



TEST REPORT

No.I15N01161-EMC

for

Huawei Technologies Co., Ltd.

Smart Phone

Model Name: HUAWEI TAG-L23

Marketing Name: HUAWEI GR3

FCC ID: QISTAG-L23

with

Hardware Version: Ver.A

Software Version: TAG-L23C464B006_A

Issued Date: 2015-12-31

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:

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

No.52, HuayuanNorth Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633, Fax:+86(0)10-62304633Email:ctl@chinattl.com, website:www.chinattl.com



REPORT HISTORY

Report Number	Revision	Description	Issue Date
I15N01161-EMC	Rev.0	1st edition	2015-12-31



CONTENTS

1. TEST LABORATORY	4
1.1. TESTING LOCATION	4
1.2. TESTING ENVIRONMENT	4
1.3. PROJECT DATA	4
1.4. SIGNATURE	4
2. CLIENT INFORMATION	5
2.1. APPLICANT INFORMATION	5
2.2. MANUFACTURER INFORMATION	5
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	6
3.1. ABOUT EUT	6
3.2. INTERNAL IDENTIFICATION OF EUT	6
3.3. INTERNAL IDENTIFICATION OF AE	6
3.4. EUT SET-UPS	9
4. REFERENCE DOCUMENTS	10
4.1. REFERENCE DOCUMENTS FOR TESTING	10
5. LABORATORY ENVIRONMENT	11
6. SUMMARY OF TEST RESULTS	12
7. TEST FACILITIES UTILIZED	13
ANNEX A: MEASUREMENT RESULTS	14



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°C
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2015-12-16
Testing End Date: 2015-12-29

1.4. Signature

Liang Yong

(Prepared this test report)

Du Zhaoxuan

(Reviewed this test report)

Cao Junfei

Director of the laboratory

(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

2.2. Manufacturer Information

Company Name: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

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

3.1. About EUT

Description	Smart Phone
Model Name	HUAWEI TAG-L23
Marketing Name	HUAWEI GR3
FCC ID	QISTAG-L23
TX Band	GSM850/1900,WCDMA Band 2/4/5,LTE Band 2/4/5/7
RX Band	GSM850/1900,WCDMA Band 2/4/5,LTE Band 2/4/5/7

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

The EUT supports GPRS service with multi-slots class 12 and EGPRS service with multi-slots class 12. 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
N0.1	868885020012253

*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	/

AE1-1

Model	HB3742A0EZC+
Manufacturer	Sunwoda electronic Co., Ltd
Capacitance	22000mAh
Nominal voltage	3.8V

AE1-2

Model	HB3742A0EZC+
Manufacturer	Scud (Fujian) Electronics Co., Ltd
Capacitance	2200mAh
Nominal voltage	3.8V

AE2-1

Model	HW-050100E01
Manufacturer	Huizhou BYD Electronic CO.,LTD.
Length of cable	/



SN	B66757F5R00004
AE2-2	
Model	HW-050100U01
Manufacturer	Huizhou BYD Electronic CO.,LTD.
Length of cable	/
SN	B66660F3G00439
AE2-3	
Model	HW-050100I01
Manufacturer	Huizhou BYD Electronic CO.,LTD.
Length of cable	/
SN	B71332F6800090
AE2-4	
Model	HW-050100E01
Manufacturer	Dongguan Phitek Electronics Co.,Ltd
Length of cable	/
SN	P66707F5L03115
AE2-5	
Model	HW-050100U01
Manufacturer	Dongguan Phitek Electronics Co.,Ltd
Length of cable	/
SN	P66605F7A02842
AE2-6	
Model	HW-050100U01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	H666LRF6R00755
AE2-7	
Model	HW-050100E01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	H667LJFAH00077
AE2-8	
Model	HW-050100I01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	H7131RF8C00216
AE2-9	
Model	HW-050100R01
Manufacturer	Huizhou BYD Electronic CO.,LTD.
Length of cable	/
SN	/



AE2-10

Model HW-050100B01
Manufacturer Huizhou BYD Electronic CO.,LTD.
Length of cable /
SN /

AE2-11

Model HW-050100A01
Manufacturer Huizhou BYD Electronic CO.,LTD.
Length of cable /
SN /

AE2-12

Model HW-050100Z01
Manufacturer Huizhou BYD Electronic CO.,LTD.
Length of cable /
SN /

AE2-13

Model HW-050100R01
Manufacturer Dongguan Phitek Electronics Co.,Ltd
Length of cable /
SN /

AE2-14

Model HW-050100B01
Manufacturer Dongguan Phitek Electronics Co.,Ltd
Length of cable /
SN /

AE2-15

Model HW-050100A01
Manufacturer Dongguan Phitek Electronics Co.,Ltd
Length of cable /
SN /

AE2-16

Model HW-050100Z01
Manufacturer Dongguan Phitek Electronics Co.,Ltd
Length of cable /
SN /



AE2-17

Model HW-050100R01
Manufacturer SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable /
SN

AE2-18

Model HW-050100B01
Manufacturer SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable /
SN

AE2-19

Model HW-050100A01
Manufacturer SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable /
SN

AE2-20

Model HW-050100Z01
Manufacturer SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable /
SN

AE3-1

Model 130-41040
Manufacturer CHANGSHU HONGLIN TECHNOLOGY CO.,LTD.
Length of cable 94cm

AE3-2

Model H09-000473
Manufacturer SHEN ZHEN PANG NGAI INDUSTRIAL CO., LTD.
Length of cable 95cm

*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+ AE1-1 + AE2-1 + AE3-1	Charging mode
Set.2	EUT1+ AE1-2 + AE2-2 + AE3-2	Charging mode
Set.3	EUT1+ AE1-1 + AE2-3 + AE3-1	Charging mode
Set.4	EUT1+ AE1-2 + AE2-4 + AE3-2	Charging mode
Set.5	EUT1+ AE1-1 + AE2-5 + AE3-1	Charging mode
Set.6	EUT1+ AE1-2 + AE2-6 + AE3-2	Charging mode
Set.7	EUT1+ AE1-1 + AE2-7 + AE3-1	Charging mode
Set.8	EUT1+ AE1-2 + AE2-8 + AE3-2	Charging mode
Set.9	EUT1+ AE1-1 + AE3-1	USB mode
Set.10	EUT1+ AE1-2 + AE3-2	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 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-1000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3 m distance, from 30 to 1000 MHz
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. = 30 °C
Relative humidity	Min. =35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-1000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

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

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-1000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 6 GHz, 3 m distance



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	2016.08.10	1 year
2.	Test Receiver	ESCI	100702	R&S	2016.05.30	1 year
3.	Spectrum Analyzer	FSP 40	100378	R&S	2016.12.18	1 year
4.	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2017.01.20	3 years
5.	LISN	ESH2-Z5	100196	R&S	2016.01.13	1 year
6.	Horn Antenna	3117	00066577	ETS-Lindgren	2016.04.01	3 years
7.	Universal Radio Communication Tester	E5515C	GB44051324	Agilent	2016.05.19	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 ($\mu\text{V}/\text{m}$)		
	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 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.

Note: the result contains vertical part and Horizontal part

RE Measurement uncertainty: 30M-1GHz: 5.08dB (K=2);
1GHz-18GHz: 4.56 dB (K=2)

Set.1 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A_{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14183.000000	55.5	H	11.3	18.5	74.0
14590.000000	56.3	V	11.8	17.7	74.0
15725.000000	57.6	V	12.9	16.4	74.0
15861.000000	57.4	V	13.0	16.6	74.0
16732.000000	57.9	V	13.9	16.1	74.0
17447.000000	57.6	V	14.3	16.4	74.0

Set.1 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A_{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14155.000000	43.3	H	11.2	10.7	54.0
15051.000000	44.2	V	12.0	9.8	54.0
15739.000000	46.0	H	12.9	8.0	54.0
16195.000000	45.5	V	13.3	8.5	54.0
16796.000000	46.1	H	14.0	7.9	54.0
17395.000000	45.8	V	14.3	8.2	54.0

Set.2 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14493.000000	56.5	H	11.7	17.5	74.0
14566.000000	56.9	H	11.8	17.1	74.0
15801.000000	58.7	V	13.0	15.3	74.0
16395.000000	58.7	V	13.6	15.3	74.0
16612.000000	59.1	H	13.8	14.9	74.0
17418.000000	59.5	V	14.3	14.5	74.0

Set.2 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14522.000000	44.6	V	11.7	9.4	54.0
15100.000000	45.4	V	12.0	8.6	54.0
15691.000000	46.9	V	12.8	7.1	54.0
16226.000000	46.9	V	13.3	7.1	54.0
16751.000000	47.5	V	14.0	6.5	54.0
17390.000000	47.4	V	14.3	6.6	54.0

Set.3 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14123.000000	55.4	V	11.2	18.6	74.0
15140.000000	56.3	H	12.1	17.7	74.0
15811.000000	58.1	V	13.0	15.9	74.0
15869.000000	58.2	H	13.1	15.8	74.0
16722.000000	57.9	V	13.9	16.1	74.0
17811.000000	57.6	V	14.4	16.4	74.0

Set.3 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14175.000000	43.2	H	11.3	10.8	54.0
15054.000000	44.0	V	12.0	10.0	54.0
15752.000000	45.8	V	12.9	8.2	54.0
16236.000000	45.4	H	13.3	8.6	54.0
16826.000000	46.0	V	14.0	8.0	54.0
17400.000000	45.6	V	14.3	8.4	54.0

Set.4 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14467.000000	55.9	V	11.6	18.1	74.0
15172.000000	56.8	V	12.1	17.2	74.0
15840.000000	58.5	V	13.0	15.5	74.0
16326.000000	59.1	H	13.5	14.9	74.0
16690.000000	58.6	V	13.9	15.4	74.0
17426.000000	58.7	V	14.3	15.3	74.0

Set.4 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14511.000000	44.2	V	11.7	9.8	54.0
15176.000000	45.0	V	12.1	9.0	54.0
15739.000000	46.6	V	12.9	7.4	54.0
16205.000000	46.7	H	13.3	7.3	54.0
16821.000000	46.9	V	14.0	7.1	54.0
17377.000000	46.8	V	14.3	7.2	54.0

Set.5 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14462.000000	55.0	H	11.6	19.0	74.0
15062.000000	55.7	V	12.0	18.3	74.0
15790.000000	58.2	H	13.0	15.8	74.0
16224.000000	57.2	V	13.3	16.8	74.0
16766.000000	57.8	V	14.0	16.2	74.0
17296.000000	57.6	V	14.1	16.4	74.0

Set.5 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14165.000000	43.3	H	11.2	10.7	54.0
15126.000000	44.2	V	12.1	9.8	54.0
15777.000000	46.1	V	12.9	7.9	54.0
16203.000000	45.6	V	13.3	8.4	54.0
16740.000000	46.0	V	14.0	8.0	54.0
17349.000000	45.7	V	14.2	8.3	54.0

Set.6 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14056.000000	55.7	V	11.1	18.3	74.0
15124.000000	56.6	H	12.1	17.4	74.0
15747.000000	57.9	H	12.9	16.1	74.0
16259.000000	57.9	H	13.3	16.1	74.0
17225.000000	58.5	H	14.0	15.5	74.0
17922.000000	58.8	V	14.5	15.2	74.0

Set.6 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14446.000000	43.6	V	11.6	10.4	54.0
15176.000000	44.7	V	12.1	9.3	54.0
15777.000000	46.3	V	12.9	7.7	54.0
16231.000000	46.1	V	13.3	7.9	54.0
16839.000000	46.6	V	14.0	7.4	54.0
17385.000000	46.2	V	14.3	7.8	54.0

Set.7 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
13996.000000	55.9	V	10.9	18.1	74.0
15161.000000	56.5	V	12.1	17.5	74.0
15699.000000	59.3	H	12.8	14.7	74.0
16311.000000	58.1	V	13.5	15.9	74.0
16890.000000	57.8	V	14.1	16.2	74.0
17868.000000	57.5	V	14.4	16.5	74.0

Set.7 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14170.000000	43.3	V	11.3	10.7	54.0
15155.000000	44.3	V	12.1	9.7	54.0
15765.000000	45.9	V	12.9	8.1	54.0
16205.000000	45.7	V	13.3	8.3	54.0
16769.000000	46.1	H	14.0	7.9	54.0
17354.000000	45.8	V	14.2	8.2	54.0

Set.8 Charging mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14140.000000	55.8	V	11.2	18.2	74.0
15054.000000	56.8	V	12.0	17.2	74.0
15747.000000	58.0	H	12.9	16.0	74.0
16331.000000	57.6	V	13.5	16.4	74.0
16837.000000	58.6	V	14.0	15.4	74.0
17377.000000	58.0	V	14.3	16.0	74.0

Set.8 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14472.000000	43.6	V	11.6	10.4	54.0
15176.000000	44.5	V	12.1	9.5	54.0
15777.000000	46.1	V	12.9	7.9	54.0
16213.000000	45.9	V	13.3	8.1	54.0
16769.000000	46.5	V	14.0	7.5	54.0
17341.000000	46.2	V	14.2	7.8	54.0

Set.9 USB mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14079.000000	56.6	V	11.1	17.4	74.0
15124.000000	56.0	V	12.1	18.0	74.0
15763.000000	58.6	V	12.9	15.4	74.0
16273.000000	58.2	H	13.4	15.8	74.0
16790.000000	58.9	V	14.0	15.1	74.0
17744.000000	58.1	V	14.4	15.9	74.0

Set.9 USB mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dBμV/m)
14516.000000	43.4	V	11.7	10.6	54.0
15163.000000	44.3	V	12.1	9.7	54.0
15772.000000	45.9	V	12.9	8.1	54.0
16205.000000	45.7	V	13.3	8.3	54.0
16821.000000	46.2	V	14.0	7.8	54.0
17329.000000	46.0	V	14.2	8.0	54.0

Set.10 USB mode / Peak detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14553.000000	55.2	H	11.8	18.8	74.0
15166.000000	55.7	V	12.1	18.3	74.0
15777.000000	58.8	V	12.9	15.2	74.0
16372.000000	58.1	V	13.6	15.9	74.0
16811.000000	57.2	V	14.0	16.8	74.0
17352.000000	58.2	H	14.2	15.8	74.0

Set.10 USB mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	A _{Rpl} (dB)	Margin(dB)	Limit (dB μ V/m)
14165.000000	43.3	V	11.2	10.7	54.0
15137.000000	44.0	V	12.1	10.0	54.0
15777.000000	45.9	V	12.9	8.1	54.0
16208.000000	45.4	V	13.3	8.6	54.0
16834.000000	45.9	V	14.0	8.1	54.0
17359.000000	45.6	V	14.2	8.4	54.0

Note: The measurement result of Set.1,Set.2,Set.3,Set.4,Set.5,Set.6,Set.7,Set.8, Set.9 and Set.10 showed here are worst cases of combinations of different batteries and USB cables.

Charging mode: Set 1

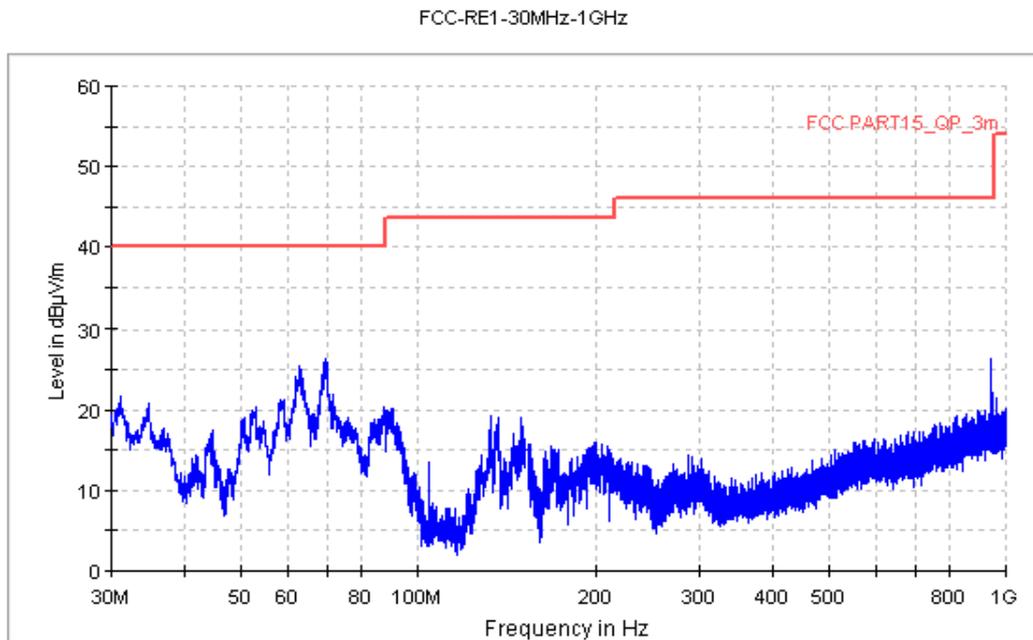


Figure A.1 Radiated Emission from 30MHz to 1GHz

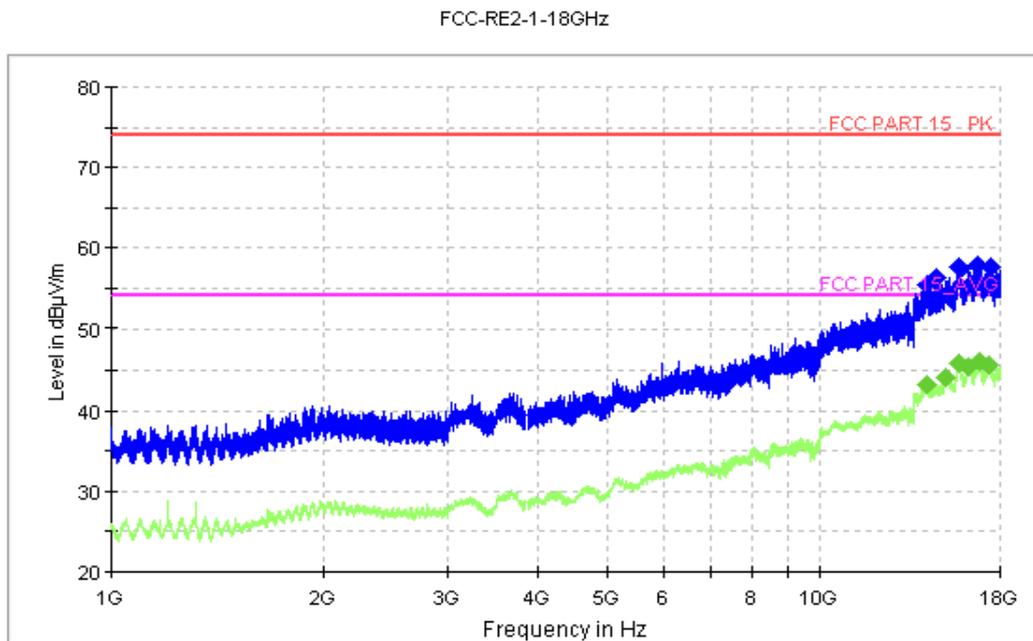


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 2

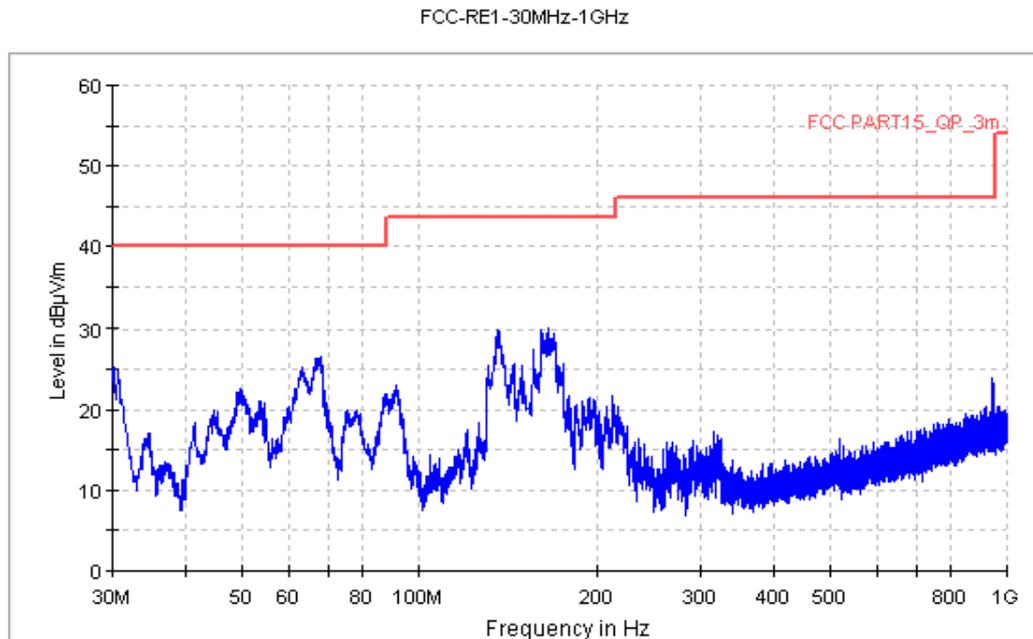


Figure A.3 Radiated Emission from 30MHz to 1GHz

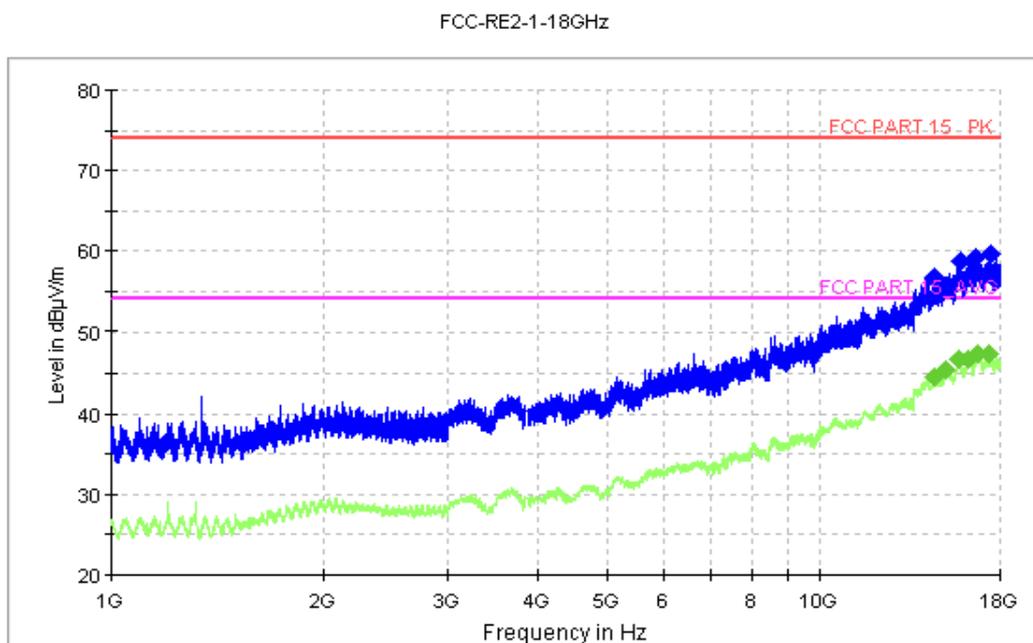


Figure A.4 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 3

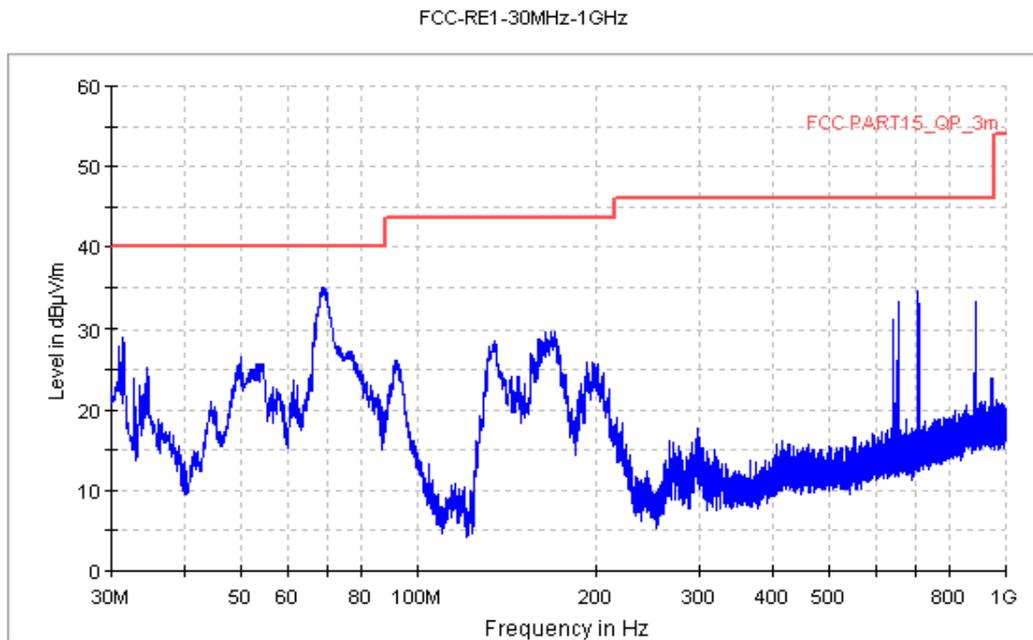


Figure A.5 Radiated Emission from 30MHz to 1GHz

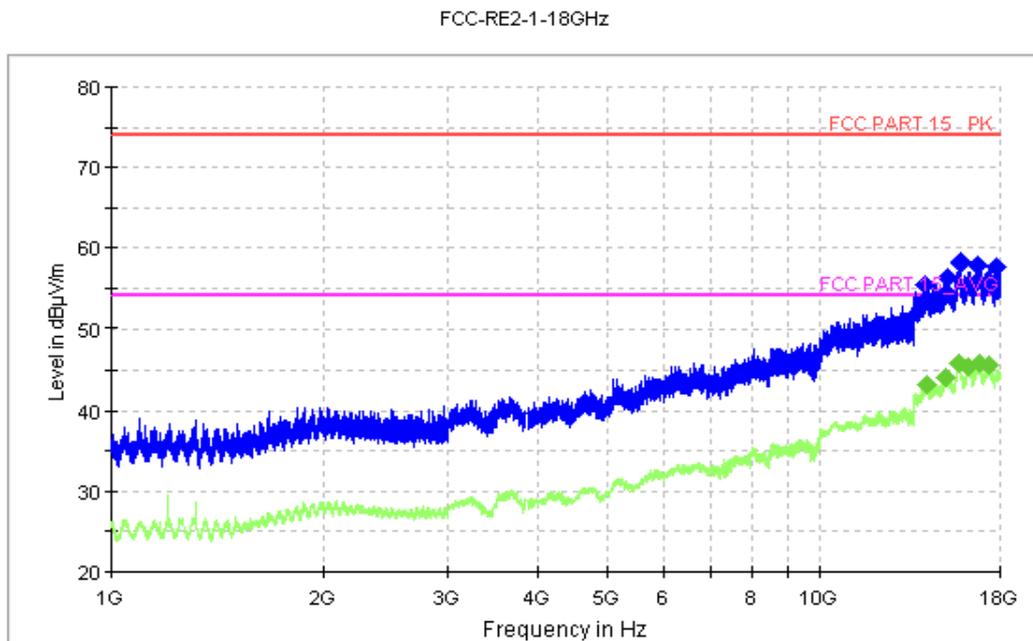


Figure A.6 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 4

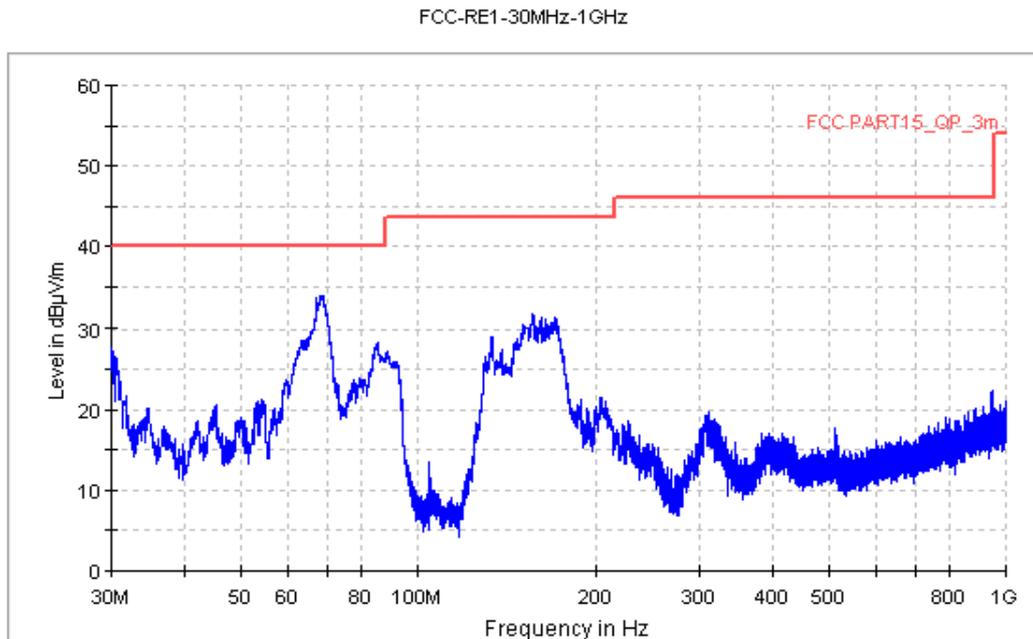


Figure A.7 Radiated Emission from 30MHz to 1GHz

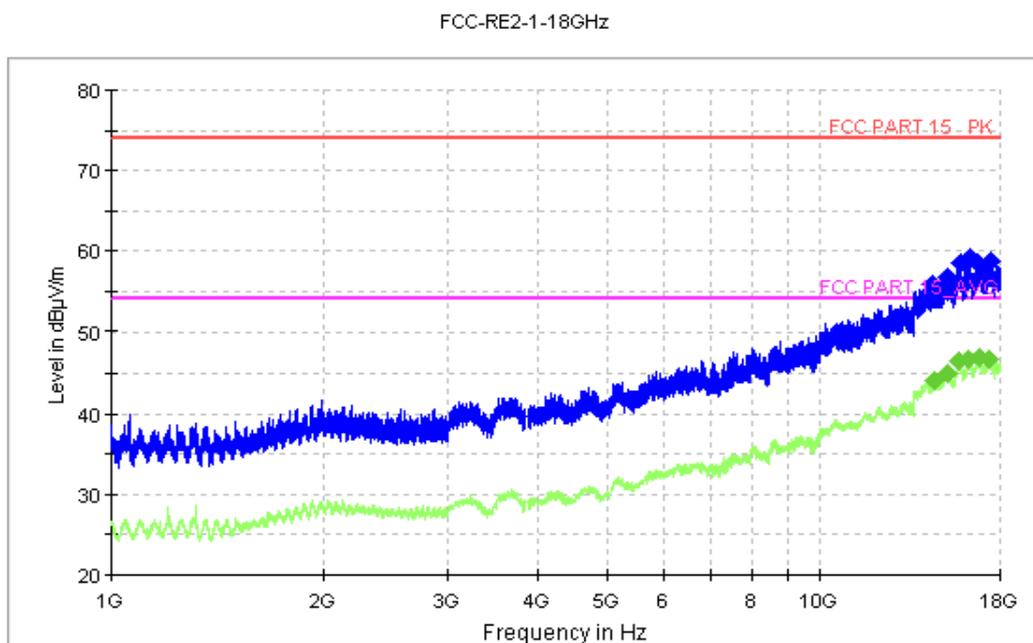


Figure A.8 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 5

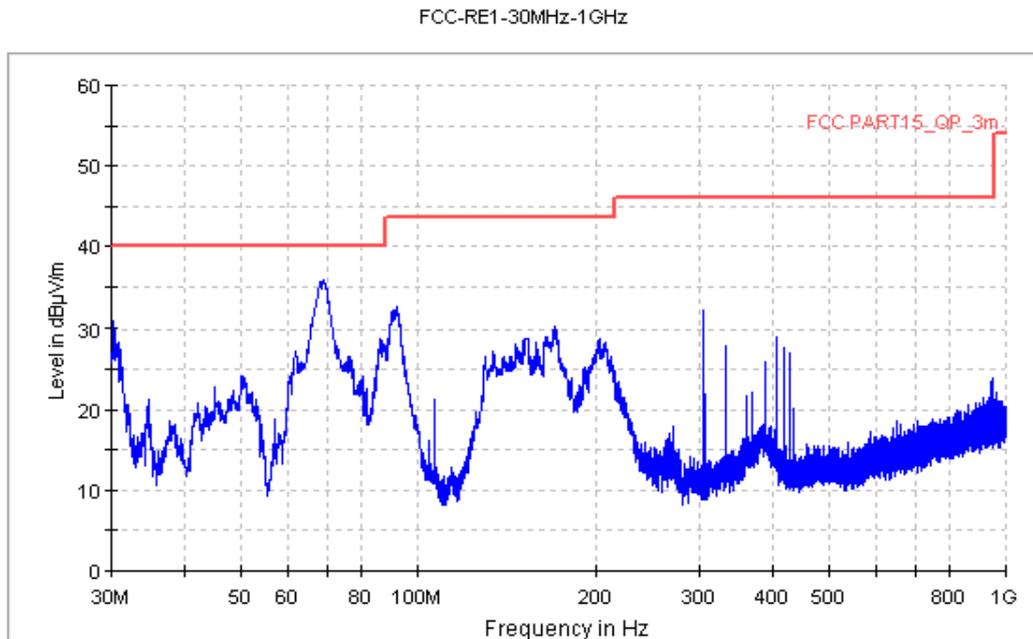


Figure A.9 Radiated Emission from 30MHz to 1GHz

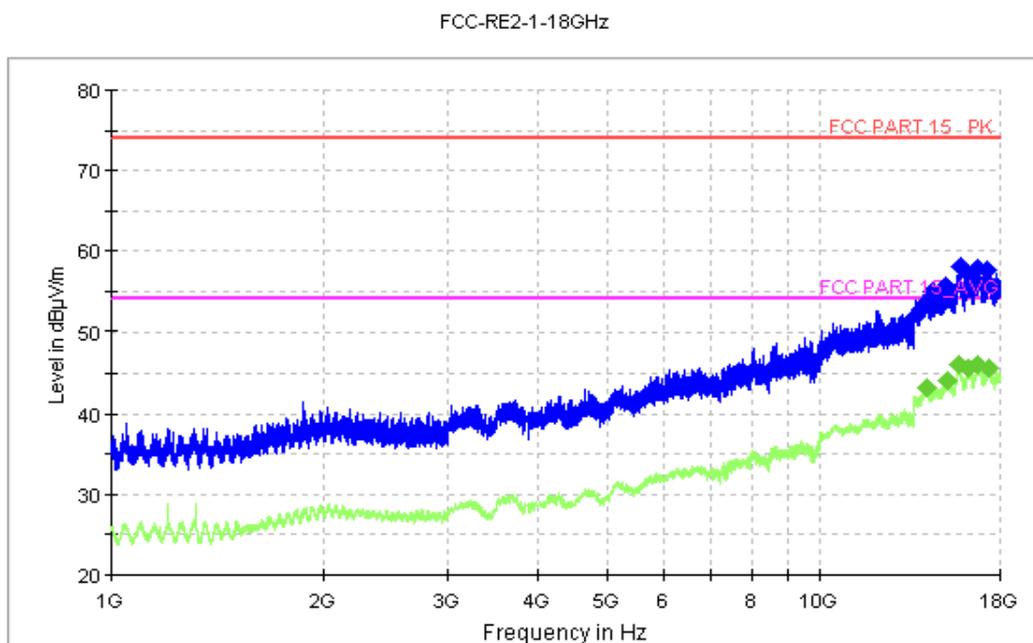


Figure A.10 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 6

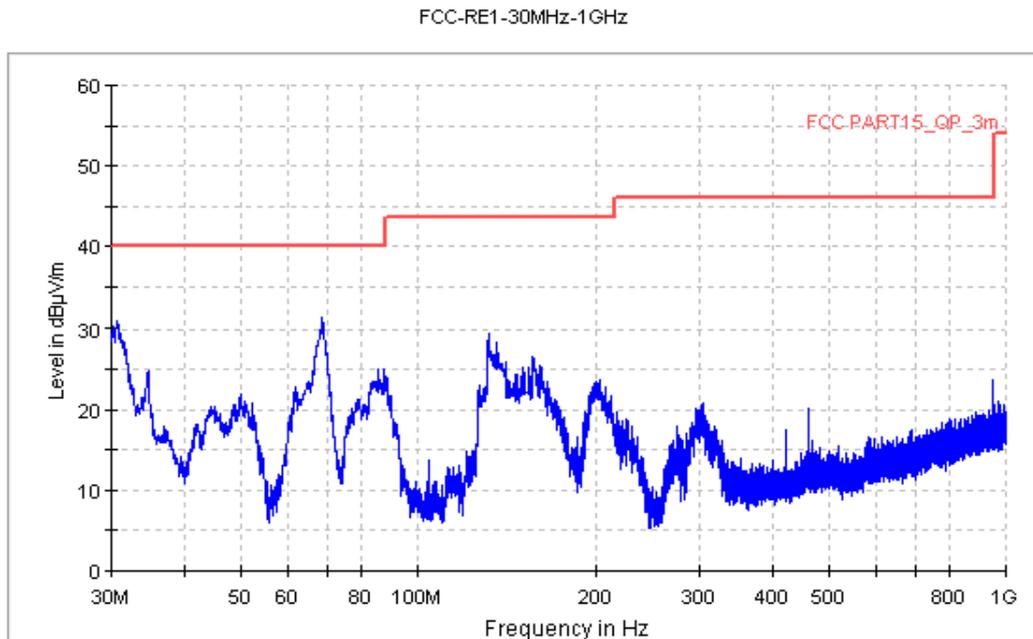


Figure A.11 Radiated Emission from 30MHz to 1GHz

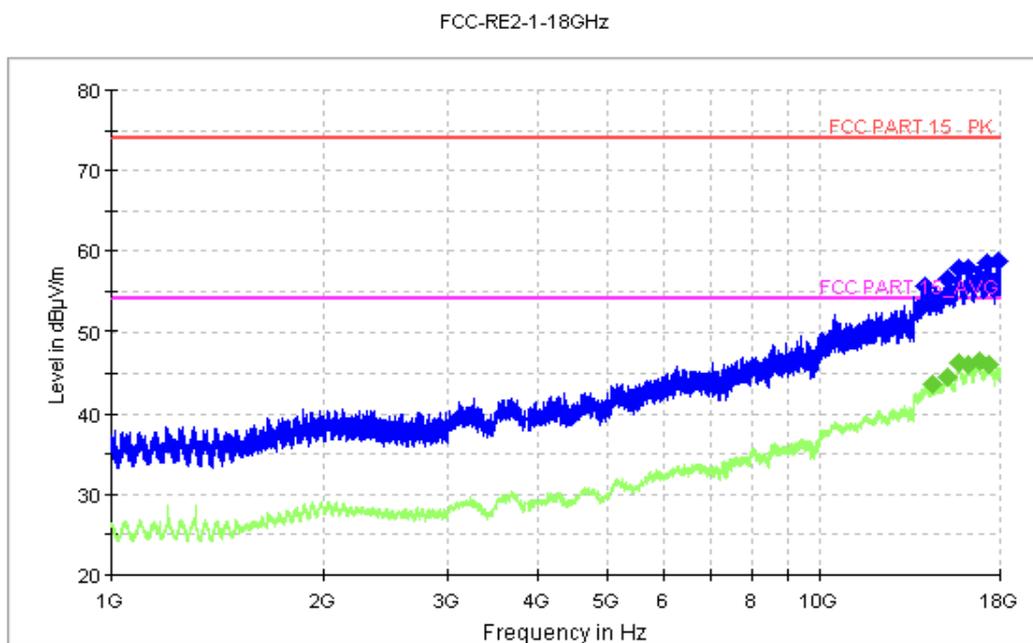


Figure A.12 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 7

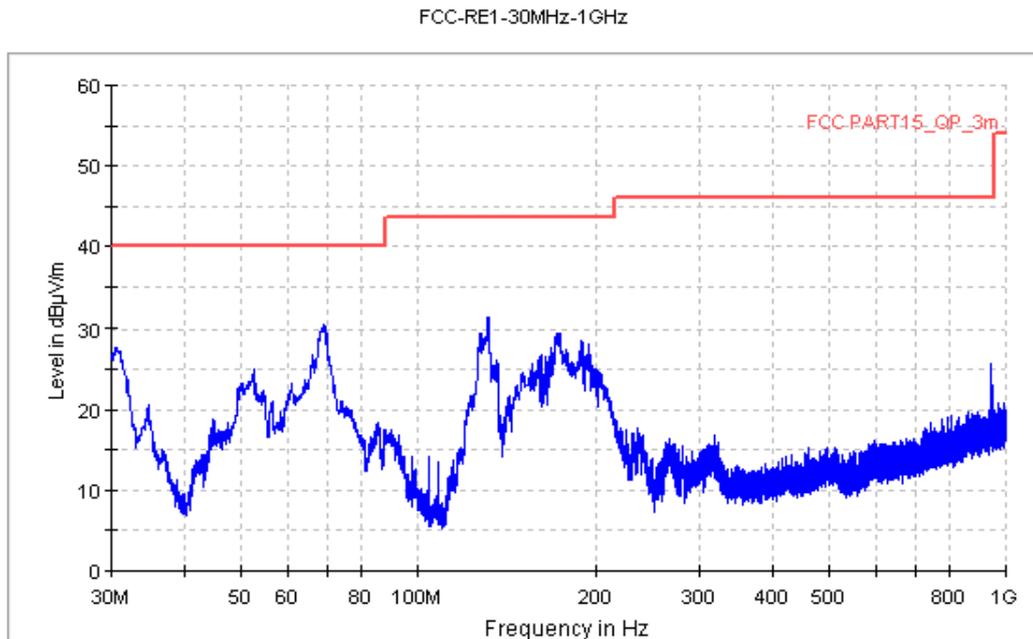


Figure A.13 Radiated Emission from 30MHz to 1GHz

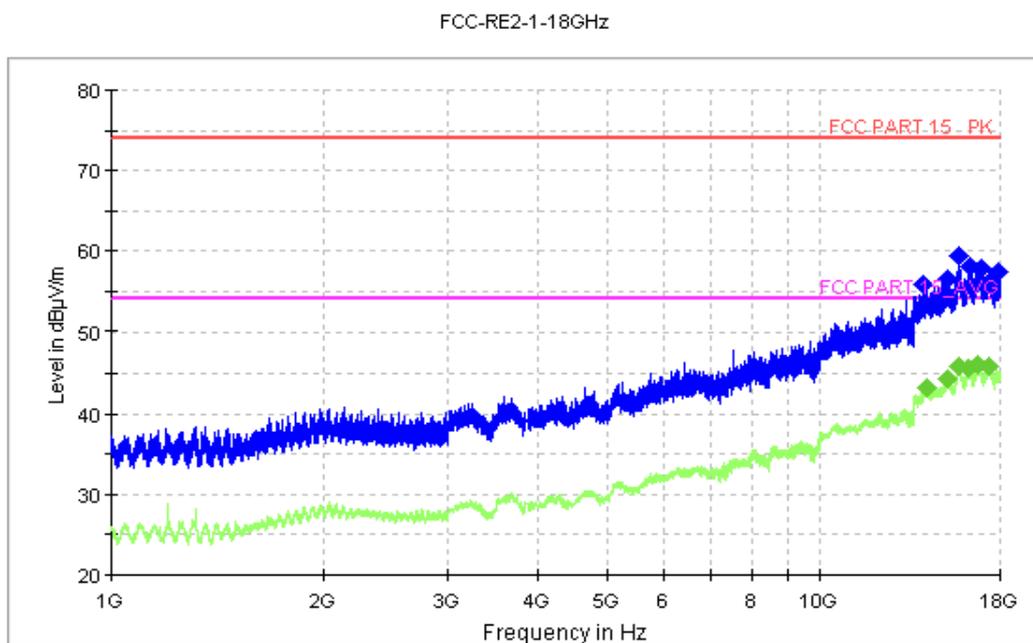


Figure A.14 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 8

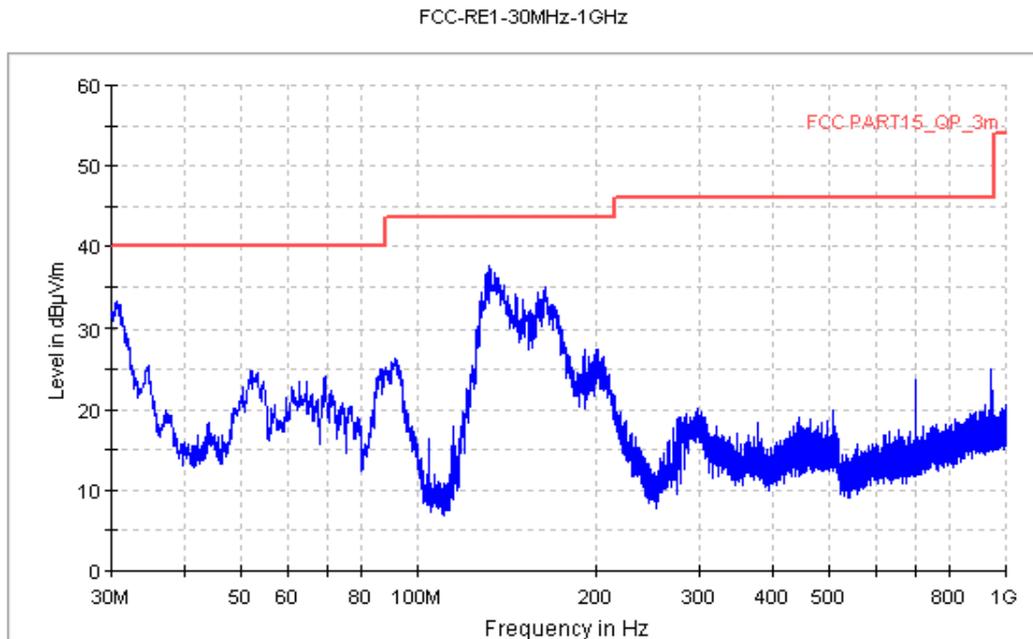


Figure A.15 Radiated Emission from 30MHz to 1GHz

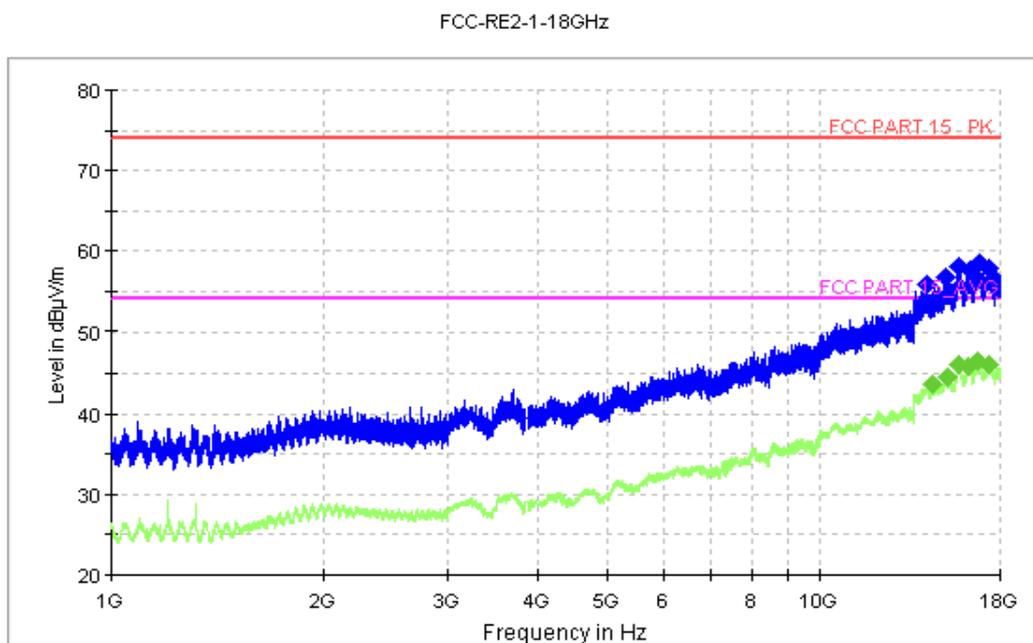


Figure A.16 Radiated Emission from 1GHz to 18GHz

USB mode: Set.9

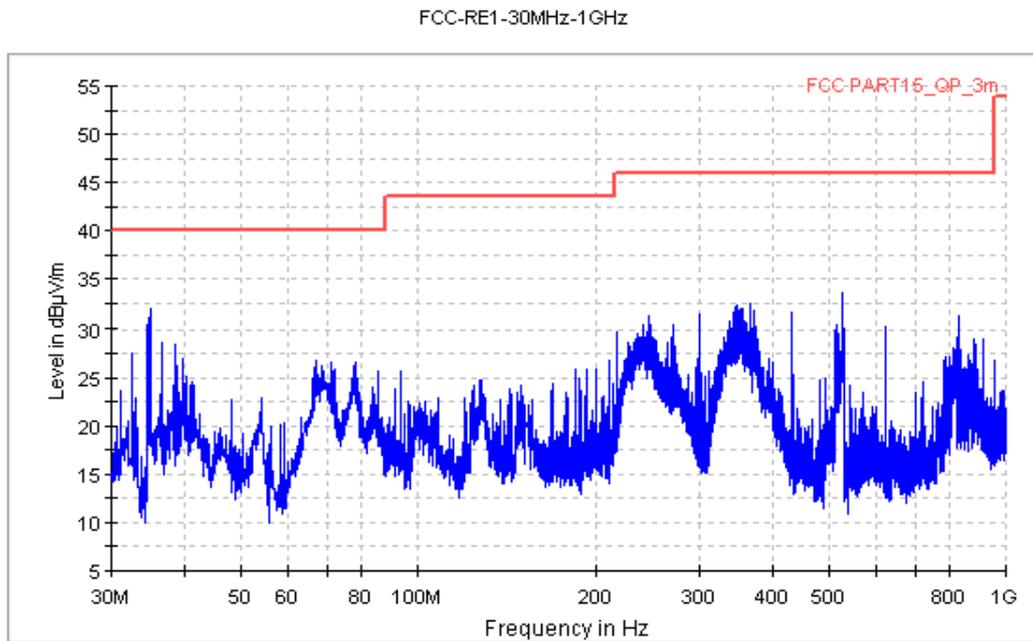


Figure A.17 Radiated Emission from 30MHz to 1GHz

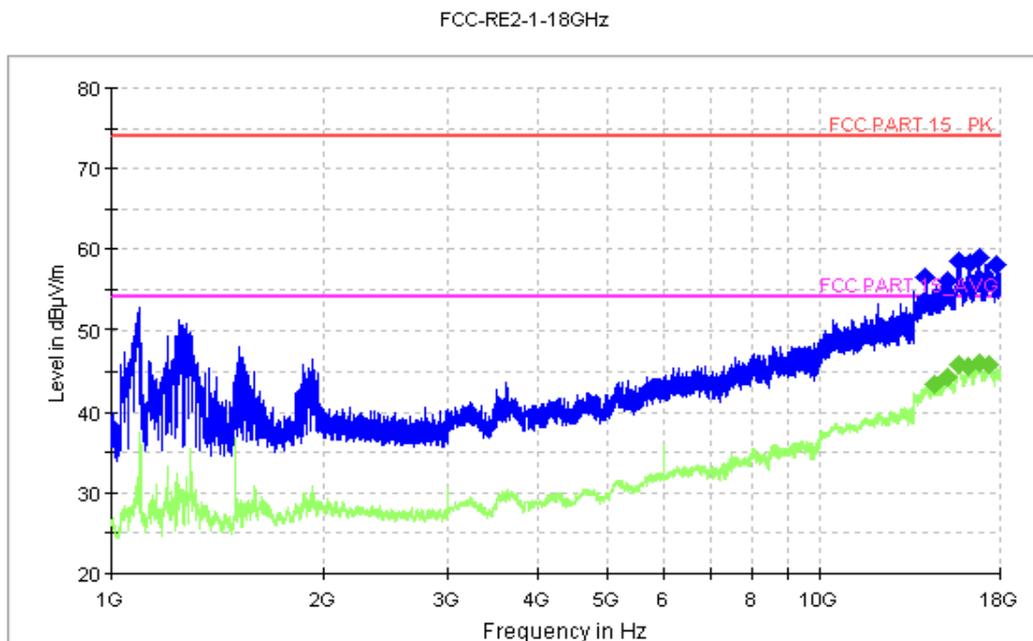


Figure A.18 Radiated Emission from 1GHz to 18GHz

USB mode: Set.10

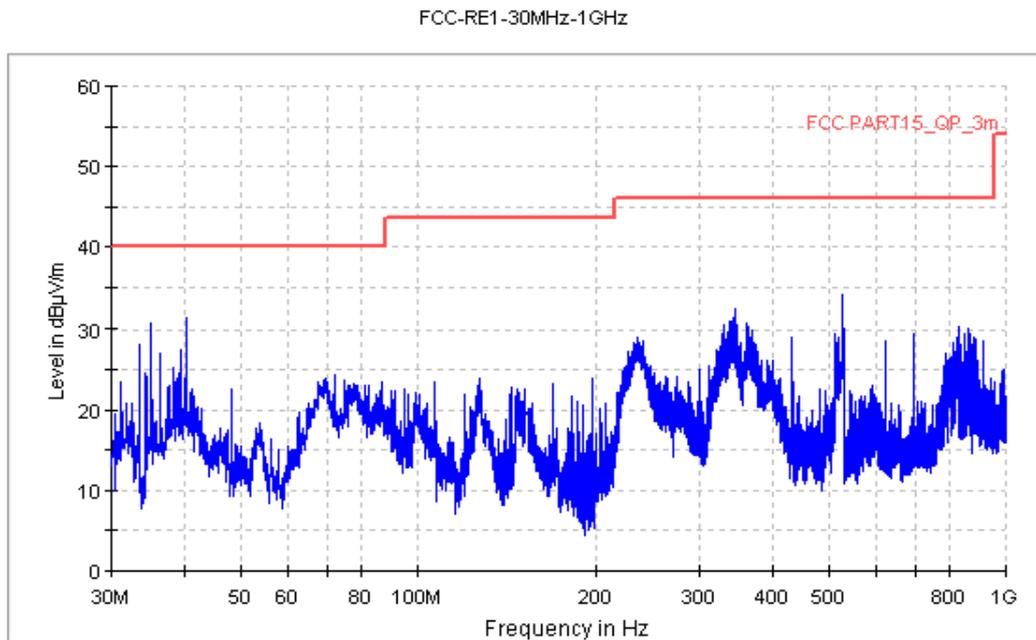


Figure A.19 Radiated Emission from 30MHz to 1GHz

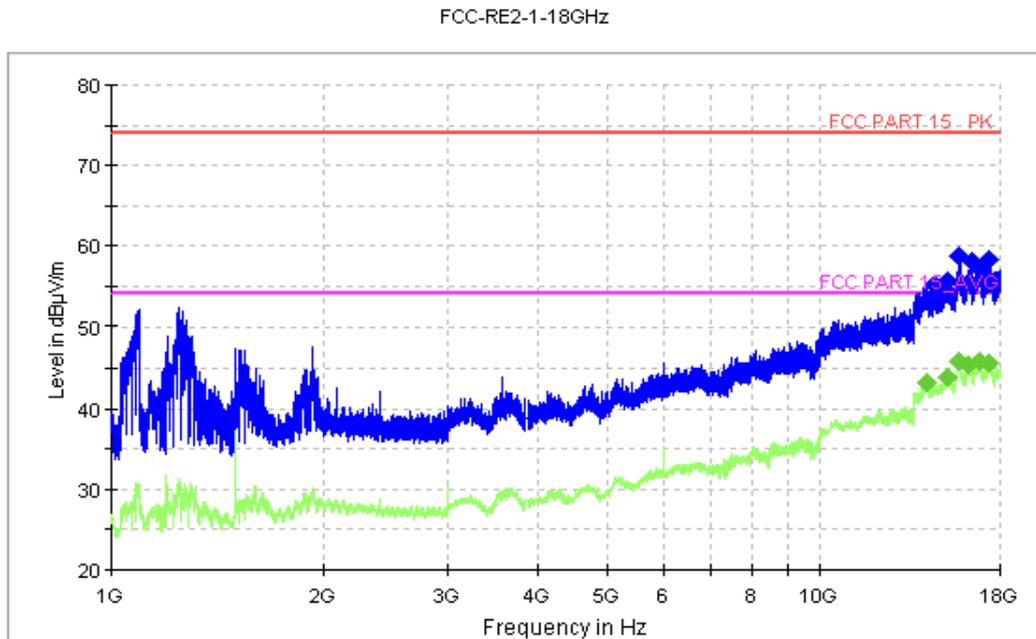


Figure A.20 Radiated Emission from 1GHz to 18GHz

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 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 (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	Sweep Time(s)
9kHz	1

CE Measurement uncertainty: 2.7 dB (K=2)

A.2.5 Measurement Results
Charging mode:Set.1

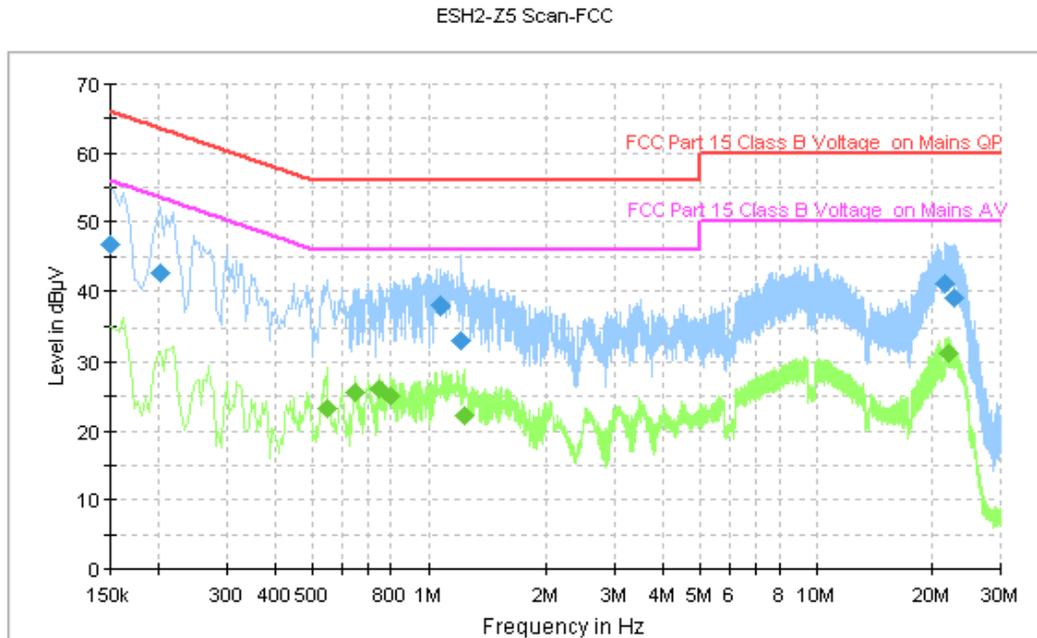


Figure A.21 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	46.7	GND	L1	10.0	19.3	66.0
0.202000	42.6	GND	L1	10.0	20.9	63.5
1.070000	38.0	GND	L1	10.1	18.0	56.0
1.214000	32.9	GND	N	10.1	23.1	56.0
21.618000	41.0	GND	L1	10.6	19.0	60.0
22.646000	38.9	GND	L1	10.6	21.1	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.546000	23.3	GND	L1	10.1	22.7	46.0
0.646000	25.6	GND	L1	10.0	20.4	46.0
0.746000	26.2	GND	L1	10.0	19.8	46.0
0.798000	25.1	GND	L1	10.1	20.9	46.0
1.238000	22.1	GND	L1	10.1	23.9	46.0
22.006000	31.2	GND	L1	10.6	18.8	50.0

Charging mode:Set.2

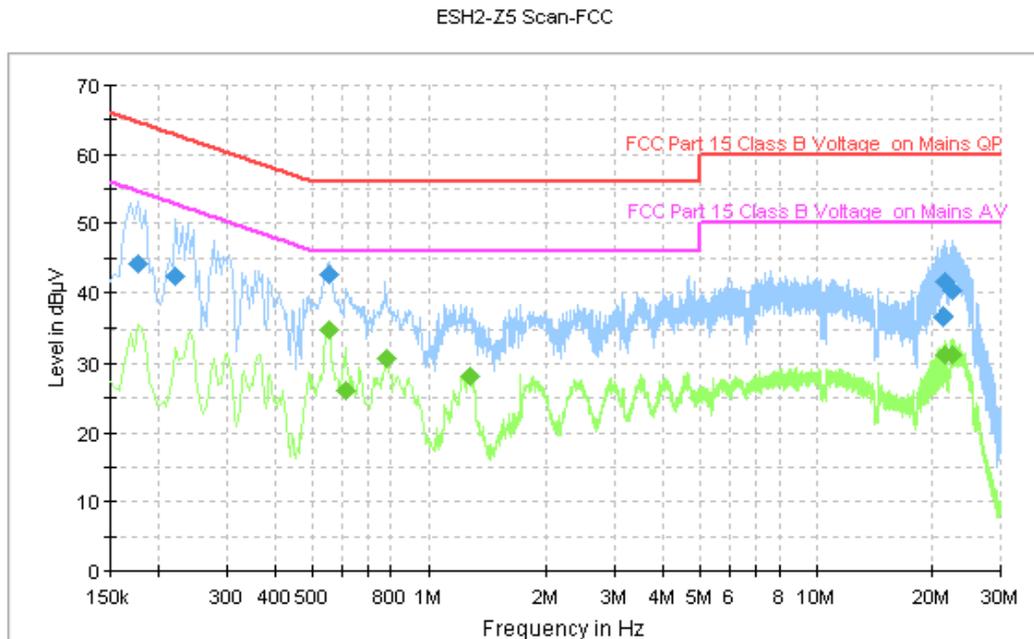


Figure A.22 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.178000	44.1	GND	L1	10.0	20.5	64.6
0.222000	42.4	GND	L1	10.0	20.4	62.7
0.554000	42.7	GND	L1	10.1	13.3	56.0
21.194000	36.6	GND	N	10.7	23.4	60.0
21.562000	41.7	GND	L1	10.6	18.3	60.0
22.406000	40.4	GND	L1	10.6	19.6	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.554000	35.0	GND	N	10.1	11.0	46.0
0.610000	26.0	GND	N	10.0	20.0	46.0
0.778000	30.6	GND	N	10.1	15.4	46.0
1.286000	28.3	GND	N	10.1	17.7	46.0
21.622000	31.2	GND	L1	10.6	18.8	50.0
22.570000	31.3	GND	L1	10.6	18.7	50.0

Charging mode:Set.3

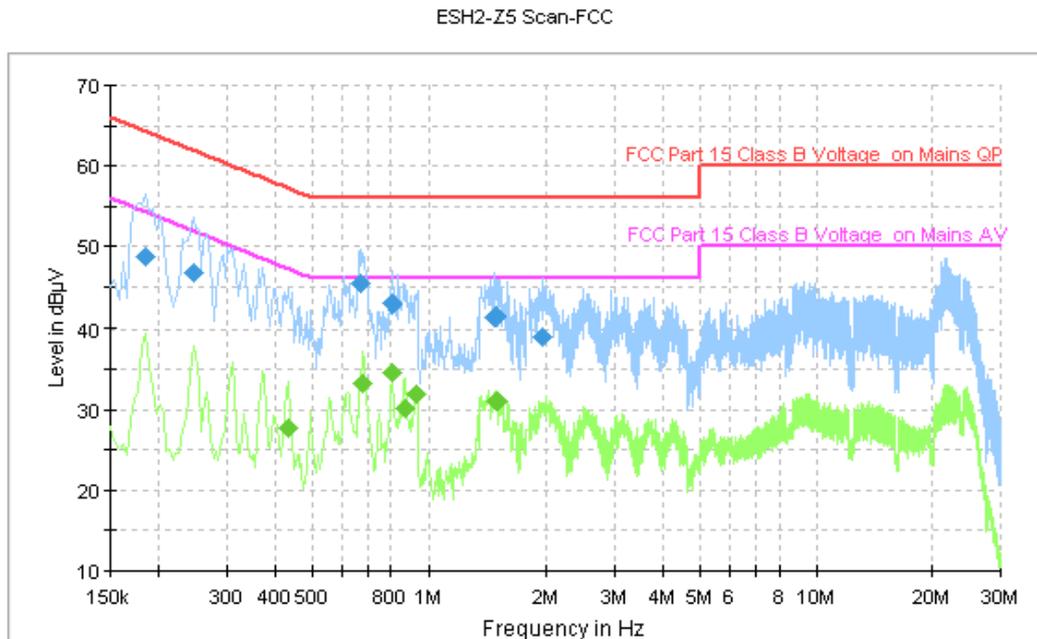


Figure A.23 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.186000	48.6	GND	L1	10.0	15.6	64.2
0.246000	46.8	GND	L1	10.0	15.1	61.9
0.670000	45.4	GND	L1	10.0	10.6	56.0
0.802000	43.0	GND	L1	10.1	13.0	56.0
1.474000	41.4	GND	L1	10.1	14.6	56.0
1.954000	39.1	GND	L1	10.1	16.9	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.434000	27.8	GND	L1	10.0	19.4	47.2
0.678000	33.3	GND	L1	10.0	12.7	46.0
0.802000	34.5	GND	L1	10.1	11.5	46.0
0.870000	30.2	GND	L1	10.1	15.8	46.0
0.930000	31.9	GND	L1	10.1	14.1	46.0
1.490000	31.0	GND	L1	10.1	15.0	46.0

Charging mode:Set.4

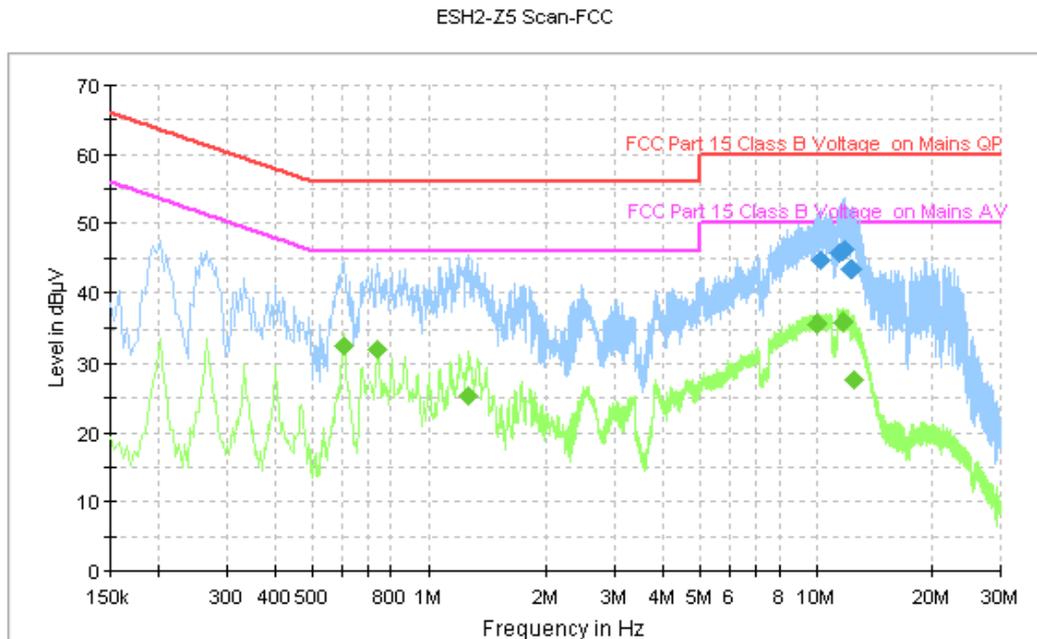


Figure A.24 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
10.306000	44.8	GND	L1	10.3	15.2	60.0
11.434000	45.6	GND	L1	10.3	14.4	60.0
11.738000	46.1	GND	L1	10.3	13.9	60.0
11.806000	46.4	GND	L1	10.3	13.6	60.0
12.282000	43.3	GND	L1	10.4	16.7	60.0
12.326000	43.3	GND	L1	10.4	16.7	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.602000	32.5	GND	L1	10.0	13.5	46.0
0.738000	32.1	GND	L1	10.0	13.9	46.0
1.274000	25.2	GND	L1	10.1	20.8	46.0
10.046000	35.7	GND	L1	10.3	14.3	50.0
11.738000	35.9	GND	L1	10.3	14.1	50.0
12.534000	27.7	GND	L1	10.4	22.3	50.0

Charging mode:Set.5

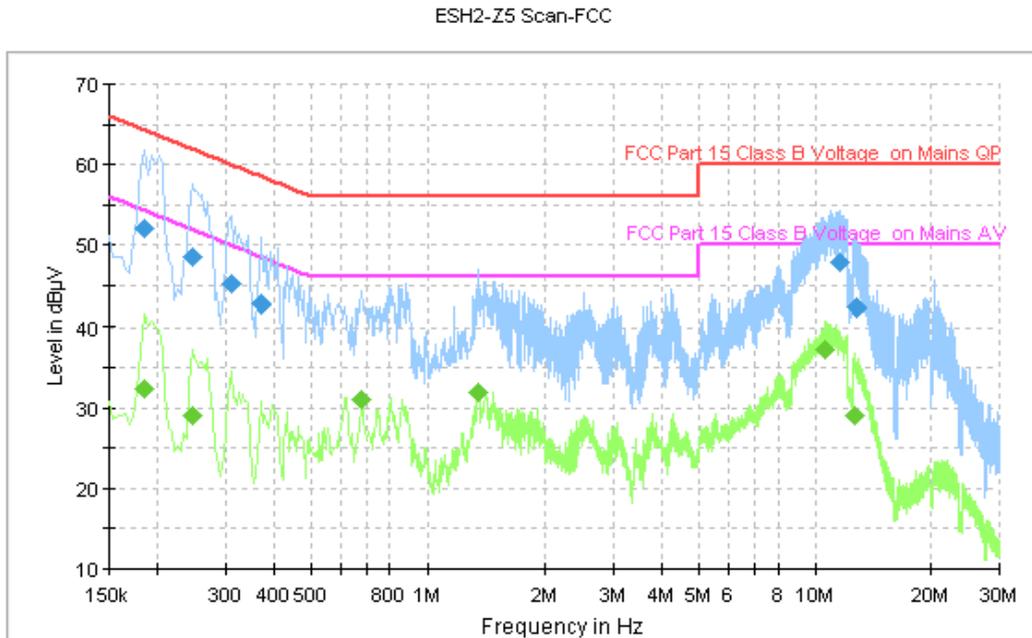


Figure A.25 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.186000	52.1	GND	L1	10.0	12.1	64.2
0.246000	48.5	GND	L1	10.0	13.4	61.9
0.310000	45.1	GND	L1	10.0	14.9	60.0
0.370000	42.7	GND	L1	10.0	15.8	58.5
11.594000	47.8	GND	L1	10.3	12.2	60.0
12.754000	42.2	GND	L1	10.4	17.8	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.186000	32.4	GND	L1	10.0	21.8	54.2
0.246000	29.0	GND	L1	10.0	22.9	51.9
0.678000	30.9	GND	N	10.0	15.1	46.0
1.358000	31.8	GND	L1	10.1	14.2	46.0
10.618000	37.2	GND	L1	10.4	12.8	50.0
12.702000	29.0	GND	L1	10.4	21.0	50.0

Charging mode:Set.6

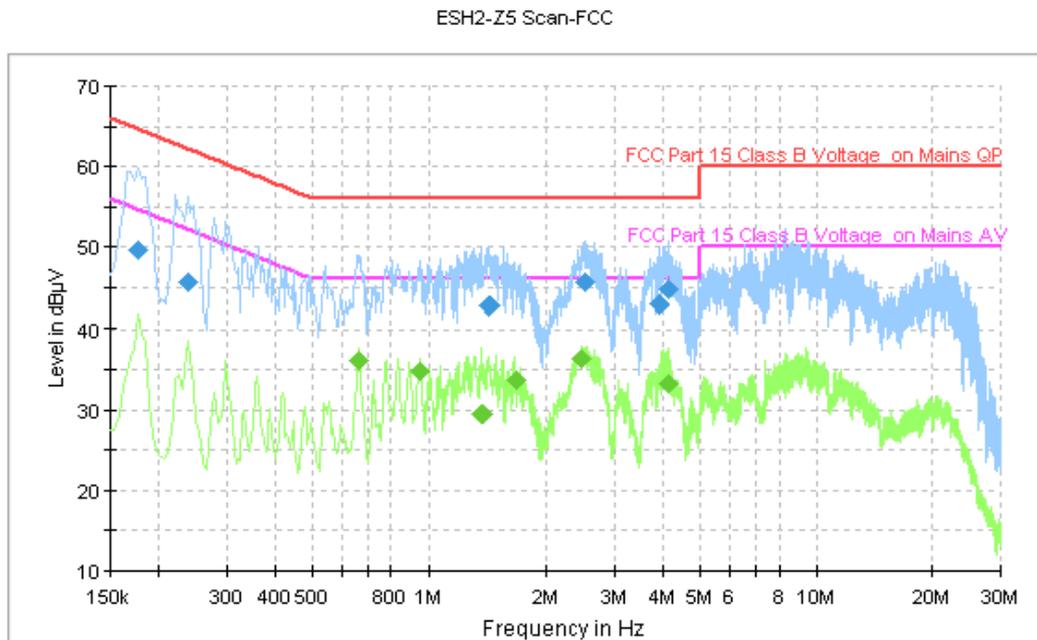


Figure A.26 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.178000	49.5	GND	L1	10.0	15.1	64.6
0.238000	45.6	GND	L1	10.0	16.5	62.2
1.438000	42.8	GND	N	10.1	13.2	56.0
2.530000	45.7	GND	N	10.2	10.3	56.0
3.914000	43.1	GND	N	10.2	12.9	56.0
4.134000	44.7	GND	N	10.2	11.3	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.658000	36.2	GND	N	10.0	9.8	46.0
0.954000	34.8	GND	L1	10.1	11.2	46.0
1.378000	29.5	GND	L1	10.1	16.5	46.0
1.674000	33.8	GND	L1	10.1	12.2	46.0
2.458000	36.3	GND	N	10.2	9.7	46.0
4.138000	33.3	GND	N	10.2	12.7	46.0

Charging mode:Set.7

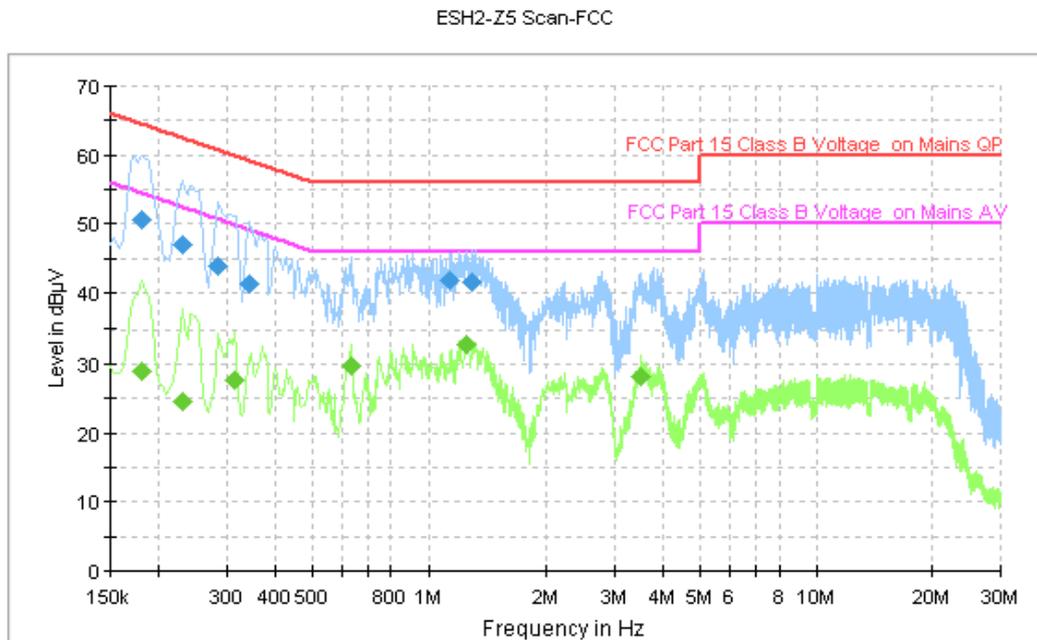


Figure A.27 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	50.6	GND	L1	10.0	13.7	64.4
0.230000	47.1	GND	L1	10.0	15.3	62.4
0.286000	44.0	GND	L1	10.0	16.6	60.6
0.342000	41.4	GND	L1	10.0	17.7	59.2
1.134000	41.8	GND	L1	10.1	14.2	56.0
1.290000	41.6	GND	L1	10.1	14.4	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	29.0	GND	L1	10.0	25.4	54.4
0.230000	24.4	GND	L1	10.0	28.0	52.4
0.314000	27.7	GND	L1	10.0	22.1	49.9
0.630000	29.7	GND	L1	10.0	16.3	46.0
1.258000	32.8	GND	L1	10.1	13.2	46.0
3.522000	28.2	GND	L1	10.2	17.8	46.0

Charging mode:Set.8

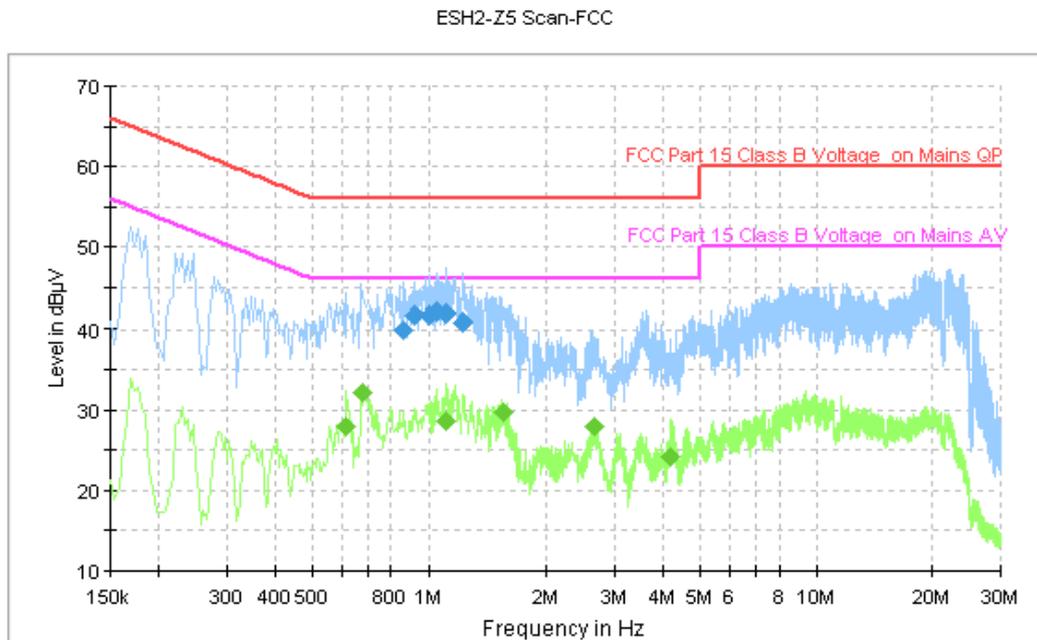


Figure A.28 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.862000	39.8	GND	L1	10.0	16.2	56.0
0.922000	41.6	GND	L1	10.1	14.4	56.0
1.006000	41.8	GND	L1	10.0	14.2	56.0
1.046000	42.1	GND	L1	10.1	13.9	56.0
1.106000	41.9	GND	L1	10.1	14.1	56.0
1.230000	40.8	GND	L1	10.1	15.2	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.614000	27.9	GND	L1	10.0	18.1	46.0
0.678000	32.1	GND	L1	10.0	13.9	46.0
1.106000	28.7	GND	L1	10.1	17.3	46.0
1.542000	29.6	GND	L1	10.1	16.4	46.0
2.662000	27.9	GND	L1	10.2	18.1	46.0
4.174000	24.2	GND	L1	10.2	21.8	46.0

USB mode: Set.9

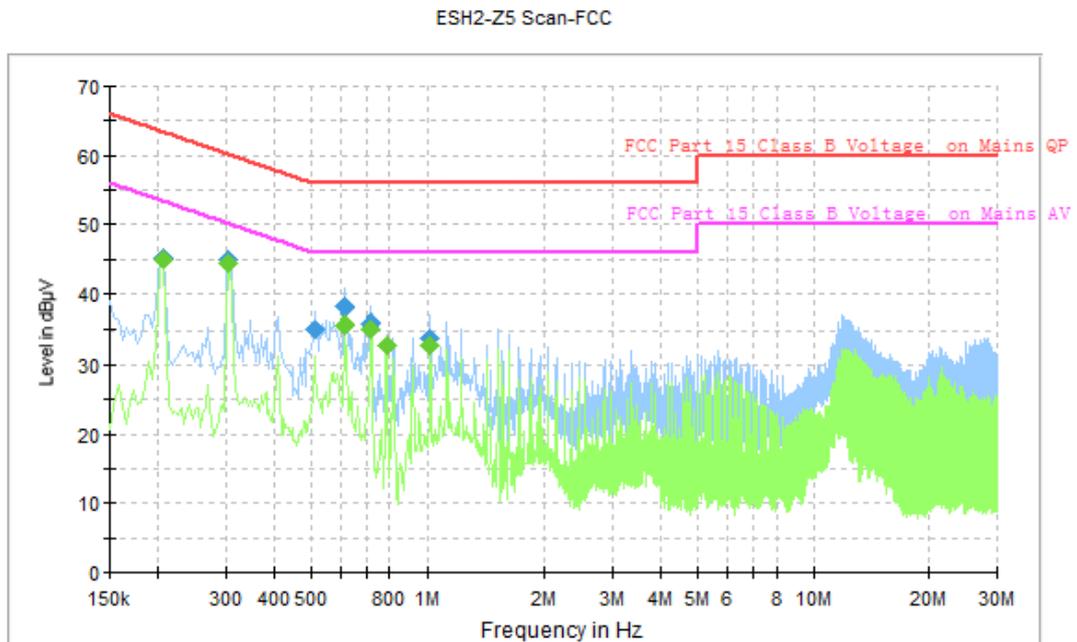


Figure A.29 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.2	GND	N	10.1	18.2	63.4
0.306000	44.9	GND	N	10.1	15.2	60.1
0.510000	35.0	GND	N	10.1	21.0	56.0
0.614000	38.1	GND	N	10.0	17.9	56.0
0.714000	35.9	GND	N	10.0	20.1	56.0
1.022000	33.7	GND	N	10.0	22.3	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.9	GND	N	10.1	8.5	53.4
0.306000	44.4	GND	N	10.1	5.7	50.1
0.614000	35.7	GND	N	10.0	10.3	46.0
0.714000	35.2	GND	N	10.0	10.8	46.0
0.786000	32.8	GND	L1	10.1	13.2	46.0
1.022000	32.8	GND	L1	10.0	13.2	46.0

USB mode: Set.10

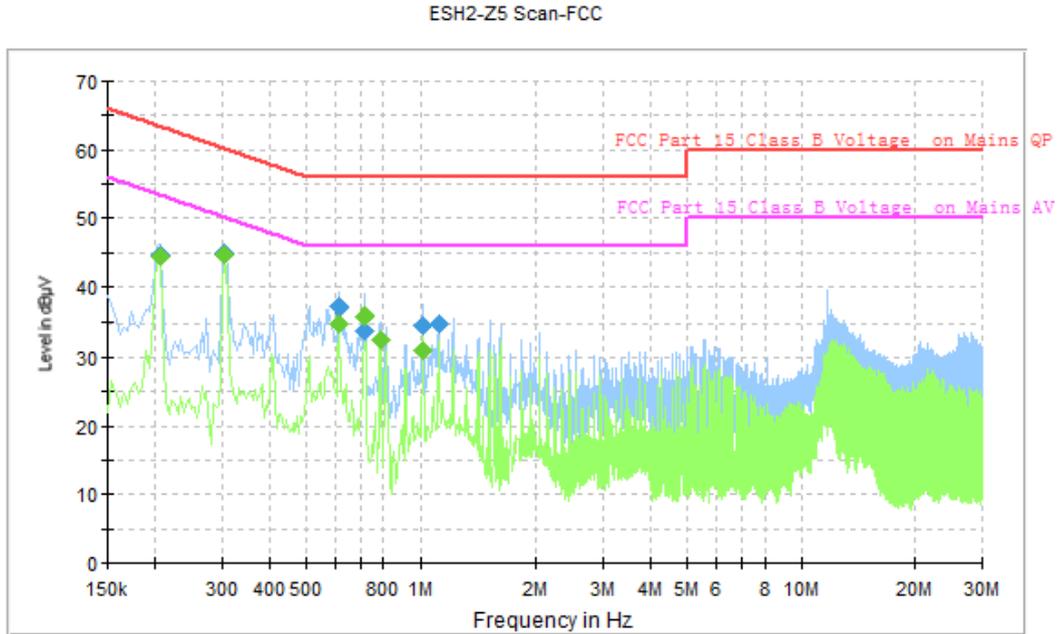


Figure A.30 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.6	GND	N	10.1	18.7	63.4
0.306000	45.0	GND	N	10.1	15.1	60.1
0.610000	37.1	GND	N	10.0	18.9	56.0
0.710000	33.9	GND	N	10.0	22.1	56.0
1.018000	34.5	GND	N	10.0	21.5	56.0
1.122000	35.0	GND	N	10.1	21.0	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	44.3	GND	N	10.1	9.1	53.4
0.306000	44.6	GND	N	10.1	5.5	50.1
0.610000	34.8	GND	N	10.0	11.2	46.0
0.714000	36.0	GND	N	10.0	10.0	46.0
0.786000	32.6	GND	L1	10.1	13.4	46.0
1.018000	31.1	GND	N	10.0	14.9	46.0

END OF REPORT