



TEST REPORT

No.I20N02441-EMC

for

Wingtech Group (Hongkong) Limited

Multi-band WCDMA/LTE MIFI with WLAN

Model Name: CT2MHS01

With

Hardware Version: 89323_1_21

Software Version: CT2MHS01_0.01.41

FCC ID: 2APXW-CT2MHS01

Issued Date: 2020-10-16

Designation Number: CN1210

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 SAICT.

Test Laboratory:

SAICT, Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen,
Guangdong, P. R. China 518026.

Tel:+86(0)755-33322000, Fax:+86(0)755-33322001

Email: yewu@caict.ac.cn. www.saict.ac.cn



REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20N02441-EMC	Rev.0	1st edition	2020-10-16

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

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1. Summary of Test Report

1.1. Test Items

Description	Multi-band WCDMA/LTE MIFI with WLAN
Model Name	CT2MHS01
Applicant's name	Wingtech Group (Hongkong) Limited
Manufacturer's Name	Wingtech Group (Hongkong) Limited

1.2. Test Standards

FCC Part 15, Subpart B 10-1-2019 Edition; ANSI C63.4 2014

1.3. Test Result

Pass

Total test 2 items, pass 2 items. Please refer to "6.2 Summary of Measurement Results"

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

1.5. Project data

Testing Start Date: 2020-08-20

Testing End Date: 2020-09-04

1.6. Signature

Liang Yong
(Prepared this test report)

Zhang Yunzhuan
(Reviewed this test report)

Cao Junfei
(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: Wingtech Group (Hongkong) Limited
Address: Flat/RM 1903, 19/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui,
Kowloon, Hongkong.
Contact: Rui Sha
Email: sharui@wingtech.com
Telephone: +86-13917939276

2.2. Manufacturer Information

Company Name: Wingtech Group (Hongkong) Limited
Address: Flat/RM 1903, 19/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui,
Kowloon, Hongkong.
Contact: Rui Sha
Email: sharui@wingtech.com
Telephone: +86-13917939276

3. Equipment UnderTest (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Multi-band WCDMA/LTE MIFI with WLAN
Model Name	CT2MHS01
FCC ID	2APXW-CT2MHS01
Antenna Type	Internal Antenna
Extreme vol. Limits	3.4VDC to 4.4VDC (nominal: 3.85VDC)
Condition of EUT as received	No obvious damage in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
UT01aa	353929580015637	89323_1_21	CT2MHS01_0.01.41

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

3.3. Internal Identification of AE

AE ID*	Description	SN	Remarks
AE1	Battery	/	/
AE2	charger	/	/
AE3	USB cable	/	/
AE4	USB cable	/	/

AE1

Type	MF01
Manufacturer	Jiade Energy Technology (Zhuhai) Co.,Ltd.
Capacity	/
Nominal Voltage	/

AE2

Model	PA-US5V2A-036
Manufacturer	Huizhou puan electronics co., ltd
Length of cable	/

AE3

Type	USB TYPE A to C 2.0 Cable (1.0m)
Manufacturer	Huizhou Washin Electronics Co.,Ltd
Length of cable	/

AE4

Type	USB TYPE A to C 2.0 Cable (1.0m)
Manufacturer	Shenzhen BRL Technology Co.,Ltd.
Length of cable	/

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

AE: ancillary equipment



Note:The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.

Set.1

COMBINATION OF EUT AND AE

UT01aa+ AE1+AE2+AE3/AE4

3.5. General Description

The Equipment Under Test (EUT) is a model of Multi-band WCDMA/LTE MIFI with WLAN with internal antenna.

It consists of normal options: Battery, Charger,USB Cable.

Manual and specifications of the EUT were provided to fulfill the test.

Samples (EUT+AE) undergoing test were selected by the Client. Relevant information is provided by the Client.

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	10-1-2019 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber did not exceed following limits along the EMC testing:

9.10m×6.10m×5.60m (L×W×H)

Temperature	Min. = 15 °C, Max. = 35°C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω
Normalised site attenuation (NSA)	<±4 dB, 3 m distance, from 30 to 1000 MHz

Shield 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-10000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing:

9.10m×6.10m×5.60m (L×W×H)

Temperature	Min. = 15 °C, Max. = 35°C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

6. SUMMARY OF TEST RESULTS

6.1. Testing Environment

Normal Temperature: 15~35℃
Relative Humidity: 20~75%
Atmospheric pressure 86~106kPa

6.2. Summary of Measurement Results

Abbreviations used in this clause:	
P	Pass
NA	Not applicable
F	Fail

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

6.3. Statement

6.3.1 Statements of conformity

This report takes measured values as criterion of test conclusion. The test conclusion meets the limit requirements.

7. Measurement uncertainty

Test item	Frequency ranges	Measurement uncertainty
Radiated Emission	30MHz-1GHz	4.90dB(k=2)
	1GHz-18GHz	4.60dB(k=2)
Conducted Emission	150kHz-30MHz	3.00dB(k=2)

8. Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL DUE DATE	CAL PERIOD
1.	Test Receiver	ESR7	101676	R&S	2020.11.27	1 year
2.	Test Receiver	ESCI	100701	R&S	2021.08.09	1 year
3.	Spectrum Analyzer	FSV40	101192	R&S	2021.01.14	1 year
4.	BiLog Antenna	3142E	00224831	ETS-Lindgren	2021.05.17	3 years
5.	LISN	ENV216	102067	R&S	2021.07.16	1 year
6.	Horn Antenna	3117	00066577	ETS-Lindgren	2022.04.02	3 years
7.	Universal Radio Communication Tester	CMW500	152499	R&S	2021.07.16	1 year
8.	Signal Generator	SMB100A	179725	R&S	2020.11.27	1 year
9.	Chamber	FACT3-2.0	1285	ETS-Lindgren	2021.07.19	2 years
10.	Software	EMC32	V10.01.00	R&S	/	/

9. Test Accessory Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL DUE DATE	CAL PERIOD
1.	PC	ThinkPad T480	PF-13LW0C	Lenovo	/	/
2.	Printer	P1008	VNF6C12491	HP	/	/
3.	Mouse	MOEUUOA	44NY517	Lenovo	/	/

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§15.109(a))

Reference

FCC: CFR Part 15.109(a)

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (Data transfer mode of EUT and charging mode of EUT) at a distance 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 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 EUT is operating in the 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 the 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.

A.1.3 Measurement Limit

Limit from CFR Part 15.109(a)

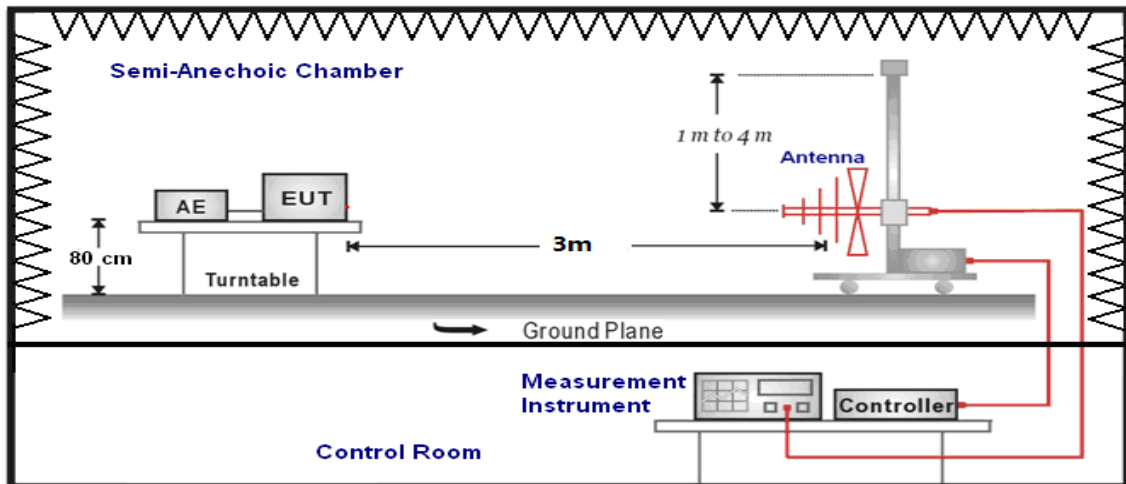
Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

*Note: The original limit is defined at 10m test distance. This limit is calculated according to CISPR requirements.

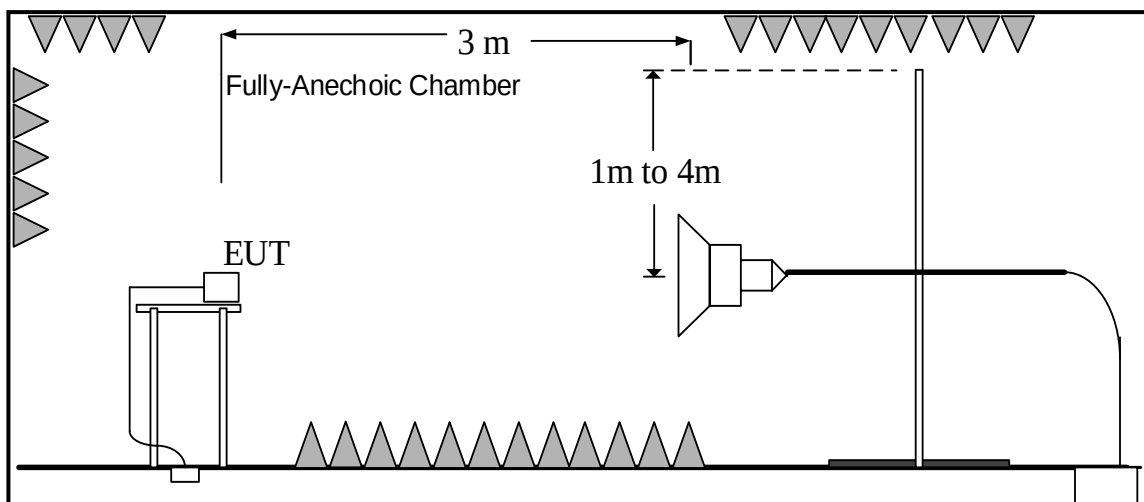
A.1.4 Test Condition

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz (IF bandwidth)	5
Above 1000	1MHz/3MHz	15

A.1.5 Test set-up: 30MHz-1GHz



1GHz-18GHz



A.1.6 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.

Result: Quasi-Peak(dBμV/m) / Average(dBμV/m)/Peak(dBμV/m)

Note: the result contains vertical part and Horizontal part

Measurement results

Charger+ WCDMA Band5 RX 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)
17886.100	49.5	-18.5	45.6	22.400	54.0	4.5	H
17883.267	49.2	-18.5	45.6	22.100	54.0	4.8	H
17983.000	49.1	-17.7	45.6	21.200	54.0	4.9	V
17976.200	48.9	-17.7	45.6	21.000	54.0	5.1	H
17971.667	48.7	-17.7	45.6	20.800	54.0	5.3	H
17897.433	48.6	-18.5	45.6	21.500	54.0	5.4	H

Charger+ WCDMA Band5 RX 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)
17998.867	57.6	-17.7	45.6	29.700	74.0	16.4	H
17970.533	57.4	-17.7	45.6	29.500	74.0	16.6	H
17966.567	57.2	-17.7	45.6	29.300	74.0	16.8	V
17976.200	56.9	-17.7	45.6	29.000	74.0	17.1	H
17983.000	56.8	-17.7	45.6	28.900	74.0	17.2	H
17963.167	56.7	-17.7	45.6	28.800	74.0	17.3	H

Charger+ LTE Band5 RX 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)
17955.233	49.8	-17.7	45.6	21.900	54.0	4.2	H
17983.567	49.0	-17.7	45.6	21.100	54.0	5.0	H
17985.833	48.8	-17.7	45.6	20.900	54.0	5.2	V
17975.633	48.5	-17.7	45.6	20.600	54.0	5.5	H
17980.167	48.4	-17.7	45.6	20.500	54.0	5.6	H
17963.733	48.4	-17.7	45.6	20.500	54.0	5.6	H

Charger+ LTE Band5 RX 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)
17934.267	57.8	-17.7	45.6	29.900	74.0	16.2	H
17976.767	57.8	-17.7	45.6	29.900	74.0	16.2	H
17967.133	56.7	-17.7	45.6	28.800	74.0	17.3	V
17857.767	56.6	-18.5	45.6	29.500	74.0	17.4	H
17954.100	56.5	-17.7	45.6	28.600	74.0	17.5	H
17886.667	56.4	-18.5	45.6	29.300	74.0	17.6	H

Charger+ LTE Band14 RX 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)
17975.633	49.3	-17.7	45.6	21.400	54.0	4.7	H
17901.400	48.7	-18.5	45.6	21.600	54.0	5.3	H
17982.433	48.7	-17.7	45.6	20.800	54.0	5.3	V
17905.367	48.6	-18.5	45.6	21.500	54.0	5.4	H
17989.233	48.6	-17.7	45.6	20.700	54.0	5.4	H
17966.000	48.5	-17.7	45.6	20.600	54.0	5.5	H

Charger+ LTE Band14 RX 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)
17981.867	57.6	-17.7	45.6	29.700	74.0	16.4	H
17992.633	57.1	-17.7	45.6	29.200	74.0	16.9	H
17947.300	56.8	-17.7	45.6	28.900	74.0	17.2	V
17866.833	56.8	-18.5	45.6	29.700	74.0	17.2	H
17988.667	56.6	-17.7	45.6	28.700	74.0	17.4	H
17992.067	56.6	-17.7	45.6	28.700	74.0	17.4	H

Charger+ WCDMA Band5 RX mode

Full Spectrum

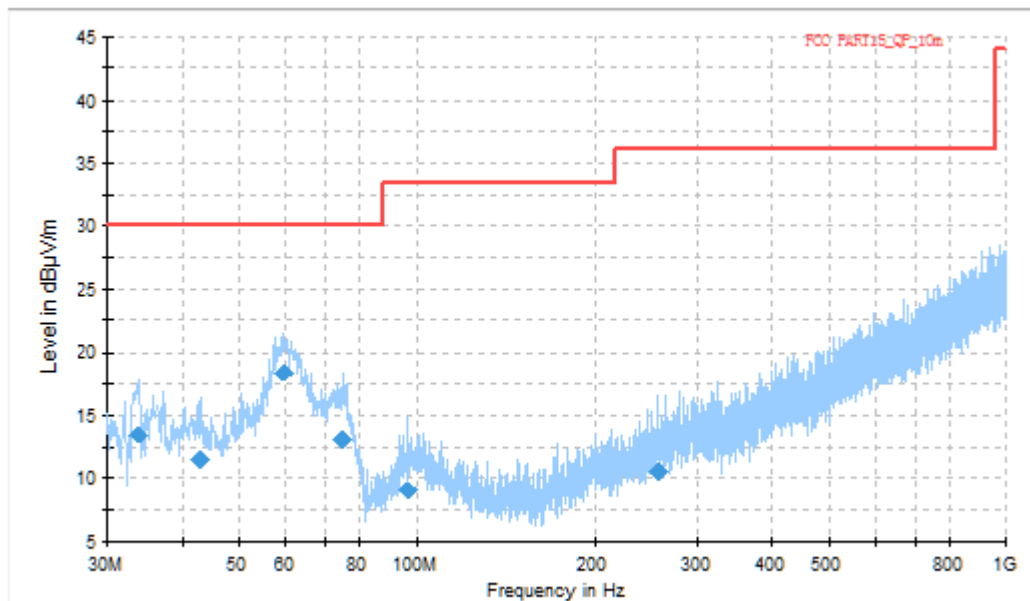


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
33.723000	13.46	30.00	16.54	1000.0	120.000	101.0	V	-10.0
43.132000	11.45	30.00	18.55	1000.0	120.000	112.0	V	81.0
59.834000	18.43	30.00	11.57	1000.0	120.000	225.0	V	9.0
74.976000	13.13	30.00	16.87	1000.0	120.000	194.0	V	60.0
96.279000	9.07	33.50	24.45	1000.0	120.000	212.0	V	21.0
256.28700	10.48	36.00	25.54	1000.0	120.000	225.0	V	120.0

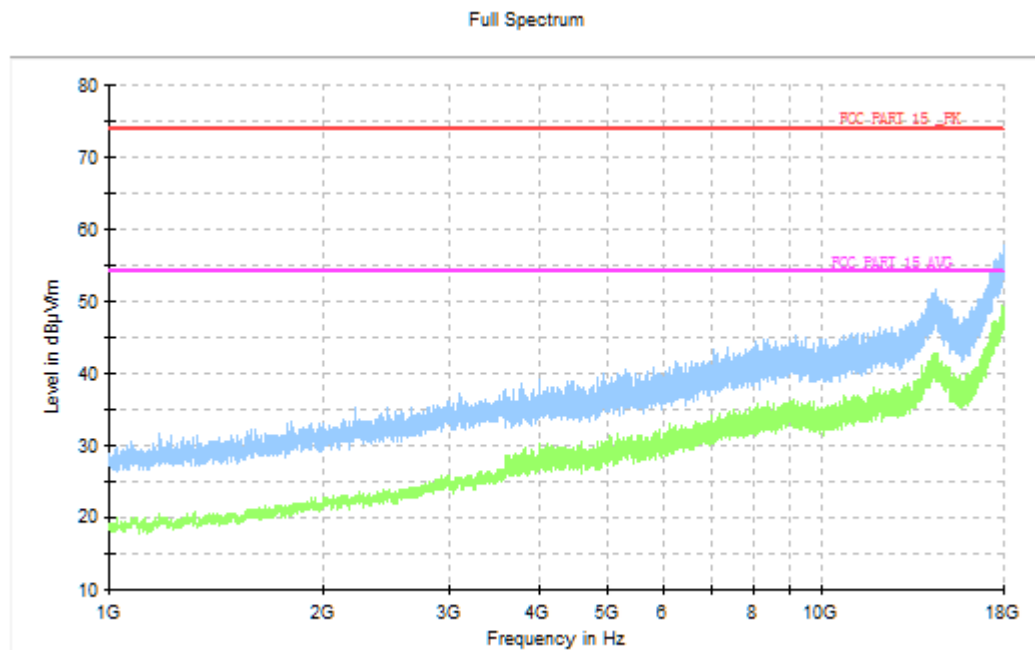


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charger+ LTE Band5 RX mode

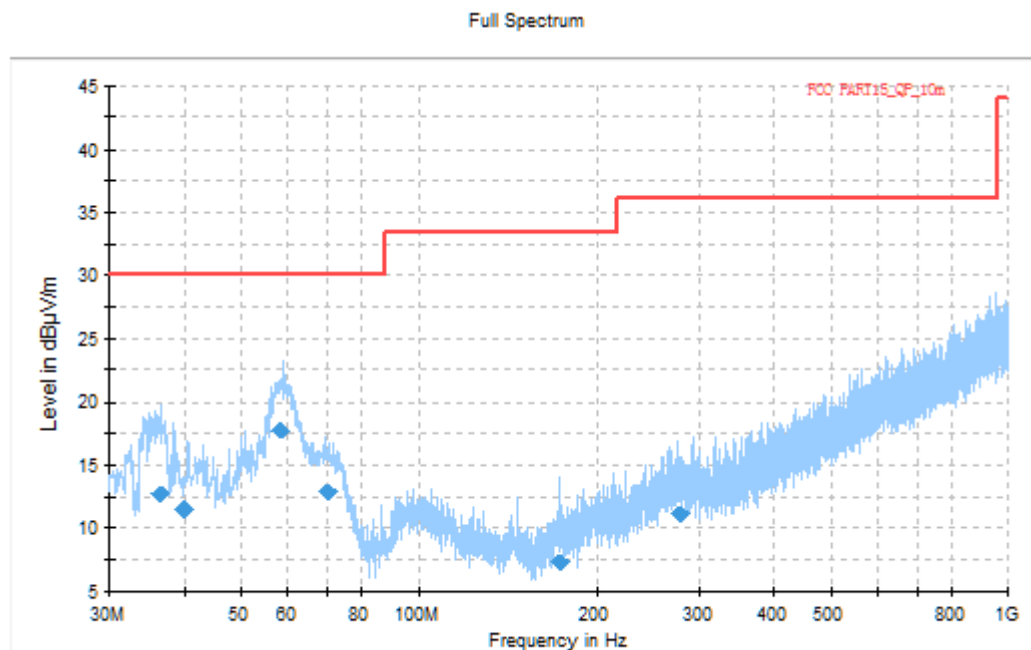


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
36.619000	12.74	30.00	17.26	1000.0	120.000	125.0	V	153.0
40.070000	11.48	30.00	18.52	1000.0	120.000	225.0	V	17.0
58.329000	17.73	30.00	12.27	1000.0	120.000	125.0	V	188.0
69.959000	12.91	30.00	17.09	1000.0	120.000	208.0	V	120.0
173.69900	7.29	33.50	26.23	1000.0	120.000	225.0	V	120.0
276.82300	11.14	36.00	24.88	1000.0	120.000	99.0	V	202.0

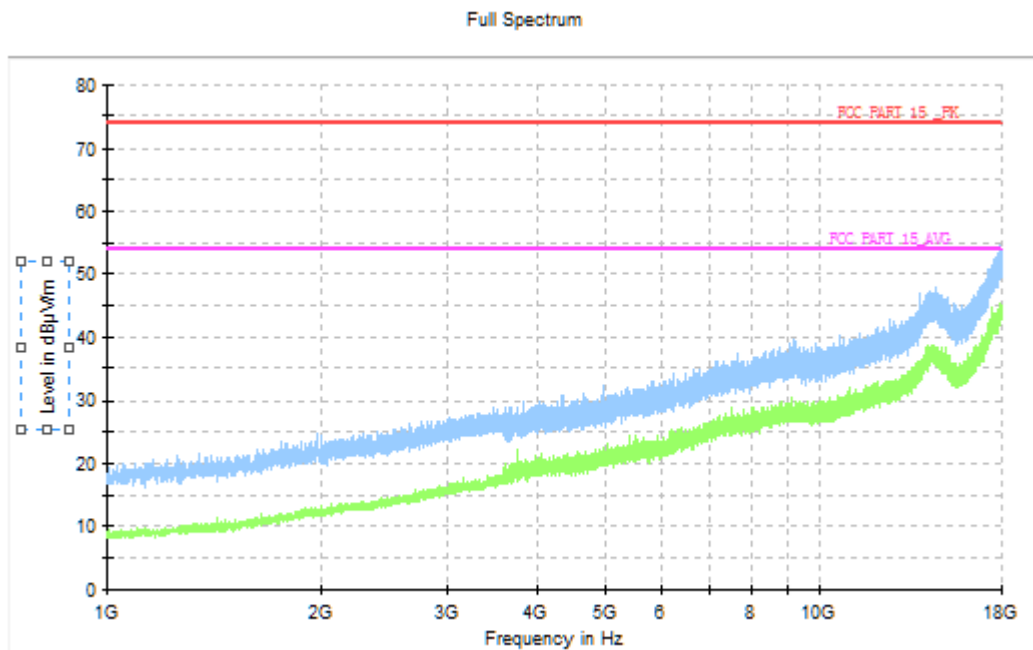


Figure A.4 Radiated Emission from 1GHz to 18GHz

Charger+ LTE Band14 RX mode

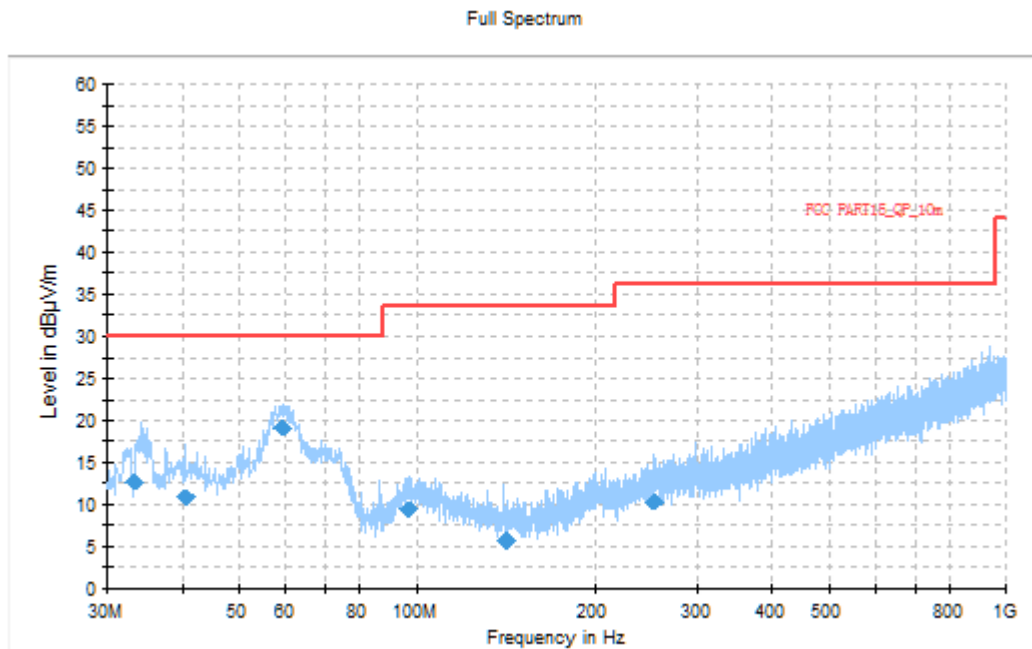


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
33.437000	12.72	30.00	17.28	1000.0	120.000	118.0	V	188.0
40.702000	10.92	30.00	19.08	1000.0	120.000	225.0	V	3.0
59.400000	19.15	30.00	10.85	1000.0	120.000	98.0	V	-12.0
97.032000	9.30	33.50	24.22	1000.0	120.000	101.0	V	-4.0
141.44800	5.74	33.50	27.78	1000.0	120.000	187.0	V	-12.0
252.53600	10.38	36.00	25.64	1000.0	120.000	111.0	V	72.0

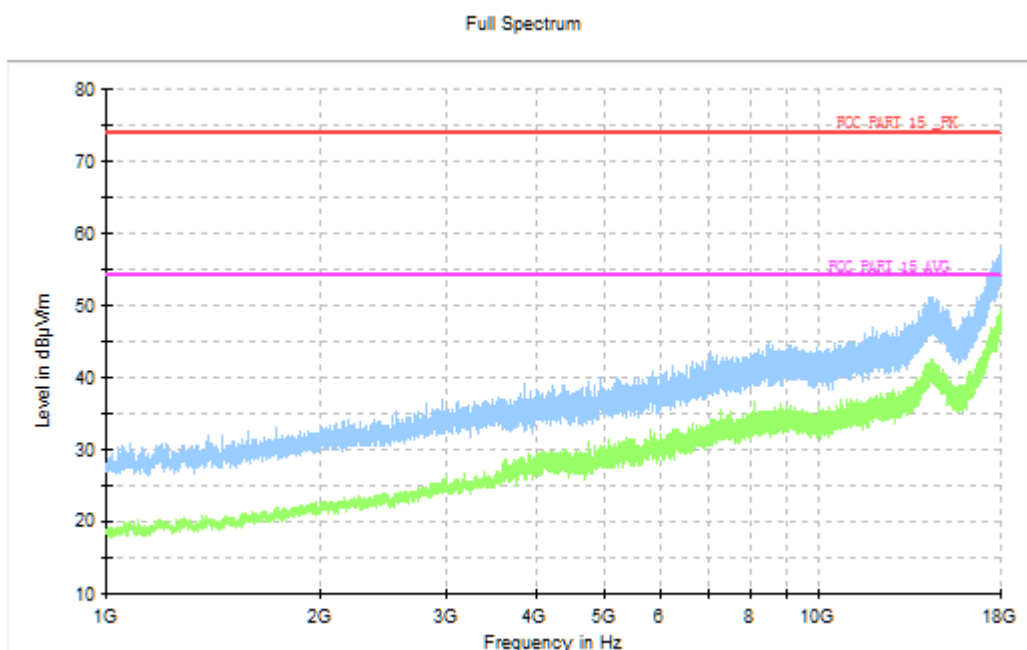


Figure A.6 Radiated Emission from 1GHz to 18GHz

A.2 Conducted Emission (§15.107(a))**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 150kHz to 30MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 -2014, section 7.3.

A.2.2 EUT Operating :

The EUT is operating in the charging mode.

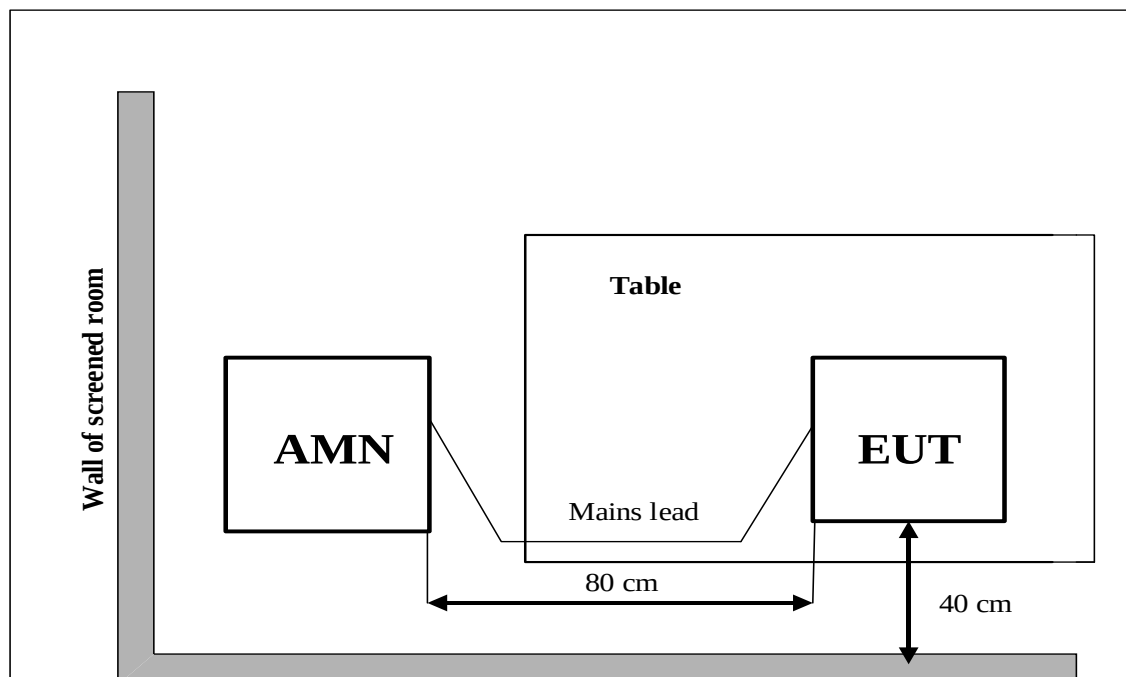
The software is used to let the PC keep on copying data to EUT, reading and erasing the data after copy action was finished.

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 set-up:



A.2.5 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60
240	60

RBW	Sweep Time(s)
9kHz	1

A.2.6 Measurement Results

AC Input Port/ Voltage: 120V/60Hz
charger

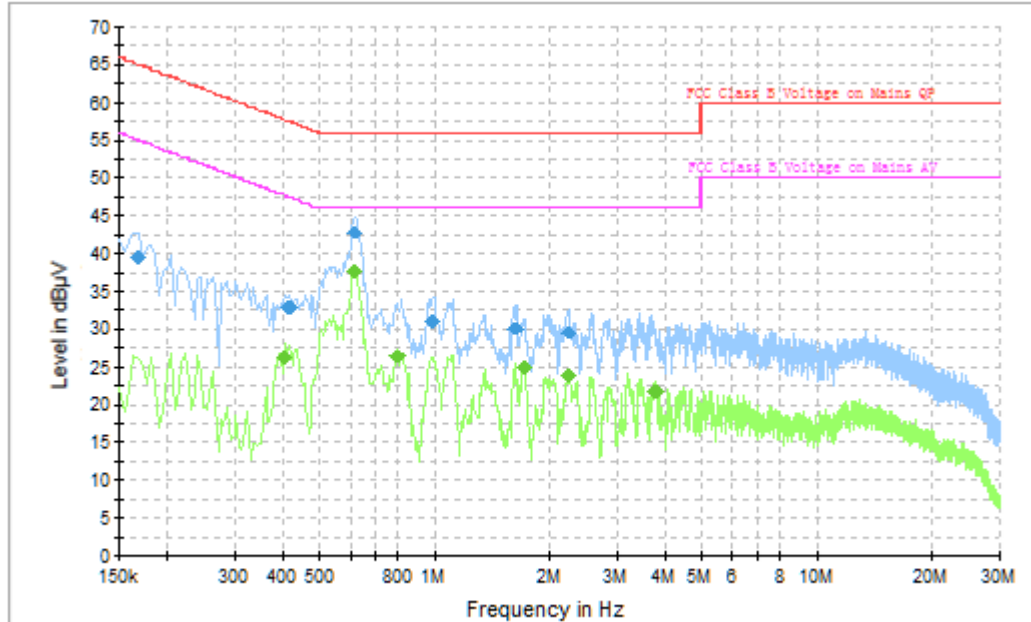


Figure A.7 Conducted Emission

Note1: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.168000	39.5	1000.0	9.000	On	N	19.7	25.6	65.1
0.415500	32.9	1000.0	9.000	On	N	19.9	24.6	57.5
0.618000	42.7	1000.0	9.000	On	N	19.9	13.3	56.0
0.991500	31.1	1000.0	9.000	On	N	19.9	24.9	56.0
1.621500	30.0	1000.0	9.000	On	N	19.8	26.0	56.0
2.238000	29.6	1000.0	9.000	On	N	19.8	26.4	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.406500	26.3	1000.0	9.000	On	N	19.9	21.4	47.7
0.618000	37.7	1000.0	9.000	On	N	19.9	8.3	46.0
0.798000	26.5	1000.0	9.000	On	N	19.8	19.5	46.0
1.711500	24.9	1000.0	9.000	On	N	19.8	21.1	46.0
2.242500	24.0	1000.0	9.000	On	N	19.8	22.0	46.0
3.786000	21.9	1000.0	9.000	On	N	19.8	24.1	46.0

Note2: The measurement results showed here are worst cases of the combinations of different cables.

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