TEST REPORT

No. 2013TAR764

for

Sony Mobile Communications AB

GSM/WCDMA/LTE mobile phone

Type: PM-0640-BV

FCC ID: PY7PM-0640

with

Hardware Version: A

Software Version: 14.2.A.0.78

Issued Date: Nov. 15th, 2013

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

DAkks accreditation (DIN EN ISO/IEC 17025): No. D-PL-12123-01-01

FCC 2.948 Listed: No.733176

IC O.A.T.S listed: No.6629A-1

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191.

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CONTENTS

1. Test Laboratory

1.1. Testing Location

Location A

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	No 52, Huayuan Bei Road, Haidian District, Beijing, P.R. China
Postal Code:	100191

1.2. Testing Environment

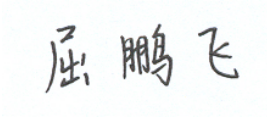
Normal Temperature:	15-35℃
Relative Humidity:	20-75%
Air pressure:	980 - 1040 hPa

The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

1.3. Project data

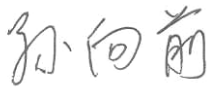
Receipt of Sample:	Oct. 29th, 2013
Testing Start Date:	Oct. 31st, 2013
Testing End Date:	Nov. 12th, 2013

1.4. Signature



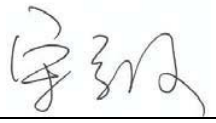
Qu Pengfei

(Prepared this test report)



Sun Xiangqian

(Reviewed this test report)



Song Chongwen

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Sony Mobile Communications (China) Co. Ltd
Address /Post:	Sony Mobile R&D Center, No. 16, Guangshun South Street, Chaoyang District
City:	Beijing
Postal Code:	100102
Country:	China
Contact Person:	Ma, Gang
Telephone:	+86-10-58656312
Fax:	+86-10-58659049

2.2. Manufacturer Information

Company Name:	Sony Mobile Communications AB
Address /Post:	Mobilvägen, 22188 Lund, Sweden
City:	Lund
Postal Code:	22188
Country:	Sweden
Contact Person:	Nilsson, Mikael
Telephone:	+46 703 227503
Fax:	+46 706 127385

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	GSM 850/900/1800/1900 quad bands, GPRS, EDGE, WCDMA FDD bands 1/2/4/5/8, HSDPA, HSUPA, LTE FDD bands 1/2/3/4/5/7/8/20, Bluetooth (EDR and 4.0), ANT+, WLAN (802.11 a/ac/b/g/n), NFC, FM, GPS mobile phone
Type	PM-0640-BV
FCC ID	PY7PM-0640
GSM Frequency Band	GSM 850/900/1800/1900
UMTS Frequency Band	FDD Band 1 / FDD Band 2/ FDD Band 4/ FDD Band 5 / FDD Band 8
LTE Frequency Band	FDD Band 1/ FDD Band 2/ FDD Band 3 / FDD Band 4 / FDD Band 5/ FDD Band 7/ FDD Band 8/ FDD Band 20
Antenna	Internal
Power supply	Battery (charged by travel adapter or vehicle charger)
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 4.2VDC)
Extreme temp. Tolerance	-30°C to +50°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN	IMEI	HW Version	SW Version
EUT4	CB5A1VG620	004402451604411	A	14.2.A.0.78

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Revision
#22974	Travel Charger	8512W19 200056	1C
#24009	USB Cable	123307DD003654E	1
#23691	MHL dongle	/	1
AE7	HDMI cable	/	A

#22974

Commercial name	EP880
Type	AC-0400-EU
Manufacturer	SALCOMP
Length of cable	98.5 cm (length of USB cable)

#24009

Commercial name	EC801
Type	AI-0401
Manufacturer	Sony Mobile
Length of cable	98.5 cm

#23691

Type	AI-0200
Manufacturer	Sony Mobile
Length of cable	12.5 cm

AE7

Type	3871
Manufacturer	Monoprice
Length of cable	93 cm

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment Under Test (EUT) is a model of GSM/WCDMA/LTE mobile phone with integrated antenna and inbuilt battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD band 1/2/4/5/8 and LTE FDD bands 1/2/3/4/5/7/8/20. It supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33. The HSDPA and HSUPA features are also supported.

It has MP3, camera, USB memory, Mobile High-Definition Link (MHL), FM radio, GPS receiver, NFC, Bluetooth (EDR and Bluetooth 4.0), ANT+, WLAN (802.11 a/ac/b/g/n) and Wi-Fi hotspot functions. For WLAN 802.11n, it supports 20MHz bandwidth on 2.4GHz band and 20MHz/40MHz bandwidths on 5GHz/5.8GHz band. For WLAN 802.11 ac, it supports 20MHz/40MHz/80MHz bandwidths.

It includes normal options: travel charger, USB cable, MHL dongle and HDMI cable.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices	10-1-12 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2009

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.1 of this report

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	P	A
2	Conducted Emission	15.107(a)	B.2	P	A

6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the Mobile High-Definition Link (MHL) function among the features described in section 3.

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1.	Test Receiver	ESCI	100344	R&S	2014-03-28
2.	Test Receiver	ESCI 7	100948	R&S	2014-07-18
3.	Spectrum Analyzer	FSV	100376	R&S	2014-06-30
4.	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2014-02-17
5.	EMI Antenna	3115	6914	ETS-Lindgren	2014-12-16
6.	LISN	ESH2-Z5	829991/012	R&S	2014-04-14
7.	Universal Radio Communication Tester	CMU200	102228	R&S	2014-06-23
8.	Universal Radio Communication Tester	CMU200	116455	R&S	2014-05-19
9.	TFT monitor	L197WA	3MO4345A3561214	Lenovo	/

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

Reference

FCC: CFR Part 15.109(a)

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (MHL function) at a distance of 10m (30MHz-1GHz) and 3m (>1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 - 2009, section 8.3.

A.1.2 EUT Operating Mode:

EUT Setup: EUT4 + #22974 + #24009 + #23691 + AE7

The MS is connected to a TFT monitor with MHL dongle and HDMI cable. The MS is keeping on playing a video file of 1280*720 resolution. The video signal is transferred from MS to TFT monitor via the MS's MHL function. Meanwhile, the MS is operating under GSM 1900MHz idle mode.

A.1.3 Test layout: see Pic.1 in ANNEX B.

A.1.4 Measurement Limit

Limit from CFR Part 15.109(a)

Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

A.1.5 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/1MHz	15	Peak, Average

A.1.6 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss". It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

Result = $P_{Mea} + A_{Rpl} = P_{Mea} + G_A + G_{PL}$

Where

G_A: Antenna factor of receive antenna

G_{PL}: Path Loss

P_{Mea}: Measurement result on receiver.

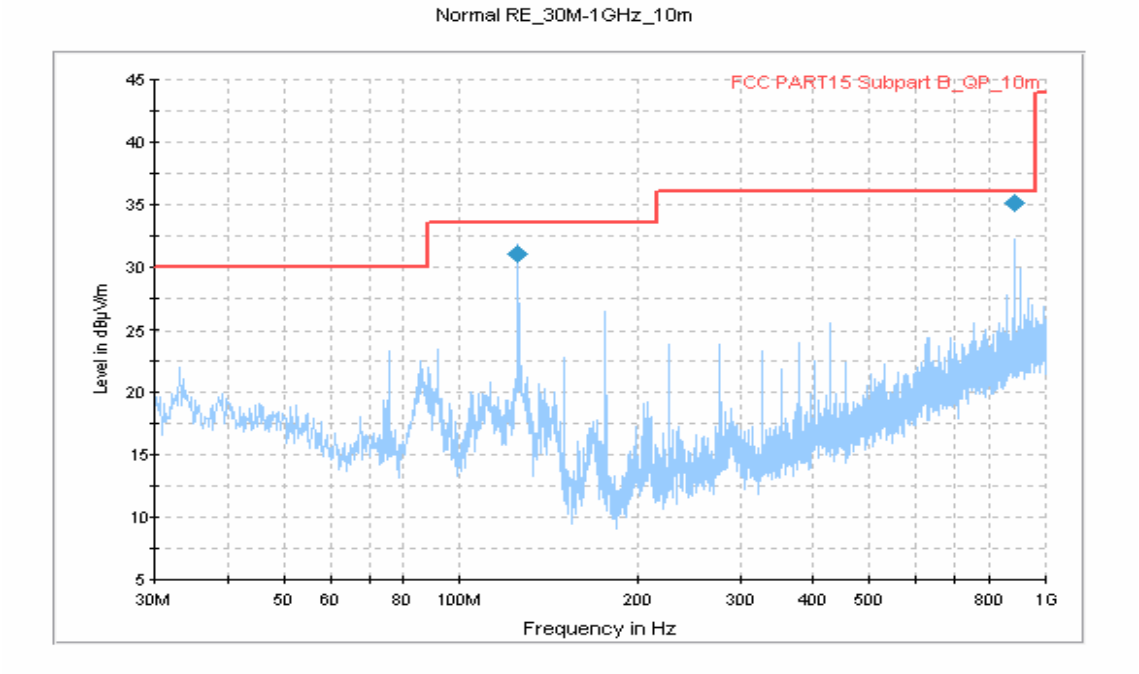
Measurement result for MHL mode:

Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17896.938	64.5	-18.5	45.6	37.4	HORIZONTAL
17838.500	64.3	-18.5	45.6	37.2	VERTICAL
17866.125	64.2	-18.5	45.6	37.1	HORIZONTAL
17885.250	64.1	-18.5	45.6	37.0	VERTICAL
17822.563	64.1	-18.5	45.6	37.0	VERTICAL
17855.500	64.0	-18.5	45.6	36.9	VERTICAL

Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17998.938	52.3	-17.7	45.6	24.4	VERTICAL
17865.063	52.3	-18.5	45.6	25.2	HORIZONTAL
17848.063	52.3	-18.5	45.6	25.2	VERTICAL
17876.750	52.2	-18.5	45.6	25.1	HORIZONTAL
17840.625	52.2	-18.5	45.6	25.1	HORIZONTAL
17915.000	52.2	-17.7	45.6	24.3	HORIZONTAL



Note: The test distance for 30MHz-1GHz is 10 m, so the limit line used is 10 dB below the limit in A.1.4.

Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
125.970000	31.0	100.0	V	282.0	-23.0	2.5	33.5
882.023750	35.1	391.0	H	30.0	-6.6	0.9	36.0

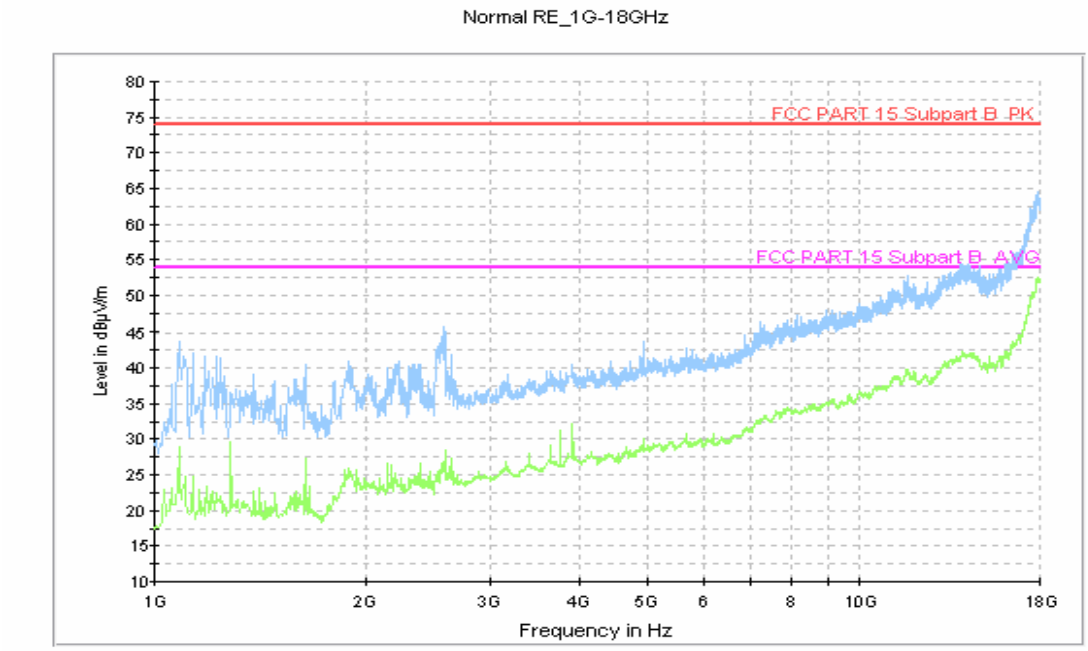


Figure A.2 Radiated Emission from 1GHz to 18GHz

Maximum expanded measurement uncertainty (30MHz - 1GHz): *U* = 3.9 dB, *k* =2.

Maximum expanded measurement uncertainty (>1GHz): *U* = 4.2dB, *k* =2

A.2 Conducted Emission

Reference

FCC: CFR Part 15.107(a)

A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30MHz shall not exceed the limits. Test is performed in accordance with the procedures of ANSI C63.4-2009, section 7.2.

A.2.2 EUT Operating Mode:

EUT Setup: EUT4 + #22974 + #24009 + #23691 + AE7

The MS is connected to a TFT monitor with MHL dongle and HDMI cable. The MS is keeping on playing a video file of 1280*720 resolution. The video signal is transferred from MS to TFT monitor via the MS's MHL function. Meanwhile, the MS is operating under GSM 1900MHz idle mode.

A.2.3 Test layout: see Pic.2 in ANNEX B.

A.2.4 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

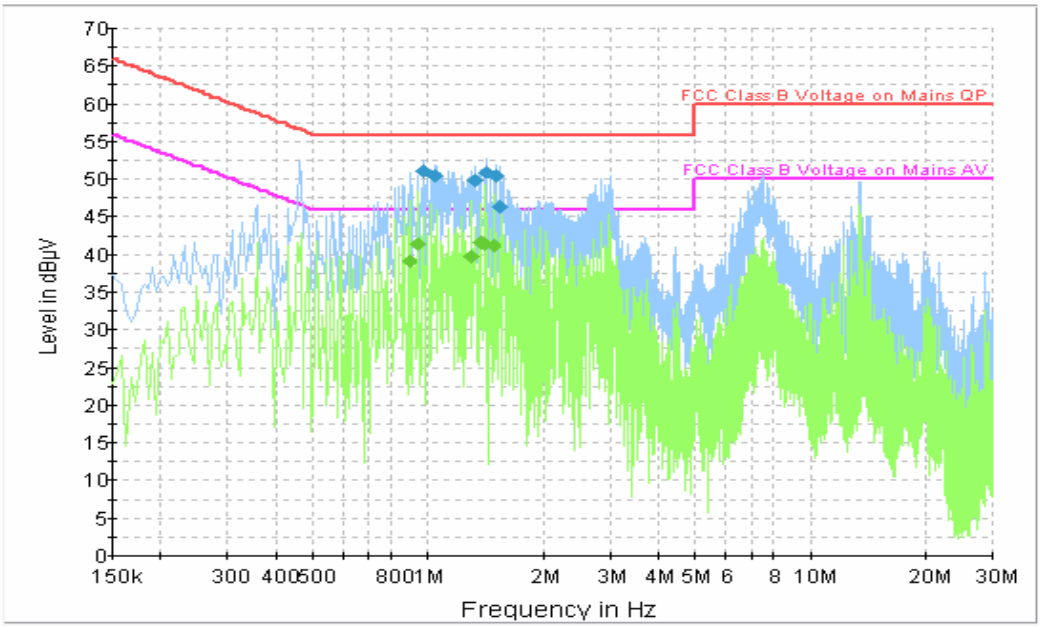
A.2.5 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.6 Measurement Results

MHL Mode



Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Fig A.4 Conducted Continuous Emission from 150 kHz to 30 MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.969000	51.2	GND	L1	9.7	4.8	56.0
1.045500	50.5	GND	L1	9.7	5.5	56.0
1.324500	49.9	GND	L1	9.7	6.1	56.0
1.428000	51.0	GND	L1	9.7	5.0	56.0
1.504500	50.5	GND	L1	9.7	5.5	56.0
1.536000	46.4	GND	L1	9.7	9.6	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.892500	39.1	GND	L1	9.7	6.9	46.0
0.942000	41.4	GND	N	9.7	4.6	46.0
1.297500	39.7	GND	N	9.7	6.3	46.0
1.374000	41.6	GND	N	9.7	4.4	46.0
1.401000	41.5	GND	N	9.7	4.5	46.0
1.477500	41.3	GND	N	9.7	4.7	46.0

Note: Maximum expanded measurement uncertainty for this test item is U =2.9 dB, k=2.