



# TEST REPORT

## No. I18Z60272-EMC01

for

**TCL Communication Ltd.**

**GSM Quad-band/HSPA-UMTS Six-band/LTE 18-bands mobile phone**

**Model Name: BBE100-2**

**FCC ID: 2ACCJN024**

with

**Hardware Version: 04**

**Software Version: V6R13-6**

**Issued Date: 2018-06-08**



**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:**

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I18Z60272-EMC01	Rev.0	1 <sup>st</sup> edition	2018-06-08



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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

#### CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development  
Area, Beijing, P. R. China 100176

### 1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

### 1.3. Project data

Testing Start Date: 2018-05-04

Testing End Date: 2018-06-01

### 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: TCL Communication Ltd.  
7/F, Block F4, TCL International E City, Zhong Shan Yuan Road,  
Address /Post: Nanshan District, Shenzhen, Guangdong, P.R. China 518052  
Shenzhen, Guangdong  
Contact Person: Gong Zhizhou  
Contact Email zhizhou.gong@tcl.com  
Telephone: 0086-755-36611722  
Fax: 0086-75536612000-81722

### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd.  
7/F, Block F4, TCL International E City, Zhong Shan Yuan Road,  
Address /Post: Nanshan District, Shenzhen, Guangdong, P.R. China 518052  
Shenzhen, Guangdong  
Contact Person: Gong Zhizhou  
Contact Email zhizhou.gong@tcl.com  
Telephone: 0086-755-36611722  
Fax: 0086-75536612000-81722

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

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

Description	GSM Quad-band/HSPA-UMTS Six-band/LTE 18-bands mobile phone
Model Name	BBE100-2
FCC ID	2ACCJN024
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, CAICT.

#### **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	015138000010596	04	V6R13-6
EUT2	015138000010604	04	V6R13-6

\*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	/	/
AE4	USB Cable	/	/
AE5	Charger	/	NO TEST

##### AE1

Model	TLp029C1
Manufacturer	BYD
Capacitance	2900mAh
Nominal voltage	3.85V

##### AE2

Model	CBA0064AGBC1
Manufacturer	BYD
Length of cable	/

##### AE3

Model	CDA0000119CF
Manufacturer	LUXSHARE
Length of cable	/cm

##### AE4

Model	CDA0000119C1
Manufacturer	Juwei
Length of cable	/cm

##### AE5

Model	CBA0064AHBC1
Manufacturer	BYD



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	EUT1+ AE1+ AE2+ AE3/AE4	Charger
Set.2	EUT1+ AE1+ AE3/AE4	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×17 meters×10 meters) 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	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m 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	Test Receiver	ESCI 7	100344	R&S	2019-02-28	1 year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2018-11-26	1 year
4	LISN	ENV216	101200	R&S	2019-04-15	1 year
5	EMI Antenna	VULB 9163	9163-514	Schwarzbeck	2021-01-03	3 years
6	EMI Antenna	3115	6914	ETS-Lindgren	2018-12-31	1 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 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 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: 5.16dB, 1GHz-18GHz: 5.44dB,  $k=2$ .

#### 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
17426.533	41.7	-19.2	41.5	19.400	H
17856.633	41.7	-18.5	45.6	14.600	H
17423.700	41.7	-19.2	41.5	19.400	V
17867.400	41.5	-18.5	45.6	14.400	H
17448.633	41.5	-19.2	41.5	19.200	H
17425.967	41.5	-19.2	41.5	19.200	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
17435.033	53.2	-19.2	41.5	30.900	H
17828.300	53.0	-18.5	45.6	25.900	H
17355.133	53.0	-19.5	41.5	31.000	V
17565.367	53.0	-18.9	45.6	26.300	H
17414.633	53.0	-19.2	41.5	30.700	H
17431.067	52.9	-19.2	41.5	30.600	H

**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
17435.033	42.2	-19.2	41.5	19.900	H
17444.100	41.8	-19.2	41.5	19.500	H
17441.833	41.7	-19.2	41.5	19.400	V
17432.767	41.7	-19.2	41.5	19.400	H
17760.300	41.6	-18.5	45.6	14.500	H
17451.467	41.6	-19.2	41.5	19.300	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
17725.167	53.9	-18.9	45.6	27.200	H
17544.400	53.7	-19.2	45.6	27.300	H
17877.033	53.5	-18.5	45.6	26.400	V
17169.267	53.5	-19.8	41.5	31.800	H
17257.100	53.5	-19.5	41.5	31.500	H
17964.867	53.4	-17.7	45.6	25.500	H

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

Charging Mode, Set.1

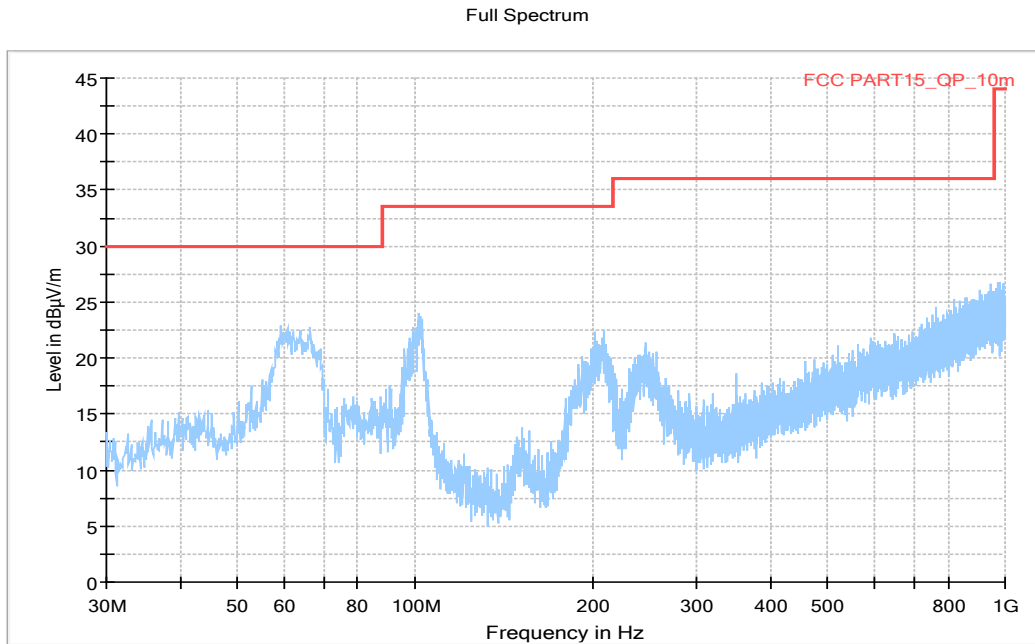


Fig A.1 Radiated Emission from 30MHz to 1GHz

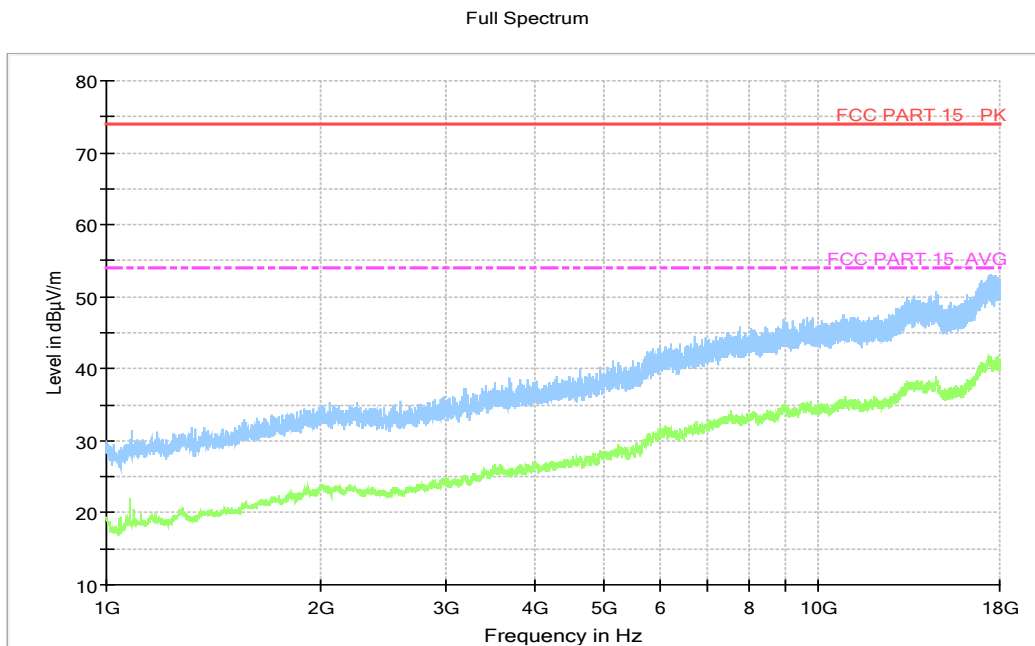


Fig A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

Full Spectrum

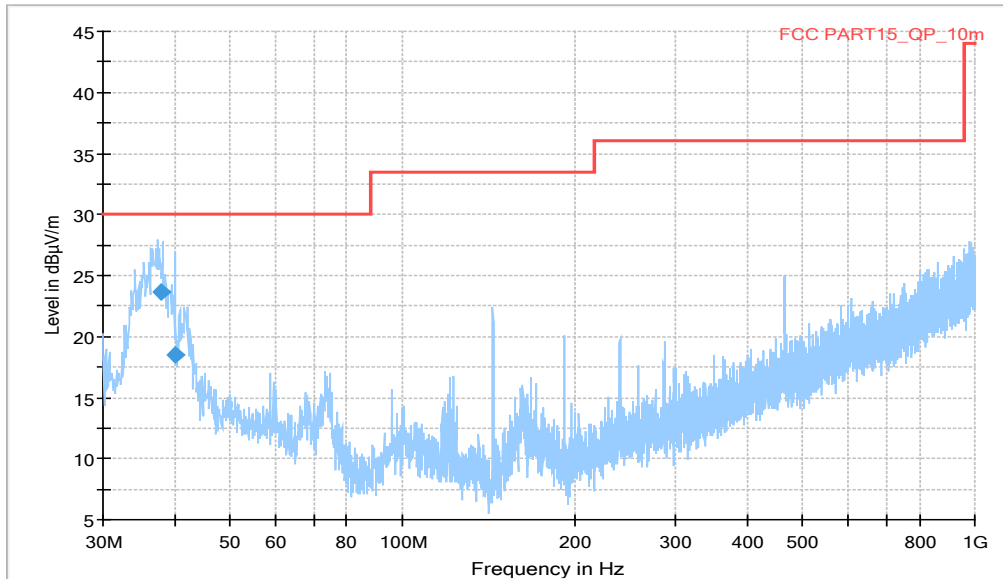


Fig A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
37.949000	23.66	30.00	6.34	1000.0	120.000	225.0	V	-8.0
40.148000	18.44	30.00	11.56	1000.0	120.000	279.0	V	186.0

Full Spectrum

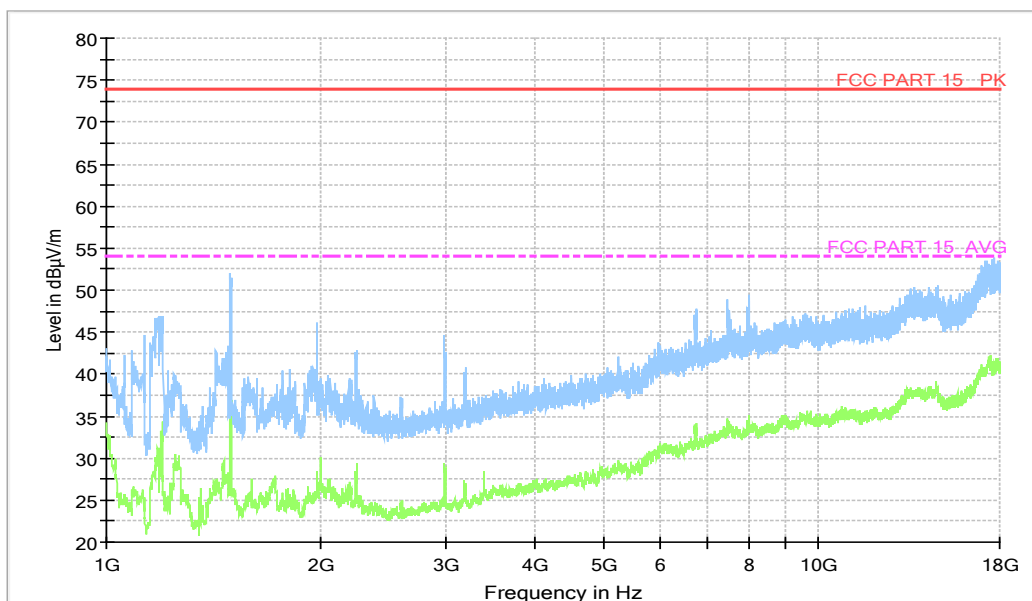


Fig A.4 Radiated Emission from 1GHz to 3GHz



## 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:  $U= 3.08 \text{ dB}$ ,  $k=2$ .

#### Charging Mode, Set.1

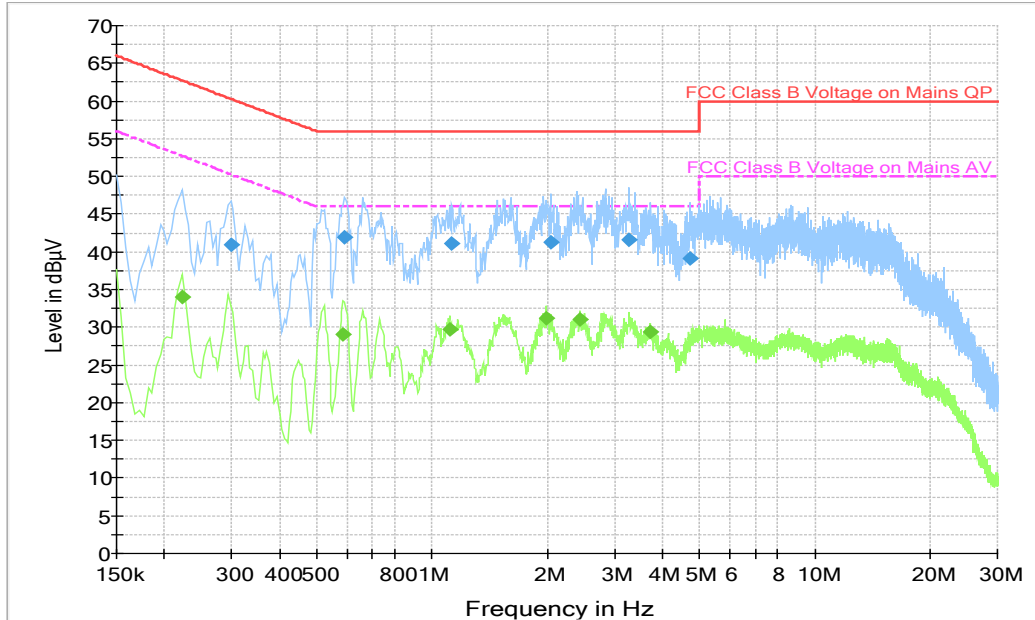


Fig A.5 Conducted Emission

#### Final Result 1

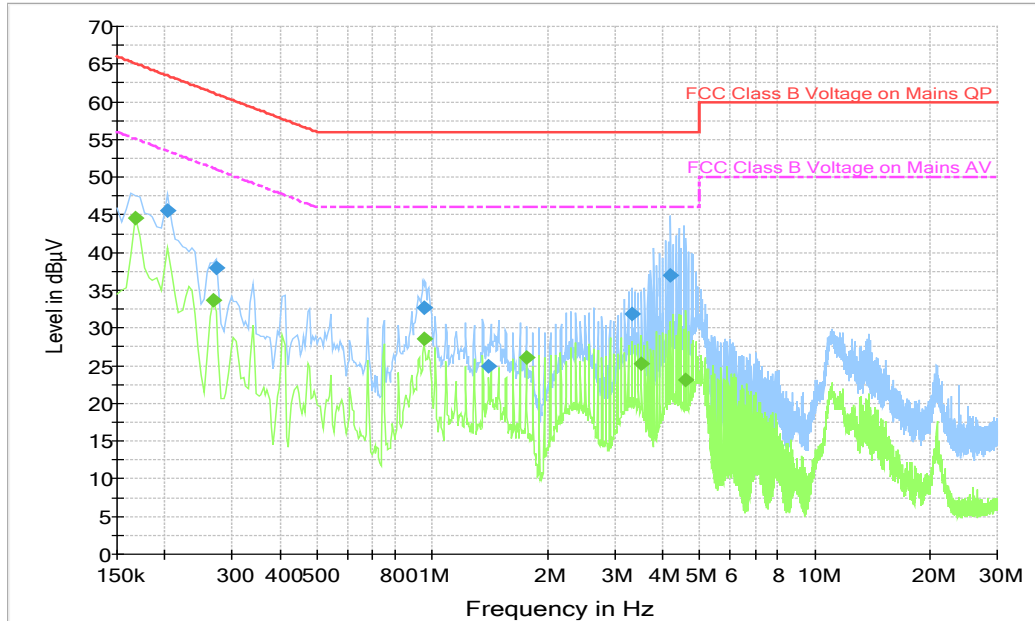
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.298500	41.0	2000.0	9.000	On	L1	19.8	19.3	60.3
0.591000	42.0	2000.0	9.000	On	L1	19.9	14.0	56.0
1.126500	41.1	2000.0	9.000	On	L1	19.6	14.9	56.0
2.040000	41.2	2000.0	9.000	On	L1	19.7	14.8	56.0
3.277500	41.6	2000.0	9.000	On	L1	19.7	14.4	56.0
4.717500	39.1	2000.0	9.000	On	L1	19.6	16.9	56.0

#### Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	34.0	2000.0	9.000	On	L1	19.8	18.7	52.7
0.586500	29.0	2000.0	9.000	On	L1	19.9	17.0	46.0
1.113000	29.8	2000.0	9.000	On	L1	19.6	16.2	46.0
1.990500	31.2	2000.0	9.000	On	L1	19.7	14.8	46.0
2.440500	31.1	2000.0	9.000	On	L1	19.7	14.9	46.0
3.727500	29.4	2000.0	9.000	On	L1	19.6	16.6	46.0

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

USB Mode, Set.2



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.204000	45.6	2000.0	9.000	On	L1	19.8	17.8	63.4
0.271500	38.1	2000.0	9.000	On	N	19.8	23.0	61.1
0.955500	32.6	2000.0	9.000	On	L1	19.6	23.4	56.0
1.405500	24.9	2000.0	9.000	On	N	19.6	31.1	56.0
3.327000	31.8	2000.0	9.000	On	N	19.7	24.2	56.0
4.209000	37.0	2000.0	9.000	On	N	19.7	19.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.204000	45.6	2000.0	9.000	On	L1	19.8	17.8	63.4
0.271500	38.1	2000.0	9.000	On	N	19.8	23.0	61.1
0.955500	32.6	2000.0	9.000	On	L1	19.6	23.4	56.0
1.405500	24.9	2000.0	9.000	On	N	19.6	31.1	56.0
3.327000	31.8	2000.0	9.000	On	N	19.7	24.2	56.0
4.209000	37.0	2000.0	9.000	On	N	19.7	19.0	56.0

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

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