



TEST REPORT

No. I19Z60337-EMC04

for

TCL Communication Ltd
LTE/WCDMA/GSM mobile phone

Model Name: VFD 730

FCC ID: 2ACCJH104

Hardware Version: PIO

Software Version: v4JT7

Issued Date: 2019-04-09



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

Report Number	Revision	Description	Issue Date
I19Z60337-EMC04	Rev.0	1 st edition	2019-04-09



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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. China100191

1.2. Testing Environment

Normal Temperature: 15-35℃

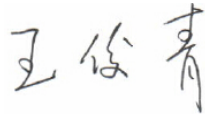
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2019-01-16

Testing End Date: 2019-04-04

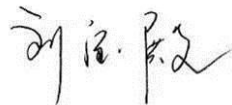
1.4. Signature



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
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Address /Post: International E City, Zhong Shan Yuan Road, Nanshan District,
Shenzhen, Guangdong, P.R. China
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Postal Code: 518052
Country: P.R. China
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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 /Post: International E City, Zhong Shan Yuan Road, Nanshan District,
Shenzhen, Guangdong, P.R. China
City: Shenzhen
Postal Code: 518052
Country: P.R. China
Telephone: 0086-755-36611722

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

3.1. About EUT

Description	LTE/WCDMA/GSM mobile phone
Model Name	VFD 730
FCC ID	2ACCJH104
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	354780100206936/	PIO	v4JT7
	354780100206944		

*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	Charger	/	/
AE4	USB Cable	/	/
AE5	USB Cable	/	/
AE6	Headset	/	/
AE7	Charger	/	/
AE8	Charger	/	/
AE9	Charger	/	/
AE10	Charger	/	/
AE1			
	Model	CAC3400011C1	
	Manufacturer	BYD	
	Capacitance	3500mAh	
	Nominal voltage	/	
AE2			
	Model	CBA0058AAVC5	
	Manufacturer	PUAN	
	Length of cable	/	
AE3			
	Model	CBA0058AAVC1	



Manufacturer	BYD
Length of cable	/
AE4	
Model	CDA6050000C1
Manufacturer	JUWEI
Length of cable	/
AE5	
Model	CDA6050000C8
Manufacturer	PUAN
Length of cable	/
AE6	
Model	CCB0049A11C1
Manufacturer	DALIN
Length of cable	115cm
AE7	
Model	CBA0058ACVC5
Manufacturer	PUAN
Length of cable	/
AE8	
Model	CBA0058ACVC1
Manufacturer	BYD
Length of cable	/
AE9	
Model	CBA0058ABAVC5
Manufacturer	PUAN
Length of cable	/
AE10	
Model	CBA0058ABVC1
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

EUT set-up No.	Combination of EUT and AE	Remarks
Set.3	EUT1+ AE2+ AE4/AE5+AE6	Charger+Headset
Set.4	EUT1+ AE3+ AE4/AE5+AE6	Charger+Headset
Set.5	EUT1+ AE4	USB

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(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCi7	100948	R&S	2019-06-27	1 Year
2	Universal Radio Communication Tester	CMW500	143008	R&S	2019-11-26	1 year
3	LISN	ENV216	101200	R&S	2019-04-15	1 year
4	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2019-08-21	1 year
5	EMI Antenna	3115	00167250	ETS-Lindgren	2019-05-17	1 year
6	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
7	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
8	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
9	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 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_{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)
17487.733	32.4	-25.9	40.1	18.245	H
17394.800	32.1	-25.9	40.1	17.945	H
17372.133	31.8	-26.6	40.1	18.301	V
17790.900	31.8	-25.7	43.4	14.142	H
17526.833	31.8	-25.9	43.4	14.345	H
17587.467	31.8	-26.9	43.4	15.252	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)
17656.600	43.8	-26.9	43.4	27.252	H
17389.700	43.4	-25.9	40.1	29.245	H
17958.067	43.4	-25.5	43.4	25.502	V
17337.000	43.4	-26.6	40.1	29.901	H
16855.333	43.4	-26.9	38.5	31.773	H
17310.933	43.3	-26.6	40.1	29.801	H

Measurement results for Set.4:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17394.233	32.1	-25.9	40.1	17.945	H
17441.833	32.0	-25.9	40.1	17.845	H
17434.467	31.8	-25.9	40.1	17.645	V
17797.133	31.8	-25.7	43.4	14.142	H
17472.433	31.7	-25.9	40.1	17.545	H
17464.500	31.7	-25.9	40.1	17.545	H

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17300.733	43.6	-26.6	40.1	30.101	H
17976.200	43.5	-25.5	43.4	25.602	H
16972.633	43.3	-26.6	38.5	31.419	V
17878.733	43.3	-25.7	43.4	25.642	H
17891.767	43.2	-25.7	43.4	25.542	H
17998.867	43.1	-25.5	43.4	25.202	H

Measurement results for Set.5:

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)
2619.533	36.2	-38.7	28.4	46.458	H
6749.967	35.7	-35.6	34.3	36.959	H
2620.100	35.5	-38.7	28.4	45.758	V
6045.600	34.6	-36.1	34.4	36.341	H
4049.800	34.3	-38.2	32.5	39.954	H
4852.767	33.7	-37.3	32.3	38.672	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)
3598.167	47.1	-38.0	31.1	54.043	H
7440.733	46.1	-35.1	35.2	46.034	H
3591.367	45.0	-38.0	31.1	51.943	V
4785.900	44.7	-37.3	32.3	49.662	H
17510.400	44.0	-25.9	43.4	26.545	H
2395.700	43.8	-38.8	27.2	55.449	H

Note: The measurement results of Set.3, Set.4, and Set.5 showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.3

Full Spectrum

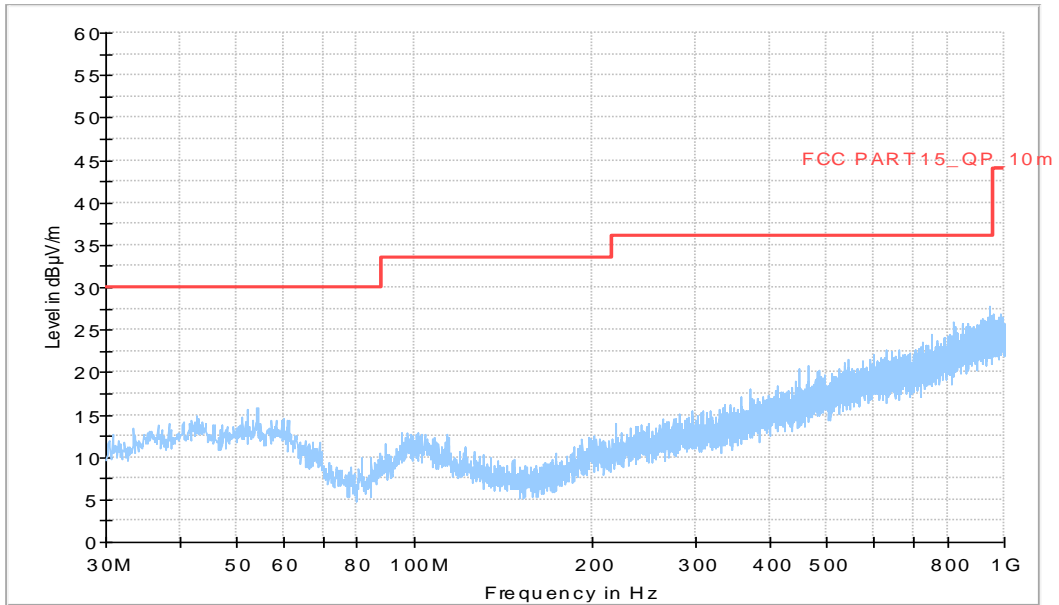


Fig A.1 Radiated Emission from 30MHz to 1GHz

Full Spectrum

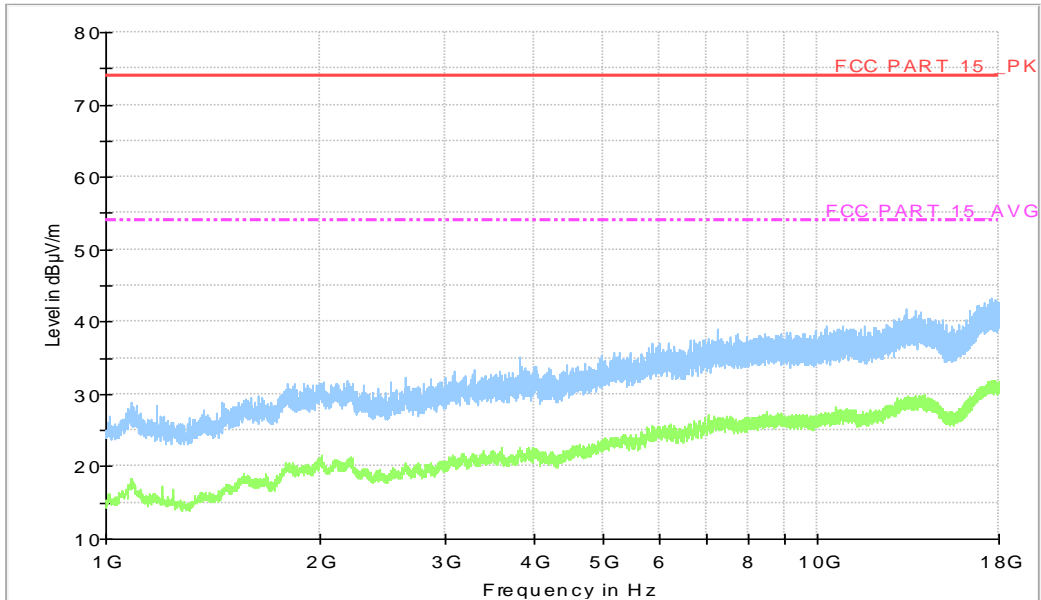


Fig A.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.4

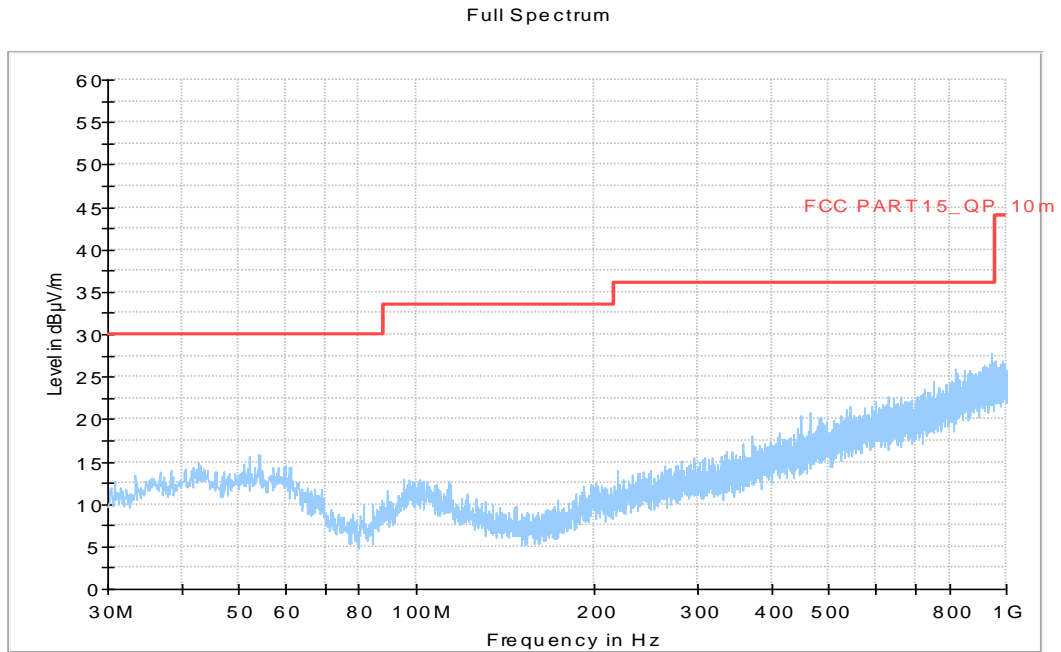


Fig A.3 Radiated Emission from 30MHz to 1GHz

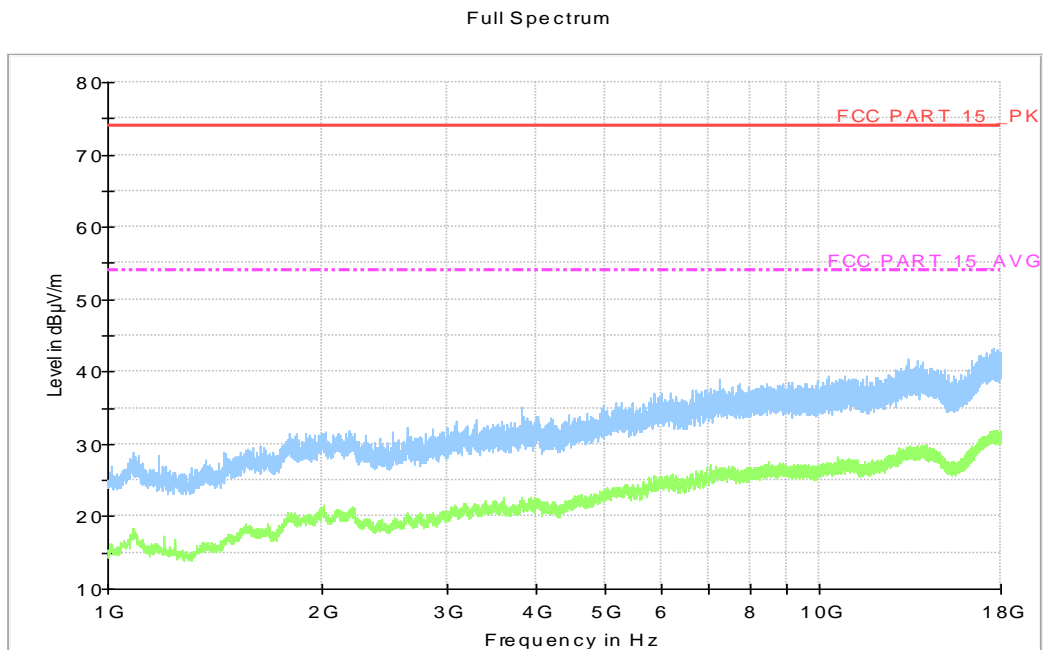


Fig A.4 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.5

Full Spectrum

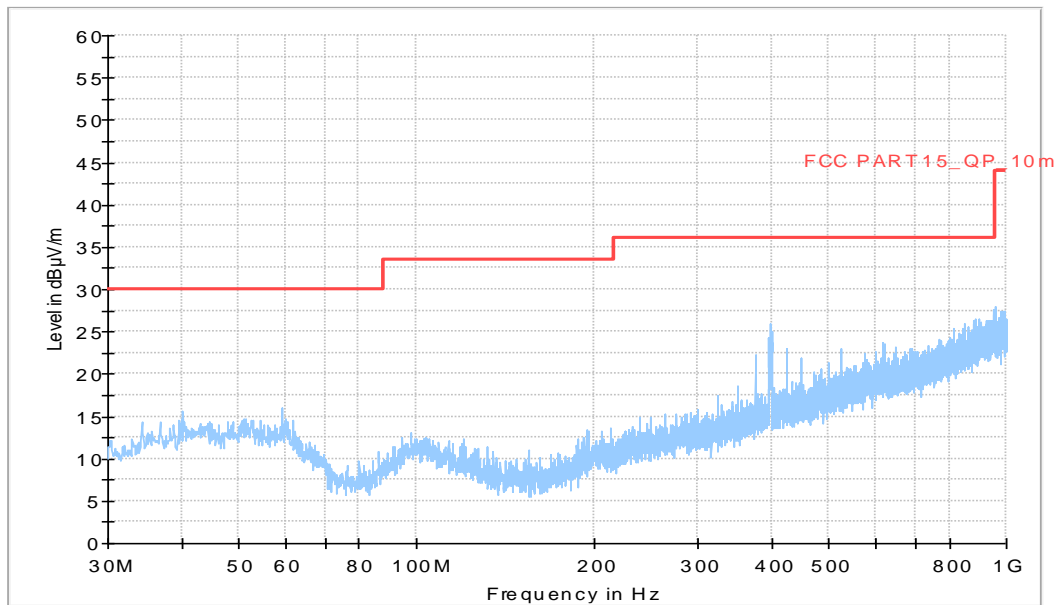


Fig A.5 Radiated Emission from 30MHz to 1GHz

Full Spectrum

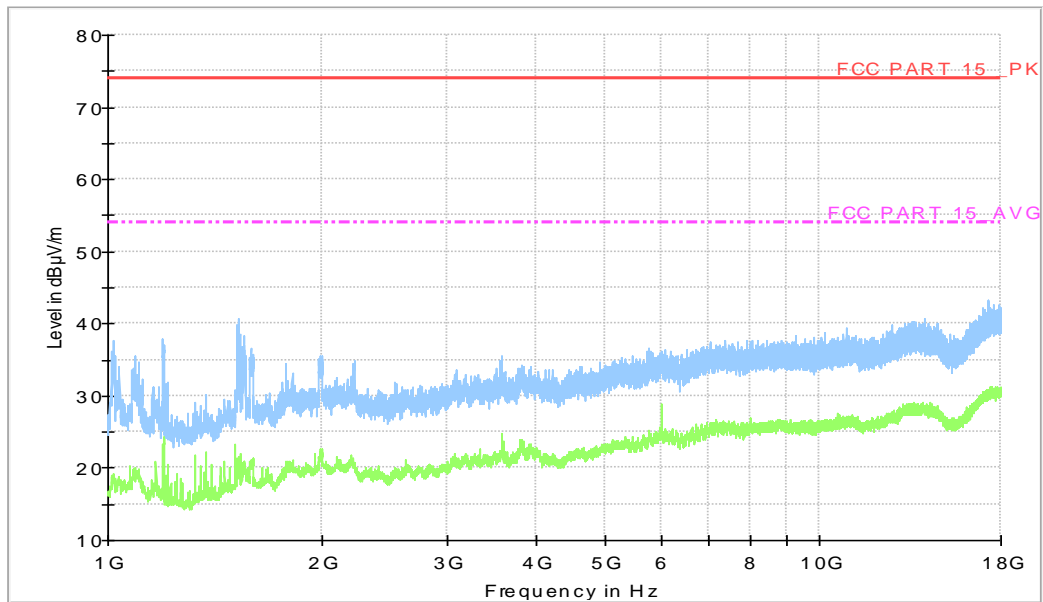


Fig A.6 Radiated Emission from 1GHz to 18GHz

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 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: $U= 3.08$ dB, $k=2$.

Charging Mode, Set.3

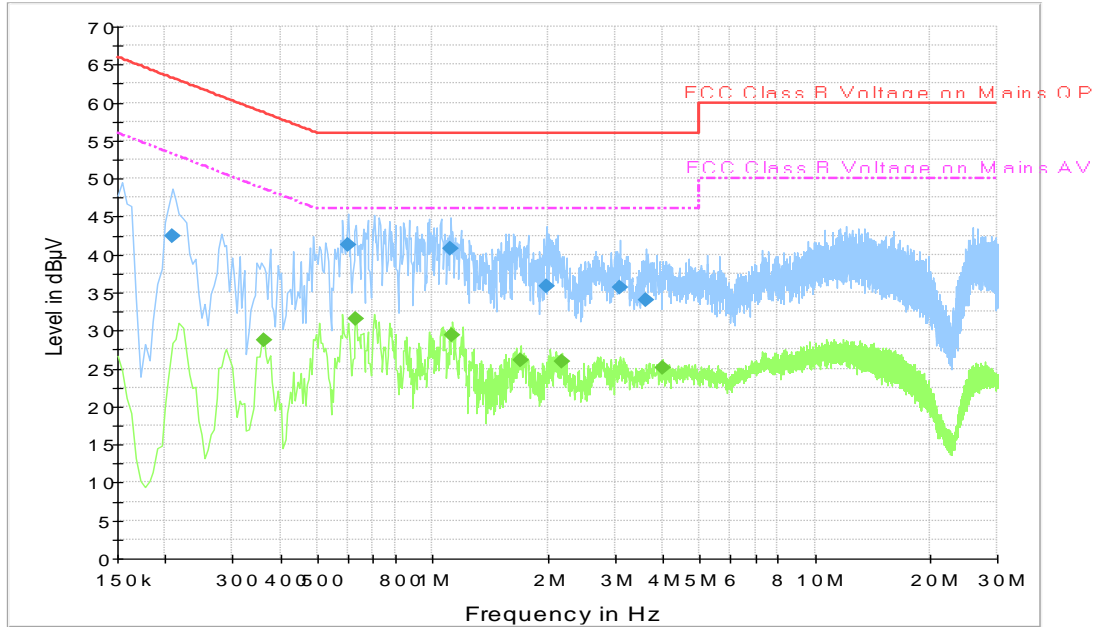


Fig A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.208500	42.5	2000.0	9.000	N	19.8	20.8	63.3
0.600000	41.3	2000.0	9.000	L1	19.8	14.7	56.0
1.117500	40.8	2000.0	9.000	L1	19.6	15.2	56.0
1.981500	35.8	2000.0	9.000	L1	19.7	20.2	56.0
3.084000	35.7	2000.0	9.000	L1	19.7	20.3	56.0
3.624000	34.0	2000.0	9.000	L1	19.6	22.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.361500	28.8	2000.0	9.000	L1	19.8	19.9	48.7
0.631500	31.5	2000.0	9.000	L1	19.8	14.5	46.0
1.126500	29.4	2000.0	9.000	L1	19.6	16.6	46.0
1.707000	26.1	2000.0	9.000	L1	19.7	19.9	46.0
2.175000	25.9	2000.0	9.000	L1	19.7	20.1	46.0
4.002000	25.0	2000.0	9.000	L1	19.6	21.0	46.0

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

Charging Mode, Set.4

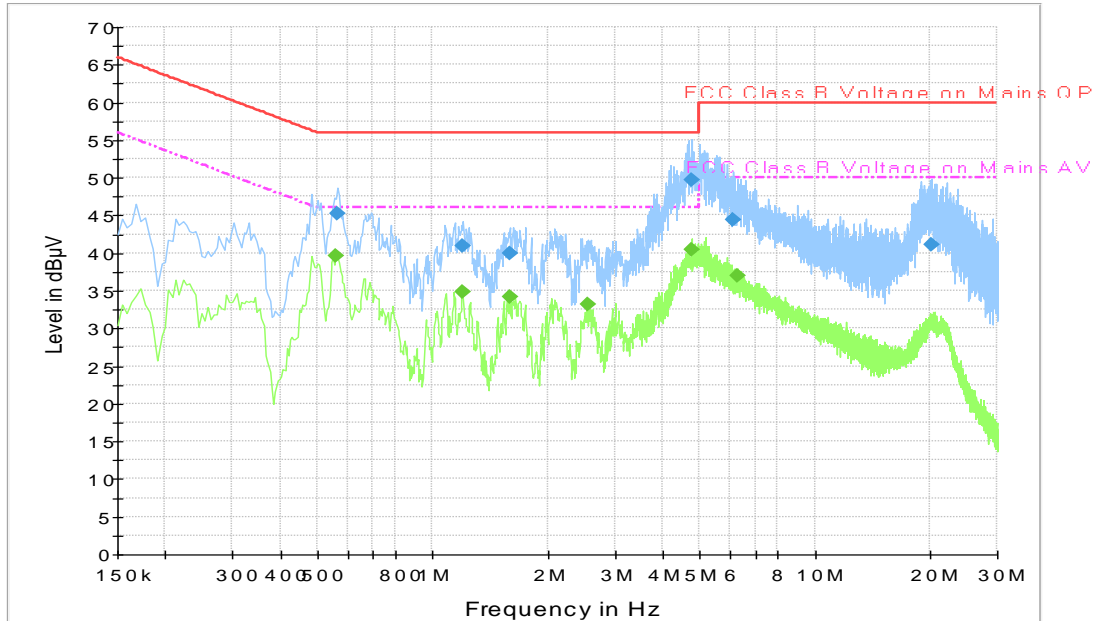


Fig A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.564000	45.3	2000.0	9.000	L1	19.9	10.7	56.0
1.203000	41.0	2000.0	9.000	L1	19.6	15.0	56.0
1.590000	40.0	2000.0	9.000	L1	19.7	16.0	56.0
4.749000	49.7	2000.0	9.000	L1	19.6	6.3	56.0
6.135000	44.4	2000.0	9.000	L1	19.7	15.6	60.0
20.121000	41.0	2000.0	9.000	N	20.0	19.0	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.559500	39.6	2000.0	9.000	L1	19.9	6.4	46.0
1.198500	34.9	2000.0	9.000	L1	19.6	11.1	46.0
1.590000	34.2	2000.0	9.000	L1	19.7	11.8	46.0
2.557500	33.3	2000.0	9.000	L1	19.7	12.7	46.0
4.749000	40.4	2000.0	9.000	L1	19.6	5.6	46.0
6.252000	36.9	2000.0	9.000	L1	19.7	13.1	50.0

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

USB Mode, Set.5

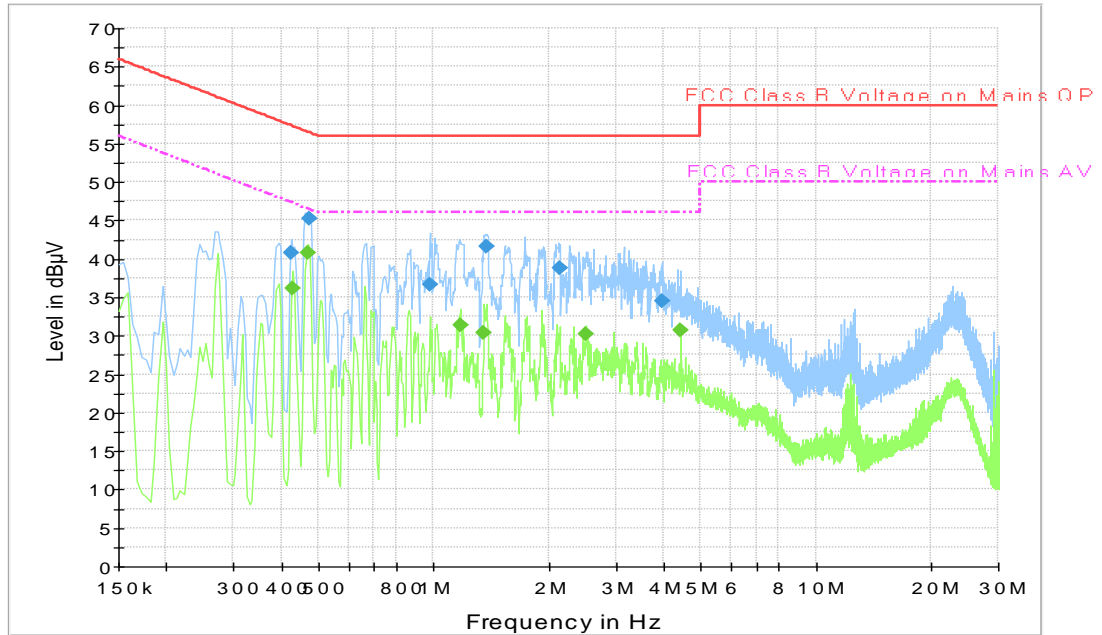


Fig A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.424500	40.8	2000.0	9.000	L1	19.9	16.5	57.4
0.474000	45.2	2000.0	9.000	L1	19.9	11.2	56.4
0.978000	36.6	2000.0	9.000	L1	19.6	19.4	56.0
1.383000	41.6	2000.0	9.000	L1	19.6	14.4	56.0
2.134500	38.8	2000.0	9.000	N	19.6	17.2	56.0
3.948000	34.6	2000.0	9.000	N	19.7	21.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	36.1	2000.0	9.000	N	19.9	11.1	47.3
0.469500	40.8	2000.0	9.000	N	19.9	5.7	46.5
1.176000	31.4	2000.0	9.000	L1	19.6	14.6	46.0
1.356000	30.5	2000.0	9.000	L1	19.6	15.5	46.0
2.512500	30.2	2000.0	9.000	N	19.6	15.8	46.0
4.443000	30.7	2000.0	9.000	N	19.7	15.3	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	Wang Huan
Radiated Emission	EMC32 V9.01.00	R&S	Li Jinpeng

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