TEST REPORT

No. I18Z61354-EMC01

for

FOXX Development Inc.

Smartphone MIRO

Model Name: L590A

FCC ID: 2AQRMFXMC52401

with

Hardware Version: L590MB_V0.4

Software Version: R02.V04

Issued Date: 2018-11-09

TESTING
NVLAP LAB CODE 600118-0

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z61354-EMC01	Rev.0	1st edition	2018-11-01
I18Z61354-EMC01	Rev.1	Updated the Client information and product name	2018-11-09

CONTENTS

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: 2018-09-11

Testing End Date: 2018-11-01

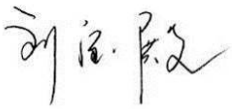
1.4. Signature

Li Yan

(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:	FOXX Development Inc.
Address /Post:	101 E. Park Blvd., Plano, TX 75074, United States
Contact Person:	Yi Zhang
Contact Email	ethanzhang@foxxusa.com
Telephone:	+1 855-585-3699
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2.2. Manufacturer Information

Company Name:	FOXX Development Inc.
Address /Post:	101 E. Park Blvd., Plano, TX 75074, United States
Contact Person:	Yi Zhang
Contact Email	ethanzhang@foxxusa.com
Telephone:	+1 855-585-3699
Fax:	+1 855-515-3699

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

3.1. About EUT

Description	Smartphone MIRO
Model Name	L590A
FCC ID	2AQRMFXMC52401
Extreme vol. Limits	3.5VDC to 4.4VDC (nominal: 3.85VDC)

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	015271000009043	L590MB_V0.4	R02.V04

*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	USB Cable	/	/
AE4	Headset	/	/

AE1

Model	/
Manufacturer	DONGGUAN DRN NEW ENERGY CO., LTD
Capacitance	2450mAh
Nominal voltage	3.85V

AE2

Model	A18A-050100U-US2
Manufacturer	Dongguan Aohai Technology Co.,Ltd
Length of cable	/

AE3

Model	/
Manufacturer	SHENZHEN KOAR ELECTRCS CO.,LTD.
Length of cable	/

AE4

Model	/
Manufacturer	/
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	EUT1+ AE1+ AE2+ AE3+ AE4	Charger mode+FM
Set.2	EUT1+ AE1+ AE3	USB mode+MP3+GPS

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 (23meters×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 (10meters×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	ESU26	100235	R&S	2019-03-31	1 year
2	Universal Radio Communication Tester	CMW500	143008	R&S	2018-12-26	1 year
3	Test Receiver	ESCI 3	100344	R&S	2019-02-28	1 year
4	Universal Radio Communication Tester	CMW500	116588	R&S	2018-11-26	1 year
5	LISN	ENV216	101200	R&S	2019-04-15	1 year
6	EMI Antenna	VULB9163	9163-302	Schwarzbeck	2020-02-27	3 years
7	EMI Antenna	3115	00167250	ETS-Lindgren	2020-05-21	3 years
8	Signal Generator	SMT06	831285/005	R&S	2019-04-04	1 years
9	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
11	Keyboard	L100	CN0RH659658907ATOI40	DELL	N/A	N/A
12	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. During the charging mode the FM application is started up. During the USB mode The EUT is keeping on playing MP3 and the GNSS application is started up. 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): 5.44dB, *k*=2.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17950.700	40.4	-17.7	45.6	12.500	H
17958.633	40.3	-17.7	45.6	12.400	H
17985.833	40.2	-17.7	45.6	12.300	V
17952.967	40.2	-17.7	45.6	12.300	H
17969.967	40.2	-17.7	45.6	12.300	H
17974.500	40.1	-17.7	45.6	12.200	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17963.733	52.5	-17.7	45.6	24.600	H
17939.367	51.9	-17.7	45.6	24.000	H
17978.467	51.8	-17.7	45.6	23.900	V
17962.600	51.6	-17.7	45.6	23.700	H
17984.700	51.5	-17.7	45.6	23.600	H
17953.533	51.4	-17.7	45.6	23.500	H

Measurement results for Set.2:

USB Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17973.367	39.4	-17.7	45.6	11.500	H
17972.800	39.2	-17.7	45.6	11.300	H
17942.200	39.0	-17.7	45.6	11.100	V
17962.033	39.0	-17.7	45.6	11.100	H
17972.233	39.0	-17.7	45.6	11.100	H
17962.600	39.0	-17.7	45.6	11.100	H

USB Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Polarity
17934.267	51.5	-17.7	45.6	23.600	H
17998.867	50.5	-17.7	45.6	22.600	H
17945.600	50.5	-17.7	45.6	22.600	V
17892.333	50.4	-18.5	45.6	23.300	H
17964.300	50.4	-17.7	45.6	22.500	H
17963.167	50.3	-17.7	45.6	22.400	H

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

Charging Mode+FM, Set.1

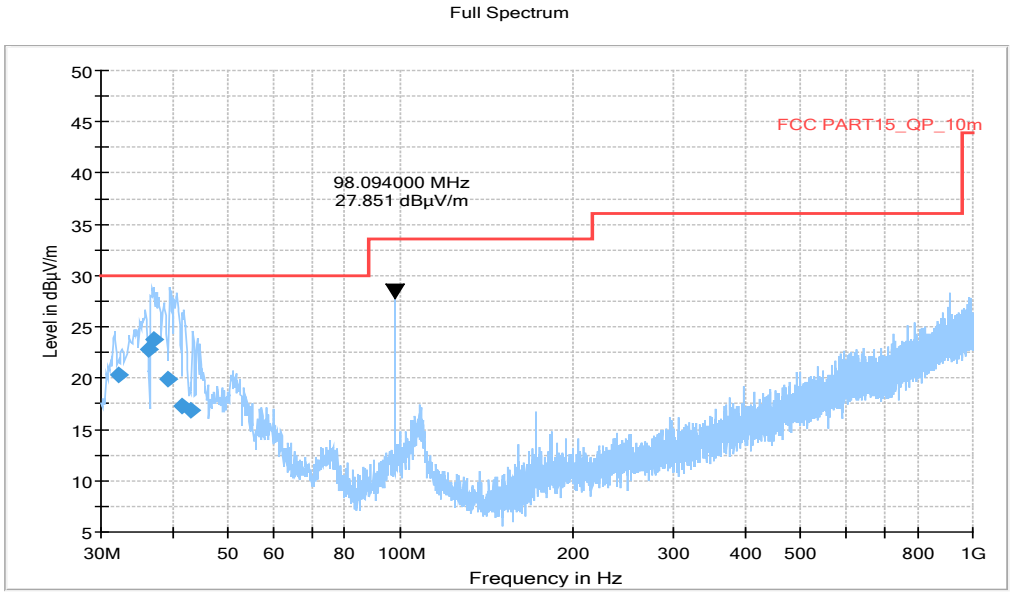

Figure A.1 Radiated Emission from 30MHz to 1GHz

Note: the spike（98MHz）is coming from FM signal source.

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
32.249000	20.30	30.00	9.70	1000.0	120.000	292.0	V	300.0
36.397000	22.83	30.00	7.17	1000.0	120.000	113.0	V	-27.0
37.201000	23.81	30.00	6.19	1000.0	120.000	211.0	V	30.0
39.386000	19.96	30.00	10.04	1000.0	120.000	105.0	V	269.0
41.594000	17.30	30.00	12.70	1000.0	120.000	289.0	V	-28.0
42.943000	16.90	30.00	13.10	1000.0	120.000	202.0	V	10.0

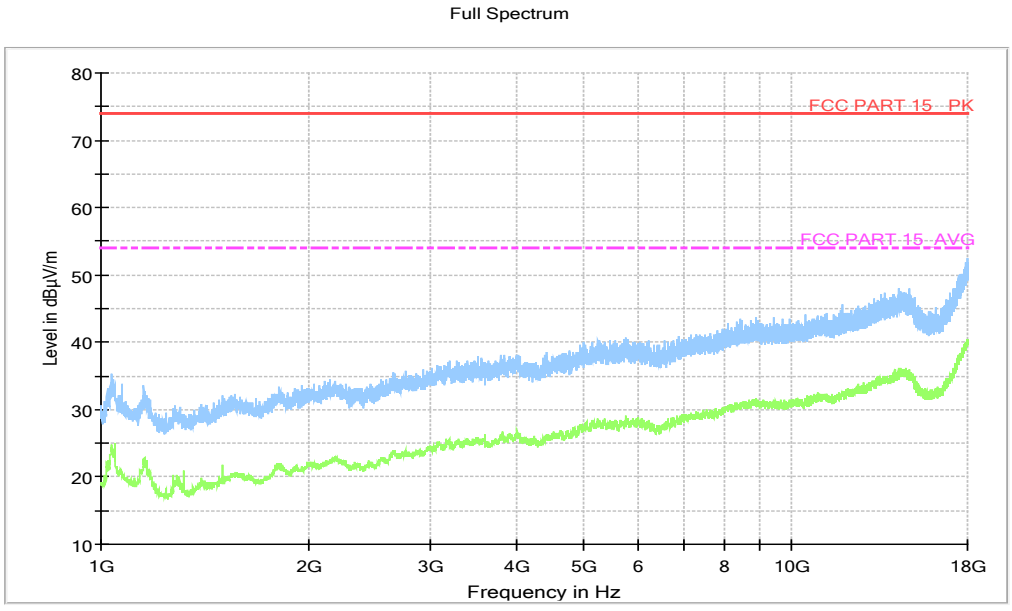

Figure A.2 Radiated Emission from 1GHz to 18GHz

USB Mode+MP3+GNSS, Set.2

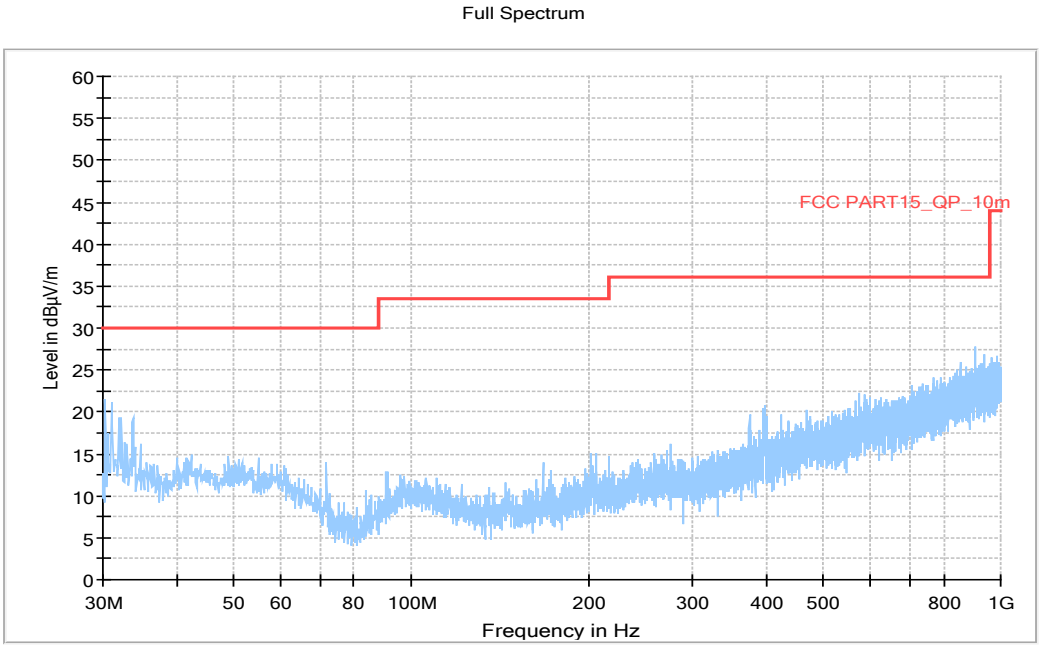

Figure A.3 Radiated Emission from 30MHz to 1GHz

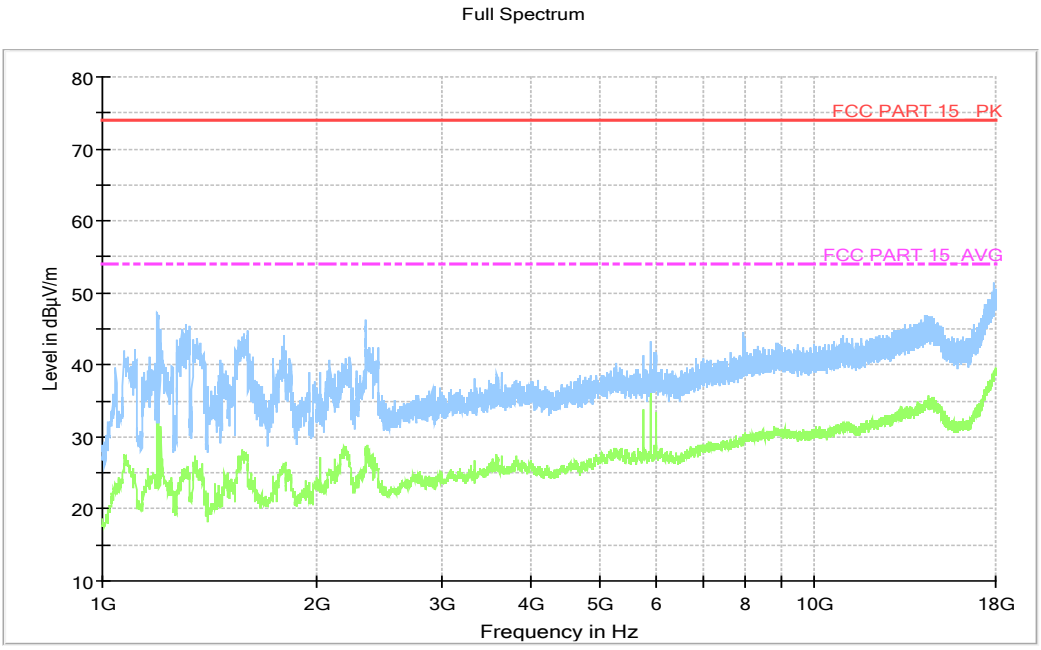

Figure A.4 Radiated Emission from 1GHz to 18GHz

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. During the charging mode the FM application is started up. During the USB mode The EUT is keeping on playing MP3 and the GNSS application is started up. 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*= 3.08 dB, *k*=2.

Charging Mode+FM, Set.1

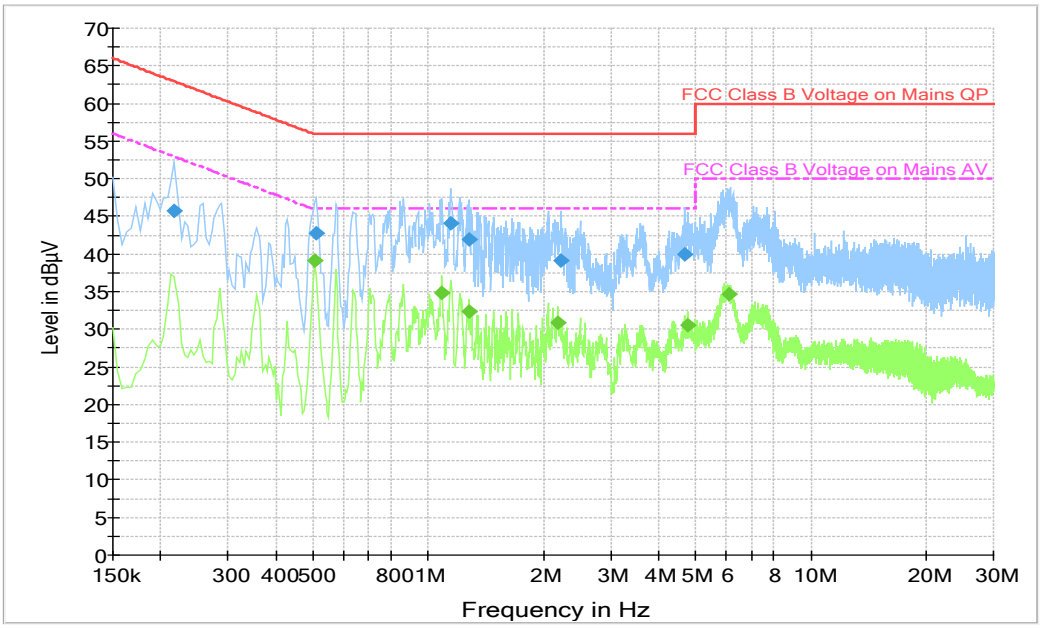

Figure A.5 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.217500	45.7	2000.0	9.000	L1	19.8	17.2	62.9
0.510000	42.8	2000.0	9.000	N	19.9	13.2	56.0
1.144500	44.0	2000.0	9.000	L1	19.6	12.0	56.0
1.275000	41.9	2000.0	9.000	L1	19.6	14.1	56.0
2.229000	39.1	2000.0	9.000	L1	19.7	16.9	56.0
4.695000	39.9	2000.0	9.000	L1	19.6	16.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.505500	39.1	2000.0	9.000	N	19.9	6.9	46.0
1.086000	34.9	2000.0	9.000	L1	19.6	11.1	46.0
1.275000	32.4	2000.0	9.000	L1	19.6	13.6	46.0
2.179500	30.9	2000.0	9.000	L1	19.7	15.1	46.0
4.780500	30.6	2000.0	9.000	L1	19.6	15.4	46.0
6.130500	34.6	2000.0	9.000	L1	19.7	15.4	50.0

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

USB Mode+MP3+GNSS, Set.2

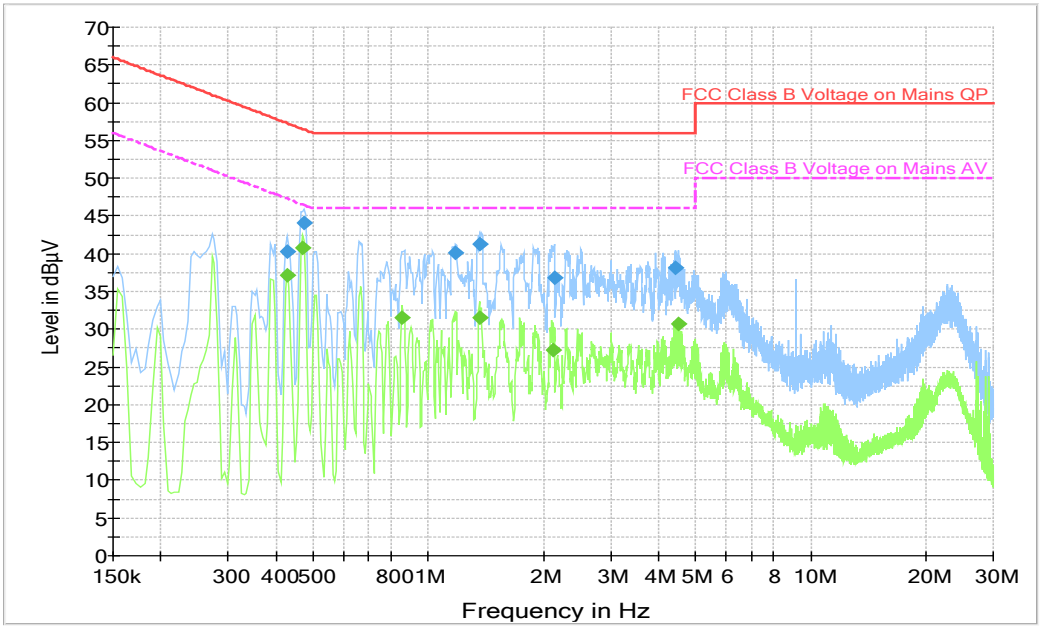

Figure A.6 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	40.2	2000.0	9.000	L1	19.9	17.0	57.3
0.474000	44.1	2000.0	9.000	N	19.9	12.3	56.4
1.180500	40.2	2000.0	9.000	N	19.6	15.8	56.0
1.369500	41.3	2000.0	9.000	L1	19.6	14.7	56.0
2.134500	36.8	2000.0	9.000	N	19.6	19.2	56.0
4.447500	38.1	2000.0	9.000	N	19.7	17.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	37.1	2000.0	9.000	L1	19.9	10.2	47.3
0.469500	40.8	2000.0	9.000	L1	19.9	5.8	46.5
0.856500	31.5	2000.0	9.000	N	19.8	14.5	46.0
1.360500	31.5	2000.0	9.000	L1	19.6	14.5	46.0
2.130000	27.3	2000.0	9.000	N	19.6	18.7	46.0
4.528500	30.7	2000.0	9.000	N	19.7	15.3	46.0

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

ANNEX B: Persons involved in this testing

Test Item	Tester
Radiated Emission	Wang Huan
Conducted Emission	Shi Suolan

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