



TEST REPORT

No. I22Z62077-EMC01

for

TCL Communication Ltd.

GSM/UMTS/LTE mobile phone

Model Name: T431D

FCC ID: 2ACCJH171

with

Hardware Version: 05

Software Version: KW1E

Issued Date: 2022-12-08

Note:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z62077-EMC01	Rev.0	1 st edition	2022-12-08

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



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1. Test Laboratory

1.1. Testing Location

CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology
Development Area, Beijing, P. R. China 100176

1.2. Testing Environment

Normal Temperature: 15-35°C
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2022-12-06
Testing End Date: 2022-12-08


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

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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	T431D
FCC ID:	2ACCJH171

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
UT14a	351490260001753	05	KW1E

*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	USB Cable
AE3	USB Cable
AE4	Charger
AE5	Headset

AE1

Model	TLi028C7
Manufacturer	NINGBO VEKEN BATTERY CO., LTD
Capacity	min2880mAh/Typ3000mAh
Nominal Voltage	3.85V

AE2

Model	CDA3122005C8
Manufacturer	HUIZHOU PUAN ELECTRONICS CO LTD
Length of cable	/

AE3

Model	CDA3122005C1
Manufacturer	Juwei Electroncs Co.,LTD
Length of cable	/

AE4

Model	UC11US(part number: CBA0058AG9C5)
Manufacturer	HUIZHOU PUAN ELECTRONICS CO LTD
Length of cable	

AE5

Model	CCB0046A15C1
Manufacturer	Juwei Electroncs 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 + AE2/3 + AE4	Charger1
Set.2	EUT1 + AE1 + AE2/3 + AE4	Charger1
Set.3	EUT1 + AE1 + AE2/3 + AE5	USB+FM

Note:

Equipment Under Test (EUT) is a model of LTE Mobile Phone with integrated antenna. It supports

GSM Band	GSM 900/1800
UMTS Band	FDD Band I(W2100) /FDD Band VIII(W900)
LTE Band	FDD1/3/7/8/20/28

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

NOTE: The model 431D is a variant model based on 431E. According to the declaration of changes, the following test items and test modes were performed.

Test Item	Mode or Feature	EUT Set-up
Radiated Continues Emission	Charging mode/USB mode	Set.1/2/3

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 metersx6.7metersx6.1meters) 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 M Ω
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 M Ω
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) CTTL(BDA)

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	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:

Charing 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)
17032.000	38.53	-27.0	41.0	24.54	54.0	15.5	V
17035.000	38.53	-27.0	41.0	24.54	54.0	15.5	V
17032.500	38.50	-27.0	41.0	24.50	54.0	15.5	V
16922.000	38.49	-27.2	41.3	24.32	54.0	15.5	V
17039.500	38.48	-27.0	41.0	24.49	54.0	15.5	V
16918.500	38.46	-27.2	41.3	24.28	54.0	15.5	V

Charing 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)
16775.500	51.1	-27.3	41.3	37.16	74.0	22.9	H
17520.500	51.0	-26.7	40.8	37.01	74.0	23.0	H
17124.500	51.0	-26.9	40.9	37.00	74.0	23.0	V
16360.500	51.0	-27.6	40.6	37.95	74.0	23.0	V
17032.000	50.8	-27.0	41.0	36.77	74.0	23.2	H
16916.000	50.7	-27.2	41.4	36.56	74.0	23.3	V

**Measurement results for Set.2:
Charing 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)
16652.500	38.40	-27.5	41.2	24.78	54.0	15.6	V
16929.500	38.39	-27.2	41.3	24.23	54.0	15.6	V
16920.000	38.38	-27.2	41.3	24.20	54.0	15.6	V
16927.500	38.37	-27.2	41.3	24.21	54.0	15.6	V
16931.000	38.35	-27.1	41.3	24.20	54.0	15.6	V
16919.000	38.34	-27.2	41.3	24.16	54.0	15.7	V

Charing 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)
17021.500	51.0	-27.1	41.1	37.04	74.0	23.0	V
17492.000	50.8	-26.7	40.8	36.74	74.0	23.2	V
16174.000	50.7	-28.0	40.6	38.09	74.0	23.3	V
16374.000	50.7	-27.6	40.6	37.64	74.0	23.3	V
17049.000	50.7	-27.0	41.0	36.67	74.0	23.3	H
16857.000	50.6	-27.2	41.4	36.45	74.0	23.4	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)
17122.500	38.47	-26.9	40.9	24.49	54.0	15.5	V
17033.500	38.42	-27.0	41.0	24.43	54.0	15.6	V
16927.500	38.41	-27.2	41.3	24.25	54.0	15.6	V
16866.000	38.36	-27.2	41.4	24.22	54.0	15.6	V
17037.500	38.34	-27.0	41.0	24.35	54.0	15.7	V
17249.500	38.31	-26.9	40.9	24.31	54.0	15.7	V

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)
15947.500	52.7	-27.7	40.3	40.10	74.0	21.3	V
15948.500	52.5	-27.7	40.3	39.89	74.0	21.5	V
15939.500	52.3	-27.7	40.3	39.78	74.0	21.7	H
7996.500	52.2	-34.1	35.9	50.39	74.0	21.8	H
15941.000	52.0	-27.7	40.3	39.39	74.0	22.0	H
15940.500	51.9	-27.7	40.3	39.31	74.0	22.1	H

Measurement results for Set.1:

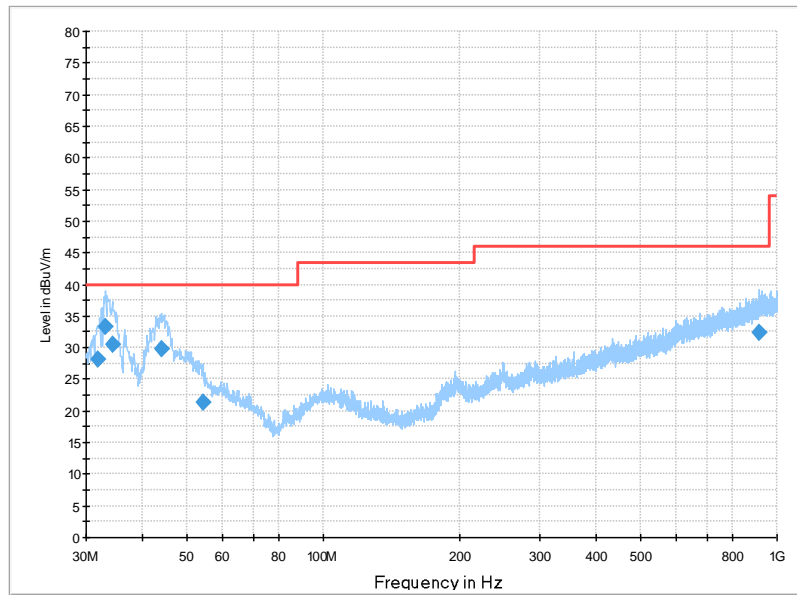


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
31.746000	28.1	100.0	V	96.0	-3.5	11.9	40.0	
33.007000	33.3	100.0	V	45.0	-3.3	6.7	40.0	
34.268000	30.6	100.0	V	270.0	-2.9	9.4	40.0	
43.871000	29.8	100.0	V	51.0	-0.2	10.2	40.0	
54.444000	21.3	100.0	V	45.0	0.2	18.7	40.0	
912.409000	32.4	115.0	V	115.0	13.0	13.6	46.0	

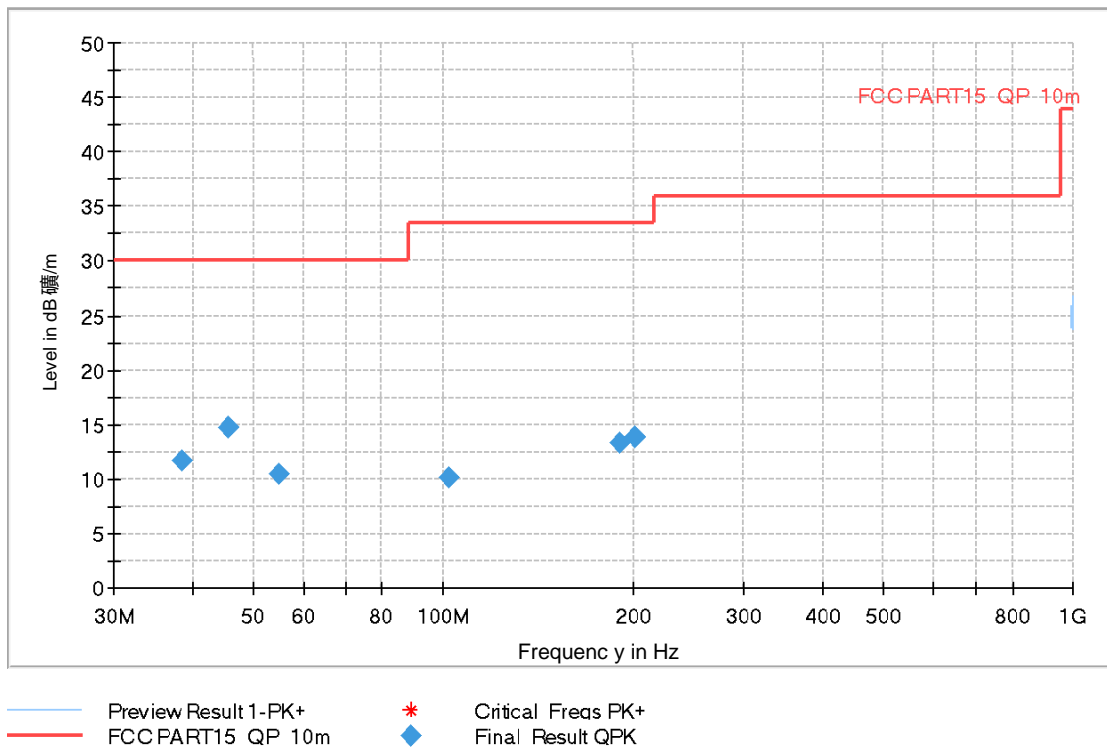


Fig A.2 Radiated Emission from 1GHz to 3GHz

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

Measurement results for Set.2:

Full Spectrum


Fig A.4 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)
38.439000	11.76	30.00	18.24	120.000	222.0	V	252.0
45.617000	14.78	30.00	15.22	120.000	325.0	V	60.0
54.929000	10.49	30.00	19.51	120.000	283.0	V	-44.0
102.459000	10.22	33.52	23.30	120.000	325.0	V	-31.0
191.020000	13.33	33.52	20.19	120.000	125.0	V	59.0
201.690000	13.91	33.52	19.61	120.000	125.0	V	59.0

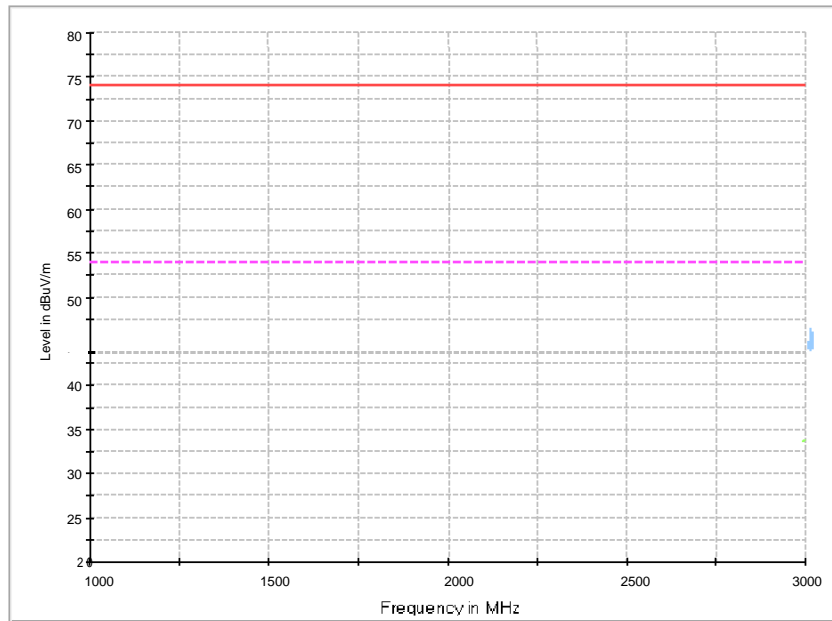


Fig A.5 Radiated Emission from 1GHz to 3GHz

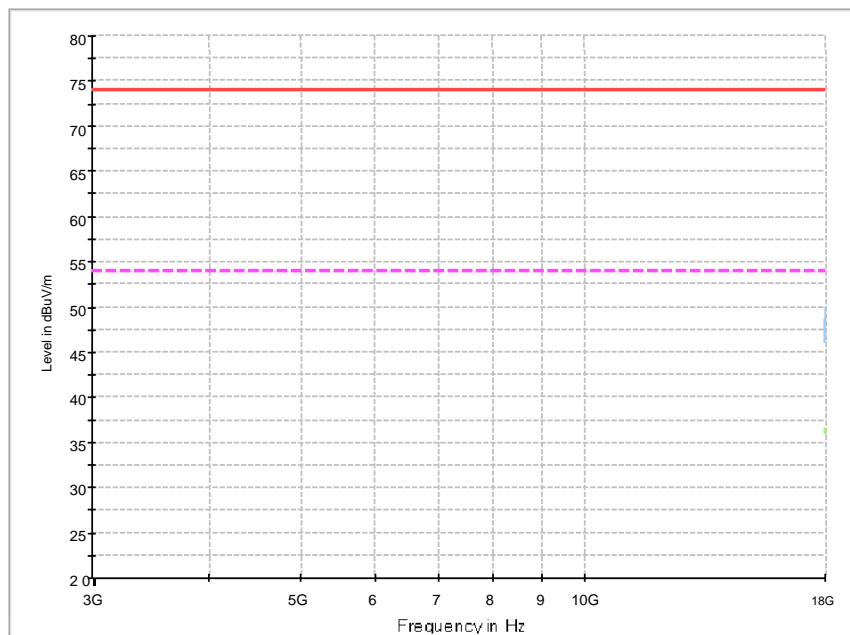
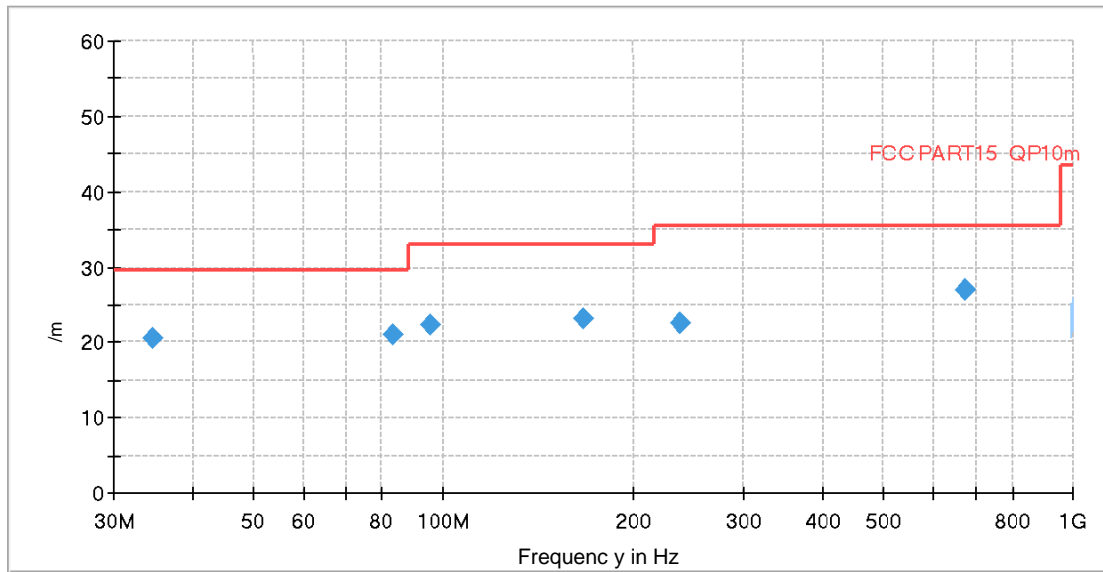


Fig A.6 Radiated Emission from 3GHz to 6GHz

Measurement results for Set.3:

Full Spectrum



- Preview Result 1-PK+ [Preview Result 1.Result:1]
- * Critical Freqs PK+ [Critical Freqs.Result:4]
- FCC PART15 QP10m [..]
- ◆ Final Result QPK [Final Result.Result:4]
- × MaxPeak-PK+ (Single) [Result Table Single.Result:1]
- + QuasiPeak-QPK (Single) [Result Table Single.Result:2]

Fig A.7 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)
34.559000	20.56	29.54	8.98	120.000	282.0	V	33.0
83.350000	21.16	29.54	8.38	120.000	120.0	V	50.0
95.281000	22.48	33.06	10.58	120.000	186.0	V	71.0
166.770000	23.29	33.06	9.77	120.000	101.0	V	170.0
238.162000	22.77	35.56	12.79	120.000	125.0	V	186.0
673.886000	26.98	35.56	8.58	120.000	190.0	V	15.0

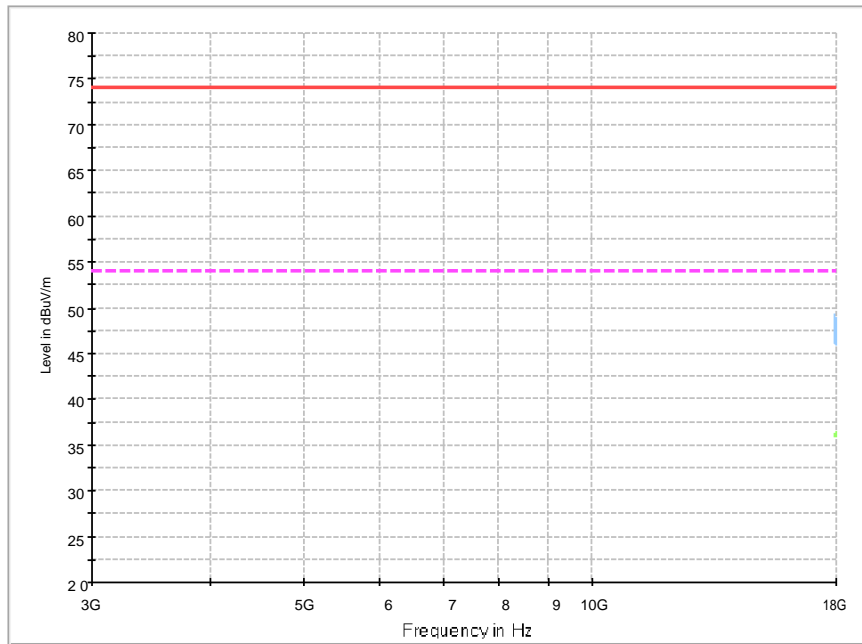


Fig A.8 Radiated Emission from 1GHz to 3GHz

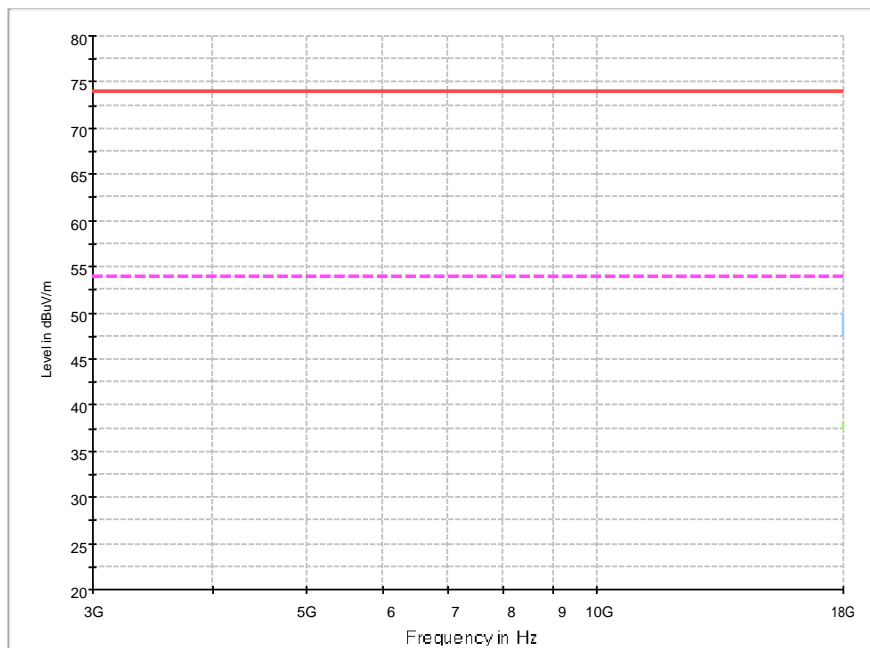


Fig A.9 Radiated Emission from 3GHz to 6GHz

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 :

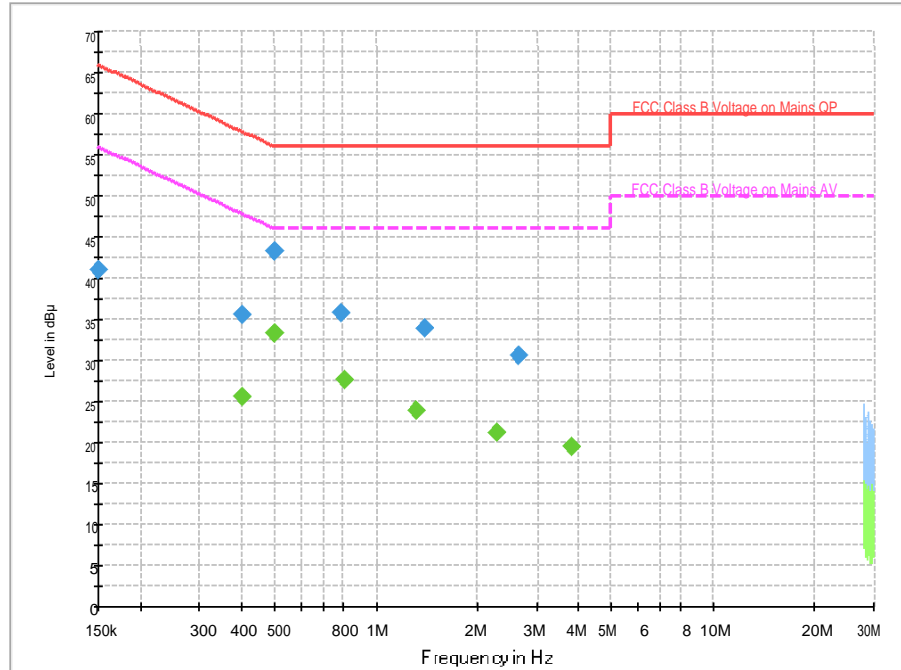


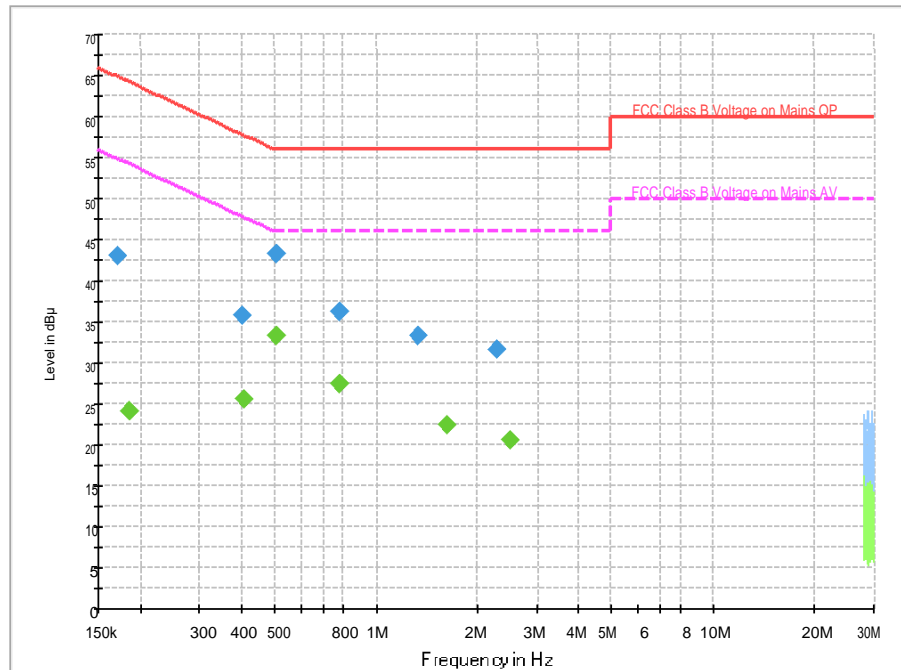
Fig A.10 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.150000	41.0	9.000	On	L1	20.0	25.0	66.0	
0.402000	35.6	9.000	On	L1	19.7	22.3	57.8	
0.498000	43.2	9.000	On	L1	19.7	12.8	56.0	
0.790000	35.7	9.000	On	L1	19.7	20.3	56.0	
1.398000	33.9	9.000	On	L1	19.6	22.1	56.0	
2.658000	30.6	9.000	On	L1	19.6	25.4	56.0	

Final Result 2

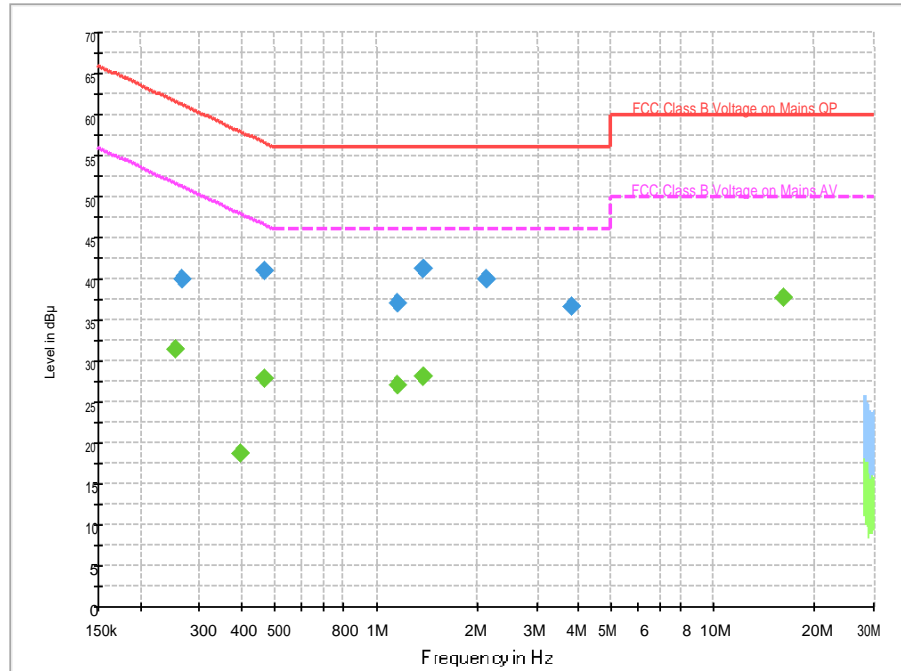
Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.402000	25.6	9.000	On	L1	19.7	22.2	47.8	
0.498000	33.3	9.000	On	L1	19.7	12.8	46.0	
0.802000	27.7	9.000	On	L1	19.7	18.3	46.0	
1.314000	24.0	9.000	On	L1	19.6	22.0	46.0	
2.270000	21.2	9.000	On	L1	19.6	24.8	46.0	
3.794000	19.6	9.000	On	L1	19.6	26.4	46.0	

Charging Mode, Set.2:

Fig A.11 Conducted Emission from 150kHz to 30MHz
Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.170000	43.1	9.000	On	L1	19.7	21.8	65.0	
0.402000	35.7	9.000	On	L1	19.7	22.1	57.8	
0.502000	43.3	9.000	On	L1	19.7	12.7	56.0	
0.778000	36.2	9.000	On	L1	19.7	19.8	56.0	
1.330000	33.4	9.000	On	L1	19.6	22.6	56.0	
2.278000	31.7	9.000	On	L1	19.6	24.3	56.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.186000	24.3	9.000	On	L1	19.7	30.0	54.2	
0.406000	25.7	9.000	On	L1	19.7	22.1	47.7	
0.502000	33.3	9.000	On	L1	19.7	12.7	46.0	
0.778000	27.4	9.000	On	L1	19.7	18.6	46.0	
1.618000	22.5	9.000	On	L1	19.6	23.5	46.0	
2.498000	20.6	9.000	On	L1	19.6	25.4	46.0	

Charging Mode, Set.3:

Fig A.12 Conducted Emission from 150kHz to 30MHz
Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.266000	39.9	9.000	On	N	19.7	21.3	61.2	
0.466000	41.0	9.000	On	N	19.7	15.6	56.6	
1.150000	37.0	9.000	On	L1	19.7	19.0	56.0	
1.374000	41.3	9.000	On	L1	19.6	14.7	56.0	
2.122000	40.1	9.000	On	N	19.6	15.9	56.0	
3.786000	36.7	9.000	On	N	19.6	19.3	56.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.254000	31.5	9.000	On	L1	19.7	20.1	51.6	
0.394000	18.9	9.000	On	L1	19.7	29.1	48.0	
0.466000	27.9	9.000	On	L1	19.7	18.7	46.6	
1.162000	27.1	9.000	On	N	19.6	18.9	46.0	
1.374000	28.1	9.000	On	L1	19.6	17.9	46.0	
16.226000	37.8	9.000	On	N	19.7	12.2	50.0	

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