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LD/SEMC/BGGI/NM *Ramadan Plicanic*

Approved

LD/SEMC/BGGI/NMC *Mats Hansson*

Checked

051013

Company Internal  
REPORT

No.

BGGIN05:300

Date

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**Report issued by Accredited SAR Laboratory****For****PY7-A1022013****Date of test:** *5,6 and 10 October, 2005***Laboratory:** Sony Ericsson SAR Test Laboratory  
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+46 46 19 38 62*Ramadan Plicanic***Testing Approval** *Mats Hansson*  
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Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

**Sony Ericsson Type: AAB-1022013-BV; FCC ID: PY7-A1022013; IC: 4170B-A1022013**

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

(None)

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



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

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

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

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## 2 Introduction

In this test report, compliance of the Sony Ericsson PY7-A1022013 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>	Build in	
<b>Location</b>	Up on the back side	
<b>Dimensions</b>	Max length	32mm
	Max width	20mm
<b>Configuration</b>	PIFA	

### 3.2 Device description

<b>Device model</b>	PY7-A1022013	
<b>Serial number</b>	CB3023NYSV (#3376)	
<b>Mode</b>	GSM1900	GSM1900GPRS
<b>Multiple Access Scheme</b>	TDMA	TDMA
<b>Maximum Output Power Setting</b>	30.0dBm	28.5dBm
<b>Factory Tolerance in Power Setting</b>	±0.5 dB	±0.5 dB
<b>Maximum Peak Output Power for GPRS</b>	30.5dBm	29dBm
<b>Crest Factor</b>	8	4
<b>Transmitting Frequency Range(MHz)</b>	1850.2 – 1909.8	
<b>Prototype or Production Unit</b>	Preproduction HW R2A	
<b>Device Category</b>	Portable	
<b>RF exposure environment</b>	General population / uncontrolled	



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## 4 Test equipment

### 4.1 Dosimetric system

SAR measurements were made using the 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	428	052006
E-field probe ETDV6	1569	052006
Dipole Validation Kit, D1900V2	5d002	032007

### 4.2 Additional equipment

<b>Description</b>	<b>Inventory Number</b>	<b>Due Date</b>
Signal generator ESG-D4000A	INV 462935	112006
Directional coupler HP778D	INV 2903	012006
Power meter R&S NRVD	INV 483920	012006
Power sensor R&S NRV-Z5	INV 2333	012006
Power sensor R&S NRV-Z5	INV 2334	012006
Termination 65N50-0-11	INV 2903	012006
Network analyzer HP8753C	INV421671	092006
S-parameter test set HP85047A	INV 421670	092006
Dielectric probe kit HP8507D	INV 20000053	Self cali.



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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 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, 05/10/2005	38.3	1.46	1.00
		Recommended	40.0	1.40	1.00
1900	Body	Measured, 10/10/2005	51.1	1.57	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 (23-24) °C and humanity (45-50) %. 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 0.00003mW/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, 05/10/2005	40.9/20.8	38.3	1.46	1.00	23
		Measured, 06/10/2005	40.9/21.0	38.3	1.46	1.00	23
		Reference	39.2/20.6	39.6	1.45	1.00	-
1900	Body	Measured, 10/10/2005	38.2/19.8	51.1	1.57	1.00	23
		Reference	39.6/20.9	53.3	1.58	1.00	-



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## 7 SAR measurement uncertainty

### SAR measurement uncertainty evaluation for Sonyericsson PY7-A1022013 phone

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C <sub>i</sub>	GSM 1900-Head	GSM 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>					±7.8	±7.8
<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	-3.8/-3.8	R	√3	1	-2.1	-2.1
<b>Test Sample Related Uncertainty</b>					±9.2	±9.2
<b>Phantom and Tissue Parameters</b>						
Phantom uncertainty	±4.0	R	√3	1	±2.3	±2.3
Liquid conductivity (meas.)	-4.3/-4.1	R	√3	0.6	-1.5	-1.4
Liquid conductivity (target)	±5.0	R	√3	0.6	±1.7	±1.7
Liquid Permittivity (meas.)	4.3/3.3	R	√3	0.6	+1.5	-1.1
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7	±1.7
<b>Phantom and Tissue Parameters Uncertainty</b>					±3.9	±3.8
<b>Combined standard uncertainty</b>					±12.7	±12.6
<b>Extended standard uncertainty (k=2)</b>					±25.4	±25.2



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## 8 Test results

The measured 1-gram averaged SAR values of the device against head and body are provided in Table 1 and Table 2. The ambient humidity and temperature of test facility were (45-53) % and (23-24) °C respectively.

The depth of the head and body tissue simulating liquids were 15.3cm and 15.1cm. A base station simulator was used to control the device during the SAR measurements. 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 different phones position, cheek (touch) and tilt (cheek + 15deg). For all modes, the device was tested at the lowest, middle and highest frequencies in the transmit band.

For body measurements the phone was tested on either the phone's antenna (Back) or the Front side phone against the flat section of the phantom with 15mm distance. GPRS measurements are done for back and front side of the phone for all three different channels. For speech mode it's used Sony Ericsson hands free HPM-61 and measured only in back side position to phantom

For Blue Tooth mode the phone was pared with Sony Ericsson HBH-200 Blue tooth head set and measured only on the worst case on body positions in speech phone mode.

Mode	Chanel	Power (dB)	Phone Position	Liquid t (°C)	SAR (W/kg)	
					Right-hand	Left-hand
					1g mass	1g mass
1900 GSM	512	30.5	Cheek	23	0.29	0.26
			Tilt	23	0.31	0.31
	661	30.3	Cheek	23	0.31	0.28
			Tilt	23	<b>0.38</b>	0.31
	810	30.3	Cheek	23	0.25	0.21
			Tilt	23	0.30	0.29

Table1: SAR measurement result for Sony Ericsson PY7-A1022013 telephone at highest possible output power. Measurements have done against the head.

Mode	Channel	Power (dBm)	Phone Position	Liquid t (°C)	SAR (W/kg) in 1 g mass	
1900	512	30.5	Antenna to phantom, HF HPM-20	23	0.45	
		29	Antenna to phantom, GPRS 2 Slots	23	<b>1.00</b>	
			Front to phantom, GPRS 2 Slots	23	0.10	
Show GSM	661	30.5	Antenna to phantom, HF HPM-20	23	0.58	
		29	Antenna to phantom, BT HBH-200	23	0.52	
			Antenna to phantom, GPRS 2 Slots	23	0.80	
	885	29	Front to phantom, GPRS 2 Slots	23	0.10	
			30.5	Antenna to phantom, HF HPM 20	23	0.51
			29	Antenna to phantom, GPRS 2 Slots	23	0.69
			Front to phantom, GPRS 2 Slots	23	0.10	

Table2: SAR measurement result for Sony Ericsson PY7-A1022013 telephone at highest possible output power. Measurements have done 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 sides



Down Connector

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**Back side with battery**



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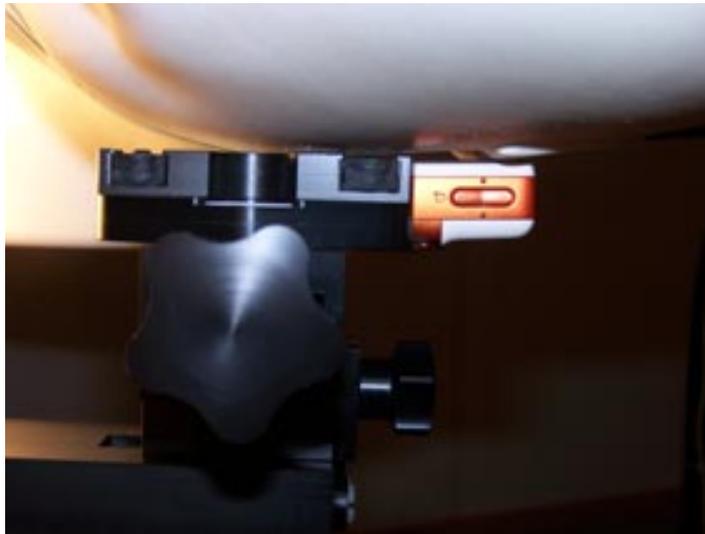
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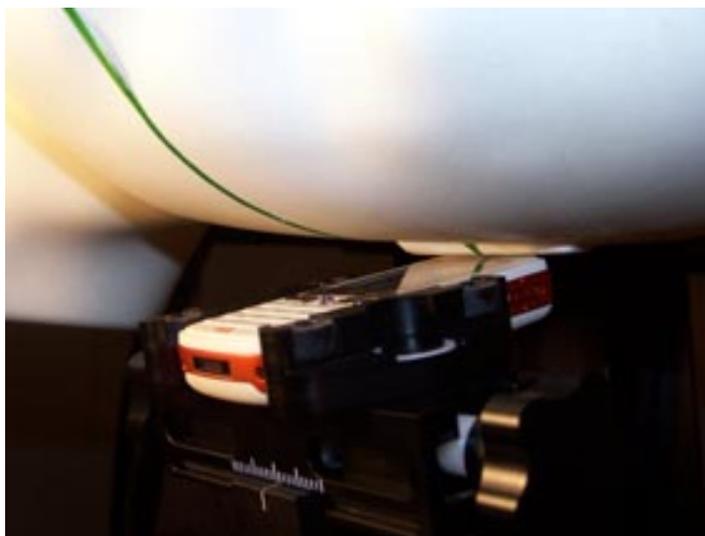
Reference

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: 15mm distance from Phantom.**

## 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

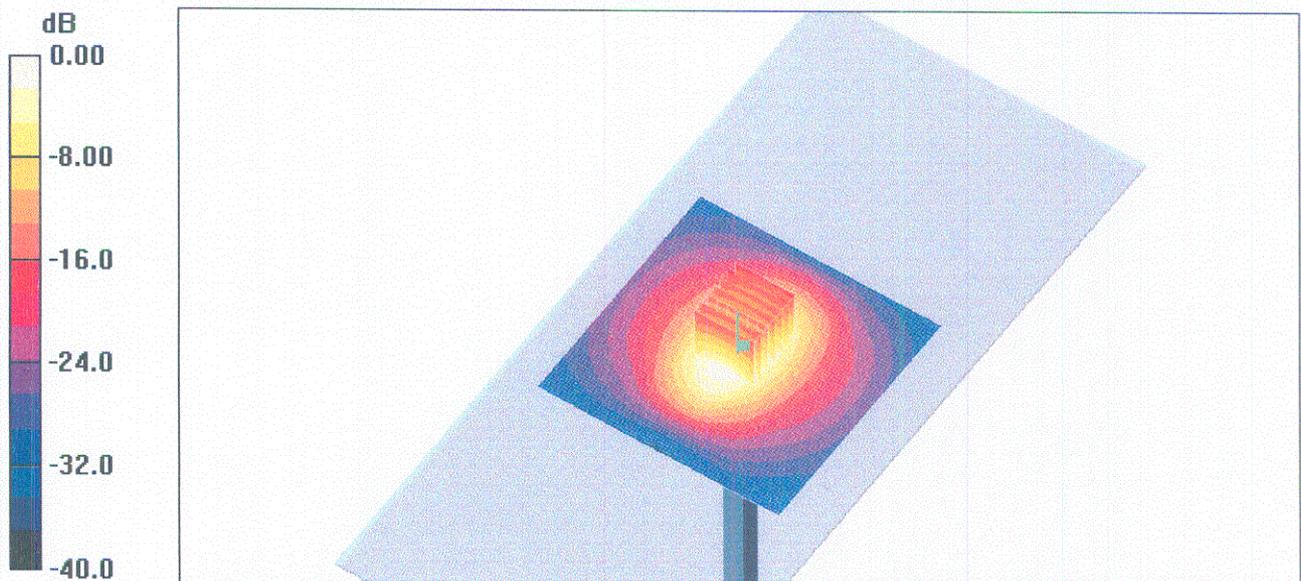
**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

## 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

