

SAR TEST REPORT

Equipment Under Test :	GSM 850&GSM 1900MHz MOBILE PHONE
Model No. :	A2005sa
Market name:	my100B or my100L
Applicant :	SAGEM Communication
Address of Applicant :	2,rue du Petit Albi BP 28250 95801 CERGY PONTOISE Cedex
Date of Receipt :	2005.12.30
Date of Test :	2005.12.31– 2006.01.05
Date of Issue :	2006.01.12

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 :

2006.01.12

Approved by :

Zhang Xue

Date :

2006.01.12

Contents

1. General Information.....	5
1.1 Test Laboratory.....	5
1.2 Details of Applicant	5
1.3 Description of EUT(s).....	5
1.4 Test Environment	6
1.5 Operation Configuration	6
1.6 The SAR Measurement System.....	6
1.7 SAR System Verification.....	8
1.8 Tissue Simulant Fluid for the Frequency Band 900MHz and 1900MHZ	9
1.9 Test Standards and Limits	10
2. Summary of Results	11
3. Instruments List	13
4. Measurements	14
4.1 FCC-OET65-LeftHandSide-Cheek-GSM850-Low	14
FCC-OET65-LeftHandSide-Cheek-GSM850-Low.....	14
4.2 FCC-OET65-LeftHandSide-Cheek-GSM850-Mid	16
FCC-OET65-LeftHandSide-Cheek-GSM850-Mid	16
4.3 FCC-OET65-LeftHandSide-Cheek-GSM850-High	18
FCC-OET65-LeftHandSide-Cheek-GSM850-High	18
4.4 FCC-OET65-LeftHandSide-Tilt-GSM850-Low	20
FCC-OET65-LeftHandSide-Tilt-GSM850-Low	20
4.5 FCC-OET65-LeftHandSide-Tilt-GSM850-Mid	22
FCC-OET65-LeftHandSide-Tilt-GSM850-Mid	22
4.6 FCC-OET65-LeftHandSide-Tilt-GSM850-High.....	24
FCC-OET65-LeftHandSide-Tilt-GSM850-High.....	24
4.7 FCC-OET65-RightHandSide-Cheek-GSM850-Low	26
FCC-OET65-RightHandSide-Cheek-GSM850-Low.....	26
4.8 FCC-OET65-RightHandSide-Cheek-GSM850-Mid	28
FCC-OET65-RightHandSide-Cheek-GSM850-Mid	28
4.9 FCC-OET65-RightHandSide-Cheek-GSM850-High	30
FCC-OET65-RightHandSide-Cheek-GSM850-High	30
4.10 FCC-OET65-RightHandSide-Tilt-GSM850-Low.....	32

FCC-OET65-RightHandSide-Tilt-GSM850-Low	32
4.11 FCC-OET65-RightHandSide-Tilt-GSM850-Mid	34
FCC-OET65-RightHandSide-Tilt-GSM850-Mid	34
4.12 FCC-OET65-RightHandSide-Tilt-GSM850-High	36
FCC-OET65-RightHandSide-Tilt-GSM850-High	36
4.13 FCC-OET65-Body-Worn-GSM850-Low.....	38
FCC-OET65-Body-Worn-GSM850-Low	38
4.14 FCC-OET65-Body-Worn-GSM850-Mid.....	40
FCC-OET65-Body-Worn-GSM850-Mid	40
4.15 FCC-OET65-Body-Worn-GSM850-High.....	42
FCC-OET65-Body-Worn-GSM850-High.....	42
4.16 FCC-OET65-LeftHandSide-Cheek-GSM1900-Low	44
FCC-OET65-LeftHandSide-Cheek-GSM1900-Low	44
4.17 FCC-OET65-LeftHandSide-Cheek-GSM1900-Mid	46
FCC-OET65-LeftHandSide-Cheek-GSM1900-Mid.....	46
4.18 FCC-OET65-LeftHandSide-Cheek-GSM1900-High	48
FCC-OET65-LeftHandSide-Cheek-GSM1900-High	48
4.19 FCC-OET65-LeftHandSide-Tilt-GSM1900-Low	50
FCC-OET65-LeftHandSide-Tilt-GSM1900-Low	50
4.20 FCC-OET65-LeftHandSide-Tilt-GSM1900-Mid	52
FCC-OET65-LeftHandSide-Tilt-GSM1900-Mid	52
4.21 FCC-OET65-LeftHandSide-Tilt-GSM1900-High.....	54
FCC-OET65-LeftHandSide-Tilt-GSM1900-high.....	54
4.22 FCC-OET65-RightHandSide-Cheek-GSM1900-Low	56
FCC-OET65-RightHandSide-Cheek-GSM1900-Low.....	56
4.23 FCC-OET65-RightHandSide-Cheek-GSM1900-Mid	58
FCC-OET65-RightHandSide-Cheek-GSM1900-Mid	58
4.24 FCC-OET65-RightHandSide-Cheek-GSM1900-High	60
FCC-OET65-RightHandSide-Cheek-GSM1900-High	60
4.25 FCC-OET65-RightHandSide-Tilt-GSM1900-Low.....	62
FCC-OET65-RightHandSide-Tilt-GSM1900-Low	62
4.26 FCC-OET65-RightHandSide-Tilt-GSM1900-Mid.....	64
FCC-OET65-RightHandSide-Tilt-GSM1900-Mid.....	64
4.27 FCC-OET65-RightHandSide-Tilt-GSM1900-High.....	66

FCC-OET65-RightHandSide-Tilt-GSM1900-High.....	66
4.28 FCC-OET65-Body-Worn-GSM1900-Low.....	68
FCC-OET65-Body-Worn-GSM1900-Low.....	68
4.29 FCC-OET65-Body-Worn-GSM1900-Mid.....	70
FCC-OET65-Body-Worn-GSM1900-Mid	70
4.30 FCC-OET65-Body-Worn-GSM1900-High.....	72
FCC-OET65-Body-Worn-GSM1900-High.....	72
Appendix	74
1. Photographs of Test Setup.....	74
2. Photographs of the EUT	77
3. Photographs of the battery.....	78
4. Photograph of the charger	78
5. Probe Calibration certificate.....	79
6. Uncertainty analysis	88
7. Phantom description	89

1. General Information

1.1 Test Laboratory

GSM Lab
 SGS-CSTC Standards Technical Services Co.Ltd Shanghai Branch
 9F,the 3rd Building, No.899, 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.	A2005sa	
Market Name	my100B or my100L	
Serial No.	IMEI: 35399200261905-5	
Battery Type	Li-ion, 3.9V	
Antenna Type	Inner Antenna	
Operation Mode	GSM850/GSM1900	
Modulation Mode	GMSK	
Frequency range	GSM850	Tx: 824~849 MHz
		Rx: 869~894 MHz
	GSM1900	Tx: 1850~1910 MHz
		Rx: 1930~1990 MHz
Maximum RF Conducted Power	GSM850: 33dBm, GSM1900: 30dBm	

1.4 Test Environment

Ambient temperature: 22.0° C

Tissue Simulating Liquid: 22° C

Relative Humidity: 34%

1.5 Operation Configuration

Configuration 1: GSM 850, LeftHandSide Cheek & 15° Tilt Position

Configuration 2: GSM 850, RightHandSide Cheek & 15° Tilt Position

Configuration 3: GSM 850, BodyWorn (1.5cm between EUT and phantom)

Configuration 4: GSM 1900, LeftHandSide Cheek & 15° Tilt Position

Configuration 5: GSM 1900, RightHandSide Cheek & 15° Tilt Position

Configuration 6: GSM 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 $SAR = \sigma (|E_i|^2) / \rho$ 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:

- Ÿ 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).
- Ÿ 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.
- Ÿ 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.

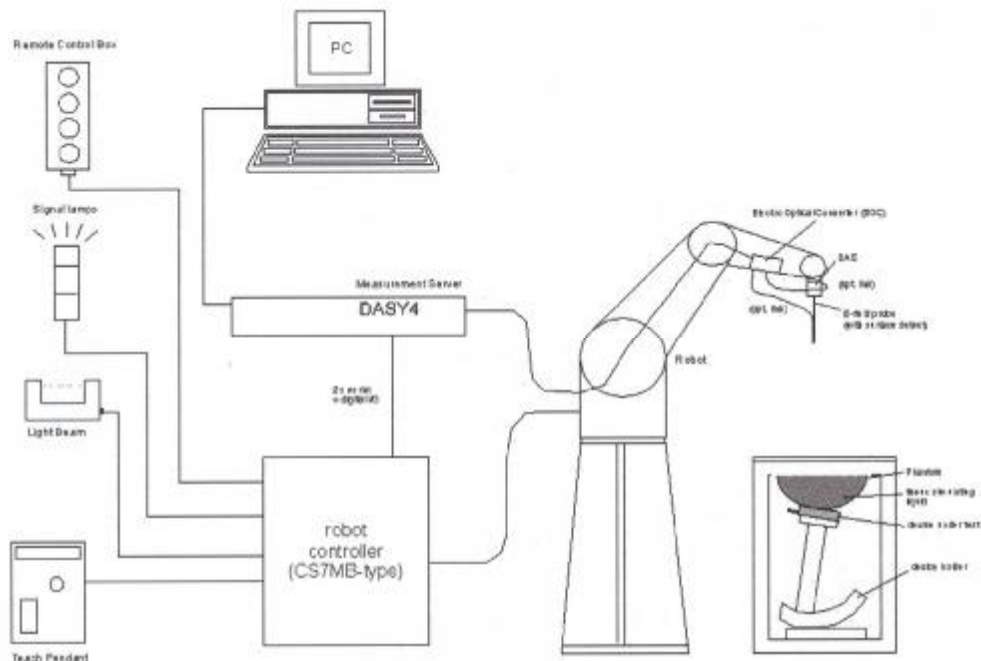


Fig. a SAR System Configuration

- 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.

- Ÿ The device holder for handheld mobile phones.
- Ÿ Tissue simulating liquid mixed according to the given recipes.
- Ÿ Validation dipole kits allowing to validate 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 $\pm 10\%$ from the target SAR values. These tests were done at 900MHz and 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.

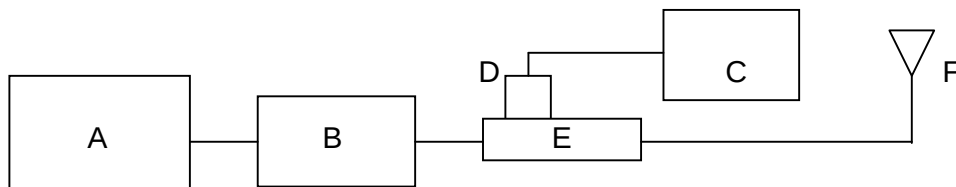


Fig. b the microwave circuit arrangement used for SAR system verification

- 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	900 Head	2.6	1.67	2.70	1.74	2006-01-04
ES3DV3 SN3088	900 Body	2.69	1.74	2.79	1.79	2006-01-05
ES3DV3 SN3088	1900 Head	9.65	5.13	9.74	5.20	2005-12-31
ES3DV3 SN3088	1900 Body	9.48	5.17	9.88	5.39	2006-01-05

Table 1. Result System Validation

1.8 Tissue Simulant Fluid for the Frequency Band 900MHz and 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)
835	Head	Measured, 2006-01-04	41.72	0.880	22.5
		Recommended Limit	41.5±5%	0.90±5%	20-24
	Body	Measured, 2005-01-05	52.57	0.995	22.5
		Recommended Limit	55.2±5%	0.97±5%	20-24
1900	Head	Measured, 2005-12-31	40.03	1.461	22.3
		Recommended Limit	40.0±5%	1.40±5%	20-24
	Body	Measured, 2006-01-05	51.54	1.547	22.6
		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)	Power Drift (dB)	Amb. Temp (°C)	Verdict
GSM 850	LeftHandSide Cheek, Low Channel	33.1	1.17	-0.117	22	PASS
	LeftHandSide Cheek, Mid Channel	33.3	0.978	-0.126	22	PASS
	LeftHandSide Cheek, High Channel	33.4	0.901	-0.157	22	PASS
	LeftHandSide Tilt, Low Channel	33.1	0.595	0.018	22	PASS
	LeftHandSide Tilt, Mid Channel	33.3	0.533	-0.195	22	PASS
	LeftHandSide Tilt, High Channel	33.4	0.469	-0.113	22	PASS
	RightHandSide Cheek, Low Channel	33.1	1.22	0.038	22	PASS
	RightHandSide Cheek, Mid Channel	33.3	1.15	-0.158	22	PASS
	RightHandSideCheek, High Channel	33.4	1.04	-0.143	22	PASS
	RightHandSide Tilt, Low Channel	33.1	0.599	-0.124	22	PASS
	RightHandSide Tilt, Mid Channel	33.3	0.472	-0.052	22	PASS
	RightHandSide Tilt, High Channel	33.4	0.456	-0.059	22	PASS
	BodyWorn, Low Channel	33.1	0.877	-0.104	22	PASS
	BodyWorn, Mid Channel	33.3	0.781	-0.082	22	PASS
	BodyWorn, High Channel	33.4	0.731	-0.198	22	PASS
GSM 1900	LeftHandSide Cheek, Low Channel	30.8	1.21	-0.073	22	PASS
	LeftHandSide Cheek, Mid Channel	30.8	1.26	-0.122	22	PASS
	LeftHandSide Cheek, High Channel	30.6	1.02	-0.062	22	PASS
	LeftHandSide Tilt, Low Channel	30.8	1.12	-0.096	22	PASS
	LeftHandSide Tilt, Mid Channel	30.8	1.06	-0.023	22	PASS
	LeftHandSide Tilt, High Channel	30.6	0.986	-0.133	22	PASS
	RightHandSide Cheek, Low Channel	30.8	0.882	-0.087	22	PASS
	RightHandSide Cheek, Mid Channel	30.8	0.892	0.018	22	PASS

	RightHandSideCheek, High Channel	30.6	0.743	-0.081	22	PASS
	RightHandSide Tilt, Low Channel	30.8	0.943	-0.058	22	PASS
	RightHandSide Tilt, Mid Channel	30.8	0.861	-0.112	22	PASS
	RightHandSide Tilt, High Channel	30.6	0.697	-0.074	22	PASS
	BodyWorn, Low Channel	30.8	0.572	-0.102	22	PASS
	BodyWorn, Mid Channel	30.8	0.466	-0.059	22	PASS
	BodyWorn, High Channel	30.6	0.342	-0.046	22	PASS

Maximum value

Frequency Band(MHz)	EUT position	Conducted Output Power (dBm)	1g Average (W/Kg)	Power Drift (dB)	Amb. Temp (°C)	Verdict
850	RightHandSide Cheek, Low Channel	33.1	1.22	0.038	22	PASS
	BodyWorn, Low Channel	33.1	0.877	-0.104	22	PASS
1900	LeftHandSide Cheek, Mid Channel	30.8	1.26	-0.122	22	PASS
	BodyWorn, Low Channel	30.8	0.572	-0.102	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 GSM1900 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.
4. For the Bodyworn measurements, the distance from the sample to the phantom is 1.5cm.

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
900MHz system validation dipole	D900V2	184	GSM-SAR-013	2005.8.22
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-033	2005.05.20
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	2004.01.25

4. Measurements

4.1 FCC-OET65-LeftHandSide-Cheek-GSM850-Low

Date/Time: 2006-1-4 13:24:45

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Cheek-GSM850-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.866$ mho/m; $\epsilon_r = 41.8$;
 $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.25 mW/g

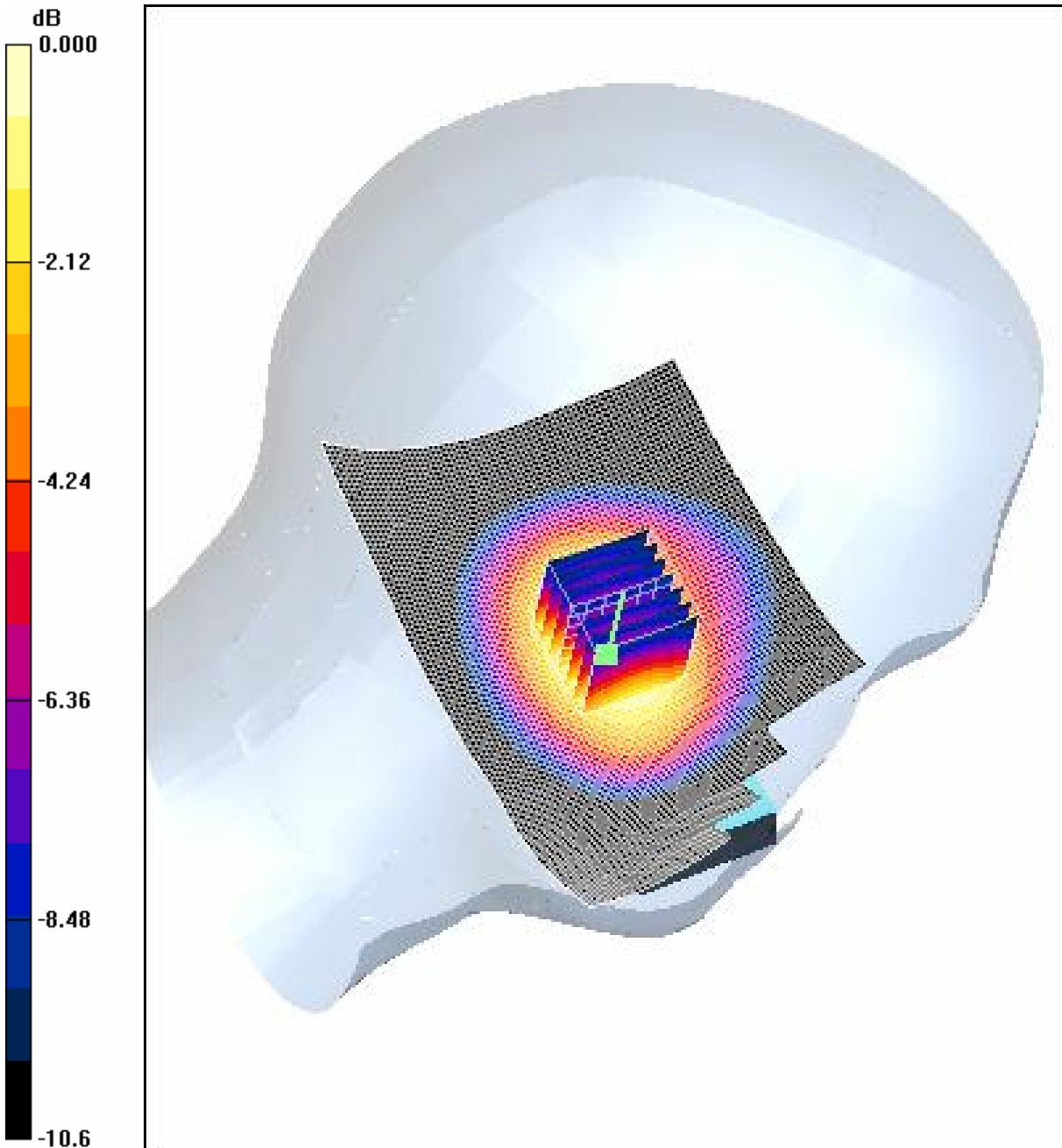
Cheek position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.9 V/m; Power Drift = -0.117 dB

Peak SAR (extrapolated) = 1.65 W/kg

SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.779 mW/g

Maximum value of SAR (measured) = 1.25 mW/g



0 dB = 1.25mW/g

4.2 FCC-OET65-LeftHandSide-Cheek-GSM850-Mid

Date/Time: 2006-1-4 13:51:48

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Cheek-GSM850-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 41.7$;
 $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.07 mW/g

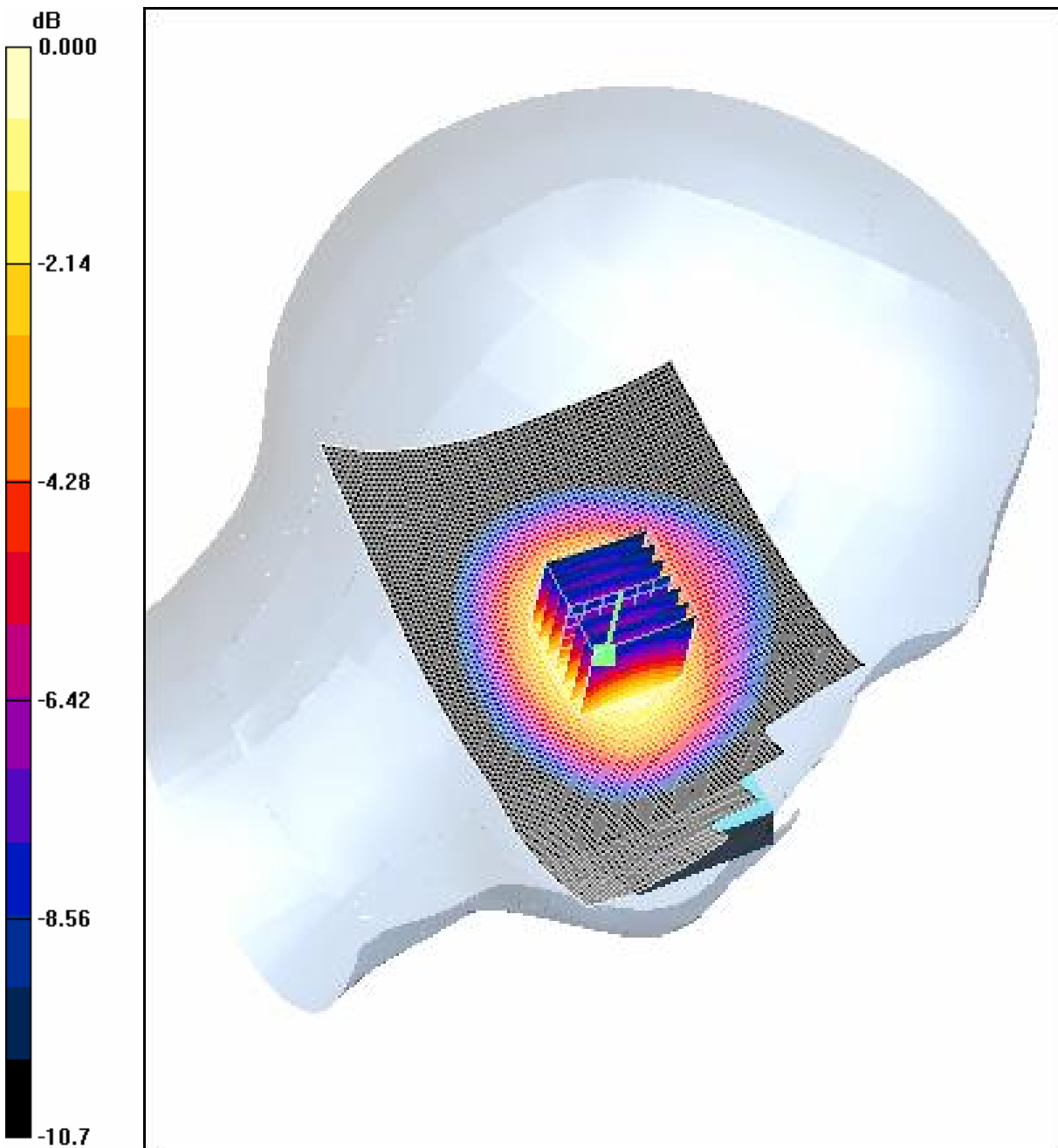
Cheek position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,
dz=5mm

Reference Value = 25.9 V/m; Power Drift = -0.126 dB

Peak SAR (extrapolated) = 1.39 W/kg

SAR(1 g) = 0.978 mW/g; SAR(10 g) = 0.653 mW/g

Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

4.3 FCC-OET65-LeftHandSide-Cheek-GSM850-High

Date/Time: 2006-1-4 14:16:51

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Cheek-GSM850-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used: $f = 849$ MHz; $\sigma = 0.89$ mho/m; $\varepsilon_r = 41.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.997 mW/g

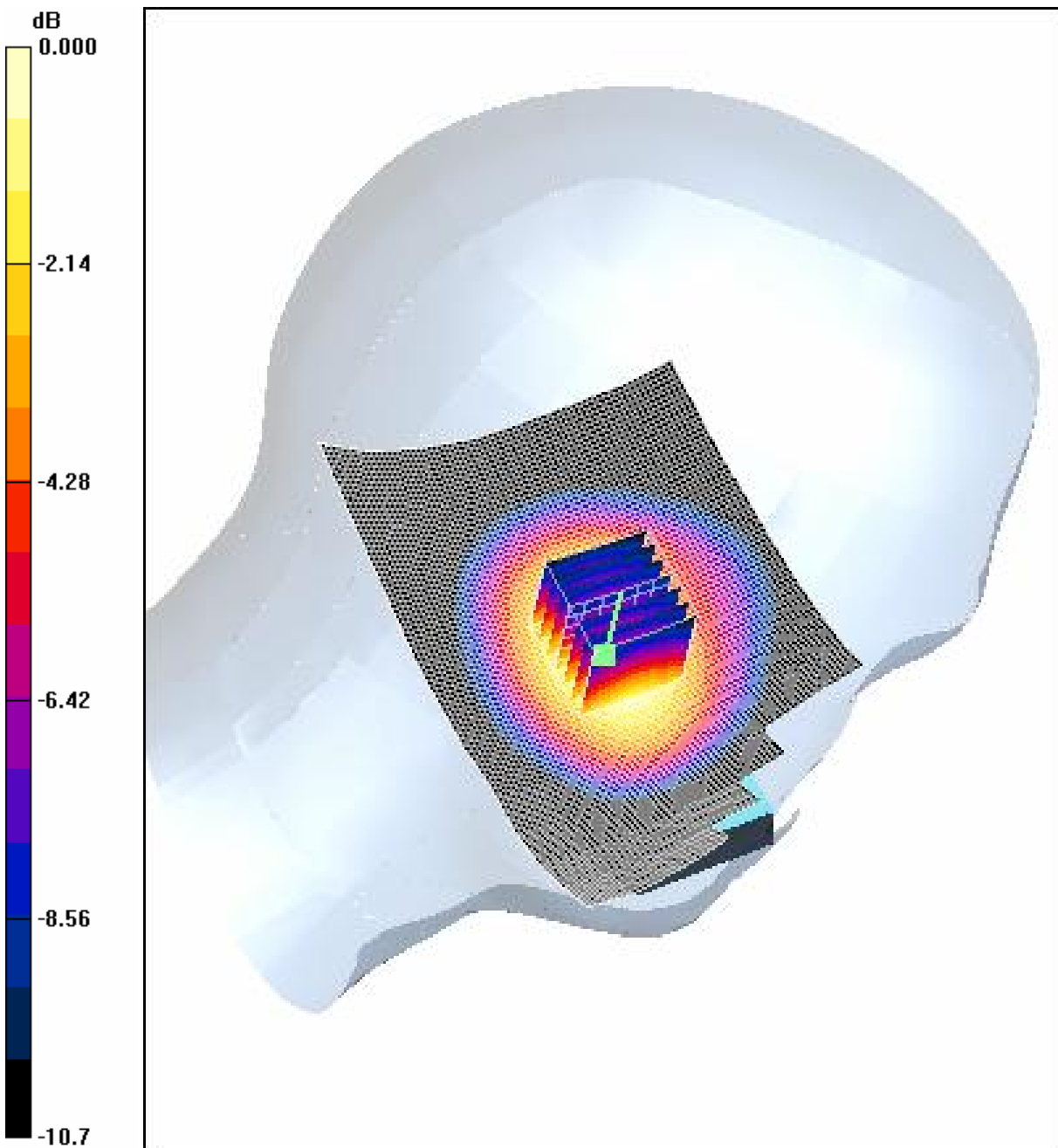
Cheek position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.4 V/m; Power Drift = -0.157 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.901 mW/g; SAR(10 g) = 0.598 mW/g

Maximum value of SAR (measured) = 0.974 mW/g



0 dB = 0.974mW/g

4.4 FCC-OET65-LeftHandSide-Tilt-GSM850-Low

Date/Time: 2006-1-4 15:06:44

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Tilt-GSM850-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.866$ mho/m; $\epsilon_r = 41.8$;
 $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, 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) = 0.630 mW/g

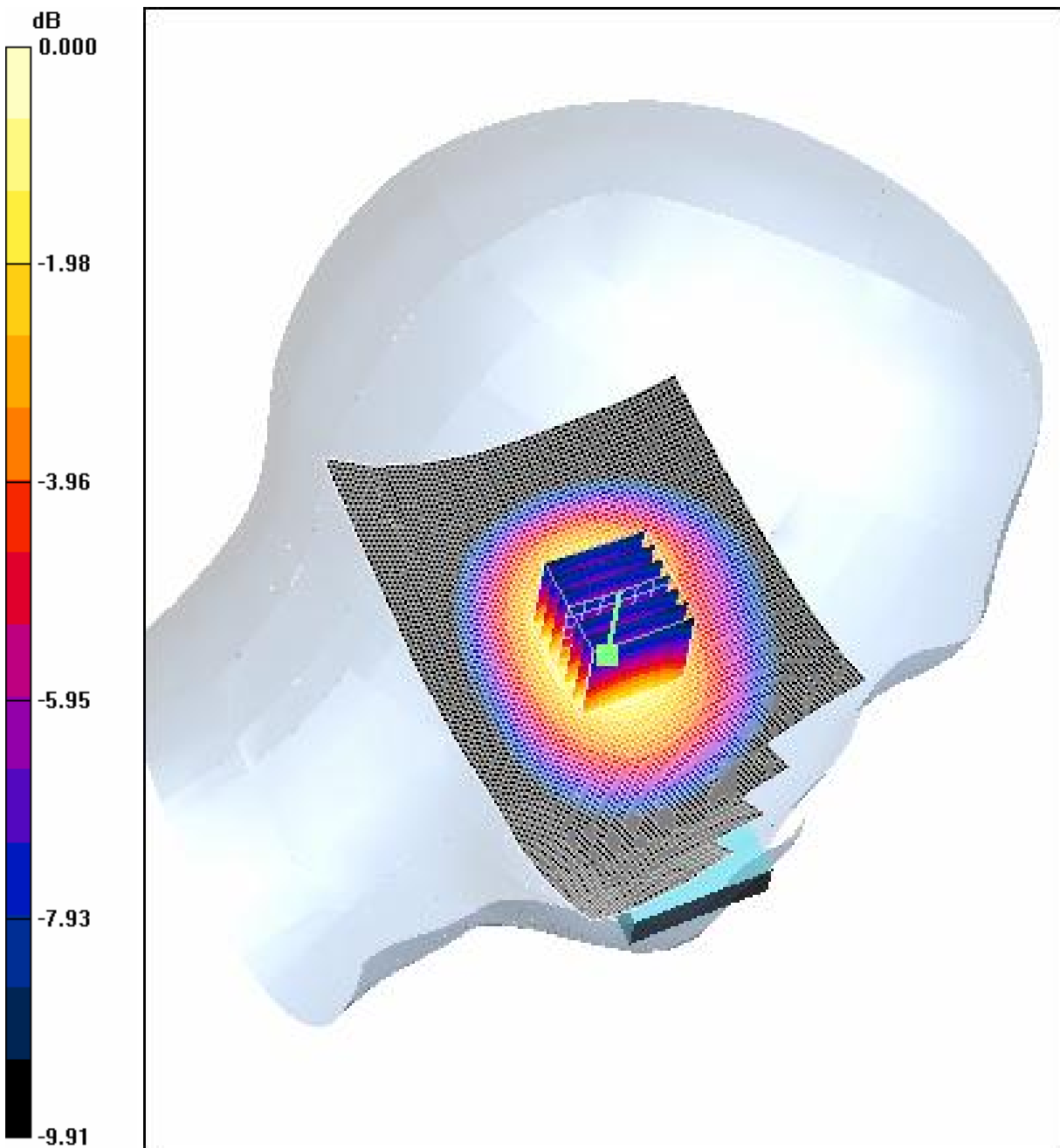
Tilt position - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.7 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 0.851 W/kg

SAR(1 g) = 0.595 mW/g; SAR(10 g) = 0.405 mW/g

Maximum value of SAR (measured) = 0.637 mW/g



0 dB = 0.637mW/g

4.5 FCC-OET65-LeftHandSide-Tilt-GSM850-Mid

Date/Time: 2006-1-4 15:31:42

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Tilt-GSM850-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 41.7$;
 $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, 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) = 0.582 mW/g

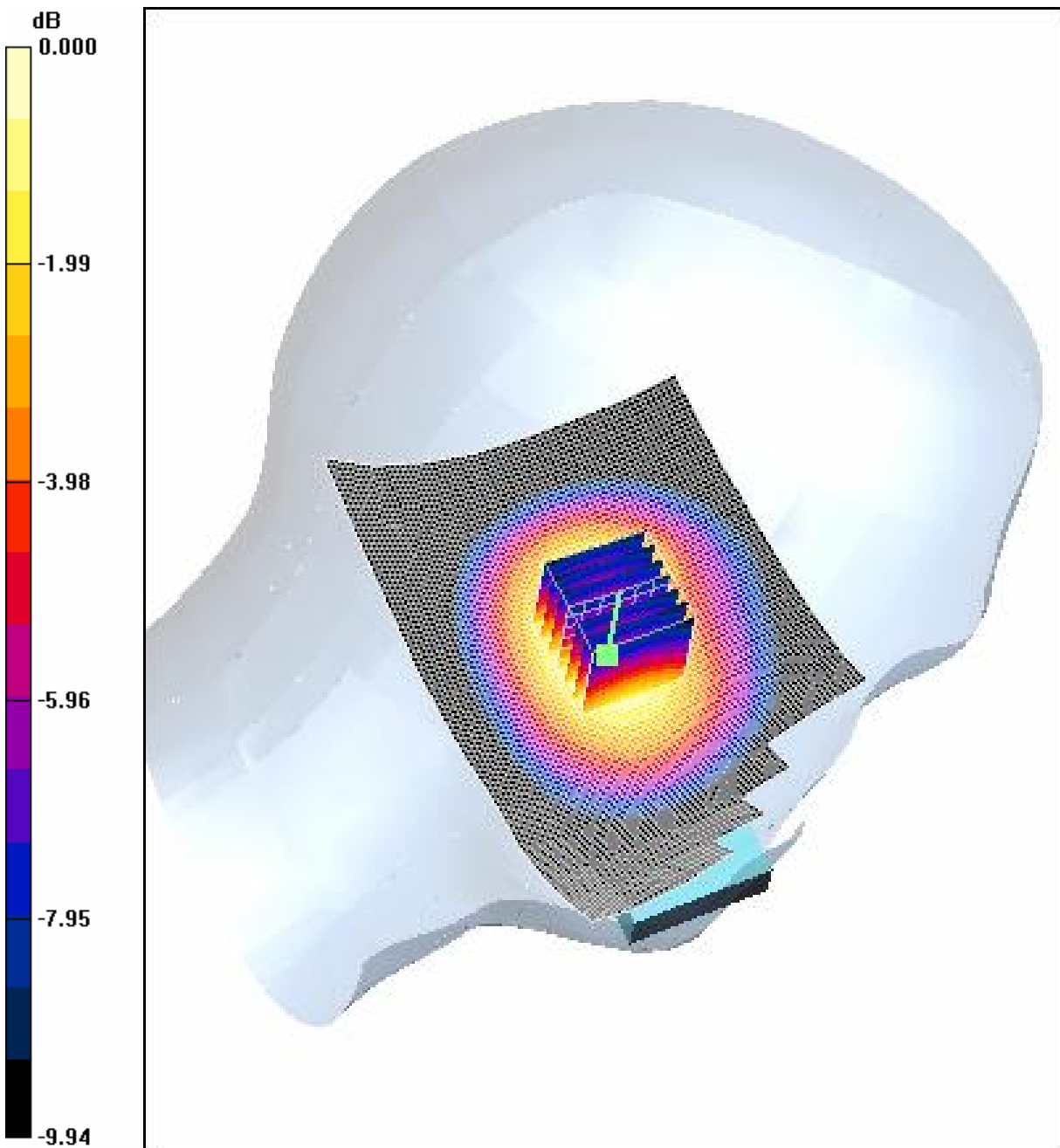
Tilt position - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.7 V/m; Power Drift = -0.195 dB

Peak SAR (extrapolated) = 0.756 W/kg

SAR(1 g) = 0.533 mW/g; SAR(10 g) = 0.363 mW/g

Maximum value of SAR (measured) = 0.570 mW/g



0 dB = 0.570mW/g

4.6 FCC-OET65-LeftHandSide-Tilt-GSM850-High

Date/Time: 2006-1-4 16:11:51

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Tilt-GSM850-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used: $f = 849$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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) = 0.503 mW/g

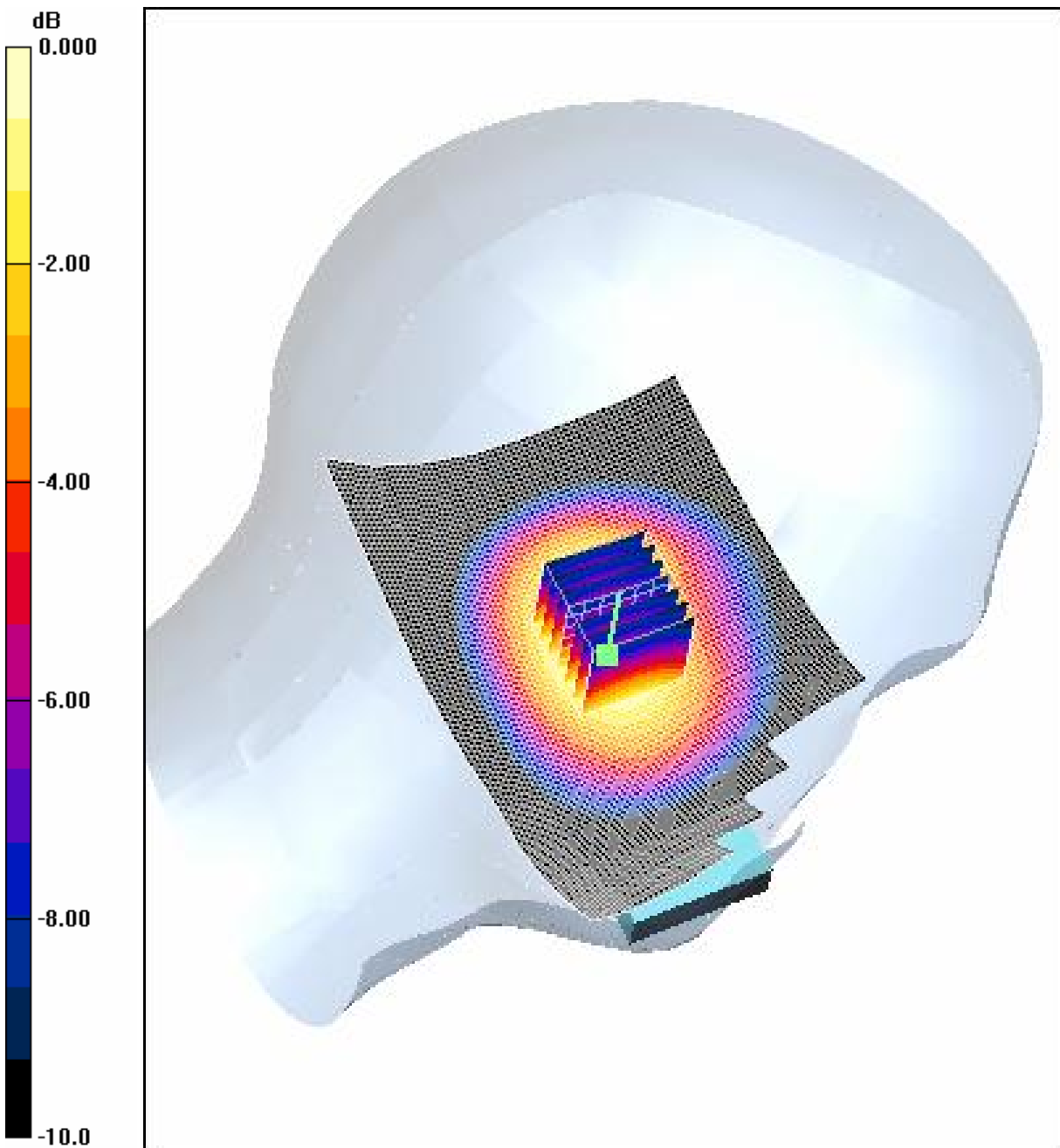
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.8 V/m; Power Drift = -0.113 dB

Peak SAR (extrapolated) = 0.667 W/kg

SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.318 mW/g

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



0 dB = 0.501mW/g

4.7 FCC-OET65-RightHandSide-Cheek-GSM850-Low

Date/Time: 2006-1-4 9:17:40

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Cheek-GSM850-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.866$ mho/m; $\epsilon_r = 41.8$;
 $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Low/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.30 mW/g

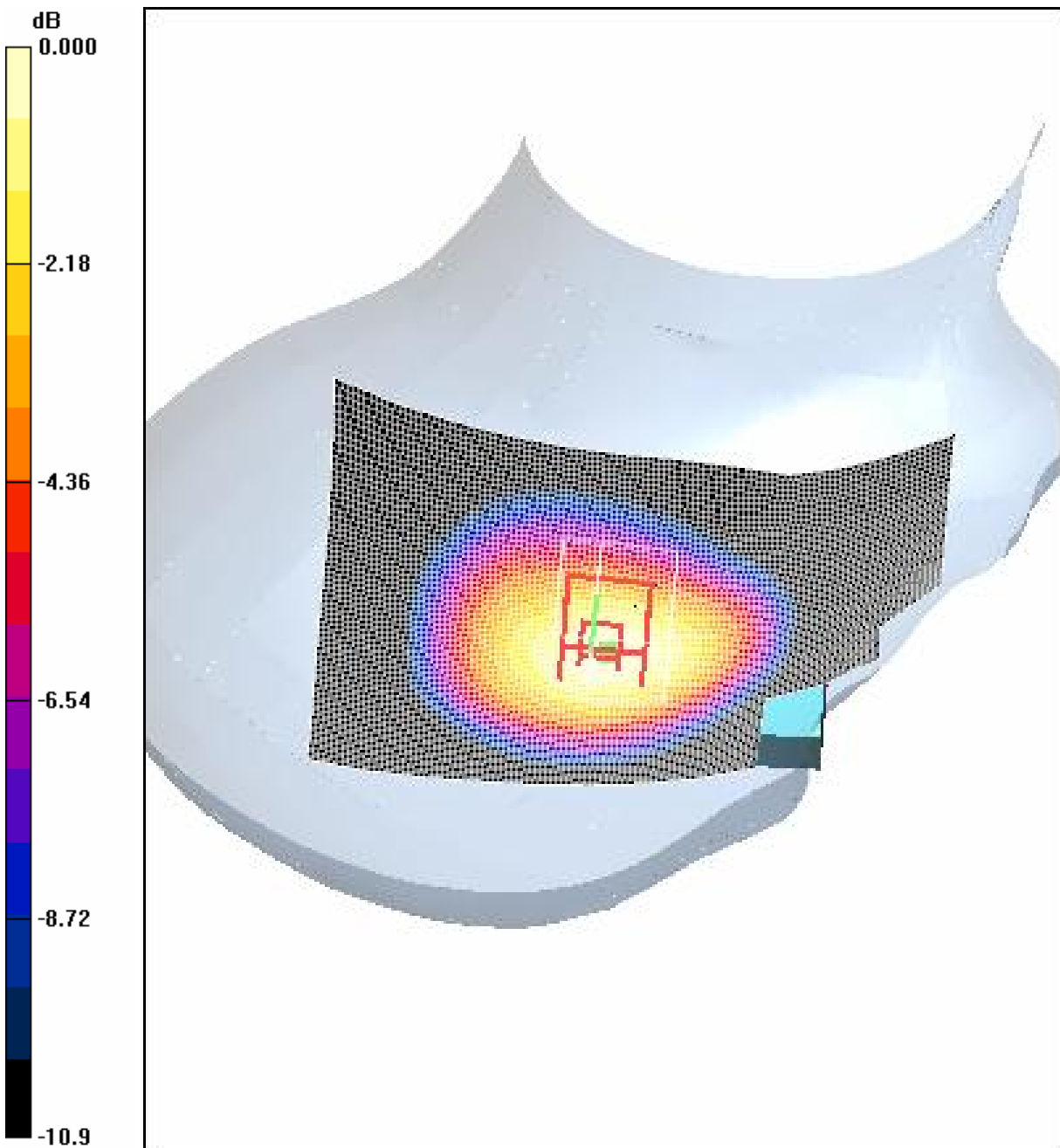
Cheek position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.3 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 1.73 W/kg

SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.816 mW/g

Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31mW/g

4.8 FCC-OET65-RightHandSide-Cheek-GSM850-Mid

Date/Time: 2006-1-4 9:45:23

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Cheek-GSM850-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 41.7$;
 $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.29 mW/g

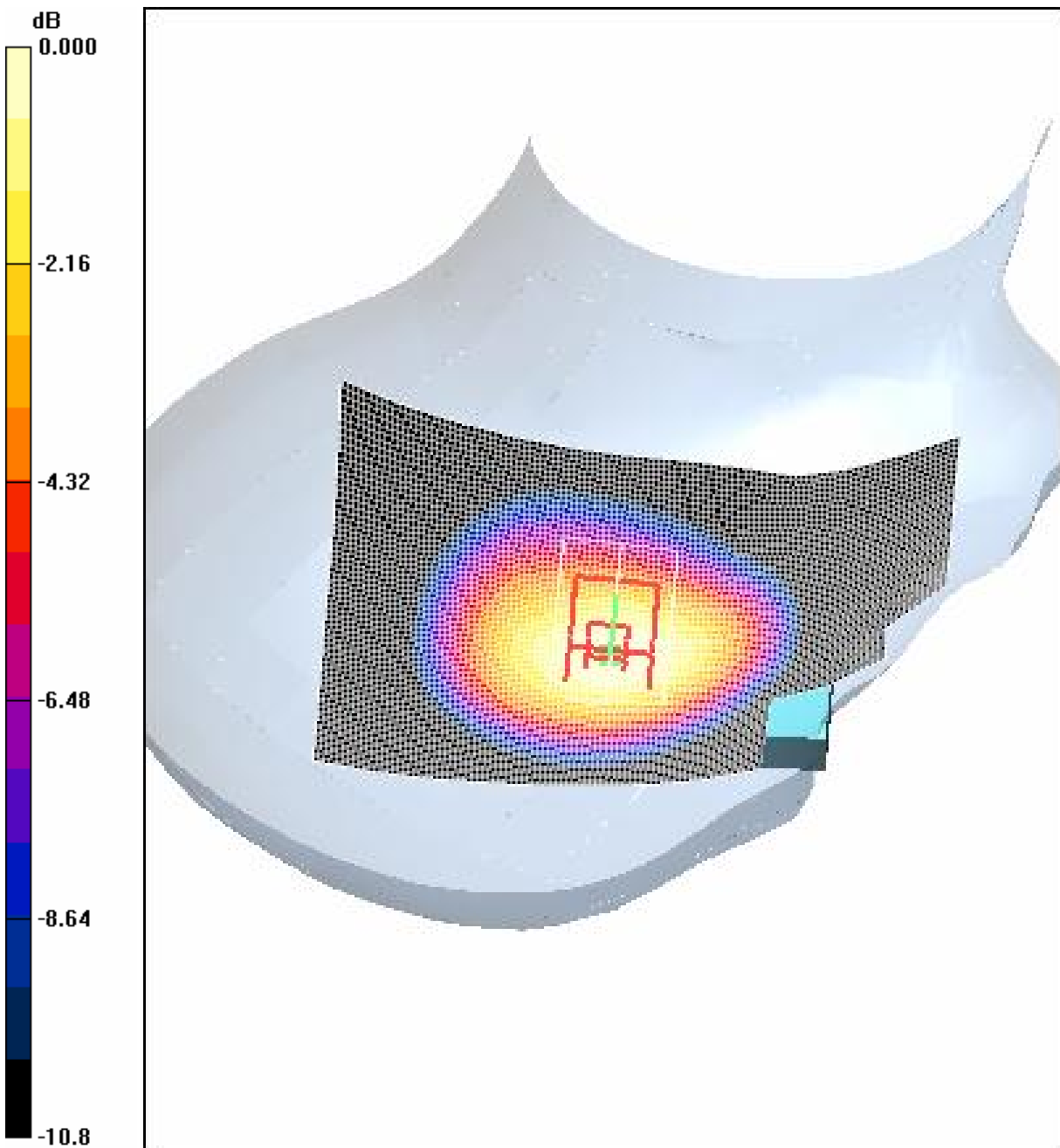
Cheek position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,
dz=5mm

Reference Value = 27.7 V/m; Power Drift = -0.158 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.767 mW/g

Maximum value of SAR (measured) = 1.24 mW/g



0 dB = 1.24mW/g

4.9 FCC-OET65-RightHandSide-Cheek-GSM850-High

Date/Time: 2006-1-4 10:10:18

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Cheek-GSM850-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used: $f = 849$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.16 mW/g

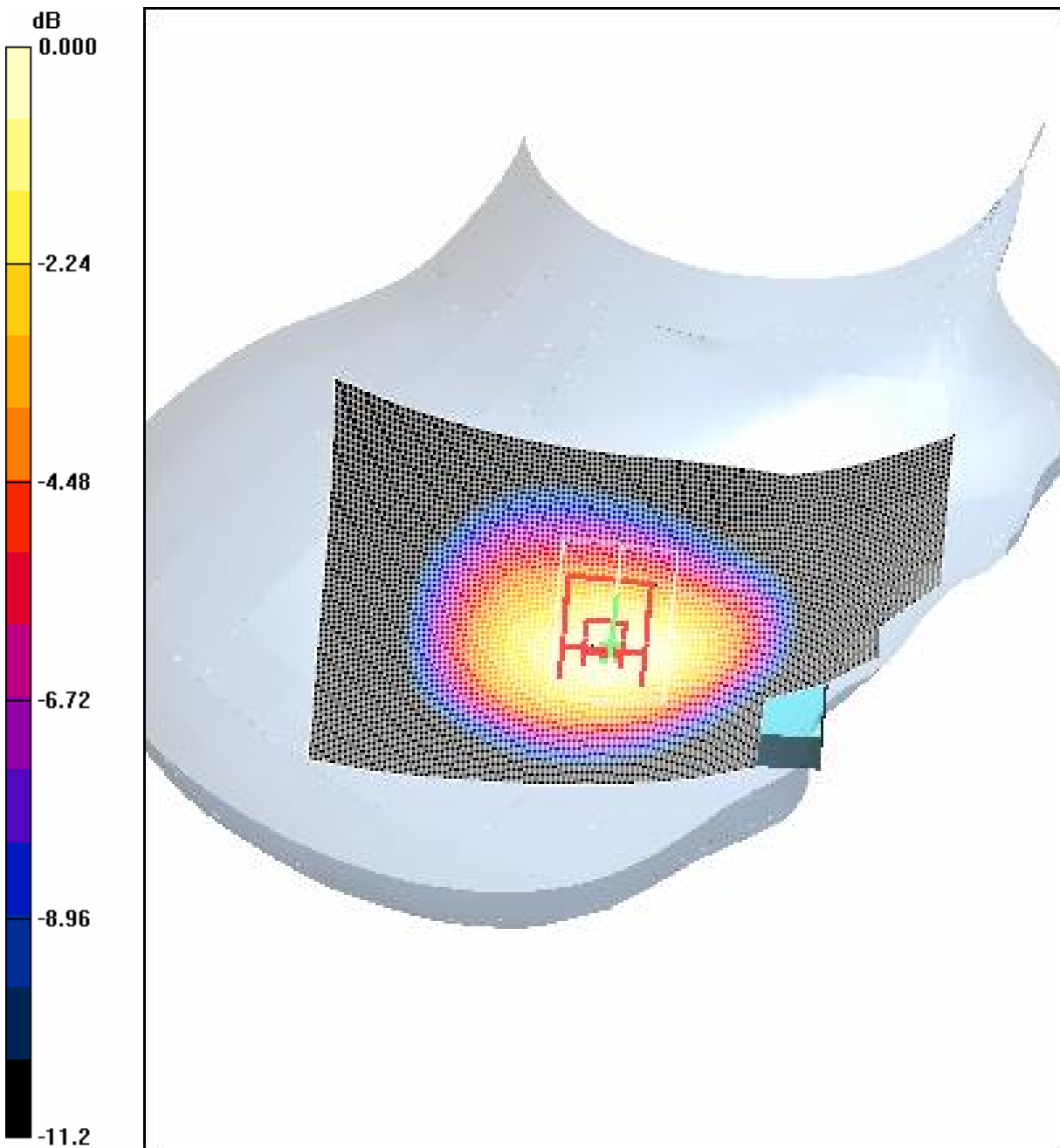
Cheek position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.0 V/m; Power Drift = -0.143 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.690 mW/g

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



0 dB = 1.12mW/g

4.10 FCC-OET65-RightHandSide-Tilt-GSM850-Low

Date/Time: 2006-1-4 12:08:52

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Tilt-GSM850-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.866$ mho/m; $\epsilon_r = 41.8$;
 $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, 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) = 0.660 mW/g

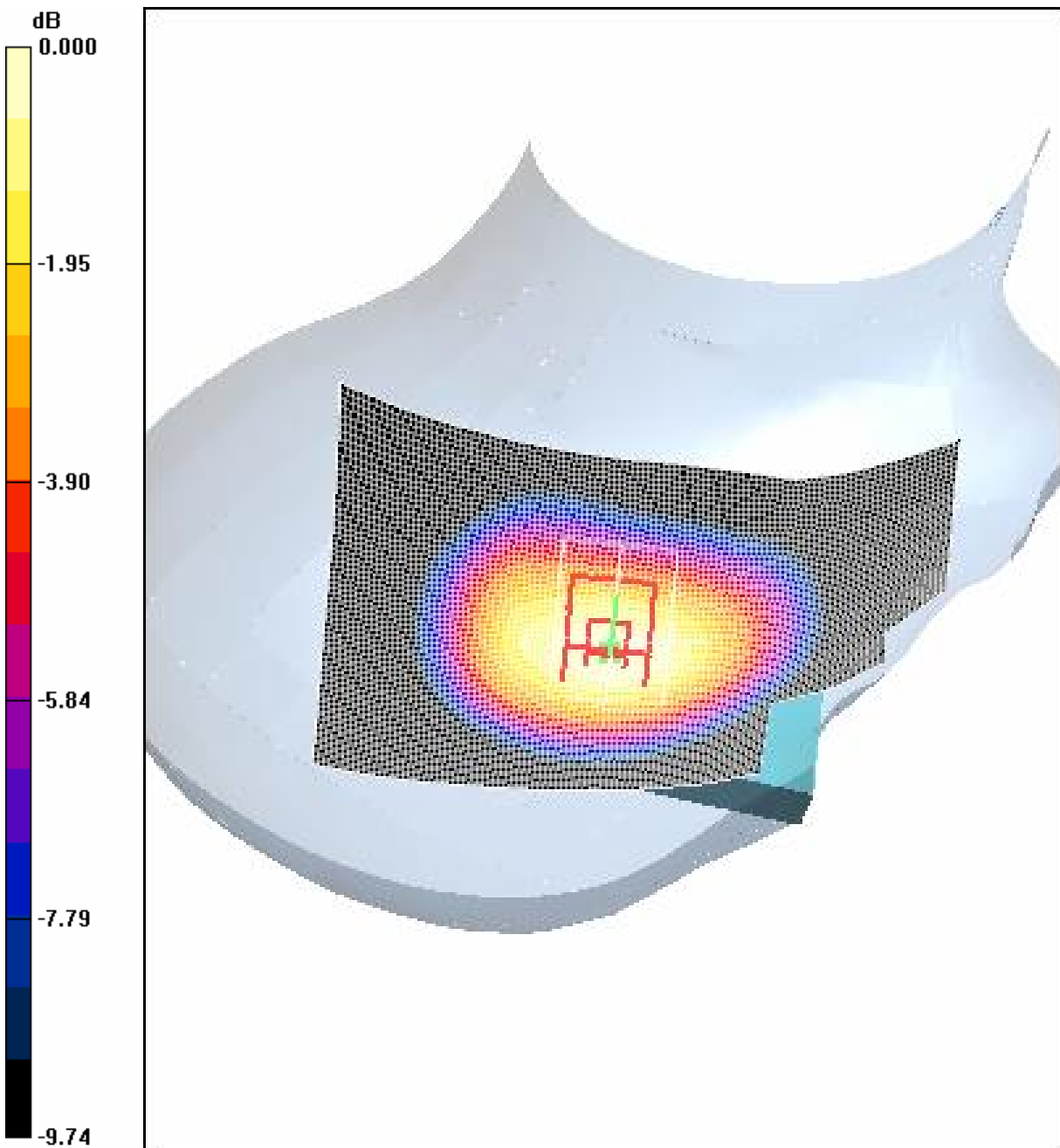
Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,
dz=5mm

Reference Value = 21.7 V/m; Power Drift = -0.124 dB

Peak SAR (extrapolated) = 0.822 W/kg

SAR(1 g) = 0.599 mW/g; SAR(10 g) = 0.413 mW/g

Maximum value of SAR (measured) = 0.638 mW/g



0 dB = 0.638mW/g

4.11 FCC-OET65-RightHandSide-Tilt-GSM850-Mid

Date/Time: 2006-1-4 11:02:37

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Tilt-GSM850-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 41.7$;
 $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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: DAS4, 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) = 0.518 mW/g

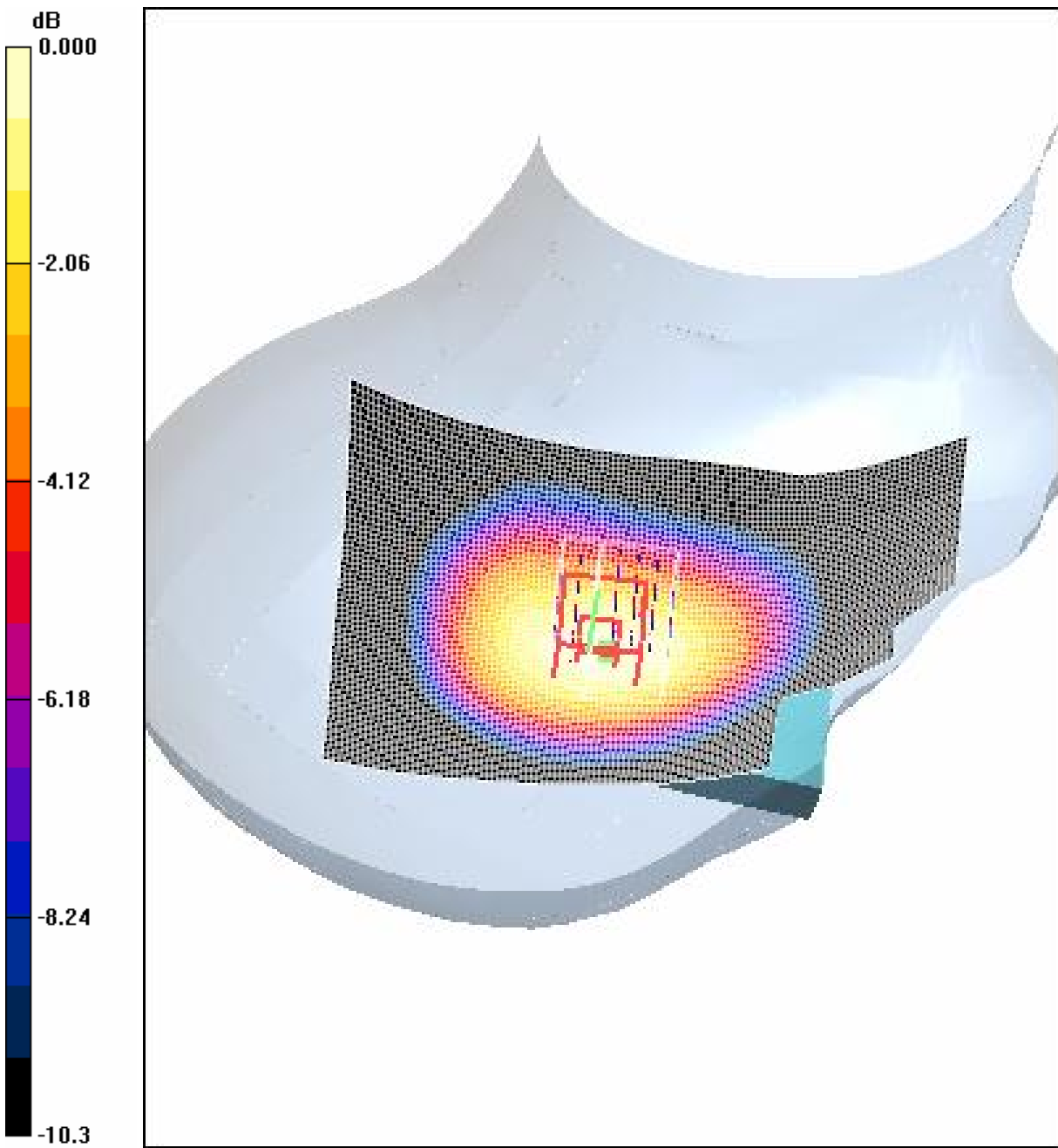
Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.3 V/m; Power Drift = -0.052 dB

Peak SAR (extrapolated) = 0.662 W/kg

SAR(1 g) = 0.472 mW/g; SAR(10 g) = 0.324 mW/g

Maximum value of SAR (measured) = 0.502 mW/g



0 dB = 0.502mW/g

4.12 FCC-OET65-RightHandSide-Tilt-GSM850-High

Date/Time: 2006-1-4 10:36:42

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Tilt-GSM850-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL850 Medium parameters used: $f = 849$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.91, 5.91, 5.91); 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) = 0.505 mW/g

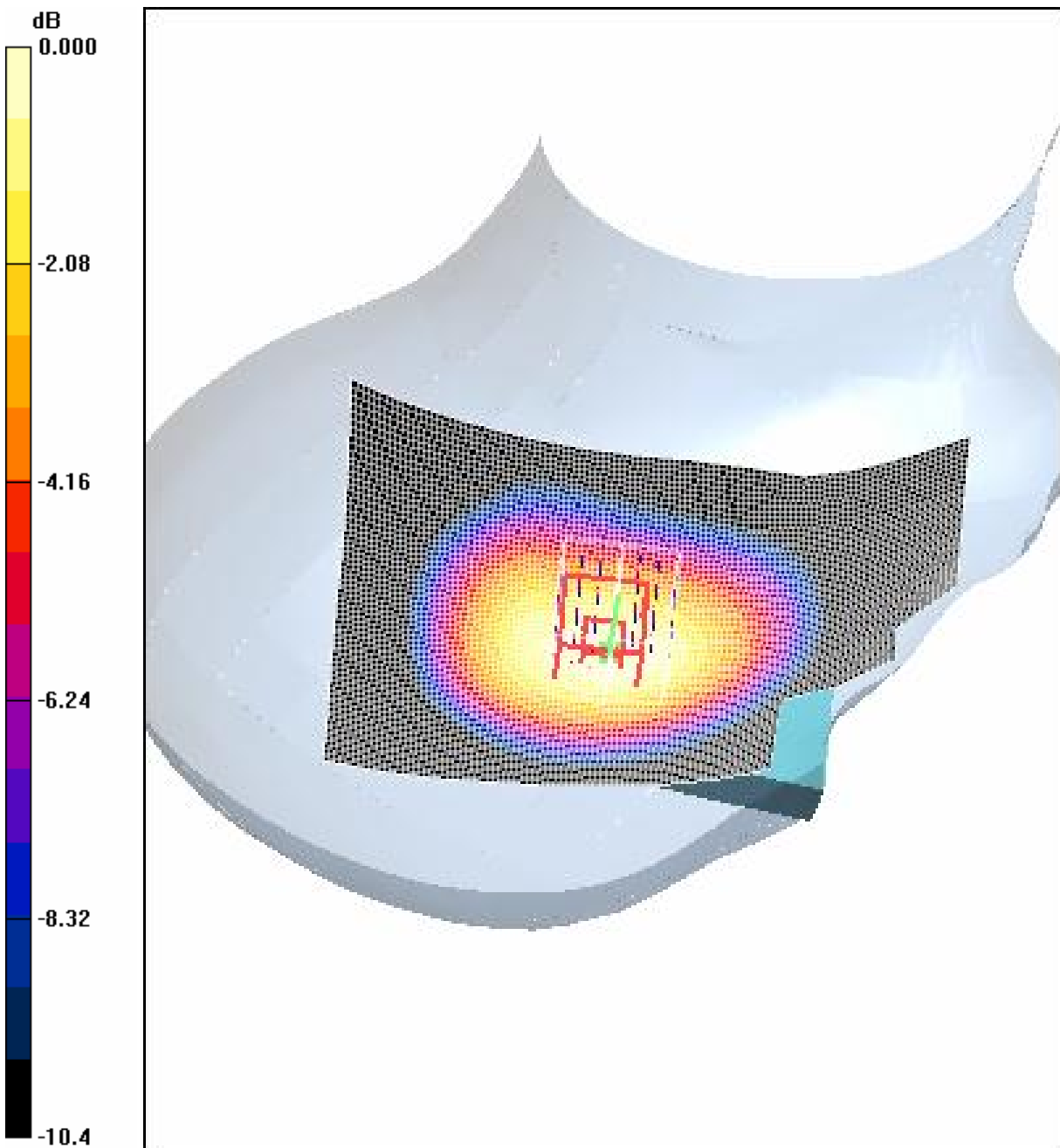
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.8 V/m; Power Drift = -0.059 dB

Peak SAR (extrapolated) = 0.642 W/kg

SAR(1 g) = 0.456 mW/g; SAR(10 g) = 0.312 mW/g

Maximum value of SAR (measured) = 0.487 mW/g



0 dB = 0.487mW/g

4.13 FCC-OET65-Body-Worn-GSM850-Low

Date/Time: 2006-1-5 11:16:42

Test Laboratory: SGS-GSM

FCC-OET65-Body-Worn-GSM850-Low

DUT: GSM50111-Body; Type: Body; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium: HSL850-Body Medium parameters used: $f = 824.2 \text{ MHz}$; $\sigma = 0.984 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.83, 5.83, 5.83); 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: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.962 mW/g

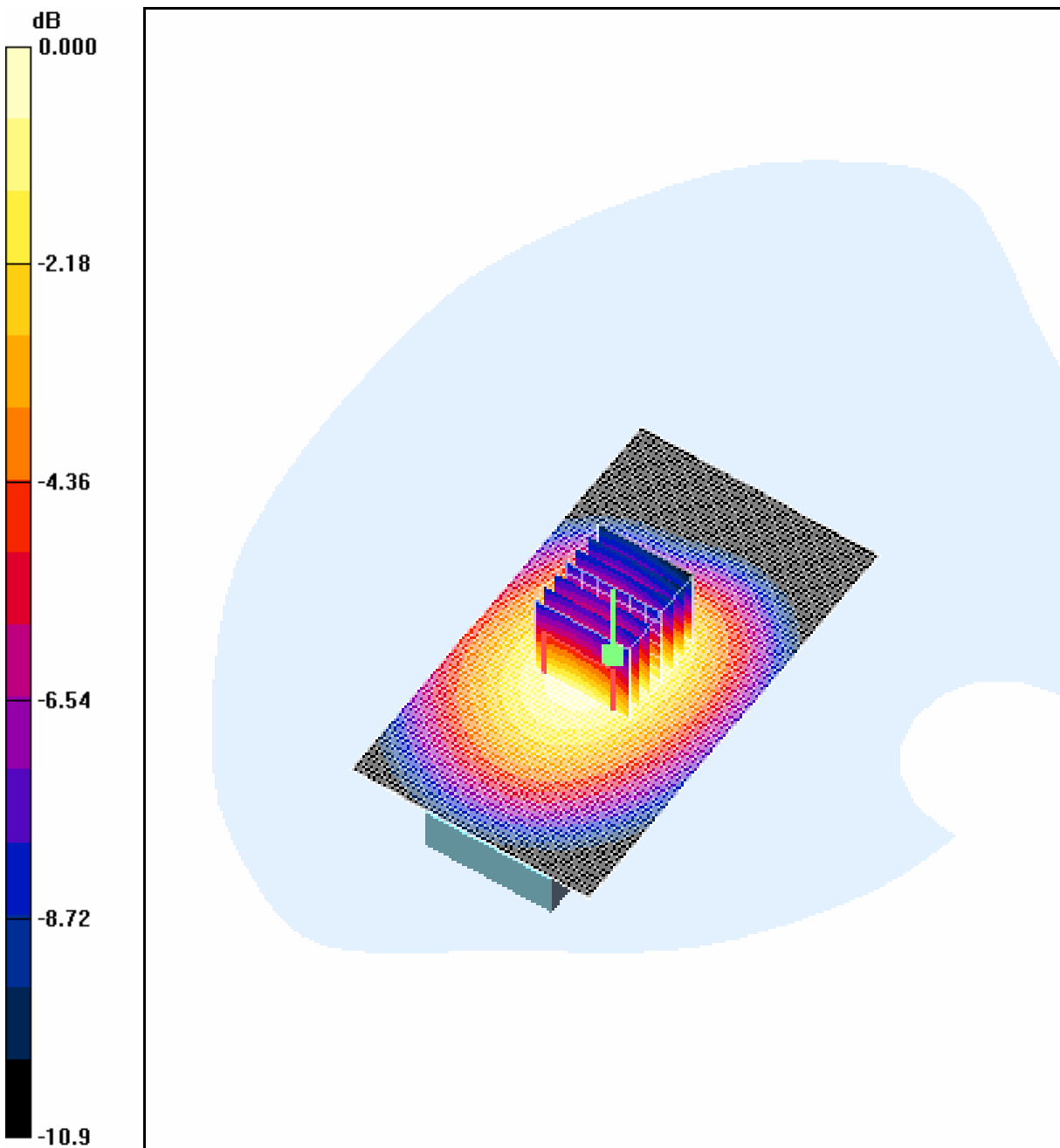
Body Worn - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.2 V/m ; Power Drift = -0.104 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.877 mW/g ; SAR(10 g) = 0.616 mW/g

Maximum value of SAR (measured) = 0.935 mW/g



0 dB = 0.935mW/g

4.14 FCC-OET65-Body-Worn-GSM850-Mid

Date/Time: 2006-1-5 11:39:30

Test Laboratory: SGS-GSM

FCC-OET65-Body-Worn-GSM850-Mid

DUT: GSM50111-Body; Type: Body; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 836.4 MHz; Duty Cycle: 1:8.3

Medium: HSL850-Body Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.998 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.83, 5.83, 5.83); 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: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.856 mW/g

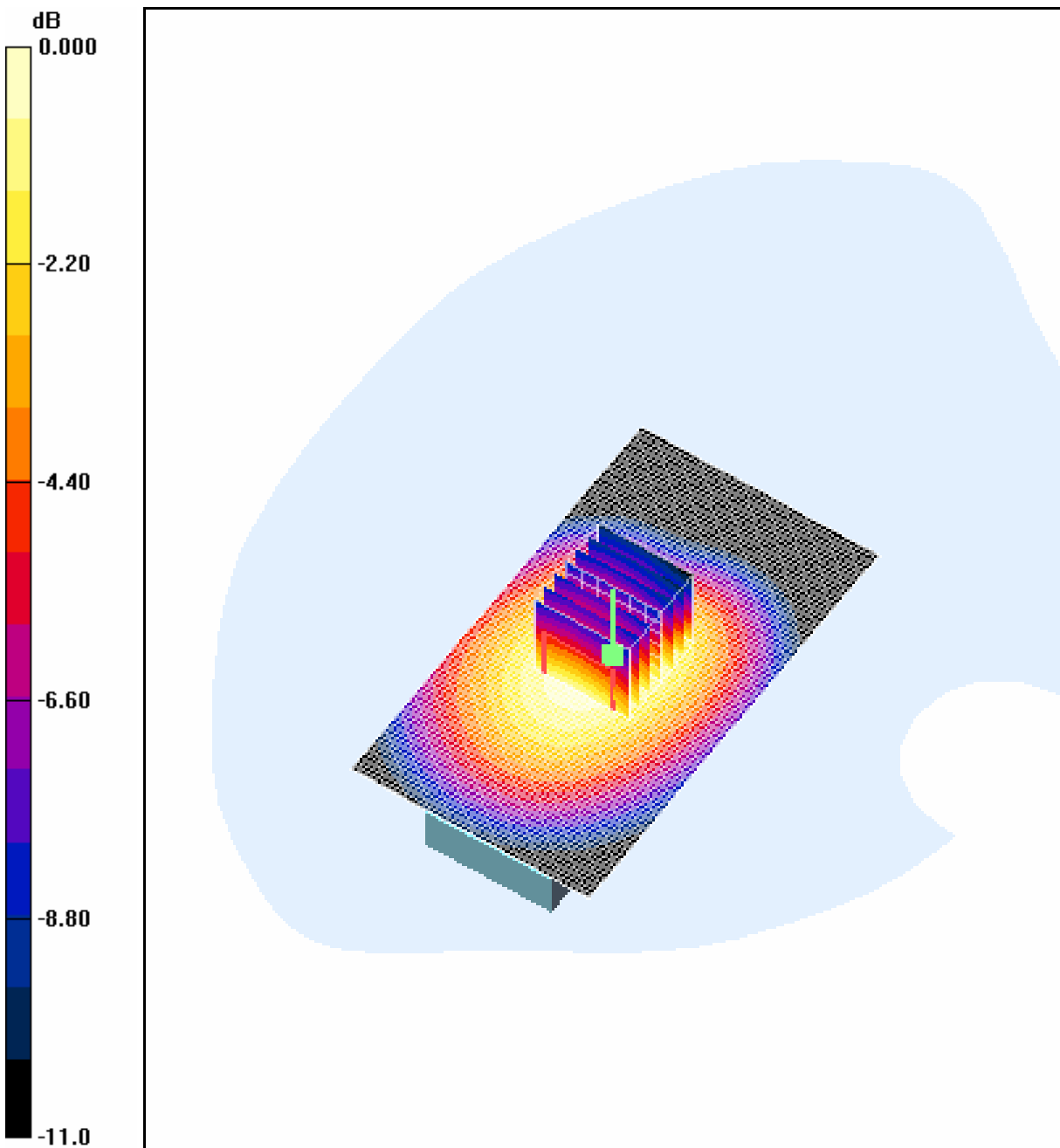
Body Worn - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.0 V/m; Power Drift = -0.082 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.781 mW/g; SAR(10 g) = 0.548 mW/g

Maximum value of SAR (measured) = 0.831 mW/g



0 dB = 0.831mW/g

4.15 FCC-OET65-Body-Worn-GSM850-High

Date/Time: 2006-1-5 12:34:05

Test Laboratory: SGS-GSM

FCC-OET65-Body-Worn-GSM850-High

DUT: GSM50111-Body; Type: Body; Serial: 20051231

Communication System: GSM850-GSM Mode; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: HSL850-Body Medium parameters used: $f = 848.8 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 Configuration:

- Probe: ES3DV3 - SN3088; ConvF(5.83, 5.83, 5.83); 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - High/Area Scan (51x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.812 mW/g

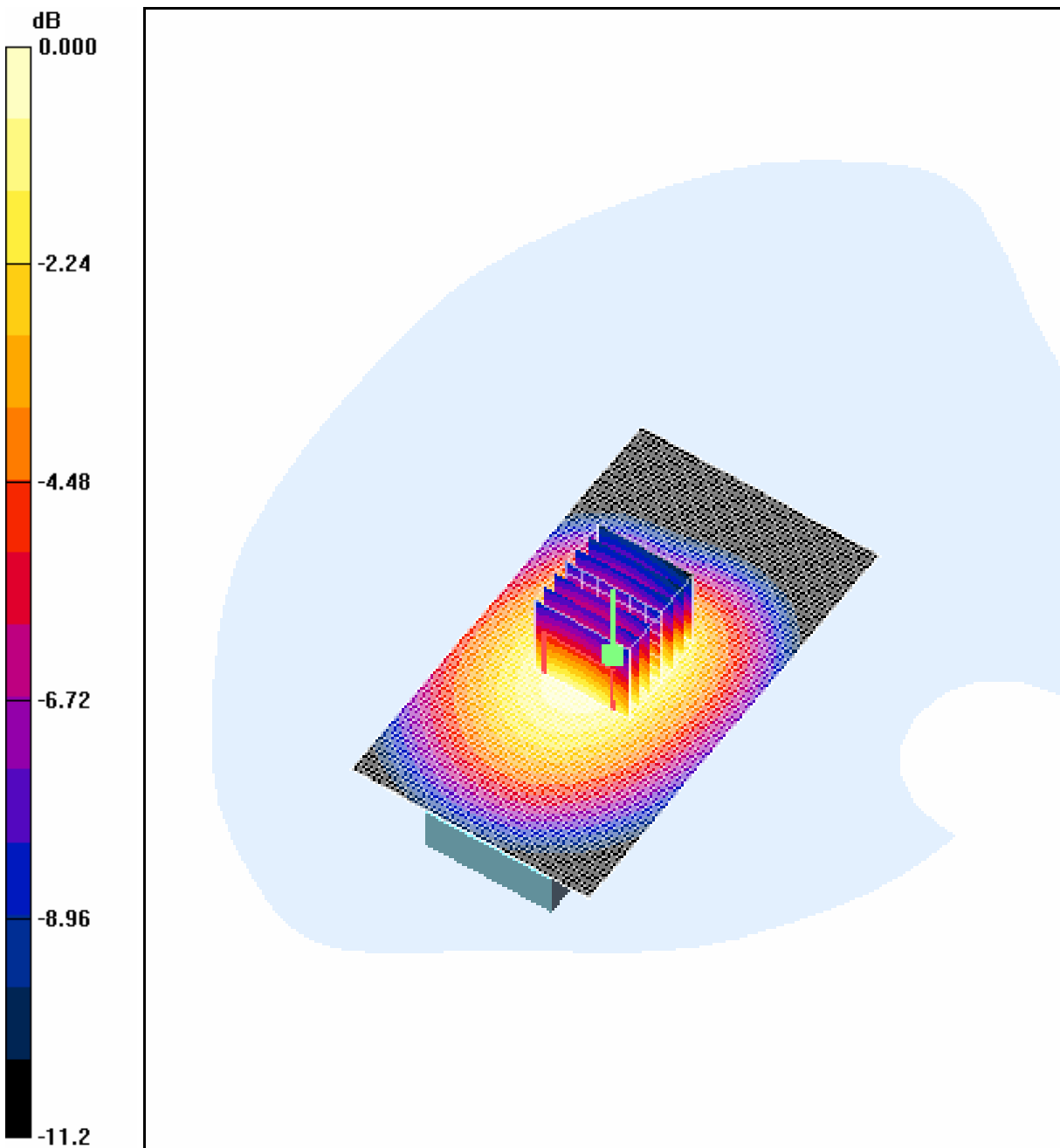
Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.4 V/m ; Power Drift = -0.198 dB

Peak SAR (extrapolated) = 0.999 W/kg

SAR(1 g) = 0.731 mW/g ; SAR(10 g) = 0.513 mW/g

Maximum value of SAR (measured) = 0.778 mW/g



0 dB = 0.778mW/g

4.16 FCC-OET65-LeftHandSide-Cheek-GSM1900-Low

Date/Time: 2005-12-31 9:40:01

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Cheek-GSM1900-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1850.2 \text{ MHz}$; $\sigma = 1.42 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Low/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.39 mW/g

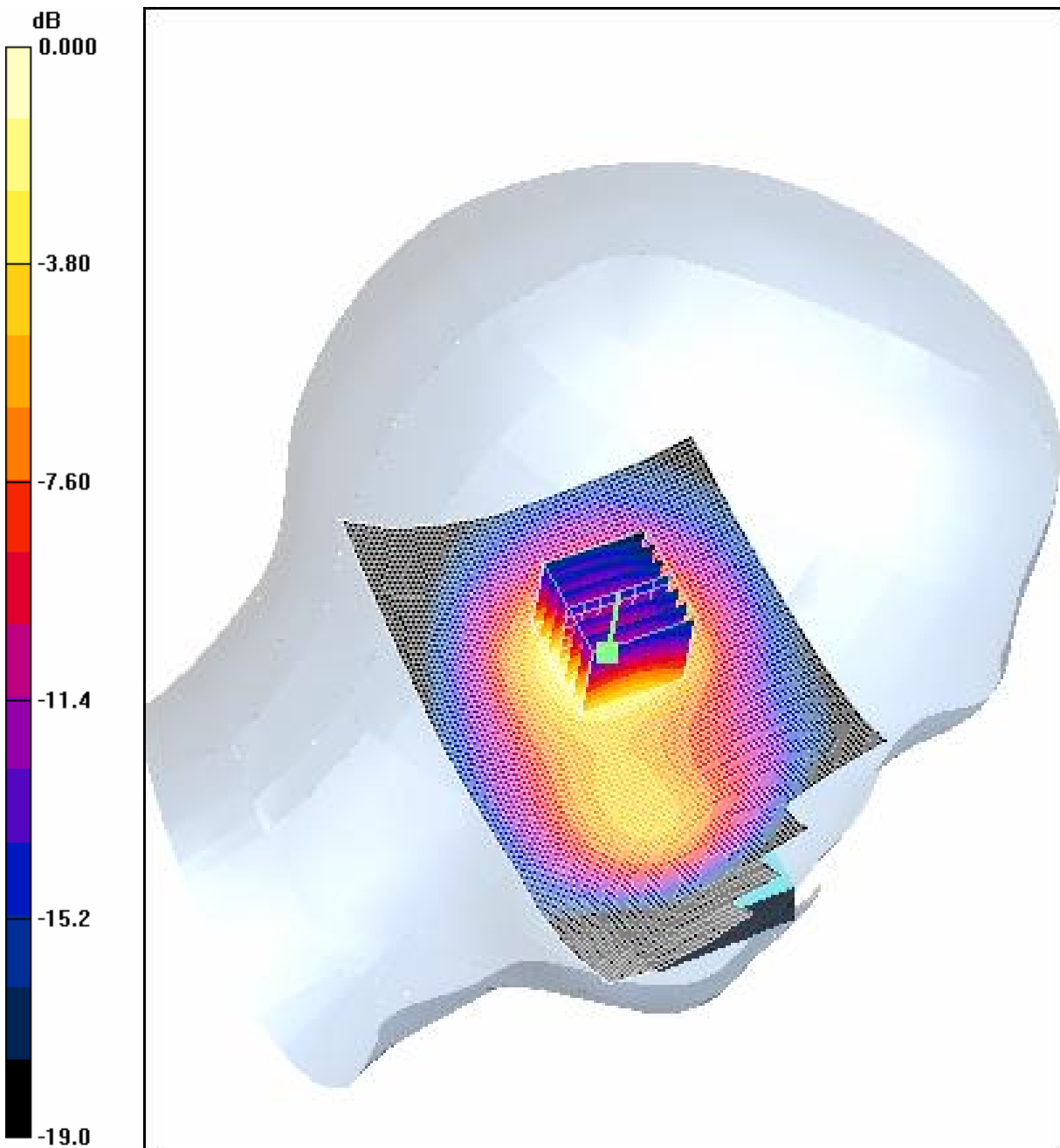
Cheek position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.3 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 2.12 W/kg

SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.652 mW/g

Maximum value of SAR (measured) = 1.34 mW/g



0 dB = 1.34mW/g

4.17 FCC-OET65-LeftHandSide-Cheek-GSM1900-Mid

Date/Time: 2005-12-31 10:10:46

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Cheek-GSM1900-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

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

Medium: HSL1900_Head Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.47 mW/g

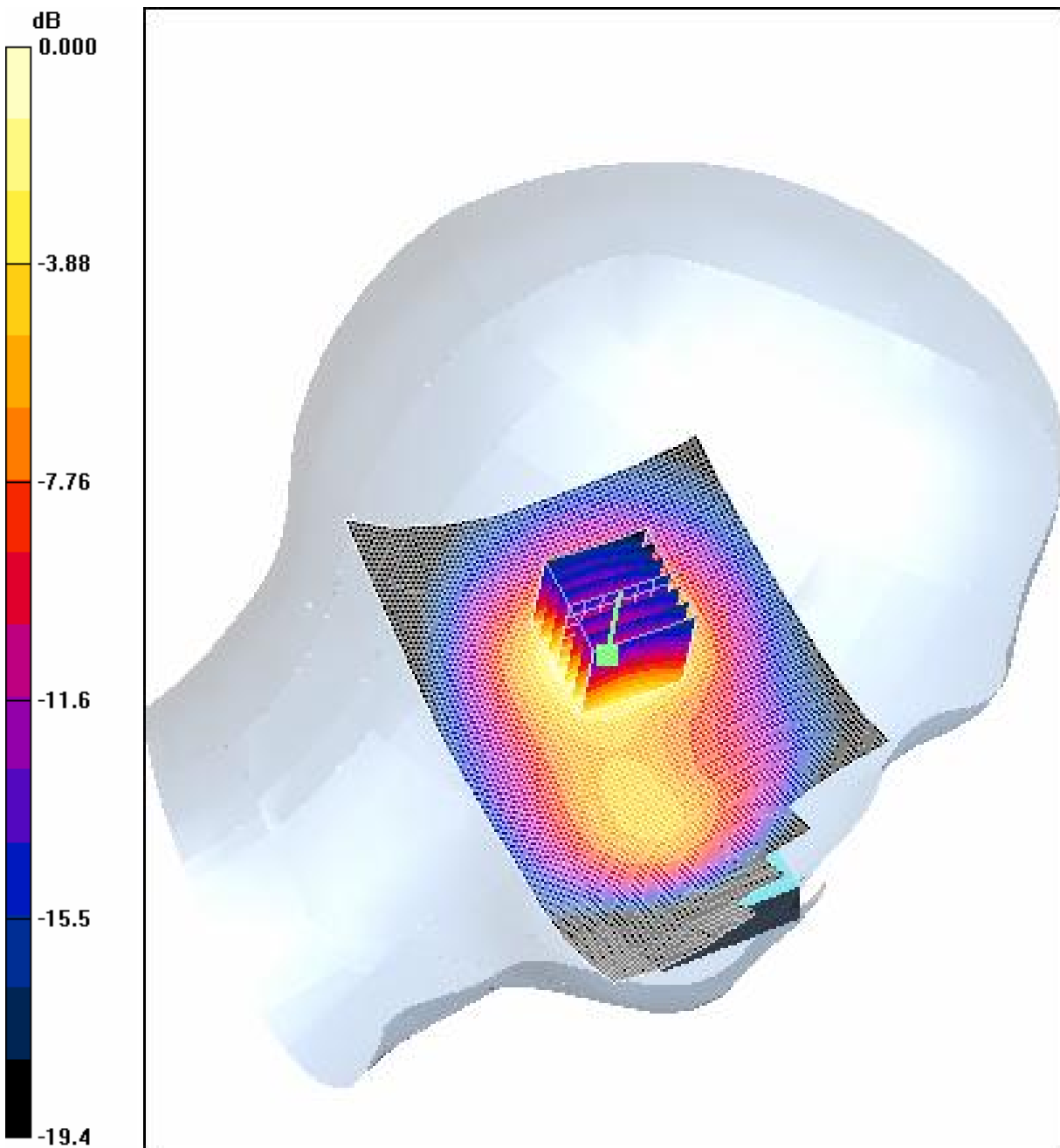
Cheek position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.8 V/m; Power Drift = -0.122 dB

Peak SAR (extrapolated) = 2.24 W/kg

SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.677 mW/g

Maximum value of SAR (measured) = 1.41 mW/g



0 dB = 1.41mW/g

4.18 FCC-OET65-LeftHandSide-Cheek-GSM1900-High

Date/Time: 2005-12-31 10:42:54

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Cheek-GSM1900-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.17 mW/g

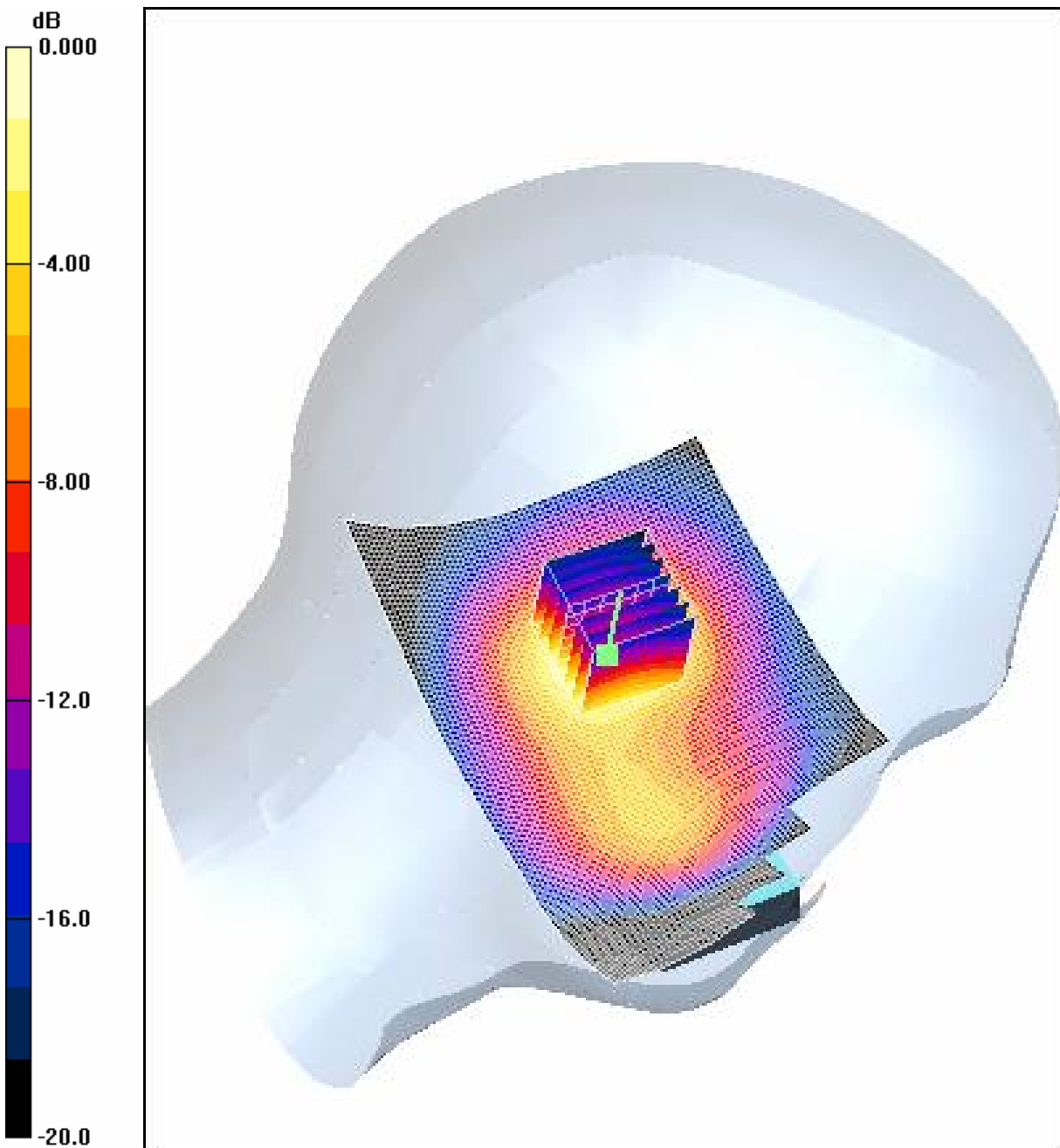
Cheek position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.4 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.540 mW/g

Maximum value of SAR (measured) = 1.14 mW/g



0 dB = 1.14mW/g

4.19 FCC-OET65-LeftHandSide-Tilt-GSM1900-Low

Date/Time: 2005-12-31 11:51:26

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Tilt-GSM1900-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1850.2 \text{ MHz}$; $\sigma = 1.42 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, 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) = 1.29 mW/g

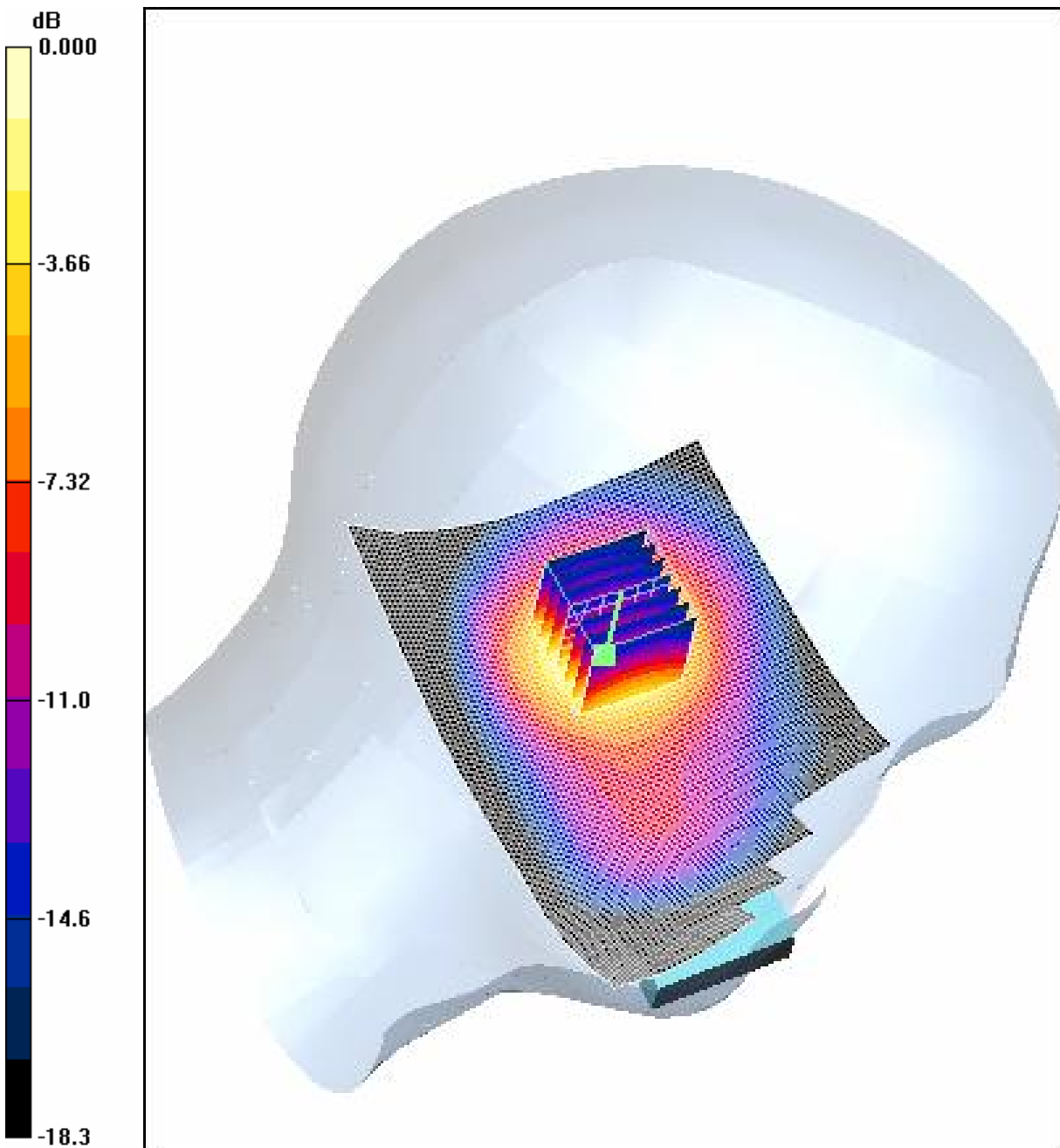
Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.3 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 1.96 W/kg

SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.606 mW/g

Maximum value of SAR (measured) = 1.25 mW/g



0 dB = 1.25mW/g

4.20 FCC-OET65-LeftHandSide-Tilt-GSM1900-Mid

Date/Time: 2005-12-31 12:24:34

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Tilt-GSM1900-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

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

Medium: HSL1900_Head Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, 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) = 1.23 mW/g

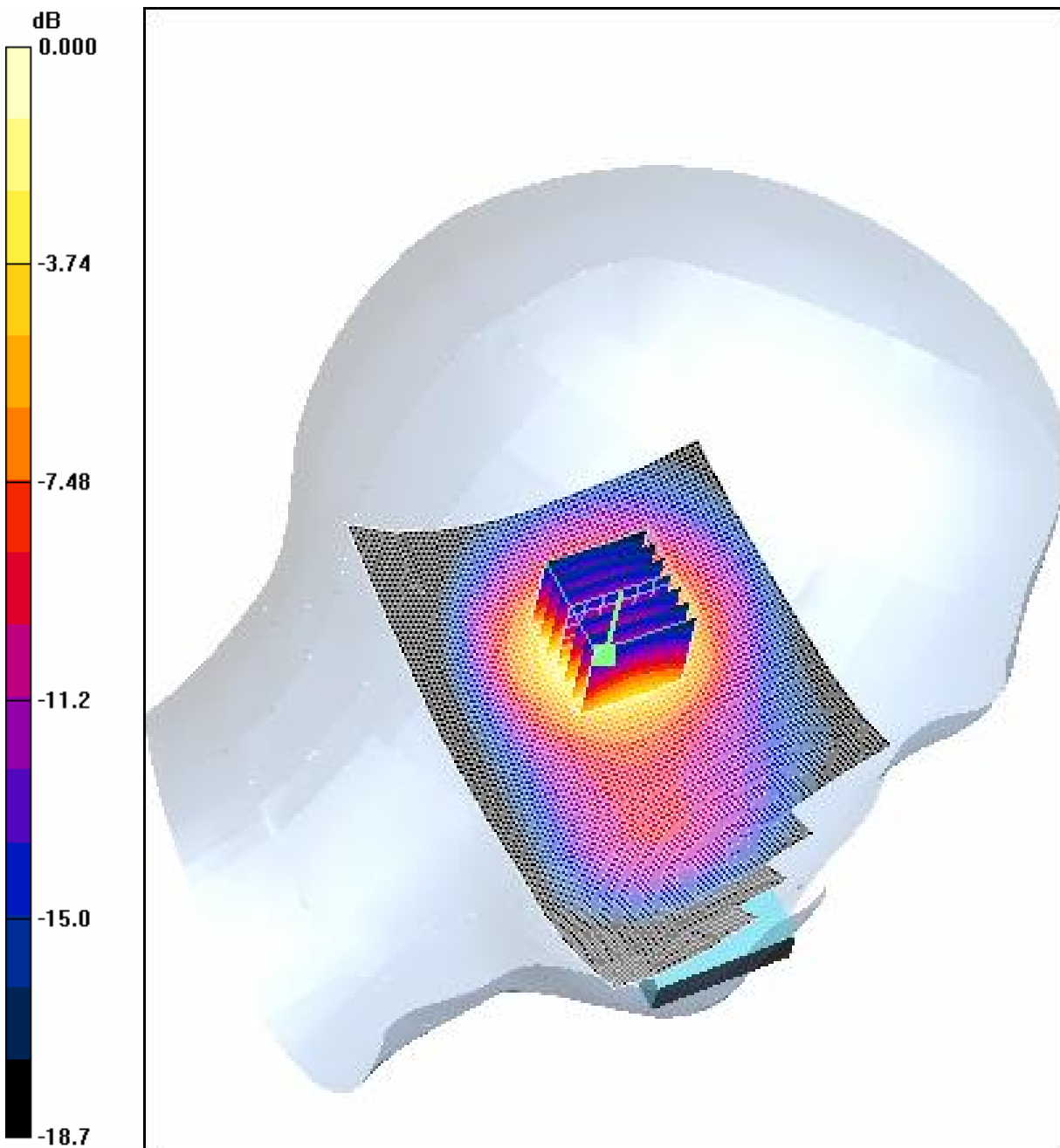
Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.2 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 1.86 W/kg

SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.566 mW/g

Maximum value of SAR (measured) = 1.18 mW/g



0 dB = 1.18mW/g

4.21 FCC-OET65-LeftHandSide-Tilt-GSM1900-High

Date/Time: 2005-12-31 13:10:57

Test Laboratory: SGS-GSM

FCC-OET65-LeftHandSide-Tilt-GSM1900-high

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, 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) = 1.13 mW/g

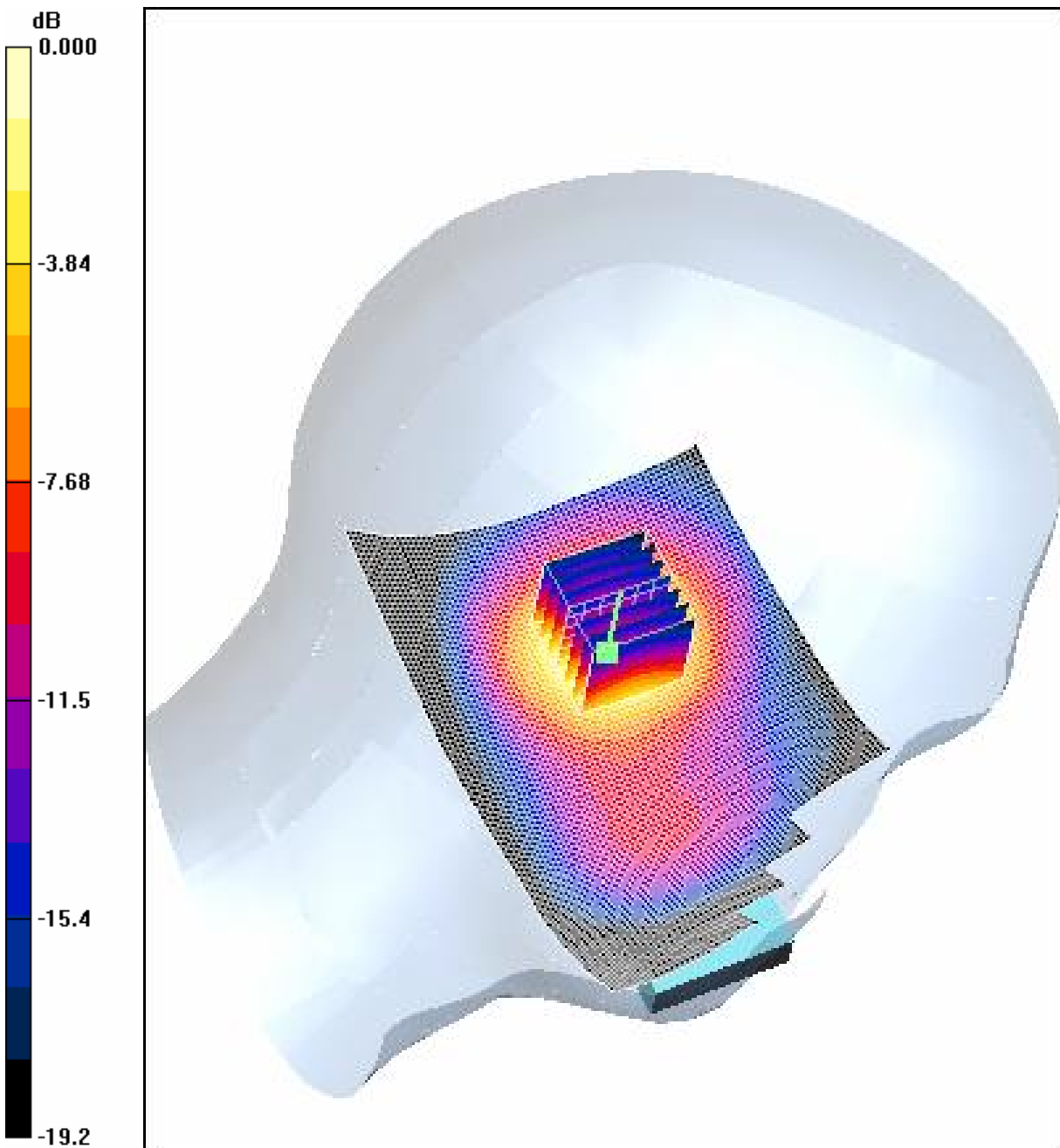
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.1 V/m; Power Drift = -0.133 dB

Peak SAR (extrapolated) = 1.74 W/kg

SAR(1 g) = 0.986 mW/g; SAR(10 g) = 0.520 mW/g

Maximum value of SAR (measured) = 1.10 mW/g



0 dB = 1.10mW/g

4.22 FCC-OET65-RightHandSide-Cheek-GSM1900-Low

Date/Time: 2005-12-31 13:49:07

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Cheek-GSM1900-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1850.2 \text{ MHz}$; $\sigma = 1.42 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

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 (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.03 mW/g

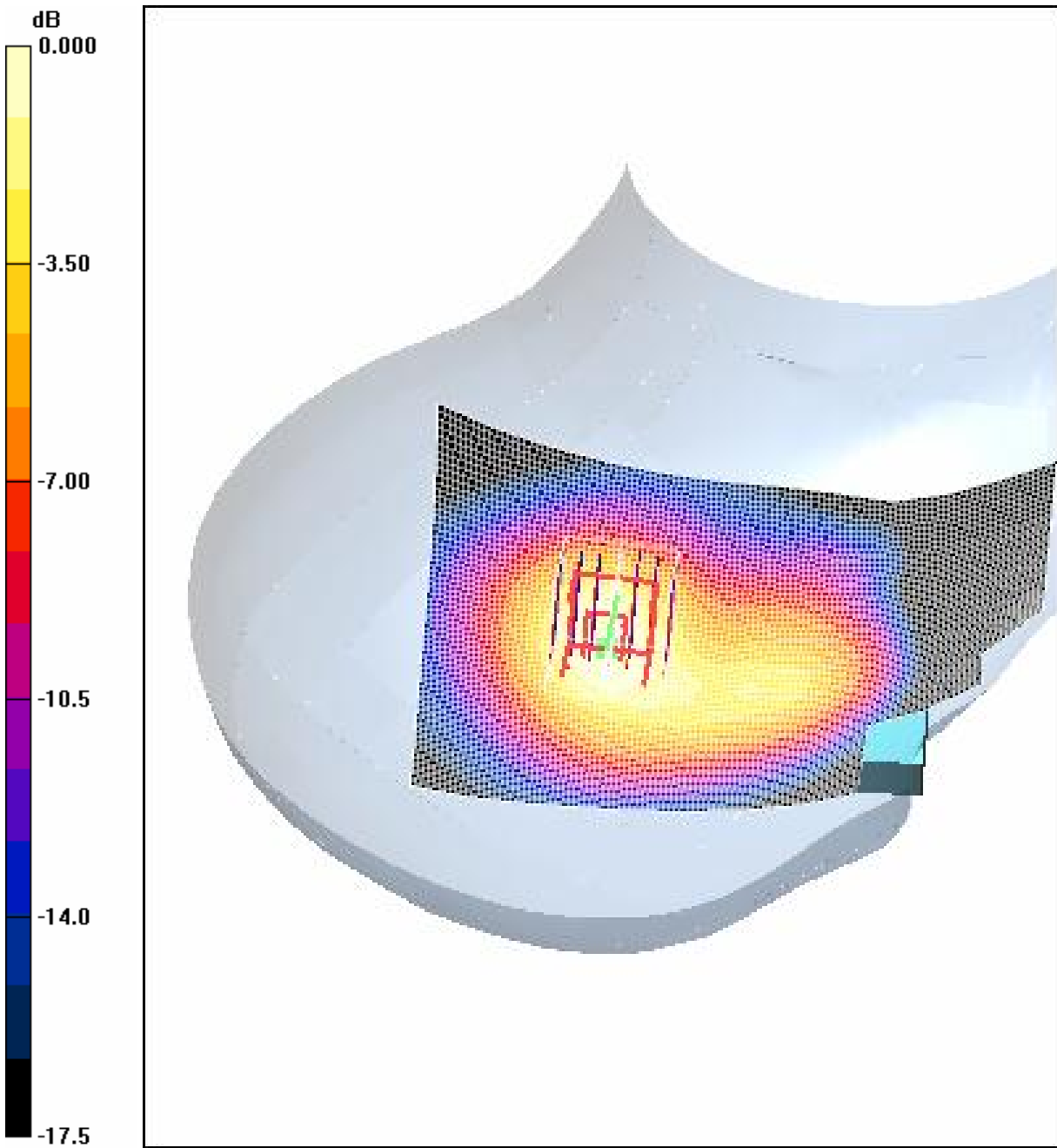
Cheek position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.2 V/m; Power Drift = -0.087 dB

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 0.882 mW/g; SAR(10 g) = 0.506 mW/g

Maximum value of SAR (measured) = 0.962 mW/g



0 dB = 0.962mW/g

4.23 FCC-OET65-RightHandSide-Cheek-GSM1900-Mid

Date/Time: 2005-12-31 14:38:39

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Cheek-GSM1900-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

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

Medium: HSL1900_Head Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - Middle/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.03 mW/g

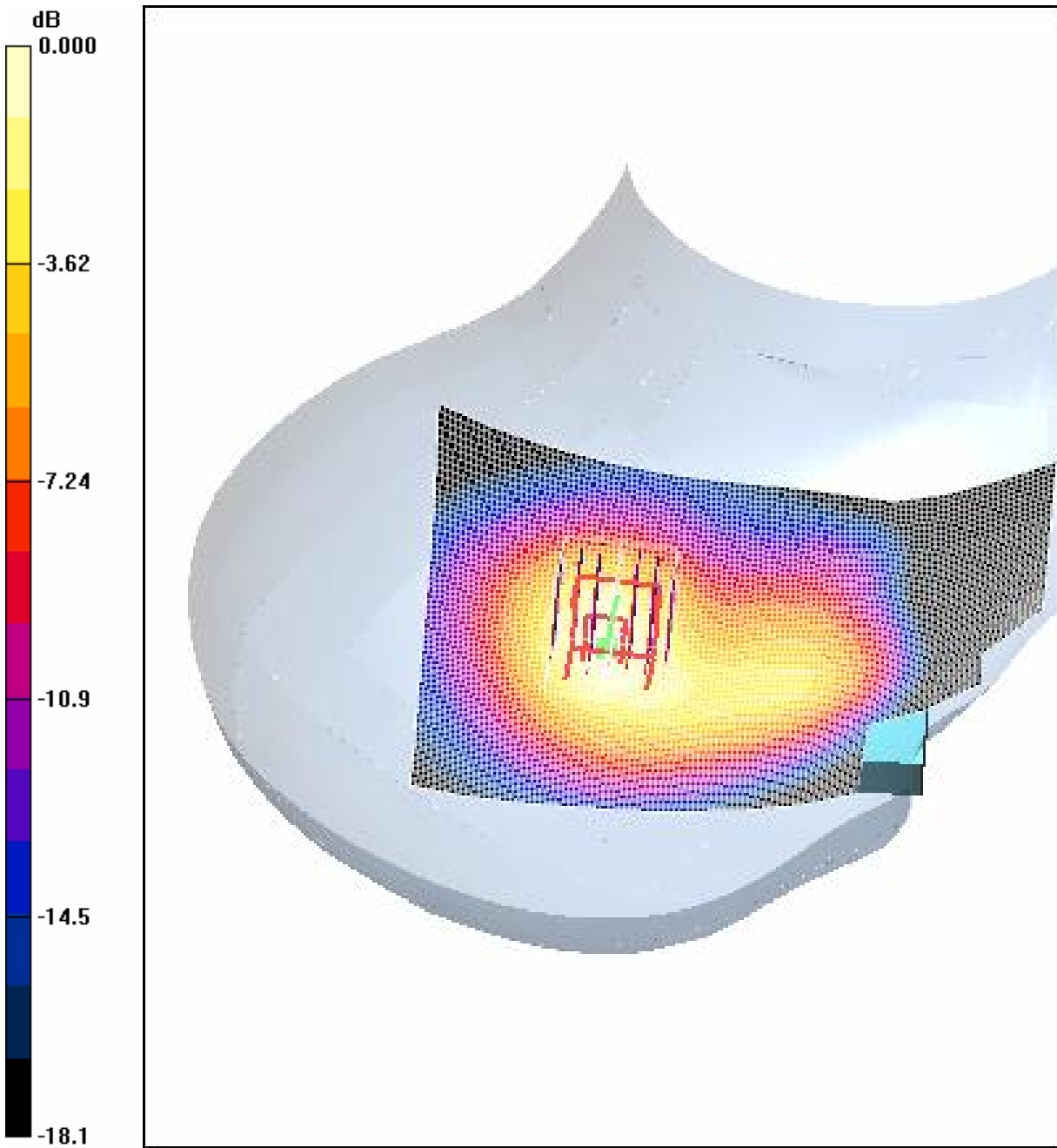
Cheek position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.9 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.892 mW/g; SAR(10 g) = 0.507 mW/g

Maximum value of SAR (measured) = 0.983 mW/g



0 dB = 0.983mW/g

4.24 FCC-OET65-RightHandSide-Cheek-GSM1900-High

Date/Time: 2005-12-31 15:10:45

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Cheek-GSM1900-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Cheek position - High/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.860 mW/g

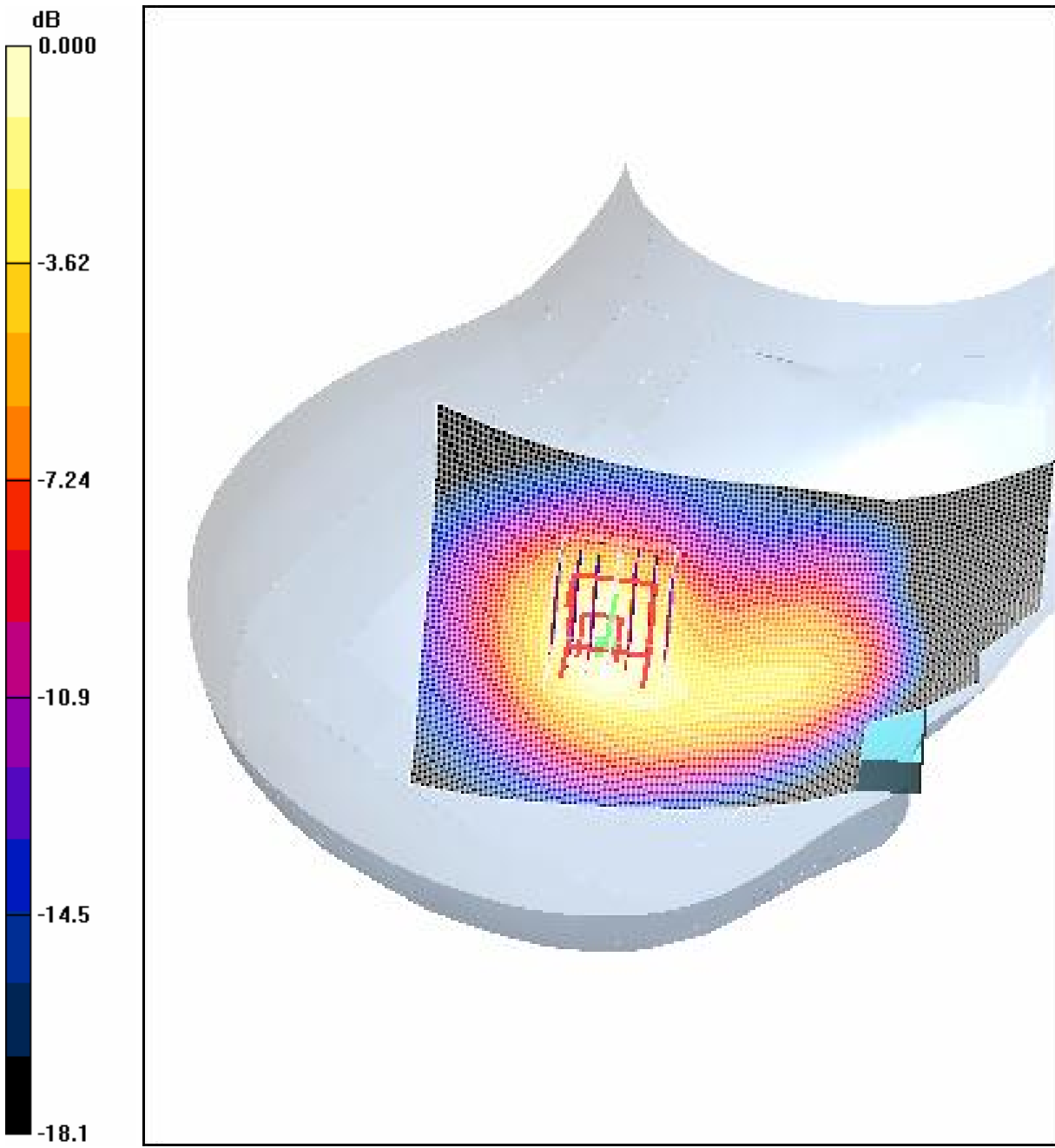
Cheek position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.8 V/m; Power Drift = -0.081 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.743 mW/g; SAR(10 g) = 0.421 mW/g

Maximum value of SAR (measured) = 0.815 mW/g



0 dB = 0.815mW/g

4.25 FCC-OET65-RightHandSide-Tilt-GSM1900-Low

Date/Time: 2005-12-31 15:47:24

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Tilt-GSM1900-Low

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

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) = 1.09 mW/g

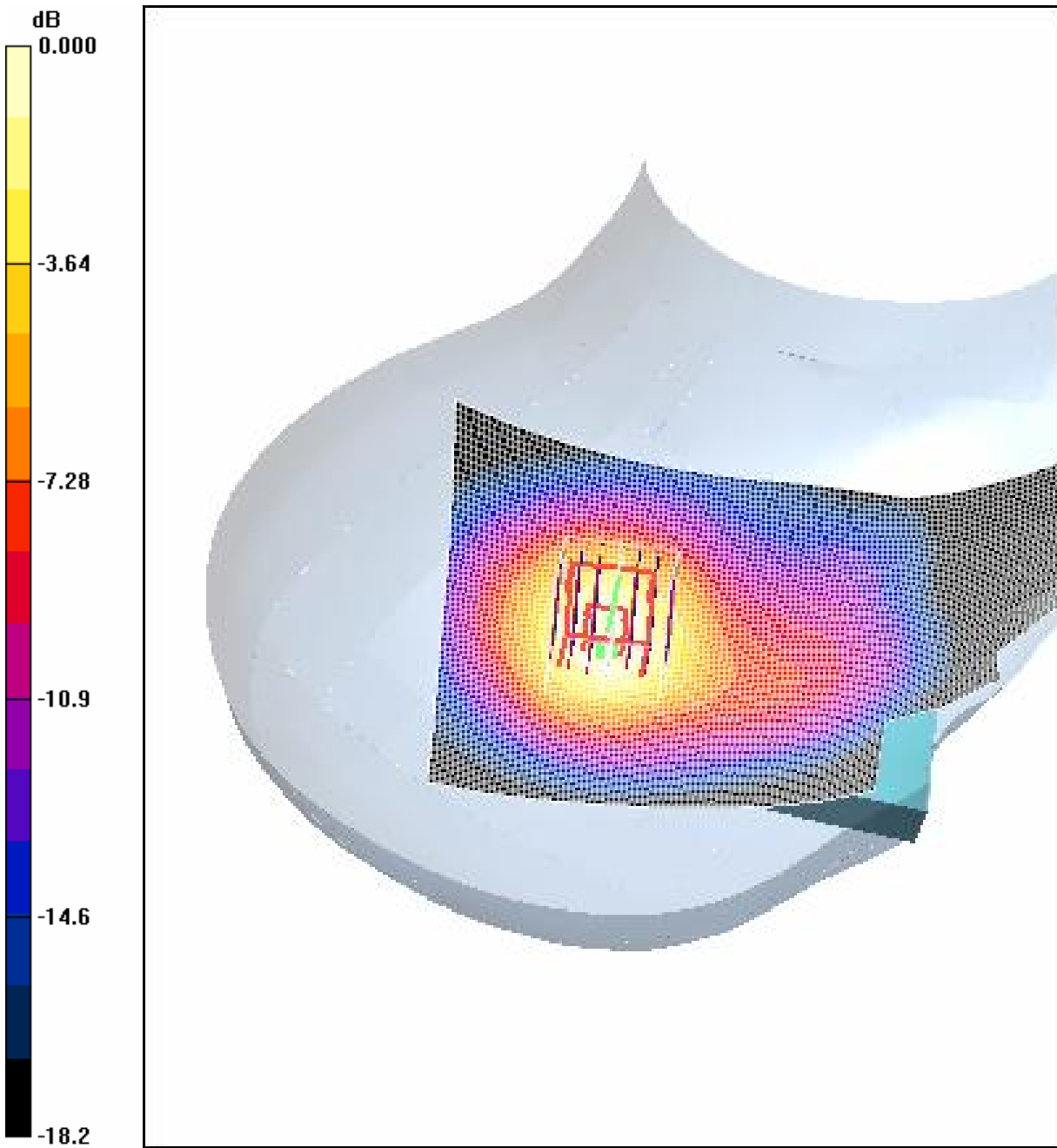
Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.6 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.943 mW/g; SAR(10 g) = 0.521 mW/g

Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

4.26 FCC-OET65-RightHandSide-Tilt-GSM1900-Mid

Date/Time: 2005-12-31 16:18:38

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Tilt-GSM1900-Mid

DUT: GSM50111-Head; Type: Head; Serial: 20051231

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

Medium: HSL1900_Head Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Tilt position - Middle/Area Scan (71x111x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 1.00 mW/g

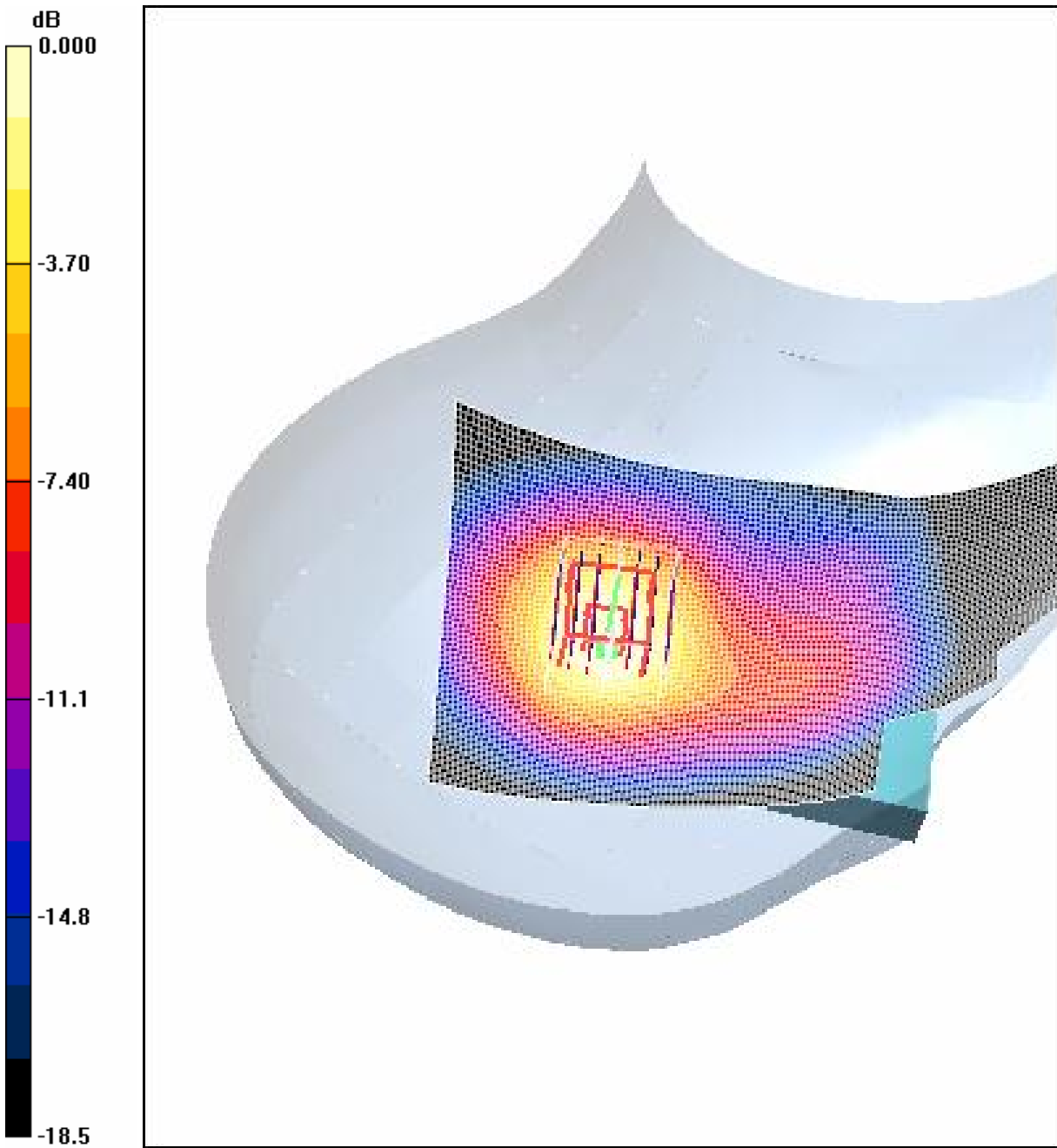
Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 25.3 V/m ; Power Drift = -0.112 dB

Peak SAR (extrapolated) = 1.47 W/kg

SAR(1 g) = 0.861 mW/g ; SAR(10 g) = 0.471 mW/g

Maximum value of SAR (measured) = 0.940 mW/g



0 dB = 0.940mW/g

4.27 FCC-OET65-RightHandSide-Tilt-GSM1900-High

Date/Time: 2005-12-31 16:51:26

Test Laboratory: SGS-GSM

FCC-OET65-RightHandSide-Tilt-GSM1900-High

DUT: GSM50111-Head; Type: Head; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL1900_Head Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, 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) = 0.808 mW/g

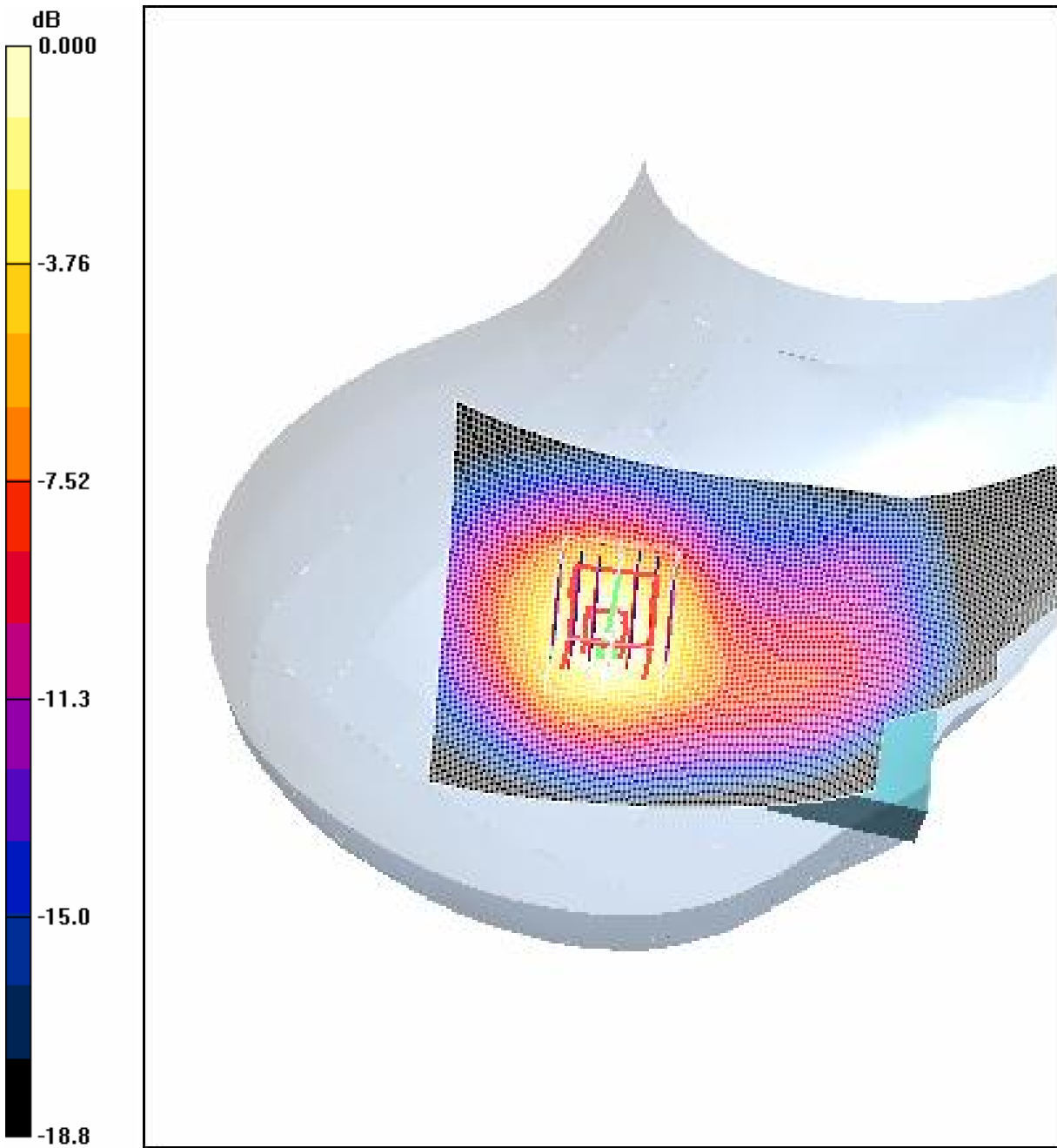
Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.5 V/m; Power Drift = -0.074 dB

Peak SAR (extrapolated) = 1.21 W/kg

SAR(1 g) = 0.697 mW/g; SAR(10 g) = 0.378 mW/g

Maximum value of SAR (measured) = 0.760 mW/g



0 dB = 0.760mW/g

4.28 FCC-OET65-Body-Worn-GSM1900-Low

Date/Time: 2006-1-5 9:17:42

Test Laboratory: SGS-GSM

FCC-OET65-Body-Worn-GSM1900-Low

DUT: GSM50111-Body; Type: Body; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: HSL1900-Body Medium parameters used: $f = 1850.2 \text{ MHz}$; $\sigma = 1.49 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

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: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.674 mW/g

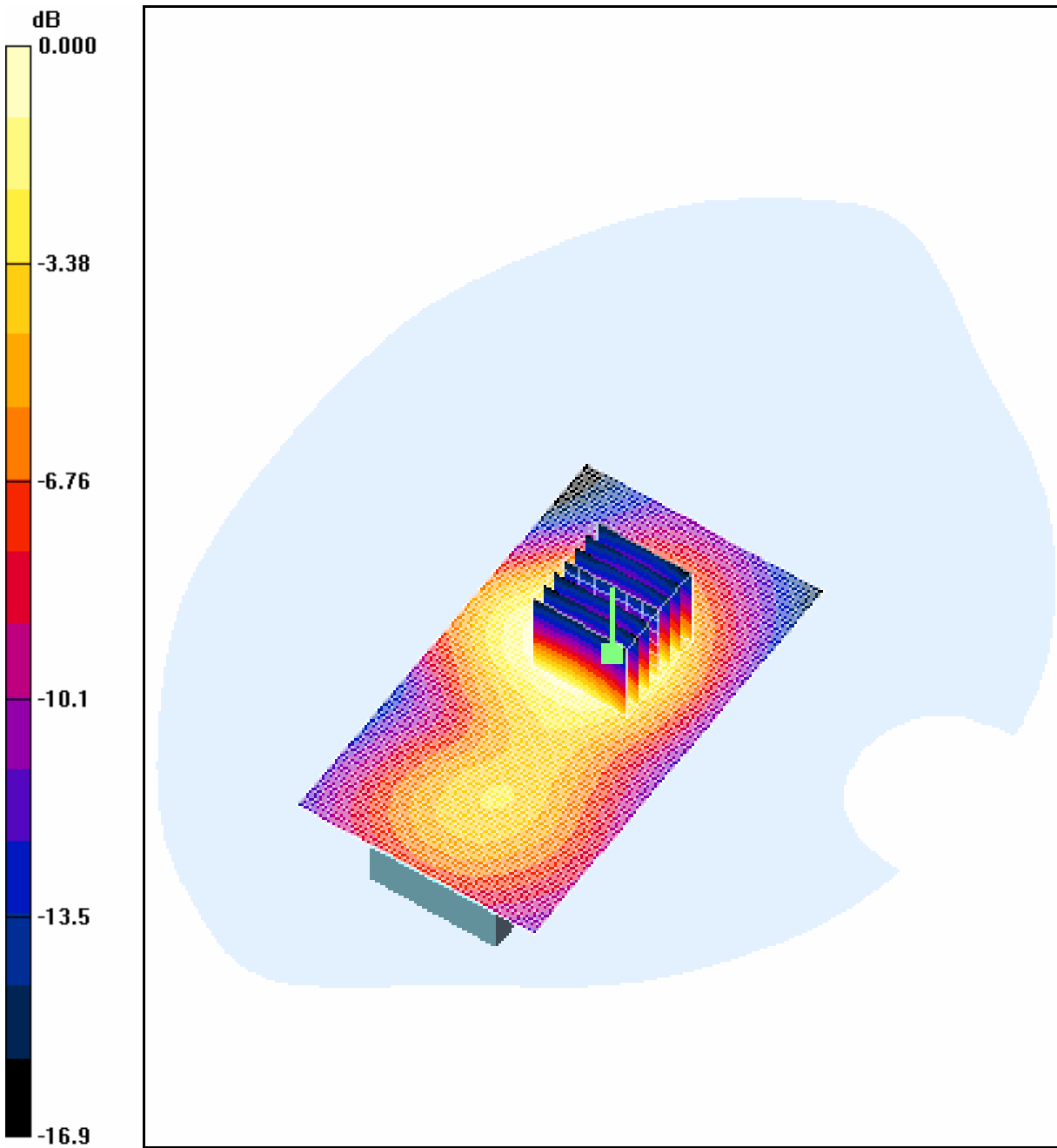
Body Worn - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.9 V/m ; Power Drift = -0.102 dB

Peak SAR (extrapolated) = 0.990 W/kg

SAR(1 g) = 0.572 mW/g ; SAR(10 g) = 0.327 mW/g

Maximum value of SAR (measured) = 0.621 mW/g



0 dB = 0.621mW/g

4.29 FCC-OET65-Body-Worn-GSM1900-Mid

Date/Time: 2006-1-5 9:43:53

Test Laboratory: SGS-GSM

FCC-OET65-Body-Worn-GSM1900-Mid

DUT: GSM50111-Body; Type: Body; Serial: 20051231

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

Medium: HSL1900-Body Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.52 \text{ mho/m}$; $\epsilon_r = 51.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - Middle/Area Scan (51x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.539 mW/g

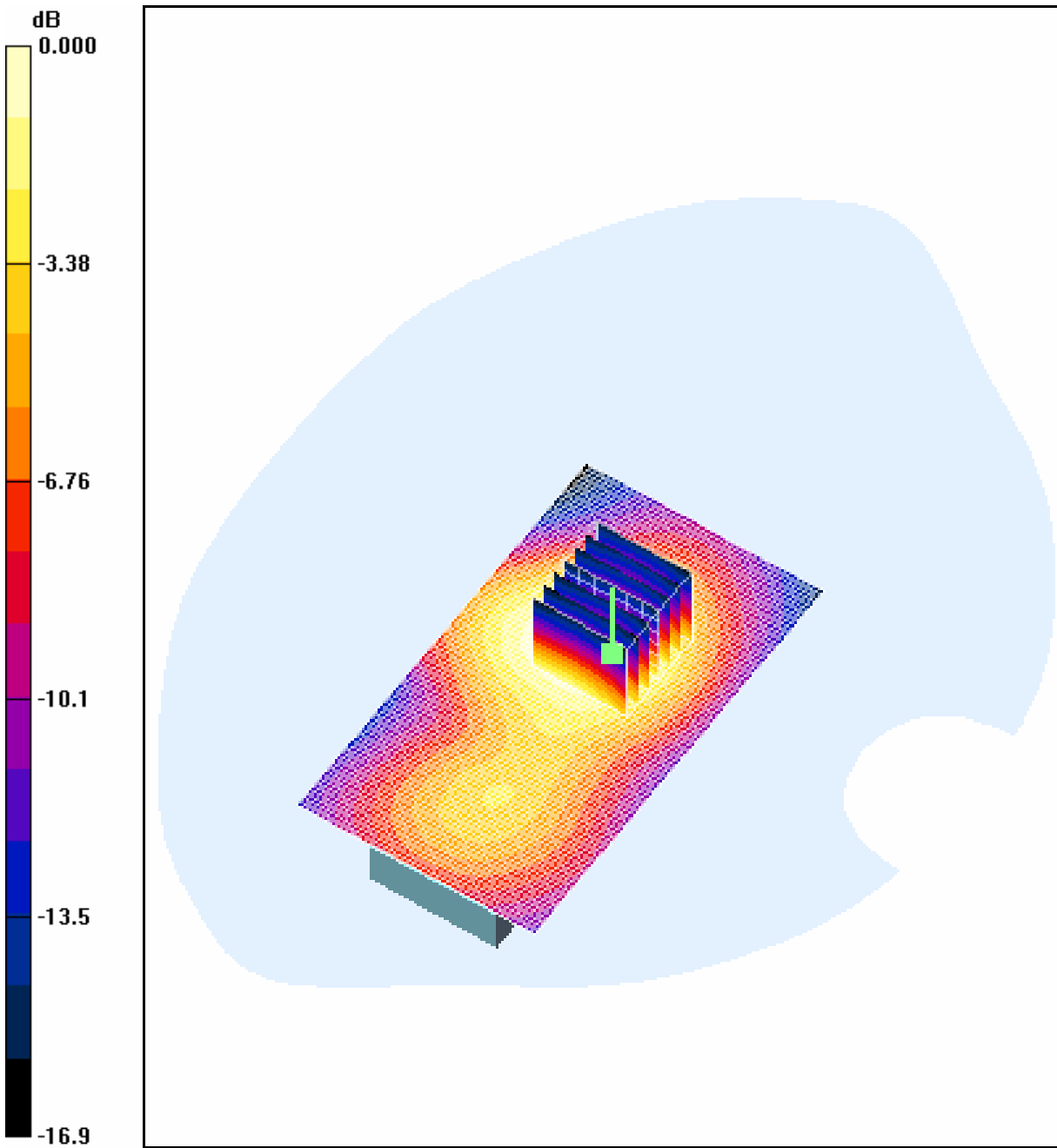
Body Worn - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.6 V/m; Power Drift = -0.059 dB

Peak SAR (extrapolated) = 0.801 W/kg

SAR(1 g) = 0.466 mW/g; SAR(10 g) = 0.269 mW/g

Maximum value of SAR (measured) = 0.506 mW/g



0 dB = 0.506mW/g

4.30 FCC-OET65-Body-Worn-GSM1900-High

Date/Time: 2006-1-5 10:31:18

Test Laboratory: SGS-GSM

FCC-OET65-Body-Worn-GSM1900-High

DUT: GSM50111-Body; Type: Body; Serial: 20051231

Communication System: GSM1900-GSM Mode; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: HSL1900-Body Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.55 \text{ mho/m}$; $\epsilon_r = 51.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DAS4 (High Precision Assessment)

DAS4 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: DAS4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body Worn - High/Area Scan (51x91x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.395 mW/g

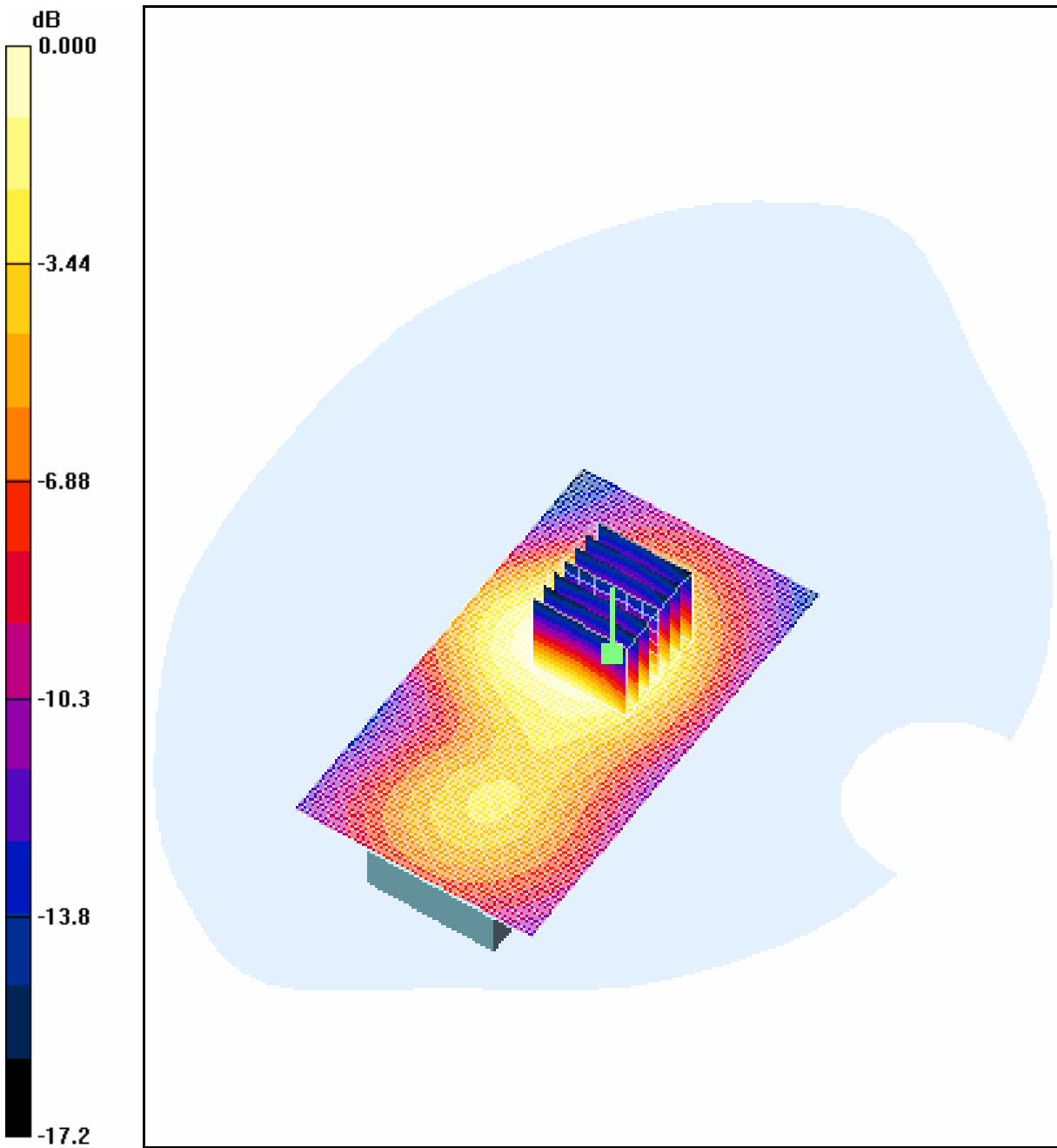
Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.5 V/m; Power Drift = -0.046 dB

Peak SAR (extrapolated) = 0.584 W/kg

SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.199 mW/g

Maximum value of SAR (measured) = 0.372 mW/g



0 dB = 0.372mW/g

Appendix

1. Photographs of Test Setup

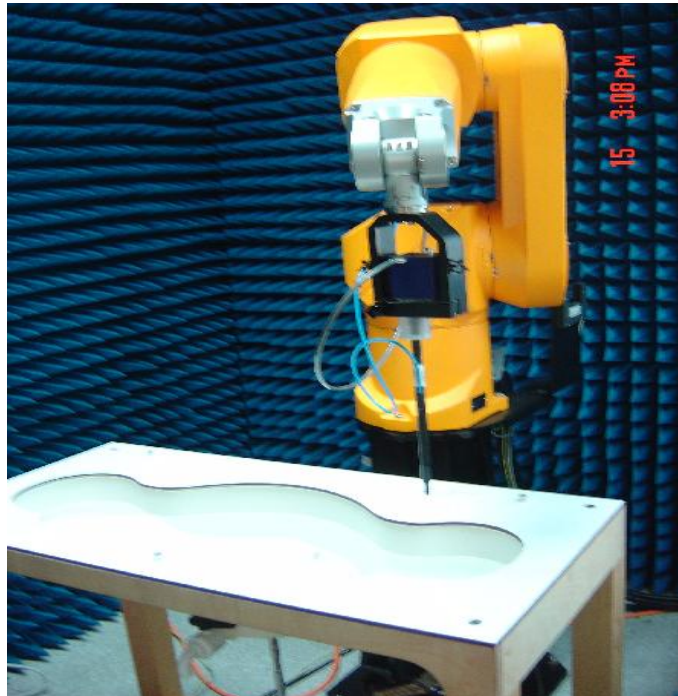


Fig.1 Photograph of the SAR measurement System

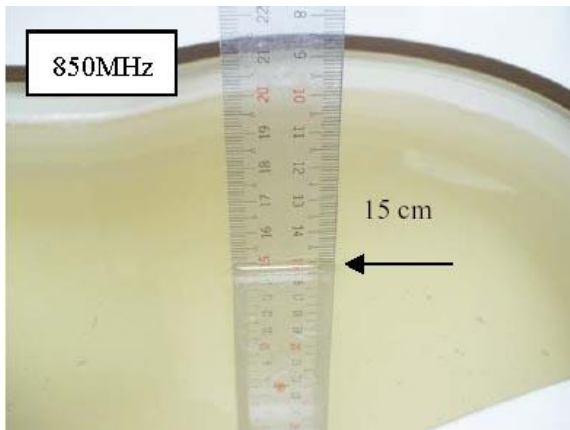


Fig.2 Photograph of the Tissue Simulant
Fluid Liquid depth 15cm
for Left-Head Side

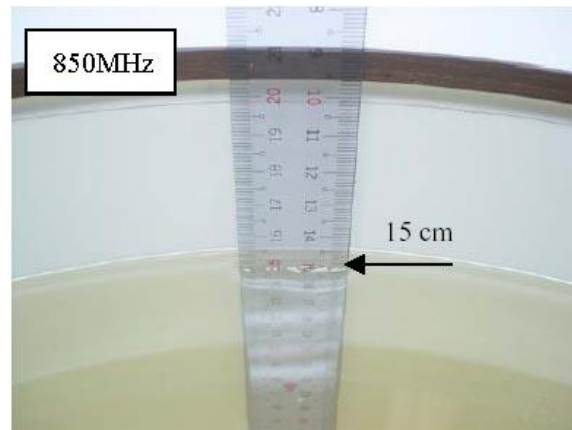


Fig.3 Photograph of the Tissue Simulant
Liquid depth 15cm for Body-Worn

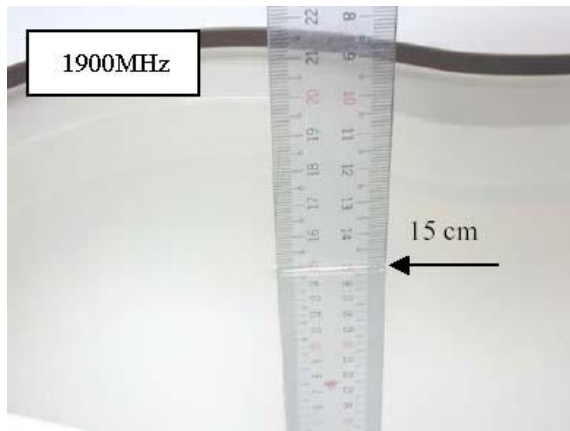


Fig.4 Photograph of the Tissue Simulant Fluid Liquid depth 15cm for Right-Head Side



Fig.5 Photograph of the Tissue Simulant Fluid 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

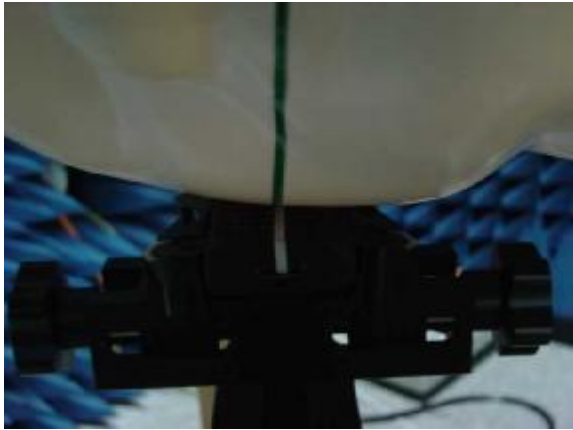


Fig.8 Photograph of the Right Hand Side Cheek status

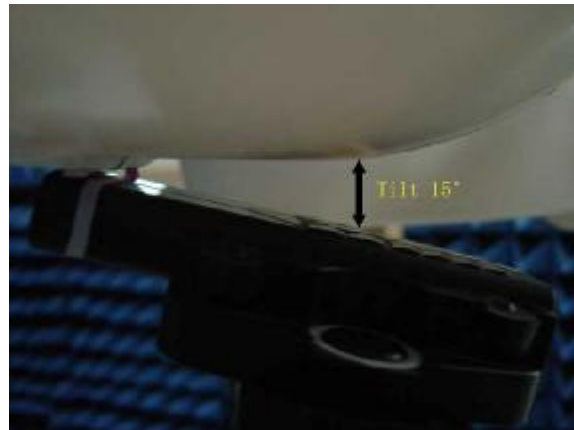


Fig.9 Photograph of the Right Hand Side Tilt status



Fig.10 Photograph of the BodyWorn status

2. Photographs of the EUT



Fig.11 Front View



Fig.12 Back View

[illegible]

A black rectangular GSM module, labeled 'GSM5011AC', is shown with a coiled black cable. The module is placed on a white grid background with numerical markings from 1 to 12 on both the horizontal and vertical axes. The cable has a standard RJ45 Ethernet connector at one end and a smaller, multi-pin connector at the other, which is plugged into the module.

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:3086**

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 $(22 \pm 3)^{\circ}\text{C}$ 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-05
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-05
Power sensor E4412A	MY41493087	3-May-05 (METAS, No. 251-00466)	May-05
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-05
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

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

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



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S Servizio svizzero di taratura
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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,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 NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 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.

ES3DV3 SN:3088

September 13, 2005

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 _{iso} [%]	Without Correction Algorithm	5.8	2.7
	SAR _{iso} [%]	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 _{iso} [%]	Without Correction Algorithm	7.6	4.5
	SAR _{iso} [%]	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 E²-field uncertainty inside TSL (see Page 8).

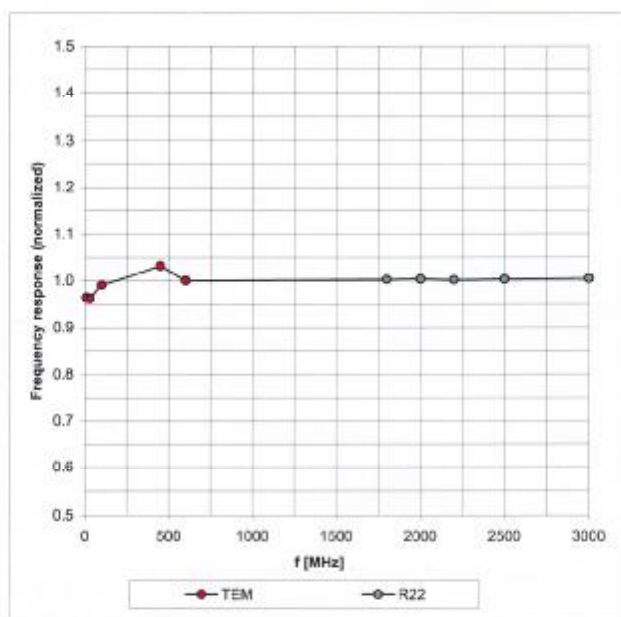
^B Numerical linearization parameter; uncertainty not required.

ES3DV3 SN:3088

September 13, 2005

Frequency Response of E-Field

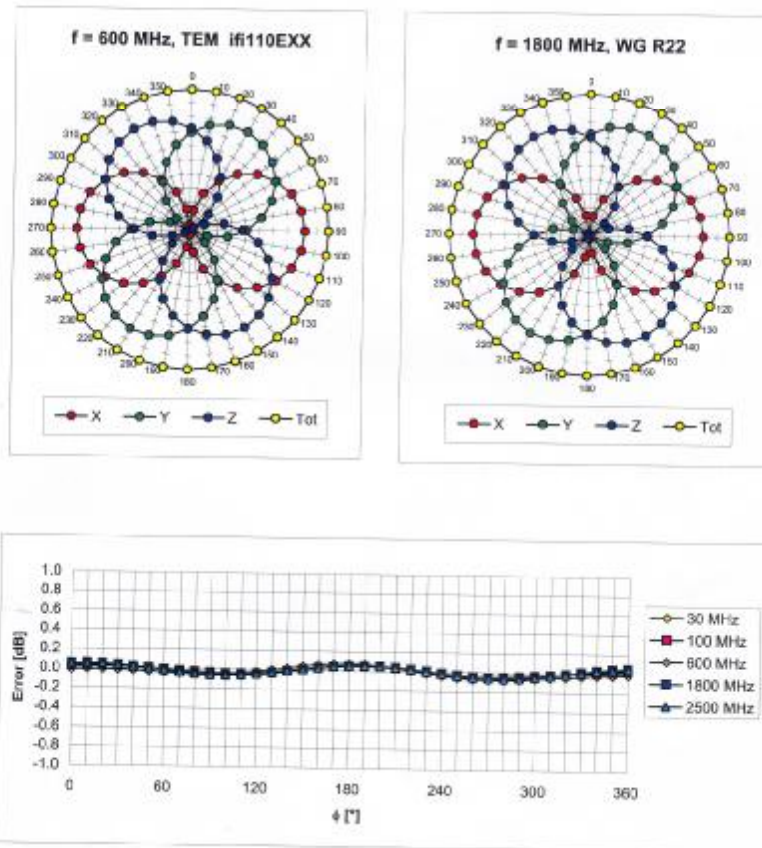
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

ES3DV3 SN:3088

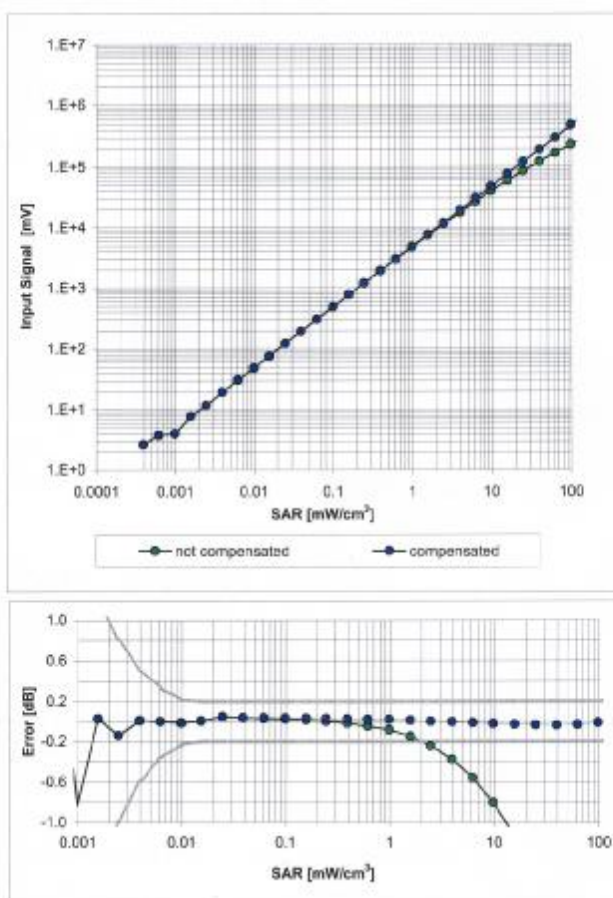
September 13, 2005

Receiving Pattern (ϕ), $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ES3DV3 SN:3088

September 13, 2005

Dynamic Range $f(\text{SAR}_{\text{head}})$
(Waveguide R22, $f = 1800$ MHz)

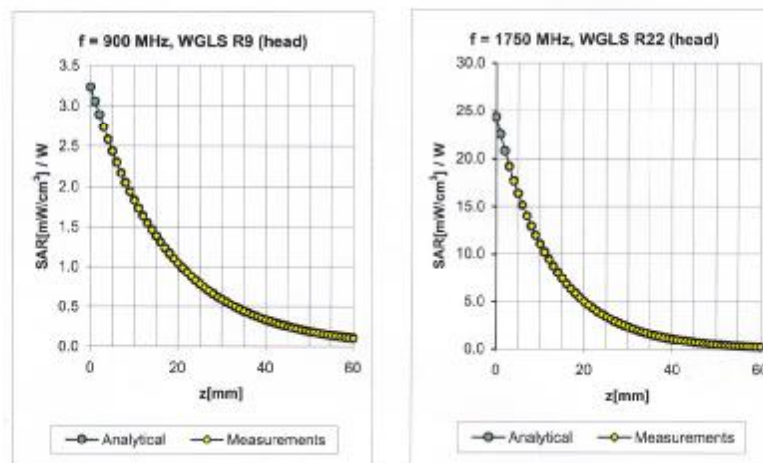


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

ES3DV3 SN:3088

September 13, 2005

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	5.63 ± 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)

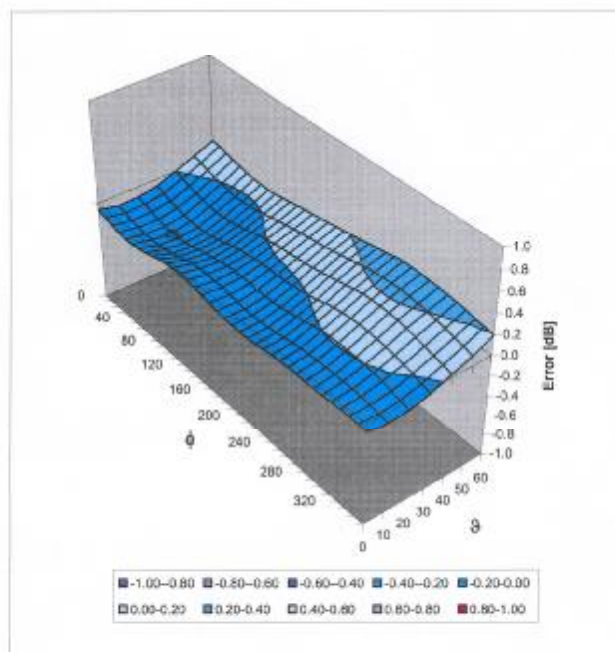
^c The validity of ± 100 MHz only applies for DASY v6.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ES3DV3 SN:3088

September 13, 2005

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

6. Uncertainty analysis

Error Description	Tol. (± %)	Prob. dist.	Div.	(<i>c</i> _i) (1g)	(<i>c</i> _i) (10g)	Std. unc. (± %)		(<i>v</i> _i)
Measurement System								
Probe Calibration	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7	∞
Hemispherical Isotropy	0	R	√3	1	1	0	0	∞
Boundary Effects	1.0	R	√3	1	1	0.6	0.6	∞
Linearity	4.7	R	√3	1	1	2.7	2.7	∞
System Detection Limit	1.0	R	√3	1	1	0.6	0.6	∞
Readout Electronics	1.0	N	1	1	1	1.0	1.0	∞
Response Time	0	R	√3	1	1	0	0	∞
Integration Time	0	R	√3	1	1	0	0	∞
RF Ambient Conditions	3.0	R	√3	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	√3	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	√3	1	1	1.7	1.7	∞
Algorithms for Max. SAR Eval.	1.0	R	√3	1	1	0.6	0.6	∞
Dipole								
Dipole Axis to Liquid Distance	2.0	R	√3	1	1	1.2	1.2	∞
Input power and SAR drift meas.	4.7	R	√3	1	1	2.7	2.7	∞
Phantom and Tissue Param.								
Phantom Uncertainty	4.0	R	√3	1	1	2.3	2.3	∞
Liquid Conductivity (target)	5.0	R.	√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	√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	Unlensee Composites Hauptstr. 69 CH-8559 Fruttwilen 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.	ITIS 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-S
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 ITIS 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

*F. Bernhardt***Schmid & Partner
Engineering AG**Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79*Helmut Kappeler***The end**