TEST REPORT

No. I18Z61172-EMC01

for

TCL Communication Ltd.

LTE/UMTS/GSM mobile phone

5059Z

with

FCC ID: 2ACCJH094

Hardware Version: 04

Software Version: vAPA3

Issued Date: 2018-07-30

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

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
I18Z61172-EMC01	Rev.0	1st edition	2018-07-23
I18Z61172-EMC01	Rev.0	Modify the 30M-1GHz charging RE result	2018-07-30

CONTENTS

1. Test Laboratory

1.1. Testing Location

Location 4: CTTL(BDA)

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

Location 1: 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: 2018-07-21

Testing End Date: 2018-07-23

1.4. Signature

张颖

Zhang Ying

(Prepared this test report)

王俊青

Wang Junqing

(Reviewed this test report)

刘宝殿

Liu Baodian

(Approved this test report)

2. Client Information

2.1. Applicant Information

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

2.2. Manufacturer Information

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

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

3.1. About EUT

Description	LTE/UMTS/GSM mobile phone
Model Name	5059Z
FCC ID	2ACCJH094
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, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT3	015249000200101	04	vAPA3

*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	Travel charger	/	/
AE3	USB Cable	/	/
AE4	USB Cable	/	/

AE1

Model	CAC2400038C1
Manufacturer	BYD
Capacitance	2400 mAh
Nominal voltage	3.8V

AE2

Model	CBA0058AGAC5
Manufacturer	PUAN
Length of cable	/

AE3

Model	CDA3122005C2
Manufacturer	SHENGHUA
Length of cable	/

AE4

Model	CDA3122005C1
Manufacturer	/
Length of cable	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT3+ AE2+ AE3	Charger
Set.2	EUT3+ AE3	USB
Set.3	EUT3+ 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	10-1-16 Edition
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

Fully-anechoic chamber FAC-1 (7.3 meters×5.4 meters×3.5 meters), **FAC-3** (9 meters×6.5 meters×4 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	< 4 Ω
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 4000 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
Location Column	1/2/4	The test is performed in test location 1/2/4 which is described in section 1.1 of this report

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	P	1, 4
2	Conducted Emission	15.107(a)	B.2	P	4

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100376	Rohde & Schwarz	2018-12-27	1 year
2	Test Receiver	ESCI	100766	Rohde & Schwarz	2019-05-16	1 year
3	Universal Radio Communication Tester	CMW500	127406	R&S	2019-02-19	1 year
4	Universal Radio Communication Tester	CMW500	159408	R&S	2019-04-15	1 year
5	LISN	ESH3-Z5	825562/028	Rohde & Schwarz	2019-02-28	1 year
6	EMI Antenna	VULB 9163	514	Schwarzbeck	2019-02-03	1 year
7	EMI Antenna	3117	00139065	ETS-Lindgren	2018-11-05	1 year
8	Test Receiver	ESU26	100235	Rohde & Schwarz	2019-03-31	1 year
9	EMI Antenna	VULB 9163	301	Schwarzbeck	2019-02-03	1 year
10	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
11	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
12	Keyboard	L100	CN0RH659658907ATOI40	DELL	N/A	N/A
13	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V8.52.0（Location 4）	R&S
Radiated Continuous Emission	EMC32 V9.01.0（Location 1）	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 (charging mode of MS) at distances of 3 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 charging mode. During the test MS is connected to a charger in the case of charging mode.

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/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:

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：4.86dB, 1GHz-18GHz：5.26dB, *k*=2.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency (MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Limit (dBμV/m)	Polarity
17083.500	38.2	-25.5	41.3	22.39	54.0	H
17742.750	38.2	-24.1	41.0	21.29	54.0	H
17749.500	38.2	-24.0	41.0	21.17	54.0	V
17954.250	38.2	-24.9	40.8	22.29	54.0	H
17958.000	38.2	-25.0	40.8	22.31	54.0	H
17028.000	38.1	-25.6	41.4	22.32	54.0	V

Charging Mode/Peak detector

Frequency (MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Limit (dBμV/m)	Polarity
17623.500	50.4	-25.9	41.1	35.17	74.0	H
16994.250	50.1	-25.6	41.4	34.30	74.0	V
17978.250	49.9	-25.3	40.8	34.35	74.0	H
16945.500	49.9	-25.7	41.4	34.14	74.0	H
16971.000	49.9	-25.6	41.4	34.11	74.0	V
16785.750	49.8	-26.2	41.5	34.57	74.0	H

Sample calculation: Peak detector, 17623.500MHz

Result =P_{Mea} (35.17 dBμV)+ G_A (41.1dB/m)+ G_{PL}(-25.9 dB) =50.4 dBμV/m

Measurement results for Set.2:

USB Mode/Average detector

Frequency (MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Limit (dBμV/m)	Polarity
5876.250	38.8	-32.2	35.1	35.91	54.0	V
16803.000	38.1	-26.2	41.5	22.76	54.0	V
16960.500	38.1	-25.6	41.4	22.30	54.0	V
17762.250	38.0	-23.8	41.0	20.76	54.0	V
17748.750	38.0	-24.0	41.0	20.95	54.0	V
17622.000	38.0	-25.9	41.1	22.71	54.0	V

USB Mode/Peak detector

Frequency (MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Limit (dBμV/m)	Polarity
16878.000	50.7	-25.9	41.4	35.12	74.0	H
17747.250	50.3	-24.0	41.0	33.26	74.0	H
16354.500	50.2	-25.6	40.8	35.04	74.0	V
16485.000	50.1	-26.0	41.1	35.06	74.0	H
16936.500	50.1	-25.7	41.4	34.34	74.0	V
17976.000	49.9	-25.2	40.8	34.32	74.0	V

Sample calculation: Peak detector, 16878.000 MHz

Result =P_{Mea} (35.12dBμV)+ G_A (41.4dB/m)+ G_{PL}(-25.9 dB) =-25.9dBμV/m

Measurement results for Set.2:

USB Mode/Average detector

Frequency (MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Limit (dBμV/m)	Polarity
5876.250	39.6	-32.2	35.1	36.63	54.0	V
16783.500	38.1	-26.2	41.5	22.82	54.0	H
5877.000	38.0	-32.2	35.1	35.09	54.0	V
16943.250	38.0	-25.7	41.4	22.26	54.0	V
17967.750	38.0	-25.1	40.8	22.27	54.0	V
16791.750	38.0	-26.2	41.5	22.66	54.0	H

USB Mode/Peak detector

Frequency (MHz)	Result(dBμV/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea}(dBμV)	Limit (dBμV/m)	Polarity
17534.250	50.4	-25.5	41.2	34.68	74.0	H
16772.250	50.3	-26.2	41.5	35.06	74.0	V
17997.000	49.9	-25.0	40.8	34.08	74.0	V
16941.750	49.9	-25.7	41.4	34.15	74.0	V
17754.750	49.9	-23.9	41.0	32.77	74.0	H
16628.250	49.7	-25.9	41.3	34.36	74.0	V

Sample calculation: Peak detector, 17534.250 MHz

Result =P_{Mea} (34.68dBμV)+ G_A (41.2dB/m)+ G_{PL}(-25.5 dB) =-50.4 dBμV/m

Charging Mode, Set.1

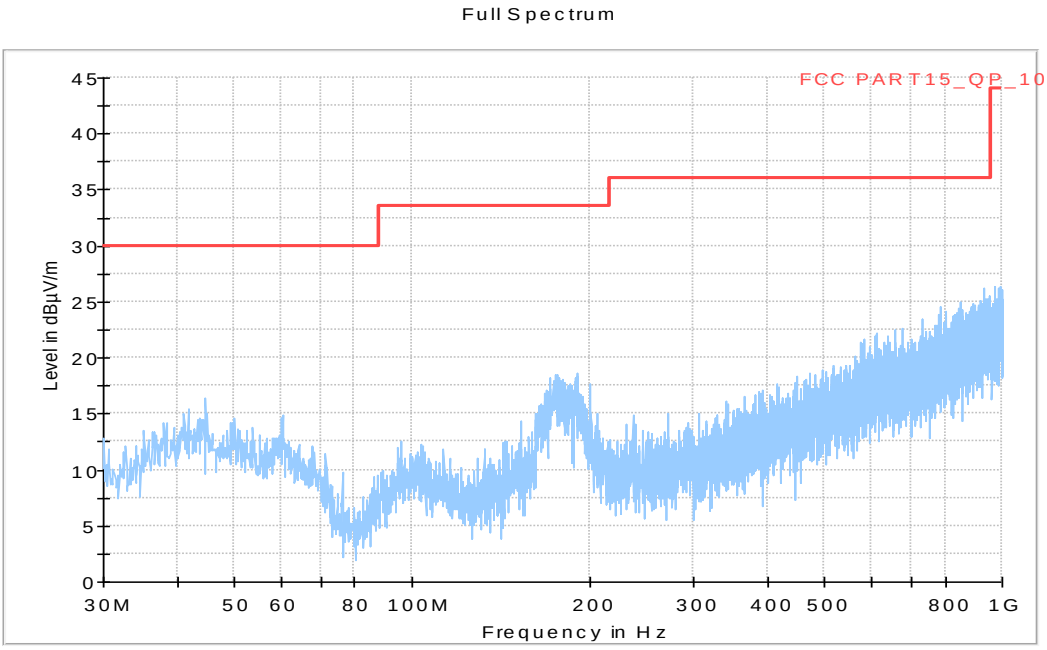

Figure A.1 Radiated Emission from 30MHz to 1GHz

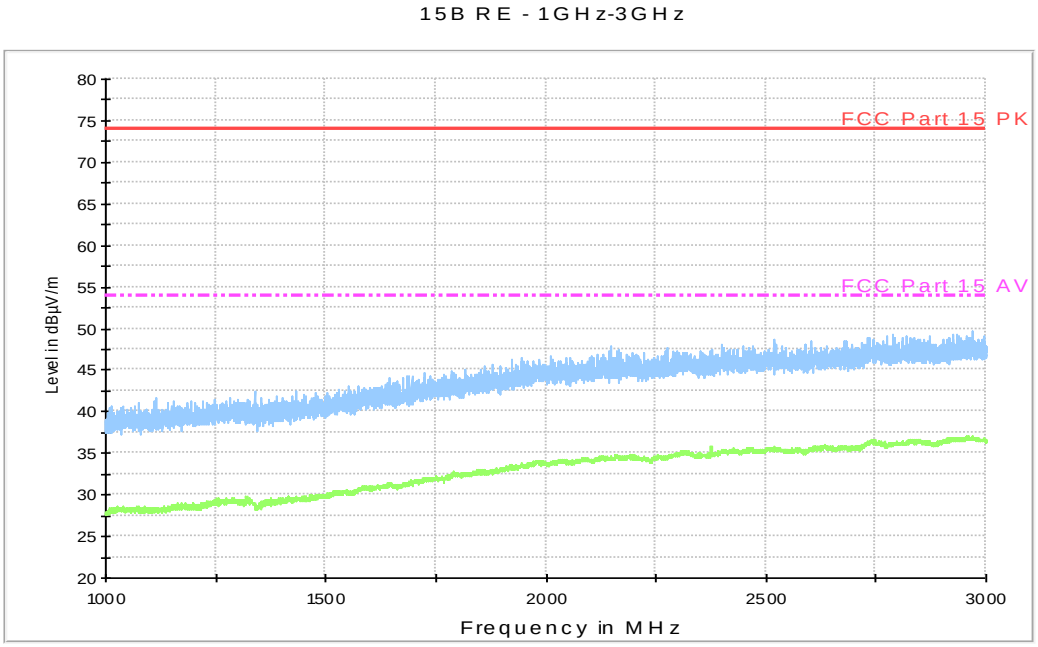

Figure A.2 Radiated Emission from 1GHz to 3GHz

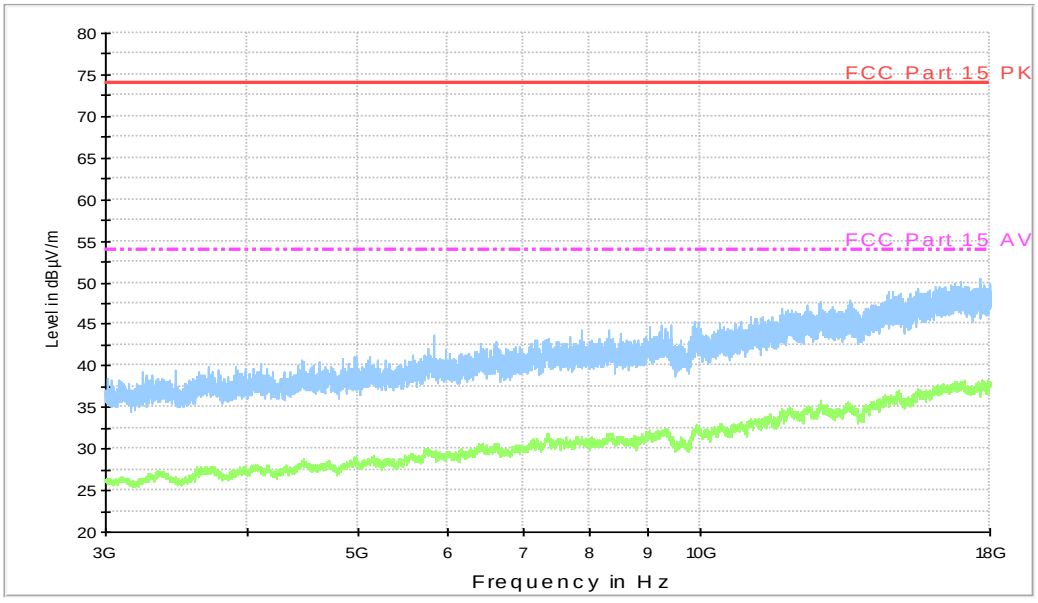

Figure A.3 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.2

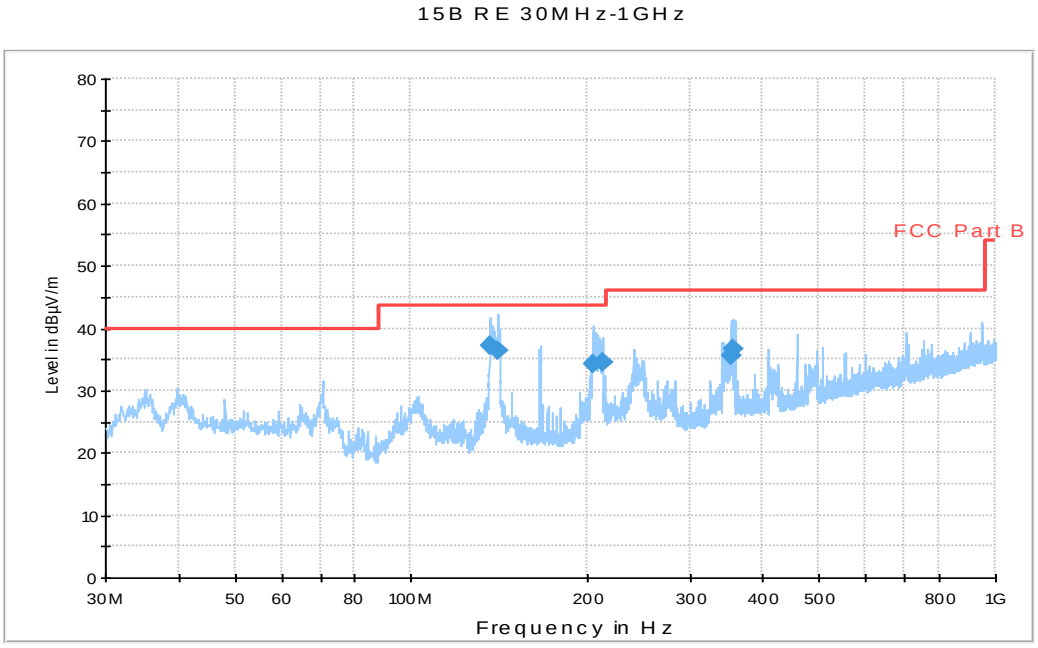

Figure A.4 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency	QuasiPeak	Height	Polarization	Azimuth	Corr.	Margin	Limit
136.894000	37.1	100.0	V	287.0	-4.5	6.4	43.5
140.968000	36.3	100.0	V	270.0	-4.7	7.2	43.5
204.988000	34.2	114.0	H	24.0	-1.6	9.3	43.5
212.360000	34.5	100.0	H	32.0	-1.3	9.0	43.5
353.883000	35.5	125.0	V	-18.0	3.3	10.5	46.0
357.084000	36.8	125.0	V	0.0	3.4	9.2	46.0

15B RE - 1GHz-3GHz

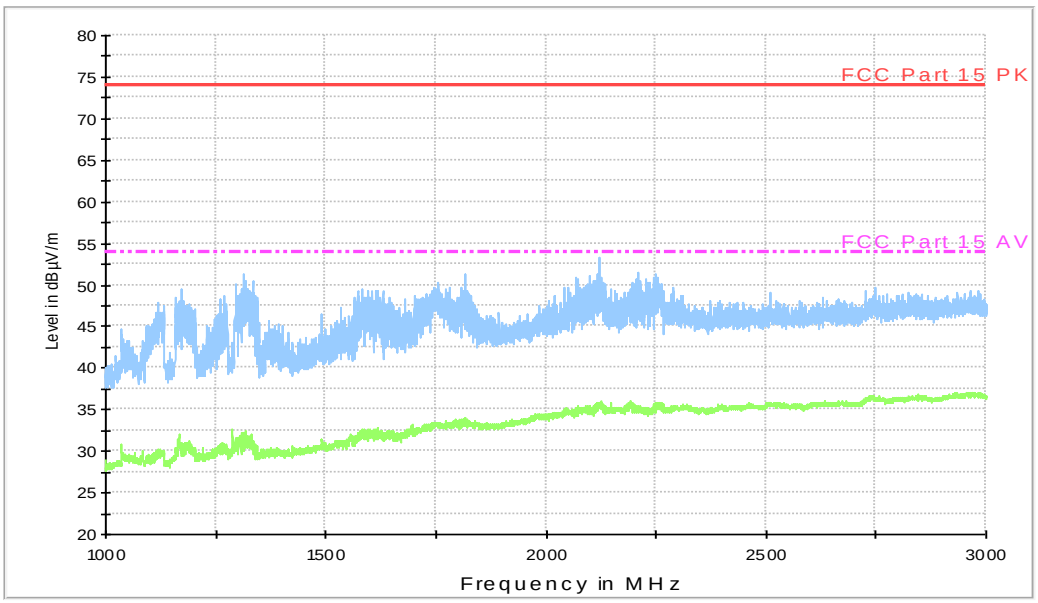

Figure A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

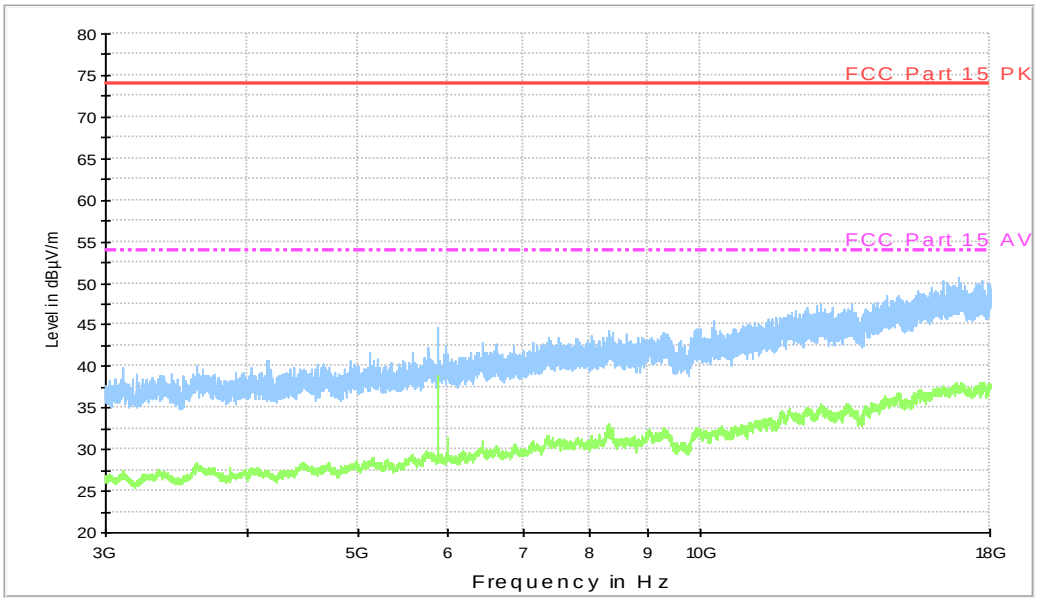

Figure A.6 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.3

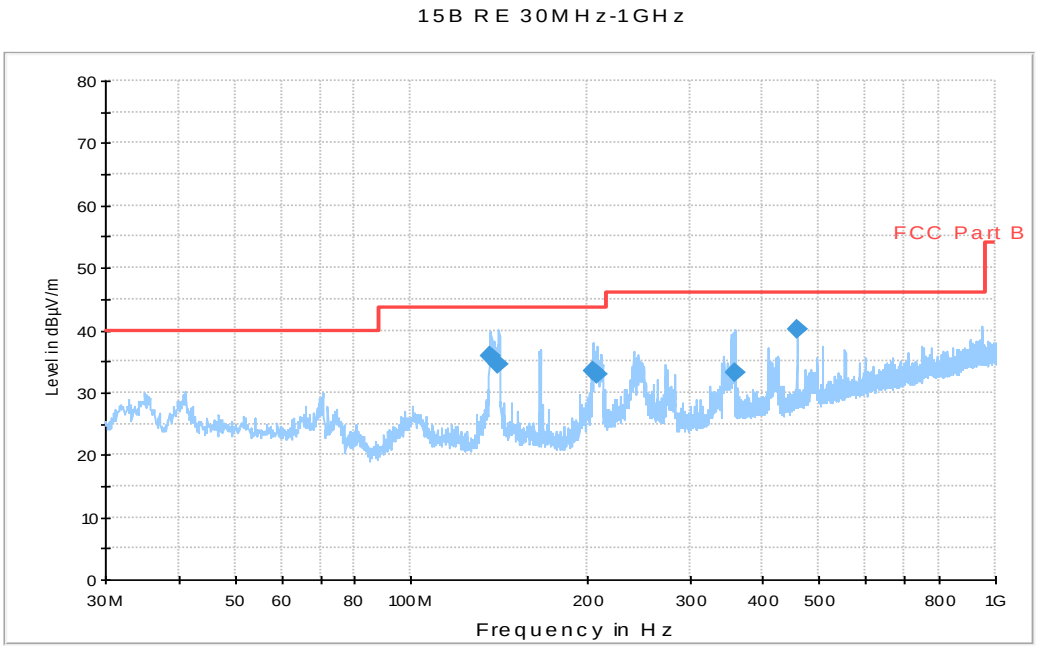

Figure A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency	QuasiPeak	Height	Polarization	Azimuth	Corr.	Margin	Limit
136.797000	35.8	125.0	H	27.0	-4.5	7.7	43.5
141.356000	34.6	100.0	V	297.0	-4.7	8.9	43.5
204.600000	33.5	125.0	H	159.0	-1.6	10.0	43.5
208.674000	33.0	100.0	H	27.0	-1.5	10.5	43.5
358.539000	33.2	122.0	V	-8.0	3.5	12.8	46.0
456.412000	40.2	109.0	V	0.0	6.0	5.8	46.0

15B RE - 1GHz-3GHz

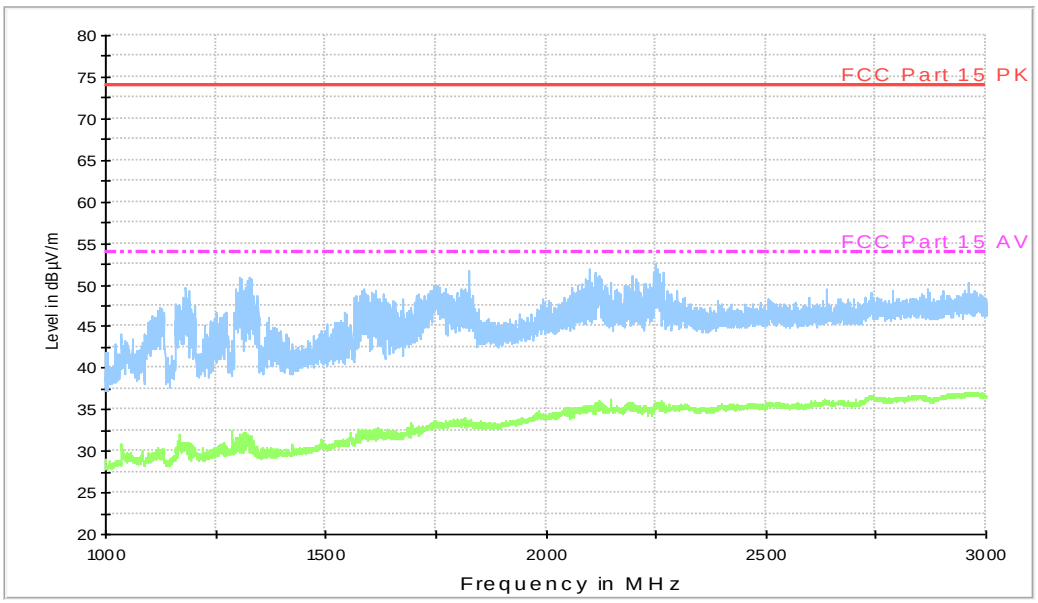

Figure A.8 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

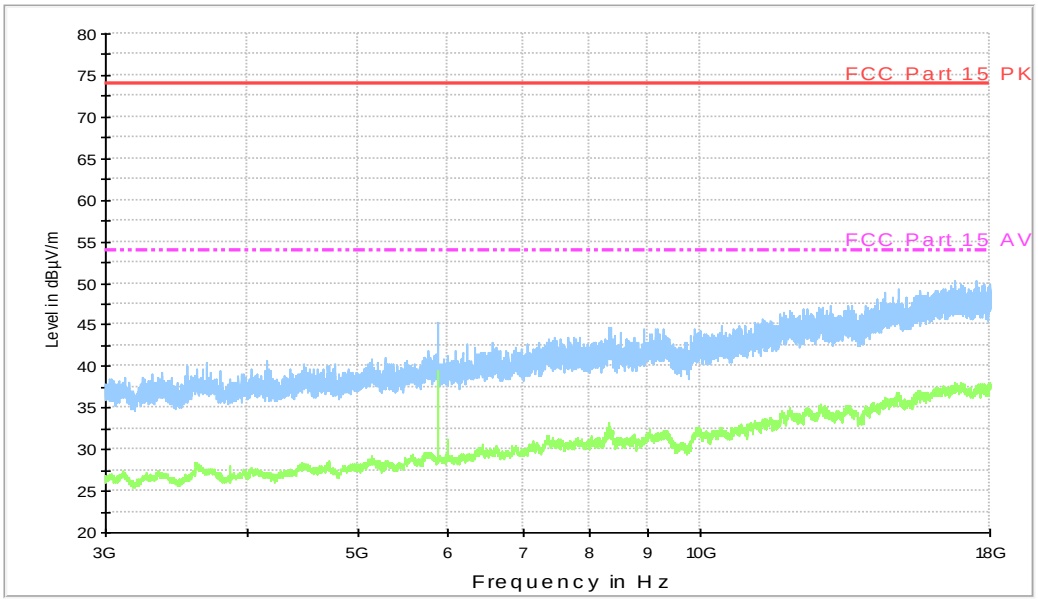

Figure A.9 Radiated Emission from 3GHz to 18GHz

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 charging mode. During the test MS is connected to a charger in the case of charging mode.

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*=3.10dB, *k*=2.

Charging Mode, Set.1

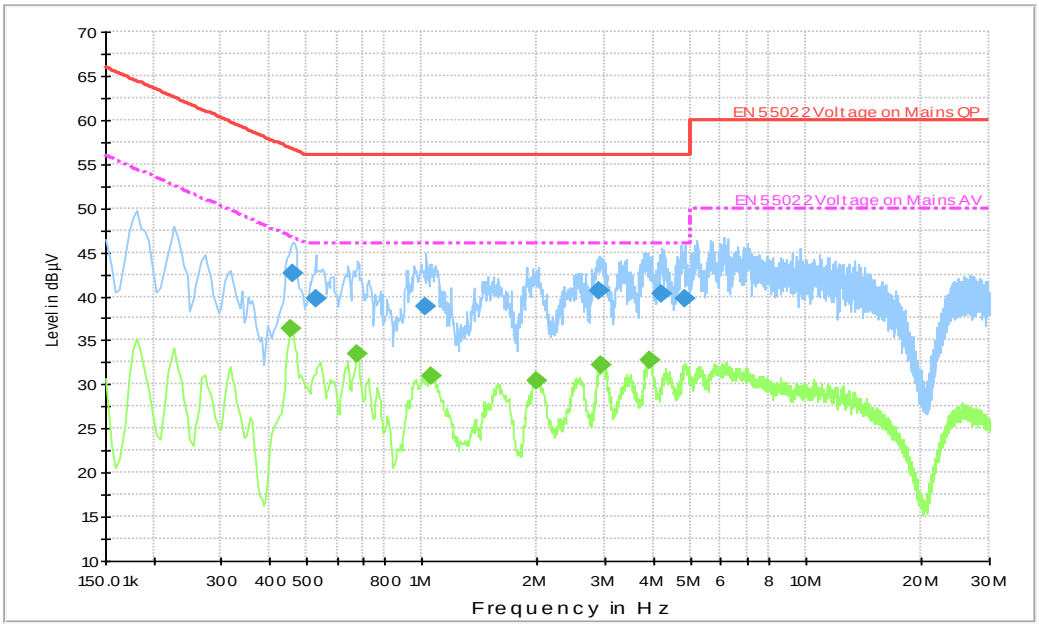

Figure A.10 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.460500	42.5	L1	10.7	14.1	56.7
0.528000	39.7	L1	10.6	16.3	56.0
1.023000	38.9	L1	10.9	17.1	56.0
2.881500	40.5	L1	10.5	15.5	56.0
4.209000	40.3	L1	10.4	15.7	56.0
4.852500	39.6	L1	10.4	16.4	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.456000	36.3	L1	10.8	10.5	46.8
0.676500	33.4	L1	10.8	12.6	46.0
1.059000	31.0	L1	10.9	15.0	46.0
1.981500	30.4	L1	10.5	15.6	46.0
2.940000	32.2	L1	10.5	13.8	46.0
3.907500	32.8	L1	10.4	13.2	46.0

USB Mode, Set.2

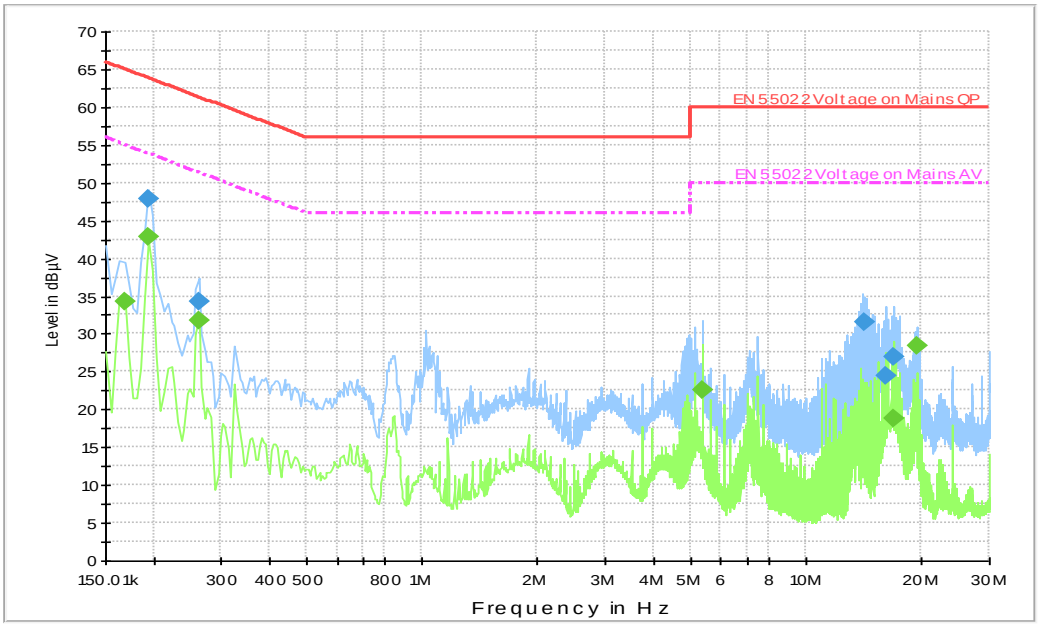

Figure A.11 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.5	L1	10.8	28.5	66.0
0.195000	47.9	L1	10.8	15.9	63.8
0.262500	34.4	L1	10.8	27.0	61.4
14.140500	31.6	N	10.9	28.4	60.0
16.161000	24.4	N	10.9	35.6	60.0
16.858500	27.0	L1	10.8	33.0	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	34.3	L1	10.8	20.8	55.1
0.195000	42.9	L1	10.8	11.0	53.8
0.262500	31.7	L1	10.8	19.7	51.4
5.388000	22.5	L1	10.5	27.5	50.0
16.863000	18.8	N	10.9	31.2	50.0
19.369500	28.4	N	10.7	21.6	50.0

USB Mode, Set.3

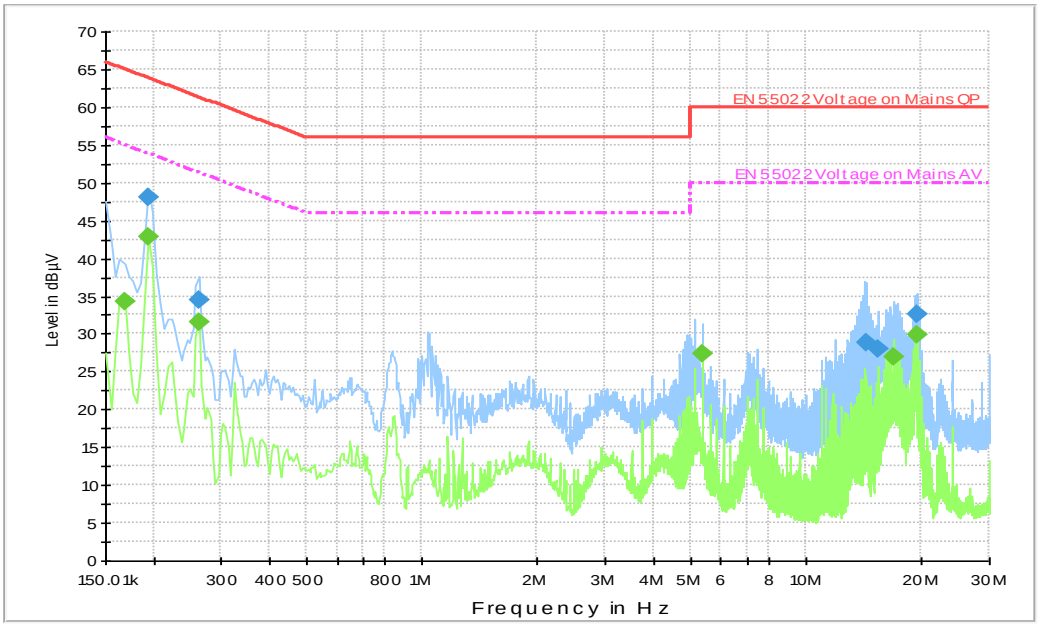

Figure A.12 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.7	L1	10.8	28.3	66.0
0.195000	48.0	L1	10.8	15.8	63.8
0.262500	34.5	L1	10.8	26.9	61.4
14.334000	28.8	N	10.9	31.2	60.0
15.445500	28.1	N	11.0	31.9	60.0
19.410000	32.5	L1	10.8	27.5	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	34.3	L1	10.8	20.8	55.1
0.195000	42.8	L1	10.8	11.0	53.8
0.262500	31.5	L1	10.8	19.8	51.4
5.383500	27.4	L1	10.5	22.6	50.0
16.849500	27.0	L1	10.8	23.0	50.0
19.369500	29.9	L1	10.8	20.1	50.0

ANNEX A: Persons involved in this testing

Test Item	Tester
Conducted Continuous Emission	Yang Fei
Radiated Continuous Emission	Zhao Wenhui

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