



TEST REPORT

No. I17Z60885-EMC01

for

TCL Communication Ltd.

LTE/UMTS/GSM mobile phone

Model Name: 6058A

FCC ID: 2ACCJH078

with

Hardware Version: P10

Software Version: v2CT4

Issued Date: 2017-07-04

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.

Test Laboratory:

FCC 2.948 Listed: No. 525429

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z60885-EMC01	Rev.0	1st edition	2017-07-04

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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: 2017-06-17

Testing End Date: 2017-06-27

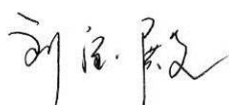
1.4. Signature



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(Prepared this test report)



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(Reviewed this test report)



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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
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Pudong Area Shanghai, P.R. China. 201203
Contact Person: Gong Zhizhou
Contact Email: zhizhou.gong@tcl.com
Telephone: 0086-21-31363544
Fax: 0086-21-61460602

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

3.1. About EUT

Description	LTE/UMTS/GSM mobile phone
Model Name	6058A
FCC ID	2ACCJH078
Extreme vol. Limits	3.5VDC 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 Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT4	358472080201071	PIO	v2CT4

*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	Travel charger	/	/
AE4	Travel charger	/	/
AE5	USB cable	/	/
AE6	USB cable	/	/
AE7	Headset	/	/
AE8	Headset	/	/

AE1

Model	CAC2710004C1
Manufacturer	BYD
Capacitance	2710mAh
Nominal voltage	/

AE2

Model	CAC2710005CC
Manufacturer	JINNENG
Capacitance	2710mAh
Nominal voltage	/

AE3

Model	CBA0058AGAC5
Manufacturer	PUAN
Length of cable	/

AE4

Model	CBA0058AGAC2
Manufacturer	TEN PAO

Length of cable /

AE5

Model CDA3122005C2
Manufacturer SHENGHUA
Length of cable 92cm

AE6

Model CDA3122005C8
Manufacturer PUAN
Length of cable /

AE7

Model CCB0049A10C1
Manufacturer Juwei
Length of cable /

AE8

Model CCB0049A10C4
Manufacturer MEIHAO
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	EUT4+ AE1+ AE3 + AE5	Charging mode
Set.2	EUT4+ AE1+ AE4 + AE5	Charging mode
Set.3	EUT4+ AE1+ AE5	USB mode

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	2015
ANSI C63.4	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 used have no deviation with standards above.

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 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
Location Column	1	The test is performed in test location 1 which are described in section 1.1 of this report

Clause	List	Clause in FCC rules	Verdict	Location
1	Radiated Emission	15.109(a)	P	1
2	Conducted Emission	15.107(a)	P	1

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI	100344	R&S	2018-02-15	1 year
2	Test Receiver	ESU26	100235	R&S	2018-03-01	1 year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2017-12-01	1 year
4	Universal Radio Communication Tester	CMW500	155415	R&S	2018-01-15	1 year
5	LISN	ENV216	101200	R&S	2017-07-10	1 year
6	EMI Antenna	VULB 9163	9163-302	Schwarzbeck	2020-03-30	3 years
7	EMI Antenna	3115	6914	ETS-Lindgren	2017-12-15	3 years

Test Software Utilized

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01	R&S
Conducted Emission	EMC32 V8.52.0	R&S

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§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 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 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:

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

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case):

30MHz-1GHz: $U = 4.86 \text{ dB}$, $k=2$,

1GHz-18GHz: $U = 5.26 \text{ dB}$, $k=2$

Measurement results for Set.1

Charging Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17940.500	43.9	-17.7	45.6	16.000	H
17847.567	43.7	-18.5	45.6	16.600	H
17934.833	43.7	-17.7	45.6	15.800	V
17934.267	43.7	-17.7	45.6	15.800	H
17918.400	43.7	-17.7	45.6	15.800	H
17939.367	43.7	-17.7	45.6	15.800	H

Charging Mode /Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17988.100	55.3	-17.7	45.6	27.400	H
17910.467	55.0	-18.5	45.6	27.900	H
17921.233	54.9	-17.7	45.6	27.000	H
17955.800	54.9	-17.7	45.6	27.000	H
17900.833	54.9	-18.5	45.6	27.800	H
17891.767	54.9	-18.5	45.6	27.800	H

Measurement results for Set.2:

Charging Mode /Average detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17924.633	43.8	-17.7	45.6	15.900	H
17950.133	43.7	-17.7	45.6	15.800	H
17929.733	43.6	-17.7	45.6	15.700	H
17954.667	43.6	-17.7	45.6	15.700	H
17954.100	43.6	-17.7	45.6	15.700	H
17934.833	43.6	-17.7	45.6	15.700	H

Charging Mode /Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17971.667	55.4	-17.7	45.6	27.500	H
17988.100	55.3	-17.7	45.6	27.400	H
17927.467	55.2	-17.7	45.6	27.300	H
17846.433	55.1	-18.5	45.6	28.000	H
17851.533	55.1	-18.5	45.6	28.000	H
17943.900	54.9	-17.7	45.6	27.000	H

Measurement results for Set.3:
USB Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17911.600	43.9	-18.5	45.6	16.800	H
17955.233	43.9	-17.7	45.6	16.000	H
17894.033	43.8	-18.5	45.6	16.700	H
17974.500	43.8	-17.7	45.6	15.900	H
17972.233	43.5	-17.7	45.6	15.600	H
17943.900	43.5	-17.7	45.6	15.600	H

USB Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17984.700	55.4	-17.7	45.6	27.500	H
17848.700	55.4	-18.5	45.6	28.300	H
17873.067	55.4	-18.5	45.6	28.300	H
17943.333	55.4	-17.7	45.6	27.500	H
17953.533	55.3	-17.7	45.6	27.400	H
17933.700	55.2	-17.7	45.6	27.300	H

Sample calculation: Average detector , 17911.6MHz

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}}(16.8\text{dB}\mu\text{V}) + G_A (45.6\text{dB/m}) + G_{\text{PL}} (-18.5\text{dB}) = 43.9\text{dB}\mu\text{V/m}$$

Charging Mode, Set.1

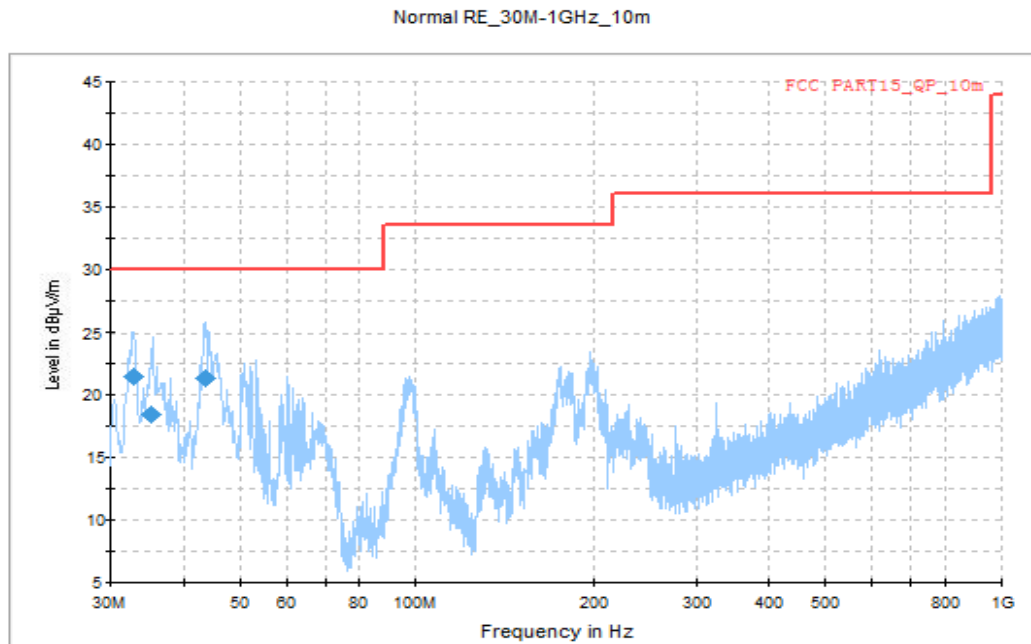


Fig.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.887000	21.5	120.000	275.0	V	248.0	-15.0	8.5	30.0
35.289000	18.4	120.000	287.0	V	-30.0	-14.0	11.6	30.0
43.557000	21.3	120.000	175.0	V	300.0	-12.0	8.7	30.0

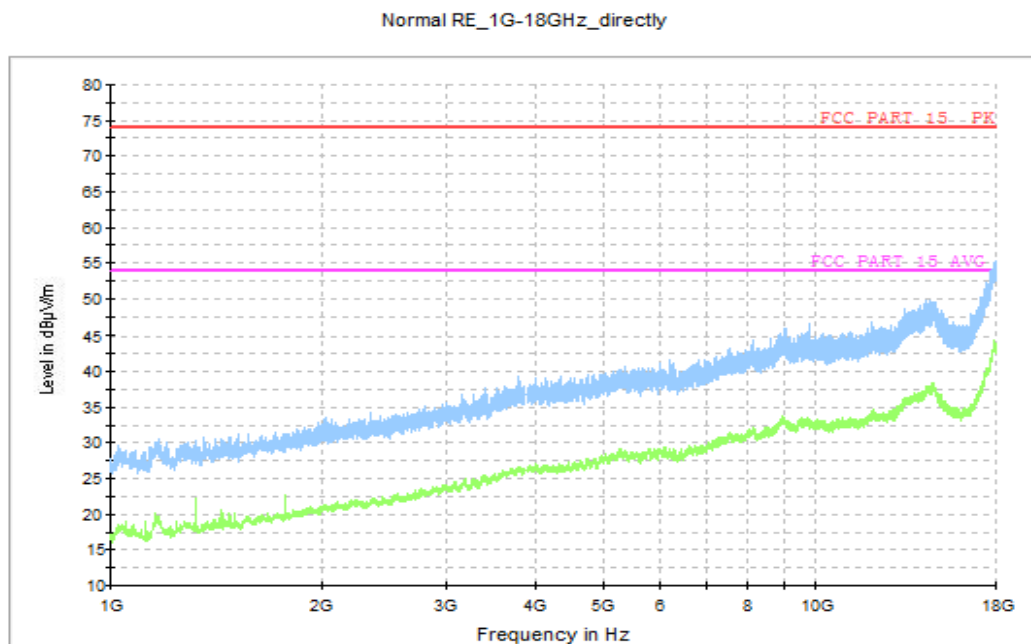


Fig.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.2

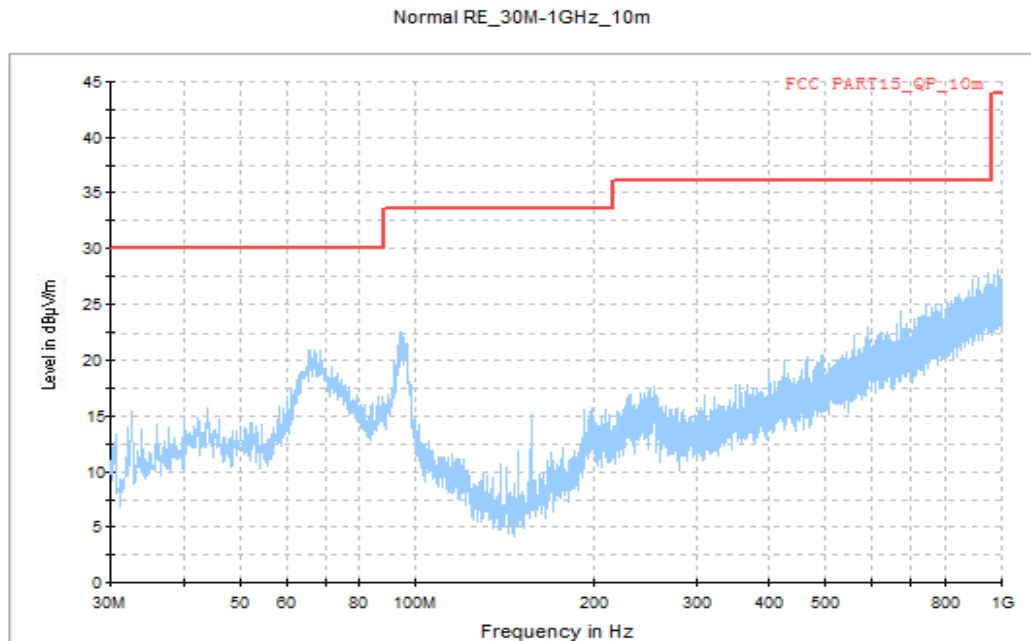


Fig.3 Radiated Emission from 30MHz to 1GHz

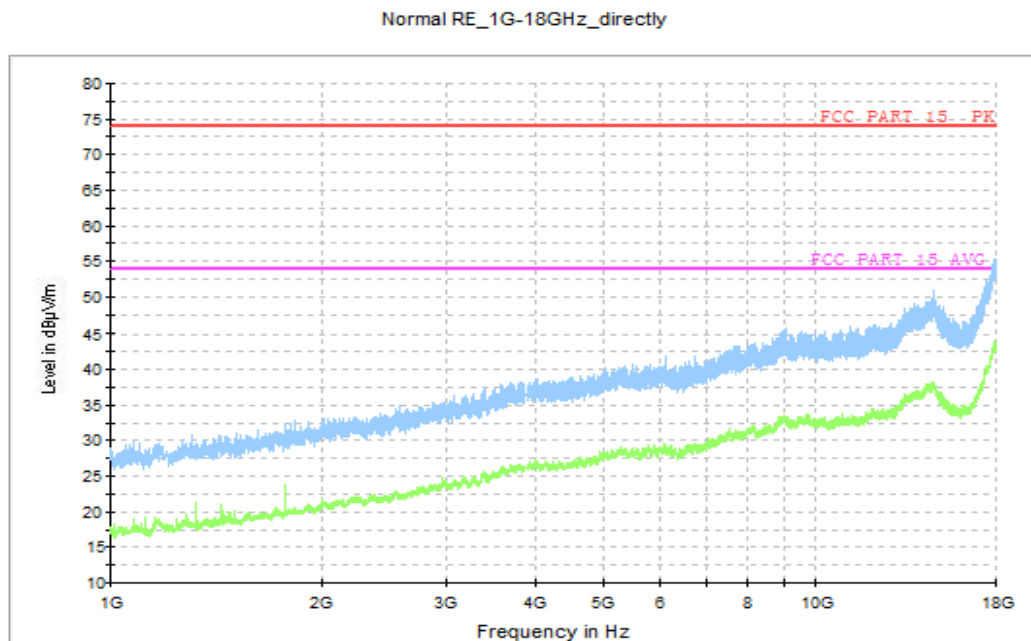


Fig.4 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.3

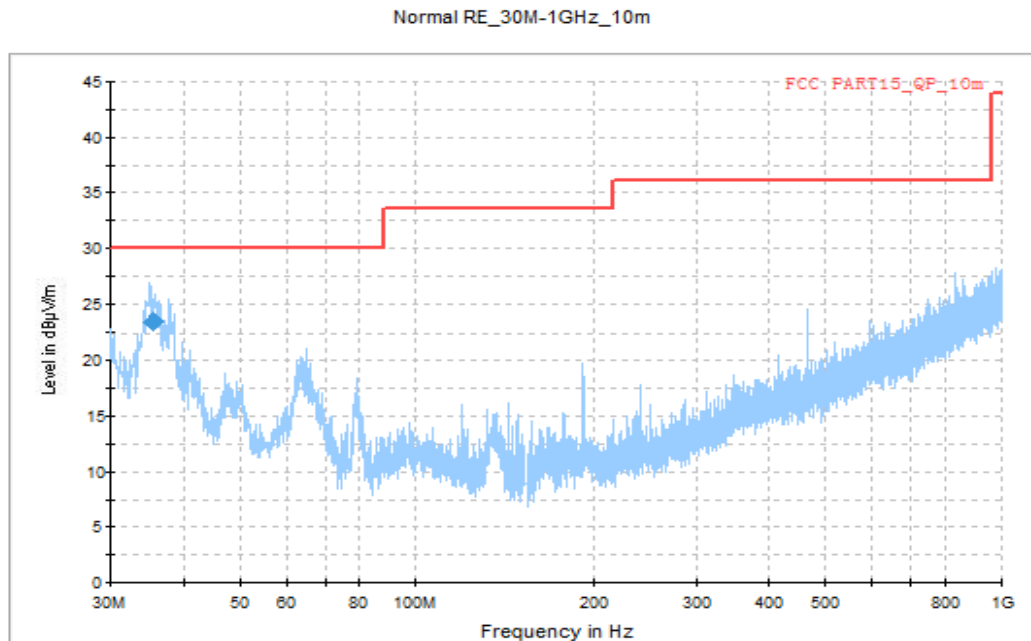


Fig.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
35.524000	23.5	120.000	325.0	V	247.0	-13.9	6.5	30.0

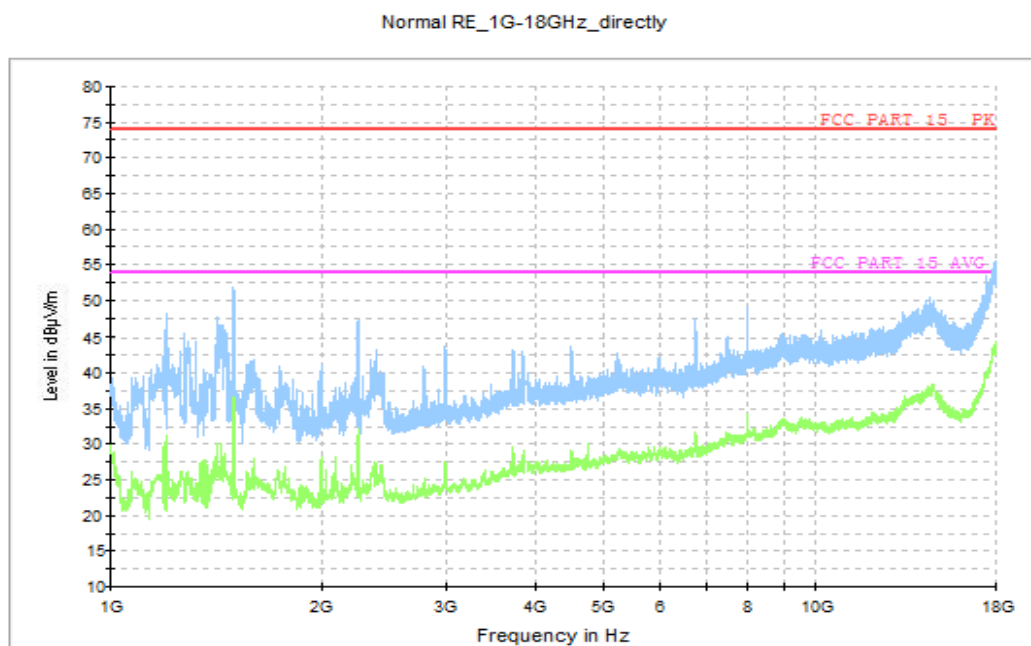


Fig.6 Radiated Emission from 1GHz to 18GHz

A.2 Conducted Emission (§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 7.2.

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 (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: $U= 3.38$ dB, $k=2$.

Charging Mode, Set.1

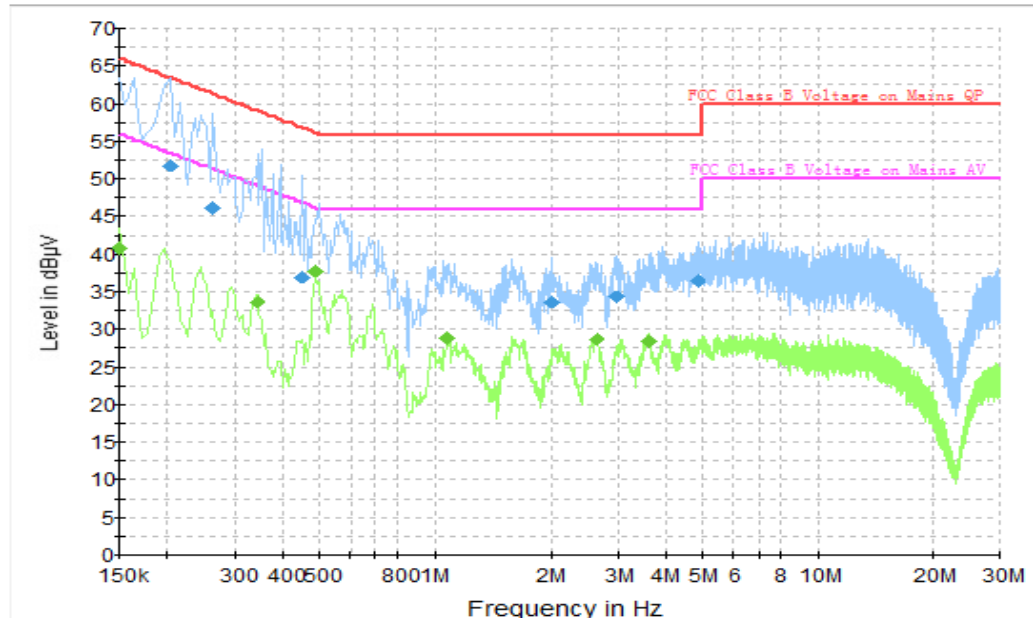


Fig.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.204000	51.9	2000.0	9.000	On	L1	19.8	11.6	63.4
0.262500	46.2	2000.0	9.000	On	N	19.8	15.1	61.4
0.447000	37.0	2000.0	9.000	On	L1	19.9	19.9	56.9
2.031000	33.6	2000.0	9.000	On	L1	19.7	22.4	56.0
2.989500	34.3	2000.0	9.000	On	L1	19.1	21.7	56.0
4.848000	36.4	2000.0	9.000	On	L1	19.6	19.6	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	40.8	2000.0	9.000	On	L1	20.2	15.2	56.0
0.343500	33.7	2000.0	9.000	On	L1	19.9	15.4	49.1
0.487500	37.8	2000.0	9.000	On	L1	19.9	8.4	46.2
1.077000	28.9	2000.0	9.000	On	L1	19.7	17.1	46.0
2.656500	28.7	2000.0	9.000	On	L1	19.4	17.3	46.0
3.628500	28.4	2000.0	9.000	On	L1	19.5	17.6	46.0

Charging Mode, Set.2

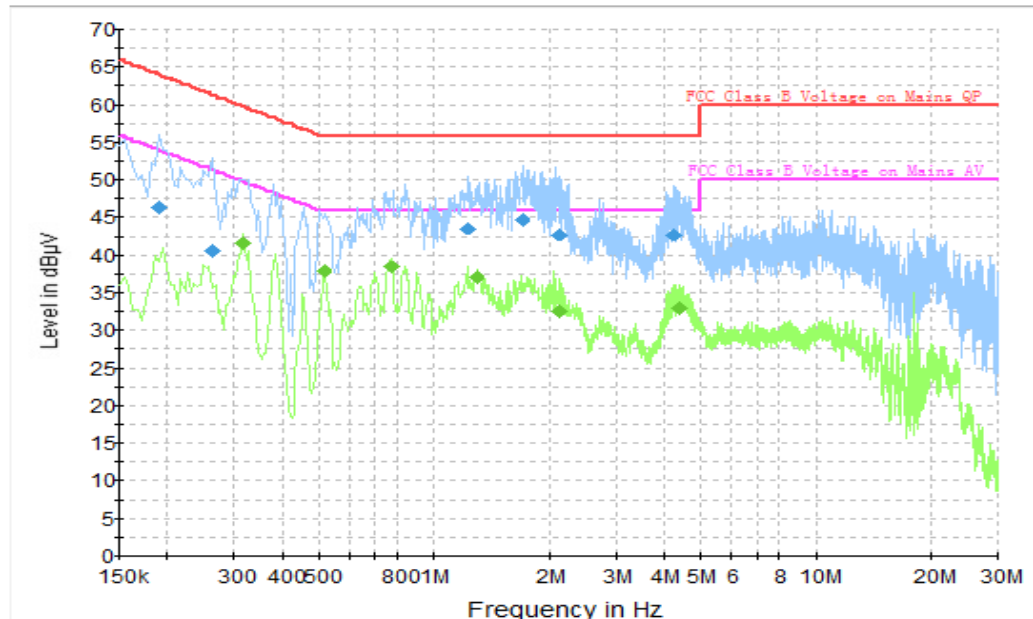


Fig.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.190500	46.5	2000.0	9.000	On	L1	19.8	17.5	64.0
0.262500	40.6	2000.0	9.000	On	L1	19.8	20.7	61.4
1.225500	43.6	2000.0	9.000	On	L1	19.7	12.4	56.0
1.702500	44.7	2000.0	9.000	On	L1	19.7	11.3	56.0
2.125500	42.7	2000.0	9.000	On	L1	19.5	13.3	56.0
4.231500	42.8	2000.0	9.000	On	L1	19.6	13.2	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.316500	41.7	2000.0	9.000	On	N	19.8	8.1	49.8
0.514500	37.9	2000.0	9.000	On	N	19.9	8.1	46.0
0.771000	38.4	2000.0	9.000	On	N	19.8	7.6	46.0
1.293000	37.2	2000.0	9.000	On	N	19.7	8.8	46.0
2.125500	32.4	2000.0	9.000	On	L1	19.5	13.6	46.0
4.384500	33.0	2000.0	9.000	On	L1	19.6	13.0	46.0

Charging Mode, Set.3

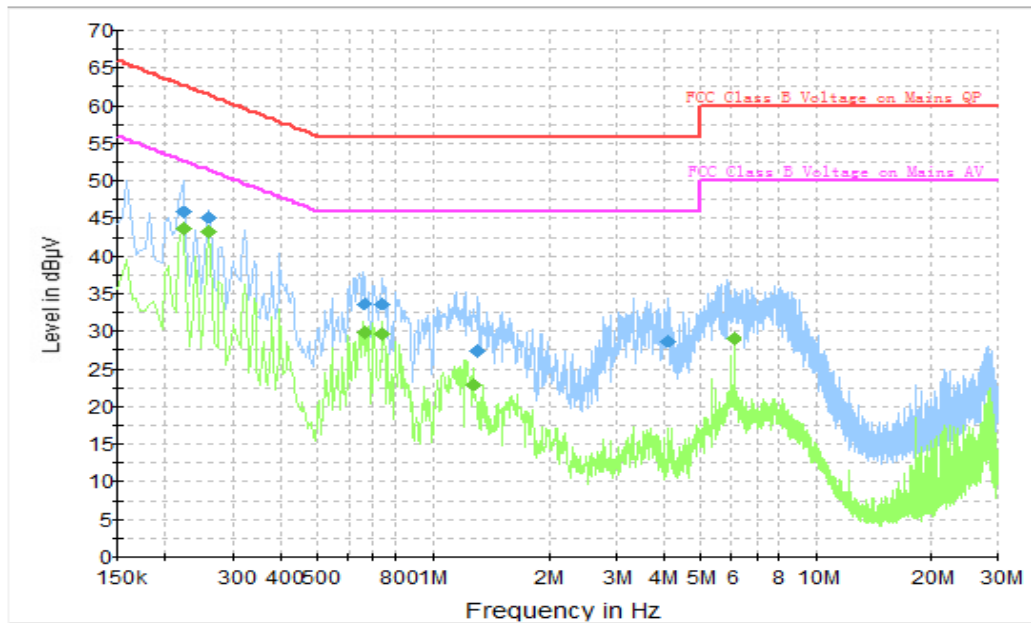


Fig.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.222000	45.9	2000.0	9.000	On	N	19.8	16.8	62.7
0.258000	45.2	2000.0	9.000	On	N	19.8	16.3	61.5
0.658500	33.6	2000.0	9.000	On	N	19.8	22.4	56.0
0.739500	33.7	2000.0	9.000	On	N	19.8	22.3	56.0
1.306500	27.4	2000.0	9.000	On	N	19.7	28.6	56.0
4.128000	28.7	2000.0	9.000	On	N	19.6	27.3	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.222000	43.7	2000.0	9.000	On	N	19.8	9.0	52.7
0.258000	43.3	2000.0	9.000	On	N	19.8	8.2	51.5
0.658500	29.9	2000.0	9.000	On	N	19.8	16.1	46.0
0.739500	29.7	2000.0	9.000	On	N	19.8	16.3	46.0
1.275000	23.0	2000.0	9.000	On	N	19.7	23.0	46.0
6.090000	29.1	2000.0	9.000	On	N	19.6	20.9	50.0

END OF REPORT