



TEST REPORT

No. I17Z60860-EMC01

for

TCL Communication Ltd.

UMTS/GSM Smartphone

Model Name: 4049G/4049M

FCC ID: 2ACCJB095

with

Hardware Version: PIO

Software Version: V1.0

Issued Date: 2017-06-29

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
I17Z60860-EMC01	Rev.0	1st edition	2017-06-29



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1. Test Laboratory

1.1. Testing Location

CTTL(BDA)

Address: No. 18 Jia Kangding Street, BDA District Beijing, P. R. China

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-06-19

Testing End Date: 2017-06-27

1.4. Signature



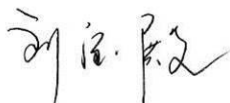
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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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

3.1. About EUT

Description	UMTS/GSM Smartphone
Model Name	4049G/4049M
FCC ID	2ACCJB095
Extreme vol. Limits	3.4VDC to 4.35VDC (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
EUT1	359162080001436	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	/	/
AE2	Battery	/	/
AE3	Travel charger	/	/
AE4	Travel charger	/	/
AE5	USB cable	/	/
AE6	USB cable	/	/
AE7	Headset	/	/
AE8	Headset	/	/

AE1

Model	CAB1500071C7
Manufacturer	VEKEN
Capacitance	1500mAh
Nominal voltage	3.8V

AE2

Model	CAB1500074C1
Manufacturer	BYD
Capacitance	1500mAh
Nominal voltage	3.8V

AE3/AE4

Model	CBA0066AGAC5
Manufacturer	PUAN
Length of cable	116cm



AE5/AE6

Model CDA3122005C2
Manufacturer SHENGHUA
Length of cable 92cm

AE7/AE8

Model CCB0046A10C1
Manufacturer /
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	Charging mode
Set.2	EUT1+ 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-2 (10.0m x 6.7m x 6.15m) 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, 3 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	100766	R&S	2018-04-06	1 year
2	Test Receiver	ESU26	100376	R&S	2017-10-31	1 year
3	Universal Radio Communication Tester	CMW500	127406	R&S	2018-01-19	1 year
4	AMN	ESH2-Z5	829991/012	R&S	2018-04-10	1 year
5	EMI Antenna	VULB 9163	9163-514	Schwarzbeck	2017-11-24	3 years
6	EMI Antenna	3117	00139065	ETS-Lindgren	2017-09-21	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:

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

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case):

30MHz-1GHz: $U = 4.86$ dB, $k=2$,

1GHz-18GHz: $U = 5.26$ dB, $k=2$

Measurement results for Set.1:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
17802.000	41.58	-23.1	41.0	23.73	54.0	12.4	H
17809.500	41.46	-23.0	41.0	23.50	54.0	12.5	V
17801.250	41.44	-23.1	41.0	23.61	54.0	12.6	H
17802.750	41.44	-23.1	41.0	23.59	54.0	12.6	H
17805.750	41.42	-23.1	41.0	23.52	54.0	12.6	H
17817.750	41.37	-23.1	40.9	23.53	54.0	12.6	V

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
17805.000	54.2	-23.1	41.0	36.34	74.0	19.8	H
17795.250	53.0	-23.2	41.0	35.23	74.0	21.0	H
17812.500	52.7	-23.0	40.9	34.82	74.0	21.3	V
17656.500	52.5	-25.5	41.1	36.89	74.0	21.5	H
17894.250	52.4	-24.1	40.9	35.69	74.0	21.6	H
17829.750	52.4	-23.3	40.9	34.74	74.0	21.6	H

Measurement results for Set.2:

USB Mode/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)
17802.000	41.63	-23.1	41.0	23.78	54.0	12.4	H
17805.000	41.51	-23.1	41.0	23.62	54.0	12.5	V
17815.500	41.49	-23.1	40.9	23.62	54.0	12.5	H
17801.250	41.40	-23.1	41.0	23.56	54.0	12.6	V
17797.500	41.38	-23.2	41.0	23.61	54.0	12.6	V
5877.750	39.96	-32.2	35.1	37.03	54.0	14.0	H

USB Mode/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)
17826.750	52.9	-23.2	40.9	35.24	74.0	21.1	V
17805.750	52.7	-23.1	41.0	34.80	74.0	21.3	H
17712.750	52.6	-24.6	41.0	36.18	74.0	21.4	V
17813.250	52.6	-23.0	40.9	34.65	74.0	21.4	H
17793.750	52.5	-23.2	41.0	34.77	74.0	21.5	V
5994.750	46.5	-31.6	35.3	42.76	74.0	27.5	V

Sample calculation: Average detector , 17820MHz

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}}(23.78 \text{ dBuV}) + G_{\text{A}} (41.0\text{dB/m}) + G_{\text{PL}} (-23.1\text{dB}) = 41.63\text{dBuV/m}$$

Charging Mode, Set.1

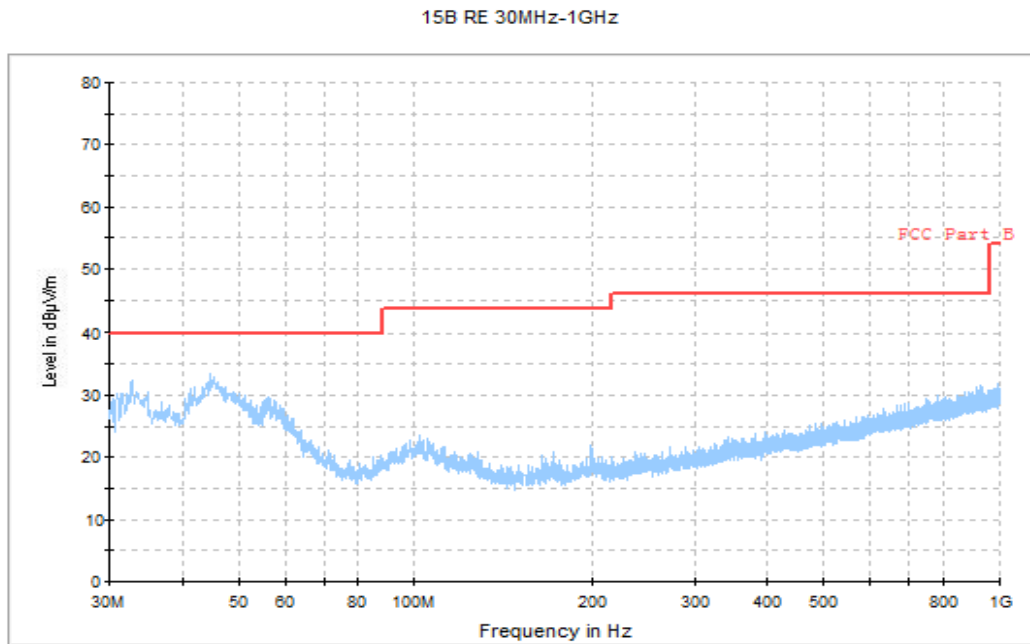


Fig.1 Radiated Emission from 30MHz to 1GHz

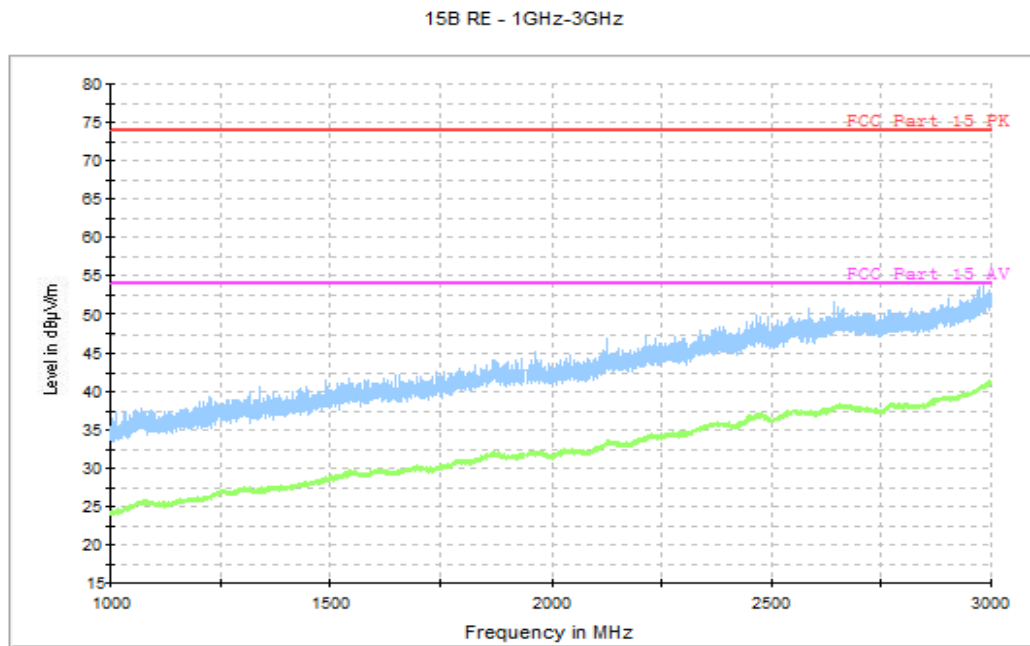


Fig.2 Radiated Emission from 1GHz to 3GHz

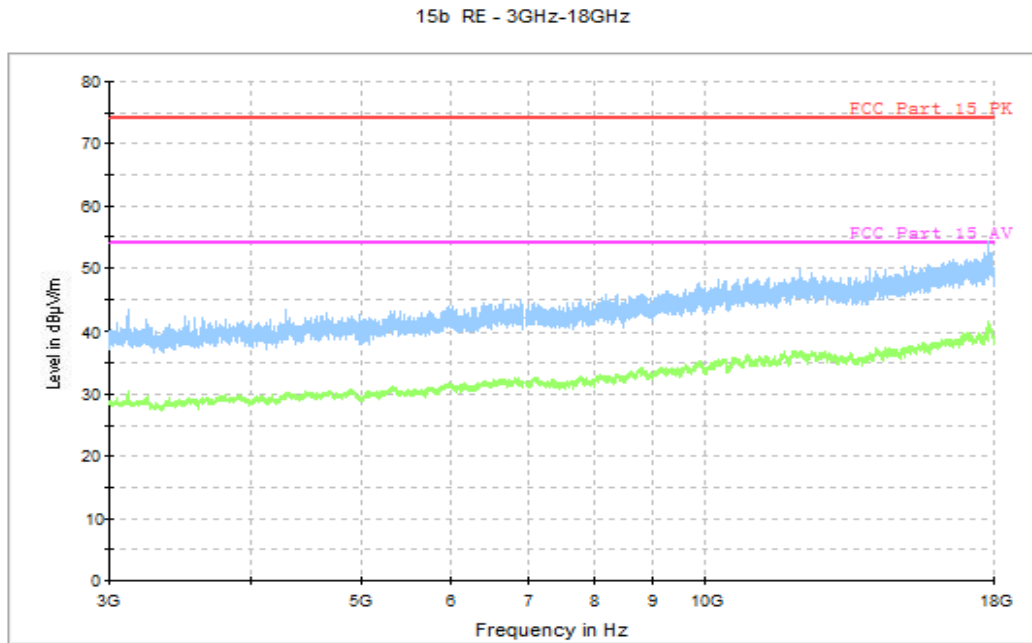


Fig.3 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.2

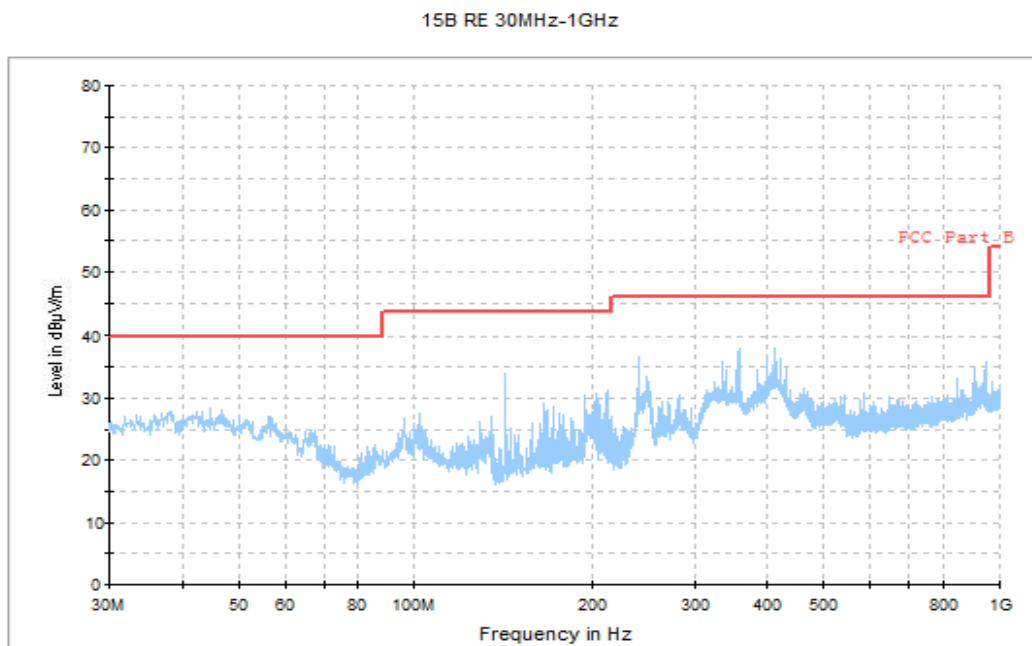


Fig.4 Radiated Emission from 30MHz to 1GHz

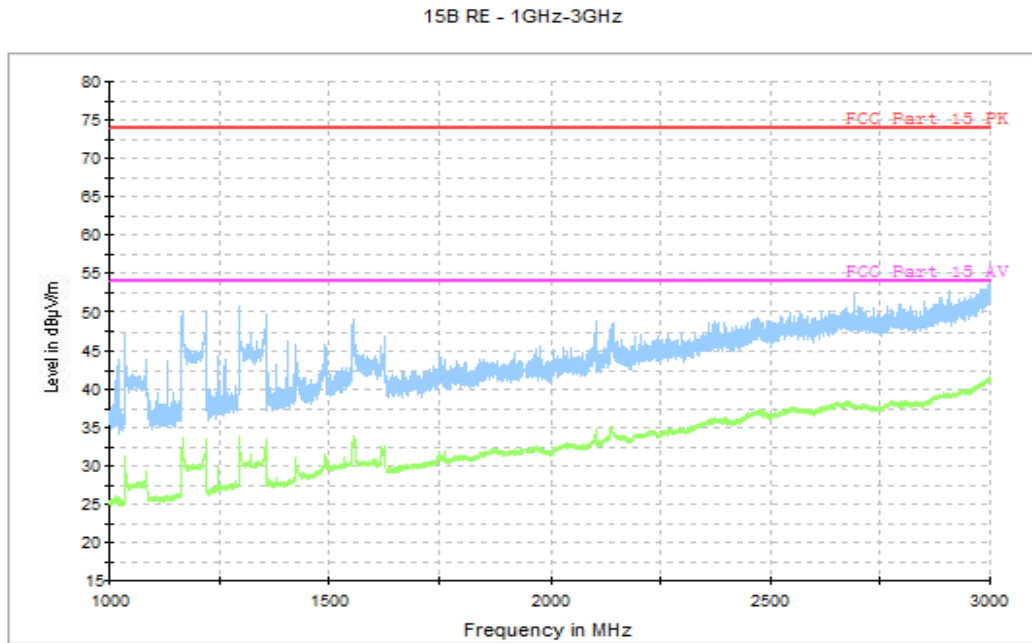


Fig.5 Radiated Emission from 1GHz to 3GHz

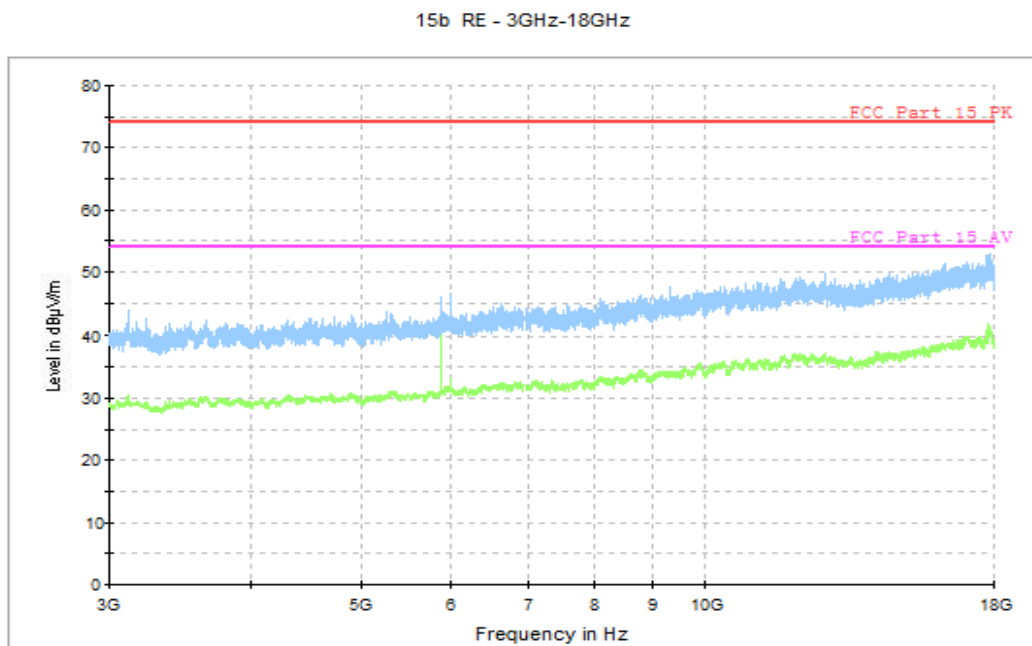


Fig.6 Radiated Emission from 3GHz to 18GHz

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 (dB μ V)	
	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

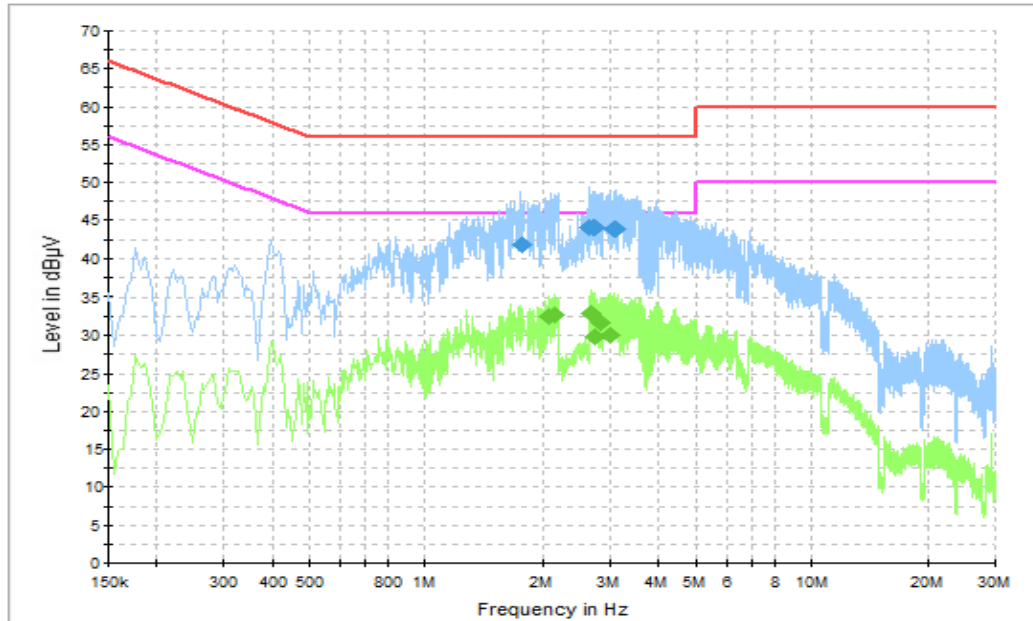


Fig.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.774500	41.8	GND	L1	10.2	14.2	56.0
2.652000	44.1	GND	L1	10.3	11.9	56.0
2.701500	44.1	GND	L1	10.3	11.9	56.0
2.742000	44.1	GND	L1	10.3	11.9	56.0
3.061500	43.9	GND	L1	10.3	12.1	56.0
3.093000	43.9	GND	L1	10.3	12.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.085000	32.5	GND	L1	10.3	13.5	46.0
2.134500	32.6	GND	L1	10.3	13.4	46.0
2.679000	33.0	GND	L1	10.3	13.0	46.0
2.719500	29.9	GND	L1	10.3	16.1	46.0
2.827500	31.7	GND	L1	10.3	14.3	46.0
3.003000	30.0	GND	L1	10.3	16.0	46.0

USB Mode, Set.2

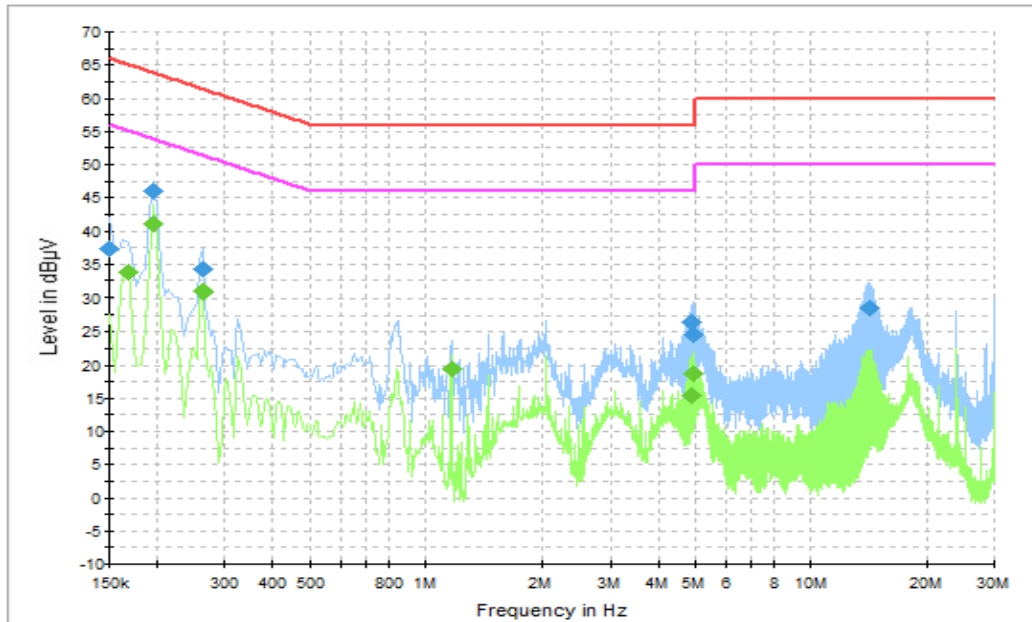


Fig.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	37.4	GND	N	10.3	28.6	66.0
0.195000	46.0	GND	L1	10.2	17.9	63.8
0.262500	34.3	GND	L1	10.2	27.0	61.4
4.884000	26.4	GND	L1	10.4	29.6	56.0
4.951500	24.6	GND	L1	10.4	31.4	56.0
14.257500	28.6	GND	N	10.8	31.4	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	33.9	GND	L1	10.2	21.2	55.1
0.195000	41.0	GND	L1	10.2	12.9	53.8
0.262500	31.0	GND	L1	10.2	20.3	51.4
1.167000	19.5	GND	N	10.3	26.5	46.0
4.888500	15.5	GND	L1	10.4	30.5	46.0
4.951500	18.7	GND	L1	10.4	27.3	46.0

END OF REPORT