



TEST REPORT

No. I16Z41517-EMC01

for

TCL Communication Ltd.

GSM Quad Band Mobile phone

Model Name: 2051X

FCC ID: 2ACCJB069

with

Hardware Version: P10

Software Version: V1.0

Issued Date: 2016-07-15



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Note:

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Test Laboratory:

FCC 2.948 Listed: No. 525429

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16Z41517-EMC01	Rev.0	1st edition	2016-07-15

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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: 2016-07-06
Testing End Date: 2016-07-11

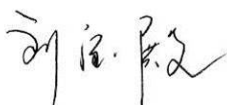
1.4. Signature



Zhang Hui
(Prepared this test report)



Qu Pengfei
(Reviewed this test report)



Liu Baodian
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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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Pudong Area Shanghai, P.R. China.
City: Shanghai
Postal Code: 201203
Country: China
Telephone: 0086-21-31363544
Fax: 0086-21-61460602

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

3.1. About EUT

Description	GSM Quad Band Mobile phone
Model Name	2051X
FCC ID	2ACCJB069
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 3.7VDC)

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
EUT1	358329070007787	PIO	V1.0

*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	/	1641517BA005
AE2	Battery	/	1641517BA001
AE3	USB Cable	/	1641517DC001
AE4	USB Cable	/	1641517DC002
AE5	Travel charger	/	16TCT-CH-0749
AE6	Travel charger	/	16TCT-CH-0713
AE7	Travel charger	/	16TCT-CH-0123
AE8	Travel charger	/	16TCT-CH-0124

AE1 ,AE2

Model	CAB22B0000C1
Manufacturer	BYD
Capacitance	750mAh
Nominal voltage	3.7V

AE3,AE4

Model	CDA0000092C3
Manufacturer	JIAYIKANG
Length of cable	97cm

AE5,AE6

Model	CBA3068AGAC1
Manufacturer	BYD
Length of cable	/

AE7, AE8

Model CBA3068AGAC5
Manufacturer PUAN
Length of cable /

AE9

Model CBA3068AAAC1
Manufacturer BYD
Length of cable /

AE10

Model CBA3068ABAC1
Manufacturer BYD
Length of cable /

AE11

Model CBA3068AAAC5
Manufacturer PUAN
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 + AE5	Charging mode
Set.2	EUT1 + AE1 + AE3 + AE7	Charging mode
Set.3	EUT1 + AE1 + AE3	USB mode

Note: GSM Quad Band Mobile phone 2051X manufactured by TCL Communication Ltd is a new product for the test.

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

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

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	100235	R&S	2017-03-02	1 year
2	Test Receiver	ESCI	100344	R&S	2017-03-01	1 year
3	Universal Radio Communication Tester	CMW500	143008	R&S	2016-12-09	1 year
4	Universal Radio Communication Tester	CMW500	155415	R&S	2017-01-11	1 year
5	LISN	ENV216	101200	R&S	2016-07-07	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2017-12-16	3 years
7	EMI Antenna	3115	6914	ETS-Lindgren	2017-12-15	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Monitor	E178FPc	CN-OWR979-64180-7AJ-D2MS	DELL	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
11	Keyboard	L100	CN0RH659658907 ATOI40	DELL	N/A	N/A
12	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

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 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)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17972.800	51.8	-17.7	45.6	23.900	H
17966.850	51.4	-17.7	45.6	23.500	H
17994.900	51.4	-17.7	45.6	23.500	V
17995.750	51.3	-17.7	45.6	23.400	V
17849.550	51.3	-18.5	45.6	24.200	H
17960.900	51.2	-17.7	45.6	23.300	V

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17943.900	62.4	-17.7	45.6	34.500	H
17772.200	61.6	-18.5	45.6	34.500	H
17994.900	61.5	-17.7	45.6	33.600	H
17924.350	61.4	-17.7	45.6	33.500	V
17993.200	61.2	-17.7	45.6	33.300	H
17982.150	61.1	-17.7	45.6	33.200	V

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
17986.500	51.4	-17.7	45.6	23.500	H
17986.000	51.3	-17.7	45.6	23.400	V
17994.000	51.3	-17.7	45.6	23.400	V
17983.000	51.3	-17.7	45.6	23.400	V
17992.500	51.3	-17.7	45.6	23.400	V
17979.500	51.3	-17.7	45.6	23.400	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
17978.500	63.6	-17.7	45.6	35.700	V
17999.000	63.3	-17.7	45.6	35.400	H
17972.000	63.1	-17.7	45.6	35.200	V
17984.000	62.8	-17.7	45.6	34.900	V
17871.500	62.8	-18.5	45.6	35.700	V
17987.500	62.6	-17.7	45.6	34.700	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
17984.700	51.6	-17.7	45.6	23.700	H
17998.300	51.5	-17.7	45.6	23.600	V
17943.050	51.4	-17.7	45.6	23.500	V
17986.400	51.3	-17.7	45.6	23.400	V
17974.500	51.2	-17.7	45.6	23.300	H
17996.600	51.1	-17.7	45.6	23.200	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
17996.600	62.0	-17.7	45.6	34.100	H
17914.150	61.6	-18.5	45.6	34.500	V
17949.000	61.5	-17.7	45.6	33.600	H
17909.900	61.4	-18.5	45.6	34.300	H
17979.600	61.4	-17.7	45.6	33.500	V
17966.850	61.4	-17.7	45.6	33.500	H

Charging Mode, Set.1

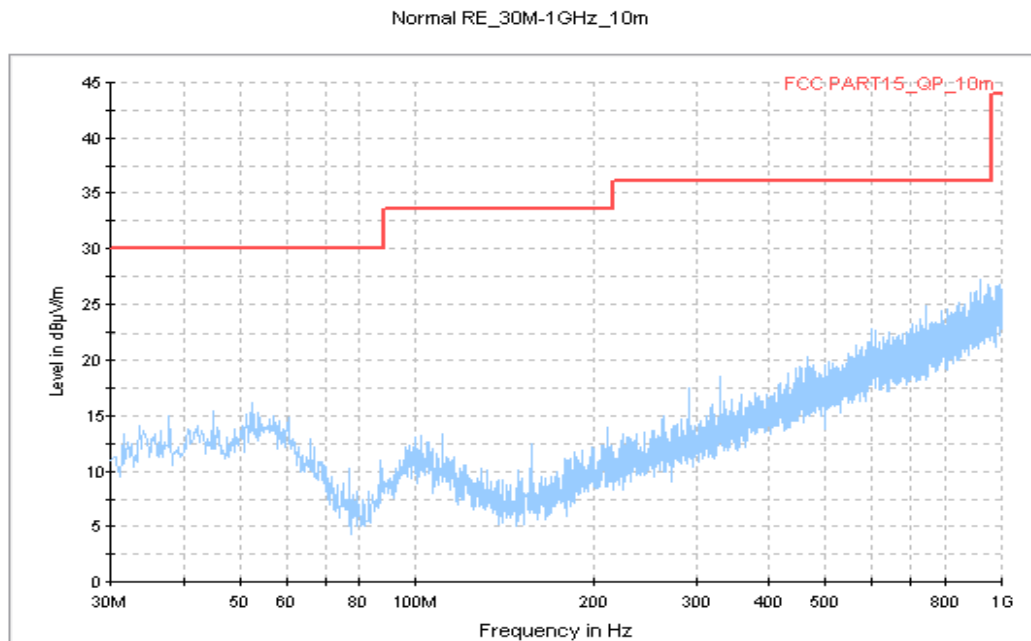


Fig.1 Radiated Emission from 30MHz to 1GHz

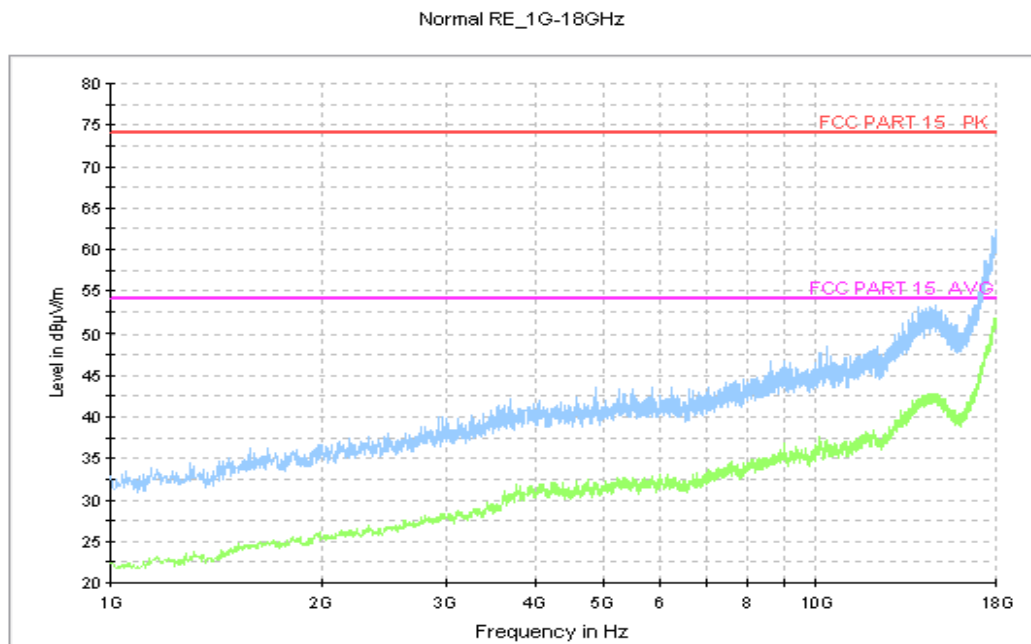


Fig.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.2

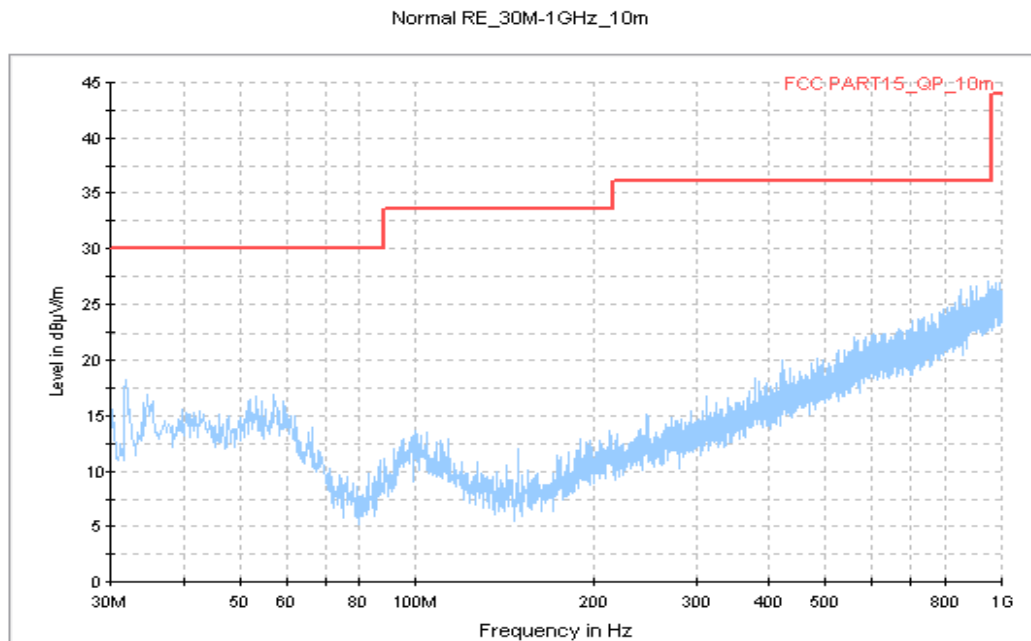


Fig.3 Radiated Emission from 30MHz to 1GHz

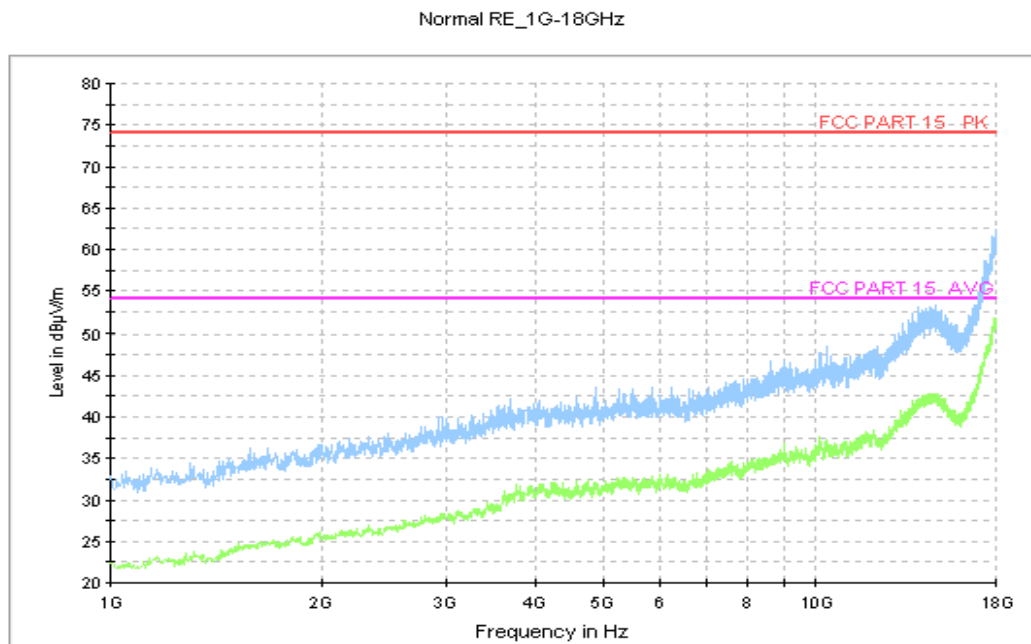


Fig.4 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.3

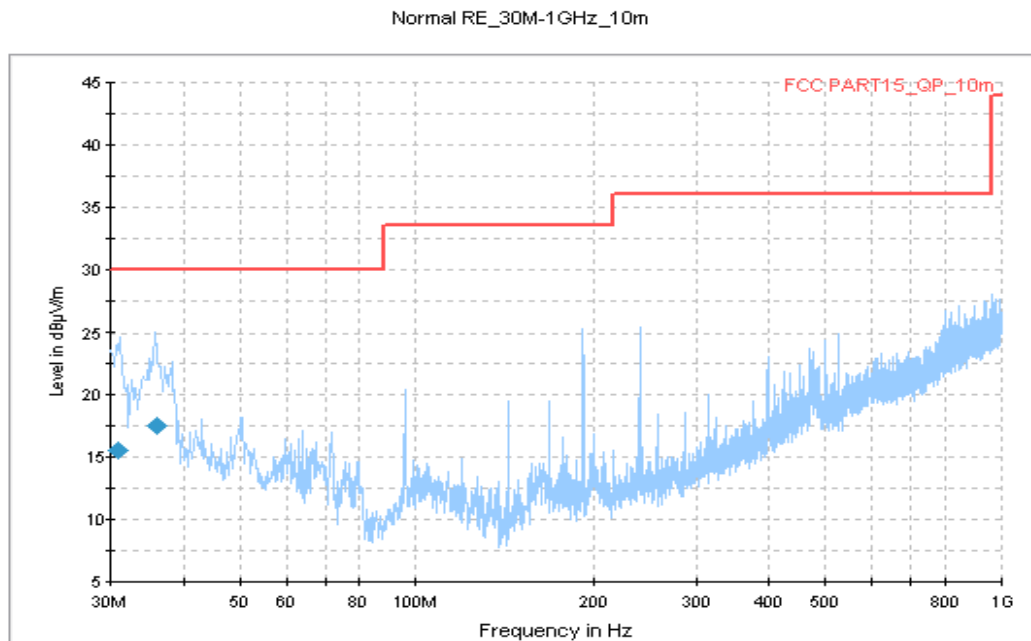


Fig.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization n	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.864000	15.6	100.0	V	270.0	-14.0	14.4	30.0
36.120000	17.6	275.0	V	280.0	-12.8	12.4	30.0

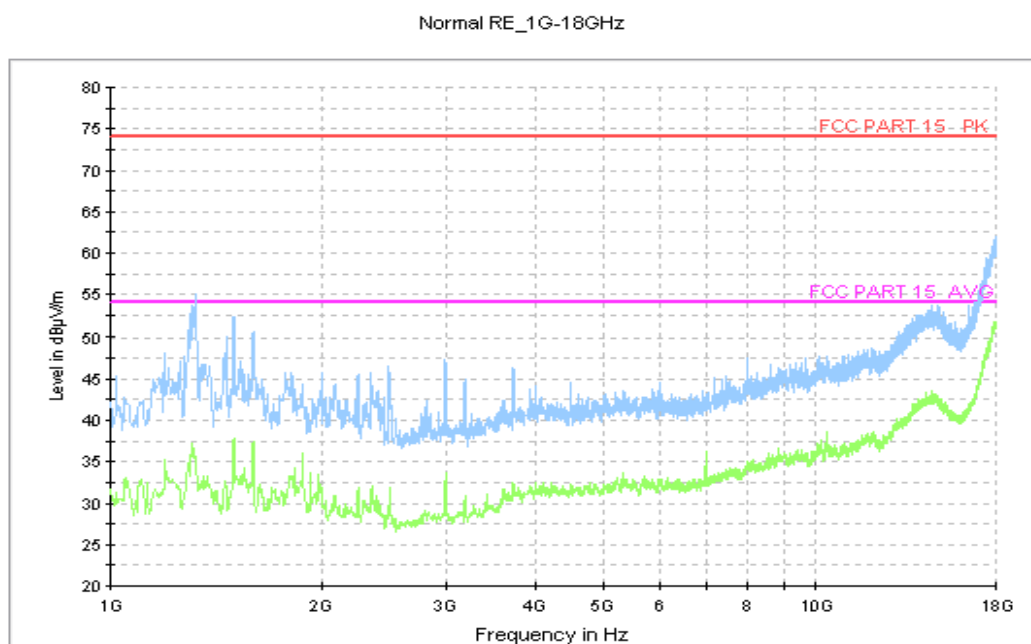


Fig.6 Radiated Emission from 1GHz to 18GHz

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

Charging Mode, Set.1

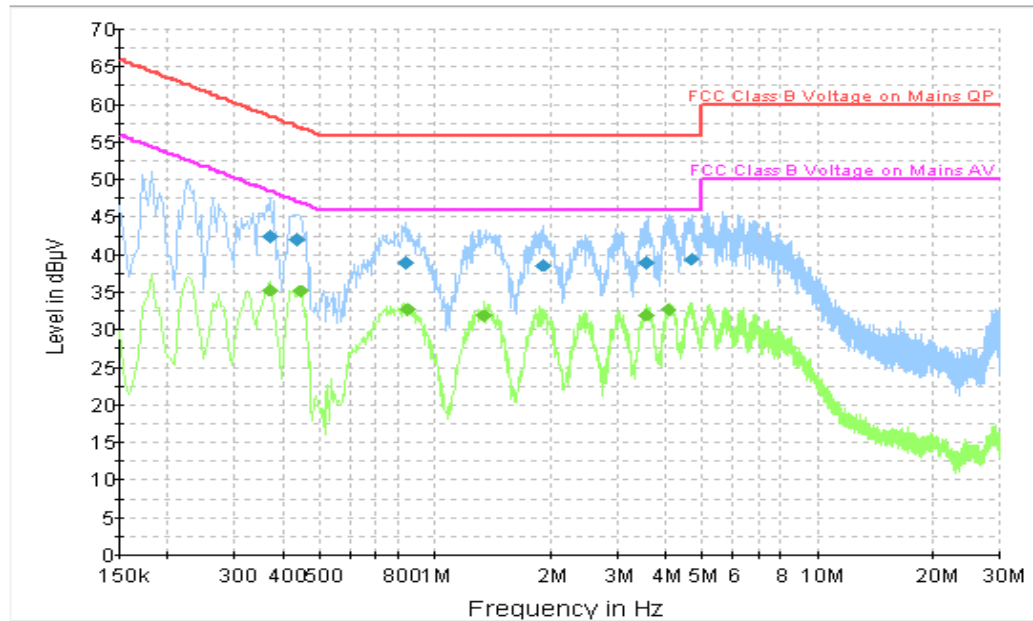


Fig.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.370500	42.4	2000.0	9.000	On	L1	19.9	16.1	58.5
0.438000	42.0	2000.0	9.000	On	N	19.9	15.1	57.1
0.834000	38.9	2000.0	9.000	On	L1	19.8	17.1	56.0
1.914000	38.6	2000.0	9.000	On	N	19.7	17.4	56.0
3.592500	39.0	2000.0	9.000	On	N	19.5	17.0	56.0
4.681500	39.5	2000.0	9.000	On	L1	19.6	16.5	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.370500	35.4	2000.0	9.000	On	L1	19.9	13.1	48.5
0.442500	35.2	2000.0	9.000	On	L1	19.9	11.8	47.0
0.847500	32.8	2000.0	9.000	On	N	19.8	13.2	46.0
1.338000	31.8	2000.0	9.000	On	N	19.7	14.2	46.0
3.579000	32.1	2000.0	9.000	On	N	19.5	13.9	46.0
4.087500	32.6	2000.0	9.000	On	L1	19.6	13.4	46.0

Charging Mode, Set.2

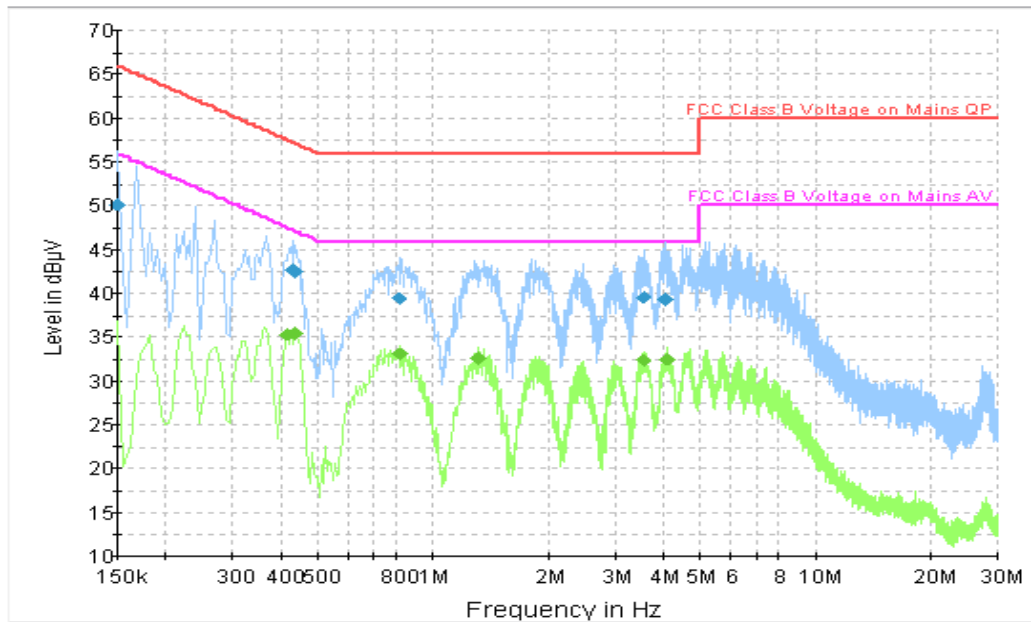


Fig.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	50.2	2000.0	9.000	On	N	20.2	15.8	66.0
0.429000	42.7	2000.0	9.000	On	N	19.9	14.6	57.3
0.438000	42.5	2000.0	9.000	On	L1	19.9	14.6	57.1
0.816000	39.4	2000.0	9.000	On	N	19.8	16.6	56.0
3.547500	39.6	2000.0	9.000	On	L1	19.5	16.4	56.0
4.029000	39.4	2000.0	9.000	On	N	19.5	16.6	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.415500	35.3	2000.0	9.000	On	N	19.9	12.2	47.5
0.438000	35.5	2000.0	9.000	On	N	19.9	11.6	47.1
0.820500	33.0	2000.0	9.000	On	L1	19.8	13.0	46.0
1.320000	32.7	2000.0	9.000	On	L1	19.7	13.3	46.0
3.547500	32.4	2000.0	9.000	On	L1	19.5	13.6	46.0
4.132500	32.5	2000.0	9.000	On	L1	19.6	13.5	46.0

USB Mode, Set.3

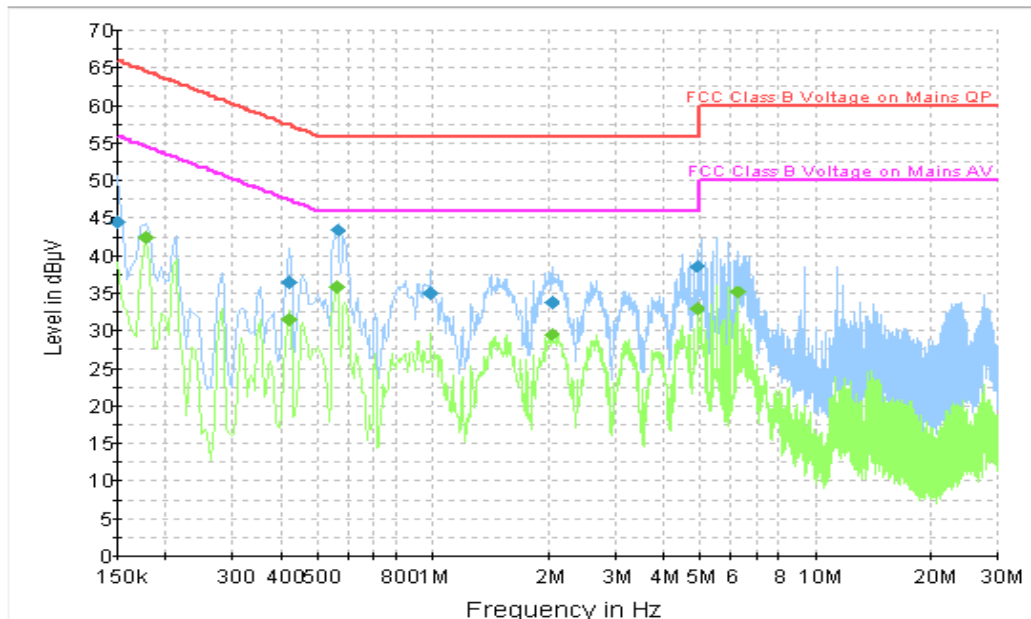


Fig.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	44.6	2000.0	9.000	On	N	20.2	21.4	66.0
0.420000	36.5	2000.0	9.000	On	N	19.9	21.0	57.4
0.564000	43.4	2000.0	9.000	On	N	19.9	12.6	56.0
0.987000	35.0	2000.0	9.000	On	N	19.7	21.0	56.0
2.035500	33.9	2000.0	9.000	On	L1	19.7	22.1	56.0
4.920000	38.6	2000.0	9.000	On	N	19.6	17.4	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.177000	42.4	2000.0	9.000	On	N	19.8	12.2	54.6
0.420000	31.5	2000.0	9.000	On	N	19.9	15.9	47.4
0.559500	35.9	2000.0	9.000	On	L1	19.9	10.1	46.0
2.035500	29.6	2000.0	9.000	On	L1	19.7	16.4	46.0
4.920000	33.0	2000.0	9.000	On	N	19.6	13.0	46.0
6.297000	35.2	2000.0	9.000	On	N	19.6	14.8	50.0

END OF REPORT