



TEST REPORT

No. I16Z41073-EMC01

for

TCL Communication Ltd.

UMTS/GSM mobile phone

Model Name: 5012G/SMART PLUS

FCC ID: 2ACCJH057

with

Hardware Version: PIO

Software Version: v7GA4

Issued Date: 2016-07-06

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 CTTL.

Test Laboratory:

FCC 2.948 Listed: No.525429

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16Z41073-EMC01	Rev.0	1 st edition	2016-06-15
I16Z41073-EMC01	Rev.1	Chargers updating	2016-07-06

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1. Test Laboratory

1.1. Testing Location

Location 1: CTTL(huayuan North Road)

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

1.2. Testing Environment

Normal Temperature: 15-35℃

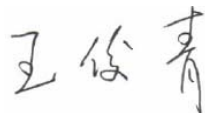
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2016-06-08

Testing End Date: 2016-06-15

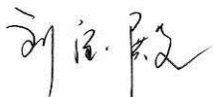
1.4. Signature



Wang Junqing
(Prepared this test report)



Qu Pengfei
(Reviewed this test report)



Liu Baodian
Deputy Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Pudong Area Shanghai, P.R. China. 201203
City: Shanghai
Postal Code: 201203
Country: P. R. China
Contact Person: Gong Zhizhou
Contact Email: zhizhou.gong@tcl.com
Telephone: 0086-21-51798260
Fax: 0086-21-61460602

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Pudong Area Shanghai, P.R. China. 201203
City: Shanghai
Postal Code: 201203
Country: P. R. China
Telephone: 0086-21-51798260
Fax: 0086-21-61460602

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

3.1. About EUT

Description	UMTS/GSM mobile phone
Model Name	5012G/SMART PLUS
FCC ID	2ACCJH057
Extreme vol. Limits	3.5VDC 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, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT51	014674000015384	PIO	v7GA4

*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	/	16TCT-BA-0758
AE2	Battery	/	16TCT-BA-0760
AE3	Battery	/	16TCT-BA-0757
AE4	Charger	/	16TCT-CH-0057
AE5	Charger	/	16TCT-CH-0390
AE6	Charger	/	/
AE7	Charger	/	/
AE8	USB Cable	/	16TCT-DC-0127
AE9	USB Cable	/	16TCT-DC-0125
AE10	Battery	/	/
AE11	Charger	/	/
AE12	Charger	/	/

AE1, AE2, AE3

Model	CAC2500064C1 (TLp025H1)
Manufacturer	BYD
Capacitance	2500 mAh
Nominal voltage	3.85 V

AE4

Model	CBA0058AG0C2
Manufacturer	TEPAO
Length of cable	/

AE5

Model	CBA0058AG0C3
Manufacturer	YINGJU
Length of cable	/

AE6

Model	CBA0058AGAC2
Manufacturer	TENPAO
Length of cable	/

AE7

Model	CBA0058AGAC3
Manufacturer	YINGJU
Length of cable	/

AE8, AE9

Model	52691160TMC USB
Manufacturer	Liqi
Length of cable	100cm

AE10

Model	CAB2500001C1
Manufacturer	BYD
Capacitance	2500 mAh
Nominal voltage	3.85 V

AE11

Model	CBA0058AA1C2
Manufacturer	TENPAO
Length of cable	/

AE12

Model	CBA0058AA1C3
Manufacturer	YINGYU
Length of cable	/

*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	EUT51+ AE2/AE10+ AE4+ AE8	Charger
Set.2	EUT51+ AE2/AE10+ AE5+ AE8	Charger
Set.3	EUT51+ AE2/AE10+ AE8	USB mode

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	10-1-15 Edition
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

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

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
Location Column	1	The test is performed in test location 1 which is 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	1
2	Conducted Emission	15.107(a)	B.2	P	1

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESU26	100235	R&S	2017-03-02	1 year
2	Universal Radio Communication Tester	CMW500	143008	R&S	2016-12-09	1 year
3	LISN	ENV216	101200	R&S	2016-07-07	1 year
4	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2017-12-16	3 years
5	EMI Antenna	3115	6914	ETS-Lindgren	2016-12-15	3 years
6	Test Receiver	ESCI7	100948	R&S	2016-07-07	1 year
7	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
8	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
9	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
10	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

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 ($\mu\text{V/m}$)		
	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:

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

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): $U = 4.3 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17925.200	51.7	-17.7	45.6	23.800	V
17949.000	51.6	-17.7	45.6	23.700	V
17985.550	51.4	-17.7	45.6	23.500	V
17987.250	51.3	-17.7	45.6	23.400	H
17994.900	51.2	-17.7	45.6	23.300	H
17982.150	51.2	-17.7	45.6	23.300	V

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17972.800	63.3	-17.7	45.6	35.400	H
17913.300	62.1	-18.5	45.6	35.000	V
17949.000	62.1	-17.7	45.6	34.200	V
17937.950	61.8	-17.7	45.6	33.900	H
17991.500	61.6	-17.7	45.6	33.700	H
17943.900	61.5	-17.7	45.6	33.600	V

Measurement results for Set.2:
Charging Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17973.65	51.7	-17.7	45.6	23.8	H
17958.35	51.7	-17.7	45.6	23.8	V
17978.75	51.6	-17.7	45.6	23.7	V
17965.15	51.5	-17.7	45.6	23.6	H
17994.05	51.4	-17.7	45.6	23.5	H
17933.70	51.2	-17.7	45.6	23.3	V

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17886.100	61.9	-18.5	45.6	34.800	V
17978.750	61.8	-17.7	45.6	33.900	H
17952.400	61.8	-17.7	45.6	33.900	V
17987.250	61.8	-17.7	45.6	33.900	H
17972.800	61.7	-17.7	45.6	33.800	V
17957.500	61.7	-17.7	45.6	33.800	H

Measurement results for Set.3:
USB Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{mea} (dB μ V)	Polarity
17988.100	51.8	-17.7	45.6	23.900	H
17920.950	51.5	-17.7	45.6	23.600	V
17996.600	51.4	-17.7	45.6	23.500	V
17922.650	51.4	-17.7	45.6	23.500	H
17933.700	51.4	-17.7	45.6	23.500	H
17932.000	51.4	-17.7	45.6	23.500	V

USB Mode/ Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{mea} (dB μ V)	Polarity
17875.050	62.6	-18.5	45.6	35.500	H
17838.500	62.1	-18.5	45.6	35.000	V
17951.550	61.9	-17.7	45.6	34.000	V
17897.150	61.5	-18.5	45.6	34.400	H
17829.150	61.5	-18.5	45.6	34.400	H
17983.000	61.5	-17.7	45.6	33.600	V

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

Charging Mode, Set.1

Normal RE_30M-1GHz_10m

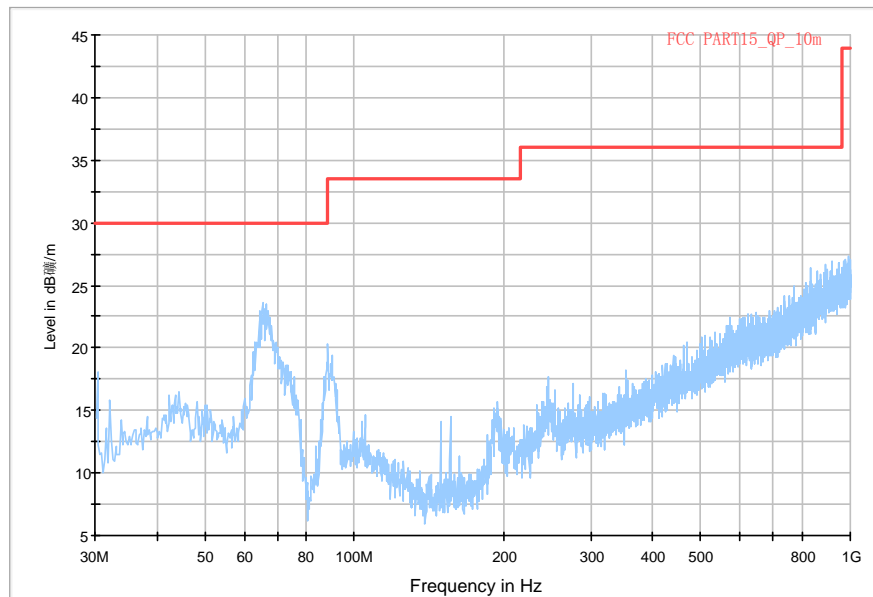


Figure A.1 Radiated Emission from 30MHz to 1GHz

Normal RE_1G-18GHz

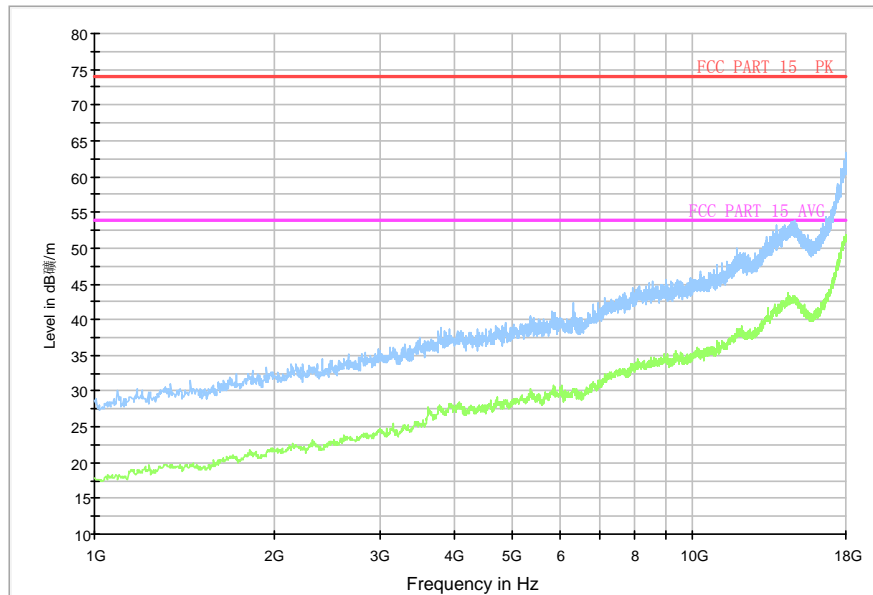


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.2

Normal RE_30M-1GHz_10m

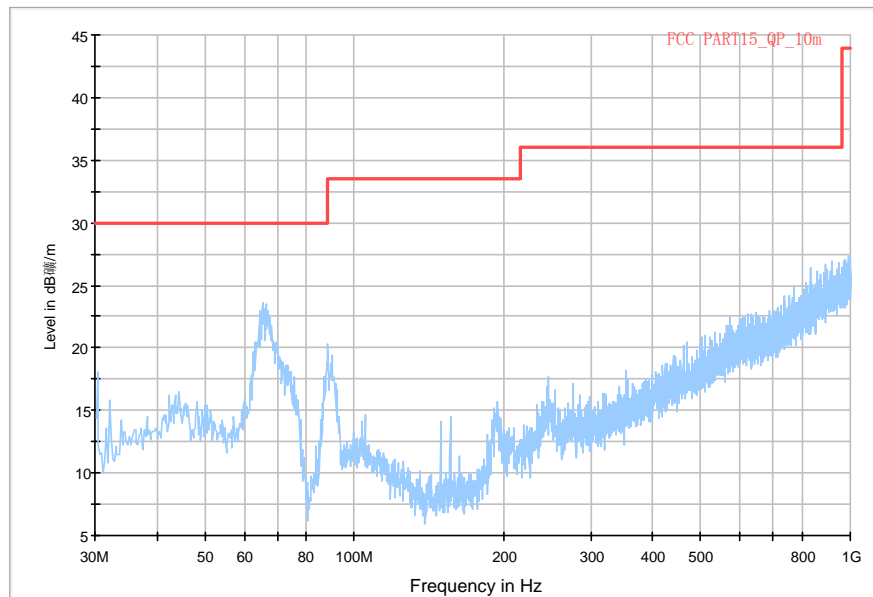


Figure A.3 Radiated Emission from 30MHz to 1GHz

Normal RE_1G-18GHz

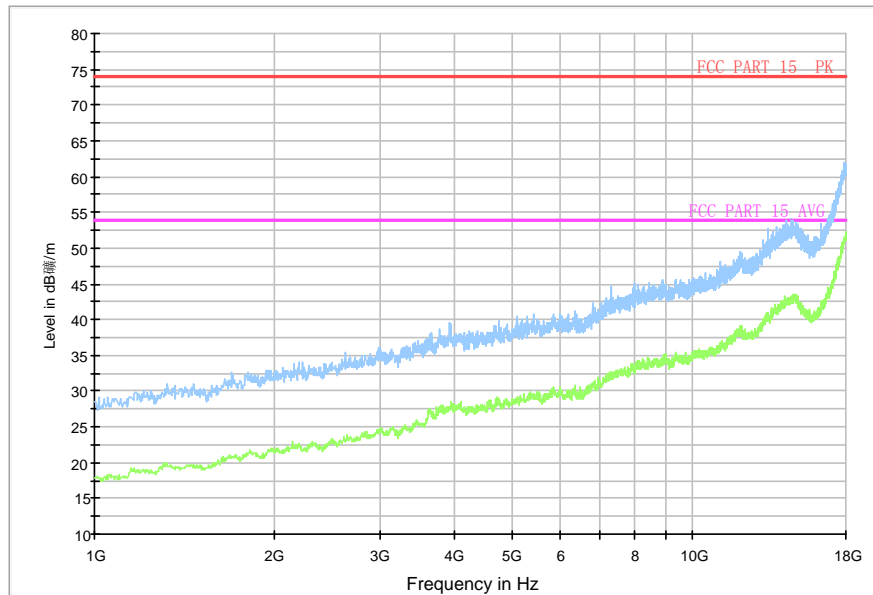


Figure A.4 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.3

Normal RE_30M-1GHz_10m

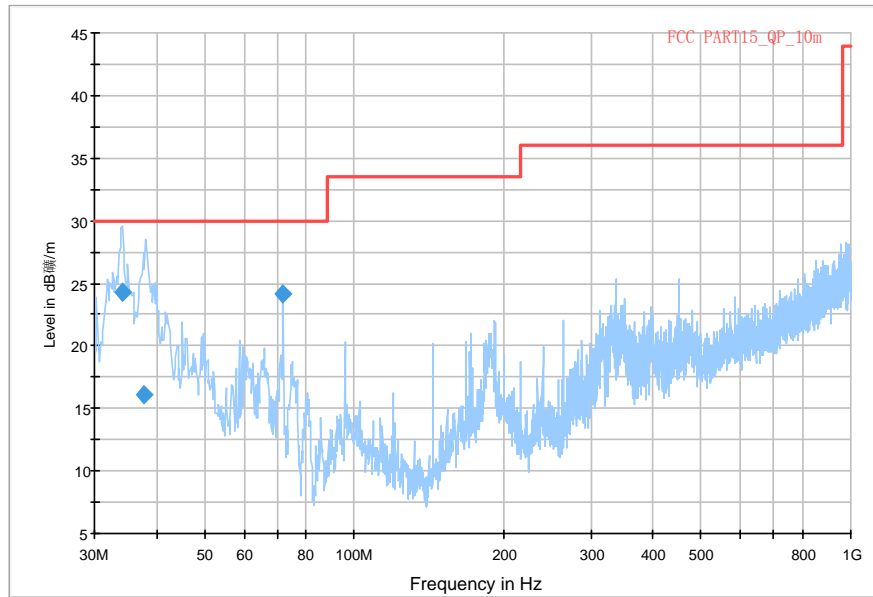


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
34.088000	24.3	325.0	V	61.0	-13.3	5.7	30.0
37.811000	16.2	225.0	V	248.0	-12.5	13.8	30.0
72.001000	24.2	225.0	V	90.0	-15.8	5.8	30.0

Normal RE_1G-18GHz

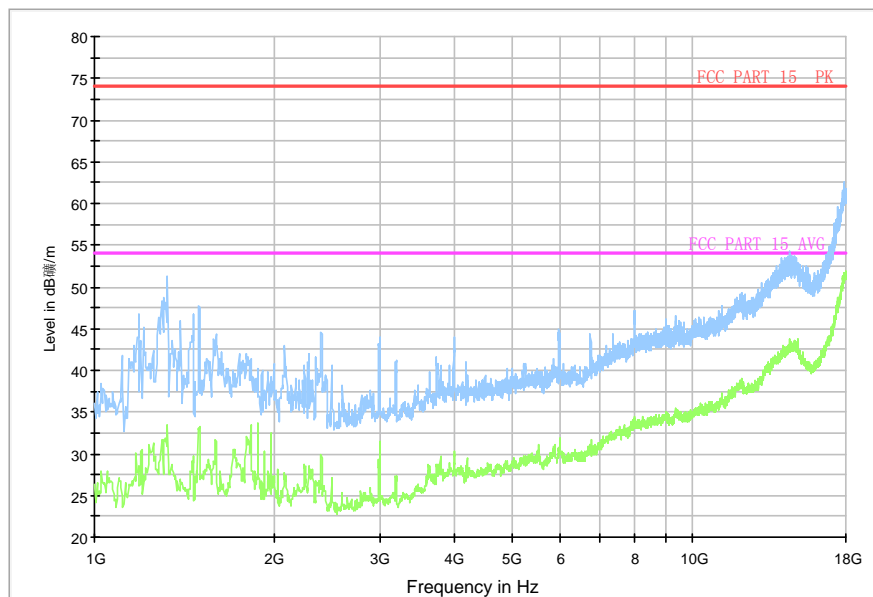


Figure A.6 Radiated Emission from 1GHz to 18GHz

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 (dB μ V)	
	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: $U=2.9\text{ dB}$, $k=2$.

Charging Mode, Set.1

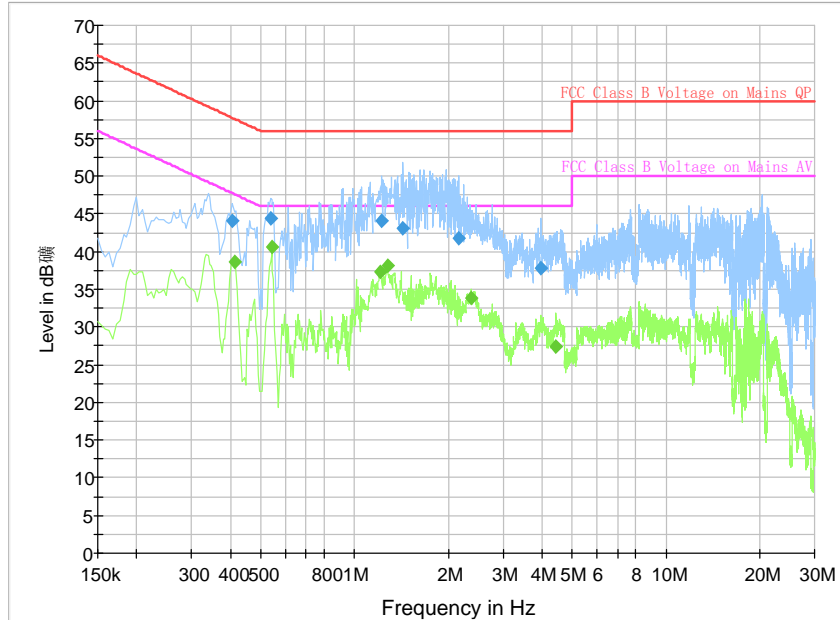


Figure A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time(ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.406500	44.1	2000.0	9.000	On	N	19.9	13.6	57.7
0.537000	44.4	2000.0	9.000	On	N	19.9	11.6	56.0
1.225500	44.2	2000.0	9.000	On	L1	19.7	11.8	56.0
1.432500	43.1	2000.0	9.000	On	L1	19.7	12.9	56.0
2.157000	41.7	2000.0	9.000	On	L1	19.4	14.3	56.0
3.970500	37.8	2000.0	9.000	On	N	19.5	18.2	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time(ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.411000	38.6	2000.0	9.000	On	N	19.9	9.0	47.6
0.541500	40.7	2000.0	9.000	On	N	19.9	5.4	46.0
1.212000	37.3	2000.0	9.000	On	N	19.7	8.7	46.0
1.279500	38.1	2000.0	9.000	On	N	19.7	7.9	46.0
2.368500	33.8	2000.0	9.000	On	N	19.2	12.2	46.0
4.447500	27.3	2000.0	9.000	On	N	19.6	18.7	46.0

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

Charging Mode, Set.2

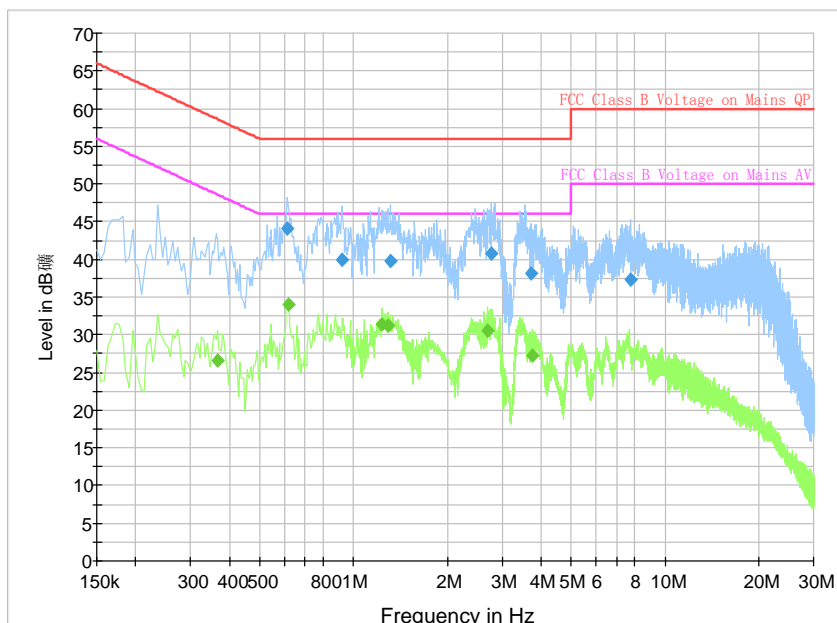


Figure A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time(ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.613500	44.0	2000.0	9.000	On	L1	19.8	12.0	56.0
0.915000	39.9	2000.0	9.000	On	N	19.8	16.1	56.0
1.315500	39.8	2000.0	9.000	On	N	19.7	16.2	56.0
2.764500	40.7	2000.0	9.000	On	L1	19.0	15.3	56.0
3.732000	38.1	2000.0	9.000	On	L1	19.5	17.9	56.0
7.791000	37.3	2000.0	9.000	On	N	19.6	22.7	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time(ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.366000	26.6	2000.0	9.000	On	L1	19.8	22.0	48.6
0.618000	34.0	2000.0	9.000	On	L1	19.8	12.0	46.0
1.234500	31.4	2000.0	9.000	On	L1	19.7	14.6	46.0
1.288500	31.2	2000.0	9.000	On	L1	19.7	14.8	46.0
2.706000	30.6	2000.0	9.000	On	L1	19.2	15.4	46.0
3.741000	27.3	2000.0	9.000	On	L1	19.5	18.7	46.0

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

USB Mode, Set.3

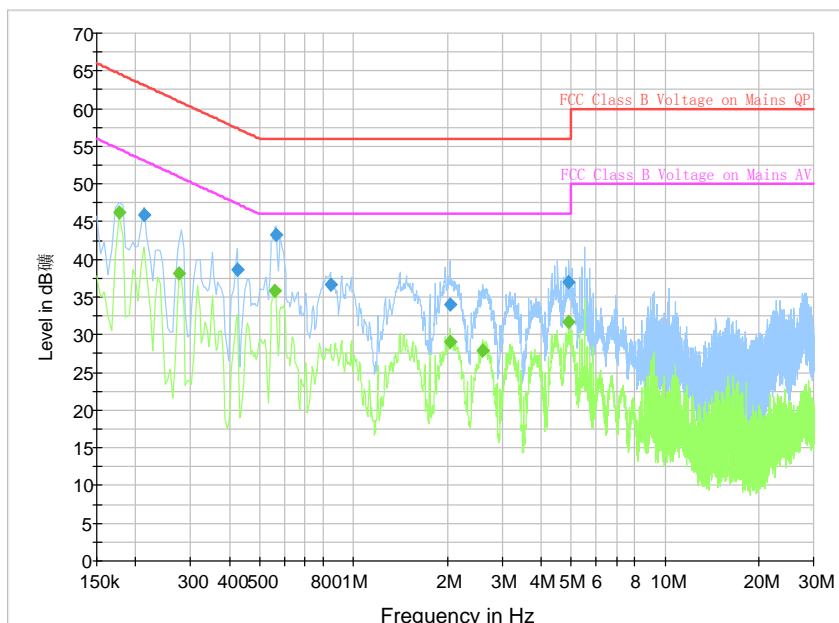


Figure A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time(ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.213000	45.9	2000.0	9.000	On	N	19.8	17.1	63.1
0.424500	38.6	2000.0	9.000	On	N	19.9	18.7	57.4
0.564000	43.3	2000.0	9.000	On	L1	19.9	12.7	56.0
0.843000	36.6	2000.0	9.000	On	N	19.8	19.4	56.0
2.044500	34.0	2000.0	9.000	On	N	19.7	22.0	56.0
4.920000	37.0	2000.0	9.000	On	N	19.6	19.0	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time(ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.177000	46.3	2000.0	9.000	On	N	19.8	8.3	54.6
0.276000	38.1	2000.0	9.000	On	N	19.8	12.9	50.9
0.559500	35.8	2000.0	9.000	On	N	19.9	10.2	46.0
2.044500	29.0	2000.0	9.000	On	N	19.7	17.0	46.0
2.602500	28.0	2000.0	9.000	On	L1	19.1	18.0	46.0
4.920000	31.8	2000.0	9.000	On	N	19.6	14.2	46.0

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

END OF REPORT