

# Full SAR Test Report

Applicant Name: Verykool USA Inc

Applicant Address: 4350 Executive Dr. #100, San Diego

The following samples were submitted and identified on behalf of the client as:

Sample Description	GSM/GPRS Quad-band Mobile Phone
Brand Name	verykool
Model Number	i285
Final Hardware Version Tested	MAUI.09A.W09.52.MP.V57.F2
Final Software Version Tested	I285_VK_SW_0.09
FCC ID	WA6I285
Date Initial Sample Received	07-30,2011
Testing Start Date	07-31,2011
Testing End Date	08-01,2011

According to:

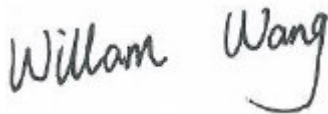
FCC 47CFR § 2.1093, IEEE Std C95.1-2005

IEEE1528-2003, OET Bulletin 65 Supplement C

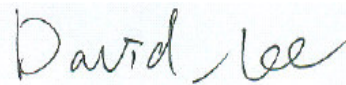
Comments/ Conclusion:

The configuration tested complied to the certification requirements specified in this report.

Signed for on behalf of SGS



Testing Engineer  
Prepared



Project Manager  
approved

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### Change History

Version	Change Contents	Author	Date
V1.0	First edition	Willam Wang	08-02, 2011

## 1. Report Overview

This report details the results of testing carried out on the samples listed in section 17, 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.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of SGS Shanghai EMC lab or testing done by SGS Shanghai EMC lab made in connection with the distribution or use of the tested product must be approved in writing by SGS Shanghai EMC lab.

## 2. Test Lab Declaration or Comments

None

## 3. Applicant Declaration or Comments

None

## 4. Full Test Report

A full test report contains, within the results section, all the applicable test cases from the certification requirements of the permanent reference documents of the listed certification bodies.

## 5. Partial Test Report

A partial test report contains within the results section a sub-set of all the applicable test cases from the certification requirements of the permanent reference documents of the listed certification bodies.

## 6. Measurement Uncertainty

Measurements and results are all in compliance with the standards listed in section 12 of this report. All measurements and results are recorded and maintained at the laboratory performing the tests and measurement uncertainties are taken into account when comparing measurements to pass/ fail criteria.

A	b1	c	d	e = f(d,k)	g	i = cxg/e	k
Uncertainty Component	Section in P1528	Tol (%)	Prob . Dist.	Div.	Ci (1g)	1g ui (%)	Vi (Veff)
Probe calibration	E.2.1	6.3	N	1	1	6.3	∞
Axial isotropy	E.2.2	0.5	R	$\sqrt{3}$	$(1-c_p)^{1/2}$	0.20	∞
hemispherical isotropy	E.2.2	2.6	R	$\sqrt{3}$	$\sqrt{c_p}$	1.06	∞
Boundary effect	E.2.3	0.8	R	$\sqrt{3}$	1	0.46	∞
Linearity	E.2.4	0.6	R	$\sqrt{3}$	1	0.35	∞
System detection limit	E.2.5	0.25	R	$\sqrt{3}$	1	0.15	∞
Readout electronics	E.2.6	0.3	N	1	1	0.3	∞
Response time	E.2.7	0	R	$\sqrt{3}$	1	0	∞
Integration time	E.2.8	2.6	R	$\sqrt{3}$	1	1.5	∞
RF ambient Condition –Noise	E.6.1	3	R	$\sqrt{3}$	1	1.73	∞
RF ambient Condition - reflections	E.6.1	3	R	$\sqrt{3}$	1	1.73	∞
Probe positioning- mechanical tolerance	E.6.2	1.5	R	$\sqrt{3}$	1	0.87	∞
Probe positioning- with respect to phantom	E.6.3	2.9	R	$\sqrt{3}$	1	1.67	∞
Max. SAR evaluation	E.5.2	1	R	$\sqrt{3}$	1	0.58	∞
Test sample positioning	E.4.2	4	N	1	1	3.7	9
Device holder uncertainty	E.4.1	3.6	N	1	1	3.6	∞
Output power variation –SAR drift measurement	6.62	5	R	$\sqrt{3}$	1	2.89	∞
Phantom uncertainty (shape and thickness tolerances)	E.3.1	4	R	$\sqrt{3}$	1	2.31	∞
Liquid conductivity - deviation from target values	E.3.2	5	R	$\sqrt{3}$	0.64	1.85	∞
Liquid conductivity - measurement uncertainty	E.3.2	4	N	1	0.64	2.56	5
Liquid permittivity - deviation from target values	E.3.3	5	R	$\sqrt{3}$	0.6	1.73	∞
Liquid permittivity - measurement uncertainty	E.3.3	4	N	1	0.6	2.40	5
Combined standard uncertainty				RSS		10.71	430
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		21.43	

## 7. Testing Environment

Normal Temperature	+20 to +24 °C
Relative Humidity	35 to 60 %

## 8. Primary Test Laboratory

Name:	EMC Laboratory SGS-CSTC Standards Technical Services(Shanghai) Co., Ltd
Address:	9F, 3 <sup>rd</sup> Building, No.889, Yishan Rd, Xuhui District, Shanghai, China 200233
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Internet:	<a href="http://www.cn.sgs.com">http://www.cn.sgs.com</a>
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## 9. Details of Applicant

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## 10. Details of Manufacturer

Name:	Verykool Wireless Technology Ltd.
Address:	Room 1701, Reward Building C, No.203, 2nd Section of WangJing, Li Ze Zhong Yuan, ChaoYang District, Beijing, P.R. of China 100102
Telephone:	8610-64399678-813
Fax	8610-64399678-888
Contact Person:	Meng lai quan
Email:	<a href="mailto:laiquan.meng@verykool.cn">laiquan.meng@verykool.cn</a>

## 11. Other testing Locations

Name:	Not Required
Address:	--
Telephone:	--
Contact:	--
Fax	--
Email:	--

## 12. Referenced Documents

The Equipment under Test (EUT) has been tested at SGS's (own or subcontracted) laboratories according to FCC 47CFR § 2.1093, IEEE Std C95.1-2005, IEEE1528-2003, OET Bulletin 65 Supplement C,

The following table summarizes the specific reference documents such as harmonized standards or test specifications which were used for testing as SGS's (own or subcontracted) laboratories.

Identity	Document Title	Version
FCC 47CFR § 2.1093	Radiofrequency radiation exposure evaluation: portable devices	2001
IEEE Std C95.1-2005	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.	2005
IEEE1528-2003	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	2003
OET Bulletin 65 Supplement C	Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions	2001

Human Exposure	Uncontrolled Environment General Population
Spatial Peak SAR	1.60 W/kg (averaged over a mass of 1g)

Table 12-1 RF Exposure Limits

Notes:

Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.

13. Primary Laboratory Accreditation Details





#### 14. SGS Shanghai EMC lab, Personnel

SGS EMC Shanghai Project Management Team and list of approved Testers for SGS EMC Shanghai.

Surname	Forename	Initials
CAI	CAI	CAICAI
Xu	Jim	JimXu
Pan	Tino	Tino
Hailiang	Cai	HAILIANG
Nie	Neo	Neo
Xu	Jesse	Jesse
Wang	Willam	Willam
Lee	David	David
Liu	Magi	Magi

Version 2011-06-01

## 15. Test Equipment Information

### 15.1 SPEAG DASY4

Test Platform	SPEAG DASY4 Professional			
Location	SGS SH Lab #8			
Manufacture	SPEAG			
Description	SAR Test System (Frequency range 300MHz-3GHz) 835, 900, 1800, 1900, 2000, 2450 frequency band HAC Extension			
Software Reference	DASY4: V4.7 Build 80 SEMCAD: V1.8 Build 186			
Hardware Reference				
Equipment	Model	Serial Number	Calibration Date	Due date of calibration
Robot	RX90L	F03/5V32A1/A01	n/a	n/a
Phantom	SAM 12	TP-1283	n/a	n/a
DAE	DAE3	569	2010-11-22	2011-11-21
E-Field Probe	ES3DV3	3088	2010-11-23	2011-11-22
Validation Kits	D835V2	4d070	2010-11-19	2011-11-18
Validation Kits	D1900V2	5d028	2010-11-25	2011-11-24
Validation Kits	D2450V2	733	2010-11-25	2011-11-24
Agilent Network Analyzer	E5071B	MY42100549	2010-11-24	2011-11-23
RF Bi-Directional Coupler	ZABDC20-252H	n/a	2011-05-21	2012-05-20
Agilent Signal Generator	E4438C	14438CATO-19719	2010-11-01	2011-10-31
Mini-Circuits Preamplifier	ZHL-42	D041905	2010-11-01	2011-10-31
Agilent Power Meter	E4416A	GB41292095	2010-11-01	2011-10-31
Agilent Power Sensor	8481H	MY41091234	2010-11-01	2011-10-31
R&S Power Sensor	NRP-Z92	100025	2011-04-12	2012-04-11
R&S Universal Radio Communication Tester	CMU200	103633	2010-11-01	2011-10-31

## 15.2 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. 15-1.

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (Speag Dasy 4 professional system). A Model ES3DV3 3088 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation  $SAR = \sigma (|E|^2) / \rho$  where  $\sigma$  and  $\rho$  are the conductivity and mass density of the tissue-simulant.

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

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension is for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

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 between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.

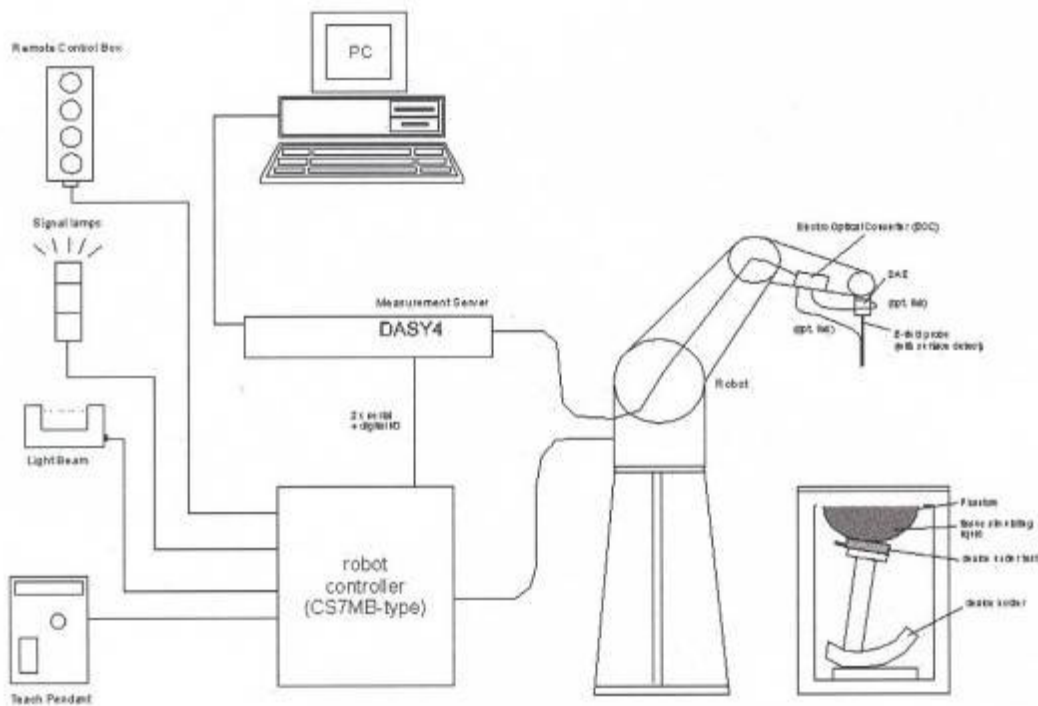


Fig. 15-1 SAR System Configuration

- 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.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000.

- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and BodyWorn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system

### 15.3 Isotropic E-field Probe ES3DV3

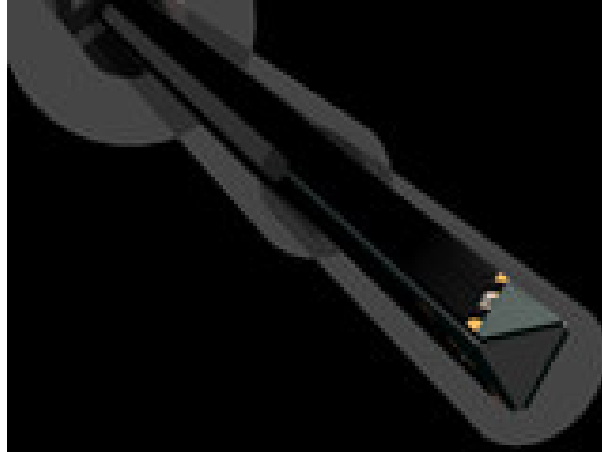


Fig. 15-2 E-field Probe

<b>Construction</b>	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
<b>Calibration</b>	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 900 and HSL 1810 Additional CF for other liquids and frequencies upon request
<b>Frequency</b>	10 MHz to 4 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 4 GHz)
<b>Directivity</b>	$\pm 0.2$ dB in HSL (rotation around probe axis) $\pm 0.3$ dB in tissue material (rotation normal to probe axis)
<b>Dynamic Range</b>	5 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB
<b>Dimensions</b>	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
<b>Application</b>	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

## 15.4 SAM Twin Phantom



Fig. 15-3 SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left hand
- Right hand
- Flat phantom

A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on the cover are possible.

On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

Phantom specification:

<b>Description</b>	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. 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 evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.
<b>Shell Thickness</b>	2+0.2mm, Center ear point: 6+0.2mm
<b>Filling Volume</b>	Approx.25 liters
<b>Dimensions</b>	Length: 1000mm, Width: 500mm, Height: 850mm

## 15.5 Device Holder for Transmitters



**Fig. 15-4 Device Holder for Transmitters**

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5mm distance, a positioning uncertainty of  $\pm 0.5\text{mm}$  would produce a SAR uncertainty of  $\pm 20\%$ . An accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions, in which the devices must be measured, are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the 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 DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\tan \delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

## 16. Detailed Test Results

### 16.1 Summary of Results

#### 16.1.1 Measurement of RF conducted Power

Unit:dBm

Mode		GPRS			
Slot (Uplink)		1		2	
/		Max burst	averaged	Max burst	averaged
Band	Channel	GMSK			
850	128	33.56	24.37	33.57	27.39
	190	33.54	24.35	33.59	27.41
	251	33.63	24.44	33.64	27.46
1900	512	30.08	20.89	30.07	23.89
	661	30.39	21.20	30.38	24.20
	810	30.75	21.56	30.75	24.57

Mode		GSM	
Slot (Uplink)		GMSK	
/		Max burst	averaged
Band	Channel	GMSK	
850	128	33.56	24.37
	190	33.54	24.35
	251	33.63	24.44
1900	512	30.08	20.89
	661	30.39	21.20
	810	30.75	21.56



## 16.1.2 Measurement of SAR average value

## GSM 850

Band	EUT Position	Mode	Test Configuration	Averaged SAR over 1g (W/kg)			SAR limit 1g (W/kg))	Verdict
				CH128	CH190	CH251		
				824.2MHz	836.6MHz	848.8MHz		
GSM850	Left	GSM	Cheek	--	0.457	--	1.6	Passed
			Tilt	--	0.220	--	1.6	Passed
	Right		Cheek	0.316	0.483	0.770	1.6	Passed
			Tilt	--	0.303	--	1.6	Passed
	Right		Cheek (SIM 2)	--	--	0.797	1.6	Passed
	Body Worn		GSM	Front of EUT facing phantom	--	0.458	--	1.6
		Rear of EUT facing phantom		0.333	0.511	0.785	1.6	Passed
		Rear of EUT facing phantom(SIM 2)		--	--	0.795	1.6	Passed
		Worst case With earphone		--	--	0.294	1.6	Passed
		Worst case With GPRS 1TS		--	--	0.823	1.6	Passed
		Worst case With GPRS 2TS		--	--	0.952	1.6	Passed

**GSM 1900**

Band	EUT Position	Mode	Test Configuration	Averaged SAR over 1g (W/kg)			SAR limit 1g (W/kg)	Verdict
				CH512	CH661	CH810		
				1850.2MHz	1880MHz	1909.8MHz		
GSM1900	Left	GSM	Cheek	--	0.498	--	1.6	Passed
			Tilt	--	0.286	--	1.6	Passed
	Right		Cheek	0.769	0.634	0.555	1.6	Passed
			Tilt	--	0.254	--	1.6	Passed
	Left		Cheek(SIM 2)	0.718	--	--	1.6	Passed
	Body Worn	GSM	Front of EUT facing phantom	--	0.300	--	1.6	Passed
			Rear of EUT facing phantom	0.371	0.313	0.267	1.6	Passed
			Rear of EUT facing phantom(SIM 2)	0.352	--	--	1.6	Passed
			Worst case With earphone	0.344	--	--	1.6	Passed
		Worst case With GPRS 1TS		0.366	--	--	1.6	Passed
		Worst case With GPRS 2TS		0.581	--	--	1.6	Passed

**16.2 Maximum Results**

The maximum measured SAR values for Head configuration and BodyWorn configuration are given in section 16.2.1 and 16.2.2.

**16.2.1 Head Configuration**

Frequency Band	EUT Position	Conducted Power (dBm)	SAR, Averaged over 1g (W/kg)	Power Drift (dB)	SAR limit (W/kg)	Verdict
GSM 850	Right Cheek High SIM 2	24.44	0.797	0.161	1.6	Passed
GSM 1900	Right Cheek Low	20.89	0.769	-0.115	1.6	Passed

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### 16.2.2 BodyWorn Configuration

Frequency Band	EUT Position	Conducted Power (dBm)	SAR, Averaged over 1g (W/kg)	Power Drift (dB)	SAR limit (W/kg)	Verdict
GSM 850	Back of EUT facing phantom/GPRS2TS/ High	27.46	0.952	0.019	1.6	Passed
GSM 1900	Back of EUT facing phantom/GPRS2TS/ Low	23.89	0.581	-0.160	1.6	Passed

### 16.2.3 Maximum Drift

Maximum Drift during measurement	-0.259
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### 16.2.4 Measurement Uncertainty

Extended Uncertainty (k=2) 95%	21.43%
--------------------------------	--------

## 16.3 Operation Configurations

### 16.3.1

The EUT is controlled by using a radio communication tester (CMU200) with air link, and the EUT is set to maximum output power by CMU200 during GSM Mode tests.

1. Testing Head SAR at GSM mode for all bands with Left Cheek/Tilt and Right Cheek/Tilt conditions.
2. Testing Body SAR at GSM mode for all bands by separating 15 mm from the EUT (both front and rear) to flat phantom.
3. Head and Body SAR with accessories should be done at worstcase to identify maximum SAR value.
4. Test reduction has been adopted according to conducted output power and produced SAR level:

Low and High channel SAR are optional if SAR value produced in the middle channel is 3dB lower than the applicable SAR limit;

In GPRS mode, the multislots configuration which produces highest SAR value is regarded as the worst case to be measured, other multislots configurations are selectively confirmed;

5. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which within 2dB of the highest peak

6. Head SAR for GSM should be tested in GPRS/EGPRS modes, if EUT support DTM.

## 16.4 Measurement procedure

### Step 1: Power reference measurement

The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed location point was measured and used as a reference value.

### Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm\*15mm or 10mm\*10mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

### Step 3: Zoom scan

Around this point, a volume of 30mm\*30mm\*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 7\*7\*7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the center of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification) the extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points (10\*10\*10) were interpolated to calculate the average. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

### Step 4: Power reference measurement (drift)

The SAR value at the same location as in step 1 was again measured. (If the value changed by more than 5%, the evaluation should be done repeatedly)

## 16.5 Detailed Test Results

### 16.5.1 GSM 850 Left Cheek Middle

Date/Time: 2011-7-31 9:06:06

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Left Cheek Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 836.6 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used:  $f = 836.6$  MHz;  $\sigma = 0.895$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Left Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.485 mW/g**

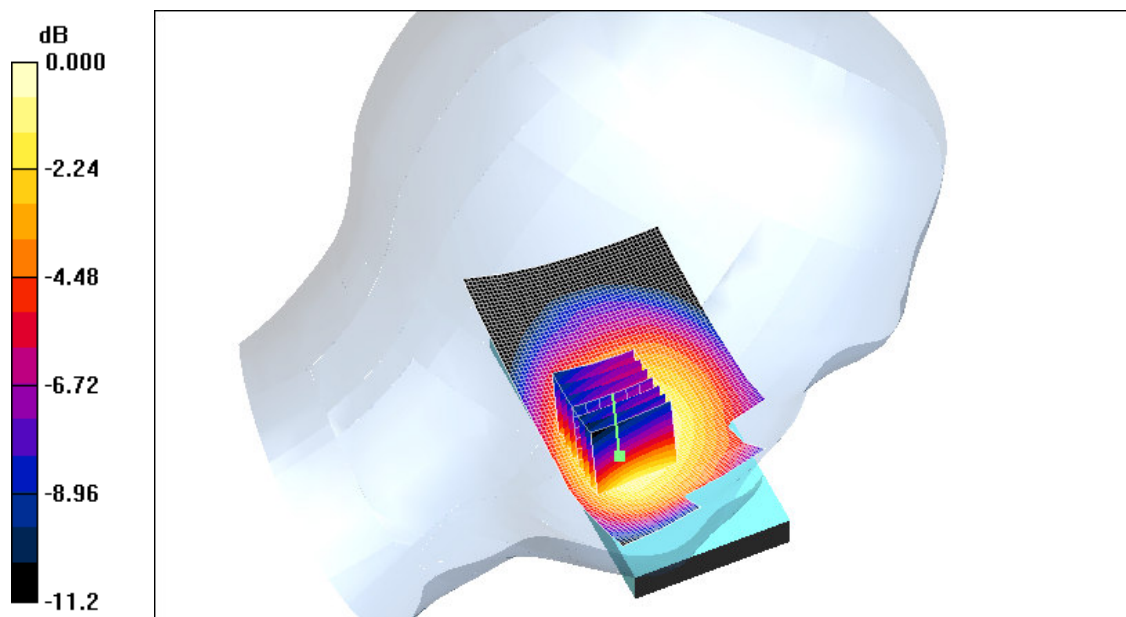
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 7.69 V/m; Power Drift = 0.037 dB**

**Peak SAR (extrapolated) = 0.651 W/kg**

SAR(1 g) = 0.457 mW/g; SAR(10 g) = 0.321 mW/g

**Maximum value of SAR (measured) = 0.487 mW/g**



0 dB = 0.487mW/g

**SHEMC**

### 16.5.2 GSM 850 Left Tilt Middle

Date/Time: 2011-7-31 9:33:00

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Left Tilt Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 836.6 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used: f = 836.6 MHz;  $\sigma = 0.895$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Left Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.229 mW/g**

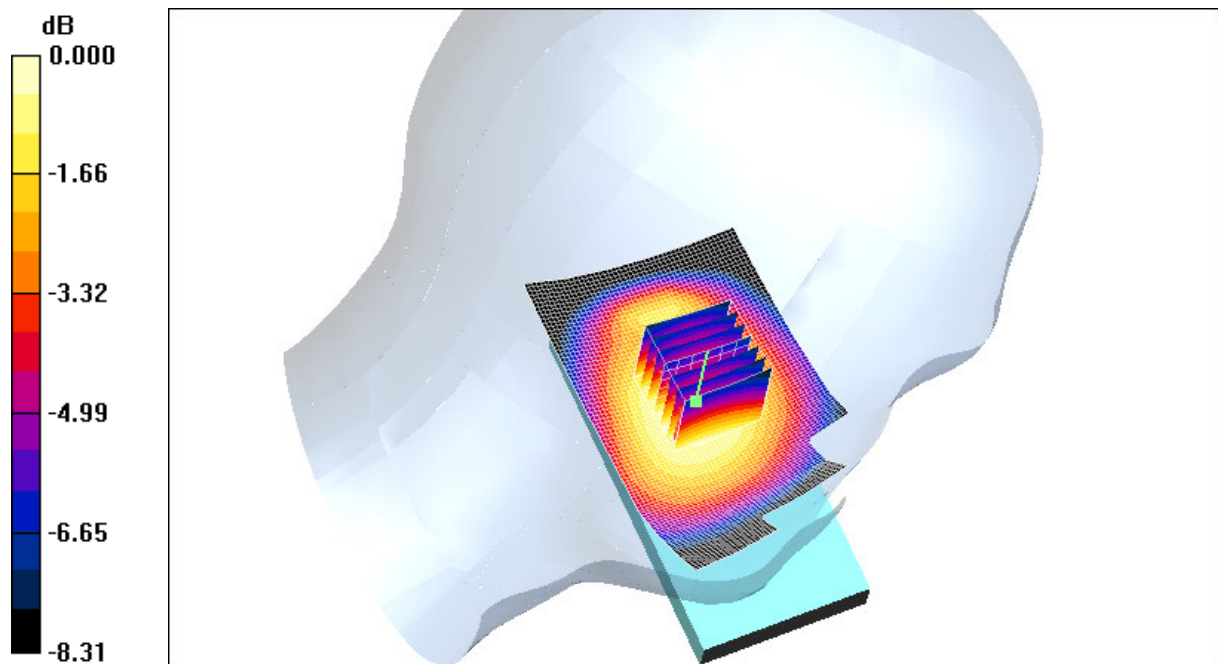
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 12.0 V/m; Power Drift = 0.004 dB**

**Peak SAR (extrapolated) = 0.277 W/kg**

SAR(1 g) = 0.220 mW/g; SAR(10 g) = 0.166 mW/g

**Maximum value of SAR (measured) = 0.231 mW/g**



0 dB = 0.231mW/g

### 16.5.3 GSM 850 Right Cheek Middle

Date/Time: 2011-7-31 10:05:08

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Right Cheek Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 836.6 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used:  $f = 836.6$  MHz;  $\sigma = 0.895$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

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

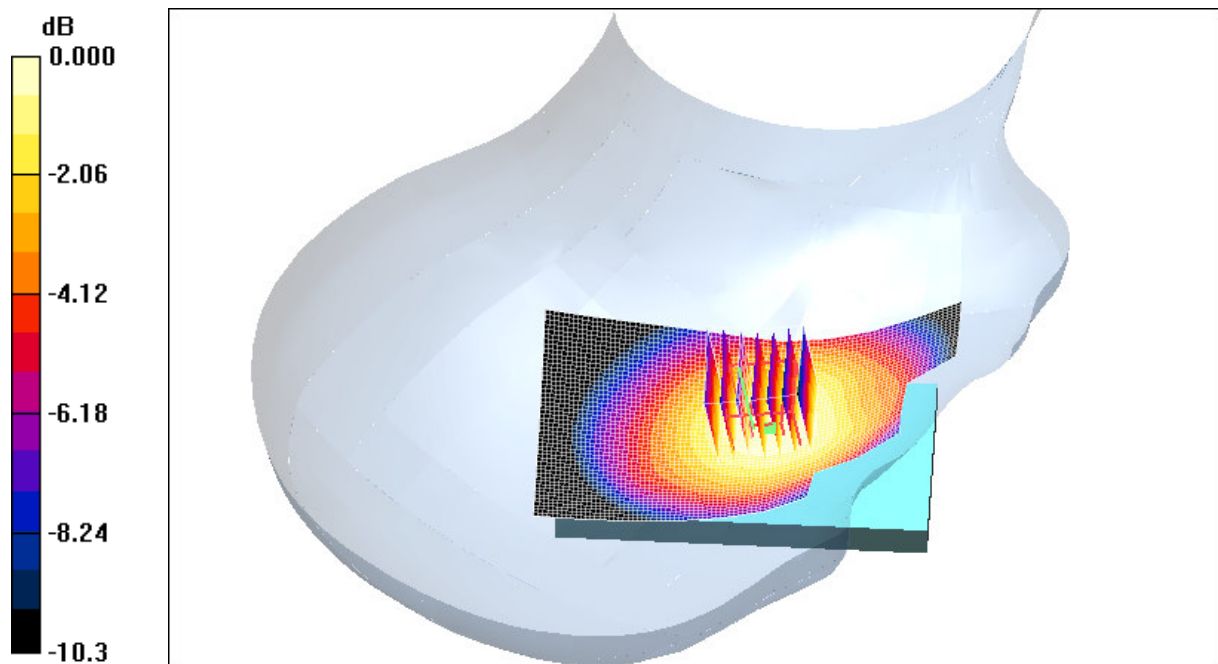
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 9.07 V/m; Power Drift = 0.028 dB**

**Peak SAR (extrapolated) = 0.609 W/kg**

SAR(1 g) = 0.483 mW/g; SAR(10 g) = 0.358 mW/g

**Maximum value of SAR (measured) = 0.505 mW/g**



0 dB = 0.505mW/g

### 16.5.4 GSM 850 Right Tilt Middle

Date/Time: 2011-7-31 10:40:04

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Right Tilt Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 836.6 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used: f = 836.6 MHz;  $\sigma = 0.895$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.316 mW/g**

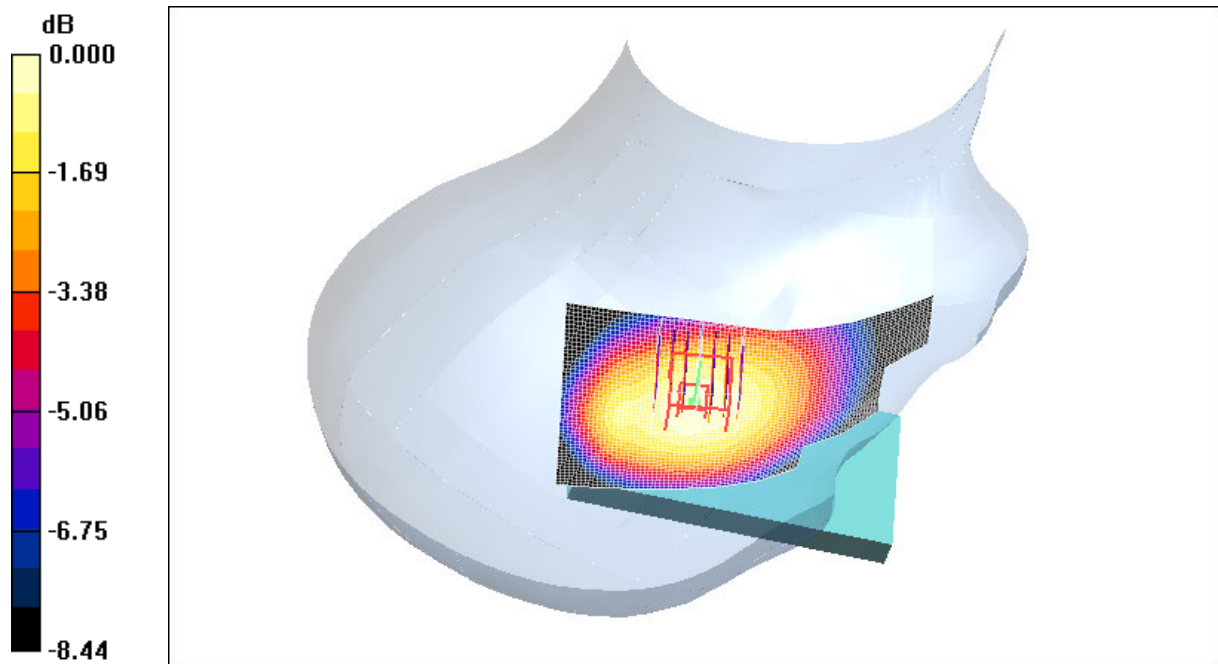
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 14.8 V/m; Power Drift = 0.043 dB**

**Peak SAR (extrapolated) = 0.388 W/kg**

SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.228 mW/g

**Maximum value of SAR (measured) = 0.316 mW/g**



0 dB = 0.316mW/g



### 16.5.5 GSM 850 Right Cheek High

Date/Time: 2011-7-31 11:15:31

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Right Cheek High

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used: f = 848.8 MHz;  $\sigma$  = 0.906 mho/m;  $\epsilon_r$  = 40.9;  $\rho$  = 1000 kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek High/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.812 mW/g**

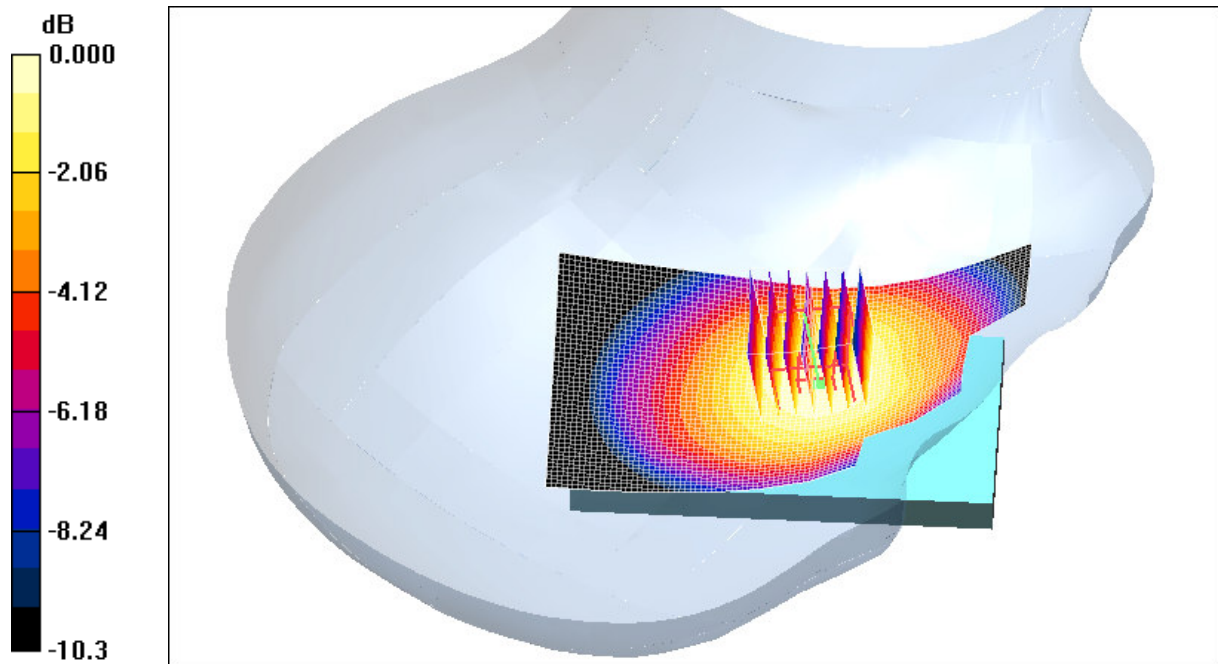
Cheek High/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 11.6 V/m; Power Drift = 0.025 dB**

**Peak SAR (extrapolated) = 0.954 W/kg**

SAR(1 g) = 0.770 mW/g; SAR(10 g) = 0.574 mW/g

**Maximum value of SAR (measured) = 0.810 mW/g**



0 dB = 0.810mW/g

### 16.5.6 GSM 850 Right Cheek Low

Date/Time: 2011-7-31 11:46:34

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Right Cheek Low

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used:  $f = 824.2$  MHz;  $\sigma = 0.883$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Low/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.328 mW/g**

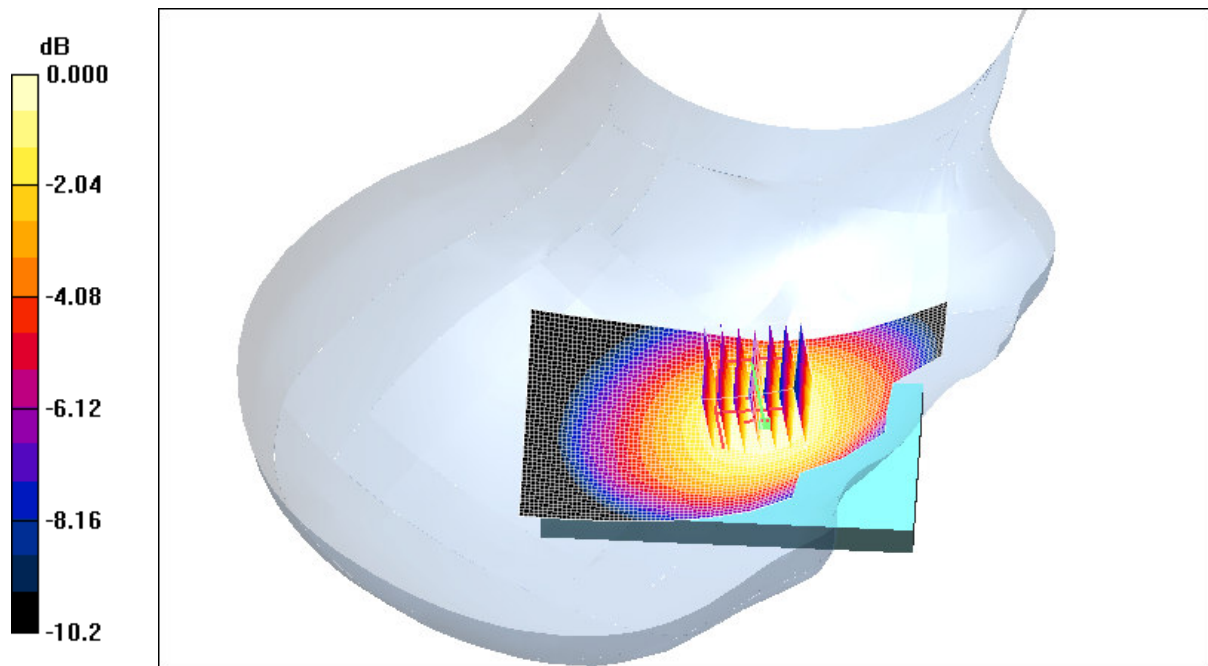
Cheek Low/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 7.49 V/m; Power Drift = 0.171 dB**

**Peak SAR (extrapolated) = 0.393 W/kg**

SAR(1 g) = 0.316 mW/g; SAR(10 g) = 0.236 mW/g

**Maximum value of SAR (measured) = 0.333 mW/g**



0 dB = 0.333mW/g

### 16.5.7 GSM 850 Right Cheek High SIM 2

Date/Time: 2011-7-31 12:19:47

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Right Cheek High SIM 2

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3**

**Medium: HSL850\_Head Medium parameters used: f = 848.8 MHz;  $\sigma = 0.906$  mho/m;  $\epsilon_r = 40.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek High SIM 2/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

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

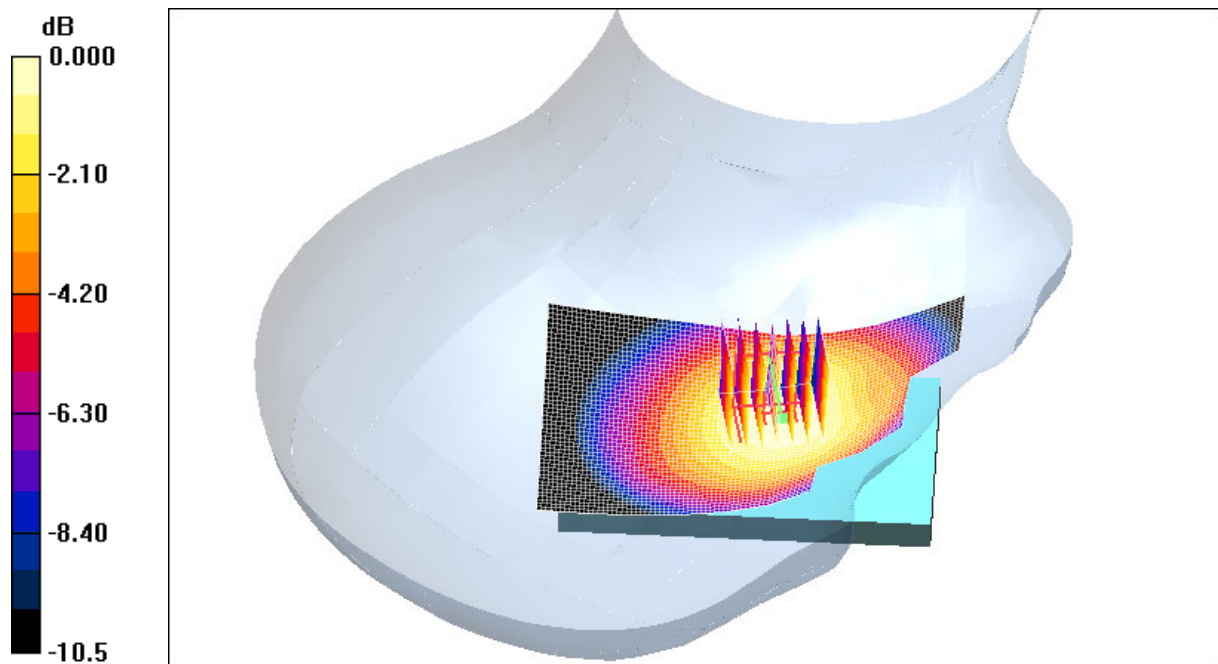
Cheek High SIM 2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 11.3 V/m; Power Drift = 0.161 dB**

**Peak SAR (extrapolated) = 0.989 W/kg**

SAR(1 g) = 0.797 mW/g; SAR(10 g) = 0.593 mW/g

**Maximum value of SAR (measured) = 0.838 mW/g**



0 dB = 0.838mW/g

**SHEMC**

### 16.5.8 GSM 850 BodyWron Front Middle

Date/Time: 2011-7-31 13:55:05

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Bodyworn 15mm Front Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 836.6 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used:  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.972 \text{ mho/m}$ ;  $\epsilon_r = 53.8$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Front Middle/Area Scan (51x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 0.477 mW/g**

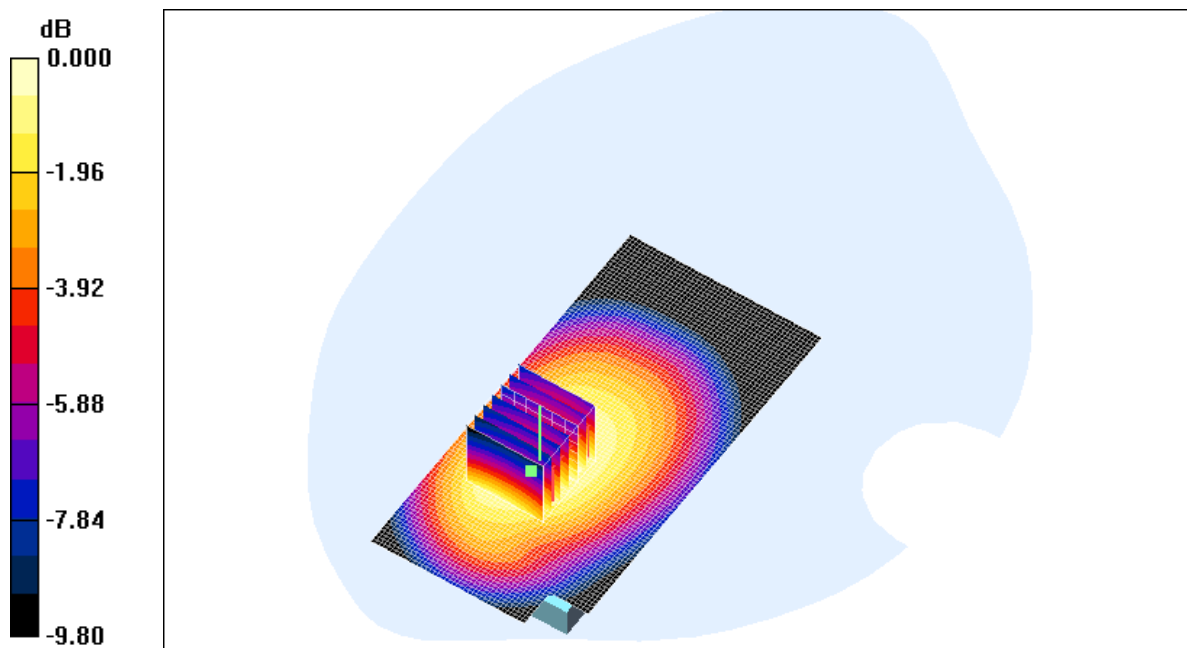
Front Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 9.10 V/m; Power Drift = 0.162 dB**

**Peak SAR (extrapolated) = 0.609 W/kg**

SAR(1 g) = 0.458 mW/g; SAR(10 g) = 0.337 mW/g

**Maximum value of SAR (measured) = 0.484 mW/g**



0 dB = 0.484mW/g

### 16.5.9 GSM 850 BodyWron Back Middle

Date/Time: 2011-7-31 14:25:45

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Bodyworn 15mm Back Middle

DUT: i 288; Type: GSM; Serial: 35868800000158

**Communication System: GSM850-GSM Mode; Frequency: 836.6 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used: f = 836.6 MHz;  $\sigma$  = 0.972 mho/m;  $\epsilon_r$  = 53.8;  $\rho$  = 1000 kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Middle/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.540 mW/g**

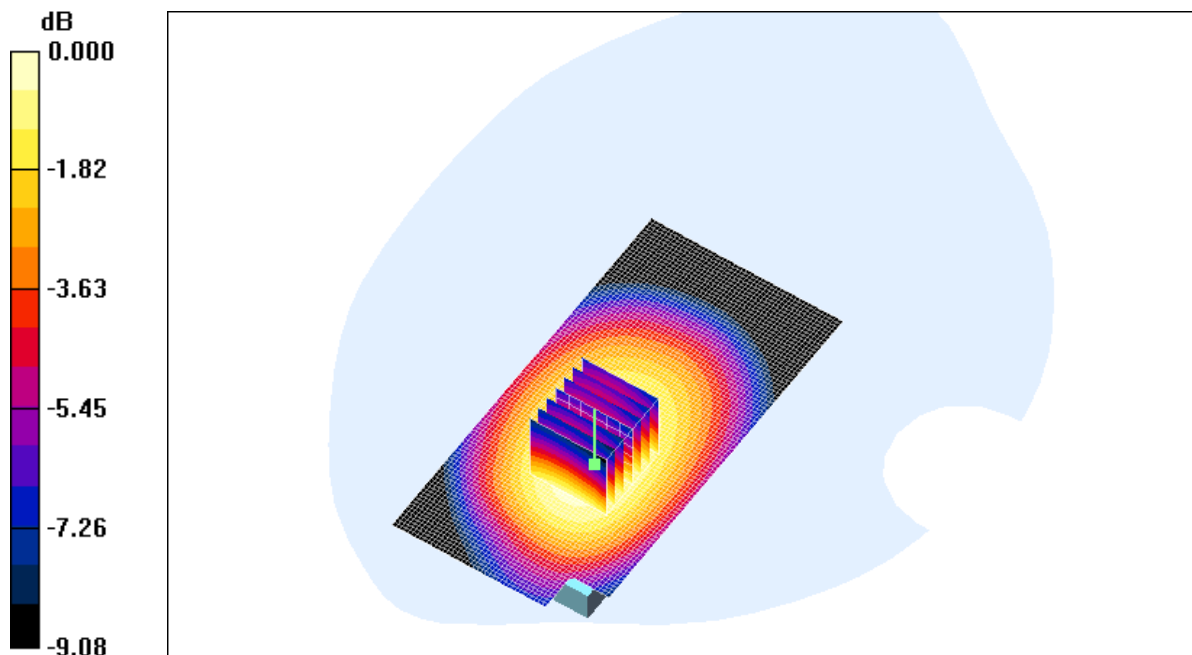
Rear Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 11.1 V/m; Power Drift = 0.045 dB**

**Peak SAR (extrapolated) = 0.646 W/kg**

SAR(1 g) = 0.511 mW/g; SAR(10 g) = 0.385 mW/g

**Maximum value of SAR (measured) = 0.537 mW/g**



0 dB = 0.537mW/g

### 16.5.10 GSM 850 BodyWron Back High

Date/Time: 2011-7-31 14:59:45

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Bodyworn 15mm Back High

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used:  $f = 848.8 \text{ MHz}$ ;  $\sigma = 0.984 \text{ mho/m}$ ;  $\epsilon_r = 53.7$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear High/Area Scan (51x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 0.832 mW/g**

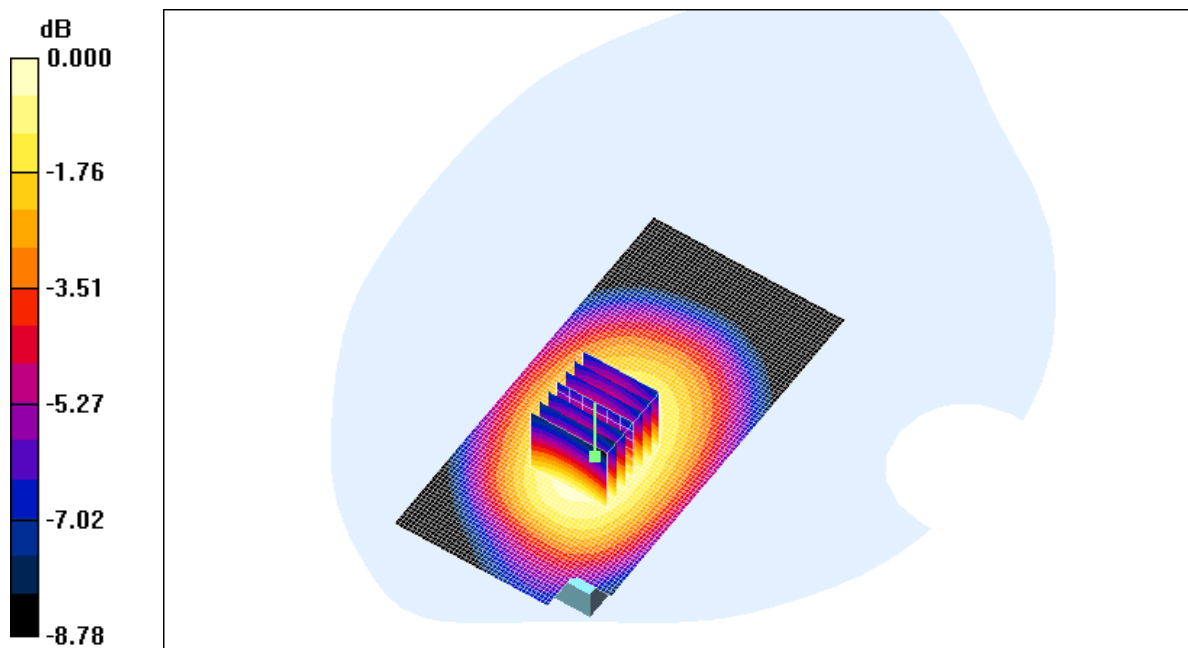
Rear High/Zoom Scan (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 13.3 V/m; Power Drift = -0.004 dB**

**Peak SAR (extrapolated) = 1.00 W/kg**

SAR(1 g) = 0.785 mW/g; SAR(10 g) = 0.590 mW/g

**Maximum value of SAR (measured) = 0.825 mW/g**



0 dB = 0.825mW/g

**16.5.11 GSM 850 BodyWron Back Low**

Date/Time: 2011-7-31 15:37:12

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Bodyworn 15mm Back Low

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used: f = 824.2 MHz;  $\sigma$  = 0.959 mho/m;  $\epsilon_r$  = 53.8;  $\rho$  = 1000 kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Low/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.356 mW/g**

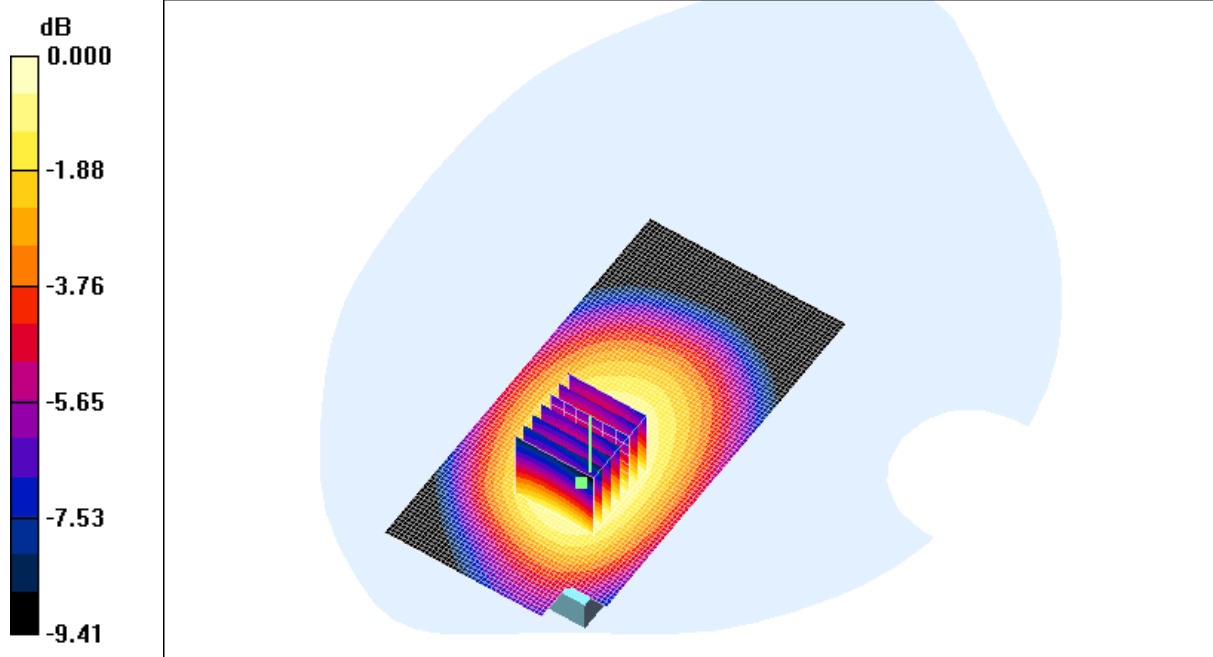
Rear Low/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 8.67 V/m; Power Drift = -0.015 dB**

**Peak SAR (extrapolated) = 0.421 W/kg**

SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.250 mW/g

**Maximum value of SAR (measured) = 0.350 mW/g**



0 dB = 0.350mW/g

**16.5.12 GSM 850 BodyWron Back High SIM 2**

Date/Time: 2011-7-31 16:06:52

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Bodyworn 15mm Back High SIM 2

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used:  $f = 848.8$  MHz;  $\sigma = 0.984$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear High SIM2/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.846 mW/g**

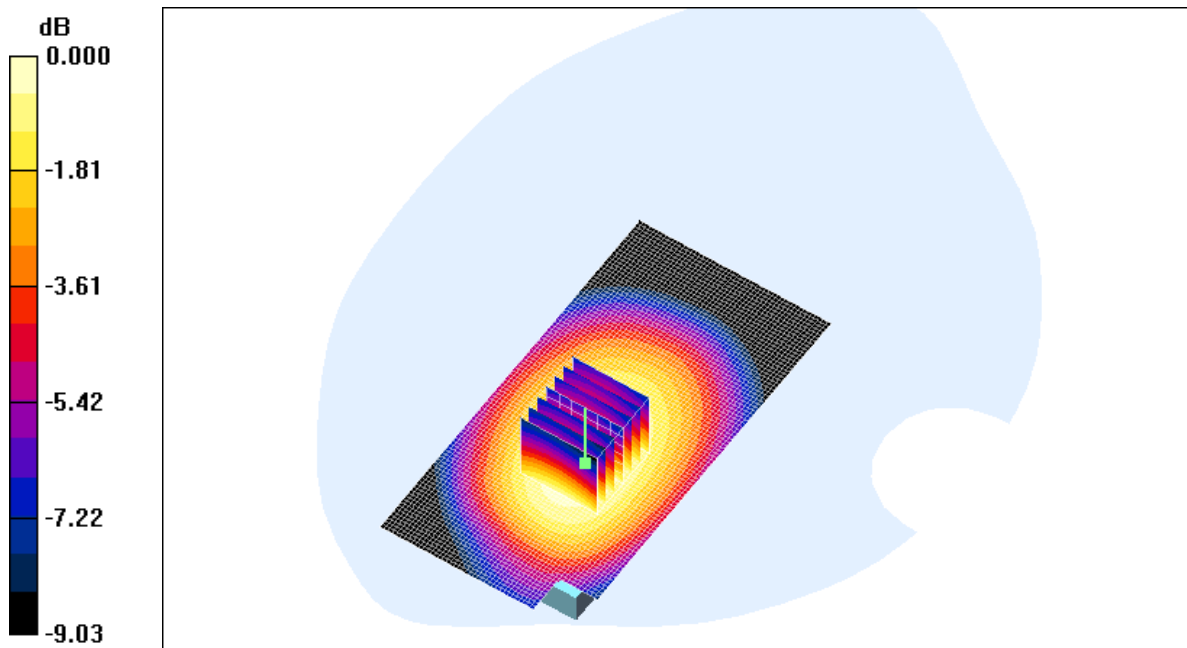
Rear High SIM2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 13.8 V/m; Power Drift = 0.005 dB**

**Peak SAR (extrapolated) = 1.02 W/kg**

SAR(1 g) = 0.795 mW/g; SAR(10 g) = 0.598 mW/g

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



0 dB = 0.840mW/g



### 16.5.13 GSM 850 BodyWron Back High SIM2 with earphone

Date/Time: 2011-7-31 16:49:32

**Test Laboratory: SGS-GSM**

i 288 GSM 850 Bodyworn 15mm Back High SIM 2

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used:  $f = 848.8$  MHz;  $\sigma = 0.984$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear High SIM2 With Headset/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

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

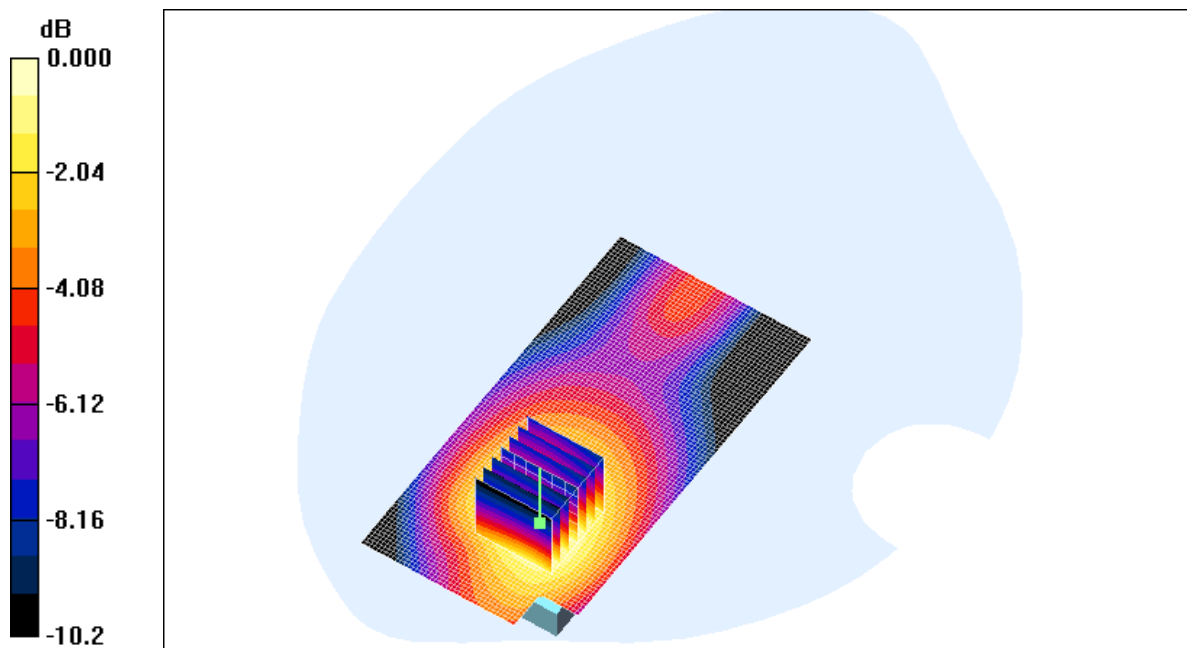
Rear High SIM2 With Headset/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 9.59 V/m; Power Drift = 0.033 dB**

**Peak SAR (extrapolated) = 0.412 W/kg**

SAR(1 g) = 0.294 mW/g; SAR(10 g) = 0.204 mW/g

**Maximum value of SAR (measured) = 0.314 mW/g**



0 dB = 0.314mW/g

**SHEMC**

**16.5.14 GSM 850+GPRS 1TS Back High SIM2**

Date/Time: 2011-7-31 17:27:57

**Test Laboratory: SGS-GSM**

i 288 GPRS 850 1TS Bodyworn 15mm Back High

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GPRS Mode(1up); Frequency: 848.8 MHz;Duty Cycle: 1:8.3**

**Medium: HSL835Body Medium parameters used:  $f = 848.8 \text{ MHz}$ ;  $\sigma = 0.984 \text{ mho/m}$ ;  $\epsilon_r = 53.7$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear High SIM2/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

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

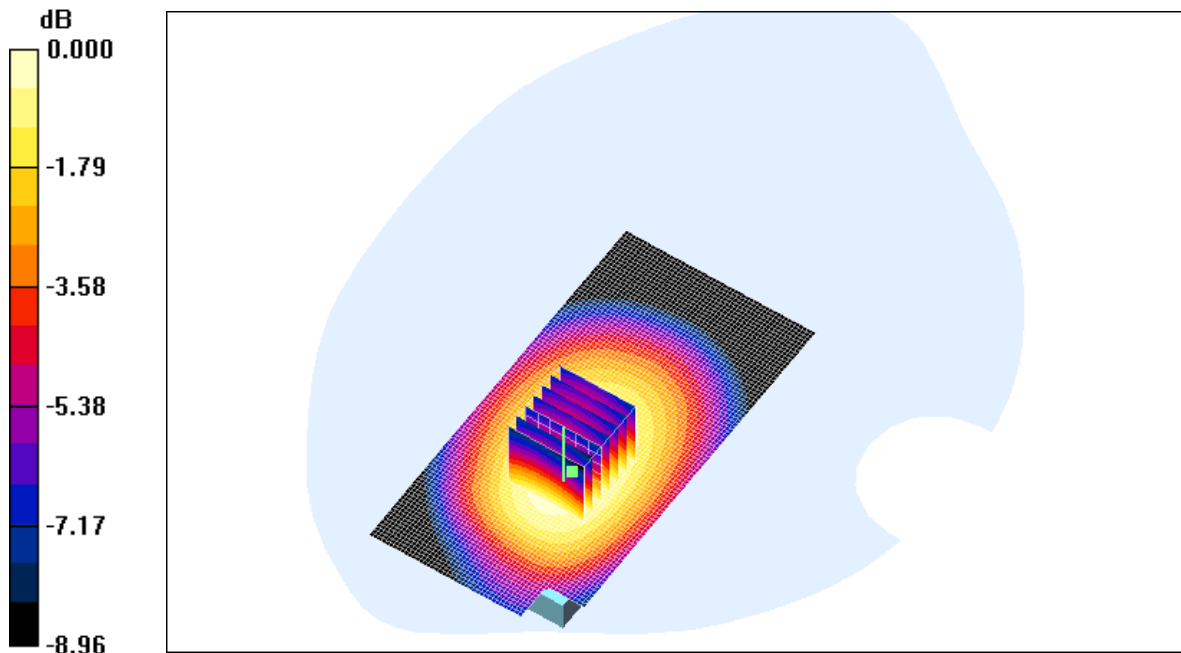
Rear High SIM2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 13.9 V/m; Power Drift = -0.069 dB**

**Peak SAR (extrapolated) = 1.05 W/kg**

SAR(1 g) = 0.823 mW/g; SAR(10 g) = 0.618 mW/g

**Maximum value of SAR (measured) = 0.864 mW/g**



0 dB = 0.864mW/g

**16.5.15 GSM 850+GPRS 2TS Back Low SIM2**

Date/Time: 2011-7-31 18:10:12

**Test Laboratory: SGS-GSM**

i 288 GPRS 850 2TS Bodyworn 15mm Back High

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: GSM850-GPRS Mode(2up); Frequency: 848.8 MHz; Duty Cycle: 1:4.15**

**Medium: HSL835Body Medium parameters used:  $f = 848.8 \text{ MHz}$ ;  $\sigma = 0.984 \text{ mho/m}$ ;  $\epsilon_r = 53.7$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear High SIM2/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

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

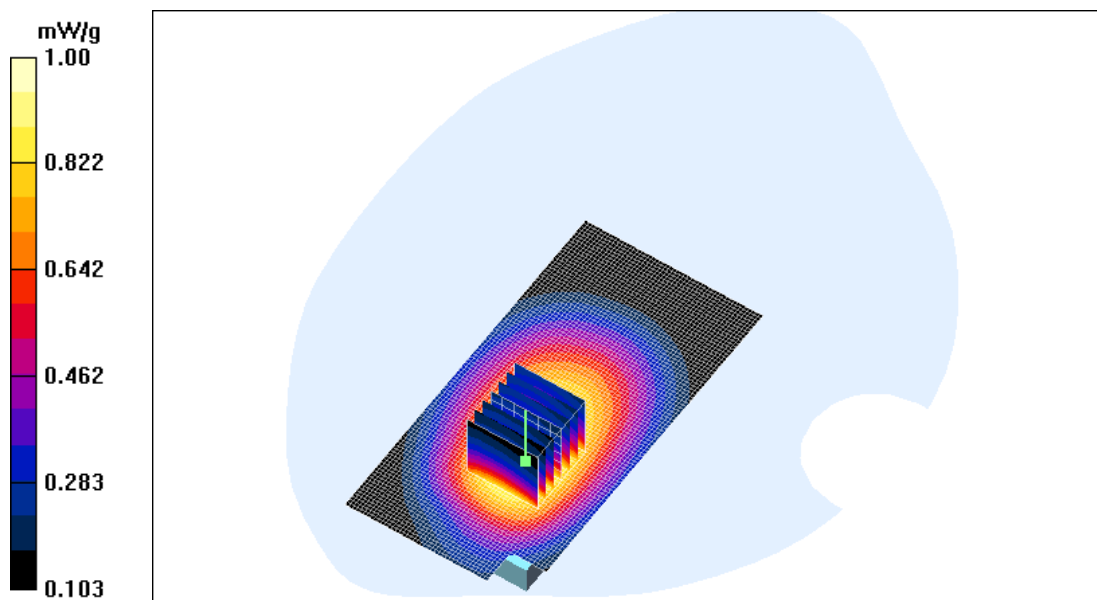
Rear High SIM2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

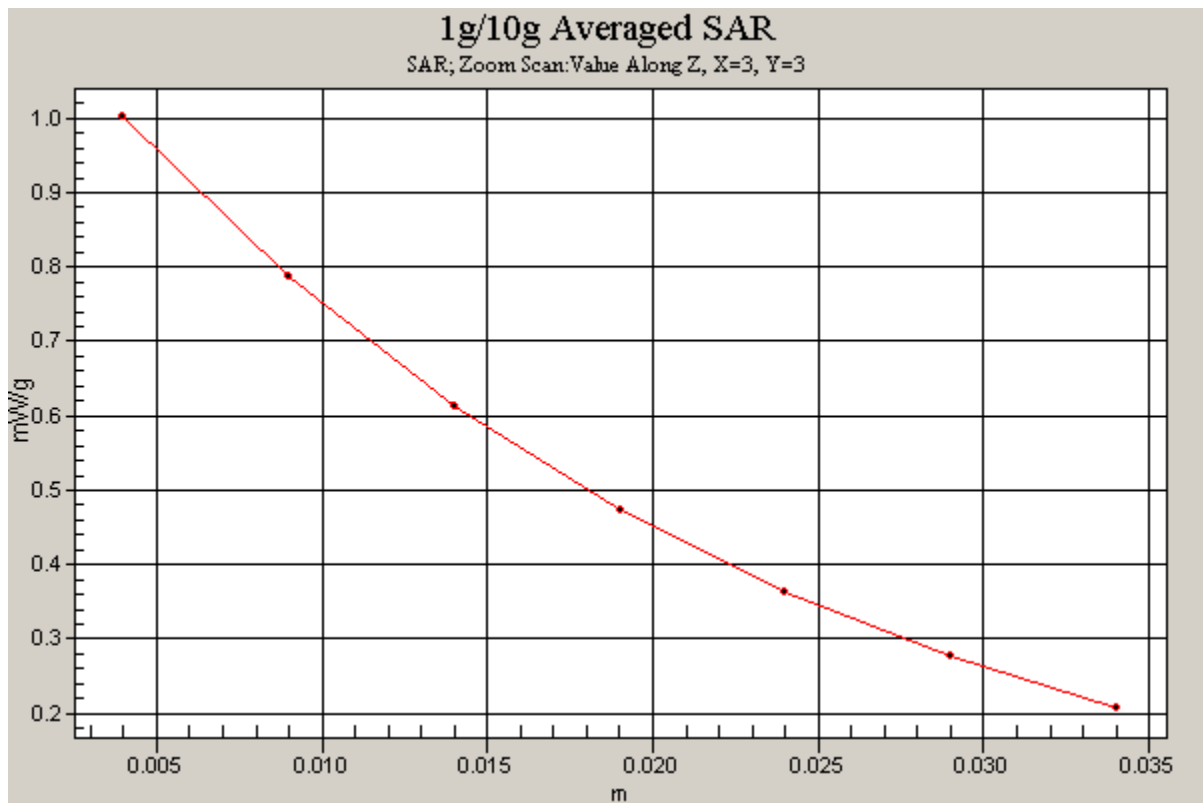
**Reference Value = 14.3 V/m; Power Drift = 0.019 dB**

**Peak SAR (extrapolated) = 1.21 W/kg**

SAR(1 g) = 0.952 mW/g; SAR(10 g) = 0.724 mW/g

**Maximum value of SAR (measured) = 1.00 mW/g**





**16.5.16 GSM 1900 Left Cheek Middle**

Date/Time: 2011-8-1 9:07:58

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Left Cheek Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Left Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.538 mW/g**

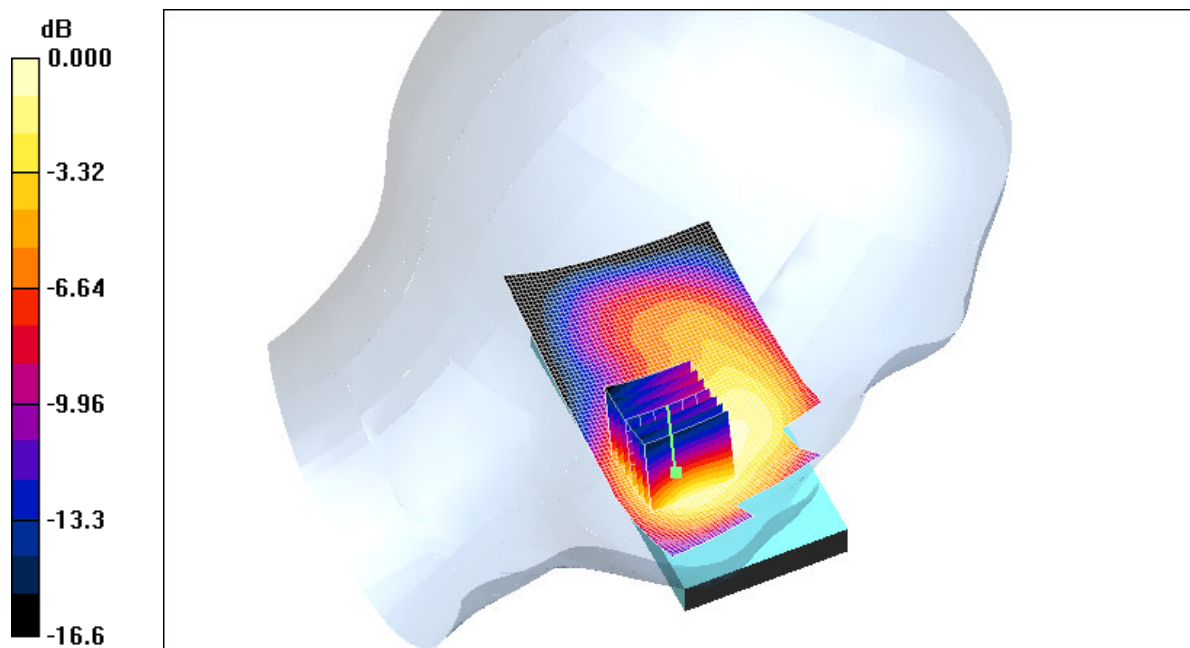
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 7.28 V/m; Power Drift = 0.081 dB**

**Peak SAR (extrapolated) = 0.776 W/kg**

SAR(1 g) = 0.498 mW/g; SAR(10 g) = 0.310 mW/g

**Maximum value of SAR (measured) = 0.542 mW/g**



0 dB = 0.542mW/g

**16.5.17 GSM 1900 Left Tilt Middle**

Date/Time: 2011-8-1 9:46:39

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Left Tilt Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Left Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.339 mW/g**

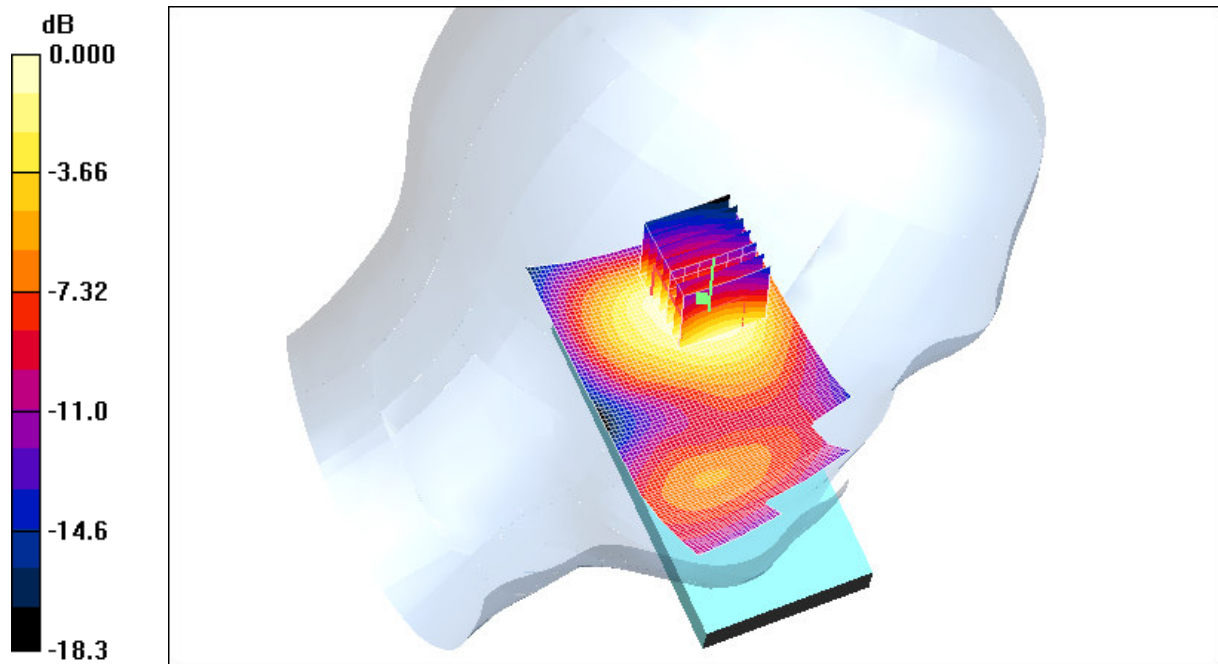
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 12.0 V/m; Power Drift = -0.057 dB**

**Peak SAR (extrapolated) = 0.427 W/kg**

SAR(1 g) = 0.286 mW/g; SAR(10 g) = 0.176 mW/g

**Maximum value of SAR (measured) = 0.311 mW/g**



0 dB = 0.311mW/g

**16.5.18 GSM 1900 Right Cheek Middle**

Date/Time: 2011-8-1 10:25:39

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Right Cheek Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Middle 2/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.733 mW/g**

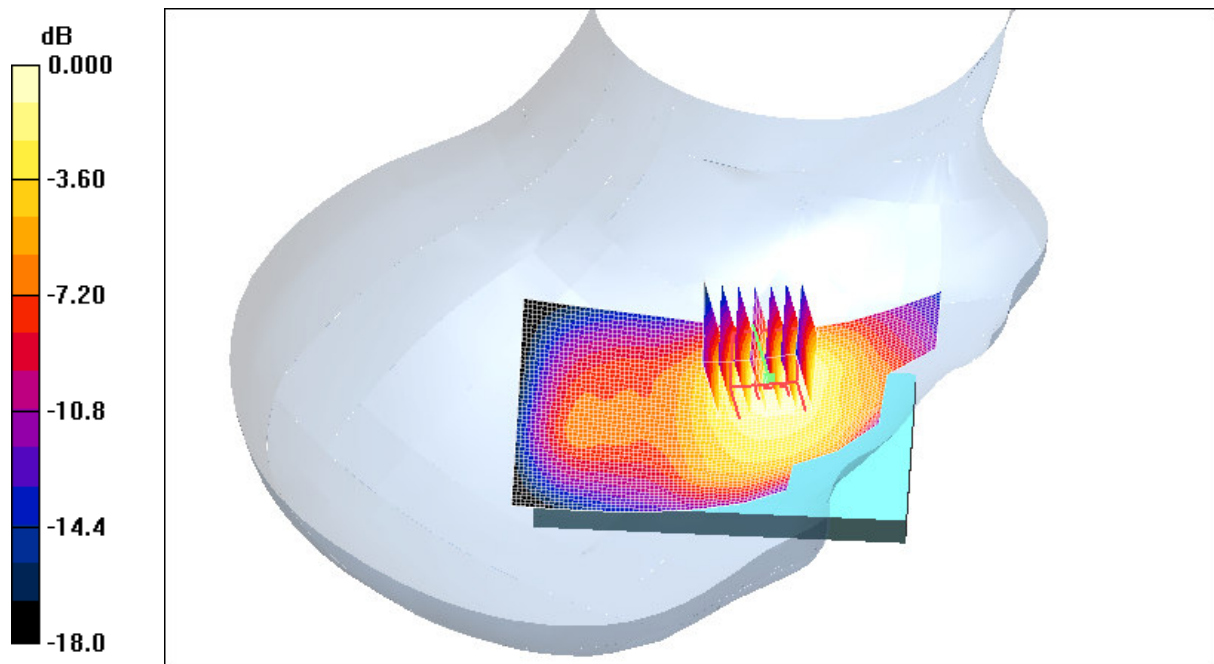
Cheek Middle 2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 9.47 V/m; Power Drift = -0.030 dB**

**Peak SAR (extrapolated) = 0.945 W/kg**

SAR(1 g) = 0.634 mW/g; SAR(10 g) = 0.391 mW/g

**Maximum value of SAR (measured) = 0.678 mW/g**



0 dB = 0.678mW/g

**16.5.19 GSM 1900 Right Tilt Middle**

Date/Time: 2011-8-1 10:56:22

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Right Tilt Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt Middle/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.341 mW/g**

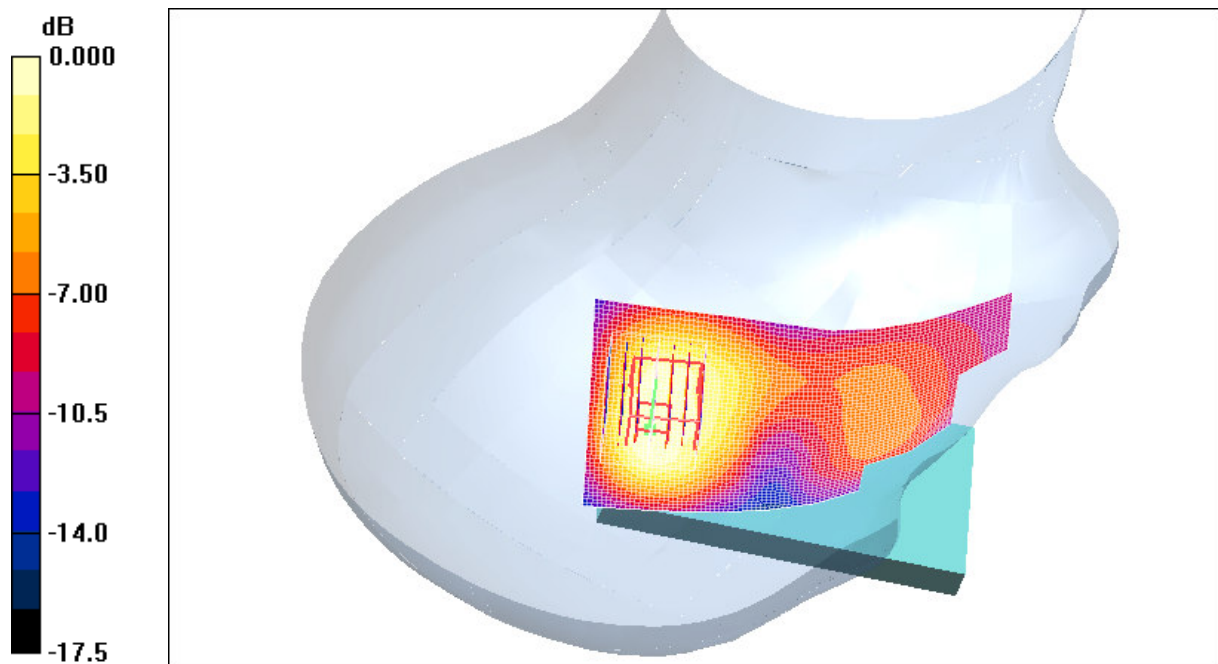
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 14.0 V/m; Power Drift = -0.083 dB**

**Peak SAR (extrapolated) = 0.382 W/kg**

SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.160 mW/g

**Maximum value of SAR (measured) = 0.276 mW/g**



0 dB = 0.276mW/g



**16.5.20 GSM 1900 Right Cheek High**

Date/Time: 2011-8-1 11:23:17

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Right Cheek High

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.41 \text{ mho/m}$ ;  $\epsilon_r = 39.6$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek High/Area Scan (51x91x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 0.645 mW/g**

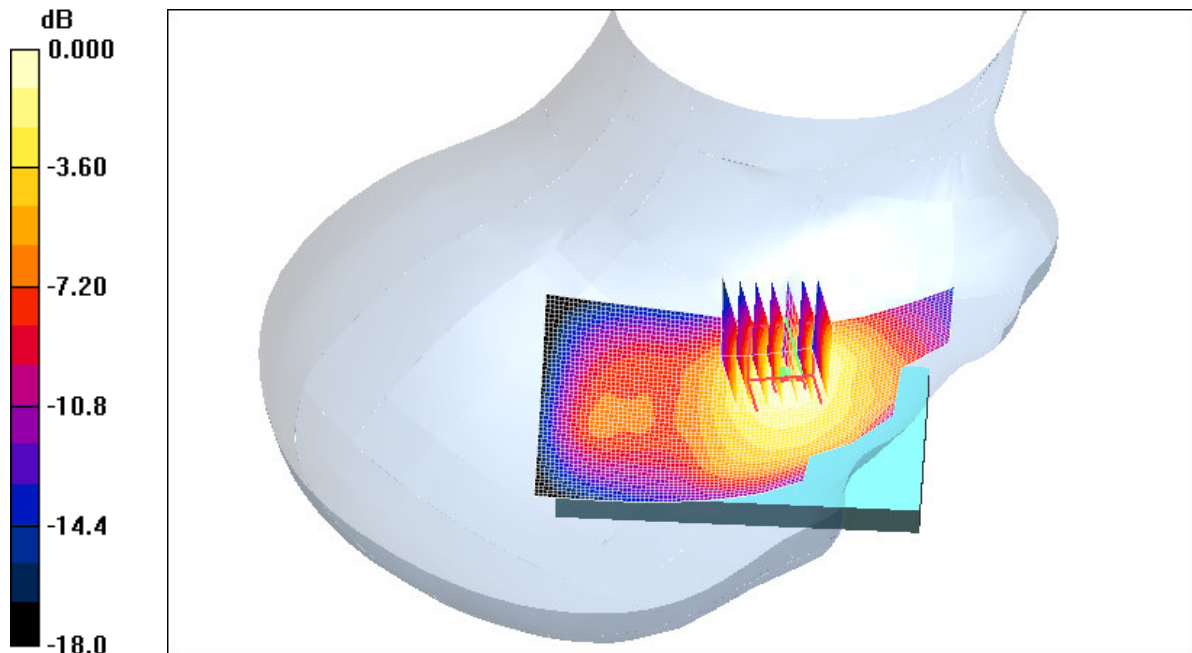
Cheek High/Zoom Scan (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 8.53 V/m; Power Drift = -0.044 dB**

**Peak SAR (extrapolated) = 0.834 W/kg**

SAR(1 g) = 0.555 mW/g; SAR(10 g) = 0.338 mW/g

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



0 dB = 0.596mW/g

**16.5.21 GSM 1900 Right Cheek Low**

Date/Time: 2011-8-1 11:56:30

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Right Cheek Low

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1850.2$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Low/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

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

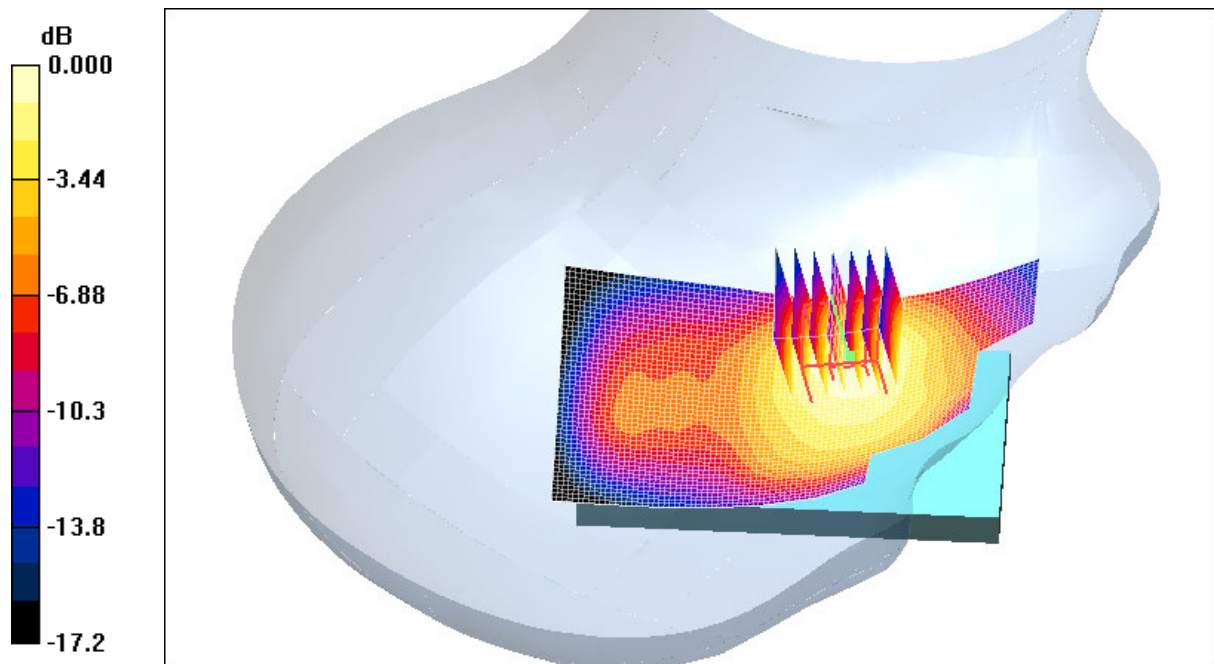
Cheek Low/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 11.1 V/m; Power Drift = -0.115 dB**

**Peak SAR (extrapolated) = 1.14 W/kg**

SAR(1 g) = 0.769 mW/g; SAR(10 g) = 0.477 mW/g

**Maximum value of SAR (measured) = 0.833 mW/g**



0 dB = 0.833mW/g

**16.5.22 GSM 1900 Right Cheek Low SIM 2**

Date/Time: 2011-8-1 12:34:40

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Right Cheek Low SIM 2

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900\_Head Medium parameters used:  $f = 1850.2$  MHz;  $\sigma = 1.36$  mho/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Right Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Low SIM 2/Area Scan (51x91x1): **Measurement grid: dx=15mm, dy=15mm**

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

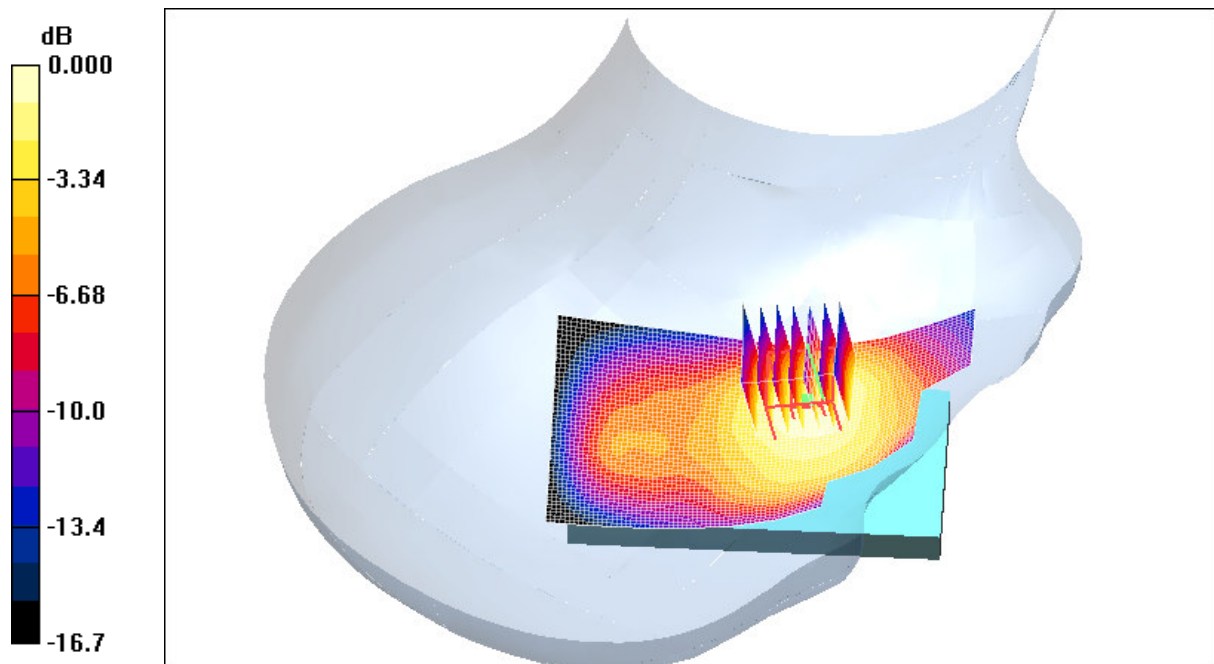
Cheek Low SIM 2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 11.0 V/m; Power Drift = -0.259 dB**

**Peak SAR (extrapolated) = 1.05 W/kg**

SAR(1 g) = 0.718 mW/g; SAR(10 g) = 0.452 mW/g

**Maximum value of SAR (measured) = 0.768 mW/g**



0 dB = 0.768mW/g

**16.5.23 GSM 1900 BodyWron Front Middle**

Date/Time: 2011-8-1 14:11:20

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Bodyworn 15mm Front Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 53.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Front Middle/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.341 mW/g**

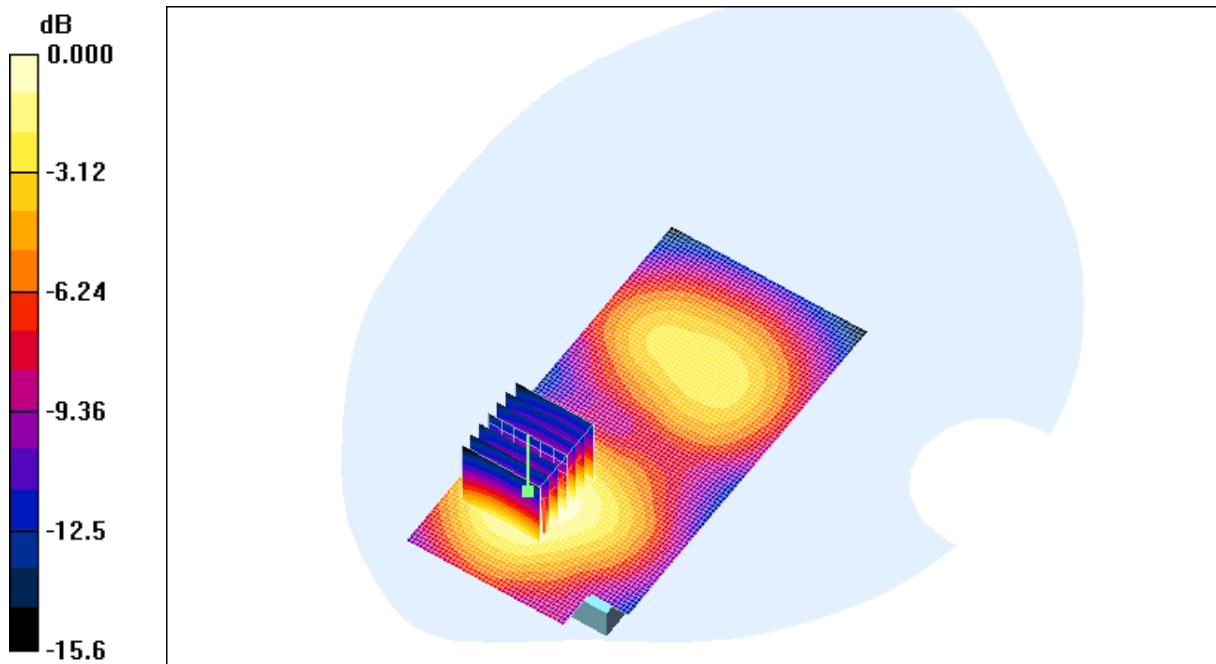
Front Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 9.62 V/m; Power Drift = -0.004 dB**

**Peak SAR (extrapolated) = 0.474 W/kg**

SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.181 mW/g

**Maximum value of SAR (measured) = 0.328 mW/g**



0 dB = 0.328mW/g

### 16.5.24 GSM 1900 BodyWron Back Middle

Date/Time: 2011-8-1 14:47:32

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Bodyworn 15mm Back Middle

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 53.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Middle/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.342 mW/g**

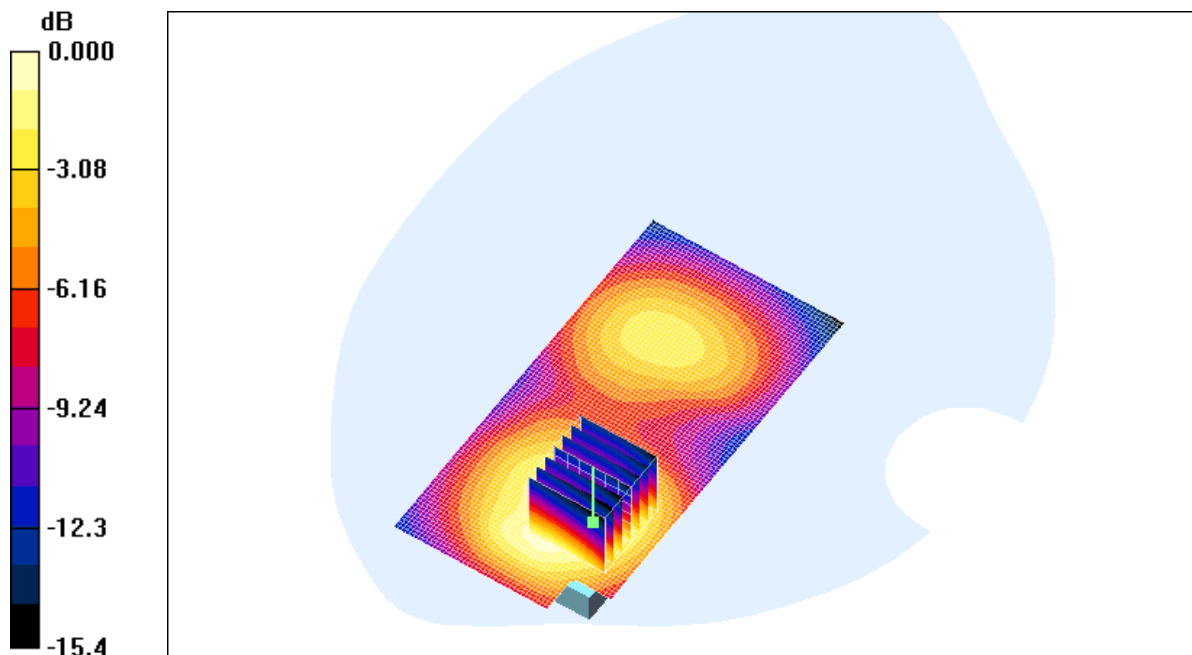
Rear Middle/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 9.98 V/m; Power Drift = -0.113 dB**

**Peak SAR (extrapolated) = 0.504 W/kg**

SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.188 mW/g

**Maximum value of SAR (measured) = 0.342 mW/g**



0 dB = 0.342mW/g

### 16.5.25 GSM 1900 BodyWron Back High

Date/Time: 2011-8-1 15:37:05

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Bodyworn 15mm Back High

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.55 \text{ mho/m}$ ;  $\epsilon_r = 53.5$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear High/Area Scan (51x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 0.290 mW/g**

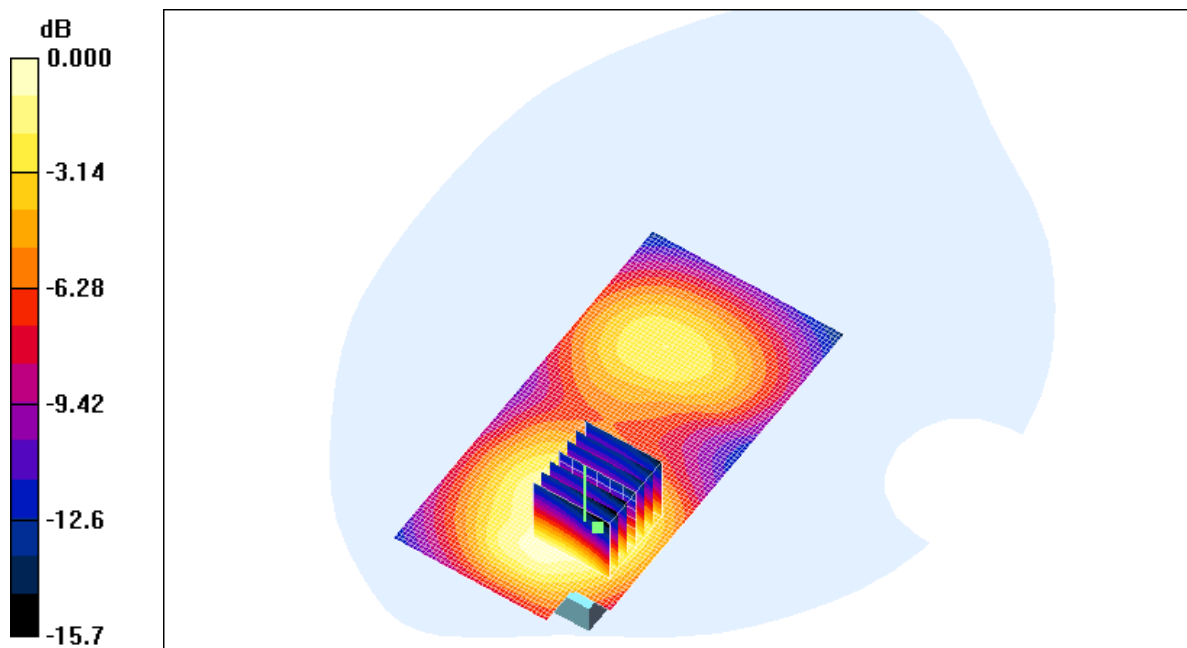
Rear High/Zoom Scan (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 9.51 V/m; Power Drift = -0.050 dB**

**Peak SAR (extrapolated) = 0.439 W/kg**

SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.161 mW/g

**Maximum value of SAR (measured) = 0.290 mW/g**



0 dB = 0.290mW/g

**16.5.26 GSM 1900 BodyWron Back Low**

Date/Time: 2011-8-1 16:01:58

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Bodyworn 15mm Back Low

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1850.2$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Low/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.408 mW/g**

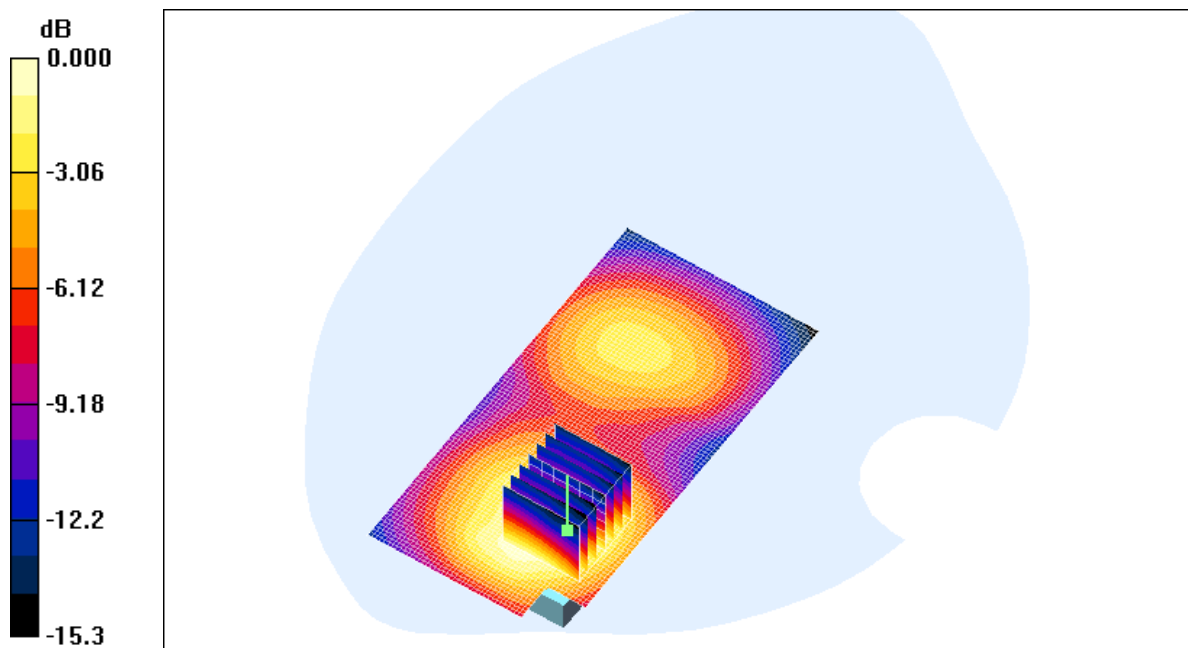
Rear Low/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 10.7 V/m; Power Drift = -0.112 dB**

**Peak SAR (extrapolated) = 0.608 W/kg**

SAR(1 g) = 0.371 mW/g; SAR(10 g) = 0.221 mW/g

**Maximum value of SAR (measured) = 0.405 mW/g**



0 dB = 0.405mW/g

**16.5.27 GSM 1900 BodyWron Back Low SIM 2**

Date/Time: 2011-8-1 16:37:22

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Bodyworn 15mm Back Low SIM 2

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1850.2$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 53.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Low SIM2/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.389 mW/g**

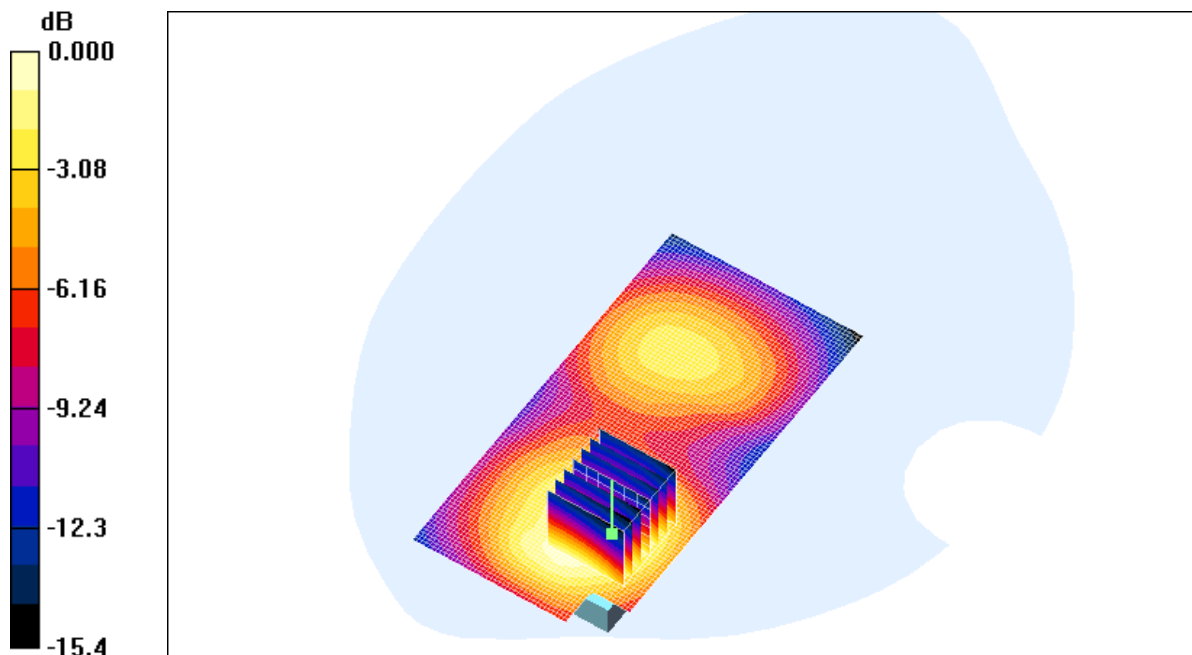
Rear Low SIM2/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 10.6 V/m; Power Drift = -0.101 dB**

**Peak SAR (extrapolated) = 0.567 W/kg**

SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.211 mW/g

**Maximum value of SAR (measured) = 0.383 mW/g**



0 dB = 0.383mW/g



### 16.5.28 GSM 1900 BodyWron Back Low with Earphone

Date/Time: 2011-8-1 17:02:25

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 Bodyworn 15mm Back Low With Headset

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.55 \text{ mho/m}$ ;  $\epsilon_r = 53.5$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Low With Headset/Area Scan (51x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 0.376 mW/g**

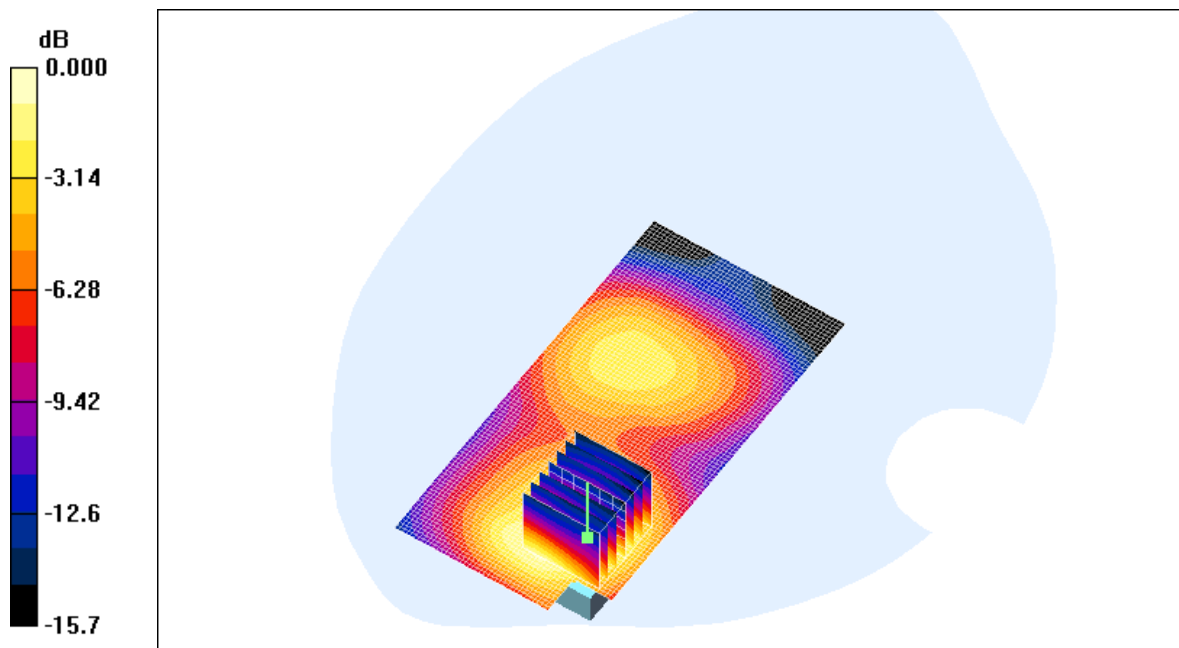
Rear Low With Headset/Zoom Scan (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 6.80 V/m; Power Drift = -0.057 dB**

**Peak SAR (extrapolated) = 0.558 W/kg**

SAR(1 g) = 0.344 mW/g; SAR(10 g) = 0.200 mW/g

**Maximum value of SAR (measured) = 0.372 mW/g**



0 dB = 0.372mW/g

**16.5.29 GSM 1900+GPRS 1TS Back Low**

Date/Time: 2011-8-1 17:49:26

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 1TS Bodyworn 15mm Back Low

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GPRS Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3**

**Medium: HSL1900-Body Medium parameters used:  $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.49 \text{ mho/m}$ ;  $\epsilon_r = 53.8$ ;  $\rho = 1000 \text{ kg/m}^3$**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Low/Area Scan (51x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 0.407 mW/g**

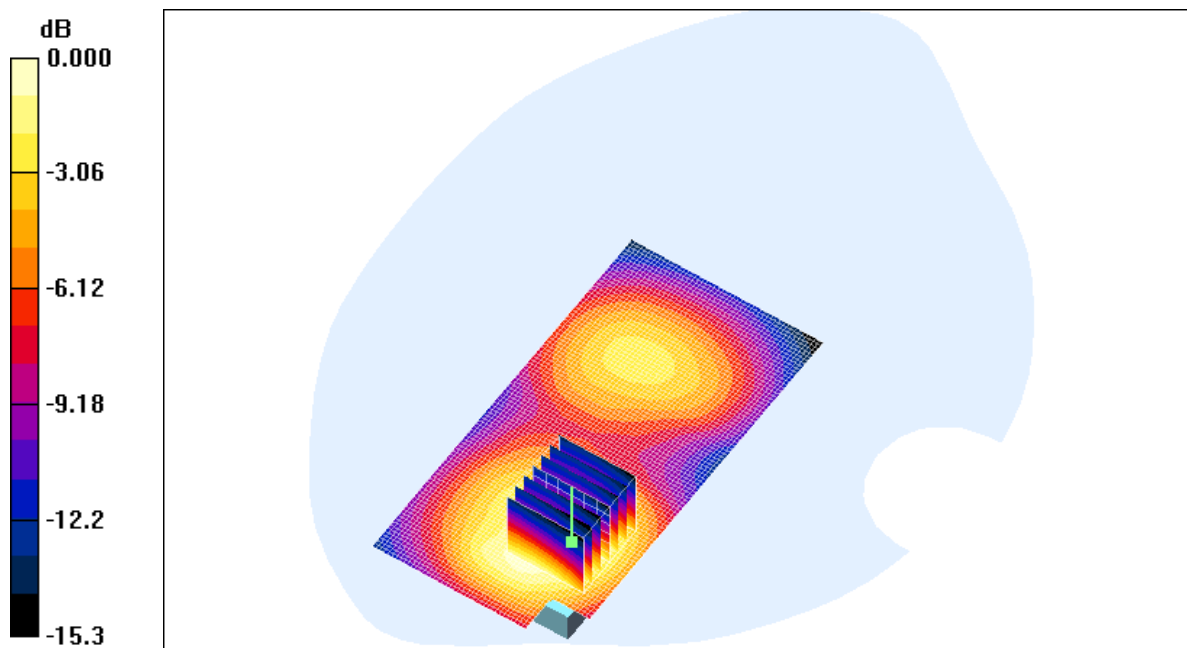
Rear Low/Zoom Scan (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 10.5 V/m; Power Drift = -0.063 dB**

**Peak SAR (extrapolated) = 0.585 W/kg**

SAR(1 g) = 0.366 mW/g; SAR(10 g) = 0.219 mW/g

**Maximum value of SAR (measured) = 0.401 mW/g**



0 dB = 0.401mW/g

**SHEMC**

**16.5.30 GSM 1900+GPRS 2TS Back Low**

Date/Time: 2011-8-1 18:19:34

**Test Laboratory: SGS-GSM**

i 288 GSM 1900 2TS Bodyworn 15mm Back Low

DUT: i 288; Type: GSM; Serial: 358688000000158

**Communication System: PCS1900-GPRS Mode(2 ts); Frequency: 1850.2 MHz;Duty Cycle: 1:4.15**

**Medium: HSL1900-Body Medium parameters used: f = 1850.2 MHz;  $\sigma$  = 1.49 mho/m;  $\epsilon_r$  = 53.8;  $\rho$  = 1000 kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Rear Low/Area Scan (51x101x1): **Measurement grid: dx=15mm, dy=15mm**

**Maximum value of SAR (interpolated) = 0.646 mW/g**

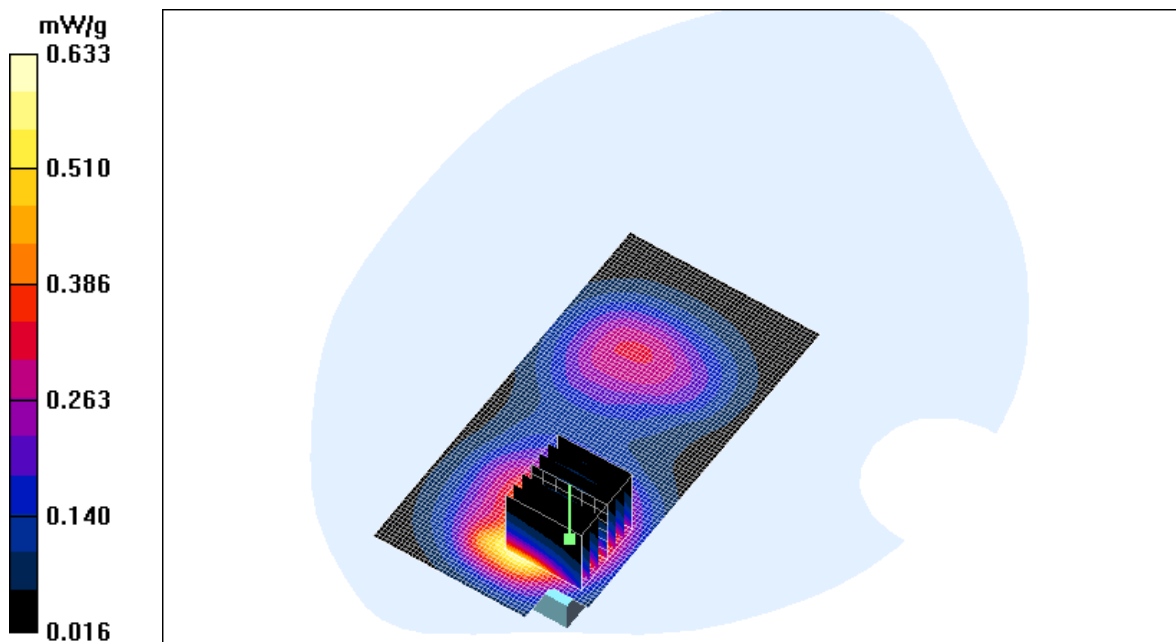
Rear Low/Zoom Scan (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

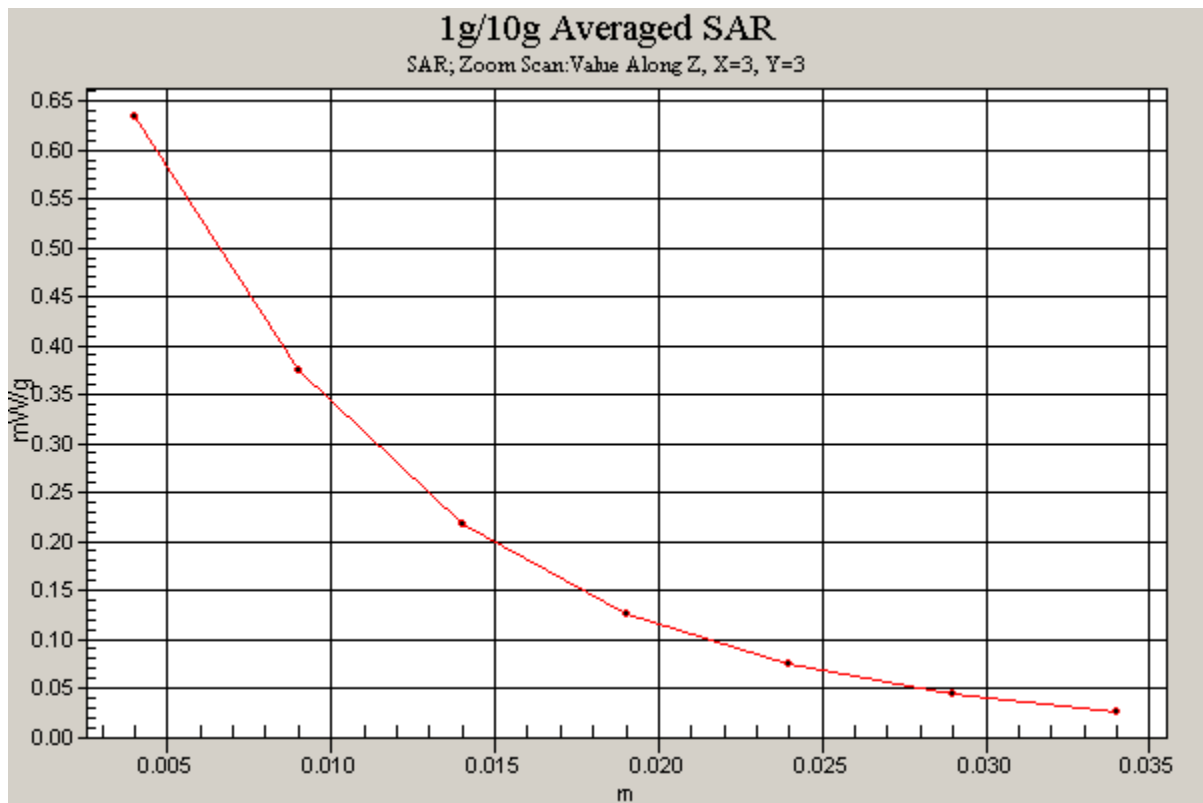
**Reference Value = 11.5 V/m; Power Drift = -0.160 dB**

**Peak SAR (extrapolated) = 0.966 W/kg**

SAR(1 g) = 0.581 mW/g; SAR(10 g) = 0.339 mW/g

**Maximum value of SAR (measured) = 0.633 mW/g**





### 17. Identification of Samples

Product Name	GSM/GPRS Quad-band Mobile Phone	
Mode Name	i285	
Brand Name	verykool	
Final Hardware Version	MAUI.09A.W09.52.MP.V57.F2	
Final Software Version	I285_VK_SW_0.09	
Antenna Type	Inner antenna	
Device Type	Portable	
Limit Type	General Population/Uncontrolled	
GSM Frequency Bands	GSM850	Tx: 824~849MHz
		Rx: 869~894MHz
	PCS1900	Tx:1850~1910MHz
		Rx:1930~1990MHz
Modulation Mode	GMSK	
GSM / GPRS Power Class	GSM850	4
	PCS1900	1
GPRS Multislot class	10	
IMEI	358688000000158	
Date of receipt	07-30,2011	
Date of Testing Start	07-31,2011	
Date of Testing End	08-01,2011	

## 18. Photographs of EUT



Fig.18-1 Front View of EUT



Fig.18-2 Back View of EUT



Fig.18-3 Front View of Battery



Fig.18-4 earphone

**Annex A Photographs of Test Setup**

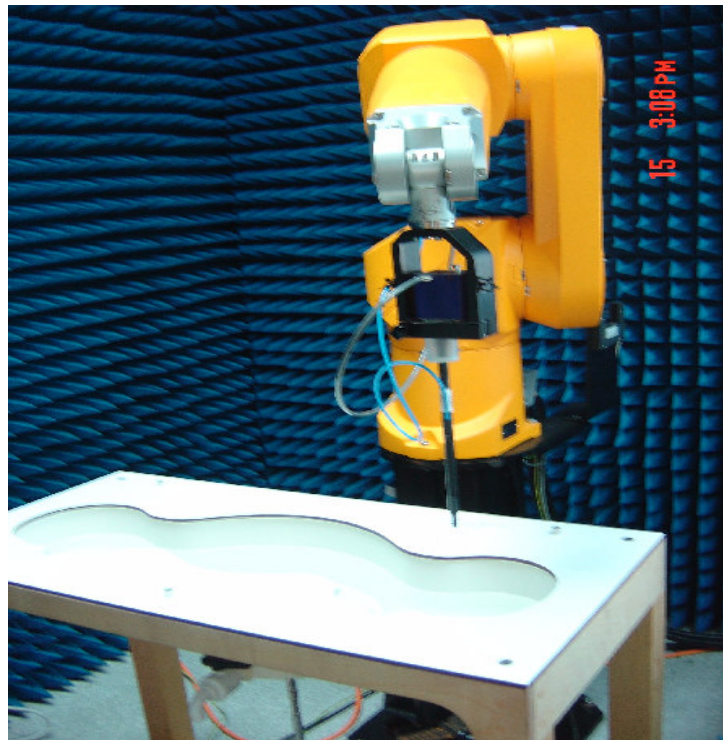
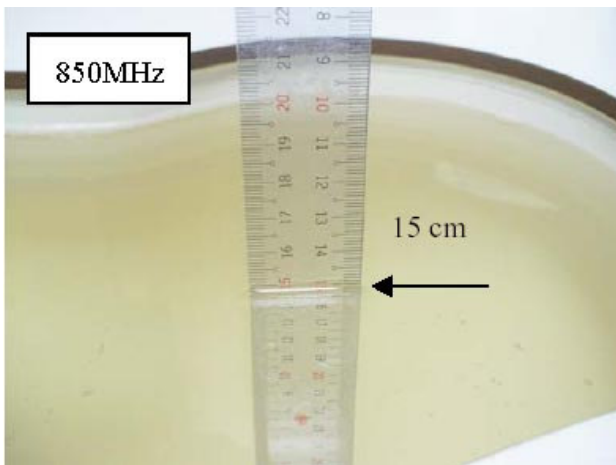
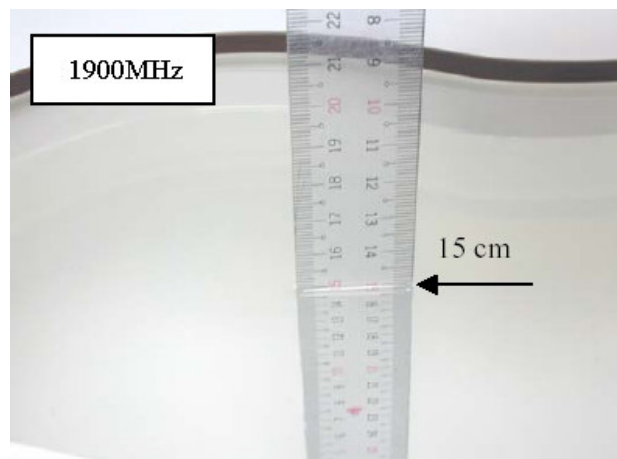


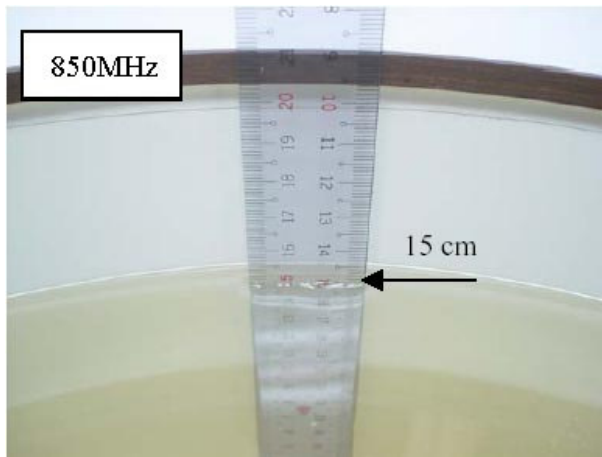
Fig.A-1 Photograph of the SAR measurement System



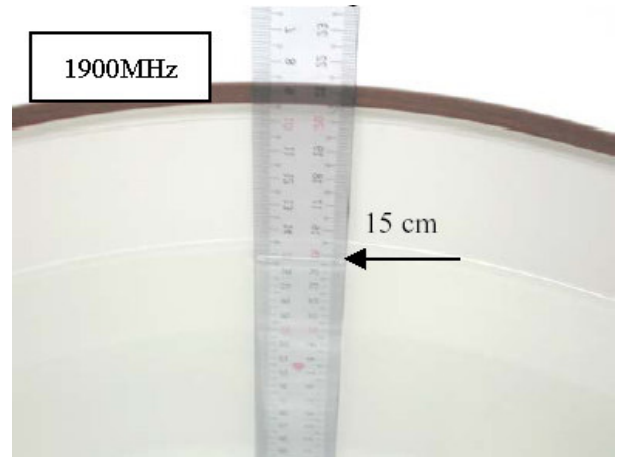
**Fig.A-2a** Photograph of the Tissue Simulant  
Liquid depth 15cm for Head



**Fig.A-2b** Photograph of the Tissue Simulant  
Liquid depth 15cm for Head



**Fig.A-2a** Photograph of the Tissue Simulant  
Liquid depth 15cm for Body Worn

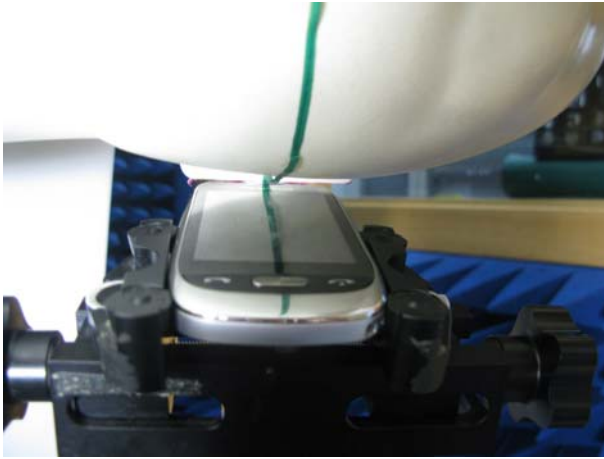


**Fig.A-2b** Photograph of the Tissue Simulant  
Liquid depth 15cm for Body Worn



**Fig.A-3a** Photograph of the Left Hand Side Cheek status

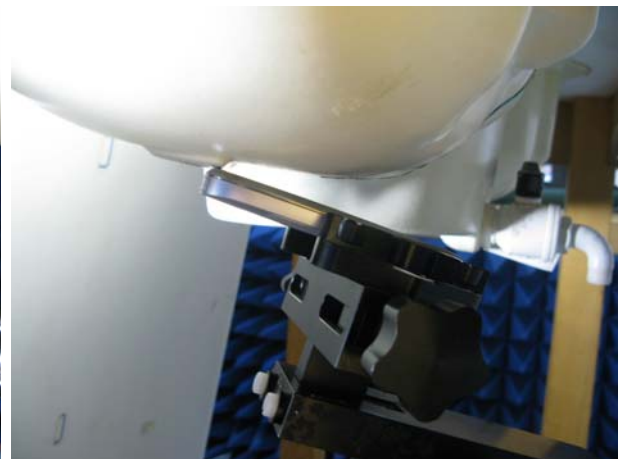
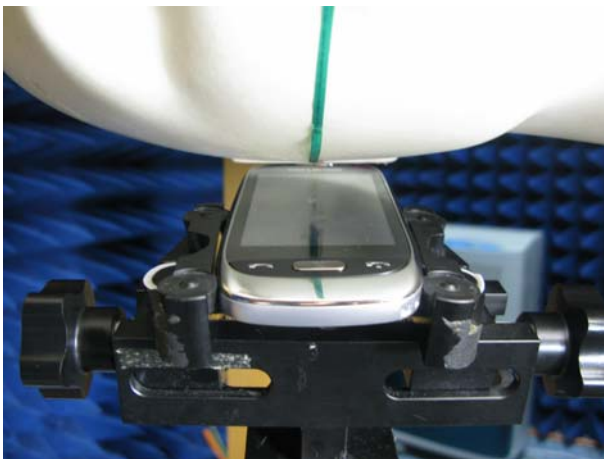




**Fig.A-3b Photograph of the Left Hand Side Tilted status**



**Fig.A-3c Photograph of the Right Hand Side Cheek status**



**Fig.A-3d Photograph of the Right Hand Side Tilted status**



Fig.A-3e Photograph of the Body Worn status-front



Fig.A-3f Photograph of the Body Worn status-rear



Fig.A-3g Photograph of the Body Worn status-rear with earphone

## Annex B Tissue Simulant Liquid

### Annex B.1 Recipes for Tissue Simulant Liquid

The following tables give the recipes for tissue simulating liquids to be used in different frequency bands.

Frequency (MHz)	835		900		1800-2000		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
<b>Ingredient (% by weight)</b>								
Water	40.30	50.75	40.30	50.75	55.24	70.17	62.7	73.26
Salt (NaCl)	1.38	0.94	1.38	0.94	0.31	0.39	0.5	0.04
Sucrose	57.90	48.21	57.90	48.21	0	0	0	0
HEC	0.24	0	0.24	0	0	0	0	0
Bactericide	0.18	0.10	0.10	0.10	0	0	0	0
DGBE	0	0	0	0	44.45	29.44	36.8	26.7
<b>Measurement dielectric parameters</b>								
Dielectric Constant	41.9	55.0	41.1	54.5	39.2	53.2	39.8	52.5
Conductivity (S/m)	0.93	0.97	1.04	1.06	1.45	1.59	1.88	1.78
<b>Target values</b>								
Dielectric Constant	41.5	55.2	41.5	55.0	40.0	53.3	39.2	52.7
Conductivity (S/m)	0.90	0.97	0.97	1.05	1.40	1.52	1.80	1.95
Salt: 99+% Pure Sodium Chloride					Sucrose: 98+% Pure Sucrose			
Water: De-ionized, 16 MΩ <sup>+</sup> resistivity					HEC: Hydroxyethyl Cellulose			
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]								

**Table B-1 Recipe of Tissue Simulat Liquid**

### Annex B.2 Measurement for Tissue Simulant Liquid

The dielectric properties for this Tissue Simulant Liquids were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Agilent E5071B Network Analyzer (300 KHz-8500 MHz). The Conductivity ( $\sigma$ ) and Permittivity ( $\rho$ ) are listed in Table 1. For the SAR measurement given in this report. The temperature variation of the Tissue Simulant Liquids was  $22\pm 2^\circ\text{C}$ .

Frequency (MHz)	Tissue Type	Limit/Measured	Permittivity ( $\rho$ )	Conductivity ( $\sigma$ )	Temp ( $^\circ\text{C}$ )
835	Head	Recommended Limit	41.5 $\pm$ 5% (39.43~43.58)	0.90 $\pm$ 5% (0.855~0.945)	22 $\pm$ 2
		Measured, 07-31,2011	40.9	0.91	21.4
835	Body	Recommended Limit	55.2 $\pm$ 5% (52.44~57.96)	0.97 $\pm$ 5% (0.922~1.02)	22 $\pm$ 2
		Measured, 07-31,2011	53.7	0.99	21.5
1900	Head	Recommended Limit	40.0 $\pm$ 5% (38.0~42.0)	1.40 $\pm$ 5% (1.33~1.47)	22 $\pm$ 2
		Measured, 08-01,2011	39.6	1.40	21.3
1900	Body	Recommended Limit	53.3 $\pm$ 5% (50.64~55.97)	1.52 $\pm$ 5% (1.44~1.60)	22 $\pm$ 2
		Measured, 08-01,2011	53.6	1.54	21.6

Table B-2 Measurement result of Tissue electric parameters

### Annex C SAR System Validation

The microwave circuit arrangement for system verification is sketched in Fig. C-1. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 835&1900MHz. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the table C-1 (A power level of 250mw was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

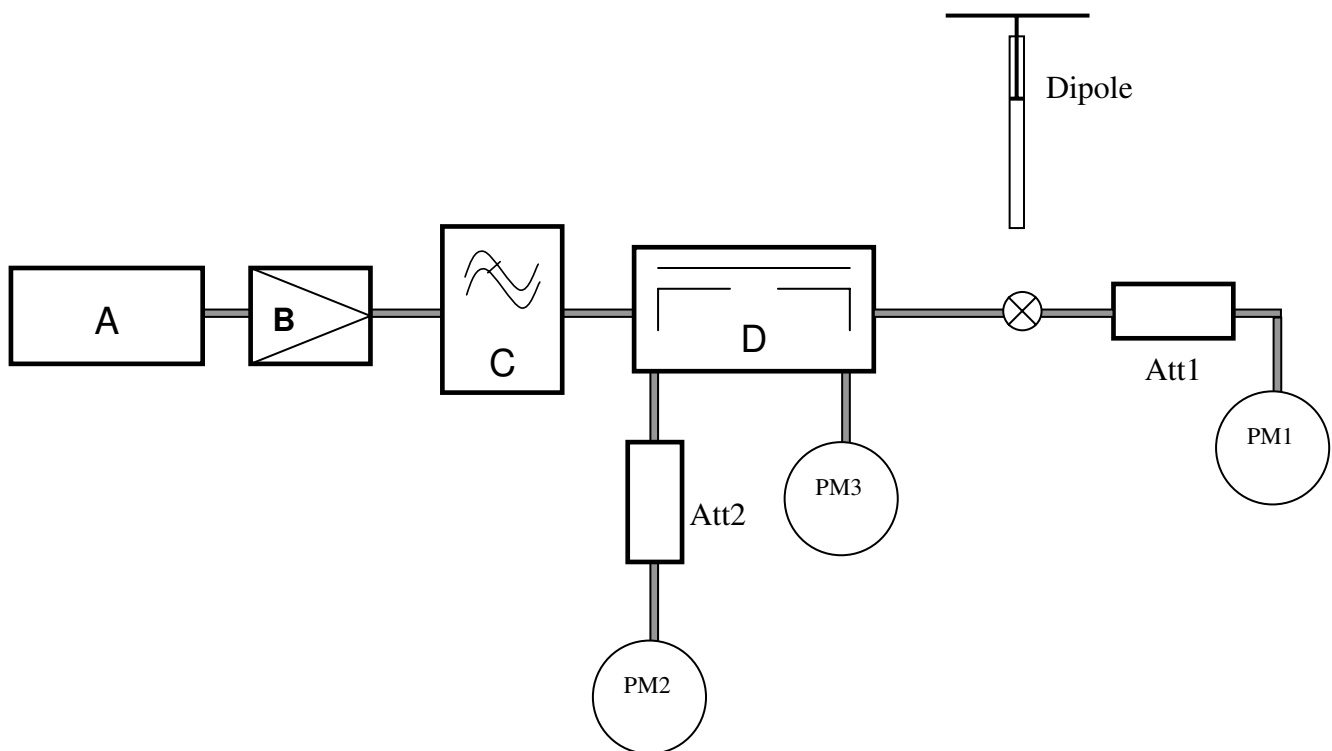


Fig. C-1 the microwave circuit arrangement used for SAR system verification

- A. Agilent E4438C Signal Generator
- B. Mini-Circuit ZHL-42 Preamplifier
- C. Mini-Circuit VLF-2500+ Low Pass Filter
- D. Mini-Circuits ZABDC20-252H-N+ Bi-DIR Coupling
- PM1. Power Sensor NRP-Z92
- PM2. Agilent Model E4416A Power Meter
- PM3. Power Sensor NRP-Z92

Validation Kit	Frequency (MHz)	Tissue Type	Limit/Measurement		
			Condition	Recommended/Measured	1g
D835V2	835	Head	Nomalized to 1mW(for nominal Head TSL parameters)	Recommended Limit	9.48±10% (8.53~10.43)
			Nomalized to 1W(for nominal Head TSL parameters)	-	<b>9.52</b>
			250mW input power	Measured, 07-31, 2011	<b>2.38</b>
D835V2	835	Body	Nomalized to 1mW(for nominal Head TSL parameters)	Recommended Limit	10.12±10% (9.11~11.13)
			Nomalized to 1W(for nominal Head TSL parameters)	-	<b>9.64</b>
			250mW input power	Measured, 07-31, 2011	<b>2.41</b>
D1900V2	1900	Head	Nomalized to 1mW(for nominal Head TSL parameters)	Recommended Limit	40.4±10% (36.36-44.44)
			Nomalized to 1W(for nominal Head TSL parameters)	-	<b>41.6</b>
			250mW input power	Measured, 08-01, 2011	<b>10.4</b>
D1900V2	1900	Body	Nomalized to 1mW(for nominal Head TSL parameters)	Recommended Limit	40.4±10% (36.36-44.44)
			Nomalized to 1W(for nominal Head TSL parameters)	-	<b>40.8</b>
			250mW input power	Measured, 08-01, 2011	<b>10.2</b>

**Table C-1 SAR System Validation Result**

## System Validation for 835MHz-Head

Date/Time: 2011-7-31 08:19:11

### Test Laboratory: SGS-GSM

System Performance Check at 835MHz Head

DUT: Dipole 835MHz; Type: D835V2; Serial: D835V2 - SN:4d070

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

Medium: HSL835\_Head Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.91 \text{ mho/m}$ ;  $\epsilon_r = 40.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

### DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(6.07, 6.07, 6.07); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

$d=15\text{mm}$ ,  $P_{in}=250\text{mW}$ /Area Scan (61x121x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 2.74 mW/g**

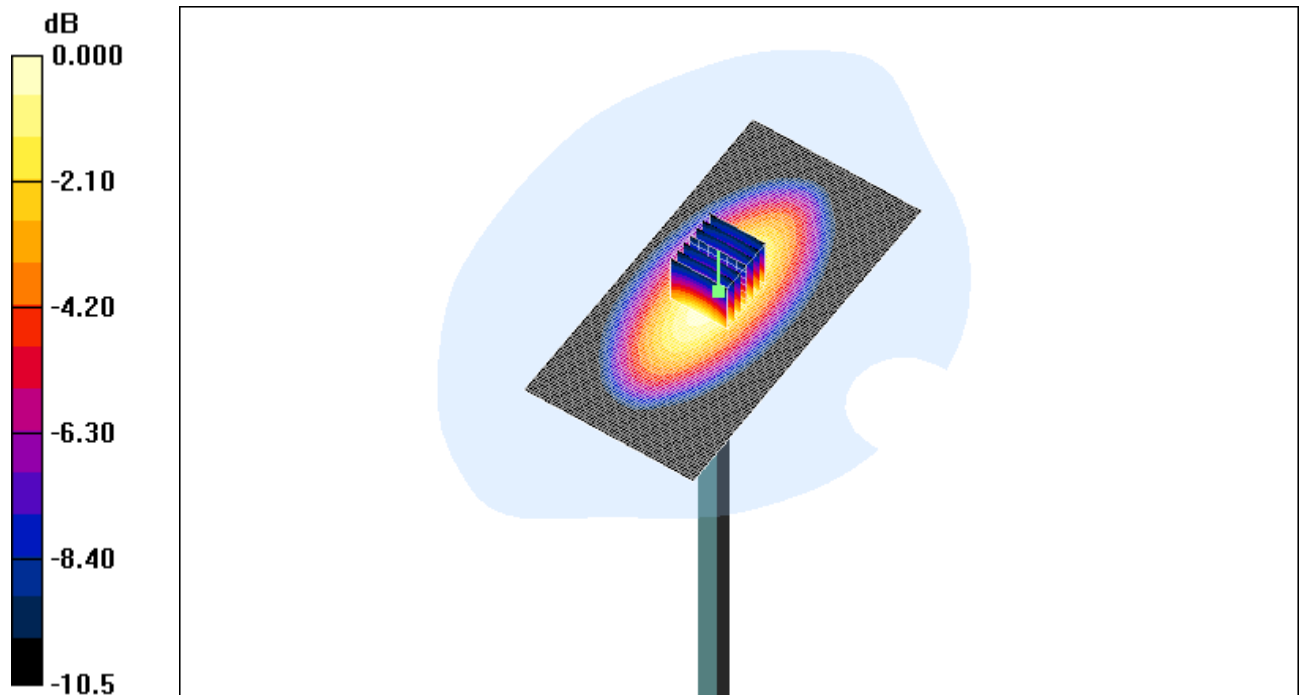
$d=15\text{mm}$ ,  $P_{in}=250\text{mW}$ /Zoom Scan (7x7x7) (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 56.5 V/m; Power Drift = -0.113 dB**

**Peak SAR (extrapolated) = 3.85 W/kg**

SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.49 mW/g

**Maximum value of SAR (measured) = 2.78 mW/g**



0 dB = 2.78mW/g

**SHEMC**

**System Validation for 835MHz-Body**

Date/Time: 2011-7-31 13:11:53

**Test Laboratory: SGS-GSM**

System Performance Check at 835MHz

DUT: Dipole 835MHz; Type: D835V2; Serial: D835V2 - SN:4d070

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

**Medium: HSL835\_Body Medium parameters used: f = 835 MHz;  $\sigma$  = 0.99 mho/m;  $\epsilon_r$  = 53.7;  $\rho$  = 1000 kg/m<sup>3</sup>**

**Phantom section: Flat Section**

**DASY4 Configuration:**

- Probe: ES3DV3 - SN3088; ConvF(5.98, 5.98, 5.98); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

**Maximum value of SAR (interpolated) = 2.87 mW/g**

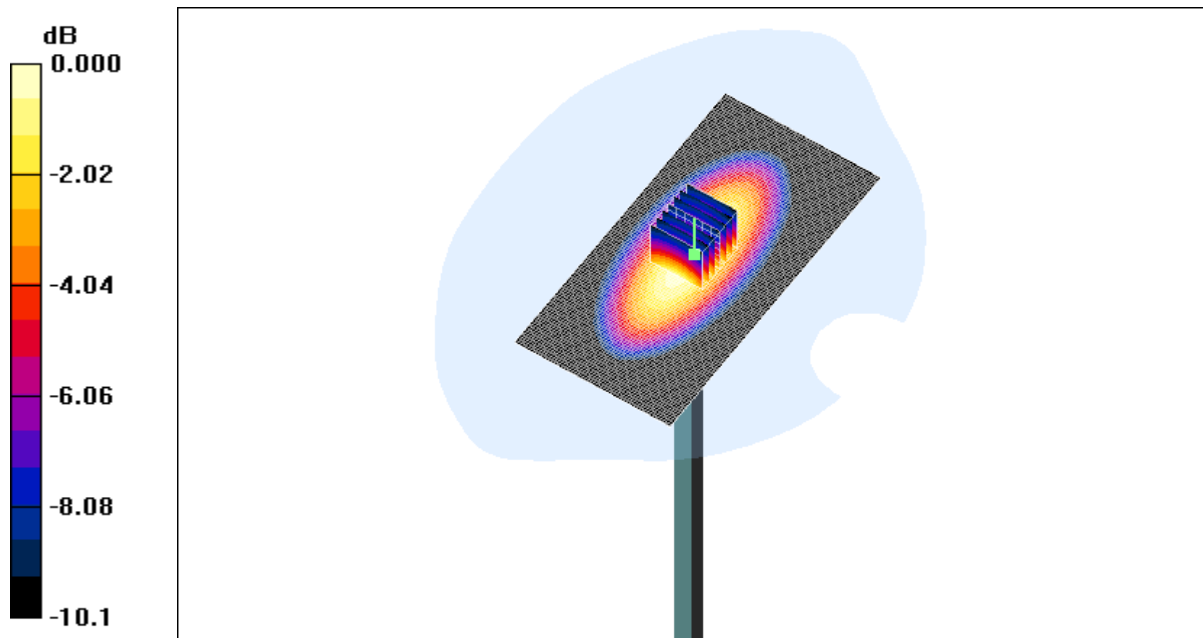
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: **Measurement grid: dx=5mm, dy=5mm, dz=5mm**

**Reference Value = 59.1 V/m; Power Drift = -0.152 dB**

**Peak SAR (extrapolated) = 3.71 W/kg**

SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.53 mW/g

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



0 dB = 2.77mW/g



## System Validation for 1900MHz-Head

Date/Time: 2011-8-1 8:11:56

### Test Laboratory: SGS-GSM

System Performance Check at 1900 MHz

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d028

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

Medium: HSL1900\_Head Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.4 \text{ mho/m}$ ;  $\epsilon_r = 39.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

### DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.14, 5.14, 5.14); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

$d=10\text{mm}$ ,  $P_{in}=250\text{mW}$ /Area Scan (61x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 12.9 mW/g**

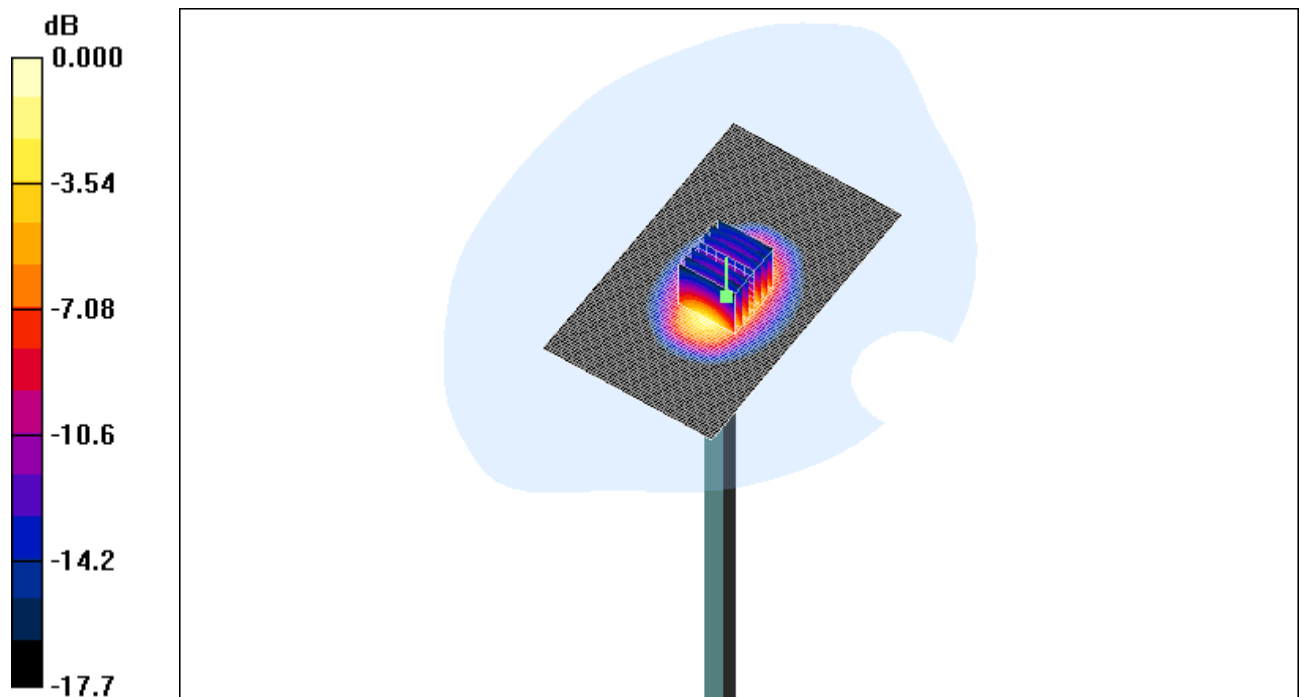
$d=10\text{mm}$ ,  $P_{in}=250\text{mW}$ /Zoom Scan (7x7x7) (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 63.2 V/m; Power Drift = 0.021 dB**

**Peak SAR (extrapolated) = 19.7 W/kg**

SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.19 mW/g

**Maximum value of SAR (measured) = 11.5 mW/g**



0 dB = 11.5mW/g

**SHEMC**

## System Validation for 1900MHz-Body

Date/Time: 2011-8-1 13:31:35

### Test Laboratory: SGS-GSM

System Performance Check at 1900 MHz

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d028

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

Medium: HSL1900-Body Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.54 \text{ mho/m}$ ;  $\epsilon_r = 53.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

### DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.6, 4.6, 4.6); Calibrated: 2010-11-23
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2010-11-22
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

$d=10\text{mm}$ ,  $P_{in}=250\text{mW}$ /Area Scan (61x101x1): **Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**

**Maximum value of SAR (interpolated) = 12.9 mW/g**

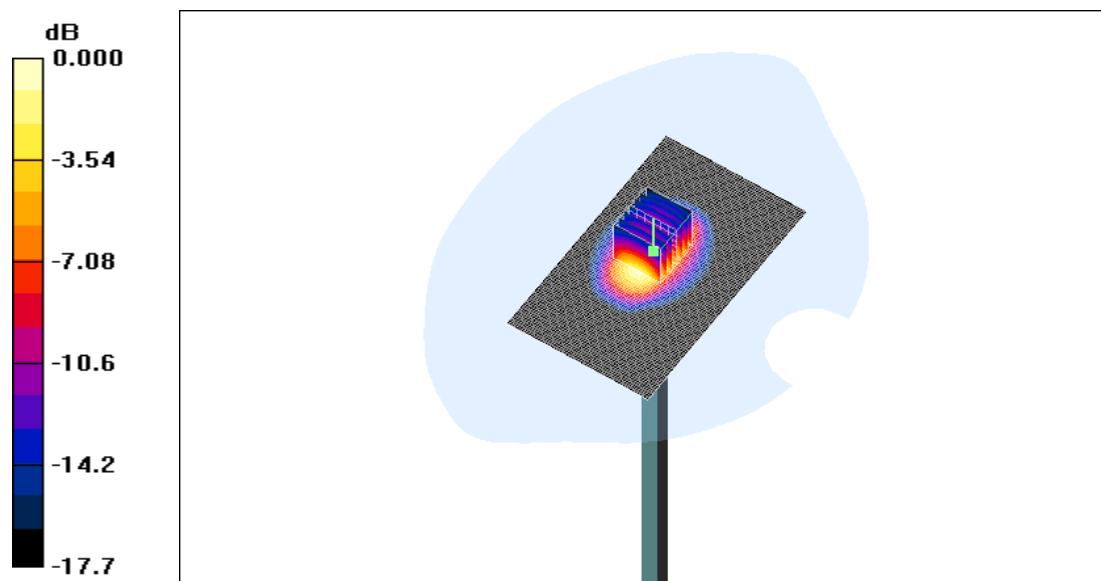
$d=10\text{mm}$ ,  $P_{in}=250\text{mW}$ /Zoom Scan (7x7x7) (7x7x7)/Cube 0: **Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**

**Reference Value = 86.7 V/m; Power Drift = -0.101 dB**

**Peak SAR (extrapolated) = 18.6 W/kg**

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.22 mW/g

**Maximum value of SAR (measured) = 11.8 mW/g**



0 dB = 11.8mW/g

**SHEMC**

## Annex D Description of Test Position

### Annex D.1 SAM Phantom Shape

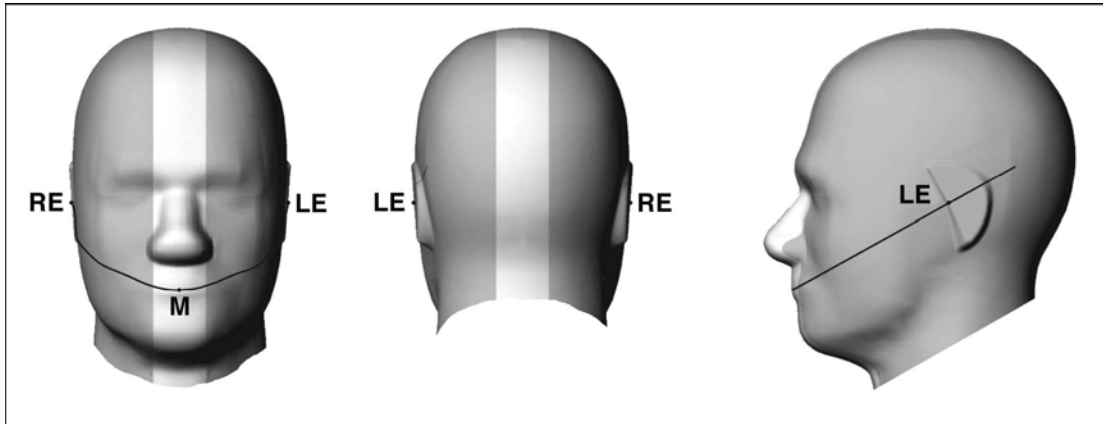


Figure D-1 front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only-procedures in this recommended practice are intended primarily for the phantom setup of Figure D-2. Note: The center strip including the nose region has a different thickness tolerance.

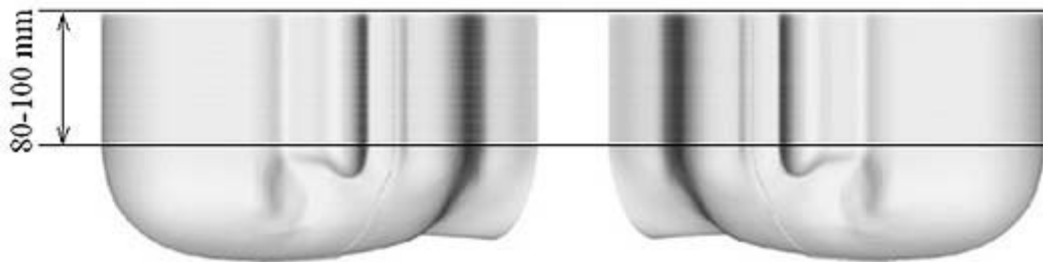


Figure D-2 Sagittally bisected phantom with extended perimeter (shown placed on its side as used for SAR measurements)

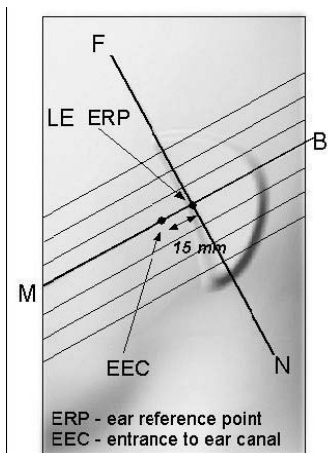


Figure D-3 Close-up side view of phantom showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations

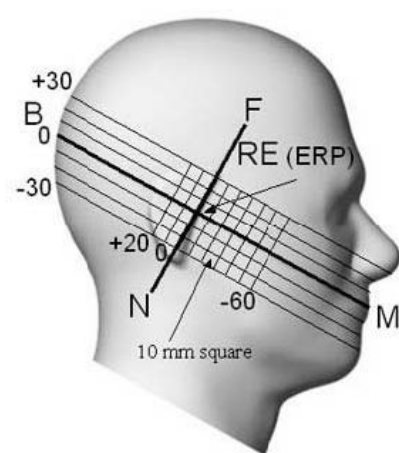


Figure D-4 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

## Annex D.2 EUT constructions

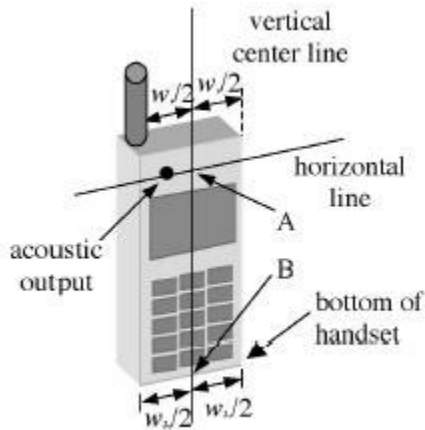


Figure D-5a Handset vertical and horizontal reference lines-“fixed case”

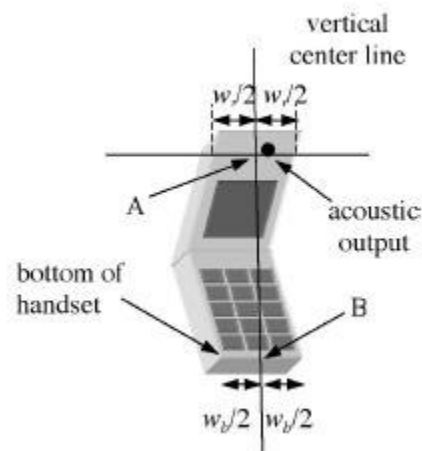


Figure D-5b Handset vertical and horizontal reference lines-“clam-shell case”

## Annex D.3 Definition of the “cheek” position

- a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom (“initial position” see Figure 1-7). While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE;
- b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until the phone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

## Annex D.4 Definition of the “tilted” position

- a) Position the device in the “cheek” position described above;
- b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.

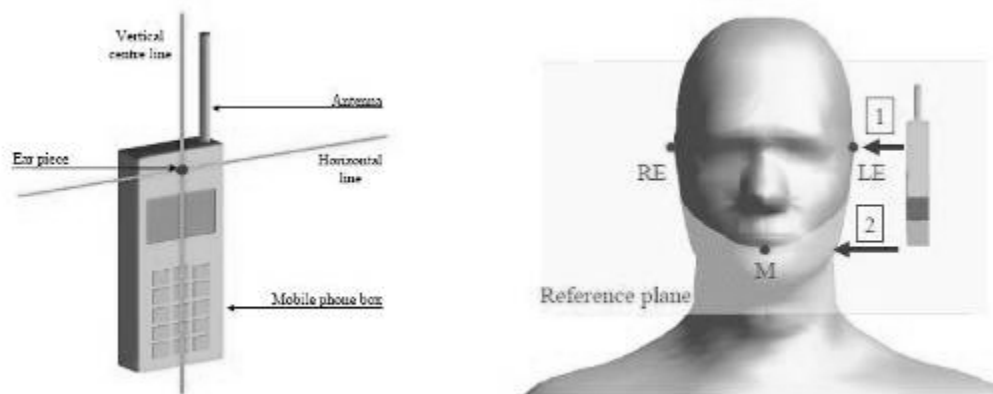


Figure D-6 Definition of the reference lines and points, on the phone and on the phantom and initial position

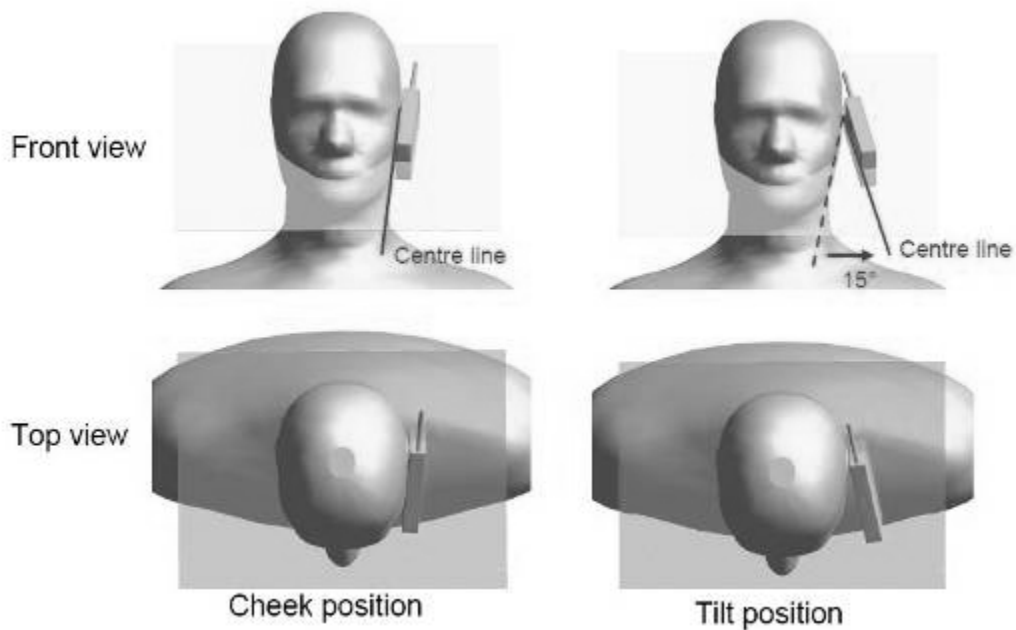


Figure D-7 “Cheek” and “tilt” positions of the mobile phone on the left side

## Annex E Calibration certificate

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Accreditation No.: SCS 108

Client: **SGS-CH (Auden)**

Certificate No: **ES3-3088\_Nov10**

### CALIBRATION CERTIFICATE

Object: **ES3DV3 - SN.3088**

Calibration procedure(s): **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2  
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 23, 2010**

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	GB41292674	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41496087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (30)	30-Mar-10 (No. 217-01169)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (30b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAB4	SN: 669	20-Apr-10 (No. DAB4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8649C	US3642U01700	4-Aug-09 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name: <b>Jeton Kashtal</b>	Function: <b>Laboratory Technician</b>	Signature:
Approved by:	Name: <b>Katja Pokovic</b>	Function: <b>Technical Manager</b>	Signature:

Issued: November 23, 2010

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**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 effect 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.
- Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z; A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  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.

ES3DV3 SN:3088

November 23, 2010

# Probe ES3DV3

## SN:3088

Manufactured:	July 20, 2005
Last calibrated:	November 19, 2009
Recalibrated:	November 23, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ES3-3088\_Nov10

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**SHEMC**



ES3DV3 SN:3088

November 23, 2010

**DASY/EASY - Parameters of Probe: ES3DV3 SN:3088**

**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.32	1.27	1.26	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	100.0	99.9	100.2	

**Modulation Calibration Parameters**

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc <sup>C</sup> (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	156.3	$\pm 3.4\%$
			Y	0.00	0.00	1.00	152.0	
			Z	0.00	0.00	1.00	147.1	

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 Norm X, Y, Z do not affect the E-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 maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ES3DV3 SN:3088

November 23, 2010

**DASY/EASY - Parameters of Probe: ES3DV3 SN:3088**

**Calibration Parameter Determined in Head Tissue Simulating Media**

f [MHz]	Validity [MHz] <sup>1)</sup>	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k <sup>2</sup> )
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.07	6.07	6.07	0.99	1.03 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	5.97	5.97	5.97	0.99	1.02 ± 11.0%
1610	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.23	5.23	5.23	0.59	1.38 ± 11.0%
1800	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.14	5.14	5.14	0.51	1.51 ± 11.0%
2000	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.07	5.07	5.07	0.51	1.54 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.56	4.56	4.56	0.45	1.70 ± 11.0%

<sup>1)</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ES3DV3 SN:3088

November 23, 2010

## DASY/EASY - Parameters of Probe: ES3DV3 SN:3088

### Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] <sup>Ⓒ</sup>	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc. (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.98	5.98	5.98	0.88	1.13 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.85	5.85	5.85	0.76	1.19 ± 11.0%
1610	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.92	4.92	4.92	0.26	3.77 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.60	4.60	4.60	0.28	2.78 ± 11.0%
2000	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.76	4.76	4.76	0.26	4.52 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.34	4.34	4.34	0.44	1.96 ± 11.0%

<sup>Ⓒ</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Certificate No: ES3-3088\_Mov10

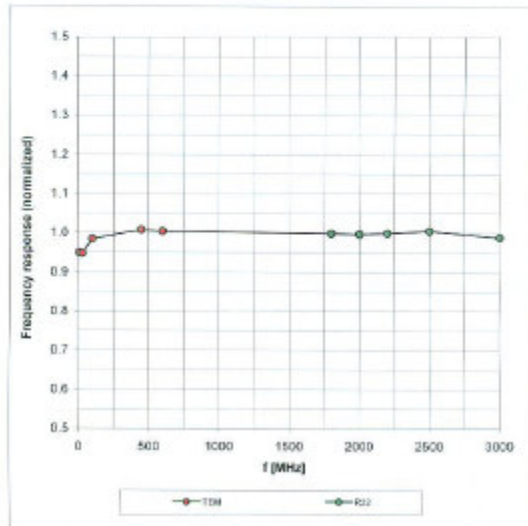
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**SHEMC**

ES3DV3 SN:3088

November 23, 2010

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



Uncertainty of Frequency Response of E-field:  $\pm 5.3\%$  (k=2)

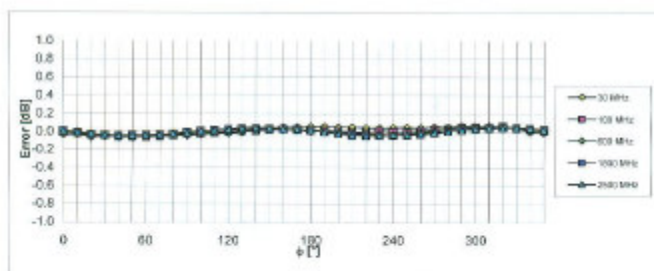
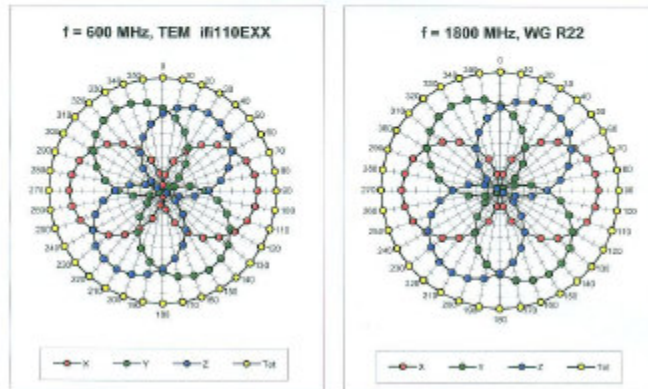
Certificate No: ES3-3088\_Nov'10

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November 23, 2010

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



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

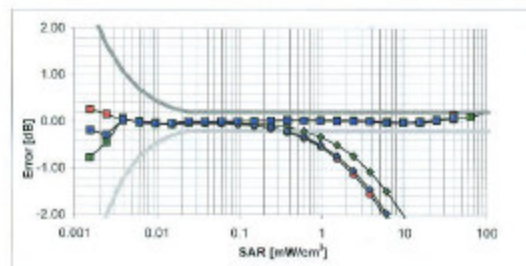
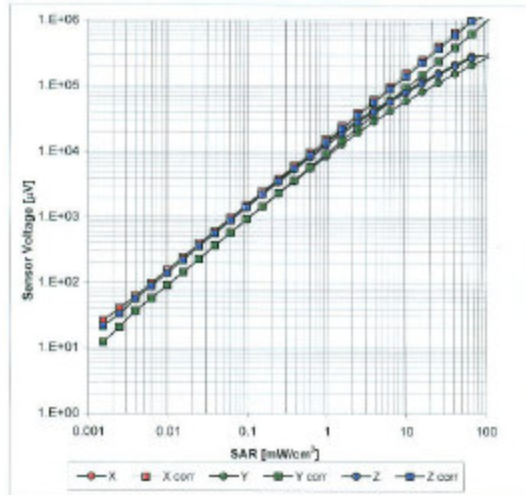
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November 23, 2010

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



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

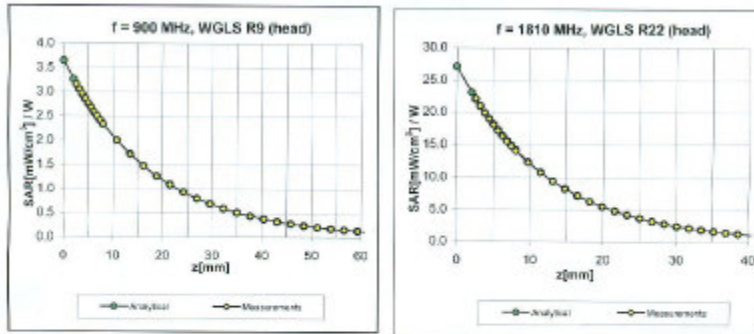
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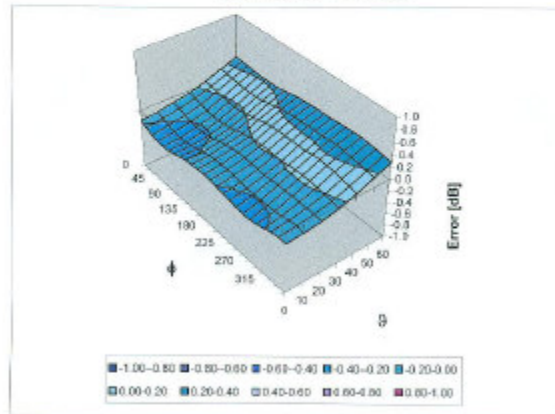
November 23, 2010

### Conversion Factor Assessment



### Deviation from Isotropy in HSL

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



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.5\%$  (k=2)

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**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



Certificate No: ES3-3088\_Nov10

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## Annex E.2 DAE Calibration certification

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Accreditation No.: SCS 108

Client: **SGS-CH (Auden)** Certificate No.: **DAE3-569\_Nov10**

---

### CALIBRATION CERTIFICATE



Object	DAE3 - SD 000 D03.AA - SN: 569		
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)		
Calibration date:	November 22, 2010		

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&E critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bornhoff	R&D Director	

Issued: November 22, 2010

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Certificate No: DAE3-569\_Nov10
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

### Glossary

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

### Methods Applied and Interpretation of Parameters

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

**DC Voltage Measurement**

A/D - Converter Resolution nominal

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

Low Range: 1LSB = 81mV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	402.938 ± 0.1% (k=2)	403.345 ± 0.1% (k=2)	403.529 ± 0.1% (k=2)
Low Range	3.92800 ± 0.7% (k=2)	3.95637 ± 0.7% (k=2)	3.94644 ± 0.7% (k=2)

**Connector Angle**

Connector Angle to be used in DASY system	263.0° ± 1°
---	-------------

Appendix

1. DC Voltage Linearity

High Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	199997.6	0.39	0.00
Channel X + Input	19998.27	-1.73	-0.01
Channel X - Input	-20000.54	-0.84	0.00
Channel Y + Input	199999.9	2.71	0.00
Channel Y + Input	20000.26	0.08	0.00
Channel Y - Input	-19999.11	0.59	-0.00
Channel Z + Input	199999.2	3.34	0.00
Channel Z + Input	19994.29	-5.81	-0.03
Channel Z - Input	-20000.54	-0.74	0.00

Low Range	Reading ( $\mu\text{V}$ )	Difference ( $\mu\text{V}$ )	Error (%)
Channel X + Input	2000.6	0.76	0.04
Channel X + Input	199.37	-0.23	-0.11
Channel X - Input	-200.61	-0.71	0.35
Channel Y + Input	2000.0	-0.01	-0.00
Channel Y + Input	198.53	-1.37	-0.69
Channel Y - Input	-202.14	-1.84	0.92
Channel Z + Input	2000.6	0.24	0.01
Channel Z + Input	196.39	-1.51	-0.76
Channel Z - Input	-201.69	-1.99	0.99

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 ( $\mu\text{V}$ )	Low Range Average Reading ( $\mu\text{V}$ )
Channel X	200	-0.51	-2.10
	-200	2.82	2.01
Channel Y	200	4.53	4.19
	-200	-8.17	-8.12
Channel Z	200	-14.00	-14.37
	-200	12.62	12.51

3. Channel separation

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

	Input Voltage (mV)	Channel X ( $\mu\text{V}$ )	Channel Y ( $\mu\text{V}$ )	Channel Z ( $\mu\text{V}$ )
Channel X	200	-	2.31	-2.14
Channel Y	200	2.21	-	3.30
Channel Z	200	0.63	-0.46	-

**4. AD-Converter Values with inputs shorted**

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

	High Range (LSB)	Low Range (LSB)
Channel X	16227	16350
Channel Y	16585	16231
Channel Z	15827	16157

**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	0.17	-1.94	1.97	0.67
Channel Y	-0.86	-2.25	1.36	0.69
Channel Z	-1.20	-2.36	0.46	0.57

**6. Input Offset Current**

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

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

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

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

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

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

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

## Annex E.1 Dipole Calibration certification

D835V2

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Accreditation No.: **SCS 108**

Client **SGS-CH (Auden)**

Certificate No: **D835V2-4d070\_Nov10**

### CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d070**

Calibration procedure(s): **QA CAL-05.v7  
Calibration procedure for dipole validation kits**

Calibration date: **November 19, 2010**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01198)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jan-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S BMT-06	105005	4-Aug-09 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8733E	US37390585 54208	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: **Jeton Kastali** (Name) / **Laboratory Technician** (Function) / *[Signature]* (Signature)

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

Issued: November 22, 2010

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

Certificate No: D835V2-4d070\_Nov10

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



S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

**Glossary:**

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

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

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

**Additional Documentation:**

- d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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

**Measurement Conditions**

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
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	41.5 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	****	****

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	260 mW input power	2.37 mW / g
SAR normalized	normalized to 1W	9.48 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.56 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 mW / g
SAR normalized	normalized to 1W	6.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>6.20 mW / g ± 16.5 % (k=2)</b>



**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °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	2.53 mW / g
SAR normalized	normalized to 1W	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.92 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.65 mW / g
SAR normalized	normalized to 1W	6.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.51 mW / g ± 16.5 % (k=2)</b>

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	52.4 Ω - 2.7 jΩ
Return Loss	- 29.0 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	48.0 Ω - 3.9 jΩ
Return Loss	- 27.0 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.394 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	November 08, 2007

## DASY5 Validation Report for Head TSL

Date/Time: 18.11.2010 11:02:35

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d070**

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

Medium: HSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.89 \text{ mho/m}$ ;  $\epsilon_r = 41.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**

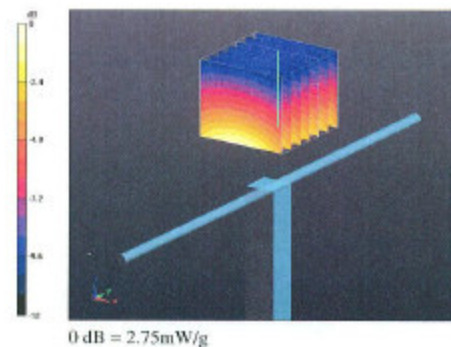
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.2 V/m; Power Drift = 0.025 dB

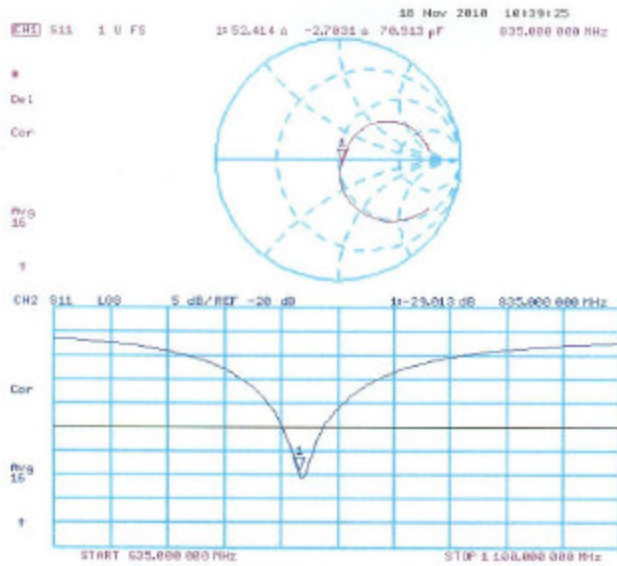
Peak SAR (extrapolated) = 3.56 W/kg

**SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.54 mW/g**

Maximum value of SAR (measured) = 2.75 mW/g



### Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body

Date/Time: 19.11.2010 13:25:58

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d070**

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

Medium: MSL900

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.99 \text{ mho/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**

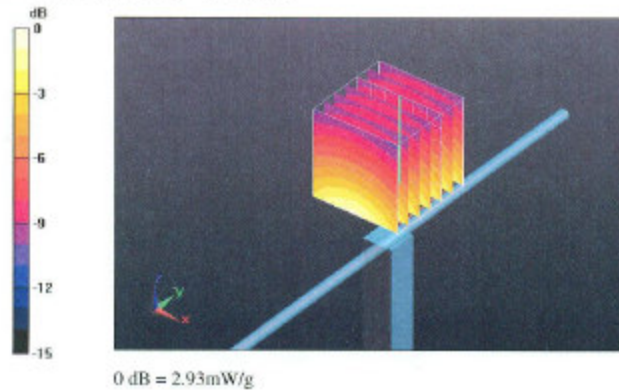
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.1 V/m; Power Drift = -0.000422 dB

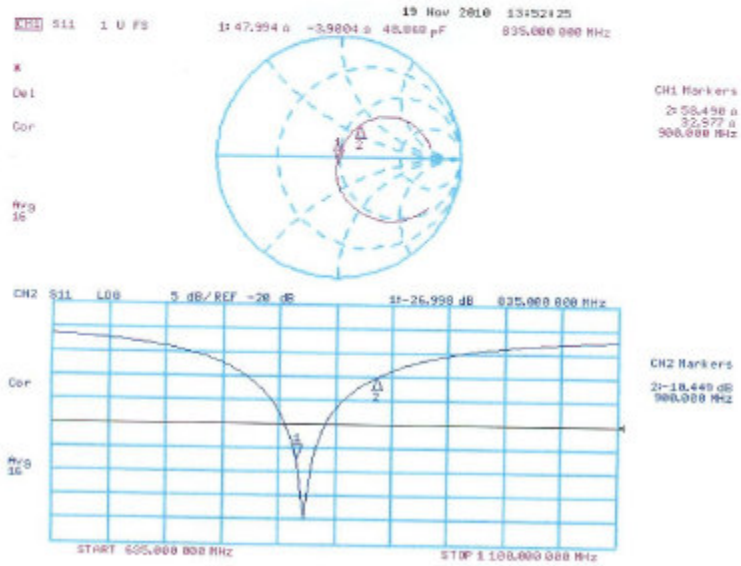
Peak SAR (extrapolated) = 3.73 W/kg

**SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.65 mW/g**

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



### Impedance Measurement Plot for Body TSL



D1900V2

Calibration Laboratory of  
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Engineering AG  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS-CH (Auden)

Certificate No: D1900V2-5d028\_Nov10

## CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d028

Calibration procedure(s): QA CAL-05.v7  
Calibration procedure for dipole validation kits

Calibration date: November 25, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GS37486704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01182)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41082317	18-Oct-09 (in house check Oct-09)	in house check: Oct-11
RF generator R&S SMT-06	100006	4-Aug-99 (in house check Oct-09)	in house check: Oct-11
Network Analyzer HP 8753E	US37390685 S4206	18-Oct-01 (in house check Oct-10)	in house check: Oct-11

Calibrated by:	Name	Function	Signature
	Dimitry Ilev	Laboratory Technician	
Approved by:	Kerja Pokovic	Technical Manager	

Issued: November 25, 2010

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Certificate No: D1900V2-5d028\_Nov10

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 Zeughausstrasse 43, 8004 Zurich, Switzerland



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

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

Accreditation No.: SCS 108

**Glossary:**

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

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

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

**Additional Documentation:**

- d) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

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



**Measurement Conditions**

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 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	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.3 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	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.0 mW / g ± 16.5 % (k=2)

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.8 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °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	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>40.3 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 mW / g
SAR normalized	normalized to 1W	21.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>21.2 mW / g ± 16.5 % (k=2)</b>

**Appendix**

**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	52.3 $\Omega$ + 5.8 $j\Omega$
Return Loss	- 24.3 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	47.3 $\Omega$ + 6.7 $j\Omega$
Return Loss	- 22.6 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.200 ns
----------------------------------	----------

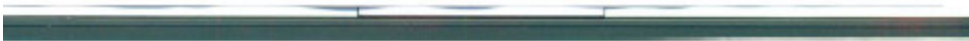
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	December 17, 2002



**DASY5 Validation Report for Head TSL**

Date/Time: 25.11.2010 12:33:59

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d028**

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

Medium: HSL U12 BB

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.4 \text{ mho/m}$ ;  $\epsilon_r = 39.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**

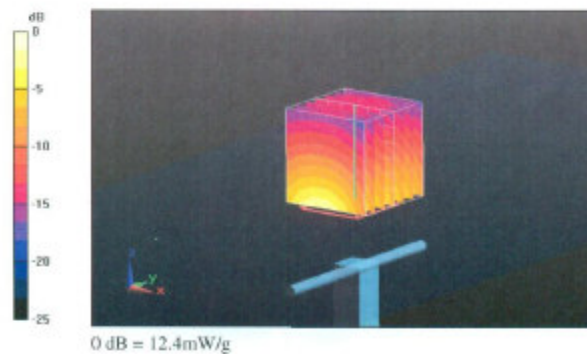
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.6 V/m; Power Drift = 0.035 dB

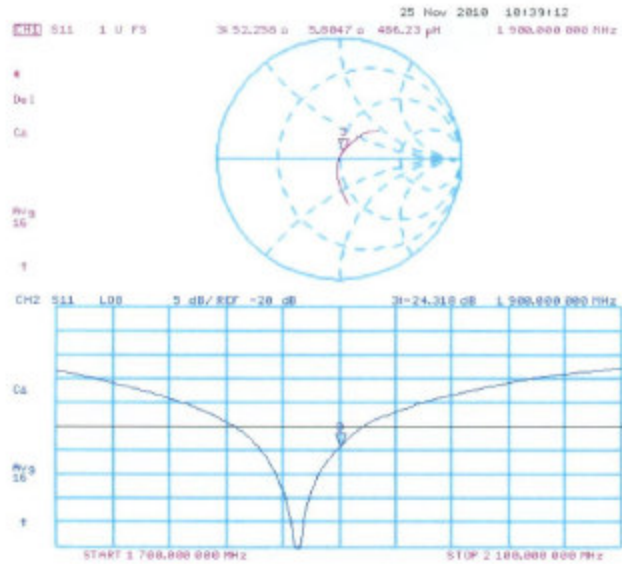
Peak SAR (extrapolated) = 18.6 W/kg

**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g**

Maximum value of SAR (measured) = 12.4 mW/g



### Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body

Date/Time: 24.11.2010 12:05:53

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d028**

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

Medium: MSL U12 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 52.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement

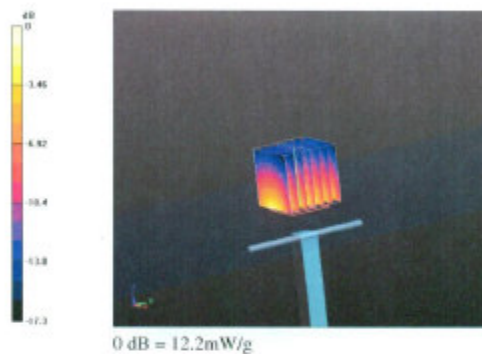
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.8 V/m; Power Drift = 0.033 dB

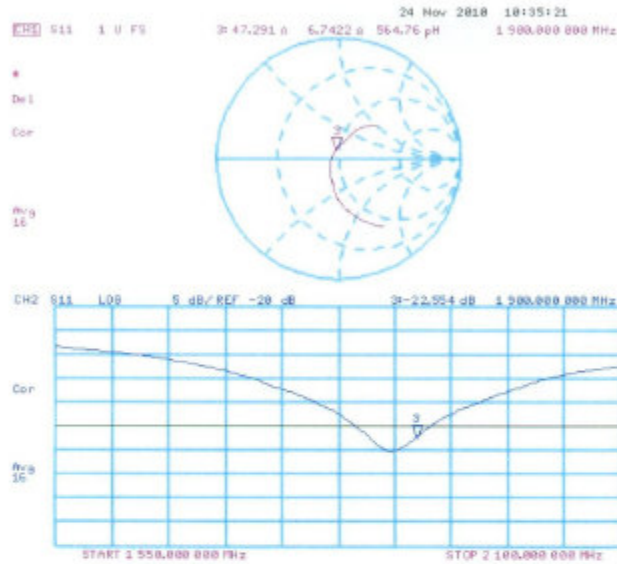
Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.3 mW/g**

Maximum value of SAR (measured) = 12.2 mW/g



### Impedance Measurement Plot for Body TSL



END OF REPORT

**SHEMC**

