FCC 15B TEST REPORT

No. I20Z60681-EMC01

for

TCL Communication Ltd.

GSM/UMTS/LTE Mobile phone

Model Name: 5004S

FCC ID: 2ACCJH127

with

Hardware Version: 08

Software Version: 5H6EUFE0

Issued Date: 2020-07-10

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.

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20Z60681-EMC01	Rev.0	1st edition	2020-06-24
I20Z60681-EMC01	Rev.1	2nd edition,Update the Test Equipments Utilized	2020-07-10

CONTENTS

1. Test Laboratory

1.1. Testing Location

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: 2020-05-28

Testing End Date: 2020-06-22

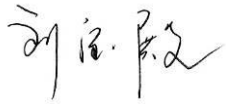
1.4. Signature

An Hui

(Prepared this test report)

Zhang Ying

(Reviewed this test report)



Liu Baodian

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	Hong Kong
Postal Code:	/
Country:	China
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	Hong Kong
Postal Code:	/
Country:	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/UMTS/LTE Mobile phone
Model Name	5004S
FCC ID	2ACCJH127

The Equipment under Test (EUT) is a model of GSM/UMTS/LTE Mobile phone with integrated antenna and inbuilt battery.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the client.

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
EUT1	355952110203844	08	5H6EUFE0

*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	Headset	/	/

AE1

Model	CAC2900028C1
Manufacturer	BYD
Capacitance	3000mAh
Nominal voltage	/

AE2

Model	CBA0059BGTC5
Manufacturer	PUAN
Length of cable	/

AE3

Model	CDA0000151C1
Manufacturer	JUWEI
Length of cable	/

AE4

Model	Headset
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	EUT2+ AE1 + AE2 + AE3	Charger+MP3+GNSS + GSM850 idle
Set.2	EUT2+ AE1 + AE2 + AE3	Charger+CAMERA + WCDMA850 idle
Set.3	EUT2+ AE1 + AE2 + AE3 + AE4	USB mode +FM + LTE FDD Band 5/12/13

Note：

The device contains receivers which tune and operate between 30MHz-960MHz in the following bands: GSM850, WCDMA850, LTE B5, LTE B12 and LTE B13.

The EUT was tested while operating in licensed band RX mode. All licensed band receivers are investigated. Only the worst case emissions are reported.

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

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 M
Ground system resistance	< 4
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

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 M
Ground system resistance	< 4

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)	A.1	P	1
2	Conducted Emission	15.107(a)	A.2	P	1

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	LISN	ENV216	101200	Rohde & Schwarz	1 year	2021-05-17
2	Test Receiver	ESCI 7	100344	Rohde & Schwarz	1 Year	2021-02-26
3	Universal Radio Communication Tester	CMW500	150344	R&S	1 Year	2020-11-17
4	Test Receiver	ESU26	100235	Rohde & Schwarz	1 Year	2021-03-03
5	BiLog Antenna	VULB9163	483	Schwarzbeck	1 Year	2020-09-17
6	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	1 Year	2021-01-14
7	PC	M4000e-17	M706GWXD	Lenovo	N/A	N/A
8	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
9	Signal Generator	SMT06	831285/005	R&S	1 Year	2021-01-04

Note: The EMI Antenna with series number 167250 was used before Cal. Due Date.

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01.0	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 and FM 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 charging mode. During the test MS is connected to a charger in the case of charging 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 Section 2.2, 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.

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：5.16dB, 1GHz-18GHz：5.44dB, *k*=2.

Measurement results for Set.1:

Charger+MP3+GNSS + GSM850 idle

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.737000	17.36	30.00	12.64	184.0	V	30.0
41.192000	13.06	30.00	16.94	195.0	V	-30.0
52.564000	12.74	30.00	17.26	184.0	V	182.0
60.851000	16.65	30.00	13.35	288.0	V	-30.0
102.967000	9.95	33.50	23.57	225.0	V	-2.0
398.586000	14.40	36.00	21.62	104.0	V	72.0

Charger+MP3+GNSS + GSM850 idle Average detector

Frequency (MHz)	Result (dBμV/m)	GPL (dB)	GA (dB/m)	PMea (dBμV)	Polarity	Limit (dBμV/m)	Margin (dB)
17954.100	47.7	-17.7	45.6	19.800	H	54	6.3
17844.733	47.1	-18.5	45.6	20.000	H	54	6.9
17962.033	47.0	-17.7	45.6	19.100	V	54	7
17977.333	46.9	-17.7	45.6	19.000	H	54	7.1
17950.133	46.8	-17.7	45.6	18.900	H	54	7.2
17981.300	46.8	-17.7	45.6	18.900	H	54	7.2

Charger+MP3+GNSS + GSM850 idle Peak detector

Frequency (MHz)	Result (dBμV/m)	GPL (dB)	GA (dB/m)	PMea (dBμV)	Polarity	Limit (dBμV/m)	Margin (dB)
17958.633	55.9	-17.7	45.6	28.000	H	74	18.1
17946.733	55.8	-17.7	45.6	27.900	H	74	18.2
17890.067	55.6	-18.5	45.6	28.500	V	74	18.4
17954.100	55.5	-17.7	45.6	27.600	H	74	18.5
17948.433	55.5	-17.7	45.6	27.600	H	74	18.5
17840.200	55.5	-18.5	45.6	28.400	H	74	18.5

Measurement results for Set.2:

Charger+CAMERA + WCDMA 850 idle QP detector

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
32.134000	18.05	30.00	11.95	110.0	V	30.0
41.538000	12.08	30.00	17.92	314.0	V	-7.0
59.382000	14.50	30.00	15.50	277.0	V	120.0
100.334000	9.32	33.50	24.20	316.0	V	-30.0
110.801000	10.42	33.50	23.10	125.0	V	-18.0
577.200000	17.47	36.00	18.55	225.0	V	190.0

Charger+CAMERA + WCDMA 850 idle Mode /Average detector

Frequency (MHz)	Result (dBμV/m)	GPL (dB)	GA (dB/m)	PMea (dBμV)	Polarity	Limit (dBμV/m)	Margin (dB)
17947.867	47.4	-17.7	45.6	19.500	H	54	6.6
17941.067	47.4	-17.7	45.6	19.500	H	54	6.6
17958.633	47.2	-17.7	45.6	19.300	V	54	6.8
17945.600	47.1	-17.7	45.6	19.200	H	54	6.9
17982.433	46.8	-17.7	45.6	18.900	H	54	7.2
17839.067	46.8	-18.5	45.6	19.700	H	54	7.2

Charger+CAMERA + WCDMA 850 idle Mode /Peak detector

Frequency (MHz)	Result (dBμV/m)	GPL (dB)	GA (dB/m)	PMea (dBμV)	Polarity	Limit (dBμV/m)	Margin (dB)
17958.633	55.9	-17.7	45.6	28.000	H	74	18.1
17946.733	55.8	-17.7	45.6	27.900	H	74	18.2
17890.067	55.6	-18.5	45.6	28.500	V	74	18.4
17954.100	55.5	-17.7	45.6	27.600	H	74	18.5
17948.433	55.5	-17.7	45.6	27.600	H	74	18.5
17840.200	55.5	-18.5	45.6	28.400	H	74	18.5

Measurement results for Set.3:

USB & FM + LTE B12 idle Mode QP detector

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
44.379000	18.97	30.00	11.03	125.0	V	104.0
74.694000	17.13	30.00	12.87	178.0	V	78.0
99.124000	21.70	33.50	11.82	101.0	V	-18.0
296.491000	20.54	36.00	15.48	102.0	V	157.0
494.431000	24.24	36.00	11.78	279.0	V	-18.0
595.344000	28.36	36.00	7.66	225.0	V	-30.0

USB & FM Mode + LTE B12 idle Average detector

Frequency (MHz)	Result (dBμV/m)	GPL (dB)	GA (dB/m)	PMea (dBμV)	Polarity	Limit (dBμV/m)	Margin (dB)
17954.667	46.8	-17.7	45.6	18.900	H	54	7.2
17963.167	46.8	-17.7	45.6	18.900	H	54	7.2
17985.833	46.8	-17.7	45.6	18.900	V	54	7.2
17993.200	46.7	-17.7	45.6	18.800	H	54	7.3
17965.433	46.5	-17.7	45.6	18.600	H	54	7.5
17957.500	46.5	-17.7	45.6	18.600	H	54	7.5

USB & FM Mode + LTE B12 idle Peak detector

Frequency (MHz)	Result (dBμV/m)	GPL (dB)	GA (dB/m)	PMea (dBμV)	Polarity	Limit (dBμV/m)	Margin (dB)
17959.200	56.0	-17.7	45.6	28.100	H	74	18
17967.700	55.9	-17.7	45.6	28.000	H	74	18.1
17990.933	55.8	-17.7	45.6	27.900	V	74	18.2
17962.600	55.8	-17.7	45.6	27.900	H	74	18.2
17977.900	55.7	-17.7	45.6	27.800	H	74	18.3
17957.500	55.6	-17.7	45.6	27.700	H	74	18.4

Sample calculation: Peak detector, 17959.200MHz

Result =P_{Mea} (28.1dBμV)+ G_A (45.6dB/m)+ G_{PL}(-17.7 dB) =56 dBμV/m

Charger+MP3+GNSS + GSM850 idle, Set.1

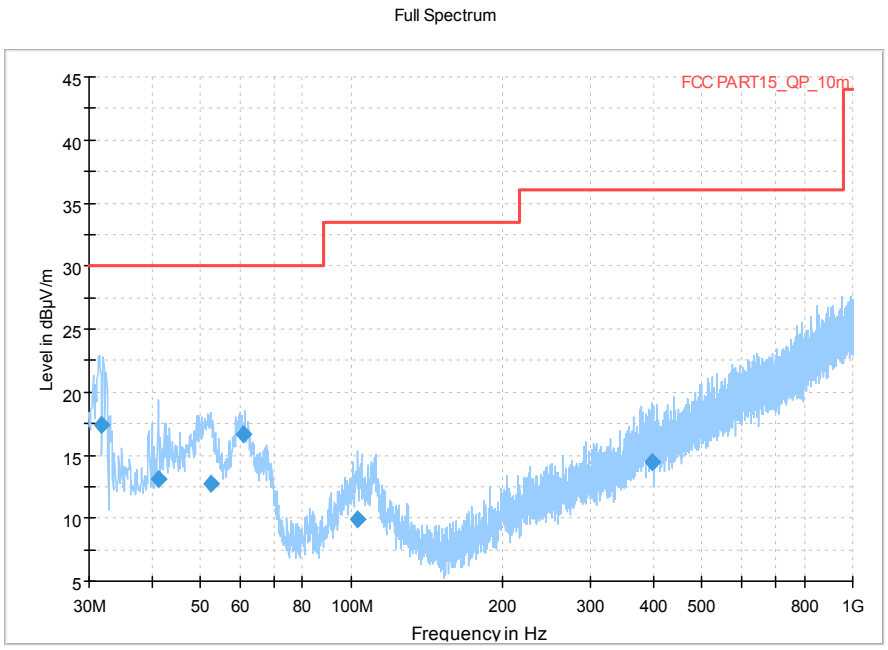


Figure A.1 Radiated Emission from 30MHz to 1GHz

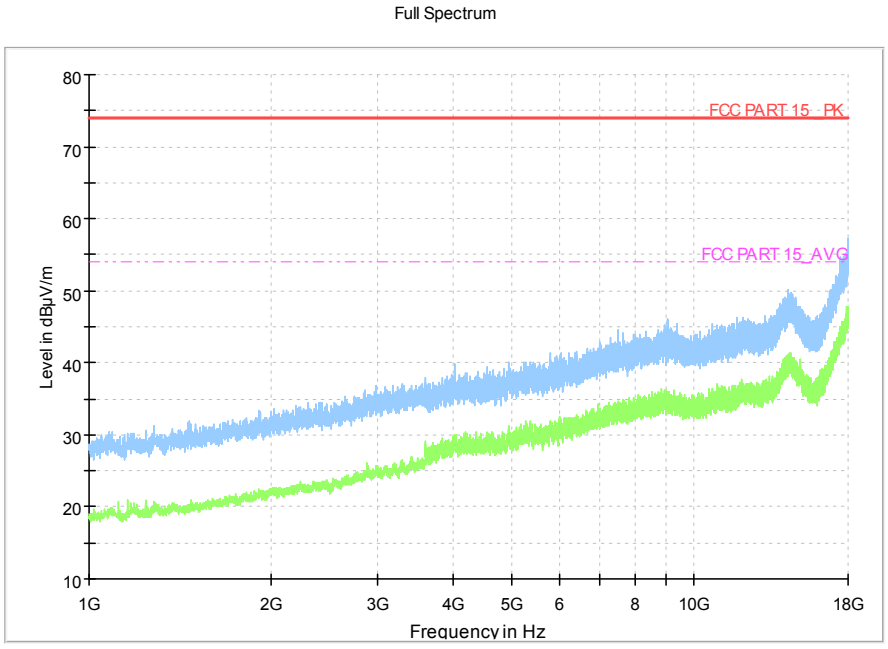


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charger+CAMERA + WCDMA850 idle, Set.2

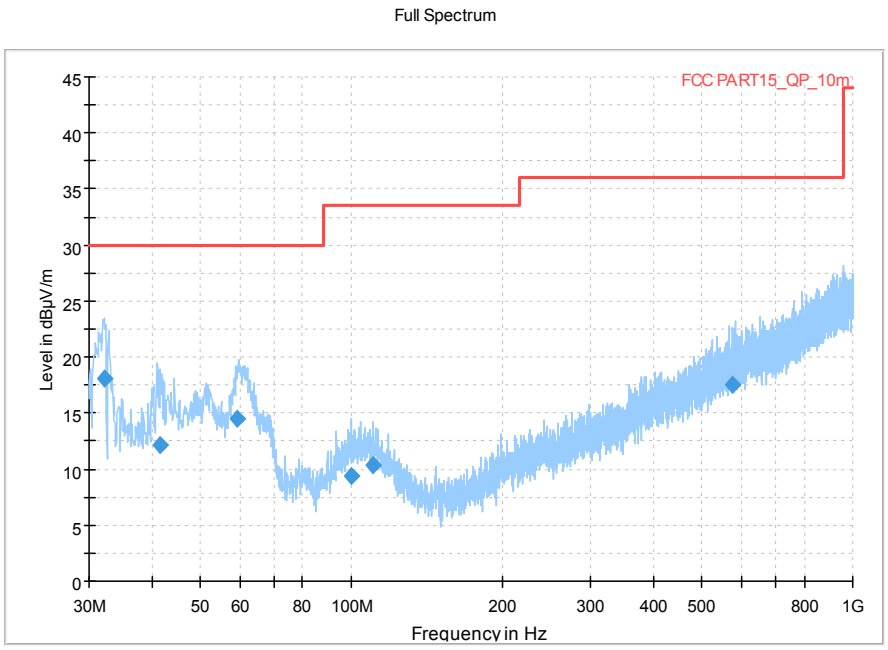


Figure A.3 Radiated Emission from 30MHz to 1GHz

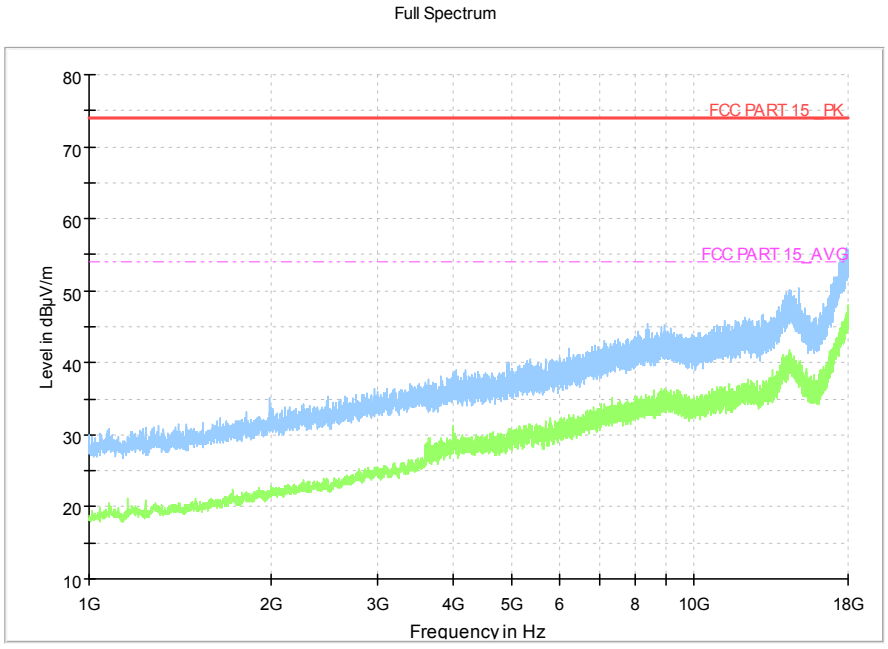


Figure A.4 Radiated Emission from 1GHz to 18GHz

USB mode +FM + LTE FDD Band 5, Set.3

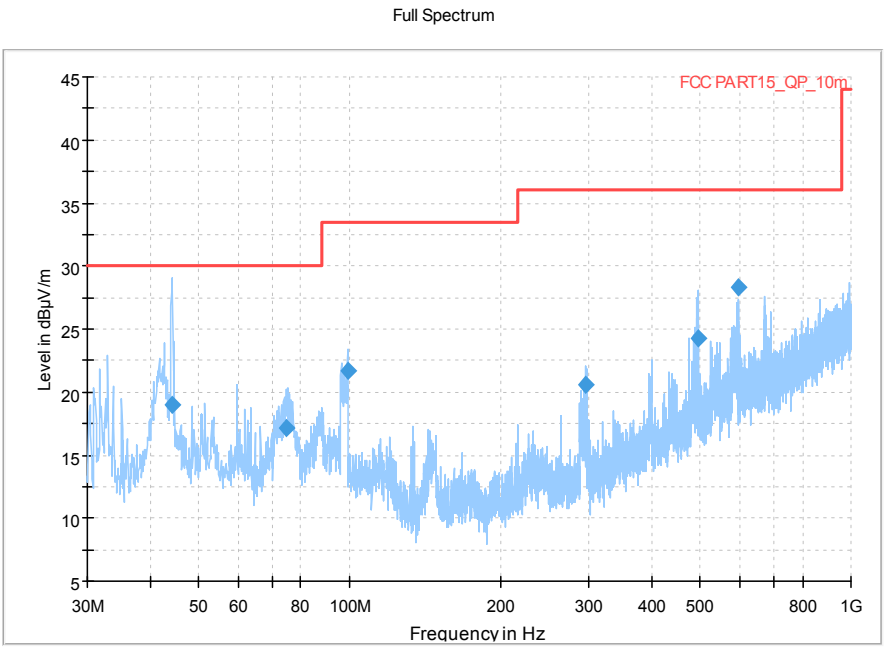


Figure A.5 Radiated Emission from 30MHz to 1GHz

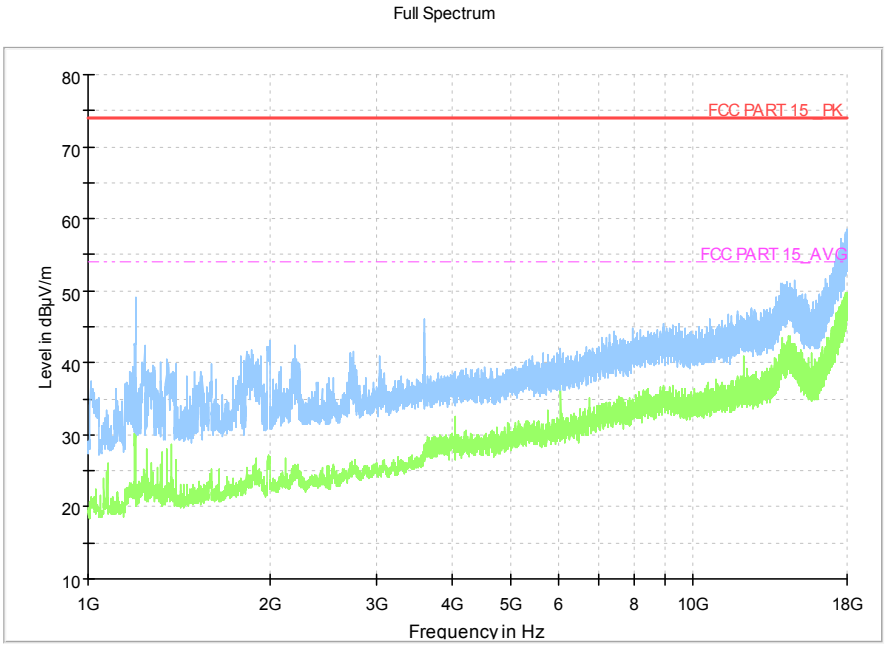


Figure A.6 Radiated Emission from 1GHz to 18GHz

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 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*=3.08dB, *k*=2.

Charger+MP3+GNSS + GSM850 idle, Set.1

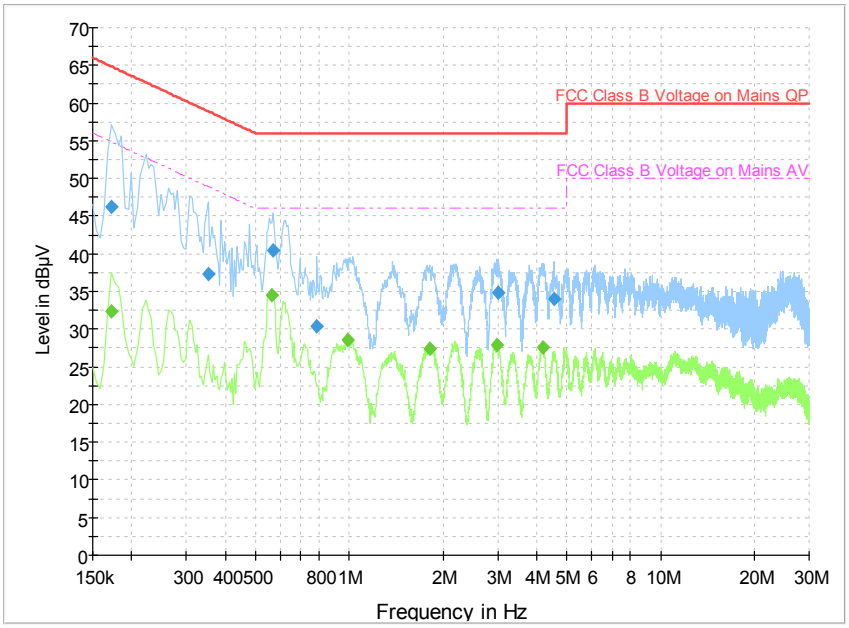


Figure A.11 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	46.2	L1	20.1	18.6	64.8
0.352500	37.3	N	19.9	21.6	58.9
0.568500	40.4	N	20.0	15.6	56.0
0.789000	30.3	L1	20.0	25.7	56.0
3.021000	34.8	N	20.1	21.2	56.0
4.533000	34.0	L1	20.7	22.0	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	32.3	L1	20.1	22.6	54.8
0.564000	34.4	N	20.0	11.6	46.0
0.987000	28.6	L1	19.8	17.4	46.0
1.806000	27.3	N	19.9	18.7	46.0
2.989500	27.9	L1	20.3	18.1	46.0
4.173000	27.6	N	20.4	18.4	46.0

Charger+CAMERA + WCDMA850 idle, Set.2

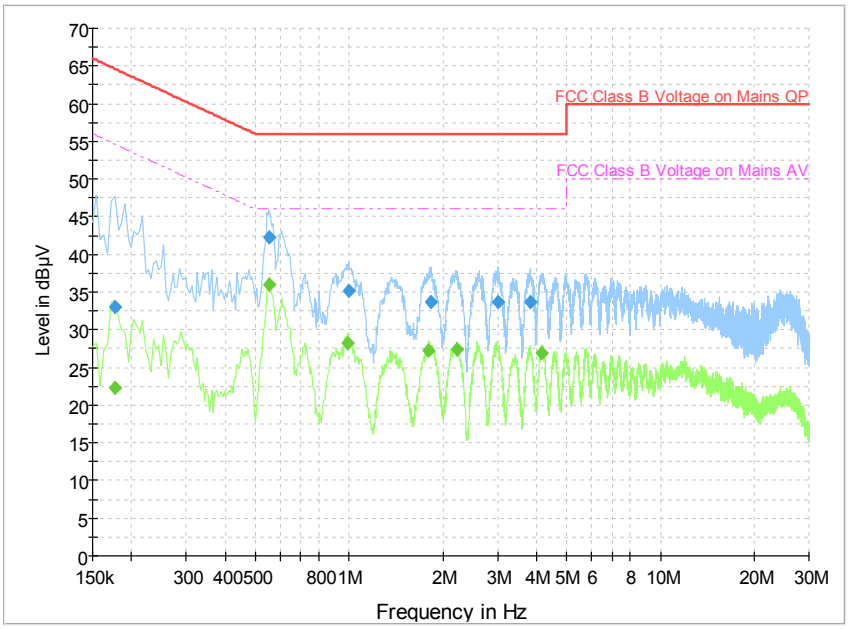


Figure A.12 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.177000	33.0	L1	20.1	31.6	64.6
0.555000	42.3	N	20.0	13.7	56.0
0.996000	35.2	L1	19.8	20.8	56.0
1.828500	33.7	L1	20.0	22.3	56.0
3.016500	33.7	L1	20.3	22.3	56.0
3.817500	33.7	L1	20.5	22.3	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.177000	22.3	L1	20.1	32.3	54.6
0.555000	36.0	N	20.0	10.0	46.0
0.987000	28.3	N	19.9	17.7	46.0
1.797000	27.2	L1	20.0	18.8	46.0
2.211000	27.3	L1	20.1	18.7	46.0
4.155000	27.0	L1	20.6	19.0	46.0

USB mode +FM + LTE FDD Band 5, Set.3

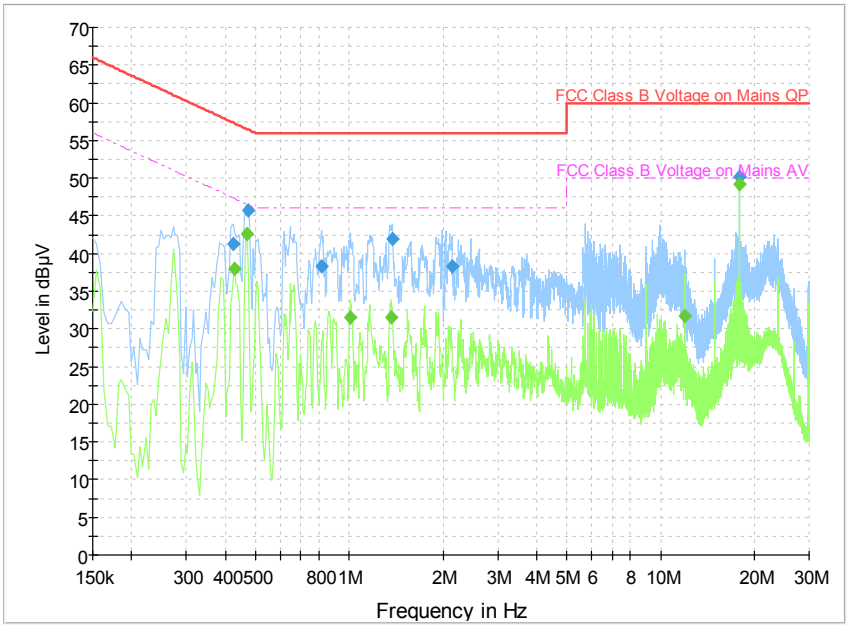


Figure A.13 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.424500	41.2	N	19.9	16.2	57.4
0.474000	45.7	L1	20.1	10.7	56.4
0.811500	38.2	L1	20.0	17.8	56.0
1.374000	41.9	N	19.9	14.1	56.0
2.139000	38.3	N	19.9	17.7	56.0
17.916000	50.1	L1	24.8	9.9	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	37.9	L1	20.1	9.4	47.3
0.469500	42.6	L1	20.1	3.9	46.5
1.009500	31.6	N	19.9	14.4	46.0
1.365000	31.5	N	19.9	14.5	46.0
11.944500	31.7	N	23.2	18.3	50.0
17.916000	49.2	L1	24.8	0.9	50.0

ANNEX B: Persons involved in this testing

Test Item	Tester
Conducted Continuous Emission	Wang Huan
Radiated Continuous Emission	Yan Hanchen

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