TESTING
No. L2264

# OET 65

# TEST REPORT

| | |
|---|---|
| **Product Name** | Tablet MID |
| **Model** | B7916H3 |
| **Trademark** | QBEX |
| **FCC ID** | XFM-B7916H3 |
| **Client** | QBEX ELECTRONICS CORP |

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

# GENERAL SUMMARY

| | | | |
|---|---|---|---|
| **Product Name** | Tablet MID | **Model** | B7916H3 |
| **Report No.** | RXA1212-1125SAR01R2 | **FCC ID** | XFM-B7916H3 |
| **Client** | QBEX ELECTRONICS CORP | | |
| **Manufacturer** | QBEX ELECTRONICS CORP | | |
| **Reference Standard(s)** | **IEEE Std C95.1, 1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields, 3 kHz to 300 GHz.<br>**SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001 including DA 02-1438, published June 2002:** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions.<br>**FCC 47CFR §2.1093** Radiofrequency Radiation Exposure Evaluation: Portable Devices<br>**KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01** SAR Measurement Requirements for 100 MHz to 6 GHz<br>**KDB 447498 D01 Mobile Portable RF Exposure v05:** Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies<br>**KDB 941225 D01 SAR test for 3G devices v02:** SAR Measurement Procedures CDMA 20001x RTT, 1x Ev-Do, WCDMA, HSDPA/HSPA<br>**KDB 941225 D03 Test Reduction GSM_GPRS_EDGE v01** Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE | | |
| **Conclusion** | This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards for FCC band.<br><br>General Judgment: **Pass**<br><br>上海同耀通信技术有限公司 报告专用章<br>(Stamp)<br>**Date of issue: January 23rd, 2013** | | |
| **Comment** | The test result only responds to the measured sample. | | |

**Approved by** ________ **Revised by** ________ **Performed by** ________

Director SAR Manager SAR Engineer

# TABLE OF CONTENT

# 1. General Information

## 1.1. Notes of the Test Report

**TA Technology (Shanghai) Co., Ltd.** has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

**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.

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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.

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

## 1.2. Testing Laboratory

| | |
|---|---|
| Company: | TA Technology (Shanghai) Co., Ltd. |
| Address: | No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China |
| City: | Shanghai |
| Post code: | 201201 |
| Country: | P. R. China |
| Contact: | Yang Weizhong |
| Telephone: | +86-021-50791141/2/3 |
| Fax: | +86-021-50791141/2/3-8000 |
| Website: | http://www.ta-shanghai.com |
| E-mail: | yangweizhong@ta-shanghai.com |

## 1.3. Applicant Information

| | |
|---|---|
| Company: | QBEX ELECTRONICS CORP |
| Address: | 1606 NW 84th AVE,Miami,FL 33126, U.S.A. |
| City: | / |
| Postal Code: | / |
| Country: | USA |

## 1.4. Manufacturer Information

| | |
|---|---|
| Company: | QBEX ELECTRONICS CORP |
| Address: | 1606 NW 84th AVE,Miami,FL 33126, U.S.A. |
| City: | / |
| Postal Code: | / |
| Country: | USA |

## 1.5. Information of EUT

**General Information**

<table>
<tr><td>Device Type:</td><td colspan="3">Portable Device</td></tr>
<tr><td>Exposure Category:</td><td colspan="3">Uncontrolled Environment / General Population</td></tr>
<tr><td>State of Sample:</td><td colspan="3">Prototype Unit</td></tr>
<tr><td>Product Name:</td><td colspan="3">Tablet MID</td></tr>
<tr><td>IMEI:</td><td colspan="3">/</td></tr>
<tr><td>Hardware Version:</td><td colspan="3">Windows 2000,Windows XP 32/64,Windows Vista 32/64, WinCE, Linux</td></tr>
<tr><td>Software Version:</td><td colspan="3">Android 4.0</td></tr>
<tr><td>Antenna Type:</td><td colspan="3">Internal Antenna</td></tr>
<tr><td colspan="4">Device Operating Configurations :</td></tr>
<tr><td>Supporting Mode(s):</td><td colspan="3">GSM 850/GSM 1900 /UMTS Band V; (tested)<br>GSM 900/GSM 1800/WiFi (802.11b/g/n HT20)/Bluetooth; (untested)</td></tr>
<tr><td>Test Modulation:</td><td colspan="3">(GSM)GMSK; (UMTS)QPSK</td></tr>
<tr><td>Device Class:</td><td colspan="3">B</td></tr>
<tr><td>HSDPA UE Category:</td><td colspan="3">8</td></tr>
<tr><td rowspan="3">GPRS Multislot Class(12):</td><td colspan="2">Max Number of Timeslots in Uplink</td><td>4</td></tr>
<tr><td colspan="2">Max Number of Timeslots in Downlink</td><td>4</td></tr>
<tr><td colspan="2">Max Total Timeslot</td><td>5</td></tr>
<tr><td rowspan="3">EGPRS Multislot Class(12):</td><td colspan="2">Max Number of Timeslots in Uplink</td><td>4</td></tr>
<tr><td colspan="2">Max Number of Timeslots in Downlink</td><td>4</td></tr>
<tr><td colspan="2">Max Total Timeslot</td><td>5</td></tr>
<tr><td rowspan="4">Operating Frequency Range(s):</td><td>Mode</td><td>Tx (MHz)</td><td>Rx (MHz)</td></tr>
<tr><td>GSM 850</td><td>824.2 ~ 848.8</td><td>869.2 ~ 893.8</td></tr>
<tr><td>GSM 1900</td><td>1850.2 ~ 1909.8</td><td>1930.2 ~ 1989.8</td></tr>
<tr><td>UMTS Band V</td><td>826.4 ~ 846.6</td><td>871.4 ~ 891.6</td></tr>
<tr><td rowspan="3">Power Class:</td><td colspan="3">GSM 850: 4</td></tr>
<tr><td colspan="3">GSM 1900: 1</td></tr>
<tr><td colspan="3">UMTS Band V: 3</td></tr>
<tr><td rowspan="3">Power Level:</td><td colspan="3">GSM 850: tested with power level 5</td></tr>
<tr><td colspan="3">GSM 1900: tested with power level 0</td></tr>
<tr><td colspan="3">UMTS Band V: tested with power control all up bits</td></tr>
<tr><td>Test Channel:<br>(Low - Middle - High)</td><td colspan="3">128 - 190 - 251 (GSM 850) (tested)<br>512 - 661 - 810 (GSM 1900) (tested)<br>4132 - 4183 - 4233 (UMTS Band V) (tested)</td></tr>
</table>

**AE1:Battery**

Model: PL3864105

Manufacturer: YAOAN BATTERY POTECH(SHENZHEN)CO.,LTD

SN: 00026

Equipment Under Test (EUT) is a Tablet MID. The EUT has a GSM/UMTS antenna that is used for Tx/Rx, and the other is BT/WIFI antenna that can be used for Tx/Rx. The detail about EUT is in chapter 1.5 in this report. SAR tested for GSM 850, GSM 1900 and UMTS Band V.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

## 1.6. The Maximum Report $SAR_{1g}$ Values

**Body Worn Configuration**

| Mode | Test Position | Channel | Measurement Result | | Tune-up procedures MAX Average Power(dBm) | 1g Average Limit 1.6 W/kg |
|---|---|---|---|---|---|---|
| | | | Average Conducted Power(dBm) | 1g Average (W/kg) | | Report SAR Result (W/kg) |
| 4Txslots EGPRS850 | Back Side | High/251 | 27.00 | 0.753 | 28.99 | 1.191 |
| 4Txslots GPRS1900 | Back Side | Low/512 | 23.94 | 1.150 | 23.99 | 1.163 |
| UMTS Band V | Back Side | Low/4132 | 22.52 | 0.426 | 23 | 0.476 |

## 1.7. Test Date

The test performed from December 24, 2012 to December 25, 2012 and January 6, 2013.

# 2. SAR Measurements System Configuration

## 2.1. SAR Measurement Set-up

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

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

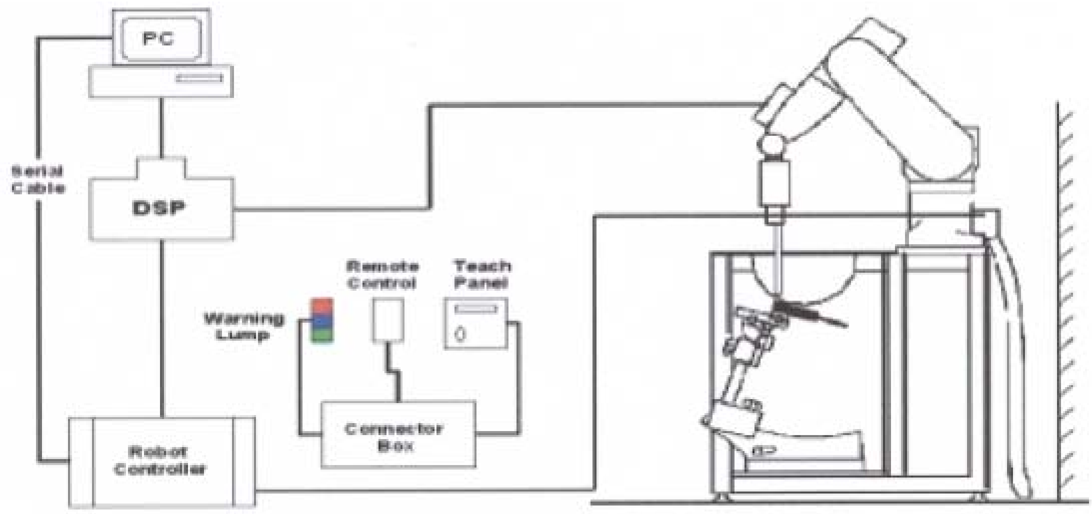


**Figure 1 SAR Lab Test Measurement Set-up**

## 2.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

### 2.2.1. ES3DV3 Probe Specification

| | |
|---|---|
| Construction | Symmetrical design with triangular core<br>Interleaved sensors<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | ISO/IEC 17025 calibration service available |
| Frequency | 10 MHz to 4 GHz<br>Linearity: ± 0.2 dB<br>(30 MHz to 4 GHz) |
| Directivity | ± 0.2 dB in HSL (rotation around probe axis)<br>± 0.3 dB in tissue material (rotation normal to probe axis) |
| Dynamic Range | 5 μW/g to > 100 mW/g Linearity:<br>± 0.2dB |
| Dimensions | Overall length: 330 mm (Tip: 20 mm)<br>Tip diameter: 3.9 mm (Body: 12 mm)<br>Distance from probe tip to dipole centers: 2.0 mm |
| Application | General dosimetry up to 4 GHz<br>Dosimetry in strong gradient fields<br>Compliance tests of mobile phones |

Figure 2.ES3DV3 E-field Probe

Figure 3. ES3DV3 E-field probe

### 2.2.2. E-field Probe Calibration

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

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

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

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

Where: $\Delta t$ = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

$\Delta T$ = Temperature increase due to RF exposure.

Or

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

Where:

$\sigma$ = Simulated tissue conductivity,

$\rho$ = Tissue density (kg/m3).

## 2.3. Other Test Equipment

### 2.3.1. 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

### 2.3.2. Phantom

Phantom for compliance testing of handheld andbody-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI isfully compatible with the IEC 62209-2 standard and all known tissuesimulating liquids. ELI has been optimized regarding its performance and can beintegrated into our standard phantom tables. A cover prevents evaporation ofthe liquid. Reference markings on the phantom allow installation of thecomplete setup, including all predefined phantom positions and measurementgrids, by teaching three points. The phantom is compatible with all SPEAGdosimetric probes and dipoles.

| | |
|---|---|
| Shell Thickness | 2±0.2 mm |
| Filling Volume | Approx. 30 liters |
| Dimensions | 190×600×0 mm (H x L x W) |

**Figure 4.ELI4 Phantom**

## 2.4. Scanning Procedure

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

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

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

- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 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 5x5x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

- Spatial Peak Detection

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

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

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

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 5x5x7 measurement points with 8mm resolution amounting to 175 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 5x5x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

## 2.5. Data Storage and Evaluation

### 2.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE4". 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.

### 2.5.2. Data Evaluation by SEMCAD

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

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

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

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

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

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

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

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

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

$dcp_i$ = diode compression point (DASY parameter)

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

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

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

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

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

$ConvF$ = sensitivity enhancement in solution

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

$f$ = carrier frequency [GHz]

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

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

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

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

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

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

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

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

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

. = equivalent tissue density in g/cm$^3$

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

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

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

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

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

## 3. Laboratory Environment

**Table 1: The Requirements of the Ambient Conditions**

| | |
|---|---|
| Temperature | Min. = 18°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. | |

# 4. Tissue-equivalent Liquid

## 4.1. Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, salt, Glycol, Sugar, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The table 2 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

**Table 2: Composition of the Body Tissue Equivalent Matter**

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

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

## 4.2. Tissue-equivalent Liquid Properties

**Table 3: Dielectric Performance of Body Tissue Simulating Liquid**

| Frequency | Description | Dielectric Parameters | | Temp ℃ | Limit |
|---|---|---|---|---|---|
| | | $\varepsilon_r$ | σ(s/m) | | |
| 835MHz (body) | Target value | 55.20 | 0.97 | 22.0 | Deviation Within ±5% |
| | Measurement value 2012-12-24 | 55.10 | 0.99 | 21.5 | |
| | Deviation | 0.18% | 2.06% | / | |
| 1900MHz (body) | Target value | 53.30 | 1.52 | 22.0 | |
| | Measurement value 2013-1-6 | 52.10 | 1.54 | 21.5 | |
| | Deviation | 2.25% | 1.32% | / | |
| | Measurement value 2012-12-25 | 52.15 | 1.52 | 21.5 | |
| | Deviation | 2.16% | 0 | / | |

# 5. System Check

## 5.1. Description of System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulates, 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 4.

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

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

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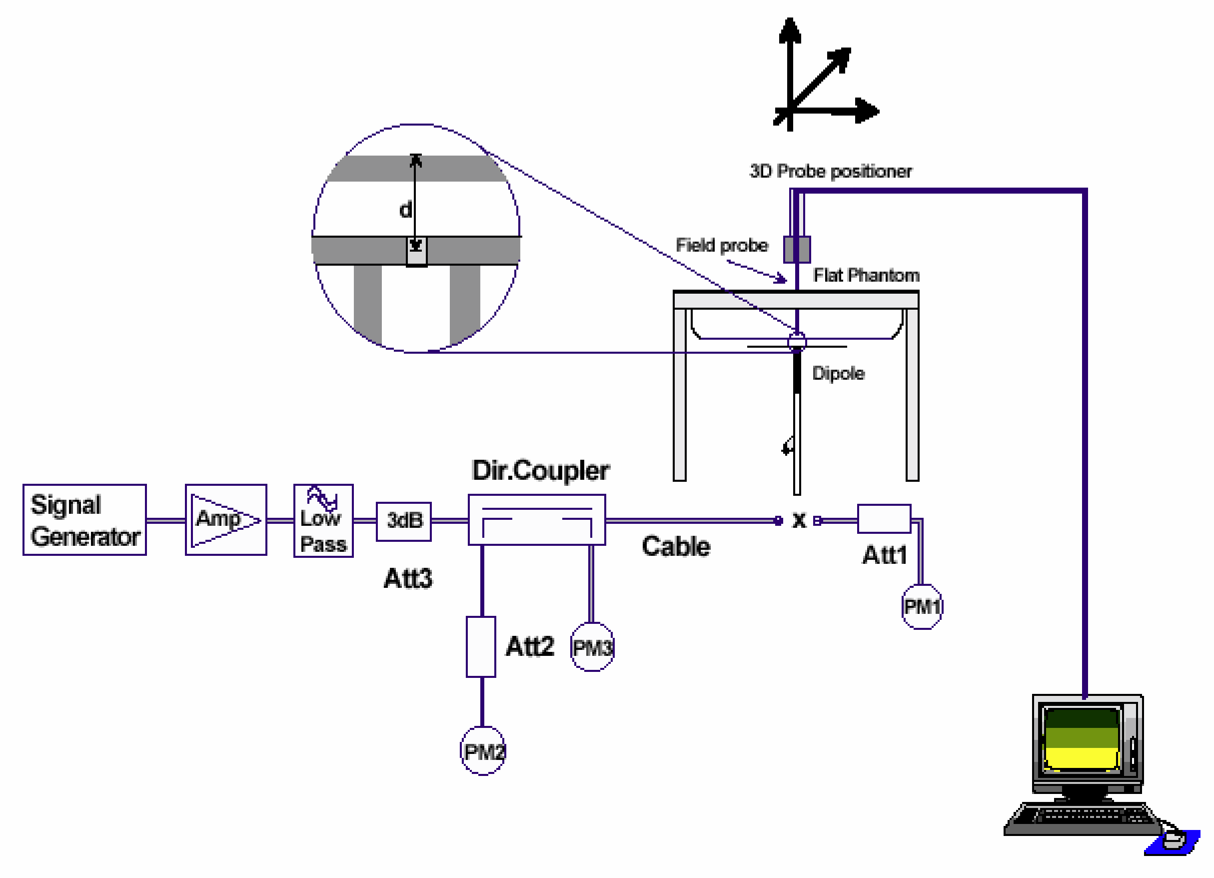



Figure 5 System Check Set-up

**Justification for Extended SAR Dipole Calibrations**

Usage of SAR dipoles calibrated less than 2 years ago but more than 1 year ago were confirmed in maintaining return loss (< - 20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 450824:

| Dipole D835V2 SN: 4d020 | | | | |
|---|---|---|---|---|
| Body Liquid | | | | |
| Date of Measurement | Return Loss(dB) | Δ % | Impedance (Ω) | ΔΩ |
| 8/26/2011 | -25.1 | / | 48.7 | / |
| 8/25/2012 | -24.3 | 3.2 % | 50.6 | 1.9Ω |

| Dipole D1900V2 SN: 5d060 | | | | |
|---|---|---|---|---|
| Body Liquid | | | | |
| Date of Measurement | Return Loss(dB) | Δ % | Impedance (Ω) | ΔΩ |
| 8/31/2011 | -21.3 | / | 47.3 | / |
| 8/30/2012 | -20.9 | 1.9% | 45.9 | 1.4Ω |

## 5.2. System Check Results

**Table 4: System Check in Body Tissue Simulating Liquid**

| **Frequency** | **Test Date** | **Dielectric Parameters** | | **Temp** | **250mW Measured SAR1g** | **1W Normalized $SAR_{1g}$** | **1W Target SAR1g (±10% Deviation)** |
|---|---|---|---|---|---|---|---|
| | | **$\varepsilon_r$** | **σ(s/m)** | **(℃)** | **(W/kg)** | | |
| **835MHz** | 2012-12-24 | 55.10 | 0.99 | 21.5 | 2.52 | 10.08 | 9.46 (8.51~10.41) |
| **1900MHz** | 2013-1-6 | 52.10 | 1.54 | 21.5 | 9.80 | 39.20 | 41.70 (37.53~45.87) |
| | 2012-12-25 | 52.15 | 1.52 | 21.5 | 9.82 | 39.28 | |

Note：1. The graph results see ANNEX B.
2. Target Values used derive from the calibration certificate.

# 6. Operational Conditions during Test

## 6.1. General Description of Test Procedures

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

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

## 6.2. Test Configuration

### 6.2.1. GSM Test Configuration

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

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

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

**Table 5: The allowed power reduction in the multi-slot configuration**

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

### 6.2.2. UMTS Test Configuration

#### 6.2.2.1. WCDMA Test Configuration

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

1) 12.2kbps RMC, 64,144,384 kbps RMC with TPC set to all up bits
2) Test loop Mode 1

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

**Table 6: The configurations for the DPCCH and $DPDCH_1$**

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

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

### 6.2.3. HSDPA Test Configuration

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

HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc,βd), and HS-DPCCH power offset parameters(△ACK, △NACK, △CQI)should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

**Table 7: Subtests for UMTS Release 5 HSDPA**

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

Note1: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$= 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$=30/15 ⇔ $\beta_{hs}$=30/15*$\beta_c$

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

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

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

**Table 8: 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 9: HSDPA UE category**

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

**Table 10: UE maximum output powers with HS-DPCCH (Release 5 Only)**

| Ratio of $\beta_c$ to $\beta_d$ for all values of $\beta_{hs}$ | Power Class 3 | | Power Class 4 | |
|---|---|---|---|---|
| | Power (dBm) | Tolerance (dB) | Power (dBm) | Tolerance (dB) |
| $1/15 \leq \beta_c/\beta_d \leq 12/15$ | +24 | +1/-3 | +21 | +2/-2 |
| $13/15 \leq \beta_c/\beta_d \leq 15/8$ | +23 | +2/-3 | +20 | +3/-2 |
| $15/7 \leq \beta_c/\beta_d \leq 15/0$ | +22 | +3/-3 | +19 | +4/-2 |

## 6.3. Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:
1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

## 6.4. Test Positions

For tablets with a display or overall diagonal dimension 22 cm > 20 cm, for each antenna, SAR is only required for the edge with the most conservative exposure condition.

- Test Position 1: The back side of the EUT towards and directed tightly to touch the bottom of the flat phantom. (ANNEX H Picture 5)
  SAR is reuired for GSM/WCDMA antenna, the bottom face (back of the device) is required to be tested touching the flat phantom.

- Test Position 2: The top side of the EUT towards and directed tightly to touch the bottom of the flat phantom. (ANNEX H Picture 6）
  SAR is reuired for GSM/WCDMA antenna, since it is the most conservative exposure conditions of the edge. (Please see ANNEX H Picture 4)

- Test Position 3: The bottom side of the EUT towards and directed tightly to touch the bottom of the flat phantom.
  SAR is not reuired for GSM/WCDMA antenna; this is not the most conservative antenna-to-user distance at edge mode. SAR is required only the edge with the most conservative exposure conditions. (Please see ANNEX H Picture 4)

- Test Position 4: The left side of the EUT towards and directed tightly to touch the bottom of the flat phantom.
  SAR is not reuired for GSM/WCDMA antenna; this is not the most conservative antenna-to-user distance at edge mode. SAR is required only the edge with the most conservative exposure conditions .(Please see ANNEX H Picture 4)

- Test Position 5: The right side of the EUT towards and directed tightly to touch the bottom of the flat phantom. (ANNEX H Picture 7)
  SAR is reuired for GSM/WCDMA antenna, since it is the most conservative exposure conditions of the edge. (Please see ANNEX H Picture 4)

# 7. Test Results

## 7.1. Conducted Power Results

**Table 11: Conducted Power Measurement Results**

| **GSM 850** | | **Burst Conducted Power(dBm)** | | | | **Average power(dBm)** | | |
|---|---|---|---|---|---|---|---|---|
| | | Channel 128 | Channel 190 | Channel 251 | | Channel 128 | Channel 190 | Channel 251 |
| GPRS (GMSK) | 1Txslot | 31.57 | 31.35 | 31.12 | -9.03dB | 22.54 | 22.32 | 22.09 |
| | 2Txslots | 31.53 | 31.28 | 31.07 | -6.02dB | 25.51 | 25.26 | 25.05 |
| | 3Txslots | 31.46 | 31.22 | 30.97 | -4.26dB | 27.20 | 26.96 | 26.71 |
| | 4Txslots | 30.52 | 30.26 | 30.01 | -3.01dB | **27.51** | **27.25** | **27.00** |
| EGPRS (GMSK) | 1Txslot | 31.57 | 31.35 | 31.12 | -9.03dB | 22.54 | 22.32 | 22.09 |
| | 2Txslots | 31.53 | 31.28 | 31.07 | -6.02dB | 25.51 | 25.26 | 25.05 |
| | 3Txslots | 31.46 | 31.22 | 30.97 | -4.26dB | 27.20 | 26.96 | 26.71 |
| | 4Txslots | 30.52 | 30.26 | 30.01 | -3.01dB | **27.51** | **27.25** | **27.00** |
| EGPRS (8PSK) | 1Txslot | 25.79 | 25.50 | 25.31 | -9.03dB | 16.76 | 16.47 | 16.28 |
| | 2Txslots | 25.78 | 25.49 | 25.30 | -6.02dB | 19.76 | 19.47 | 19.28 |
| | 3Txslots | 25.78 | 25.49 | 25.29 | -4.26dB | 21.52 | 21.23 | 21.03 |
| | 4Txslots | 25.25 | 25.00 | 24.78 | -3.01dB | 22.24 | 21.99 | 21.77 |
| **GSM 1900** | | **Burst Conducted Power(dBm)** | | | | **Average power(dBm)** | | |
| | | Channel 512 | Channel 661 | Channel 810 | | Channel 512 | Channel 661 | Channel 810 |
| GPRS (GMSK) | 1Txslot | 30.31 | 30.20 | 29.77 | -9.03dB | 21.28 | 21.17 | 20.74 |
| | 2Txslots | 28.06 | 27.90 | 27.78 | -6.02dB | 22.04 | 21.88 | 21.76 |
| | 3Txslots | 27.96 | 27.83 | 27.75 | -4.26dB | 23.70 | 23.57 | 23.49 |
| | 4Txslots | 26.95 | 26.84 | 26.73 | -3.01dB | **23.94** | **23.83** | **23.72** |
| EGPRS (GMSK) | 1Txslot | 30.25 | 30.21 | 29.73 | -9.03dB | 21.22 | 21.18 | 20.70 |
| | 2Txslots | 28.02 | 27.89 | 27.72 | -6.02dB | 21.67 | 21.87 | 21.70 |
| | 3Txslots | 27.93 | 27.81 | 27.69 | -4.26dB | 23.67 | 23.55 | 23.43 |
| | 4Txslots | 26.91 | 26.80 | 26.64 | -3.01dB | **23.90** | **23.79** | **23.63** |
| EGPRS (8PSK) | 1Txslot | 26.30 | 26.20 | 26.04 | -9.03dB | 17.27 | 17.17 | 17.01 |
| | 2Txslots | 25.62 | 25.15 | 25.00 | -6.02dB | 19.60 | 19.13 | 18.98 |
| | 3Txslots | 24.25 | 24.13 | 24.00 | -4.26dB | 19.99 | 19.87 | 19.74 |
| | 4Txslots | 22.77 | 22.64 | 22.48 | -3.01dB | 19.76 | 19.63 | 19.47 |

Note:

1) Division Factors

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

1Txslot = 1 transmit time slot out of 8 time slots
=> conducted power divided by (8/1) => -9.03 dB

2Txslots = 2 transmit time slots out of 8 time slots
=> conducted power divided by (8/2) => -6.02 dB

3Txslots = 3 transmit time slots out of 8 time slots
=> conducted power divided by (8/3) => -4.26 dB

4Txslots = 4 transmit time slots out of 8 time slots
=> conducted power divided by (8/4) => -3.01 dB

2) Average power numbers

The maximum power numbers are marks in bold.

| **UMTS Band V** | | **Conducted Power (dBm)** | | |
|---|---|---|---|---|
| | | Channel 4132 | Channel 4183 | Channel 4233 |
| **RMC** | 12.2kbps RMC | 22.52 | 22.04 | 22.42 |
| | 64kbps RMC | 22.49 | 21.97 | 22.43 |
| | 144kbps RMC | 22.42 | 22.01 | 22.34 |
| | 384kbps RMC | 22.40 | 21.98 | 22.31 |
| **HSDPA** | Sub - Test 1 | 22.53 | 22.06 | 22.40 |
| | Sub - Test 2 | 22.43 | 22.00 | 22.41 |
| | Sub - Test 3 | 22.45 | 21.99 | 22.35 |
| | Sub - Test 4 | 22.44 | 21.97 | 22.32 |

## 7.2. SAR Test Results

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

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

| Limit of SAR | | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|---|
| | | | 2.0 W/kg | 1.6 W/kg | ±0.21 dB | |
| Test Case Of Body | | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Test Position | Timeslots | Channel | 10 g Average | 1 g Average | | |
| Test Case Position of GPRS(Distance 0mm) | | | | | | |
| Test Position 1 | 4 Txslots | High/251 | 0.257 | 0.710 | 0.001 | Figure 9 |
| | | Middle/190 | 0.198 | 0.501 | 0.030 | Figure 10 |
| | | Low/128 | 0.164 | 0.437 | 0.010 | Figure 11 |
| Test Position 2 | 4 Txslots | Middle/190 | 0.028 | 0.067 | 0.053 | Figure 12 |
| Test Position 3 | N/A | N/A | N/A | N/A | N/A | N/A |
| Test Position 4 | N/A | N/A | N/A | N/A | N/A | N/A |
| Test Position 5 | 4 Txslots | Middle/190 | 0.003 | 0.006 | 0.003 | Figure 13 |
| Worst Case Position of GPRS with EGPRS (GMSK, Distance 0mm) | | | | | | |
| Test Position 1 | 4 Txslots | High/251 | 0.270 | 0.753 | 0.010 | Figure 14 |

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

2. Upper and lower frequencies were measured at the worst position.

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

4. When multiple slots can be used, SAR should be tested to account for the maximum source-based time-averaged output power.

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

6. NA: According to KDB 447498 D01 4)b)ii)(2),for each antenna, SAR is only required for the edge with the most conservative exposure condition. Therefore, these positions are not required for SAR measurement.

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

| Mode | Test Position | Channel | Measurement Result | | Tune-up procedures MAX Average Power(dBm) | 1g Average Limit 1.6 W/kg |
|---|---|---|---|---|---|---|
| | | | Average Conducted Power(dBm) | 1g Average (W/kg) | | Report SAR Result (W/kg) |
| 4Txslots GPRS850 | Back Side | High/251 | 27.00 | 0.710 | 27.99 | 0.892 |
| 4Txslots EGPRS850 | Back Side | High/251 | 27.00 | 0.753 | 28.99 | 1.191 |

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

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

| Limit of SAR | | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|---|
| | | | 2.0 W/kg | 1.6 W/kg | ±0.21 dB | |
| Test Case Of Body | | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Test Position | Timeslots | Channel | 10 g Average | 1 g Average | | |
| Test Case Position of GPRS(Distance 0mm) | | | | | | |
| Test Position 1 | 4 Txslots | High/810 | 0.473 | 1.110 | 0.001 | Figure 15 |
| | | Middle/661 | 0.393 | 0.980 | 0.001 | Figure 16 |
| | | Low/512 | 0.502 | 1.150 | 0.001 | Figure 17 |
| Test Position 2 | 4 Txslots | Middle/661 | 0.047 | 0.103 | 0.027 | Figure 18 |
| Test Position 3 | N/A | N/A | N/A | N/A | N/A | N/A |
| Test Position 4 | N/A | N/A | N/A | N/A | N/A | N/A |
| Test Position 5 | 4 Txslots | Middle/661 | 0.011 | 0.020 | 0.048 | Figure 19 |
| Worst Case Position of GPRS with EGPRS (GMSK, Distance 0mm) | | | | | | |
| Test Position 1 | 4 Txslots | Low/512 | 0.499 | 1.130 | 0.001 | Figure 20 |

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

2. Upper and lower frequencies were measured at the worst position.

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

4. When multiple slots can be used, SAR should be tested to account for the maximum source-based time-averaged output power.

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

6. NA: According to KDB 447498 D01 4)b)ii)(2),for each antenna, SAR is only required for the edge with the most conservative exposure condition. Therefore, these positions are not required for SAR measurement.

**Table 15: SAR Measurement Variability Results [GSM 1900 (GPRS/EGPRS)]**

| Test Position | Timeslots | Channel | Measured SAR (1g) | 1st Repeated SAR (1g) | Ratio | 2nd Repeated SAR (1g) | 3rd Repeated SAR (1g) | Graph Results |
|---|---|---|---|---|---|---|---|---|
| Test Position 1 | 4 timeslots | Low/512 | 1.150 | 1.150 | 1.0 | NA | NA | Figure 21 |

Note: 1) When the original highest measured SAR is ⩾ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ⩾ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ⩾ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

**Table 16: Report SAR Values [GSM 1900 (GPRS/EGPRS)]**

| Mode | Test Position | Channel | Measurement Result | | Tune-up procedures MAX Average Power(dBm) | 1g Average Limit 1.6 W/kg |
|---|---|---|---|---|---|---|
| | | | Average Conducted Power(dBm) | 1g Average (W/kg) | | Report SAR Result (W/kg) |
| 4Txslots GPRS1900 | Back Side | Low/512 | 23.94 | 1.150 | 23.99 | 1.163 |

### 7.2.3. UMTS Band V (WCDMA/HSDPA)

**Table 17: SAR Values [UMTS Band V (WCDMA/HSDPA)]**

| Limit of SAR | | 10 g Average | 1g Average | Power Drift | Graph Results |
|---|---|---|---|---|---|
| | | 2.0 W/kg | 1.6 W/kg | ±0.21 dB | |
| Test Case Of Body | | Measurement Result (W/kg) | | Power Drift (dB) | |
| Test Position | Channel | 10 g Average | 1 g Average | | |
| Test Case Position of GPRS(Distance 0mm) | | | | | |
| Test Position 1 | High/4233 | 0.147 | 0.415 | 0.001 | Figure 22 |
| | Middle/4183 | 0.095 | 0.271 | 0.001 | Figure 23 |
| | Low/4132 | 0.148 | 0.426 | 0.001 | Figure 24 |
| Test Position 2 | Middle/4183 | 0.008 | 0.020 | 0.106 | Figure 25 |
| Test Position 3 | N/A | N/A | N/A | N/A | N/A |
| Test Position 4 | N/A | N/A | N/A | N/A | N/A |
| Test Position 5 | Middle/4183 | 0.003 | 0.004 | 0.118 | Figure 26 |

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

2. Upper and lower frequencies were measured at the worst position.

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

4. WCDMA mode were tested under RMC 12.2kbps with HSPA (HSDPA) inactive per KDB Publication 941225 D01. HSPA (HSDPA) SAR for body was not required since the average output power of the HSPA (HSDPA) subtests was not more than 0.25 dB higher than the RMC level and the maximum SAR for 12.2kbps RMC was less than 75% SAR limit.

5. NA: According to KDB 447498 D01 4)b)ii)(2),for each antenna, SAR is only required for the edge with the most conservative exposure condition. Therefore, these positions are not required for SAR measurement.

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

| Mode | Test Position | Channel | Measurement Result | | Tune-up procedures MAX Average Power(dBm) | 1g Average Limit 1.6 W/kg |
|---|---|---|---|---|---|---|
| | | | Average Conducted Power(dBm) | 1g Average (W/kg) | | Report SAR Result (W/kg) |
| UMTS Band V | Back Side | Low/4132 | 22.52 | 0.426 | 23 | 0.476 |

### 7.2.4. Bluetooth/WiFi Function

The location of the antennas inside tablet is shown in Annex H:

The output power of BT antenna is as following:

| Channel | Ch 0 (2402 MHz) | Ch 39 (2441 MHz) | Ch 78 (2480 MHz) |
|---|---|---|---|
| GFSK Test result (dBm) | 2.10 | 1.89 | 1.82 |
| EDR2M-4_DQPSK Test result (dBm) | 1.15 | 1.20 | 1.02 |
| EDR3M-8DPSK Test result (dBm) | 0.85 | 0.56 | 0.70 |

The output power of WIFI antenna is as following:

| Mode | Channel | Data rate (Mbps) | PK Power (dBm) | AV Power (dBm) |
|---|---|---|---|---|
| 11b | 1 | 1 | 9.11 | 5.90 |
| | | 2 | 9.10 | 5.49 |
| | | 5.5 | 9.05 | 5.18 |
| | | 11 | 9.00 | 5.25 |
| | 6 | 1 | 9.03 | 5.58 |
| | | 2 | 9.04 | 5.50 |
| | | 5.5 | 9.00 | 5.30 |
| | | 11 | 8.95 | 5.26 |
| | 11 | 1 | 9.10 | 5.12 |
| | | 2 | 9.08 | 5.08 |
| | | 5.5 | 9.05 | 5.20 |
| | | 11 | 9.10 | 5.51 |
| 11g | 1 | 6 | 7.80 | 4.80 |
| | | 9 | 7.55 | 4.87 |
| | | 12 | 7.80 | 4.86 |
| | | 18 | 7.70 | 4.59 |
| | | 24 | 7.75 | 4.68 |
| | | 36 | 7.36 | 4.54 |
| | | 48 | 7.60 | 4.69 |
| | | 54 | 7.50 | 4.47 |
| | 6 | 6 | 7.60 | 4.25 |
| | | 9 | 7.47 | 4.47 |
| | | 12 | 7.78 | 4.41 |

| | | | | |
|---|---|---|---|---|
| | | 18 | 7.73 | 4.44 |
| | | 24 | 7.40 | 4.50 |
| | | 36 | 7.54 | 4.44 |
| | | 48 | 7.58 | 4.19 |
| | | 54 | 7.50 | 4.20 |
| | 11 | 6 | 7.47 | 4.36 |
| | | 9 | 7.43 | 4.29 |
| | | 12 | 7.57 | 4.28 |
| | | 18 | 7.41 | 4.36 |
| | | 24 | 7.54 | 4.41 |
| | | 36 | 7.24 | 4.13 |
| | | 48 | 7.36 | 4.24 |
| | | 54 | 7.40 | 4.30 |
| 11n | 1 | MCS 0 | 6.85 | 3.10 |
| | | MCS 1 | 6.80 | 3.26 |
| | | MCS 2 | 6.55 | 3.17 |
| | | MCS 3 | 6.45 | 3.45 |
| | | MCS 4 | 6.56 | 3.02 |
| | | MCS 5 | 6.60 | 3.47 |
| | | MCS 6 | 6.78 | 3.10 |
| | | MCS 7 | 6.60 | 3.20 |
| | 6 | MCS 0 | 6.85 | 3.02 |
| | | MCS 1 | 6.79 | 3.21 |
| | | MCS 2 | 6.65 | 3.17 |
| | | MCS 3 | 6.64 | 3.20 |
| | | MCS 4 | 6.85 | 3.28 |
| | | MCS 5 | 6.74 | 3.26 |
| | | MCS 6 | 6.77 | 3.25 |
| | | MCS 7 | 6.69 | 3.20 |
| | 11 | MCS 0 | 6.79 | 3.26 |
| | | MCS 1 | 6.80 | 3.28 |
| | | MCS 2 | 6.75 | 3.10 |
| | | MCS 3 | 6.59 | 3.20 |
| | | MCS 4 | 6.60 | 3.29 |

| | | | | |
|---|---|---|---|---|
| | | MCS 5 | 6.50 | 3.10 |
| | | MCS 6 | 6.64 | 3.20 |
| | | MCS 7 | 6.33 | 3.30 |

**Stand-alone SAR**

According to the output power and the test distance (When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion), we can draw the conclusion that:

Stand-alone SAR are not required for BT, because [(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] *[√f (GHz)] = (2.239 / 5) * (√2.441) = 0.7 ≤ 3.0

Stand-alone SAR are not required for WIFI, because [(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] *[√f (GHz)] = (3.981 / 5) * (√2.437) = 1.2 ≤ 3.0

**Simultaneous Transmission SAR**

About BT and GSM/UMTS Antenna,

$SAR_{Max.BT}$ = (max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] * [√f(GHz)/ 7.5] W/kg = (2.239 / 5) * [(√2.441)/7.5] = 0.1 W/kg

$SAR_{Max.GSM/UMTS}$ = 1.191 W/kg

$SAR_{Max.BT}$ + $SAR_{Max.GSM/UMTS}$ = 0.1 W/kg + 1.191 W/kg = 1.291 W/kg ≤ 1.6 W/kg, So the Simultaneous SAR are not required for BT and GSM/UMTS antenna.

About WIFI and GSM/UMTS Antenna,

$SAR_{Max.WIFI}$ = (max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] * [√f(GHz)/ 7.5] W/kg = (3.981 / 5) * [(√2.437)/7.5] = 0.2 W/kg

$SAR_{Max.GSM/UMTS}$ = 1.191 W/kg

$SAR_{Max.WIFI}$ + $SAR_{Max.GSM/UMTS}$ = 0.2 W/kg + 1.191 W/kg = 1.391 W/kg ≤ 1.6 W/kg, So the Simultaneous SAR are not required for WIFI and GSM/UMTS antenna.

About BT and WIFI Antenna,

$SAR_{Max.BT}$ = (max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] * [√f(GHz)/ 7.5] W/kg = (2.239 / 5) * [(√2.441)/7.5] = 0.1 W/kg

$SAR_{Max.WIFI}$ = (max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] * [√f(GHz)/ 7.5] W/kg = (3.981 / 5) * [(√2.437)/7.5] = 0.2 W/kg

$SAR_{Max.BT}$ + $SAR_{Max.WIFI}$ = 0.1 W/kg + 0.2 W/kg = 0.3W/kg ≤ 1.6 W/kg, So the Simultaneous SAR are not required for BT and WIFI antenna.

# 8. 700MHz to 3GHz Measurement Uncertainty

| No. | source | Type | Uncertainty Value (%) | Probability Distribution | k | $c_i$ | Standard ncertainty $u_i^{'}$ (%) | Degree of freedom $V_{eff}$ or $v_i$ |
|---|---|---|---|---|---|---|---|---|
| 1 | System repetivity | A | 0.5 | N | 1 | 1 | 0.5 | 9 |
| Measurement system | | | | | | | | |
| 2 | -probe calibration | B | 6.0 | N | 1 | 1 | 6.0 | ∞ |
| 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 | 71 |
| 18 | -Device Holder Uncertainty | A | 4.1 | N | 1 | 1 | 4.1 | 5 |
| 19 | -Output Power Variation - SAR drift measurement | B | 5.0 | R | $\sqrt{3}$ | 1 | 2.9 | ∞ |
| Physical parameter | | | | | | | | |
| 20 | -phantom | B | 4.0 | R | $\sqrt{3}$ | 1 | 2.3 | ∞ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21 | -liquid conductivity (deviation from target) | B | 5.0 | R | $\sqrt{3}$ | 0.64 | 1.8 | ∞ |
| 22 | -liquid conductivity (measurement uncertainty) | B | 2.5 | N | 1 | 0.64 | 1.6 | 9 |
| 23 | -liquid permittivity (deviation from target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 1.7 | ∞ |
| 24 | -liquid permittivity (measurement uncertainty ) | B | 2.5 | N | 1 | 0.6 | 1.5 | 9 |
| Combined standard uncertainty | | $u_c^{'} = \sqrt{\sum_{i=1}^{24} c_i^2 u_i^2}$ | | | | | 11.50 | |
| Expanded uncertainty (confidence interval of 95 %) | | $u_e = 2u_c$ | | N | k=2 | | 23.00 | |

# 9. Main Test Instruments

**Table 19: List of Main Instruments**

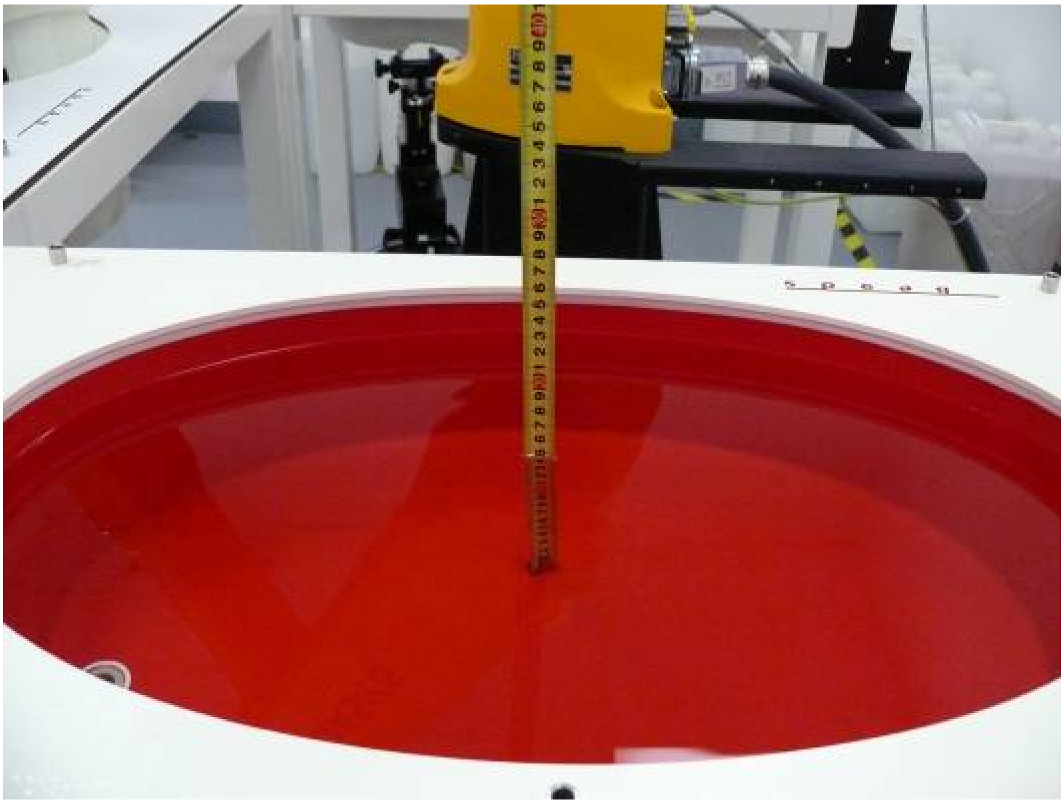
| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|---|---|---|---|---|---|
| 01 | Network analyzer | Agilent 8753E | US37390326 | September 11, 2012 | One year |
| 02 | Dielectric Probe Kit | Agilent 85070E | US44020115 | No Calibration Requested | |
| 03 | Power meter | Agilent E4417A | GB41291714 | March 11, 2012 | One year |
| 04 | Power sensor | Agilent N8481H | MY50350004 | September 24, 2012 | One year |
| 05 | Power sensor | E9327A | US40441622 | September 23, 2012 | One year |
| 06 | Signal Generator | HP 8341B | 2730A00804 | September 10, 2012 | One year |
| 07 | Dual directional coupler | 778D-012 | 50519 | March 26, 2012 | One year |
| 08 | Amplifier | IXA-020 | 0401 | No Calibration Requested | |
| 09 | BTS | E5515C | MY48360988 | December 1, 2012 | One year |
| 10 | E-field Probe | ES3DV3 | 3189 | June 22, 2012 | One year |
| 11 | DAE | DAE4 | 1317 | January 23, 2012 | One year |
| 12 | Validation Kit 835MHz | D835V2 | 4d020 | August 26, 2011 | Two years |
| 13 | Validation Kit 1900MHz | D1900V2 | 5d060 | August 31, 2011 | Two years |
| 14 | Temperature Probe | JM222 | AA1009129 | March 15, 2012 | One year |
| 15 | Hygrothermograph | WS-1 | 64591 | September 27, 2012 | One year |

*******END OF REPORT *******

# ANNEX A: Test Layout


Picture 1: Specific Absorption Rate Test Layout

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



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

# ANNEX B: System Check Results

### System Performance Check at 835 MHz

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

Date/Time: 12/24/2012 12:45:20 PM

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

Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; $\varepsilon_r$ = 55.10; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

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

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

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

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

Peak SAR (extrapolated) = 3.63 W/kg

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

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

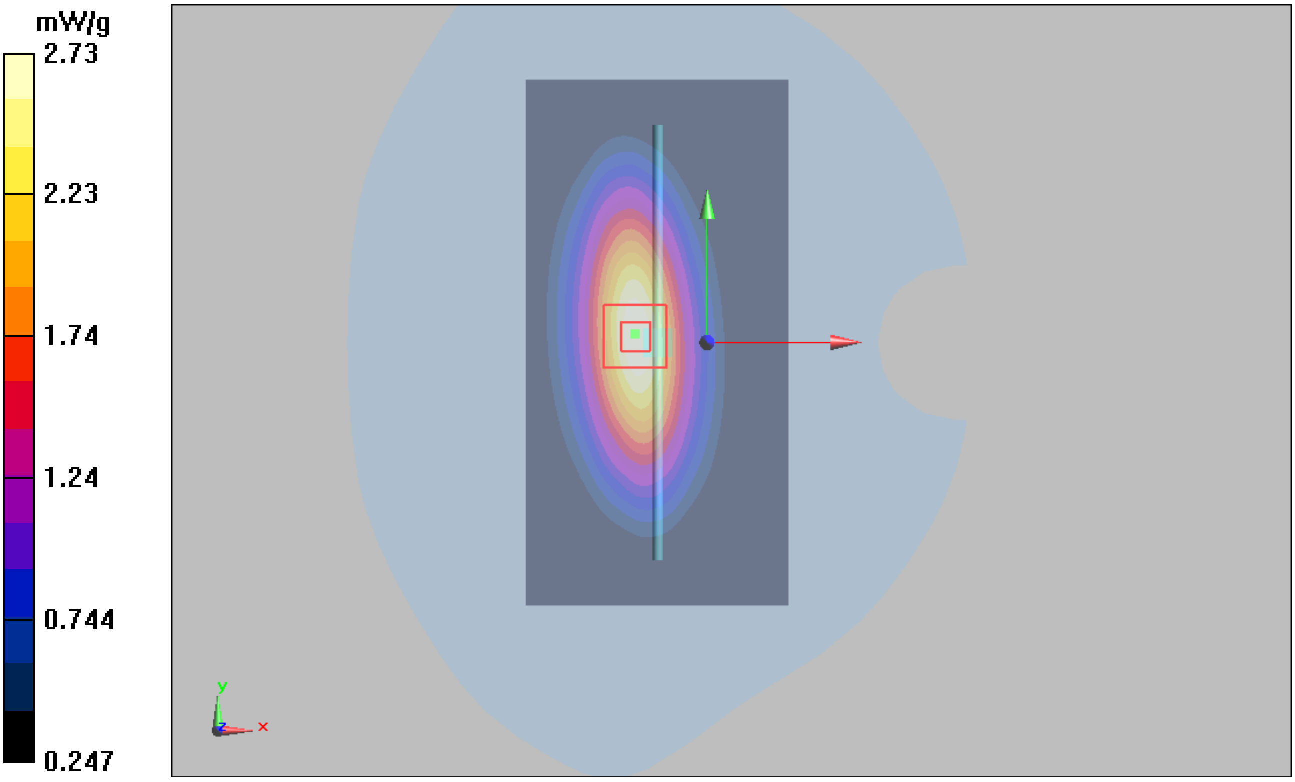



**Figure 6 System Performance Check 835MHz 250mW**

**System Performance Check at 1900 MHz**

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

Date/Time: 1/6/2013 4:25:19 PM

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

Medium parameters used: f = 1900 MHz; σ = 1.54mho/m; $\varepsilon_r$ = 52.10; ρ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

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

Maximum value of SAR (interpolated) = 11.78 mW/g

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

Reference Value = 80.78 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 17.63 W/kg

**SAR(1 g) = 9.80 mW/g; SAR(10 g) = 5.23 mW/g**

Maximum value of SAR (measured) = 10.97 mW/g

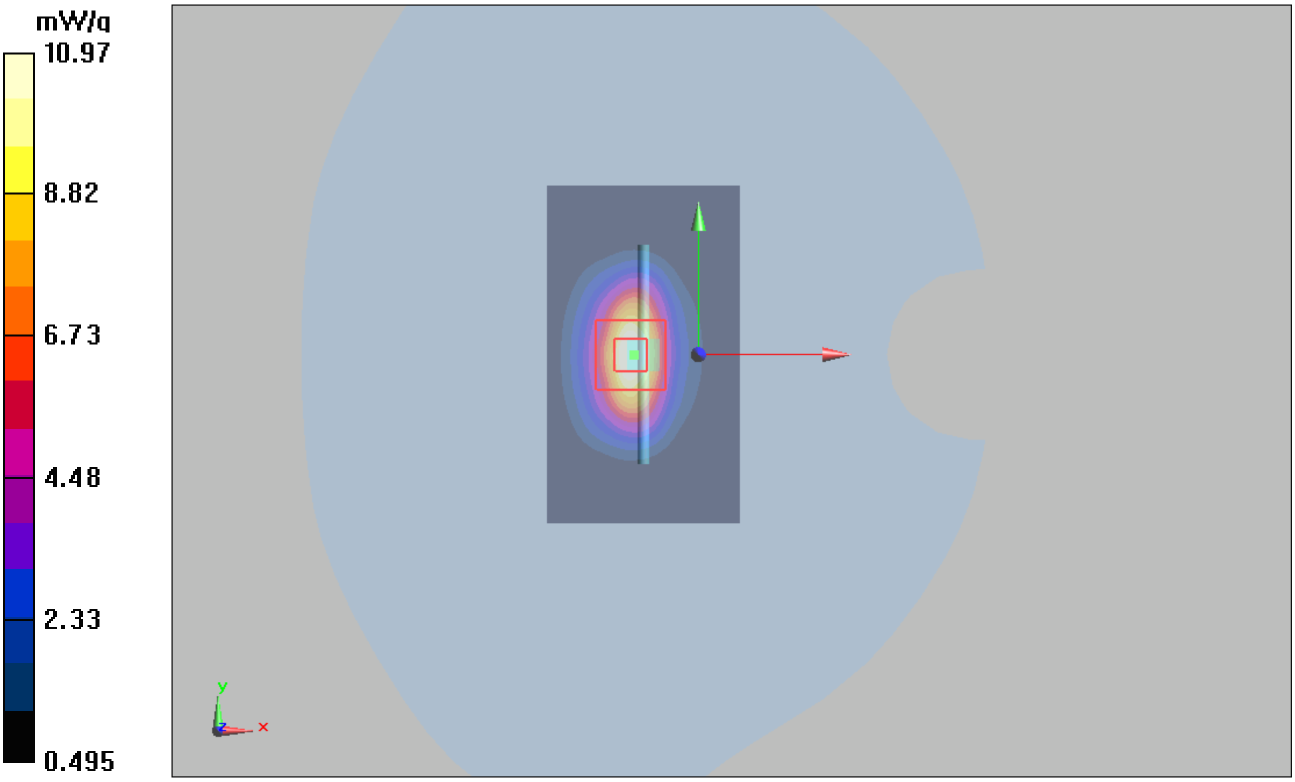



**Figure 7 System Performance Check 1900MHz 250mW**

**System Performance Check at 1900 MHz**

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

Date/Time: 12/25/2012 2:00:19 PM

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

Medium parameters used: f = 1900 MHz; $\sigma$ = 1.52mho/m; $\varepsilon_r$ = 52.15; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

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

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

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

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

Peak SAR (extrapolated) = 17.6 W/kg

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

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

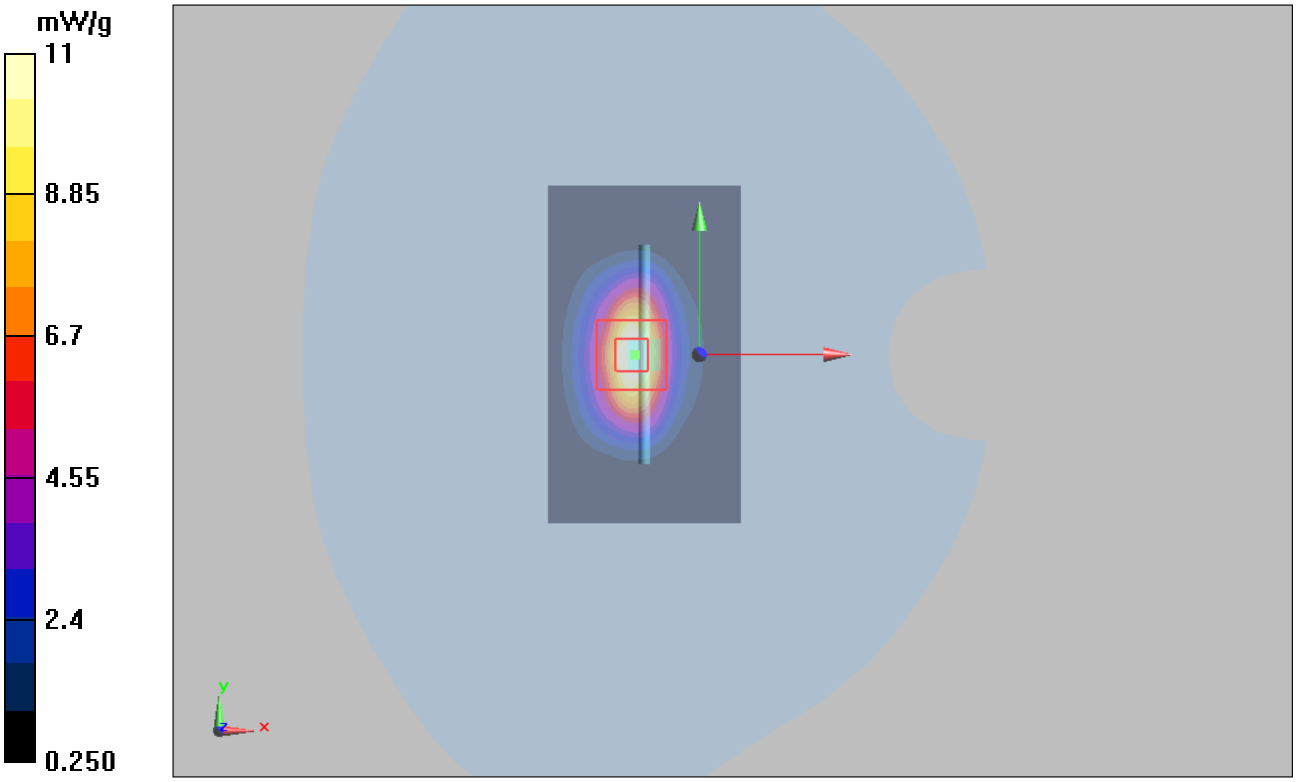



**Figure 8 System Performance Check 1900MHz 250mW**

## ANNEX C: Graph Results

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

Date/Time: 12/24/2012 2:15:51 PM

Communication System: GPRS 4TX; Frequency: 848.8 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 849 MHz; $\sigma$ = 1 mho/m; $\varepsilon_r$ = 55; $\rho$ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/High/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

**Test Position 1/High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.613 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.45 W/kg

**SAR(1 g) = 0.710 mW/g; SAR(10 g) = 0.257 mW/g**

Maximum value of SAR (measured) = 0.824 mW/g

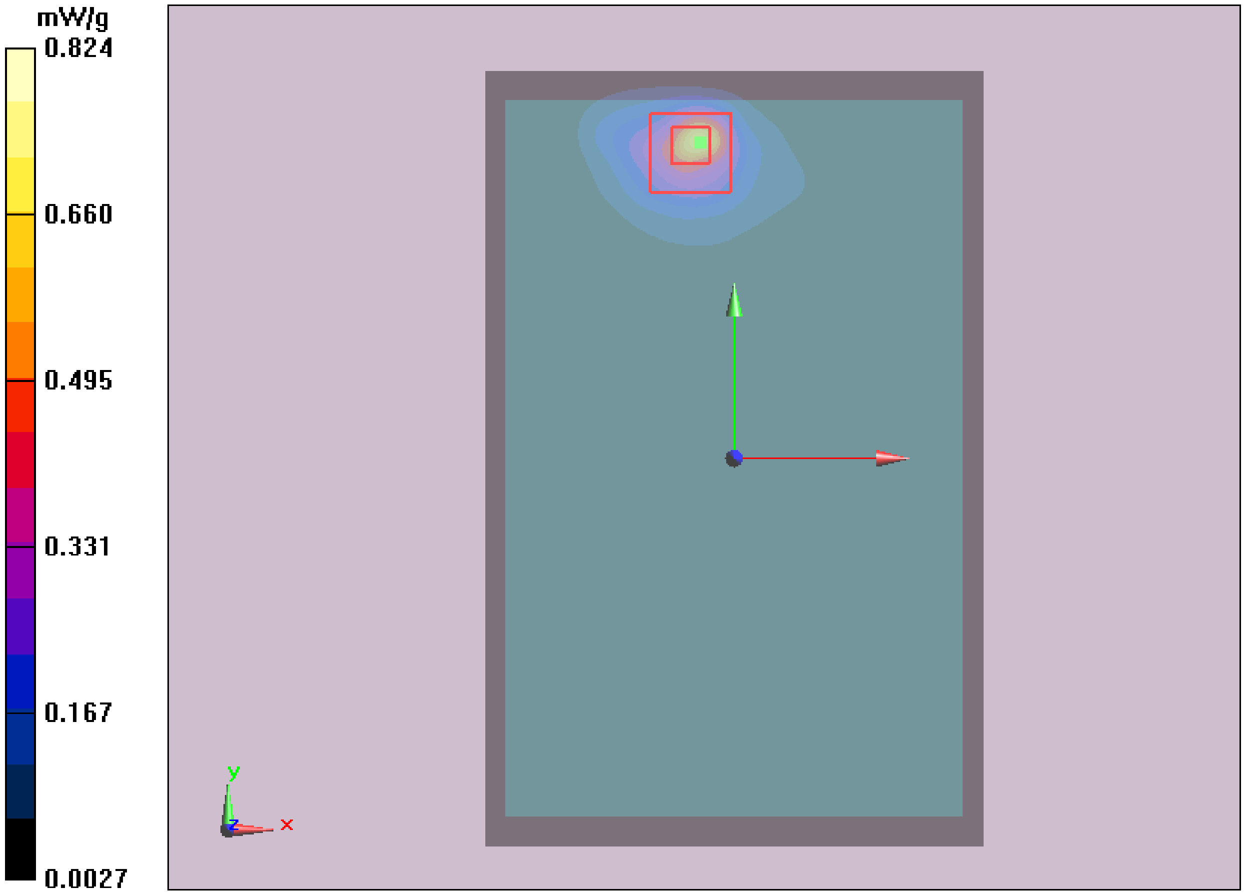



**Figure 9 GSM 850 GPRS (4Txslots) Test Position 1 Channel 251**

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

Date/Time: 12/24/2012 3:48:37 PM

Communication System: GPRS 4TX; Frequency: 836.6 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 837 MHz; $\sigma$ = 0.988 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Middle/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.578 mW/g

**Test Position 1/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.505 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.501 mW/g; SAR(10 g) = 0.198 mW/g**

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

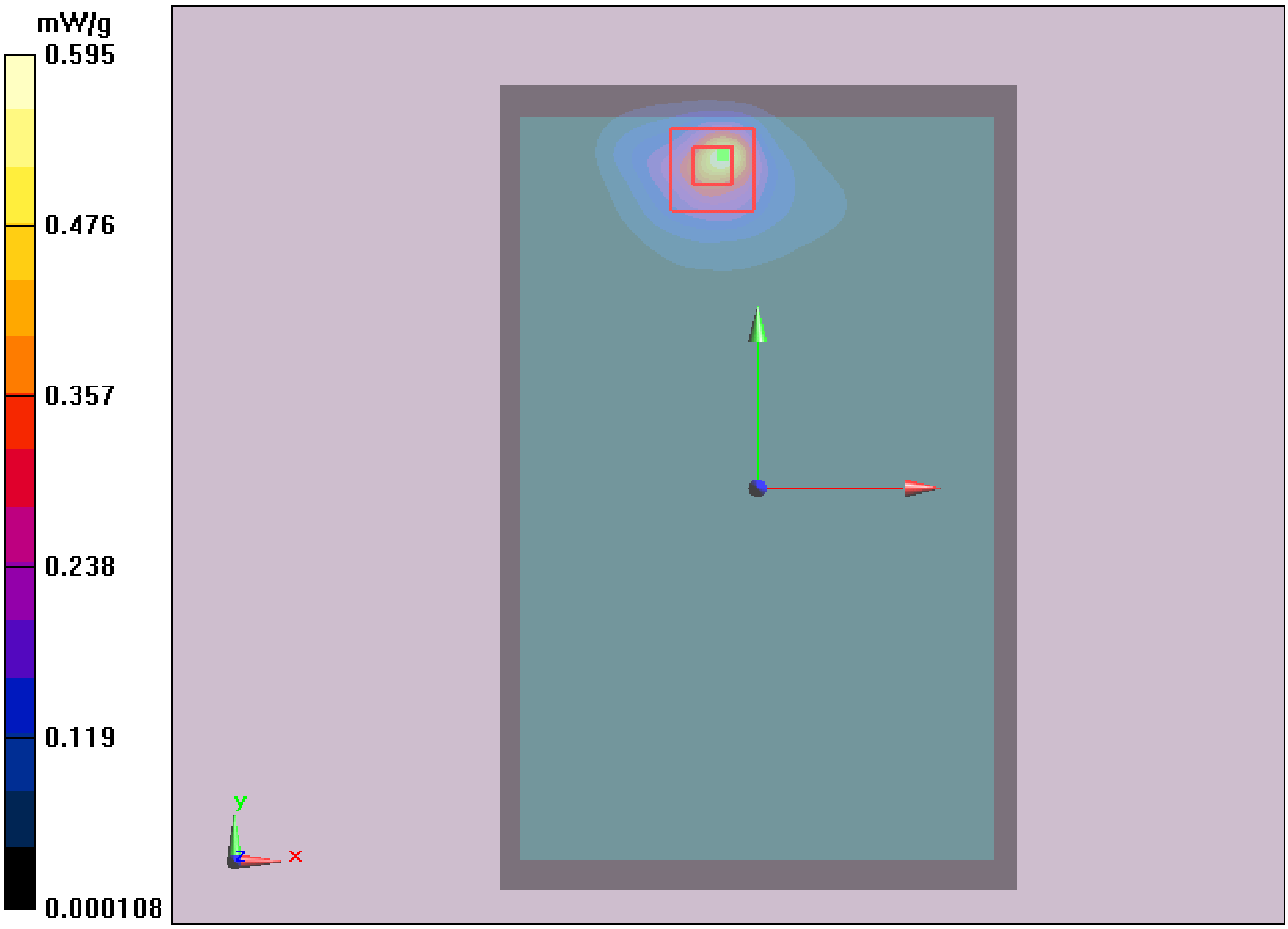



**Figure 10 GSM 850 GPRS (4Txslots) Test Position 1 Channel 190**

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

Date/Time: 12/24/2012 2:41:50 PM

Communication System: GPRS 4TX; Frequency: 824.2 MHz;Duty Cycle: 1:2.07491

Medium parameters used (interpolated): f = 824.2 MHz; $\sigma$ = 0.976 mho/m; $\varepsilon_r$ = 55.2; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Low/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

**Test Position 1/Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.1 W/kg

**SAR(1 g) = 0.437 mW/g; SAR(10 g) = 0.164 mW/g**

Maximum value of SAR (measured) = 0.583 mW/g

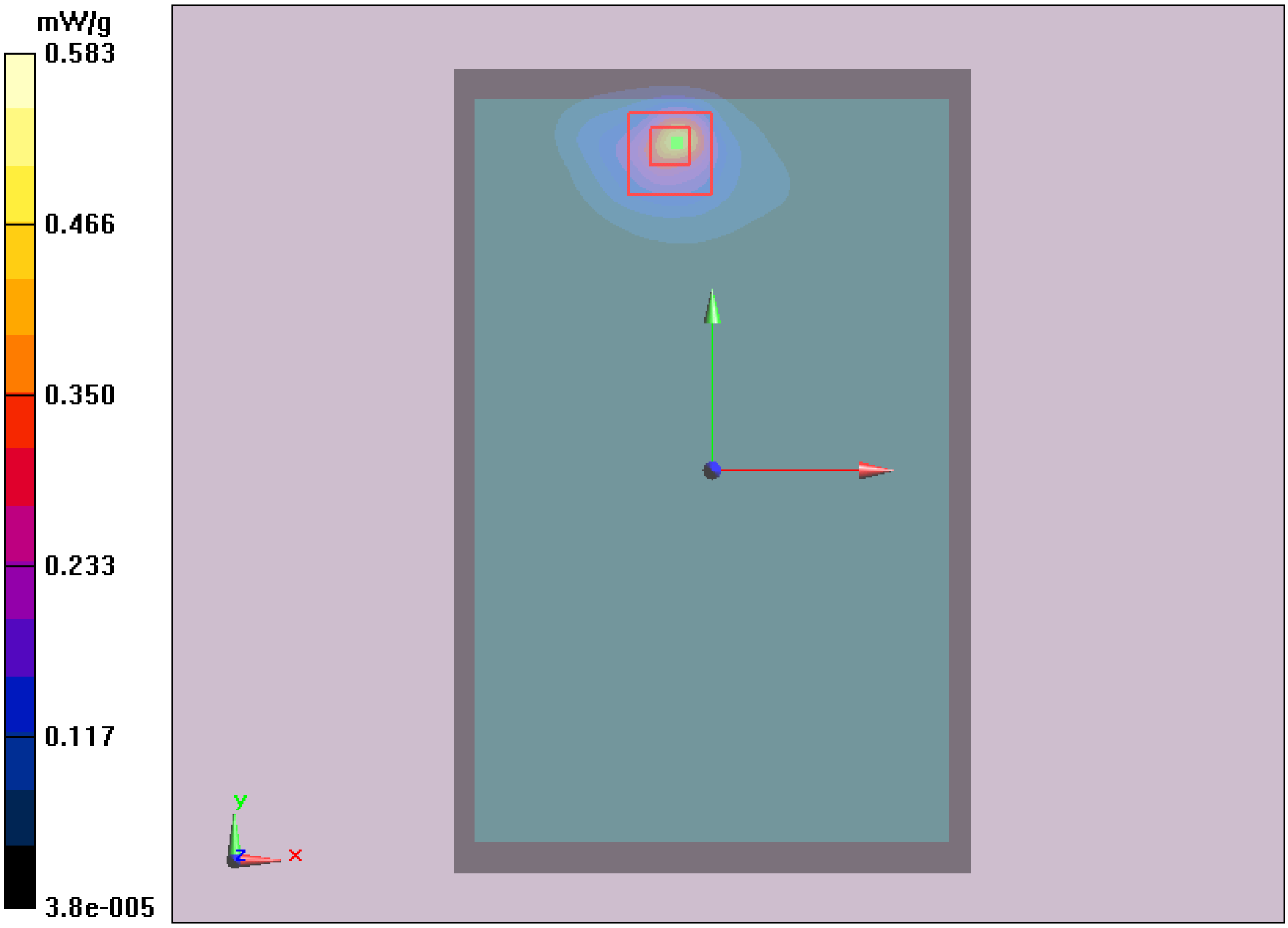



**Figure 11 GSM 850 GPRS (4Txslots) Test Position 1 Channel 128**

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

Date/Time: 12/25/2012 11:18:04 AM

Communication System: GPRS 4TX; Frequency: 836.6 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 837 MHz; $\sigma$ = 0.988 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 2/Middle/Area Scan (31x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.054 mW/g

**Test Position 2/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.34 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 0.188 W/kg

**SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.028 mW/g**

Maximum value of SAR (measured) = 0.082 mW/g

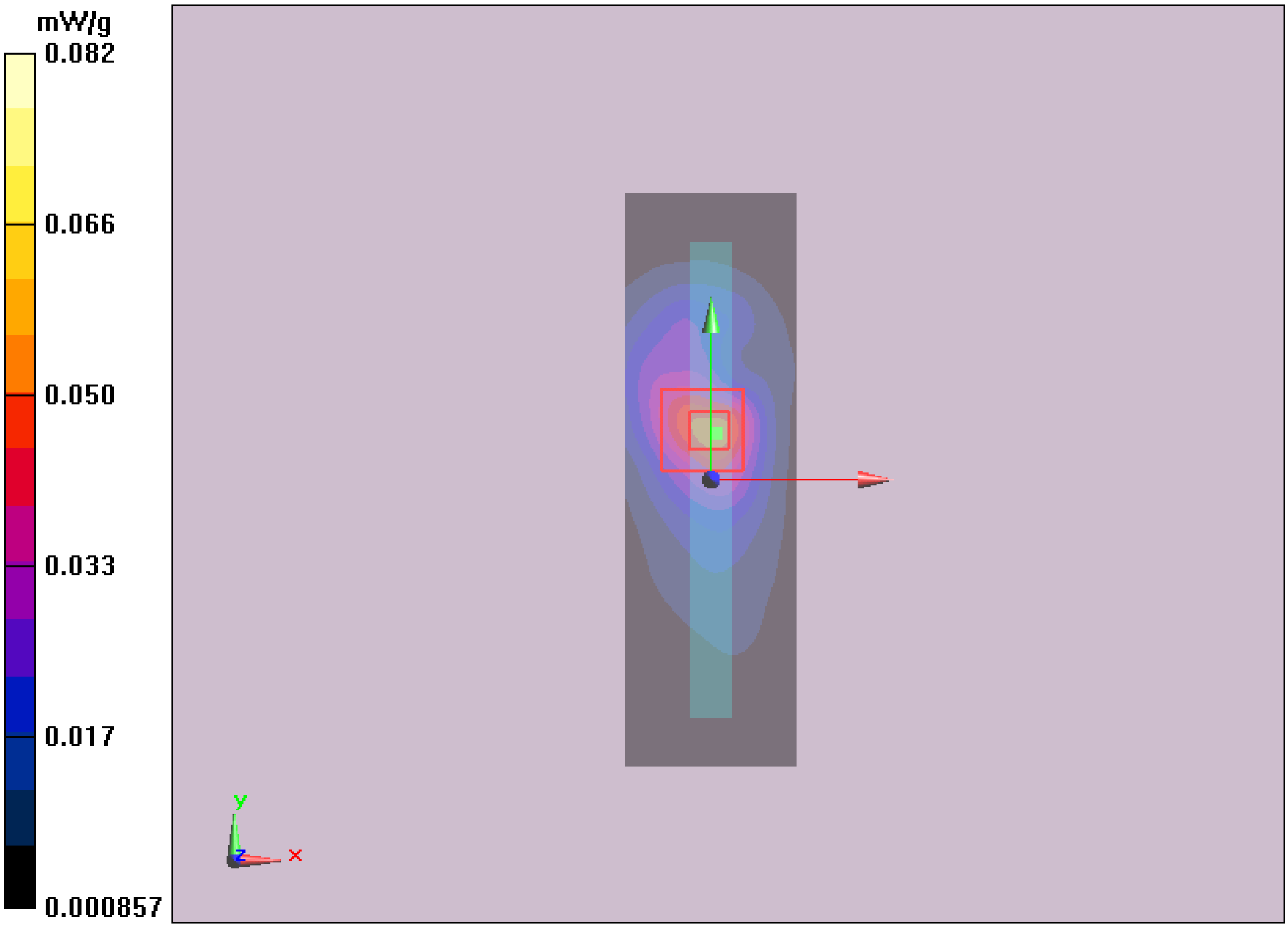



**Figure 12 GSM 850 GPRS (4Txslots) Test Position 2 Channel 190**

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

Date/Time: 12/24/2012 3:19:14 PM

Communication System: GPRS 4TX; Frequency: 836.6 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 837 MHz; σ = 0.988 mho/m; $\varepsilon_r$ = 55.1; ρ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 5/Middle/Area Scan (21x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0065 mW/g

**Test Position 5/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.252 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 0.022 W/kg

**SAR(1 g) = 0.006 mW/g; SAR(10 g) = 0.003 mW/g**

Maximum value of SAR (measured) = 0.00619 mW/g

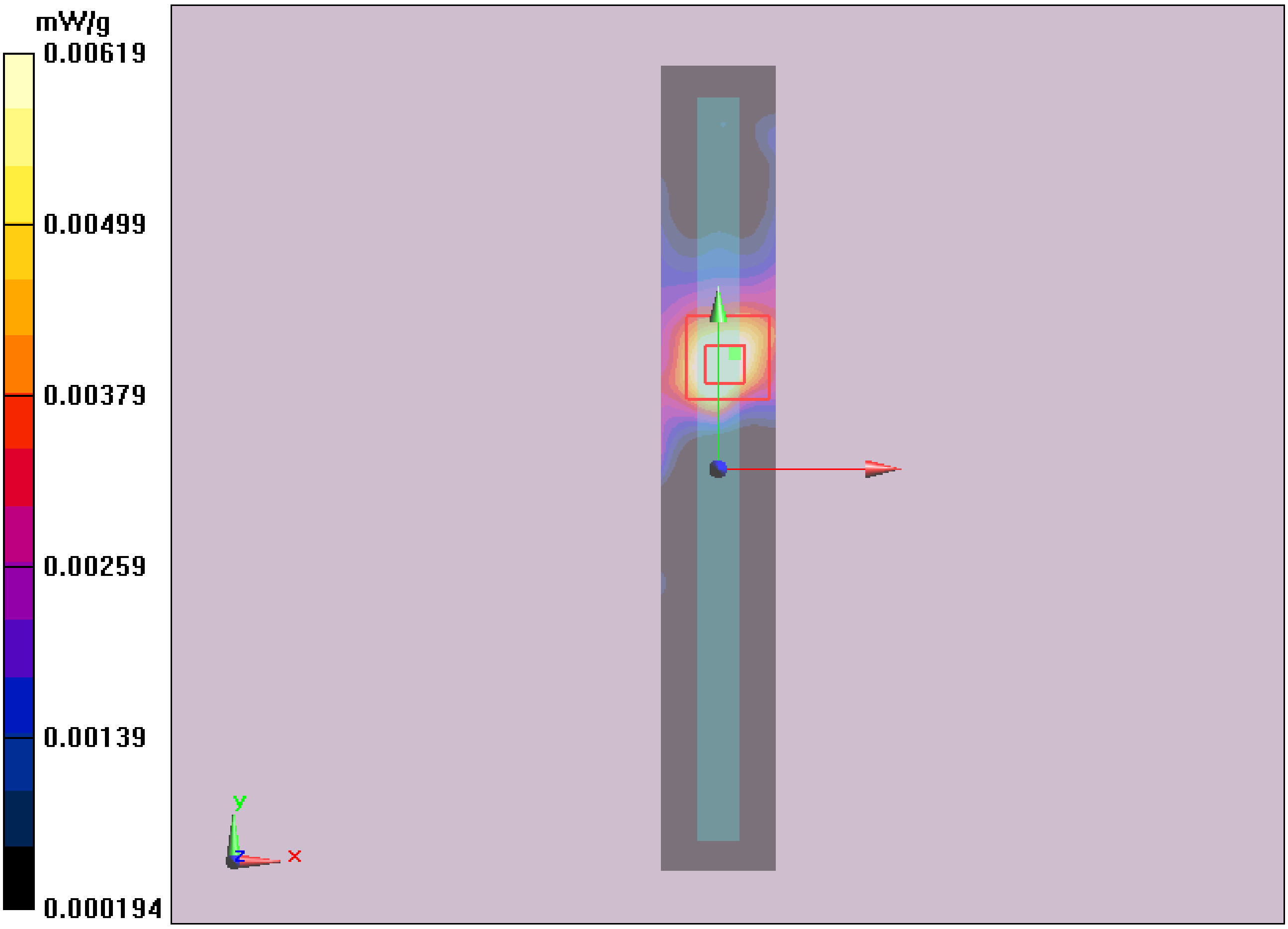



**Figure 13 GSM 850 GPRS (4Txslots) Test Position 5 Channel 190**

**GSM 850 EGPRS (4Txslots) Test Position 1 High**

Date/Time: 12/24/2012 10:42:28 PM

Communication System: EGPRS 4TX; Frequency: 848.8 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 849 MHz; $\sigma$ = 1 mho/m; $\varepsilon_r$ = 55; $\rho$ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1High/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

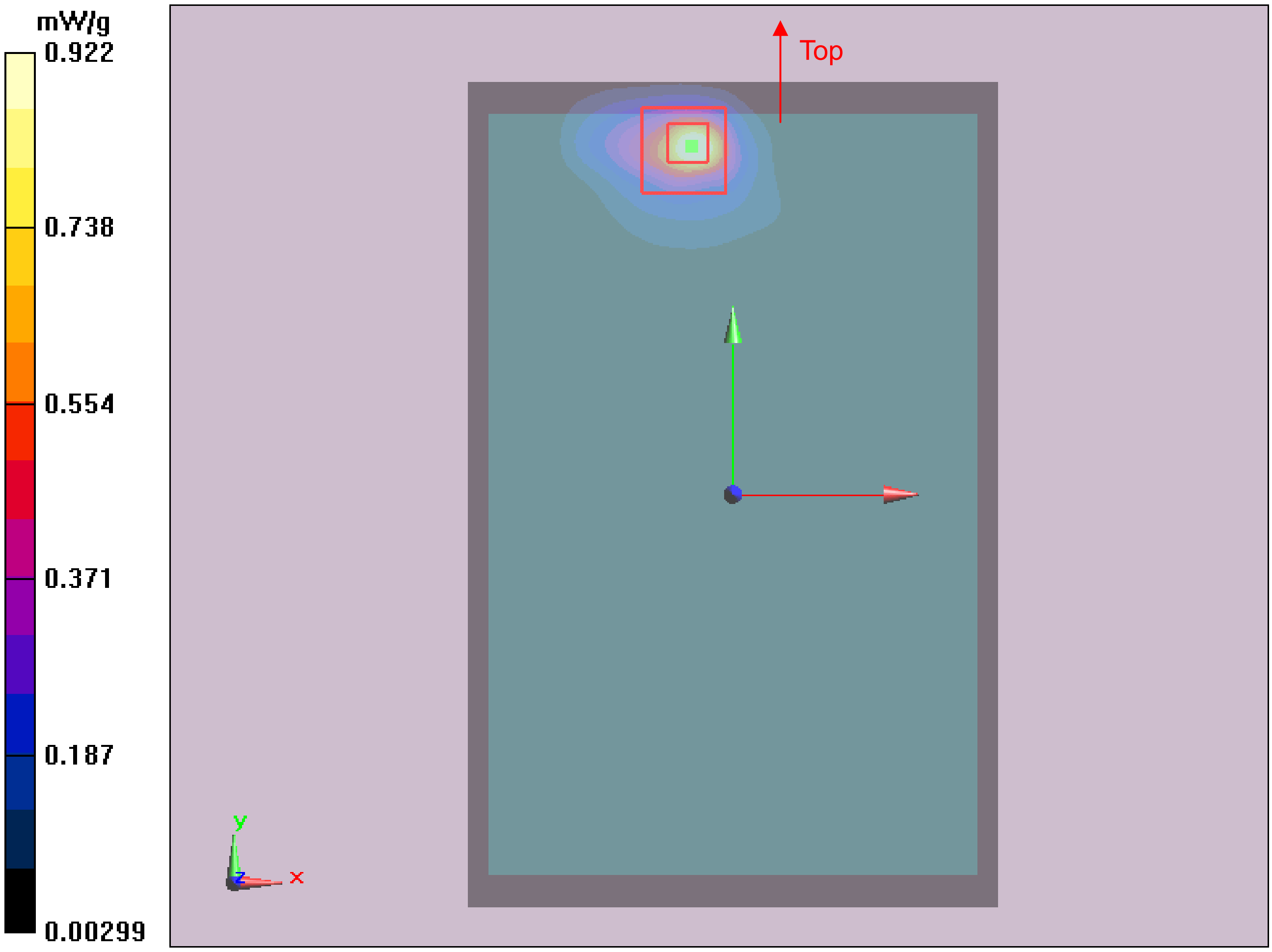
**Test Position 1High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.433 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.62 W/kg

**SAR(1 g) = 0.753 mW/g; SAR(10 g) = 0.270 mW/g**

Maximum value of SAR (measured) = 0.922 mW/g



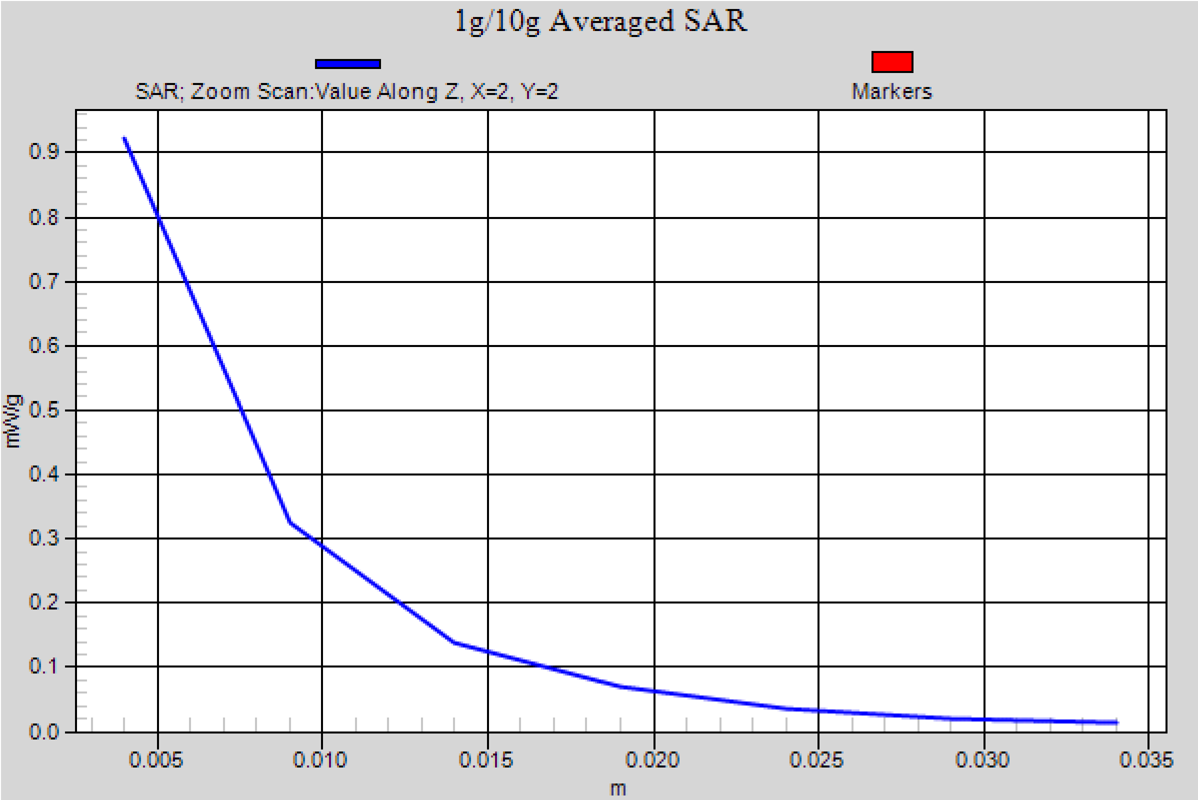



**Figure 14 GSM 850 EGPRS (4Txslots) Test Position 1 Channel 251**

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

Date/Time: 12/25/2012 6:46:52 PM

Communication System: GPRS 4TX; Frequency: 1909.8 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 1910 MHz; $\sigma$ = 1.54 mho/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/High/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

**Test Position 1/High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 2.83 W/kg

**SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.473 mW/g**

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

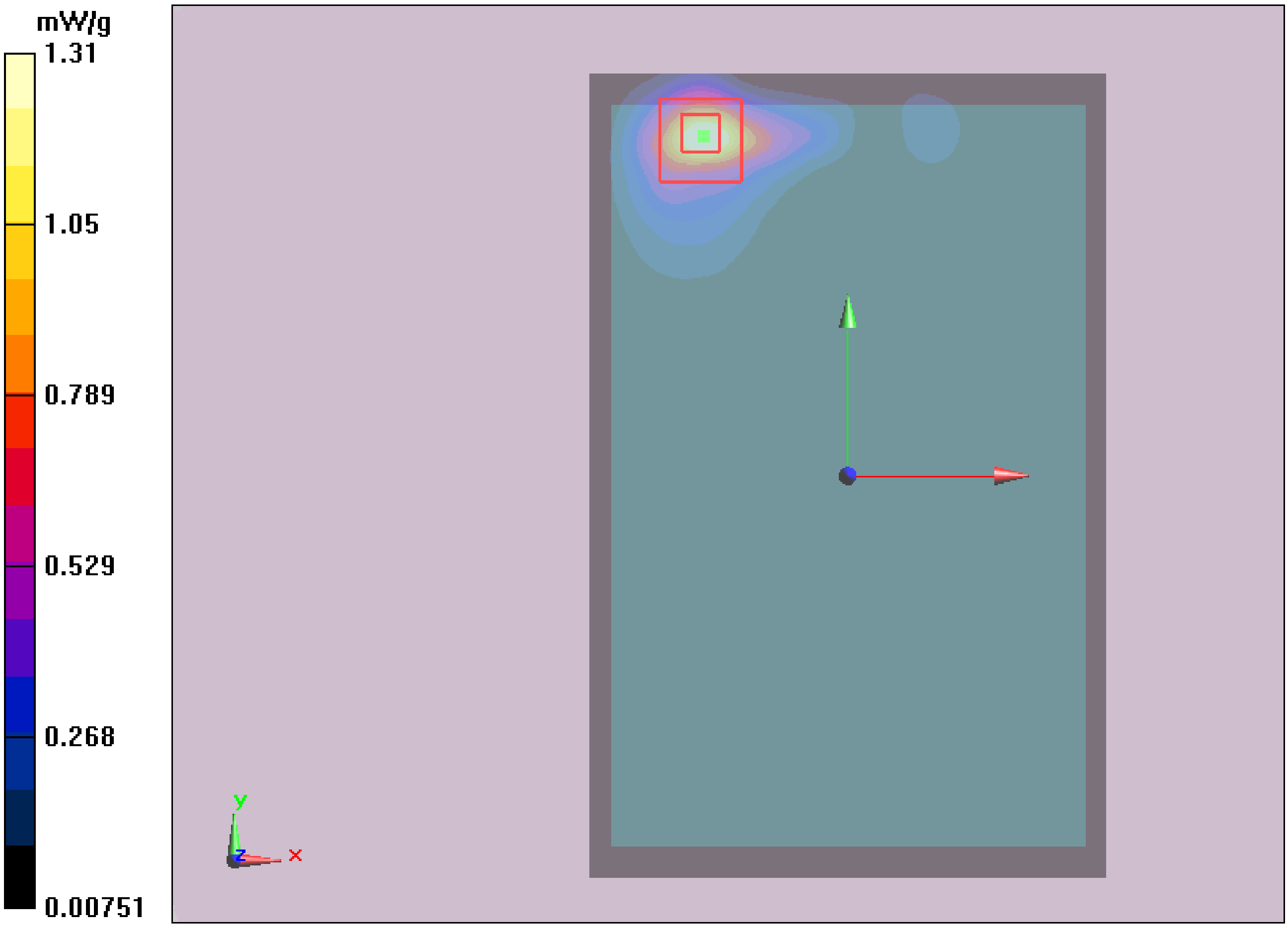



**Figure 15 GSM 1900 GPRS (4Txslots) Test Position 1 Channel 810**

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

Date/Time: 12/25/2012 6:19:32 PM

Communication System: GPRS 4TX; Frequency: 1880 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; $\varepsilon_r$ = 52.2; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Middle/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

**Test Position 1/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 2.26 W/kg

**SAR(1 g) = 0.980 mW/g; SAR(10 g) = 0.393 mW/g**

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

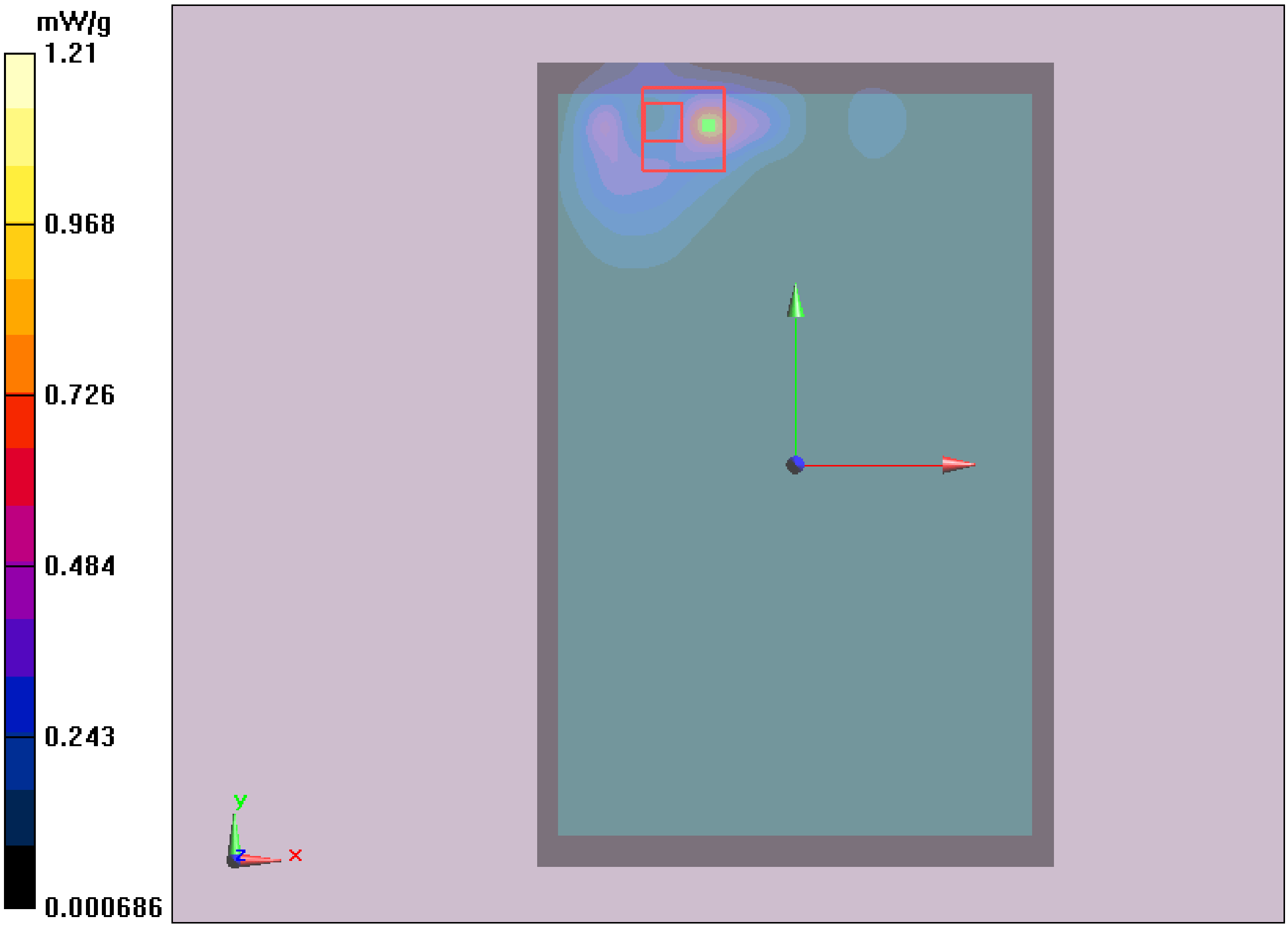



**Figure 16 GSM 1900 GPRS (4Txslots) Test Position 1 Channel 661**

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

Date/Time: 12/25/2012 7:14:50 PM

Communication System: GPRS 4TX; Frequency: 1850.2 MHz;Duty Cycle: 1:2.07491

Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.48 mho/m; $\varepsilon_r$ = 52.4; $\rho$ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Low/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

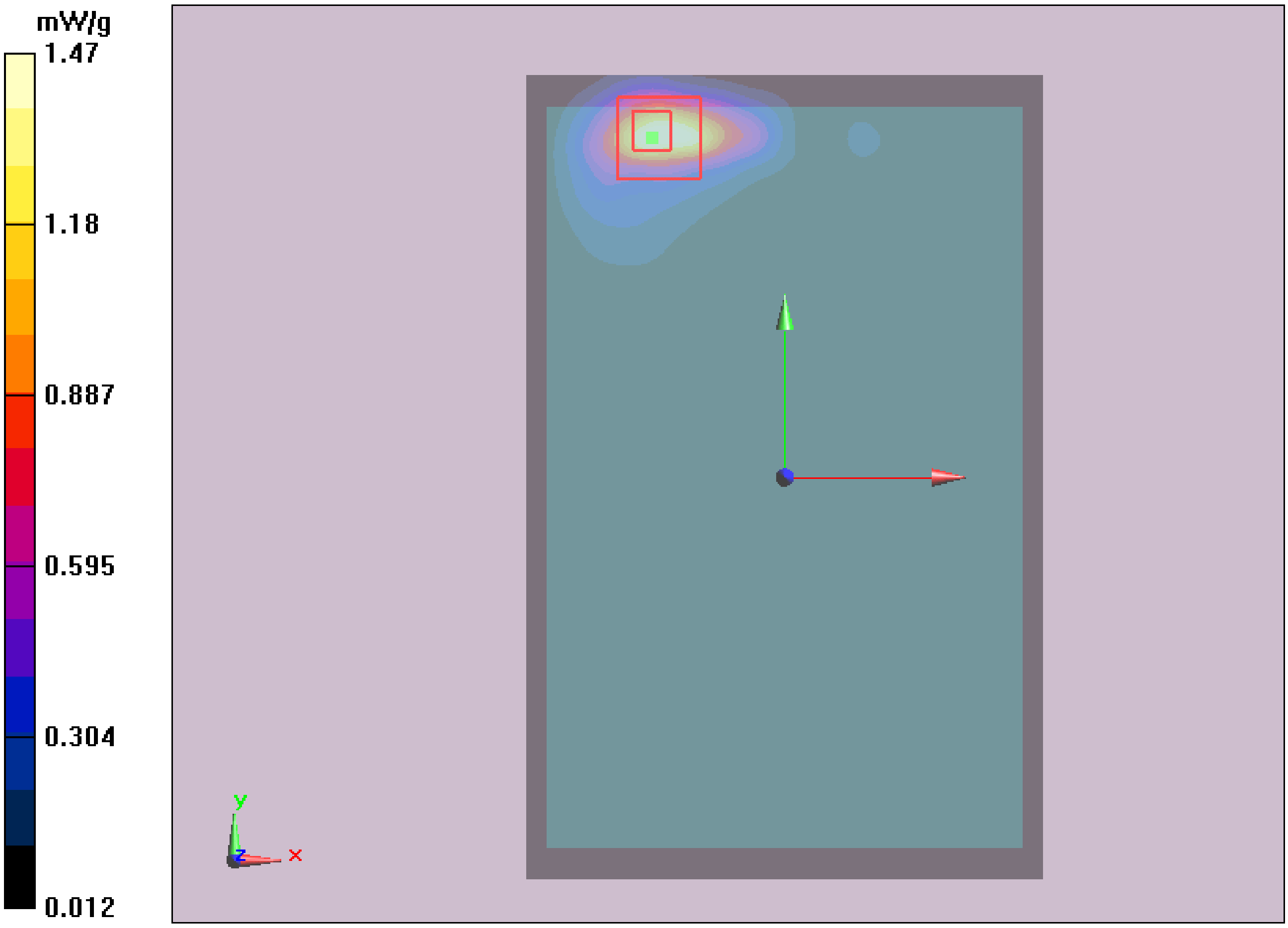
**Test Position 1/Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 2.66 W/kg

**SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.502 mW/g**

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



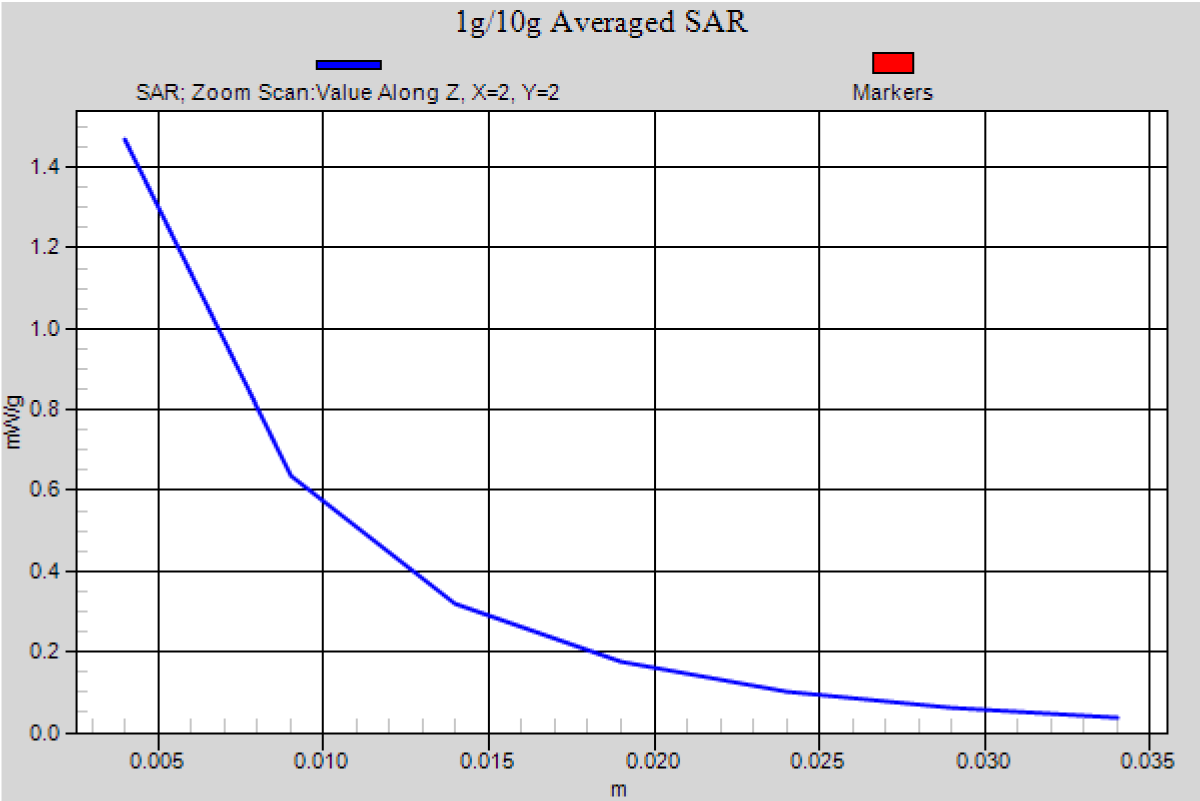



**Figure 17 GSM 1900 GPRS (4Txslots) Test Position 1 Channel 512**

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

Date/Time: 12/25/2012 7:07:11 PM

Communication System: GPRS 4TX; Frequency: 1880 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 52.2; $\rho$ = 1000 kg/$m^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 2/Middle/Area Scan (21x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.099 mW/g

**Test Position 2/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.65 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 0.240 W/kg

**SAR(1 g) = 0.103 mW/g; SAR(10 g) = 0.047 mW/g**

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

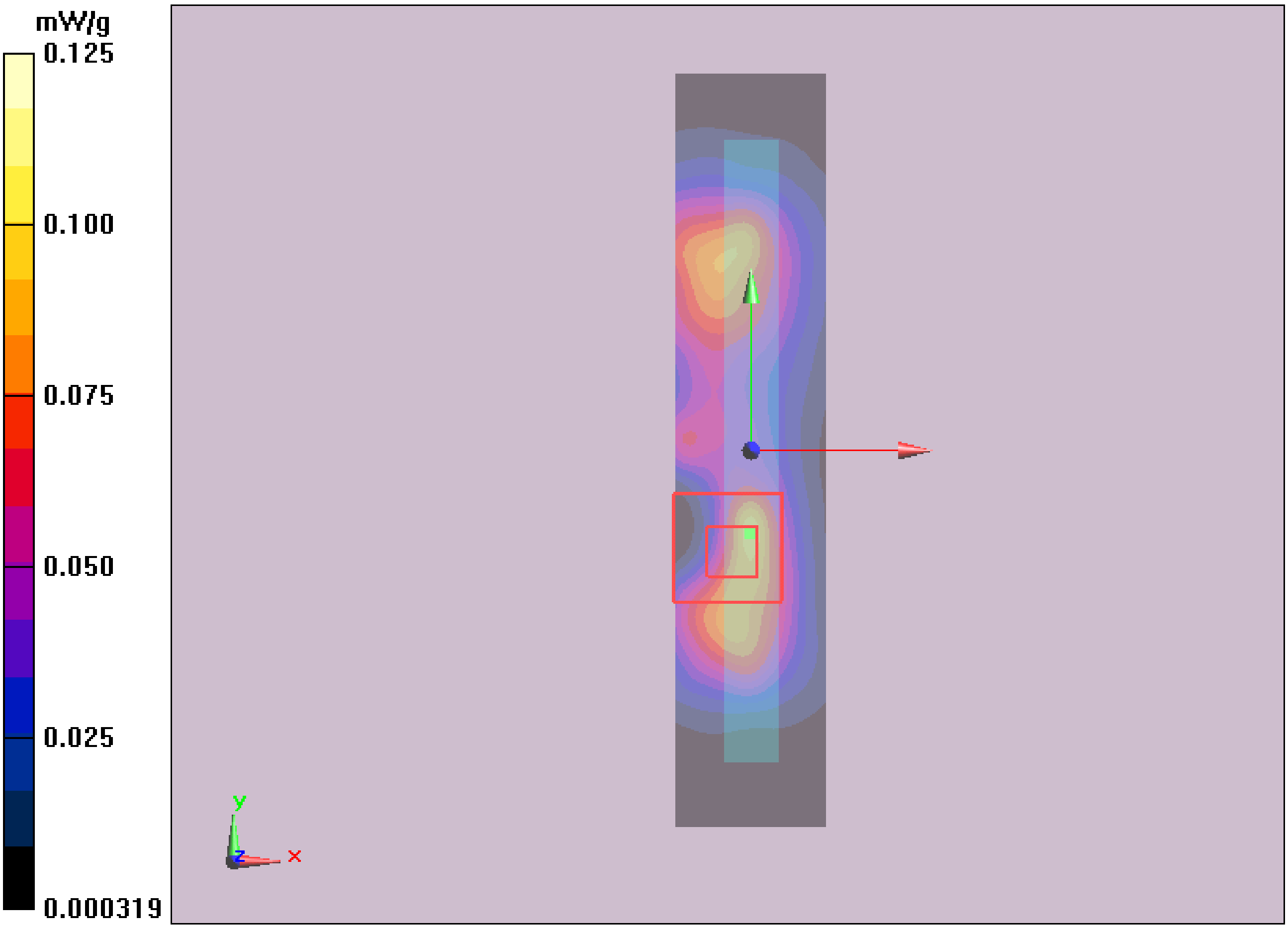



**Figure 18 GSM 1900 GPRS (4Txslots) Test Position 2 Channel 661**

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

Date/Time: 12/25/2012 6:46:02 PM

Communication System: GPRS 4TX; Frequency: 1880 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 1880 MHz; $\sigma$ = 1.5 mho/m; $\varepsilon_r$ = 52.2; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 5/Middle/Area Scan (21x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.021 mW/g

**Test Position 5/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.28 V/m; Power Drift = 0.048 dB

Peak SAR (extrapolated) = 0.037 W/kg

**SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.011 mW/g**

Maximum value of SAR (measured) = 0.022 mW/g

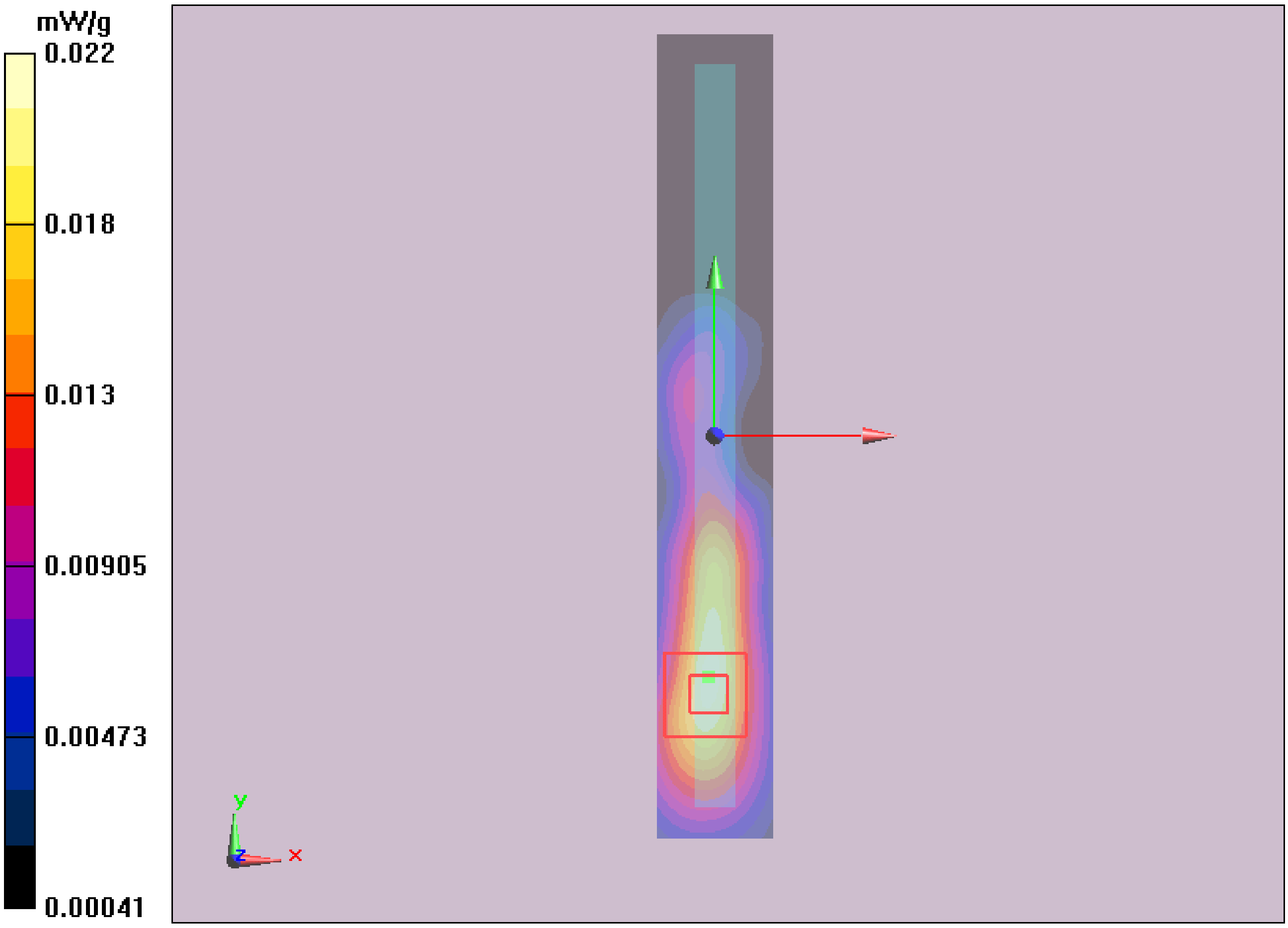



**Figure 19 GSM 1900 GPRS (4Txslots) Test Position 5 Channel 661**

**GSM 1900 EGPRS (4Txslots) Test Position 1 Low**

Date/Time: 12/25/2012 7:46:31 PM

Communication System: EGPRS 4TX; Frequency: 1850.2 MHz;Duty Cycle: 1:2.07491

Medium parameters used (interpolated): f = 1850.2 MHz; $\sigma$ = 1.48 mho/m; $\varepsilon_r$ = 52.4; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Low/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

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

**Test Position 1/Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001dB

Peak SAR (extrapolated) = 2.41 W/kg

**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.499 mW/g**

Maximum value of SAR (measured) = 1.46 mW/g

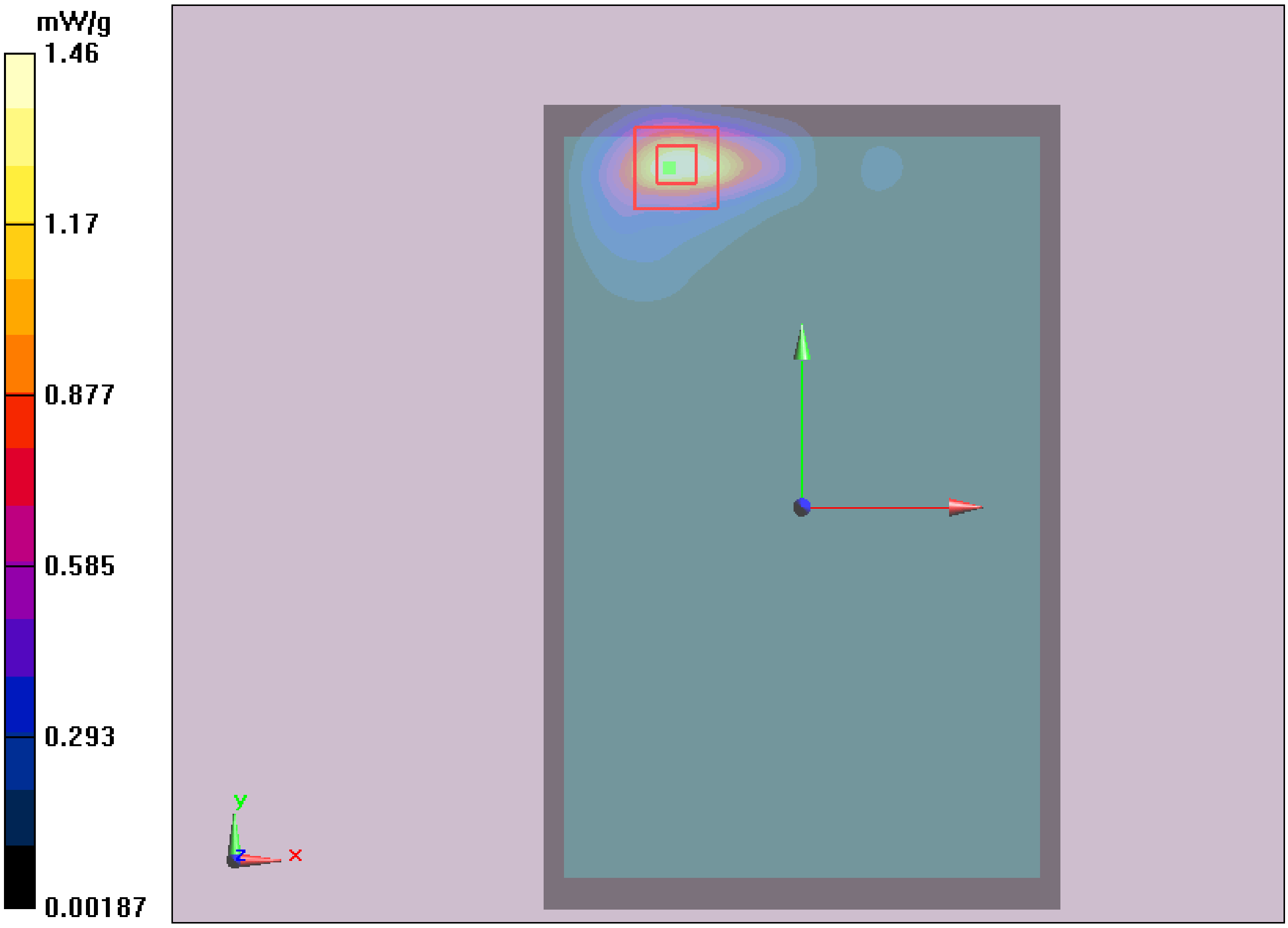



**Figure 20 GSM 1900 EGPRS (4Txslots) Test Position 1 Channel 512**

**GSM 1900 GPRS (4Txslots) Test Position 1 Low (1st Repeated SAR)**

Date/Time: 1/6/2013 5:44:46 PM

Communication System: GPRS 4TX; Frequency: 1850.2 MHz;Duty Cycle: 1:2.07491

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.48 mho/m; $\varepsilon_r$ = 52.4; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(4.36, 4.36, 4.36); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1 Low/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.6 mW/g

**Test Position 1 Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 3.14 W/kg

**SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.426 mW/g**

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

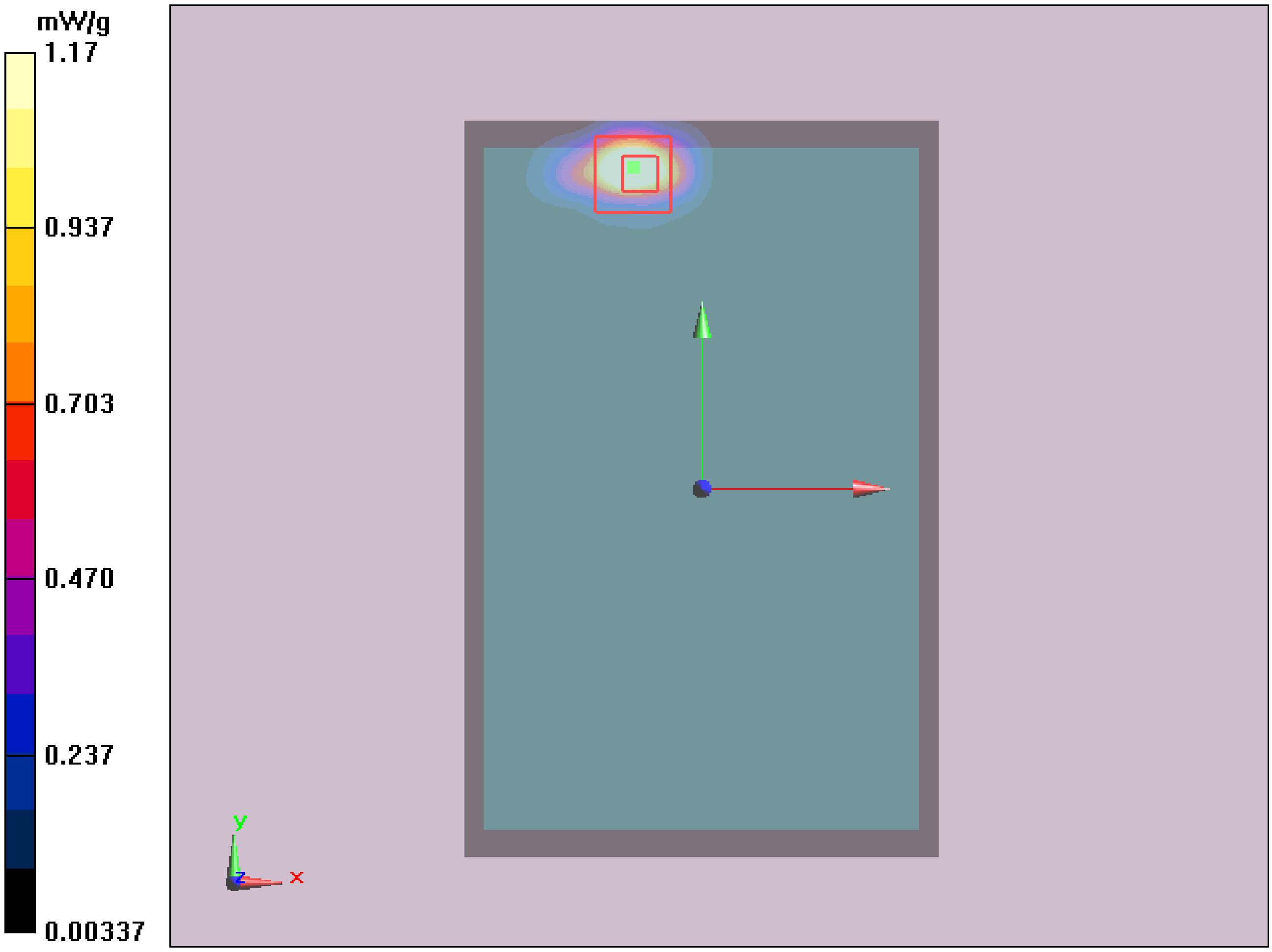



**Figure 21 GSM 1900 GPRS (4Txslots) Test Position 1 Channel 512**

**UMTS Band V Test Position 1 High**

Date/Time: 12/25/2012 12:36:06 PM

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

Medium parameters used: f = 847 MHz; σ = 0.998 mho/m; $\varepsilon_r$ = 55; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/High/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.423 mW/g

**Test Position 1/High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 1.5 W/kg

**SAR(1 g) = 0.415 mW/g; SAR(10 g) = 0.147 mW/g**

Maximum value of SAR (measured) = 0.453 mW/g

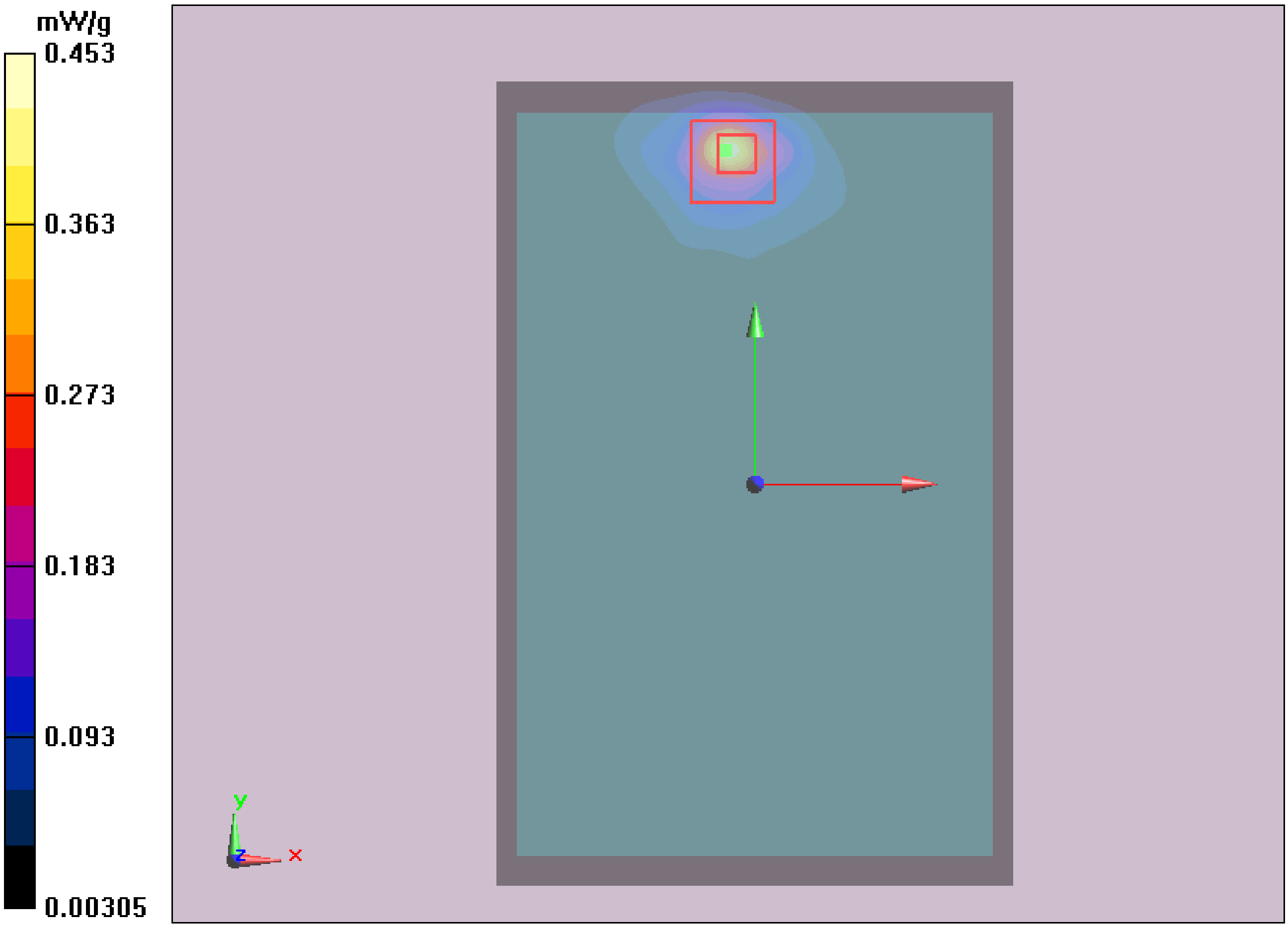



**Figure 22 UMTS Band V Test Position 1 Channel 4233**

**UMTS Band V Test Position 1 Middle**

Date/Time: 12/25/2012 12:09:49 PM

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

Medium parameters used: f = 837 MHz; $\sigma$ = 0.988 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Middle/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.282 mW/g

**Test Position 1/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001dB

Peak SAR (extrapolated) = 0.975 W/kg

**SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.095 mW/g**

Maximum value of SAR (measured) = 0.307 mW/g

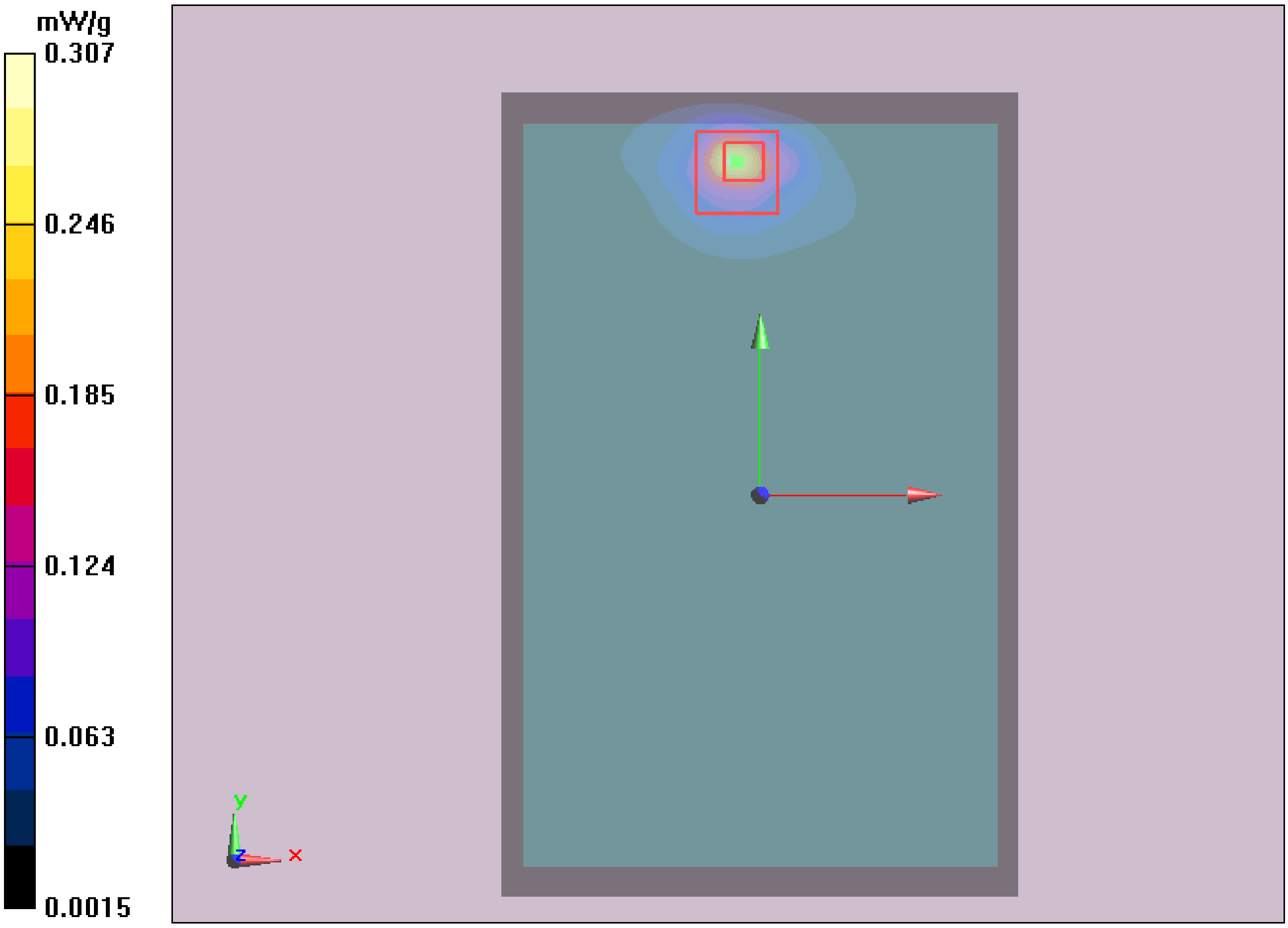



**Figure 23 UMTS Band V Test Position 1 Channel 4183**

## UMTS Band V Test Position 1 Low

Date/Time: 12/25/2012 1:04:28 PM

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

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.978 mho/m; $\varepsilon_r$ = 55.2; ρ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 1/Low/Area Scan (91x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.454 mW/g

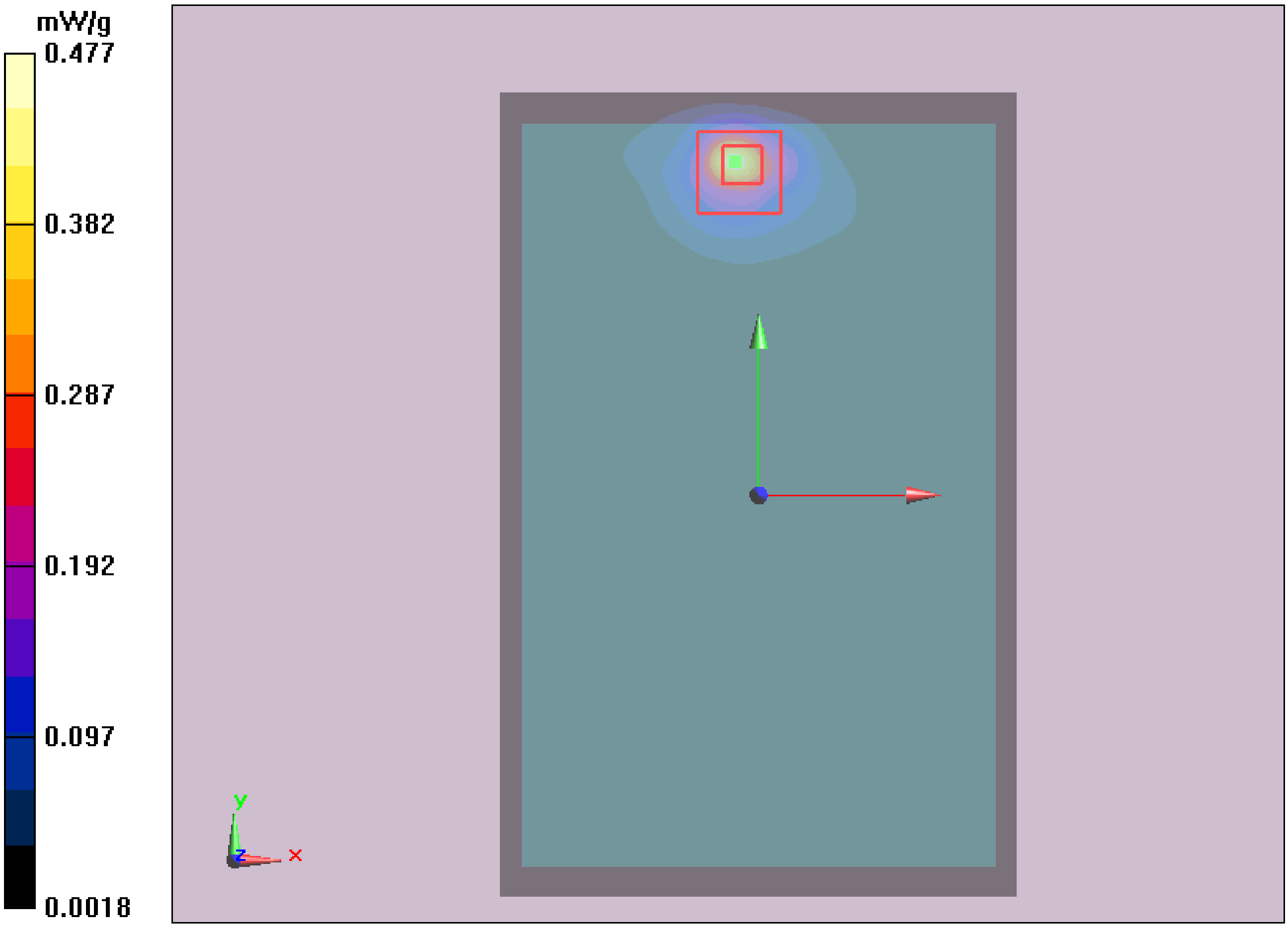
**Test Position 1/Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 1.54 W/kg

**SAR(1 g) = 0.426 mW/g; SAR(10 g) = 0.148 mW/g**

Maximum value of SAR (measured) = 0.477 mW/g



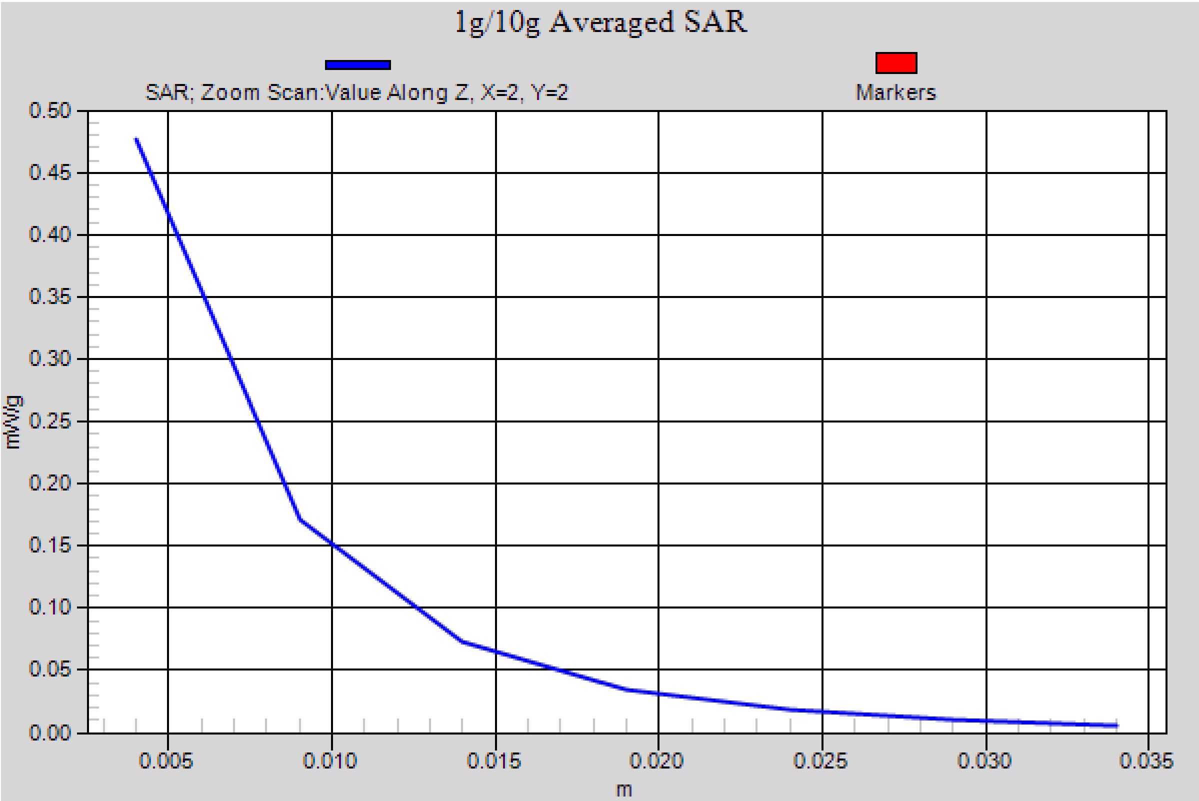



**Figure 24 UMTS Band V Test Position 1 Channel 4132**

**UMTS Band V Test Position 2 Middle**

Date/Time: 12/24/2012 4:02:09 PM

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

Medium parameters used: f = 837 MHz; $\sigma$ = 0.988 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 2/Middle/Area Scan (31x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.014 mW/g

**Test Position 2/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.97 V/m; Power Drift = 0.106 dB

Peak SAR (extrapolated) = 0.059 W/kg

**SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.008 mW/g**

Maximum value of SAR (measured) = 0.021 mW/g

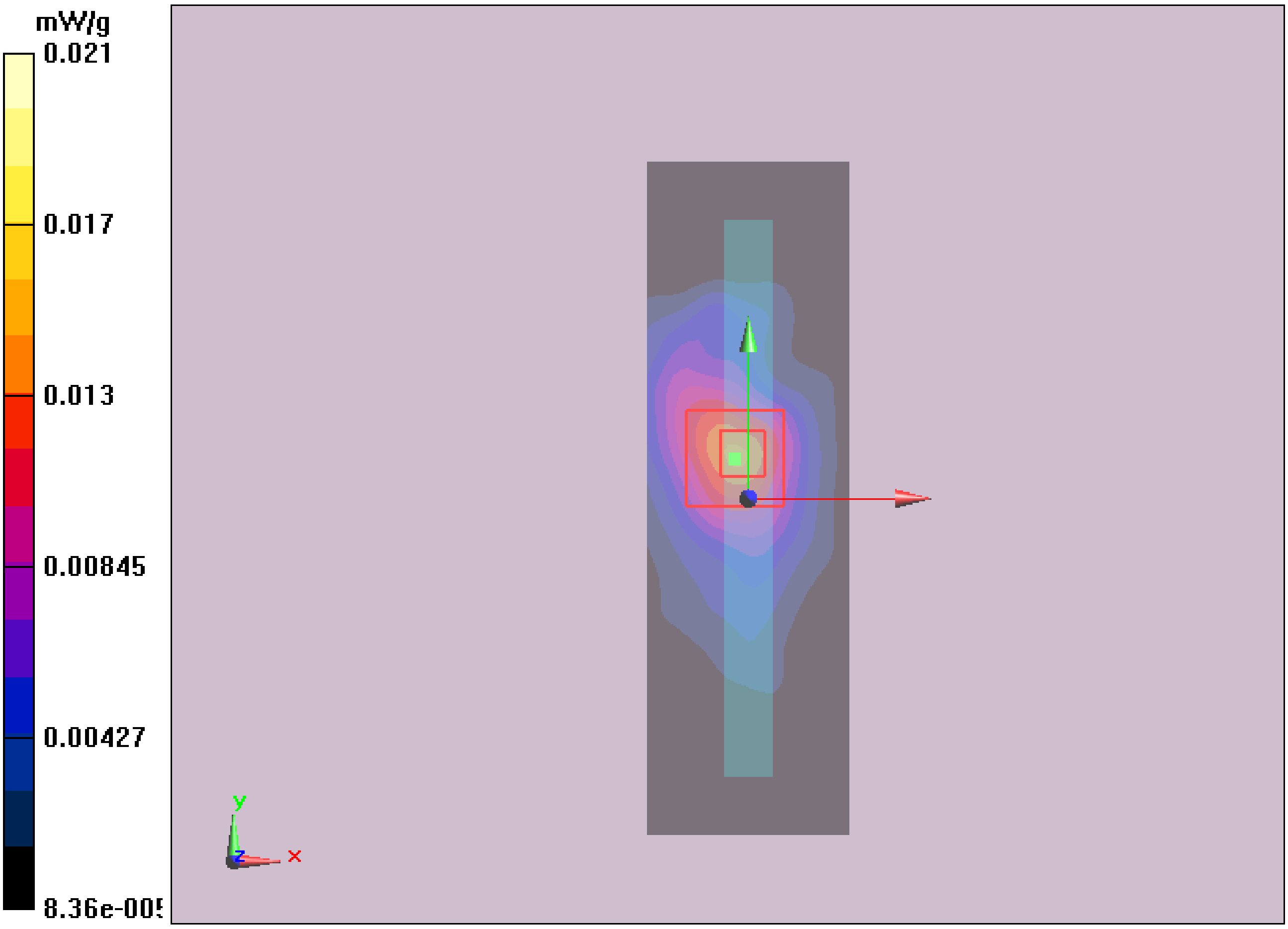



**Figure 25 UMTS Band V Test Position 2 Channel 4183**

### UMTS Band V Test Position 5 Middle

Date/Time: 12/25/2012 9:36:36 AM

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

Medium parameters used: f = 837 MHz; $\sigma$ = 0.988 mho/m; $\varepsilon_r$ = 55.1; $\rho$ = 1000 kg/m$^3$

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: ES3DV3 - SN3189; ConvF(5.81, 5.81, 5.81); Calibrated: 6/22/2012

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 59

**Test Position 5/Middle/Area Scan (31x141x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.00438 mW/g

**Test Position 5/Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.27 V/m; Power Drift = 0.118 dB

Peak SAR (extrapolated) = 0.010 W/kg

**SAR(1 g) = 0.004 mW/g; SAR(10 g) = 0.003 mW/g**

Maximum value of SAR (measured) = 0.00349 mW/g

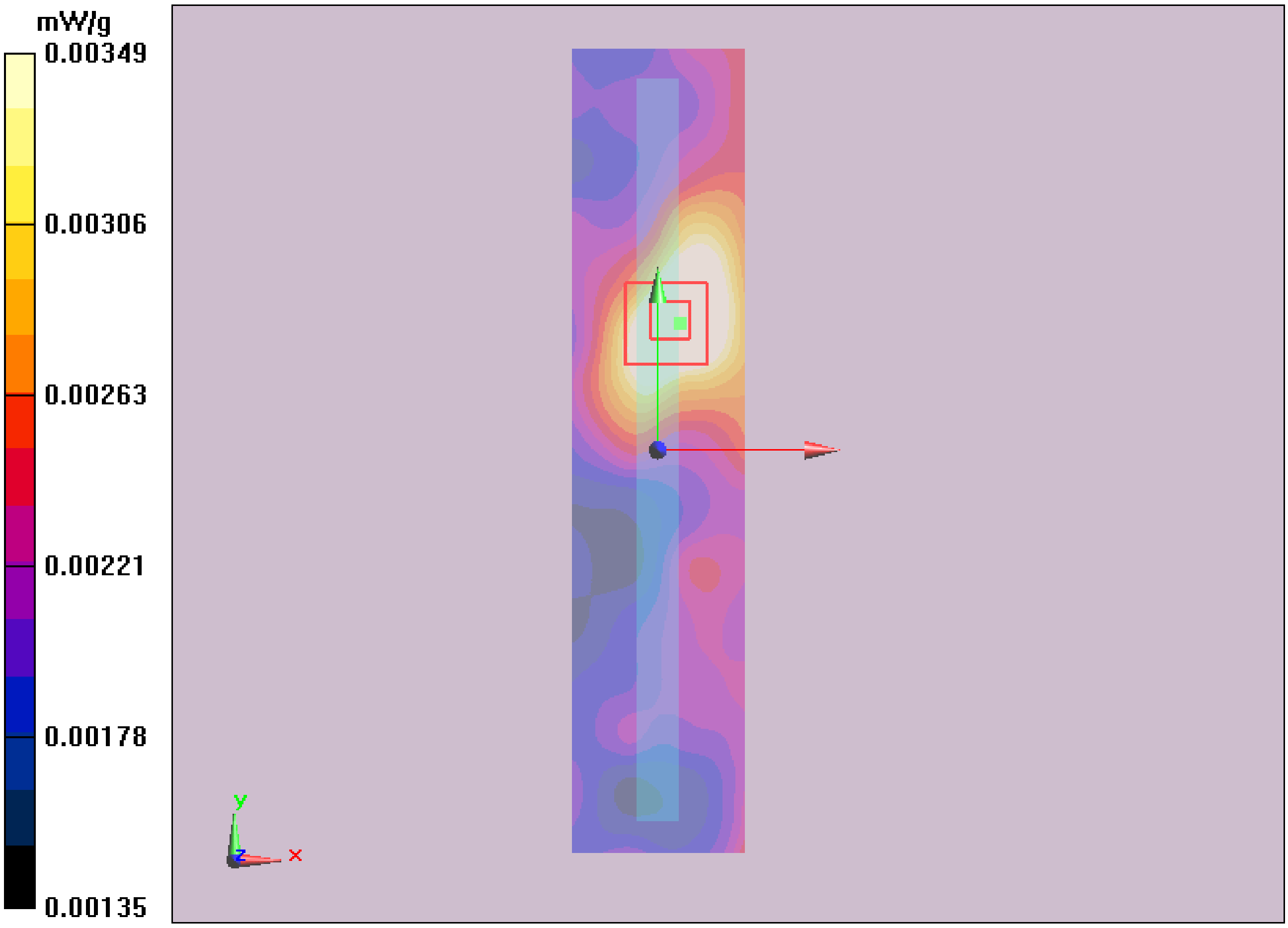



**Figure 26 UMTS Band V Test Position 5 Channel 4183**

# ANNEX D: Probe ES3DV3 Calibration Certificate

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

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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **ES3-3189_Jun12**

## CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3189

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: June 22, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter E4419B | GB41293874 | 29-Mar-12 (No. 217-01508) | Apr-13 |
| Power sensor E4412A | MY41498087 | 29-Mar-12 (No. 217-01508) | Apr-13 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 27-Mar-12 (No. 217-01531) | Apr-13 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 27-Mar-12 (No. 217-01529) | Apr-13 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 27-Mar-12 (No. 217-01532) | Apr-13 |
| Reference Probe ES3DV2 | SN: 3013 | 29-Dec-11 (No. ES3-3013_Dec11) | Dec-12 |
| DAE4 | SN: 660 | 10-Jan-12 (No. DAE4-660_Jan12) | Jan-13 |
| | | | |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Apr-11) | In house check: Apr-13 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-11) | In house check: Oct-12 |

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

Issued: June 22, 2012

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

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

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

Accreditation No.: **SCS 108**

## Glossary:

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

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

## Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the $E^2$-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe ES3DV3

## SN:3189

Manufactured: March 25, 2008
Calibrated: June 22, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3189

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm ($\mu V/(V/m)^2$)[A] | 1.32 | 1.35 | 1.05 | ± 10.1 % |
| DCP (mV)[B] | 99.5 | 100.6 | 100.2 | |

## Modulation Calibration Parameters

| UID | Communication System Name | PAR | | A dB | B dB | C dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | 0.00 | X | 0.00 | 0.00 | 1.00 | 160.3 | ±3.8 % |
| | | | Y | 0.00 | 0.00 | 1.00 | 164.9 | |
| | | | Z | 0.00 | 0.00 | 1.00 | 182.0 | |

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

[A] The uncertainties of NormX,Y,Z do not affect the $E^2$-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3189

## Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 300 | 45.3 | 0.87 | 6.83 | 6.83 | 6.83 | 0.25 | 1.06 | ± 13.4 % |
| 450 | 43.5 | 0.87 | 6.37 | 6.37 | 6.37 | 0.14 | 1.67 | ± 13.4 % |
| 835 | 41.5 | 0.90 | 5.81 | 5.81 | 5.81 | 0.63 | 1.24 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 4.90 | 4.90 | 4.90 | 0.80 | 1.14 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 4.69 | 4.69 | 4.69 | 0.62 | 1.31 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 4.14 | 4.14 | 4.14 | 0.65 | 1.36 | ± 12.0 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3189

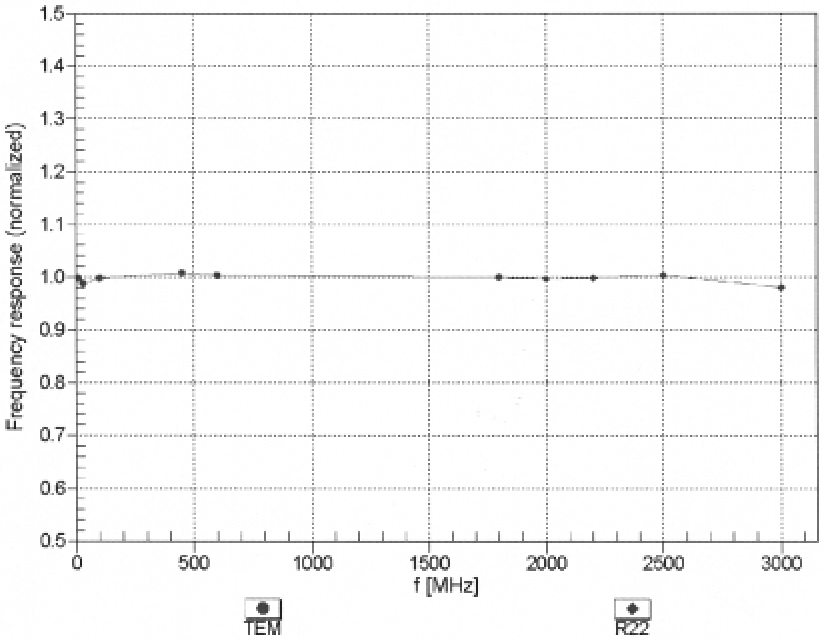
### Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) [C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 300 | 58.2 | 0.92 | 6.53 | 6.53 | 6.53 | 0.23 | 1.90 | ± 13.4 % |
| 450 | 56.7 | 0.94 | 6.73 | 6.73 | 6.73 | 0.10 | 1.00 | ± 13.4 % |
| 835 | 55.2 | 0.97 | 5.81 | 5.81 | 5.81 | 0.54 | 1.33 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 4.65 | 4.65 | 4.65 | 0.67 | 1.38 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 4.36 | 4.36 | 4.36 | 0.62 | 1.40 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 3.96 | 3.96 | 3.96 | 0.64 | 0.99 | ± 12.0 % |

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

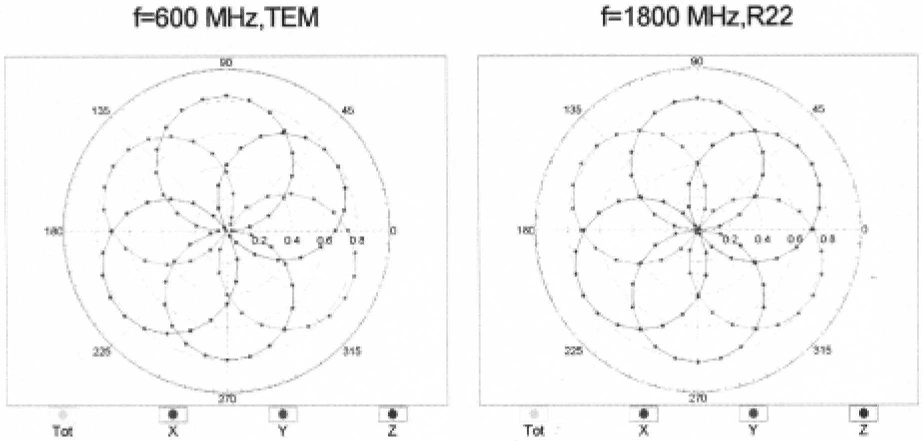
ES3DV3– SN:3189 June 22, 2012

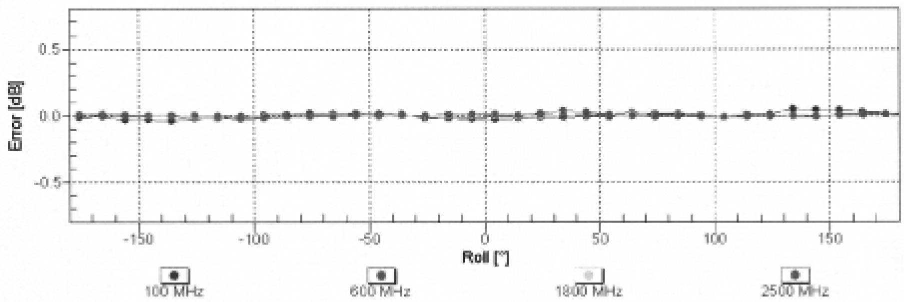
## Frequency Response of E-Field
**(TEM-Cell:ifi110 EXX, Waveguide: R22)**




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

# Receiving Pattern (ϕ), ϑ = 0°

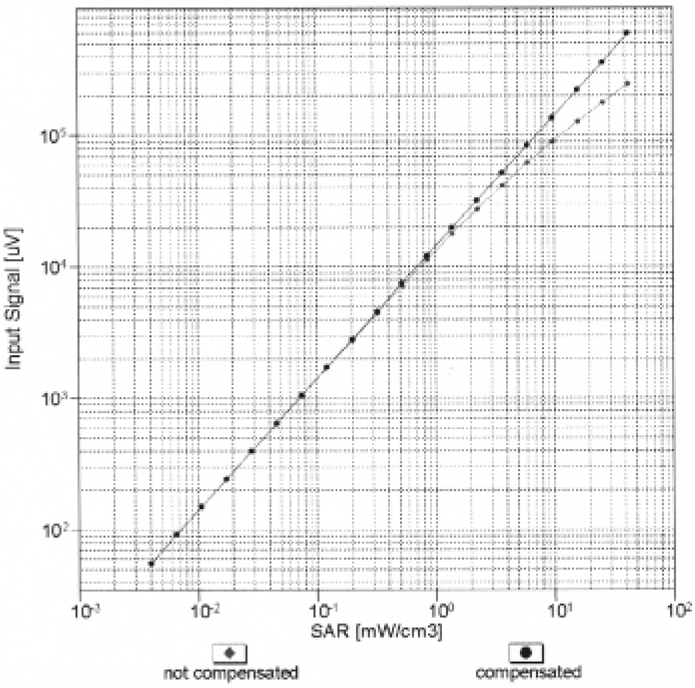


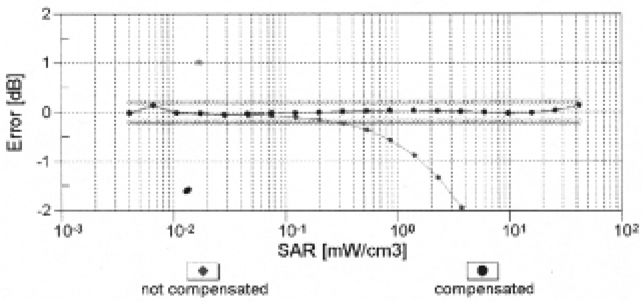




**Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)**

ES3DV3– SN:3189 June 22, 2012

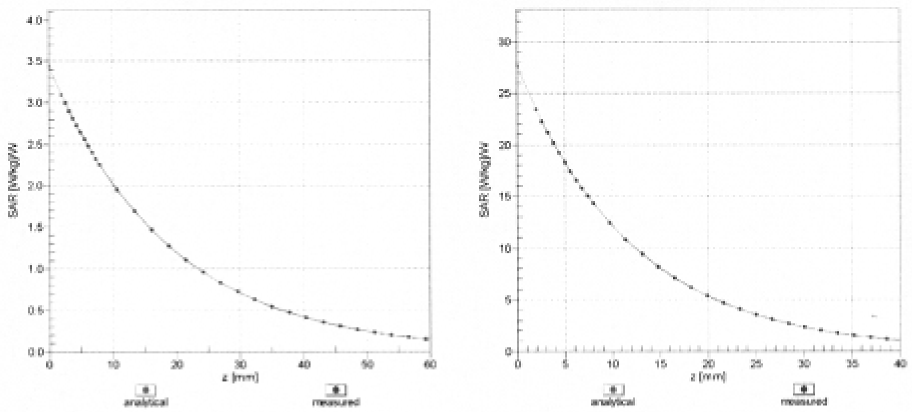
## Dynamic Range f($SAR_{head}$)
**(TEM cell , f = 900 MHz)**



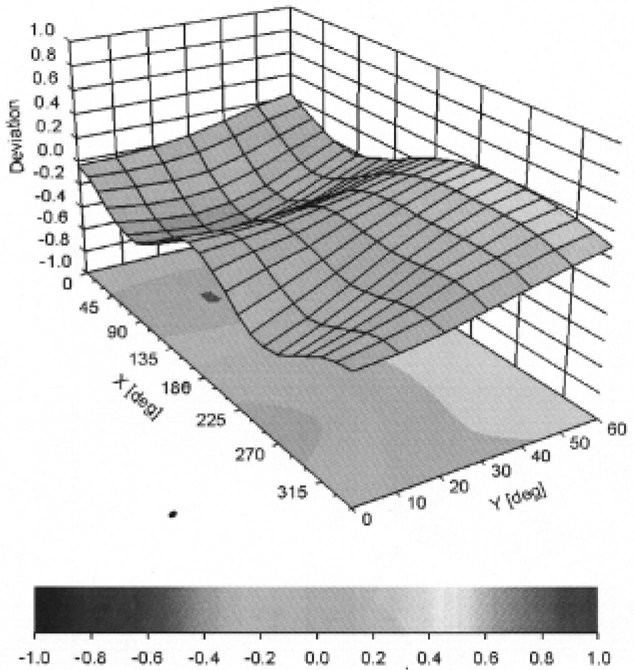

**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

# Conversion Factor Assessment




# Deviation from Isotropy in Liquid

**Error (ϕ, ϑ), f = 900 MHz**




**Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)**

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3189

**Other Probe Parameters**

| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 54.1 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 10 mm |
| Tip Diameter | 4 mm |
| Probe Tip to Sensor X Calibration Point | 2 mm |
| Probe Tip to Sensor Y Calibration Point | 2 mm |
| Probe Tip to Sensor Z Calibration Point | 2 mm |
| Recommended Measurement Distance from Surface | 3 mm |

## ANNEX E: D835V2 Dipole Calibration Certificate

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

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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D835V2-4d020_Aug11**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D835V2 - SN: 4d020 |
| Calibration procedure(s) | QA CAL-05.v8<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | August 26, 2011 |

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371) | Apr-12 |
| Reference Probe ES3DV3 | SN: 3205 | 29-Apr-11 (No. ES3-3205_Apr11) | Apr-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-09) | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

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

Issued: August 26, 2011

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

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

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

Accreditation No.: **SCS 108**

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.6.2 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 835 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.90 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 41.1 ± 6 % | 0.89 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.32 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.34 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.52 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.11 mW /g ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.97 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.4 ± 6 % | 0.99 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.42 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.46 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.59 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.26 mW / g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.9 Ω - 3.1 jΩ |
| Return Loss | - 27.7 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 48.7 Ω - 5.4 jΩ |
| Return Loss | - 25.1 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.391 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | April 22, 2004 |

**DASY5 Validation Report for Head TSL**

Date: 25.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

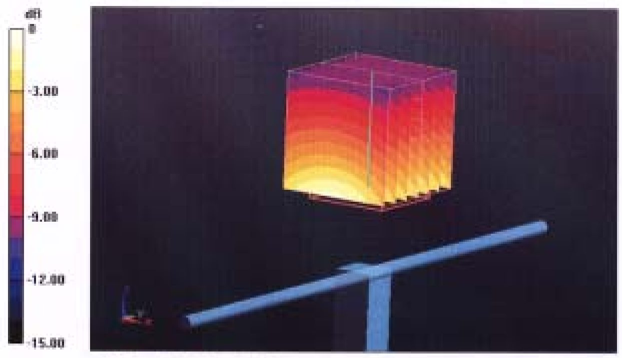
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020**

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.89$ mho/m; $\varepsilon_r = 41.1$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

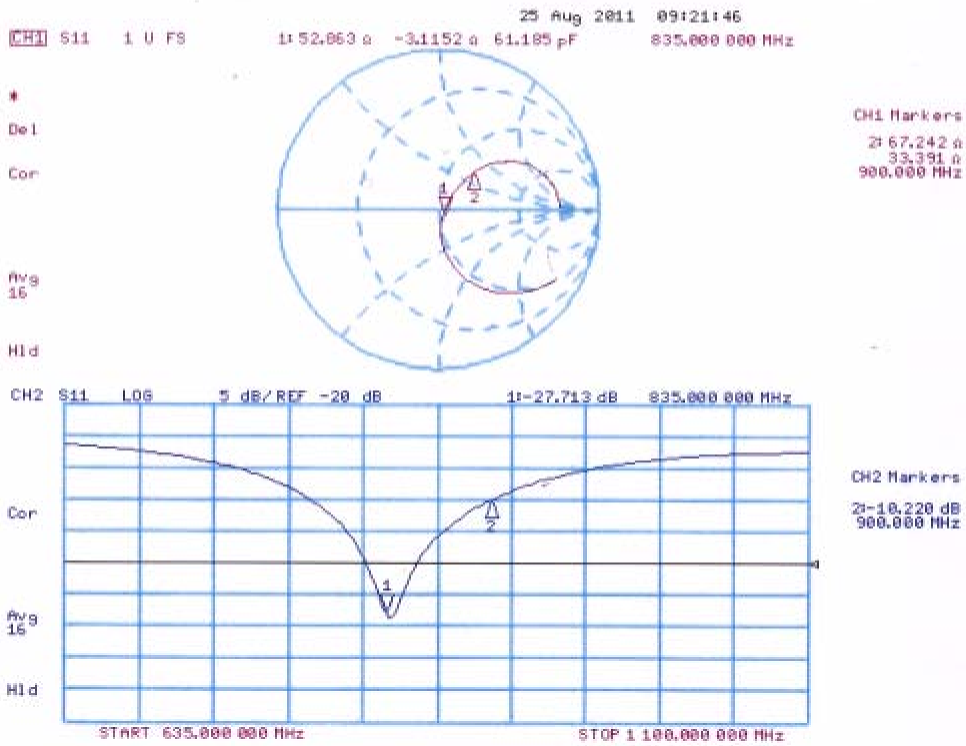
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.930 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.421 W/kg
**SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.52 mW/g**
Maximum value of SAR (measured) = 2.708 mW/g




0 dB = 2.710mW/g

**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body TSL**

Date: 26.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

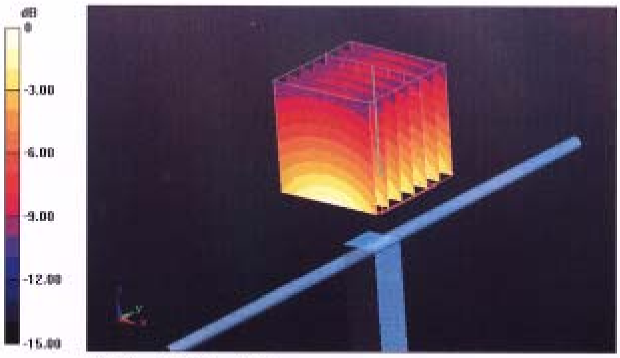
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020**

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 0.99 mho/m; $\varepsilon_r$ = 53.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

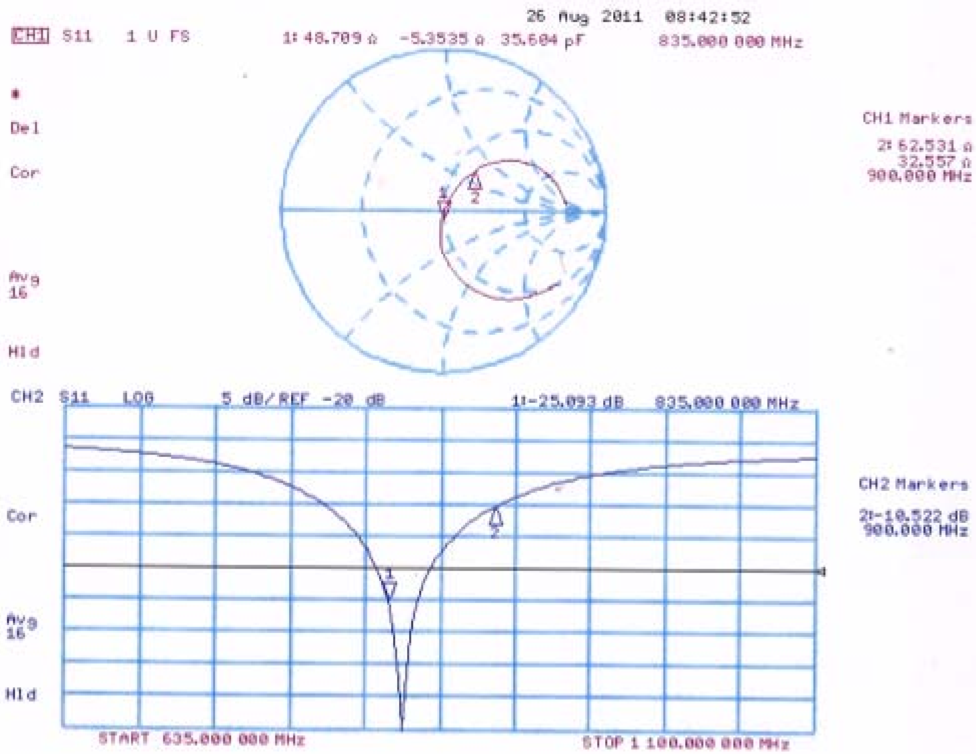
- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.406 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.509 W/kg
**SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.59 mW/g**
Maximum value of SAR (measured) = 2.827 mW/g




0 dB = 2.830mW/g

**Impedance Measurement Plot for Body TSL**



# ANNEX F: D1900V2 Dipole Calibration Certificate

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

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

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

Accreditation No.: **SCS 108**

Client **TA-Shanghai (Auden)**

Certificate No: **D1900V2-5d060_Aug11**

## CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d060

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: August 31, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Power sensor HP 8481A | US37292783 | 06-Oct-10 (No. 217-01266) | Oct-11 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 29-Mar-11 (No. 217-01367) | Apr-12 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 29-Mar-11 (No. 217-01371) | Apr-12 |
| Reference Probe ES3DV3 | SN: 3205 | 29-Apr-11 (No. ES3-3205_Apr11) | Apr-12 |
| DAE4 | SN: 601 | 04-Jul-11 (No. DAE4-601_Jul11) | Jul-12 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-09) | In house check: Oct-11 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-09) | In house check: Oct-11 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-10) | In house check: Oct-11 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dimce Iliev | Laboratory Technician | D. Iliev |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 31, 2011

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

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

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

Accreditation No.: **SCS 108**

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.6.2 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.5 ± 6 % | 1.42 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.2 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **40.3 mW /g ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.30 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | **21.1 mW /g ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.9 ± 6 % | 1.57 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.6 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **41.7 mW / g ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.55 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | **22.0 mW / g ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.6 Ω + 7.5 jΩ |
| Return Loss | - 22.3 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.3 Ω + 7.9 jΩ |
| Return Loss | - 21.3 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.194 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | December 10, 2004 |

## DASY5 Validation Report for Head TSL

Date: 30.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

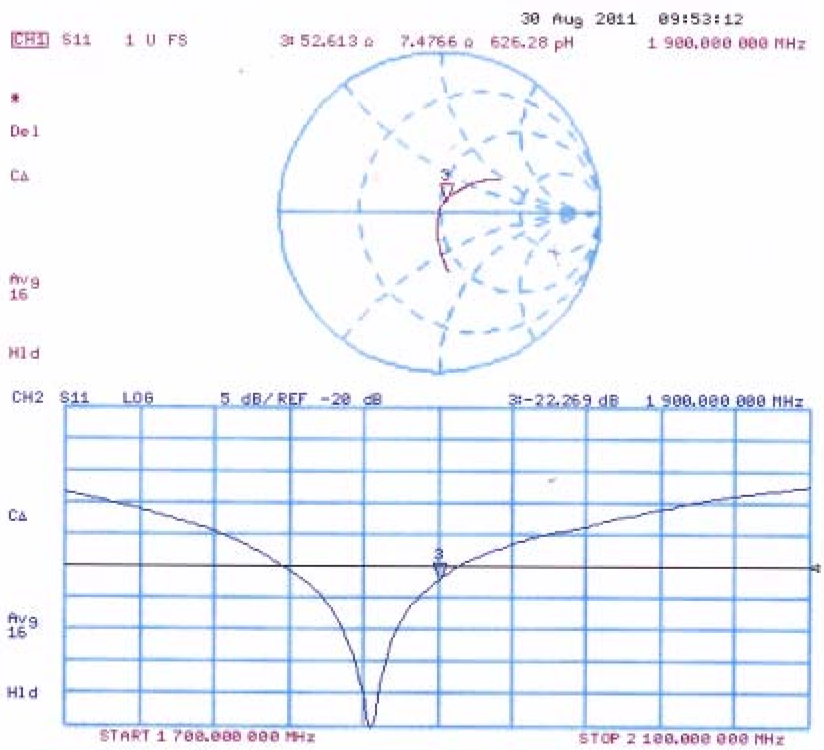
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.636 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 18.535 W/kg
**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.3 mW/g**
Maximum value of SAR (measured) = 12.600 mW/g


0 dB = 12.600mW/g

**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body TSL**

Date: 31.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

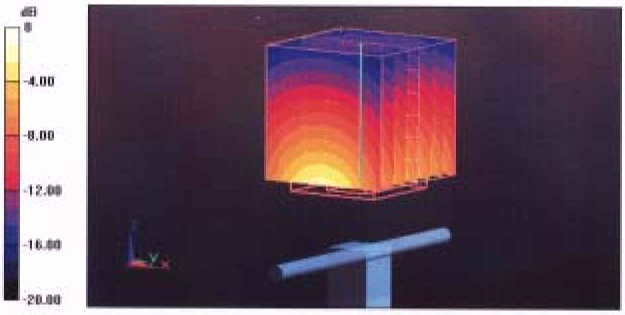
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060**

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.57$ mho/m; $\varepsilon_r = 53.9$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

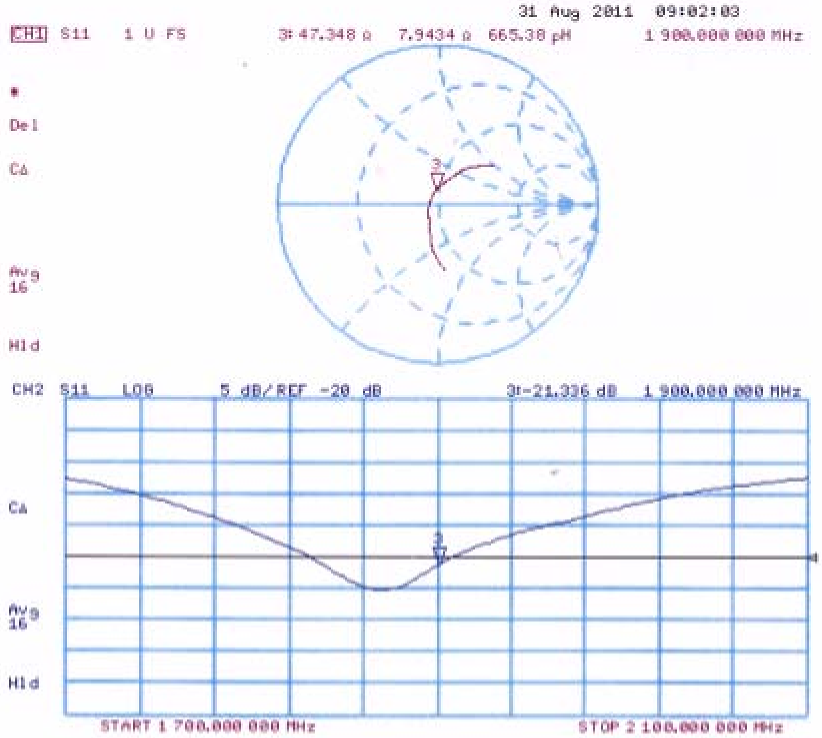
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.435 V/m; Power Drift = -0.0099 dB
Peak SAR (extrapolated) = 18.663 W/kg
**SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.55 mW/g**
Maximum value of SAR (measured) = 13.397 mW/g




0 dB = 13.400mW/g

**Impedance Measurement Plot for Body TSL**



# ANNEX G: DAE4 Calibration Certificate

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

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

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

Accreditation No.: **SCS 108**

Client **TA Shanghai (Auden)**

Certificate No: **DAE4-1317_Jan12**

## CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BJ - SN: 1317

Calibration procedure(s): QA CAL-06.v24
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: January 23, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Keithley Multimeter Type 2001 | SN: 0810278 | 28-Sep-11 (No:11450) | Sep-12 |
| **Secondary Standards** | **ID #** | **Check Date (in house)** | **Scheduled Check** |
| Calibrator Box V2.1 | SE UWS 053 AA 1001 | 05-Jan-12 (in house check) | In house check: Jan-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Dominique Steffen | Technician | |
| Approved by: | Fin Bomholt | R&D Director | F. Bomholt |

Issued: January 23, 2012

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

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

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

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

Accreditation No.: **SCS 108**

**Glossary**

| | |
|---|---|
| DAE | data acquisition electronics |
| Connector angle | information used in DASY system to align probe sensor X to the robot coordinate system. |

**Methods Applied and Interpretation of Parameters**

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

## DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---|---|---|---|
| High Range | 404.064 ± 0.1% (k=2) | 404.056 ± 0.1% (k=2) | 403.955 ± 0.1% (k=2) |
| Low Range | 3.98762 ± 0.7% (k=2) | 3.98737 ± 0.7% (k=2) | 3.98343 ± 0.7% (k=2) |

## Connector Angle

| | |
|---|---|
| **Connector Angle** to be used in DASY system | 117.0 ° ± 1 ° |

## Appendix

### 1. DC Voltage Linearity

| High Range | | Reading (μV) | Difference (μV) | Error (%) |
|---|---|---|---|---|
| Channel X | + Input | 199992.18 | -1.75 | -0.00 |
| Channel X | + Input | 20001.35 | 0.46 | 0.00 |
| Channel X | - Input | -19997.31 | 1.96 | -0.01 |
| Channel Y | + Input | 199993.18 | -1.24 | -0.00 |
| Channel Y | + Input | 20001.40 | 0.60 | 0.00 |
| Channel Y | - Input | -20000.04 | -0.70 | 0.00 |
| Channel Z | + Input | 199991.58 | -2.43 | -0.00 |
| Channel Z | + Input | 19999.62 | -1.14 | -0.01 |
| Channel Z | - Input | -20001.31 | -1.83 | 0.01 |

| Low Range | | Reading (μV) | Difference (μV) | Error (%) |
|---|---|---|---|---|
| Channel X | + Input | 2000.74 | -0.89 | -0.04 |
| Channel X | + Input | 202.18 | -0.01 | -0.01 |
| Channel X | - Input | -197.58 | 0.36 | -0.18 |
| Channel Y | + Input | 2000.34 | -1.20 | -0.06 |
| Channel Y | + Input | 199.67 | -2.39 | -1.18 |
| Channel Y | - Input | -197.64 | 0.32 | -0.16 |
| Channel Z | + Input | 2000.69 | -0.78 | -0.04 |
| Channel Z | + Input | 200.84 | -1.16 | -0.57 |
| Channel Z | - Input | -198.45 | -0.47 | 0.24 |

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Common mode Input Voltage (mV) | High Range Average Reading (μV) | Low Range Average Reading (μV) |
|---|---|---|---|
| Channel X | 200 | -23.40 | -24.98 |
| | - 200 | 28.01 | 26.12 |
| Channel Y | 200 | -2.57 | -2.75 |
| | - 200 | 1.67 | 1.31 |
| Channel Z | 200 | -11.92 | -11.43 |
| | - 200 | 9.80 | 9.45 |

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | Input Voltage (mV) | Channel X (μV) | Channel Y (μV) | Channel Z (μV) |
|---|---|---|---|---|
| Channel X | 200 | - | -2.15 | -4.41 |
| Channel Y | 200 | 7.18 | - | -2.47 |
| Channel Z | 200 | 7.44 | 5.46 | - |

## 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| | High Range (LSB) | Low Range (LSB) |
|---|---|---|
| Channel X | 16081 | 17027 |
| Channel Y | 16103 | 16170 |
| Channel Z | 16221 | 16651 |

## 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

| | Average (μV) | min. Offset (μV) | max. Offset (μV) | Std. Deviation (μV) |
|---|---|---|---|---|
| Channel X | -0.45 | -1.32 | 0.40 | 0.32 |
| Channel Y | -2.63 | -3.99 | -1.68 | 0.42 |
| Channel Z | -0.67 | -3.07 | 1.36 | 0.50 |

## 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

## 7. Input Resistance (Typical values for information)

| | Zeroing (kOhm) | Measuring (MOhm) |
|---|---|---|
| Channel X | 200 | 200 |
| Channel Y | 200 | 200 |
| Channel Z | 200 | 200 |

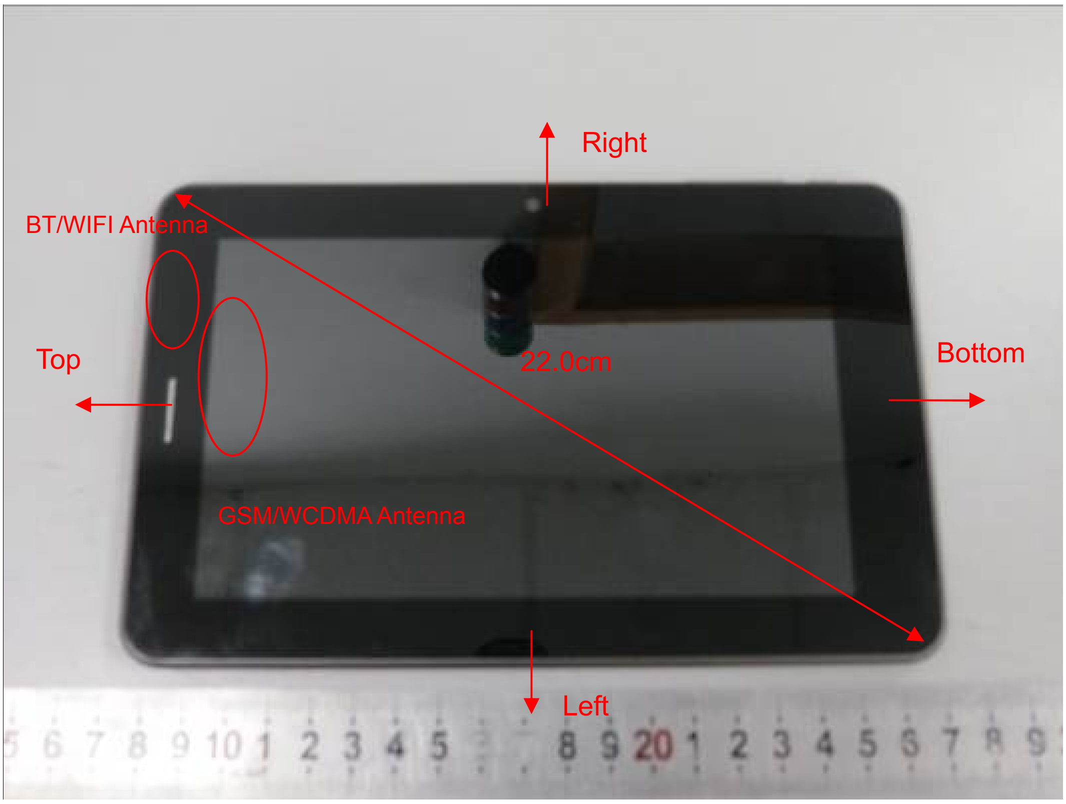
## 8. Low Battery Alarm Voltage (Typical values for information)

| Typical values | Alarm Level (VDC) |
|---|---|
| Supply (+ Vcc) | +7.9 |
| Supply (- Vcc) | -7.6 |

## 9. Power Consumption (Typical values for information)

| Typical values | Switched off (mA) | Stand by (mA) | Transmitting (mA) |
|---|---|---|---|
| Supply (+ Vcc) | +0.01 | +6 | +14 |
| Supply (- Vcc) | -0.01 | -8 | -9 |

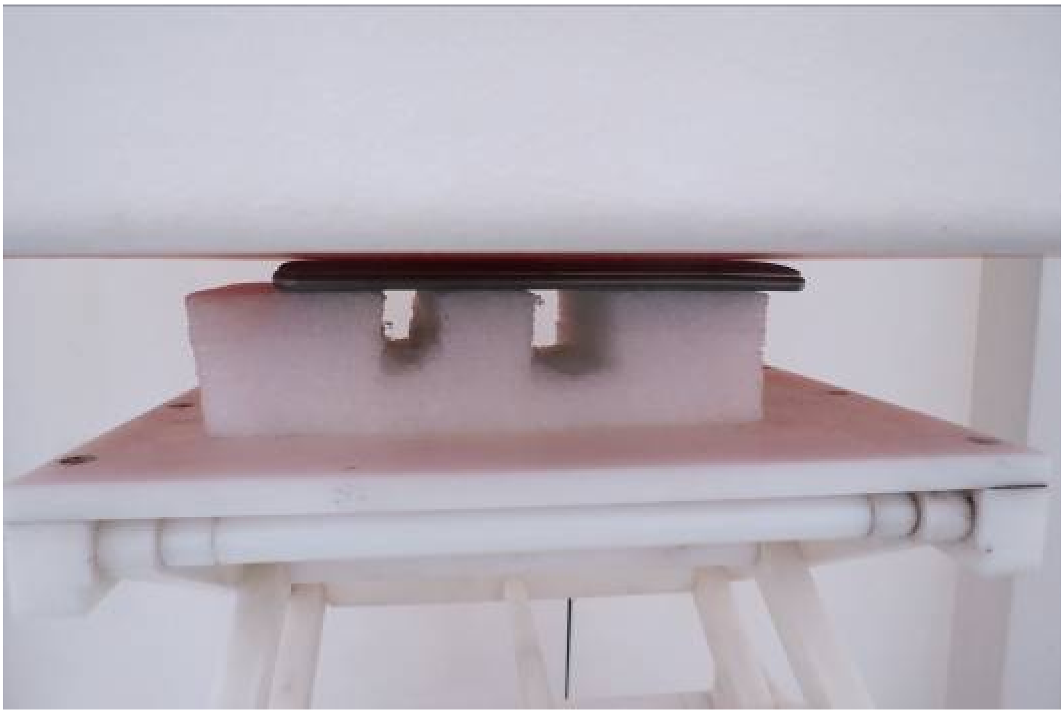
## ANNEX H: The EUT Appearances and Test Configuration




a: Front side


b: Back view

**Picture 4: Constituents of the EUT**



Picture 5: Test position 1


Picture 6: Test position 2


**Picture 7: Test position 5**