

## TEST REPORT

Test Report No.: 1-4254/12-73-04-A



### Testing Laboratory

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#### Accredited Test Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)  
 The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

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### Manufacturer

**Sony Mobile Communications AB**  
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### Test Standard/s

IEEE 1528-2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
OET Bulletin 65 Supplement C	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-102 Issue 4	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

For further applied test standards please refer to section 3 of this test report.

### Test Item

Kind of test item:	Mobile Phone
Device type:	portable device
<b>Model name:</b>	<b>PM-0280-BV</b>
S/N serial number:	CB5A1MAPXC / CB5A1MAQ0T
FCC-ID:	PY7PM-0280
IC:	4170B-PM0280
IMEI-Number:	00440214-629913-0 / 00440214-629991-6 (for WLAN)
Hardware status:	AP1.2
Software status:	10.1.A.0.287
Frequency:	see technical details
Antenna:	integrated antenna
Battery option:	integrated battery
Accessories:	stereo headset
Test sample status:	identical prototype
Exposure category:	general population / uncontrolled environment

**Note: this test report is an addendum to test report 1-4254/12-73-02-B for PCII of HSDPA category change from 14 to 24.**

**Test Report authorised:**

**Test performed:**

2013-01-14 Thomas Vogler  
 Senior Testing Manager

2013-01-14 Oleksandr Hnatovskiy  
 Testing Manager

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## 2 General information

### 2.1 Notes and disclaimer

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### 2.2 Application details

Date of receipt of order:	2012-12-03
Date of receipt of test item:	2012-12-03
Start of test:	2012-12-04
End of test:	2013-01-02
Person(s) present during the test:	

### 2.3 Technical details

Band tested for this test report	Technology	Frequency band	Lowest transmit frequency/MHz	Highest transmit frequency/MHz	Lowest receive Frequency/MHz	Highest receive Frequency/MHz	Kind of modulation	Power Class	Tested power control level	GPRS/EGPRS mobile station class	GPRS/EGPRS multislots class	(E)GPRS voice mode or DTM	Test channel low	Test channel middle	Test channel high	Maximum output power(dBm )*
<input type="checkbox"/>	GSM	GSM	880.2	914.8	925.2	959.8	GMSK 8-PSK	4 E2	5	B	12	no	975	37	124	33.4
<input type="checkbox"/>	GSM	DCS	1710.2	1784.8	1805.2	1879.8	GMSK 8-PSK	1 E2	0	B	12	no	512	698	885	30.3
<input checked="" type="checkbox"/>	GSM	cellular	824.2	848.8	869.2	893.8	GMSK 8-PSK	4 E2	5	B	12	no	128	190	251	33.2
<input checked="" type="checkbox"/>	GSM	PCS	1850.2	1909.8	1930.2	1989.8	GMSK 8-PSK	1 E2	0	B	12	no	512	661	810	30.1
<input type="checkbox"/>	UMTS	FDD I	1922.4	1977.6	2112.4	2167.6	QPSK	3	max	--	--	--	9612	9750	9888	24.0
<input checked="" type="checkbox"/>	UMTS	FDD II	1852.4	1907.6	1982.4	1987.6	QPSK	3	max	--	--	--	9262	9400	9538	22.6
<input checked="" type="checkbox"/>	UMTS	FDD IV	1712.4	1752.6	1807.4	1877.6	QPSK	3	max	--	--	--	1312	1412	1513	23.1
<input checked="" type="checkbox"/>	UMTS	FDD V	826.4	846.6	871.4	891.6	QPSK	3	max	--	--	--	4132	4182	4233	24.2
<input type="checkbox"/>	UMTS	FDD VIII	882.4	912.6	927.4	957.6	QPSK	3	max	--	--	--	2712	2787	2863	23.9
<input type="checkbox"/>	WLAN	ISM	2412	2472	2412	2472	CCK OFDM	--	max	--	--	--	1	7	13	15.6
<input checked="" type="checkbox"/>	WLAN US	ISM	2412	2462	2412	2462	CCK OFDM	--	max	--	--	--	1	6	11	15.6
<input checked="" type="checkbox"/>	WLAN	ISM	5180	5240	5180	5240	OFDM	--	max	--	--	--	36	--	--	9.7
<input checked="" type="checkbox"/>	WLAN	ISM	5260	5320	5260	5320	OFDM	--	max	--	--	--	52	--	--	9.2
<input checked="" type="checkbox"/>	WLAN	ISM	5500	5700	5500	5700	OFDM	--	max	--	--	--	--	120	--	8.8
<input checked="" type="checkbox"/>	WLAN	ISM	5745	5825	5745	5825	OFDM	--	max	--	--	--	--	--	165	9.3
<input type="checkbox"/>	BT	ISM	2402	2480	2402	2480	GFSK	3	max	--	--	--	0	39	78	9.6

supported UMTS features	category	remarks
Release 8 HSDPA	24	QPSK, 16QAM, 64QAM, Dual-Cell, 42.2 Mbit/s
Release 6 HSUPA	6	no 16QAM , no MIMO, 5.76 Mbit/s

)\*: slotted peak power for GSM, averaged max. RMS power for UMTS, WLAN and BT.

### 3 Test standards/ procedures references

Test Standard	Version	Test Standard Description
IEEE 1528-2003	2003-04	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
OET Bulletin 65 Supplement C	1997-01 2001-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-102 Issue 4	2010-03	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Canada's Safety Code No. 6	99-EHD-237	Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
IEEE Std. C95-3	2002	IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave
IEEE Std. C95-1	1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
IEC 62209-2	2010	Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices. Human models, instrumentation, and procedures. Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

FCC KDB publications:

KDB 865664D01v01 FCC OET SAR measurement requirements 100 MHz to 6 GHz, October 24, 2012

KDB 865664D02v01 RF Exposure Compliance Reporting and Documentation Considerations, October 24, 2012

KDB 447498D01v05 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies, October 24, 2012

KDB 648474D04v01 SAR Evaluation Considerations for Handsets with Multiple Transmitters & Antennas, October 24, 2012.

KDB 941225D01v02 SAR Measurements Procedures for 3G Devices, April 10, 2007.

KDB 941225D02v01 3GPP R6 HSPA and R7 HSPA+ SAR Guidance; December 14, 2009

KDB 941225D03v01 SAR Test Reduction Procedure for GSM/GPRS/EDGE, December, 2008.

KDB 941225D06v01 SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities; April 4, 2011

KDB 248227D01v01 SAR Measurement Procedures for 802.11 a/b/g Transmitters, May, 2007.

## 4 Test Environment

Ambient temperature:	20 – 24 °C
Tissue Simulating liquid:	20 – 24 °C
Relative humidity content:	40 – 50 %
Air pressure:	not relevant for this kind of testing
Power supply:	230 V / 50 Hz

Exact temperature values for each test are shown in the table(s) under 7.1 and/or on the measurement plots.

## 5 Test Results

### 5.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMW 500 was used. The output power was measured using an integrated RF connector and attached RF cable.

Note: The following overview contains DC-HSDPA conducted power measurement results in comparison to RMC test results.

#### 5.1.1 Conducted power measurements 3GPP UMTS FDD V (850 MHz)

mode	Max. RMS output power 850 MHz (FDD V) / dBm		
	Channel / frequency		
	4132 / 826.4 MHz	4182 / 836.4 MHz	4233 / 846.6 MHz
<b>RMC 12.2 kbit/s</b>	<b>24.2</b>	<b>24.2</b>	<b>24.2</b>
<b>DC-HSDPA Sub test 1</b>	<b>24.1</b>	<b>23.9</b>	<b>24.0</b>
DC-HSDPA Sub test 2	23.9	23.8	23.9
DC-HSDPA Sub test 3	23.5	23.4	23.5
DC-HSDPA Sub test 4	23.4	23.3	23.3

Table 1: Test results conducted power measurement UMTS FDD V 850MHz

#### 5.1.2 Conducted power measurements 3GPP UMTS FDD IV (1700 MHz)

mode	Max. RMS output power FDD IV (1700MHz) / dBm		
	Channel / frequency		
	1312 / 1712.4 MHz	1412 / 1732.4 MHz	1513 / 1752.6 MHz
<b>RMC 12.2 kbit/s</b>	<b>23.1</b>	<b>23.1</b>	<b>23.1</b>
<b>DC-HSDPA Sub test 1</b>	<b>22.1</b>	<b>22.2</b>	<b>22.2</b>
DC-HSDPA Sub test 2	22.0	22.1	22.2
DC-HSDPA Sub test 3	21.5	21.6	21.7
DC-HSDPA Sub test 4	21.4	21.5	21.6

Table 2: Test results conducted power measurement UMTS FDD IV 1700MHz

#### 5.1.3 Conducted power measurements 3GPP UMTS FDD II (1900 MHz)

mode	Max. RMS output power 1900 MHz (FDD II) / dBm		
	Channel / frequency		
	9262 / 1852.4 MHz	9400 / 1880.0 MHz	9538 / 1907.6 MHz
<b>RMC 12.2 kbit/s</b>	<b>22.6</b>	<b>22.6</b>	<b>22.6</b>
<b>DC-HSDPA Sub test 1</b>	<b>21.7</b>	<b>21.6</b>	<b>21.8</b>
DC-HSDPA Sub test 2	21.6	21.6	21.7
DC-HSDPA Sub test 3	21.1	21.0	21.2
DC-HSDPA Sub test 4	21.0	21.0	21.1

Table 3: Test results conducted power measurement UMTS FDD II 1900MHz

Remark: None of the DC-HSDPA settings leads to conducted power values exceeding the conducted power in RMC mode by more than 0.25 dB, therefore no additional SAR measurements were performed in DC-HSDPA mode.

### 5.1.4 Test-set-up information for WCDMA / HSPDA / HSUPA

#### a) WCDMA RMC

In RMC (reference measurement channel) mode the conducted power at 4 different bit rates was measured. They correspond with the used spreading factors as follows:

<b>Bit rate</b>	<b>12.2 kbit/s</b>	<b>64 kbit/s</b>	<b>144 kbit/s</b>	<b>384 kbit/s</b>
Spreading factor (SF)	64	16	8	4

In RMC mode only DPCCH and DPDCH are active. As bit rate changes do not influence the relative power of any code channel the measured RMS output power remains on the same level which is set to maximum by TPC (Transmit power control) pattern type 'All 1'.

#### b) HSDPA

HSDPA adds the HS-DPCCH in uplink as a control channel for high speed data transfer in downlink. In HSDPA mode 4 sub-tests are defined by 3GPP 34.121 according to the following table:

<b>Sub-test</b>	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}^{(1)}$	<b>CM(dB)<sup>(2)</sup></b>
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	12/15 <sup>(3)</sup>	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1:  $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI} = 8 \iff A_{hs} = \beta_{hs}/\beta_c = 30/15 \iff \beta_{hs} = 30/15 * \beta_c$

Note 2 : CM = 1 for  $\beta_c/\beta_d = 12/15, \beta_{hs}/\beta_c = 24/15$

Note 3 : For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$

Table 4: Sub-tests for UMTS Release 5 HSDPA

The  $\beta_c$  and  $\beta_d$  gain factors for DPCCH and DPDCH were set according to the values in the above table,  $\beta_{hs}$  for HS-DPCCH is set automatically to the correct value when  $\Delta_{ACK}, \Delta_{NACK}, \Delta_{CQI} = 8$ . The variation of the  $\beta_c/\beta_d$  ratio causes a power reduction at sub-tests 2 - 4.

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

<b>Parameter</b>	<b>Value</b>
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI's
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 5: settings of required H-Set 1 QPSK acc. to 3GPP 34.121



c) DC-HSDPA (3GPP UMTS Release 8)

Dual Cell – HSDPA has been signalized using the following settings for connection setup:

Parameter During Connection Setup	Value
P-CPICH_Ec/Ior	-10 dB
P-CCPCH	-12
SCH_Ec/Ior	-12
PICH_Ec/Ior	-15
HS-PDSCH	off
HS-SCCH_1	off
DPCH_Ec/Ior	-5
OCNS_Ec/Ior	-3.1

Table 6: Downlink Physical Channels according to 3GPP 34.121 Table E.5.0

The fixed reference channel has been set to H-set 12 according to 3GPP TS 34.121 Table C.8.1.12:

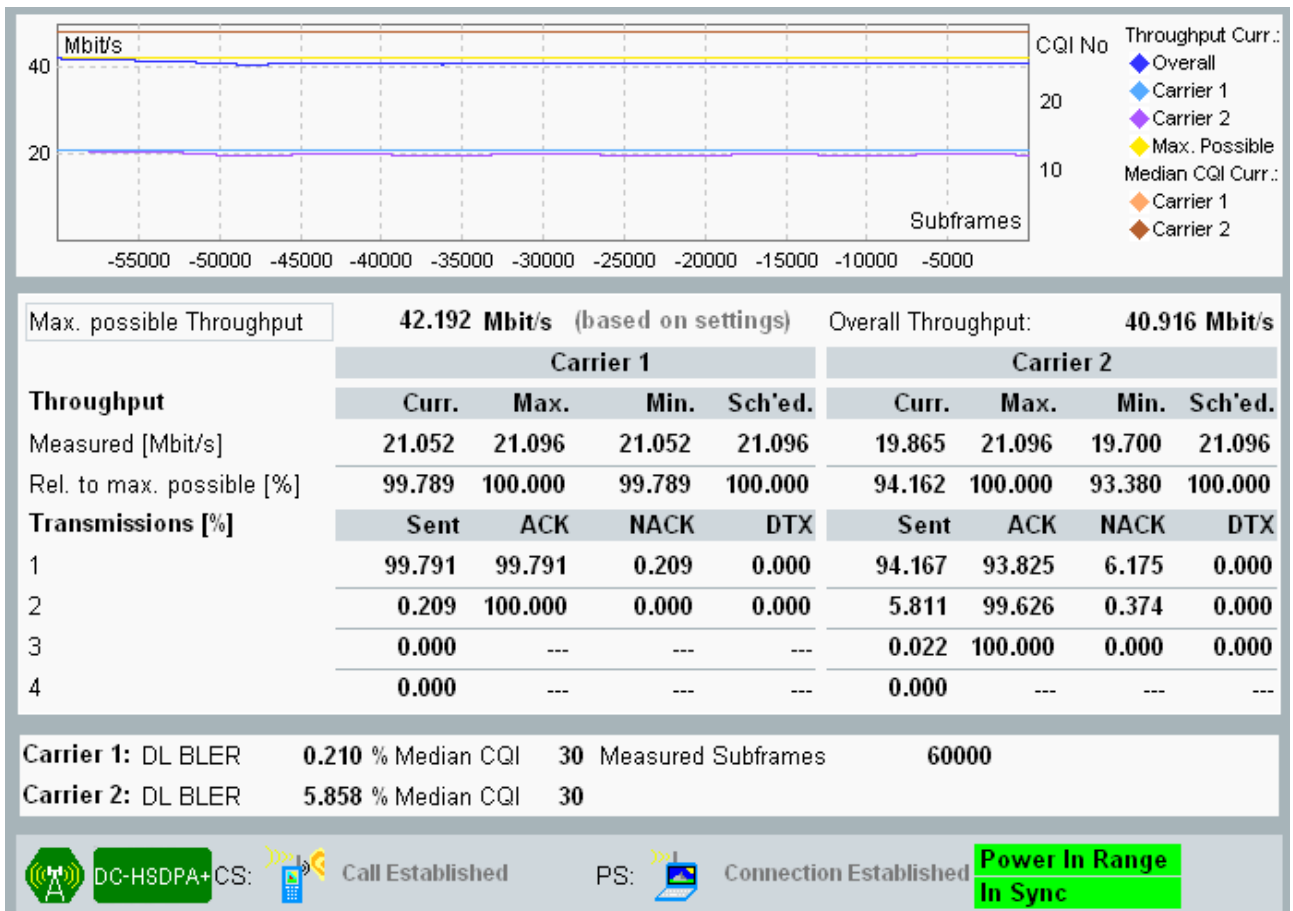
Parameter	Unit	Value
Nominal Average Inf. Bit Rate	kbit/s	60
Inter-TTI Distance	TTI's	1
Information Bit Payload ( $N_{INF}$ )	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Process	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codecs	Codecs	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

Table 7: H-Set 12 QPSK configuration

The same Sub-test settings as for Release 5 HSDPA (see table 6) were used for the tests.

Device set-up with CMW500 for DC-HSDPA:

- configure the settings for HSDPA Rel.5
- change scenario from 'standard cell' to 'dual cell'
- H-set 12 becomes available in H-set selection drop down list box
- select H-set 12 QPSK for activation of dual cell mode with 64QAM in downlink
- set beta factors and  $\Delta_{ACK}$ ,  $\Delta_{NACK}$ ,  $\Delta_{CQI}$  according to table 6
- set-up connection
- DC-HSDPA+ should light up
- check dual cell operation in HSDPA ACK table for maximum throughput (2x 21 Mbits):



- measure conducted power in uplink and observe if CM is 0 dB for sub-tests 1 and 2 and 0.5 dB for sub-tests 3 and 4

## 6 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

used	Equipment	Type	Manufacturer	Serial No.	Last Calibration	Frequency (months)
<input checked="" type="checkbox"/>	Universal Radio Communication Tester	CMW500	Rohde & Schwarz	102375	January 4, 2011	24

)\* : Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

## Annex A: Document History

Version	Applied Changes	Date of Release
	Initial Release	2013-01-14
-A	Corrected note on the page 1	2013-01-15

## Annex B: Further Information

### Glossary

BW	-	Bandwidth
DTS	-	Distributed Transmission System
DUT	-	Device under Test
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
LTE	-	Long Term Evolution
N/A	-	not applicable
PCE	-	Personal Consumption Expenditure
OET	-	Office of Engineering and Technology
RB	-	resource block(s)
SAR	-	Specific Absorption Rate
S/N	-	Serial Number
SW	-	Software
UNII	-	Unlicensed National Information Infrastructure