

# SAR TEST REPORT

<b>Equipment Under Test</b>	PA968 Rugged Mobile Computer
<b>Model Name</b>	PA968
<b>Company Name</b>	unitech electronics co., ltd.
<b>Company Address</b>	5Fl., No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien City, Taipei Hsien, Taiwan 231, R.O.C.
<b>Date of Receipt</b>	2008.12.19
<b>Date of Test(s)</b>	2009.01.06 -2009.01.07
<b>Date of Issue</b>	2009.03.26

Standards:

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

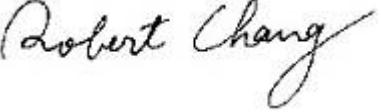
In the configuration tested, the EUT complied with the standards specified above.

**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.

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Date : 2009.03.19  
Engineer

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# Contents

<b>1. General Information .....</b>	<b>3</b>
1.1 Testing Laboratory .....	3
1.2 Details of Applicant .....	3
1.3 Description of EUT .....	3
1.4 Test Environment .....	4
1.5 Operation description .....	4
1.6 Positioning Procedure .....	5
1.7 EVALUATION PROCEDURES .....	6
1.8 The SAR Measurement System .....	8
1.9 System Components .....	9
1.10 SAR System Verification .....	11
1.11 Tissue Simulant Fluid for the Frequency Band .....	12
1.12 Test Standards and Limits .....	14
<b>2. Summary of Results .....</b>	<b>16</b>
<b>3. Instruments List .....</b>	<b>20</b>
<b>4. Measurements .....</b>	<b>21</b>
<b>5. System Verification .....</b>	<b>70</b>
<b>6. DAE &amp; Probe Calibration certificate .....</b>	<b>75</b>
<b>7. Uncertainty Analysis .....</b>	<b>87</b>
<b>8. Phantom description .....</b>	<b>88</b>
<b>9. System Validation from Original equipment supplier .....</b>	<b>89</b>

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## 1. General Information

### 1.1 Testing Laboratory

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### 1.2 Details of Applicant

Company Name	unitech electronics co., ltd.
Company Address	5Fl., No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien City, Taipei Hsien, Taiwan 231, R.O.C.
Contact Person	Eric Wu
TEL	+886-2-8912-1122
E-mail	EricW@tw.ute.com

### 1.3 Description of EUT

EUT Name	PA968 Rugged Mobile Computer
FCC ID	HLEPA968TGGR
Model Name	PA968
Brand Name	unitech
IMEI Code	354114010152700
Mode of Operation	GSM/GPRS/EDGE mode
Definition	Production unit

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Modulation Mode	GSM/GMSK/8PSK/DSSS		
Duty Cycle	GSM	GPRS/EDGE	WLAN 802.11 b/g
	1/8	1/2	1
Maximum RF Conducted Power (Average)	GSM 850	PCS1900	WLAN 802.11 b/g
	32.3dbm	29.52dbm	19.05dbm
TX Frequency Range (MHz)	GSM 850	PCS1900	WLAN 802.11 b/g
	824.2-848.8	1850-1910	2412-2462
Channel Number (ARFCN)	GSM 850	PCS1900	WLAN 802.11 b/g
	128-251	512-810	1-11
Battery Type	3.7 V Lithium-Ion		
Antenna Type	Internal Antenna		
Max. SAR Measured (1 g)	Head	Body	
	<b>0.862 W/kg</b> (At GSM1900 Right Head (15 Tilt Position)_512 Channel)	<b>0.179 W/kg</b> (At GSM 850 Body 128 Channel)	

**Note:**

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

## 1.4 Test Environment

Ambient Temperature:  $22 \pm 2^\circ \text{C}$

Tissue Simulating Liquid:  $22 \pm 2^\circ \text{C}$

## 1.5 Operation description

**General:**

1. The EUT is controlled by using a Radio Communication Tester (Agilent 8960), and the communication between the EUT and the tester is established by air link.

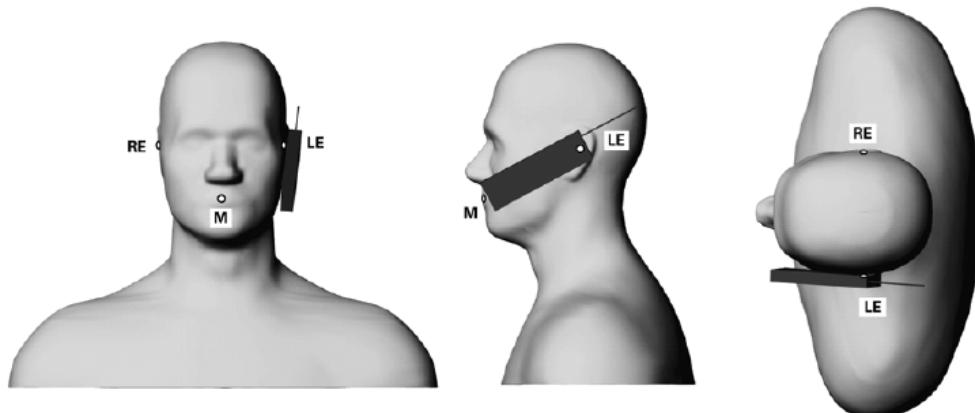
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2. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
3. During the SAR testing, the DASY5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
4. Testing Head SAR at lowest, middle and highest channel for all bands with LET/LEC/RET/REC conditions.
5. Testing body-worn SAR by separating 1.5cm between the back of the EUT and the flat phantom in GPRS mode.

**SAR evaluation considerations for handsets with multiple transmitters:**

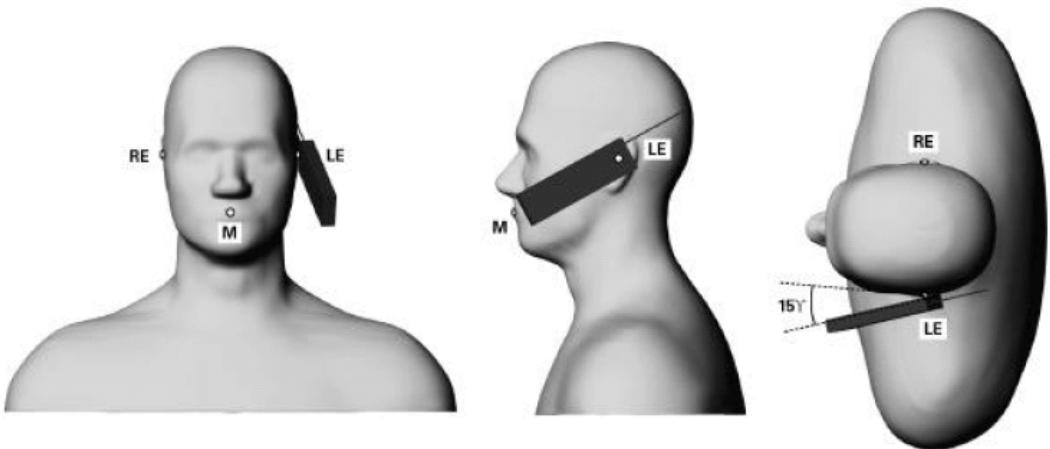
6. Since the WLAN function of this device does NOT support VoIP function. Users will not use it close to head. SAR evaluation of head adjacent is unnecessary, only Body condition will be considered for WLAN stand-alone situation.
7. The maximum SAR value for licensed transmitter happens on GSM 1900 band, Head Right side(15 Tilt Position) , channel 512. the value is **0.862W/kg(1g)**. And the max SAR value for un-licensed transmitter WLAN 802.11b happens on Body worn, channel 11. The SAR value is **0.016W/kg (1g)** . The summation of the 1g SAR is  $0.862 + 0.016 = 0.88$  W/kg, which lower than the limit 1.6W/kg. **NO simultaneous transmission SAR evaluation is necessary.**

## 1.6 Positioning Procedure



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Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning



Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning

#### Cheek/Touch Position:

the handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

#### Ear/Tilt Position:

With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

## 1.7 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

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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 then 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.

### 1.8 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 5 professional system). A Model ES3DV3 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.

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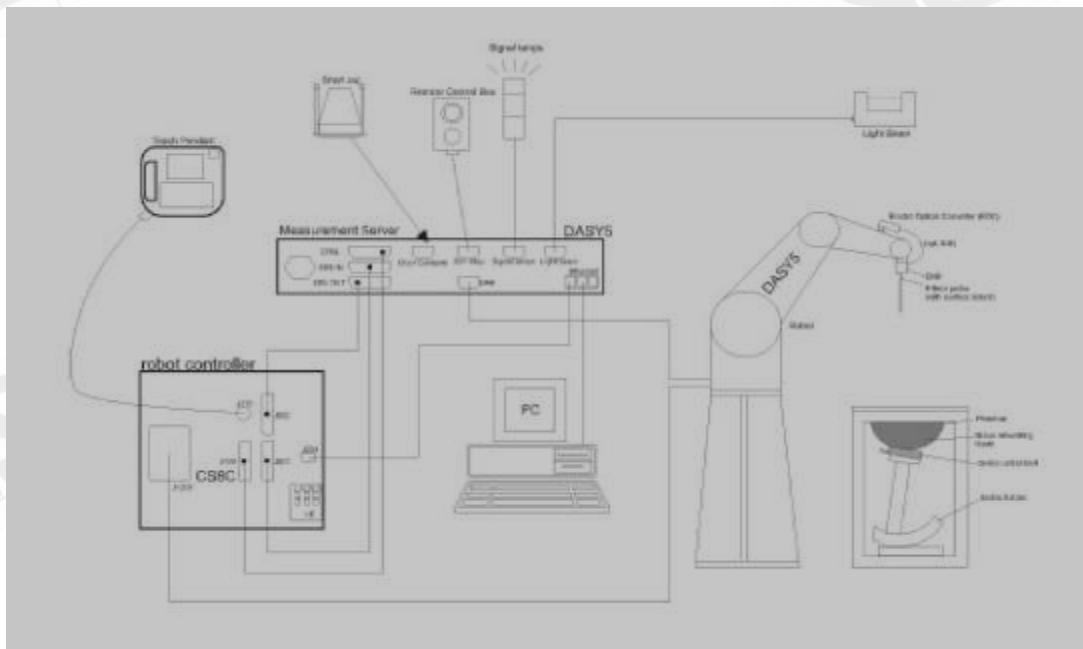


Fig.a The block diagram of SAR system

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

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach

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pendant and software. An arm extension is 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.
  - DASY5 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 handheld mobile phones.
  - Tissue simulating liquid mixed according to the given recipes.
  - Validation dipole kits allowing to validate the proper functioning of the system.

## 1.9 System Components

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**ES3DV3 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 HSL850/1900/2450 Additional CF for other liquids and frequencies upon request	ES3DV3 E-Field Probe
Frequency:	10 MHz to > 3 GHz; Linearity: $\pm 0.6$ 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: $\pm 0.6$ dB (noise: typically < 1 $\mu$ W/g)	
Dimensions:	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 4 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 2 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.
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Shell Thickness:	2 ± 0.2 mm	
Filling Volume:	Approx. 25 liters	
Dimensions:	Height: 850 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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### 1.10 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 +/- 5% from the target SAR values. These tests were done at 850/1900/2450 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. During the tests, the ambient temperature of the laboratory was in the range 22.2°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.

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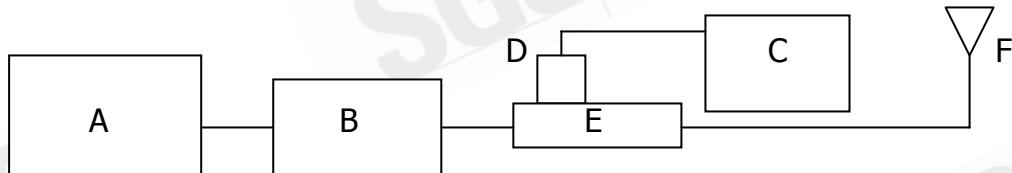
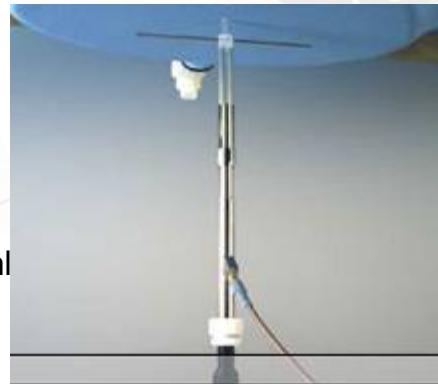


Fig.b The block diagram for SAR system verification

- 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 & 777D Dual directional coupling
- F. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	Frequency (MHz)	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Variation	Measured Date
D835V2 S/N: 4d063	835 MHz (Head)	2.29 mW/g	2.34mW/g	2.2%	2009/01/06
D835V2 S/N: 4d063	835 MHz (Body)	2.44 mW/g	2.41mW/g	1.2%	2009/01/07
D1900V2 S/N: 5d027	1900 MHz (Head)	10.3 mW/g	10.2mW/g	1%	2009/01/06
D1900V2 S/N: 5d027	1900 MHz (Body)	9.64 mW/g	9.55mW/g	0.9%	2009/01/07
D2450V2 S/N: 727	2450 MHz (Body)	13.2 mW/g	12.8mW/g	3%	2009/01/07

Table 1. System validation (follow manufacture target value)

### 1.11 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-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-6000MHz) by using a procedure detailed in Section V.

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All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the ear reference point of the phantom was  $15\text{cm}\pm5\text{mm}$  during all tests. (Appendix Fig .2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			$\rho$	$\sigma (\text{S}/\text{m})$	Simulated Tissue Temperature( $^{\circ}\text{C}$ )
850	Head	Measured, 2009.01.06	42.3	0.89	21.7
		Recommended Limits	38.38-42.42	0.84-0.92	20-24
850	Body	Measured, 2009.01.07	56	0.961	21.7
		Recommended Limits	50.73-56.07	0.94-1.04	20-24
1900	Head	Measured, 2009.01.06	41.1	1.43	21.7
		Recommended Limits	38.1-42.11	1.4-1.54	20-24
1900	Body	Measured, 2009.01.07	53.7	1.51	21.7
		Recommended Limits	48.83-53.97	1.48-1.64	20-24
2450	Body	Measured, 2009.01.07	52.2	1.99	21.7
		Recommended Limits	48.36-53.45	1.88-2.08	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

The composition of the brain tissue simulating liquid for 850 &1900 & 2450 band:

Ingredient	850MHz (Head)	850MHz (Body)	1900MHz (Head)	1900MHz (Body)	2450Mhz (Body)
DGMBE	X	X	444.52 g	300.67g	301.7 ml
Water	532.98 g	631.68 g	552.42 g	716.56 g	698.3 ml
Salt	18.3 g	11.72 g	3.06 g	4.0 g	X
Preventol D-7	2.4 g	1.2 g	X	X	X
Cellulose	3.2 g	X	X	X	X
Sugar	766.0 g	600 g	X	X	X
Total amount	1 L (1.0kg)	1 L (1.0kg)	1 L (1.0kg)	1 L (1.0kg)	1 L (1.0kg)

Table 3. Recipes for tissue simulating liquid

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## 1.12 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

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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 .6)

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

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## 2. Summary of Results

### GSM 850 MHZ

#### Right Head (Cheek Position)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32.2dbm	0.459	22.1	21.7
	190	836.6	32.1dbm	0.381	22.1	21.7
	251	848.8	32dbm	0.277	22.1	21.7

#### Left Head (Cheek Position)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32.2dbm	0.358	22.1	21.7
	190	836.6	32.1dbm	0.297	22.1	21.7
	251	848.8	32dbm	0.220	22.1	21.7

#### Right Head (15° Tilt Position)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32.2dbm	0.672	22.1	21.7
	190	836.6	32.1dbm	0.540	22.1	21.7
	251	848.8	32dbm	0.403	22.1	21.7

#### Left Head (15° Tilt Position)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32.2dbm	0.475	22.1	21.7
	190	836.6	32.1dbm	0.387	22.1	21.7
	251	848.8	32dbm	0.288	22.1	21.7

#### Body worn

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32.2dbm	0.179	22.1	21.7
	190	836.6	32.1dbm	0.166	22.1	21.7

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	251	848.8	32dbm	0.126	22.1	21.7
<b>Body worn _repeated for EUT back to phantom</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32dbm	0.12	22.1	21.7
<b>Body worn _repeated with Memory card</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	128	824.2	32dbm	0.157	22.1	21.7

## PCS 1900 MHZ

<b>Right Head (Cheek Position)</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.52dbm	0.668	22.1	21.7
	661	1880	29.48dbm	0.619	22.1	21.7
	810	1909.8	29.13dbm	0.439	22.1	21.7
<b>Left Head (Cheek Position)</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.52dbm	0.348	22.1	21.7
	661	1880	29.48dbm	0.35	22.1	21.7
	810	1909.8	29.13dbm	0.273	22.1	21.7
<b>Right Head (15° Tilt Position)</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.52dbm	0.862	22.1	21.7
	661	1880	29.48dbm	0.811	22.1	21.7
	810	1909.8	29.13dbm	0.57	22.1	21.7
<b>Left Head (15° Tilt Position)</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.52dbm	0.5	22.1	21.7
	661	1880	29.48dbm	0.462	22.1	21.7
	810	1909.8	29.13dbm	0.334	22.1	21.7

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Right Head (15° Tilt Position)_repeated with Memory card						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.52dbm	0.832	22.1	21.7
Body worn						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	512	1850.2	29.52dbm	0.158	22.1	21.7
	661	1880	29.48dbm	0.155	22.1	21.7
	810	1909.8	29.13dbm	0.125	22.1	21.7

## WLAN802.11 b

Body worn						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
WLAN 802.11 b	1	2412	18.7dbm	0.012	22.1	21.7
	6	2437	19.05dbm	0.012	22.1	21.7
	11	2462	18.69dbm	0.016	22.1	21.7
Body worn- repeated for EUT Back to phantom						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
WLAN 802.11 b	11	2462	18.69dbm	0.011	22.1	21.7
Body worn-repeated with Memory card						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
WLAN 802.11 b	11	2462	18.69dbm	0.012	22.1	21.7
Body worn- repeated with Bluetooth active						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
WLAN 802.11 b	11	2462	18.69dbm	0.010	22.1	21.7

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**WLAN 802.11 g****Body worn**

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
WLAN 802.11 g	1	2412	17.59dbm	0.00953	22.1	21.7
	6	2437	17.1dbm	0.010	22.1	21.7
	11	2462	17.55dbm	0.013	22.1	21.7

Note: SAR measurement results for the Mobile Phone at maximum output power.

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### 3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-FieldProbe	ES3DV3	3172	Jun.23.2008
Schmid & Partner Engineering AG	850/1900/2450MHz System Validation Dipole	D835V2 D1900V2 D2450V2	4d063 5d027 727	Jun.06.2008 Apr.15.2008 Apr.11.2008
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	856	May.07.2008
Schmid & Partner Engineering AG	Software	DASY 5 V5.0 Build119	N/A	Calibration isn't necessary
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration isn't necessary
Agilent	Network Analyzer	8753D	3410A56662	Apr.16.2008
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration isn't necessary
Agilent	Dual-directional coupler	778D	50313	Aug.26.2008
		777D	50114	Aug.26.2008
Agilent	RF Signal Generator	E4438c	MY45093613	May.21.2008
Agilent	Power Sensor	8481H	MY41091361	May.20.2008
Agilent	Radio Communication Test	E5515c	GB44051912	Nov.05 .2008

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## 4. Measurements

Date/Time: 01/06/2009 02:21:58

### RE\_CHEEK\_CH128

**DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Head 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.88$  mho/m;  $\epsilon_r = 42.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

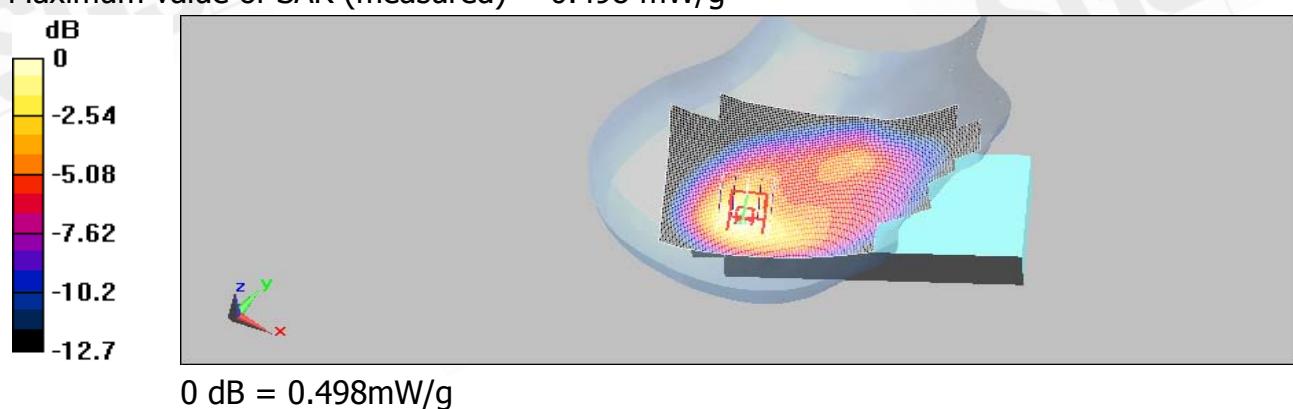
**RE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.499 mW/g**RE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.5 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 0.698 W/kg

**SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.287 mW/g**

Maximum value of SAR (measured) = 0.498 mW/g



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Date/Time: 01/06/2009 02:53:59

**RE\_CHEEK\_CH190****DUT: PA968;**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: Head 900 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.892$  mho/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

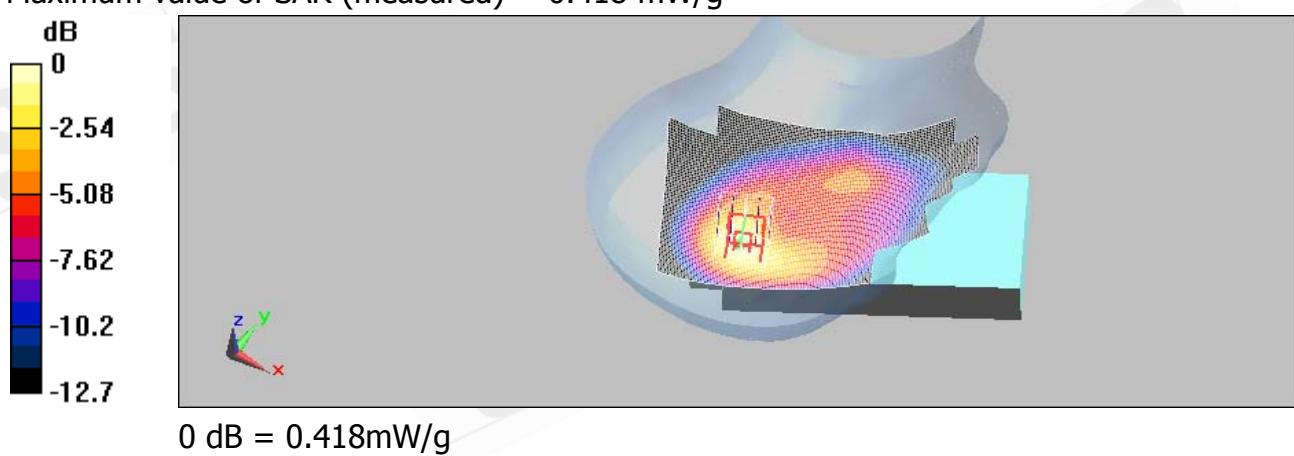
**RE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.405 mW/g**RE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.1 V/m; Power Drift = 0.114 dB

Peak SAR (extrapolated) = 0.590 W/kg

**SAR(1 g) = 0.381 mW/g; SAR(10 g) = 0.237 mW/g**

Maximum value of SAR (measured) = 0.418 mW/g



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Date/Time: 01/06/2009 03:23:05

**RE\_CHEEK\_CH251****DUT: PA968;**

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: Head 900 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.906$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

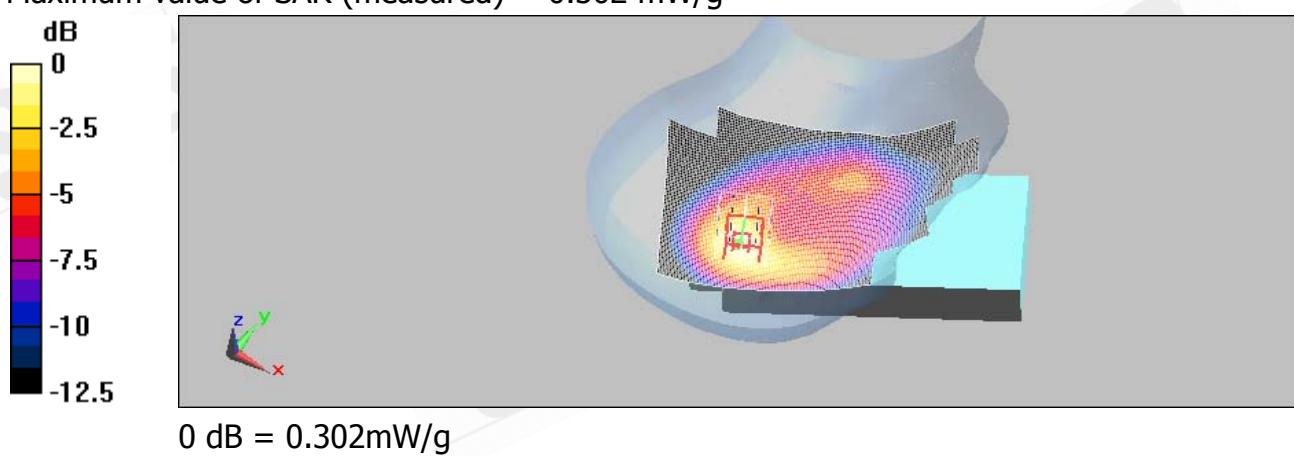
**RE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.294 mW/g**RE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.8 V/m; Power Drift = 0.100 dB

Peak SAR (extrapolated) = 0.427 W/kg

**SAR(1 g) = 0.277 mW/g; SAR(10 g) = 0.171 mW/g**

Maximum value of SAR (measured) = 0.302 mW/g



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Date/Time: 01/06/2009 05:44:58

**LE\_CHEEK\_CH128****DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.88$  mho/m;  $\epsilon_r = 42.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**LE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.387 mW/g

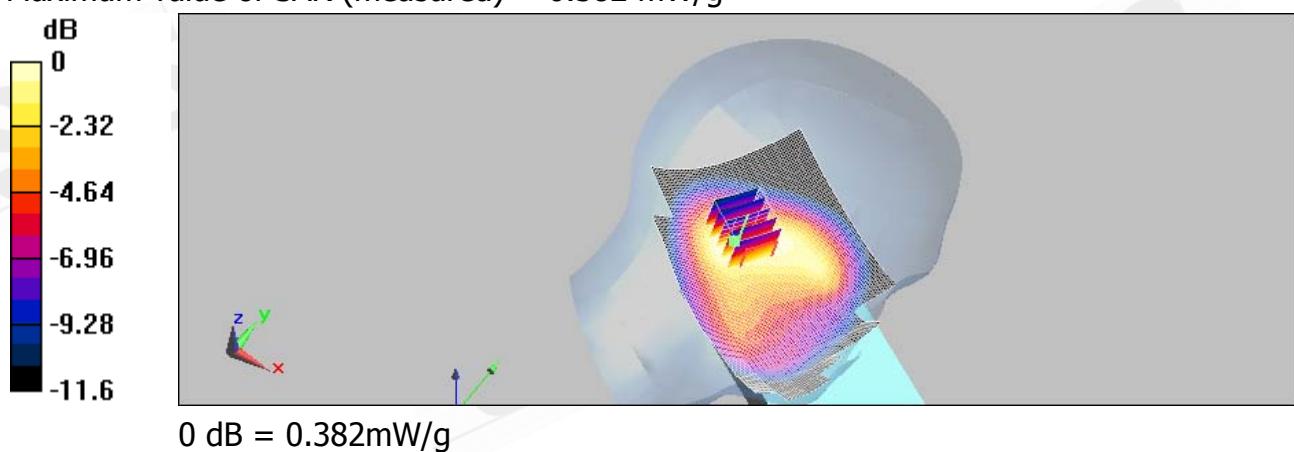
**LE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.1 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 0.507 W/kg

**SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.246 mW/g**

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



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Date/Time: 01/06/2009 06:17:11

**LE\_CHEEK\_CH190****DUT: PA968;**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: Head 900 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.892$  mho/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

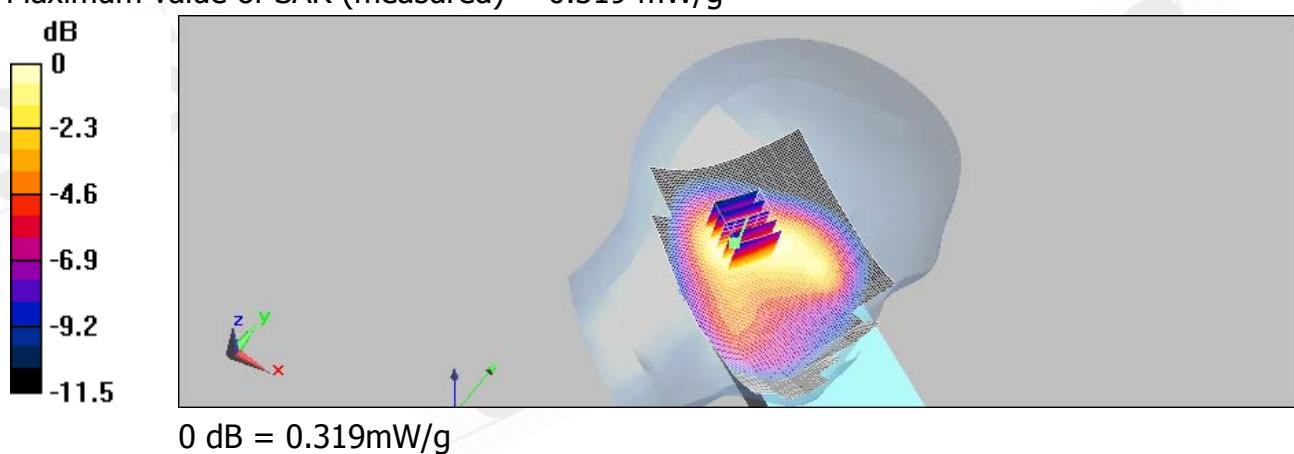
**LE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.322 mW/g**LE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19 V/m; Power Drift = -0.00685 dB

Peak SAR (extrapolated) = 0.423 W/kg

**SAR(1 g) = 0.297 mW/g; SAR(10 g) = 0.201 mW/g**

Maximum value of SAR (measured) = 0.319 mW/g



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Date/Time: 01/06/2009 06:52:43

**LE\_CHEEK\_CH251****DUT: PA968;**

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: Head 900 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.906$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

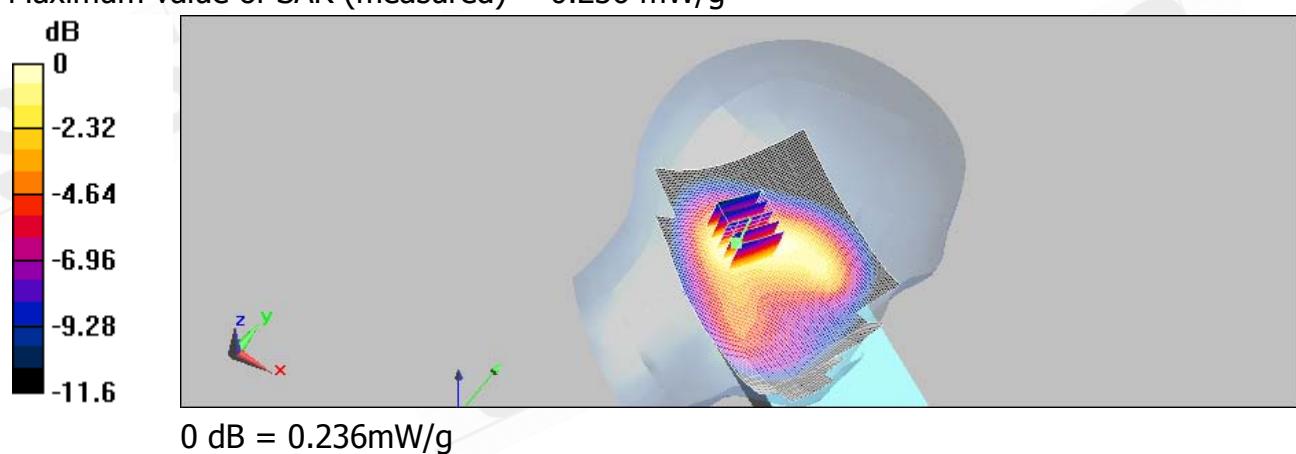
**LE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.240 mW/g**LE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.2 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 0.315 W/kg

**SAR(1 g) = 0.220 mW/g; SAR(10 g) = 0.148 mW/g**

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



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Date/Time: 01/06/2009 03:56:06

**RE\_TILT\_CH128****DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.88$  mho/m;  
 $\epsilon_r = 42.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.729 mW/g

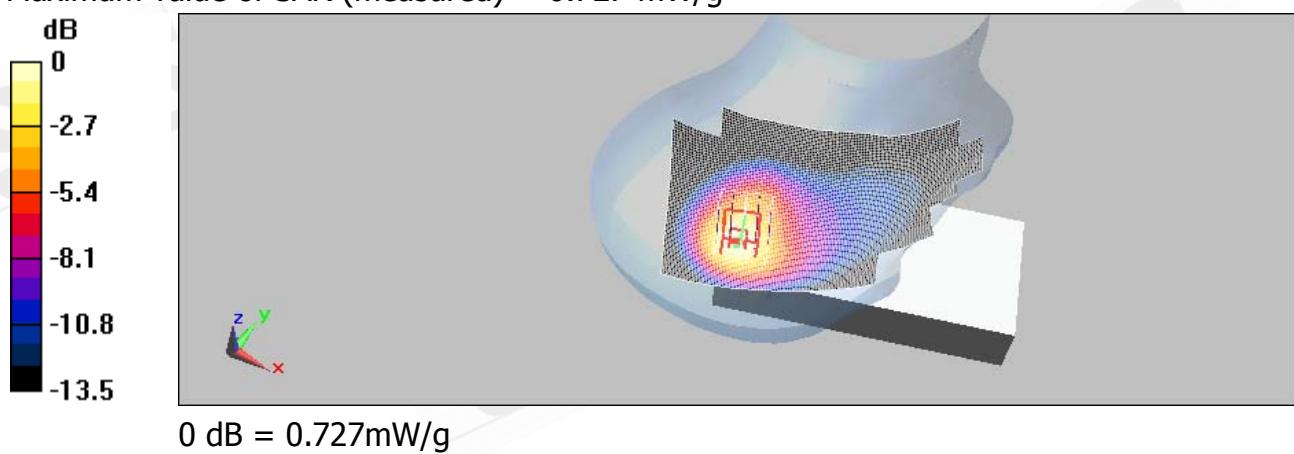
**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm,  
dy=8mm, dz=5mm

Reference Value = 19.6 V/m; Power Drift = -0.00847 dB

Peak SAR (extrapolated) = 1.07 W/kg

**SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.408 mW/g**

Maximum value of SAR (measured) = 0.727 mW/g



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Date/Time: 01/06/2009 04:28:50

**RE\_TILT\_CH190****DUT: PA968;**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium: Head 900 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.892$  mho/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

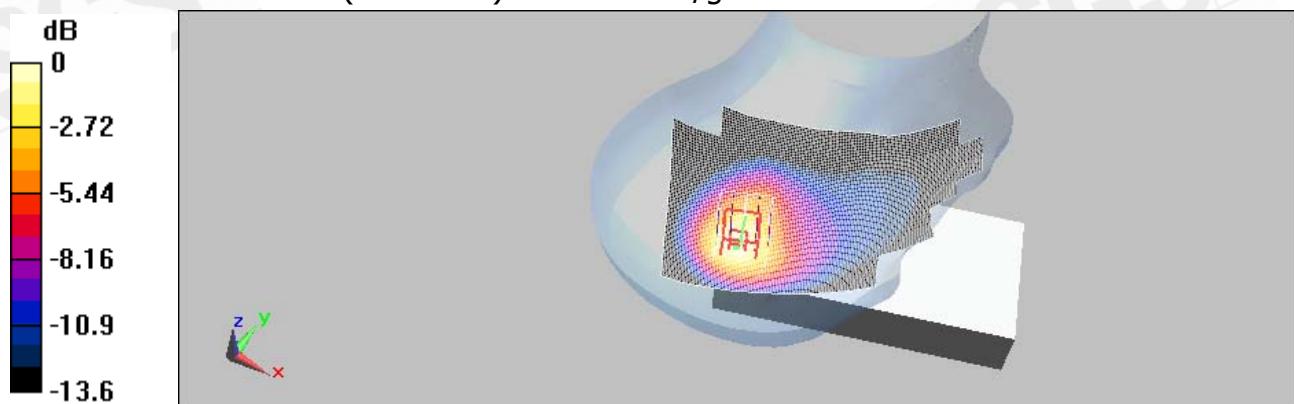
DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.584 mW/g

**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 17.2 V/m; Power Drift = 0.027 dB  
Peak SAR (extrapolated) = 0.850 W/kg

**SAR(1 g) = 0.540 mW/g; SAR(10 g) = 0.329 mW/g**  
Maximum value of SAR (measured) = 0.586 mW/g



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Date/Time: 01/06/2009 05:02:21

**RE\_TILT\_CH251****DUT: PA968;**

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3  
Medium: Head 900 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.906$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

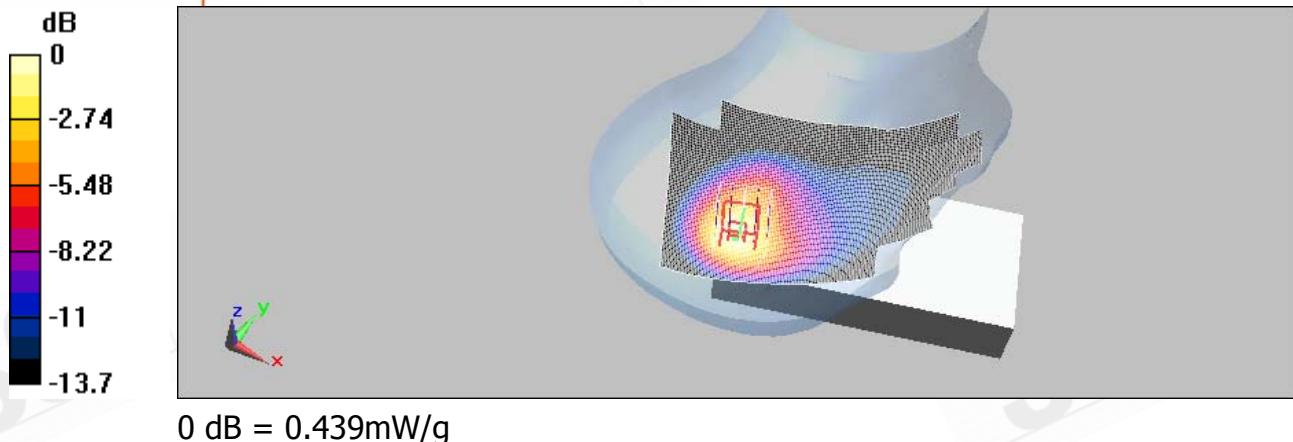
**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.431 mW/g

**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.5 V/m; Power Drift = 0.046 dB  
Peak SAR (extrapolated) = 0.646 W/kg

**SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.243 mW/g**  
Maximum value of SAR (measured) = 0.439 mW/g

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Date/Time: 01/06/2009 07:26:36

**LE\_TILT\_CH128****DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: Head 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.88$  mho/m;  $\epsilon_r = 42.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

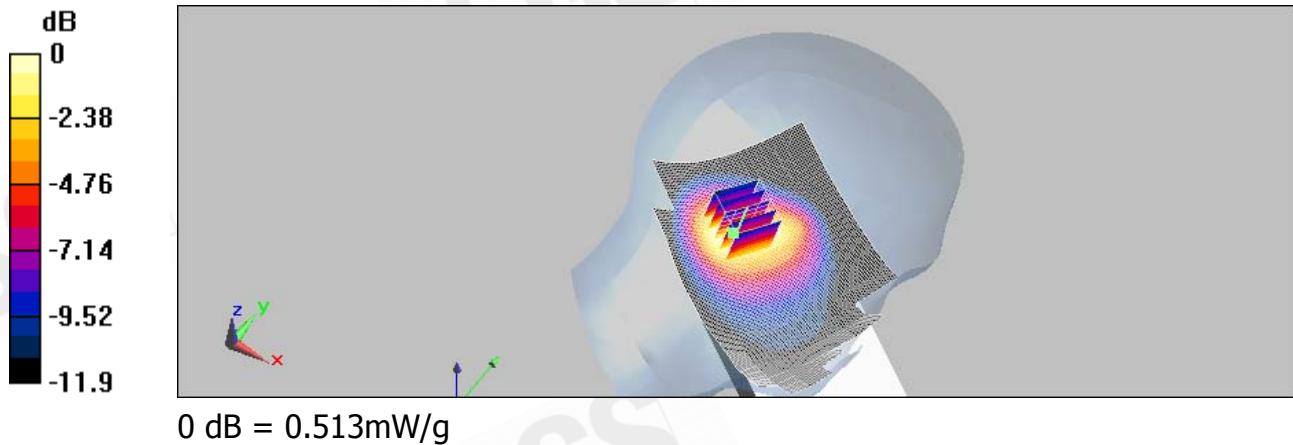
DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**LE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.529 mW/g**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mmReference Value = 23 V/m; Power Drift = -0.033 dB  
Peak SAR (extrapolated) = 0.676 W/kg

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**SAR(1 g) = 0.475 mW/g; SAR(10 g) = 0.313 mW/g**  
Maximum value of SAR (measured) = 0.513 mW/g



Date/Time: 01/06/2009 07:58:21

## LE\_TILT\_CH190

DUT: PA968;

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium: Head 900 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.892$  mho/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

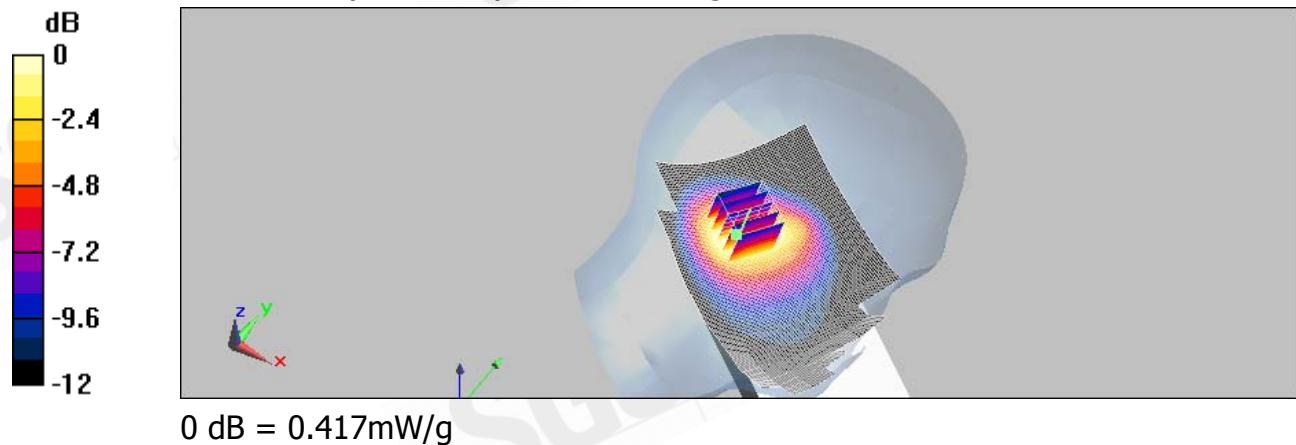
**LE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.437 mW/g

**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

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Reference Value = 20.4 V/m; Power Drift = 0.080 dB  
Peak SAR (extrapolated) = 0.546 W/kg

**SAR(1 g) = 0.387 mW/g; SAR(10 g) = 0.256 mW/g**  
Maximum value of SAR (measured) = 0.417 mW/g



Date/Time: 01/06/2009 08:33:18

## LE\_TILT\_CH251

**DUT: PA968;**

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3  
Medium: Head 900 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.906$  mho/m;  $\epsilon_r = 42.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**LE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.321 mW/g

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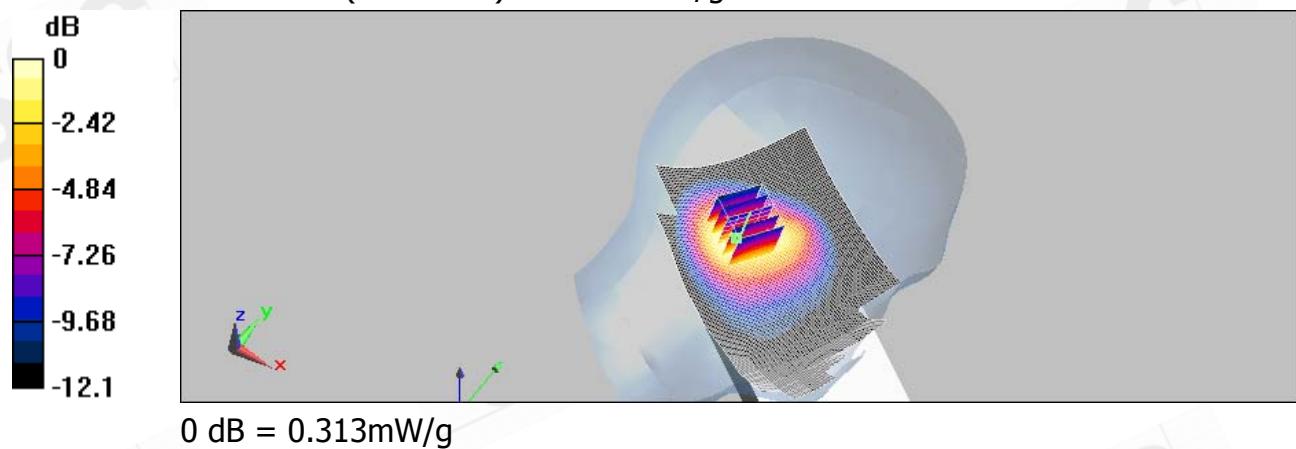
**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.3 V/m; Power Drift = 0.054 dB

Peak SAR (extrapolated) = 0.412 W/kg

**SAR(1 g) = 0.288 mW/g; SAR(10 g) = 0.188 mW/g**

Maximum value of SAR (measured) = 0.313 mW/g



Date/Time: 01/07/2009 04:45:02

## BODY\_CH128

**DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium: Body 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 55.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

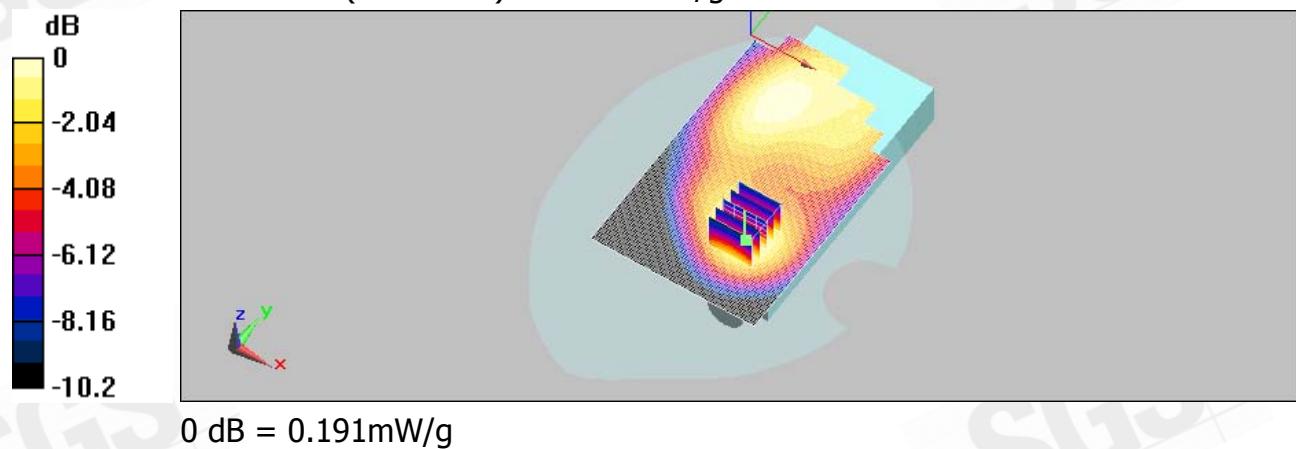
- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

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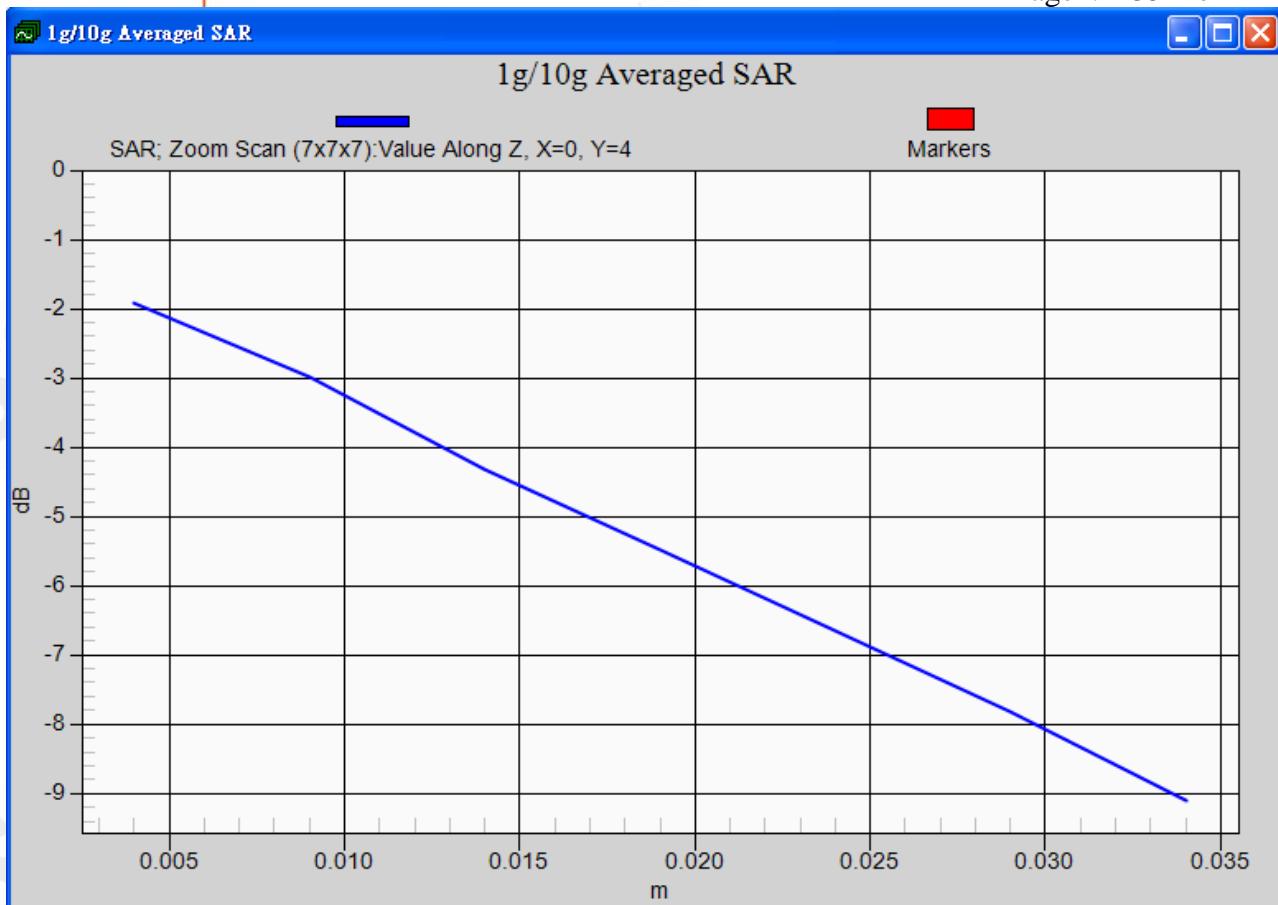
**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.190 mW/g

**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 12.8 V/m; Power Drift = -0.105 dB  
Peak SAR (extrapolated) = 0.241 W/kg

**SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.123 mW/g**  
Maximum value of SAR (measured) = 0.191 mW/g



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Date/Time: 01/07/2009 05:20:39

**BODY\_CH190****DUT: PA968;**

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4

Medium: Body 900 Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.962$  mho/m;  $\epsilon_r = 55.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.178 mW/g

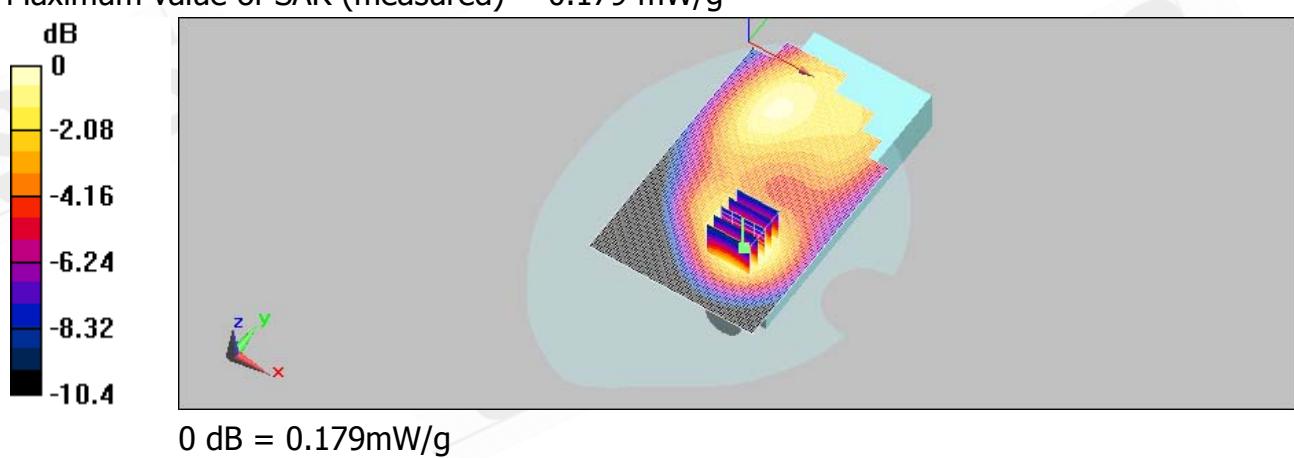
**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.1 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 0.226 W/kg

**SAR(1 g) = 0.166 mW/g; SAR(10 g) = 0.114 mW/g**

Maximum value of SAR (measured) = 0.179 mW/g



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Date/Time: 01/07/2009 05:53:02

**BODY\_CH251****DUT: PA968;**

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:4  
Medium: Body 900 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.974$  mho/m;  $\epsilon_r = 55$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

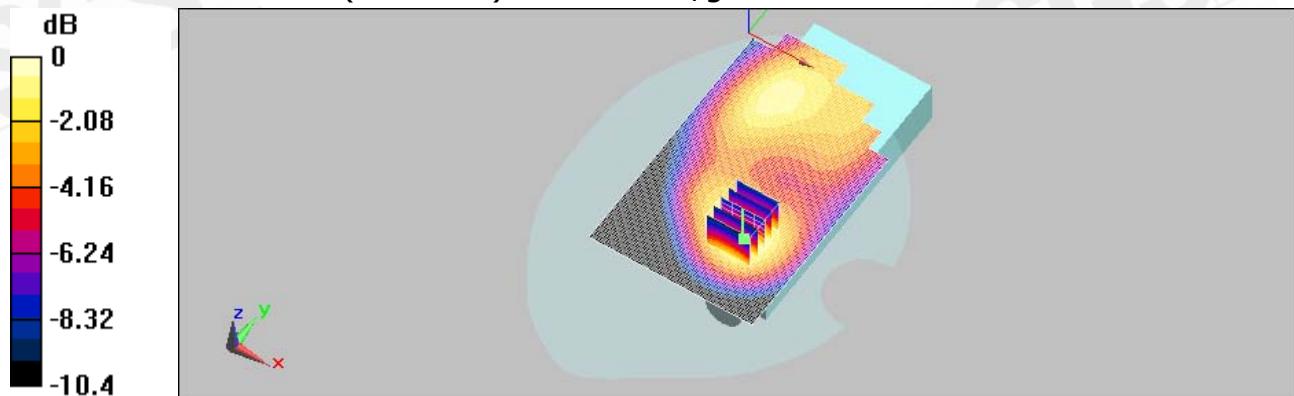
- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**BODY/Area Scan (81x161x1):** Measurement grid:  $dx=15$  mm,  $dy=15$  mm  
Maximum value of SAR (interpolated) = 0.136 mW/g

**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid:  $dx=8$  mm,  $dy=8$  mm,  $dz=5$  mm  
Reference Value = 10.5 V/m; Power Drift = 0.082 dB  
Peak SAR (extrapolated) = 0.173 W/kg

**SAR(1 g) = 0.126 mW/g; SAR(10 g) = 0.086 mW/g**

Maximum value of SAR (measured) = 0.135 mW/g



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Date/Time: 01/07/2009 06:11:00

**BODY\_CH128\_repeated with the back phantom****DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:4

Medium: Body 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 55.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

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

**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

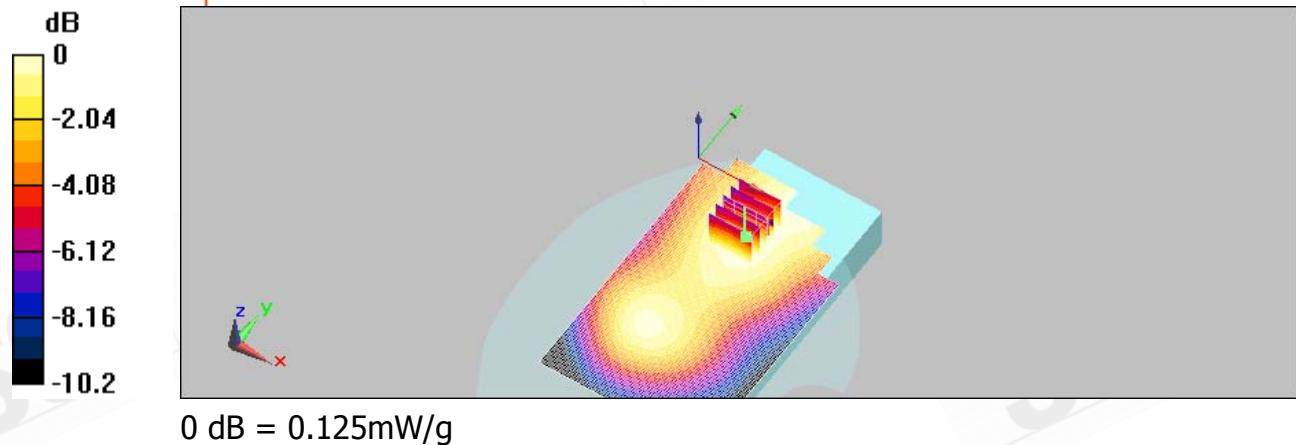
Reference Value = 10 V/m; Power Drift = 0.127 dB

Peak SAR (extrapolated) = 0.149 W/kg

**SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.092 mW/g**

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

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Date/Time: 01/07/2009 06:50:37

**BODY\_CH128\_repeated with Memory card****DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:4  
Medium: Body 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 55.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

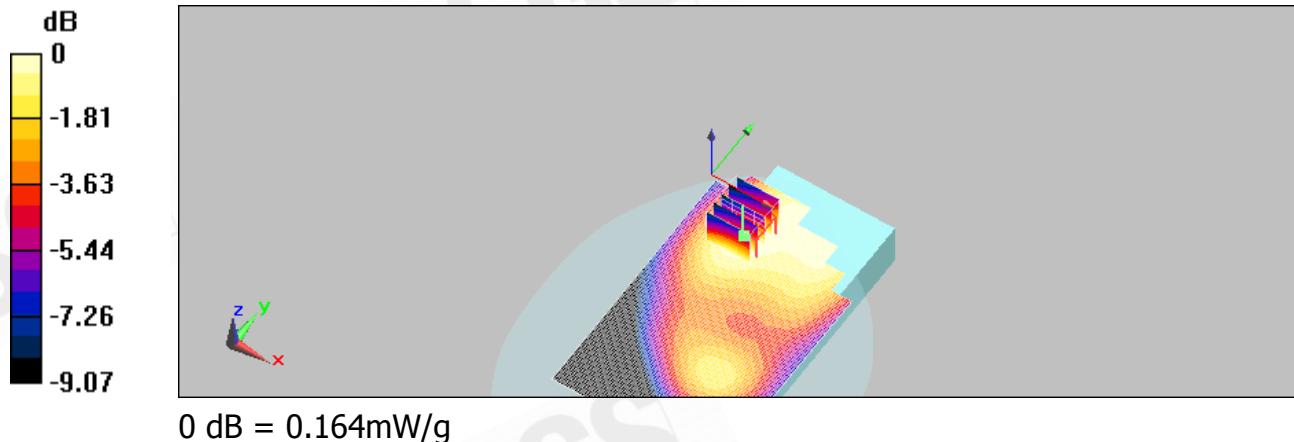
**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.164 mW/g

**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.1 V/m; Power Drift = 0.057 dB  
Peak SAR (extrapolated) = 0.200 W/kg

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**SAR(1 g) = 0.157 mW/g; SAR(10 g) = 0.118 mW/g**  
Maximum value of SAR (measured) = 0.164 mW/g



Date/Time: 01/07/2009 07:34:55

### **BODY\_CH128\_repeated with Bluetooth active**

**DUT: PA968;**

Communication System: GSM 850; Frequency: 824.2 MHz; Duty Cycle: 1:4  
Medium: Body 900 Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.951$  mho/m;  $\epsilon_r = 55.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.159 mW/g

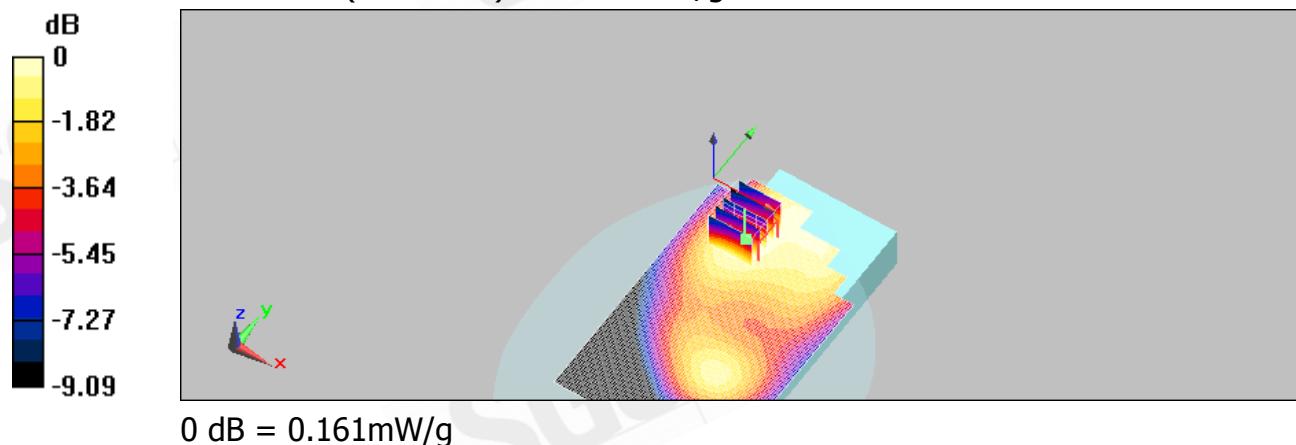
**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

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Reference Value = 10.6 V/m; Power Drift = 0.00889 dB  
Peak SAR (extrapolated) = 0.198 W/kg

**SAR(1 g) = 0.153 mW/g; SAR(10 g) = 0.113 mW/g**

Maximum value of SAR (measured) = 0.161 mW/g



Date/Time: 01/06/2009 10:52:10

**RE\_CHEEK\_CH512**

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.705 mW/g

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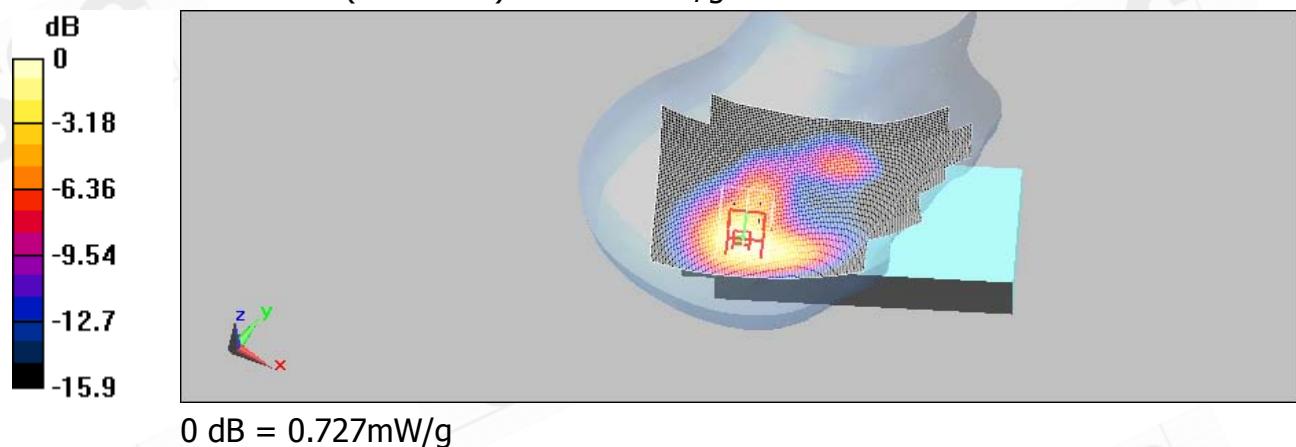
**RE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.8 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 1.13 W/kg

**SAR(1 g) = 0.668 mW/g; SAR(10 g) = 0.381 mW/g**

Maximum value of SAR (measured) = 0.727 mW/g



Date/Time: 01/06/2009 11:25:38

## RE\_CHEEK\_CH661

DUT: PA968;

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

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

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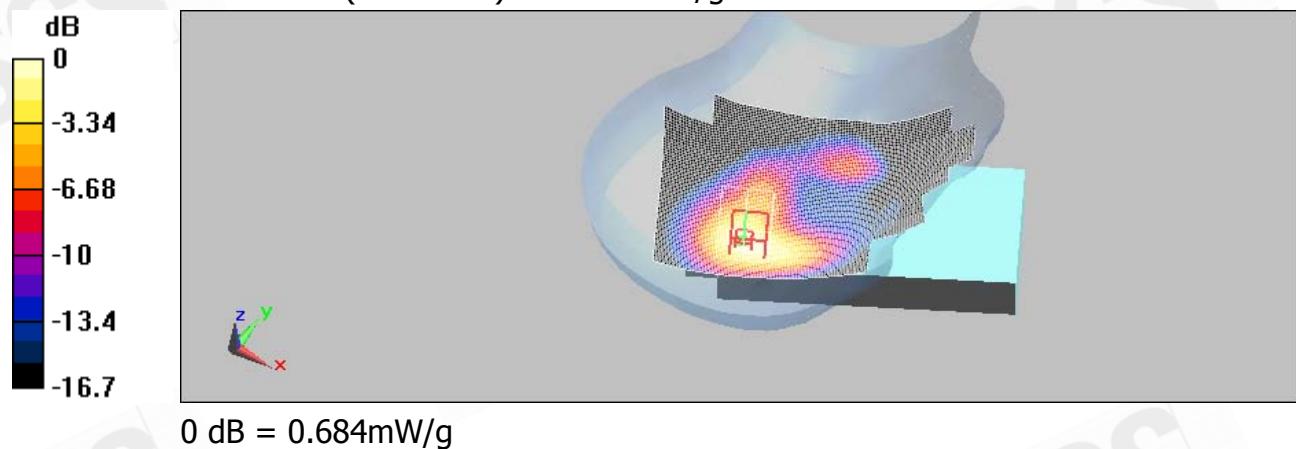
**RE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.7 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 1.06 W/kg

**SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.351 mW/g**

Maximum value of SAR (measured) = 0.684 mW/g



Date/Time: 01/06/2009 12:00:08

**RE\_CHEEK\_CH810**

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: Head 1900 Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

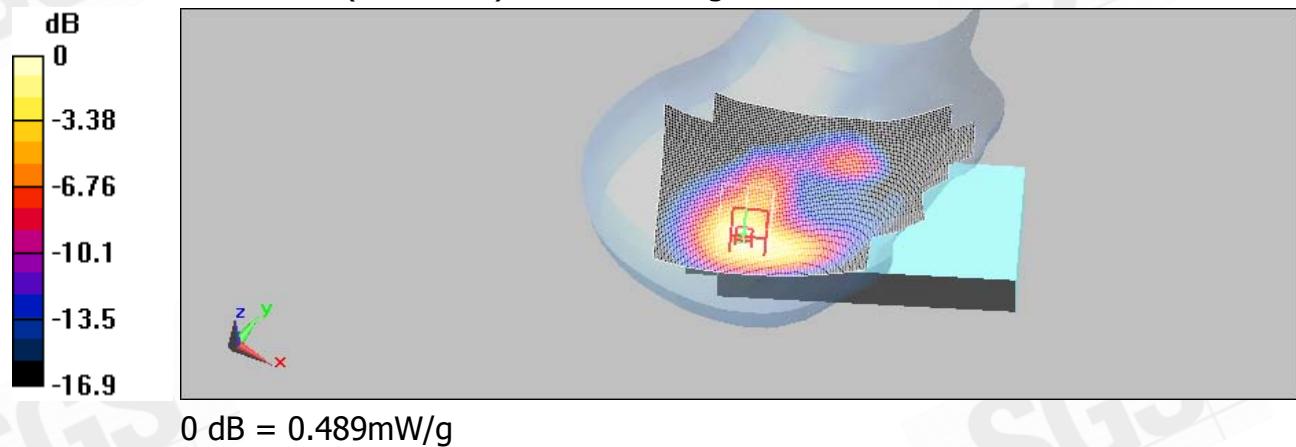
- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

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**RE Cheek/Area Scan (81x161x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 0.469 mW/g

**RE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  
 $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 10.4 V/m; Power Drift = 0.019 dB  
Peak SAR (extrapolated) = 0.757 W/kg

**SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.246 mW/g**  
Maximum value of SAR (measured) = 0.489 mW/g



Date/Time: 01/06/2009 14:20:06

**LE\_CHEEK\_CH512**

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used (interpolated):  $f = 1850.2\text{ MHz}$ ;  $\sigma = 1.37\text{ mho/m}$ ;  $\epsilon_r = 41.2$ ;  $\rho = 1000\text{ kg/m}^3$   
Phantom section: Left Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

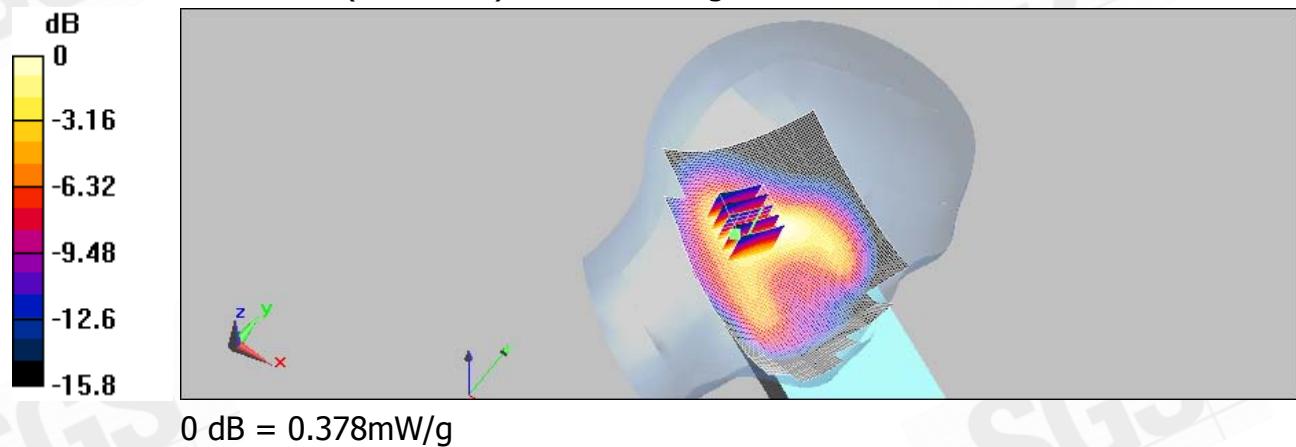
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**LE Cheek/Area Scan (81x161x1):** Measurement grid:  $dx=15mm$ ,  $dy=15mm$   
Maximum value of SAR (interpolated) = 0.394 mW/g

**LE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid:  $dx=8mm$ ,  
 $dy=8mm$ ,  $dz=5mm$

Reference Value = 17 V/m; Power Drift = -0.123 dB  
Peak SAR (extrapolated) = 0.538 W/kg

**SAR(1 g) = 0.348 mW/g; SAR(10 g) = 0.215 mW/g**  
Maximum value of SAR (measured) = 0.378 mW/g



Date/Time: 01/06/2009 14:53:29

## LE\_CHEEK\_CH661

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY5 Configuration:

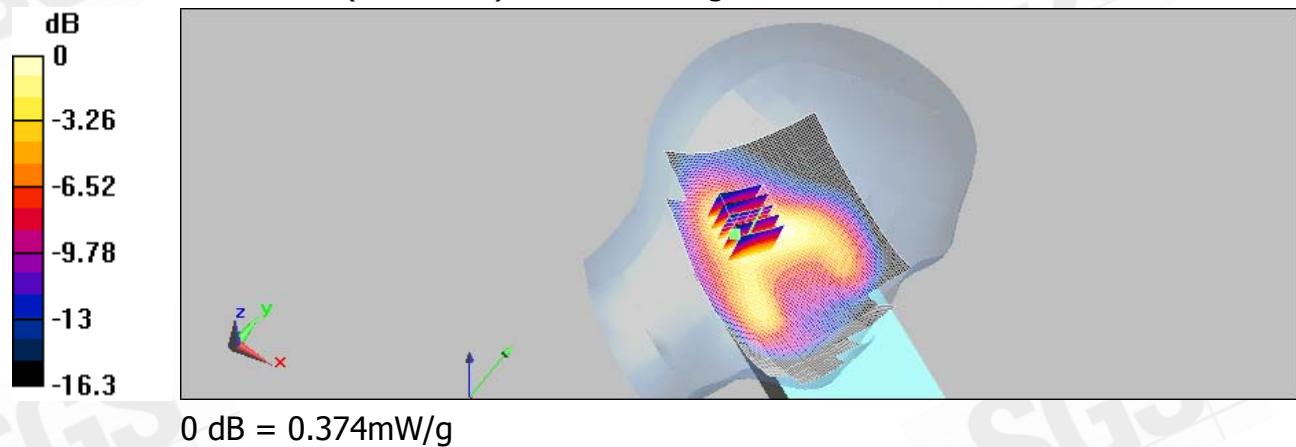
- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

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**LE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.406 mW/g

**LE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 15.7 V/m; Power Drift = -0.075 dB  
Peak SAR (extrapolated) = 0.560 W/kg

**SAR(1 g) = 0.350 mW/g; SAR(10 g) = 0.214 mW/g**  
Maximum value of SAR (measured) = 0.374 mW/g



Date/Time: 01/06/2009 15:27:05

## LE\_CHEEK\_CH810

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used:  $f = 1910 \text{ MHz}$ ;  $\sigma = 1.44 \text{ mho/m}$ ;  $\epsilon_r = 41.2$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section

DASY5 Configuration:

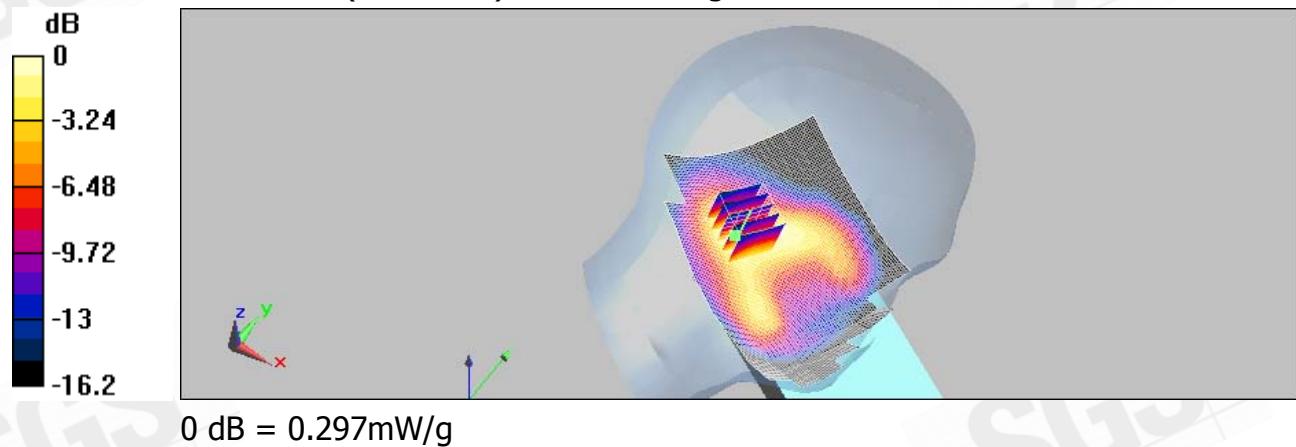
- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

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**LE Cheek/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.310 mW/g

**LE Cheek/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 13.2 V/m; Power Drift = 0.044 dB  
Peak SAR (extrapolated) = 0.447 W/kg

**SAR(1 g) = 0.273 mW/g; SAR(10 g) = 0.163 mW/g**  
Maximum value of SAR (measured) = 0.297 mW/g



Date/Time: 01/06/2009 12:32:21

**RE\_TILT\_CH512**

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;

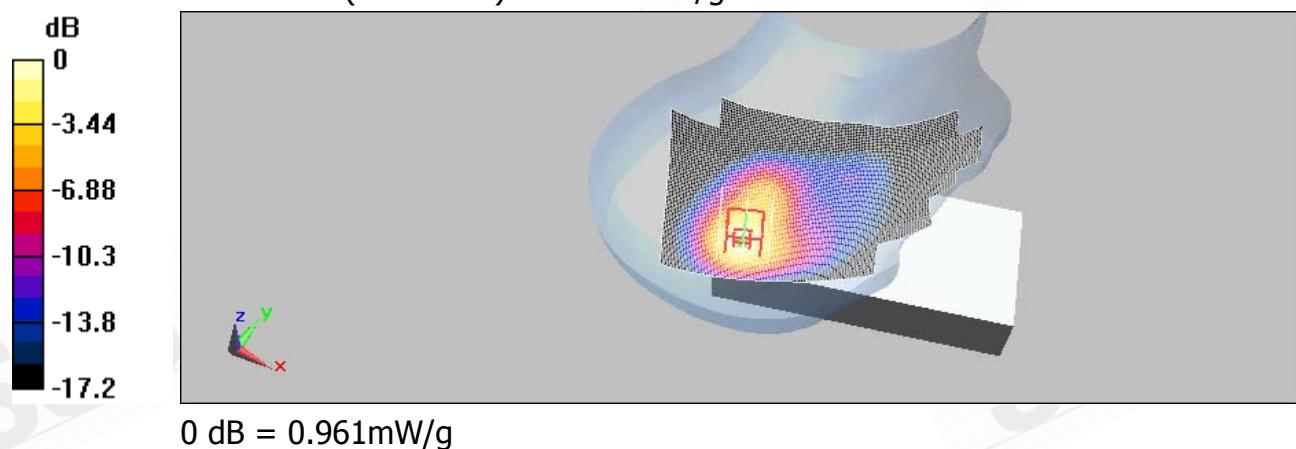
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- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

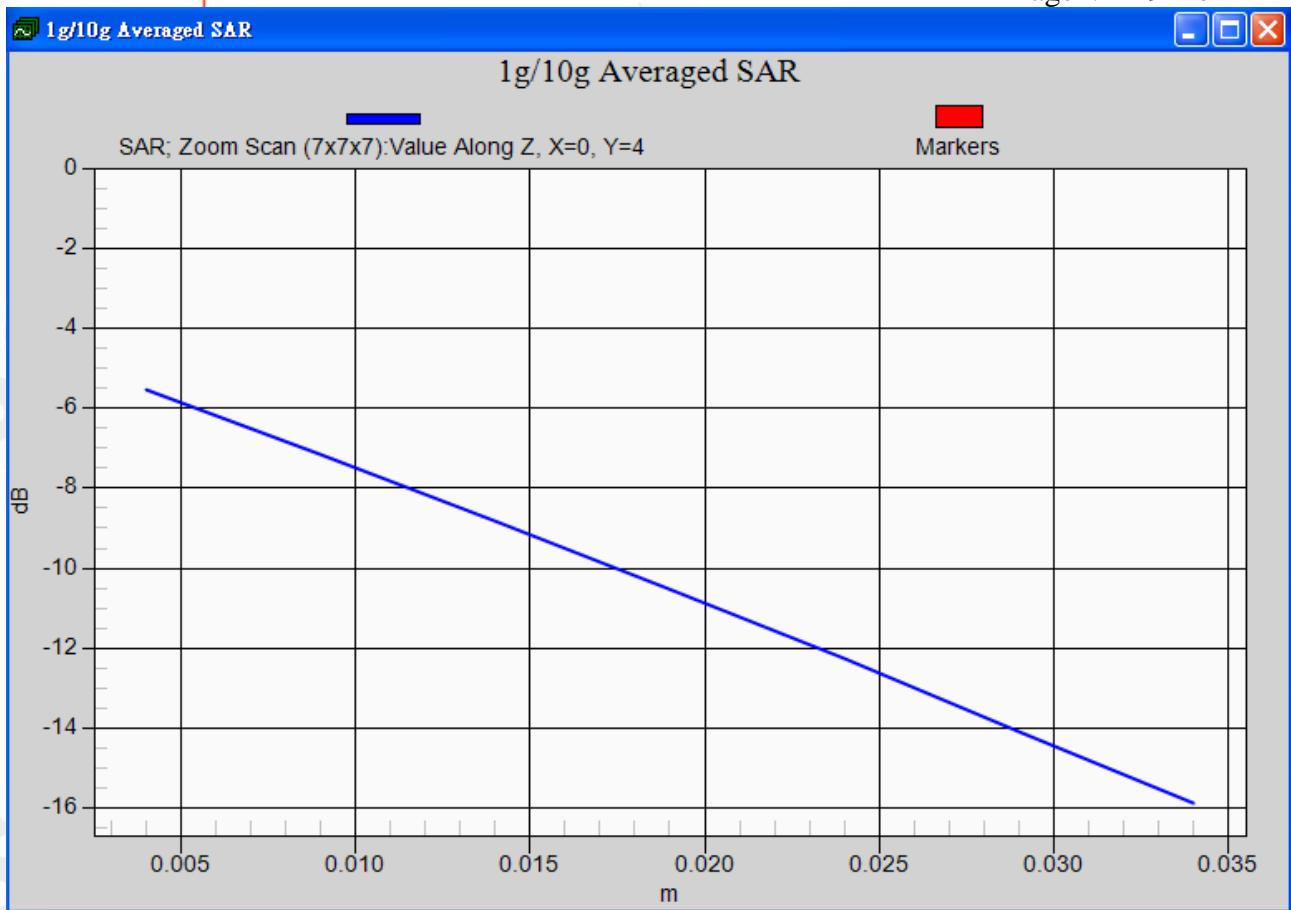
**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.967 mW/g

**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 17.5 V/m; Power Drift = 0.016 dB  
Peak SAR (extrapolated) = 1.52 W/kg

**SAR(1 g) = 0.862 mW/g; SAR(10 g) = 0.465 mW/g**  
Maximum value of SAR (measured) = 0.961 mW/g



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## RE\_TILT\_CH661

DUT: PA968;

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.917 mW/g

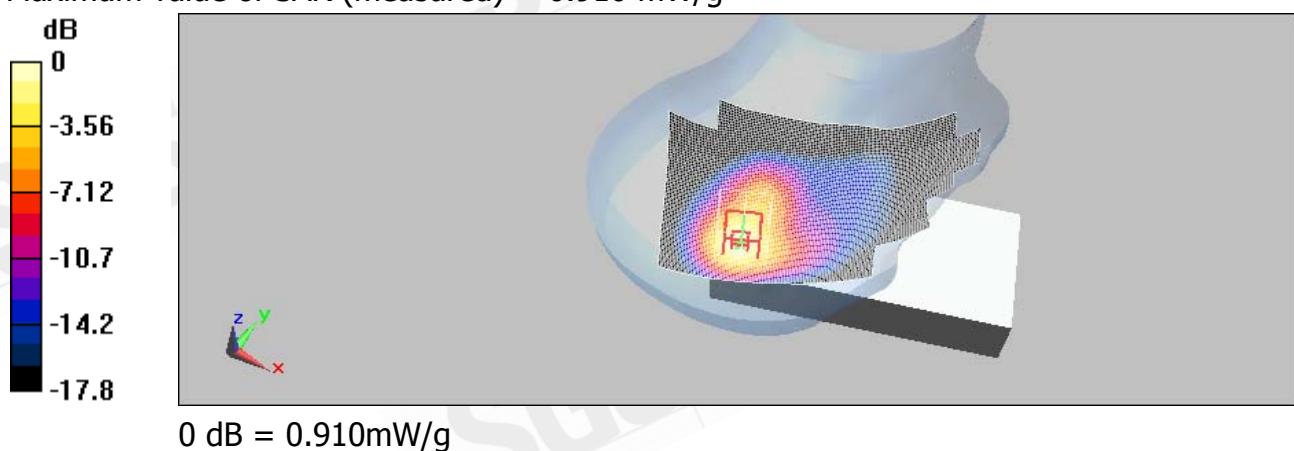
**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.8 V/m; Power Drift = 0.068 dB

Peak SAR (extrapolated) = 1.45 W/kg

**SAR(1 g) = 0.811 mW/g; SAR(10 g) = 0.430 mW/g**

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



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Date/Time: 01/06/2009 13:37:09

**RE\_TILT\_CH810****DUT: PA968;**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.631 mW/g

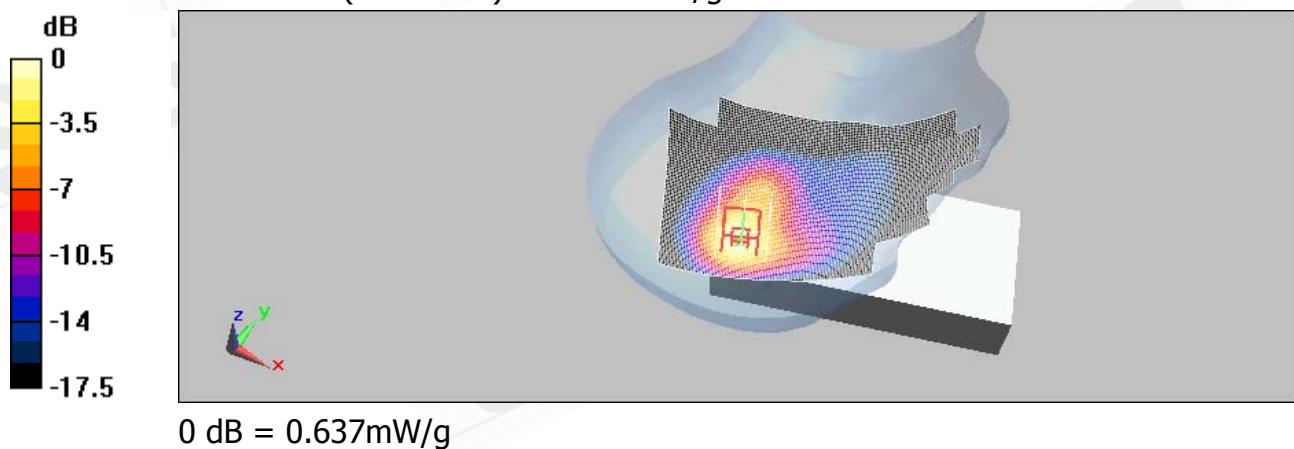
**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.7 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 1.04 W/kg

**SAR(1 g) = 0.570 mW/g; SAR(10 g) = 0.300 mW/g**

Maximum value of SAR (measured) = 0.637 mW/g



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Date/Time: 01/06/2009 16:03:59

**LE\_TILT\_CH512****DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

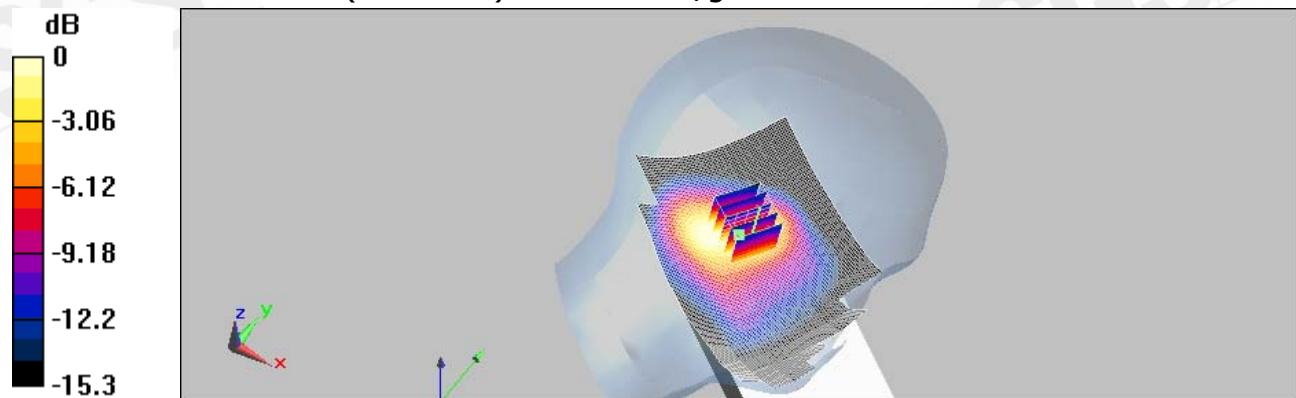
DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**LE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.562 mW/g

**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 20.3 V/m; Power Drift = 0.024 dB  
Peak SAR (extrapolated) = 0.820 W/kg

**SAR(1 g) = 0.500 mW/g; SAR(10 g) = 0.296 mW/g**  
Maximum value of SAR (measured) = 0.551 mW/g



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Date/Time: 01/06/2009 16:34:41

**LE\_TILT\_CH661****DUT: PA968;**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**LE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

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

**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.3 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 0.760 W/kg

**SAR(1 g) = 0.462 mW/g; SAR(10 g) = 0.269 mW/g**

Maximum value of SAR (measured) = 0.499 mW/g

**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

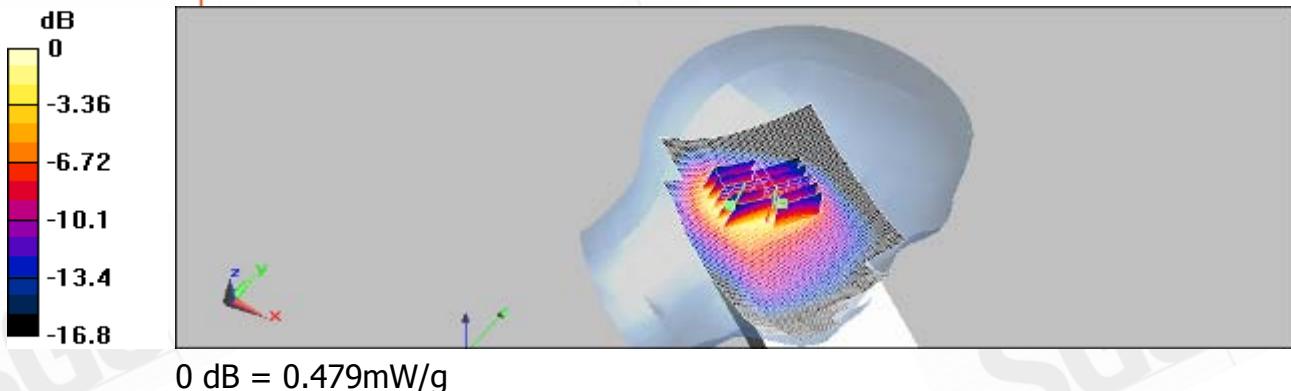
Reference Value = 19.3 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 0.721 W/kg

**SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.267 mW/g**

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

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Date/Time: 01/06/2009 17:10:06

**LE\_TILT\_CH810****DUT: PA968;**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**LE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.383 mW/g

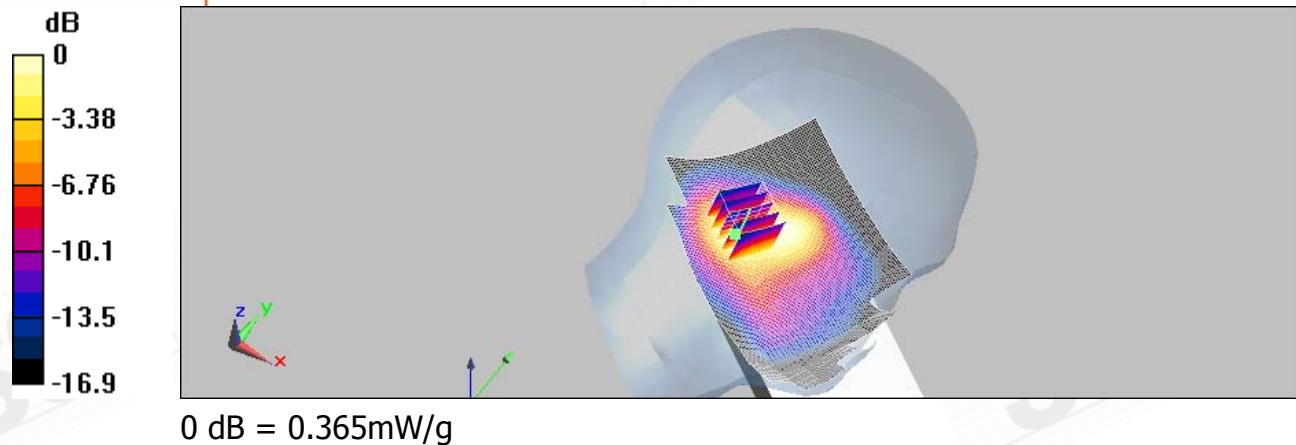
**LE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.3 V/m; Power Drift = -0.000235 dB

Peak SAR (extrapolated) = 0.550 W/kg

**SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.200 mW/g**  
Maximum value of SAR (measured) = 0.365 mW/g

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Date/Time: 01/06/2009 17:52:01

**RE\_TILT\_CH512\_repeated with Memory card****DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: Head 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.957 mW/g

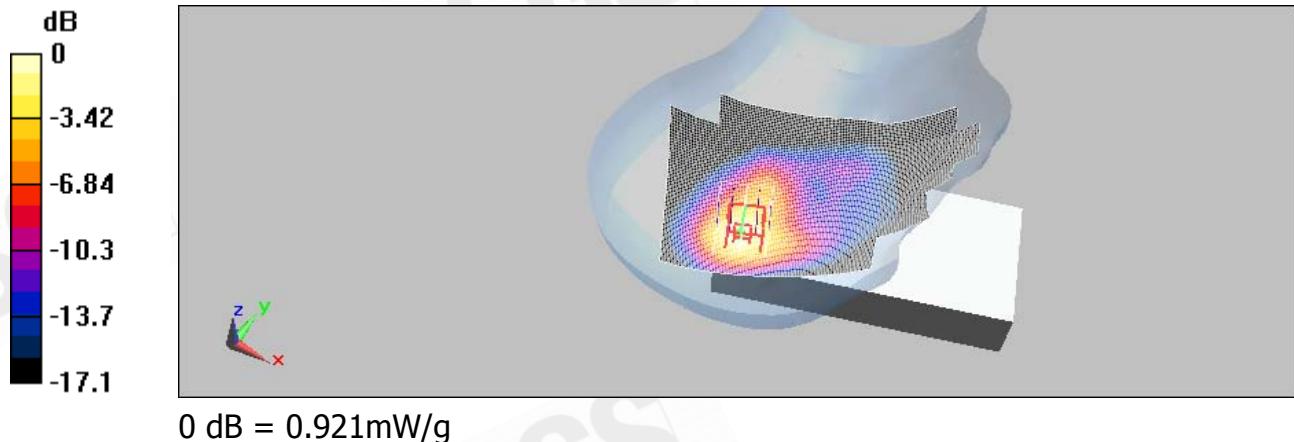
**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.7 V/m; Power Drift = -0.125 dB

Peak SAR (extrapolated) = 1.48 W/kg

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**SAR(1 g) = 0.832 mW/g; SAR(10 g) = 0.451 mW/g**  
Maximum value of SAR (measured) = 0.921 mW/g



Date/Time: 01/06/2009 18:38:55

### **RE\_TILT\_CH512\_repeated with Bluetooth active**

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**RE Tilt/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.779 mW/g

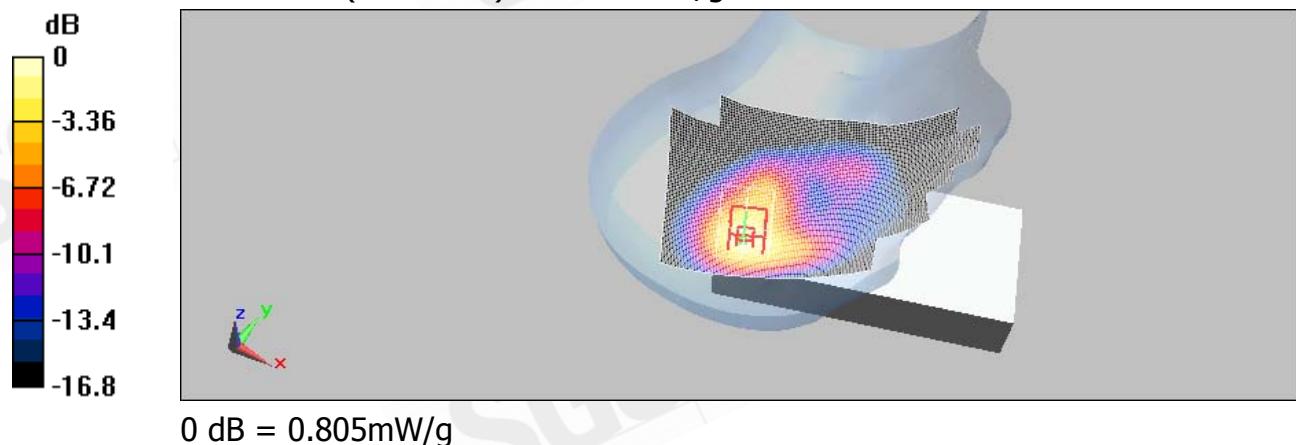
**RE Tilt/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

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Reference Value = 16.1 V/m; Power Drift = -0.084 dB  
Peak SAR (extrapolated) = 1.25 W/kg

**SAR(1 g) = 0.719 mW/g; SAR(10 g) = 0.398 mW/g**

Maximum value of SAR (measured) = 0.805 mW/g



Date/Time: 01/07/2009 01:44:29

## BODY\_CH512

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4  
Medium: Body 1900 Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.49$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY5 Configuration:

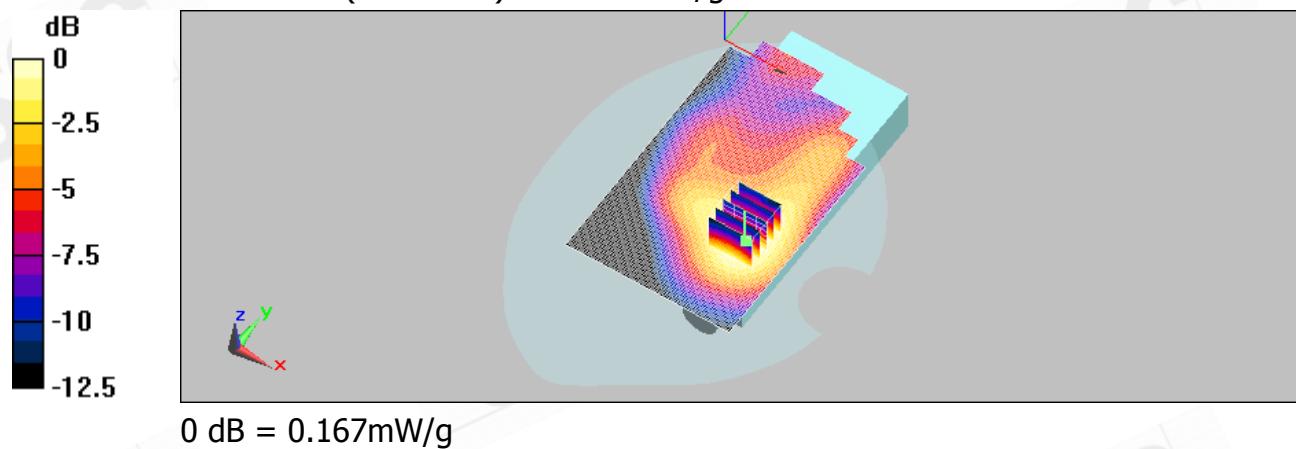
- Probe: ES3DV3 - SN3172; ConvF(4.73, 4.73, 4.73); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.171 mW/g

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**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid:  $dx=8mm$ ,  $dy=8mm$ ,  $dz=5mm$   
Reference Value = 8.52 V/m; Power Drift = 0.107 dB  
Peak SAR (extrapolated) = 0.238 W/kg

**SAR(1 g) = 0.158 mW/g; SAR(10 g) = 0.103 mW/g**  
Maximum value of SAR (measured) = 0.167 mW/g



Date/Time: 01/07/2009 02:18:34

## **BODY\_CH661**

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4  
Medium: Body 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.50$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

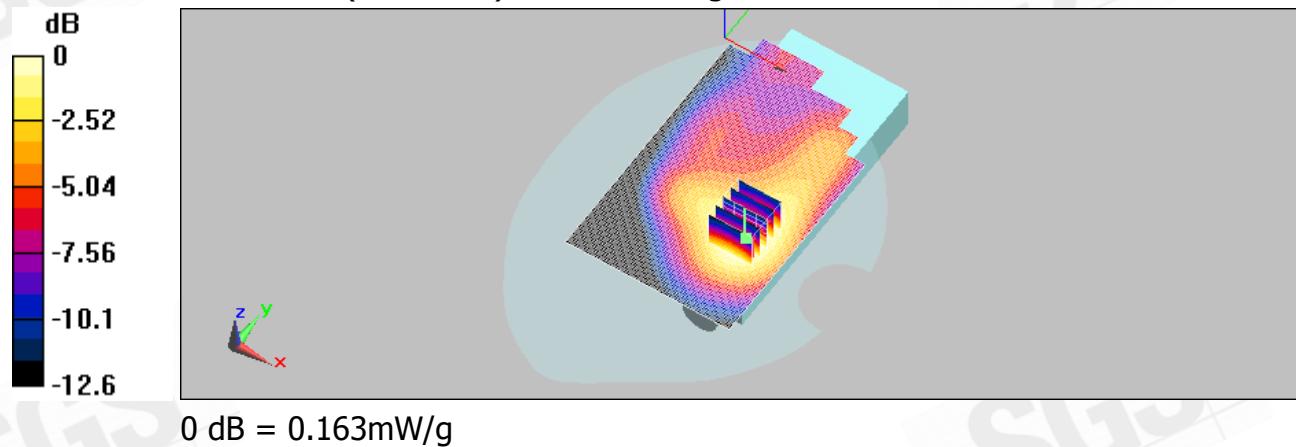
- Probe: ES3DV3 - SN3172; ConvF(4.73, 4.73, 4.73); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

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**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.169 mW/g

**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 8.07 V/m; Power Drift = 0.048 dB  
Peak SAR (extrapolated) = 0.234 W/kg

**SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.099 mW/g**  
Maximum value of SAR (measured) = 0.163 mW/g



Date/Time: 01/07/2009 02:50:28

## BODY\_CH810

**DUT: PA968;**

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:4  
Medium: Body 1900 Medium parameters used:  $f = 1910 \text{ MHz}$ ;  $\sigma = 1.53 \text{ mho/m}$ ;  $\epsilon_r = 53.7$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.73, 4.73, 4.73); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;

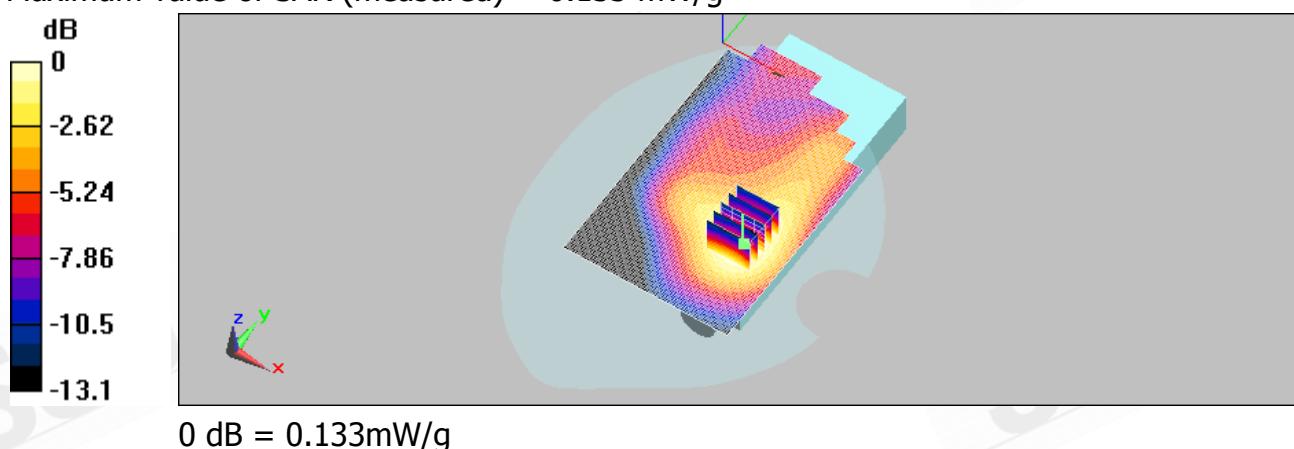
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- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**BODY/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.135 mW/g

**BODY/Zoom Scan (7x7x7) (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 7.04 V/m; Power Drift = 0.113 dB  
Peak SAR (extrapolated) = 0.195 W/kg

**SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.080 mW/g**  
Maximum value of SAR (measured) = 0.133 mW/g



Date/Time: 01/07/2009 11:53:27

## BODY\_WLAN 802.11b\_CH1

**DUT: PA968;**

Communication System: Wireless LAN; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.93 \text{ mho/m}$ ;  $\epsilon_r = 52.2$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)

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- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.013 mW/g

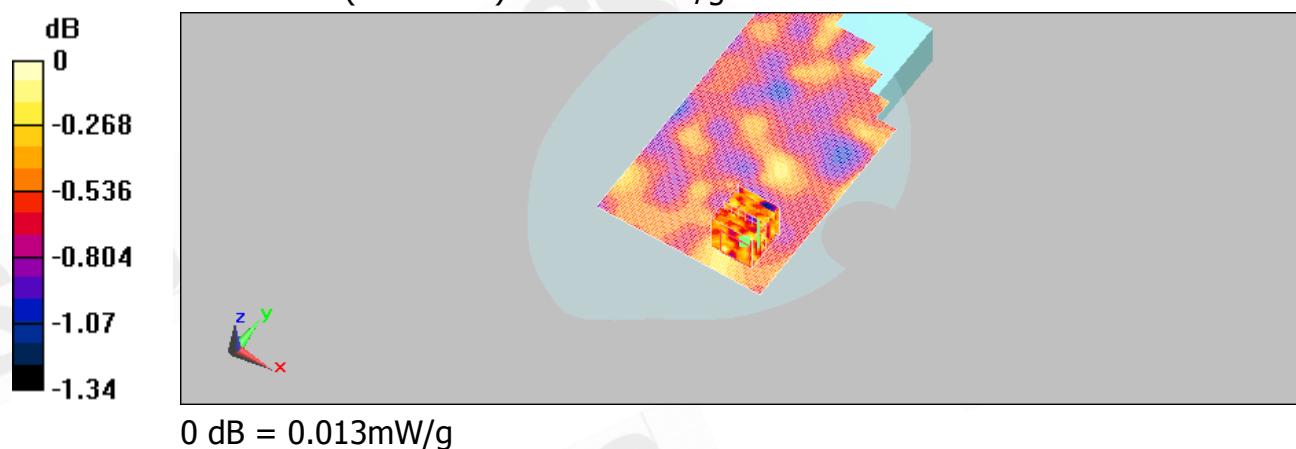
**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.45 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 0.013 W/kg

**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.012 mW/g**

Maximum value of SAR (measured) = 0.013 mW/g



Date/Time: 01/07/2009 12:29:50

## BODY\_WLAN 802.11b\_CH6

**DUT: PA968;**

Communication System: Wireless LAN; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: Body 2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.97$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

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- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

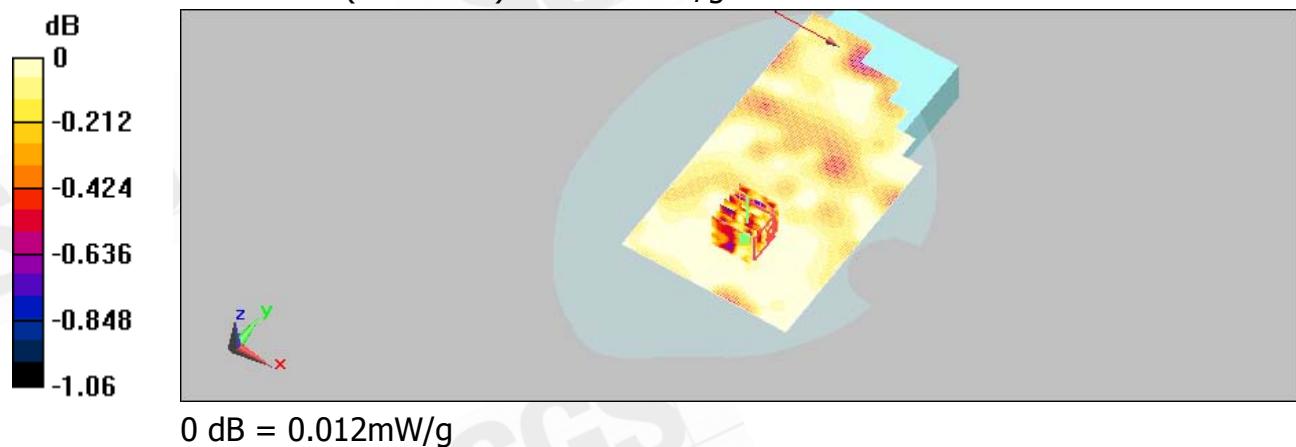
**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.013 mW/g

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

Reference Value = 2.43 V/m; Power Drift = -0.181 dB  
Peak SAR (extrapolated) = 0.014 W/kg

**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.011 mW/g**

Maximum value of SAR (measured) = 0.012 mW/g



Date/Time: 01/07/2009 13:03:35

## BODY\_WLAN 802.11b\_CH11

**DUT: PA968;**

Communication System: Wireless LAN; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

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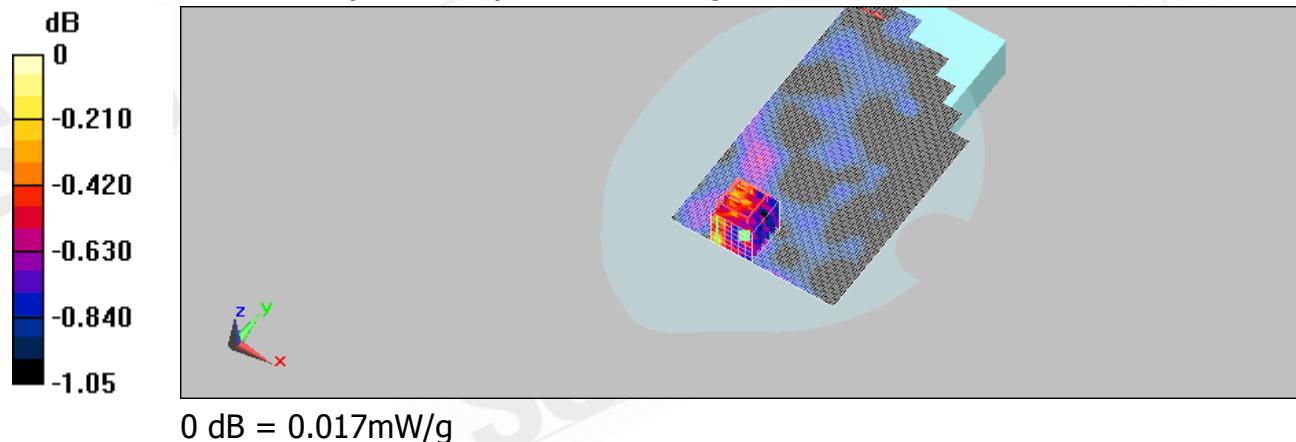
## DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.015 mW/g

**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 2.57 V/m; Power Drift = 0.186 dB  
Peak SAR (extrapolated) = 0.017 W/kg

**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.015 mW/g**  
Maximum value of SAR (measured) = 0.017 mW/g



Date/Time: 01/07/2009 15:41:53

**BODY\_WLAN 802.11b\_CH11\_repeated with the back phantom****DUT: PA968;**

Communication System: Wireless LAN; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho =$

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## DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.011 mW/g

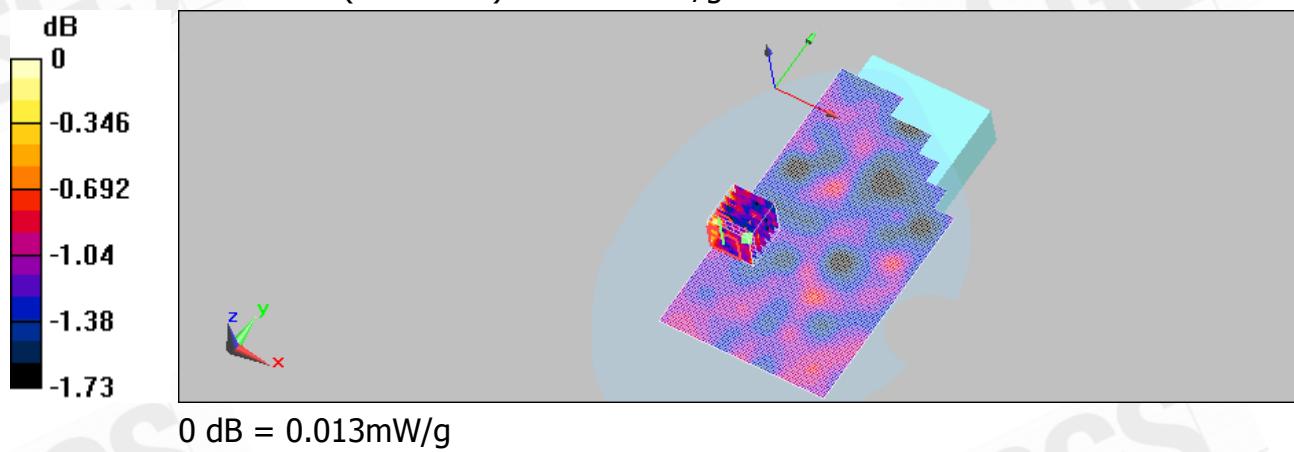
**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.22 V/m; Power Drift = 0.158 dB

Peak SAR (extrapolated) = 0.013 W/kg

**SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.010 mW/g**

Maximum value of SAR (measured) = 0.013 mW/g



Date/Time: 01/07/2009 16:26:43

**BODY\_WLAN 802.11b\_CH11\_repeated with Memory card****DUT: PA968;**

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Communication System: Wireless LAN; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

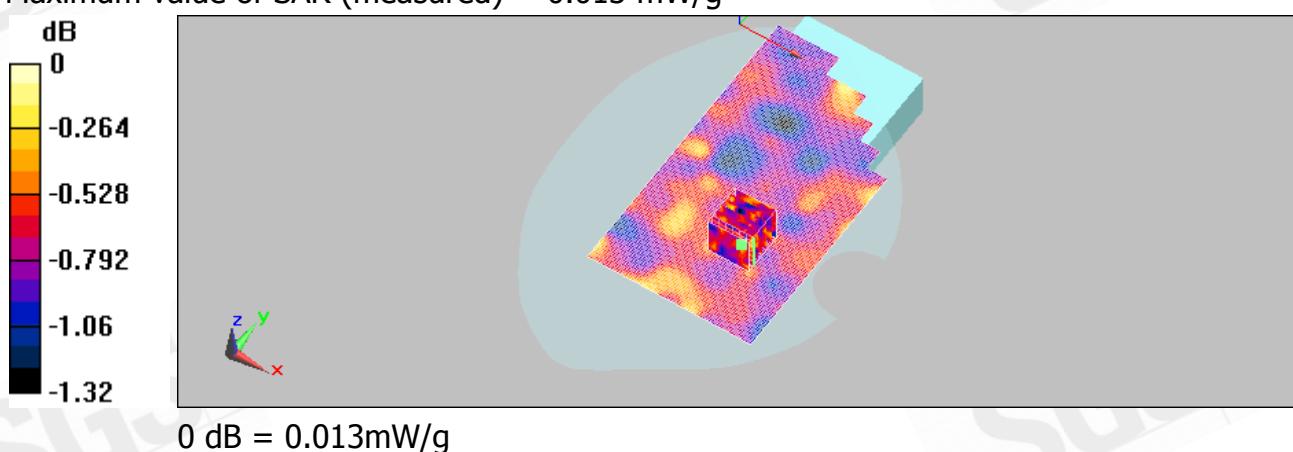
#### DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.013 mW/g

**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 2.31 V/m; Power Drift = 0.110 dB  
Peak SAR (extrapolated) = 0.013 W/kg

**SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.011 mW/g**  
Maximum value of SAR (measured) = 0.013 mW/g



Date/Time: 01/07/2009 17:13:54

#### **BODY\_WLAN 802.11b\_CH11\_repeated with Bluetooth active**

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Communication System: Wireless LAN; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.011 mW/g

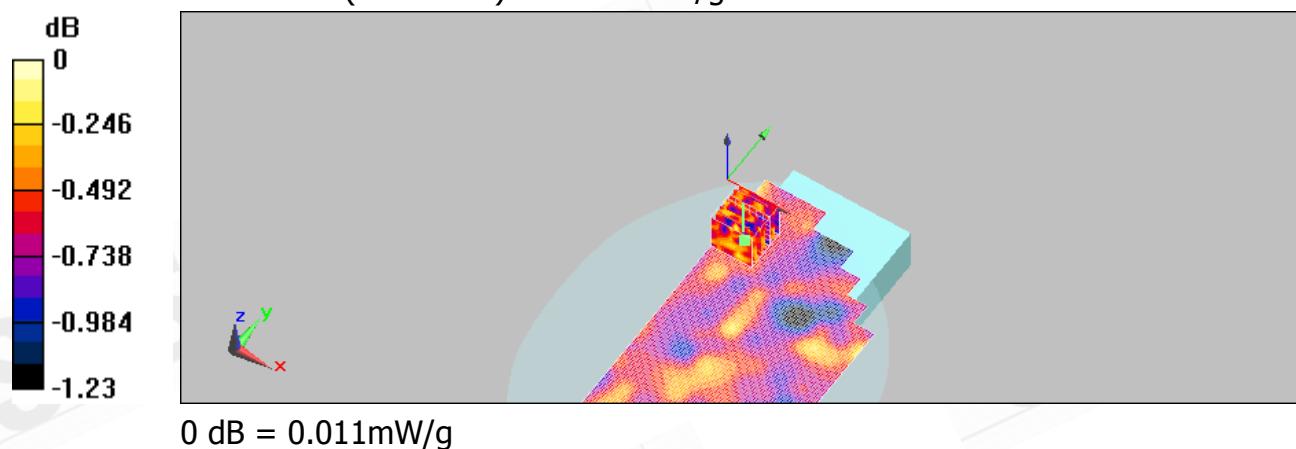
**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.1 V/m; Power Drift = 0.194 dB

Peak SAR (extrapolated) = 0.011 W/kg

**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00971 mW/g**

Maximum value of SAR (measured) = 0.011 mW/g



Date/Time: 01/07/2009 13:41:57

**BODY\_WLAN 802.11g\_CH1**

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DUT: PA968;

Communication System: Wireless LAN; Frequency: 2412 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.011 mW/g

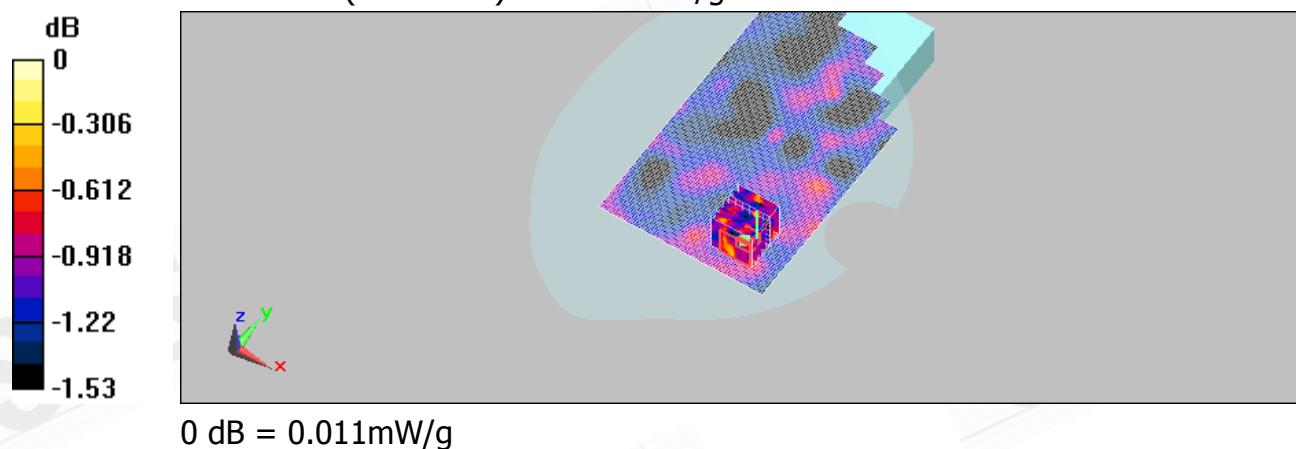
**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.33 V/m; Power Drift = -0.165 dB

Peak SAR (extrapolated) = 0.011 W/kg

**SAR(1 g) = 0.00953 mW/g; SAR(10 g) = 0.00918 mW/g**

Maximum value of SAR (measured) = 0.011 mW/g



Date/Time: 01/07/2009 14:16:15

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**BODY\_WLAN 802.11g\_CH6****DUT: PA968;**

Communication System: Wireless LAN; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: Body 2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.97$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.010 mW/g

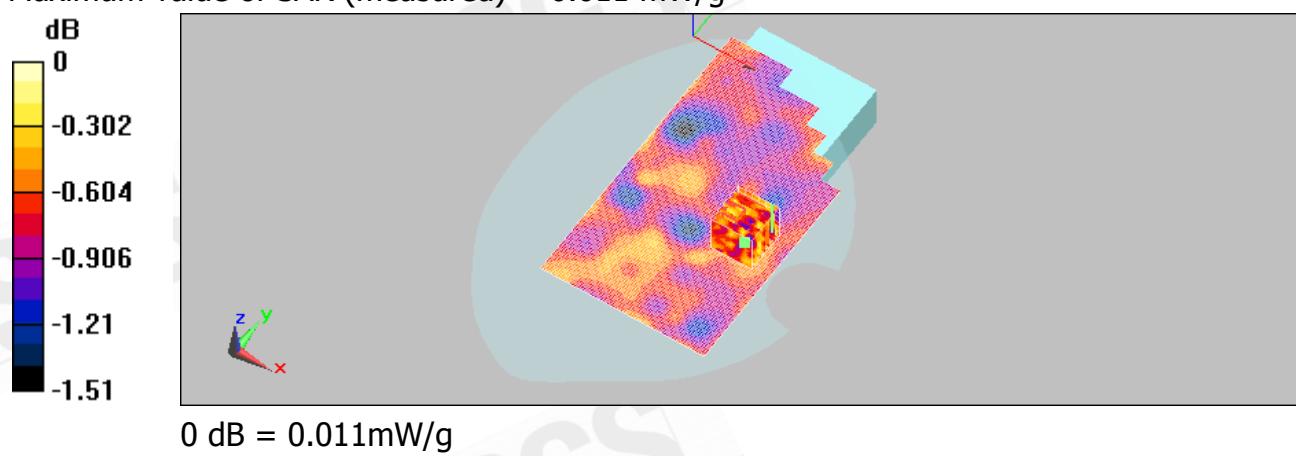
**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.18 V/m; Power Drift = 0.067 dB

Peak SAR (extrapolated) = 0.011 W/kg

**SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00985 mW/g**

Maximum value of SAR (measured) = 0.011 mW/g



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## BODY\_WLAN 802.11g\_CH11

DUT: PA968;

Communication System: Wireless LAN; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: Body 2450 Medium parameters used:  $f = 2462$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

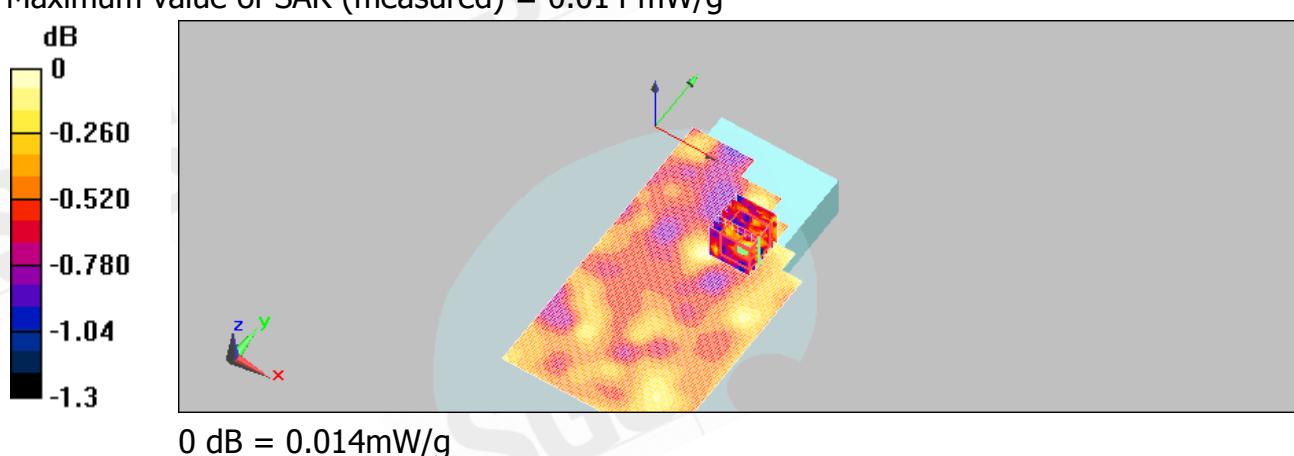
DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**Body/Area Scan (81x161x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.014 mW/g

**Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 2.58 V/m; Power Drift = -0.187 dB  
Peak SAR (extrapolated) = 0.014 W/kg

**SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.012 mW/g**  
Maximum value of SAR (measured) = 0.014 mW/g



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## 5. System Verification

Date/Time: 01/06/2009 01:18:12

### DUT: Dipole 835 MHz

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

Medium: HSL900 Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.66, 5.66, 5.66); Calibrated: 6/23/2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**d=15mm, Pin=250mW, Area Scan:** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.67 mW/g

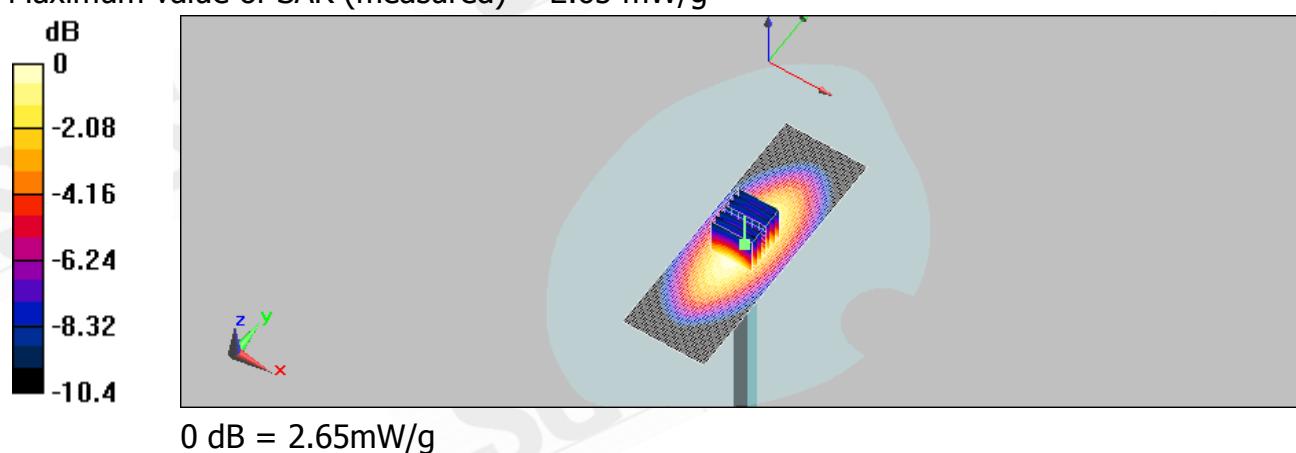
**d=15mm, Pin=250mW, Zoom Scan:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.3 V/m; Power Drift = 0.00796 dB

Peak SAR (extrapolated) = 3.44 W/kg

**SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.54 mW/g**

Maximum value of SAR (measured) = 2.65 mW/g



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## DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: BODY 900 Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.961$  mho/m;  $\epsilon_r = 56$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

### DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(5.61, 5.61, 5.61); Calibrated: 6/23/2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

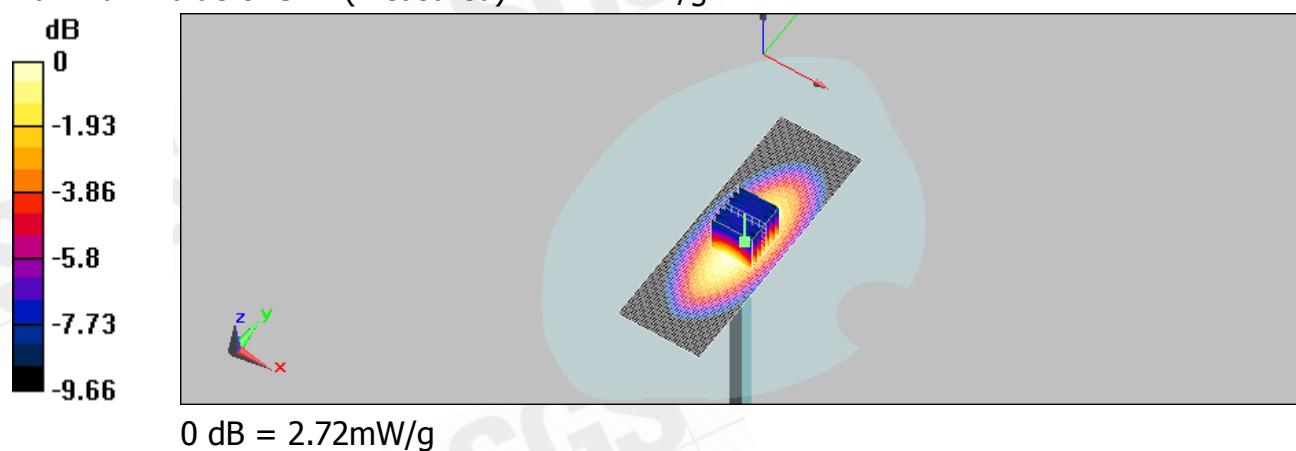
**d=15mm, Pin=250mW, Area Scan:** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.71 mW/g

**d=15mm, Pin=250mW, Zoom Scan:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.3 V/m; Power Drift = -0.032 dB  
Peak SAR (extrapolated) = 3.46 W/kg

**SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.61 mW/g**

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



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## DUT: Dipole 1900 MHz

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium: HSL900 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

### DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(4.97, 4.97, 4.97); Calibrated: 6/23/2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

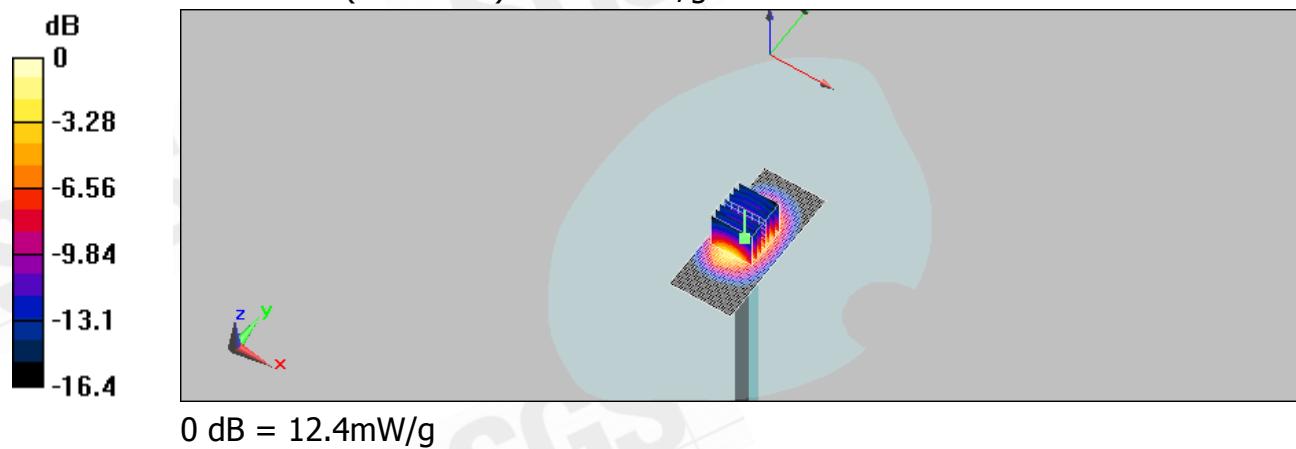
**d=15mm, Pin=250mW, Area Scan:** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 13.6 mW/g

**d=15mm, Pin=250mW, Zoom Scan:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.5 V/m; Power Drift = 0.154 dB  
Peak SAR (extrapolated) = 18.5 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/g**

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



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Date/Time: 01/07/2009 00:39:01

**DUT: Dipole 1900 MHz**

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

Medium: HSL1900 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.51$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

**DASY5 Configuration:**

- Probe: ES3DV3 - SN3172; ConvF(4.73, 4.73, 4.73); Calibrated: 6/23/2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

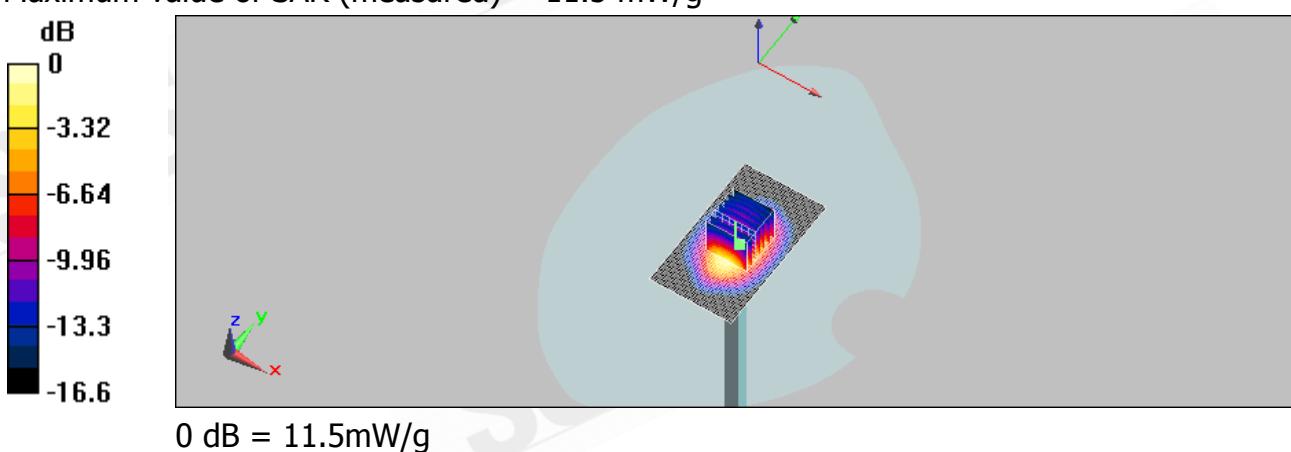
**d=15mm, Pin=250mW, Area Scan:** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 12.9 mW/g**d=15mm, Pin=250mW, Zoom Scan:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.7 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 9.55 mW/g; SAR(10 g) = 4.97 mW/g**

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



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Date/Time: 01/07/2009 10:46:03

**DUT: Dipole 2450 MHz**

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium: HSL900 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3172; ConvF(3.92, 3.92, 3.92); Calibrated: 6/23/2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/7/2008
- Phantom: SAM1; Type: SAM;
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

**d=15mm, Pin=250mW, Area Scan:** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 17.9 mW/g

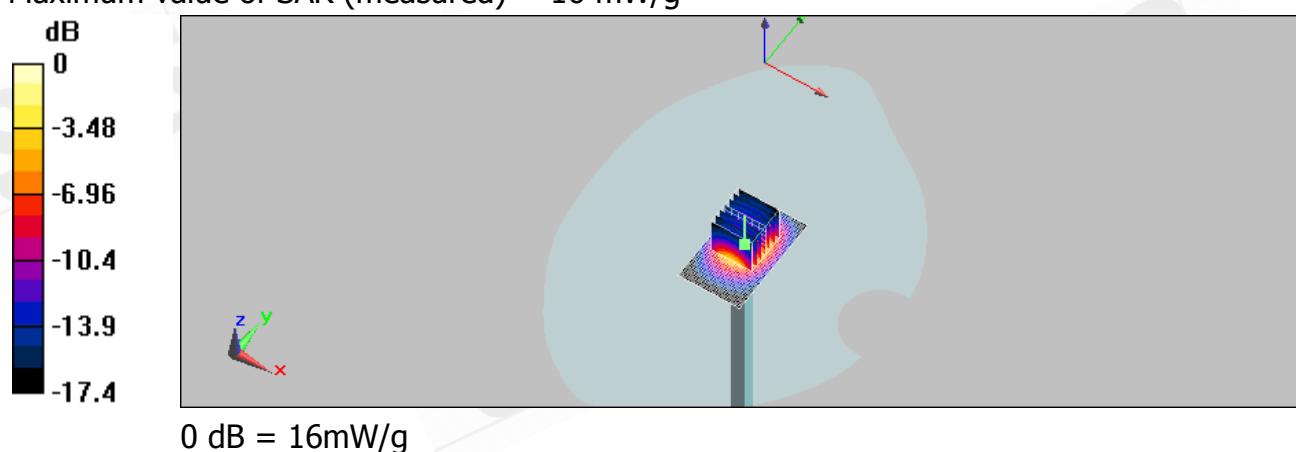
**d=15mm, Pin=250mW, Zoom Scan 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.6 V/m; Power Drift = -0.00586 dB

Peak SAR (extrapolated) = 26.3 W/kg

**SAR(1 g) = 12.8 mW/g; SAR(10 g) = 6.03 mW/g**

Maximum value of SAR (measured) = 16 mW/g



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## 6. DAE & Probe Calibration certificate

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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

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

Accreditation No.: SCS 108

Client

*SGS (Ander)*

Certificate No: DAE4-856\_May08

**CALIBRATION CERTIFICATE**

Object DAE4 - SD 000 D04 BG - SN: 856

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

Calibration date: May 7, 2008

Condition of the calibrated item In Tolerance

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

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

Calibration Equipment used (M&amp;TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	04-Oct-07 (No: 6467)	Oct-08
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (No: 6465)	Oct-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	25-Jun-07 (in house check)	In house check: Jun-08

Calibrated by: Name: Dominique Steffen Function: Technician

Approved by: Name: Fin Bomhoff Function: R&amp;D Director

Issued: May 7, 2008

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

Certificate No: DAE4-856\_May08

Page 1 of 5

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



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

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

Accreditation No.: **SCS 108**Client **SGS (Auden)**Certificate No: **ES3-3172\_Jun08****CALIBRATION CERTIFICATE**Object **ES3DV3 - SN:3172**Calibration procedure(s) **QA CAL-01.v6 and QA CAL-23.v3**  
Calibration procedure for dosimetric E-field probesCalibration date: **June 23, 2008**Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&amp;TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41485277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41488087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S8054 (3c)	6-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 860	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-08 (in house check Oct-07)	In house check: Oct-08
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08
Calibrated by:	Name	Function	Signature
	Katja Polovic	Technical Manager	
Approved by:	Name	Function	Signature
	Niels Kuster	Quality Manager	

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Issued: June 24, 2008

Certificate No: **ES3-3172\_Jun08**

Page 1 of 9

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



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

Accreditation No.: SCS 108

#### Glossary:

TSL	tissue simulating liquid
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 $\theta$	$\theta$ 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:

- 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  $\theta = 0$  ( $f \leq 900$  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<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORMx,y,z * frequency\_response$  (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep (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.

ES3DV3 SN:3172

June 23, 2008

# Probe ES3DV3

## SN:3172

Manufactured: January 23, 2008  
Calibrated: June 23, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ES3-3172\_Jun08

Page 3 of 9

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ES3DV3 SN:3172

June 23, 2008

**DASY - Parameters of Probe: ES3DV3 SN:3172****Sensitivity in Free Space<sup>A</sup>**

NormX	$1.38 \pm 10.1\%$	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	$1.15 \pm 10.1\%$	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	$0.94 \pm 10.1\%$	$\mu\text{V}/(\text{V}/\text{m})^2$

**Diode Compression<sup>B</sup>**

DCP X	93 mV
DCP Y	93 mV
DCP Z	89 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	3.0 mm	4.0 mm
SAR <sub>be</sub> [%]      Without Correction Algorithm	11.8	6.1
SAR <sub>be</sub> [%]      With Correction Algorithm	0.6	0.2

TSL      1810 MHz      Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance	3.0 mm	4.0 mm
SAR <sub>be</sub> [%]      Without Correction Algorithm	10.2	6.5
SAR <sub>be</sub> [%]      With Correction Algorithm	0.4	0.4

**Sensor Offset**

Probe Tip to Sensor Center      2.0 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%.

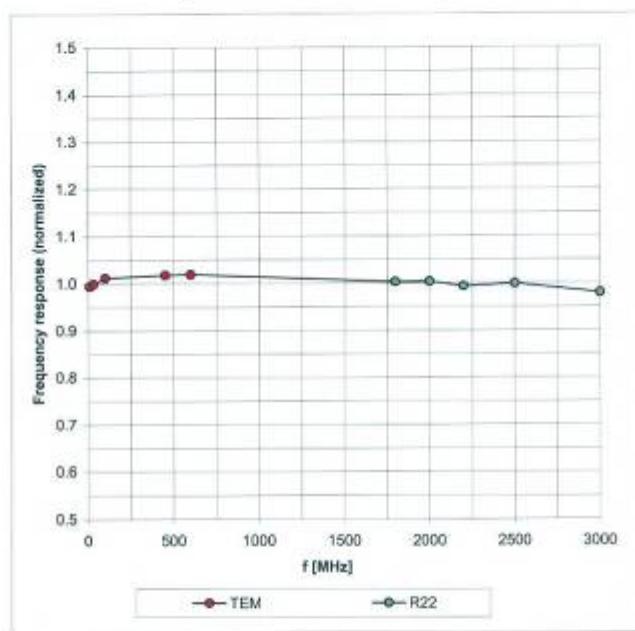
<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).<sup>B</sup> Numerical linearization parameter: uncertainty not required.

ES3DV3 SN:3172

June 23, 2008

**Frequency Response of E-Field**

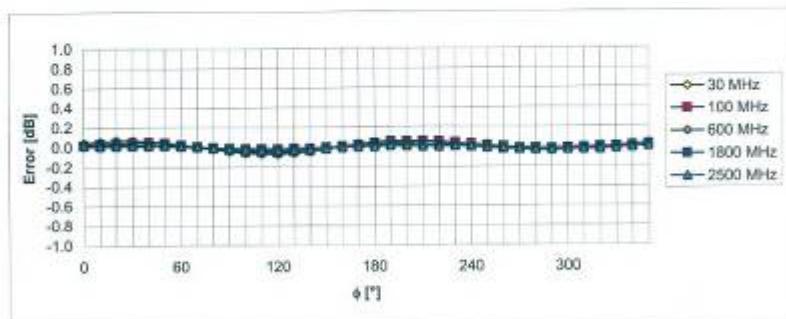
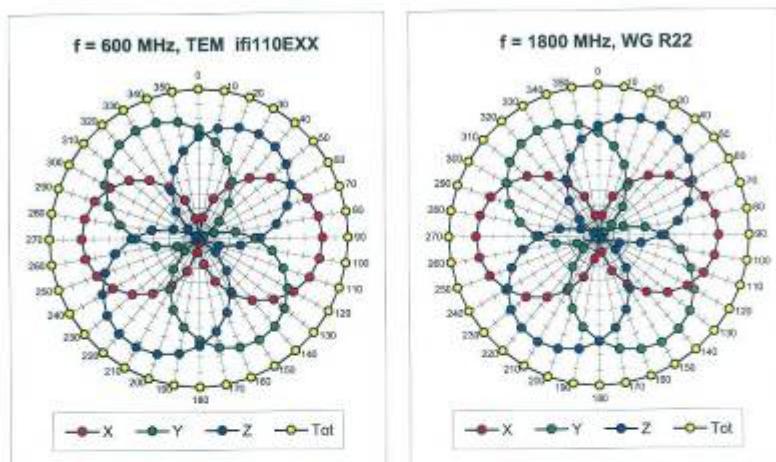
(TEM-Cell:ifi110 EXX, Waveguide: R22)

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

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ES3DV3 SN:3172

June 23, 2008

**Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$** Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

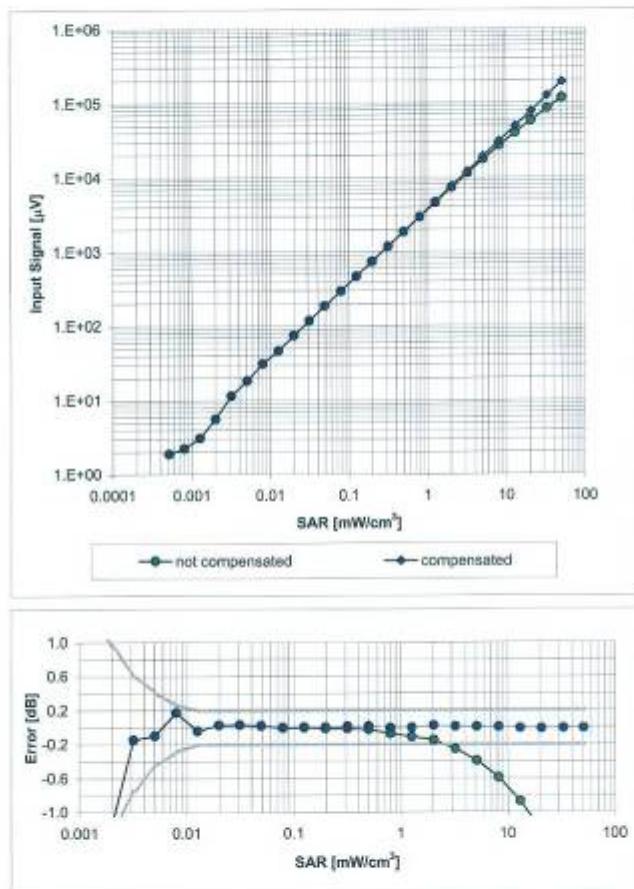
Certificate No: ES3-3172\_Jun08

Page 6 of 9

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ES3DV3 SN:3172

June 23, 2008

**Dynamic Range f(SAR<sub>head</sub>)**  
(Waveguide R22, f = 1800 MHz)

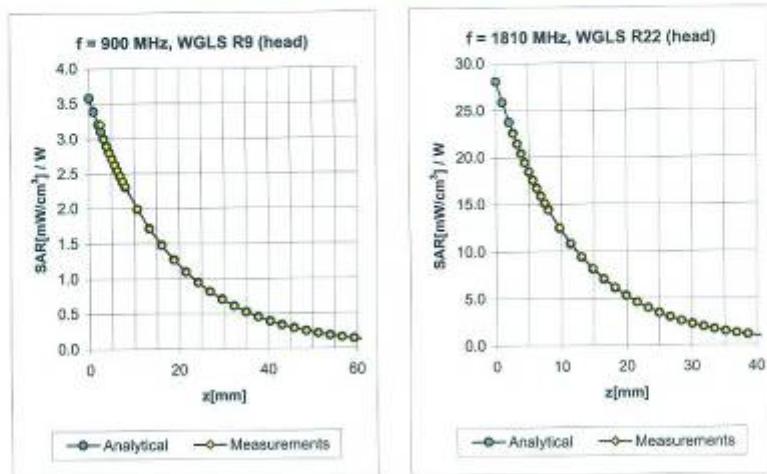
Certificate No: ES3-3172\_Jun08

Page 7 of 9

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ES3DV3 SN:3172

June 23, 2008

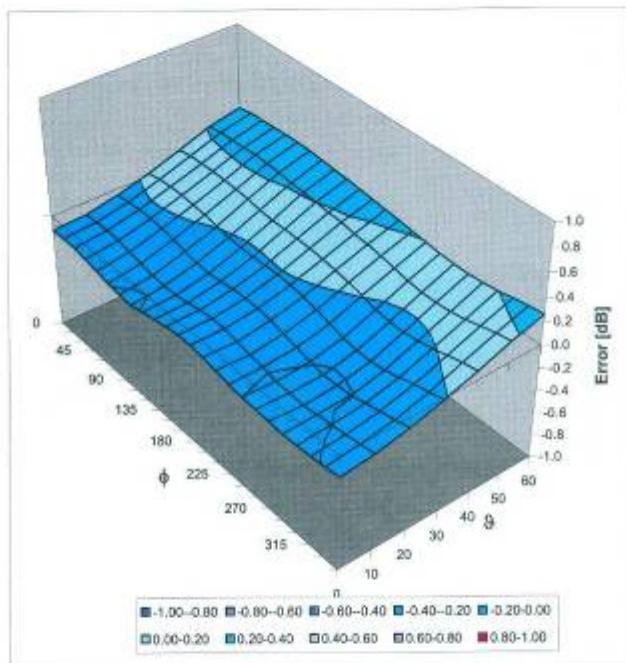
**Conversion Factor Assessment**

$f$ [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	$\pm 50 / \pm 100$	Head	$41.5 \pm 5\%$	$0.97 \pm 5\%$	0.23	2.36	$5.66 \pm 11.0\% (k=2)$
1810	$\pm 50 / \pm 100$	Head	$40.0 \pm 5\%$	$1.40 \pm 5\%$	0.32	2.07	$4.97 \pm 11.0\% (k=2)$
1950	$\pm 50 / \pm 100$	Head	$40.0 \pm 5\%$	$1.40 \pm 5\%$	0.65	1.40	$4.80 \pm 11.0\% (k=2)$
2450	$\pm 50 / \pm 100$	Head	$39.2 \pm 5\%$	$1.80 \pm 5\%$	0.72	1.34	$4.38 \pm 11.0\% (k=2)$
900	$\pm 50 / \pm 100$	Body	$55.0 \pm 5\%$	$1.05 \pm 5\%$	0.35	1.83	$5.61 \pm 11.0\% (k=2)$
1810	$\pm 50 / \pm 100$	Body	$53.3 \pm 5\%$	$1.52 \pm 5\%$	0.55	1.50	$4.73 \pm 11.0\% (k=2)$
1950	$\pm 50 / \pm 100$	Body	$53.3 \pm 5\%$	$1.52 \pm 5\%$	0.80	1.35	$4.57 \pm 11.0\% (k=2)$
2450	$\pm 50 / \pm 100$	Body	$52.7 \pm 5\%$	$1.95 \pm 5\%$	0.75	1.25	$3.92 \pm 11.0\% (k=2)$

<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.

ES3DV3 SN:3172

June 23, 2008

**Deviation from Isotropy in HSL**Error ( $\phi$ ,  $\theta$ ),  $f = 900$  MHzUncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

Certificate No: ES3-3172\_Jun08

Page 9 of 9

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## 7. Uncertainty Analysis

### DASY5 Uncertainty Budget According to IEEE 1528 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	$(c_i)$ 1g	$(c_i)$ 10g	Std. Unc. (1g)	Std. Unc. (10g)	$(v_i)$ $v_{eff}$
Measurement System								
Probe Calibration	±5.9%	N	1	1	1	±5.9%	±5.9%	∞
Axial Isotropy	±4.7%	R	$\sqrt{3}$	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	$\sqrt{3}$	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effects	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	$\sqrt{3}$	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	$\sqrt{3}$	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Test Sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	$\sqrt{3}$	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	$\sqrt{3}$	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Std. Uncertainty						±10.9%	±10.7%	387
Expanded STD Uncertainty						±21.9%	±21.4%	

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## 8. Phantom description

Schmid &amp; 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'S 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 I

- [4] FCC OET Bulletin 65, Supplement C, Edition 01-01

(\*) The IT'S 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

## 9. System Validation from Original equipment supplier

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



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

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

Accreditation No.: SCS 108

Client SGS (Auden)

Certificate No: D835V2-4d063\_Jun08

### CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d063
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	June 06, 2008
Condition of the calibrated item	In Tolerance

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

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

#### Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Type-N mismatch combination	SN: 5047.2 / 06327	08-Aug-07 (No. 217-00721)	Aug-08
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. E53-3025_Apr08)	Apr-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (In house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	04-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

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

Issued: June 13, 2008

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

Certificate No: D835V2-4d063\_Jun08

Page 1 of 9

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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:

- 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
- 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:

- 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	DASY4	V4.7
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	40.4 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature during test	(21.6 ± 0.2) °C	—	—

**SAR result with Head TSL**

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.29 mW / g
SAR normalized	normalized to 1W	9.16 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	9.14 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.52 mW / g
SAR normalized	normalized to 1W	6.08 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	6.05 mW / g ± 16.5 % (k=2)

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

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.2	0.97 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	53.4 ± 6 %	0.99 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(21.5 ± 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	2.44 mW / g
SAR normalized	normalized to 1W	9.76 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	9.43 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.61 mW / g
SAR normalized	normalized to 1W	6.44 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	6.28 mW / g ± 16.5 % (k=2)

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

**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.0 $\Omega$ - 2.4 $\text{j}\Omega$
Return Loss	-28.6 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	48.2 $\Omega$ - 4.2 $\text{j}\Omega$
Return Loss	-26.7 dB

**General Antenna Parameters and Design**

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

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

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

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

**Additional EUT Data**

Manufactured by	SPEAG
Manufactured on	November 27, 2006

**DASY4 Validation Report for Head TSL**

Date/Time: 05.06.2008 14:11:53

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063**

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

Medium: HSL 900 MHz;

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.879$  mho/m;  $\epsilon_r = 40.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

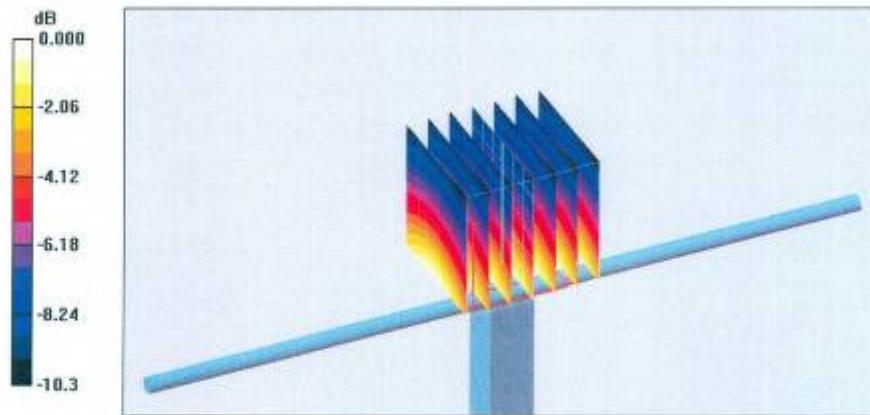
Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

**DASY4 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(5.97, 5.97, 5.97); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA, ;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

**Pin=250mW; dip=15mm; dist=3.4mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 55.3 V/m; Power Drift = -0.021 dB  
Peak SAR (extrapolated) = 3.36 W/kg  
SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.52 mW/g  
Maximum value of SAR (measured) = 2.58 mW/g

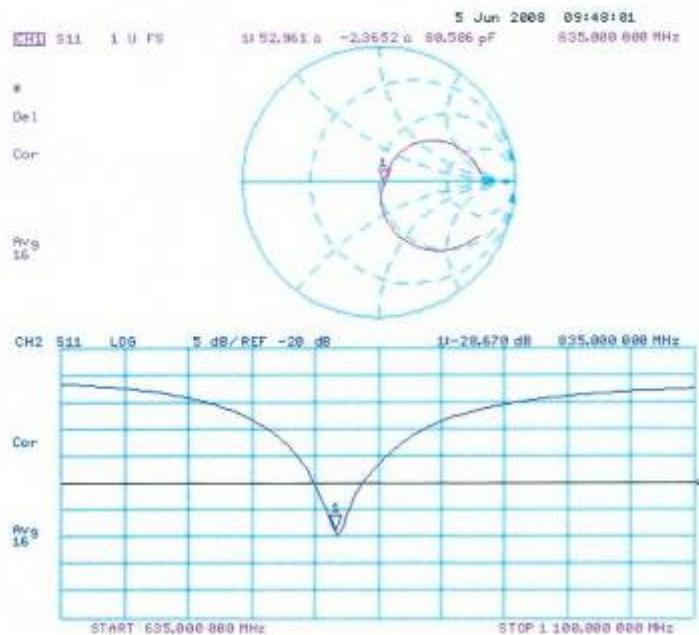


0 dB = 2.58mW/g

Certificate No: D835V2-4d063\_Jun08

Page 8 of 9

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**Impedance Measurement Plot for Head TSL**

**DASY4 Validation Report for Body TSL**

Date/Time: 06.06.2008 14:01:1

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063**

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

Medium: MSL900;

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 53.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

**DASY4 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(5.9, 5.9, 5.9); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

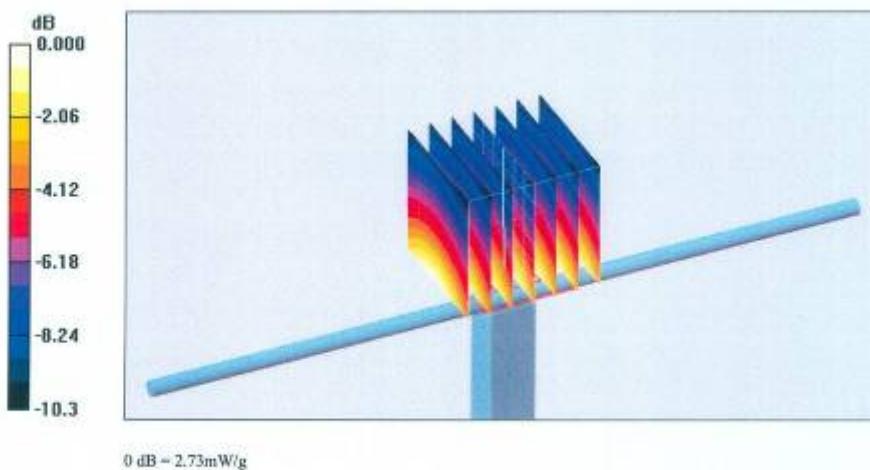
**Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.6 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.61 mW/g

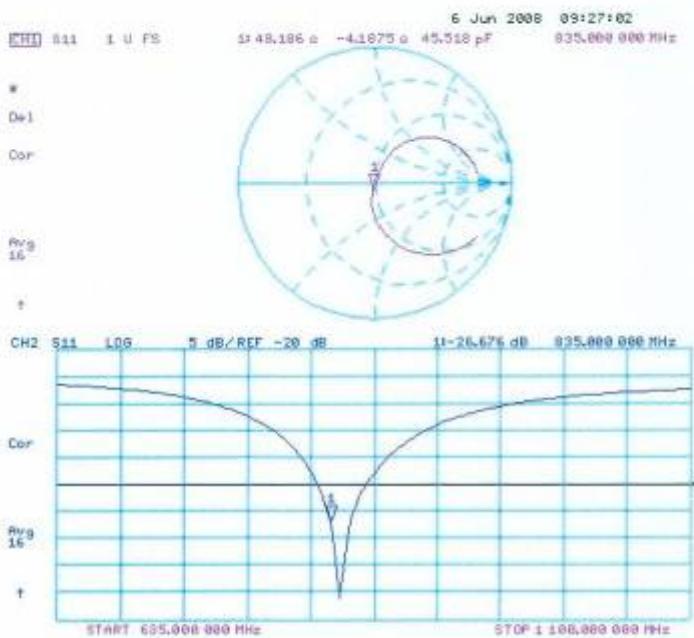
Maximum value of SAR (measured) = 2.73 mW/g



Certificate No: D835V2-4d063\_Jun08

Page 8 of 9

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**Impedance Measurement Plot for Body TSL**

Certificate No: D835V2-4d063\_Jun08

Page 9 of 9

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Accreditation No.: SCS 108

Client **SGS (Auden)**

Certificate No: D1900V2-5d027\_Apr08

**CALIBRATION CERTIFICATE**Object **D1900V2 - SN: 5d027**Calibration procedure(s) **QA CAL-05.v7**  
Calibration procedure for dipole validation kitsCalibration date: **April 15, 2008**Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&amp;TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (No. 217-00718)	Aug-08
Type-N mismatch combination	SN: 5047.2 / 06327	08-Aug-07 (No. 217-00721)	Aug-08
Reference Probe ES3DV2	SN: 3025	01-Mar-08 (No. ES3-3025_Mar08)	Mar-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-08
RF generator R&S SMT-08	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390565 S4206	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

Calibrated by:	Name	Function	Signature
	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 17, 2008

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

Certificate No: D1900V2-5d027\_Apr08

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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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz)", July 2001
- 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 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	DASY4	V4.7
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	40.1 ± 6 %	1.47 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	10.3 mW / g
SAR normalized	normalized to 1W	41.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	40.2 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.30 mW / g
SAR normalized	normalized to 1W	21.2 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	21.0 mW / g ± 16.5 % (k=2)

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

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.3	1.52 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	51.4 ± 6 %	1.56 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(20.7 ± 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	9.64 mW / g
SAR normalized	normalized to 1W	38.6 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	37.2 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.07 mW / g
SAR normalized	normalized to 1W	20.3 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	19.8 mW / g ± 16.5 % (k=2)

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

**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.9 $\Omega$ + 6.2 $j\Omega$
Return Loss	- 24.0 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	48.6 $\Omega$ + 6.3 $j\Omega$
Return Loss	- 23.8 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.197 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

**DASY4 Validation Report for Head TSL**

Date/Time: 08.04.2008 13:49:58

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: HSL U10 BB;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

## DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.9, 4.9, 4.9); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

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

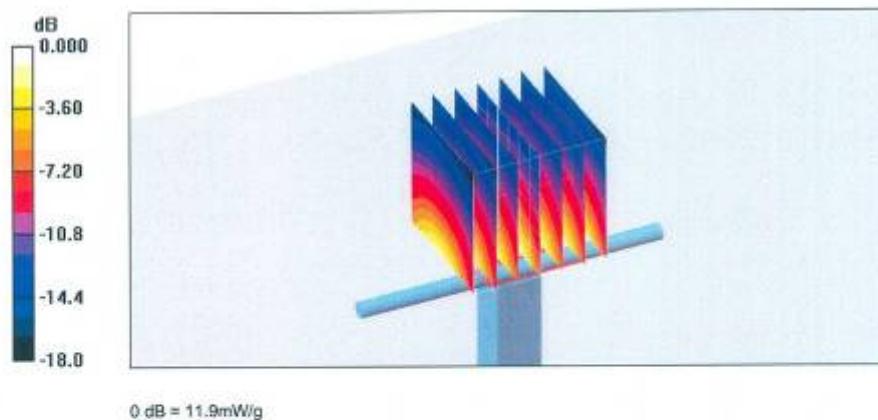
Measurement grid: dx=5mm, dy=5mm, dz=5mm

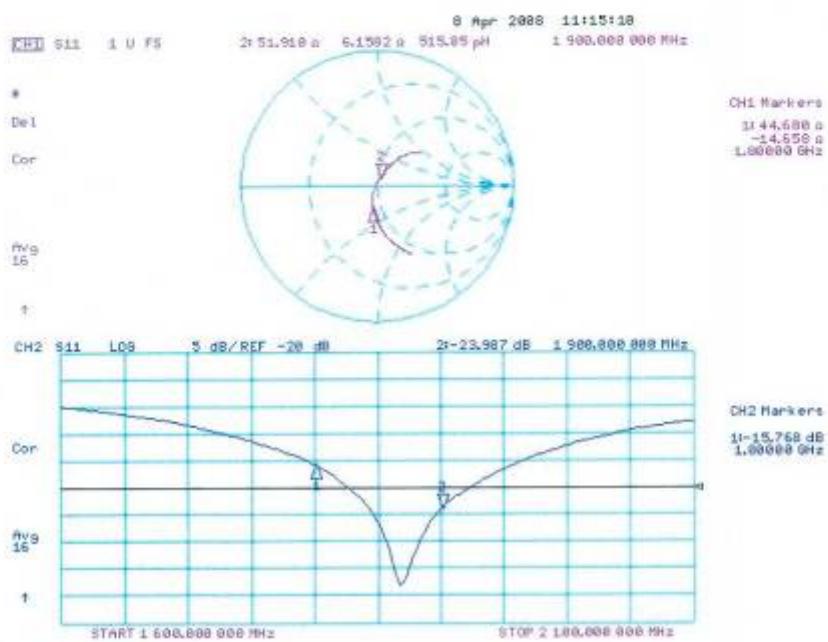
Reference Value = 92.2 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 19.1 W/kg

**SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.3 mW/g**

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



**Impedance Measurement Plot for Head TSL**

**DASY4 Validation Report for Body TSL**

Date/Time: 15.04.2008 13:51:25

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;  $\sigma = 1.56$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

**DASY4 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(4.5, 4.5, 4.5); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn801; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

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

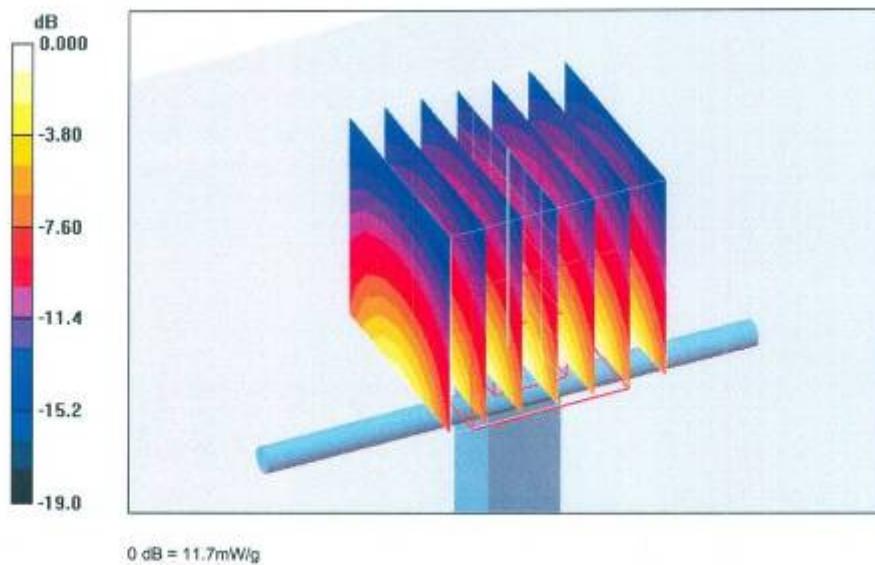
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.3 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 17.4 W/kg

**SAR(1 g) = 9.64 mW/g; SAR(10 g) = 5.07 mW/g**

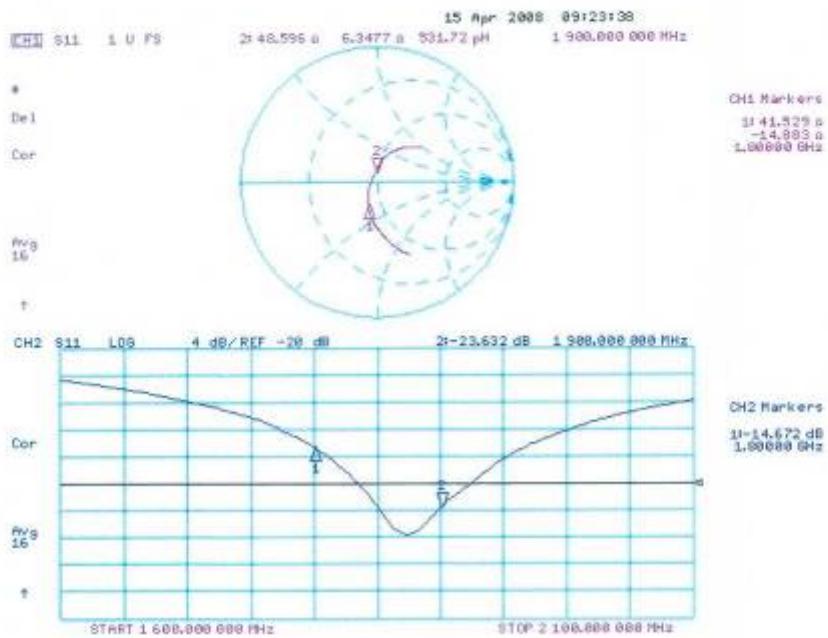
Maximum value of SAR (measured) = 11.7 mW/g



Certificate No: D1900V2-5d027\_Apr08

Page 8 of 9

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**Impedance Measurement Plot for Body TSL**

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client: SGS (Auden)

Certificate No: D2450V2-727\_Apr08

## CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 727

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

Calibration date: April 11, 2008

Condition of the calibrated item: In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (No. 217-00718)	Aug-08
Reference Probe ES3DV2	SN: 3025	01-Mar-08 (No. ES3-3025_Mar08)	Mar-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-08	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 84208	18-Oct-01 (in house check Oct-07)	In house check: Oct-06

Calibrated by:	Name: Mike Moll	Function: Laboratory Technician	Signature:
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 14, 2008

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

Certificate No: D2450V2-727\_Apr08

Page 1 of 9

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Calibration Laboratory of  
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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:

- 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
- 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:

- 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	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	$dx, dy, dz = 5 \text{ mm}$	
Frequency	$2450 \text{ MHz} \pm 1 \text{ MHz}$	

**Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	$22.0 \text{ }^{\circ}\text{C}$	39.2	$1.80 \text{ mho/m}$
Measured Head TSL parameters	$(22.0 \pm 0.2) \text{ }^{\circ}\text{C}$	$39.4 \pm 6 \text{ \%}$	$1.84 \text{ mho/m} \pm 6 \text{ \%}$
Head TSL temperature during test	$(21.6 \pm 0.2) \text{ }^{\circ}\text{C}$	-----	-----

**SAR result with Head TSL**

SAR averaged over $1 \text{ cm}^3$ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	$13.9 \text{ mW/g}$
SAR normalized	normalized to 1W	$55.6 \text{ mW/g}$
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	$55.2 \text{ mW/g} \pm 17.0 \text{ \% (k=2)}$

SAR averaged over $10 \text{ cm}^3$ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	$6.44 \text{ mW/g}$
SAR normalized	normalized to 1W	$25.8 \text{ mW/g}$
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	$25.7 \text{ mW/g} \pm 16.5 \text{ \% (k=2)}$

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

**Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	1.98 mho/m ± 6 %
Body TSL temperature during test	(21.2 ± 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	13.2 mW / g
SAR normalized	normalized to 1W	52.8 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	51.4 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.15 mW / g
SAR normalized	normalized to 1W	24.6 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	24.2 mW / g ± 16.5 % (k=2)

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

**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.2 $\Omega$ + 3.3 $\Omega$
Return Loss	-27.0 dB

**Antenna Parameters with Body TSL**

Impedance, transformed to feed point	50.6 $\Omega$ + 7.5 $\Omega$
Return Loss	-22.5 dB

**General Antenna Parameters and Design**

Electrical Delay (one direction)	1.149 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	January 9, 2003

**DASY4 Validation Report for Head TSL**

Date/Time: 11.04.2008 13:11:14

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN727**

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.84$  mho/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

**DASY4 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 01.03.2008
- Sensor Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

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

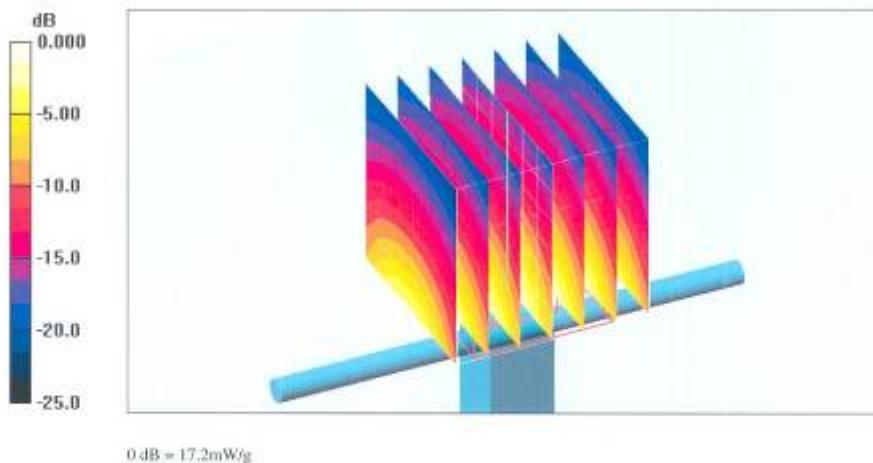
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.0 V/m; Power Drift = 0.015 dB

Peak SAR (extrapolated) = 28.6 W/kg

SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.44 mW/g

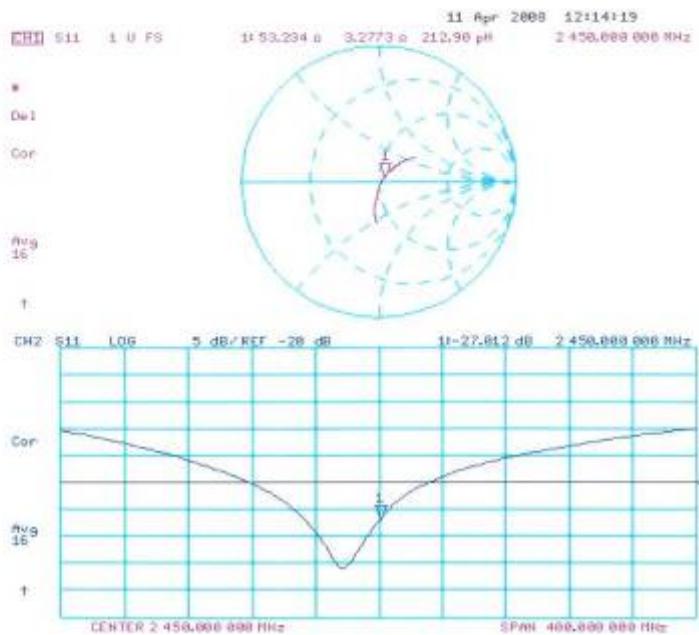
Maximum value of SAR (measured) = 17.2 mW/g



Certificate No: D2450V2-727\_Apr08

Page 6 of 9

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**Impedance Measurement Plot for Head TSL**

**DASY4 Validation Report for Body TSL**

Date/Time: 11.04.2008 15:23:03

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN727**

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL U10;

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.99$  mho/m;  $\epsilon_r = 51$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

**DASY4 Configuration:**

- Probe: ES3DV2 - SN3025; ConvF(4.07, 4.07, 4.07); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

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

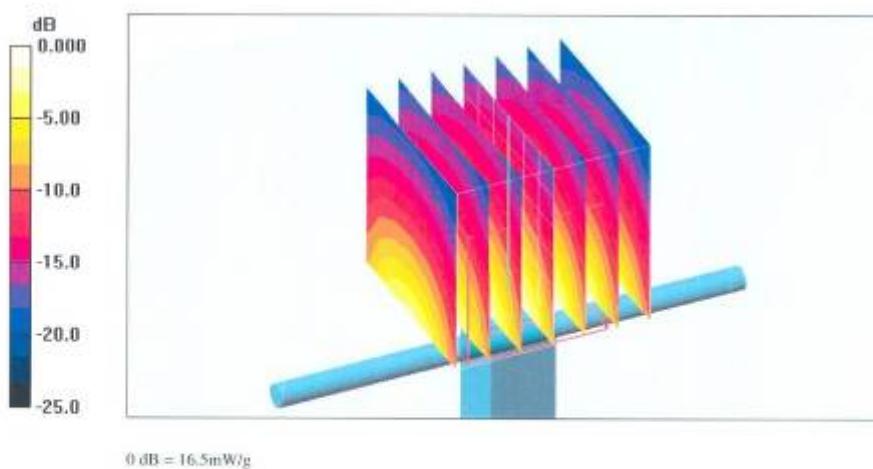
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.5 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 26.5 W/kg

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.15 mW/g

Maximum value of SAR (measured) = 16.5 mW/g

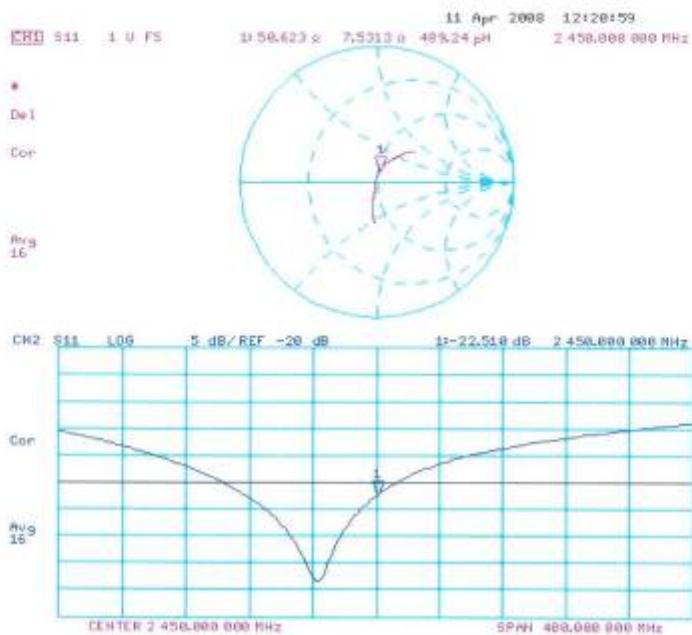


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Page 8 of 9

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## Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-727\_Apr08

Page 9 of 9

End of 1<sup>st</sup> part of report

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