

# SAR TEST REPORT

Report No. 2012SAR152

FCC ID: Q78-ZTEMF667  
Applicant: ZTE Corporation  
Product: HSPA+ USB Modem  
Model: MF667  
HW Version: MF667-1.0.0  
SW Version: EN\_ZTE\_HDMF667V1.0.0B03

Prepared by: Yin Xiaoming Date: 2012.5.24  
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Approved by: Wang Jianrong Date: 2012.5.24

**Note:**  
The following test results relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of the test laboratory.

### General Information

Product Name	HSPA+ USB Modem	Model Name	MF667
Applicant	ZTE CORPORATION		
Manufacturer	ZTE CORPORATION		
Applicable Standard	<b>ANSI/IEEE C95.1-2005</b> Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields. 3 kHz to 300 GHz		
	<b>ANSI/IEEE C95.3-2002</b> Recommended Practice For Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to such Fields. 100 kHz-300 GHz		
	<b>IEEE Std 1528™-2003:</b> IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques		
	<b>OET Bulletin 65-(Edition 97-01) Supplement C (edition01-01)</b> Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields---Additional Supplement C (Edition 01-01)Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions		
Test Results	Pass		

## Change History

Version	Change Contents	Author	Date
V1.0	First edition	Yin xiaoming	2012-04-17
V2.0	Page 8 , add “ EDGE Multislot Class” Page25-26,Update the output power of GPRS/DEGE Page30-31, add “timeslot of GPRS and EDGE which tested for SAR”	Yin xiaoming	2012-04-27
V3.0	Retest GSM850/1900.	Yin xiaoming	2012-05-23

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## 1. Test Laboratory

### 1.1 Testing Location:

Company: Shanghai Tejet Communications Technology Co., Ltd Testing Center.  
Address: Room 6205-6208, Building 6, No.399 Cailun Rd. Zhangjiang Hi-Tech Park,  
Shanghai, China  
Post Code : 210203  
Tel: +86-21-61650880  
Fax: +86-21-61650881  
Website: [www.tejet.cn](http://www.tejet.cn)

### 1.2 Laboratory Environment

Temperature 20° C ~ 25 ° C  
Relative humidity 20% ~ 70%

### 1.3 Testing date

Test start date: 2012-04-07  
Test end date: 2012-05-23

## 2. Client Information

### 2.1 Applicant information

Company Name: ZTE Corporation  
Address: ZTE Plaza ,Keji Road South ,Hi-Tech Industrial Park ,Nanshan  
District, Shenzhen, Guangdong,518057,P.R.China  
Post Code : 518057  
Country: China  
Tel: 021-68897541  
Fax: 021-50801070

### 2.2 Manufacturer Information

Company Name: ZTE Corporation  
Address: ZTE Plaza ,Keji Road South ,Hi-Tech Industrial Park ,Nanshan  
District, Shenzhen, Guangdong,518057,P.R.China  
Post Code : 518057  
Country: China  
Tel: 021-68897541  
Fax: 021-50801070

### 3.Equipment Under Test (EUT) and Accessory Equipment (AE)

#### 3.1 Information of EUT

Device type	Portable device	
Product name	HSPA+ USB Modem	
Exposure category	Uncontrolled environment / general population	
Device operation configuration:		
Operating mode(s):	GSM850	
	PCS1900	
	WCDMA BAND II	
	WCDMA BAND V	
Modulation Type	(GSM)GMSK, (WCDMA)QPSK	
GPRS operation Class	B	
GPRS Multislot Class	10	
EDGE operation Class	B	
EDGE Multislot Class	12	
DTM	NA	
Hotspot support	NA	
Rated output power	GSM 850:33dBm	
	PCS1900: 30dBm	
	WCDMA Band II/V: 24dBm	
Antenna type:	Internal antenna	
Operating frequency range(s):	Band	Tx(MHz)
	GSM850	824.2~848.8
	PCS1900	1850.2~1909.8
	WCDMA Band II	1852.4~1907.6
	WCDMA BAND V	826.4~846.6
Power class	GSM850: 4, test with power level 5	
	PCS1900: 1, test with power level 0	
	WCDMA Band II: 3, test with maximum output power	

	WCDMA Band V : 3, test with maximum output power
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**Note:** Equipment under test (EUT) is HSPA+ USB Modem with internal antenna. It consists of HSPA+ USB Modem and the detail about these is in this report. SAR is tested for GSM850/1900, WCDMA BAND II/V.

### 3.2 Information Of AE

The following host laptop, levono T410i,are used during the tests to test the 4orientations(2 horizontals and 2 verticals) of the EUT, and the used USB slots are marked in the pictures.



Laptop



Laptop (horizontal slot)



Laptop (vertical slot)



USB cable (shorter than 12 inches)

## 4. Characteristics of the Test

### 4.1. Applicable Limit Regulations

**ANSI/IEEE C95.1-2005** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields. 3 kHz to 300 GHz

### 4.2. Applicable Measurement Standards

**IEEE Std 1528™-2003:** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques

**ANSI/IEEE C95.3-2002** Recommended Practice For Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to such Fields. 100 kHz-300 GHz

**OET Bulletin 65-(Edition 97-01) Supplement C(edition01-01)** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields---Additional Supplement C (Edition 01-01)Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions

### 4.3. Reference standards/documentations

**KDB 447498 D02:** SAR Measurements Procedures for USB Dongle Transmitters

## **5. Operational Conditions During Test**

### **5.1 General description of test procedures**

A communication link is set up with a system simulator by air link, and a call is established. The absolute radio frequency channel is allocated to low, middle, high in the case of GSM850/1900. The EUT is commanded to operate at maximum transmitting power.

Connection to the EUT is established via air interface with CMU200, and the EUT is set to maximum output power by CMU200. 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.

### **5.2 GSM Test Configuration**

SAR test for GSM 850/1900, a communication link is set up with a system simulator by air link. Using CMU200 the power level is set to "5" in SAR of GSM850, set to "0" in SAR of PCS1900. The tests in the band of GSM850 and PCS1900 are performed in the mode of data transfer function.

### **5.3 WCDMA Test Configuration**

SAR test for WCDMA BAND II/ V, a communication link is set up with a system simulator by air link. Using CMU200 the power level is set to "3" in SAR of WCDMA BAND II/ V. The tests in the band of WCDMA BAND II/ V, are performed in the mode of RMC 12.2kbps transfer function.

SAR for body exposure configurations in voice and data modes is measured using 12.2kbps RMC with TPC bits configured to all "1's". SAR for other spreading codes and multiple DPDCHn, when supported by the DUT, are not required when the maximum average output of each RF channel, for each spreading code and DPDCHn configuration, are less than 1/4 dB higher than those measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or DPDCHn using the exposure configuration that results in the highest SAR with 12.2 kbps RMC. When more than 2 DPDCHn are supported by the DUT, it may be necessary to configure additional DPDCHn for a DUT using FTM(Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384kbps and 968 kbps RMC.

### HSDPA Test Configuration

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 12.2 kbps RMC or the maximum SAR 12.2 kbps RMC is above 75% of the SAR limit. Body SAR is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps 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 DODCH gain factors ( $\beta_c, \beta_d$ ), and HS\_DPCCH power offset parameters ( $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}$ ) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS\_PDSCHs and modulation used in the H-set.

**Table 1: Subtest for UMTS Release 5 HSDPA**

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

Note 1:  $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI}=8 \Leftrightarrow A_{hs}=\beta_{hs}/\beta_c=30/15 \Leftrightarrow \beta_{hs}=30/15c$   
 Note 2:  $CM=1$  for  $\beta_c/\beta_d=12/15, \beta_{hs}/\beta_c=24/15$   
 Note 3: For subset 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 factor for the reference TFC (TFC1, TF1) to  $\beta_c=11/15$  and  $\beta_d=15/15$ .

**Table 2: 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	Bitw	3202
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bots	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 3: 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
1 2	15	1	27952	172800
1 1	5	2	3630	14400
1 2	5	1	3630	28800
1 3	15	1	34800	259200
1 4	15	1	42196	259200
1 5	15	1	23370	345600
1 6	15	1	27952	345600

**HSUPA Test Configuration**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hr}^{(1)}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (codes)	CM <sup>(2)</sup> (dB)	MPR (dB)	AG <sup>(4)</sup> Index	E-TFCI
1	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	11/15 <sup>(3)</sup>	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed} = 47/15$ $\beta_{ed} = 47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	15/15 <sup>(4)</sup>	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hr}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

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

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

applicable only if Maximum Power Reduction (MPR) is implemented according to Cubic Metric (CM) requirements.<sup>37</sup>

## 6. SAR Measurements system configuration

### 6.1 SAR Measurement set-up

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

- A standard high precision 6-axis robot ( Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic \_field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as 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.

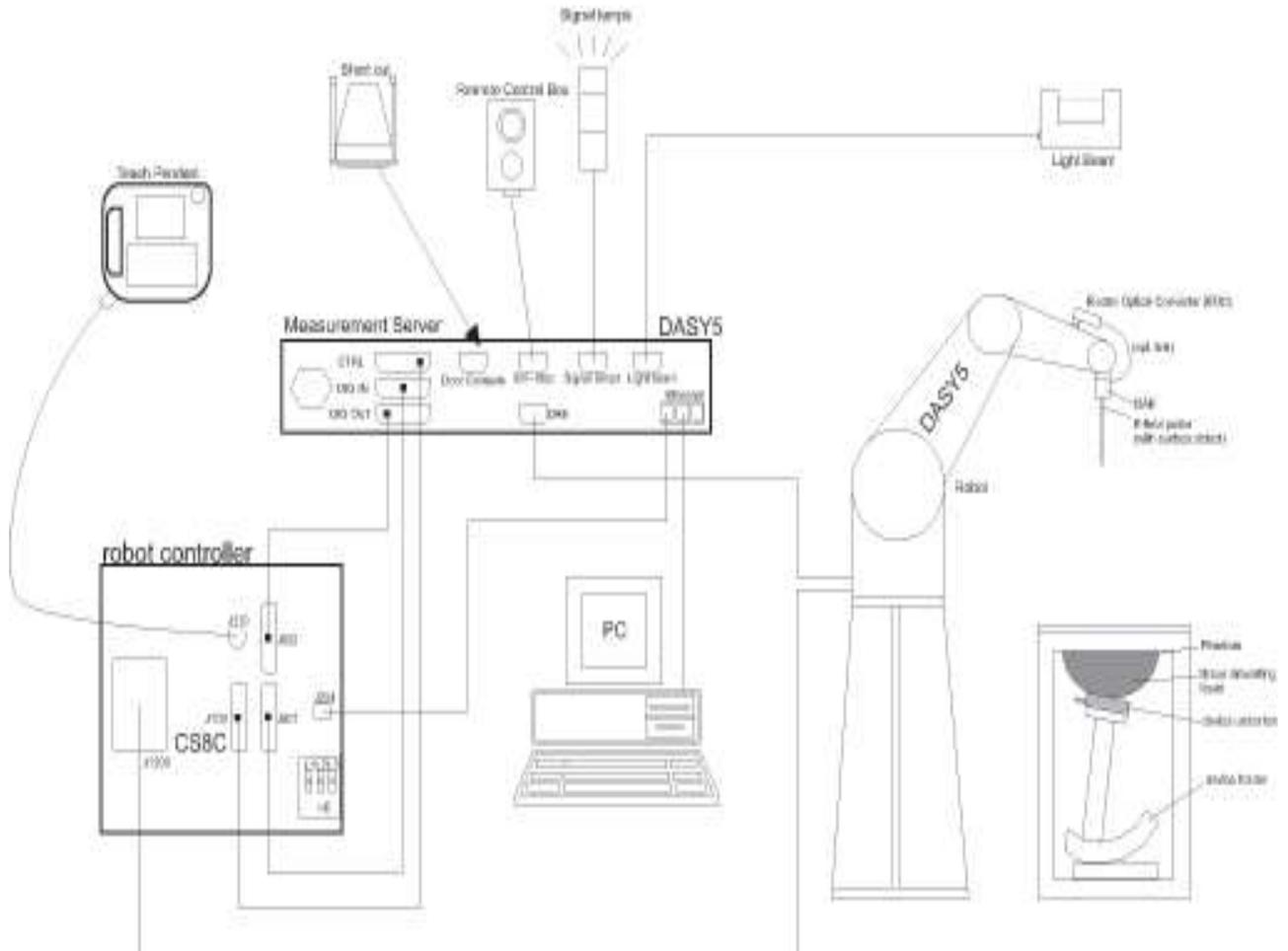


Figure 1. SAR Lab Test Measurement Set-up

## 6.2. 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.

### 6.2.1. Ex3DV3 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 850 and HSL 1750 Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)
Directivity	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material

	(rotation normal to probe axis)
Dynamic Range	10 μW/g to > 100 mW/g Linearity: ± 0.2dB (noise: typically < 1 μW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.



Figure 2.ES3DV3 E-field Probe



Figure 3. ES3DV3 E-field probe

### 6.2.2. 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 below 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

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

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

Where: Δt = Exposure time (30 seconds),  
 C = Heat capacity of tissue (brain or muscle),

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

Or

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

Where:

$\sigma$  = Simulated tissue conductivity,

$\rho$  = Tissue density (kg/m<sup>3</sup>).

### 6.3. Other Test Equipment

#### 6.3.1. Device Holder for Transmitters

The DASY5 device holder is designed to cope with the die rent positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.

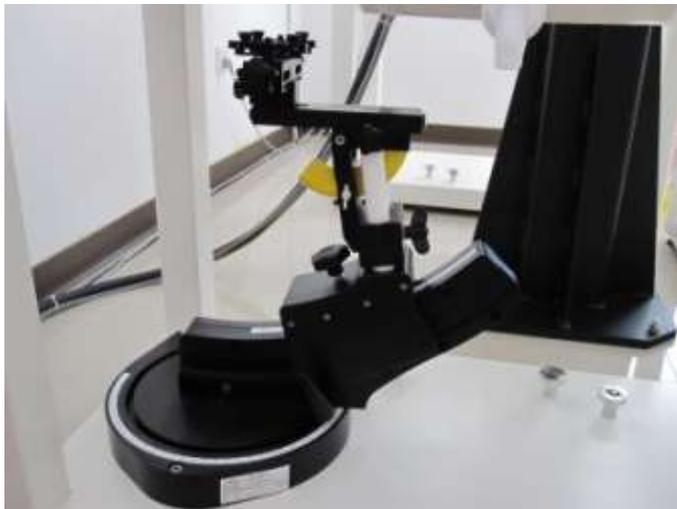


Figure 4. Device Holder

#### 6.3.2. Phantom

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

the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

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



**Figure 5. Generic Twin Phantom**

#### **6.4. Scanning procedure**

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

- The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max.  $\pm 5\%$ .
- 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  $\pm 0.1\text{mm}$ ). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within  $\pm 30^\circ$ .)

- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.

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

- Zoom Scan

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

- Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The 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 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

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

## 6.5. Data Storage and Evaluation

### 6.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DA4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm<sup>2</sup>], [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.

### 6.5.2. 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, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	Dcpi
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)<sup>2</sup>] for E-field Probes

$ConvF$  = sensitivity enhancement in solution

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

$f$  = carrier frequency [GHz]

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

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

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

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

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

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

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

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

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

= equivalent tissue density in g/cm<sup>3</sup>

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

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

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

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

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

## 6.6. 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 8.1 and 8.2.

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

System check is performed regularly on all frequency bands where tests are performed with the DASY 5 system.

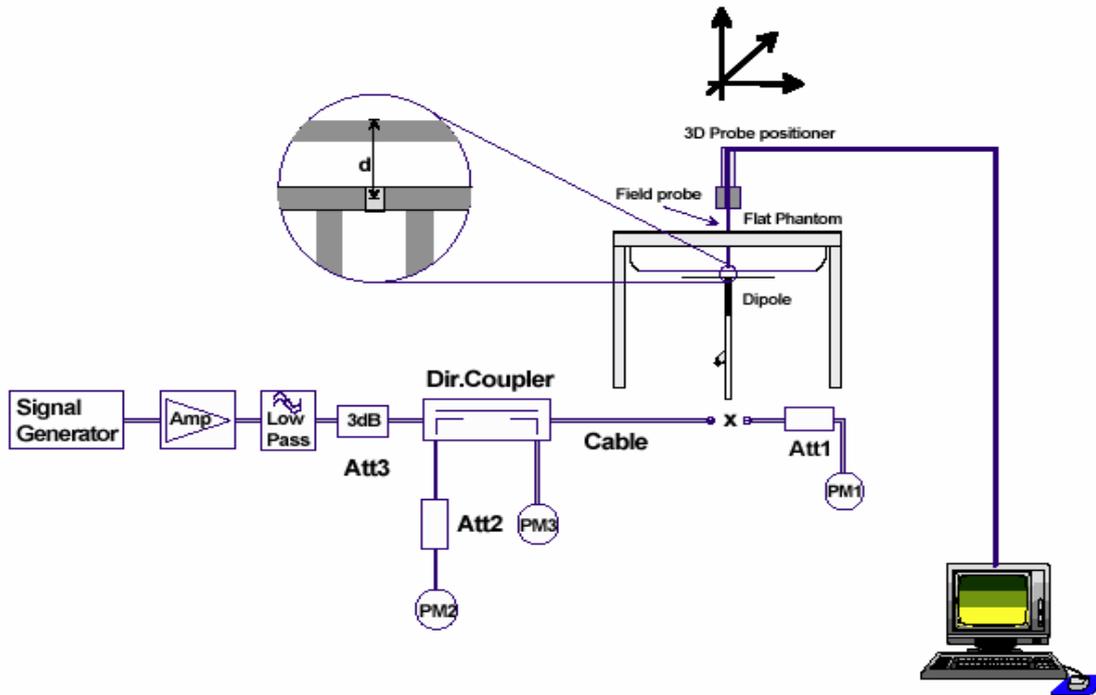


Figure 6. System Check Set-up

### 6.7. Equivalent Tissues

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 1 and Table 2 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

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

MIXTURE%	FREQUENCY(body)1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1950MHz $\epsilon=53.3$ $\sigma=1.52$

## 7. Conducted Output Power Measurement

### 7.1. Summary

The DUT is tested using an CMU200 communications tester as controller unit to set test channels

and maximum output power to the DUT, as well as for measuring the conducted power. Conducted output power was measured using an integrated RF connector and attached RF cable.

This result contains conducted output power for the EUT.

### 7.2. Conducted Power Results

GSM850	Conducted Power		
	Channel 128	Channel 189	Channel 251
Results (dBm)	31.55	31.43	31.27
PCS1900	Conducted Power		
	Channel 512	Channel 661	Channel 810
Results (dBm)	28.33	28.67	28.86

<b>GPRS(GMSK)</b>							
GSM850+GPRS	Conducted Power						
	Ch 128	Ch 189	Ch 251	(dB)	Ch 128	Ch 189	Ch 251
1 TX-slot result	31.47	31.45	31.05	-9.03	22.44	22.42	22.02
2 TX-slot result	30.52	30.49	30.08	-6.02	<b>24.50</b>	<b>24.47</b>	<b>24.06</b>
PCS1900+GPRS	Conducted Power						
	Ch 512	Ch 661	Ch 810	(dB)	Ch 512	Ch 661	Ch 810
1 TX-slot result	28.19	28.68	28.49	-9.03	19.16	19.65	19.46
2 TX-slot result	27.24	27.72	27.53	-6.02	<b>21.22</b>	<b>21.70</b>	<b>21.51</b>
<b>EDGE(GMSK)</b>							
GSM850+EDGE	Conducted Power						
	Ch 128	Ch 189	Ch 251	(dB)	Ch 128	Ch 189	Ch 251
1 TX-slot result	29.52	29.41	29.33	-9.03	20.49	20.38	20.30

2 TX-slot result	28.47	28.36	28.28	-6.02	22.45	22.34	22.26
3 TX-slot result	27.24	27.13	27.05	-4.26	22.98	22.87	22.79
4 TX-slot result	26.43	26.32	26.24	-3.01	<b>23.42</b>	<b>23.31</b>	<b>23.23</b>
PCS1900+EDGE	Conducted Power						
	Ch 512	Ch 661	Ch 810	(dB)	Ch 512	Ch 661	Ch 810
1 TX-slot result	26.74	26.82	26.79	-9.03	17.71	17.79	17.76
2 TX-slot result	25.69	25.77	25.74	-6.02	19.67	19.75	19.72
3 TX-slot result	24.46	24.54	24.51	-4.26	20.20	20.28	20.25
4 TX-slot result	23.65	23.73	23.70	-3.01	<b>20.64</b>	<b>20.72</b>	<b>20.69</b>

Note:

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

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

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

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

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

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

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

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

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

WCDMA BAND II	Conducted Power		
	Channel9262	Channel9400	Channel9538
12.2kbps RMC (dBm)	20.62	20.45	20.86
WCDMA BAND II +HSDPA (dBm)	Conducted Power		
	Channel9262	Channel9400	Channel9538
SUB-TEST 1	20.32	20.31	20.14
SUB-TEST 2	19.78	19.67	19.89
SUB-TEST 3	19.69	19.77	19.87
SUB-TEST 4	20.23	20.34	20.1
WCDMA BAND II	Conducted power		

+HSUPA (dBm)	Channel9262	Channel9400	Channel9538
SUB-TEST 1	20.14	20.39	20.19
SUB-TEST 2	19.98	19.99	19.82
SUB-TEST 3	19.78	19.8	19.94
SUB-TEST 4	20.34	20.35	20.08
SUB-TEST 5	19.75	19.34	19.93
WCDMA BAND V	Conducted Power		
	Channel4132	Channel4183	Channel4233
12.2kbps RMC (dBm)	21.99	21.84	21.67
WCDMA BAND V +HSDPA (dBm)	Conducted Power		
	Channel4132	Channel4183	Channel4233
SUB-TEST 1	21.72	21.71	21.04
SUB-TEST 2	21.18	21.07	20.79
SUB-TEST 3	21.09	21.17	20.77
SUB-TEST 4	21.63	21.74	21
WCDMA BAND V +HSUPA (dBm)	Conducted Power		
	Channel4132	Channel4183	Channel4233
SUB-TEST 1	21.54	21.79	21.09
SUB-TEST 2	21.38	21.39	20.72
SUB-TEST 3	21.18	21.2	20.84
SUB-TEST 4	21.74	21.75	20.98
SUB-TEST 5	21.15	20.74	20.83

## 8 Test Results

### 8.1. Dielectric Performance

#### Dielectric Performance of Head Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters $\epsilon_r$	$\sigma$ (s/m)	temp °C
<b>835MHz (body)</b>	Target value 5% window	55.2 52.44-57.96	0.97 0.92-1.02	/
	Measurement value 2012-04-09	54.3	0.96	21.7
	Measurement value 2012-05-22	54.4	0.97	21.6
	Measurement value 2012-05-23	53.9	0.96	22.1
<b>1900MHz (body)</b>	Target value 5% window	53.3 50.63-55.96	1.52 1.44 — 1.60	/
	Measurement value 2012-04-07	52.2	1.5	21.9
	Measurement value 2012-04-08	52.5	1.53	21.8
	Measurement value 2012-05-22	52.4	1.54	21.6

## 8.2. System Check Results

### System Check for Head tissue simulation liquid

Frequency	Description	SAR(W/kg)		Dielectric Parameters $\epsilon_r$	$\sigma$ (s/m)	Temp °C
		10g	1g			
<b>835MHz (body)</b>	Recommended result $\pm 10\%$ window	1.59 1.43-1.75	2.45 2.20-2.70	55.2	0.97	/
	Measurement value 2012-04-09	1.59	2.45	54.3	0.967	21.7
	Measurement value 2012-05-22	1.62	2.48	54.4	0.97	21.6
	Measurement value 2012-05-23	1.49	2.29	53.9	0.96	22.1
<b>1900MHz (body)</b>	Recommended result $\pm 10\%$ window	5.36 4.824-5.896	10.2 9.18-11.22	53.3	1.52	/
	Measurement value 2012-04-07	5.09	9.79	52.2	1.5	21.9
	Measurement value 2012-04-08	5.03	9.66	52.5	1.53	21.8
	Measurement value 2012-05-22	5.34	10.4	52.4	1.54	21.6

Note: 1. the graph results see ANNEX D.

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

### 8.3. Test Results

#### 8.3.1. Summary of Measurement Results (GSM850)

**SAR Values (GSM850)**

Test Case		Measurement Result(W/kg)	Power Drift(dB)	Note
Different Test Position	Channel	1 g		
		Average		
Test position of body with GPRS (2up) (Distance 5mm)				
Horizontal up	middle	0.580	-0.06	
Horizontal down	middle	0.559	-0.17	
Vertical front	middle	0.138	0.00	
Vertical back	middle	0.339	0.13	
Horizontal-up	low	0.586	0.02	
	high	0.609	-0.16	<b>Max</b>
Horizontal-up	high	0.538	-0.09	EDGE (4up)

Note: 1. The value with blue color is the maximum SAR Value of test case of head and body in each test band.

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

8.3.2. Summary of Measurement Results (PCS1900)

**SAR Values (PCS1900)**

Test Case		Measurement Result(W/kg)	Power Drift(dB)	Note
Different Test Position	Channel	1 g		
		Average		
Test position of body with GPRS (2up) (Distance 5mm)				
Horizontal up	middle	0.468	0.07	
Horizontal down	middle	0.463	0.03	
Vertical front	middle	0.218	0.09	
Vertical back	middle	0.320	0.02	
Horizontal down	low	0.614	-0.11	
	high	0.578	0.01	
Horizontal down	low	<b>0.616</b>	-0.19	EDGE (4up) <b>Max</b>

Note: 1. The value with blue color is the maximum SAR Value of test case of head and body in each test band.

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

8.3.3. Summary of Measurement Results (WCDMA BAND II)

**SAR Values (WCDMA BAND II)**

Test Case		Measurement Result(W/kg)	Power Drift(dB)	Note
Different Test Position	Channel	1 g		
		Average		
Test position of body ( Distance 5mm )				
Horizontal up	middle	1.1	0.12	<b>Max</b>
Horizontal down	middle	1.06	0.19	
Vertical front	middle	0.761	-0.05	
Vertical back	middle	0.614	0.19	
Horizontal up	low	0.777	0.15	
	high	0.930	0.01	
Horizontal down	low	0.839	0.17	
	high	0.982	-0.09	
Horizontal up	middle	0.788	-0.16	HSDPA
Horizontal up	middle	0.244	0.08	HSUPA

Note: 1.The value with blue color is the maximum SAR Value of test case of head and body in each test band.

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

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

8.3.4. Summary of Measurement Results (WCDMA BAND V)

**SAR Values (WCDMA BAND V)**

Test Case		Measurement Result(W/kg)	Power Drift(dB)	Note
Different Test Position	Channel	1 g		
		Average		
Test position of body ( Distance 5mm )				
Horizontal up	middle	0.840	-0.16	<b>Max</b>
Horizontal down	middle	0.764	0.10	
Vertical front	middle	0.348	0.15	
Vertical back	middle	0.360	0.11	
Horizontal up	low	0.598	0.08	
	high	0.670	0.13	
Horizontal up	middle	0.758	0.01	HSDPA
Horizontal up	middle	0.454	0.07	HSUPA

Note: 1. The value with blue color is the maximum SAR Value of test case of head and body in each test band.

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

#### 8.4. Conclusion

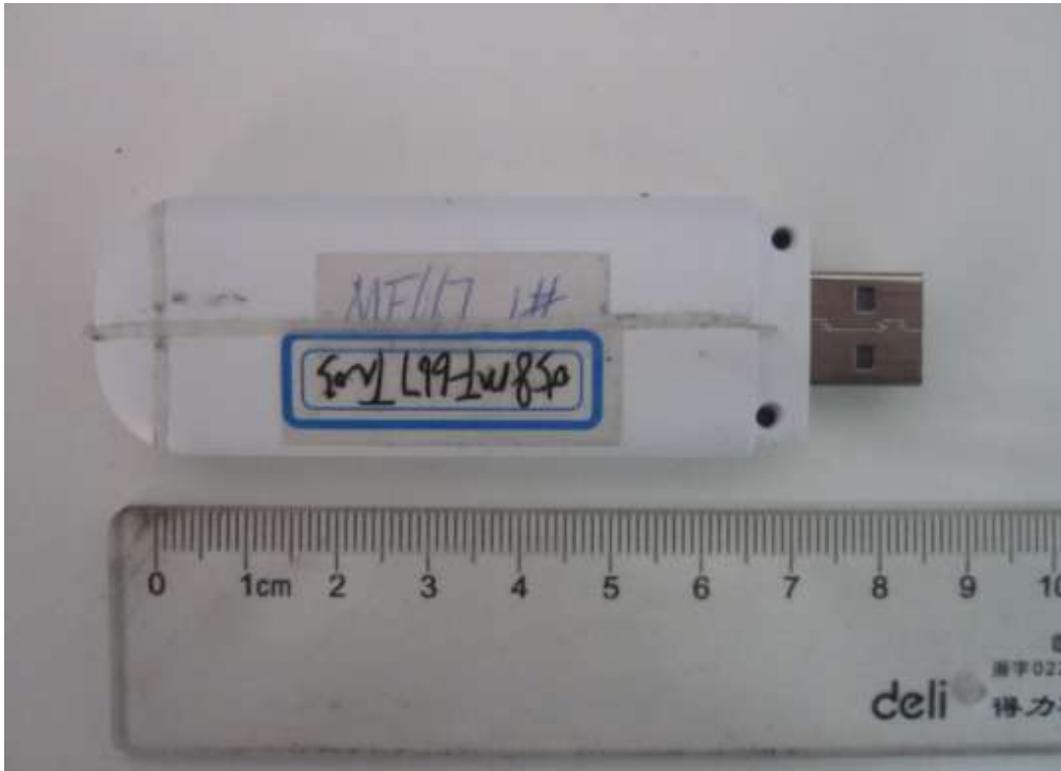
According KDB 447498 D02: SAR Measurement Procedures for USB Dongle Transmitters , USB Dongle is testing for 4 positions : Horizontal up, Horizontal down, Vertical front and Vertical back.

##### Maximum SAR

TEST BAND	Worst Position	Channel	Maximum SAR(1g) (W/kg)	Limit of SAR(1g) (W/kg)
GSM850	Horizontal up With GPRS(2UP)	high	0.609	1.6
PCS1900	Horizontal down With EDGE(4UP)	low	0.616	1.6
WCDMA BAND II	Horizontal up	middle	1.1	1.6
WCDMA BAND V	Horizontal up	middle	0.840	1.6

General Judgment: PASS

ANNEX A: Photograph of EUT



EUT



Horizontal-up

Test position 1 (distance between EUT and phantom is 5mm) horizontal-up



Horizontal-down

Test position 2 (EUT is connected to laptop via a USB cable which is shorter than 12 inches and distance between EUT and phantom is 5mm) horizontal-down



Vertical-Front

Test position 3 (distance between EUT and phantom is 5mm) vertical-front



Vertical-Back

Test position 4 (EUT is connected to laptop via a USB cable which is shorter than 12 inches and distance between EUT and phantom is 5mm) vertical-back

**ANNEX B: Measurement Uncertainty**

No.	source	type	Uncertainty Value (%)	Probability Distribution	k	$c_i$	Standard uncertainty $i u$ (%)	Degree of freedom $V_{eff}$ or $v_i$
1	-System repetivity	A	0.3	N	1	1	0.5	9
Measurement system								
2	—probe calibration	B	7	N	2	1	3.5	$\infty$
3	—axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	0.5	4.3	$\infty$
4	— Hemispherical isotropy of the probe	B	9.4	R	$\sqrt{3}$	1	0	$\infty$
5	—probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	$\infty$
6	—System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	$\infty$
7	—boundary effect	B	11.0	R	$\sqrt{3}$	1	6.4	$\infty$
8	—response time	B	0	R	$\sqrt{3}$	1	0	$\infty$
9	—noise	B	0	N	$\sqrt{3}$	1	0	$\infty$
10	—integration time	B	5.0	R	$\sqrt{3}$	1	2.9	$\infty$
11	—readout Electronics	B	0.4	R	$\sqrt{3}$	1	0.2	$\infty$
12	—-phantom	B	2.9	R	$\sqrt{3}$	1	1.7	$\infty$
13	—Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	$\infty$
14	—Device Holder Uncertainty	A	4.9	R	1	1	4.9	5
物理参数								
15	-liquid density	B	0	R	$\sqrt{3}$	1	0	$\infty$
16	-liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.5	2.9	$\infty$
17	-liquid conductivity (measurement uncertainty)	A	0.23	N	1	1	0.23	9

18	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.5	2.9	$\infty$
19	-liquid permittivity (measurement uncertainty)	A	0.46	N	1	1	0.46	9
20	– Probe Positioner Mechanical Tolerance	B	5.0	R	$\sqrt{3}$	1	2.9	$\infty$
21	– Environment	B	3.0	R	$\sqrt{3}$	1	1.7	$\infty$
22	– Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	$\infty$
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$					12.2	88.7
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	K=2		24.4	

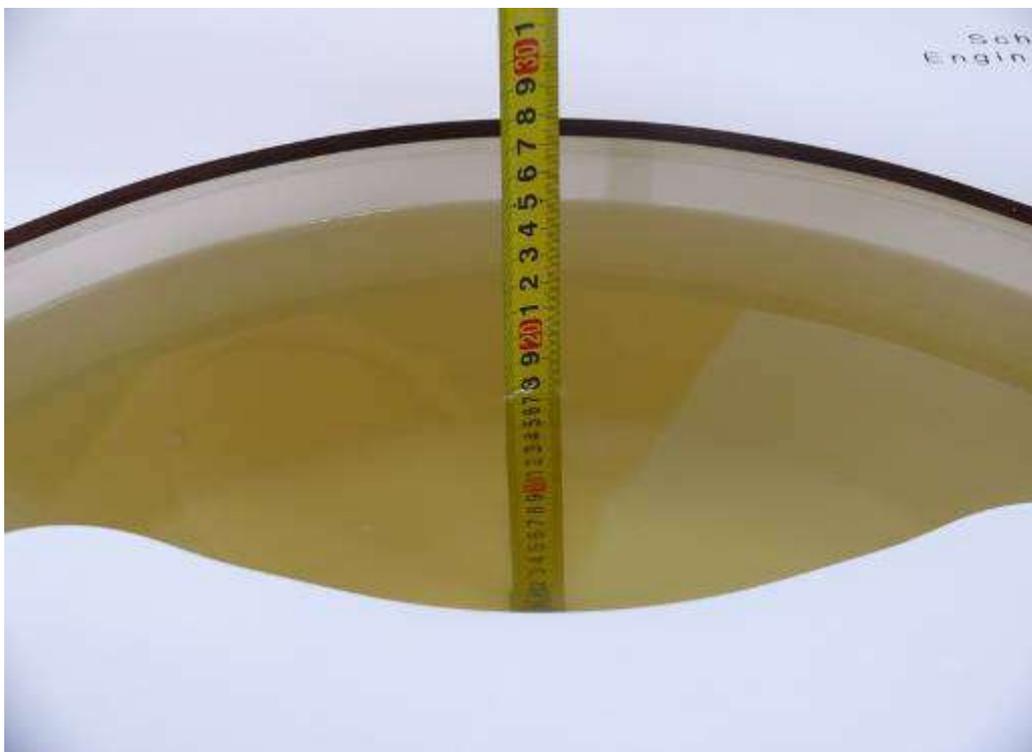
**ANNEX C: Main Test Instruments**

No.	Name	Type	Calibration Date	Valid Period
01	Network analyzer	Agilent E5071E	Oct 14 <sup>th</sup> , 2011	One year
02	Dielectric Probe Kit	Agilent 85070E	No Calibration Requested	
03	Power meter	Agilent E4418B	Oct 14 <sup>th</sup> , 2011	One year
04	Power sensor	Agilent E9200B	Oct 14 <sup>th</sup> , 2011	One year
05	Signal Generator	Agilent N5182A	Oct 14 <sup>th</sup> , 2011	One year
06	Amplifier	ZHL-42W	No Calibration Requested	
07	BTS	CMU200	Oct 14 <sup>th</sup> , 2011	One year
08	E-field Probe	ES3DV3	Sep 27 <sup>th</sup> , 2011	One year
09	DAE	DAE4	June 13 <sup>th</sup> , 2011	One year
10	Validation Kit 835MHz	D835V2	June 14 <sup>th</sup> , 2011	One year
11	Validation Kit 1900MHz	D1900V2	June 22 <sup>th</sup> , 2011	One year

## ANNEX D: Test Layout



Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the flat Phantom (850MHz) (17.5cm deep)



Picture 4: Liquid depth in the flat Phantom (1900 MHz) (19cm deep)

## ANNEX E: System Check Results

### System check 835body

Date/Time: 2012-4-9 8:32:49

Communication System: CW; Communication System Band: D835 (835.0 MHz);

Frequency: 835 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.948$  mho/m;  $\epsilon_r = 54.255$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.2 (0); SEMCAD X Version 14.6.4 (4989)

### 835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Area Scan (61x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.835 mW/g

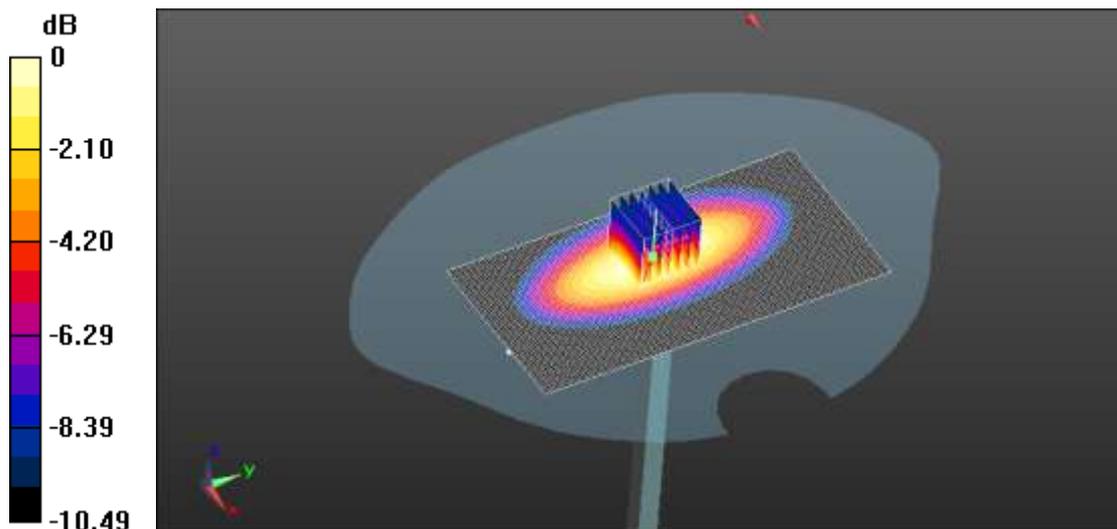
### 835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.310 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.7990

**SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.59 mW/g**

Maximum value of SAR (measured) = 2.869 mW/g



$$0 \text{ dB} = 2.870 \text{ mW/g} = 9.16 \text{ dB mW/g}$$

**System check 835body**

Date/Time: 22/05/2012 15:07:01

Communication System: CW; Communication System Band: D835 (835.0 MHz);

Frequency: 835 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.948$  mho/m;  $\epsilon_r = 54.255$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.93 mW/g

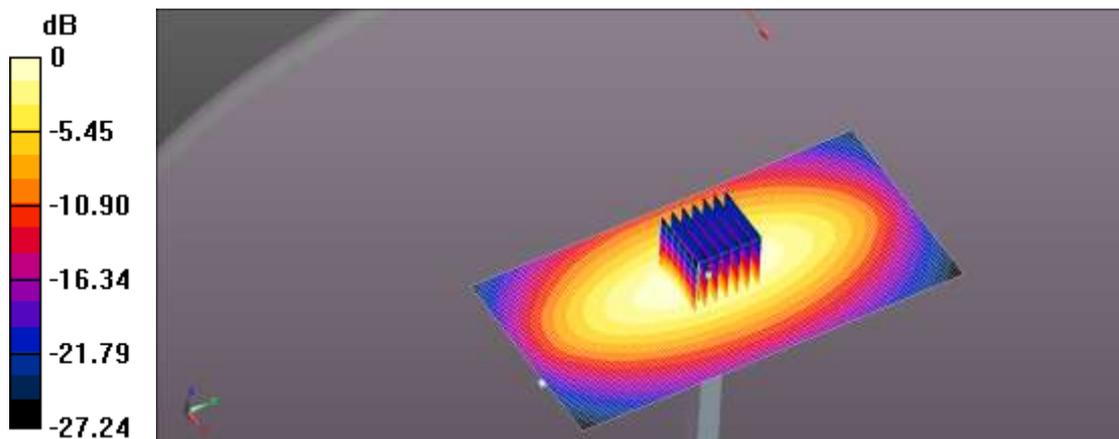
**835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.507 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.790 mW/g

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

Maximum value of SAR (measured) = 2.91 mW/g



0 dB = 2.93 mW/g = 9.34 dB mW/g

**System check 835body**

Date/Time: 23/05/2012 08:50:19

Communication System: CW; Communication System Band: D835 (835.0 MHz);

Frequency: 835 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.948 \text{ mho/m}$ ;  $\epsilon_r = 54.255$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Area Scan (61x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.62 mW/g

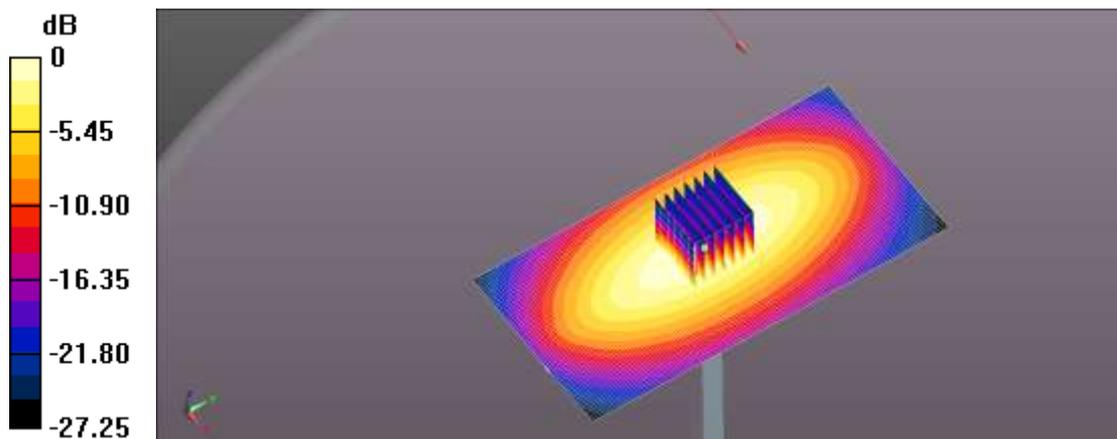
**835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.188 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.502 mW/g

**SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.49 mW/g**

Maximum value of SAR (measured) = 2.70 mW/g



0 dB = 2.62 mW/g = 8.38 dB mW/g

**System check 1900body**

Date/Time: 2012-4-7 8:36:17

Communication System: CW; Communication System Band: D1900 (1900.0 MHz);

Frequency: 1900 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.495$  mho/m;  $\epsilon_r = 52.357$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASYS2, Version 52.2 (0); SEMCAD X Version 14.6.4 (4989)

**1900body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Area Scan**

**(41x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.641 mW/g

**1900body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan**

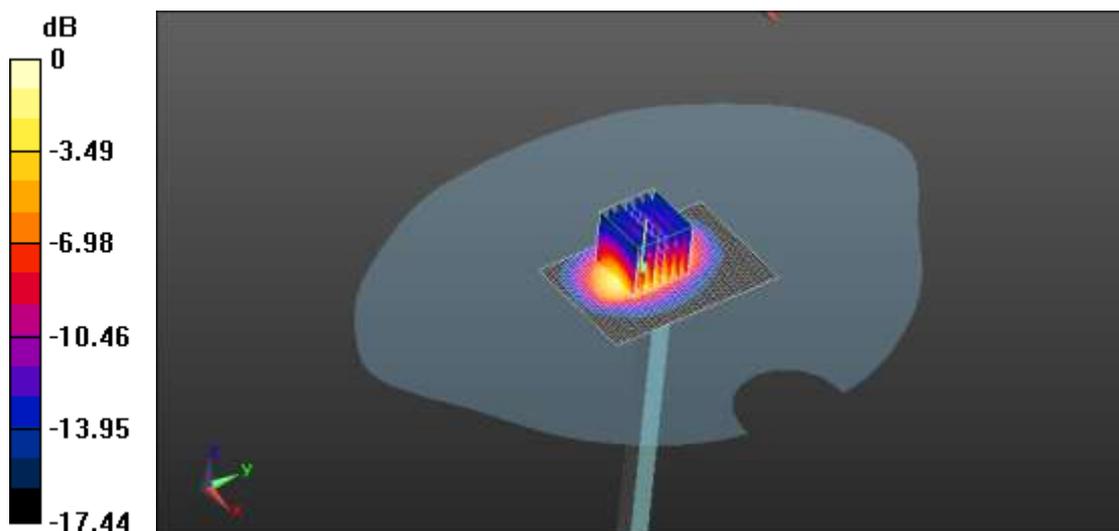
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 75.260 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 17.4470

**SAR(1 g) = 9.79 mW/g; SAR(10 g) = 5.09 mW/g**

Maximum value of SAR (measured) = 12.422 mW/g



$$0 \text{ dB} = 12.420 \text{ mW/g} = 21.88 \text{ dB mW/g}$$

**System check 1900body**

Date/Time: 2012-4-8 8:45:44

Communication System: CW; Communication System Band: D1900 (1900.0 MHz);

Frequency: 1900 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.495$  mho/m;  $\epsilon_r = 52.357$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASYS2, Version 52.2 (0); SEMCAD X Version 14.6.4 (4989)

**1900body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Area Scan**

**(41x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.283 mW/g

**1900body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan**

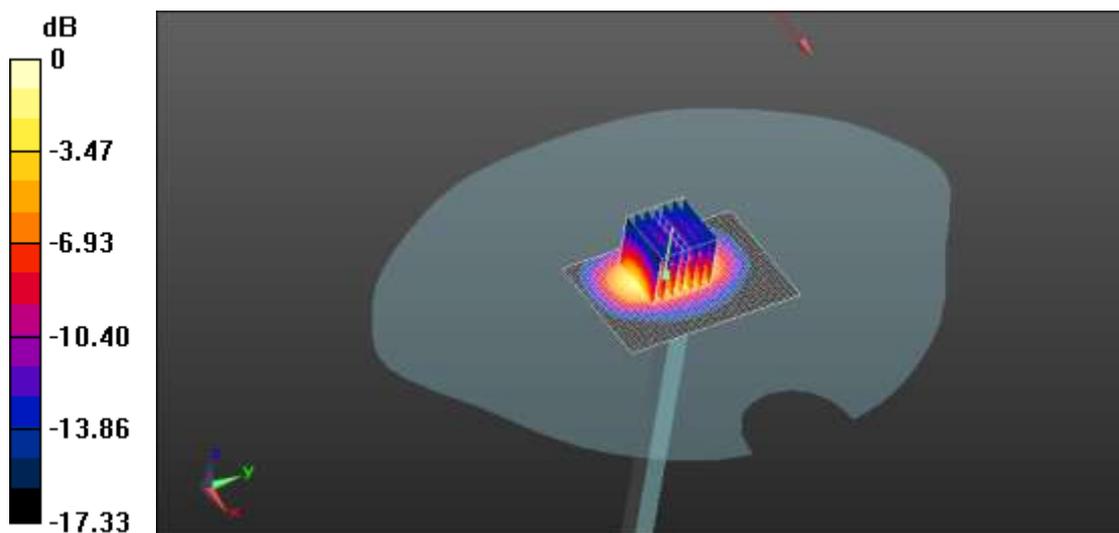
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 76.184 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 17.3430

**SAR(1 g) = 9.66 mW/g; SAR(10 g) = 5.03 mW/g**

Maximum value of SAR (measured) = 12.321 mW/g



$$0 \text{ dB} = 12.320 \text{ mW/g} = 21.81 \text{ dB mW/g}$$

**System check 1900body**

Date/Time: 2012-5-22 9:05:07

Communication System: CW; Communication System Band: D1900 (1900.0 MHz);

Frequency: 1900 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.495$  mho/m;  $\epsilon_r = 52.357$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.4 (4989)

**1900body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Area Scan**

**(41x61x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.629 mW/g

**1900body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan**

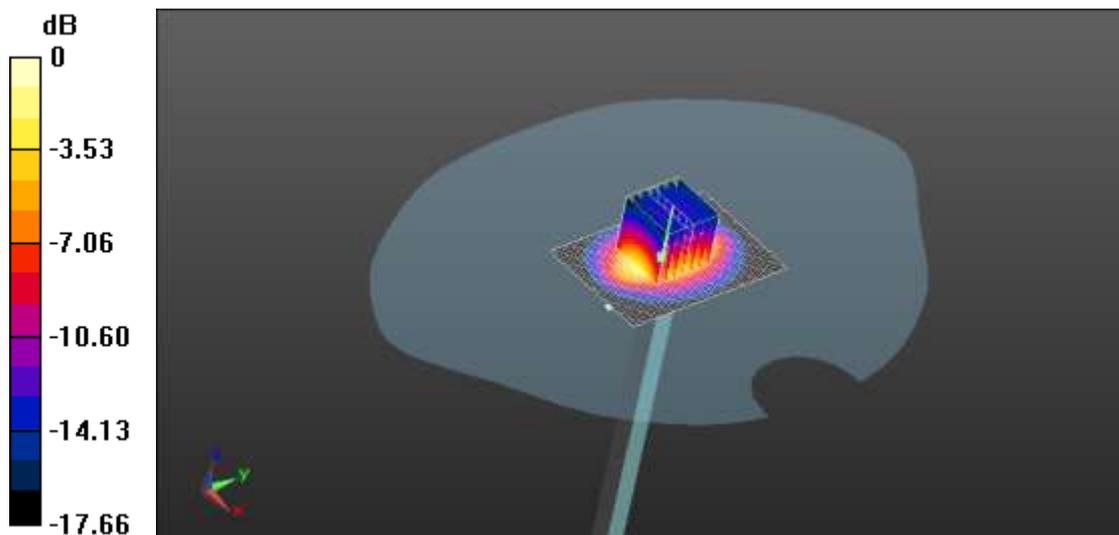
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.049 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 18.9820

**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.34 mW/g**

Maximum value of SAR (measured) = 13.367 mW/g



0 dB = 13.370mW/g = 22.52 dB mW/g

## ANNEX F: Graph Result

### GSM850 horizontal-up - mid with GPRS

Date/Time: 22/05/2012 15:47:39

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

### Configuration/horizontal-up - mid with GPRS/Area Scan (61x111x1):

Measurement grid: dx=10mm, dy=10mm

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

### Configuration/horizontal-up - mid with GPRS/Zoom Scan (7x7x7)/Cube

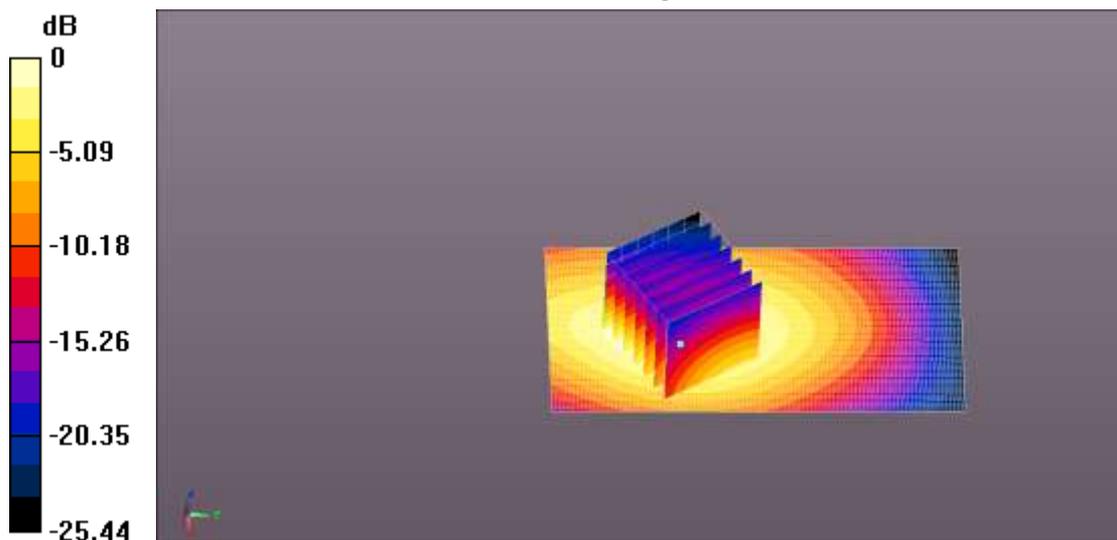
**0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.849 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.949 mW/g

**SAR(1 g) = 0.580 mW/g; SAR(10 g) = 0.347 mW/g**

Maximum value of SAR (measured) = 0.639 mW/g



0 dB = 0.644 mW/g = -3.83 dB mW/g

**GSM850 horizontal-down - mid with GPRS**

Date/Time: 22/05/2012 16:32:28

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASYS2, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Configuration/horizontal-down - mid with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.633 mW/g

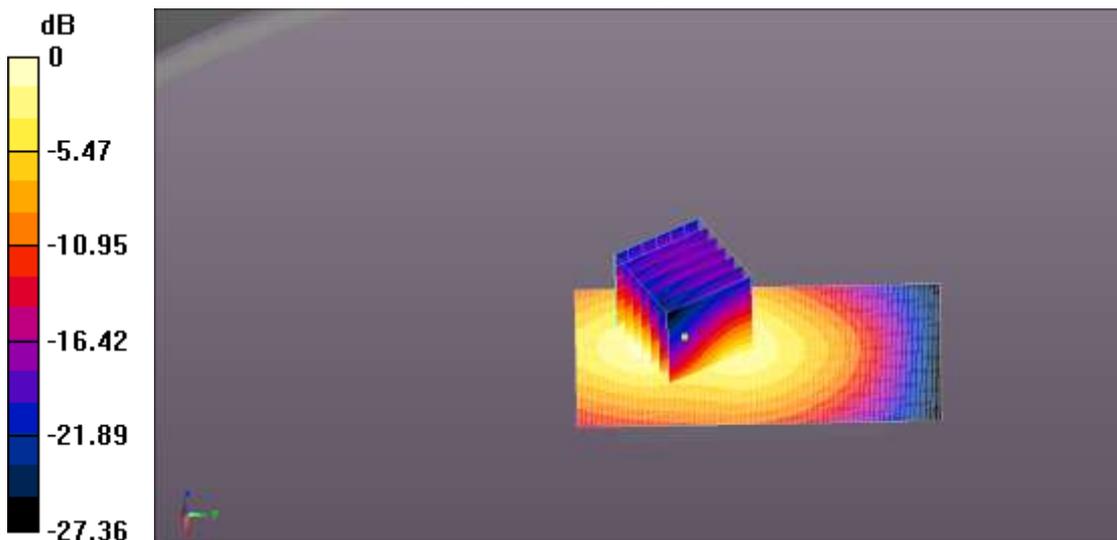
**Configuration/horizontal-down - mid with GPRS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.021 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.933 mW/g

**SAR(1 g) = 0.559 mW/g; SAR(10 g) = 0.327 mW/g**

Maximum value of SAR (measured) = 0.624 mW/g



0 dB = 0.633 mW/g = -3.97 dB mW/g

**GSM850 vertical-front - mid with GPRS**

Date/Time: 22/05/2012 17:02:22

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Configuration 2/vertical-front - mid with GPRS/Area Scan (51x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.142 mW/g

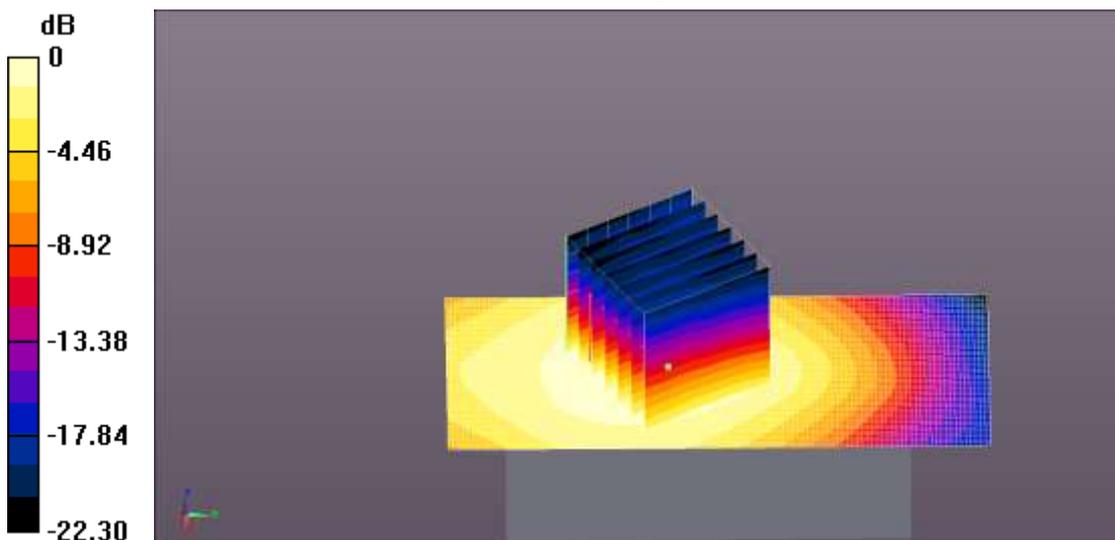
**Configuration 2/vertical-front - mid with GPRS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.620 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.285 mW/g

**SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.080 mW/g**

Maximum value of SAR (measured) = 0.147 mW/g



0 dB = 0.142 mW/g = -16.93 dB mW/g

**GSM850 vertical-back - mid with GPRS**

Date/Time: 23/05/2012 12:29:48

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Configuration 2/vertical-back - mid with GPRS/Area Scan (51x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.365 mW/g

**Configuration 2/vertical-back - mid with GPRS/Zoom Scan (7x7x7)/Cube 0:**

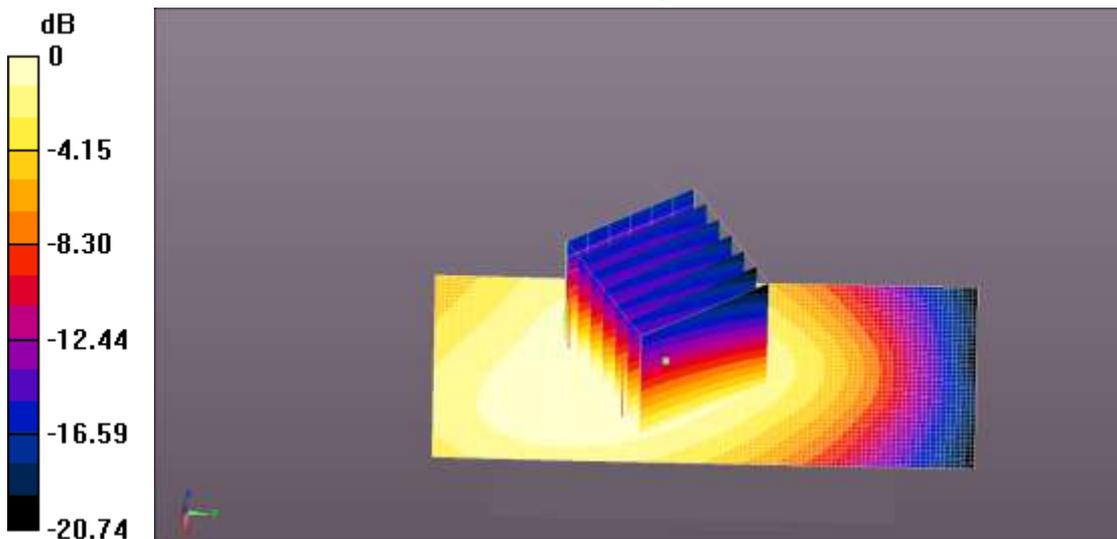
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.830 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.521 mW/g

**SAR(1 g) = 0.339 mW/g; SAR(10 g) = 0.234 mW/g**

Maximum value of SAR (measured) = 0.359 mW/g



0 dB = 0.365 mW/g = -8.76 dB mW/g

**GSM850 horizontal-up -low with GPRS**

Date/Time: 23/05/2012 10:15:28

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 824.2 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.933$  mho/m;  $\epsilon_r = 54.311$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Configuration/horizontal-up -low with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm.

Maximum value of SAR (interpolated) = 0.614 mW/g

**Configuration/horizontal-up -low with GPRS/Zoom Scan (7x7x7)/Cube**

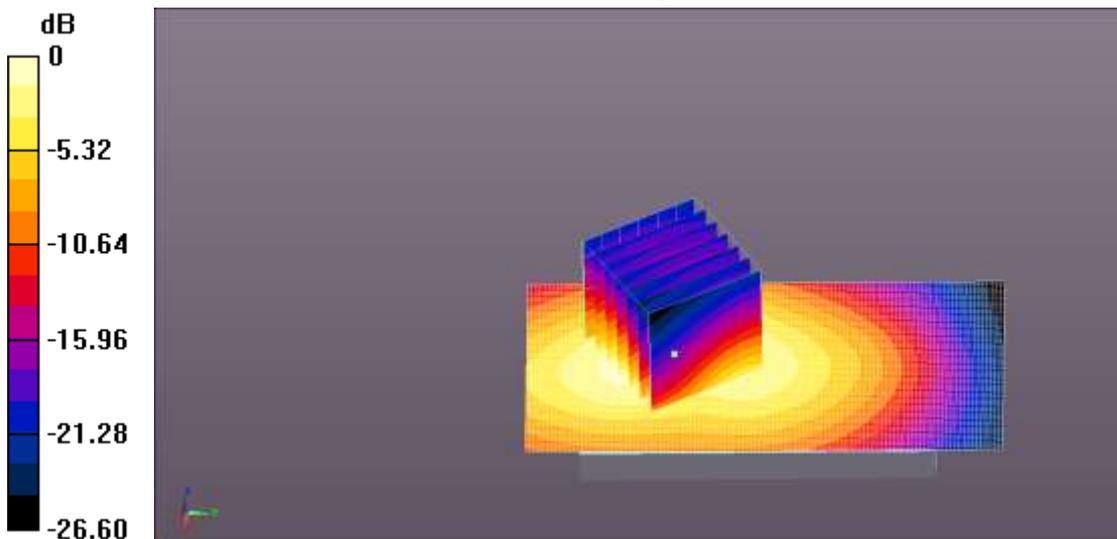
**0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.292 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.973 mW/g

**SAR(1 g) = 0.586 mW/g; SAR(10 g) = 0.343 mW/g**

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



0 dB = 0.614 mW/g = -4.23 dB mW/g

**GSM850 horizontal-up - high with GPRS**

Date/Time: 23/05/2012 10:53:30

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 848.6 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.967$  mho/m;  $\epsilon_r = 54.15$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Configuration/horizontal-up - high with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

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

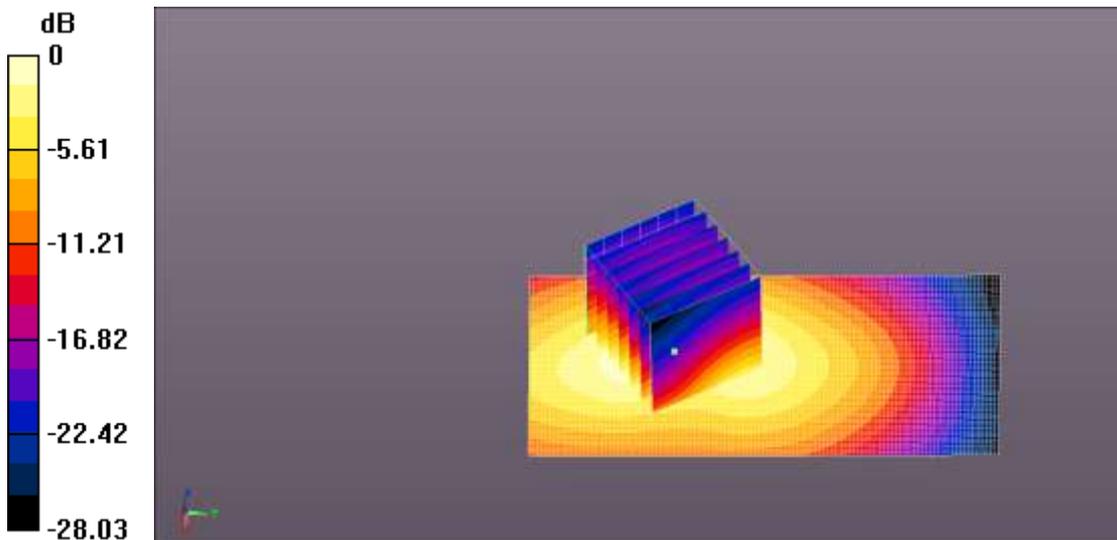
**Configuration/horizontal-up - high with GPRS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.712 V/m; Power Drift = -0.16 dB

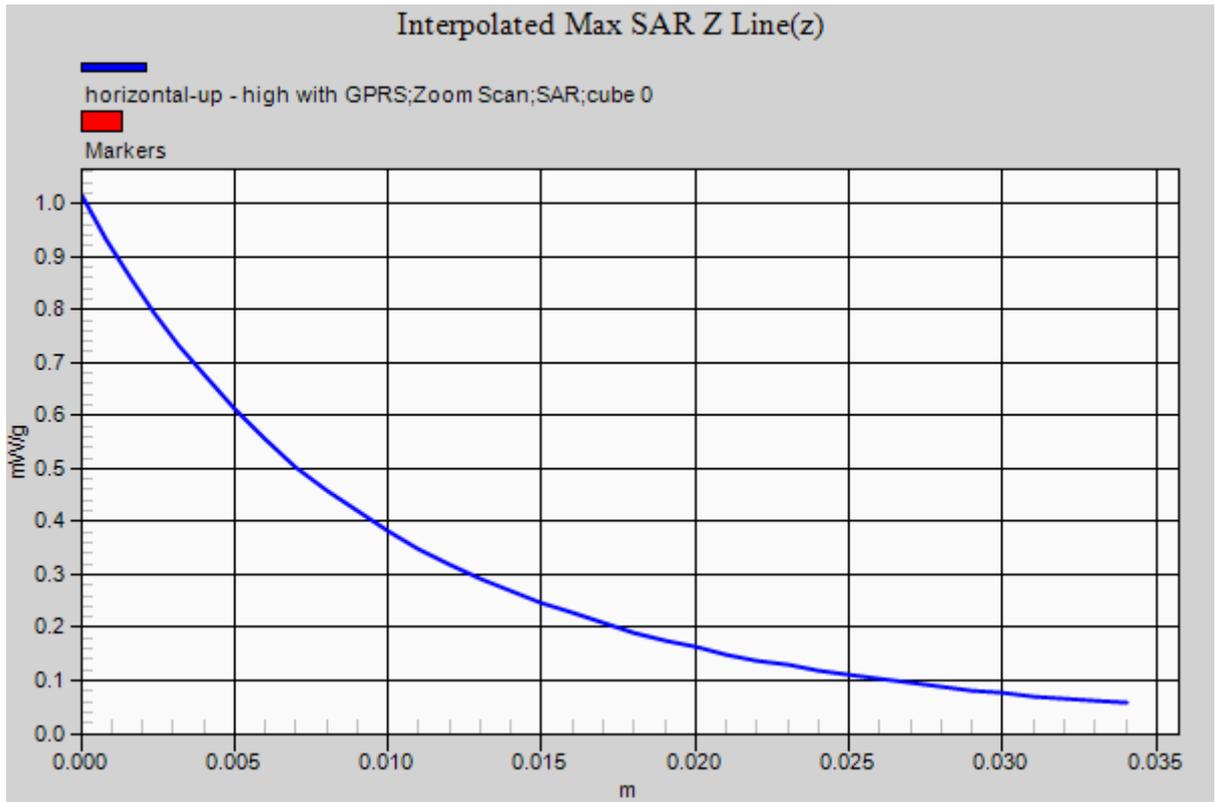
Peak SAR (extrapolated) = 1.016 mW/g

**SAR(1 g) = 0.609 mW/g; SAR(10 g) = 0.358 mW/g**

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



0 dB = 0.595 mW/g = -4.52 dB mW/g



**GSM850 horizontal-up - high with EDGE**

Date/Time: 23/05/2012 11:53:12

Communication System: Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 848.6 MHz; Communication System PAR: 9.191 dB  
 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.967$  mho/m;  $\epsilon_r = 54.15$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 11/04/2012
- Phantom: ELI v4.0; Type: ELI4; Serial: TP:1086
- Measurement SW: DASYS2, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

**Configuration/horizontal-up - high with EDGE/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.593 mW/g

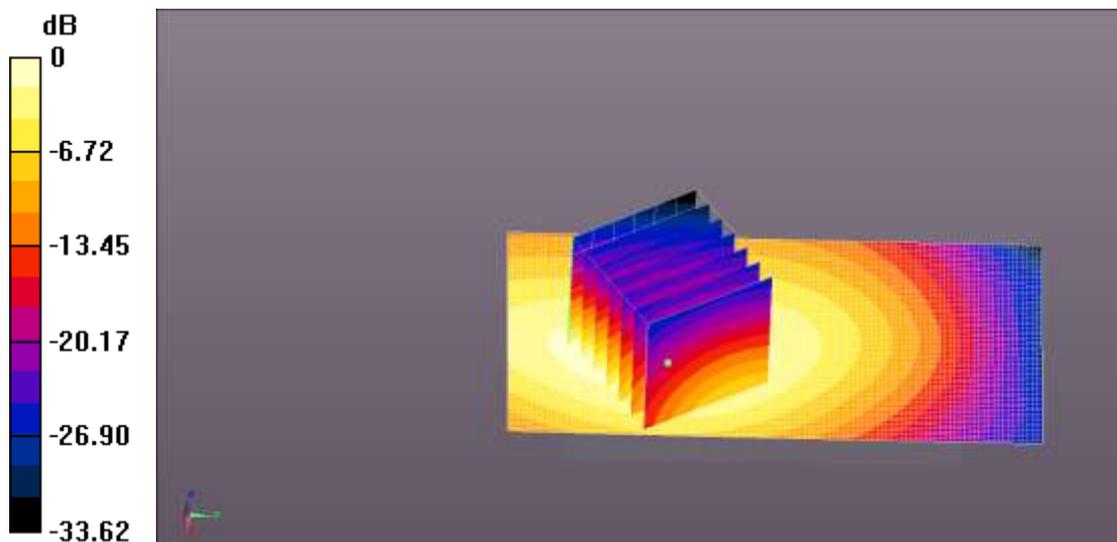
**Configuration/horizontal-up - high with EDGE/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.134 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.884 mW/g

**SAR(1 g) = 0.538 mW/g; SAR(10 g) = 0.319 mW/g**

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



0 dB = 0.593 mW/g = -4.53 dB mW/g

**GSM1900 horizontal-up - mid with GPRS**

Date/Time: 2012-5-22 9:57:42

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz; Communication System PAR: 9.191 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration/horizontal-up - mid with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

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

**Configuration/horizontal-up - mid with GPRS/Zoom Scan (7x7x7)/Cube**

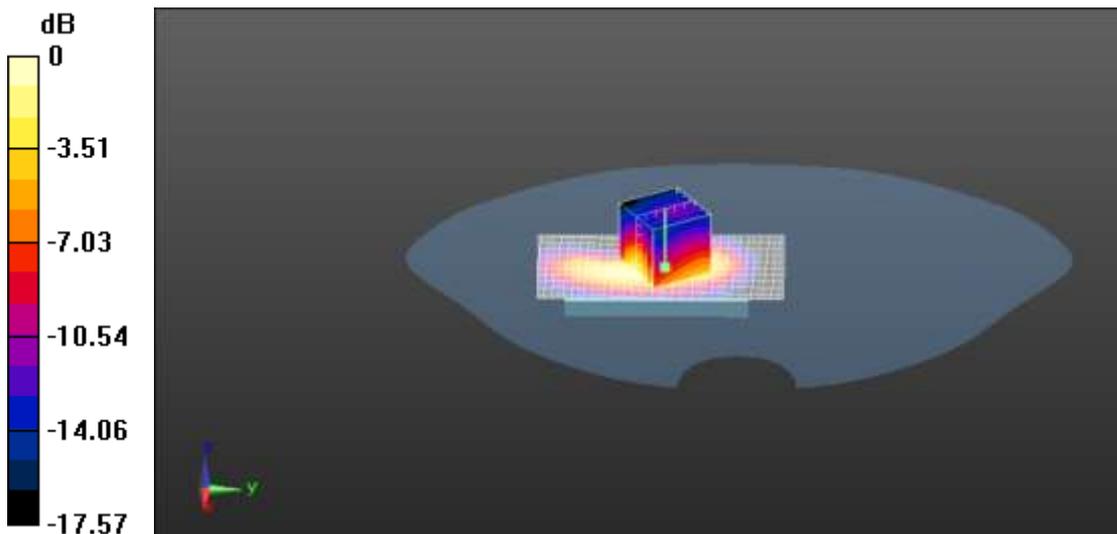
**0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.936 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.7570

**SAR(1 g) = 0.468 mW/g; SAR(10 g) = 0.258 mW/g**

Maximum value of SAR (measured) = 0.520 mW/g



0 dB = 0.520mW/g = -5.68 dB mW/g

**GSM1900 horizontal-down - mid with GPRS**

Date/Time: 2012-5-22 14:13:59

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz; Communication System PAR: 9.191 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration/horizontal-down - mid with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.526 mW/g

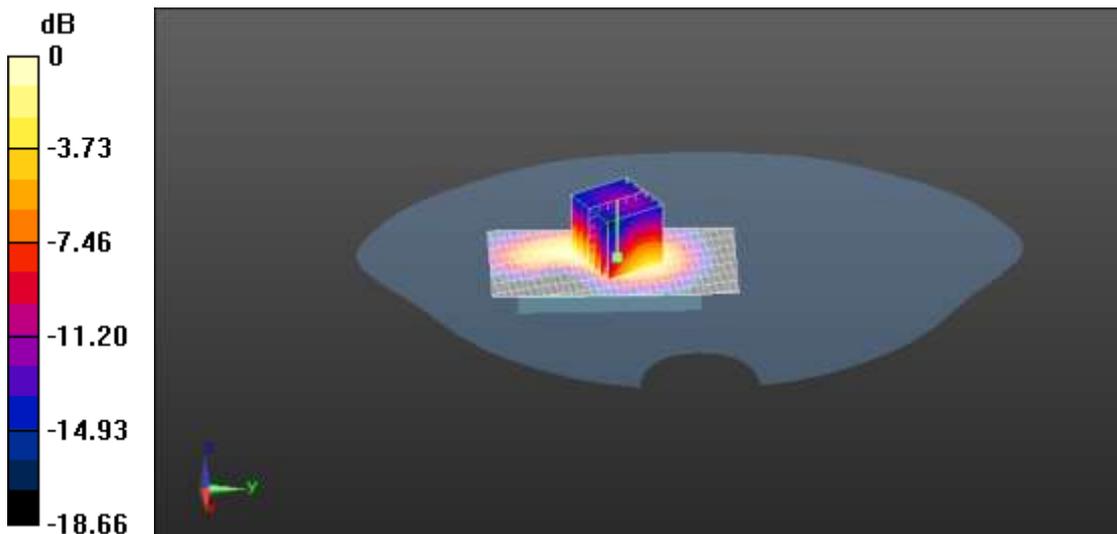
**Configuration/horizontal-down - mid with GPRS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.317 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.7510

**SAR(1 g) = 0.463 mW/g; SAR(10 g) = 0.261 mW/g**

Maximum value of SAR (measured) = 0.511 mW/g



0 dB = 0.510mW/g = -5.85 dB mW/g

**GSM1900 vertical-front - mid with GPRS**

Date/Time: 2012-5-22 11:11:36

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz; Communication System PAR: 9.191 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration 2/vertical-front - mid with GPRS/Area Scan (51x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.247 mW/g

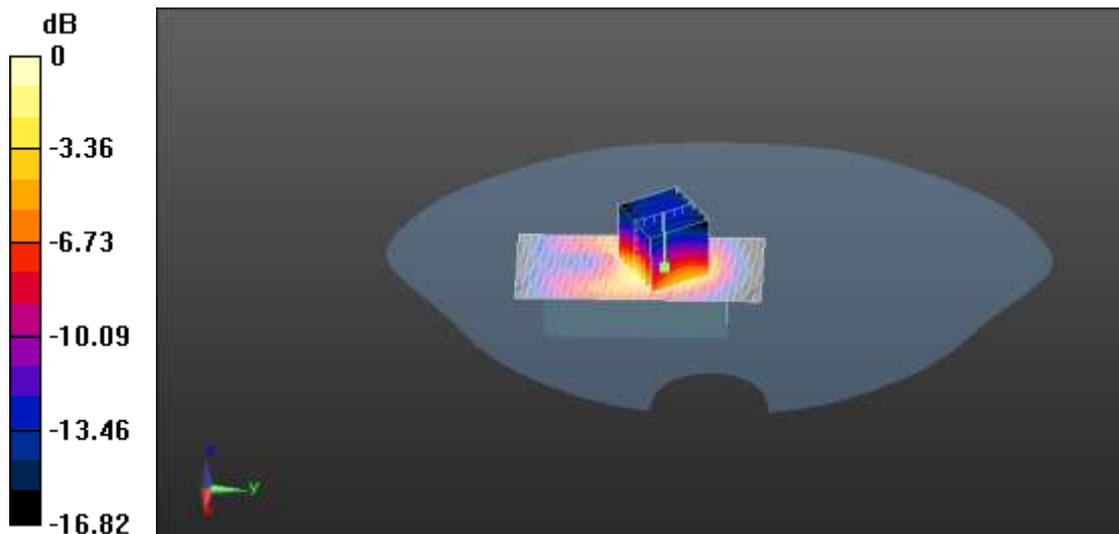
**Configuration 2/vertical-front - mid with GPRS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.401 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.3840

**SAR(1 g) = 0.218 mW/g; SAR(10 g) = 0.118 mW/g**

Maximum value of SAR (measured) = 0.245 mW/g



0 dB = 0.250mW/g = -12.04 dB mW/g

**GSM1900 with GPRS vertical-back - mid with GPRS**

Date/Time: 2012-5-22 11:54:57

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz; Communication System PAR: 9.191 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration 2/vertical-back - mid with GPRS/Area Scan (51x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.360 mW/g

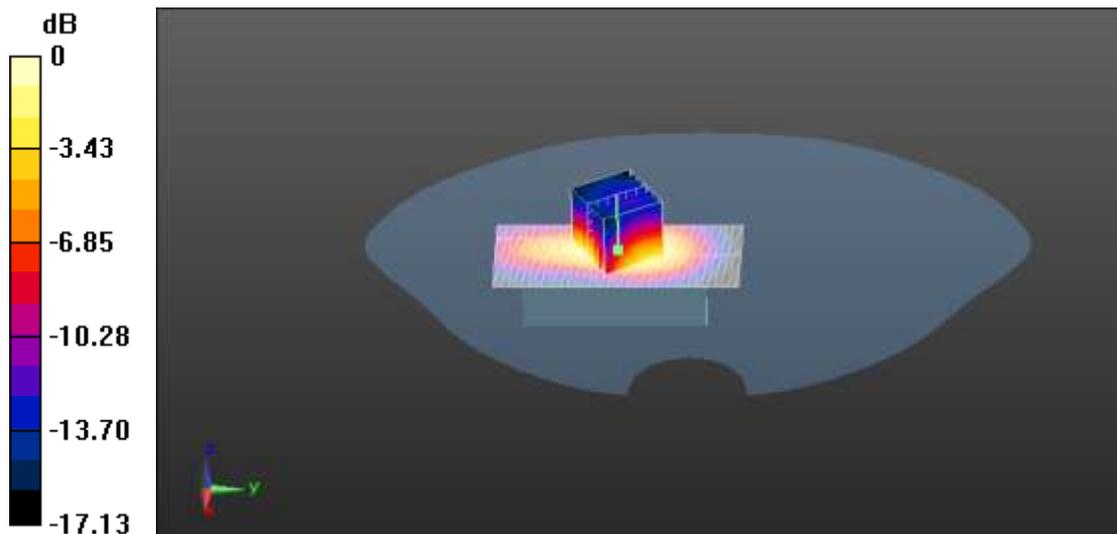
**Configuration 2/vertical-back - mid with GPRS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.616 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.5690

**SAR(1 g) = 0.320 mW/g; SAR(10 g) = 0.176 mW/g**

Maximum value of SAR (measured) = 0.357 mW/g



$0 \text{ dB} = 0.360 \text{ mW/g} = -8.87 \text{ dB mW/g}$

**GSM1900 horizontal-up - low with GPRS**

Date/Time: 2012-5-22 12:34:25

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1850.2 MHz; Communication System PAR: 9.191 dB

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.448$  mho/m;  $\epsilon_r = 52.486$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration/horizontal-up - low with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.726 mW/g

**Configuration/horizontal-up - low with GPRS/Zoom Scan (7x7x7)/Cube**

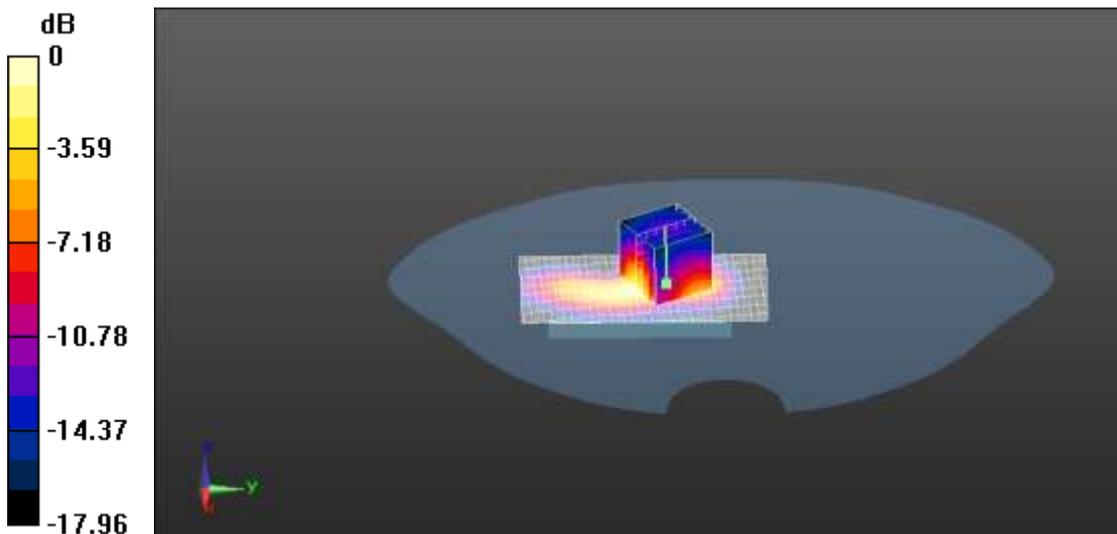
**0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.341 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.0660

**SAR(1 g) = 0.614 mW/g; SAR(10 g) = 0.317 mW/g**

Maximum value of SAR (measured) = 0.704 mW/g



0 dB = 0.700mW/g = -3.10 dB mW/g

**GSM1900 horizontal-up - high with GPRS**

Date/Time: 2012-5-22 13:10:31

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1909.8 MHz; Communication System PAR: 9.191 dB

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.503$  mho/m;  $\epsilon_r = 52.325$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration/horizontal-up - high with GPRS/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

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

**Configuration/horizontal-up - high with GPRS/Zoom Scan (7x7x7)/Cube**

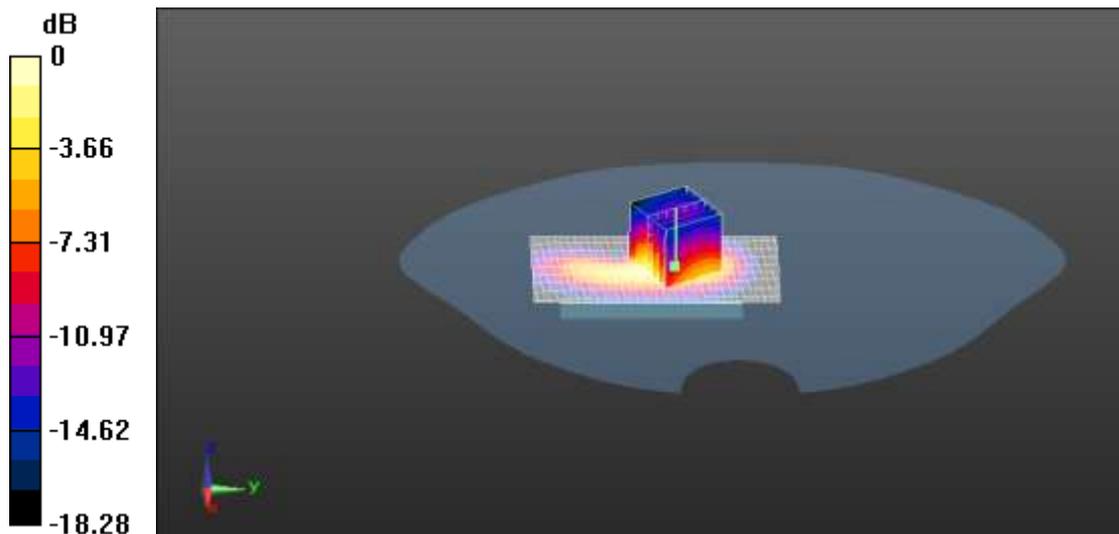
**0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.208 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.9740

**SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.310 mW/g**

Maximum value of SAR (measured) = 0.654 mW/g



0 dB = 0.650mW/g = -3.74 dB mW/g

**GSM1900 horizontal-up - low with EDGE**

Date/Time: 2012-5-22 13:37:09

Communication System: Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1850.2 MHz; Communication System PAR: 9.191 dB

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.448$  mho/m;  $\epsilon_r = 52.486$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1327; Calibrated: 2012-4-11
- Phantom: SAM 1; Type: SAM; Serial: TP:1702
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**Configuration/horizontal-up - low with EDGE/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.740 mW/g

**Configuration/horizontal-up - low with EDGE/Zoom Scan (7x7x7)/Cube**

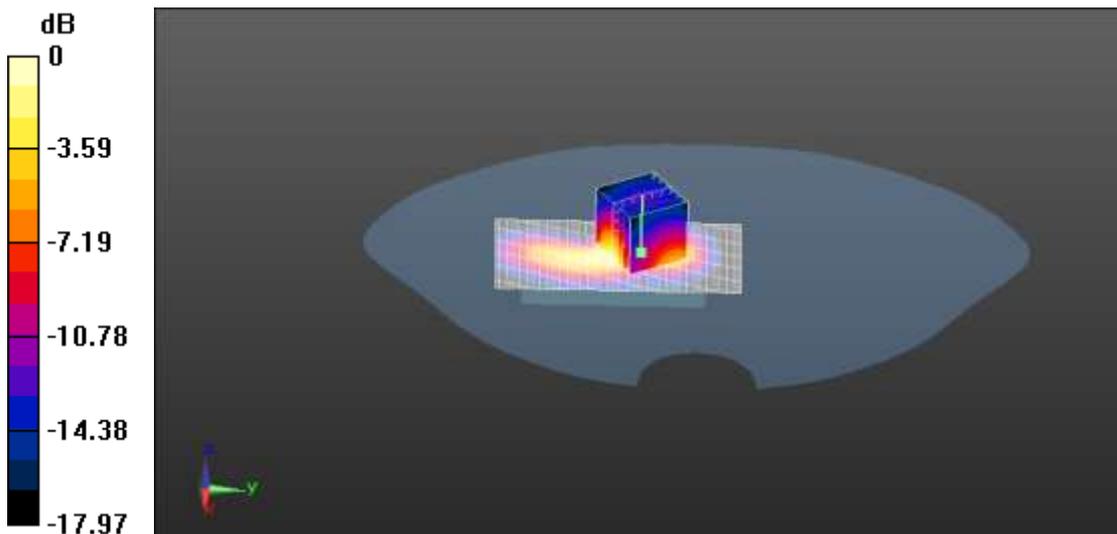
**0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.547 V/m; Power Drift = -0.19 dB

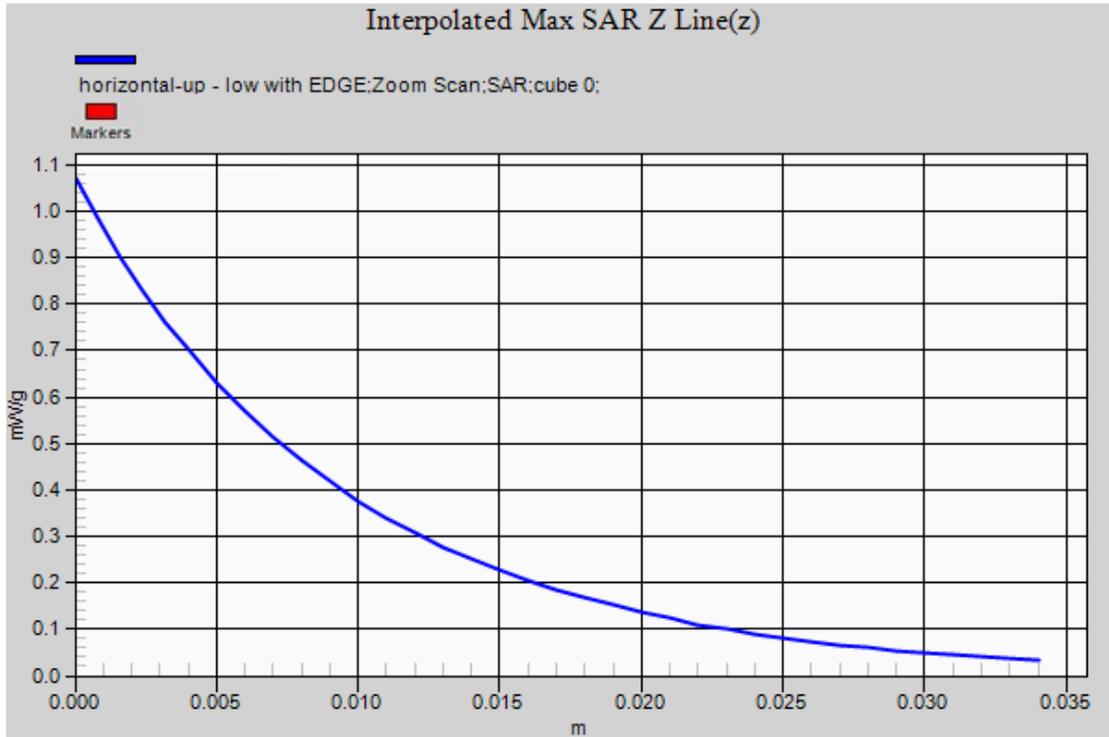
Peak SAR (extrapolated) = 1.0720

**SAR(1 g) = 0.616 mW/g; SAR(10 g) = 0.317 mW/g**

Maximum value of SAR (measured) = 0.707 mW/g



0 dB = 0.710mW/g = -2.97 dB mW/g



**WCDMA BAND II horizontal-up - mid**

Date/Time: 2012-4-7 13:24:40

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1880 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - mid/Area Scan (61x111x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.222 mW/g

**body/horizontal-up - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

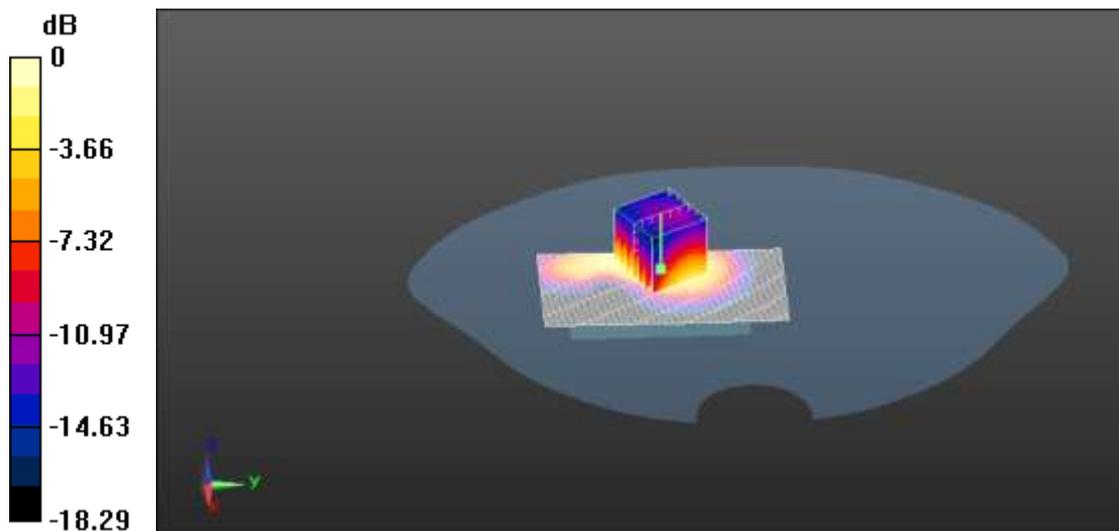
dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.484 V/m; Power Drift = 0.12 dB

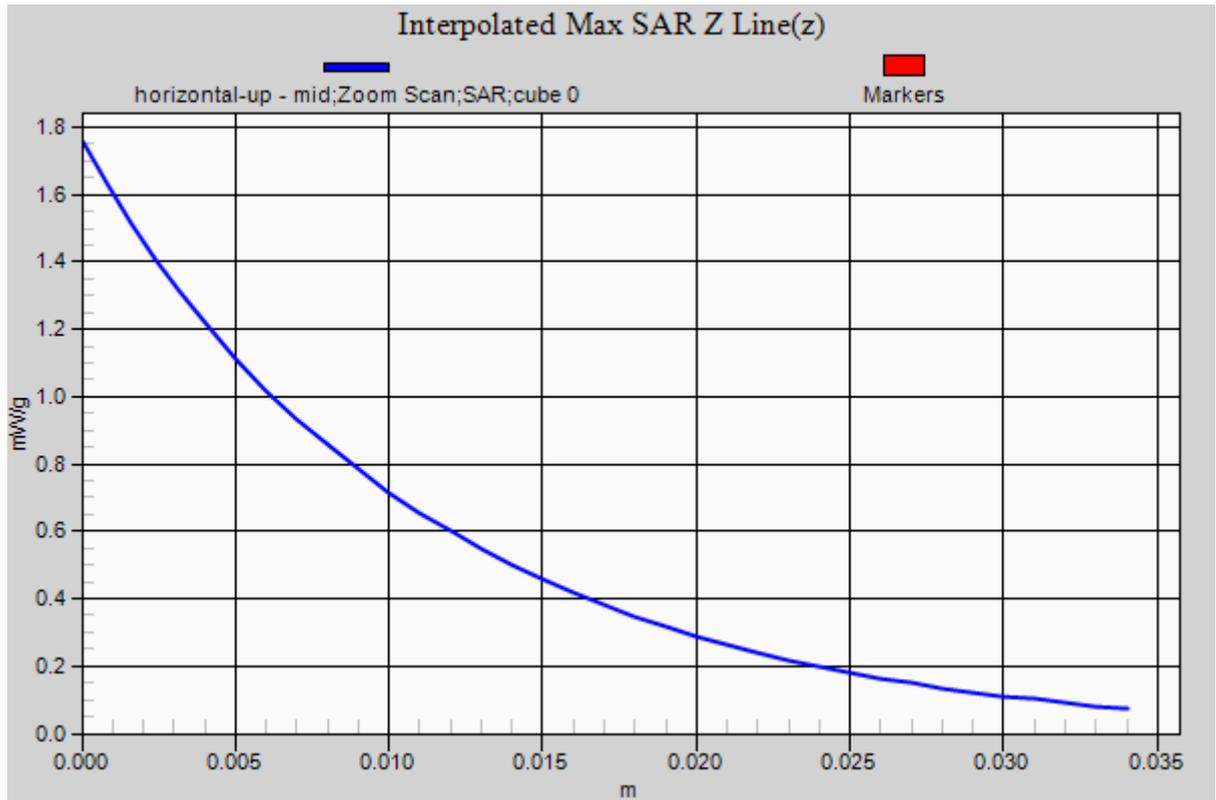
Peak SAR (extrapolated) = 1.7560

**SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.626 mW/g**

Maximum value of SAR (measured) = 1.217 mW/g



$0 \text{ dB} = 1.220 \text{ mW/g} = 1.73 \text{ dB mW/g}$



**WCDMA BAND II horizontal-down - mid**

Date/Time: 2012-4-7 14:59:38

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1880 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-down - mid/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 1.187 mW/g

**body/horizontal-down - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

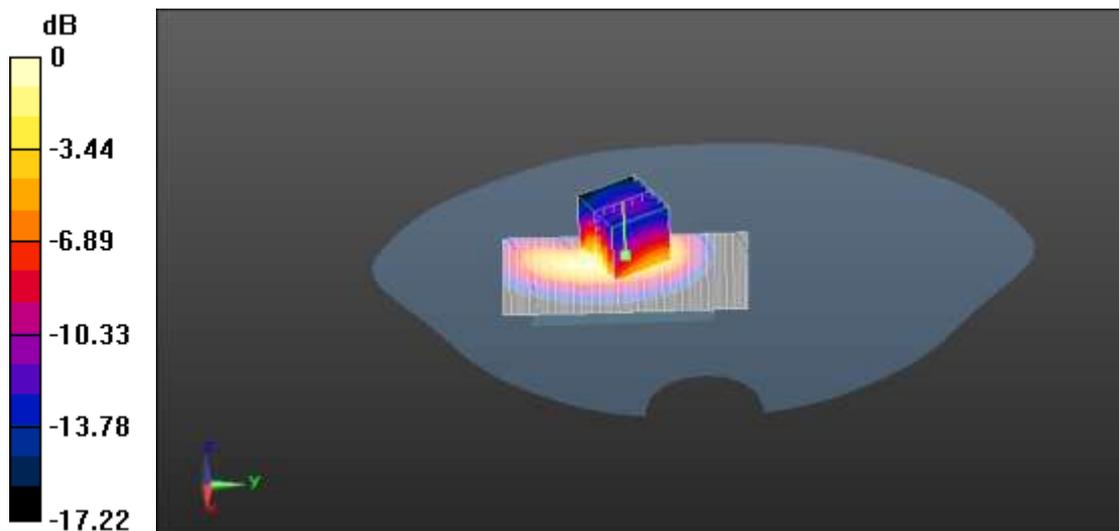
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 5.488 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.7110

**SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.593 mW/g**

Maximum value of SAR (measured) = 1.188 mW/g



$$0 \text{ dB} = 1.190 \text{ mW/g} = 1.51 \text{ dB mW/g}$$

**WCDMA BAND II vertical-front - mid**

Date/Time: 2012-4-8 9:38:41

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1880 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body 2/vertical-front - mid/Area Scan (51x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 1.081 mW/g

**body 2/vertical-front - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

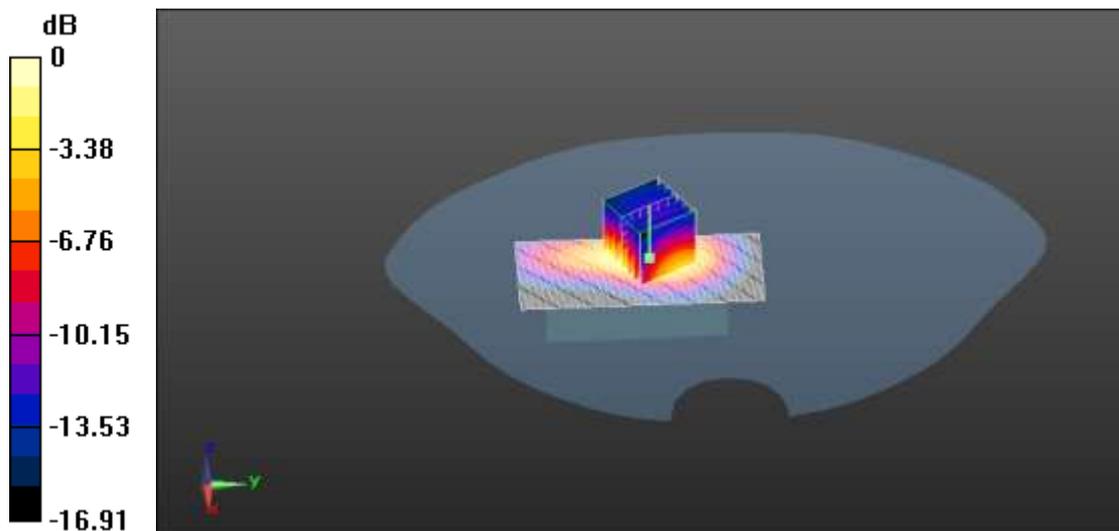
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 10.500 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.6600

**SAR(1 g) = 0.761 mW/g; SAR(10 g) = 0.428 mW/g**

Maximum value of SAR (measured) = 1.064 mW/g



$$0 \text{ dB} = 1.060 \text{ mW/g} = 0.51 \text{ dB mW/g}$$

**WCDMA BAND II vertical-back - mid**

Date/Time: 2012-4-8 9:14:47

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1880 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body 2/vertical-back - mid/Area Scan (51x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 0.661 mW/g

**body 2/vertical-back - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

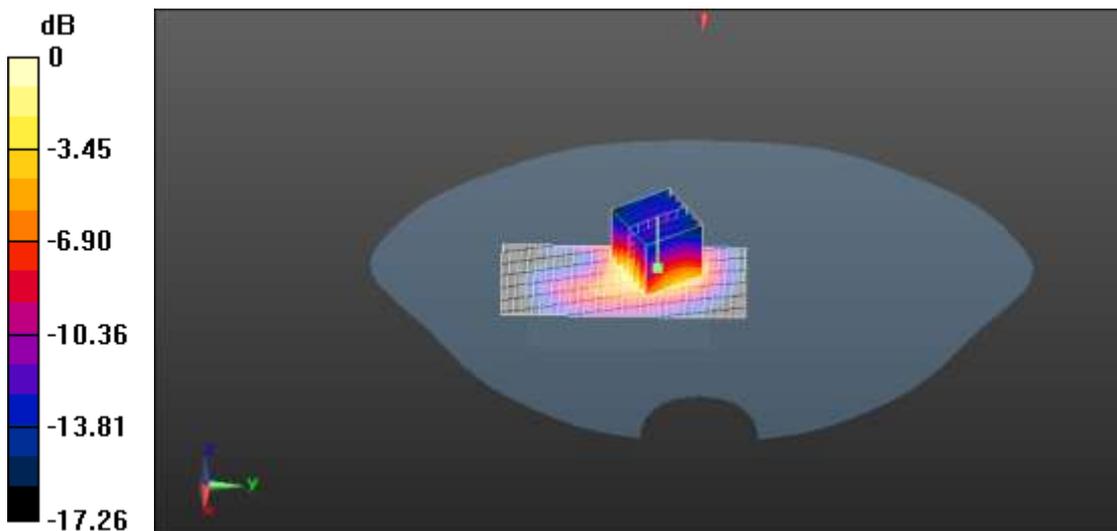
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 10.421 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.0810

**SAR(1 g) = 0.614 mW/g; SAR(10 g) = 0.329 mW/g**

Maximum value of SAR (measured) = 0.689 mW/g



$0 \text{ dB} = 0.690 \text{ mW/g} = -3.22 \text{ dB mW/g}$

**WCDMA BAND II horizontal-up - low**

Date/Time: 2012-4-7 14:08:37

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1852.4 MHz; Communication System PAR: 0 dB

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.451$  mho/m;  $\epsilon_r = 52.481$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - low/Area Scan (61x111x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.879 mW/g

**body/horizontal-up - low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

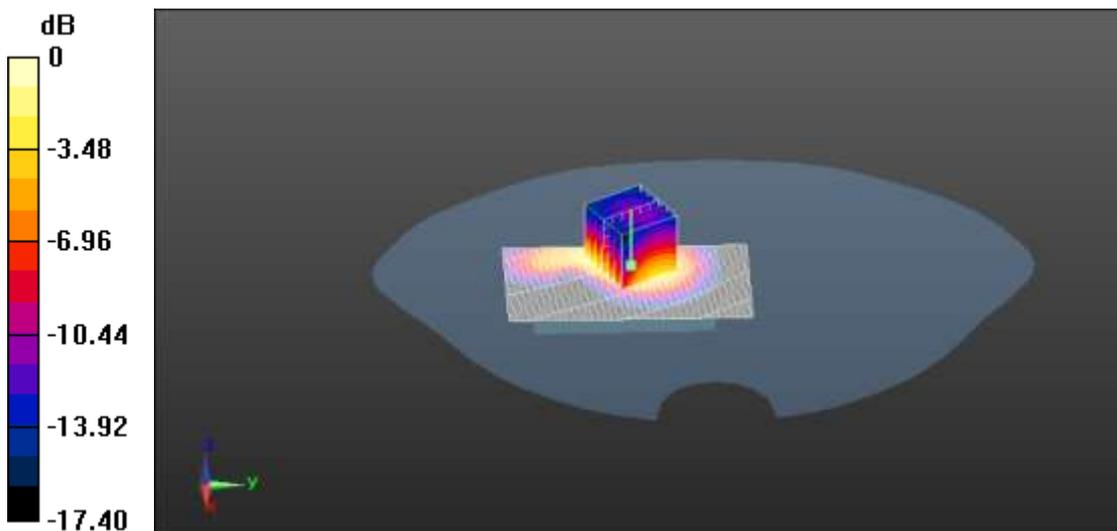
dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.019 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.2520

**SAR(1 g) = 0.777 mW/g; SAR(10 g) = 0.436 mW/g**

Maximum value of SAR (measured) = 0.866 mW/g



$$0 \text{ dB} = 0.870 \text{ mW/g} = -1.21 \text{ dB mW/g}$$

**WCDMA BAND II horizontal-up - high**

Date/Time: 2012-4-7 14:31:19

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1907.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.502$  mho/m;  $\epsilon_r = 52.332$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - high/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 1.038 mW/g

**body/horizontal-up - high/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

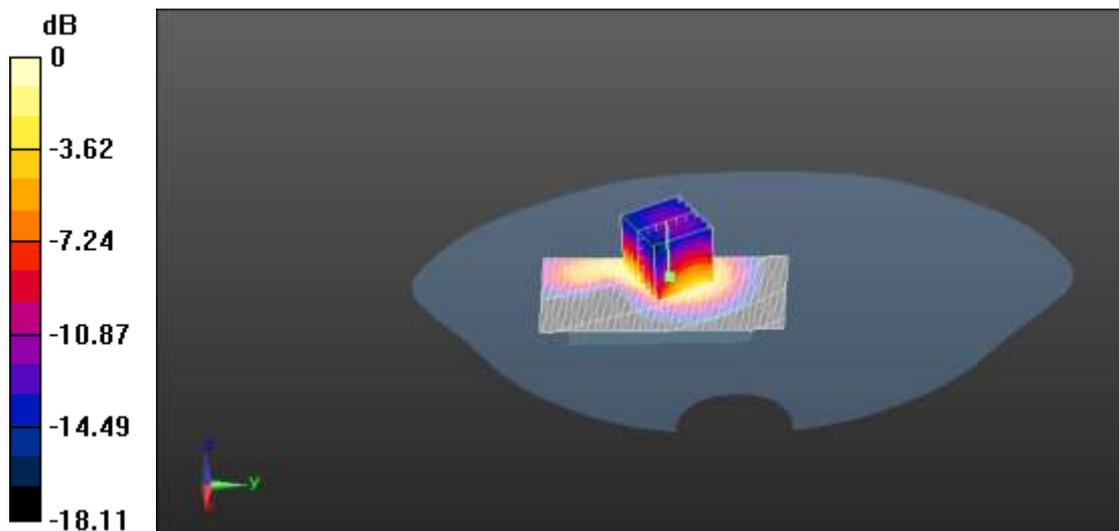
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 6.595 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.5140

**SAR(1 g) = 0.930 mW/g; SAR(10 g) = 0.528 mW/g**

Maximum value of SAR (measured) = 1.031 mW/g



$$0 \text{ dB} = 1.030 \text{ mW/g} = 0.26 \text{ dB mW/g}$$

**WCDMA BAND II horizontal-down -low**

Date/Time: 2012-4-7 15:23:07

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1852.4 MHz; Communication System PAR: 0 dB

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.451$  mho/m;  $\epsilon_r = 52.481$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-down -low/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 0.969 mW/g

**body/horizontal-down -low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

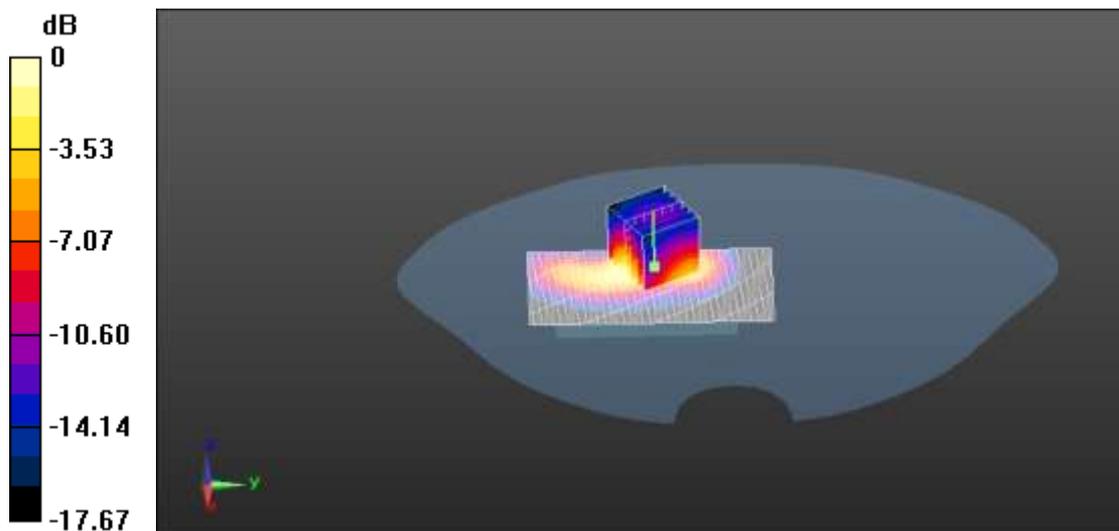
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 4.797 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.4170

**SAR(1 g) = 0.839 mW/g; SAR(10 g) = 0.448 mW/g**

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



$0 \text{ dB} = 0.950 \text{ mW/g} = -0.45 \text{ dB mW/g}$

**WCDMA BAND II horizontal-down - high**

Date/Time: 2012-4-7 16:23:48

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1907.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.502$  mho/m;  $\epsilon_r = 52.332$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-down - high/Area Scan (61x111x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.093 mW/g

**body/horizontal-down - high/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

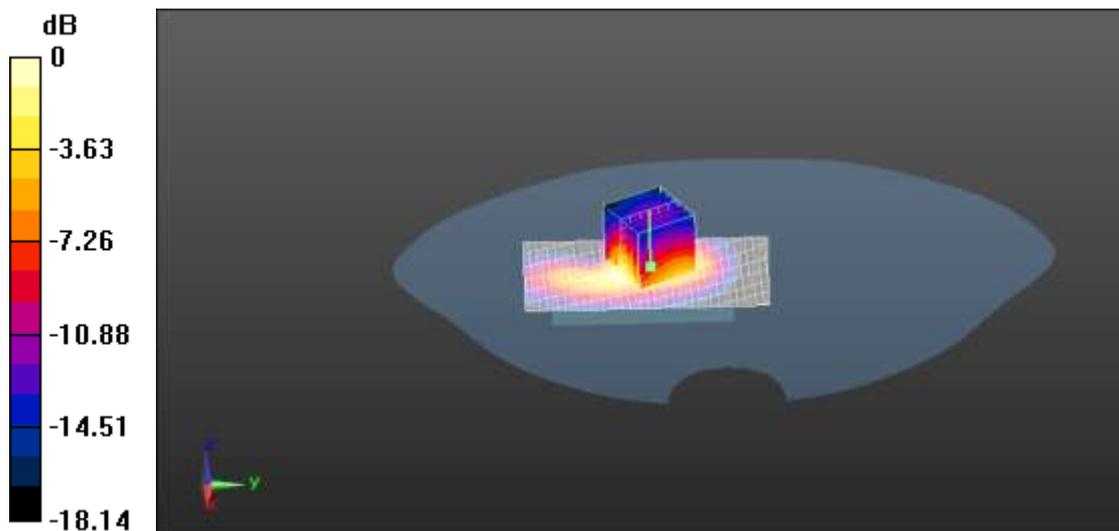
dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.393 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.6470

**SAR(1 g) = 0.982 mW/g; SAR(10 g) = 0.539 mW/g**

Maximum value of SAR (measured) = 1.103 mW/g



$$0 \text{ dB} = 1.100 \text{ mW/g} = 0.83 \text{ dB mW/g}$$

**WCDMA BAND II horizontal-up - mid with HSDPA**

Date/Time: 2012-4-8 15:31:27

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1880 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - mid HSDPA/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 0.883 mW/g

**body/horizontal-up - mid HSDPA/Zoom Scan (7x7x7)/Cube 0:**

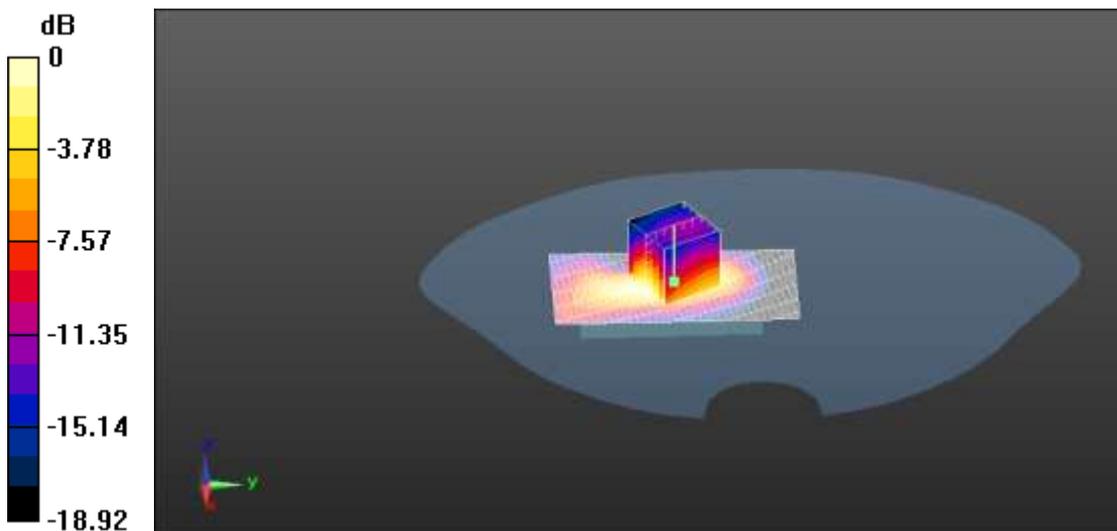
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 6.930 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 1.3410

**SAR(1 g) = 0.788 mW/g; SAR(10 g) = 0.437 mW/g**

Maximum value of SAR (measured) = 0.879 mW/g



$$0 \text{ dB} = 0.880 \text{ mW/g} = -1.11 \text{ dB mW/g}$$

**WCDMA BAND II horizontal-up - mid with HSUPA**

Date/Time: 2012-4-8 11:07:49

Communication System: WCDMA; Communication System Band: BAND 2;

Frequency: 1880 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.477$  mho/m;  $\epsilon_r = 52.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(4.67, 4.67, 4.67);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - mid HSUPA/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

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

**body/horizontal-up - mid HSUPA/Zoom Scan (7x7x7)/Cube 0:**

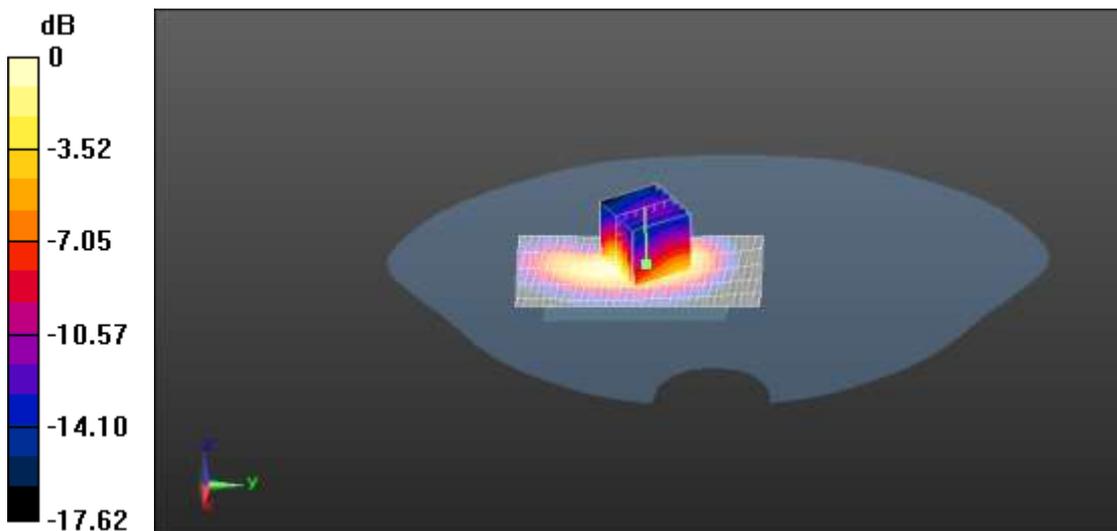
Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 4.759 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.3990

**SAR(1 g) = 0.244 mW/g; SAR(10 g) = 0.136 mW/g**

Maximum value of SAR (measured) = 0.272 mW/g



$0 \text{ dB} = 0.270 \text{ mW/g} = -11.37 \text{ dB mW/g}$

**WCDMA BAND V horizontal-up - mid**

Date/Time: 2012-4-9 16:35:44

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 836.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - mid/Area Scan (61x111x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.925 mW/g

**body/horizontal-up - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

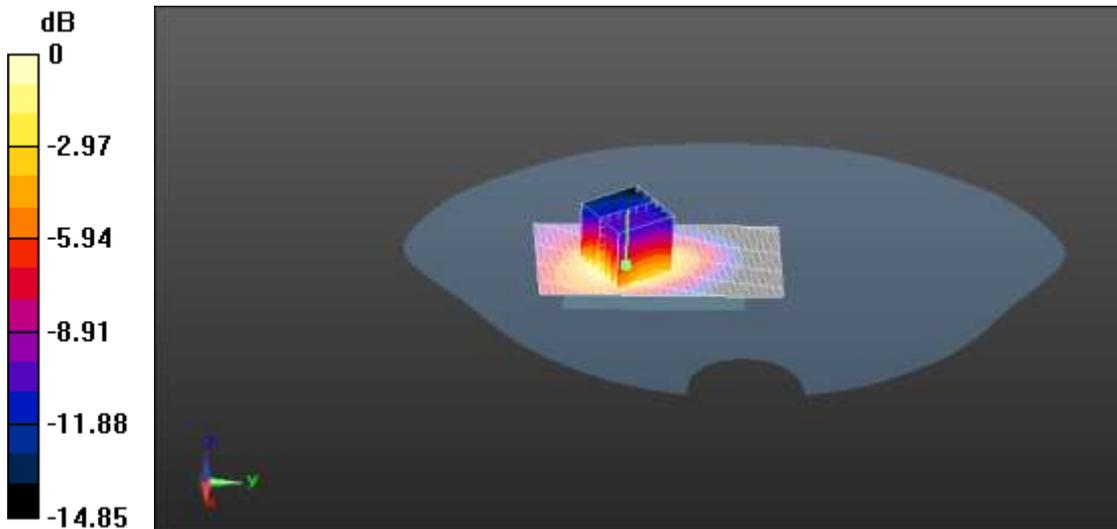
dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.236 V/m; Power Drift = -0.16 dB

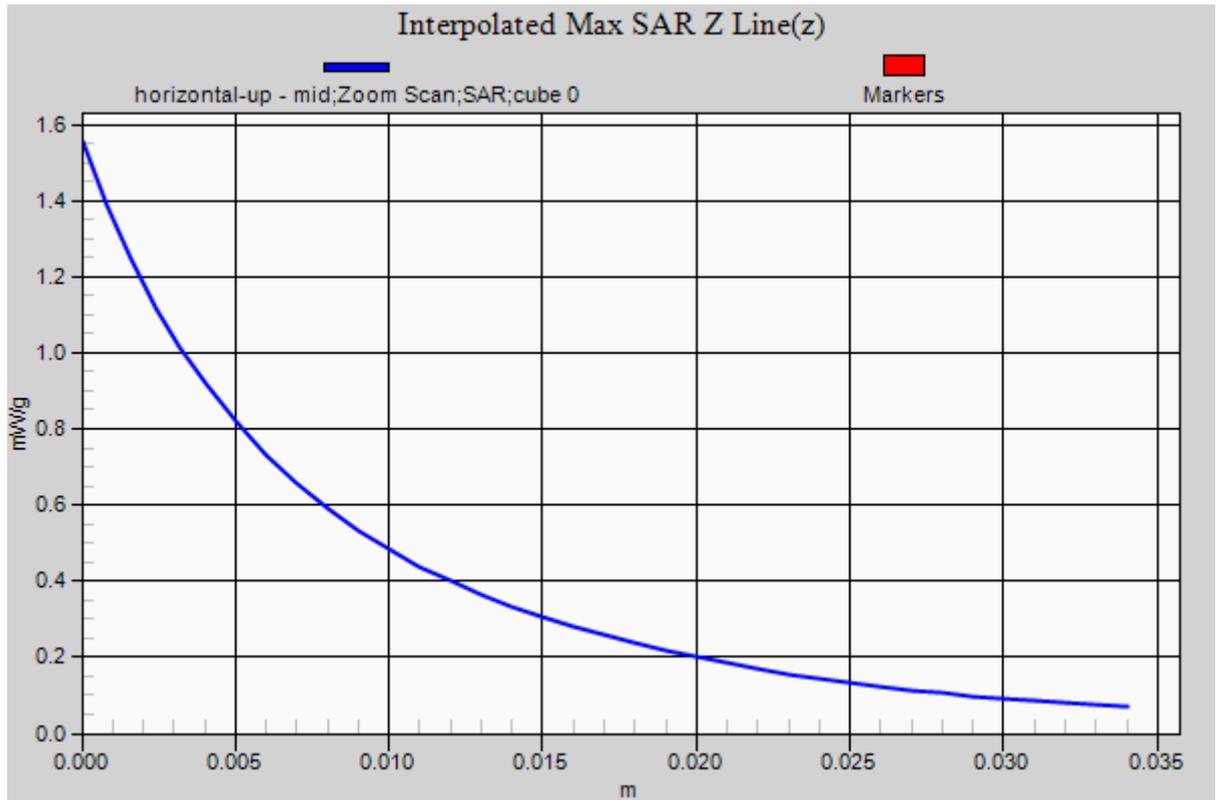
Peak SAR (extrapolated) = 1.5540

**SAR(1 g) = 0.840 mW/g; SAR(10 g) = 0.472 mW/g**

Maximum value of SAR (measured) = 0.926 mW/g



$0 \text{ dB} = 0.930 \text{ mW/g} = -0.63 \text{ dB mW/g}$



**WCDMA BAND V horizontal-down - mid**

Date/Time: 2012-4-9 19:37:30

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 836.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-down - mid/Area Scan (61x111x1):** Measurement grid:

dx=10mm, dy=10mm

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

**body/horizontal-down - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

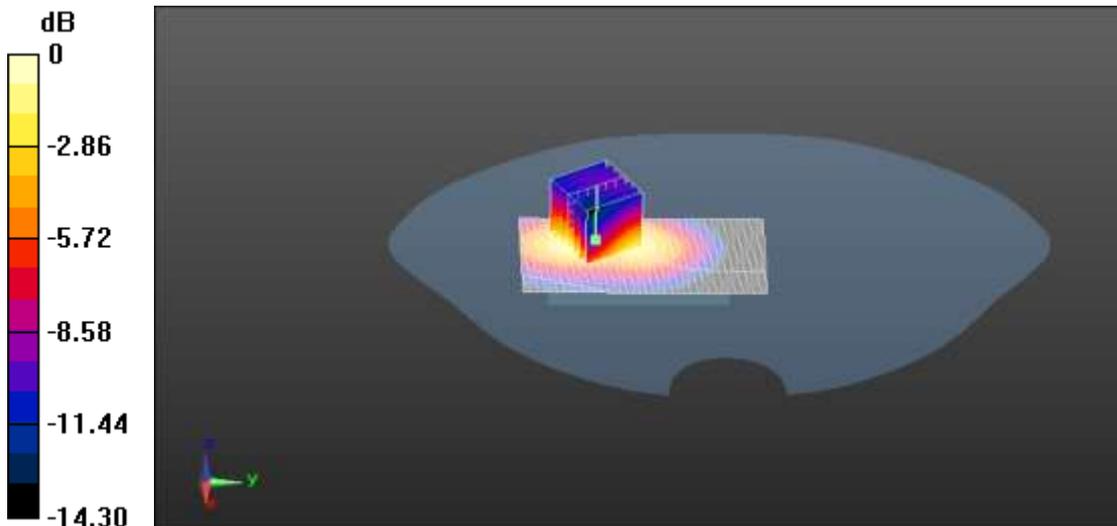
dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.449 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 1.2720

**SAR(1 g) = 0.764 mW/g; SAR(10 g) = 0.451 mW/g**

Maximum value of SAR (measured) = 0.836 mW/g



0 dB = 0.840mW/g = -1.51 dB mW/g

**WCDMA BAND V vertical-front - mid**

Date/Time: 2012-4-9 19:03:07

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 836.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body2/vertical-front - mid/Area Scan (51x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 0.382 mW/g

**body2/vertical-front - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

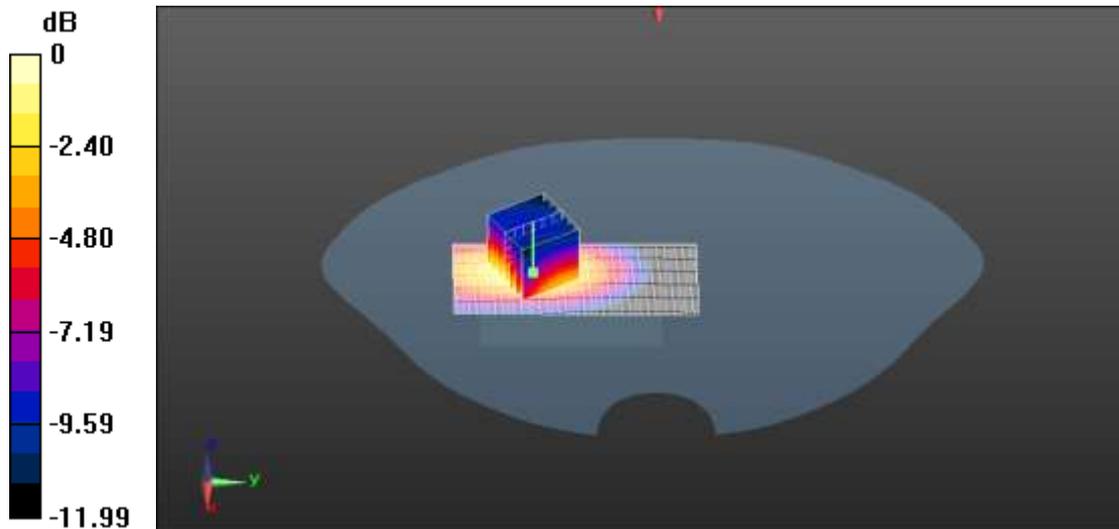
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 5.231 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.5660

**SAR(1 g) = 0.348 mW/g; SAR(10 g) = 0.211 mW/g**

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



$0 \text{ dB} = 0.390 \text{ mW/g} = -8.18 \text{ dB mW/g}$

**WCDMA BAND V vertical-back - mid**

Date/Time: 2012-4-9 18:23:45

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 836.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body2/vertical-back - mid/Area Scan (61x111x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.384 mW/g

**body2/vertical-back - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.811 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.5240

**SAR(1 g) = 0.360 mW/g; SAR(10 g) = 0.251 mW/g**

Maximum value of SAR (measured) = 0.381 mW/g

**body2/vertical-back - mid/Zoom Scan (7x7x7)/Cube 1:** Measurement grid:

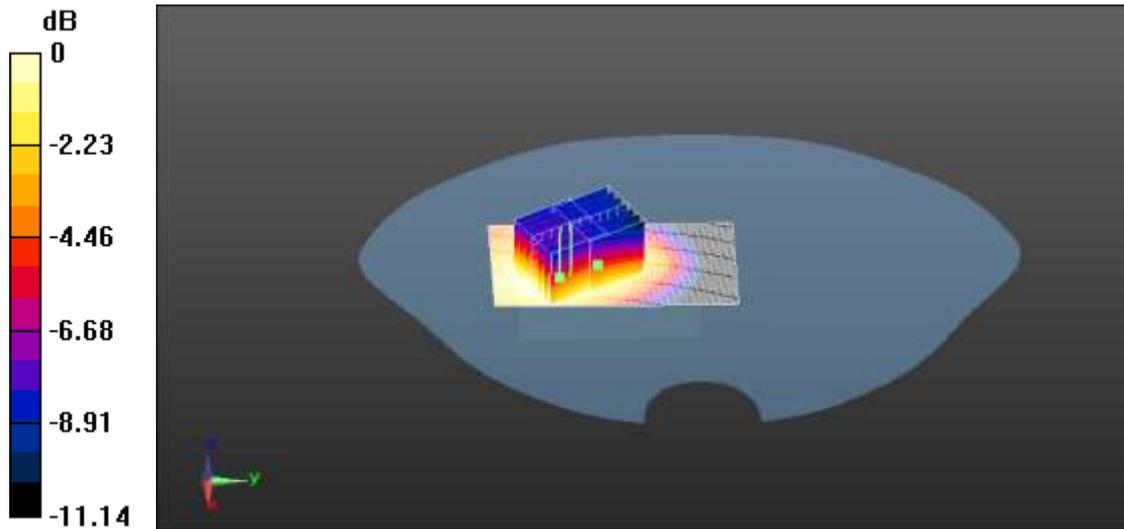
dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.811 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.5350

**SAR(1 g) = 0.353 mW/g; SAR(10 g) = 0.244 mW/g**

Maximum value of SAR (measured) = 0.378 mW/g



0 dB = 0.380mW/g = -8.40 dB mW/g

**WCDMA BAND V horizontal-up - low**

Date/Time: 2012-4-9 17:13:42

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 826.4 MHz; Communication System PAR: 0 dB

Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.936$  mho/m;  $\epsilon_r = 54.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - low/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

Maximum value of SAR (interpolated) = 0.673 mW/g

**body/horizontal-up - low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

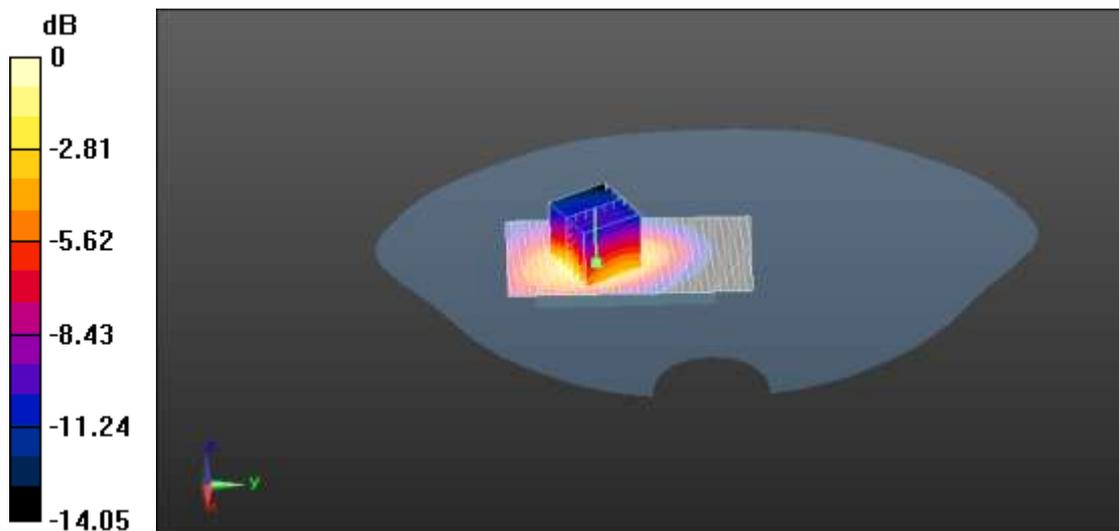
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 7.037 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.0330

**SAR(1 g) = 0.598 mW/g; SAR(10 g) = 0.345 mW/g**

Maximum value of SAR (measured) = 0.659 mW/g



$$0 \text{ dB} = 0.660 \text{ mW/g} = -3.61 \text{ dB mW/g}$$

**WCDMA BAND V horizontal-up - high**

Date/Time: 2012-4-9 17:37:48

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 846.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.965$  mho/m;  $\epsilon_r = 54.169$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - high/Area Scan (61x111x1):** Measurement grid:

$dx=10$ mm,  $dy=10$ mm

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

**body/horizontal-up - high/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

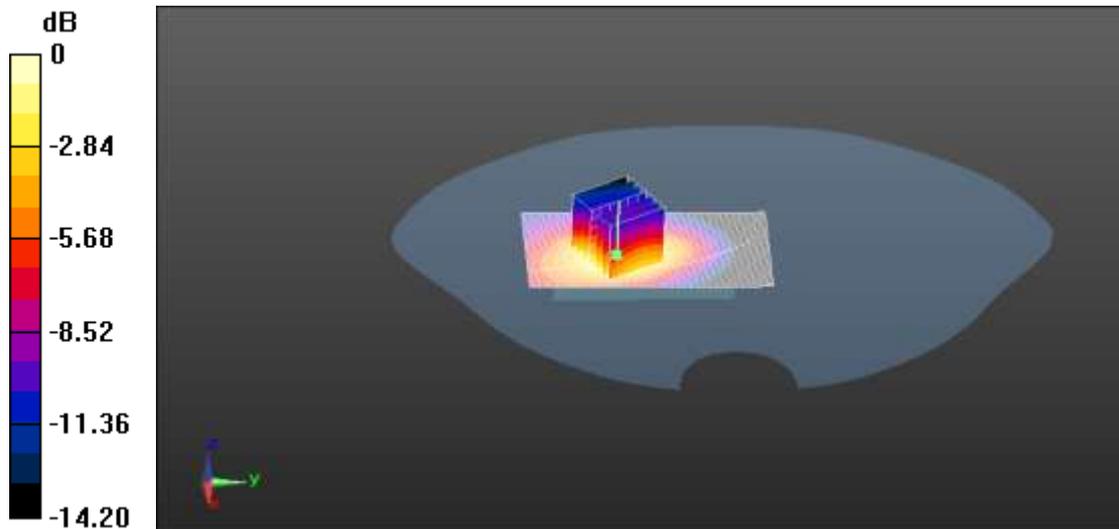
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 7.922 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.1240

**SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.393 mW/g**

Maximum value of SAR (measured) = 0.735 mW/g



$0 \text{ dB} = 0.740 \text{ mW/g} = -2.62 \text{ dB mW/g}$

**WCDMA BAND V horizontal-up - mid with HSDPA**

Date/Time: 2012-4-9 20:16:17

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 836.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - mid with HSDPA/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.855 mW/g

**body/horizontal-up - mid with HSDPA/Zoom Scan (7x7x7)/Cube 0:**

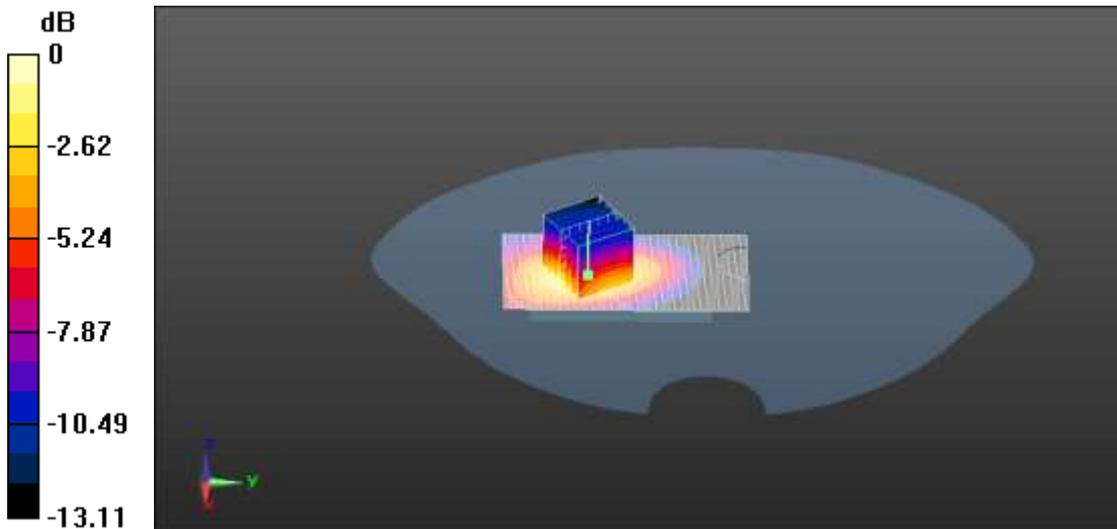
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.428 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.2990

**SAR(1 g) = 0.758 mW/g; SAR(10 g) = 0.446 mW/g**

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



$0 \text{ dB} = 0.840 \text{ mW/g} = -1.51 \text{ dB mW/g}$

**WCDMA BAND V horizontal-up - mid with HSUPA**

Date/Time: 2012-4-9 20:44:49

Communication System: WCDMA; Communication System Band: BAND 5;

Frequency: 836.6 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 54.241$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (OET 65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.19, 6.19, 6.19);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/horizontal-up - mid with HSUPA/Area Scan (61x111x1):**

Measurement grid: dx=10mm, dy=10mm

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

**body/horizontal-up - mid with HSUPA/Zoom Scan (7x7x7)/Cube 0:**

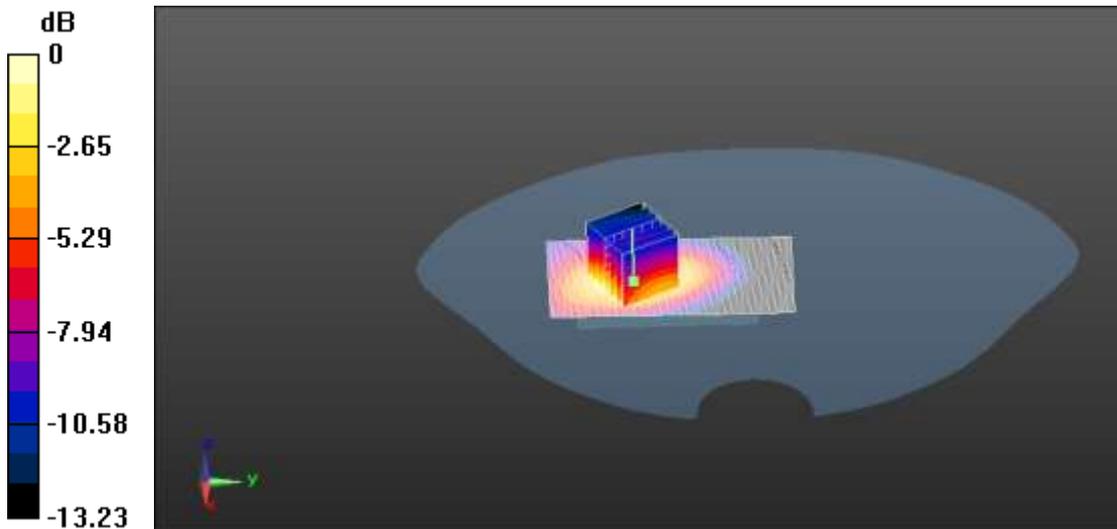
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.939 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.7520

**SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.269 mW/g**

Maximum value of SAR (measured) = 0.503 mW/g



$0 \text{ dB} = 0.500 \text{ mW/g} = -6.02 \text{ dB mW/g}$

## ANNEX G: Probe Calibration Certificate

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



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

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

Accreditation No.: **SCS 108**

Client **ZTE Shanghai (Auden)**

Certificate No: **ES3-3241\_Sep11**

### CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3241
Calibration procedure(s)	QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	September 27, 2011
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p>	

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642J01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name <b>Claudio Leubler</b>	Function Laboratory Technician	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Function Technical Manager	Signature 
			Issued: September 28, 2011
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  
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

**Glossary:**

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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:**

- **NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below *ConvF*).
- **NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- **DCP<sub>x,y,z</sub>**: 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
- **A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; 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  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* 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  $\pm 50$  MHz to  $\pm 100$  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:3241

Manufactured: May 5, 2009  
Calibrated: September 27, 2011

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

## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3241

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>a</sup>	1.18	0.87	1.05	$\pm 10.1 \%$
DCP ( $\text{mV}$ ) <sup>b</sup>	101.3	104.7	100.8	

### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>c</sup> (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	146.9	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	123.7	
			Z	0.00	0.00	1.00	140.3	

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%.

<sup>a</sup> The uncertainties of NormX,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Pages 5 and 6).

<sup>b</sup> Numerical linearization parameter: uncertainty not required.

<sup>c</sup> 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:3241

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	6.18	6.18	6.18	0.80	1.00	± 12.0 %
900	41.5	0.97	6.07	6.07	6.07	0.80	1.00	± 12.0 %
1750	40.1	1.37	5.32	5.32	5.32	0.80	1.25	± 12.0 %
1810	40.0	1.40	5.15	5.15	5.15	0.80	1.26	± 12.0 %
1900	40.0	1.40	5.09	5.09	5.09	0.80	1.25	± 12.0 %
2000	40.0	1.40	5.07	5.07	5.07	0.80	1.22	± 12.0 %
2450	39.2	1.80	4.45	4.45	4.45	0.74	1.30	± 12.0 %

<sup>C</sup> 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.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) 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:3241

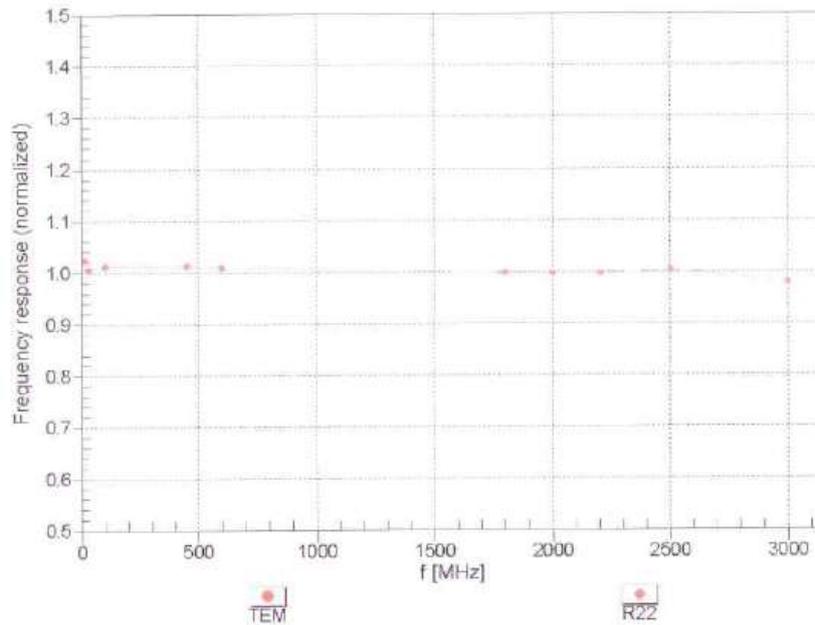
### Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	6.19	6.19	6.19	0.80	1.00	± 12.0 %
900	55.0	1.05	6.12	6.12	6.12	0.80	1.00	± 12.0 %
1750	53.4	1.49	4.85	4.85	4.85	0.80	1.32	± 12.0 %
1810	53.3	1.52	4.78	4.78	4.78	0.80	1.29	± 12.0 %
1900	53.3	1.52	4.67	4.67	4.67	0.80	1.32	± 12.0 %
2000	53.3	1.52	4.76	4.76	4.76	0.75	1.35	± 12.0 %
2450	52.7	1.95	4.29	4.29	4.29	0.80	1.20	± 12.0 %

<sup>c</sup> 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.

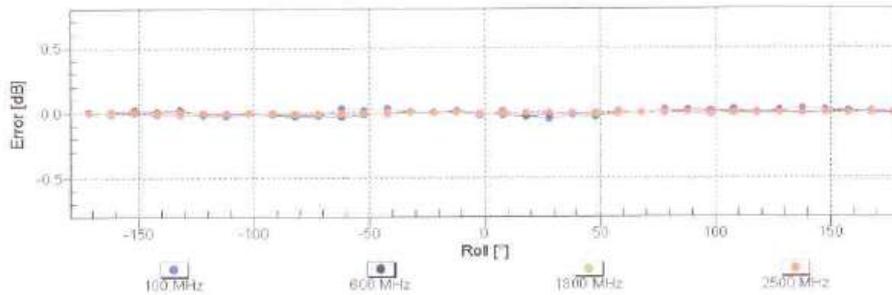
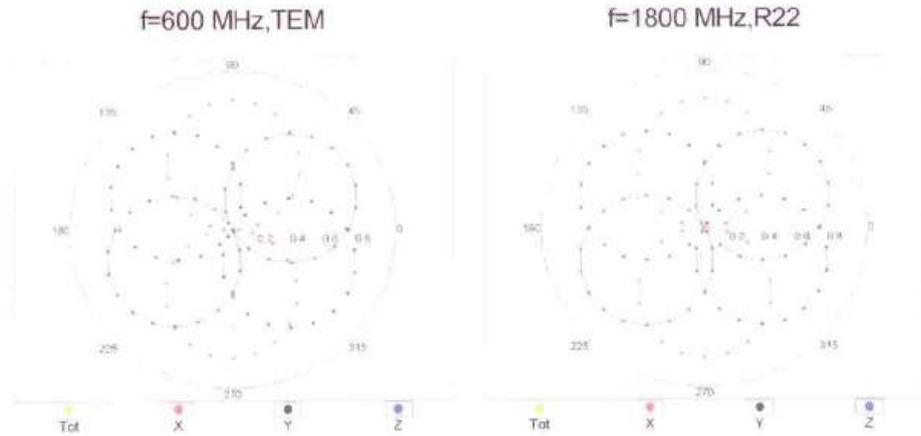
<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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



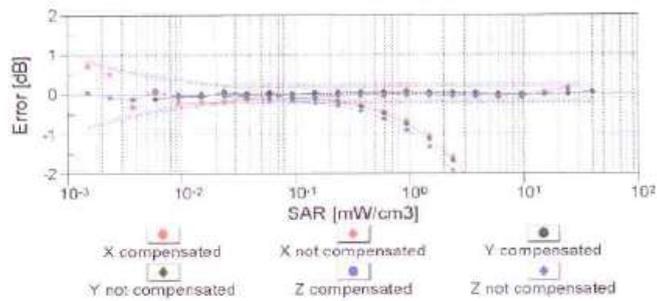
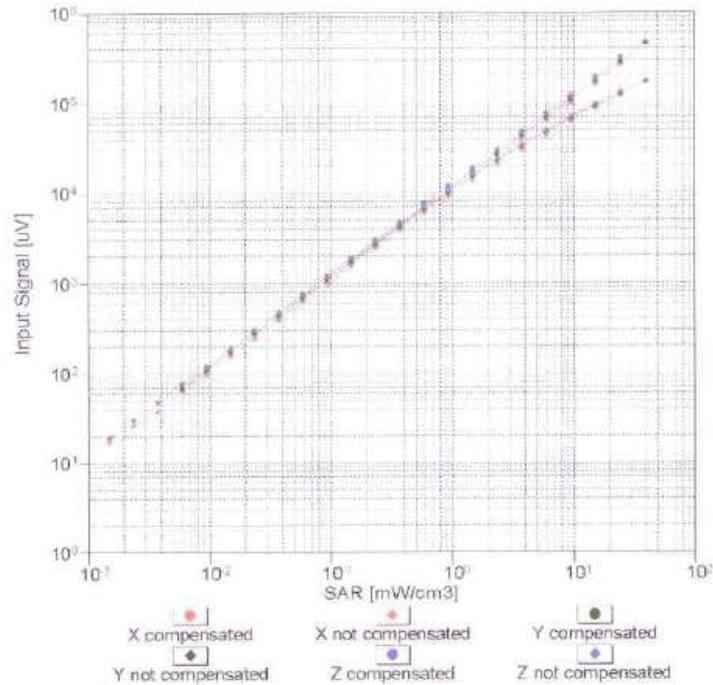
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

Receiving Pattern ( $\phi$ ),  $\vartheta = 0^\circ$



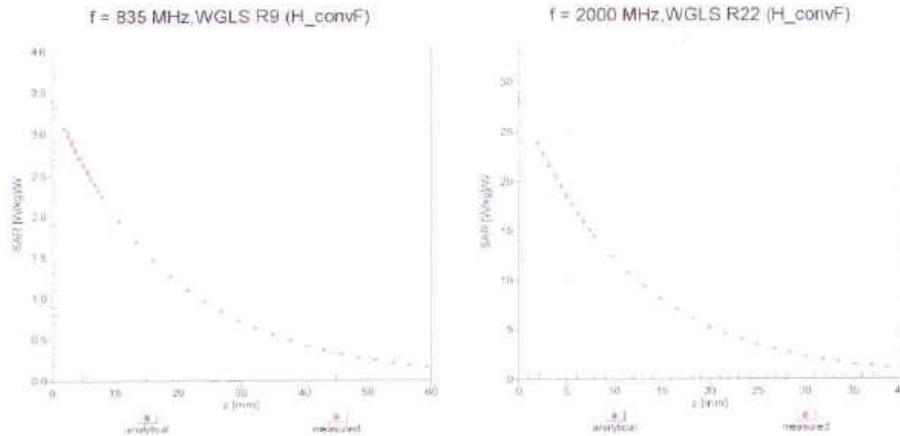
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

**Dynamic Range f(SAR<sub>head</sub>)**  
(TEM cell , f = 900 MHz)



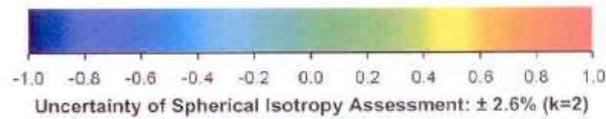
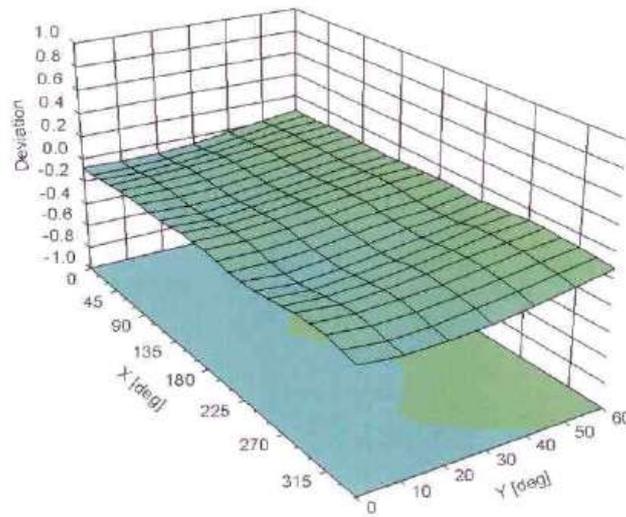
**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

### Conversion Factor Assessment



### Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ),  $f = 900$  MHz



## DASY/EASY - Parameters of Probe: ES3DV3 - SN:3241

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	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 H:DAE4 Calibration Certificate**

工业和信息化部通信计量中心  
Telecommunication Metrology Center of MIIT

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
Tel: +86-10-62304633-2079 Fax: +86-10-62304793  
E-mail: [info@emcite.com](mailto:info@emcite.com) Http://www.emcite.com

批准  
CNAS L0442

Client **Tejet**
Certificate No: **DAE4-1226\_Jun11**

**CALIBRATION CERTIFICATE**

Object: **DAE4 - SN: 1226**

Calibration Procedure(s): **TMC-XZ-01-029  
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **June 13, 2011**

Condition of the calibrated item: **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Multimeter 3458A	MY45041463	12-Nov-10 (TMC, No: DLsc2010-1115)	Nov-11
DC POWER SUPPLY 66321D	MY43001657	12-Nov-10 (TMC, No: JZ10-290)	Nov-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box	/	18-Jun-10 (TMC, in house check)	In house check Jun-11

	Name	Function	Signature
Calibrated by:	Lin Hao	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Xiao Li	Deputy Director of the laboratory	

Issued: June 13, 2011

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

Certificate No: DAE4-1226\_Jun11
Page 1 of 5

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
Tel: +86-10-62304633-2079 Fax: +86-10-62304793  
E-mail: [info@emcite.com](mailto:info@emcite.com) Http://www.emcite.com

**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 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.

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 Tel: +86-10-62304633-2079 Fax: +86-10-62304793  
 E-mail: [Info@emcite.com](mailto:Info@emcite.com) Http://www.emcite.com

**DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1  $\mu$ V, 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	405.837 $\pm$ 0.1% (k=2)	405.272 $\pm$ 0.1% (k=2)	405.326 $\pm$ 0.1% (k=2)
Low Range	3.99601 $\pm$ 0.7% (k=2)	4.01768 $\pm$ 0.7% (k=2)	4.02083 $\pm$ 0.7% (k=2)

**Connector Angle**

Connector Angle to be used in DASY system	112.5 $^{\circ}$ $\pm$ 1 $^{\circ}$
---	-------------------------------------

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 E-mail: [Info@emcite.com](mailto:Info@emcite.com) Http://www.emcite.com

**Appendix**

**1. DC Voltage Linearity**

High Range	Input (μ V)	Reading (μ V)	Error (%)
Channel X + Input	200000	200000	0.00
Channel X + Input	20000	20003.91	0.03
Channel X - Input	20000	-20002.26	0.01
Channel Y + Input	200000	200000	0.00
Channel Y + Input	20000	20004.30	0.02
Channel Y - Input	20000	-20001.84	0.01
Channel Z + Input	200000	200000.6	0.00
Channel Z + Input	20000	20002.05	0.01
Channel Z - Input	20000	-20003.32	0.02

Low Range	Input (μ V)	Reading (μ V)	Error (%)
Channel X + Input	2000	1999.9	0.00
Channel X + Input	200	199.61	-0.19
Channel X - Input	200	-200.68	0.36
Channel Y + Input	2000	1999.9	0.00
Channel Y + Input	200	199.40	-0.29
Channel Y - Input	200	-200.46	0.23
Channel Z + Input	2000	2000	0.00
Channel Z + Input	200	199.33	-0.34
Channel Z - Input	200	-201.29	0.66

**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 (μ V)	Low Range Average Reading (μ V)
Channel X	200	3.40	3.47
	- 200	-2.47	-3.10
Channel Y	200	0.15	-0.51
	- 200	-0.60	-1.12
Channel Z	200	-9.89	-10.17
	- 200	7.71	8.15

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
 Tel: +86-10-62304633-2079 Fax: +86-10-62304793  
 E-mail: [Info@emcite.com](mailto:Info@emcite.com) Http://www.emcite.com

**3. Channel separation**

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

	Input Voltage (mV)	Channel X ( $\mu$ V)	Channel Y ( $\mu$ V)	Channel Z ( $\mu$ V)
Channel X	200	-	2.59	-0.31
Channel Y	200	0.57	-	2.47
Channel Z	200	-1.89	0.23	-

**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	16128	16441
Channel Y	15957	16202
Channel Z	15979	16032

**5. Input Offset Measurement**

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

Input 10M $\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation( $\mu$ V)
Channel X	0.57	-1.05	2.02	0.41
Channel Y	-1.02	-1.96	-0.02	0.39
Channel Z	1.15	-0.07	1.94	0.34

**6. Input Offset Current**

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

**7. Input Resistance**

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2000	200.0
Channel Y	0.2000	200.0
Channel Z	0.2000	200.0

**ANNEX I: D835V2 Calibration Certificate**

工业和信息化部通信计量中心  
Telecommunication Metrology Center of MIIT

校准  
CNAS L0442

Client **Tejet** Certificate No: **D835V2-4d100\_Jun11**

### CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d100**

Calibration Procedure(s): **TMC-XZ-01-027  
Calibration procedure for dipole validation kits**

Calibration date: **June 14, 2011**

Condition of the calibrated item: **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	101253	03-Sep-10 (TMC, No.JZ10-248)	Sep-11
Power sensor NRV-Z5	100333	03-Sep-10 (TMC, No. JZ10-248)	Sep-11
Reference Probe ES3DV3	SN 3149	25-Sep-10(SPEAG No.ES3-3149_Sep10)	Sep-11
DAE4	SN 771	21-Nov-10(SPEAG No.DAE4-771_Nov10)	Nov-11
RF generator E4438C	MY45092879	17-Jun-10(TMC, No.JZ10-302)	Jun-11
Network Analyzer 8753E	US38433212	28-Aug-10(TMC, No.JZ10-056)	Aug-11

	Name	Function	Signature
Calibrated by:	Lin Hao	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Xiao Li	Deputy Director of the laboratory	

Issued: July 5, 2011

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

Certificate No: D835V2-4d100\_Jun11

Page 1 of 9

**Glossary:**

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
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 300MHz to 3GHz)", 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) DASY System Handbook

**Methods Applied and Interpretation of Parameters:**

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

### Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	2mm Oval Phantom ELI4	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	0.89mho/m $\pm$ 6 %
Head TSL temperature during test	(21.7 $\pm$ 0.2) °C	----	----

### SAR result with Head TSL

SAR averaged over 1 $cm^3$ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR normalized	normalized to 1W	9.48 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	9.53 mW /g $\pm$ 17.0 % (k=2)

SAR averaged over 10 $cm^3$ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.53 mW / g
SAR normalized	normalized to 1W	6.12 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	6.14 mW /g $\pm$ 16.5 % (k=2)

<sup>1</sup> Correction to nominal TSL parameters according to d). chapter "SAR Sensitivities"

### 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	53.8 ± 6%	1.00mho/m ± 6 %
Body TSL temperature during test	(21.9 ± 0.2) °C	----	----

### SAR result with Body TSL

SAR averaged over 1 $cm^3$ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.45 mW / g
SAR normalized	normalized to 1W	9.80 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	9.47 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 normalized	normalized to 1W	6.36 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	6.21 mW /g ± 16.5 % (k=2)

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	47.8Ω + 0.22 jΩ
Return Loss	- 32.8dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	45.9Ω + 3.6 jΩ
Return Loss	- 24.9dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	2.983 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	March 9, 2010

**DASY5 Validation Report for Head TSL**

Date/Time: 2011-6-14 8:57:36

Test Laboratory: TMC, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: SN: 4d100

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

Medium: Head 835MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.56, 6.56, 6.56); Calibrated: 25.09.10
- Electronics: DAE4 Sn771; Calibration: 21.11.10
- Phantom: 2mm Oval Phantom ELI4; Type: QDOVA001BB
- Measurement SW: DASY5, V5.0 Build 119.9; Postprocessing SW: SEMCAD, V13.2 Build 87

Pin=250mW; d=15mm/Zoom Scan (7x7x7)/Cube 0:

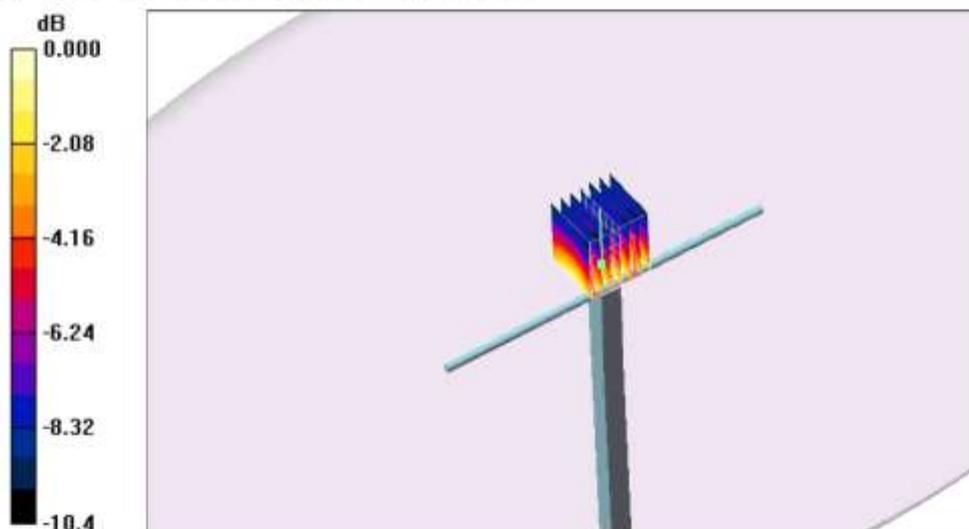
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.1 V/m; Power Drift = 0.096 dB

Peak SAR (extrapolated) = 3.45 W/kg

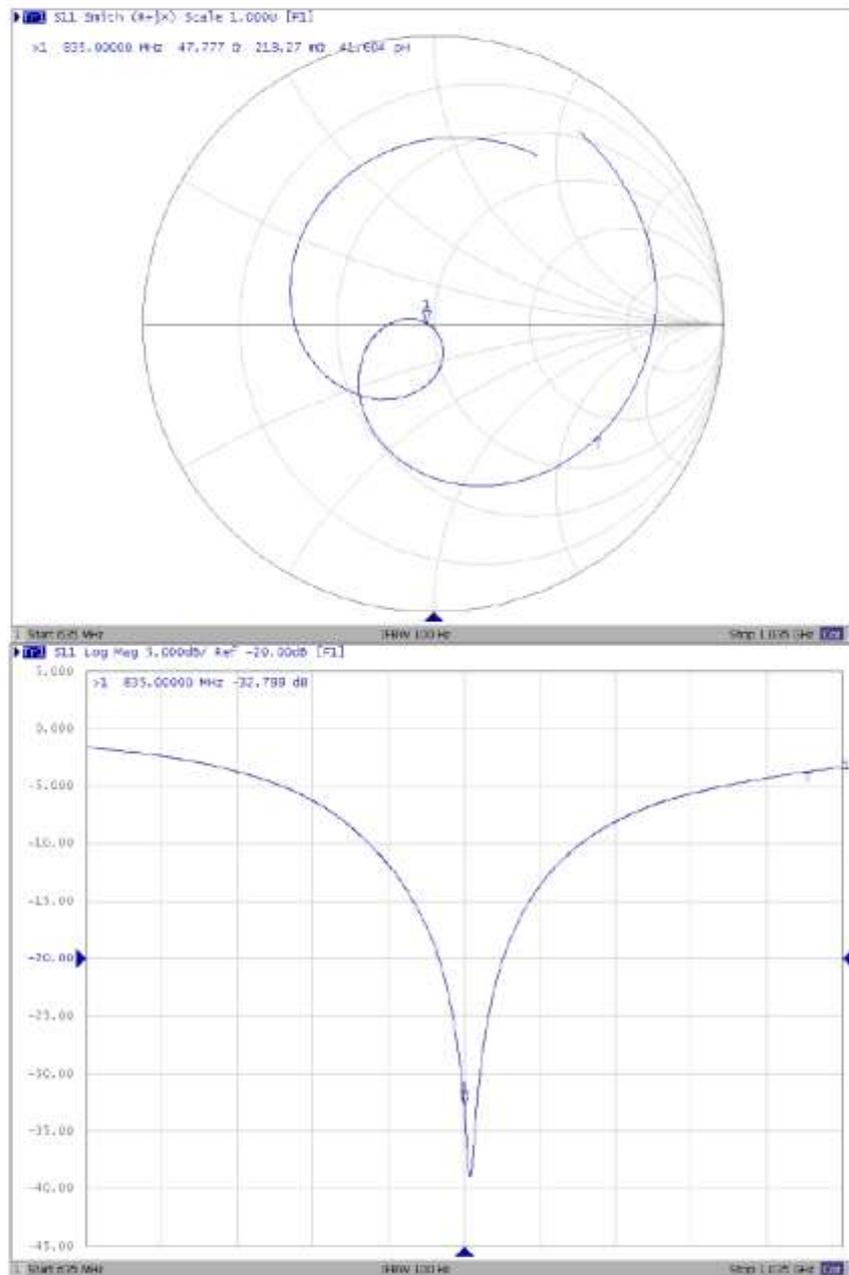
SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.53 mW/g

Maximum value of SAR (measured) = 2.54 mW/g



0 dB = 2.54mW/g

Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date/Time: 2011-6-14 9:52:23

Test Laboratory: TMC, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: SN: 4d100

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

Medium: Body 835MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 1.00 \text{ mho/m}$ ;  $\epsilon_r = 53.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.22, 6.22, 6.22); Calibrated: 25.09.10
- Electronics: DAE4 Sn771; Calibration: 21.11.10
- Phantom: 2mm Oval Phantom ELI4; Type: QDOVA001BB
- Measurement SW: DASY5, V5.0 Build 119.9; Postprocessing SW: SEMCAD, V13.2 Build 87

Pin=250mW; d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 41.3 V/m; Power Drift = -0.084 dB

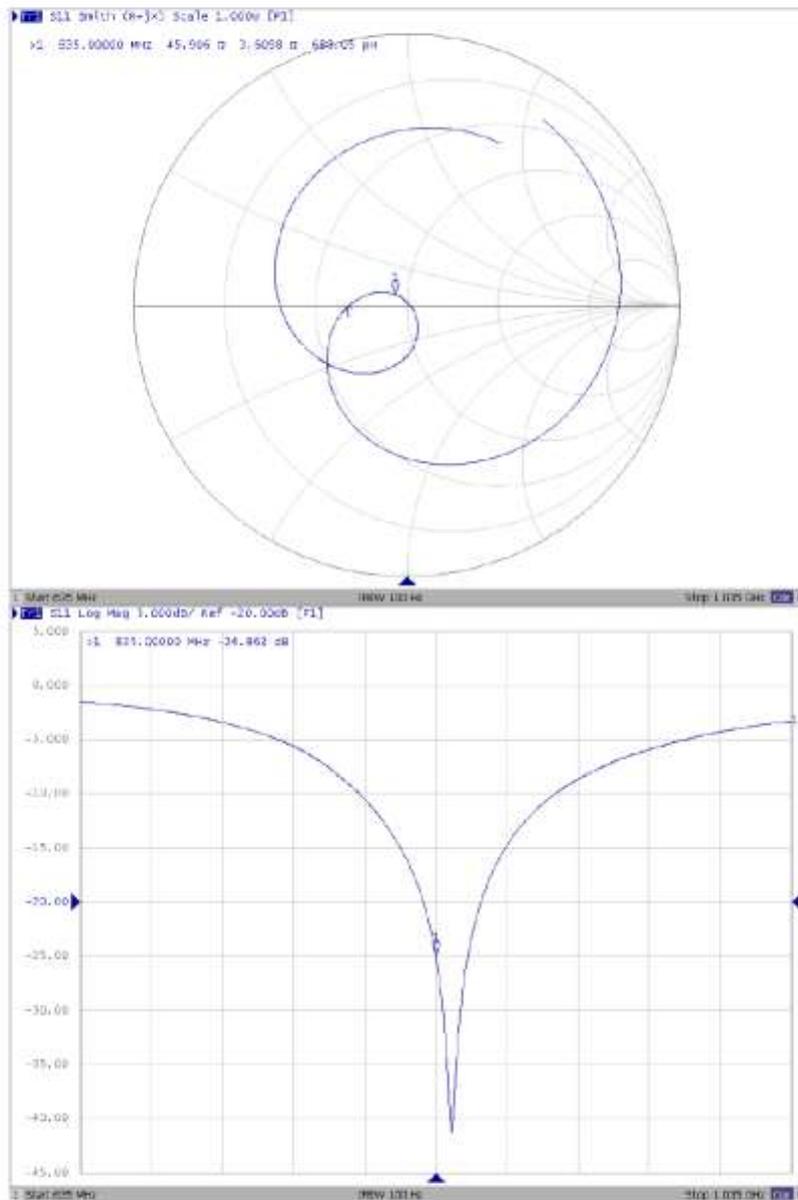
Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.59 mW/g

Maximum value of SAR (measured) = 2.66 mW/g



Impedance Measurement Plot for Body TSL



## ANNEX J: D1900V2 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 **Auden**

Certificate No: **D1900V2-5d142\_Jul11**

CALIBRATION CERTIFICATE																																															
Object	D1900V2 - SN: 5d142																																														
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz																																														
Calibration date:	July 22, 2011																																														
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity &lt; 70%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>06-Oct-10 (No. 217-01266)</td> <td>Oct-11</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>06-Oct-10 (No. 217-01266)</td> <td>Oct-11</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: S5086 (20b)</td> <td>29-Mar-11 (No. 217-01367)</td> <td>Apr-12</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 5047.2 / 06327</td> <td>29-Mar-11 (No. 217-01371)</td> <td>Apr-12</td> </tr> <tr> <td>Reference Probe ES3DV3</td> <td>SN: 3205</td> <td>29-Apr-11 (No. ES3-3205_Apr11)</td> <td>Apr-12</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>04-Jul-11 (No. DAE4-601_Jul11)</td> <td>Jul-12</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power sensor HP 8481A</td> <td>MY41092317</td> <td>18-Oct-02 (in house check Oct-09)</td> <td>In house check: Oct-11</td> </tr> <tr> <td>RF generator R&amp;S SMT-06</td> <td>100005</td> <td>04-Aug-99 (in house check Oct-09)</td> <td>In house check: Oct-11</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US3739C585 S4206</td> <td>18-Oct-01 (in house check Oct-10)</td> <td>In house check: Oct-11</td> </tr> </tbody> </table>				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	US3739C585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11
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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  
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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	39.1 ± 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 <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>39.4 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.21 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>20.7 mW / g ± 16.5 % (k=2)</b>

**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	52.3 ± 6 %	1.53 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

**SAR result with Body TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>40.5 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.36 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>21.3 mW / g ± 16.5 % (k=2)</b>

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	54.6 $\Omega$ + 5.8 j $\Omega$
Return Loss	- 23.0 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	47.8 $\Omega$ + 6.7 j $\Omega$
Return Loss	- 22.9 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.201 ns
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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	March 11, 2011

**DASY5 Validation Report for Head TSL**

Date: 20.07.201

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d142**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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:**

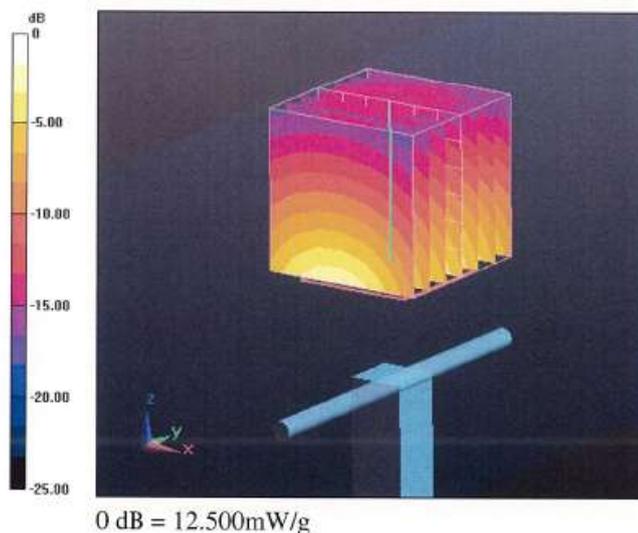
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.703 V/m; Power Drift = 0.02 dB

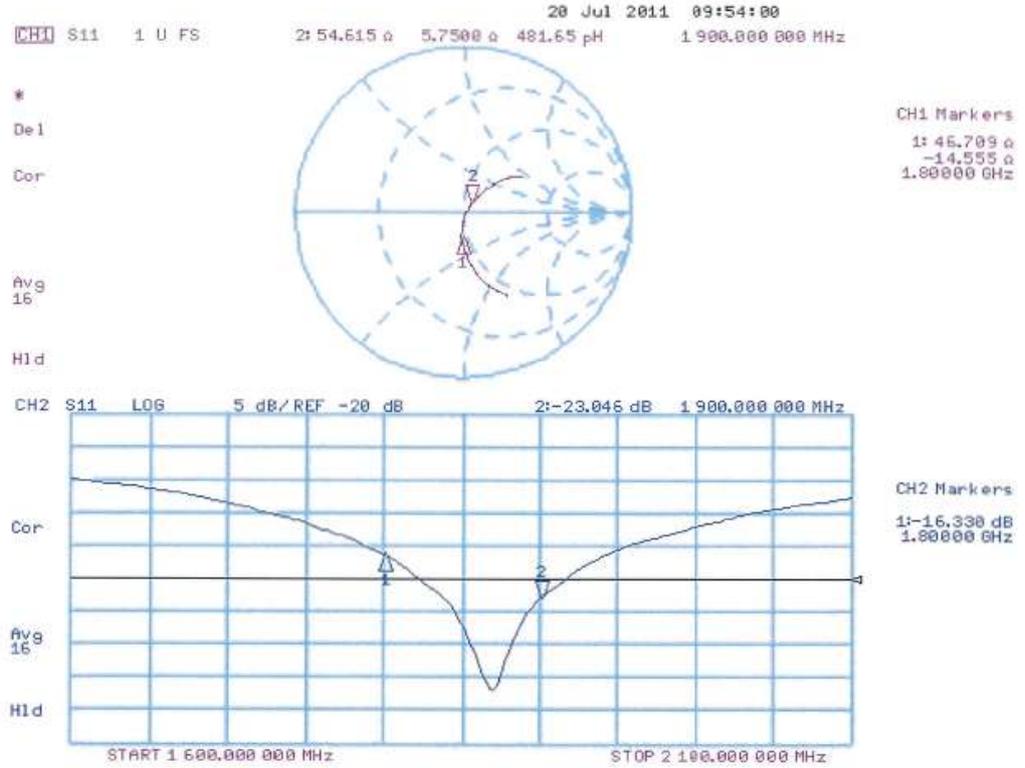
Peak SAR (extrapolated) = 18.174 W/kg

**SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.21 mW/g**

Maximum value of SAR (measured) = 12.496 mW/g



Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 22.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d142**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.53 \text{ mho/m}$ ;  $\epsilon_r = 52.3$ ;  $\rho = 1000 \text{ kg/m}^3$

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:**

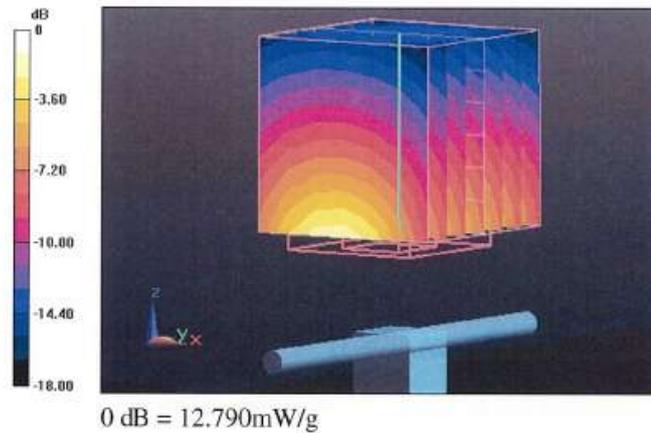
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 95.443 V/m; Power Drift = 0.0058 dB

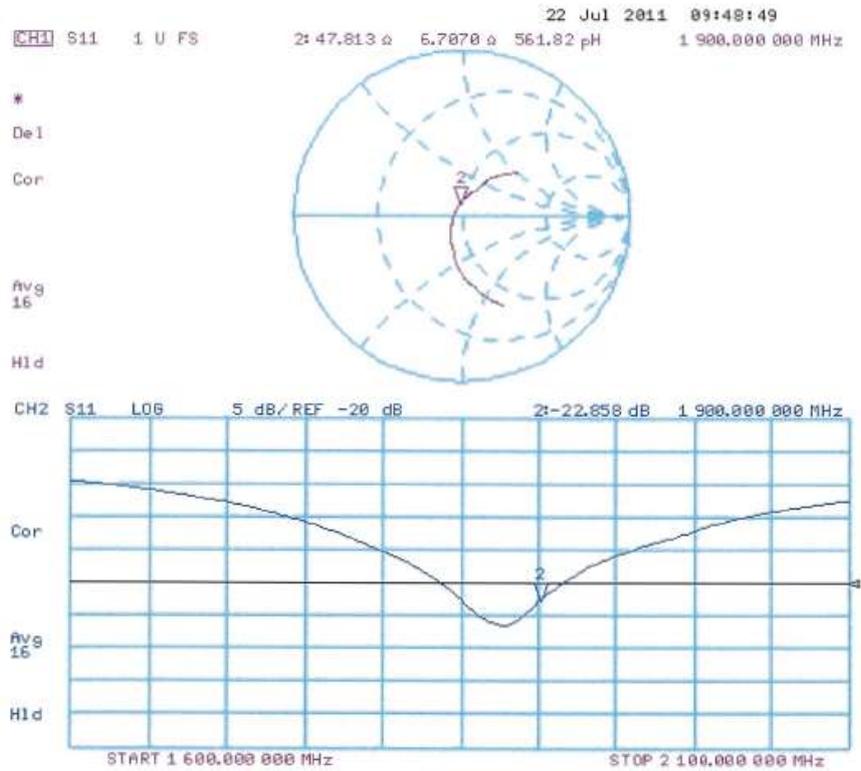
Peak SAR (extrapolated) = 18.044 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.36 mW/g**

Maximum value of SAR (measured) = 12.793 mW/g



Impedance Measurement Plot for Body TSL



-----END OF REPORT-----