



# TEST REPORT

## No. I17Z62297-EMC01

for

**LG Electronics MobileComm USA, Inc.**

**Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN**

**Model Name: LM-X210FM, LMX210FM, X210FM**

**FCC ID: ZNFX210FM**

with

**Hardware Version: Rev.1.0**

**Software Version: V09c**

**Issued Date: 2018-01-18**



**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**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I17Z62297-EMC01	Rev.0	1 <sup>st</sup> edition	2018-01-18



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## 1. Test Laboratory

### 1.1. Testing Location

Location1: 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: 2017-12-26

Testing End Date: 2018-01-18

### 1.4. Signature



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Li Yan

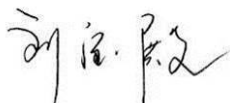
(Prepared this test report)



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Zhang Ying

(Reviewed this test report)



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Liu Baodian

Deputy Director of the laboratory

(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: LG Electronics MobileComm USA, Inc.  
Address /Post: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632  
City: Englewood  
Postal Code: /  
Country: U.S.A  
Telephone: /  
Fax: /

### **2.2. Manufacturer Information**

Company Name: Jiaxing Yongrui Electron Technology Co., Ltd.  
Address /Post: NO.777 Yazhong Road, Daqiao Town, Nanhu District, Jiaxing  
City, Zhejiang  
City: Jiaxing  
Postal Code: /  
Country: China  
Telephone: /  
Fax: /



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

#### **3.1. About EUT**

Description	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model Name	LM-X210FM,LMX210FM,X210FM
FCC ID	ZNFX210FM
Extreme vol. Limits	3.6VDC 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, Academy of Telecommunication Research, MIIT.

#### **3.2. Internal Identification of EUT used during the test**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
EUT3	353459090003311	Rev.1.0	V09c

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

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>	<b>Remarks</b>
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB cable	/	/

AE1

Model	BL-45F1F
Manufacturer	Shenzhen BYD Lithium Battery Company Limited
Capacitance	2500mAh
Nominal voltage	3.85V

AE2

Model	EAY64009102
Manufacturer	Sunlin Electronics Co.,Ltd.
Length of cable	/

AE3

Model	EAD62377927
Manufacturer	Ningbo
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**

<b>EUT set-up No.</b>	<b>Combination of EUT and AE</b>	<b>Remarks</b>
Set.1	EUT3+AE1+AE2+AE3	Charger
Set.2	EUT3+AE1+AE3	USB mode



## **4. Reference Documents**

### **4.1. Reference Documents for testing**

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

<b>Reference</b>	<b>Title</b>	<b>Version</b>
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	ESU26	100235	R&S	2018-03-01	1 year
2	Test Receiver	ESCI 7	100344	R&S	2018-03-15	1 year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2018-11-26	1 year
4	Universal Radio Communication Tester	CMW500	143008	R&S	2018-12-26	1 year
5	LISN	ENV216	101200	R&S	2018-08-03	1 year
6	EMI Antenna	VULB9163	9163-302	Schwarzbeck	2020-03-27	3 years
7	EMI Antenna	3115	00167250	ETS-Lindgren	2020-05-21	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH6596589 07ATOI40	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 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

$G_{\text{PL}}$ : Path Loss

$P_{\text{Mea}}$ : Measurement result on receiver.

Measurement uncertainty (worst case): 30MHz-1GHz: 4.86dB, 1GHz-18GHz: 5.26dB,  $k=2$ .

#### Measurement results for Set.1:

##### Charging Mode/Average detector

Frequency(MHz)	Result(dB $\mu$ V/m)	$G_{\text{PL}}$ (dB)	$G_A$ (dB/m)	$P_{\text{Mea}}$ (dB $\mu$ V)	Polarity
17908.767	38.5	-25.7	43.4	20.842	H
17894.033	38.5	-25.7	43.4	20.842	H
17874.200	38.4	-25.7	43.4	20.742	V
17892.333	38.4	-25.7	43.4	20.742	H
17794.867	38.3	-25.7	43.4	20.642	H
17873.633	38.3	-25.7	43.4	20.642	H

##### Charging Mode/Peak detector

Frequency(MHz)	Result(dB $\mu$ V/m)	$G_{\text{PL}}$ (dB)	$G_A$ (dB/m)	$P_{\text{Mea}}$ (dB $\mu$ V)	Polarity
17372.133	50.3	-26.6	40.1	36.801	H
17374.400	50.3	-26.6	40.1	36.801	H
17782.400	50.1	-25.7	43.4	32.442	V
17757.467	50.1	-25.7	43.4	32.442	H
17888.933	50.1	-25.7	43.4	32.442	H
17468.467	50.0	-25.9	40.1	35.845	H

Sample calculation: Peak detector, 17908.767MHz

$$\text{Result} = P_{\text{Mea}} (20.842\text{dB}\mu\text{V}) + G_A (43.4\text{dB/m}) + G_{\text{PL}}(-25.7\text{dB}) = 38.5\text{dB}\mu\text{V/m}$$



**Measurement results for Set.2:**

**USB Mode/Average detector**

Frequency(MHz)	Result(dB $\mu$ V/m)	G <sub>PL</sub> (dB)	G <sub>A</sub> (dB/m)	P <sub>Mea</sub> (dB $\mu$ V)	Polarity
17810.733	38.4	-25.7	43.4	20.742	H
17907.633	38.4	-25.7	43.4	20.742	H
17861.167	38.3	-25.7	43.4	20.642	V
17909.333	38.3	-25.7	43.4	20.642	H
17906.500	38.3	-25.7	43.4	20.642	H
6000.267	38.2	-36.1	34.4	39.941	H

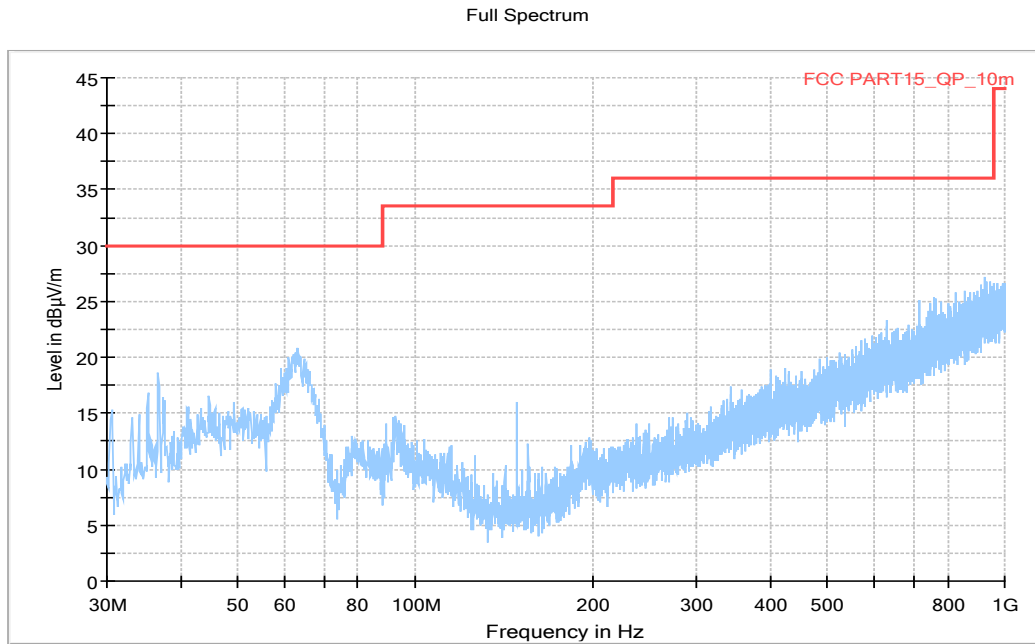
**USB Mode/Peak detector**

Frequency(MHz)	Result(dB $\mu$ V/m)	G <sub>PL</sub> (dB)	G <sub>A</sub> (dB/m)	P <sub>Mea</sub> (dB $\mu$ V)	Polarity
17941.067	50.6	-25.5	43.4	32.702	H
17347.767	50.4	-26.6	40.1	36.901	H
17859.467	50.3	-25.7	43.4	32.642	V
17878.167	49.8	-25.7	43.4	32.142	H
17909.333	49.8	-25.7	43.4	32.142	H
17417.467	49.8	-25.9	40.1	35.645	H

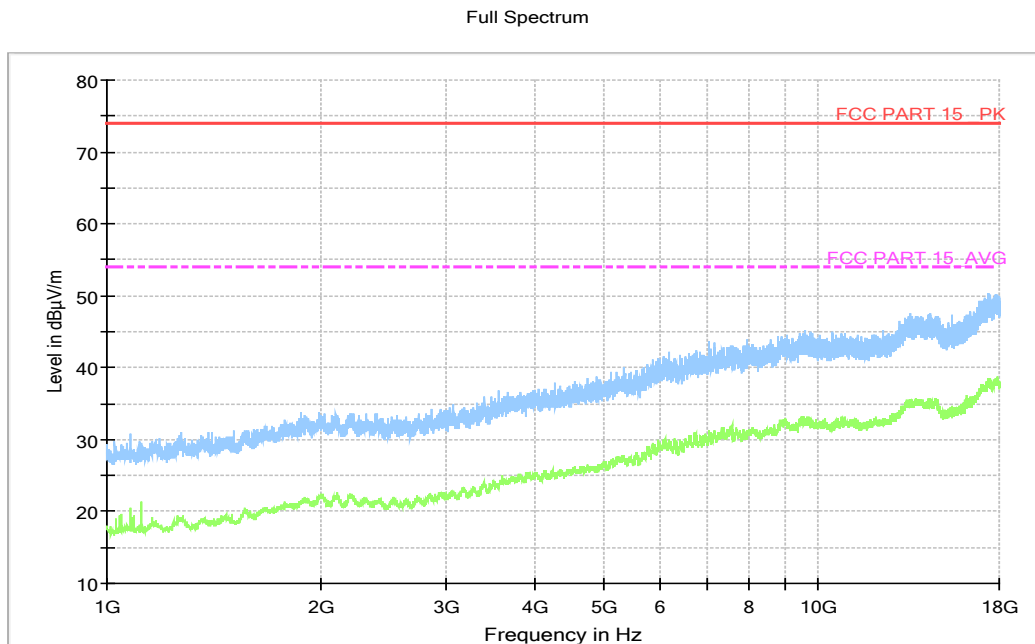
Sample calculation: Peak detector, 17941.067MHz

$$\text{Result} = P_{\text{Mea}} (32.702\text{dB}\mu\text{V}) + G_{\text{A}} (43.4\text{dB/m}) + G_{\text{PL}} (-25.5 \text{ dB}) = 50.6\text{dB}\mu\text{V/m}$$

**Charging Mode, Set.1**



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



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

USB Mode, Set.2

Full Spectrum

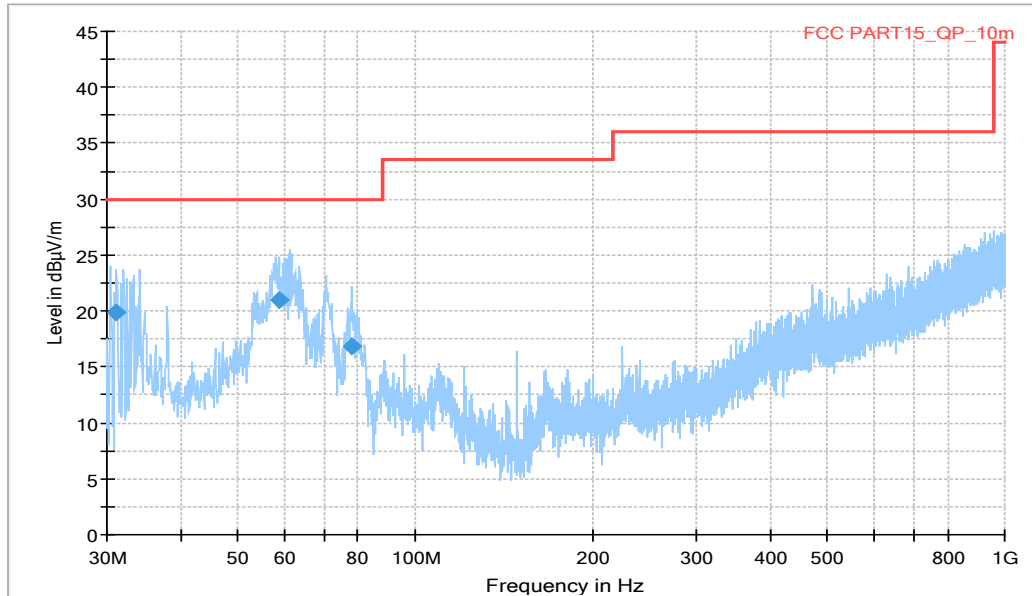


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
31.16400	19.92	30.00	10.08	1000.0	120.000	305.0	V	151.0
58.90600	21.00	30.00	9.00	1000.0	120.000	125.0	V	153.0
78.17200	16.83	30.00	13.17	1000.0	120.000	211.0	V	94.0

Full Spectrum

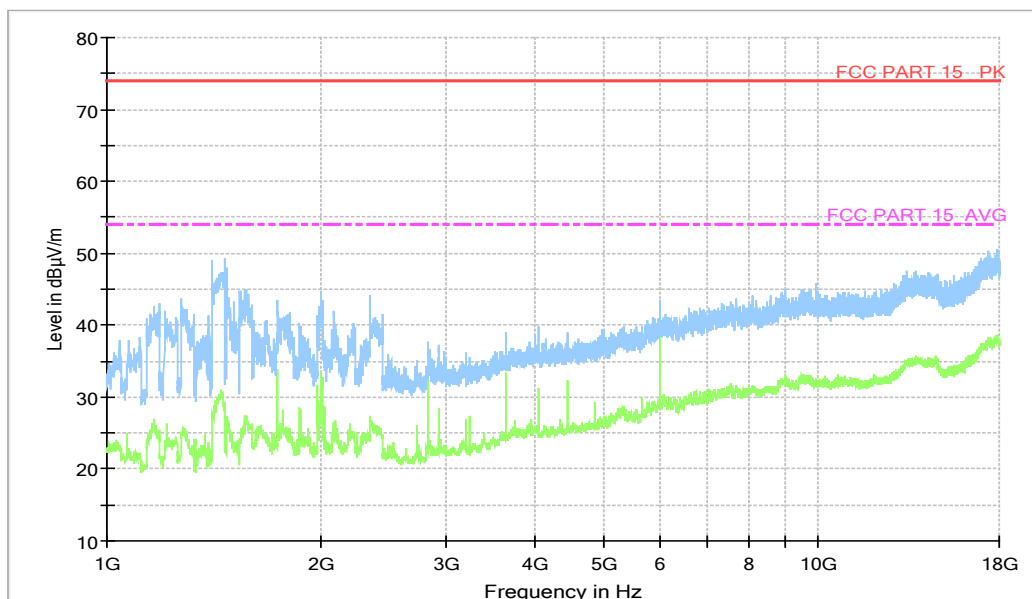


Figure A.4 Radiated Emission from 1GHz to 18GHz

## 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. 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 $\mu$ 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

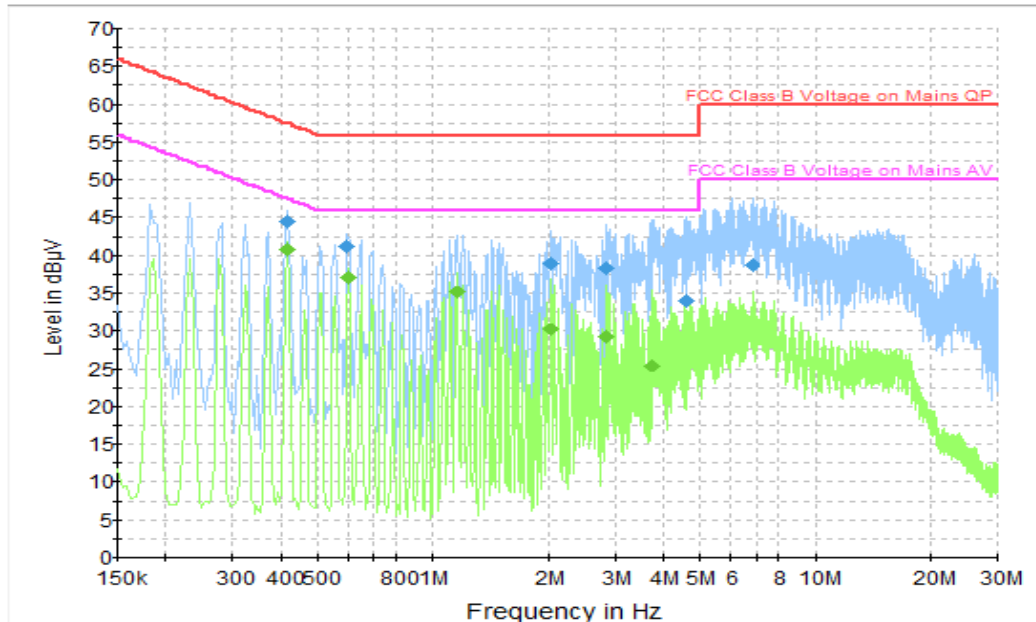


Figure A.5 Conducted Emission

#### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	44.6	2000.0	9.000	L1	19.9	12.9	57.5
0.595500	41.2	2000.0	9.000	L1	19.9	14.8	56.0
2.031000	39.0	2000.0	9.000	L1	19.7	17.0	56.0
2.859000	38.3	2000.0	9.000	L1	19.7	17.7	56.0
4.614000	34.0	2000.0	9.000	L1	19.7	22.0	56.0
6.823500	38.8	2000.0	9.000	L1	19.8	21.2	60.0

#### Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	40.8	2000.0	9.000	L1	19.9	6.7	47.5
0.600000	37.2	2000.0	9.000	L1	19.9	8.8	46.0
1.153500	35.1	2000.0	9.000	L1	19.8	10.9	46.0
2.031000	30.3	2000.0	9.000	L1	19.7	15.7	46.0
2.859000	29.2	2000.0	9.000	L1	19.7	16.8	46.0
3.736500	25.5	2000.0	9.000	L1	19.7	20.5	46.0

USB Mode, Set.2

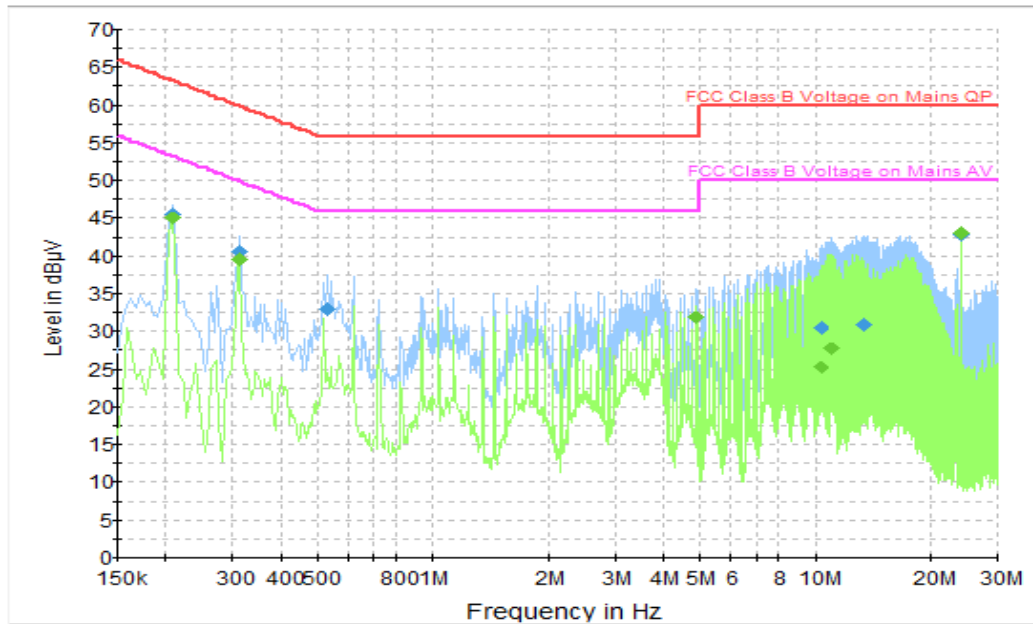


Figure A.6 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.208500	45.6	2000.0	9.000	N	19.8	17.7	63.3
0.312000	40.6	2000.0	9.000	N	19.9	19.3	59.9
0.528000	33.0	2000.0	9.000	N	19.9	23.0	56.0
10.329000	30.5	2000.0	9.000	L1	19.9	29.5	60.0
13.326000	30.9	2000.0	9.000	L1	19.8	29.1	60.0
24.009000	42.9	2000.0	9.000	N	20.0	17.1	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.208500	45.1	2000.0	9.000	N	19.8	8.1	53.3
0.312000	39.6	2000.0	9.000	N	19.9	10.3	49.9
4.857000	31.8	2000.0	9.000	N	19.7	14.2	46.0
10.329000	25.3	2000.0	9.000	L1	19.9	24.7	50.0
11.053500	27.8	2000.0	9.000	L1	19.9	22.2	50.0
24.009000	43.1	2000.0	9.000	N	20.0	6.9	50.0

## ANNEX B: Accreditation Certificate

<p>United States Department of Commerce National Institute of Standards and Technology</p>  <hr/> <p><b>Certificate of Accreditation to ISO/IEC 17025:2005</b></p> <hr/> <p>NVLAP LAB CODE: 600118-0</p> <p><b>Telecommunication Technology Labs, CAICT</b> Beijing China</p> <p><i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i></p> <p><b>Electromagnetic Compatibility &amp; Telecommunications</b></p> <p><i>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).</i></p> <hr/> <table border="0" style="width: 100%;"><tr><td style="width: 40%; text-align: center;"><p>2016-09-29 through 2017-09-30 <i>Effective Dates</i></p></td><td style="width: 20%; text-align: center;"></td><td style="width: 40%; text-align: center;"> <hr/><p><i>For the National Voluntary Laboratory Accreditation Program</i></p></td></tr></table>		<p>2016-09-29 through 2017-09-30 <i>Effective Dates</i></p>		 <hr/> <p><i>For the National Voluntary Laboratory Accreditation Program</i></p>
<p>2016-09-29 through 2017-09-30 <i>Effective Dates</i></p>		 <hr/> <p><i>For the National Voluntary Laboratory Accreditation Program</i></p>		

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