SAR TEST REPORT

Equipment Under Test :	GSM 850/1900MHz Mobile Phones
Model No. :	Bubble US
Market name:	OT-V270A
FCC ID	RAD069
Applicant :	T&A Mobile phones
Address of Applicant :	3/F,B2 Block, Digital Technology Yard, Gaoxin Nan Qi Road,Nan Shan District, Shenzhen, Guangdong, P.R. China
Date of Receipt :	2007.12.12
Date of Test :	2007.12.17 ~2007.12.26
Date of Issue :	2008.01.04

Standards:

FCC OET Bulletin 65 supplement C,
ANSI/IEEE C95.1, C95.3, IEEE 1528-2003

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

Remarks:

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

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS-CSTC Shanghai GSM Lab or testing done by SGS-CSTC Shanghai GSM Lab must approve SGS Shanghai GSM Lab in connection with distribution or use of the product described in this report in writing.

Tested by :	Zenger Zhang	Date :	2008.01.04
Approved by :	Zhiang Yuan	Date :	2008.01.04

Contents

1. General Information

1.1 Test Laboratory

GSM Lab
SGS-CSTC Standards Technical Services Co., Ltd Shanghai Branch
9F,the 3rd Building, No.889, Yishan Rd, Xuhui District, Shanghai, China
Zip code: 200233
Telephone: +86 (0) 21 6495 1616
Fax: +86 (0) 21 6495 3679
Internet: http://www.cn.sgs.com

1.2 Details of Applicant

Name: T&A Mobile phones

Address: 3/F,B2 Block, Digital Technology Yard,
Gaoxin Nan Qi Road,Nan Shan District,
Shenzhen, Guangdong, P.R. China

1.3 Description of EUT(s)

Brand name	Alcatel	
Model No.	Bubble US	
Market Name	OT-V270A	
Serial No.	IMEI: 011433000000166	
Battery Type	Li-ion:	T5001298AAAA
Antenna Type	Inner Antenna	
Operation Mode	GSM	
Modulation Mode	GMSK	
Frequency range	GSM850	Tx: 824~849 MHz
		Rx: 869~894 MHz
	PCS1900	Tx: 1850~1910 MHz
		Rx: 1930~1990 MHz
Maximum RF Conducted Power	GSM850: 33dBm PCS1900: 30dBm	

1.4 Test Environment

Ambient temperature: 22.0° C

Tissue Simulating Liquid: 22° C

Relative Humidity: 35%~45%

1.5 Operation Configuration

Configuration 1: GSM850, LeftHandSide Cheek & 15° Tilt Position

Configuration 2: GSM850, RightHandSide Cheek & 15° Tilt Position

Configuration 3: GSM850, BodyWorn (2.0cm between EUT and phantom)

Configuration 4: PCS1900, LeftHandSide Cheek & 15° Tilt Position

Configuration 5: PCS1900, RightHandSide Cheek & 15° Tilt Position

Configuration 6: PCS1900, BodyWorn (2.0cm between EUT and phantom)

1.6 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a.

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (Speag Dasy 4 professional system). A Model EX3DV4 3578 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= $\sigma (|Ei|^2)/ \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

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

- A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension for accommodation the data acquisition electronics (DAE).

- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.

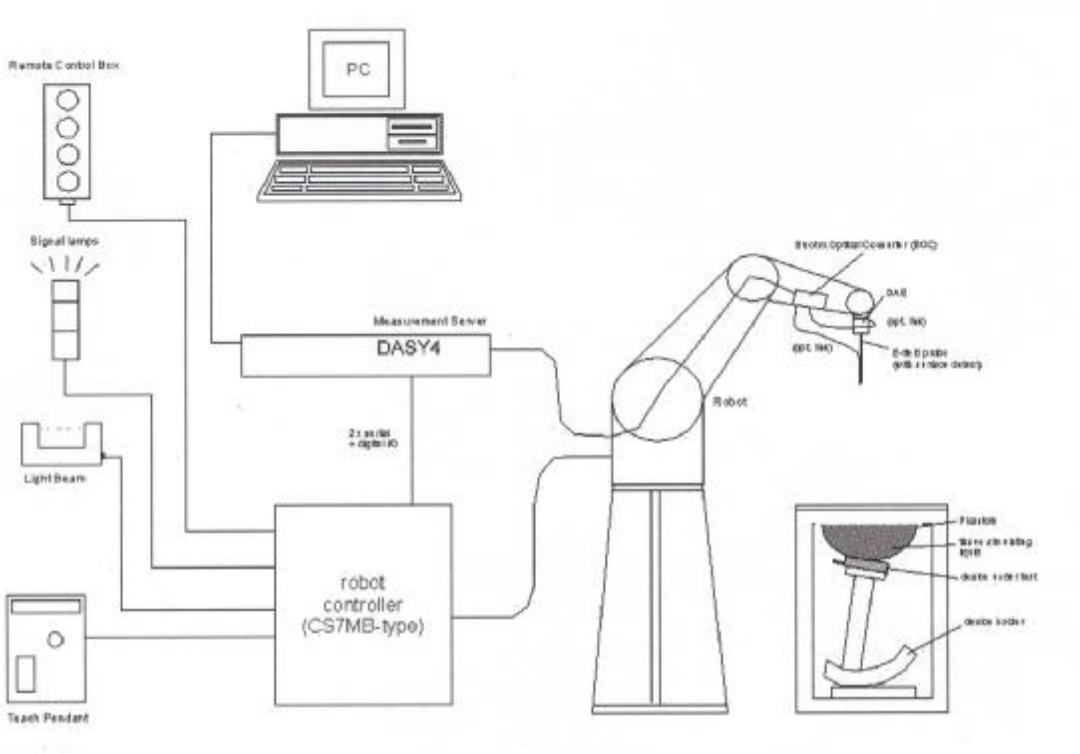


Fig. a SAR System Configuration

- 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.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and body-worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.

ÿ Validation dipole kits allowing to validating the proper functioning of the system.

1.7 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 900&1800MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

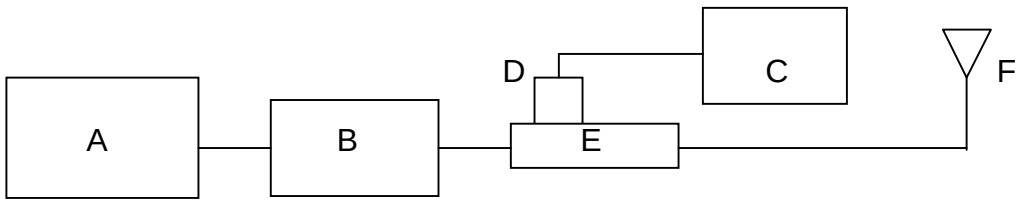


Fig. b the microwave circuit arrangement used for SAR system verification

A. Agilent Model E4438C Signal Generator
B. Mini-Circuit Model ZHL-42 Preamplifier
C. Agilent Model E4416A Power Meter
D. Agilent Model 8481H Power Sensor
E. HT CP6100 20N Dual directional coupler
F. Reference dipole antenna

Validation Kit	Frequency MHz	Target SAR 1g (250mW)	Target SAR 10g (250mW)	Measured SAR 1g	Measured SAR 10g	Measured Date
D900V2 SN:168	**900 Head**	2.59	1.66	2.55	1.64	2007-12-17
D900V2 SN:168	**900 Body**	2.58	1.71	2.52	1.58	2007-12-26
D1800V2 SN:2d0520	**1800 Head**	9.16	4.89	9.02	4.61	2007-12-21
D1800V2 SN:2d052	**1800 Body**	9.61	5.28	9.37	5.11	2007-12-26

Table 1. Result System Validation

1.8 Tissue Simulant Fluid for the Frequency Band 900MHz/ 1800MHz

The dielectric properties for this body-simulant fluid were measured by using the HP Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Agilent E5071B Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report. The temperature variation of the Tissue Simulant Fluid was 22°C.

Frequency (MHz)	Tissue Type	Limit/Measured	Permittivity (ρ)	Conductivity (σ)	Simulated Tissue Temp (°C)
900	**Head**	**Recommended Limit**	**42.0±5%**	**0.99±5%**	**20-24**
		Measured, 2007-12-17	41.15	0.968	22.5
	Body	**Recommended Limit**	**55.0±5%**	**1.05±5%**	**20-24**
		Measured, 2007-12-26	55.12	0.995	21.8
1800	**Head**	**Recommended Limit**	**40.0±5%**	**1.38±5%**	**20-24**
		Measured, 2007-12-21	40.23	1.352	22.3
	Body	**Recommended Limit**	**53.3±5%**	**1.52±5%**	**20-24**
		Measured, 2007-12-26	53.10	1.521	22.6

Table 2. Dielectric parameters for the Frequency Band 900&1800MHZ

1.9 Test Standards and Limits

According to FCC 47 CFR §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, 3KHz to 300GHz,” ANSI/IEEE C95.1-1992, Copyright 1992 by the Institute of Electrical & Electronics Engineers, Inc., New York, New York 10071.

Human Exposure	**Uncontrolled Environment** **General Population**
Spatial Peak SAR (Brain)	1.60 mW/g (averaged over a mass of 1g)

Table 3. 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. Summary of Results

GSM850 SAR

Mode	Test Configuration		SAR, Averaged over 1g(W/kg)			Temperature	Verdict
	Channel/Power(dBm)		Low/31.2	Middle/31.3	High/31.5	(℃)	
GSM850	Left	Cheek	0.597	0.600	0.661	22	Pass
		Tilt	--	0.342	--	22	Pass
	Right	Cheek	0.612	0.517	0.751	22	Pass
		Tilt	--	0.367	--	22	Pass
	Body		0.552	0.653	0.578	22	Pass

PCS1900 SAR

Mode	Test Configuration		SAR, Averaged over 1g(W/kg)			Temperature	Verdict
	Channel/Power(dBm)		Low/29.1	Middle/28.7	High/28.6	(℃)	
PCS1900	Left	Cheek	0.448	0.734	0.825	22	Pass
		Tilt	--	0.148	--	22	Pass
	Right	Cheek	0.453	0.740	0.890	22	Pass
		Tilt	--	0.134	--	22	Pass
	Body		0.249	0.342	0.401	22	Pass

Maximum values

Frequency Band (MHz)	EUT position	Conducted Output Power (dBm)	1g Average (W/kg)	Power Drift(dB)	Amb. Temp (℃)	Verdict
850	LeftHandside Cheek, High Channel	31.5	0.661	-0.011	22	PASS
	RightHandside, Cheek, High Channel	31.5	0.751	0.021	22	PASS
	BodyWorn, Middle Channel	31.3	0.653	-0.042	22	PASS
1900	LeftHandside Cheek, High Channel	28.6	0.825	-0.042	22	PASS
	RightHandside, Cheek, High Channel	28.6	0.890	-0.066	22	PASS
	BodyWorn, High Channel	28.6	0.401	0.019	22	PASS

Note:

1. In GSM850 band, the low, middle and high channels are CH128/824.2MHz, CH189/836.4MHz and CH251/848.8MHz separately.

2. In PCS1900 band, the low, middle and high channels are CH512/1805.2MHz, CH661/1880.0MHz and CH810/1909.8MHz separately.

3. For the Bodyworn measurements the sample was only placed with the antenna toward the phantom since this position delivers the highest SAR values. The distance from the sample to the phantom is 2.0 cm.

4. For all the tests, EUT is working with the max transmission power and the maximum absolute value of the power drift is 0.246dB which is under the GSM850-RightHandSide-Cheek-Middle Channel configuration.

3. Instruments List

Instrument	Model	Serial number	NO.	Date of last Calibration
Desktop PC	COMPAQ EVO	N/A	GSM-SAR-025	N/A
Dasy 4 software	V 4.7 build 44	N/A	GSM-SAR-001	N/A
Probe	Ex3DV4	3578	-	2007.04.24
DAE	DAE3	569	GSM-SAR-023	2007.11.19
900MHz system validation dipole	D900V2	168	-	2007.04.25
1800MHz system validation dipole	D1800V2	2d052	-	2007.04.25
Phantom	SAM 12	TP-1283	GSM-SAR-005	N/A
Robot	RX90L	F03/5V32A1/A01	GSM-SAR-006	N/A
Dielectric probe kit	85070D	US01440168	GSM-SAR-016	2007.12.18*
Agilent network analyzer	E5071B	MY42100549	GSM-SAR-007	2007.12.18*
Agilent signal generator	E4438	14438CATO-19719	GSM-SAR-008	2007.12.18*
Mini-Circuits preamplifier	ZHL-42	D041905	GSM-SAR-033	2007.12.18*
Agilent power meter	E4416A	GB41292095	GSM-SAR-010	2007.12.18*
Agilent power sensor	8481H	MY41091234	GSM-SAR-011	2007.12.18*
HT CP6100 20N Coupling	6100	SCP301480120	GSM-SAR-012	2007.12.18*
R&S Universal radio communication tester	CMU200	103633	GSM-AUD-002	2007.12.18*

*The previous calibration date is Dec 19, 2006

4. Measurements

4.1 GSM850-LeftHandSide-Cheek-Middle

Date/Time: 2007-12-19 18:06:14

Test Laboratory: SGS-GSM

GSM850-LeftHandSide-Cheek-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

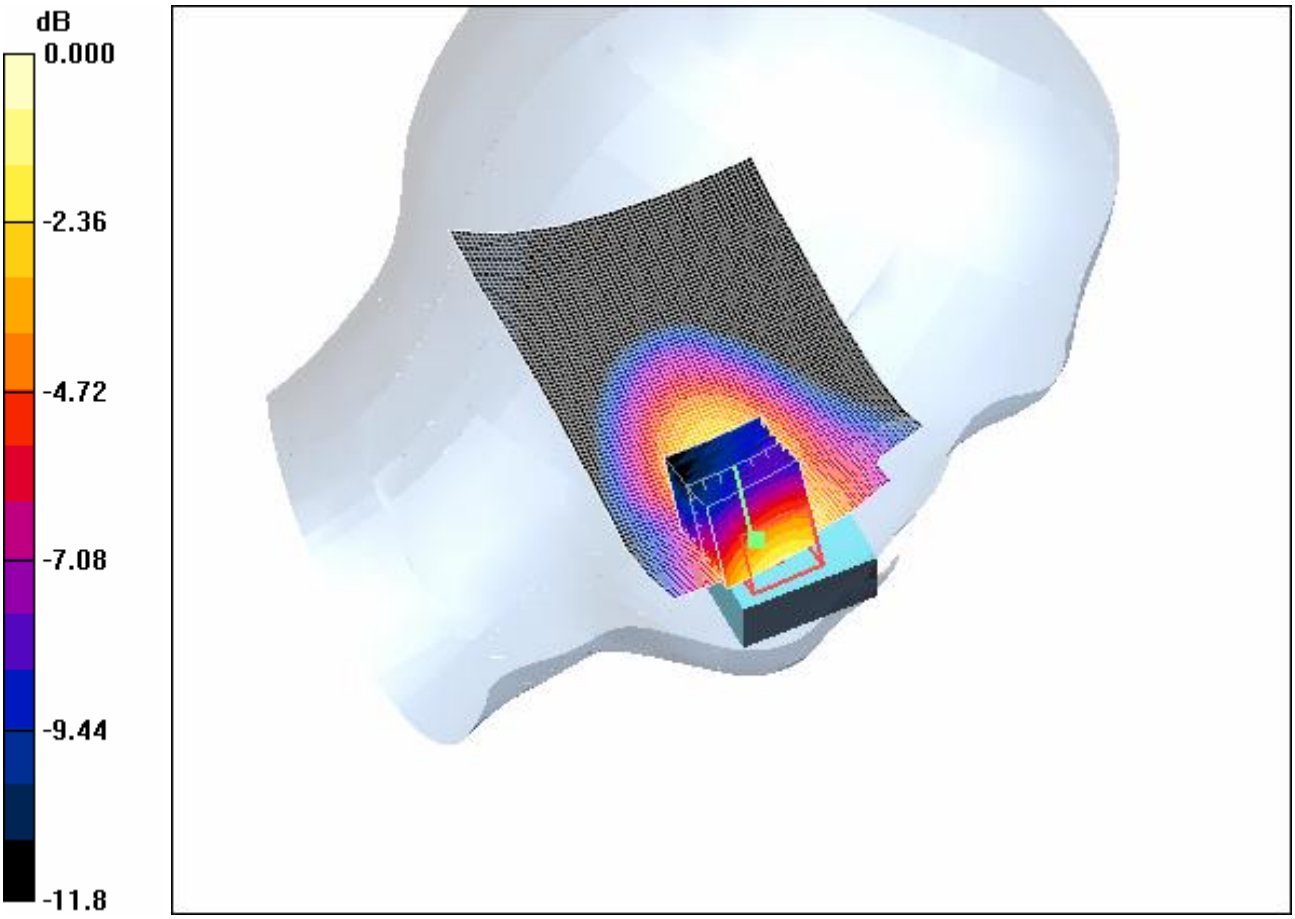
Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 836.4 MHz; σ = 0.87 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Mid(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.657 mW/g

Cheek position - Mid(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.60 V/m; Power Drift = 0.151 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.600 mW/g; SAR(10 g) = 0.371 mW/g
Maximum value of SAR (measured) = 0.663 mW/g



0 dB = 0.663mW/g

4.2 GSM850-LeftHandSide-Tilt-Middle

Date/Time: 2007-12-19 19:27:29

Test Laboratory: SGS-GSM

GSM850-LeftHandSide-Tilt-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

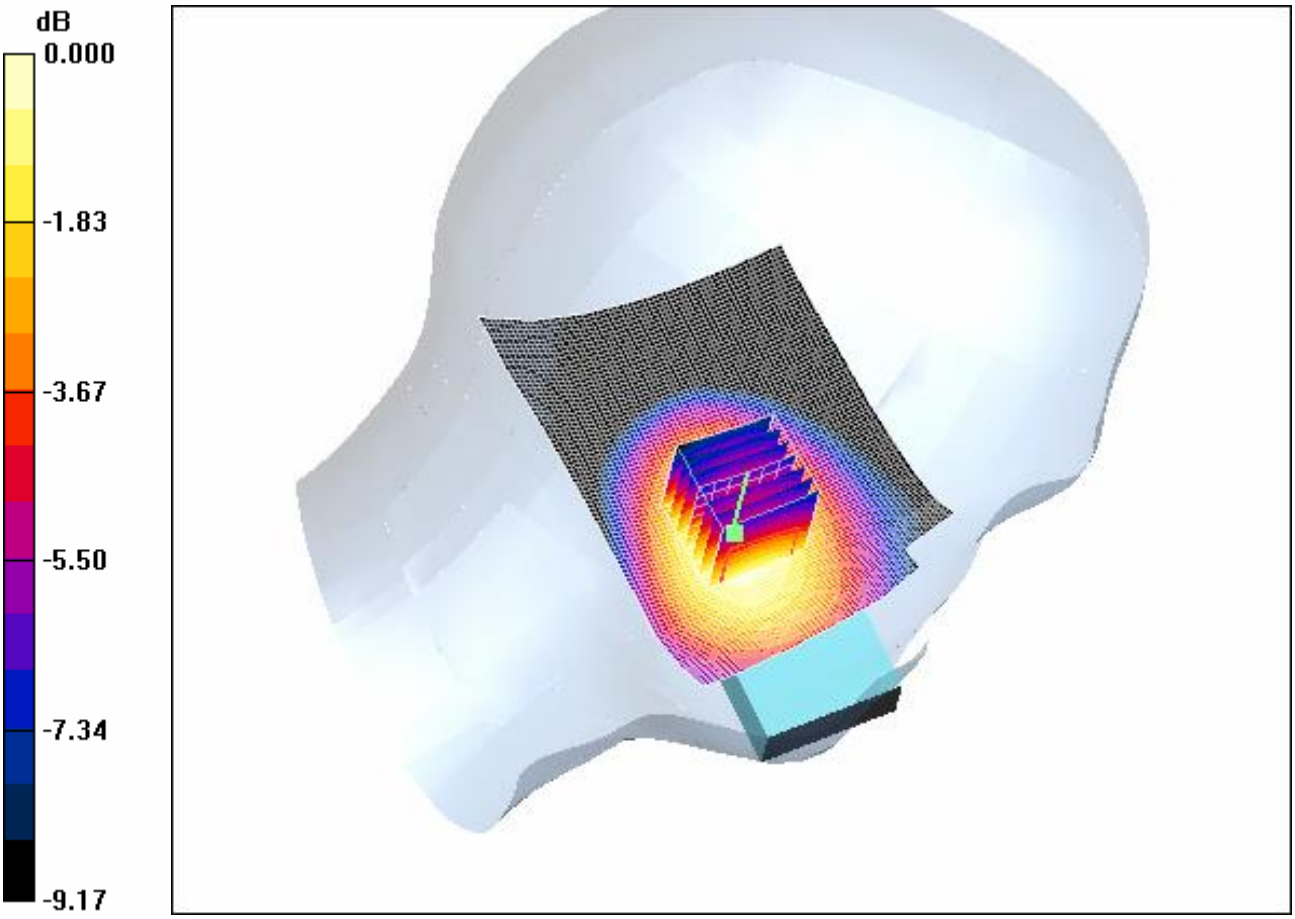
Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 836.4 MHz; σ = 0.87 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Tilt position - Mid(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.367 mW/g

Tilt position - Mid(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.5 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 0.440 W/kg
SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.252 mW/g
Maximum value of SAR (measured) = 0.363 mW/g



0 dB = 0.363mW/g

4.3 GSM850-LeftHandSide-WorstCase-Low

Date/Time: 2007-12-19 18:36:44

Test Laboratory: SGS-GSM

GSM850-LeftHandSide-Cheek-Low

DUT: GSM0743445; Type: Head; Serial: 011433000000166

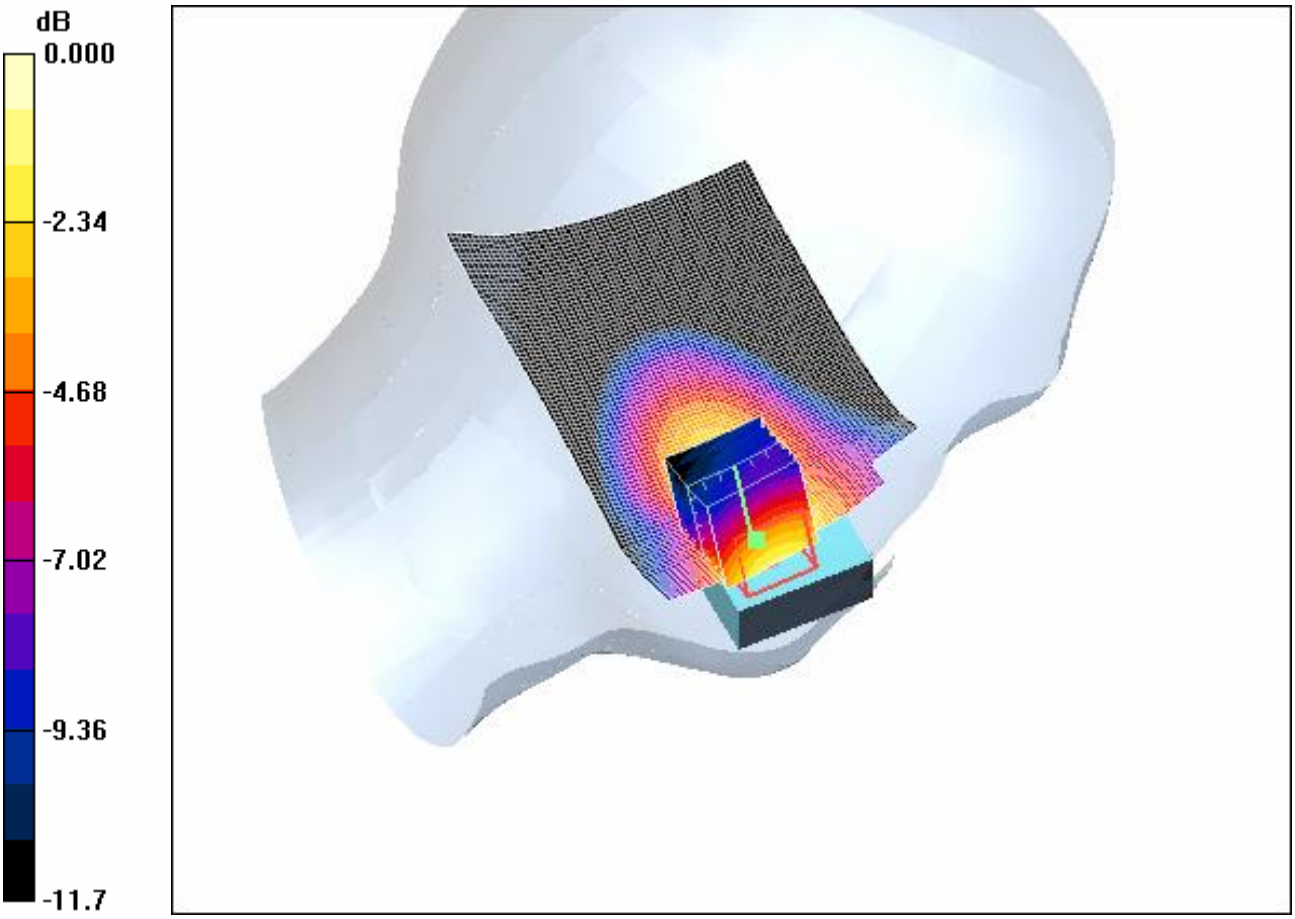
Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 824.2 MHz; σ = 0.858 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Low(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.655 mW/g

Cheek position - Low(JN)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.45 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.597 mW/g; SAR(10 g) = 0.366 mW/g
Maximum value of SAR (measured) = 0.654 mW/g



0 dB = 0.654mW/g

4.4 GSM850-LeftHandSide-WorstCase-High

Date/Time: 2007-12-19 19:03:36

Test Laboratory: SGS-GSM

GSM850-LeftHandSide-Cheek-High

DUT: GSM0743445; Type: Head; Serial: 011433000000166

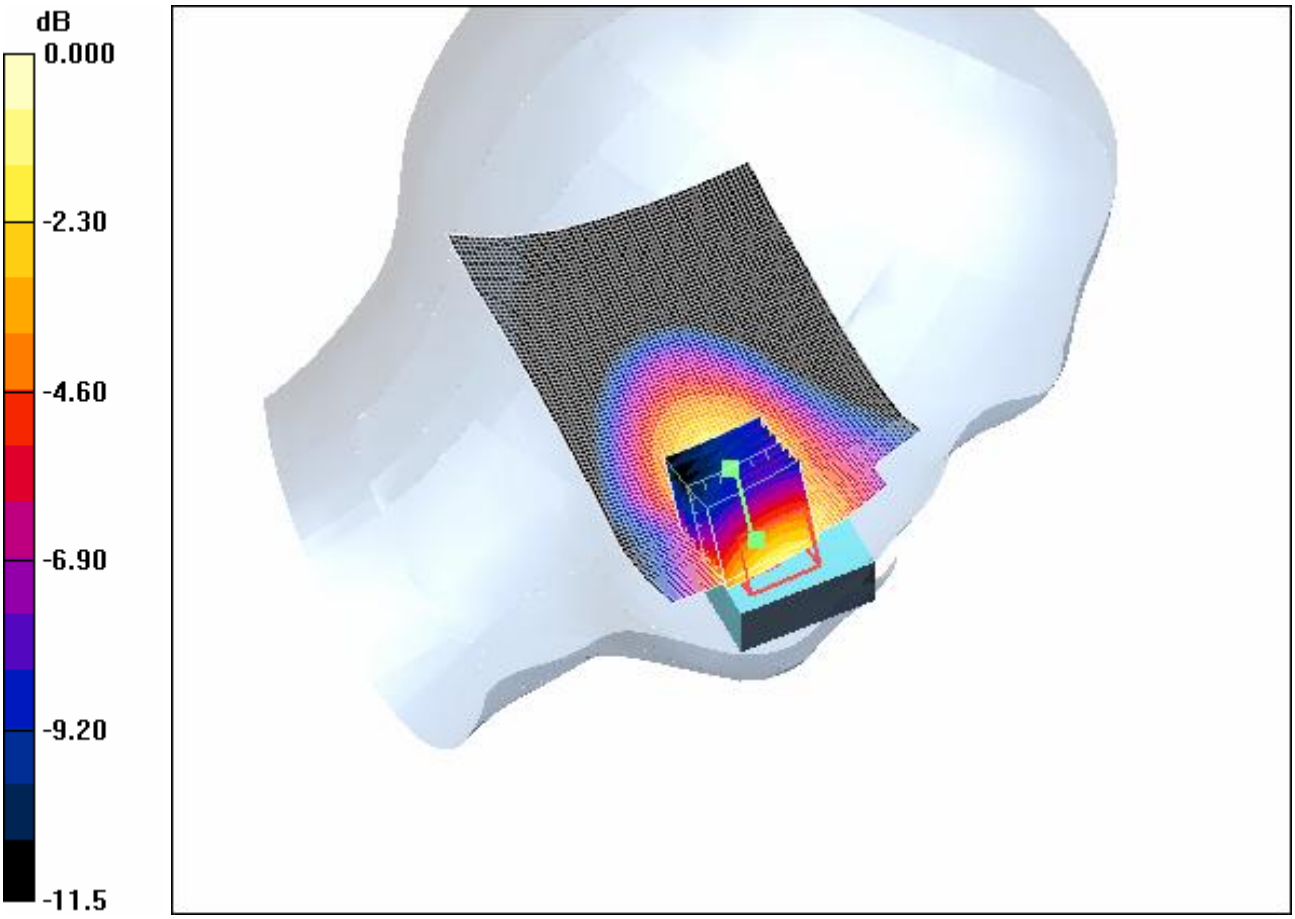
Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 848.8 MHz; σ = 0.882 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - High(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.727 mW/g

Cheek position - High(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.55 W/kg
SAR(1 g) = 0.661 mW/g; SAR(10 g) = 0.405 mW/g
Maximum value of SAR (measured) = 0.714 mW/g



0 dB = 0.714mW/g

4.5 GSM850-RightHandSide-Cheek-Middle

Date/Time: 2007-12-19 19:59:50

Test Laboratory: SGS-GSM

GSM850-RightHandSide-Cheek-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

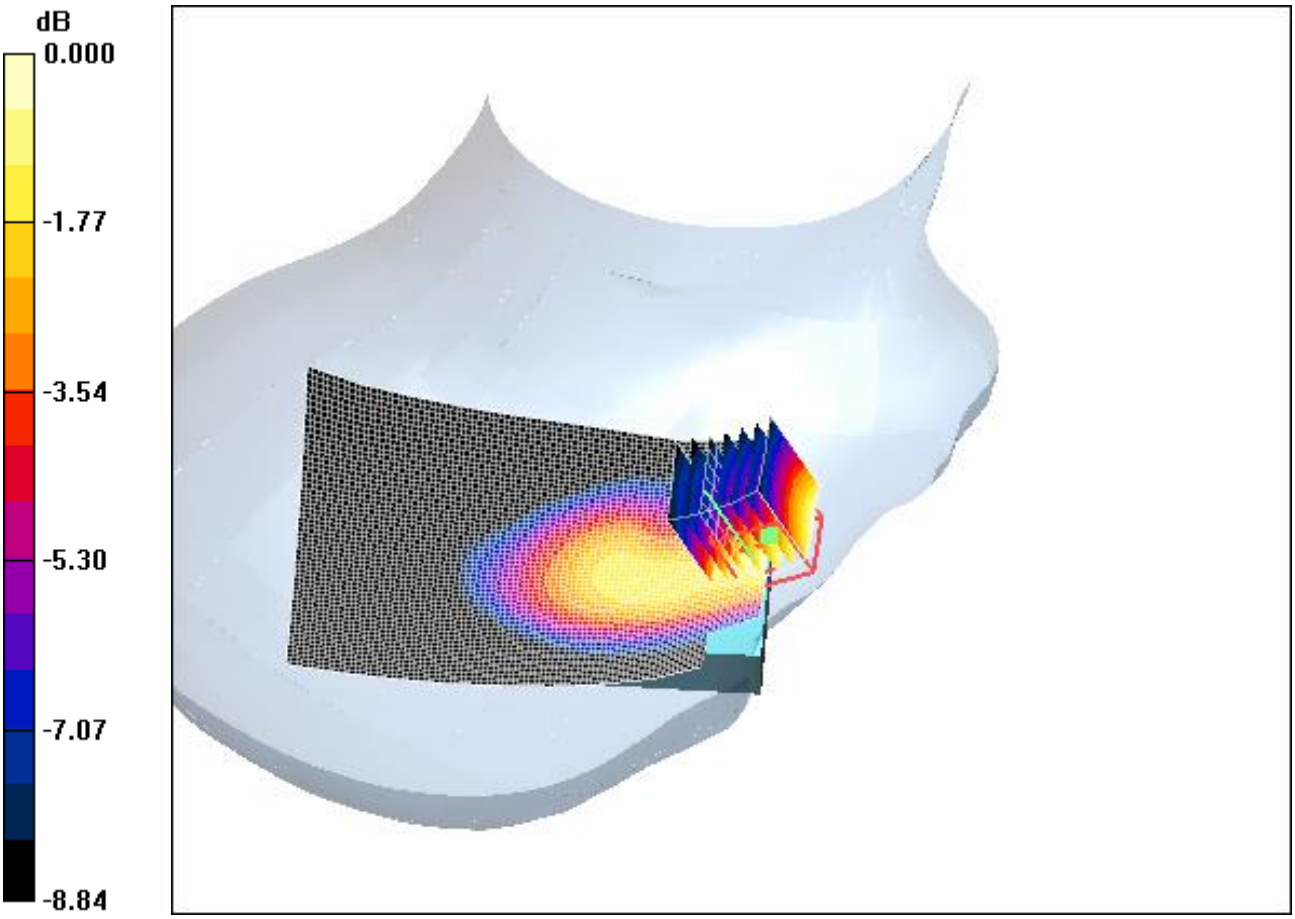
Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 836.4 MHz; σ = 0.87 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Middle(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.555 mW/g

Cheek position - Middle(JN)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.10 V/m; Power Drift = 0.246 dB
Peak SAR (extrapolated) = 0.748 W/kg
SAR(1 g) = 0.517 mW/g; SAR(10 g) = 0.378 mW/g
Maximum value of SAR (measured) = 0.549 mW/g



0 dB = 0.549mW/g

4.6 GSM850-RightHandSide-Tilt-Middle

Date/Time: 2007-12-19 21:48:07

Test Laboratory: SGS-GSM

GSM850-RightHandSide-Tilt-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

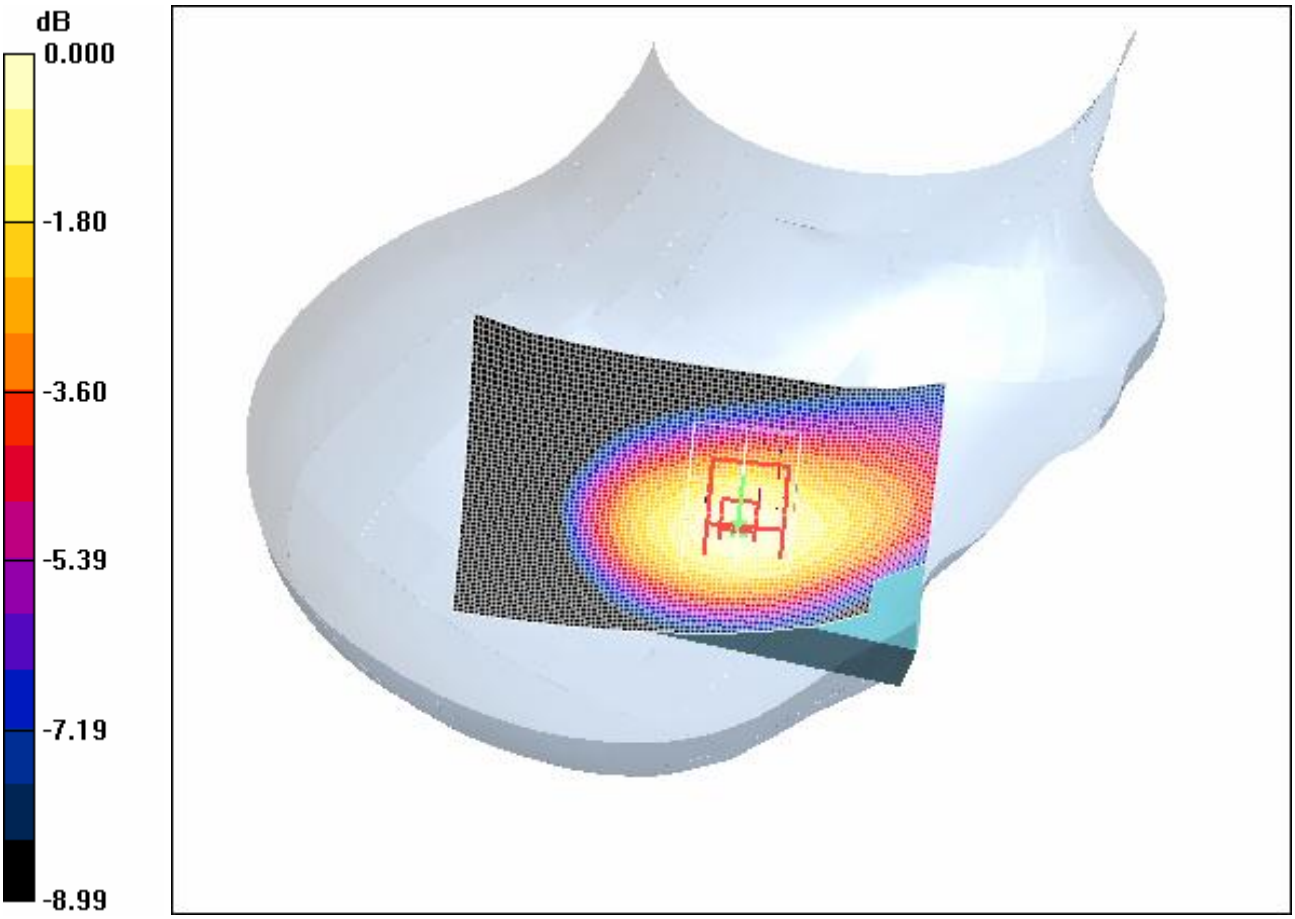
Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 836.4 MHz; σ = 0.87 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Tilt position - Middle(BYD)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.393 mW/g

Tilt position - Middle(BYD)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.8 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 0.479 W/kg
SAR(1 g) = 0.367 mW/g; SAR(10 g) = 0.267 mW/g
Maximum value of SAR (measured) = 0.391 mW/g



0 dB = 0.391mW/g

4.7 GSM850-RightHandSide-WorstCase-Low

Date/Time: 2007-12-19 20:54:46

Test Laboratory: SGS-GSM

GSM850-RightHandSide-Cheek-Low

DUT: GSM0743445; Type: Head; Serial: 011433000000166

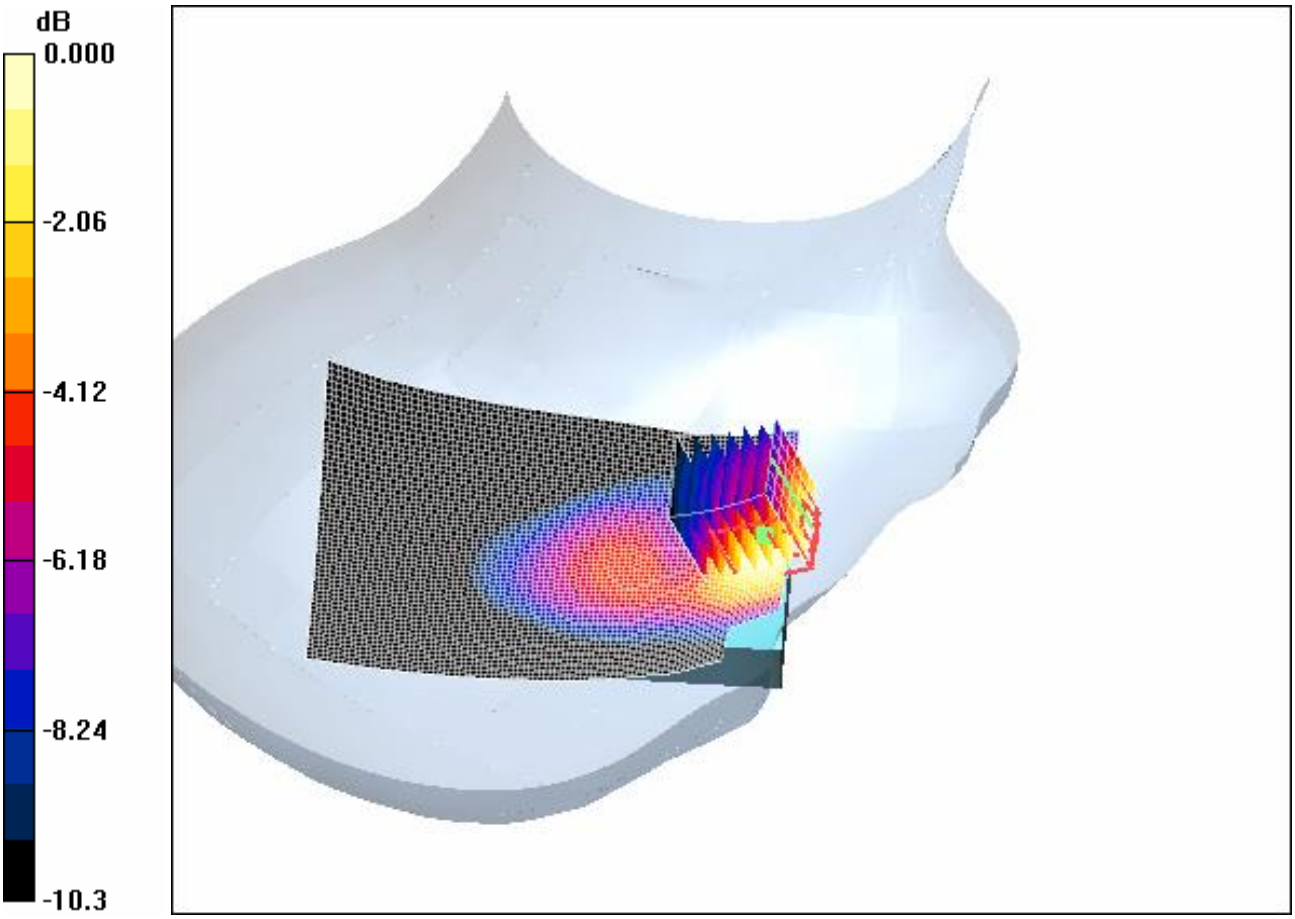
Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 824.2 MHz; σ = 0.858 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Low(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.757 mW/g

Cheek position - Low(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.08 V/m; Power Drift = 0.089 dB
Peak SAR (extrapolated) = 0.901 W/kg
SAR(1 g) = 0.612 mW/g; SAR(10 g) = 0.444 mW/g
Maximum value of SAR (measured) = 0.657 mW/g



0 dB = 0.657mW/g

4.8 GSM850-RightHandSide-WorstCase-High

Date/Time: 2007-12-19 21:21:12

Test Laboratory: SGS-GSM

GSM850-RightHandSide-Cheek-High

DUT: GSM0743445; Type: Head; Serial: 011433000000166

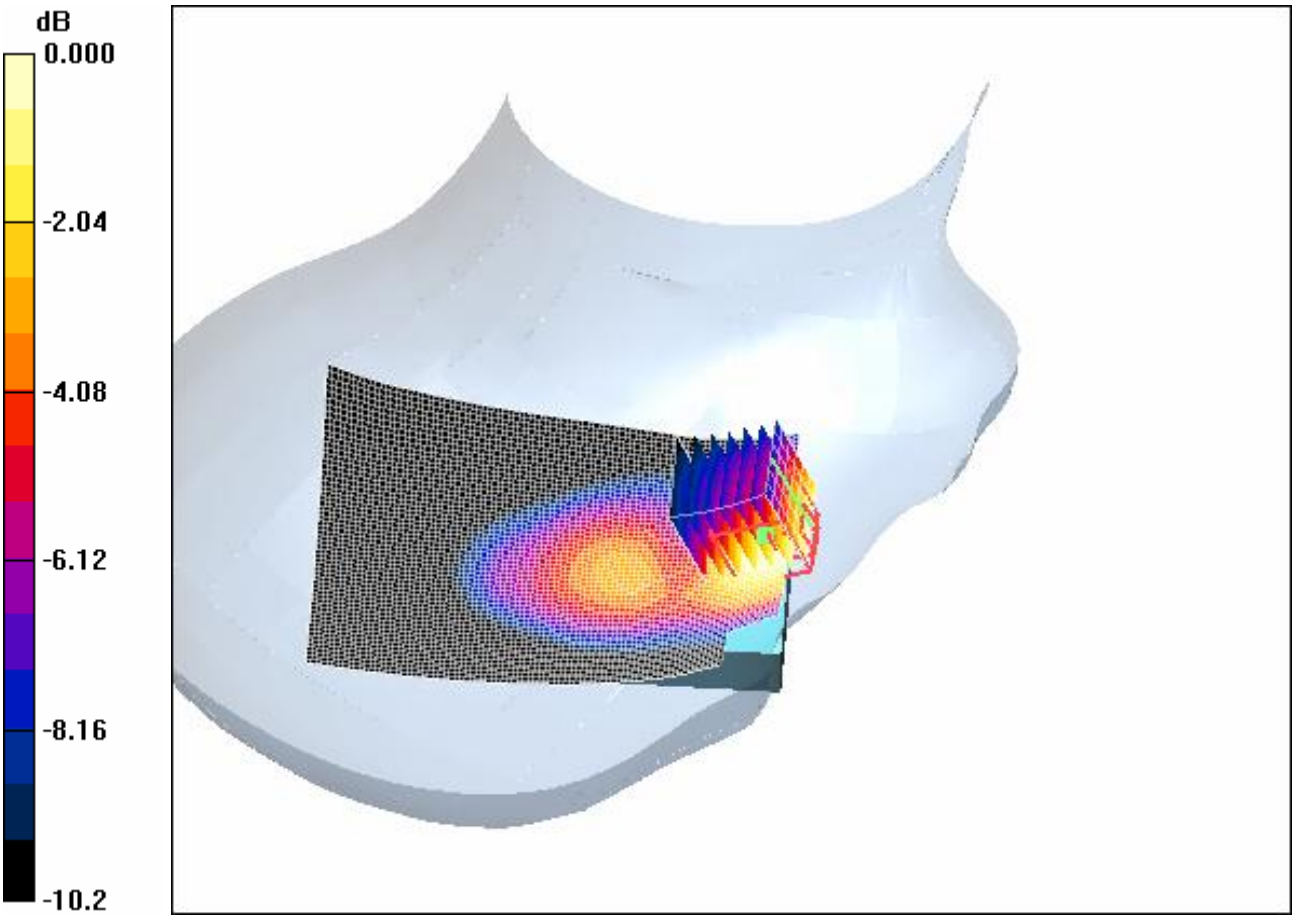
Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium: HSL900_Head Medium parameters used: f = 848.8 MHz; σ = 0.882 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.12, 8.12, 8.12); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - High(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.918 mW/g

Cheek position - High(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.6 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.751 mW/g; SAR(10 g) = 0.543 mW/g
Maximum value of SAR (measured) = 0.803 mW/g



0 dB = 0.803mW/g

4.9 GSM850-Body-Worn –Low

Date/Time: 2007-12-26 18:55:30

Test Laboratory: SGS-GSM

GSM850-Body-Worn-Low-2.0

DUT: GSM10743445; Type: Head; Serial: 011433000000166

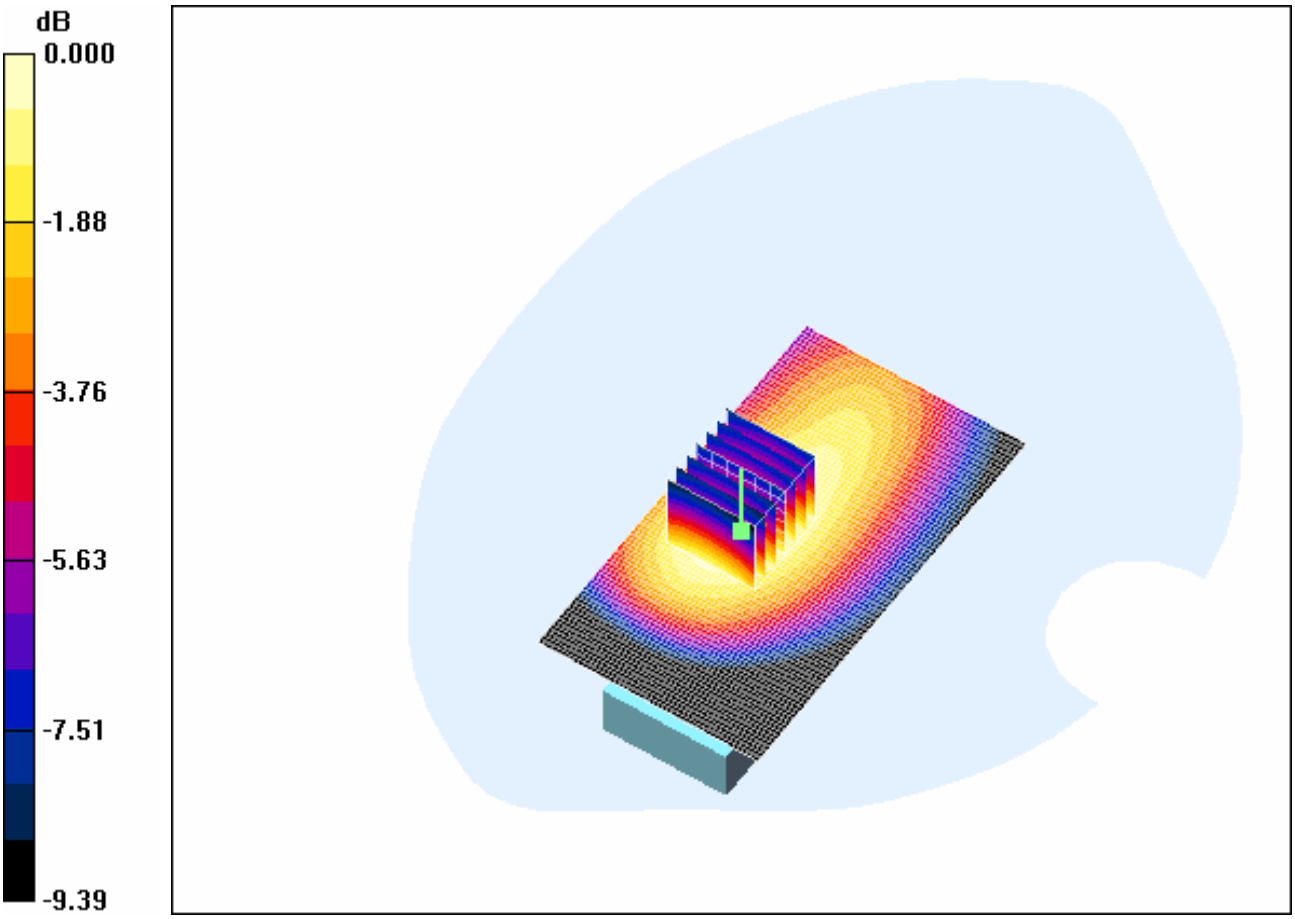
Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz;Duty Cycle: 1:8.3
Medium: HSL850-Body Medium parameters used: f = 824.2 MHz; σ = 0.974 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.02, 8.02, 8.02); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body Worn - Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.584 mW/g

Body Worn - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 0.745 W/kg
SAR(1 g) = 0.552 mW/g; SAR(10 g) = 0.398 mW/g
Maximum value of SAR (measured) = 0.584 mW/g



0 dB = 0.584mW/g

4.10 GSM850-Body-Worn -Middle

Date/Time: 2007-12-26 19:18:16

Test Laboratory: SGS-GSM

GSM850-Body-Worn-Mid-2.0

DUT: GSM10743445; Type: Head; Serial: 011433000000166

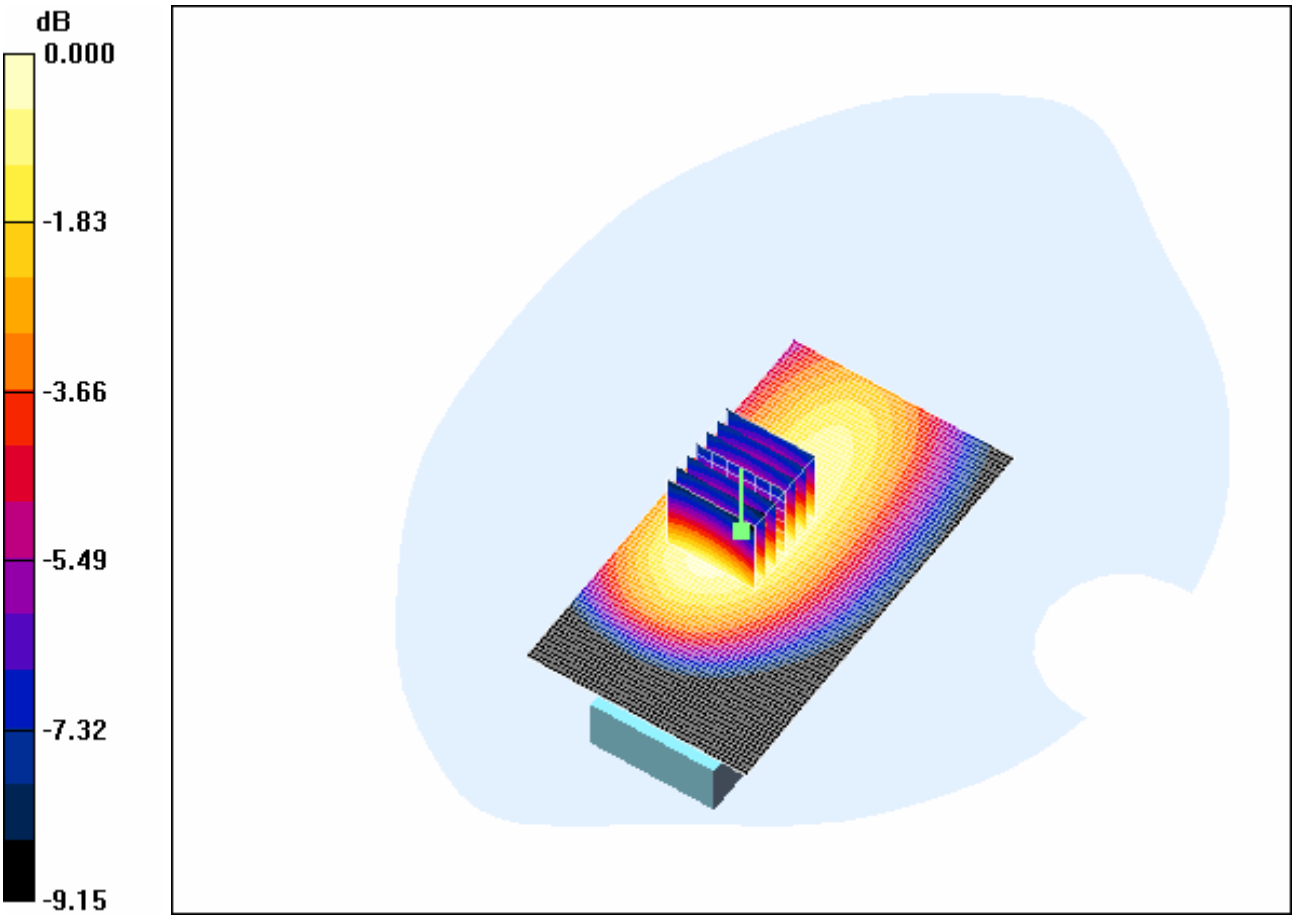
Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz;Duty Cycle: 1:8.3
Medium: HSL850-Body Medium parameters used: f = 836.4 MHz; σ = 0.991 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.02, 8.02, 8.02); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body Worn - Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.689 mW/g

Body Worn - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.1 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 0.875 W/kg
SAR(1 g) = 0.653 mW/g; SAR(10 g) = 0.472 mW/g
Maximum value of SAR (measured) = 0.690 mW/g



0 dB = 0.690mW/g

4.11 GSM850-Body-Worn -High

Date/Time: 2007-12-26 19:40:46

Test Laboratory: SGS-GSM

GSM850-Body-Worn-High-2.0

DUT: GSM10743445; Type: Head; Serial: 011433000000166

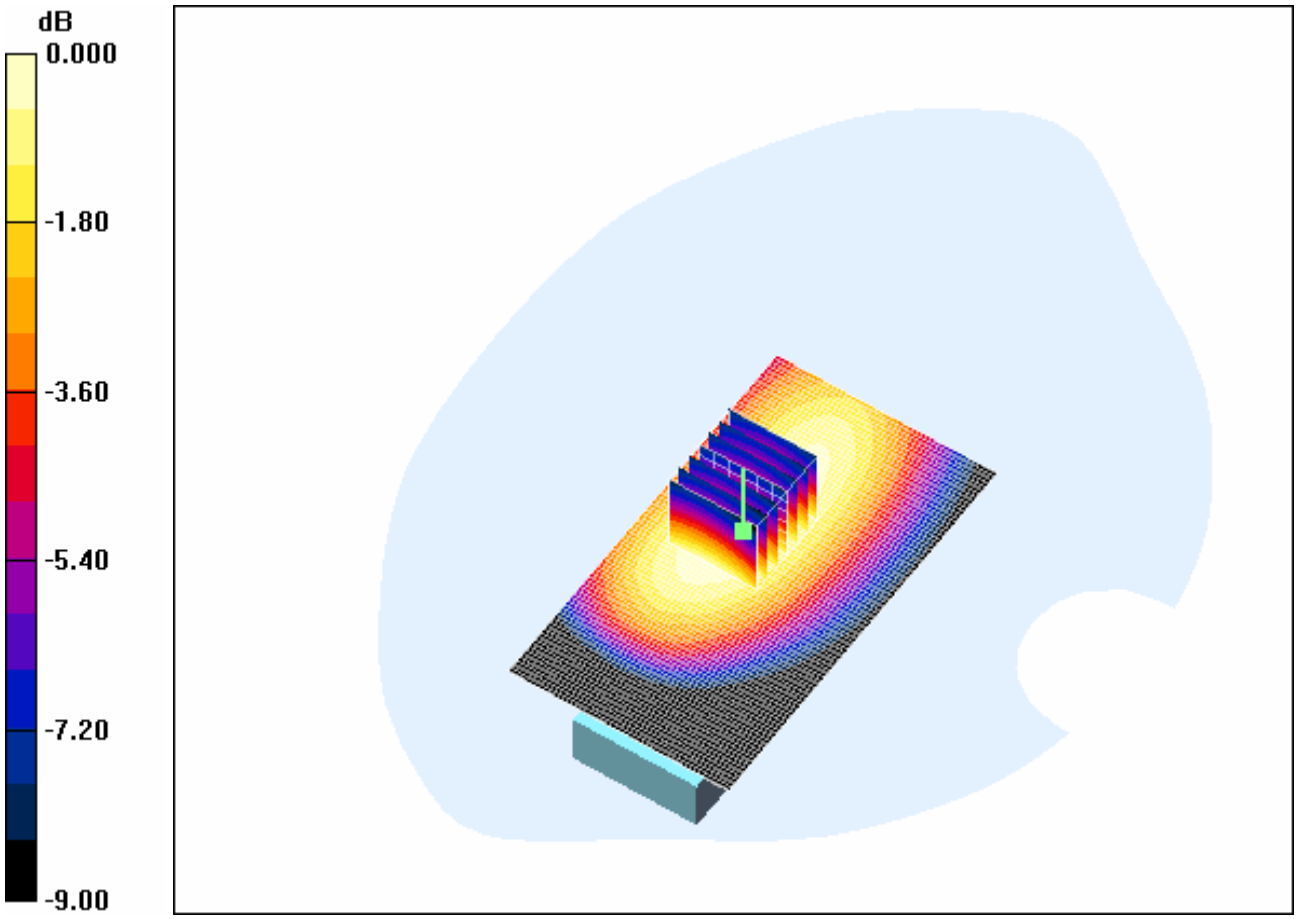
Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium: HSL850-Body Medium parameters used: f = 848.8 MHz; σ = 1.01 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(8.02, 8.02, 8.02); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body Worn - High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.618 mW/g

Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.5 V/m; Power Drift = -0.081 dB
Peak SAR (extrapolated) = 0.771 W/kg
SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.419 mW/g
Maximum value of SAR (measured) = 0.609 mW/g



0 dB = 0.609mW/g

4.12 PCS1900-LeftHandSide-Cheek-Middle

Date/Time: 2007-12-21 18:13:03

Test Laboratory: SGS-GSM

GSM1900-LeftHandSide-Cheek-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

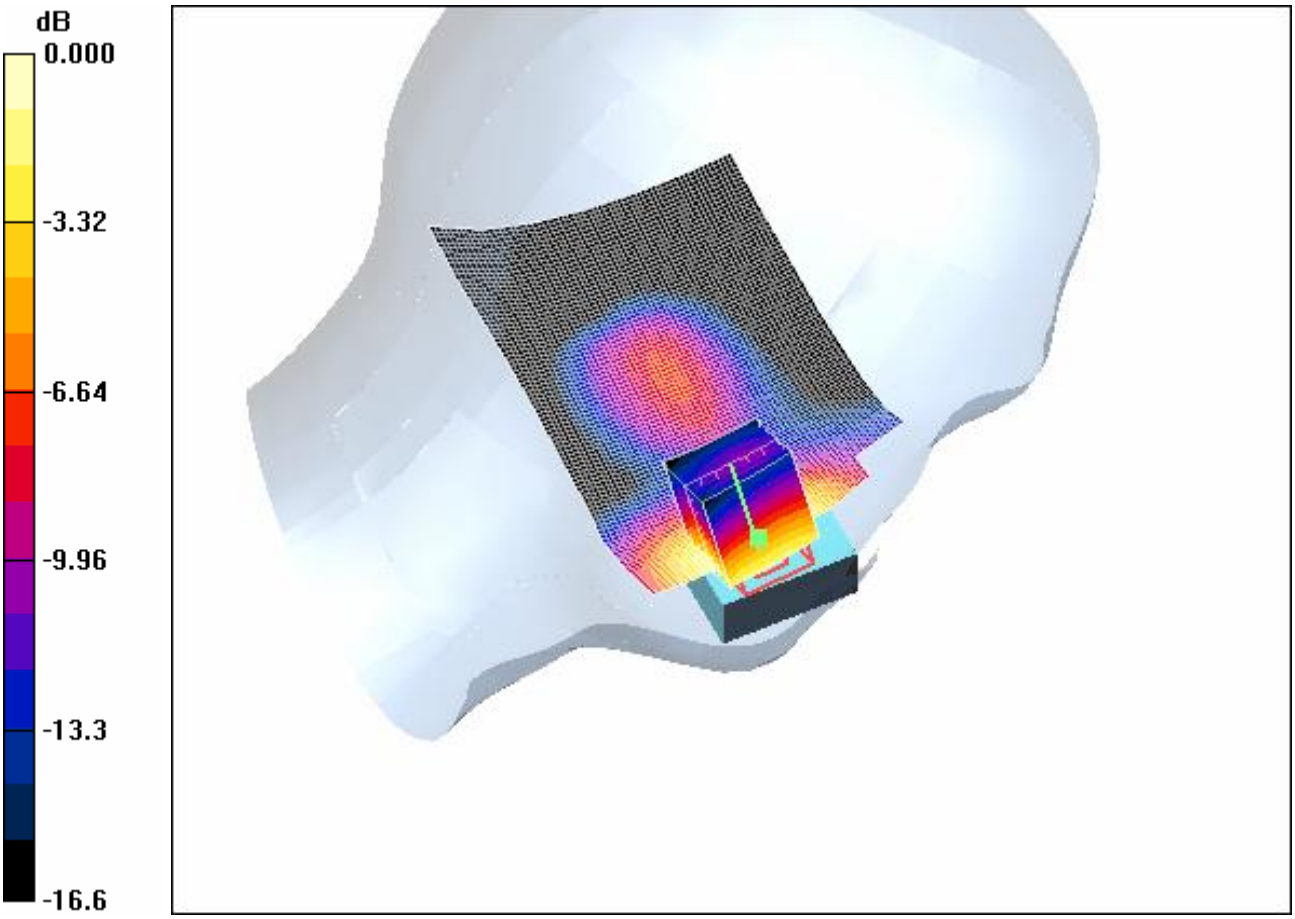
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1880 MHz; σ = 1.42 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Middle(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.852 mW/g

Cheek position - Middle(JN)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.40 V/m; Power Drift = 0.097 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.734 mW/g; SAR(10 g) = 0.454 mW/g
Maximum value of SAR (measured) = 0.793 mW/g



0 dB = 0.793mW/g

4.13 PCS1900-LeftHandSide-Tilt-Middle

Date/Time: 2007-12-21 19:41:12

Test Laboratory: SGS-GSM

GSM1900-LeftHandSide-Tilt-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

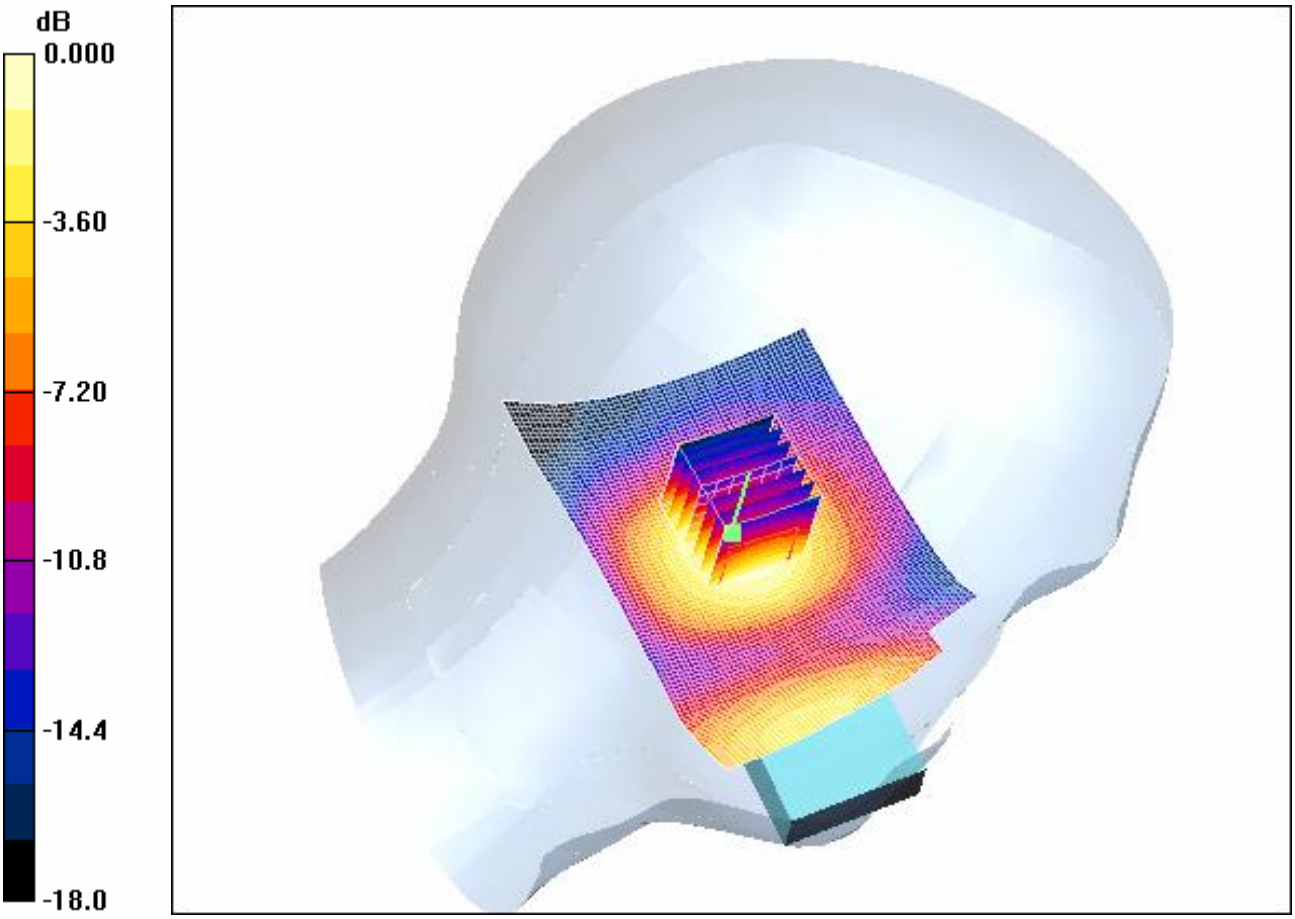
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1880 MHz; σ = 1.42 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Tilt position - Middle(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.173 mW/g

Tilt position - Middle(JN)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.70 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 0.239 W/kg
SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.087 mW/g
Maximum value of SAR (measured) = 0.160 mW/g



0 dB = 0.160mW/g

4.14 PCS1900-LeftHandSide-WorstCase-Low

Date/Time: 2007-12-21 18:41:05

Test Laboratory: SGS-GSM

GSM1900-LeftHandSide-Cheek-Low

DUT: GSM0743445; Type: Head; Serial: 011433000000166

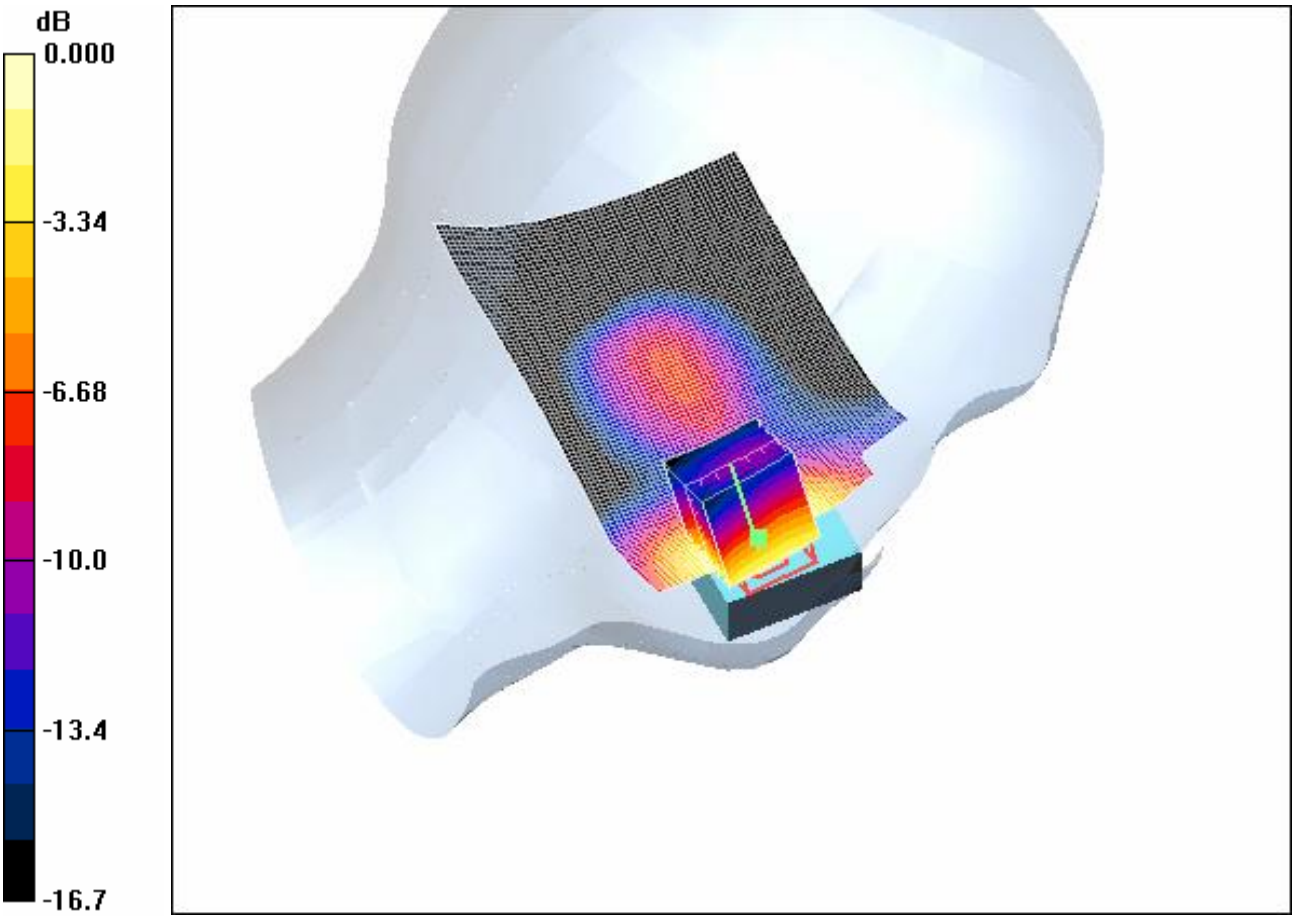
Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1850.2 MHz; σ = 1.39 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Low(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.525 mW/g

Cheek position - Low(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.71 V/m; Power Drift = 0.058 dB
Peak SAR (extrapolated) = 0.687 W/kg
SAR(1 g) = 0.448 mW/g; SAR(10 g) = 0.278 mW/g
Maximum value of SAR (measured) = 0.480 mW/g



0 dB = 0.480mW/g

4.15 PCS1900-LeftHandSide-WorstCase-High

Date/Time: 2007-12-21 19:06:25

Test Laboratory: SGS-GSM

GSM1900-LeftHandSide-Cheek-High

DUT: GSM0743445; Type: Head; Serial: 011433000000166

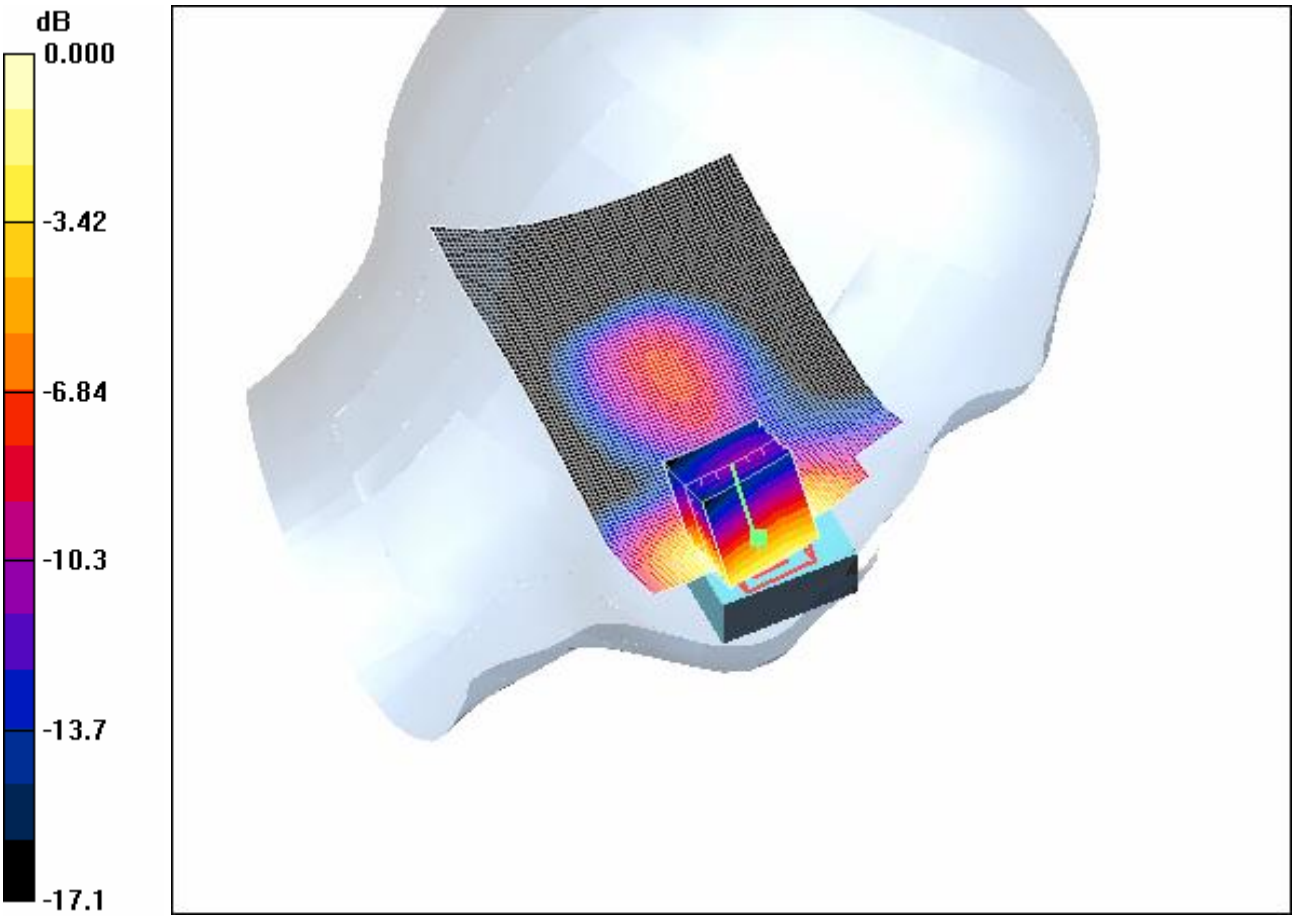
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1909.8 MHz; σ = 1.45 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - High(JN)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.969 mW/g

Cheek position - High(JN)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.91 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.825 mW/g; SAR(10 g) = 0.506 mW/g
Maximum value of SAR (measured) = 0.891 mW/g



0 dB = 0.891mW/g

4.16 PCS1900-RightHandSide-Cheek-Middle

Date/Time: 2007-12-21 21:05:36

Test Laboratory: SGS-GSM

GSM1900-RightHandSide-Cheek-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1880 MHz; σ = 1.42 mho/m; ε_r = 39.8; ρ =

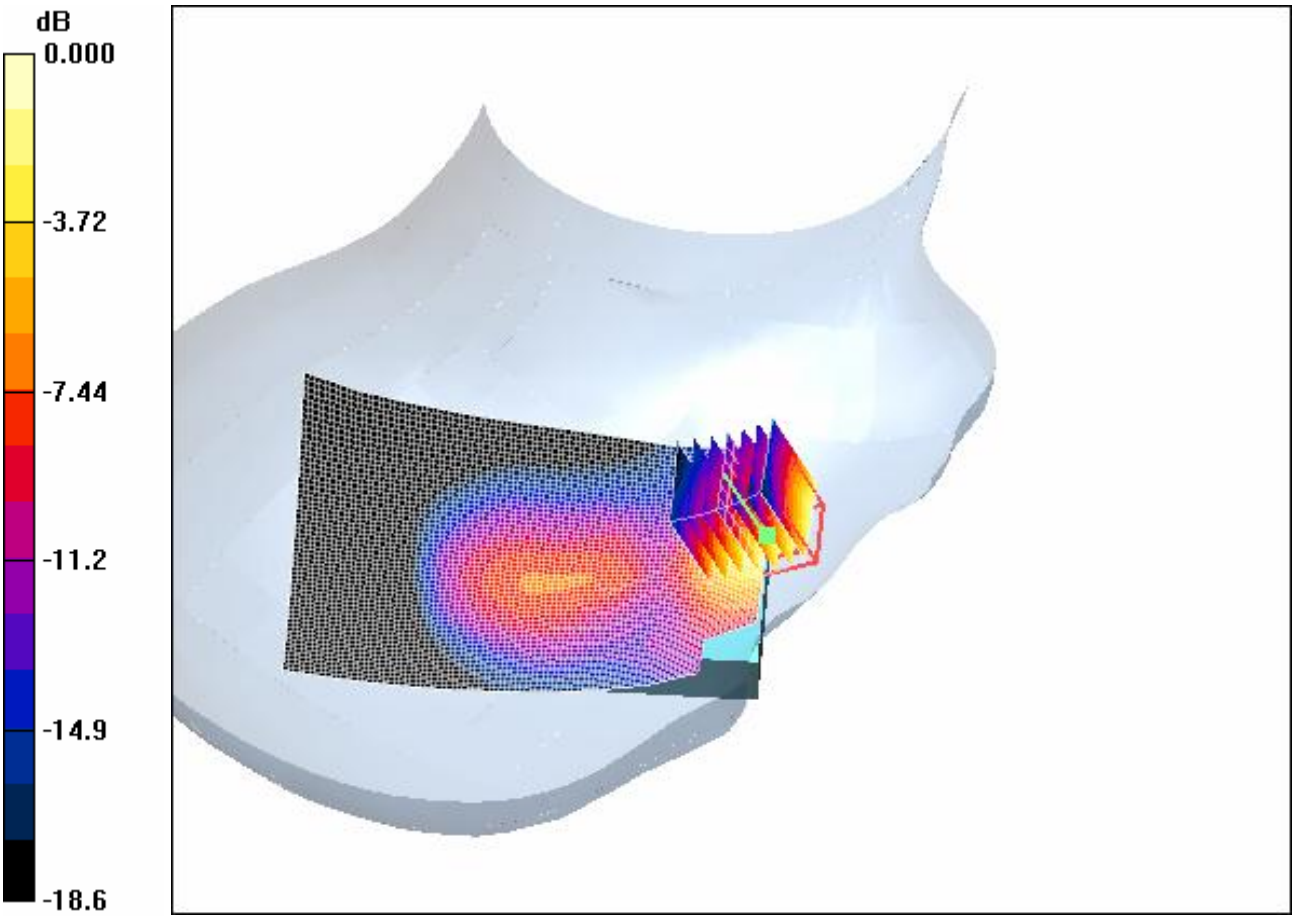
1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Middle(BYD)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.790 mW/g

Cheek position - Middle(BYD)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.66 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.740 mW/g; SAR(10 g) = 0.424 mW/g
Maximum value of SAR (measured) = 0.804 mW/g



0 dB = 0.804mW/g

4.17 PCS1900-RightHandSide-Tilt-Middle

Date/Time: 2007-12-21 20:12:53

Test Laboratory: SGS-GSM

GSM1900-RightHandSide-Tilt-Mid

DUT: GSM0743445; Type: Head; Serial: 011433000000166

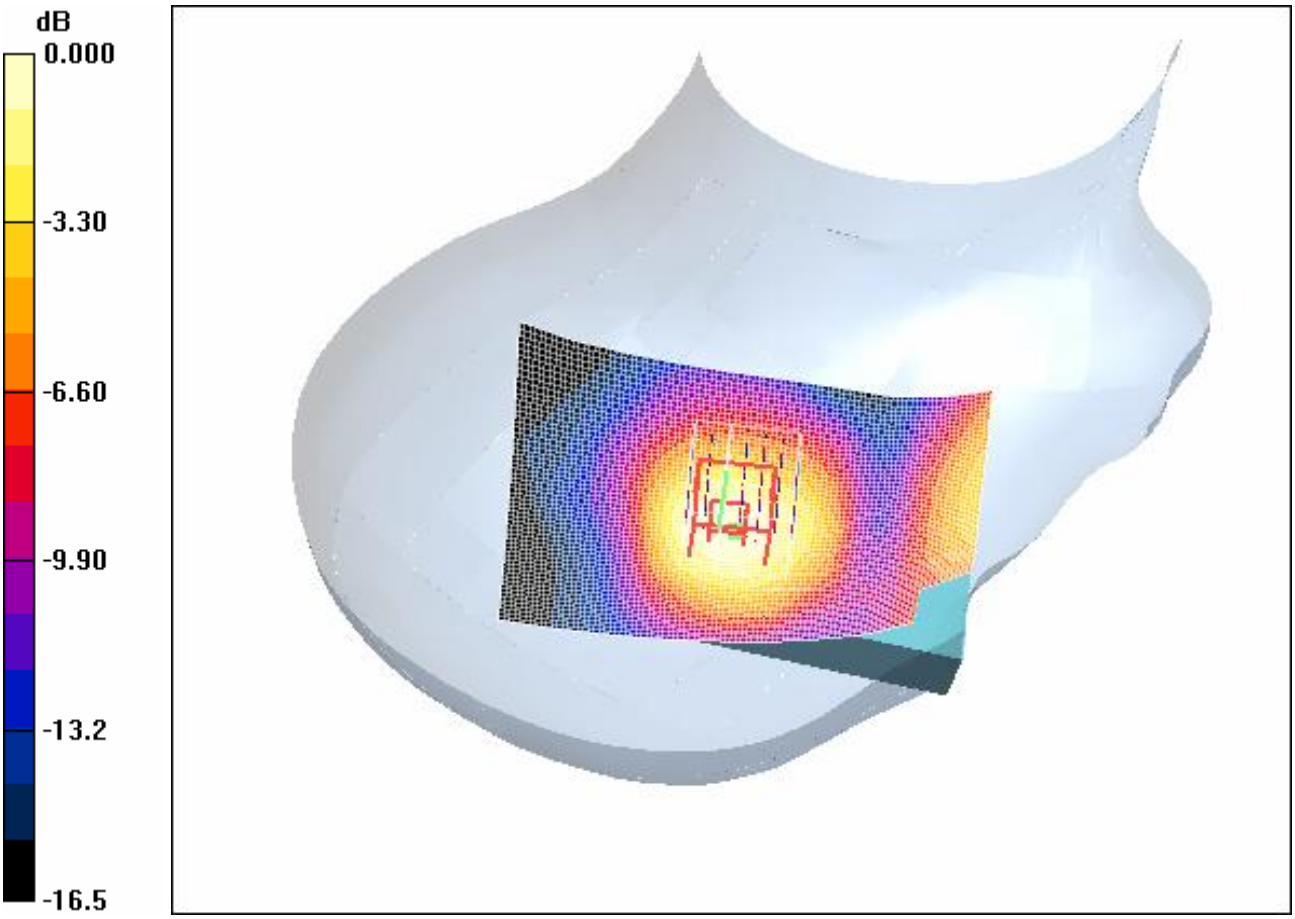
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1880 MHz; σ = 1.42 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Tilt position - Middle(BYD)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.150 mW/g

Tilt position - Middle(BYD)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.56 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 0.216 W/kg
SAR(1 g) = 0.134 mW/g; SAR(10 g) = 0.079 mW/g
Maximum value of SAR (measured) = 0.146 mW/g



0 dB = 0.146mW/g

4.18 PCS1900-RightHandSide-WorstCase-Low

Date/Time: 2007-12-21 21:31:30

Test Laboratory: SGS-GSM

GSM1900-RightHandSide-Cheek-Low

DUT: GSM0743445; Type: Head; Serial: 011433000000166

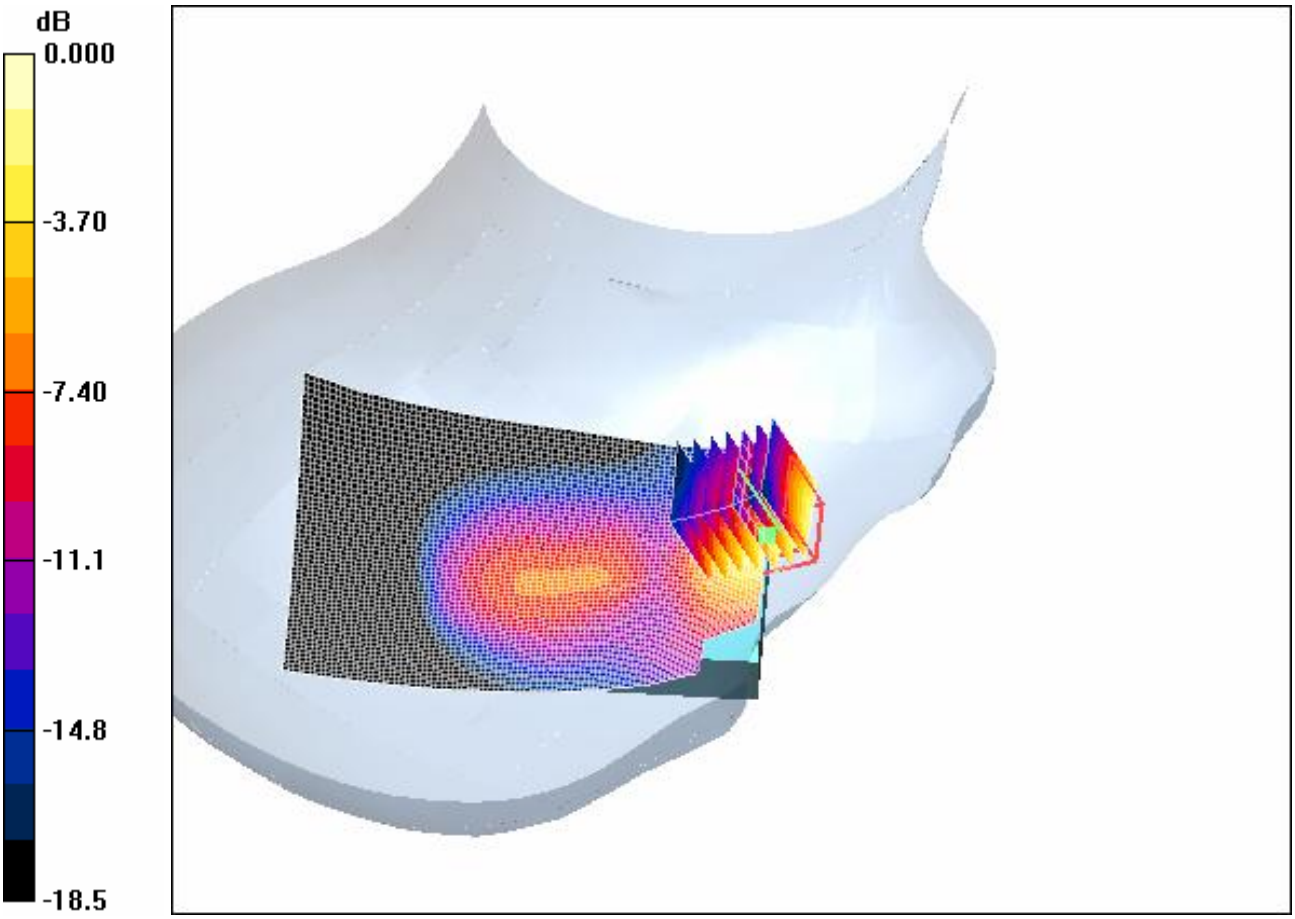
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1880 MHz; σ = 1.42 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - Low(BYD)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.483 mW/g

Cheek position - Low(BYD)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.21 V/m; Power Drift = 0.084 dB
Peak SAR (extrapolated) = 0.748 W/kg
SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.261 mW/g
Maximum value of SAR (measured) = 0.495 mW/g



0 dB = 0.495mW/g

4.19 PCS1900-RightHandSide-WorstCase-High

Date/Time: 2007-12-21 22:04:19

Test Laboratory: SGS-GSM

GSM1900-RightHandSide-Cheek-High

DUT: GSM0743445; Type: Head; Serial: 011433000000166

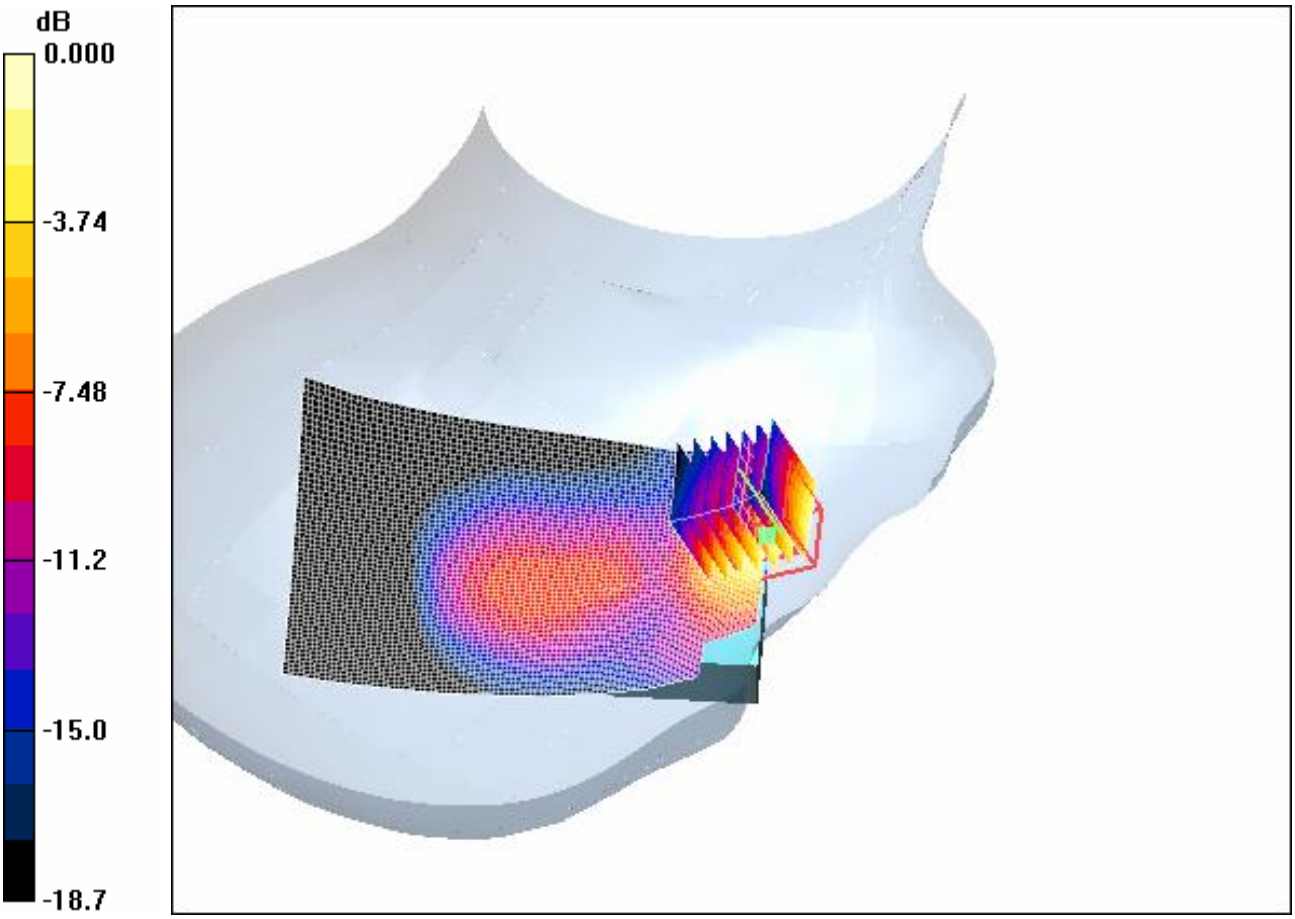
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900_Head Medium parameters used: f = 1909.8 MHz; σ = 1.45 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.9, 6.9, 6.9); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Cheek position - High(BYD)/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.960 mW/g

Cheek position - High(BYD)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.28 V/m; Power Drift = -0.066 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.890 mW/g; SAR(10 g) = 0.505 mW/g
Maximum value of SAR (measured) = 0.971 mW/g



0 dB = 0.971mW/g

4.20PCS1900-Body-Worn -Low

Date/Time: 2007-12-26 14:08:28

Test Laboratory: SGS-GSM

GSM1900-Body-Worn-Low-2cm

DUT: GSM0743445; Type: Head; Serial: 011433000000166

Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: 1900-Body Medium parameters used: f = 1850.2 MHz; σ = 1.53 mho/m; ε_r = 50.9; ρ = 1000

kg/m^3

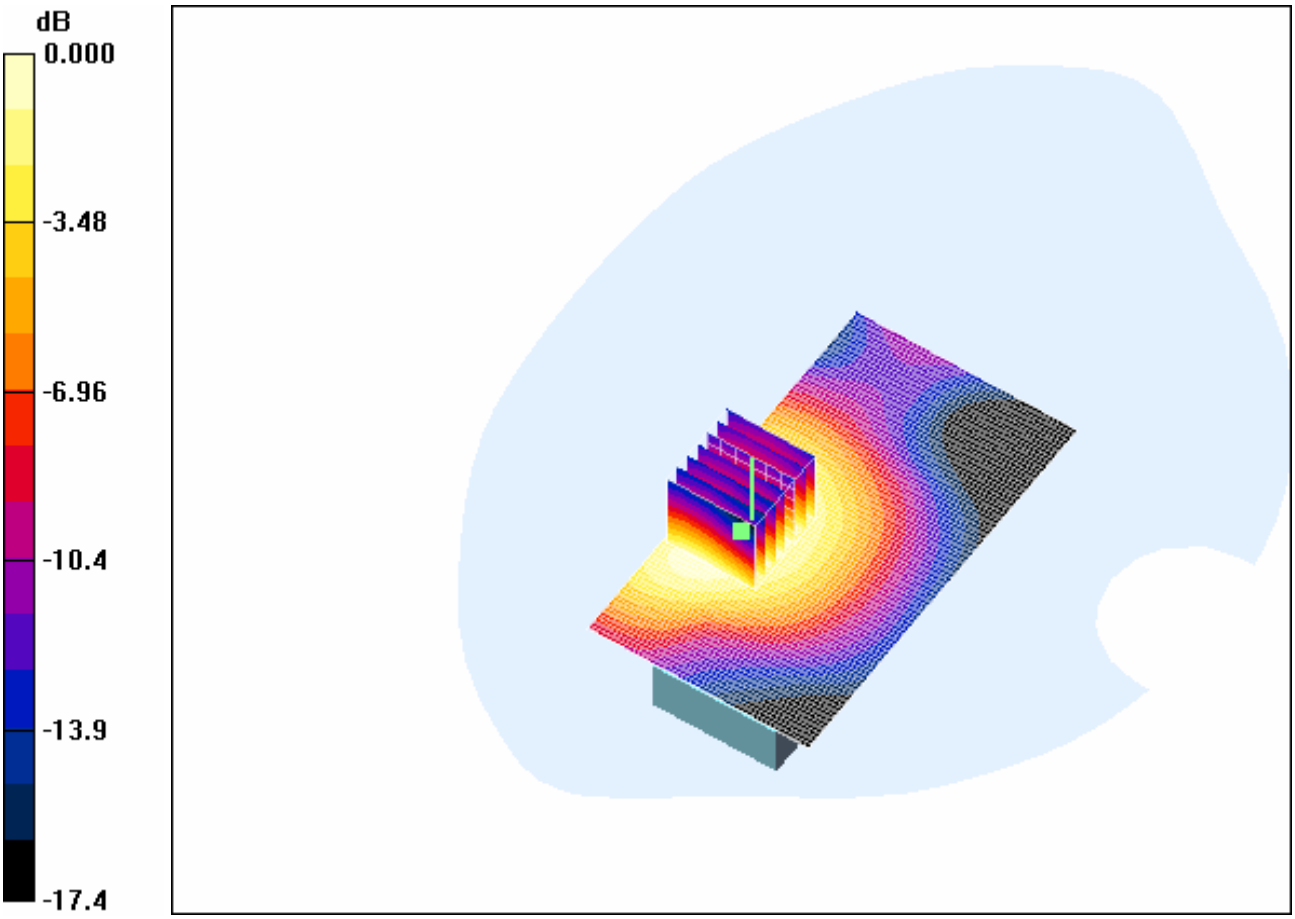
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.97, 6.97, 6.97); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body Worn - Low(BYD)/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.273 mW/g

Body Worn - Low(BYD)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.89 V/m; Power Drift = 0.217 dB
Peak SAR (extrapolated) = 0.398 W/kg
SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.156 mW/g
Maximum value of SAR (measured) = 0.268 mW/g



0 dB = 0.268mW/g

4.21 PCS1900-Body-Worn -Middle

Date/Time: 2007-12-26 13:48:22

Test Laboratory: SGS-GSM

GSM1900-Body-Worn-Mid-2cm

DUT: GSM0743445; Type: Head; Serial: 011433000000166

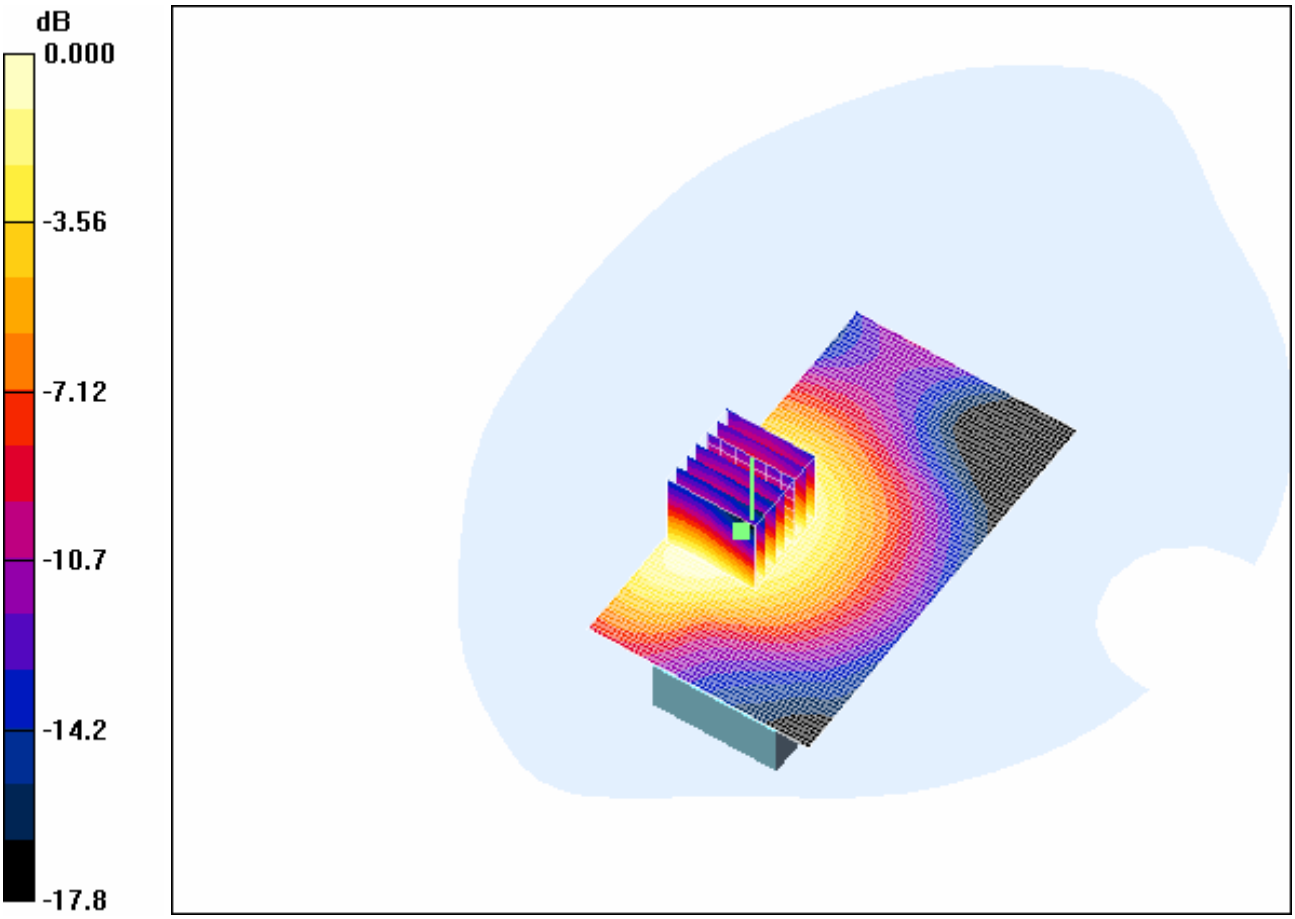
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900-Body Medium parameters used: f = 1880 MHz; σ = 1.56 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.97, 6.97, 6.97); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body Worn - Middle(BYD)/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.375 mW/g

Body Worn - Middle(BYD)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.95 V/m; Power Drift = 0.119 dB
Peak SAR (extrapolated) = 0.548 W/kg
SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.213 mW/g
Maximum value of SAR (measured) = 0.367 mW/g



0 dB = 0.367mW/g

4.22 PCS1900-Body-Worn -High

Date/Time: 2007-12-26 14:37:04

Test Laboratory: SGS-GSM

GSM1900-Body-Worn-High-2cm

DUT: GSM0743445; Type: Head; Serial: 011433000000166

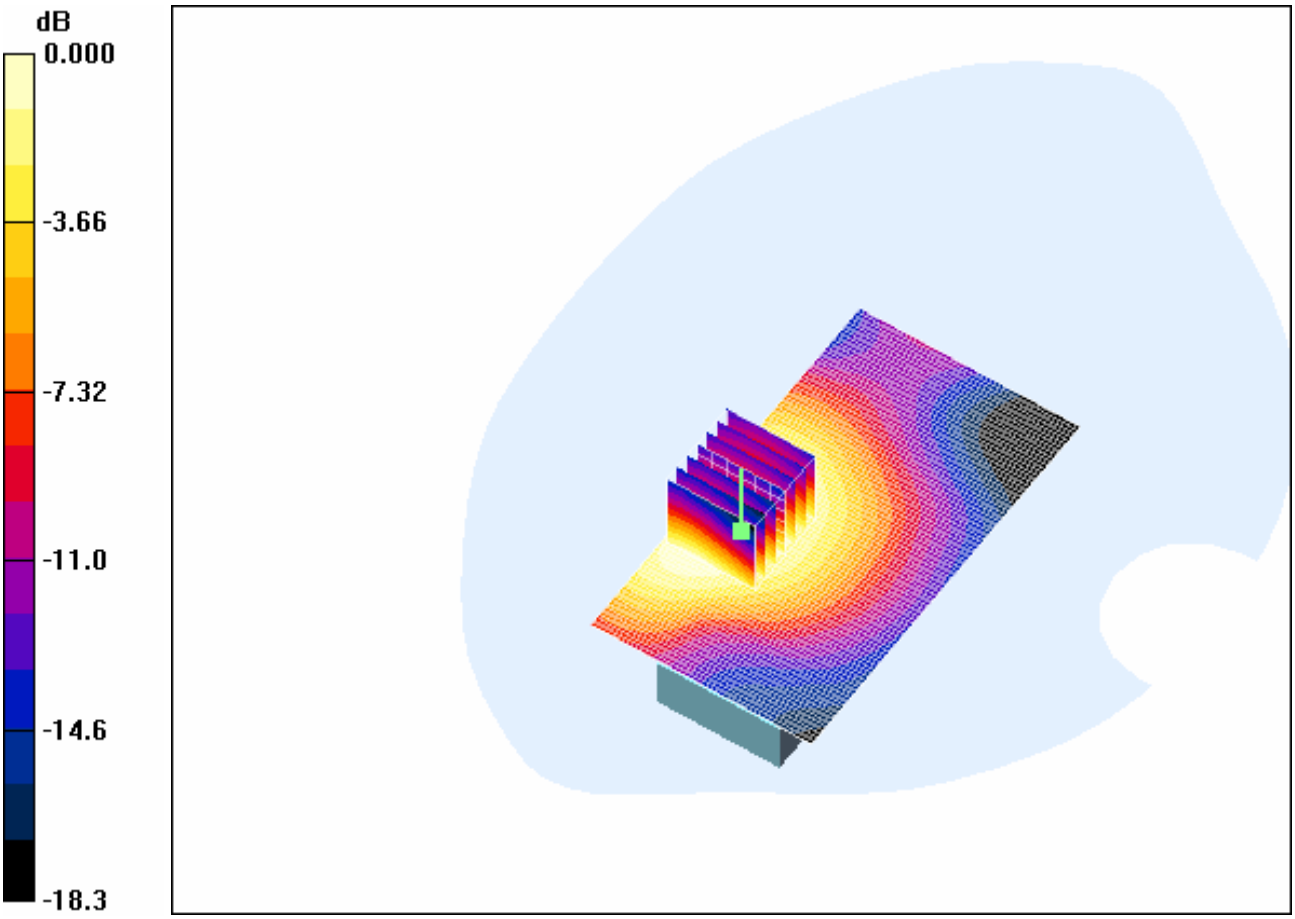
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: 1900-Body Medium parameters used: f = 1909.8 MHz; σ = 1.6 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3578; ConvF(6.97, 6.97, 6.97); Calibrated: 2007-4-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2007-11-19
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body Worn - High(BYD)/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.444 mW/g

Body Worn - High(BYD)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.47 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 0.667 W/kg
SAR(1 g) = 0.401 mW/g; SAR(10 g) = 0.248 mW/g
Maximum value of SAR (measured) = 0.429 mW/g



0 dB = 0.429mW/g

Appendix

1. Photographs of Test Setup

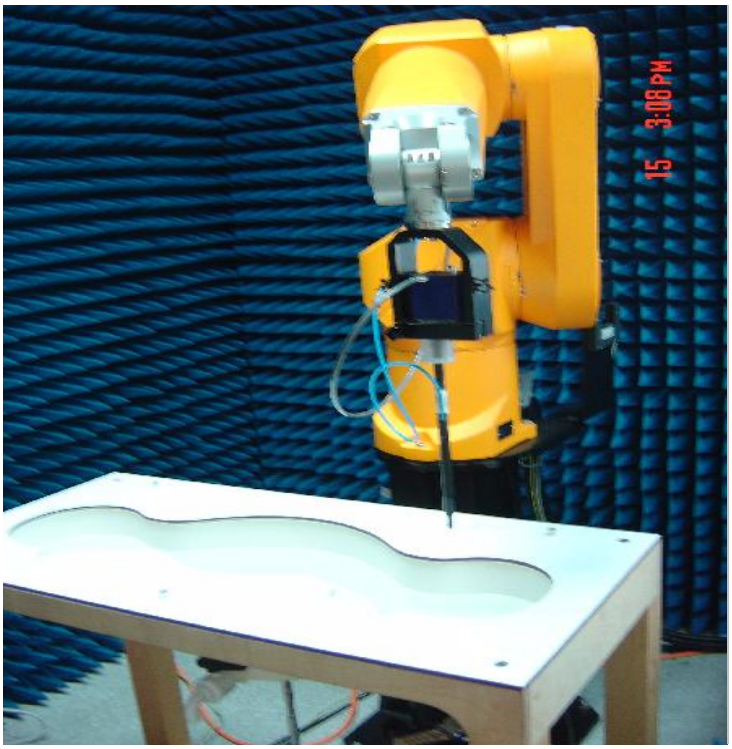


Fig.1 Photograph of the SAR measurement System

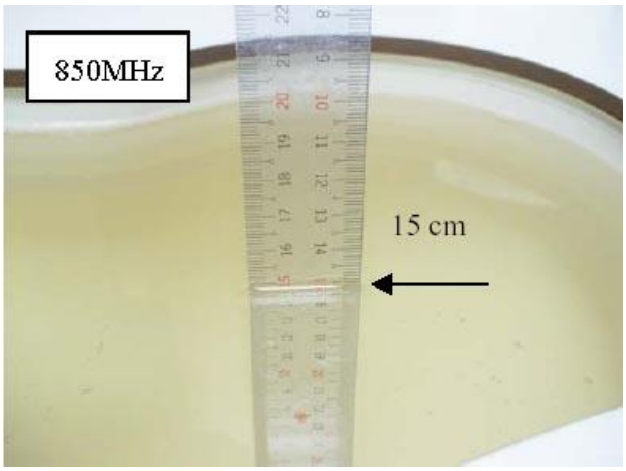


Fig.2 Photograph of the Tissue Simulant Fluid Liquid depth 15cm for Left-Head Side

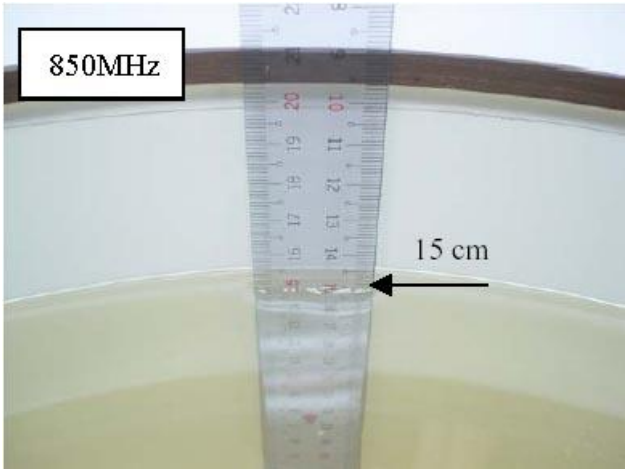


Fig.3 Photograph of the Tissue Simulant Liquid depth 15cm for Body-Worn

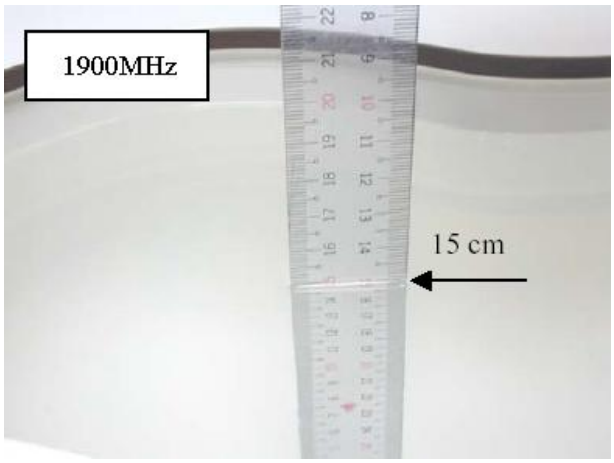


Fig.4 Photograph of the Tissue Simulant Fluid Liquid depth 15cm for Right-Head Side

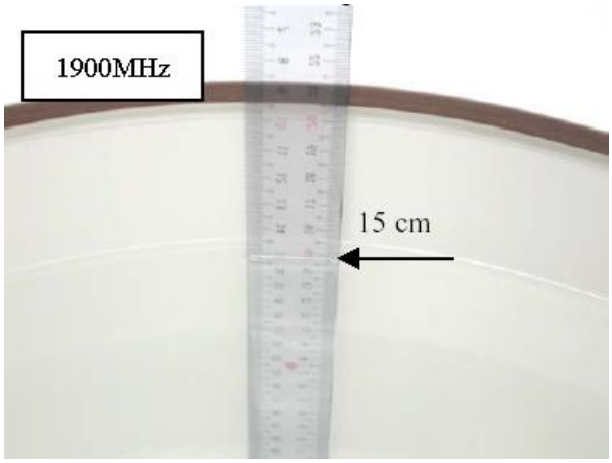


Fig.5 Photograph of the Tissue Simulant Liquid depth 15cm for Body-Worn

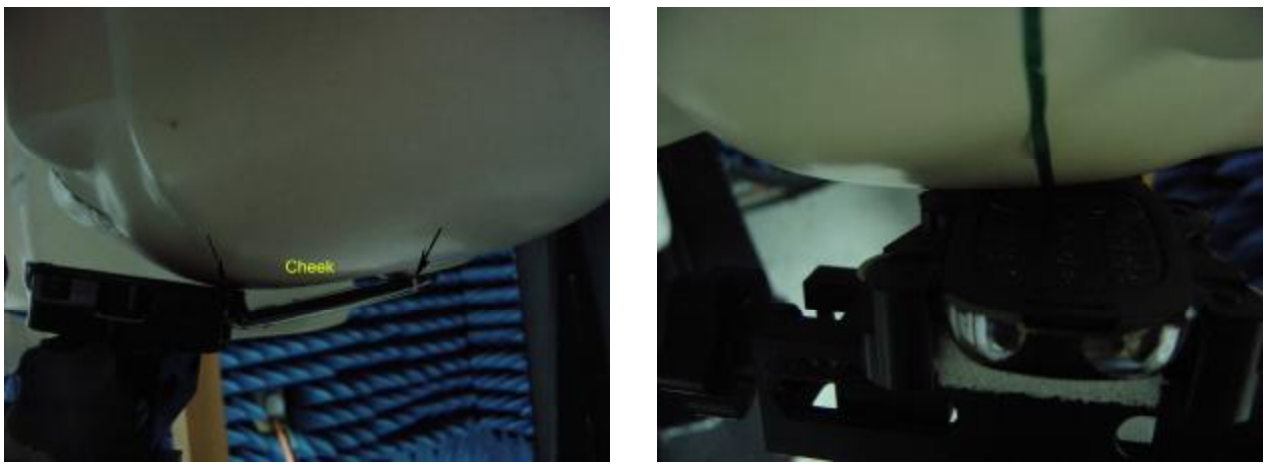


Fig.6 Photograph of the Left Hand Side Cheek status

Fig.7 Photograph of the Left Hand Side Tilt status

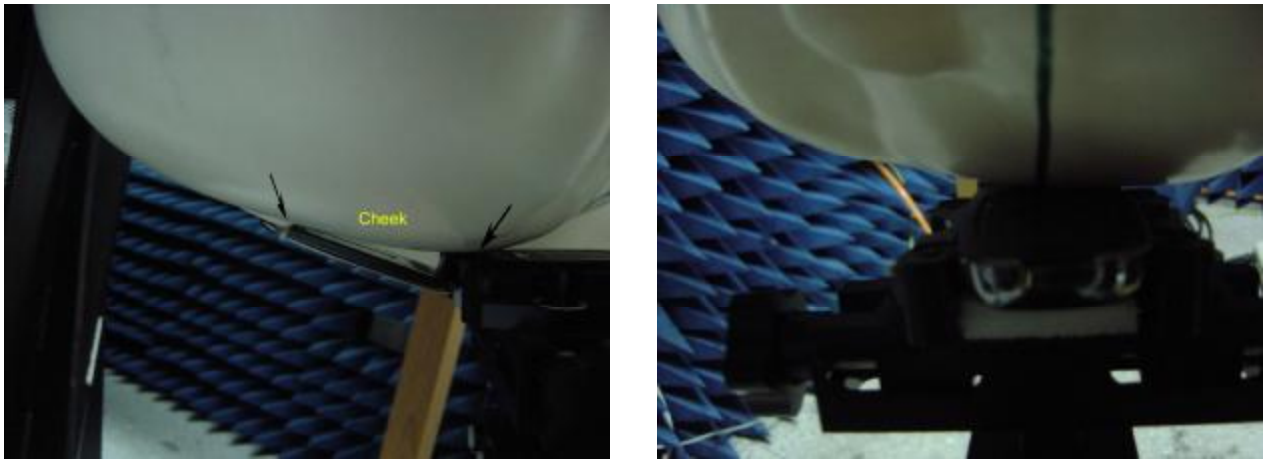


Fig.8 Photograph of the Right Hand Side Cheek status

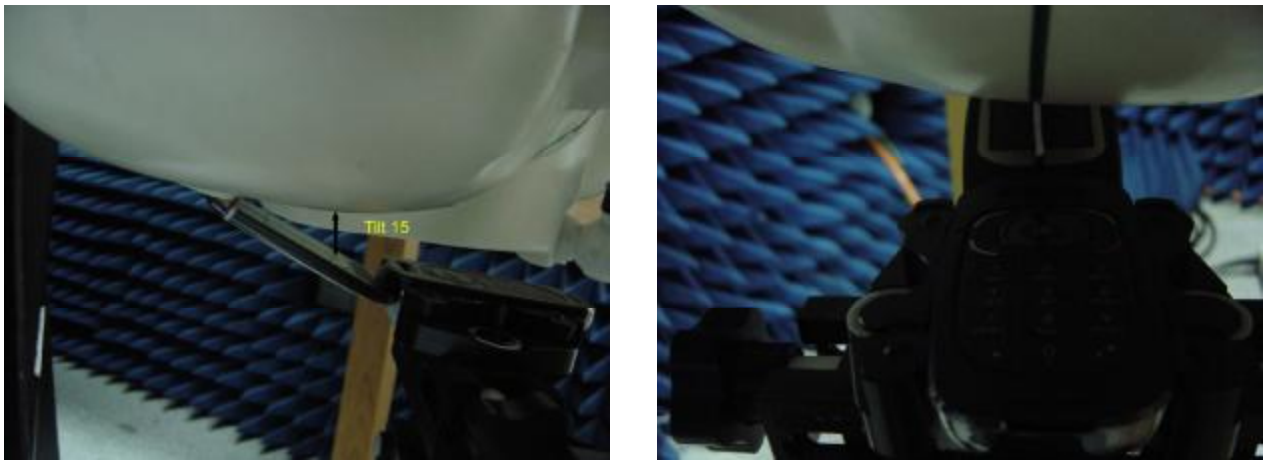


Fig.9 Photograph of the Right Hand Side Tilt status

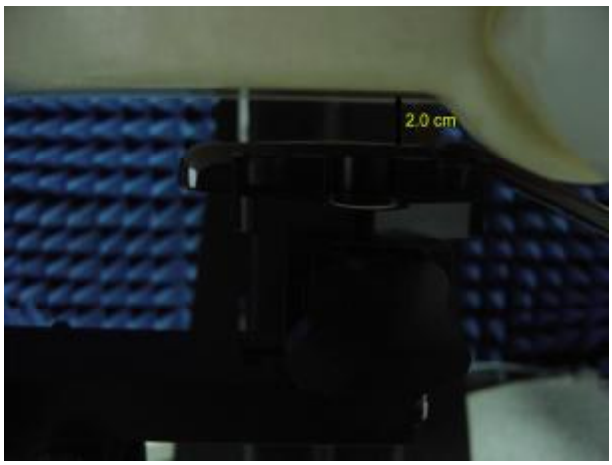


Fig.10 Photograph of the BodyWorn status

2. Photographs of the EUT

Fig.11 Front View

Fig.12 Back View

3. Photographs of the battery

Fig.13 Battery

4. Probe Calibration certificate

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

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

Accreditation No.: SCS 108

Client **Auden**

Certificate No: EX3-3578_Apr07

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3578
Calibration procedure(s)	QA CAL-01.v5 and QA CAL14.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	April 24, 2007
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00692)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00693)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	2[illegible]-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

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

Issued: April 24, 2007

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

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
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 effect 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 (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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:3578

Manufactured:	November 4, 2005
Last calibrated:	March 20, 2006
Recalibrated:	April 24, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3578

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**0.540** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**80** mV
NormY	**0.490** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**86** mV
NormZ	**0.570** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**93** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.3	1.6
SAR_{be} [%]	With Correction Algorithm	0.0	0.1

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	2.5	1.0
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

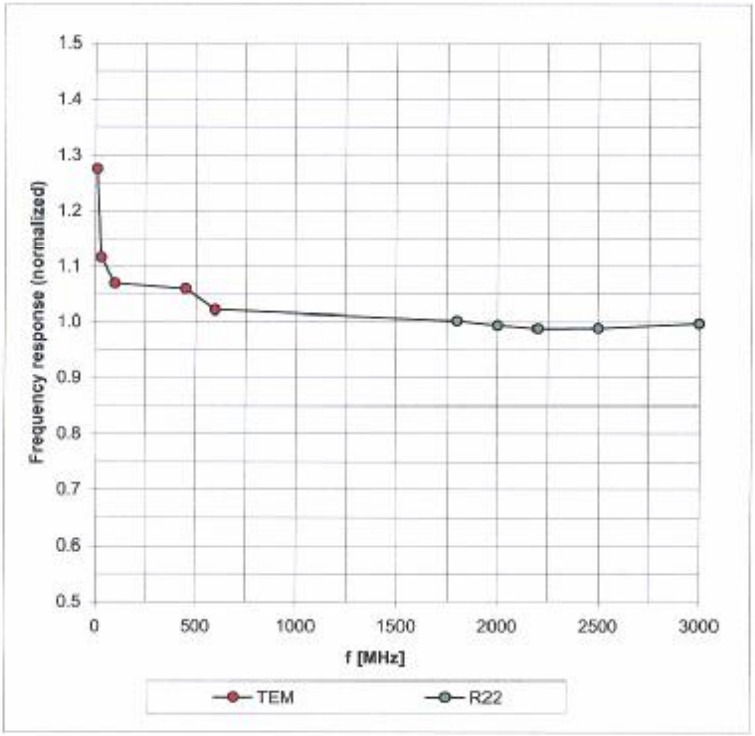
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

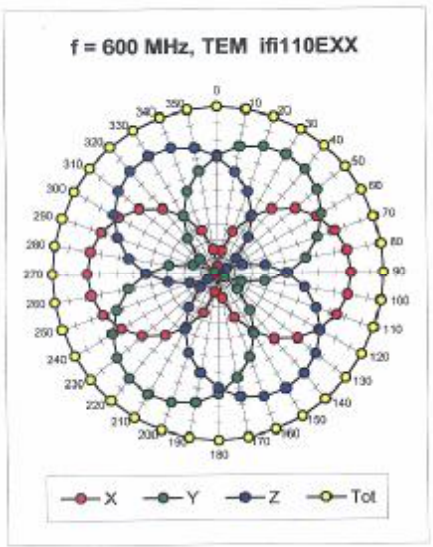
Frequency Response of E-Field

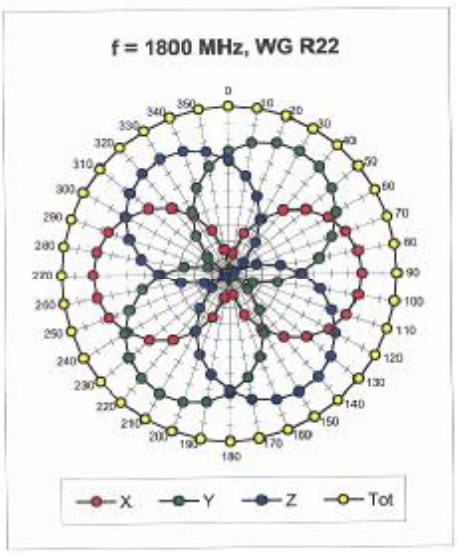
(TEM-Cell:ifi110 EXX, Waveguide: R22)

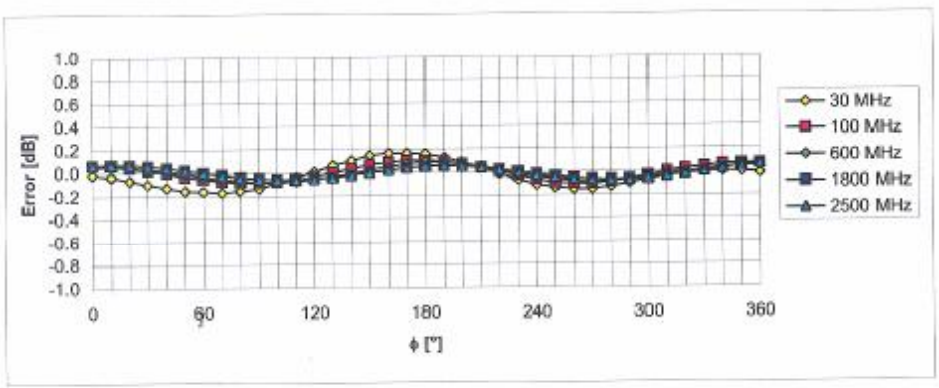


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



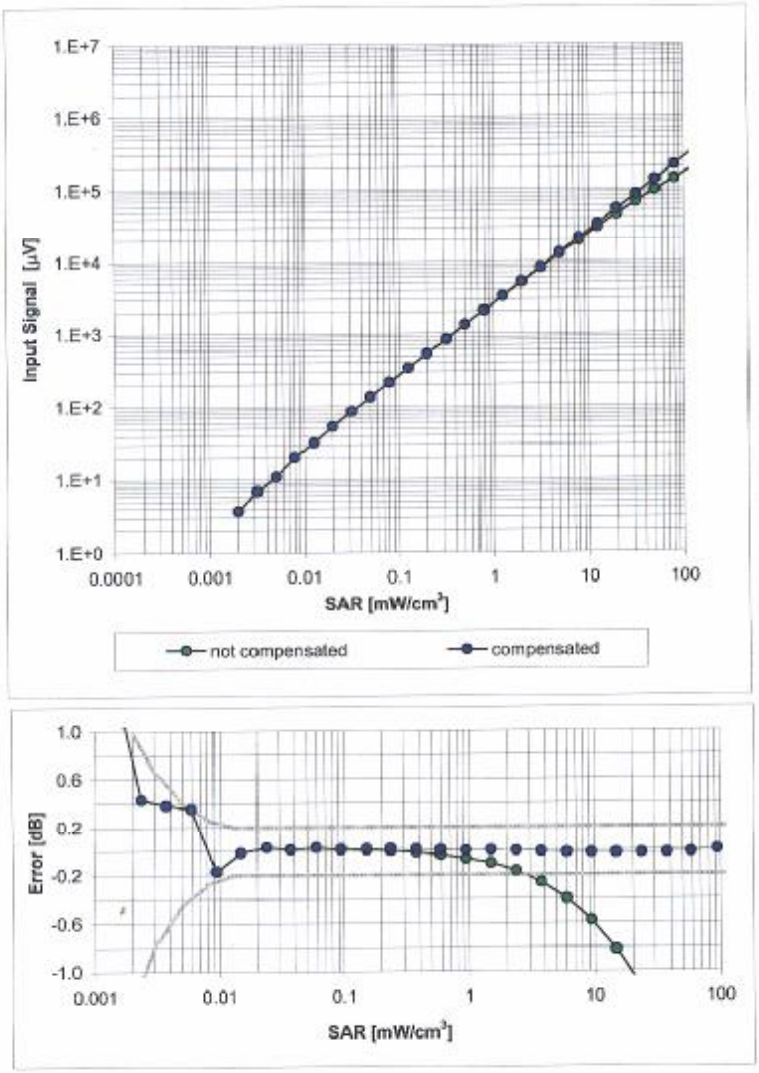




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

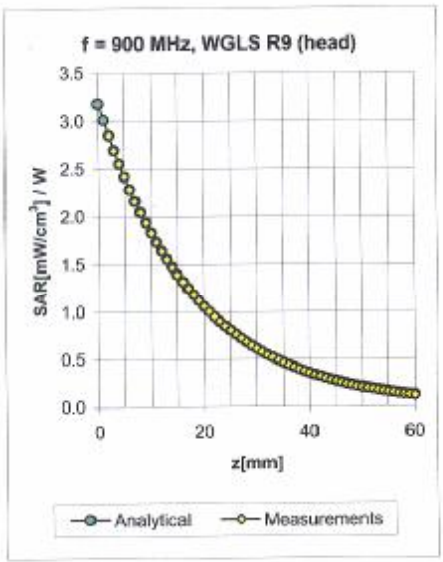
Dynamic Range f(SAR_{head})

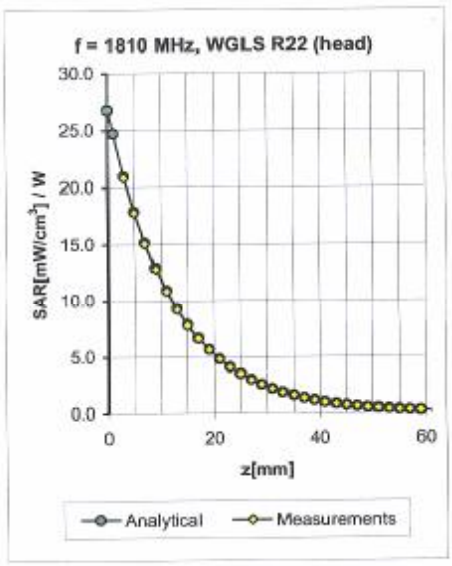
(Waveguide R22, f = 1800 MHz)



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

Conversion Factor Assessment



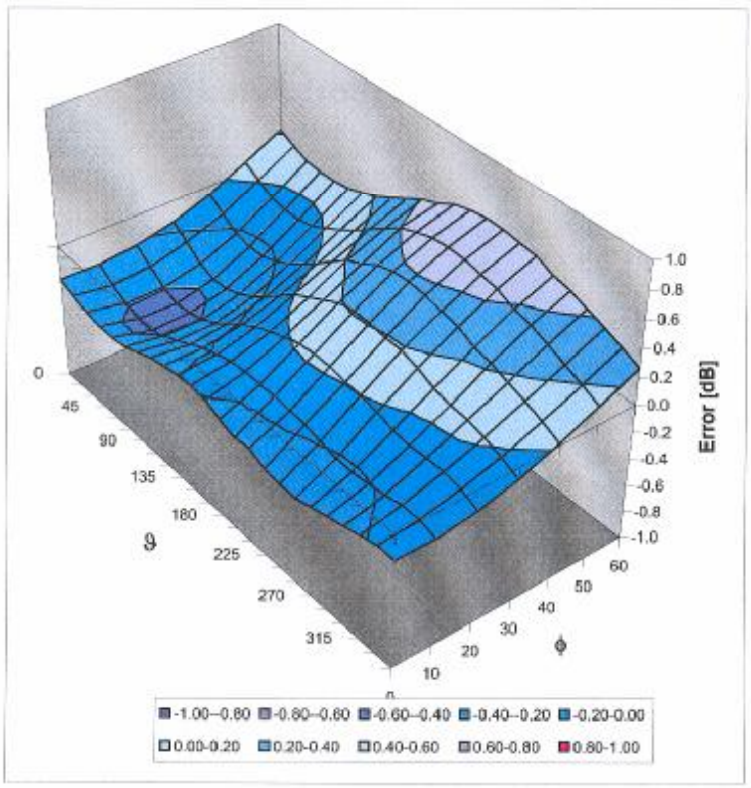


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.60	0.90	8.12 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.24	1.00	6.90 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.40	1.00	6.52 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.45	1.00	6.35 ± 11.8% (k=2)
5200	± 50 / ± 100	Head	36.0 ± 5%	4.66 ± 5%	0.43	1.70	4.61 ± 13.1% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.43	1.70	4.10 ± 13.1% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.60	0.80	8.02 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.22	1.00	6.97 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.45	1.00	6.56 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.50	1.00	6.38 ± 11.8% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.48	1.75	3.88 ± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.47	1.75	3.76 ± 13.1% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

5. Dipole Calibration certification

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

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Accreditation No.: SCS 108

Client: Auden

Certificate No: D900V2-168_Apr07

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 168
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	April 17, 2007
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6 (HF)	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

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

Issued: April 25, 2007

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

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S Swiss Calibration Service

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
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 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 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	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 ± 6 %	0.97 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 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	2.59 mW / g
SAR normalized	normalized to 1W	10.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**10.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.66 mW / g
SAR normalized	normalized to 1W	6.64 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.67 mW /g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature during test	(22.8 ± 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	2.58 mW / g
SAR normalized	normalized to 1W	10.3 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**10.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.71 mW / g
SAR normalized	normalized to 1W	6.84 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.84 mW /g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.4 Ω - 7.9 jΩ
Return Loss	- 21.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.5 Ω - 9.6 jΩ
Return Loss	- 18.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.407 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	May 16, 2002

DASY4 Validation Report for Head TSL

Date/Time: 17.04.2007 14:47:41

Test Laboratory: SPEAG, Zurich, Switzerland

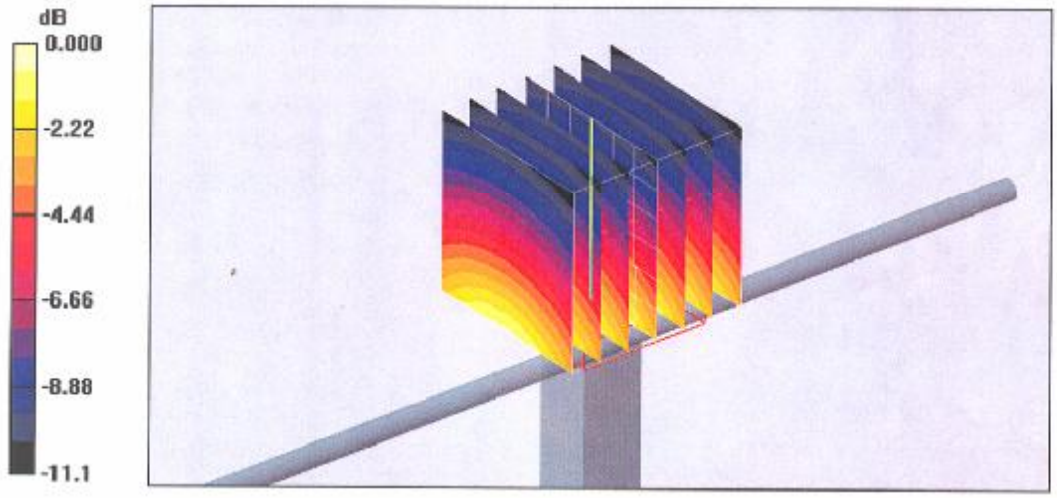
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:168

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL U10BB;
Medium parameters used: f = 900 MHz; σ = 0.96 mho/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

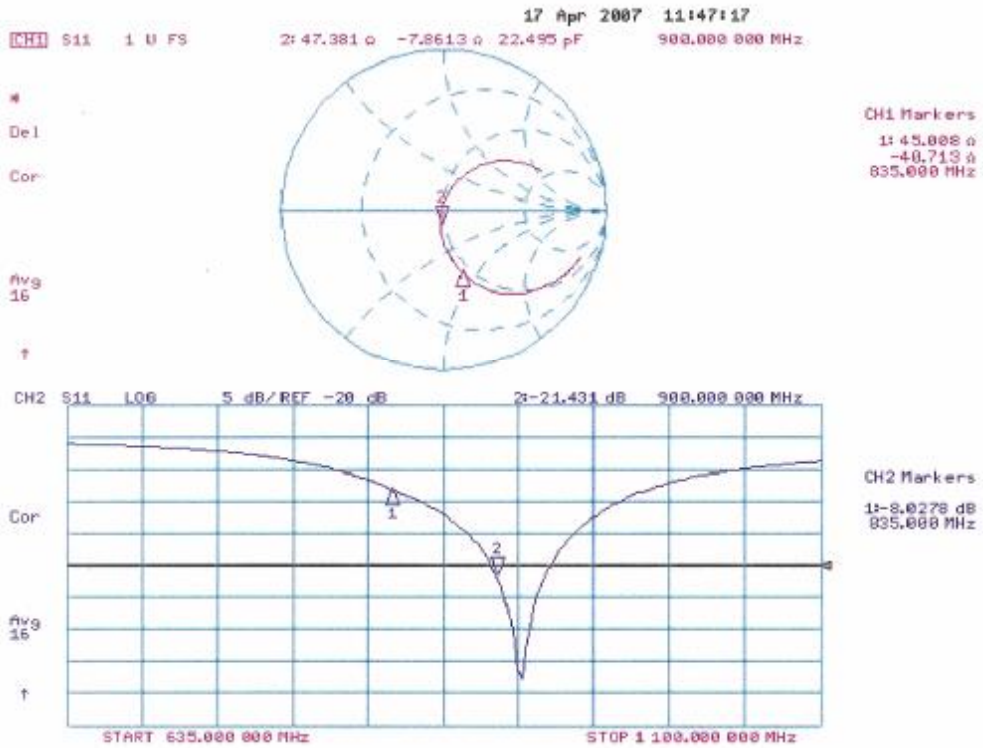
- Probe: ET3DV6 - SN1507 (HF); ConvF(6.01, 6.01, 6.01); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.4 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 3.80 W/kg
SAR(1 g) = 2.59 mW/g; SAR(10 g) = 1.66 mW/g
Maximum value of SAR (measured) = 2.79 mW/g



0 dB = 2.79mW/g

Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 17.04.2007 16:56:18

Test Laboratory: SPEAG, Zurich, Switzerland

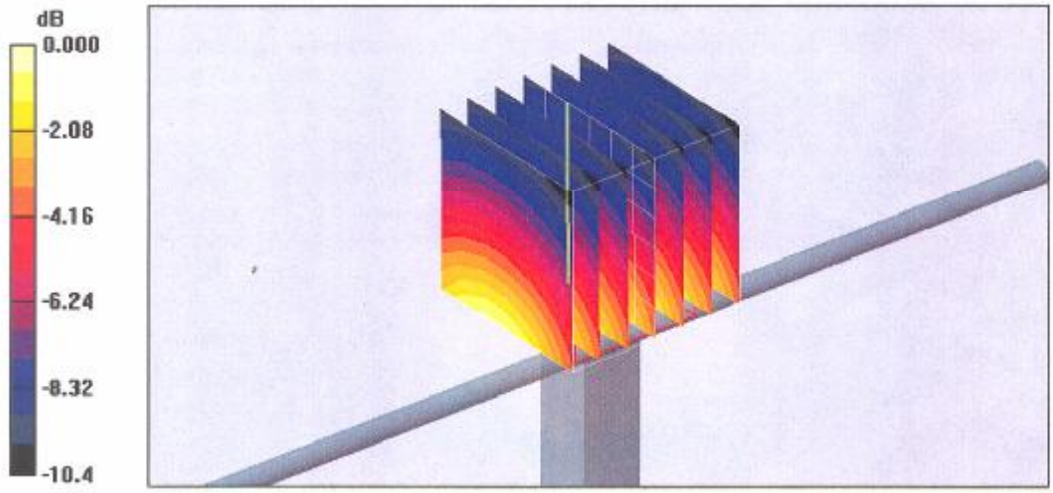
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:168

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1
Medium: MSL U10BB;
Medium parameters used: f = 900 MHz; σ = 1.01 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

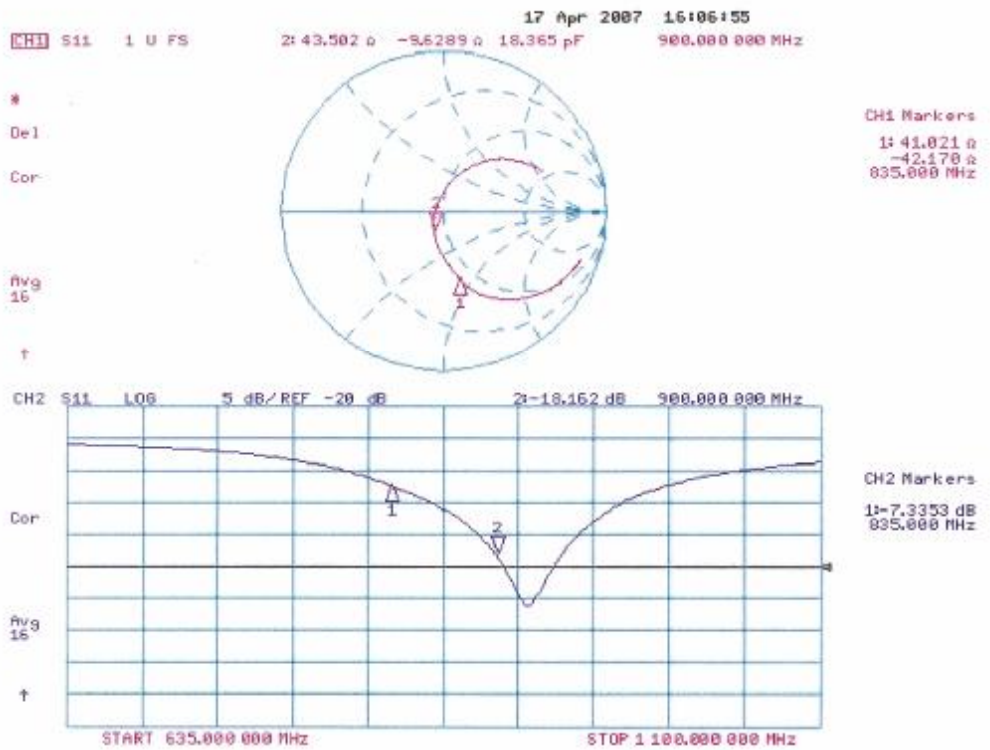
- Probe: ET3DV6 - SN1507 (HF); ConvF(5.8, 5.8, 5.8); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build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

Pin=250mW/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.58 mW/g; SAR(10 g) = 1.71 mW/g
Maximum value of SAR (measured) = 2.77 mW/g



0 dB = 2.77mW/g

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 108

Client Auden

Certificate No: D1800V2-2d052_Apr07

CALIBRATION CERTIFICATE

Object	D1800V2 - SN: 2d052
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	April 23, 2007
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN: 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

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

Issued: April 25, 2007

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

Accreditation No.: **SCS 108**

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

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 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 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	40.0 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 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	9.16 mW /g
SAR normalized	normalized to 1W	36.6 mW /g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**36.6 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.89 mW /g
SAR normalized	normalized to 1W	19.6 mW /g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**19.6 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.9 ± 6 %	1.53 mho/m ± 6 %
Body TSL temperature during test	(21.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.61 mW /g
SAR normalized	normalized to 1W	38.4 mW /g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**37.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.28 mW /g
SAR normalized	normalized to 1W	21.1 mW /g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**20.8 mW / g ± 16.5 % (k=2)**

[2] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.1 Ω - 4.2 jΩ
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	41.7 Ω - 4.4 jΩ
Return Loss	- 19.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.216 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	July 5, 2002

DASY4 Validation Report for Head TSL

Date/Time: 23.04.2007 12:54:23

Test Laboratory: SPEAG, Zurich, Switzerland

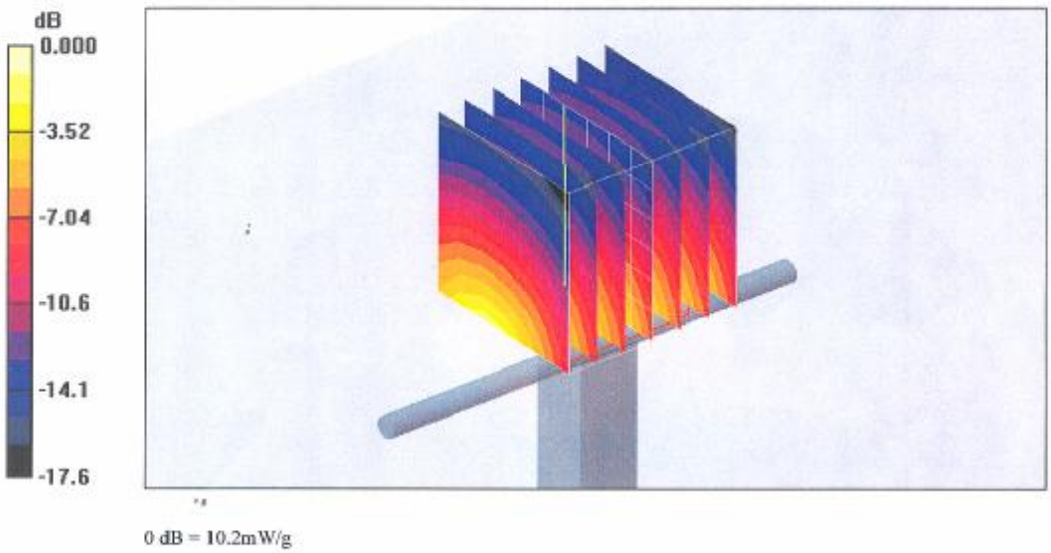
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d052

Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1800 MHz; σ = 1.4 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

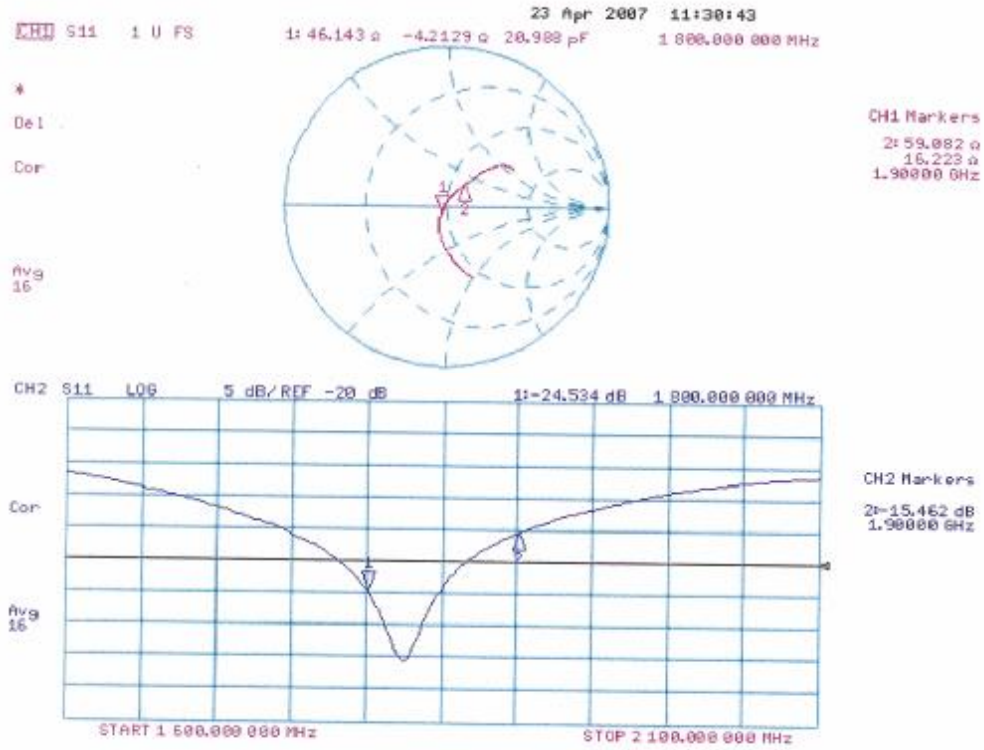
- Probe: ET3DV6 - SN1507 (HF); ConvF(5.03, 5.03, 5.03); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.3 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(1 g) = 9.16 mW/g; SAR(10 g) = 4.89 mW/g
Maximum value of SAR (measured) = 10.2 mW/g



0 dB = 10.2mW/g

Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 23.04.2007 17:18:36

Test Laboratory: SPEAG, Zurich, Switzerland

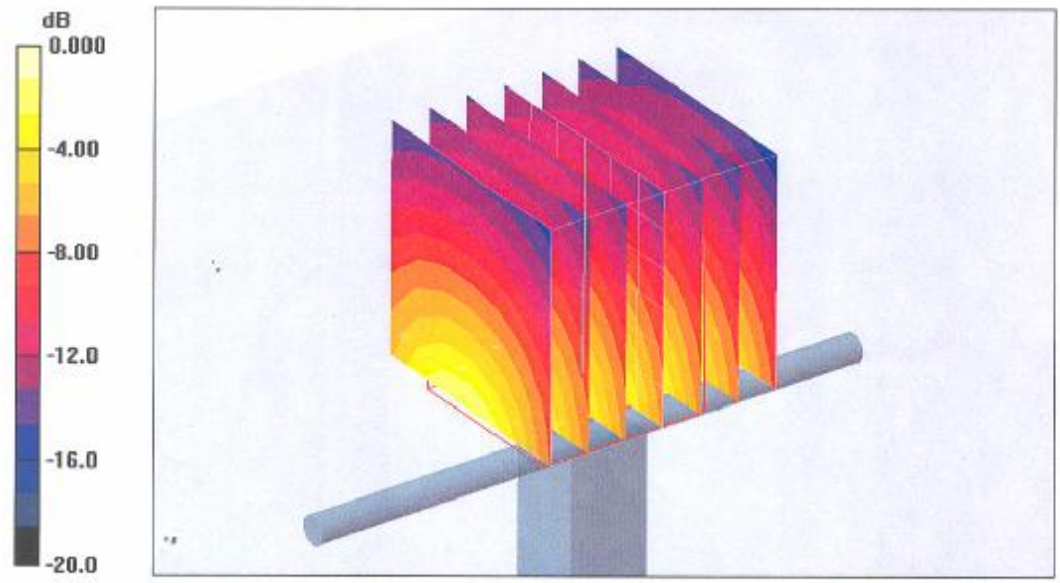
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d052

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: MSL U10 BB;
Medium parameters used: f = 1800 MHz; σ = 1.53 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

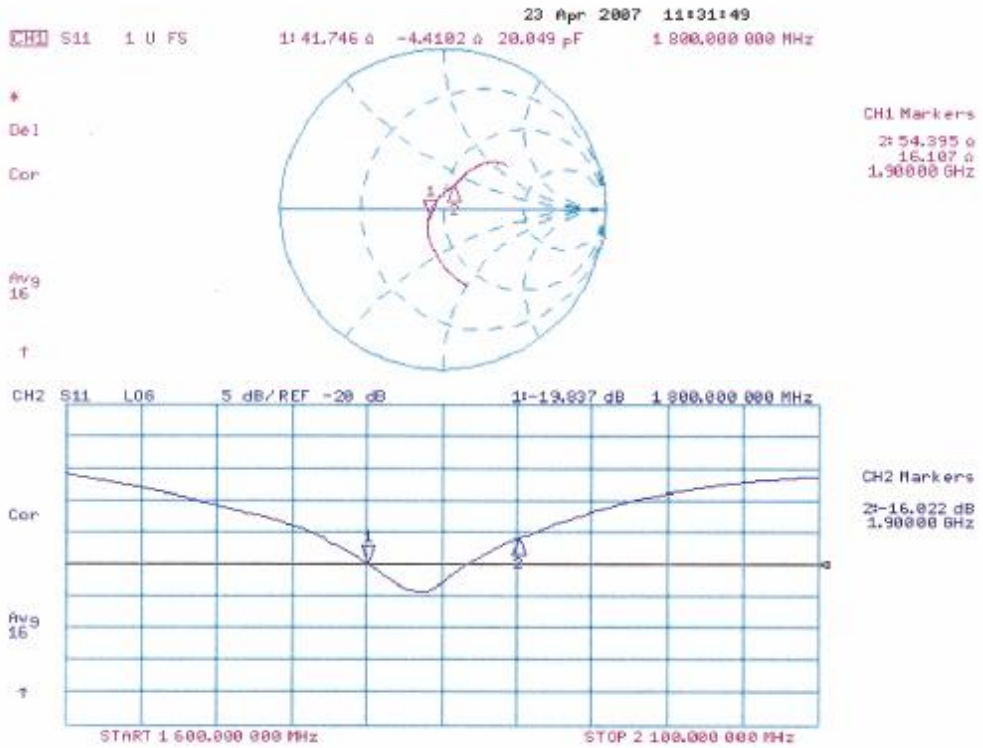
- Probe: ET3DV6 - SN1507 (HF); ConvF(4.47, 4.47, 4.47); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.5 V/m; Power Drift = 0.039 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(1 g) = 9.61 mW/g; SAR(10 g) = 5.28 mW/g
Maximum value of SAR (measured) = 10.7 mW/g



0 dB = 10.7mW/g

Impedance Measurement Plot for Body TSL



7. Uncertainty analysis

Error Description	Tol. (± %)	Prob. dist.	Div.	(c_i) (1g)	(c_i) (10g)	Std. unc. (± %) (1g)	(10g)	(v_i)
Measurement System								
Probe Calibration	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
Hemispherical Isotropy	0	R	$\sqrt{3}$	1	1	0	0	∞
Boundary Effects	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
System Detection Limit	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Readout Electronics	1.0	N	1	1	1	1.0	1.0	∞
Response Time	0	R	$\sqrt{3}$	1	1	0	0	∞
Integration Time	0	R	$\sqrt{3}$	1	1	0	0	∞
RF Ambient Conditions	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
Algorithms for Max. SAR Eval.	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Dipole								
Dipole Axis to Liquid Distance	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
Input power and SAR drift meas.	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
Phantom and Tissue Param.								
Phantom Uncertainty	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5.0	R.	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (meas.)	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity (target)	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (meas.)	2.5	N	1	0.6	0.49	1.5	1.2	∞
Combined Stdandard Uncertainty						8.4	8.1	∞
Coverage Factor for 95%		kp=2						
Expanded Uncertainty						16.8	16.2	

Dasy4 Uncertainty Budget

8. Phantom description

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen 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 units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 28.02.2002

Signature / Stamp

Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

F. Bomholt

Doc No 841 – QD 000 P40 CA – B

Page 1 (1)

End of Report