



# TEST REPORT

No. I19Z61444-EMC01

for

**Micromax Informatics Ltd**

**LTE Mobile Phone**

**Model Name: T5542**

**FCC ID: 2AU5XT5542**

**with**

**Hardware Version: MMX\_T5542\_V3.0**

**Software Version: MMX\_T5542\_SW\_V03\_20191106**

**Issued Date: 2019-11-13**

**Note:**

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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>
I19Z61444-EMC01	Rev.0	1 <sup>st</sup> edition	2019-11-13

Note: the latest revision of the test report supersedes all previous version.

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## **1. Test Laboratory**

### **1.1. Introduction & Accreditation**

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

## **2. Test Laboratory**

### **2.1. Testing Location**

**CTTL(huayuan North Road)**

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

### **2.2. Testing Environment**

Normal Temperature: 15-35°C

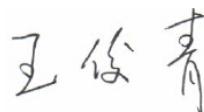
Relative Humidity: 20-75%

### **2.3. Project data**

Testing Start Date: 2019-09-24

Testing End Date: 2019-11-13

### **2.4. Signature**



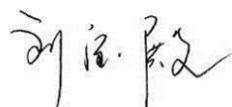
Wang Junqing

(Prepared this test report)



Zhang Ying

(Reviewed this test report)



Liu Baodian

Deputy Director of the laboratory

(Approved this test report)

### **3. Client Information**

#### **3.1. Applicant Information**

Company Name: Micromax Informatics Ltd  
Address: 288A Udyog Vihar Phase 4 Gurgaon 122015  
Contact Person: Mr. Sunil Joon  
Contact Email: sunil@micromaxinfo.com  
Telephone: +91 8447446444  
Fax: /

#### **3.2. Manufacturer Information**

Company Name: Micromax Informatics Ltd  
Address: 288A Udyog Vihar Phase 4 Gurgaon 122015  
Contact Person: Mr. Sunil Joon  
Contact Email: sunil@micromaxinfo.com  
Telephone: +91 8447446444  
Fax: /

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

### **4.1. About EUT**

Description	LTE Mobile Phone
Model Name	T5542
FCC ID	2AU5XT5542
Extreme vol. Limits	3.5VDC to 4.3VDC (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.

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

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	358849109007870	MMX_T5542_V3.0	MMX_T5542_SW_V03_20191106

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

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

AE ID*	Description	SN	Remarks
AE1	Battery	/	Inbuilt
AE2	Charger	/	CH002
AE3	USB Cable	/	DC004
AE4	Headset	/	/

AE1

Model	Li-Polymer
Manufacturer	NINGBO VEKEN BATTERY CO., LTD.
Capacitance	4000mAh
Nominal voltage	3.85V

AE2

Model	HA-19050200UU
Manufacturer	ShenZhen HongGuangDe Technology CO.,LTD.
Length of cable	/

AE3

Model	YXT-537-TYPE-1.2M
Manufacturer	THIN STRIP OF SKY,SHENZHEN ELECTRONICS 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.

#### **4.4. EUT set-ups**

<b>EUT set-up No.</b>	<b>Combination of EUT and AE</b>	<b>Remarks</b>
Set.1	EUT1+ AE1+ AE2 + AE3 +AE4	Charger + FM
Set.2	EUT1+ AE1+ AE3	USB

## 5. Reference Documents

### 5.1. 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.

## **6. 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

## 7. 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)

## **8. Test Equipments Utilized**

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100235	R&S	2020-03-01	1 Year
2	Test Receiver	ESCI3	100344	R&S	2020-02-14	1 Year
3	Universal Radio Communication Tester	CMW500	150344	R&S	2019-12-27	1 year
4	Universal Radio Communication Tester	CMW500	116588	R&S	2019-12-26	1 year
5	LISN	ENV216	101200	R&S	2020-03-14	1 year
6	EMI Antenna	VULB 9163	9163-1222	Schwarzbeck	2020-03-14	1 year
7	EMI Antenna	3115	6914	ETS-Lindgren	2020-01-03	1 year
8	Signal Generator	SMBV100A	260613	R&S	2019-12-27	1 year
9	PC	M4000E-17	M706GWXD	LENOVO	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	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 M4000E-17, and the serial number of the PC is M706GWXD. 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 ( $\mu$ 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:

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

Where

$G_A$ : Antenna factor of receive antenna

$G_{PL}$ : Path Loss

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

Measurement uncertainty (worst case):  $U = 5.44 \text{ dB}$ ,  $k=2$ .

#### Measurement results for Set.1:

##### Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17983.567	46.0	-17.7	45.6	18.1	H
17952.967	45.9	-17.7	45.6	18.0	H
17821.500	45.8	-18.5	45.6	18.7	V
17959.767	45.8	-17.7	45.6	17.9	H
17824.333	45.7	-18.5	45.6	18.6	H
17954.100	45.7	-17.7	45.6	17.8	H

##### Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17814.133	57.7	-18.5	45.6	30.6	H
17926.333	57.6	-17.7	45.6	29.7	H
17944.467	57.2	-17.7	45.6	29.3	V
17488.300	57.1	-19.2	41.5	34.8	H
17903.100	57.1	-18.5	45.6	30.0	H
17987.533	57.1	-17.7	45.6	29.2	H

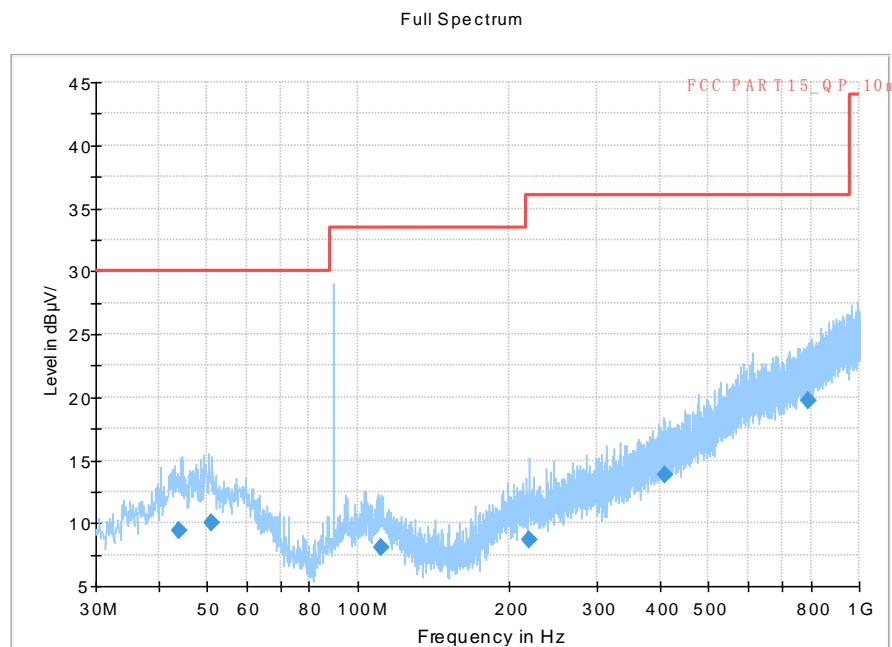
**Measurement results for Set.2:**
**USB Mode/Average detector**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17951.833	46.5	-17.7	45.6	18.6	H
17954.100	46.4	-17.7	45.6	18.5	H
17952.967	46.4	-17.7	45.6	18.5	V
17950.133	46.4	-17.7	45.6	18.5	H
17821.500	46.3	-18.5	45.6	19.2	H
17941.633	46.3	-17.7	45.6	18.4	H

**USB Mode/ Peak detector**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17843.600	58.1	-18.5	45.6	31.0	H
17990.367	57.9	-17.7	45.6	30.0	H
17975.633	57.9	-17.7	45.6	30.0	V
17402.167	57.8	-19.2	41.5	35.5	H
17802.233	57.6	-18.5	45.6	30.5	H
17917.267	57.6	-17.7	45.6	29.7	H

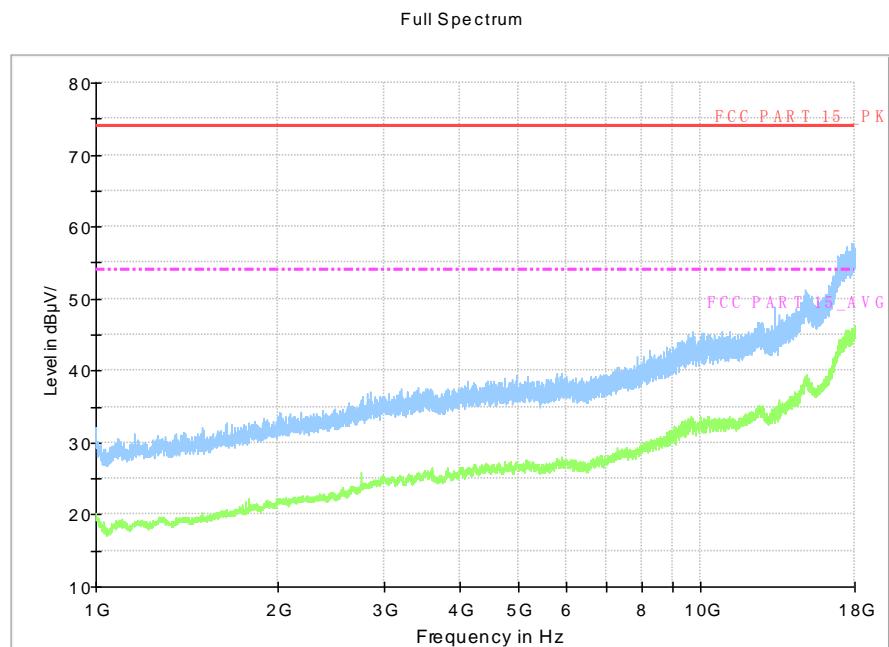
### Charging Mode, Set.1



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

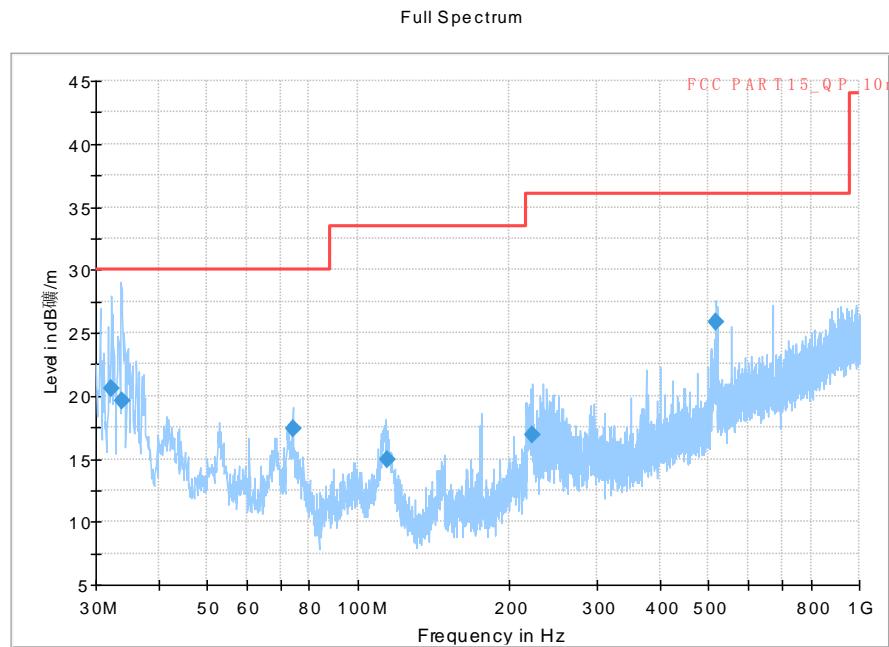
### Final\_Result

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
44.010000	9.39	30.00	20.61	1000.0	120.000	400.0	V	84.0
50.887000	10.01	30.00	19.99	1000.0	120.000	325.0	V	196.0
111.235000	8.02	33.50	25.50	1000.0	120.000	286.0	V	296.0
219.778000	8.62	36.00	27.40	1000.0	120.000	315.0	V	210.0
409.404000	13.86	36.00	22.16	1000.0	120.000	221.0	V	60.0
789.607000	19.75	36.00	16.27	1000.0	120.000	393.0	V	120.0



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

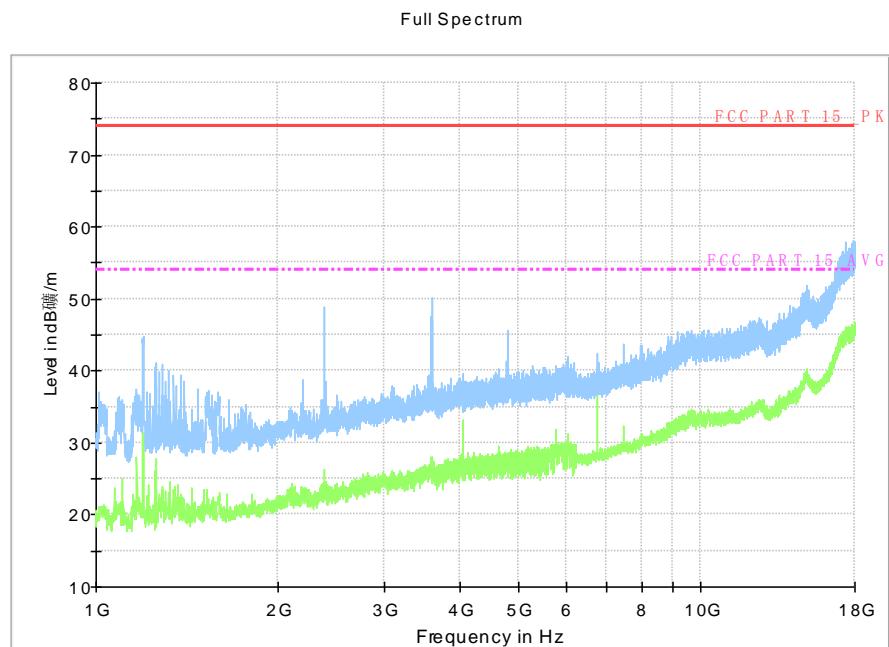
### USB Mode, Set.2



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

### Final\_Result

Frequency (MHz)	QuasiPeak (dB <sub>mic</sub> /m)	Limit (dB <sub>mic</sub> /m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
32.231000	20.56	30.00	9.44	1000.0	120.000	325.0	V	-26.0
33.723000	19.66	30.00	10.34	1000.0	120.000	125.0	V	-30.0
74.158000	17.44	30.00	12.56	1000.0	120.000	176.0	V	197.0
114.348000	14.98	33.50	18.54	1000.0	120.000	125.0	V	268.0
222.439000	16.86	36.00	19.16	1000.0	120.000	125.0	V	-8.0
518.908000	25.84	36.00	10.18	1000.0	120.000	325.0	V	189.0



**Fig 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 M4000E-17, and the serial number of the PC is M706GWXD. 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

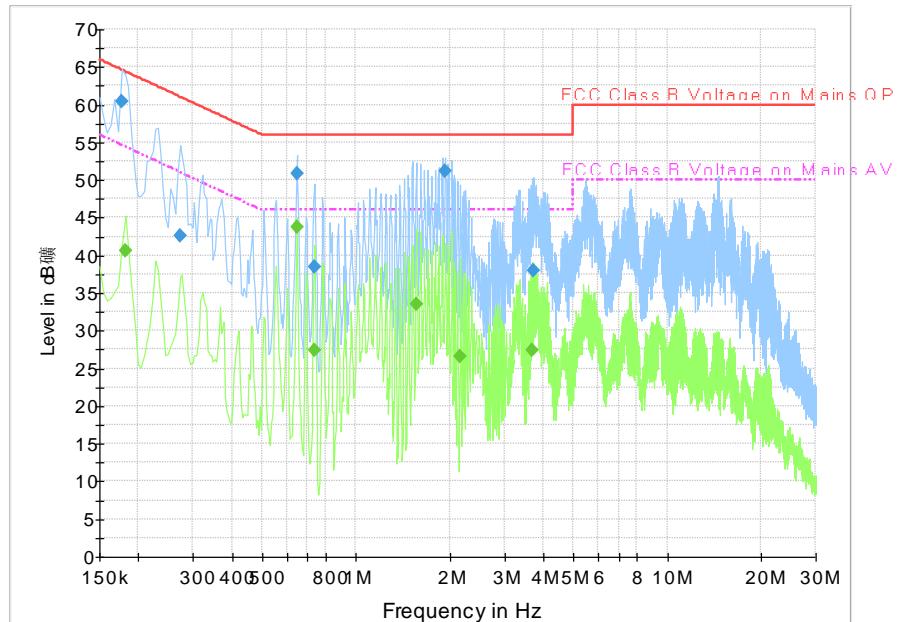
Voltage (V)	Frequency (Hz)
120	60

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

### A.2.5 Measurement Results

Measurement uncertainty:  $U = 3.38 \text{ dB}$ ,  $k=2$ .

#### Charging Mode, Set.1



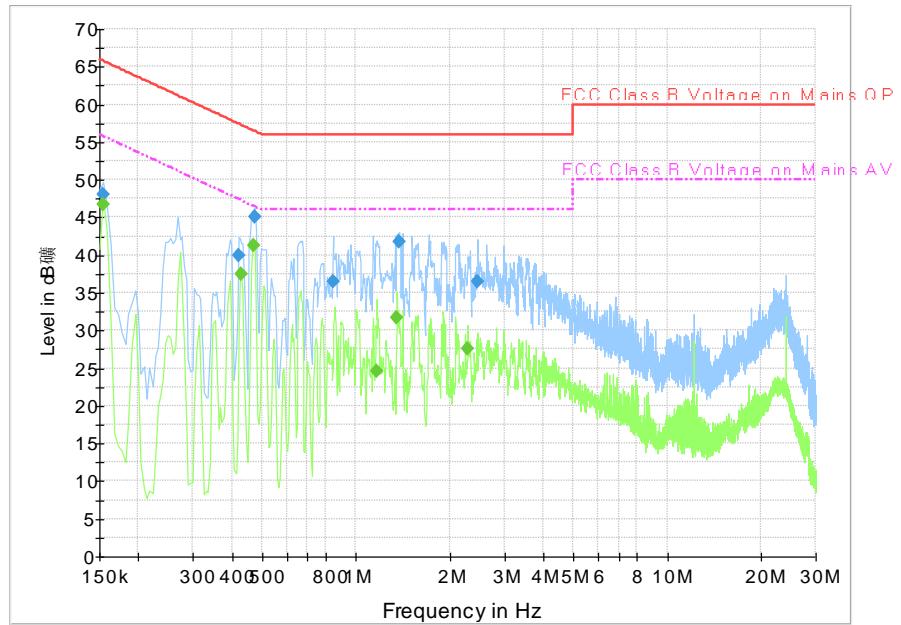
**Fig A.5 Radiated Emission from 30MHz to 1GHz**

#### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.177000	60.5	2000.0	9.000	On	N	24.8	4.1	64.6	
0.271500	42.6	2000.0	9.000	On	N	19.8	18.5	61.1	
0.645000	50.8	2000.0	9.000	On	L1	19.8	5.2	56.0	
0.739500	38.5	2000.0	9.000	On	L1	19.8	17.5	56.0	
1.927500	51.1	2000.0	9.000	On	L1	19.6	4.9	56.0	
3.727500	37.9	2000.0	9.000	On	L1	19.6	18.1	56.0	

#### Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.181500	40.6	2000.0	9.000	On	L1	23.8	13.8	54.4	
0.645000	43.7	2000.0	9.000	On	L1	19.8	2.3	46.0	
0.739500	27.4	2000.0	9.000	On	L1	19.8	18.6	46.0	
1.563000	33.5	2000.0	9.000	On	L1	19.6	12.5	46.0	
2.161500	26.6	2000.0	9.000	On	L1	19.6	19.4	46.0	
3.678000	27.4	2000.0	9.000	On	L1	19.6	18.6	46.0	

**USB Mode, Set.2**

**Fig A.6 Radiated Emission from 30MHz to 1GHz**
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.154500	48.1	2000.0	9.000	On	L1	29.7	17.7	65.8	
0.420000	39.9	2000.0	9.000	On	L1	19.8	17.5	57.4	
0.474000	45.0	2000.0	9.000	On	L1	19.8	11.4	56.4	
0.843000	36.5	2000.0	9.000	On	N	19.7	19.5	56.0	
1.378500	41.8	2000.0	9.000	On	L1	19.6	14.2	56.0	
2.463000	36.5	2000.0	9.000	On	N	19.6	19.5	56.0	

**Final Result 2**

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.154500	46.7	2000.0	9.000	On	L1	29.7	9.1	55.8	
0.429000	37.4	2000.0	9.000	On	L1	19.8	9.8	47.3	
0.469500	41.3	2000.0	9.000	On	L1	19.8	5.2	46.5	
1.167000	24.6	2000.0	9.000	On	N	19.7	21.4	46.0	
1.356000	31.6	2000.0	9.000	On	L1	19.6	14.4	46.0	
2.278500	27.5	2000.0	9.000	On	N	19.6	18.5	46.0	

**ANNEX B: PERSONS INVOLVED IN THIS TESTING**

Test Item	Test Software and Version	Software Vendor	Test operator
Conducted Emission	EMC32 V8.5.2	R&S	Shi Suolan
Radiated Emission	EMC32 V9.01.00	R&S	Li Pengfei, Wang Huan

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