SAR TEST REPORT

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

Equipment Under Test	Mobile Phone
Model Name	ST23i
Brand Name	SONY
Model No.	PM-0180-BV
Company Name	Sony Mobile Communications AB
Company Address	Nya Vattentornet 22188 Lund/SWEDEN
Standards	FCC- OET 65 supplement C,IEEE /ANSI C95.1 , C95.3, IEEE 1528, RSS-102
FCC ID	PY7PM-0180
IC ID	4170B-PM0180
Date of Receipt	Apr. 18, 2012
Date of Test(s)	May 07, 2012 ~ Jun. 07, 2012
Date of Issue	Aug. 01, 2012

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

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronic & Communication Laboratory or testing done by SGS Taiwan Electronic & Communication Laboratory in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronic & Communication Laboratory in writing.

Signed for on the behalf of SGS

Engineer

Chris Tsung

Chris Tsung

Date: Aug. 01, 2012

Supervisor

Kelly Tsai

Kelly Tsai

Date: Aug. 01, 2012

Version

Report Number	Revision	Date	Memo
EN/2012/40008	00	2012/07/12	Initial creation of test report.
EN/2012/40008	01	2012/07/13	1st modification
EN/2012/40008	02	2012/07/13	2nd modification
EN/2012/40008	03	2012/07/20	3rd modification
EN/2012/40008	04	2012/07/23	4th modification
EN/2012/40008	05	2012/07/26	5th modification
EN/2012/40008	06	2012/07/27	6th modification
EN/2012/40008	07	2012/08/01	7th modification

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

Contents

1. General Information

1.1 Testing Laboratory

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1.2 Details of Applicant

Company Name	Sony Mobile Communications AB
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Fax	+46 10 8002441
E-mail	Mats.Hansson@sonymobile.com

1.3 Description of EUT

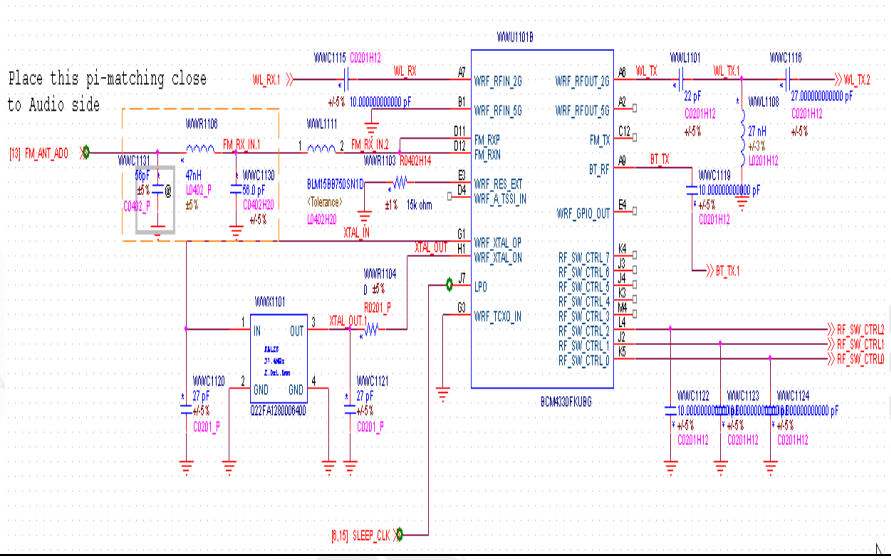
EUT Name	Mobile Phone
Marketing Name	ST23i
Brand Name	SONY
Model No.	PM-0180-BV
Hardware Version	A
Software Version	2.3.J.3.8
Serial No.	BX902WK00R
IMEI Code	004402145494492 / 004402145486233
FCC ID	PY7PM-0180
IC ID	4170B-PM0180
Mode of Operation	☒GSM ☒GPRS ☒EDGE ☒Bluetooth ☒WLAN802.11 b/g/n(20M)

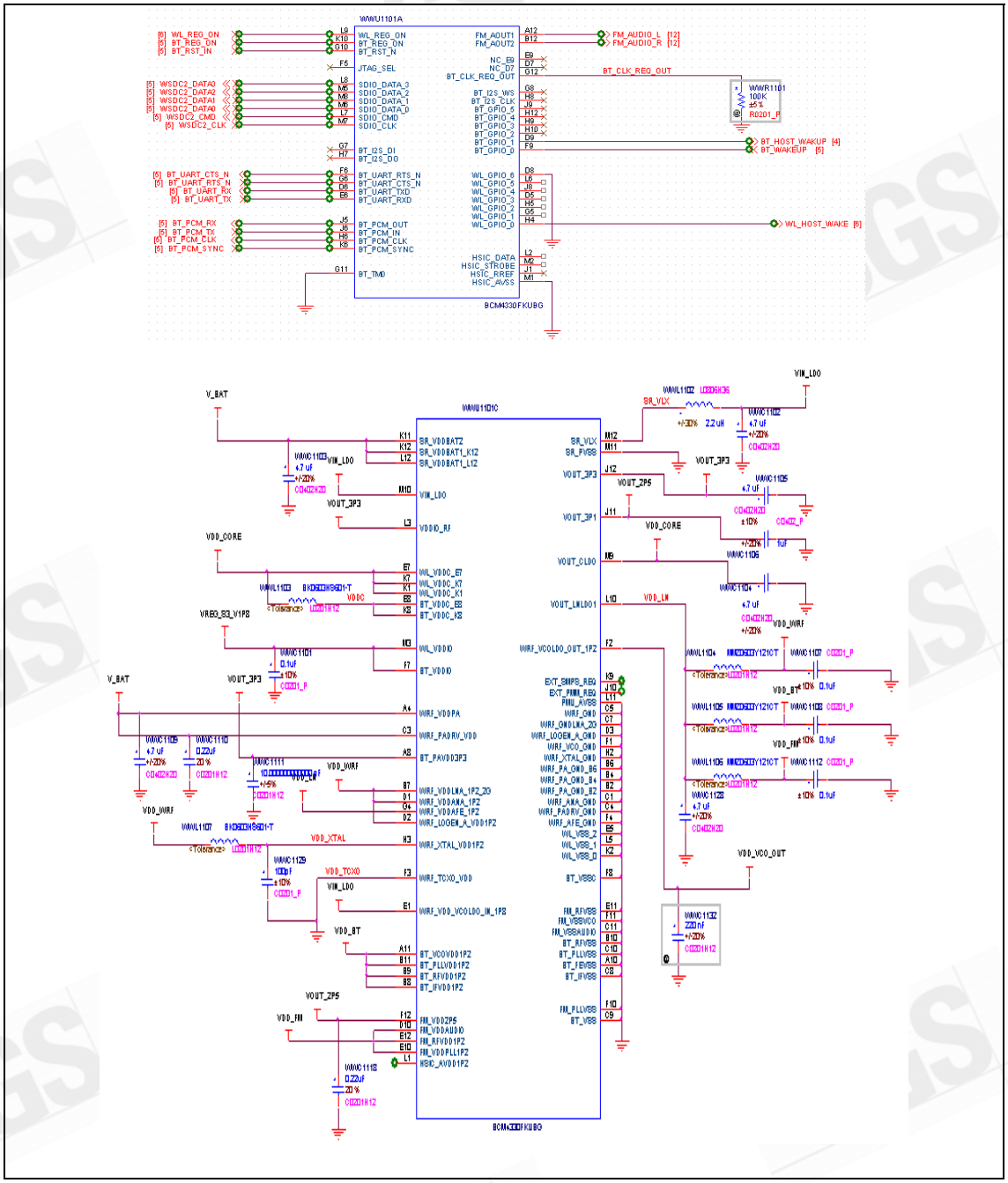
Duty Cycle	GSM		1/8.3	
	GPRS (Mulit-class 12)		1/2 (1Dn4UP) 1/3 (1Dn3UP) 1/4 (1Dn2UP) 1/8.3(1Dn1UP)	
	EDGE (Mulit-class 12)		1/2 (1Dn4UP) 1/3 (1Dn3UP) 1/4 (1Dn2UP) 1/8.3(1Dn1UP)	
	WLAN 802.11 b/g/n(20M)		1	
	Bluetooth		1	
TX Frequency Range (MHz)	GSM850		824.2 —	848.8
	GSM1900		1850.2 —	1909.8
	WLAN 802.11 b/g/n(20M)		2412 —	2462
	Bluetooth		2402 —	2480
Channel Number (ARFCN)	GSM850		128 —	251
	GSM1900		512 —	810
	WLAN 802.11 b		1 —	11
	Bluetooth		0 —	78
Max. SAR Measured(1 g) (Unit: W/Kg)	Head	GSM850	0.73	☐Left ☒Right ☒Cheek ☐Tilt 251 Channel
		GSM1900	1.03	☒Left ☐Right ☒Cheek ☐Tilt 810 Channel
		WLAN802.11 b	0.419	☒Left ☐Right ☒Cheek ☐Tilt 6 Channel - with memory card
	Body worn (Speech mode)	GSM850	0.526	☐Front ☒Back 251 Channel
		GSM1900	0.491	☐Front ☒Back 810 Channel
	Hotspot mode	GSM850	1.19	☐Front ☒Back ☐Bottom ☐Right ☐Left 251 Channel

Max. SAR Measured(1 g) (Unit: W/Kg)	Hotspot mode	GSM1900	1.28	☐Front ☒Back ☐Bottom ☐Right ☐Left __810__Channel
		WLAN802.11 b	0.112	☐Front ☐Back ☐Top ☒Right ☐Left __6__Channel - with headset

ST23i variant and ST23a variant WLAN antenna &matching design are the same. WLAN test results leverage from ST23a (Report No.:EN/2012/40006).

HW Architecture			
	Band	Component Name	Part Reference
ST23i variant	WLAN	BCM4330	WWU1101
ST23a variant	WLAN	BCM4330	WWU1101





#. Scaling SAR table:

Mode		Band	Channel	Power (dBm)	Target Power (dBm)	Scaling	Max. SAR Measured (1 g) (W/Kg)	Calculated SAR (1 g) (W/Kg)
Head		GSM 850	251	34.3	34.3	0%	0.73	0.73
		GSM 1900	810	30.9	31	2.33%	1.03	**1.05**
Body	Body worn (speech mode)	GSM 850	251	34.3	34.3	0%	0.53	0.53
		GSM 1900	810	30.9	31	2.33%	0.49	0.50
	Hotspot mode	GPRS 850 1Dn4UP	251	28.6	28.6	0%	1.19	1.19
		GPRS1900 1Dn4UP	810	26.4	26.4	0%	**1.28**	**1.28**

#. GSM/GPRS/EDGE conducted power table:

EUT mode	Frequency (MHz)	CH	Burst average power	Source-based time average power
			Avg.(dBm)	Avg.(dBm)
GSM 850 (GMSK)	824.2	128	33.90	24.87
	836.6	190	34.10	25.07
	848.8	251	34.30	25.27
The division factor compared to the number of TX time slot				
Division factor			1 TX time slot	
			-9.03	

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 850 (GMSK)	824.2	128	34.20	30.00	28.70	28.60
	836.6	190	34.50	29.90	28.70	28.70
	848.8	251	34.50	29.90	28.70	28.60
Source-based time average power						
GPRS 850 (GMSK)	824.2	128	25.17	23.98	24.44	25.59
	836.6	190	25.47	23.88	24.44	25.69
	848.8	251	25.47	23.88	24.44	25.59
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 850 (MCS 5)	824.2	128	27.60	26.60	26.40	26.20
	836.6	190	27.60	26.60	26.50	26.30
	848.8	251	27.50	26.50	26.40	26.30
Source-based time average power						
EDGE 850 (MCS 5)	824.2	128	18.57	20.58	22.14	23.19
	836.6	190	18.57	20.58	22.24	23.29
	848.8	251	18.47	20.48	22.14	23.29
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 850 (MCS 4)	824.2	128	27.32	26.37	26.28	26.14
	836.6	190	27.37	26.41	26.35	26.18
	848.8	251	27.34	26.40	26.28	26.15
Source-based time average power						
EDGE 850 (MCS 4)	824.2	128	18.29	20.35	22.02	23.13
	836.6	190	18.34	20.39	22.09	23.17
	848.8	251	18.31	20.38	22.02	23.14
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 850 (MCS 9)	824.2	128	27.29	26.32	26.21	26.20
	836.6	190	27.33	26.39	26.27	26.28
	848.8	251	27.29	26.31	26.24	26.17
Source-based time average power						
EDGE 850 (MCS 9)	824.2	128	18.26	20.30	21.95	23.19
	836.6	190	18.30	20.37	22.01	23.27
	848.8	251	18.26	20.29	21.98	23.16
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

EUT mode	Frequency (MHz)	CH	Burst average power	Source-based time average power
			Avg.(dBm)	Avg.(dBm)
GSM 1900 (GMSK)	1850.2	512	31.80	22.77
	1880	661	31.20	22.17
	1909.8	810	30.90	21.87
The division factor compared to the number of TX time slot				
Division factor			1 TX time slot	
			-9.03	

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 1900 (GMSK)	1850.2	512	31.80	29.00	28.10	27.10
	1880	661	31.40	28.70	27.80	26.80
	1909.8	810	30.80	28.30	27.30	26.40
Source-based time average power						
GPRS 1900 (GMSK)	1850.2	512	22.77	22.98	23.84	24.09
	1880	661	22.37	22.68	23.54	23.79
	1909.8	810	21.77	22.28	23.04	23.39
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 1900 (MCS 5)	1850.2	512	27.10	26.30	26.20	26.00
	1880	661	26.80	25.90	25.90	25.90
	1909.8	810	26.60	25.70	25.70	25.70
Source-based time average power						
EDGE 1900 (MCS 5)	1850.2	512	18.07	20.28	21.94	22.99
	1880	661	17.77	19.88	21.64	22.89
	1909.8	810	17.57	19.68	21.44	22.69
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 1900 (MCS 4)	1850.2	512	26.54	26.55	26.07	25.85
	1880	661	26.53	26.55	26.06	25.85
	1909.8	810	26.47	26.46	26.00	25.80
Source-based time average power						
EDGE 1900 (MCS 4)	1850.2	512	17.51	20.53	21.81	22.84
	1880	661	17.50	20.53	21.80	22.84
	1909.8	810	17.44	20.44	21.74	22.79
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 1900 (MCS 9)	1850.2	512	26.50	25.71	25.68	25.62
	1880	661	26.51	25.70	25.65	25.61
	1909.8	810	26.45	25.66	25.57	25.58
Source-based time average power						
EDGE 1900 (MCS 9)	1850.2	512	17.47	19.69	21.42	22.61
	1880	661	17.48	19.68	21.39	22.60
	1909.8	810	17.42	19.64	21.31	22.57
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

#. WLAN802.11 b/g/n(20M) conducted power table:

802.11 b		Average Power Output (dBm)			
CH	Frequency (MHz)	Data Rate (Mbps)			
		1	2	5.5	11
1	2412	14.29	14.24	14.2	14.14
6	2437	14.31	14.24	14.2	14.14
11	2462	15.25	15.15	15.09	14.99

802.11 g		Average Power Output (dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
1	2412	13.06	13.01	12.66	12.56	12.1	12.05	11.66	11.41
6	2437	13.36	13.3	12.85	12.65	12.35	12.15	11.87	11.59
11	2462	13.65	13.47	13.27	13.07	12.92	12.81	12.57	12.52

802.11 n (20M)		Average Power Output (dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6.5	13	19.5	26	39	52	58.5	65
1	2412	11.64	11.61	11.18	11.05	10.52	10.49	9.94	9.74
6	2437	11.49	11.37	11.00	10.90	10.37	10.31	9.80	9.69
11	2462	12.50	12.47	12.07	11.97	11.58	11.48	10.97	10.87

#. Bluetooth conducted power table:

Frequency (MHz)	Peak Power (dBm)		Average Power (dBm)	
	BDR	EDR	BDR	EDR
2402	9.7	10.17	8.47	6.48
2441	9.46	10.03	8.38	6.42
2480	9.26	9.3	8.11	6.29

1.4 Test Environment

Ambient Temperature : 22±2° C
Tissue Simulating Liquid: 22±2° C

1.5 Operation Description

General:

1. The EUT is controlled by using a Radio Communication Tester (Agilent E5515C), 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 batt¯ery is fully charged.
3. During the SAR testing, the DASY5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
4. Testing Head SAR at lowest, middle and highest channel for all bands with Left Tilt /Left cheek/Right Tilt/Right cheek conditions.
5. Testing body-worn speech mode SAR by separating the EUT and the Phantom **15mm** distance when performing GSM850 and GSM1900 (Both Front side& back side)
6. Testing hotspot mode SAR by separating the EUT and the Phantom **10mm** distance.

   #. The SAR testing for portable devices with wireless router capability is refered as test guidance of **KDB 941225 D06** (SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities).

   #. The following procedures are applicable when the overall device length and width are ≥9 cm x 5 cm respectively. A test separation of 10 mm is required. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25 mm from that surface or edge, for the data modes, wireless technologies and frequency bands supporting hotspot mode.

For GPRS body-worn (15mm separation): the testing device support mobile hotspot function, the separation distance is **10mm (No need to perform SAR testing with Body worn accessory (15mm separation distance) due to the hotspot mode(10mm separation distance) is conservative than Body worn accessory mode.)**

Test configurations:

(1) Front side
(2) Back side
(3) Top side.(WWAN antenna to edge distance >25mm_No SAR)
(4) Bottom side. (WLAN antenna to edge distance >25mm_No SAR)
(5) Right side.
(6) Left side. (WLAN antenna to edge distance >25mm_No SAR)

7. When the maximum transmitter and antenna output power are ≦ 60/f(GHz) (mW) SAR evaluation is typically not required for FCC or TCB approval **(Bluetooth average power= 8.47dBm)**
8. According to **KDB248227**-SAR is not required for 802.11 g/HT20/HT40 channels when the maximum average output power is less than 0.25 dB higher than that measured on the corresponding 802.11b channels.
9. For Head, The highest 1-g SAR for WLAN is 0.419 W/kg and the highest 1-g SAR for WWAN is 1.05 W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0. 419 +1.03 = 1.449 W/kg.
10. For Body, The highest 1-g SAR for WLAN is 0.112 W/kg and the highest 1-g SAR for WWAN is 1.37 W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0.112 +1.28 = 1.392 W/kg.
11. For both head & body, summing 1-g SAR for WLAN and WWAN **were lower than the limit 1.6W/kg.** According to **KDB648474/KDB447498** Simultaneous SAR evaluation is not required.
12. WLAN / WWAN – Antenna separation is 75.75mm> 5cm, Sum of SAR is less than 1.6W/kg, hence no simultaneous SAR is needed.

Additional configuration(Head):

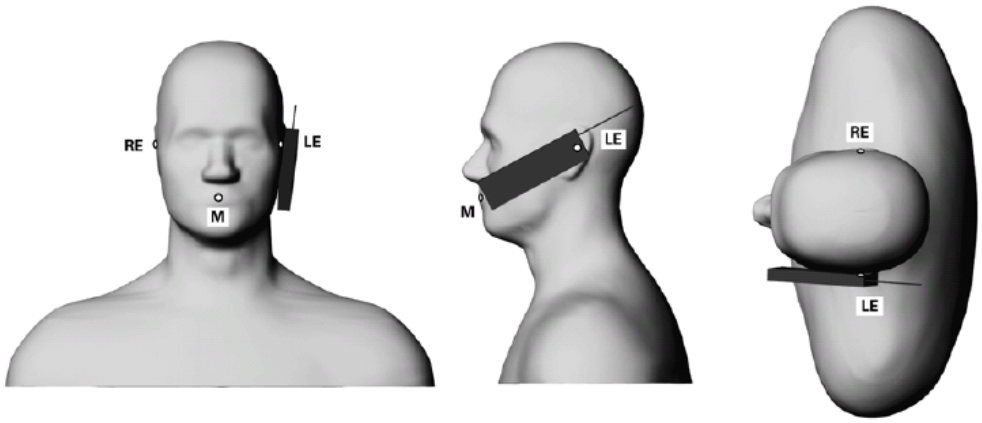
13. For highest SAR configuration in this band repeated with external Memory card inside.

14. For highest SAR configuration in this band repeated with 2nd Battery (Supplier: Samsung).

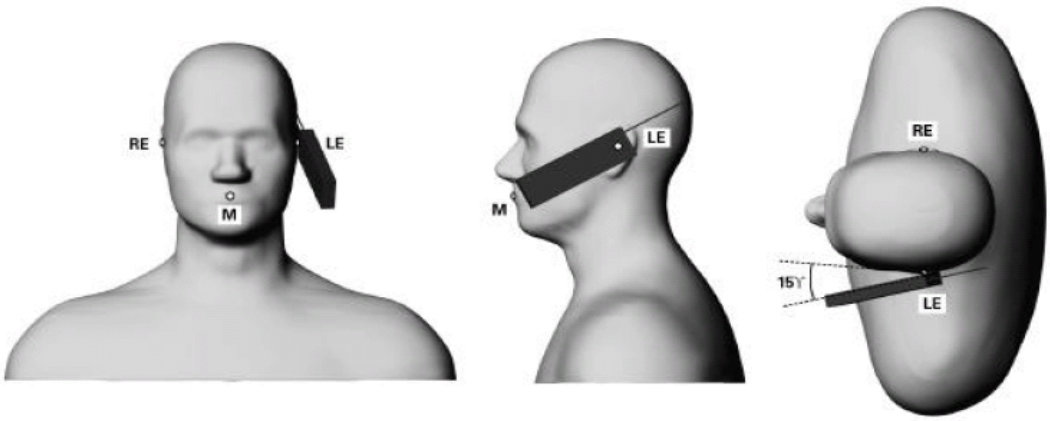
Additional configuration(Body):

15. For highest SAR configuration in this band repeated with external Memory card inside.
16. For highest SAR configuration in this band repeated with Headset.
17. For highest SAR configuration in this band repeated with 2nd Battery (Manufacture: Samsung).

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:
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, 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 the moved around until the highest averaged SAR is found.

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

1.8 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

1.8.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field (E) and the temperature gradient ($\delta T / \delta t$) in the liquid.

$$SAR = \frac{\sigma}{\rho}|E|^2 = c\frac{\delta T}{\delta t}$$

whereby σ is the conductivity, ρ the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

- The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be

completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.

- The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ) , there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about ±10% (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is ±5% (RSS) when the same liquid is used for the calibration and for actual measurements and ±7-9% (RSS) when not, which is in good agreement with the estimates given in [2].

1.8.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

- The setup must enable accurate determination of the incident power.
- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

References

[1] N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.

[2] K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.

[3] K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432{438, Apr. 1998.

1.9 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). A Model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

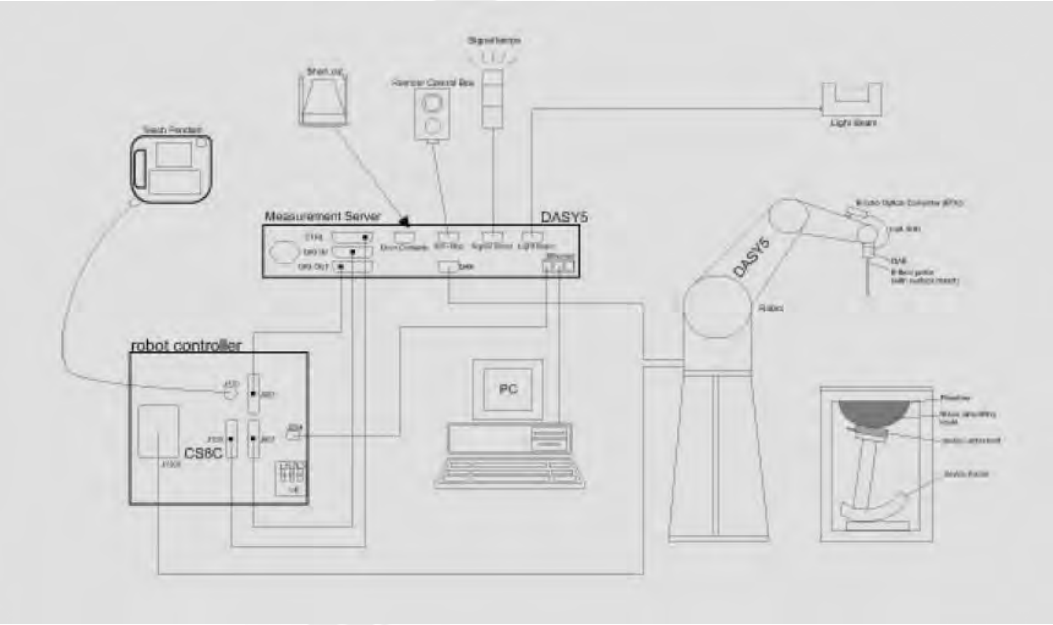


Fig.a A block diagram of the SAR measurement system.

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

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach 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 XP.
- DASY52 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

1.10 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)	 EX3DV4 E-Field Probe
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL835/1900/2450MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz; Linearity: ± 0.6 dB (30 MHz to 4 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

SAM PHANTOM V4.0C

Construction:	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.	
Shell Thickness:	2 ± 0.2 mm	
Filling Volume:	Approx. 25 liters	
Dimensions:	Height: 810 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

1.11 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 21.7°C, the relative humidity was 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.

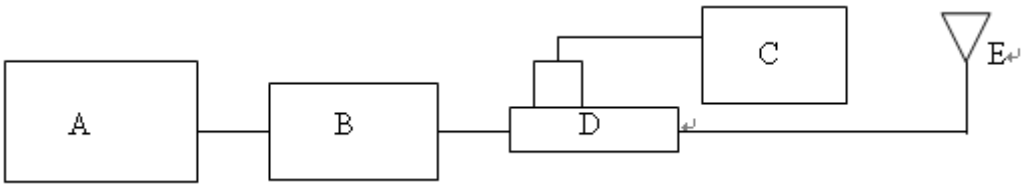
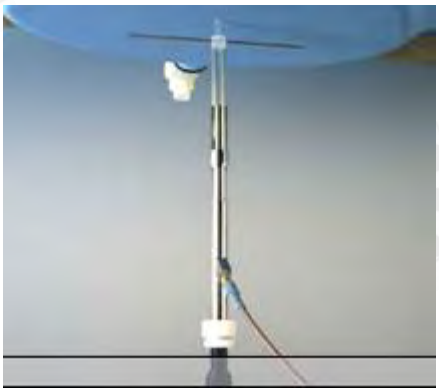


Fig.b The block diagram of system verification

A. Signal Generator
B. Amplifier
C. Power meter
D. Dual directional coupling
E. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	S/N	Frequency (MHz)		Target SAR (1g) (Pin=250mW) (mW/g)	Measured SAR (1g)(mW/g)	Measured Date
D835V2	4d120	835	Head	2.3	2.41	May 15, 2012
			Body	2.43	2.43	May 15, 2012
D1900V2	5d027	1900	Head	9.43	9.25	May 15, 2012
			Body	10	10.1	May 15, 2012
D2450V2	727	2450	Head	12.8	13.4	May 07, 2012
			Body	12.7	12.3	May 12, 2012
D835V2	4d120	835	Body	2.43	2.51	Jun. 07, 2012
D1900V2	5d027	1900	Body	10	10.2	Jun. 07, 2012

Table 1. System validation (follow manufacture target value)

1.12 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-simulant fluid were measured by using the HP Model 85070E Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjuncation with 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 iin the flat section of the phantom was 15cm±5mm during all tests. (Appendix Fig .2)

Frequency (MHz)	Tissue type	Dielectric Parameters		Recommended Limits	Measured	Measurement date
850	Head	Verification	ρ	38.95-43.05	41.026	May 15, 2012
			σ (S/m)	0.84-0.92	0.877	
		Test CH (L)_GSM	ρ	38.95-43.05	41.166	
			σ (S/m)	0.84-0.92	0.867	
		Test CH (M)_GSM	ρ	38.95-43.05	41.004	
			σ (S/m)	0.84-0.92	0.879	
		Test CH (H)_GSM	ρ	38.95-43.05	40.862	
			σ (S/m)	0.84-0.92	0.889	
		Simulated Tissue Temp.(°C)		20-24	21.7	
	Body	Verification	ρ	51.11-56.49	52.142	May 15, 2012
			σ (S/m)	0.93-1.03	1.008	
		Test CH (L)_GSM	ρ	51.11-56.49	52.241	
			σ (S/m)	0.93-1.03	0.997	
		Test CH (M)_GSM	ρ	51.11-56.49	52.113	
			σ (S/m)	0.93-1.03	1.01	
		Test CH (H)_GSM	ρ	51.11-56.49	51.978	
			σ (S/m)	0.93-1.03	1.023	
		Simulated Tissue Temp.(°C)		20-24	21.7	

Frequency (MHz)	Tissue type	Dielectric Parameters		Recommended Limits	Measured	Measurement date
1900	Head	Verification	ρ	38.76-42.84	37.219	May 15, 2012
			σ (S/m)	1.3-1.44	1.4	
		Test CH (L)_GSM	ρ	38.76-42.84	39.404	
			σ (S/m)	1.3-1.44	1.354	
		Test CH (M)_GSM	ρ	38.76-42.84	39.298	
			σ (S/m)	1.3-1.44	1.381	
		Test CH (H)_GSM	ρ	38.76-42.84	39.17	
			σ (S/m)	1.3-1.44	1.41	
		Simulated Tissue Temp.(°C)		20-24	21.7	
	Body	Verification	ρ	50.64-55.97	51.361	
			σ (S/m)	1.43-1.59	1.522	
		Test CH (L)_GSM	ρ	50.64-55.97	52.164	
			σ (S/m)	1.43-1.59	1.51	
		Test CH (M)_GSM	ρ	50.64-55.97	51.813	
			σ (S/m)	1.43-1.59	1.509	
		Test CH (H)_GSM	ρ	50.64-55.97	51.214	
			σ (S/m)	1.43-1.59	1.537	
		Simulated Tissue Temp.(°C)		20-24	21.7	
2450	Head	Verification	ρ	37.62-41.58	37.641	May 07, 2012
			σ (S/m)	1.72-1.9	1.809	
		Test CH (L)_WLAN	ρ	37.62-41.58	37.653	
			σ (S/m)	1.72-1.9	1.767	
		Test CH (M)_WLAN	ρ	37.62-41.58	37.652	
			σ (S/m)	1.72-1.9	1.797	
		Test CH (H)_WLAN	ρ	37.62-41.58	37.608	
			σ (S/m)	1.72-1.9	1.82	
		Simulated Tissue Temp.(°C)		20-24	21.7	

Frequency (MHz)	Tissue type	Dielectric Parameters		Recommended Limits	Measured	Measurement date
2450	Body	Verification	ρ	49.78-55.02	48.926	May 12, 2012
			σ (S/m)	1.88-2.08	1.867	
		Test CH (L)_WLAN	ρ	49.78-55.02	48.977	
			σ (S/m)	1.88-2.08	1.815	
		Test CH (M)_WLAN	ρ	49.78-55.02	48.949	
			σ (S/m)	1.88-2.08	1.851	
		Test CH (H)_WLAN	ρ	49.78-55.02	48.897	
			σ (S/m)	1.88-2.08	1.88	
		Simulated Tissue Temp.(°C)		20-24	21.7	
850	Body	Verification	ρ	51.11-56.49	54.687	Jun. 07, 2012
			σ (S/m)	0.93-1.03	1.018	
		Test CH (L)_GSM	ρ	51.11-56.49	54.799	
			σ (S/m)	0.93-1.03	1.011	
		Test CH (M)_GSM	ρ	51.11-56.49	54.653	
			σ (S/m)	0.93-1.03	1.02	
		Test CH (H)_GSM	ρ	51.11-56.49	54.372	
			σ (S/m)	0.93-1.03	1.025	
		Simulated Tissue Temp.(°C)		20-24	21.7	
1900	Body	Verification	ρ	50.64-55.97	51.001	Jun. 07, 2012
			σ (S/m)	1.43-1.59	1.538	
		Test CH (L)_GSM	ρ	50.64-55.97	51.138	
			σ (S/m)	1.43-1.59	1.448	
		Test CH (M)_GSM	ρ	50.64-55.97	50.756	
			σ (S/m)	1.43-1.59	1.492	
		Test CH (H)_GSM	ρ	50.64-55.97	51.174	
			σ (S/m)	1.43-1.59	1.556	
		Simulated Tissue Temp.(°C)		20-24	21.7	

Table 2. Dielectric Parameters of Tissue Simulant Fluid

The composition of the brain tissue simulating liquid:

Frequency (MHz)	Mode	Ingredient						Total amount
		DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	
850	Head	—	532.98	18.3	2.4	3.2	766	1.0L(Kg)
	Body	—	631.68	11.72	1.2	—	600	1.0L(Kg)
1900	Head	444.52	552.42	3.06	—	—	—	1.0L(Kg)
	Body	300.67	716.56	4	—	—	—	1.0L(Kg)
2450	Head	550	450	—	—	—	—	1.0L(Kg)
	Body	301.7	698.3	—	—	—	—	1.0L(Kg)

Table 3. Recipes for tissue simulating liquid (Unit: g)

1.13 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (“SAR”) in Section 4.2 of “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.

These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in “Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields,” NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter.

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

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).

Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels

or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

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

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

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

2. Summary of Results

GSM 850 MHz

Band	Mode	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)			SAR Limit 1g (W/kg)
				CH 128	CH 190	CH 251	
				824.2 MHz	836.6 MHz	848.8 MHz	
				Source-based time average power (dBm) GSM			
				24.87	25.07	25.27	
				Source-based time average power (dBm) GPRS			
				25.59	25.69	25.59	
GSM850	GSM	Right	Cheek	0.333	0.489	0.733	1.6
			Tilt	—	0.331	—	1.6
		Left	Cheek	—	0.441	—	1.6
			Tilt	—	0.284	—	1.6
		Body worn (Speech mode)	Front -with headset	—	0.299	—	1.6
			Back -with headset	0.239	0.373	0.526	1.6
	GPRS 1Dn4UP	Hotspot mode	Front	—	0.697	—	1.6
			Back	0.633	0.926	1.19	1.6
			Bottom	—	0.058	—	1.6
			Right	—	0.538	—	1.6
			Left	—	0.449	—	1.6

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 ≤ 100 MHz, testing for the other channels is not required.

GSM 1900 MHz

Band	Mode	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)			SAR Limit 1g (W/kg)
				CH 512	CH 661	CH 810	
				1850.2 MHz	1880 MHz	1909.8 MHz	
				Source-based time average power (dBm) GSM			
				22.77	22.17	21.87	
				Source-based time average power (dBm) GPRS			
				24.09	23.79	23.39	
GSM 1900	GSM	Right	Cheek	—	0.696	—	1.6
			Tilt	—	0.288	—	1.6
		Left	Cheek	0.932	0.797	1.03	1.6
			- with Memory card	—	—	0.994	1.6
			- with 2nd Battery	—	—	0.979	1.6
			Tilt	—	0.269	—	1.6
		Body worn (Speech mode)	Front -with headset	—	0.402	—	1.6
			Back -with headset	0.386	0.461	0.491	1.6
	GPRS 1Dn4UP	Hotspot mode	Front	1.04	1.12	1.09	1.6
			Back	1.07	1.23	1.28	1.6
			- with Memory card	—	—	1.26	1.6
			- with headset	—	—	1.03	1.6
			- with 2nd Battery	—	—	1.25	1.6
			Bottom	—	0.786	—	1.6
			Right	—	0.299	—	1.6
			Left	—	0.267	—	1.6

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 ≤ 100 MHz, testing for the other channels is not required.

WLAN802.11 b

Band	EUT Position	Test Configuration	Averaged SAR over 1g (W/kg)			SAR Limit 1g (W/kg)
			CH 1	CH 6	CH 11	
			2412 MHz	2437 MHz	2462 MHz	
			Average Power Output (dBm)			
			14.29	14.31	15.25	
WLAN 802.11 b	Right	Cheek	—	0.252	—	1.6
		Tilt	—	0.251	—	1.6
	Left	Cheek	0.389	0.415	0.392	1.6
		- with Memory card	—	0.419	—	1.6
		- with 2nd Battery	—	0.402	—	1.6
		Tilt	—	0.349	—	1.6
	Hotspot mode	Front	—	0.07	—	1.6
		Back	—	0.071	—	1.6
		Top	—	0.058	—	1.6
		Right	0.07	0.073	0.07	1.6
		with Memory card	—	0.064	—	1.6
		- with headset	—	0.112	—	1.6
		- with 2nd Battery	—	0.072	—	1.6

Using KDB248227-SAR is not required for 802.11 g/HT20 channels when the maximum average output power is less than 0.25dB 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 ≤ 100 MHz, testing for the other channels is not required.

3. Instruments List

Device	Manufacturer	Type	Serial number	Date of last calibration	Date of next calibration
Dosimetric E-Field Probe	Schmid & Partner Engineering AG	EX3DV4	3770	Apr.27.2012	Apr.26.2013
835/1900/2450 MHz System Validation Dipole	Schmid & Partner Engineering AG	D835V2	4d120	Jul.19.2011	Jul.18.2012
		D1900V2	5d027	Apr.26.2012	Apr.25.2013
		D2450V2	727	Apr.25,2012	Apr.24,2013
Data acquisition Electronics	Schmid & Partner Engineering AG	DAE4	905	Jun.24.2011	Jun.23.2012
Software	Schmid & Partner Engineering AG	DASY 52 V52.8	N/A	Calibration not required	Calibration not required
Phantom	Schmid & Partner Engineering AG	SAM	N/A	Calibration not required	Calibration not required
Network Analyzer	HP	8753D	3410A05547	Mar.15.2012	Mar.14.2013
Dielectric Probe Kit	HP	85070E	MY44300554	Calibration not required	Calibration not required
Dual-directional coupler	Agilent	772D	MY46151242	Jul.07,2011	Jul.06,2012
		778D	MY48220468	Mar.30.2012	Mar.29.2013
RF Signal Generator	Agilent	N5181A	MY50141235	Jan.06,2012	Jan.05,2013
Power meter	Agilent	E4417A	MY51410006	Oct.24.2011	Oct.23.2013
Radio Communication Test	Agilent	E5515C	GB44051912	Jul.26.2010	Jul.25.2012
TECPEL	Digital thermometer	DTM-303A	TP102616	Mar.08.2012	Mar.07.2013

Device	Manufacturer	Type	Serial number	Date of last calibration	Date of next calibration
Spectrum Analyzer	Agilent	E4446A	MY51100003	Apr.15.2011	Apr.14.2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	Mar.17.2012	Mar.16.2014
Power Sensor	Anritsu	ML2495A	1005007	Feb.08.2012	Feb.07.2014
Power Meter	Anritsu	MA2411B	917032	Feb.08.2012	Feb.07.2014

4. Measurements

Date: 5/15/2012

RE Cheek_CH128

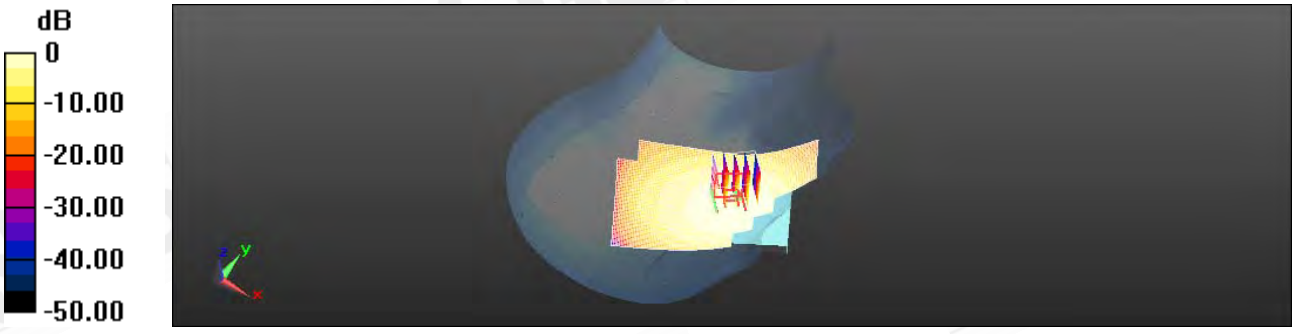
Communication System: GSM; Frequency: 824.2 MHz
Medium parameters used: f = 824.2 MHz; σ = 0.867 mho/m; ε_r = 41.166; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.49, 9.49, 9.49); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.387 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.519 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.420 mW/g
SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.243 mW/g
Maximum value of SAR (measured) = 0.382 mW/g



0 dB = 0.387 mW/g = -8.24 dB mW/g

Date: 5/15/2012

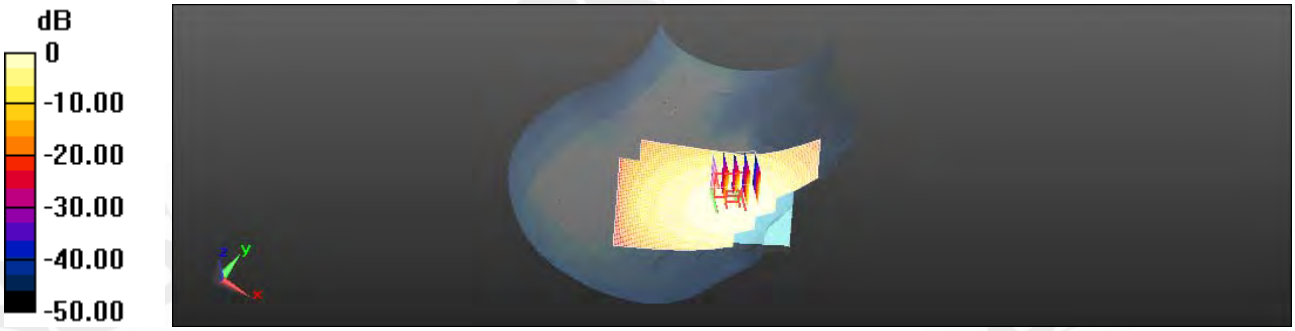
RE Cheek_CH190

Communication System: GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.879 mho/m; ε_r = 41.004; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.49, 9.49, 9.49); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.570 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.784 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.613 mW/g
SAR(1 g) = 0.489 mW/g; SAR(10 g) = 0.355 mW/g
Maximum value of SAR (measured) = 0.558 mW/g



0 dB = 0.570 mW/g = -4.89 dB mW/g

Date: 5/15/2012

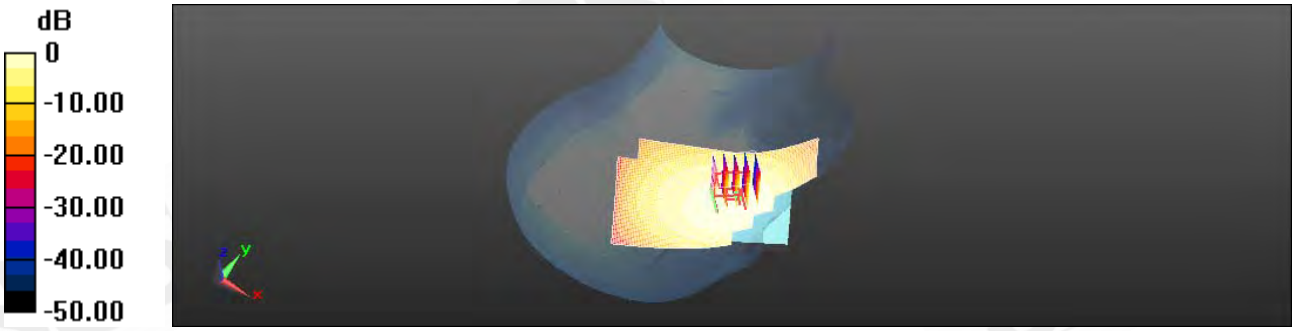
RE Cheek_CH251

Communication System: GSM; Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 0.889 mho/m; ε_r = 40.862; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.49, 9.49, 9.49); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.824 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.617 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.929 mW/g
SAR(1 g) = 0.733 mW/g; SAR(10 g) = 0.524 mW/g
Maximum value of SAR (measured) = 0.844 mW/g



0 dB = 0.824 mW/g = -1.69 dB mW/g

Date: 5/15/2012

RE Tilt_CH190

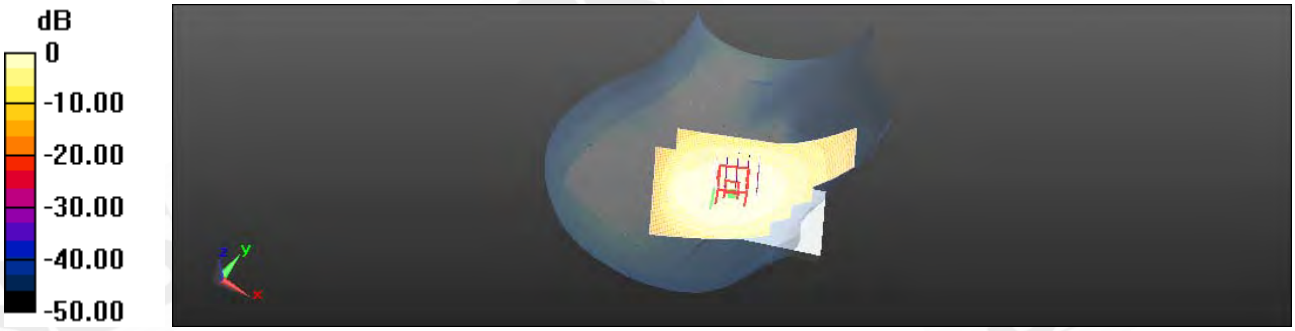
Communication System: GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.879 mho/m; ε_r = 41.004; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.49, 9.49, 9.49); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.381 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.463 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.427 mW/g
SAR(1 g) = 0.331 mW/g; SAR(10 g) = 0.244 mW/g
Maximum value of SAR (measured) = 0.384 mW/g



0 dB = 0.381 mW/g = -8.38 dB mW/g

Date: 5/15/2012

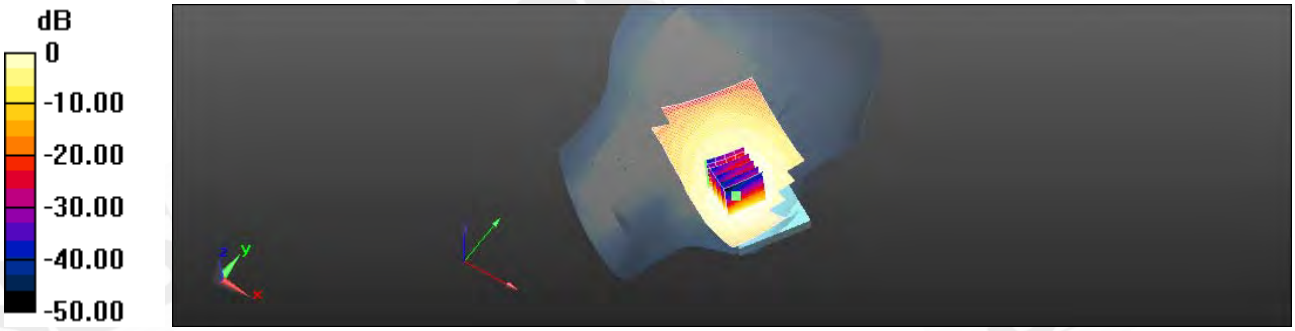
LE Cheek_CH190

Communication System: GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.879 mho/m; ε_r = 41.004; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.49, 9.49, 9.49); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.547 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.900 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.631 mW/g
SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.316 mW/g
Maximum value of SAR (measured) = 0.527 mW/g



0 dB = 0.547 mW/g = -5.24 dB mW/g

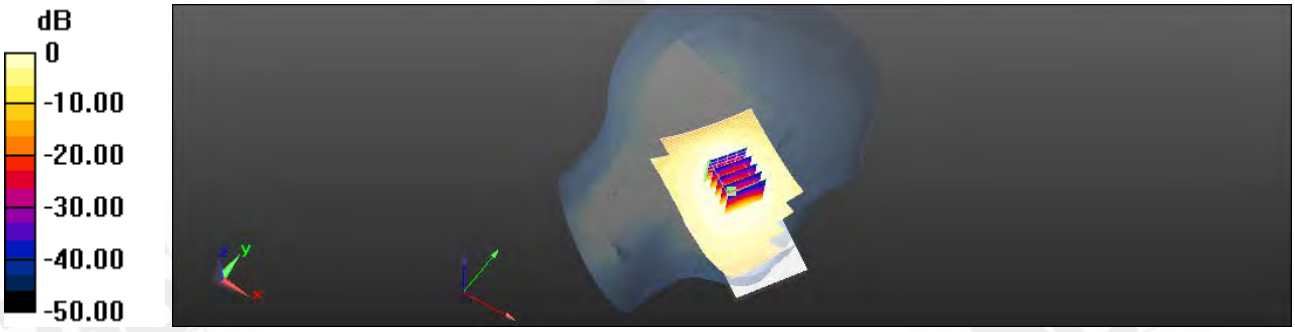
LE Tilt_CH190

Communication System: GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.879 mho/m; ε_r = 41.004; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.49, 9.49, 9.49); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.330 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.670 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.368 mW/g
SAR(1 g) = 0.284 mW/g; SAR(10 g) = 0.209 mW/g
Maximum value of SAR (measured) = 0.330 mW/g



0 dB = 0.330 mW/g = -9.62 dB mW/g

Body_Speech mode_Front side_CH190_repeated with headset

Communication System: GSM; Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 54.653; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.346 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

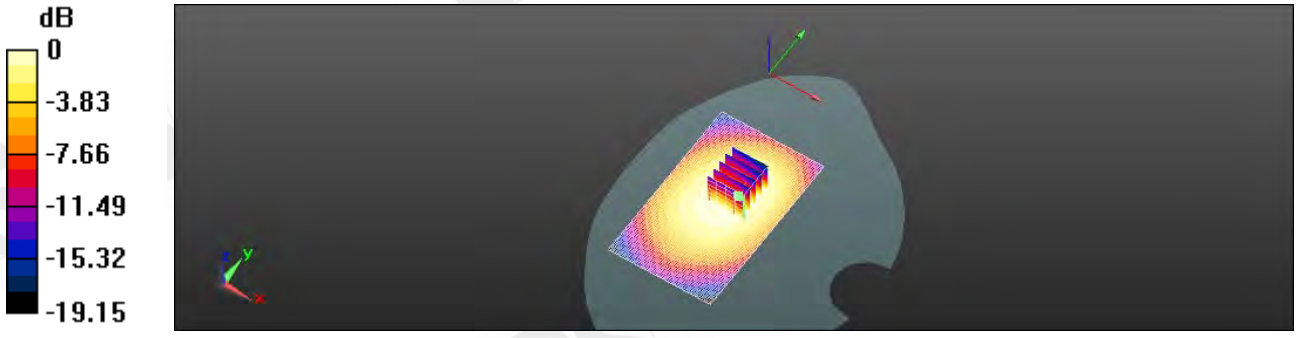
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.606 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.386 mW/g

SAR(1 g) = 0.299 mW/g; SAR(10 g) = 0.222 mW/g

Maximum value of SAR (measured) = 0.348 mW/g



0 dB = 0.346 mW/g = -9.21 dB mW/g

Date: 6/7/2012

Body_Speech mode_Back side_CH128_repeated with headset

Communication System: GSM; Frequency: 824.2 MHz

Medium parameters used (interpolated): f = 824.2 MHz; σ = 1.011 mho/m; ε_r = 54.799; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.284 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

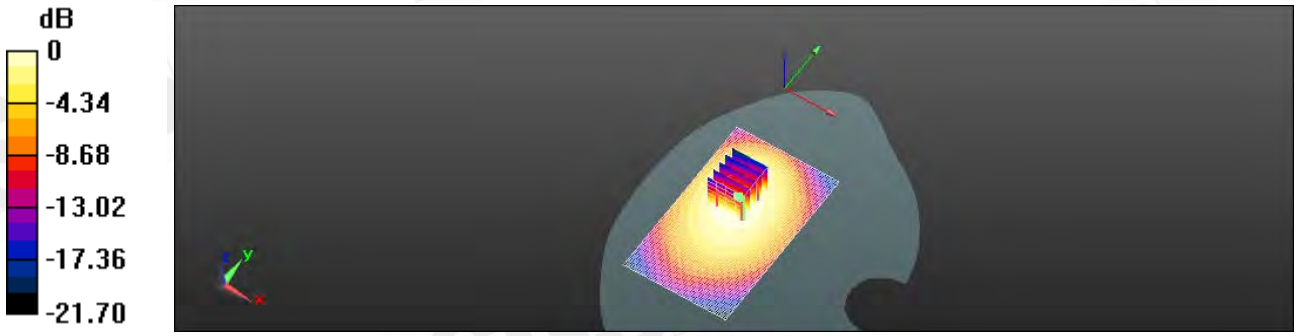
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.918 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.321 mW/g

SAR(1 g) = 0.239 mW/g; SAR(10 g) = 0.172 mW/g

Maximum value of SAR (measured) = 0.284 mW/g



0 dB = 0.284 mW/g = -10.94 dB mW/g

Date: 6/7/2012

Body_Speech mode_Back side_CH190_repeated with headset

Communication System: GSM; Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 54.653; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.441 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

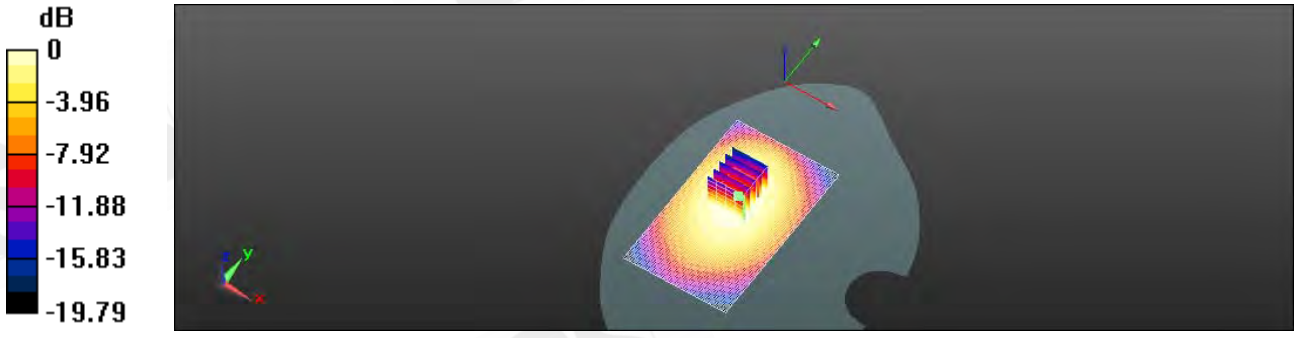
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.058 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.492 mW/g

SAR(1 g) = 0.373 mW/g; SAR(10 g) = 0.271 mW/g

Maximum value of SAR (measured) = 0.439 mW/g



0 dB = 0.441 mW/g = -7.12 dB mW/g

Date: 6/7/2012

Body_Speech mode_Back side_CH251_repeated with headset

Communication System: GSM; Frequency: 848.8 MHz

Medium parameters used: f = 849 MHz; σ = 1.025 mho/m; ε_r = 54.372; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.623 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

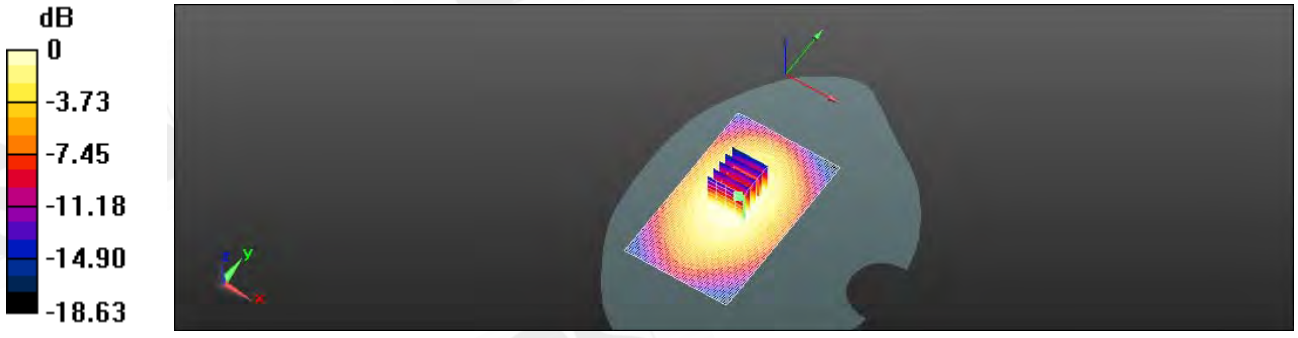
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.380 V/m; Power Drift = -0.05 dB

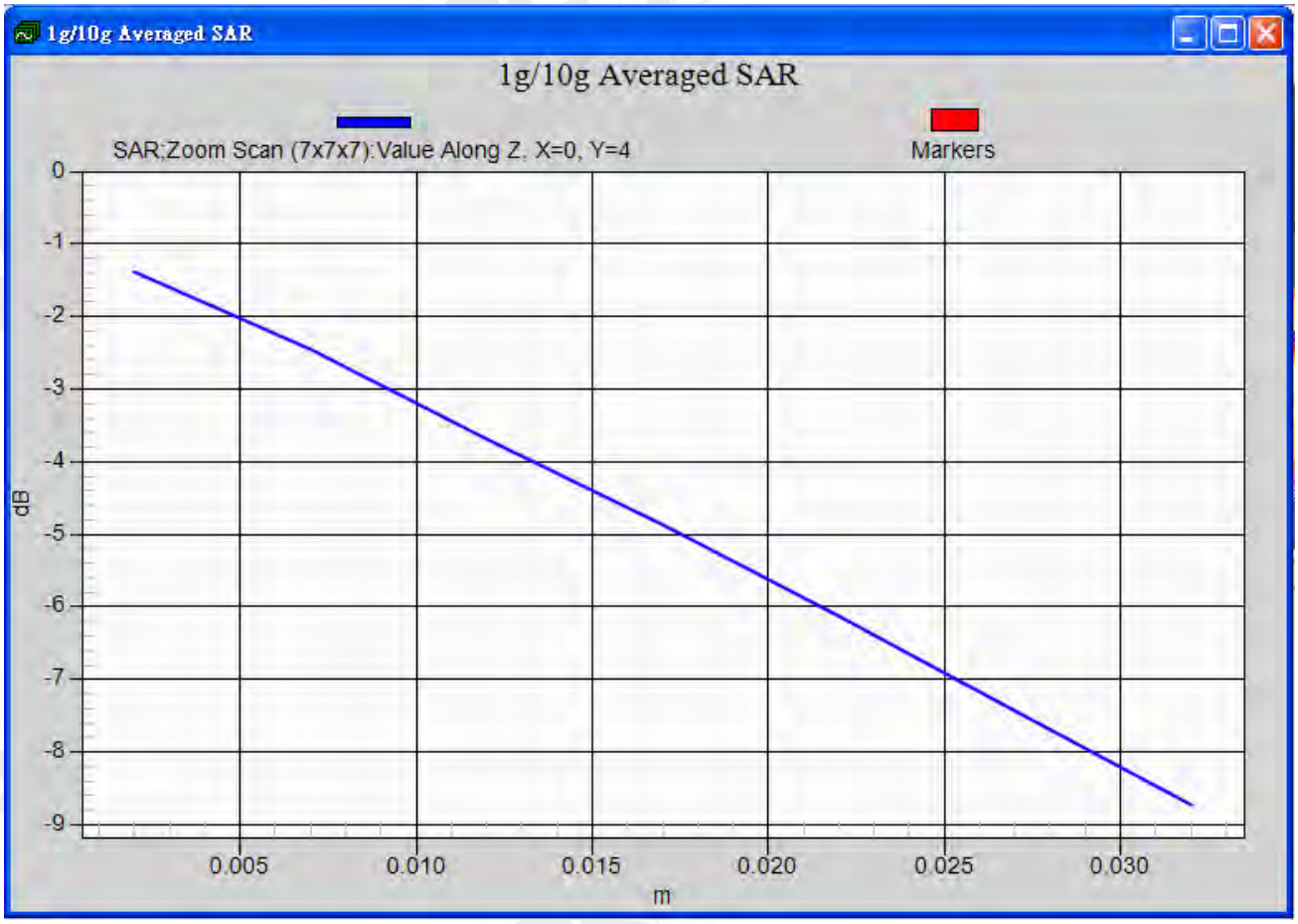
Peak SAR (extrapolated) = 0.689 mW/g

SAR(1 g) = 0.526 mW/g; SAR(10 g) = 0.386 mW/g

Maximum value of SAR (measured) = 0.618 mW/g



0 dB = 0.623 mW/g = -4.11 dB mW/g



Date: 5/15/2012

Hotspot_Front side_CH190

Communication System: GPRS(Class 12); Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.01 mho/m; ε_r = 52.113; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.865 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

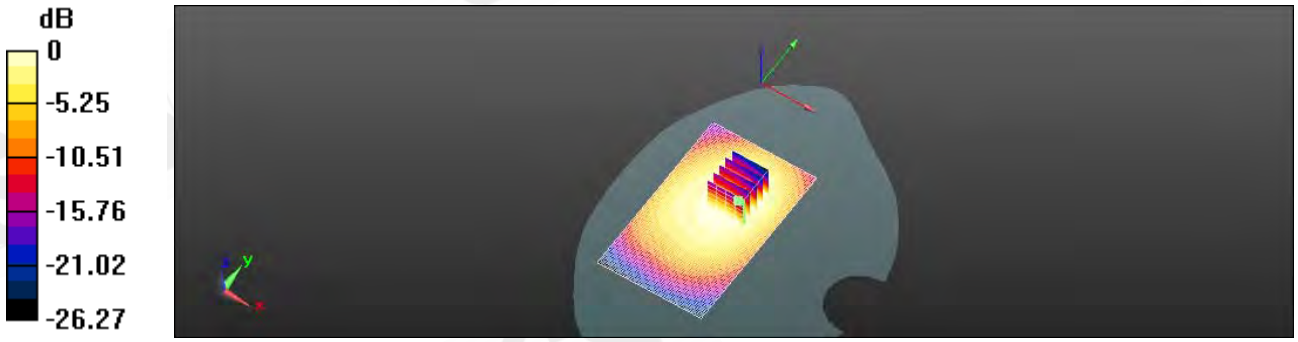
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.400 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.928 mW/g

SAR(1 g) = 0.697 mW/g; SAR(10 g) = 0.502 mW/g

Maximum value of SAR (measured) = 0.823 mW/g



0 dB = 0.865 mW/g = -1.26 dB mW/g

Date: 5/15/2012

Hotspot_Back side_CH128

Communication System: GPRS(Class 12); Frequency: 824.2 MHz

Medium parameters used: f = 824.2 MHz; σ = 0.997 mho/m; ε_r = 52.241; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.697 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

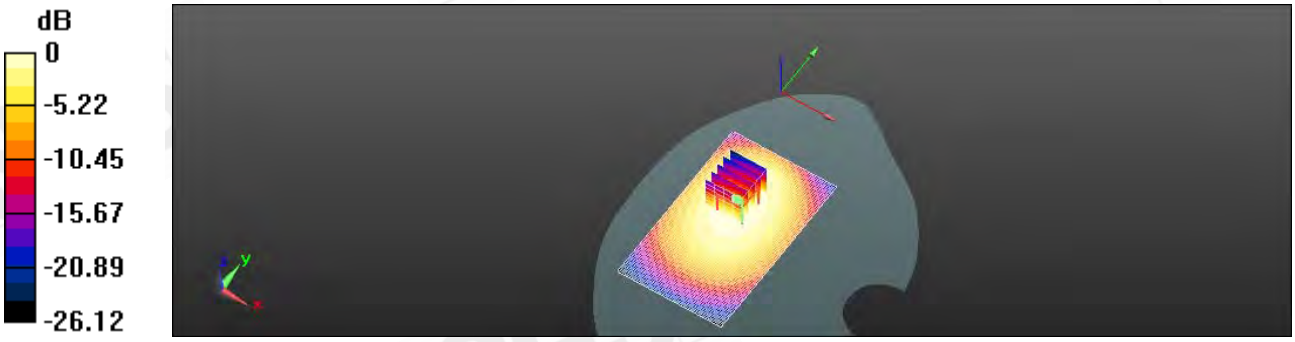
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.482 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.838 mW/g

SAR(1 g) = 0.633 mW/g; SAR(10 g) = 0.455 mW/g

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



0 dB = 0.740 mW/g = -2.62 dB mW/g

Date: 5/15/2012

Hotspot_Back side_CH190

Communication System: GPRS(Class 12); Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.01 mho/m; ε_r = 52.113; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.23 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

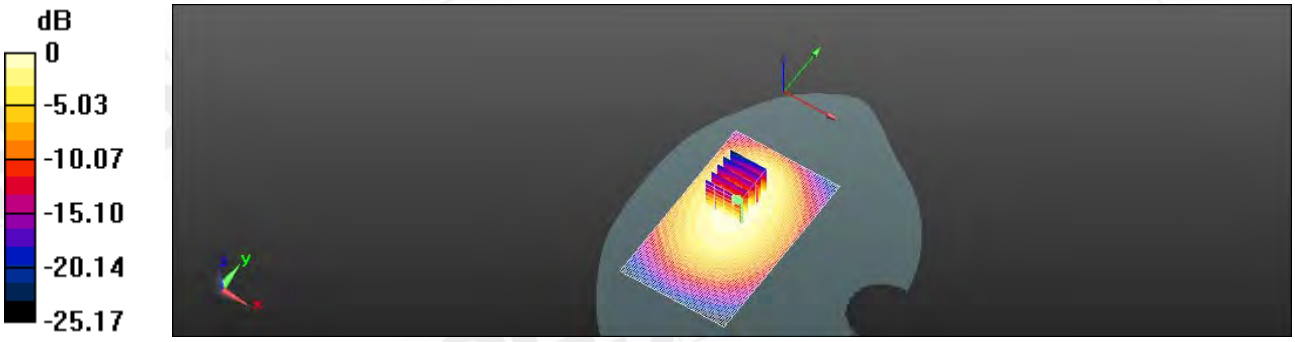
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.002 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.757 mW/g

SAR(1 g) = 0.926 mW/g; SAR(10 g) = 0.659 mW/g

Maximum value of SAR (measured) = 1.12 mW/g



0 dB = 1.23 mW/g = 1.80 dB mW/g

Date: 5/15/2012

Hotspot_Back side_CH251

Communication System: GPRS(Class 12); Frequency: 848.8 MHz

Medium parameters used: f = 849 MHz; σ = 1.023 mho/m; ε_r = 51.978; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.42 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

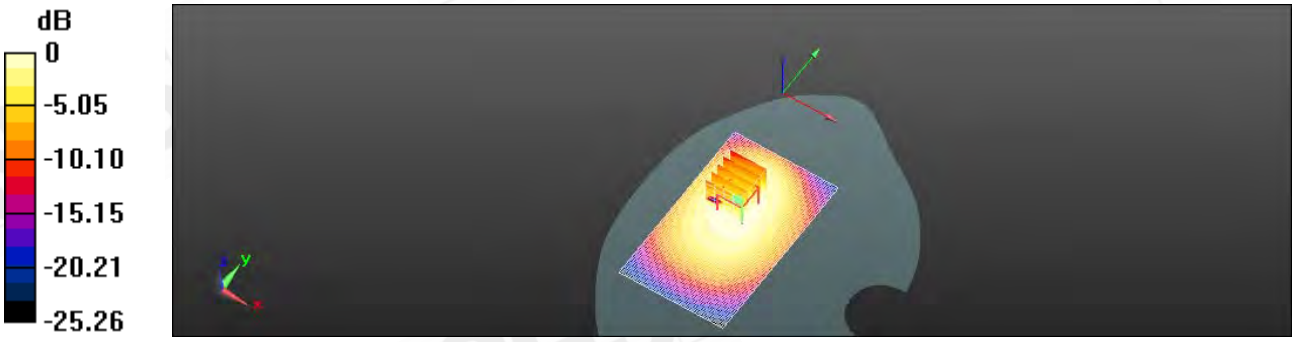
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.174 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.626 mW/g

SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.845 mW/g

Maximum value of SAR (measured) = 1.43 mW/g



0 dB = 1.42 mW/g = 3.03 dB mW/g

Date: 5/15/2012

Hotspot_Botton side_CH190

Communication System: GPRS(Class 12); Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.01 mho/m; ε_r = 52.113; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0825 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

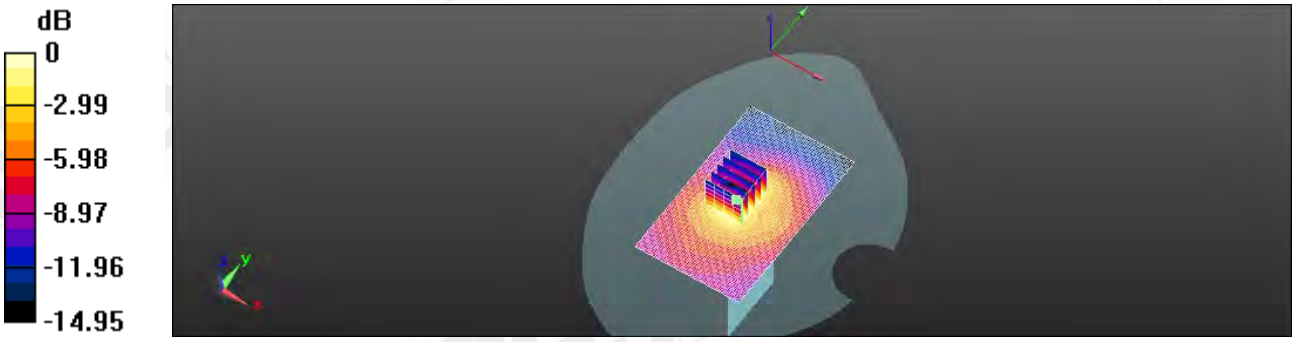
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.839 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.112 mW/g

SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.032 mW/g

Maximum value of SAR (measured) = 0.0787 mW/g



0 dB = 0.0825 mW/g = -21.67 dB mW/g

Date: 5/15/2012

Hotspot_Right side_CH190

Communication System: GPRS(Class 12); Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.01 mho/m; ε_r = 52.113; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.676 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

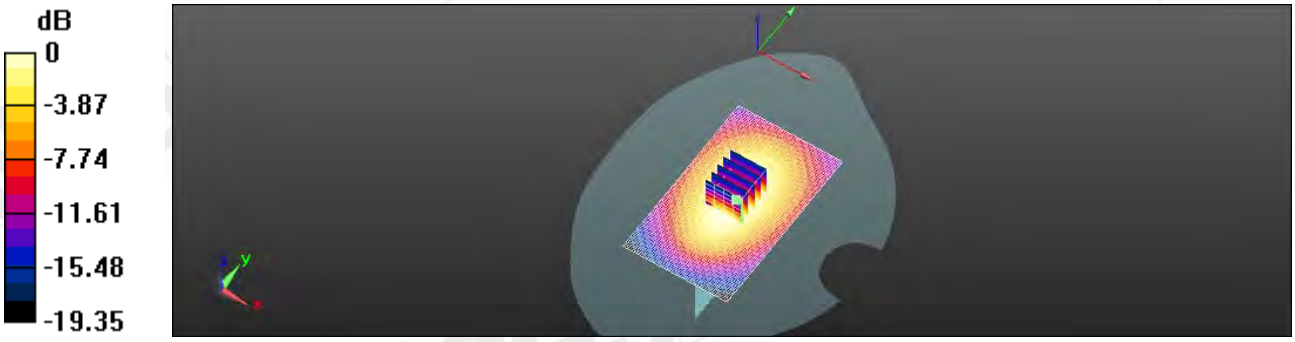
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.081 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.784 mW/g

SAR(1 g) = 0.538 mW/g; SAR(10 g) = 0.370 mW/g

Maximum value of SAR (measured) = 0.664 mW/g



0 dB = 0.676 mW/g = -3.40 dB mW/g

Date: 5/15/2012

Hotspot_Left side_CH190

Communication System: GPRS(Class 12); Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.01 mho/m; ε_r = 52.113; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.604 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

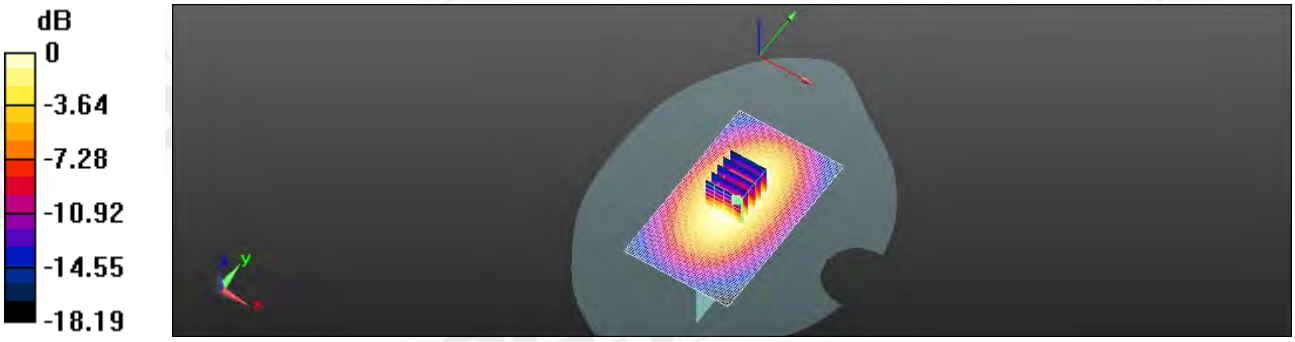
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.875 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.635 mW/g

SAR(1 g) = 0.449 mW/g; SAR(10 g) = 0.312 mW/g

Maximum value of SAR (measured) = 0.552 mW/g



0 dB = 0.604 mW/g = -4.38 dB mW/g

Date: 5/15/2012

RE Cheek_CH661

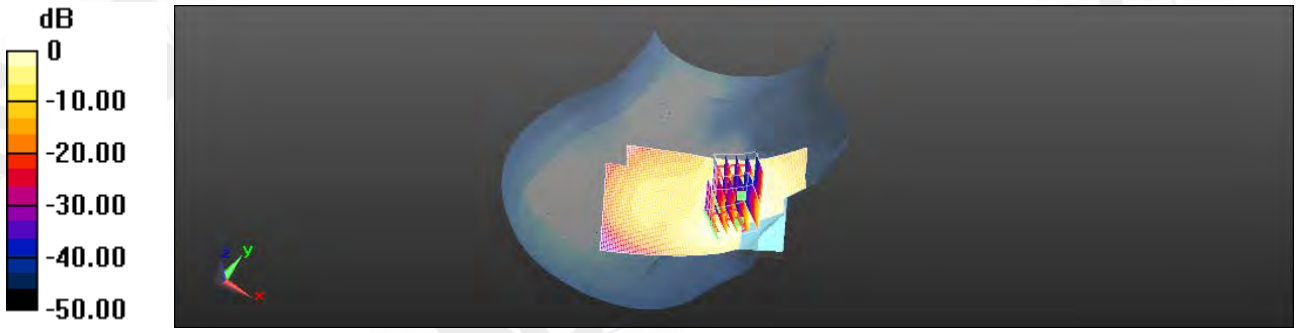
Communication System: GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.381 mho/m; εr = 39.298; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

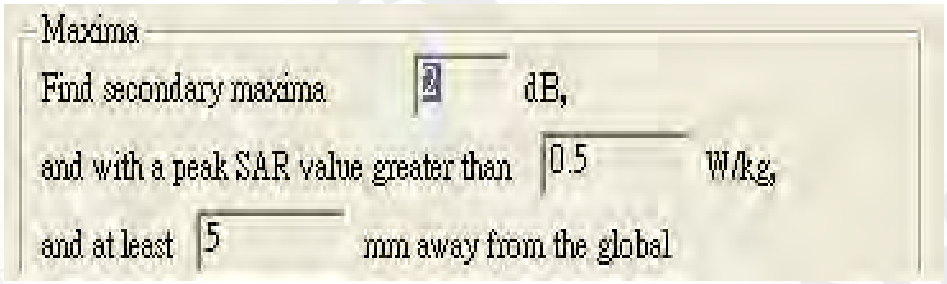
Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.886 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.342 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.026 mW/g
SAR(1 g) = 0.679 mW/g; SAR(10 g) = 0.427 mW/g
Maximum value of SAR (measured) = 0.856 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 1:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.342 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.097 mW/g
SAR(1 g) = 0.696 mW/g; SAR(10 g) = 0.410 mW/g
Maximum value of SAR (measured) = 0.921 mW/g



0 dB = 0.886 mW/g = -1.05 dB mW/g



Date: 5/15/2012

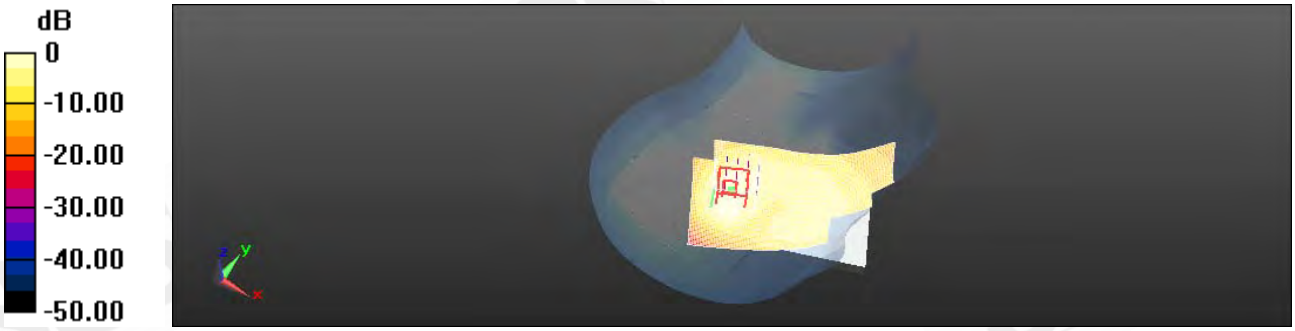
RE Tilt_CH661

Communication System: GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.381 mho/m; εr = 39.298; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.372 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.152 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.469 mW/g
SAR(1 g) = 0.288 mW/g; SAR(10 g) = 0.161 mW/g
Maximum value of SAR (measured) = 0.364 mW/g



0 dB = 0.372 mW/g = -8.59 dB mW/g

Date: 5/15/2012

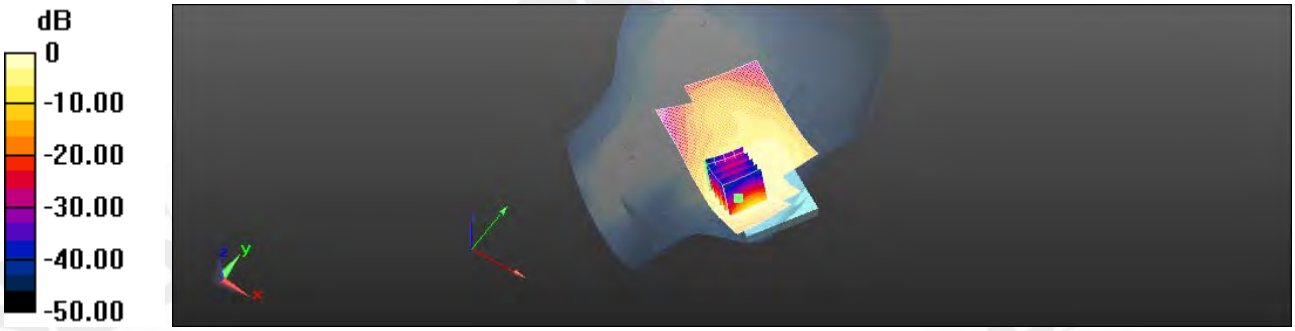
LE Cheek_CH512

Communication System: GSM; Frequency: 1850.2 MHz
Medium parameters used: f = 1850.2 MHz; σ = 1.354 mho/m; εr = 39.404; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.20 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.836 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.506 mW/g
SAR(1 g) = 0.932 mW/g; SAR(10 g) = 0.521 mW/g
Maximum value of SAR (measured) = 1.23 mW/g



0 dB = 1.20 mW/g = 1.60 dB mW/g

Date: 5/15/2012

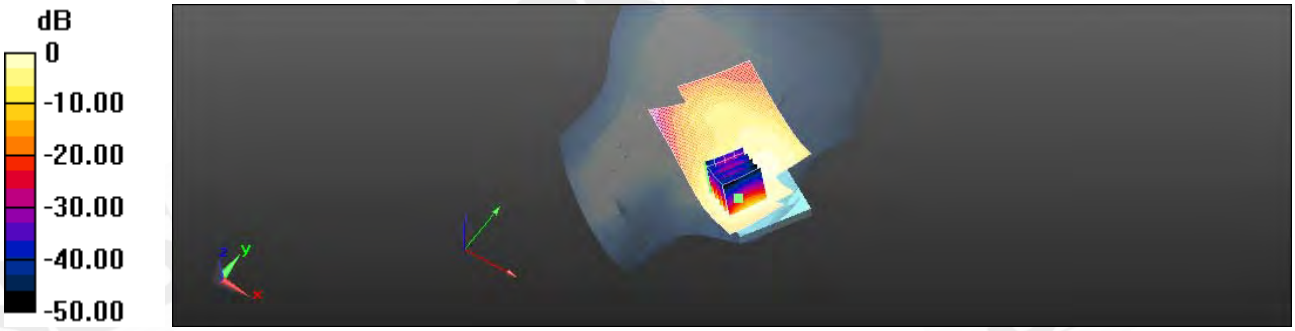
LE Cheek_CH661

Communication System: GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.381 mho/m; εr = 39.298; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.959 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.137 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.258 mW/g
SAR(1 g) = 0.797 mW/g; SAR(10 g) = 0.458 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 0.959 mW/g = -0.37 dB mW/g

Date: 5/15/2012

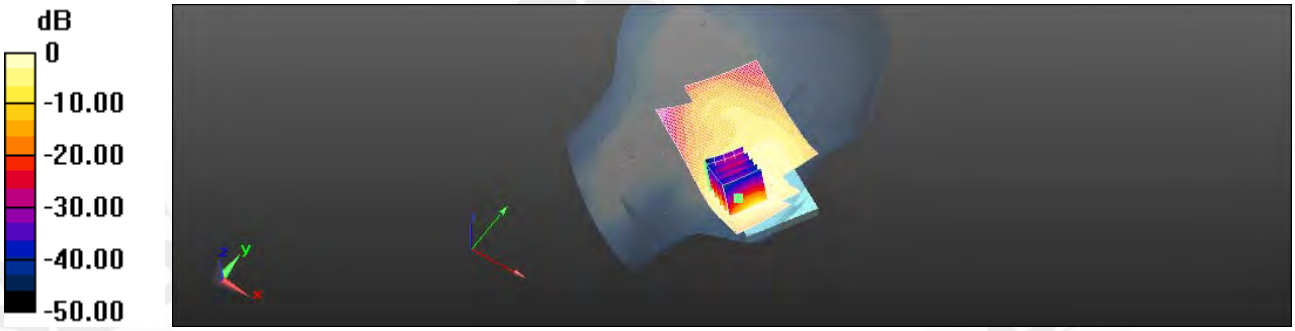
LE Cheek_CH810

Communication System: GSM; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.41 mho/m; ε_r = 39.17; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

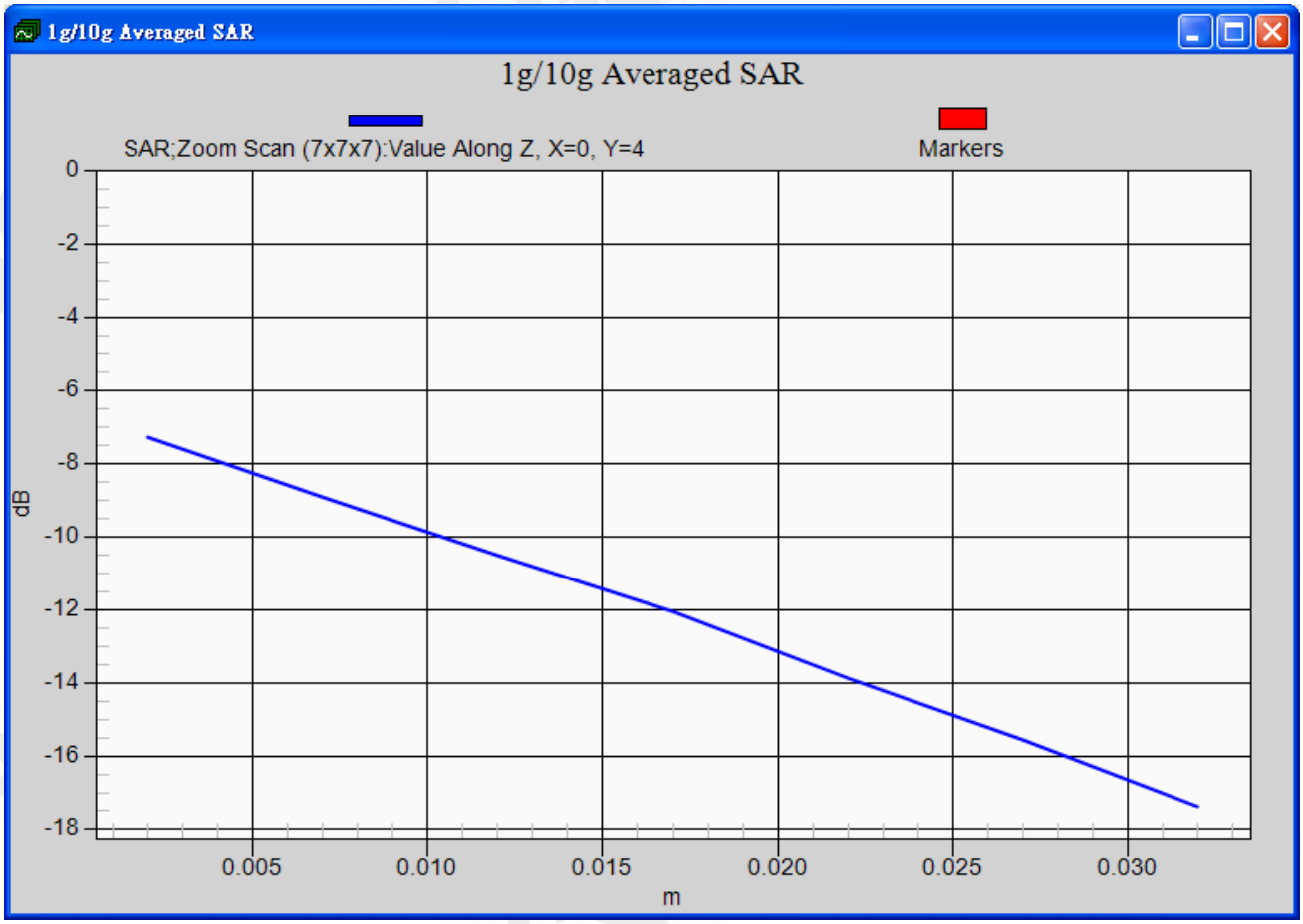
- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.38 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.824 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.653 mW/g
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.573 mW/g
Maximum value of SAR (measured) = 1.34 mW/g



0 dB = 1.38 mW/g = 2.81 dB mW/g



Date: 5/15/2012

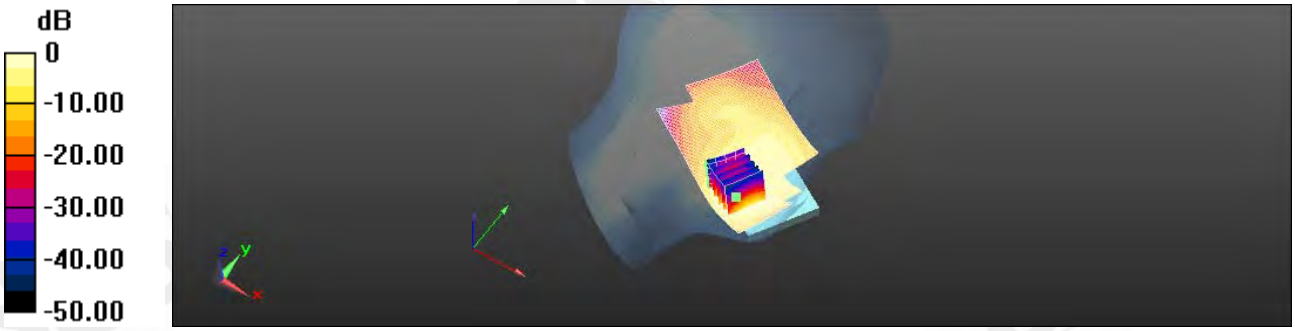
LE Cheek_CH810_repeated with external Memory card inside

Communication System: GSM; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.41 mho/m; εr = 39.17; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.32 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.246 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.614 mW/g
SAR(1 g) = 0.994 mW/g; SAR(10 g) = 0.549 mW/g
Maximum value of SAR (measured) = 1.30 mW/g



0 dB = 1.32 mW/g = 2.40 dB mW/g

Date: 5/15/2012

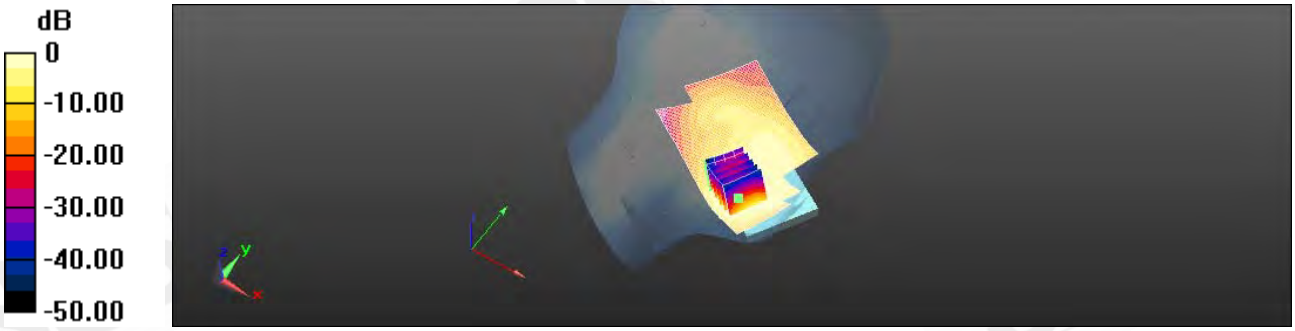
LE Cheek_CH810_repeated with 2nd Battery

Communication System: GSM; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.41 mho/m; εr = 39.17; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.29 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.665 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.577 mW/g
SAR(1 g) = 0.979 mW/g; SAR(10 g) = 0.551 mW/g
Maximum value of SAR (measured) = 1.30 mW/g



0 dB = 1.29 mW/g = 2.19 dB mW/g

Date: 5/15/2012

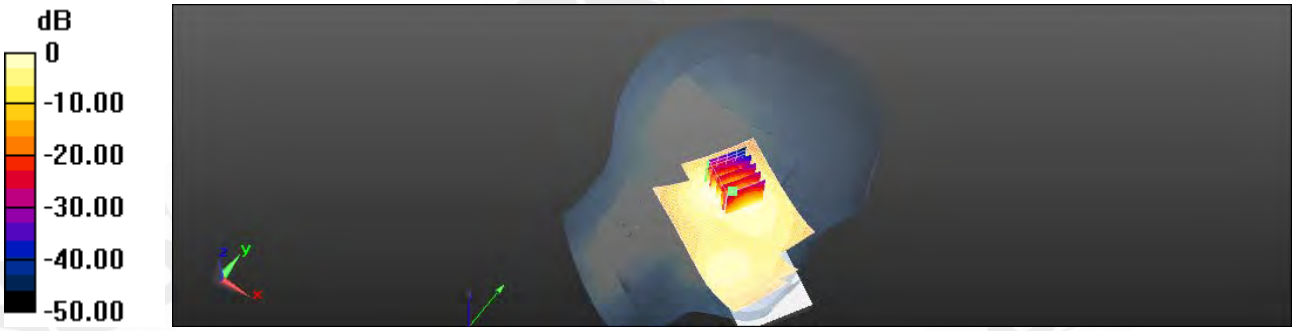
LE Tilt_CH661

Communication System: GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.381 mho/m; εr = 39.298; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.430 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.921 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.448 mW/g
SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.341 mW/g



0 dB = 0.430 mW/g = -7.34 dB mW/g

Body_Speech mode_Front side_CH661_repeated with headset

Communication System: GSM; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.492 mho/m; ε_r = 50.756; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.533 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

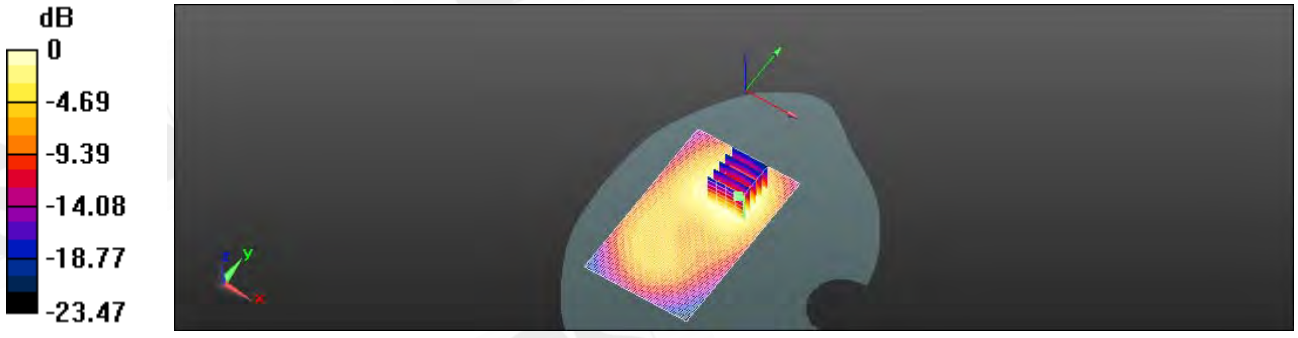
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.924 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.639 mW/g

SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.246 mW/g

Maximum value of SAR (measured) = 0.523 mW/g



0 dB = 0.533 mW/g = -5.46 dB mW/g

Date: 6/7/2012

Body_Speech mode_Back side_CH512_repeated with headset

Communication System: GSM; Frequency: 1850.2 MHz

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.448 mho/m; ε_r = 51.138; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.510 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

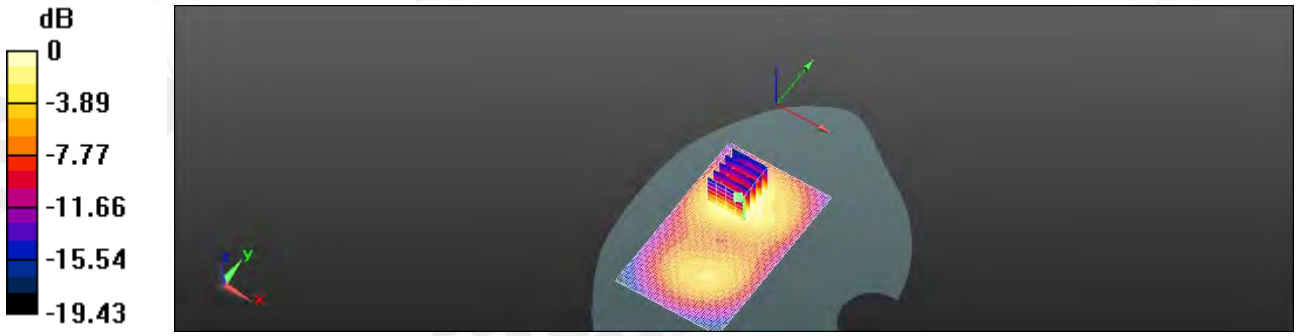
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.946 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.605 mW/g

SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.235 mW/g

Maximum value of SAR (measured) = 0.501 mW/g



0 dB = 0.510 mW/g = -5.86 dB mW/g

Date: 6/7/2012

Body_Speech mode_Back side_CH661_repeated with headset

Communication System: GSM; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.492 mho/m; ε_r = 50.756; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.614 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

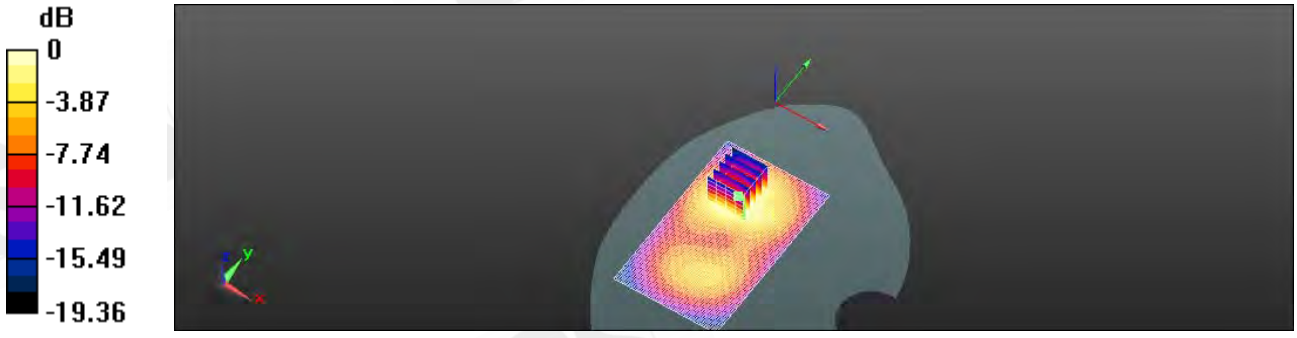
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.026 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.720 mW/g

SAR(1 g) = 0.461 mW/g; SAR(10 g) = 0.281 mW/g

Maximum value of SAR (measured) = 0.598 mW/g



0 dB = 0.614 mW/g = -4.23 dB mW/g

Date: 6/7/2012

Body_Speech mode_Back side_CH810_repeated with headset

Communication System: GSM; Frequency: 1909.8 MHz

Medium parameters used: f = 1910 MHz; σ = 1.556 mho/m; ε_r = 51.174; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.654 mW/g

Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

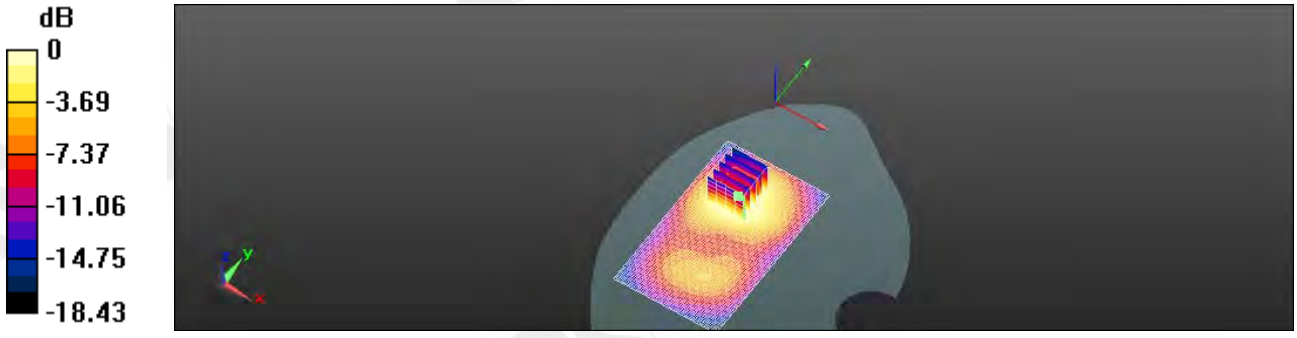
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.615 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.773 mW/g

SAR(1 g) = 0.491 mW/g; SAR(10 g) = 0.299 mW/g

Maximum value of SAR (measured) = 0.636 mW/g



0 dB = 0.654 mW/g = -3.69 dB mW/g

Date: 5/15/2012

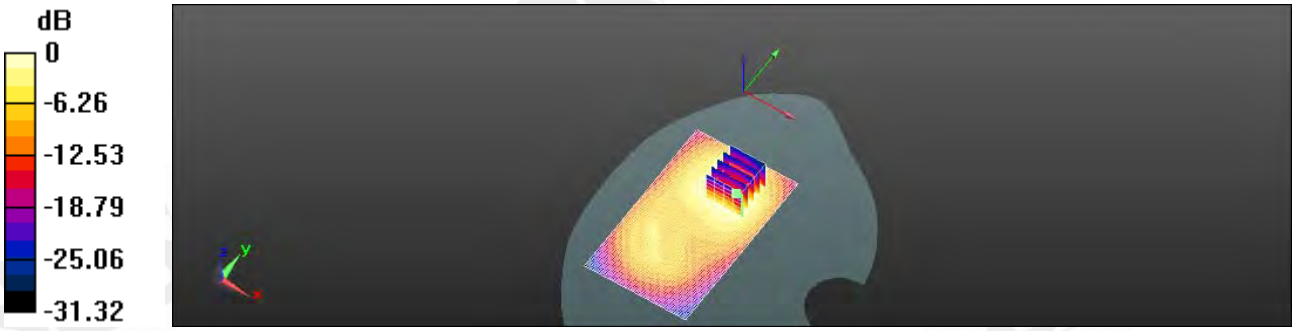
Hotspot_Front side_CH512

Communication System: GPRS(Class 12); Frequency: 1850.2 MHz
Medium parameters used: f = 1850.2 MHz; σ = 1.51 mho/m; ε_r = 52.164; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.45 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.327 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.750 mW/g
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.604 mW/g
Maximum value of SAR (measured) = 1.41 mW/g



0 dB = 1.45 mW/g = 3.21 dB mW/g

Date: 5/15/2012

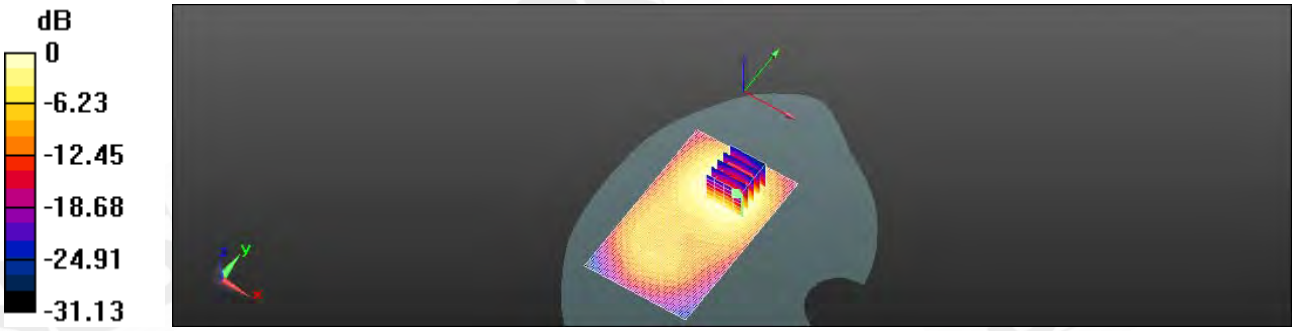
Hotspot_Front side_CH661

Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.509 mho/m; ε_r = 51.813; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.54 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.961 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.861 mW/g
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.655 mW/g
Maximum value of SAR (measured) = 1.50 mW/g



0 dB = 1.54 mW/g = 3.77 dB mW/g

Date: 5/15/2012

Hotspot_Front side_CH810

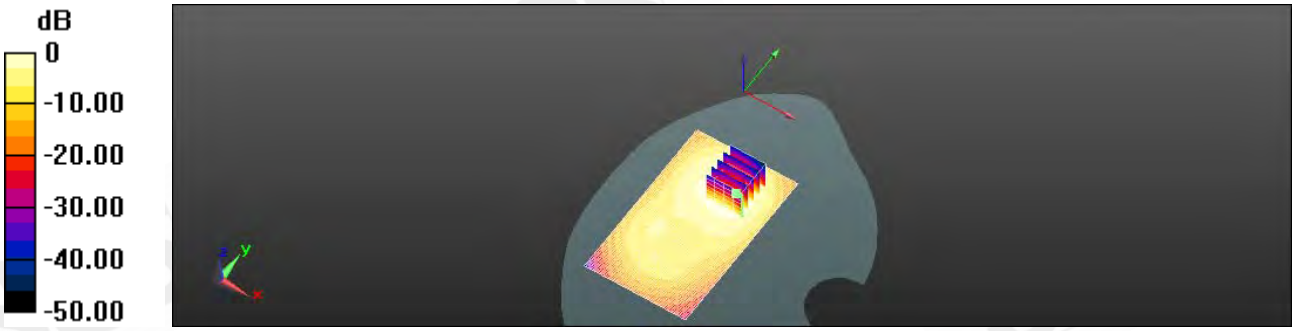
Communication System: GPRS(Class 12); Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.537 mho/m; ε_r = 51.214; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.57 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.298 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.768 mW/g
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.654 mW/g
Maximum value of SAR (measured) = 1.41 mW/g



0 dB = 1.57 mW/g = 3.89 dB mW/g

Date: 5/15/2012

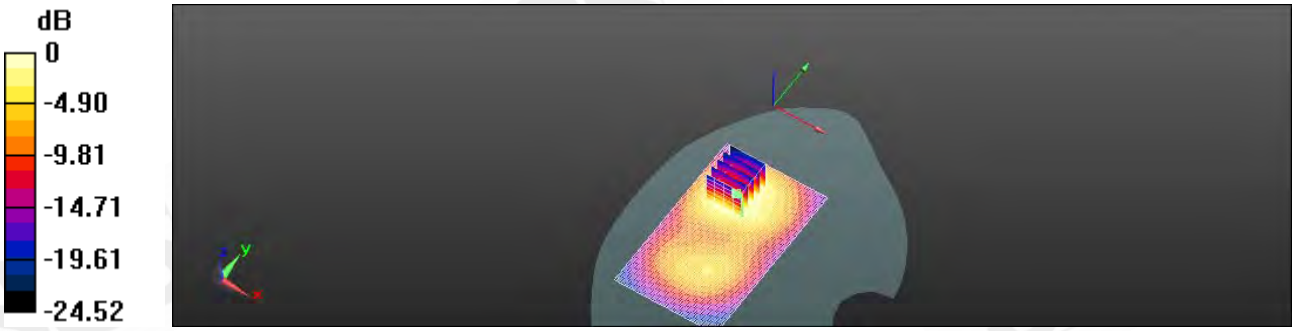
Hotspot_Back side_CH512

Communication System: GPRS(Class 12); Frequency: 1850.2 MHz
Medium parameters used: f = 1850.2 MHz; σ = 1.51 mho/m; ε_r = 52.164; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.53 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.298 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.786 mW/g
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.598 mW/g
Maximum value of SAR (measured) = 1.53 mW/g



0 dB = 1.53 mW/g = 3.69 dB mW/g

Date: 5/15/2012

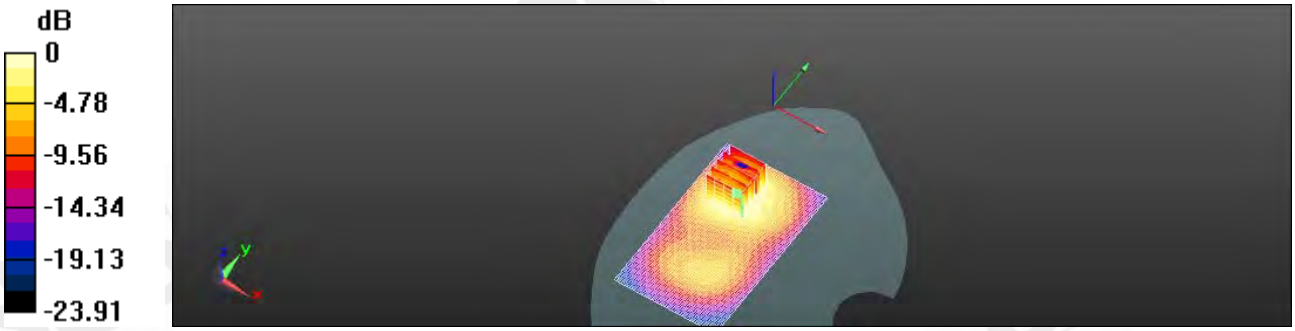
Hotspot_Back side_CH661

Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.509 mho/m; ε_r = 51.813; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.67 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.209 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 2.033 mW/g
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.721 mW/g
Maximum value of SAR (measured) = 1.65 mW/g



0 dB = 1.67 mW/g = 4.45 dB mW/g

Date: 5/15/2012

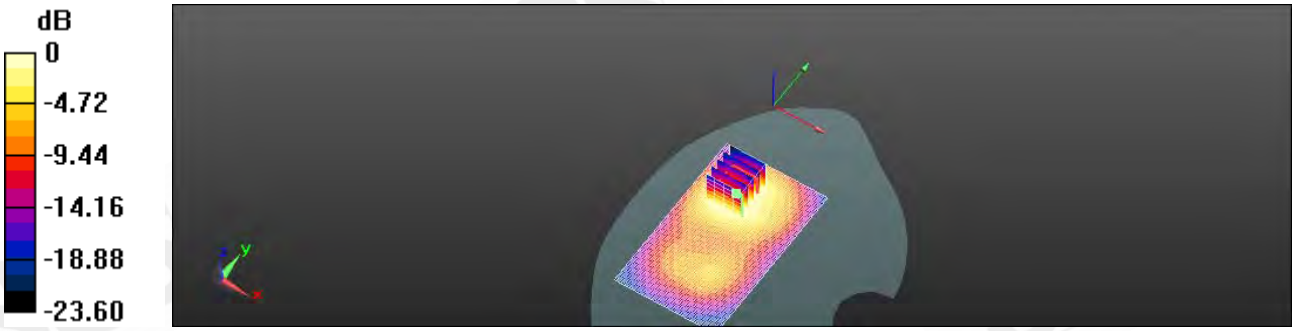
Hotspot_Back side_CH810

Communication System: GPRS(Class 12); Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.537 mho/m; ε_r = 51.214; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

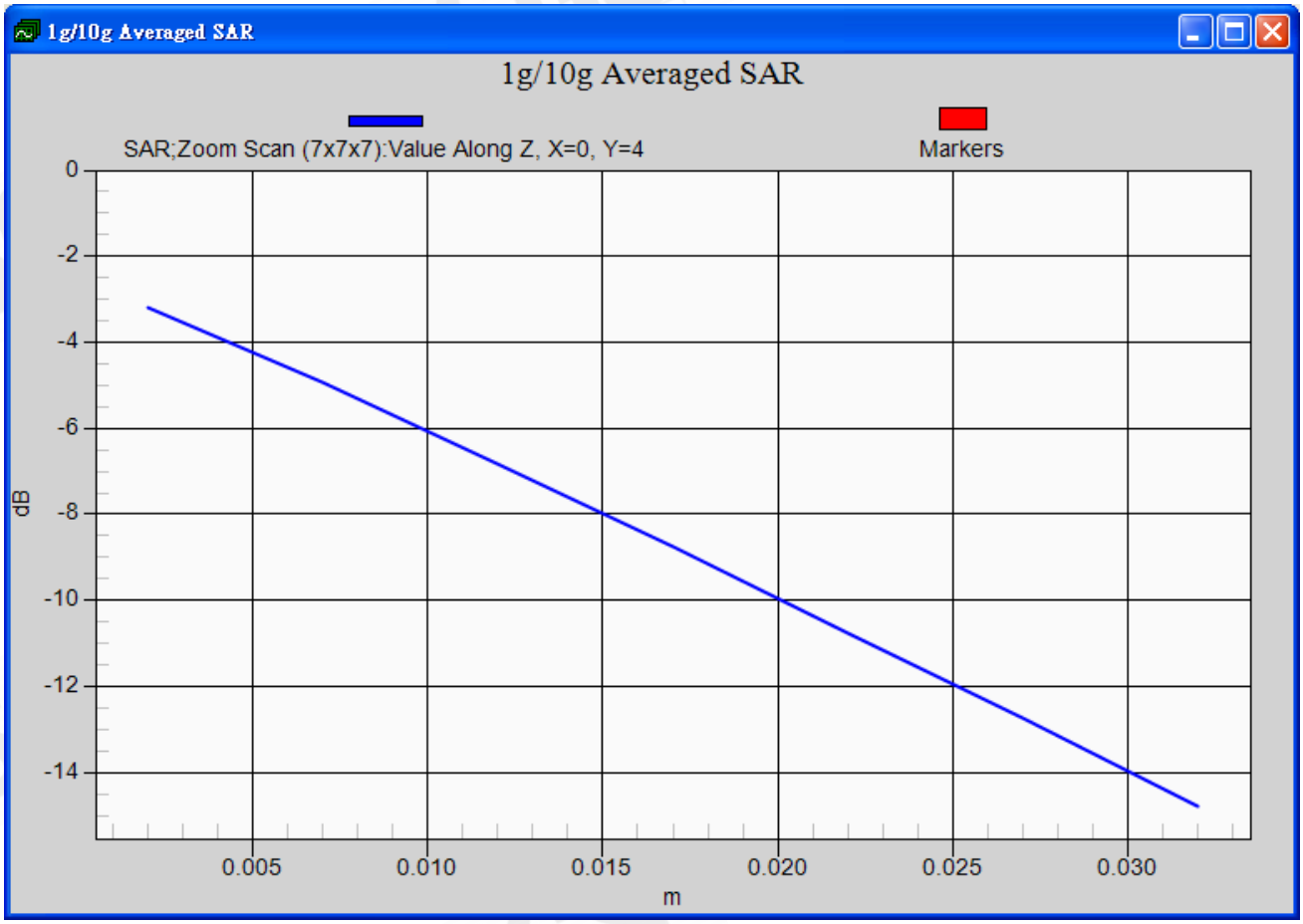
- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.79 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.153 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 2.101 mW/g
SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.754 mW/g
Maximum value of SAR (measured) = 1.69 mW/g



0 dB = 1.79 mW/g = 5.04 dB mW/g



Date: 5/15/2012

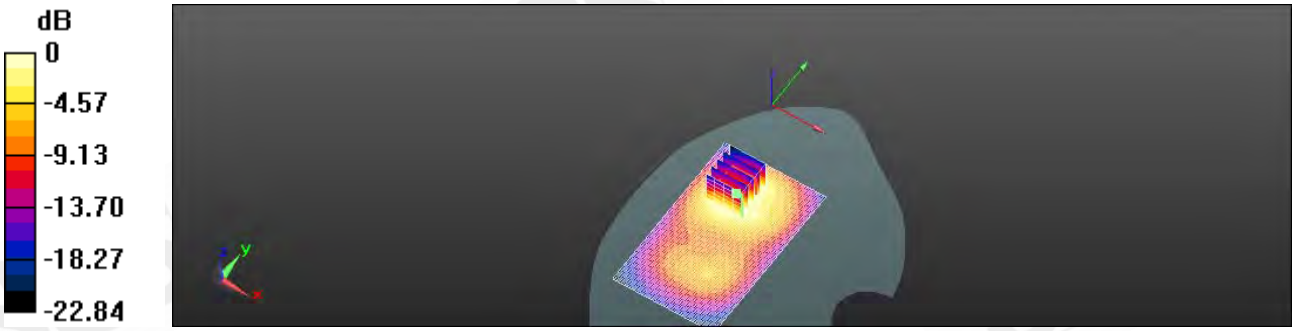
Hotspot_Back side_CH810_repeated with external Memory card inside

Communication System: GPRS(Class 12); Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.537 mho/m; ε_r = 51.214; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.74 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.769 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 2.056 mW/g
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.742 mW/g
Maximum value of SAR (measured) = 1.65 mW/g



0 dB = 1.74 mW/g = 4.83 dB mW/g

Date: 5/15/2012

Hotspot_Back side_CH810_repeated with headset

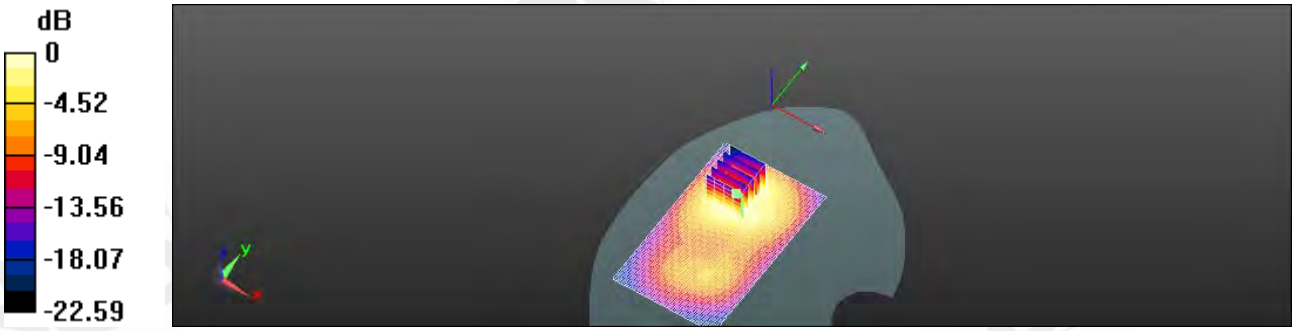
Communication System: GPRS(Class 12); Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.537 mho/m; ε_r = 51.214; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.44 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.855 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.690 mW/g
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.616 mW/g
Maximum value of SAR (measured) = 1.33 mW/g



0 dB = 1.44 mW/g = 3.17 dB mW/g

Date: 5/15/2012

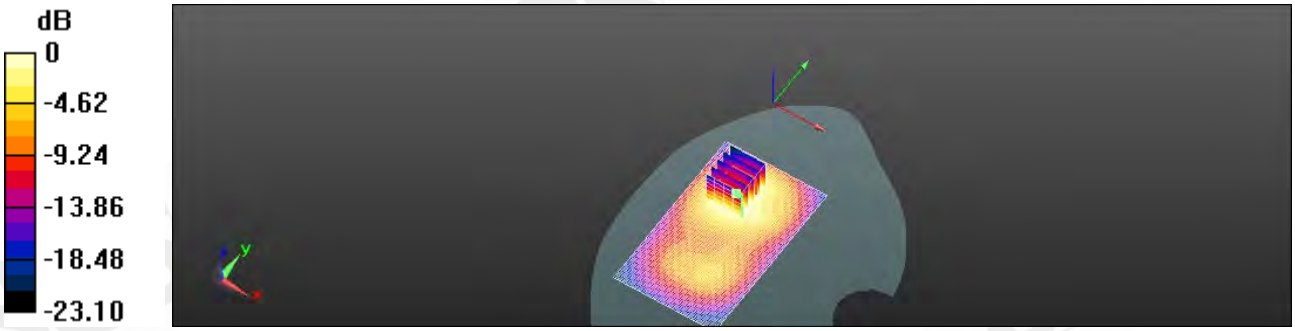
Hotspot_Back side_CH810_repeated with 2nd Battery

Communication System: GPRS(Class 12); Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.537 mho/m; ε_r = 51.214; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.72 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.010 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 2.051 mW/g
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.739 mW/g
Maximum value of SAR (measured) = 1.65 mW/g



0 dB = 1.72 mW/g = 4.71 dB mW/g

Date: 5/15/2012

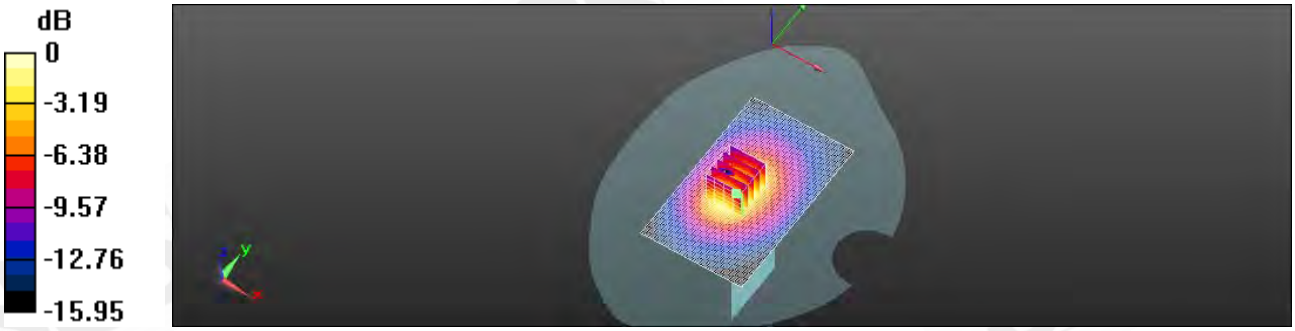
Hotspot_Bottom side_CH661

Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.509 mho/m; ε_r = 51.813; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.986 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.821 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.310 mW/g
SAR(1 g) = 0.786 mW/g; SAR(10 g) = 0.429 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 0.986 mW/g = -0.12 dB mW/g

Date: 5/15/2012

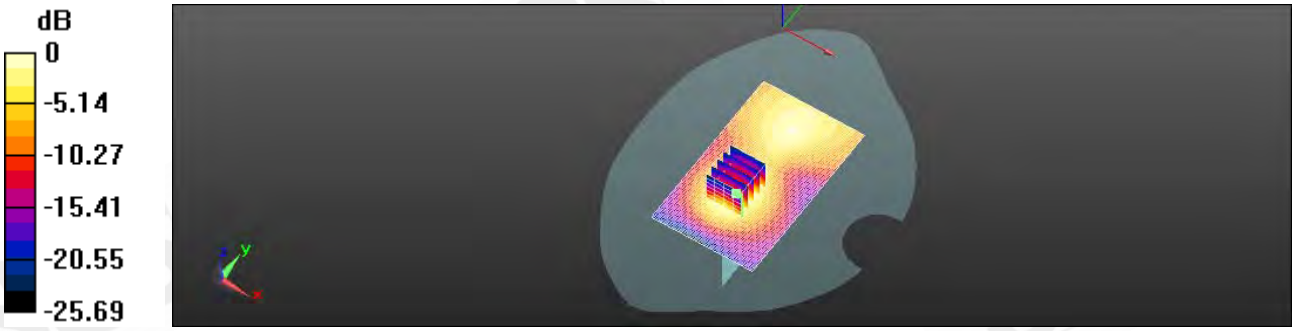
Hotspot_Right side_CH661

Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.509 mho/m; ε_r = 51.813; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.418 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.814 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.489 mW/g
SAR(1 g) = 0.299 mW/g; SAR(10 g) = 0.173 mW/g
Maximum value of SAR (measured) = 0.398 mW/g



0 dB = 0.418 mW/g = -7.58 dB mW/g

Date: 5/15/2012

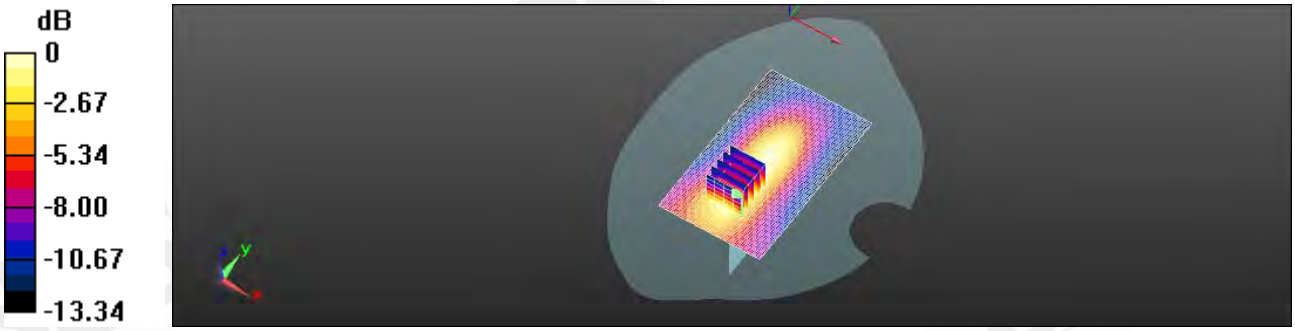
Hotspot_Left side_CH661

Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.509 mho/m; ε_r = 51.813; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.362 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.042 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.439 mW/g
SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.158 mW/g
Maximum value of SAR (measured) = 0.357 mW/g



0 dB = 0.362 mW/g = -8.83 dB mW/g

Date: 5/7/2012

RE Cheek_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.797 mho/m; ε_r = 37.652; ρ = 1000 kg/m^3

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.353 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

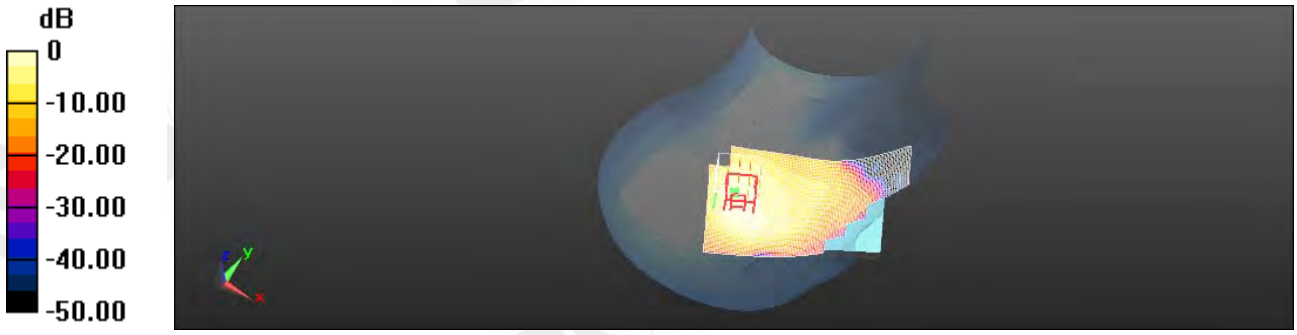
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.998 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.474 mW/g

SAR(1 g) = 0.252 mW/g; SAR(10 g) = 0.132 mW/g

Maximum value of SAR (measured) = 0.355 mW/g



0 dB = 0.353 mW/g = -9.05 dB mW/g

Date: 5/7/2012

RE Tilt_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.797 mho/m; ε_r = 37.652; ρ = 1000 kg/m^3

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.336 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

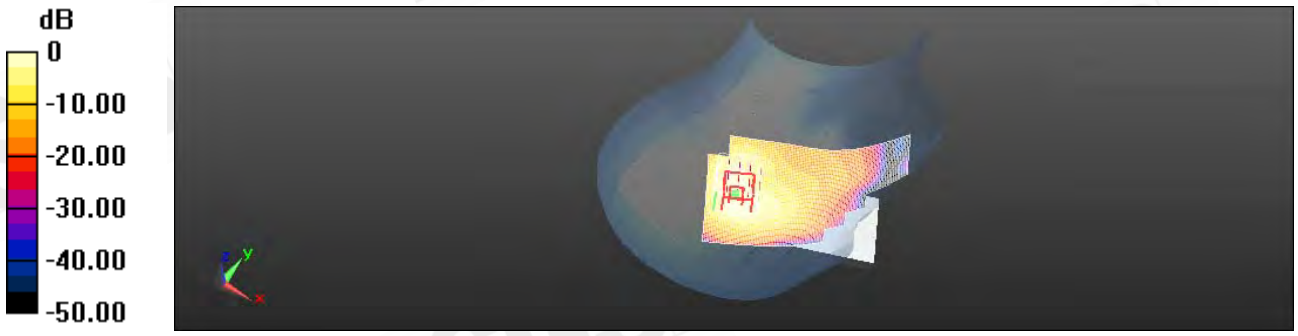
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.754 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.462 mW/g

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.128 mW/g

Maximum value of SAR (measured) = 0.348 mW/g



0 dB = 0.336 mW/g = -9.46 dB mW/g

Date: 5/7/2012

LE Cheek_WLAN802.11b_CH1

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz

Medium parameters used: f = 2412 MHz; σ = 1.767 mho/m; ε_r = 37.653; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.542 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

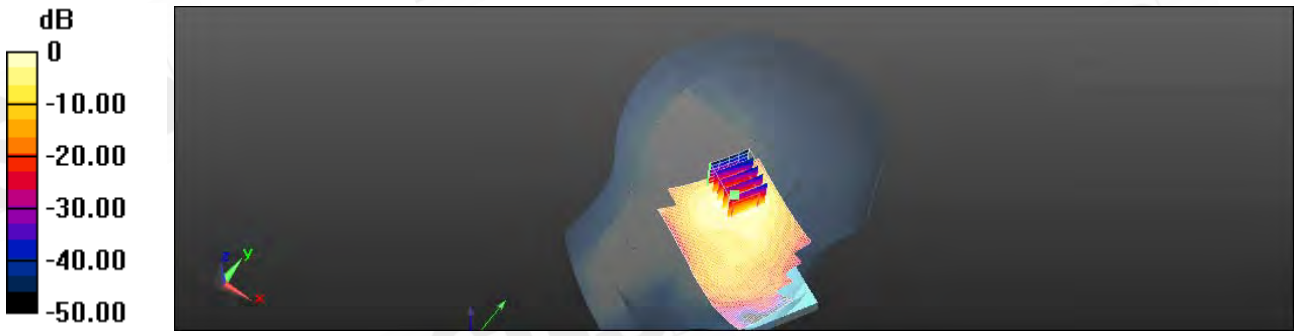
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.516 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.920 mW/g

SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.178 mW/g

Maximum value of SAR (measured) = 0.623 mW/g



0 dB = 0.542 mW/g = -5.33 dB mW/g

Date: 5/7/2012

LE Cheek_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.797 mho/m; ε_r = 37.652; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.580 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

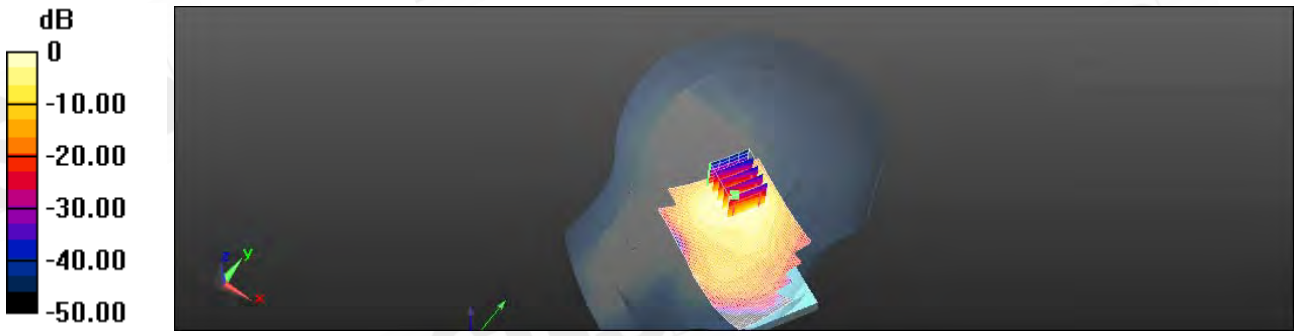
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.929 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.997 mW/g

SAR(1 g) = 0.415 mW/g; SAR(10 g) = 0.185 mW/g

Maximum value of SAR (measured) = 0.671 mW/g



0 dB = 0.580 mW/g = -4.74 dB mW/g

Date: 5/7/2012

LE Cheek_WLAN802.11b_CH11

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz

Medium parameters used: f = 2462 MHz; σ = 1.82 mho/m; ε_r = 37.608; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.561 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

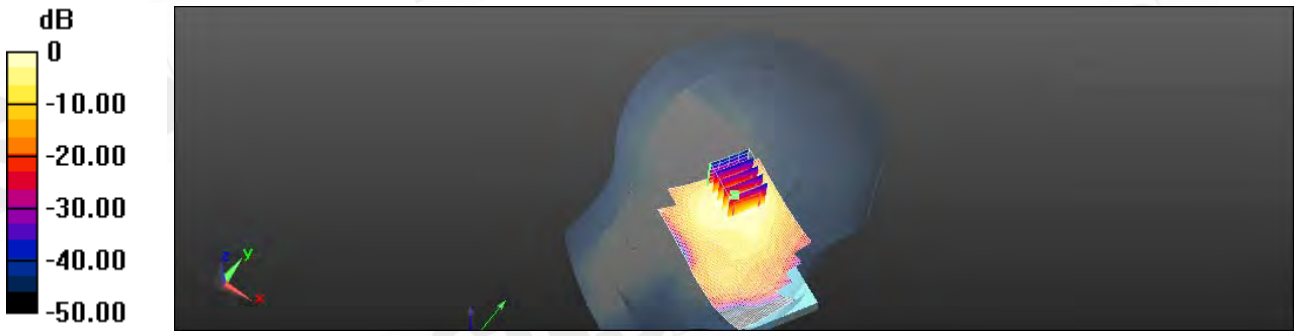
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.033 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.943 mW/g

SAR(1 g) = 0.392 mW/g; SAR(10 g) = 0.176 mW/g

Maximum value of SAR (measured) = 0.636 mW/g



0 dB = 0.561 mW/g = -5.02 dB mW/g

Date: 5/7/2012

LE Cheek_WLAN802.11b_CH6_repeated with external Memory card inside

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.797 mho/m; ε_r = 37.652; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.572 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

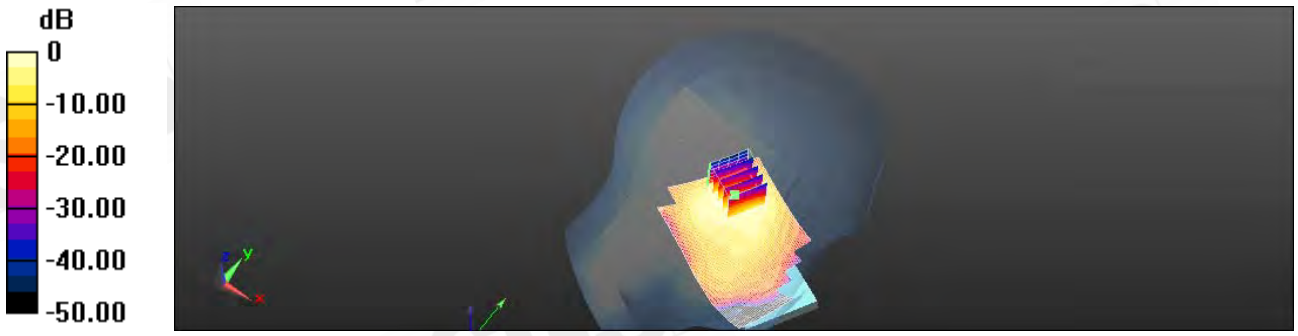
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.404 V/m; Power Drift = 0.19 dB

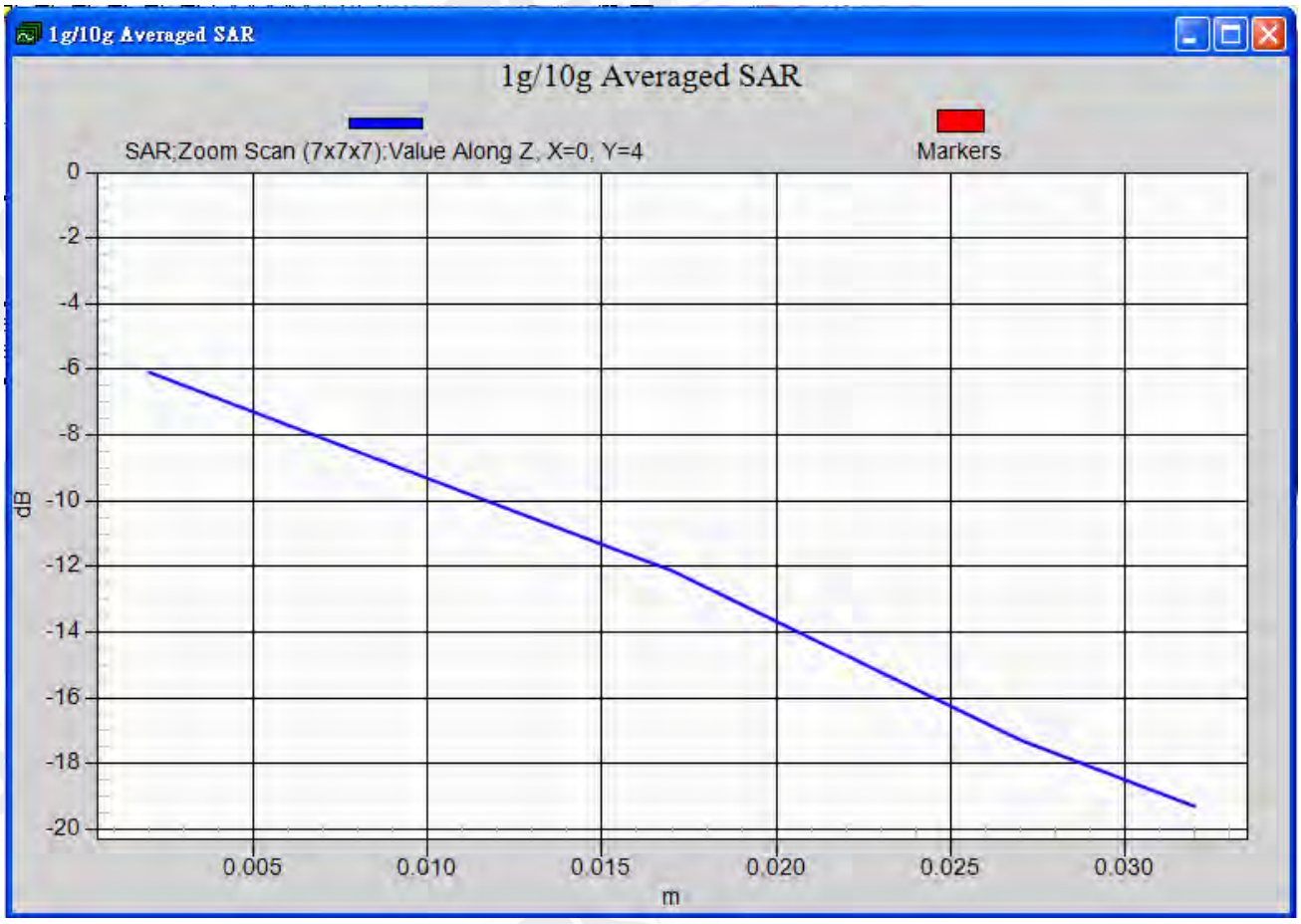
Peak SAR (extrapolated) = 1.004 mW/g

SAR(1 g) = 0.419 mW/g; SAR(10 g) = 0.186 mW/g

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



0 dB = 0.572 mW/g = -4.86 dB mW/g



Date: 5/7/2012

LE Cheek_WLAN802.11b_CH6_repeated with 2nd Battery

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.797 mho/m; ε_r = 37.652; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.564 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

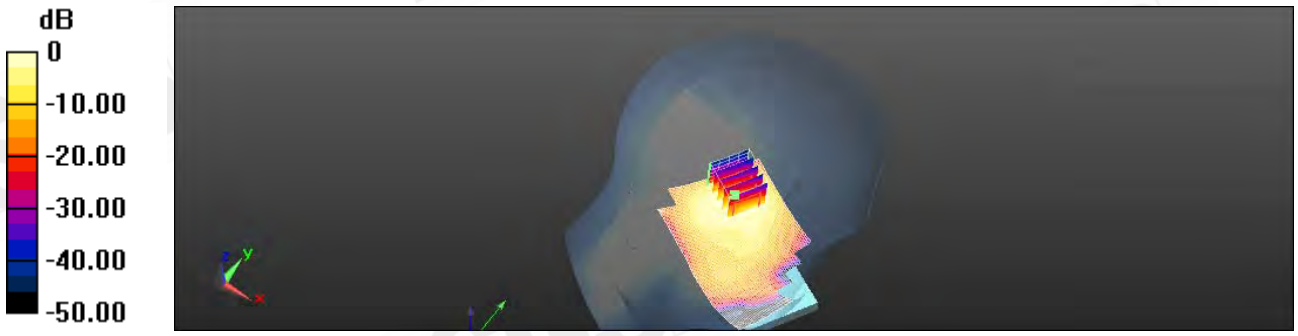
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.286 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.984 mW/g

SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.178 mW/g

Maximum value of SAR (measured) = 0.657 mW/g



0 dB = 0.564 mW/g = -4.97 dB mW/g

Date: 5/7/2012

LE Tilt_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.797 mho/m; ε_r = 37.652; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Tilt/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.526 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

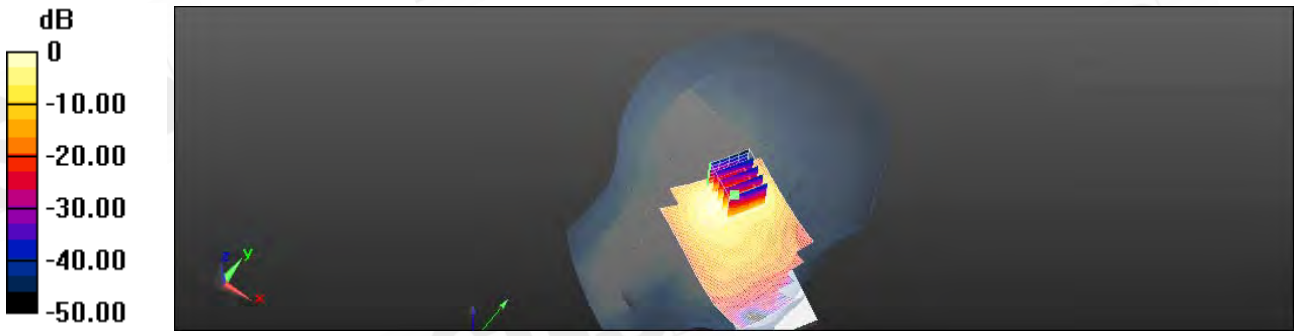
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.269 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.854 mW/g

SAR(1 g) = 0.349 mW/g; SAR(10 g) = 0.151 mW/g

Maximum value of SAR (measured) = 0.562 mW/g



0 dB = 0.526 mW/g = -5.58 dB mW/g

Date: 5/12/2012

Hotspot_Front side_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0951 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

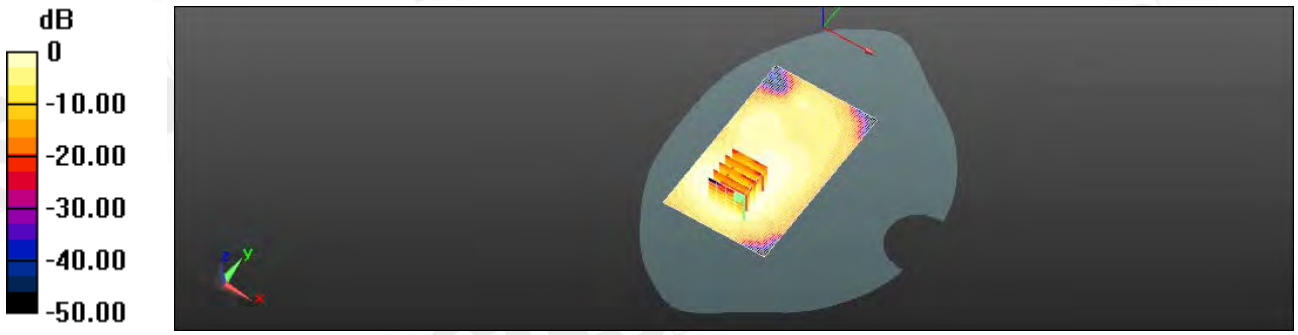
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.819 V/m; Power Drift = -0.10dB

Peak SAR (extrapolated) = 0.126 mW/g

SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.039 mW/g

Maximum value of SAR (measured) = 0.0951 mW/g



0 dB = 0.0951 mW/g = -20.44 dB mW/g

Date: 5/12/2012

Hotspot_Back side_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.107 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

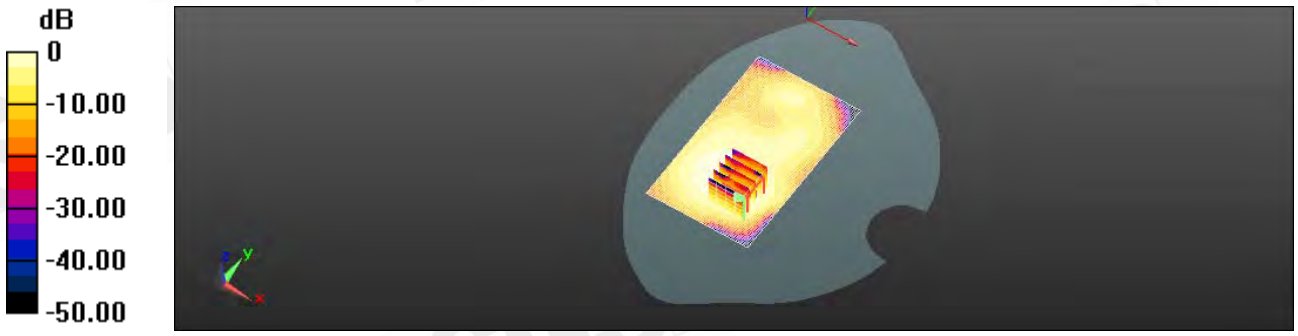
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.890 V/m; Power Drift = -0.12dB

Peak SAR (extrapolated) = 0.162 mW/g

SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.033 mW/g

Maximum value of SAR (measured) = 0.113 mW/g



0 dB = 0.107 mW/g = -19.43 dB mW/g

Date: 5/12/2012

Hotspot_Top side_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0803 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

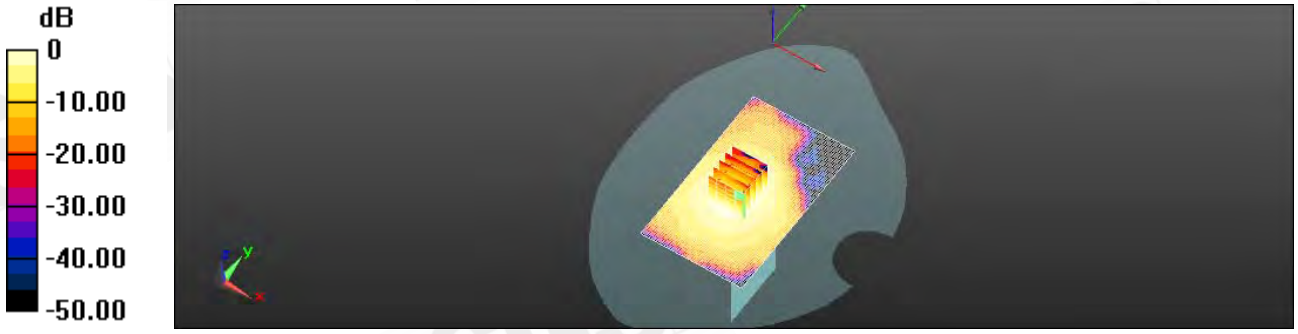
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.629 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.108 mW/g

SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.032 mW/g

Maximum value of SAR (measured) = 0.0818 mW/g



0 dB = 0.0803 mW/g = -21.90 dB mW/g

Date: 5/12/2012

Hotspot_Right side_WLAN802.11b_CH1

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz

Medium parameters used: f = 2412 MHz; σ = 1.815 mho/m; ε_r = 48.977; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0999 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

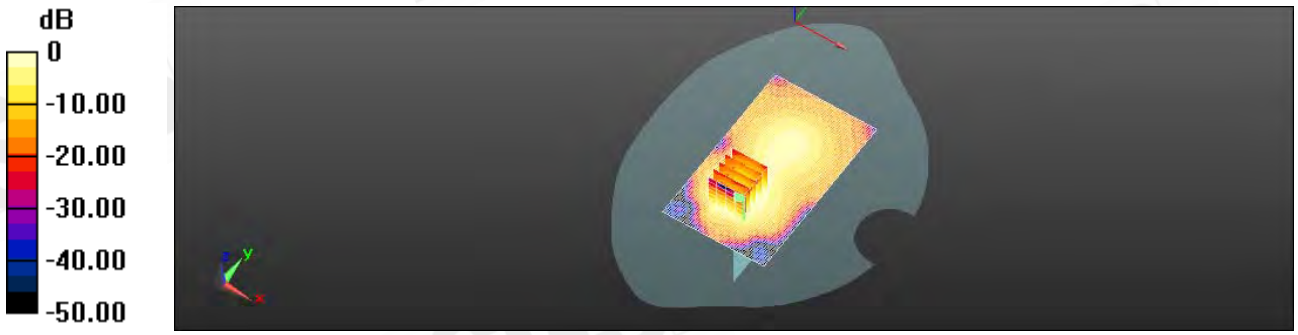
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.545 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.140 mW/g

SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.104 mW/g



0 dB = 0.0999 mW/g = -20.01 dB mW/g

Date: 5/12/2012

Hotspot_Right side_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.113 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

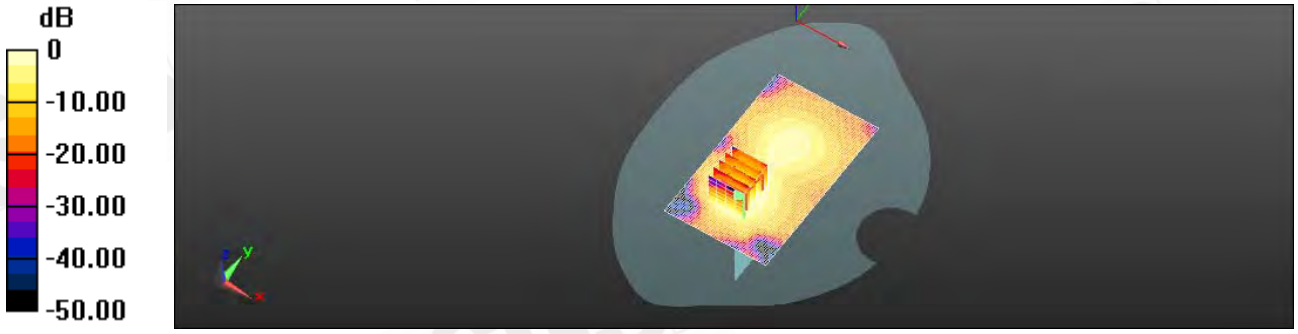
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.398 V/m; Power Drift = -0.10dB

Peak SAR (extrapolated) = 0.146 mW/g

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.035 mW/g

Maximum value of SAR (measured) = 0.107 mW/g



0 dB = 0.113 mW/g = -18.93 dB mW/g

Date: 5/12/2012

Hotspot_Right side_WLAN802.11b_CH11

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz

Medium parameters used: f = 2462 MHz; σ = 1.88 mho/m; ε_r = 48.897; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.102 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

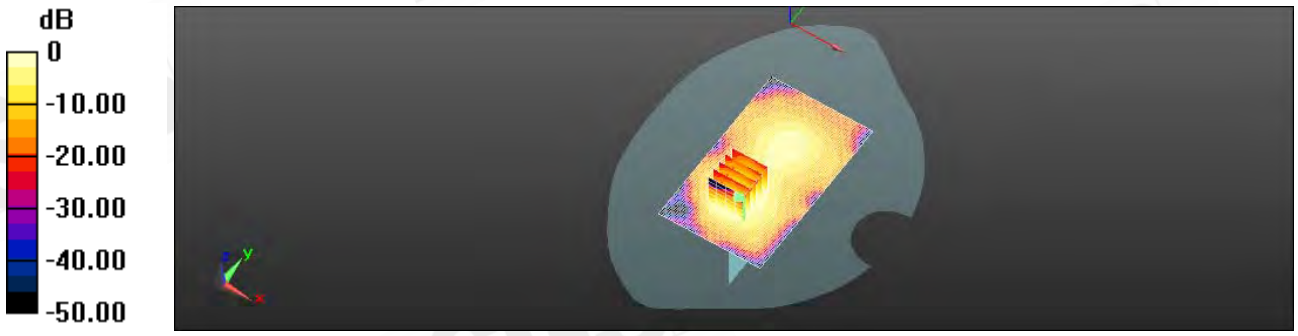
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.246 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.140 mW/g

SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.101 mW/g



0 dB = 0.102 mW/g = -19.83 dB mW/g

Date: 5/12/2012

Hotspot_Right side_WLAN802.11b_CH6_repeated with external Memory card inside

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0916 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

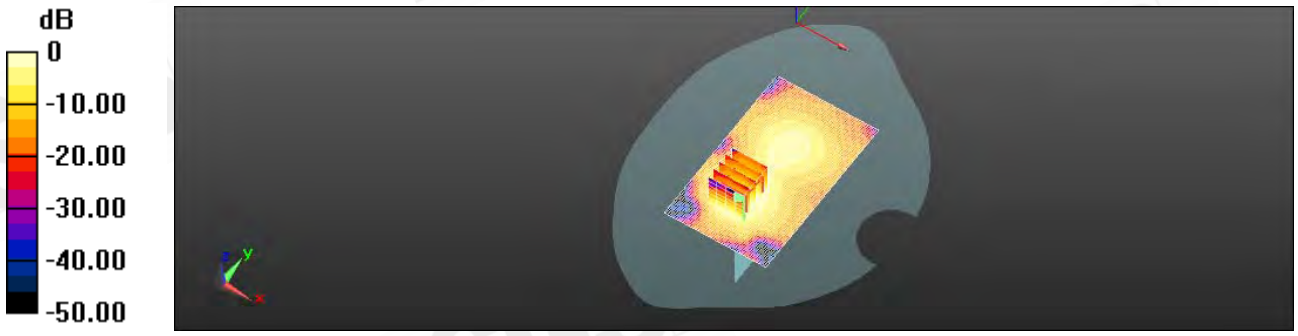
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.900 V/m; Power Drift = 0.14dB

Peak SAR (extrapolated) = 0.130 mW/g

SAR(1 g) = 0.064 mW/g; SAR(10 g) = 0.030 mW/g

Maximum value of SAR (measured) = 0.0945 mW/g



0 dB = 0.0916 mW/g = -20.76 dB mW/g

Date: 5/12/2012

Hotspot_Right side_WLAN802.11b_CH6_repeated with headset

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

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

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

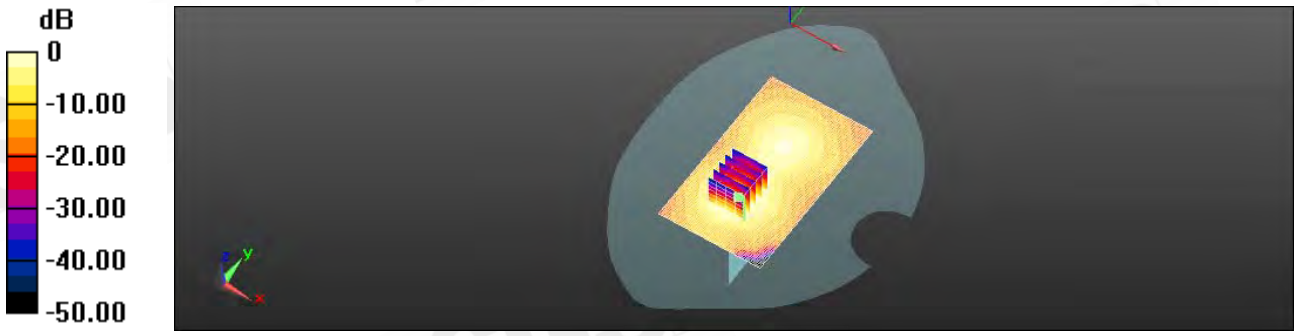
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.583 V/m; Power Drift = 0.07 dB

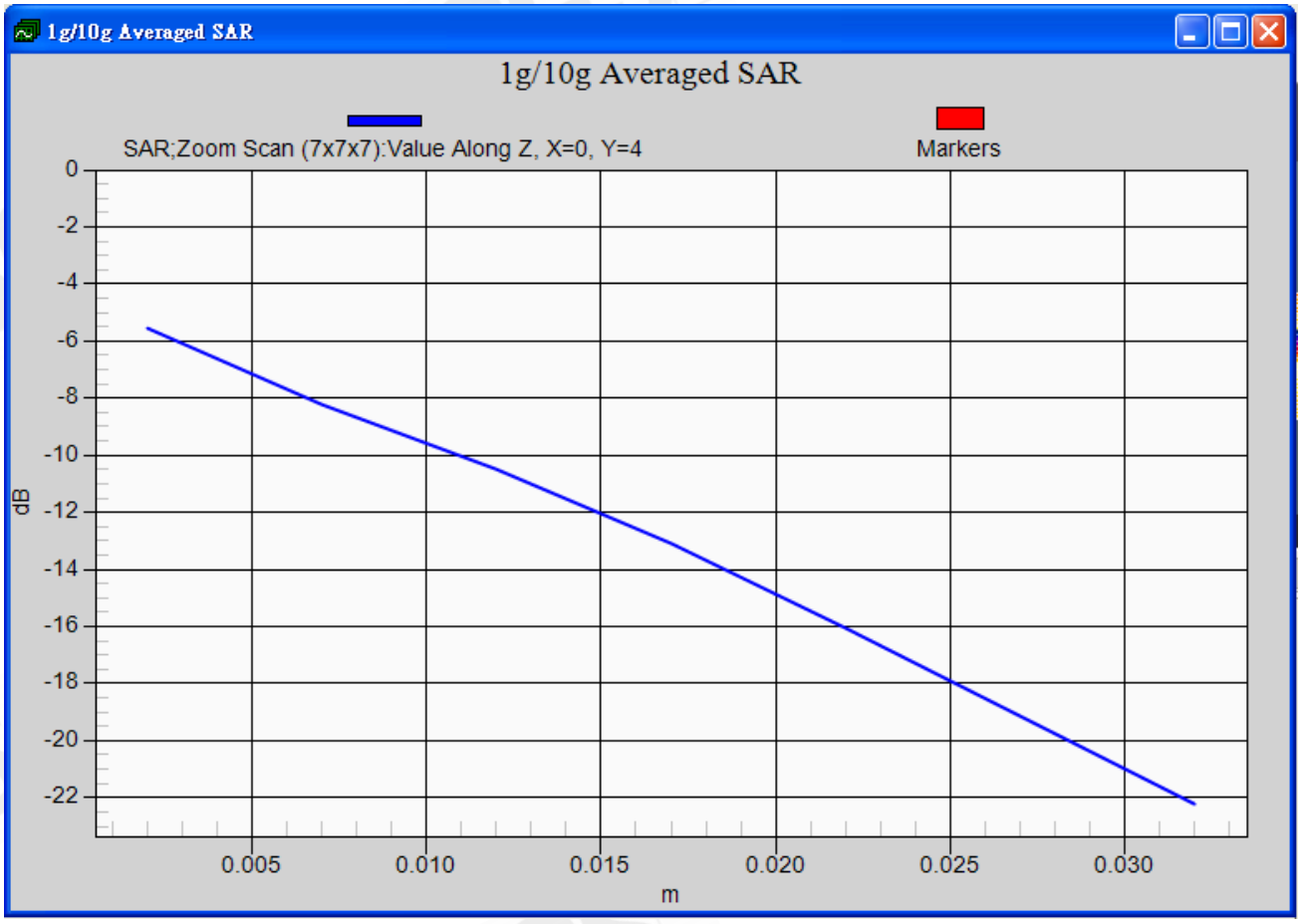
Peak SAR (extrapolated) = 0.215 mW/g

SAR(1 g) = 0.112 mW/g; SAR(10 g) = 0.056 mW/g

Maximum value of SAR (measured) = 0.159 mW/g



0 dB = 0.161 mW/g = -15.85 dB mW/g



Date: 5/12/2012

Hotspot_Right side_WLAN802.11b_CH6_repeated with 2nd Battery

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz

Medium parameters used: f = 2437 MHz; σ = 1.851 mho/m; ε_r = 48.949; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.111 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

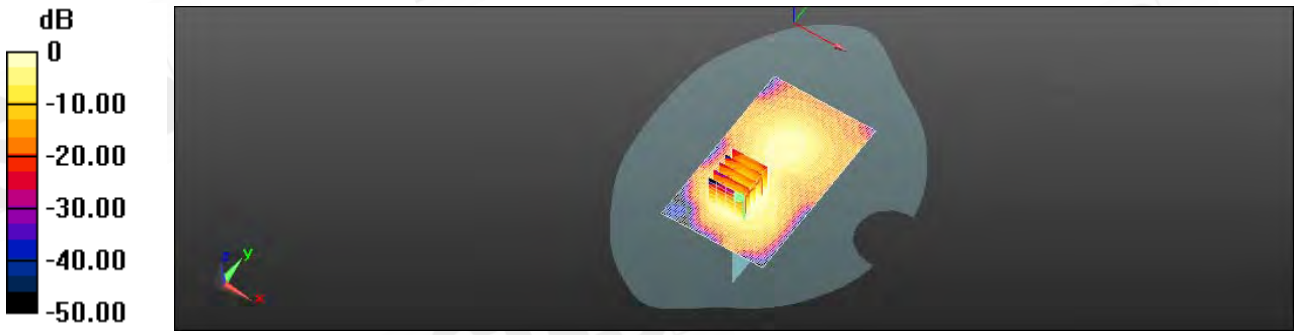
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.526 V/m; Power Drift = -0.10dB

Peak SAR (extrapolated) = 0.144 mW/g

SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.034 mW/g

Maximum value of SAR (measured) = 0.103 mW/g



0 dB = 0.111 mW/g = -19.09 dB mW/g

5. System Verification

Date: 5/15/2012

Dipole 835 MHz (Head)

Communication System: CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; σ = 0.877 mho/m; ε_r = 41.026; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.62, 9.62, 9.62); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.50 mW/g

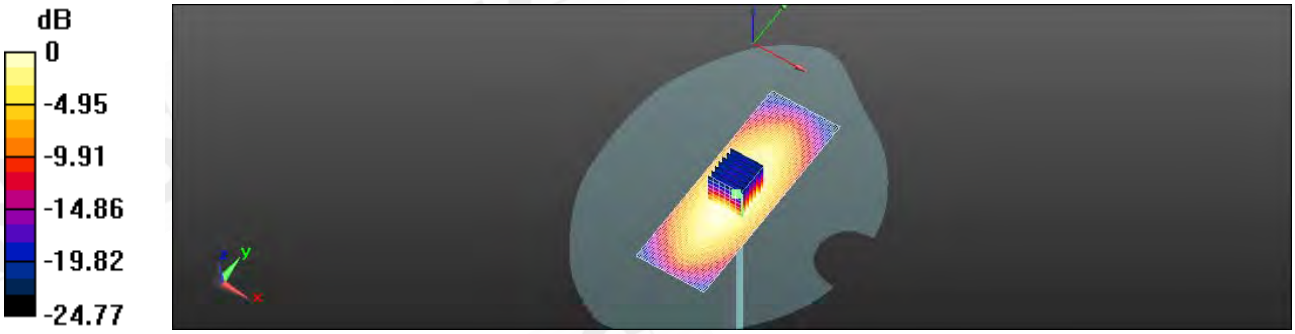
Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 68.858 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 5.491 mW/g

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

Maximum value of SAR (measured) = 4.52 mW/g



0 dB = 4.50 mW/g = 13.07 dB mW/g

Date: 5/15/2012

Dipole 835 MHz (Body)

Communication System: CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; σ = 1.008 mho/m; ε_r = 52.142; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.05 mW/g

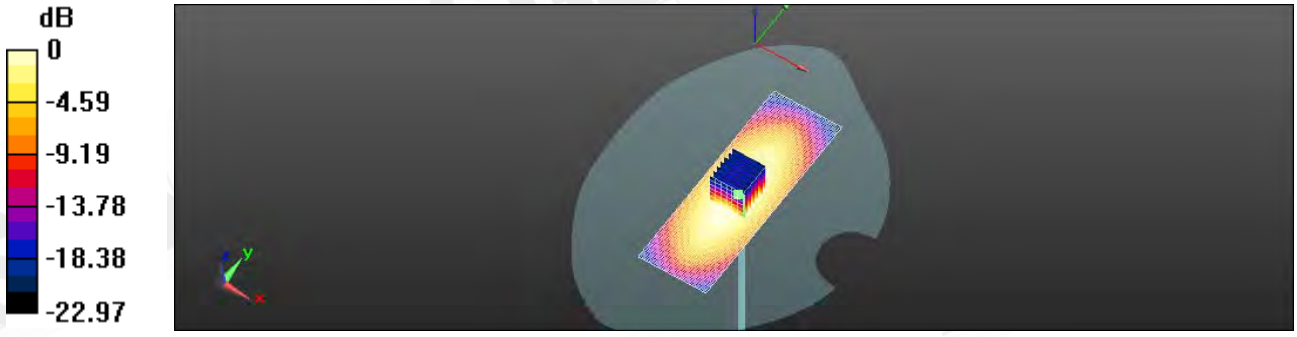
Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.407 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.573 mW/g

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

Maximum value of SAR (measured) = 3.06 mW/g



0 dB = 3.05 mW/g = 9.69 dB mW/g

Date: 5/15/2012

Dipole 1900 MHz (Head)

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 37.219; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(8.35, 8.35, 8.35); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 13.3 mW/g

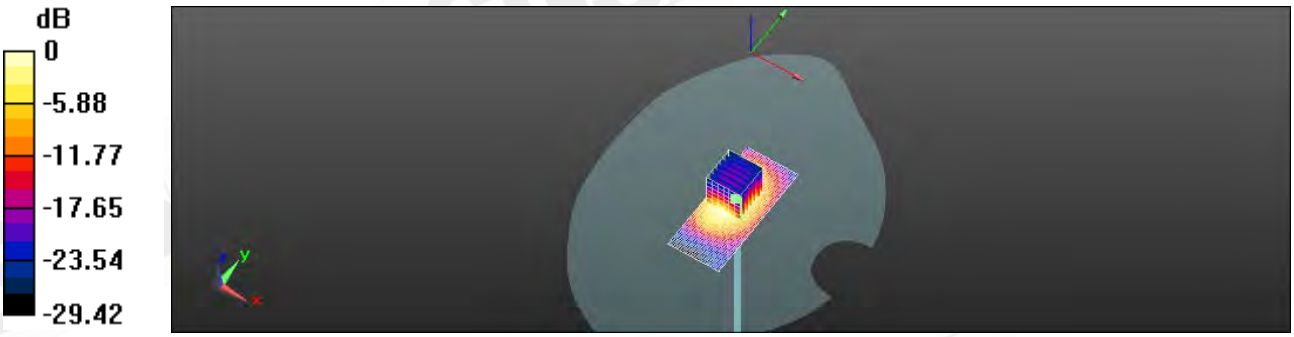
Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.465 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 16.586 mW/g

SAR(1 g) = 9.25 mW/g; SAR(10 g) = 4.86 mW/g

Maximum value of SAR (measured) = 10.3 mW/g



0 dB = 13.3 mW/g = 22.50 dB mW/g

Date: 5/15/2012

Dipole 1900 MHz (Body)

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; σ = 1.522 mho/m; ε_r = 51.361; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 15.1 mW/g

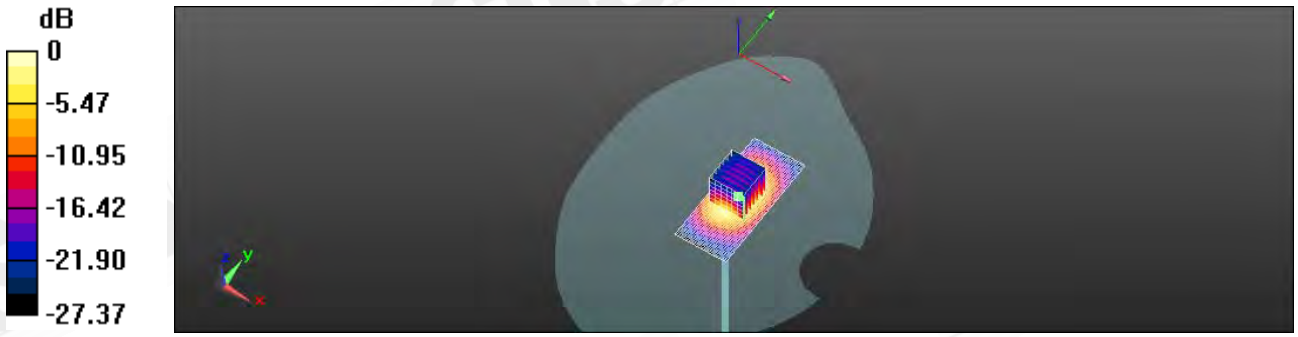
Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.101 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 17.986 mW/g

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.31 mW/g

Maximum value of SAR (measured) = 14.3 mW/g



0 dB = 15.1 mW/g = 23.57 dB mW/g

Date: 5/7/2012

Dipole 2450 MHz (Head)

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; σ = 1.809 mho/m; ε_r = 37.641; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 21.3 mW/g

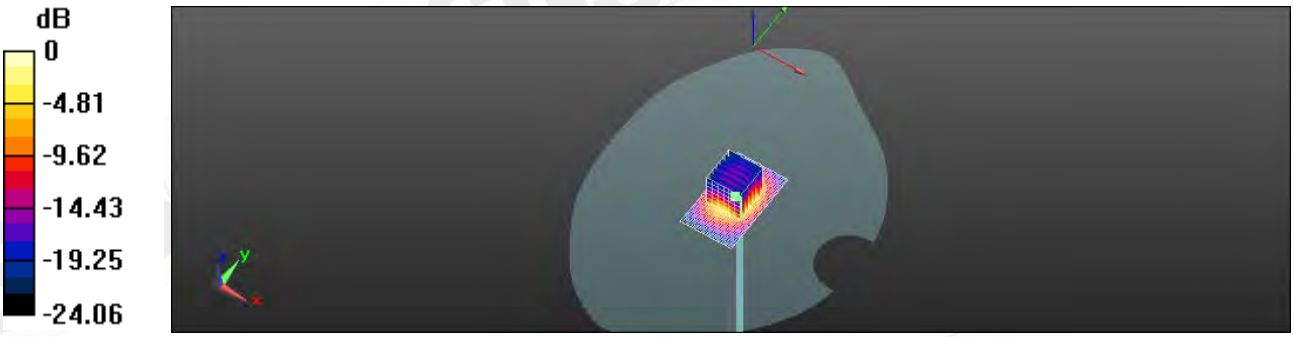
Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.7 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 27.673 mW/g

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.15 mW/g

Maximum value of SAR (measured) = 20.4 mW/g



0 dB = 21.3 mW/g = 26.57 dB mW/g

Date: 5/12/2012

Dipole 2450 MHz (Body)

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; σ = 1.867 mho/m; ε_r = 48.926; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 19.9 mW/g

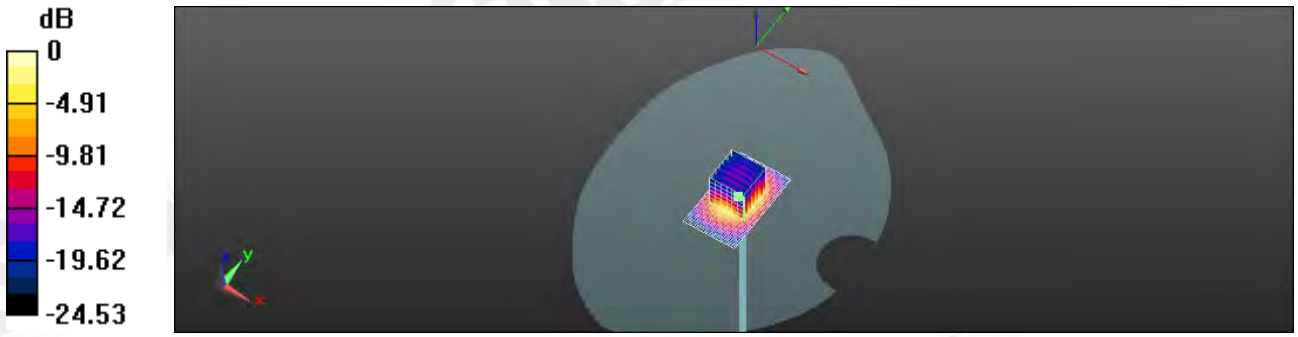
Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.6 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 25.540 mW/g

SAR(1 g) = 12.3 mW/g; SAR(10 g) = 5.64 mW/g

Maximum value of SAR (measured) = 18.5 mW/g



0 dB = 19.9 mW/g = 25.98 dB mW/g

Dipole 835 MHz (Body)

Communication System: CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; σ = 1.018 mho/m; ε_r = 54.687; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.6, 9.6, 9.6); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.14 mW/g

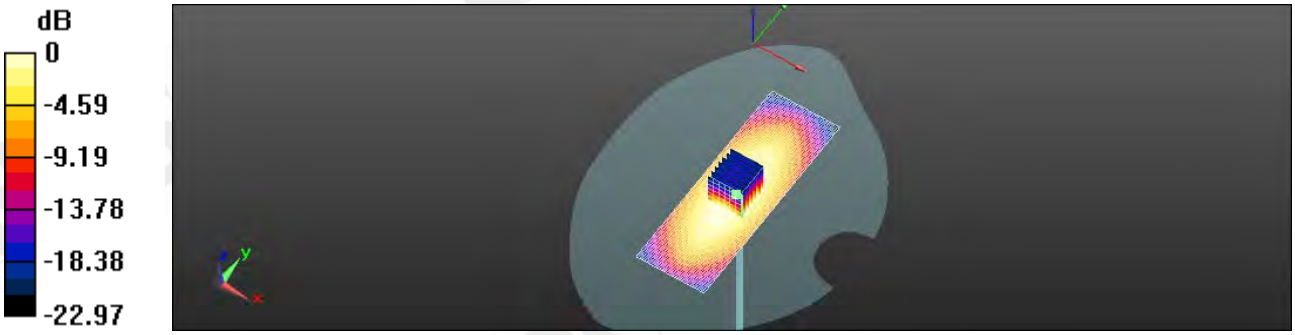
Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.407 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 3.681 mW/g

SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.65 mW/g

Maximum value of SAR (measured) = 3.15 mW/g



0 dB = 3.14 mW/g = 9.94 dB mW/g

Dipole 1900 MHz (Body)

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; σ = 1.538 mho/m; ε_r = 51.001; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.53, 7.53, 7.53); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 6/24/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 15.2 mW/g

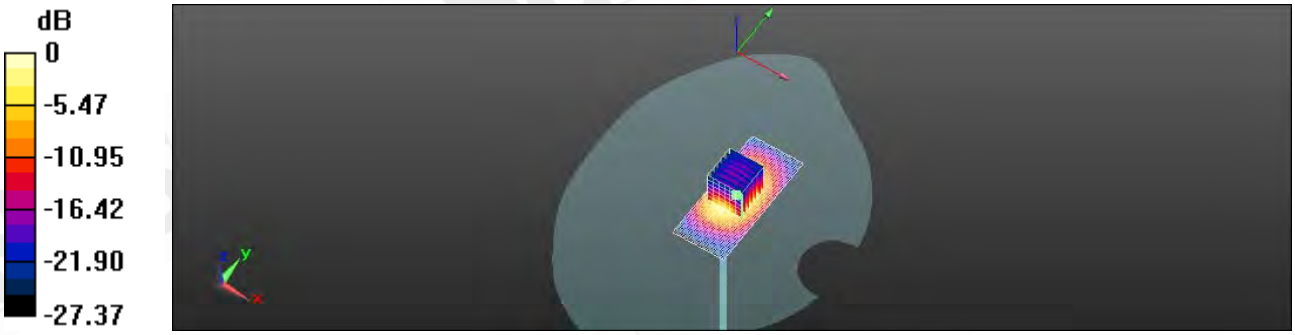
Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.101 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 18.176 mW/g

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.36 mW/g

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



0 dB = 15.2 mW/g = 23.66 dB mW/g

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 Auden

Certificate No: DAE4-905_Jun11

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BK - SN: 905
Calibration procedure(s)	QA CAL-06.v23 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	June 24, 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
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

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

Issued: June 24, 2011

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

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

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

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

Accreditation No.: **SCS 108**

Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	404.723 ± 0.1% (k=2)	405.276 ± 0.1% (k=2)	404.851 ± 0.1% (k=2)
Low Range	3.97979 ± 0.7% (k=2)	4.00079 ± 0.7% (k=2)	3.99604 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	270.5° ± 1°

Appendix

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	199999.3	-0.37	-0.00
Channel X	+ Input	20000.19	0.69	0.00
Channel X	- Input	-19996.51	2.99	-0.01
Channel Y	+ Input	199999.5	1.19	0.00
Channel Y	+ Input	19998.36	-1.14	-0.01
Channel Y	- Input	-19998.45	0.65	-0.00
Channel Z	+ Input	199996.8	-0.50	-0.00
Channel Z	+ Input	19998.70	-0.80	-0.00
Channel Z	- Input	-19998.46	0.84	-0.00

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2000.5	0.40	0.02
Channel X	+ Input	200.95	1.05	0.53
Channel X	- Input	-198.80	1.30	-0.65
Channel Y	+ Input	1999.8	0.03	0.00
Channel Y	+ Input	200.33	0.33	0.16
Channel Y	- Input	-199.66	0.24	-0.12
Channel Z	+ Input	1999.6	-0.40	-0.02
Channel Z	+ Input	200.48	0.58	0.29
Channel Z	- Input	-199.45	0.75	-0.37

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	9.95	8.16
	- 200	-7.20	-8.32
Channel Y	200	8.57	8.27
	- 200	-9.34	-9.57
Channel Z	200	2.10	1.81
	- 200	-2.85	-3.06

3. Channel separation

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

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	4.23	1.16
Channel Y	200	3.16	-	6.20
Channel Z	200	1.04	-1.10	-

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t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15901	16912
Channel Y	16152	15842
Channel Z	16382	17155

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.02	-0.50	0.97	0.26
Channel Y	-0.92	-2.26	-0.45	0.25
Channel Z	-2.00	-3.19	-0.89	0.45

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
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Swiss Calibration Service

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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: EX3-3770_Apr12

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3770

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 27, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 28, 2012

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep 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
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z:* A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 *NORMx,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 ± 50 MHz to ± 100 MHz.
- *Spherical Isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3770

Manufactured: July 6, 2010
Calibrated: April 27, 2012

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

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.31	0.60	0.40	± 10.1 %
DCP (mV)[B]	99.3	99.6	105.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.00	0.00	1.00	124.5	±2.5 %
			Y	0.00	0.00	1.00	127.2	
			Z	0.00	0.00	1.00	138.4	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] 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)[C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.95	9.95	9.95	0.16	1.71	± 12.0 %
835	41.5	0.90	9.62	9.62	9.62	0.30	0.90	± 12.0 %
900	41.5	0.97	9.49	9.49	9.49	0.25	1.03	± 12.0 %
1750	40.1	1.37	8.62	8.62	8.62	0.60	0.65	± 12.0 %
1900	40.0	1.40	8.35	8.35	8.35	0.34	0.92	± 12.0 %
2000	40.0	1.40	8.21	8.21	8.21	0.30	0.93	± 12.0 %
2300	39.5	1.67	7.64	7.64	7.64	0.41	0.75	± 12.0 %
2450	39.2	1.80	7.17	7.17	7.17	0.28	0.99	± 12.0 %
2600	39.0	1.96	6.95	6.95	6.95	0.24	1.17	± 12.0 %
5200	36.0	4.66	5.20	5.20	5.20	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.96	4.96	4.96	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.29	4.29	4.29	0.55	1.80	± 13.1 %
5800	35.3	5.27	4.55	4.55	4.55	0.5	1.80	± 13.1 %

[C] 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.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) 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 (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

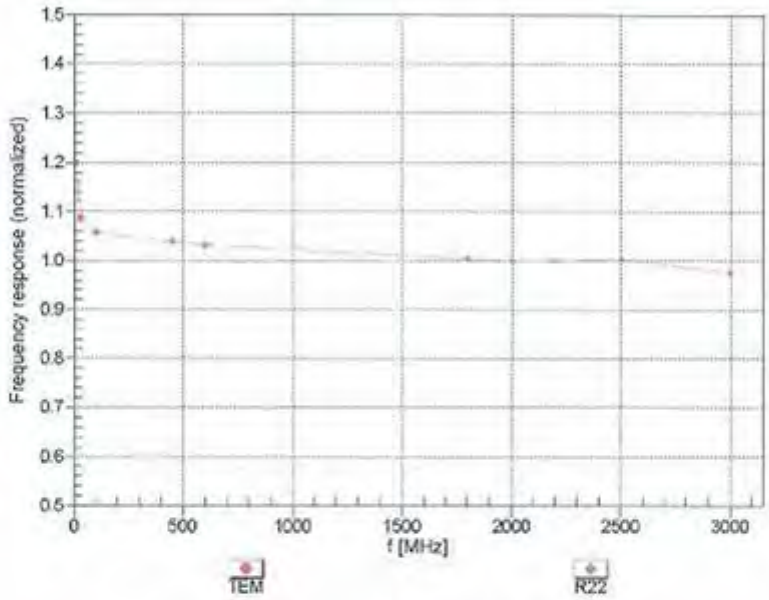
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.66	9.66	9.66	0.19	1.50	± 12.0 %
835	55.2	0.97	9.60	9.60	9.60	0.28	1.18	± 12.0 %
900	55.0	1.05	9.48	9.48	9.48	0.41	0.91	± 12.0 %
1750	53.4	1.49	7.90	7.90	7.90	0.40	0.92	± 12.0 %
1900	53.3	1.52	7.53	7.53	7.53	0.32	0.97	± 12.0 %
2000	53.3	1.52	7.64	7.64	7.64	0.43	0.86	± 12.0 %
2300	52.9	1.81	7.31	7.31	7.31	0.44	0.87	± 12.0 %
2450	52.7	1.95	7.15	7.15	7.15	0.73	0.63	± 12.0 %
2600	52.5	2.16	6.83	6.83	6.83	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.32	4.32	4.32	0.55	1.90	± 13.1 %
5300	48.9	5.42	4.08	4.08	4.08	0.60	1.90	± 13.1 %
5600	48.5	5.77	3.57	3.57	3.57	0.65	1.90	± 13.1 %
5800	48.2	6.00	4.02	4.02	4.02	0.60	1.90	± 13.1 %

[C] 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.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) 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 (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

EX3DV4- SN:3770 April 27, 2012

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

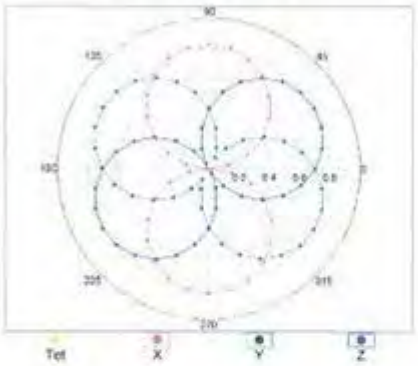


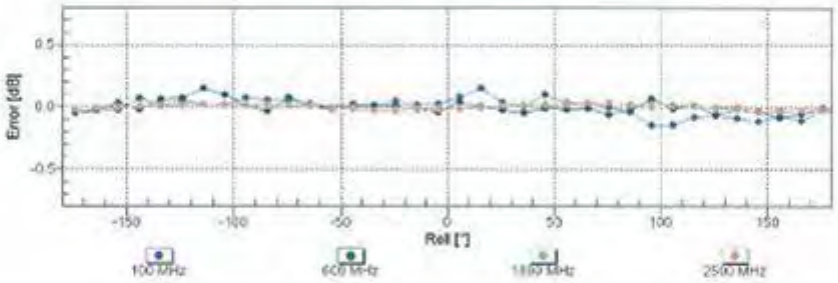
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM

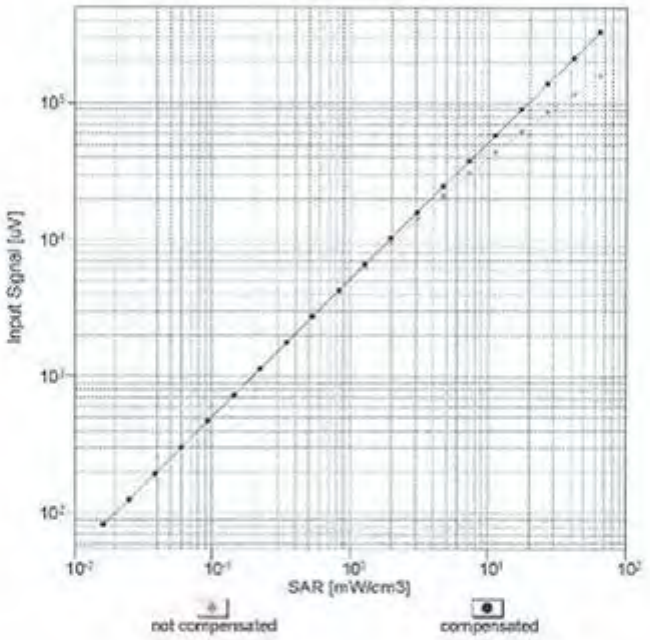
f=1800 MHz,R22

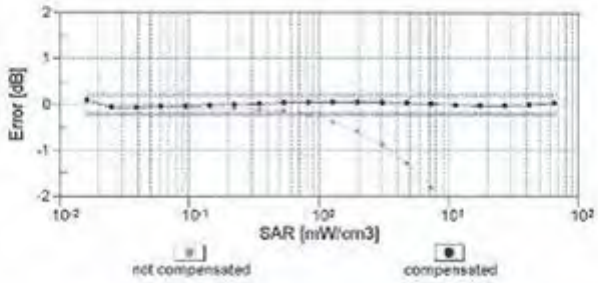




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



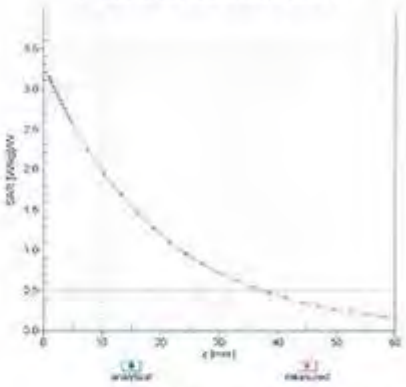


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

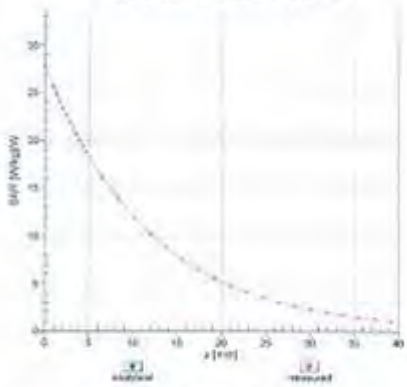
EX3DV4– SN:3770 April 27, 2012

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

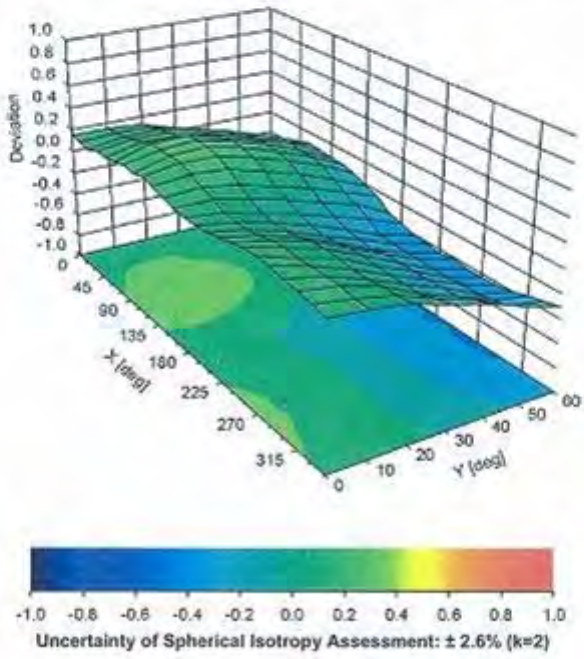


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: EX3-3770_Apr12 Page 10 of 11

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	145.8
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

7. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test
IEEE 1528

A	c	D	e	f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty %	Probability Distributioin	Div	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system								
Probe calibration(under 2.6Ghz)	6.00%	N	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	√3	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1	1	5.54%	5.54%	∞
Boundary Effect	1.00%	R	√3	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1	1	0.58%	0.58%	∞
Test Sample related								
Test sample positioning	2.90%	N	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1	1	2.89%	2.89%	∞
Phantom and Setup								
Phantom Uncertainty	4.00%	R	√3	1	1	2.31%	2.31%	∞
Liquid conductivity(meas.) Max at 1900 band	4.60%	N	1	0.64	0.43	2.94%	1.98%	M
Liquid permitivity(meas.) Max at 835 band	2.17%	N	1	0.6	0.49	1.30%	1.06%	M
Combined standard uncertainty		RSS				11.72%	11.49%	
Expant uncertainty (95% confidence interval), K=2						23.44%	22.98%	

8. Phantom Description

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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 Zürich Switzerland

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

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

Standards
[1] CENELEC EN 50361
[2] IEEE Std 1528-2003
[3] IEC 62209 Part I
[4] FCC OET Bulletin 65, Supplement C, Edition 01-01
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

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

Date 07.07.2005

Signature / Stamp

s p e a g
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info@speag.com, http://www.speag.com

Doc No 821 – QD 000 P40 C – F Page 1 (1)

9. System Validation from Original Equipment Supplier

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

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Accreditation No.: **SCS 108**

Client **Auden**

Certificate No: **D835V2-4d120_Jul11**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d120
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 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: 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	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

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	04-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

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

Issued: July 19, 2011

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

Certificate No: D835V2-4d120_Jul11 Page 1 of 8

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.33 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.51 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.11 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.8 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.59 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.34 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω - 3.4 jΩ
Return Loss	- 28.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7 Ω - 5.2 jΩ
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.397 ns

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

The dipole is made of standard semi-rigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 18.07.20

Test Laboratory: SPEAG, Zurich, Switzerland

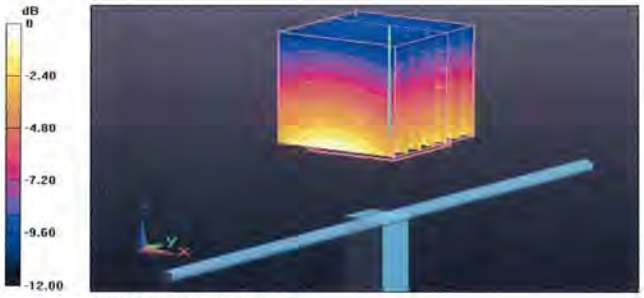
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d120

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

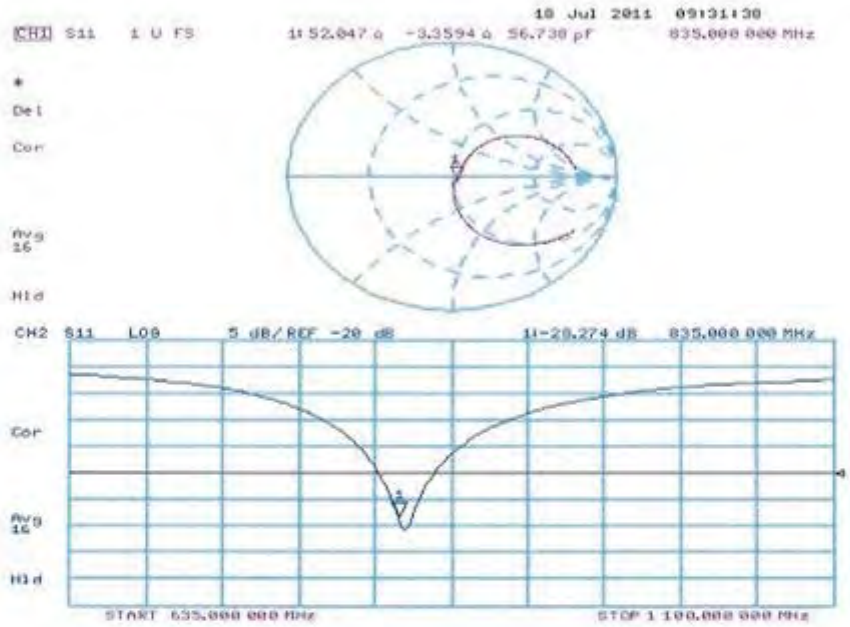
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.919 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.366 W/kg
SAR(1 g) = 2.3 mW/g; SAR(10 g) = 1.51 mW/g
Maximum value of SAR (measured) = 2.672 mW/g



0 dB = 2.670mW/g

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 19.07.2(

Test Laboratory: SPEAG, Zurich, Switzerland

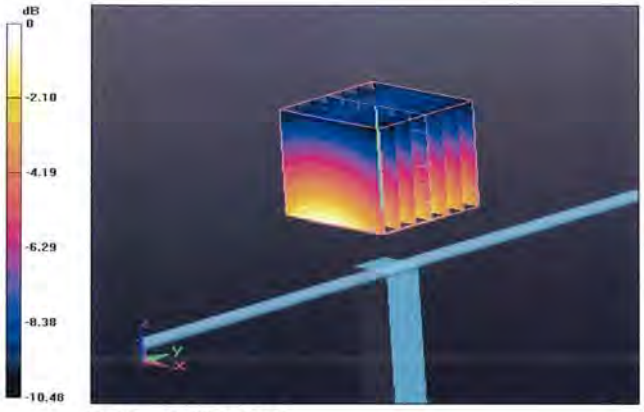
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d120

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

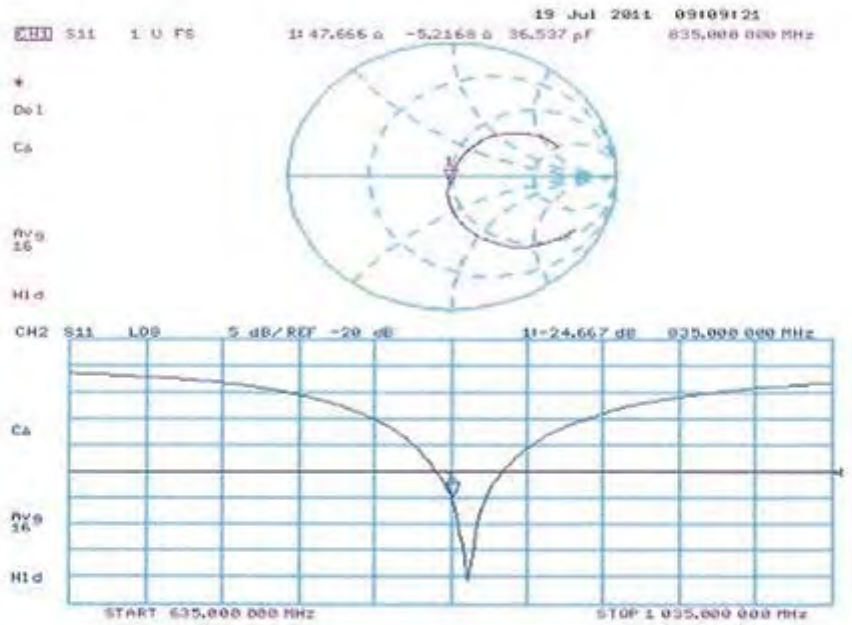
- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.302 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.528 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.787 mW/g



0 dB = 2.790mW/g

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **D1900V2-5d027_Apr12**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d027
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 26, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 26, 2012

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.43 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**38.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.96 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.1 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.3 ± 6 %	1.51 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.5 Ω + 4.5 jΩ
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2 Ω + 4.5 jΩ
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

DASY5 Validation Report for Head TSL

Date: 26.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

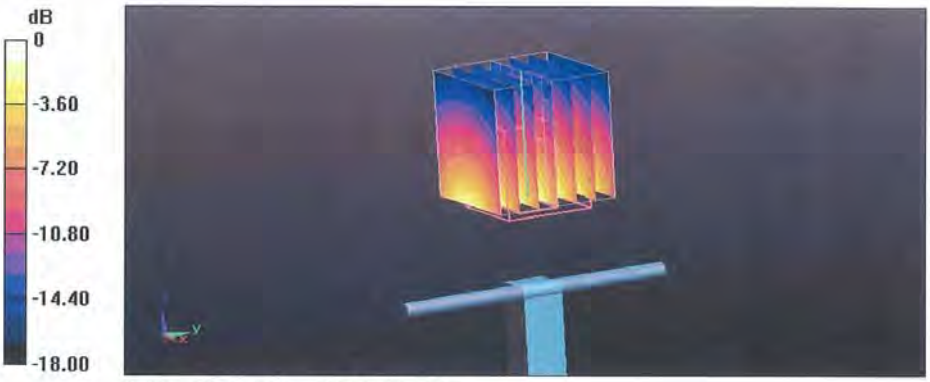
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d027

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

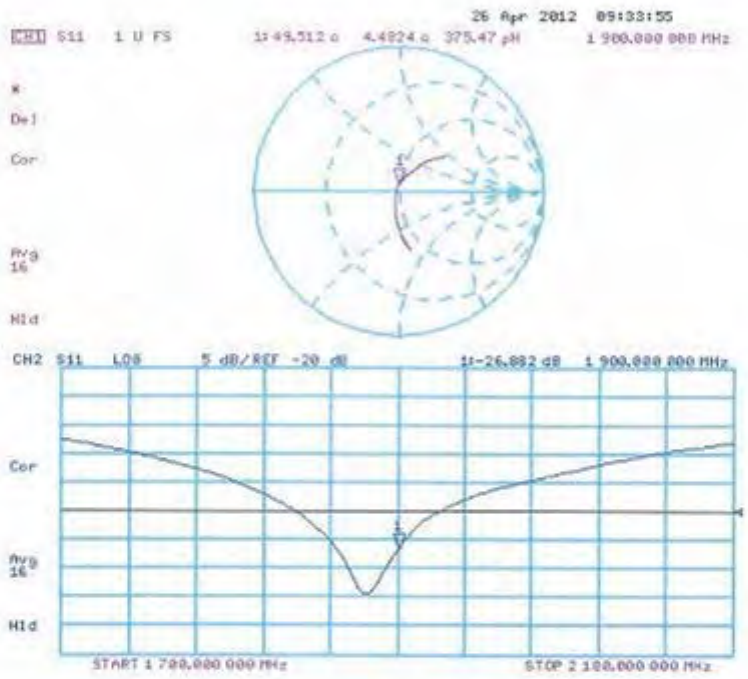
- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.127 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.890 mW/g
SAR(1 g) = 9.43 mW/g; SAR(10 g) = 4.96 mW/g
Maximum value of SAR (measured) = 11.8 mW/g



0 dB = 11.8 mW/g = 21.44 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 26.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

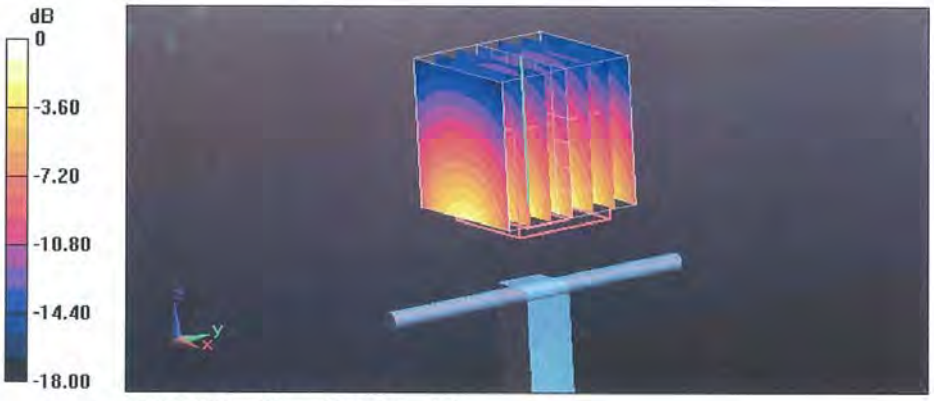
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.51 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.355 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 17.593 mW/g
SAR(1 g) = 10 mW/g; SAR(10 g) = 5.3 mW/g
Maximum value of SAR (measured) = 12.7 mW/g



0 dB = 12.7 mW/g = 22.08 dB mW/g

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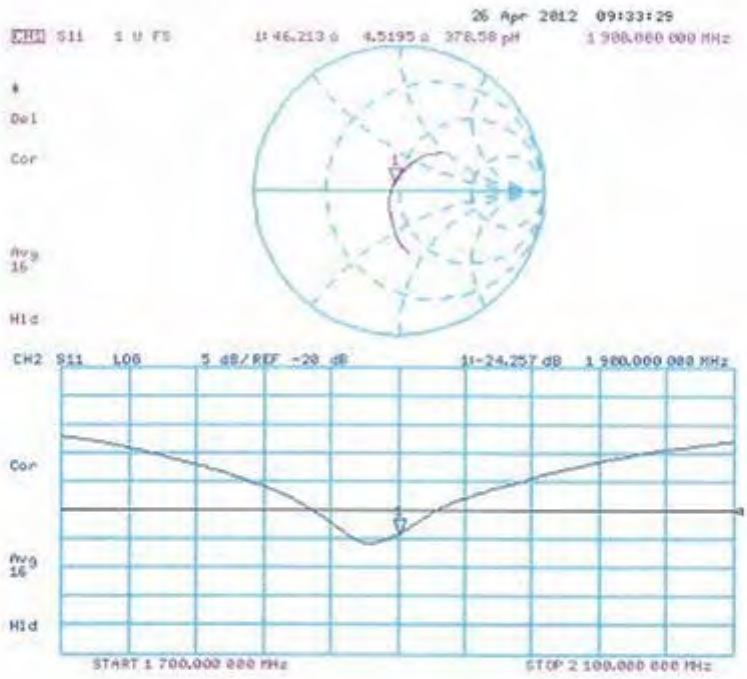
Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)** Certificate No: **D2450V2-727_Apr12**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 727
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 25, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 25, 2012

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

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.6 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**51.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.95 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	1.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.92 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.6 Ω + 2.8 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.3 Ω + 3.9 jΩ
Return Loss	- 27.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

DASY5 Validation Report for Head TSL

Date: 25.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

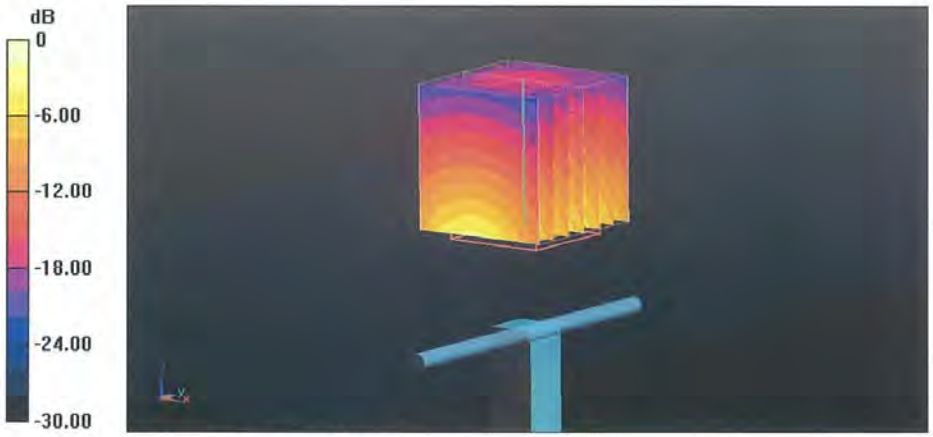
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.712 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 26.388 mW/g
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.95 mW/g
Maximum value of SAR (measured) = 16.4 mW/g



0 dB = 16.4 mW/g = 24.30 dB mW/g

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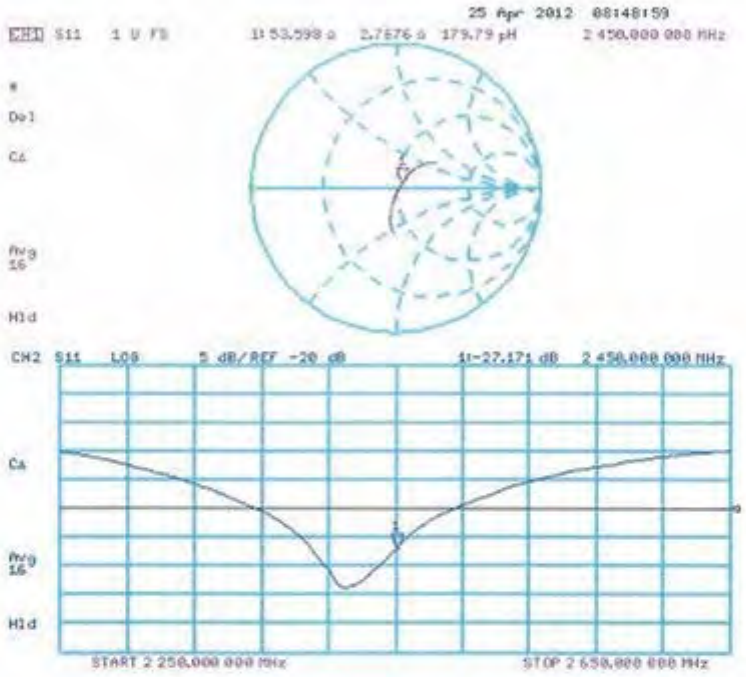
Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

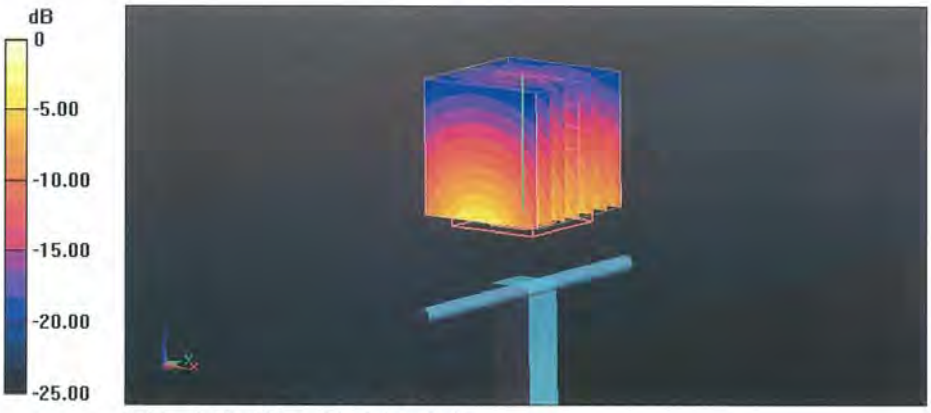
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.136 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 25.811 mW/g
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.92 mW/g
Maximum value of SAR (measured) = 16.7 mW/g



0 dB = 16.7 mW/g = 24.45 dB mW/g

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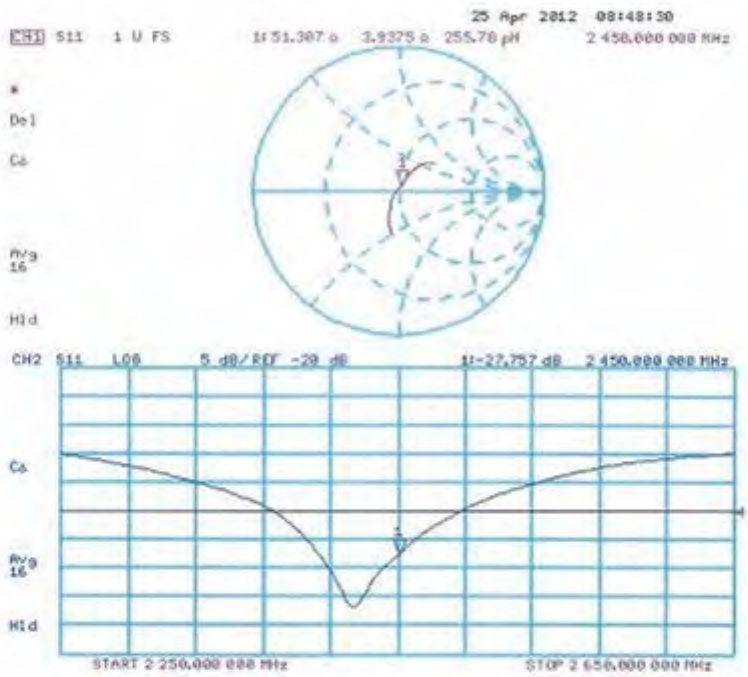
Impedance Measurement Plot for Body TSL



End of 1st part of report

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