

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM Hamid Kami Shirazi

Approved

LD/SEMC/BGLI/NM Peter Lindeborg

Checked

061204

Company Internal
REPORT

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

Report issued by Accredited SAR Laboratory**For***PY7A1022051 (Z310i)***Date of test:** 27, Nov, 2006**Laboratory:** Sony Ericsson SAR Test Laboratory
Sonyericsson Mobile Communications AB
Nya Vattentornet
SE-221 82 LUND, Sweden**Testing Engineer:** Hamid Kami Shirazi
Kami.shirazi@sonyericsson.com
+46 46232644**Testing Approval** Peter Lindeborg
Peter.Lindeborg@sonyericsson.com
+46 46 212 61 80**Statement of Compliance**

Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

Sony Ericsson Type AAB-1022051-BV; FCC ID: PY7A1022051; IC:4170B-A1022051

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).



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 (2000). 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.

© Sony Ericsson Mobile Communication AB, 2006



Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

Company Internal
REPORT

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

1 Table of contents

2	INTRODUCTION.....	3
3	DEVICE UNDER TEST.....	3
3.1	ANTENNA DESCRIPTION	3
3.2	DEVICE DESCRIPTION	3
4	TEST EQUIPMENT.....	4
4.1	DOSIMETRIC SYSTEM.....	4
4.2	ADDITIONAL EQUIPMENT	4
5	ELECTRICAL PARAMETERS ON THE TISSUE SIMULATING LIQUID	4
6	SYSTEM ACCURACY VERIFICATION.....	5
7	SAR MEASUREMENT UNCERTAINTY	6
8	TEST RESULTS	7
9	REFERENCES.....	8
10	APPENDIX	9
10.1	PHOTOGRAPHS OF THE DEVICE UNDER TEST	9
10.2	DEVICE POSITION ON SAM TWINS PHANTOM	11
10.3	ATTACHMENTS.....	12



Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM Hamid Kami Shirazi

Approved

LD/SEMC/BGLI/NM Peter Lindeborg

Checked

061204

Company Internal REPORT

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

2 Introduction

In this test report, compliance of the Sony Ericsson PY7A1022051 (Z310i) 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].

3 Device under Test

3.1 Antenna Description

Type	Internal antenna	
Location	Inside, Back, at the Middle	
Dimensions	Max length	38mm
	Max width	18mm
Configuration	PIFA	

3.2 Device description

Device model	PY7A1022051(Z310i)		
Serial number	CB510AB3NT (#6082)		
Mode	GSM1900		
Crest Factor	8.3		
Multiple Access Scheme	TDMA		
Maximum Output Power Setting (dBm)	Ch512	Ch661	Ch810
	29.0	29.0	29.0
Factory Tolerance in Power Setting	±0.5dB		
Maximum Peak Output Power (dBm)	29.5	29.5	29.5
Transmitting Frequency Range(MHz)	1850.2 – 1909.8		
Prototype or Production Unit	Preproduction (TP1)		
Device Category	Portable		
RF exposure environment	General population / uncontrolled		



Company Internal
REPORT

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

4 Test equipment

4.1 Dosimetric system

SAR measurements were made using the DASY4 professional system (software version 4.6, Build 23/7) with SAM twin phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The list of calibrated equipment is given below.

Description	Serial Number	Due Date
DASY3 DAE V1	419	March 2007
E-field probe ETDV6	1585	March 2007
Dipole Validation Kit, D1900V2	5d002	March 2007

4.2 Additional equipment

Description	Inventory Number	Due Date
Signal generator R&S SML03	INV 20007667	Dec. 2007
Power meter R&S NRVZ	INV 20007669	Dec. 2007
Power sensor R&S NRV-Z5	INV 20007672	Dec. 2007
Power sensor R&S NRV-Z5	INV 20007673	Dec. 2007
Network analyzer HP8753C	INV421671	March 2007
S-parameter test set HP85047A	INV 421670	March 2007
Dielectric probe kit HP8507D	INV 200 000 53	Self calibrated
CMU200	INV 20002149	March 2007

Company Internal
REPORT

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

5 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 DASY4 software is also given.

Recommended limits for permittivity ϵ_r , conductivity σ and mass density ρ are also shown.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ϵ_r	σ (S/m)	ρ (g/cm ³)
1900	Head	Measured, 27/Nov./2006	39.9	1.47	1.00
		Recommended	40.0	1.40	1.00
	Body	Measured, 27/Nov./2006	51.4	1.55	1.00
		Recommended	53.3	1.52	1.00

6 System accuracy verification

A system accuracy verification of the DASY4 was performed using the dipole validation kit listed in section 3.1. Measurement made in ambient temperature (22-23) °C and humidity (35-40) %. The obtained results are displayed in the table below.

RF noise had been measured in liquid when all RF equipment in lab was set off. Measured value was 0.0002mW/g in 1g mass

f (MHz)	Tissue type	Measured / Reference	SAR (W/kg) 1g/10g	Dielectric Parameters			Liquid t(°C)
				ϵ_r	σ (S/m)	ρ (g/cm ³)	
1900	Head	Measured, 27/Nov./2006	40.1/20.9	39.9	1.47	1.00	22±0.2
		Reference	39.2/20.6	39.6	1.45	1.00	22±0.2
	Body	Measured, 27/Nov./2006	20.2/21.2	51.4	1.55	1.00	22±0.2
		Reference	39.6/20.9	51.6	1.58	1.00	22±0.2



Company Internal
REPORT

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

7 SAR measurement uncertainty

SAR measurement uncertainty evaluation for Sonyericsson PY7A1022051 (Z310i) phone

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C _i	GSM 1900-Head	GSM 1900-Body
Measurement System						
Probe Calibration	±4.8	N	1	1	±4.8	±4.8
Axial Isotropy	±4.7	R	√3	0.7	±1.9	±1.9
Spherical Isotropy	±9.6	R	√3	0.7	±3.9	±3.9
Boundary effect	±1.0	R	√3	1	±1.0	±1.0
Probe linearity	±4.7	R	√3	1	±2.7	±2.7
Detection limit	±1.0	R	√3	1	±0.6	±0.6
Readout electronics	±1.0	N	1	1	±1.0	±1.0
Response time	±0.8	R	√3	1	±0.5	±0.5
Integration time	±1.4	R	√3	1	±0.8	±0.8
RF Ambient Conditions	±3.0	R	√3	1	±1.7	±1.7
Mech. Constraints of robot	±0.4	R	√3	1	±0.2	±0.2
Probe positioning	±2.9	R	√3	1	±1.7	±1.7
Extrap, interpolation and integration	±3.9	R	√3	1	±2.3	±2.3
Measurement System Uncertainty					±8.0	±8.0
Test Sample Related						
Device positioning	±3.5	N	1	1	±3.5	±3.5
Device holder uncertainty	±3.5	N	1	1	±3.5	±3.5
Power drift	±(2.8/0.7)	R	√3	1	-1.6	-0.4
Test Sample Related Uncertainty					±5.2	±5.0
Phantom and Tissue Parameters						
Phantom uncertainty	±4.0	R	√3	1	±2.3	±2.3
Liquid conductivity (measurement)	±(5.0/2.0)	N	1	0.64	±3.2	±1.3
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8	±1.8
Liquid Permittivity (measurement)	±(0.3/3.6)	N	1	0.6	±0.2	±2.2
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7	±1.7
Phantom and Tissue Parameters Uncertainty					±4.7	±4.2
Combined standard uncertainty					±10.6	±10.3
Extended standard uncertainty (k=2)					±21.2	±20.6



Company Internal
REPORT

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

8 Test results

The measured 1-gram averaged SAR values of the device against head and body are provided in tables 1 and 2. The ambient humidity and temperature of test facility were 35%-40% and 22°C–23°C respectively. The depth of tissue simulating liquid for head and body are 15.2cm and 15cm. A base station simulator was used to control the device during the SAR measurement. The phone was supplied with full-charged battery for each measurement.

For head measurement, the device was tested on the right-hand phantom (corresponding to the right side of the head) and the left-hand phantom in two phone position, cheek (touch) and tilt (cheek + 15deg).

For body measurement phone was tested on the antenna (back) and Front against flat section of phantom with 15mm distance in speech and mode. The device was tested at the lowest, middle and highest frequencies in the transmit band. For Hands free used Sony Ericsson head set (HPB-60) and for Blue Tooth phone was paired with Sony Ericsson HBH-60 Blue Tooth accessory and measured on worst case speech mode and for body. According to GPRS class 8 and EDGE have class 2 (one Tx slot uplink) body SAR values are similar like GSM speech SAR values

Mode	Channel	Power (dB)	Phone Position	Liquid t (°C)	SAR (W/kg)	
					Right-hand	Left-hand
					1g mass	1g mass
1900 GSM Head	512	29.5	Cheek	22±0.2	0.68	0.60
			Tilt	22±0.2	0.22	0.23
	661	29.5	Cheek	22±0.2	0.69	0.60
			Tilt	22±0.2	0.20	0.22
	810	29.5	Cheek	22±0.2	0.58	0.59
			Tilt	22±0.2	0.18	0.18

Table1: SAR measurement result for Sony Ericsson PY7A1022051 (Z310i) telephone at highest possible output power. The phone has measured against head.

Mode	Channel	Power (dBm)	Phone Position	Liquid t (°C)	SAR (W/kg) in 1 g mass
GSM 1900 Body	512	29.5	Antenna to phantom Blue Tooth	22±0.2	0.24
	661	29.5	Antenna to phantom Blue Tooth	22±0.2	0.25
			Antenna to phantom Hands Free	22±0.2	0.25
	810	29.5	Antenna to phantom Blue Tooth	22±0.2	0.24

Table2: SAR measurement result for Sony Ericsson PY7A1022051 (Z310i) telephone at highest possible output power. The phone has measured against the Body.



Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

Company Internal
REPORT

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

9

References

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

[2] Basic standard for the Measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300MHz-3GHz), European Standard EN 50361, July 2001

[3] 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).

[4] 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.

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

Company Internal REPORT

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

10 Appendix

10.1 Photographs of the device under test



Open



Close

Front & Back side



Open



Close

Sides



Down Connector

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

**Company Internal
REPORT**

No.

BGGIN06:520

Date

061201

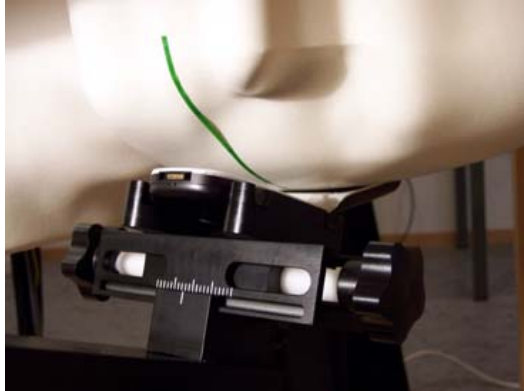
Rev

A

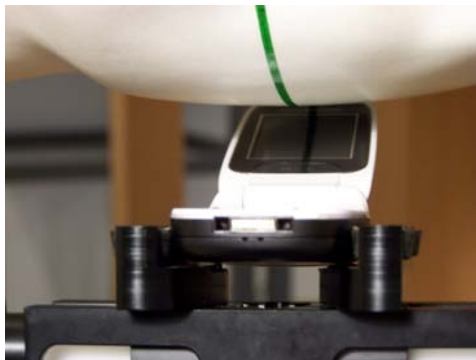
Reference

File

10.2 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: Phone on 15mm distance against Phantom



Company Internal
REPORT

Prepared (also subject responsible if other)

LD/SEMC/BGLI/NM *Hamid Kami Shirazi*

Approved

LD/SEMC/BGLI/NM *Peter Lindeborg*

Checked

061204

No.

BGGIN06:520

Date

061201

Rev

A

Reference

File

10.3 Attachment

- Probe & Dipole Calibration
- Measurement plots and system validation
- Annex

Date/Time: 2006-11-27 09:05:25

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: SN:5d002

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 39.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1585; ConvF(5.11, 5.11, 5.11); Calibrated: 2006-03-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn419; Calibrated: 2006-03-08
- Phantom: SAM 4; Type: SAM; Serial: 1053
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

d=10mm, Pin=100mW/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.85 mW/g

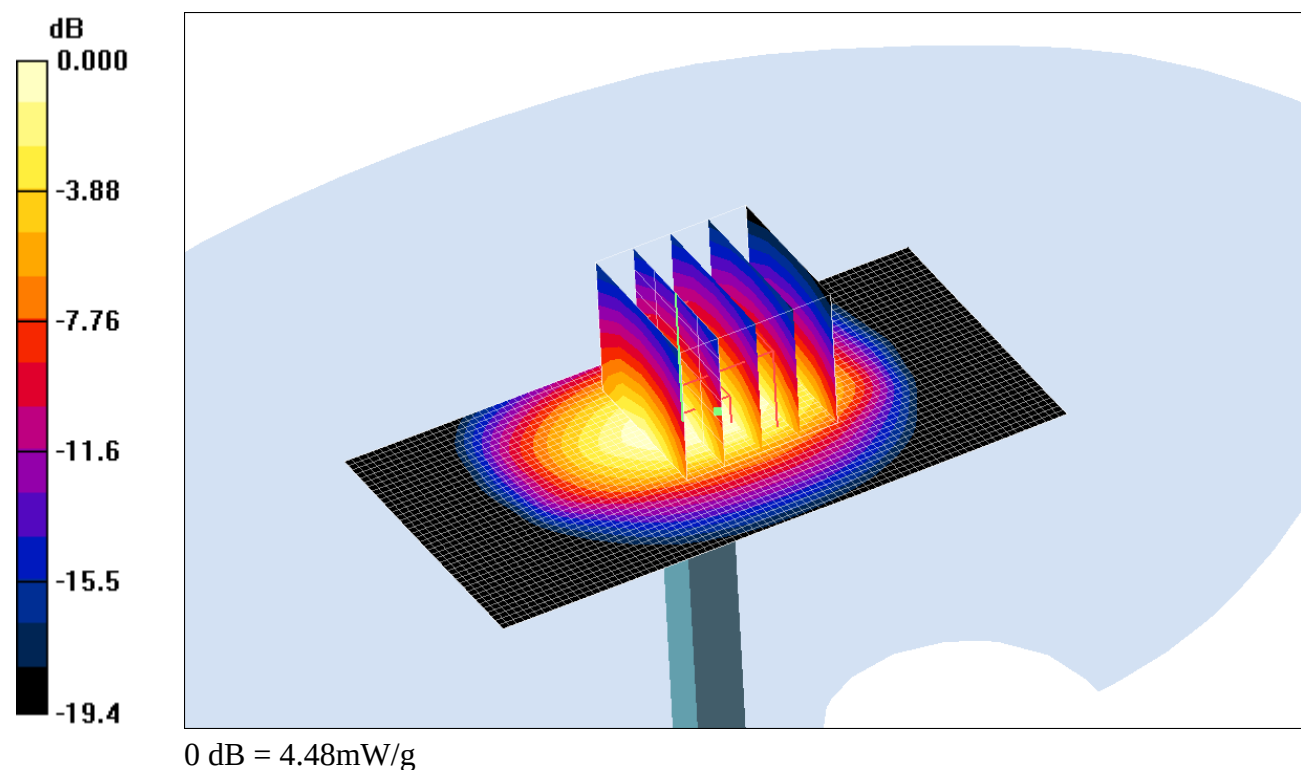
d=10mm, Pin=100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.8 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 7.07 W/kg

SAR(1 g) = 4.01 mW/g; SAR(10 g) = 2.09 mW/g

Maximum value of SAR (measured) = 4.48 mW/g



Date/Time: 2006-11-27 15:02:50

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: SN:5d002

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.55 \text{ mho/m}$; $\epsilon_r = 51.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1585; ConvF(4.56, 4.56, 4.56); Calibrated: 2006-03-16

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

d=10mm, Pin=100mW/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.91 mW/g

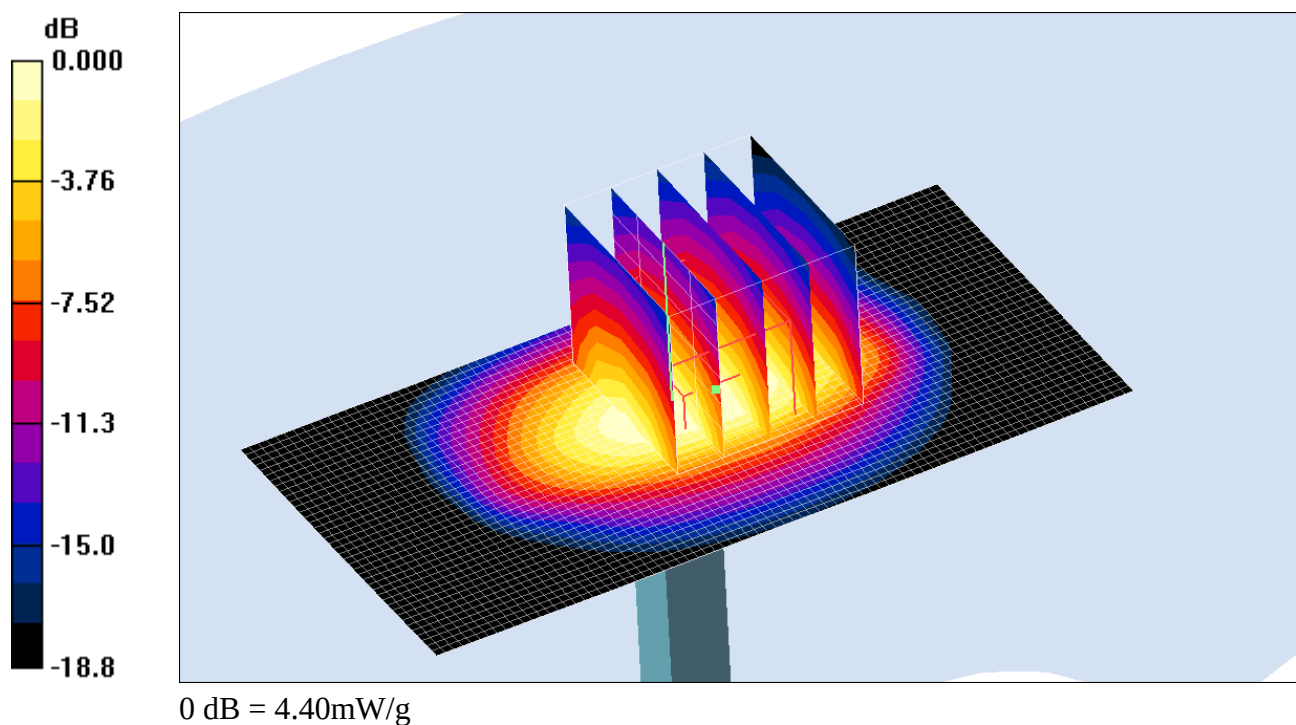
d=10mm, Pin=100mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.0 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 6.95 W/kg

SAR(1 g) = 4.02 mW/g; SAR(10 g) = 2.12 mW/g

Maximum value of SAR (measured) = 4.40 mW/g



Date/Time: 2006-11-27 13:42:10

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: #6082; Type: PY7A1022051; Serial: CB510AB3NT

Communication System: DCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m^3

Phantom section: Left Section

DASY4 Configuration:

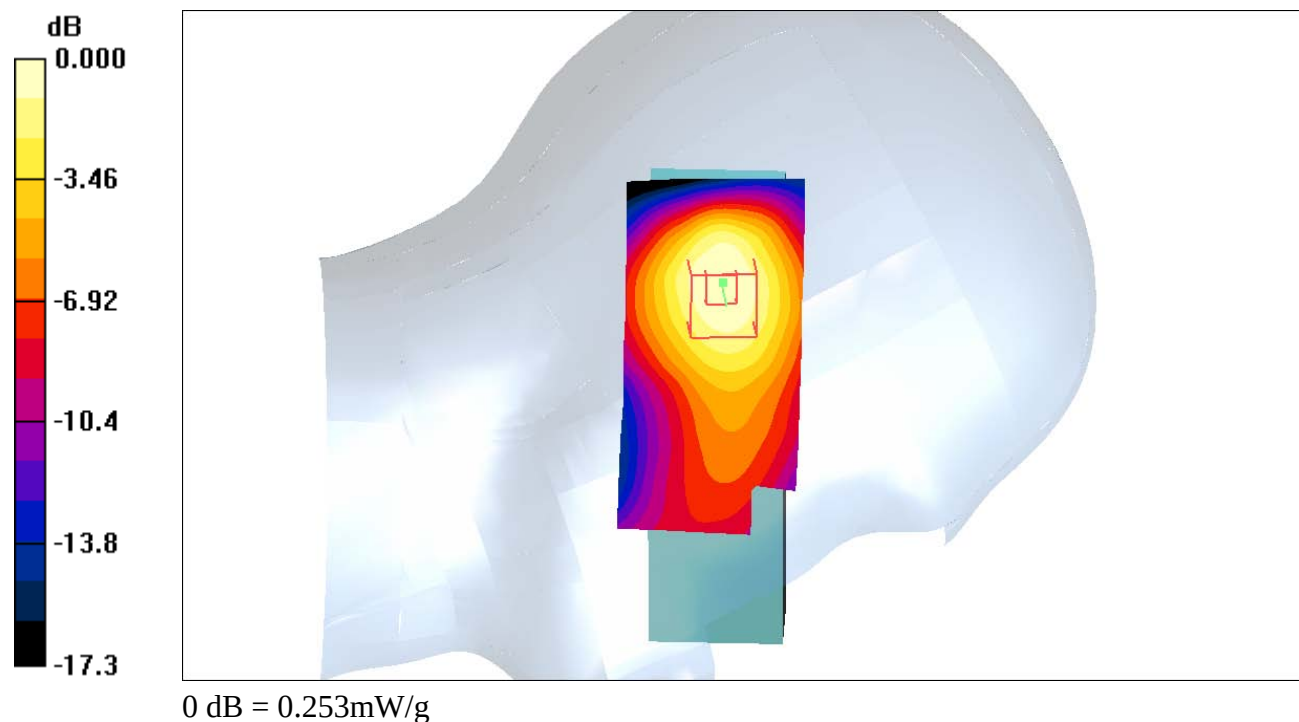
- Probe: ET3DV6 - SN1585; ConvF(5.11, 5.11, 5.11); Calibrated: 2006-03-16

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Tilt position - Low/Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ [Info: Interpolated medium parameters used for SAR evaluation.](#)Maximum value of SAR (interpolated) = 0.273 mW/g**Tilt position - Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 11.0 V/m; Power Drift = -0.018 dBPeak SAR (extrapolated) = 0.342 W/kg**SAR(1 g) = 0.231 mW/g; SAR(10 g) = 0.141 mW/g**[Info: Interpolated medium parameters used for SAR evaluation.](#)Maximum value of SAR (measured) = 0.253 mW/g

Date/Time: 2006-11-27 10:54:14

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: #6081; Type: PY7A1022051; Serial: CB510AB3NT

Communication System: DCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.45 \text{ mho/m}$; $\epsilon_r = 38.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY4 Configuration:

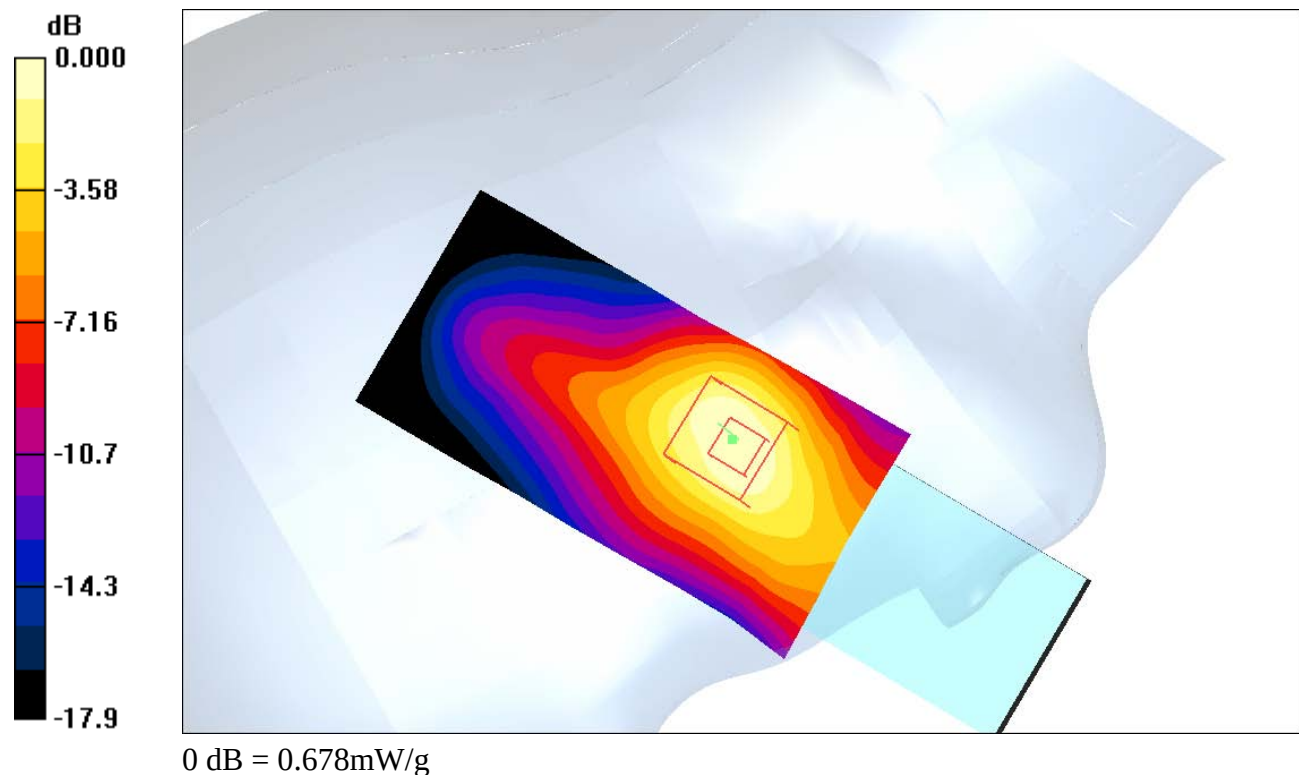
- Probe: ET3DV6 - SN1585; ConvF(5.11, 5.11, 5.11); Calibrated: 2006-03-16

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Touch position - Middle 2/Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 0.728 mW/g **Touch position - Middle 2/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 6.33 V/m ; Power Drift = -0.120 dB Peak SAR (extrapolated) = 0.991 W/kg **SAR(1 g) = 0.691 mW/g ; SAR(10 g) = 0.369 mW/g** Maximum value of SAR (measured) = 0.782 mW/g 

Date/Time: 2006-11-27 11:51:29

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: #6082; Type: PY7A1022051; Serial: CB510AB3NT

Communication System: DCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 38.3$; $\rho = 1000$ kg/m^3

Phantom section: Left Section

DASY4 Configuration:

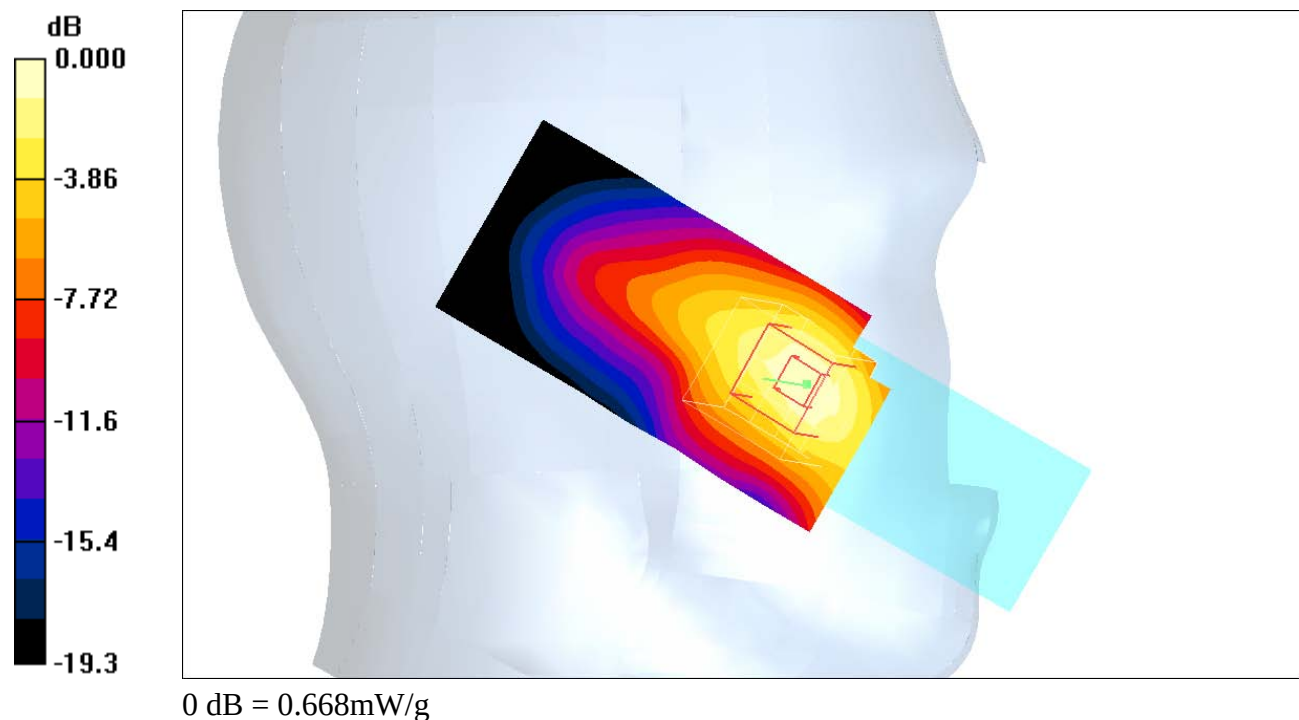
- Probe: ET3DV6 - SN1585; ConvF(5.11, 5.11, 5.11); Calibrated: 2006-03-16

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Touch position - Low/Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ [Info: Interpolated medium parameters used for SAR evaluation.](#)Maximum value of SAR (interpolated) = 0.631 mW/g **Touch position - Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 5.19 V/m ; Power Drift = -0.040 dB Peak SAR (extrapolated) = 0.967 W/kg **SAR(1 g) = 0.596 mW/g ; SAR(10 g) = 0.330 mW/g** [Info: Interpolated medium parameters used for SAR evaluation.](#)Maximum value of SAR (measured) = 0.668 mW/g 

Date/Time: 2006-11-27 10:44:06

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: #6082; Type: PY7A1022051; Serial: CB510AB3NT

Communication System: DCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 40.1$; $\rho = 1000$ kg/m^3

Phantom section: Right Section

DASY4 Configuration:

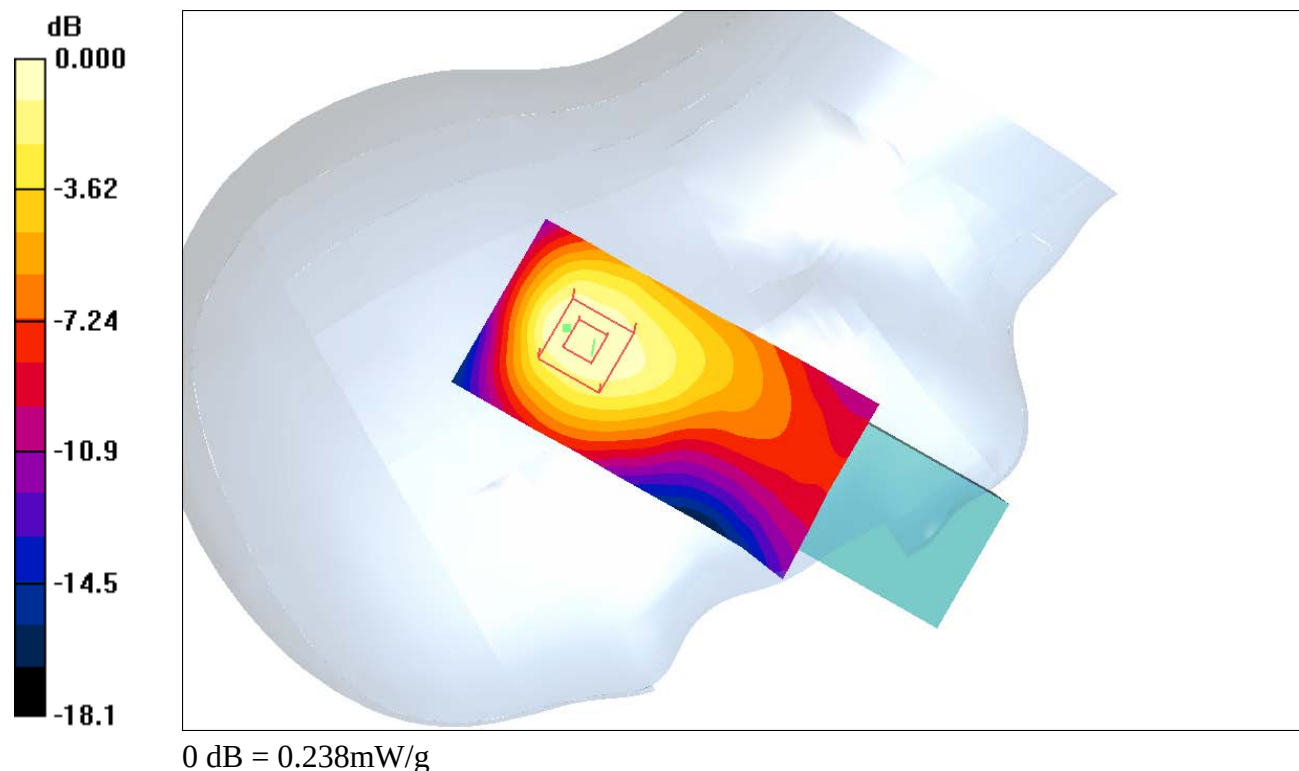
- Probe: ET3DV6 - SN1585; ConvF(5.11, 5.11, 5.11); Calibrated: 2006-03-16

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Tilt position - Low/Area Scan (41x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ [Info: Interpolated medium parameters used for SAR evaluation.](#)Maximum value of SAR (interpolated) = 0.254 mW/g **Tilt position - Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 11.5 V/m ; Power Drift = 0.026 dB Peak SAR (extrapolated) = 0.323 W/kg **SAR(1 g) = 0.219 mW/g ; SAR(10 g) = 0.134 mW/g** [Info: Interpolated medium parameters used for SAR evaluation.](#)Maximum value of SAR (measured) = 0.238 mW/g 

Date/Time: 2006-11-27 15:58:39

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: #6082; Type: PY7A1022051; Serial: CB510AB3NT

Communication System: DCS 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.53 \text{ mho/m}$; $\epsilon_r = 51.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

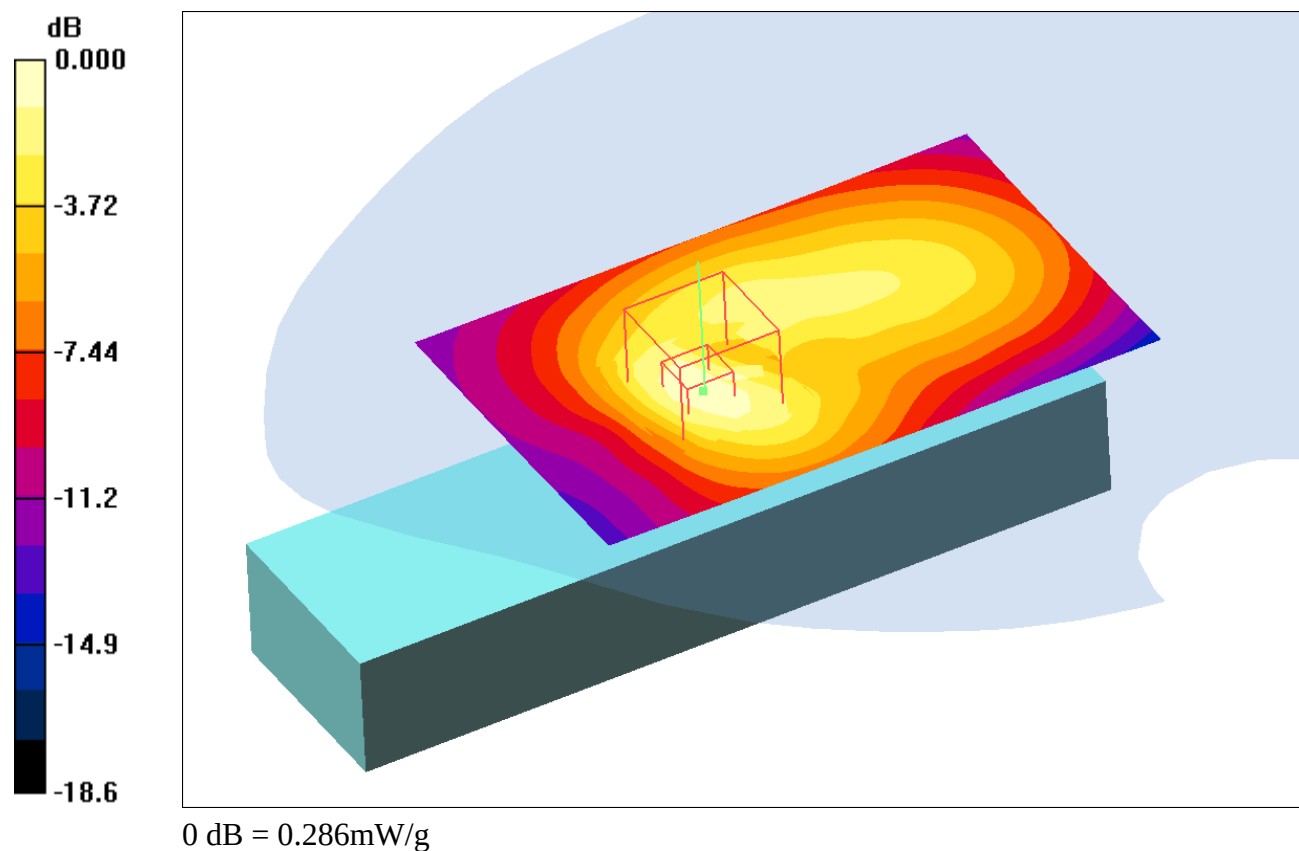
- Probe: ET3DV6 - SN1585; ConvF(4.56, 4.56, 4.56); Calibrated: 2006-03-16

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

d=15mm,Back,Middle ,Speech;BT/Area Scan (51x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (interpolated) = 0.239 mW/g **d=15mm,Back,Middle ,Speech;BT/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 8.00 V/m ; Power Drift = -0.030 dB Peak SAR (extrapolated) = 0.423 W/kg **SAR(1 g) = 0.250 mW/g ; SAR(10 g) = 0.133 mW/g** Maximum value of SAR (measured) = 0.286 mW/g 

Date/Time: 2006-11-27 15:13:14

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: SN:5d002

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.55 \text{ mho/m}$; $\epsilon_r = 51.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1585; ConvF(4.56, 4.56, 4.56); Calibrated: 2006-03-16

- Sensor-Surface: 0mm (Fix Surface)

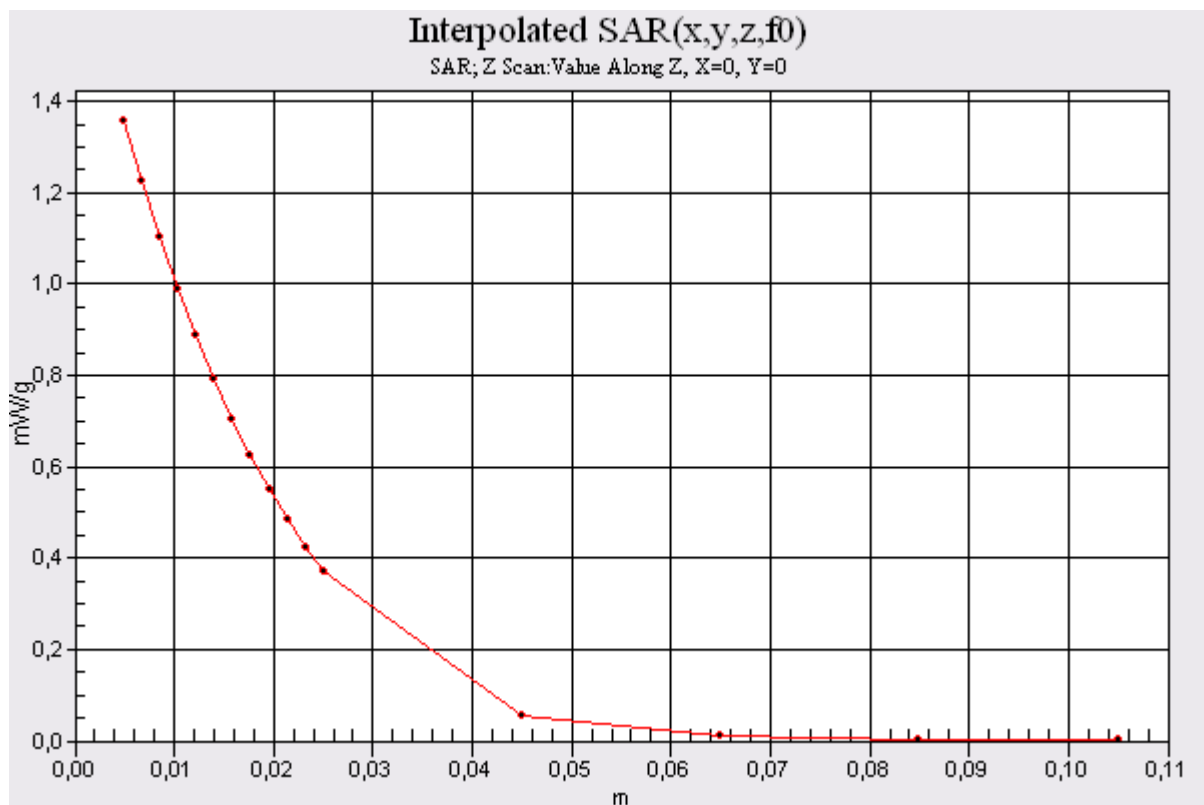
- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

d=10mm, Pin=100mW/Z Scan (1x1x16): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$, $dz=20\text{mm}$

Maximum value of SAR (interpolated) = 1.36 mW/g



Date/Time: 2006-11-27 09:15:53

Test Laboratory: Sony Ericsson Mobile Communications AB

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: SN:5d002

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 39.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1585; ConvF(5.11, 5.11, 5.11); Calibrated: 2006-03-16

- Sensor-Surface: 0mm (Fix Surface)

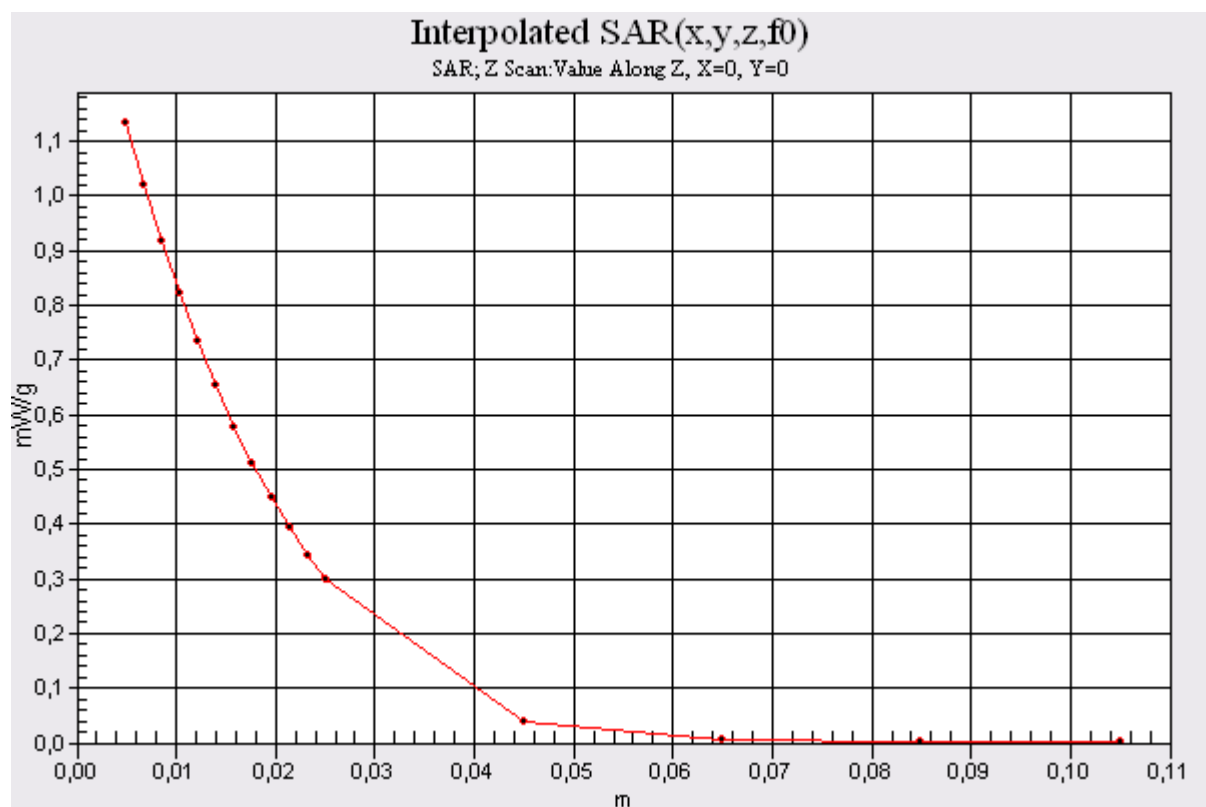
- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- Phantom: SAM 4; Type: SAM; Serial: 1053

- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

d=10mm, Pin=100mW/Z Scan (1x1x16): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$, $dz=20\text{mm}$

Maximum value of SAR (interpolated) = 1.13 mW/g



DASY4 Validation Report for Body TSL

Date/Time: 15.03.2005 15:20:32

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d002

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL 1900 MHz;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.43, 4.43, 4.43); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0; Type: QD000P50AA; Serial: 1001;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.4 mW/g

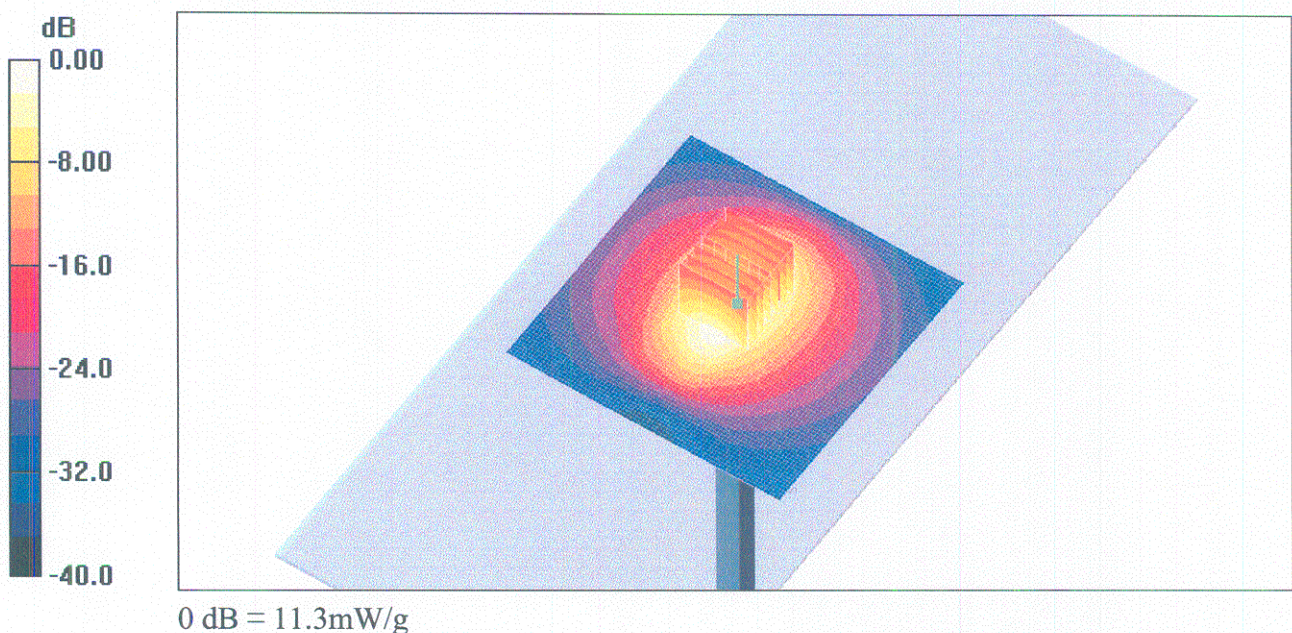
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.3 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.23 mW/g

Maximum value of SAR (measured) = 11.3 mW/g



DASY4 Validation Report for Head TSL

Date/Time: 09.03.2005 15:20:45

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d002

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL 1900 MHz;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.96, 4.96, 4.96); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0; Type: QD000P50AA; Serial: 1001;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.4 mW/g

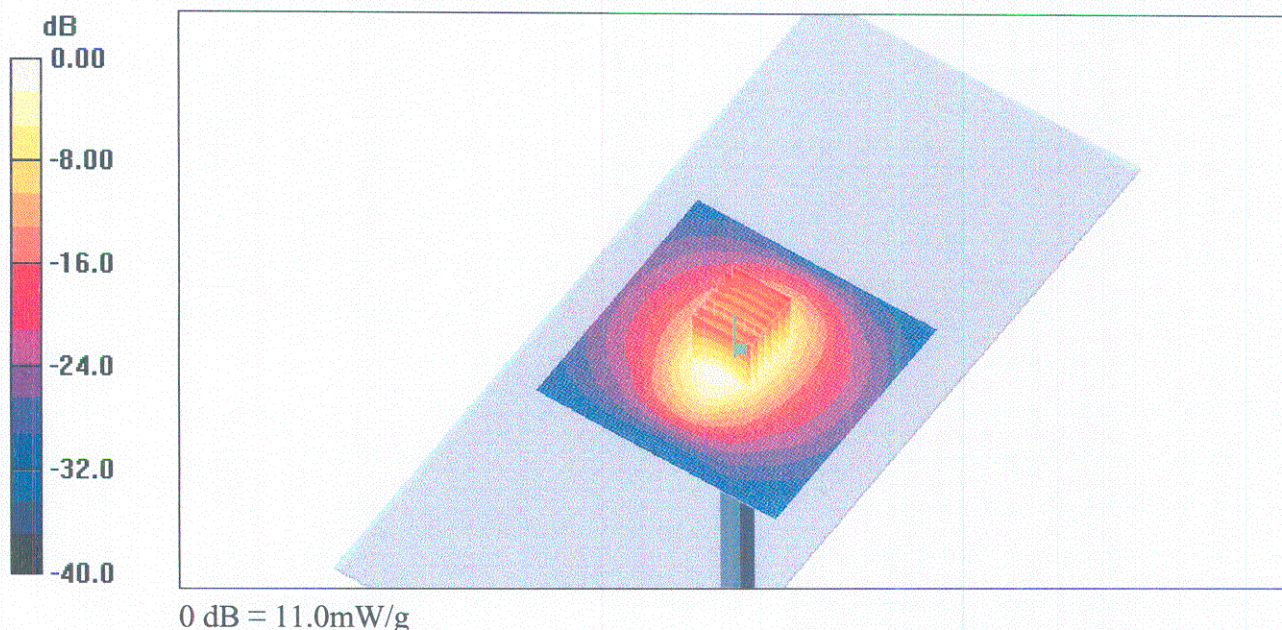
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.4 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.81 mW/g; SAR(10 g) = 5.15 mW/g

Maximum value of SAR (measured) = 11.0 mW/g





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 **Sony Ericsson Lund**

Certificate No. **ET3-1585_Mar06**

CALIBRATION CERTIFICATE

Object **ET3DV8 - SN:1585**

Calibration procedure(s) **QA CAL-01.v5
Calibration procedure for dosimetric E-field probes**

Calibration date: **March 16, 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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-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 Nov-05)	In house check: Nov 06

Calibrated by: **Katja Pokovic** **Technical Manager** **[Signature]**

Approved by: **Niele Kuster** **Quality Manager** **[Signature]**

Issued: March 18, 2006

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



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**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1585

Manufactured:	May 7, 2001
Last calibrated:	March 16, 2005
Recalibrated:	March 16, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1585

Sensitivity in Free Space^A

Diode Compression^B

NormX	1.89 ± 10.1%	$\mu\text{V}/(\text{V/m})^2$	DCP X	93 mV
NormY	1.74 ± 10.1%	$\mu\text{V}/(\text{V/m})^2$	DCP Y	93 mV
NormZ	1.91 ± 10.1%	$\mu\text{V}/(\text{V/m})^2$	DCP Z	93 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR _{be} [%]	Without Correction Algorithm	7.5	4.1
SAR _{be} [%]	With Correction Algorithm	0.1	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	6.0	3.2
SAR _{be} [%]	With Correction Algorithm	0.2	0.3

Sensor Offset

Probe Tip to Sensor Center **2.7 mm**

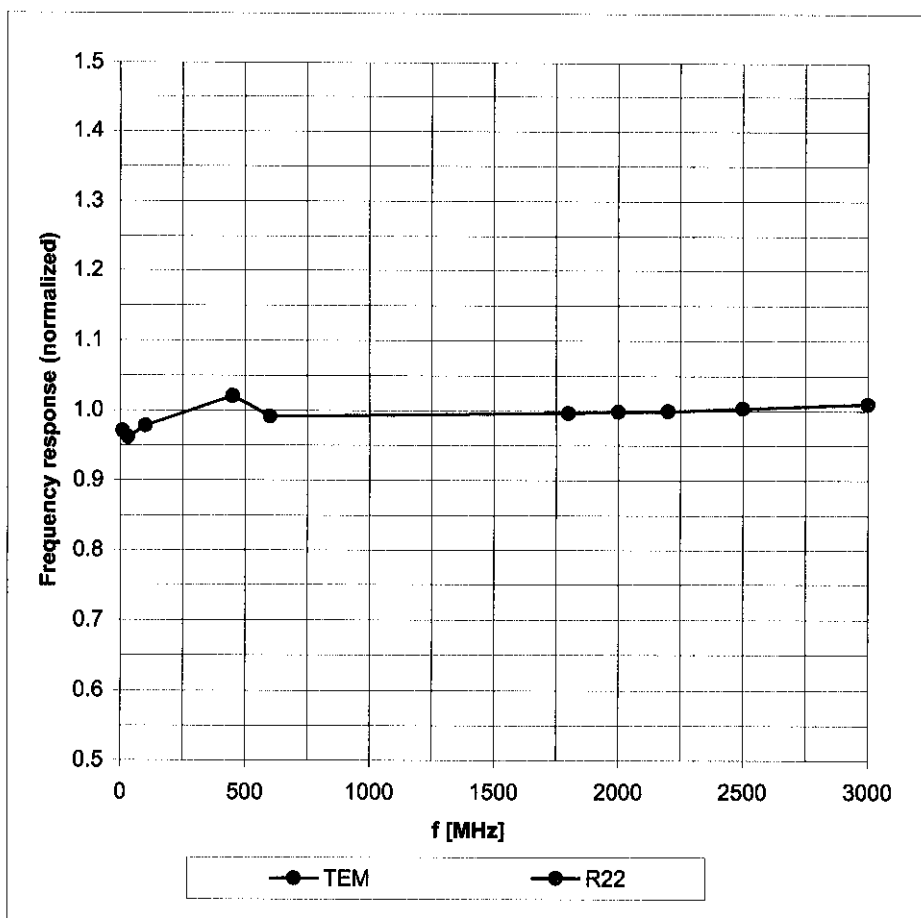
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

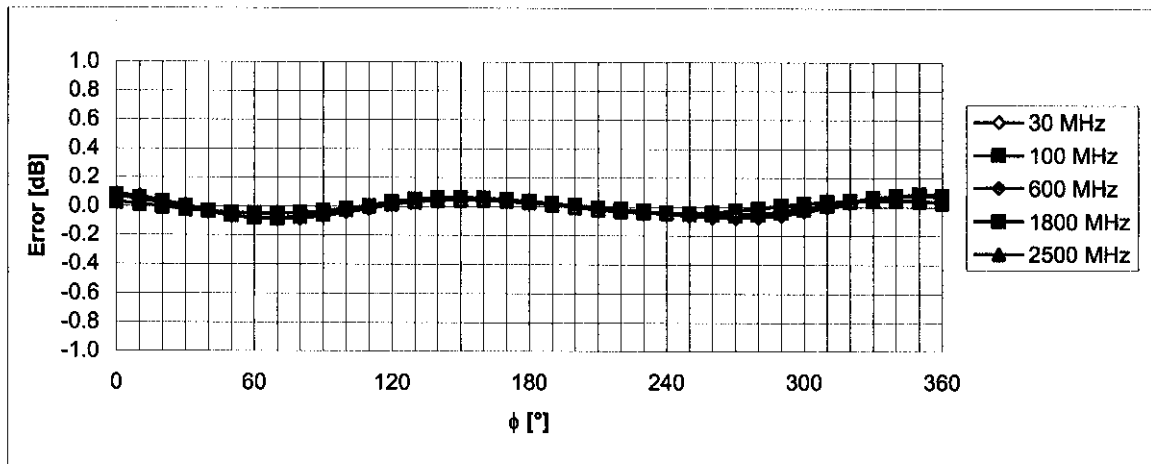
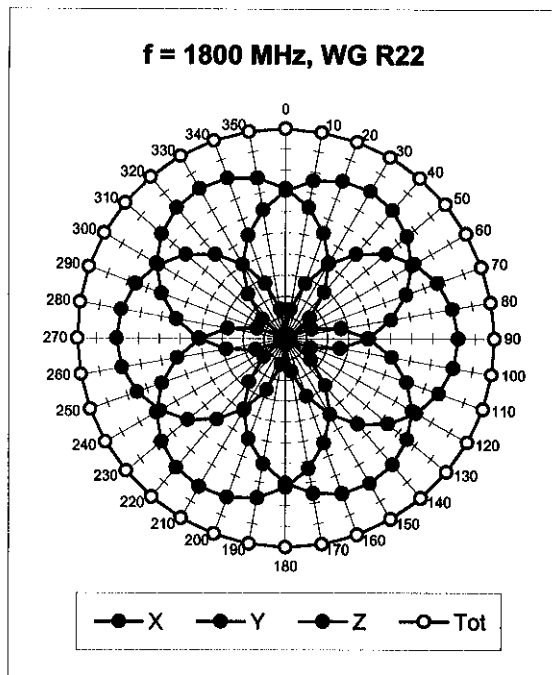
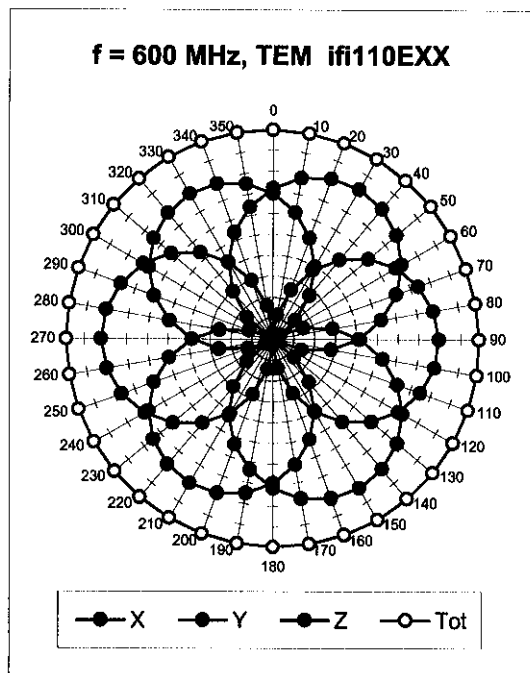
Frequency Response of E-Field

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



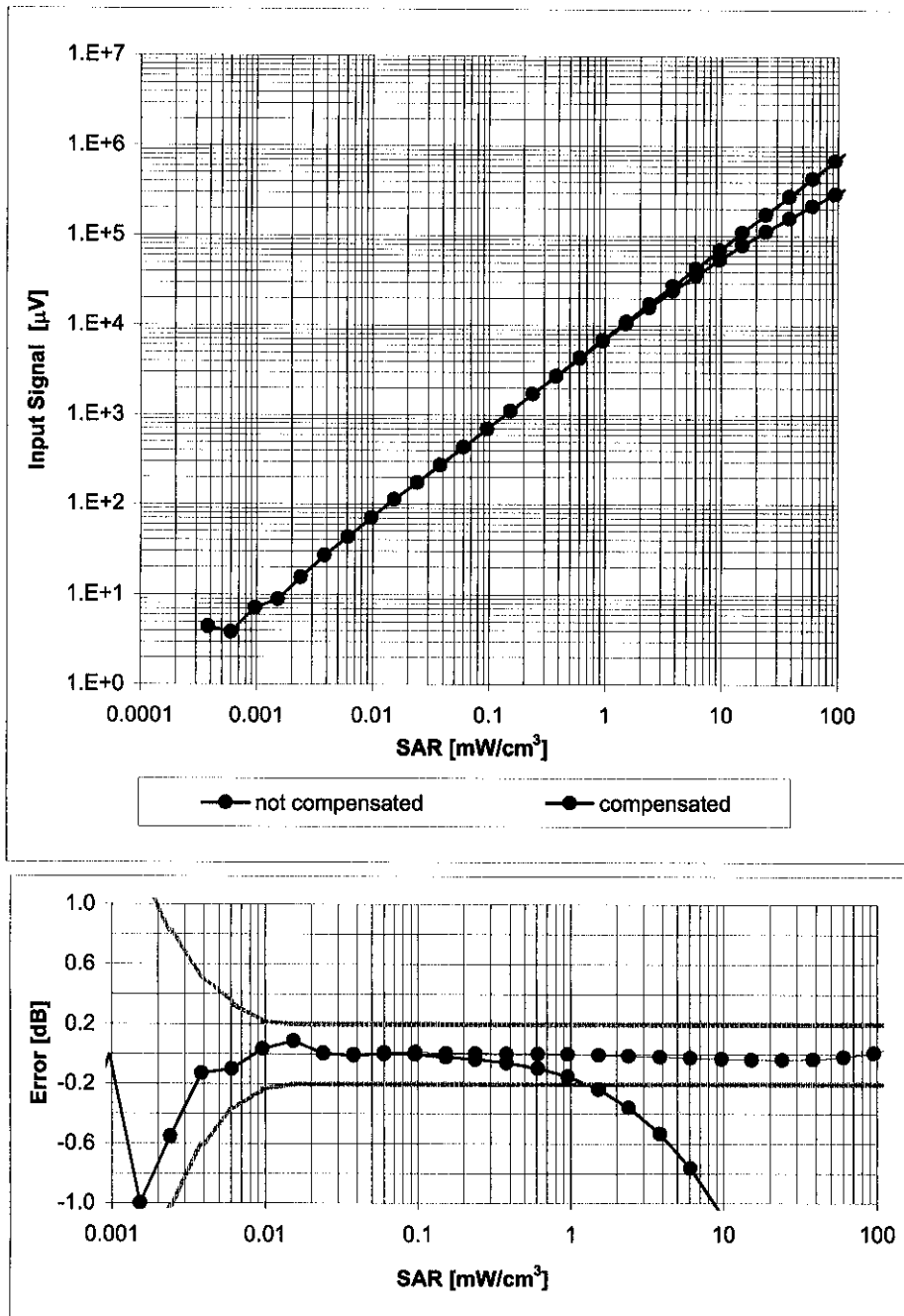
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$



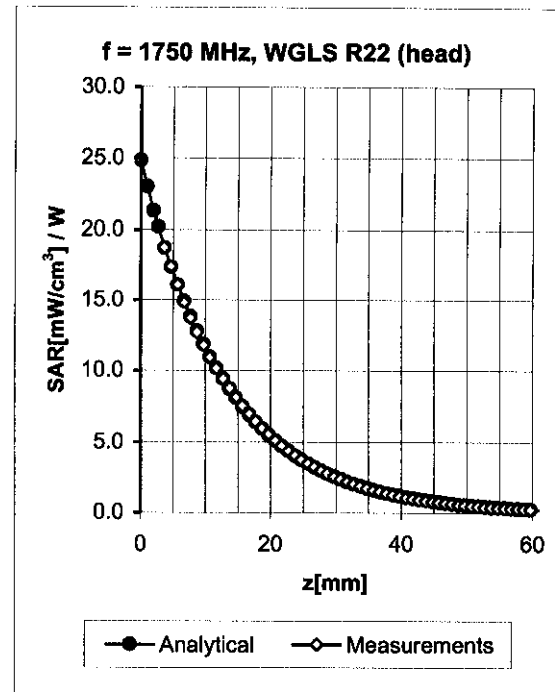
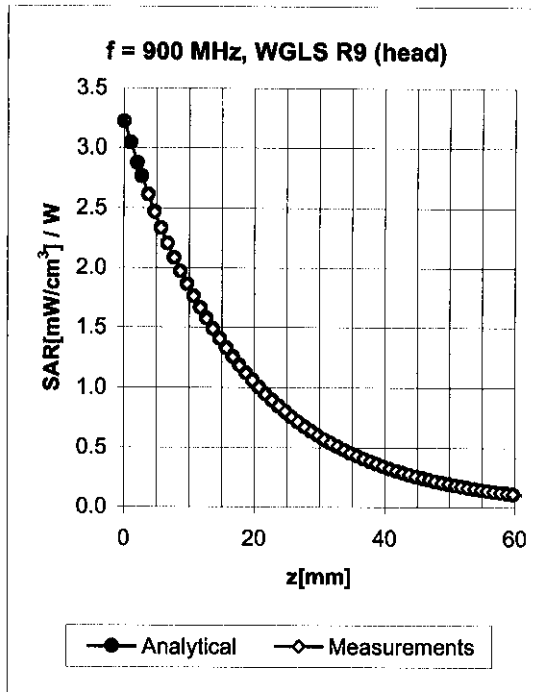
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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



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

Conversion Factor Assessment

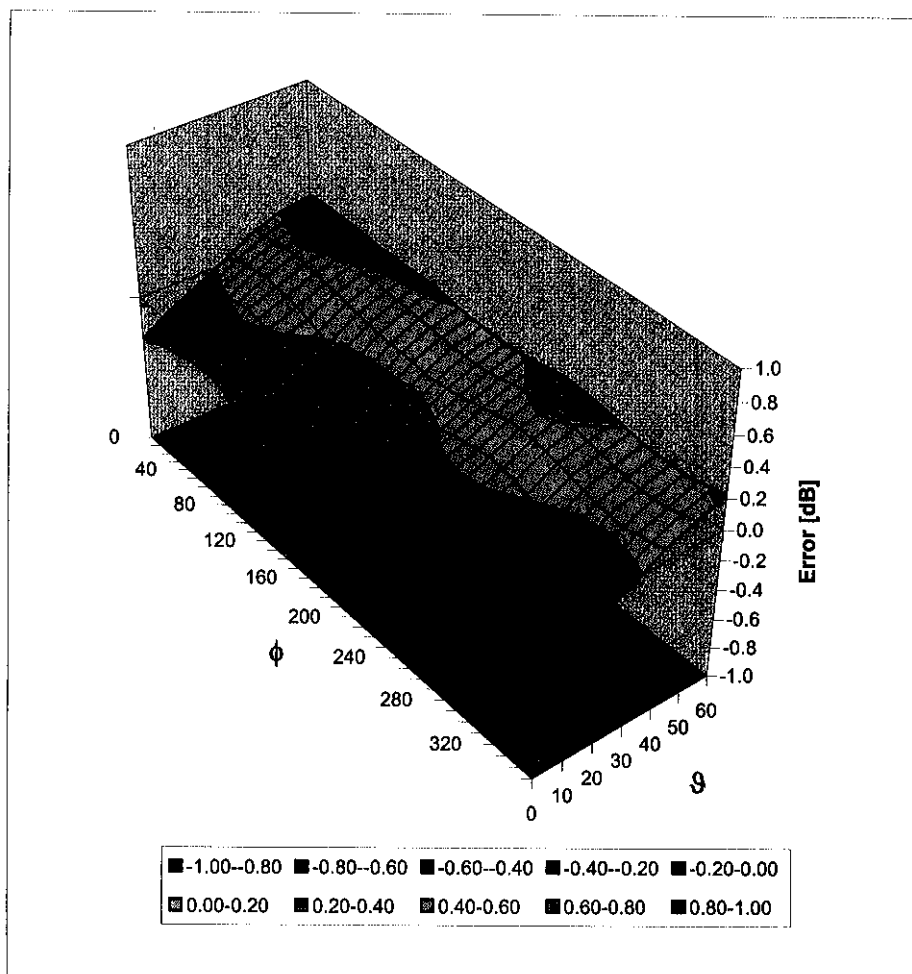


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.52	1.80	6.77 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.49	1.89	6.63 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.45	2.80	5.36 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.47	2.59	5.11 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.48	2.18	4.44 ± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.48	2.00	6.53 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.44	2.12	6.21 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.53	2.67	4.77 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.64	2.35	4.56 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.61	2.29	4.07 ± 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: $\pm 2.6\%$ ($k=2$)



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 **Sony Ericsson Lund**

Certificate No: **D1900V2-5d002_Mar05**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d002**

Calibration procedure(s) **QA CAL-05.v6
Calibration procedure for dipole validation kits**

Calibration date: **March 15, 2005**

Condition of the calibrated item **In Tolerance**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Power sensor HP 8481A	US37292783	12-Oct-04 (METAS, No. 251-00412)	Oct-05
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference Probe ET3DV6	SN 1507	26-Oct-04 (SPEAG, No. ET3-1507_Oct04)	Oct-05
DAE4	SN 601	07-Jan-05 (SPEAG, No. DAE4-601_Jan05)	Jan-06
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

Calibrated by: **Judith Müller** Name
Laboratory Technician Function

Approved by: **Katja Pokovic** Name
Technical Manager Function

Signature

[Handwritten signature of Judith Müller]
[Handwritten signature of Katja Pokovic]

Issued: March 16, 2005

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



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**

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	V4.5
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 $\pm$ 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 $\pm$ 0.2) °C	39.6 $\pm$ 6 %	1.45 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.5 $\pm$ 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	9.81 mW / g
SAR normalized	normalized to 1W	39.2 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	38.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.15 mW / g
SAR normalized	normalized to 1W	20.6 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	20.1 mW / g $\pm$ 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	51.6 ± 6 %	1.58 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 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	9.91 mW / g
SAR normalized	normalized to 1W	39.6 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	37.9 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.23 mW / g
SAR normalized	normalized to 1W	20.9 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	20.0 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	$52.8 \Omega + 2.0 j\Omega$
Return Loss	- 29.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.5 \Omega + 2.7 j\Omega$
Return Loss	- 30.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.178 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	February 14, 2002

DASY4 Validation Report for Head TSL

Date/Time: 09.03.2005 15:20:45

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d002

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL 1900 MHz;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.96, 4.96, 4.96); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0; Type: QD000P50AA; Serial: 1001;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.4 mW/g

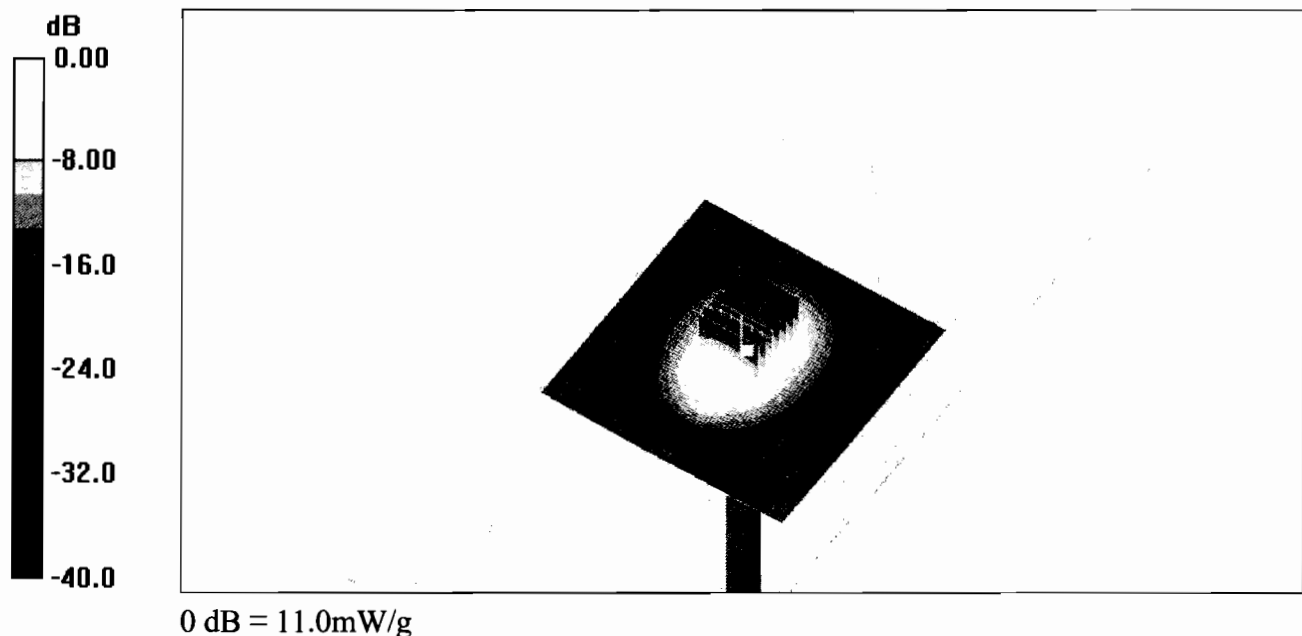
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 91.4 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.81 mW/g; SAR(10 g) = 5.15 mW/g

Maximum value of SAR (measured) = 11.0 mW/g



Impedance Measurement Plot for Head TSL

9 Mar 2005 10:14:39

CH1 S11 1 U FS 1: 52.820 Ω 2.0293 Ω 169.99 μH 1 900.000 000 MHz

*

De1

Cor

Avg
16

↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-29.440 dB 1 900.000 000 MHz

Cor

↑

CENTER 1 900.000 000 MHz

SPAN 400.000 000 MHz

DASY4 Validation Report for Body TSL

Date/Time: 15.03.2005 15:20:32

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d002

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL 1900 MHz;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.43, 4.43, 4.43); Calibrated: 26.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.01.2005
- Phantom: Flat Phantom 5.0; Type: QD000P50AA; Serial: 1001;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.4 mW/g

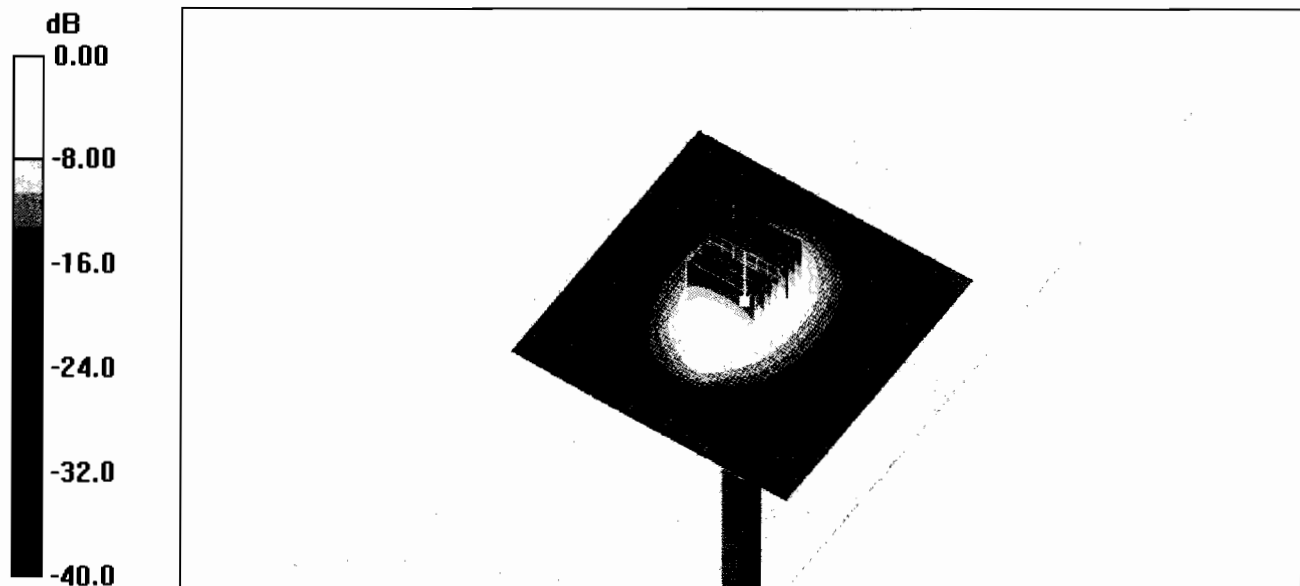
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.3 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.91 mW/g; SAR(10 g) = 5.23 mW/g

Maximum value of SAR (measured) = 11.3 mW/g



0 dB = 11.3mW/g

Impedance Measurement Plot for Body TSL

15 Mar 2005 11:48:46
[CH1] S11 1 U FS 1: 48.463 Ω 2.6895 Ω 225.28 μ H 1 900.000 000 MHz

*
De1
Cor

Avg
16

↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-30.040 dB 1 900.000 000 MHz

Cor

Avg
16

↑

CENTER 1 900.000 000 MHz SPAN 400.000 000 MHz