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LD/SEMC/BGLIM *Ramadan Plicanic*

Approved

LD/SEMC/BGLIMC *Peter Lindeborg*

Checked

080108

Company Internal  
REPORT

No.

BGLI08:004

Date

080104

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## Report issued by Accredited SAR Laboratory

### For

*PY7A1042041 (W380a)*

**Date of test:** *09, 15, 16 and 19 November 2007*

**Laboratory:** Sony Ericsson SAR Test Laboratory  
Sonyericsson Mobile Communications AB  
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### Statement of Compliance

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

***Sony Ericsson Type AAB-1032051-BV; FCC ID: PY7A1032051; IC:4170B-A1032051***

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 (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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## 2 Introduction

In this test report, compliance of the Sony Ericsson PY7A1032051 (W380a) 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, Rear, on the bottom	
<b>Dimensions</b>	Max length	42mm
	Max width	11mm
<b>Configuration</b>	PIFA	

### 3.2 Device description

<b>Device model</b>	PY7A1032051(w380a)					
<b>Serial number</b>	CB510TJQGP (#9522)					
<b>Mode</b>	GSM 850			GSM1900		
<b>Crest Factor</b>	8.3			8.3		
<b>Multiple Access Scheme</b>	TDMA			TDMA		
<b>Output Power (dBm)</b>	Ch128	Ch190	Ch251	Ch512	Ch661	Ch810
	33.5	33.6	33.6	30.5	30.7	30.3
<b>Factory Tolerance in Power Setting</b>	±0.5dB			±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	33.5	33.5	33.5	30.5	30.5	30.5
<b>Transmitting Frequency Range(MHz)</b>	824.2-848.8			1850.2 – 1909.8		
<b>Prototype or Production Unit</b>	Preproduction HW FP2					
<b>Device Category</b>	Portable					
<b>RF exposure environment</b>	General population / uncontrolled					
<b>Mode</b>	GPRS/EDGE			GPRS/EDGE		
<b>Crest Factor</b>	4.15			4.15		
<b>Output Power (dBm)</b>	Ch128	Ch190	Ch251	Ch128	Ch190	Ch251
	33.5/27.9	33.6/27.8	33.6/27.6	30.5/27.0	30.7/27.2	30.3/27.1
<b>Factory Tolerance in Power Setting</b>	±0.5dB			±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	33.5/27.5	33.5/27.5	33.5/27.5	30.5/27.0	30.5/27.0	30.5/27.0
<b>GPRS Multislot class</b>	10			10		
<b>GPRS capability class</b>	B			B		



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## 4 Test equipment

### 4.1 Dosimetric system

SAR measurements were made using the DASY4 professional system (software version 4.7, Build 53) 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>
DASY DAE V1	640	01 2008
E-field probe ES3DV6	3062	01 2008
Dipole Validation Kit, D835V2	4d039	05 2008
Dipole Validation Kit, D1900V2	5d073	05 2008

### 4.2 Additional equipment

<b>Description</b>	<b>Inventory Number</b>	<b>Due Date</b>
Signal generator ESG-D4000A	INV 462935	032008
Directional coupler HP778D	INV 2903	032008
Power meter R&S NRVD	INV 20007668	032008
Power sensor R&S NRV-Z5	INV 20007670	032008
Power sensor R&S NRV-Z5	INV 20007671	032008
Termination 65N50-0-11	INV 2903	032008
Network analyzer HP8753C	INV421671	032008
S-parameter test set HP85047A	INV 421670	032008
Dielectric probe kit HP85070D	INV 20000053	Self cal



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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> )
850	Head	Measured, 09 November 2007	40.6	0.87	1.00
		Recommended	41.5	0.90	1.00
	Body	Measured, 19 November 2007	55.0	0.98	1.00
		Recommended	55.2	0.97	1.00
1900	Head	Measured, 15 November 2007	38.6	1.47	1.00
		Recommended	40.0	1.40	1.00
	Body	Measured, 16 November 2007	52.0	1.58	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 kits listed in section 3.1. Measurement made in ambient temperature (23.1-22.5) °C and humidity (30.1-31) %. 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 0.000029mW/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> )	
850	Head	Measured, 09 Nov. 2007	9.27/6.08	40.6	0.87	1.00	21.7
		Reference	9.29/6.03	41.5	0.90	1.00	22.0
	Body	Measured, 19 Nov. 2007	9.45/6.22	55.0	0.98	1.00	21.1
		Reference	9.66/6.31	55.2	0.97	1.00	22.0
1900	Head	Measured, 15 Nov. 2007	41.1/20.9	38.6	1.47	1.00	21.9
		Reference	38.2/20.3	40.0	1.40	1.00	22.0
	Body	Measured, 16 Nov. 2007	41.2/21.2	52.0	1.58	1.00	22.4
		Reference	41.9/22.2	53.3	1.52	1.00	22.0



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## 7 SAR measurement uncertainty

### SAR measurement uncertainty evaluation for Sonyericsson PY7A1032051 (W380a) phone According to IEEE 1528

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C <sub>i</sub>	1g mass
<b>Measurement System</b>					
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	±1.0
Linearity	±4.7	R	√3	1	±2.7
System Detection Limits	±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
Probe Positioner	±0.4	R	√3	1	±0.2
Probe Positioning	±2.9	R	√3	1	±1.7
Max. SAR Evaluation	±1.0	R	√3	1	±0.6
<b>Measurement System Uncertainty</b>					<b>±8.4</b>
<b>Test Sample Related</b>					
Device positioning	±2.9	N	1	1	±2.9
Device holder uncertainty	±3.6	N	1	1	±3.6
Power drift	±5.0	R	√3	1	±2.9
<b>Test Sample Related Uncertainty</b>					<b>±5.5</b>
<b>Phantom and Tissue Parameters</b>					
Phantom uncertainty	±4.0	R	√3	1	±2.3
Liquid conductivity (measurement)	±2.5	N	1	0.64	±1.6
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8
Liquid Permittivity (measurement)	±2.5	N	1	0.6	±1.5
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7
<b>Phantom and Tissue Parameters Uncertainty</b>					<b>±4.0</b>
<b>Combined standard uncertainty</b>					<b>±10.8</b>
<b>Extended standard uncertainty (k=2)</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 30.1%-31% and 21.1°C–22.2°C respectively. The depth of tissue simulating liquid for head and body were 15.9cm and 15.8cm. 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 mode. The device was tested at the lowest, middle and highest frequencies in the transmit band. For Hands free used Sony Ericsson head set HPH-60 or for BT portable hands free HBH-610a

Mode	Channel	Power (dB)	Phone Position	Liquid t (°C)	SAR (W/kg)	
					Right-hand 1g mass	Left-hand 1g mass
1900 GSM Head	512	30.5	Cheek	22.7	0.67	0.56
			Tilt	22.7	-	-
	661	30.7	Cheek	22.7	0.60	0.53
			Tilt	22.7	0.10	0.09
	810	30.3	Cheek	22.7	0.39	0.35
			Tilt	22.7	-	-
850 GSM Head	128	33.5	Cheek	21.7	0.61	0.66
			Tilt	21.7	-	-
	189	33.6	Cheek	21.7	0.70	0.63
			Tilt	21.7	0.23	0.19
	251	33.6	Cheek	21.7	0.49	0.61
			Tilt	21.7	-	-

Table1: SAR measurement result for Sony Ericsson PY7A1032051 (W380a) 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	30.5	Antenna to phantom BT HBH-610a	22.4	0.55
		30.5	Antenna to phantom GPRS2TX	22.4	1.13
		30.5	Front to phantom GPRS2TX	22.4	0.54
		30.5	Antenna to phantom PHF HPH-60	22.4	0.61
		27.0	Antenna to phantom EDGE2Tx	22.4	0.20
	661	30.7	Antenna to phantom PHF HPH-60	22.4	0.43
		30.7	Antenna to phantom GPRS2TX	22.4	0.79
	810	30.3	Antenna to phantom PHF HPH-60	22.4	0.26
		30.3	Antenna to phantom GPRS2TX	22.4	0.49
	GSM 850 Body	128	33.5	Antenna to phantom BT HBH-610a	21.1
33.5			Antenna to phantom GPRS2TX	21.1	0.99
33.5			Front to phantom GPRS2TX	21.1	0.60
33.5			Antenna to phantom PHF HPH-60	21.1	0.46
27.9			Antenna to phantom EDGE2Tx	21.1	0.22
190		33.6	Antenna to phantom BT HBH-610a	21.1	0.36
		33.6	Antenna to phantom GPRS2TX	21.1	0.74
251		33.6	Antenna to phantom BT HBH-610a	21.1	0.29
		33.6	Antenna to phantom GPRS2TX	21.1	0.56

Table2: SAR measurement result for Sony Ericsson PY7A1032051 (W380a) 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



System Connector



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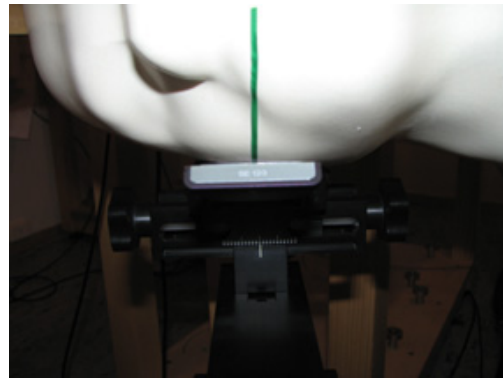
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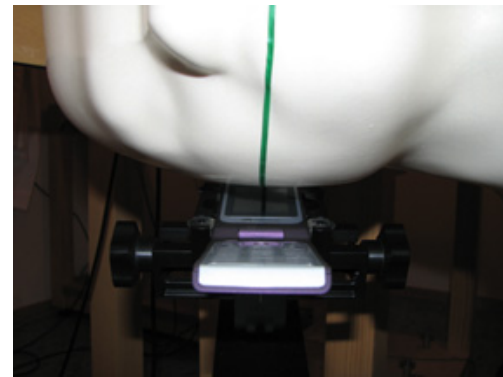
Reference

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

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Device position against the body: Phone on 15mm distance against Phantom

### 10.3 Attachment

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

Test Laboratory: Sony Ericsson Mobile Communications

## SystemPerformanceCheck\_Head\_071109\_RP

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d039**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.87$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

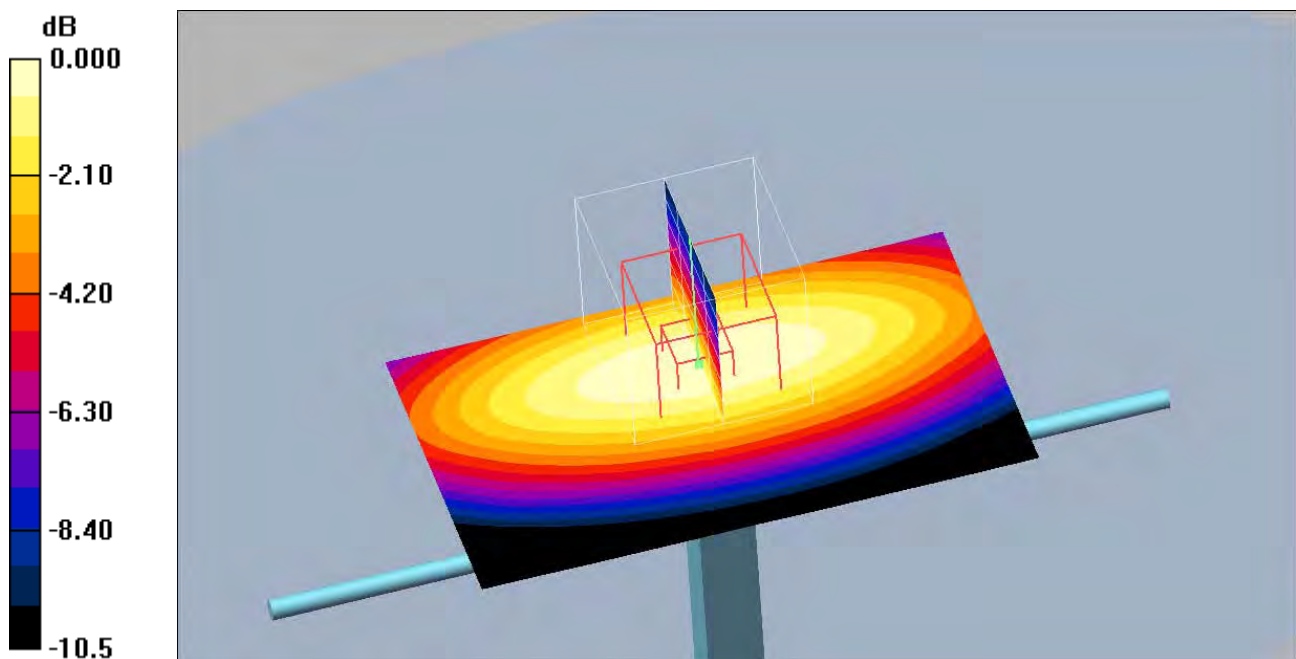
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.06, 6.06, 6.06); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 6; Type: SAM; Serial: 1351
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**d=15mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 1.01 mW/g

**d=15mm, Pin=100mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 29.6 V/m; Power Drift = -0.205 dB  
Peak SAR (extrapolated) = 1.36 W/kg  
**SAR(1 g) = 0.927 mW/g; SAR(10 g) = 0.608 mW/g**  
Maximum value of SAR (measured) = 1.00 mW/g



0 dB = 1.00mW/g

Test Laboratory: Sony Ericsson Mobile Communications

**SystemPerformanceCheck\_Body\_071119\_RP**

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d039**

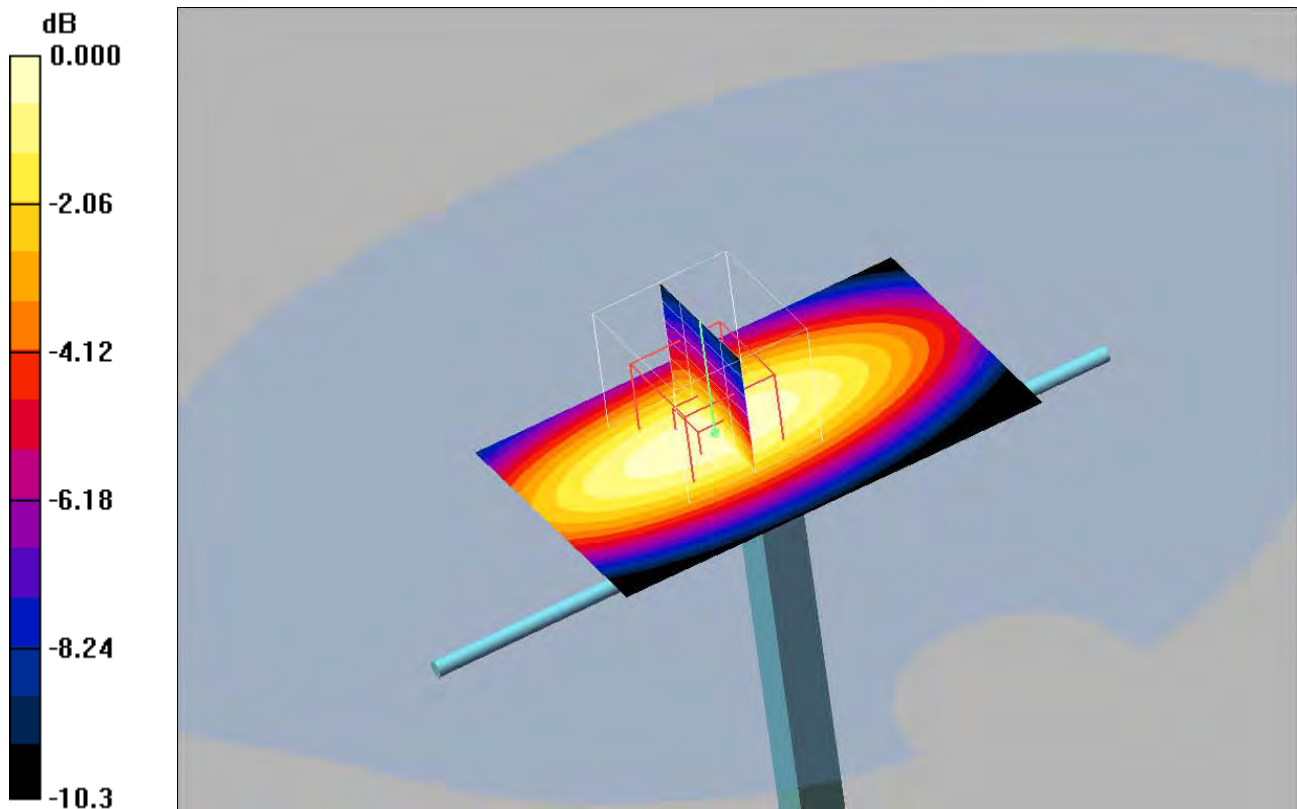
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.98 \text{ mho/m}$ ;  $\epsilon_r = 55$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.13, 6.13, 6.13); Calibrated: 2007-01-16
  - Sensor-Surface: 4mm (Mechanical Surface Detection)
  - Electronics: DAE4 Sn640; Calibrated: 2007-01-19
  - Phantom: SAM 5; Type: SAM; Serial: 1352
  - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171
- d=15mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 1.01 mW/g
- d=15mm, Pin=100mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 31.6 V/m; Power Drift = -0.043 dB  
Peak SAR (extrapolated) = 1.37 W/kg  
**SAR(1 g) = 0.945 mW/g; SAR(10 g) = 0.622 mW/g**  
Maximum value of SAR (measured) = 1.02 mW/g



0 dB = 1.02mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### Verification\_1900MHz\_Head\_071115\_RP

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d073**

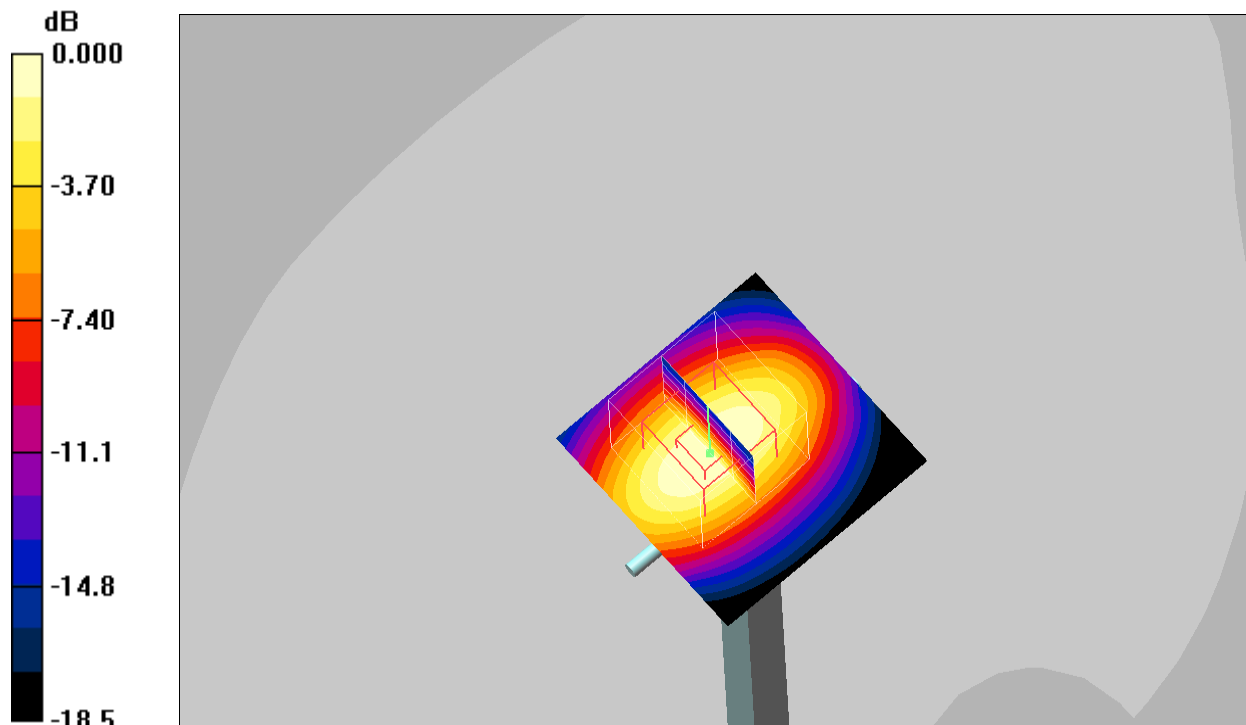
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.47 \text{ mho/m}$ ;  $\epsilon_r = 38.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.73, 4.73, 4.73); Calibrated: 2007-01-16
  - Sensor-Surface: 4mm (Mechanical Surface Detection)
  - Electronics: DAE4 Sn640; Calibrated: 2007-01-19
  - Phantom: SAM 5; Type: SAM; Serial: 1352
  - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171
- Flat, Pin=100mW, d=10mm/Area Scan (61x61x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 4.78 mW/g
- Flat, Pin=100mW, d=10mm/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 52.5 V/m; Power Drift = -0.071 dB  
Peak SAR (extrapolated) = 7.76 W/kg  
**SAR(1 g) = 4.11 mW/g; SAR(10 g) = 2.09 mW/g**  
Maximum value of SAR (measured) = 4.62 mW/g



0 dB = 4.62mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### Verification\_1900MHz\_Body\_071116\_RP

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d073**

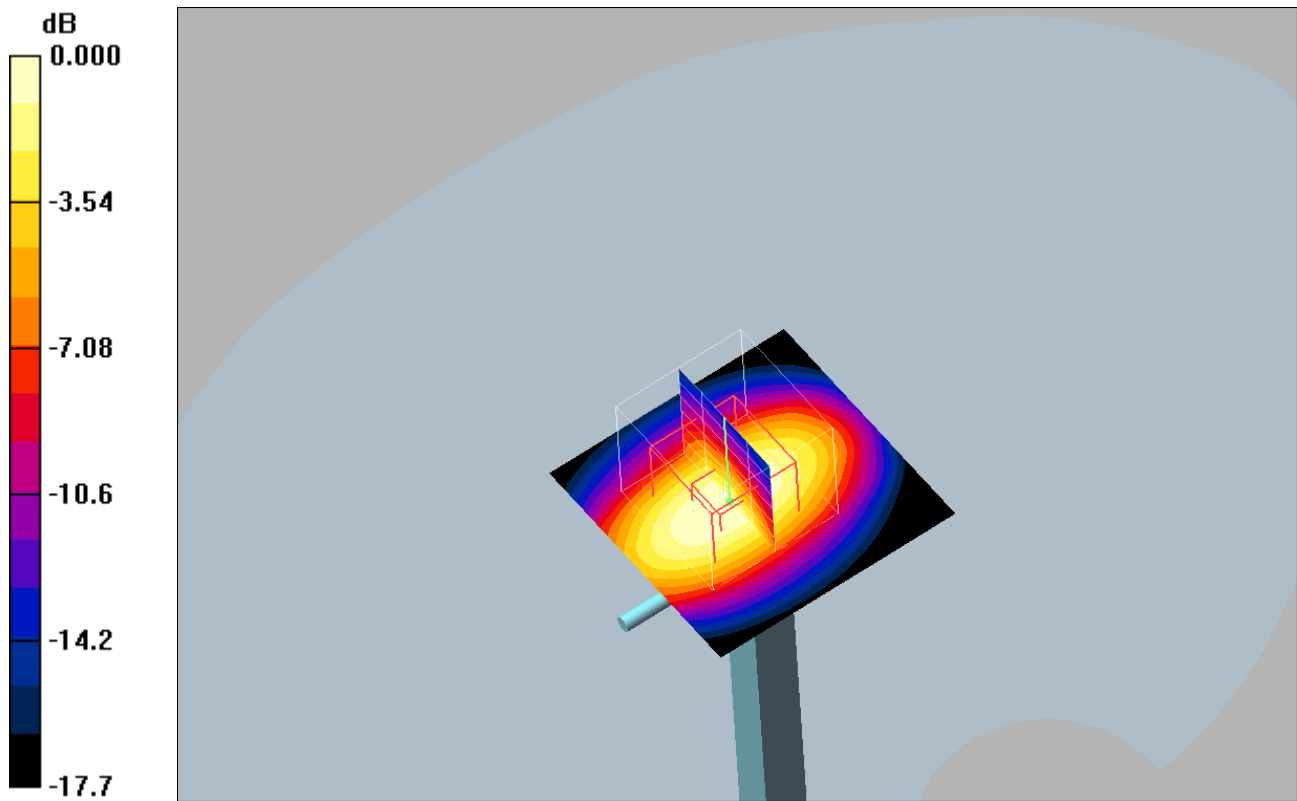
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 52$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.53, 4.53, 4.53); Calibrated: 2007-01-16
  - Sensor-Surface: 4mm (Mechanical Surface Detection)
  - Electronics: DAE4 Sn640; Calibrated: 2007-01-19
  - Phantom: SAM 5; Type: SAM; Serial: 1352
  - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171
- Flat, Pin=100mW, d=10mm/Area Scan (61x61x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 4.85 mW/g
- Flat, Pin=100mW, d=10mm/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 53.5 V/m; Power Drift = -0.045 dB  
Peak SAR (extrapolated) = 7.57 W/kg  
**SAR(1 g) = 4.12 mW/g; SAR(10 g) = 2.12 mW/g**  
Maximum value of SAR (measured) = 4.65 mW/g



0 dB = 4.65mW/g

Test Laboratory: Sony Ericsson Mobile Communications

## ch190\_RC\_071109\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 836.6$  MHz;  $\sigma = 0.87$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.06, 6.06, 6.06); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 6; Type: SAM; Serial: 1351
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Right Cheek/Area Scan (71x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.756 mW/g

**Right Cheek/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.71 V/m; Power Drift = -0.042 dB

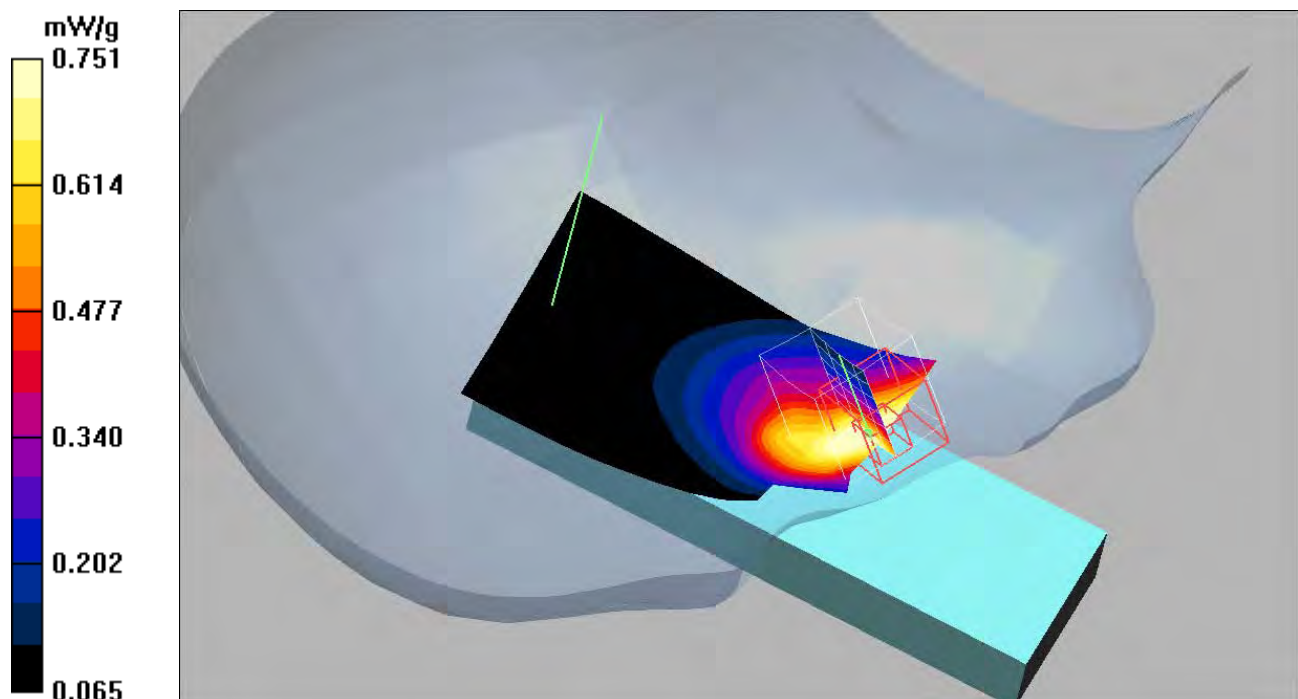
Peak SAR (extrapolated) = 0.897 W/kg

**SAR(1 g) = 0.704 mW/g; SAR(10 g) = 0.508 mW/g**

Maximum value of SAR (measured) = 0.751 mW/g

**Right Cheek/Z Scan (1x1x16):** Measurement grid: dx=20mm, dy=20mm, dz=20mm

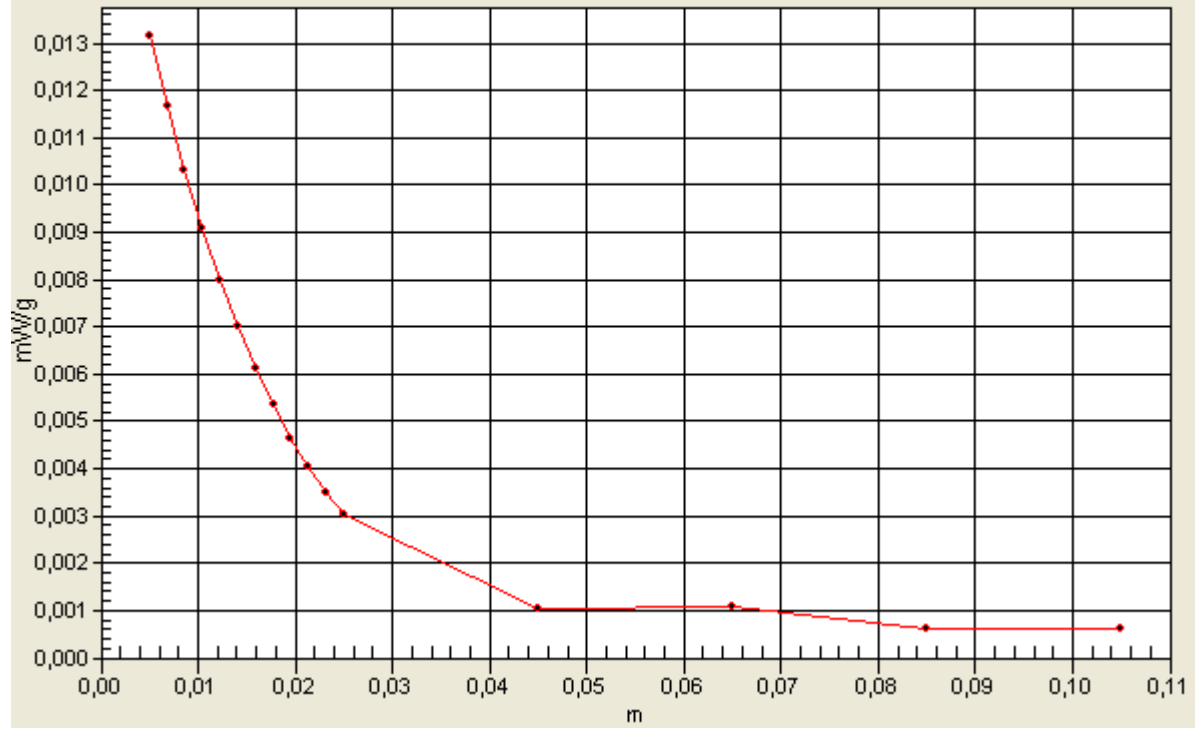
Maximum value of SAR (interpolated) = 0.013 mW/g





# Interpolated SAR(x,y,z,f0)

SAR; Z Scan: Value Along Z, X=0, Y=0



Test Laboratory: Sony Ericsson Mobile Communications

**ch190\_LT\_071109\_RP**

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

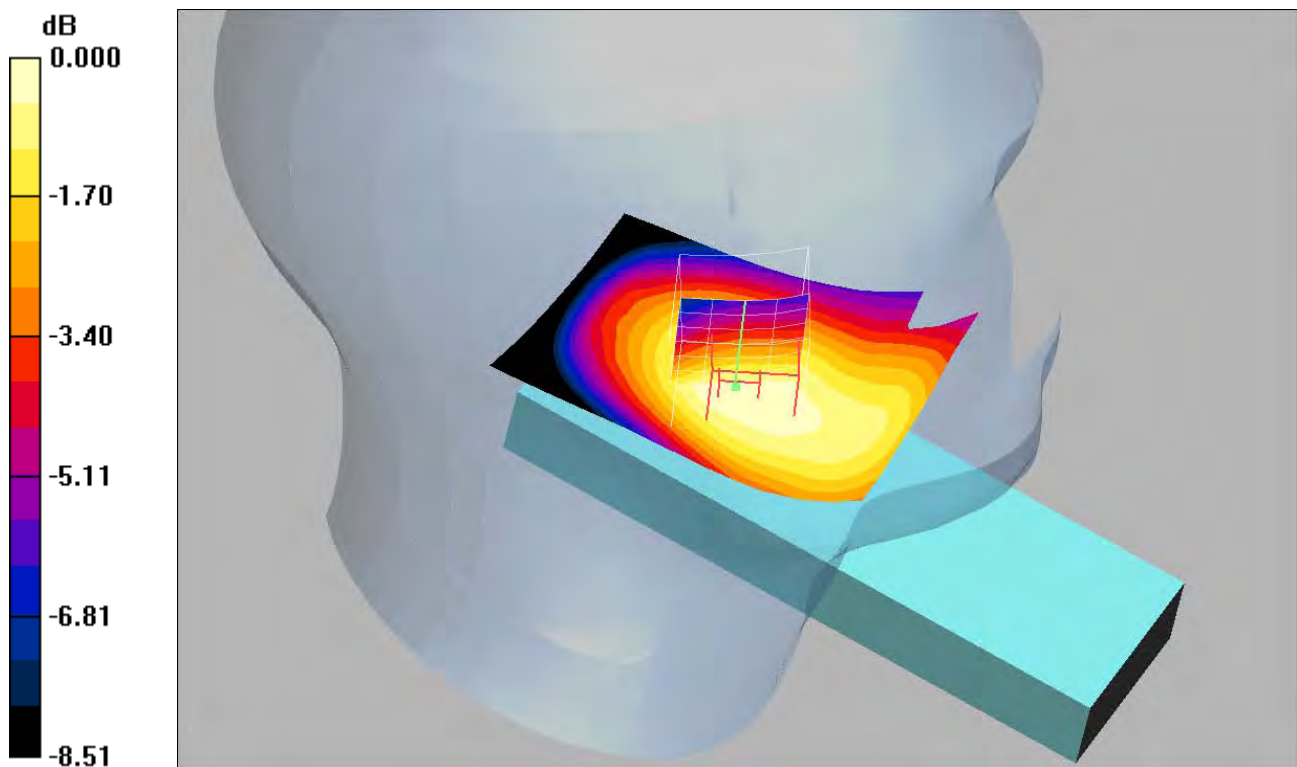
Communication System: GSM835MHz; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.87 \text{ mho/m}$ ;  $\epsilon_r = 40.6$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.06, 6.06, 6.06); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 6; Type: SAM; Serial: 1351
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Left Tilt/Area Scan (71x111x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$   
Maximum value of SAR (interpolated) = 0.205 mW/g

**Left Tilt/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 8.41 V/m; Power Drift = 0.069 dB  
Peak SAR (extrapolated) = 0.238 W/kg  
**SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.143 mW/g**  
Maximum value of SAR (measured) = 0.201 mW/g



0 dB = 0.201mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### ch190\_LC\_071109\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz; Frequency: 836.6 MHz; Duty Cycle: 1:8.3  
Medium parameters used:  $f = 836.6$  MHz;  $\sigma = 0.87$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.06, 6.06, 6.06); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 6; Type: SAM; Serial: 1351
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Left Cheek/Area Scan (71x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.684 mW/g

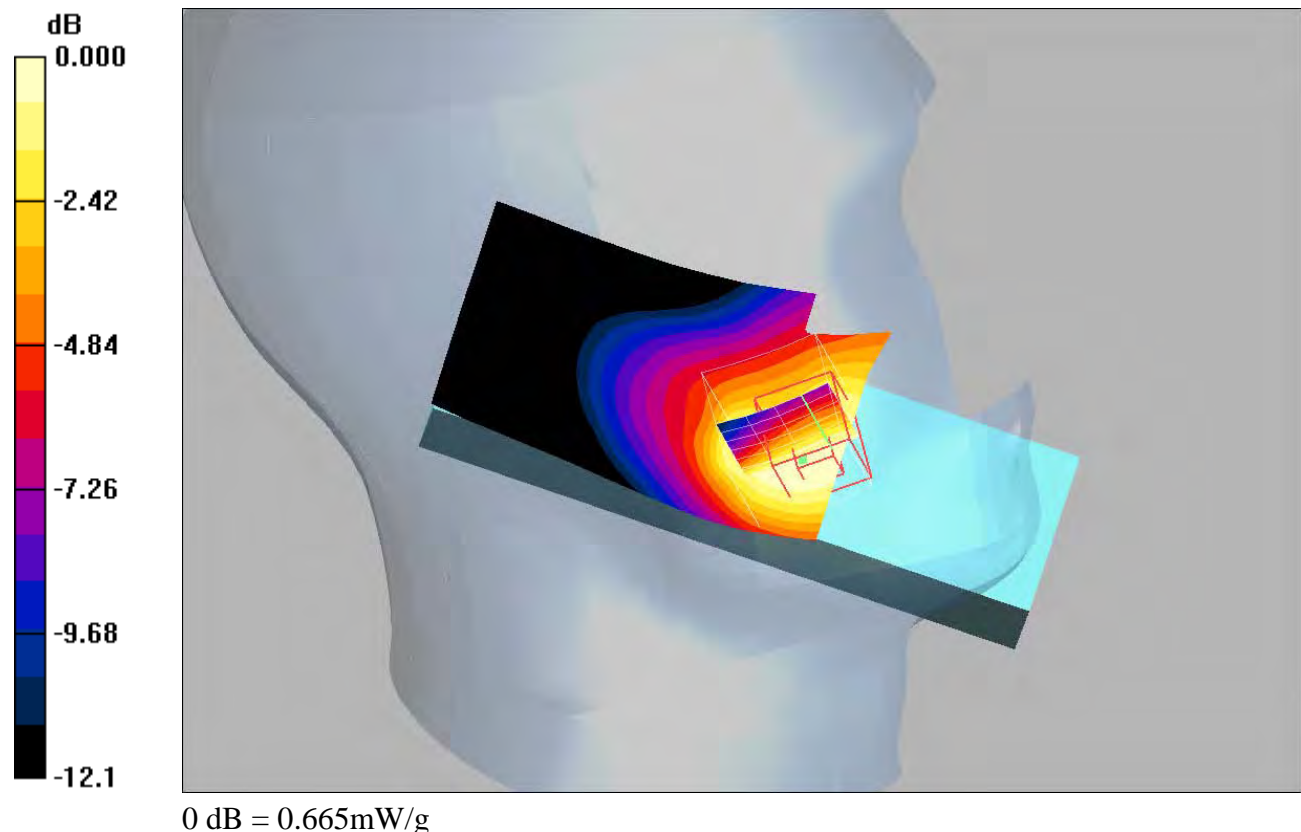
**Left Cheek/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.99 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 1.31 W/kg

**SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.439 mW/g**

Maximum value of SAR (measured) = 0.665 mW/g



Test Laboratory: Sony Ericsson Mobile Communications

### ch190\_RT\_071109\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 836.6$  MHz;  $\sigma = 0.87$  mho/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.06, 6.06, 6.06); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 6; Type: SAM; Serial: 1351
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Right Tilt/Area Scan (71x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.247 mW/g

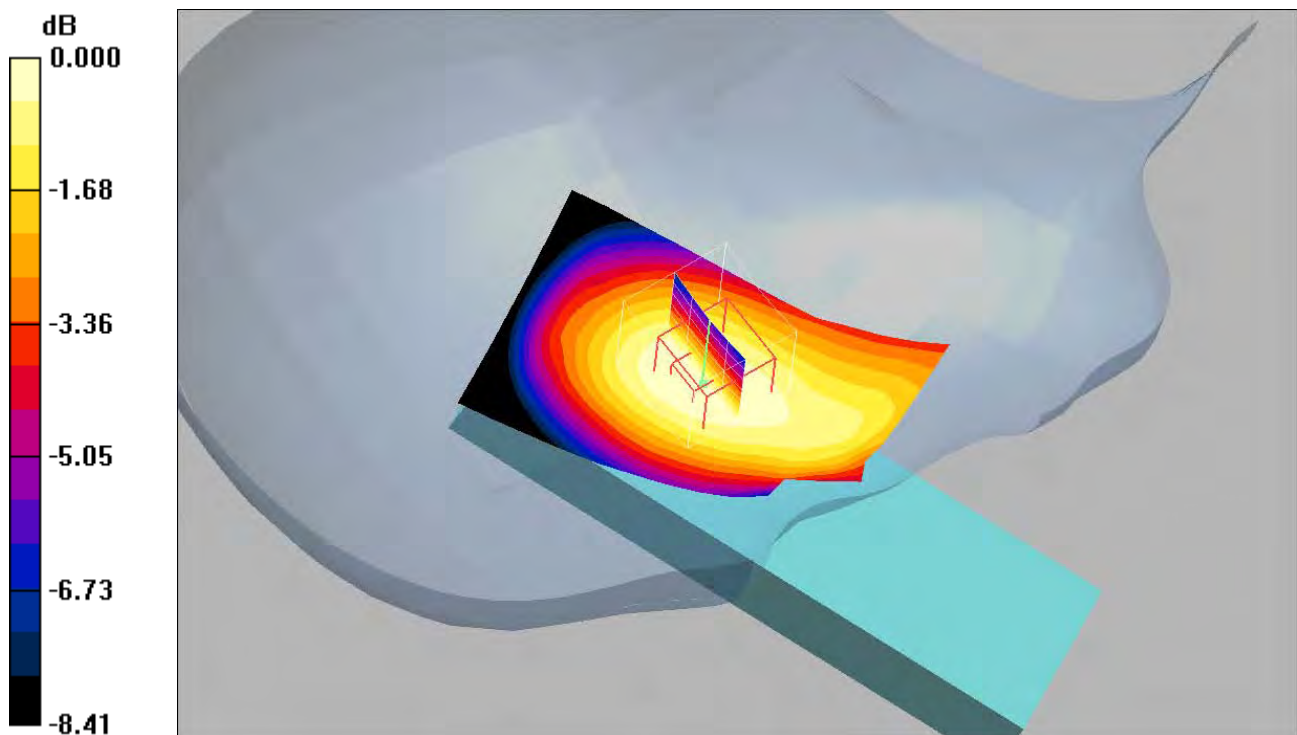
**Right Tilt/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.2 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.288 W/kg

**SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.177 mW/g**

Maximum value of SAR (measured) = 0.244 mW/g



0 dB = 0.244mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### ch128\_GPRS2Slot\_Data\_071119\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz\_GPRS2Slots; Frequency: 824.2 MHz; Duty Cycle: 1:4.15  
Medium parameters used:  $f = 824.2$  MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 55.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.13, 6.13, 6.13); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Flat, 15mm, Data/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.08 mW/g

**Flat, 15mm, Data/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.7 V/m; Power Drift = -0.037 dB

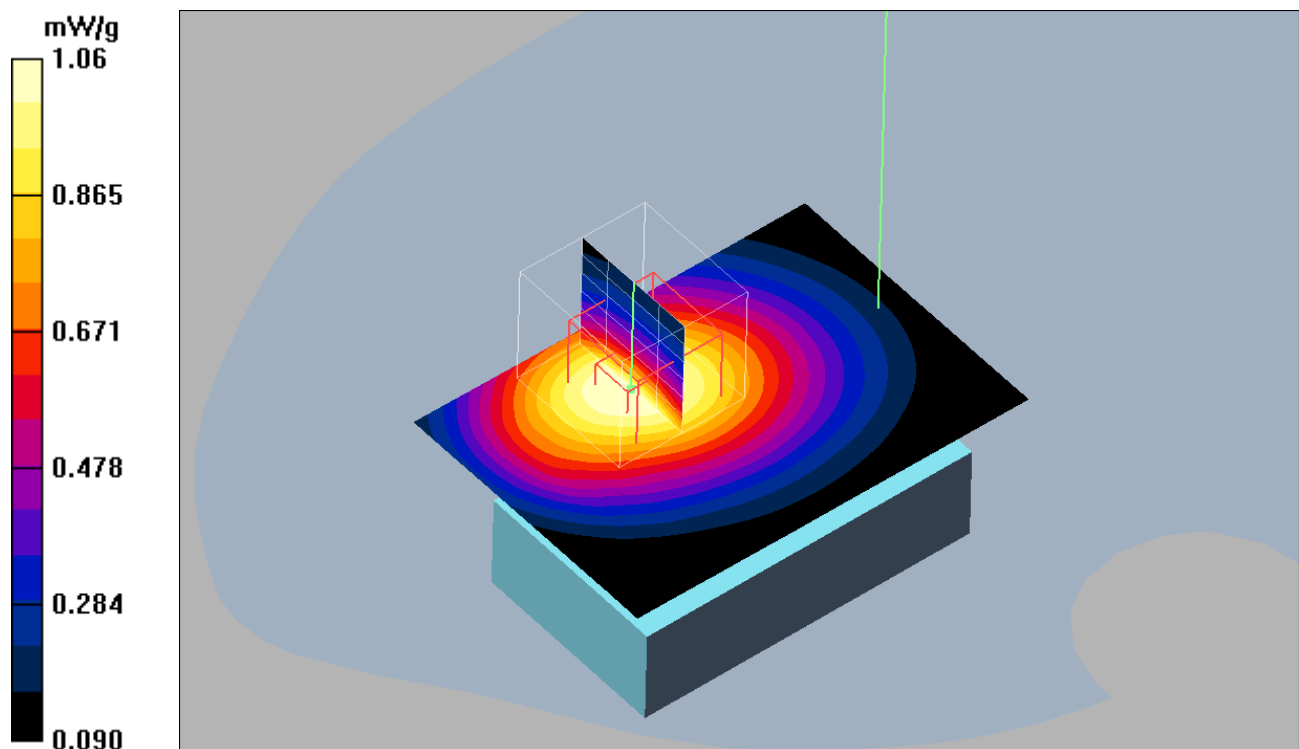
Peak SAR (extrapolated) = 1.33 W/kg

**SAR(1 g) = 0.988 mW/g; SAR(10 g) = 0.695 mW/g**

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

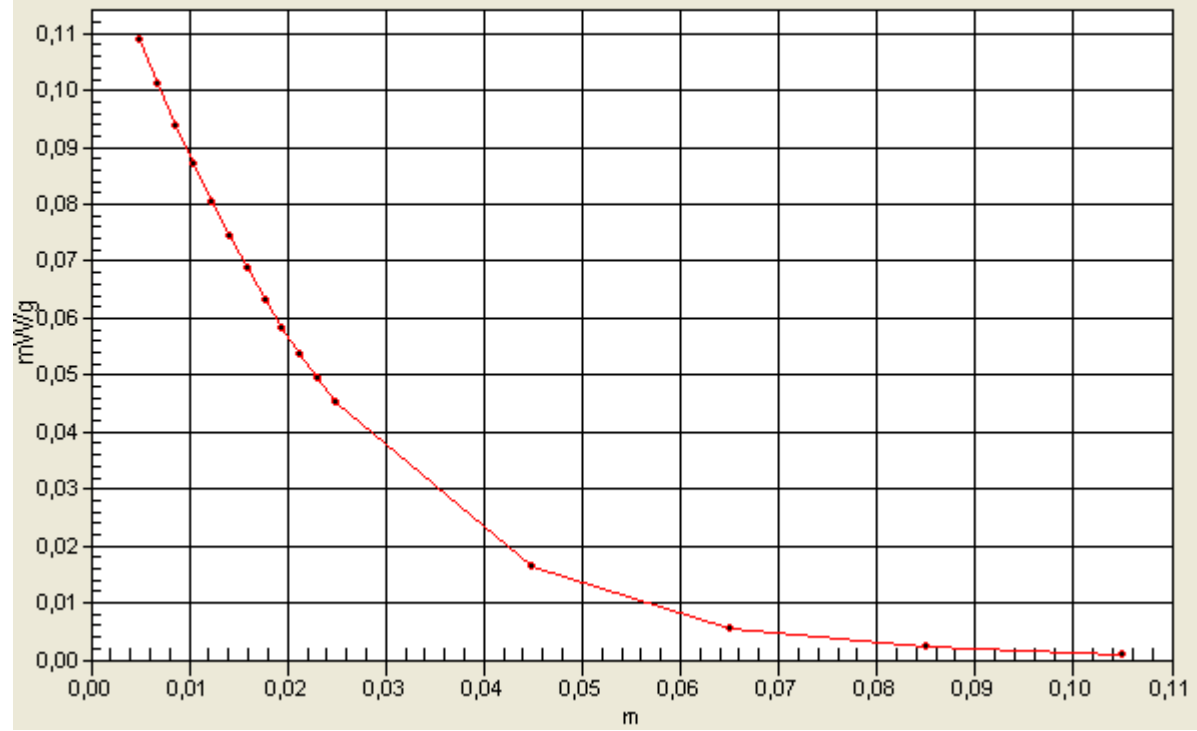
**Flat, 15mm, Data/Z Scan (1x1x16):** Measurement grid: dx=20mm, dy=20mm, dz=20mm

Maximum value of SAR (interpolated) = 0.109 mW/g



# Interpolated SAR(x,y,z,f0)

SAR; Z Scan: Value Along Z, X=0, Y=0



Test Laboratory: Sony Ericsson Mobile Communications

**ch128\_EDGE2Slot\_Data\_071119\_RP**

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz\_GPRS2Slots; Frequency: 824.2 MHz; Duty Cycle: 1:4.15  
Medium parameters used:  $f = 824.2$  MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 55.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.13, 6.13, 6.13); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Flat, 15mm, Data/Area Scan (81x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.237 mW/g

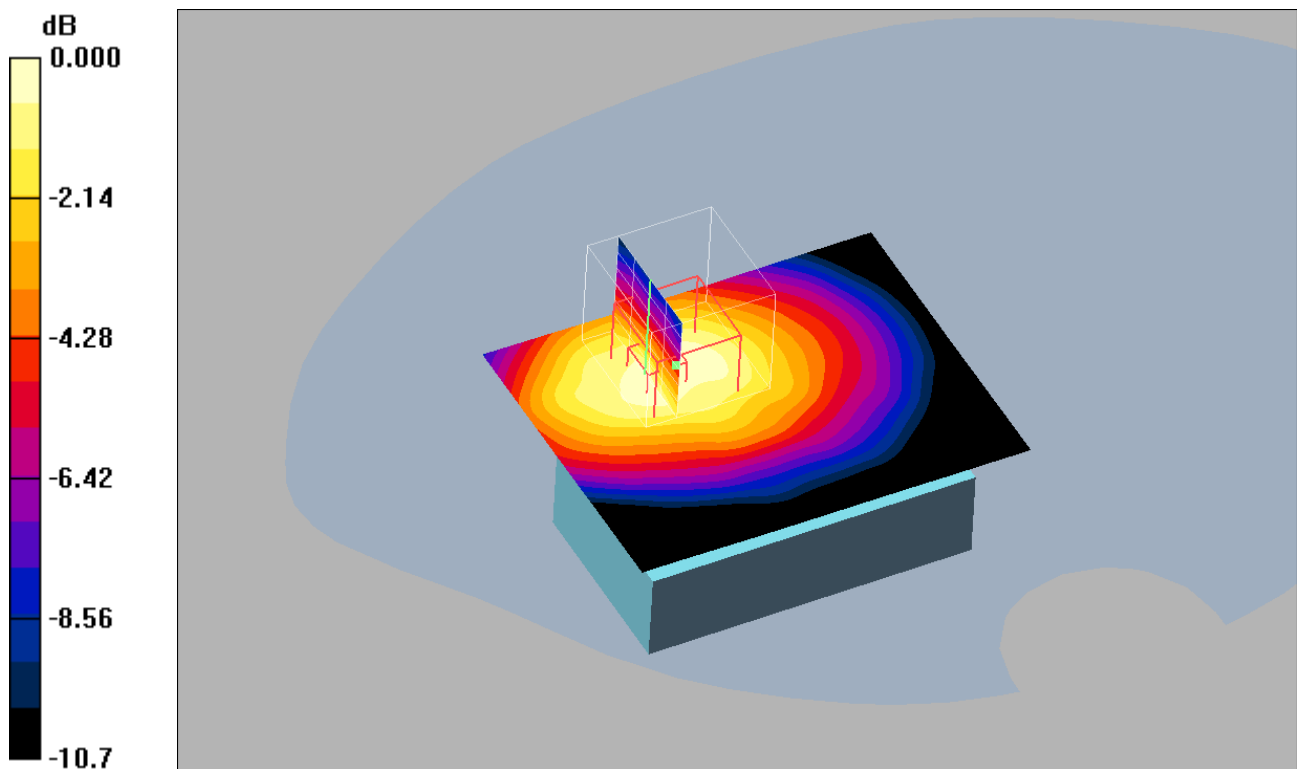
**Flat, 15mm, Data/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.74 V/m; Power Drift = 0.423 dB

Peak SAR (extrapolated) = 0.306 W/kg

**SAR(1 g) = 0.216 mW/g; SAR(10 g) = 0.148 mW/g**

Maximum value of SAR (measured) = 0.242 mW/g



0 dB = 0.242mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### ch128\_BT\_Speech\_071119\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz; Frequency: 824.2 MHz; Duty Cycle: 1:8.3

Medium parameters used:  $f = 824.2$  MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 55.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.13, 6.13, 6.13); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Flat, 15mm, Speech/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.512 mW/g

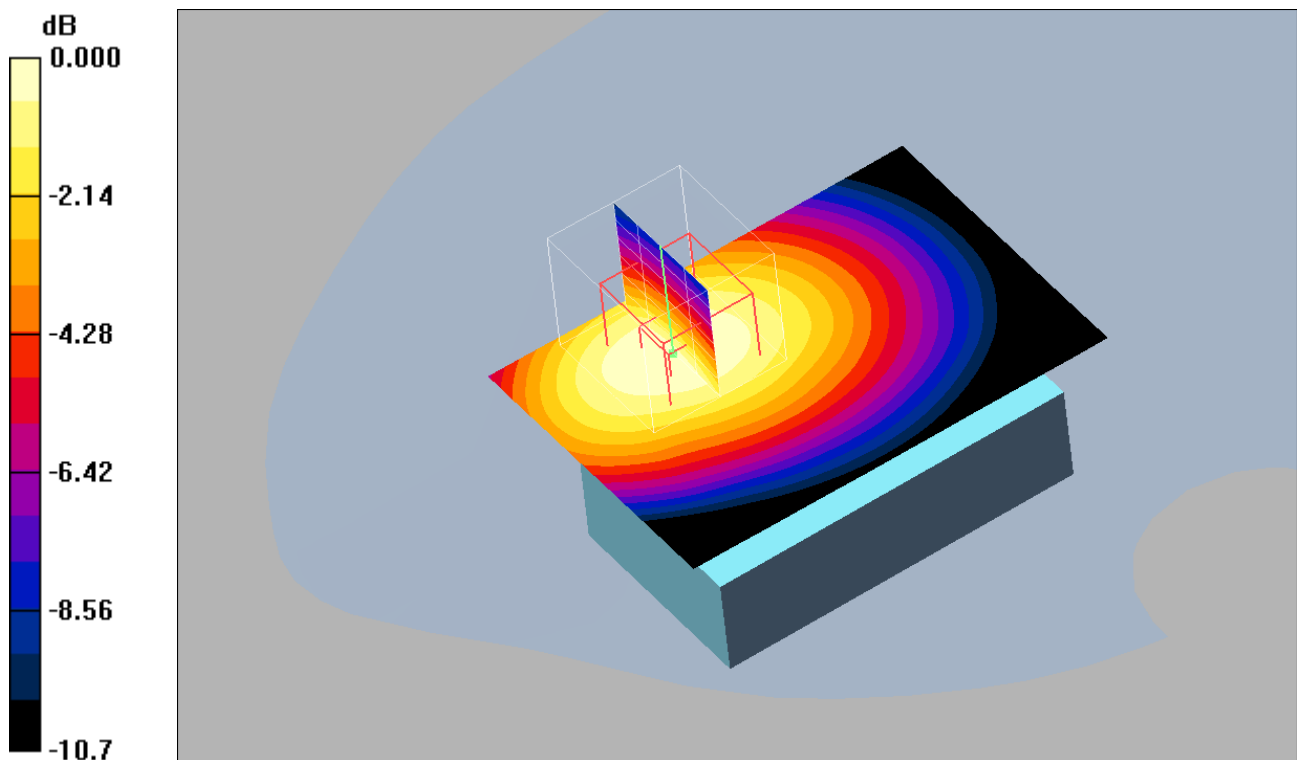
**Flat, 15mm, Speech/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.25 V/m; Power Drift = -0.011 dB

Peak SAR (extrapolated) = 0.655 W/kg

**SAR(1 g) = 0.473 mW/g; SAR(10 g) = 0.327 mW/g**

Maximum value of SAR (measured) = 0.508 mW/g



0 dB = 0.508mW/g



Test Laboratory: Sony Ericsson Mobile Communications

### ch128\_GPRS2Slot\_Rear\_Data\_071119\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM835MHz\_GPRS2Slots; Frequency: 824.2 MHz; Duty Cycle: 1:4.15  
Medium parameters used:  $f = 824.2$  MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 55.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(6.13, 6.13, 6.13); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Flat, 15mm, Data/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.641 mW/g

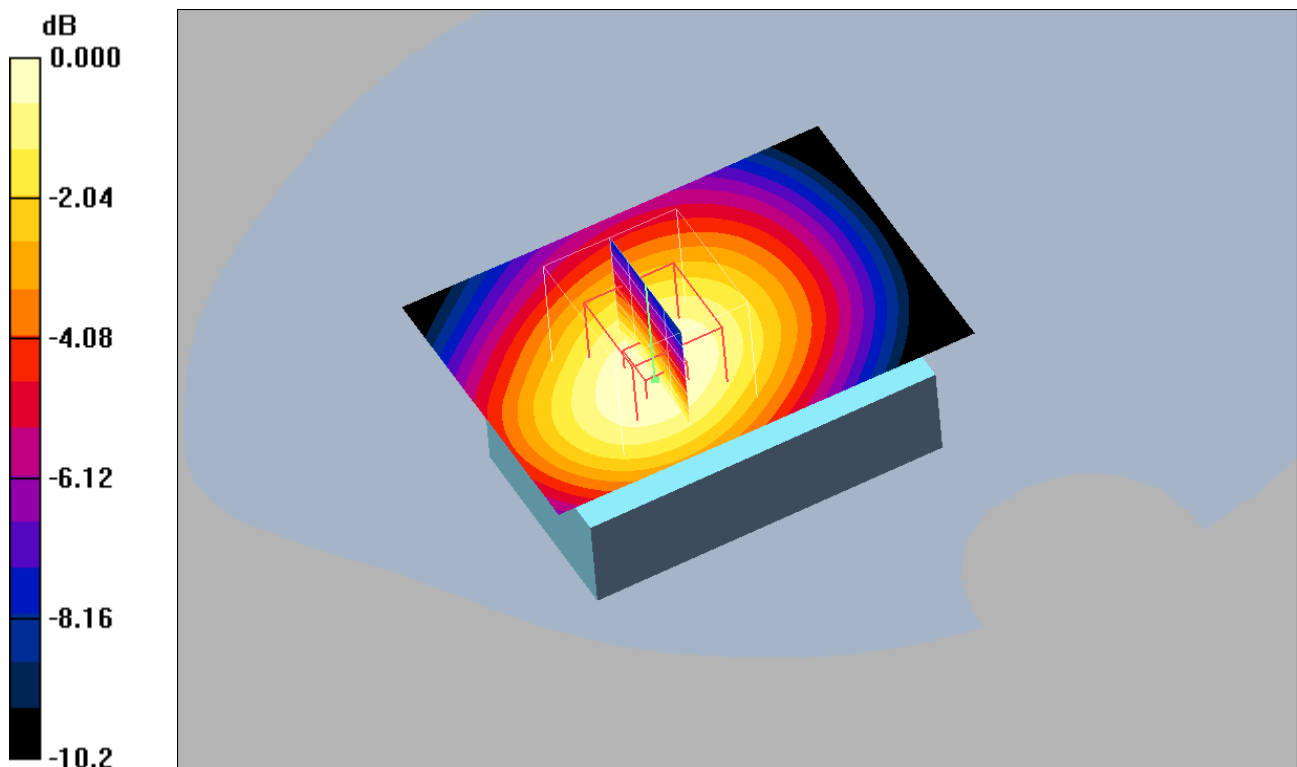
**Flat, 15mm, Data/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.9 V/m; Power Drift = -0.053 dB

Peak SAR (extrapolated) = 0.793 W/kg

**SAR(1 g) = 0.589 mW/g; SAR(10 g) = 0.415 mW/g**

Maximum value of SAR (measured) = 0.625 mW/g



0 dB = 0.625mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### ch661\_LT\_071115\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.73, 4.73, 4.73); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Left Tilt/Area Scan (71x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.094 mW/g

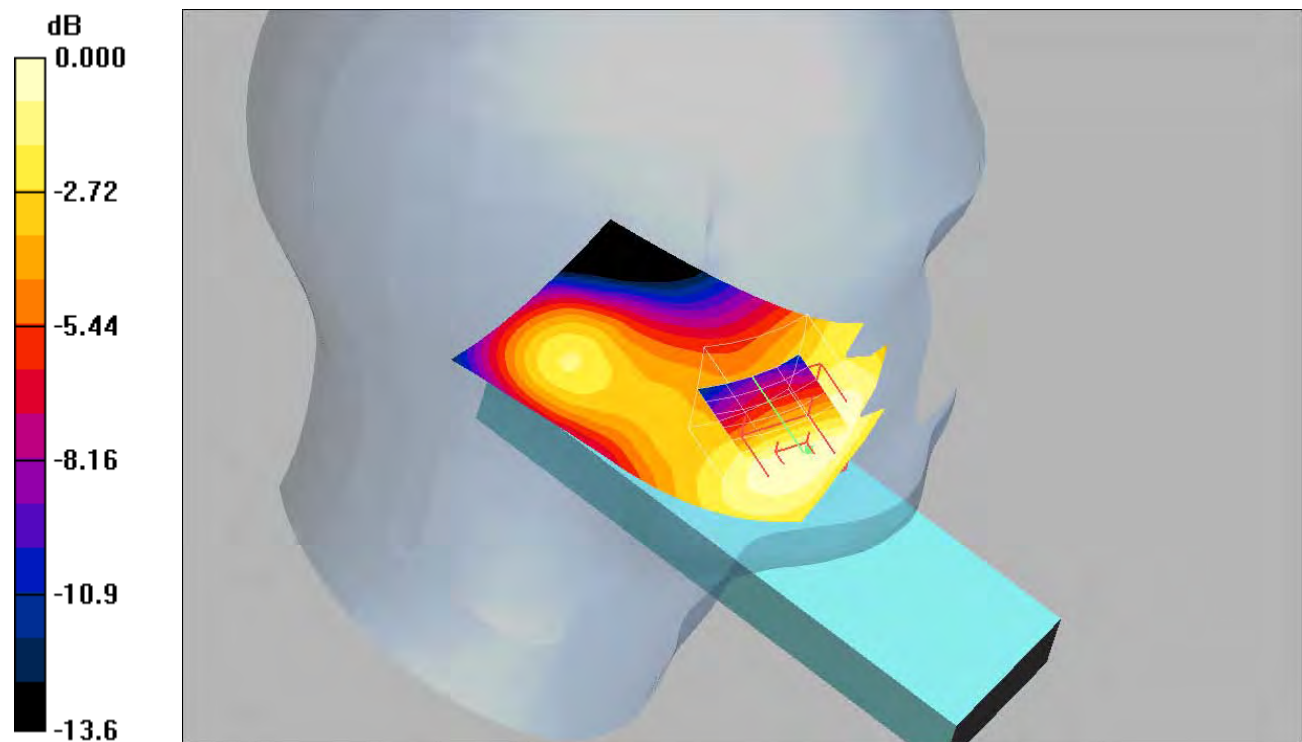
**Left Tilt/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.90 V/m; Power Drift = -0.067 dB

Peak SAR (extrapolated) = 0.131 W/kg

**SAR(1 g) = 0.089 mW/g; SAR(10 g) = 0.061 mW/g**

Maximum value of SAR (measured) = 0.095 mW/g



0 dB = 0.095mW/g

Test Laboratory: Sony Ericsson Mobile Communications

### ch512\_RC\_071115\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

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

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 38.8$ ;  $\rho = 1000$

kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.73, 4.73, 4.73); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Right Cheek/Area Scan (71x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.721 mW/g

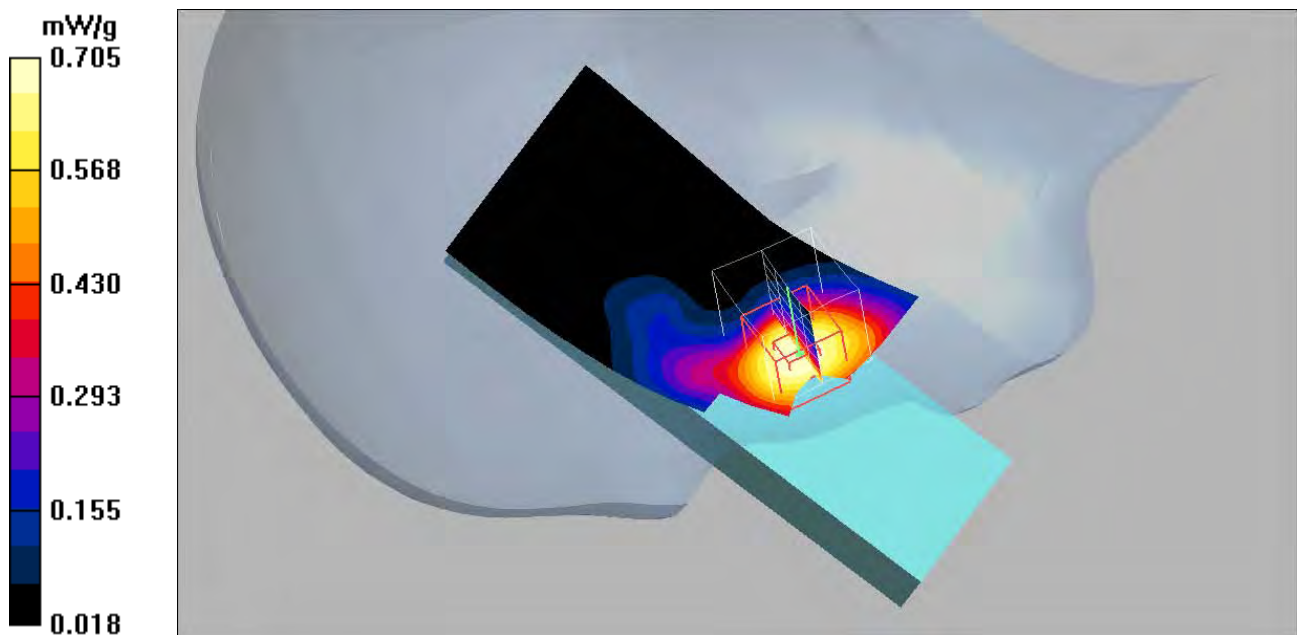
**Right Cheek/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.64 V/m; Power Drift = 0.116 dB

Peak SAR (extrapolated) = 0.941 W/kg

**SAR(1 g) = 0.665 mW/g; SAR(10 g) = 0.438 mW/g**

Maximum value of SAR (measured) = 0.705 mW/g



Test Laboratory: Sony Ericsson Mobile Communications

### ch512\_LC\_071115\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

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

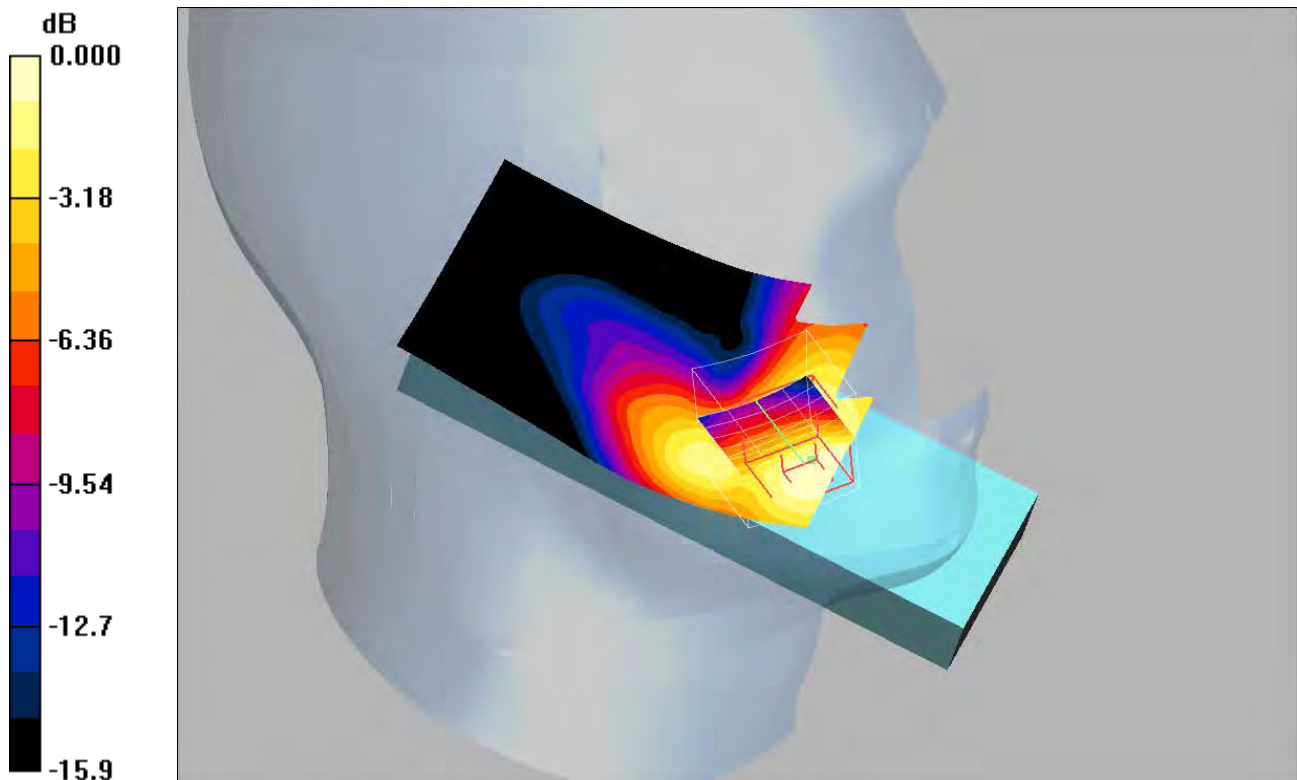
Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.42$  mho/m;  $\epsilon_r = 38.8$ ;  $\rho = 1000$

kg/m<sup>3</sup>

Phantom section: Left Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.73, 4.73, 4.73); Calibrated: 2007-01-16
  - Sensor-Surface: 4mm (Mechanical Surface Detection)
  - Electronics: DAE4 Sn640; Calibrated: 2007-01-19
  - Phantom: SAM 5; Type: SAM; Serial: 1352
  - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171
- Left Cheek/Area Scan (71x121x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 0.610 mW/g
- Left Cheek/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 2.57 V/m; Power Drift = -0.065 dB  
Peak SAR (extrapolated) = 0.863 W/kg  
**SAR(1 g) = 0.560 mW/g; SAR(10 g) = 0.351 mW/g.**  
Maximum value of SAR (measured) = 0.609 mW/g



0 dB = 0.609mW/g

Test Laboratory: Sony Ericsson Mobile Communications

## ch661\_RT\_071115\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

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

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 38.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.73, 4.73, 4.73); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Right Tilt/Area Scan (71x121x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.103 mW/g

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

Reference Value = 6.37 V/m; Power Drift = 0.012 dB

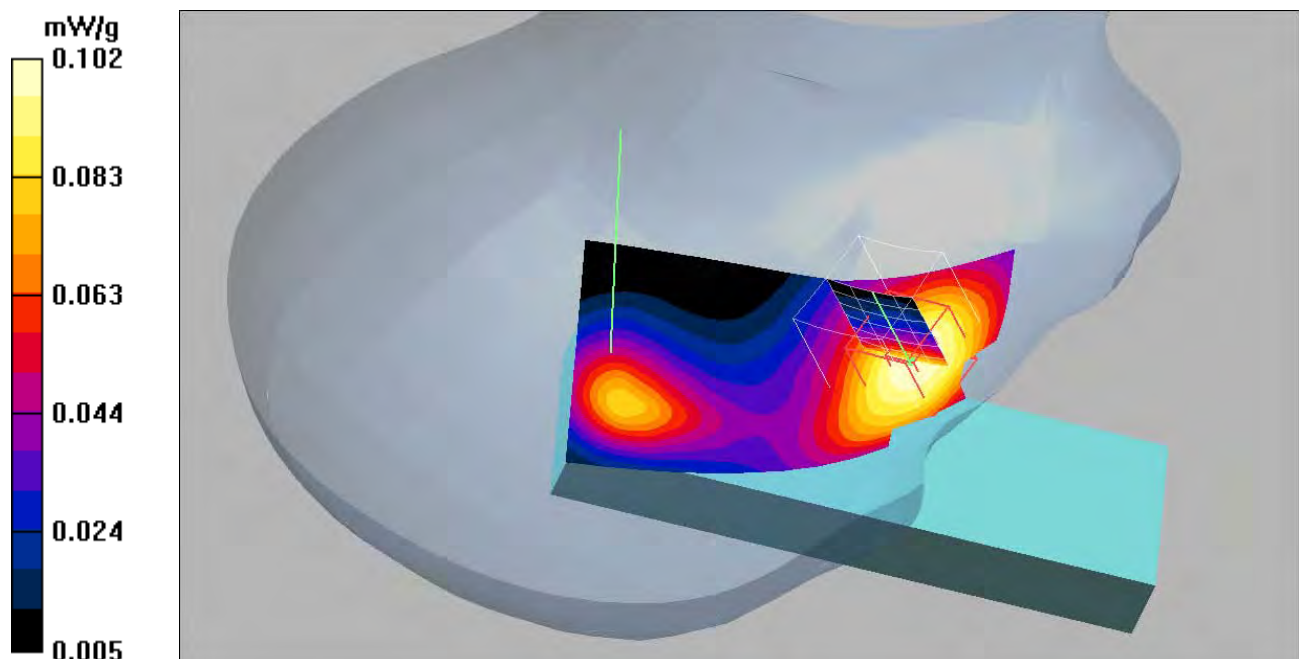
Peak SAR (extrapolated) = 0.142 W/kg

**SAR(1 g) = 0.096 mW/g; SAR(10 g) = 0.064 mW/g**

Maximum value of SAR (measured) = 0.102 mW/g

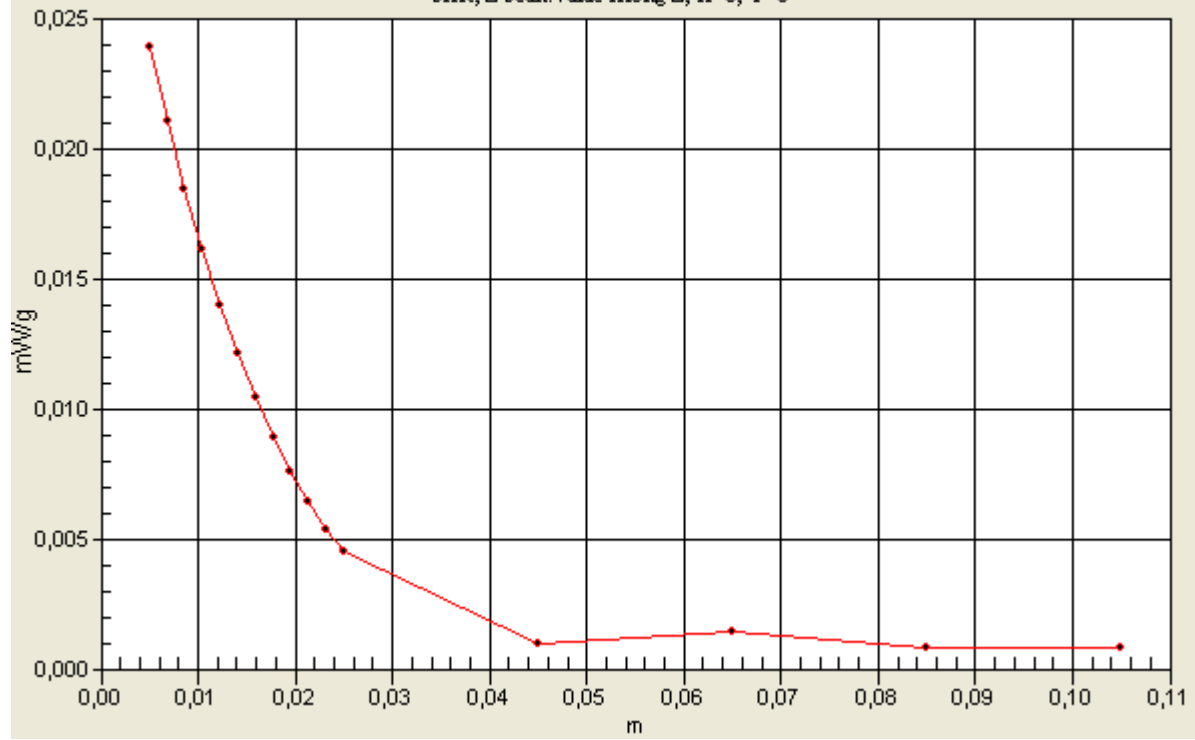
**Right Tilt/Z Scan (1x1x16):** Measurement grid: dx=20mm, dy=20mm, dz=20mm

Maximum value of SAR (interpolated) = 0.024 mW/g



### Interpolated SAR(x,y,z,f0)

SAR; Z Scan: Value Along Z, X=0, Y=0



Test Laboratory: Sony Ericsson Mobile Communications

### ch512\_GPRS2Slot\_Data\_Rear\_071116\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

Communication System: GSM1900\_GPRS; Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.53, 4.53, 4.53); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Flat, 15mm, Data/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.593 mW/g

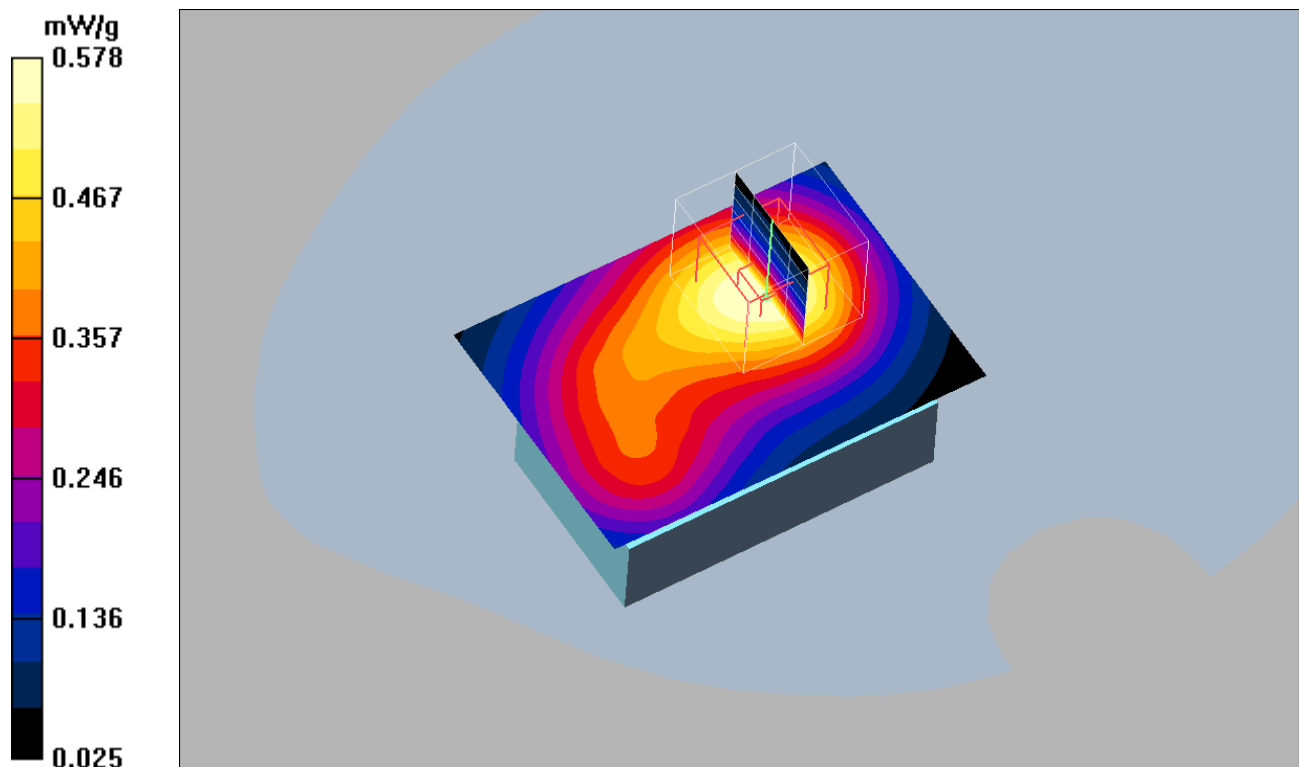
**Flat, 15mm, Data/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.802 W/kg

**SAR(1 g) = 0.538 mW/g; SAR(10 g) = 0.349 mW/g**

Maximum value of SAR (measured) = 0.578 mW/g



Test Laboratory: Sony Ericsson Mobile Communications

### ch512\_GPRS2Slot\_Data\_EDGE\_071116\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

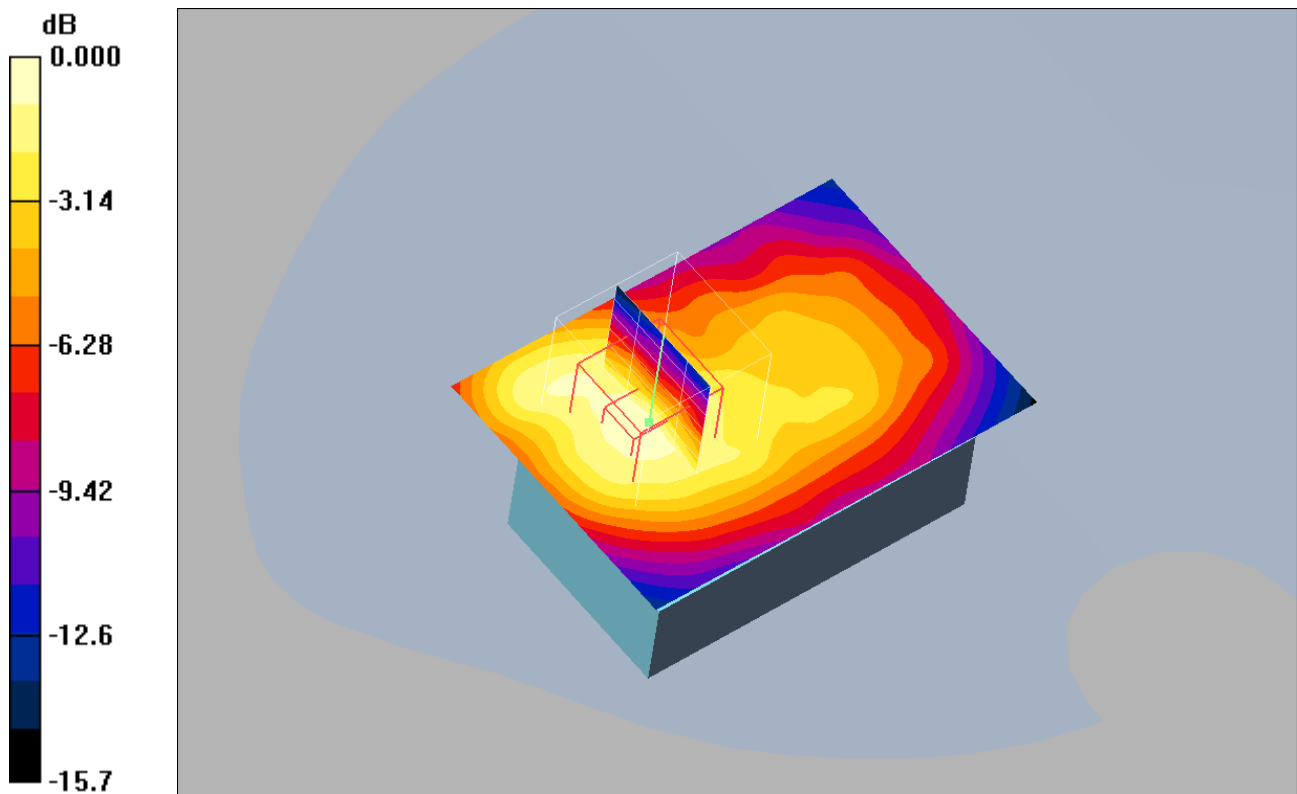
Communication System: GSM1900\_GPRS; Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.53, 4.53, 4.53); Calibrated: 2007-01-16
  - Sensor-Surface: 4mm (Mechanical Surface Detection)
  - Electronics: DAE4 Sn640; Calibrated: 2007-01-19
  - Phantom: SAM 5; Type: SAM; Serial: 1352
  - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171
- Flat, 15mm, Data/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 0.216 mW/g
- Flat, 15mm, Data/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 5.87 V/m; Power Drift = 0.000 dB  
Peak SAR (extrapolated) = 0.332 W/kg  
**SAR(1 g) = 0.196 mW/g; SAR(10 g) = 0.113 mW/g**  
Maximum value of SAR (measured) = 0.215 mW/g



0 dB = 0.215mW/g



Test Laboratory: Sony Ericsson Mobile Communications

### ch512\_GPRS2Slot\_Data\_071116\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

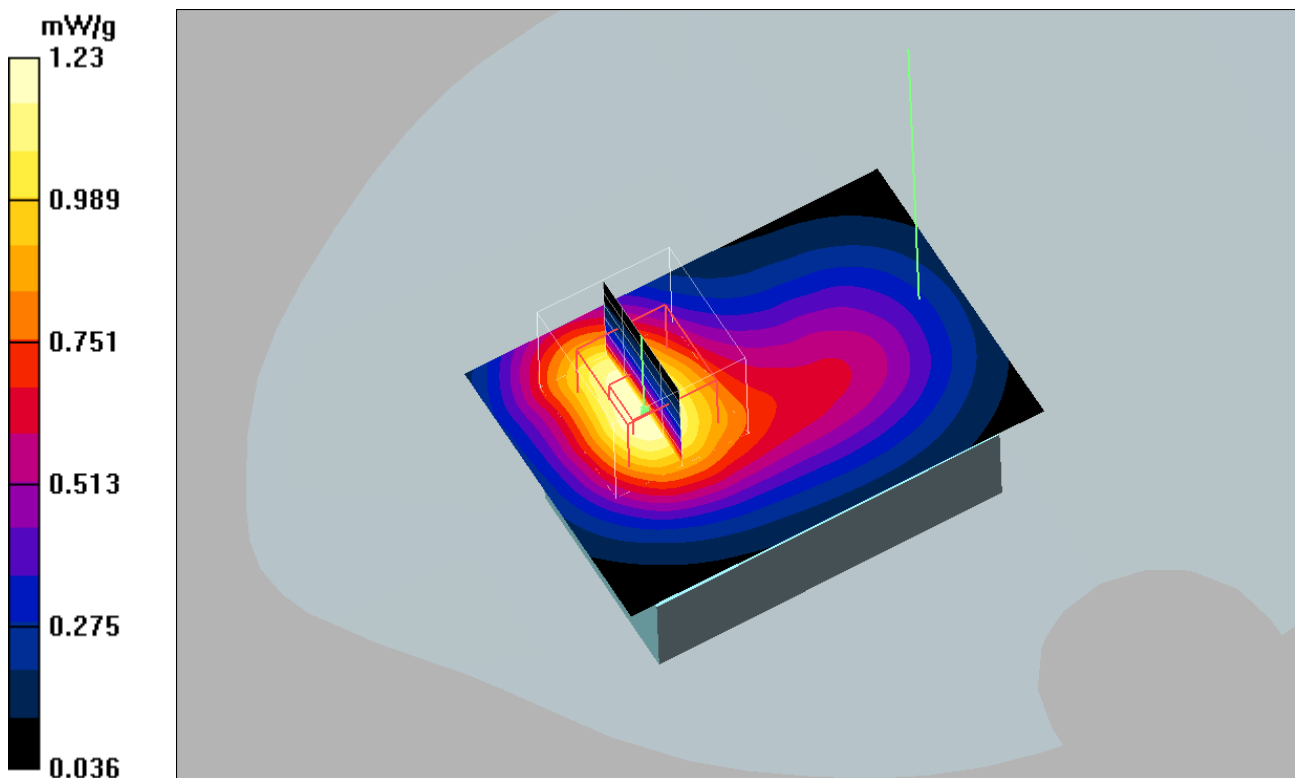
Communication System: GSM1900\_GPRS; Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

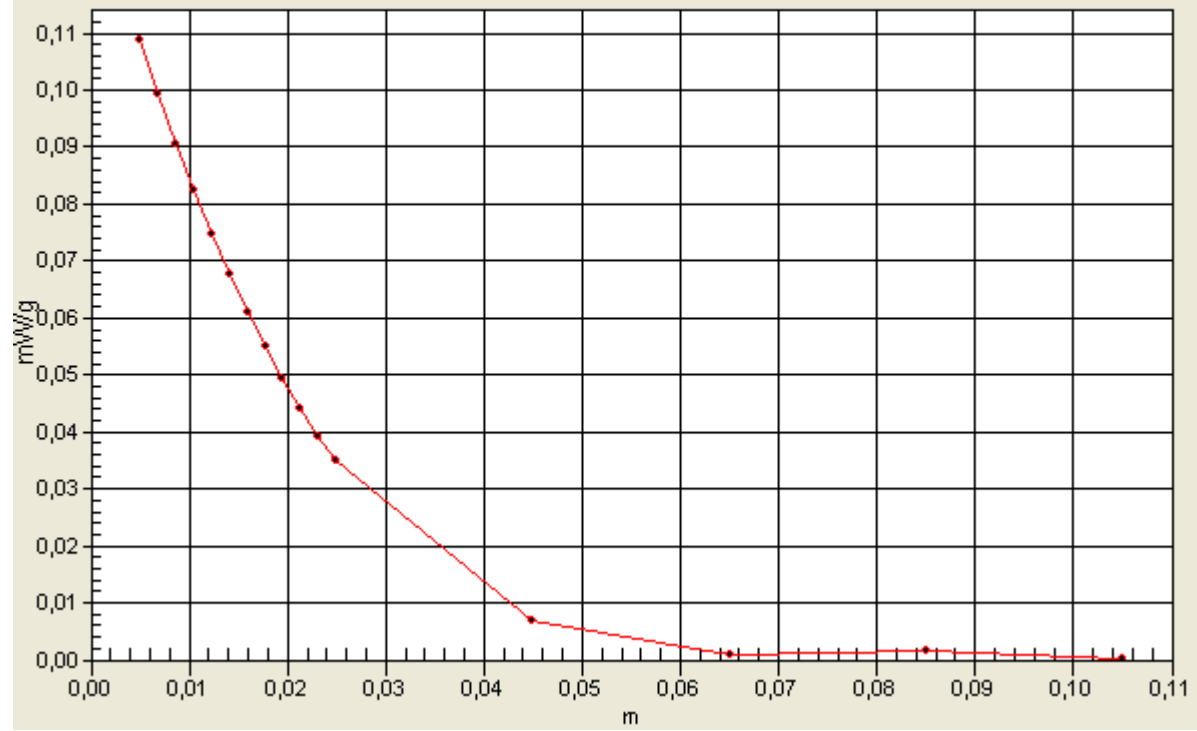
DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.53, 4.53, 4.53); Calibrated: 2007-01-16
  - Sensor-Surface: 4mm (Mechanical Surface Detection) Sensor-Surface: 0mm (Fix Surface)
  - Electronics: DAE4 Sn640; Calibrated: 2007-01-19
  - Phantom: SAM 5; Type: SAM; Serial: 1352
  - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171
- Flat, 15mm, Data/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 1.27 mW/g
- Flat, 15mm, Data/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 14.9 V/m; Power Drift = -0.105 dB  
Peak SAR (extrapolated) = 1.86 W/kg  
**SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.678 mW/g**  
Maximum value of SAR (measured) = 1.23 mW/g
- Flat, 15mm, Data/Z Scan (1x1x16):** Measurement grid: dx=20mm, dy=20mm, dz=20mm  
Maximum value of SAR (interpolated) = 0.109 mW/g



# Interpolated SAR(x,y,z,f0)

SAR; Z Scan: Value Along Z, X=0, Y=0



Test Laboratory: Sony Ericsson Mobile Communications

### ch512\_PHF\_Speech\_071116\_RP

**DUT: PY7A1032051 (W380a); Type: GSM; Serial: #9522**

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

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.5$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3062; ConvF(4.53, 4.53, 4.53); Calibrated: 2007-01-16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn640; Calibrated: 2007-01-19
- Phantom: SAM 5; Type: SAM; Serial: 1352
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 171

**Flat, 15mm, Speech/Area Scan (71x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.681 mW/g

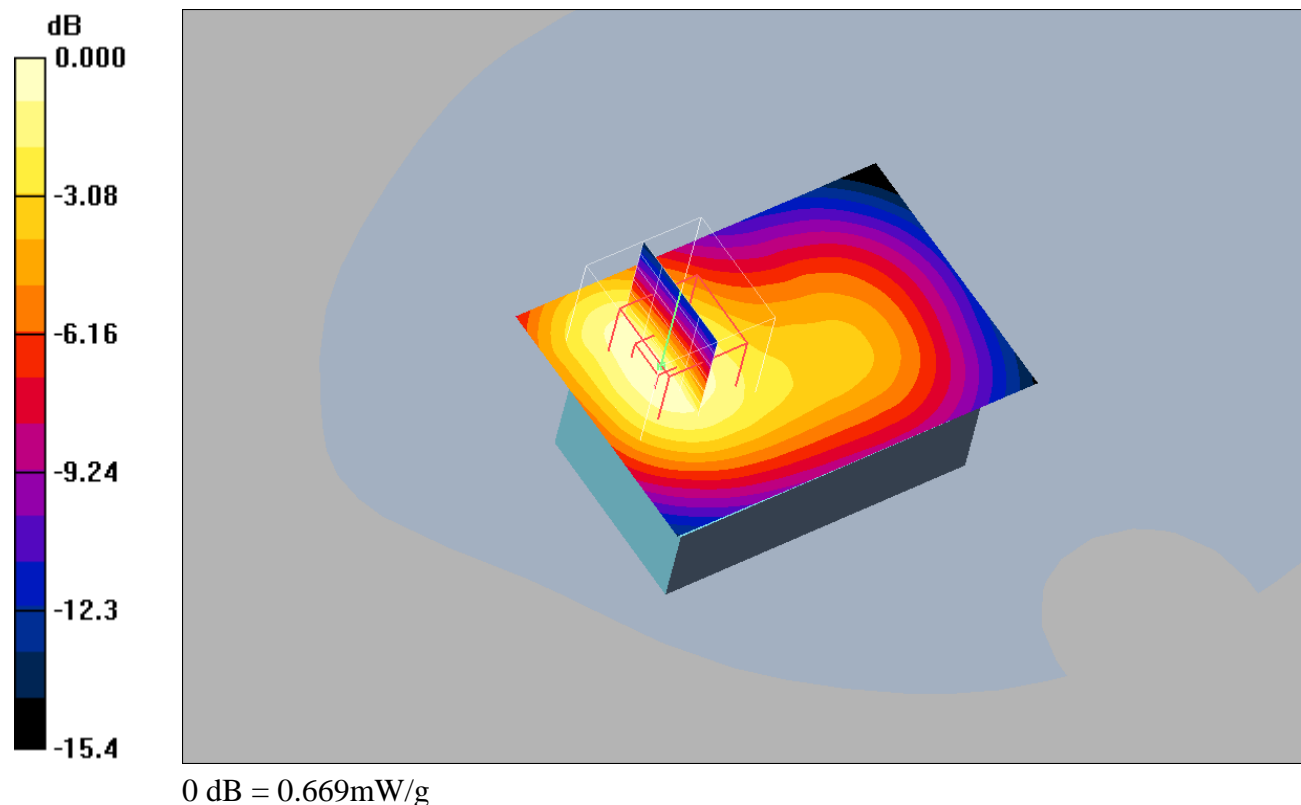
**Flat, 15mm, Speech/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.32 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 0.994 W/kg

**SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.365 mW/g**

Maximum value of SAR (measured) = 0.669 mW/g





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Sony Ericsson Lund**

Certificate No: **D835V2-4d039\_May06**

**CALIBRATION CERTIFICATE**

Object **D835V2 - SN: 4d039**

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

Calibration date: **May 31, 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	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
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 Nov-05)	In house check: Nov-06

Calibrated by:	Name <b>Mike Meili</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Technical Manager	

Issued: June 1, 2006

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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.

<b>DASY Version</b>	DASY4	V4.6
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V4.9	
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Area Scan resolution</b>	dx, dy = 15 mm	
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	835 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.90 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	41.9 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
<b>Head TSL temperature during test</b>	(23.0 $\pm$ 0.2) °C	---	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	2.31 mW / g
SAR normalized	normalized to 1W	9.24 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>9.29 mW / g <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.50 mW / g
SAR normalized	normalized to 1W	6.00 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>6.03 mW / g <math>\pm</math> 16.5 % (k=2)</b>

<sup>1</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.2	0.97 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	56.8 ± 6 %	0.98 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(23.2 ± 0.2) °C	----	----

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	2.39 mW / g
SAR normalized	normalized to 1W	9.56 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>9.66 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>6.31 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.1 $\Omega$ - 2.1 j $\Omega$
Return Loss	- 32.5 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 $\Omega$ - 3.5 j $\Omega$
Return Loss	- 27.6 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.382 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	September 20, 2005



# DASY4 Validation Report for Head TSL

Date/Time: 31.05.2006 10:59:32

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d039**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB\_060425;

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.912 \text{ mho/m}$ ;  $\epsilon_r = 41.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

## DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

**Pin = 250 mW; d = 10 mm/Area Scan (71x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.44 mW/g

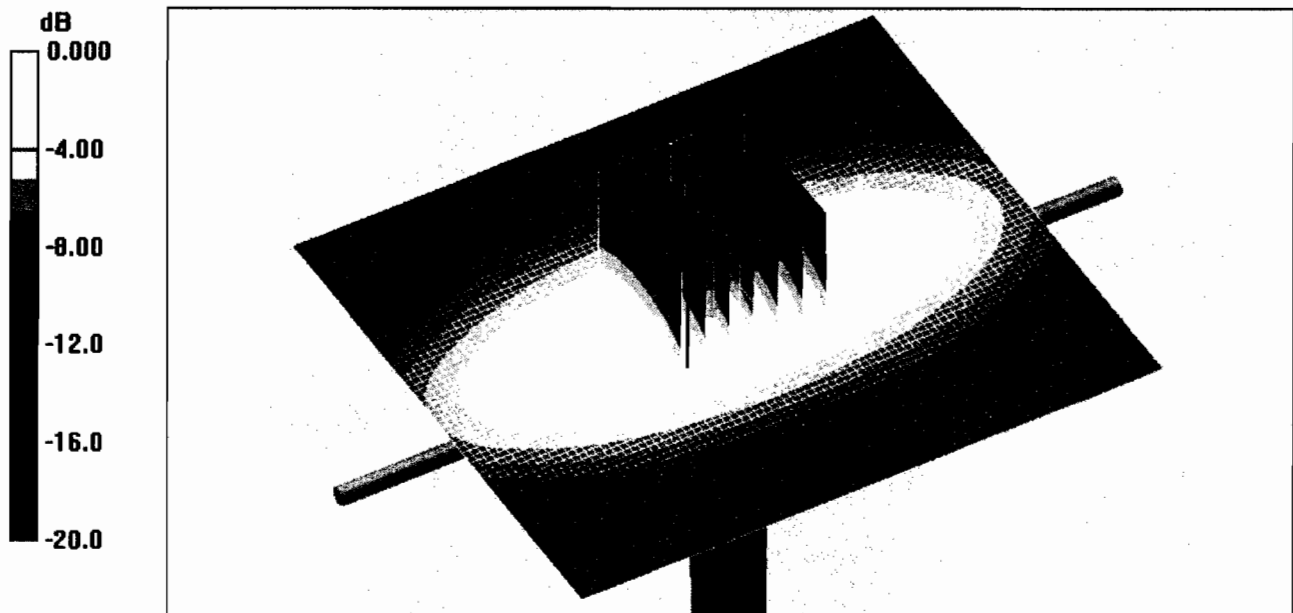
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.1 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 3.48 W/kg

**SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.5 mW/g**

Maximum value of SAR (measured) = 2.48 mW/g



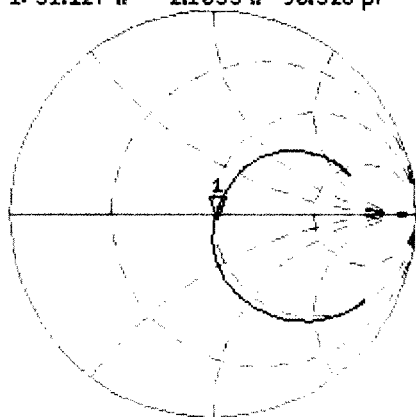
0 dB = 2.48mW/g

# Impedance Measurement Plot for Head TSL

31 May 2006 09:35:47

CH1 S11 1 U FS 1: 51.127  $\Omega$  -2.1055  $\Omega$  90.528 pF 835.000 000 MHz

\*  
Del  
CA

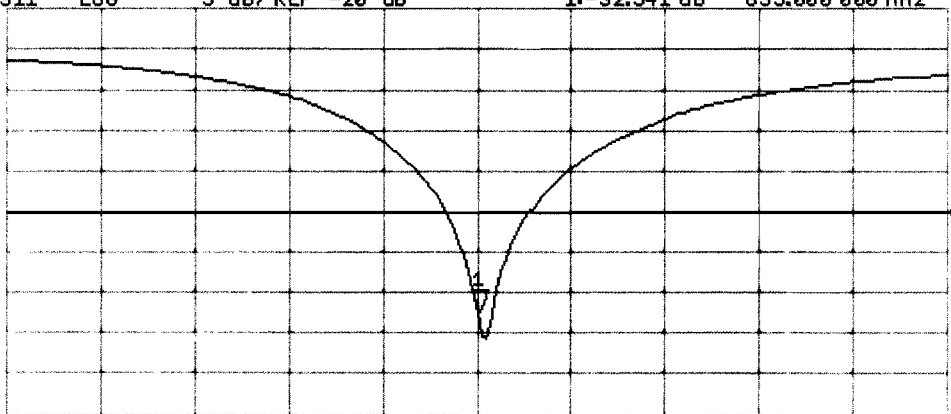


Avg  
16  
↑

CH2 S11 LOG 5 dB/REF -20 dB 1: -32.541 dB 835.000 000 MHz

CA

Avg  
16  
↑



CENTER 835.000 000 MHz

SPAN 400.000 000 MHz

# DASY4 Validation Report for Body TSL

Date/Time: 31.05.2006 13:23:15

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d039**

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: MSL U10 BB;

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.997 \text{ mho/m}$ ;  $\epsilon_r = 56.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.84, 5.84, 5.84); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

**Pin = 250 mW; d = 15 mm/Area Scan (81x81x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 2.59 mW/g

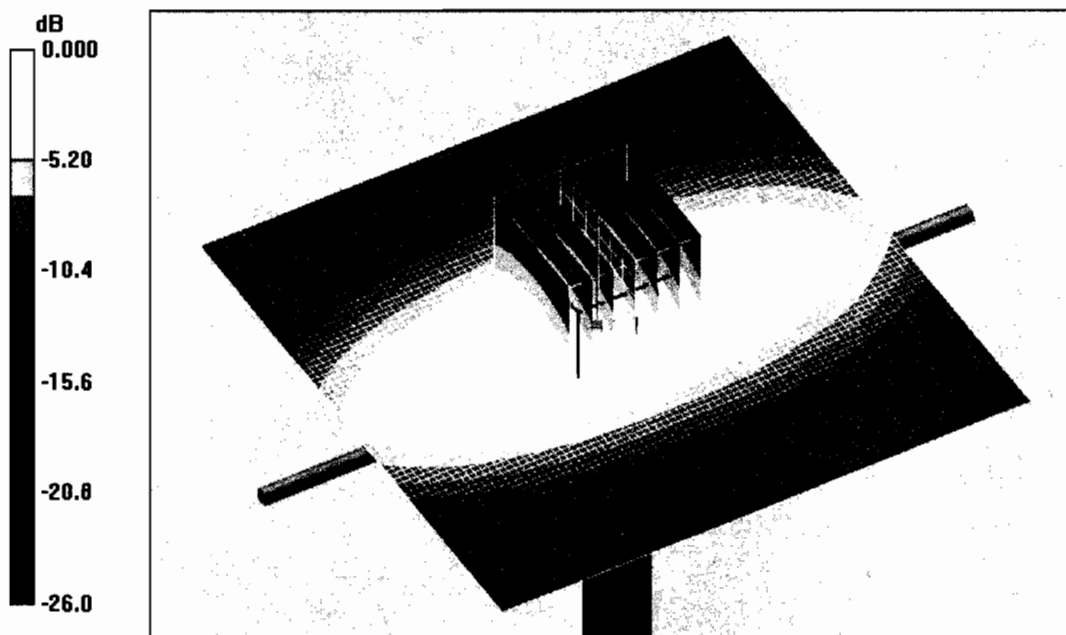
**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.1 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 3.45 W/kg

**SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g**

Maximum value of SAR (measured) = 2.58 mW/g



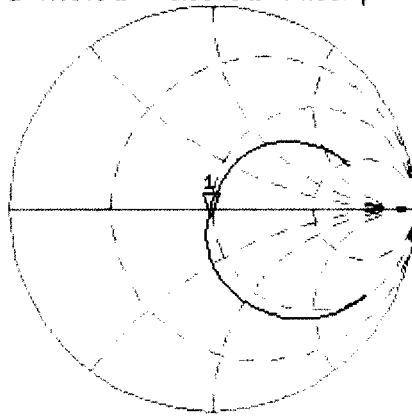
0 dB = 2.58mW/g

# Impedance Measurement Plot Body TSL

31 May 2006 12:26:44

[CH1] S11 1 U FS 1: 47.943  $\Omega$  -3.5078  $\Omega$  54.337 pF 835.000 000 MHz

\*  
De1  
CA



Avg  
16

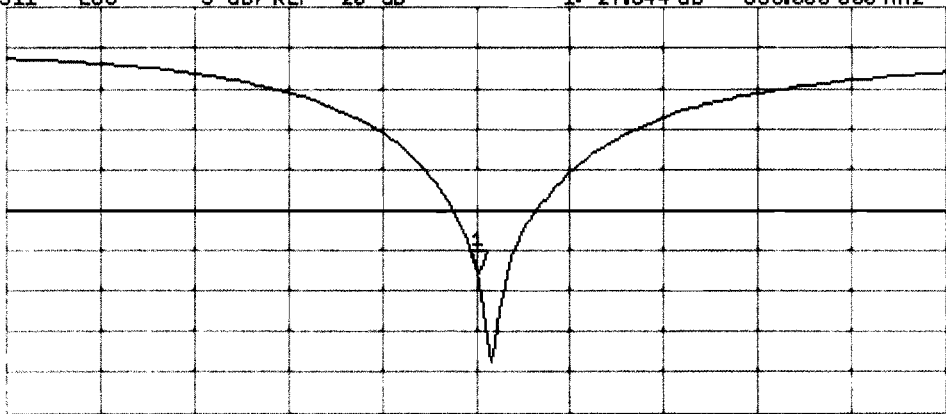
↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.644 dB 835.000 000 MHz

CA

Avg  
16

↑



CENTER 835.000 000 MHz

SPAN 400.000 000 MHz



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Accreditation No.: **SCS 108**

Client **Sony Ericsson Lund**

Certificate No: **D1900V2-5d073\_May06**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d073**

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

Calibration date: **May 31, 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	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN: 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
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 Nov-05)	In house check: Nov-06

Calibrated by: **Name** Mike Meili **Function** Laboratory Technician **Signature** *M. Meili*

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

Issued: June 1, 2006

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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:

- 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
- 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:

- 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.

<b>DASY Version</b>	DASY4	V4.6
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Area Scan resolution</b>	dx, dy = 15 mm	
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	39.4 $\pm$ 6 %	1.41 mho/m $\pm$ 6 %
<b>Head TSL temperature during test</b>	(22.8 $\pm$ 0.2) °C	---	---

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	9.67 mW / g
SAR normalized	normalized to 1W	38.7 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>38.2 mW / g <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	5.11 mW / g
SAR normalized	normalized to 1W	20.4 mW / g
SAR for nominal Head TSL parameters <sup>1</sup>	normalized to 1W	<b>20.3 mW / g <math>\pm</math> 16.5 % (k=2)</b>

<sup>1</sup> 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	54.7 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature during test	(22.7 ± 0.2) °C	----	----

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.4 mW / g
SAR normalized	normalized to 1W	41.6 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>41.9 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.50 mW / g
SAR normalized	normalized to 1W	22.0 mW / g
SAR for nominal Body TSL parameters <sup>2</sup>	normalized to 1W	<b>22.2 mW / g ± 16.5 % (k=2)</b>

<sup>2</sup> Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"



## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.6 $\Omega$ + 5.7 j $\Omega$
Return Loss	- 24.3 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.9 $\Omega$ + 6.4 j $\Omega$
Return Loss	- 23.7 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns
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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	January 24, 2006

# DASY4 Validation Report for Head TSL

Date/Time: 31.05.2006 11:49:47

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d073**

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

Medium: HSL U10 BB;

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.41 \text{ mho/m}$ ;  $\epsilon_r = 39.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.74, 4.74, 4.74); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

**Pin = 250 mW; d = 10 mm/Area Scan (71x71x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 11.6 mW/g

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

Reference Value = 94.1 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 16.6 W/kg

**SAR(1 g) = 9.67 mW/g; SAR(10 g) = 5.11 mW/g**

Maximum value of SAR (measured) = 10.9 mW/g



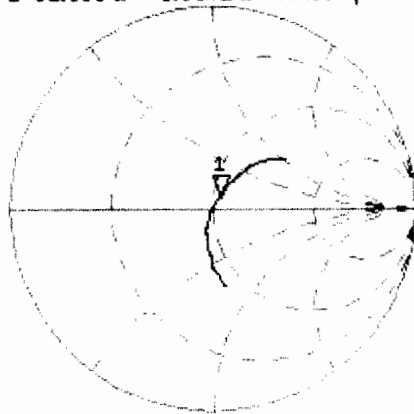
0 dB = 10.9mW/g

# Impedance Measurement Plot for Head TSL

31 May 2006 09:41:45

CH1 S11 1 U FS 1: 52.600  $\Omega$  5.6641  $\Omega$  474.45 pF 1 900.000 000 MHz

\*  
Del  
CA



Avg  
16

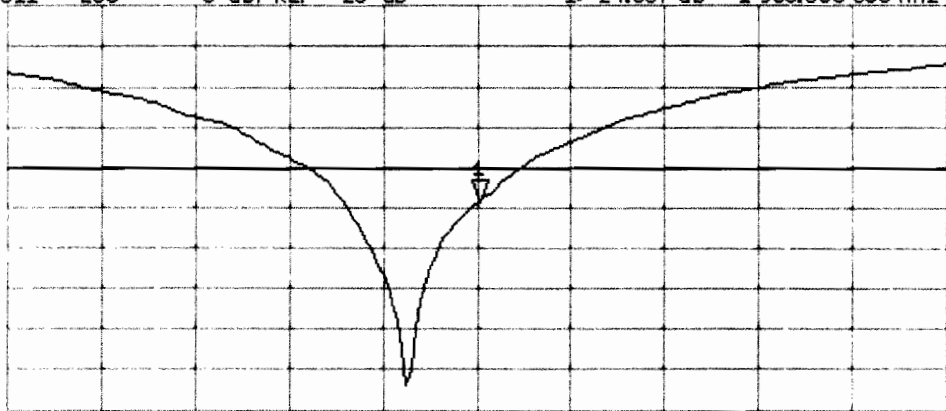
↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-24.337 dB 1 900.000 000 MHz

CA

Avg  
16

↑



# DASY4 Validation Report for Body TSL

Date/Time: 31.05.2006 14:35:04

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d073**

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

Medium: MSL U10;

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.54$  mho/m;  $\epsilon_r = 54.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.3, 4.3, 4.3); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

**Pin = 250 mW; d = 10 mm/Area Scan (71x71x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 12.6 mW/g

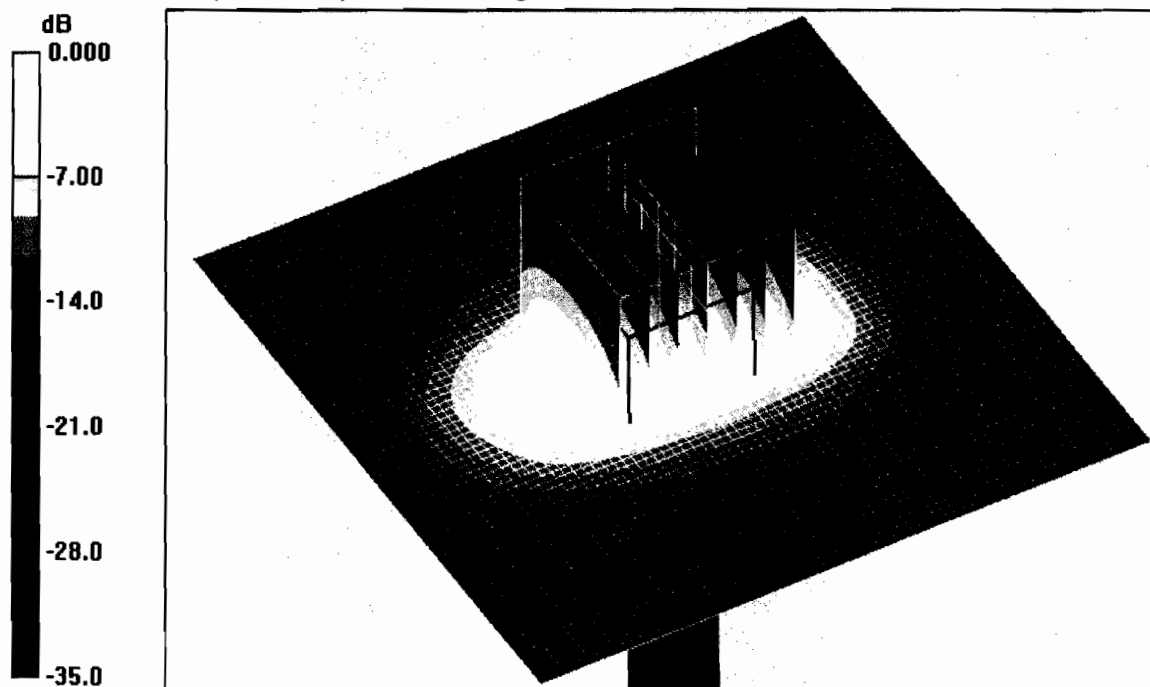
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.4 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.5 mW/g**

Maximum value of SAR (measured) = 11.7 mW/g



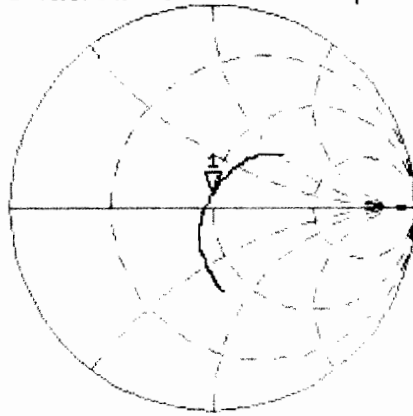
0 dB = 11.7mW/g

# Impedance Measurement Plot for Body TSL

31 May 2006 12:30:26

CH1 S11 1 U FS 1: 48.850  $\Omega$  6.3867  $\Omega$  534.99 pF 1 900.000 000 MHz

\*  
Del  
CA

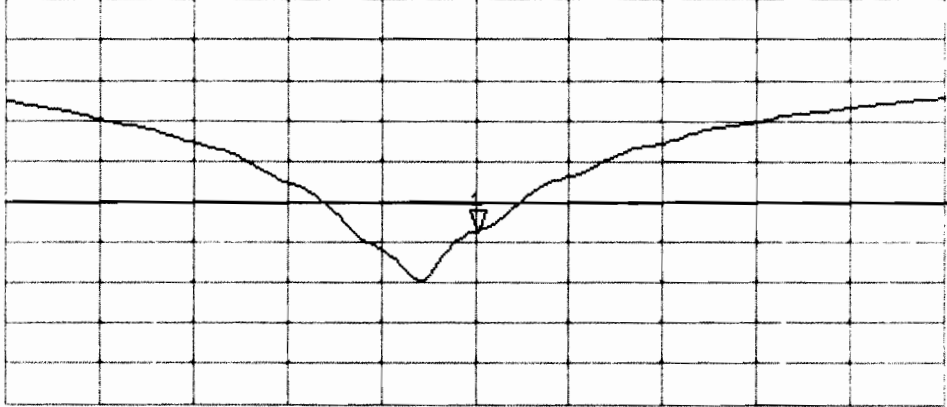


Avg  
16  
↑

CH2 S11 LOG 5 dB/REF -20 dB 1:-23.676 dB 1 900.000 000 MHz

CA

Avg  
16  
↑



CENTER 1 900.000 000 MHz

SPAN 400.000 000 MHz



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. **ES3-3062\_Jan07**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN 3062**

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

Calibration date: **January 16, 2007**

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	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
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

Calibrated by: **Katja Popovic** **Technical Manager** 

Approved by: **Nils Kuster** **Quality Manager** 

Issued: January 16, 2007

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



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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<sup>2</sup>-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 ES3DV3

## SN:3062

Manufactured:	January 30, 2004
Last calibrated:	January 20, 2006
Recalibrated:	January 16, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



## DASY - Parameters of Probe: ES3DV3 SN:3062

### Sensitivity in Free Space<sup>A</sup>

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

NormX	1.18 ± 10.1%	μV/(V/m) <sup>2</sup>	DCP X	95 mV
NormY	1.19 ± 10.1%	μV/(V/m) <sup>2</sup>	DCP Y	96 mV
NormZ	1.10 ± 10.1%	μV/(V/m) <sup>2</sup>	DCP Z	95 mV

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

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

Sensor Center to Phantom Surface Distance		<b>3.0 mm</b>	<b>4.0 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	3.2	1.2
SAR <sub>be</sub> [%]	With Correction Algorithm	0.0	0.7

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

Sensor Center to Phantom Surface Distance		<b>3.0 mm</b>	<b>4.0 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	4.0	1.9
SAR <sub>be</sub> [%]	With Correction Algorithm	0.2	0.2

### Sensor Offset

Probe Tip to Sensor Center                      **2.0 mm**

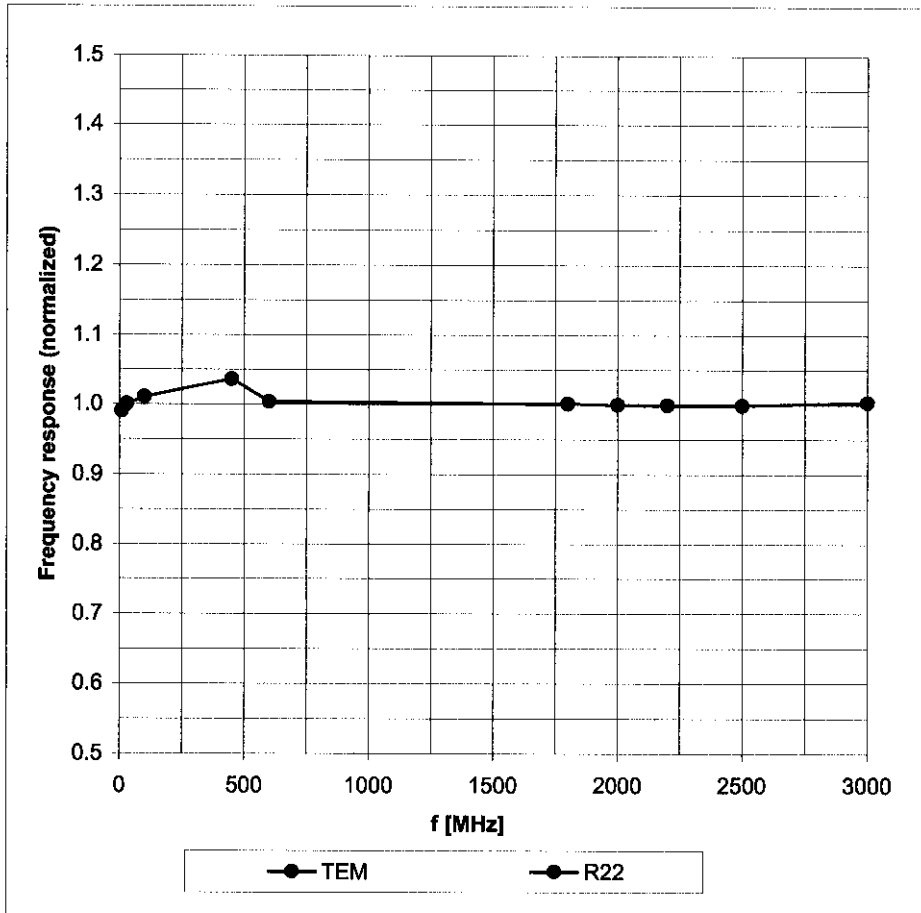
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<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.

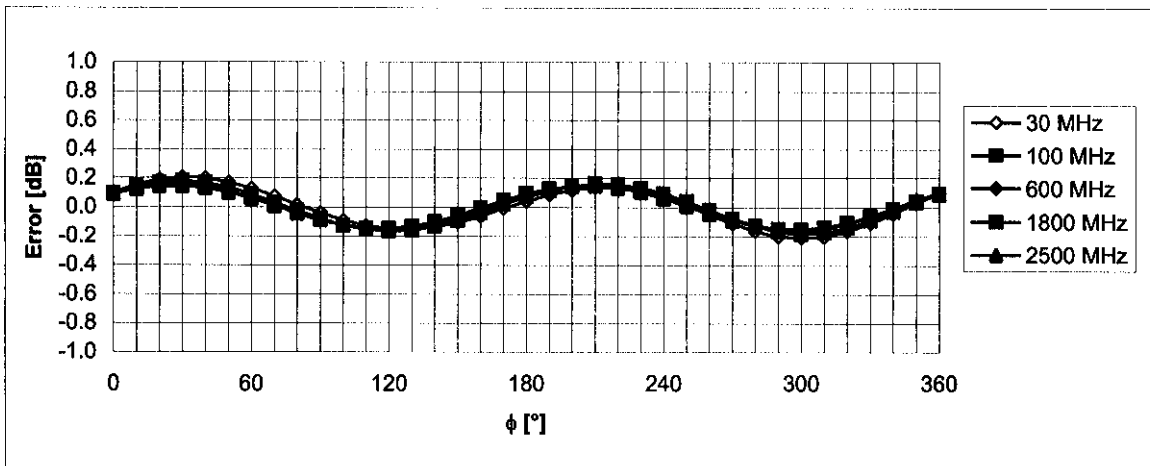
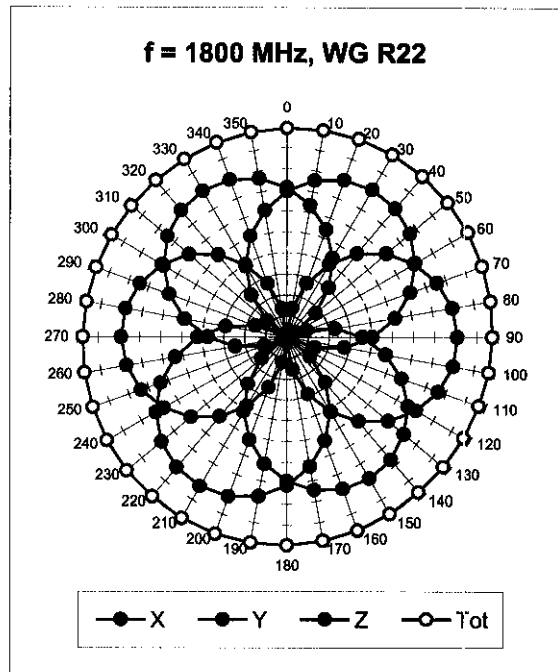
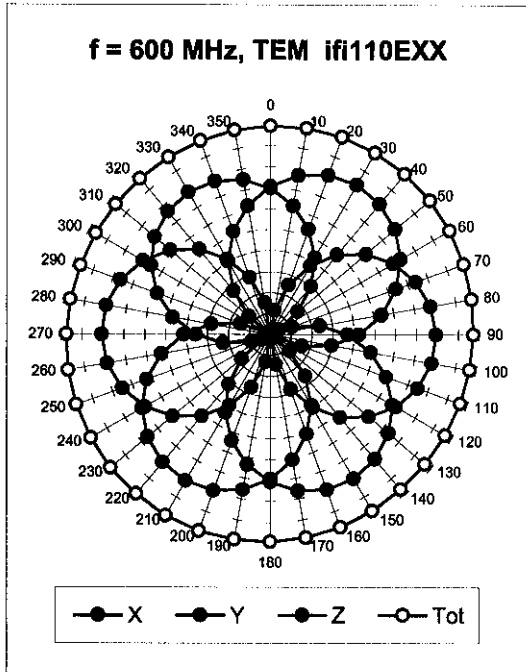
# Frequency Response of E-Field

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



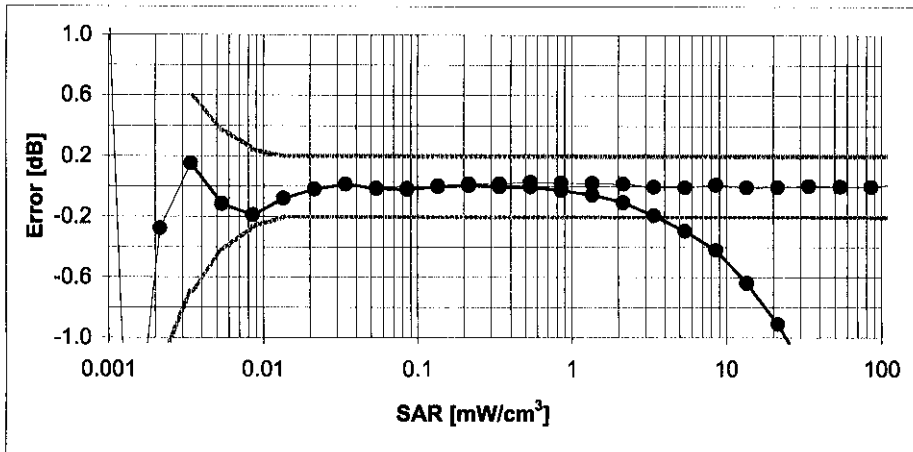
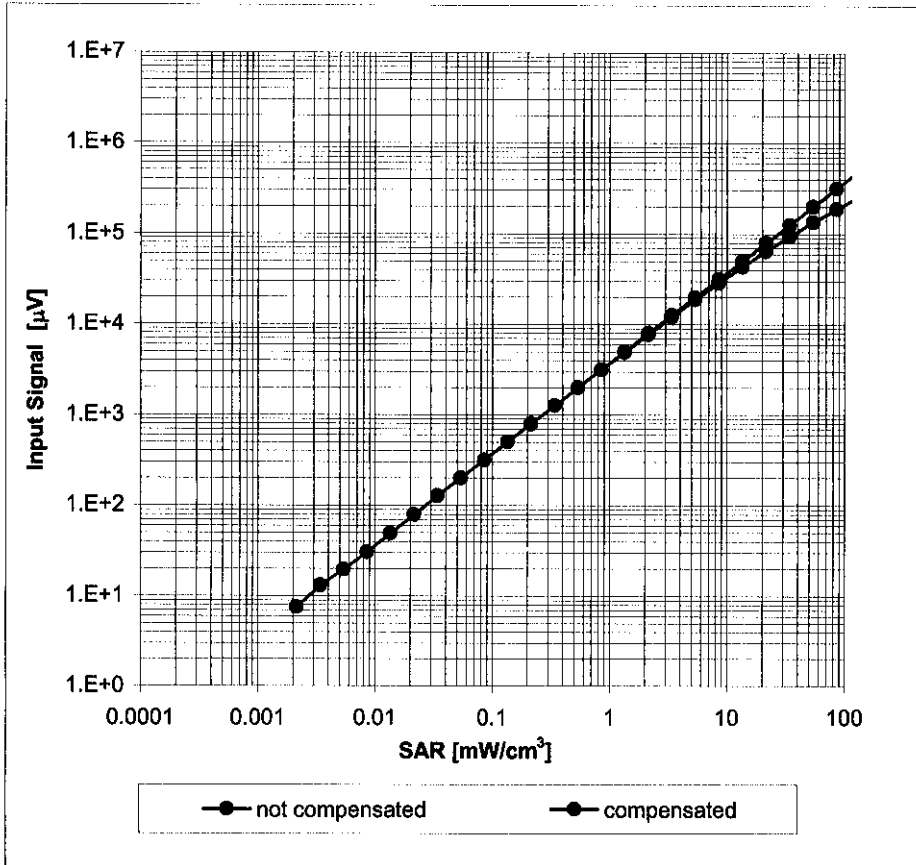
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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



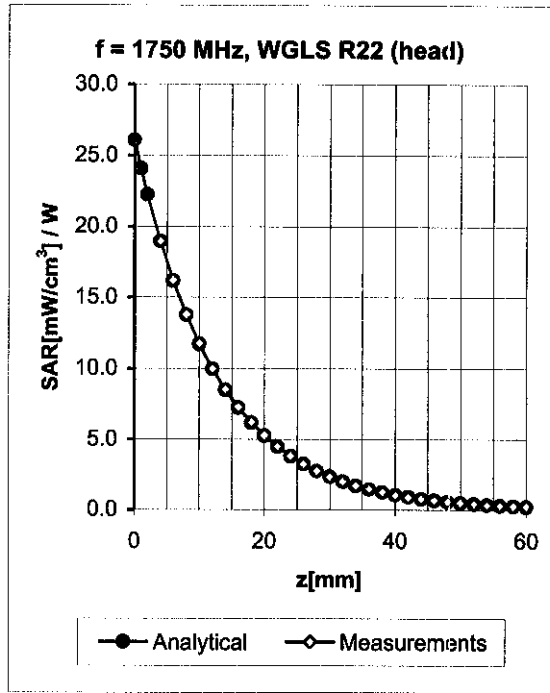
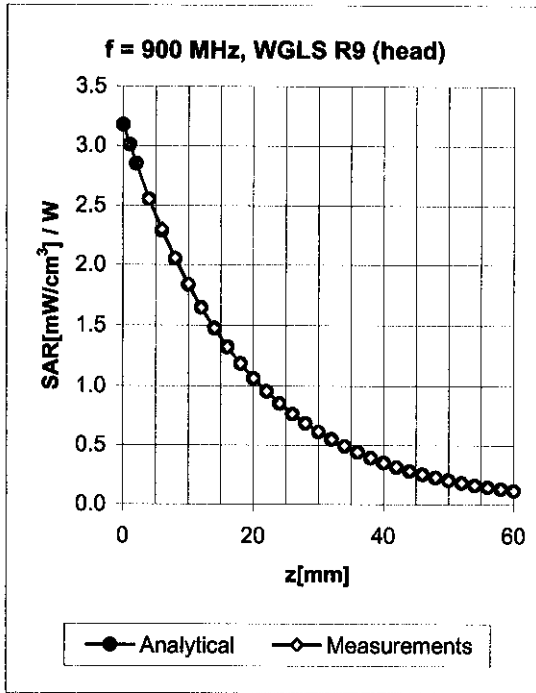
**Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )**

## 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

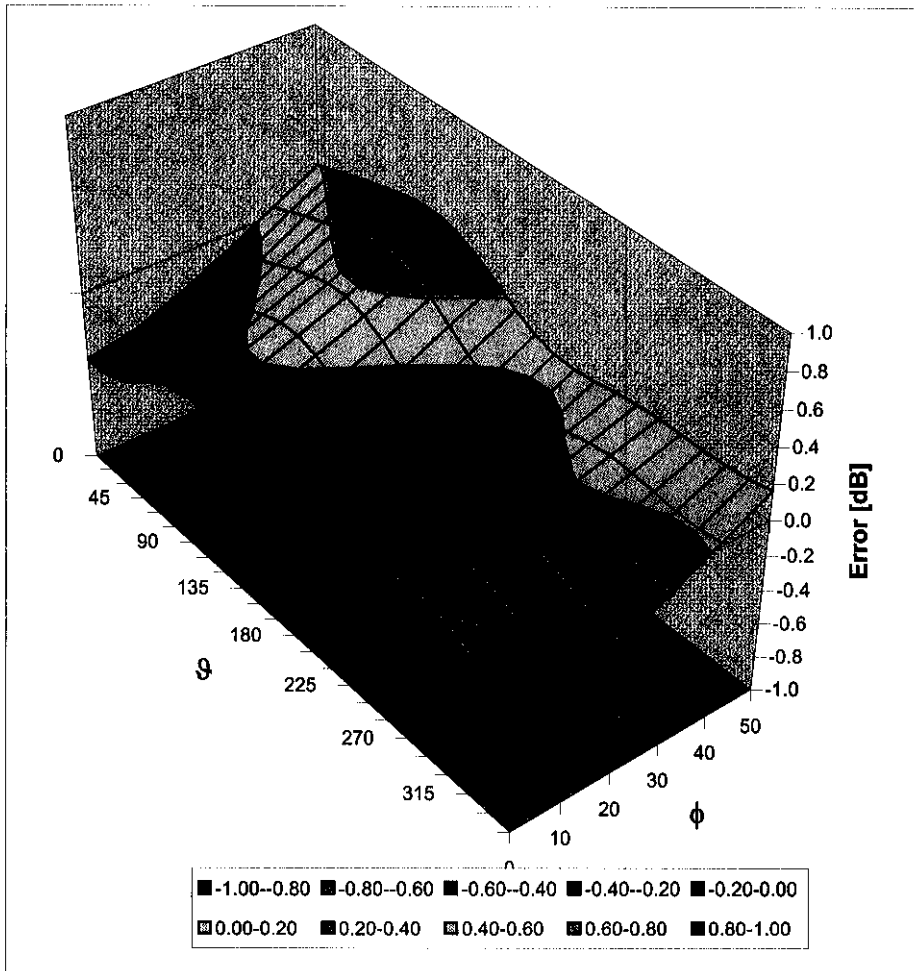


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	1.00	1.11	6.06 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	1.00	1.15	5.99 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.85	1.21	4.84 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.86	1.19	4.73 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.67	1.40	4.34 ± 11.8% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.98	1.15	6.13 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	1.00	1.14	5.84 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.80	1.29	4.72 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.71	1.35	4.53 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.86	1.10	4.09 ± 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 ( $\phi$ ,  $\theta$ ),  $f = 900$  MHz



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