SAR TEST REPORT

Eequipment Under Test :	Tri-Band GSM900/DCS1800/PCS1900 MOBILE PHONE
FCC ID :	S2VM4X100
Model No. :	M4X1
Applicant :	Yuhua TelTech (Shanghai) Co., Ltd.
Address of Applicant :	Yuhua R&D Building, 27 Xin Jin Qiao Road, Pudong
	Shanghai, P.R. China 201206
Date of Receipt :	2005.03.30
Date of Test :	2005.04.01 – 2005.04.22
Date of Issue :	2005.04.26

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 :	Alpha Xie	Date :	2005.04.26
Approved by :	Zhiang Yuan	Date :	2005.04.26

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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.sgscstc.com

1.2 Details of Applicant

Name: Yuhua TelTech (Shanghai) Co., Ltd.
Address: Yuhua R&D Building, 27 Xin Jin Qiao Road, Pudong, Shanghai 201206, P.R. China

1.3 Description of EUT(s)

Brand name	M4X1
Model No.	**PANPAC M-1**
Battery Type	Lithium-Ion, 3.8Volt
Operation Mode	GSM 900/1800/1900
Modulation Mode	GMSK
Maximum RF Conducted Power	30 dBm
Frequency range	1900MHz (1850~1910MHZ)
Antenna Type	External Antenna

1.4 Test Environment

Ambient temperature: 22.0° C

Tissue Simulating Liquid: 22° C

Relative Humidity: 32%

1.5 Operation Configuration

Configuration 1: GSM 1900, LeftHandSide

Configuration 2: GSM 1900, RightHandSide

Configuration 3: GSM 1900, BodyWorn

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 ET3DV6 1774 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The 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.

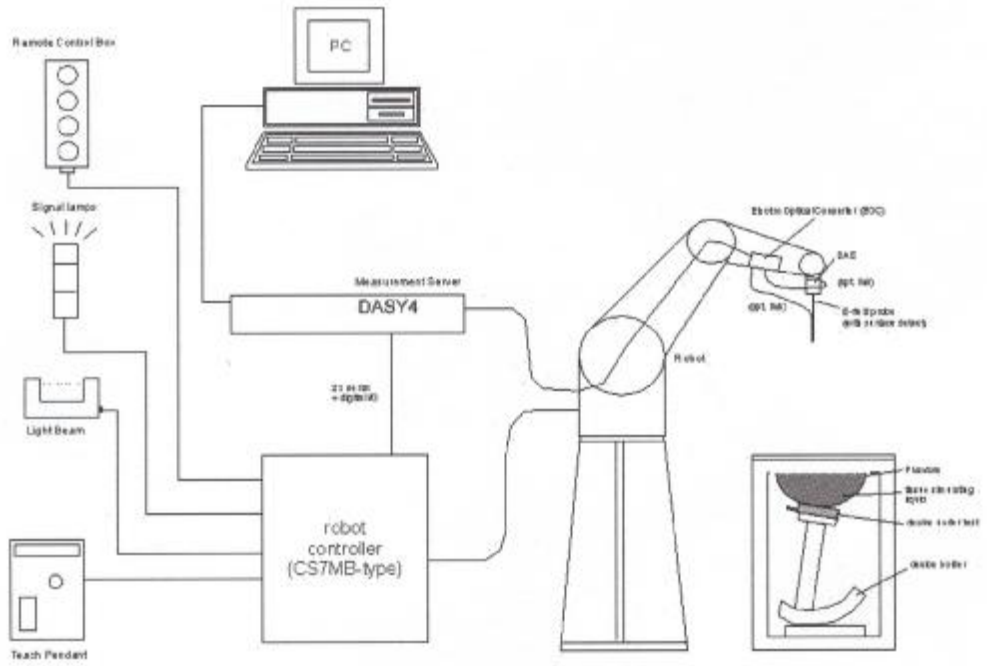


Fig. a SAR System Configuration

- 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 or Windows XP.
- 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 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 +/- 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.

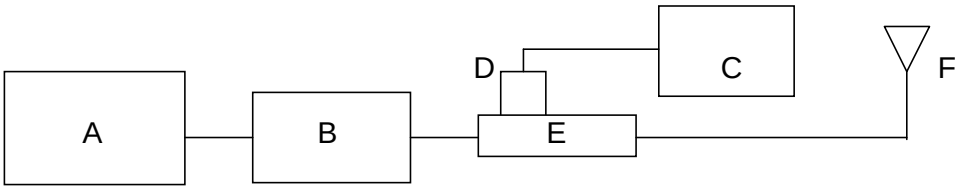


Fig. b the microwave circuit arrangement used for SAR system verification

A. Agilent Model E4438C Signal Generator
B. Agilent Model 8449B 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	Target SAR 1g (250mW)	Target SAR 10g (250mW)	Measured SAR 1g	Measured SAR 10g	Measured Date
ET3DV6 SN1774	1900M Head	10.4	5.35	10.35	5.31	2005-4-1
ET3DV6 SN1774	1900M Body	10.52	5.53	10.42	5.36	2005-4-6
ET3DV6 SN1774	1900M Body	10.52	5.53	10.46	5.39	2005-4-22

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 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Agilent E5071B Network Analyzer (300 KHz-8500 MHz). The Measured dielectric parameters of the body-simulant fluid at 1900 MHz (head) are ρ =40.00± 5%, σ =1.40±10% S/m. The measured properties are close to the values of ρ =40.13 and σ =1.46 S/m. The Measured dielectric parameters of the body-simulant fluid at 1900 MHz (body) are ρ =53.3± 5%, σ =1.52±10% S/m. The measured properties are close to the values of ρ =51.49 and σ =1.54 S/m. 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, 2005-04-1**	40.13	1.46	21.5
		Recommended Limit	40.0±5%	1.40±10%	20-24
1900	**Body**	**Measured, 2005-04-6**	51.49	1.54	22
		Recommended Limit	53.3±5%	1.52±10%	20-24
1900	**Body**	**Measured, 2005-04-22**	51.53	1.58	21.8
		Recommended Limit	53.3±5%	1.52±10%	20-24

Table 2. Dielectric parameters for the Frequency Band 1900MHZ

1.9 Test Standards and Limits

According to EN50360: 2001, the European Standard incorporates by dated or updated reference, provisions from other publications. These normative references are cited at the appropriate in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of the publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN50361, Basic standard for measurement of Specific Absorption Rate related to human exposure to electromagnetic fields form mobile phones (300MHz-3GHz)

Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300GHz) (Official Journal L 197 of 30 July 1999).

International Commission on Non-Ionising Radiation Protection (1998), Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300GHz). Health Physics74, 494 - 522.

Human Exposure	**Uncontrolled Environment General Population**	**Controlled Environment Occupational**
Spatial Peak SAR (Brain)	1.60 mW/g	8.00 mW/g
Spatial Average SAR (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

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. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2. Summary of Results

Frequency Band	EUT position	Conducted Output Power (Average)	1g Average (mW/g)	10g Average (mW/g)	Amb. Temp (℃)	Verdict
1900 MHz	LeftHandSide Touch, Low Channel	29.2	1.17	0.686	22	PASS
	LeftHandSide Touch, Mid Channel	29.5	1.06	0.618	22	PASS
	LeftHandSide Touch, High Channel	29.7	1.07	0.607	22	PASS
	LeftHandSide Tilt, Low Channel	29.2	0.601	0.375	22	PASS
	LeftHandSide Tilt, Mid Channel	29.5	0.601	0.369	22	PASS
	LeftHandSide Tilt, High Channel	29.7	0.593	0.361	22	PASS
	RightHandSide Touch, Low Channel	29.2	1.08	0.615	22	PASS
	RightHandSide Touch, Mid Channel	29.5	0.987	0.557	22	PASS
	RightHandSide Touch, High Channel	29.7	0.993	0.551	22	PASS
	RightHandSide Tilt, Low Channel	29.2	0.35	0.221	22	PASS
	RightHandSide Tilt, Mid Channel	29.5	0.362	0.226	22	PASS
	RightHandSide Tilt, High Channel	29.7	0.35	0.215	22	PASS
	BodyWorn, Low Channel	29.2	0.136	0.0798	22	PASS
	BodyWorn, Mid Channel	29.5	0.159	0.0911	22	PASS
	BodyWorn, High Channel	29.7	0.2	0.114	22	PASS
	BodyWorn, GPRS Low Channel	29.2	0.405	0.221	22	PASS
	BodyWorn, GPRS Mid Channel	29.5	0.461	0.25	22	PASS
	BodyWorn, GPRS High Channel	29.7	0.563	0.305	22	PASS

3. Instruments List

Instrument	Model	Serial number	NO.
Desktop PC	COMPAQ EVO	N/A	GSM-SAR-025
Dasy 4 professional system	V 4.1 build 47	N/A	GSM-SAR-001
Probe	ET3DV6	1774	GSM-SAR-021
DAE	DAE3	569	GSM-SAR-023
Phantom	SAM	N/A	GSM-SAR-005
Robot	RX90L	N/A	GSM-SAR-008
Agilent network analyzer	E5071B	MY42100549	GSM-SAR-007
1900MHz system validation dipole	D1900V2	5d028	GSM-SAR-019
Dielectric probe kit	85070D	US01440168	GSM-SAR-016
Agilent signal generator	E4438	14438CATO-19719	GSM-SAR-008
Agilent preamplifier	8449B	3008A01921	GSM-SAR-009
Agilent power meter	E4416A	GB41292095	GSM-SAR-010
Agilent power sensor	8481h	MY41091234	GSM-SAR-011
HT CP6100 20N Coupling	6100	SCP301480120	GSM-SAR-012
R&S Universal radio communication tester	CMU200	103633	GSM-AUD-002

4. Measurements

GSM Mode

4.1 FCC-OET65-LeftHandSide-Touch-GSM1900-Low

Date/Time: 04/01/05 14:44:23

Test Laboratory: SGS-GSM
File Name: FCC-OET65-LeftHandSide-Touch-GSM1900-2.da4

FCC-OET65-LeftHandSide-Touch-GSM1900-Low

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Left-Hand Side)

Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.41808 mho/m, ε_r = 40.5312, ρ = 1000 kg/m^3)
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Touch position - Low/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.78 V/m
Power Drift = 0.09 dB
Maximum value of SAR = 1.34 mW/g

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

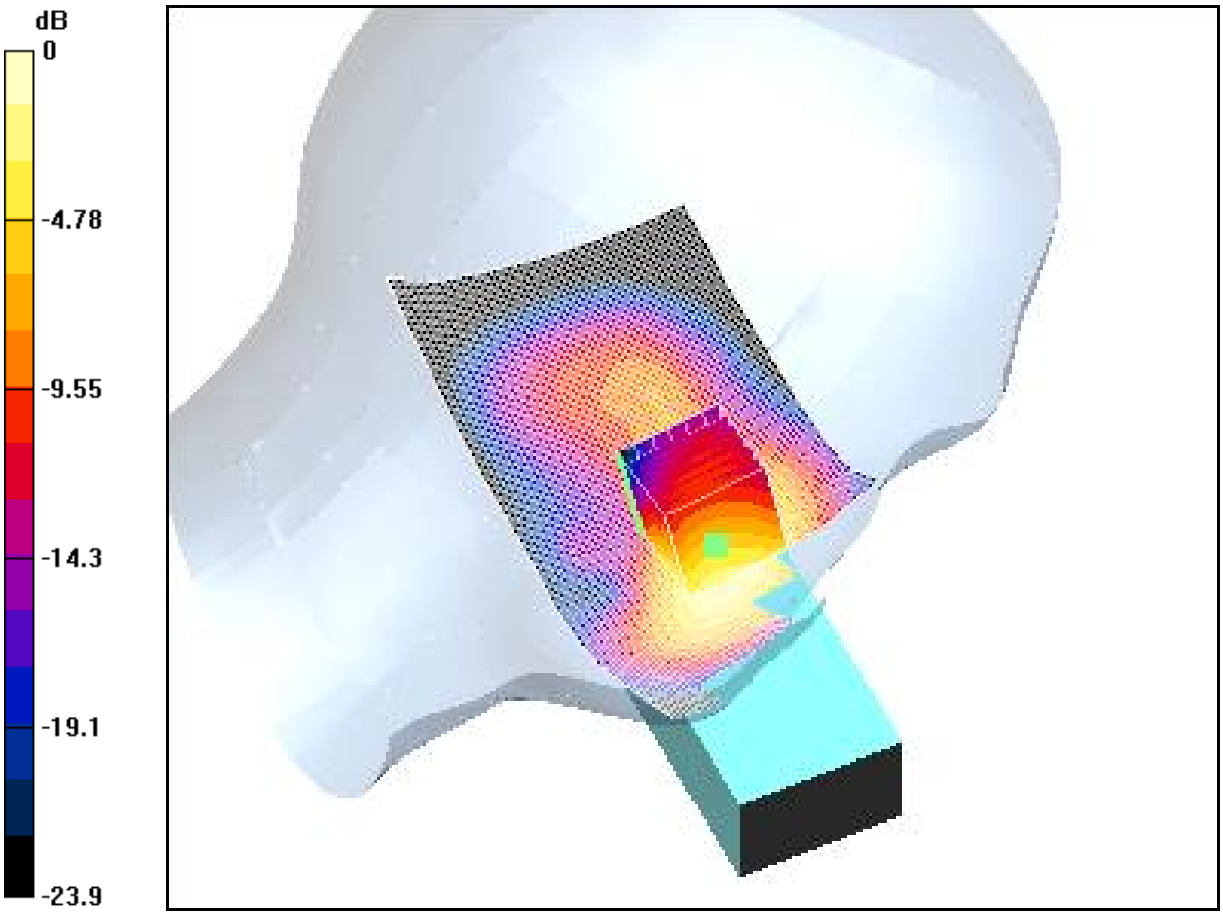
Peak SAR (extrapolated) = 1.74 W/kg

SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.686 mW/g

Reference Value = 9.78 V/m

Power Drift = 0.09 dB

Maximum value of SAR = 1.3 mW/g



0 dB = 1.3mW/g

4.2 FCC-OET65-LeftHandSide-Touch-GSM1900-Mid

Date/Time: 04/01/05 16:03:53

Test Laboratory: SGS-GSM
File Name: FCC-OET65-LeftHandSide-Touch-GSM1900-2.da4

FCC-OET65-LeftHandSide-Touch-GSM1900-Mid

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Left-Hand Side)

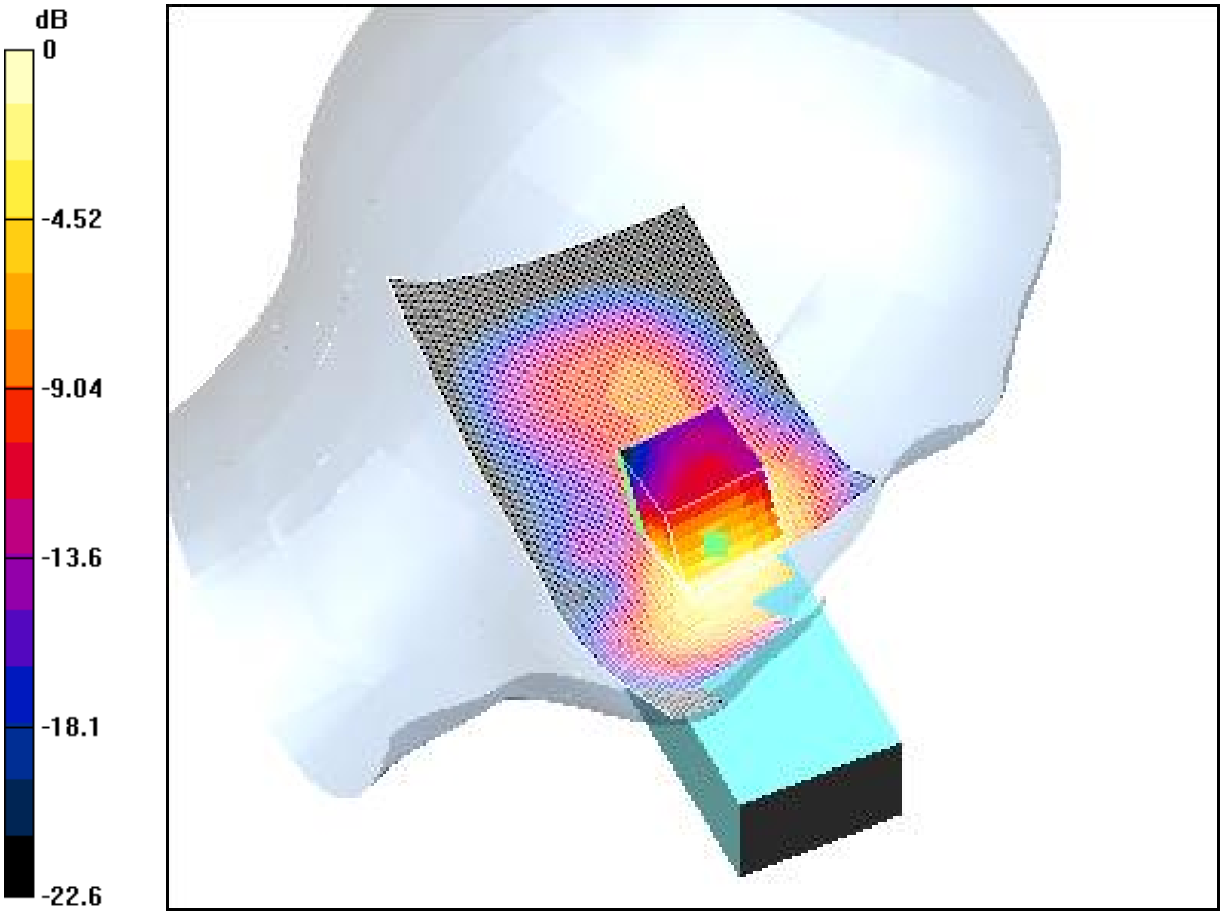
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.44443 mho/m, ε_r = 40.3239, ρ = 1000 kg/m^3)
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Touch position - Middle/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.75 V/m
Power Drift = 0.08 dB
Maximum value of SAR = 1.21 mW/g

Touch position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.618 mW/g
Reference Value = 9.75 V/m
Power Drift = 0.08 dB
Maximum value of SAR = 1.17 mW/g



0 dB = 1.17mW/g

4.3 FCC-OET65-LeftHandSide-Touch-GSM1900-High

Date/Time: 04/01/05 16:03:53

Test Laboratory: SGS-GSM
File Name: FCC-OET65-LeftHandSide-Touch-GSM1900-2.da4

FCC-OET65-LeftHandSide-Touch-GSM1900-High

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Left-Hand Side)

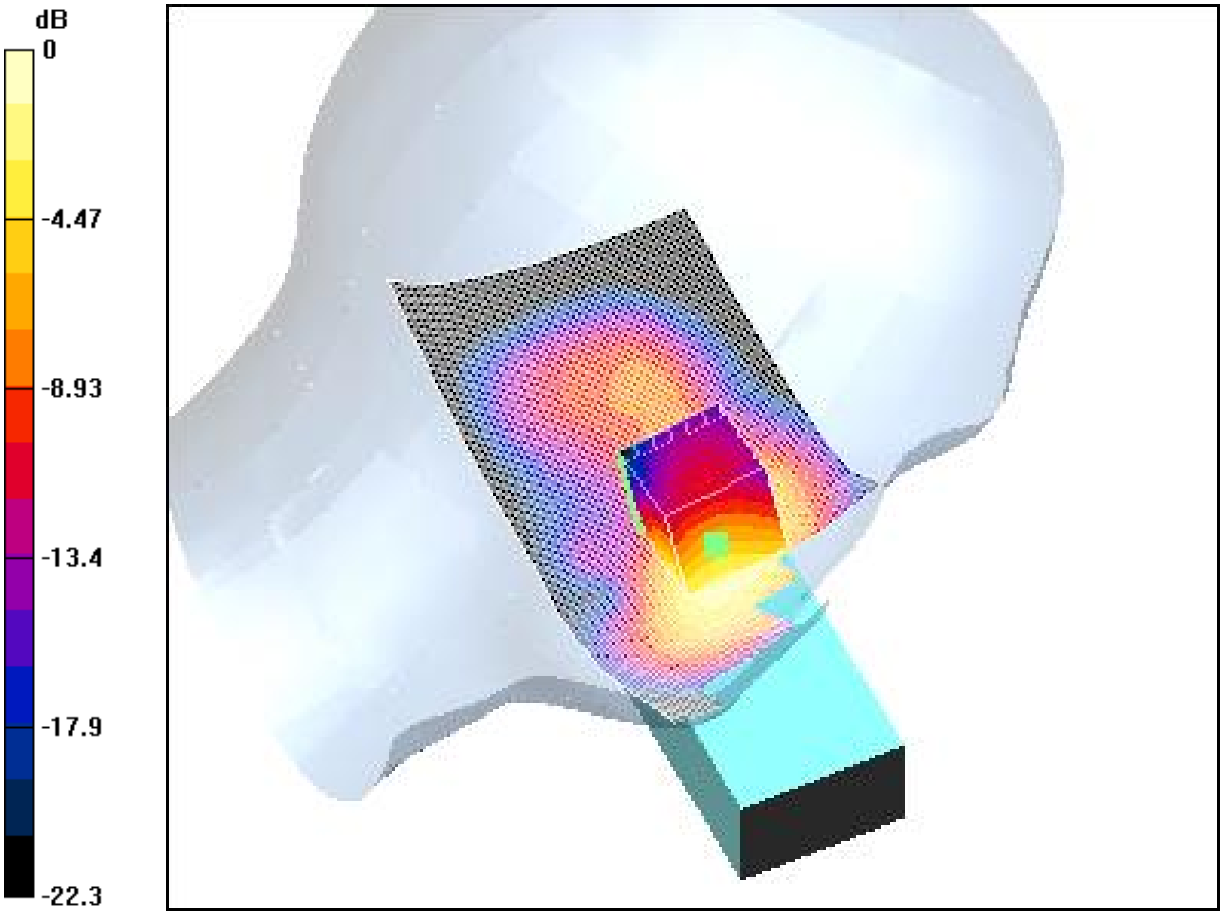
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.46824 mho/m, ε_r = 39.9929, ρ = 1000 kg/m^3)
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Touch position - High/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.94 V/m
Power Drift = -0.01 dB
Maximum value of SAR = 1.21 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.607 mW/g
Reference Value = 9.94 V/m
Power Drift = -0.01 dB
Maximum value of SAR = 1.18 mW/g



0 dB = 1.18mW/g

4.4 FCC-OET65-LeftHandSide-Tilt-GSM1900-Low

Date/Time: 04/01/05 13:33:48

Test Laboratory: SGS-GSM
File Name: FCC-OET65-LeftHandSide-Tilt-GSM1900.da4

FCC-OET65-LeftHandSide-Tilt-GSM1900-Low

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Left-Hand Side)

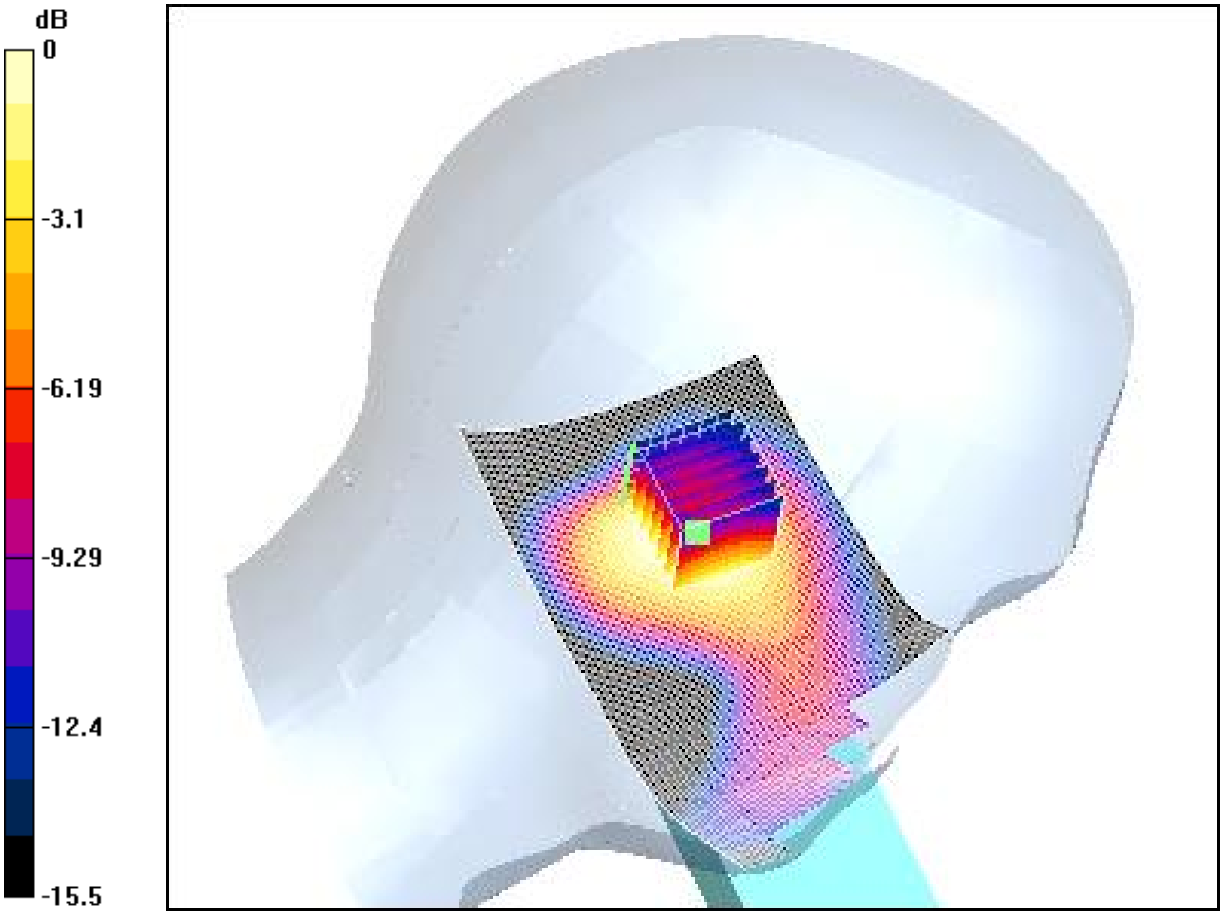
Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.41808 mho/m, ε_r = 40.5312, ρ = 1000 kg/m^3)
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilt position - Low/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 21 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.656 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.847 W/kg
SAR(1 g) = 0.601 mW/g; SAR(10 g) = 0.375 mW/g
Reference Value = 21 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.646 mW/g



0 dB = 0.646mW/g

4.5 FCC-OET65-LeftHandSide-Tilt-GSM1900-Mid

Date/Time: 04/01/05 13:33:48

Test Laboratory: SGS-GSM
File Name: FCC-OET65-LeftHandSide-Tilt-GSM1900.da4

FCC-OET65-LeftHandSide-Tilt-GSM1900-Mid

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Left-Hand Side)

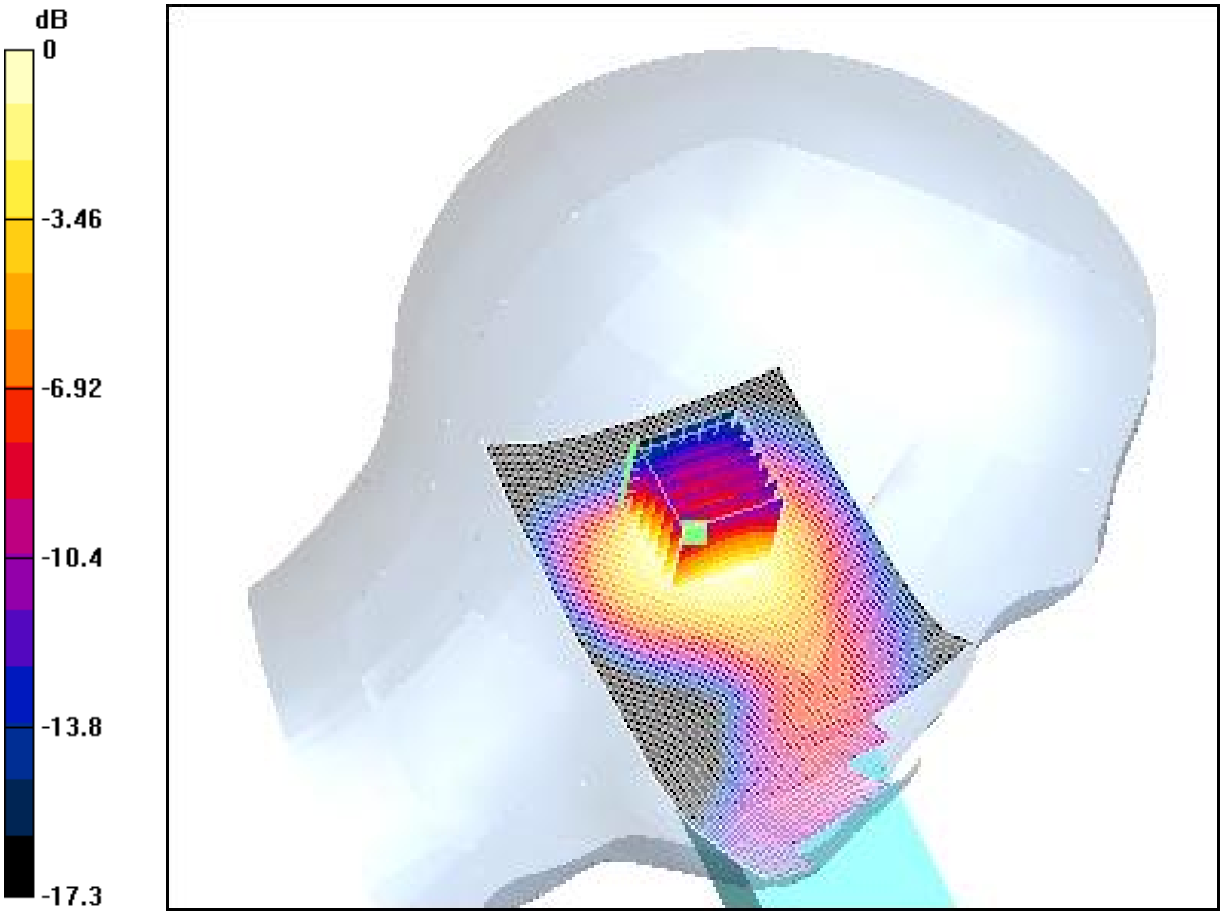
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.44443 mho/m, ε_r = 40.3239, ρ = 1000 kg/m^3)
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilt position - Middle/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 21.2 V/m
Power Drift = -0.09 dB
Maximum value of SAR = 0.658 mW/g

Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.853 W/kg
SAR(1 g) = 0.601 mW/g; SAR(10 g) = 0.369 mW/g
Reference Value = 21.2 V/m
Power Drift = -0.09 dB
Maximum value of SAR = 0.655 mW/g



0 dB = 0.655mW/g

4.6 FCC-OET65-LeftHandSide-Tilt-GSM1900-High

Date/Time: 04/01/05 13:33:48

Test Laboratory: SGS-GSM
File Name: FCC-OET65-LeftHandSide-Tilt-GSM1900.da4

FCC-OET65-LeftHandSide-Tilt-GSM1900-High

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Left-Hand Side)

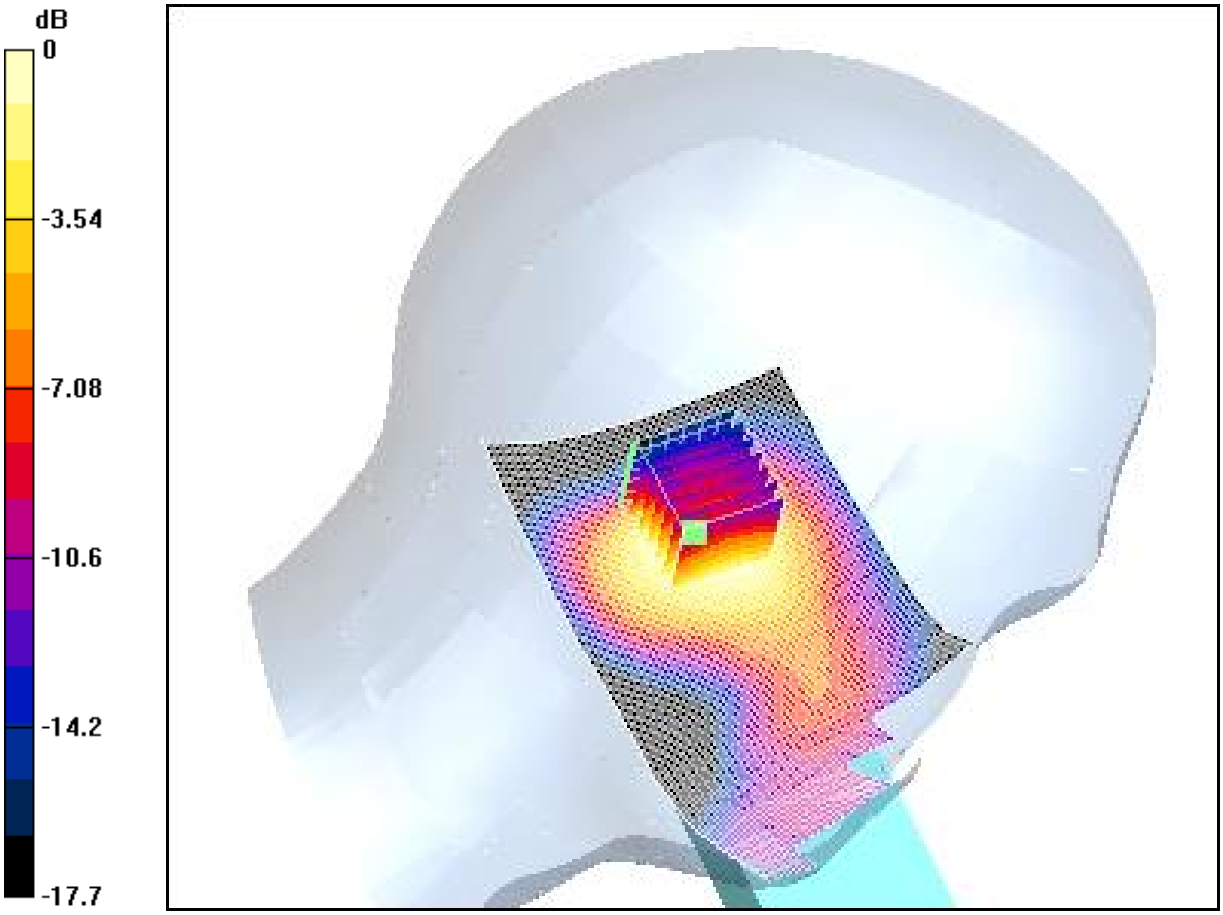
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.46824 mho/m, ε_r = 39.9929, ρ = 1000 kg/m^3)
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilt position - High/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 20.5 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.633 mW/g

Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.857 W/kg
SAR(1 g) = 0.593 mW/g; SAR(10 g) = 0.361 mW/g
Reference Value = 20.5 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.647 mW/g



0 dB = 0.647mW/g

4.7 FCC-OET65-RightHandSide-Touch-GSM1900-Low

Date/Time: 04/05/05 17:11:35

Test Laboratory: SGS-GSM
File Name: FCC-OET65-RightHandSide-Touch-GSM1900.da4

FCC-OET65-RightHandSide-Touch-GSM1900-Low

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Right-Hand Side)

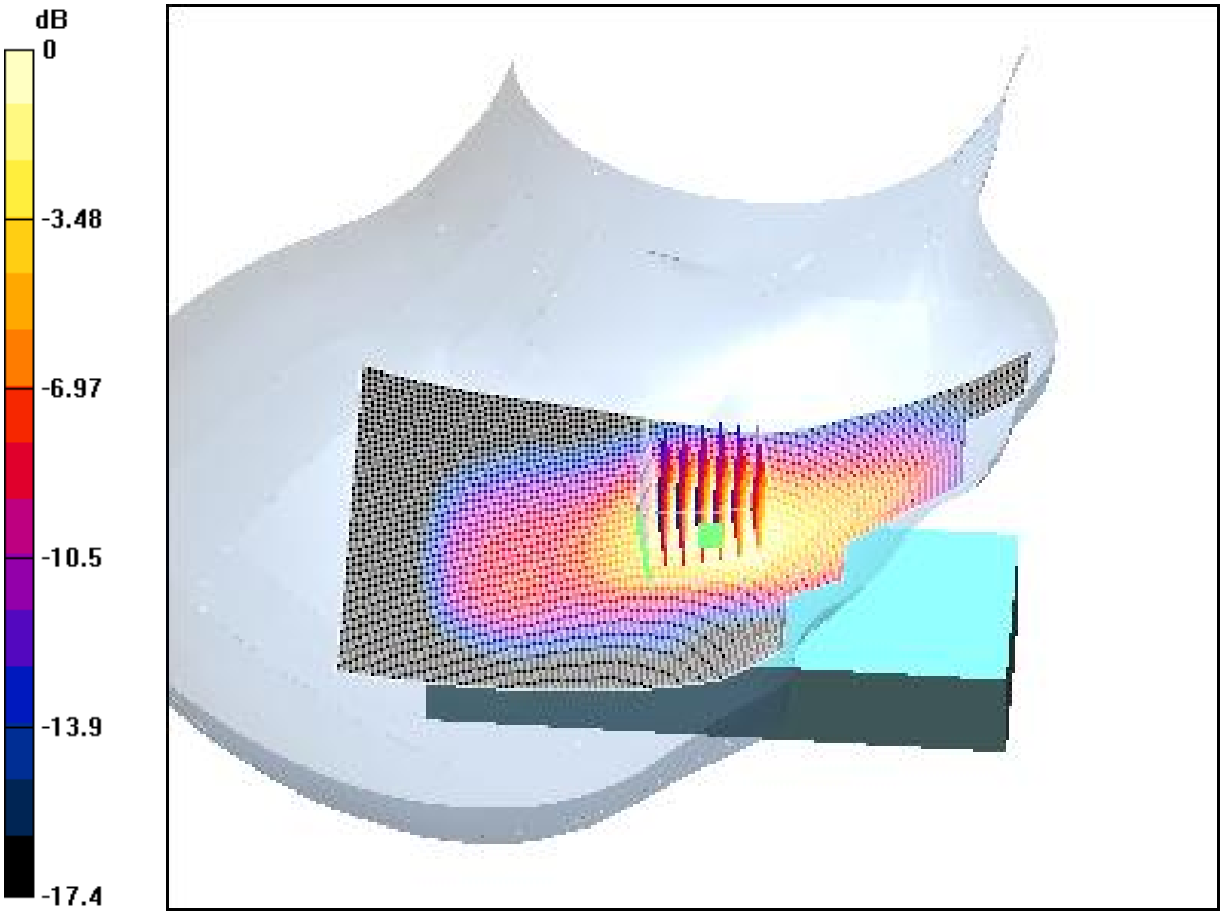
Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.41808 mho/m, ε_r = 40.5312, ρ = 1000 kg/m^3)
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Touch position - Low/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.1 V/m
Power Drift = -0.05 dB
Maximum value of SAR = 1.16 mW/g

Touch position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.85 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.615 mW/g
Reference Value = 11.1 V/m
Power Drift = -0.05 dB
Maximum value of SAR = 1.14 mW/g



0 dB = 1.14mW/g

4.8 FCC-OET65-RightHandSide-Touch-GSM1900-Mid

Date/Time: 04/05/05 17:11:35

Test Laboratory: SGS-GSM
File Name: FCC-OET65-RightHandSide-Touch-GSM1900.da4

FCC-OET65-RightHandSide-Touch-GSM1900-Mid

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Right-Hand Side)

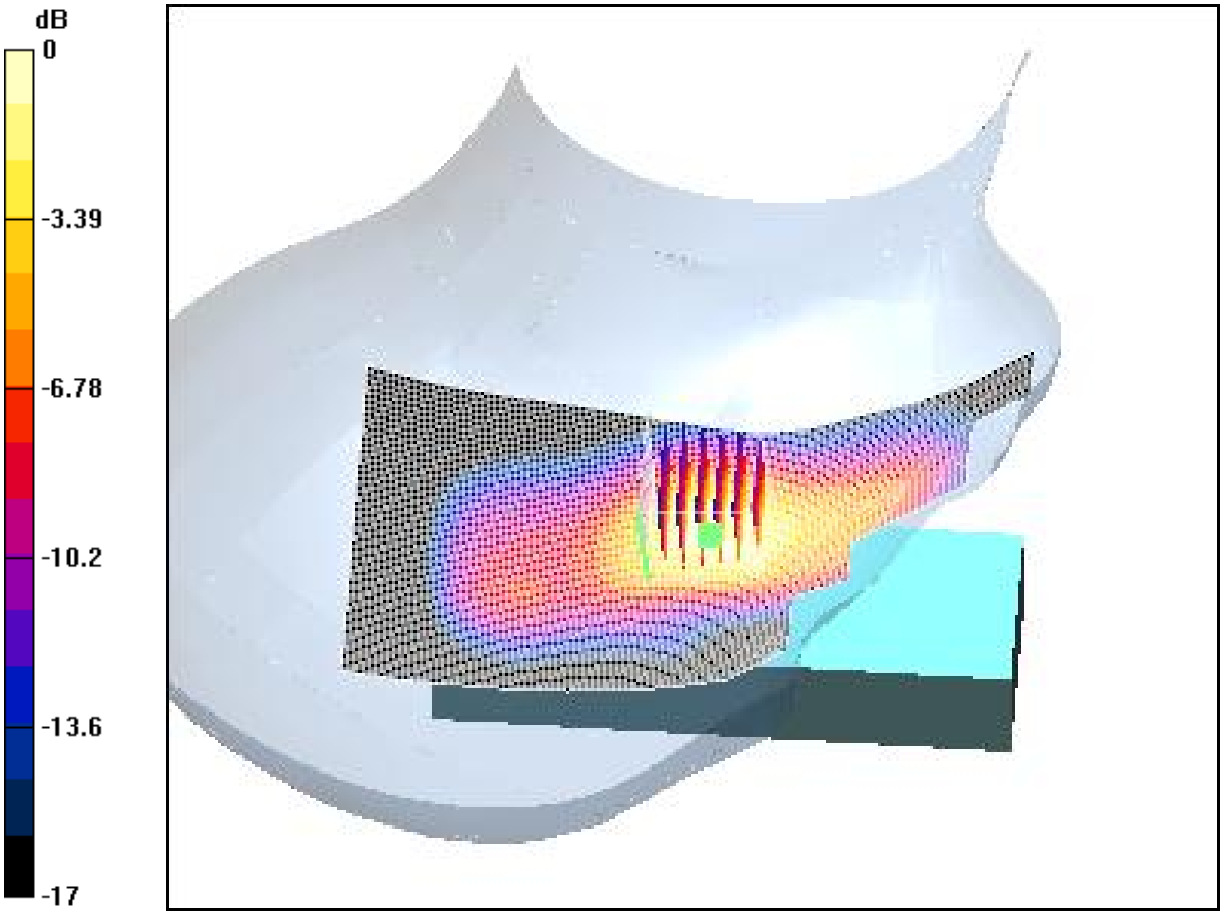
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.44443 mho/m, ε_r = 40.3239, ρ = 1000 kg/m^3)
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Touch position - Middle/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.4 V/m
Power Drift = 0.3 dB
Maximum value of SAR = 1.07 mW/g

Touch position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.987 mW/g; SAR(10 g) = 0.557 mW/g
Reference Value = 10.4 V/m
Power Drift = 0.3 dB
Maximum value of SAR = 1.06 mW/g



0 dB = 1.06mW/g

4.9 FCC-OET65-RightHandSide-Touch-GSM1900-High

Date/Time: 04/05/05 17:11:35

Test Laboratory: SGS-GSM
File Name: FCC-OET65-RightHandSide-Touch-GSM1900.da4

FCC-OET65-RightHandSide-Touch-GSM1900-High

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Right-Hand Side)

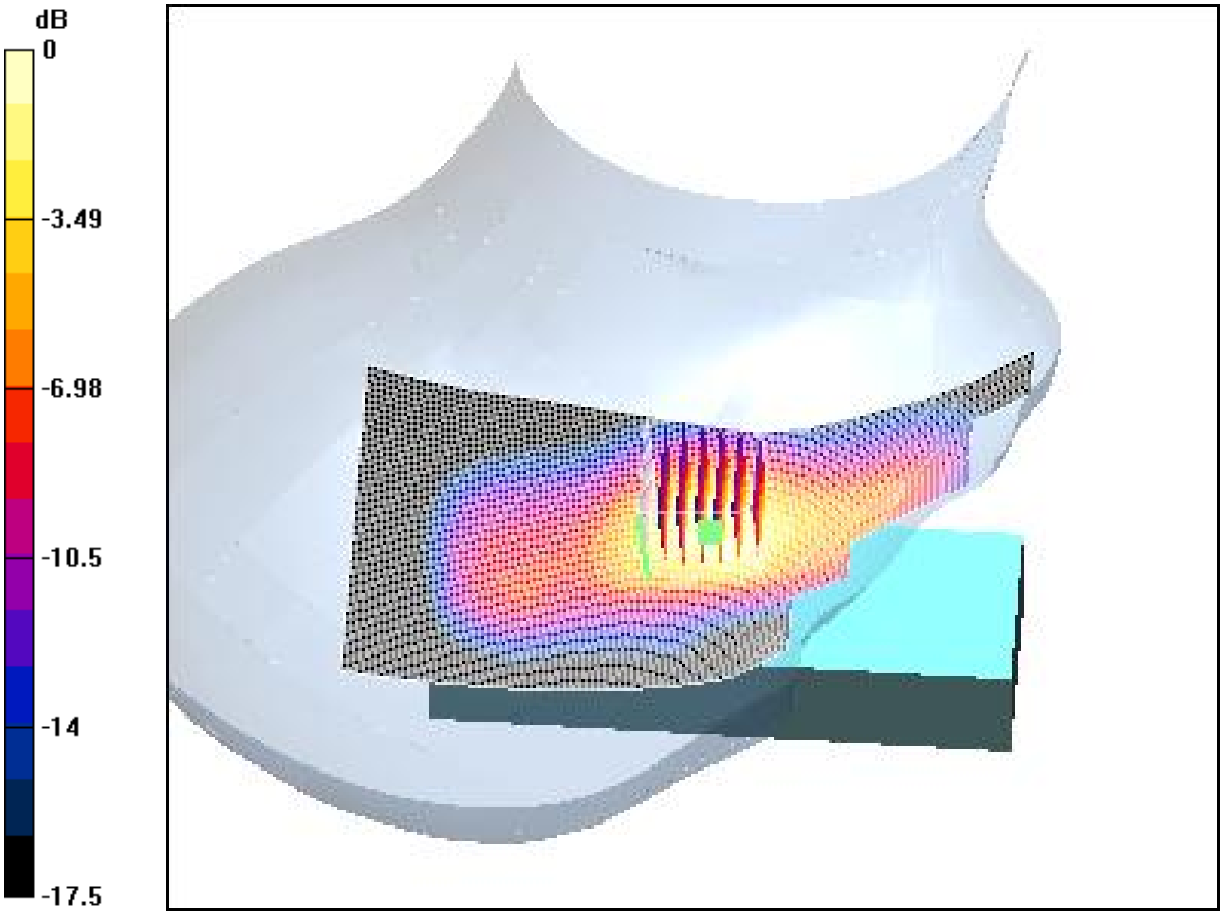
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.46824 mho/m, ε_r = 39.9929, ρ = 1000 kg/m^3)
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Touch position - High/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.8 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 1.08 mW/g

Touch position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.993 mW/g; SAR(10 g) = 0.551 mW/g
Reference Value = 10.8 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 1.06 mW/g



0 dB = 1.06mW/g

4.10 FCC-OET65-RightHandSide-Tilt-GSM1900-Low

Date/Time: 04/05/05 19:13:24

Test Laboratory: SGS-GSM
File Name: FCC-OET65-RightHandSide-Tilt-GSM1900.da4

FCC-OET65-RightHandSide-Tilt-GSM1900-Low

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Right-Hand Side)

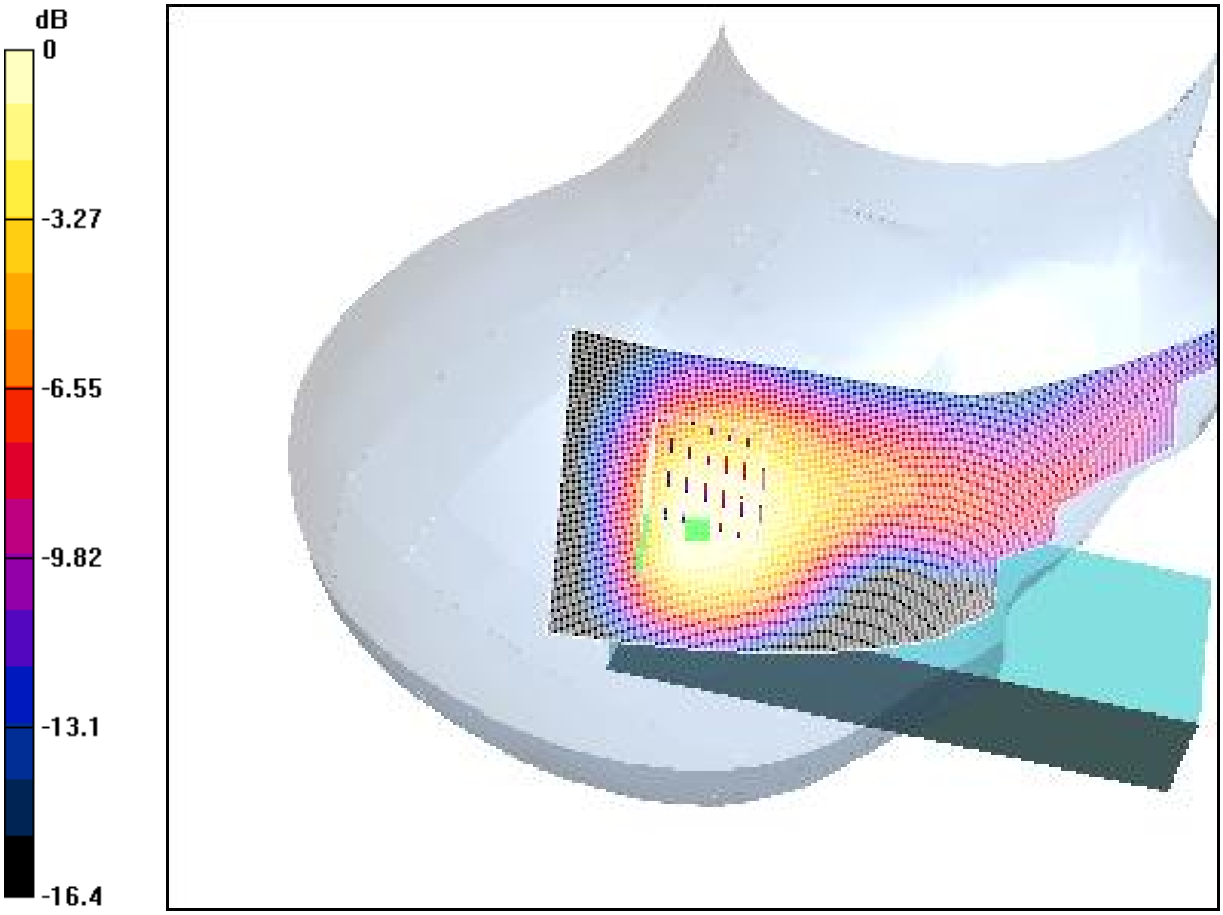
Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.41808 mho/m, ε_r = 40.5312, ρ = 1000 kg/m^3)
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilt position - Low/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.8 V/m
Power Drift = 0.002 dB
Maximum value of SAR = 0.4 mW/g

Tilt position - Low/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.484 W/kg
SAR(1 g) = 0.35 mW/g; SAR(10 g) = 0.221 mW/g
Reference Value = 16.8 V/m
Power Drift = 0.002 dB
Maximum value of SAR = 0.372 mW/g



0 dB = 0.372mW/g

4.11 FCC-OET65-RightHandSide-Tilt-GSM1900-Mid

Date/Time: 04/05/05 19:13:24

Test Laboratory: SGS-GSM
File Name: FCC-OET65-RightHandSide-Tilt-GSM1900.da4

FCC-OET65-RightHandSide-Tilt-GSM1900-Mid

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Right-Hand Side)

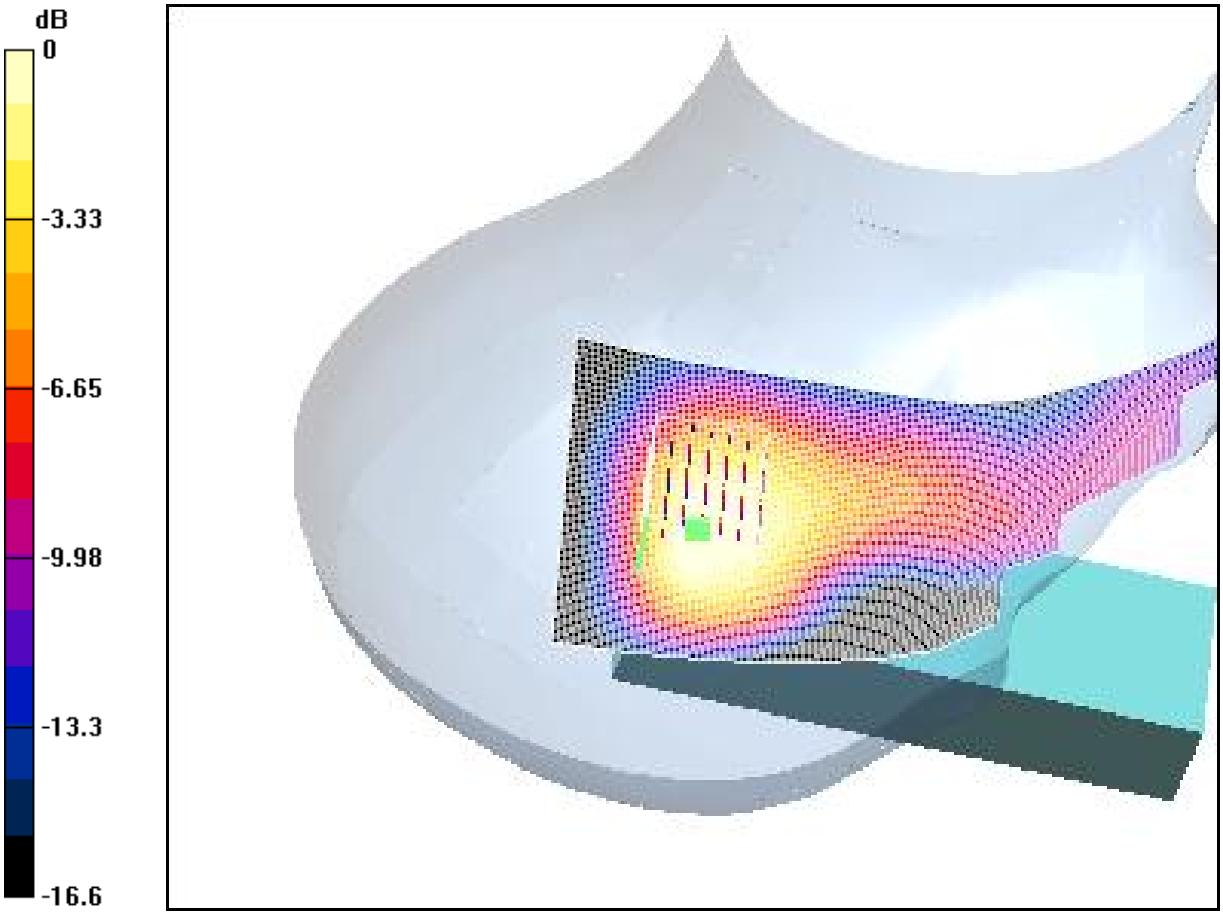
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.44443 mho/m, ε_r = 40.3239, ρ = 1000 kg/m^3)
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilt position - Middle/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.4 V/m
Power Drift = -0.3 dB
Maximum value of SAR = 0.415 mW/g

Tilt position - Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.503 W/kg
SAR(1 g) = 0.362 mW/g; SAR(10 g) = 0.226 mW/g
Reference Value = 17.4 V/m
Power Drift = -0.3 dB
Maximum value of SAR = 0.387 mW/g



0 dB = 0.387mW/g

4.12 FCC-OET65-RightHandSide-Tilt-GSM1900-High

Date/Time: 04/05/05 19:13:24

Test Laboratory: SGS-GSM
File Name: FCC-OET65-RightHandSide-Tilt-GSM1900.da4

FCC-OET65-RightHandSide-Tilt-GSM1900-High

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Right-Hand Side)

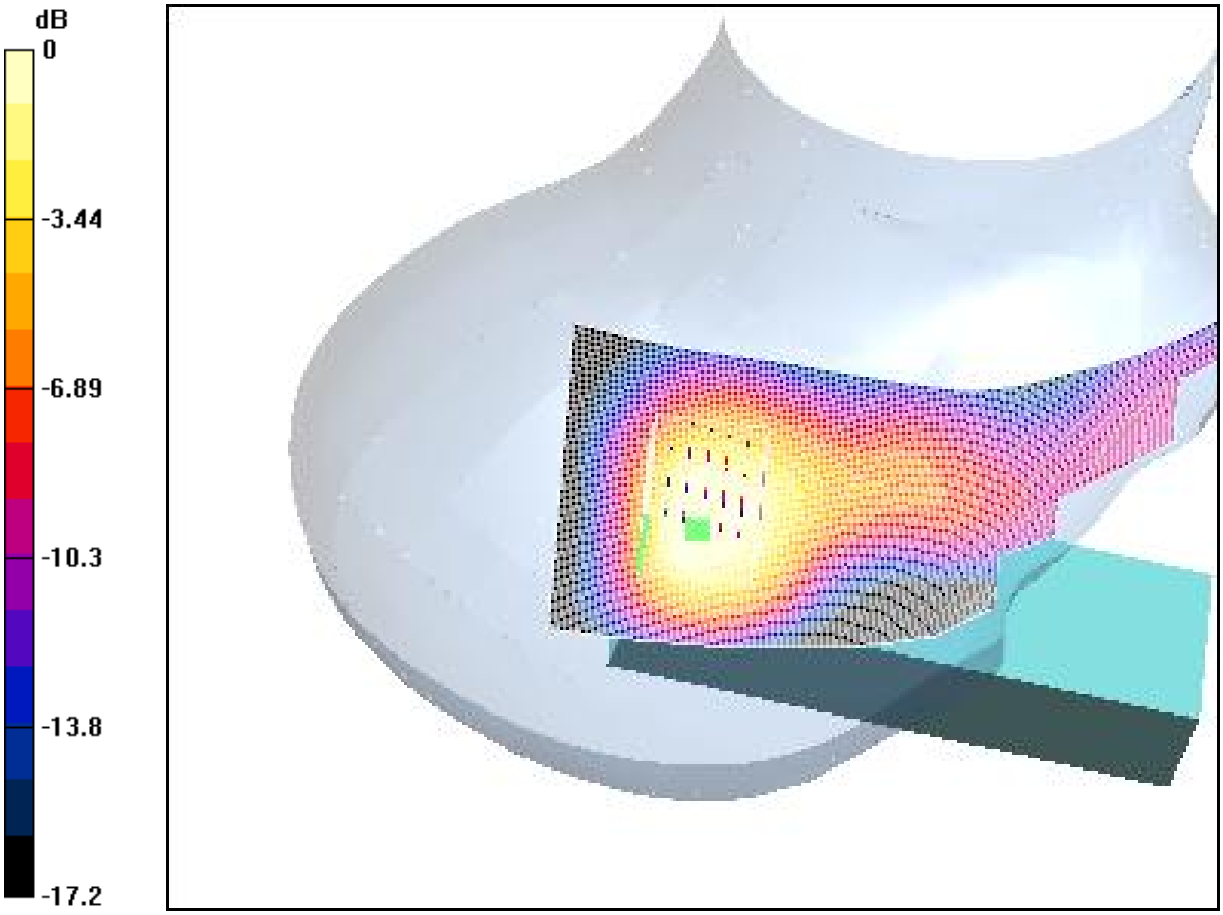
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.46824 mho/m, ε_r = 39.9929, ρ = 1000 kg/m^3)
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(5.25, 5.25, 5.25); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Tilt position - High/Area Scan (61x131x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.8 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.426 mW/g

Tilt position - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.499 W/kg
SAR(1 g) = 0.35 mW/g; SAR(10 g) = 0.215 mW/g
Reference Value = 16.8 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.379 mW/g



0 dB = 0.379mW/g

4.13 FCC-OET65-Body-Worn-GSM1900-Low

Date/Time: 04/06/05 21:56:41

Test Laboratory: SGS-GSM
File Name: FCC-OET65-Body-Worn-GSM1900.da4

FCC-OET65-Body-Worn-GSM1900-Low

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Body Worn)

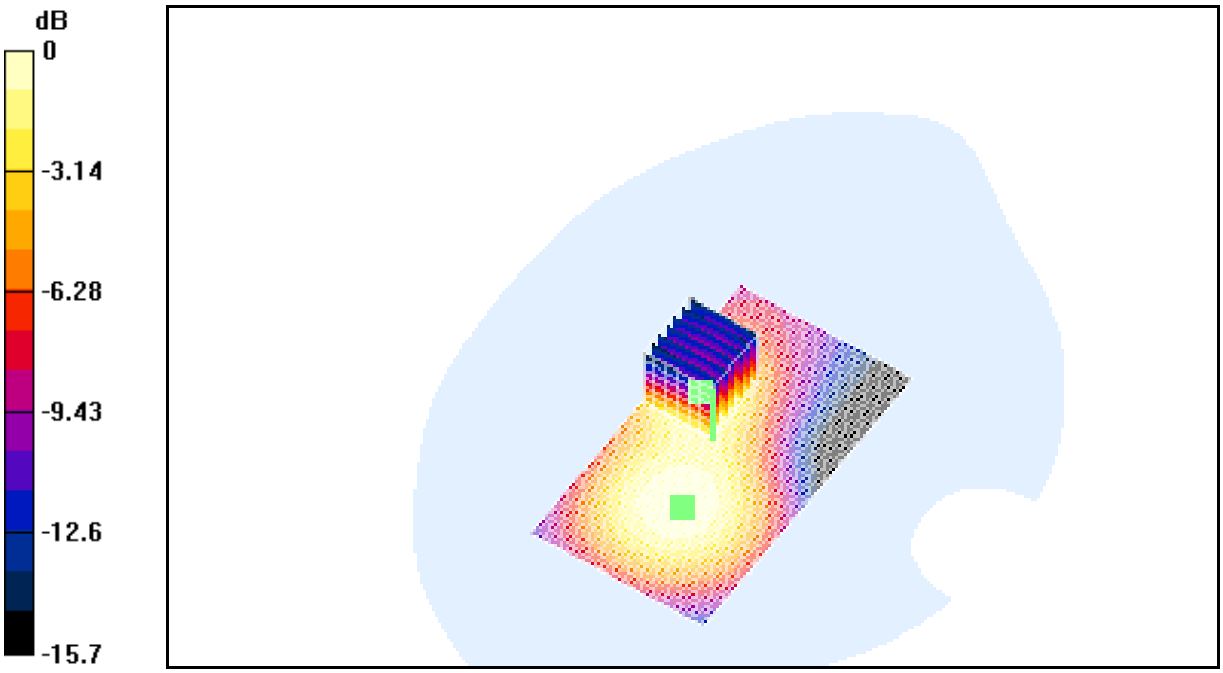
Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.48803 mho/m, ε_r = 51.6495, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(4.66, 4.66, 4.66); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Body Worn - Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 7.94 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.156 mW/g

Body Worn - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.217 W/kg
SAR(1 g) = 0.136 mW/g; SAR(10 g) = 0.0798 mW/g
Reference Value = 7.94 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.146 mW/g



0 dB = 0.146mW/g

4.14 FCC-OET65-Body-Worn-GSM1900-Mid

Date/Time: 04/06/05 21:56:41

Test Laboratory: SGS-GSM
File Name: FCC-OET65-Body-Worn-GSM1900.da4

FCC-OET65-Body-Worn-GSM1900-Mid

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Body Worn)

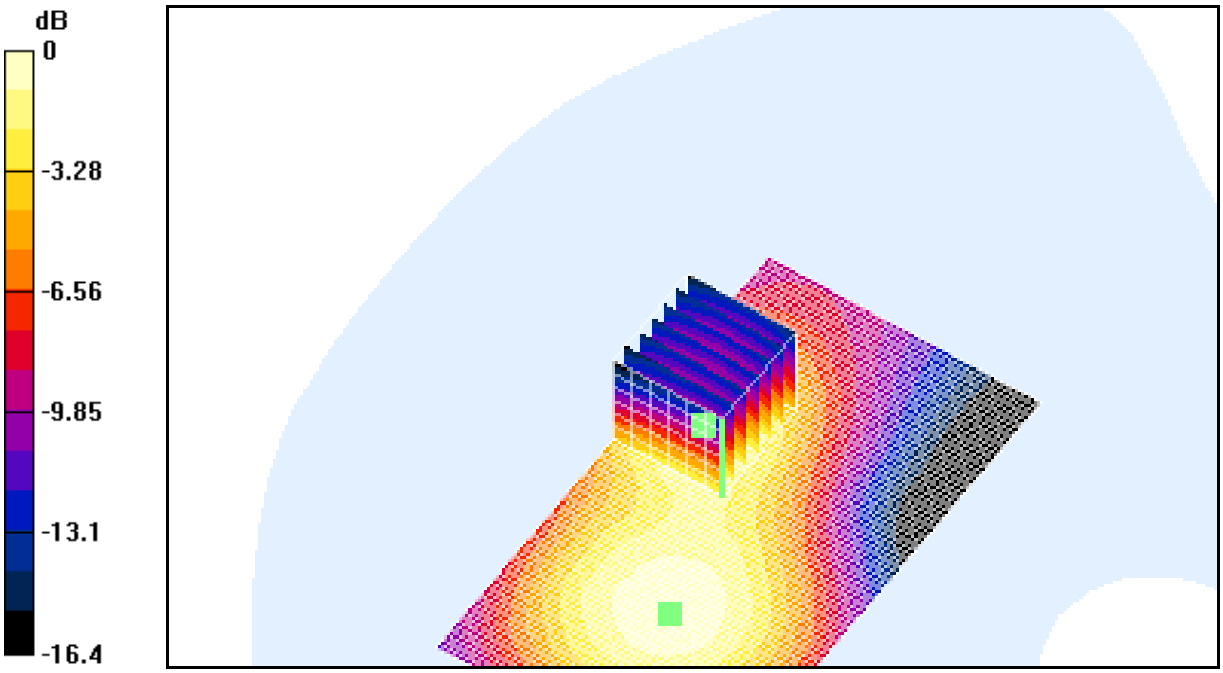
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.52127 mho/m, ε_r = 51.5237, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(4.66, 4.66, 4.66); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Body Worn - Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 7.75 V/m
Power Drift = 0.05 dB
Maximum value of SAR = 0.174 mW/g

Body Worn - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.259 W/kg
SAR(1 g) = 0.159 mW/g; SAR(10 g) = 0.0911 mW/g
Reference Value = 7.75 V/m
Power Drift = 0.05 dB
Maximum value of SAR = 0.171 mW/g



0 dB = 0.171mW/g

4.15 FCC-OET65-Body-Worn-GSM1900-High

Date/Time: 04/06/05 21:50:22

Test Laboratory: SGS-GSM
File Name: FCC-OET65-Body-Worn-GSM1900.da4

FCC-OET65-Body-Worn-GSM1900-High

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Body Worn)

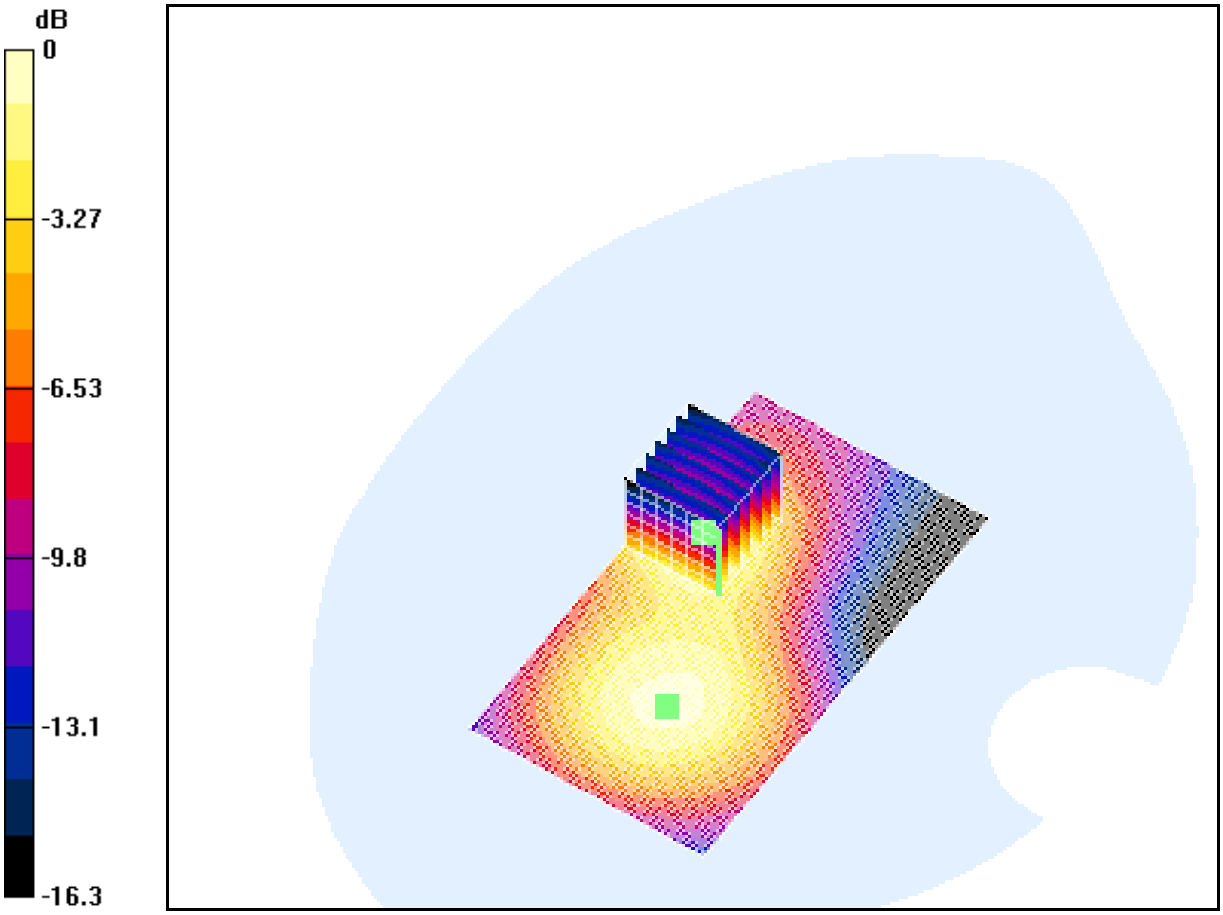
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium: HSL1900 (σ = 1.55344 mho/m, ε_r = 51.4693, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(4.66, 4.66, 4.66); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Body Worn - High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 7.78 V/m
Power Drift = -0.01 dB
Maximum value of SAR = 0.216 mW/g

Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.331 W/kg
SAR(1 g) = 0.2 mW/g; SAR(10 g) = 0.114 mW/g
Reference Value = 7.78 V/m
Power Drift = -0.01 dB
Maximum value of SAR = 0.214 mW/g



0 dB = 0.214mW/g

GPRS Mode

4.16 FCC-OET65-Body-Worn-GSM1900-GPRS-Low

Date/Time: 04/22/05 13:06:14

Test Laboratory: SGS-GSM
File Name: FCC-OET65-Body-Worn-GSM1900-GPRS-3.da4

FCC-OET65-Body-Worn-GSM1900-GPRS-Low

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Body Worn)

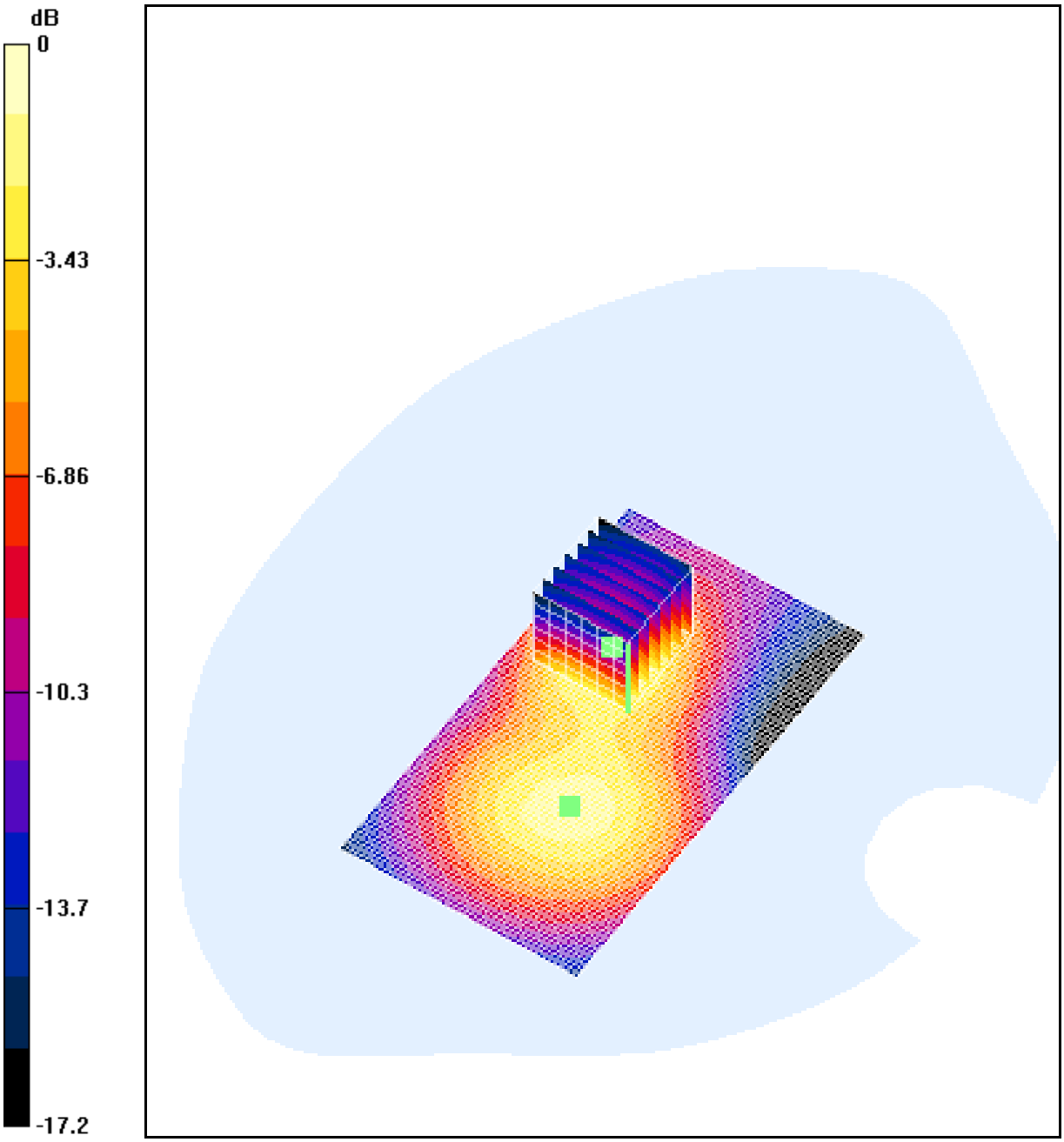
Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4
Medium: HSL1900 (σ = 1.48803 mho/m, ε_r = 51.6495, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(4.66, 4.66, 4.66); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Body Worn - Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 17.3 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.456 mW/g

Body Worn - Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.679 W/kg
SAR(1 g) = 0.405 mW/g; SAR(10 g) = 0.221 mW/g
Reference Value = 17.3 V/m
Power Drift = -0.03 dB
Maximum value of SAR = 0.443 mW/g



0 dB = 0.443mW/g

4.17 FCC-OET65-Body-Worn-GSM1900-GPRS-Mid

Date/Time: 04/22/05 13:06:14

Test Laboratory: SGS-GSM
File Name: FCC-OET65-Body-Worn-GSM1900-GPRS-3.da4

FCC-OET65-Body-Worn-GSM1900-GPRS-Mid

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Body Worn)

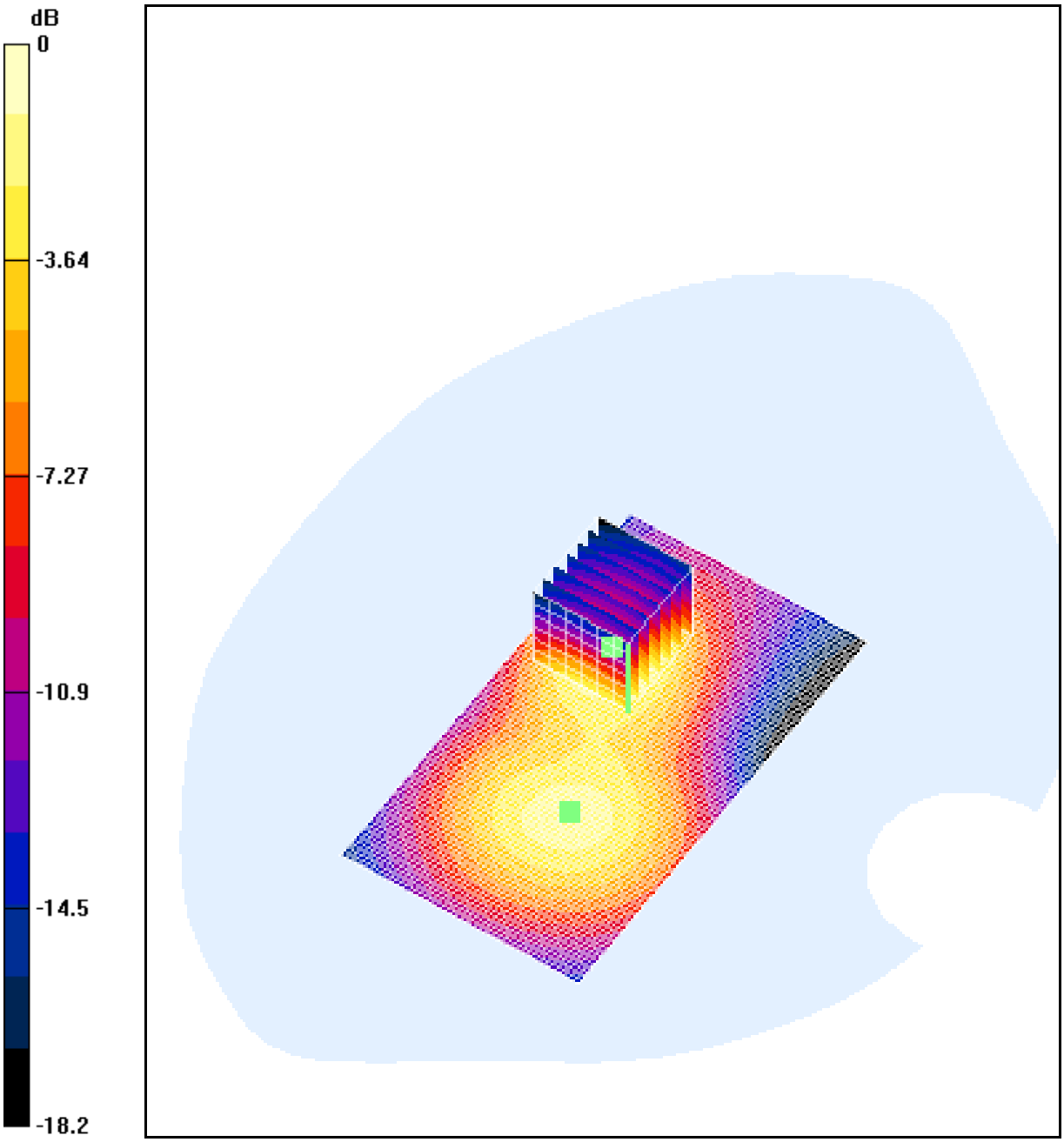
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: HSL1900 (σ = 1.52127 mho/m, ε_r = 51.5237, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(4.66, 4.66, 4.66); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Body Worn - Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16.5 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.518 mW/g

Body Worn - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.795 W/kg
SAR(1 g) = 0.461 mW/g; SAR(10 g) = 0.25 mW/g
Reference Value = 16.5 V/m
Power Drift = -0.02 dB
Maximum value of SAR = 0.503 mW/g



0 dB = 0.503mW/g

4.18 FCC-OET65-Body-Worn-GSM1900-GPRS-High

Date/Time: 04/22/05 13:06:14

Test Laboratory: SGS-GSM
File Name: FCC-OET65-Body-Worn-GSM1900-GPRS-3.da4

FCC-OET65-Body-Worn-GSM1900-GPRS-High

DUT: GSM500021; Type: FCC PCS1900; Serial: 20050331
Program: Compliance Testing: FCC OET65 Protocol (Body Worn)

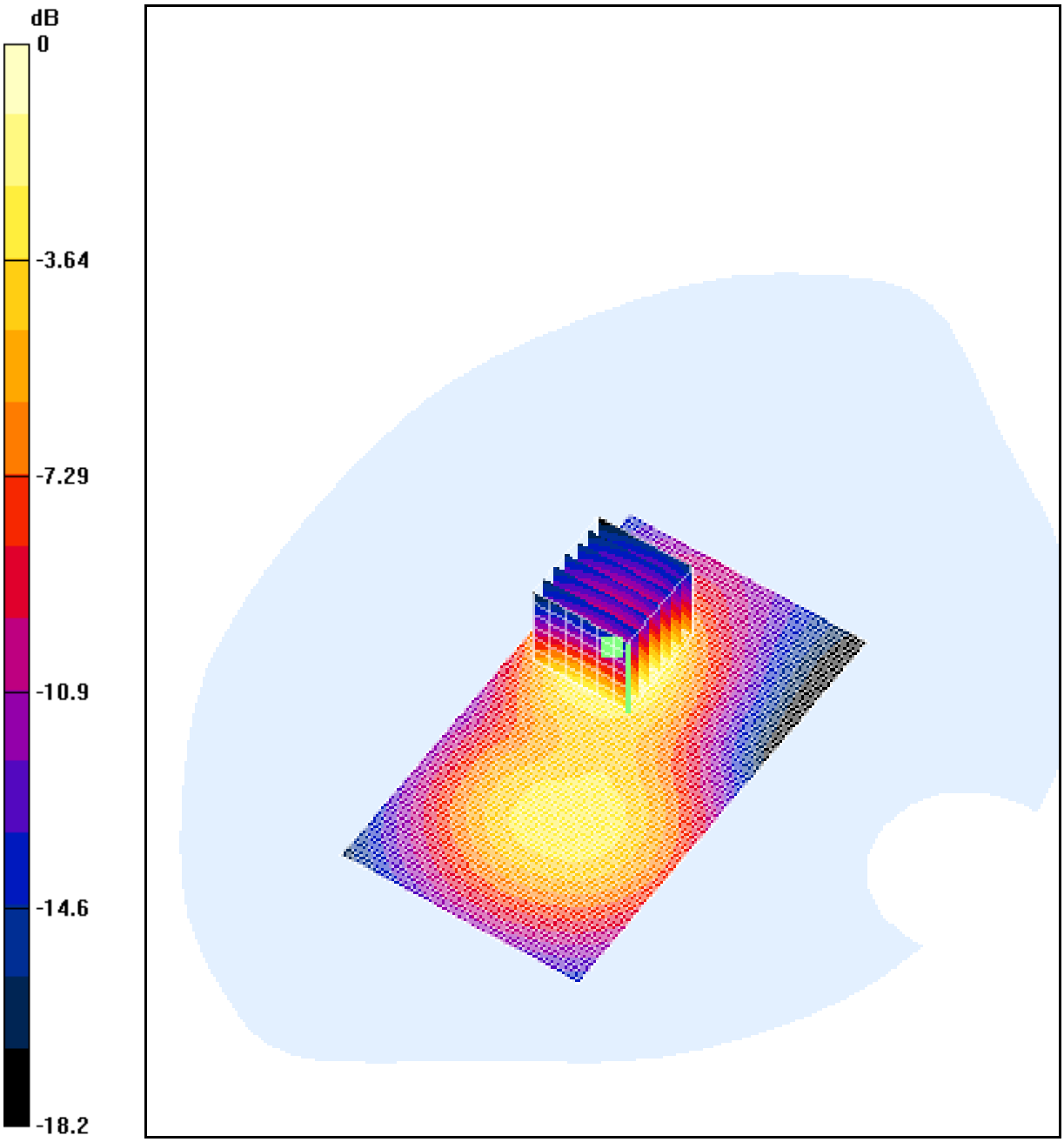
Communication System: DCS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:4
Medium: HSL1900 (σ = 1.55344 mho/m, ε_r = 51.4693, ρ = 1000 kg/m^3)
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1774; ConvF(4.66, 4.66, 4.66); Calibrated: 2004-10-26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn569; Calibrated: 2003-6-4
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1283
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Body Worn - High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 16 V/m
Power Drift = 0.03 dB
Maximum value of SAR = 0.656 mW/g

Body Worn - High/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.956 W/kg
SAR(1 g) = 0.563 mW/g; SAR(10 g) = 0.305 mW/g
Reference Value = 16 V/m
Power Drift = 0.03 dB
Maximum value of SAR = 0.614 mW/g



0 dB = 0.614mW/g

Appendix

1. Photographs of Test Setup

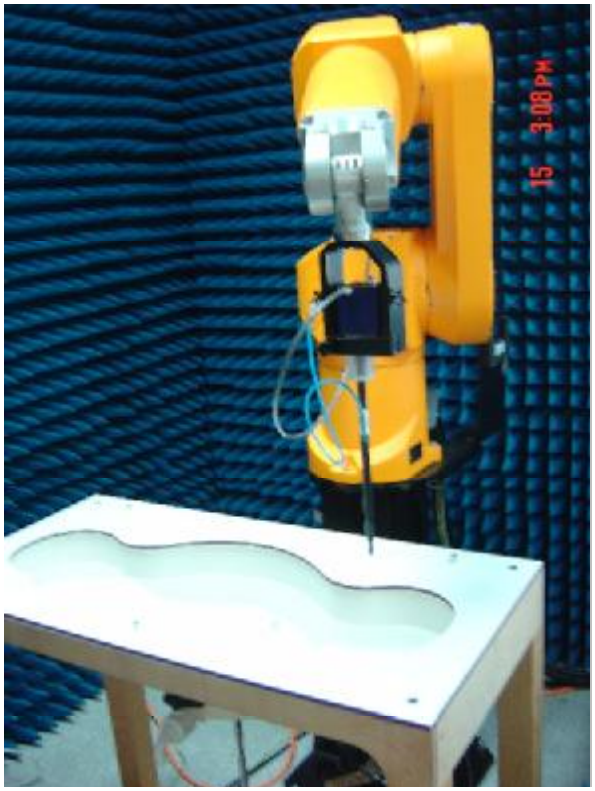


Fig.1 Photograph of the SAR measurement System

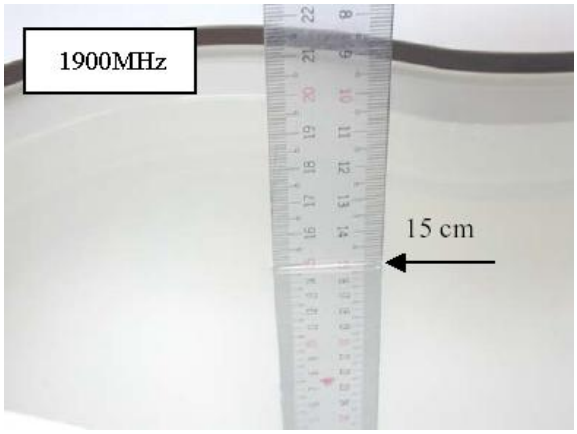


Fig.2 Photograph of the Tissue Simulant Fluid Fluid Liquid depth 15cm for Left-Head Side

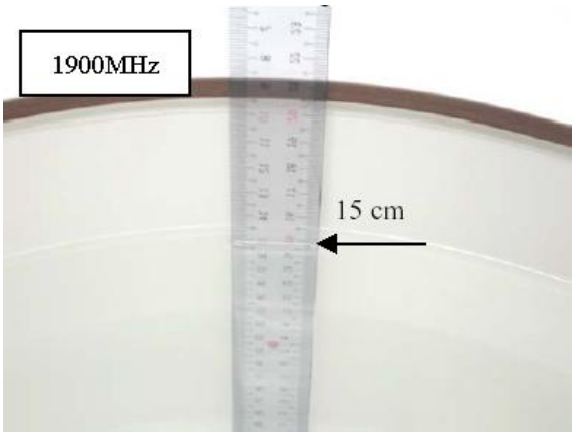


Fig.3 Photograph of the Tissue Simulant Liquid depth 15cm for Body-Worn

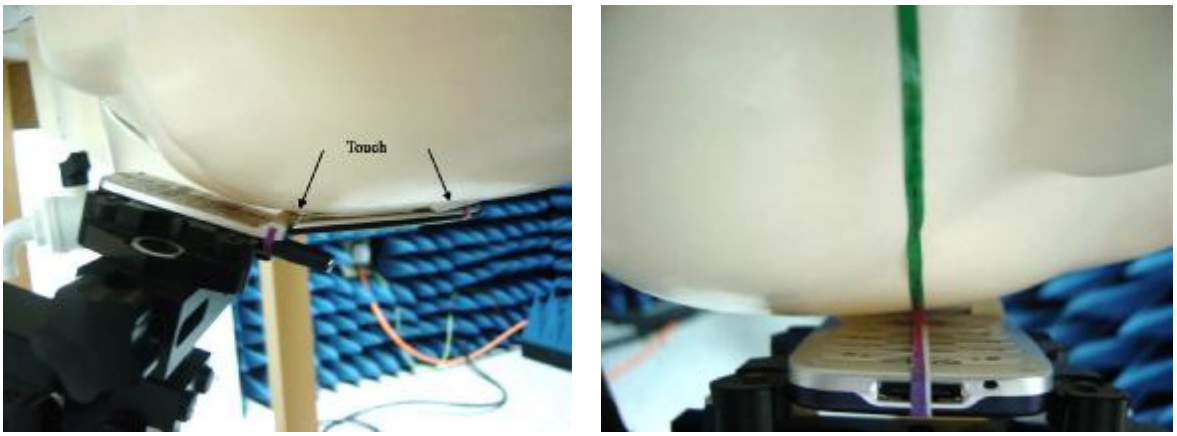


Fig.4 Photograph of the Left Hand Side Touch status

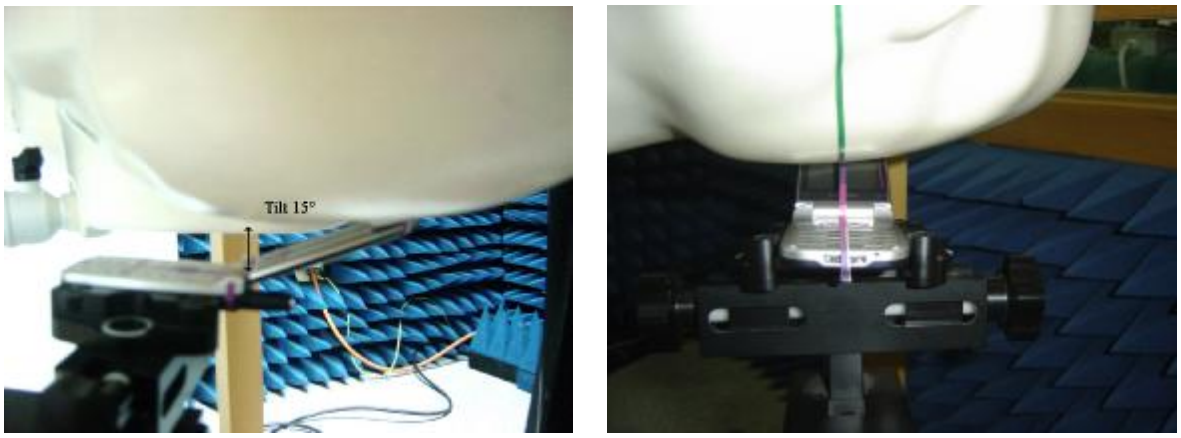


Fig.5 Photograph of the Left Hand Side Tilt status

Fig.6 Photograph of the Right Hand Side Touch status

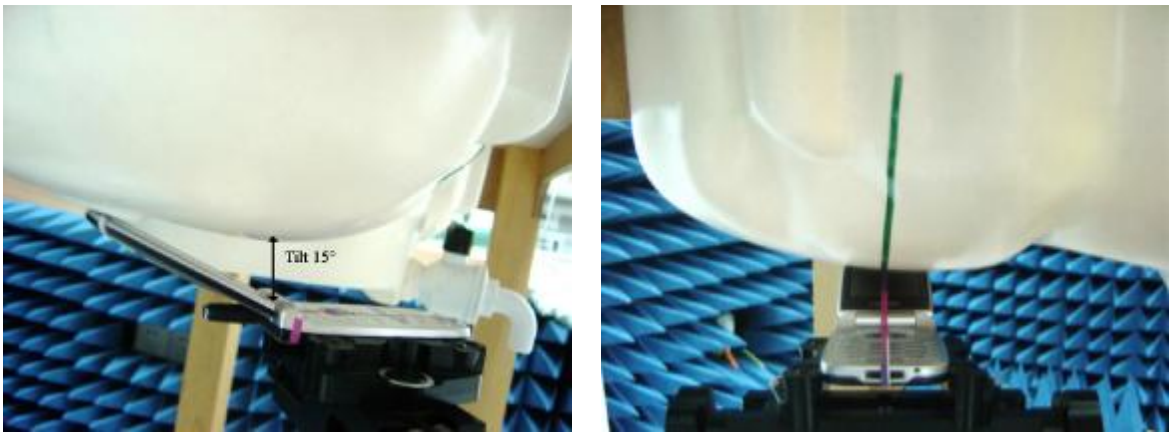


Fig.7 Photograph of the Right Hand Side Tilt status

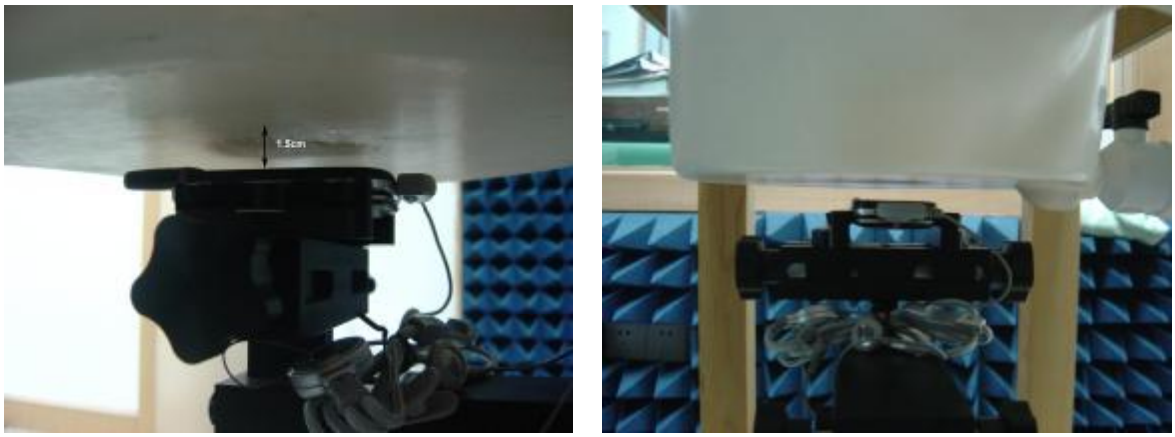


Fig.8 Photograph of the BodyWorn status in GSM Mode

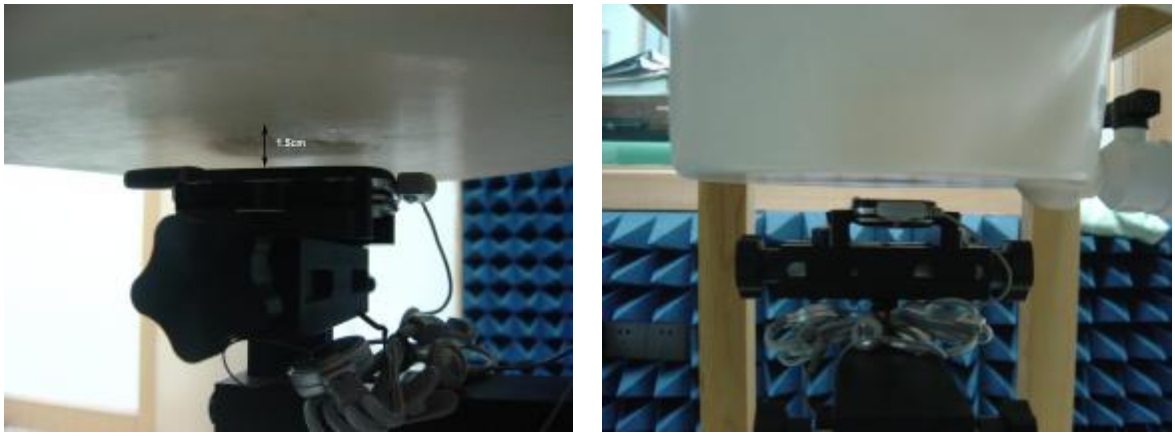


Fig.9 Photograph of the BodyWorn status in GPRS Mode

2. Photographs of the EUT

Fig.10 Front View

Fig.11 Back View

3. Photographs of the battery

Fig.12 Front view of battery

Fig.13 Back view of battery

4. Photograph of the charger

Fig.14 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
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 China (Auden)**

Certificate No: ET3-1774_Oct04

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1774
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	October 26, 2004
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	5-May-04 (METAS, No. 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No. 251-00388)	May-05
Reference 3 dB Attenuator	SN: S5054 (3c)	3-Apr-03 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-04 (METAS, No. 251-00389)	May-05
Reference 30 dB Attenuator	SN: S5129 (30b)	3-Apr-03 (METAS, No. 251-00404)	Aug-05
Reference Probe ES3DV2	SN:3013	8-Jan-04 (SPEAG, No. ES3-3013_Jan04)	Jan-05
DAE4	SN: 617	26-May-04 (SPEAG, No. DAE4-617_May04)	May-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
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-03)	In house check: Nov 04

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

Issued: October 28, 2004

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

Probe ET3DV6

SN:1774

Manufactured:	April 15, 2003
Last calibrated:	May 23, 2003
Repaired:	October 18, 2004
Recalibrated:	October 26, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1774 **October 26, 2004**

DASY - Parameters of Probe: ET3DV6 SN:1774

Sensitivity in Free Space[A]

NormX	**1.92** ± 9.9%	$\mu V/(V/m)^2$	DCP X	**93** mV
NormY	**1.80** ± 9.9%	$\mu V/(V/m)^2$	DCP Y	**93** mV
NormZ	**1.72** ± 9.9%	$\mu V/(V/m)^2$	DCP Z	**93** mV

Diode Compression[B]

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		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	8.8	4.6
SAR_{be} [%]	With Correction Algorithm	0.7	0.1

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	12.5	8.3
SAR_{be} [%]	With Correction Algorithm	0.7	0.1

Sensor Offset

Probe Tip to Sensor Center **2.7** 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%.

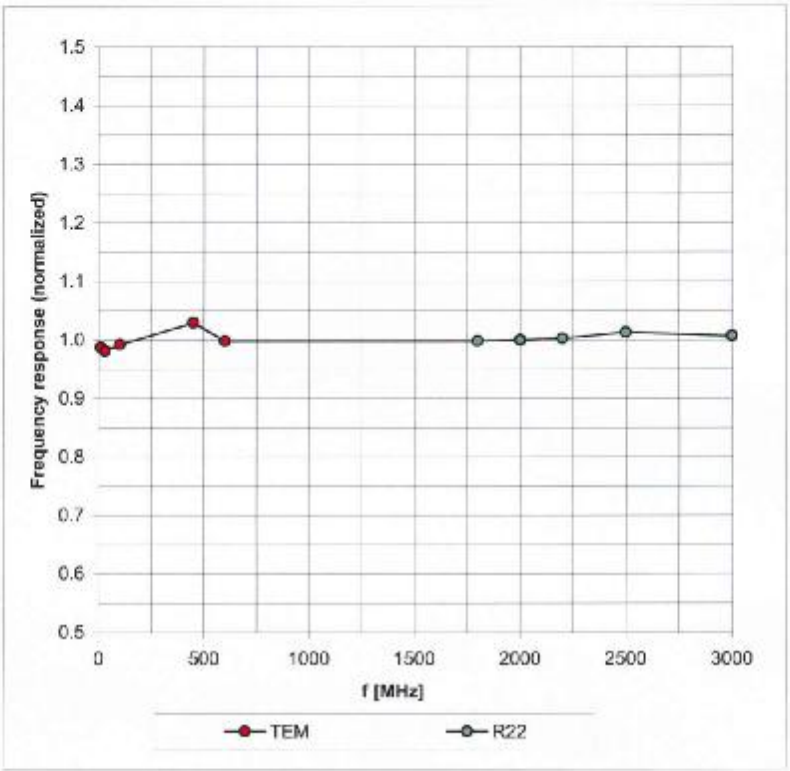
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1774 **October 26, 2004**

Frequency Response of E-Field

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

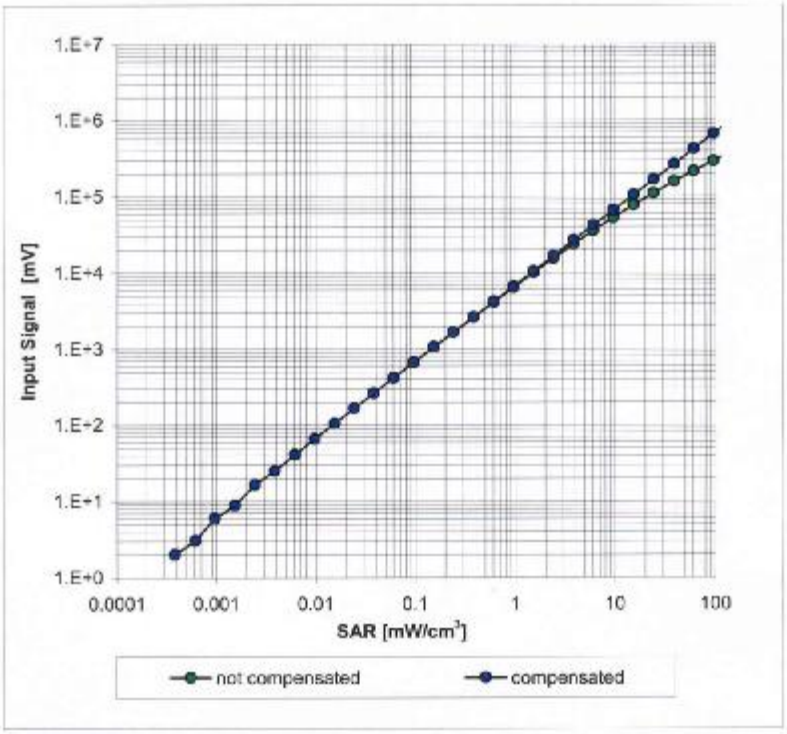


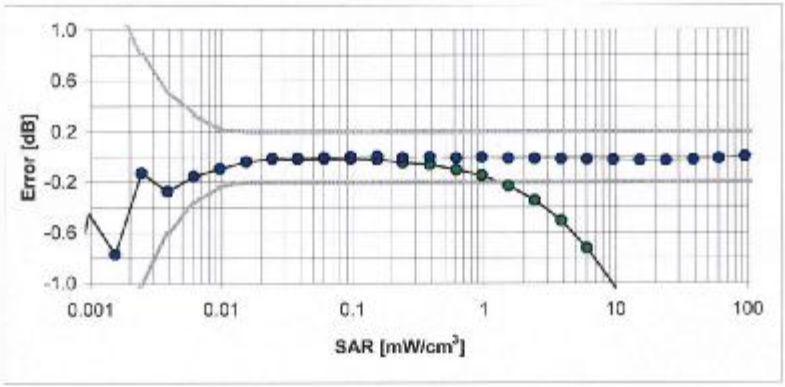
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1774 **October 26, 2004**

Dynamic Range f(SAR_{head})

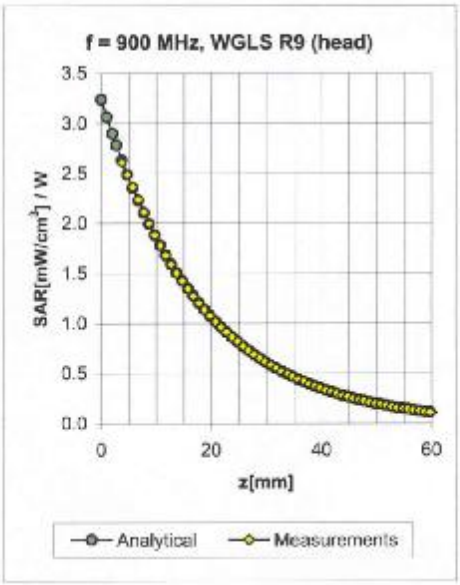
(Waveguide R22, f = 1800 MHz)

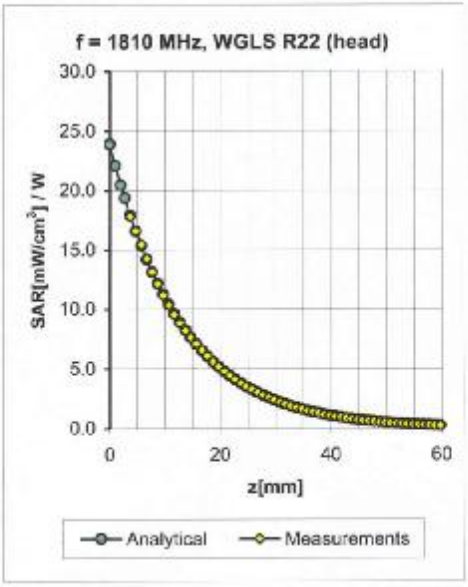




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment





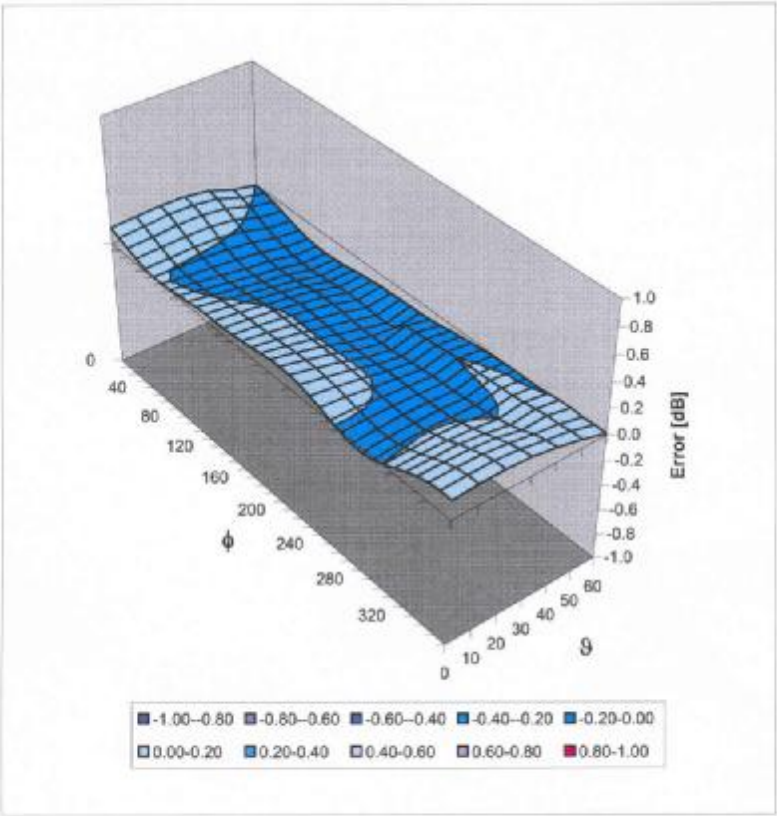
f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	1.13	1.42	6.98 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	1.09	1.46	6.61 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.58	2.31	5.48 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.54	2.52	5.25 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.63	2.30	4.70 ± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.96	1.58	6.65 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	1.00	1.57	6.36 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.81	4.79 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.98	4.66 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.62	2.18	4.35 ± 11.8% (k=2)

[c] The validity of ± 100 MHz only applies for DASY 4.3 B17 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.

ET3DV6 SN:1774 October 26, 2004

Deviation from Isotropy in HSL

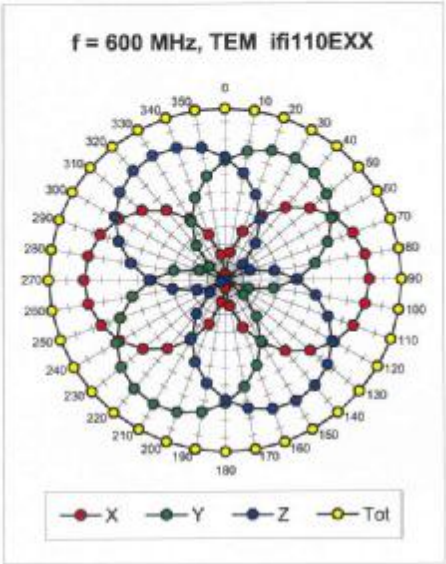
Error (ϕ, ϑ), f = 900 MHz

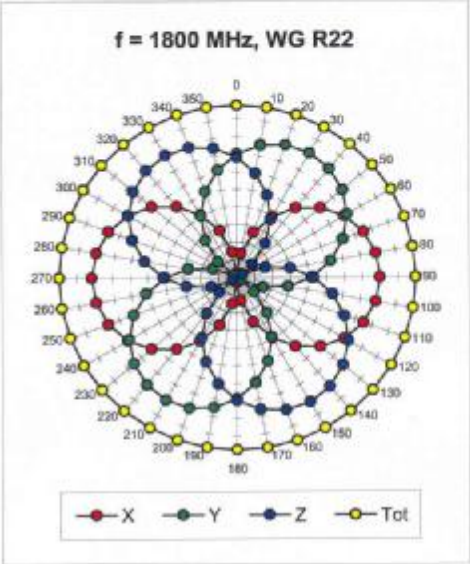


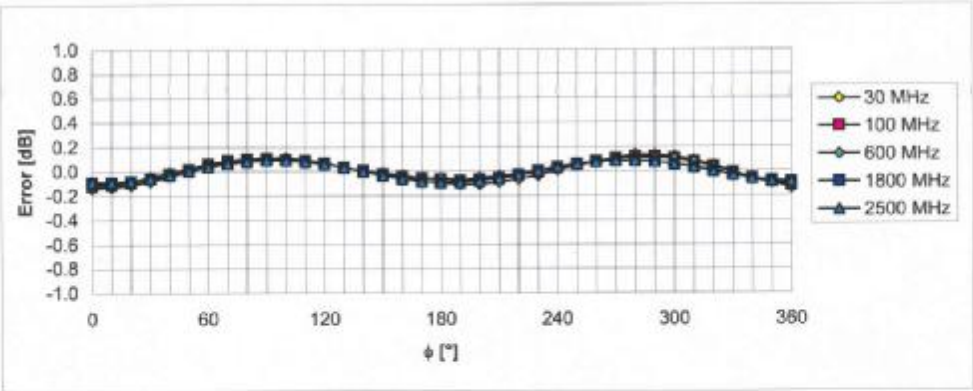
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

ET3DV6 SN:1774 October 26, 2004

Receiving Pattern (ϕ), ϑ = 0°







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

6. Uncertainty analysis

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

Dasy4 Uncertainty Budget

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

F. Bomholt

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

Doc No 881 – QD 000 P40 CA – B Page 1 (1)

The end