TEST REPORT

No. I18Z60290-EMC04

for

HMD Global Oy

Smart phone

Model Name: TA-1061

FCC ID: 2AJOTTA-1061

with

Hardware Version: 0403/0407

Software Version: 00WW_0_266

Issued Date: 2018-06-03

TESTING
NVLAP LAB CODE 600118-0

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z60290-EMC04	Rev.0	1st edition	2018-06-03

CONTENTS

1. Test Laboratory

1.1. Testing Location

CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

1.2. Testing Environment

Normal Temperature: 15-35℃

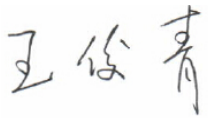
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-04-22

Testing End Date: 2018-05-16

1.4. Signature

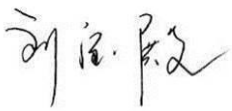


Wang Junqing

(Prepared this test report)

Zhang Ying

(Reviewed this test report)



Liu Baodian

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	HMD Global Oy
Address /Post:	Karaportti 2 02610 Espoo FINLAND
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2.2. Manufacturer Information

Company Name:	HMD Global Oy
Address /Post:	Karaportti 2 02610 Espoo FINLAND
City:	Espoo
Postal Code:	/
Country:	FINLAND
Telephone:	+358 408036126

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

3.1. About EUT

Description	Smart phone
Model Name	TA-1075
FCC ID	2AJOTTA-1061
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 3.8VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL,Telecommunication Technology Labs, CAICT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	004402971276740	0403	00WW_0_266
EUT7-2	/	0407	00WW_0_266

*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	Remarks
AE1	Battery	/	/
AE2	Charger	/	/
AE3	Charger	/	/
AE4	USB Cable	/	/
AE5	USB Cable	/	/

AE1

Model	HE336
Manufacturer	SCUD(Fujian) Electronics Co., Ltd.
Capacitance	2900 mAh
Nominal voltage	3.85 V

AE2

Model	AD-10WX
Manufacturer	Salcomp
Length of cable	/

AE3

Model	AD-10WX
Manufacturer	/
Length of cable	/

AE4

Model	CUBB01M-FA010-DH
Manufacturer	FIT
Length of cable	95cm

AE5

Model	JCT022-F001

Manufacturer	FUCONN
Length of cable	95cm

*AE ID: is used to identify the test sample in the lab internally.
Note: The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1 + AE2+ AE4/AE5	Charger
Set.2	EUT1+ AE1 + AE4/AE5	USB mode
Set.3	EUT1+ AE1 + AE3+ AE4/AE5	Charger

Note: Smart phone, TA-1061 manufactured by TCL Communication Ltd is a variant model based on TA-1075 for conformance test. According to the declaration of changes, no test needs to been performed, all results are cited from the initial model. The report number for initial model is I18Z60297-EMC04.

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 - Unintentional Radiators	2016
ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

Note: The test methods have no deviation with standards.

5. LABORATORY ENVIRONMENT

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

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

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m 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 ˚C, Max. = 35 ˚C
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

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail

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

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100235	R&S	2018-04-01	1 year
2	Test Receiver	ESCI	100948	R&S	2018-07-25	1 Year
3	Universal Radio Communication Tester	CMW500	143008	R&S	2018-11-26	1 year
4	Universal Radio Communication Tester	CMW500	155415	R&S	2019-01-15	1 year
5	LISN	ENV216	101200	R&S	2018-08-03	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2019-01-03	3 years
7	EMI Antenna	3115	00167250	ETS-Lindgren	2018-11-30	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH659658907ATOI40	DELL	N/A	N/A
11	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01	R&S
Conducted Emission	EMC32 V8.52.0	R&S

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 (USB mode of MS and charging mode of MS) at distances of 10 meters(for 30MHz-1GHz) and 3 meters (for above 1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

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

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

A.1.4 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.1.5 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 uncertainty (worst case): U = 4.3 dB, k=2.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17803.367	37.6	-18.5	45.6	10.500	H
17847.000	37.6	-18.5	45.6	10.500	V
17441.833	37.6	-19.2	41.5	15.300	V
17860.600	37.6	-18.5	45.6	10.500	V
17901.400	37.6	-18.5	45.6	10.500	H
17405.567	37.5	-19.2	41.5	15.200	H

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17874.767	49.5	-18.5	45.6	22.400	H
17299.033	49.3	-19.5	41.5	27.300	H
17888.933	49.2	-18.5	45.6	22.100	V
17320.567	49.2	-19.5	41.5	27.200	V
17879.300	49.0	-18.5	45.6	21.900	H
17423.700	49.0	-19.2	41.5	26.700	H

Measurement results for Set.2:

USB Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17884.400	37.7	-18.5	45.6	10.600	V
17905.367	37.7	-18.5	45.6	10.600	H
17416.333	37.7	-19.2	41.5	15.400	V
17834.533	37.7	-18.5	45.6	10.600	H
17432.767	37.6	-19.2	41.5	15.300	H
17920.667	37.6	-17.7	45.6	9.700	H

USB Mode/ Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17874.767	49.5	-18.5	45.6	22.400	H
17299.033	49.3	-19.5	41.5	27.300	H
17888.933	49.2	-18.5	45.6	22.100	V
17320.567	49.2	-19.5	41.5	27.200	H
17879.300	49.0	-18.5	45.6	21.900	H
17423.700	49.0	-19.2	41.5	26.700	V

Measurement results for Set.3:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17866.267	42.1	-18.5	45.6	15.000	H
17859.467	42.1	-18.5	45.6	15.000	V
17444.100	42.0	-19.2	41.5	19.700	V
17857.767	42.0	-18.5	45.6	14.900	V
17862.300	41.9	-18.5	45.6	14.800	H
17448.633	41.9	-19.2	41.5	19.600	H

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17867.400	54.0	-18.5	45.6	26.900	H
17847.000	53.7	-18.5	45.6	26.600	H
17628.267	53.6	-18.9	45.6	26.900	V
17831.133	53.5	-18.5	45.6	26.400	V
17852.667	53.4	-18.5	45.6	26.300	H
17389.700	53.4	-19.2	41.5	31.100	H

Note: The measurement results of Set.1, Set.2, Set.3 showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.1

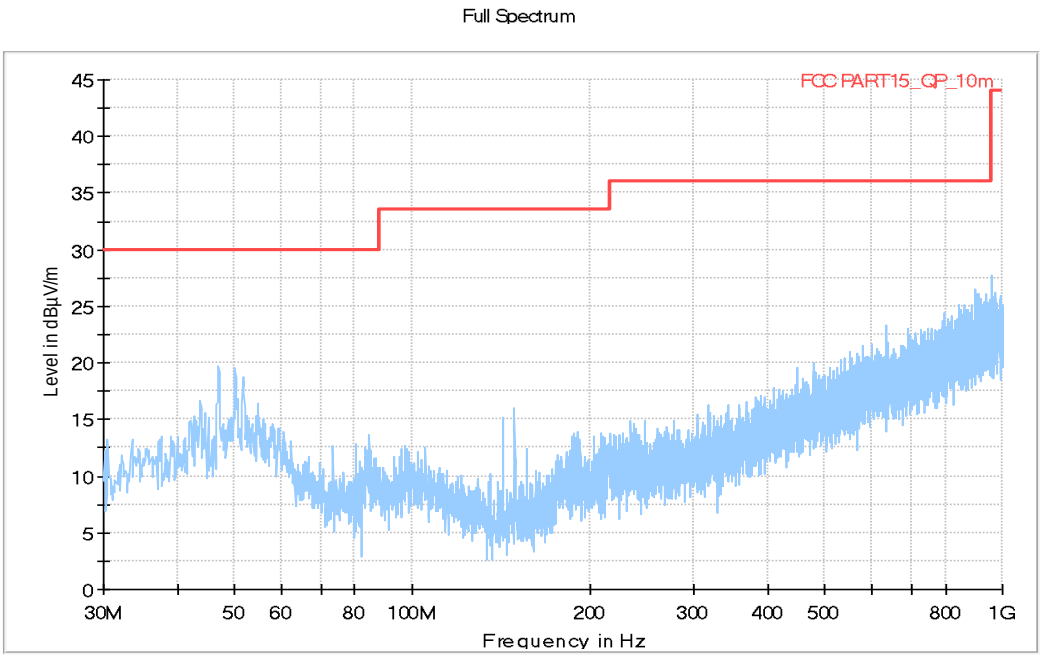

Fig A.1 Radiated Emission from 30MHz to 1GHz

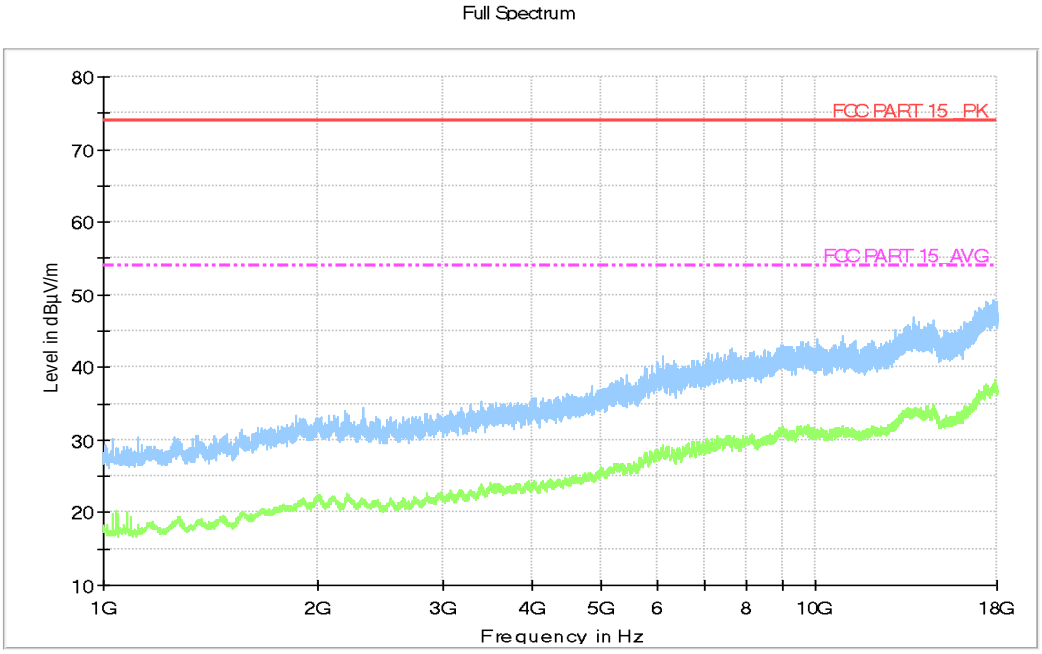

Fig A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

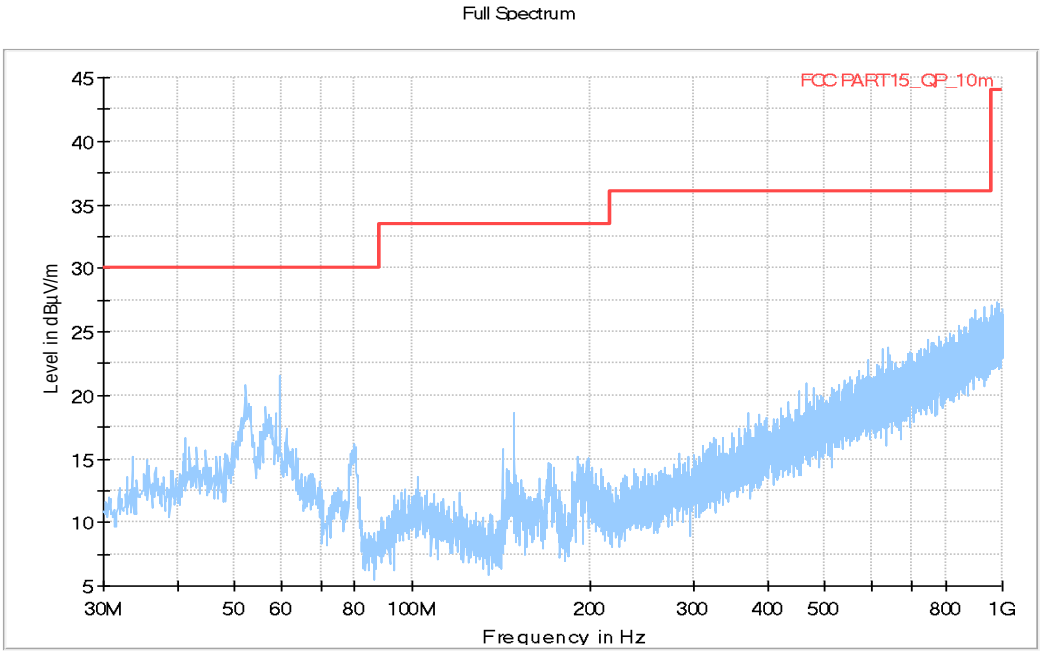

Fig A.3 Radiated Emission from 30MHz to 1GHz

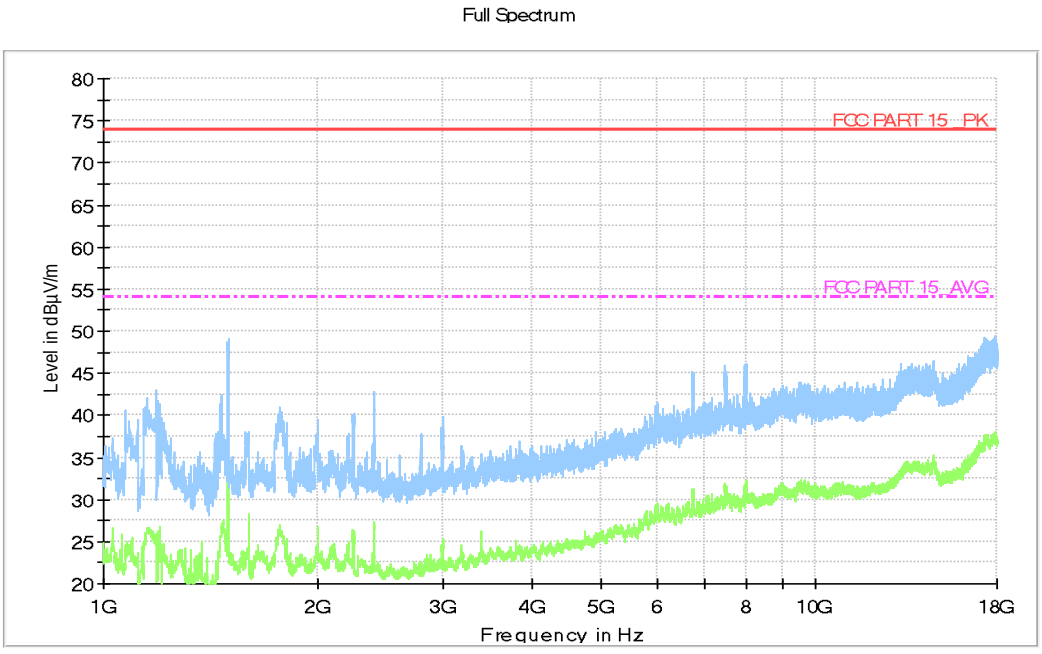

Fig A.4 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.3

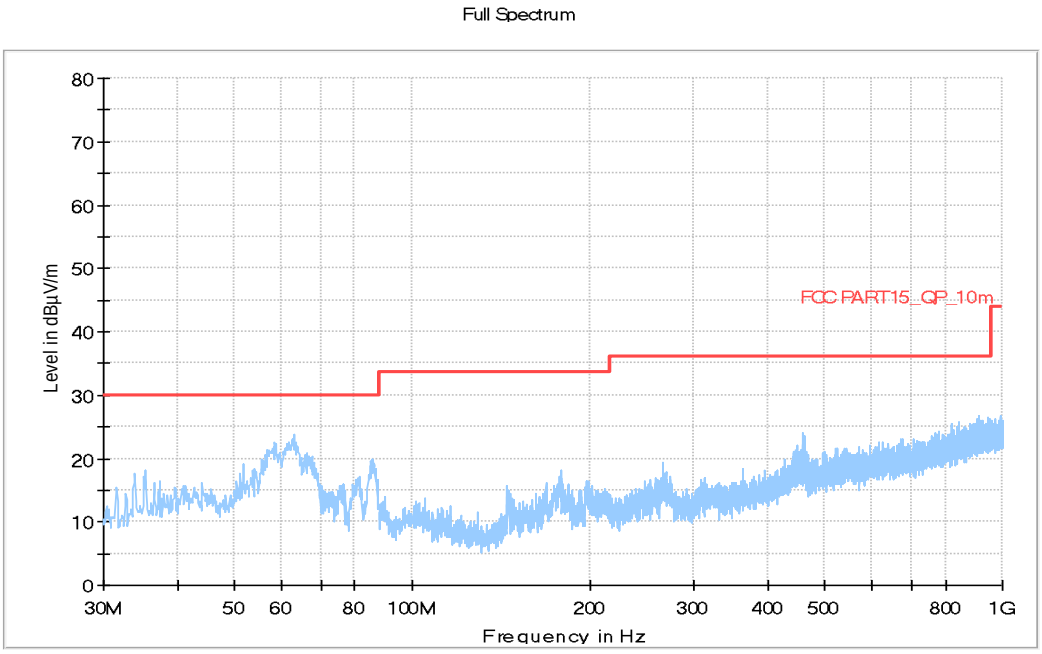

Fig A.5 Radiated Emission from 30MHz to 1GHz

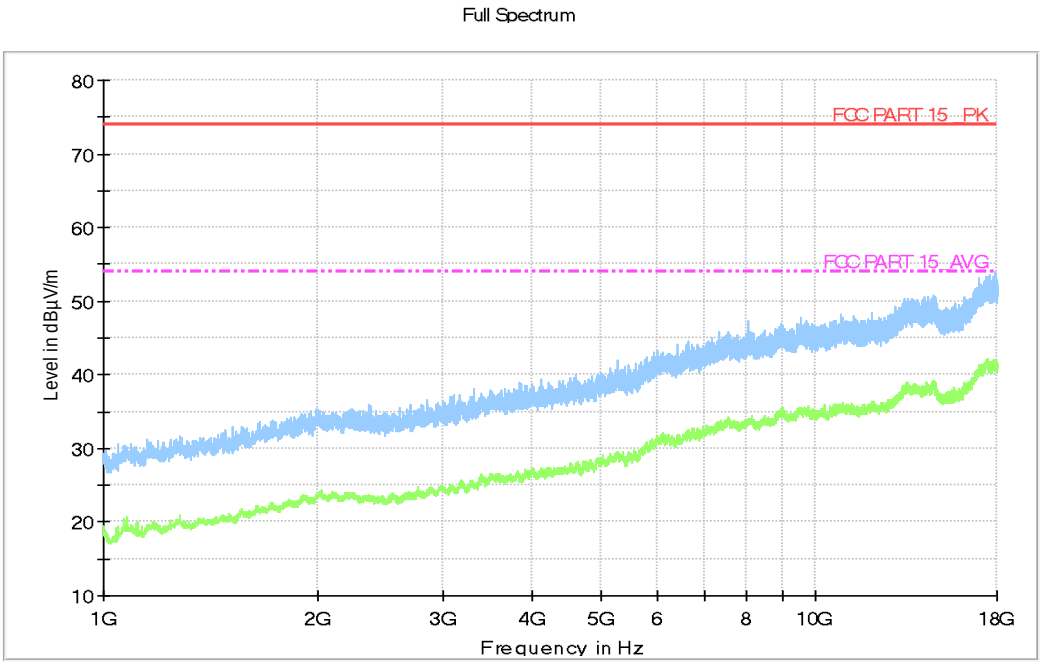

Fig A.6 Radiated Emission from 1GHz to 18GHz

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 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 7.3.

A.2.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.2.3 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.2.4 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60

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

A.2.5 Measurement Results

Measurement uncertainty: *U*= 2.9 dB, *k*=2.

Charging Mode, Set.1

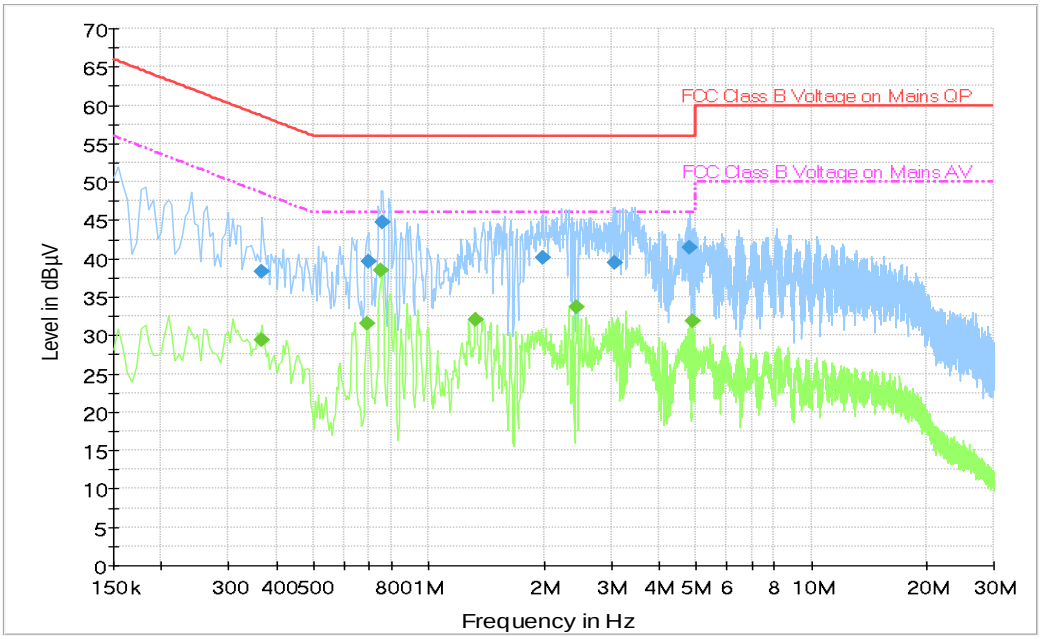

Fig A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.366000	38.3	2000.0	9.000	L1	19.8	20.3	58.6
0.694500	39.7	2000.0	9.000	L1	19.8	16.3	56.0
0.757500	44.7	2000.0	9.000	L1	19.8	11.3	56.0
1.986000	40.1	2000.0	9.000	N	19.6	15.9	56.0
3.066000	39.5	2000.0	9.000	L1	19.7	16.5	56.0
4.830000	41.5	2000.0	9.000	L1	19.6	14.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.366000	29.4	2000.0	9.000	L1	19.8	19.2	48.6
0.690000	31.5	2000.0	9.000	L1	19.8	14.5	46.0
0.753000	38.5	2000.0	9.000	L1	19.8	7.5	46.0
1.329000	32.0	2000.0	9.000	L1	19.6	14.0	46.0
2.440500	33.8	2000.0	9.000	L1	19.7	12.2	46.0
4.897500	31.8	2000.0	9.000	L1	19.6	14.2	46.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

USB Mode, Set.2

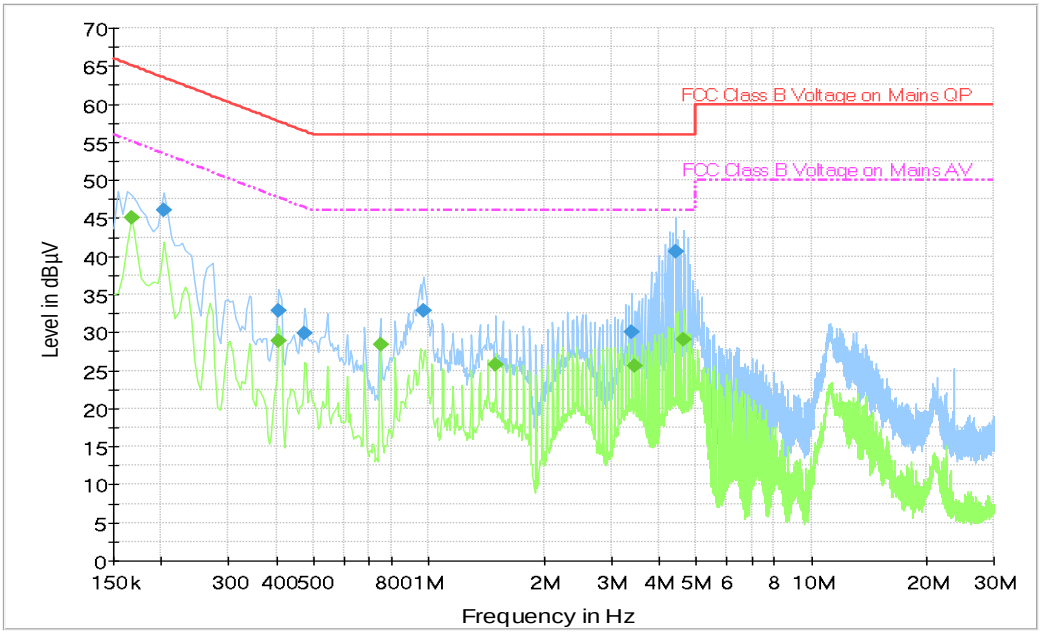

Fig A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.204000	46.1	2000.0	9.000	L1	19.8	17.4	63.4
0.406500	32.8	2000.0	9.000	L1	19.9	24.9	57.7
0.474000	29.9	2000.0	9.000	N	19.9	26.6	56.4
0.969000	32.8	2000.0	9.000	N	19.7	23.2	56.0
3.399000	30.0	2000.0	9.000	N	19.7	26.0	56.0
4.420500	40.6	2000.0	9.000	N	19.7	15.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	45.1	2000.0	9.000	N	19.8	10.0	55.1
0.406500	28.9	2000.0	9.000	L1	19.9	18.9	47.7
0.748500	28.3	2000.0	9.000	N	19.8	17.7	46.0
1.495500	25.7	2000.0	9.000	N	19.6	20.3	46.0
3.466500	25.7	2000.0	9.000	L1	19.7	20.3	46.0
4.623000	29.0	2000.0	9.000	N	19.7	17.0	46.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.3

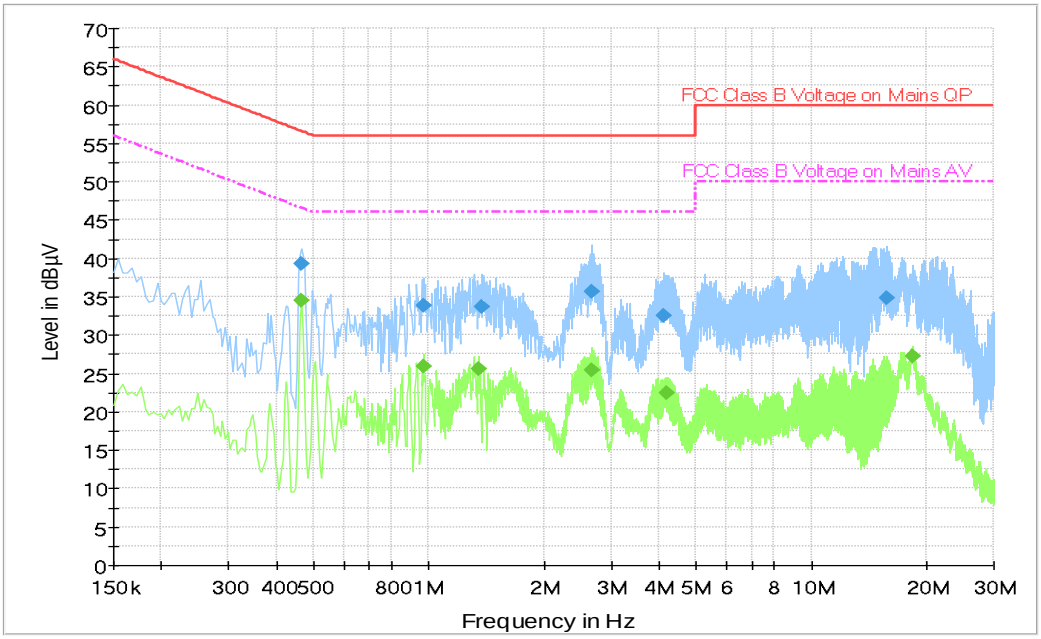

Fig A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.465000	39.4	2000.0	9.000	N	19.9	17.2	56.6
0.969000	33.8	2000.0	9.000	L1	19.6	22.2	56.0
1.383000	33.7	2000.0	9.000	L1	19.6	22.3	56.0
2.674500	35.6	2000.0	9.000	L1	19.7	20.4	56.0
4.105500	32.5	2000.0	9.000	L1	19.6	23.5	56.0
15.792000	34.8	2000.0	9.000	L1	19.9	25.2	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.465000	34.5	2000.0	9.000	L1	19.9	12.1	46.6
0.969000	25.9	2000.0	9.000	L1	19.6	20.1	46.0
1.351500	25.6	2000.0	9.000	L1	19.6	20.4	46.0
2.674500	25.5	2000.0	9.000	L1	19.7	20.5	46.0
4.186500	22.5	2000.0	9.000	L1	19.6	23.5	46.0
18.343500	27.2	2000.0	9.000	L1	20.0	22.8	50.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2016-09-29 through 2017-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

*****END OF REPORT*****