



# TEST REPORT

## No. I16Z42199-EMC01

for

**TCL Communication Ltd.**

**GSM Quad Band Mobile phone**

**Model Name: 2051E**

**FCC ID: 2ACCJB069**

with

**Hardware Version: PIO**

**Software Version: V1.0**

**Issued Date: 2017-01-05**

**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

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I16Z42199-EMC01	Rev.0	1st edition	2017-01-05



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## **1. Test Laboratory**

### **1.1. Testing 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: 2017-01-04

Testing End Date: 2017-01-05

### **1.4. Signature**



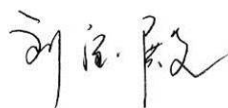
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Zhang Hui  
(Prepared this test report)



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(Reviewed this test report)



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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.  
City: Shanghai  
Postal Code: 201203  
Country: China  
Contact Person: Gong Zhizhou  
Contact Email: zhizhou.gong@tcl.com  
Telephone: 0086-21-31363544  
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### **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.  
City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: 0086-21-31363544  
Fax: 0086-21-61460602

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

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

Description	GSM Quad Band Mobile phone
Model Name	2051E
FCC ID	2ACCJB069
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 3.7VDC)

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 of People's Republic of China.

#### **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>
EUT1	358328070005478	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**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>	<b>Remarks</b>
AE1	Battery	/	1642199BA001
AE2	Battery	/	1642199BA002
AE3	Travel charger	/	16TCT-CH-0749
AE4	Travel charger	/	16TCT-CH-0713
AE5	Travel charger	/	16TCT-CH-0123
AE6	Travel charger	/	16TCT-CH-0124

AE1

Model	CAB22B0000C1
Manufacturer	BYD
Capacitance	750mAh
Nominal voltage	3.7V

AE2

Model	CAB0400016C1
Manufacturer	BYD
Capacitance	400mAh
Nominal voltage	3.7V

AE3,AE4

Model	CBA0066AGAC1
Manufacturer	BYD
Length of cable	122cm

AE5,AE6

Model	CBA0066AGAC5
Manufacturer	PUAN
Length of cable	117cm

\*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	EUT1 + AE1/AE2 + AE3/AE4	Charging mode
Set.2	EUT1 + AE1/AE2 + AE5/AE6	Charging 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	2015
ANSI C63.4	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 used have no deviation with standards above.

## 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber SAC-2** (10.0m x 6.7m x 6.15m) 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, 3 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 are described in section 1.1 of this report

Clause	List	Clause in FCC rules	Verdict	Location
1	Radiated Emission	15.109(a)	P	1
2	Conducted Emission	15.107(a)	P	1

## 7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESC17	100948	R&S	2017-07-10	1 year
2	Test Receiver	ESU26	100235	R&S	2017-03-02	1 year
3	Universal Radio Communication Tester	CMW500	155415	R&S	2017-01-11	1 year
4	Universal Radio Communication Tester	CMW500	143008	R&S	2017-12-09	1 year
5	AMN	ENV216	101200	R&S	2017-07-10	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2017-12-16	3 years
7	EMI Antenna	3115	6914	ETS	2017-12-15	3 years

## Test Software Utilized

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 (§15.109(a))**

#### **A.1.1 Method of measurement**

The field strength of radiated emissions from the unintentional radiator (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 charging mode. During the test MS is connected to a charger in the case of charging mode.

#### **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:  $U = 4.86$  dB,  $k=2$ ,

1GHz-18GHz:  $U = 5.26$  dB,  $k=2$

#### 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
17898.000	43.4	-18.5	45.6	16.300	H
17887.800	43.3	-18.5	45.6	16.200	H
17869.100	43.2	-18.5	45.6	16.100	V
17877.033	43.2	-18.5	45.6	16.100	V
17882.133	43.2	-18.5	45.6	16.100	V
17867.400	43.1	-18.5	45.6	16.000	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
17849.267	55.2	-18.5	45.6	28.100	V
17974.500	55.0	-17.7	45.6	27.100	H
17885.533	55.0	-18.5	45.6	27.900	V
17876.467	54.8	-18.5	45.6	27.700	H
17952.967	54.6	-17.7	45.6	26.700	H
17874.767	54.6	-18.5	45.6	27.500	V

#### Measurement results for Set.2:

##### 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
17873.067	43.5	-18.5	45.6	16.400	V
17882.700	43.3	-18.5	45.6	16.200	V
17874.767	43.2	-18.5	45.6	16.100	V
17874.200	43.2	-18.5	45.6	16.100	H
17885.533	43.2	-18.5	45.6	16.100	H
17864.000	43.1	-18.5	45.6	16.000	V

**Charging 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
17903.667	55.1	-18.5	45.6	28.000	H
17845.867	55.1	-18.5	45.6	28.000	H
17874.200	54.6	-18.5	45.6	27.500	V
17904.800	54.6	-18.5	45.6	27.500	H
17884.967	54.6	-18.5	45.6	27.500	V
17922.367	54.5	-17.7	45.6	26.600	H

**Sample calculation: Average detector , 17903.667MHz**

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}}(28.000 \text{ dB}\mu\text{V}) + G_{\text{A}} (45.6\text{dB/m})+ G_{\text{PL}} (-18.5\text{dB}) = 55.1\text{dB}\mu\text{V/m}$$

Charging Mode, Set.1

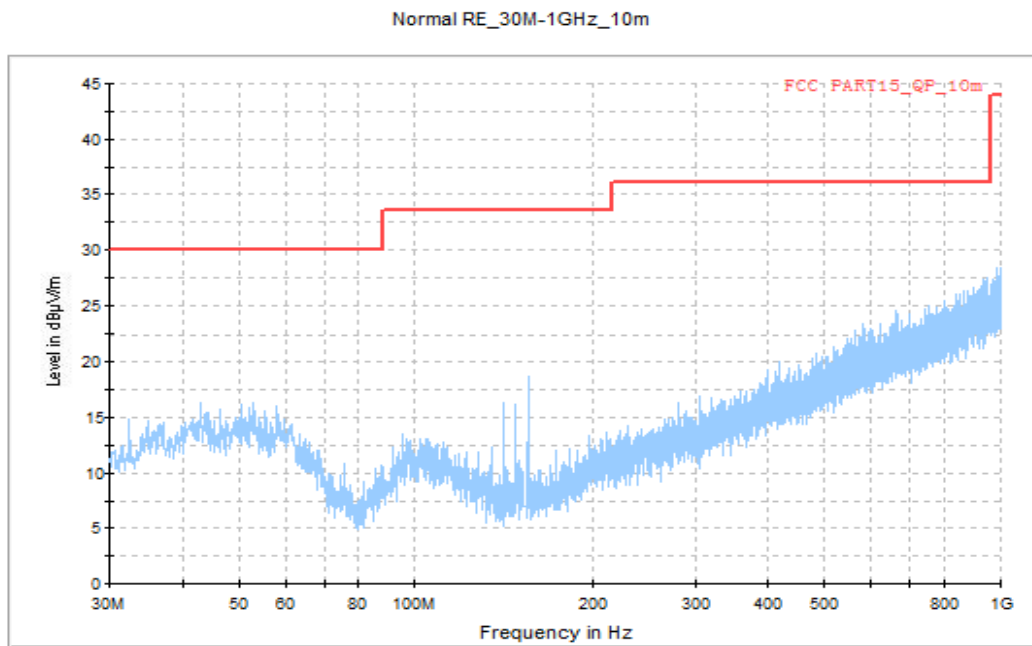


Fig.1 Radiated Emission from 30MHz to 1GHz

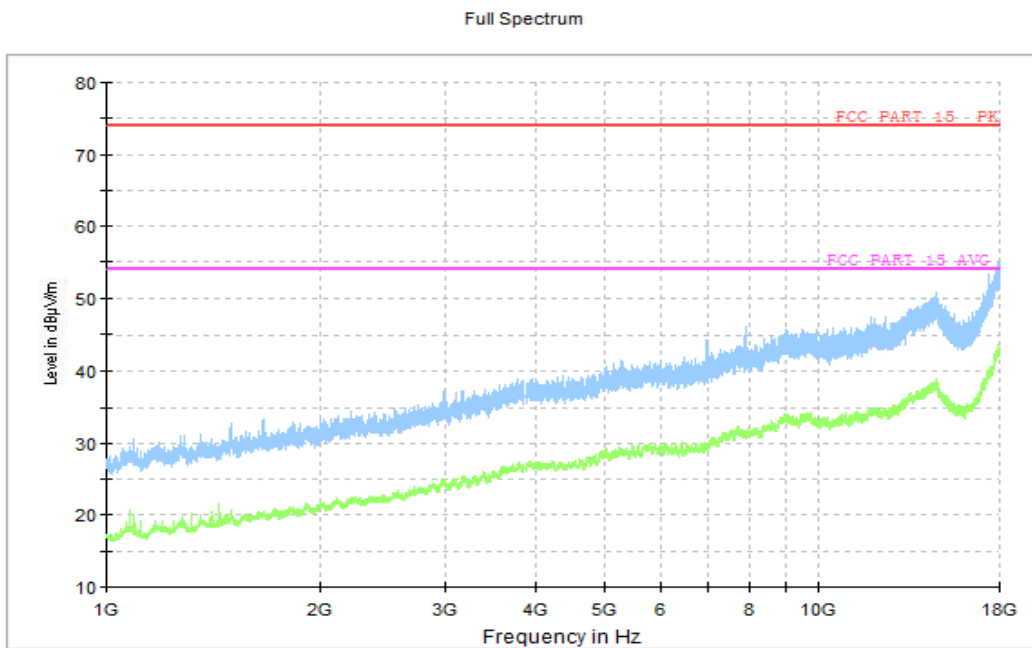


Fig.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.2

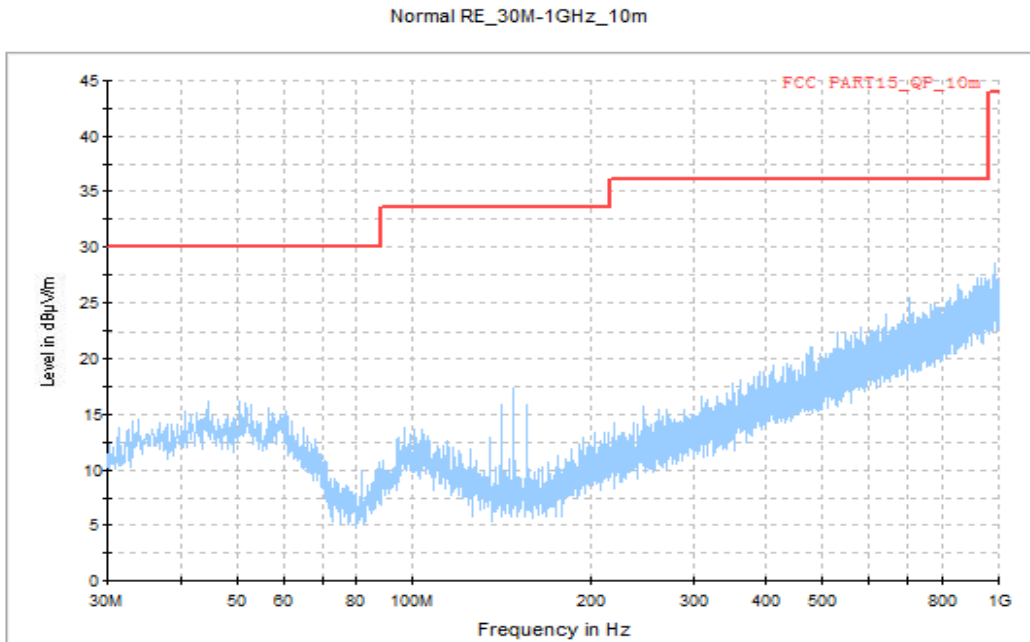


Fig.3 Radiated Emission from 30MHz to 1GHz

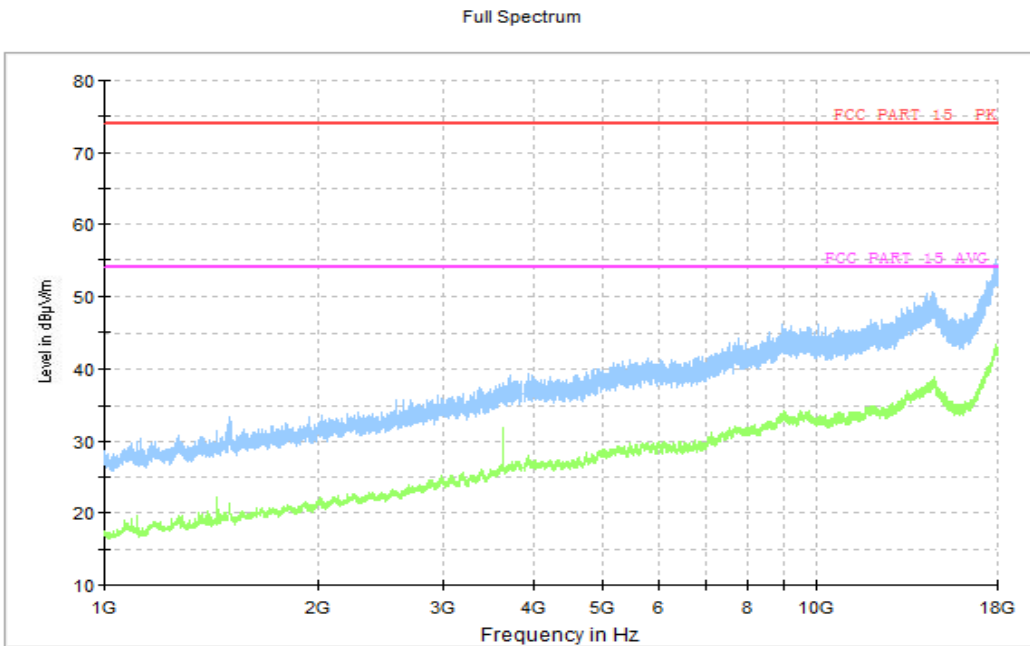


Fig.4 Radiated Emission from 1GHz to 18GHz

## A.2 Conducted Emission (§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 7.2.

### A.2.2 EUT Operating Mode

The MS is operating in charging mode. During the test MS is connected to a charger in the case of charging mode.

### 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:  $U= 3.38$  dB,  $k=2$ .

#### Charging Mode, Set.1

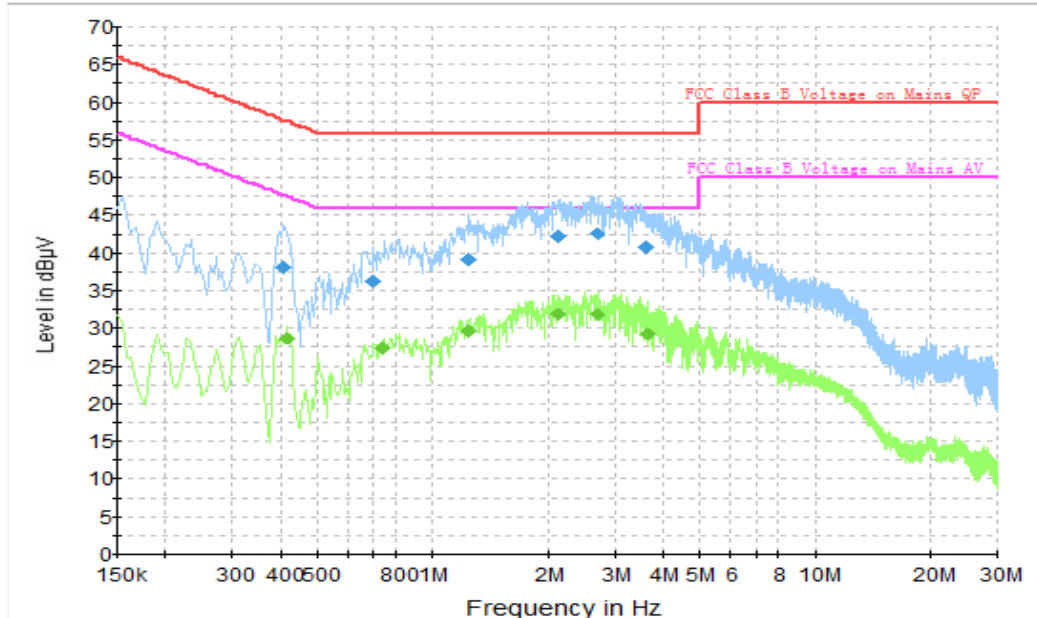


Fig.5 Conducted Emission

#### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.406500	38.1	2000.0	9.000	On	L1	19.9	19.6	57.7
0.699000	36.3	2000.0	9.000	On	L1	19.8	19.7	56.0
1.248000	39.1	2000.0	9.000	On	N	19.7	16.9	56.0
2.121000	42.3	2000.0	9.000	On	N	19.6	13.7	56.0
2.692500	42.6	2000.0	9.000	On	N	19.3	13.4	56.0
3.628500	40.9	2000.0	9.000	On	L1	19.5	15.1	56.0

#### Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	28.7	2000.0	9.000	On	N	19.9	18.8	47.5
0.735000	27.5	2000.0	9.000	On	L1	19.8	18.5	46.0
1.248000	29.7	2000.0	9.000	On	N	19.7	16.3	46.0
2.121000	31.9	2000.0	9.000	On	N	19.6	14.1	46.0
2.706000	31.9	2000.0	9.000	On	L1	19.2	14.1	46.0
3.637500	29.2	2000.0	9.000	On	L1	19.5	16.8	46.0

Charging Mode, Set.2

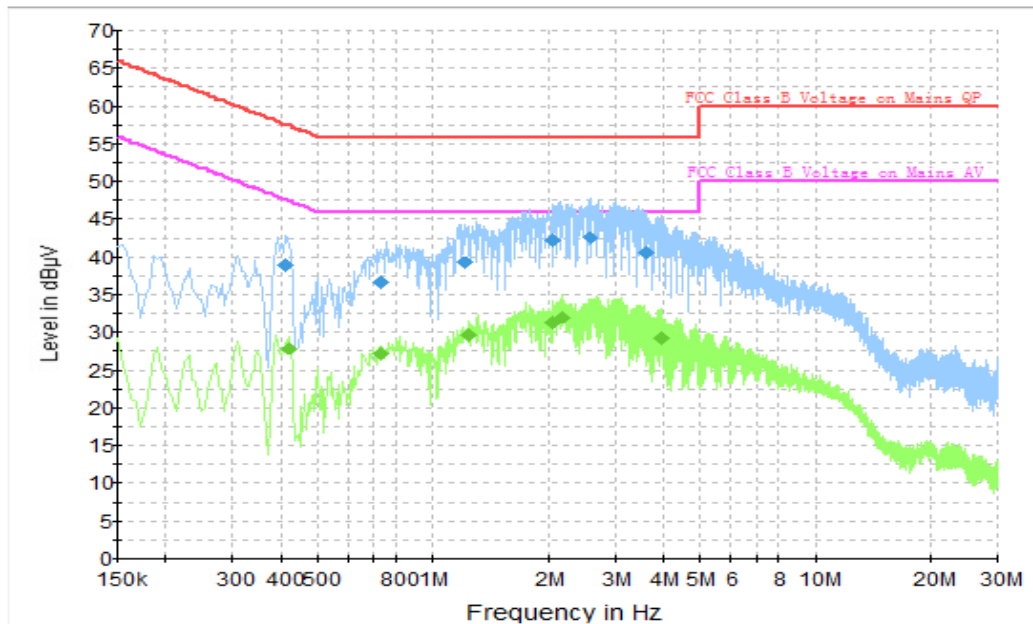


Fig.6 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.411000	38.9	2000.0	9.000	On	L1	19.9	18.7	57.6
0.730500	36.7	2000.0	9.000	On	L1	19.8	19.3	56.0
1.212000	39.3	2000.0	9.000	On	N	19.7	16.7	56.0
2.071500	42.3	2000.0	9.000	On	N	19.7	13.7	56.0
2.580000	42.6	2000.0	9.000	On	N	19.1	13.4	56.0
3.610500	40.6	2000.0	9.000	On	L1	19.5	15.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.420000	27.8	2000.0	9.000	On	L1	19.9	19.6	47.4
0.730500	27.3	2000.0	9.000	On	N	19.8	18.7	46.0
1.239000	29.7	2000.0	9.000	On	N	19.7	16.3	46.0
2.067000	31.4	2000.0	9.000	On	L1	19.7	14.6	46.0
2.179500	32.0	2000.0	9.000	On	L1	19.4	14.0	46.0
3.957000	29.3	2000.0	9.000	On	N	19.5	16.7	46.0

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