



TESTREPORT

No.I19N01941-EMC

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

Tracker

Model Name: cp311A-CT

FCC ID: R38YLCP311A-CT

IC ID: 10367A-YL311ACT

Hardware Version: V1.01

Software Version: 3.18.004.P0.190809.cp311A-CT

Issued Date: 2019-09-26

Designation Number: CN1210

ISED Assigned Code: 23289

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.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19N01941-EMC	Rev.0	1st edition	2019-09-26

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1. Summary of Test Report

1.1. Test Items

Description	Tracker
Model Name	cp311A-CT
Applicant's name	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Manufacturer's Name	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

1.2. Test Standards

Please refer to "4. Reference Documents"

1.3. Test Result

Please refer to "6.2 Test Results"

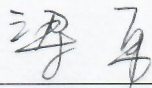
1.4. Testing Location

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

1.5. Project data

Testing Start Date: 2019-08-31
Testing End Date: 2019-09-24

1.6. Signature



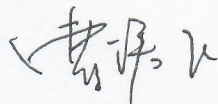
Liang Yong

(Prepared this test report)



Zhang Yunzhan

(Reviewed this test report)



Cao Junfei

Director of the laboratory
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2. ClientInformation

2.1. Applicant Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address: Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan
District, Shenzhen
Contact: Yentl Chen
E-mail: chenyanting@yulong.com
Tel: +86 15927320221

2.2. Manufacturer Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address: Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan
District, Shenzhen
Contact: Yentl Chen
E-mail: chenyanting@yulong.com
Tel: +86 15927320221

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

3.1. About EUT

Description	Tracker
Model Name	cp311A-CT
FCC ID	R38YLCP311A-CT
IC ID	10367A-YL311ACT
Condition of EUT as received	No obvious damage in appearance

The Equipment Under Test (EUT) are a model of Tracker with integrated antenna.

Remark: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed information.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Receive Date
UT01aa	860778040000291	V1.01	3.18.004.P0.190809.cp311A-CT	2019-08-31

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

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Battery	/
AE2	5V1A charger	/
AE3	USB-Pogo pin Cable	/

AE1

Model	Li-polymer
Manufacturer	Ningbo Veken
Capacity	760mAh
Nominal Voltage	3.85V

AE2-1

Model	618045
Manufacturer	Shenzhen Kosun

AE2-2

Model	RD0501000-USBA-18MG
Manufacturer	Shenzhen Kosun

AE3

Model	USB A to Pogo pin
Manufacturer	Dongguan Jieye

*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	UT01aa+AE1+AE2-1+AE3	Charging mode
Set.2	UT01aa+AE1+AE2-2+AE3	Charging 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	10-1-2018 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
ICES-003	Information Technology Equipment(ITE)-Limits and methods of measurement	Issue 6

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. = 15 %, 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. = 30 °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. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω
VoltageStandingWaveRatio (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	Clause in IC rules	Section in this report	Verdict
1	Radiated Emission	15.109(a)	section 5	A.1	P
2	Conducted Emission	15.107(a)	section 5	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
RE	30MHz-1GHz	4.9dB
	1GHz-18GHz	4.6dB
CE	150kHz-30MHz	3dB

8. Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CALDUE DATE	CAL PERIOD
1.	Test Receiver	ESR7	101676	R&S	2019.11.28	1 year
2.	Test Receiver	ESCI	100702	R&S	2020.06.19	1 year
3.	Spectrum Analyzer	FSV40	101192	R&S	2020.05.19	1 year
4.	BiLog Antenna	3142E	00224831	ETS-Lindgren	2021.05.17	3 years
5.	LISN	ENV216	102067	R&S	2020.07.17	1 year
6.	Horn Antenna	3117	00066577	ETS-Lindgren	2022.04.02	3 years
7.	Universal Radio Communication Tester	CMU200	114545	R&S	2020.05.16	1 year
8.	Chamber	FACT3-2.0	1285	ETS-Lindgren	2021.07.19	2 years
9.	Software	EMC32	V10.01.00	R&S	/	/

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§15.109(a))

Reference

FCC: CFR Part 15.109(a)

IC: ICES-003 section 5

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (Data transfer mode of MS and charging mode of MS) 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:

Charging mode: The EUT is synchronized to System Simulator (SS), and able to respond to paging messages and incoming call. An established call has been released. The EUT is connected to a charger.

A.1.3 Measurement Limit

Limit from CFR Part 15.109(a)

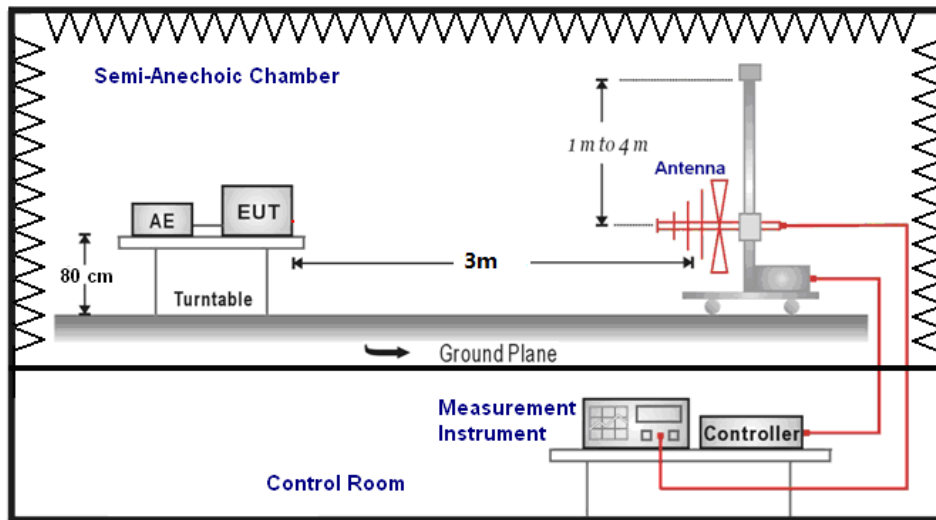
Frequency range (MHz)	Field strength limit ($\mu\text{V}/\text{m}$)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

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

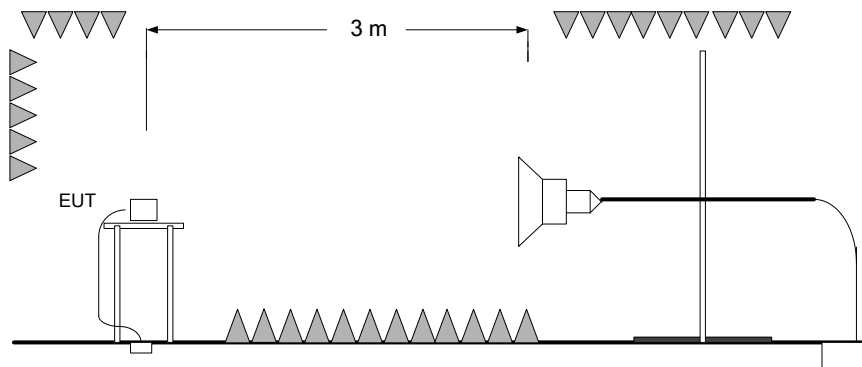
A.1.4 Test Condition

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} : PathLoss

P_{Mea} : Measurement result on receiver.

Note: the result contains vertical part and Horizontal part

Set.1 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Limit (dB μ V/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dB μ V)
12605.5	47.08	74	26.92	H	8	39.08
14011	46.67	74	27.33	H	9.7	36.97
14896	47.39	74	26.61	H	11.1	36.29
15992.5	49.55	74	24.45	H	13.1	36.45
17102	50.51	74	23.49	V	15	35.51
17998.5	51.31	74	22.69	H	15.9	35.41

Set.1 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Limit (dB μ V/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dB μ V)
10716	36.2	54	17.8	H	5.5	30.7
11733.5	37.29	54	16.71	H	7.3	29.99
12918	37.29	54	16.71	V	8.5	28.79
14198	38.56	54	15.44	H	10.9	27.66
15958	39.72	54	14.28	H	13.1	26.62
17926.5	41.15	54	12.85	H	15.7	25.45

Set.2 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Limit (dB μ V/m)	Margin(dB)	Polarity	ARpl (dB/m)	P _{Mea} (dB μ V)
10783	44.75	74	29.25	H	5.8	38.95
11636	45.84	74	28.16	H	7.2	38.64
12746.5	45.49	74	28.51	H	8.1	37.39
14216	46.62	74	27.38	H	11	35.62
15611	47.55	74	26.45	H	11.9	35.65
17135.5	51.44	74	22.56	H	14.7	36.74

Set.2 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Limit (dB μ V/m)	Margin(dB)	Polarity	ARpl (dB/m)	P _{Mea} (dB μ V)
10772	35.77	54	18.23	H	5.8	29.97
11636.5	36.68	54	17.32	H	7.2	29.48
12742	36.83	54	17.17	V	8.1	28.73
14231.5	38.1	54	15.9	H	11	27.1
15592	38.1	54	15.9	H	11.9	26.2
17120.5	40.54	54	13.46	V	14.7	25.84

Charging mode: Set 1

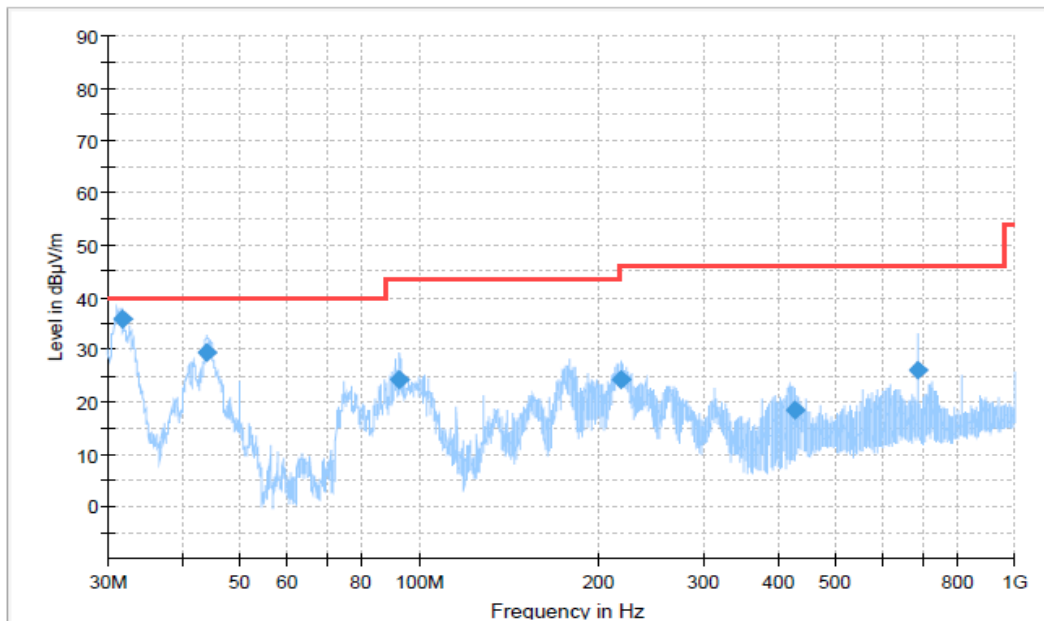


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	ARpl (dB/m)	P _{Mea} (dBµV)
31.688889	35.75	40.00	4.25	V	-25.7	61.45
44.017222	29.30	40.00	10.70	V	-32.0	61.3
92.734444	24.34	43.50	19.16	V	-32.7	57.04
217.995000	24.34	46.00	21.66	V	-32.4	56.74
426.965556	18.55	46.00	27.45	H	-25.5	44.05
687.518333	25.97	46.00	20.03	V	-19.9	45.87

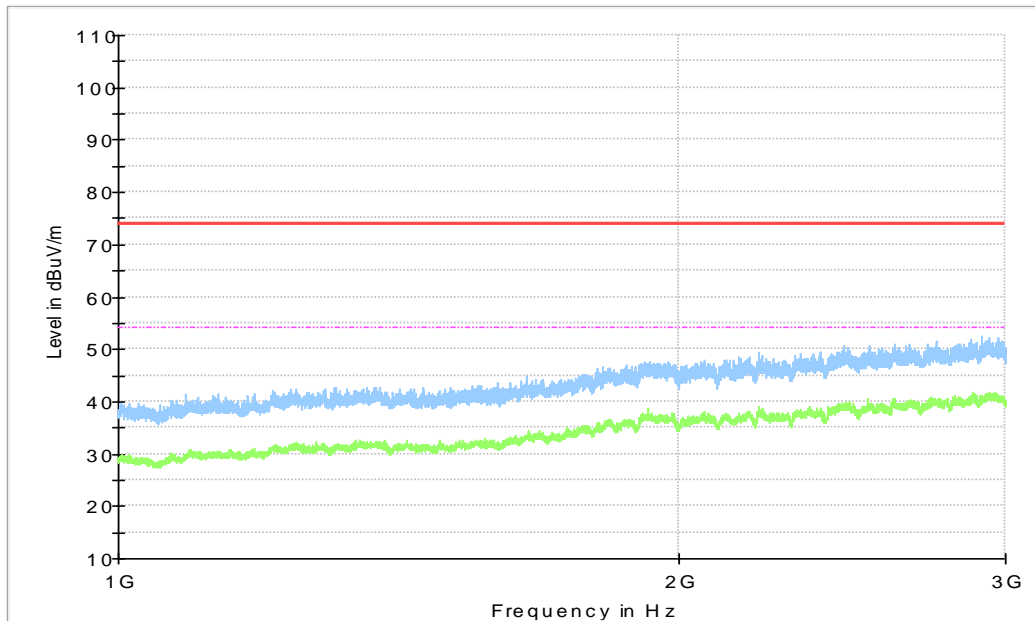


Figure A.2 Radiated Emission from 1GHz to 3GHz

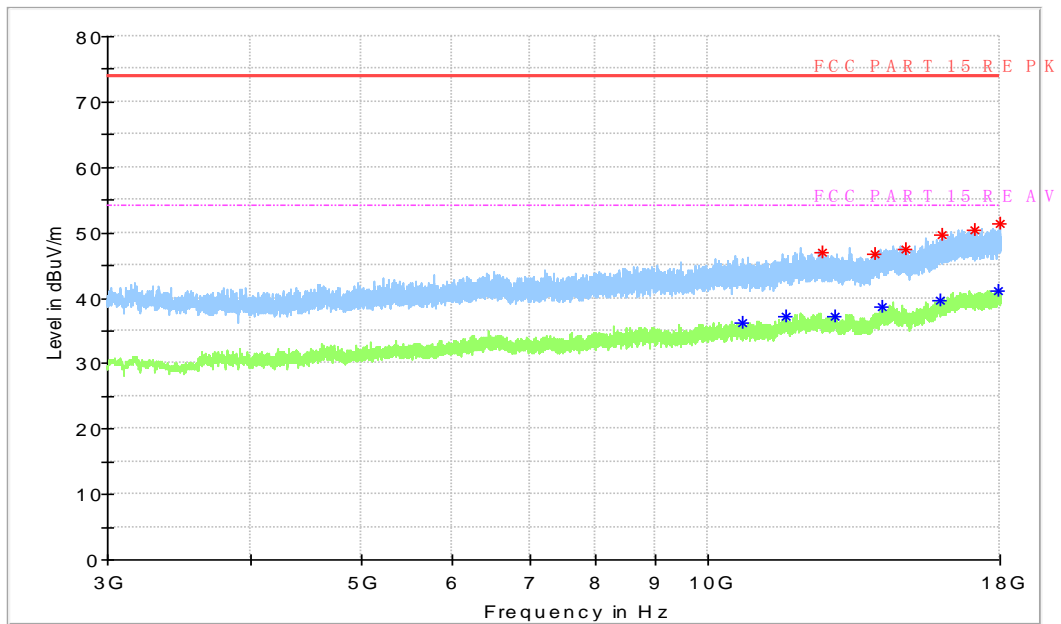


Figure A.3 Radiated Emission from 3GHz to 18GHz

Charging mode: Set 2

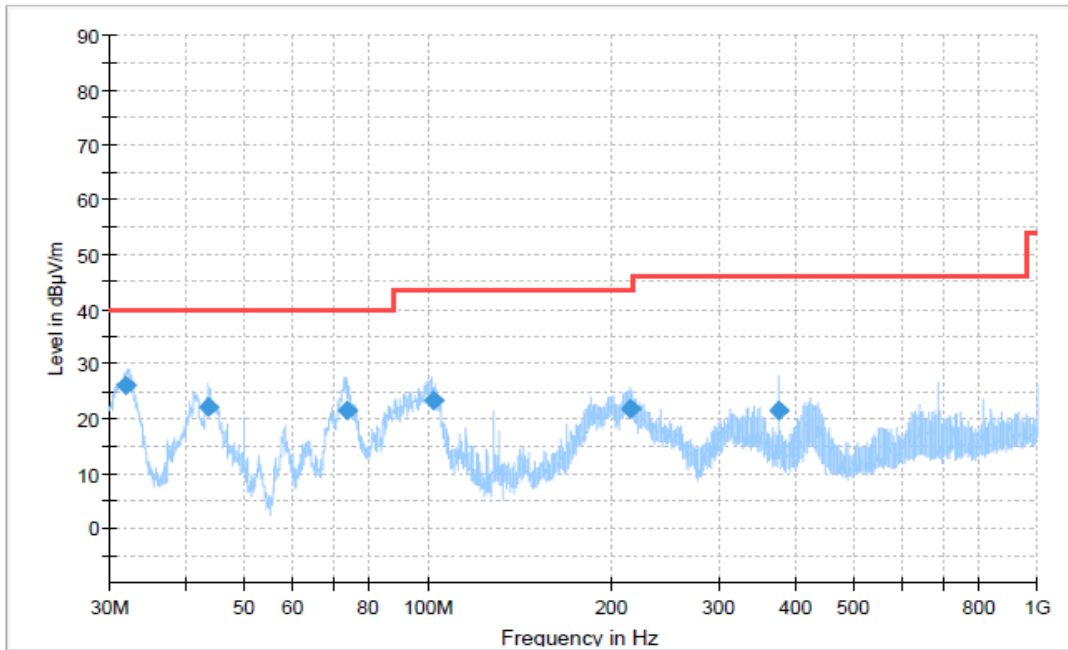


Figure A.4 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	ARpl (dB/m)	P _{Mea} (dBµV)
31.989444	26.00	40.00	14.00	V	-25.9	51.9
43.775556	22.22	40.00	17.78	V	-31.9	54.12
73.640556	21.41	40.00	18.59	V	-33.8	55.21
102.516111	23.23	43.50	20.27	V	-32.5	55.73
214.862222	21.85	43.50	21.65	V	-32.4	54.25
375.016667	21.39	46.00	24.61	V	-26.8	48.19

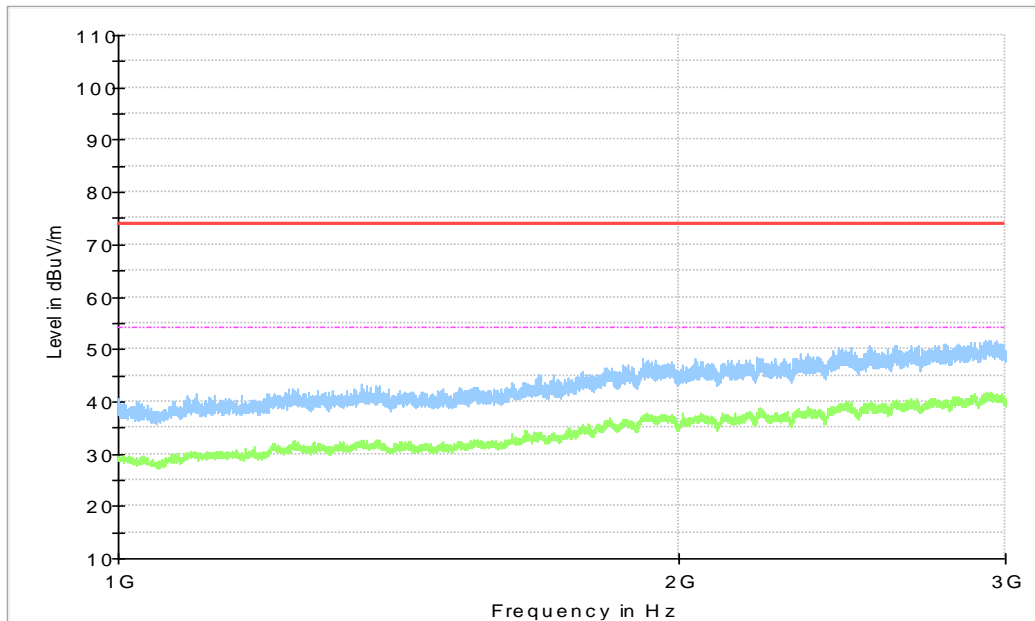


Figure A.5 Radiated Emission from 1GHz to 3GHz

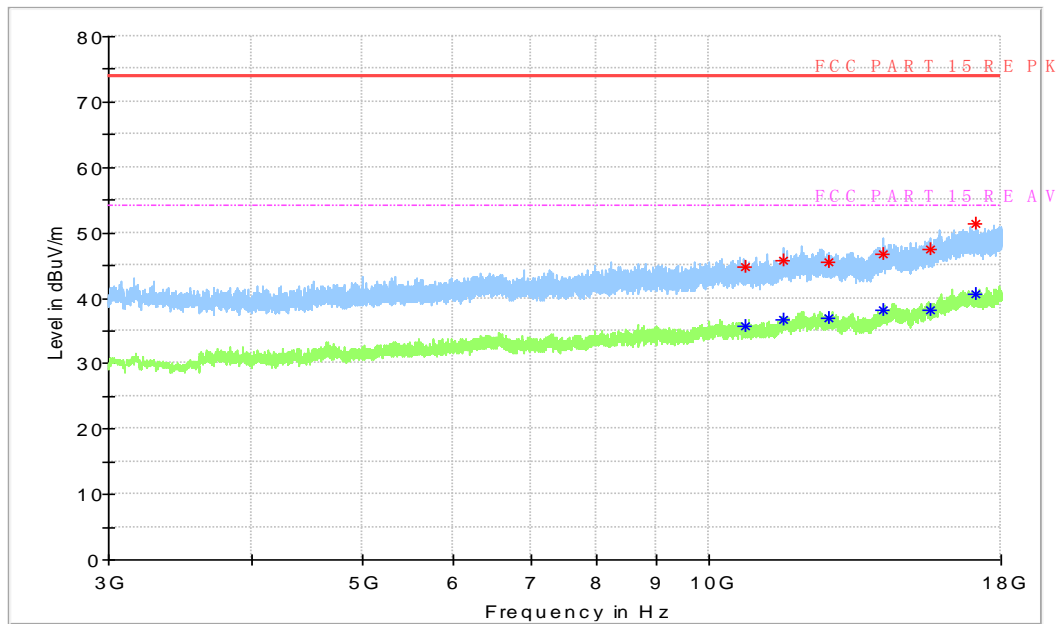


Figure A.6 Radiated Emission from 3GHz to 18GHz

B.2 Conducted Emission (§15.107(a))

Reference

FCC: CFR Part 15.107(a)

IC: ICES-003 section 5

B.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.

B.2.2 EUT Operating Mode:

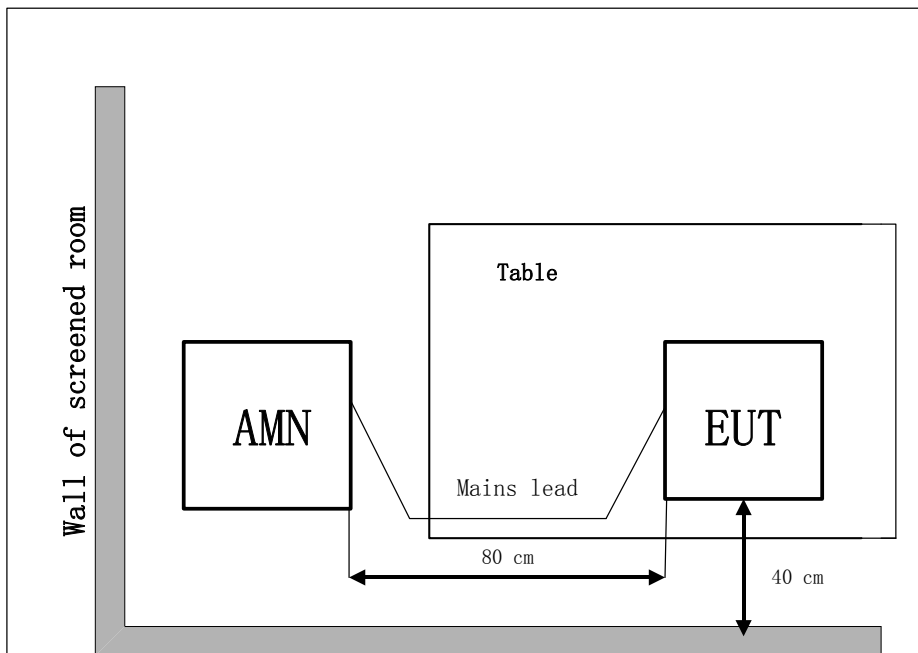
Charging mode: The EUT is synchronized to System Simulator (SS), and able to respond to paging messages and incoming call. An established call has been released. The EUT is connected to a charger.

B.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

B.2.4 Test set-up:



B.2.5 Test Condition in charging mode

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

RBW	Sweep Time(s)
9kHz	1

B.2.6 Measurement Results

$$\text{QuasiPeak(dB}\mu\text{V)} / \text{Average(dB}\mu\text{V)} = \text{PMea} + \text{Corr}$$

Where

Corr: PathLoss + Voltage Division Factor

PMea: Measurement result on receiver.

Charging mode: Set 1
Voltage: 120V

Full Spectrum

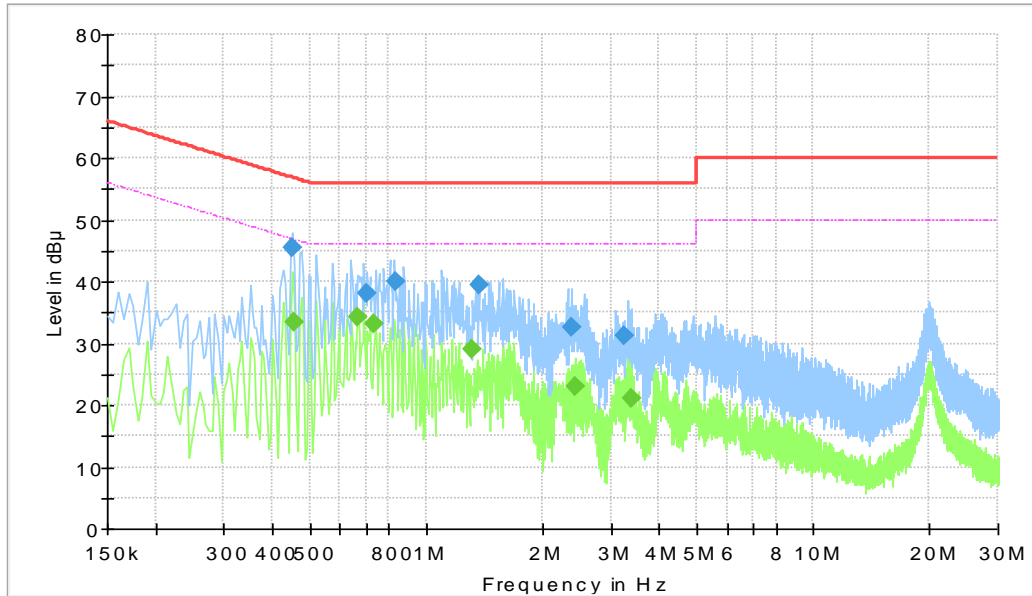


Figure B.1 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.45	45.4	56.88	11.47	L1	9.6	35.8
0.7	38.1	56	17.9	L1	9.6	28.5
0.83	39.91	56	16.09	L1	9.6	30.31
1.365	39.51	56	16.49	L1	9.7	29.81
2.38	32.66	56	23.34	L1	9.7	22.96
3.24	31.3	56	24.7	L1	9.7	21.6

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.455	33.43	46.78	13.35	L1	9.6	23.83
0.665	34.19	46	11.81	L1	9.6	24.59
0.735	33.2	46	12.8	L1	9.6	23.6
1.31	29.07	46	16.93	L1	9.7	19.37
2.415	23.02	46	22.98	L1	9.7	13.32
3.39	20.99	46	25.01	L1	9.7	11.29

Charging mode: Set 2
Voltage: 120V

Full Spectrum

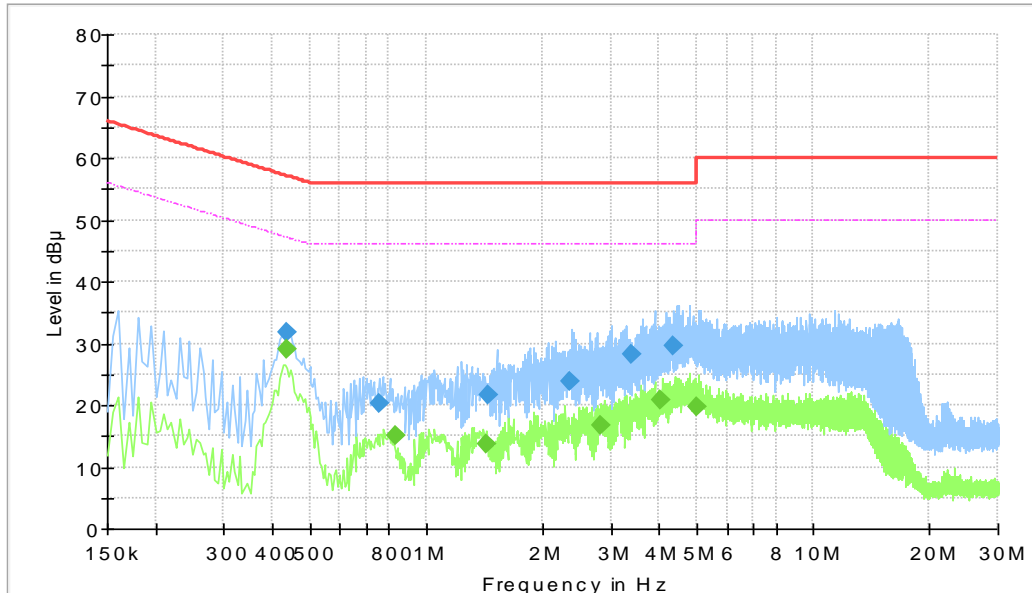


Figure B.2 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.435	31.81	57.16	25.35	L1	9.6	22.21
0.76	20.15	56	35.85	N	9.6	10.55
1.45	21.63	56	34.37	N	9.7	11.93
2.35	23.89	56	32.11	N	9.7	14.19
3.385	28.14	56	27.86	N	9.7	18.44
4.35	29.58	56	26.42	N	9.7	19.88

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.435	29.02	47.16	18.13	L1	9.6	19.42
0.835	14.93	46	31.07	L1	9.6	5.33
1.435	13.61	46	32.39	L1	9.7	3.91
2.81	16.74	46	29.26	N	9.7	7.04
4.025	20.91	46	25.09	N	9.7	11.21
5.005	19.6	50	30.4	N	9.7	9.9

Charging mode: Set 1
Voltage: 240V

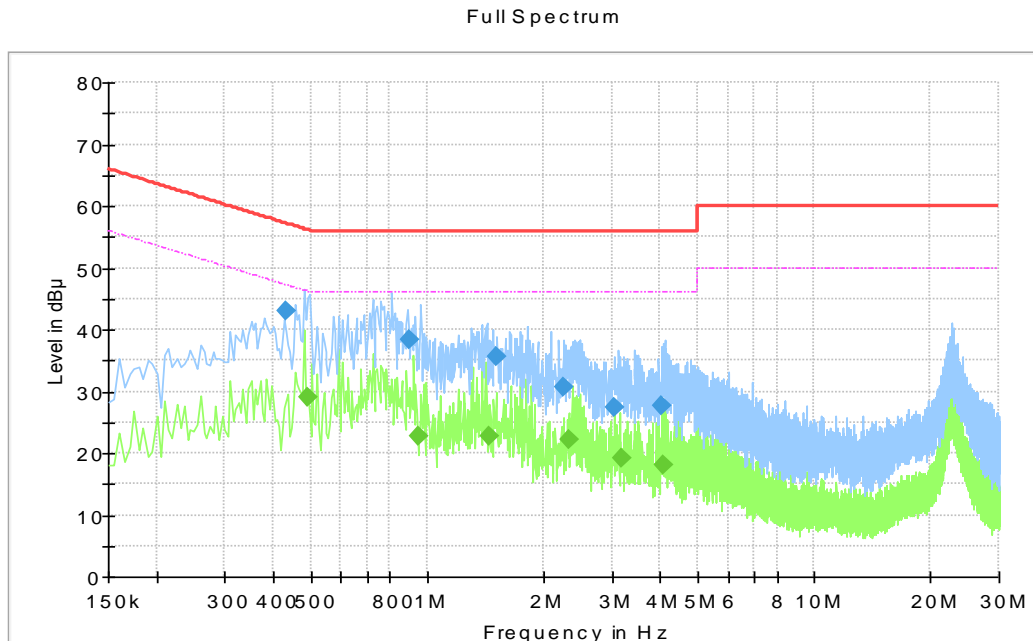


Figure B.3 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.43	43.12	57.25	14.13	N	9.6	33.52
0.9	38.48	56	17.52	N	9.7	28.78
1.51	35.68	56	20.32	N	9.7	25.98
2.255	30.7	56	25.3	N	9.7	21
3.05	27.37	56	28.63	L1	9.7	17.67
4.02	27.72	56	28.28	N	9.7	18.02

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.49	29.11	46.17	17.06	N	9.6	19.51
0.945	22.76	46	23.24	N	9.7	13.06
1.45	22.67	46	23.33	N	9.7	12.97
2.315	22.22	46	23.78	N	9.7	12.52
3.18	19.1	46	26.9	N	9.7	9.4
4.07	18.21	46	27.79	N	9.7	8.51

Charging mode: Set 2
Voltage: 240V

Full Spectrum

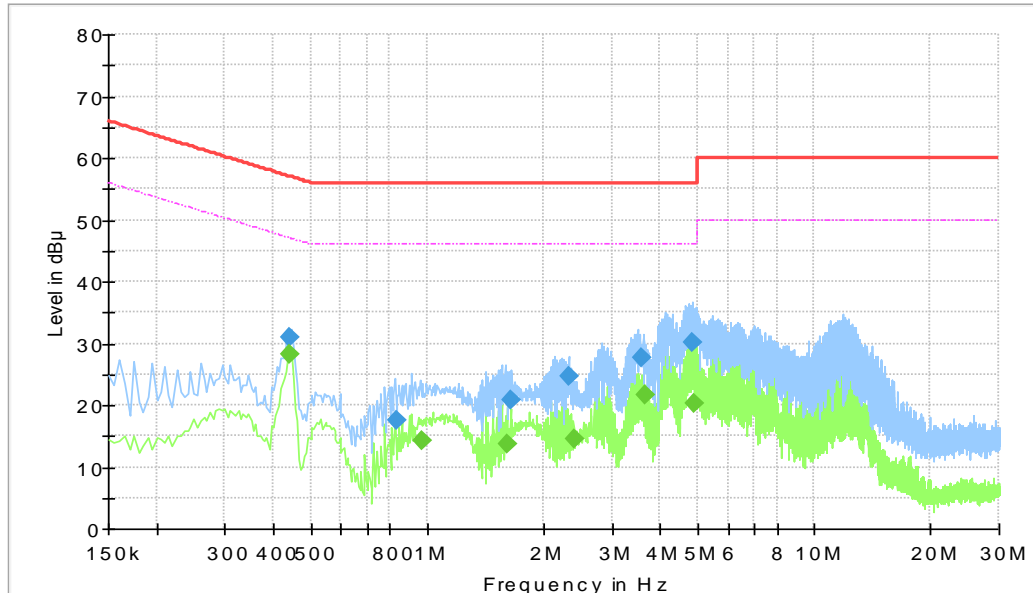


Figure B.4 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.44	31.01	57.06	26.05	L1	9.6	21.41
0.835	17.65	56	38.35	N	9.6	8.05
1.64	20.94	56	35.06	N	9.7	11.24
2.325	24.78	56	31.22	N	9.7	15.08
3.57	27.54	56	28.46	N	9.7	17.84
4.825	30.06	56	25.94	N	9.7	20.36

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P _{Mea} (dBµV)
0.44	28.19	47.06	18.87	L1	9.6	18.59
0.97	14.3	46	31.7	N	9.7	4.6
1.615	13.83	46	32.17	N	9.7	4.13
2.39	14.63	46	31.37	N	9.7	4.93
3.655	21.51	46	24.49	N	9.7	11.81
4.9	20.23	46	25.77	N	9.7	10.53

END OF REPORT