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

Approved

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**Report issued by Accredited SAR Laboratory****For***PY7AF052051 (W810i)***Date of test:** 17 to 28, Feb, 2006**Laboratory:** Sony Ericsson SAR Test Laboratory  
Sonericsson Mobile Communications AB  
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Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

***Sony Ericsson Type AAF-1052051-BV; FCC ID: PY7AF052051; IC:4170B-AF052051***

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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B

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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 .....4**

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

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

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

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

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

10.1 PHOTOGRAPHS OF THE DEVICE UNDER TEST .....9

10.2 DEVICE POSITION ON SAM TWINS PHANTOM .....11

10.3 ATTACHMENTS.....12



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## 2 Introduction

In this test report, compliance of the Sony Ericsson PY7AF052051 (W810i) portable telephone with RF safety guidelines is demonstrated. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in the *SAR Measurement Specifications of Wireless Handsets* [1].

## 3 Device under Test

### 3.1 Antenna Description

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

### 3.2 Device description

<b>Device model</b>	PY7AF052051(W810i)					
<b>Serial number</b>	BD3050HQLB					
<b>Mode</b>	GSM 850			GSM1900		
<b>Crest Factor</b>	8			8		
<b>Multiple Access Scheme</b>	TDMA			TDMA		
<b>Maximum Output Power Setting (dBm)</b> 4	Ch128	Ch190	Ch251	Ch512	Ch661	Ch810
	32.5	32.5	32.5	30.0	30.0	30.5
<b>Factory Tolerance in Power Setting</b>	±0.5dB			±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	33	33	33	30.5	30.5	31.0
<b>Mode</b> +	GSM 850- GPRS2TX			GSM1900-GPRS2TX		
<b>Maximum Output Power Setting (dBm)</b> 6	Ch128	Ch190	Ch251	Ch512	Ch661	Ch810
	30.5	30.5	30.5	28.0	28.0	28.5
<b>Factory Tolerance in Power Setting</b>	±0.5dB			±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	31	31	31	28.5	28.5	29
<b>Mode</b>	GSM 850- EGPRS2TX			GSM1900-EGPRS2TX		
<b>Crest Factor</b>	4			4		
<b>Maximum Output Power Setting</b>	27.5 dBm			26.5 dBm		
<b>Factory Tolerance in Power Setting</b>	±0.5dB			±0.5dB		
<b>Maximum Peak Output Power (dBm)</b>	28			27		
<b>Transmitting Frequency Range(MHz)</b>	824.2-848.8			1850.2 – 1909.8		
<b>Prototype or Production Unit</b>	Preproduction					
<b>Device Category</b>	Portable					
<b>RF exposure environment</b>	General population / uncontrolled					



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## 4 Test equipment

### 4.1 Dosimetric system

SAR measurements were made using the 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 ETDV6	1585	March 2006
Dipole Validation Kit, D835V2	484	March 2007
Dipole Validation Kit, D1900V2	5d002	March 2007

### 4.2 Additional equipment

<b>Description</b>	<b>Inventory Number</b>	<b>Due Date</b>
Signal generator R&S SML03	INV 20007667	Dec. 2007
Power meter R&S NRVZ	INV 20007669	Dec. 2007
Power sensor R&S NRV-Z5	INV 20007672	Dec. 2007
Power sensor R&S NRV-Z5	INV 20007673	Dec. 2007
Network analyzer HP8753C	INV421671	Nov. 2006
S-parameter test set HP85047A	INV 421670	Nov. 2006
Dielectric probe kit HP8507D	INV 200 000 53	Self calibrated
CMU200	INV 20002149	Mars. 2006



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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> )
850	Head	Measured, 23/Feb/2006	40.2	0.86	1.00
		Recommended	41.5	0.90	1.00
	Body	Measured, 17/Feb/2006	55.4	1.01	1.00
		Recommended	55.2	0.97	1.00
1900	Head	Measured, 21/Feb./2006	39.7	1.47	1.00
		Recommended	40.0	1.40	1.00
	Body	Measured, 20/Feb/2006	51.2	1.56	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. Measurement made in ambient temperature (22-23) °C and humanity (22-23) %. The obtained results are displayed in the table below.

RF noise had been measured in liquid when all RF equipment in lab was set off. Measured value was 0.0002mW/g in 1g mass

f (MHz)	Tissue type	Measured / Reference	SAR (W/kg) 1g/10g	Dielectric Parameters			Liquid t(°C)
				$\epsilon_r$	$\sigma$ (S/m)	$\rho$ (g/cm <sup>3</sup> )	
850	Head	Measured, 23/Feb/2006	9.25/5.96	40.2	0.86	1.00	22±0.2
		Measured, 24/Feb/2006	9.00/5.81	40.2	0.86	1.00	22±0.2
		Reference	9.08/5.96	42.2	0.91	1.00	22±0.2
	Body	Measured, 17/Feb/2006	10.1/6.49	55.4	1.01	1.00	22±0.2
		Reference	9.48/6.24	54.9	1.01	1.00	22±0.2
		Reference	9.48/6.24	54.9	1.01	1.00	22±0.2
1900	Head	Measured, 21/Feb./2006	40.5/20.7	39.7	1.47	1.00	22±0.2
		Reference	39.2/20.6	39.6	1.45	1.00	22±0.2
	Body	Measured, 20/Feb/2006	41.4/21.3	51.2	1.56	1.00	22±0.2
		Reference	39.6/20.9	51.6	1.58	1.00	22±0.2



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## 7 SAR measurement uncertainty

### SAR measurement uncertainty evaluation for Sonyericsson PY7AF052051 (W810i) phone

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C <sub>i</sub>	GSM 850-Head	GSM 850-Body	GSM 1900-Head	GSM 1900-Body
<b>Measurement System</b>								
Probe Calibration	±4.8	N	1	1	±4.8	±4.8	±4.8	±4.8
Axial Isotropy	±4.7	R	√3	0.7	±1.9	±1.9	±1.9	±1.9
Spherical Isotropy	±9.6	R	√3	0.7	±3.9	±3.9	±3.9	±3.9
Boundary effect	±1.0	R	√3	1	±1.0	±1.0	±1.0	±1.0
Probe linearity	±4.7	R	√3	1	±2.7	±2.7	±2.7	±2.7
Detection limit	±1.0	R	√3	1	±0.6	±0.6	±0.6	±0.6
Readout electronics	±1.0	N	1	1	±1.0	±1.0	±1.0	±1.0
Response time	±0.8	R	√3	1	±0.5	±0.5	±0.5	±0.5
Integration time	±1.4	R	√3	1	±0.8	±0.8	±0.8	±0.8
RF Ambient Conditions	±3.0	R	√3	1	±1.7	±1.7	±1.7	±1.7
Mech. Constraints of robot	±0.4	R	√3	1	±0.2	±0.2	±0.2	±0.2
Probe positioning	±2.9	R	√3	1	±1.7	±1.7	±1.7	±1.7
Extrap, interpolation and integration	±3.9	R	√3	1	±2.3	±2.3	±2.3	±2.3
<b>Measurement System Uncertainty</b>					<b>±8.0</b>	<b>±8.0</b>	<b>±8.0</b>	<b>±8.0</b>
<b>Test Sample Related</b>								
Device positioning	±3.5	N	1	1	±3.5	±3.5	±3.5	±3.5
Device holder uncertainty	±3.5	N	1	1	±3.5	±3.5	±3.5	±3.5
Power drift	±(2.1/2.1/0.2/0.9)	R	√3	1	+1.2	-1.2	-0.1	-0.5
<b>Test Sample Related Uncertainty</b>					<b>±5.1</b>	<b>±5.1</b>	<b>±5.0</b>	<b>±5.0</b>
<b>Phantom and Tissue Parameters</b>								
Phantom uncertainty	±4.0	R	√3	1	±2.3	±2.3	±2.3	±2.3
Liquid conductivity (measurement)	±(2.6/4.1/5.0/2.6)	N	1	0.64	±1.7	±2.6	±3.2	±1.7
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8	±1.8	±1.8	±1.8
Liquid Permittivity (measurement)	±(3.0/0.4/0.8/3.9)	N	1	0.6	±1.8	±0.2	±0.5	±2.3
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7	±1.7	±1.7	±1.7
<b>Phantom and Tissue Parameters Uncertainty</b>					<b>±4.2</b>	<b>±4.3</b>	<b>±4.7</b>	<b>±4.4</b>
<b>Combined standard uncertainty</b>					<b>±10.4</b>	<b>±10.4</b>	<b>±10.5</b>	<b>±10.4</b>
<b>Extended standard uncertainty (k=2)</b>					<b>±20.8</b>	<b>±20.8</b>	<b>±21.0</b>	<b>±20.8</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 22%-23% and 22°C–23°C respectively. The depth of tissue simulating liquid for head and body are 15.4cm and 15cm. A base station simulator was used to control the device during the SAR measurement. The phone was supplied with full-charged battery for each measurement.

For head measurement, the device was tested on the right-hand phantom (corresponding to the right side of the head) and the left-hand phantom in two phone position, cheek (touch) and tilt (cheek + 15deg).

For body measurement phone was tested on the antenna (back) and Front against flat section of phantom with 15mm distance in both speech and Data (EGPRS and GPRS) mode. For all modes, the device was tested at the lowest, middle and highest frequencies in the transmit band. For Hands free used Sony Ericsson head set (HPB-60) and for Blue Tooth phone was paired with Sony Ericsson HBH-60 Blue Tooth accessory and measured on worst case speech mode and for body.

Mode	Channel	Power (dB)	Phone Position	Liquid t (°C)	SAR (W/kg)	
					Right-hand	Left-hand
					1g mass	1g mass
1900 GSM Head	512	30.3	Cheek	22±0.2	0.94	0.79
			Tilt	22±0.2	0.86	0.88
	661	30.4	Cheek	22±0.2	0.85	0.76
			Tilt	22±0.2	0.79	0.83
	810	30.8	Cheek	22±0.2	0.77	0.70
			Tilt	22±0.2	0.78	0.78
850 GSM Head	128	32.8	Cheek	22±0.2	0.40	0.55
			Tilt	22±0.2	0.48	0.47
	190	32.9	Cheek	22±0.2	0.36	0.39
			Tilt	22±0.2	0.38	0.36
	251	32.9	Cheek	22±0.2	0.32	0.47
			Tilt	22±0.2	0.35	0.32

Table1: SAR measurement result for Sony Ericsson PY7AF052051 (W810i) 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	30.3	Antenna to phantom Hands Free	22±0.2	0.99	
		30.3	Antenna to phantom Blue Tooth	22±0.2	1.12	
		28.3	Antenna to phantom GPRS2TX	22±0.2	1.17	
	661	30.4	Antenna to phantom Hands Free	22±0.2	0.92	
			Antenna to phantom GPRS2TX	22±0.2	1.24	
			30.8	Antenna to phantom Hands Free	22±0.2	0.80
	810	30.8	Antenna to phantom GPRS2TX	22±0.2	1.39	
			26.2	Antenna to phantom EGPRS2TX	22±0.2	1.09
			26.2	Front to phantom EGPRS2TX	22±0.2	0.27
GSM 850 Body	128	32.8	Antenna to phantom	22±0.2	0.62	
		30.8	Antenna to phantom GPRS2TX	22±0.2	0.74	
	190	32.9	Antenna to phantom	22±0.2	0.60	
			Antenna to phantom GPRS2TX	22±0.2	0.68	
	251	32.9	Antenna to phantom	22±0.2	0.66	
			Antenna to phantom Hands Free	22±0.2	0.78	
		Antenna to phantom Blue Tooth	22±0.2	0.63		
		30.9	Antenna to phantom GPRS2TX	22±0.2	0.76	
		27.2	Antenna to phantom EGPRS2TX	22±0.2	0.76	
			Front to phantom EGPRS2TX	22±0.2	0.28	

Table2: SAR measurement result for Sony Ericsson PY7AF052051 (W810i) 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.

[5] IEC, "Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz," Std. 62209-1, February, 2005.

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## 10 Appendix

### 10.1 Photographs of the device under test



Front & Back side



Back with Battery



Down Connector



Sides



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## 10.2 Device position on SAM Twins Phantom



Device position against the head: Cheek (touch) phone position



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



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



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### 10.3 Attachment

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