

Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/ NMC *Mats Hansson*

Checked

060726

Company Internal  
REPORT

No.

*BGGIN06:359*

Date

060725

Rev

A

Reference

File

**Report issued by Accredited SAR Laboratory****For***PY7AD022043 (K610im)***Date of test:** *20 to 24, July, 2006***Laboratory:** Sony Ericsson SAR Test Laboratory  
Sonyericsson Mobile Communications AB  
Nya Vattentornet  
SE-221 82 LUND, Sweden**Testing Engineer:** *Hamid Kami Shirazi*  
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*+46 46232644***Testing Approval** *Mats Hansson*  
*Mats.Hansson@sonyericsson.com*  
*+46 4619 33 57***Statement of Compliance**

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

***Sony Ericsson Type AAD-3022043-BV; FCC ID: PY7AD022043; IC:4170B-AD022043***

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.

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## 2 Introduction

In this test report, compliance of the Sony Ericsson PY7AD022043 (K610im) 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

<b>Type</b>	Internal antenna	
<b>Location</b>	Inside, Back, at the Top	
<b>Dimensions</b>	Max length	38mm
	Max width	16mm
<b>Configuration</b>	PIFA	

### 3.2 Device description

<b>Device model</b>	PY7AD022043(K610im)		
<b>Serial number</b>	BC5107ZXEW		
<b>Mode</b>	GSM1900		
<b>Crest Factor</b>	8.3		
<b>Multiple Access Scheme</b>	TDMA		
<b>Maximum Output Power Setting (dBm)</b>	Ch512	Ch661	Ch810
	30.5	30.5	30.5
<b>Factory Tolerance in Power Setting</b>	±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	31.0	31.0	31.0
<b>Mode</b>	GPRS2TX and EGPRS2TX		
<b>Crest Factor</b>	4.15		
<b>Maximum Output Power Setting dBm</b>	Ch512	Ch661	Ch810
	30.5	30.5	30.5
<b>Factory Tolerance in Power Setting</b>	±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	31.0	31.0	31.0
<b>Transmitting Frequency Range(MHz)</b>	1850.2 – 1909.8		
<b>Prototype or Production Unit</b>	Preproduction		
<b>Device Category</b>	Portable		
<b>RF exposure environment</b>	General population / uncontrolled		



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## 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.

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

### 4.2 Additional equipment

<b>Description</b>	<b>Inventory Number</b>	<b>Due Date</b>
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



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## 5 Electrical parameters on the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity,  $\epsilon_r$ , and the conductivity,  $\sigma$ , of the tissue simulating liquids were measured with the dielectric probe kit. These values are shown in the table below. The mass density,  $\rho$ , entered into the DASY4 software is also given.

Recommended limits for permittivity  $\epsilon_r$ , conductivity  $\sigma$  and mass density  $\rho$  are also shown.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			$\epsilon_r$	$\sigma$ (S/m)	$\rho$ (g/cm <sup>3</sup> )
1900	Head	Measured, 20/July/2006	38.9	1.43	1.00
		Recommended	40.0	1.40	1.00
	Body	Measured, 24/July/2006	50.7	1.46	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 (22-23) %. 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)
				$\epsilon_r$	$\sigma$ (S/m)	$\rho$ (g/cm <sup>3</sup> )	
1900	Head	Measured, 20/July/2006	38.6/20.2	38.9	1.43	1.00	22±0.2
		Reference	39.2/20.6	39.6	1.45	1.00	22±0.2
	Body	Measured, 24/July/2006	39.1/21.0	50.7	1.46	1.00	22±0.2
		Reference	39.6/20.9	51.6	1.58	1.00	22±0.2



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## 7 SAR measurement uncertainty

### SAR measurement uncertainty evaluation for Sonyericsson PY7AD022043 (K610im) phone

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C <sub>i</sub>	GSM 1900-Head	GSM 1900-Body
<b>Measurement System</b>						
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
<b>Measurement System Uncertainty</b>					<b>±8.0</b>	<b>±8.0</b>
<b>Test Sample Related</b>						
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	±(0.3/0.0)	R	√3	1	-0.2	-0.0
<b>Test Sample Related Uncertainty</b>					<b>±5.0</b>	<b>±5.0</b>
<b>Phantom and Tissue Parameters</b>						
Phantom uncertainty	±4.0	R	√3	1	±2.3	±2.3
Liquid conductivity (measurement)	±(2.1/3.9)	N	1	0.64	-1.3	-2.5
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8	±1.8
Liquid Permittivity (measurement)	±(2.8/4.9)	N	1	0.6	-1.7	-3.0
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7	±1.7
<b>Phantom and Tissue Parameters Uncertainty</b>					<b>±4.0</b>	<b>±5.2</b>
<b>Combined standard uncertainty</b>					<b>±10.3</b>	<b>±10.8</b>
<b>Extended standard uncertainty (k=2)</b>					<b>±20.6</b>	<b>±21.6</b>



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## 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 24%-28% and 24°C–25°C respectively. The depth of tissue simulating liquid for head and body are 15.3cm 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 both speech and Data (EGPRS and GPRS) mode. For all modes, 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.

Mode	Channel	Power (dB)	Phone Position	Liquid t (°C)	SAR (W/kg)	
					Right-hand	Left-hand
					1g mass	1g mass
1900 GSM Head	512	31	Cheek	22±0.2	0.72	0.63
			Tilt	22±0.2	0.62	0.63
	661	31	Cheek	22±0.2	0.87	0.74
			Tilt	22±0.2	0.79	0.78
	810	31	Cheek	22±0.2	<b>1.06</b>	0.82
			Tilt	22±0.2	1.02	0.95

Table1: SAR measurement result for Sony Ericsson PY7AD022043 (K610im) 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	31	Antenna to phantom Blue Tooth	22±0.2	0.34
		31	Antenna to phantom EGPRS2TX	22±0.2	0.59
	661	31	Antenna to phantom Blue Tooth	22±0.2	0.36
		31	Antenna to phantom EGPRS2TX	22±0.2	<b>0.75</b>
	810	31	Front to phantom EGPRS2TX	22±0.2	0.33
			31	Antenna to phantom Blue Tooth	22±0.2
	31	Antenna to phantom EGPRS2TX	22±0.2	0.69	

Table2: SAR measurement result for Sony Ericsson PY7AD022043 (K610im) telephone at highest possible output power. The phone has measured against the Body.



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## 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.



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## 10 Appendix

### 10.1 Photographs of the device under test



Front & Back side



Back with Battery



Down Connector



Sides



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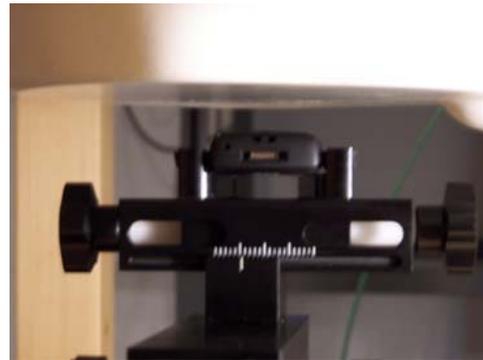
## 10.2 Device position on SAM Twins Phantom



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



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### 10.3 Attachment

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

Date/Time: 2006-07-24 08:32:51

Test Laboratory: Sony Ericsson Mobile Communications AB

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

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 50.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 (71x81x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 4.49 mW/g

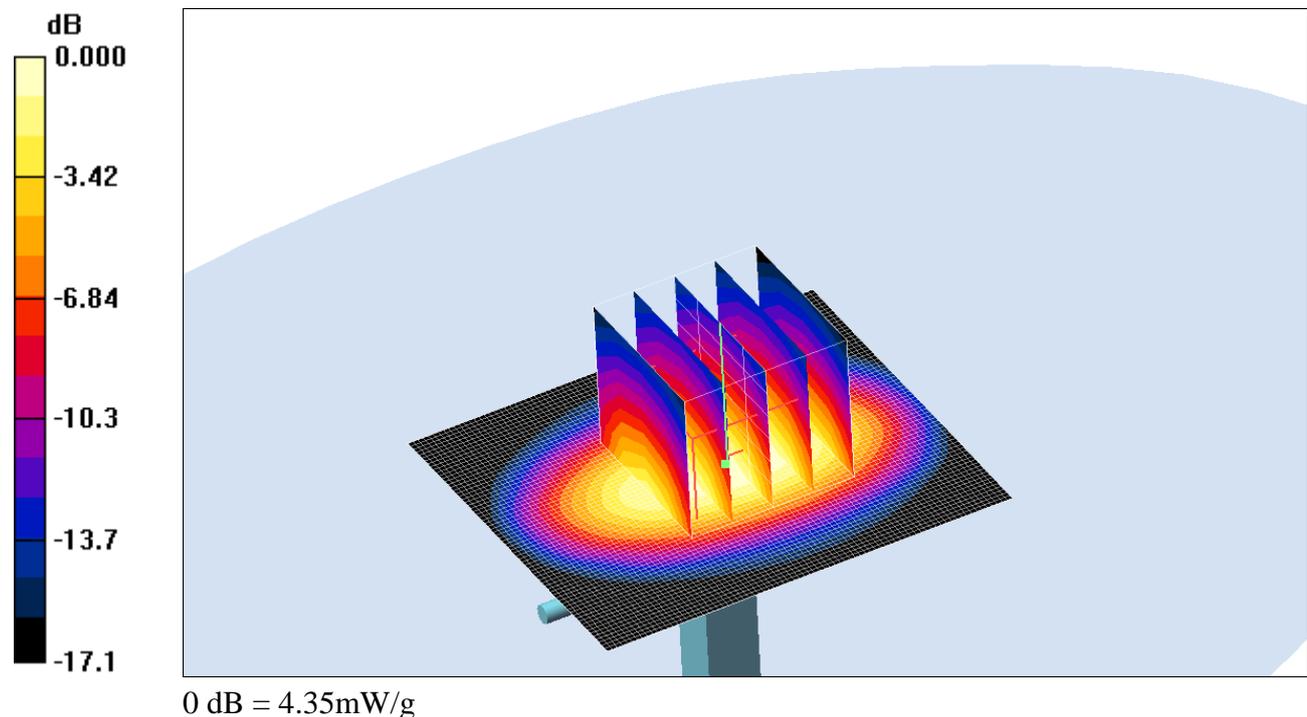
**d=10mm, Pin=100mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 58.1 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 6.59 W/kg

**SAR(1 g) = 3.91 mW/g; SAR(10 g) = 2.1 mW/g**

Maximum value of SAR (measured) = 4.35 mW/g



Date/Time: 2006-07-20 09:31:57

Test Laboratory: Sony Ericsson Mobile Communications AB

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

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 (61x81x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 4.44 mW/g

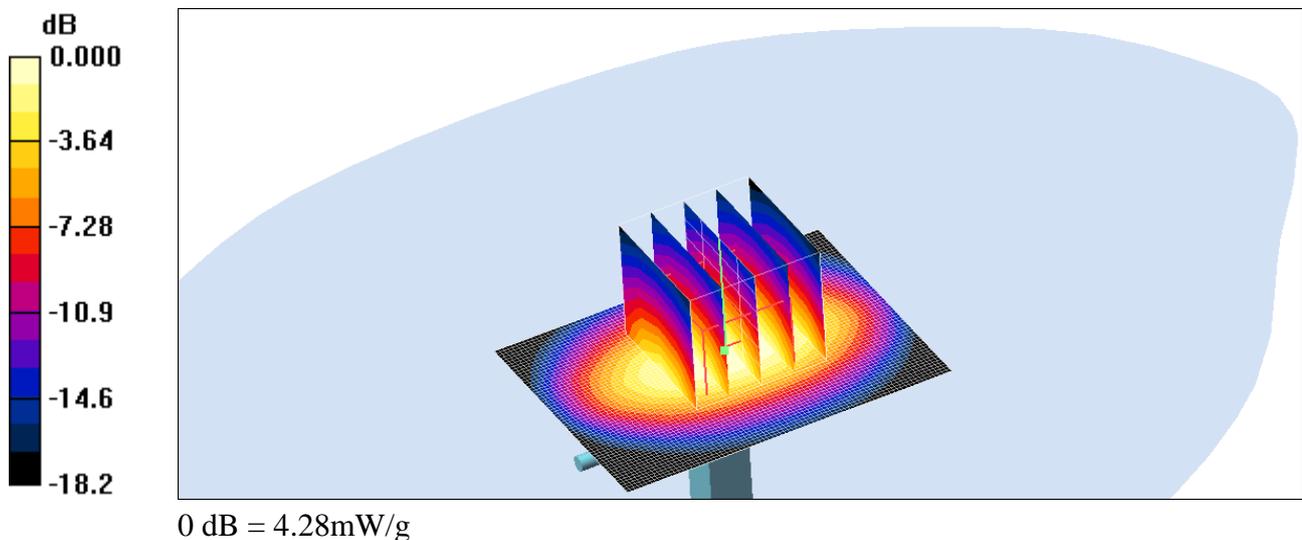
**d=10mm, Pin=100mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.4 V/m; Power Drift = -0.083 dB

Peak SAR (extrapolated) = 6.78 W/kg

**SAR(1 g) = 3.86 mW/g; SAR(10 g) = 2.02 mW/g**

Maximum value of SAR (measured) = 4.28 mW/g



Date/Time: 2006-07-24 08:45:18

Test Laboratory: Sony Ericsson Mobile Communications AB

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

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 50.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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)

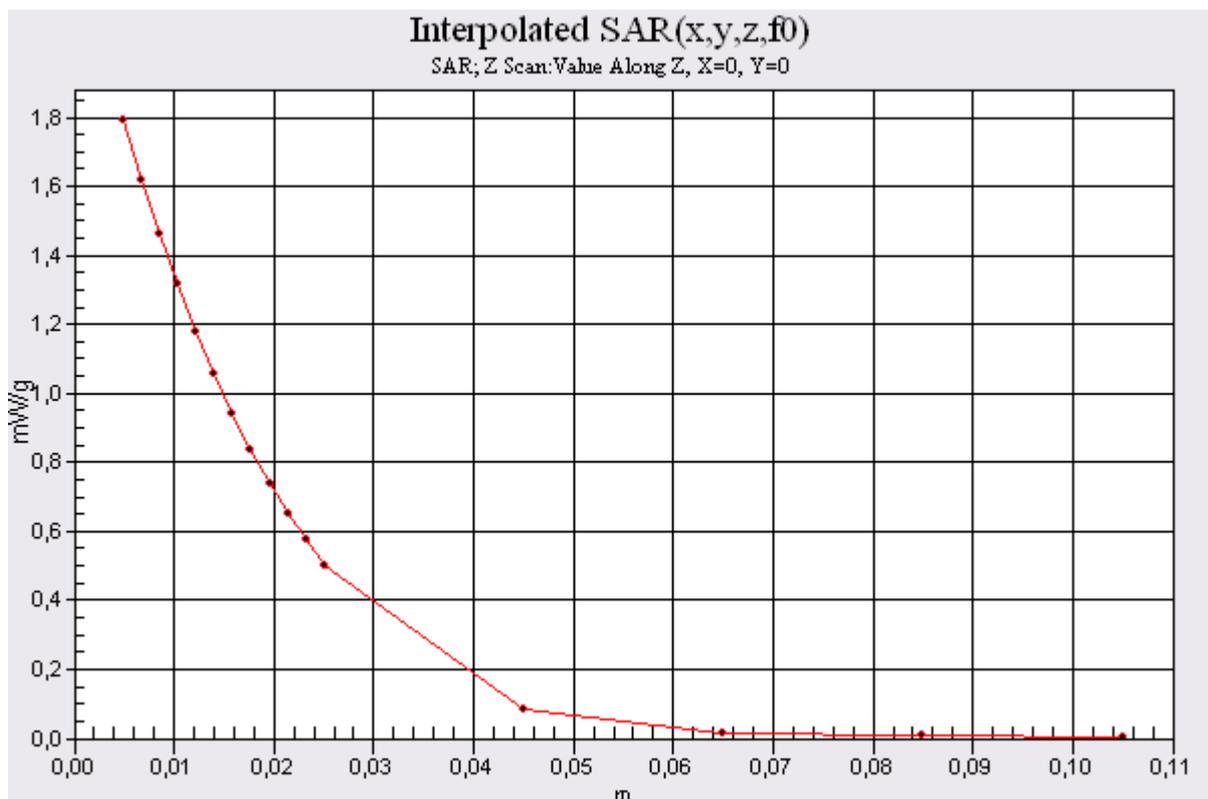
- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- 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=20mm, dy=20mm, dz=20mm

Maximum value of SAR (interpolated) = 1.79 mW/g



Date/Time: 2006-07-20 09:43:30

Test Laboratory: Sony Ericsson Mobile Communications AB

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

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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)

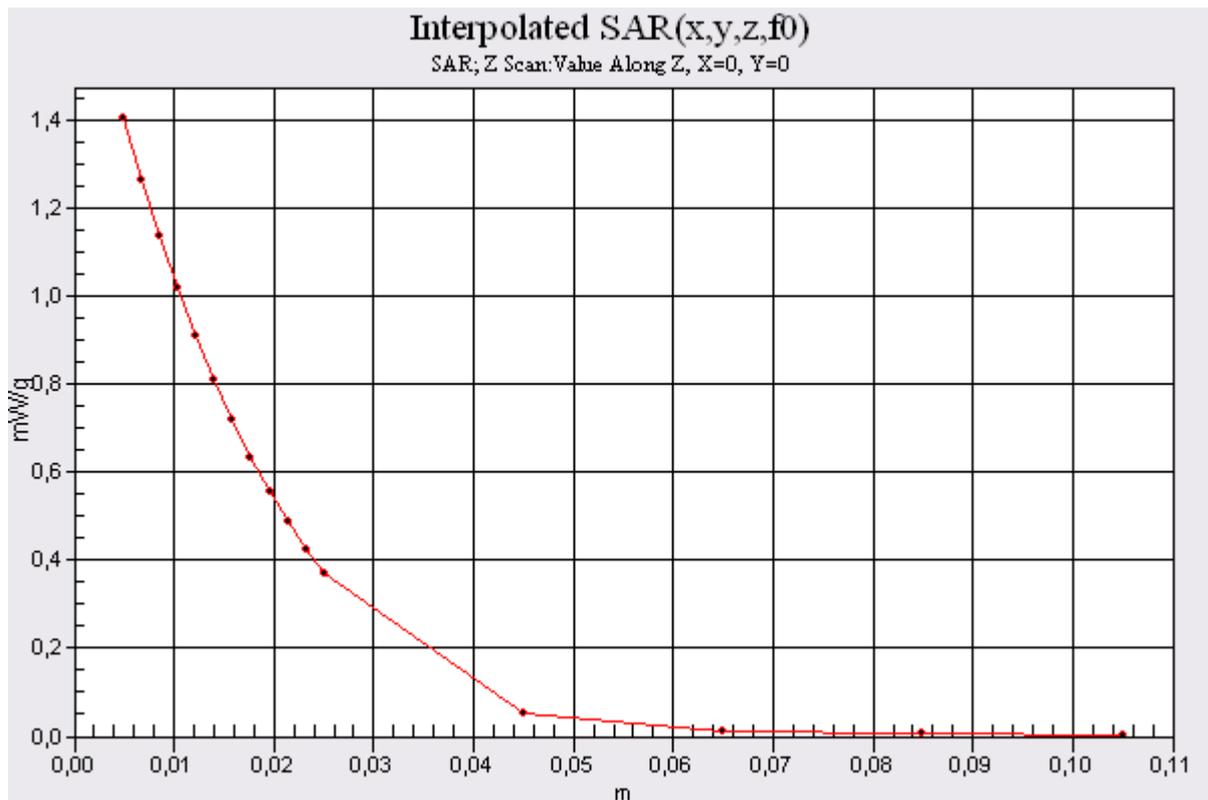
- Electronics: DAE3 Sn419; Calibrated: 2006-03-08

- 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=20mm, dy=20mm, dz=20mm

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



Date/Time: 2006-07-20 14:06:29

Test Laboratory: Sony Ericsson Mobile Communications AB

**DUT: #5261; Type: PY7AD022043; Serial: CB5107ZXEW**

Communication System: DCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 - High/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.06 mW/g

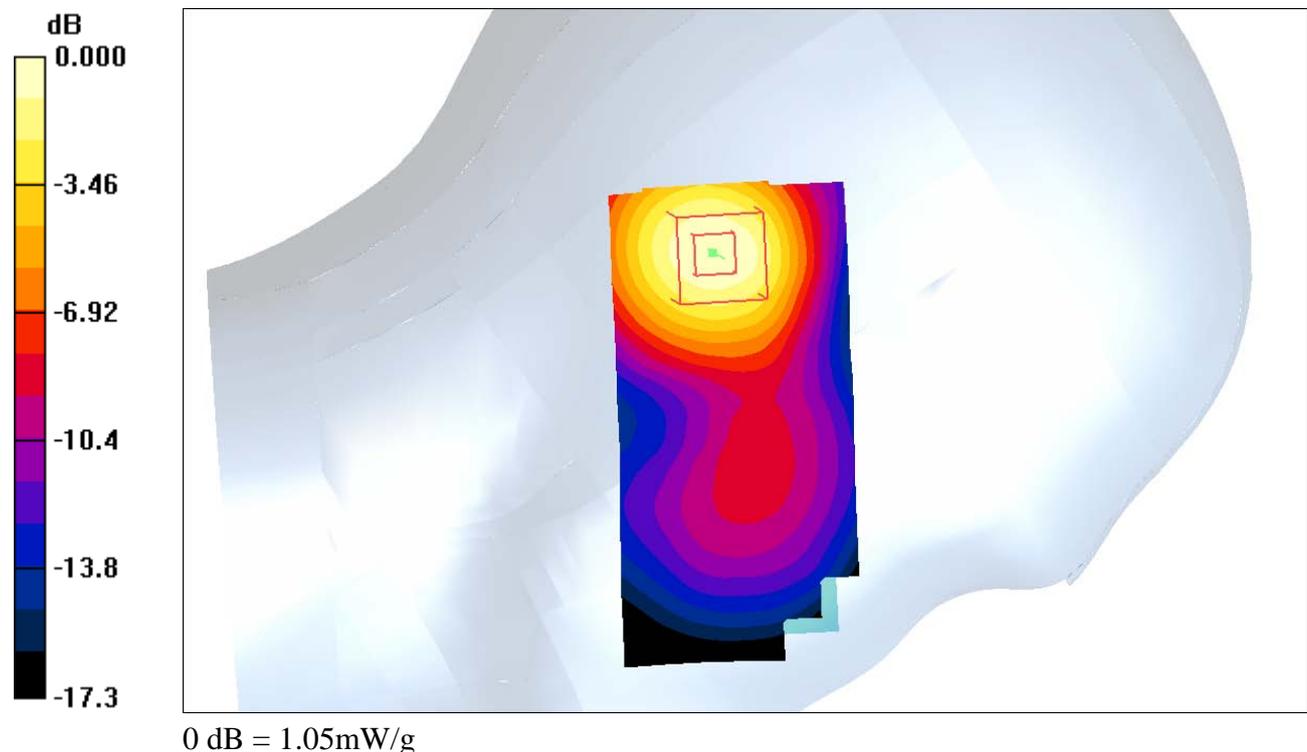
**Tilt position - High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.1 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 1.58 W/kg

**SAR(1 g) = 0.947 mW/g; SAR(10 g) = 0.524 mW/g**

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



Date/Time: 2006-07-20 10:44:55

Test Laboratory: Sony Ericsson Mobile Communications AB

**DUT: #5261; Type: PY7AD022043; Serial: CB5107ZXEW**

Communication System: DCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 - High/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.20 mW/g

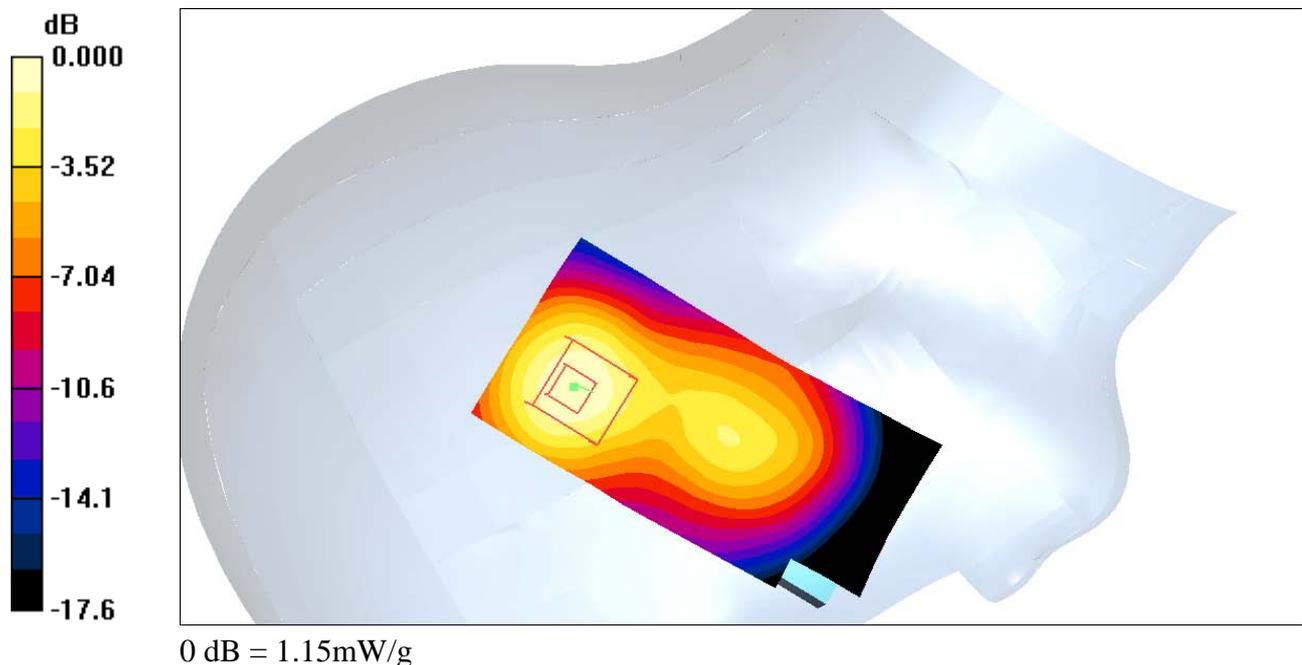
**Touch position - High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.5 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 1.78 W/kg

**SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.597 mW/g**

Maximum value of SAR (measured) = 1.15 mW/g



Date/Time: 2006-07-20 13:50:26

Test Laboratory: Sony Ericsson Mobile Communications AB

**DUT: #5261; Type: PY7AD022043; Serial: CB5107ZXEW**

Communication System: DCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 - High/Area Scan 2 (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.881 mW/g

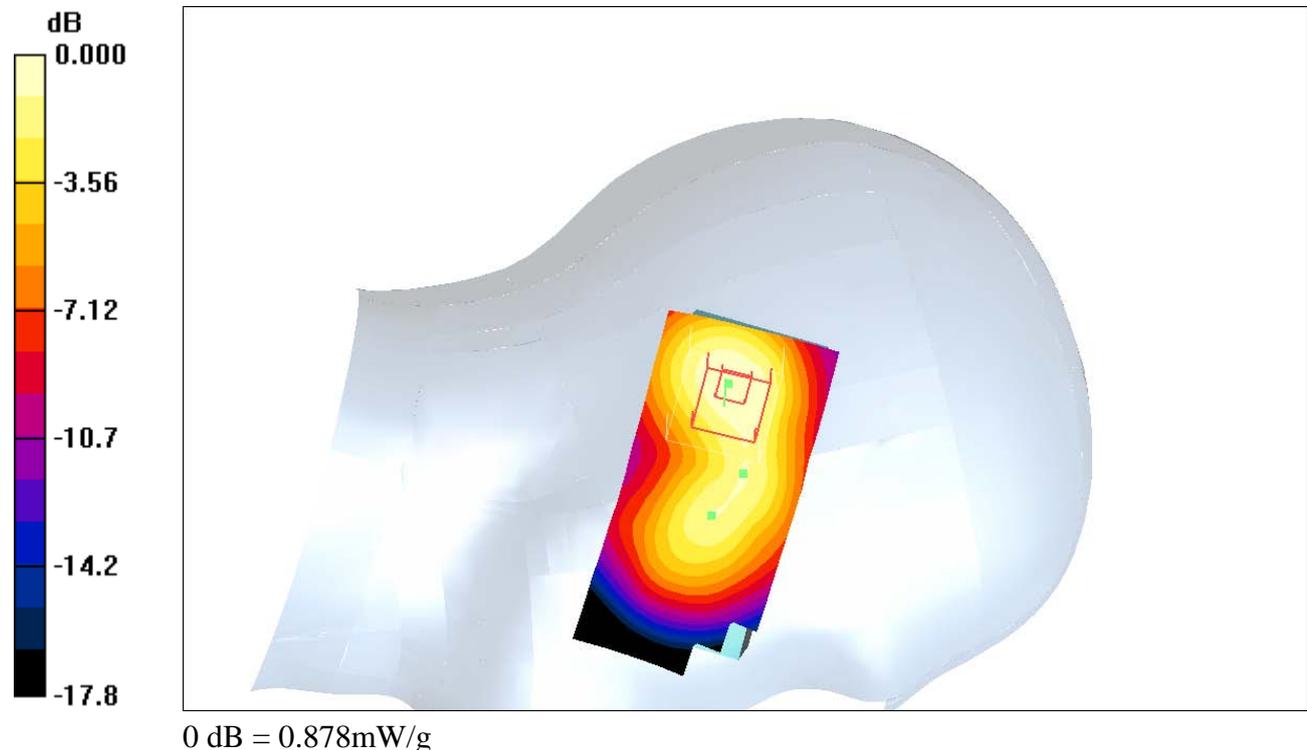
**Touch position - High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.1 V/m; Power Drift = -0.003 dB

Peak SAR (extrapolated) = 1.30 W/kg

**SAR(1 g) = 0.815 mW/g; SAR(10 g) = 0.480 mW/g**

Maximum value of SAR (measured) = 0.878 mW/g



Date/Time: 2006-07-24 13:08:05

Test Laboratory: Sony Ericsson Mobile Communications AB

**DUT: #5261; Type: PY7AD022043; Serial: CB5107ZXEW**

Communication System: GSM1900 GPRS2TX; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.45$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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,Front,Middle;EGPRS2TX/Area Scan (61x131x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.363 mW/g

**d=15mm,Front,Middle;EGPRS2TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:

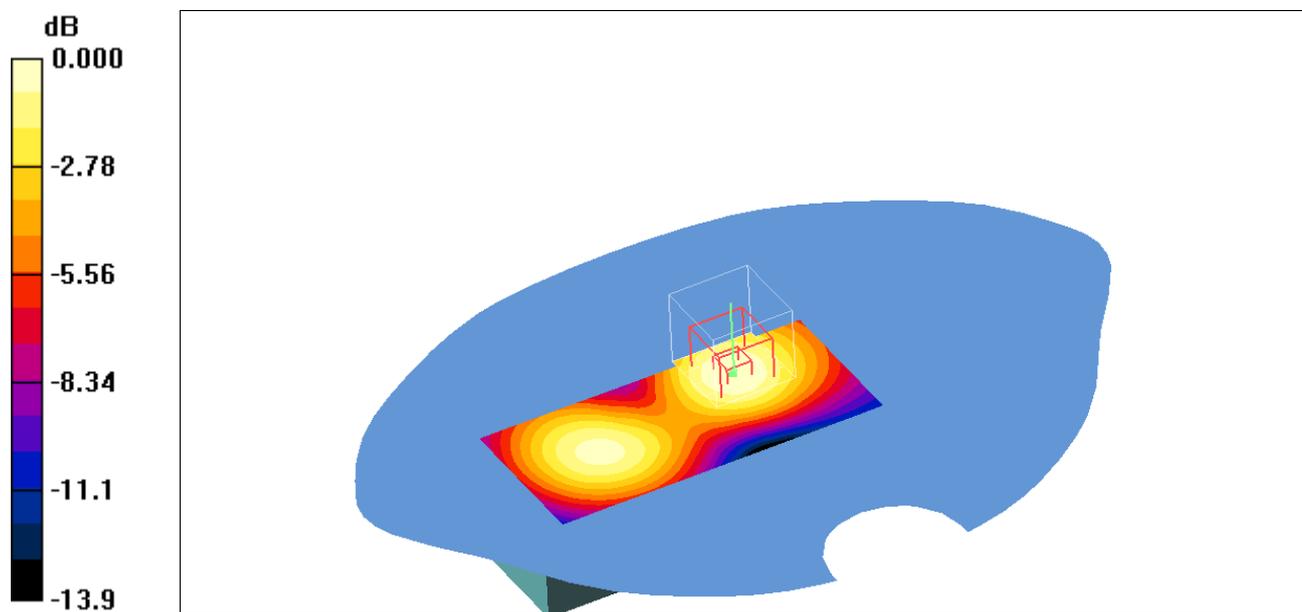
dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.2 V/m; Power Drift = 0.063 dB

Peak SAR (extrapolated) = 0.511 W/kg

**SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.208 mW/g**

Maximum value of SAR (measured) = 0.358 mW/g



0 dB = 0.358mW/g

Date/Time: 2006-07-24 11:23:18

Test Laboratory: Sony Ericsson Mobile Communications AB

**DUT: #5261; Type: PY7AD022043; Serial: CB5107ZXEW**

Communication System: GSM1900 GPRS2TX; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.45$  mho/m;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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;EGPRS2TX/Area Scan (61x131x1):** Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.819 mW/g

**d=15mm,Back,Middle;EGPRS2TX/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:

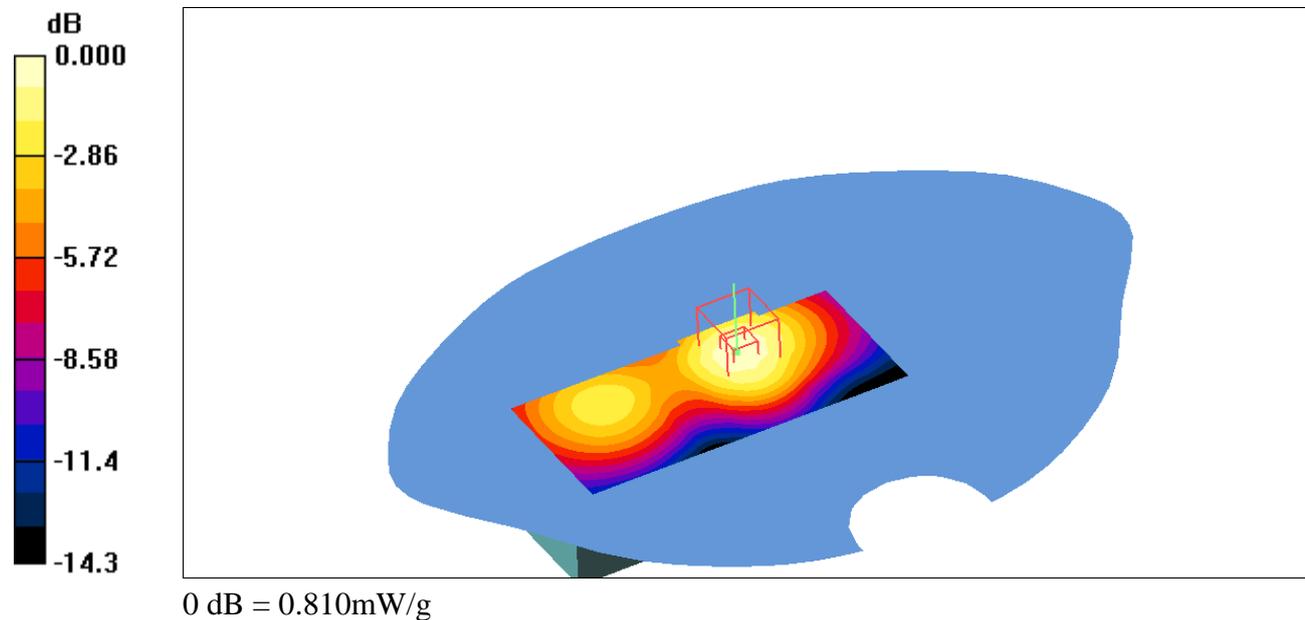
dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.1 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.745 mW/g; SAR(10 g) = 0.456 mW/g**

Maximum value of SAR (measured) = 0.810 mW/g



Date/Time: 2006-07-20 11:05:18

Test Laboratory: Sony Ericsson Mobile Communications AB

**DUT: #5261; Type: PY7AD022043; Serial: CB5107ZXEW**

Communication System: DCS 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.44$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 - High/Area Scan (61x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.15 mW/g

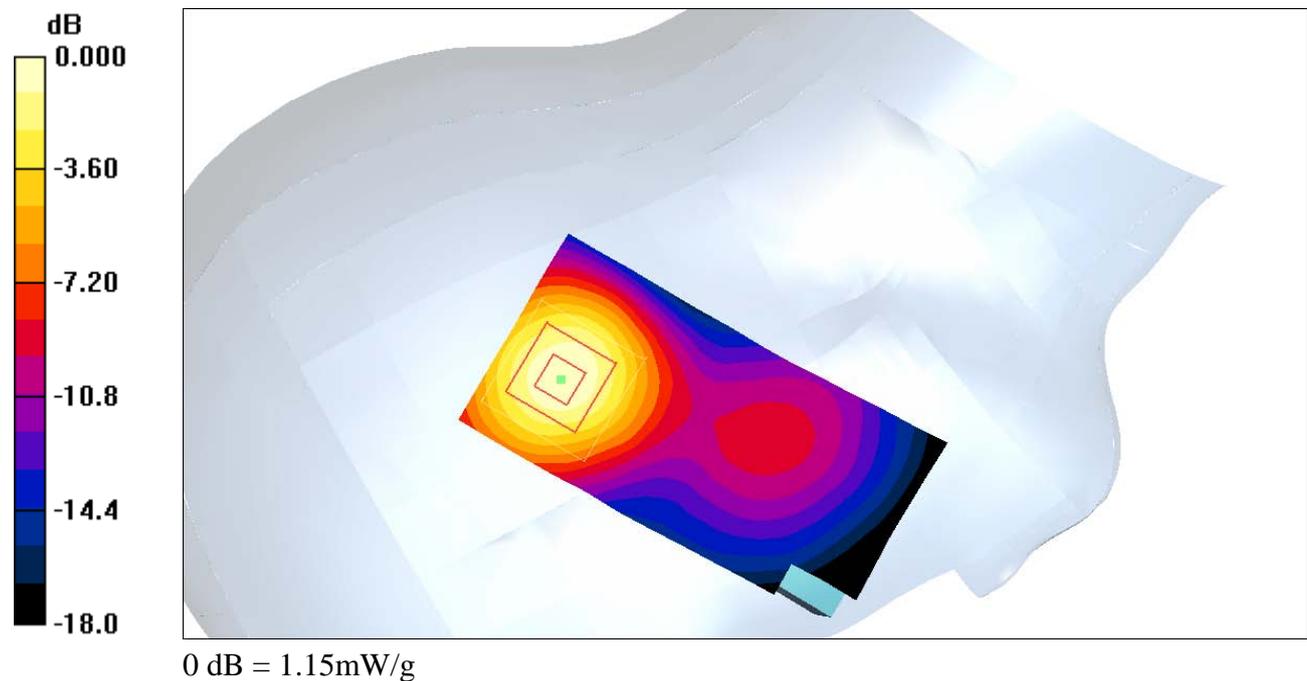
**Tilt position - High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.1 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 1.74 W/kg

**SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.557 mW/g**

Maximum value of SAR (measured) = 1.15 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/m<sup>3</sup>

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

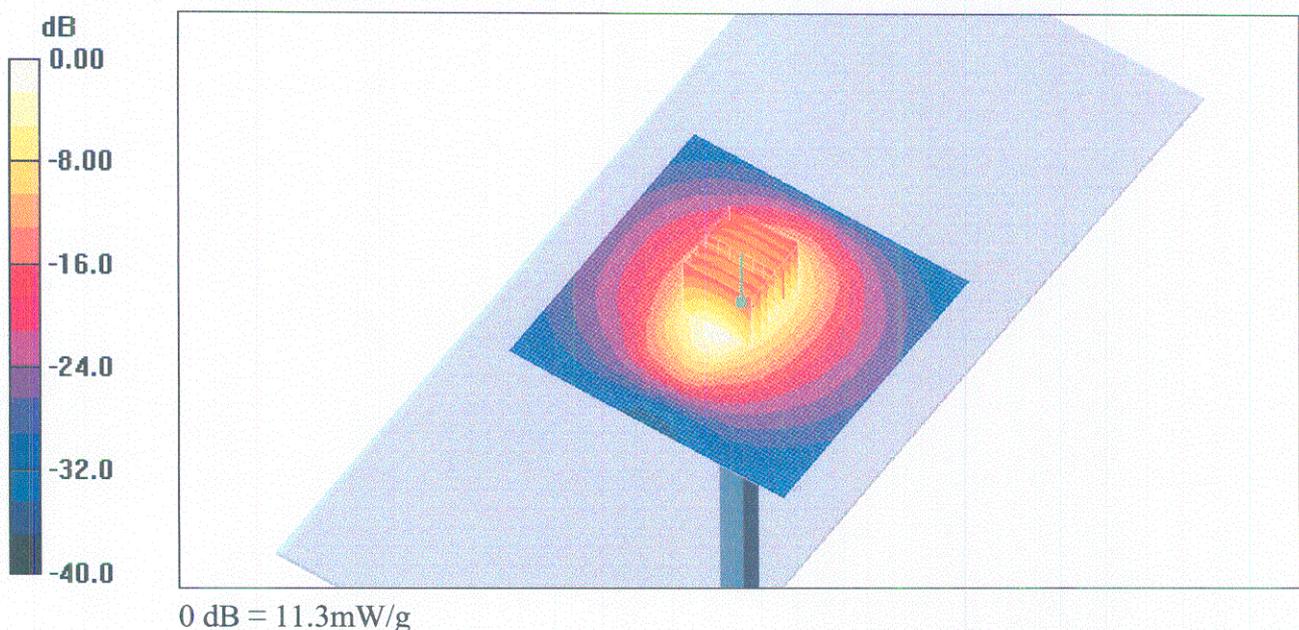
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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/m<sup>3</sup>

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

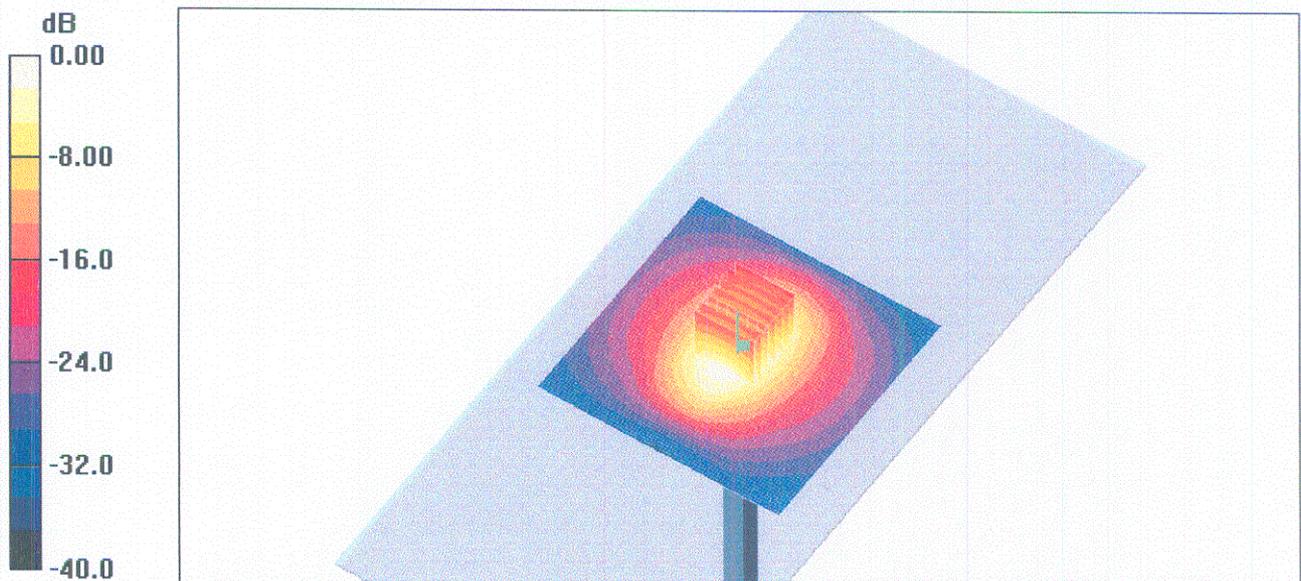
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 11.0mW/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 ( $22 \pm 3$ )°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

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

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 <sub>x,y,z</sub>	sensitivity in free space
ConF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ 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<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* 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<sub>x,y,z</sub>**: 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<sub>x,y,z</sub> \* 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  $\pm 50$  MHz to  $\pm 100$  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<sup>A</sup>

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

### Diode Compression<sup>B</sup>

### 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		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	7.5	4.1
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.1

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

Sensor Center to Phantom Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	6.0	3.2
SAR <sub>be</sub> [%]	With Correction Algorithm	0.2	0.3

### Sensor Offset

Probe Tip to Sensor Center                      **2.7 mm**

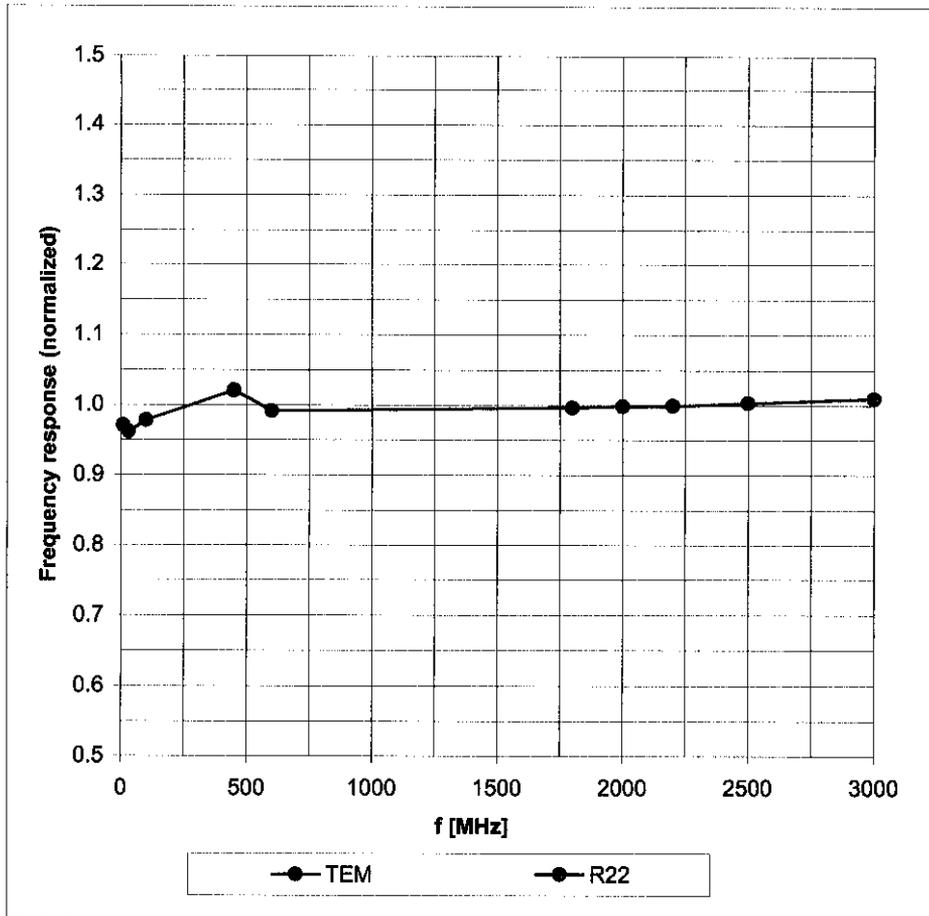
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

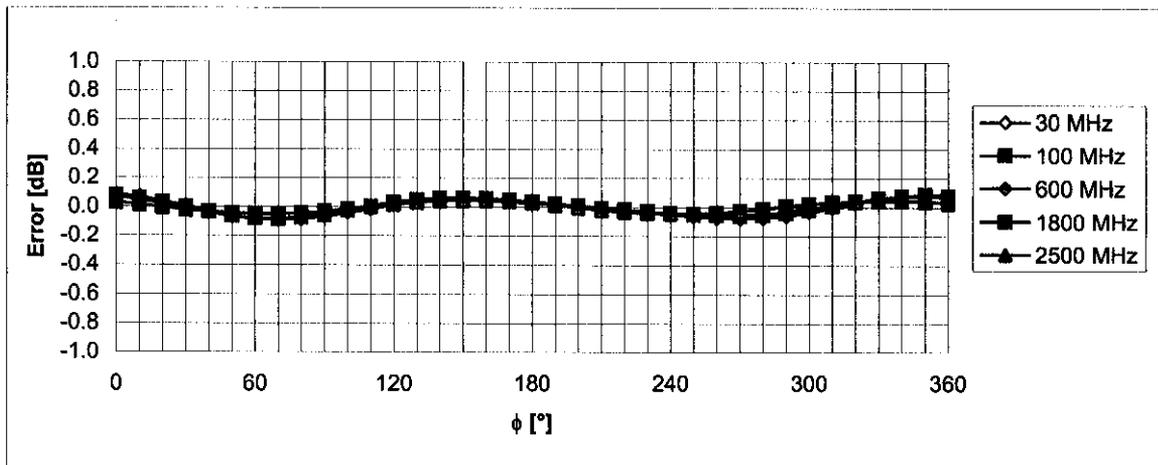
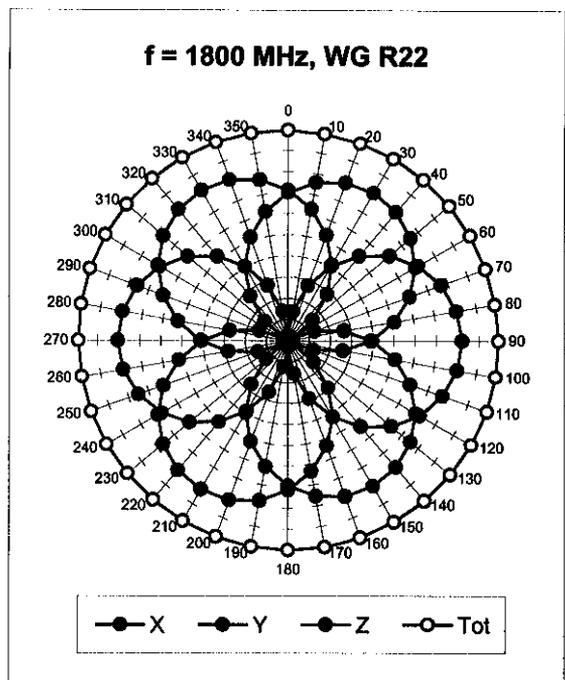
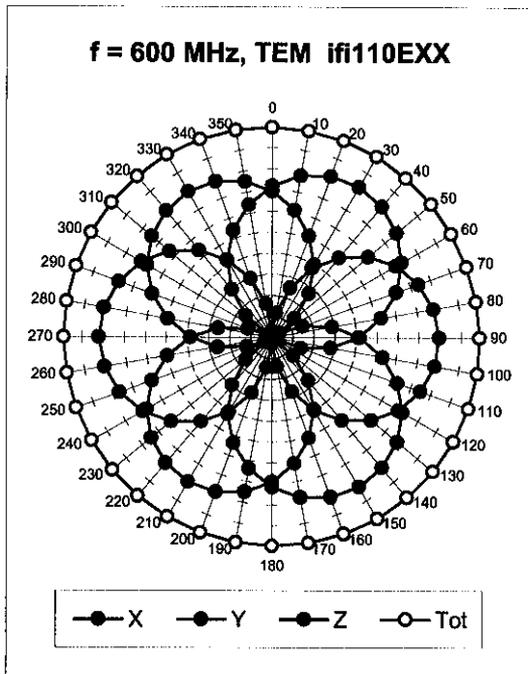
# Frequency Response of E-Field

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



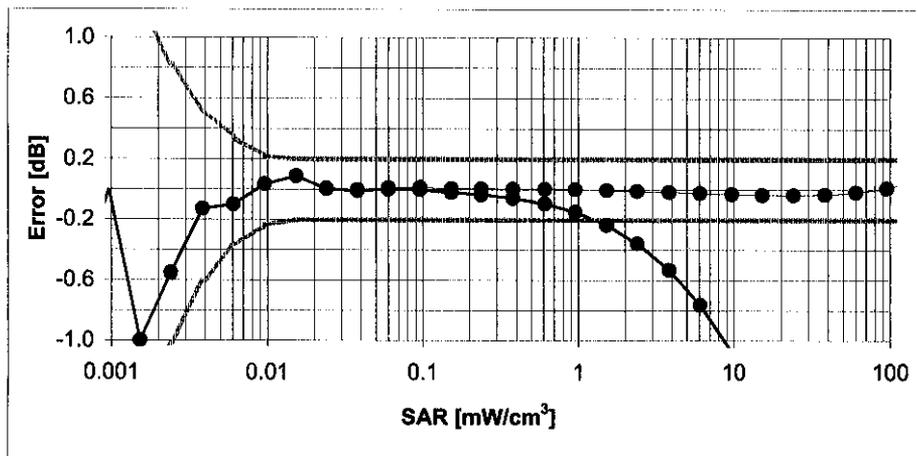
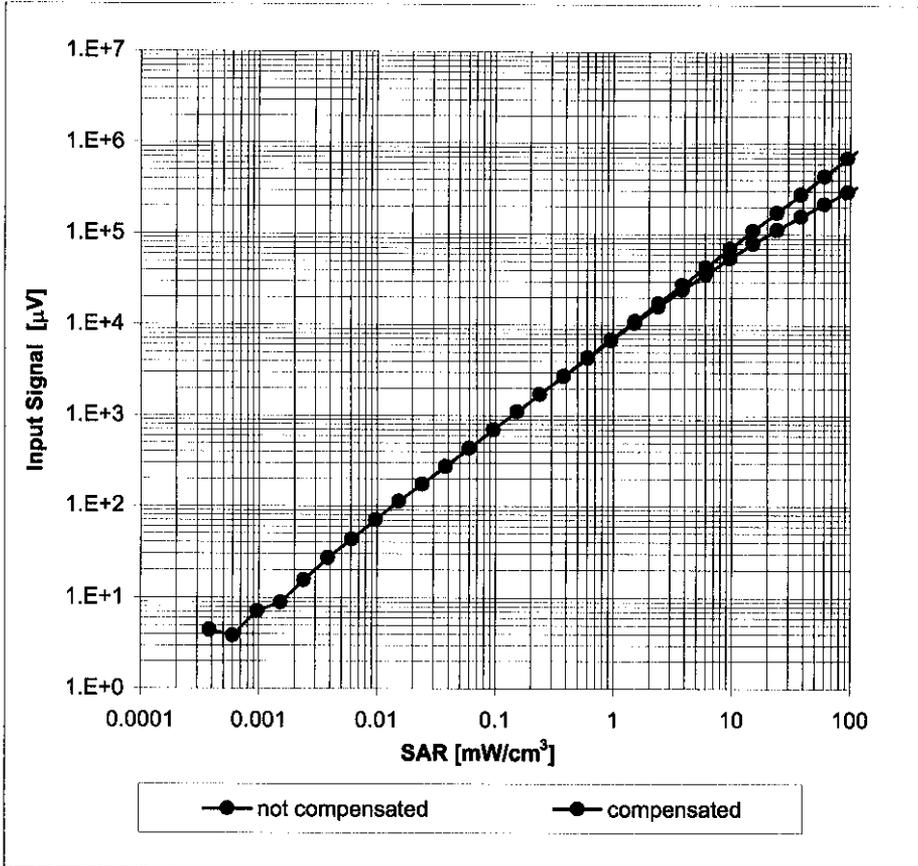
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



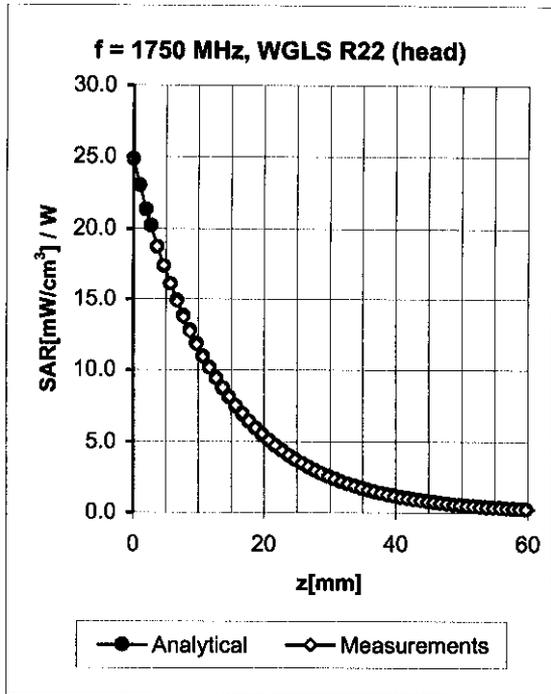
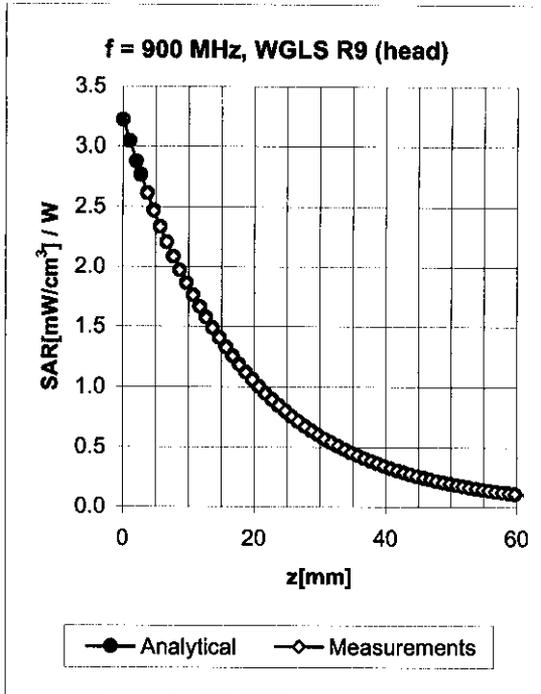
**Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)**

## 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

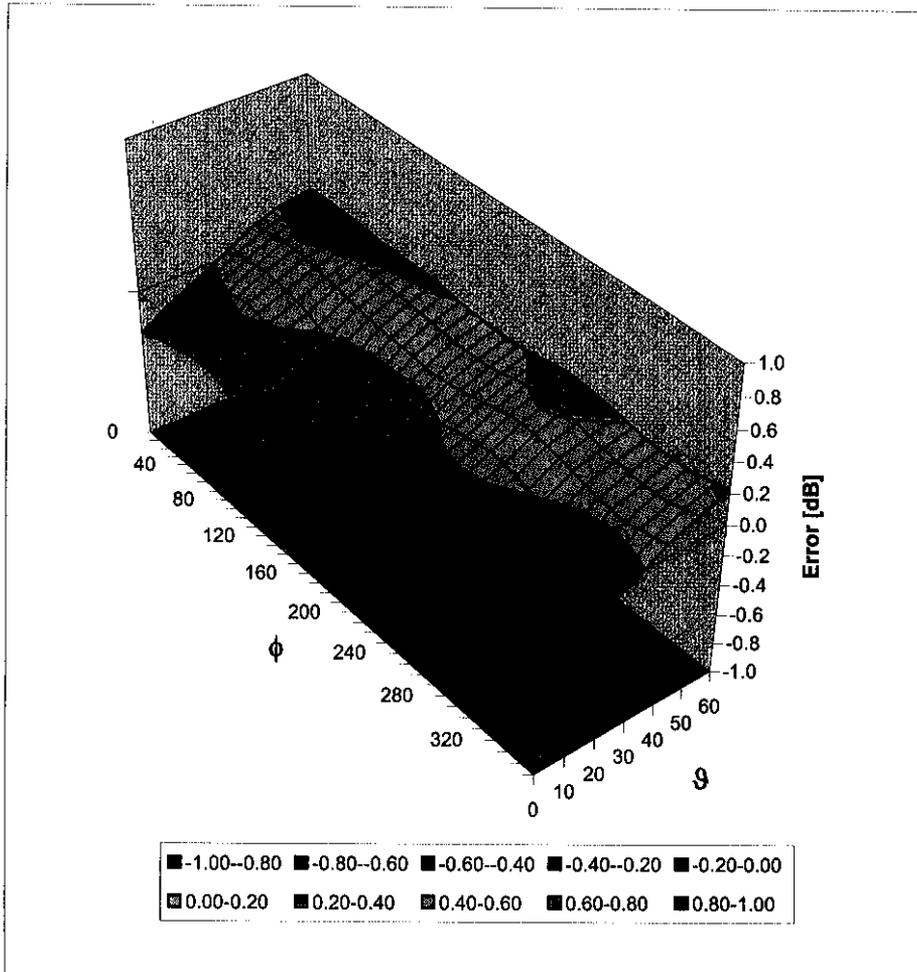


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.52	1.80	6.77 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.49	1.89	6.63 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.45	2.80	5.36 ± 11.0% (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)

<sup>c</sup> 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 ( $\phi$ ,  $\vartheta$ ),  $f = 900$  MHz



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