TEST REPORT

No. I22Z62236-EMC03

for

TCL Communication Ltd.

GSM mobile phone

Model Name: T301P, T301Q

FCC ID: 2ACCJB197

with

Hardware Version: C685_MB_V1.0

Software Version: T301P_CE_V1.0_20221108/

T301Q_CE_V1.1_20221128

Issued Date: 2023-02-22

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z62236-EMC03	Rev.0	1st edition	2023-01-06
I22Z62236-EMC03	Rev.1	2nd edition	2023-01-12
I22Z62236-EMC03	Rev.2	3rd edition	2023-02-17
I22Z62236-EMC03	Rev.3	4th edition	2023-02-22

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

CONTENTS

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: 2022-12-04

Testing End Date: 2022-12-05

1.4. Signature

Wang Xue

(Prepared this test report)

Zhang Ying

(Reviewed this test report)

Zhang Xia

(Approved this test report)

2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
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Telephone:	+86 755 36611621
Fax:	+86 755 3661 2000-81722

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

3.1. About EUT

Description	GSM mobile phone
Model Name	T301P, T301Q
FCC ID:	2ACCJB197

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
UT44a	358894697410706/ 358894697414708	C685_MB_V1.0	T301P_CE_V1.0_20221108

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE1	Battery	TLi010CA	TMB
AE2	Battery	TLi010CB	Guihang
AE3	Charger1	XT-252A-5055	Baijunda
AE4	Charger2	XT-536B-5055	Baijunda
AE5	Charger3	XT-252E-5055	Baijunda
AE6	Headset	WH15	DALIN

*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 + AE1/2 + AE3	Charger1+REAR Camera+GSM 850 idle
Set.2	EUT1 + AE1/2 + AE3	Charger1+MP3
Set.3	EUT1 + AE1/2 + AE6+ Cable	USB

Note:

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

It supports

GSM Band GSM 850/900/1800/1900

It has camera, mp3, Bluetooth 2.1 functions.

The device contains receivers which tune and operate between 30MHz-960MHz in the following bands: GSM 850. All licensed band receivers that tune in the range of 30MHz-960MHz are investigated. Only the worst-case emissions are reported.

According to declaration of changes from T301P(SW: T301P_CE_V1.0_20221108) to T301Q(SW: T301Q_CE_V1.1_20221128), T301P is a dual sim card equipment while T301Q is a single sim card equipment. All measurement results are tested for T301P while T301Q share them without further measurement.

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	< 4Ω
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	< 4Ω

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	163975	R&S	2023-01-10	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 (μV/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:

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

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 dB, k=2.

Measurement results for Set.1:

Charging 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)
17981.300	41.80	-29.06	46.66	24.20	54.00	12.20	V
17906.840	41.70	-29.33	45.95	25.07	54.00	12.30	V
17781.040	41.60	-29.89	45.95	25.53	54.00	12.40	H
17987.080	41.60	-29.06	46.66	24.00	54.00	12.40	V
17996.260	41.60	-29.06	46.66	24.00	54.00	12.40	V
17929.620	41.60	-29.40	46.66	24.34	54.00	12.40	H

Charging 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)
17997.960	53.20	-29.06	46.66	35.60	74.00	20.80	V
17799.400	52.70	-29.89	45.95	36.63	74.00	21.30	V
17511.760	52.70	-29.26	44.35	37.60	74.00	21.30	V
17750.100	52.70	-29.61	45.95	36.36	74.00	21.30	H
17369.980	52.40	-29.97	43.36	39.01	74.00	21.60	H
17986.400	52.20	-29.06	46.66	34.60	74.00	21.80	V

Measurement results for Set.2:

Charging 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)
17916.020	42.00	-29.33	46.66	24.67	54.00	12.00	H
17993.200	41.90	-29.06	46.66	24.30	54.00	12.10	V
17904.120	41.80	-29.33	45.95	25.17	54.00	12.20	V
17649.460	41.70	-29.60	45.25	26.05	54.00	12.30	H
17562.080	41.70	-29.79	45.25	26.25	54.00	12.30	H
17545.080	41.70	-29.49	44.35	26.83	54.00	12.30	H

Charging 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)
17790.560	52.50	-29.89	45.95	36.43	74.00	21.50	H
17795.320	52.40	-29.89	45.95	36.33	74.00	21.60	V
17899.020	52.40	-29.53	45.95	35.98	74.00	21.60	V
17645.720	52.20	-29.60	45.25	36.55	74.00	21.80	V
17773.220	52.20	-29.63	45.95	35.87	74.00	21.80	V
17976.200	52.20	-29.06	46.66	34.60	74.00	21.80	H

Measurement results for Set.3:

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)
17993.540	42.50	-29.06	46.66	24.90	54.00	11.50	H
17996.260	42.20	-29.06	46.66	24.60	54.00	11.80	H
17998.980	42.20	-29.06	46.66	24.60	54.00	11.80	H
17552.900	42.10	-29.49	44.35	27.23	54.00	11.90	H
17994.560	42.10	-29.06	46.66	24.50	54.00	11.90	V
17894.600	41.90	-29.53	45.95	25.48	54.00	12.10	V

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)
17896.640	52.80	-29.53	45.95	36.38	74.00	21.20	V
17469.940	52.70	-30.06	44.35	38.40	74.00	21.30	H
17912.960	52.60	-29.33	45.95	35.97	74.00	21.40	V
17474.360	52.50	-30.06	44.35	38.20	74.00	21.50	H
17799.400	52.40	-29.89	45.95	36.33	74.00	21.60	H
17589.280	52.40	-29.70	45.25	36.85	74.00	21.60	V

Measurement results for Set.1:

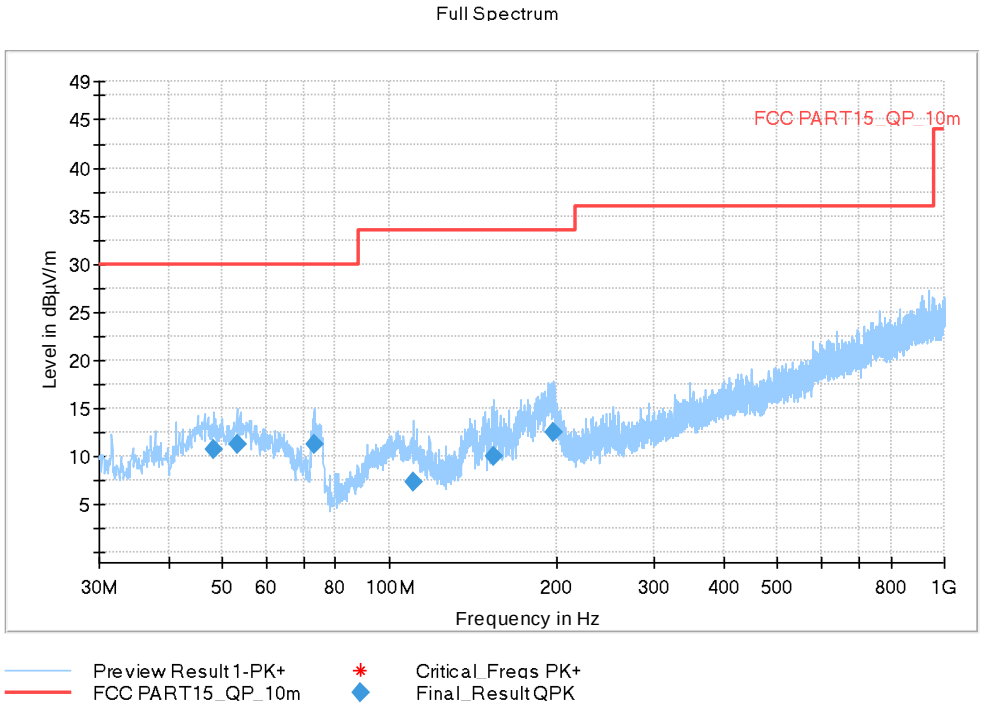

Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
48.333000	10.71	30.00	19.29	120.000	125.0	H	135.0	-11.1
53.086000	11.20	30.00	18.80	120.000	225.0	H	163.0	-11.0
73.359000	11.21	30.00	18.79	120.000	202.0	V	8.0	-16.3
110.704000	7.35	33.52	26.17	120.000	322.0	V	219.0	-12.8
153.675000	10.03	33.52	23.49	120.000	125.0	V	162.0	-15.4
198.101000	12.56	33.52	20.96	120.000	100.0	V	70.0	-11.5

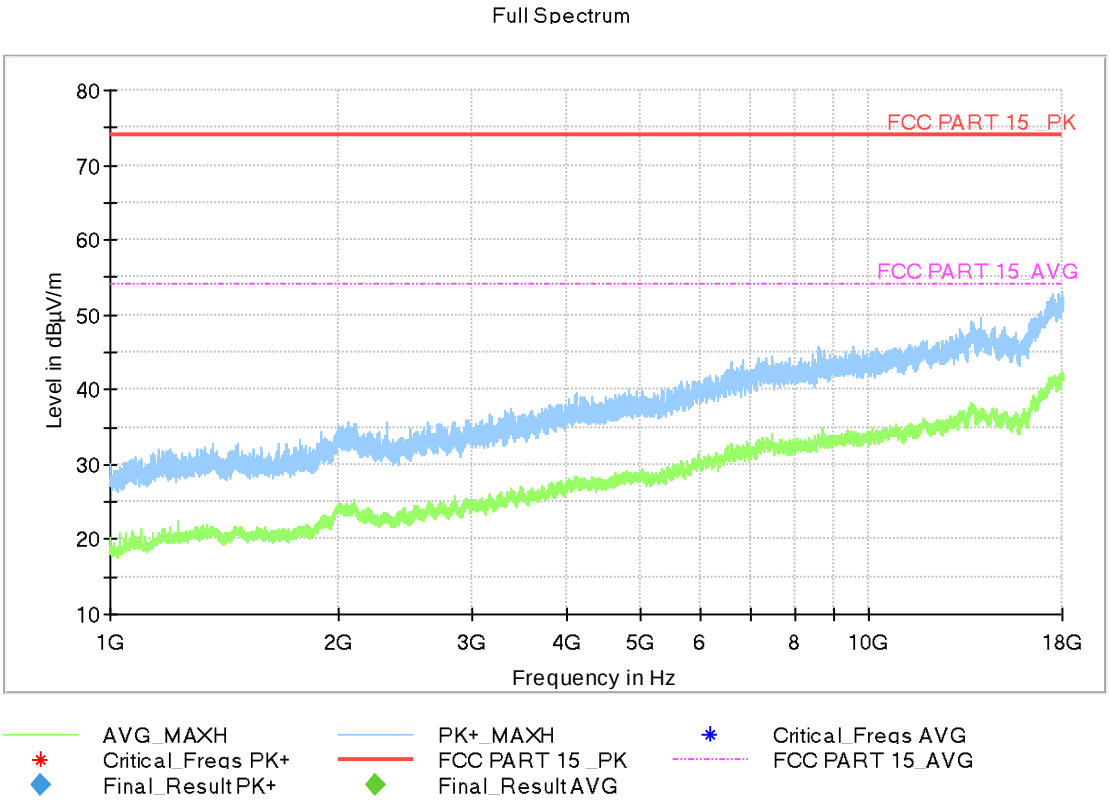

Fig A.2 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2:

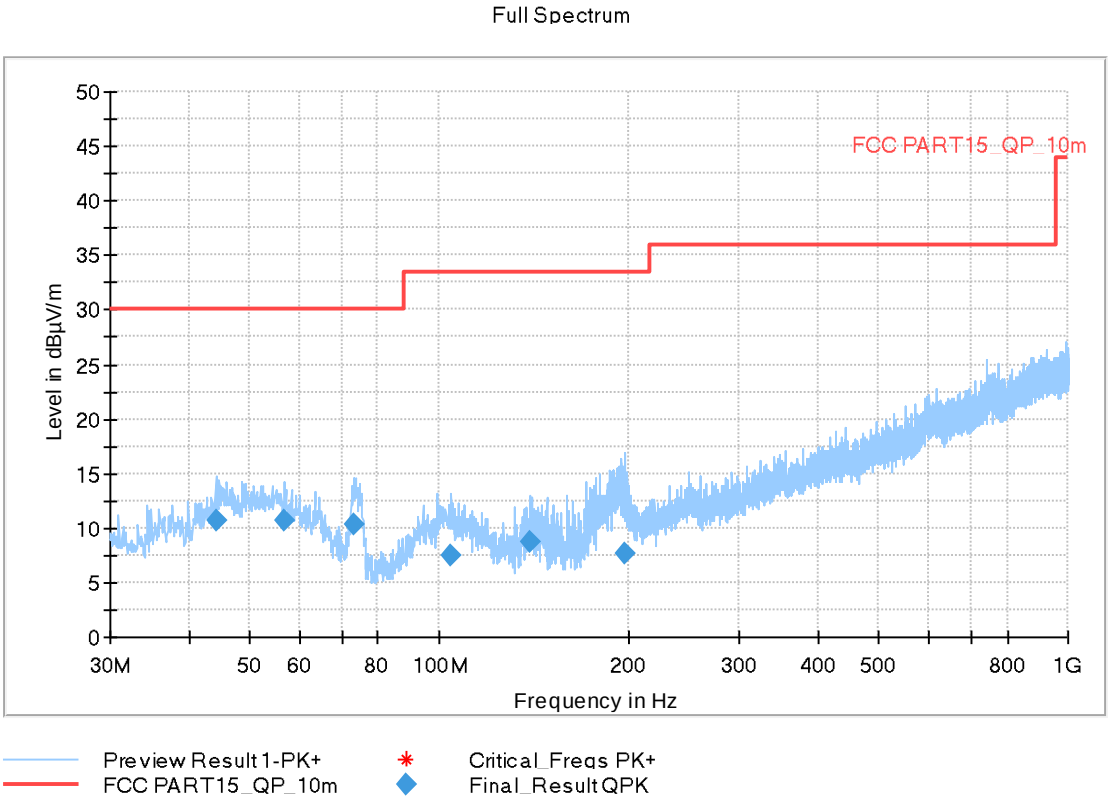

Fig A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.162000	10.75	30.00	19.25	120.000	302.0	H	84.0	-11.4
56.675000	10.70	30.00	19.30	120.000	125.0	H	-32.0	-11.3
73.262000	10.40	30.00	19.60	120.000	323.0	V	239.0	-16.2
104.690000	7.50	33.52	26.02	120.000	225.0	V	238.0	-12.3
139.998000	8.71	33.52	24.81	120.000	175.0	V	135.0	-15.7
197.810000	7.61	33.52	25.91	120.000	108.0	V	136.0	-11.5

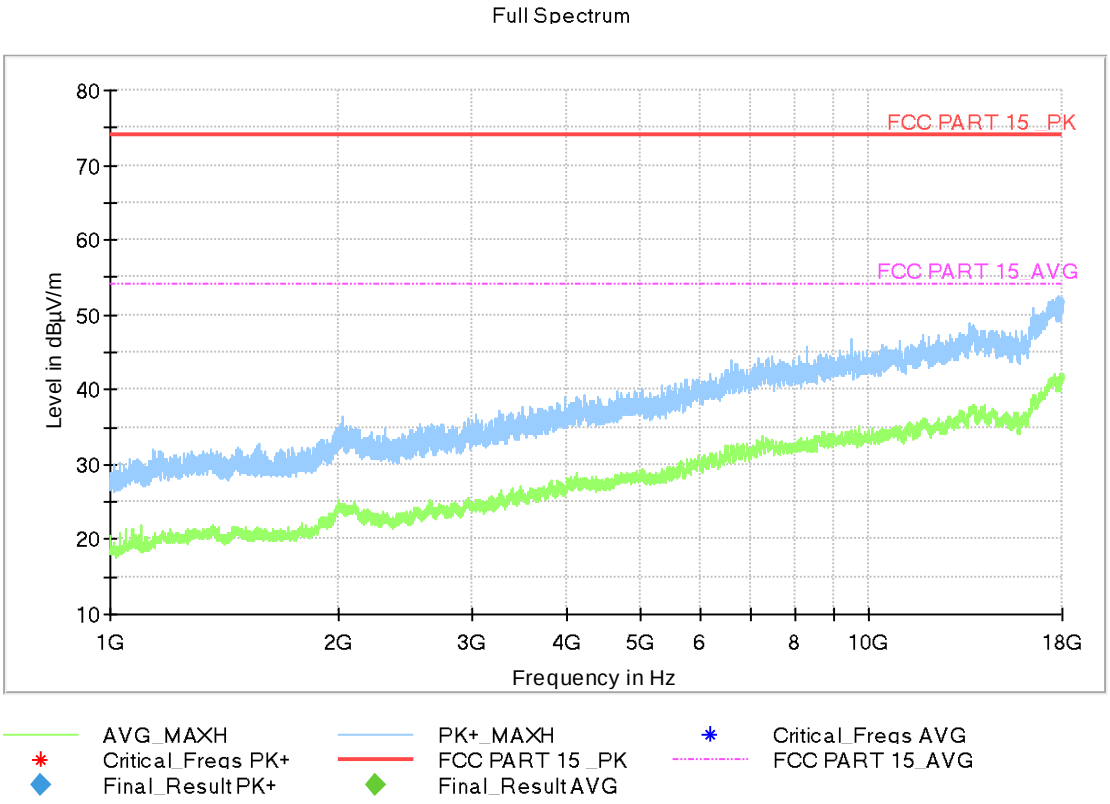

Fig A.4 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.3:

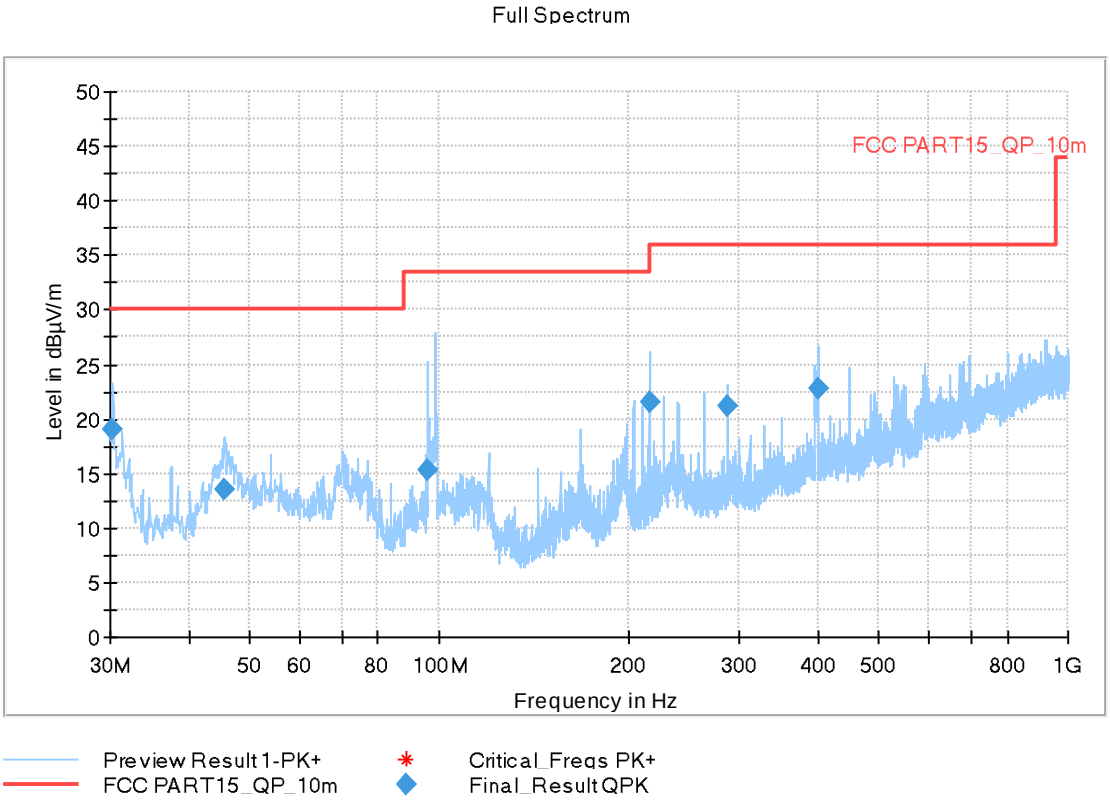

Fig A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.291000	19.03	30.00	10.97	120.000	225.0	V	305.0	-15.1
45.520000	13.43	30.00	16.57	120.000	175.0	V	71.0	-11.0
95.863000	15.34	33.52	18.18	120.000	125.0	V	306.0	-13.1
215.852000	21.57	33.52	11.95	120.000	183.0	H	251.0	-11.9
287.826000	21.25	36.02	14.77	120.000	325.0	H	71.0	-9.2
399.958000	22.80	36.02	13.22	120.000	175.0	H	-32.0	-5.7

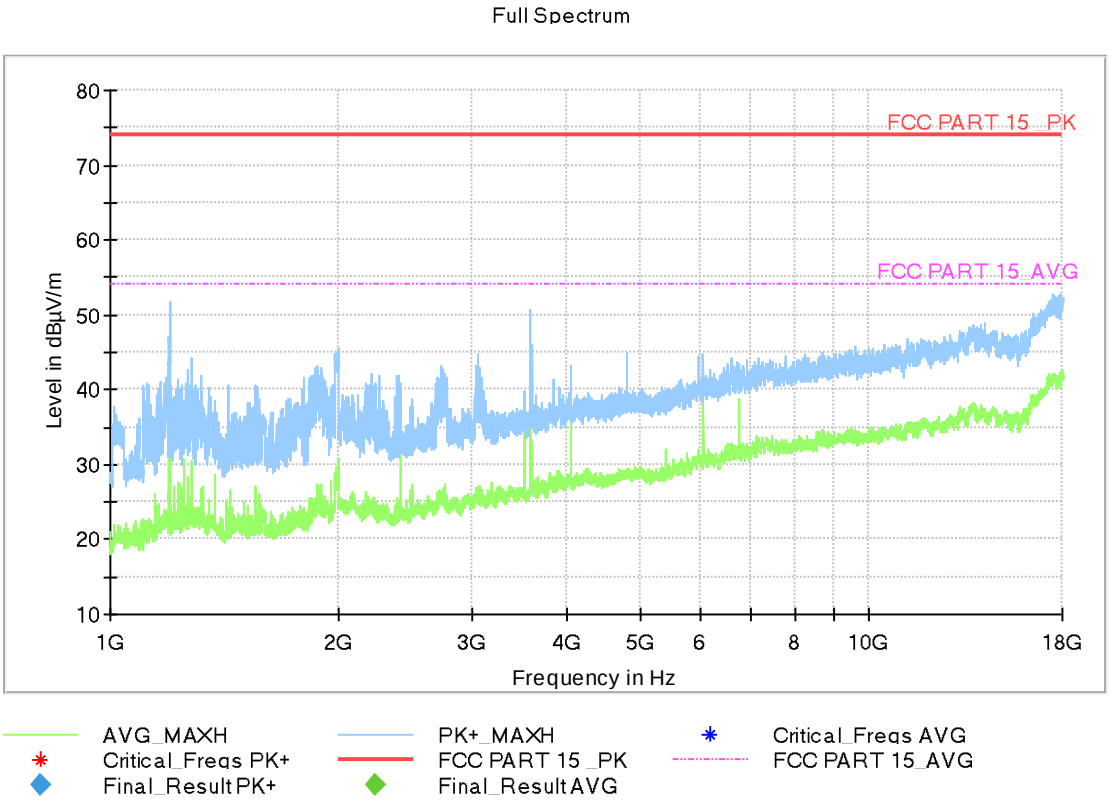

Fig A.6 Radiated Emission from 1GHz to 3GHz

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 (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*= 3.08 dB, *k*=2.

Charging Mode, Set.1 :

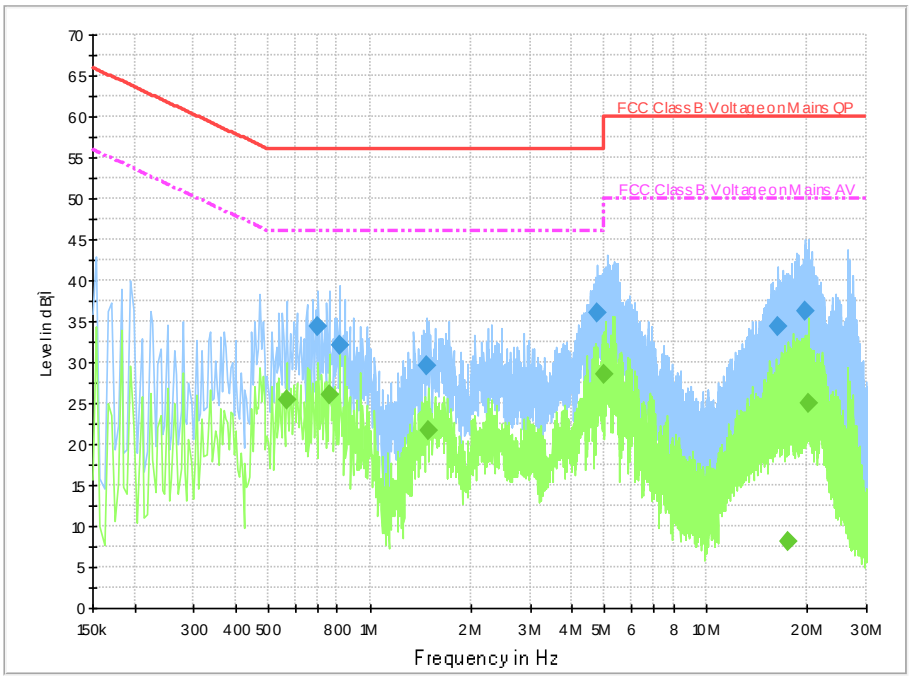

Fig A.7 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.702000	34.4	9.000	On	L1	19.7	21.6	56.0	
0.814000	32.1	9.000	On	L1	19.7	23.9	56.0	
1.474000	29.7	9.000	On	L1	19.7	26.3	56.0	
4.754000	36.1	9.000	On	N	19.6	19.9	56.0	
16.354000	34.4	9.000	On	L1	19.7	25.6	60.0	
19.678000	36.3	9.000	On	L1	19.8	23.7	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.566000	25.5	9.000	On	L1	19.7	20.5	46.0	
0.758000	26.1	9.000	On	L1	19.7	19.9	46.0	
1.490000	21.8	9.000	On	L1	19.6	24.2	46.0	
4.974000	28.6	9.000	On	N	19.6	17.4	46.0	
17.458000	8.1	9.000	On	L1	19.7	41.9	50.0	
20.114000	24.9	9.000	On	L1	19.8	25.1	50.0	

Charging Mode, Set.2 :

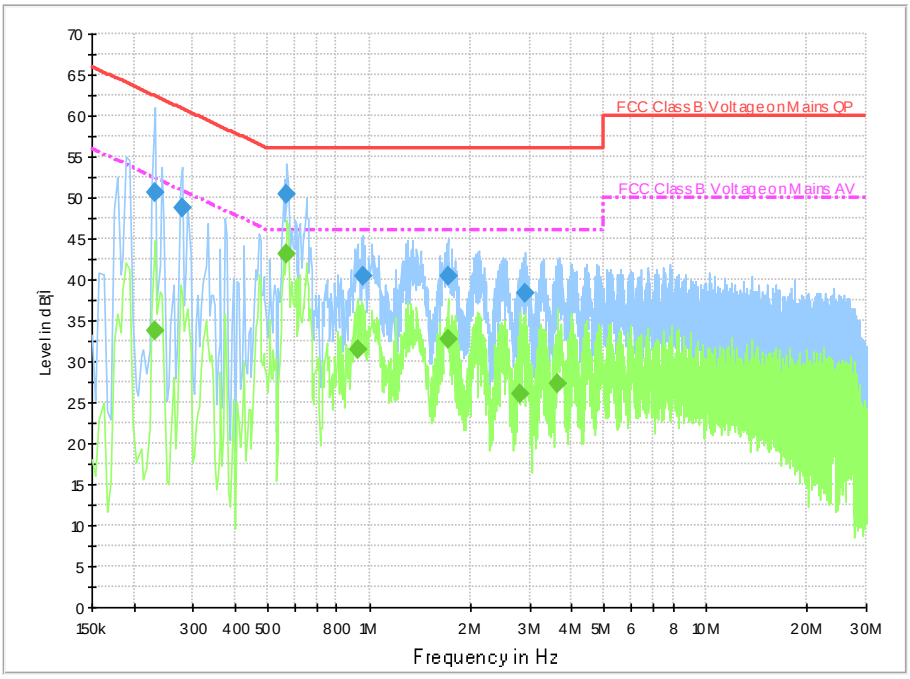

Fig A.8 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.466000	35.4	9.000	On	L1	19.7	21.2	56.6	
0.742000	33.6	9.000	On	L1	19.7	22.4	56.0	
2.338000	28.5	9.000	On	L1	19.6	27.5	56.0	
4.970000	37.2	9.000	On	L1	19.6	18.8	56.0	
15.790000	32.7	9.000	On	L1	19.7	27.3	60.0	
24.318000	40.9	9.000	On	N	19.8	19.1	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.466000	27.5	9.000	On	L1	19.7	19.1	46.6	
0.798000	25.2	9.000	On	L1	19.7	20.8	46.0	
4.970000	29.5	9.000	On	L1	19.6	16.5	46.0	
6.186000	23.1	9.000	On	L1	19.6	26.9	50.0	
15.790000	21.9	9.000	On	L1	19.7	28.1	50.0	
23.866000	24.5	9.000	On	N	19.8	25.5	50.0	

USB Mode, Set.3 :

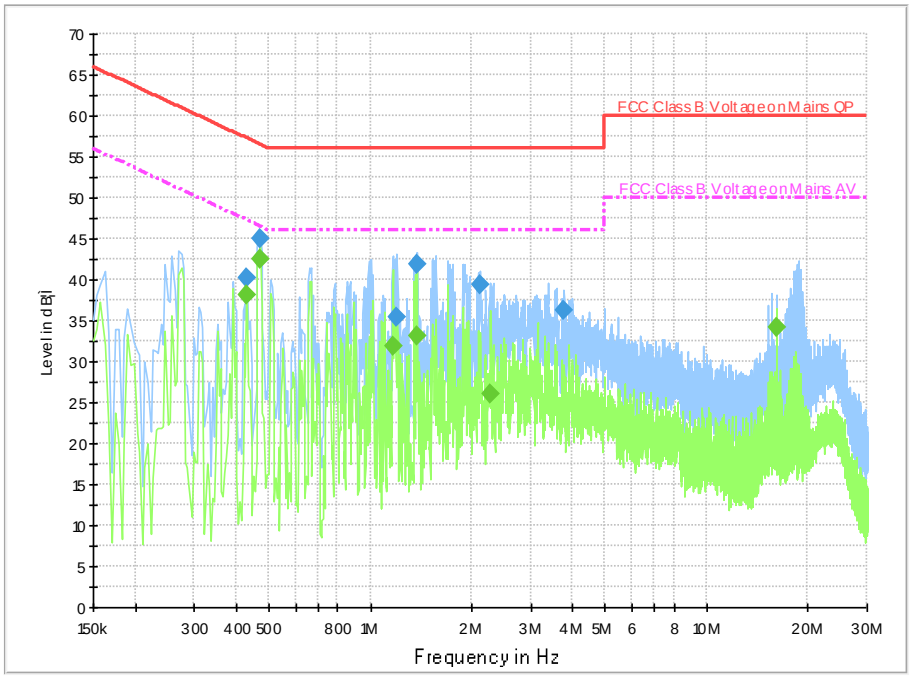

Fig A.9 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.430000	40.2	2000.0	9.000	On	L1	19.7	17.0	
0.470000	45.0	2000.0	9.000	On	L1	19.7	11.5	
1.198000	35.5	2000.0	9.000	On	N	19.6	20.5	
1.378000	41.9	2000.0	9.000	On	L1	19.6	14.1	
2.122000	39.4	2000.0	9.000	On	L1	19.6	16.6	
3.778000	36.3	2000.0	9.000	On	N	19.6	19.7	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.430000	38.1	2000.0	9.000	On	L1	19.7	9.2	
0.470000	42.4	2000.0	9.000	On	L1	19.7	4.1	
1.166000	32.0	2000.0	9.000	On	N	19.6	14.0	
1.378000	33.1	2000.0	9.000	On	L1	19.6	12.9	
2.274000	26.1	2000.0	9.000	On	N	19.6	19.9	
16.226000	34.2	2000.0	9.000	On	N	19.7	15.8	

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