

# SAR TEST REPORT

<b>Equipment Under Test</b>	Notebook
<b>Model No.</b>	TN12XR(X=0~9)
<b>FCC ID</b>	U9M-TN12XR
<b>Applicant</b>	CLEVO CO.
<b>Address of Applicant</b>	No.129, Hsing-Te road, Sun Chung city 241,Taipei Hsien, Taiwan, R.O.C
<b>Date of Receipt</b>	2007.10.05
<b>Date of Test(s)</b>	2007.11.23
<b>Date of Issue</b>	2007.11.26

Standards:

**FCC OET Bulletin 65 supplement C,  
ANSI/IEEE C95.1 , C95.3, IEEE 1528**

In the configuration tested, the EUT complied with the standards specified above.

**Remarks:**

This report details the results of the testing carried out on one sample, 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 report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronics & Communication Laboratory Services or testing done by SGS Taiwan Electronics & Communication Laboratory Services in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronics & Communication Laboratory Services in writing.

Tested by : Ricky Huang   
Sr. Engineer

Date : 2007.11.26

Approved by : Dikin Yang   
RF. Supervisor

Date : 2007.11.26

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## 1. General Information

### 1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory	
5F, No. 134, Wukung Road, Wuku industrial zone	
Taipei county, Taiwan, R.O.C.	
Telephone	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	<a href="http://www.tw.sgs.com/">http://www.tw.sgs.com/</a>

### 1.2 Details of Applicant

Name	CLEVO CO.
Address	No.129, Hsing-Te road, Sun Chung city 241,Taipei Hsien, Taiwan, R.O.C
Country	Taiwan
Telephone	+886-2-2278-9696
Fax	+886-2-2278-4787
Contact Person	HY Sung
E-mail	<a href="mailto:hysung@clevo.com.tw">hysung@clevo.com.tw</a>

### 1.3 Description of EUT

Product Name	Notebook	
Model Number	TN12XR(X=0~9)	
Brand Name	CLEVO	
IMEI	352678010425491	
Mode of Operation	GSM,GPRS,EDGE,(900/1800/850/1900)	
Modulation mode	GMSK/ QPSK/8PSK	
Duty Cycle	GSM	GPRS(EDGE)
	1/8	1/2
Maximum RF Conducted Power (Average)	GSM 850	PCS 1900
	31.4 dBm	28.4 dBm
TX Frequency range	GSM 850	PCS 1900
	824.2-848.8 MHz	1850.2-1909.8 MHz
Channel Number (ARFCN)	GSM 850	PCS 1900
	128-251	512-810

Power Supply	14.8Vdc re-chargeable battery or 19Vdc by AC/DC power adapter	
	Battery Model	TN120RBAT-4
	Adapter Model	0335A1965
Antenna Type	PIFA Antenna	
Antenna Gain	GSM 850	PCS 1900
	-5.87 dBi	-10.38dBi
Definition	Production unit	
Max. SAR Measured (10 g)	1.23 W/kg (At GSM 1900 Channel 512 Configuration 3 )	



Note:

EGPRS mode was not measured because maximum averaged output power is more than 3 dB lower in EGPRS mode than in GPRS mode.

#### 1.4 Test Environment

Ambient Temperature: 22.1° C

Tissue Simulating Liquid: 21.6° C

Relative Humidity: 62 %

#### 1.5 Operation description

The EUT type is Notebook. When uses it, it will be defined as a portable device since the Notebook will place on the thigh, so SAR measurement is mandatory. The EUT is controlled by using a Communication simulate Tester (Agilent 8960), and the communication between the EUT and the tester is established by air link. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

Value of Crest Factors are 2 for GPRS mode (multi-slot=4) were used for SAR testing according to the nature of the EUT. The test configuration tested at the low, middle and high frequency channels. By using the program subordinated in the computer, and change into the written

channel, and then test of set in highest power. Finally, we will test it by dividing into 4 configurations:

Configuration 1: Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.( Appendix-Fig.3 & Fig.4)

Configuration 2: Bottom side of the Notebook is paralleled with flat phantom, turn the panel outside and close it, bottom side is contact with flat phantom.( Appendix-Fig.5 & Fig.6)

Configuration 3: Right side of Notebook is paralleled with flat phantom, turn the panel outside and close it, right side is contact with flat phantom.( Appendix-Fig.7& Fig.8)

Configuration 4: Top side of the Notebook is paralleled flat phantom, turn the panel outside and close it, top side is contact with flat phantom.( Appendix-Fig.9 & Fig.10)

## 1.6 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system ( Speag Dasy 4 professional system ). A Model EX3DV3 3526-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation  $SAR = \sigma (|E_i|^2) / \rho$  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:

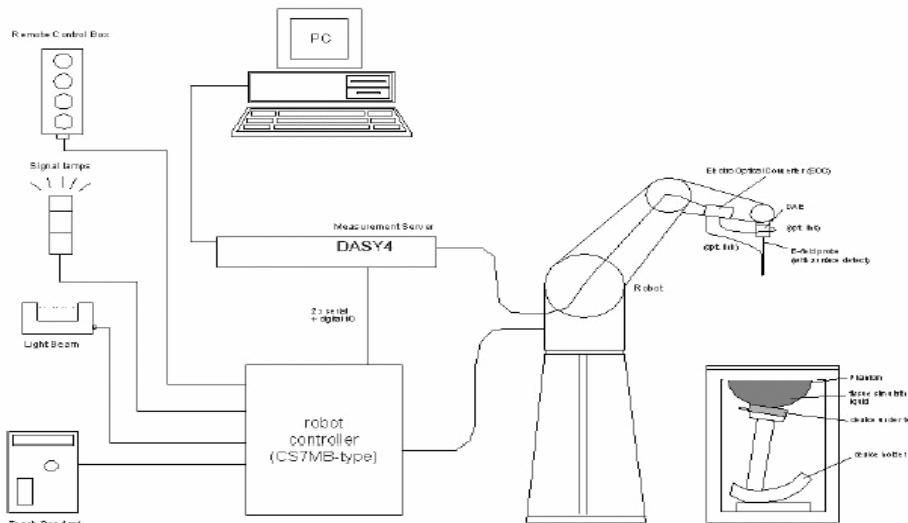


Fig. a The microwave circuit arrangement used for SAR system verification

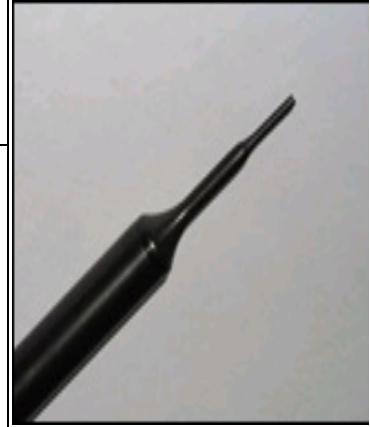
- A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition 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 the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
  - A computer operating Windows 2000 or Windows XP.
  - 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 and right-hand usage.
  - The device holder for hand-held mobile phones.
  - Tissue simulating liquid mixed according to the given recipes.
  - Validation dipole kits allowing to validate the proper functioning of the system.

## 1.7 System Components

### EX3DV3 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL850/1900 Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz, Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)	
Directivity	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 $\mu$ W/g to > 100 mW/g Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

### SAM PHANTOM V4.0C

Construction:	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, 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 manually teaching three points with the robot.
Shell Thickness:	2 ± 0.2 mm
Filling Volume:	Approx. 25 liters
Dimensions:	Height: 251 mm; Length: 1000 mm; Width: 500 mm



### DEVICE HOLDER

Construction	In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).	 Device Holder
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### 1.8 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. 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 900 & 1900 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22.1°C, the

relative humidity was in the range 62% 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.

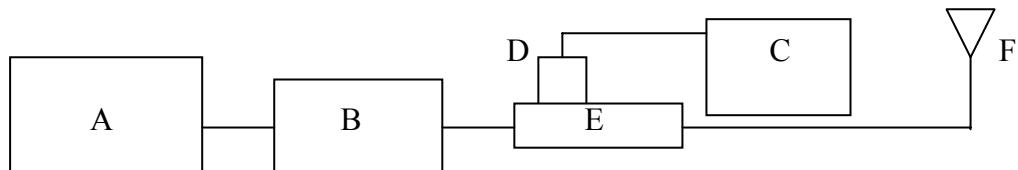
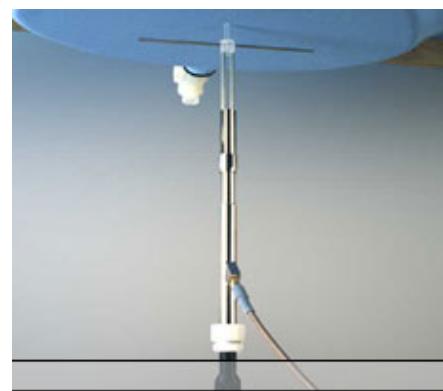


Fig.b The microwave circuit arrangement used for SAR system verification

- A. Agilent Model 8648D Signal Generator
- B. Mini circuits Model ZHL-42 Amplifier
- C. Agilent Model E4416A Power Meter
- D. Agilent Model 8481H Power Sensor
- E. Agilent Model 778D Dual directional coupling
- F. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	Frequency Hz	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Variation	Measured Date
D900V2 S/N: 178	900 MHz (Body)	2.66 m W/g	2.76 m W/g	3.75 %	2007-11-23
D1900V2 S/N: 5d027	1900 MHz (Body)	9.67 m W/g	9.57 m W/g	1.03 %	2007-11-23

Table 1. Results system validation

### 1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the HP Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D Network Analyzer (30 KHz-6000 MHz) by using a procedure detailed in Section V. All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurement. The depth of the tissue simulant in the ear reference point of the phantom was 15cm±5mm during all tests. (Appendix part, Fig. 2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			$\rho$	$\sigma$ (S/m)	Simulated Tissue Temperature( $^{\circ}$ C)
900	Body	Measured, 2007.11.23	55.6	1.03	21.7

		Recommended Limits	52.3-58.0	0.92-1.10	20-24
1900	Body	Measured, 2007.11.23	51	1.59	21.6
		Recommended Limits	50.6-56.0	1.38-1.60	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

Band 850(Body) Frequency (MHz)	Channel	Target	Permittivity Measurement Date	Variation	Target	Conductivity Measurement Date	Variation
Low(824.2)	128	55.2	56.4	2.17%	0.97	0.953	1.75%
Mid(836.6)	190		56.2	1.81%		0.965	0.51%
High(848.8)	251		56.1	1.53%		0.977	0.72%

Table 4. Dielectric Parameters of Tissue Simulant Fluid (follow P1528 target value)

The composition of the brain tissue simulating liquid for 900 & 1900 MHz is:

Ingredient	900Mhz(Body)	1900Mhz(Body)
DGMBE	X	300.67
Water	632.68	716.56
Sale	11.72	4.0
Preventol D-7	1.2	X
Cellulose	X	X
Sugar	600 g	X
Total amount	1 L (1.0kg)	1 L (1.0kg)

Table 3. Recipes for tissue simulating liquid

## 1.10 EVALUATION PROCEDURES

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from

the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within -2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

## 1.11 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1-1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310

of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

<b>Human Exposure</b>	<b>Uncontrolled Environment General Population</b>	<b>Controlled Environment Occupational</b>
<b>Spatial Peak SAR (Brain)</b>	1.60 m W/g	8.00 m W/g
<b>Spatial Average SAR (Whole Body)</b>	0.08 m W/g	0.40 m W/g
<b>Spatial Peak SAR (Hands/Feet/Ankle/Wrist)</b>	4.00 m W/g	20.00 m W/g

Table .4 RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

## 2. Summary of Results

### GSM 850 MHZ- testing in GPRS mode (uplink slot=4)

**Configuration 1-** Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	31.2dbm	0.00716	22.1	21.7
	190	836.6	31.3dbm	0.00645	22.1	21.7
	251	848.8	31.4dbm	0.00659	22.1	21.7

**Configuration 2-** Bottom side of the Notebook is paralleled with flat phantom, turn the panel outside and close it, bottom side is contact with flat phantom.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	31.2dbm	0.022	22.1	21.7
	190	836.6	31.3dbm	0.022	22.1	21.7
	251	848.8	31.4dbm	0.021	22.1	21.7

**Configuration 3-** Right side of Notebook is paralleled with flat phantom, turn the panel outside and close it, right side is contact with flat phantom

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	31.2dbm	0.643	22.1	21.7
	190	836.6	31.3dbm	0.684	22.1	21.7
	251	848.8	31.4dbm	0.690	22.1	21.7

**Configuration 4-** Top side of the Notebook is paralleled flat phantom, turn the panel outside and close it, top side is contact with flat phantom

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	31.2dbm	0.023	22.1	21.7
	190	836.6	31.3dbm	0.022	22.1	21.7
	251	848.8	31.4dbm	0.021	22.1	21.7

## PCS 1900 MHZ- testing in GPRS mode (uplink slot=4)

**Configuration 1-** Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	28.0dbm	0.00249	22.1	21.7
	661	1880.0	28.2dbm	0.00194	22.1	21.7
	810	1909.8	28.4dbm	0.00297	22.1	21.7

**Configuration 2-** Bottom side of the Notebook is paralleled with flat phantom, turn the panel outside and close it, bottom side is contact with flat phantom.

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1710.2	28.0dbm	0.030	22.1	21.7
	661	1747.4	28.2dbm	0.031	22.1	21.7
	810	1784.8	28.4dbm	0.048	22.1	21.7

**Configuration 3-** Right side of Notebook is paralleled with flat phantom, turn the panel outside and close it, right side is contact with flat phantom

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1710.2	28.0dbm	1.23	22.1	21.7
	661	1747.4	28.2dbm	0.823	22.1	21.7
	810	1784.8	28.4dbm	0.924	22.1	21.7

**Configuration 4-** Top side of the Notebook is paralleled flat phantom, turn the panel outside and close it, top side is contact with flat phantom

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1710.2	28.0dbm	0.051	22.1	21.7
	661	1747.4	28.2dbm	0.046	22.1	21.7
	810	1784.8	28.4dbm	0.070	22.1	21.7

### 3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV3	3526	Aug.29.2007
Schmid & Partner Engineering AG	900/1900 MHz System Validation Dipole	D900V2 D1900V2	178 5d027	Feb.19.2007 Mar.20.2007
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Oct.01.2007
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 53	N/A	Calibration isn't necessary
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration isn't necessary
Agilent	Network Analyzer	8753D	3410A05547	Nov.15.2007
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration isn't necessary
Agilent	Dual-directional coupler	778D	50313	Aug.21.2007
Agilent	RF Signal Generator	8648D	3847M00432	May.22.2007
Agilent	Power Sensor	8481H	MY41091361	Jun.04.2007
Agilent	8960 Series 10 Wireless Communication Tester	8960	GB44051912	Nov.28.2006

## 4. Measurements

Configuration 1\_GPRS\_CH128

Date/Time: 2007/11/23 10:05:56

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.953$  mho/m;

$\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.007 mW/g

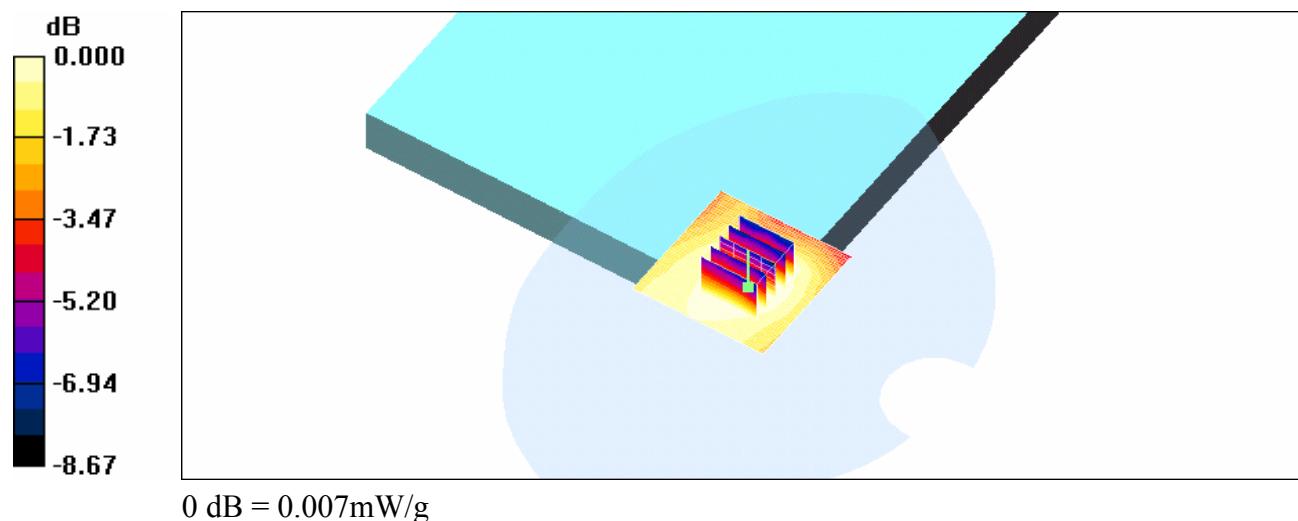
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.68 V/m; Power Drift = 0.162 dB

Peak SAR (extrapolated) = 0.009 W/kg

SAR(1 g) = 0.00716 mW/g; SAR(10 g) = 0.00531 mW/g

Maximum value of SAR (measured) = 0.007 mW/g



## Configuration 1\_GPRS\_CH190

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.965$  mho/m;  
 $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.007 mW/g

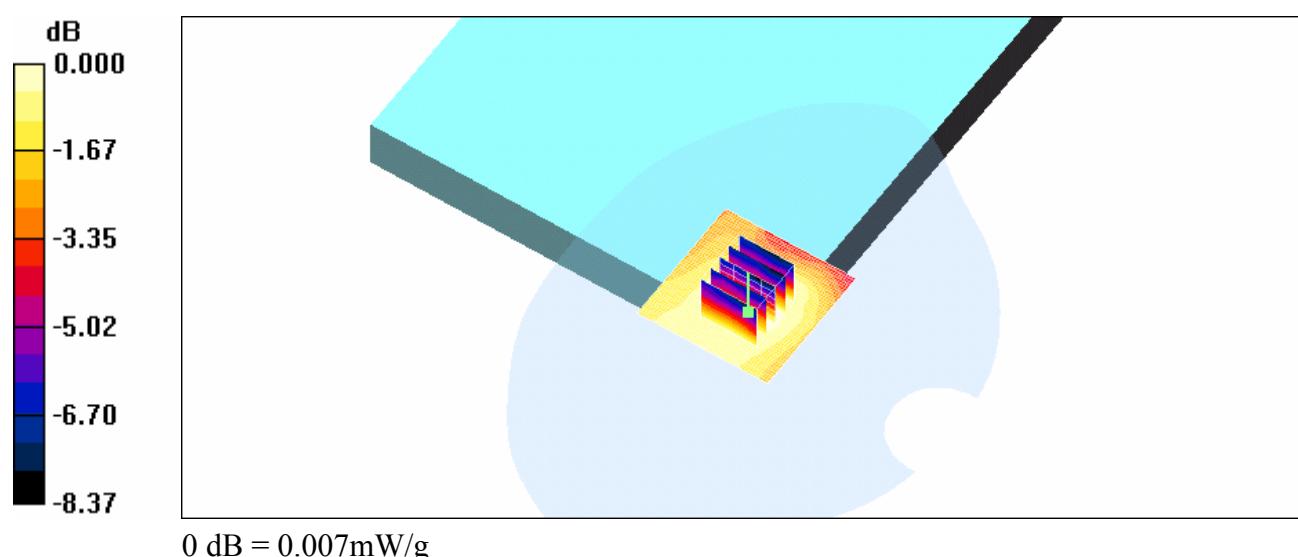
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.55 V/m; Power Drift = 0.167 dB

Peak SAR (extrapolated) = 0.009 W/kg

SAR(1 g) = 0.00645 mW/g; SAR(10 g) = 0.00482 mW/g

Maximum value of SAR (measured) = 0.007 mW/g



## Configuration 1\_CH251

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 0.977$  mho/m;  
 $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.007 mW/g

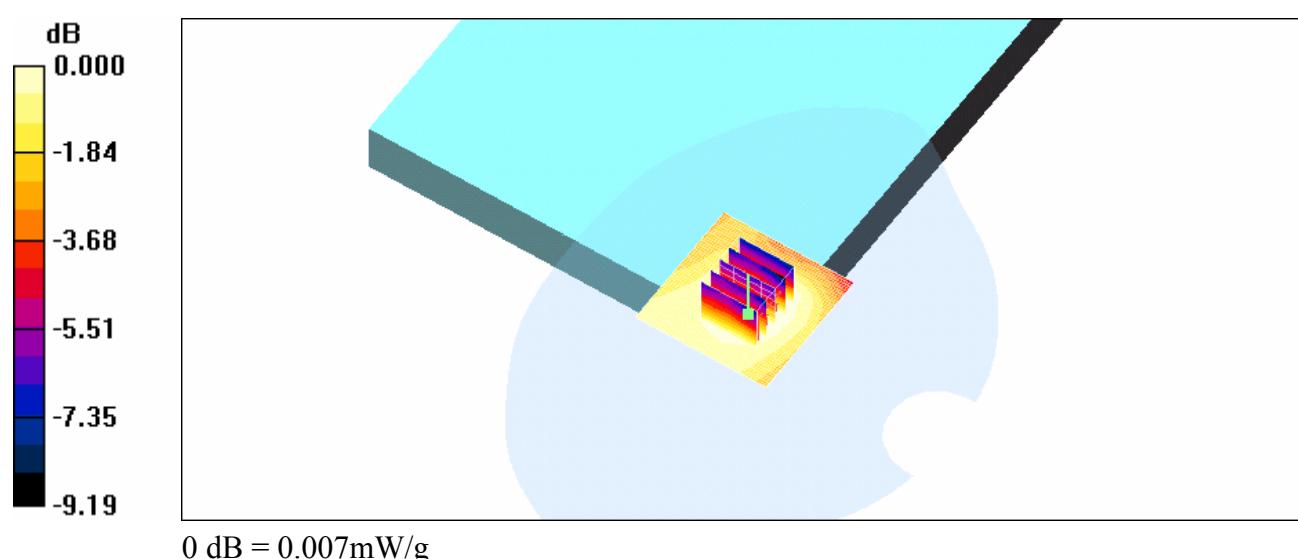
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.56 V/m; Power Drift = 0.191 dB

Peak SAR (extrapolated) = 0.009 W/kg

SAR(1 g) = 0.00659 mW/g; SAR(10 g) = 0.0049 mW/g

Maximum value of SAR (measured) = 0.007 mW/g



## Configuration 2\_GPRS\_CH128

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.953$  mho/m;  
 $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.024 mW/g

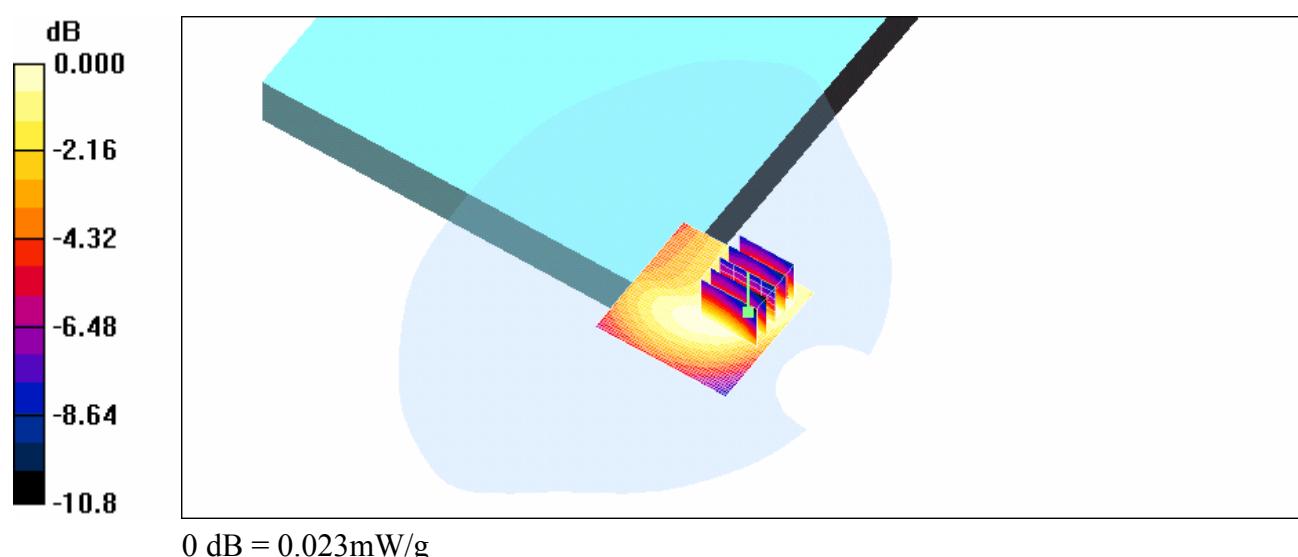
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.87 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 0.030 W/kg

**SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.015 mW/g**

Maximum value of SAR (measured) = 0.023 mW/g



## Configuration 2\_GPRS\_CH190

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.965$  mho/m;  
 $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.024 mW/g

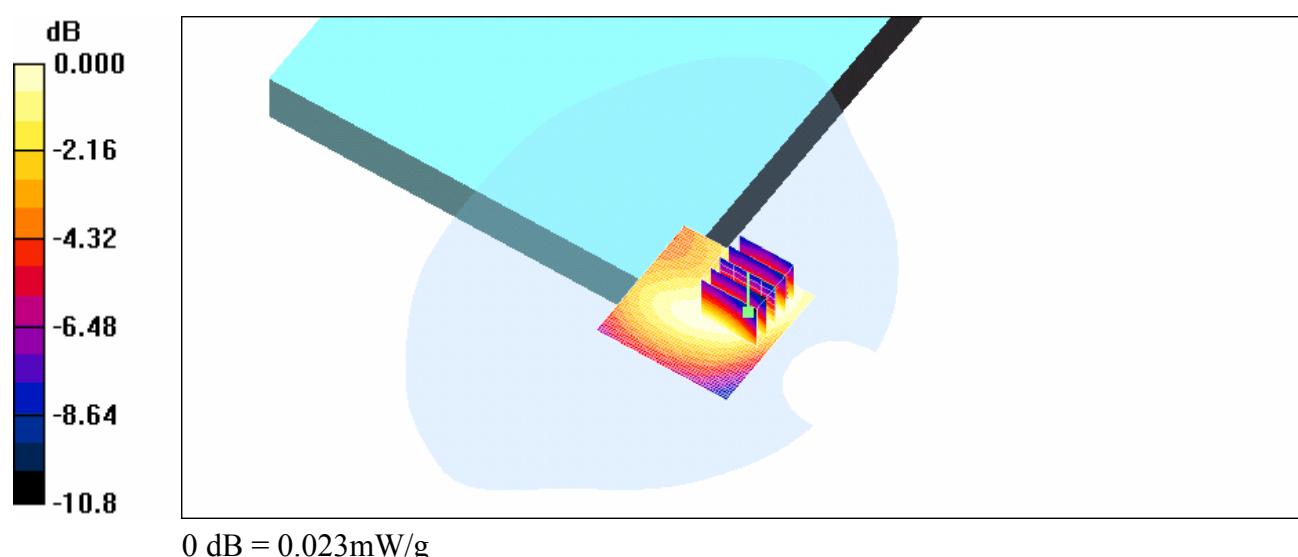
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.98 V/m; Power Drift = -0.013 dB

Peak SAR (extrapolated) = 0.031 W/kg

**SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.016 mW/g**

Maximum value of SAR (measured) = 0.023 mW/g



## Configuration 2\_GPRS\_CH251

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 0.977$  mho/m;  
 $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.023 mW/g

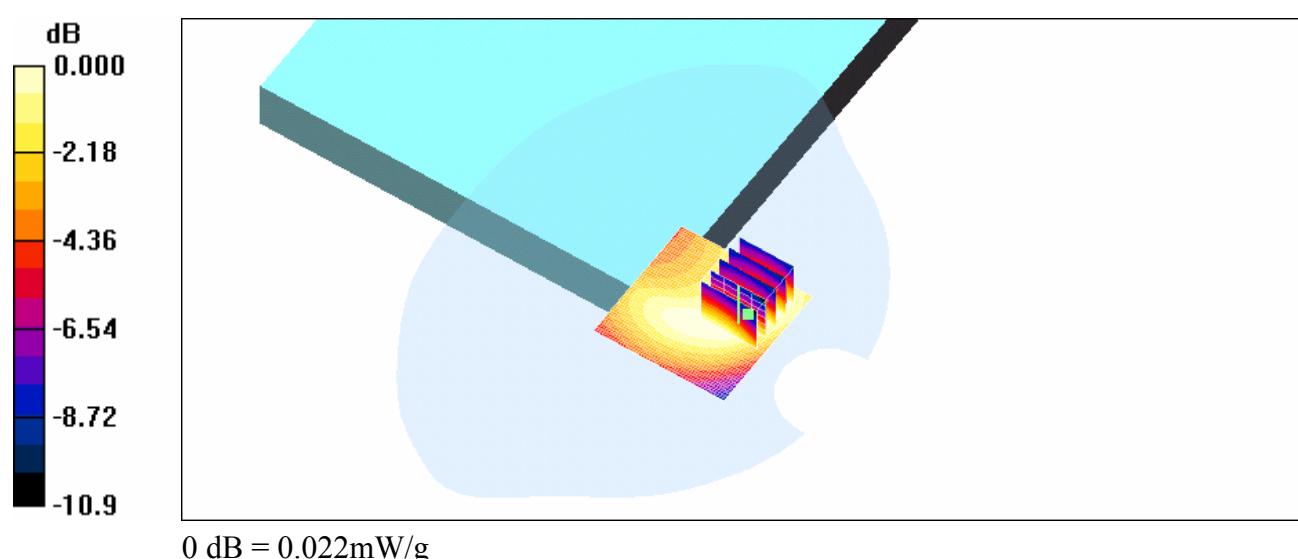
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.89 V/m; Power Drift = -0.127 dB

Peak SAR (extrapolated) = 0.029 W/kg

**SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.014 mW/g**

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



## Configuration 3\_GPRS\_CH128

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.953$  mho/m;  
 $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.716 mW/g

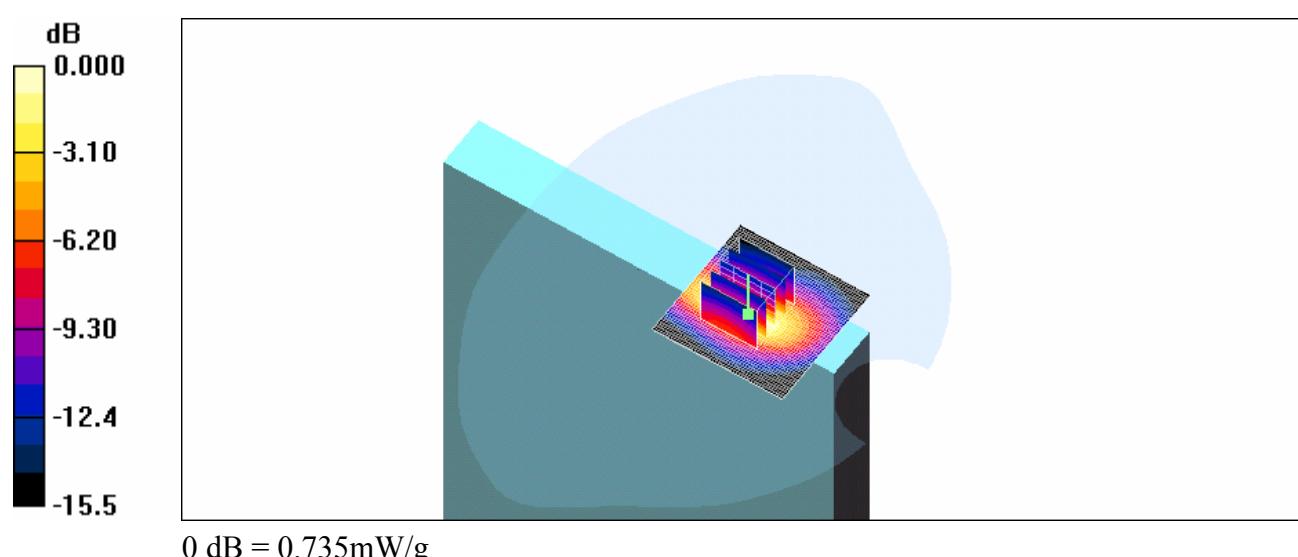
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.3 V/m; Power Drift = -0.095 dB

Peak SAR (extrapolated) = 1.31 W/kg

**SAR(1 g) = 0.643 mW/g; SAR(10 g) = 0.322 mW/g**

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



## Configuration 3\_GPRS\_CH190

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.965$  mho/m;  
 $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.749 mW/g

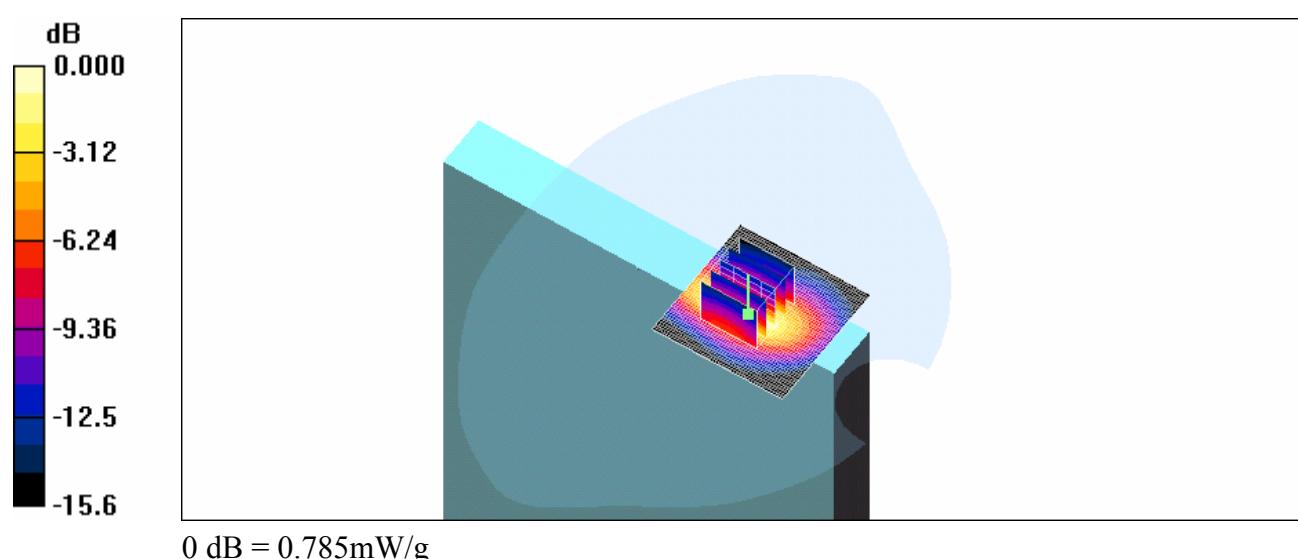
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.9 V/m; Power Drift = -0.069 dB

Peak SAR (extrapolated) = 1.40 W/kg

SAR(1 g) = 0.684 mW/g; SAR(10 g) = 0.341 mW/g

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



## Configuration 3\_GPRS\_CH251

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 0.977$  mho/m;  
 $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.768 mW/g

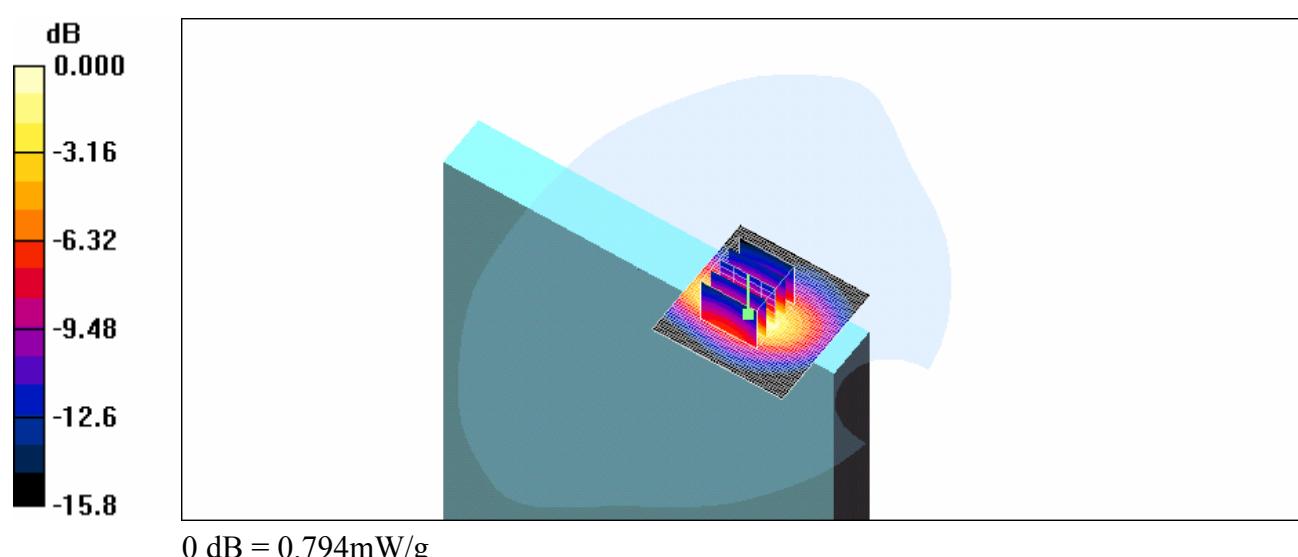
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.9 V/m; Power Drift = -0.082 dB

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.690 mW/g; SAR(10 g) = 0.345 mW/g**

Maximum value of SAR (measured) = 0.794 mW/g



## Configuration 4\_GPRS\_CH128

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.953$  mho/m;  
 $\epsilon_r = 56.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.025 mW/g

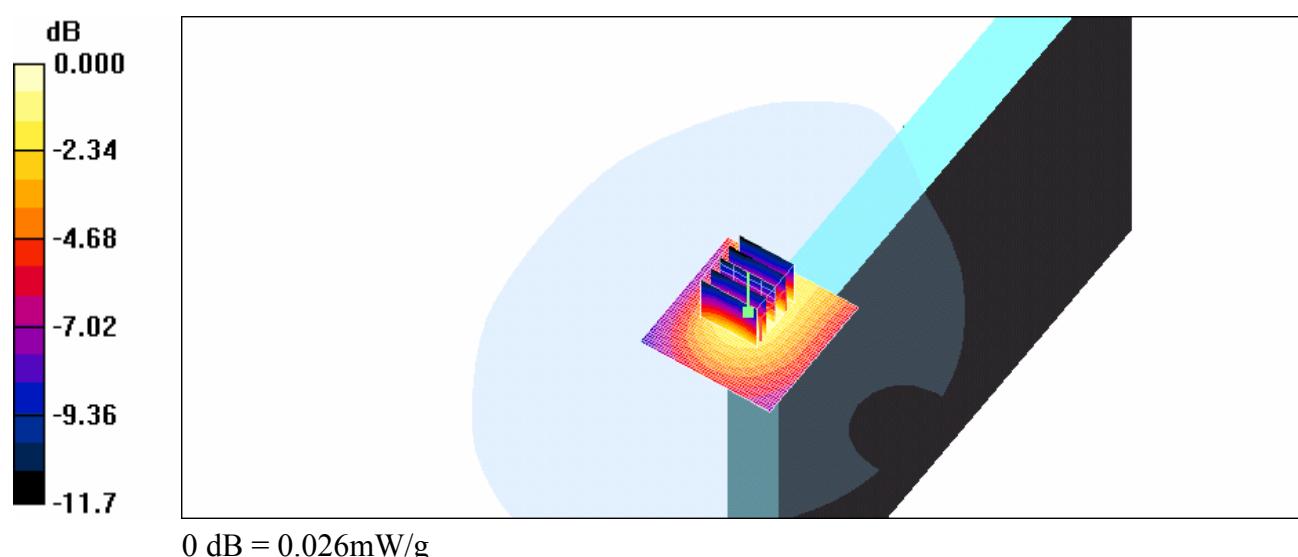
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.42 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.041 W/kg

**SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.014 mW/g**

Maximum value of SAR (measured) = 0.026 mW/g



## Configuration 4\_GPRS\_CH190

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.965$  mho/m;  
 $\epsilon_r = 56.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.024 mW/g

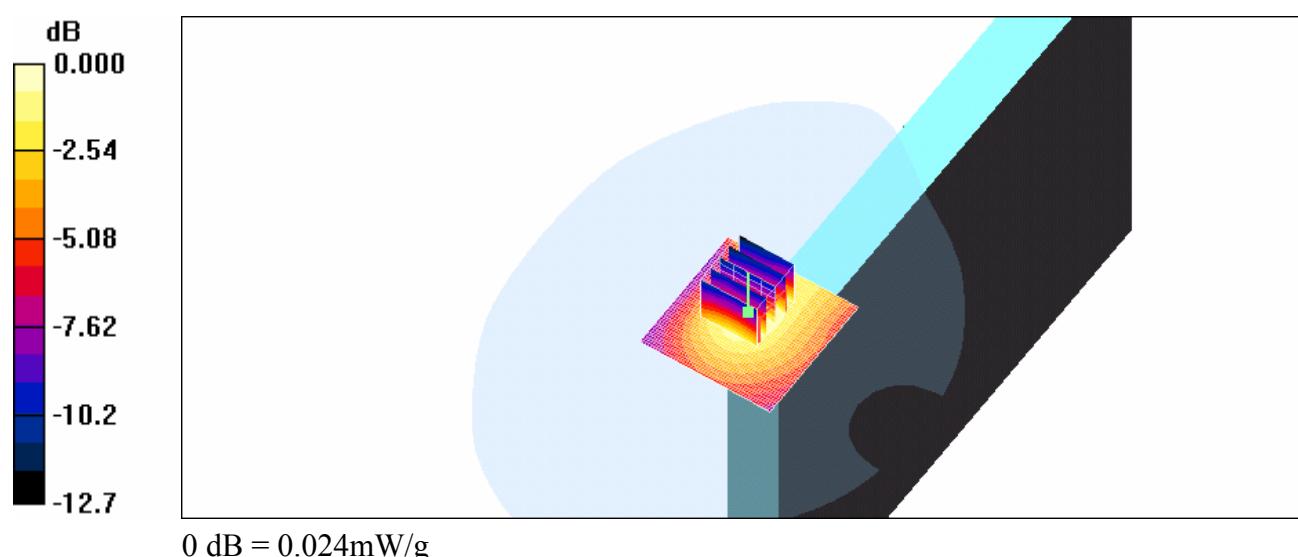
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.27 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 0.040 W/kg

**SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.013 mW/g**

Maximum value of SAR (measured) = 0.024 mW/g



## Configuration 4\_GPRS\_CH251

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium: Muscle 900 MHz Medium parameters used (interpolated):  $f = 848.8$  MHz;  $\sigma = 0.977$  mho/m;  
 $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.023 mW/g

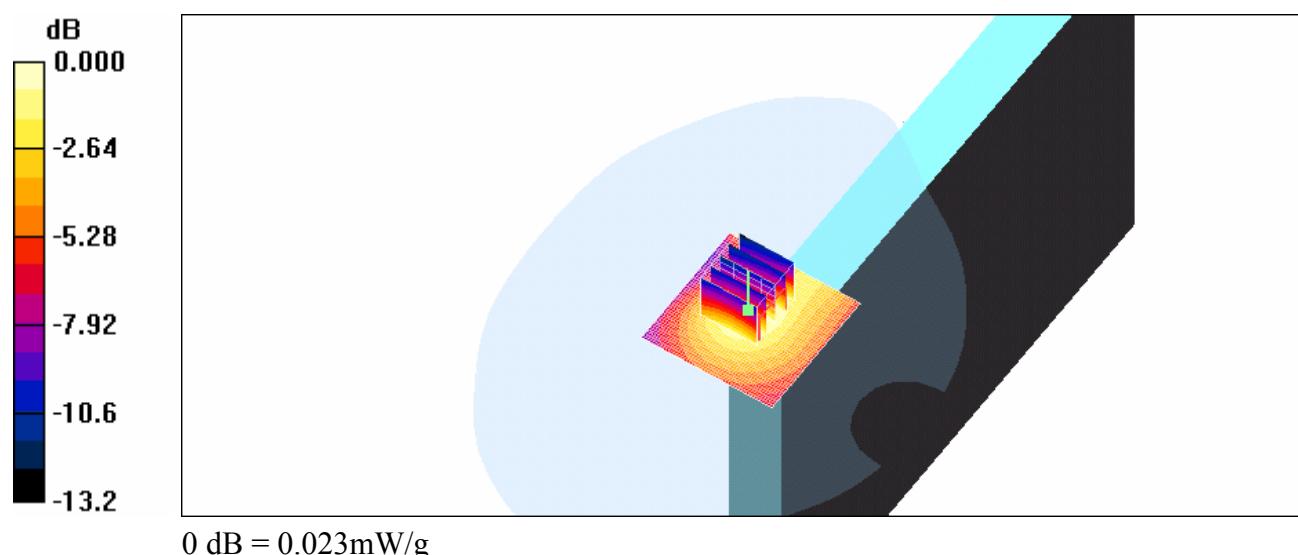
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.23 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 0.039 W/kg

**SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.013 mW/g**

Maximum value of SAR (measured) = 0.023 mW/g



## Configuration 1\_GPRS\_CH512

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.003 mW/g

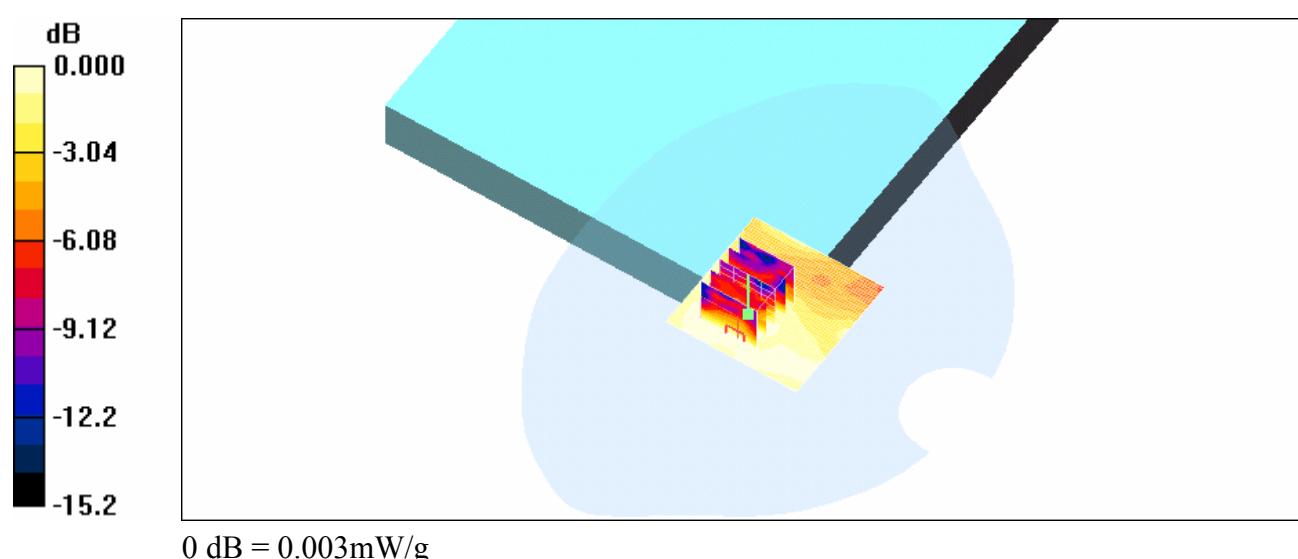
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.22 V/m; Power Drift = 0.087 dB

Peak SAR (extrapolated) = 0.003 W/kg

SAR(1 g) = 0.00249 mW/g; SAR(10 g) = 0.00164 mW/g

Maximum value of SAR (measured) = 0.003 mW/g



## Configuration 1\_GPRS\_CH661

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.002 mW/g

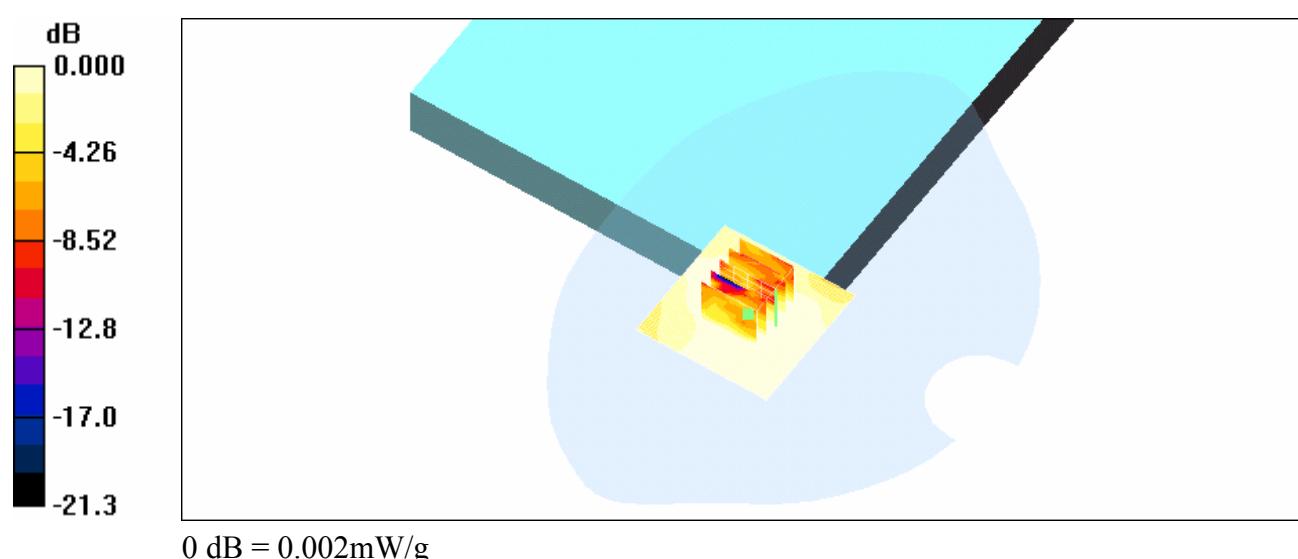
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.05 V/m; Power Drift = 0.172 dB

Peak SAR (extrapolated) = 0.004 W/kg

SAR(1 g) = 0.00194 mW/g; SAR(10 g) = 0.00128 mW/g

Maximum value of SAR (measured) = 0.002 mW/g



## Configuration 1\_GPRS\_CH810

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.6$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.003 mW/g

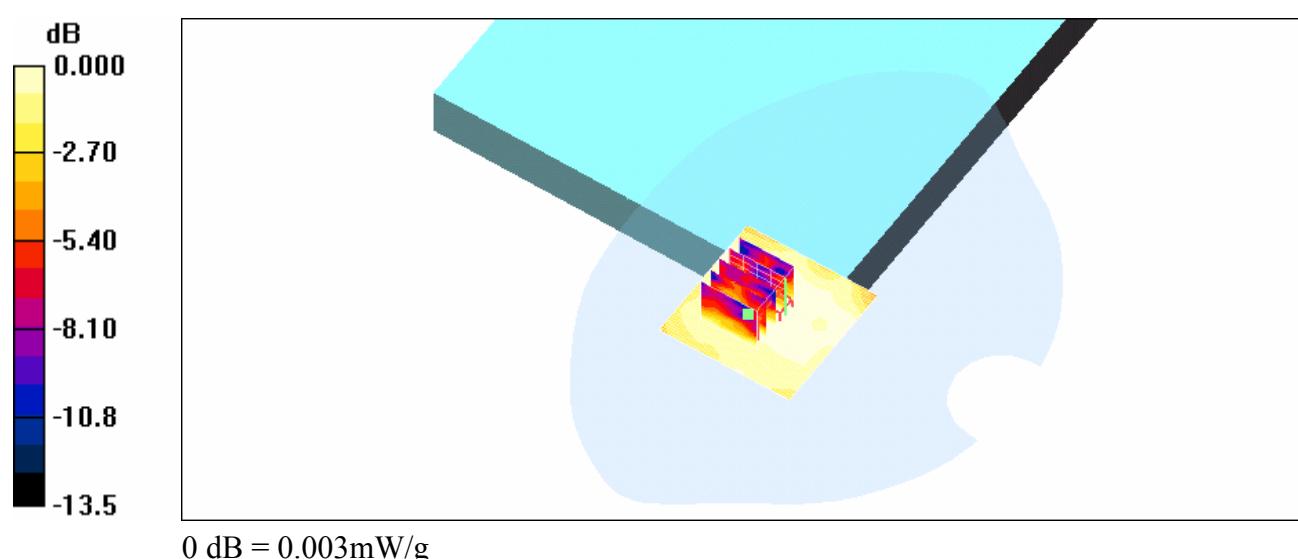
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.24 V/m; Power Drift = 0.175 dB

Peak SAR (extrapolated) = 0.005 W/kg

SAR(1 g) = 0.00297 mW/g; SAR(10 g) = 0.00186 mW/g

Maximum value of SAR (measured) = 0.003 mW/g



## Configuration 2\_GPRS\_CH512

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2  
Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.035 mW/g

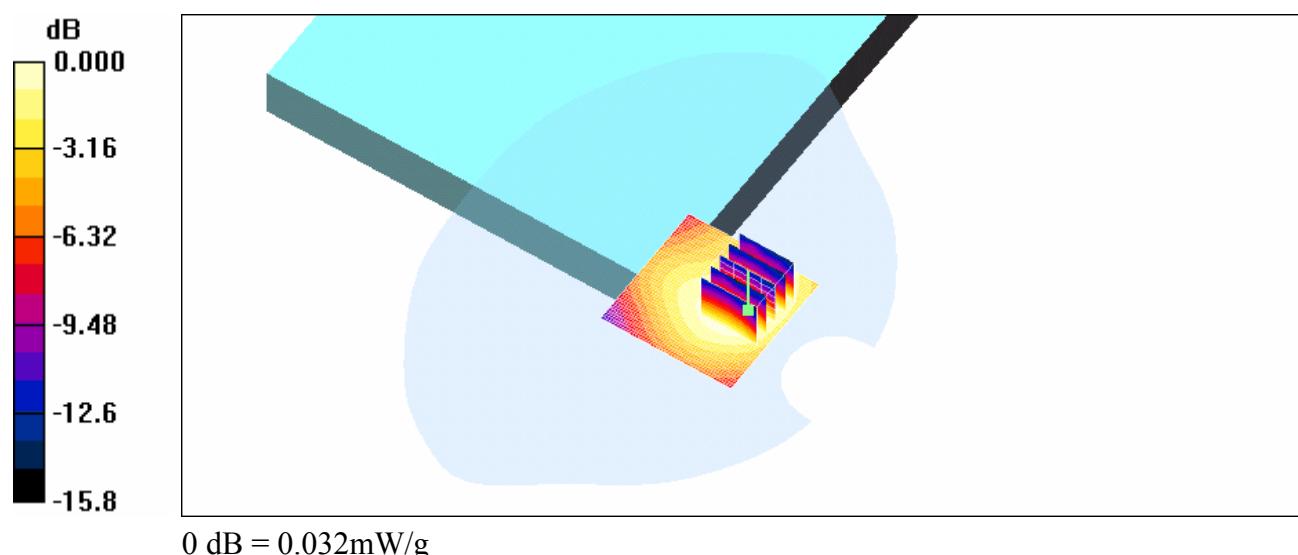
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.02 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 0.047 W/kg

**SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.019 mW/g**

Maximum value of SAR (measured) = 0.032 mW/g



## Configuration 2\_GPRS\_CH661

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.035 mW/g

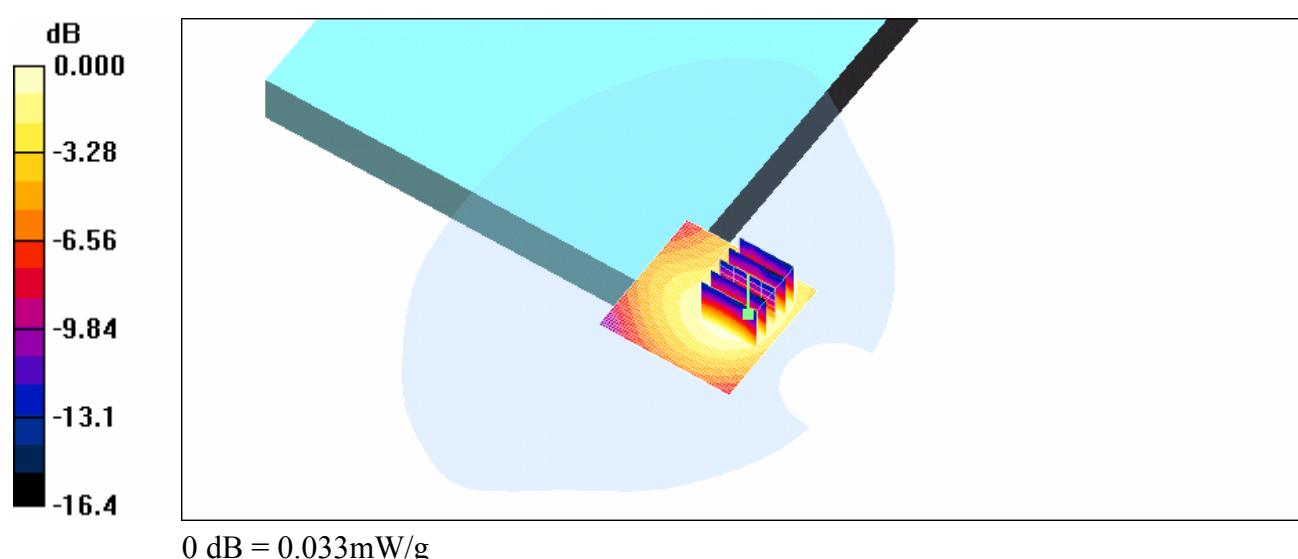
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.98 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.051 W/kg

**SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.019 mW/g**

Maximum value of SAR (measured) = 0.033 mW/g



## Configuration 2\_GPRS\_CH810

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.6$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.052 mW/g

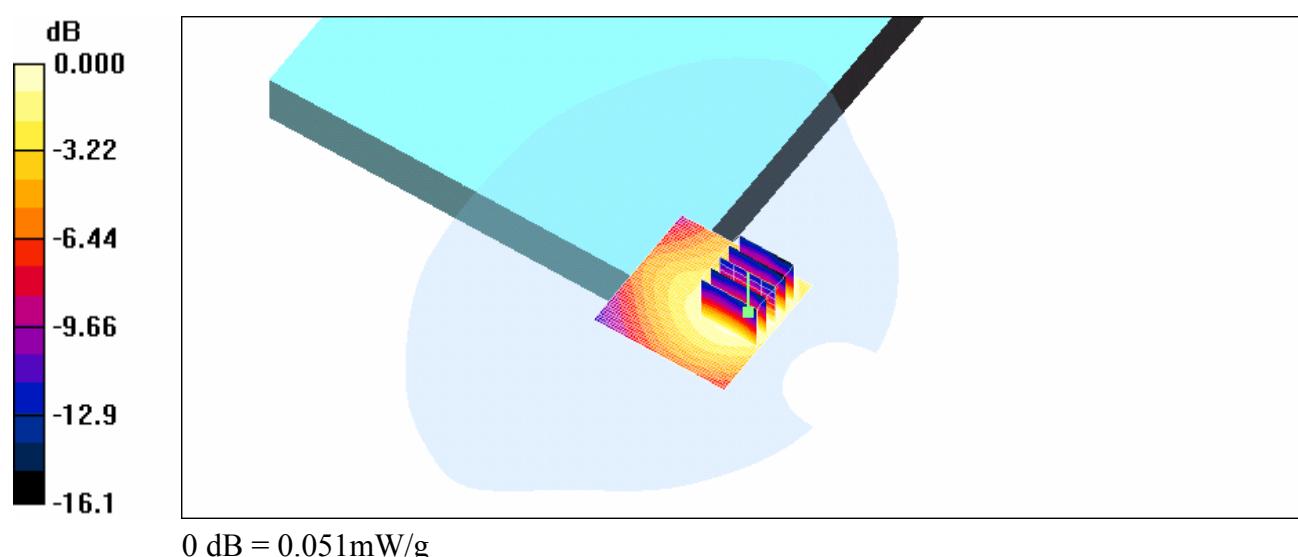
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.66 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 0.078 W/kg

**SAR(1 g) = 0.048 mW/g; SAR(10 g) = 0.029 mW/g**

Maximum value of SAR (measured) = 0.051 mW/g



## Configuration 3\_GPRS\_CH512

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2  
Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

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

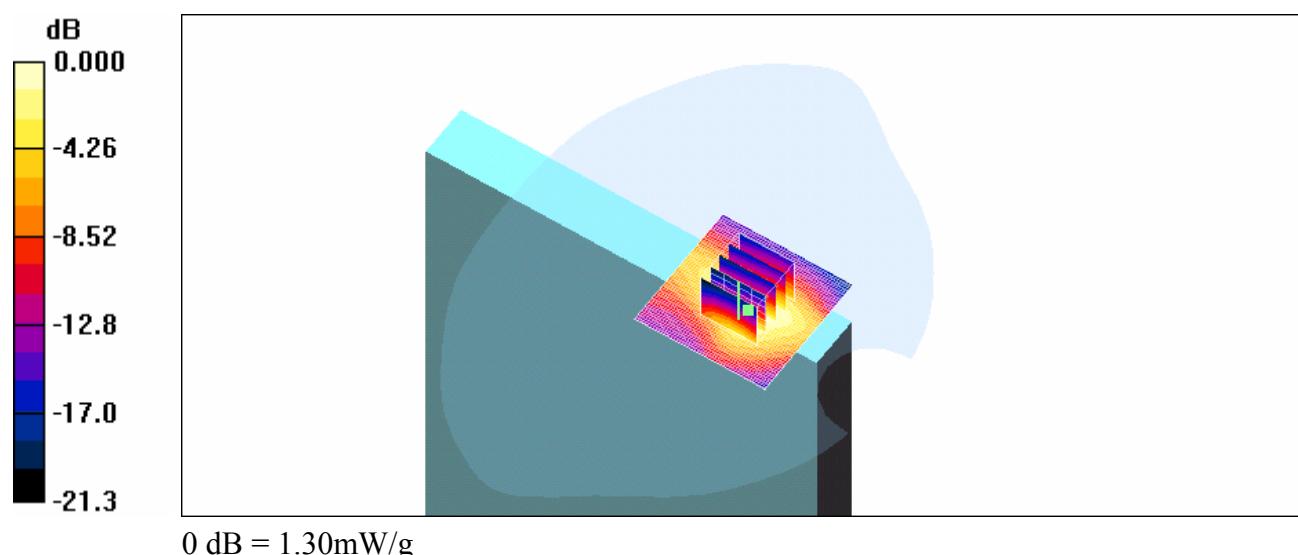
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

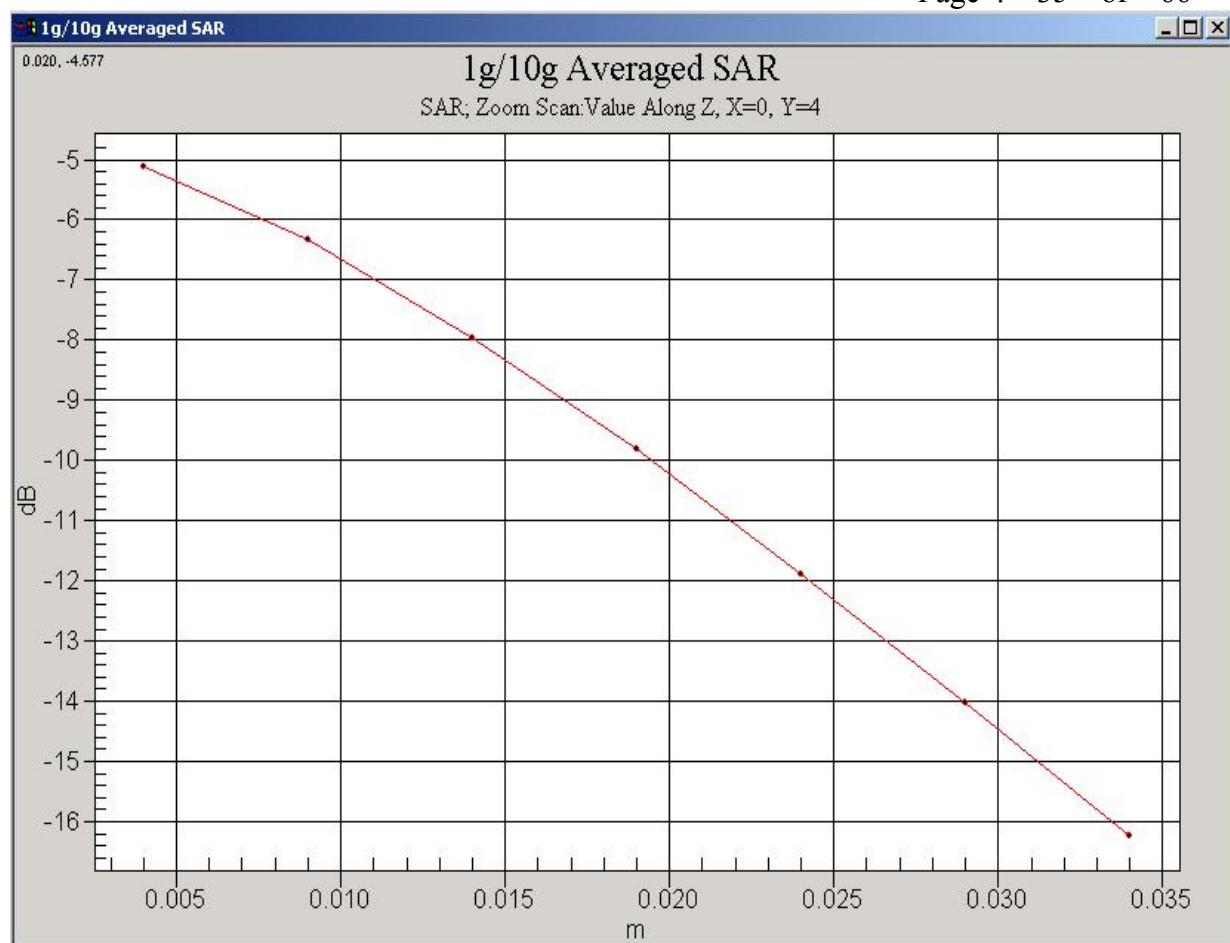
Reference Value = 14.7 V/m; Power Drift = 0.187 dB

Peak SAR (extrapolated) = 3.09 W/kg

**SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.577 mW/g**

Maximum value of SAR (measured) = 1.30 mW/g





## Configuration 3\_GPRS\_CH661

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.948 mW/g

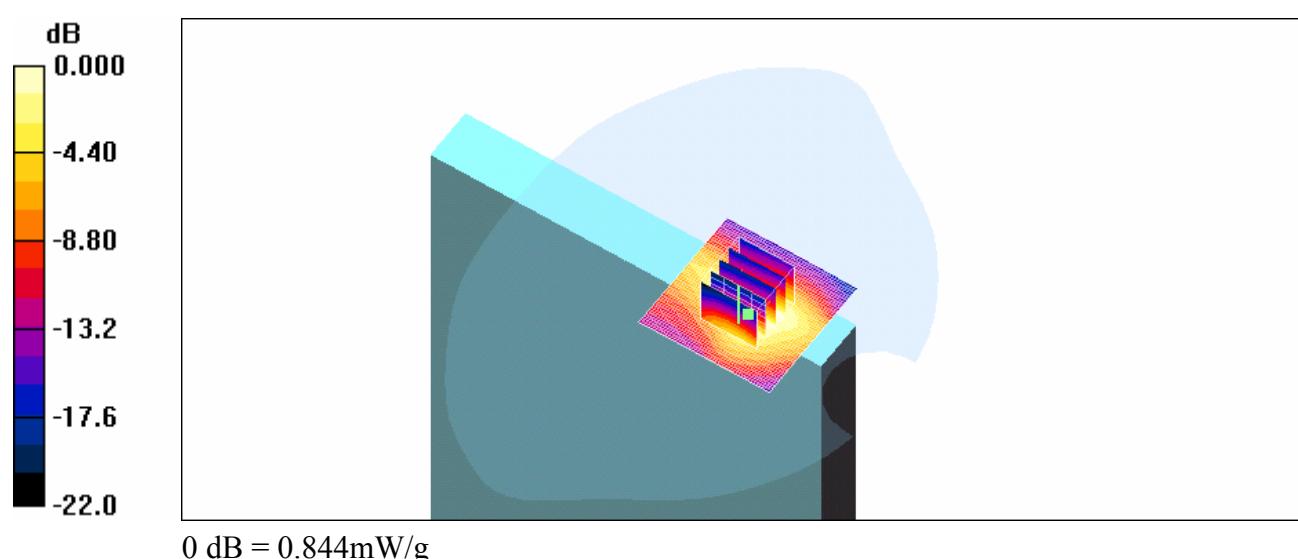
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.8 V/m; Power Drift = -0.043 dB

Peak SAR (extrapolated) = 2.11 W/kg

SAR(1 g) = 0.823 mW/g; SAR(10 g) = 0.386 mW/g

Maximum value of SAR (measured) = 0.844 mW/g



## Configuration 3\_GPRS\_CH810

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.6$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.07 mW/g

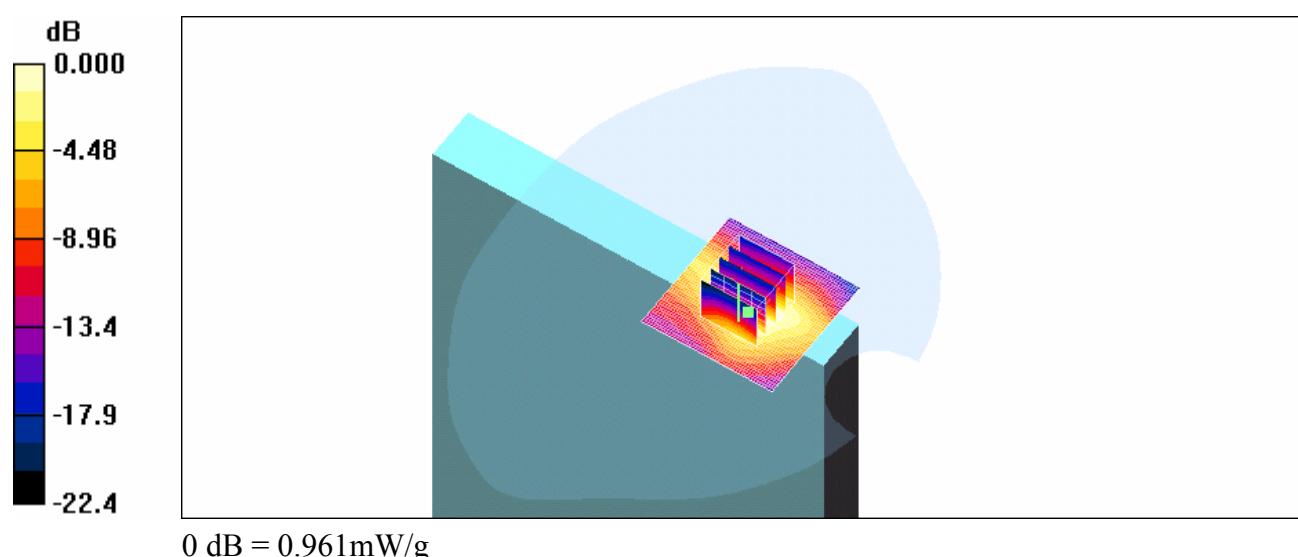
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 2.42 W/kg

**SAR(1 g) = 0.924 mW/g; SAR(10 g) = 0.426 mW/g**

Maximum value of SAR (measured) = 0.961 mW/g



## Configuration 4\_GPRS\_CH512

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 51.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.055 mW/g

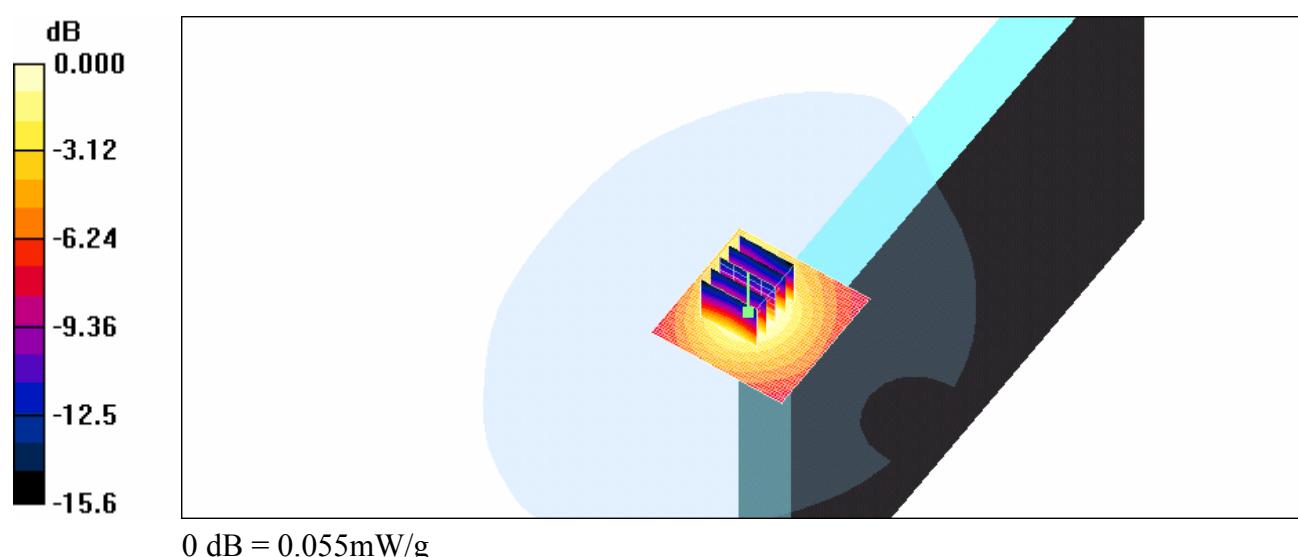
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.58 V/m; Power Drift = 0.105 dB

Peak SAR (extrapolated) = 0.091 W/kg

**SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.029 mW/g**

Maximum value of SAR (measured) = 0.055 mW/g



## Configuration 4\_GPRS\_CH661

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.050 mW/g

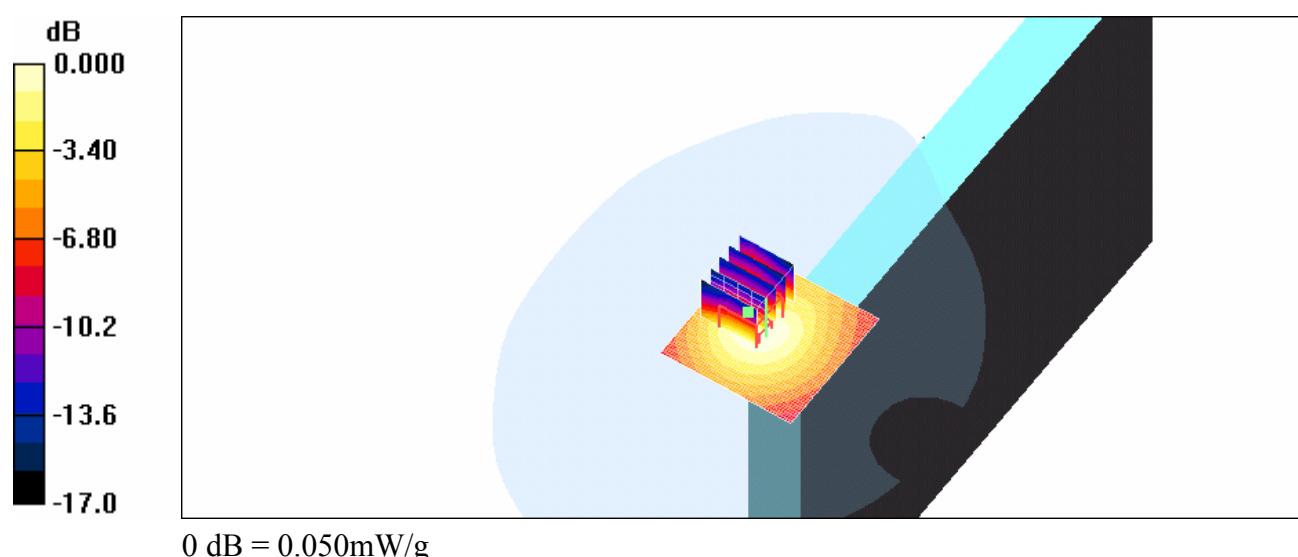
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.43 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 0.087 W/kg

**SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.026 mW/g**

Maximum value of SAR (measured) = 0.050 mW/g



## Configuration 4\_GPRS\_CH810

DUT: TN12XR; Type: GSM; IMEI: 352678010425491

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:2

Medium: M1800 & 1900 Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.6$  mho/m;  $\epsilon_r = 50.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**BODY/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.080 mW/g

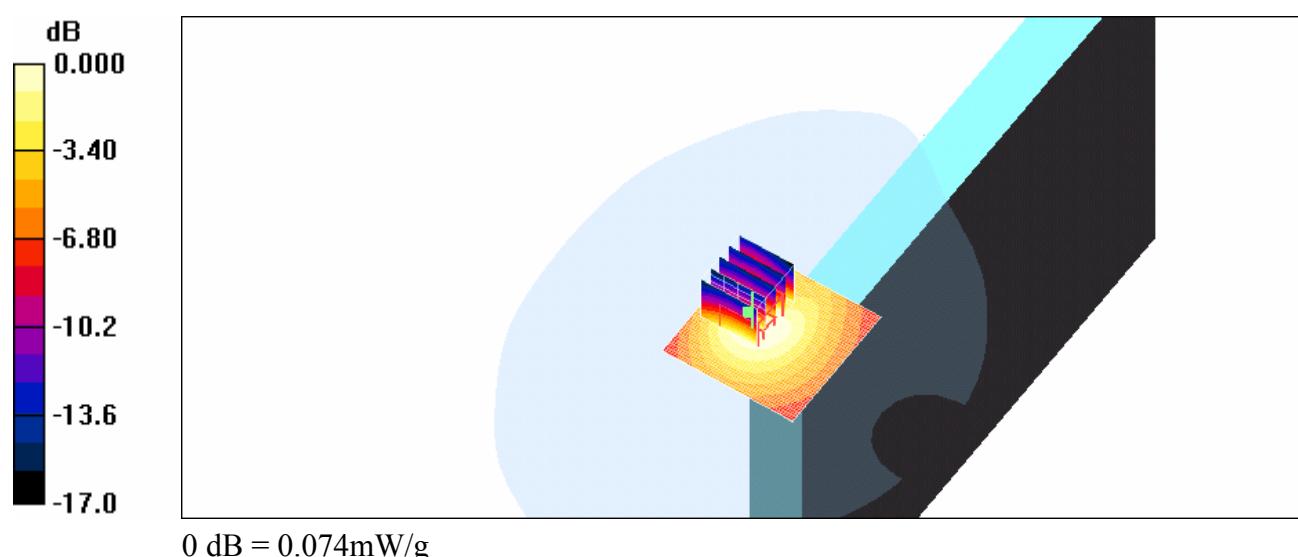
**BODY/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.59 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 0.133 W/kg

**SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.040 mW/g**

Maximum value of SAR (measured) = 0.074 mW/g



## SAR System Performance Verification

**DUT: Dipole 900 MHz; Type: D900V2; Serial: SN:178**

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: Muscle 900 MHz Medium parameters used:  $f = 900$  MHz;  $\sigma = 1.03$  mho/m;  $\epsilon_r = 55.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(10.93, 10.93, 10.93); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM2; Type: SAM 4.0; Serial: TP:1270
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Maximum value of SAR (interpolated) = 2.98 mW/g

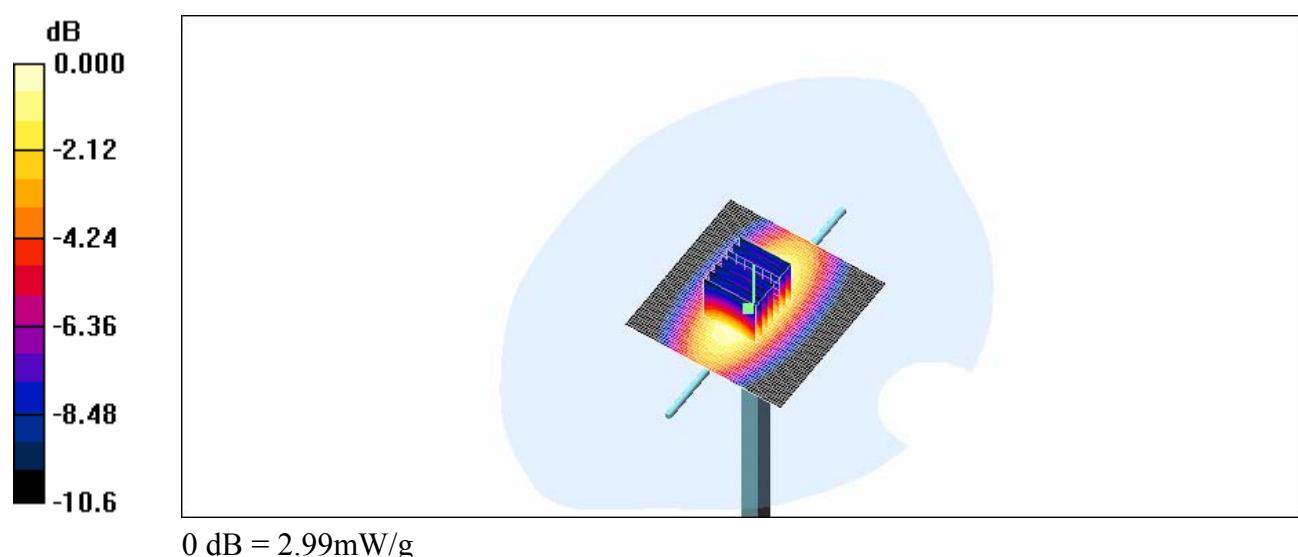
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.7 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 4.18 W/kg

**SAR(1 g) = 2.76 mW/g; SAR(10 g) = 1.79 mW/g**

Maximum value of SAR (measured) = 2.99 mW/g



## SAR System Performance Verification

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d027**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium: M1800 & 1900 Medium parameters used (interpolated):  $f = 1900$  MHz;  $\sigma = 1.59$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV3 - SN3526; ConvF(9.04, 9.04, 9.04); Calibrated: 2007/8/29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2007/10/1
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Pin=250mW/Area Scan (51x61x1):** Measurement grid: dx=15mm, dy=15mm

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

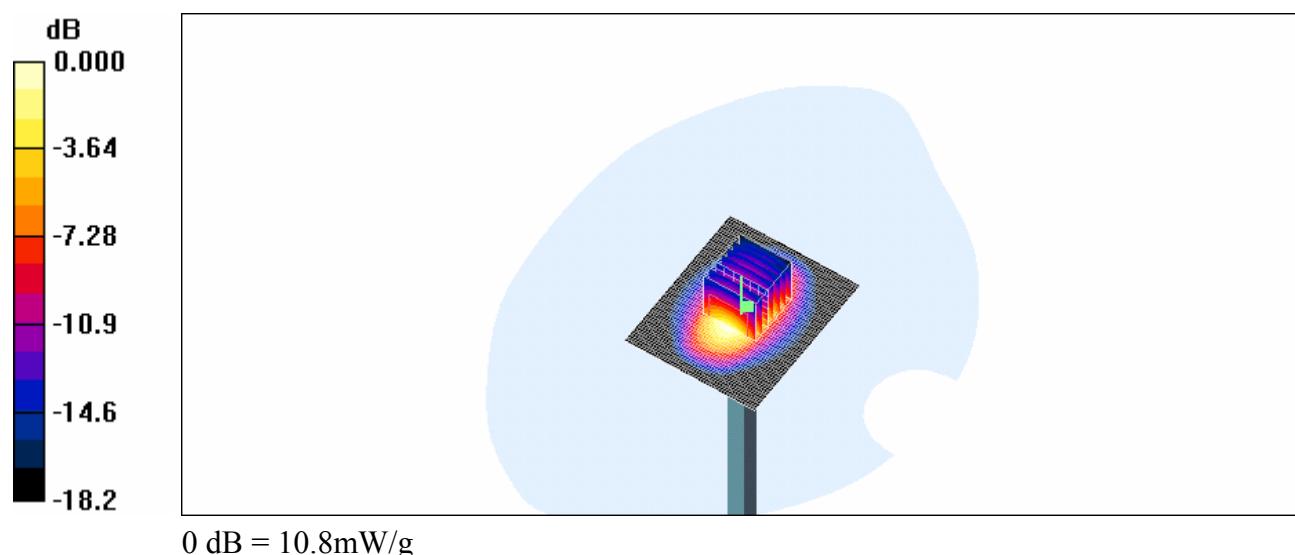
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.9 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 9.57 mW/g; SAR(10 g) = 4.91 mW/g**

Maximum value of SAR (measured) = 10.8 mW/g



## 5.APPENDIX

### 5.1 Photographs of Test Setup

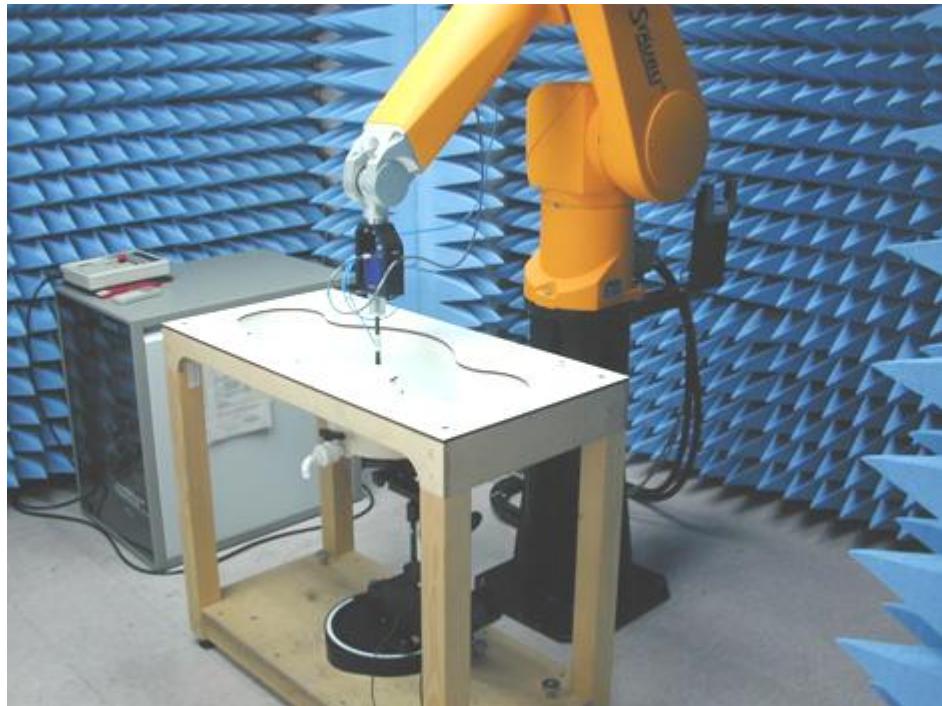


Fig.1 Photograph of the SAR measurement System

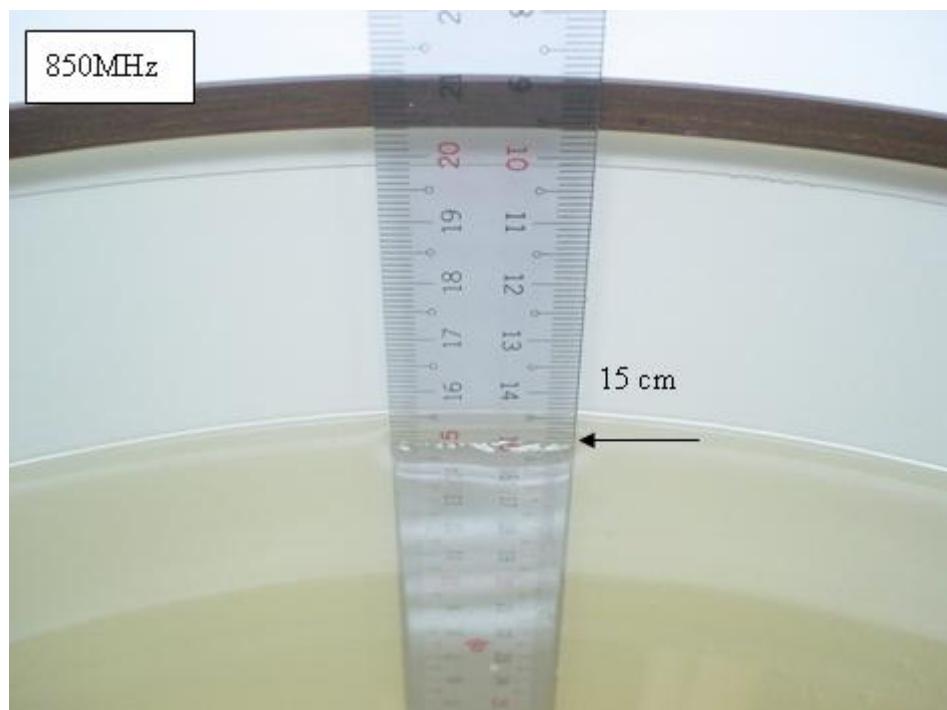


Fig.2.1 Photograph of the Tissue Simulant liquid depth 15cm for Flat position

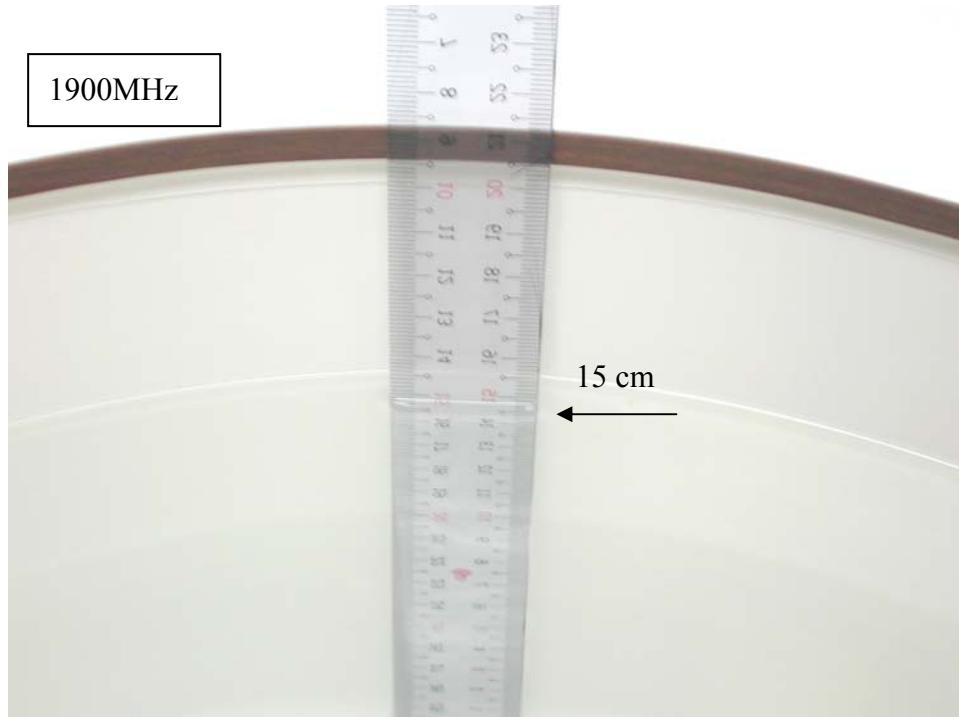


Fig.2.2 Photograph of the Tissue Simulant liquid depth 15cm  
for Flat position

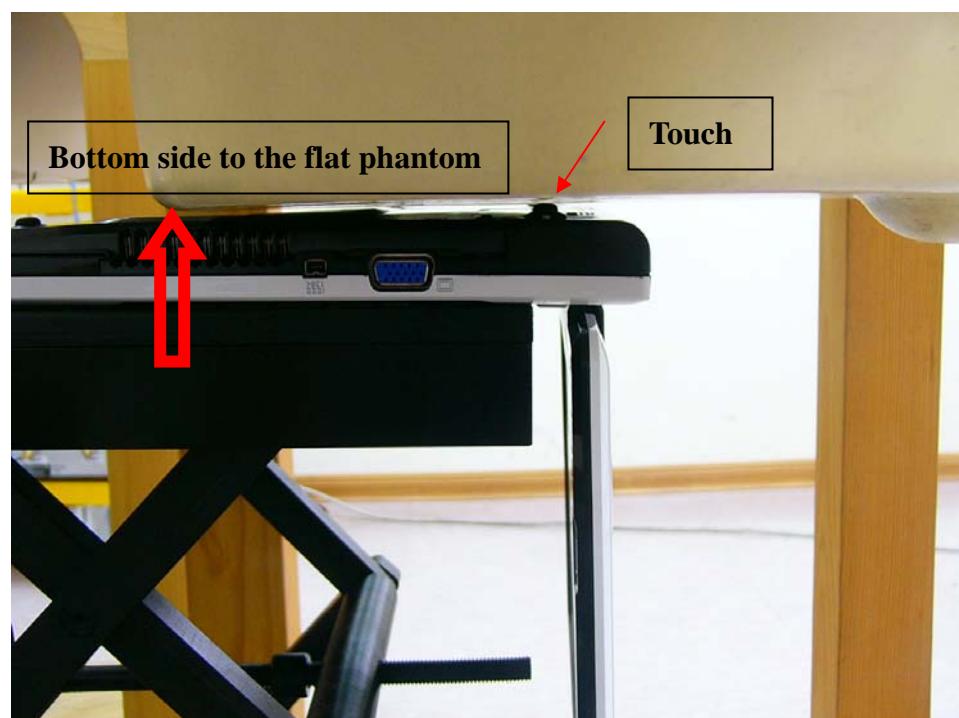


Fig.3 Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

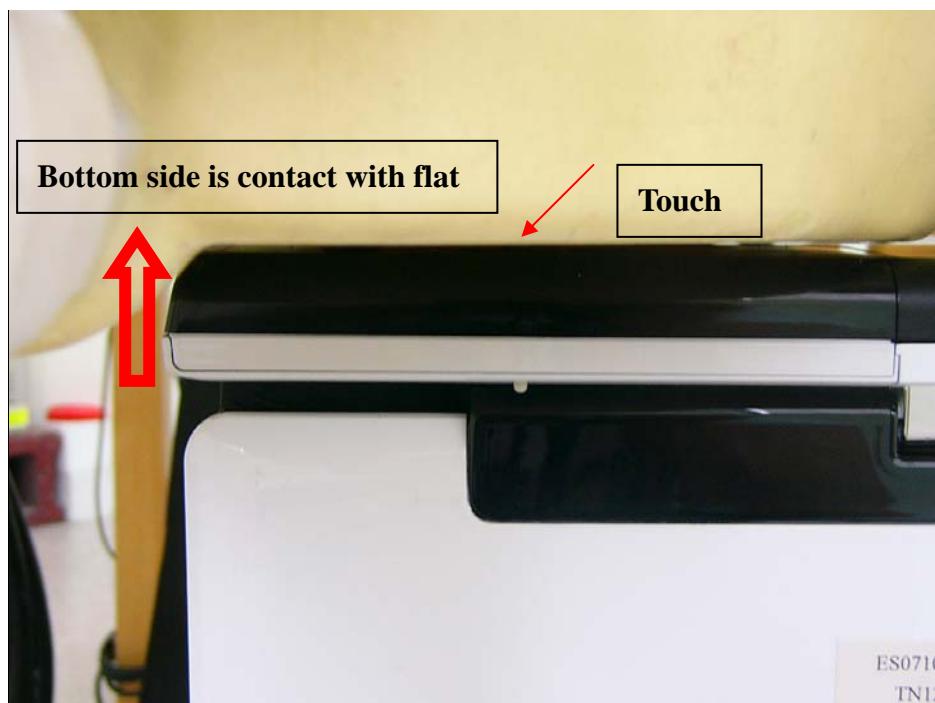


Fig.4 Bottom side of the Notebook is paralleled with flat phantom, open the panel with 90 degrees, bottom side is contact with flat phantom.

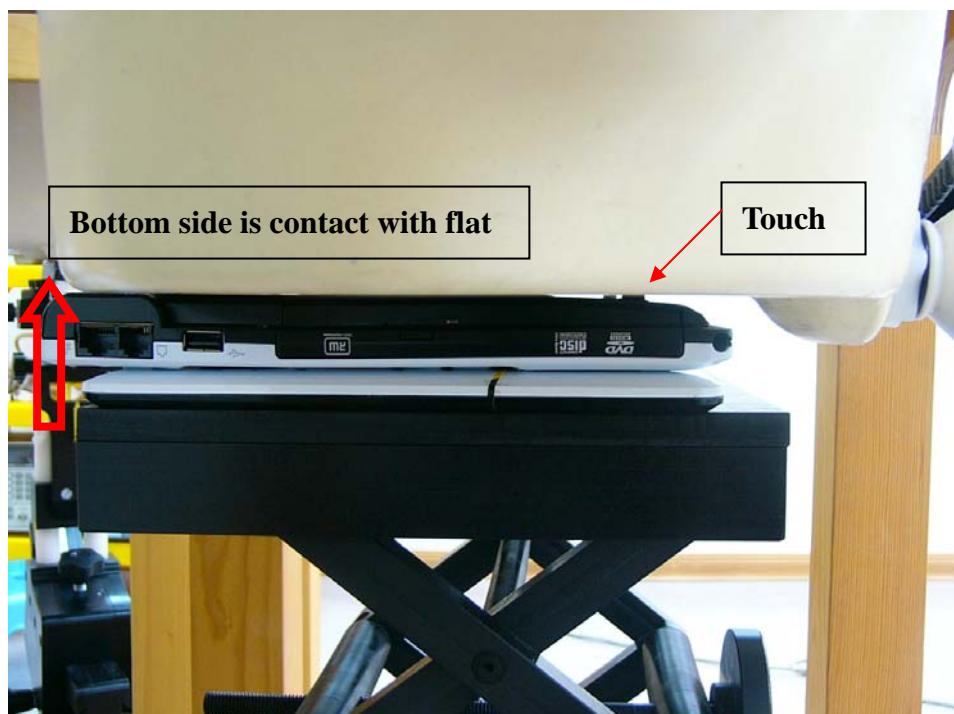


Fig.5 Bottom side of the Notebook is paralleled with flat phantom, turn the panel outside and close it, bottom side is contact with flat phantom

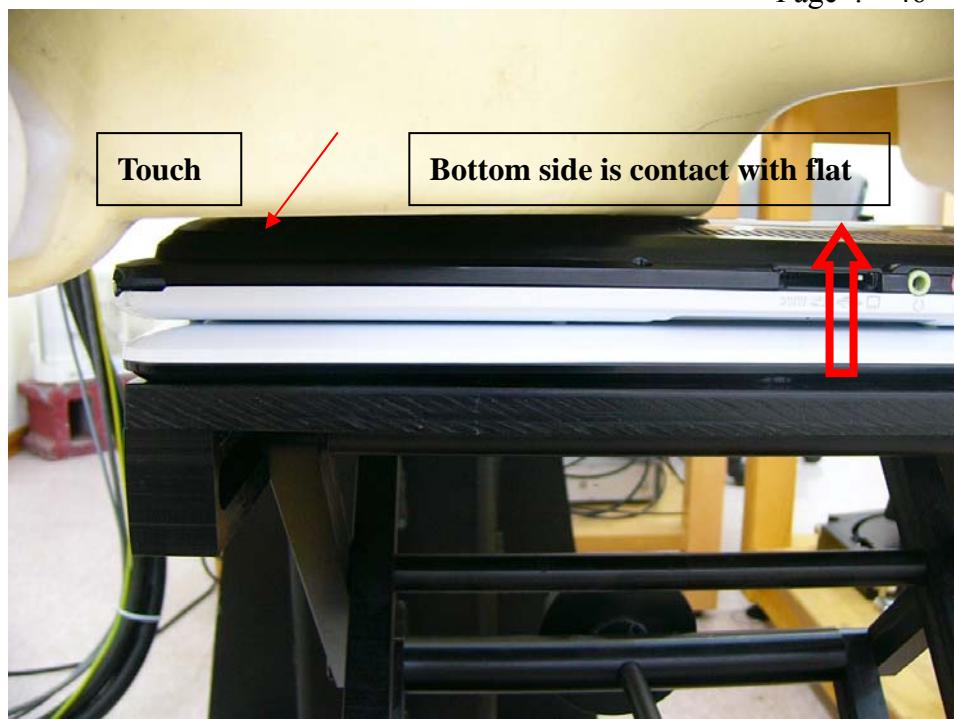


Fig.6 Bottom side of the Notebook is paralleled with flat phantom, turn the panel outside and close it, bottom side is contact with flat phantom

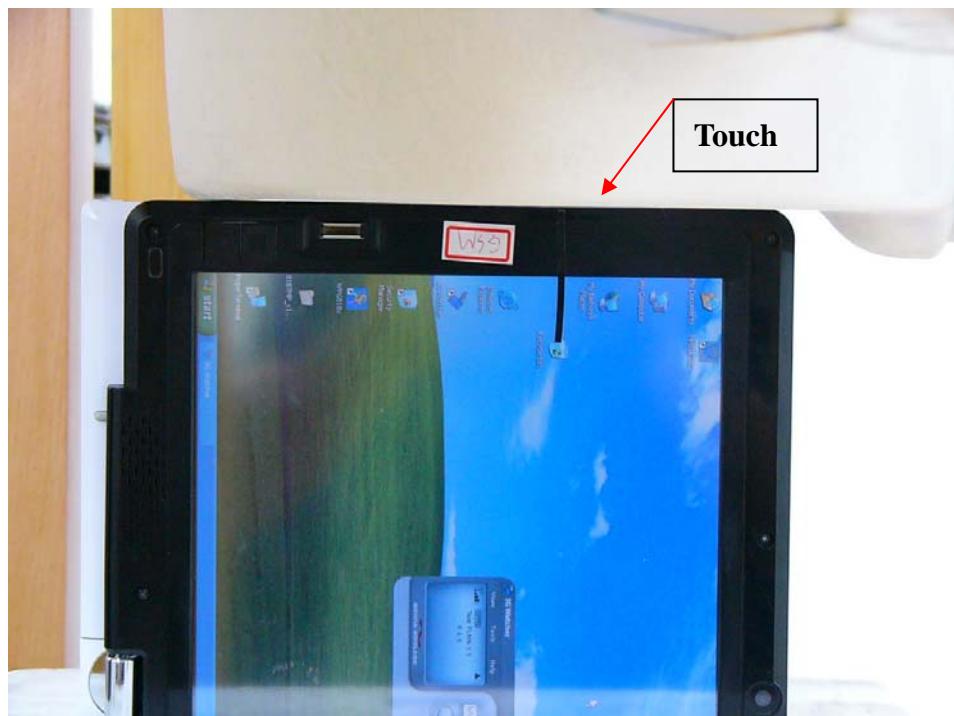


Fig.7 Right side of Notebook is paralleled with flat phantom, turn the panel outside and close it, right side is contact with flat phantom.

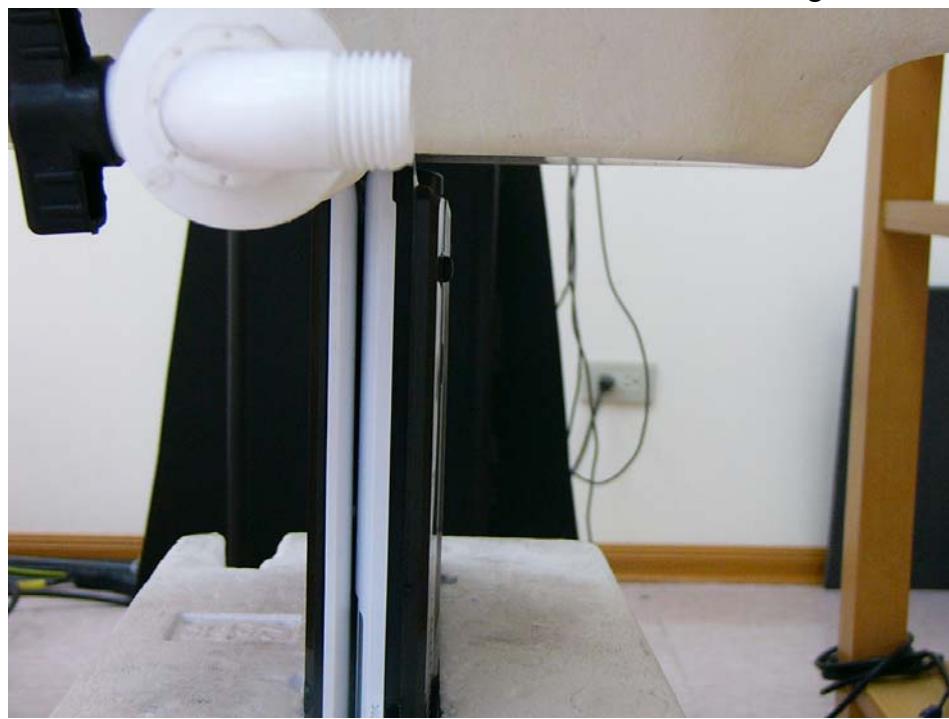


Fig.8 Right side of Notebook is paralleled with flat phantom, turn the panel outside and close it, right side is contact with flat phantom.

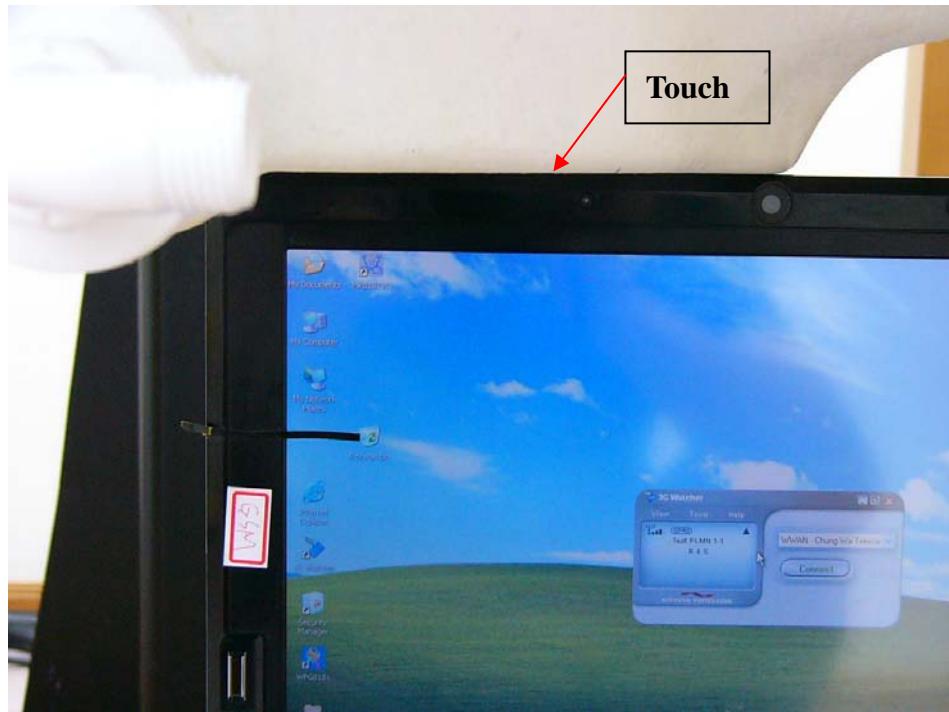


Fig.9 Top side of the Notebook is paralleled flat phantom, turn the panel outside and close it, top side is contact with flat phantom.

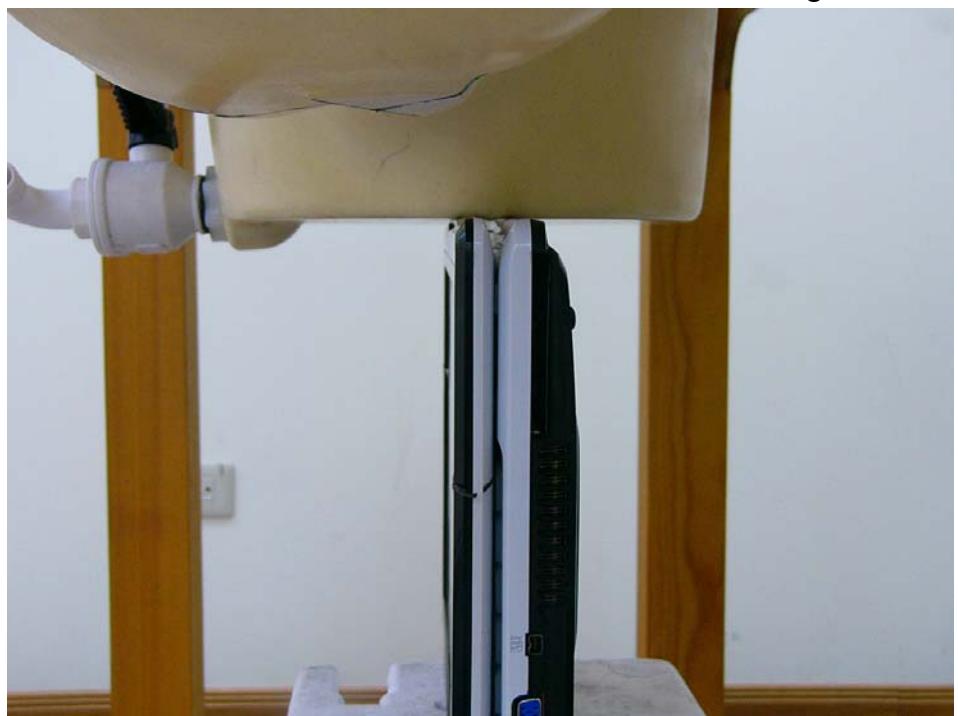


Fig.10 Top side of the Notebook is paralleled flat phantom, turn the panel outside and close it, top side is contact with flat phantom.

## 5.2 Photographs of the EUT



Fig.11 Front view of EUT



Fig.12 Back view of EUT



Fig.13 Left Side of EUT



Fig.14 Right Side of EUT



Fig.15 Fold up of EUT



Fig.16 Fold down of EUT

### 5.3 Photographs of the Accessories of EUT



Fig.17 Notebook charger

## 5.4 DAE & Probe Calibration certificate

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



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

Accredited by the Swiss Federal Office of Metrology and Accreditation  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **SGS (Auden)**

Certificate No: **DAE4-547\_Mar07**

### CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BA - SN: 547**

Calibration procedure(s) **QA CAL-06.v12**  
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: **March 5, 2007**

Condition of the calibrated item **In Tolerance**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	13-Oct-06 (Elcal AG, No: 5492)	Oct-07
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-06 (Elcal AG, No: 5478)	Oct-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1002	15-Jun-06 (SPEAG, in house check)	In house check Jun-07

Calibrated by:	Name Daniel Steinacher	Function Technician	Signature 
Approved by:	Fin Bornholt	R&D Director	

Issued: March 5, 2007

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

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



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

Accredited by the Swiss Federal Office of Metrology and Accreditation  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS (Auden)

Certificate No: EX3-3526\_Aug07

## CALIBRATION CERTIFICATE

Object EX3DV3 - SN:3526

Calibration procedure(s) QA CAL-01.v6  
Calibration procedure for dosimetric E-field probes

Calibration date: August 29, 2007

Condition of the calibrated item In Tolerance

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

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07
Calibrated by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	
Approved by:	Name	Function	Signature
	Niels Kuster	Quality Manager	

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

Issued: August 29, 2007

Certificate No: EX3-3526\_Aug07

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



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

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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
NORM $x,y,z$	sensitivity in free space
ConvF	sensitivity in TSL / NORM $x,y,z$
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

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

- 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
- 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:**

- $NORM_{x,y,z}$ : Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).  $NORM_{x,y,z}$  are only intermediate values, i.e., the uncertainties of  $NORM_{x,y,z}$  does not effect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORM_{x,y,z} * frequency\_response$  (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- $DCPx,y,z$ : DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- 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  $NORM_{x,y,z} * ConvF$  whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  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.

EX3DV3 SN:3526

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# Probe EX3DV3

## SN:3526

Manufactured: March 19, 2004  
Last calibrated: August 25, 2006  
Recalibrated: August 29, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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## DASY - Parameters of Probe: EX3DV3 SN:3526

### Sensitivity in Free Space<sup>A</sup>

NormX	$0.991 \pm 10.1\%$	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	$0.807 \pm 10.1\%$	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	$0.876 \pm 10.1\%$	$\mu\text{V}/(\text{V}/\text{m})^2$

### Diode Compression<sup>B</sup>

DCP X	<b>97</b> mV
DCP Y	<b>96</b> mV
DCP Z	<b>97</b> mV

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

TSL                    900 MHz                    Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance	<b>2.0</b> mm	<b>3.0</b> mm
SAR <sub>be</sub> [%]      Without Correction Algorithm	1.5	0.5
SAR <sub>be</sub> [%]      With Correction Algorithm	0.3	0.4

TSL                    1810 MHz                    Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance	<b>2.0</b> mm	<b>3.0</b> mm
SAR <sub>be</sub> [%]      Without Correction Algorithm	3.0	1.5
SAR <sub>be</sub> [%]      With Correction Algorithm	0.2	0.1

### Sensor Offset

Probe Tip to Sensor Center                    **1.0** mm

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

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Page 8).

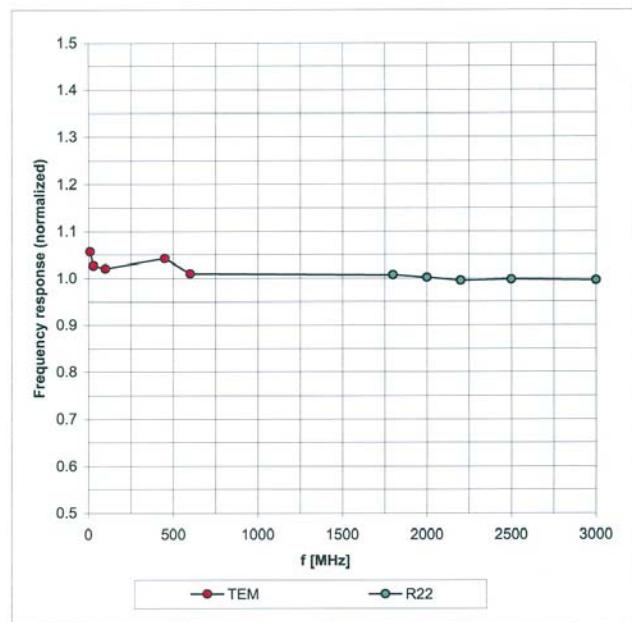
<sup>B</sup> Numerical linearization parameter: uncertainty not required.

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### Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

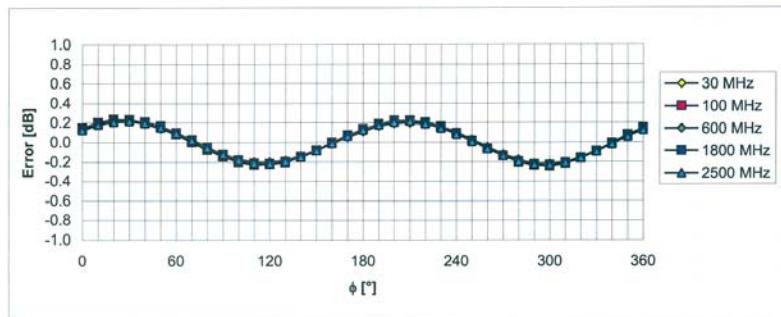
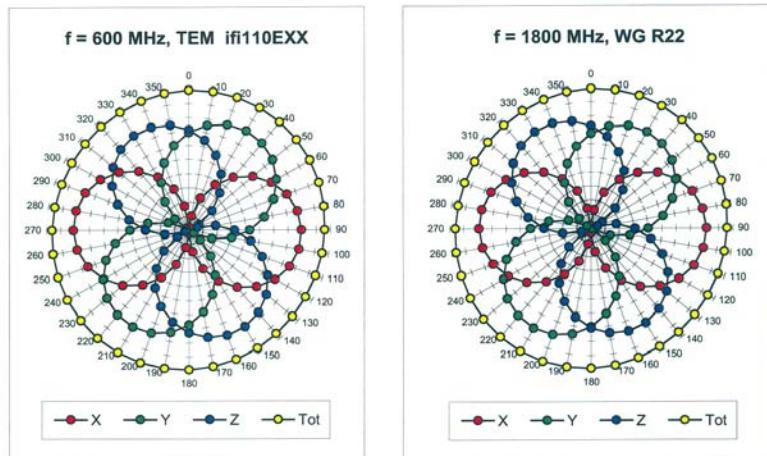


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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

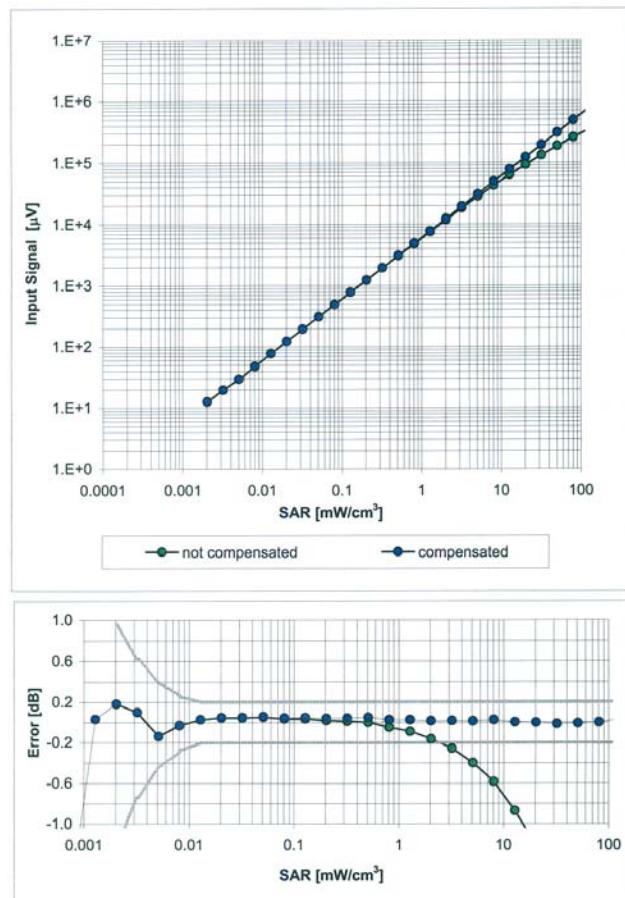


Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

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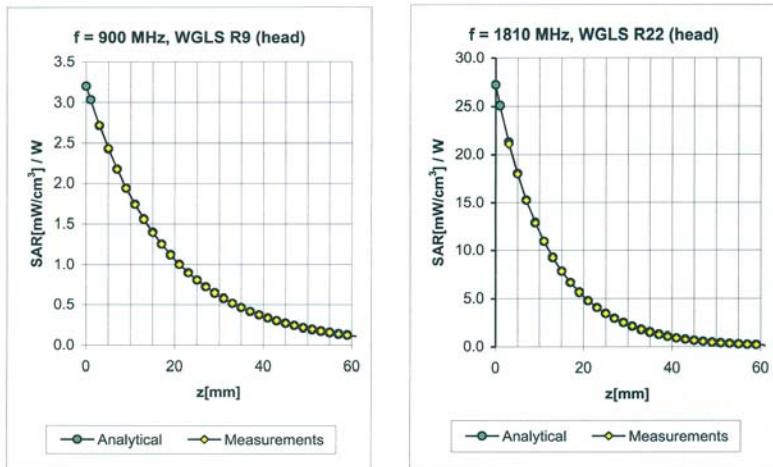
**Dynamic Range  $f(\text{SAR}_{\text{head}})$**   
(Waveguide R22,  $f = 1800$  MHz)



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### Conversion Factor Assessment



f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	$\pm 50 / \pm 100$	Head	$41.5 \pm 5\%$	$0.97 \pm 5\%$	0.50	0.80	11.48	$\pm 11.0\% (k=2)$
1810	$\pm 50 / \pm 100$	Head	$40.0 \pm 5\%$	$1.40 \pm 5\%$	0.15	1.32	9.30	$\pm 11.0\% (k=2)$
1950	$\pm 50 / \pm 100$	Head	$40.0 \pm 5\%$	$1.40 \pm 5\%$	0.22	1.01	8.91	$\pm 11.0\% (k=2)$
2450	$\pm 50 / \pm 100$	Head	$39.2 \pm 5\%$	$1.80 \pm 5\%$	0.34	1.00	8.42	$\pm 11.8\% (k=2)$

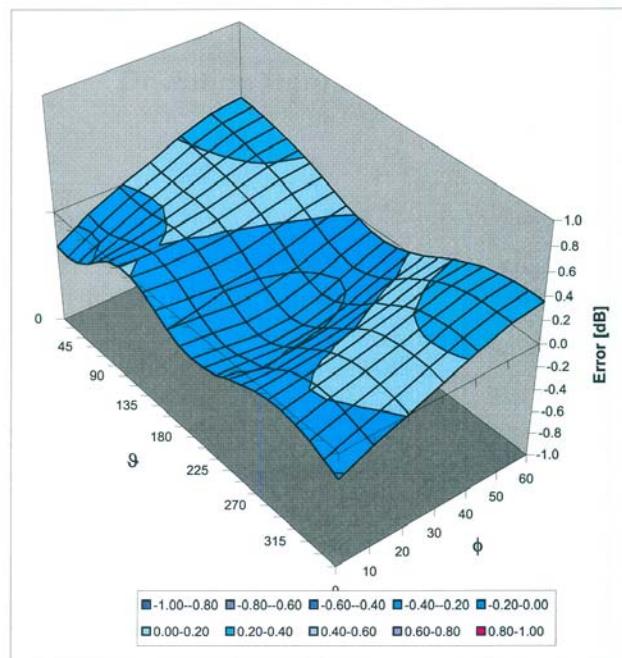
900	$\pm 50 / \pm 100$	Body	$55.0 \pm 5\%$	$1.05 \pm 5\%$	0.50	0.80	10.93	$\pm 11.0\% (k=2)$
1810	$\pm 50 / \pm 100$	Body	$53.3 \pm 5\%$	$1.52 \pm 5\%$	0.16	1.28	9.04	$\pm 11.0\% (k=2)$
1950	$\pm 50 / \pm 100$	Body	$53.3 \pm 5\%$	$1.52 \pm 5\%$	0.15	1.43	8.67	$\pm 11.0\% (k=2)$
2450	$\pm 50 / \pm 100$	Body	$52.7 \pm 5\%$	$1.95 \pm 5\%$	0.38	1.00	8.08	$\pm 11.8\% (k=2)$

<sup>c</sup> The validity of  $\pm 100$  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.

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**Deviation from Isotropy in HSL**  
Error ( $\phi, \theta$ ),  $f = 900$  MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

## 5.5 Uncertainty Analysis

DASY4 Uncertainty Budget According to IEEE P1528 [1]								
Error Description	Uncertainty value	Prob. Dist.	Div.	$(c_i)$ 1g	$(c_i)$ 10g	Std. Unc. (1g)	Std. Unc. (10g)	$(v_i)$ $v_{eff}$
<b>Measurement System</b>								
Probe Calibration	$\pm 4.8\%$	N	1	1	1	$\pm 4.8\%$	$\pm 4.8\%$	$\infty$
Axial Isotropy	$\pm 4.7\%$	R	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	$\infty$
Hemispherical Isotropy	$\pm 9.6\%$	R	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	$\infty$
Boundary Effects	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	$\infty$
Linearity	$\pm 4.7\%$	R	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	$\infty$
System Detection Limits	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	$\infty$
Readout Electronics	$\pm 1.0\%$	N	1	1	1	$\pm 1.0\%$	$\pm 1.0\%$	$\infty$
Response Time	$\pm 0.8\%$	R	$\sqrt{3}$	1	1	$\pm 0.5\%$	$\pm 0.5\%$	$\infty$
Integration Time	$\pm 2.6\%$	R	$\sqrt{3}$	1	1	$\pm 1.5\%$	$\pm 1.5\%$	$\infty$
RF Ambient Conditions	$\pm 3.0\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	$\infty$
Probe Positioner	$\pm 0.4\%$	R	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	$\infty$
Probe Positioning	$\pm 2.9\%$	R	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	$\infty$
Max. SAR Eval.	$\pm 1.0\%$	R	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	$\infty$
<b>Test Sample Related</b>								
Device Positioning	$\pm 2.9\%$	N	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	875
Device Holder	$\pm 3.6\%$	N	1	1	1	$\pm 3.6\%$	$\pm 3.6\%$	5
Power Drift	$\pm 5.0\%$	R	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	$\infty$
<b>Phantom and Setup</b>								
Phantom Uncertainty	$\pm 4.0\%$	R	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	$\infty$
Liquid Conductivity (target)	$\pm 5.0\%$	R	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	$\infty$
Liquid Conductivity (meas.)	$\pm 2.5\%$	N	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	$\infty$
Liquid Permittivity (target)	$\pm 5.0\%$	R	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	$\infty$
Liquid Permittivity (meas.)	$\pm 2.5\%$	N	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	$\infty$
Combined Std. Uncertainty						$\pm 10.3\%$	$\pm 10.0\%$	331
<b>Expanded STD Uncertainty</b>						<b><math>\pm 20.6\%</math></b>	<b><math>\pm 20.1\%</math></b>	

## 5.6 Phantom Description

Schmid & Partner Engineering AG

**s p e a g**

Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 1 245 9700, Fax +41 1 245 9779  
info@speag.com, http://www.speag.com

### Certificate of Conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland

#### Tests

The series production process used allows the limitation to test of first articles.  
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid.	< 1% typical < 0.8% if filled with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

#### Standards

- [1] CENELEC EN 50361
- [2] IEEE Std 1528-2003
- [3] IEC 62209 Part 1
- [4] FCC OET Bulletin 65, Supplement C, Edition 01-01

(\*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

#### Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005

**s p e a g**

Signature / Stamp

Schmid & Partner Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland  
Phone +41 1 245 9700, Fax +41 1 245 9779  
info@speag.com, http://www.speag.com

## 5.7 System Validation from Original equipment supplier

### DASY4 Validation Report for Body TSL

Date/Time: 12.02.2007 14:24:23

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:178**

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: MSL900;

Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 1.04 \text{ mho/m}$ ;  $\epsilon_r = 52.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

#### DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.8, 5.8, 5.8); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

#### Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

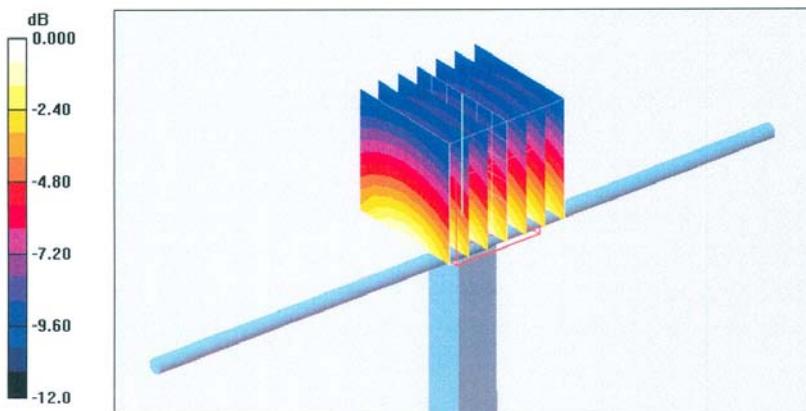
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 55.9 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 3.80 W/kg

**SAR(1 g) = 2.69 mW/g; SAR(10 g) = 1.76 mW/g**

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



### DASY4 Validation Report for Body TSL

Date/Time: 20.03.2007 15:34:07

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027**

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

Medium: MSL U10 BB;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.43, 4.43, 4.43); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:**

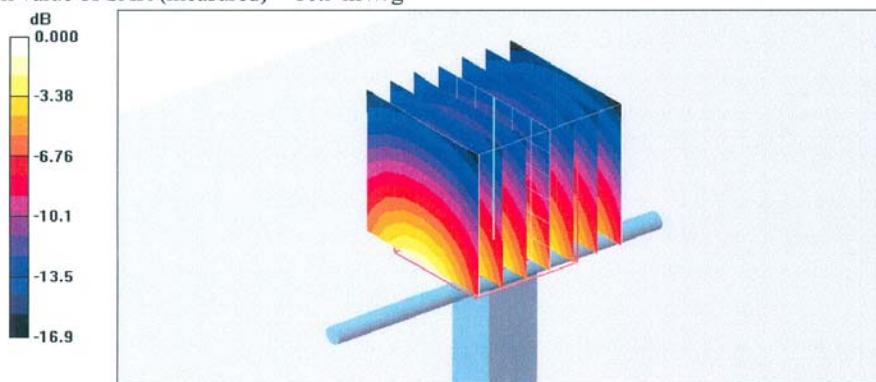
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.5 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 16.2 W/kg

**SAR(1 g) = 9.67 mW/g; SAR(10 g) = 5.16 mW/g**

Maximum value of SAR (measured) = 10.9 mW/g



0 dB = 10.9mW/g

# End of Report