



TEST REPORT

No. I22Z62079-EMC01

for

TCL Communication Ltd.

GSM/UMTS/LTE mobile phone

Model Name: T610E

FCC ID: 2ACCJB193

with

Hardware Version: 05

Software Version: 7GS9

Issued Date: 2022-12-19

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:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z62079-EMC01	Rev.0	1 st edition	2022-12-09
I22Z62079-EMC01	Rev.1	2 nd edition	2022-12-19

Note: the latest revision of the test report supersedes all previous version.



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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. China 100191

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2022-12-05

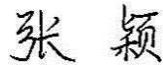
Testing End Date: 2022-12-08

1.4. Signature



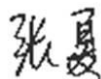
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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
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Fax: +86 755 3661 2000-81722

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

3.1. About EUT

Description	GSM/UMTS/LTE mobile phone
Model Name	T610E
FCC ID:	2ACCJB193

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, CAICT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
UT16a	357837630001109	05	7GS9

*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
AE1	Battery
AE2	Charger1
AE3	USB Cable1
AE4	Headset

AE1

Model	TLp049C8
Manufacturer	Dongguan Ganfeng Electronics Co., LTD
Capacity	4900mAh
Nominal Voltage	3.87V

AE2

Model	YJC018R-US
Manufacturer	Dongguan YingJu Power Co., Ltd.

AE3

Model	JWUB1520-M01R
Manufacturer	Huizhou Juwei Electronics Co., Ltd.

AE4

Model	JWEP1247-M01R
Manufacturer	Huizhou Juwei Electronics Co., Ltd.
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	EUT1 + AE1 + AE2 + AE3	Charger1+REAR Camera+GSM 850 idle
Set.2	EUT1 + AE1 + AE2 + AE3	Charger1+MP4+WCDMA 850 idle
Set.3	EUT1 + AE1 + AE3 + AE4	USB+front camera + LTE idle +FM

Note:

Equipment Under Test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna.

It supports

GSM Band	GSM 850/900/1800/1900
UMTS Band	FDD Band I(W2100) /FDD Band II(W1900) /FDD Band IV(W1700)/FDD Band V(W850)/FDD Band VIII(W900)
LTE Band	FDD1/2/3/4/5/7/8/12/13/17/28/66, TDD 38/40

It has Wi-Fi (802.11a/b/g/n/ac, 802.11n supports 20MHz and 40MHz bandwidth,802.11ac supports 20MHz , 40MHz and 80MHz bandwidth) functions.

The device contains receivers which tune and operate between 30MHz-960MHz in the following bands: GSM 850, WCDMA850, LTE Band 5/12/13/17. All licensed band receivers that tune in the range of 30MHz-960MHz 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	2019
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 (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
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 6000 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)	B.1	P	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESW44	103015	R&S	2023-01-23	1 year
2	Universal Radio Communication Tester	CMW500	116588	R&S	2022-12-20	1 year
3	EMI Antenna	VULB 9163	302	SCHWARZBECK	2022-12-28	1 year
4	EMI Antenna	3115	00146404	ETS-Lindgren	2023-02-23	1 year
5	LISN	ENV216	101200	R&S	2023-06-29	1 year
6	Test Receiver	ESCI 7	100344	R&S	2023-03-21	1 Year
7	Software	EMC32	/	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 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 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 3.4, 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.

The model of the PC is M4000E-17, and the serial number of the PC is M706GWXD. 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/3MHz	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): $U = 5.54 \text{ dB}$, $k=2$.

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)
17980.280	42.70	-29.06	46.66	25.10	54.00	11.30	H
17993.200	42.50	-29.06	46.66	24.90	54.00	11.50	V
17660.340	42.50	-29.90	45.25	27.15	54.00	11.50	V
17566.500	42.50	-29.79	45.25	27.05	54.00	11.50	H
17990.820	42.40	-29.06	46.66	24.80	54.00	11.60	H
17790.220	42.40	-29.89	45.95	26.33	54.00	11.60	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)
17566.500	53.40	-29.79	45.25	37.95	74.00	20.60	V
17892.900	53.40	-29.53	45.95	36.98	74.00	20.60	V
17463.140	53.00	-30.06	44.35	38.70	74.00	21.00	H
17544.400	53.00	-29.49	44.35	38.13	74.00	21.00	V
17556.980	52.90	-29.49	44.35	38.03	74.00	21.10	H
17790.220	52.90	-29.89	45.95	36.83	74.00	21.10	H

Measurement results for Set.2:
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)
17996.260	42.50	-29.06	46.66	24.90	54.00	11.50	H
17568.880	42.40	-29.79	45.25	26.95	54.00	11.60	V
17662.720	42.20	-29.90	45.25	26.85	54.00	11.80	H
17993.880	42.20	-29.06	46.66	24.60	54.00	11.80	H
17980.960	42.10	-29.06	46.66	24.50	54.00	11.90	H
17992.180	42.10	-29.06	46.66	24.50	54.00	11.90	H

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)
17587.240	53.50	-29.70	45.25	37.95	74.00	20.50	V
17453.960	53.30	-29.87	44.35	38.82	74.00	20.70	H
17991.500	53.10	-29.06	46.66	35.50	74.00	20.90	H
17795.320	53.10	-29.89	45.95	37.03	74.00	20.90	V
17534.880	53.00	-29.32	44.35	37.97	74.00	21.00	H
17130.280	53.00	-29.66	42.36	40.29	74.00	21.00	V

Measurement results for Set.3:
USB 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)
17593.020	43.30	-29.70	45.25	27.75	54.00	10.70	V
17226.840	43.20	-29.57	43.36	29.41	54.00	10.80	V
17260.500	43.20	-29.75	43.36	29.59	54.00	10.80	V
17640.280	43.10	-29.60	45.25	27.45	54.00	10.90	V
17605.940	43.10	-29.52	45.25	27.37	54.00	10.90	H
17561.740	43.00	-29.79	45.25	27.55	54.00	11.00	H

USB 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)
17361.140	54.50	-29.97	43.36	41.11	74.00	19.50	H
17992.520	54.40	-29.06	46.66	36.80	74.00	19.60	V
17511.080	53.80	-29.26	44.35	38.70	74.00	20.20	V
17509.720	53.70	-29.26	44.35	38.60	74.00	20.30	H
17592.000	53.60	-29.70	45.25	38.05	74.00	20.40	H
17660.680	53.60	-29.90	45.25	38.25	74.00	20.40	H

Measurement results for Set.1:

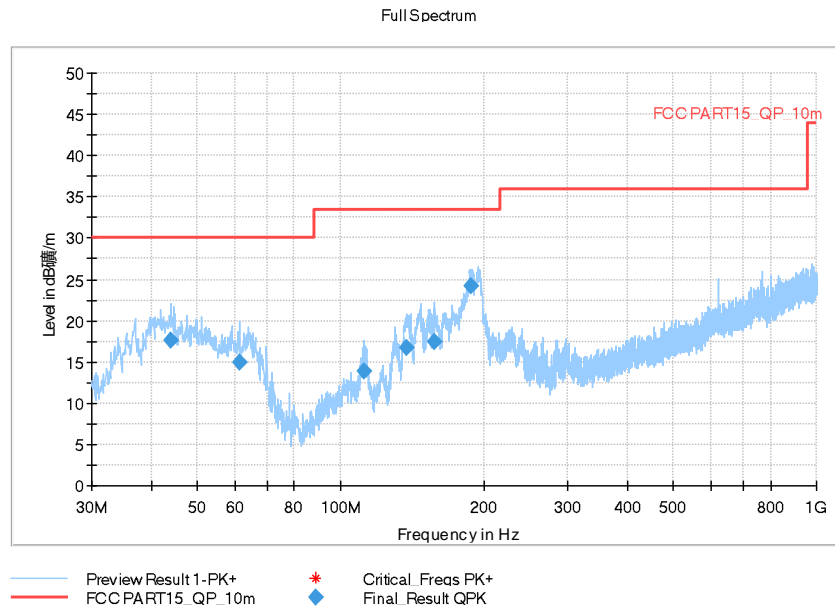


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.968000	17.63	30.00	12.37	120.000	125.0	V	305.0	-11.5
61.331000	14.95	30.00	15.05	120.000	125.0	V	277.0	-12.3
111.674000	13.85	33.52	19.67	120.000	100.0	V	20.0	-13.0
138.058000	16.67	33.52	16.85	120.000	183.0	V	8.0	-15.7
157.361000	17.48	33.52	16.04	120.000	100.0	V	161.0	-15.2
188.498000	24.17	33.52	9.35	120.000	100.0	V	72.0	-12.9

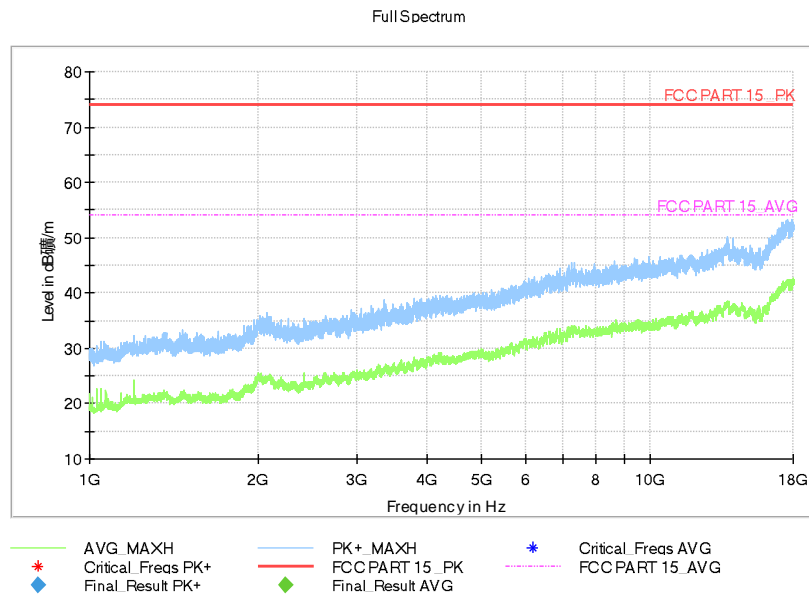




Fig A.2 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2:

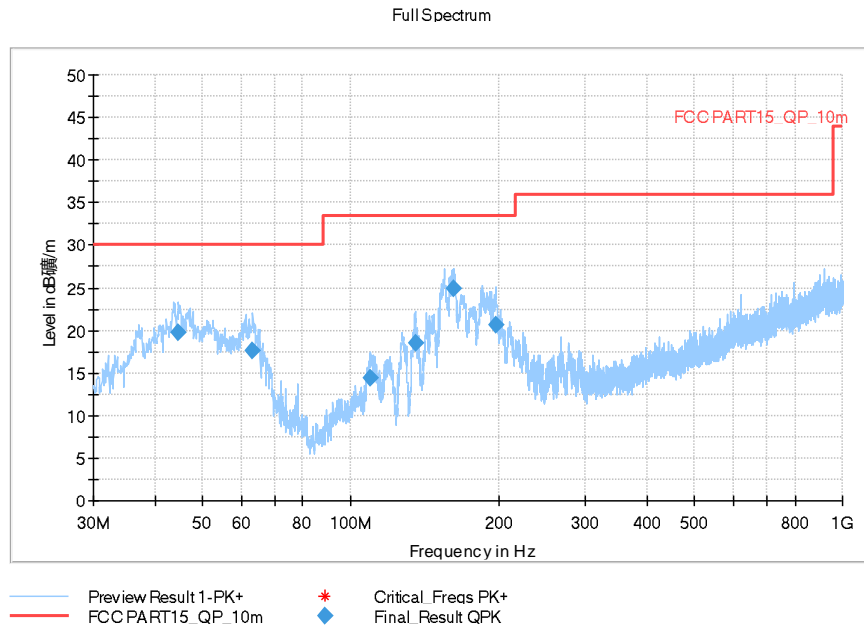


Fig A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.647000	19.74	30.00	10.26	120.000	175.0	V	34.0	-11.3
63.271000	17.64	30.00	12.36	120.000	275.0	V	-45.0	-12.8
109.637000	14.38	33.52	19.14	120.000	225.0	V	9.0	-12.7
135.245000	18.47	33.52	15.05	120.000	100.0	V	-30.0	-15.5
161.823000	24.94	33.52	8.58	120.000	100.0	V	-4.0	-14.8
196.937000	20.68	33.52	12.84	120.000	100.0	V	71.0	-11.5

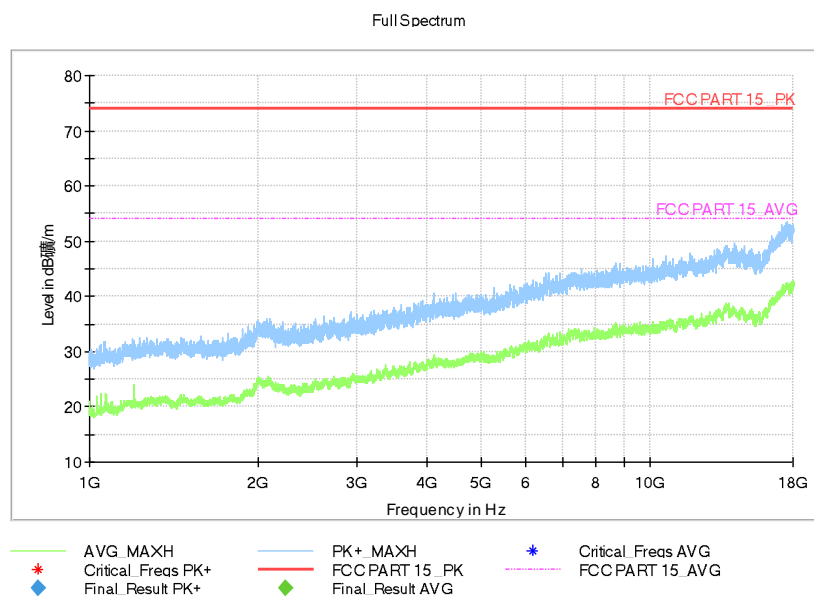


Fig A.4 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.3:

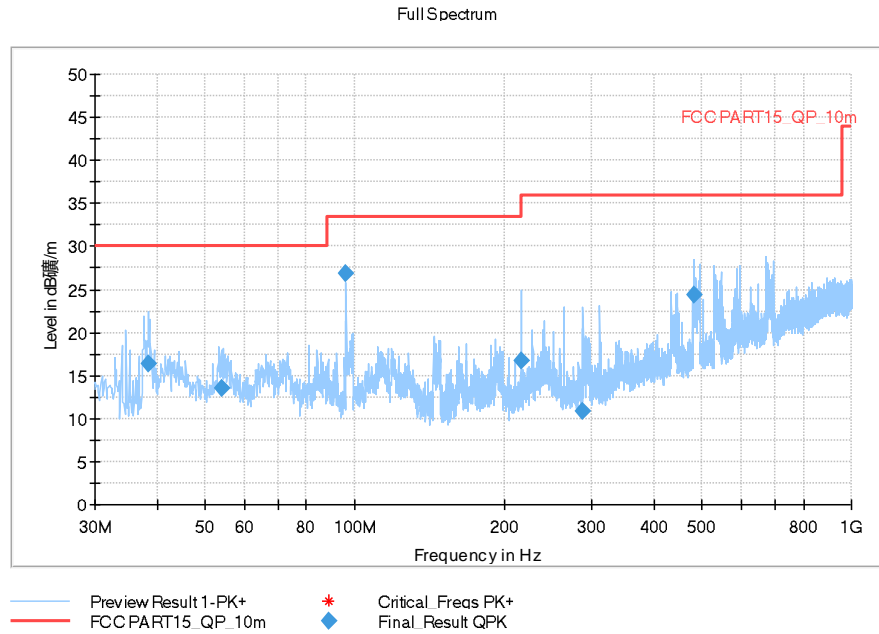


Fig A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
38.439000	16.41	30.00	13.59	120.000	125.0	V	225.0	-12.8
53.862000	13.53	30.00	16.47	120.000	225.0	V	215.0	-11.1
96.057000	26.79	33.52	6.73	120.000	302.0	H	238.0	-13.0
215.949000	16.66	33.52	16.86	120.000	100.0	V	33.0	-11.9
288.408000	10.86	36.02	25.16	120.000	325.0	H	225.0	-9.2
480.759000	24.31	36.02	11.71	120.000	225.0	V	-6.0	-3.8

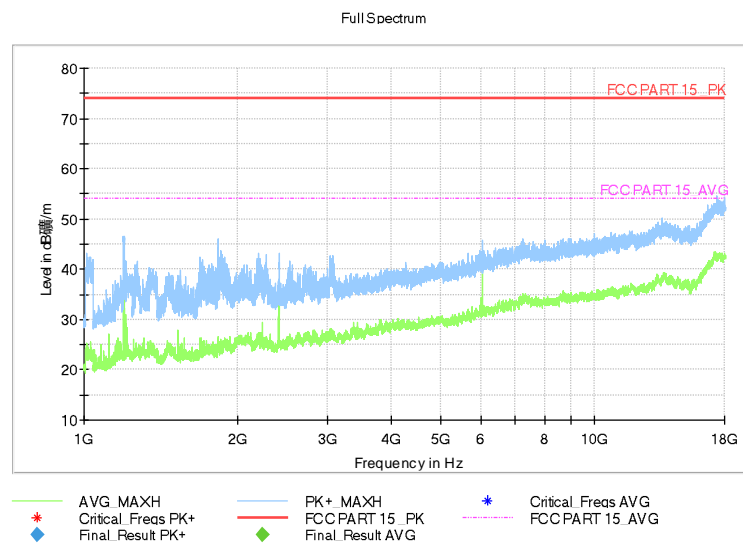


Fig A.6 Radiated Emission from 1GHz to 3GHz

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 M4000E-17, and the serial number of the PC is M706GWXD. 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: $U= 3.08$ dB, $k=2$.

Charging Mode, Set.1 :

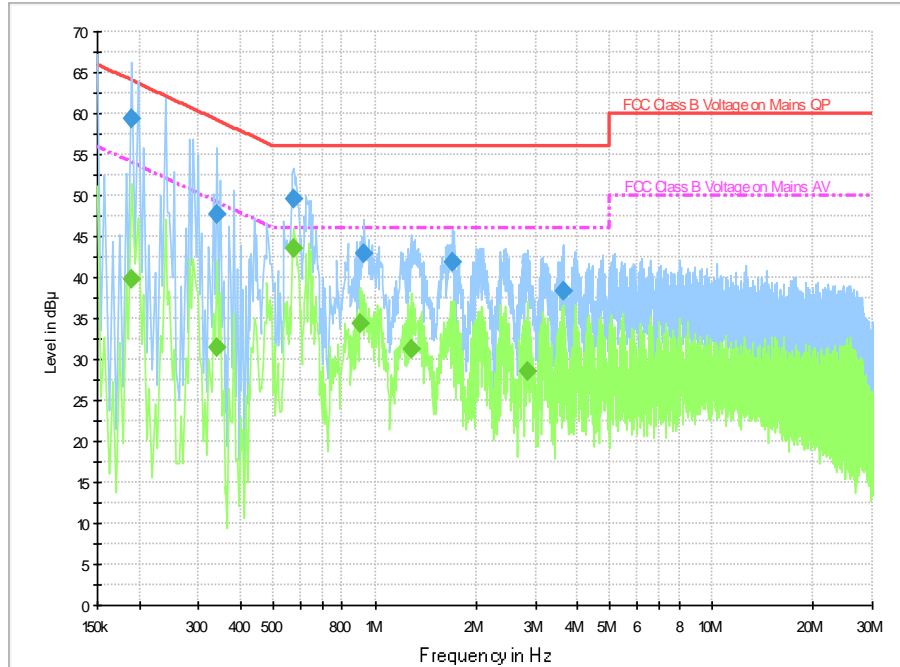


Fig A.7 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.190000	59.4	9.000	On	L1	19.7	4.6	64.0	
0.338000	47.7	9.000	On	L1	19.7	11.6	59.3	
0.574000	49.6	9.000	On	N	19.7	6.4	56.0	
0.930000	42.8	9.000	On	L1	19.7	13.2	56.0	
1.694000	41.9	9.000	On	L1	19.6	14.1	56.0	
3.618000	38.3	9.000	On	N	19.6	17.7	56.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.190000	39.9	9.000	On	L1	19.7	14.2	54.0	
0.338000	31.5	9.000	On	L1	19.7	17.8	49.3	
0.574000	43.6	9.000	On	N	19.7	2.4	46.0	
0.906000	34.4	9.000	On	N	19.6	11.6	46.0	
1.278000	31.2	9.000	On	L1	19.7	14.8	46.0	
2.846000	28.6	9.000	On	L1	19.6	17.4	46.0	

Charging Mode, Set.2 :

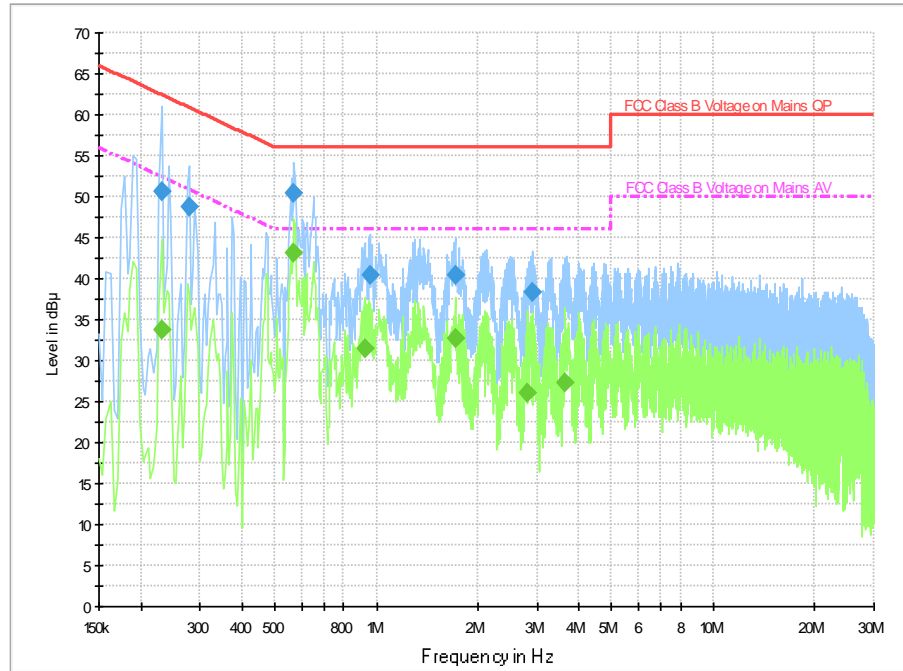


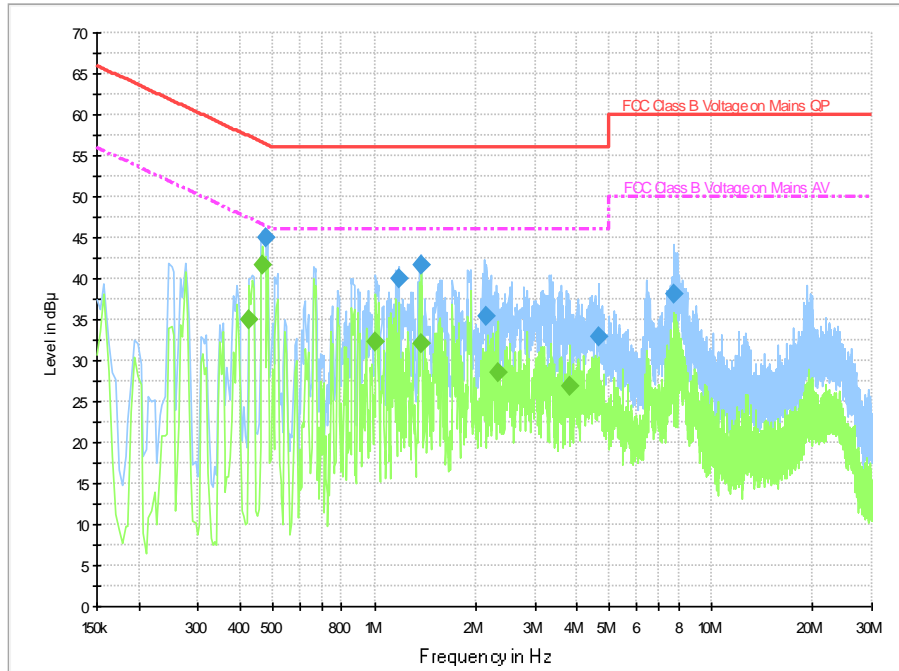
Fig A.8 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.230000	50.7	9.000	On	L1	19.7	11.8	62.4	
0.278000	48.7	9.000	On	L1	19.7	12.1	60.9	
0.570000	50.4	9.000	On	N	19.7	5.6	56.0	
0.954000	40.5	9.000	On	L1	19.7	15.5	56.0	
1.710000	40.5	9.000	On	N	19.6	15.5	56.0	
2.898000	38.3	9.000	On	L1	19.6	17.7	56.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.230000	33.8	9.000	On	L1	19.7	18.7	52.4	
0.570000	43.0	9.000	On	N	19.7	3.0	46.0	
0.922000	31.4	9.000	On	L1	19.7	14.6	46.0	
1.710000	32.8	9.000	On	N	19.6	13.2	46.0	
2.810000	25.9	9.000	On	L1	19.6	20.1	46.0	
3.618000	27.3	9.000	On	L1	19.6	18.7	46.0	

USB Mode, Set.3 :

Fig A.9 Conducted Emission from 150kHz to 30MHz
Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.474000	45.0	9.000	On	N	19.7	11.4	56.4	
1.182000	39.9	9.000	On	L1	19.7	16.1	56.0	
1.382000	41.7	9.000	On	L1	19.6	14.3	56.0	
2.146000	35.5	9.000	On	N	19.6	20.5	56.0	
4.658000	32.9	9.000	On	N	19.6	23.1	56.0	
7.786000	38.2	9.000	On	L1	19.7	21.8	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.426000	35.1	9.000	On	N	19.7	12.3	47.3	
0.466000	41.6	9.000	On	L1	19.7	5.0	46.6	
1.010000	32.3	9.000	On	L1	19.7	13.7	46.0	
1.382000	32.1	9.000	On	L1	19.6	13.9	46.0	
2.326000	28.4	9.000	On	L1	19.6	17.6	46.0	
3.790000	26.8	9.000	On	N	19.6	19.2	46.0	

END OF REPORT