SAR TEST REPORT

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

Equipment Under Test	PDA Phone
Marketing Name	MT25i
Brand Name	Sony
Model No.	PM-0110-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
FCC ID	PY7PM-0110
Date of Receipt	Feb. 04, 2012
Date of Test(s)	Apr. 09, 2012 ~ Jun. 02, 2012
Date of Issue	Jun. 25, 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 two samples, 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: Jun. 25, 2012

Supervisor

Kelly Tsai

Kelly Tsai

Date: Jun. 25, 2012

Version

Report Number	Revision	Date	Memo
EN/2012/20005	00	2012/05/25	Initial creation of test report.
EN/2012/20005	01	2012/05/29	1st modification
EN/2012/20005	02	2012/05/31	2nd modification
EN/2012/20005	03	2012/05/31	3rd modification
EN/2012/20005	04	2012/06/04	4th modification
EN/2012/20005	05	2012/06/08	5th modification
EN/2012/20005	06	2012/06/14	6th modification
EN/2012/20005	07	2012/06/19	7th modification
EN/2012/20005	08	2012/06/25	8th 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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1.3 Description of EUT

EUT Name	PDA Phone			
Marketing Name	MT25i			
Brand Name	Sony			
Model No.	PM-0110-BV			
Hardware Version	AP			
Software Version	4.1.B.0.405			
IMEI Code	004402144827346 / 004402144840430			
Serial No.	BX902VD2UF / BX902YECAZ			
FCC ID	PY7PM-0110			
Mode of Operation	☒GSM ☒GPRS ☒EDGE ☒WLAN802.11 b/g/n (H20) band			
Duty Cycle	GSM	1/8.3		
	GPRS	1/2		
	EDGE	1/2		
	WLAN802.11 b/g/n(H20)	1		
TX Frequency Range (MHz)	GSM850	824.2	—	848.8
	GSM1900	1850.2	—	1909.8
	WLAN802.11 b/g/n(H20)	2412	—	2462
Channel Number (ARFCN)	GSM850	128	—	251
	GSM1900	512	—	810
	WLAN802.11 b/g/n(H20)	1	—	11

Max. SAR Measured(1 g) (Unit: W/Kg)	Head	GSM 850	0.51	☒Left ☐Right ☒Cheek ☐Tilt 251 Channel
		GSM 1900	0.84	☒Left ☒Cheek ☐Right ☐Tilt 810 Channel -with memory card
		WLAN802.11 b	0.36	☐Left ☒Right ☒Cheek ☐Tilt 11 Channel
	Body worn (speech mode)	GSM 850	0.448	☐Front ☒Back 128 Channel
		GSM 1900	0.381	☐Front ☒Back 810 Channel
	Hotspot mode	GPRS 850	1.26	☐Left ☐Front ☐Right ☒Back ☐Bottom 251 Channel -with memory card
		GPRS 1900	1.13	☐Left ☐Front ☐Right ☒Back ☐Bottom 810 Channel
		WLAN802.11 b	0.13	☐Front ☒Back ☐Top ☐Left 6 Channel -with memory card

 # Scaling SAR table:

		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	33.3	33	-	0.51	-
		GSM 1900	810	30.5	30	-	**0.84**	-
Body	**Body worn (speech mode)**	GSM 850	128	32.9	33	2.33%	0.45	0.46
		GSM 1900	810	30.5	30	-	0.38	-
	Hotspot mode	GPRS 850 1Dn4UP	251	27	27	-	**1.26**	-
		GPRS1900 1Dn4UP	810	26.2	26.5	7.15%	1.13	1.21

#. 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	824.2	128	32.90	23.87
	836.6	190	33.20	24.17
	848.8	251	33.30	24.27
The division factor compared to the number of TX time slot				
Division factor			1 TX time slot	
			-9.03	

Burst average power						
EUT mode	Frequency (MHz)	CH	1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
			Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 850	824.2	128	32.60	28.90	28.10	26.90
	836.6	190	33.00	29.00	28.20	27.00
	848.8	251	33.00	28.90	28.10	27.00
Source-based time average power						
GPRS 850	824.2	128	23.57	22.88	23.84	23.89
	836.6	190	23.97	22.98	23.94	23.99
	848.8	251	23.97	22.88	23.84	23.99
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						
EUT mode	Frequency (MHz)	CH	1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
			Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 850 (MCS5)	824.2	128	26.80	26.60	26.40	25.70
	836.6	190	26.70	26.60	26.50	25.80
	848.8	251	26.80	26.60	26.50	26.00
Source-based time average power						
EDGE 850 (MCS5)	824.2	128	17.77	20.58	22.14	22.69
	836.6	190	17.67	20.58	22.24	22.79
	848.8	251	17.77	20.58	22.24	22.99
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 (MCS4)	824.2	128	27.14	27.00	26.86	26.72
	836.6	190	27.02	26.78	26.87	26.43
	848.8	251	27.10	26.96	26.84	26.69
Source-based time average power						
EDGE 850 (MCS4)	824.2	128	18.11	20.98	22.60	23.71
	836.6	190	17.99	20.76	22.61	23.42
	848.8	251	18.07	20.94	22.58	23.68
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 (MCS9)	824.2	128	27.09	26.44	26.14	25.59
	836.6	190	27.07	26.44	26.14	25.58
	848.8	251	26.92	26.23	26.49	25.85
Source-based time average power						
EDGE 850 (MCS9)	824.2	128	18.06	20.42	21.88	22.58
	836.6	190	18.04	20.42	21.88	22.57
	848.8	251	17.89	20.21	22.23	22.84
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	1850.2	512	30.50	21.47
	1880	661	30.80	21.77
	1909.8	810	30.50	21.47
The division factor compared to the number of TX time slot				
Division factor			1 TX time slot	
			-9.03	

Burst average power						
EUT mode	Frequency (MHz)	CH	1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
			Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 1900	1850.2	512	30.30	28.20	27.10	25.90
	1880	661	30.00	28.00	26.80	26.20
	1909.8	810	30.00	28.10	27.00	26.20
Source-based time average power						
GPRS 1900	1850.2	512	21.27	22.18	22.84	22.89
	1880	661	20.97	21.98	22.54	23.19
	1909.8	810	20.97	22.08	22.74	23.19
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						
EUT mode	Frequency (MHz)	CH	1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
			Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 1900 (MCS5)	1850.2	512	26.30	25.80	25.70	25.20
	1880	661	26.20	25.80	25.50	24.90
	1909.8	810	26.00	25.60	25.40	24.80
Source-based time average power						
EDGE 1900 (MCS5)	1850.2	512	17.27	19.78	21.44	22.19
	1880	661	17.17	19.78	21.24	21.89
	1909.8	810	16.97	19.58	21.14	21.79
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 (MCS4)	1850.2	512	26.24	26.13	26.22	25.96
	1880	661	26.22	25.96	26.28	25.90
	1909.8	810	26.26	26.02	26.13	25.80
Source-based time average power						
EDGE 1900 (MCS4)	1850.2	512	17.21	20.11	21.96	22.95
	1880	661	17.19	19.94	22.02	22.89
	1909.8	810	17.23	20.00	21.87	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 (MCS9)	1850.2	512	26.88	26.59	26.23	25.32
	1880	661	26.81	26.49	26.10	25.20
	1909.8	810	25.78	26.42	25.88	24.92
Source-based time average power						
EDGE 1900 (MCS9)	1850.2	512	17.85	20.57	21.97	22.31
	1880	661	17.78	20.47	21.84	22.19
	1909.8	810	16.75	20.40	21.62	21.91
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 (H20) conducted power table:

802.11b		Average Power Output(dBm)			
CH	Frequency (MHz)	Data Rate (Mbps)			
		1	2	5.5	11
1	2412	15.34	15.32	15.28	15.18
6	2437	15.35	15.3	15.29	15.25
11	2462	15.31	15.28	15.25	15.22

802.11g		Average Power Output (dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
1	2412	12.13	12.11	12.08	12.02	11.97	11.93	11.88	11.81
6	2437	12.26	12.18	12.12	12.05	11.97	11.92	11.87	11.83
11	2462	12.37	12.31	12.25	12.16	12.07	11.98	11.89	11.79

802.11n (H20)		Average Power Output (dBm)							
CH	Frequency (MHz)	Data Rate (Mbps)							
		6.5	13	19.5	26	39	52	58.5	65
1	2412	11.46	11.39	11.34	11.25	11.17	11.06	10.95	10.89
6	2437	11.58	11.45	11.38	11.27	11.18	11.07	10.96	10.87
11	2462	11.51	11.44	11.35	11.26	11.16	11.09	11.02	10.99

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 8960), 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 LET/LEC/RET/REC conditions.
5. Testing body-worn speech mode SAR by separating **15mm** for GSM850 and GSM1900 (Front side& back side)

   # 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.)**
6. Testing hotspot mode SAR by separating **10mm.**

   #. 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.

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. (WLAN antenna to edge distance >25mm_No SAR)
(6) Left side.

SAR evaluation considerations for handsets with multiple transmitters:

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 **(BT power= 8.59dBm)**
8. According to **KDB248227**-SAR is not required for 802.11 g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB height than that measured on the corresponding 802.11b channels.
9. For Head, The highest 1-g SAR for WLAN is 0.36 W/kg and the highest 1-g SAR for WWAN is 0.84W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0.36+0.84 = 1.20 W/kg.
10. For Body, The highest 1-g SAR for WLAN is 0.13 W/kg and the highest 1-g SAR for WWAN is 1.26W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0.13+1.26 = 1.39 W/kg.
11. Both Head & Body, **which lower than the limit 1.6W/kg.** According to **KDB648474/KDB447498** Simultaneous SAR evaluation is not required.
12. WLAN / WWAN – Antenna separation is 74.85mm> 5cm, Sum of SAR is less than 1.6W/kg, hence no simultaneous SAR is needed.

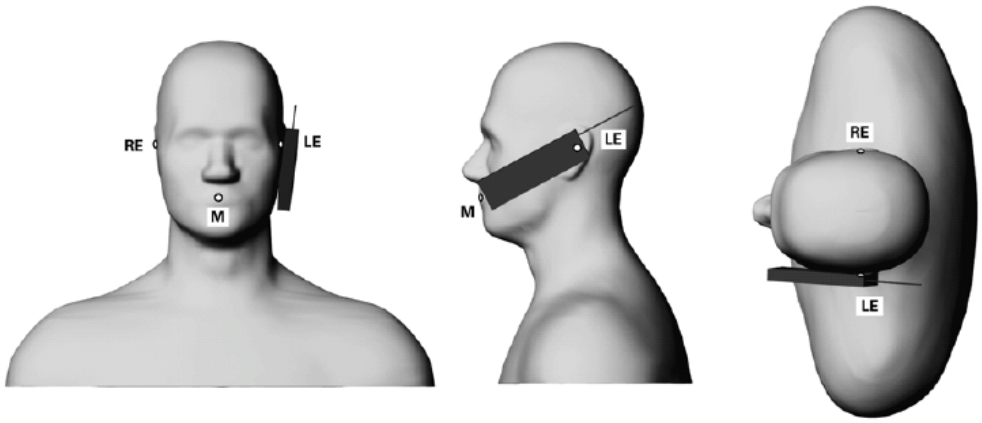
Additional configuration(Head):

13. For highest SAR configuration in this band (WWAN & WLAN) repeated with external Memory card inside.

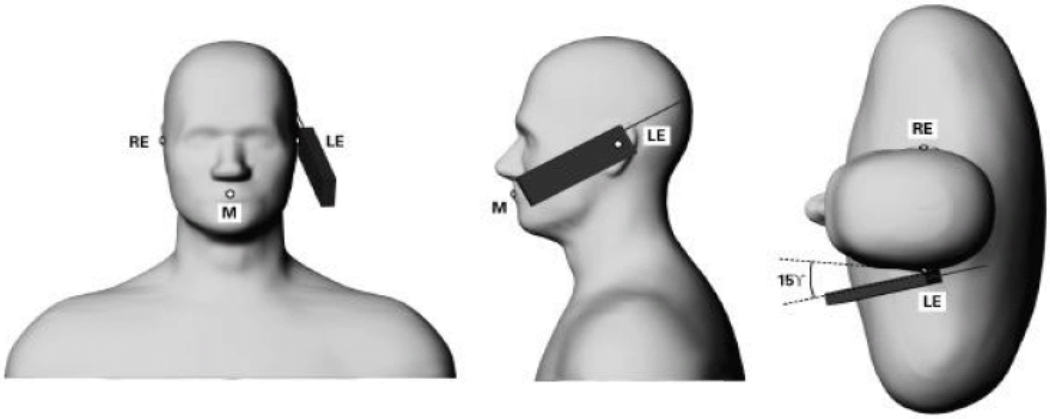
Additional configuration(Body):

14. For highest SAR configuration in this band (WWAN & WLAN) repeated with external Memory card inside.
15. For highest SAR configuration in this band (WWAN & WLAN) repeated with Headset.

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 The SAR Measurement System

A 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 DASY5 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.

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 intissue 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.

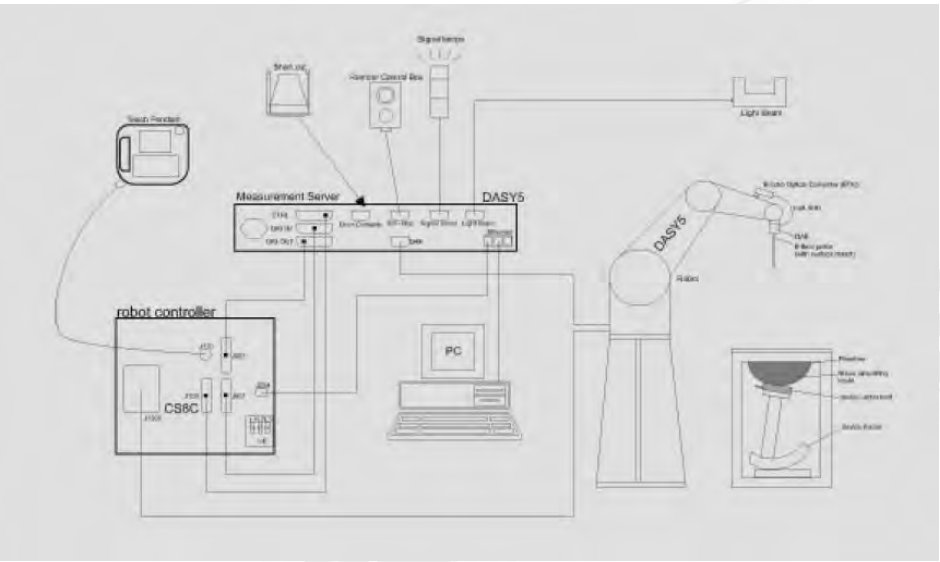


Fig.a The block diagram of SAR system

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

1.8 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835/1900/2450 MHz 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: ± 0.6 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

1.9 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 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in 22.1°C, the relative humidity was in 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.

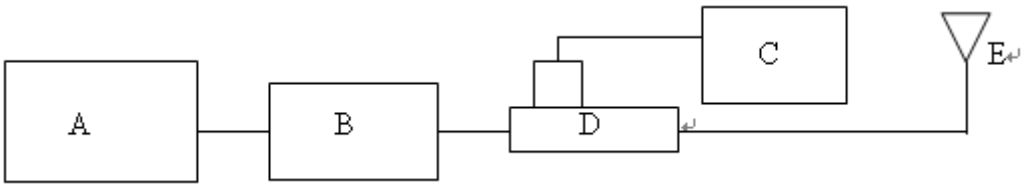
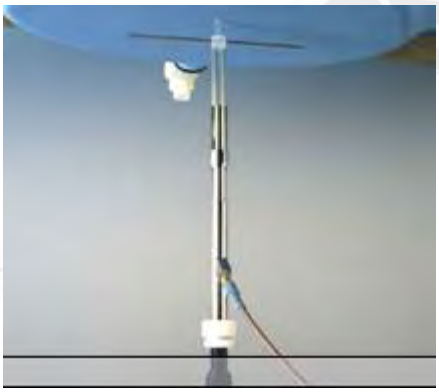


Fig.b The block diagram of system verification

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	4d063	835	Head	2.31	2.25	Apr. 09, 2012
			Body	2.43	2.53	Apr. 09, 2012
D1900V2	5d027	1900	Head	10.1	9.83	Apr. 09, 2012
			Body	9.93	9.96	Apr. 09, 2012
D2450V2	727	2450	Head	12.8	13.2	May. 10, 2012
			Body	12.7	12.2	May. 10, 2012
D835V2	4d120	835	Body	2.43	2.54	Jun. 02, 2012
D1900V2	5d027	1900	Body	10	10.4	Jun. 02, 2012

Table 1. Results of system validation

1.10 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D Network Analyzer (30 KHz-6000 MHz).

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the flat section of the phantom was 15cm±5mm during all tests. (Fig .2)

Frequency (MHz)	Tissue type	Dielectric Parameters		Recommended Limits	Measured	Measurement date
850	Head	ρ	Verification	38.38-42.42	41.345	Apr. 09, 2012
			CH (L)		41.485	
			CH (M)		41.319	
			CH (H)		41.176	
		σ (S/m)	Verification	0.84-0.92	0.885	
			CH (L)		0.875	
			CH (M)		0.887	
			CH (H)		0.888	
		Simulated Tissue Temp.(℃)		20-24	21.7	
	Body	ρ	Verification	51.21-56.6	52.571	Apr. 09, 2012
			CH (L)		52.678	
			CH (M)		52.552	
			CH (H)		52.43	
		σ (S/m)	Verification	0.95-1.05	1.013	
			CH (L)		1.002	
			CH (M)		1.016	
			CH (H)		1.028	
		Simulated Tissue Temp.(℃)		20-24	21.7	

1900	Head	ρ	Verification	36.96-40.85	40.19	Apr. 09, 2012
			CH (L)		40.358	
			CH (M)		40.254	
			CH (H)		40.151	
		σ (S/m)	Verification	1.34-1.48	1.421	
			CH (L)		1.373	
			CH (M)		1.401	
			CH (H)		1.431	
		Simulated Tissue Temp.(℃)		20-24	21.7	
	Body	ρ	Verification	48.55-53.66	51.672	Apr. 09, 2012
			CH (L)		52.33	
			CH (M)		52.036	
			CH (H)		51.55	
		σ (S/m)	Verification	1.44-1.6	1.52	
			CH (L)		1.5	
			CH (M)		1.505	
			CH (H)		1.535	
		Simulated Tissue Temp.(℃)		20-24	21.7	
2450	Head	ρ	Verification	37.62-41.58	38.509	May 10,2012
			CH (L)		38.833	
			CH (M)		38.618	
			CH (H)		38.45	
		σ (S/m)	Verification	1.72-1.9	1.803	
			CH (L)		1.762	
			CH (M)		1.787	
			CH (H)		1.82	
		Simulated Tissue Temp.(℃)		20-24	21.7	

2450	Body	ρ	Verification	49.78-55.02	50.534	May 10,2012
			CH (L)		50.585	
			CH (M)		50.557	
			CH (H)		50.504	
		σ (S/m)	Verification	1.88-2.08	1.974	
			CH (L)		1.922	
			CH (M)		1.958	
			CH (H)		1.988	
		Simulated Tissue Temp.(℃)		20-24	21.7	
850	Body	ρ	Verification	51.11-56.49	53.732	Jun. 02, 2012
			CH (L)		53.828	
			CH (M)		53.709	
			CH (H)		53.527	
		σ (S/m)	Verification	0.93-1.03	1.03	
			CH (L)		1.021	
			CH (M)		1.032	
			CH (H)		1.041	
		Simulated Tissue Temp.(℃)		20-24	21.7	
1900	Body	ρ	Verification	50.64-55.97	51.041	Jun. 02, 2012
			CH (L)		51.176	
			CH (M)		50.789	
			CH (H)		51.217	
		σ (S/m)	Verification	1.43-1.59	1.542	
			CH (L)		1.451	
			CH (M)		1.496	
			CH (H)		1.561	
		Simulated Tissue Temp.(℃)		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	
850M	Head	—	532.98 g	18.3 g	2.4 g	3.2 g	766.0 g	1.0L(Kg)
	Body	—	631.68 g	11.72 g	1.2 g	—	600 g	1.0L(Kg)
1900M	Head	444.52 g	552.42 g	3.06 g	—	—	—	1.0L(Kg)
	Body	300.67 g	716.56 g	4.0 g	—	—	—	1.0L(Kg)
2450M	Head	550ml	450ml	—	—	—	—	1.0L(Kg)
	Body	301.7ml	698.3ml	—	—	—	—	1.0L(Kg)

Table 3. Recipes for Tissue Simulating Liquid

1.11 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.

1.12 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:

1.12.1 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].

1.12.2 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.

1.13 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).

(2) 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.

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

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

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			
				23.87	24.17	24.27	
				Source-based time average power (dBm)_GPRS			
				23.89	23.99	23.99	
GSM 850	GSM	Right	Cheek	—	0.44	—	1.6
			Tilt	—	0.27	—	1.6
		Left	Cheek	0.35	0.46	0.51	1.6
			Tilt	—	0.26	—	1.6
		Body worn (speech mode)	Front - with Headset	—	0.308	—	1.6
			Back - with Headset	0.448	0.422	0.389	1.6
	GPRS Multi-class 12 (1Dn4UP)	Hotspot mode	Front	—	0.69	—	1.6
			Back	0.69	1.01	1.21	1.6
			-with Memory card	—	—	1.26	1.6
			-with Headset	—	—	0.77	1.6
			Bottom	—	0.04	—	1.6
			Right	—	0.52	—	1.6
			Left	—	0.53	—	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

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			
				21.47	21.77	21.47	
				Source-based time average power (dBm)_GPRS			
				22.89	23.19	23.19	
GSM 1900	GSM	Right	Cheek	—	0.43	—	1.6
			Tilt	—	0.27	—	1.6
		Left	Cheek	0.72	0.67	0.75	1.6
			-with Memory card	—	—	0.84	1.6
			Tilt	—	0.22	—	1.6
		Body worn (speech mode)	Front - with Headset	—	0.281	—	1.6
			Back - with Headset	0.276	0.333	0.381	1.6
	GPRS Multi-class 12 (1Dn4UP)	Hotspot mode	Front	—	0.76	—	1.6
			Back	1.12	1.03	1.13	1.6
			Bottom	—	0.39	—	1.6
			Right	—	0.14	—	1.6
			Left	—	0.27	—	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)			
			15.34	15.35	15.31	
WLAN 802.11 b	Right	Cheek	0.29	0.35	0.36	1.6
		-with Memory card	—	—	0.33	1.6
		Tilt	—	0.11	—	1.6
	Left	Cheek	—	0.15	—	1.6
		Tilt	—	0.12	—	1.6
	Hotspot mode	Front	—	0.06	—	1.6
		Back	0.11	0.13	0.09	1.6
		-with Memory card	—	0.13	—	1.6
		-with Headset	—	0.10	—	1.6
		Top	—	0.04	—	1.6
		Left	—	0.13	—	1.6

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

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

3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3770	Apr.19.2011 Apr.27.2012	Apr.18.2012 Apr.26.2013
Schmid & Partner Engineering AG	835/1900/2450 MHz System Validation Dipole	D835V2	4d063 4d120	May25.2011 Jul.19.2011	May24.2012 Jul.18.2012
		D1900V2	5d027	Apr.19.2011 Apr.26.2012	Apr.18.2012 Apr.25.2013
		D2450V2	727	Apr.25.2012	Apr.24.2013
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	856 905	May18.2011 Jun.24.2011	May17.2012 Jun.23.2012
Schmid & Partner Engineering AG	Software	DASY 5 V52.8	N/A	Calibration not required	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.15.2012	Mar.14.2013
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	777D 778D	50114 50313	Aug.18.2011 Aug.19,2011	Aug.17.2012 Aug.18,2012
Agilent	RF Signal Generator	N5181A	MY50141235	Jan.06,2012	Jan.05,2013
Agilent	Power meter	E4417A	MY51410006	Oct.24.2011	Oct.23.2012
Agilent	Radio Communication Test	E5515C	GB44051912	Jun.27.2010	Jun.26.2012
TECPEL	Digital thermometer	DTM-303A	TP102616	Mar.08.2012	Mar.07.2013

Power Sensor	Anritsu	ML2495A	1005007	Feb.08.2012	Feb.07.2014
Power Meter	Anritsu	MA2411B	917032	Feb.08.2012	Feb.07.2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	Apr.15.2011	Apr.14.2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	Mar.17.2012	Mar.16.2014

4. Measurements

Date: 4/09/2012

RE Cheek_CH190

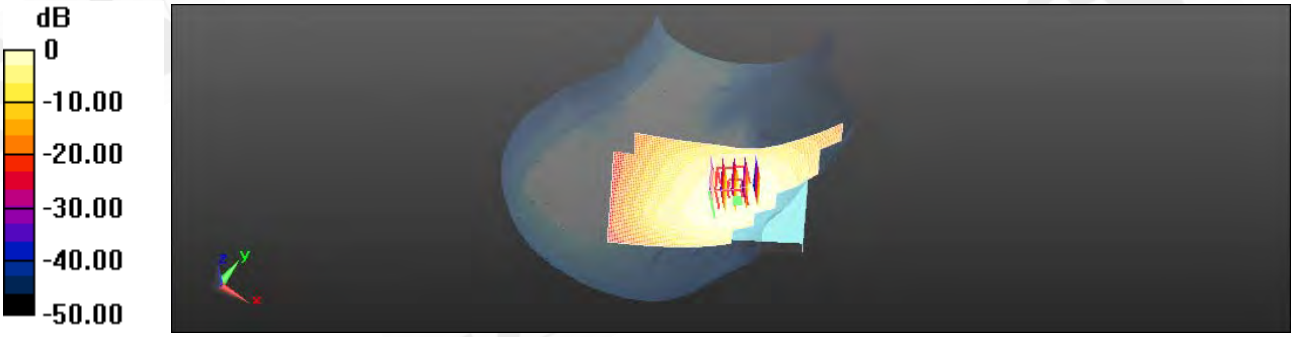
Communication System: Generic GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.887 mho/m; ε_r = 41.319; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid:
dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.506 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.310 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.581 mW/g

SAR(1 g) = 0.44 mW/g; SAR(10 g) = 0.325 mW/g
Maximum value of SAR (measured) = 0.526 mW/g



0 dB = 0.506 mW/g = -5.92 dB mW/g

RE Tilt_CH190

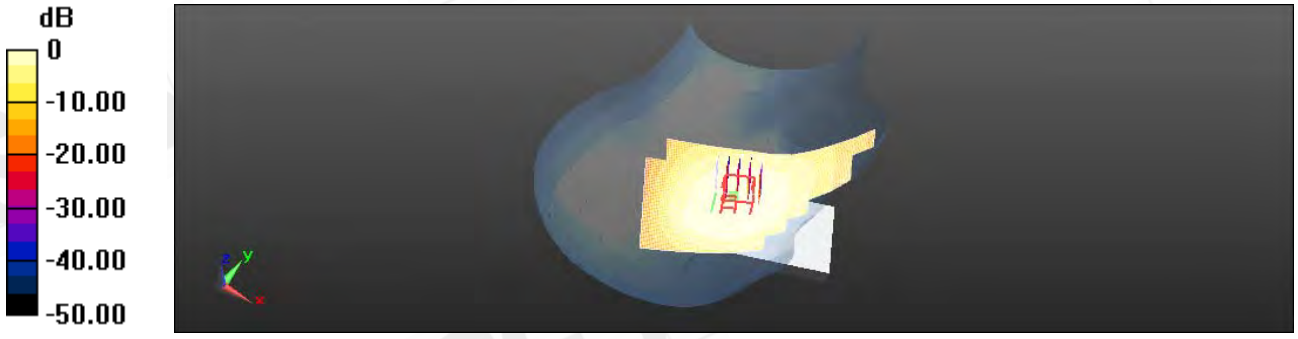
Communication System: Generic GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.887 mho/m; ε_r = 41.319; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Tilt/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.327 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.202 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.369 mW/g

SAR(1 g) = 0.27 mW/g; SAR(10 g) = 0.197 mW/g
Maximum value of SAR (measured) = 0.333 mW/g



0 dB = 0.327 mW/g = -9.70 dB mW/g

LE Cheek_CH128

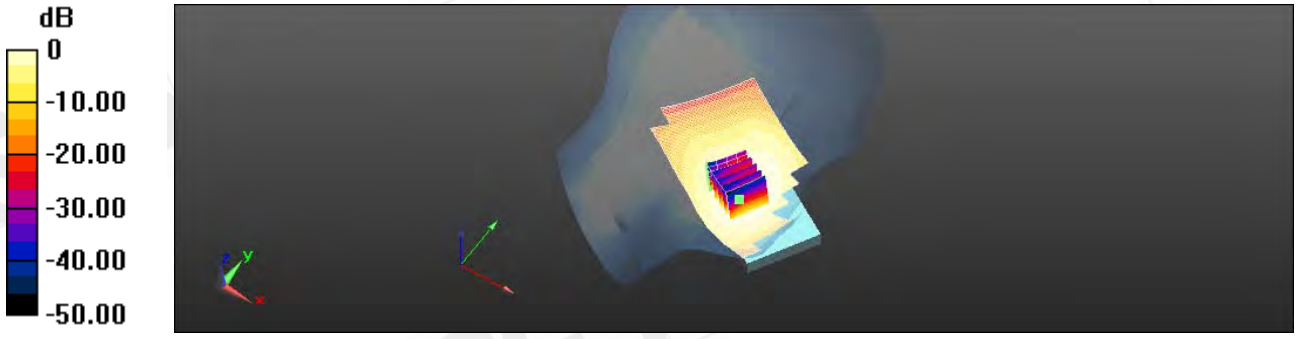
Communication System: Generic GSM; Frequency: 824.2 MHz
Medium parameters used: f = 824.2 MHz; σ = 0.875 mho/m; ε_r = 41.485; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.420 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.635 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.460 mW/g

SAR(1 g) = 0.35 mW/g; SAR(10 g) = 0.261 mW/g
Maximum value of SAR (measured) = 0.410 mW/g



0 dB = 0.420 mW/g = -7.54 dB mW/g

LE Cheek_CH190

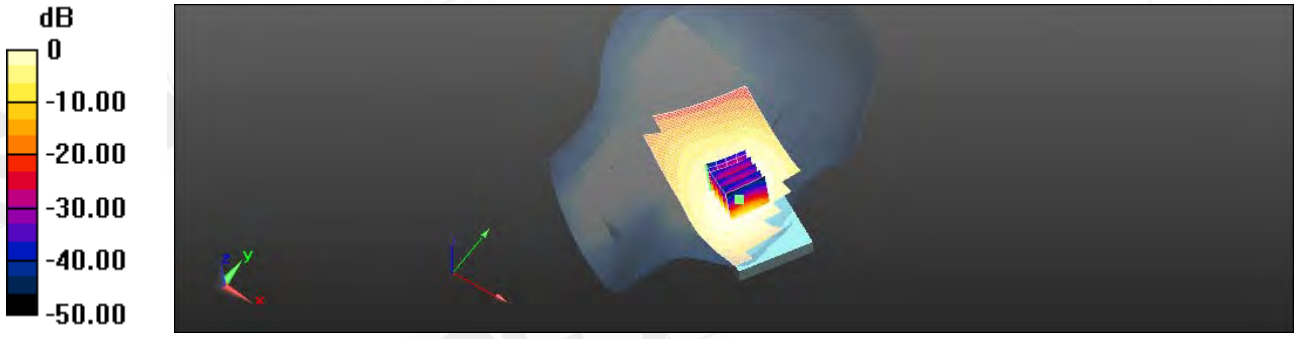
Communication System: Generic GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.887 mho/m; ε_r = 41.319; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.559 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.382 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.612 mW/g

SAR(1 g) = 0.46 mW/g; SAR(10 g) = 0.337 mW/g
Maximum value of SAR (measured) = 0.549 mW/g



0 dB = 0.559 mW/g = -5.05 dB mW/g

LE Cheek_CH251

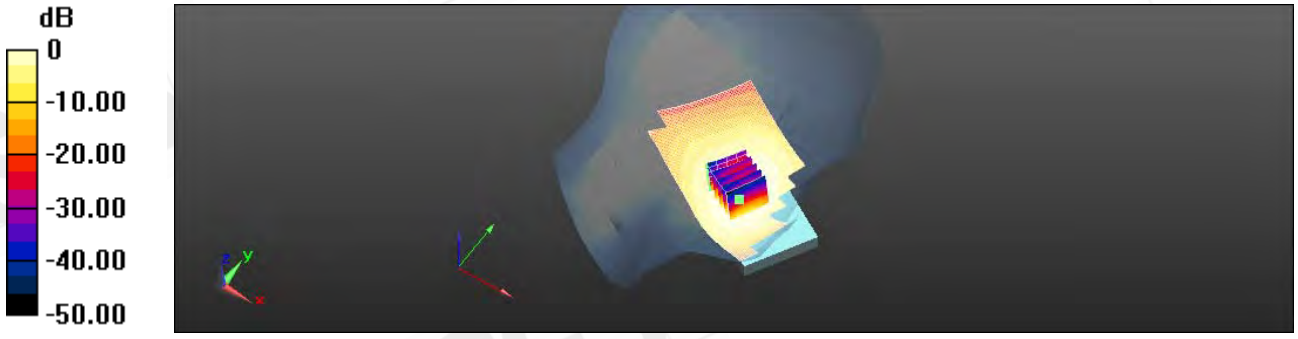
Communication System: Generic GSM; Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 0.888 mho/m; ε_r = 41.176; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.607 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.486 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.661 mW/g

SAR(1 g) = 0.51 mW/g; SAR(10 g) = 0.374 mW/g
Maximum value of SAR (measured) = 0.590 mW/g



0 dB = 0.607 mW/g = -4.34 dB mW/g

LE Tilt_CH190

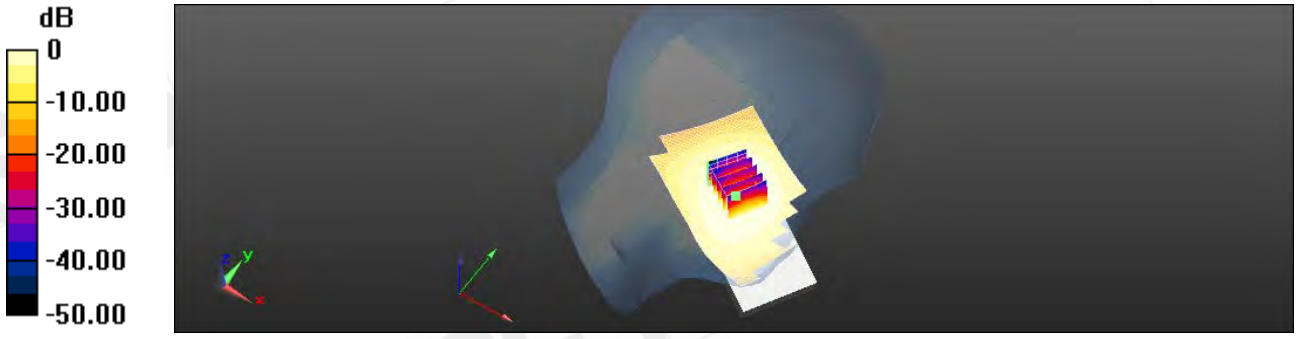
Communication System: Generic GSM; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 0.887 mho/m; ε_r = 41.319; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Tilt/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.298 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.654 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.323 mW/g

SAR(1 g) = 0.26 mW/g; SAR(10 g) = 0.196 mW/g
Maximum value of SAR (measured) = 0.295 mW/g



0 dB = 0.298 mW/g = -10.52 dB mW/g

Date: 6/2/2012

Body_Speech mode_Front Side_CH190_repeated with headset

Communication System: GSM; Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.032 mho/m; ε_r = 53.709; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.367 mW/g

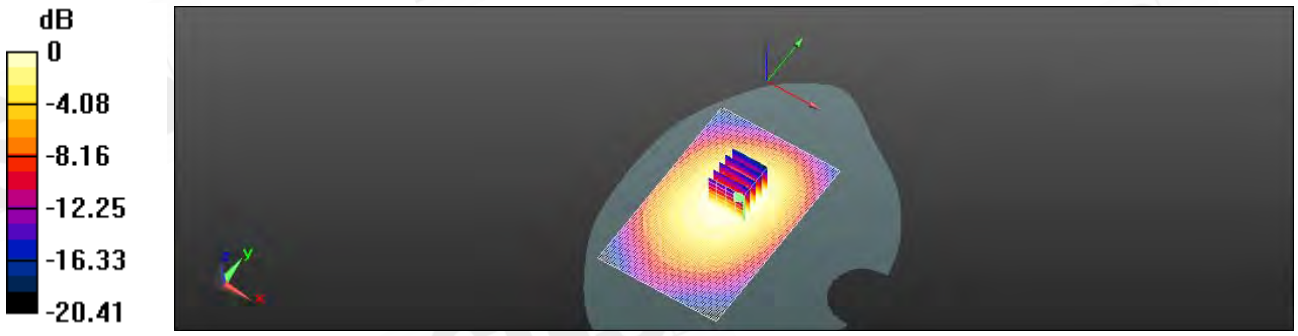
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.153 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.401 mW/g

SAR(1 g) = 0.308 mW/g; SAR(10 g) = 0.226 mW/g

Maximum value of SAR (measured) = 0.361 mW/g



0 dB = 0.367 mW/g = -8.70 dB mW/g

Date: 6/2/2012

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 = 1.021 mho/m; ε_r = 53.828; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.521 mW/g

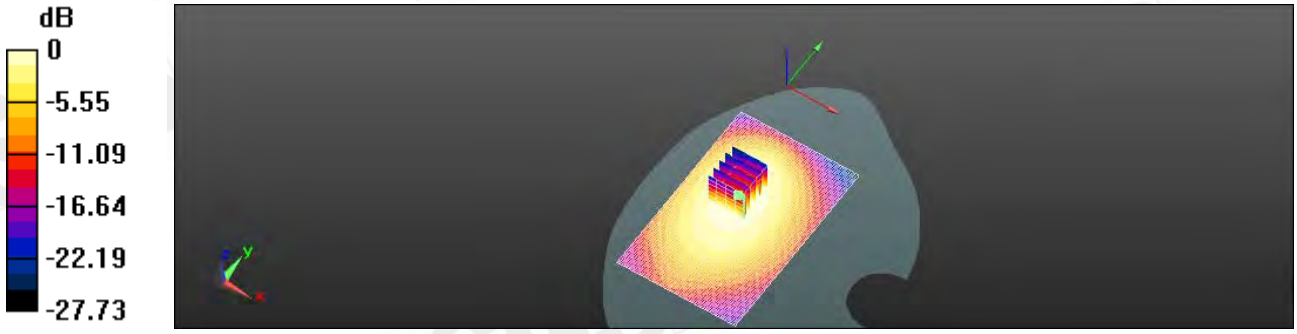
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.423 V/m; Power Drift = 0.17 dB

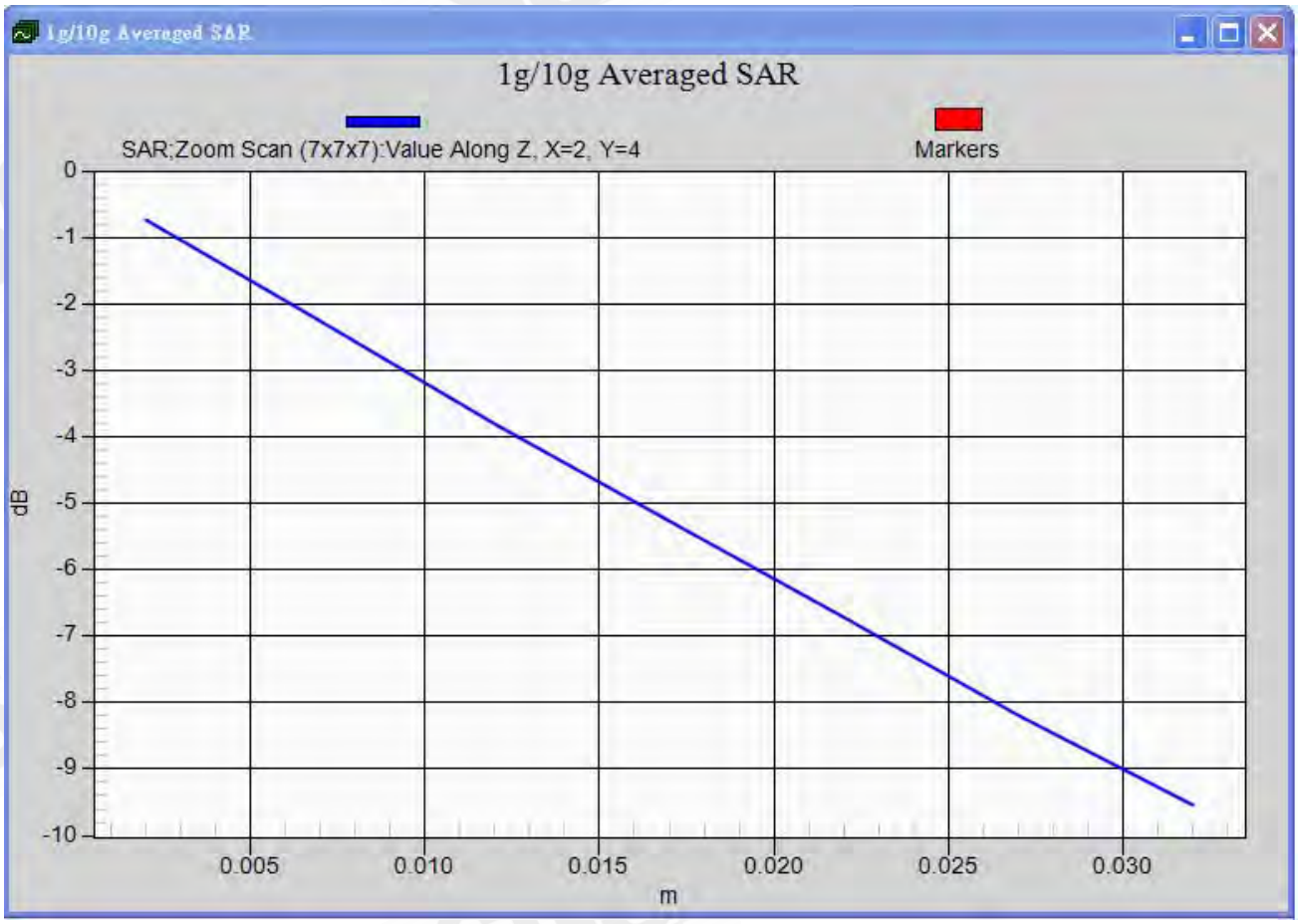
Peak SAR (extrapolated) = 0.612 mW/g

SAR(1 g) = 0.448 mW/g; SAR(10 g) = 0.316 mW/g

Maximum value of SAR (measured) = 0.535 mW/g



0 dB = 0.521 mW/g = -5.66 dB mW/g



Date: 6/2/2012

Body_Speech mode _Back Side_CH190_repeated with headset

Communication System: GSM; Frequency: 836.6 MHz

Medium parameters used: f = 837 MHz; σ = 1.032 mho/m; ε_r = 53.709; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.517 mW/g

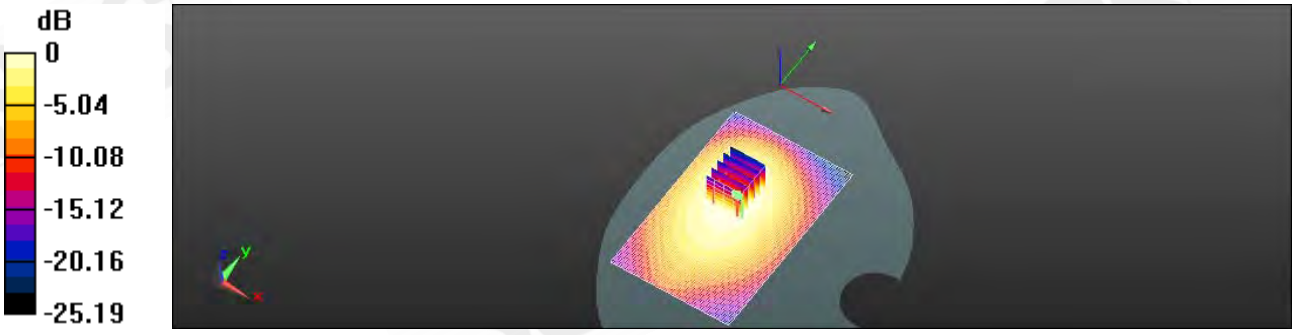
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.931 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.568 mW/g

SAR(1 g) = 0.422 mW/g; SAR(10 g) = 0.306 mW/g

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



0 dB = 0.517 mW/g = -5.73 dB mW/g

Date: 6/2/2012

Body_Speech mode _Back Side_CH251_repeated with headset

Communication System: GSM; Frequency: 848.8 MHz

Medium parameters used: f = 849 MHz; σ = 1.041 mho/m; ε_r = 53.527; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.466 mW/g

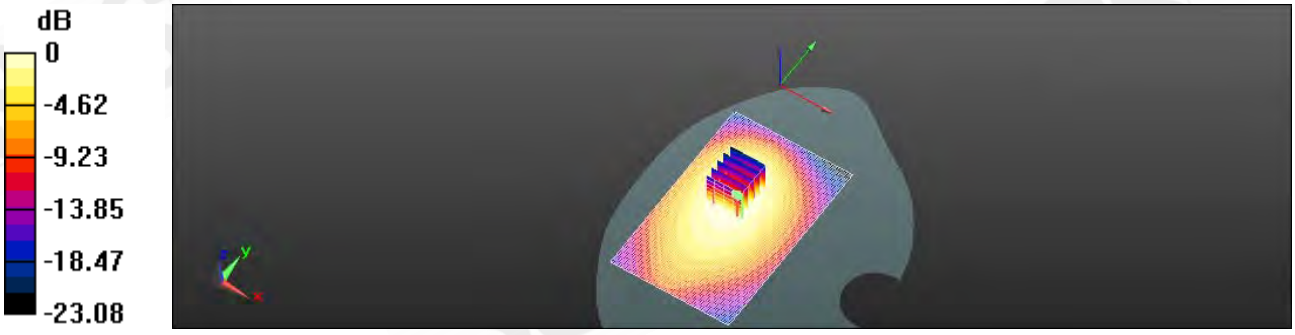
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.465 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.530 mW/g

SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.278 mW/g

Maximum value of SAR (measured) = 0.467 mW/g



0 dB = 0.466 mW/g = -6.63 dB mW/g

Hotspot mode_Front Side_CH190

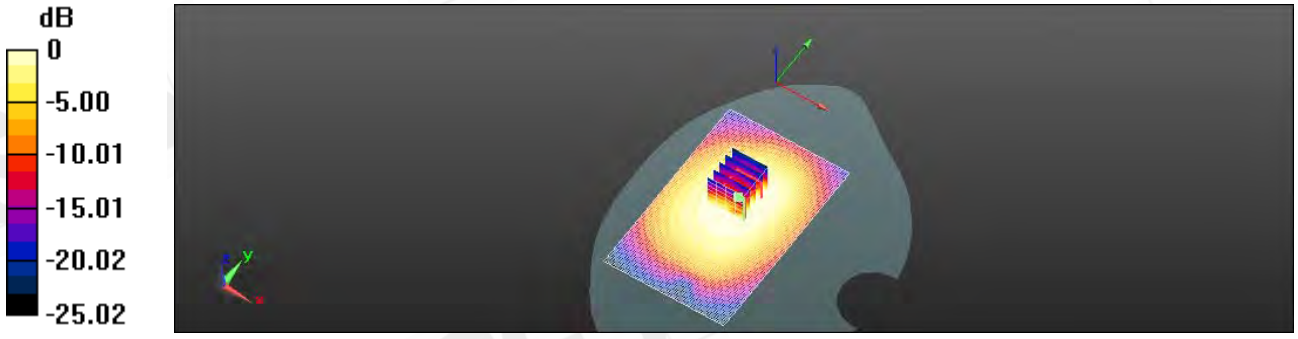
Communication System: GPRS(Class 12); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.016 mho/m; ε_r = 52.552; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.771 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.261 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.184 mW/g

SAR(1 g) = 0.69 mW/g; SAR(10 g) = 0.507 mW/g
Maximum value of SAR (measured) = 0.802 mW/g



0 dB = 0.771 mW/g = -2.26 dB mW/g

Hotspot mode_Back Side_CH128

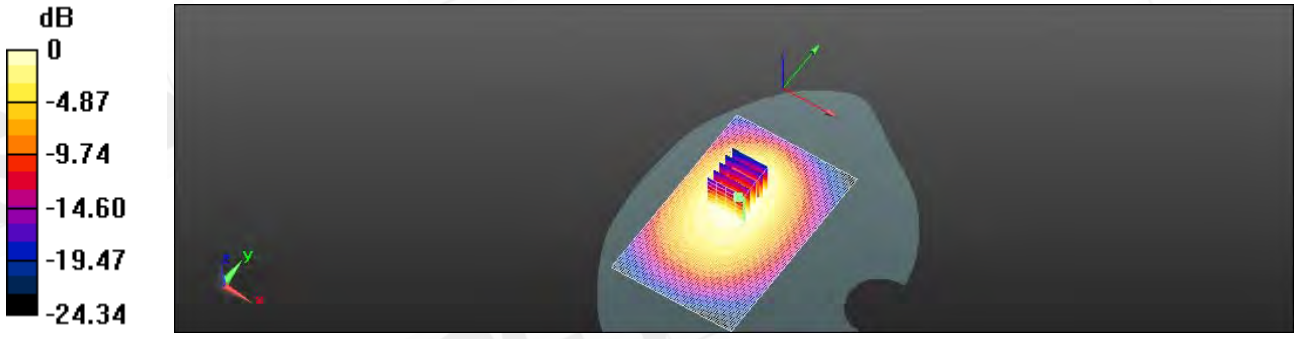
Communication System: GPRS(Class 12); Frequency: 824.2 MHz
Medium parameters used: f = 824.2 MHz; σ = 1.002 mho/m; ε_r = 52.678; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.838 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.590 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.929 mW/g

SAR(1 g) = 0.69 mW/g; SAR(10 g) = 0.507 mW/g
Maximum value of SAR (measured) = 0.816 mW/g



0 dB = 0.838 mW/g = -1.53 dB mW/g

Hotspot mode_Back Side_CH190

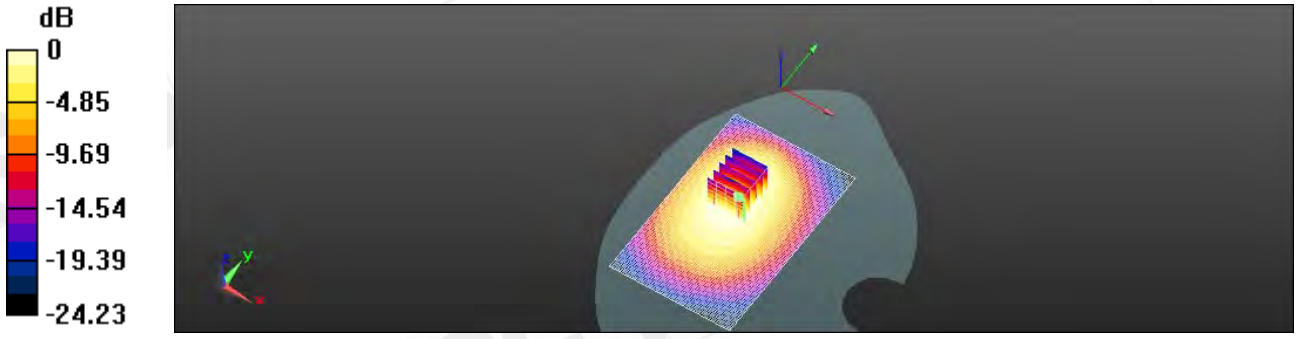
Communication System: GPRS(Class 12); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.016 mho/m; ε_r = 52.552; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.21 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.729 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.325 mW/g

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.734 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



0 dB = 1.21 mW/g = 1.64 dB mW/g

Hotspot mode_Back Side_CH251

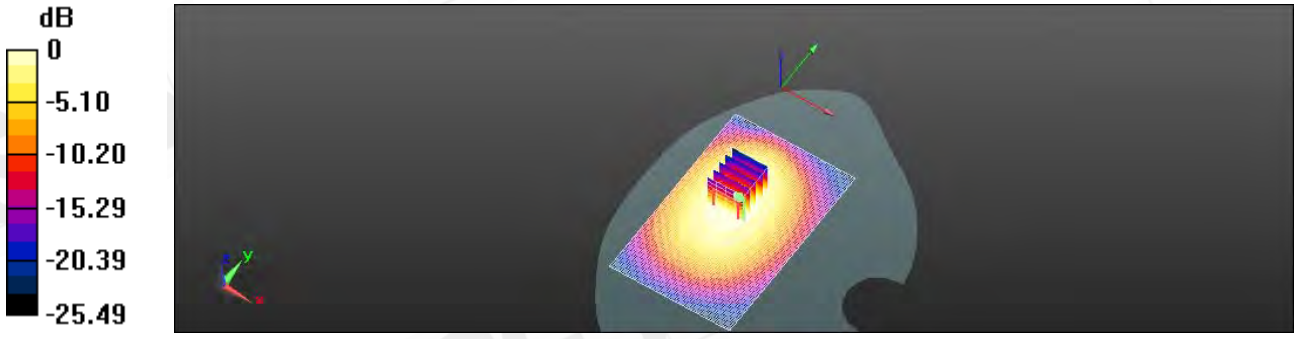
Communication System: GPRS(Class 12); Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 1.028 mho/m; ε_r = 52.43; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.46 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.338 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 1.593 mW/g

SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.891 mW/g
Maximum value of SAR (measured) = 1.41 mW/g



0 dB = 1.46 mW/g = 3.31 dB mW/g

Hotspot mode_Back Side_CH251_repeated with external Memory card inside

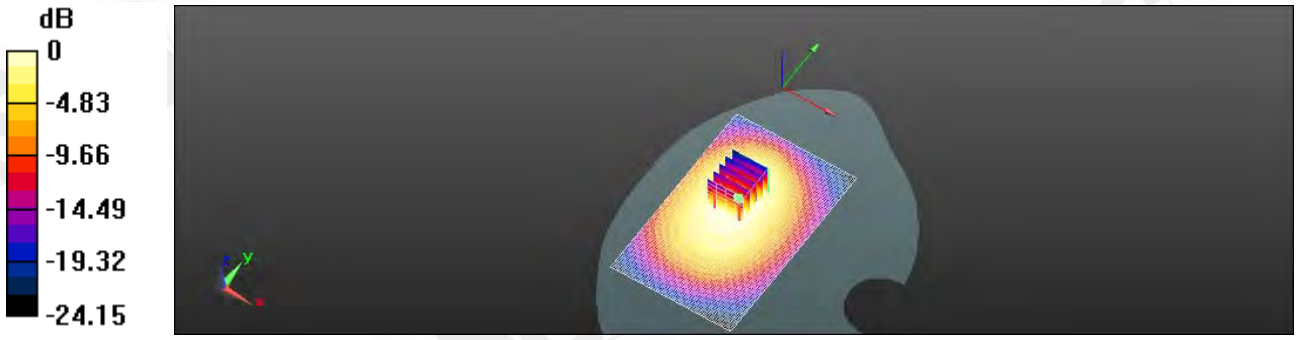
Communication System: GPRS(Class 12); Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 1.028 mho/m; ε_r = 52.43; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

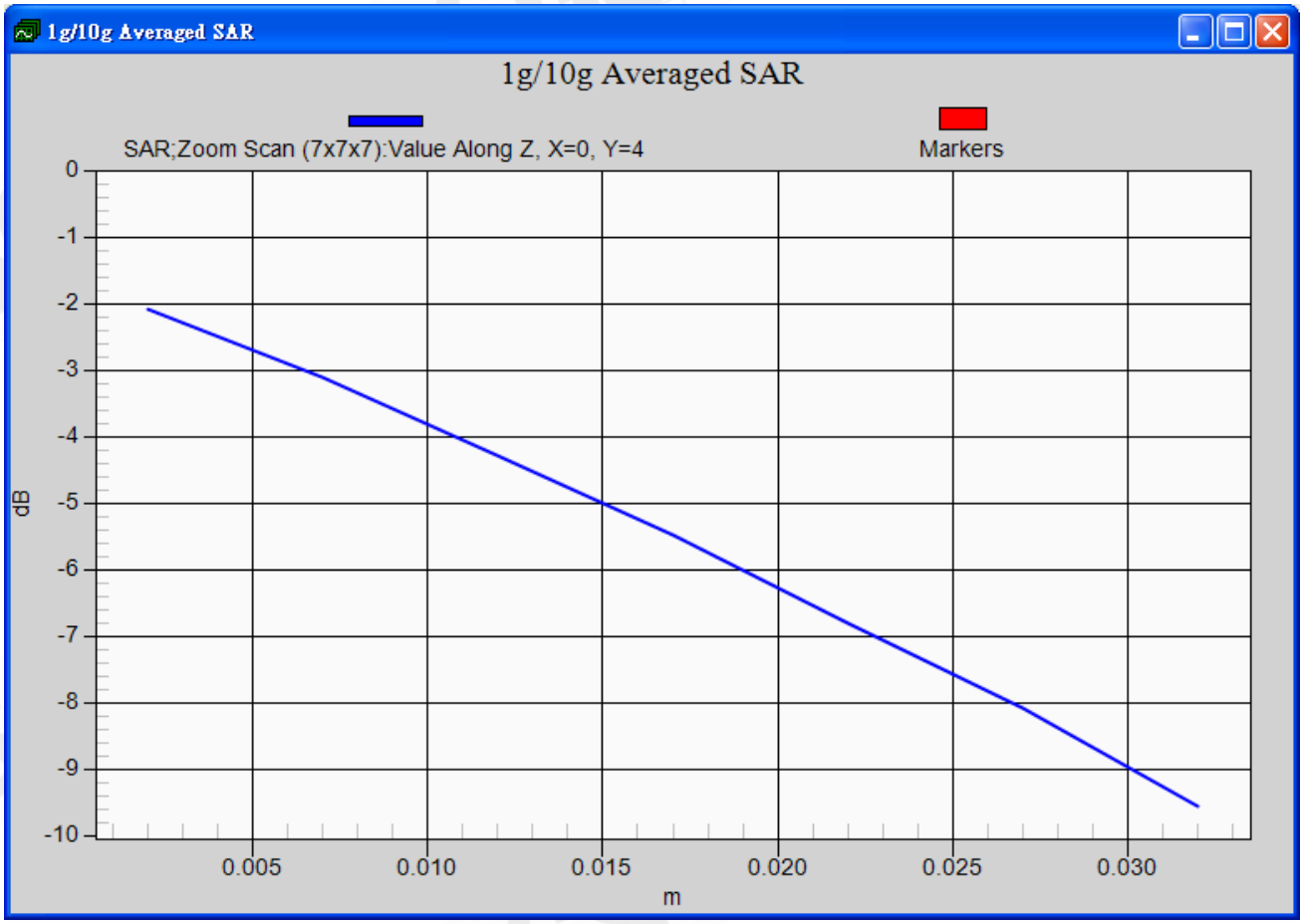
Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.52 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.424 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 1.618 mW/g

SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.916 mW/g
Maximum value of SAR (measured) = 1.46 mW/g



0 dB = 1.52 mW/g = 3.65 dB mW/g



Hotspot mode_Back Side_CH251_repeated with headset

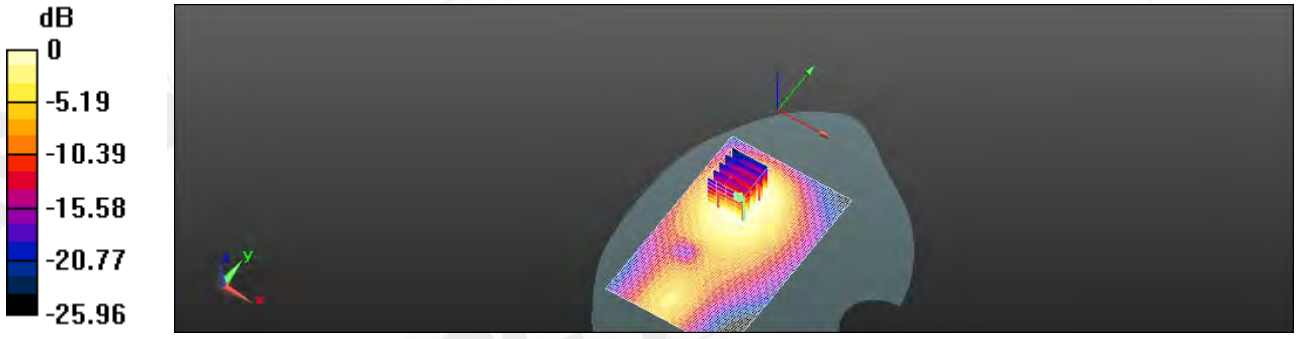
Communication System: GPRS(Class 12); Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 1.028 mho/m; ε_r = 52.43; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.06 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.038 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.167 mW/g

SAR(1 g) = 0.77 mW/g; SAR(10 g) = 0.510 mW/g
Maximum value of SAR (measured) = 0.981 mW/g



0 dB = 1.06 mW/g = 0.53 dB mW/g

Hotspot mode_Bottom Side_CH190

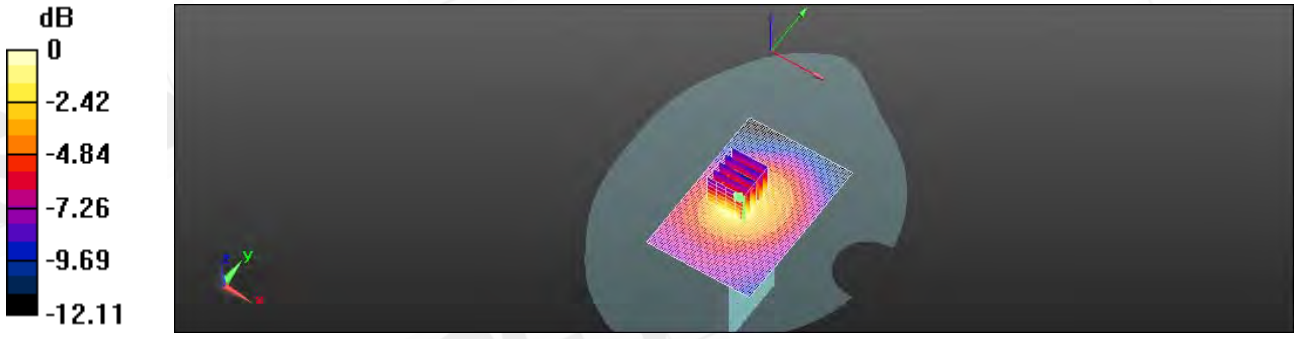
Communication System: GPRS(Class 12); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.016 mho/m; ε_r = 52.552; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0635 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.437 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.093 mW/g

SAR(1 g) = 0.04 mW/g; SAR(10 g) = 0.026 mW/g
Maximum value of SAR (measured) = 0.0673 mW/g



0 dB = 0.0635 mW/g = -23.95 dB mW/g

Hotspot mode_Right Side_CH190

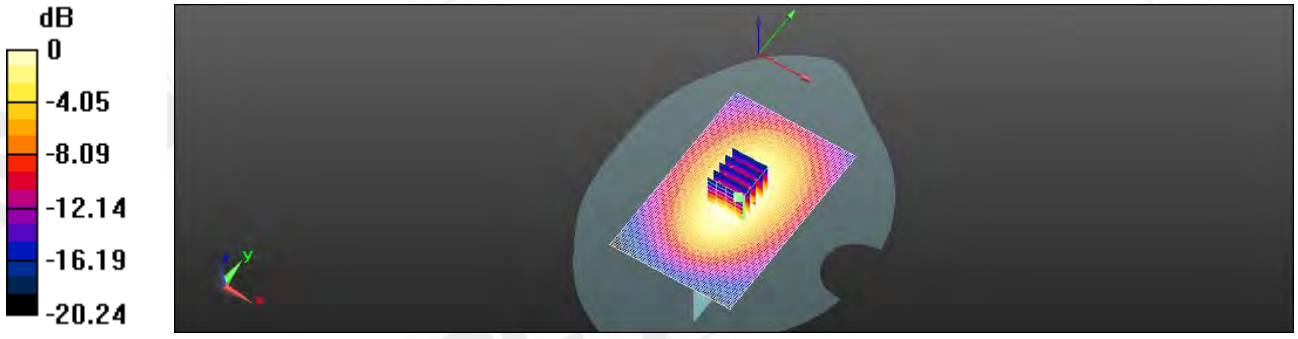
Communication System: GPRS(Class 12); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.016 mho/m; ε_r = 52.552; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.635 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.780 V/m; Power Drift = -0.31 dB
Peak SAR (extrapolated) = 0.712 mW/g

SAR(1 g) = 0.52 mW/g; SAR(10 g) = 0.363 mW/g
Maximum value of SAR (measured) = 0.617 mW/g



0 dB = 0.635 mW/g = -3.94 dB mW/g

Hotspot mode_Left Side_CH190

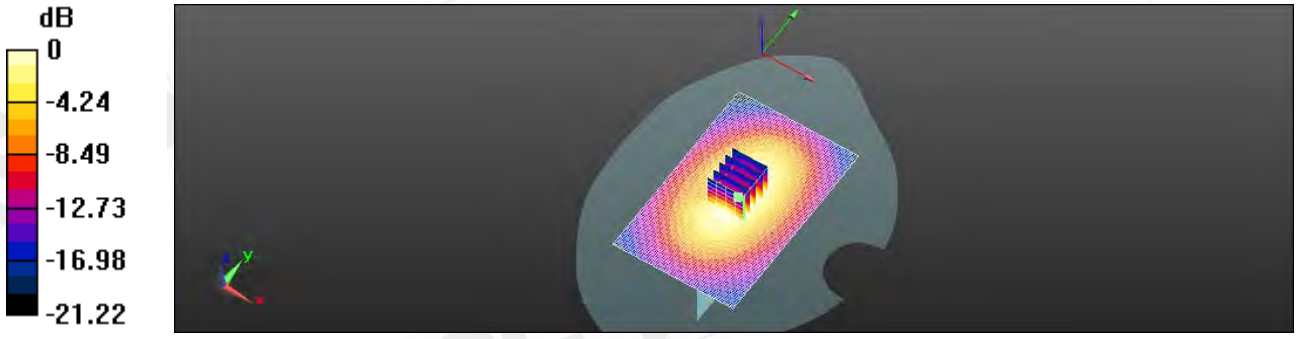
Communication System: GPRS(Class 12); Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1.016 mho/m; ε_r = 52.552; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.672 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.856 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.739 mW/g

SAR(1 g) = 0.53 mW/g; SAR(10 g) = 0.371 mW/g
Maximum value of SAR (measured) = 0.653 mW/g



0 dB = 0.672 mW/g = -3.46 dB mW/g

RE Cheek_CH661

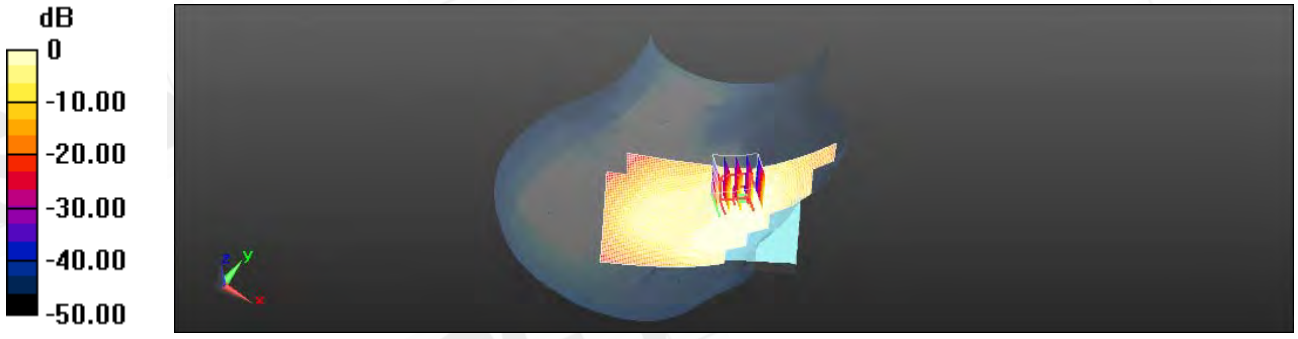
Communication System: Generic GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.401 mho/m; ε_r = 40.254; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.531 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.867 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.639 mW/g

SAR(1 g) = 0.43 mW/g; SAR(10 g) = 0.271 mW/g
Maximum value of SAR (measured) = 0.545 mW/g



0 dB = 0.531 mW/g = -5.49 dB mW/g

RE Tilt_CH661

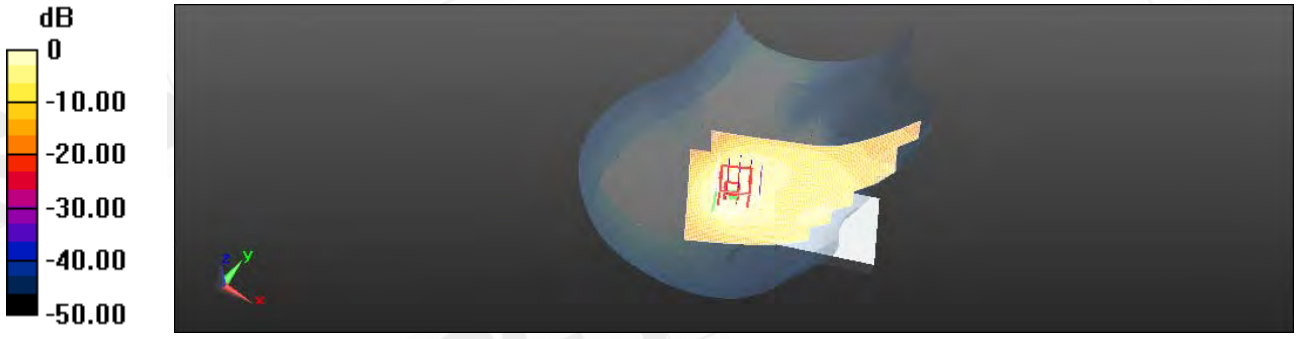
Communication System: Generic GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.401 mho/m; ε_r = 40.254; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Tilt/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.367 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.556 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.416 mW/g

SAR(1 g) = 0.27 mW/g; SAR(10 g) = 0.163 mW/g
Maximum value of SAR (measured) = 0.341 mW/g



0 dB = 0.367 mW/g = -8.70 dB mW/g

LE Cheek_CH512

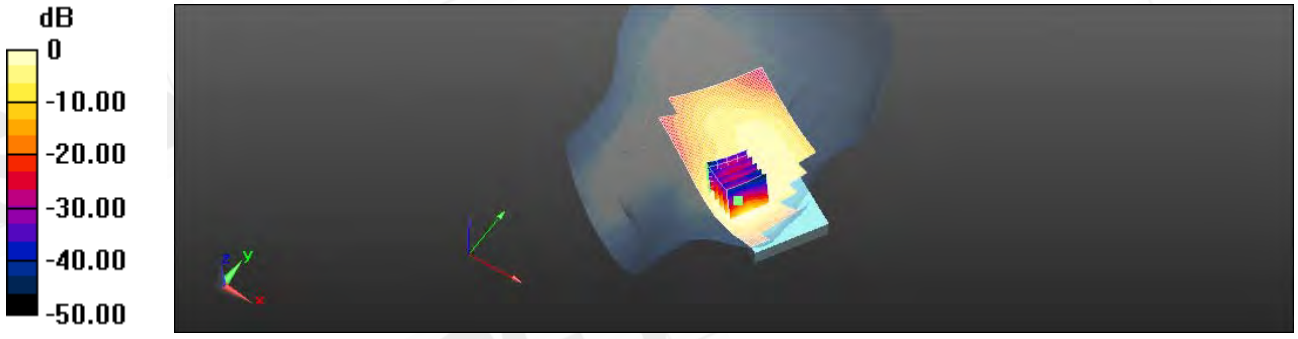
Communication System: Generic GSM; Frequency: 1850.2 MHz
Medium parameters used: f = 1850.2 MHz; σ = 1.373 mho/m; ε_r = 40.358; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.977 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.266 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.113 mW/g

SAR(1 g) = 0.72 mW/g; SAR(10 g) = 0.426 mW/g
Maximum value of SAR (measured) = 0.940 mW/g



0 dB = 0.977 mW/g = -0.20 dB mW/g

LE Cheek_CH661

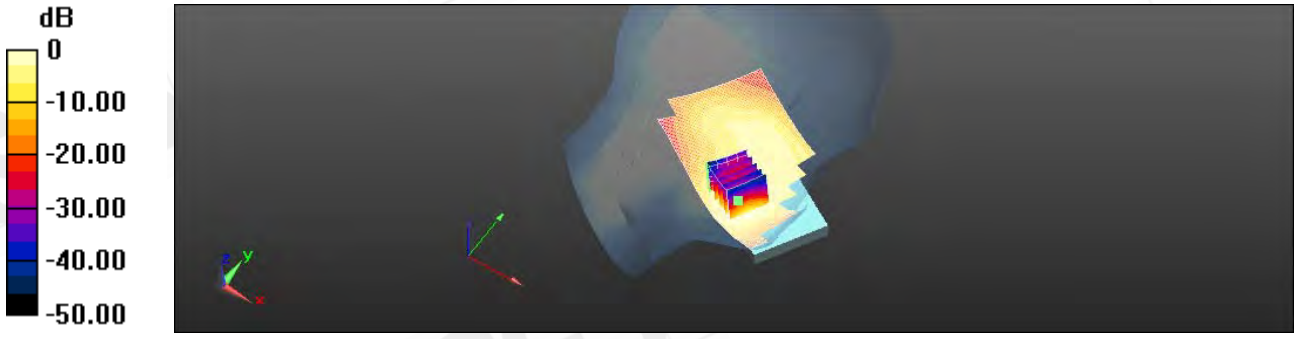
Communication System: Generic GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.401 mho/m; ε_r = 40.254; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.881 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.908 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.033 mW/g

SAR(1 g) = 0.67 mW/g; SAR(10 g) = 0.412 mW/g
Maximum value of SAR (measured) = 0.868 mW/g



0 dB = 0.881 mW/g = -1.10 dB mW/g

LE Cheek_CH810

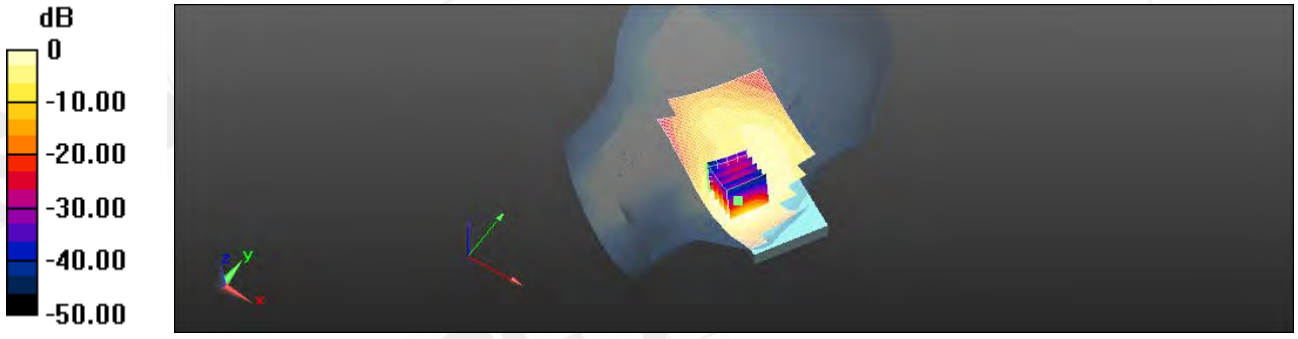
Communication System: Generic GSM; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.431 mho/m; ε_r = 40.151; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.01 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.056 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.186 mW/g

SAR(1 g) = 0.75 mW/g; SAR(10 g) = 0.442 mW/g
Maximum value of SAR (measured) = 0.991 mW/g



0 dB = 1.01 mW/g = 0.08 dB mW/g

LE Cheek_CH810_repeated with external Memory card inside

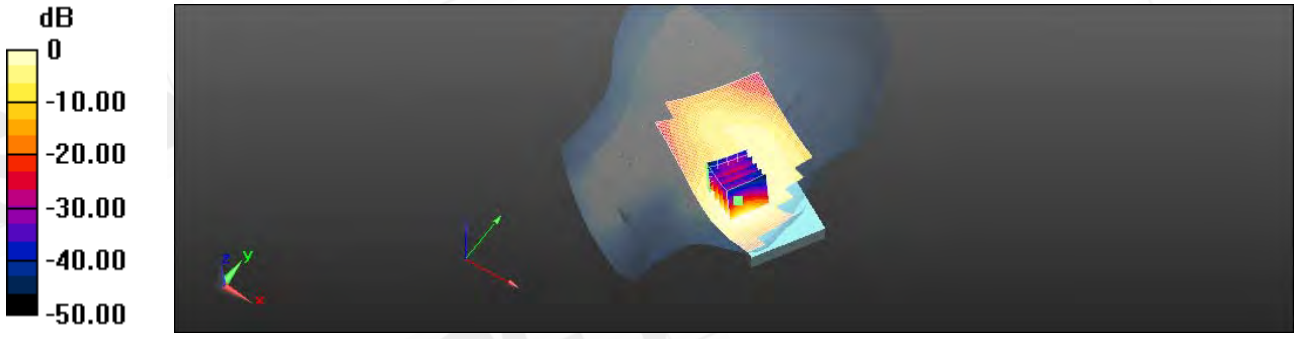
Communication System: Generic GSM; Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.431 mho/m; ε_r = 40.151; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.04 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.617 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.332 mW/g

SAR(1 g) = 0.84 mW/g; SAR(10 g) = 0.497 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.04 mW/g = 0.32 dB mW/g

LE Tilt_CH661

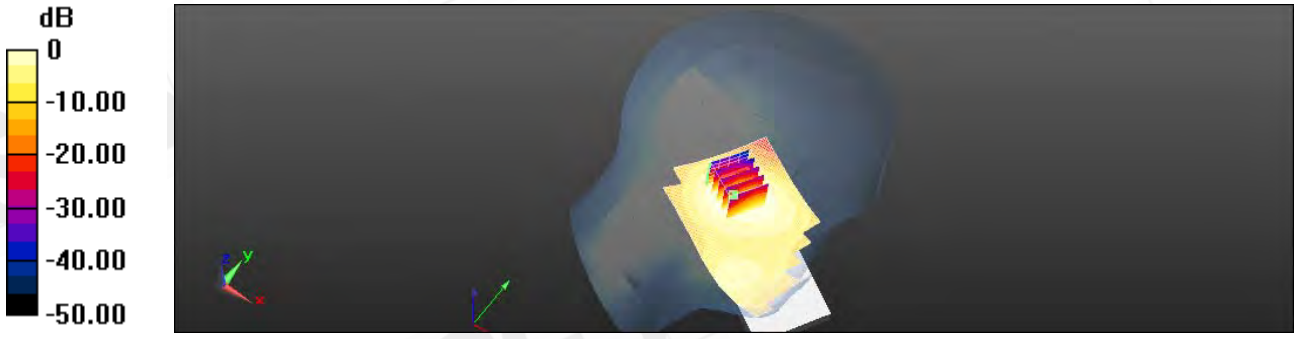
Communication System: Generic GSM; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.401 mho/m; ε_r = 40.254; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Tilt/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.315 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.195 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.351 mW/g

SAR(1 g) = 0.22 mW/g; SAR(10 g) = 0.143 mW/g
Maximum value of SAR (measured) = 0.293 mW/g



0 dB = 0.315 mW/g = -10.04 dB mW/g

Date: 6/2/2012

Body_Speech mode _Front Side_CH661_repeated with headset

Communication System: GSM; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.496 mho/m; ε_r = 50.789; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

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

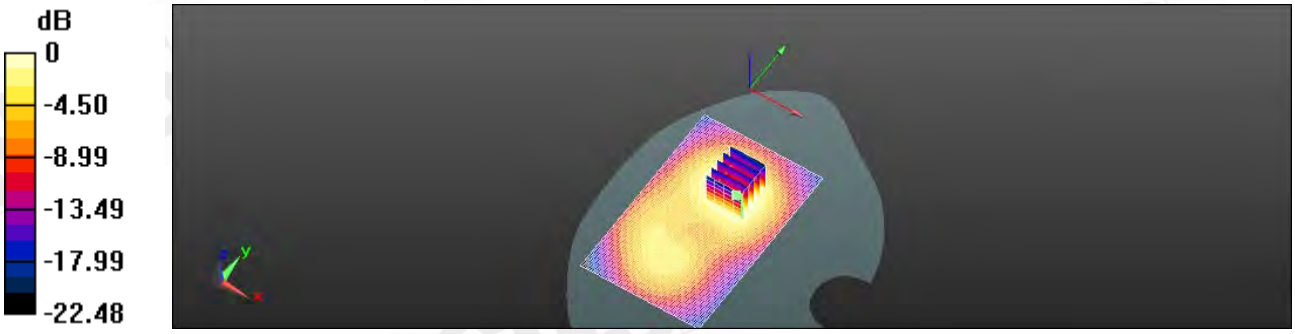
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.328 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.480 mW/g

SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.172 mW/g

Maximum value of SAR (measured) = 0.386 mW/g



0 dB = 0.353 mW/g = -9.04 dB mW/g

Date: 6/2/2012

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 = 1.451 mho/m; ε_r = 51.176; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.349 mW/g

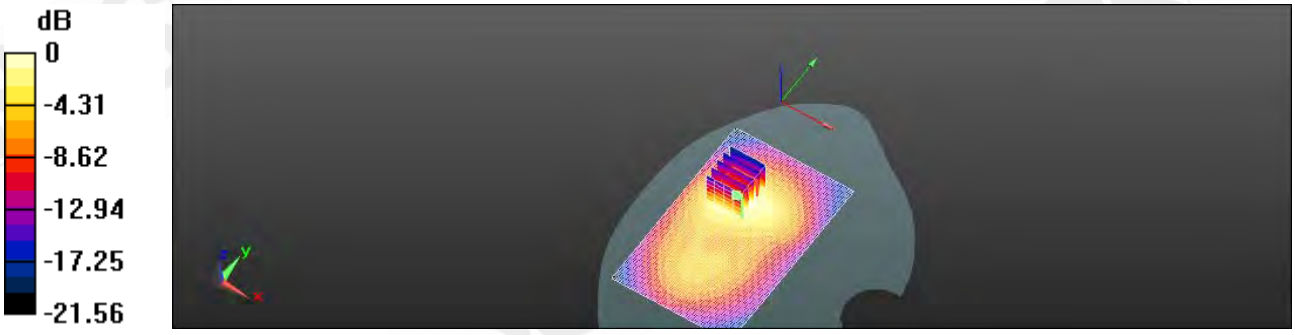
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.380 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.450 mW/g

SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.161 mW/g

Maximum value of SAR (measured) = 0.377 mW/g



0 dB = 0.349 mW/g = -9.15 dB mW/g

Date: 6/2/2012

Body_Speech mode _Back Side_CH661_repeated with headset

Communication System: GSM; Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; σ = 1.496 mho/m; ε_r = 50.789; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.422 mW/g

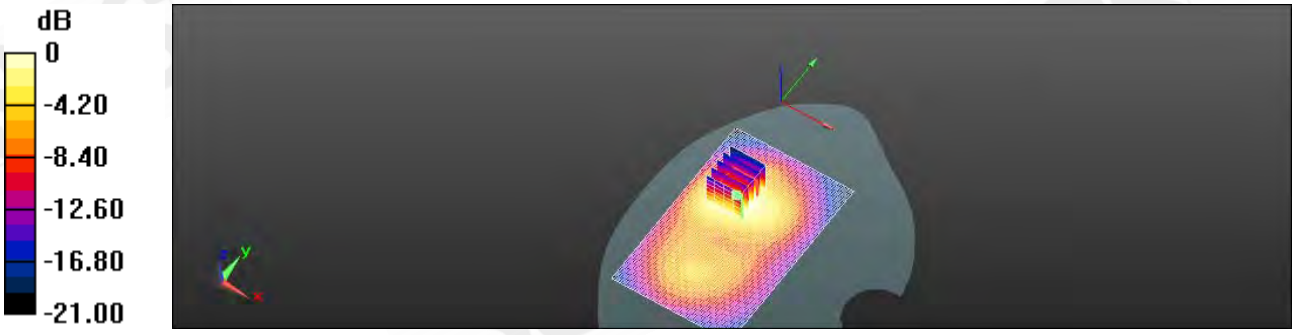
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.409 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.521 mW/g

SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.198 mW/g

Maximum value of SAR (measured) = 0.428 mW/g



0 dB = 0.422 mW/g = -7.49 dB mW/g

Date: 6/2/2012

Body_Speech mode _Back Side_CH810_repeated with headset

Communication System: GSM; Frequency: 1909.8 MHz

Medium parameters used: f = 1910 MHz; σ = 1.561 mho/m; ε_r = 51.217; 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

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

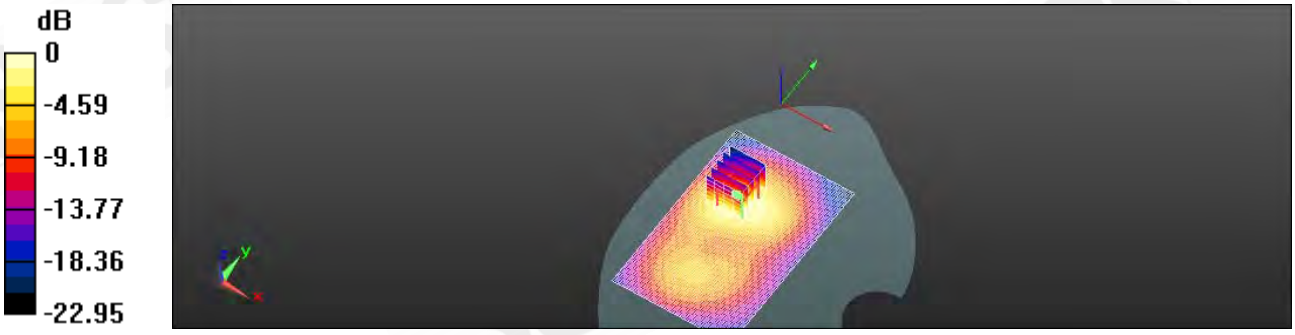
Configuration/Body/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.160 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.567 mW/g

SAR(1 g) = 0.381 mW/g; SAR(10 g) = 0.228 mW/g

Maximum value of SAR (measured) = 0.461 mW/g



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

Hotspot mode_Front Side_CH661

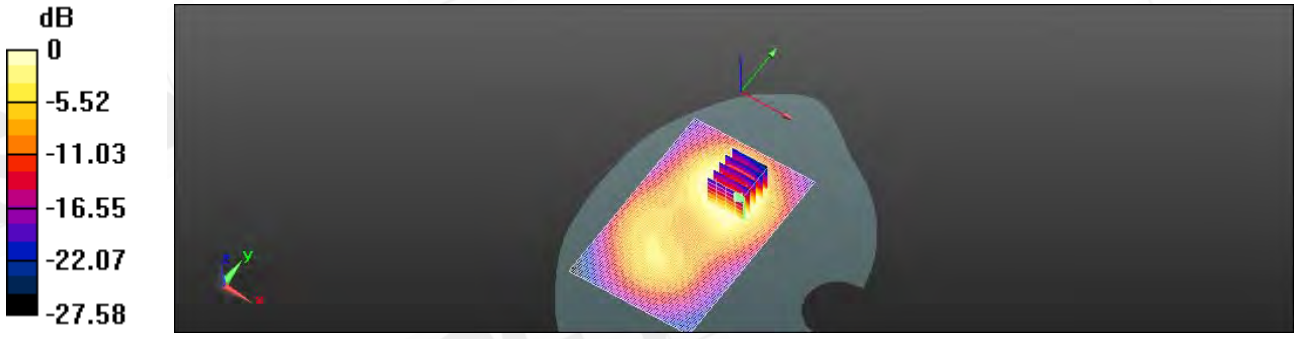
Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.505 mho/m; ε_r = 52.036; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.10 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.773 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.215 mW/g

SAR(1 g) = 0.76 mW/g; SAR(10 g) = 0.467 mW/g
Maximum value of SAR (measured) = 1.02 mW/g



0 dB = 1.10 mW/g = 0.86 dB mW/g

Hotspot mode_Back Side_CH512

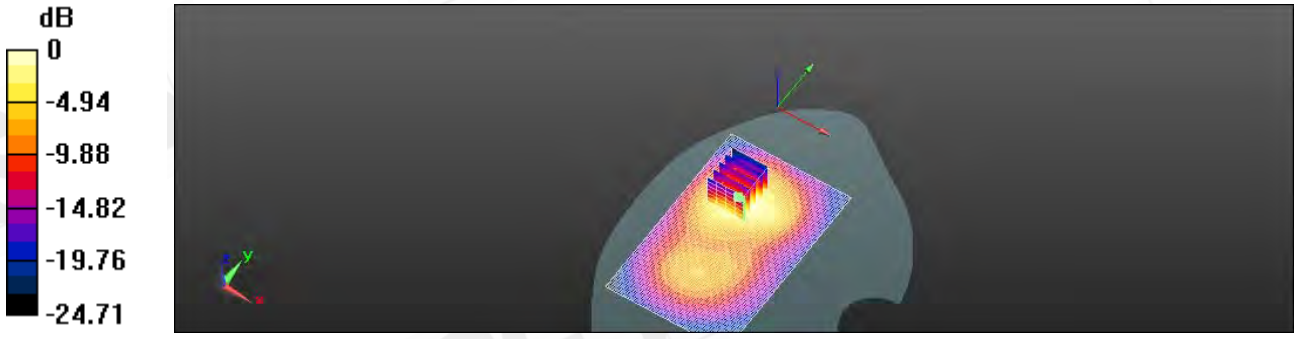
Communication System: GPRS(Class 12); Frequency: 1850.2 MHz
Medium parameters used: f = 1850.2 MHz; σ = 1.5 mho/m; ε_r = 52.33; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.48 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.623 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.737 mW/g

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.666 mW/g
Maximum value of SAR (measured) = 1.42 mW/g



0 dB = 1.48 mW/g = 3.39 dB mW/g

Hotspot mode_Back Side_CH661

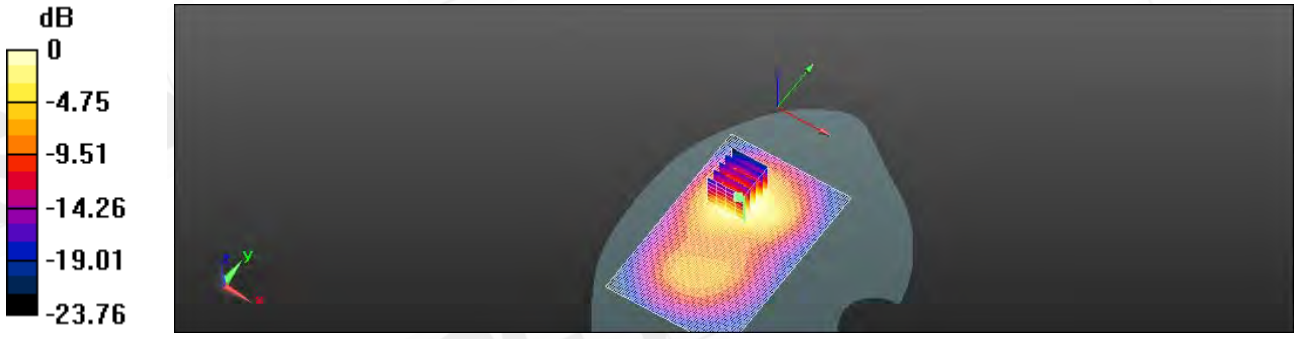
Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.505 mho/m; ε_r = 52.036; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): 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 = 8.249 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.601 mW/g

SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.624 mW/g
Maximum value of SAR (measured) = 1.32 mW/g



0 dB = 1.42 mW/g = 3.07 dB mW/g

Hotspot mode_Back Side_CH810

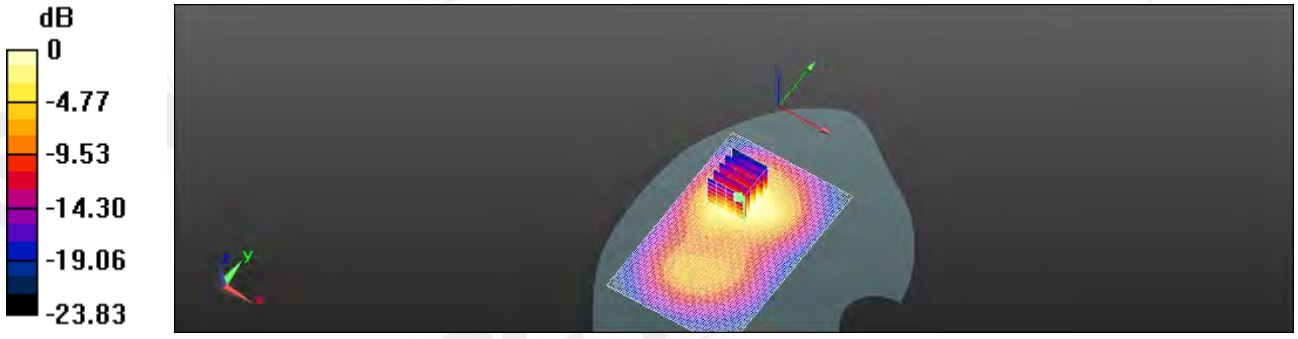
Communication System: GPRS(Class 12); Frequency: 1909.8 MHz
Medium parameters used: f = 1910 MHz; σ = 1.535 mho/m; ε_r = 51.55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.55 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.342 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.762 mW/g

SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.673 mW/g
Maximum value of SAR (measured) = 1.44 mW/g



0 dB = 1.55 mW/g = 3.81 dB mW/g

Hotspot mode_Bottom Side_CH661

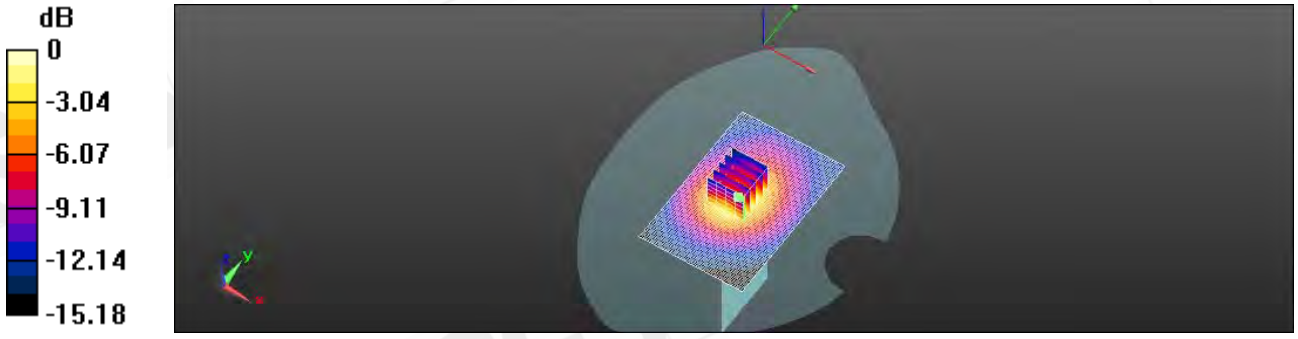
Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.505 mho/m; ε_r = 52.036; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.500 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.153 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.621 mW/g

SAR(1 g) = 0.39 mW/g; SAR(10 g) = 0.227 mW/g
Maximum value of SAR (measured) = 0.527 mW/g



0 dB = 0.500 mW/g = -6.03 dB mW/g

Hotspot mode_Right Side_CH661

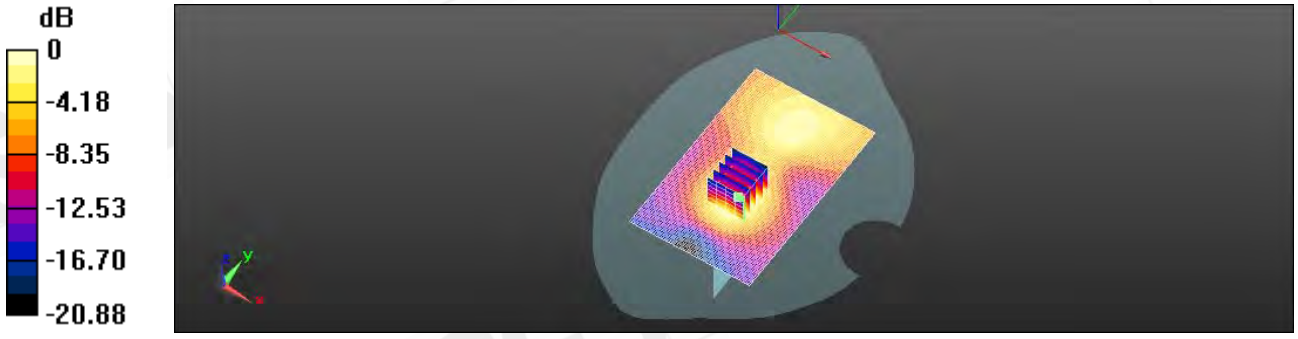
Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.505 mho/m; ε_r = 52.036; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.180 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.552 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.223 mW/g

SAR(1 g) = 0.14 mW/g; SAR(10 g) = 0.084 mW/g
Maximum value of SAR (measured) = 0.185 mW/g



0 dB = 0.180 mW/g = -14.92 dB mW/g

Hotspot mode_Left Side_CH661

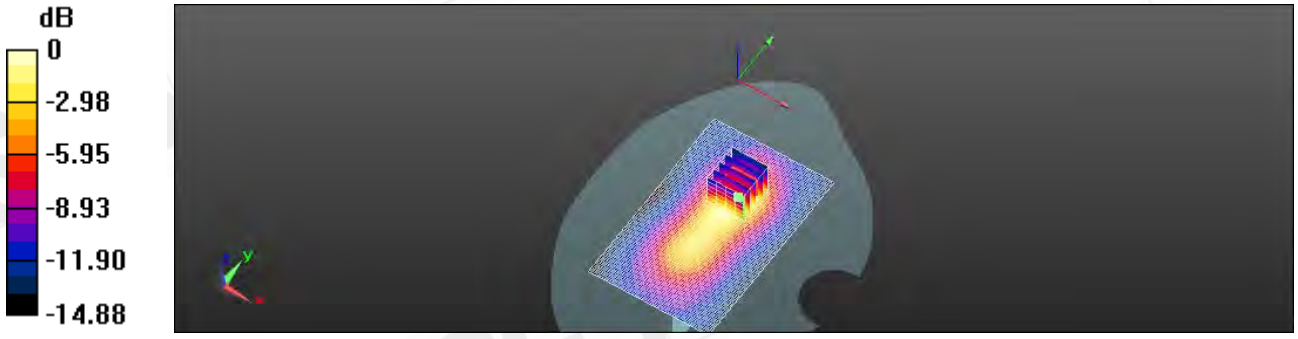
Communication System: GPRS(Class 12); Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.505 mho/m; ε_r = 52.036; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.384 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.108 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.435 mW/g

SAR(1 g) = 0.27 mW/g; SAR(10 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.359 mW/g



0 dB = 0.384 mW/g = -8.32 dB mW/g

RE Cheek_WLAN802.11b_CH1

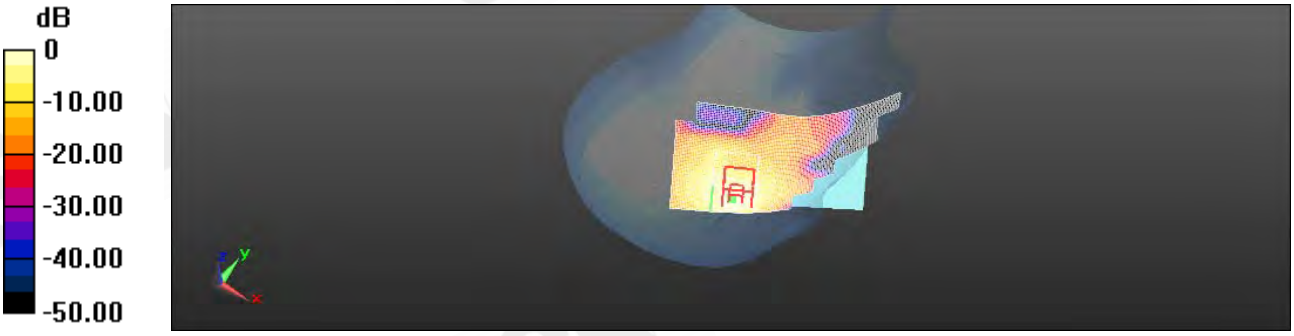
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz
Medium parameters used: f = 2412 MHz; σ = 1.762 mho/m; ε_r = 38.833; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.472 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.429 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.747 mW/g

SAR(1 g) = 0.29 mW/g; SAR(10 g) = 0.125 mW/g
Maximum value of SAR (measured) = 0.515 mW/g



0 dB = 0.472 mW/g = -6.52 dB mW/g

Date: 5/10/2012

RE Cheek_WLAN802.11b_CH6

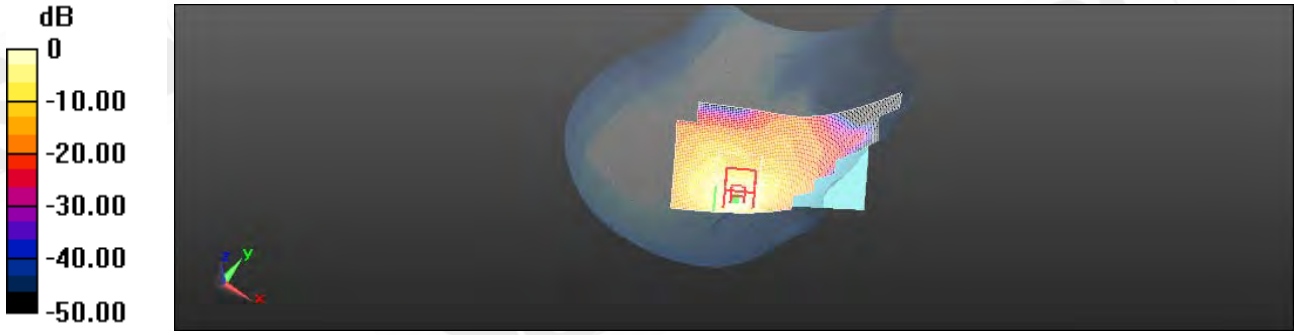
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.787 mho/m; ε_r = 38.618; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.528 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.499 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.851 mW/g

SAR(1 g) = 0.35 mW/g; SAR(10 g) = 0.150 mW/g
Maximum value of SAR (measured) = 0.590 mW/g



0 dB = 0.528 mW/g = -5.55 dB mW/g

RE Cheek_WLAN802.11b_CH11

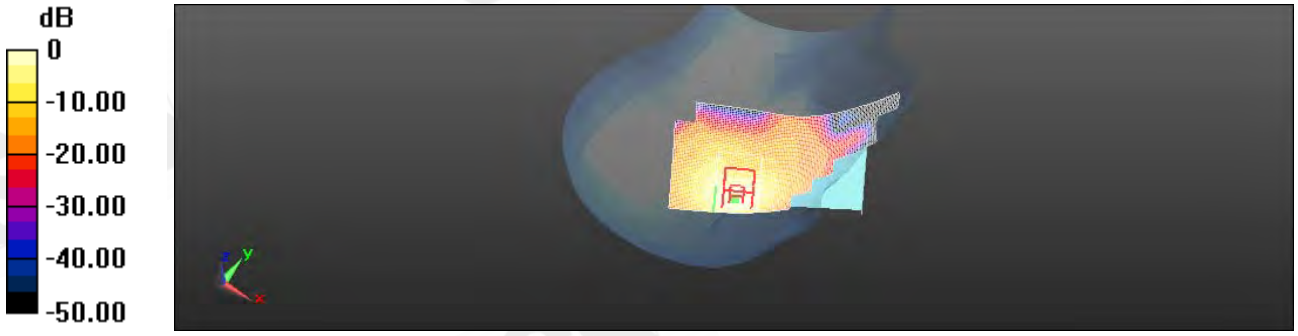
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz
Medium parameters used: f = 2462 MHz; σ = 1.82 mho/m; ε_r = 38.45; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.556 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.280 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.912 mW/g

SAR(1 g) = 0.36 mW/g; SAR(10 g) = 0.153 mW/g
Maximum value of SAR (measured) = 0.628 mW/g



0 dB = 0.556 mW/g = -5.10 dB mW/g

Date: 5/10/2012

RE Cheek_WLAN802.11b_CH11_repeated with external Memory card inside

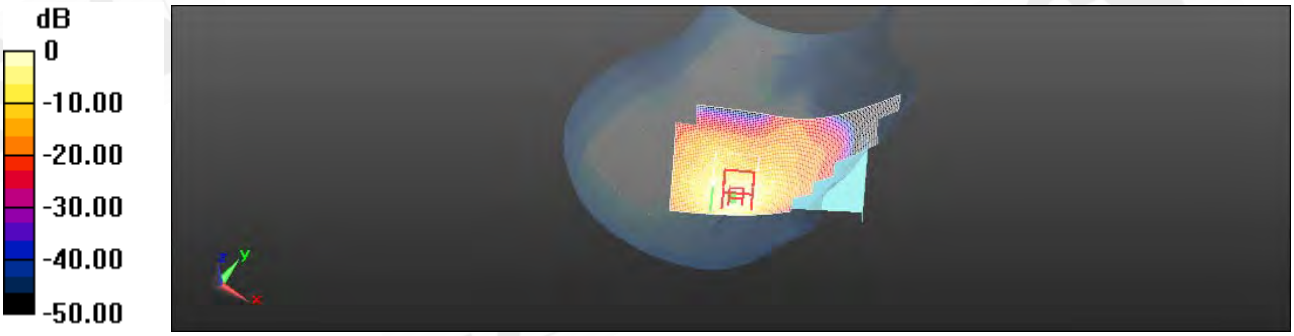
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz
Medium parameters used: f = 2462 MHz; σ = 1.82 mho/m; ε_r = 38.45; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.574 mW/g

Configuration/RE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.376 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.845 mW/g

SAR(1 g) = 0.33 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 0.551 mW/g



0 dB = 0.574 mW/g = -4.83 dB mW/g

RE Tilt_WLAN802.11b_CH6

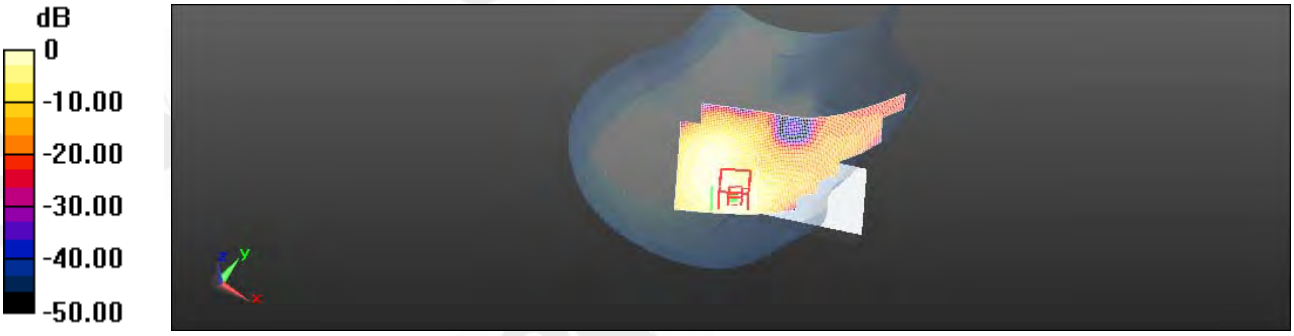
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.787 mho/m; ε_r = 38.618; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/RE Tilt/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.170 mW/g

Configuration/RE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.361 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.226 mW/g

SAR(1 g) = 0.11 mW/g; SAR(10 g) = 0.055 mW/g
Maximum value of SAR (measured) = 0.171 mW/g



0 dB = 0.170 mW/g = -15.41 dB mW/g

LE Cheek_WLAN802.11b_CH6

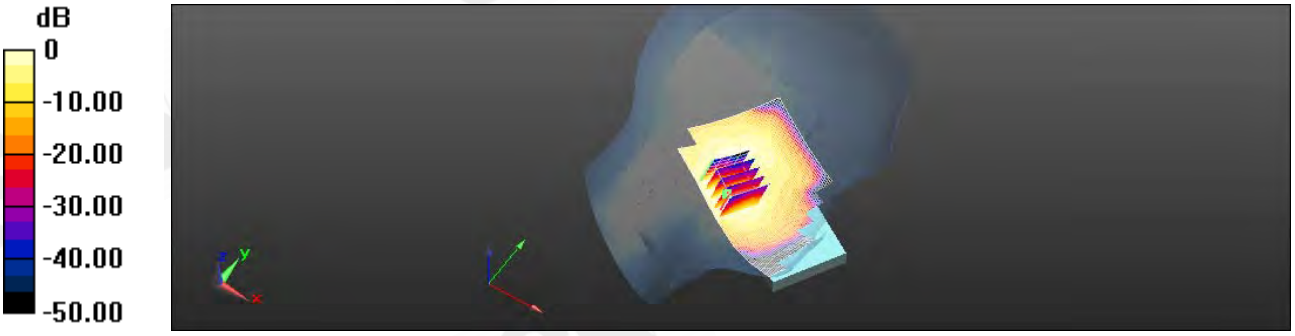
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.787 mho/m; ε_r = 38.618; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Cheek/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.228 mW/g

Configuration/LE Cheek/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.428 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.338 mW/g

SAR(1 g) = 0.15 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.226 mW/g



0 dB = 0.228 mW/g = -12.83 dB mW/g

LE Tilt_WLAN802.11b_CH6

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.787 mho/m; ε_r = 38.618; 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 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/LE Tilt/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.174 mW/g

Configuration/LE Tilt/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.187 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.235 mW/g

SAR(1 g) = 0.12 mW/g; SAR(10 g) = 0.062 mW/g
Maximum value of SAR (measured) = 0.174 mW/g

0 dB = 0.174 mW/g = -15.17 dB mW/g

Hotspot mode_Front Side_WLAN802.11b_CH6

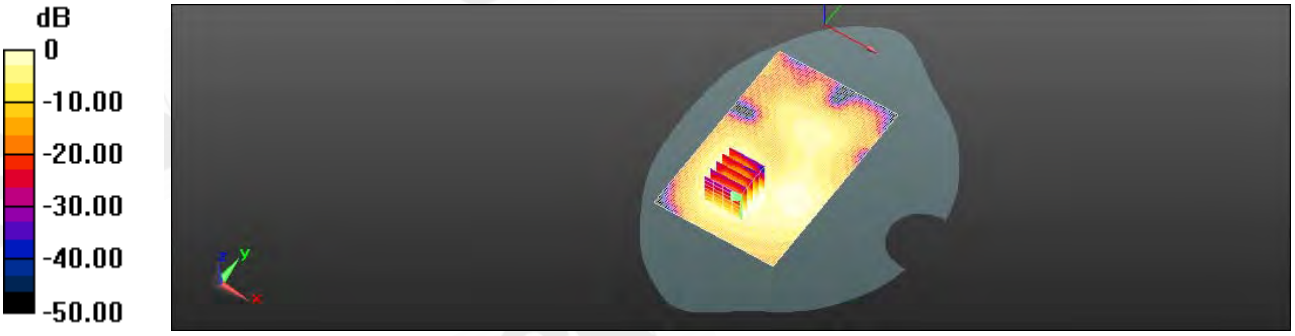
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.958 mho/m; ε_r = 50.557; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0887 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.103 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.111 mW/g

SAR(1 g) = 0.06 mW/g; SAR(10 g) = 0.034 mW/g
Maximum value of SAR (measured) = 0.0862 mW/g



0 dB = 0.0887 mW/g = -21.05 dB mW/g

Hotspot mode_Back Side_WLAN802.11b_CH1

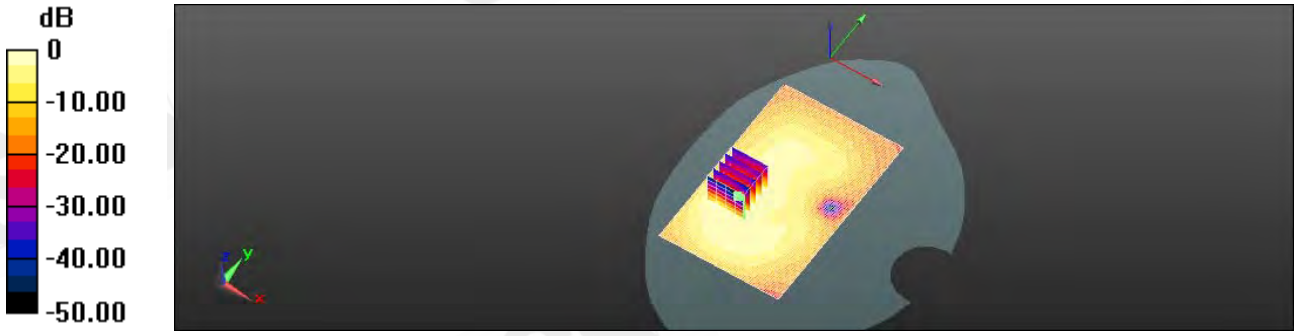
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz
Medium parameters used: f = 2412 MHz; σ = 1.922 mho/m; ε_r = 50.585; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.151 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.554 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.237 mW/g

SAR(1 g) = 0.11 mW/g; SAR(10 g) = 0.054 mW/g
Maximum value of SAR (measured) = 0.158 mW/g



0 dB = 0.151 mW/g = -16.45 dB mW/g

Hotspot mode_Back Side_WLAN802.11b_CH6

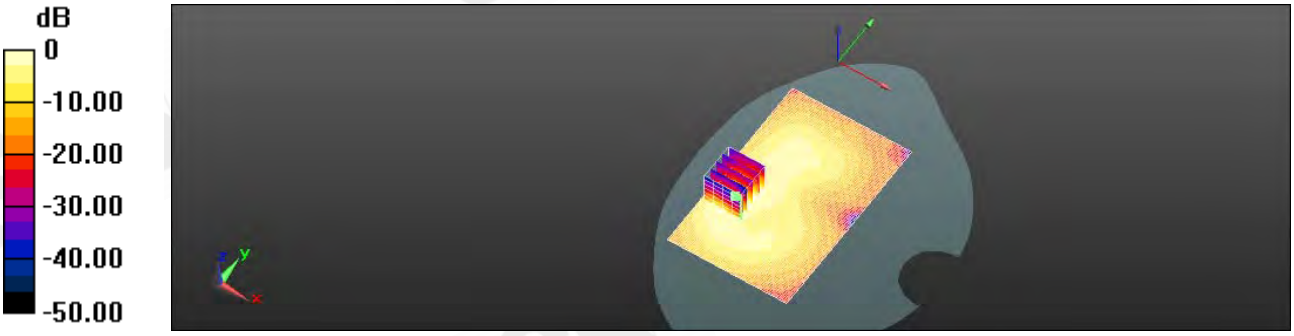
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.958 mho/m; ε_r = 50.557; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.197 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.127 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.287 mW/g

SAR(1 g) = 0.13 mW/g; SAR(10 g) = 0.065 mW/g
Maximum value of SAR (measured) = 0.198 mW/g



0 dB = 0.197 mW/g = -14.12 dB mW/g

Hotspot mode_Back Side_WLAN802.11b_CH11

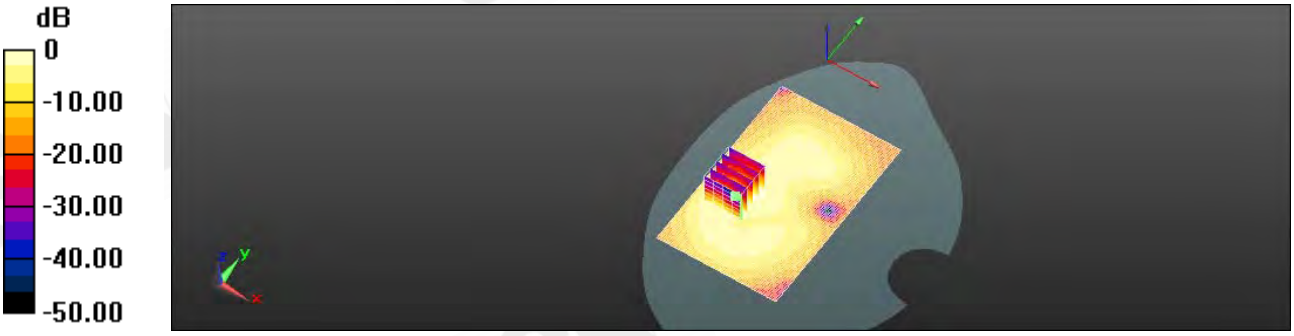
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz
Medium parameters used: f = 2462 MHz; σ = 1.988 mho/m; ε_r = 50.504; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.137 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.232 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.197 mW/g

SAR(1 g) = 0.09 mW/g; SAR(10 g) = 0.047 mW/g
Maximum value of SAR (measured) = 0.138 mW/g



0 dB = 0.137 mW/g = -17.27 dB mW/g

Hotspot mode_Back Side_WLAN802.11b_CH6_repeated with external Memory card inside

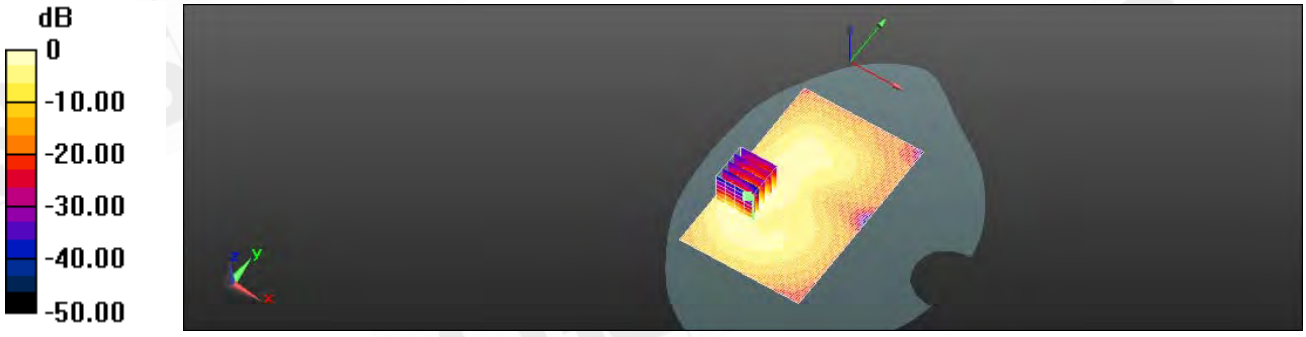
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.958 mho/m; ε_r = 50.557; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.180 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.437 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.297 mW/g

SAR(1 g) = 0.13 mW/g; SAR(10 g) = 0.065 mW/g
Maximum value of SAR (measured) = 0.201 mW/g



0 dB = 0.180 mW/g = -14.89 dB mW/g

Hotspot mode_Back Side_WLAN802.11b_CH6_repeated with headset

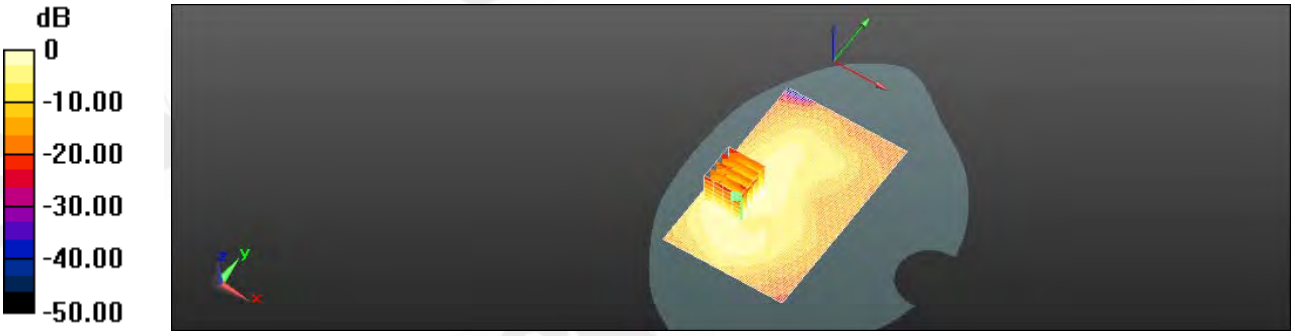
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.958 mho/m; ε_r = 50.557; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.145 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.126 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.240 mW/g

SAR(1 g) = 0.10 mW/g; SAR(10 g) = 0.050 mW/g
Maximum value of SAR (measured) = 0.161 mW/g



0 dB = 0.145 mW/g = -16.75 dB mW/g

Hotspot mode_Top Side_WLAN802.11b_CH6

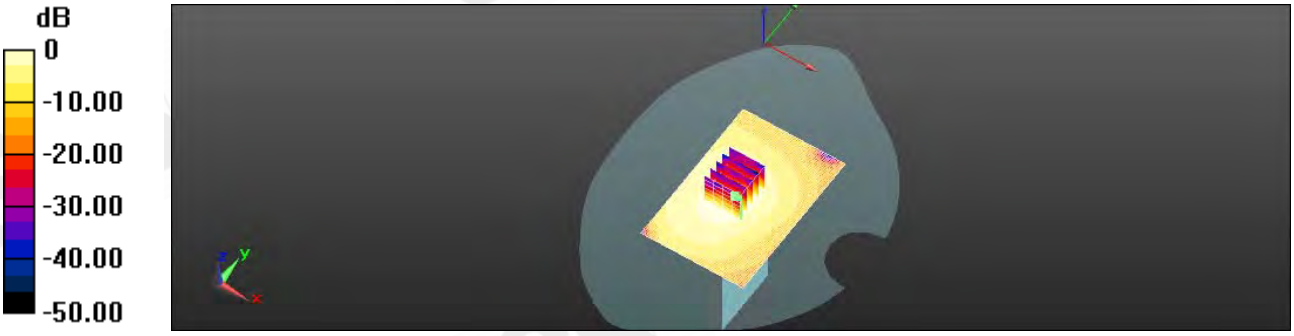
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.958 mho/m; ε_r = 50.557; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0641 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.482 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.089 mW/g

SAR(1 g) = 0.04 mW/g; SAR(10 g) = 0.025 mW/g
Maximum value of SAR (measured) = 0.0667 mW/g



0 dB = 0.0641 mW/g = -23.87 dB mW/g

Hotspot mode_Left Side_WLAN802.11b_CH6

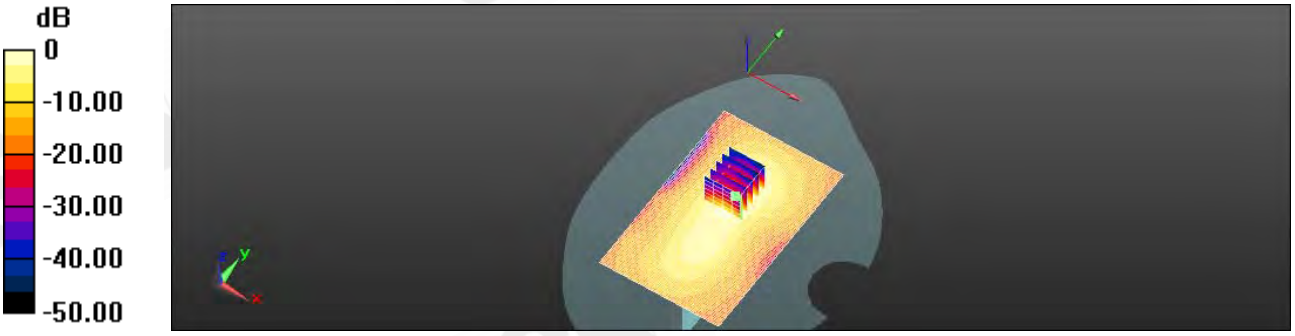
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.958 mho/m; ε_r = 50.557; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Configuration/Body/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.187 mW/g

Configuration/Body/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.793 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.283 mW/g

SAR(1 g) = 0.13 mW/g; SAR(10 g) = 0.064 mW/g
Maximum value of SAR (measured) = 0.207 mW/g



0 dB = 0.187 mW/g = -14.57 dB mW/g

5. SAR System Performance Verification

Date: 4/09/2012

DUT: Dipole 835 MHz; (Head)

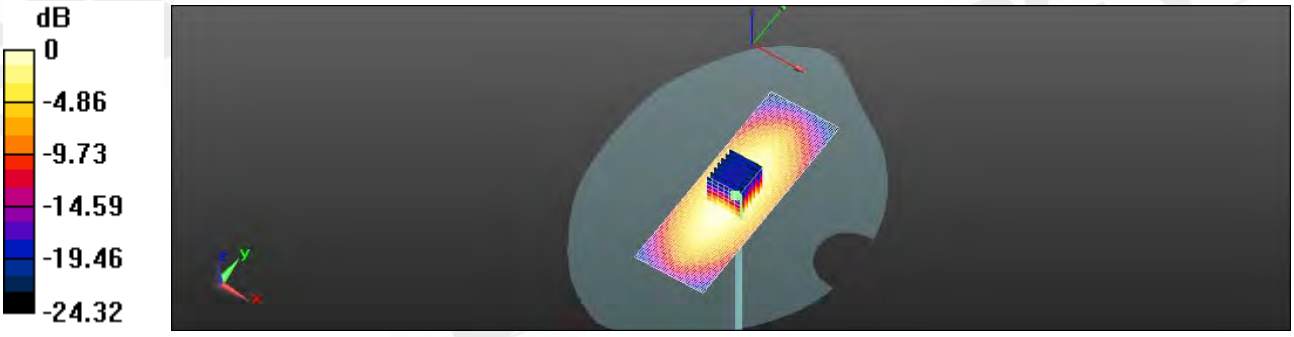
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.885 mho/m; ε_r = 41.345; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.25, 9.25, 9.25); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); 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) = 2.91 mW/g

Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.494 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.537 mW/g

SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.43 mW/g
Maximum value of SAR (measured) = 2.92 mW/g



0 dB = 2.91 mW/g = 9.27 dB mW/g

Date: 4/09/2012

DUT: Dipole 835 MHz; (Body)

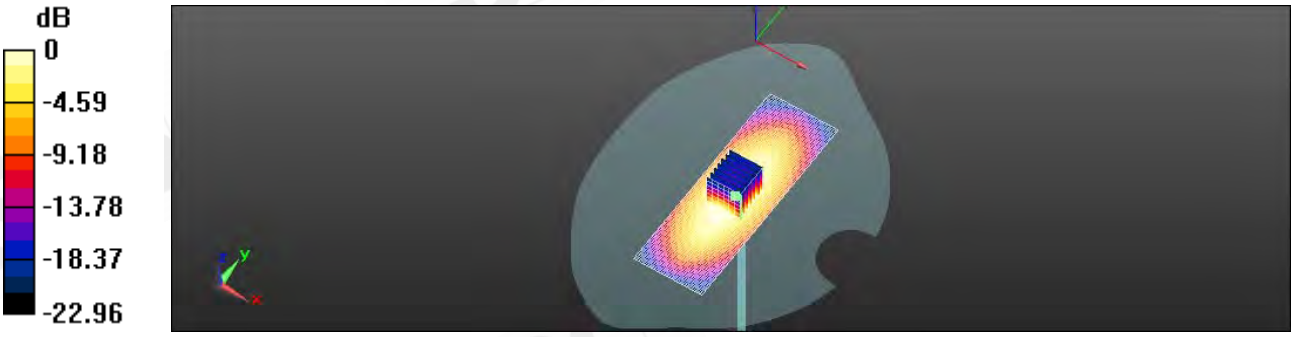
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.013 mho/m; ε_r = 52.571; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); 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) = 3.18 mW/g

Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.211 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 3.743 mW/g

SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.66 mW/g
Maximum value of SAR (measured) = 3.20 mW/g



0 dB = 3.18 mW/g = 10.05 dB mW/g

Date: 4/09/2012

DUT: Dipole 1900 MHz; (Head)

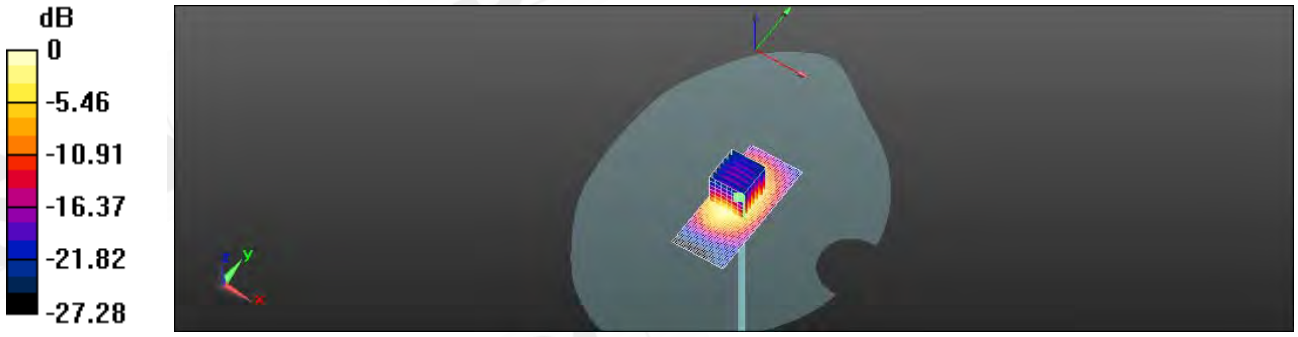
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.421 mho/m; ε_r = 40.19; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); 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) = 14.6 mW/g

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.689 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 18.052 mW/g

SAR(1 g) = 9.83 mW/g; SAR(10 g) = 5.22 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 14.6 mW/g = 23.29 dB mW/g

Date: 4/09/2012

DUT: Dipole 1900 MHz; (Body)

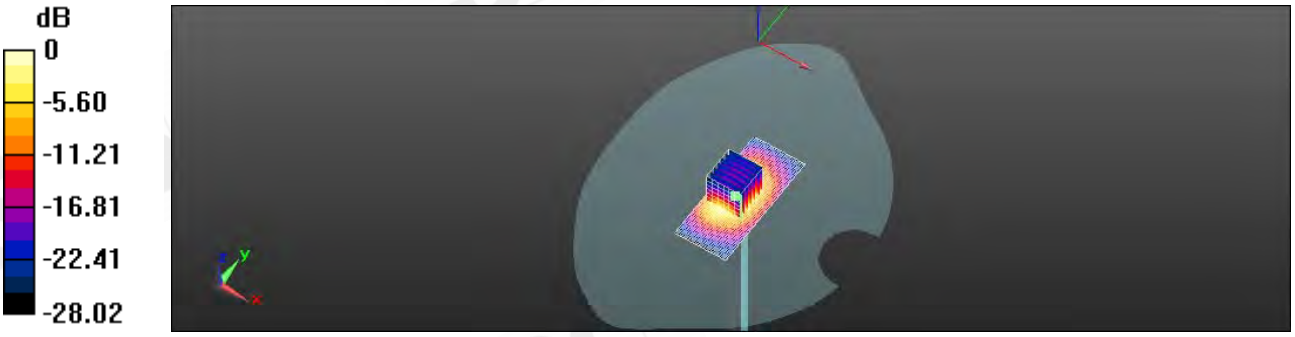
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 51.672; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 4/19/2011;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- Phantom: SAM2; Type: SAM
- Measurement SW: DASY52, Version 52.8 (0); 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) = 15.0 mW/g

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.021 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 18.067 mW/g

SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.29 mW/g
Maximum value of SAR (measured) = 14.2 mW/g



0 dB = 15.0 mW/g = 23.53 dB mW/g

DUT: Dipole 2450 MHz; (Head)

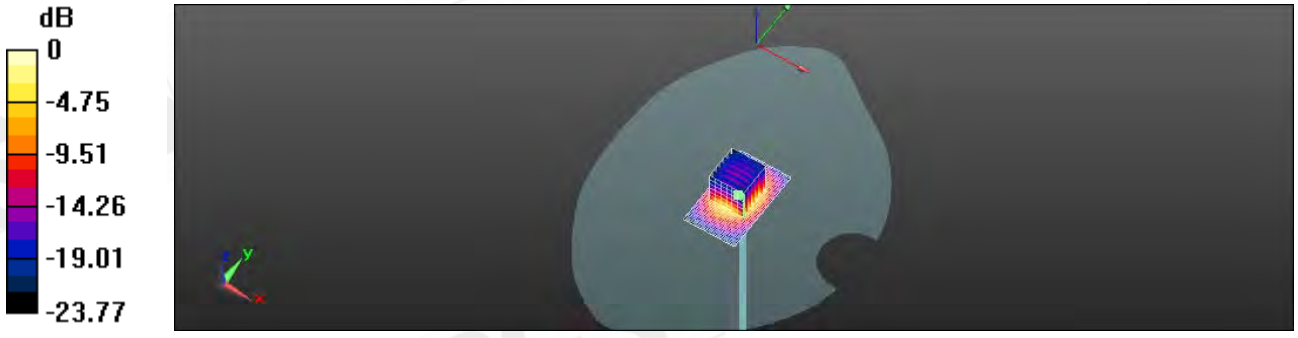
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.803 mho/m; ε_r = 38.509; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.17, 7.17, 7.17); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- 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) = 21.6 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 = -0.10 dB
Peak SAR (extrapolated) = 28.141 mW/g

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.16 mW/g
Maximum value of SAR (measured) = 20.5 mW/g



0 dB = 21.6 mW/g = 26.68 dB mW/g

Date: 5/10/2012

DUT: Dipole 2450 MHz; (Body)

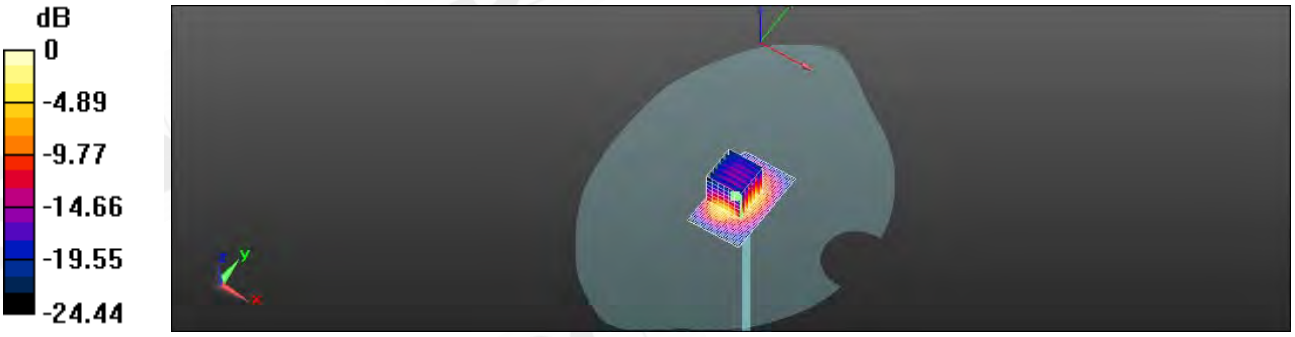
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.974 mho/m; ε_r = 50.534; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/27/2012;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/18/2011
- 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 = 99.242 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 25.726 mW/g

SAR(1 g) = 12.2 mW/g; SAR(10 g) = 5.59 mW/g
Maximum value of SAR (measured) = 18.4 mW/g



0 dB = 19.9 mW/g = 25.96 dB mW/g

Date: 6/2/2012

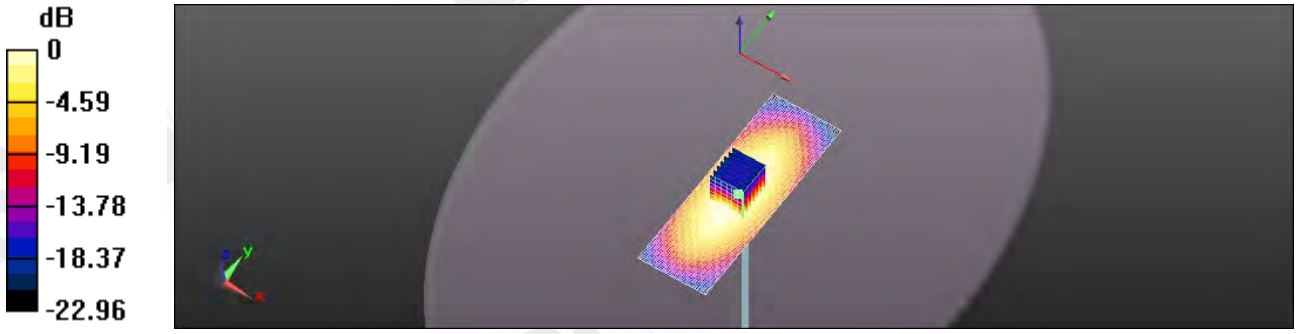
DUT: Dipole 835 MHz; (Body)

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.03 mho/m; ε_r = 53.732; 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) = 3.22 mW/g

Configuration/d=15mm, Pin=250mW, dist=2mm: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.257 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 3.764 mW/g
SAR(1 g) = 2.54 mW/g; SAR(10 g) = 1.69 mW/g
Maximum value of SAR (measured) = 3.23 mW/g



0 dB = 3.22 mW/g = 10.15 dB mW/g

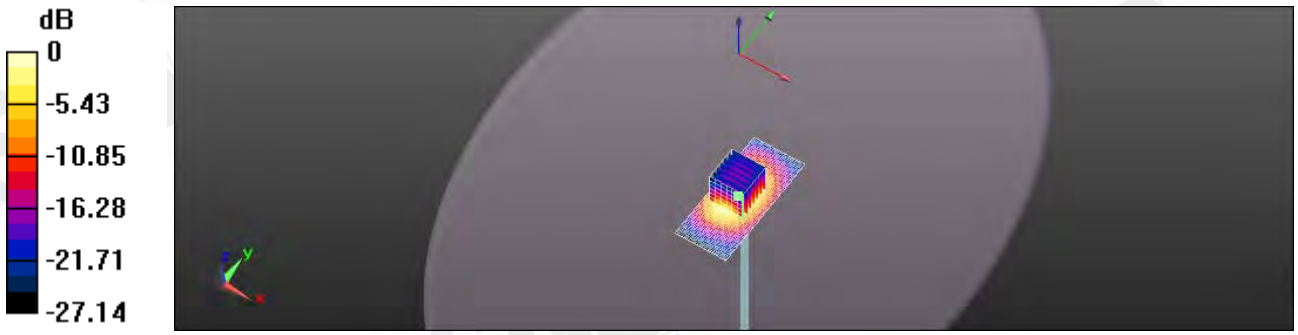
Date: 6/2/2012

DUT: Dipole 1900 MHz; (Body)

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.542 mho/m; ε_r = 51.041; 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: ELI v5.0; Type: QDOVA002AA
- 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) = 15.7 mW/g
Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.1 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 18.642 mW/g
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.51 mW/g
Maximum value of SAR (measured) = 14.8 mW/g



0 dB = 15.7 mW/g = 23.89 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

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Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)** Certificate No: **DAE4-856_May11**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 856
Calibration procedure(s)	QA CAL-06.v23 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	May 18, 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	07-Jun-10 (in house check)	In house check: Jun-11

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

Issued: May 18, 2011

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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	404.687 ± 0.1% (k=2)	405.496 ± 0.1% (k=2)	405.496 ± 0.1% (k=2)
Low Range	3.97389 ± 0.7% (k=2)	3.99086 ± 0.7% (k=2)	3.98361 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	52.0 ° ± 1 °

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Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199998.6	-2.15	-0.00
Channel X	+ Input	20001.54	1.64	0.01
Channel X	- Input	-19996.67	3.63	-0.02
Channel Y	+ Input	199998.3	-0.97	-0.00
Channel Y	+ Input	19995.75	-3.85	-0.02
Channel Y	- Input	-20000.71	-0.71	0.00
Channel Z	+ Input	200006.5	-1.30	-0.00
Channel Z	+ Input	19995.61	-5.29	-0.03
Channel Z	- Input	-20002.31	-2.21	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1999.7	-0.46	-0.02
Channel X	+ Input	200.07	0.07	0.03
Channel X	- Input	-199.59	0.21	-0.11
Channel Y	+ Input	1999.2	-0.79	-0.04
Channel Y	+ Input	199.32	-0.58	-0.29
Channel Y	- Input	-201.54	-1.64	0.82
Channel Z	+ Input	2000.5	0.38	0.02
Channel Z	+ Input	199.31	-0.49	-0.25
Channel Z	- Input	-201.71	-1.81	0.90

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	-12.48	-13.76
	- 200	15.56	14.10
Channel Y	200	-17.96	-18.05
	- 200	17.63	17.34
Channel Z	200	-24.33	-24.68
	- 200	23.26	23.38

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	-	3.26	-0.67
Channel Y	200	2.96	-	5.04
Channel Z	200	2.43	-0.09	-

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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	16571	16600
Channel Y	15791	15793
Channel Z	16299	16113

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	0.06	-0.68	0.80	0.31
Channel Y	-0.59	-2.42	1.04	0.44
Channel Z	-0.96	-1.83	0.45	0.39

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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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	i.V.

Issued: June 24, 2011

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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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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	16812
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	-0.88	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	+6	+14
Supply (- Vcc)	-0.01	-8	-9

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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: EX3-3770_Apr11

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3770

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

Calibration date: April 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: April 19, 2011

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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* are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- *VR:* VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 19, 2011

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]	0.32	0.62	0.40	± 10.1 %
DCP (mV)[B]	106.6	98.3	102.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	120.8	±2.7 %
			Y	0.00	0.00	1.00	134.3	
			Z	0.00	0.00	1.00	133.5	

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

[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	9.58	9.58	9.58	0.80	0.70	± 12.0 %
835	41.5	0.90	9.25	9.25	9.25	0.80	0.67	± 12.0 %
900	41.5	0.97	9.06	9.06	9.06	0.76	0.71	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.80	0.61	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.71	0.62	± 12.0 %
2000	40.0	1.40	7.79	7.79	7.79	0.75	0.58	± 12.0 %
2450	39.2	1.80	6.99	6.99	6.99	0.80	0.56	± 12.0 %
2600	39.0	1.96	6.95	6.95	6.95	0.66	0.62	± 12.0 %

[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

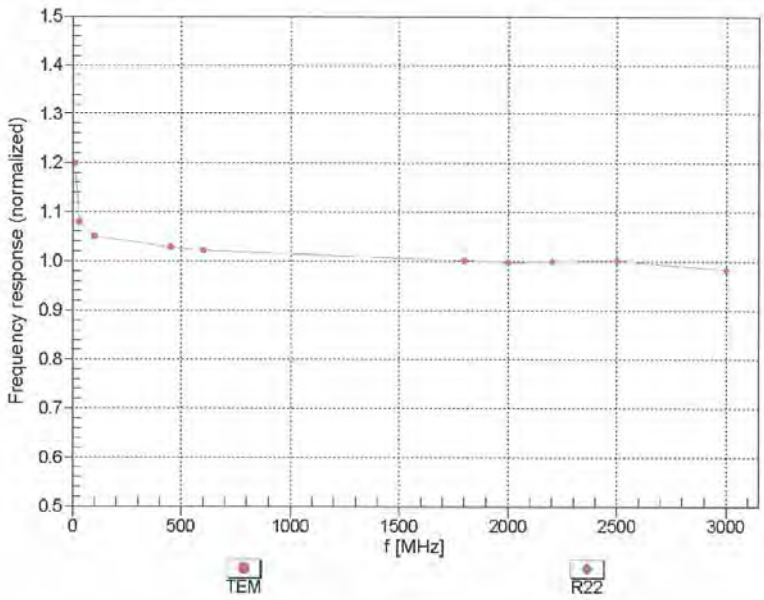
Calibration Parameter Determined in Body Tissue Simulating Media

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	9.42	9.42	9.42	0.73	0.72	± 12.0 %
835	55.2	0.97	9.30	9.30	9.30	0.72	0.72	± 12.0 %
900	55.0	1.05	9.12	9.12	9.12	0.73	0.75	± 12.0 %
1750	53.4	1.49	7.84	7.84	7.84	0.80	0.68	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.80	0.62	± 12.0 %
2000	53.3	1.52	7.44	7.44	7.44	0.80	0.66	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.78	6.78	6.78	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.42	4.42	4.42	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.12	4.12	4.12	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.54	3.54	3.54	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.80	3.80	3.80	0.60	1.90	± 13.1 %

[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 19, 2011

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



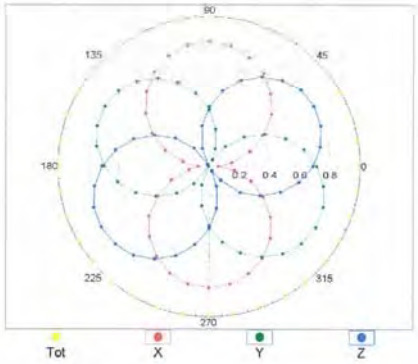
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan /台北縣五股工業區五工路 134 號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

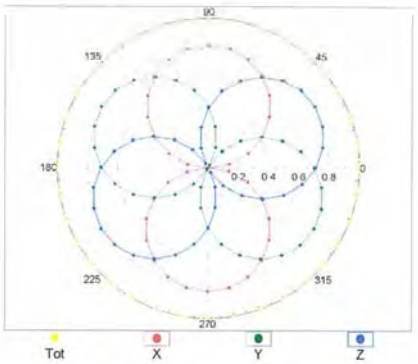
EX3DV4– SN:3770 April 19, 2011

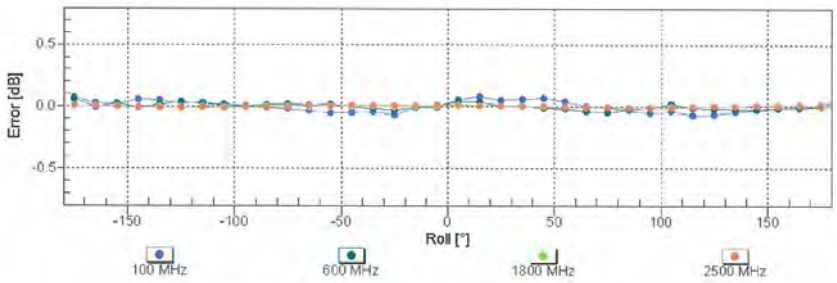
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

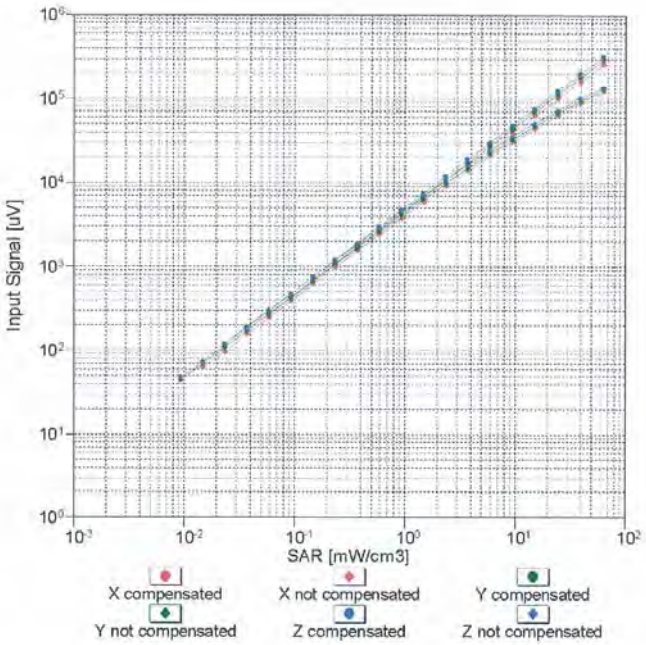


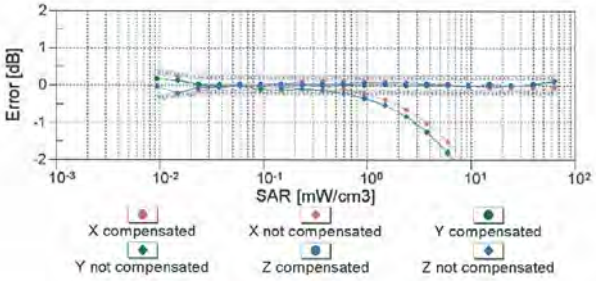


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3770 April 19, 2011

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



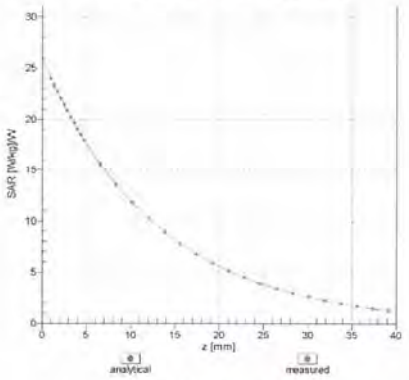


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

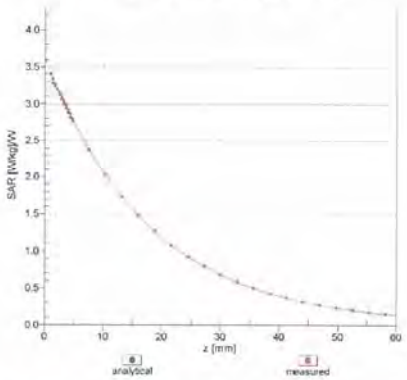
EX3DV4– SN:3770 April 19, 2011

Conversion Factor Assessment

f = 1750 MHz,WGLS R22 (H_convF)

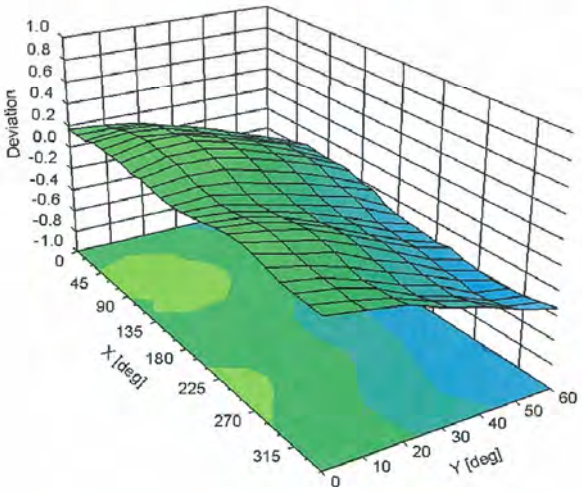


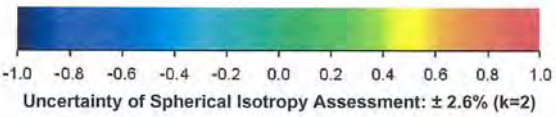
f = 900 MHz,WGLS R9 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

Certificate No: EX3-3770_Apr11 Page 10 of 11

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

Other Probe Parameters

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

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

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

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

Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: EX3-3770_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

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

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

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

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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

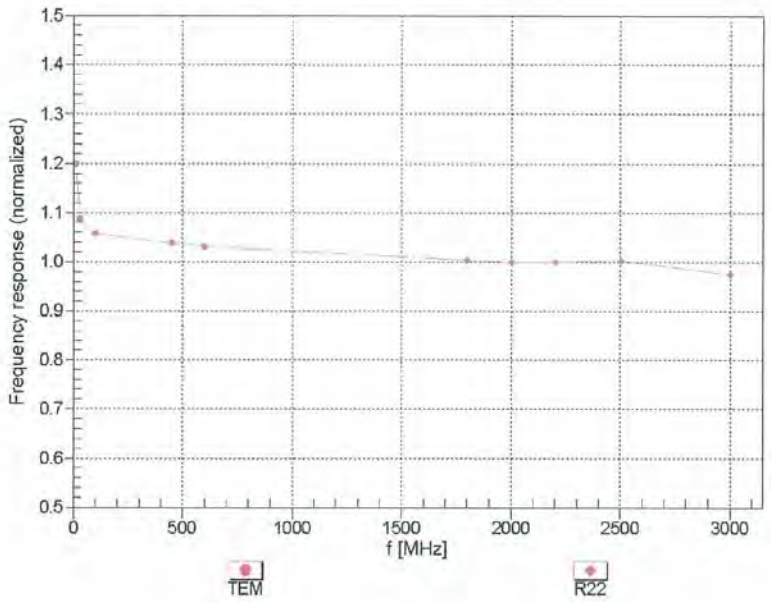
Calibration Parameter Determined in Body Tissue Simulating Media

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

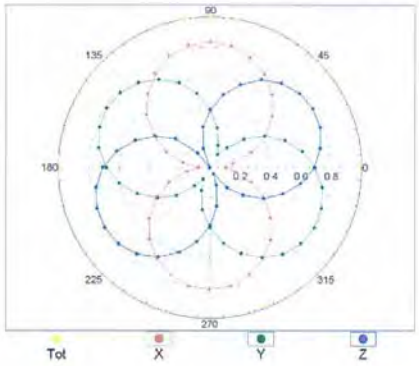
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



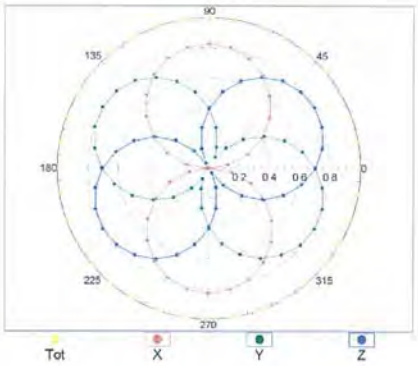
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

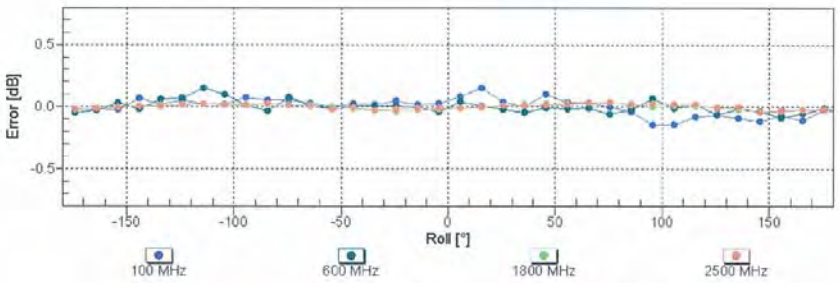
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

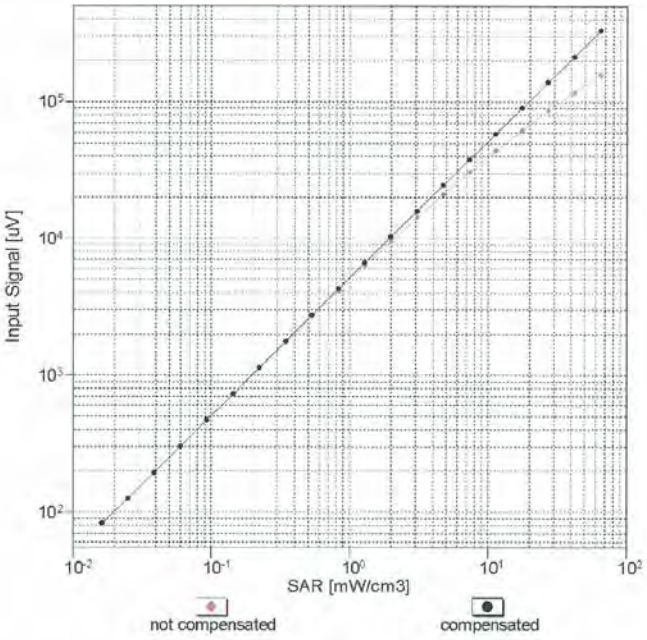


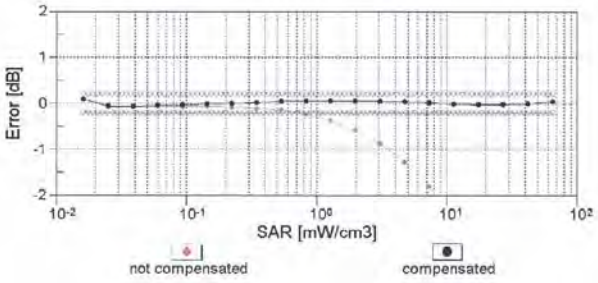


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3770 April 27, 2012

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





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

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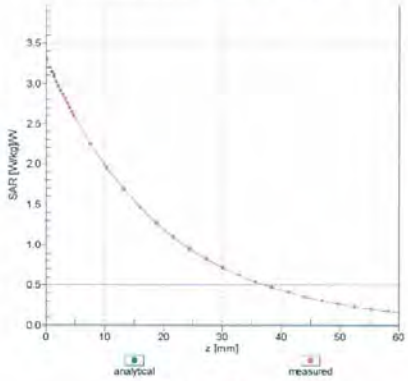
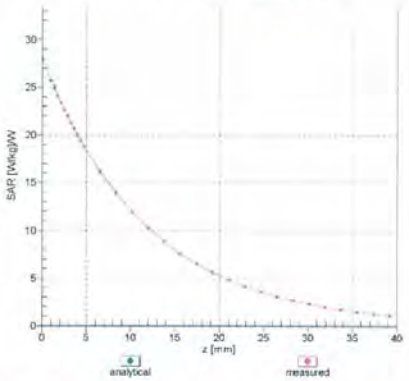
EX3DV4– SN:3770 April 27, 2012

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

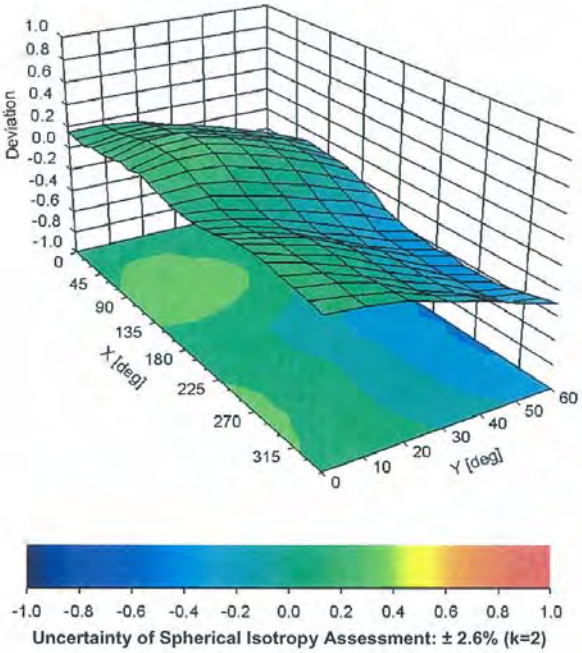


f = 1900 MHz,WGLS R22 (H_convF)



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 Distributioi n	Div	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertaint y	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

Schmid & Partner Engineering AG

s p e a g

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

Certificate of Conformity / First Article Inspection

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

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

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid	< 1% typical < 0.6% 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

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Doc No 681 – 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 **SGS-TW (Auden)**

Certificate No: **D835V2-4d063_May11**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d063
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 25, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

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

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

Issued: May 25, 2011

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

Certificate No: D835V2-4d063_May11 Page 1 of 8

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
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	40.4 ± 6 %	0.88 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	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.34 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.13 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	53.9 ± 6 %	1.00 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	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.45 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (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	**6.27 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω - 1.5 jΩ
Return Loss	- 28.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω - 4.1 jΩ
Return Loss	- 27.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.426 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

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DASY5 Validation Report for Head TSL

Date: 25.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

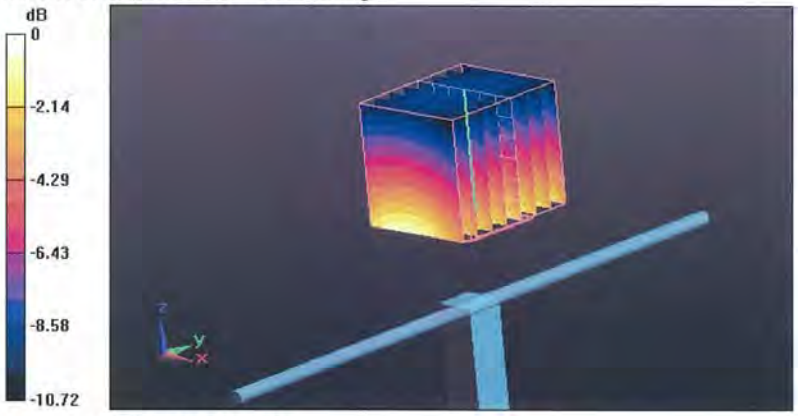
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

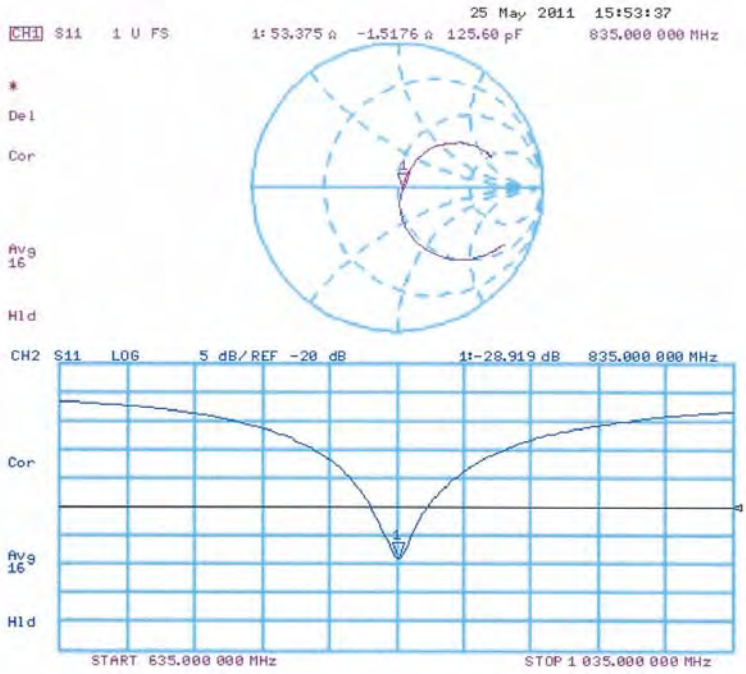
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.554 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.427 W/kg
SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.669 mW/g



0 dB = 2.670mW/g

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 25.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

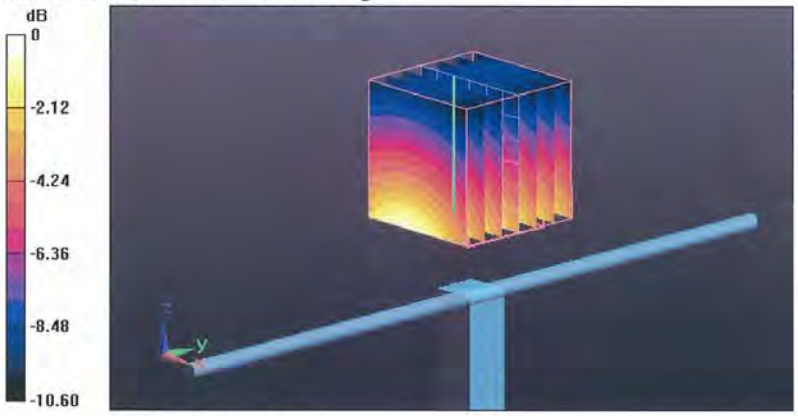
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

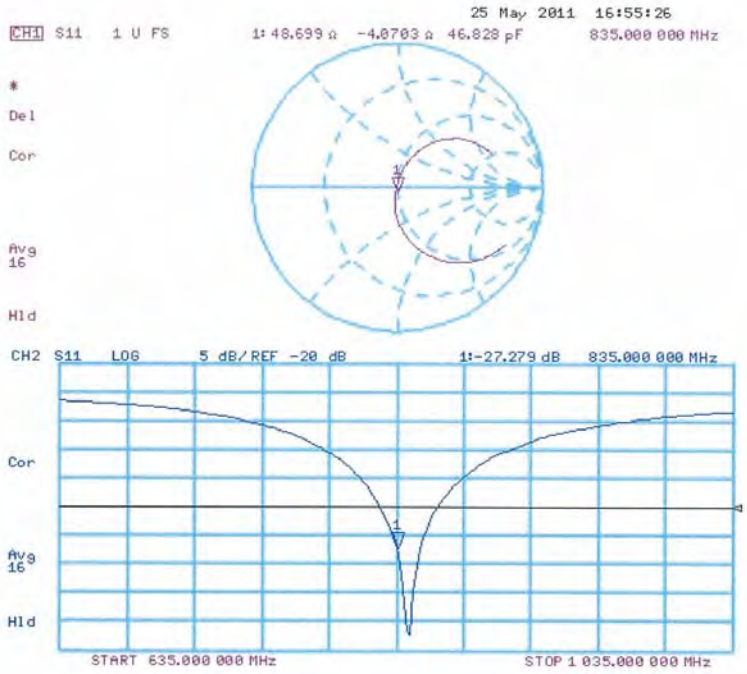
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.297 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.530 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.804 mW/g



0 dB = 2.800mW/g

Impedance Measurement Plot for Body TSL



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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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 18.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

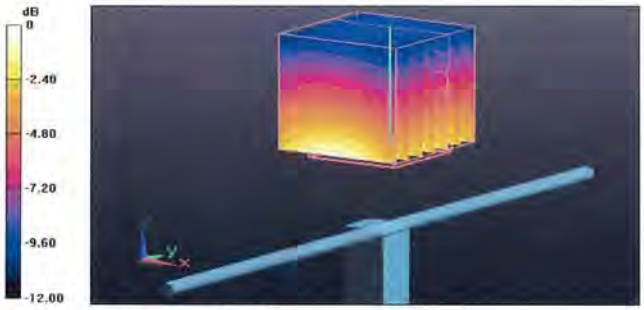
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d120

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:

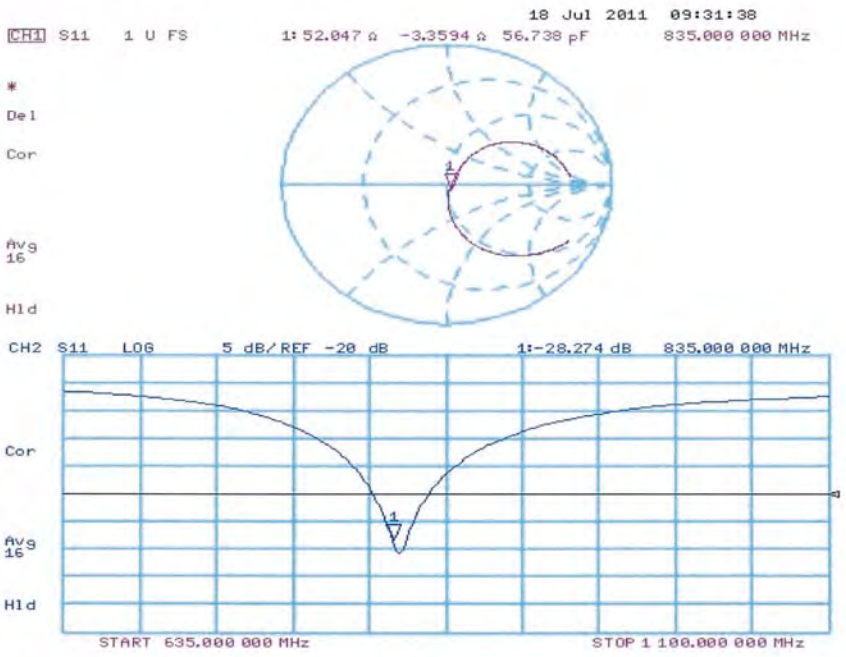
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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: 19.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

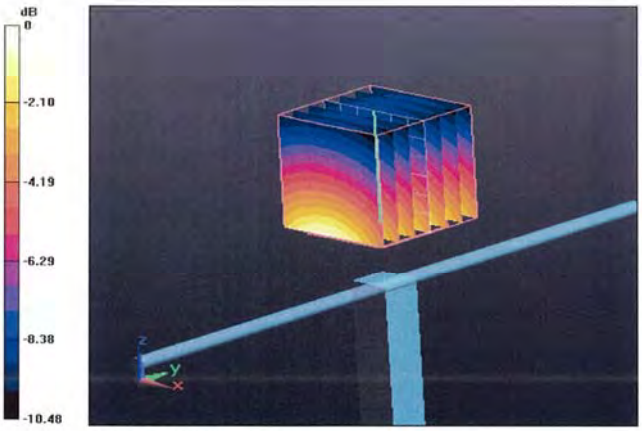
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d120

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

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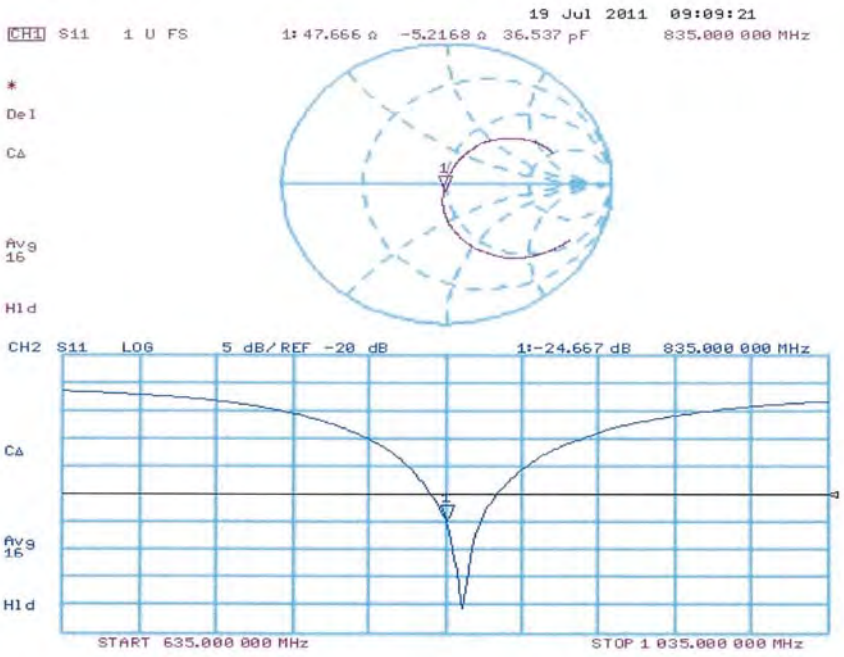
Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client SGS TW (Auden)

Certificate No: D1900V2-5d027_Apr11

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d027

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

Calibration date: April 19, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: April 19, 2011

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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 V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.1 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 mW /g ± 16.5 % (k=2)**

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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	51.1 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.93 mW / g
SAR normalized	normalized to 1W	39.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 6.4 jΩ
Return Loss	- 23.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 6.6 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

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DASY5 Validation Report for Head TSL

Date/Time: 18.04.2011 15:27:22

Test Laboratory: SPEAG, Zurich, Switzerland

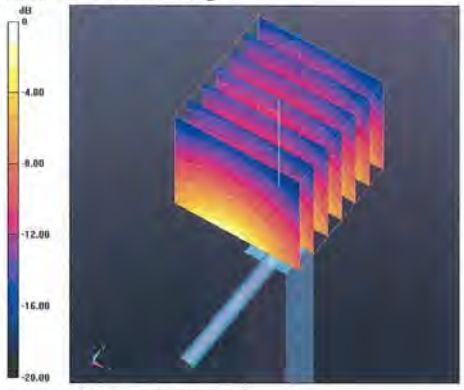
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

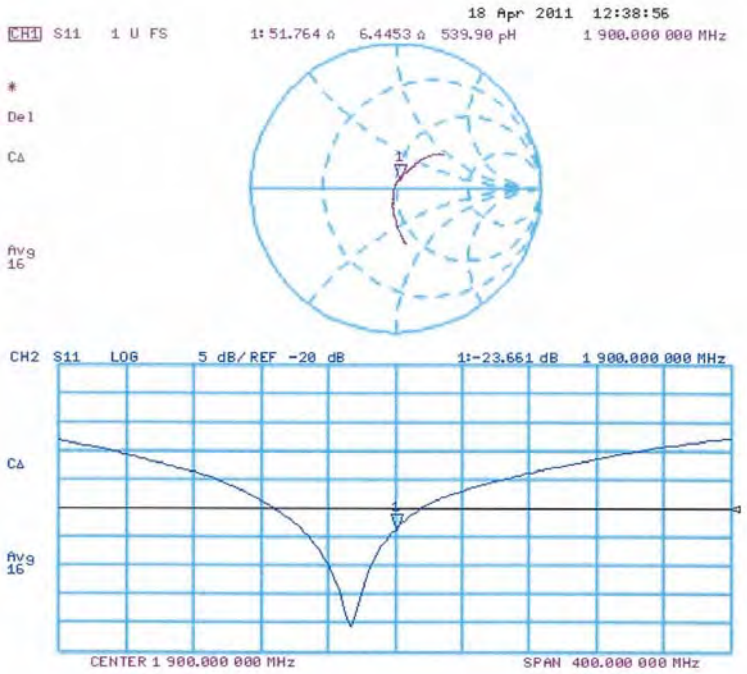
- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing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

Pin=250 mW, Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.235 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.650 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.424 mW/g



0 dB = 12.420mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 12:53:51

Test Laboratory: SPEAG, Zurich, Switzerland

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

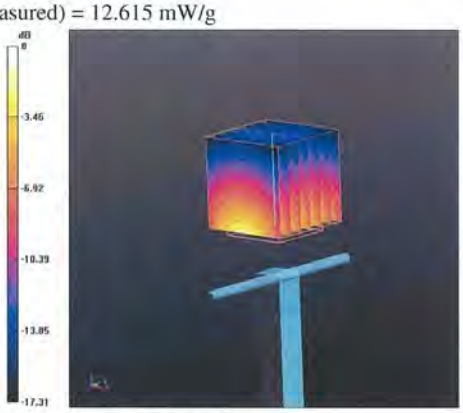
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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

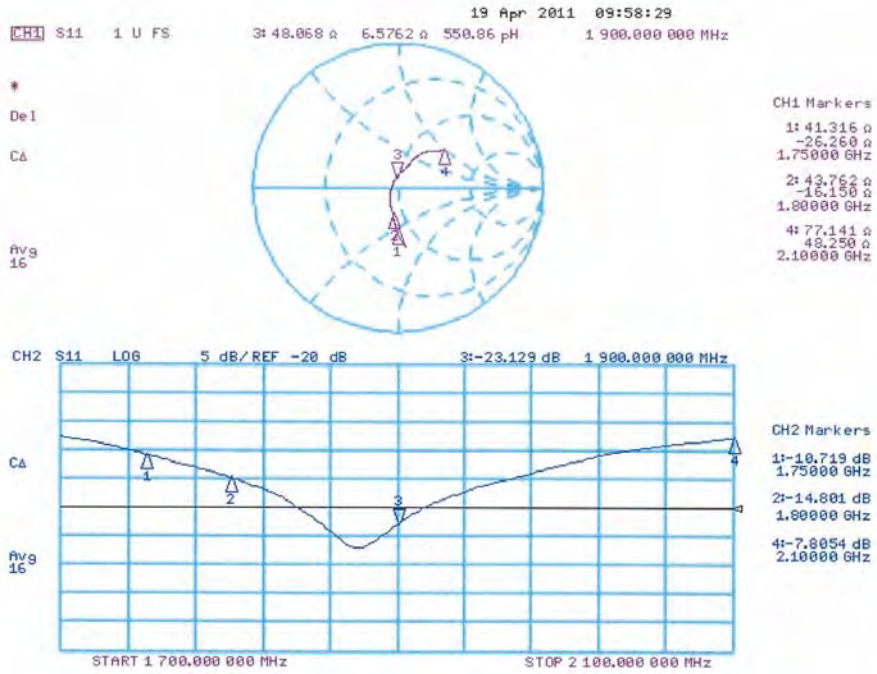
Pin=250 mW, Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.170 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.156 W/kg
SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 12.615 mW/g



0 dB = 12.610mW/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

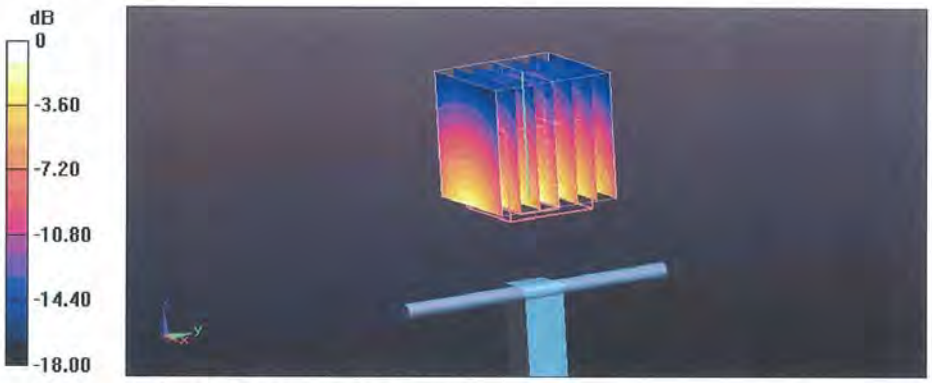
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

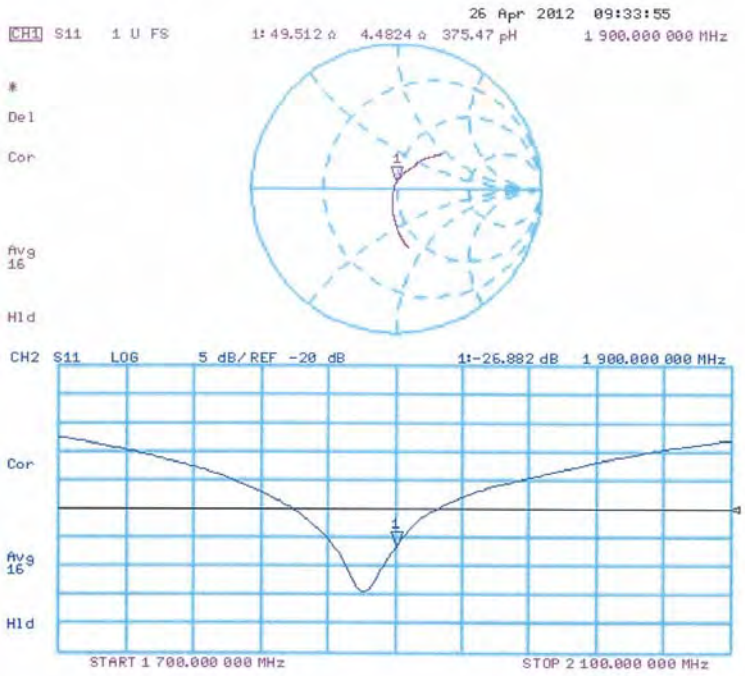
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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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

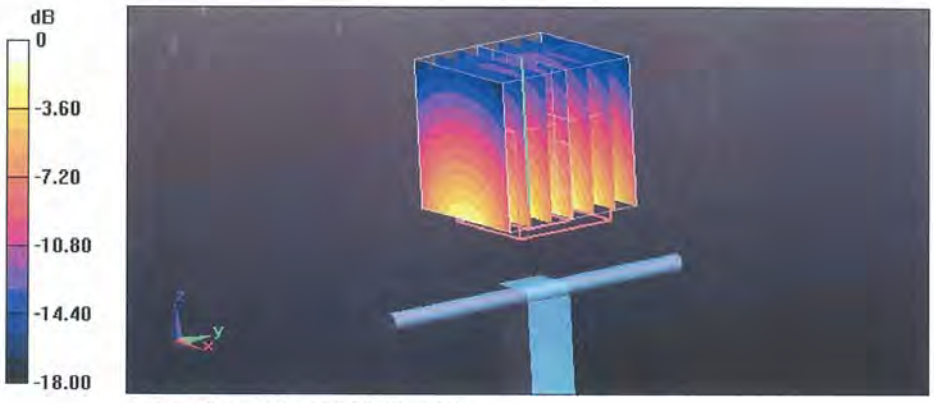
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.51 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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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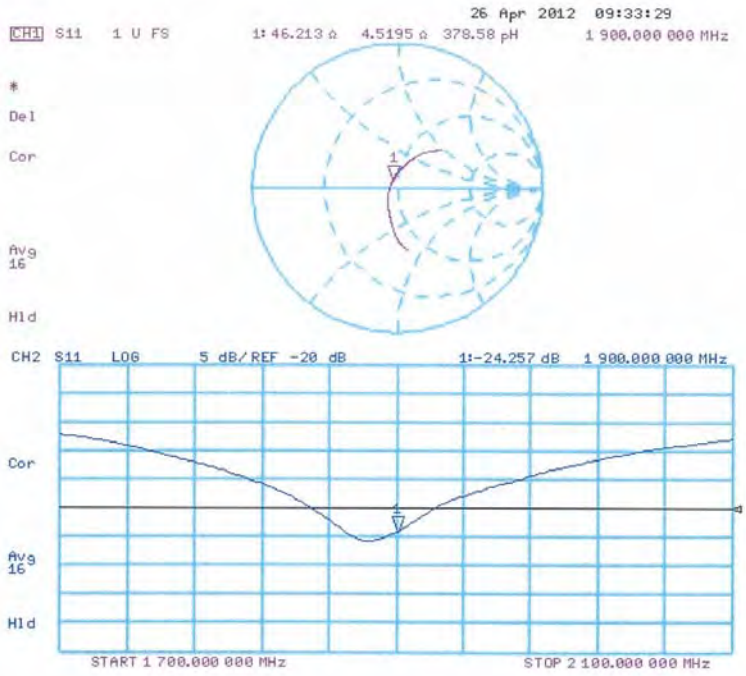
Impedance Measurement Plot for Body TSL



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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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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 cm^3 (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 cm^3 (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 cm^3 (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 cm^3 (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)**

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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

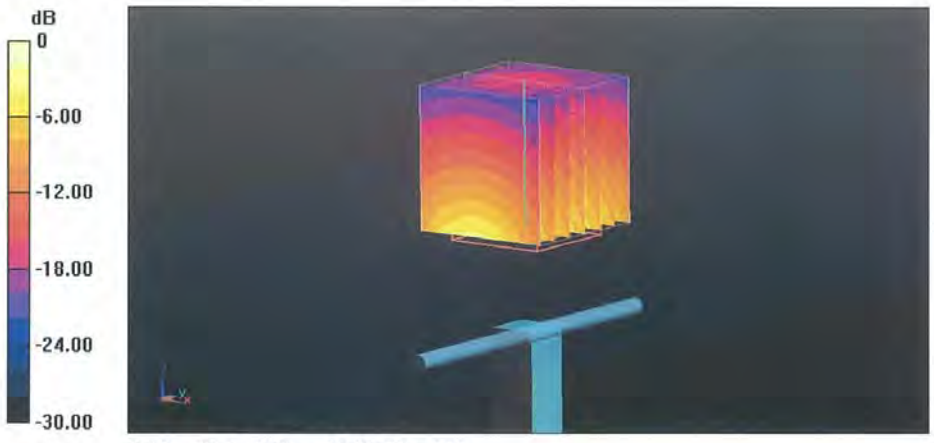
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

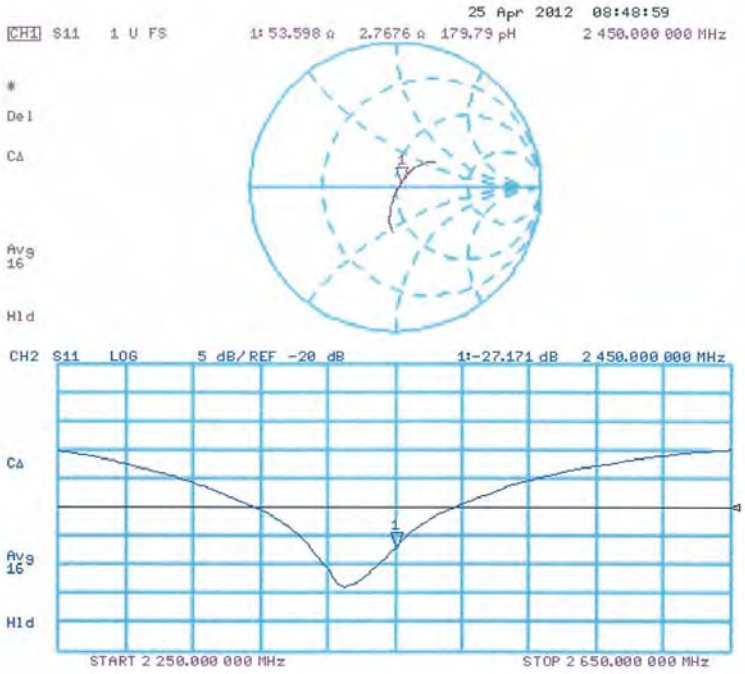
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 25.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

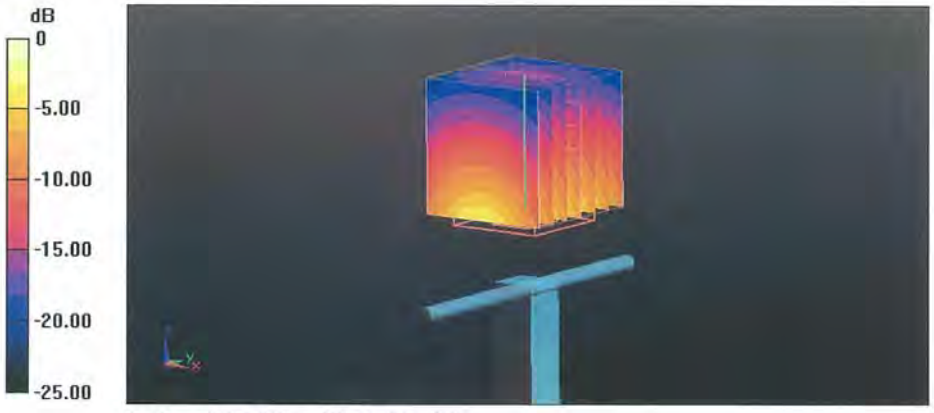
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

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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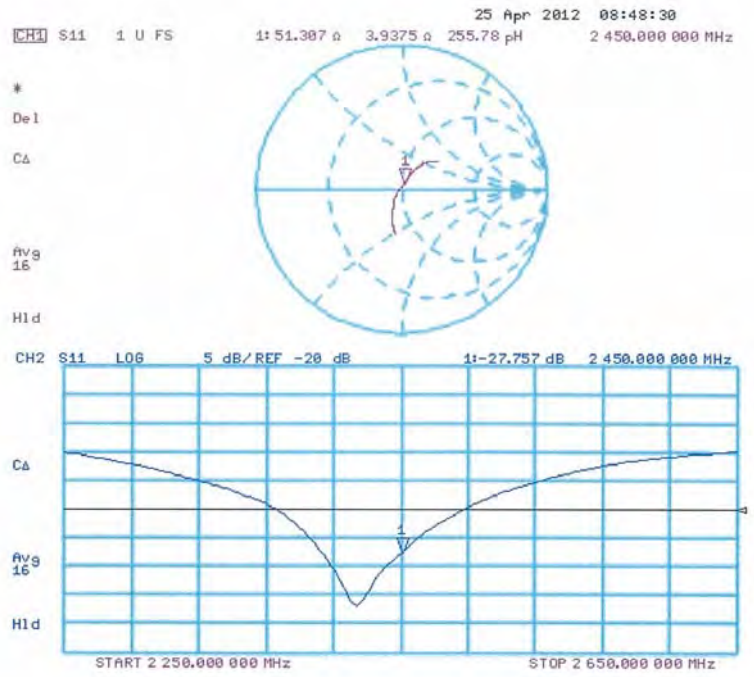
Impedance Measurement Plot for Body TSL



End of 1st part of report