

Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic*

Checked

050830

Company Internal  
REPORT

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File

**Report issued by Accredited SAR Laboratory****for****PY7A1022021 (W550i)****Date of test:** 15, 19 and 22 August 2005**Laboratory:** Sony Ericsson SAR Test Laboratory  
Sonericsson Mobile Communications AB  
Nya Vattentornet  
SE-221 82 LUND, Sweden**Testing Engineer:** *Hamid Kami Shirazi*  
[Kami.shirazi@sonyericsson.com](mailto:Kami.shirazi@sonyericsson.com)  
+4646232644**Testing Approval** *Ramadan Plicanic*  
*Ramadan.Plicanic@sonyericsson.com*  
+46 46 19 38 62**Statement of Compliance**

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

***Sony Ericsson Type AAB-1022021-BV ; FCC ID: PY7A1022021; IC:4170B-A1022021***

to which this declaration relates, is in conformity with the appropriate RF exposure standards recommendations and guidelines. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(None)

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



Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. The accredited laboratory activities meet the requirements in SS-EN ISO/IEC 17025 (2000). This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

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

© Sony Ericsson Mobile Communication AB, 2005



Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

Checked

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File

# 1 Table of contents

**2 INTRODUCTION.....3**

**3 DEVICE UNDER TEST.....3**

3.1 ANTENNA DESCRIPTION .....3

3.2 DEVICE DESCRIPTION .....3

**4 TEST EQUIPMENT.....4**

4.1 DOSIMETRIC SYSTEM.....4

4.2 ADDITIONAL EQUIPMENT .....4

**5 ELECTRICAL PARAMETERS ON THE TISSUE SIMULATING LIQUID .....5**

**6 SYSTEM ACCURACY VERIFICATION.....5**

**7 SAR MEASUREMENT UNCERTAINTY .....6**

**8 TEST RESULTS .....7**

**9 REFERENCES.....8**

**10 APPENDIX .....9**

10 PHOTOGRAPHS OF THE DEVICE UNDER TEST .....11

10.1 DEVICE POSITION ON SAM TWINS PHANTOM .....13



Prepared (also subject responsible if other)

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

Approved

Checked

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

No.

BGGIN05:256

Date

Rev

Reference

050830

A

File

## 2 Introduction

In this test report, compliance of the Sony Ericsson PY7A1022021 (W550i) 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	
<b>Location</b>	On the back side near to microphone	
<b>Dimensions</b>	Max length	40 mm
	Max width	18 mm
<b>Configuration</b>	PIFA	

### 3.2 Device description

<b>Device model</b>	PY7A1022021 (W550i)	
<b>Serial number</b>	CB50167ZR0	
<b>Mode</b>	GSM1900	GSM1900-GPRS 2 slots
<b>Multiple Access Scheme</b>	TDMA	TDMA
<b>Maximum Output Power Setting</b>	30.0 dBm	29.5 dBm
<b>Factory Tolerance in Power Setting</b>	0.5 dB	0.5 dB
<b>Maximum Peak Output Power</b>	30.5 dBm	30 dBm
<b>Crest Factor</b>	8	4
<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	



Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

Checked

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File

## 4 Test equipment

### 4.1 Dosimetric system

SAR measurements were made using the DASY3 professional system (software version 3.1c) 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, 2006
E-field probe ET3DV6	1585	March, 2006
Dipole Validation Kit, D900V2	111	March, 2007
Dipole Validation Kit, D1800V2	297	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 ESG-D4000A	INV 462935	11, 2006
Directional coupler HP778D	INV 2903	11, 2005
Power meter R&S NRVD	INV 483920	01, 2006
Power sensor R&S NRV-Z5	INV 2333	11, 2005
Power sensor R&S NRV-Z5	INV 2334	11, 2005
Termination 65N50-0-11	INV 2903	02, 2006
Network analyzer HP8753C	INV421671	09, 2005
S-parameter test set HP85047A	INV 421670	09, 2005
Dielectric probe kit HP8507D	INV 20 000 053	Self cal



Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

Checked

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File

## 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 DASY3 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, 19/08/2005	39.0	1.47	1.00
		Recommended	40.0	1.40	1.00
1900	Body	Measured, 15/08/2005	51.5	1.51	1.00
		Recommended	53.3	1.52	1.00

## 6 System accuracy verification

A system accuracy verification of the DASY3 was performed using the dipole validation kit listed in section 3.1. The system verification test was conducted on the same day as the measurement of the DUT. Measurement made in ambient temperature 22-23 °C and humidity 40-50%. 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 0.0005 m W/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, 19/08/2005	40.5/20.7	39.0	1.47	1.00	22
		Reference	39.2/20.6	39.6	1.45	1.00	-
1900	Head	Measured, 22/08/2005	41.0/21.0	38.0	1.47	1.00	22
		Reference	39.2/20.6	39.6	1.45	1.00	-
1900	Body	Measured, 15/08/2005	41.7/21.4	51.4	1.56	1.00	22
		Reference	39.6/20.9	51.6	1.58	1.00	-



Prepared (also subject responsible if other)

No.

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

BGGIN05:256

Approved

Checked

Date

Rev

Reference

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

050830

A

File

## 7 SAR measurement uncertainty

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C <sub>i</sub>	1900 Head	1900 Body
<b>Measurement System</b>						
Probe Calibration	±4.4	N	1	1	±4.4	±4.4
Axial Isotropy	±4.7	R	√3	0.5	±1.4	±1.4
Spherical Isotropy	±9.6	R	√3	0.5	±2.8	±2.8
Spatial resolution	±0.0	R	√3	1	±0.0	±0.0
Boundary effect	±5.5	R	√3	1	±3.2	±3.2
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>±7.7</b>	<b>±7.7</b>
<b>Test Sample Related</b>						
Device positioning	±6.0	N	0.89	1	±6.7	±6.7
Device holder uncertainty	±5.0	N	0.84	1	±5.9	±5.9
Power drift	0,0/2.6	R	√3	1	±0,0	±1.5
<b>Test Sample Related Uncertainty</b>					<b>±8.9</b>	<b>±9.0</b>
<b>Phantom and Tissue Parameters</b>						
Phantom uncertainty	±4.0	R	√3	1	±2.3	±2.3
Liquid conductivity (meas)	+5/-0,7	R	√3	0.6	±1.7	±0,7
Liquid conductivity (target)	±5.0	R	√3	0.6	±1.7	±1.7
Liquid Permittivity (meas)	-2,5/-3.4	R	√3	0.6	±0,9	±1,2
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7	±1.7
<b>Phantom and Tissue Parameters Uncertainty</b>					<b>±3.8</b>	<b>±3.6</b>
<b>Combined standard uncertainty</b>					<b>±12.4</b>	<b>±12.4</b>
<b>Extended standard uncertainty (k=2)</b>					<b>±24.8</b>	<b>±24.8</b>

SAR measurement uncertainty evaluation for Sonyericsson W550i Phone



Prepared (also subject responsible if other)

No.

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

BGGIN05:256

Approved

Checked

Date

Rev

Reference

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

050830

A

File

## 8 Test results

The measured 1-gram and averaged SAR values of the device against the head are provided in Tables 1 and body are provided in Tables 2. The ambient humidity and temperature of test facility were 40% - 50% and 22.0 °C – 23.0 °C respectively. The depth of the head and body tissue simulating liquid were 15.1cm. 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 all measurements the phone has measured in both open and close state.

For body measurement phone was tested on the antenna to the phantom and back to the phantom in GPRS 2 Slots mode on 15mm distance between phone and phantom. For all modes, the device was tested at the lowest, middle and highest frequencies in the transmit band. For Blue Tooth mode, phone was paired with Sony Ericsson HBH-60 Blue Tooth head sets and measured on worst case speech mode body position.

Mode	Channel	Peak Output Power(dBm)	Phone Position	Liquid temp C°	SAR (W/kg) in 1g mass			
					Right-hand		Left-hand	
					Phone Open	Phone Close	Phone Open	Phone Close
GSM 1900 Head	512	29,8	Cheek	22-22.5	0,36	0,49	0,31	0,46
			Tilt	22-22.5	0,23	<b>0,62</b>	0,25	0,56
			Tilt(blue tooth)	22-22.5	-	<b>0,62</b>	-	-
	661	29,8	Cheek	22-22.5	0,27	0,40	0,25	0,39
			Tilt	22-22.5	0,16	0,49	0,18	0,47
	810	29,8	Cheek	22-22.5	0,22	0,35	0,20	0,34
Tilt			22-22.5	0,11	0,45	0,12	0,41	

Table1: SAR measurement result for Sony Ericsson PY7A1022021 (W550i) telephone at highest possible output power. The phone has measured against the head in open and close state.

Mode	Channel	Power (dBm)	Phone Position	Liquid t ( C°)	SAR (W/kg) in 1 g mass
GSM 1900 Body	512	29,9	Antenna to phantom, GPRS 2 Slots	22-22,5	<b>0,33</b>
		29,8	Front to phantom, Speech	22-22,5	0,11
			Antenna to phantom, Speech	22-22,5	0,17
			Antenna to phantom +BT, Speech	22-22,5	0,17
	661	29,9	Antenna to phantom, GPRS 2 Slots	22-22,5	0,27
		29,8	Antenna to phantom, Speech	22-22,5	0,15
	810	29,9	Antenna to phantom, GPRS 2 Slots	22-22,5	0,24
		29,8	Antenna to phantom, Speech	22-22,5	0,14

Table2: SAR measurement result for Sony Ericsson PY7A1022021 (W550i) telephone at highest possible output power. The phone has measured against the head only in close state.



Company Internal  
REPORT

Prepared (also subject responsible if other)

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

Approved

Checked

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

No.

BGGIN05:256

Date

Rev

Reference

050830

A

File

## 9 References

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

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

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

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





Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic*

Checked

050830

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File

## 10 Photographs of the device under test



Front & back sides



Down Connector



Back side with battery



Company Internal  
REPORT

Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

Checked

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File



**Battery**



**Sides**



Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

Checked

No.

BGGIN05:256

Date

050830

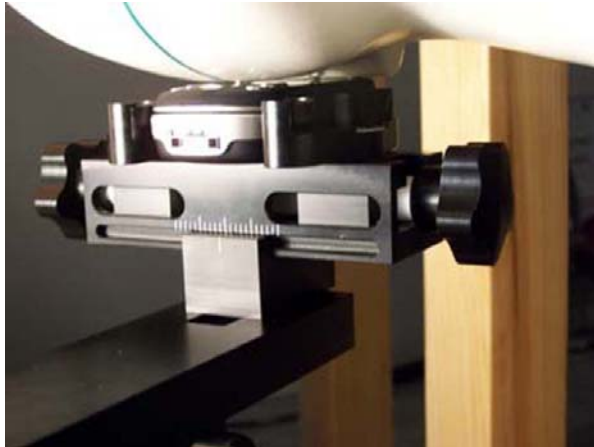
Rev

A

Reference

File

## 10.1 Device position on SAM Twins Phantom



Device position against the head: Cheek (touch) phone position (phone in close state)



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



Company Internal  
REPORT

Prepared (also subject responsible if other)

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

Approved

Checked

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

No.

BGGIN05:256

Date

Rev

Reference

050830

A

File



Device position against the head: Cheek (touch) phone position (phone in open state)



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

Company Internal  
REPORT

Prepared (also subject responsible if other)

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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic* 050830

Checked

No.

BGGIN05:256

Date

050830

Rev

A

Reference

File



**Device position against the body: Phone in close state**

## 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

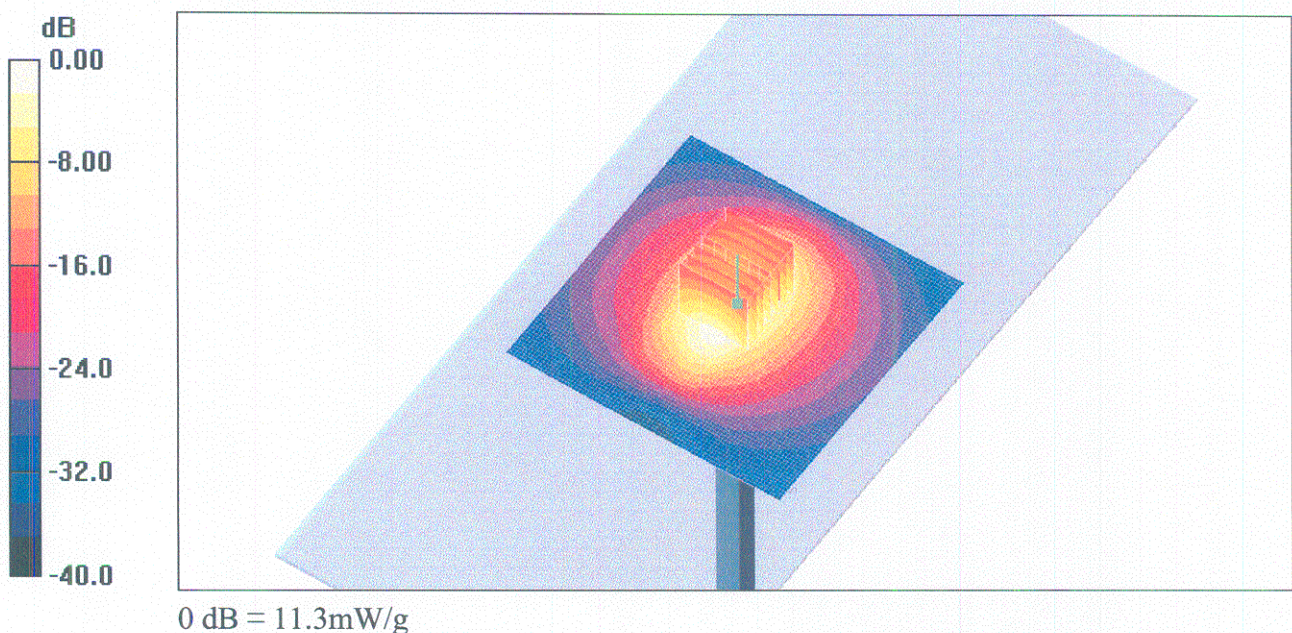
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

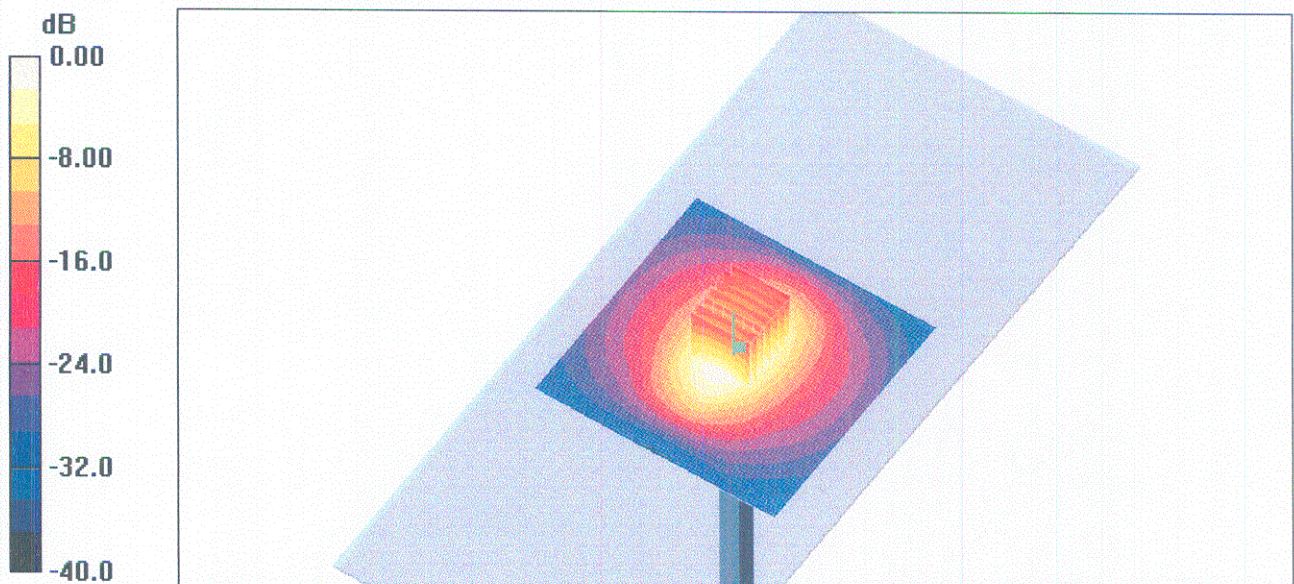
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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