Sony Ericsson

Company Internal
REPORT

Prepared (also subject responsible if other)		No.		
BA/SEM/BGLINS *Rob Carr*		*BGLI07:455.*		
Approved	Checked	Date	Rev	Reference
LD/SEMC/BGLI/NC Peter Lindeborg	*PL*	*070904*	A	File

Report issued by Accredited SAR Laboratory

For

PY7A1022092 (Z250i)

Date of test: 28, 29 August, 2007

Laboratory: Sony Ericsson SAR Test Laboratory
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Statement of Compliance
Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

Sony Ericsson Type : AAB-1022092-BV; FCC ID : PY7A1022092; IC:4170B-A1022092

To which this declaration relates, is in conformity with the appropriate RF exposure standards recommendations and guidelines. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:
(None)

This laboratory is accredited to ISO/IEC 17025 (SWEDAC accreditation no. 1847).

SWEDAC ACKREDITERING 1847 ISO/IEC 17025

Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. The accredited laboratory activities meet the requirements in SS-EN ISO/IEC 17025 (2005). This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.
The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

Sony Ericsson encourages all feedback, both positive and negative, on this report.
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1 Introduction

In this test report, compliance of the Sony Ericsson PY7A1022092 (Z250i) portable telephone with RF safety guidelines is demonstrated. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in the *SAR Measurement Specifications of Wireless Handsets* [1].

2 Device Under Test

2.1 Antenna Description

Type	Built in	
Location	Base of lower clamshell	
Dimensions	Max length	13mm
	Max width	38mm
	Max height	7mm
Configuration	Monopole	

2.2 Device description

Device model	PY7A1022092 (Z250i)	
Serial number	BX8000GS4B (#8775)	
Mode	GSM1900	GPRS1900 1TX
Multiple Access Scheme	TDMA	TDMA
Output Power Setting (dBm)	fl fm fh 30.5 30.5 30.4	fl fm fh 30.5 30.5 30.4
Factory Tolerance in Power Setting (dB)	±0.5	±0.5
Maximum Peak Output Power (dBm) 1524 production data limits	fl fm fh 30.5 30.5 30.5	fl fm fh 30.5 30.5 30.5
Crest Factor	8	8
Transmitting Frequency Range(MHz)	1850.2 – 1909.8	1850.2 – 1909.8
Prototype or Production Unit	Pre-Production HW -FP1.4	
Device Category	Portable	
RF exposure environment	General population / uncontrolled	

3 Test equipment

3.1 Dosimetric system

SAR measurements were made using the DASY4 professional system (software version 4.7, Built 44) with SAM twin phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The list of calibrated equipment is given below.

Description	***Serial Number***	***Due Date***
DASY4 DAE3	448	25-09-2007
E-field probe ET3DV6	1610	17-11-2007
Dipole Validation Kit, D1900V2	539	12-12-2008

3.2 Additional equipment

Description	***Inventory Number***	***Due Date***
Signal generator R&S SMY 02	3.094	24-04-08
Directional coupler HP778D	15.233	None
Power meter R&S NRVD	4.073	24-04-08
Power sensor R&S NRV-Z5	4.074	24-04-08
Power sensor R&S NRV-Z5	4.076	24-04-08
Network analyzer Agilent 8719D	2.022	23-04-08
Dielectric probe kit HP8507C	14.046	Self Cal
R&S CMU200	20010943	06-11-07

4 Electrical parameters on the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with the dielectric probe kit. These values are shown in the table below. The mass density, ρ, entered into the DASY software is also given. Recommended parameters for permittivity ε_r, conductivity σ and mass density ρ are also shown.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		Density
			ε_r	σ (S/m)	ρ (g/cm³)
1900	Head	Measured, 28/08/2007	38.12	1.47	1.00
		Recommended	40.0	1.40	1.00
1900	Body	Measured, 29/08/2007	53.96	1.59	1.00
		Recommended	53.3	1.52	1.00

5 System accuracy verification

A system accuracy verification of the DASY4 was performed using the dipole validation kits listed in section 3.1. The dipole was supplied with 24dBm power at 1900MHz. The system verification test was conducted on the same day as the measurement of the DUT. Measurements were made at an ambient temperature of 22-23 °C and a humidity of (41-43) %. The obtained results are displayed in the table below.

RF noise had been measured in the liquid when all RF equipment in lab was switched off. Measured value was 0.00000289 mW/g in 1g mass.

f (MHz)	Liquid	Measured / Reference	SAR (W/kg) 1g	Dielectric Parameters			Liquid t(°C)
				ε_r	σ (S/m)	ρ (g/cm³)	
1900	Head	Measured, 28/08/2007	36.6	38.1	1.47	1.00	22
		Reference	35.9	40.0	1.40	1.00	21.2
1900	Body	Measured, 29/08/2007	37.4	54	1.59	1.00	21.5
		Reference	37.0	53.3	1.52	1.00	21.6

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6 SAR measurement uncertainty

DASY4 SAR measurement uncertainty evaluation for Sony Ericsson PY7A1022092 phone According to IEEE 1528

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C_i	1g mass
Measurement System					
Probe Calibration	±5.9	N	1	1	±5.9
Axial Isotropy	±4.7	R	√3	0.7	±1.9
Spherical Isotropy	±9.6	R	√3	0.7	±3.9
Boundary effect	±1.0	R	√3	1	±0.6
Probe linearity	±4.7	R	√3	1	±2.7
Detection limit	±1.0	R	√3	1	±0.6
Readout electronics	±0.3	N	1	1	±0.3
Response time	±0.8	R	√3	1	±0.5
Integration time	±2.6	R	√3	1	±1.5
RF Ambient Conditions	±3.0	R	√3	1	±1.7
Mech. Constraints of robot	±0.4	R	√3	1	±0.2
Probe positioning	±2.9	R	√3	1	±1.7
Extrap, interpolation and integration	±1.0	R	√3	1	±0.6
Measurement System Uncertainty					*±8.4*
Test Sample Related					
Device positioning	±3.5	N	1	1	±3.5
Device holder uncertainty	±3.5	N	1	1	±3.5
Power drift	±5.0	R	√3	1	±2.9
Test Sample Related Uncertainty					*±5.5*
Phantom and Tissue Parameters					
Phantom uncertainty	±4.0	R	√3	1	±2.3
Liquid conductivity (measured)	±2.5	R	1	0.64	±1.6
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8
Liquid Permittivity (measured)	±2.5	R	1	0.6	±1.5
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7
Phantom and Tissue Parameters Uncertainty					*±4.1*
Combined standard uncertainty					*±10.8*
Extended standard uncertainty (k=2)					***±21.6***

7 Test results

The measured 1-gram averaged SAR values of the device towards the head and body are provided in Table 1 and Table 2. The ambient humidity and temperature of test facility were (41.8-43) % and (22–23) °C respectively. The depth of the head and body tissue simulating liquids were greater than 15.5cm. A base station simulator was used to control the device during the SAR measurements. The phone was supplied with a fully-charged battery for each measurement. For head measurement, the device was tested on the right-hand phantom and the left-hand phantom in two different phones position, cheek (touch) and tilt (cheek + 15deg). For all modes, the device was tested at the lowest, middle and highest frequencies in the transmission band.

For body measurements the phone was tested in speech and data mode when the phone's antenna (Back) was towards the flat section of the phantom, with a 15mm separation distance. For speech mode a Sony Ericsson portable hands free HBH-DS970 was used.

Mode	Channel	Power (dBm)	Phone Position	Liquid t (°C)	SAR (W/kg)	
					Right-hand	Left-hand
					1g mass	1g mass
1900 GSM	512	30.5	Cheek	22.0	0.58	0.60
			Tilt	22.0	-	-
	661	30.0	Cheek	22.0	0.62	0.74
			Tilt	22.0	0.31	0.25
	810	30.4	Cheek	22.0	0.65	0.76
			Tilt	22.0	-	-

Table1: Head SAR measurement results for Sony Ericsson PY7A1022092 telephone at highest possible output power.

Mode	Channel	Power (dBm)	Phone Position	Liquid t (°C)	SAR (W/kg) in 1 g mass
1900 GSM	512	30.5	Antenna to phantom, speech PHF	21.5	0.393
		30.5	Antenna to phantom, data GPRS 1SI	21.5	0.416
	661	30.5	Antenna to phantom, speech PHF	21.5	0.396
		30.5	Antenna to phantom, data GPRS 1SI	21.5	0.444
		30.5	Antenna Face down, data GPRS 1SI	21.5	0.046
	810	30.4	Antenna to phantom, speech PHF	21.5	0.365
		30.4	Antenna to phantom, data GPRS 1SI	21.5	0.432

Table2: Body SAR measurement results for Sony Ericsson PY7A1022092 telephone at highest possible output power.

8 References

[1] R.Plicanic, “SAR Measurement Specification of Wireless Handsets”, Sony Ericsson SAR Test Laboratory internal document GUG/N 03:141

[2] FCC, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio Frequency Emissions,” Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97- 01).

[3] IEEE, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques,” Std 1528-2003, June, 2003.

[4] IEC, “Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz,” Std. 62209-1, February, 2005.

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9 Appendix

9.1 Photographs of the device under test

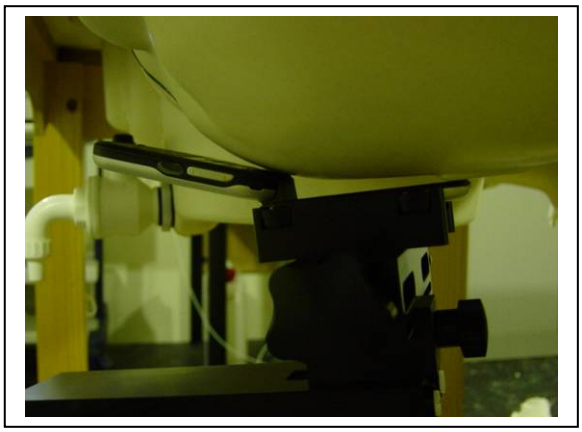
Front & Back

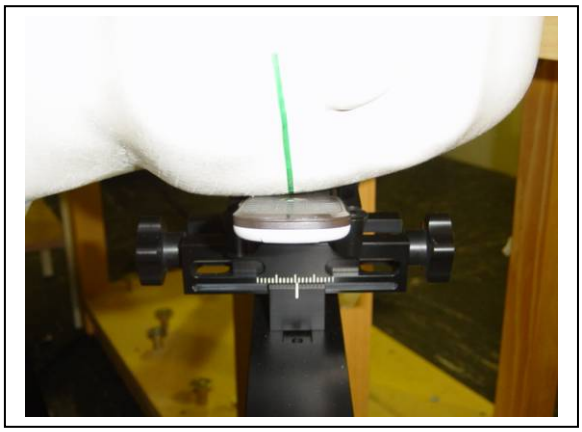
Sides

Back side with battery

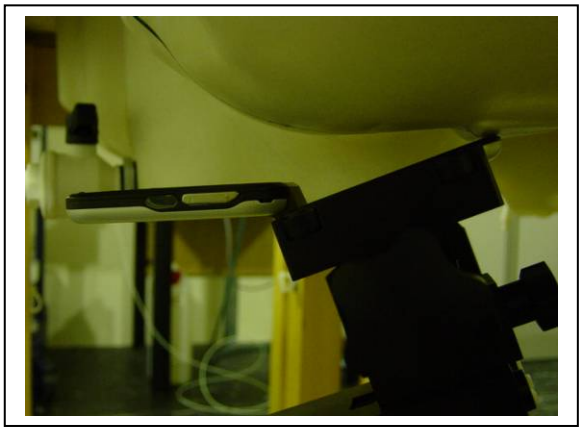
Top and Bottom

9.2 Device position on SAM Twins Phantom





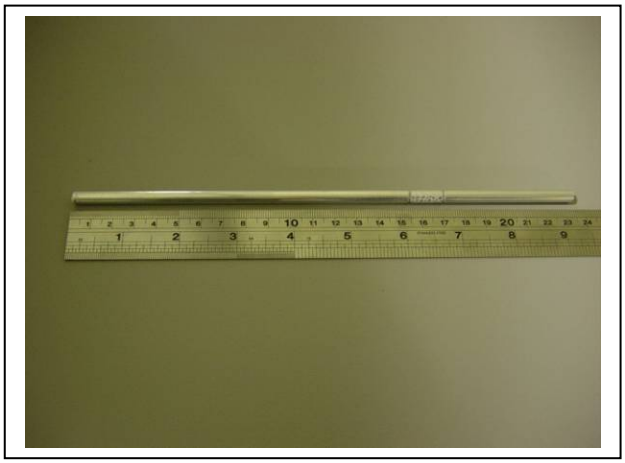
Device position against the head: Cheek (touch) phone position

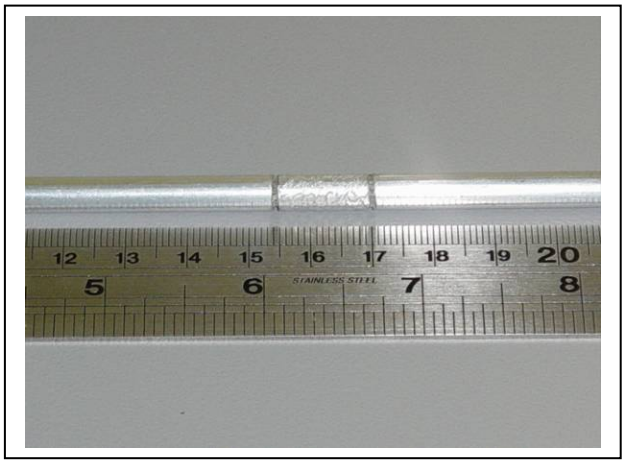


Device position against the head: Tilt (cheek+15deg) phone position

Device position against the body: 15mm distance from Phantom.

9.3 Photographs of TSL Fluid Depths





Pictures to show depth gauge used for measuring TSL depth.
Note: The low end of the scale is a depth of 15.5 cm.

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1900 Head

1900 Body

Pictures showing Phantom fluid depths.

Date/Time: 8/28/2007 11:21:58 AM

Test Laboratory: Sony Ericsson Mobile Communications International AB

1900HeadSystemperformance280807

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

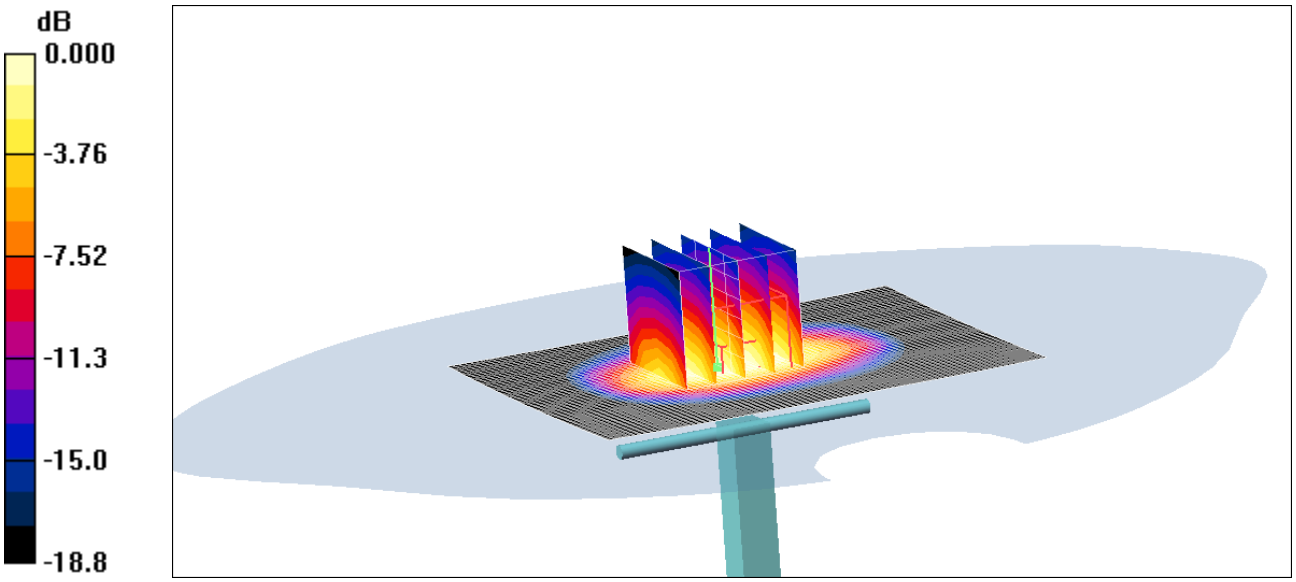
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.23, 5.23, 5.23); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.1 mW/g

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 89.2 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 15.3 W/kg
SAR(1 g) = 9.16 mW/g; SAR(10 g) = 4.85 mW/g
Maximum value of SAR (measured) = 10.1 mW/g



0 dB = 10.1mW/g

Date/Time: 8/29/2007 9:53:57 AM

Test Laboratory: Sony Ericsson Mobile Communications International AB

1900BodySystemperformance290807

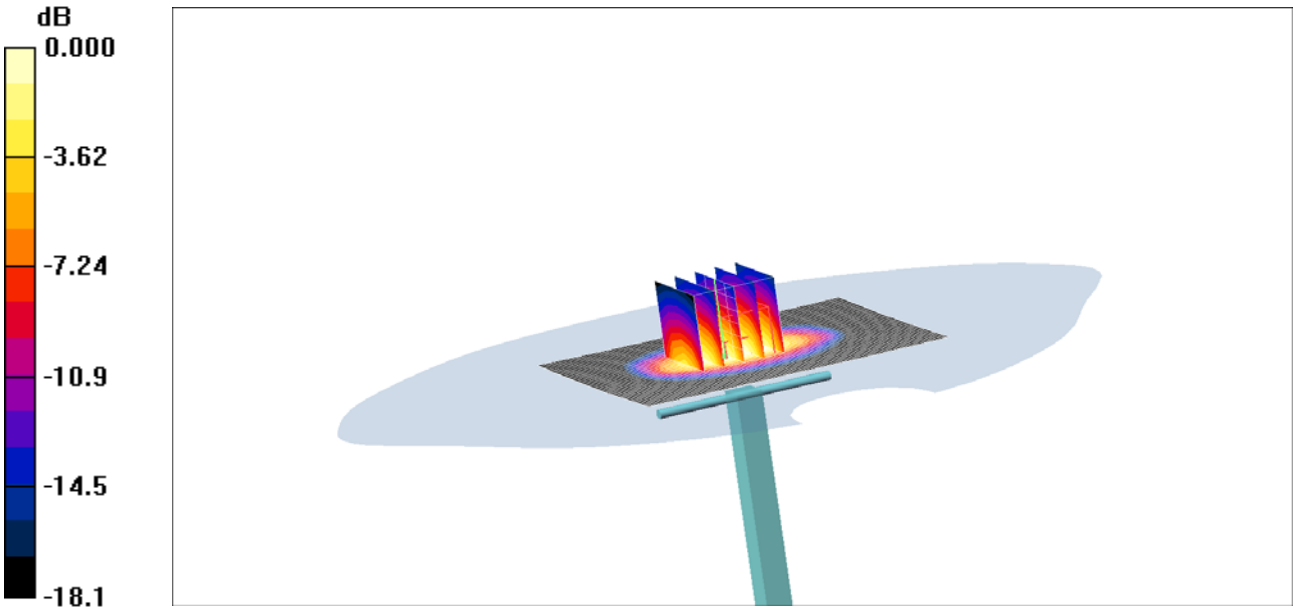
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(4.71, 4.71, 4.71); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.1 mW/g
d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 85.8 V/m; Power Drift = 0.083 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 9.35 mW/g; SAR(10 g) = 4.96 mW/g
Maximum value of SAR (measured) = 10.4 mW/g



0 dB = 10.4mW/g

Date/Time: 8/28/2007 1:00:24 PM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-LeftHandSide-GSM1900-Touch Middle

DUT: Anabel; Type: DUT; Serial: #8775

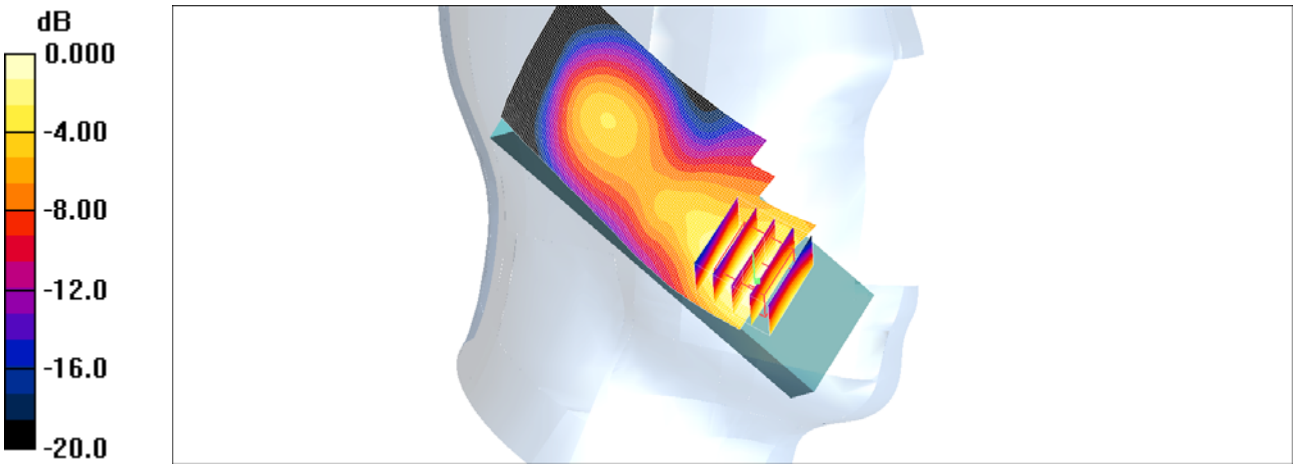
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.23, 5.23, 5.23); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Touch position - Middle/Area Scan (71x131x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.807 mW/g

Touch position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.4 V/m; Power Drift = -0.119 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.744 mW/g; SAR(10 g) = 0.460 mW/g
Maximum value of SAR (measured) = 0.830 mW/g



0 dB = 0.830mW/g

Date/Time: 8/28/2007 2:08:57 PM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-LeftHandSide-GSM1900-Tilt Middle

DUT: Anabel; Type: DUT; Serial: #8775

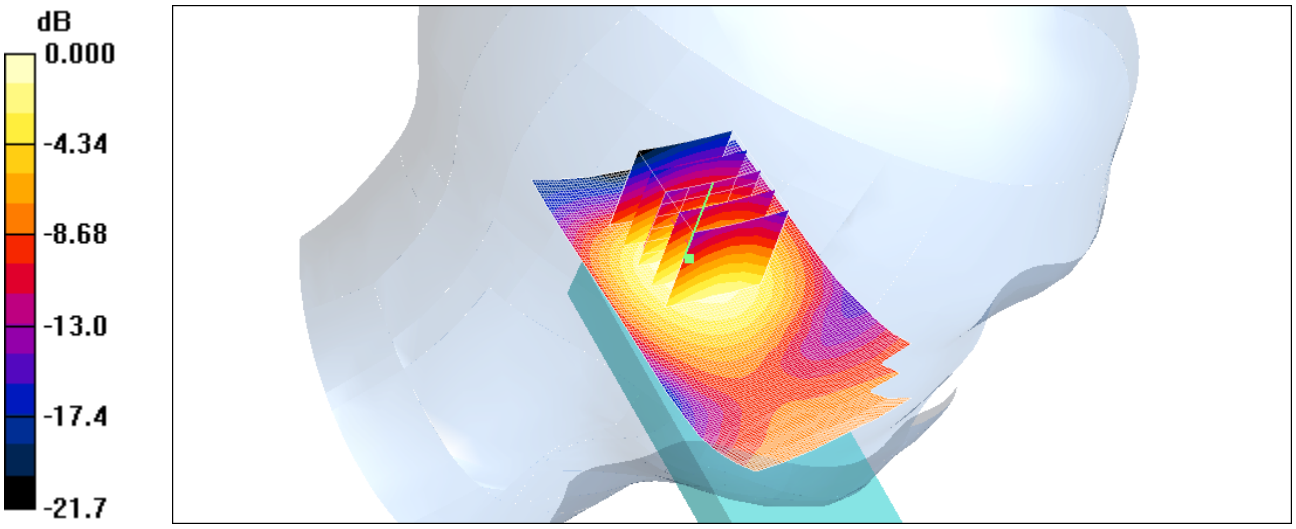
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.23, 5.23, 5.23); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Tilt position - Middle/Area Scan (71x131x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.284 mW/g

Tilt position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.1 V/m; Power Drift = 0.134 dB
Peak SAR (extrapolated) = 0.374 W/kg
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.153 mW/g
Maximum value of SAR (measured) = 0.271 mW/g



0 dB = 0.271mW/g

Date/Time: 8/28/2007 2:37:46 PM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-RightHandSide-GSM1900-Middle Touch

DUT: Anabel; Type: DUT; Serial: #8775

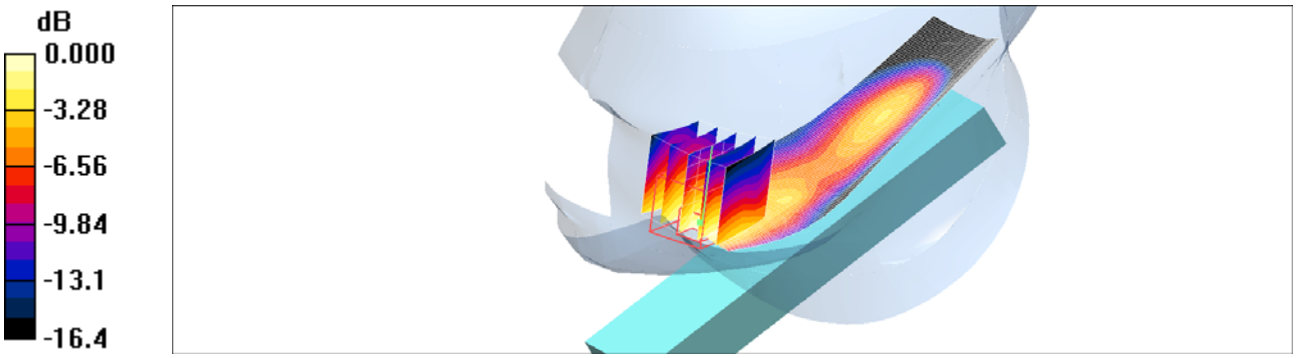
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.23, 5.23, 5.23); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Touch position - Middle/Area Scan (71x131x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.672 mW/g

Touch position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 0.866 W/kg
SAR(1 g) = 0.621 mW/g; SAR(10 g) = 0.385 mW/g
Maximum value of SAR (measured) = 0.667 mW/g



0 dB = 0.667mW/g

Date/Time: 8/28/2007 3:37:40 PM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-RightHandSide-GSM1900-Middle Tilt

DUT: Anabel; Type: DUT; Serial: #8775

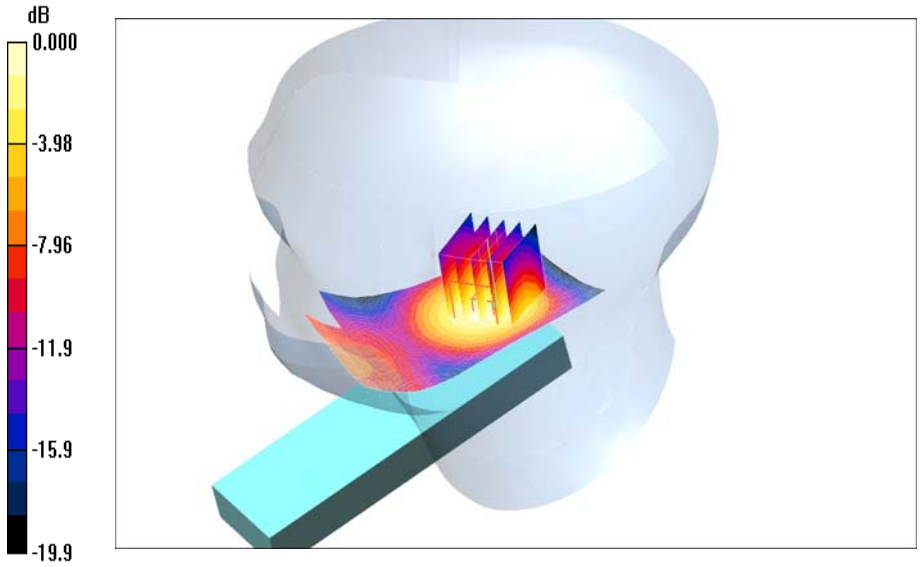
Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.23, 5.23, 5.23); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Tilt position - Middle/Area Scan (71x131x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.337 mW/g

Tilt position - Middle/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.1 V/m; Power Drift = 0.107 dB
Peak SAR (extrapolated) = 0.445 W/kg
SAR(1 g) = 0.309 mW/g; SAR(10 g) = 0.185 mW/g
Maximum value of SAR (measured) = 0.330 mW/g



0 dB = 0.330mW/g

Date/Time: 8/29/2007 1:25:01 PM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-Body15mm-Front-GPRS-CH661-GSM1900

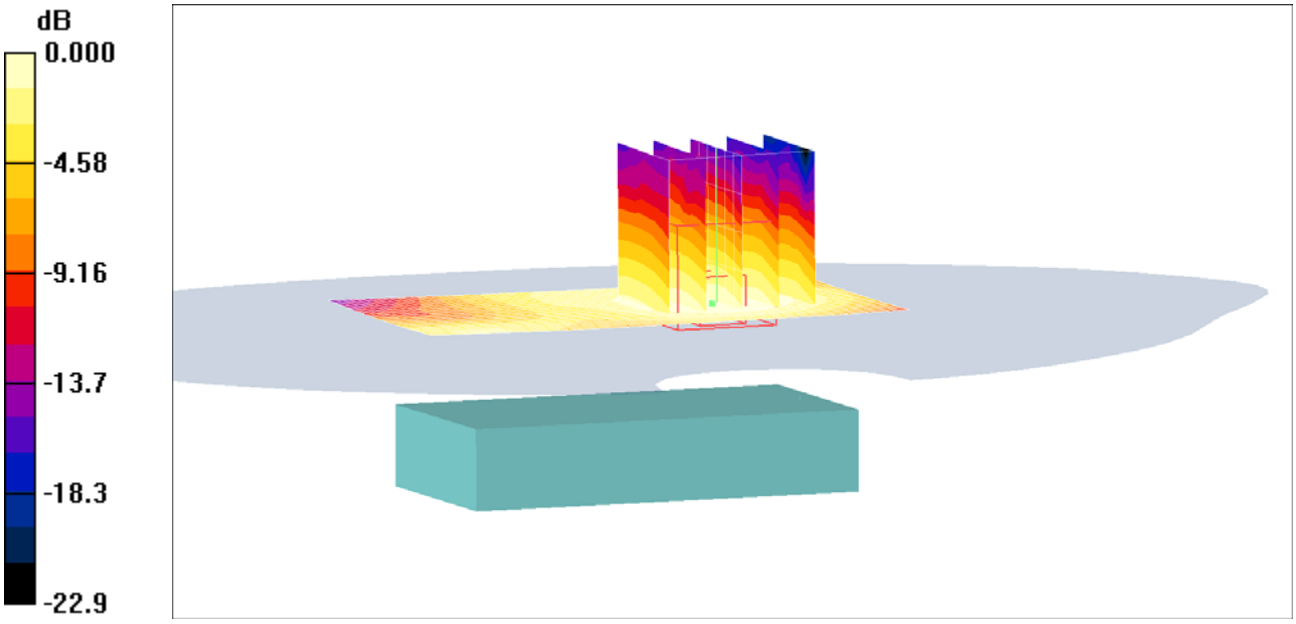
DUT: Anabel; Type: DUT; Serial: #8775

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(4.71, 4.71, 4.71); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Body Front/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.049 mW/g
Body Front/Zoom Scan (7x5x5)/Cube 0: Measurement grid: dx=5mm, dy=8mm, dz=8mm
Reference Value = 4.50 V/m; Power Drift = 0.056 dB
Peak SAR (extrapolated) = 0.071 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.028 mW/g
Maximum value of SAR (measured) = 0.050 mW/g



0 dB = 0.050mW/g

Date/Time: 8/29/2007 11:48:03 AM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-Body15mm-GPRS-GSM1900-Middle

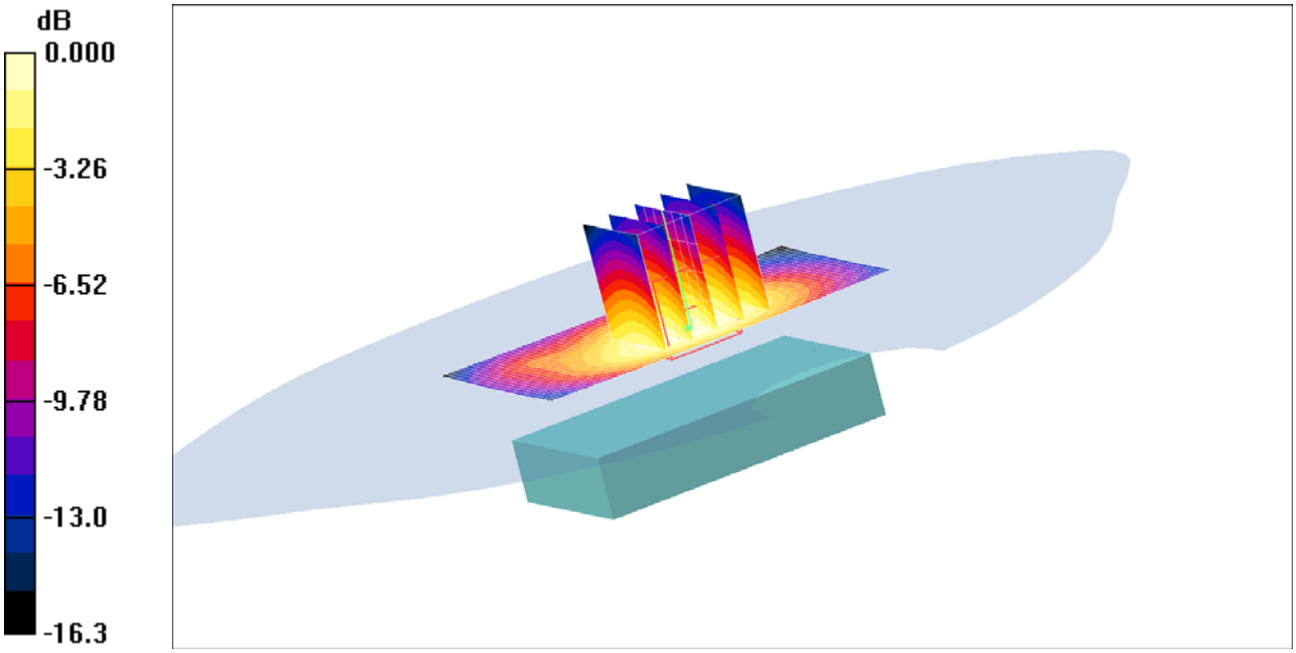
DUT: Anabel; Type: DUT; Serial: #8775

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(4.71, 4.71, 4.71); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Body 2/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.502 mW/g
Body 2/Zoom Scan (7x5x5)/Cube 0: Measurement grid: dx=5mm, dy=8mm, dz=8mm
Reference Value = 17.5 V/m; Power Drift = -0.090 dB
Peak SAR (extrapolated) = 0.637 W/kg
SAR(1 g) = 0.444 mW/g; SAR(10 g) = 0.284 mW/g
Maximum value of SAR (measured) = 0.482 mW/g



0 dB = 0.482mW/g

Date/Time: 8/29/2007 11:03:41 AM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Anabel900-Body15mm-PHF-GSM1900-Middle

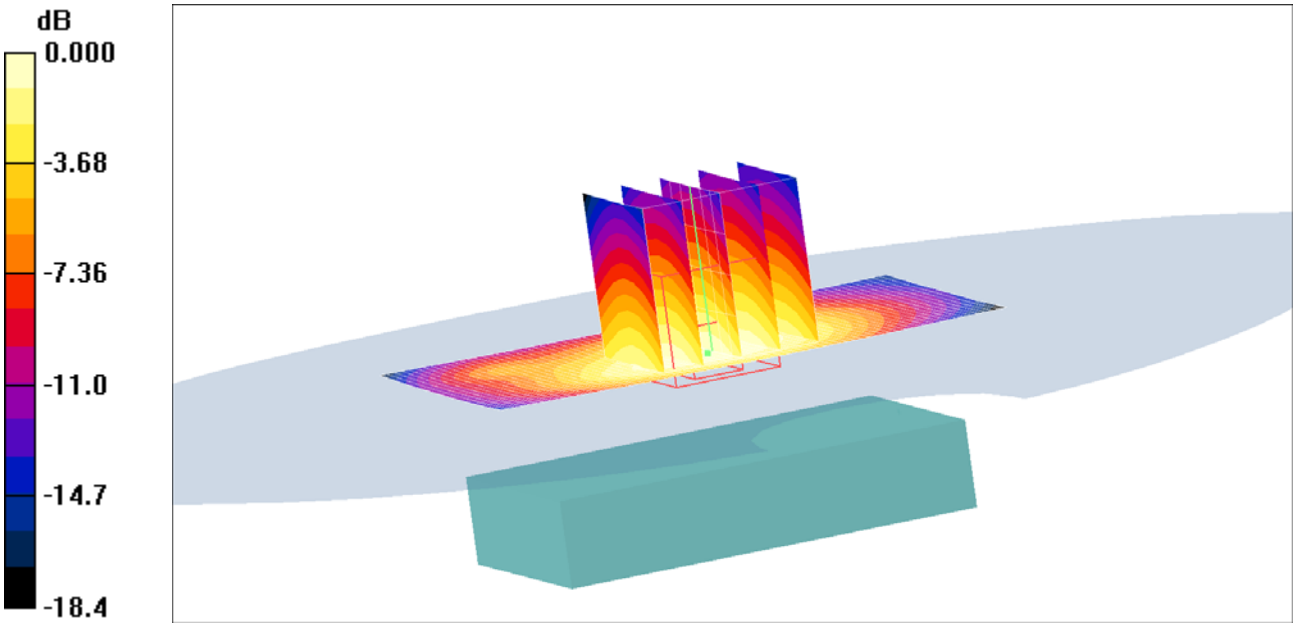
DUT: Anabel; Type: DUT; Serial: #8775

Communication System: DCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(4.71, 4.71, 4.71); Calibrated: 11/17/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 9/25/2006
- Phantom: SAM-1; Type: SAM; Serial: 1231
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Body 2/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.446 mW/g
Body 2/Zoom Scan (7x5x5)/Cube 0: Measurement grid: dx=5mm, dy=8mm, dz=8mm
Reference Value = 16.5 V/m; Power Drift = -0.113 dB
Peak SAR (extrapolated) = 0.572 W/kg
SAR(1 g) = 0.396 mW/g; SAR(10 g) = 0.252 mW/g
Maximum value of SAR (measured) = 0.430 mW/g



0 dB = 0.430mW/g

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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 Ericsson UK

Certificate No: D1900V2-539_Dec06

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 539
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	December 12, 2006
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN: 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
Reference Probe ES3DV3	SN: 3025	19-Oct-06 (SPEAG, No. ES3-3025_Oct06)	Oct-07
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

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

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 13, 2006

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

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan Resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature during test	(21.2 ± 0.2) °C	----	----

.

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.18 mW / g
SAR normalized	normalized to 1W	36.7 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**35.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.85 mW / g
SAR normalized	normalized to 1W	19.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**19.1 mW / g ± 16.5 % (k=2)**

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

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature during test	(21.6 ± 0.2) °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.49 mW / g
SAR normalized	normalized to 1W	38.0 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**37.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.05 mW / g
SAR normalized	normalized to 1W	20.2 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**19.8 mW / g ± 16.5 % (k=2)**

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.1 Ω + 0.9 jΩ
Return Loss	- 27.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.0 Ω + 2.7 jΩ
Return Loss	- 30.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 26, 2001

DASY4 Validation Report for Head TSL

Date/Time: 11.12.2006 17:13:38

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

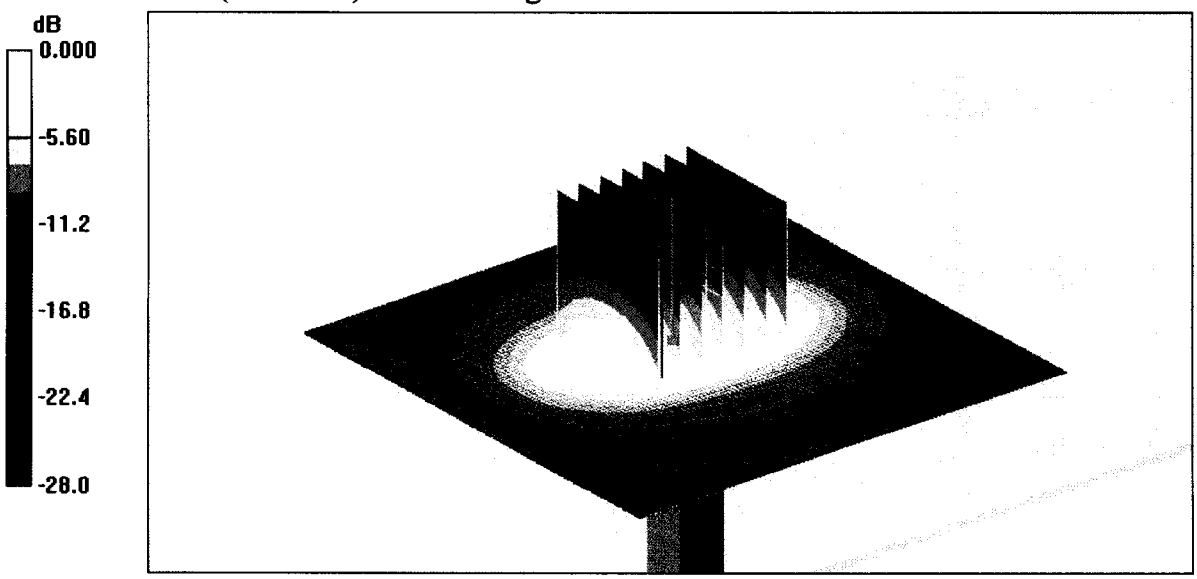
- Probe: ET3DV6 - SN1507 (HF); ConvF(4.97, 4.97, 4.97); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm/Area Scan (101x101x1):

Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.3 mW/g

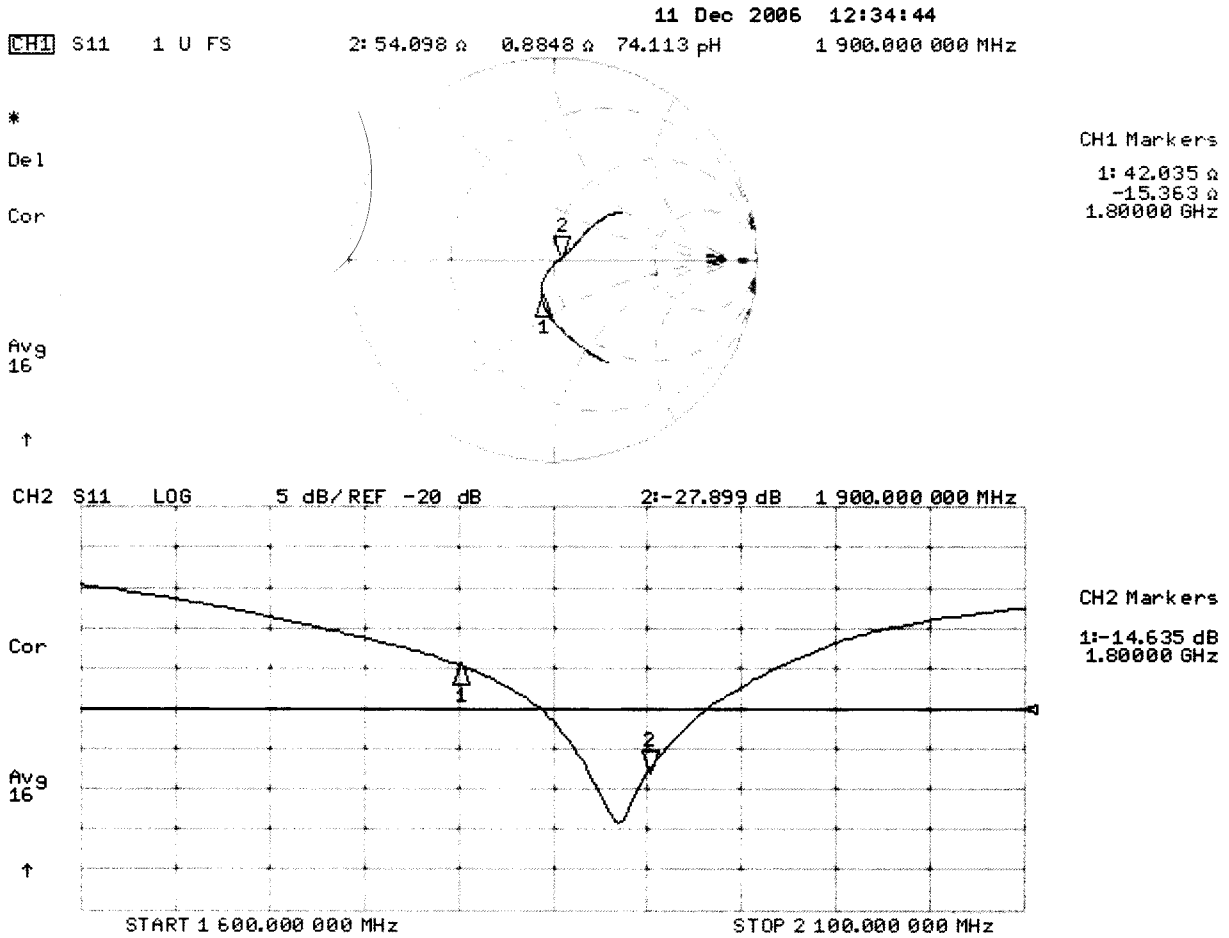
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.4 V/m; Power Drift = 0.045 dB
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 9.18 mW/g; SAR(10 g) = 4.85 mW/g
Maximum value of SAR (measured) = 10.5 mW/g



0 dB = 10.5mW/g

Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 12.12.2006 15:22:28

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

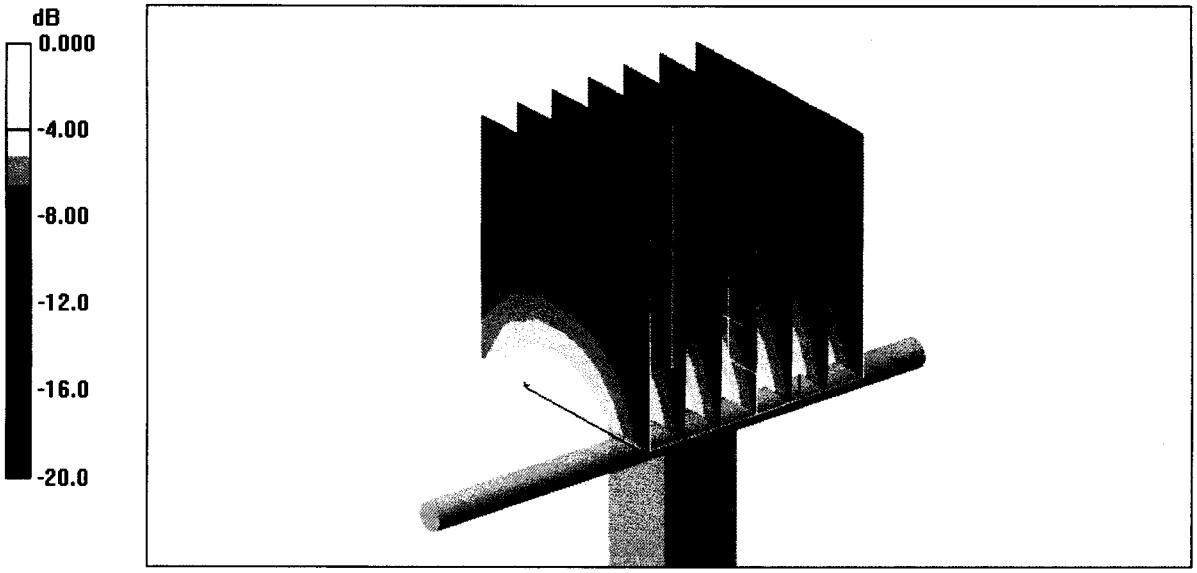
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.43, 4.43, 4.43); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

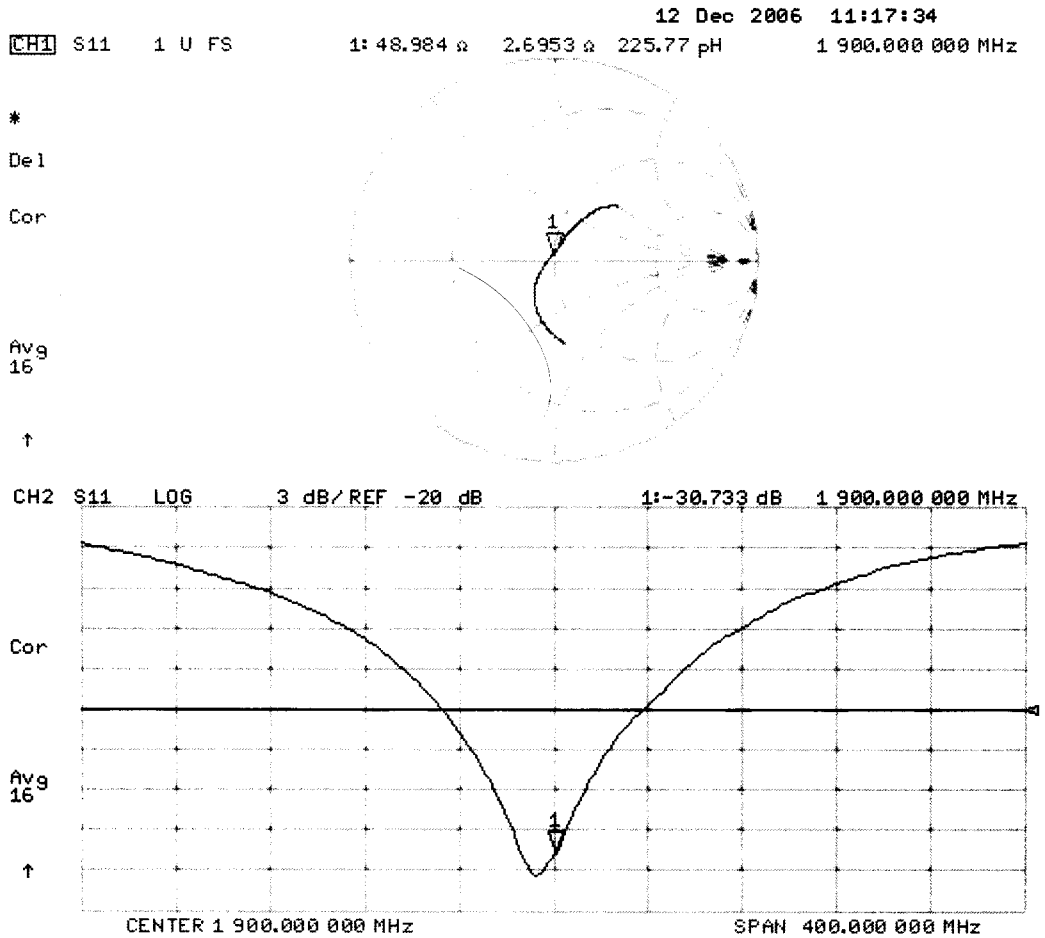
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.4 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.49 mW/g; SAR(10 g) = 5.05 mW/g
Maximum value of SAR (measured) = 10.5 mW/g



0 dB = 10.5mW/g

Impedance Measurement Plot for Body TSL



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Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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 Ericsson UK

Certificate No: ET3-1610_Nov06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1610
Calibration procedure(s)	QA CAL-01.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	November 17, 2006
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-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

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

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: November 17, 2006

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1610

Manufactured:	July 27, 2001
Last calibrated:	June 13, 2005
Recalibrated:	November 17, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1610

Sensitivity in Free Space[A]

NormX	**1.75** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**93** mV
NormY	**1.71** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**97** mV
NormZ	**1.73** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** 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	4.8
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

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	12.3	8.3
SAR_{be} [%]	With Correction Algorithm	1.0	0.2

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

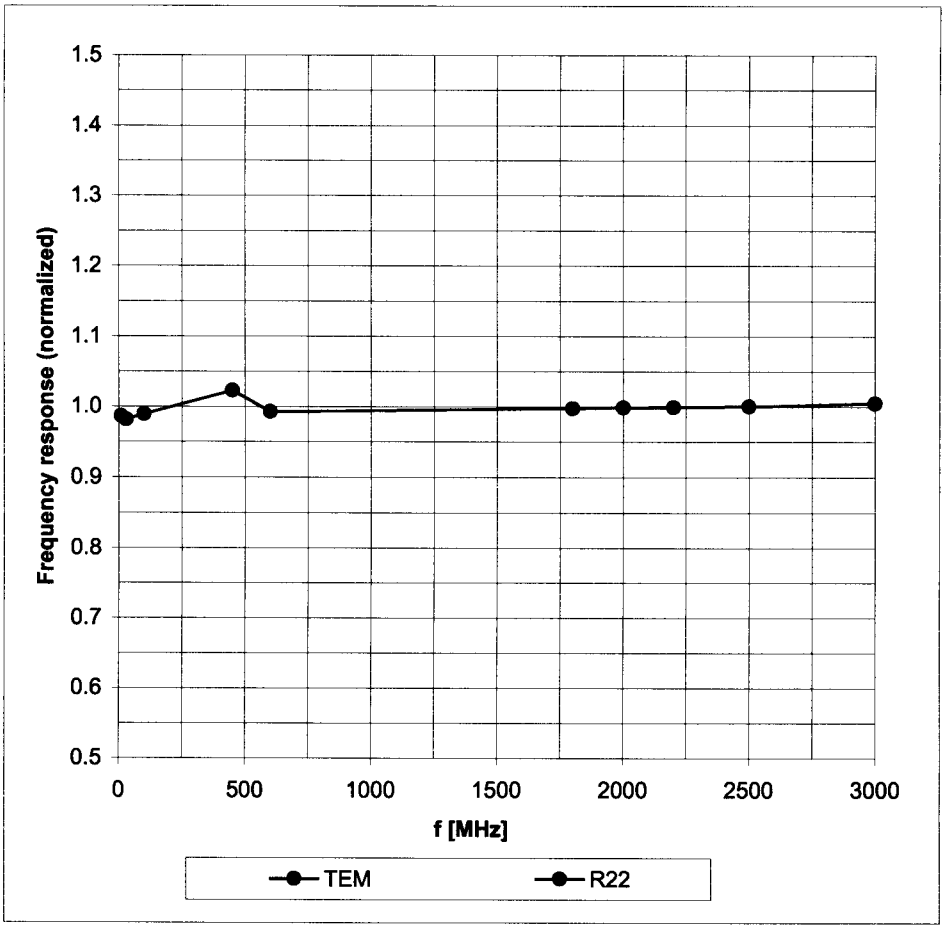
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[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.

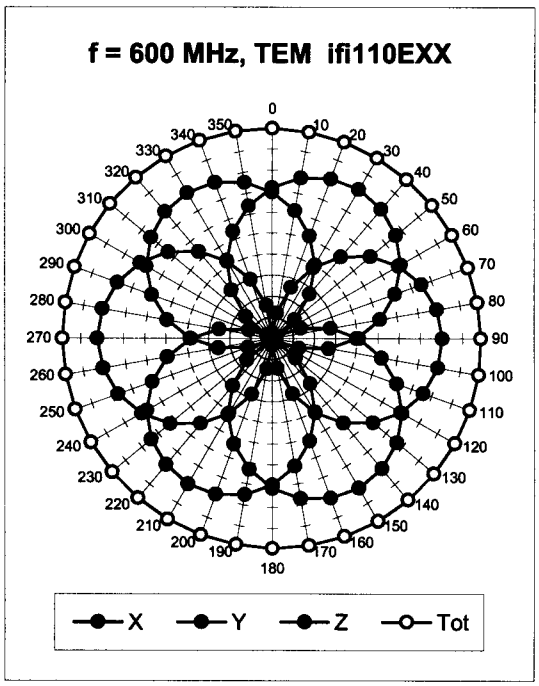
Frequency Response of E-Field

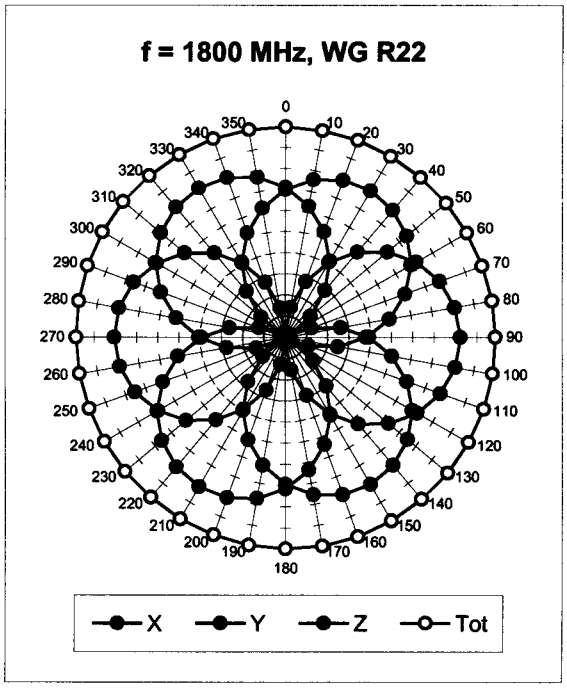
(TEM-Cell:ifi110 EXX, Waveguide: R22)

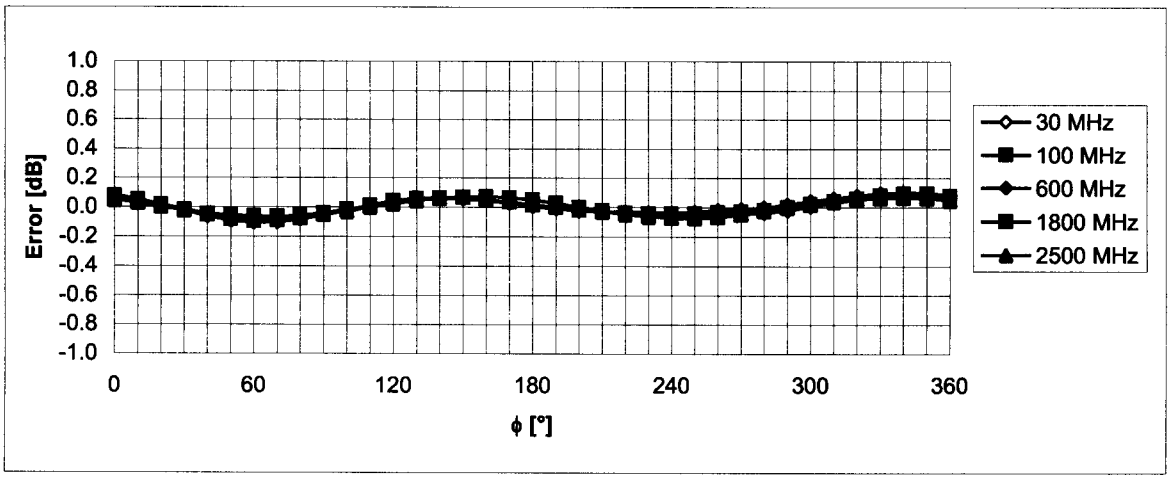


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



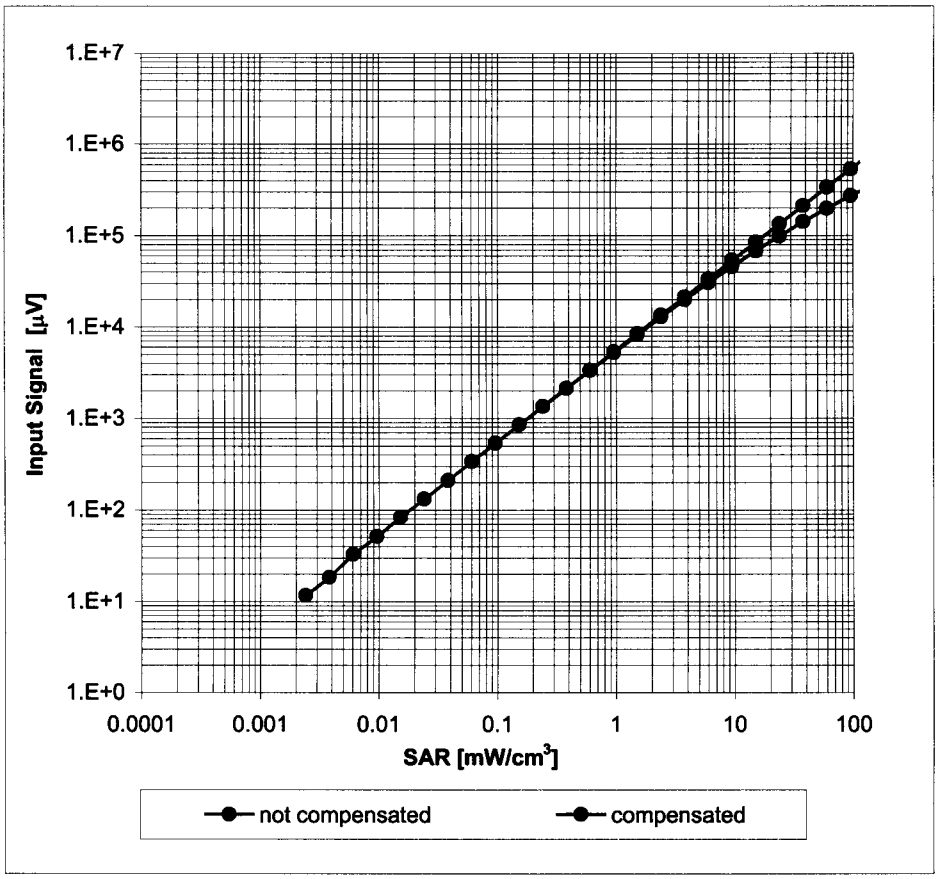


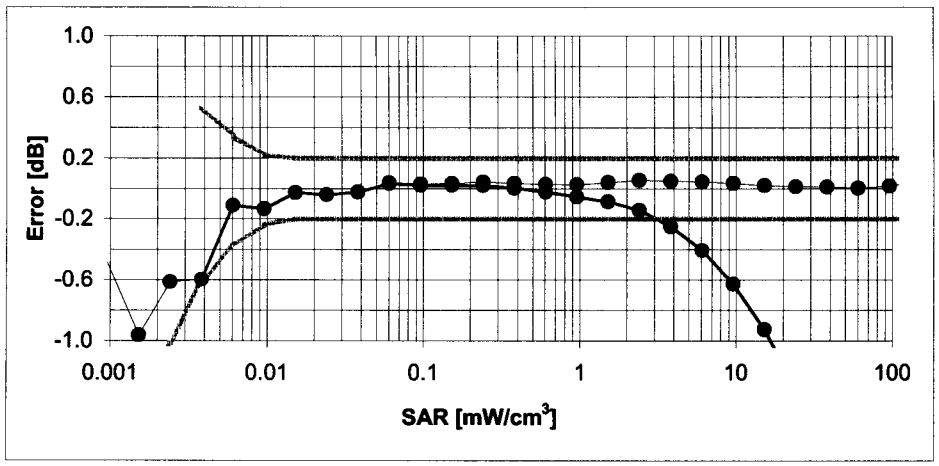


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

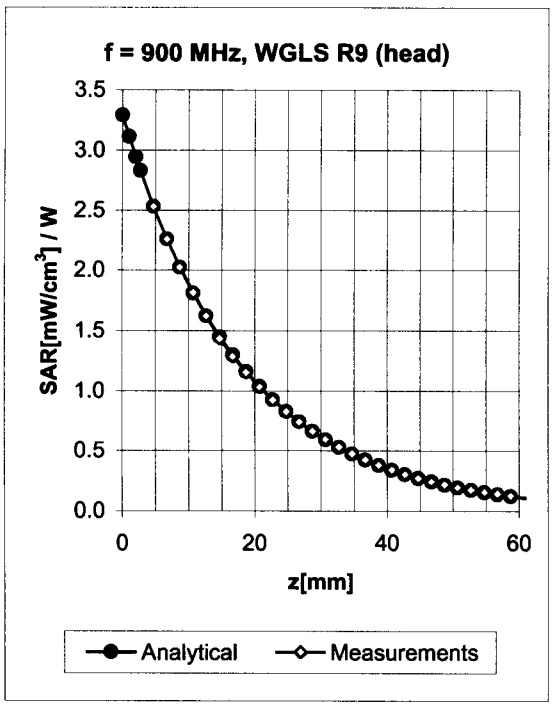
(Waveguide R22, f = 1800 MHz)

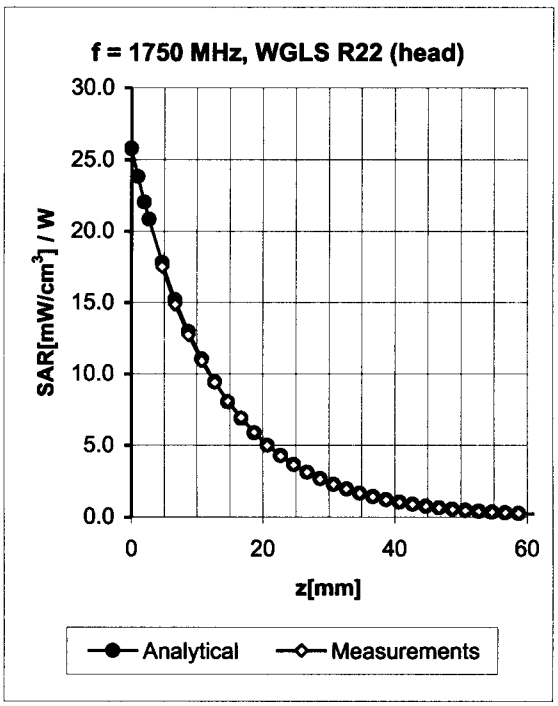




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



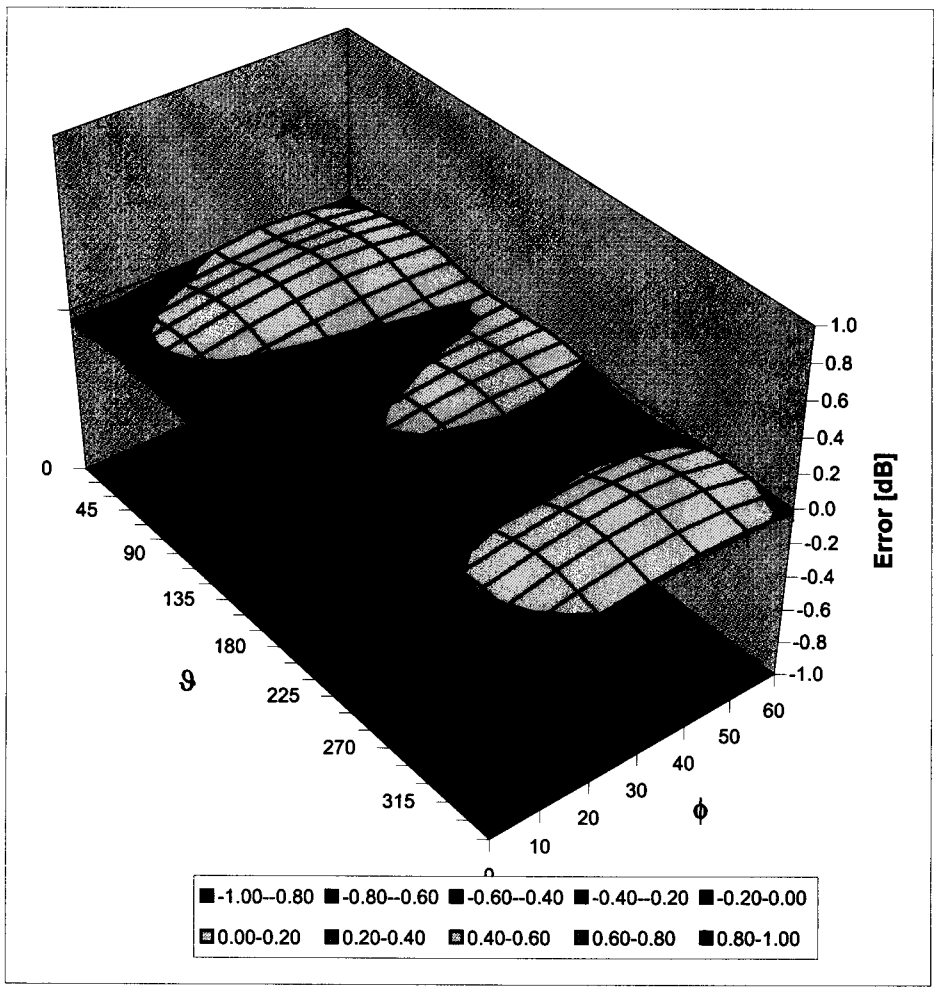


f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.28	2.61	6.68	± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.26	2.83	6.52	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.57	2.47	5.42	± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.58	2.62	5.23	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.70	2.07	4.73	± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.31	2.72	6.21	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.30	2.79	6.11	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.54	2.90	4.86	± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.70	2.43	4.71	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.73	1.79	4.19	± 11.8% (k=2)

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

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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