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LD/SEMC/BGLIVMC *Peter Lindeborg*

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No.

BGLI08:187

Date

080219

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## Report issued by Accredited SAR Laboratory

### for

### PY7A3724011 (SO906i)

**Date of test:** 18<sup>th</sup> - 26<sup>th</sup> of February, 2008**Laboratory:** Sony Ericsson SAR Test Laboratory  
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Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

***Sony Ericsson Type AAD-3724011-BV***

to which this declaration relates, is in conformity with the appropriate RF exposure standards recommendations and guidelines. Any deviations from these standards, guidelines and recommended practices are noted below:

One device configuration excluded as not applicable, see chapter 2.3.

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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## 1 Introduction

In this test report, measurements of the Sony Ericsson PY7A3724011 (SO906i) portable telephone is demonstrated. The applicable SAR measurement specifications used for the test are described in the SAR Measurement Specifications of Wireless Handsets [1].

## 2 Device Under Test

### 2.1 Device description

Device model	AAD-3724011-BV					
Market name	SO906i					
Serial number (EUT #)	3158 (#10643)					
Mode	GSM 1900			UMTS V		
Crest factor	8.3			1		
Multiple access scheme	TDMA			WCDMA		
Channel No.	512	661	810	4132	4183	4233
Maximum output power setting [dBm]	30.0	30.0	30.0	23.5	23.5	23.5
Factory tolerance in power setting	±0.5 dB			±0.5 dB		
Maximum peak output power [dBm]	30.5	30.5	30.5	24.0	24.0	24.0
Data mode	GPRS					
Crest factor	8.3					
Maximum output power setting [dBm]	30.0	30.0	30.0			
Factory tolerance in power setting	±0.5 dB					
Maximum peak output power [dBm]	30.5	30.5	30.5			
Transmitting frequency range [MHz]	1850.2 - 1909.8			826.5 - 846.6		
GPRS Multislot class	8					
GPRS Capability class	B					
Prototype or production unit	Preproduction					
Hardware version	2nd-FP2					
Software version	071129A					
Device category	Portable					
RF exposure environment	General population / uncontrolled					

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## 2.2 Antenna Description

<b>Type</b>	Internal antenna	
<b>Location</b>	Middle of clamshell, rear side	
<b>Dimensions</b>	Max length	41 mm
	Max width	12 mm
<b>Configuration</b>	Monopole	

## 2.3 Device positions for voice mode

The device is of "clamshell" type with a swivel connected between the display and the upper part of the keypad. The device has also got an antenna for DVB-T that is extractable.

When establishing a voice call there are two device positions available; clamshell open with display at 0 degrees(position 1) and clamshell open with display at 180 degrees(position 2), see picture 1 and 2 accordingly. According to customer (Sony Ericsson) specification only position 1 is applicable as intended talk position. Therefore only position 1 was used for head position during the SAR measurements presented in this report.

*Picture 1: Position 1*
*Picture 2: Position 2*

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### 3 Test equipment

#### 3.1 Dosimetric system

SAR measurements were made using the DASY4 professional system (software version 4.7, Build 55) with SAM twin phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The list of calibrated equipment is given below.

Description	Serial Number	Due Date
DASY4 DAE3	419	2008-03
E-field probe ET3DV6	1569	2009-01
Dipole Validation Kit, D1900V2	5d073	2010-01
Dipole Validation Kit, D835V2	484	2009-01

#### 3.2 Additional equipment

Description	Inventory Number	Due Date
Signal generator R&S	INV 20007667	2008-03
Directional coupler	S/N 062	2008-03
Power meter R&S NRVD	INV 20007669	2008-03
Power sensor R&S NRV-Z5	INV 20007672	2008-03
Power sensor R&S NRV-Z5	INV 20007673	2008-03
Network analyzer HP8753C	INV 421671	2008-03
S-parameter test set HP85047A	INV 421670	2008-03
Dielectric probe kit HP8507D	INV 20000053	N/A
Base station simulator CMU200	INV 20002149	2008-03
Thermometer Fluke 51	INV 2071	2008-03

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## 4 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	Measured / Recommended	Dielectric Parameters		Density
			$\epsilon_r$	$\sigma$ [S/m]	$\rho$ [g/cm <sup>3</sup> ]
835	Head	Measured, 2008-02-25	42.0	0.89	1.00
		Reference	41.5	0.9	1.00
835	Body	Measured, 2008-02-26	54.6	0.95	1.00
		Reference	55.2	0.97	1.00
1900	Head	Measured, 2008-02-18	38.6	1.46	1.00
		Reference	40	1.4	1.00
1900	Head	Measured, 2008-02-20	38.2	1.46	1.00
		Reference	40	1.4	1.00
1900	Body	Measured, 2008-02-22	51.2	1.54	1.00
		Reference	53.3	1.52	1.00

## 5 System accuracy verification

A system accuracy verification of the DASY4 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. The measurements were made at an ambient temperature of 21 - 23°C and humidity 25-35%. The obtained results are displayed in the table below.

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

f [MHz]	Tissue type	Measured / Reference	SAR [W/kg] 1g / 10g	Dielectric Parameters		Density	Liquid T[°C]
				$\epsilon_r$	$\sigma$ [S/m]	$\rho$ [g/cm <sup>3</sup> ]	
835	Head	Measured, 2008-02-25	9.24 / 6.16	42.0	0.89	1.00	21.1
		Reference	9.20 / 6.00	41.5	0.9	1.00	22
835	Body	Measured, 2008-02-26	9.60 / 6.36	54.6	0.95	1.00	21.1
		Reference	9.48 / 6.29	55.2	0.97	1.00	22
1900	Head	Measured, 2008-02-18	39.1 / 20.3	38.6	1.46	1.00	20.8
		Reference	38.3 / 20.5	40	1.4	1.00	22
1900	Head	Measured, 2008-02-20	40.0 / 20.8	38.2	1.46	1.00	21.1
		Reference	38.3 / 20.5	40	1.4	1.00	22
1900	Body	Measured, 2008-02-22	39.6 / 20.8	51.2	1.54	1.00	21.3
		Reference	37.9 / 20.3	53.3	1.52	1.00	22

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**6 SAR measurement uncertainty****SAR measurement uncertainty evaluation for Sony Ericsson PY7A3724011 (SO906i) 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	±0.6
Probe linearity	±4.7	R	√3	1	±2.7
Detection limit	±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
Mech. Constraints of robot	±0.4	R	√3	1	±0.2
Probe positioning	±2.9	R	√3	1	±1.7
Extrap, interpolation and integration	±1.0	R	√3	1	±0.6
<b>Measurement System Uncertainty</b>					<b>±8.4</b>
<b>Test Sample Related</b>					
Device positioning	±3.5	N	1	1	±3.5
Device holder uncertainty	±3.5	N	1	1	±3.5
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 (measured)	±2.5	R	1	0.64	±1.6
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8
Liquid Permittivity (measured)	±2.5	R	1	0.6	±1.5
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7
<b>Phantom and Tissue Parameters Uncertainty</b>					<b>±4.1</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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## 7 Test results

The measured 1-gram averaged SAR values of the DUT towards the head are provided in Table 1. The ambient humidity and temperature of test facility were 25-35% and 21-23°C respectively. A base station simulator was used to control the device during the SAR measurement. The DUT was supplied with a fully charged battery for each measurement.

For head measurement, the DUT was tested on the right-hand side, and the left-hand side of the phantom in two phone positions, cheek (touch) and tilt (cheek + 15°). The DUT was tested at the lowest, middle and highest frequencies in the transmission band. Results for head position are presented in table 1.

For body measurement the DUT was tested with the back (antenna) and front towards the phantom flat section with 15 mm distance in both speech and data mode. For all modes, the device was tested at the lowest, middle and highest frequencies in the transmission band. For portable hands free (PHF) usage the "Foma handset No.9" was connected to the DUT. Results for body position are presented in table 2.

Band	Channel	Output power [dBm]	Position	Liquid T [°C]	Measured SAR [W/kg]	
					Right-hand 1g mass	Left-hand 1g mass
GSM 1900	512	30.3	Cheek	20.8	0.27	0.32
			Tilt	20.8	-	-
	661	30.3	Cheek	20.8	0.28	0.34
			Cheek <sup>1</sup>	20.8	0.32	0.37
	810	30.3	Tilt	20.8	0.18	0.27
			Cheek	20.8	0.29	0.29
UMTS V	4132	23.2	Cheek	21.1	0.31	0.37
			Tilt	21.1	-	-
	4183	23.5	Cheek	21.1	0.29	0.38
			Cheek <sup>1</sup>	21.1	-	0.33
	4233	23.3	Tilt	21.1	0.13	0.11
			Cheek	21.1	0.33	0.36
			Cheek <sup>1</sup>	21.1	0.32	-
			Tilt	21.1	-	-

Table 1: SAR measurement result for Sony Ericsson PY7A3724011 telephone at highest possible output power. Measured towards the head.

<sup>1</sup> Tested in cheek position with the DVB-T antenna extracted.



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Band	Channel	Output Power [dBm]	Position / Mode	Liquid T [°C]	Measured SAR [W/kg] 1g mass
GSM 1900	512	30.3	Back / GPRS	21.3	0.36
	661	30.3	Back / GPRS	21.3	0.38
			Back / PHF	21.3	0.38
			Front / GPRS	21.3	0.17
			Back. Display out / GPRS	21.3	0.38
	810	30.3	Back / GPRS	21.3	0.28
UMTS V	4132	23.2	Back / Data	21.3	0.34
	4183	23.5	Back / Data	21.3	0.43
			Back / PHF	21.3	0.45
			Front / Data	21.3	0.14
	4233	23.3	Back / Data	21.3	0.41

**Table 2: SAR measurement result for Sony Ericsson PY7A3724011 telephone at highest possible output power. Measured towards the body.**

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- [ 1 ] R.Plicanic, "SAR Measurement Specification of Wireless Handsets", Sony Ericsson SAR Test Laboratory internal document GUG/N 03:141
- [ 2 ] 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).
- [ 3 ] 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.
- [ 4 ] IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices in the frequency range of 300 MHz to 3 GHz", February 2005.

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**9 Appendix****9.1 Photographs of the device under test***Battery and cover removed**Front side**Rear side*

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*Left side**Right side**DVB-T Antenna extracted*

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## 9.2 Device position at SAM Twin Phantom

*DUT position towards the head: Cheek (touch) position*

*DUT position towards the head: Tilt (touch + 15°) position*

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*DUT in body position with 15 mm distance*

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**9.3****Attachments**

- System validation
- Measurement plots for head and body position
- Probe calibration
- Dipole calibration