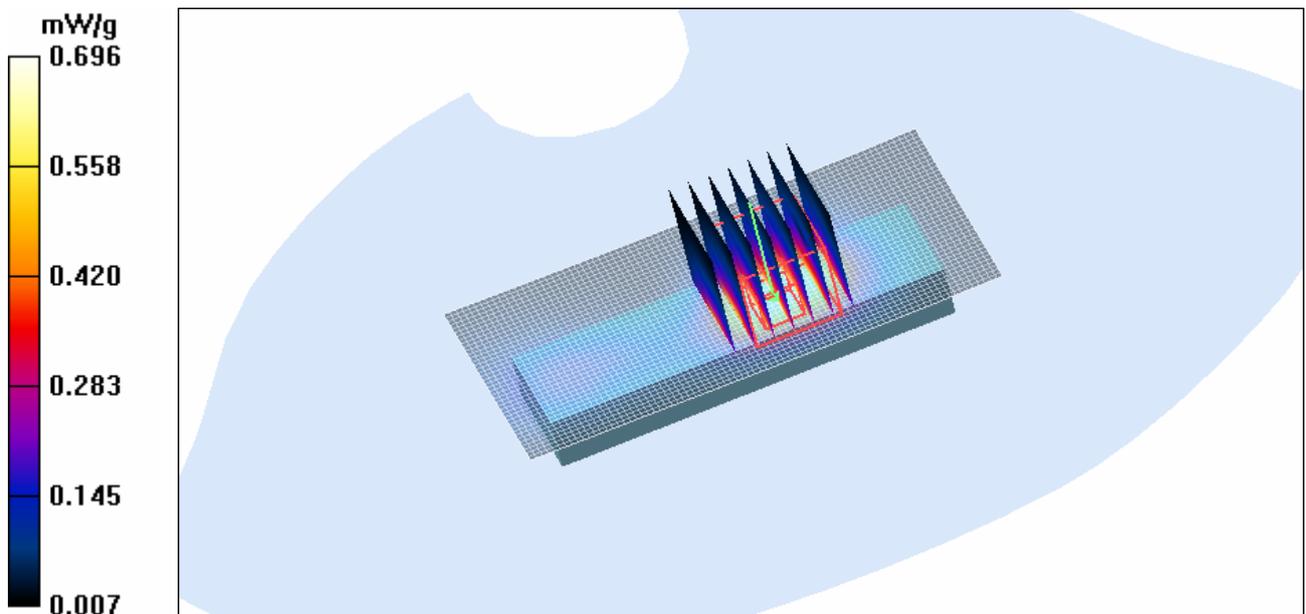


Figure 46 GSM 1900 GPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 661

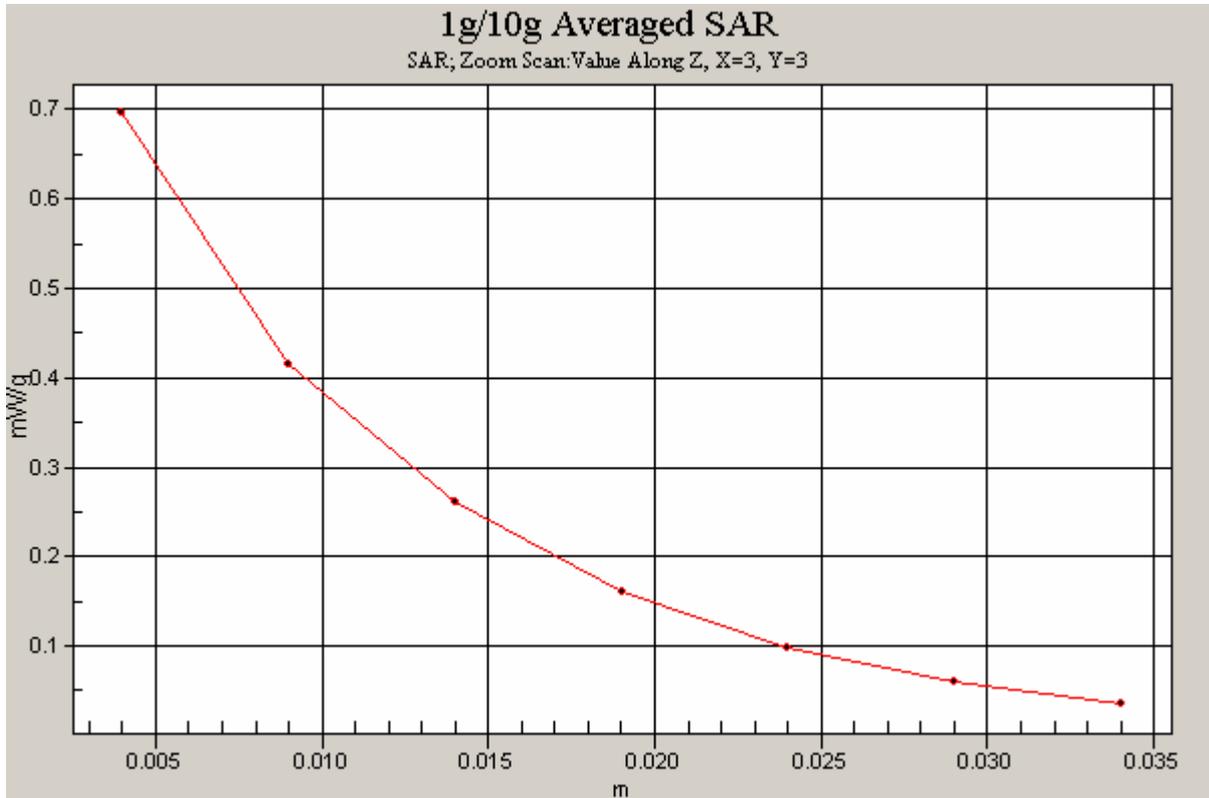


Figure 47 Z-Scan at power reference point [GSM 1900 GPRS (1 timeslot in uplink) with IBM T61
Test Position 1 Channel 661]

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

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

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

dz=5mm

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

Peak SAR (extrapolated) = 0.241 W/kg

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

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

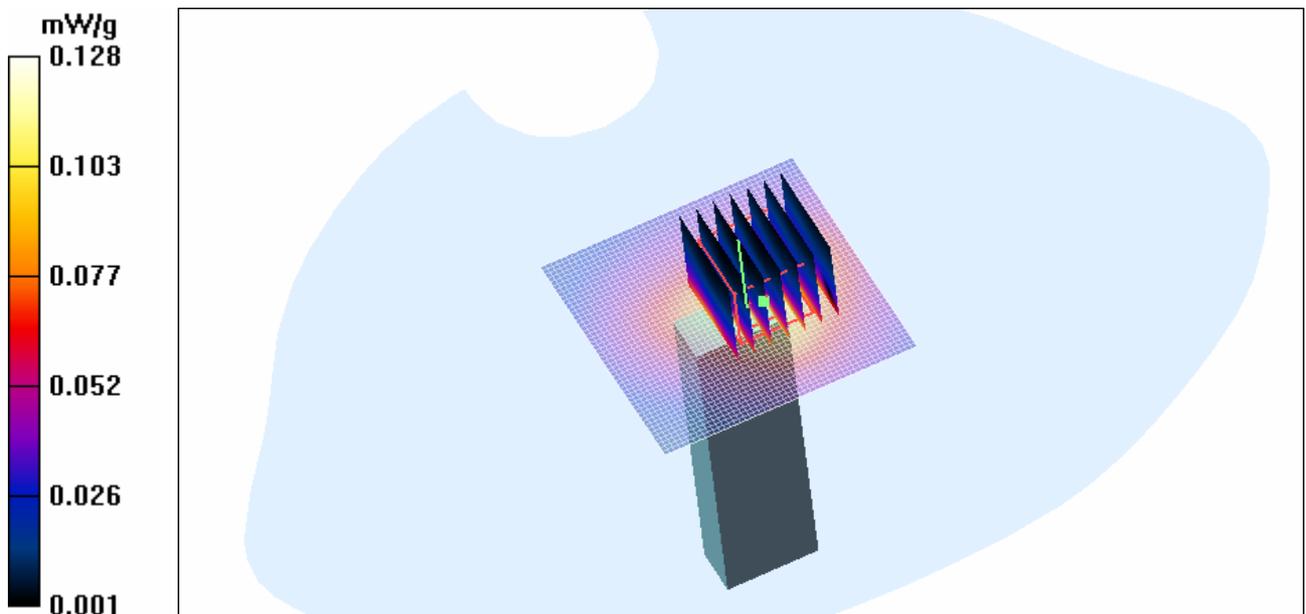


Figure 48 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Channel 661

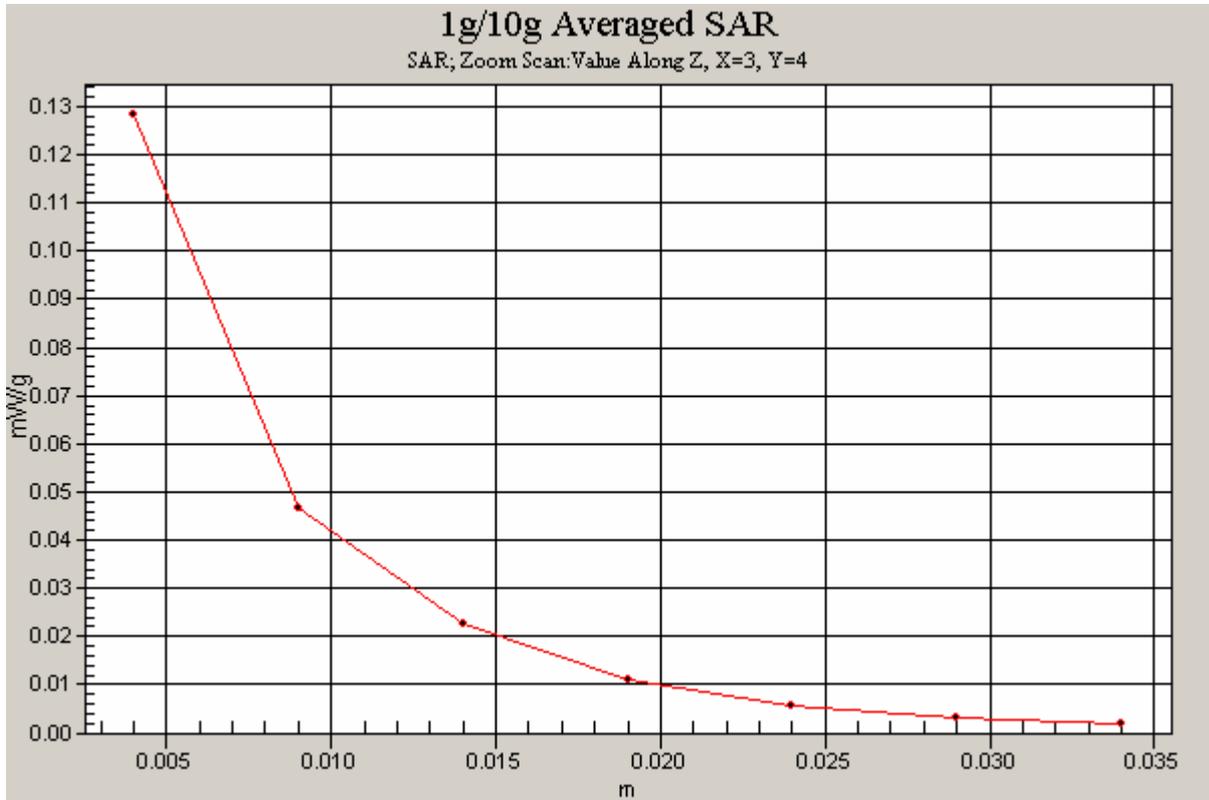


Figure 49 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 3 Channel 661]

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

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

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

dz=5mm

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

Peak SAR (extrapolated) = 0.780 W/kg

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

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

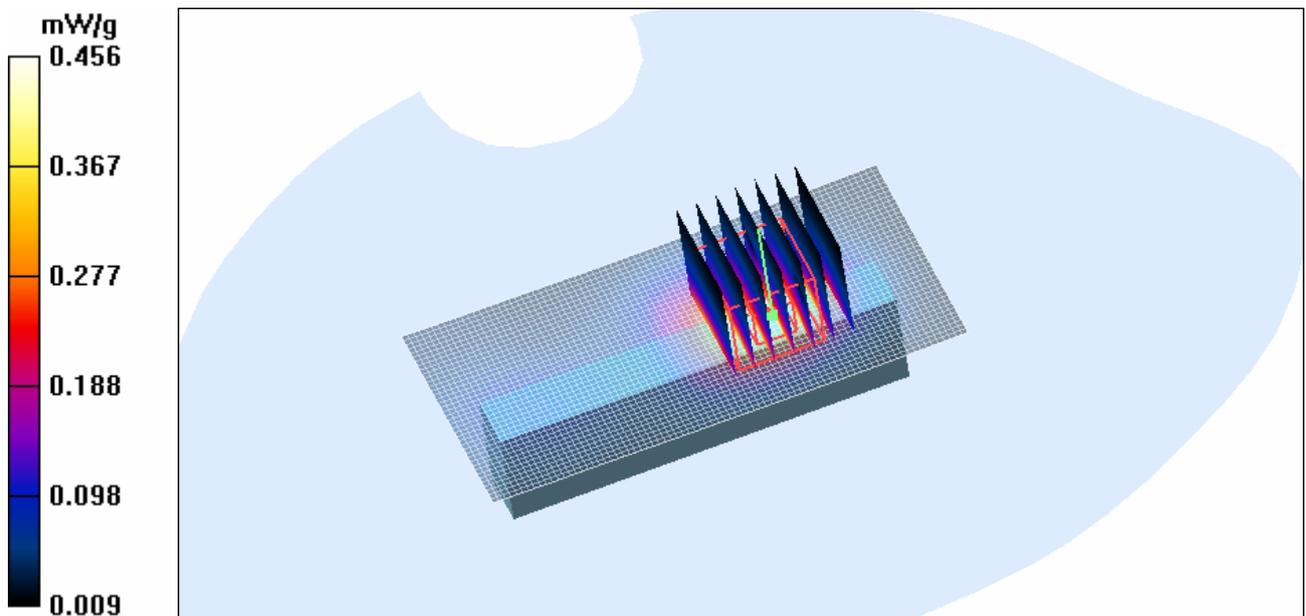


Figure 50 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Channel 661

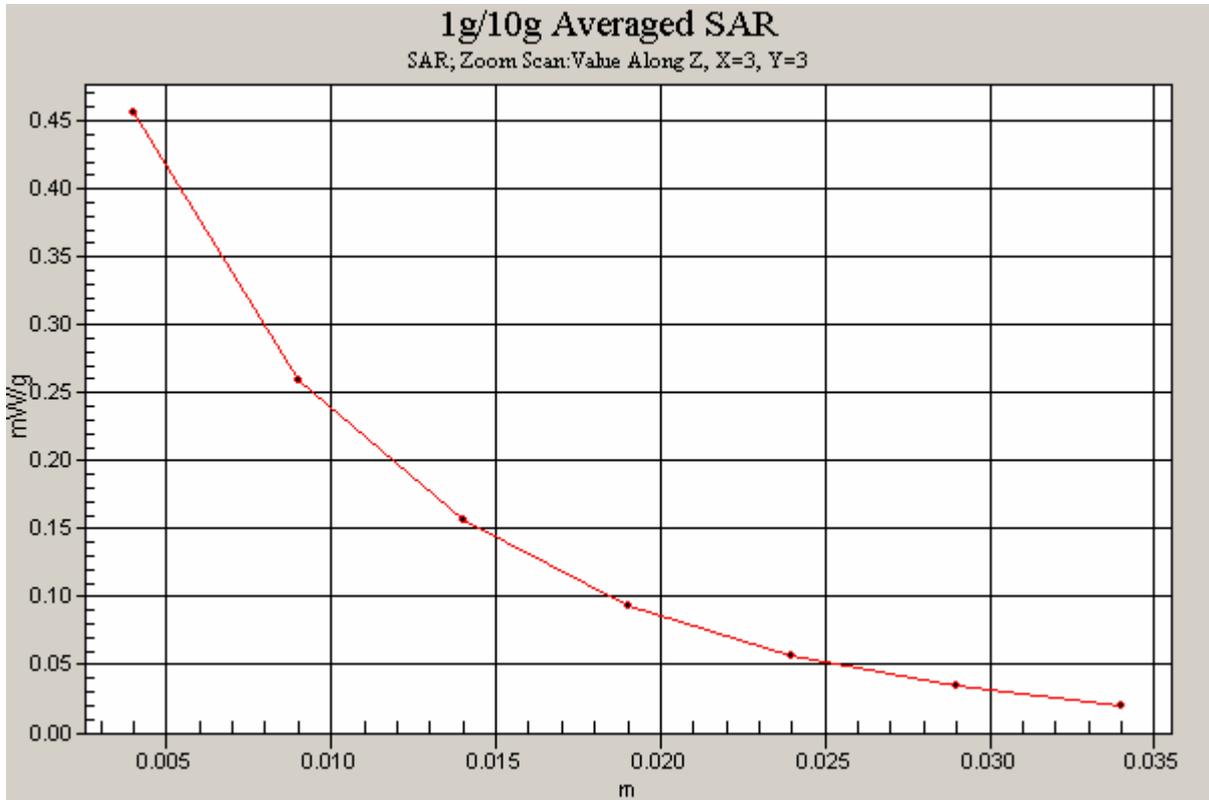


Figure 51 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 4 Channel 661]

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

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

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.07 W/kg

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

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

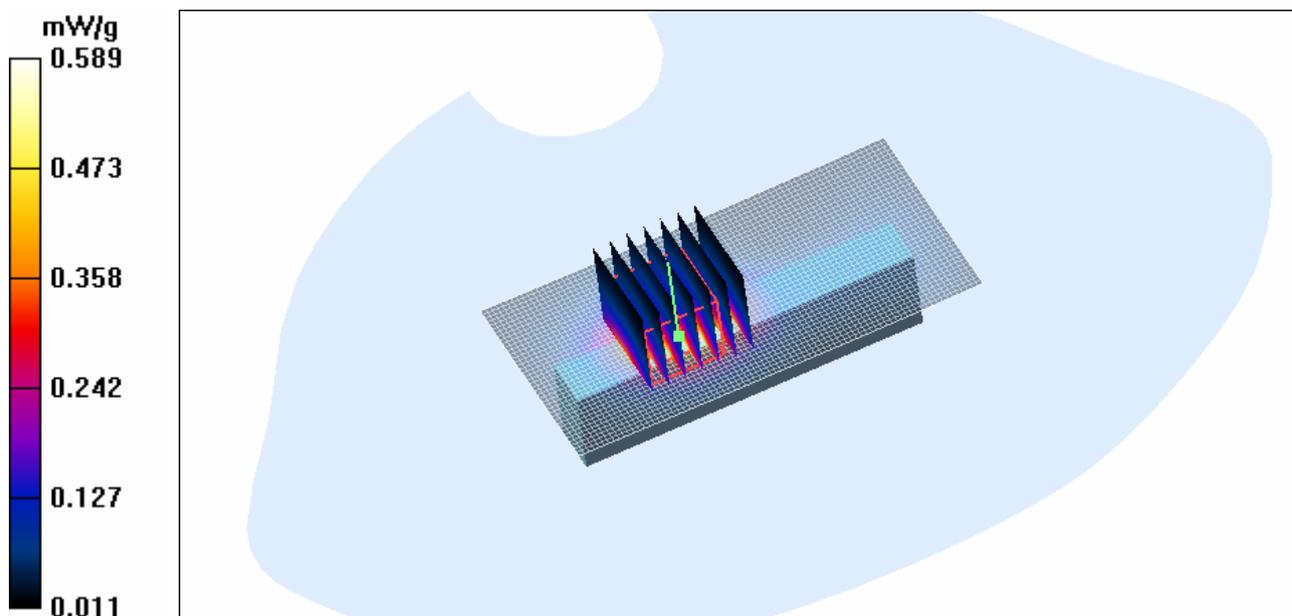


Figure 52 GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Channel 661

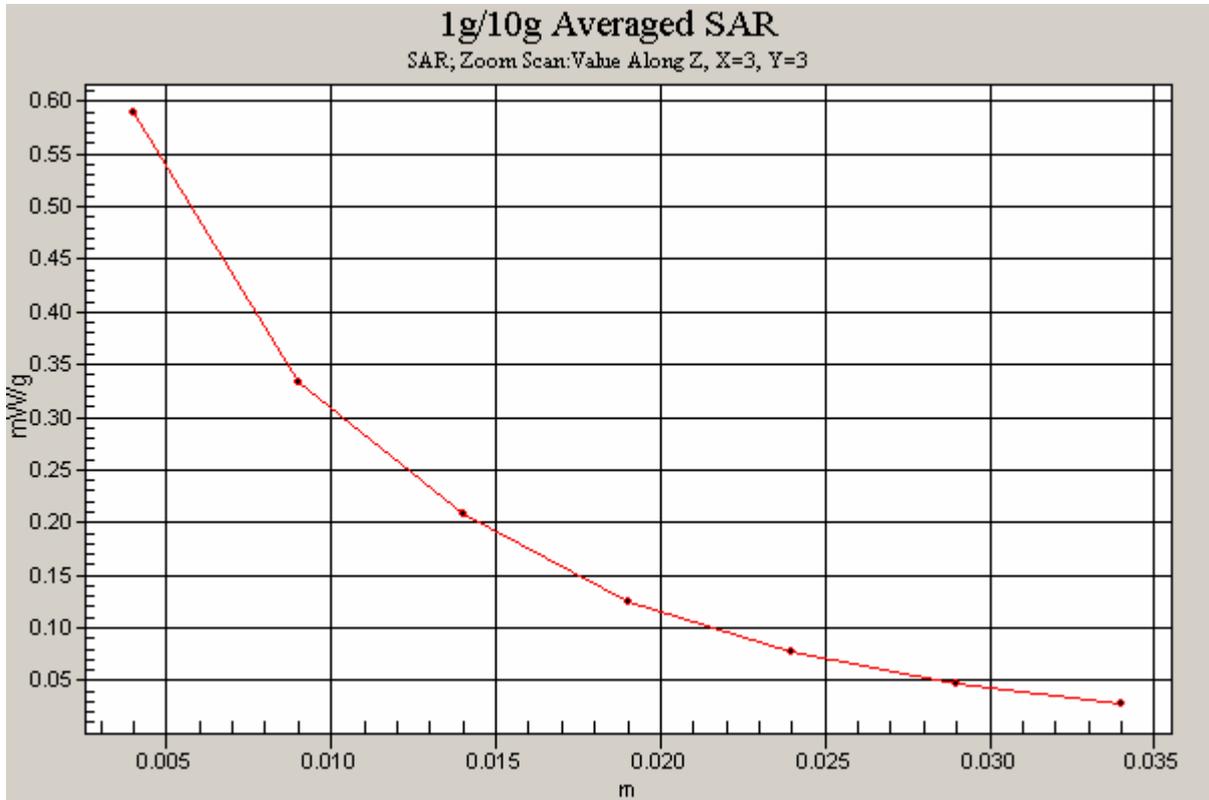


Figure 53 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with IBM T61 Test Position 5 Channel 661]

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

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

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.13 W/kg

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

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

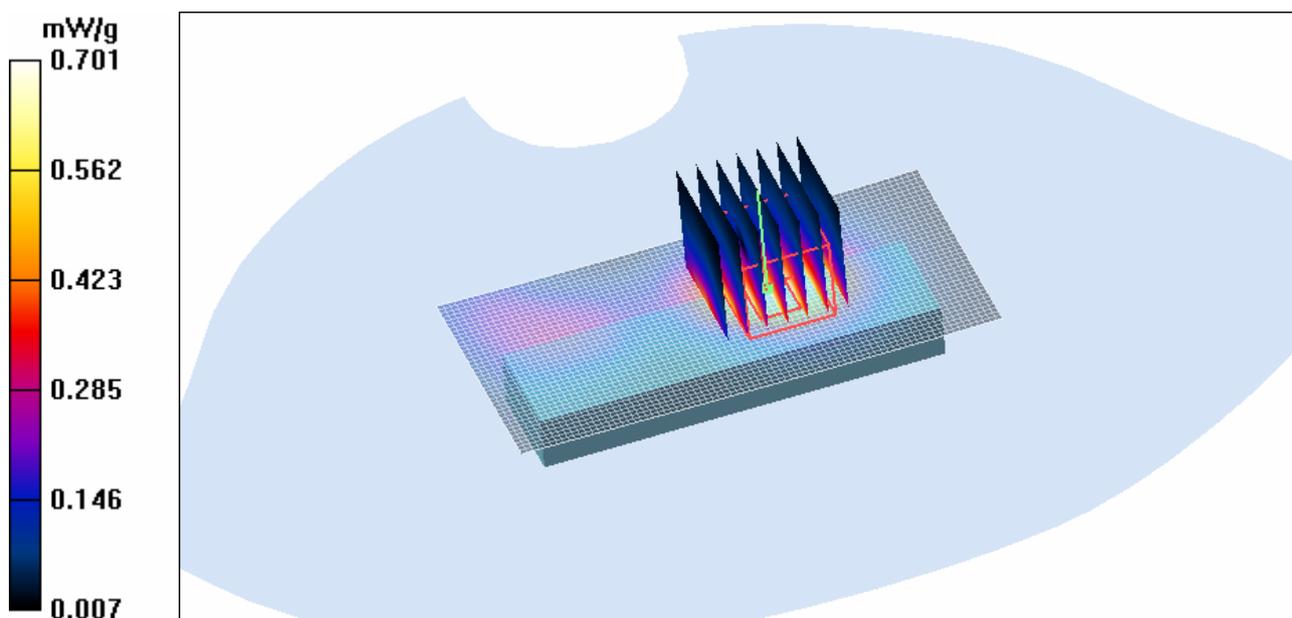


Figure 54 GSM 1900 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 661

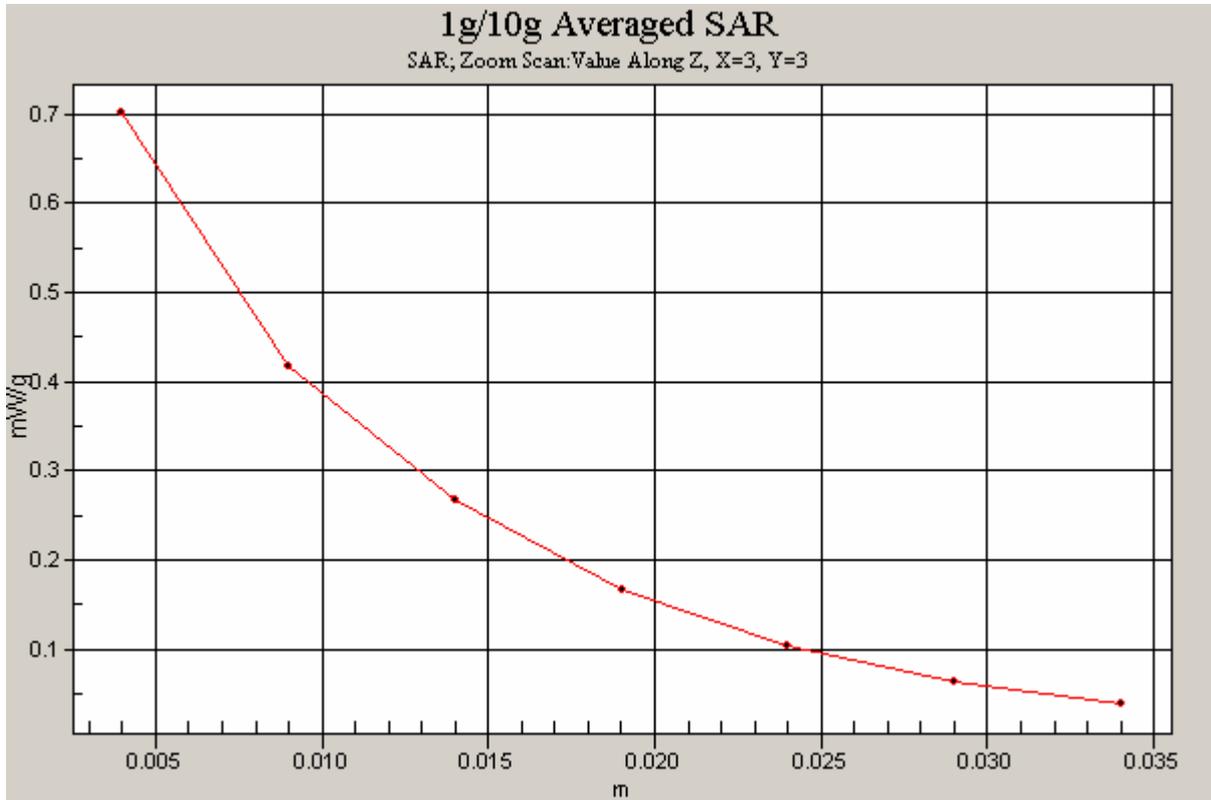


Figure 55 Z-Scan at power reference point [GSM 1900 GPRS (2 timeslots in uplink) with BenQ Joybook R55V Test Position 2 Channel 661]

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

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

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.19 W/kg

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

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

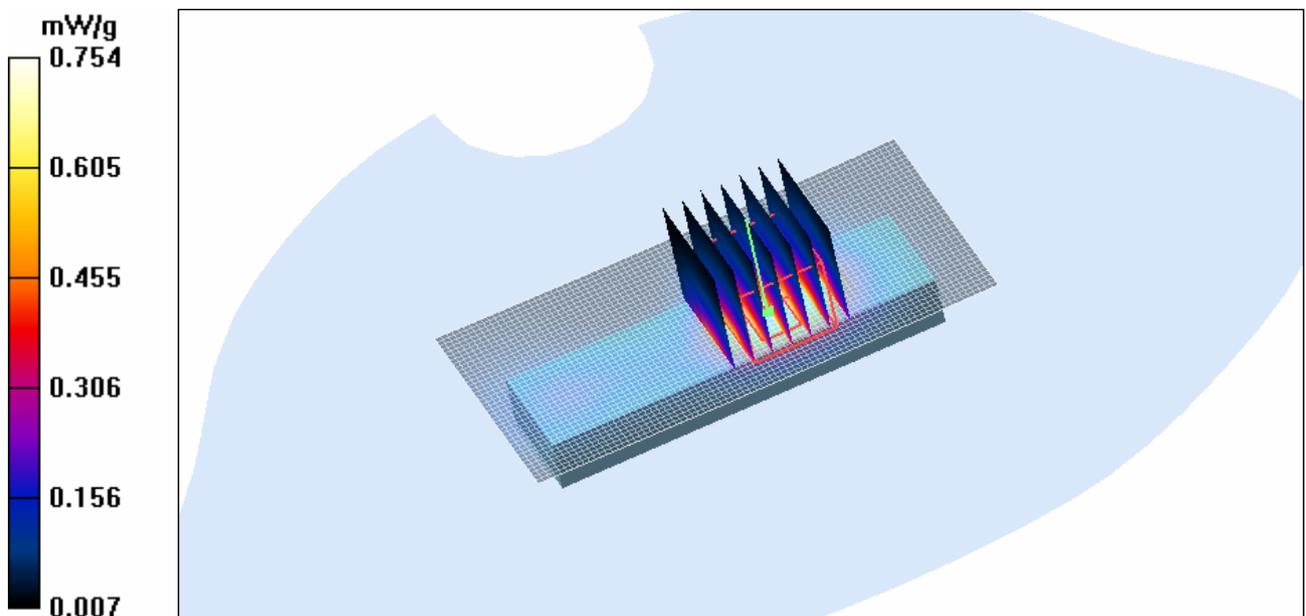


Figure 56 GSM 1900 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 810

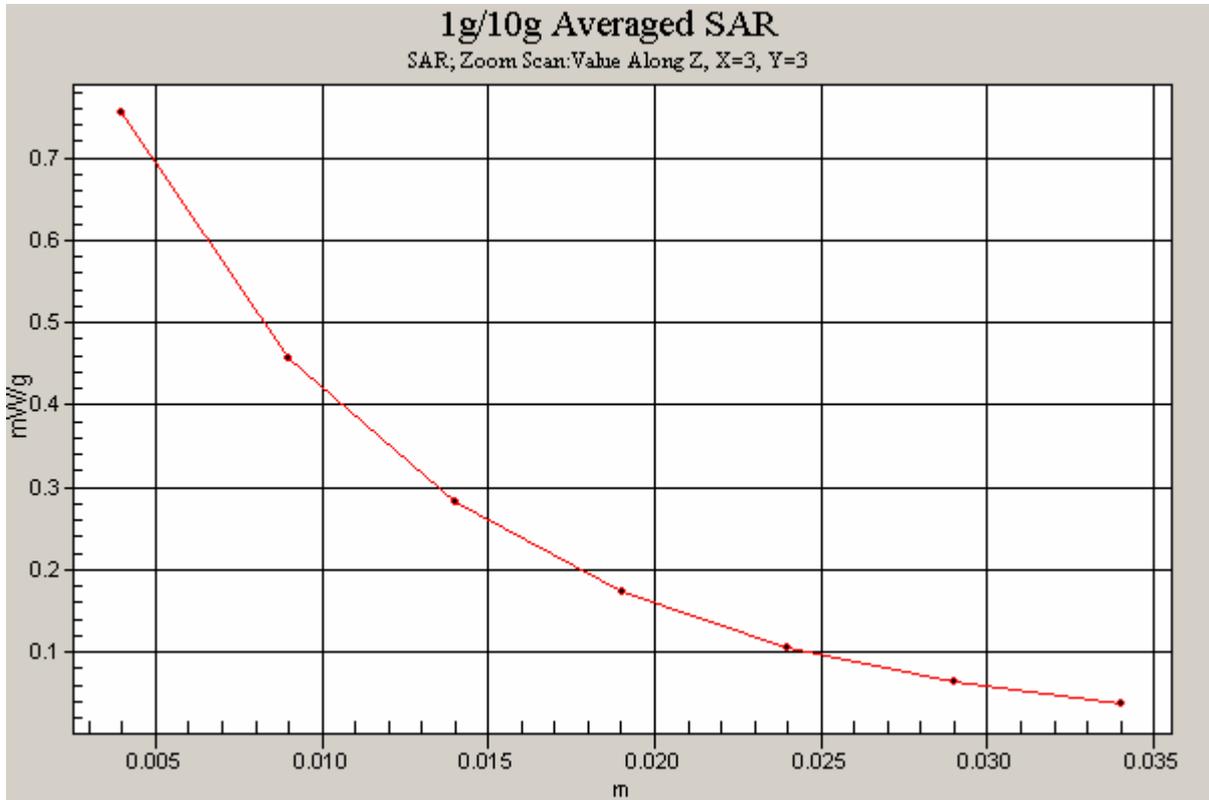


Figure 57 Z-Scan at power reference point [GSM 1900 EGPRS (1 timeslot in uplink) with IBM T61 Test Position 1 Channel 810]

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

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

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.38 W/kg

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

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

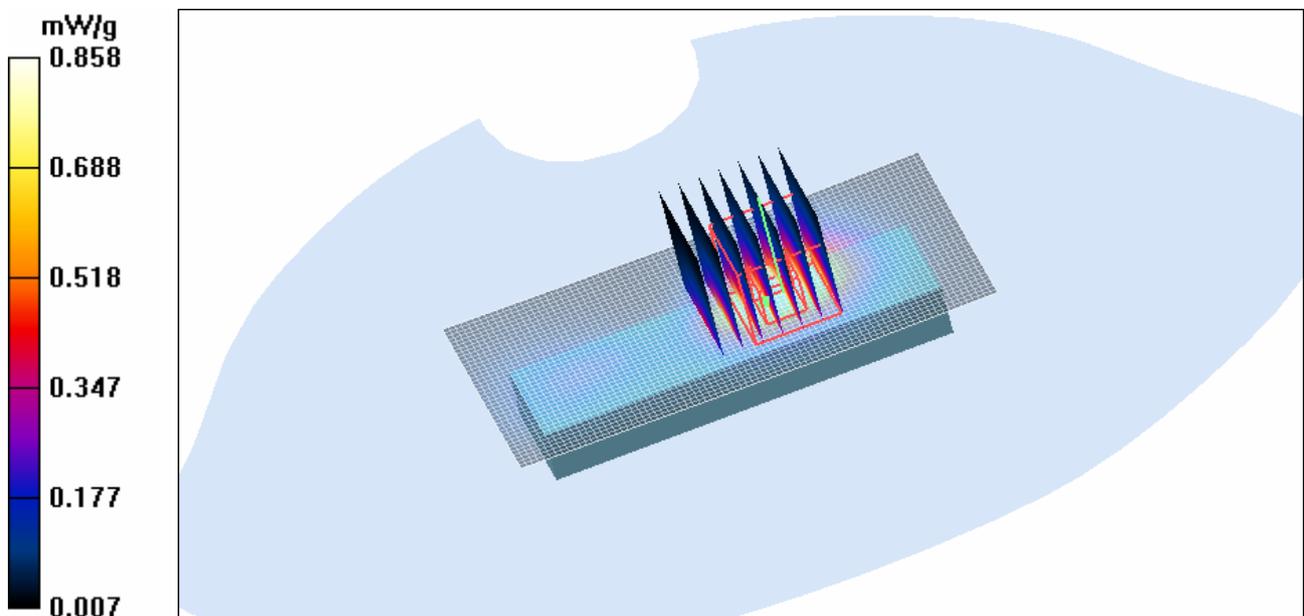


Figure 58 GSM 1900 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

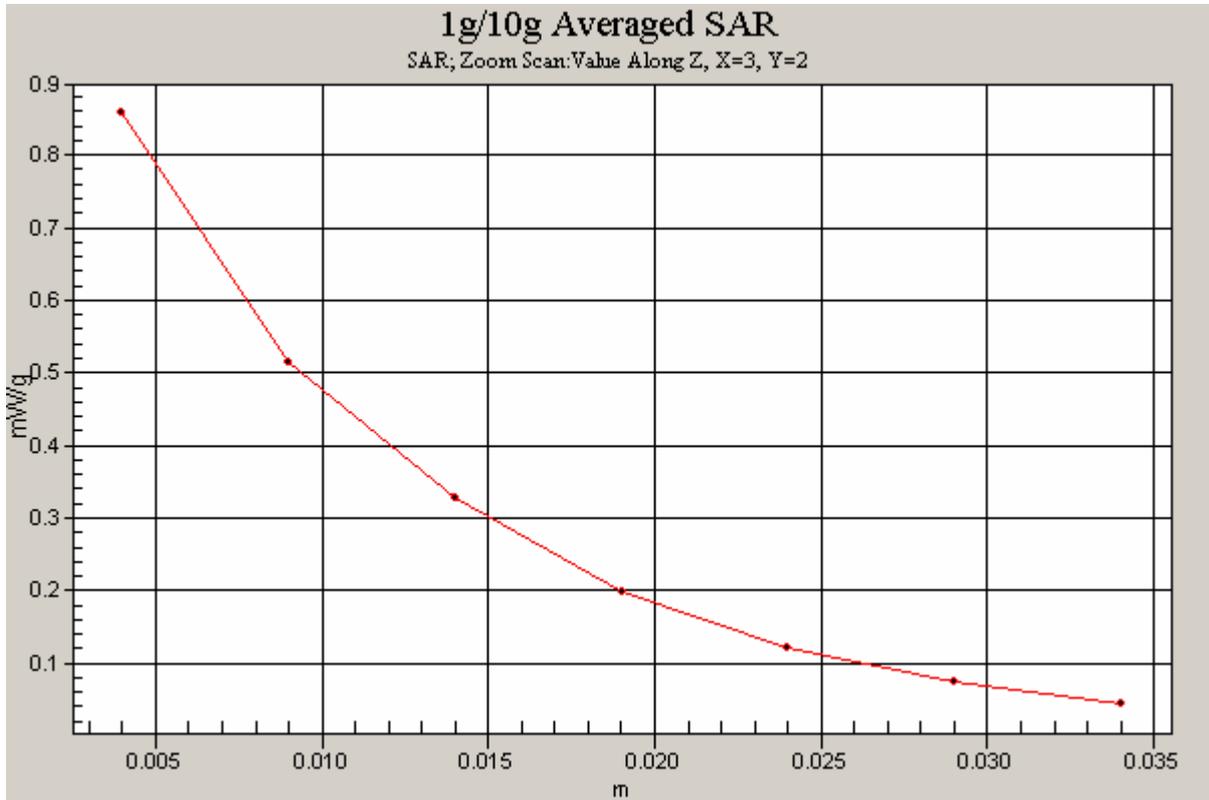


Figure 59 Z-Scan at power reference point [GSM 1900 EGPRS (2 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

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

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

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.28 W/kg

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

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

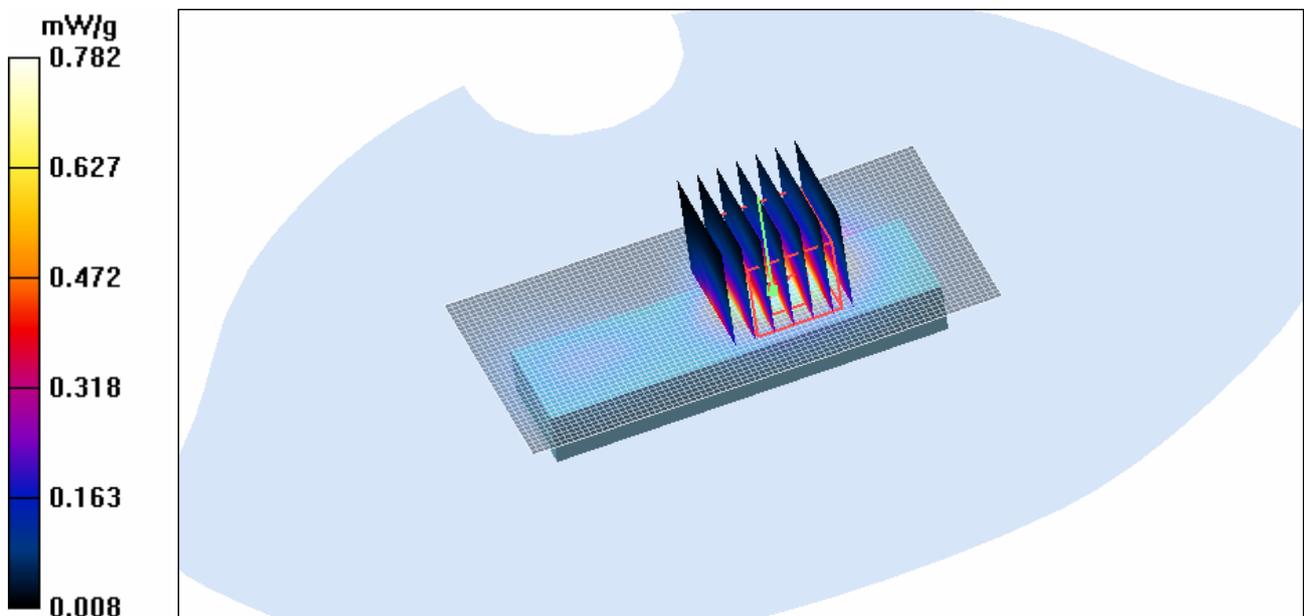


Figure 60 GSM 1900 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

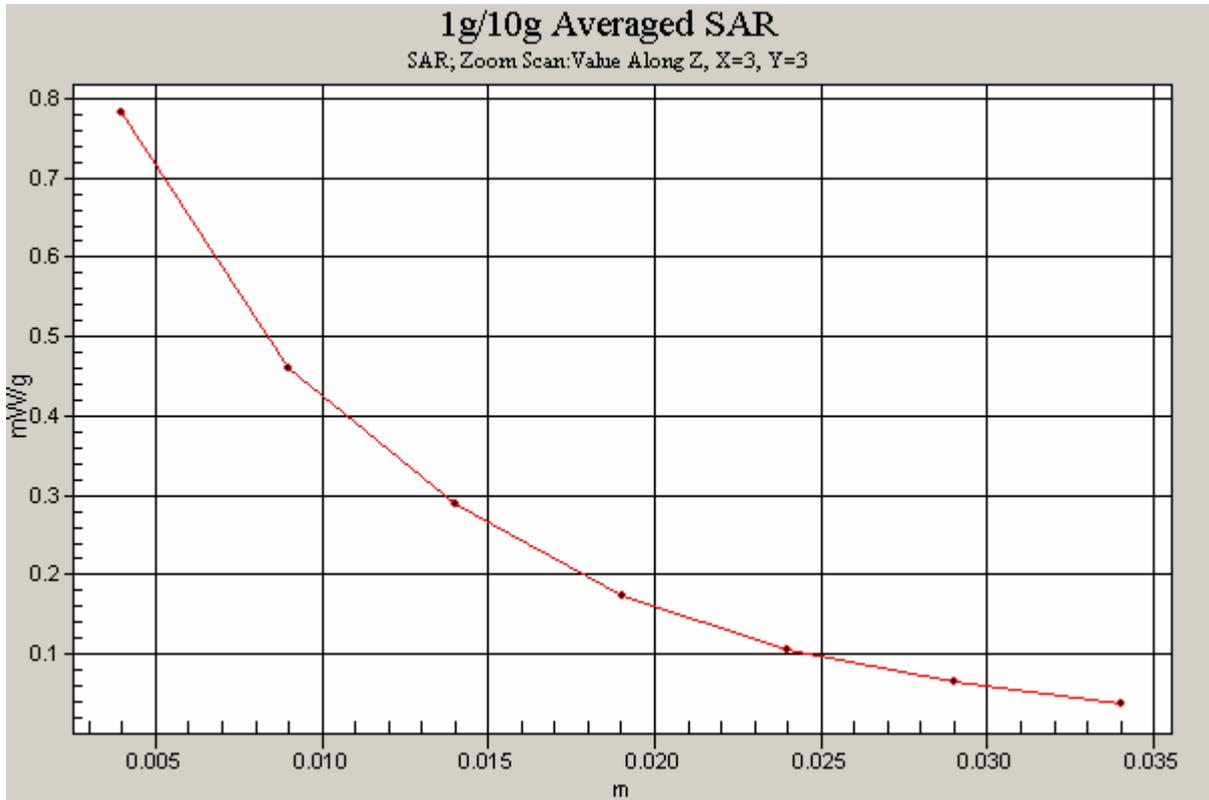


Figure 61 Z-Scan at power reference point [GSM 1900 EGPRS (3 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]

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

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

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

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

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

Phantom section: Flat Section

DASY4 Configuration:

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

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

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

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

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

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

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

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

Peak SAR (extrapolated) = 1.05 W/kg

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

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

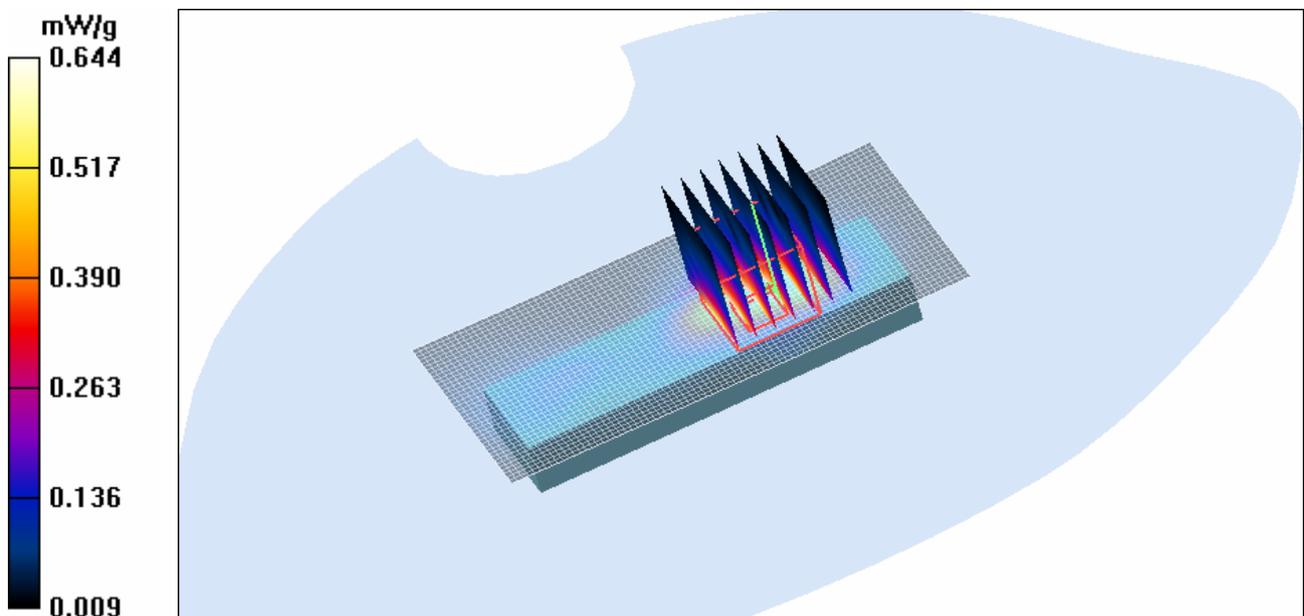


Figure 62 GSM 1900 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 810

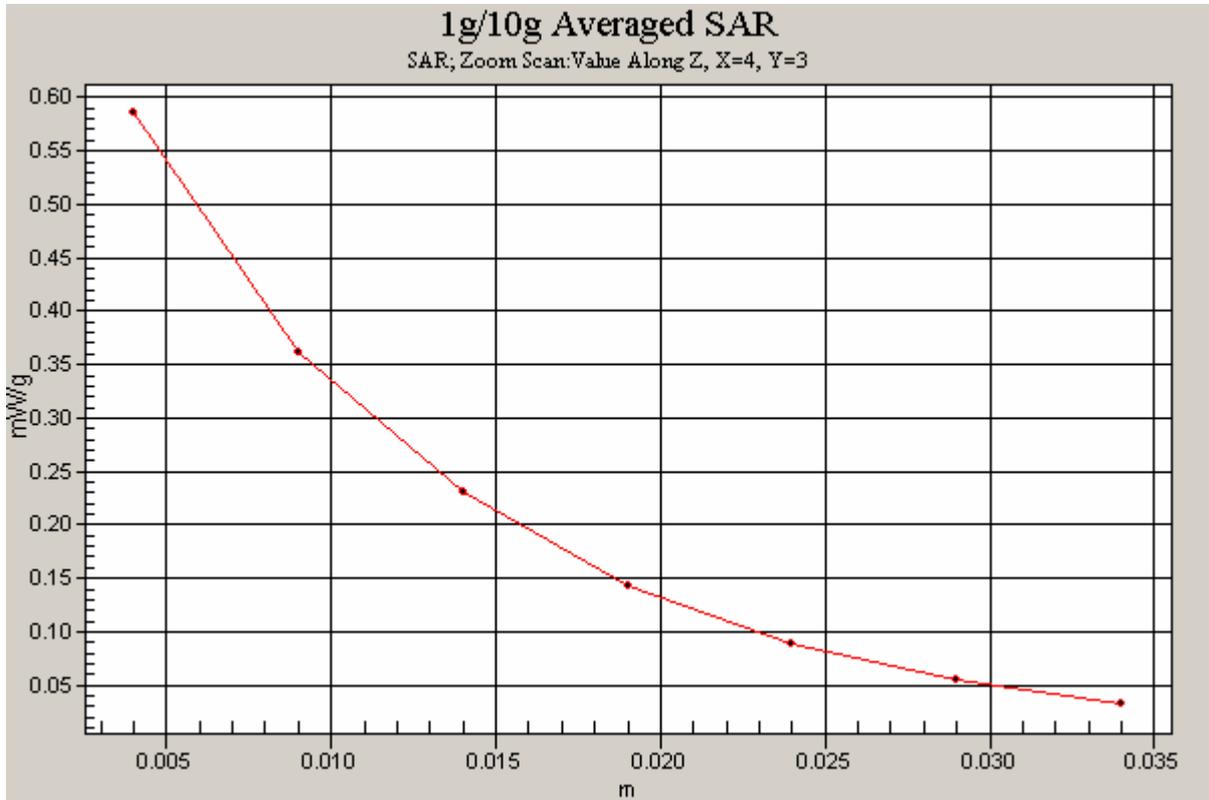


Figure 63 Z-Scan at power reference point [GSM 1900 EGPRS (4 timeslots in uplink) with IBM T61 Test Position 1 Channel 810]