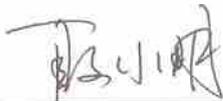


# SAR TEST REPORT

Report No. 2012SAR207

FCC ID: Q78-GS518  
Applicant: ZTE Corporation  
Product: GSM Dual-Band Digital Mobile Phone  
Model: ZTE-G S518  
HW Version: GMAQ  
SW Version: ZTE-CN-9S-P110A17V1.0.0  
Issue Date: 2012-05-23

Prepared by:   
Yin Xiaoming

Reviewed by:   
Xue Jianguo

Approved by:   
Wang Jianrong



**Remark:** This report details the results of the testing carried out on the samples specified in this report, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. The report shall be reproduced except in full, without written approval of the Company.

## Standards

<p>Applicable Limit Regulations</p>	<p><b>ANSI/IEEE C95.1-2005</b> Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields. 3 kHz to 300 GHz</p>
	<p><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</p>
<p>Applicable Standards</p>	<p><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</p>
	<p><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</p>

## Conclusion

Localized Specific Absorption Rate (SAR) of this equipment has been measured in all cases requested by the relevant standards above. Maximum localized SAR is below exposure limits as well.

### Change History

Version	Change Contents	Author	Date
V1.0	First edition	Yin xiaoming	2012-05-23

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## 1. Administrative Information

### 1.1 Project Information

Date of start test            2012-05-15  
Date of end test:            2012-05-18

### 1.2 Test Laboratory Information

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

### 1.3 Test Environment

Temperature:                20°C~25 °C  
Relative Humidity:        20%~70%

## 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  
City: Shenzhen  
Postal Code: 518057  
Country: China  
Telephone: +86-21-68895196  
Fax: +86-21-61460600

### 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  
City: Shenzhen  
Postal Code: 518057  
Country: China  
Telephone: +86-21-68895196  
Fax: +86-21-61460600

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

#### 3.1 Information of EUT

Device Type	Portable device	
Product	GSM Dual-Band Digital Mobile Phone	
Model	ZTE-G S518	
Exposure Category	Uncontrolled environment / general population	
Device operation configuration:		
Operating Mode(s):	GSM850	
	PCS1900	
Modulation Type	(GSM)GMSK	
Rated Output Power	GSM 850:33dBm	
	PCS1900: 30dBm	
Antenna Type:	Internal antenna	
Operating Frequency Range(s):	Band	Tx(MHz)
	GSM850	824.2~848.8
	PCS1900	1850.2~1909.8
Power Class	GSM850: 4, test with power level 5	
	PCS1900: 1, test with power level 0	

**Note:** Equipment under test (EUT) is GSM Dual-Band Digital Mobile Phone with internal antenna. It consists of mobile phone, battery and adaptor and the detail about these is in this report. SAR is tested for GSM850/1900

### 3.2 Identification of EUT

EUT ID	SN or IMEI	HW Version	SW Version	Received Date
TN04	864388010001430	GMAQ	ZTE-CN-9S-P110A17V1.0.0	2012-05-14

\*EUT ID: identify the test sample in the lab internally.

### 3.3 Identification of AE

AE ID*	Description
AE1	Battery
AE2	Travel Adaptor
AE3	Earphone

#### AE1

Model	Li3707T42P3h463548
Manufacturer	ZTE CORPORATION
Capacitance	720mAh
Nominal Voltage	3.7V

#### AE2

Model	STC-A22O50I700M5-C
Manufacturer	RUIDE
Length of DC line	120cm

#### AE3

Model	NLD-EM127E-035S
Manufacturer	ZTE CORPORATION
Length of DC line	120cm

\*AE ID: identify the test sample in the lab internally.

## **4. Operational Conditions during Test**

### **4.1 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 and high respectively in the case of each band. 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 30dB.

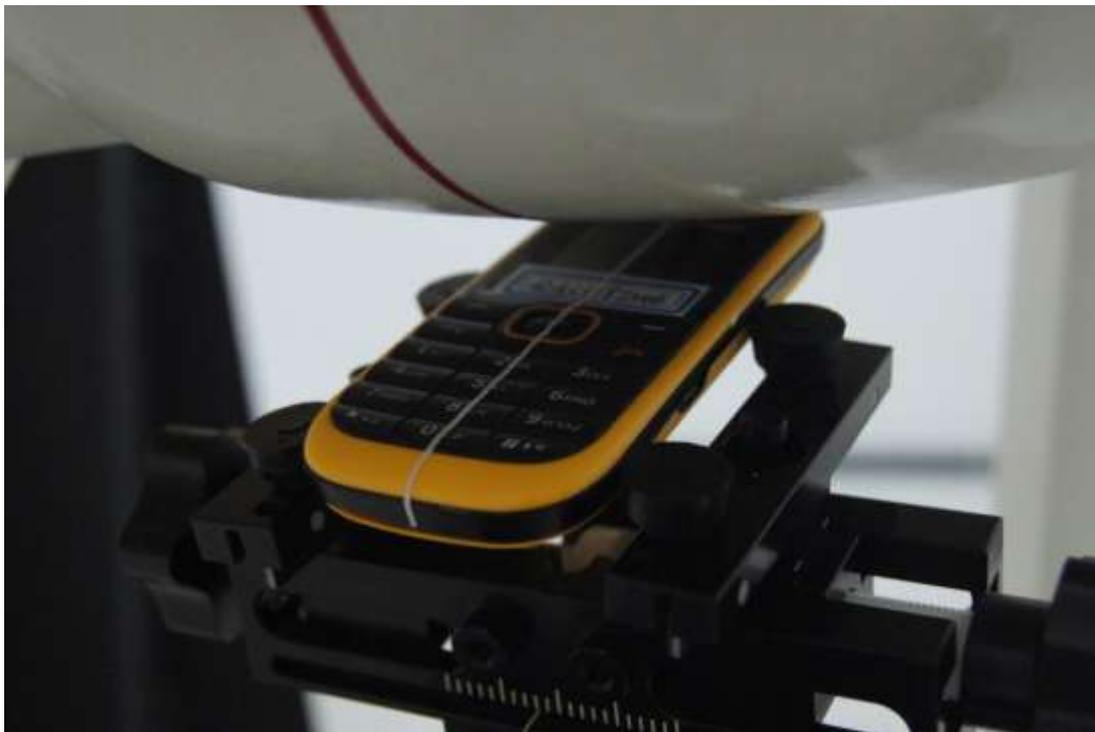
### **4.2 GSM Test Configuration**

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 GSM 1900, The tests in the band of GSM850/1900 are performed in the mode of data transfer function.

#### 4.6 Definition of Test Positions



POSITION OF LEFT HEAD TOUCH



POSITION OF LEFT HEAD TILT



POSITION OF RIGHT HEAD TOUCH



POSITION OF RIGHT HEAD TILT



POSITION OF BODY TOWARDS PHANTOM WITH 15mm DISTANCE



POSITION OF BODY TOWARDS GROUND WITH 15mm DISTANCE



POSITION OF BODY TOWARDS GROUND WITH 15mm DISTANCE (WITH EARPHONE)

## 5. SAR Measurements system configuration

### 5.1 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.

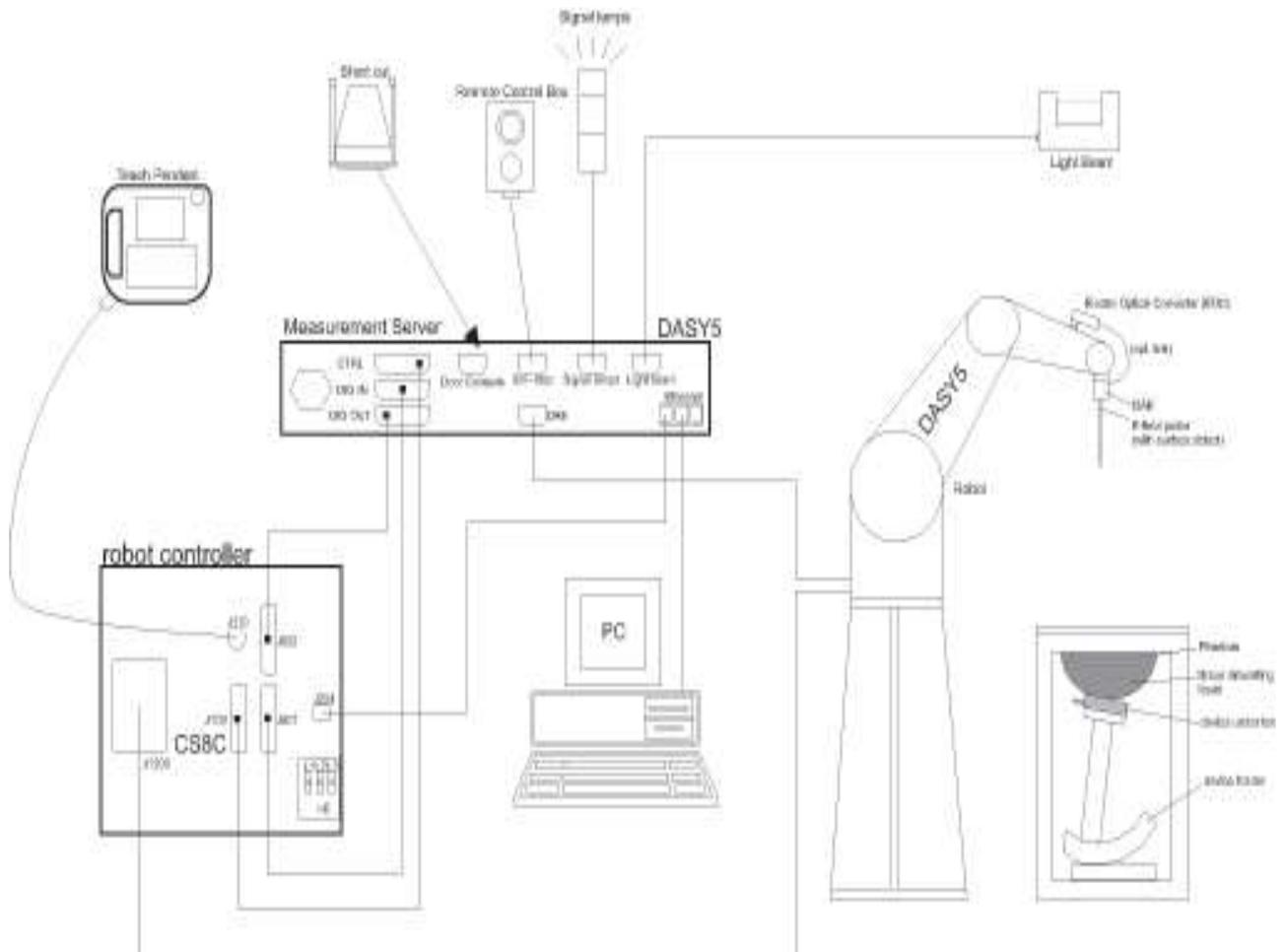


Figure 5-1 SAR Lab Test Measurement Set-up

## 5.2 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.

### 5.2.1 Es3DV3 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 $\mu$ W/g to > 100 mW/g Linearity: $\pm$ 0.2dB (noise: typically < 1 $\mu$ W/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.



Figure 5-2.ES3DV3 E-field Probe



Figure 5-3. ES3DV3 E-field probe

### 5.2.2 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than  $\pm$ 10%. The spherical isotropy was evaluated and found to be better than  $\pm$  0.25dB. 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:  $\Delta t$  = 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>).

### 5.3 Other Test Equipment

#### 5.3.1 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 are 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 5-4. Device Holder

#### 5.3.2 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 5-5. Generic Twin Phantom**

#### **5.4 Scanning procedure**

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

- The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ±5%.
- The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)
- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 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 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

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

## 5.5 Data Storage and Evaluation

### 5.5.1 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.

### 5.5.2 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.

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

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

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

= 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

## 5.6 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 7.1 and 7.2.

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.

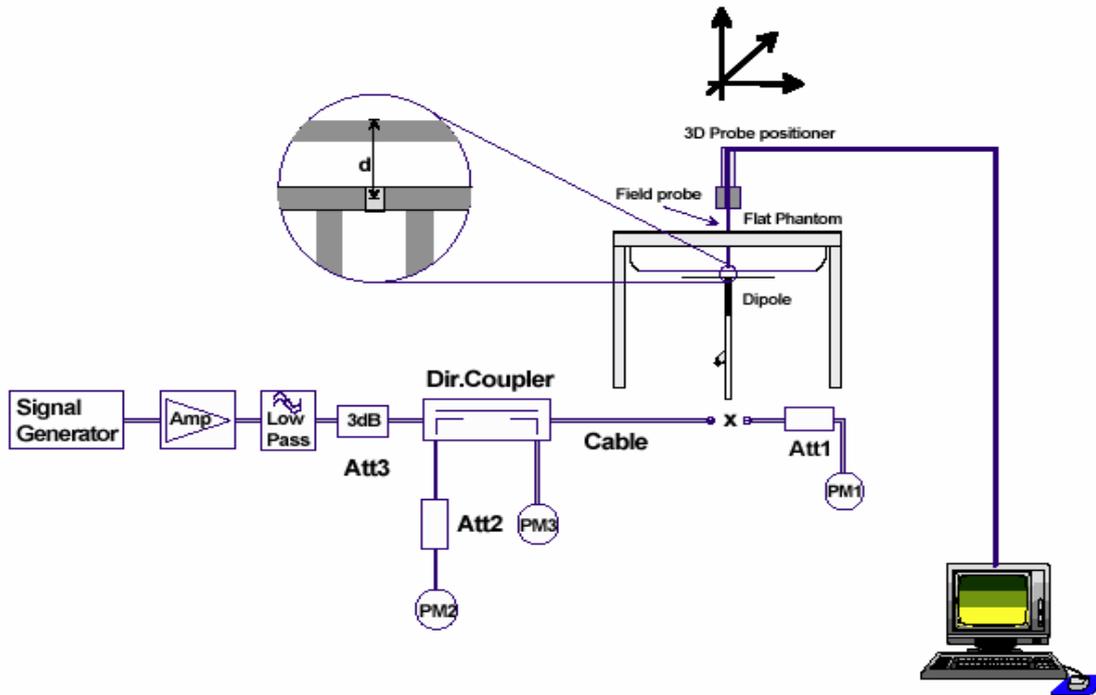


Figure 5-6. System Check Set-up

### 5.7 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(head) 835MHz
Water	41.45
Sugar	56
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz $\epsilon=41.5$ $\sigma=0.9$
MIXTURE%	FREQUENCY(body) 835MHz
Water	52.5
Sugar	45
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz $\epsilon=55.2$ $\sigma=0.97$

<b>MIXTURE%</b>	<b>FREQUENCY(head)1900MHz</b>
<b>Water</b>	<b>55.242</b>
<b>Glycol monobutyl</b>	<b>44.452</b>
<b>Salt</b>	<b>0.306</b>
<b>Dielectric Parameters Target Value</b>	<b>f=1900MHz <math>\epsilon=40.0</math> <math>\sigma=1.40</math></b>
<b>MIXTURE%</b>	<b>FREQUENCY(body)1900MHz</b>
<b>Water</b>	<b>69.91</b>
<b>Glycol monobutyl</b>	<b>29.96</b>
<b>Salt</b>	<b>0.13</b>
<b>Dielectric Parameters Target Value</b>	<b>f=1900MHz <math>\epsilon=53.3</math> <math>\sigma=1.52</math></b>

## 6. Summary of Test Results

### 6.1 Conducted Output Power Measurement

#### 6.1.1 Summary

The DUT is tested using a 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.

#### 6.1.2 Conducted Power Results

GSM850	Conducted Power (dBm)		
	Channel 128	Channel 189	Channel 251
Results	32.4	32.4	32.3
PCS1900	Conducted Power (dBm)		
	Channel 512	Channel 661	Channel 810
Results	29.8	29.8	30.5

## 6.2 Test Results

### 6.2.1. Dielectric Performance

#### Dielectric Performance of Head Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters $\epsilon_r$	$\sigma$ (s/m)	temp °C
<b>835MHz (head)</b>	Target value 5% window	41.5 39.42-43.57	0.9 0.85-0.945	/
	Measurement value 2012-05-15	41.7	0.86	21.8
<b>835MHz (body)</b>	Target value 5% window	55.2 52.44-57.96	0.97 0.92-1.02	/
	Measurement value 2012-05-17	54.6	0.964	21.9
<b>1900MHz (head)</b>	Target value 5% window	40 38-42	1.40 1.33-1.47	/
	Measurement value 2012-05-15	39.4	1.35	21.8
<b>1900MHz (body)</b>	Target value 5% window	53.3 50.63-55.96	1.52 1.44 — 1.60	/
	Measurement value 2012-05-17	53.35	1.53	21.7
	Measurement value 2012-05-18	52.4	1.54	21.8

### 6.2.2. System Check Results

#### System Check for Head & Body tissue simulation liquid

Frequency	Description	SAR(W/kg)		Dielectric Parameter $\epsilon_r$	$\sigma$ (s/m)	Temp °C
		10g	1g			
<b>835MHz (head)</b>	Recommended result $\pm 10\%$ window	1.53 1.38-1.68	2.37 2.13-2.61	41.5	0.9	/
	Measurement value 2012-05-15	1.56	2.4	41.7	0.86	21.8
<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 2012-05-17	1.51	2.32	54.6	0.964	21.9
<b>1900MHz (head)</b>	Recommended result $\pm 10\%$ window	5.09 4.58-5.60	9.65 8.69-10.62	40.0	1.4	/
	Measurement value 2012-05-15	4.98	9.74	39.4	1.35	21.8
<b>1900MHz (body)</b>	Recommended result $\pm 10\%$ window	5.3 4.77-5.83	10 9-11	53.3	1.52	/
	Measurement value 2012-05-17	5.01	9.77	53.35	1.53	21.7
	Measurement value 2012-05-18	5.29	10.3	52.4	1.54	21.8

Note: 1. the graph results see ANNEX B.1.

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

### 6.2.3 Test Results

#### 6.2.3.1 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 Head					
Left head, Touch cheek	middle	0.696		0.04	
Left head, Tilt 15 Degree	middle	0.248		-0.06	
Right head, Touch cheek	middle	0.659		0.06	
Right head, Tilt 15 Degree	middle	0.286		-0.02	
Left head, Touch cheek	low	0.664		0.03	
	high	<b>0.792</b>		-0.14	<b>max</b>
Test position of Body (Distance 15mm)					
Towards phantom	middle	0.347		0.07	
Towards Ground	middle	0.747		0.0088	
Towards Ground	low	0.686		0.03	
	high	<b>0.857</b>		0.03	<b>max</b>
Worst case position of Body with earphone (Distance 15mm)					
Towards Ground	high	0.851		0.11	

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 (< 0.8 W/kg), testing at the high and low channels is optional.

6.2.3.2 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 Head				
Left head, Touch cheek	middle	0.888	-0.10	
Left head, Tilt 15 Degree	middle	0.210	0.09	
Right head, Touch cheek	middle	0.781	-0.10	
Right head, Tilt 15 Degree	middle	0.204	-0.07	
Left head, Touch cheek	low	<b>0.924</b>	0.0055	<b>max</b>
	high	0.909	-0.0075	
Test position of Body (Distance 15mm)				
Towards phantom	middle	0.390	-0.09	
Towards Ground	middle	<b>0.951</b>	0.03	<b>max</b>
Towards Ground	low	0.915	0.01	
	high	0.897	0.05	
Worst case position of Body with earphone (Distance 15mm)				
Towards Ground	middle	0.616	0.15	

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.

**6.2.4 Maximum SAR**

<b>Test Band</b>	<b>Worst Position</b>	<b>Channel</b>	<b>Maximum SAR(1g) (W/kg)</b>	<b>Limit of SAR(1g)</b>
<b>GSM850 (head)</b>	Left head, Touch cheek	high	0.792	1.6
<b>GSM850 (body)</b>	Towards Ground	high	0.857	1.6
<b>GSM1900 (head)</b>	Left head, Touch cheek	low	0.924	1.6
<b>GSM1900 (body)</b>	Towards Ground	middle	0.951	1.6

General Judgment: PASS

## 7. Test Equipments Utilized

No.	Name	Type	S/N	Calibration Date
01	Network analyzer	Agilent E5071E	MY46109425	Oct 14th, 2012
02	Dielectric Probe Kit	Agilent 85070E	MY44300524	No Calibration Requested
03	Power meter	Agilent E4418B	MY50000852	Oct 14th, 2012
04	Power sensor	Agilent E9200B	MY50300011	Oct 14th, 2012
05	Signal Generator	Agilent N5182A	MY49071248	Oct 14th, 2012
06	Amplifier	ZHL-42W	QA1020005	No Calibration Requested
07	BTS	CMU200	121464	Oct 14th, 2012
08	E-field Probe	ES3DV3	3241	Sep 27th, 2012
09	DAE	DAE4	1226	June 13th, 2012
10	Validation Kit 835MHz	D835V2	4d100	June 14th, 2011
11	Validation Kit 1900MHz	D1900V2	5d155	April 03th ,2012

## 8. 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 A: Photograph



EUT



Battery



Travel Adaptor



Travel Adaptor



Earphone

## ANNEX B: Detailed Test Results

### Annex B.1 System Check Results

#### System check 835head

Date/Time: 2012-5-15 8:52:29

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

Frequency: 835 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 43.053$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- 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)

#### 835head/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-head/Area

Scan (61x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.759 mW/g

#### 835head/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-head/Zoom

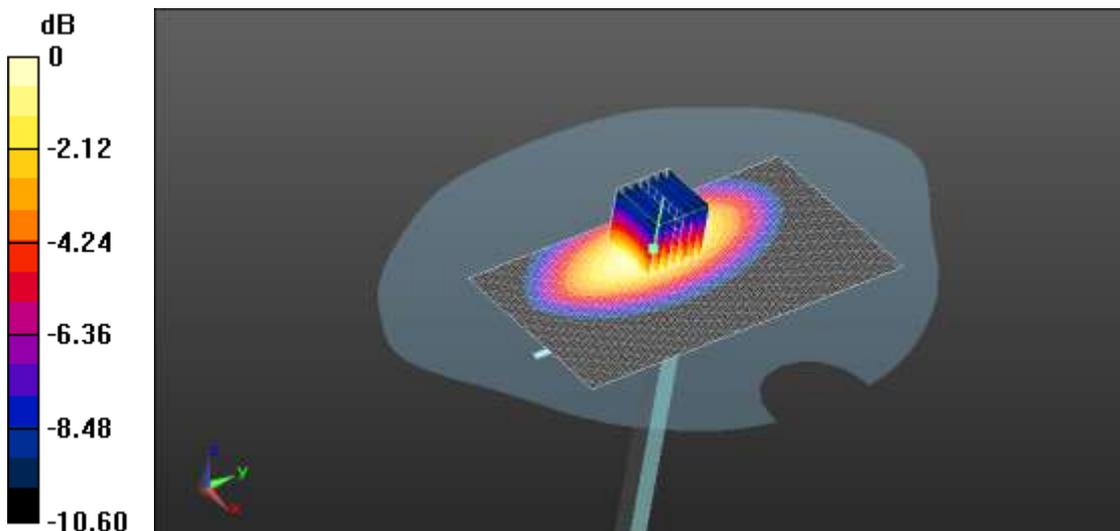
Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 42.195 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 3.7670

SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.56 mW/g

Maximum value of SAR (measured) = 2.822 mW/g



0 dB = 2.820mW/g = 9.00 dB mW/g

**System check 835body**

Date/Time: 2012-5-17 8:59:56

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 (IEEE-1528/OET65C)

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) = 2.739 mW/g

**835body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)-BODY/Zoom**

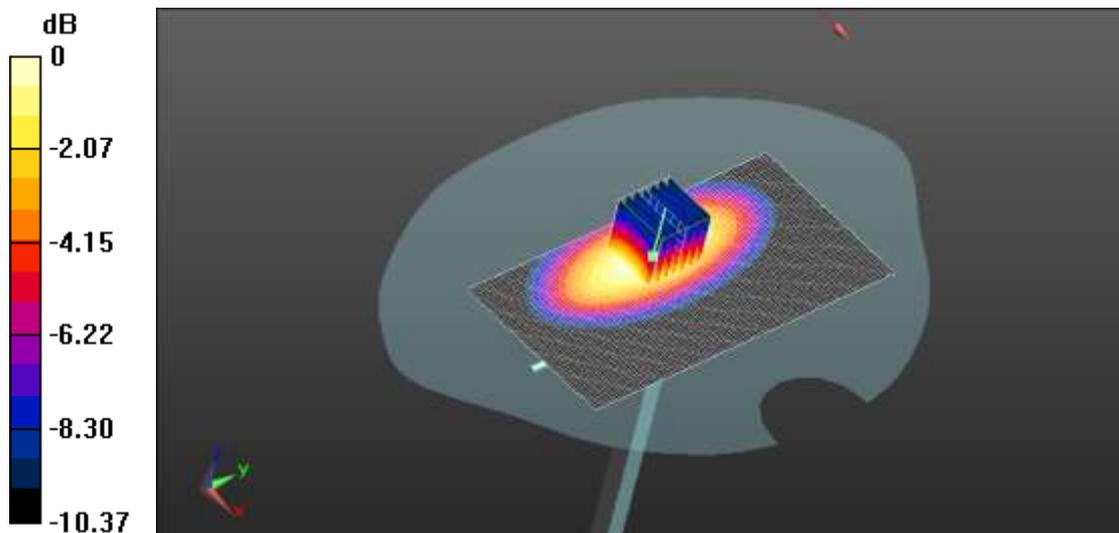
**Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 40.410 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.6030

**SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.51 mW/g**

Maximum value of SAR (measured) = 2.712 mW/g



0 dB = 2.710mW/g = 8.66 dB mW/g

**System check 1900head**

Date/Time: 2012-5-15 12:48:32

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

Frequency: 1900 MHz; Communication System PAR: 0 dB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.383$  mho/m;  $\epsilon_r = 39.048$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM2; Type: SAM; Serial: TP-1575
- Measurement SW: DASYS52, Version 52.2 (0); SEMCAD X Version 14.6.4 (4989)

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

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

Maximum value of SAR (interpolated) = 12.805 mW/g

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

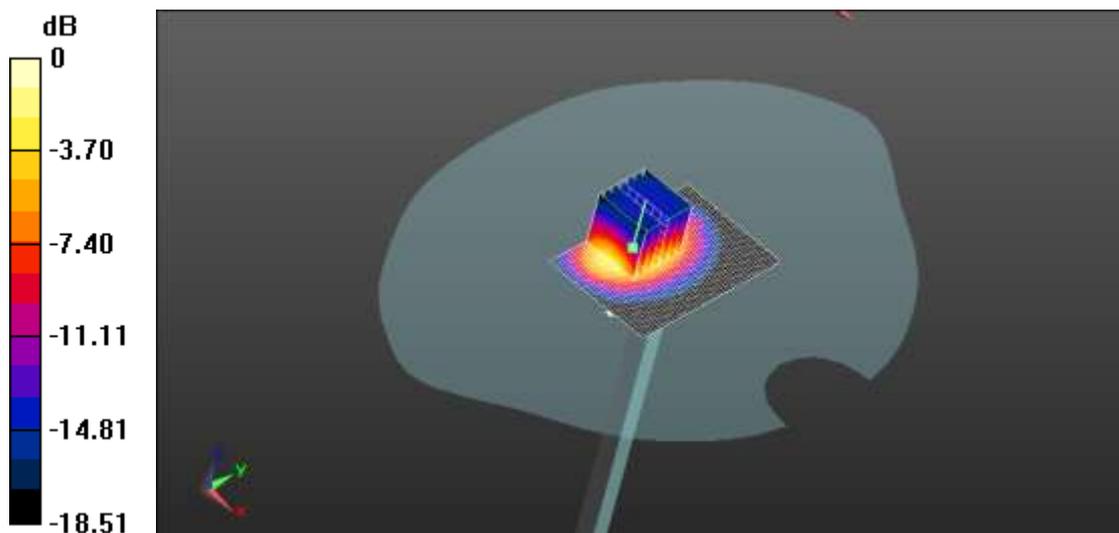
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.390 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 18.2420

**SAR(1 g) = 9.74 mW/g; SAR(10 g) = 4.98 mW/g**

Maximum value of SAR (measured) = 12.460 mW/g



0 dB = 12.460mW/g = 21.91 dB mW/g

**System check 1900body**

Date/Time: 2012-5-17 9:53:57

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 (IEEE-1528/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 (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) = 12.477 mW/g

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

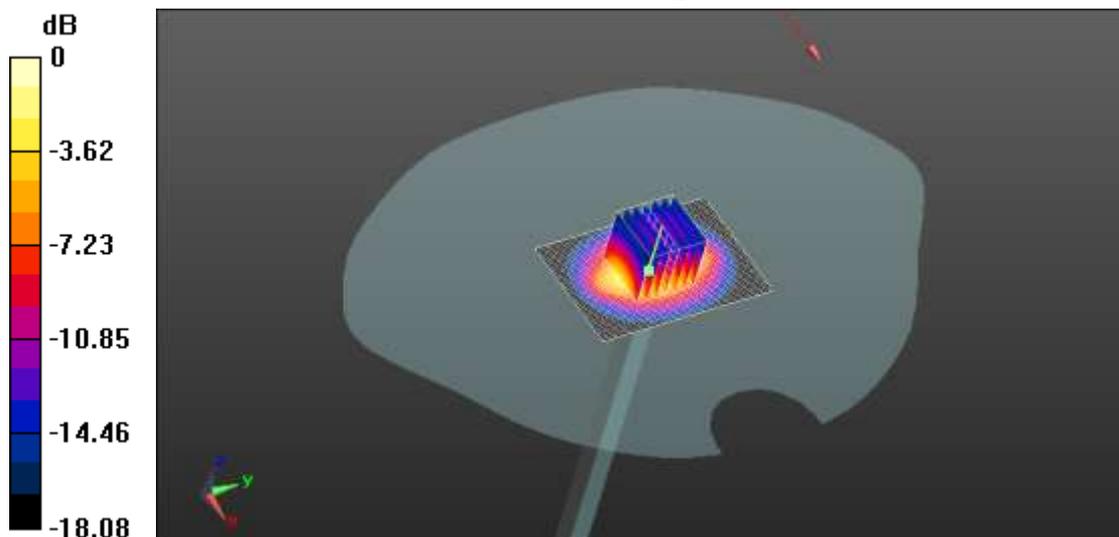
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.715 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 17.7780

**SAR(1 g) = 9.77 mW/g; SAR(10 g) = 5.01 mW/g**

Maximum value of SAR (measured) = 12.436 mW/g



0 dB = 12.440mW/g = 21.90 dB mW/g

**System check 1900body**

Date/Time: 2012-5-18 9:03:24

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 (IEEE-1528/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 Total (interpolated) = 99.932 mW/g m

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

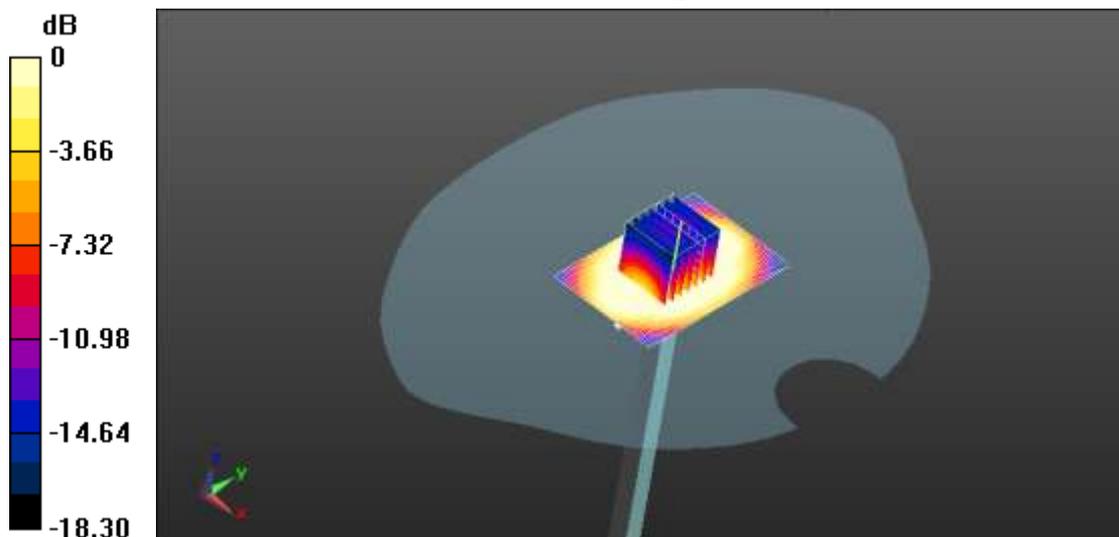
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.457 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 18.7820

**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.29 mW/g**

Maximum value of SAR (measured) = 13.090 mW/g



0 dB = 13.090mW/g m = 22.34 dB mW/g m

## Annex B.2 Graph Result

### GSM850 left Touch mid

Date/Time: 2012-5-15 9:32:31

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;  $\sigma = 0.914$  mho/m;  $\epsilon_r = 43.026$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- 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)

**left/Touch Position - mid/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.739 mW/g

**left/Touch Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

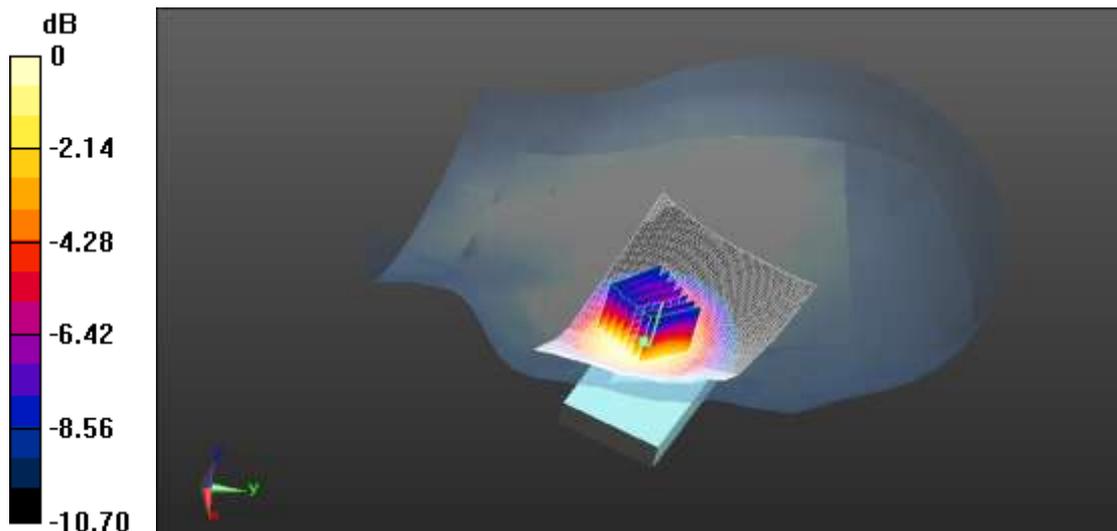
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 8.706 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.9710

**SAR(1 g) = 0.696 mW/g; SAR(10 g) = 0.488 mW/g**

Maximum value of SAR (measured) = 0.745 mW/g



0 dB = 0.750mW/g = -2.50 dB mW/g

**GSM850 left Tilt mid**

Date/Time: 2012-5-15 10:03:28

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;  $\sigma = 0.914$  mho/m;  $\epsilon_r = 43.026$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- 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)

**left/Tilt Position - mid/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.264 mW/g

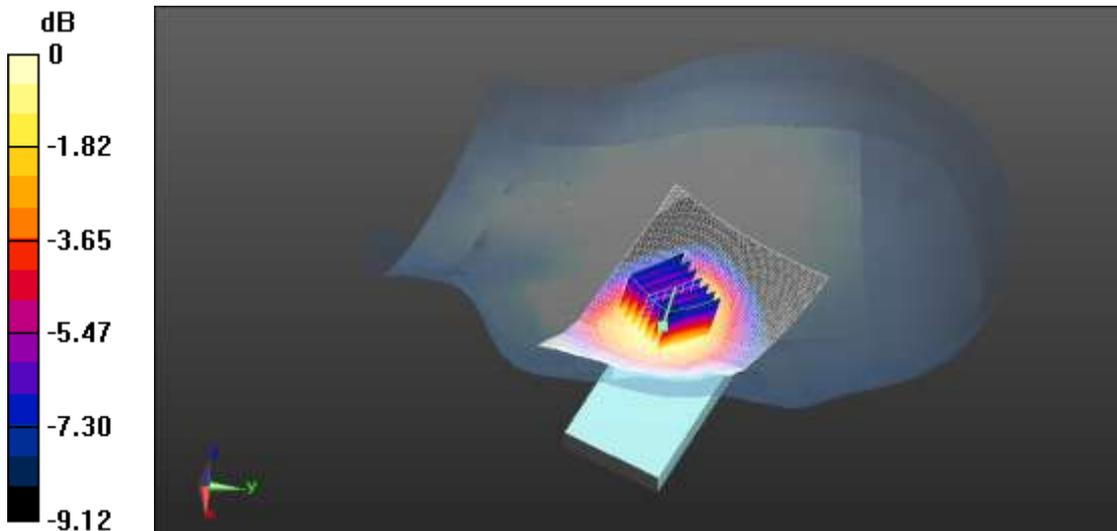
**left/Tilt Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.132 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.3320

**SAR(1 g) = 0.248 mW/g; SAR(10 g) = 0.177 mW/g**

Maximum value of SAR (measured) = 0.265 mW/g



0 dB = 0.270mW/g = -11.37 dB mW/g

**GSM850 right Touch mid**

Date/Time: 2012-5-15 10:32:33

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;  $\sigma = 0.914$  mho/m;  $\epsilon_r = 43.026$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- 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)

**right/Touch Position - mid/Area Scan (81x141x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.709 mW/g

**right/Touch Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

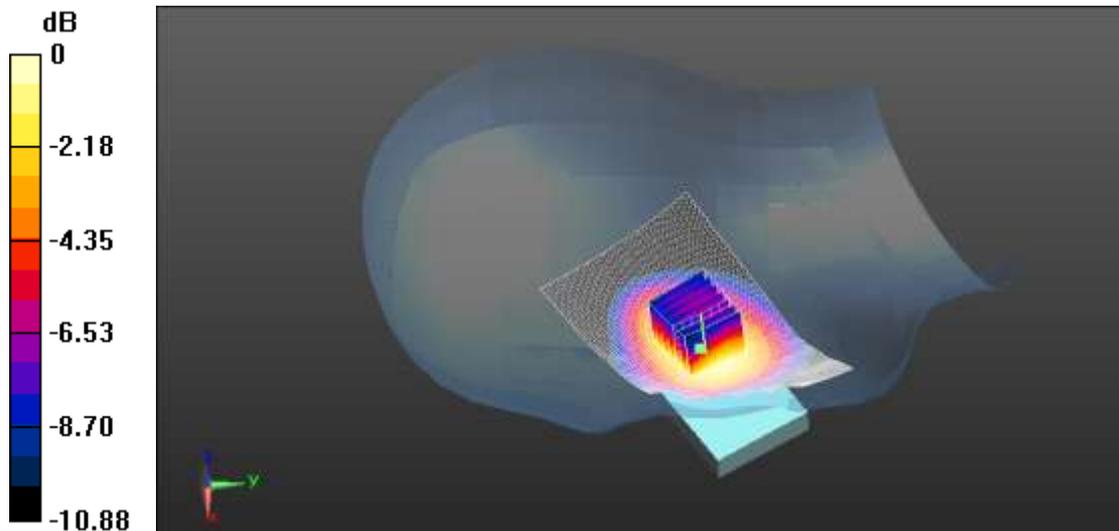
dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.505 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.8990

**SAR(1 g) = 0.659 mW/g; SAR(10 g) = 0.462 mW/g**

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



0 dB = 0.720mW/g = -2.85 dB mW/g

**GSM850 right Tilt mid**

Date/Time: 2012-5-15 10:59:11

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;  $\sigma = 0.914$  mho/m;  $\epsilon_r = 43.026$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1226; Calibrated: 2011-6-13
- Phantom: SAM1; Type: SAM; Serial: TP1576
- Measurement SW: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**right/Tilt Position - mid/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

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

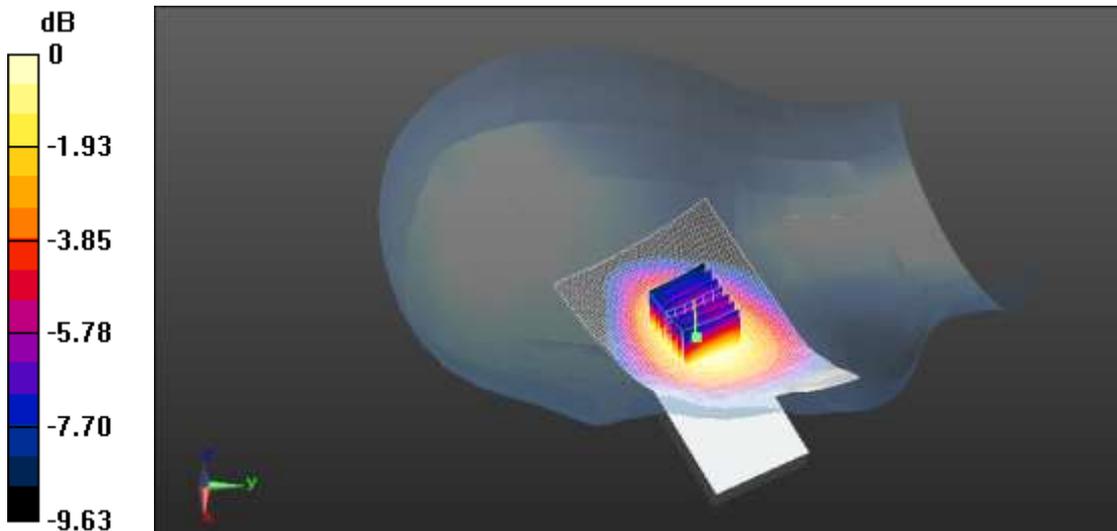
**right/Tilt Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.642 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.3870

**SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.202 mW/g**

Maximum value of SAR (measured) = 0.305 mW/g



0 dB = 0.300mW/g = -10.46 dB mW/g

**GSM850 left Touch low**

Date/Time: 2012-5-15 11:31:56

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;  $\sigma = 0.899$  mho/m;  $\epsilon_r = 43.205$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASYS5 (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- 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)

**left/Touch Position - low/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.715 mW/g

**left/Touch Position - low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

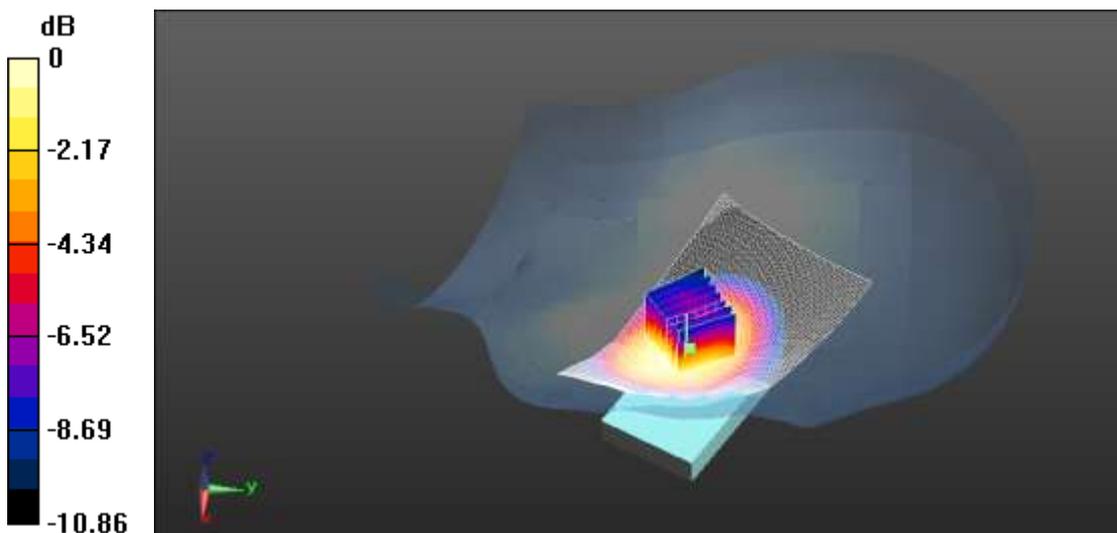
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 7.909 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.9170

**SAR(1 g) = 0.664 mW/g; SAR(10 g) = 0.468 mW/g**

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



0 dB = 0.720mW/g = -2.85 dB mW/g

**GSM850 left Touch high**

Date/Time: 2012-5-15 11:59:12

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;  $\sigma = 0.924$  mho/m;  $\epsilon_r = 42.848$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(6.18, 6.18, 6.18);
- 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)

**left/Touch Position - high/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.868 mW/g

**left/Touch Position - high/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

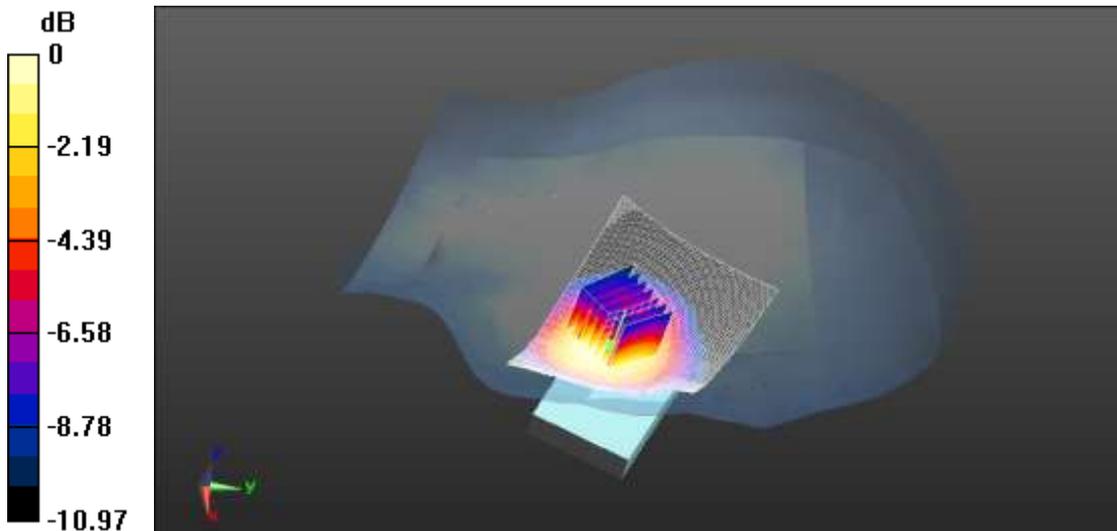
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 9.032 V/m; Power Drift = -0.14 dB

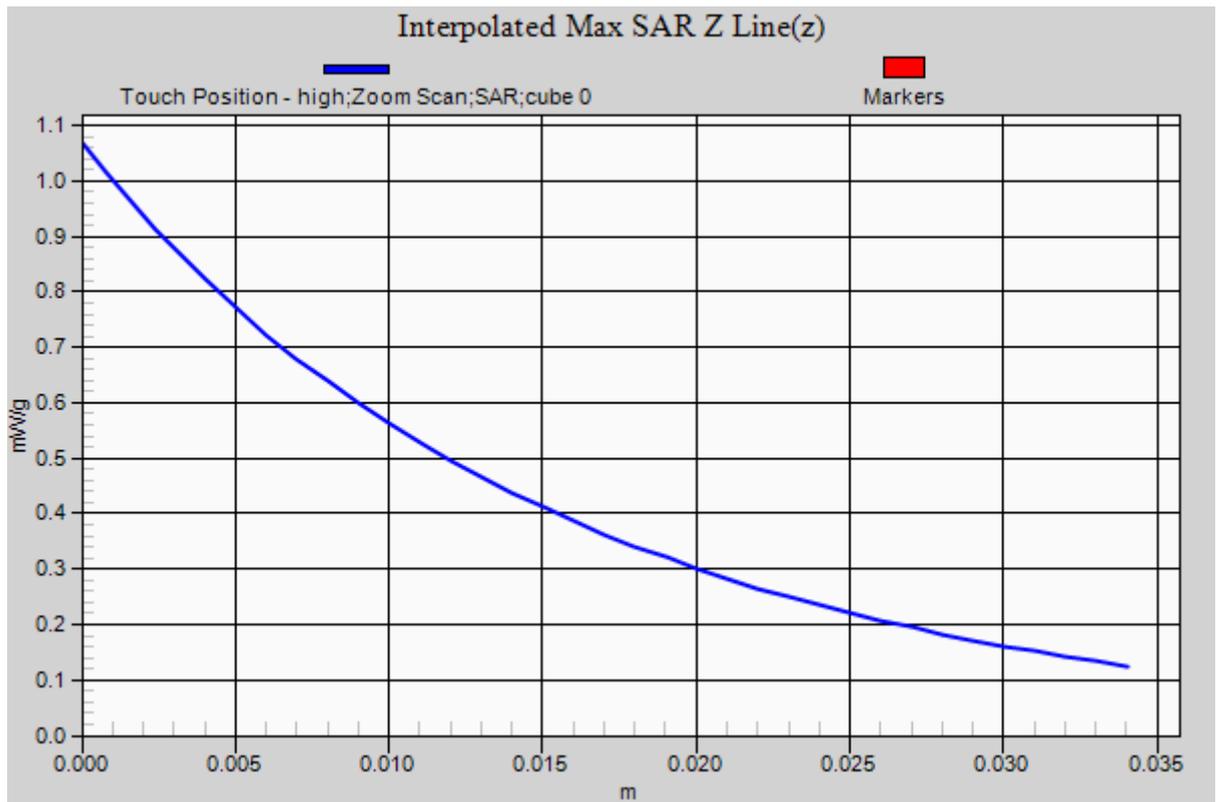
Peak SAR (extrapolated) = 1.0670

**SAR(1 g) = 0.792 mW/g; SAR(10 g) = 0.558 mW/g**

Maximum value of SAR (measured) = 0.847 mW/g



0 dB = 0.850mW/g = -1.41 dB mW/g



**GSM850 Towards phantom mid**

Date/Time: 2012-5-17 11:58:19

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 (IEEE-1528/OET65C)

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: DASYS2, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/Towards phantom - mid/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.370 mW/g

**body/Towards phantom - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement

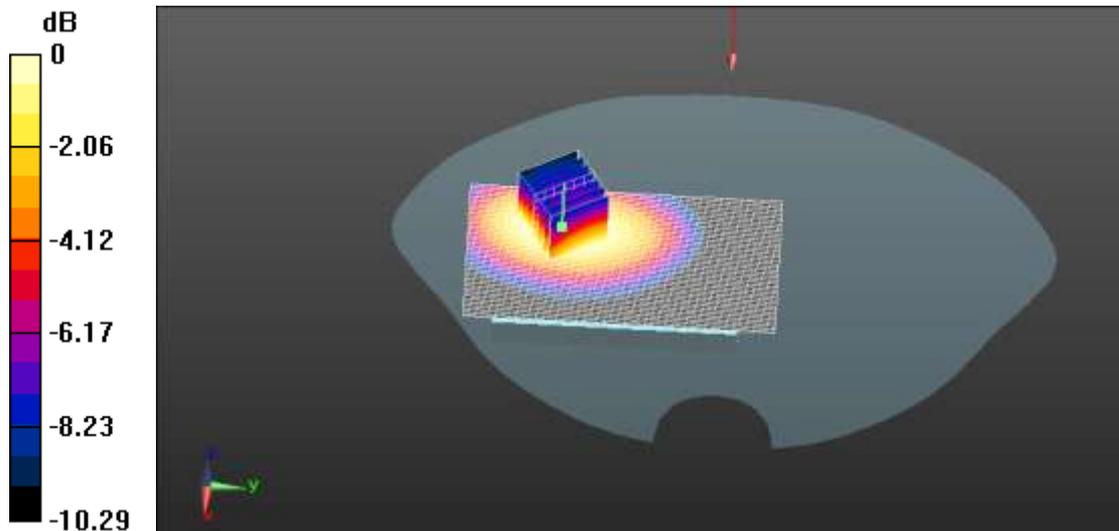
grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 3.915 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.4830

**SAR(1 g) = 0.347 mW/g; SAR(10 g) = 0.241 mW/g**

Maximum value of SAR (measured) = 0.370 mW/g



0 dB = 0.370mW/g = -8.64 dB mW/g

**GSM850 Towards ground mid**

Date/Time: 2012-5-17 12:26:32

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 (IEEE-1528/OET65C)

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/Towards ground - mid/Area Scan (81x141x1):** Measurement grid:

dx=10mm, dy=10mm

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

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

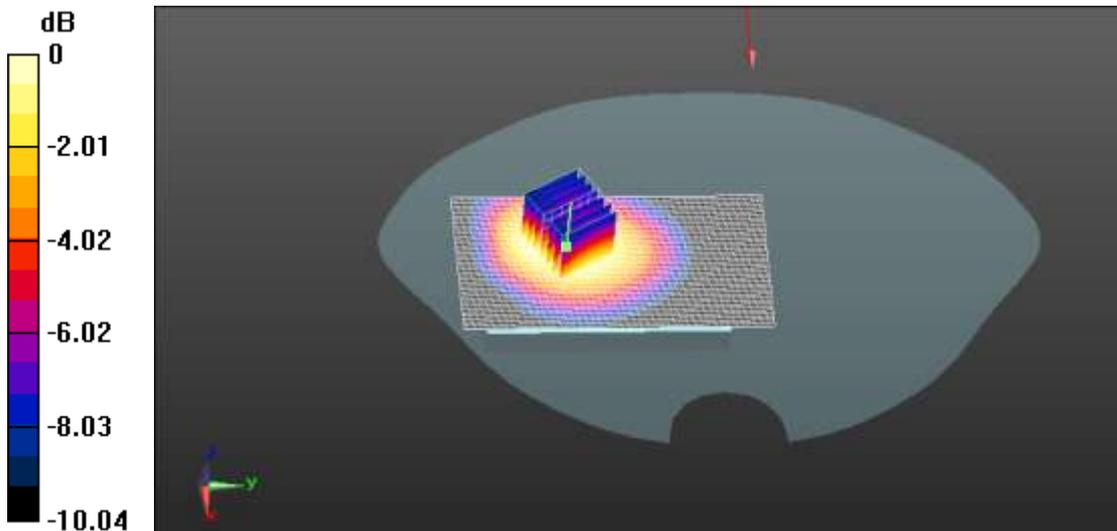
dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.799 V/m; Power Drift = 0.0088 dB

Peak SAR (extrapolated) = 1.0080

**SAR(1 g) = 0.747 mW/g; SAR(10 g) = 0.529 mW/g**

Maximum value of SAR (measured) = 0.795 mW/g



0 dB = 0.800mW/g = -1.94 dB mW/g

**GSM850 Towards ground low**

Date/Time: 2012-5-17 12:56:51

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 (IEEE-1528/OET65C)

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/Towards ground - low/Area Scan (81x141x1):** Measurement grid:

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

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

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

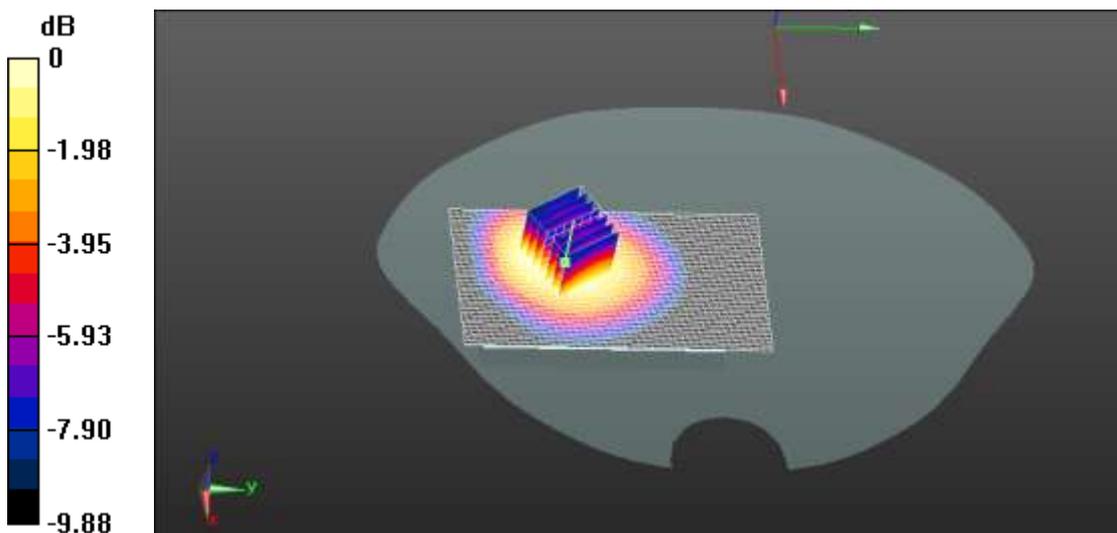
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 6.312 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.9330

**SAR(1 g) = 0.686 mW/g; SAR(10 g) = 0.488 mW/g**

Maximum value of SAR (measured) = 0.731 mW/g



0 dB = 0.730mW/g = -2.73 dB mW/g

**GSM850 Towards ground high**

Date/Time: 2012-5-17 13:24:04

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 (IEEE-1528/OET65C)

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/Towards ground - high/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.909 mW/g

**body/Towards ground - high/Zoom Scan (7x7x7)/Cube 0:** Measurement

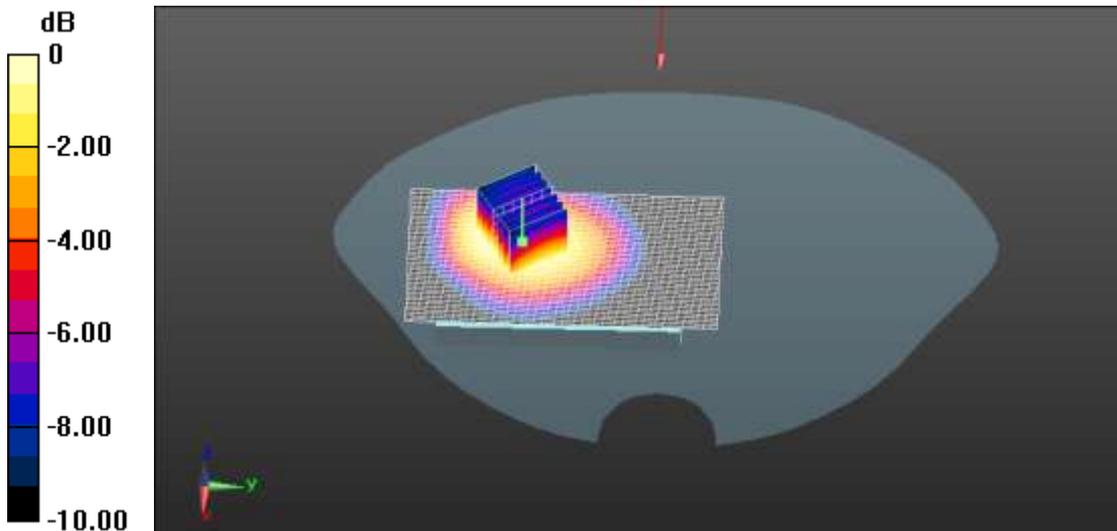
grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 7.427 V/m; Power Drift = 0.03 dB

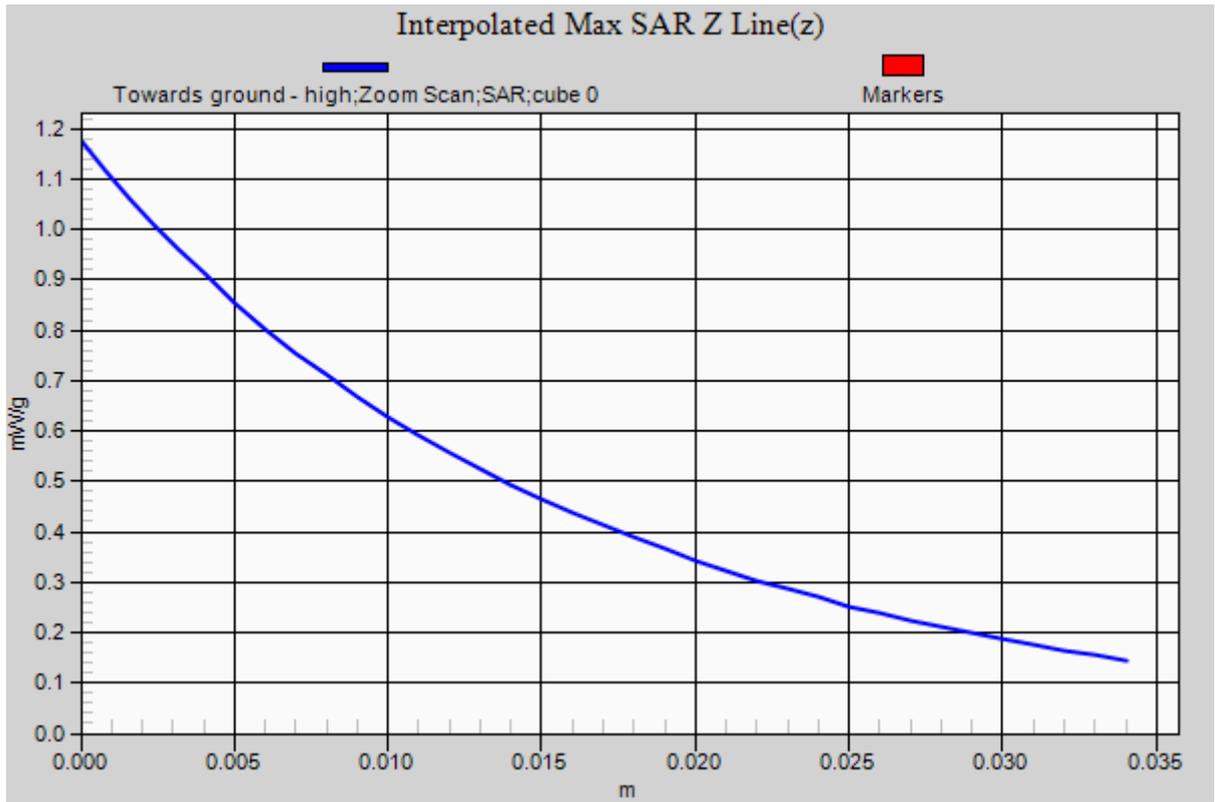
Peak SAR (extrapolated) = 1.1740

**SAR(1 g) = 0.857 mW/g; SAR(10 g) = 0.604 mW/g**

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



0 dB = 0.910mW/g = -0.82 dB mW/g



**GSM850 Towards ground high with earphone**

Date/Time: 2012-5-17 13:53:59

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 (IEEE-1528/OET65C)

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/Towards ground - high with earphone/Area Scan (81x141x1):**

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

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

**body/Towards ground - high with earphone/Zoom Scan (7x7x7)/Cube 0:**

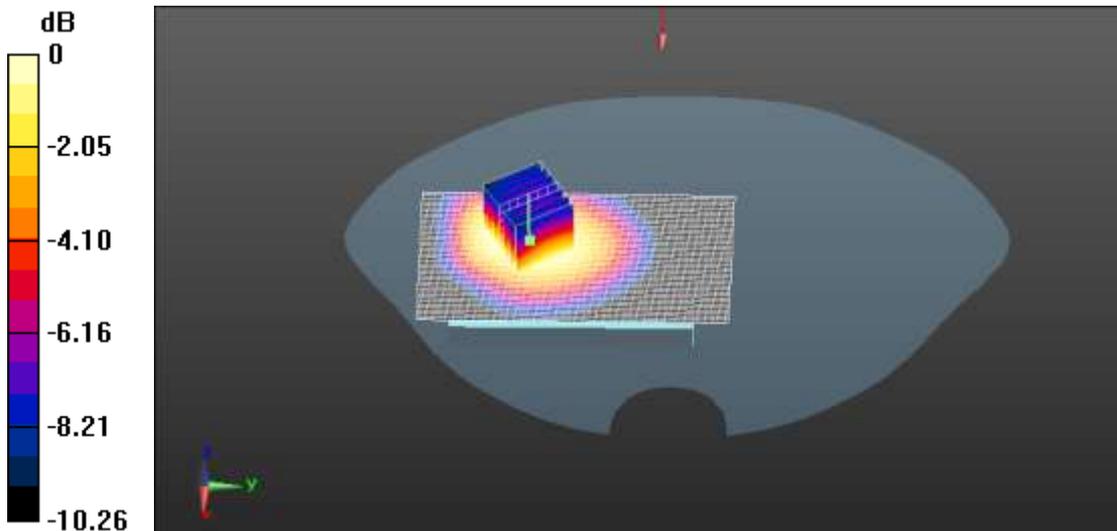
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.922 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.1660

**SAR(1 g) = 0.851 mW/g; SAR(10 g) = 0.602 mW/g**

Maximum value of SAR (measured) = 0.898 mW/g



0 dB = 0.900mW/g = -0.92 dB mW/g

**GSM1900 left Touch mid**

Date/Time: 2012-5-15 13:56:00

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;  $\sigma = 1.364$  mho/m;  $\epsilon_r = 39.144$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- 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)

**left/Touch Position - mid/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.963 mW/g

**left/Touch Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

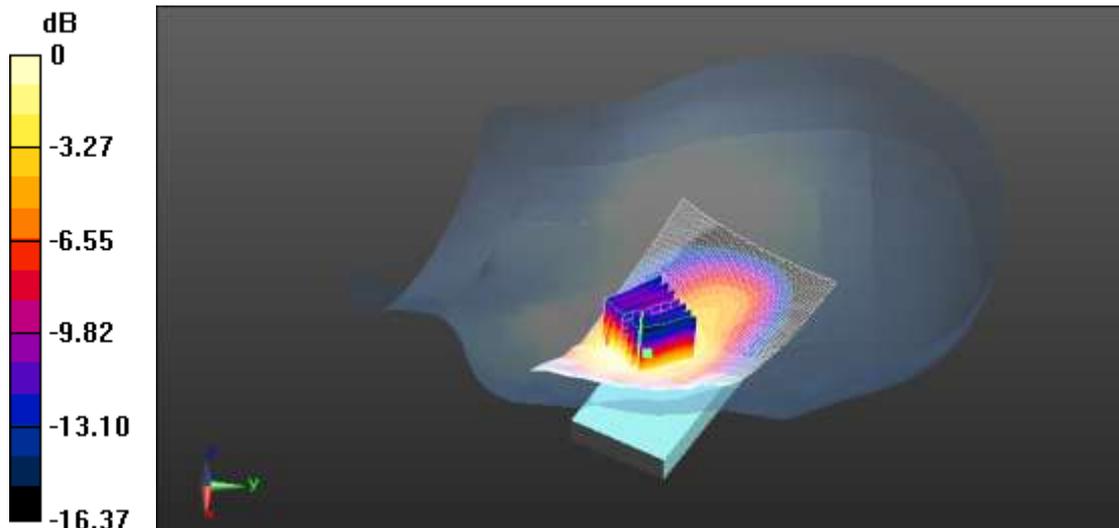
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 13.489 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.4300

**SAR(1 g) = 0.888 mW/g; SAR(10 g) = 0.542 mW/g**

Maximum value of SAR (measured) = 1.017 mW/g



0 dB = 1.020mW/g = 0.17 dB mW/g

**GSM1900 left Tilt mid**

Date/Time: 2012-5-15 15:25:25

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;  $\sigma = 1.364$  mho/m;  $\epsilon_r = 39.144$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- 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)

**left/Tilt Position - mid/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.232 mW/g

**left/Tilt Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.041 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.3430

**SAR(1 g) = 0.208 mW/g; SAR(10 g) = 0.131 mW/g**

Maximum value of SAR (measured) = 0.236 mW/g

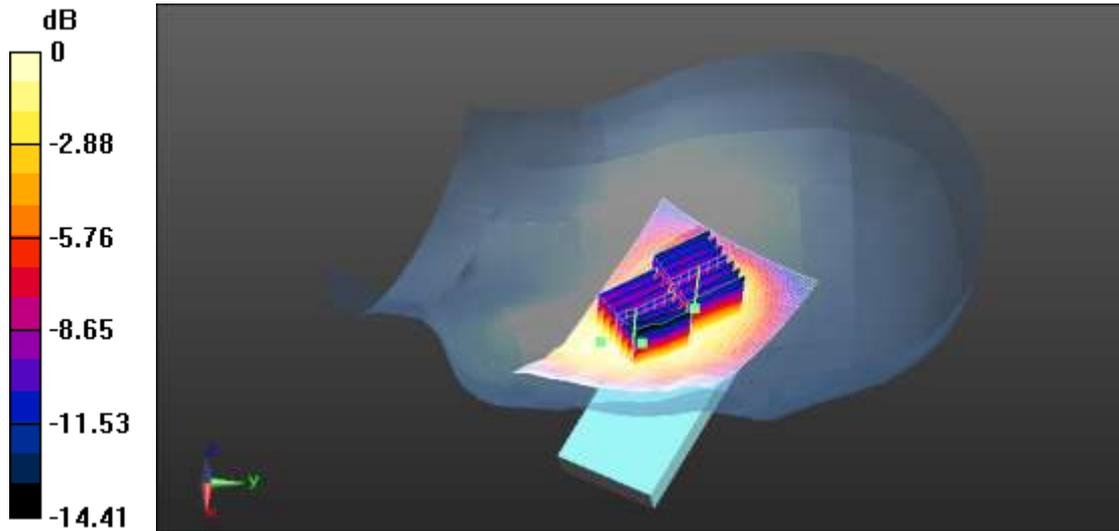
**left/Tilt Position - mid/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.041 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.3170

**SAR(1 g) = 0.210 mW/g; SAR(10 g) = 0.132 mW/g**

Maximum value of SAR (measured) = 0.227 mW/g



0 dB = 0.230mW/g = -12.77 dB mW/g

**G GSM1900 right Touch mid**

Date/Time: 2012-5-15 16:22:30

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;  $\sigma = 1.364$  mho/m;  $\epsilon_r = 39.144$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- 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)

**right/Touch Position - mid/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 0.873 mW/g

**right/Touch Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

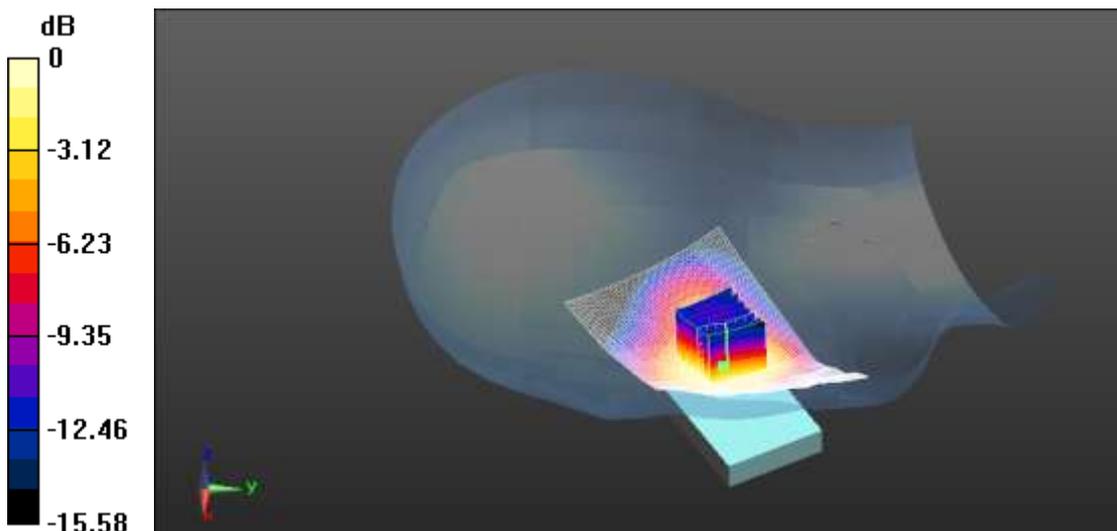
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 10.495 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.2710

**SAR(1 g) = 0.781 mW/g; SAR(10 g) = 0.485 mW/g**

Maximum value of SAR (measured) = 0.897 mW/g



0 dB = 0.900mW/g = -0.92 dB mW/g

**GSM1900 right Tilt mid**

Date/Time: 2012-5-15 16:50:19

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;  $\sigma = 1.364$  mho/m;  $\epsilon_r = 39.144$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- 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)

**right/Tilt Position - mid/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.235 mW/g

**right/Tilt Position - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.414 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.3220

**SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.130 mW/g**

Maximum value of SAR (measured) = 0.230 mW/g

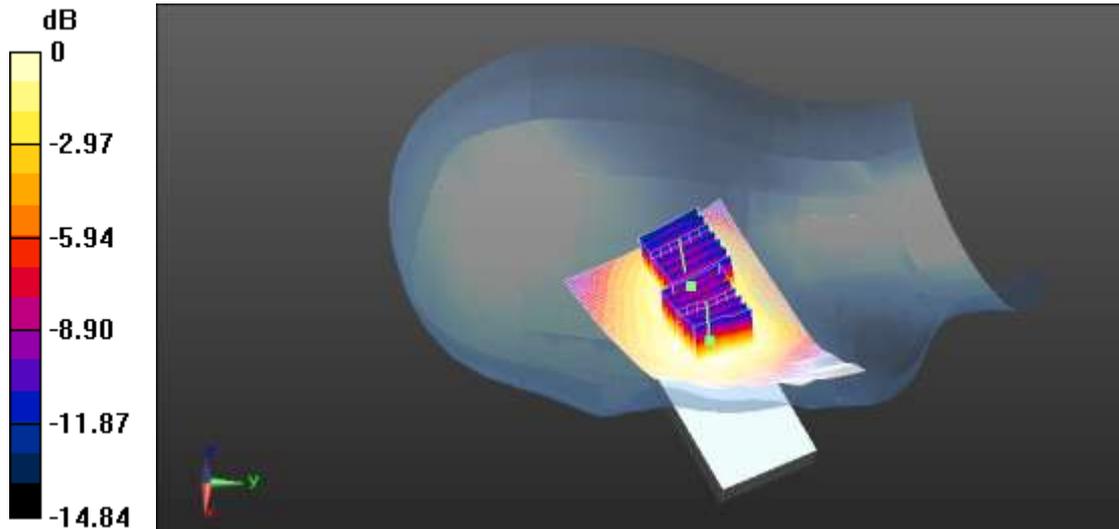
**right/Tilt Position - mid/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.414 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.2980

**SAR(1 g) = 0.189 mW/g; SAR(10 g) = 0.120 mW/g**

Maximum value of SAR (measured) = 0.204 mW/g



0 dB = 0.200mW/g = -13.98 dB mW/g

**SM1900 left Touch low**

Date/Time: 2012-5-15 14:25:26

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;  $\sigma = 1.339$  mho/m;  $\epsilon_r = 39.255$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- 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)

**left/Touch Position -low/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

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

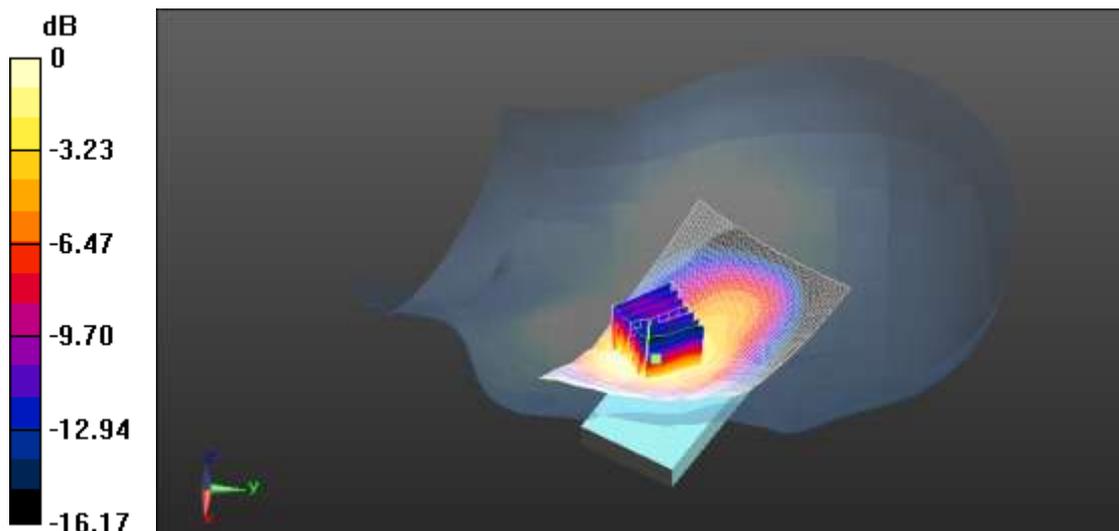
**left/Touch Position -low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.413 V/m; Power Drift = 0.0055 dB

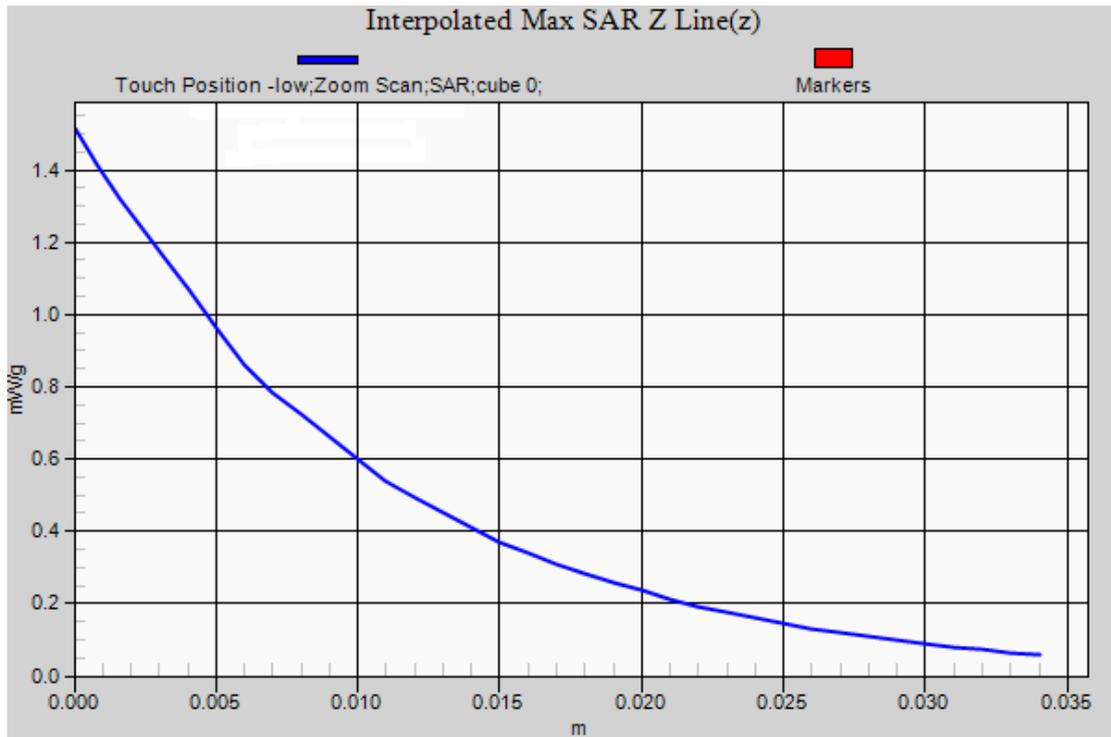
Peak SAR (extrapolated) = 1.5130

**SAR(1 g) = 0.924 mW/g; SAR(10 g) = 0.560 mW/g**

Maximum value of SAR (measured) = 1.070 mW/g



0 dB = 1.070mW/g = 0.59 dB mW/g



**GSM1900 left Touch high**

Date/Time: 2012-5-15 14:58:09

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;  $\sigma = 1.393$  mho/m;  $\epsilon_r = 39.011$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

Measurement Standard: DASYS (IEEE-1528/OET65C)

DASY5 Configuration:

- Probe: ES3DV3 - SN3241; ConvF(5.09, 5.09, 5.09);
- 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)

**left/Touch Position - high/Area Scan (81x141x1):** Measurement grid:

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

Maximum value of SAR (interpolated) = 1.001 mW/g

**left/Touch Position - high/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:

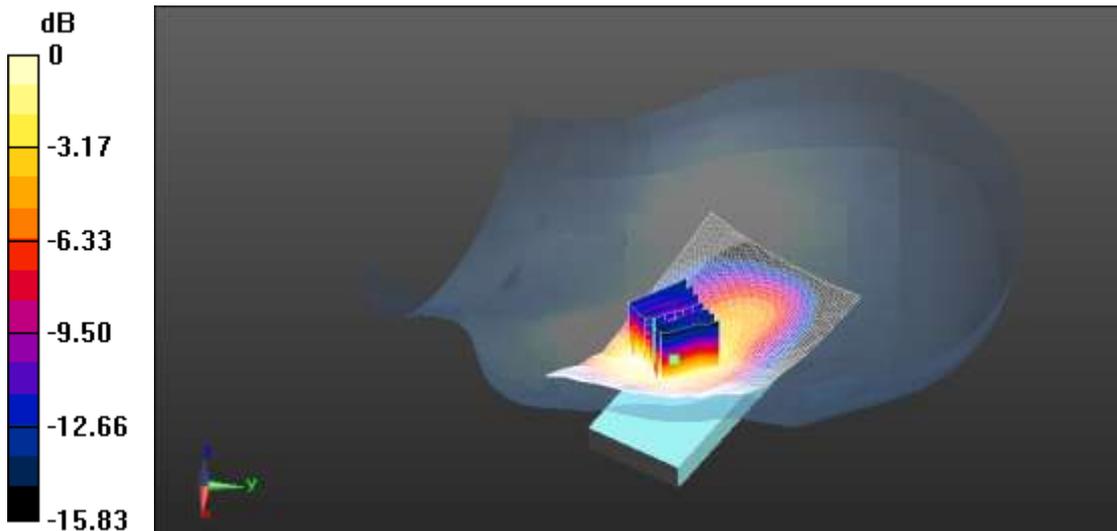
$dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 14.047 V/m; Power Drift = -0.0075 dB

Peak SAR (extrapolated) = 1.4880

**SAR(1 g) = 0.909 mW/g; SAR(10 g) = 0.554 mW/g**

Maximum value of SAR (measured) = 1.041 mW/g



0 dB = 1.040mW/g = 0.34 dB mW/g

**GSM1900 Towards phantom mid**

Date/Time: 2012-5-17 11:13:32

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: DASY5 (IEEE-1528/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: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/Towards phantom - mid/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

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

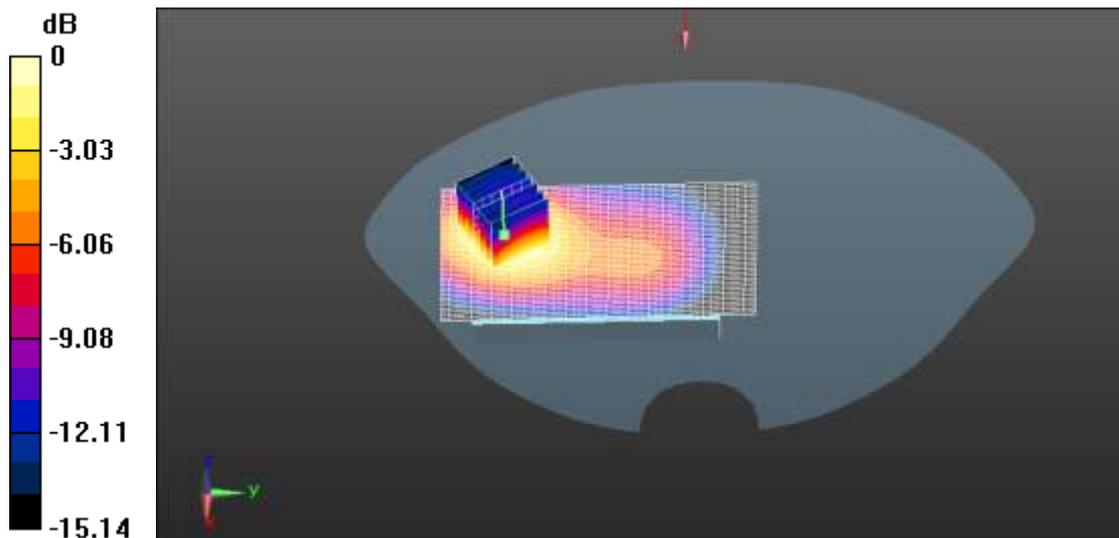
**body/Towards phantom - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.457 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.6510

**SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.232 mW/g**

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



0 dB = 0.430mW/g = -7.33 dB mW/g

**GSM1900 Towards ground mid**

Date/Time: 2012-5-17 16:41:49

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 (IEEE-1528/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)

**body/Towards ground - mid/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.040 mW/g

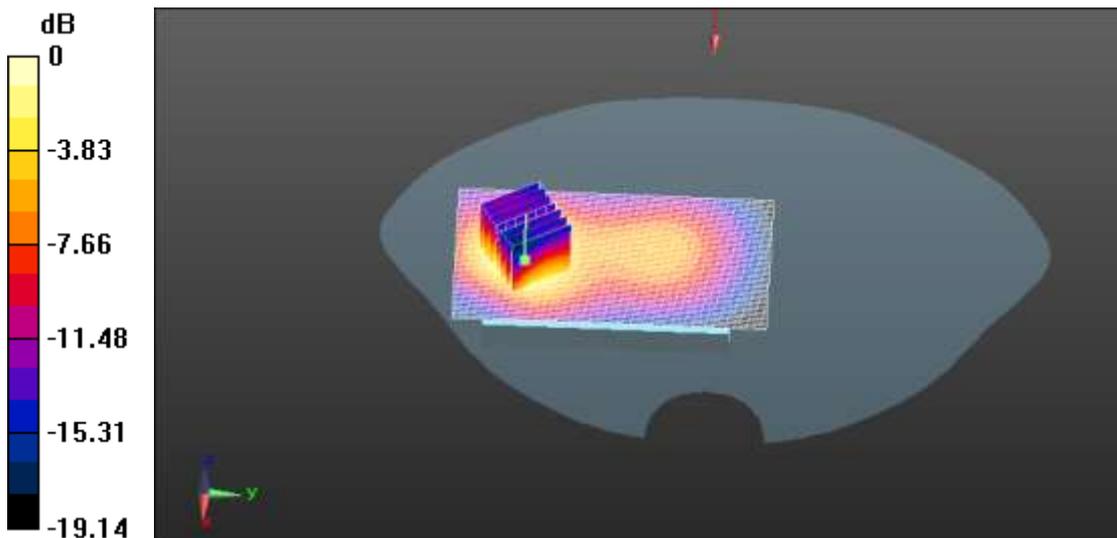
**body/Towards ground - mid/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.061 V/m; Power Drift = 0.03 dB

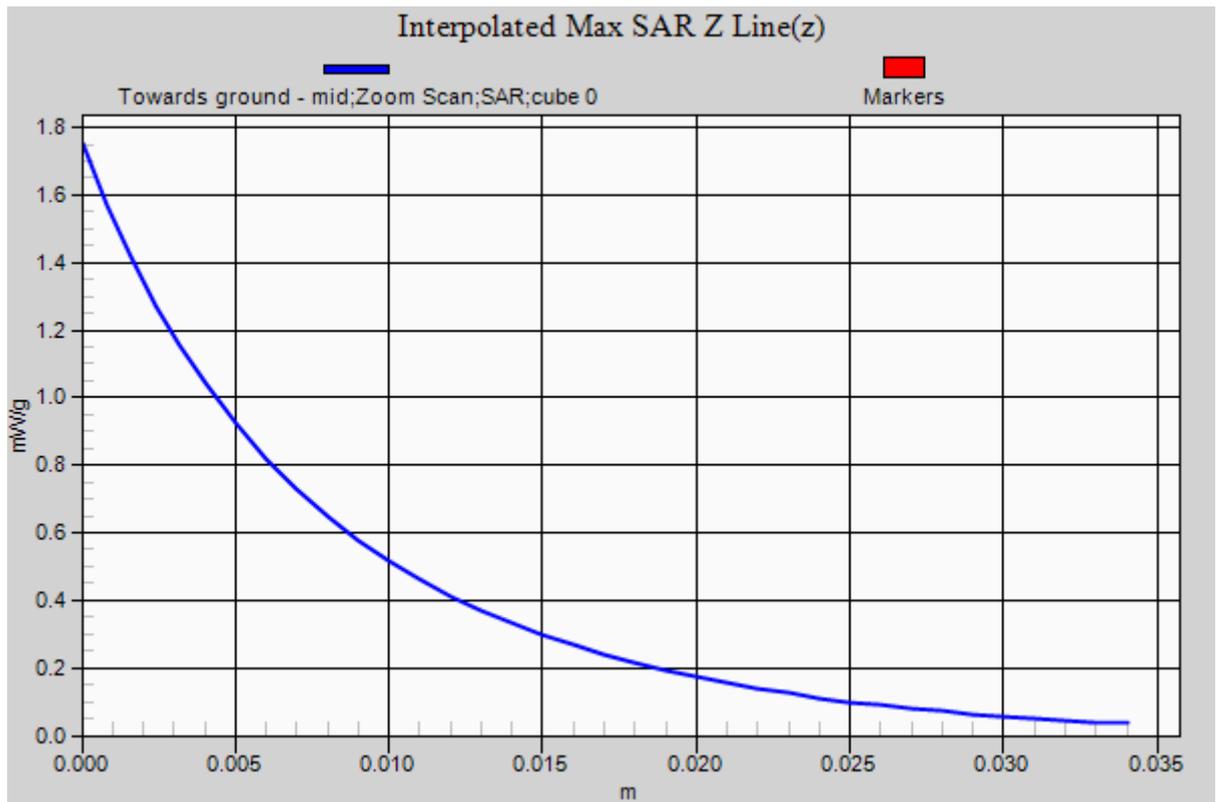
Peak SAR (extrapolated) = 1.7510

**SAR(1 g) = 0.951 mW/g; SAR(10 g) = 0.525 mW/g**

Maximum value of SAR (measured) = 1.040 mW/g



0 dB = 1.040mW/g = 0.34 dB mW/g



**GSM1900 Towards ground low**

Date/Time: 2012-5-17 17:10:42

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: DASYS5 (IEEE-1528/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: DASYS52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/Towards ground - low/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.001 mW/g

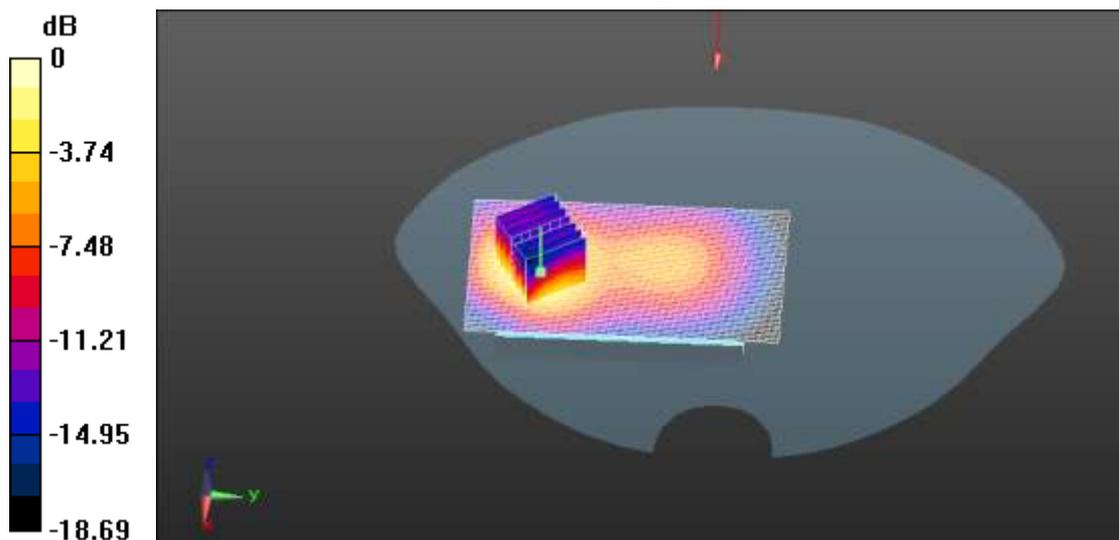
**body/Towards ground - low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.591 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.6940

**SAR(1 g) = 0.915 mW/g; SAR(10 g) = 0.503 mW/g**

Maximum value of SAR (measured) = 1.011 mW/g



0 dB = 1.010mW/g = 0.09 dB mW/g

**GSM1900 Towards ground high**

Date/Time: 2012-5-18 9:57:22

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: DASY5 (IEEE-1528/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: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

**body/Towards ground -high/Area Scan (81x141x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.972 mW/g

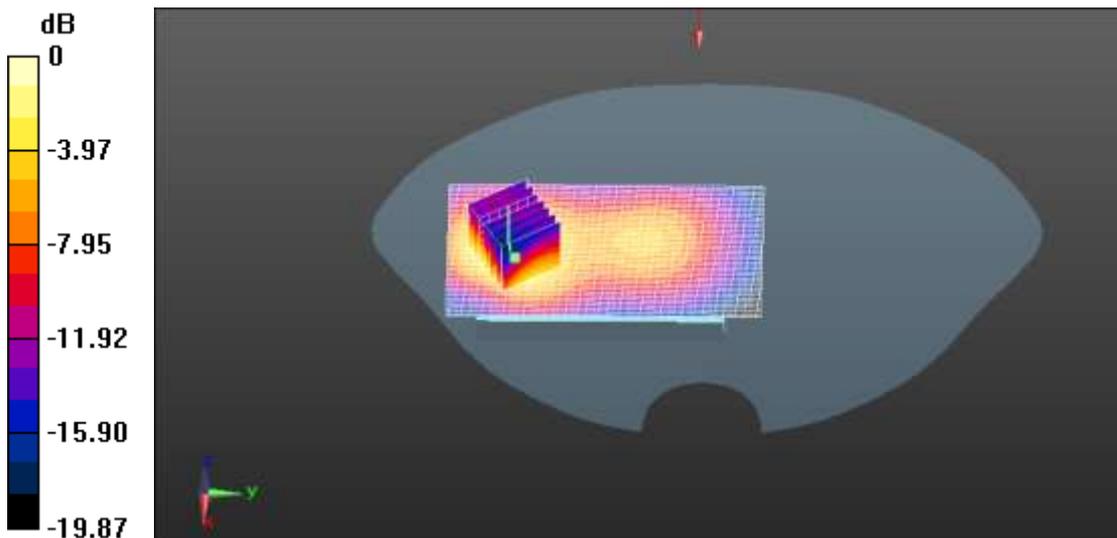
**body/Towards ground -high/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.758 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.6550

**SAR(1 g) = 0.897 mW/g; SAR(10 g) = 0.500 mW/g**

Maximum value of SAR (measured) = 0.971 mW/g



0 dB = 0.970mW/g = -0.26 dB mW/g

**GSM1900 Towards ground mid with earphone**

Date/Time: 2012-5-18 10:30:47

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 (IEEE-1528/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)

**body/Towards ground - mid with earphone/Area Scan (81x141x1):**

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

Maximum value of SAR (interpolated) = 0.677 mW/g

**body/Towards ground - mid with earphone/Zoom Scan (7x7x7)/Cube 0:**

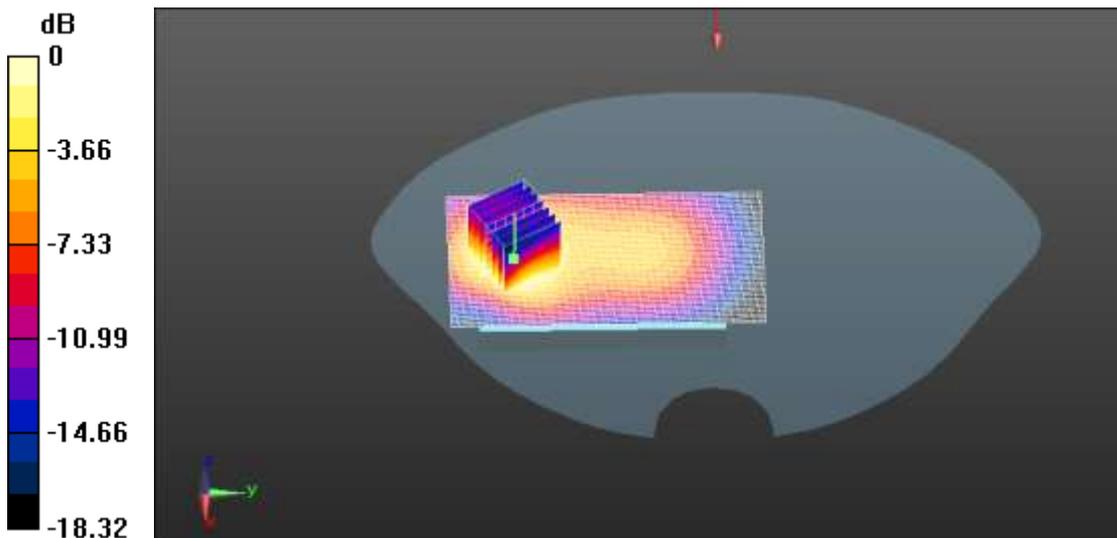
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.437 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.1240

**SAR(1 g) = 0.616 mW/g; SAR(10 g) = 0.350 mW/g**

Maximum value of SAR (measured) = 0.669 mW/g



0 dB = 0.670mW/g = -3.48 dB mW/g

## ANNEX C: Calibration Certificate

### Annex C.1 Probe Calibration Certificate

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



S Schweizerischer Kalibrierdienst  
S 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

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	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
DAE#	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	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 Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	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 ( $\mu\text{V}/(\text{V/m})^2$ ) <sup>a</sup>	1.18	0.87	1.05	$\pm 10.1\%$
DCP (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

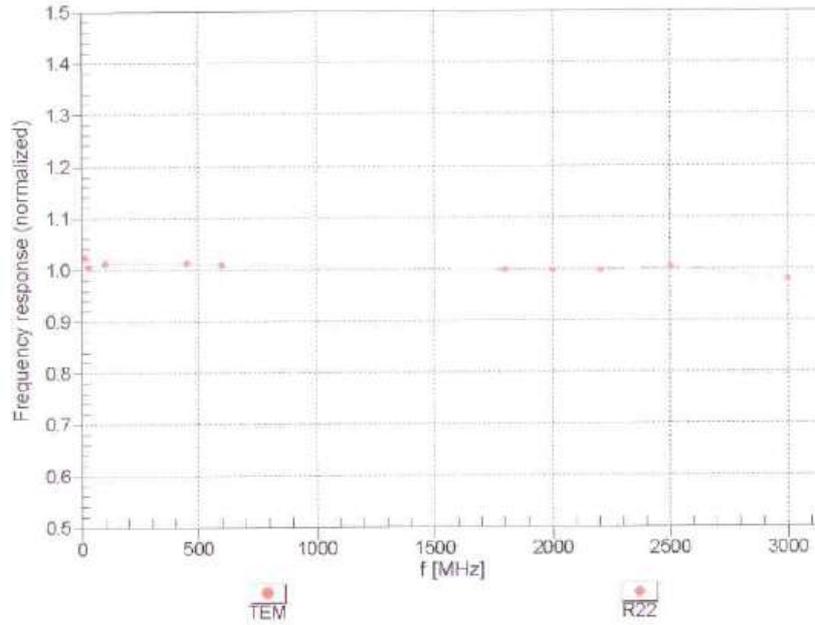
### Calibration Parameter Determined in Body Tissue Simulating Media

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.

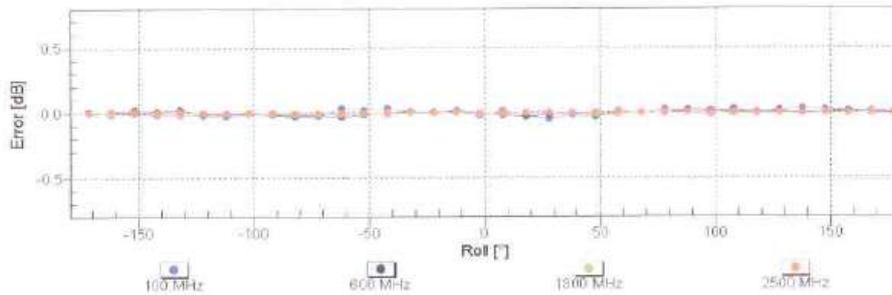
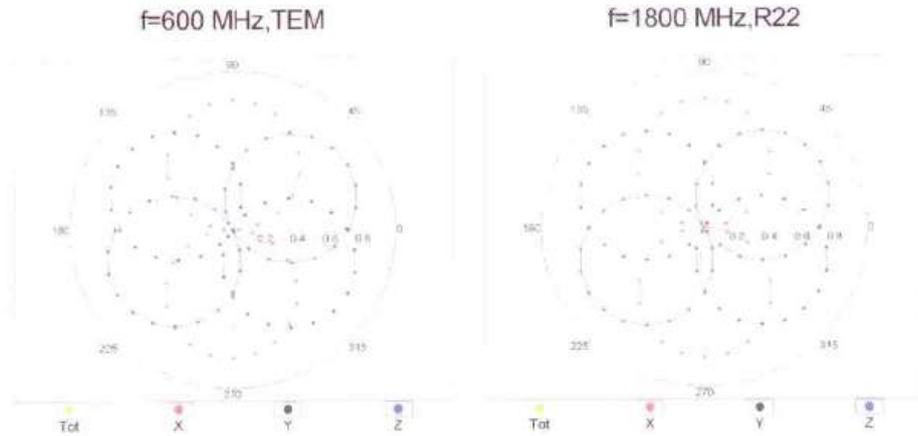
<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted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



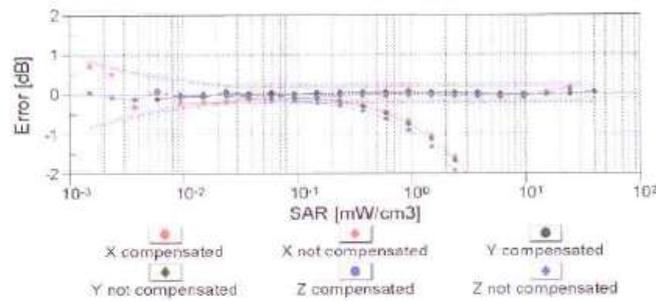
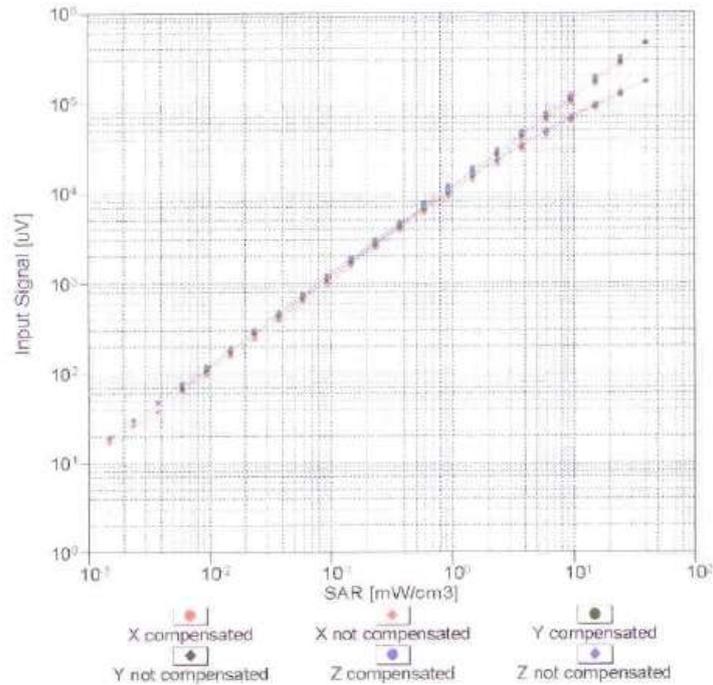
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



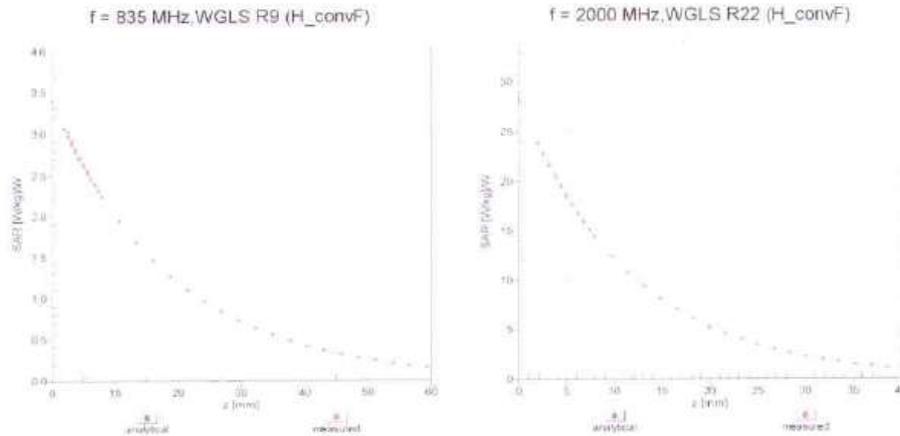
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

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



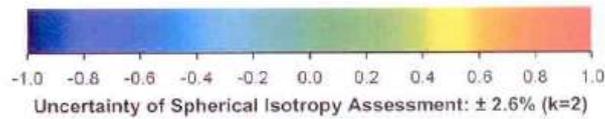
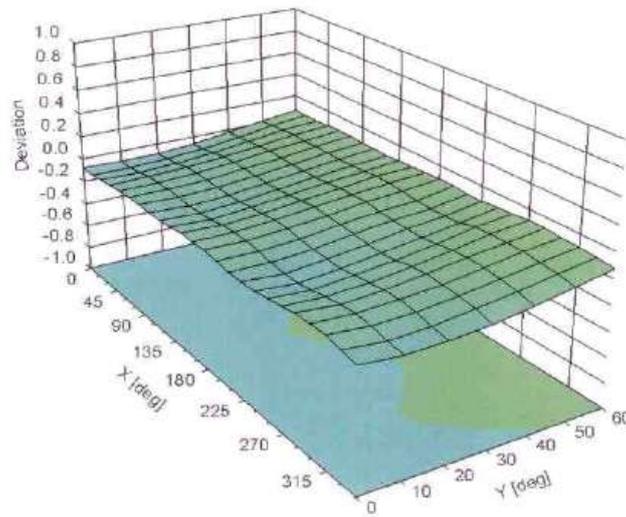
**Uncertainty of Linearity Assessment: ± 0.6% (k=2)**

### 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 C.2 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

CNAS 校准  
CNAS L0442

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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.

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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.

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

### DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB =  $6.1 \mu\text{V}$ , full range =  $-100\dots+300 \text{ mV}$

Low Range: 1LSB =  $61\text{nV}$ , full range =  $-1\dots+3\text{mV}$

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

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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

### 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 C.3 D835V2 Calibration Certificate**

校准  
CNAS L0442

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

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 ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.89mho/m ± 6 %
Head TSL temperature during test	(21.7 ± 0.2) °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	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 ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (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 ± 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	<b>9.47 mW /g ± 17.0 % (k=2)</b>

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	<b>6.21 mW /g ± 16.5 % (k=2)</b>

<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:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.89 \text{ mho/m}$ ;  $\epsilon_r = 41.4$ ;  $\rho = 1000 \text{ kg/m}^3$

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:

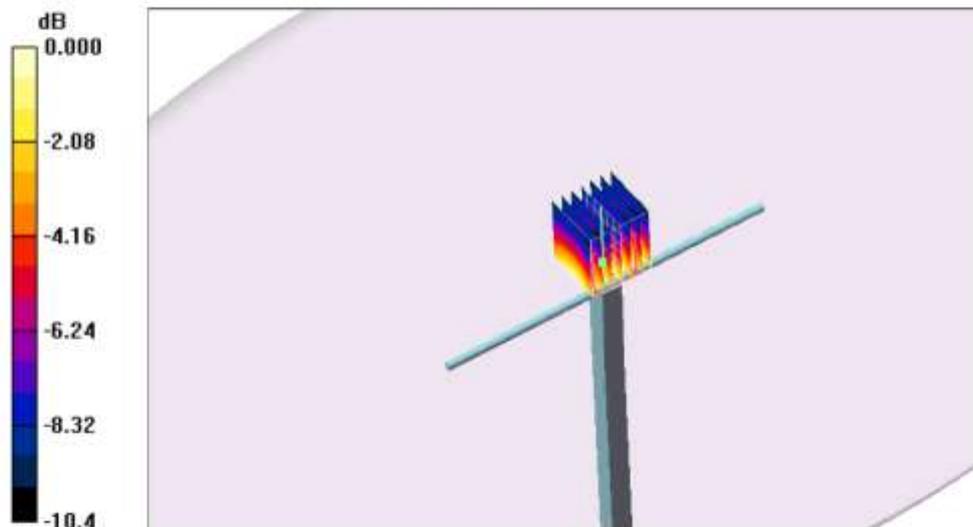
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

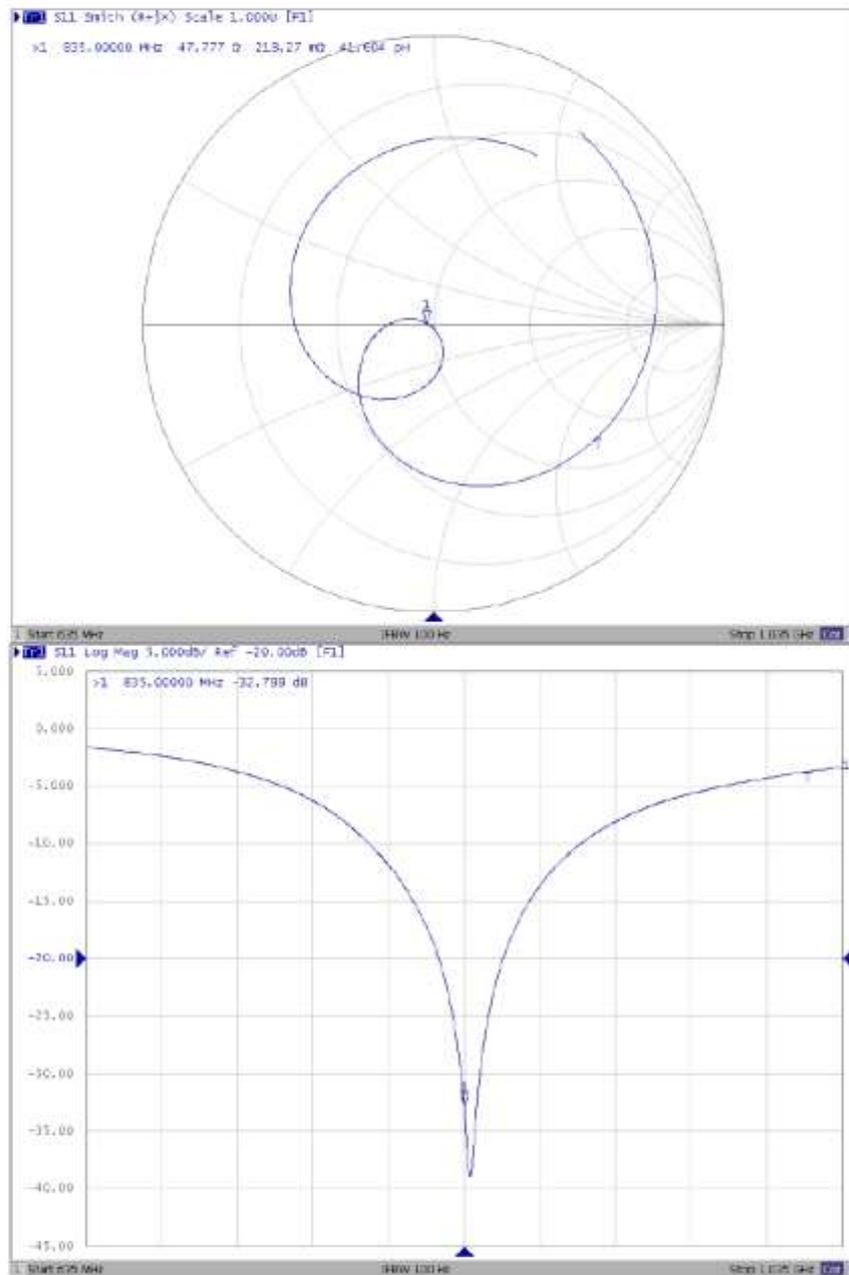
Peak SAR (extrapolated) = 3.45 W/kg

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

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



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

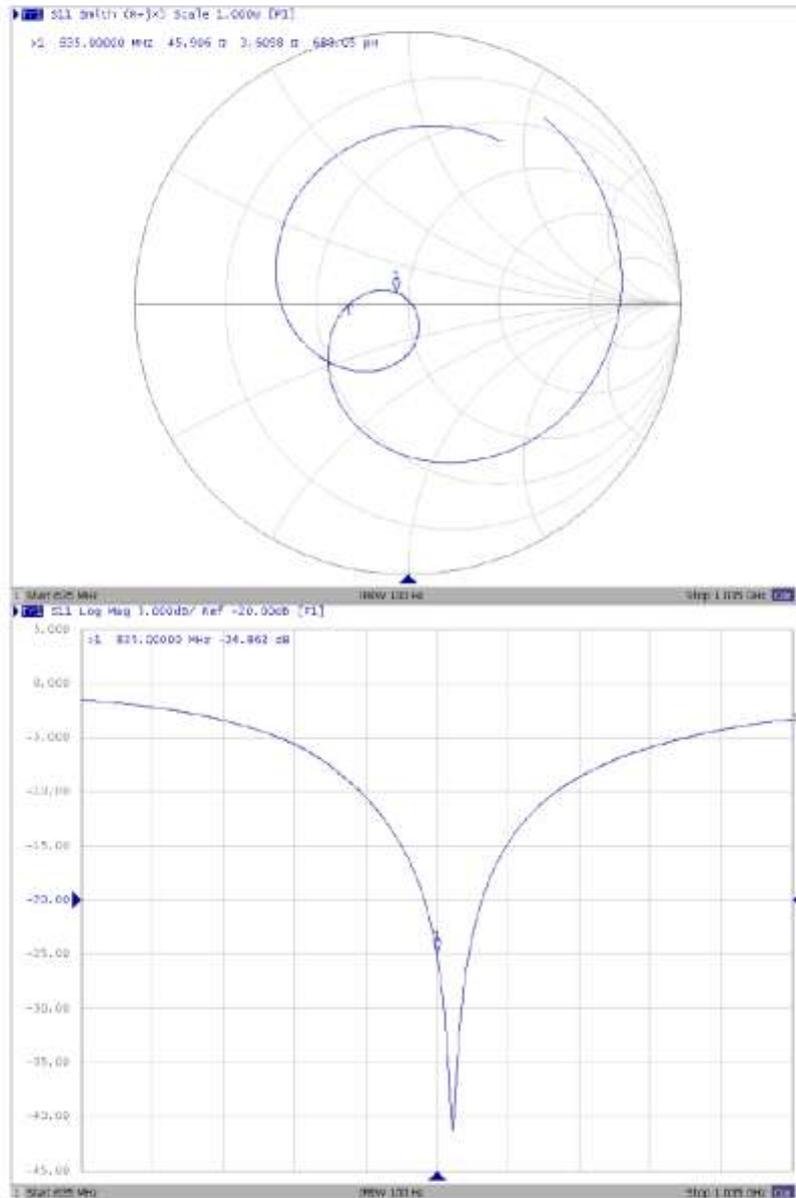
Peak SAR (extrapolated) = 3.52 W/kg

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 C.4 D1900V2 Calibration Certificate**

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



S Schweizerischer Kalibrierdienst  
S Service suisse d'étalonnage  
C Servizio svizzero di tarature  
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 **Tejet (Auden)**

Certificate No: **D1900V2-5d155\_Apr12**

**CALIBRATION CERTIFICATE**

Object: **D1900V2 - SN: 5d155**

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

Calibration date: **April 03, 2012**

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

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

Calibration Equipment used (MATE critical for calibration):

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GD07480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37282783	08-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (204)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01530)	Apr-13
Reference Probe EG10V1	SN: 3205	30-Dec-11 (No. E59-3205_Dec11)	Dec-12
DAEs	SN: 601	04-Jul-11 (No. GAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-09 (in house check Oct-11)	In house check: Oct-12
RF generator R&S SMT-06	100005	04-Aug-09 (in house check Oct-11)	In house check: Oct-12
Network Analyzer HP 8752E	US37390685 04206	18-Oct-07 (in house check Oct-11)	In house check: Oct-12

Calibrated by: **Jason Kammat** (Name) / **Laboratory Technician** (Function) / *[Signature]* (Signature)

Approved by: **Katja Pokovic** (Name) / **Technical Manager** (Function) / *[Signature]* (Signature)

Issued: April 12, 2012

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

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



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

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%.

**Measurement Conditions**

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

DASY Version	DASY5	V52.8.0
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 $\pm$ 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 $\pm$ 0.2) °C	40.8 $\pm$ 6 %	1.37 mho/m $\pm$ 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	9.65 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.09 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.6 mW / g $\pm$ 16.5 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.3 $\pm$ 6 %	1.51 mho/m $\pm$ 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	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.2 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.3 mW / g $\pm$ 16.5 % (k=2)

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	52.3 $\Omega$ + 5.4 j $\Omega$
Return Loss	- 24.8 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	48.7 $\Omega$ + 6.0 j $\Omega$
Return Loss	- 24.2 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.202 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	December 20, 2011

**DASY5 Validation Report for Head TSL**

Date: 03.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d155**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 40.8$ ;  $\rho = 1000$  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: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

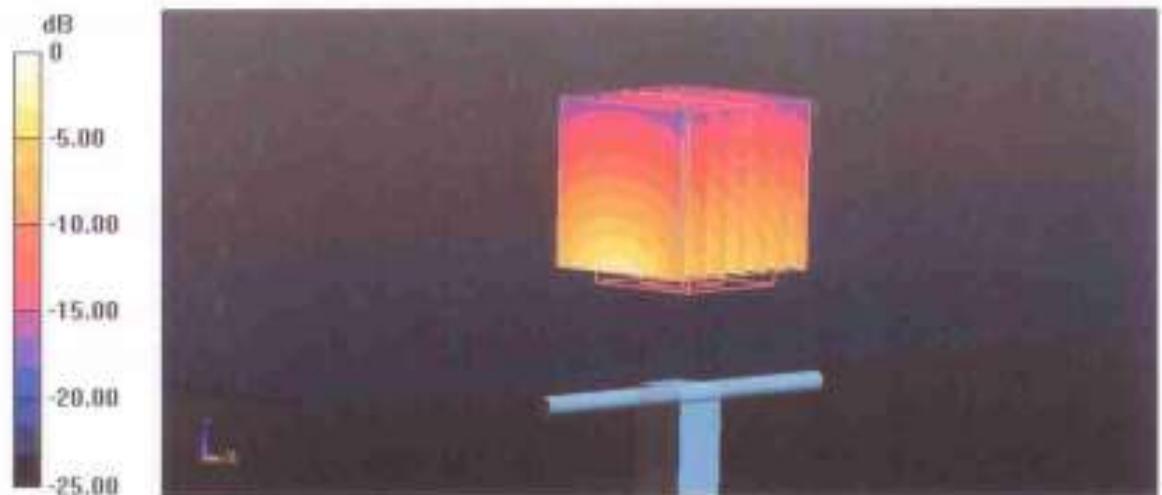
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.442 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.1390

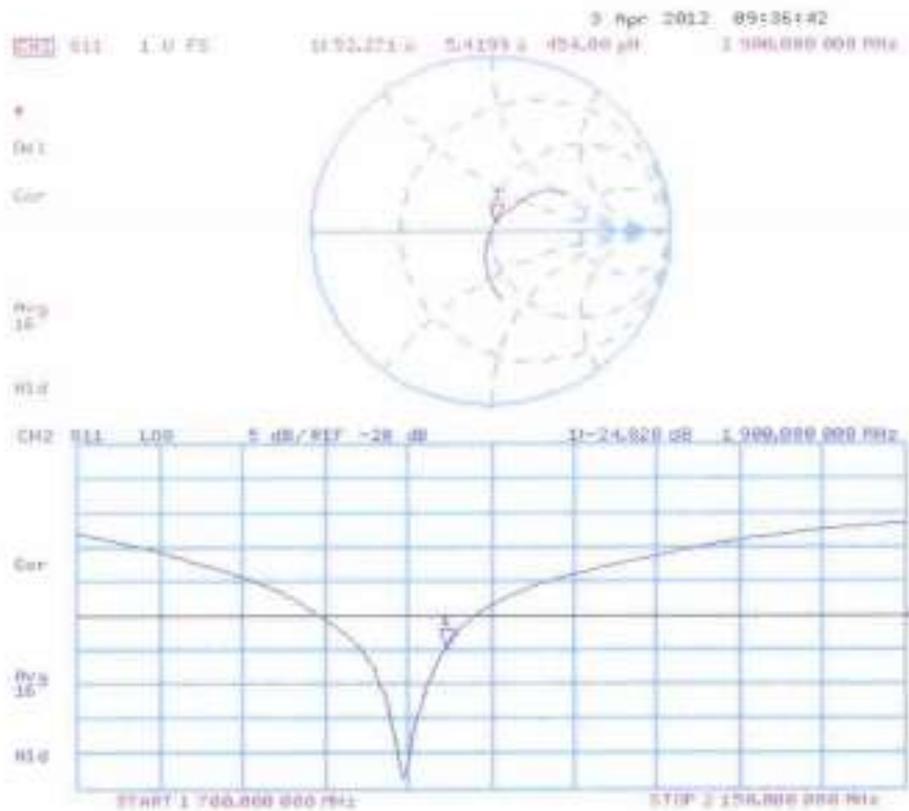
**SAR(1 g) = 9.65 mW/g; SAR(10 g) = 5.09 mW/g**

Maximum value of SAR (measured) = 12.105 mW/g



0 dB = 12.110mW/g = 21.66 dB mW/g

Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 03.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d155**

Communication System: CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.51$  rho/m;  $\epsilon_r = 53.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

**DASY52 Configuration:**

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**

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

Reference Value = 95.405 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.4140

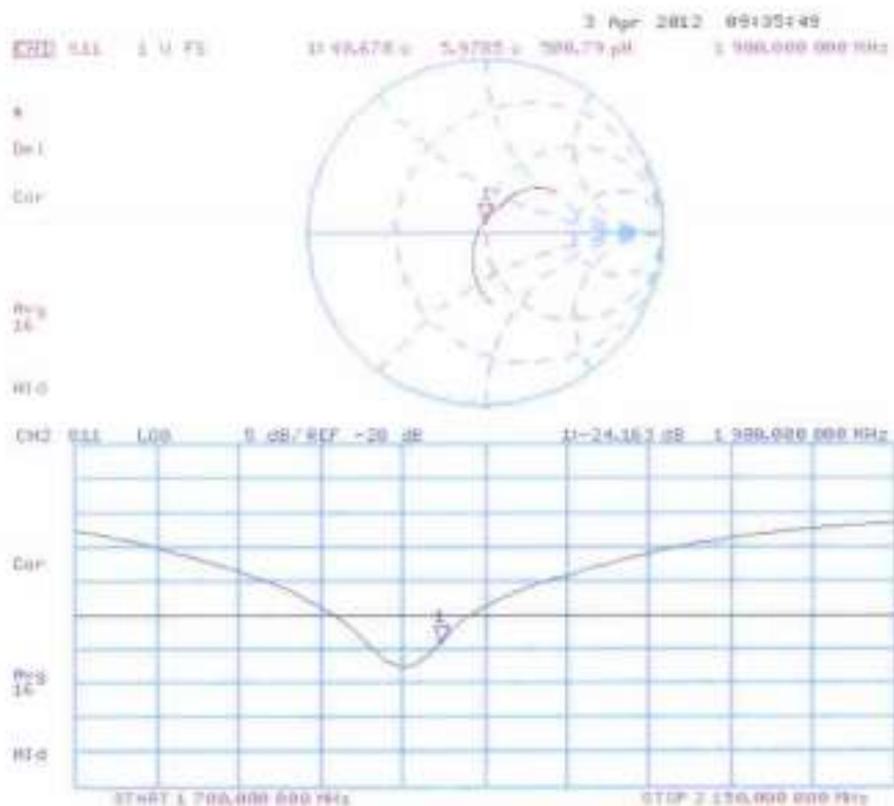
**SAR(1 g) = 10 mW/g; SAR(10 g) = 5.3 mW/g**

Maximum value of SAR (measured) = 12.631 mW/g



0 dB = 12.630mW/g = 22.03 dB·mW/g

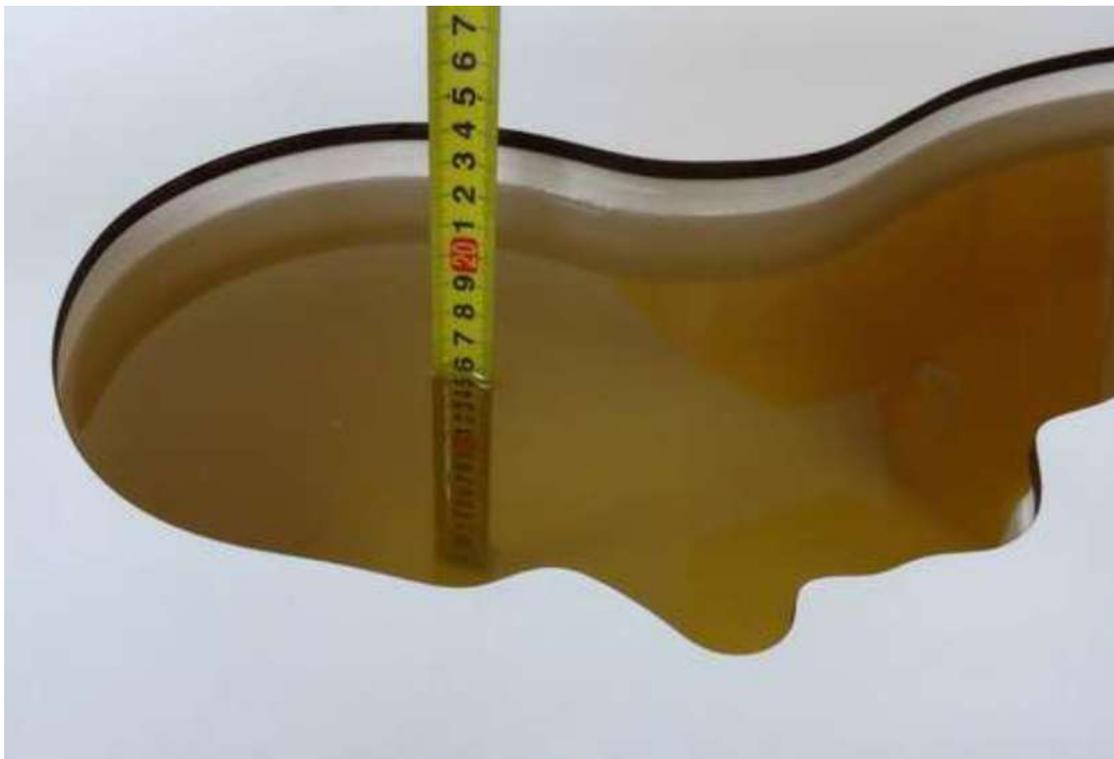
Impedance Measurement Plot for Body TSL



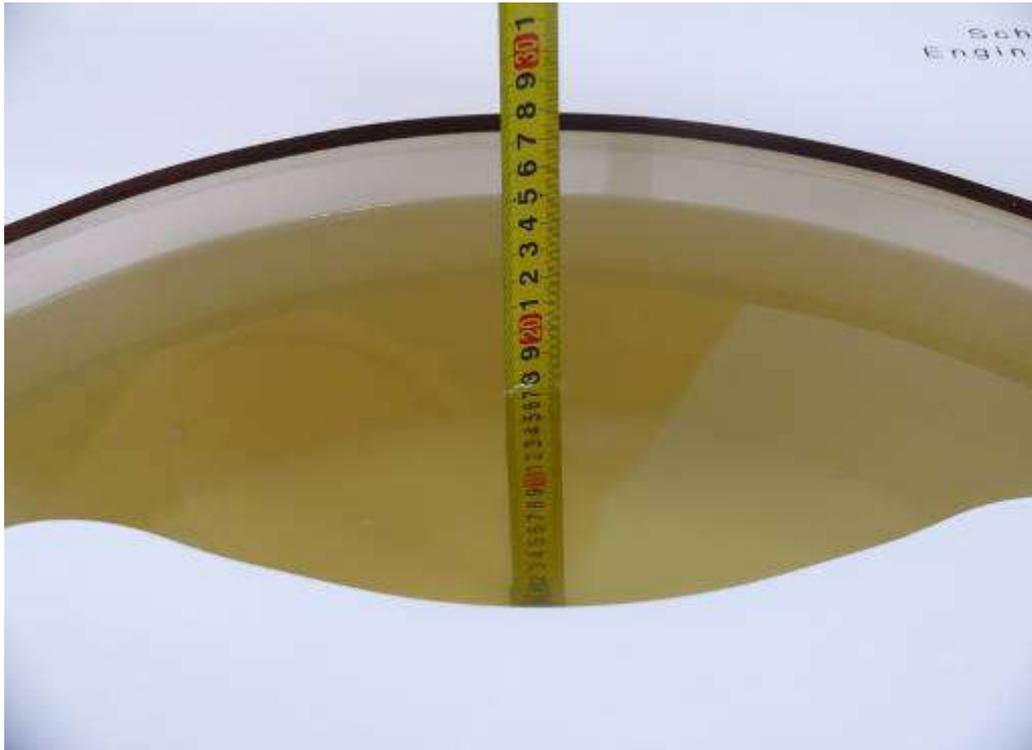
ANNEX D: Test Layout



Picture D.1: Specific Absorption Rate Test Layout



Picture D.2: Liquid depth in the head Phantom (835MHz) (16cm deep)



Picture D.3: Liquid depth in the flat Phantom (835MHz) (17.5cm deep)



Picture D.4: Liquid depth in the head Phantom (1900 MHz) (15.2cm deep)



Picture D.5: Liquid depth in the flat Phantom (1900 MHz) (19cm deep)

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