TEST REPORT

No. I21Z61109-EMC01

for

Wingtech Group (Hong Kong) Limited

4G Mobile Phone

Model Name: TMRVL4G

FCC ID: 2APXW-TMRVL4G

with

Hardware Version: 98117_1_10

Software Version: TMRVL4G_0.01.01

Issued Date: 2021-07-30

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z61109-EMC01	Rev.0	1st edition	2021-07-30

Note: the latest revision of the test report supersedes all previous versions.

CONTENTS

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2021-06-30

Testing End Date: 2021-07-29

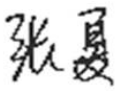
1.5. Signature

Li Yan

(Prepared this test report)

Zhang Ying

(Reviewed this test report)



Zhang Xia

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Wingtech Group (Hong Kong) Limited
Address:	Flat/RM 1903, 19/F, Podium Plaza 5 Hanoi Road, Tsim Sha Tsui Kowloon, Hong Kong
City:	/
Postal Code:	/
Country:	/
Contact:	/
Email:	/
Telephone:	/

2.2. Manufacturer Information

Company Name:	Wingtech Group (Hong Kong) Limited
Address:	Flat/RM 1903, 19/F, Podium Plaza 5 Hanoi Road, Tsim Sha Tsui Kowloon, Hong Kong
City:	/
Postal Code:	/
Country:	/
Contact:	/
Email:	/
Telephone:	/

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

3.1. About EUT

Description	4G Mobile Phone
Model Name	TMRVL4G
FCC ID	2APXW-TMRVL4G
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

EUT ID*	IME/SNI	HW Version	SW Version
EUT1	863892050009626	98117_1_10	TMRVL4G_0.01.01

*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	Charger		/
AE2	USB cable		/
AE3	Battery		/
AE4	Headset		/

AE1

Model	PA-US5V2A-036
Manufacturer	HUIZHOU PUAN ELECTRONICS CO., LTD
Length of cable	/

AE2

Description	USB CABLE ASSEMBLY
Type	711300001051
Manufacturer	Hui zhou washin
Length of cable	/

AE3

Model	JU001
Manufacturer	Jiade Energy Technology（Zhuhai）Co.,Ltd.

Note: The USB cables are shielded.

3.4. General Description

The device contains receivers which tune and operate between 30MHz-960MHz in the following bands: GSM850, WCDMA BAND 5, LTE BAND 12, LTE BAND 26 and LTE BAND 71.

3.5. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1 + AE1 + AE2 + AE3	Charger+ Camera+ RX mode
Set.2	EUT1 + AE1 + AE2 + AE3 + A4	Charger+MP4+ RX mode
Set.3	EUT1 + AE2 + AE3 + AE4	USB SD TO PC

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	2019
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 6000 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
	BR	Re-use test data from basic model report.

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	ESCI	100344	R&S	2022-12-07	1 year
2	LISN	ENV216	101200	R&S	2022-05-30	1 year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2021-12-07	1 year
4	Test Receiver	ESU26	100235	R&S	2021-02-23	1 year
5	EMI Antenna	VULB9163	483	Schwarzbeck	2021-08-27	1 year
6	EMI Antenna	3115	6914	ETS-Lindgren	2022-02-03	1 year
7	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
8	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
9	Keyboard	L100	CN0RH659658907ATOI40	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 V9.01.00	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 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, charging mode, MP4, CAMERA, SD and License RX band mode.

The EUT was tested while operating in licensed band RX mode. All licensed band receivers that tune in the range of 30MHz-960MHz, as listed in the Section 3.4, are investigated. Only the worst case emissions are reported.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit (μV/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/3MHz	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:

Result = $P_{Mea} + A_{Rpl} = P_{Mea} + G_A + G_{PL}$

Where

G_A: Antenna factor of receive antenna

G_{PL}: Path Loss

P_{Mea}: Measurement result on receiver.

Measurement uncertainty (worst case): 30MHz-1GHz：5.16dB, 1GHz-18GHz：5.44dB, *k*=2.

Measurement results for Set.1:

Charger1+ Rear Camera+ RX GSM850 /Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17994.333	48.0	-29.1	46.7	30.398	54	6.0	H
17991.500	47.4	-29.1	46.7	29.798	54	6.6	V
17948.433	47.1	-28.9	46.7	29.383	54	6.9	V
17997.733	46.9	-29.1	46.7	29.298	54	7.1	V
17993.200	46.8	-29.1	46.7	29.198	54	7.2	H
17995.467	46.7	-29.1	46.7	29.098	54	7.3	H

Charger1+ Rear Camera+ RX GSM850 /Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17996.033	56.0	-29.1	46.7	38.398	74	18.0	V
17971.100	55.9	-29.1	46.7	38.301	74	18.1	V
17957.500	55.7	-28.9	46.7	37.983	74	18.3	V
17948.433	55.6	-28.9	46.7	37.883	74	18.4	H
17934.833	55.6	-29.4	46.7	38.339	74	18.4	H
17963.167	55.5	-29.1	46.7	37.901	74	18.5	H

Measurement results for Set.2:

Charger1+ MP4+ RX WCDMA850 /Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17967.133	47.0	-29.1	46.7	29.401	54	7.0	H
17980.167	47.0	-29.1	46.7	29.398	54	7.0	H
17989.800	46.9	-29.1	46.7	29.298	54	7.1	V
17997.733	46.9	-29.1	46.7	29.298	54	7.1	H
17966.567	46.8	-29.1	46.7	29.201	54	7.2	H
17975.633	46.7	-29.1	46.7	29.101	54	7.3	V

Charger1+ MP4+ RX WCDMA850 /Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17949.000	56.6	-28.9	46.7	38.883	74	17.4	V
17938.800	55.9	-29.4	46.7	38.639	74	18.1	V
17994.900	55.7	-29.1	46.7	38.098	74	18.3	V
17990.367	55.5	-29.1	46.7	37.898	74	18.5	V
17949.567	55.3	-28.9	46.7	37.583	74	18.7	H
17996.033	55.2	-29.1	46.7	37.598	74	18.8	V

Measurement results for Set.3:

USB (SD) mode + RX LTE B12 /Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17973.933	47.4	-29.1	46.7	29.801	54	6.6	V
17998.300	47.1	-29.1	46.7	29.498	54	6.9	H
17968.833	47.0	-29.1	46.7	29.401	54	7.0	H
17902.533	46.8	-29.3	46.0	30.172	54	7.2	V
17977.333	46.8	-29.1	46.7	29.201	54	7.2	H
17951.267	46.7	-28.9	46.7	28.983	54	7.3	V

USB (SD) mode + RX LTE B12 /Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17925.767	56.7	-29.4	46.7	39.439	74	17.3	H
17985.833	56.7	-29.1	46.7	39.098	74	17.3	V
18000.000	56.1	-29.2	47.0	38.343	74	17.9	H
17997.167	56.0	-29.1	46.7	38.398	74	18.0	H
17998.300	55.8	-29.1	46.7	38.198	74	18.2	V
17988.667	55.6	-29.1	46.7	37.998	74	18.4	H

Charger1+ Rear Camera+ RX GSM850, Set.1

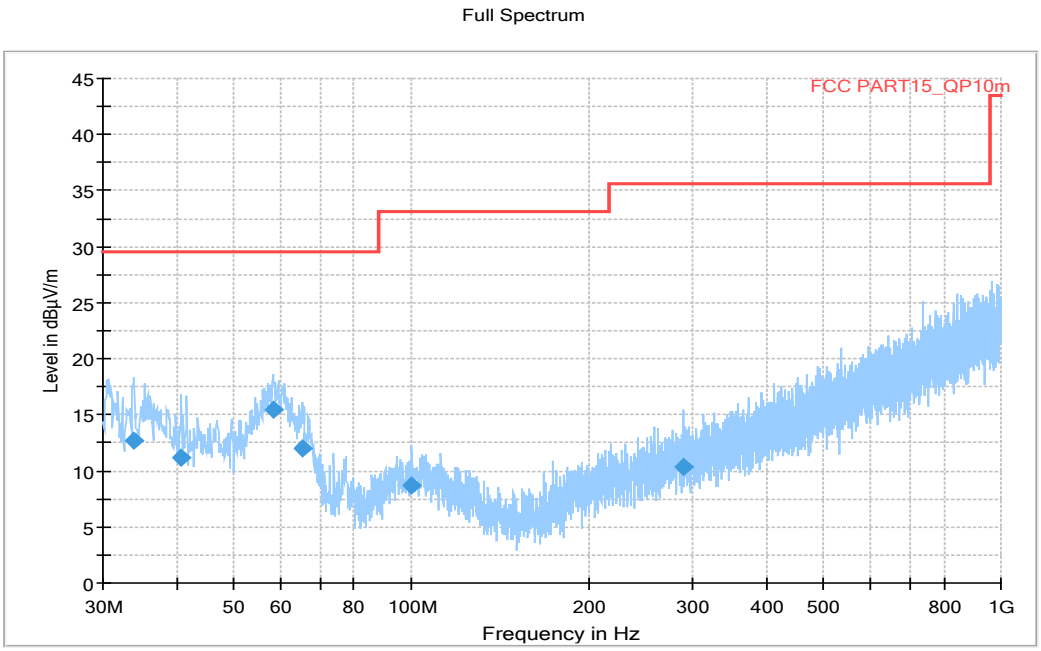


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)	Meas. Time (ms))	Margin (dB)	Limit (dBµV/m)	Bandwidth (kHz)
33.78300	12.67	117.0	V	-25.0	1000.0	16.87	29.50	120.000
40.76700	11.23	101.0	V	104.0	1000.0	18.31	29.50	120.000
58.22700	15.40	303.0	V	191.0	1000.0	14.14	29.50	120.000
65.50200	12.07	110.0	V	-21.0	1000.0	17.47	29.50	120.000
100.3250	8.70	125.0	V	-29.0	1000.0	24.36	33.10	120.000
290.2510	10.37	345.0	V	-21.0	1000.0	25.19	35.60	120.000

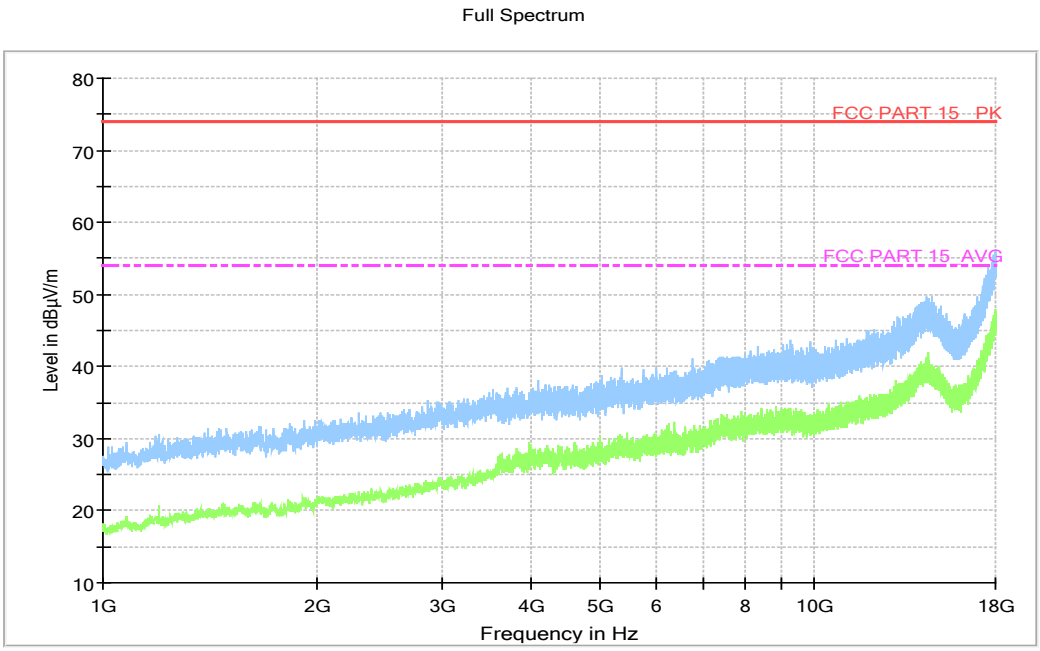


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charger1+MP4+ RX WCDMA850, Set.2

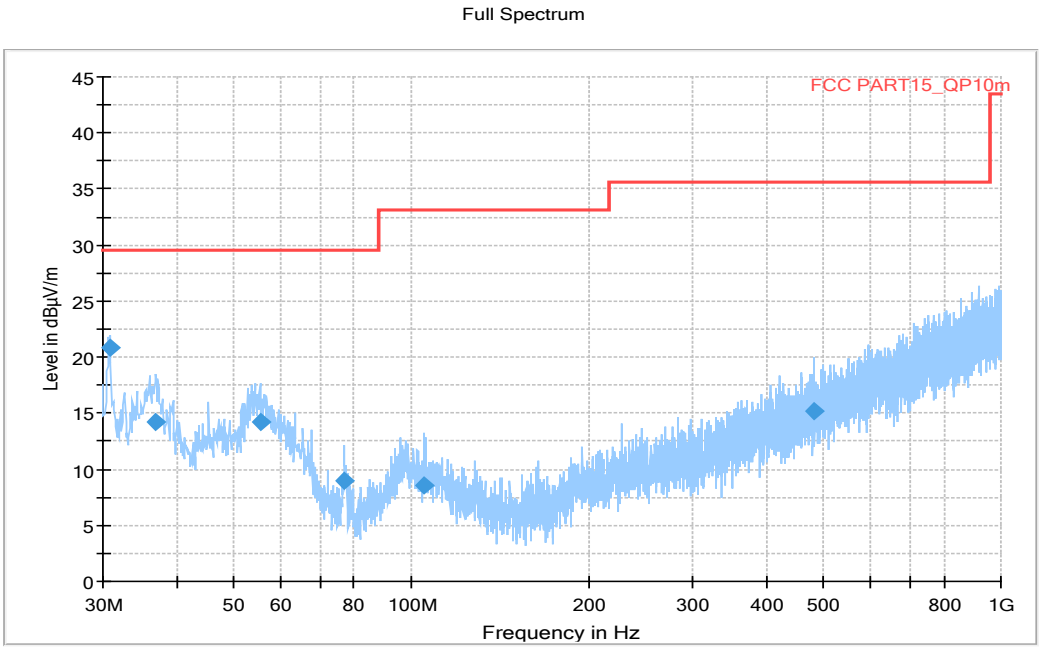


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)	Meas. Time (ms))	Margin (dB)	Limit (dBµV/m)	Bandwidth (kHz)
30.87300	20.78	125.0	V	104.0	1000.0	8.76	29.50	120.000
36.88700	14.23	113.0	V	120.0	1000.0	15.31	29.50	120.000
55.51100	14.17	235.0	V	-15.0	1000.0	15.37	29.50	120.000
77.04500	8.95	345.0	V	-4.0	1000.0	20.59	29.50	120.000
104.9810	8.60	125.0	V	-11.0	1000.0	24.46	33.10	120.000
481.2440	15.21	120.0	V	30.0	1000.0	20.35	35.60	120.000

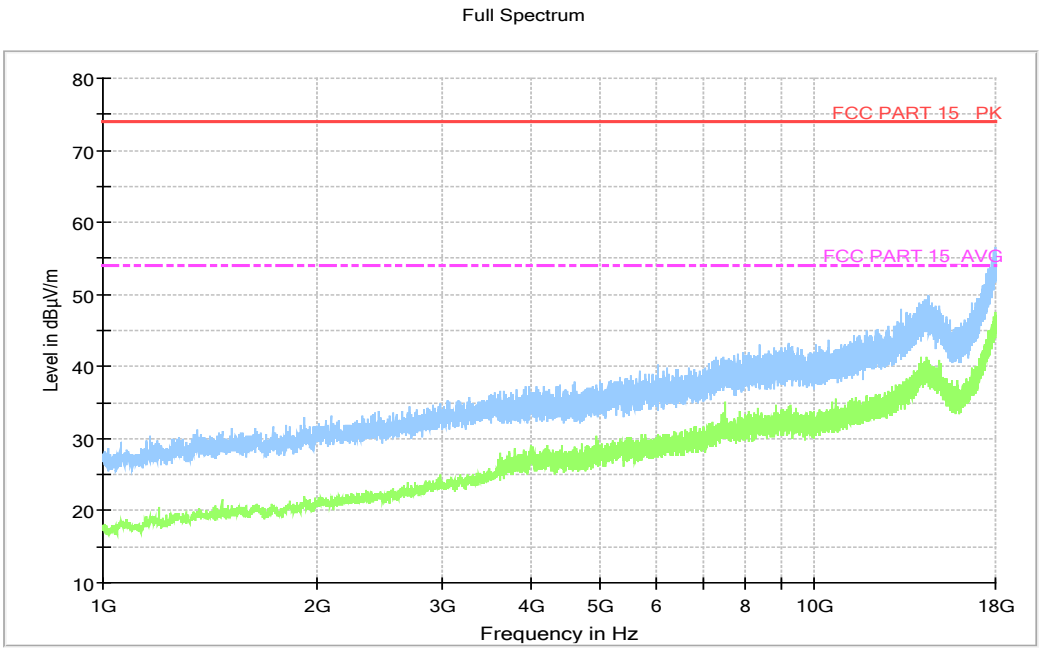


Figure A.4 Radiated Emission from 1GHz to 18GHz

USB (SD) mode + RX LTE B12, Set.3

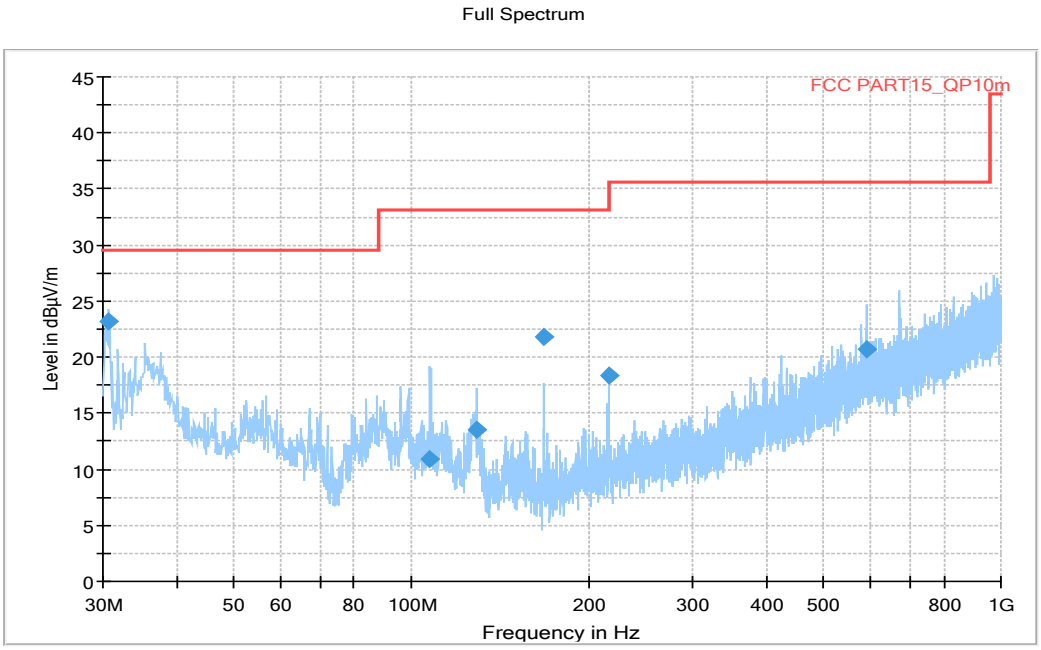


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)	Meas. Time (ms))	Margin (dB)	Limit (dBµV/m)	Bandwidth (kHz)
30.67900	23.22	116.0	V	10.0	1000.0	6.32	29.50	120.000
107.6970	10.97	116.0	V	151.0	1000.0	22.09	33.10	120.000
129.4250	13.59	101.0	V	-16.0	1000.0	19.47	33.10	120.000
168.0310	21.82	103.0	V	-30.0	1000.0	11.24	33.10	120.000
216.0460	18.31	125.0	V	300.0	1000.0	17.25	35.60	120.000
591.2420	20.69	235.0	V	300.0	1000.0	14.87	35.60	120.000

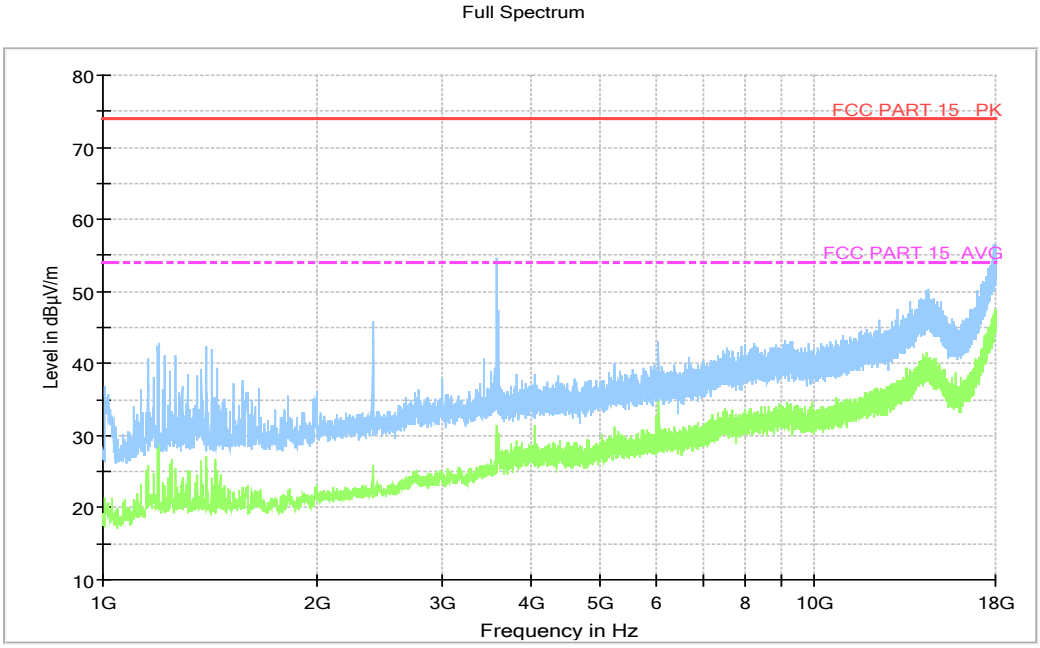


Figure A.6 Radiated Emission from 1GHz to 18GHz

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, charging mode.

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 (dBμV)	
	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*= 3.10 dB, *k*=2.

Charger mode, Set.1

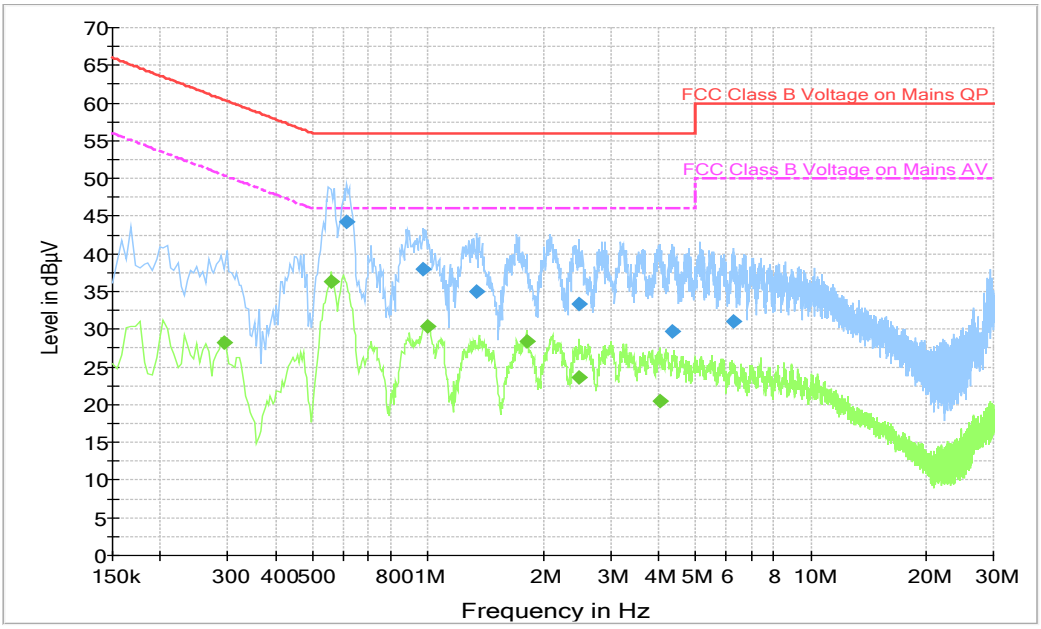


Figure A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.613500	44.3	1000.0	9.000	On	L1	19.7	11.7	56.0
0.973500	38.0	1000.0	9.000	On	L1	19.6	18.0	56.0
1.342500	35.0	1000.0	9.000	On	L1	19.5	21.0	56.0
2.485500	33.4	1000.0	9.000	On	L1	19.5	22.6	56.0
4.335000	29.7	1000.0	9.000	On	L1	19.6	26.3	56.0
6.283500	31.1	1000.0	9.000	On	L1	19.6	29.0	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.294000	28.2	1000.0	9.000	On	N	19.9	22.2	50.4
0.559500	36.3	1000.0	9.000	On	N	19.9	9.7	46.0
1.000500	30.4	1000.0	9.000	On	N	19.8	15.6	46.0
1.806000	28.4	1000.0	9.000	On	N	19.8	17.6	46.0
2.485500	23.7	1000.0	9.000	On	L1	19.5	22.3	46.0
4.033500	20.4	1000.0	9.000	On	L1	19.6	25.6	46.0

USB (SD) mode, Set.3

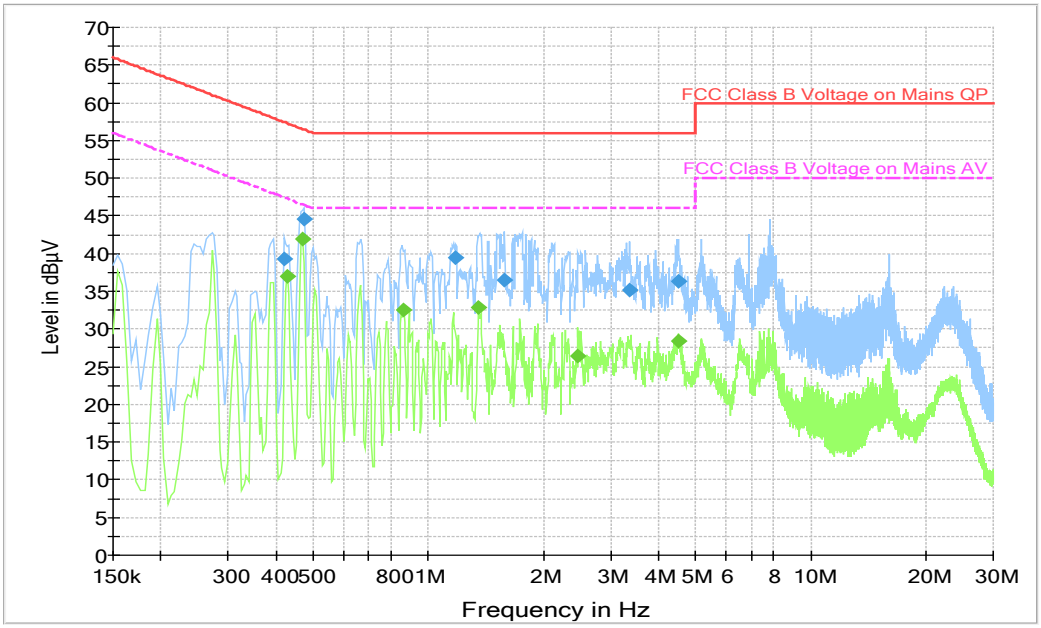


Figure A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.420000	39.2	1000.0	9.000	On	L1	19.9	18.2	57.4
0.474000	44.6	1000.0	9.000	On	L1	19.9	11.8	56.4
1.180500	39.4	1000.0	9.000	On	L1	19.5	16.6	56.0
1.585500	36.4	1000.0	9.000	On	N	19.8	19.6	56.0
3.363000	35.2	1000.0	9.000	On	N	19.7	20.8	56.0
4.497000	36.3	1000.0	9.000	On	N	19.7	19.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	37.0	1000.0	9.000	On	N	19.9	10.3	47.3
0.469500	41.9	1000.0	9.000	On	L1	19.9	4.6	46.5
0.861000	32.4	1000.0	9.000	On	N	19.8	13.6	46.0
1.356000	32.8	1000.0	9.000	On	N	19.8	13.2	46.0
2.463000	26.5	1000.0	9.000	On	N	19.7	19.5	46.0
4.497000	28.3	1000.0	9.000	On	N	19.7	17.7	46.0

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ANNEX B: Persons involved in this testing

Test Item	Tester
Radiated Emission	LI Pengfei
Conducted Emission	WANG Huan

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