



# TEST REPORT

No.I16N00272-EMC

for

**Huawei Technologies Co., Ltd.**

**Smart Phone**

**Model Name: NEM-L22**

**FCC ID: QISNEM-L22**

with

**Hardware Version: HL2NEMM**

**Software Version: NEM-L22C900B049**

**Issued Date: 2016-04-14**

**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**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I16N00272-EMC	Rev.0	1st edition	2016-04-14



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## 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: 2016-03-15  
Testing End Date: 2016-03-18

### 1.4. Signature

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Liang Yong  
(Prepared this test report)

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Du Zhaoxuan  
(Reviewed this test report)

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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	NEM-L22
FCC ID	QISNEM-L22
TX Band	GSM850/1900,WCDMA Band 5,LTE Band 5/7
RX Band	GSM850/1900,WCDMA Band 5, LTE Band 5/7

The Equipment Under Test (EUT) are a model of Smart 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**

<b>EUT ID*</b>	<b>SN or IMEI</b>
EUT	860902030006288
	860902030008318
	860902030008243
	860902030006296
	860902030007252

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

#### **3.3. Internal Identification of AE**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>
AE1	Battery	/
AE2	Travel charger	/
AE3	USB cable	/
<b>AE1-1</b>		
Model	HB366481ECW	
Manufacturer	Sunwoda Electronics Co.,Ltd	
Chip	SDI	
Capacitance	2900mAh	
Nominal voltage	3.82V	
<b>AE1-2</b>		
Model	HB366481ECW	
Manufacturer	SCUD(FUJIAN) Electronics Co.,Ltd	
Chip	SDI	
Capacitance	2900mAh	
Nominal voltage	3.82V	
<b>AE1-3</b>		



Model	HB366481ECW
Manufacturer	Sunwoda Electronics Co.,Ltd
Chip	ATL
Capacitance	2900mAh
Nominal voltage	3.82V
AE1-4	
Model	HB366481ECW
Manufacturer	Desay
Chip	LG
Capacitance	2900mAh
Nominal voltage	3.82V
AE1-5	
Model	HB366481ECW
Manufacturer	Desay
Chip	sony
Capacitance	2900mAh
Nominal voltage	3.82V
AE2-1	
Model	HW-050100U01
Manufacturer	DONG GUAN PHITEK ELECTRONICS CO., LTD.
Length of cable	/
SN	H666K5FAY06044
AE2-2	
Model	HW-050100U01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	B66622FAY01246
AE2-3	
Model	HW-050100U01
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Length of cable	/
SN	P66615FB227886
AE2-4	
Model	HW-050100B01
Manufacturer	DONG GUAN PHITEK ELECTRONICS CO., LTD.
Length of cable	/
SN	/
AE2-5	
Model	HW-050100B01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	/
AE2-6	
Model	HW-050100B01



Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Length of cable	/
SN	/
AE2-7	
Model	HW-050100A01
Manufacturer	DONG GUAN PHITEK ELECTRONICS CO., LTD.
Length of cable	/
SN	/
AE2-8	
Model	HW-050100A01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	/
AE2-9	
Model	HW-050100A01
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Length of cable	/
SN	/
AE2-10	
Model	HW-050100E01
Manufacturer	DONG GUAN PHITEK ELECTRONICS CO., LTD.
Length of cable	/
SN	/
AE2-11	
Model	HW-050100E01
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
Length of cable	/
SN	/
AE2-12	
Model	HW-050100E01
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Length of cable	/
SN	/
AE3-1	
Model	CD-U0405-1143
Manufacturer	CONNREX (SHEN ZHEN) INDUSTRIAL.,LTD
Length of cable	96cm
AE3-2	
Model	LSA00732
Manufacturer	Unirise Communication Technology Co Ltd.
Length of cable	96cm
AE3-3	
Model	H09-000577
Manufacturer	SHEN ZHEN PANG NGAI INDUSTRIAL CO., LTD.



Length of cable	96cm
AE3-4	
Model	CUBB01M-HC304-DH
Manufacturer	FOXCONN INTERCONNECT TECHNOLOGY LIMITED
Length of cable	96cm
AE3-5	
Model	L99U2017-CS-H
Manufacturer	Shenzhen Luxshare Precision Industry Co.,Ltd.
Length of cable	96cm

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

### 3.4. EUT set-ups

<b>EUT set-up No.</b>	<b>Combination of EUT and AE</b>	<b>Remarks</b>
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+ AE1-3 + AE2-3 + AE3-3	Charging mode
Set.4	EUT1+ AE1-4 + AE2-1 + AE3-4	Charging mode
Set.5	EUT1+ AE1-5 + AE2-2 + AE3-5	Charging mode
Set.6	EUT1+ AE1-1 + AE3-1	USB mode
Set.7	EUT1+ AE1-2 + AE3-2	USB mode
Set.8	EUT1+ AE1-3 + AE3-3	USB mode
Set.9	EUT1+ AE1-4 + AE3-4	USB mode
Set.10	EUT1+ AE1-5 + AE3-5	USB mode

#### 4. Reference Documents

##### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
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-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 °C, Max. = 30 °C
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 °C, Max. = 30 °C
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	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	2017.01.12	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

$G_{\text{PL}}$ : Path Loss

$P_{\text{Mea}}$ : 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 $\mu$ V/m)
14152.500000	58.1	V	13.3	15.9	74.0
15115.500000	59.1	V	14.1	14.9	74.0
15651.000000	61.5	H	14.5	12.5	74.0
16351.000000	60.5	H	15.6	13.5	74.0
16771.500000	61.7	V	15.7	12.3	74.0
17356.500000	62.0	V	16.2	12.0	74.0

#### Set.1 Charging mode / Average detector

Frequency(MHz)	Result(dBuV/m)	Polarity	$A_{Rpl}$ (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14167.000000	46.4	V	13.3	7.6	54.0
15144.000000	47.8	V	14.3	6.2	54.0
15689.500000	48.7	H	14.5	5.3	54.0
16211.500000	49.3	H	15.1	4.7	54.0
16844.000000	49.6	V	16.1	4.4	54.0
17349.000000	49.5	H	16.1	4.5	54.0

**Set.2 Charging mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14162.000000	58.2	H	13.3	15.8	74.0
15167.000000	59.8	V	14.3	14.2	74.0
15645.500000	60.4	H	14.5	13.6	74.0
16222.000000	60.5	H	15.1	13.5	74.0
16805.500000	61.6	H	15.9	12.4	74.0
17401.000000	61.1	V	16.4	12.9	74.0

**Set.2 Charging mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14548.500000	46.4	V	13.6	7.6	54.0
15182.500000	47.6	V	14.3	6.4	54.0
15768.500000	48.7	V	14.6	5.3	54.0
16212.500000	49.0	H	15.1	5.0	54.0
16843.500000	49.4	H	16.1	4.6	54.0
17437.500000	49.4	H	16.4	4.6	54.0

**Set.3 Charging mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14528.000000	58.1	V	13.6	15.9	74.0
15134.500000	59.1	V	14.2	14.9	74.0
15762.500000	61.0	H	14.6	13.0	74.0
16189.500000	60.6	V	15.1	13.4	74.0
16826.500000	61.4	H	16.0	12.6	74.0
17402.000000	61.0	V	16.4	13.0	74.0

**Set.3 Charging mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14541.500000	46.5	V	13.6	7.5	54.0
15161.500000	47.7	V	14.3	6.3	54.0
15670.500000	48.7	V	14.5	5.3	54.0
16216.500000	49.2	H	15.1	4.8	54.0
16787.000000	49.5	H	15.8	4.5	54.0
17397.500000	49.3	V	16.4	4.7	54.0

**Set.4 Charging mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14248.000000	58.5	V	13.5	15.5	74.0
15132.000000	59.0	V	14.2	15.0	74.0
15732.000000	60.9	V	14.6	13.1	74.0
16188.000000	61.4	V	15.1	12.6	74.0
16822.000000	61.5	H	16.0	12.5	74.0
17297.000000	61.1	H	15.9	12.9	74.0

**Set.4 Charging mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14528.500000	46.5	H	13.6	7.5	54.0
15164.000000	47.7	H	14.3	6.3	54.0
15675.000000	48.8	H	14.5	5.2	54.0
16216.000000	49.1	V	15.1	4.9	54.0
16787.500000	49.6	H	15.8	4.4	54.0
17418.000000	49.5	H	16.5	4.5	54.0

**Set.5 Charging mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14513.500000	58.3	H	13.5	15.7	74.0
15148.000000	59.0	V	14.3	15.0	74.0
15636.000000	60.4	V	14.5	13.6	74.0
16198.500000	60.9	H	15.1	13.1	74.0
16736.500000	61.3	V	15.5	12.7	74.0
17852.500000	61.3	H	16.4	12.7	74.0

**Set.5 Charging mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14140.500000	46.5	V	13.3	7.5	54.0
15179.500000	47.6	H	14.3	6.4	54.0
15684.500000	48.9	H	14.5	5.1	54.0
16221.500000	49.3	V	15.1	4.7	54.0
16732.500000	49.8	H	15.5	4.2	54.0
17409.000000	49.7	V	16.5	4.3	54.0

**Set.6 USB mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dBμV/m)
14033.000000	58.4	V	12.9	15.6	74.0
15134.500000	59.5	H	14.2	14.5	74.0
15619.500000	60.2	V	14.5	13.8	74.0
16344.500000	60.9	V	15.6	13.1	74.0
16654.500000	61.7	V	15.7	12.3	74.0
17375.500000	62.3	H	16.3	11.7	74.0

**Set.6 USB mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dBμV/m)
14142.500000	46.5	V	13.3	7.5	54.0
15182.500000	47.8	V	14.3	6.2	54.0
15681.000000	48.8	V	14.5	5.2	54.0
16214.500000	49.4	H	15.1	4.6	54.0
16826.500000	49.6	H	16.0	4.4	54.0
17351.000000	49.6	H	16.2	4.4	54.0

**Set.7 USB mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dBμV/m)
14098.000000	58.1	H	13.2	15.9	74.0
14673.000000	59.8	V	13.9	14.2	74.0
15685.000000	61.2	V	14.5	12.8	74.0
16333.500000	61.1	H	15.5	12.9	74.0
16916.000000	61.1	H	16.4	12.9	74.0
17442.000000	61.5	V	16.4	12.5	74.0

**Set.7 USB mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dBμV/m)
14552.500000	46.6	H	13.7	7.4	54.0
15160.000000	48.1	H	14.3	5.9	54.0
15688.000000	48.8	H	14.5	5.2	54.0
16186.000000	49.2	H	15.1	4.8	54.0
16842.000000	49.8	V	16.1	4.2	54.0
17415.500000	49.6	H	16.5	4.4	54.0

**Set.8 USB mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14104.500000	58.4	V	13.2	15.6	74.0
15163.500000	59.4	H	14.3	14.6	74.0
15664.000000	61.0	V	14.5	13.0	74.0
16282.000000	60.8	H	15.3	13.2	74.0
16839.500000	61.8	H	16.0	12.2	74.0
17318.000000	61.3	H	16.0	12.7	74.0

**Set.8 USB mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14551.500000	46.4	H	13.7	7.6	54.0
15166.500000	47.7	H	14.3	6.3	54.0
15757.500000	48.7	V	14.6	5.3	54.0
16199.500000	49.2	V	15.1	4.8	54.0
16819.000000	49.5	V	15.9	4.5	54.0
17418.500000	49.4	H	16.5	4.6	54.0

**Set.9 USB mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14488.500000	58.3	V	13.5	15.7	74.0
15152.500000	59.7	V	14.3	14.3	74.0
15665.000000	60.2	H	14.5	13.8	74.0
16194.000000	61.3	V	15.1	12.7	74.0
16837.000000	61.2	V	16.0	12.8	74.0
17407.000000	61.1	H	16.4	12.9	74.0

**Set.9 USB mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14538.000000	46.5	H	13.6	7.5	54.0
15148.000000	47.6	V	14.3	6.4	54.0
15753.500000	48.6	V	14.6	5.4	54.0
16209.500000	48.9	H	15.1	5.1	54.0
16823.000000	49.4	H	16.0	4.6	54.0
17402.500000	49.4	V	16.4	4.6	54.0

**Set.10 USB mode / Peak detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14033.000000	58.2	V	12.9	15.8	74.0
15151.000000	59.5	H	14.3	14.5	74.0
15690.000000	61.6	V	14.5	12.4	74.0
16239.500000	61.0	H	15.1	13.0	74.0
16849.000000	61.6	V	16.1	12.4	74.0
17468.500000	62.0	H	16.4	12.0	74.0

**Set.10 USB mode / Average detector**

Frequency(MHz)	Result(dBuV/m)	Polarity	A <sub>Rpl</sub> (dB)	Margin(dB)	Limit (dB $\mu$ V/m)
14538.000000	46.5	V	13.6	7.5	54.0
15151.500000	47.6	H	14.3	6.4	54.0
15682.500000	48.7	H	14.5	5.3	54.0
16220.000000	49.1	H	15.1	4.9	54.0
16832.000000	49.4	V	16.0	4.6	54.0
17418.000000	49.4	H	16.5	4.6	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

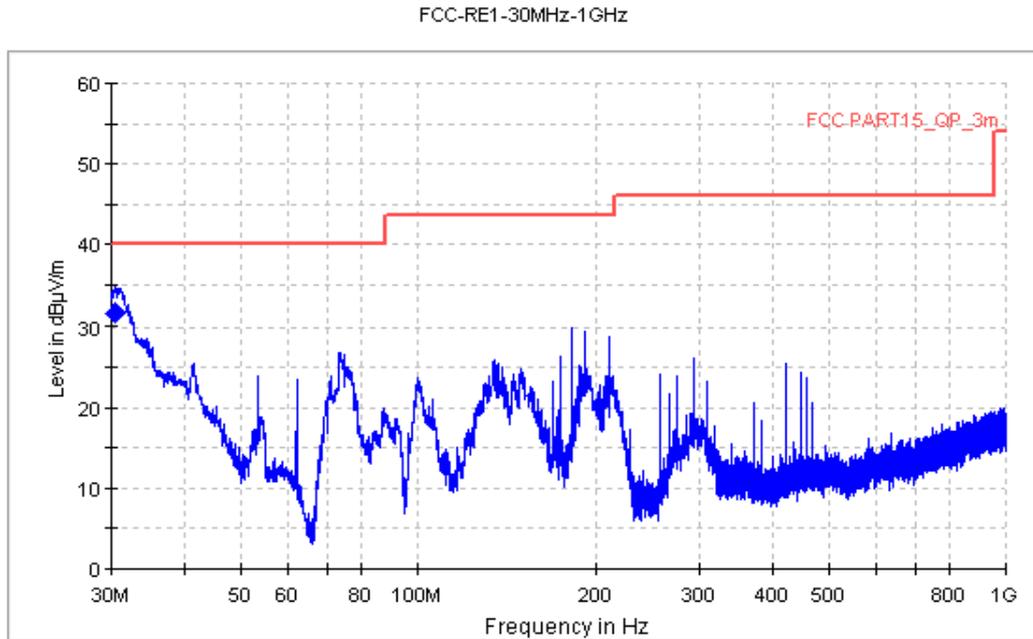


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
30.428750	31.6	120.000	V	158.0	-36.6	8.4

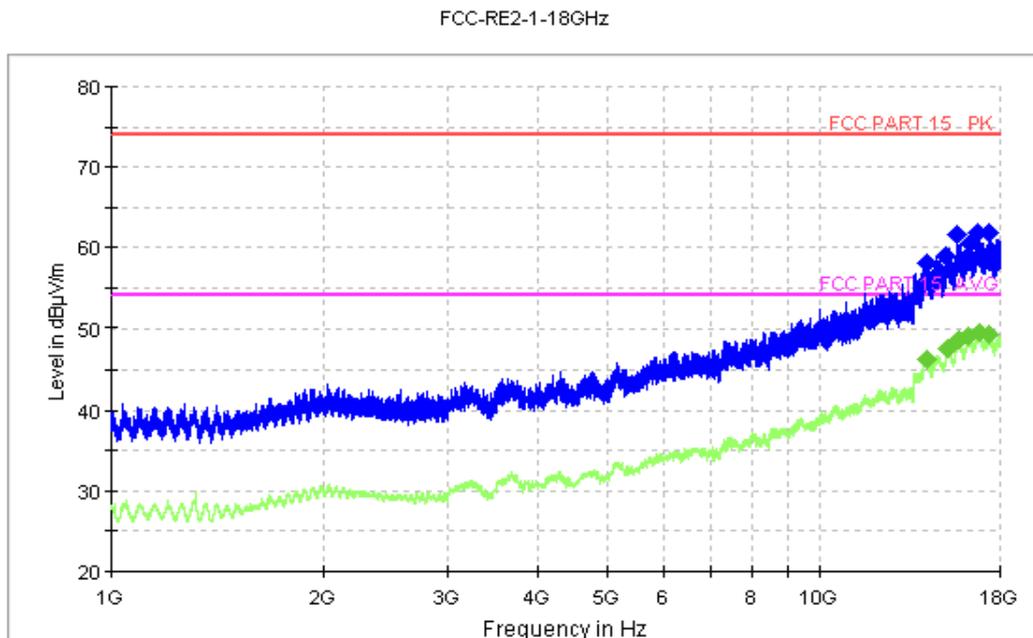


Figure A.2 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 2

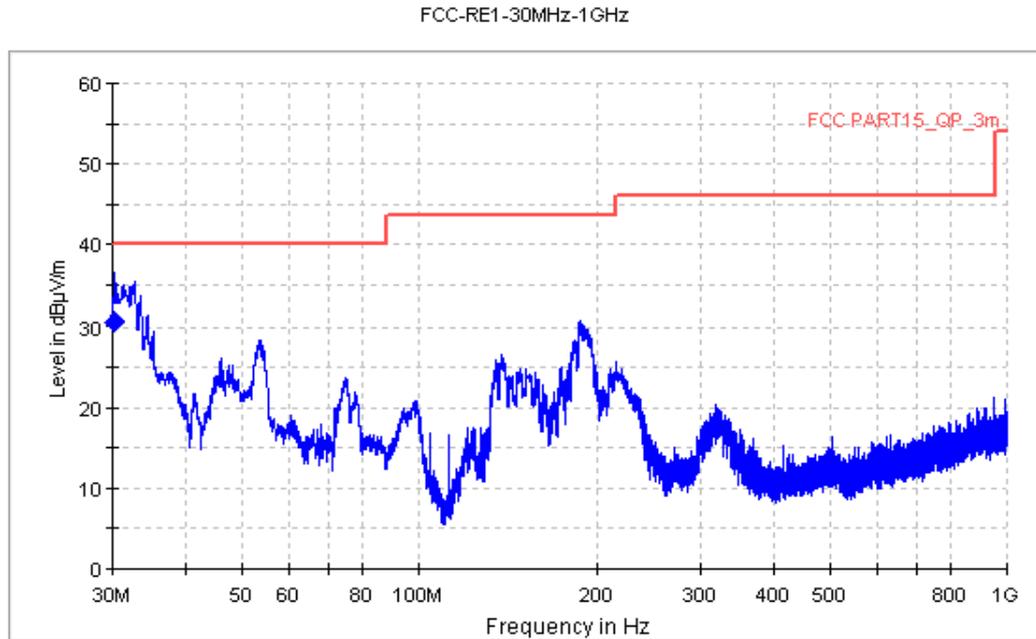


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
30.245000	30.6	120.000	V	135.0	-36.6	9.4

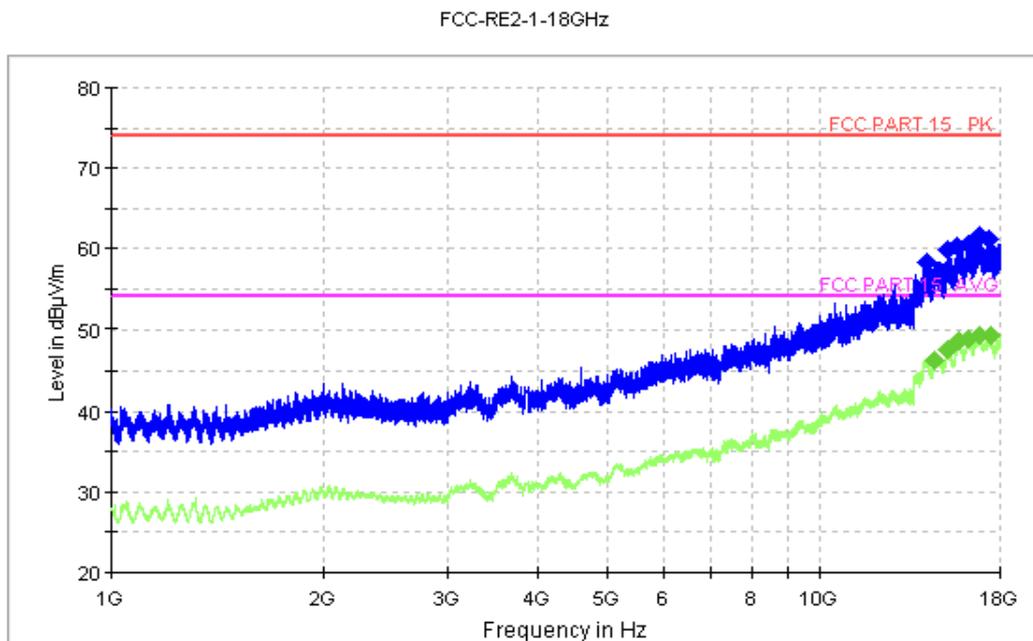


Figure A.4 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 3

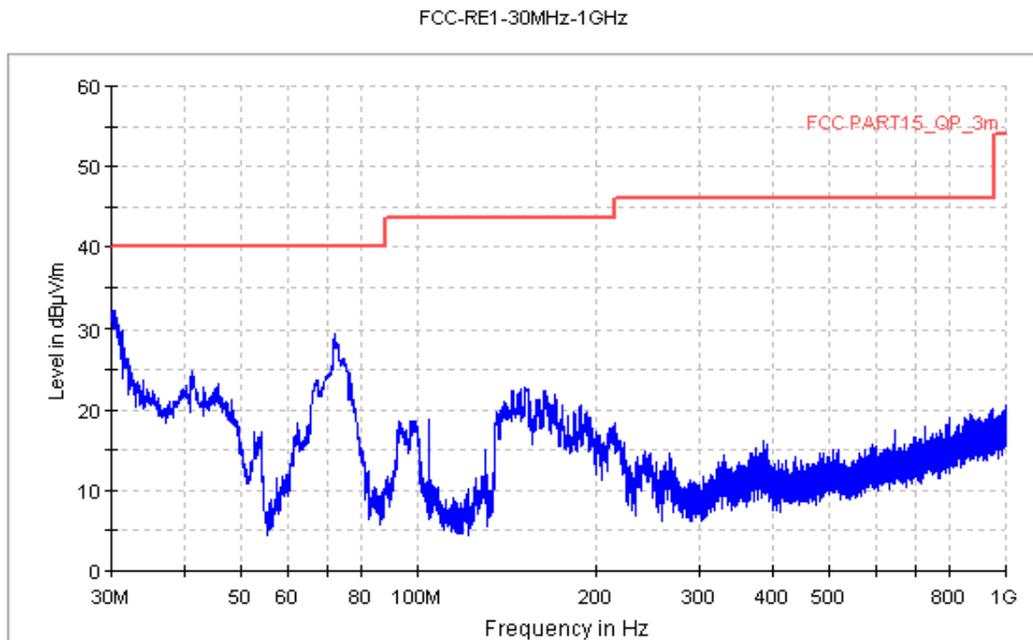


Figure A.5 Radiated Emission from 30MHz to 1GHz

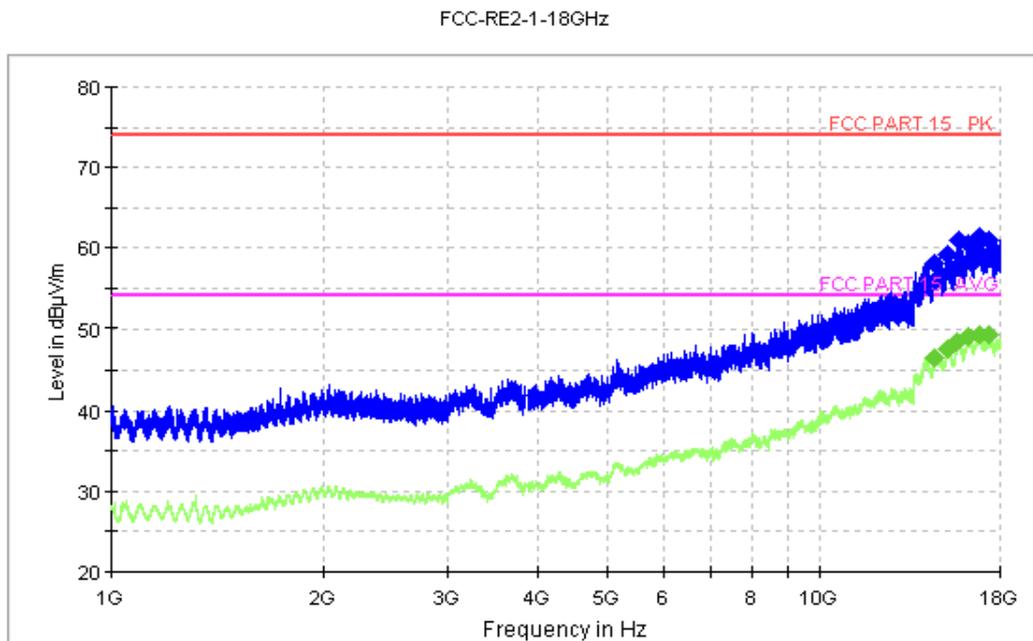


Figure A.6 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 4

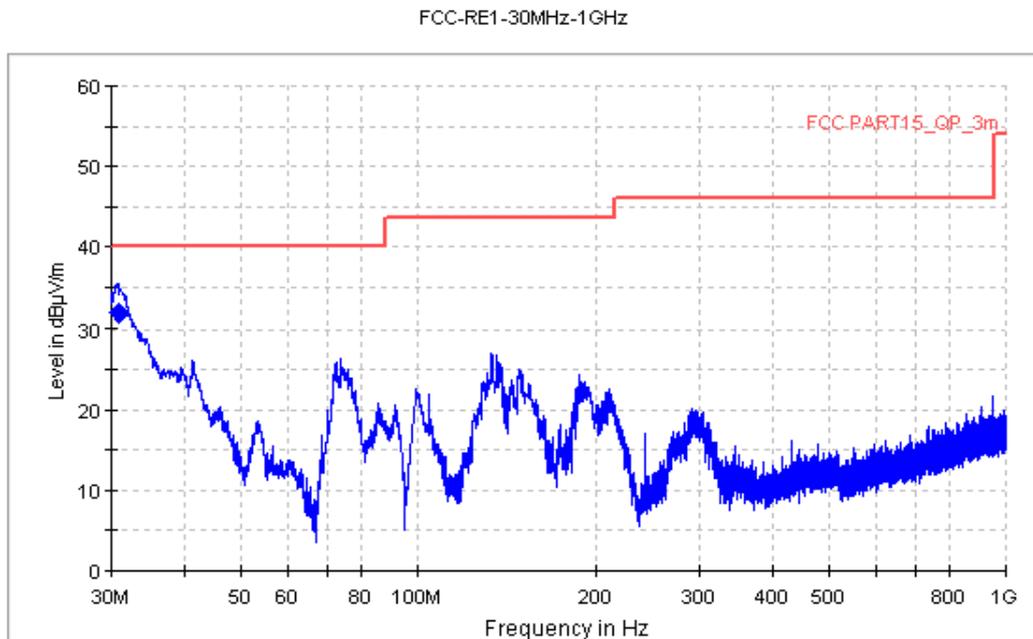


Figure A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
30.857500	31.9	120.000	V	135.0	-36.8	8.1

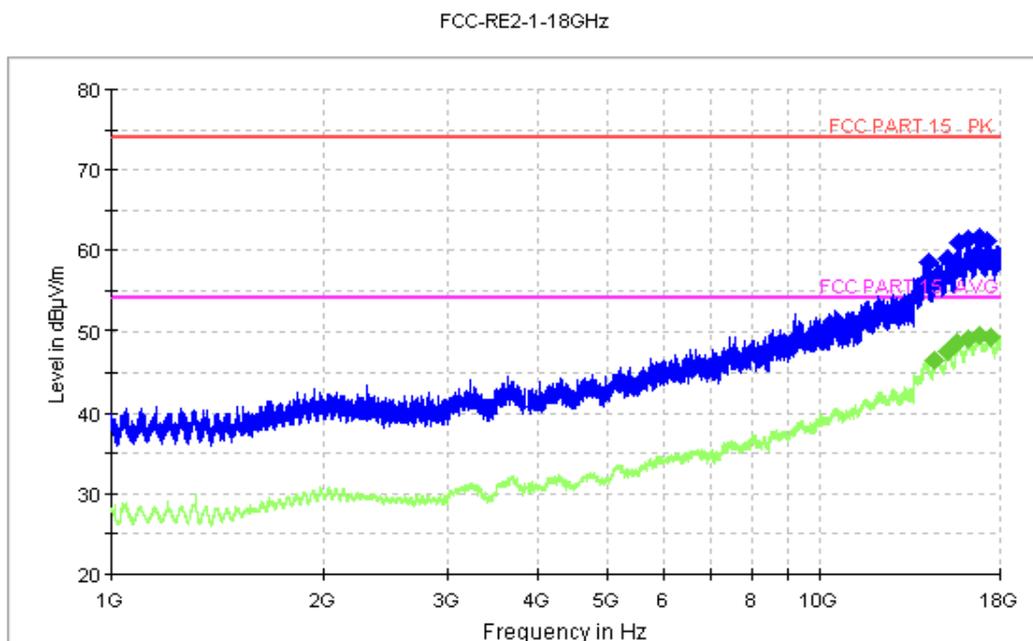


Figure A.8 Radiated Emission from 1GHz to 18GHz

Charging mode: Set 5

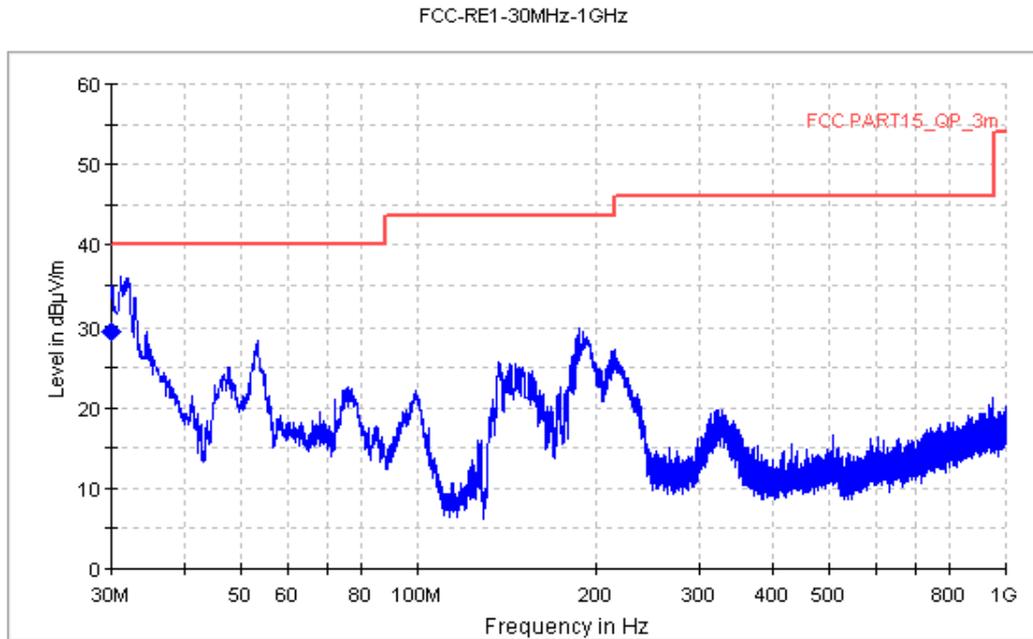


Figure A.9 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
30.061250	29.4	120.000	V	288.0	-36.5	10.6

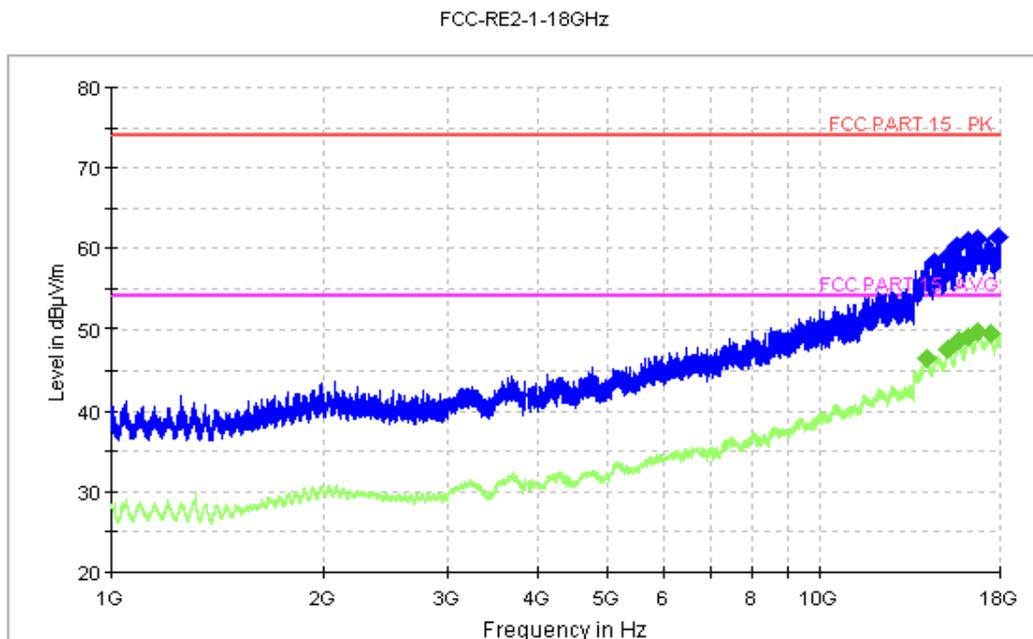


Figure A.10 Radiated Emission from 1GHz to 18GHz

USB mode: Set 6

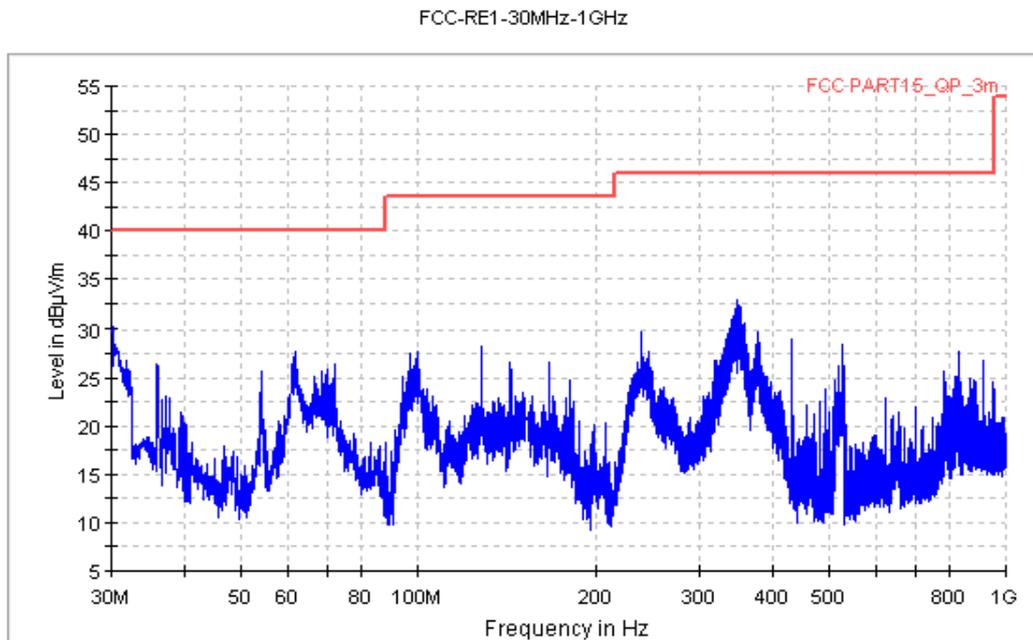


Figure A.11 Radiated Emission from 30MHz to 1GHz

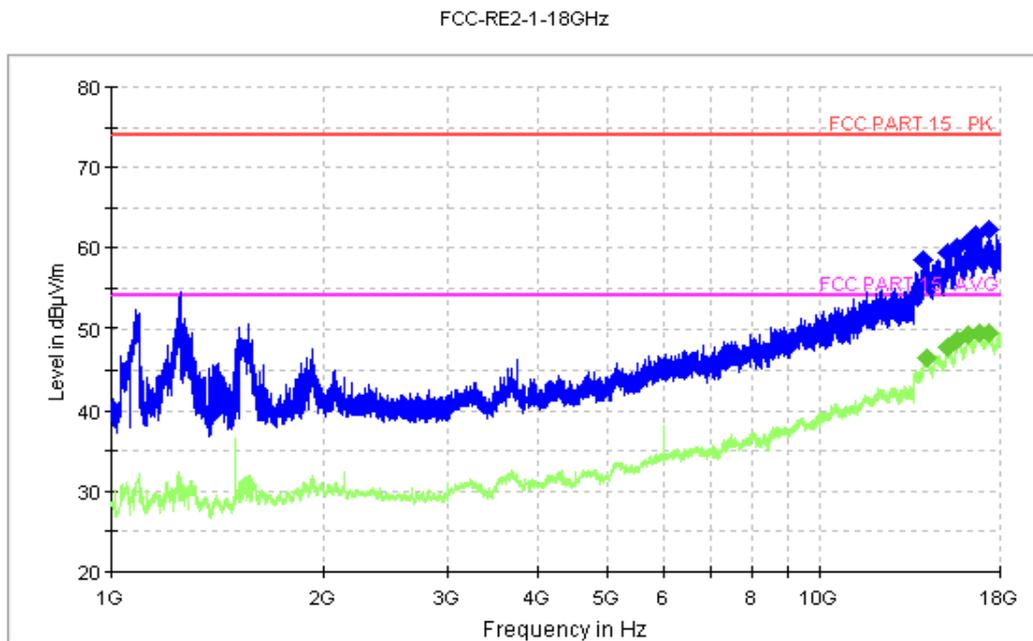


Figure A.12 Radiated Emission from 1GHz to 18GHz

USB mode: Set 7

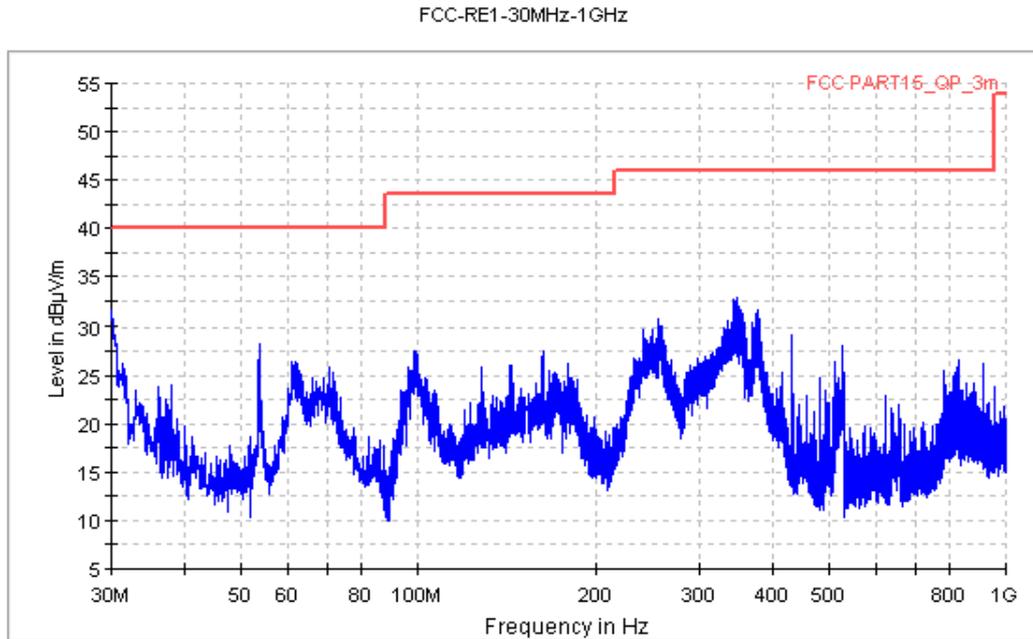


Figure A.13 Radiated Emission from 30MHz to 1GHz

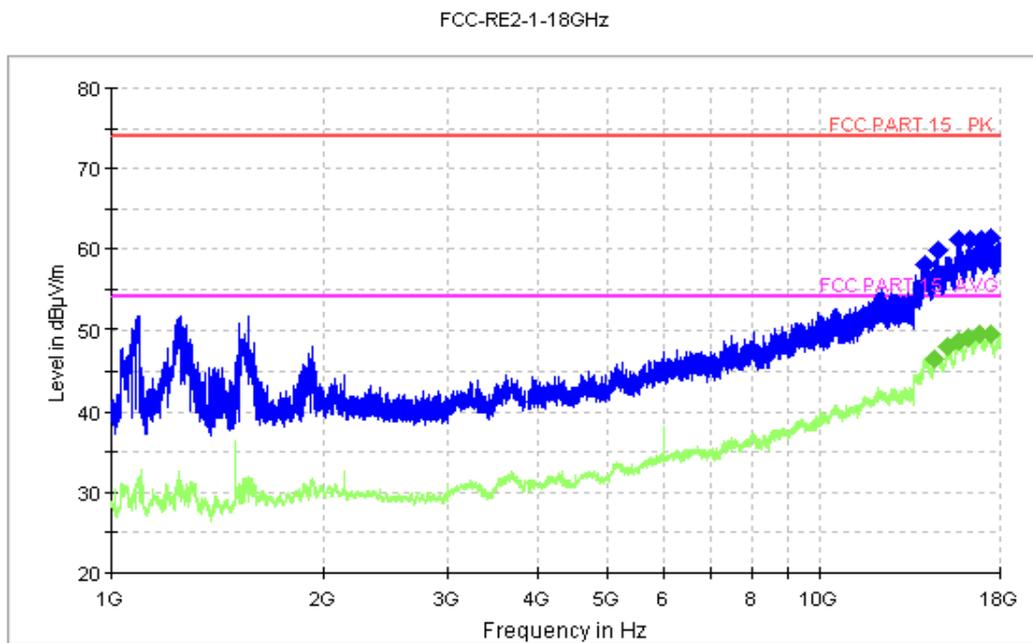


Figure A.14 Radiated Emission from 1GHz to 18GHz

USB mode: Set 8

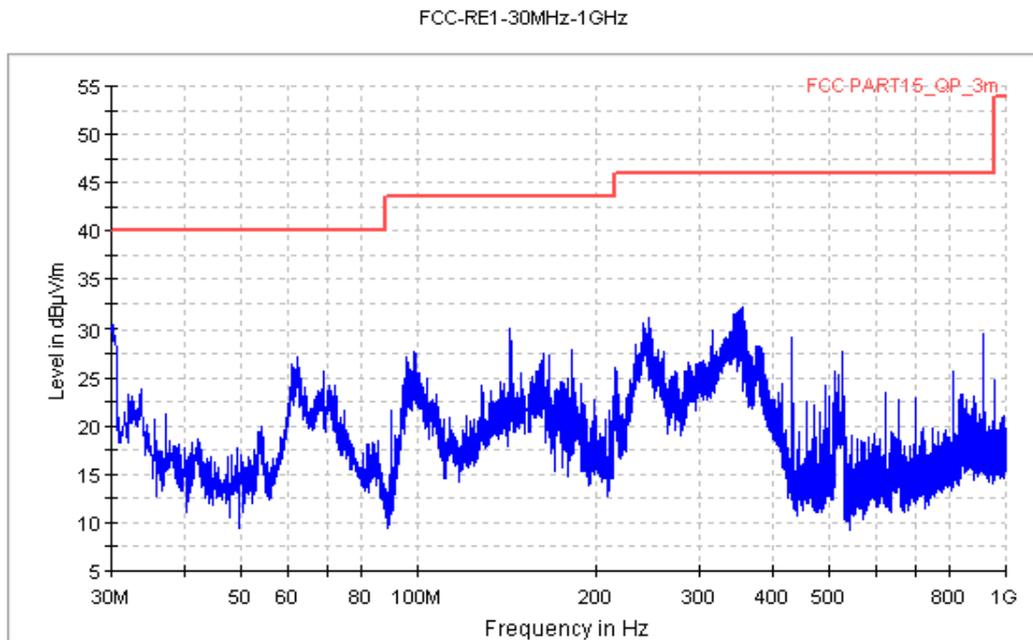


Figure A.15 Radiated Emission from 30MHz to 1GHz

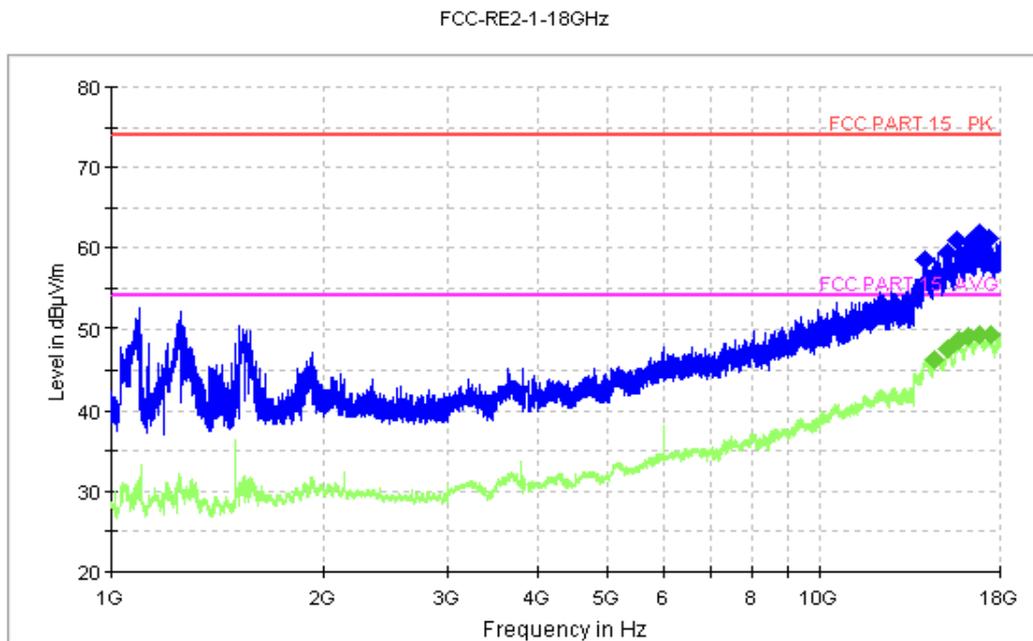


Figure A.16 Radiated Emission from 1GHz to 18GHz

USB mode: Set 9

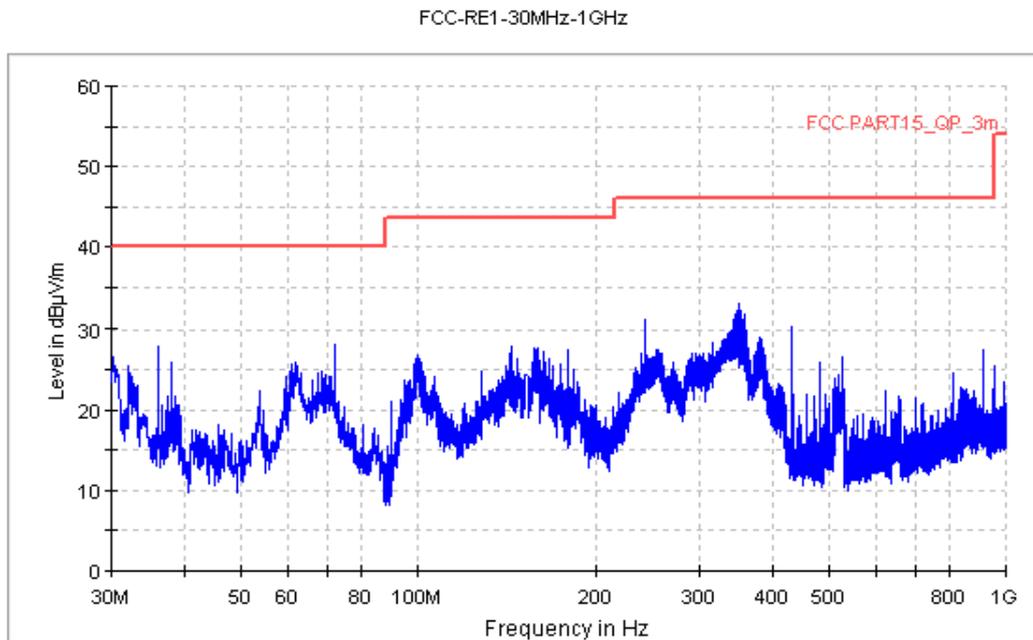


Figure A.17 Radiated Emission from 30MHz to 1GHz

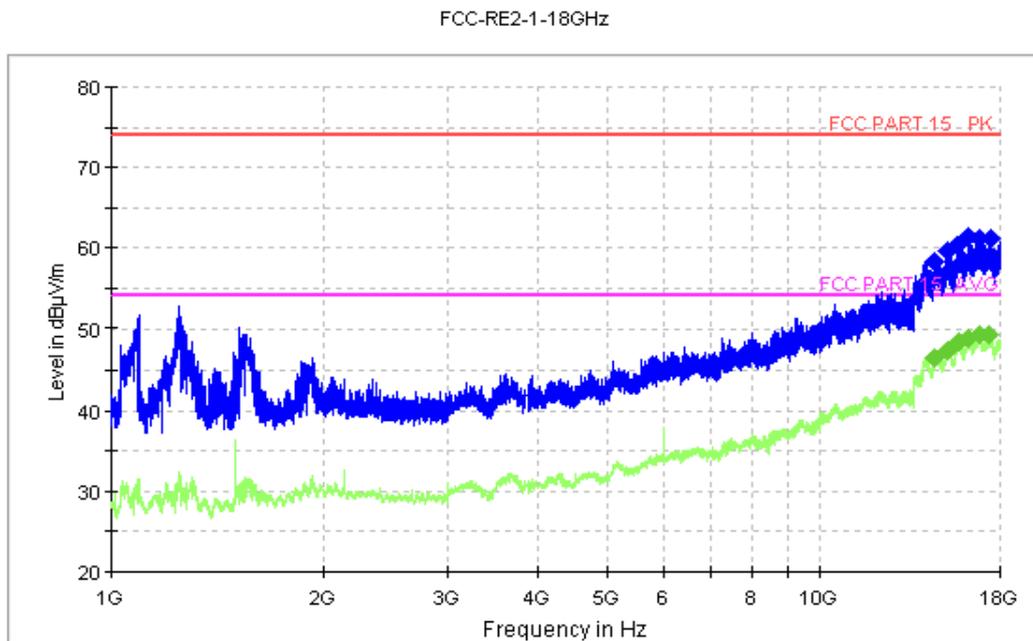


Figure A.18 Radiated Emission from 1GHz to 18GHz

USB mode: Set 10

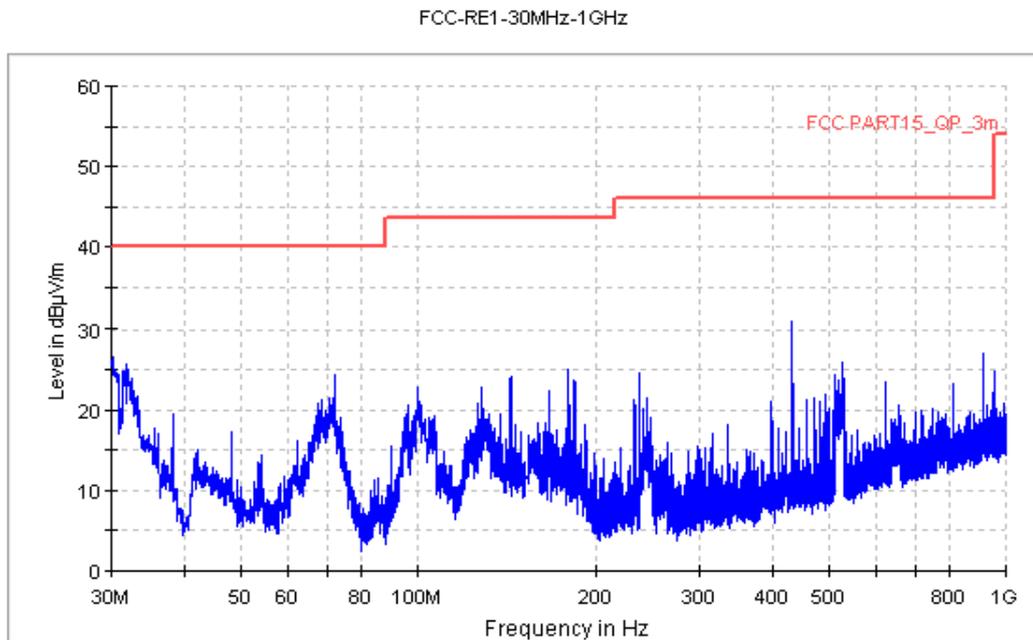


Figure A.19 Radiated Emission from 30MHz to 1GHz

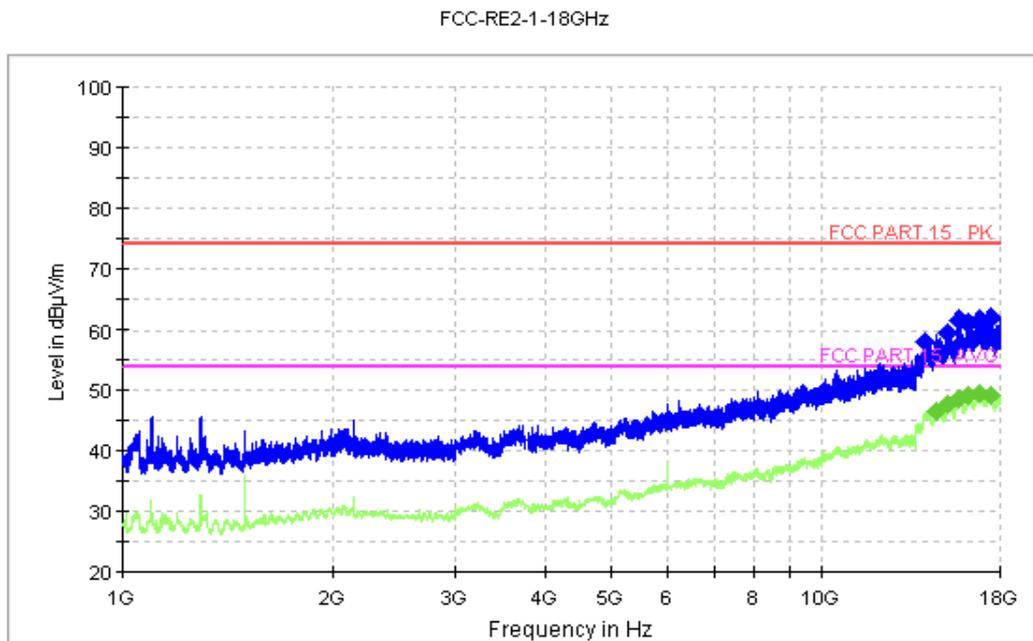


Figure A.20 Radiated Emission from 1GHz to 18GHz

## 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 $\mu$ 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

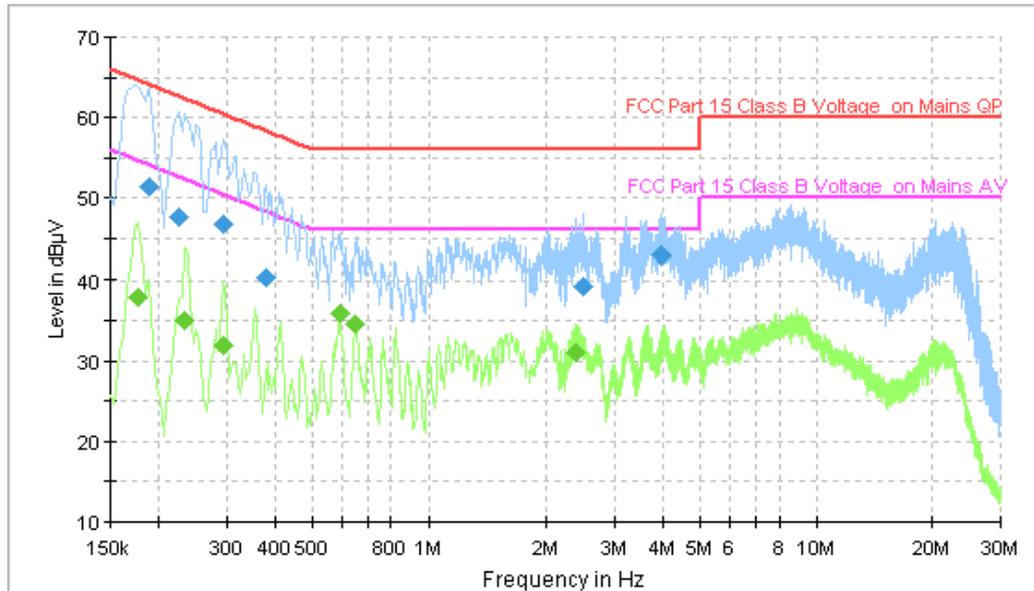
Voltage (V)	Frequency (Hz)
120	60

RBW	Sweep Time(s)
9kHz	1

**CE Measurement uncertainty:** 2.7 dB (k=2)

**A.2.5 Measurement Results**  
**Charging mode:Set.1**

ESH2-Z5 Scan-FCC



**Figure A.21 Conducted Emission**

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	51.4	GND	L1	10.0	12.6	64.0
0.226000	47.6	GND	L1	10.0	15.0	62.6
0.294000	46.7	GND	L1	10.0	13.7	60.4
0.378000	40.4	GND	L1	10.0	18.0	58.3
2.498000	39.3	GND	L1	10.2	16.7	56.0
3.970000	42.9	GND	L1	10.2	13.1	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.178000	37.9	GND	L1	10.0	16.6	54.6
0.234000	35.1	GND	L1	10.0	17.2	52.3
0.294000	32.0	GND	L1	10.0	18.4	50.4
0.590000	35.9	GND	N	10.1	10.1	46.0
0.646000	34.5	GND	N	10.0	11.5	46.0
2.386000	31.0	GND	L1	10.1	15.0	46.0

Charging mode:Set.2

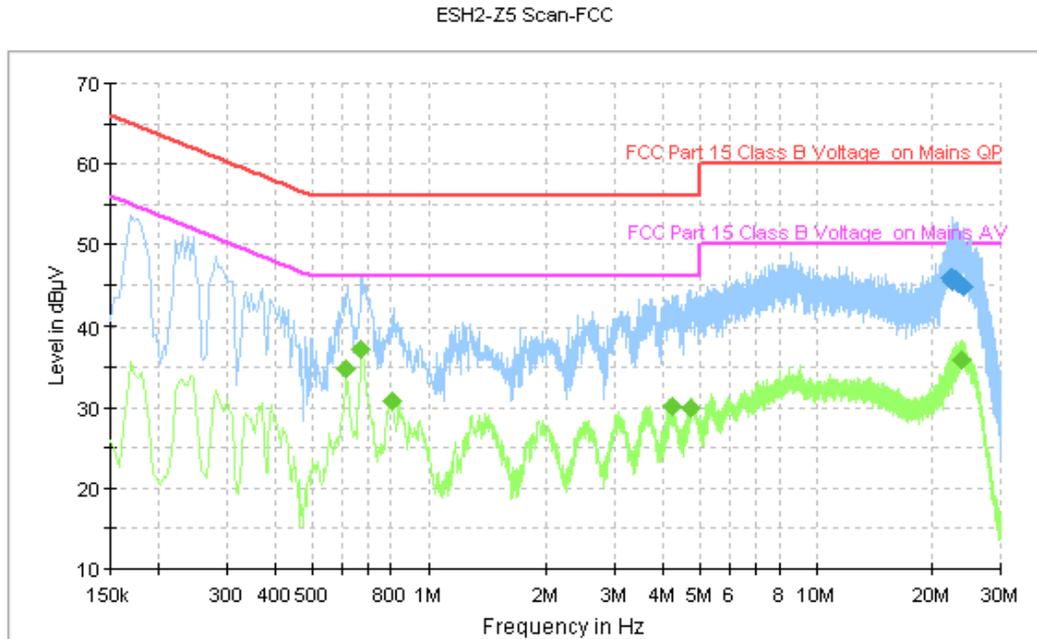


Figure A.22 Conducted Emission

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
22.262000	45.9	GND	L1	10.6	14.1	60.0
22.470000	45.5	GND	L1	10.6	14.5	60.0
22.598000	45.8	GND	L1	10.6	14.2	60.0
22.946000	45.6	GND	L1	10.6	14.4	60.0
23.350000	45.2	GND	L1	10.5	14.8	60.0
24.102000	44.7	GND	L1	10.6	15.3	60.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.614000	34.7	GND	N	10.0	11.3	46.0
0.670000	37.2	GND	N	10.0	8.8	46.0
0.802000	30.8	GND	N	10.1	15.2	46.0
4.222000	30.2	GND	L1	10.2	15.8	46.0
4.734000	29.9	GND	L1	10.2	16.1	46.0
23.734000	35.9	GND	L1	10.5	14.1	50.0

Charging mode:Set.3

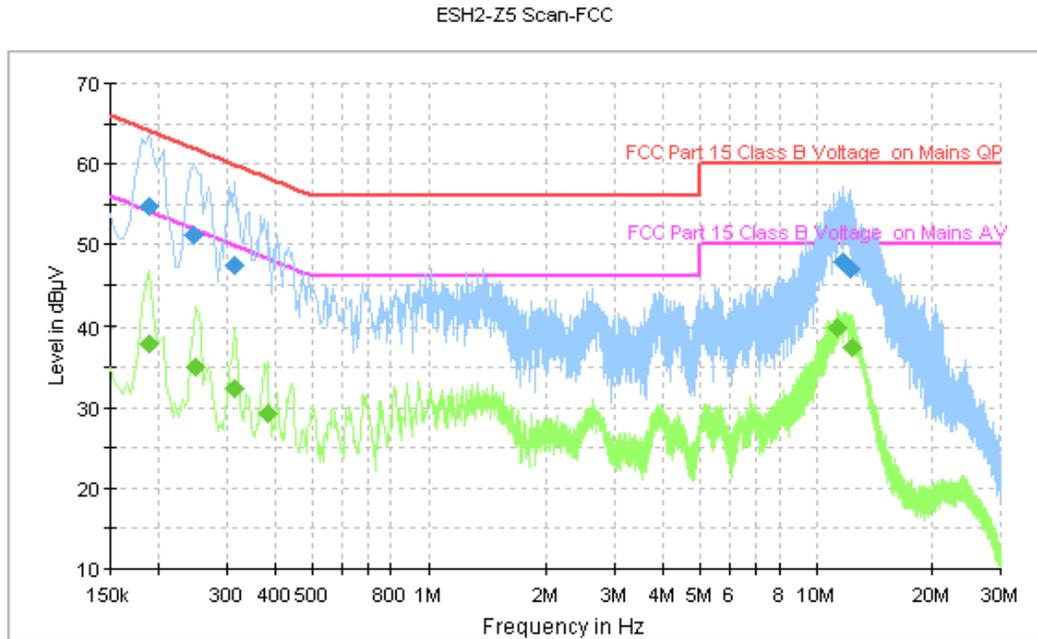


Figure A.23 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	54.7	GND	L1	10.0	9.4	64.0
0.246000	51.2	GND	L1	10.0	10.7	61.9
0.314000	47.4	GND	L1	10.0	12.5	59.9
11.718000	47.8	GND	L1	10.3	12.2	60.0
11.778000	47.9	GND	L1	10.3	12.1	60.0
12.190000	46.9	GND	L1	10.4	13.1	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	37.9	GND	L1	10.0	16.1	54.0
0.250000	35.0	GND	L1	10.0	16.7	51.8
0.314000	32.5	GND	L1	10.0	17.4	49.9
0.382000	29.2	GND	L1	10.0	19.0	48.2
11.358000	40.0	GND	L1	10.3	10.0	50.0
12.438000	37.5	GND	L1	10.4	12.5	50.0

Charging mode:Set.4

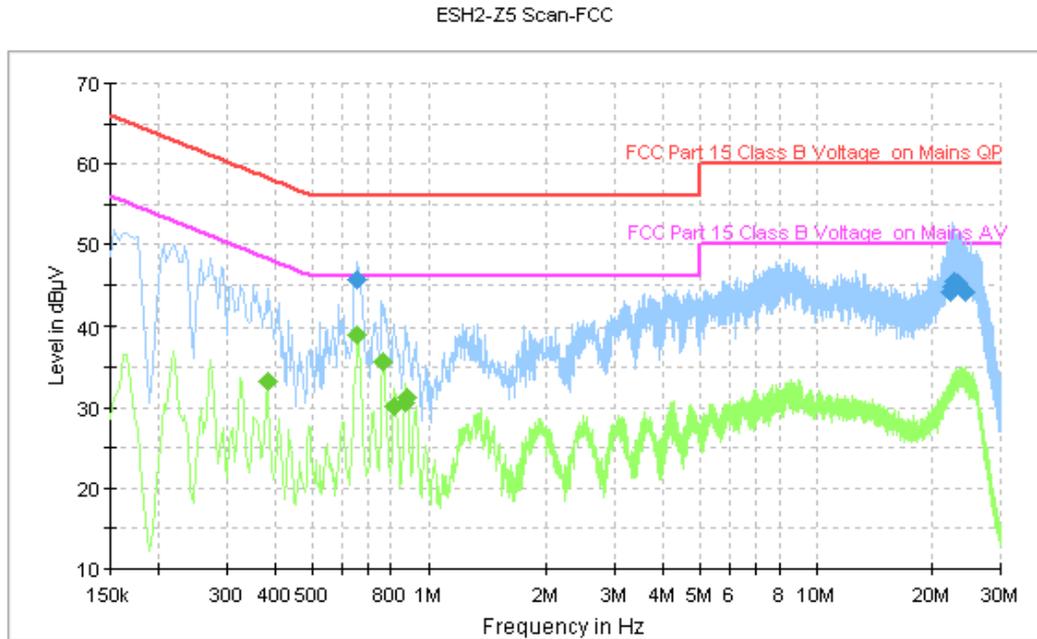


Figure A.24 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.654000	45.6	GND	L1	10.0	10.4	56.0
22.246000	44.1	GND	N	10.7	15.9	60.0
22.482000	44.7	GND	N	10.7	15.3	60.0
22.706000	45.3	GND	N	10.6	14.7	60.0
23.254000	45.2	GND	N	10.6	14.8	60.0
24.426000	44.1	GND	N	10.6	15.9	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.382000	33.3	GND	L1	10.0	14.9	48.2
0.654000	38.9	GND	L1	10.0	7.1	46.0
0.766000	35.7	GND	L1	10.1	10.3	46.0
0.818000	30.2	GND	L1	10.0	15.8	46.0
0.874000	30.5	GND	L1	10.1	15.5	46.0
0.878000	31.2	GND	L1	10.1	14.8	46.0

Charging mode:Set.5

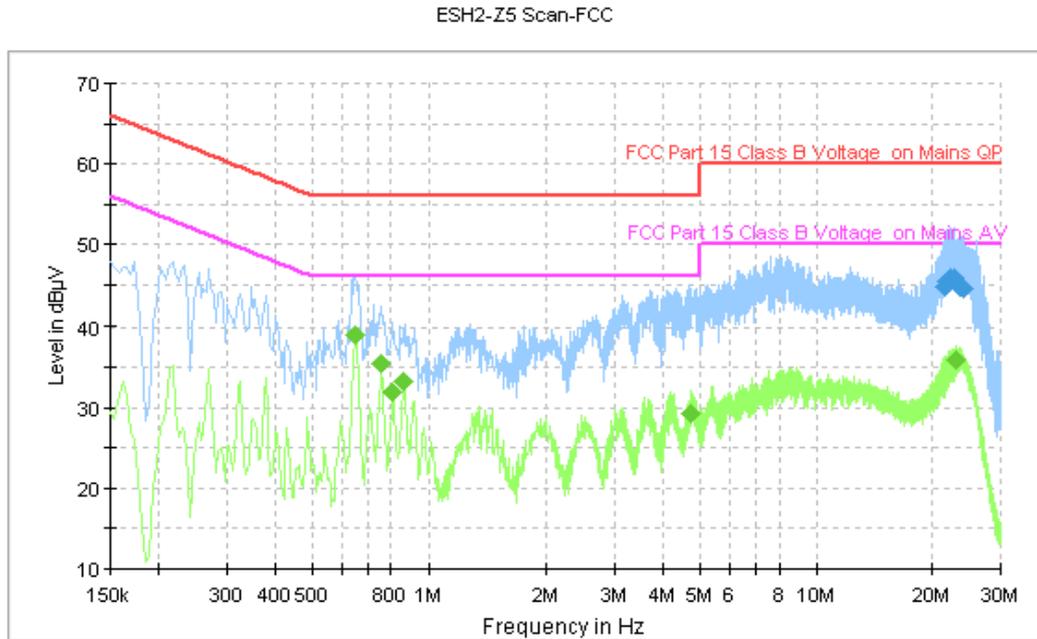


Figure A.25 Conducted Emission

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
21.626000	44.8	GND	L1	10.6	15.2	60.0
21.834000	45.4	GND	L1	10.6	14.6	60.0
22.358000	45.9	GND	L1	10.6	14.1	60.0
22.642000	45.9	GND	L1	10.6	14.1	60.0
23.514000	44.9	GND	L1	10.5	15.1	60.0
24.166000	44.5	GND	L1	10.6	15.5	60.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.646000	39.0	GND	N	10.0	7.0	46.0
0.754000	35.4	GND	N	10.1	10.6	46.0
0.810000	32.0	GND	N	10.1	14.0	46.0
0.862000	33.2	GND	N	10.1	12.8	46.0
4.722000	29.2	GND	L1	10.2	16.8	46.0
23.022000	35.9	GND	L1	10.6	14.1	50.0

USB mode:Set.6

ESH2-Z5 Scan-FCC

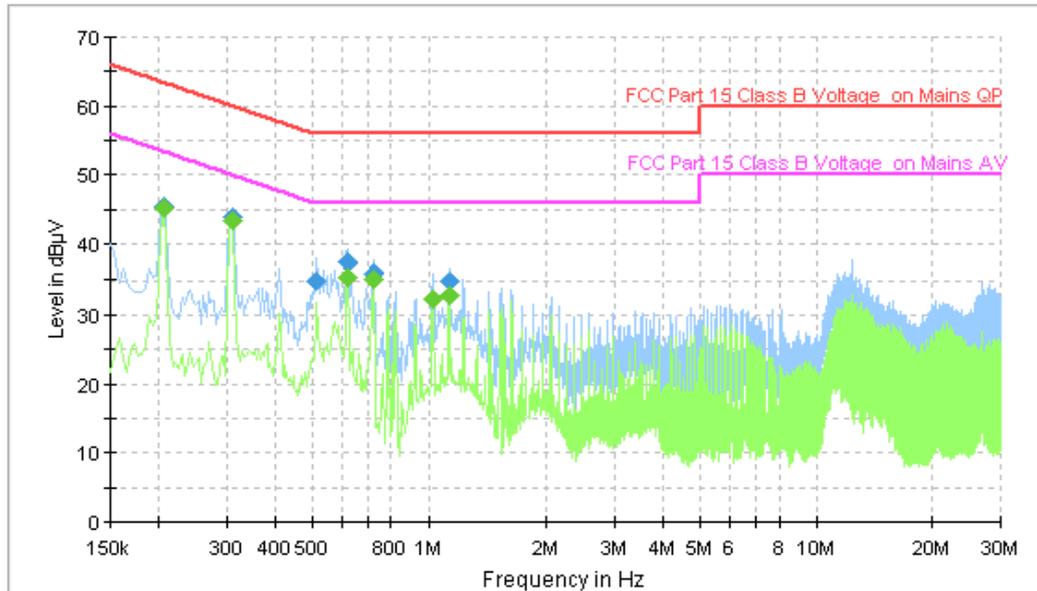


Figure A.26 Conducted Emission

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.5	GND	N	10.1	17.8	63.4
0.310000	44.0	GND	N	10.1	16.0	60.0
0.514000	35.0	GND	N	10.1	21.0	56.0
0.618000	37.5	GND	N	10.0	18.5	56.0
0.718000	35.8	GND	N	10.0	20.2	56.0
1.130000	34.8	GND	N	10.1	21.2	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.3	GND	N	10.1	8.1	53.4
0.310000	43.5	GND	N	10.1	6.5	50.0
0.618000	35.4	GND	N	10.0	10.6	46.0
0.718000	35.2	GND	N	10.0	10.8	46.0
1.026000	32.2	GND	L1	10.0	13.8	46.0
1.130000	32.9	GND	N	10.1	13.1	46.0

USB mode:Set.7

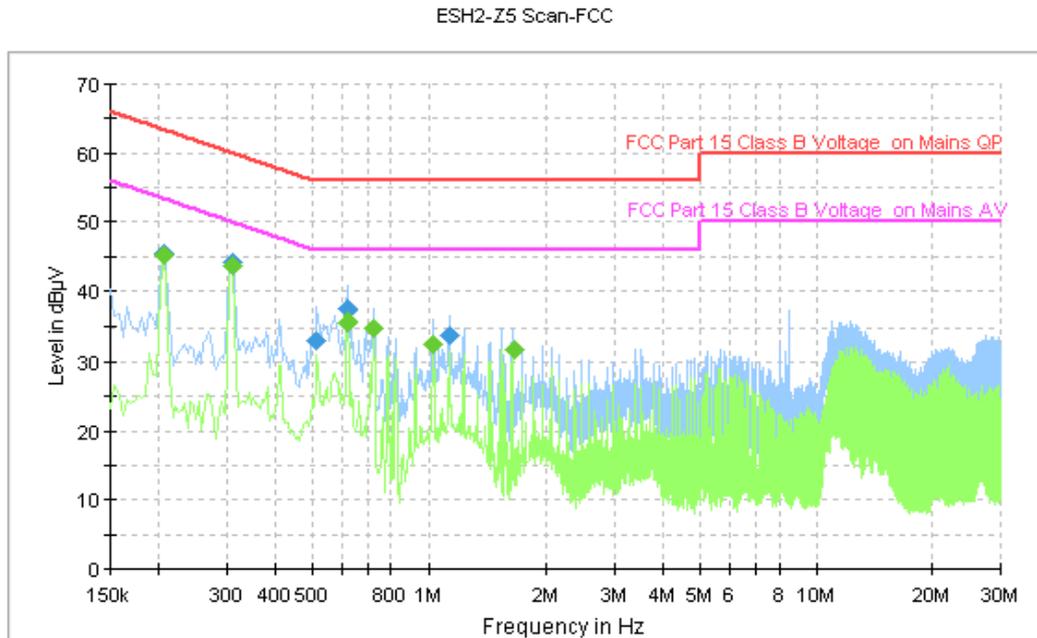


Figure A.27 Conducted Emission

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.6	GND	N	10.1	17.8	63.4
0.310000	44.1	GND	N	10.1	15.9	60.0
0.514000	33.0	GND	L1	10.0	23.0	56.0
0.618000	37.5	GND	N	10.0	18.5	56.0
0.718000	34.9	GND	N	10.0	21.1	56.0
1.130000	33.9	GND	N	10.1	22.1	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.3	GND	N	10.1	8.1	53.4
0.310000	43.6	GND	N	10.1	6.3	50.0
0.618000	35.6	GND	N	10.0	10.4	46.0
0.722000	34.9	GND	N	10.0	11.1	46.0
1.030000	32.7	GND	L1	10.0	13.3	46.0
1.646000	31.9	GND	N	10.1	14.1	46.0

USB mode:Set.8

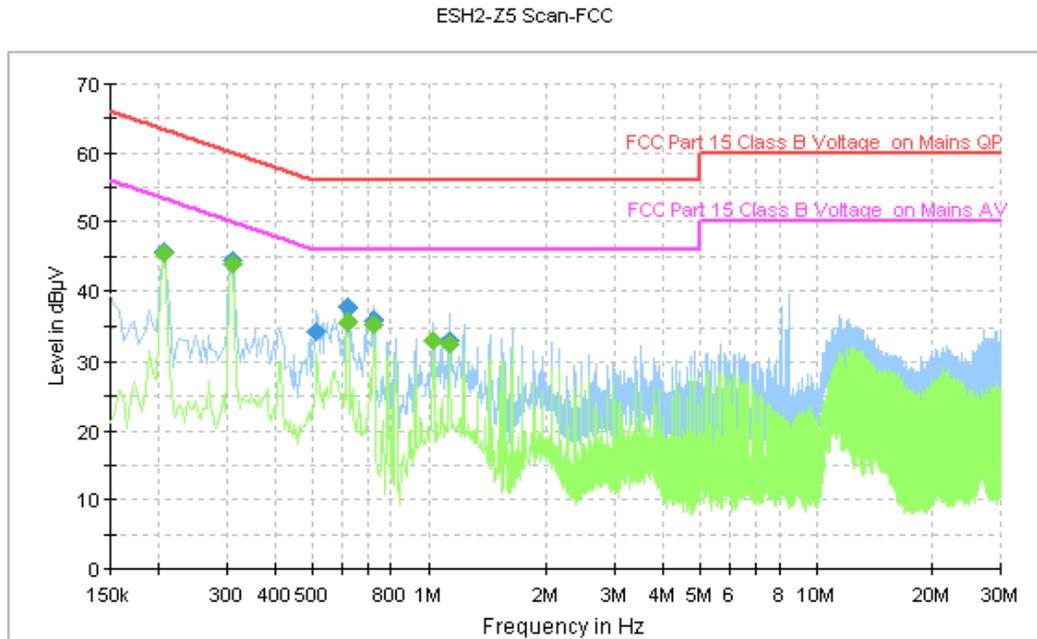


Figure A.28 Conducted Emission

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.6	GND	N	10.1	17.8	63.4
0.310000	44.3	GND	N	10.1	15.6	60.0
0.514000	34.5	GND	N	10.1	21.5	56.0
0.618000	37.6	GND	N	10.0	18.4	56.0
0.722000	35.9	GND	N	10.0	20.1	56.0
1.130000	33.0	GND	N	10.1	23.0	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.3	GND	N	10.1	8.0	53.4
0.310000	43.9	GND	N	10.1	6.1	50.0
0.618000	35.6	GND	N	10.0	10.4	46.0
0.722000	35.5	GND	N	10.0	10.5	46.0
1.030000	33.0	GND	L1	10.0	13.0	46.0
1.134000	32.4	GND	N	10.1	13.6	46.0

USB mode:Set.9

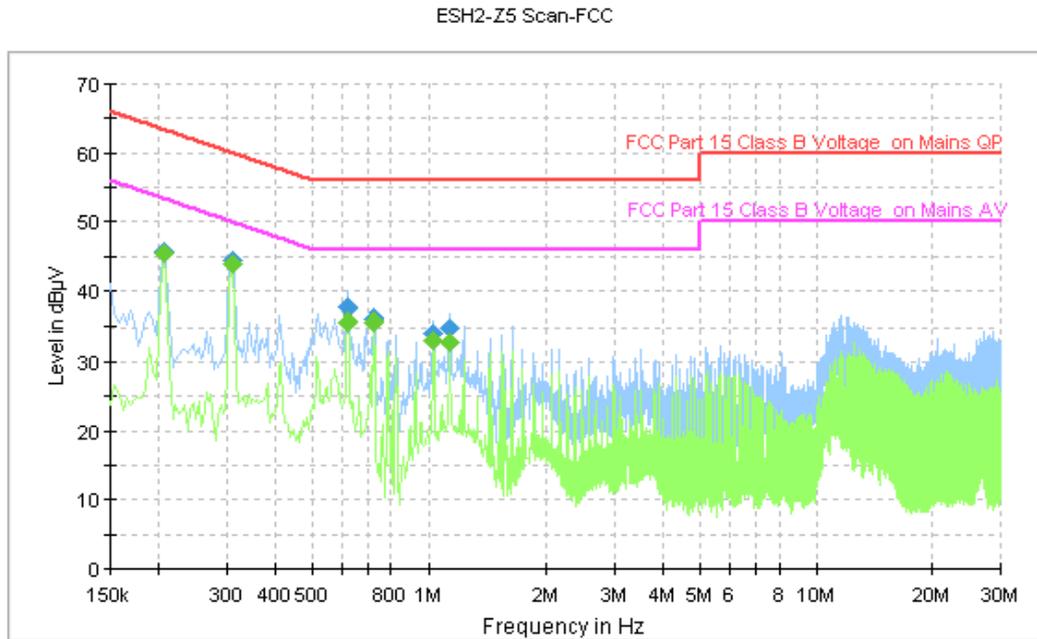


Figure A.29 Conducted Emission

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.6	GND	N	10.1	17.7	63.4
0.310000	44.5	GND	N	10.1	15.5	60.0
0.618000	37.6	GND	N	10.0	18.4	56.0
0.722000	36.2	GND	N	10.0	19.8	56.0
1.030000	34.2	GND	L1	10.0	21.8	56.0
1.134000	34.8	GND	N	10.1	21.2	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.4	GND	N	10.1	8.0	53.4
0.310000	44.0	GND	N	10.1	6.0	50.0
0.618000	35.7	GND	N	10.0	10.3	46.0
0.722000	35.7	GND	N	10.0	10.3	46.0
1.030000	33.0	GND	L1	10.0	13.0	46.0
1.134000	32.8	GND	N	10.1	13.2	46.0

USB mode:Set.10

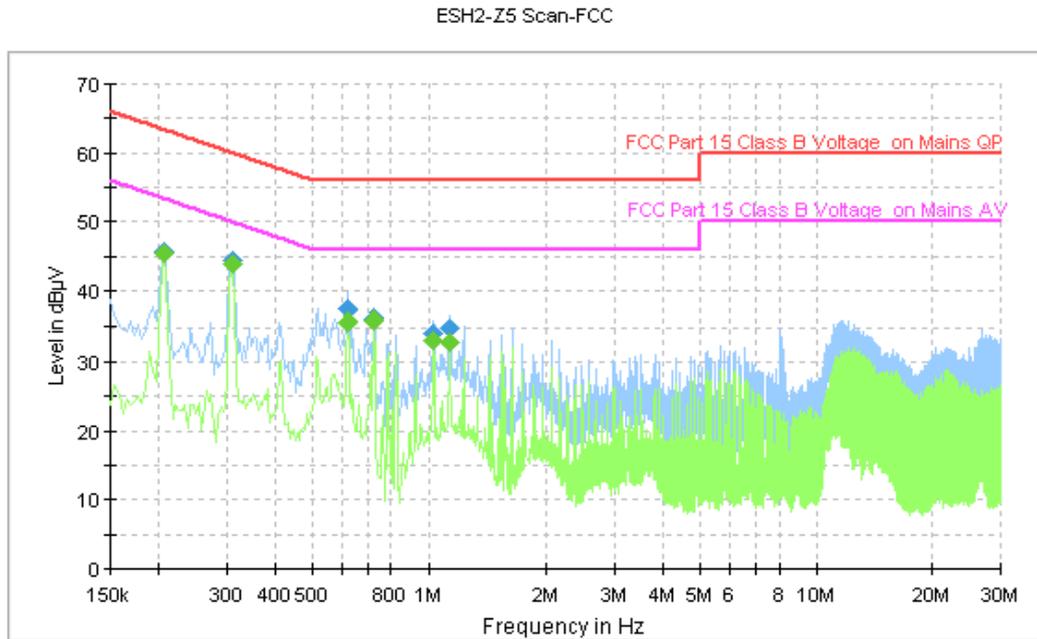


Figure A.30 Conducted Emission

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.6	GND	N	10.1	17.8	63.4
0.310000	44.5	GND	N	10.1	15.5	60.0
0.618000	37.6	GND	N	10.0	18.4	56.0
0.722000	36.3	GND	N	10.0	19.7	56.0
1.030000	34.1	GND	L1	10.0	21.9	56.0
1.134000	34.8	GND	N	10.1	21.2	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	45.3	GND	N	10.1	8.0	53.4
0.310000	44.0	GND	N	10.1	6.0	50.0
0.618000	35.7	GND	N	10.0	10.3	46.0
0.722000	35.8	GND	N	10.0	10.2	46.0
1.030000	33.1	GND	L1	10.0	12.9	46.0
1.134000	32.9	GND	N	10.1	13.1	46.0

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