



TEST REPORT

No. I18Z60513-EMC01

for

TCL Communication Ltd.

LTE/UMTS/GSM Smartphone

Model Name: 5059J

FCC ID: 2ACCJB101

with

Hardware Version: PIO

Software Version: 6J1QH1

Issued Date: 2018-04-10



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.

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z60513-EMC01	Rev.0	1 st edition	2018-04-10



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1. Test Laboratory

1.1. Testing Location

Location: 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°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-01-02

Testing End Date: 2018-01-22

1.4. Signature



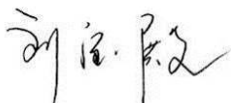
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2. Client Information

2.1. Applicant Information

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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
Contact Person: Gong Zhizhou
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	LTE/UMTS/GSM Smartphone
Model Name	5059J
FCC ID	2ACCJB101
Extreme vol. Limits	3.5VDC to 4.4VDC (nominal: 3.85VDC)

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	/	/	/

*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	/	inbuilt
AE2	Battery	/	inbuilt
AE3	Charger	/	17TCTCH0728
AE4	Charger	/	17TCTCH0492
AE5	USB cable	/	16TCTDC0476
AE6	USB cable	/	17TCTDC0485

AE1

Model	CAC2400008C1
Manufacturer	/
Capacitance	2400 mAh
Nominal voltage	3.85V

AE2

Model	CAC2400009C7
Manufacturer	/
Capacitance	2400 mAh
Nominal voltage	3.85V

AE3

Model	CBA0058AGAC5
Manufacturer	PUAN
Length of cable	/

AE4

Model	CBA0058AGAC2
Manufacturer	TENPAO
Length of cable	/

AE5

Model	CDA3122005C1
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Manufacturer	JUWEI
Length of cable	100cm
AE6	
Model	CDA3122005C2
Manufacturer	SHENGHUA
Length of cable	101cm

*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	EUT3+ AE1+ AE3+AE5/AE6	Charger
Set.2	EUT3+ AE1+ AE4+AE5/AE6	Charger
Set.3	EUT3+ AE1+ AE5/AE6	USB mode

Note: LTE/UMTS/GSM Smartphone 5059J manufactured by TCL Communication Ltd. is a variant model based on 5059A for conformance test. According to the declaration of changes, no test needs to be performed, all results are cited from the initial model. The report number for initial model is I17Z62255-EMC01.



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	2016
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 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

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) 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, 3m 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

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	A.1	P	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	A.2	P	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI	100766	R&S	2018-05-06	1 year
2	Test Receiver	ESU26	100376	R&S	2018-12-30	1 year
3	Universal Radio Communication Tester	CMW500	127406	R&S	2018-01-19	1 year
4	LISN	ESH2-Z5	829991/012	R&S	2018-05-10	1 year
5	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2018-08-20	3 years
6	EMI Antenna	3117	00139065	ETS-Lindgren	2020-11-15	3 years
7	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
8	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
9	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
10	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

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

Reference

FCC: CFR Part 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 ($\mu\text{V}/\text{m}$)		
	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): 4.3dB, $k=2$.

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
17904.233	38.4	-18.5	45.6	11.300	H
17821.500	38.3	-18.5	45.6	11.200	H
17912.167	38.3	-18.5	45.6	11.200	V
17781.267	38.2	-18.5	45.6	11.100	H
17853.800	38.2	-18.5	45.6	11.100	H
17798.833	38.1	-18.5	45.6	11.000	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
17900.267	49.7	-18.5	45.6	22.600	H
17282.033	49.7	-19.5	41.5	27.700	H
17833.400	49.7	-18.5	45.6	22.600	V
17749.533	49.6	-18.5	45.6	22.500	H
17869.100	49.4	-18.5	45.6	22.300	H
16901.800	49.4	-19.9	39.9	29.400	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
17909.900	38.4	-18.5	45.6	11.300	H
17858.900	38.2	-18.5	45.6	11.100	H
17913.867	38.2	-18.5	45.6	11.100	V
17881.000	38.1	-18.5	45.6	11.000	H
17904.233	38.1	-18.5	45.6	11.000	H
17884.400	38.1	-18.5	45.6	11.000	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
17909.333	50.3	-18.5	45.6	23.200	H
17904.233	50.0	-18.5	45.6	22.900	H
17774.467	49.1	-18.5	45.6	22.000	V
17798.833	49.1	-18.5	45.6	22.000	H
17788.633	49.0	-18.5	45.6	21.900	H
17913.867	49.0	-18.5	45.6	21.900	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
17855.500	39.1	-18.5	45.6	12.000	H
17904.800	39.0	-18.5	45.6	11.900	H
17896.300	38.9	-18.5	45.6	11.800	V
17794.867	38.8	-18.5	45.6	11.700	H
17784.667	38.8	-18.5	45.6	11.700	H
17892.900	38.8	-18.5	45.6	11.700	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
17864.000	51.4	-18.5	45.6	24.300	H
17896.300	51.2	-18.5	45.6	24.100	H
17458.833	50.8	-19.2	41.5	28.500	V
17806.200	50.8	-18.5	45.6	23.700	H
17405.567	50.5	-19.2	41.5	28.200	H
17793.167	50.4	-18.5	45.6	23.300	H

Note: The measurement results of Set.1, Set.2 and Set.3 showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.1

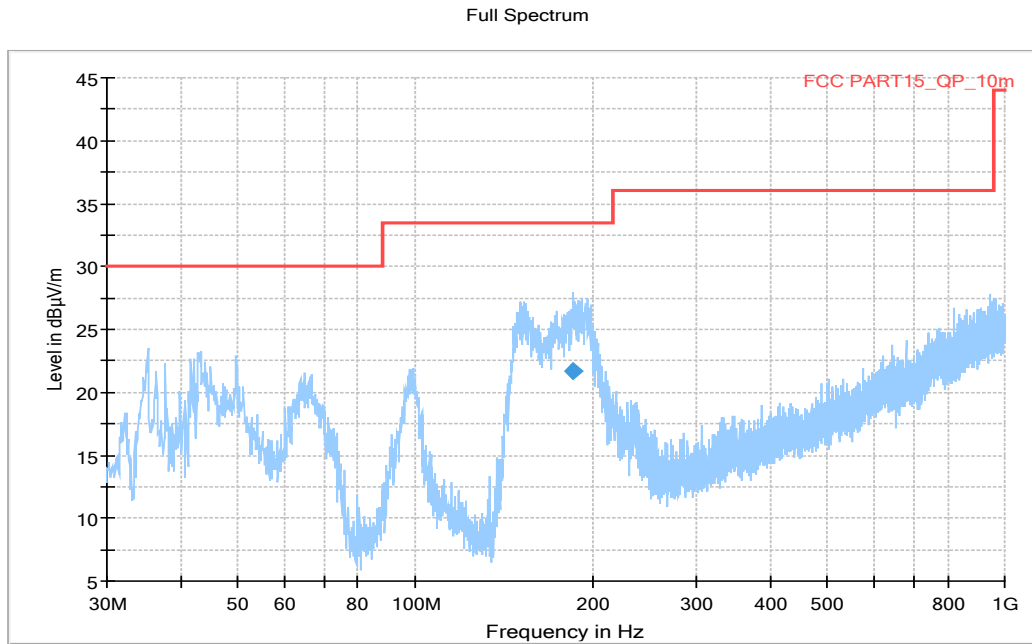


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
185.306000	21.70	33.50	11.82	1000.0	120.000	125.0	V	60.0	-13.8

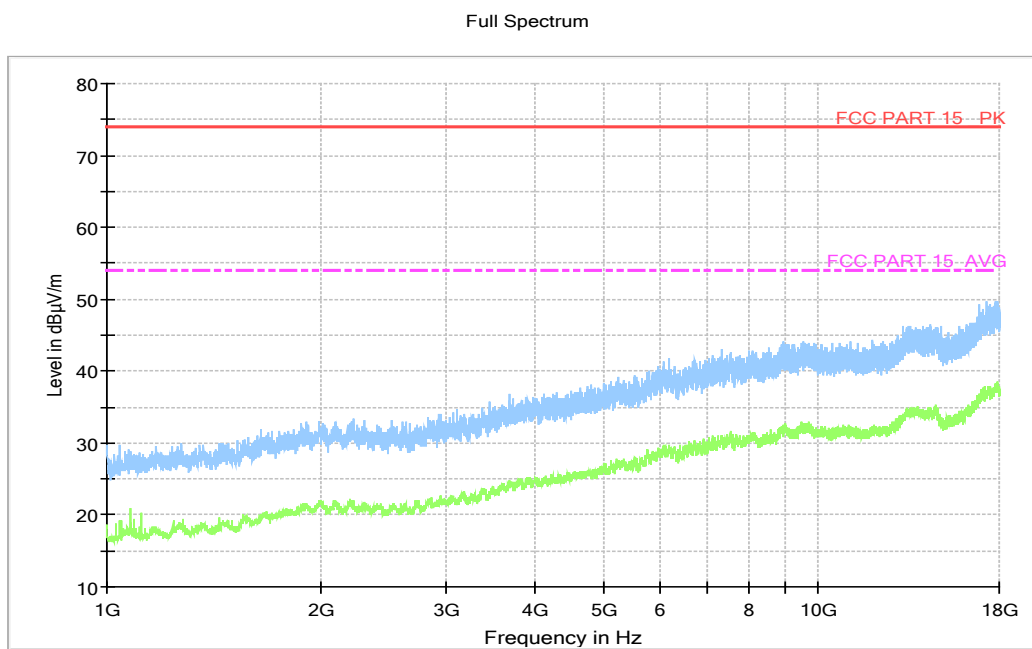


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charging Mode, Set.2

Full Spectrum

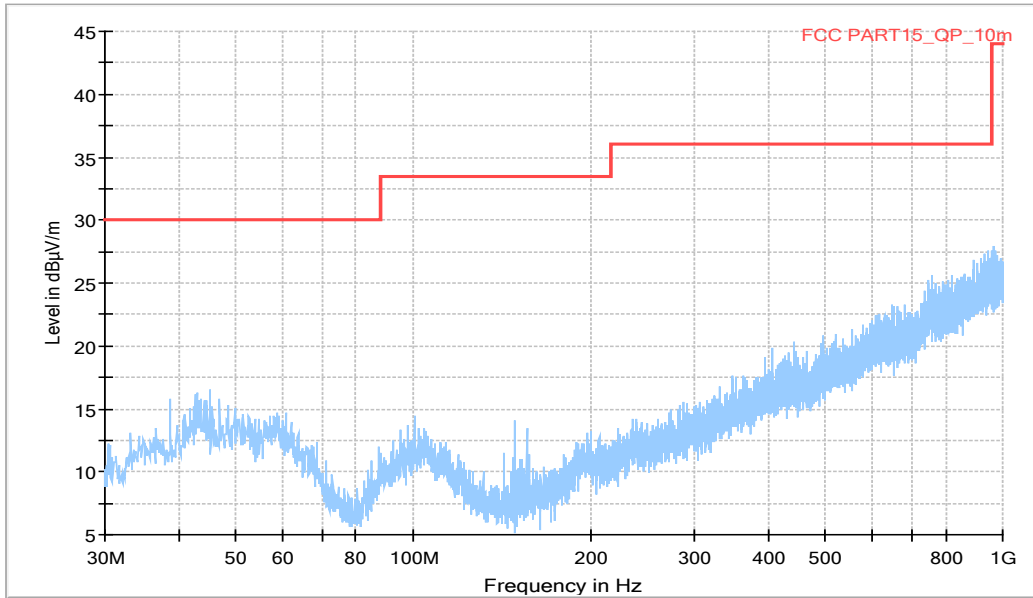


Figure A.3 Radiated Emission from 30MHz to 1GHz

Full Spectrum

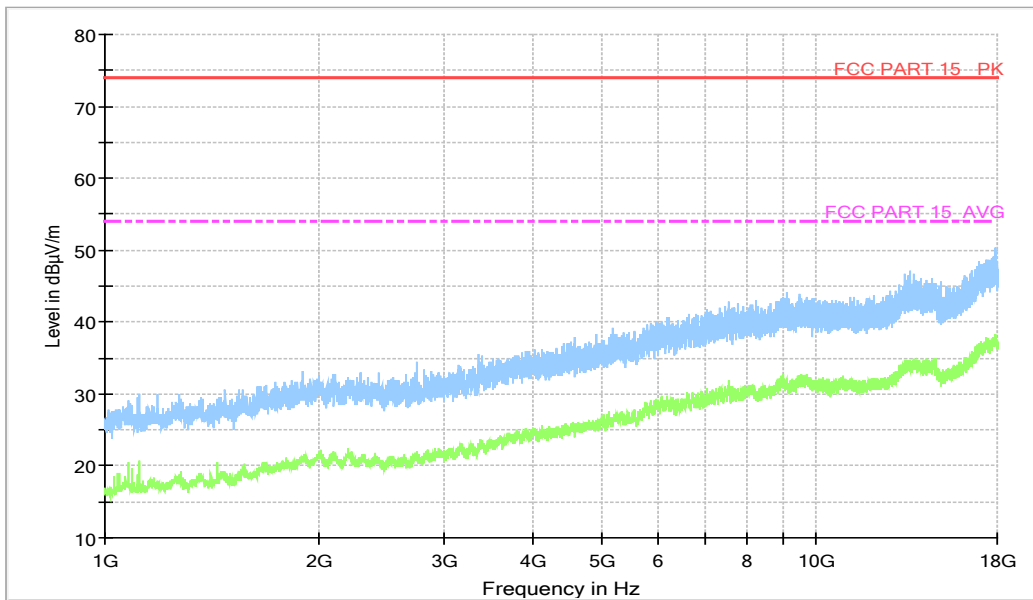


Figure A.4 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.3

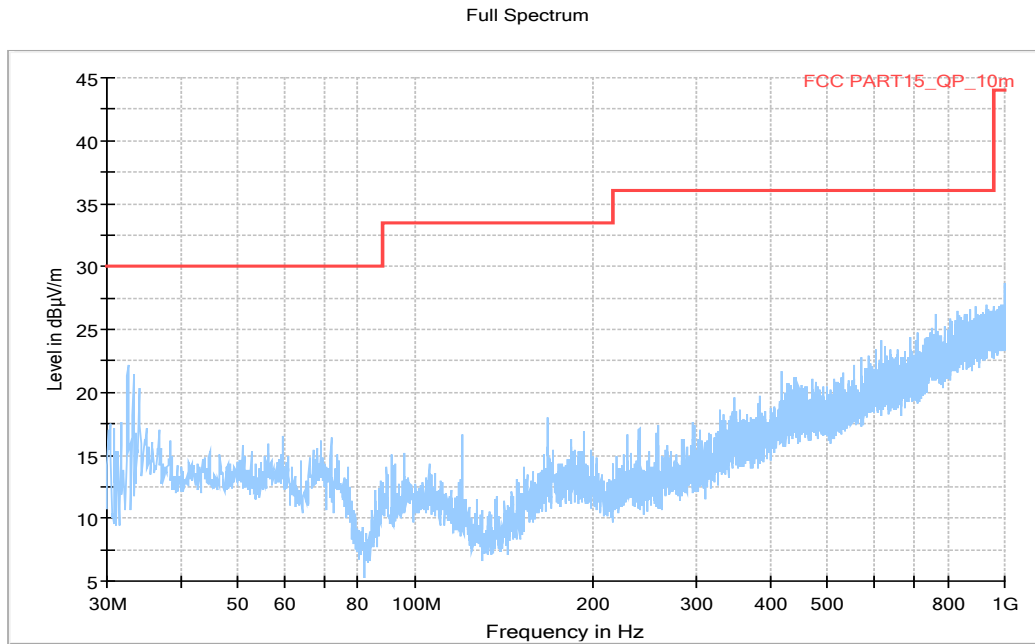


Figure A.5 Radiated Emission from 30MHz to 1GHz

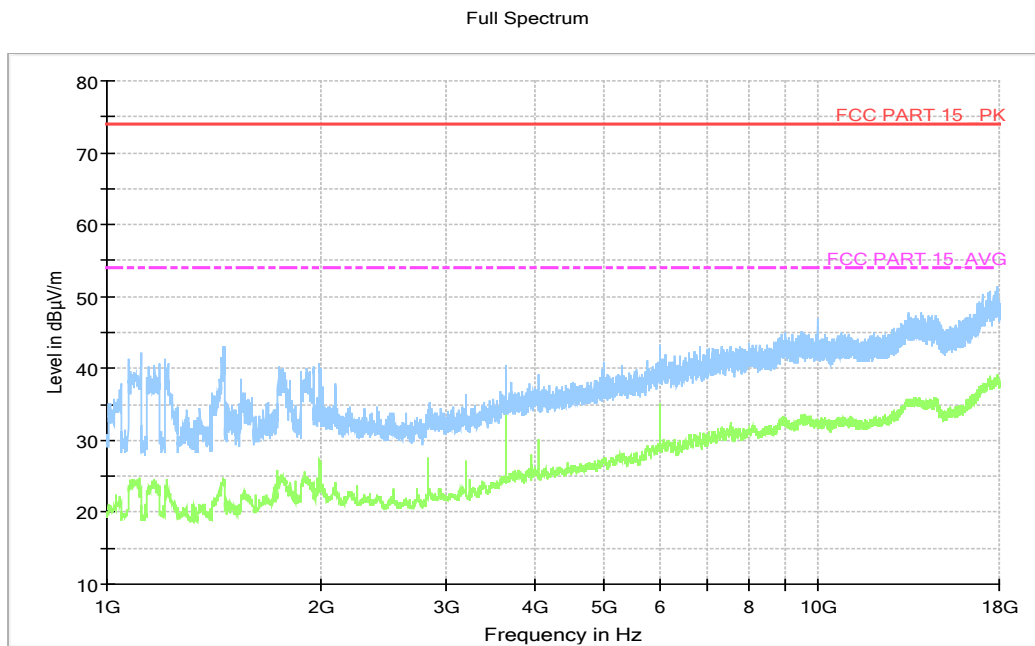


Figure A.6 Radiated Emission from 1GHz to 18GHz

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 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: $U = 2.9 \text{ dB}$, $k=2$.

Charging Mode, Set.1

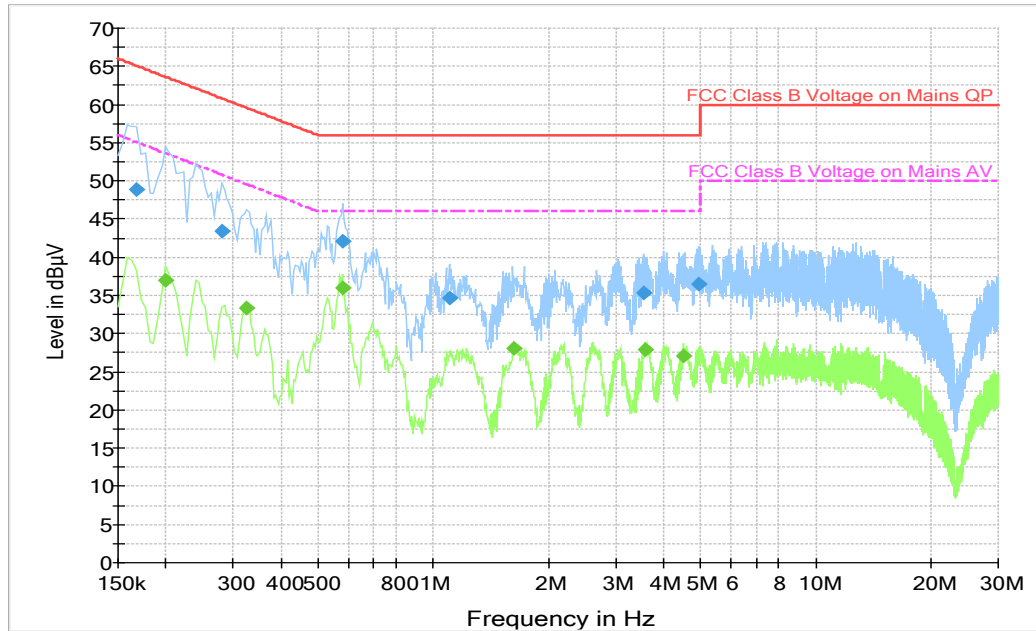


Figure A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	48.8	2000.0	9.000	L1	19.9	16.2	65.1
0.280500	43.4	2000.0	9.000	L1	19.9	17.4	60.8
0.582000	42.1	2000.0	9.000	L1	19.9	13.9	56.0
1.099500	34.7	2000.0	9.000	L1	19.8	21.3	56.0
3.538500	35.3	2000.0	9.000	L1	19.7	20.7	56.0
4.938000	36.5	2000.0	9.000	L1	19.7	19.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.199500	36.9	2000.0	9.000	L1	19.8	16.7	53.6
0.325500	33.3	2000.0	9.000	N	19.9	16.2	49.6
0.577500	36.0	2000.0	9.000	N	19.9	10.0	46.0
1.630500	28.1	2000.0	9.000	N	19.7	17.9	46.0
3.570000	27.9	2000.0	9.000	N	19.7	18.1	46.0
4.506000	27.2	2000.0	9.000	L1	19.7	18.8	46.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.2

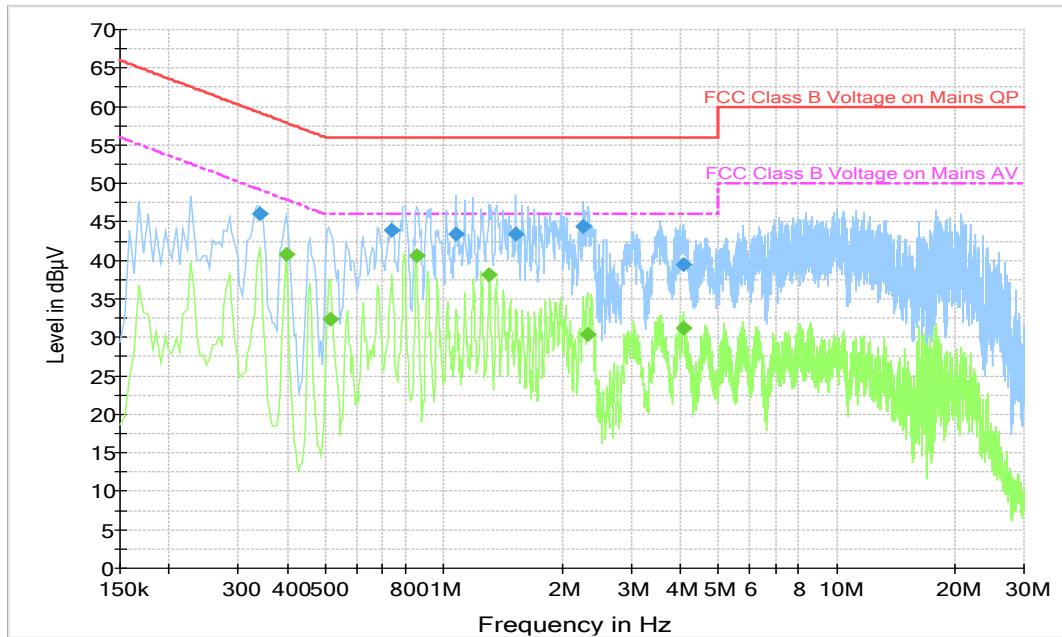


Figure A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.339000	46.1	2000.0	9.000	L1	19.9	13.1	59.2
0.735000	44.0	2000.0	9.000	L1	19.9	12.0	56.0
1.072500	43.4	2000.0	9.000	N	19.8	12.6	56.0
1.522500	43.4	2000.0	9.000	N	19.7	12.6	56.0
2.265000	44.5	2000.0	9.000	L1	19.7	11.5	56.0
4.069500	39.5	2000.0	9.000	L1	19.7	16.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.397500	40.8	2000.0	9.000	L1	19.9	7.1	47.9
0.514500	32.3	2000.0	9.000	L1	19.9	13.7	46.0
0.852000	40.6	2000.0	9.000	L1	19.8	5.4	46.0
1.306500	38.1	2000.0	9.000	L1	19.8	7.9	46.0
2.323500	30.3	2000.0	9.000	L1	19.7	15.7	46.0
4.078500	31.2	2000.0	9.000	L1	19.7	14.8	46.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

USB Mode, Set.3

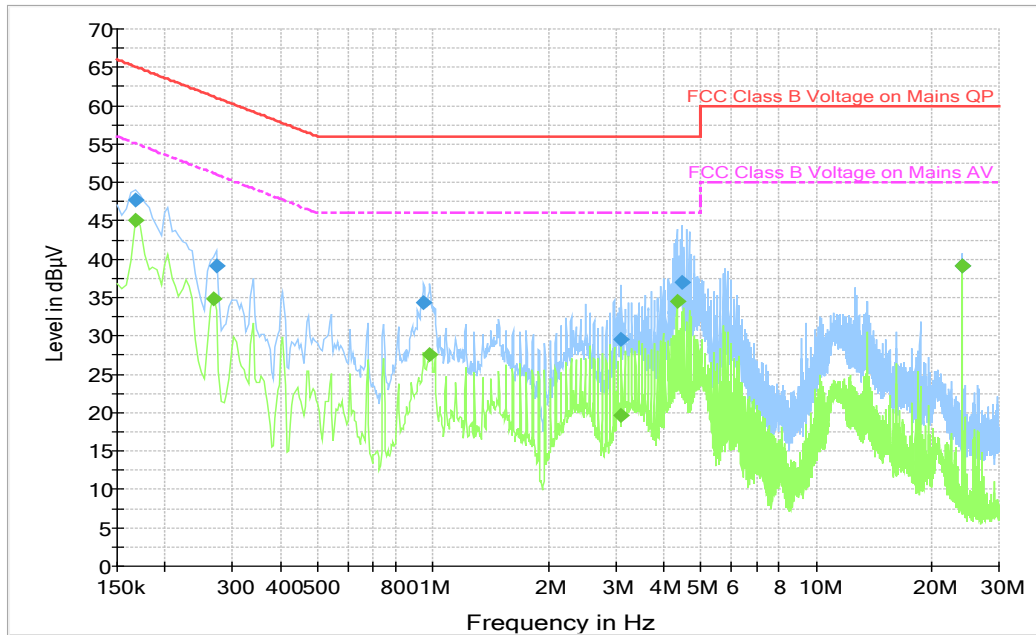


Figure A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	47.7	2000.0	9.000	N	19.9	17.4	65.1
0.271500	39.1	2000.0	9.000	L1	19.9	21.9	61.1
0.946500	34.3	2000.0	9.000	N	19.8	21.7	56.0
3.102000	29.5	2000.0	9.000	L1	19.7	26.5	56.0
4.456500	37.0	2000.0	9.000	N	19.7	19.0	56.0
24.009000	39.0	2000.0	9.000	N	20.0	21.0	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	45.1	2000.0	9.000	N	19.9	10.0	55.1
0.267000	34.8	2000.0	9.000	N	19.9	16.4	51.2
0.982500	27.6	2000.0	9.000	N	19.8	18.4	46.0
3.102000	19.6	2000.0	9.000	L1	19.7	26.4	46.0
4.330500	34.4	2000.0	9.000	L1	19.7	11.6	46.0
24.009000	39.2	2000.0	9.000	N	20.0	10.8	50.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

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