SAR TEST REPORT

Eequipment Under Test :	GSM900&DCS1800&PCS1900MHz MOBILE PHONE
Model No. :	E2006L
FCC ID	M9HE2006L
Applicant :	SAGEM Communication
Address of Applicant :	2,rue du Petit Albi BP 28250 95801 CERGY PONTOISE Cedex
Date of Receipt :	2006.05.12
Date of Test :	2006.05.17– 2006.05.29
Date of Issue :	2006.05.31

Standards:

FCC OET Bulletin 65 supplement C,
ANSI/IEEE C95.1, C95.3, IEEE 1528-2002

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 :	Will Ni	Date :	2006.05.31
Approved by :	Zhiang Yuan	Date :	2006.05.31

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: SAGEM Communication
Address: 2,rue du Petit Albi
BP 28250
95801 CERGY PONTOISE Cedex

1.3 Description of EUT(s)

Brand name	SAGEM	
Model No.	E2006L	
Serial No.	IMEI: 35999900000020-8	
H/W Version	V0x	
S/W Version	L 5,KB	
Battery Type	Li-ion	
Antenna Type	Inner Antenna	
Operation Mode	PCS1900	
Modulation Mode	GMSK	
Frequency range	PCS1900	Tx: 1850~1910 MHz
		Rx: 1930~1990 MHz
Maximum RF Conducted Power	PCS1900: 30dBm	
GPRS	Multislot Class 10 ,uplink 2 TS	

1.4 Test Environment

Ambient temperature: 22.0° C

Tissue Simulating Liquid: 22° C

Relative Humidity: 35%~50%

1.5 Operation Configuration

Configuration 1: PCS 1900, LeftHandSide Cheek & 15° Tilt Position

Configuration 2: PCS 1900, RightHandSide Cheek & 15° Tilt Position

Configuration 3: PCS 1900, BodyWorn (1.5cm 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 ES3DV3 3088 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.

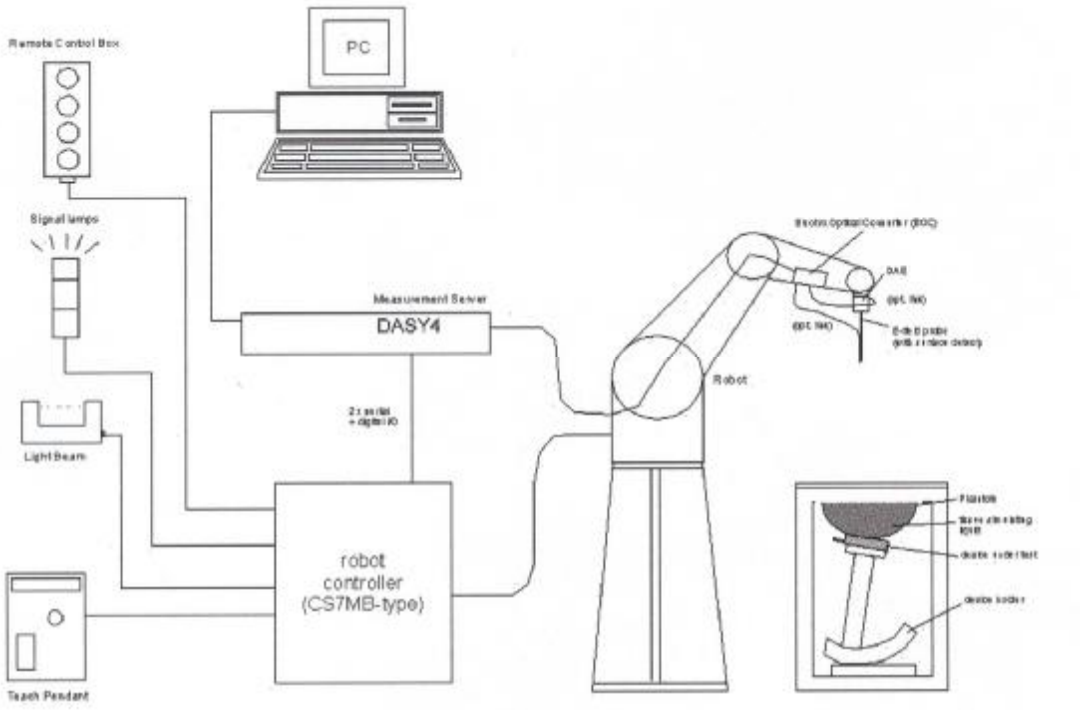


Fig. a SAR System Configuration

- 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.
- 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 1900MHz. 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.

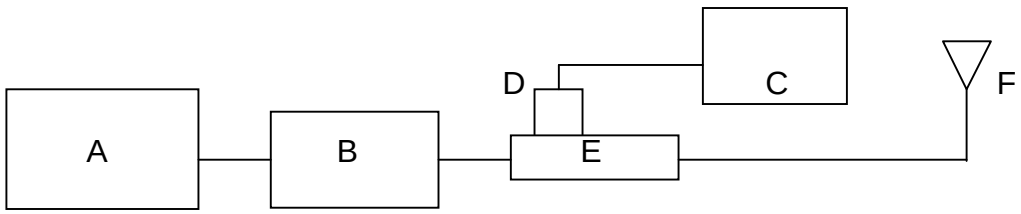


Fig. b the microwave circuit arrangement used for SAR system verification

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
ES3DV3 SN3088	1900 Head	9.89	5.16	9.66	5.06	2006-05-27
ES3DV3 SN3088	1900 Body	9.81	5.22	9.69	5.12	2006-05-17

ES3DV3 SN3088	**1900 Body**	**9.81**	**5.22**	**9.63**	**5.11**	**2006-05-29**

Table 1. Result System Validation

1.8 Tissue Simulant Fluid for the Frequency Band 1900MHZ

The dielectric properties for this body-simulant fluid were measured by using the HP Model 90070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Agilent E5071B Network Analyzer (300 KHz-9000 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in Table 2.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)
1900	**Head**	**Measured, 2006-05-27**	**39.75**	**1.432**	**22.3**
		Recommended Limit	**40.0±5%**	**1.40±5%**	**20-24**
	Body	**Measured, 2006-05-17**	**51.52**	**1.525**	**22.5**
		Recommended Limit	**53.3±5%**	**1.52±5%**	**20-24**
		Measured, 2006-05-29	**51.59**	**1.532**	**22.4**
		Recommended Limit	**53.3±5%**	**1.52±5%**	**20-24**

Table 2. Dielectric parameters for the Frequency Band 900MHz&1900MHZ

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 W/Kg (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

Frequency Band(MHz)	EUT position	Conducted Output Power (dBm)	1g Average (W/Kg)	10g Average (W/Kg)	Power Drift (dB)	Amb. Temp (℃)	Verdict
PCS 1900	LeftHandSide Cheek, Low Channel	30.4	0.219	0.133	0.008	22	PASS
	LeftHandSide Cheek, Mid Channel	30.4	0.258	0.156	0.013	22	PASS
	LeftHandSide Cheek, High Channel	29.9	0.238	0.144	-0.067	22	PASS
	LeftHandSide Tilt, Low Channel	30.4	0.254	0.138	0.020	22	PASS
	LeftHandSide Tilt, Mid Channel	30.4	0.294	0.159	-0.064	22	PASS
	LeftHandSide Tilt, High Channel	29.9	0.259	0.137	0.016	22	PASS
	RightHandSide Cheek, Low Channel	30.4	0.303	0.164	0.021	22	PASS
	RightHandSide Cheek, Mid Channel	30.4	0.333	0.180	0.025	22	PASS
	RightHandSideCheek, High Channel	29.9	0.313	0.166	-0.050	22	PASS
	RightHandSide Tilt, Low Channel	30.4	0.288	0.155	0.068	22	PASS
	RightHandSide Tilt, Mid Channel	30.4	0.338	0.179	0.010	22	PASS
	RightHandSide Tilt, High Channel	29.9	0.319	0.164	-0.035	22	PASS
	BodyWorn, GSM,Low Channel,	30.4	0.417	0.228	0.100	22	PASS
	BodyWorn, GSM,Mid Channel,	30.4	0.514	0.277	-0.003	22	PASS
	BodyWorn, GSM,High Channel,	29.9	0.733	0.373	-0.043	22	PASS
	BodyWorn, GPRS,Low Channel,	29.0	0.589	0.316	-0.061	22	PASS
	BodyWorn, GPRS,Mid Channel,	28.9	0.743	0.396	-0.063	22	PASS
	BodyWorn, GPRS,High Channel,	28.5	1.01	0.509	0.128	22	PASS

Maximum value

Frequency Band(MHz)	EUT position	Conducted Output Power (dBm)	1g Average (W/Kg)	10g Average (W/Kg)	Power Drift (dB)	Amb. Temp (℃)	Verdict
1900	RightHandSide Tilt, Mid Channel	30.4	0.338	0.179	0.010	22	PASS
	BodyWorn,GPRS, High Channel	28.5	1.01	0.509	0.128	22	PASS

Note:

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

2. For the Bodyworn measurements the sample was only placed with the antenna toward the phantom since this position delivers the highest SAR values.

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 4.6 build 23	N/A	GSM-SAR-001	N/A
Probe	ES3DV3	3088	GSM-SAR-031	2005.09.13
DAE	DAE3	569	GSM-SAR-023	2005.11.17
Phantom	SAM	TP-1283	GSM-SAR-005	N/A
Robot	RX90L	F03/5V32A1/A01	GSM-SAR-008	N/A
1900MHz system validation dipole	D1900V2	5d028	GSM-SAR-020	2005.8.25
Dielectric probe kit	85070D	US01440168	GSM-SAR-016	2005.12.19
Agilent network analyzer	E5071B	MY42100549	GSM-SAR-007	2005.12.19
Agilent signal generator	E4438	14438CATO-19719	GSM-SAR-008	2005.12.19
Mini-Circuits preamplifier	ZHL-42	D041905	GSM-SAR-035	2006.04.19
Agilent power meter	E4416A	GB41292095	GSM-SAR-010	2005.12.19
Agilent power sensor	8481h	MY41091234	GSM-SAR-011	2005.12.19
HT CP6100 20N Coupling	6100	SCP301480120	GSM-SAR-012	2005.12.19
R&S Universal radio communication tester	CMU200	103633	GSM-AUD-102	2005.12.20

4. Measurements

4.1 FCC-OET65-LeftHandSide-Cheek-PCS1900-Low

Date/Time: 2006-5-27 17:58:10

Test Laboratory: SGS-GSM

LeftHandSide-Cheek-PCS1900-Low

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.42 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

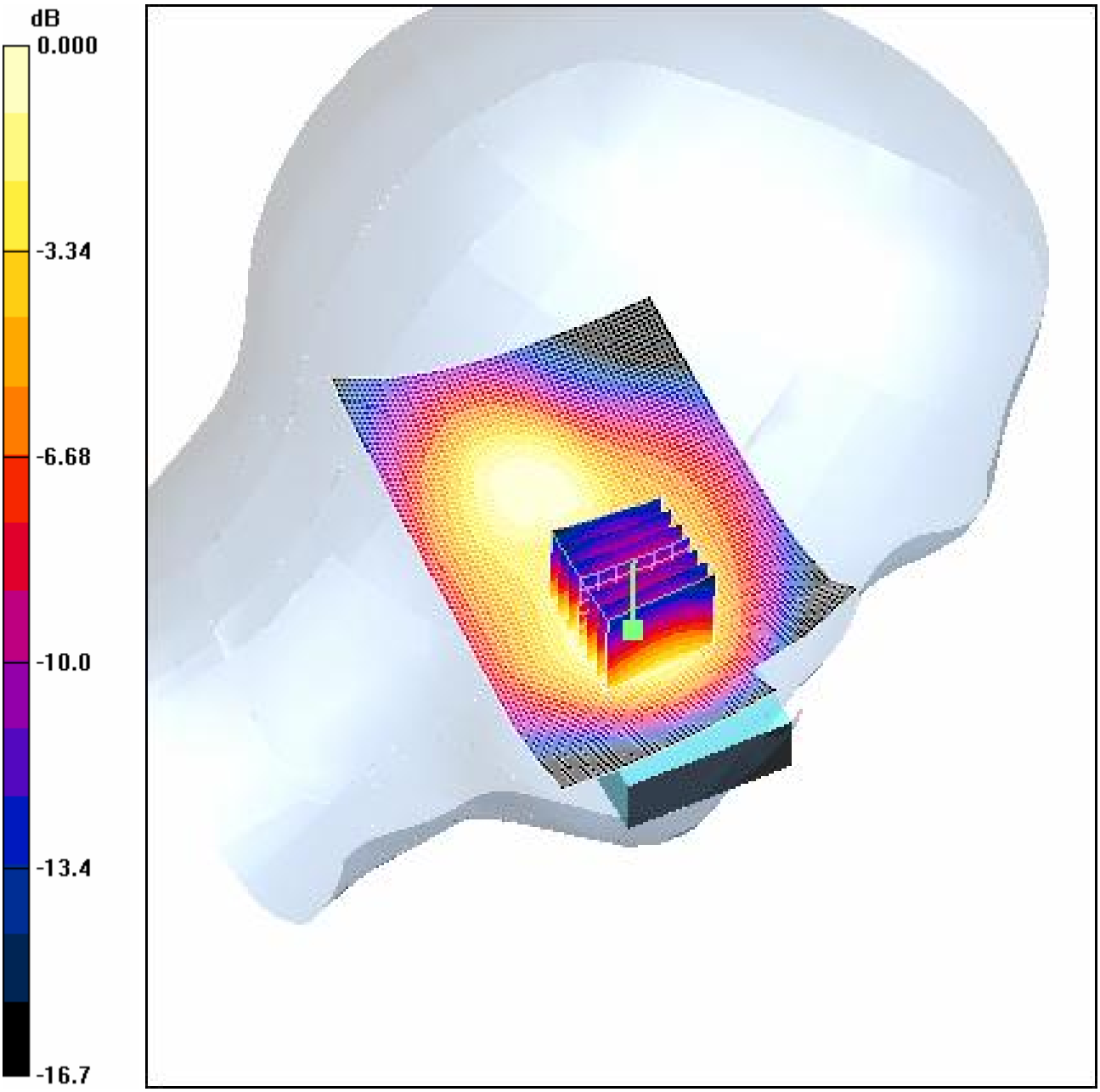
Cheek position - Low/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.244 mW/g

Cheek position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.9 V/m; Power Drift = 0.008 dB

Peak SAR (extrapolated) = 0.327 W/kg

SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.133 mW/g

Maximum value of SAR (measured) = 0.235 mW/g



0 dB = 0.235mW/g

4.2 FCC-OET65-LeftHandSide-Cheek-PCS1900-Mid

Date/Time: 2006-5-27 18:35:13

Test Laboratory: SGS-GSM

LeftHandSide-Cheek-PCS1900-Mid

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

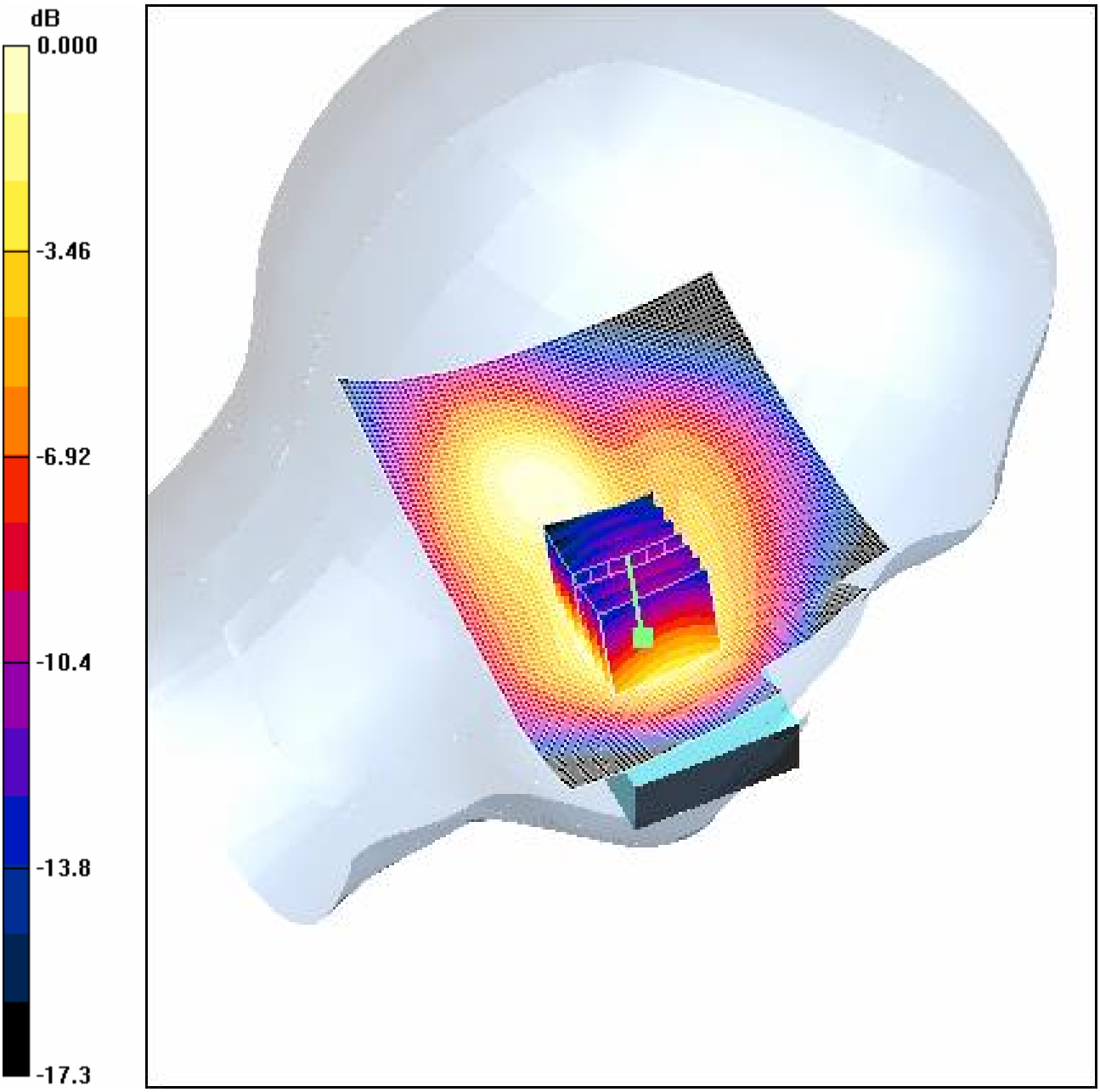
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.287 mW/g

Cheek position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 0.392 W/kg
SAR(1 g) = 0.258 mW/g; SAR(10 g) = 0.156 mW/g
Maximum value of SAR (measured) = 0.282 mW/g



0 dB = 0.282mW/g

4.3 FCC-OET65-LeftHandSide-Cheek-PCS1900-High

Date/Time: 2006-5-27 19:04:33

Test Laboratory: SGS-GSM

LeftHandSide-Cheek-PCS1900-High

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

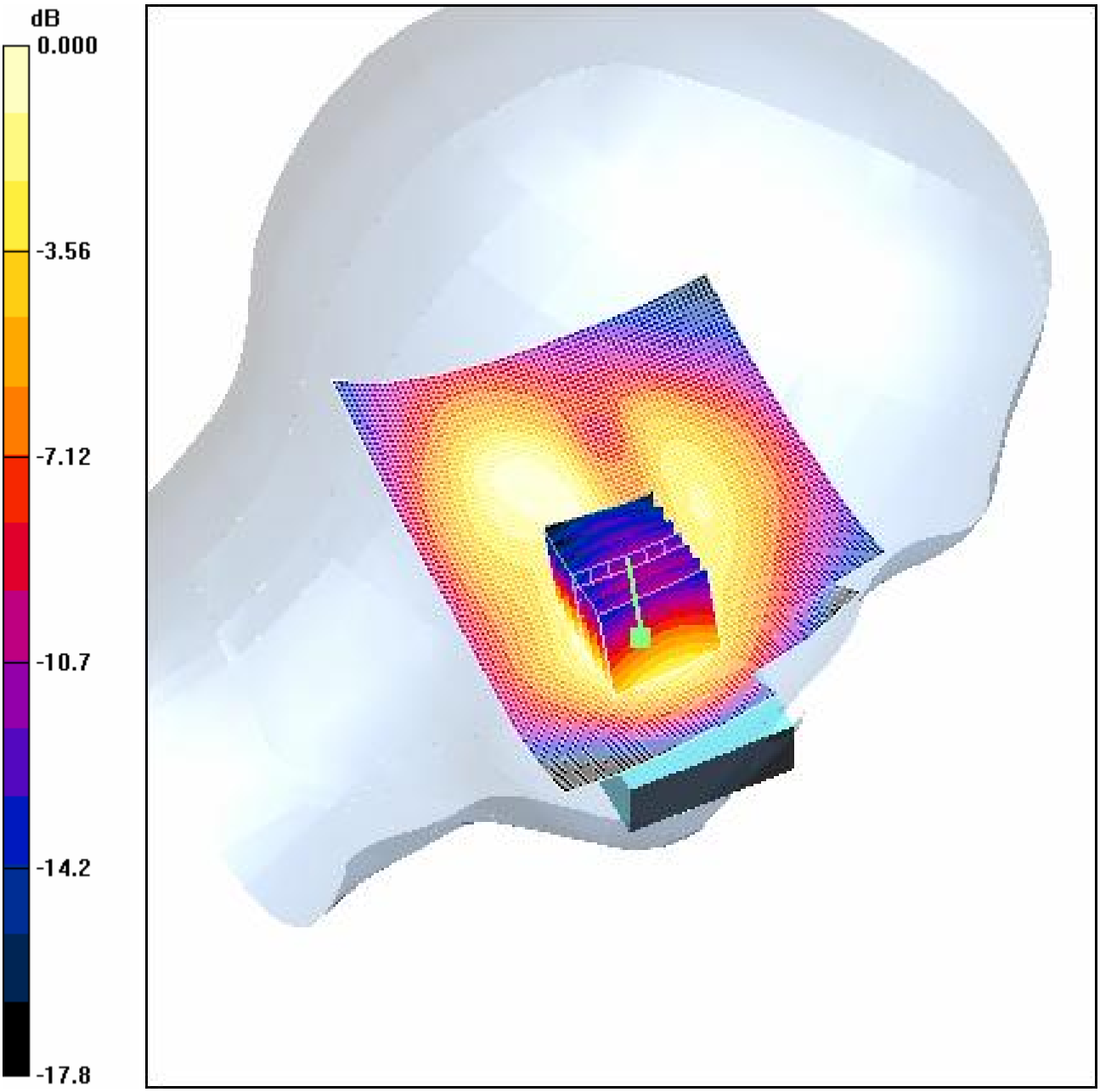
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.47 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.262 mW/g

Cheek position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 0.365 W/kg
SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.144 mW/g
Maximum value of SAR (measured) = 0.259 mW/g



0 dB = 0.259mW/g

4.4 FCC-OET65-LeftHandSide-Tilt-PCS1900-Low

Date/Time: 2006-5-27 19:38:59

Test Laboratory: SGS-GSM

LeftHandSide-Tilt-PCS1900-Low

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

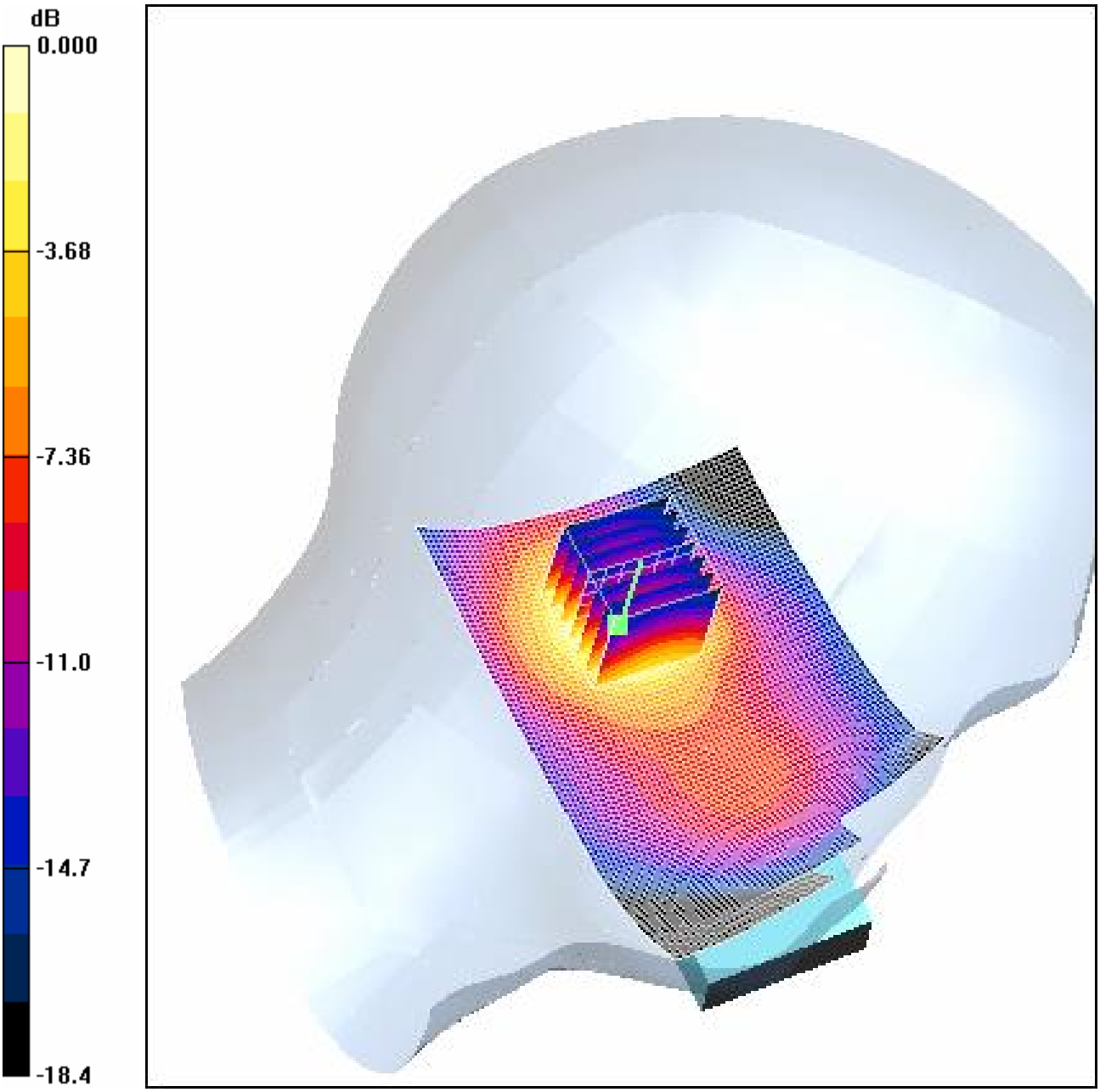
Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.42 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Low/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.294 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 0.431 W/kg
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 0.284 mW/g



0 dB = 0.284mW/g

4.5 FCC-OET65-LeftHandSide-Tilt-PCS1900-Mid

Date/Time: 2006-5-27 20:08:41

Test Laboratory: SGS-GSM

LeftHandSide-Tilt-PCS1900-Mid

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

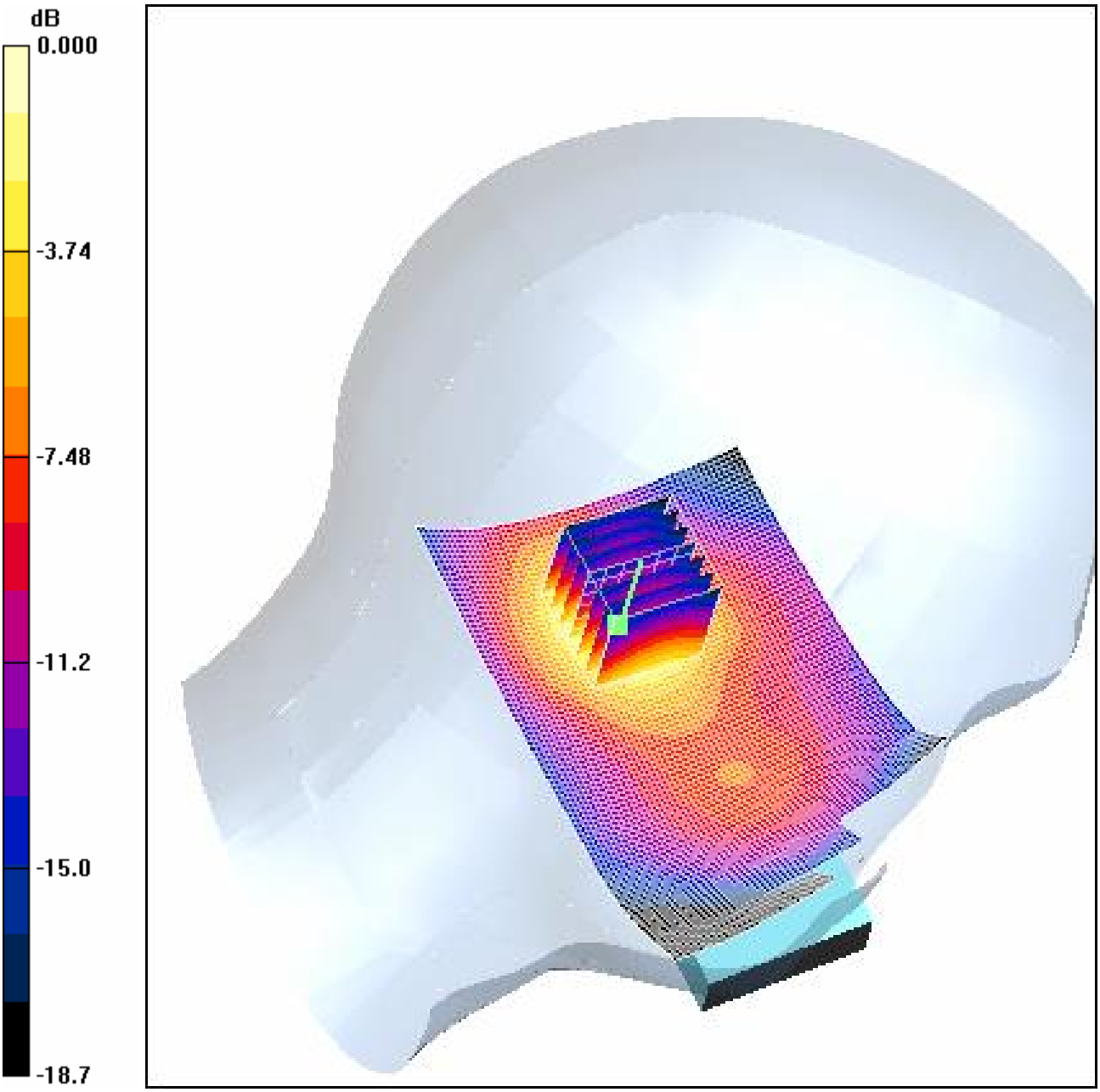
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.341 mW/g

Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.8 V/m; Power Drift = -0.064 dB
Peak SAR (extrapolated) = 0.498 W/kg
SAR(1 g) = 0.294 mW/g; SAR(10 g) = 0.159 mW/g
Maximum value of SAR (measured) = 0.327 mW/g



0 dB = 0.327mW/g

4.6 FCC-OET65-LeftHandSide-Tilt-PCS1900-High

Date/Time: 2006-5-27 20:39:25

Test Laboratory: SGS-GSM

LeftHandSide-Tilt-PCS1900-High

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

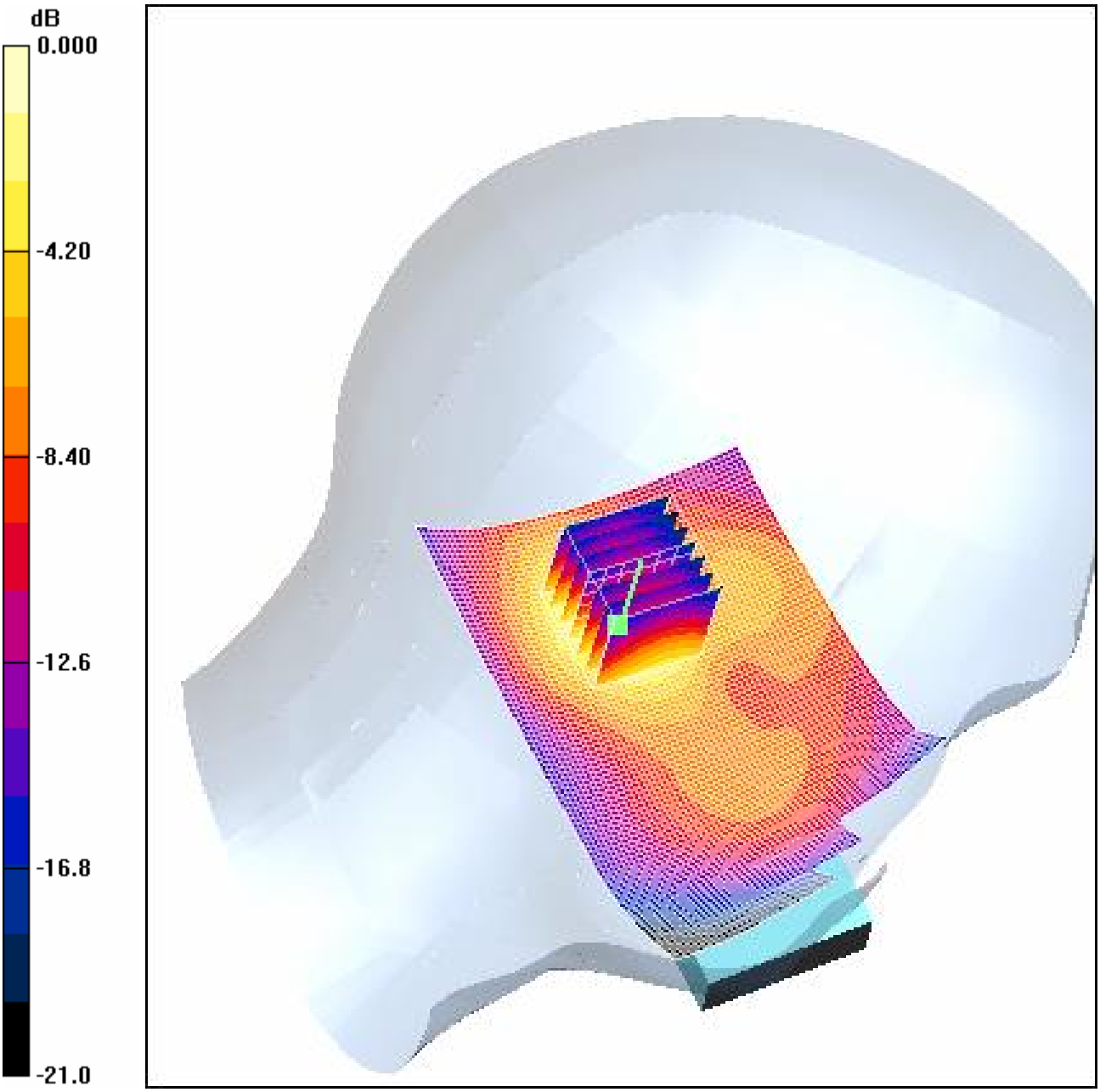
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.47 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - High/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.294 mW/g

Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.458 W/kg
SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.137 mW/g
Maximum value of SAR (measured) = 0.291 mW/g



0 dB = 0.291mW/g

4.7 FCC-OET65-RightHandSide-Cheek-PCS1900-Low

Date/Time: 2006-5-27 21:14:15

Test Laboratory: SGS-GSM

RightHandSide-Cheek-PCS1900-Low

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

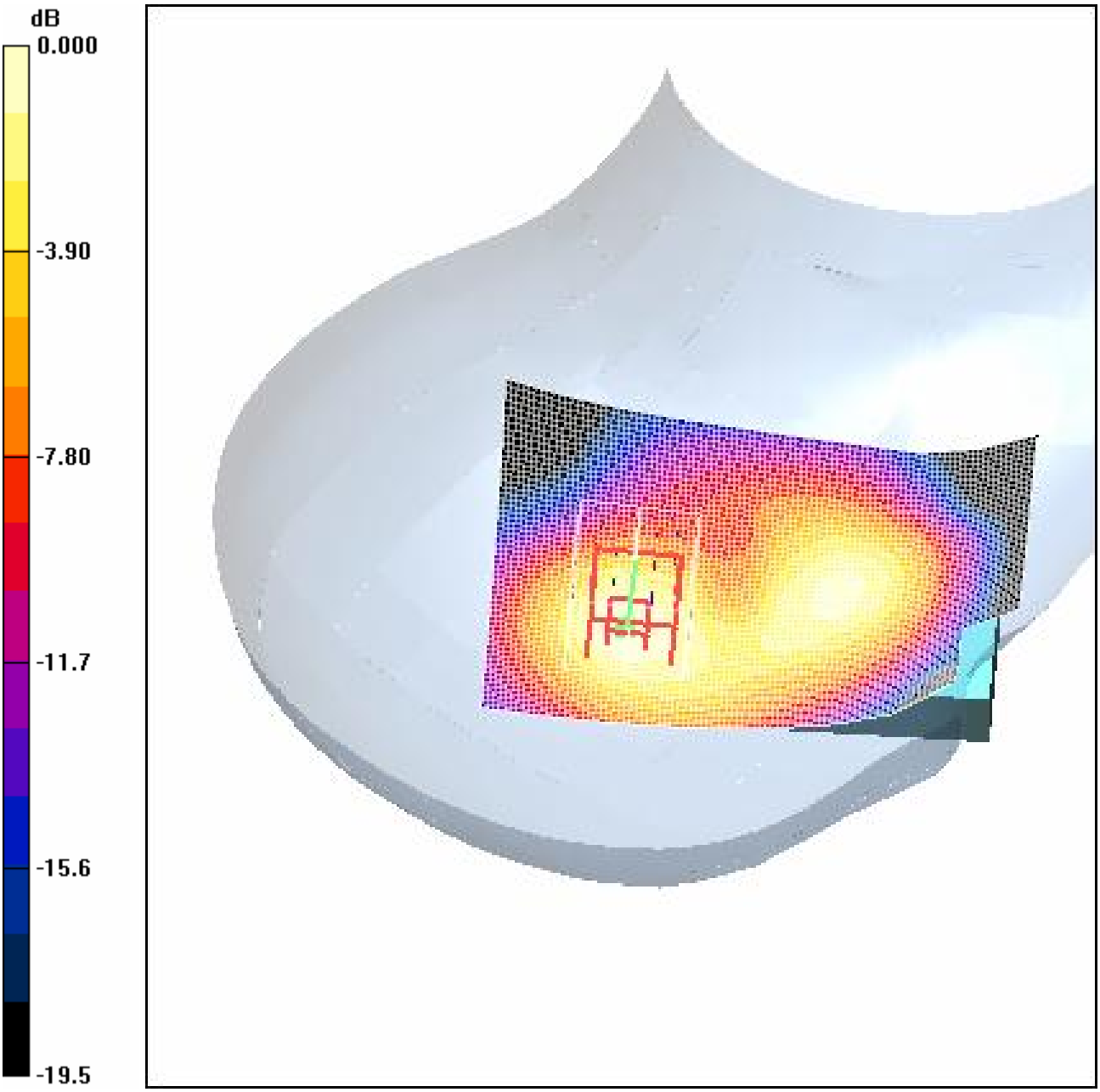
Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.42 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Low/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.353 mW/g

Cheek position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 0.536 W/kg
SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.164 mW/g
Maximum value of SAR (measured) = 0.337 mW/g



0 dB = 0.337mW/g

4.8 FCC-OET65-RightHandSide-Cheek-PCS1900-Mid

Date/Time: 2006-5-27 21:48:09

Test Laboratory: SGS-GSM

RightHandSide-Cheek-PCS1900-Mid

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

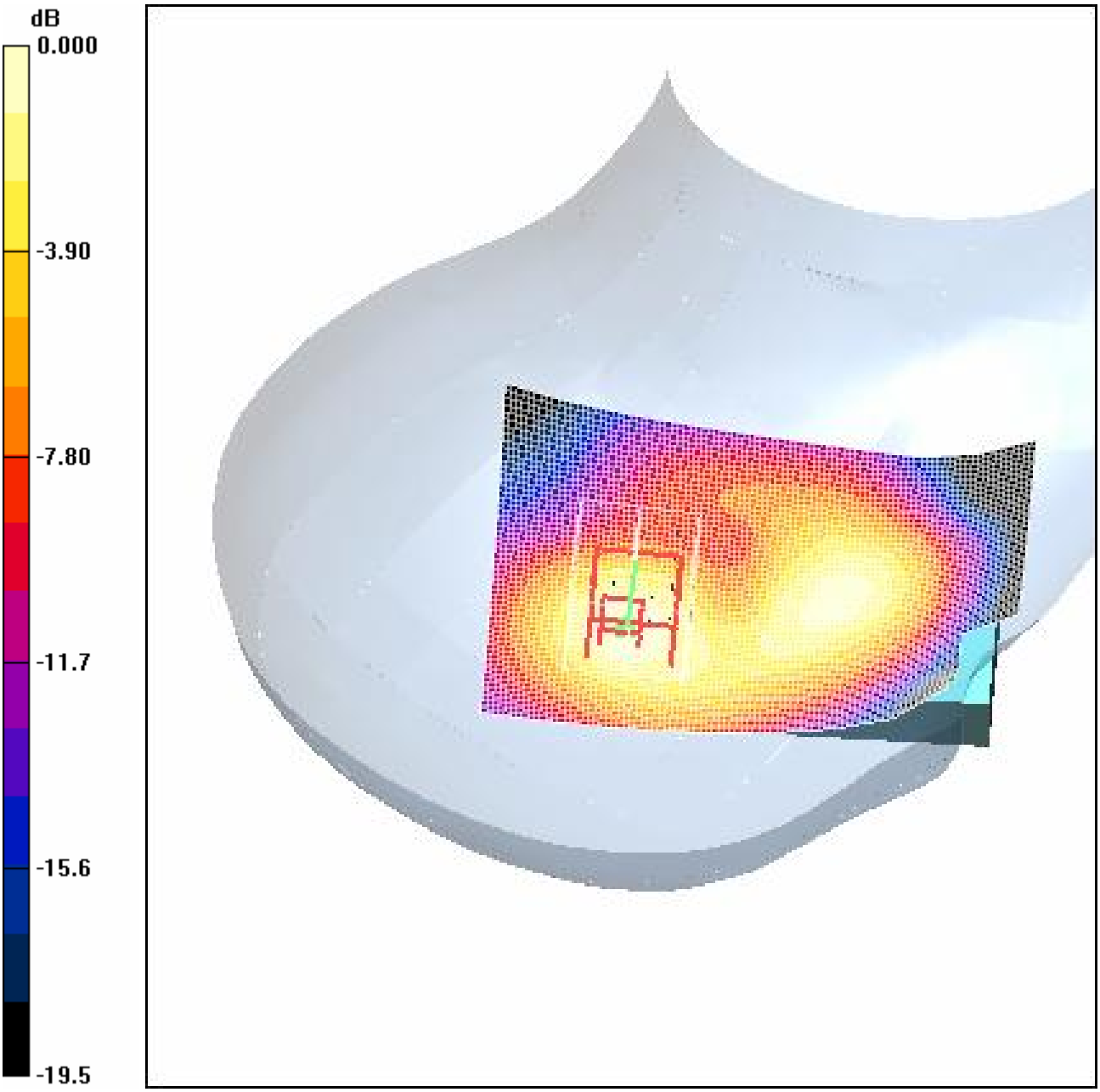
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.391 mW/g

Cheek position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = 0.025 dB
Peak SAR (extrapolated) = 0.591 W/kg
SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.180 mW/g
Maximum value of SAR (measured) = 0.368 mW/g



0 dB = 0.368mW/g

4.9 FCC-OET65-RightHandSide-Cheek-PCS1900-High

Date/Time: 2006-5-27 22:23:30

Test Laboratory: SGS-GSM

RightHandSide-Cheek-PCS1900-High

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

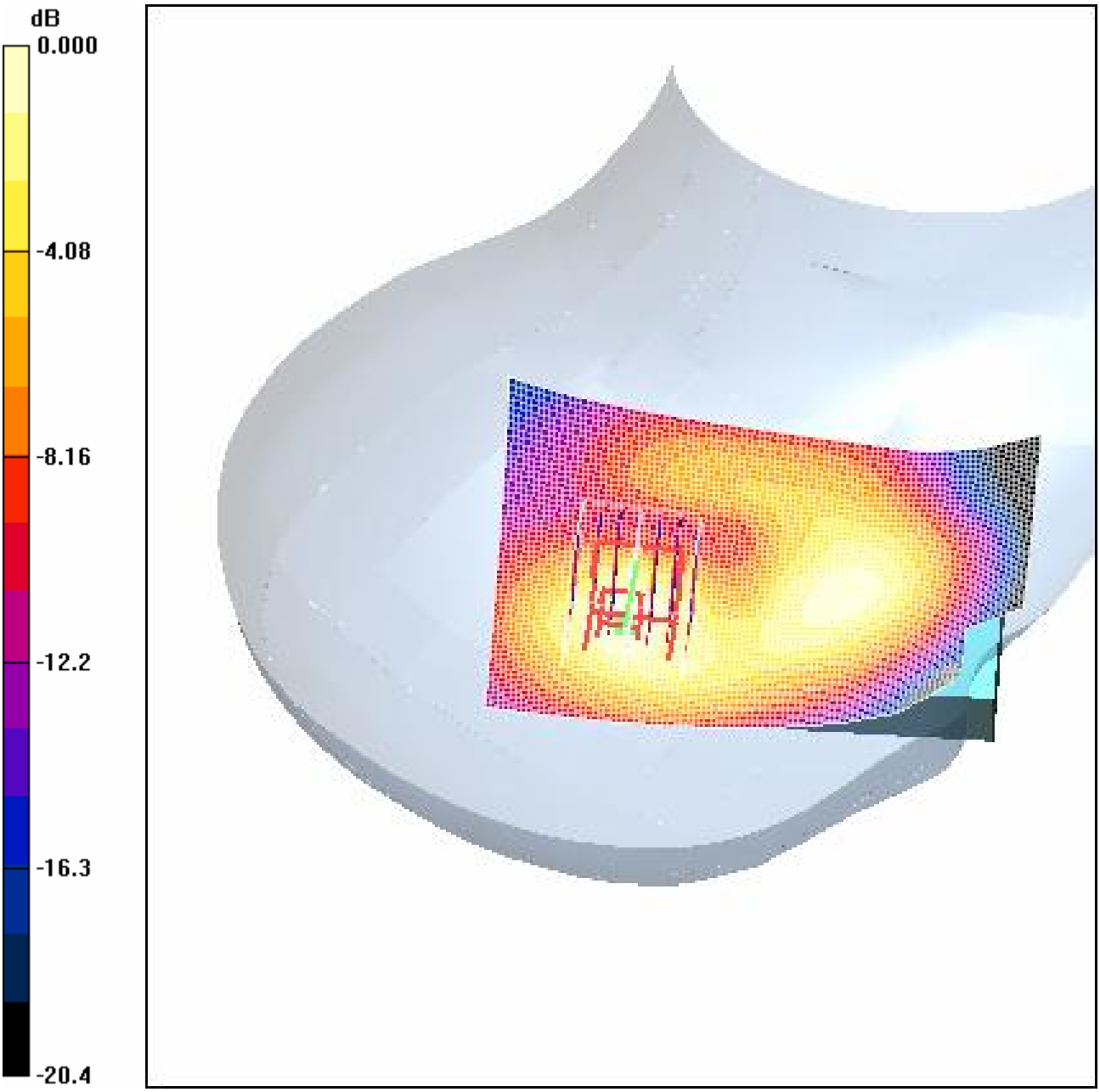
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.47 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.360 mW/g

Cheek position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.050 dB
Peak SAR (extrapolated) = 0.573 W/kg
SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.166 mW/g
Maximum value of SAR (measured) = 0.344 mW/g



0 dB = 0.344mW/g

4.10 FCC-OET65-RightHandSide-Tilt-PCS1900-Low

Date/Time: 2006-5-28 9:54:12

Test Laboratory: SGS-GSM

RightHandSide-Tilt-PCS1900-Low

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

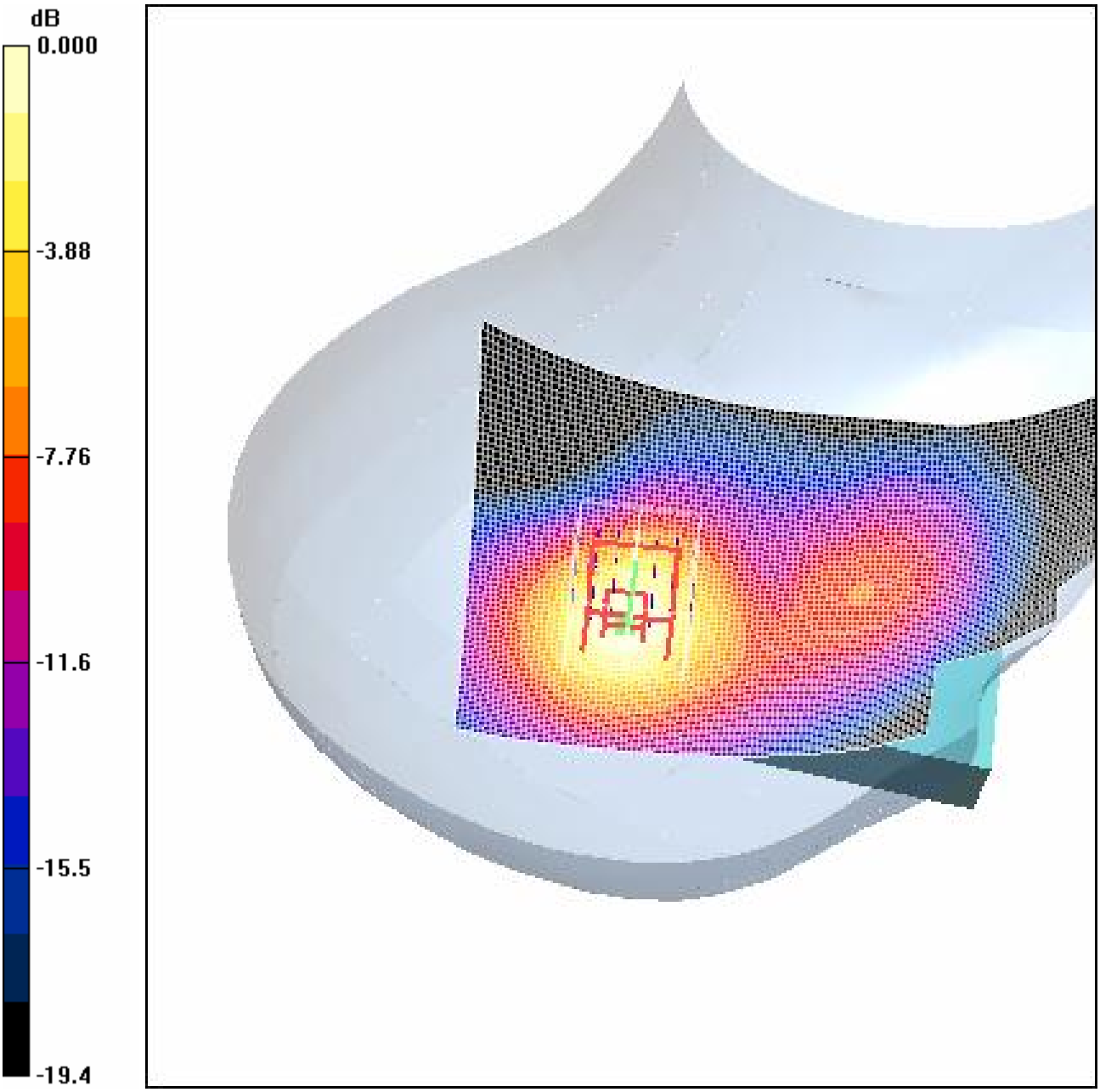
Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.42 mho/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Low/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.327 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 0.491 W/kg
SAR(1 g) = 0.288 mW/g; SAR(10 g) = 0.155 mW/g
Maximum value of SAR (measured) = 0.322 mW/g



0 dB = 0.322mW/g

4.11 FCC-OET65-RightHandSide-Tilt-PCS1900-Mid

Date/Time: 2006-5-28 10:27:10

Test Laboratory: SGS-GSM

RightHandSide-Tilt-PCS1900-Mid

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

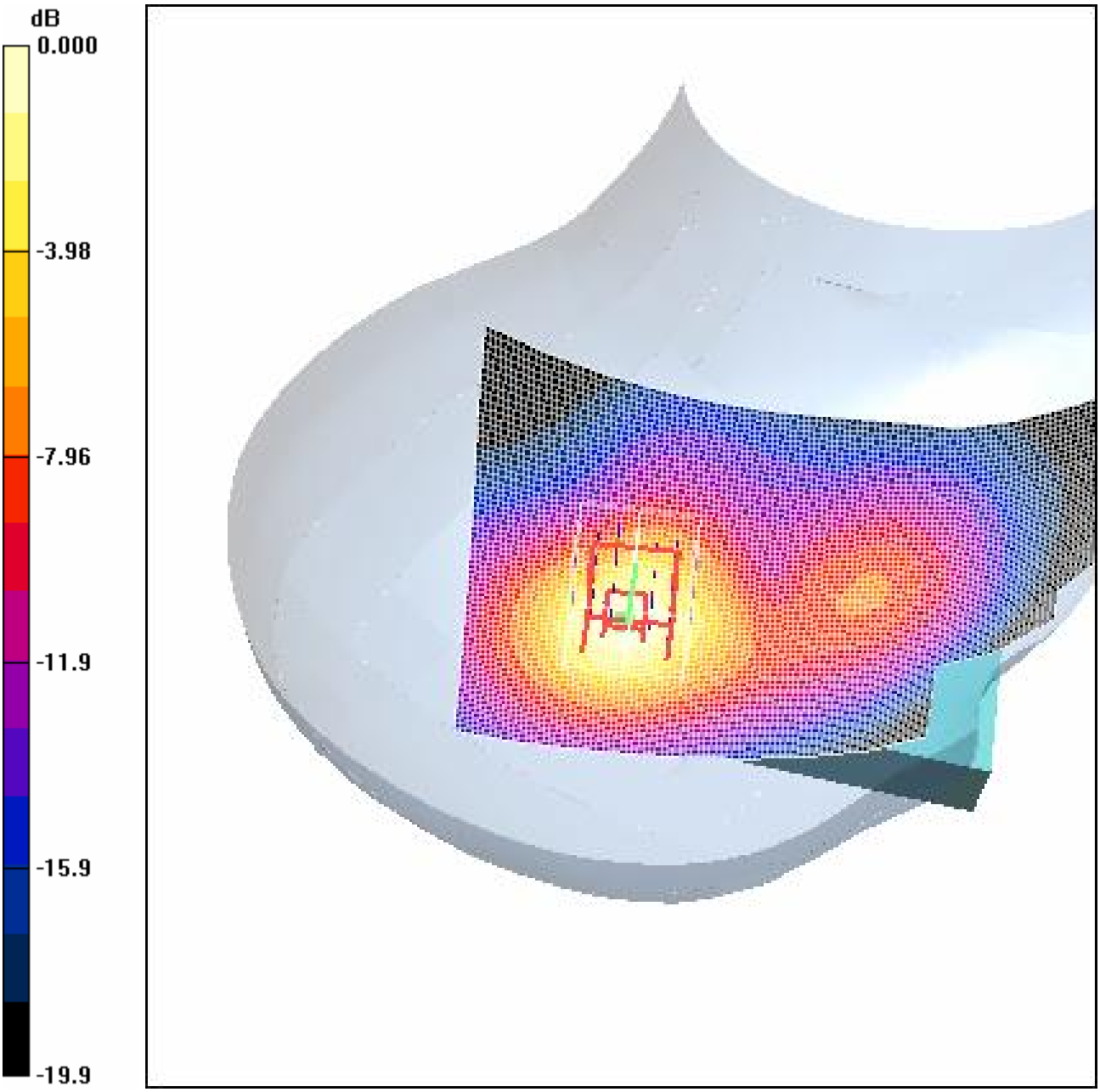
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Middle/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.369 mW/g

Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 0.593 W/kg
SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.179 mW/g
Maximum value of SAR (measured) = 0.381 mW/g



0 dB = 0.381mW/g

4.12 FCC-OET65-RightHandSide-Tilt-PCS1900-High

Date/Time: 2006-5-28 11:00:49

Test Laboratory: SGS-GSM

RightHandSide-Tilt-PCS1900-High

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

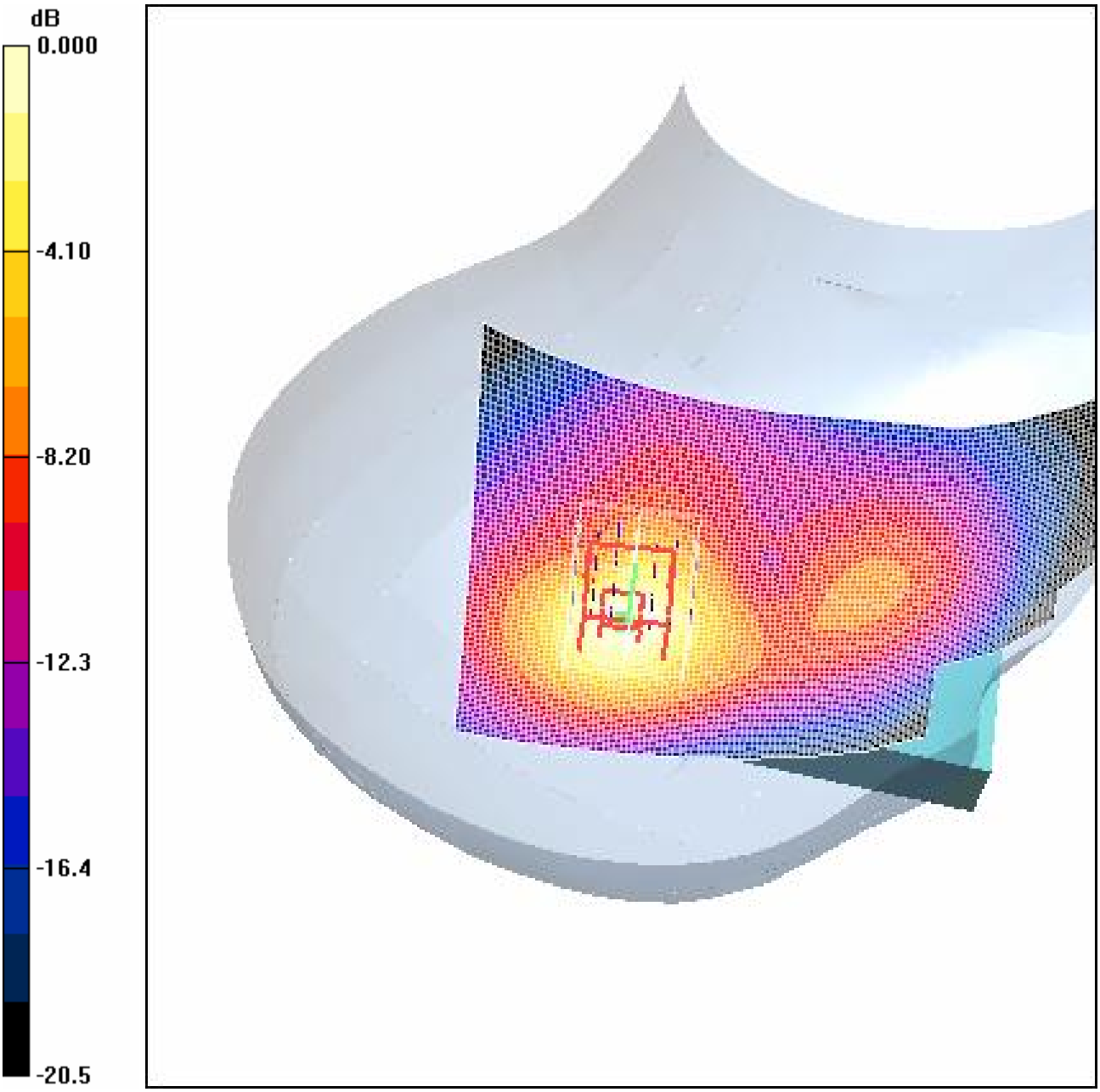
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.47 mho/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.93, 4.93, 4.93); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - High/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.344 mW/g

Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.577 W/kg
SAR(1 g) = 0.319 mW/g; SAR(10 g) = 0.164 mW/g
Maximum value of SAR (measured) = 0.356 mW/g



0 dB = 0.356mW/g

4.13 FCC-OET65-Body-Worn-PCS1900-GSM-Low

Date/Time: 2006-5-17 9:00:52

Test Laboratory: SGS-GSM

Body-Worn-PCS1900-Headset-Low

DUT: GSM60032Z; Type: Body; Serial: 20060426

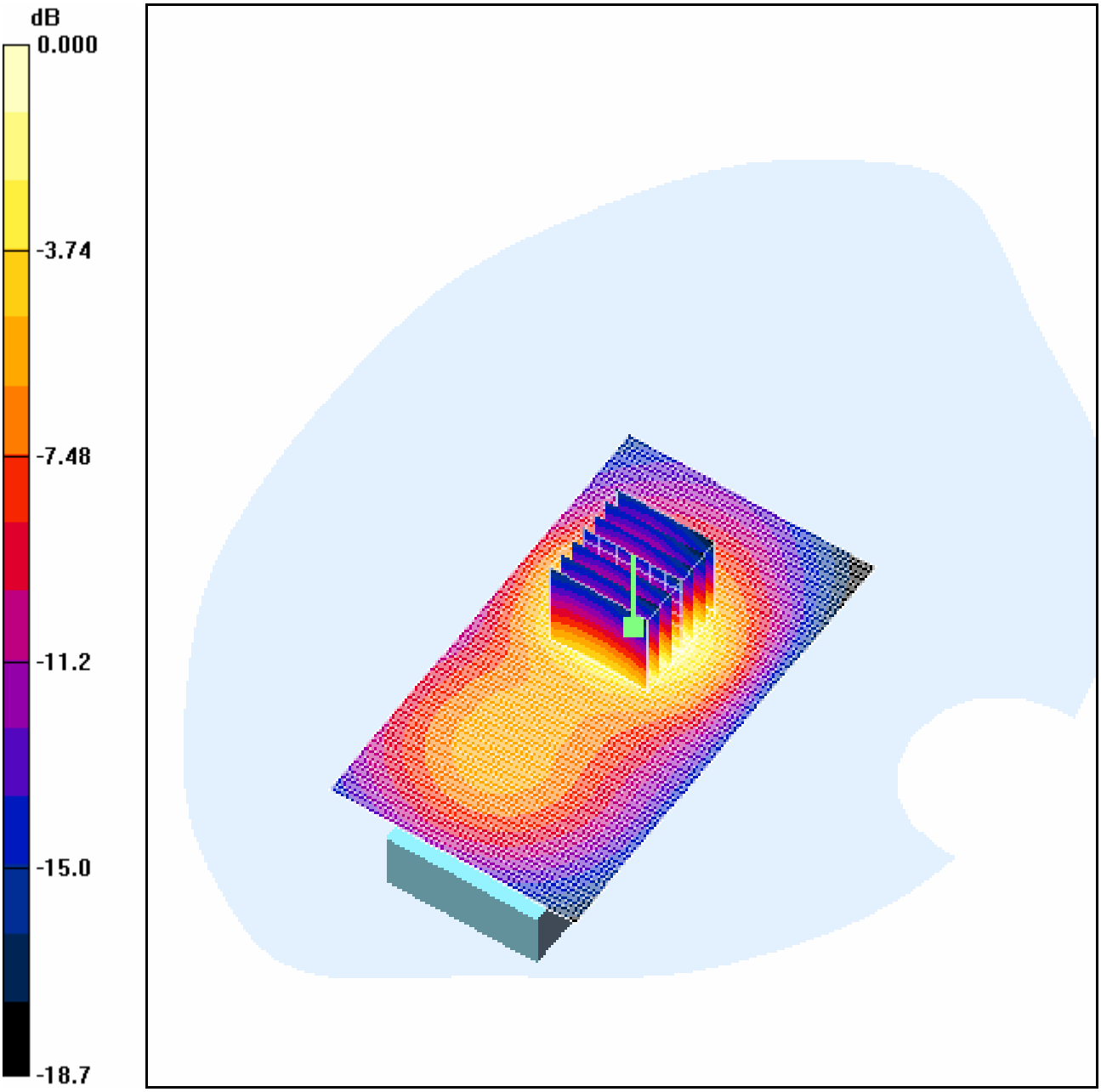
Communication System: PCS1900-GSM Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900-Body Medium parameters used: f = 1850.2 MHz; σ = 1.49 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.53, 4.53, 4.53); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.461 mW/g

Body Worn - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = 0.100 dB
Peak SAR (extrapolated) = 0.713 W/kg
SAR(1 g) = 0.417 mW/g; SAR(10 g) = 0.228 mW/g
Maximum value of SAR (measured) = 0.464 mW/g



0 dB = 0.464mW/g

4.14 FCC-OET65-Body-Worn-PCS1900-GSM-Mid

Date/Time: 2006-5-17 9:23:10

Test Laboratory: SGS-GSM

Body-Worn-PCS1900-Headset-Mid

DUT: GSM60032Z; Type: Body; Serial: 20060426

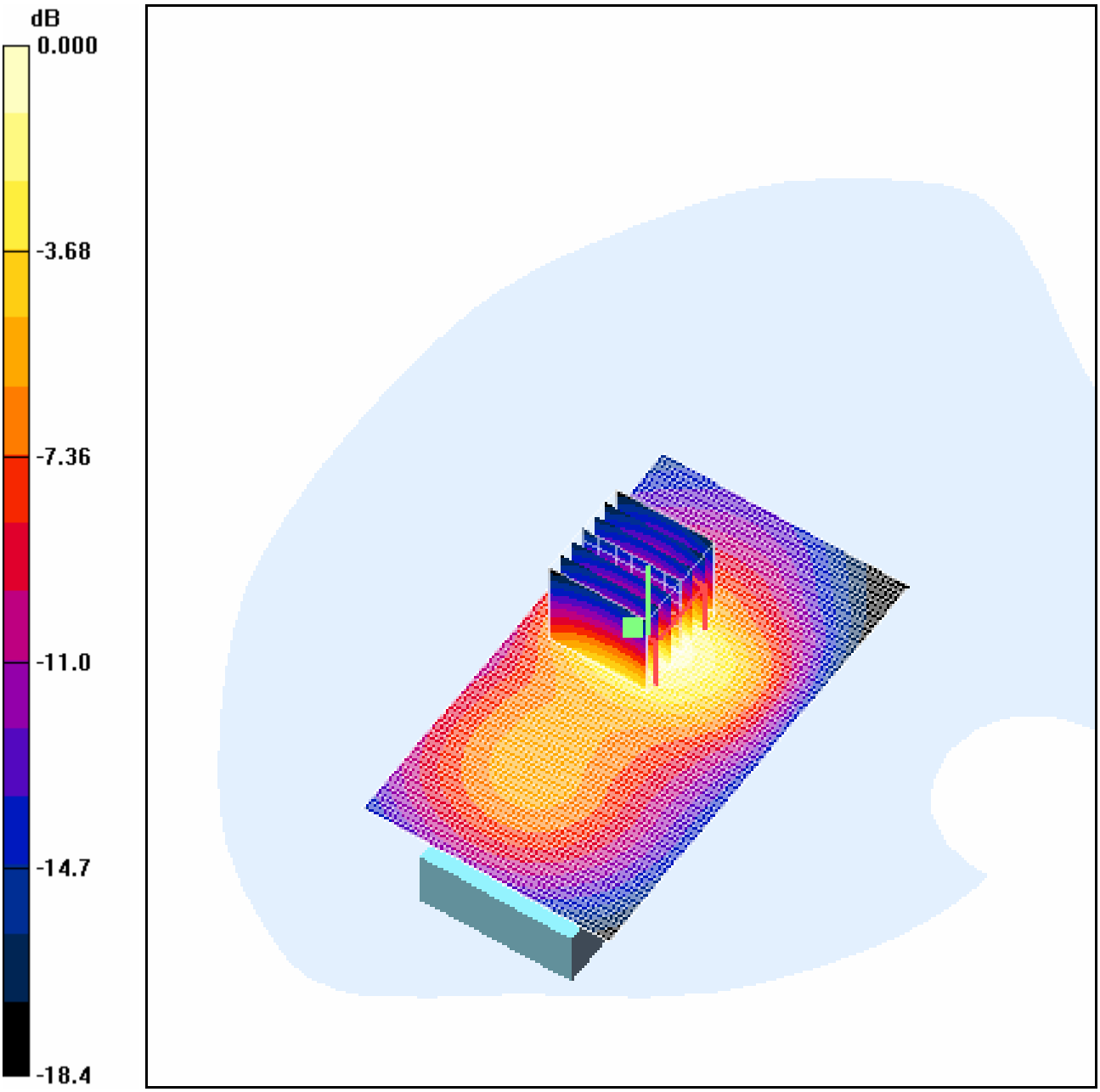
Communication System: PCS1900-GSM Mode; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900-Body Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.53, 4.53, 4.53); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.560 mW/g

Body Worn - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 0.914 W/kg
SAR(1 g) = 0.514 mW/g; SAR(10 g) = 0.277 mW/g
Maximum value of SAR (measured) = 0.570 mW/g



0 dB = 0.570mW/g

4.15 FCC-OET65-Body-Worn-PCS1900-GSM-High

Date/Time: 2006-5-17 9:45:33

Test Laboratory: SGS-GSM

Body-Worn-PCS1900-Headset-High

DUT: GSM60032Z; Type: Body; Serial: 20060426

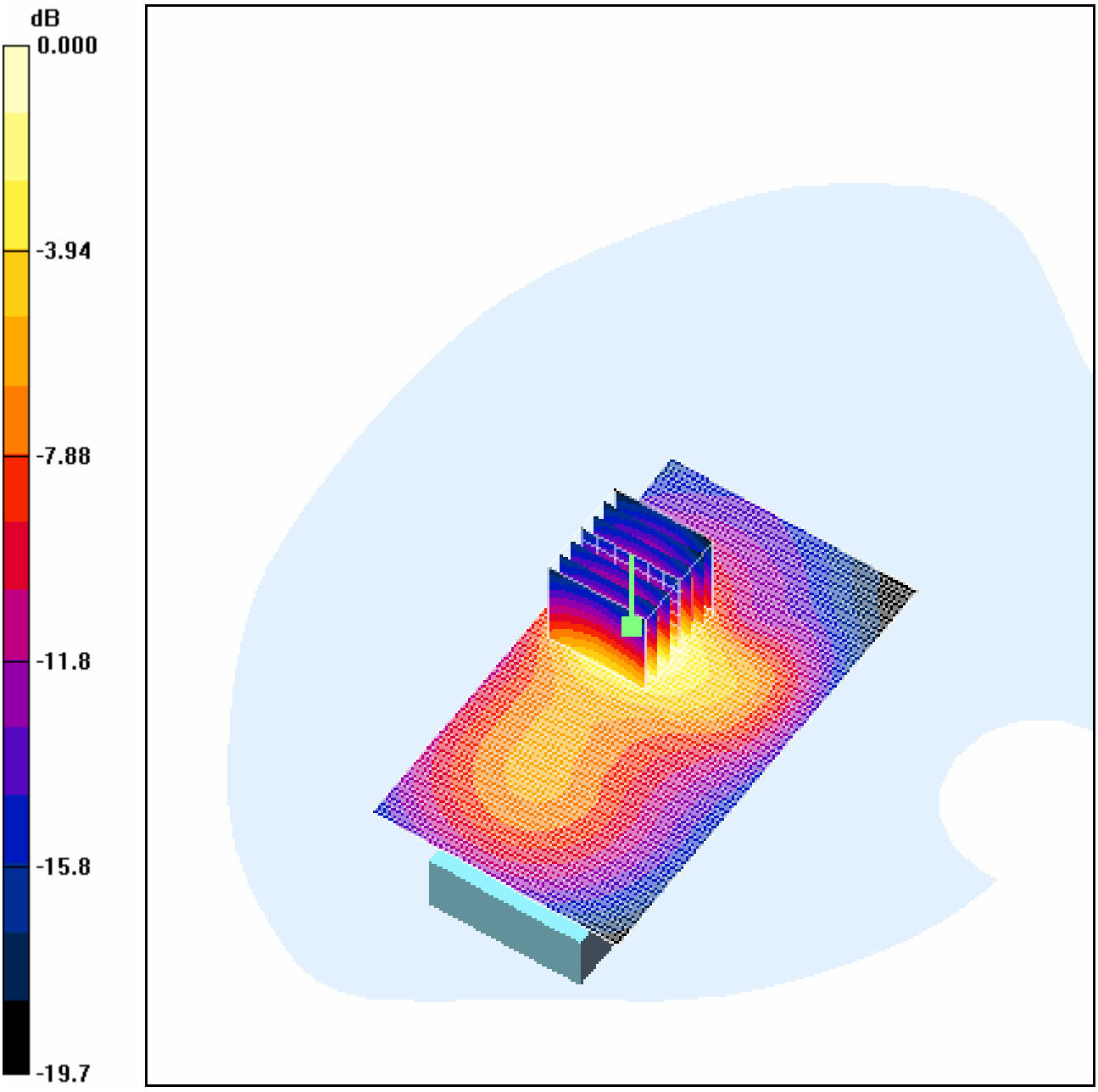
Communication System: PCS1900-GSM Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900-Body Medium parameters used: f = 1909.8 MHz; σ = 1.55 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.53, 4.53, 4.53); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.887 mW/g

Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.47 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.733 mW/g; SAR(10 g) = 0.373 mW/g
Maximum value of SAR (measured) = 0.837 mW/g



0 dB = 0.837mW/g

4.16 FCC-OET65-Body-Worn-PCS1900-GPRS-Low

Date/Time: 2006-5-29 8:43:11

Test Laboratory: SGS-GSM

Body-Worn-PCS1900-GPRS-Low

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

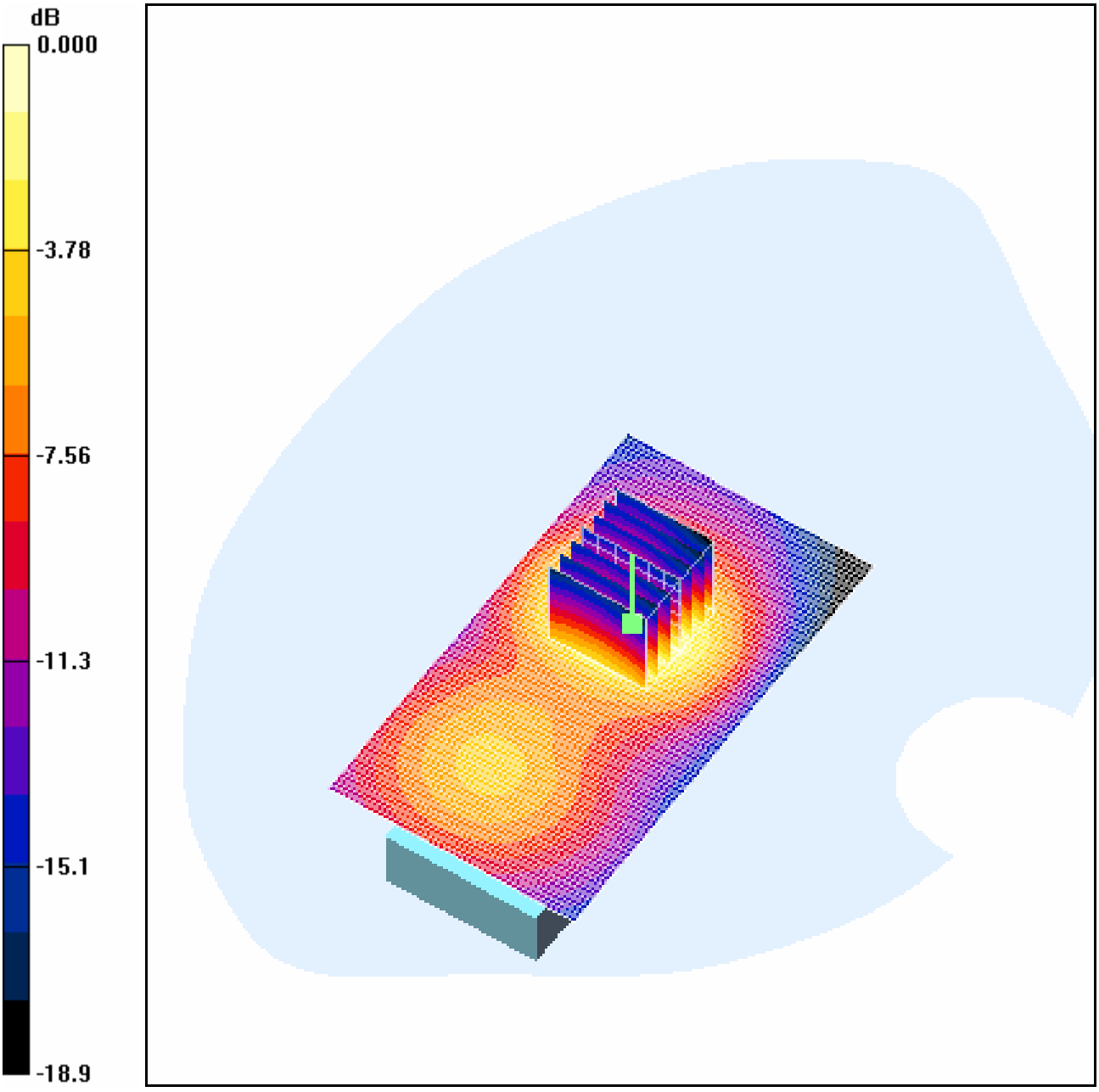
Communication System: PCS1900-GPRS Mode; Frequency: 1850.2 MHz;Duty Cycle: 1:4
Medium: HSL1900-Body Medium parameters used: f = 1850.2 MHz; σ = 1.49 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.53, 4.53, 4.53); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.660 mW/g

Body Worn - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.1 V/m; Power Drift = -0.061 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.589 mW/g; SAR(10 g) = 0.316 mW/g
Maximum value of SAR (measured) = 0.658 mW/g



0 dB = 0.658mW/g

4.17 FCC-OET65-Body-Worn-PCS1900-GPRS-Mid

Date/Time: 2006-5-29 9:09:56

Test Laboratory: SGS-GSM

Body-Worn-PCS1900-GPRS-Mid

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

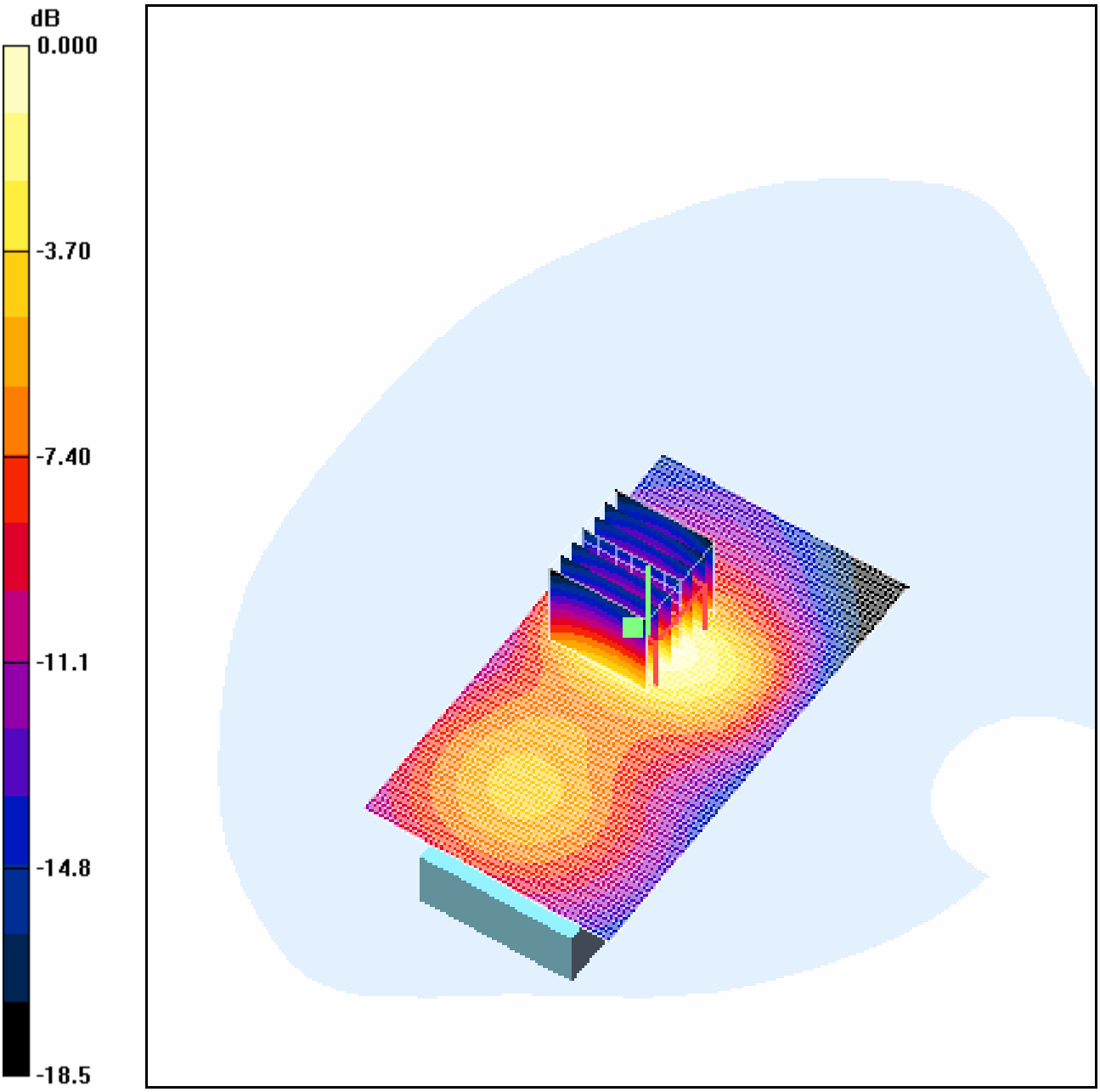
Communication System: PCS1900-GPRS Mode; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: HSL1900-Body Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.53, 4.53, 4.53); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.824 mW/g

Body Worn - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = -0.063 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.743 mW/g; SAR(10 g) = 0.396 mW/g
Maximum value of SAR (measured) = 0.824 mW/g



0 dB = 0.824mW/g

4.18 FCC-OET65-Body-Worn-PCS1900-GPRS-High

Date/Time: 2006-5-29 9:32:40

Test Laboratory: SGS-GSM

Body-Worn-PCS1900-GPRS-High

DUT: GSM60064O; Type: Head; Serial: 35999900000020-8

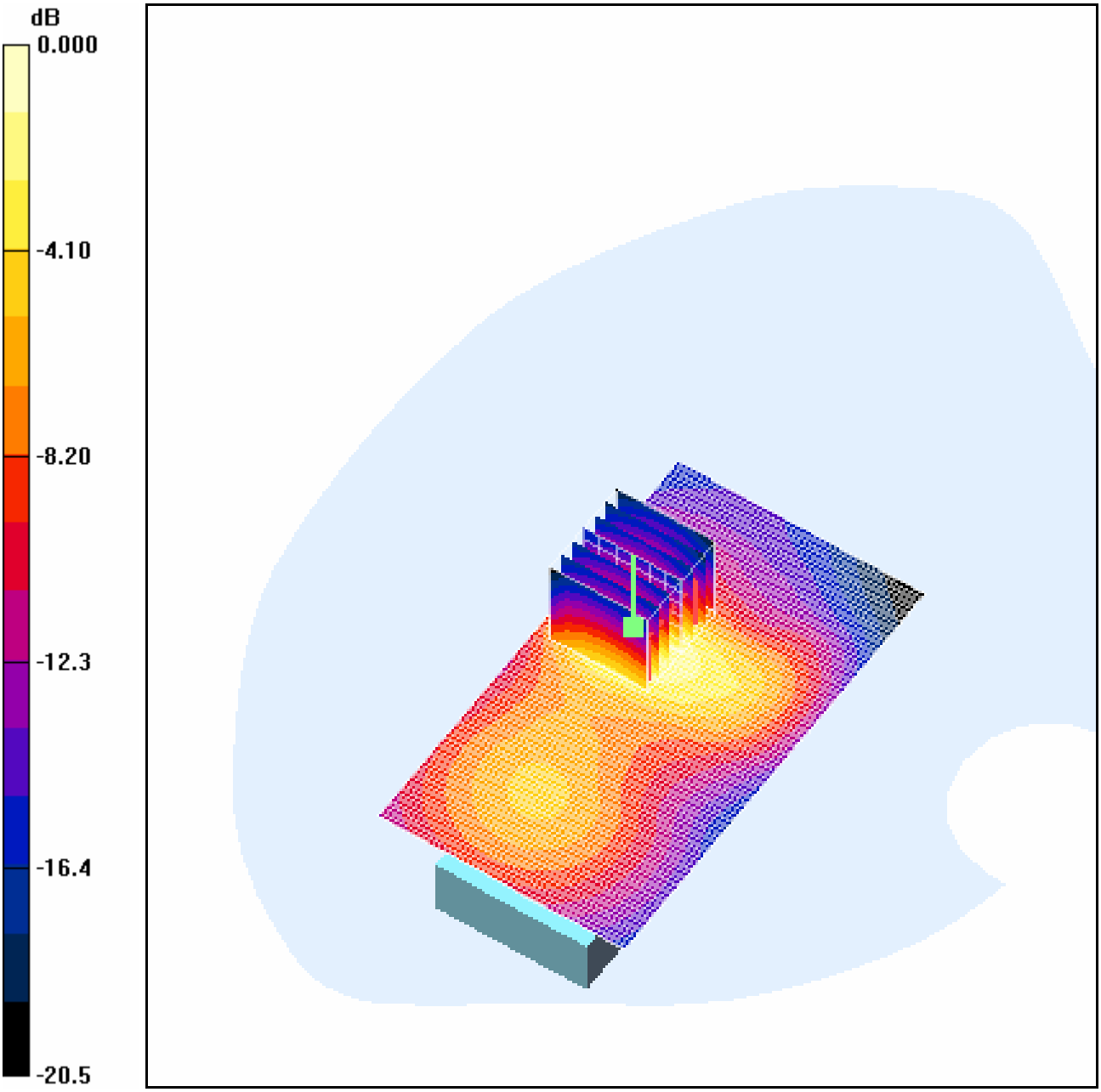
Communication System: PCS1900-GPRS Mode; Frequency: 1909.8 MHz;Duty Cycle: 1:4
Medium: HSL1900-Body Medium parameters used: f = 1909.8 MHz; σ = 1.55 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(4.53, 4.53, 4.53); Calibrated: 2005-9-13
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2005-11-17
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.22 mW/g

Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.04 V/m; Power Drift = 0.128 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.509 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



0 dB = 1.15mW/g

Appendix

1. Photographs of Test Setup

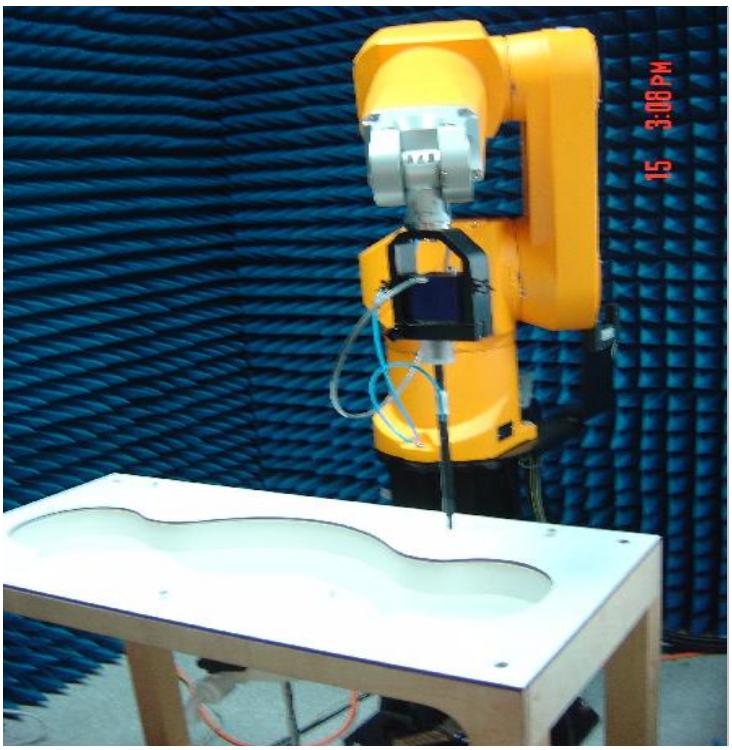


Fig.1 Photograph of the SAR measurement System

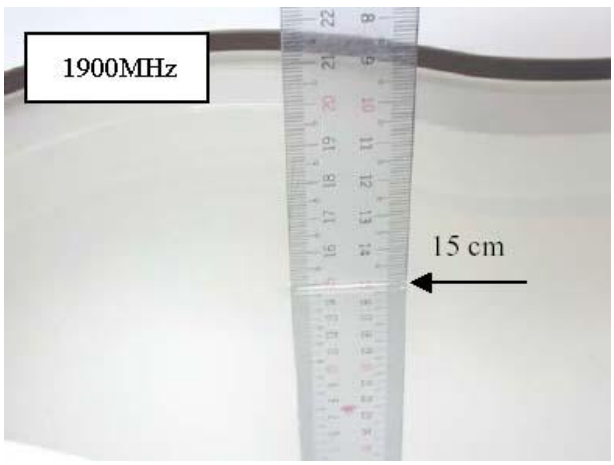


Fig.2 Photograph of the Tissue Simulant Fluid Fluid Liquid depth 15cm for Right-Head Side

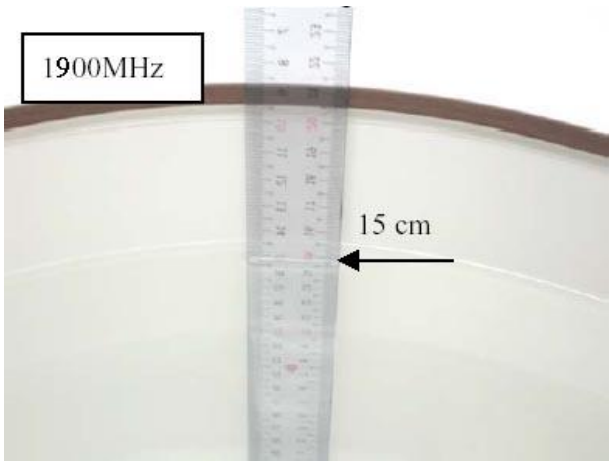


Fig.3 Photograph of the Tissue Simulant Liquid depth 15cm for Body-Worn

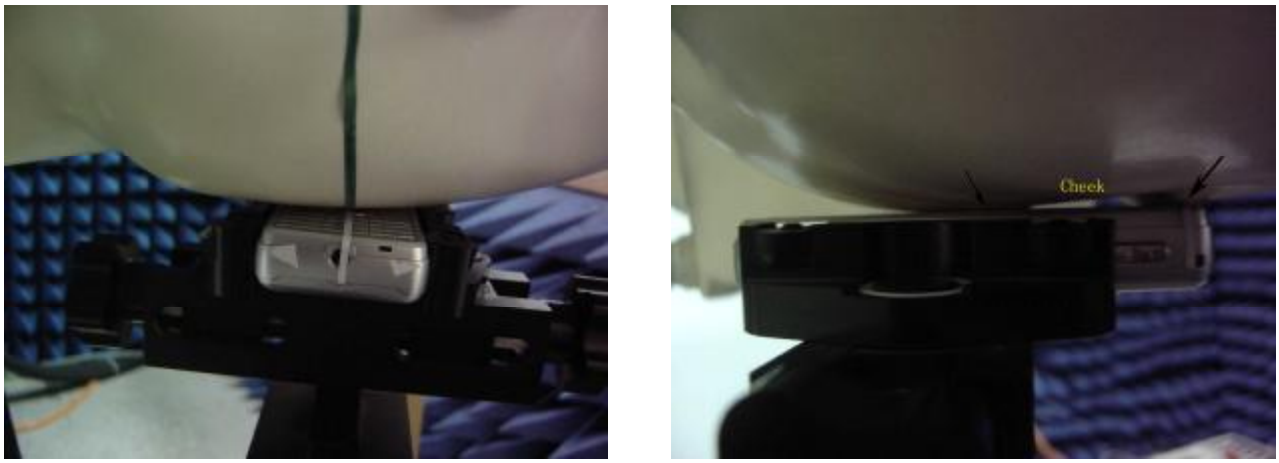


Fig.4 Photograph of the Left Hand Side Cheek status

Fig.5 Photograph of the Left Hand Side Tilt status

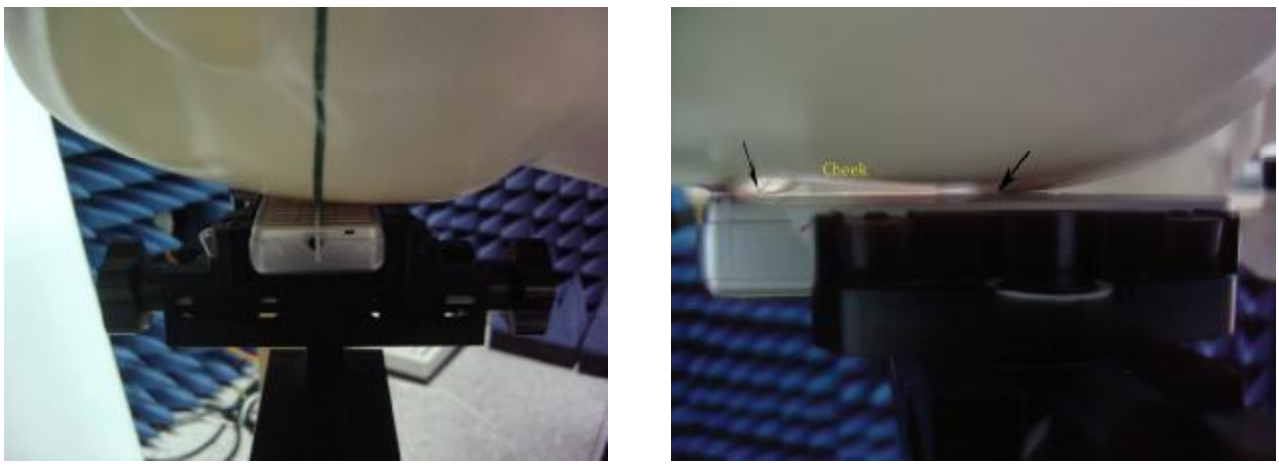


Fig.6 Photograph of the Right Hand Side Cheek status

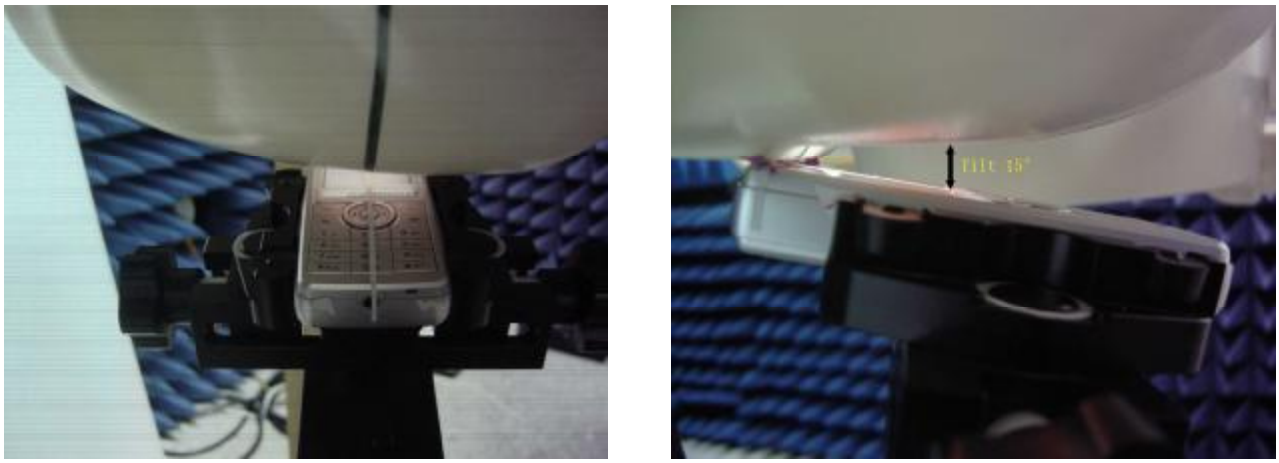


Fig.7 Photograph of the Right Hand Side Tilt status

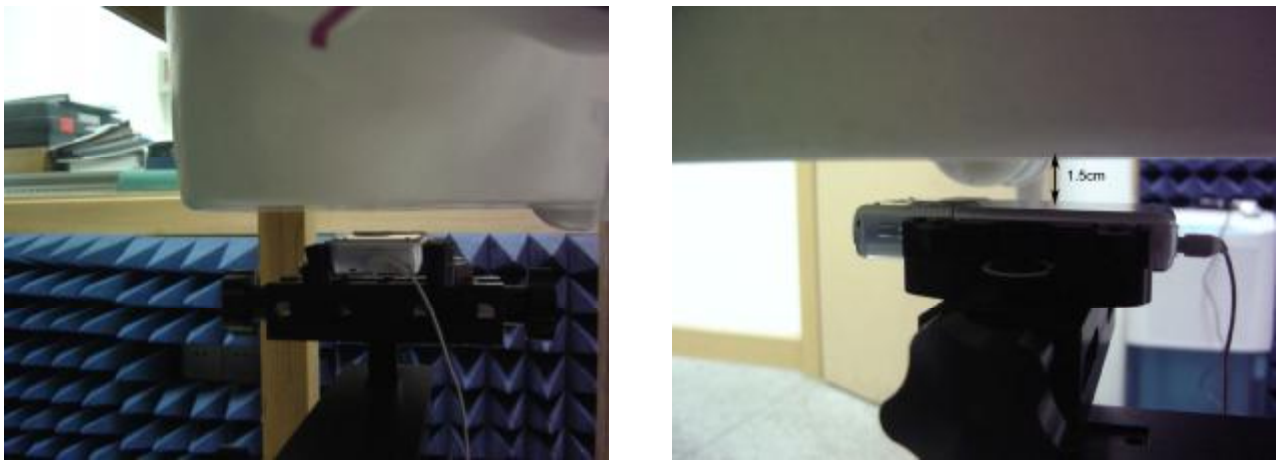


Fig.8 Photograph of the BodyWorn status

2. Photographs of the EUT

Fig.9 Front View

Fig.10 Back View

3. Photographs of the battery

Fig.11 Front view of battery

Fig.12 Back view of battery

4. Photograph of the charger

Fig.13 Charger

5. Probe Calibration certificate

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

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

Accredited by the Swiss 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 **SGS-CSTS (MTT)**

Certificate No: ES3-3088_Sep05

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3088
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	September 13, 2005
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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 654	29-Nov-04 (SPEAG, No. DAE4-654_Nov04)	Nov-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 15, 2005

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
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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., $\vartheta = 0$ 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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *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 ES3DV3

SN:3088

Manufactured: July 20, 2005
Calibrated: September 13, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ES3DV3 SN:3088 **September 13, 2005**

DASY - Parameters of Probe: ES3DV3 SN:3088

Sensitivity in Free Space[A]

Diode Compression[B]

NormX	**1.32** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**1.24** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**95** mV
NormZ	**1.23** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	5.8	2.7
SAR_{be} [%]	With Correction Algorithm	0.0	0.1

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	7.6	4.5
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

Probe Tip to Sensor Center	**2.0** mm

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

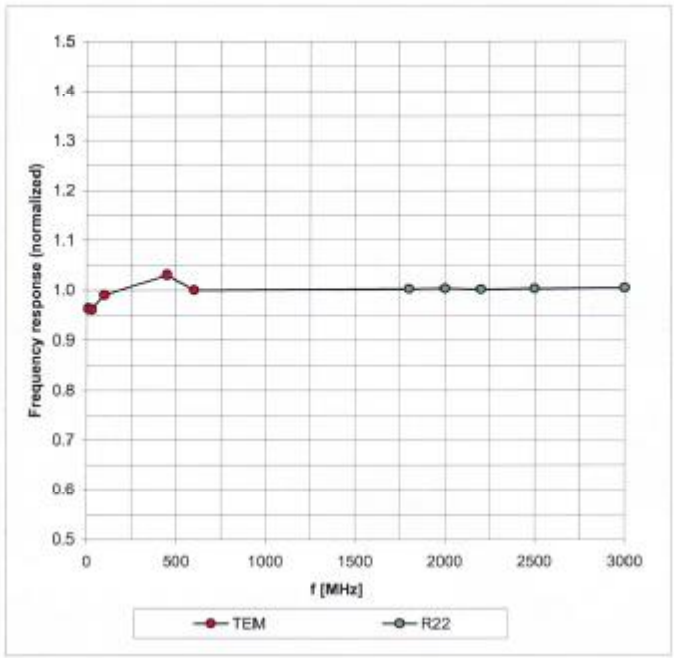
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ES3DV3 SN:3088 September 13, 2005

Frequency Response of E-Field

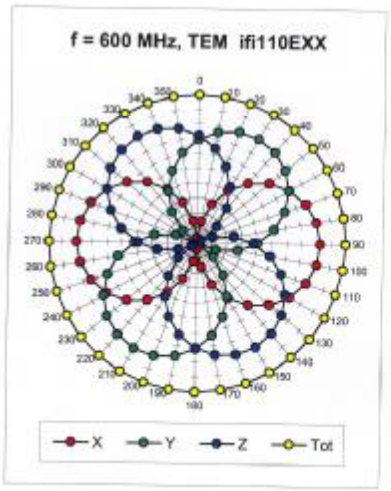
(TEM-Cell:ifi110 EXX, Waveguide: R22)

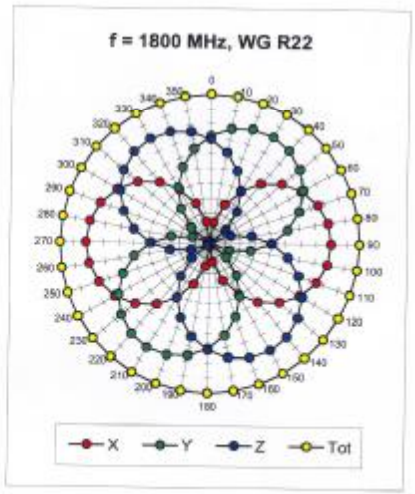


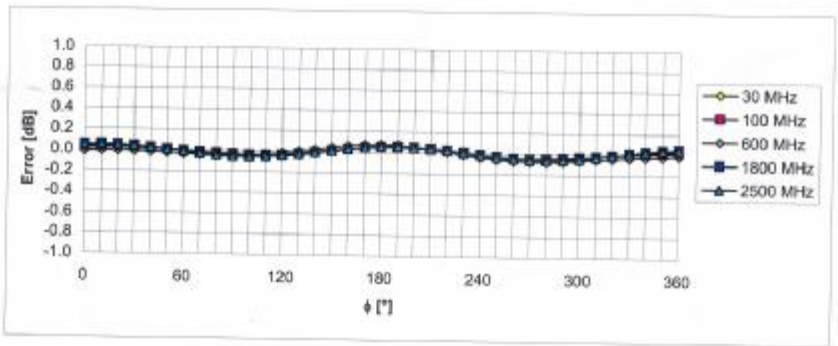
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ES3DV3 SN:3088 September 13, 2005

Receiving Pattern (ϕ), ϑ = 0°





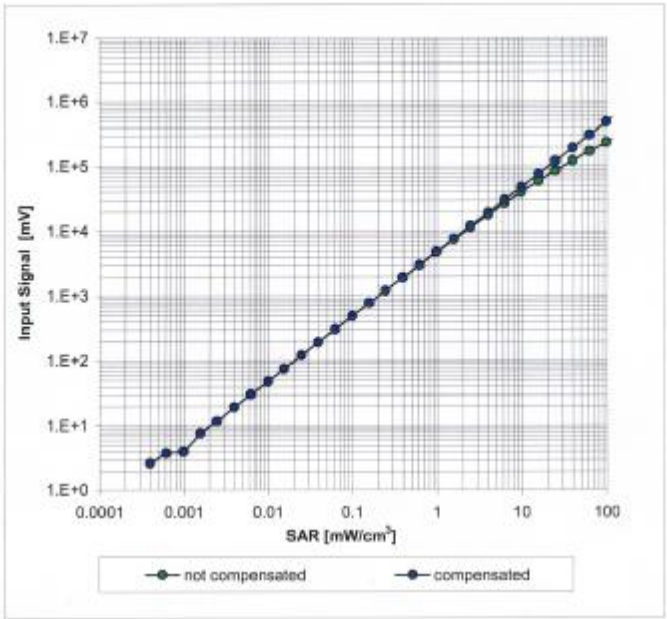


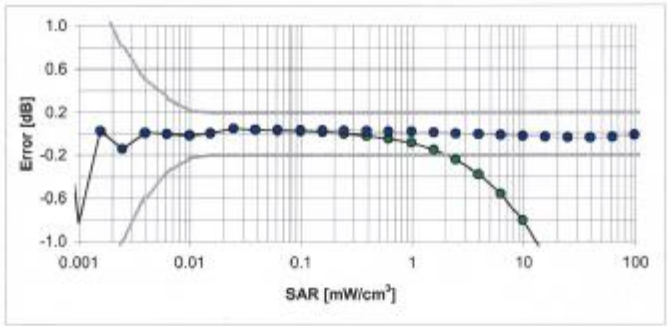
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ES3DV3 SN:3088 September 13, 2005

Dynamic Range f(SAR_{head})

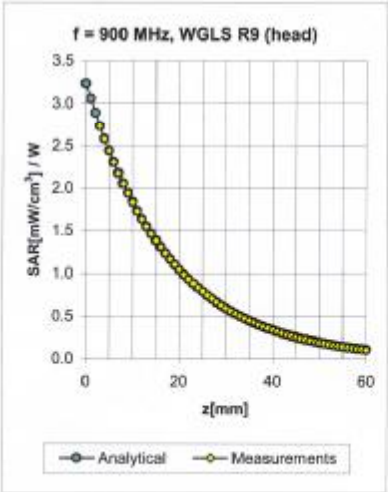
(Waveguide R22, f = 1800 MHz)

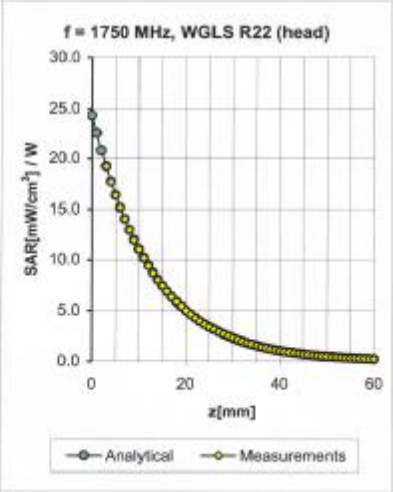




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment





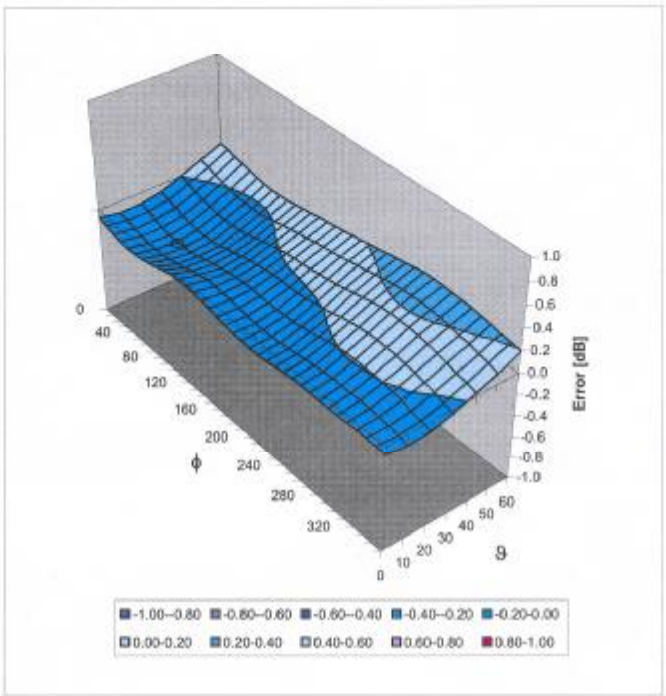
f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.47	1.40	5.91 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.24	2.39	4.97 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.27	2.28	4.93 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.25	2.34	4.87 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.61	1.25	5.83 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.28	2.53	4.61 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.28	2.57	4.53 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.32	2.11	4.47 ± 11.0% (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.

ES3DV3 SN:3088 September 13, 2005

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

6. *Uncertainty analysis*

Error Description	Tol. (± %)	Prob. dist.	Div.	(c_i) (1g)	(c_i) (10g)	Std. unc. (± %) (1g)	Std. unc. (± %) (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

7. 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

8. System validation from original equipment supplier

DASY4 Validation Report for Head TSL

Date/Time: 25.08.2005 17:04:02

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d028

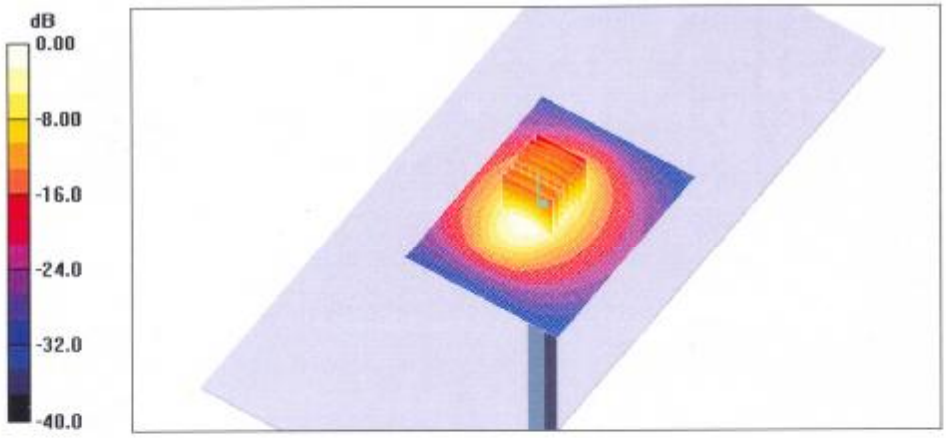
Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL 1900 MHz;
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.96, 4.96, 4.96); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.6 Build 9; Postprocessing SW: SEMCAD, V1.8 Build 151

Pin = 250 mW; d = 10 mm/Area Scan (61x81x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.8 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.5 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.89 mW/g; SAR(10 g) = 5.16 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 11.2mW/g

DASY4 Validation Report for Body TSL

Date/Time: 26.08.2005 15:32:29

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d028

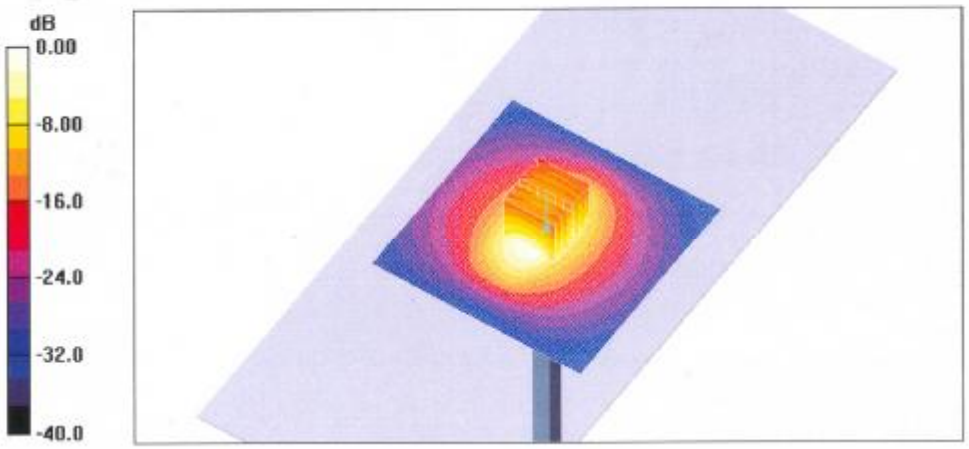
Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL 1900 MHz;
Medium parameters used: f = 1900 MHz; σ = 1.6 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.43, 4.43, 4.43); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.6 Build 9; Postprocessing SW: SEMCAD, V1.8 Build 151

Pin = 250 mW; d = 10 mm 2/Area Scan (81x81x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.2 mW/g

Pin = 250 mW; d = 10 mm 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.7 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.81 mW/g; SAR(10 g) = 5.22 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 11.2mW/g

The end