

# SAR TEST REPORT

Equipment Under Test	PDA Scanner
Model Name	PA550
Company Name	unitech electronics co., ltd.
Company Address	5F, No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan
Date of Receipt	2011.07.04
Date of Test(s)	2011.07.27-2011.07.29
Date of Issue	2011.09.01

Standards:

**FCC OET Bulletin 65 supplement C,  
IEEE/ANSI 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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Tested by : Ricky Huang   
Asst. Supervisor

Date : 2011.09.01

Approved by : Nick Hsu   
Supervisor

Date : 2011.09.01

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**Revision Version**

Report Number	Revision	Date	Memo
ES/2011/70002	00	2011/09/01	Initial creation of test report.

**This test report contains a reference to the previous version test report that it replaces.**

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## 1. General Information

### 1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory	
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Taipei county, Taiwan, R.O.C.	
Telephone	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	<a href="http://www.tw.sgs.com/">http://www.tw.sgs.com/</a>

### 1.2 Details of Applicant

Company Name	unitech electronics co., ltd.
Company Address	5F, No. 136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan
Contact Person	Chris Yeh
TEL	02-8912-1122 #393
E-mail	chrisY@tw.ute.com

### 1.3 Description of EUT

EUT Name	PDA Scanner
Model Name	PA550
IMEI Code	354114013220174
FCC ID	HLEPA550BTGGR
Mode of Operation	GSM/GPRS/EDGE/WCDMA/HSDPA/ HSUPA/WLAN802.11 b/g band

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Definition	Production unit				
Duty Cycle	GSM		GPRS/ EDGE	WCDMA	WLAN 802.11 b/g
	1/8.3		1/4.1	1	1
TX Frequency Range (MHz)	GSM850	GSM1900	WCDMA Band II	WCDMA Band V	WLAN 802.11 b/g
	824.2-848.8	1850.2-1909.8	1852.4-1907.6	826.4-846.6	2412-2462
Channel Number (ARFCN)	GSM850	GSM1900	WCDMA Band II	WCDMA Band V	WLAN 802.11 b/g
	128-251	512-810	9262-9538	4132-4233	1-11
VOIP Function	No				

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		<b>GSM850</b>	
		Head	Body
Max. SAR Measured (1 g)	<b>0.086 mW/g</b> (At GSM 850 Left Head (Cheek Position)_ 251 Channel)		<b>0.284 mW/g</b> (At GPRS 850 _Body_ 190 channel)
<b>GSM1900</b>			
Head	Body		
<b>0.085 mW/g</b> (At GSM 1900 Left Head (15° Tilt Position)_ 661 channel)		<b>0.175mW/g</b> (At GPRS 1900 _ Body_ 661 channel)	
<b>WCDMA Band II</b>			
Head	Body		
<b>0.285 mW/g</b> (At WCDMA Band II_Right Head (15° Tilt Position)_ 9538 channel)		<b>0.319 mW/g</b> (At WCDMA Band II_ Body_ 9400 channel)	
<b>WCDMA Band V</b>			
Head	Body		
<b>0.109 mW/g</b> (At WCDMA Band V_Right Head (Cheek Position)_ 4233 channel)		<b>0.172 mW/g</b> (At WCDMA Band V_Body_ 4183 channel)	
<b>WLAN802.11 b</b>			
Body			
<b>0.017 mW/g</b> (At WLAN802.11b_body_ 6 channel_ repeated with memory card)			

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**#. GSM/GPRS/EDGE conducted power table:**

<b>Burst average power</b>				
<b>EUT Mode</b>	<b>Frequency (MHz)</b>	<b>CH</b>	<b>Peak Power (dBm)</b>	<b>Avg. Power (dBm)</b>
GSM 850	824.2	128	31.00	30.90
	836.6	190	31.20	31.20
	848.8	251	31.50	31.30
<b>Source-based time average power</b>				
<b>EUT Mode</b>	<b>Frequency (MHz)</b>	<b>CH</b>	<b>Peak Power (dBm)</b>	<b>Avg. Power (dBm)</b>
GSM 850	824.2	128	21.97	21.87
	836.6	190	22.17	22.17
	848.8	251	22.47	22.27

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Burst average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
GPRS 850 (Class 10)	824.2	128	31.00	30.90	29.70	29.60
	836.6	190	31.20	31.10	29.60	29.50
	848.8	251	31.40	31.30	29.80	29.70
Source-based time average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
GPRS 850 (Class 10)	824.2	128	21.97	21.87	23.68	23.58
	836.6	190	22.17	22.07	23.58	23.48
	848.8	251	22.37	22.27	23.78	23.68

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Burst average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
EDGE 850 (Class 10)	824.2	128	29.00	25.90	27.10	23.90
	836.6	190	29.30	26.10	27.20	24.10
	848.8	251	29.40	26.30	27.50	24.30
Source-based time average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
EDGE 850 (Class 10)	824.2	128	19.97	16.87	21.08	17.88
	836.6	190	20.27	17.07	21.18	18.08
	848.8	251	20.37	17.27	21.48	18.28

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Burst average power				
EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Avg. Power (dBm)
GSM 1900	1850.2	512	29.10	28.90
	1880.0	661	28.80	28.70
	1909.8	810	28.40	28.50
Source-based time average power				
EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Avg. Power (dBm)
GSM 1900	1850.2	512	20.07	19.87
	1880.0	661	19.77	19.67
	1909.8	810	19.37	19.47

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Burst average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
GPRS 1900 (Class 10)	1850.2	512	29.10	29.00	27.50	27.30
	1880.0	661	28.80	28.70	27.20	27.10
	1909.8	810	28.40	28.20	26.80	26.90
Source-based time average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
GPRS 1900 (Class 10)	1850.2	512	20.07	19.97	21.48	21.28
	1880.0	661	19.77	19.67	21.18	21.08
	1909.8	810	19.37	19.17	20.78	20.88

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Burst average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
EDGE 1900 (Class 10)	1850.2	512	29.20	26.00	27.20	24.00
	1880.0	661	29.00	25.70	27.00	23.80
	1909.8	810	28.50	25.20	26.40	23.20
Source-based time average power						
EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)
EDGE 1900 (Class 10)	1850.2	512	20.17	16.97	21.18	17.98
	1880.0	661	19.97	16.67	20.98	17.78
	1909.8	810	19.47	16.17	20.38	17.18

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**#. WCDMA Band II & V HSDPA/HSUPA conducted power table:**

		WCDMA Band II Channel			WCDMA Band V Channel		
Mode	Subtest	9262	9400	9538	4132	4183	4233
Rel99	R99	21.59	21.05	20.32	23.5	23.45	23.71
HSDPA	1	21.76	20.94	20.18	23.29	23.31	23.83
	2	21.47	20.91	20.17	23.43	23.34	23.58
	3	21.28	20.49	19.65	22.83	22.83	23.34
	4	21.35	20.5	19.77	22.88	22.87	23.4
HSUPA	1	21.51	21.03	20.26	23.46	23.38	23.63
	2	19.56	19.1	18.3	21.52	21.46	21.67
	3	20.57	20.05	19.34	22.5	22.44	22.71
	4	19.69	19.15	18.34	21.57	21.52	21.75
	5	21.4	20.89	20.17	23.32	23.21	23.52

**#. WLAN802.11 b/g conducted power table:**

WLAN802.11 b	2412	2437	2462
Peak power	16.95	16.49	16.63
Avge power	14.4	13.96	14.21
WLAN802.11 g	2412	2437	2462
Peak power	15.23	16.57	16.72
Avge power	12.06	13.07	13.24

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## 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 (R&S CMU200), and the communication between the EUT and the tester is established by air link.
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 DASY4 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.

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

6. When the maximum transmitter and antenna output power are  $\leq 60/f(\text{GHz})$  (mW) SAR evaluation is typically not required for FCC or TCB approval (BT power= 2.44dBm)
7. According to KDB248227-SAR is not required for 802.11 g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.
8. According to KDB941225 D03 and KDB941225 D04 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.
9. According to KDB941225 D01 to exclude SAR test requirements for HSPA modes due to the maximum average output power of HSPA active is less than 1/4 dB higher than that measured without HSPA using 12.2kbps RMC.
10. The highest 1-g SAR for WLAN is 0.017 W/kg(Hotspot mode\_Back side) and the highest 1-g SAR for WWAN is 0.319W/kg(Hotspot mode\_Back side). The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is  $0.017+0.319 = 0.336$  W/kg  $< 1.6$  W/kg. According to KDB648474/ KDB447498 /KDB248227 Simultaneous SAR evaluation is not required.

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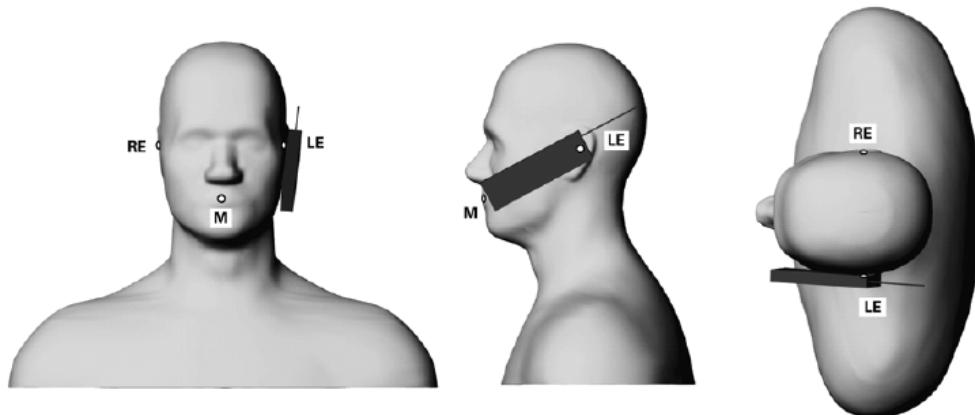
**Additional configuration(Head):**

11. For highest SAR configuration in this band repeated with external Memory card inside.

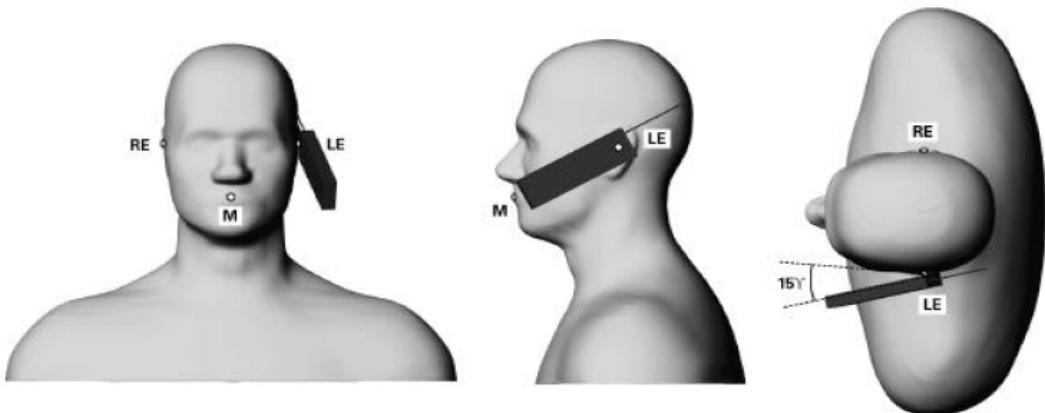
**Additional configuration(Body):**

12. For highest SAR configuration in this band repeated with external Memory card inside.

## 1.6 Positioning Procedure



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:

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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 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,

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the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans.

The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is moved around until the highest averaged SAR is found.

If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

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## 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 4 professional system). A Model EX3DV4 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.

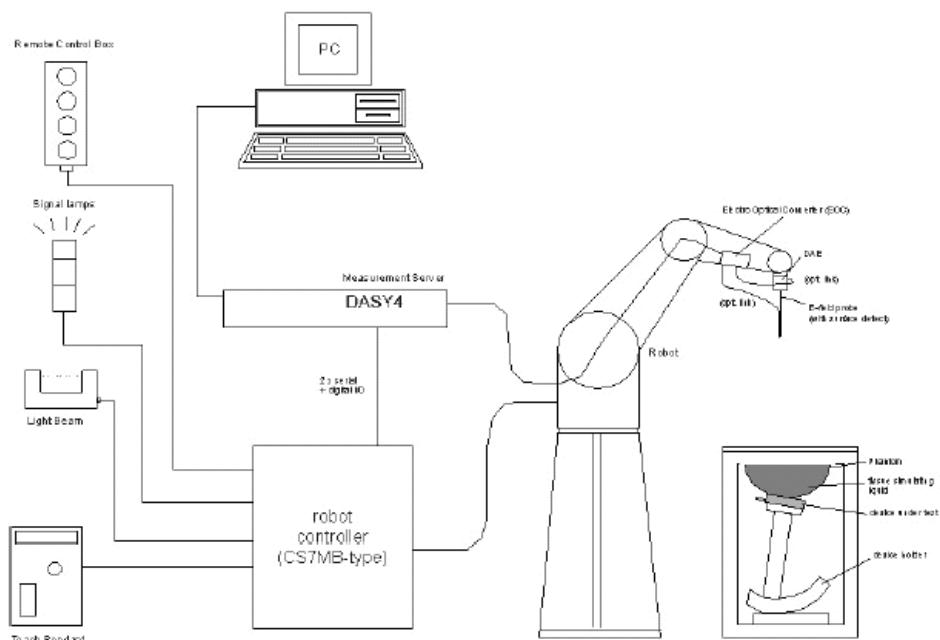


Fig.a The block diagram of SAR system

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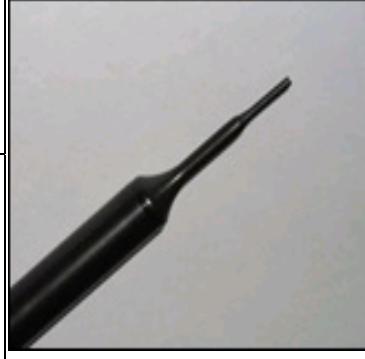
The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach 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.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

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## 1.9 System Components

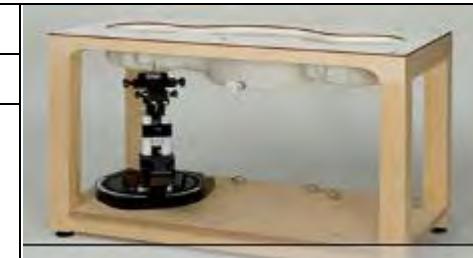
### EX3DV4 E-Field Probe

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 HSL835/1900/2450MHz Additional CF for other liquids and frequencies upon request	EX3DV4 E-Field Probe
Frequency:	10 MHz to > 6 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)	
Directivity:	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)	
Dynamic Range:	10 $\mu$ W/g to > 100 mW/g; Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/g)	
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

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**SAM PHANTOM V4.0C**

Construction:	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.	
Shell Thickness:	2 ± 0.2 mm	
Filling Volume:	Approx. 25 liters	
Dimensions:	Height: 251 mm; Length: 1000 mm; Width: 500 mm	


**DEVICE HOLDER**

Construction	In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).	 Device Holder
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## 1.10 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 835/1900/2450 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 22.1°C, the relative humidity was in the range 62% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

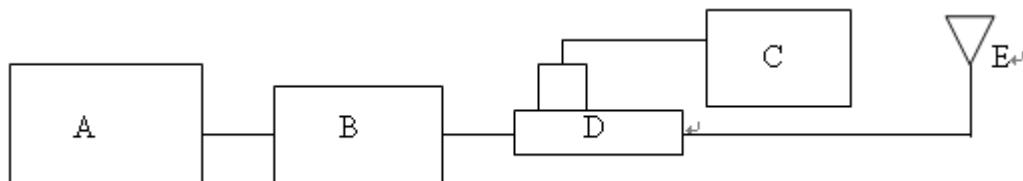
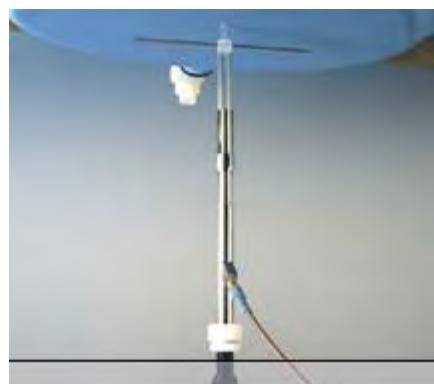


Fig.b The block diagram of system verification

- A. Agilent Model 8648D Signal Generator
- B. Mini circuits Model ZHL-42 Amplifier
- C. Agilent Model U2001B Power Sensor
- D. Agilent Model 778D/777D Dual directional coupling
- E. Reference dipole antenna



Photograph of the dipole Antenna

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Validation Kit	Frequency (MHz)	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Measured Date
D835V2 S/N: 4d063	835 MHz (Head)	2.31 mW/g	2.26mW/g	2011-07-27
D835V2 S/N: 4d063	835 MHz (Body)	2.43 mW/g	2.46mW/g	2011-07-27
D1900V2 S/N: 5d027	1900 MHz (Head)	10.1 mW/g	9.98mW/g	2011-07-28
D1900V2 S/N: 5d027	1900 MHz (Body)	9.93 mW/g	9.96mW/g	2011-07-28
D2450V2 S/N: 727	2450 MHz (Body)	12.7 mW/g	12.6mW/g	2011-07-29

Table 1. System validation (follow manufacture target value)

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## 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).

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the flat section 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		
			$\rho$	$\sigma$ (S/m)	Simulated Tissue Temperature( $^{\circ}$ C)
835	Head	Measured, 2011-07-27	41.2	0.889	21.7
		Recommended Limits	38.38-42.42	0.84-0.92	20-24
835	Body	Measured, 2011-07-27	55.4	1.02	21.7
		Recommended Limits	51.21-56.60	0.95-1.05	20-24
1900	Head	Measured, 2011-07-28	39.5	1.46	21.7
		Recommended Limits	36.96-40.85	1.34-1.48	20-24
1900	Body	Measured, 2011-07-28	51.5	1.59	21.7
		Recommended Limits	48.55-53.66	1.44-1.60	20-24
2450	Body	Measured, 2011-07-29	51.7	1.95	21.7
		Recommended Limits	48.07-53.13	1.81-2.01	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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## The composition of the brain tissue simulating liquid:

Ingredient	850MHz (Head)	850MHz (Body)	1900MHz (Head)	1900MHz (Body)	2450MHz (Body)
DGMBE	X	X	444.52 g	300.67g	301.7ml
Water	532.98 g	631.68 g	552.42 g	716.56 g	698.3ml
Salt	18.3 g	11.72 g	3.06 g	4.0 g	X
Prevento I 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

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the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube).

General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure.

Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .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

<b>Right Head (Cheek Position)</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	190	836.6	22.17dBm	0.074	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]
850 MHz	128	824.2	21.87dBm	0.078	22.1	21.7
	190	836.6	22.17dBm	0.078	22.1	21.7
	251	848.8	22.27dBm	0.086	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]
850 MHz	190	836.6	22.17dBm	0.070	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]
850 MHz	190	836.6	22.17dBm	0.061	22.1	21.7

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**Body worn\_ (testing in GPRS mode)\_multi class 10**

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	190	836.6	23.48dBm	0.284	22.1	21.7

#. Using KDB941225 D03 and KDB941225 D04 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is  $\leq$  100 MHz, testing for the other channels is not required.

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## 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	661	1880	19.67dBm	0.078	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	661	1880	19.67dBm	0.061	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	661	1880	19.67dBm	0.080	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	19.87 dBm	0.070	22.1	21.7
	661	1880	19.67 dBm	0.085	22.1	21.7
	810	1909.8	19.47 dBm	0.074	22.1	21.7

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**Body worn (testing in GPRS mode) \_multi class 10**

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	661	1880	21.08dBm	0.175	22.1	21.7

#. Using KDB941225 D03 and KDB941225 D04 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is  $\leq$  100 MHz, testing for the other channels is not required.

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## WCDMA Band II

### Right Head (Cheek Position)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
1900 MHz	9400	1880.00	21.05dBm	0.207	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]
1900 MHz	9400	1880.00	21.05dBm	0.166	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]
1900 MHz	9262	1852.40	21.59dBm	0.175	22.1	21.7
	9400	1880.00	21.05dBm	0.223	22.1	21.7
	9538	1907.60	20.32dBm	0.285	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]
1900 MHz	9400	1880.00	21.05dBm	0.208	22.1	21.7

### (For highest SAR configuration in this band)

### 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	9538	1907.60	20.32dBm	0.216	22.1	21.7

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**Body worn (testing in R99 mode)**

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[ °C]	Liquid Temp[ °C]
1900 MHz	9400	1880.00	21.05dBm	0.319	22.1	21.7

**(For highest SAR configuration in this band)****Body worn (testing in R99 mode) \_repeated for EUT front to phantom**

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[ °C]	Liquid Temp[ °C]
1900 MHz	9400	1880.00	21.05dBm	0.067	22.1	21.7

**(For highest SAR configuration in this band)****Body worn (testing in R99 mode) \_repeated with memory card**

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[ °C]	Liquid Temp[ °C]
1900 MHz	9400	1880.00	21.05dBm	0.316	22.1	21.7

#. Using KDB941225 D01 to exclude SAR test requirements for HSPA modes due to the maximum average output power of HSPA active is less than 1/4 dB higher than that measured without HSPA using 12.2kbps RMC

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is  $\leq$  100 MHz, testing for the other channels is not required.

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## WCDMA Band V

### Right Head (Cheek Position)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	4132	826.40	23.5dBm	0.052	22.1	21.7
	4183	836.60	23.45dBm	0.076	22.1	21.7
	4233	846.60	23.71dBm	0.109	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	4183	836.60	23.45dBm	0.075	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	4183	836.60	23.45dBm	0.058	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	4183	836.60	23.45dBm	0.055	22.1	21.7

### Body worn (testing in R99 mode)

Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
850 MHz	4183	836.60	23.45dBm	0.172	22.1	21.7

- #. Using KDB941225 D01 to exclude SAR test requirements for HSPA modes due to the maximum average output power of HSPA active is less than 1/4 dB higher than that measured without HSPA using 12.2kbps RMC
- #. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

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## WLAN802.11 b

<b>Body worn</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
2450 MHz	6	2437	13.96dBm	0.016	22.1	21.7
<b>Body worn_repeated for EUT front to phantom</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
2450 MHz	6	2437	13.96dBm	0.00674	22.1	21.7
<b>Body worn_repeated with Bluetooth active</b>						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[°C]	Liquid Temp[°C]
2450 MHz	6	2437	13.96dBm	0.015	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]
2450 MHz	6	2437	13.96dBm	0.017	22.1	21.7

#. Using **KDB248227**-SAR is not required for 802.11 g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is  $\leq$  100 MHz, testing for the other channels is not required.

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### 3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3770	Apr.19.2011
Schmid & Partner Engineering AG	835 /1900 /2450 MHz System Validation Dipole	D835V2	4d063	May.25.2011
		D1900V2	5d027	Apr.19.2011
		D2450V2	727	Apr.19.2011
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Aug.18.2010
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 80	N/A	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.16.2011
HP	Dielectric Probe Kit	85070D	US01440168	Calibration not required
Agilent	Dual-directional coupler	778D	50313	Aug.25.2010
		777D	50114	Aug.25.2010
Agilent	RF Signal Generator	8648D	3847M00432	Jun.01.2011
Agilent	Power Sensor	U2001B	MY48100169	Apr.28.2011
R&S	Radio Communication Test	CMU200	113505	May.31.2011

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## 4. Measurements

Date: 2011/7/27

### RE Cheek\_CH190

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

Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.079 mW/g

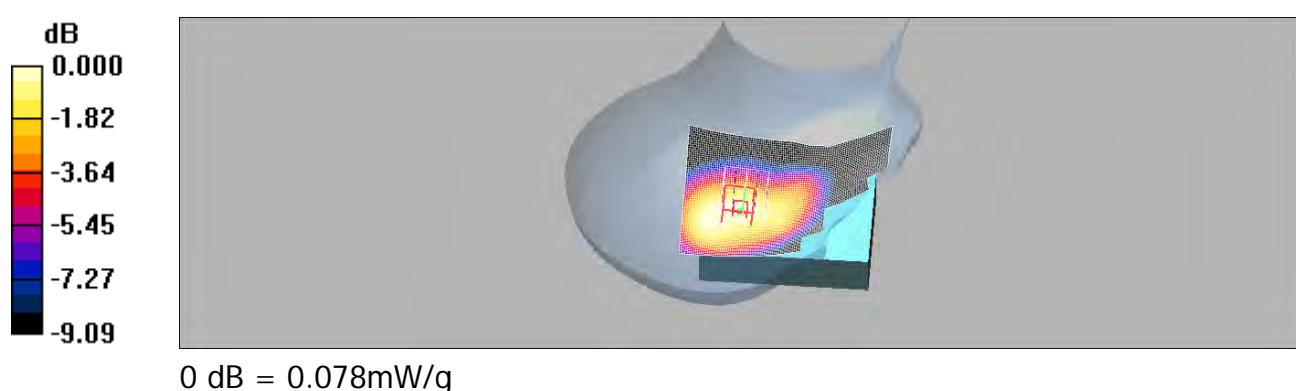
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.07 V/m; Power Drift = 0.114 dB

Peak SAR (extrapolated) = 0.105 W/kg

**SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.052 mW/g**

Maximum value of SAR (measured) = 0.078 mW/g



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## LE Cheek\_CH128

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

Medium: Head 900 MHz Medium parameters used (interpolated):  $f = 824.2$  MHz;  $\sigma = 0.878$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.082 mW/g

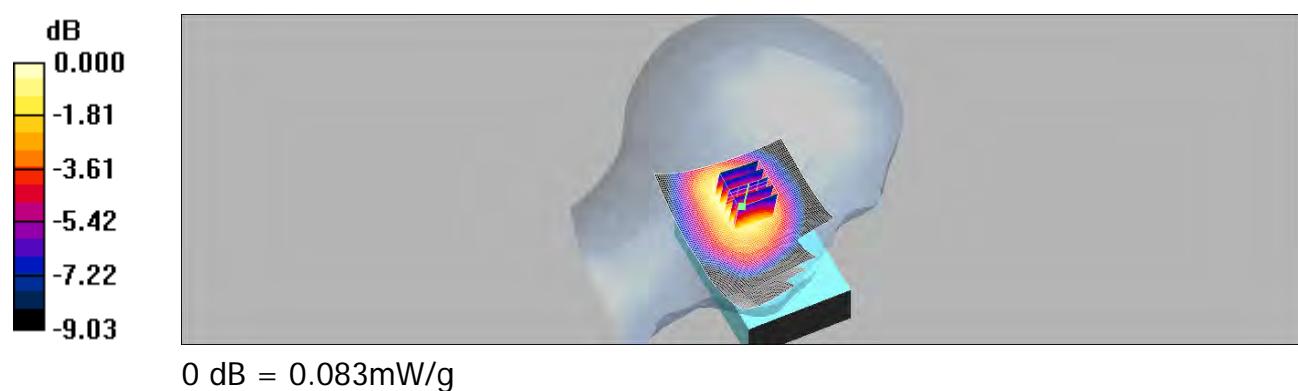
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.75 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 0.105 W/kg

**SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.056 mW/g**

Maximum value of SAR (measured) = 0.083 mW/g



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Date: 2011/7/27

## LE Cheek\_CH190

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

Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.083 mW/g

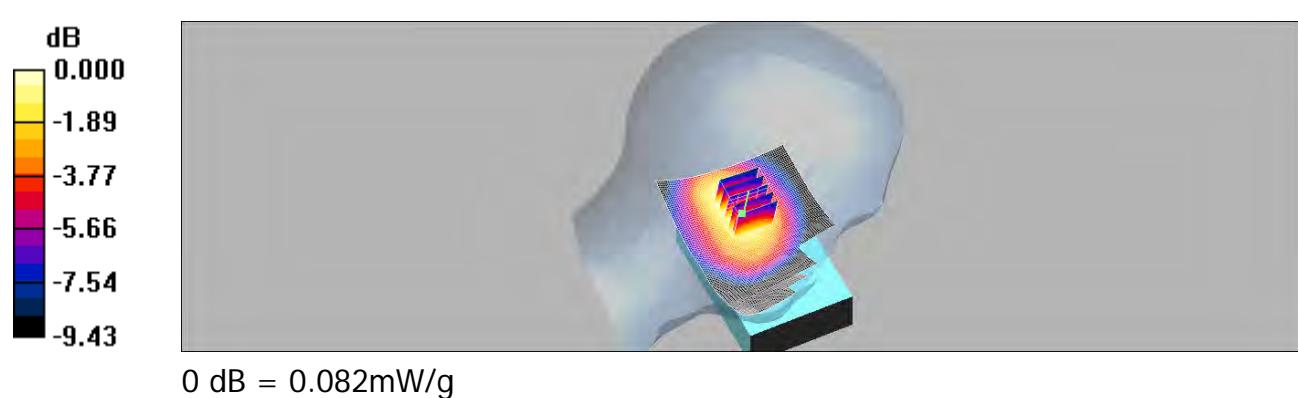
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.71 V/m; Power Drift = -0.043 dB

Peak SAR (extrapolated) = 0.107 W/kg

**SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.056 mW/g**

Maximum value of SAR (measured) = 0.082 mW/g



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## LE Cheek\_CH251

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

Medium: Head 900 MHz Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.902$  mho/m;  $\epsilon_r = 41$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.092 mW/g

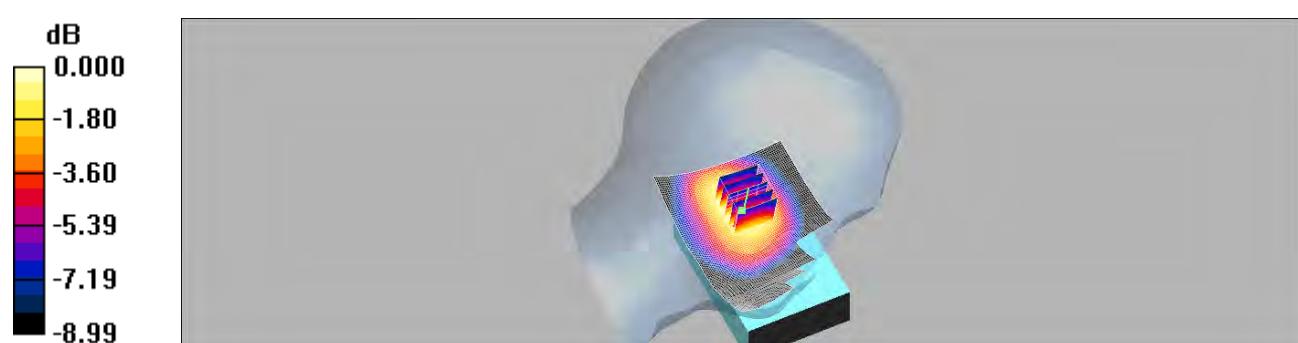
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.72 V/m; Power Drift = 0.136 dB

Peak SAR (extrapolated) = 0.115 W/kg

**SAR(1 g) = 0.086 mW/g; SAR(10 g) = 0.061 mW/g**

Maximum value of SAR (measured) = 0.091 mW/g



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Date: 2011/7/27

## RE Tilt\_CH190

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

Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.076 mW/g

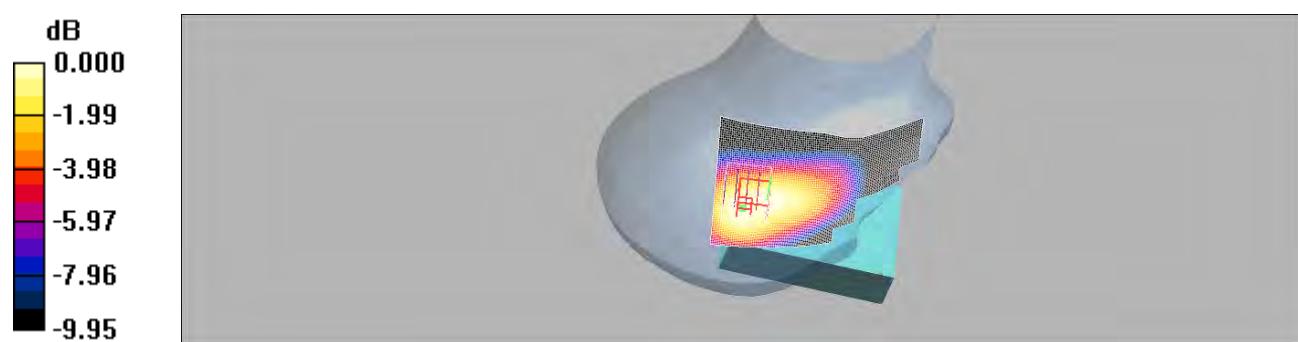
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.88 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 0.094 W/kg

**SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.051 mW/g**

Maximum value of SAR (measured) = 0.073 mW/g



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Date: 2011/7/27

## LE Tilt\_CH190

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

Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.066 mW/g

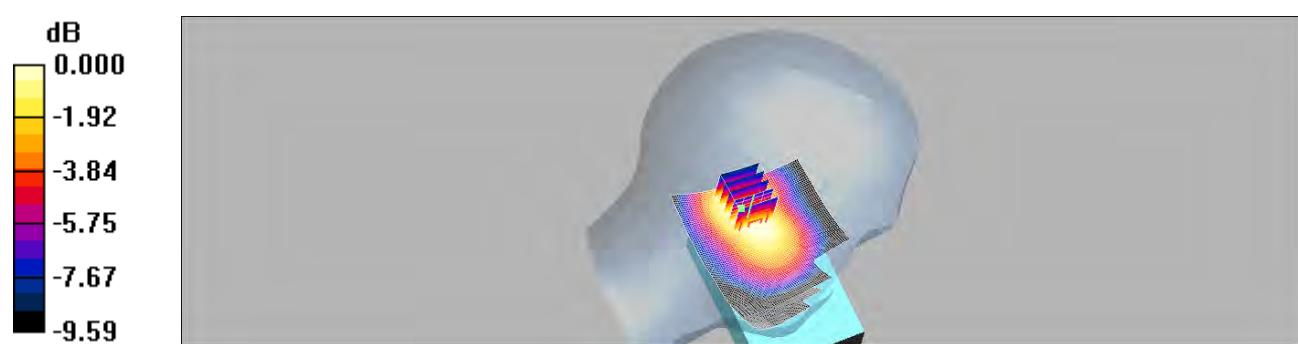
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.31 V/m; Power Drift = 0.099 dB

Peak SAR (extrapolated) = 0.083 W/kg

**SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.045 mW/g**

Maximum value of SAR (measured) = 0.064 mW/g



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## Body\_CH190\_multi class 10

Communication System: GSM 850; Frequency: 836.6 MHz; Duty Cycle: 1:4.1  
Medium: Muscle 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.312 mW/g

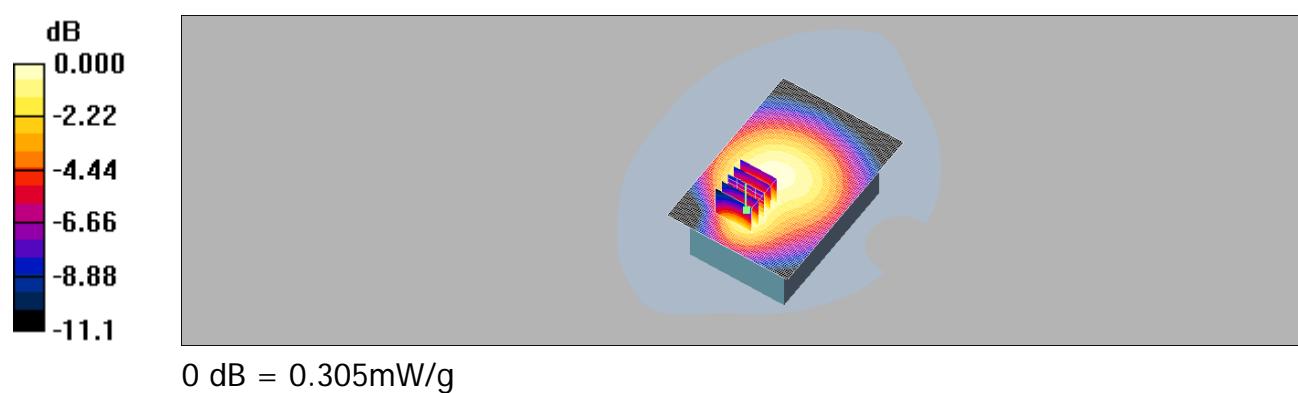
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.6 V/m; Power Drift = -0.188 dB

Peak SAR (extrapolated) = 0.392 W/kg

**SAR(1 g) = 0.284 mW/g; SAR(10 g) = 0.202 mW/g**

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



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## RE Cheek\_CH661

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.087 mW/g

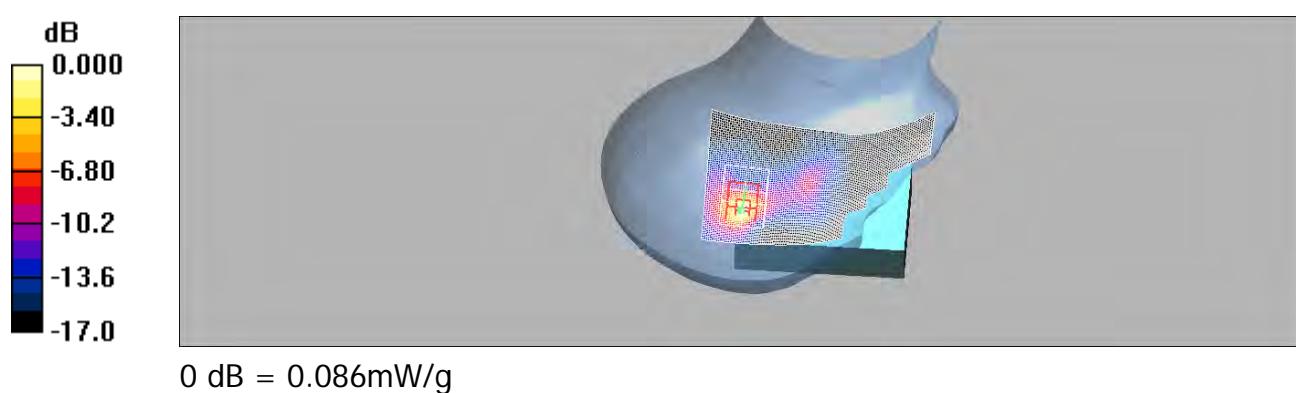
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.71 V/m; Power Drift = 0.136 dB

Peak SAR (extrapolated) = 0.122 W/kg

**SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.046 mW/g**

Maximum value of SAR (measured) = 0.086 mW/g



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Date: 2011/7/28

## LE Cheek\_CH661

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.066 mW/g

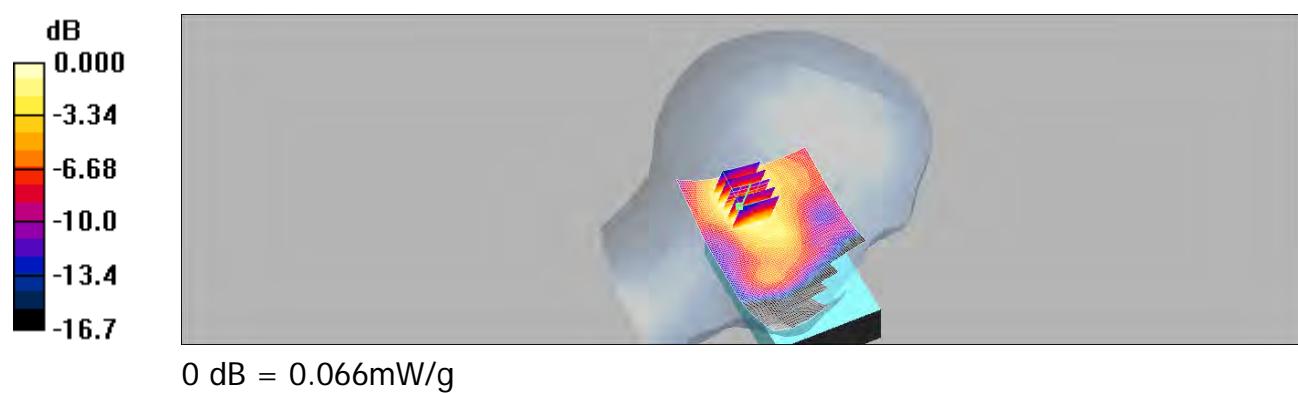
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.86 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 0.091 W/kg

**SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.038 mW/g**

Maximum value of SAR (measured) = 0.066 mW/g



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Date: 2011/7/28

## RE Tilt\_CH661

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.085 mW/g

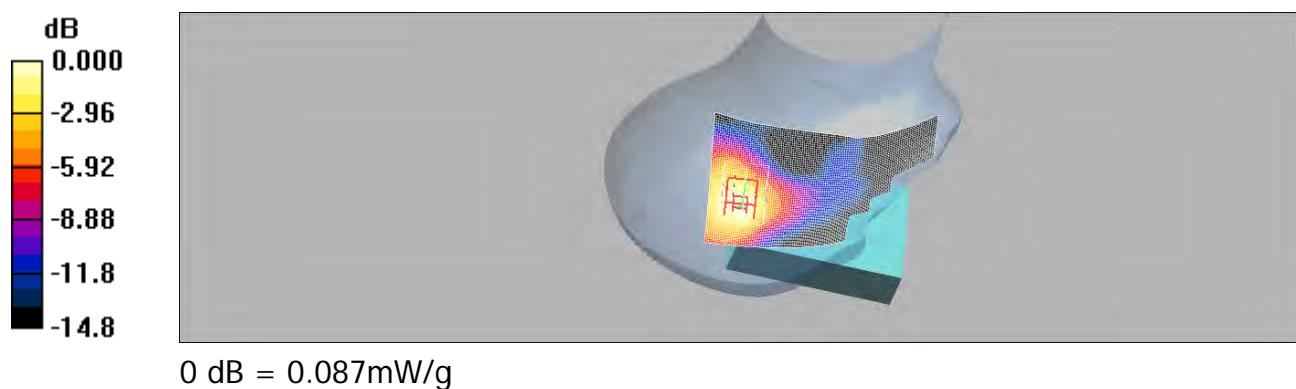
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.31 V/m; Power Drift = 0.153 dB

Peak SAR (extrapolated) = 0.123 W/kg

**SAR(1 g) = 0.080 mW/g; SAR(10 g) = 0.048 mW/g**

Maximum value of SAR (measured) = 0.087 mW/g



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## LE Tilt\_CH512

Communication System: GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: Head 1800 MHz Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.4$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.075 mW/g

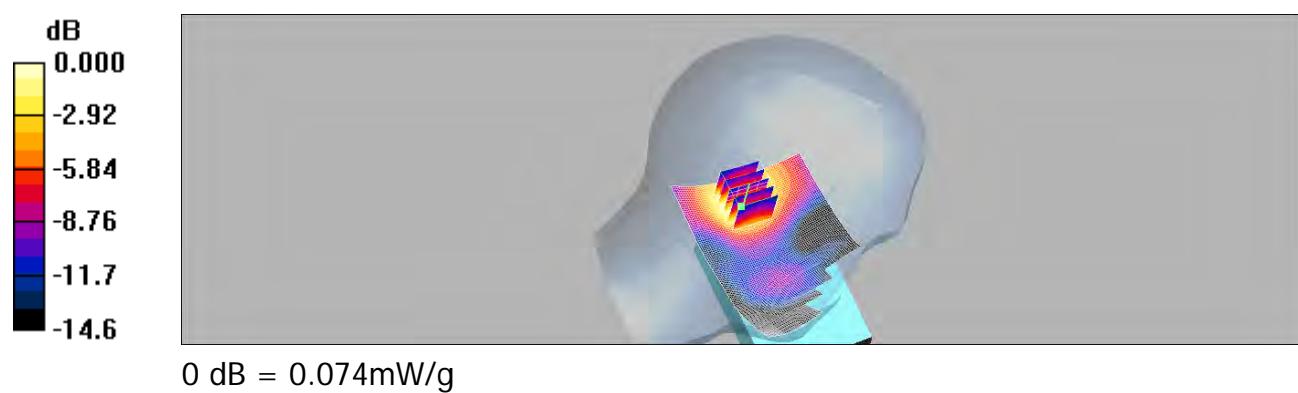
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = 0.062 dB

Peak SAR (extrapolated) = 0.105 W/kg

**SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.043 mW/g**

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



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Date: 2011/7/28

## LE Tilt\_CH661

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.093 mW/g

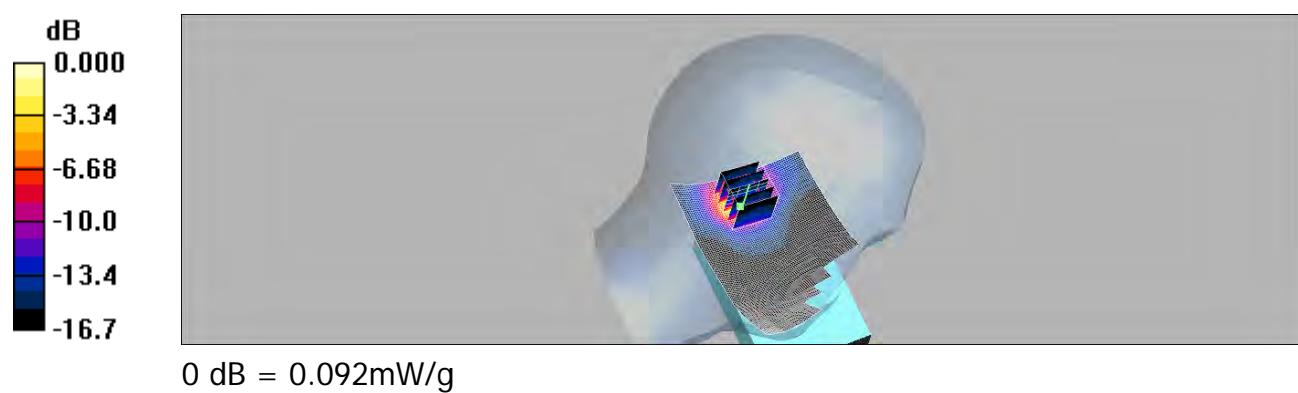
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.24 V/m; Power Drift = 0.055 dB

Peak SAR (extrapolated) = 0.133 W/kg

**SAR(1 g) = 0.085 mW/g; SAR(10 g) = 0.051 mW/g**

Maximum value of SAR (measured) = 0.092 mW/g



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Date: 2011/7/28

## LE Tilt\_CH810

Communication System: GSM1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3  
Medium: Head 1800 MHz Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.083 mW/g

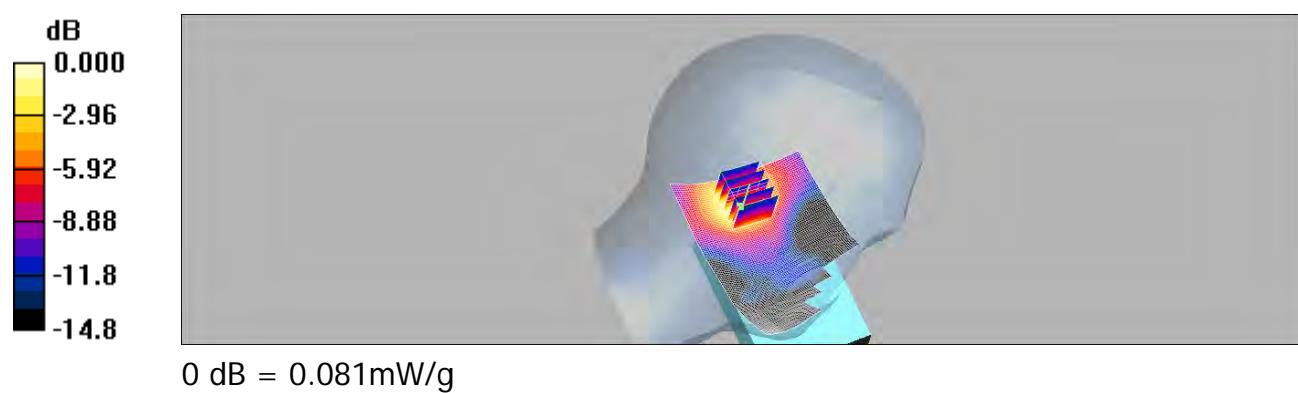
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.87 V/m; Power Drift = 0.119 dB

Peak SAR (extrapolated) = 0.115 W/kg

**SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.044 mW/g**

Maximum value of SAR (measured) = 0.081 mW/g



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## Body\_CH661\_multi class 10

Communication System: GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:4.1  
Medium: M1800 & 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.190 mW/g

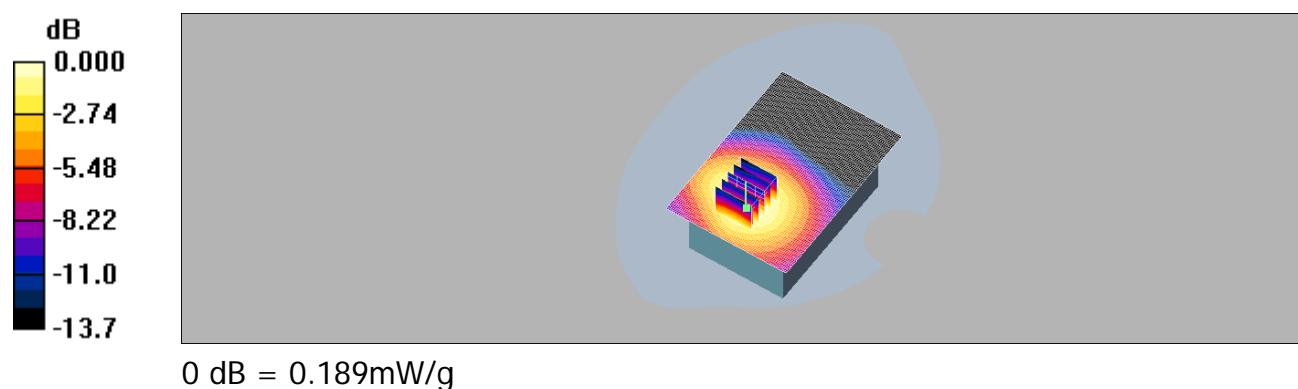
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.15 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 0.280 W/kg

**SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.109 mW/g**

Maximum value of SAR (measured) = 0.189 mW/g



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## RE Cheek\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.231 mW/g

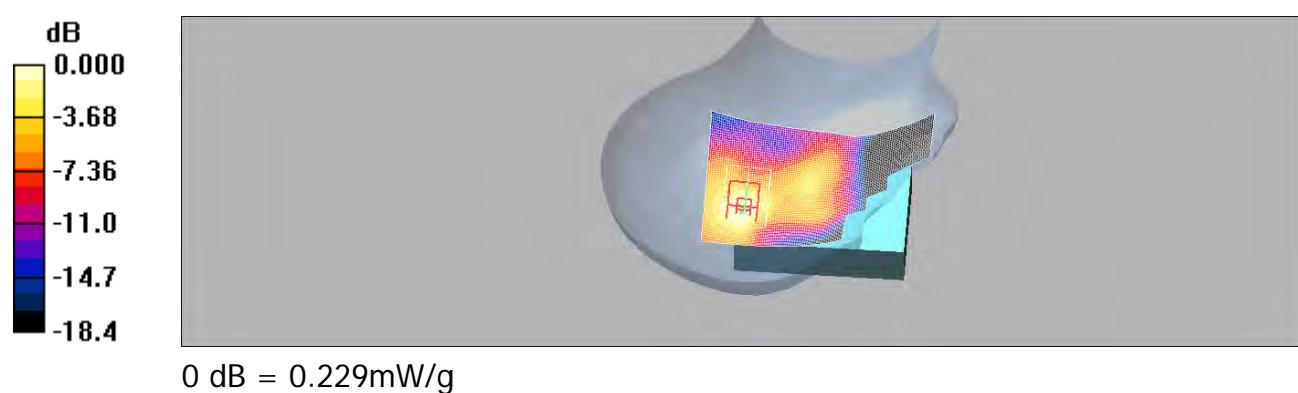
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.44 V/m; Power Drift = 0.186 dB

Peak SAR (extrapolated) = 0.323 W/kg

**SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.120 mW/g**

Maximum value of SAR (measured) = 0.229 mW/g



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Date: 2011/7/28

## LE Cheek\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.176 mW/g

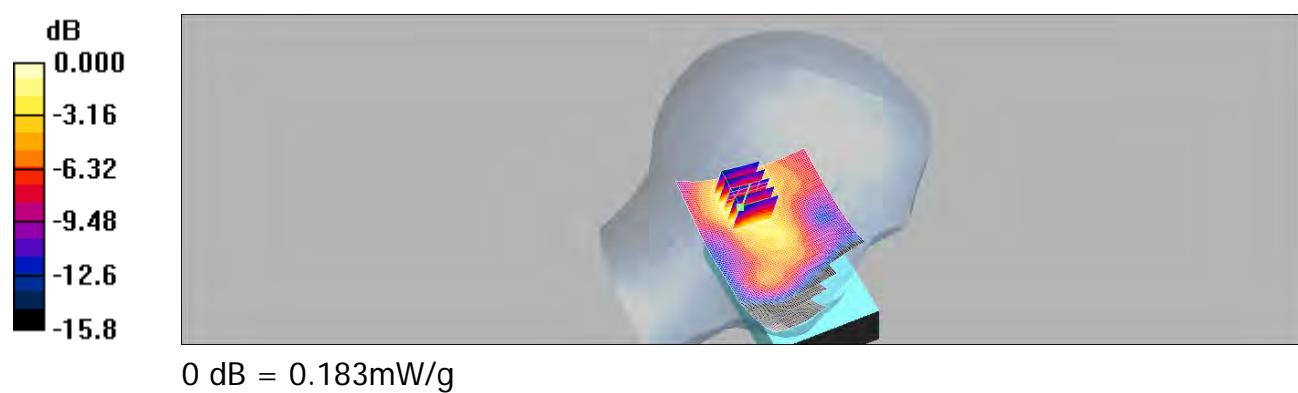
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.38 V/m; Power Drift = 0.195 dB

Peak SAR (extrapolated) = 0.256 W/kg

**SAR(1 g) = 0.166 mW/g; SAR(10 g) = 0.101 mW/g**

Maximum value of SAR (measured) = 0.183 mW/g



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Date: 2011/7/28

## RE Tilt\_CH9262

Communication System: WCDMA Band II; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.184 mW/g

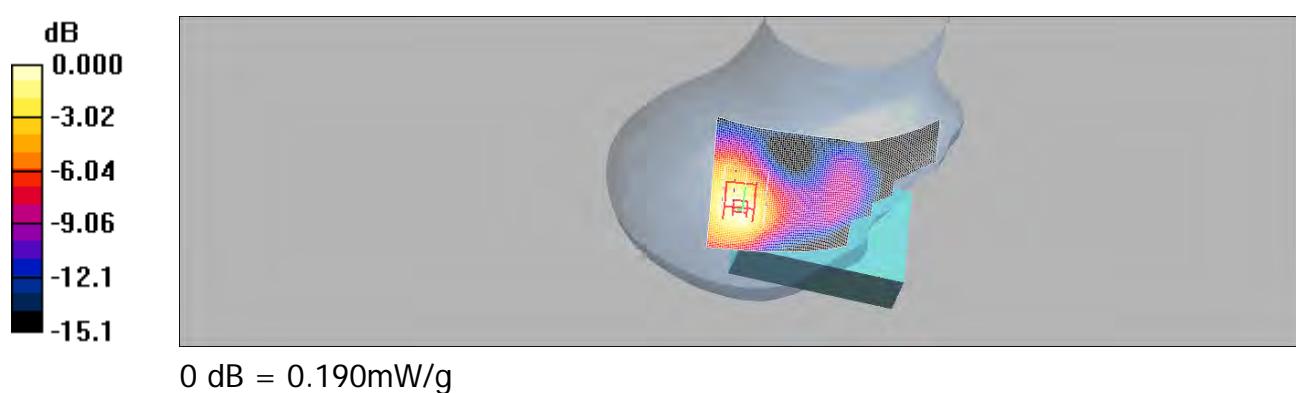
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.04 V/m; Power Drift = 0.126 dB

Peak SAR (extrapolated) = 0.267 W/kg

**SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.106 mW/g**

Maximum value of SAR (measured) = 0.190 mW/g



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Date: 2011/7/28

## RE Tilt\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.233 mW/g

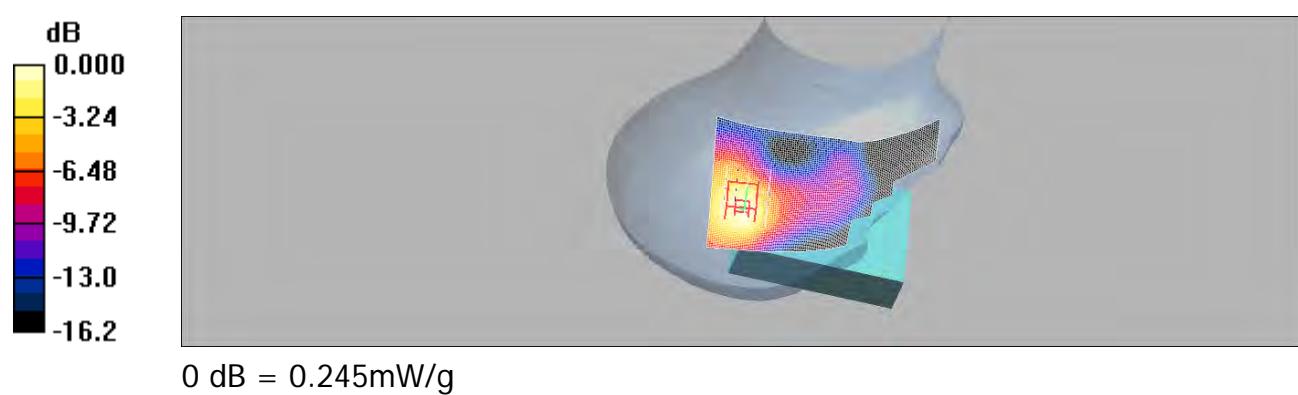
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.2 V/m; Power Drift = 0.174 dB

Peak SAR (extrapolated) = 0.351 W/kg

**SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.132 mW/g**

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



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## RE Tilt\_CH9538

Communication System: WCDMA Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.302 mW/g

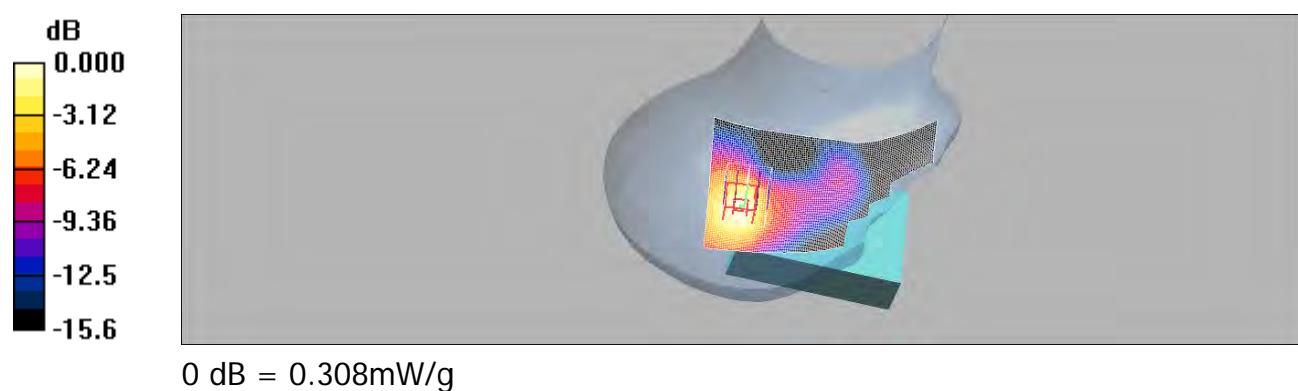
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.1 V/m; Power Drift = 0.083 dB

Peak SAR (extrapolated) = 0.437 W/kg

**SAR(1 g) = 0.285 mW/g; SAR(10 g) = 0.165 mW/g**

Maximum value of SAR (measured) = 0.308 mW/g



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## LE Tilt\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.222 mW/g

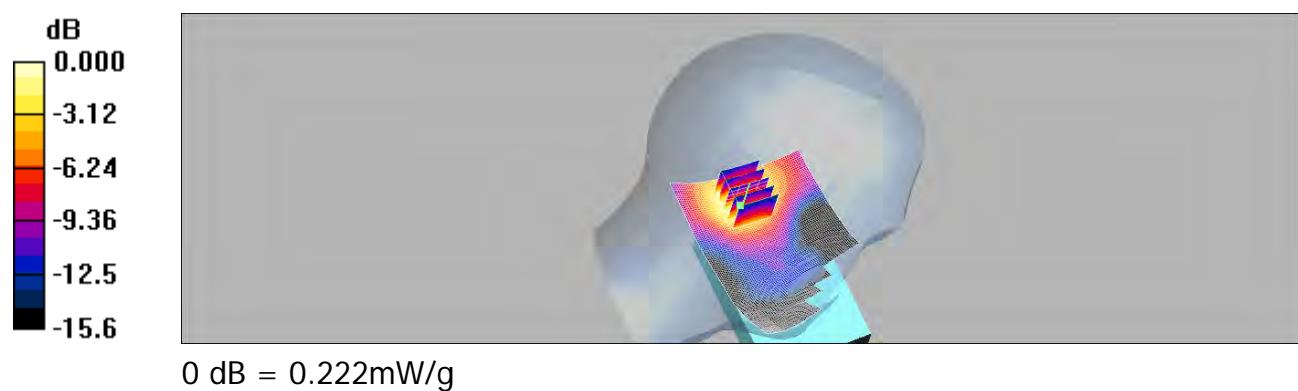
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.1 V/m; Power Drift = 0.174 dB

Peak SAR (extrapolated) = 0.328 W/kg

**SAR(1 g) = 0.208 mW/g; SAR(10 g) = 0.125 mW/g**

Maximum value of SAR (measured) = 0.222 mW/g



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## RE Tilt\_CH9538\_repeated with memory card

Communication System: WCDMA Band II; Frequency: 1907.6 MHz; Duty Cycle: 1:1  
Medium: Head 1800 MHz Medium parameters used:  $f = 1908$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x111x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.241 mW/g

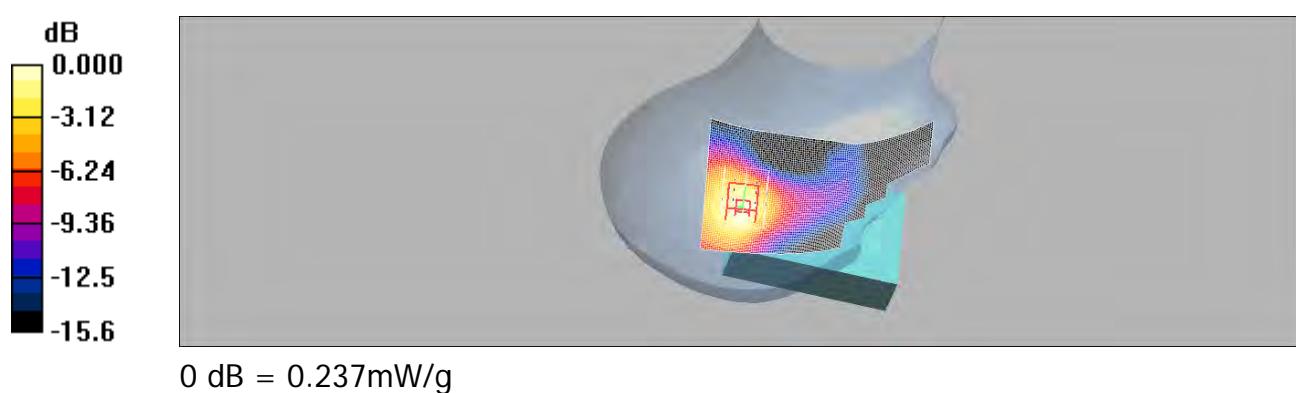
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.2 V/m; Power Drift = 0.044 dB

Peak SAR (extrapolated) = 0.331 W/kg

**SAR(1 g) = 0.216 mW/g; SAR(10 g) = 0.131 mW/g**

Maximum value of SAR (measured) = 0.237 mW/g



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## Body\_CH9400

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: M1800 & 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.347 mW/g

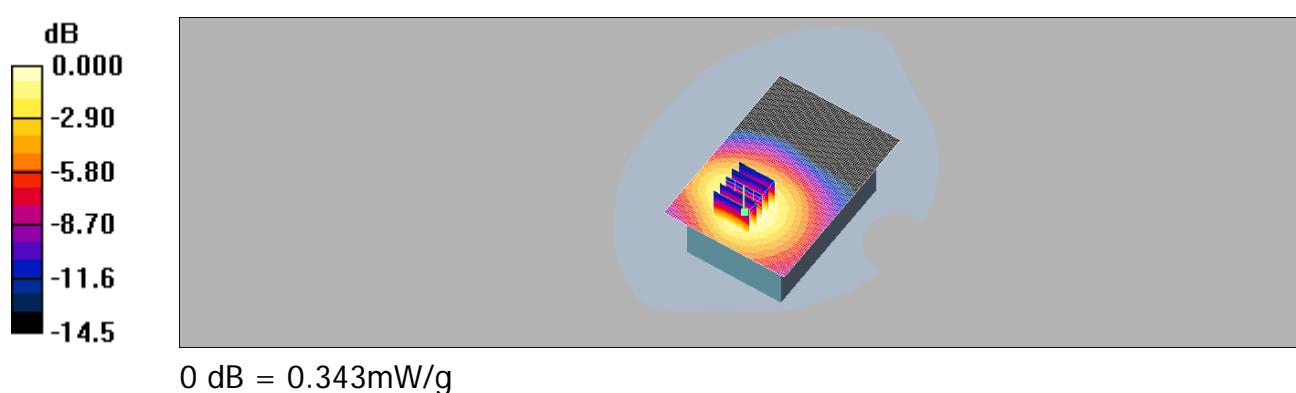
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.06 V/m; Power Drift = 0.159 dB

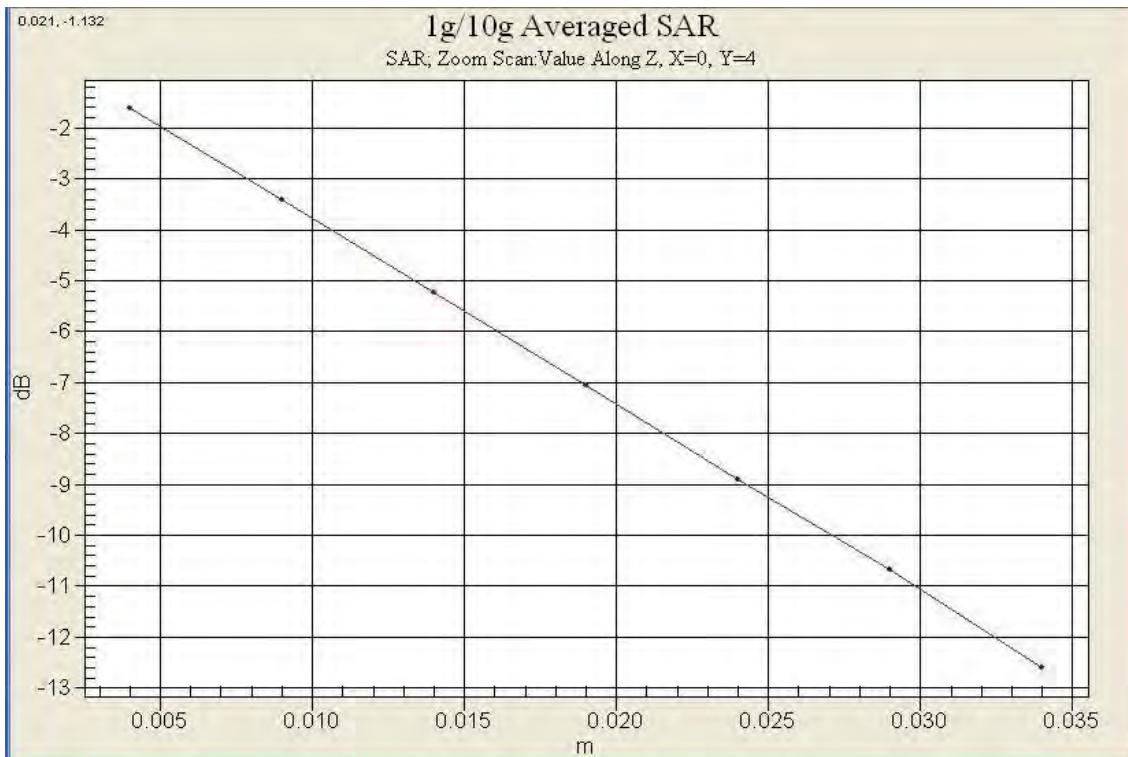
Peak SAR (extrapolated) = 0.506 W/kg

**SAR(1 g) = 0.319 mW/g; SAR(10 g) = 0.199 mW/g**

Maximum value of SAR (measured) = 0.343 mW/g



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## Body\_CH9400\_repeated for EUT front to phantom

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: M1800 & 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.073 mW/g

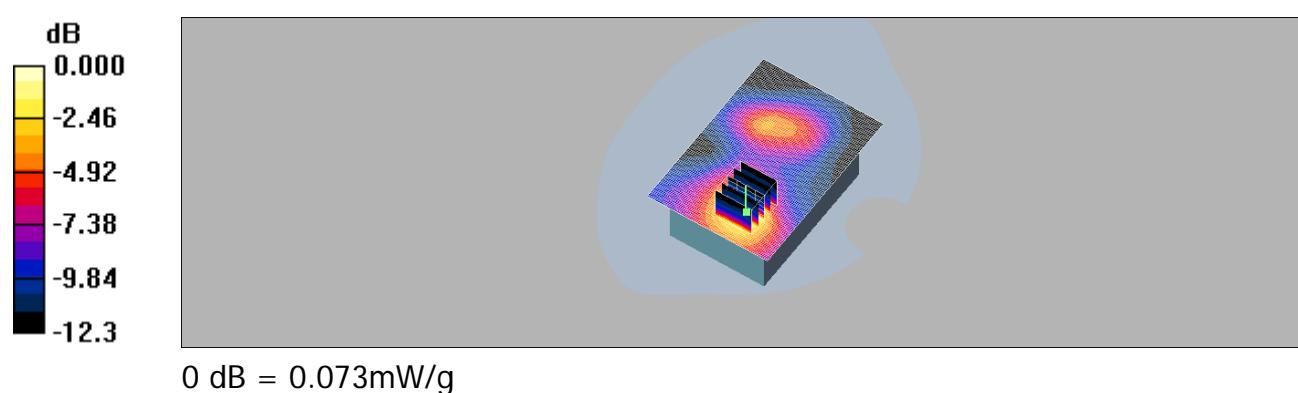
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.09 V/m; Power Drift = 0.100 dB

Peak SAR (extrapolated) = 0.101 W/kg

**SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.044 mW/g**

Maximum value of SAR (measured) = 0.073 mW/g



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## Body\_CH9400\_repeated with memory card

Communication System: WCDMA Band II; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: M1800 & 1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.340 mW/g

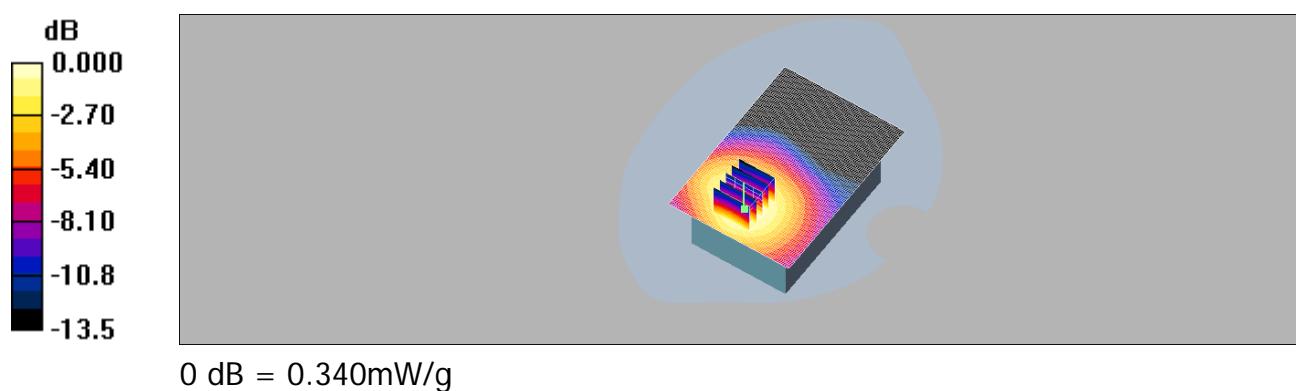
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.98 V/m; Power Drift = 0.022 dB

Peak SAR (extrapolated) = 0.498 W/kg

**SAR(1 g) = 0.316 mW/g; SAR(10 g) = 0.197 mW/g**

Maximum value of SAR (measured) = 0.340 mW/g



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## RE Cheek\_CH4132

Communication System: WCDMA Band V; Frequency: 826.4 MHz; Duty Cycle: 1:1  
Medium: Head 900 MHz Medium parameters used (interpolated):  $f = 826.4$  MHz;  $\sigma = 0.88$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.053 mW/g

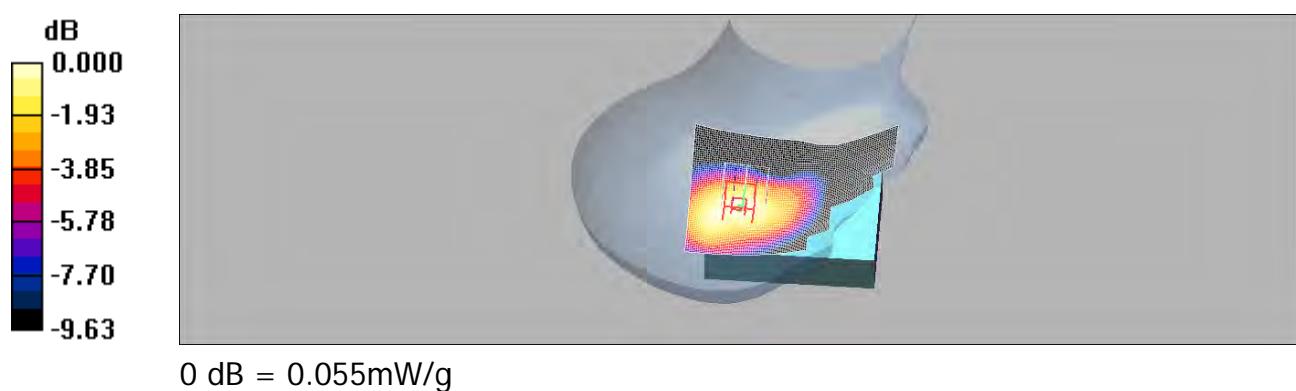
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.90 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 0.073 W/kg

**SAR(1 g) = 0.052 mW/g; SAR(10 g) = 0.037 mW/g**

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



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Date: 2011/7/27

## RE Cheek\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.081 mW/g

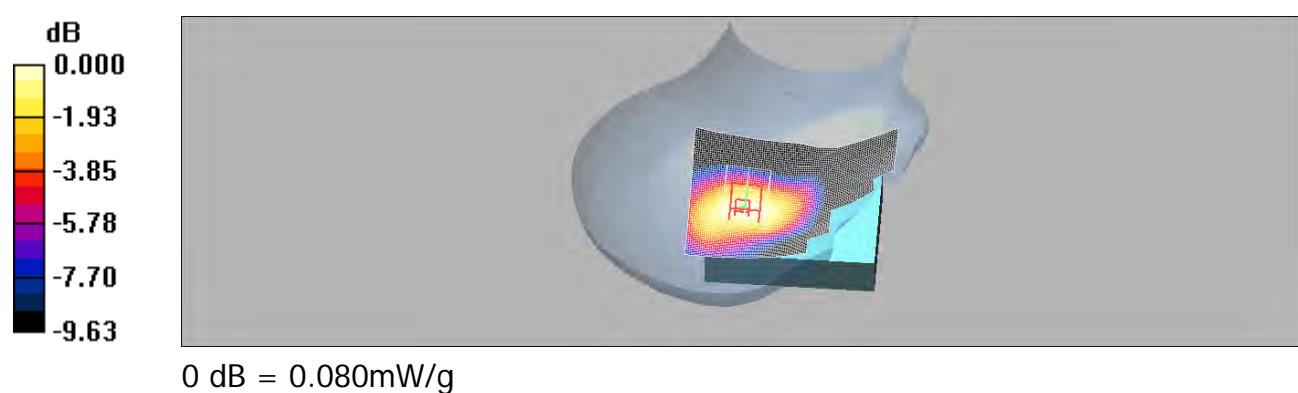
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.66 V/m; Power Drift = 0.198 dB

Peak SAR (extrapolated) = 0.106 W/kg

**SAR(1 g) = 0.076 mW/g; SAR(10 g) = 0.054 mW/g**

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



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## RE Cheek\_CH4233

Communication System: WCDMA Band V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: Head 900 MHz Medium parameters used:  $f = 847$  MHz;  $\sigma = 0.901$  mho/m;  $\epsilon_r = 41$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.115 mW/g

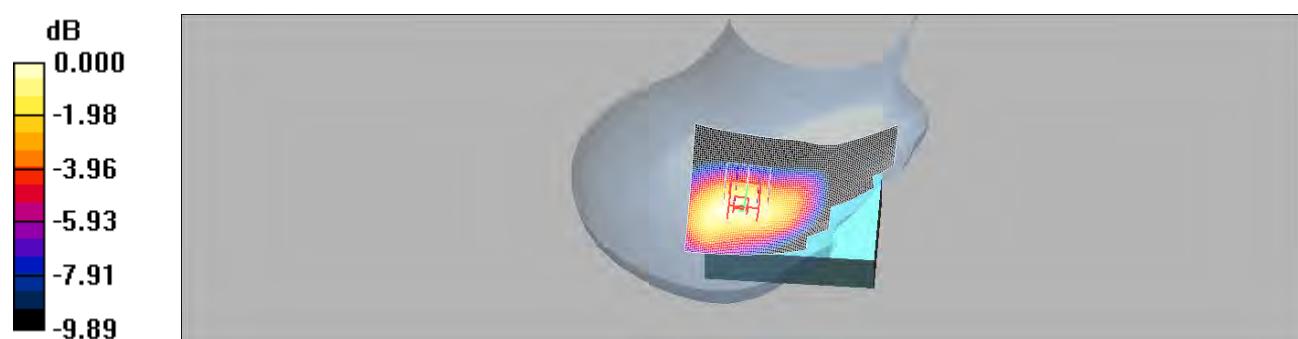
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.70 V/m; Power Drift = -0.144 dB

Peak SAR (extrapolated) = 0.153 W/kg

**SAR(1 g) = 0.109 mW/g; SAR(10 g) = 0.076 mW/g**

Maximum value of SAR (measured) = 0.115 mW/g



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## LE Cheek\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.081 mW/g

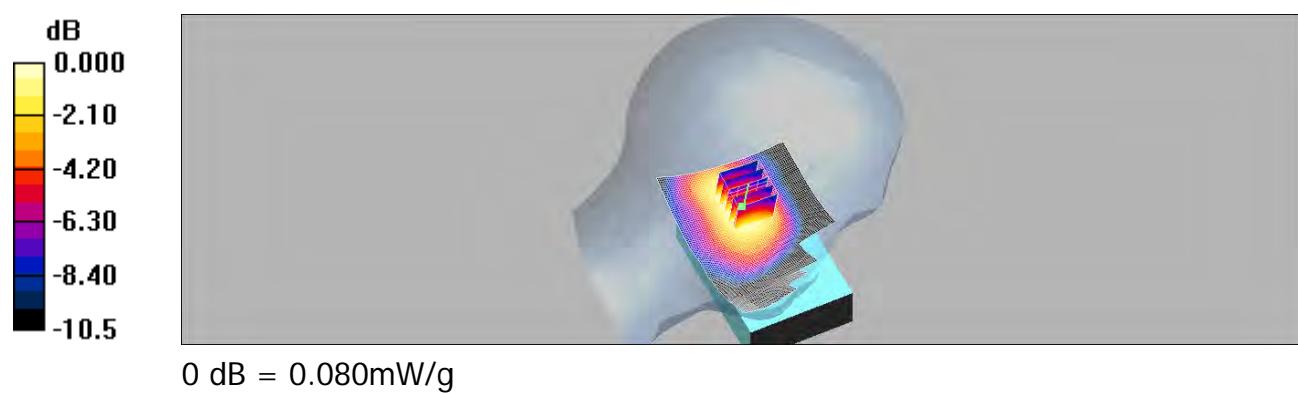
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.27 V/m; Power Drift = 0.126 dB

Peak SAR (extrapolated) = 0.101 W/kg

**SAR(1 g) = 0.075 mW/g; SAR(10 g) = 0.053 mW/g**

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



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Date: 2011/7/27

## RE Tilt\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.061 mW/g

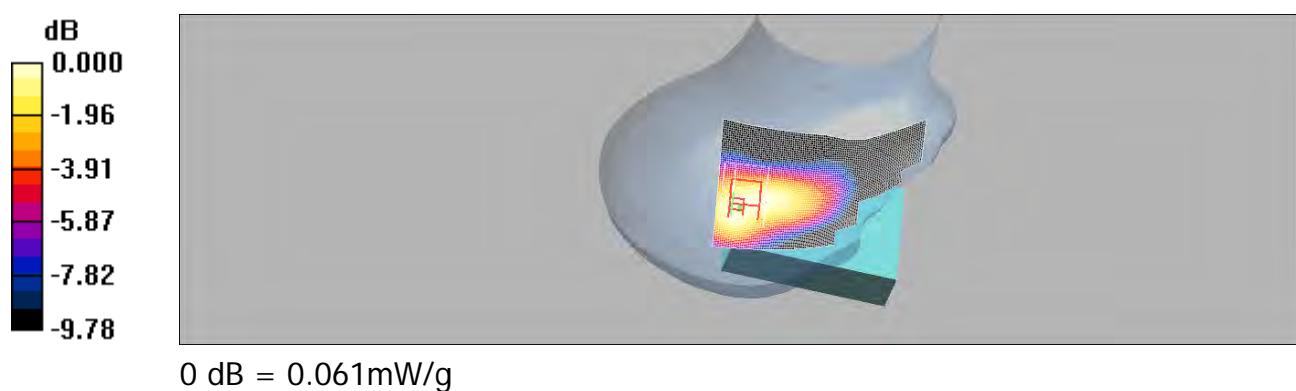
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.39 V/m; Power Drift = 0.158 dB

Peak SAR (extrapolated) = 0.079 W/kg

**SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.041 mW/g**

Maximum value of SAR (measured) = 0.061 mW/g



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## LE Tilt\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: Head 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Head/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.059 mW/g

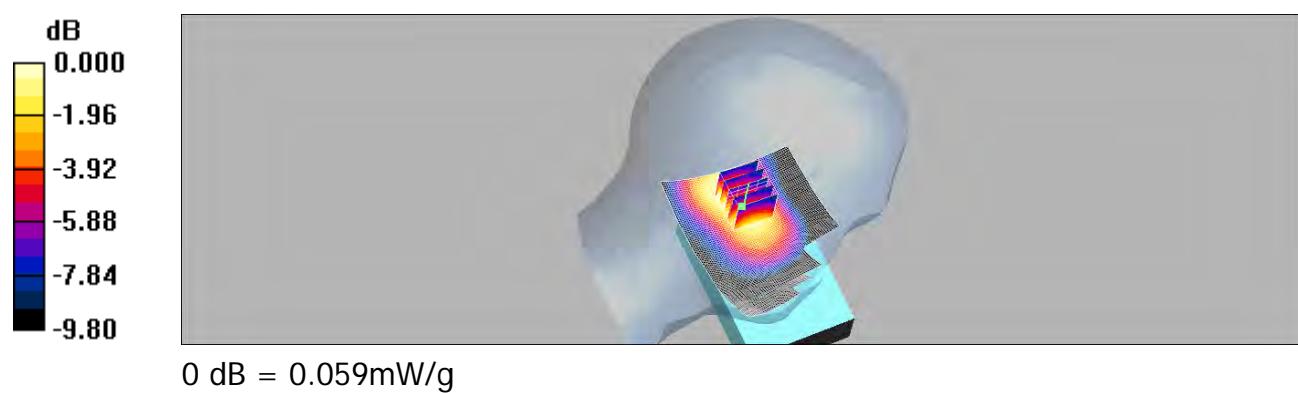
**Head/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.68 V/m; Power Drift = 0.118 dB

Peak SAR (extrapolated) = 0.077 W/kg

**SAR(1 g) = 0.055 mW/g; SAR(10 g) = 0.039 mW/g**

Maximum value of SAR (measured) = 0.059 mW/g



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## Body\_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: Muscle 900 MHz Medium parameters used:  $f = 837$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.183 mW/g

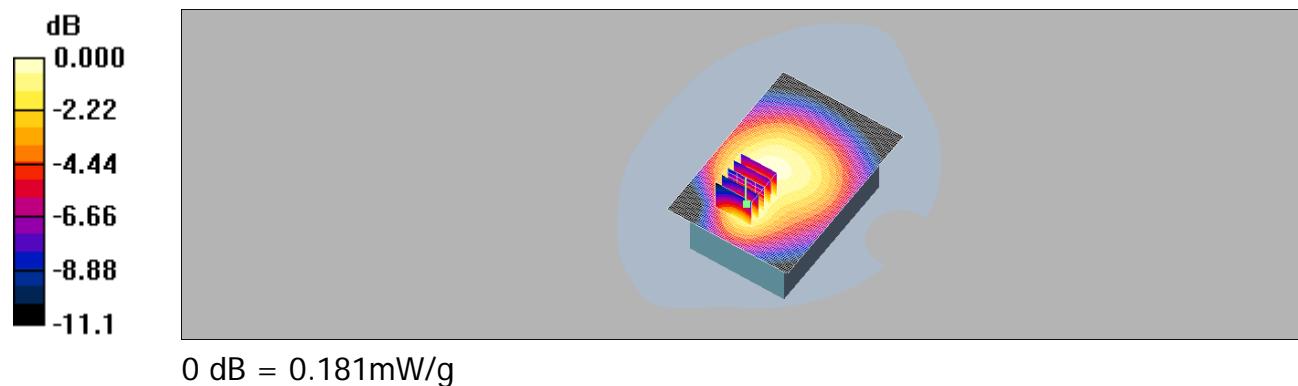
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.3 V/m; Power Drift = 0.180 dB

Peak SAR (extrapolated) = 0.238 W/kg

**SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.122 mW/g**

Maximum value of SAR (measured) = 0.181 mW/g



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## Body\_WLAN802.11b\_CH6

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

Medium: Muscle 2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.017 mW/g

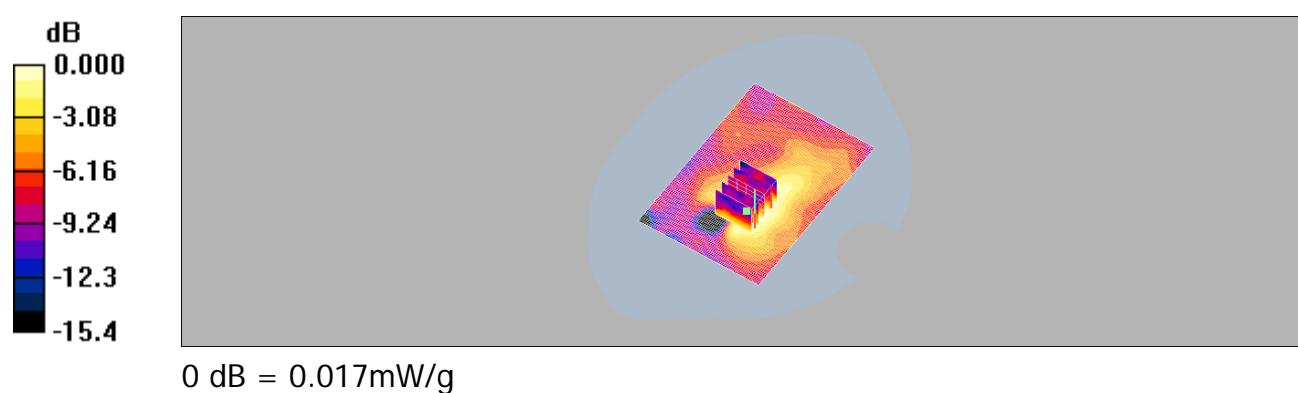
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.95 V/m; Power Drift = 0.156 dB

Peak SAR (extrapolated) = 0.032 W/kg

**SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00958 mW/g**

Maximum value of SAR (measured) = 0.017 mW/g



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## **Body\_WLAN802.11b\_CH6\_repeated for EUT front to phantom**

Communication System: Wireless LAN; Frequency: 2437 MHz; Duty Cycle: 1:1  
Medium: Muscle 2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (81x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.009 mW/g

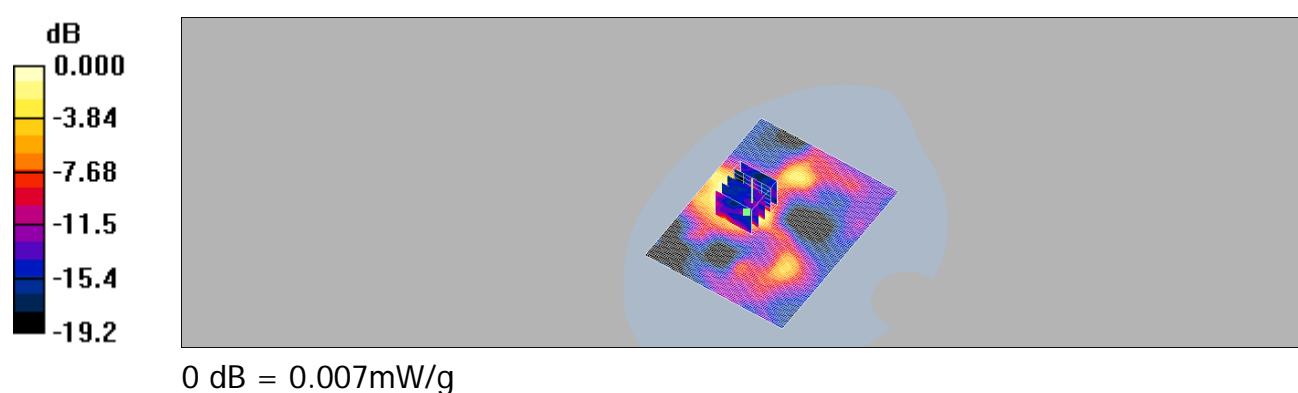
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.10 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 0.015 W/kg

**SAR(1 g) = 0.00674 mW/g; SAR(10 g) = 0.00392 mW/g**

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



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## Body\_WLAN802.11b\_CH6\_repeated with Bluetooth active

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

Medium: Muscle 2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.016 mW/g

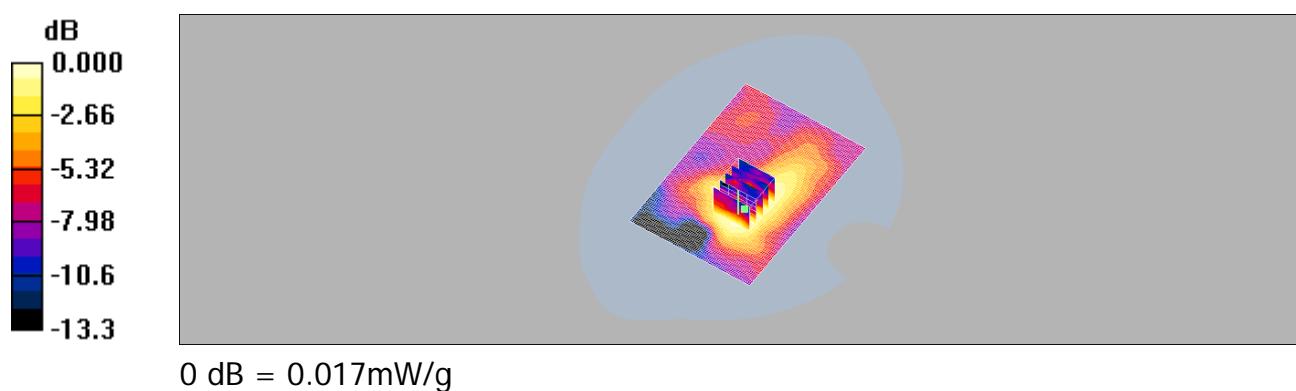
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.22 V/m; Power Drift = 0.181 dB

Peak SAR (extrapolated) = 0.026 W/kg

**SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00928 mW/g**

Maximum value of SAR (measured) = 0.017 mW/g



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## Body\_WLAN802.11b\_CH6\_repeated with memory card

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

Medium: Muscle 2450 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.93$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Body/Area Scan (71x101x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.018 mW/g

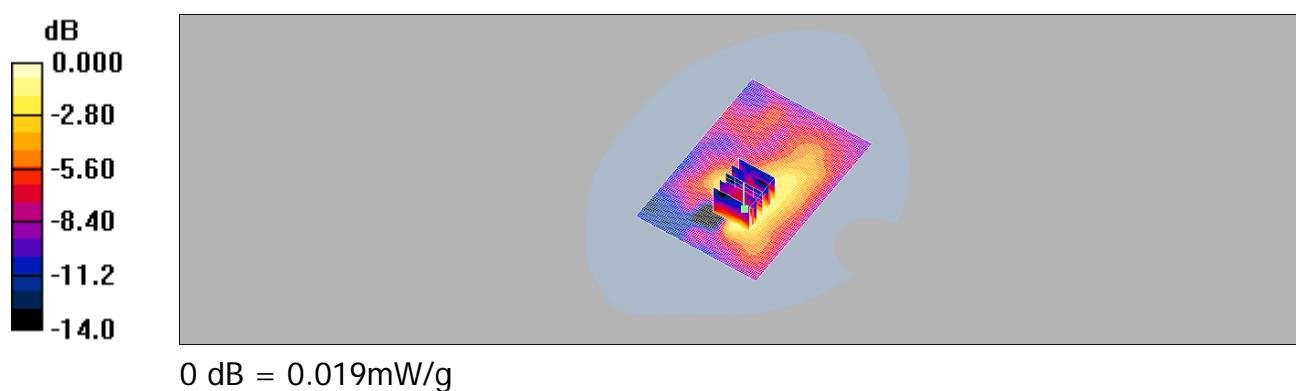
**Body/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.01 V/m; Power Drift = 0.188 dB

Peak SAR (extrapolated) = 0.034 W/kg

**SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.010 mW/g**

Maximum value of SAR (measured) = 0.019 mW/g



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## 5. System Verification

Date: 2011/7/27

### DUT: Dipole 835 MHz;

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

Medium: Head 900 MHz Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.889$  mho/m;  $\epsilon_r = 41.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.43 mW/g

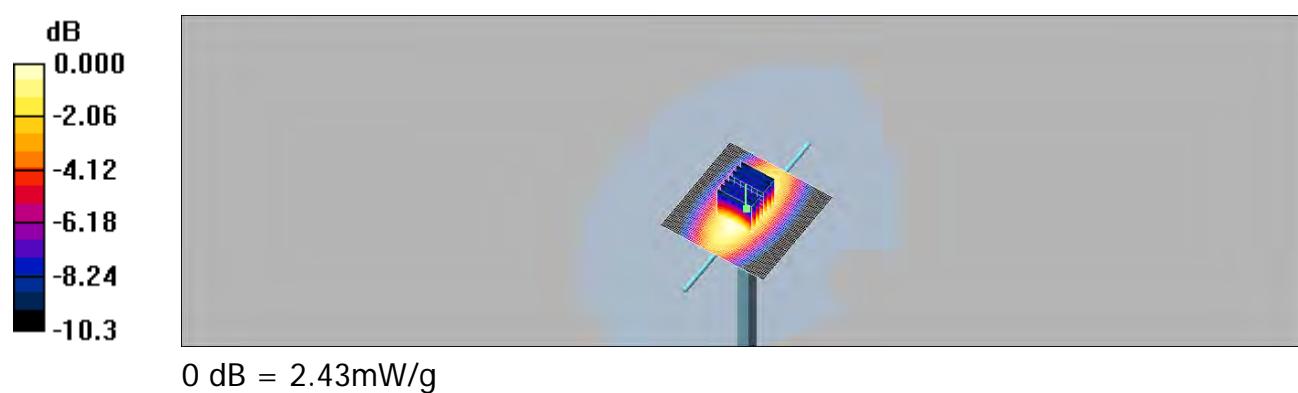
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.3 V/m; Power Drift = -0.035 dB

Peak SAR (extrapolated) = 3.37 W/kg

**SAR(1 g) = 2.26 mW/g; SAR(10 g) = 1.48 mW/g**

Maximum value of SAR (measured) = 2.43 mW/g



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**DUT: Dipole 835 MHz;**

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

Medium: Muscle 900 MHz Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.02$  mho/m;  $\epsilon_r = 55.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.69 mW/g

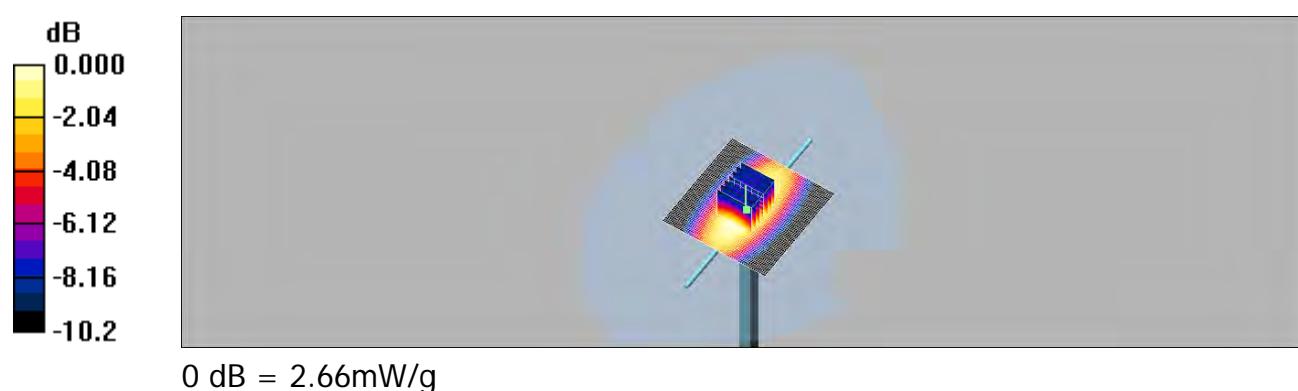
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.3 V/m; Power Drift = -0.094 dB

Peak SAR (extrapolated) = 3.63 W/kg

**SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.62 mW/g**

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



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**DUT: Dipole 1900 MHz;**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium: Head 1900MHz Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 39.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Pin=250mw/Area Scan (51x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 12.9 mW/g

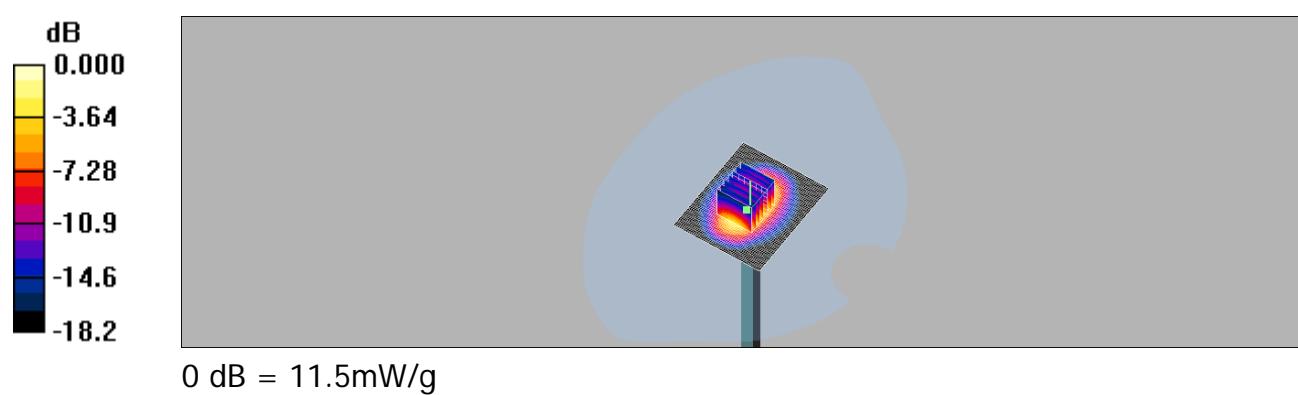
**Pin=250mw/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.1 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 19.0 W/kg

**SAR(1 g) = 9.98 mW/g; SAR(10 g) = 5.27 mW/g**

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



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**DUT: Dipole 1900 MHz;**

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

Medium: M1800 & 1900 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.59$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Pin=250mW/Area Scan (51x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 13.1 mW/g

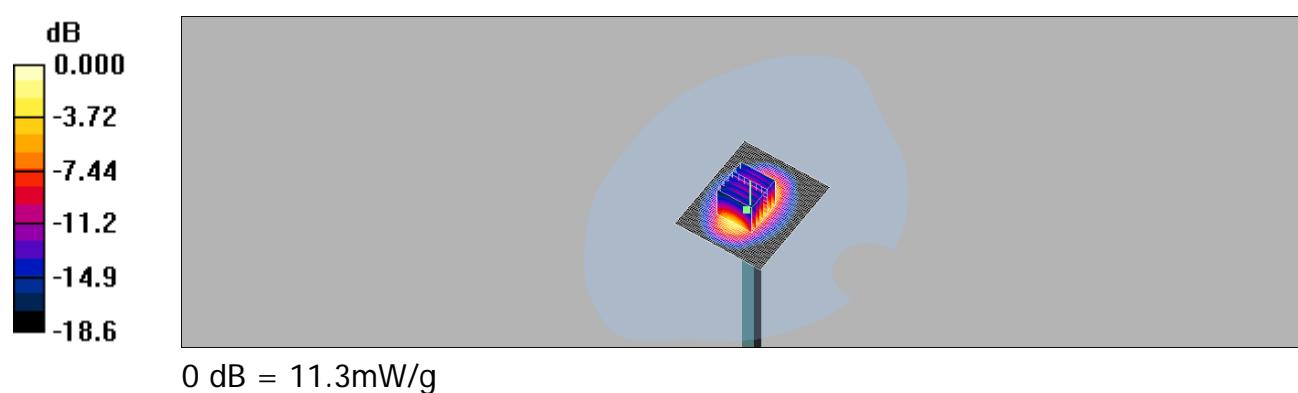
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 83.8 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 18.8 W/kg

**SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.13 mW/g**

Maximum value of SAR (measured) = 11.3 mW/g



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Date: 2011/7/29

**DUT: Dipole 2450 MHz;**

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

Medium: M 2450 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(6.96, 6.96, 6.96); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

**Pin=250mW/Area Scan (51x61x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 18.0 mW/g

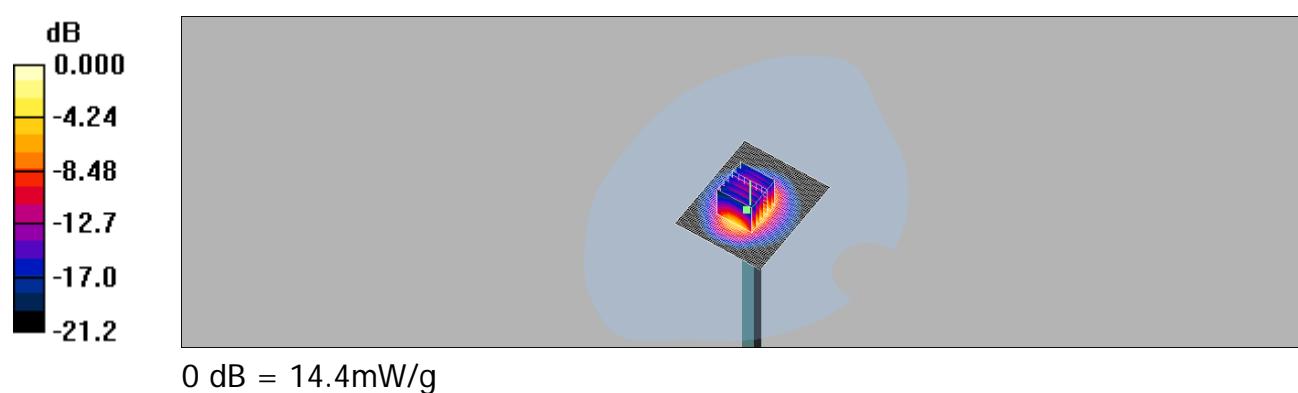
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 85.6 V/m; Power Drift = -0.128 dB

Peak SAR (extrapolated) = 23.9 W/kg

**SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.96 mW/g**

Maximum value of SAR (measured) = 14.4 mW/g



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## 6. DAE & Probe Calibration certificate

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



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

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

Accreditation No.: SCS 108

Client SGS-TW

Certificate No: DAE4-547\_Aug10

### CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BJ - SN: 547

Calibration procedure(s) QA CAL-06.v22  
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: August 18, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

Calibrated by: Name Dominique Steffen Function Technician Signature 

Approved by: Name Fin Bornholt Function R&D Director Signature 

Issued: August 18, 2010

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

Certificate No: DAE4-547\_Aug10

Page 1 of 5

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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-TW (Auden)

Certificate No: EX3-3770\_Apr11

## CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3770

Calibration procedure(s) QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v3  
Calibration procedure for dosimetric E-field probes

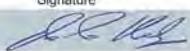
Calibration date: April 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature 
Approved by:	Fin Bornholt	R&D Director	

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

Issued: April 19, 2011

Certificate No: EX3-3770\_Apr11

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Calibration Laboratory of  
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Accreditation No.: SCS 108

#### Glossary:

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

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

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

#### Methods Applied and Interpretation of Parameters:

- $NORM_{x,y,z}$ : Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).  $NORM_{x,y,z}$  are only intermediate values, i.e., the uncertainties of  $NORM_{x,y,z}$  does not affect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORM_{x,y,z} * frequency\_response$  (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- $DCPx,y,z$ : DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- $PAR$ : PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- $A_{x,y,z}$ ;  $B_{x,y,z}$ ;  $C_{x,y,z}$  are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- $VR$ : VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- 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.

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EX3DV4 – SN:3770

April 19, 2011

# Probe EX3DV4

## SN:3770

Manufactured: July 6, 2010  
Calibrated: April 19, 2011

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

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Certificate No: EX3-3770\_Apr11

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## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.32	0.62	0.40	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	106.6	98.3	102.8	

### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>E</sup> (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	120.8	$\pm 2.7\%$
			Y	0.00	0.00	1.00	134.3	
			Z	0.00	0.00	1.00	133.5	

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 Pages 5 and 6)

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

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.58	9.58	9.58	0.80	0.70	± 12.0 %
835	41.5	0.90	9.25	9.25	9.25	0.80	0.67	± 12.0 %
900	41.5	0.97	9.06	9.06	9.06	0.76	0.71	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.80	0.61	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.71	0.62	± 12.0 %
2000	40.0	1.40	7.79	7.79	7.79	0.75	0.58	± 12.0 %
2450	39.2	1.80	6.99	6.99	6.99	0.80	0.56	± 12.0 %
2600	39.0	1.96	6.95	6.95	6.95	0.66	0.62	± 12.0 %

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

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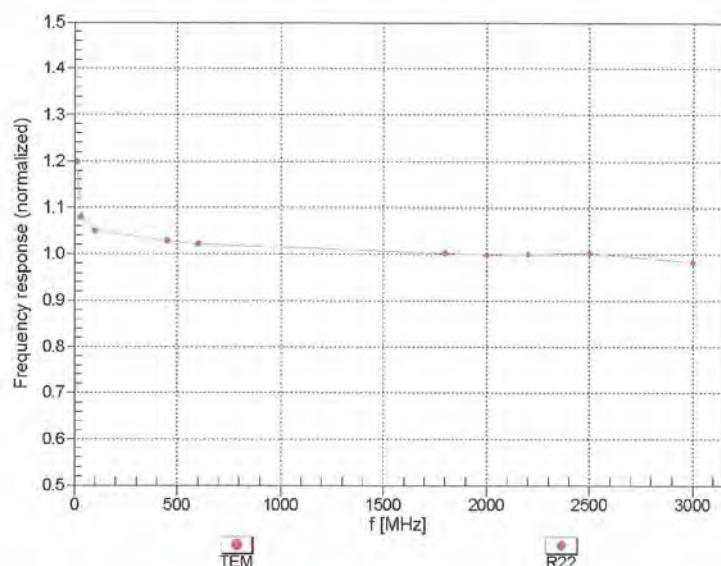
**DASY/EASY - Parameters of Probe: EX3DV4- SN:3770****Calibration Parameter Determined in Body Tissue Simulating Media**

f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.42	9.42	9.42	0.73	0.72	± 12.0 %
835	55.2	0.97	9.30	9.30	9.30	0.72	0.72	± 12.0 %
900	55.0	1.05	9.12	9.12	9.12	0.73	0.75	± 12.0 %
1750	53.4	1.49	7.84	7.84	7.84	0.80	0.68	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.80	0.62	± 12.0 %
2000	53.3	1.52	7.44	7.44	7.44	0.80	0.66	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.78	6.78	6.78	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.42	4.42	4.42	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.12	4.12	4.12	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.54	3.54	3.54	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.80	3.80	3.80	0.60	1.90	± 13.1 %

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

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

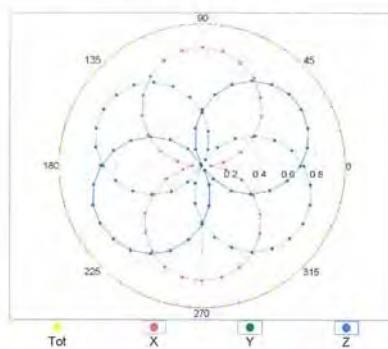


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

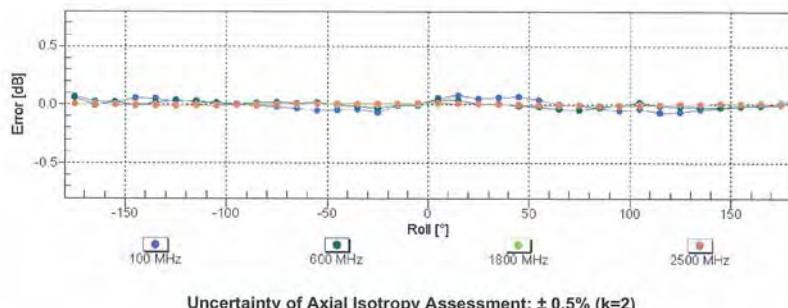
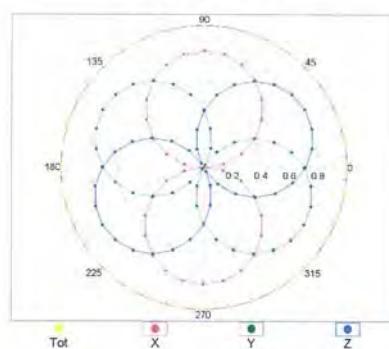
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**Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$** 

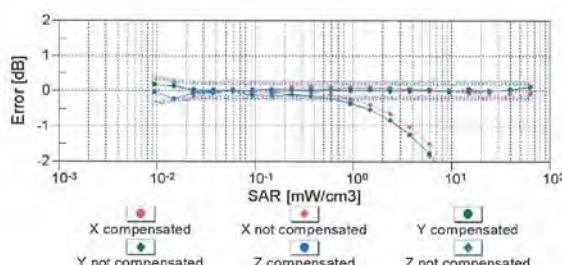
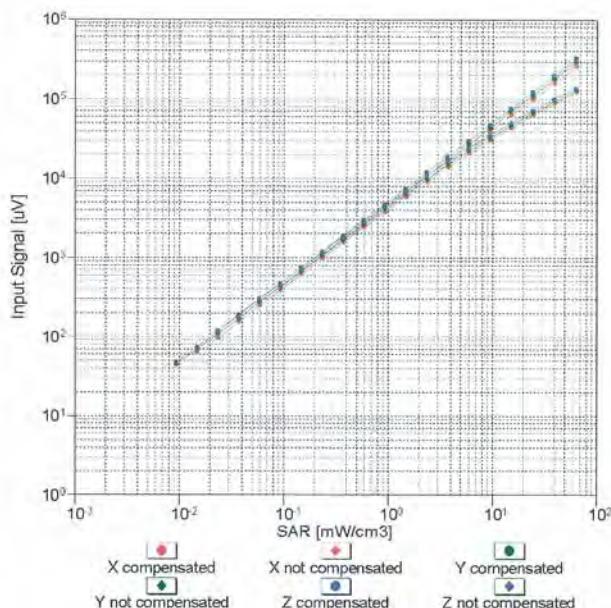
f=600 MHz, TEM



f=1800 MHz, R22



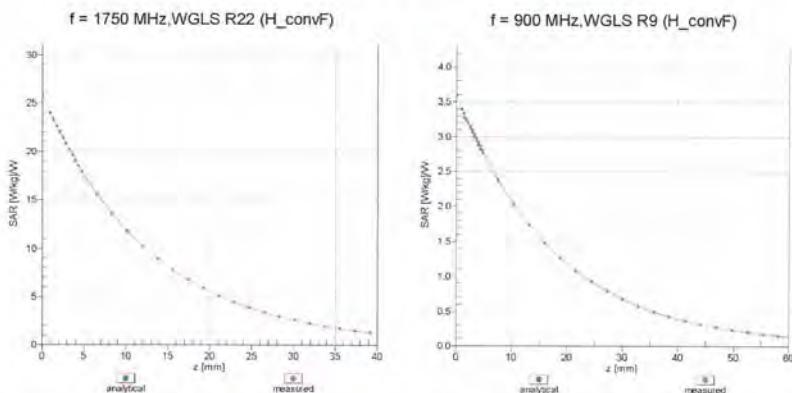
**Dynamic Range f(SAR<sub>head</sub>)**  
(TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

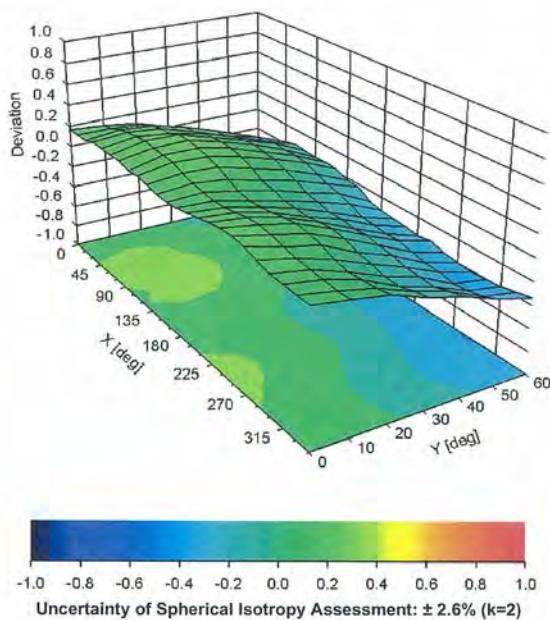
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### Conversion Factor Assessment



### Deviation from Isotropy in Liquid

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



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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## 7. Uncertainty Budget

### DASY4 Uncertainty Budget According to IEEE P1528 [1]

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

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## 8. Phantom description

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info@speag.com, http://www.speag.com

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### 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 Zurich 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 selected 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 1
- [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

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## 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-TW (Auden)

Certificate No: D835V2-4d063\_May11

### CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d063

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

Calibration date: May 25, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 25, 2011

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Certificate No: D835V2-4d063\_May11

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### DASY5 Validation Report for Head TSL

Date: 25.05.2011

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: HSL900

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.88$  mho/m;  $\epsilon_r = 40.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

#### DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

#### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Cube 0:

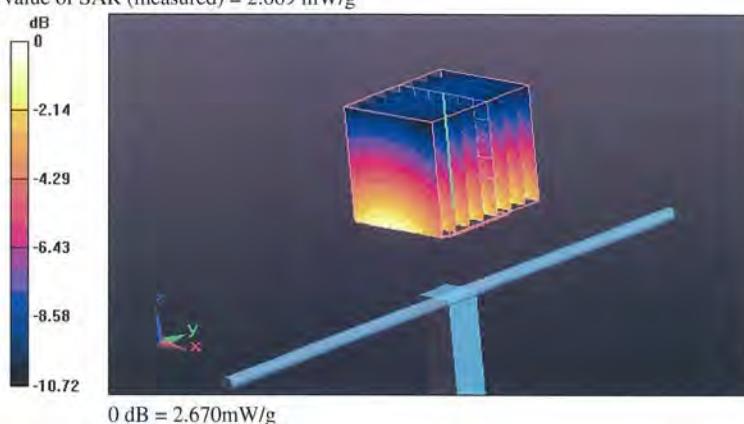
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.554 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.427 W/kg

**SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.52 mW/g**

Maximum value of SAR (measured) = 2.669 mW/g



### DASY5 Validation Report for Body TSL

Date: 25.05.2011

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;  $\sigma = 1$  mho/m;  $\epsilon_r = 53.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

#### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Cube 0:

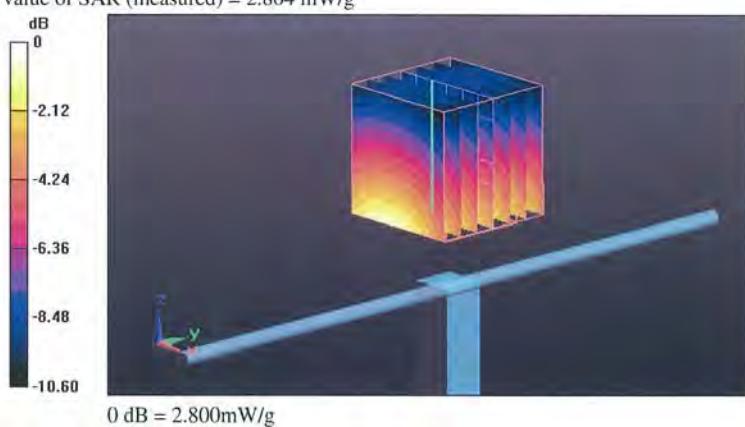
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.297 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.530 W/kg

SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.804 mW/g



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Certificate No: D835V2-4d063\_May11

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Accreditation No.: SCS 108

Client SGS TW (Auden)

Certificate No: D1900V2-5d027\_Apr11

## CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d027

Calibration procedure(s) QA CAL-05.v8  
Calibration procedure for dipole validation kits

Calibration date: April 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
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Approved by:	Katja Pokovic	Function Technical Manager	Signature 
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Issued: April 19, 2011

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Certificate No: D1900V2-5d027\_Apr11

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### DASY5 Validation Report for Head TSL

Date/Time: 18.04.2011 15:27:22

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 U12 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

#### Pin=250 mW, Cube 0:

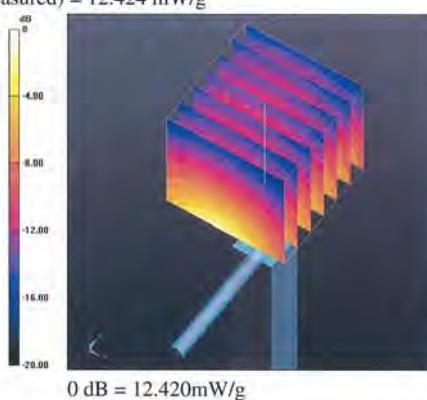
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.235 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 18.650 W/kg

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

Maximum value of SAR (measured) = 12.424 mW/g



### DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 12:53:51

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 U12 BB

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.52$  mho/m;  $\epsilon_r = 51.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

#### Pin=250 mW, Cube 0:

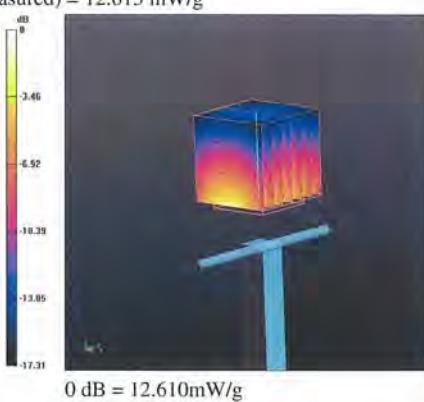
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.170 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.156 W/kg

**SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.18 mW/g**

Maximum value of SAR (measured) = 12.615 mW/g



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS TW (Auden)

Certificate No: D2450V2-727\_Apr11

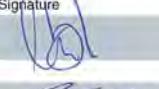
## CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 727
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	April 19, 2011

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

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

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

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. E53-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11
Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 19, 2011

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Certificate No: D2450V2-727\_Apr11

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### DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 14:37:11

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727**

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

Medium: MSL U12 BB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.91$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

#### Pin=250 mW, Cube 0:

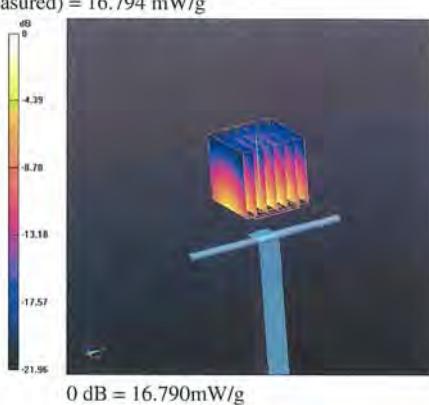
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.949 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 26.888 W/kg

**SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.84 mW/g**

Maximum value of SAR (measured) = 16.794 mW/g



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Certificate No: D2450V2-727\_Apr11

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

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