TEST REPORT

No.I16N01166-EMC01

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

LTE phone

Model Name: Coolpad E503

FCC ID: R38YLE503

with

Hardware Version: P0

Software Version: 6.0.003.P0.161010.3505I-A00

Issued Date: 2016-11-25

Test Laboratory:

FCC 2.948 Listed: No.342690

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:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16N01166-EMC01	Rev.0	1st edition	2016-11-25

CONTENTS

1. Test Laboratory

1.1. Testing Location

Address:	TCL International E city No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong, China
Postal Code:	518048
Telephone:	+86(755)33322000
Fax:	+86(755)33322000

1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.3. Project data

Testing Start Date:	2016-10-19
Testing End Date:	2016-11-24

1.4. Signature

Liang Yong
(Prepared this test report)

Zhang Yunzhuan
(Reviewed this test report)

Cao Junfei
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Coolpad Information Harbor, High-tech Industrial Park (North), Nanshan District, Shenzhen, P.R.C.

2.2. Manufacturer Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Coolpad Information Harbor, High-tech Industrial Park (North), Nanshan District, Shenzhen, P.R.C.

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

3.1. About EUT

Description	LTE phone
Model Name	Coolpad E503
FCC ID	R38YLE503

The Equipment Under Test (EUT)are a model of LTE phone with integrated antenna.
The EUT supports GPRS service and EGPRS service. It has MP3,camera,USB memory, FM radio, GPS receiver ,Bluetooth and WLAN functions.
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
EUT	008600251139605

*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	Travel charger	/
AE3	USB cable	/

AE1

Model	CPLD-414
Manufacturer	ZHUHAI COSLIGHT BATTERY CO., LTD.
Capacitance	2500mAh
Nominal Voltage	3.80V

AE2

Model	CA05-050100U
Manufacturer	JIANGSU CHENYANG ELECTRON CO.,LTD.
SN	6710015936

AE3

Model	150506118--JZ65
Manufacturer	SHEN ZHEN PANG NGAI INDUSTRIAL CO., LTD
Length of cable	92cm

*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	EUT+ AE1 + AE2+ AE3	Charging mode
Set.2	EUT+ 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	10-1-2015 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:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
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 ℃, Max. = 30 ℃
Relative humidity	Min. =35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-10000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

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

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio （VSWR）	≤ 6 dB, from 1 to 18 GHz， 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

6. SUMMARY OF TEST 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

7. Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CALDUE DATE	CAL PERIOD
1.	Test Receiver	ESCI	100701	R&S	2017.08.09	1 year
2.	Test Receiver	ESCI	100702	R&S	2017.06.26	1 year
3.	Spectrum Analyzer	FSP 40	100378	R&S	2016.12.18	1 year
4.	BiLog Antenna	VULB9163	9163 330	Schwarzbeck	2017.04.22	3 years
5.	LISN	ESH2-Z5	100196	R&S	2017.01.12	1 year
6.	Horn Antenna	3117	00066585	ETS-Lindgren	2019.03.05	3 years
7.	Universal Radio Communication Tester	E5515C	GB44051324	Agilent	2017.05.18	1 year
8.	PC	M4099t	SA08850737	Lenovo	/	/
9.	Monitor	L1710d	0M04340B10 01010	Lenovo	/	/
10.	Printer	P1008	VNF6C12491	HP	/	/
11.	Keyboard	KB-0225	0723779	Lenovo	/	/
12.	Mouse	MO28UOL	44B39412	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 (USB 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:

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 Lenovo Thinkcentre M4099t, and the serial number of the PC is SA08850737. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

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

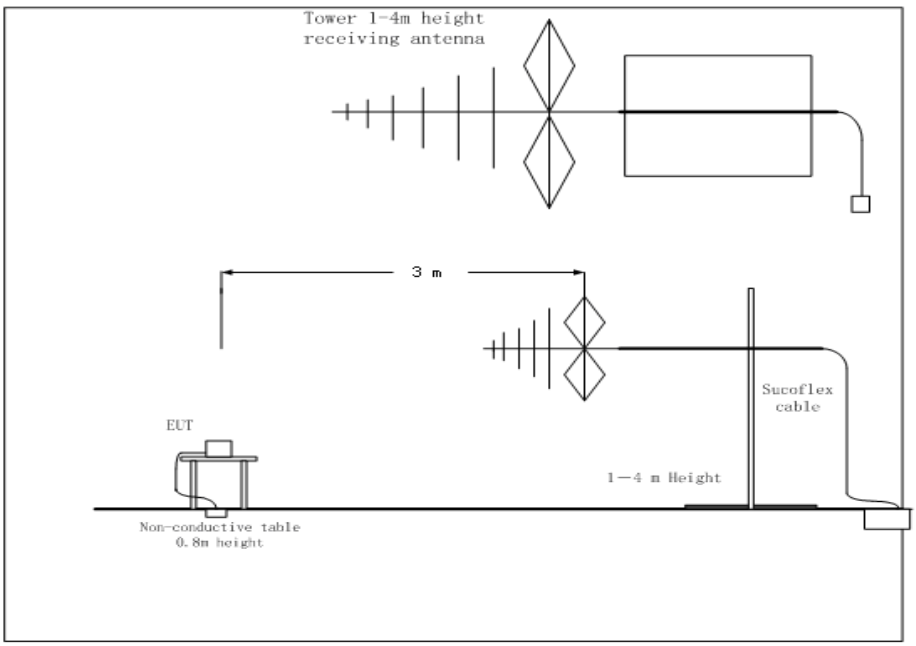
*Note: The original limit is defined at 10m test distance. This limit is calculated according to CISPR requirements.

A.1.4 Test Condition

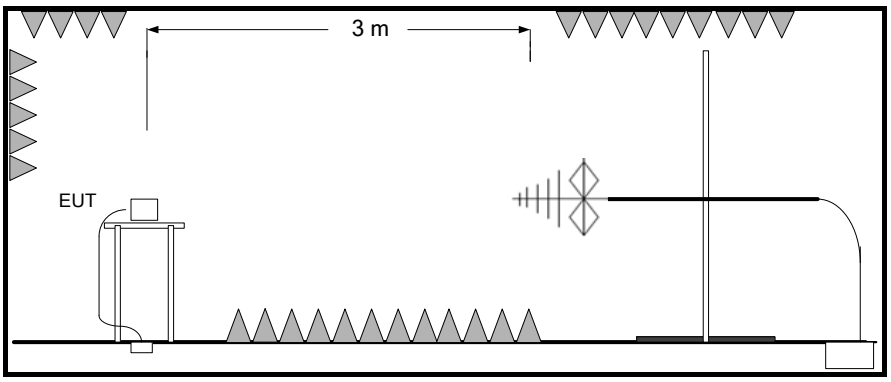
Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz (IF bandwidth)	5
Above 1000	1MHz/3MHz	15

A.1.5 Test set-up:

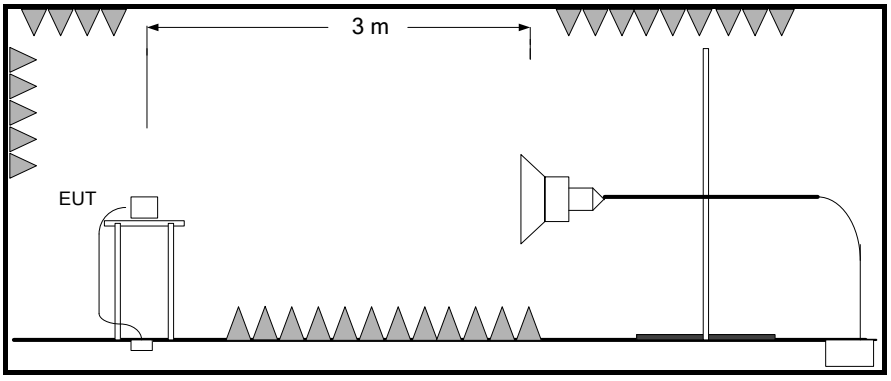
30MHz-1GHz



1GHz-3GHz



3GHz-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:

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.

Note: the result contains vertical part and Horizontal part

RE Measurement uncertainty: 30M-1GHz: 5.12dB (k=2);
1GHz-18GHz: 4.48 dB (k=2)

Set.1 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	P_{Mea} (dBμV)	A_{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
16124.500000	48.50	V	33.3	15.2	25.50	74.00
16599.000000	49.27	V	33.27	16.0	24.73	74.00
16889.000000	48.95	V	32.55	16.4	25.05	74.00
17190.000000	48.96	H	32.86	16.1	25.04	74.00
17545.500000	49.47	H	32.97	16.5	24.53	74.00
17669.500000	49.47	V	32.57	16.9	24.53	74.00

Set.1 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	P_{Mea} (dBμV)	A_{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
16112.000000	43.39	V	28.29	15.1	10.61	54.00
16611.000000	43.54	H	27.44	16.1	10.46	54.00
16885.500000	45.26	V	28.96	16.3	8.74	54.00
17218.000000	43.55	H	27.35	16.2	10.45	54.00
17563.000000	44.03	V	27.13	16.9	9.97	54.00
17654.500000	45.42	H	28.42	17.0	8.58	54.00

Set.2 USB mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	P_{Mea} (dBµV)	A_{Rpl} (dB)	Margin(dB)	Limit (dBµV/m)
16828.500000	51.16	H	34.96	16.2	22.84	74.00
17161.500000	50.79	V	34.49	16.3	23.21	74.00
17376.500000	50.26	V	33.86	16.4	23.74	74.00
17509.000000	50.47	V	33.87	16.6	23.53	74.00
17673.000000	49.97	H	33.07	16.9	24.03	74.00
17789.000000	50.49	H	33.09	17.4	23.51	74.00

Set.2 USB mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	P_{Mea} (dBµV)	A_{Rpl} (dB)	Margin(dB)	Limit (dBµV/m)
16809.000000	44.98	V	28.78	16.2	9.02	54.00
17108.500000	45.66	H	29.56	16.1	8.34	54.00
17300.500000	45.23	V	29.03	16.2	8.77	54.00
17530.500000	45.71	H	29.31	16.4	8.29	54.00
17659.000000	44.18	V	27.18	17.0	9.82	54.00
17795.000000	44.85	H	27.45	17.4	9.15	54.00

Note: The measurement result of Set.1 and Set.2 showed here are worst cases of combinations of different batteries and USB cables.

Charging mode: Set 1

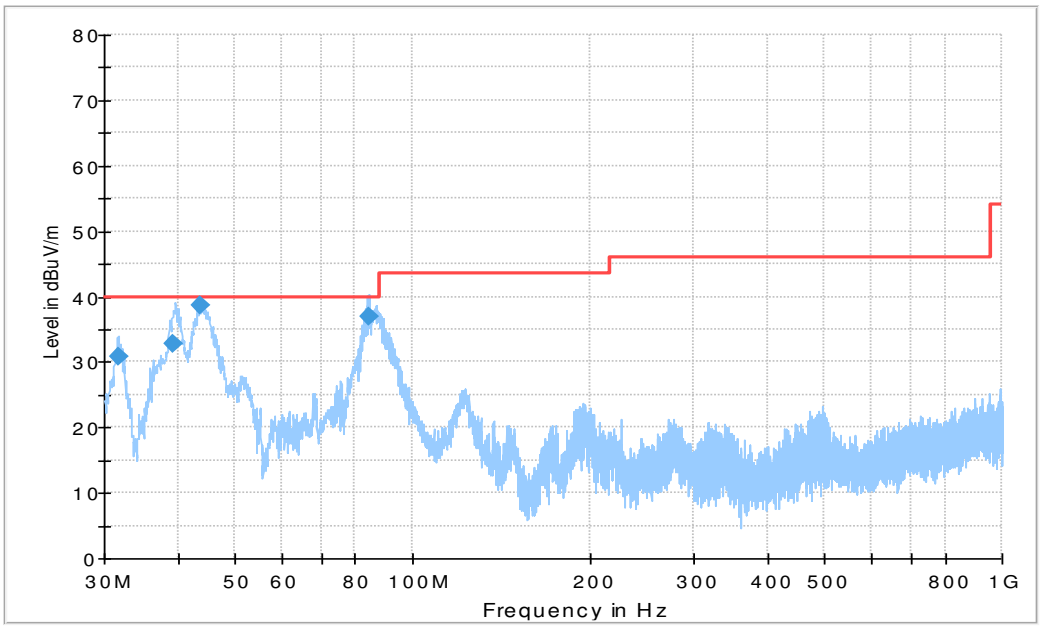


Figure A.1 Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
31.710556	30.87	40.00	9.13	V	-3.9
39.366111	32.83	40.00	7.17	V	-8.6
43.661667	38.64	40.00	1.36	V	-10.7
84.532222	37.02	40.00	2.98	V	-12.8

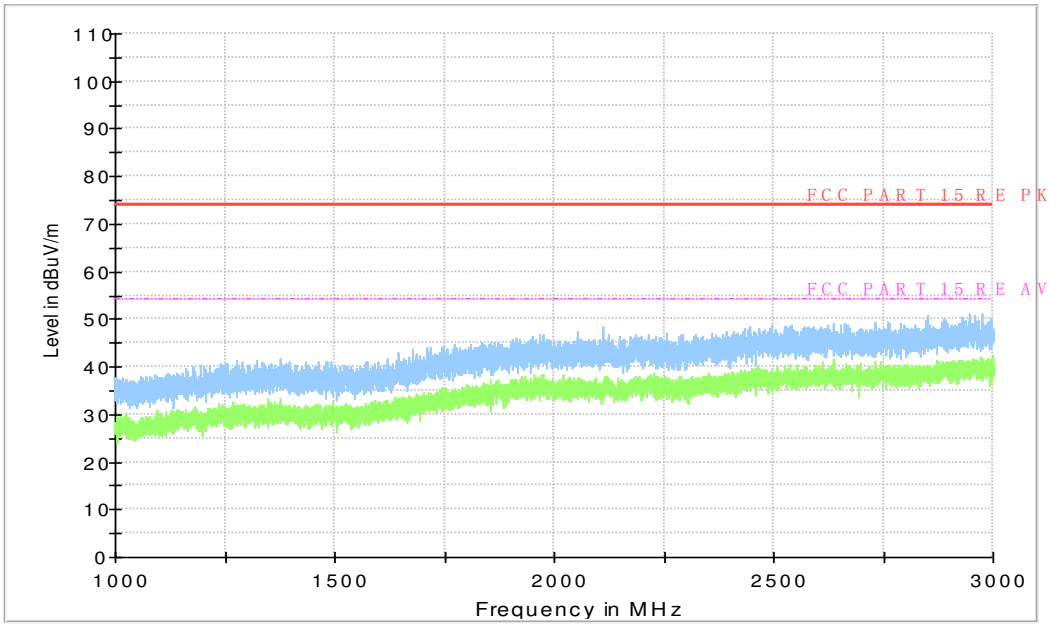


Figure A.2 Radiated Emission from 1GHz to 3GHz

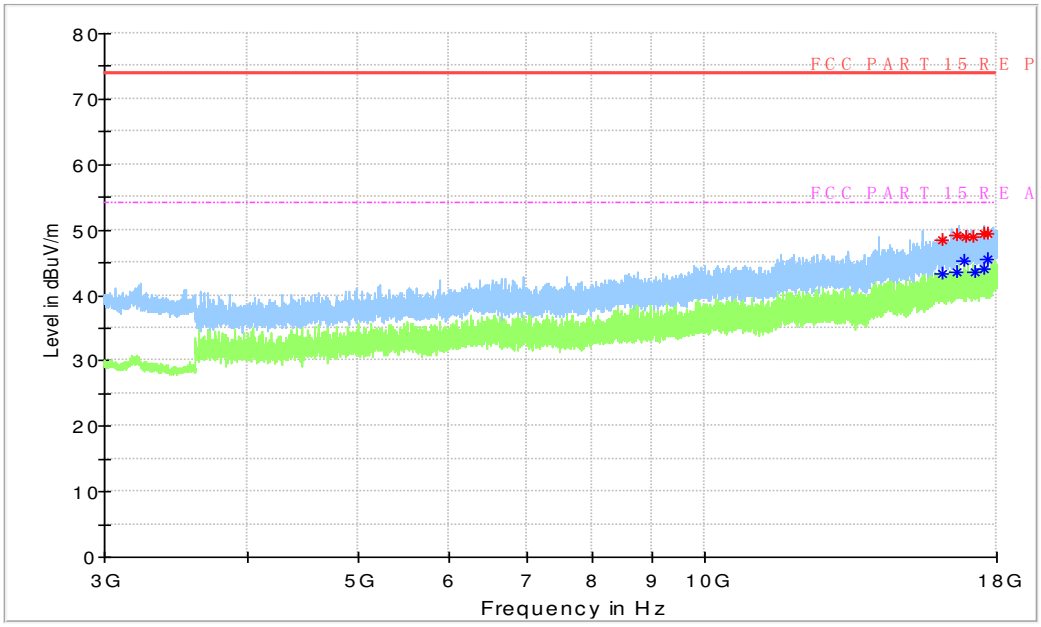


Figure A.3 Radiated Emission from 3GHz to 18GHz

USB mode: Set 2

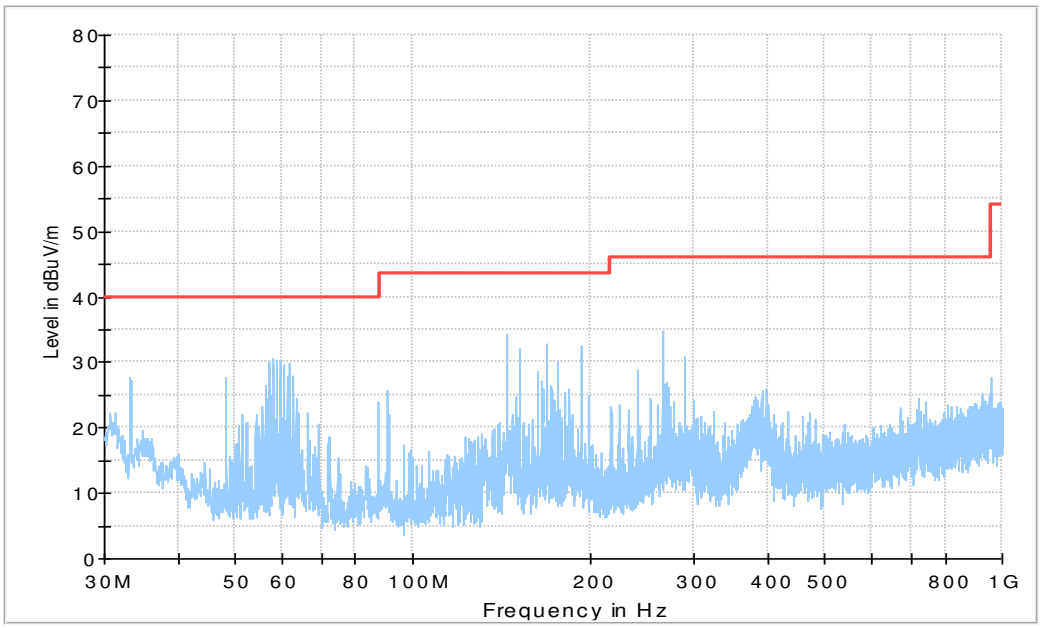


Figure A.4 Radiated Emission from 30MHz to 1GHz

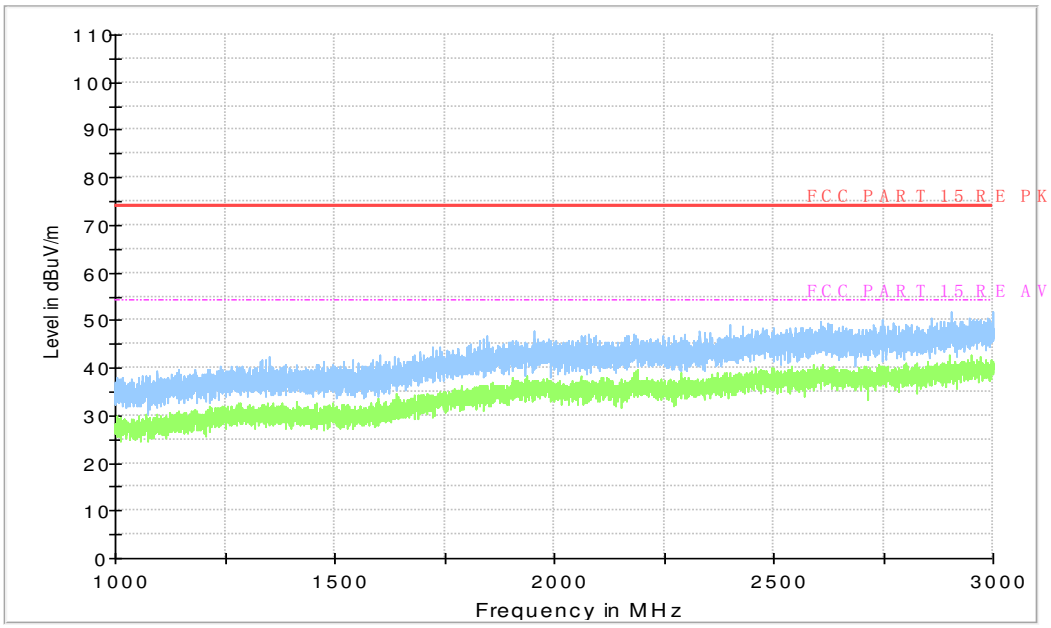


Figure A.5 Radiated Emission from 1GHz to 3GHz

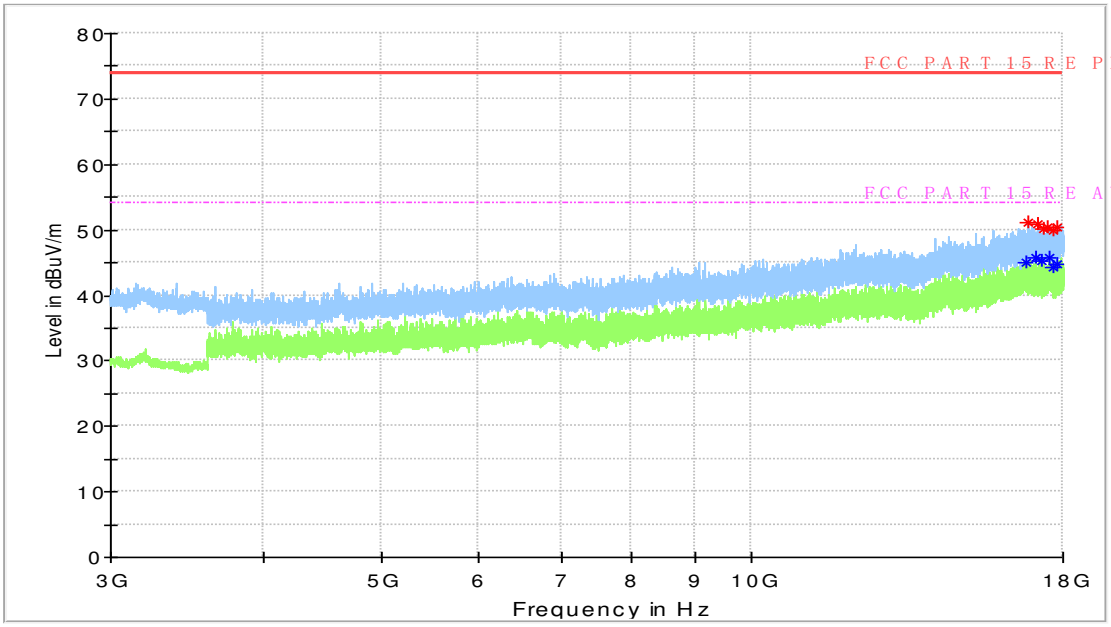


Figure A.6 Radiated Emission from 3GHz to 18GHz

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 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 - 2014, section 7.3.

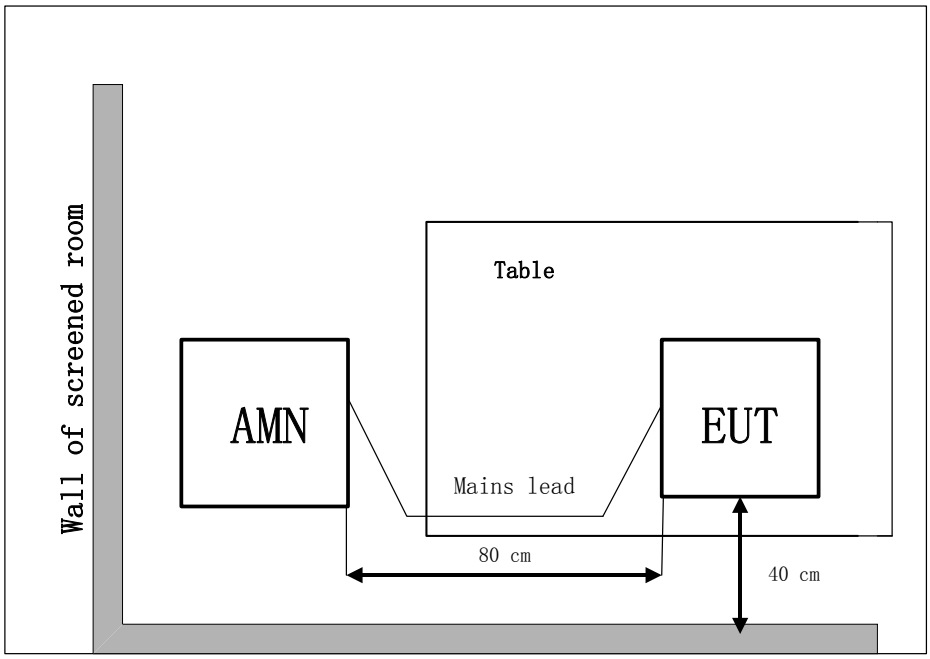
A.2.2 EUT Operating Mode:

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 Lenovo Thinkcentre M4099t, and the serial number of the PC is SA08850737. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

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

CE Measurement uncertainty: 3.06 dB (k=2)

A.2.6 Measurement Results
Charging mode:Set.1
Voltage:120V

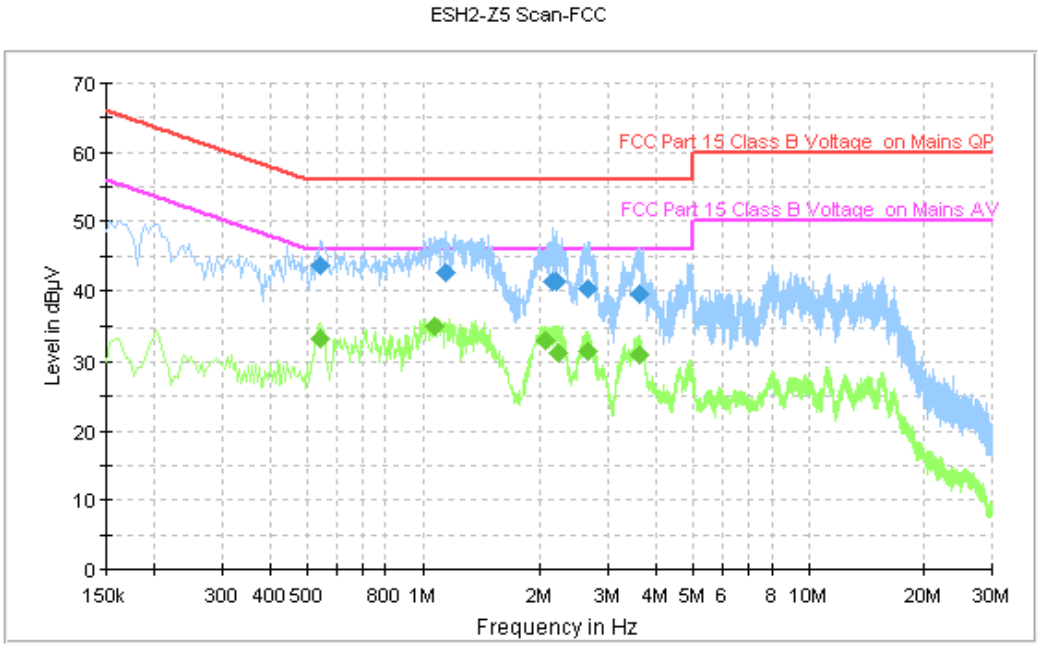


Figure A.7 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.542000	43.6	GND	L1	9.8	12.4	56.0
1.154000	42.7	GND	L1	9.8	13.3	56.0
2.166000	41.2	GND	L1	9.8	14.8	56.0
2.194000	41.3	GND	L1	9.8	14.7	56.0
2.662000	40.4	GND	L1	9.8	15.6	56.0
3.626000	39.6	GND	L1	9.8	16.4	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.542000	33.4	GND	L1	9.8	12.6	46.0
1.070000	35.1	GND	L1	9.8	10.9	46.0
2.054000	33.0	GND	L1	9.8	13.0	46.0
2.230000	31.3	GND	L1	9.8	14.7	46.0
2.670000	31.6	GND	L1	9.8	14.4	46.0
3.626000	31.0	GND	L1	9.8	15.0	46.0

Charging mode:Set.1
Voltage:240V

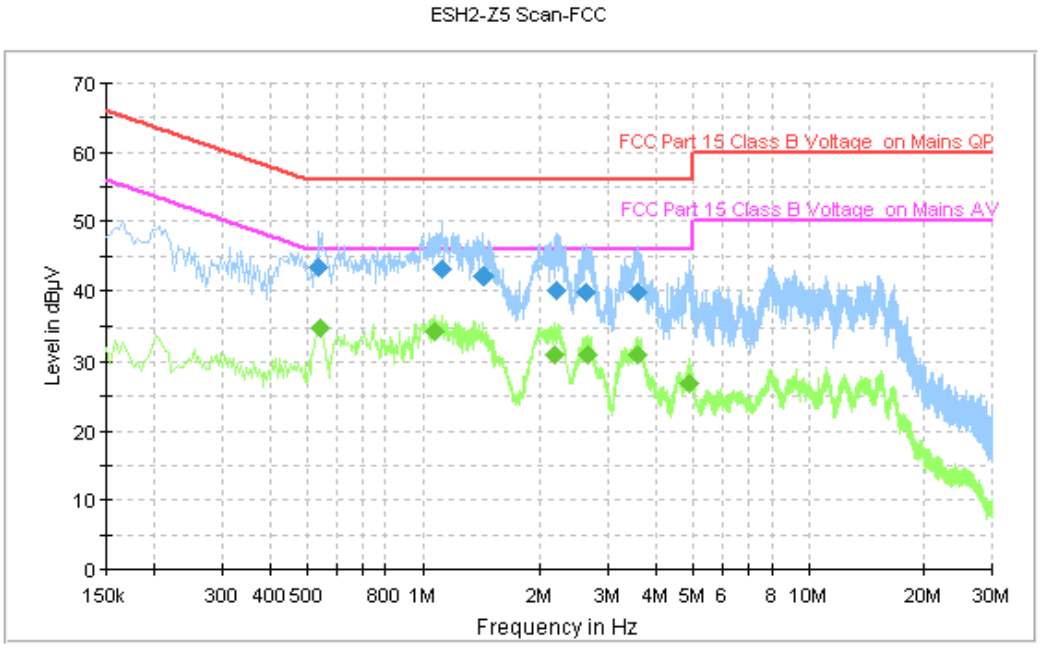


Figure A.8 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.538000	43.5	GND	L1	9.8	12.5	56.0
1.126000	43.1	GND	L1	9.8	12.9	56.0
1.430000	42.2	GND	L1	9.8	13.8	56.0
2.210000	40.2	GND	L1	9.8	15.8	56.0
2.642000	39.8	GND	L1	9.8	16.2	56.0
3.578000	39.7	GND	L1	9.8	16.3	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.542000	34.9	GND	N	9.7	11.1	46.0
1.074000	34.4	GND	L1	9.8	11.6	46.0
2.182000	31.1	GND	L1	9.8	14.9	46.0
2.650000	31.1	GND	L1	9.8	14.9	46.0
3.582000	31.1	GND	L1	9.8	14.9	46.0
4.894000	26.9	GND	L1	9.8	19.1	46.0

USB mode:Set.2
Voltage:120V

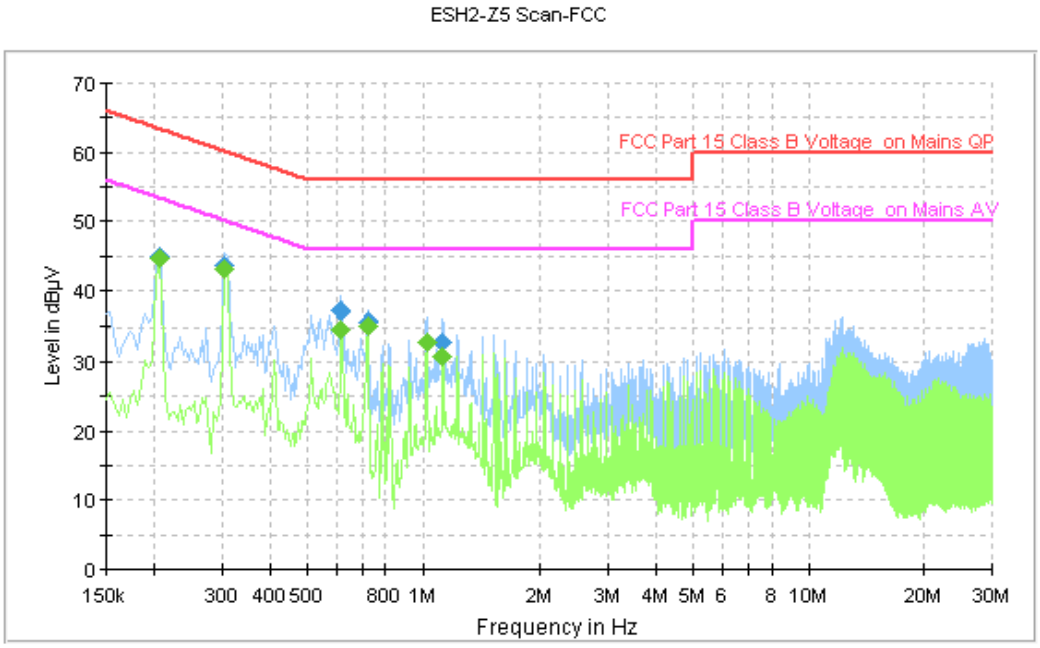


Figure A.9 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.1	GND	N	9.6	18.3	63.4
0.306000	43.5	GND	N	9.6	16.5	60.1
0.614000	37.3	GND	N	9.6	18.7	56.0
0.718000	35.8	GND	N	9.5	20.2	56.0
1.026000	32.7	GND	N	9.5	23.3	56.0
1.126000	32.8	GND	N	9.6	23.2	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.8	GND	N	9.6	8.6	53.4
0.306000	43.0	GND	N	9.6	7.0	50.1
0.614000	34.7	GND	N	9.6	11.3	46.0
0.718000	35.2	GND	N	9.5	10.8	46.0
1.026000	32.8	GND	L1	9.8	13.2	46.0
1.126000	30.7	GND	N	9.6	15.3	46.0

USB mode:Set.2
Voltage:240V

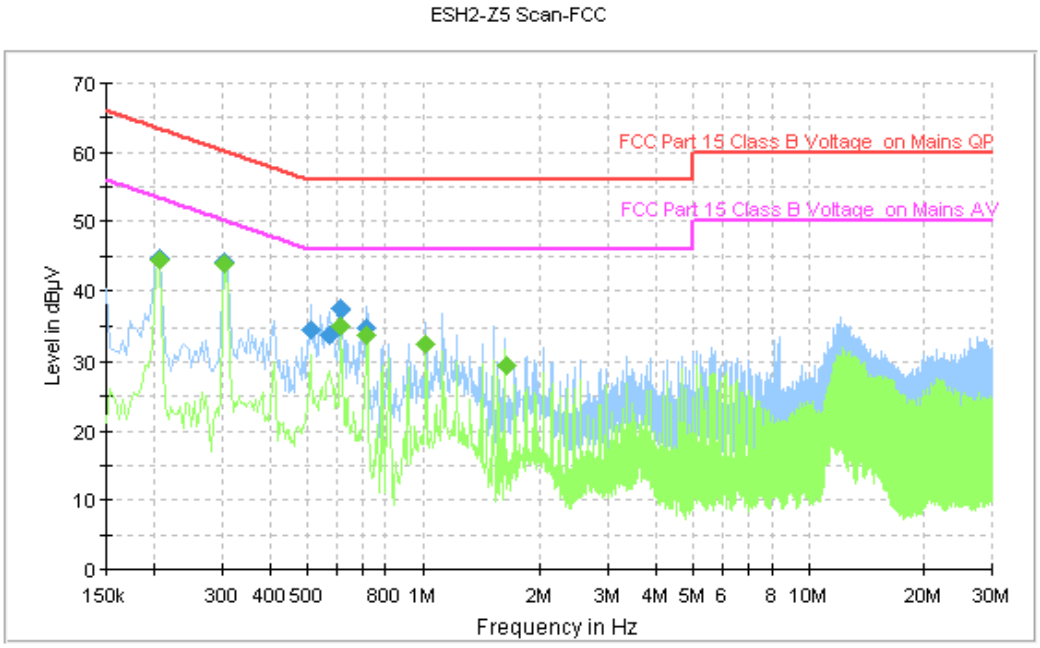


Figure A.10 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.7	GND	N	9.6	18.7	63.4
0.306000	44.3	GND	N	9.6	15.8	60.1
0.510000	34.7	GND	N	9.7	21.3	56.0
0.574000	33.7	GND	N	9.7	22.3	56.0
0.614000	37.6	GND	N	9.6	18.4	56.0
0.714000	34.9	GND	N	9.5	21.1	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.4	GND	N	9.6	9.0	53.4
0.306000	43.8	GND	N	9.6	6.3	50.1
0.614000	35.2	GND	N	9.6	10.8	46.0
0.714000	33.8	GND	N	9.5	12.2	46.0
1.022000	32.6	GND	L1	9.8	13.4	46.0
1.634000	29.4	GND	N	9.5	16.6	46.0

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