



TEST REPORT

No. I18Z60072-EMC01

for

TCL Communication Ltd.

UMTS/GSM Smartphone

Model Name: 5009A/5009U

FCC ID: 2ACCJB102

with

Hardware Version: PIO

Software Version: V1.0

Issued Date: 2018-04-02



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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z60072-EMC01	Rev.0	1 st edition	2018-03-02
I18Z60072-EMC01	Rev.1	Adding statements about two Models in P7	2018-04-02



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1. Test Laboratory

1.1. Testing Location

Location: 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°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-01-24

Testing End Date: 2018-02-26

1.4. Signature



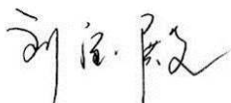
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(Reviewed this test report)



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Deputy Director of the laboratory

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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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Contact Person: Gong Zhizhou
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	UMTS/GSM Smartphone
Model Name	5009A/5009U
FCC ID	2ACCJB102
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 4.2VDC)

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
EUT3	355399090000412	PIO	V1.0

*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	Battery	/	/
AE3	USB Cable	/	17TCT-DC-0465
AE4	USB Cable	/	17TCT-DC-0557
AE5	USB Cable	/	16TCT-DC-0465
AE6	Charger	/	17TCT-CH-1328
AE7	Charger	/	17TCT-CH-1322

AE1

Model	CAC2400008C1
Manufacturer	BYD
Capacitance	3.85mAh
Nominal voltage	2400V

AE2

Model	CAC2400009C7
Manufacturer	VEKEN
Capacitance	3.85mAh
Nominal voltage	2400V

AE3

Model	CDA3122005C1
Manufacturer	JUWEI
Length	99cm

AE4

Model	CDA3122005C2
Manufacturer	Shenghua
Length	99cm



AE5

Model CDA3122005C8
Manufacturer PUAN
Length 99cm

AE6

Model CBA0058AGAC5
Manufacturer PUAN
Length of cable /

AE7

Model CBA0058AGAC7
Manufacturer CHENYANG
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	EUT3+ AE2+AE6+AE3/AE4/AE5	Charger
Set.2	EUT3+ AE2+AE7+AE3/AE4/AE5	Charger
Set.3	EUT3+ AE2+AE3/AE4/AE5	USB mode

Note: The UMTS/GSM Smartphone 5009A is a new product for this testing. The 5009U is a variant product of 5009A and results share the 5009A results.



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)	A.1	P	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	A.2	P	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI7	116588	R&S	2018-11-26	1 year
2	Test Receiver	ESU26	100235	R&S	2018-03-01	1 year
3	Universal Radio Communication Tester	CMW500	143008	R&S	2018-12-26	1 year
4	LISN	ENV216	101200	R&S	2018-07-04	1 year
5	Universal Radio Communication Tester	CMW500	116588	R&S	2018-11-26	1 year
6	EMI Antenna	3115	00167250	ETS-Lindgren	2020-05-21	3 years
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

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 3 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 ($\mu\text{V}/\text{m}$)		
	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): 4.3dB, $k=2$.

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
17884.967	39.1	-18.5	45.6	12.000	H
17771.067	39.1	-18.5	45.6	12.000	H
17886.100	39.0	-18.5	45.6	11.900	V
17890.633	39.0	-18.5	45.6	11.900	H
17862.867	38.9	-18.5	45.6	11.800	H
17889.500	38.9	-18.5	45.6	11.800	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17790.900	51.5	-18.5	45.6	24.400	H
17472.433	50.8	-19.2	41.5	28.500	H
17795.433	50.6	-18.5	45.6	23.500	V
17670.200	50.5	-18.9	45.6	23.800	H
16994.167	50.5	-19.9	39.9	30.500	H
17915.000	50.4	-17.7	45.6	22.500	H

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
17884.967	39.2	-18.5	45.6	12.100	H
17885.533	39.0	-18.5	45.6	11.900	H
17776.167	39.0	-18.5	45.6	11.900	V
17893.467	38.9	-18.5	45.6	11.800	H
17914.433	38.9	-17.7	45.6	11.000	H
17879.867	38.9	-18.5	45.6	11.800	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17789.200	51.1	-18.5	45.6	24.000	H
17810.167	50.9	-18.5	45.6	23.800	H
17440.700	50.7	-19.2	41.5	28.400	V
17663.400	50.7	-18.9	45.6	24.000	H
17711.000	50.5	-18.9	45.6	23.800	H
17779.000	50.5	-18.5	45.6	23.400	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
17886.100	39.3	-18.5	45.6	12.200	H
17887.800	39.3	-18.5	45.6	12.200	H
17770.500	39.3	-18.5	45.6	12.200	V
17891.767	39.2	-18.5	45.6	12.100	H
17895.733	39.1	-18.5	45.6	12.000	H
17909.333	39.1	-18.5	45.6	12.000	H

USB Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17368.733	51.6	-19.5	41.5	29.600	H
17407.833	51.1	-19.2	41.5	28.800	H
17462.233	50.7	-19.2	41.5	28.400	V
17764.833	50.7	-18.5	45.6	23.600	H
17453.167	50.6	-19.2	41.5	28.300	H
17869.100	50.5	-18.5	45.6	23.400	H

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

Charging Mode, Set.1

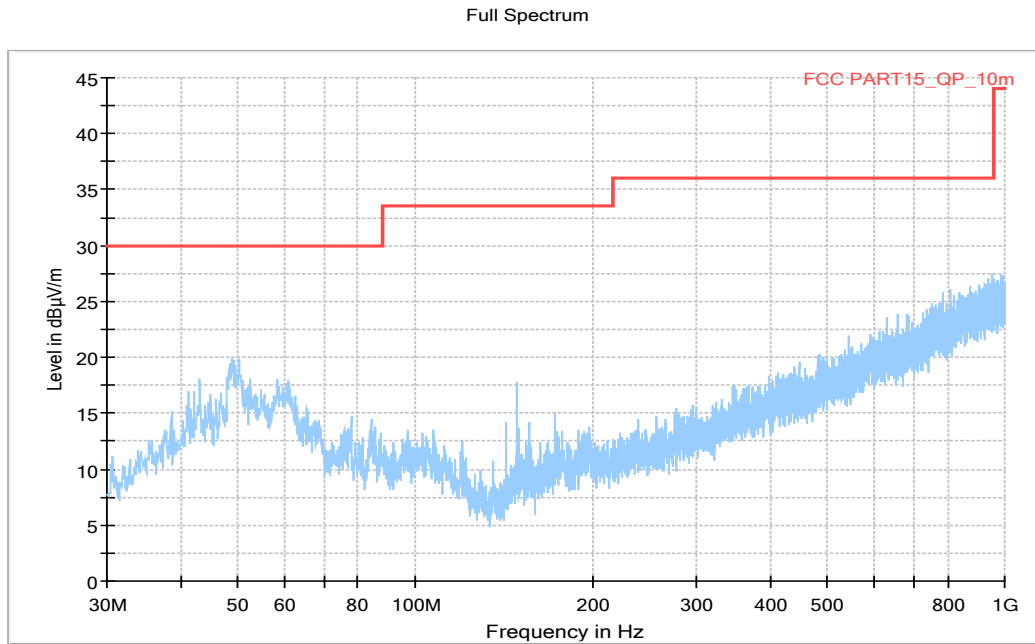


Figure A.1 Radiated Emission from 30MHz to 1GHz

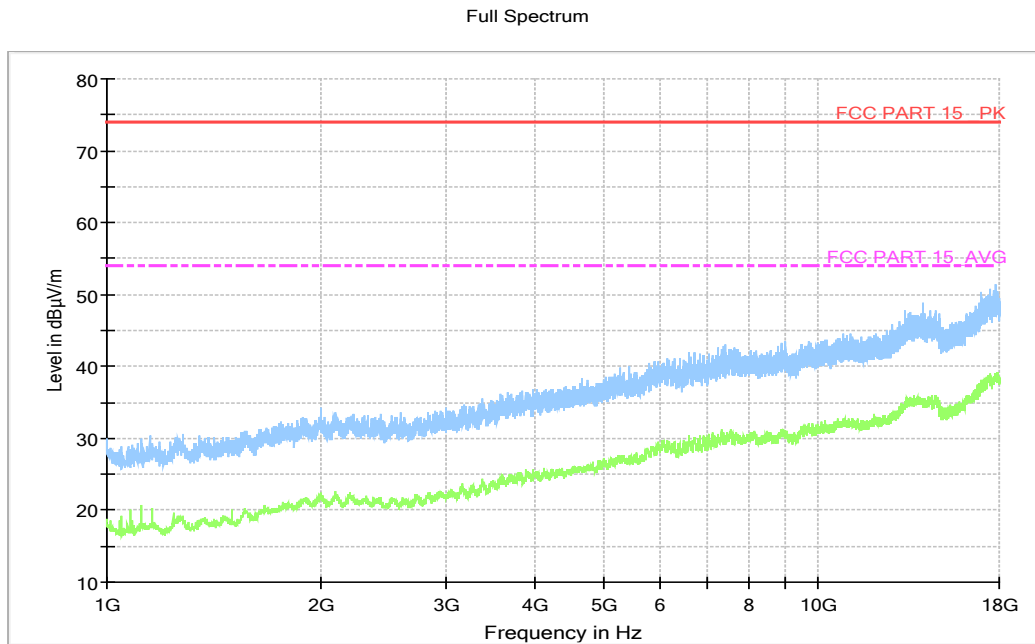


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.2

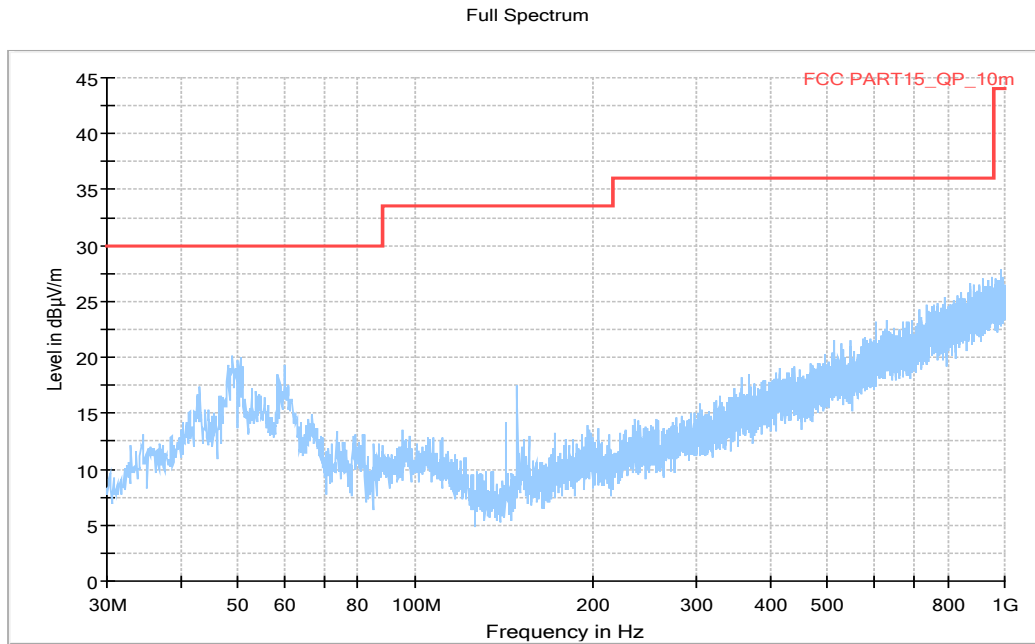


Figure A.3 Radiated Emission from 30MHz to 1GHz

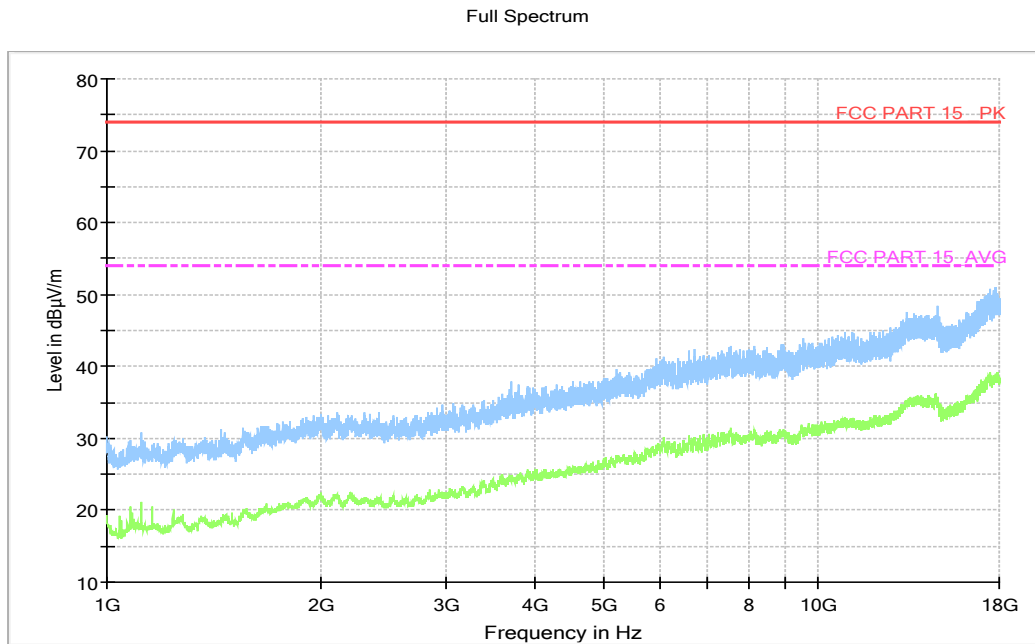


Figure A.4 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.3

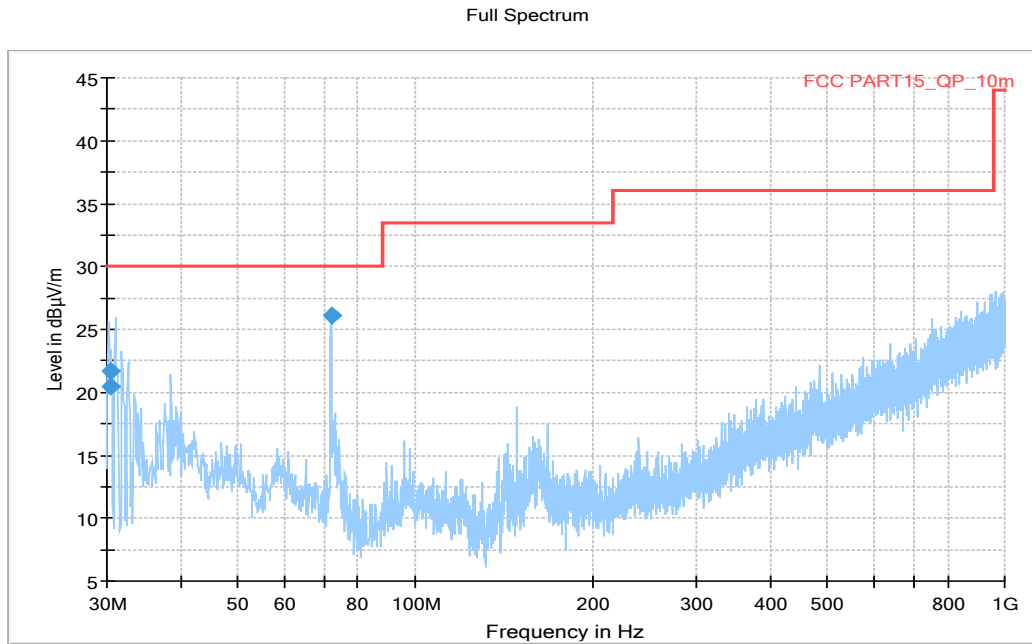


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
30.360000	21.64	30.00	8.36	1000.	120.000	106.0	V	104.0
30.467000	20.48	30.00	9.52	1000.	120.000	100.0	V	111.0
72.001000	26.05	30.00	3.95	1000.	120.000	112.0	V	240.0

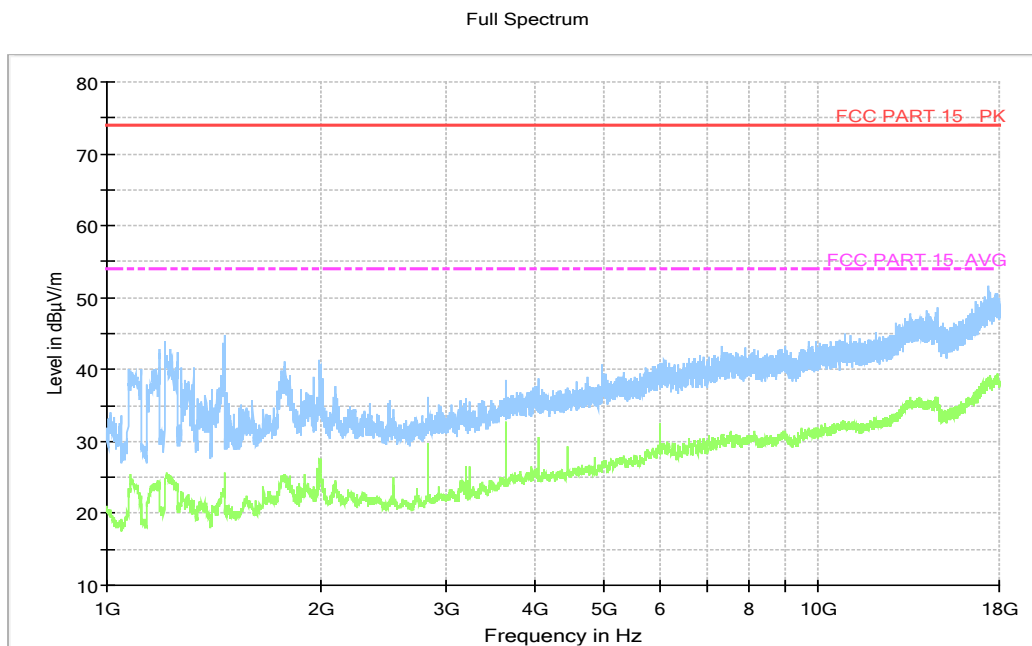


Figure A.6 Radiated Emission from 1GHz to 18GHz

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

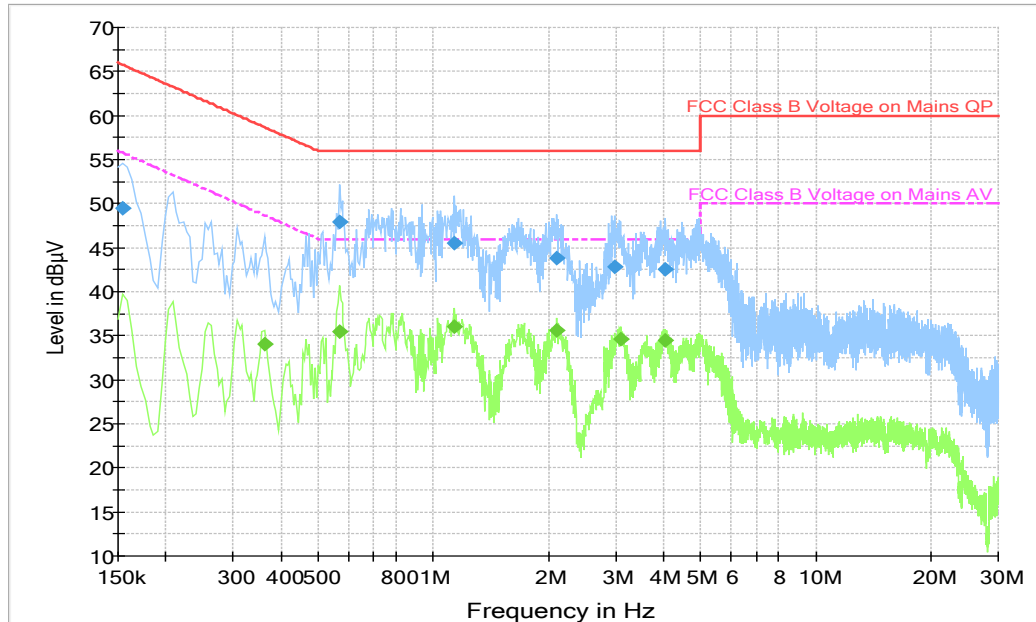


Figure A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	49.4	2000.0	9.000	L1	20.0	16.3	65.8
0.568500	48.0	2000.0	9.000	L1	19.9	8.0	56.0
1.140000	45.6	2000.0	9.000	L1	19.8	10.4	56.0
2.103000	43.8	2000.0	9.000	L1	19.7	12.2	56.0
2.989500	42.8	2000.0	9.000	L1	19.7	13.2	56.0
4.056000	42.6	2000.0	9.000	L1	19.7	13.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.361500	34.0	2000.0	9.000	L1	19.9	14.7	48.7
0.568500	35.4	2000.0	9.000	L1	19.9	10.6	46.0
1.140000	36.0	2000.0	9.000	L1	19.8	10.0	46.0
2.103000	35.6	2000.0	9.000	L1	19.7	10.4	46.0
3.088500	34.6	2000.0	9.000	L1	19.7	11.4	46.0
4.038000	34.4	2000.0	9.000	L1	19.7	11.6	46.0

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

Charging Mode, Set.2

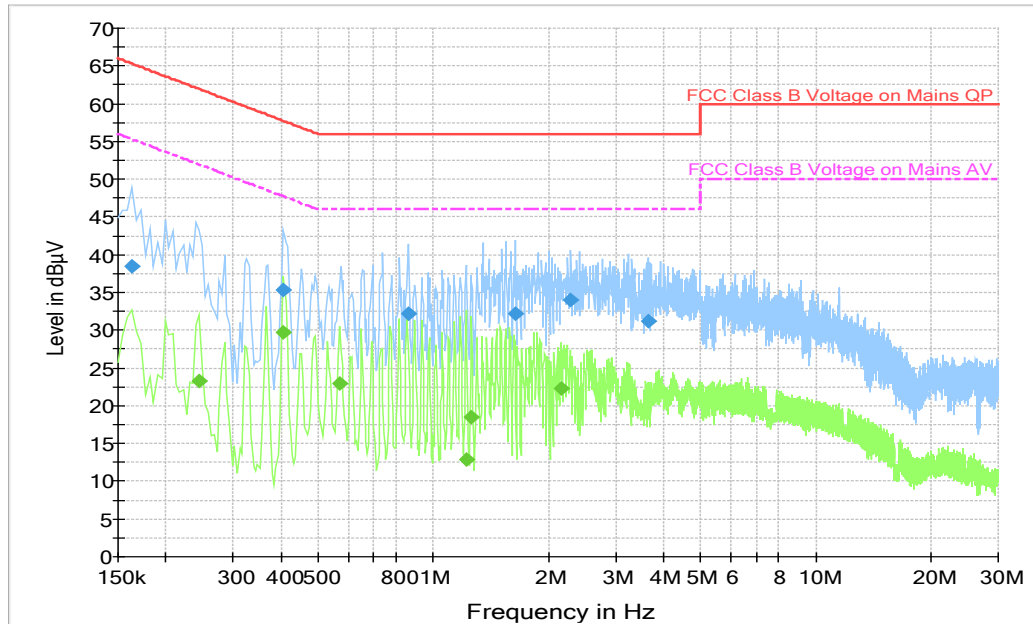


Figure A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	38.4	2000.0	9.000	L1	19.9	26.9	65.3
0.406500	35.3	2000.0	9.000	N	19.9	22.4	57.7
0.861000	32.2	2000.0	9.000	N	19.8	23.8	56.0
1.639500	32.2	2000.0	9.000	N	19.7	23.8	56.0
2.292000	34.1	2000.0	9.000	N	19.7	21.9	56.0
3.642000	31.2	2000.0	9.000	N	19.7	24.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.244500	23.2	2000.0	9.000	L1	19.9	28.7	51.9
0.406500	29.7	2000.0	9.000	L1	19.9	18.0	47.7
0.568500	23.0	2000.0	9.000	L1	19.9	23.0	46.0
1.216500	12.9	2000.0	9.000	L1	19.8	33.1	46.0
1.261500	18.5	2000.0	9.000	L1	19.8	27.5	46.0
2.157000	22.4	2000.0	9.000	L1	19.7	23.6	46.0

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

USB Mode, Set.3

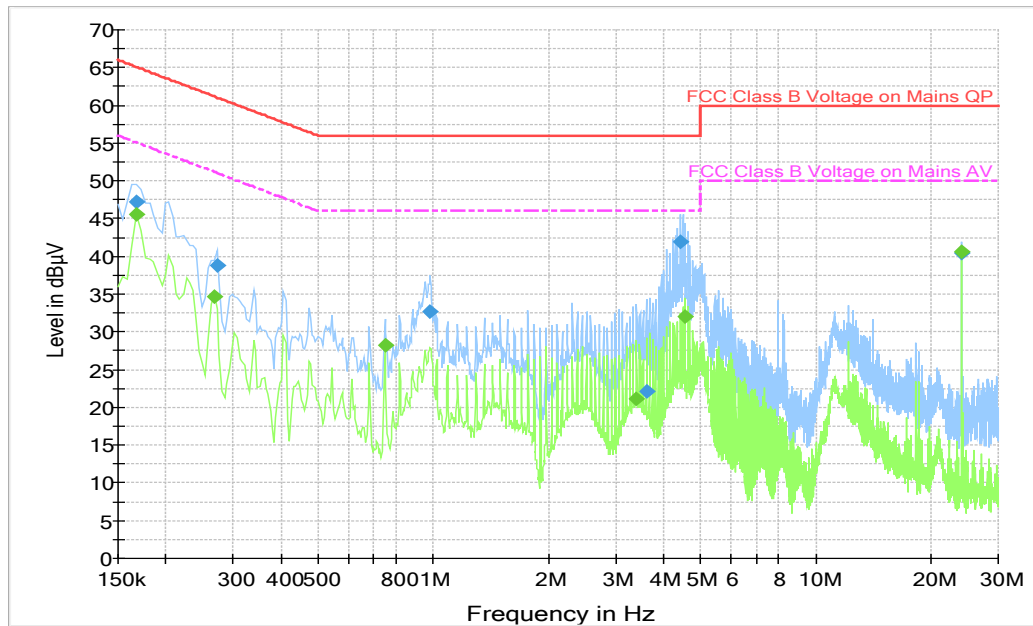


Figure A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	47.2	2000.0	9.000	L1	19.9	17.8	65.1
0.271500	38.8	2000.0	9.000	L1	19.9	22.3	61.1
0.982500	32.7	2000.0	9.000	N	19.8	23.3	56.0
3.601500	22.1	2000.0	9.000	L1	19.7	33.9	56.0
4.425000	42.0	2000.0	9.000	N	19.7	14.0	56.0
24.009000	40.4	2000.0	9.000	L1	19.9	19.6	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	45.6	2000.0	9.000	N	19.9	9.4	55.1
0.267000	34.7	2000.0	9.000	L1	19.9	16.5	51.2
0.748500	28.2	2000.0	9.000	N	19.9	17.8	46.0
3.399000	21.1	2000.0	9.000	L1	19.7	24.9	46.0
4.560000	32.0	2000.0	9.000	N	19.7	14.0	46.0
24.009000	40.6	2000.0	9.000	L1	19.9	9.4	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 Communiqué dated January 2009).*

2017-08-22 through 2018-09-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program

END OF REPORT