



TEST REPORT

No. I19Z61056-EMC01

for

TCL Communication Ltd.

LTE/UMTS/GSM mobile phone

5005R

with

FCC ID: 2ACCJH103

Hardware Version: 05

Software Version: FY20D001

Issued Date: 2019-07-08



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

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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℃

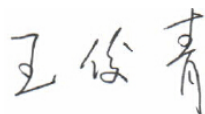
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2019-07-03

Testing End Date: 2019-07-06

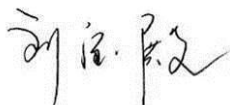
1.4. Signature



Wang Junqing
(Prepared this test report)



Zhang Ying
(Reviewed this test report)



Liu Baodian
Deputy Director of the laboratory
(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
7/F, Block F4, TCL Communication Technology Building, TCL
Address: International E City, Zhong Shan Yuan Road, Nanshan District,
Shenzhen, Guangdong, P.R. China 518052
City: Shenzhen
Postal Code: 518052
Country: China
Telephone: 0086-755-36611722
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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
7/F, Block F4, TCL Communication Technology Building, TCL
Address: International E City, Zhong Shan Yuan Road, Nanshan District,
Shenzhen, Guangdong, P.R. China 518052
City: Shenzhen
Postal Code: 518052
Country: China
Telephone: 0086-755-36611722
Fax: 0086-75536612000-81722

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

3.1. About EUT

Description	LTE/UMTS/GSM mobile phone
Model Name	5005R
FCC ID	2ACCJH103
Extreme vol. Limits	3.5VDC to 4.4VDC (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.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	015462000204573	05	FY20D001

*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	USB Cable	/	/
AE5	Headset	/	/

AE1

Model	CAB2110000C1
Manufacturer	BYD
Capacitance	/
Nominal voltage	/

AE2

Model	CBA0058AGHC5
Manufacturer	Puan
Length of cable	/

AE3

Model	CDA0000055C8
Manufacturer	PUAN
Length of cable	95cm

AE4

Model	CDA0000055C2
Manufacturer	SHENGHUA



Length of cable	95cm
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AE5

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.3	EUT1+ AE1+ AE3/AE4+ AE5	Charger Headset (including FM function)
Set.6	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.

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 (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)	B.1	P	CTTL(yizhuang)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(yizhuang)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI3	100344	R&S	2020-02-14	1 Year
2	Test Receiver	ESU26	100235	R&S	2020-03-01	1 Year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2019-12-26	1 year
4	LISN	ENV216	101200	R&S	2020-03-14	1 year
5	Signal Generator	SMBV100A	260613	R&S	2019-12-27	1 year
6	Universal Radio Communication Tester	CMW500	150344	R&S	2019-12-27	1 year
7	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2019-08-21	1 year
8	EMI Antenna	3115	6914	ETS-Lindgren	2020-01-03	1 year
9	PC	M4000e-17	M706GWXD	Lenovo	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
11	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
12	Mouse	M-UAE119	LZ935220ZRC	Lenovo	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 EUT and charging mode of EUT) 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 EUT is operating in the USB mode and charging mode. During the test EUT 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. And during the charging mode the FM 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 EUT, 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_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

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

Measurement results for Set.3:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Antenna Pol. (H/V)
17789.767	34.7	-18.5	45.6	7.600	H
17975.067	34.7	-17.7	45.6	6.800	H
17896.300	34.7	-18.5	45.6	7.600	V
17866.833	34.6	-18.5	45.6	7.500	H
17894.033	34.6	-18.5	45.6	7.500	H
17547.233	34.5	-19.2	45.6	8.100	H

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Antenna Pol. (H/V)
17658.300	47.3	-18.9	45.6	20.600	H
17379.500	46.6	-19.5	41.5	24.600	H
17959.767	46.5	-17.7	45.6	18.600	V
17858.333	46.4	-18.5	45.6	19.300	H
17865.133	46.3	-18.5	45.6	19.200	H
17485.467	46.1	-19.2	41.5	23.800	H

Measurement results for Set.6:

USB Mode/Average detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Antenna Pol. (H/V)
4803.467	43.3	-35.3	33.1	45.500	H
7440.733	41.8	-28.9	36.3	34.400	H
7440.167	41.7	-28.9	36.3	34.300	V
4804.033	41.6	-35.3	33.1	43.800	H
17853.800	35.1	-18.5	45.6	8.000	H
17660.567	34.9	-18.9	45.6	8.200	H

USB Mode/ Peak detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Antenna Pol. (H/V)
4803.467	49.0	-35.3	33.1	51.200	H
7440.733	48.9	-28.9	36.3	41.500	H
7440.167	48.8	-28.9	36.3	41.400	V
4804.033	48.5	-35.3	33.1	50.700	H
4802.900	47.3	-35.3	33.1	49.500	H
17824.900	46.6	-18.5	45.6	19.500	H

Note: The measurement results of Set.3 and Set.6 showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.3:

Full Spectrum

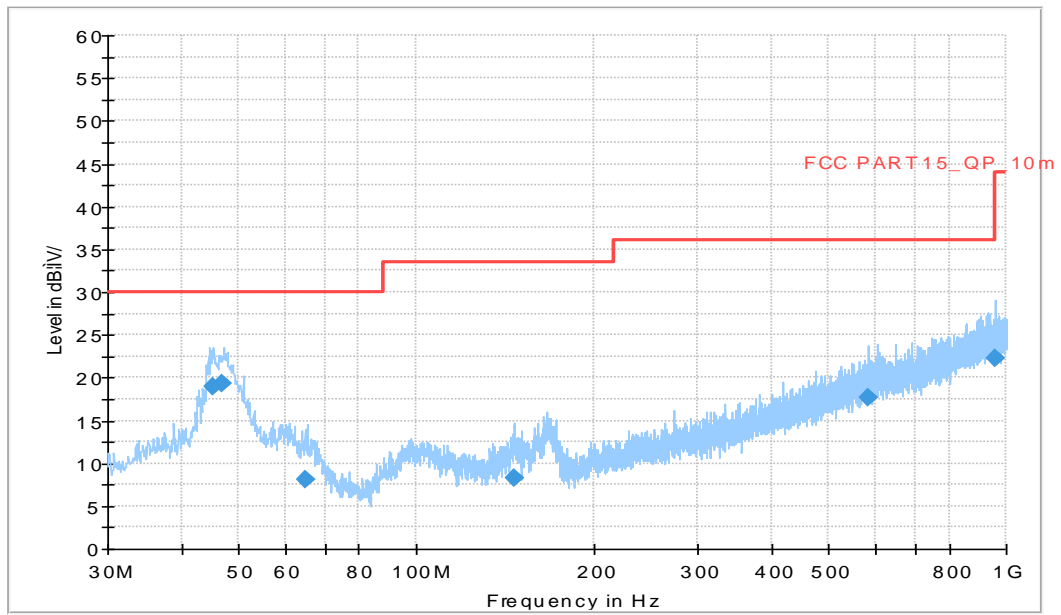


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBµ/m)	Limit (dBµ/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
45.104000	18.92	30.00	11.08	100.0	V	-1.0
47.026000	19.36	30.00	10.64	175.0	V	-29.0
64.828000	8.19	30.00	21.81	320.0	V	114.0
146.460000	8.34	33.50	25.18	298.0	V	-9.0
582.932000	17.64	36.00	18.38	191.0	V	153.0
959.666000	22.26	36.00	13.76	200.0	V	60.0

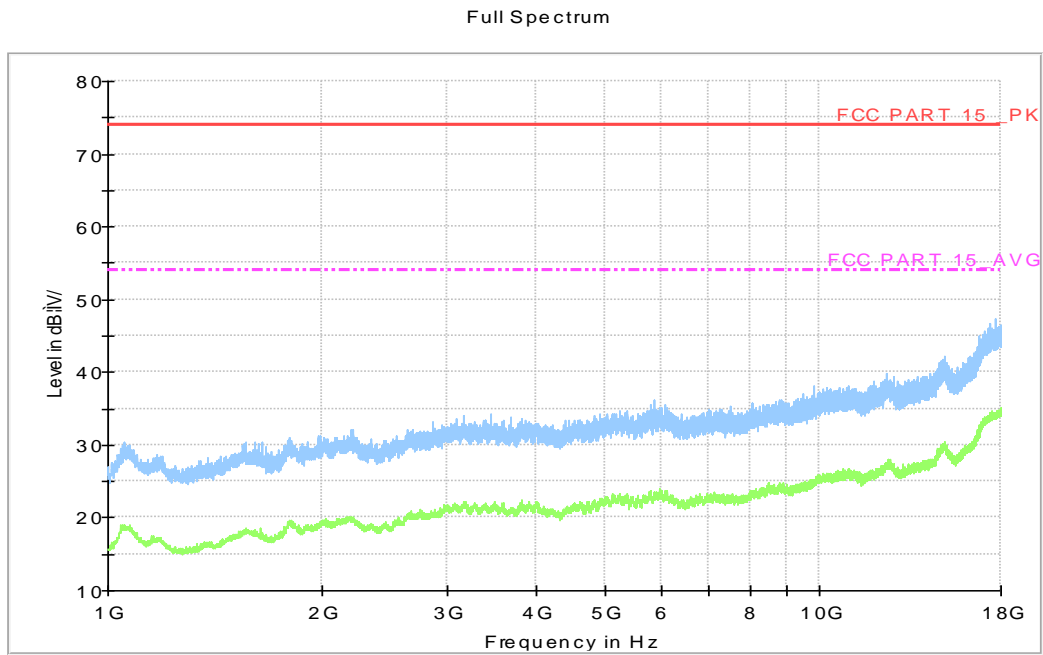


Fig A.2 Radiated Emission from 1GHz to 18z

USB Mode, Set.6

Full Spectrum

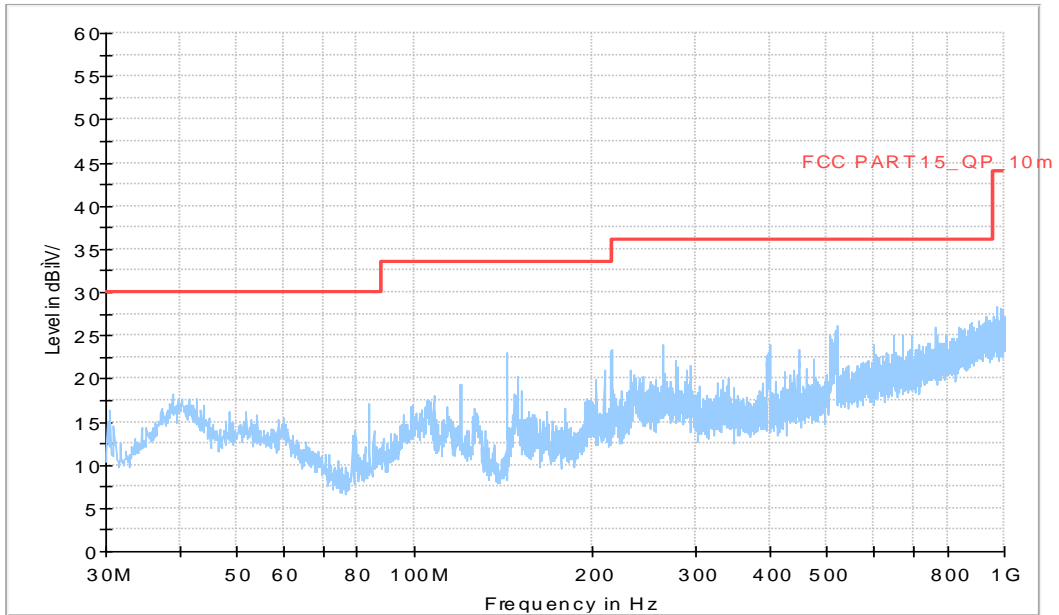


Fig A.3 Radiated Emission from 30MHz to 1GHz

Full Spectrum

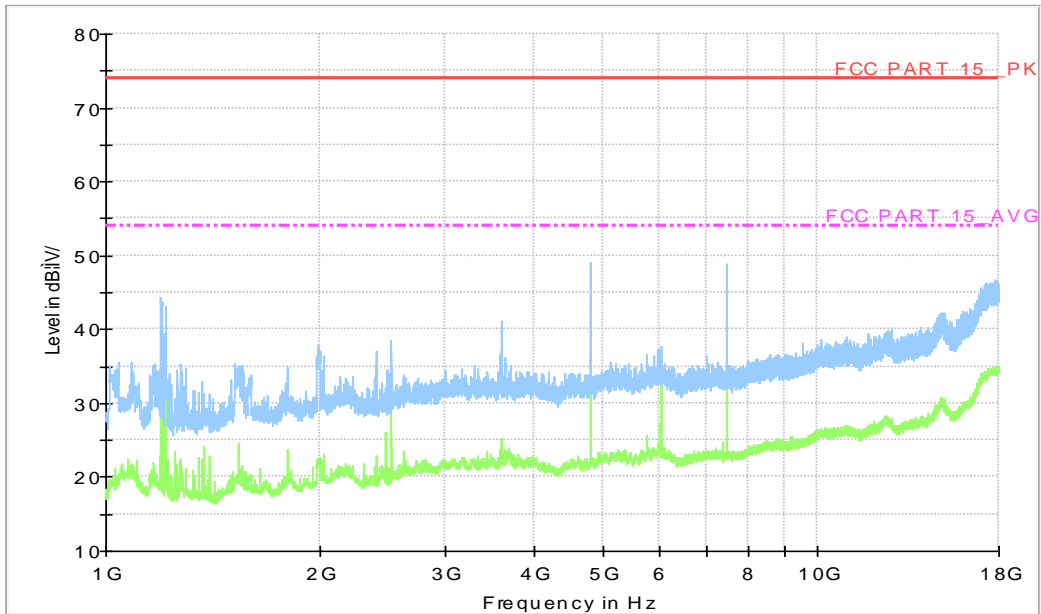


Fig A.4 Radiated Emission from 1GHz to 18z

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 EUT is operating in the USB mode and charging mode. During the test EUT 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. And during the test, FM, Camera recording are turned on for each 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 EUT, 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 μ 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.3

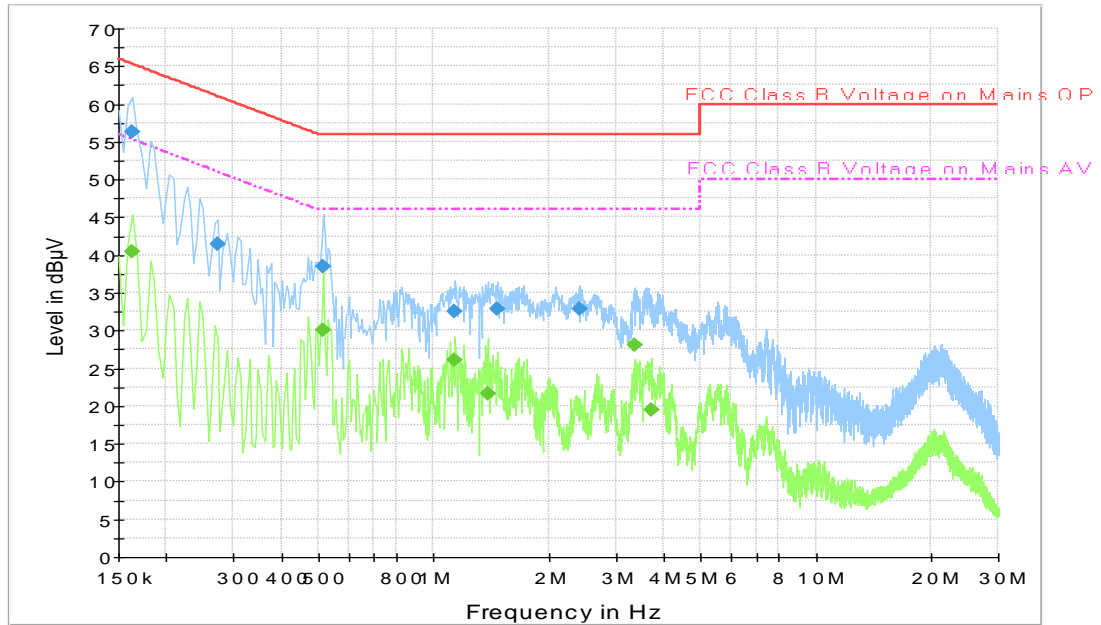


Fig A.5 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	56.2	2000.0	9.000	L1	27.7	9.1	65.3
0.271500	41.5	2000.0	9.000	L1	19.8	19.6	61.1
0.514500	38.5	2000.0	9.000	L1	19.8	17.5	56.0
1.140000	32.5	2000.0	9.000	L1	19.7	23.5	56.0
1.473000	32.9	2000.0	9.000	L1	19.6	23.1	56.0
2.409000	32.8	2000.0	9.000	N	19.6	23.2	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	40.5	2000.0	9.000	L1	27.7	14.8	55.3
0.514500	30.1	2000.0	9.000	L1	19.8	15.9	46.0
1.140000	26.0	2000.0	9.000	L1	19.7	20.0	46.0
1.387500	21.6	2000.0	9.000	L1	19.6	24.4	46.0
3.349500	28.0	2000.0	9.000	L1	19.6	18.0	46.0
3.714000	19.6	2000.0	9.000	L1	19.6	26.4	46.0

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

USB Mode, Set.6

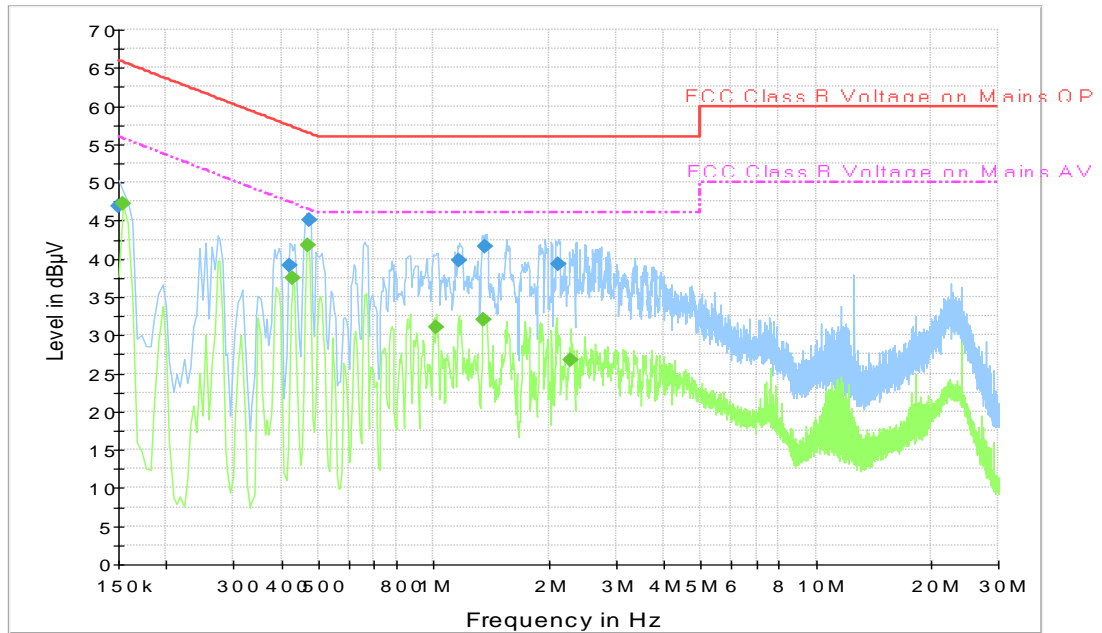


Fig A.6 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	46.9	2000.0	9.000	N	30.6	19.1	66.0
0.420000	39.1	2000.0	9.000	L1	19.8	18.4	57.4
0.474000	45.1	2000.0	9.000	L1	19.8	11.3	56.4
1.167000	39.8	2000.0	9.000	L1	19.7	16.2	56.0
1.365000	41.7	2000.0	9.000	L1	19.6	14.3	56.0
2.130000	39.2	2000.0	9.000	L1	19.6	16.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	47.2	2000.0	9.000	L1	29.7	8.5	55.8
0.429000	37.5	2000.0	9.000	L1	19.8	9.7	47.3
0.469500	41.8	2000.0	9.000	L1	19.8	4.8	46.5
1.014000	31.1	2000.0	9.000	L1	19.7	14.9	46.0
1.356000	32.0	2000.0	9.000	N	19.6	14.0	46.0
2.278500	26.8	2000.0	9.000	N	19.6	19.2	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	Test Software and Version	Software Vendor	Test operator
Conducted Emission	EMC32 V8.5.2	R&S	Yan Hanchen
Radiated Emission	EMC32 V9.01.00	R&S	Shi Suolan

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