



TEST REPORT

No. I16Z41734-EMC01

for

TCL Communication Ltd.

GPS Tracker

Model Name: MK20U

Marketing Name: MOVETRACK

FCC ID: 2ACCJB073

with

Hardware Version: GPS TRACKER V2.0

Software Version: GpsTracker_20160815_LAZ_v1.0.6_LATAM

Issued Date: 2016-08-25

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

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16Z41734-EMC01	Rev.0	1 st edition	2016-08-25

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1. Test Laboratory

1.1. Testing Location

Location 1: 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℃

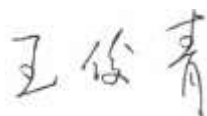
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2016-08-16

Testing End Date: 2016-08-25

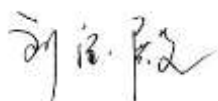
1.4. Signature



Wang Junqing
(Prepared this test report)



Qu Pengfei
(Reviewed this test report)



Liu Baodian
Deputy Director of the laboratory
(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
Address /Post: 5F, C-Tower, No.232, Liangjing Road, Zhangjiang High-tech Park,
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City: Shanghai
Postal Code: 201203
Country: P. R. China
Contact Person: Xingyu.Huang
Contact Email: xingyu.huang@tcl.com
Telephone: 86-0755-36612422
Fax: 86-0755-33035460

2.2. Manufacturer Information

Company Name: TCL Mobile Communication Co. Ltd. Huizhou
Address /Post: 70 Huifeng 4rd., ZhongKai High-Technology Development District,
Huizhou, Guangdong, PRC. 516006
City: Huizhou
Postal Code: 516006
Country: P. R. China
Telephone: 86-0755-36612422
Fax: 86-0755-33035460

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

3.1. About EUT

Description	GPS Tracker
Model Name	MK20U
Marketing Name	MOVETRACK
FCC ID	2ACCJB073
Extreme vol. Limits	3.5VDC to 4.35VDC (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
EUT1	014770000000044	GPS TRACKER V2.0	GpsTracker_20160815_LAZ_v 1.0.6_LATAM

*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	Charger	/	/
AE3	USB Cable	/	/

AE1

Model	/
Manufacturer	/
Capacitance	/
Nominal voltage	/

AE2

Model	UC11
Manufacturer	Tenpao
Length of cable	/

AE3

Model	/
Manufacturer	Shenghu
Length of cable	100cm

*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+ AE2+ AE3	Charger
Set.2	EUT1+ AE1+ AE3	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	10-1-15 Edition
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

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 is described in section 1.1 of this report

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

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESU26	100235	R&S	2017-03-02	1 year
2	Test Receiver	ESCI 7	100344	R&S	2017-07-05	1 year
3	Universal Radio Communication Tester	CMW500	143008	R&S	2016-12-09	1 year
4	Universal Radio Communication Tester	CMW500	155415	R&S	2017-01-11	1 year
5	LISN	ENV216	101200	R&S	2017-07-10	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2017-12-16	3 years
7	EMI Antenna	3115	6914	ETS-Lindgren	2016-12-15	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
11	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 10 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): $U = 4.3 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency(MHz)	Result(dB $\mu\text{V}/\text{m}$)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μV)	Polarity
17954.950	51.3	-17.7	45.6	23.400	H
17902.250	51.3	-18.5	45.6	24.200	H
17947.300	51.2	-17.7	45.6	23.300	V
17959.200	51.2	-17.7	45.6	23.300	V
17893.750	51.1	-18.5	45.6	24.000	V
17957.500	51.1	-17.7	45.6	23.200	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dB $\mu\text{V}/\text{m}$)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μV)	Polarity
17988.100	61.6	-17.7	45.6	33.700	H
17947.300	61.6	-17.7	45.6	33.700	H
17948.150	61.5	-17.7	45.6	33.600	V
17932.850	61.5	-17.7	45.6	33.600	V
17977.050	61.4	-17.7	45.6	33.500	V
17863.150	61.3	-18.5	45.6	34.200	H

Sample calculation: Peak detector, 17863.150MHz

$$\text{Result} = P_{\text{Mea}} (34.200\text{dB}\mu\text{V}) + G_A (45.6\text{dB/m}) + G_{\text{PL}}(-18.5 \text{ dB}) = 61.3\text{dB}\mu\text{V/m}$$

Measurement results for Set.2:
USB Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17927.750	51.7	-17.7	45.6	23.800	H
17997.450	51.3	-17.7	45.6	23.400	V
17952.400	51.2	-17.7	45.6	23.300	V
17987.250	51.1	-17.7	45.6	23.200	H
17936.250	51.1	-17.7	45.6	23.200	H
17985.550	51.0	-17.7	45.6	23.100	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
17777.300	61.8	-18.5	45.6	34.700	V
17960.050	61.6	-17.7	45.6	33.700	H
17927.750	61.6	-17.7	45.6	33.700	V
17915.000	61.4	-17.7	45.6	33.500	H
17917.550	61.3	-17.7	45.6	33.400	H
17903.950	61.3	-18.5	45.6	34.200	V

Sample calculation: Peak detector, 17915.000MHz

Result =P_{Mea} (33.500dB μ V)+ G_A (45.6dB/m)+ G_{PL}(-17.7 dB) =61.4dB μ V/m

Measurement results for Set.1:
WiFi Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17964.300	51.3	-17.7	45.6	23.400	H
17956.650	51.3	-17.7	45.6	23.400	H
17974.500	51.3	-17.7	45.6	23.400	V
17943.050	51.3	-17.7	45.6	23.400	H
17940.500	51.0	-17.7	45.6	23.100	H
17997.450	51.0	-17.7	45.6	23.100	V

WiFi Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17943.900	61.6	-17.7	45.6	33.700	H
17943.050	61.2	-17.7	45.6	33.300	H
17885.250	61.2	-18.5	45.6	34.100	V
17919.250	61.0	-17.7	45.6	33.100	H
17835.100	61.0	-18.5	45.6	33.900	H
17969.400	61.0	-17.7	45.6	33.100	V

Sample calculation: Peak detector, 17943.900MHz

Result =P_{Mea} (33.700dB μ V) + G_A (45.6dB/m) +G_{PL} (-17.7 dB) =61.6dB μ V/m

Charging Mode, Set.1

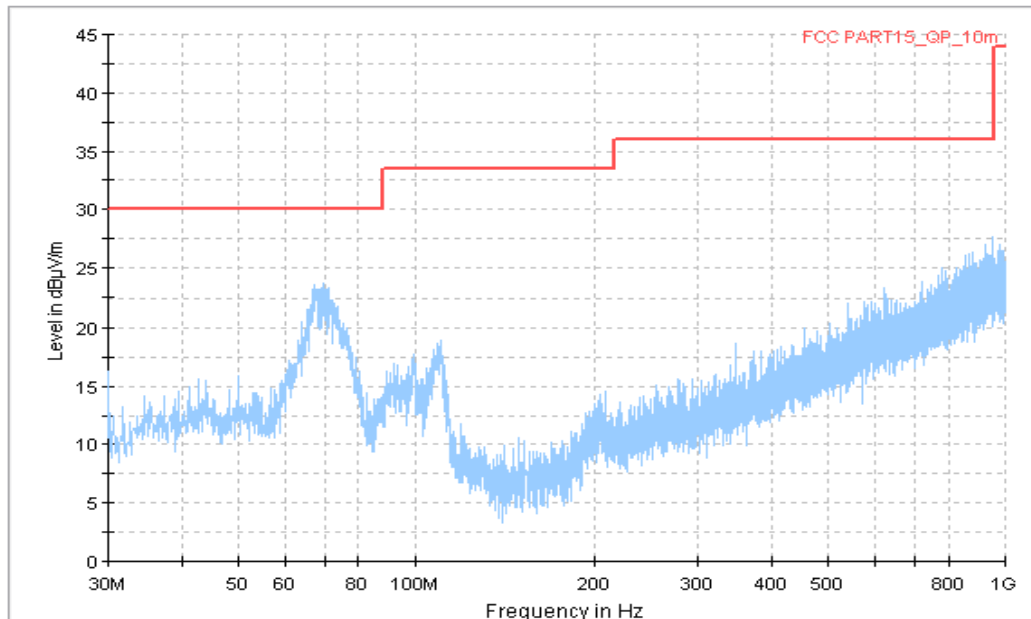


Figure A.1 Radiated Emission from 30MHz to 1GHz

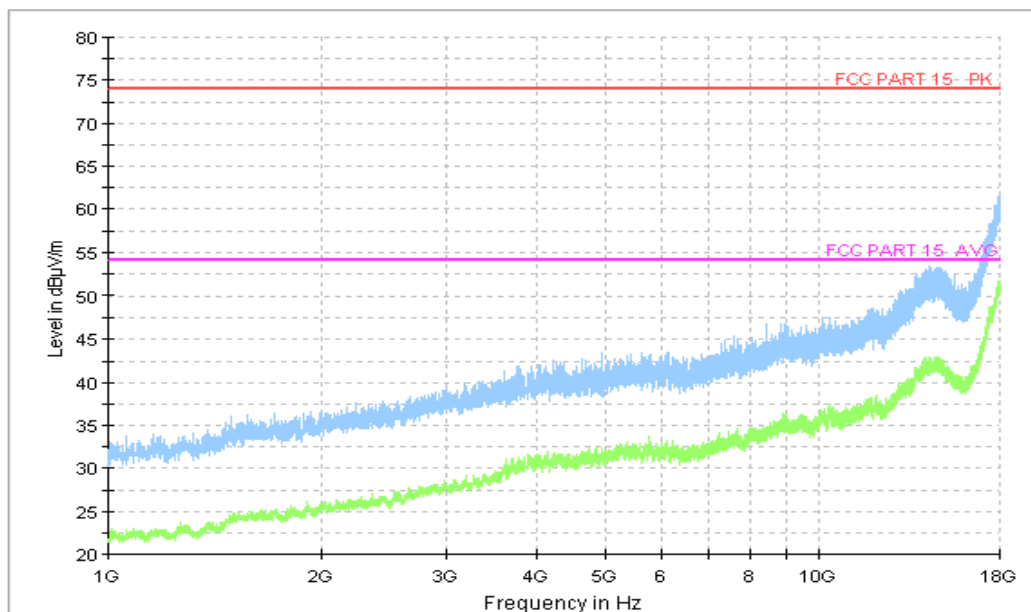


Figure A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

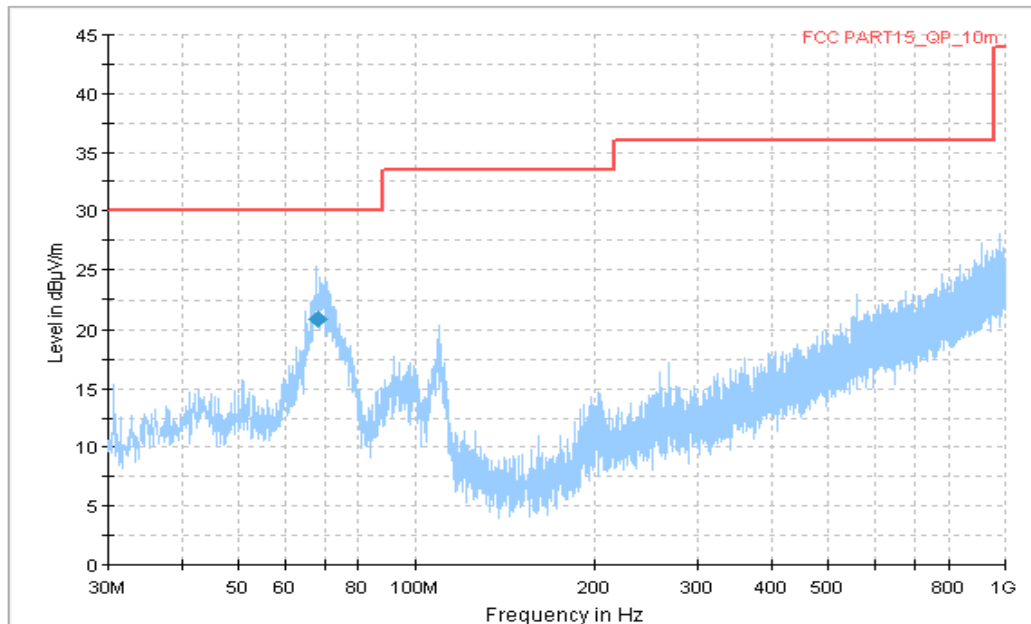


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
68.250000	20.88	121.9	V	-8.0	-14.7	9.12	30.0

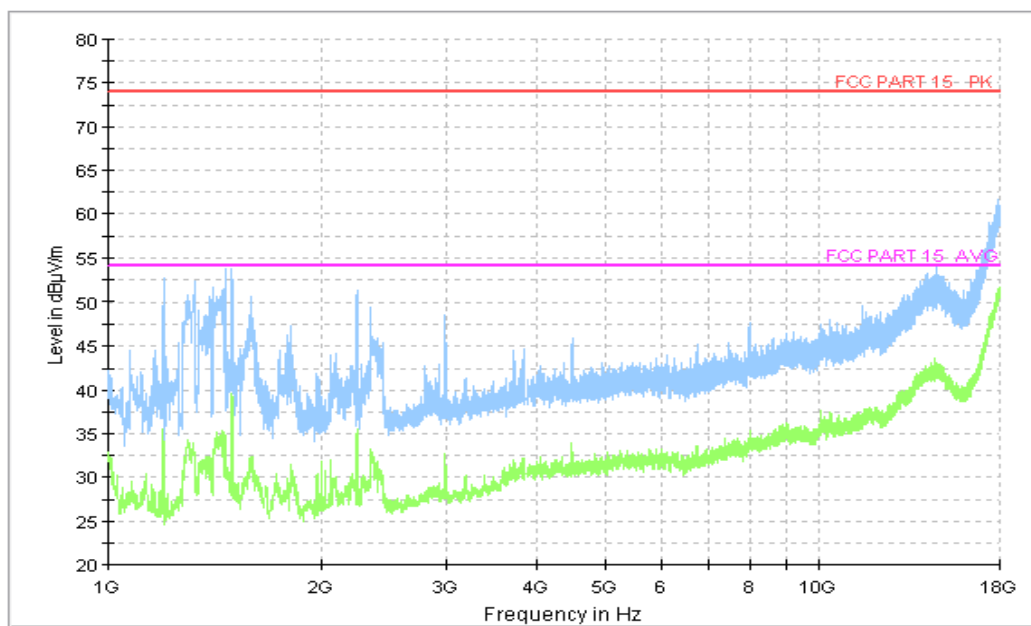


Figure A.4 Radiated Emission from 1GHz to 18GHz

WiFi Mode, Set.3

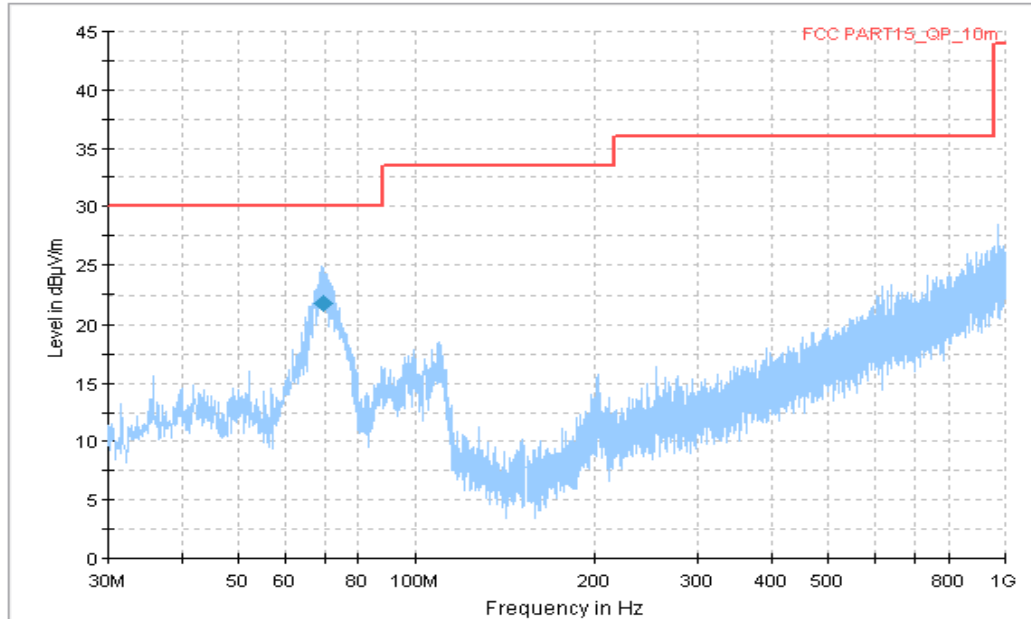


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
69.922000	21.86	188.8	V	187.0	-15.3	8.14	30.00

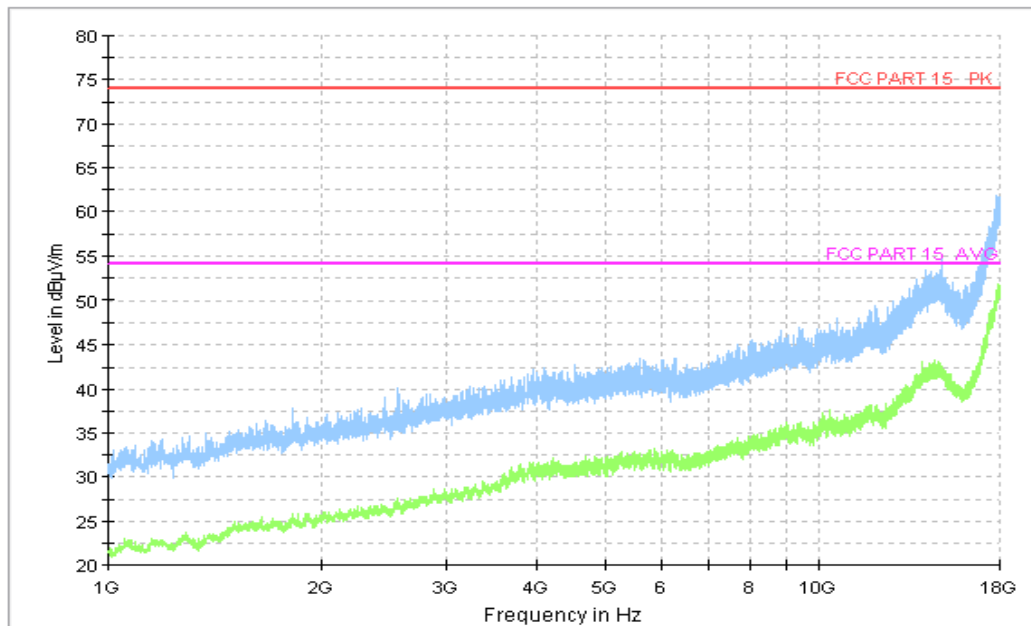


Figure A.6 Radiated Emission from 1GHz to 18GHz

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 (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: $U= 2.9$ dB, $k=2$.

Charging Mode, Set.1

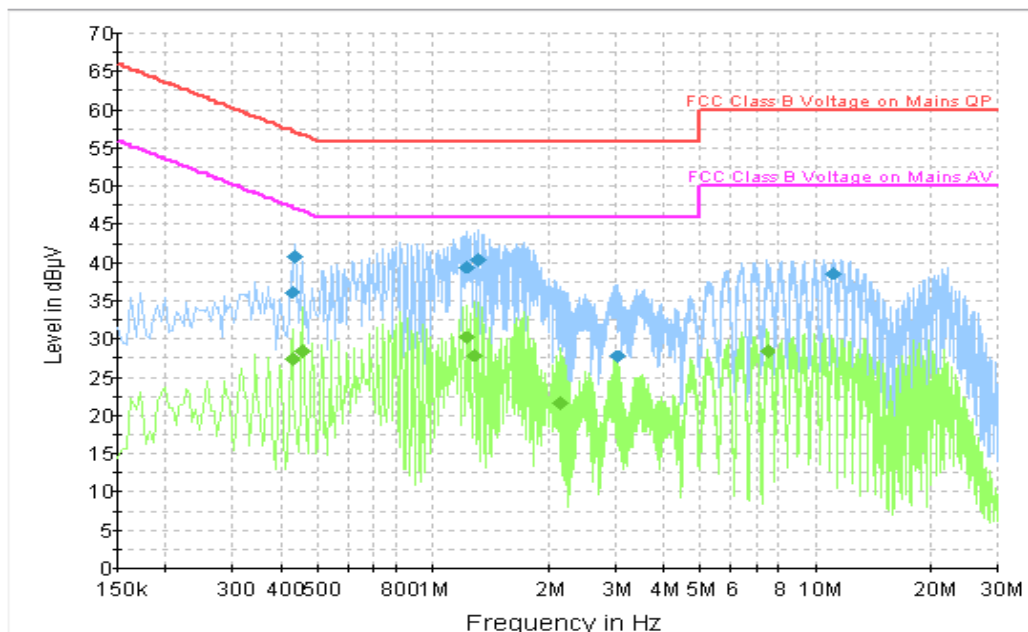


Figure A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.429000	36.1	2000.0	9.000	On	L1	19.9	21.1	57.3
0.438000	40.8	2000.0	9.000	On	N	19.9	16.3	57.1
1.225500	39.4	2000.0	9.000	On	L1	19.7	16.6	56.0
1.311000	40.5	2000.0	9.000	On	L1	19.7	15.5	56.0
3.048000	27.7	2000.0	9.000	On	L1	19.2	28.3	56.0
11.089500	38.6	2000.0	9.000	On	N	19.7	21.4	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.429000	27.3	2000.0	9.000	On	L1	19.9	19.9	47.3
0.456000	28.4	2000.0	9.000	On	L1	19.9	18.4	46.8
1.225500	30.2	2000.0	9.000	On	L1	19.7	15.8	46.0
1.284000	27.9	2000.0	9.000	On	L1	19.7	18.1	46.0
2.161500	21.6	2000.0	9.000	On	N	19.4	24.4	46.0
7.507500	28.4	2000.0	9.000	On	N	19.6	21.6	50.0

USB Mode, Set.2

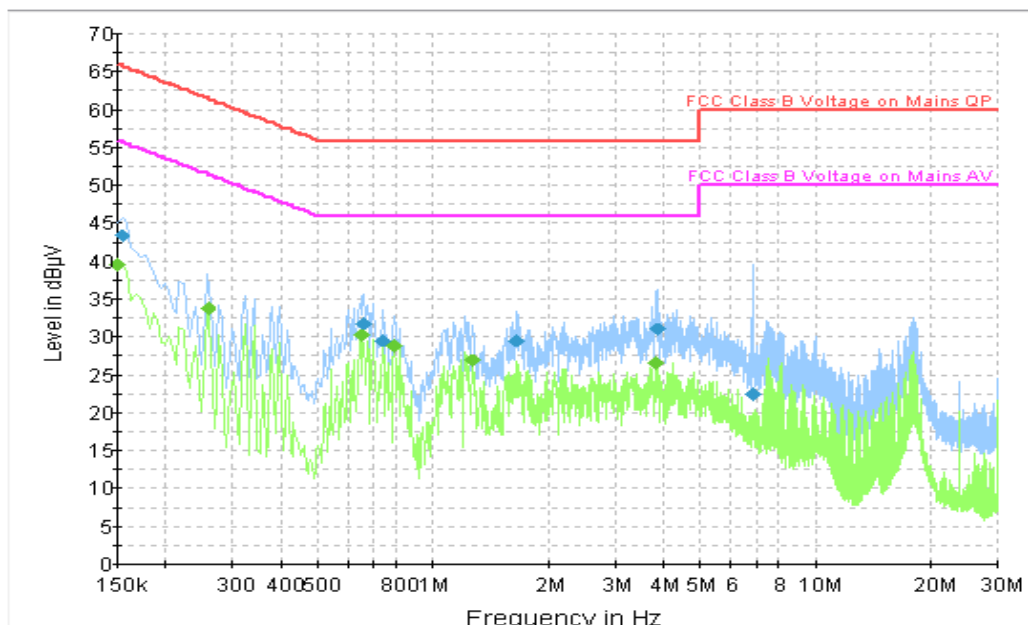


Figure A.10 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	43.4	2000.0	9.000	On	N	20.0	22.3	65.8
0.658500	31.7	2000.0	9.000	On	N	19.8	24.3	56.0
0.739500	29.6	2000.0	9.000	On	L1	19.8	26.4	56.0
1.662000	29.5	2000.0	9.000	On	N	19.7	26.5	56.0
3.840000	31.0	2000.0	9.000	On	L1	19.5	25.0	56.0
6.855000	22.4	2000.0	9.000	On	L1	19.6	37.6	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	39.6	2000.0	9.000	On	N	20.2	16.4	56.0
0.258000	33.8	2000.0	9.000	On	L1	19.8	17.7	51.5
0.654000	30.3	2000.0	9.000	On	L1	19.8	15.7	46.0
0.793500	28.9	2000.0	9.000	On	L1	19.8	17.1	46.0
1.270500	27.0	2000.0	9.000	On	N	19.7	19.0	46.0
3.835500	26.6	2000.0	9.000	On	N	19.5	19.4	46.0

WiFi Mode, Set.3

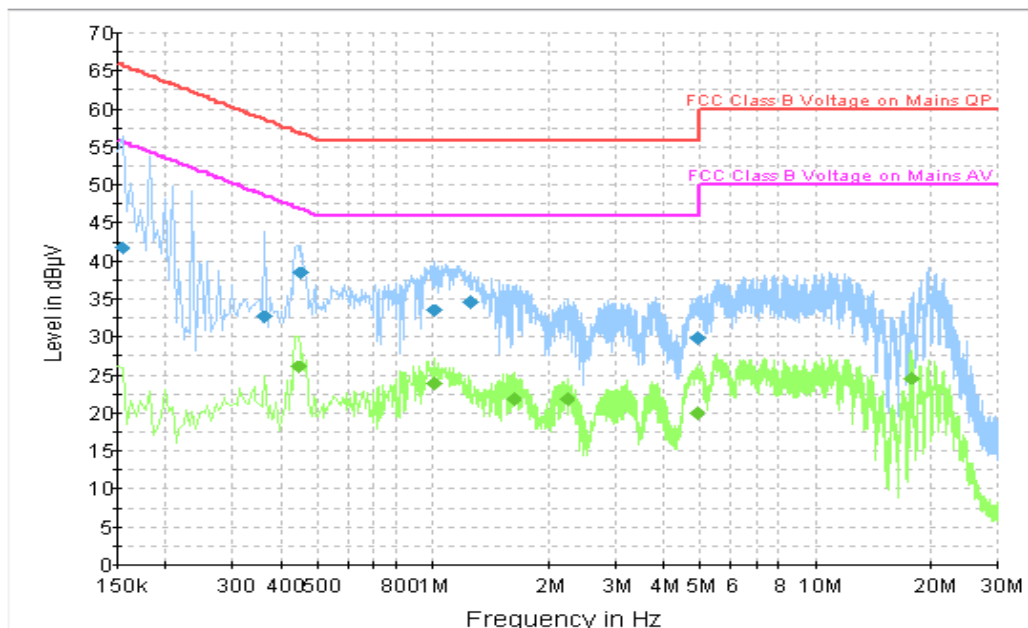


Figure A.11 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	41.7	2000.0	9.000	On	N	20.0	24.1	65.8
0.361500	32.7	2000.0	9.000	On	N	19.8	26.0	58.7
0.451500	38.4	2000.0	9.000	On	N	19.9	18.4	56.8
1.009500	33.4	2000.0	9.000	On	L1	19.7	22.6	56.0
1.252500	34.7	2000.0	9.000	On	N	19.7	21.3	56.0
4.960500	30.0	2000.0	9.000	On	N	19.6	26.0	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.442500	26.1	2000.0	9.000	On	L1	19.9	20.9	47.0
1.009500	23.9	2000.0	9.000	On	L1	19.7	22.1	46.0
1.621500	21.8	2000.0	9.000	On	L1	19.7	24.2	46.0
2.233500	21.8	2000.0	9.000	On	N	19.3	24.2	46.0
4.879500	20.0	2000.0	9.000	On	N	19.6	26.0	46.0
17.754000	24.6	2000.0	9.000	On	L1	19.9	25.4	50.0

END OF REPORT