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

Approved

LD/SEMC/BGGI/NM *Ramadan Plicanic*

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REPORT

No.

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Report issued by Accredited SAR Laboratory**for****PY7A1022021 (W550i)****Date of test:** 15, 19 and 22 August 2005**Laboratory:** Sony Ericsson SAR Test Laboratory
Sonyericsson Mobile Communications AB
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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.

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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

Type	Internal	
Location	On the back side near to microphone	
Dimensions	Max length	40 mm
	Max width	18 mm
Configuration	PIFA	

3.2 Device description

Device model	PY7A1022021 (W550i)	
Serial number	CB50167ZR0	
Mode	GSM1900	GSM1900-GPRS 2 slots
Multiple Access Scheme	TDMA	TDMA
Maximum Output Power Setting	30.0 dBm	29.5 dBm
Factory Tolerance in Power Setting	0.5 dB	0.5 dB
Maximum Peak Output Power	30.5 dBm	30 dBm
Crest Factor	8	4
Transmitting Frequency Range(MHz)	1850.2 – 1909.8	
Prototype or Production Unit	Preproduction	
Device Category	Portable	
RF exposure environment	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.

Description	Serial Number	Due Date
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

Description	Inventory Number	Due Date
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

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5 Electrical parameters on the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ϵ_r , and the conductivity, σ , of the tissue simulating liquids were measured with the dielectric probe kit. These values are shown in the table below. The mass density, ρ , entered into the DASY3 software is also given. Recommended limits for permittivity ϵ_r , conductivity σ and mass density ρ are also shown.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ϵ_r	σ (S/m)	ρ (g/cm ³)
1900	Head	Measured, 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)
				ϵ_r	σ (S/m)	ρ (g/cm ³)	
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	-



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7 SAR measurement uncertainty

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C _i	1900 Head	1900 Body
Measurement System						
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
Measurement System Uncertainty					±7.7	±7.7
Test Sample Related						
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
Test Sample Related Uncertainty					±8.9	±9.0
Phantom and Tissue Parameters						
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
Phantom and Tissue Parameters Uncertainty					±3.8	±3.6
Combined standard uncertainty					±12.4	±12.4
Extended standard uncertainty (k=2)					±24.8	±24.8

SAR measurement uncertainty evaluation for Sonyericsson W550i Phone



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	0,62	0,25	0,56
			Tilt(blue tooth)	22-22.5	-	0,62	-	-
	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	0,33
		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.



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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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Photographs of the device under test



Front & back sides



Down Connector



Back side with battery



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Battery



Sides



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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)



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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)



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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/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

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

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

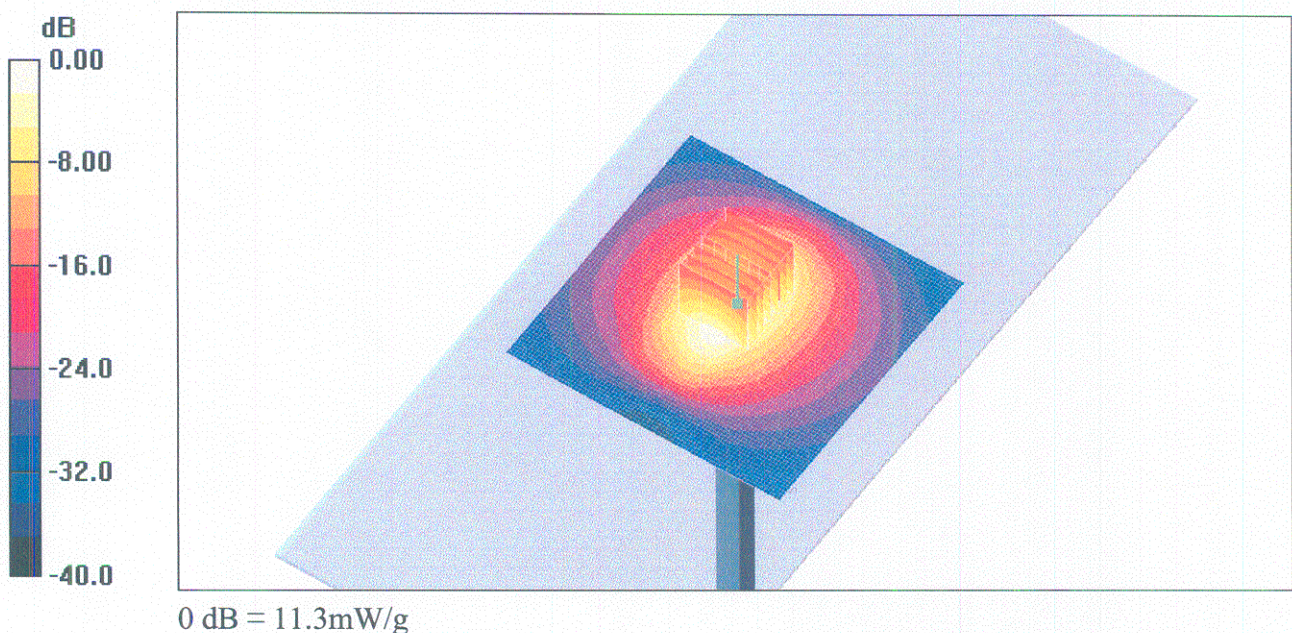
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 16.8 W/kg

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

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



DASY4 Validation Report for Head TSL

Date/Time: 09.03.2005 15:20:45

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL 1900 MHz;

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

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

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

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

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

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

Peak SAR (extrapolated) = 16.9 W/kg

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

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

