



TEST REPORT

No. I18Z61140-EMC04

for

TCL Communication Ltd.

GSM Quad Band Mobile Phone

Model Name: 2053X/2053D

FCC ID: 2ACCJB104

with

Hardware Version: PIO

Software Version: 010 01

Issued Date: 2018-08-21



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
I18Z61140-EMC04	Rev.0	1 st edition	2018-08-21

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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℃

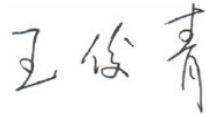
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-07-29

Testing End Date: 2018-08-09

1.4. Signature



Wang Junqing
(Prepared this test report)



Zhang Ying
(Reviewed this test report)



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Deputy Director of the laboratory
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2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
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Shenzhen, Guangdong, P.R. China 518052
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Country: P.R. China
Contact Person: Gong Zhizhou
Contact Email: zhizhou.gong@tcl.com
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722

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 518052
City: Shenzhen
Postal Code: 518052
Country: P.R. China
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722

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

3.1. About EUT

Description	GSM Quad Band Mobile Phone
Model Name	2053X/2053D
FCC ID	2ACCJB104
Extreme vol. Limits	3.55VDC to 4.2VDC (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(2053X)	869719030027655	PIO	010 01
EUT2(2053D)	/	PIO	010 01

*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	Battery	/	/
AE3	Charger	/	/
AE4	Charger	/	/
AE5	USB Cable	/	/
AE6	Charger	/	/
AE7	Charger	/	/
AE8	Charger	/	/
AE9	Charger	/	/
AE10	Charger	/	/
AE11	Charger	/	/
AE12	Charger	/	/
AE13	Charger	/	/

AE1

Model	CAB0950006CA
Manufacturer	Tianmao
Capacitance	950 mAh
Nominal voltage	/

AE2

Model	CAB0950002C1
Manufacturer	BYD
Capacitance	950 mAh
Nominal voltage	/

AE3

Model	CBA0066AGAC5
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Manufacturer	PUAN
Length of cable	120cm
AE4	
Model	CBA0066AGAC7
Manufacturer	Chenyang
Length of cable	120cm
AE5	
Model	CDB0000072C3
Manufacturer	JIAYIKANG
Length of cable	80cm
AE6	
Model	CBA0066AAAC5
Manufacturer	PUAN
Length of cable	120cm
AE7	
Model	CBA0066AAAC7
Manufacturer	Chenyang
Length of cable	120cm
AE8	
Model	CBA0066ABAC5
Manufacturer	PUAN
Length of cable	120cm
AE9	
Model	CBA0066ABAC7
Manufacturer	Chenyang
Length of cable	120cm
AE10	
Model	CBA3068AAAC5
Manufacturer	PUAN
Length of cable	/
AE11	
Model	CBA3068AAAC7
Manufacturer	Chenyang
Length of cable	/
AE12	
Model	CBA3068ABAC5
Manufacturer	PUAN
Length of cable	/
AE13	
Model	CBA3068ABAC7
Manufacturer	Chenyang
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.1	EUT1+ AE1 + AE3	Charger
Set.2	EUT1+ AE1 + AE5	USB mode
Set.3	EUT1+ AE1 + AE4	Charger

Note: GSM Quad Band Mobile Phone, 2053D manufactured by TCL Communication Ltd is a variant model based on 2053X for conformance test. According to the KDB 484596, no test needs to be performed, all results are cited from the initial model.



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	ESU26	100235	R&S	2019-03-31	1 year
2	Test Receiver	ESC13	100344	R&S	2019-02-28	1 Year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2018-12-26	1 year
4	Universal Radio Communication Tester	CMW500	143008	R&S	2018-12-26	1 year
5	LISN	ENV216	101200	R&S	2019-04-15	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2019-02-03	3 years
7	EMI Antenna	3115	00167250	ETS-Lindgren	2019-06-17	1 year
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
11	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 ($\mu\text{V/m}$)		
	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): $U = 4.3 \text{ dB}$, $k=2$.

Measurement results for Set.1:

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)
17971.100	51.6	-17.7	45.6	23.700	H
17936.533	51.4	-17.7	45.6	23.500	V
17958.633	51.4	-17.7	45.6	23.500	V
17965.433	51.1	-17.7	45.6	23.200	V
17966.000	51.1	-17.7	45.6	23.200	H
17954.100	51.1	-17.7	45.6	23.200	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)
17992.067	40.5	-17.7	45.6	12.600	H
17992.633	40.3	-17.7	45.6	12.400	H
17958.067	40.3	-17.7	45.6	12.400	V
17954.667	40.1	-17.7	45.6	12.200	V
17967.700	40.1	-17.7	45.6	12.200	H
17968.833	40.0	-17.7	45.6	12.100	H

Measurement results for Set.2:

USB Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17884.400	37.7	-18.5	45.6	10.600	V
17905.367	37.7	-18.5	45.6	10.600	H
17416.333	37.7	-19.2	41.5	15.400	V
17834.533	37.7	-18.5	45.6	10.600	H
17432.767	37.6	-19.2	41.5	15.300	H
17920.667	37.6	-17.7	45.6	9.700	H

USB Mode/ Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17951.833	40.1	-17.7	45.6	12.200	H
17983.567	40.0	-17.7	45.6	12.100	H
17961.467	39.9	-17.7	45.6	12.000	V
17966.000	39.9	-17.7	45.6	12.000	H
17966.567	39.9	-17.7	45.6	12.000	H
17952.400	39.9	-17.7	45.6	12.000	V

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)
17971.100	51.5	-17.7	45.6	23.600	H
17969.967	50.9	-17.7	45.6	23.000	V
17944.467	50.9	-17.7	45.6	23.000	V
17964.867	50.8	-17.7	45.6	22.900	V
17988.667	50.8	-17.7	45.6	22.900	H
17988.100	50.8	-17.7	45.6	22.900	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)
17954.667	40.1	-17.7	45.6	12.200	H
17962.033	40.1	-17.7	45.6	12.200	H
17963.733	40.0	-17.7	45.6	12.100	V
17960.900	40.0	-17.7	45.6	12.100	V
17980.167	39.9	-17.7	45.6	12.000	H
17956.933	39.9	-17.7	45.6	12.000	H

Note: The measurement results of Set.1, Set.2, Set.3 showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.1

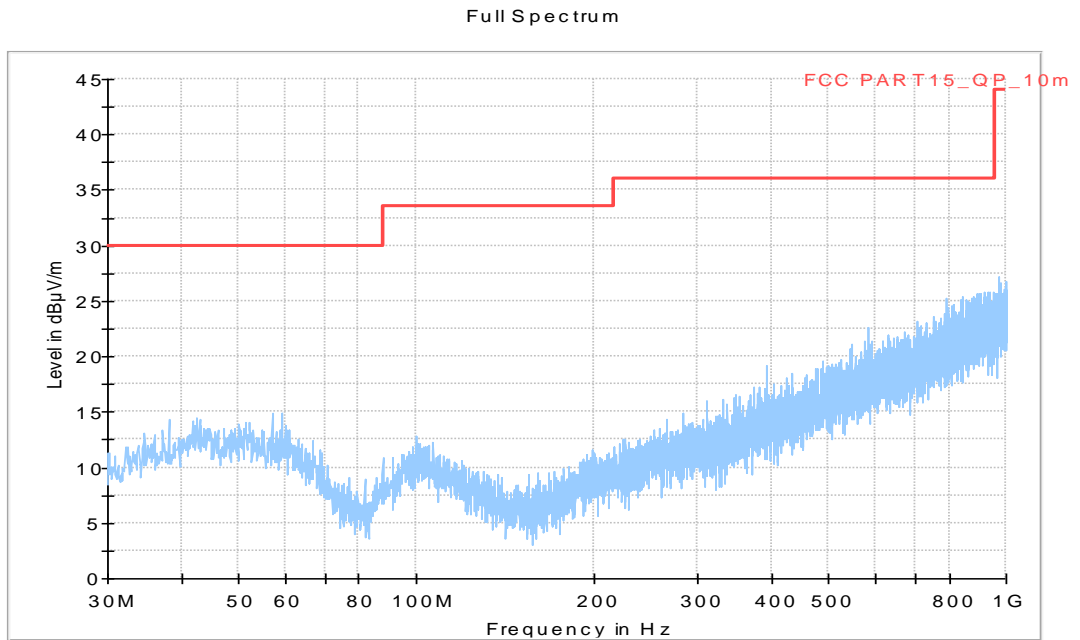


Fig A.1 Radiated Emission from 30MHz to 1GHz

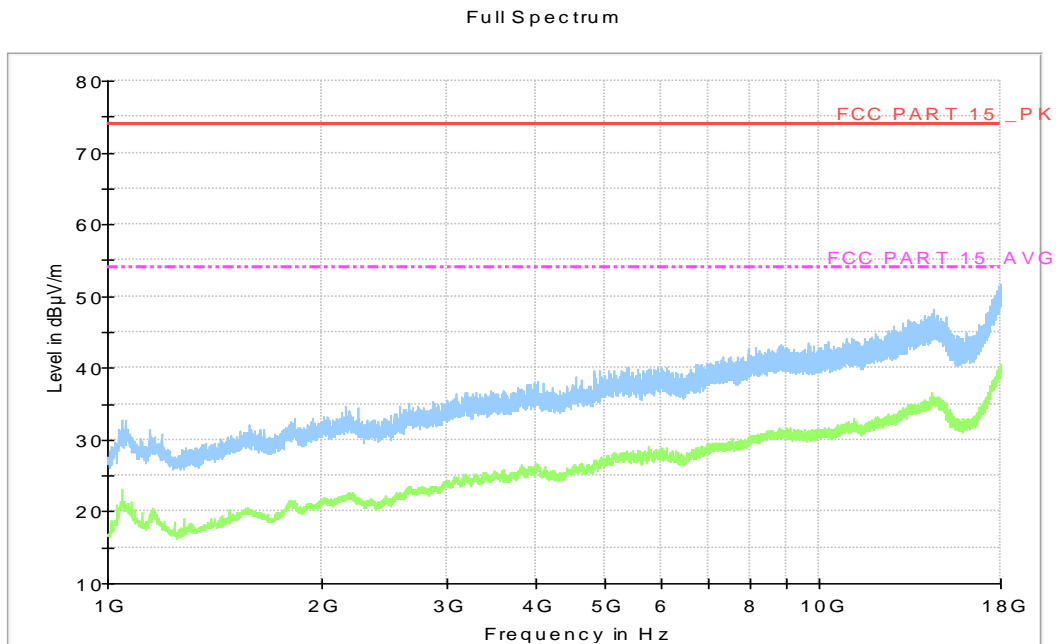


Fig A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

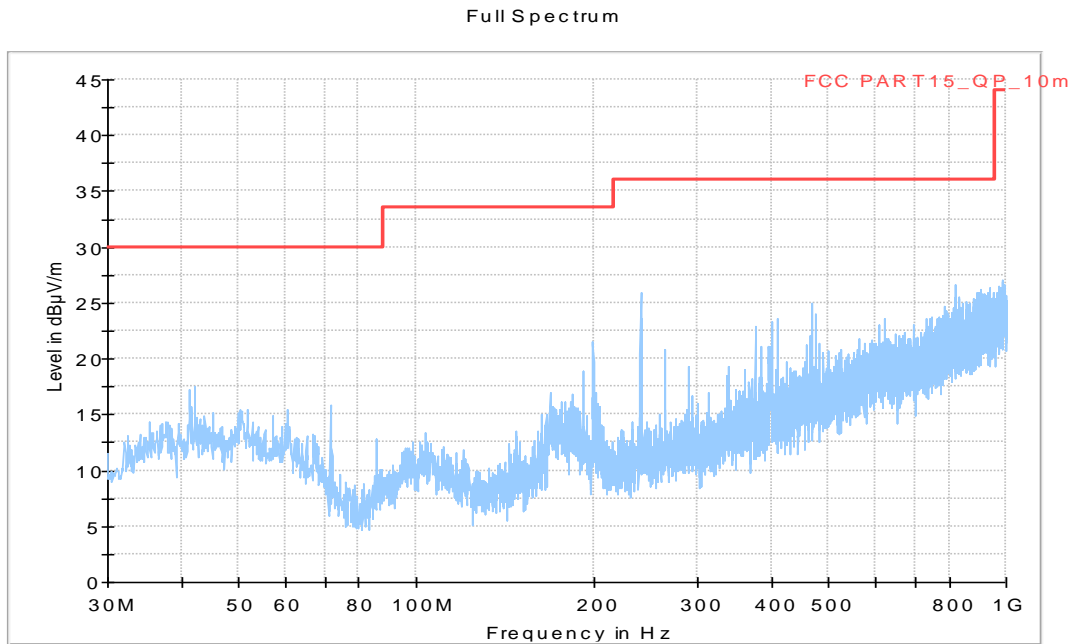


Fig A.3 Radiated Emission from 30MHz to 1GHz

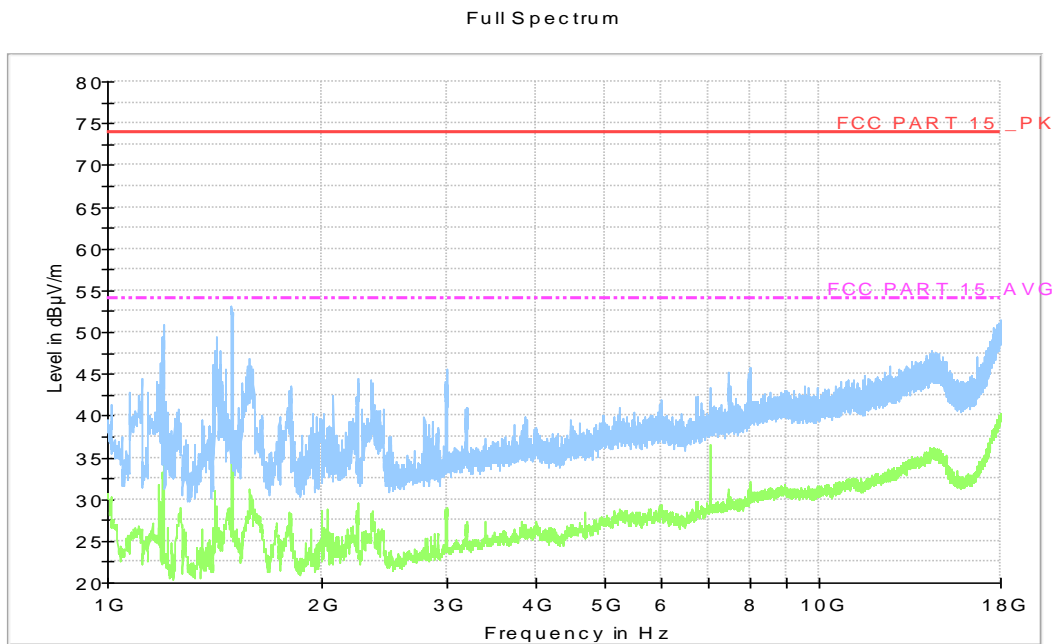


Fig A.4 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.3

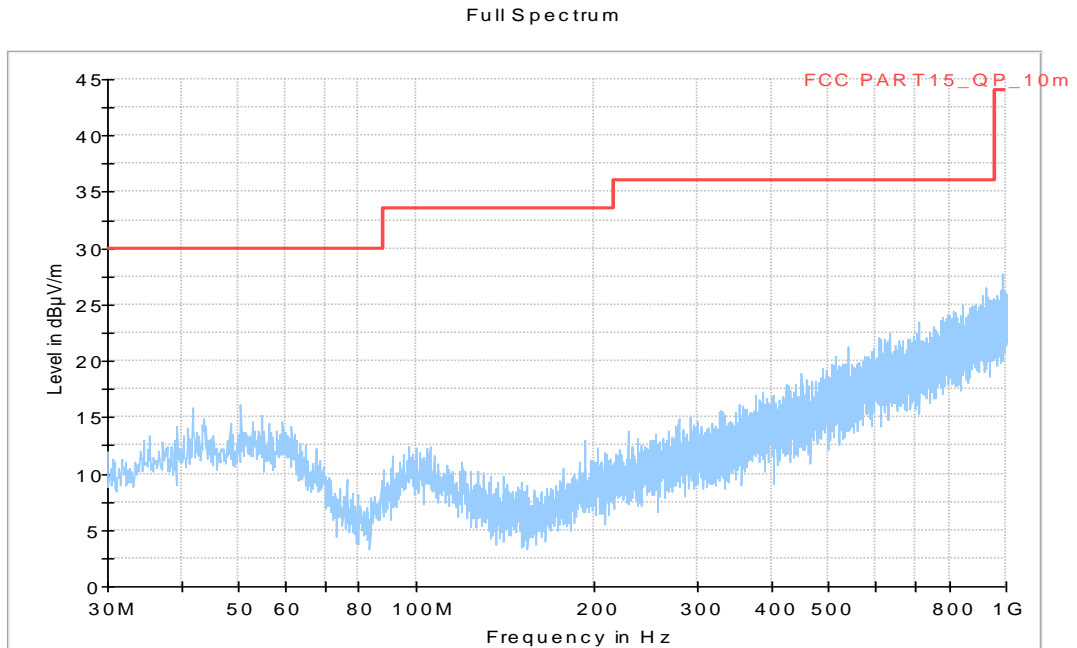


Fig A.5 Radiated Emission from 30MHz to 1GHz

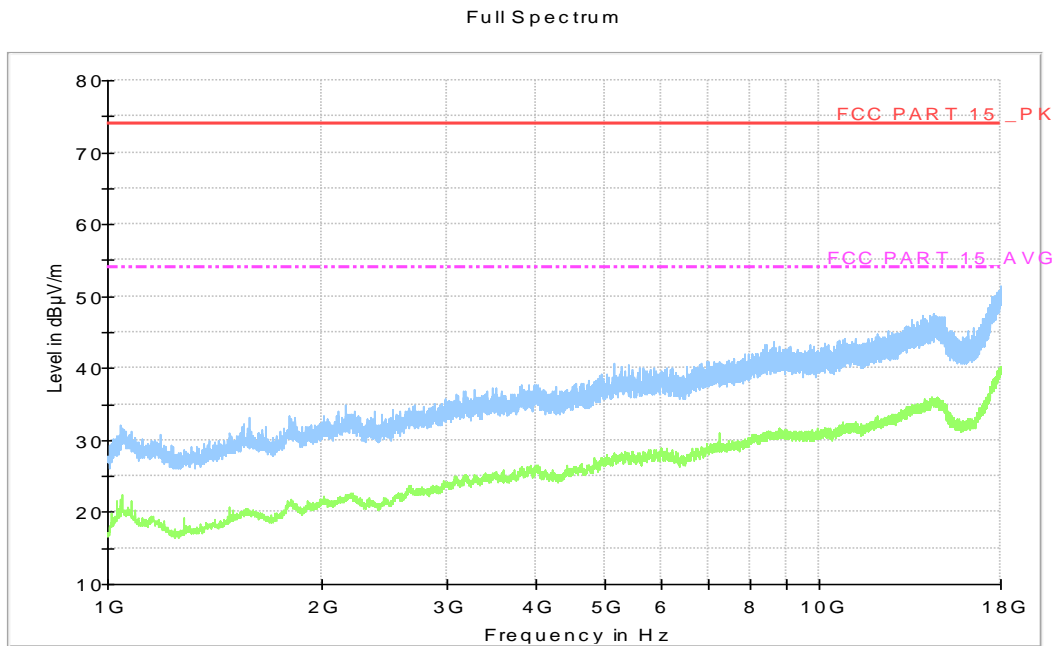


Fig A.6 Radiated Emission from 1GHz to 18GHz

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: $U= 2.9$ dB, $k=2$.

Charging Mode, Set.1

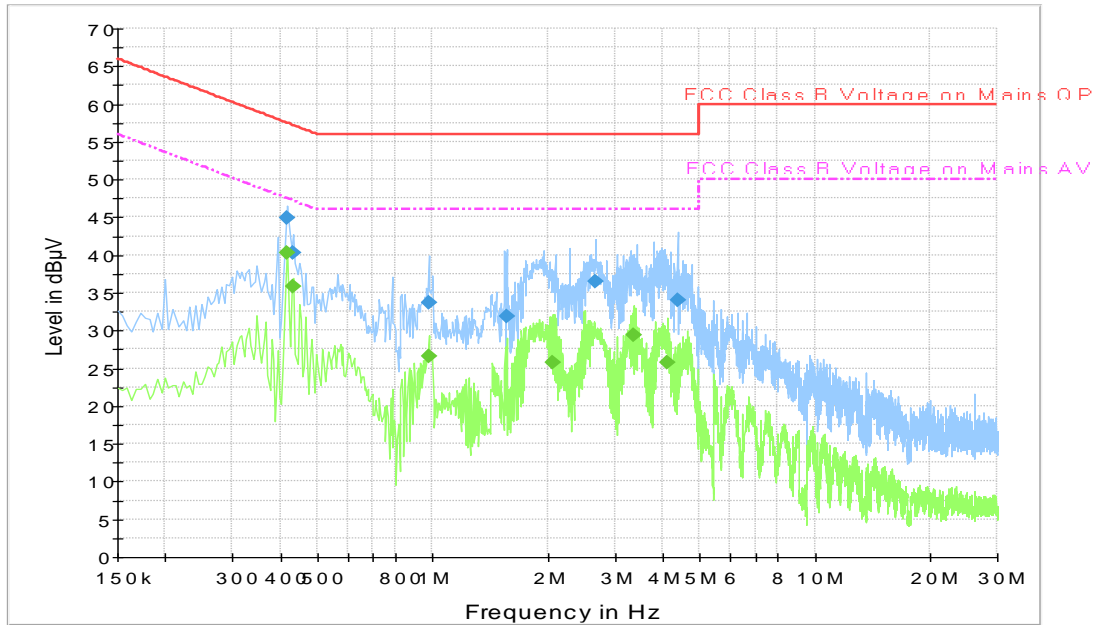


Fig A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	44.9	2000.0	9.000	L1	19.9	12.6	57.5
0.433500	40.3	2000.0	9.000	L1	19.9	16.9	57.2
0.978000	33.6	2000.0	9.000	L1	19.6	22.4	56.0
1.563000	31.8	2000.0	9.000	L1	19.7	24.2	56.0
2.665500	36.5	2000.0	9.000	L1	19.7	19.5	56.0
4.371000	33.9	2000.0	9.000	L1	19.6	22.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	40.3	2000.0	9.000	L1	19.9	7.2	47.5
0.433500	35.8	2000.0	9.000	L1	19.9	11.3	47.2
0.978000	26.6	2000.0	9.000	L1	19.6	19.4	46.0
2.071500	25.8	2000.0	9.000	L1	19.7	20.2	46.0
3.349500	29.3	2000.0	9.000	L1	19.7	16.7	46.0
4.128000	25.7	2000.0	9.000	L1	19.6	20.3	46.0

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

USB Mode, Set.2

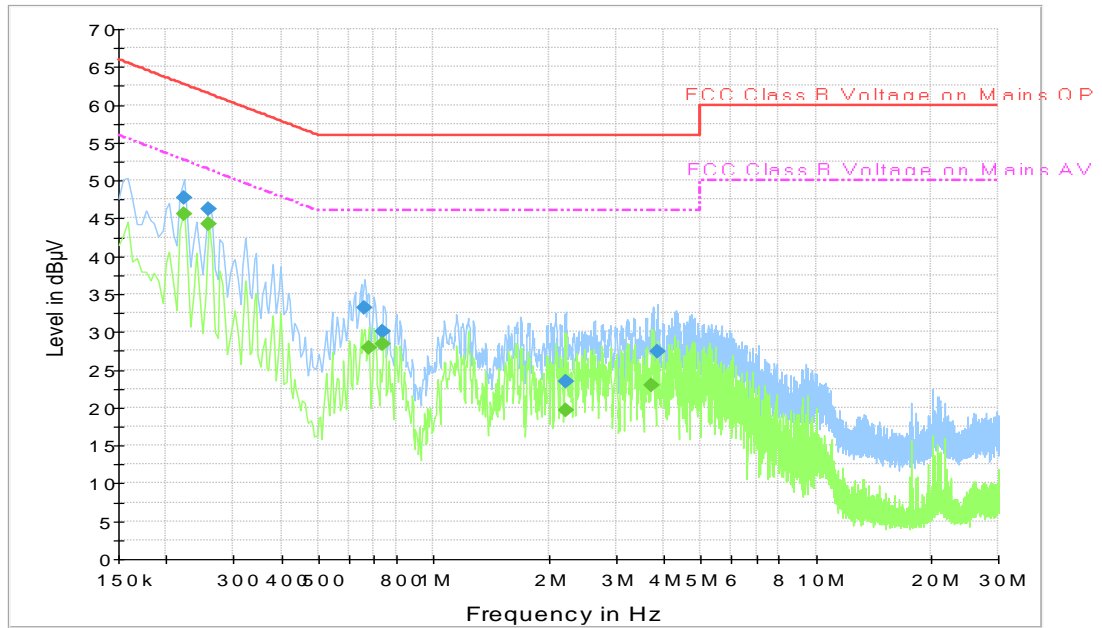


Fig A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	47.7	2000.0	9.000	N	19.8	15.0	62.7
0.258000	46.2	2000.0	9.000	N	19.8	15.3	61.5
0.658500	33.1	2000.0	9.000	N	19.9	22.9	56.0
0.739500	30.0	2000.0	9.000	N	19.9	26.0	56.0
2.211000	23.5	2000.0	9.000	L1	19.7	32.5	56.0
3.844500	27.4	2000.0	9.000	N	19.7	28.6	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	45.6	2000.0	9.000	N	19.8	7.2	52.7
0.258000	44.3	2000.0	9.000	N	19.8	7.2	51.5
0.676500	27.8	2000.0	9.000	N	19.9	18.2	46.0
0.739500	28.4	2000.0	9.000	N	19.9	17.6	46.0
2.211000	19.7	2000.0	9.000	L1	19.7	26.3	46.0
3.709500	23.0	2000.0	9.000	N	19.7	23.0	46.0

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

Charging Mode, Set.3

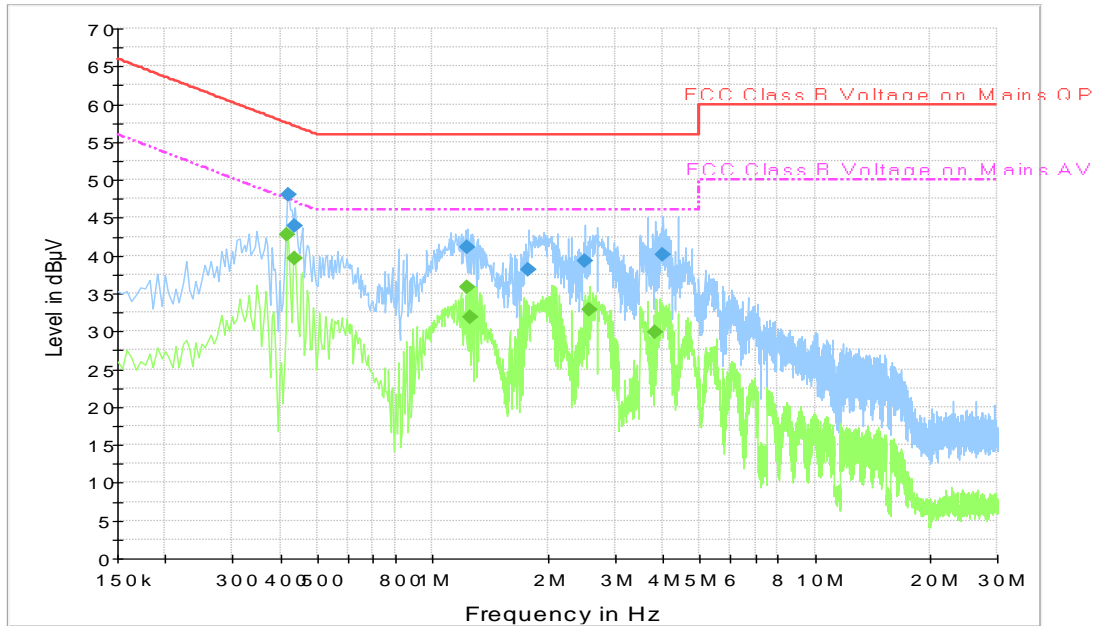


Fig A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.420000	48.1	2000.0	9.000	L1	19.9	9.4	57.4
0.438000	43.9	2000.0	9.000	L1	19.9	13.2	57.1
1.234500	41.1	2000.0	9.000	L1	19.6	14.9	56.0
1.783500	38.2	2000.0	9.000	L1	19.7	17.8	56.0
2.503500	39.4	2000.0	9.000	L1	19.7	16.6	56.0
4.002000	40.1	2000.0	9.000	L1	19.6	15.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	42.7	2000.0	9.000	L1	19.9	4.8	47.5
0.438000	39.6	2000.0	9.000	L1	19.9	7.5	47.1
1.234500	35.9	2000.0	9.000	L1	19.6	10.1	46.0
1.252500	31.8	2000.0	9.000	L1	19.6	14.2	46.0
2.580000	32.8	2000.0	9.000	L1	19.7	13.2	46.0
3.826500	29.8	2000.0	9.000	L1	19.6	16.2	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	Wang Huan
Radiated Emission	EMC32 V9.01.00	R&S	Li Jinpeng

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