



TEST REPORT

No. I17Z61499-EMC01

for

Huawei Technologies Co.,Ltd.

Fixed Wireless Terminal

Model Name: F617-51

FCC ID: QISF617-51

with

Hardware Version: WL1F617I

Software Version: V100R001

Issued Date: 2017-09-20



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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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

Tel: +86(0)10-623WL1F617I633-2512, Fax: +86(0)10-62304633-2504

Email: ctl_terminals@caict.ac.cn, website: www.caict.ac.cn



REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z61499-EMC01	Rev.0	1 st edition	2017-9-20

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 USED DURING THE TEST	6
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST.....	6
3.4. EUT SET-UPS	7
4. REFERENCE DOCUMENTS.....	8
4.1. REFERENCE DOCUMENTS FOR TESTING.....	8
5. LABORATORY ENVIRONMENT.....	9
6. SUMMARY OF TEST RESULTS.....	10
7. TEST EQUIPMENTS UTILIZED.....	11
ANNEX A: MEASUREMENT RESULTS	12
ANNEX B: ACCREDITATION CERTIFICATE	26

1. Test Laboratory

1.1. Testing Location

CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.2. Testing Environment

Normal Temperature: 15-35°C

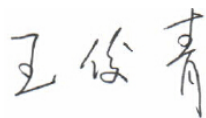
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-09-08

Testing End Date: 2017-09-19

1.4. Signature



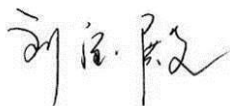
Wang Junqing

(Prepared this test report)



Zhang Ying

(Reviewed this test report)



Liu Baodian

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Huawei Technologies Co.,Ltd.
Address /Post: Administration Building, Headquarters of Huawei Technologies Co.,
Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Contact Person: Caihaiyong
Contact Email: caihaiyong2@huawei.com
Telephone: 15920224867
Fax: /

2.2. Manufacturer Information

Company Name: Huawei Technologies Co.,Ltd.
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Pudong Area Shanghai, P.R. China. 201203
Contact Person: /
Contact Email: /
Telephone: /
Fax: /

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

3.1. About EUT

Description	Fixed Wireless Terminal
Model Name	F617-51
Marketing Name	/
FCC ID	QISF617-51
Extreme vol. Limits	4.75VDC to 5.25VDC (nominal: 5.0VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	861138030010470	WL1F617I	V100R001

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	Battery	/	inbuilt
AE2	Charger	/	1761499CH001
AE3	Charger	/	1761499CH002
AE4	USB Cable	/	1761499DC001, for charging
AE5	USB Cable	/	USB Cable

AE1

Model	HGB-2A10×3
Manufacturer	Huawei Technologies Co.,Ltd.
Capacitance	1000 mAh
Nominal voltage	3.6V

AE2

Model	HW-050100U2W
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Length of cable	/

AE3

Model	HW-050100U2W
Manufacturer	Shenzhen Huntkey Electric Co., Ltd.
Length of cable	/

AE4

Model	/
Manufacturer	/
Length of cable	170cm



AE5

Model /

Manufacturer /

Length of cable 120cm

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

Note: The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1+ AE2+ AE4	Charger
Set.2	EUT1+ AE1+ AE3+ AE4	Charger
Set.3	EUT1+ AE1+ AE5	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 - Unintentional Radiators	2016
ANSI C63.4	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

Note: The test methods have no deviation with standards.

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
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. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz—1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

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

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

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESU26	100235	R&S	2018-04-01	1 year
2	Test Receiver	ESCI 7	100344	R&S	2018-03-15	1 year
4	Universal Radio Communication Tester	CMW500	155415	R&S	2018-02-15	1 year
5	LISN	ENV216	101200	R&S	2018-08-03	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2017-12-16	3 years
7	EMI Antenna	3115	6914	ETS-Lindgren	2017-12-15	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
11	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01	R&S
Conducted Emission	EMC32 V8.52.0	R&S

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

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 EUT and charging mode of EUT) at distances of 3 meters is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode

The EUT is operating in the USB mode and charging mode. During the test EUT 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 DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to EUT, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

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

Note: the above limit is for 3 meters test distance. 10 meters' limit should be got by converting.

A.1.4 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/1MHz	15	Peak, Average

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.

Measurement uncertainty (worst case): $U = 4.3 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17811.000	41.1	-23.0	41.0	23.209	54.0	12.9	H
17798.250	41.1	-23.2	41.0	23.267	54.0	12.9	V
17813.250	41.0	-23.0	40.9	23.148	54.0	13.0	V
17807.250	41.0	-23.0	41.0	23.113	54.0	13.0	V
17806.500	41.0	-23.0	41.0	23.125	54.0	13.0	H
17802.000	41.0	-23.1	41.0	23.131	54.0	13.0	V

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17811.750	52.8	-23.0	41.0	34.91	74.0	21.2	H
17802.000	52.3	-23.1	41.0	34.48	74.0	21.7	H
17814.750	52.3	-23.1	40.9	34.40	74.0	21.7	V
17801.250	52.2	-23.1	41.0	34.36	74.0	21.8	V
17795.250	52.2	-23.2	41.0	34.44	74.0	21.8	V
17810.250	52.1	-23.0	41.0	34.11	74.0	21.9	H

Measurement results for Set.2:
Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17808.750	41.0	-23.0	41.0	23.011	54.0	13.0	V
17796.000	40.9	-23.2	41.0	23.177	54.0	13.1	V
17799.000	40.8	-23.2	41.0	23.037	54.0	13.2	H
17814.000	40.8	-23.1	40.9	22.911	54.0	13.2	V
17810.250	40.8	-23.0	41.0	22.851	54.0	13.2	V
17813.250	40.8	-23.0	40.9	22.880	54.0	13.2	H

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17811.750	53.1	-23.0	41.0	35.16	74.0	20.9	H
17799.000	52.9	-23.2	41.0	35.13	74.0	21.1	H
17796.750	52.9	-23.2	41.0	35.16	74.0	21.1	H
17807.250	52.6	-23.0	41.0	34.65	74.0	21.4	H
17801.250	52.5	-23.1	41.0	34.67	74.0	21.5	H
17808.000	52.4	-23.0	41.0	34.50	74.0	21.6	H

Measurement results for Set.3:
Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17804.250	41.0	-23.1	41.0	23.091	54.0	13.0	H
17802.000	40.9	-23.1	41.0	23.096	54.0	13.1	V
17813.250	40.9	-23.0	40.9	22.996	54.0	13.1	H
17800.500	40.9	-23.1	41.0	23.071	54.0	13.1	V
17809.500	40.8	-23.0	41.0	22.873	54.0	13.2	H
17799.000	40.8	-23.2	41.0	23.026	54.0	13.2	V

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17802.000	53.0	-23.1	41.0	35.20	74.0	21.0	V
17838.000	52.6	-23.4	40.9	35.02	74.0	21.4	H
17810.250	52.5	-23.0	41.0	34.58	74.0	21.5	V
17815.500	52.5	-23.1	40.9	34.63	74.0	21.5	V
17792.250	52.4	-23.3	41.0	34.75	74.0	21.6	V
17808.000	52.2	-23.0	41.0	34.31	74.0	21.8	H

Charging Mode, Set.1

15B RE 30MHz-1GHz

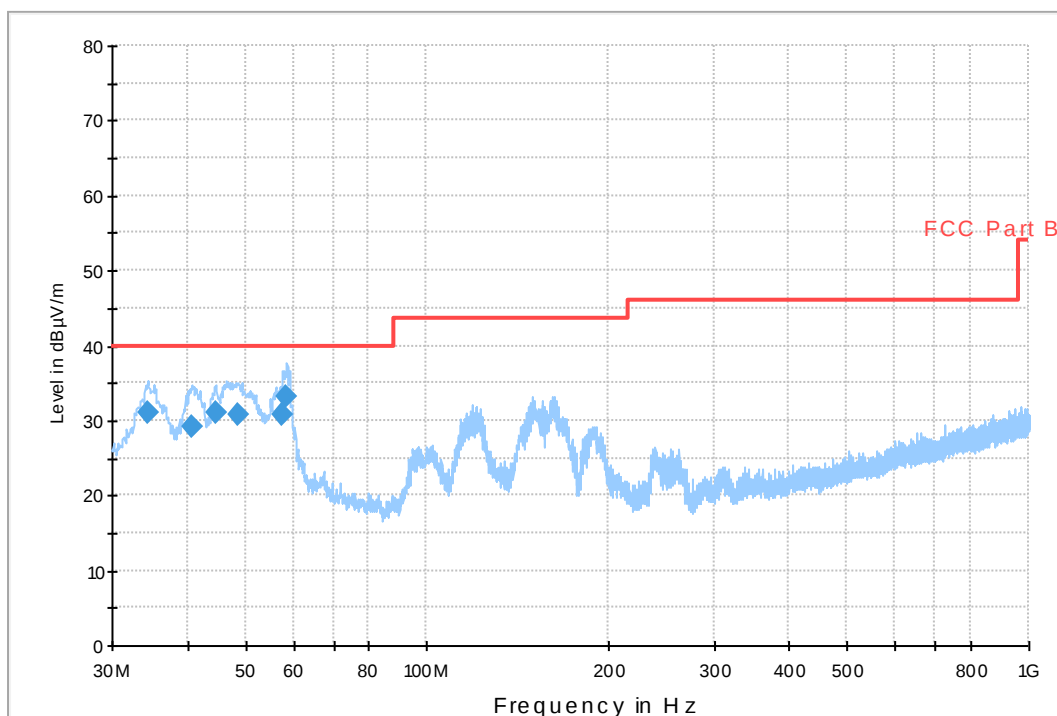


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
34.462000	31.0	100.0	V	69.0	-20.3	9.0	40.0
40.864000	29.2	109.0	V	62.0	-18.9	10.8	40.0
44.550000	31.1	100.0	V	90.0	-17.8	8.9	40.0
48.624000	30.6	121.0	V	39.0	-18.1	9.4	40.0
57.548000	30.7	100.0	V	249.0	-17.8	9.3	40.0
58.615000	33.2	100.0	V	281.0	-18.0	6.8	40.0

15B RE - 1GHz-3GHz

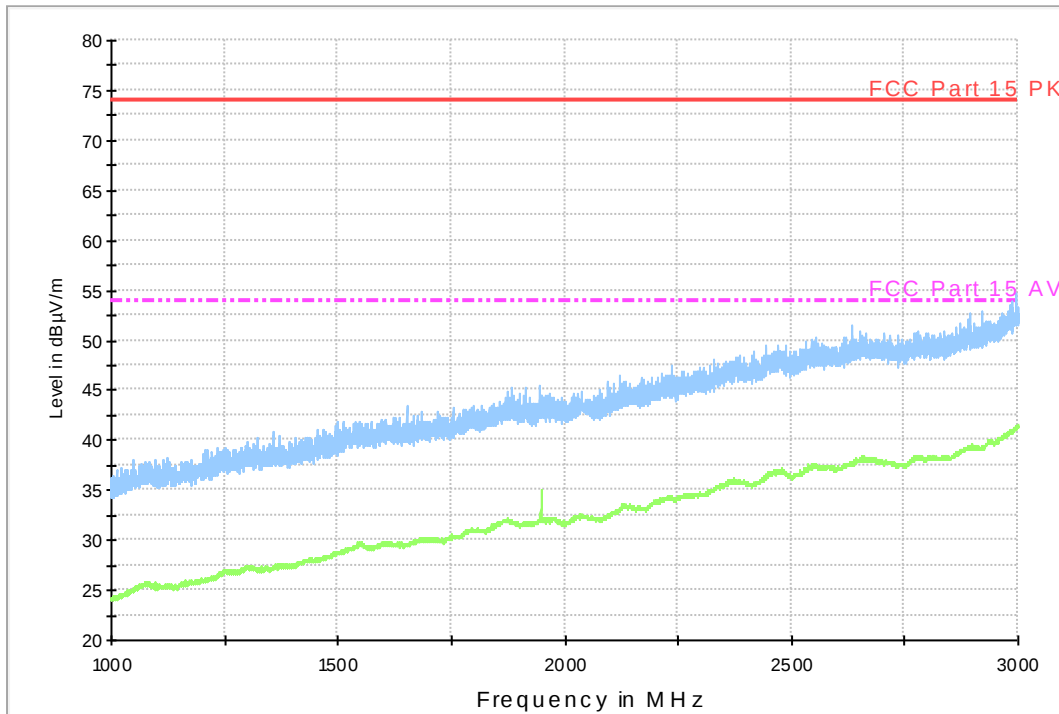


Fig A.2 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

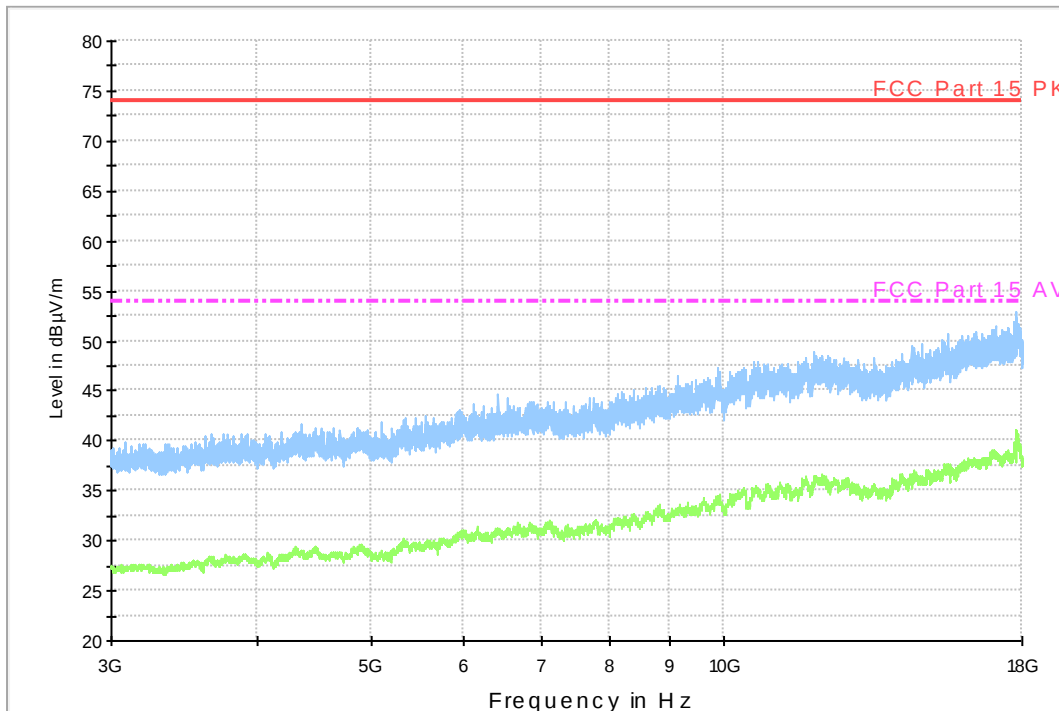


Fig A.3 Radiated Emission from 3GHz to 18GHz

Charging Mode, Set.2

15B RE 30MHz-1GHz

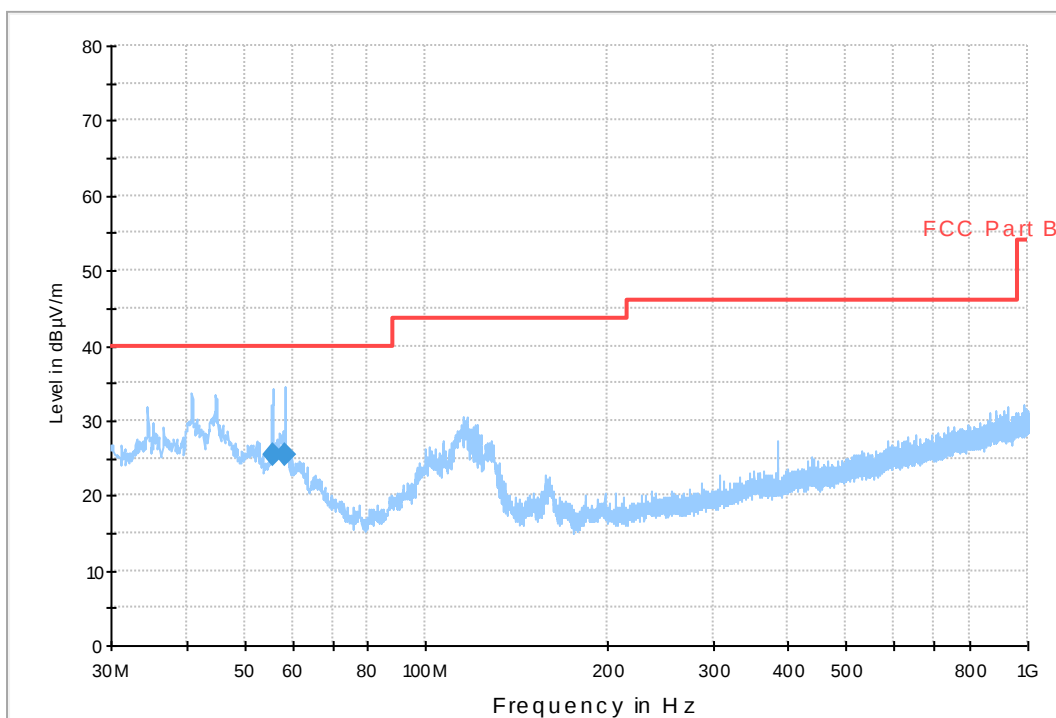


Fig A.4 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
55.705000	25.5	100.0	V	239.0	-18.1	14.5	40.0
58.421000	25.4	100.0	V	291.0	-17.9	14.6	40.0

15B RE - 1GHz-3GHz

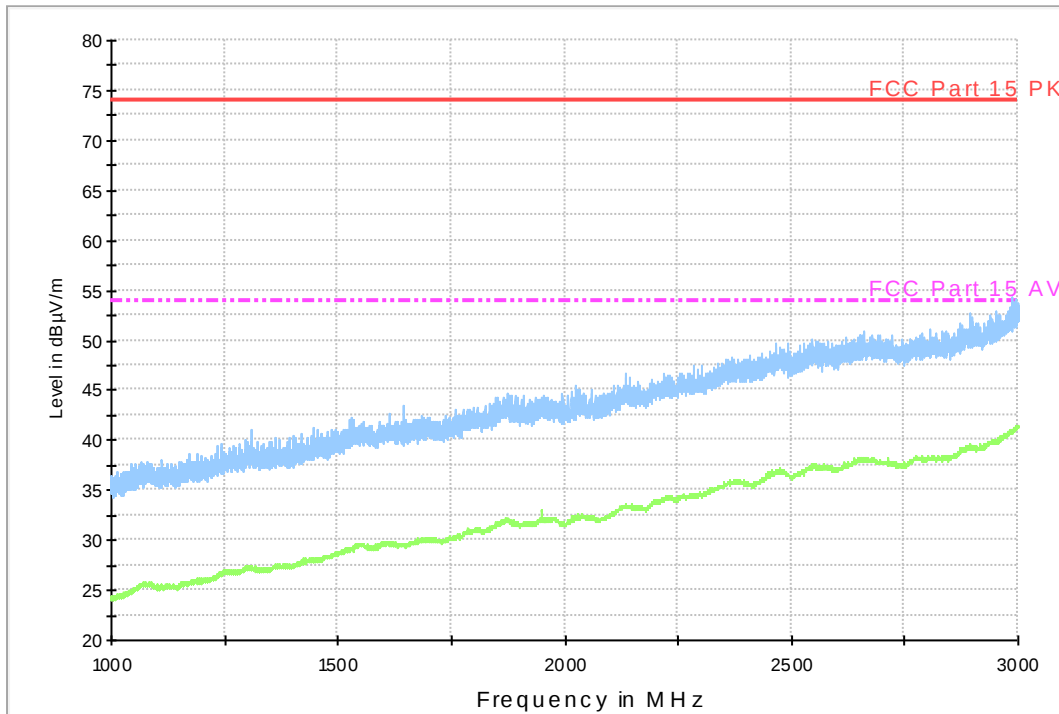


Fig A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

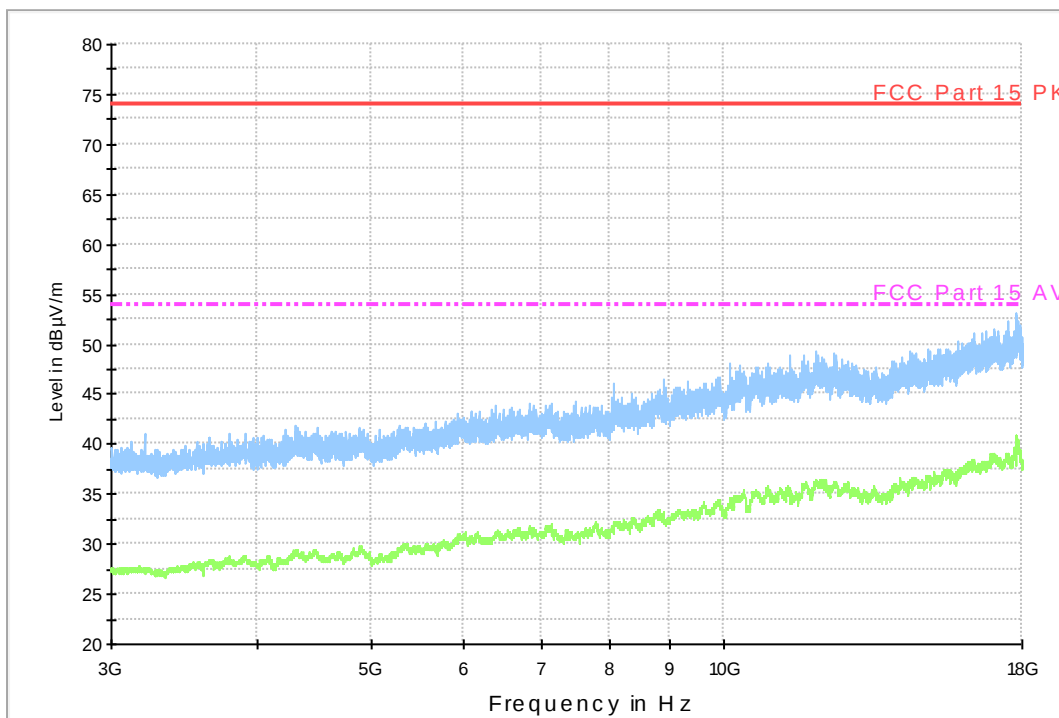


Fig A.6 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.3

15B RE 30MHz-1GHz

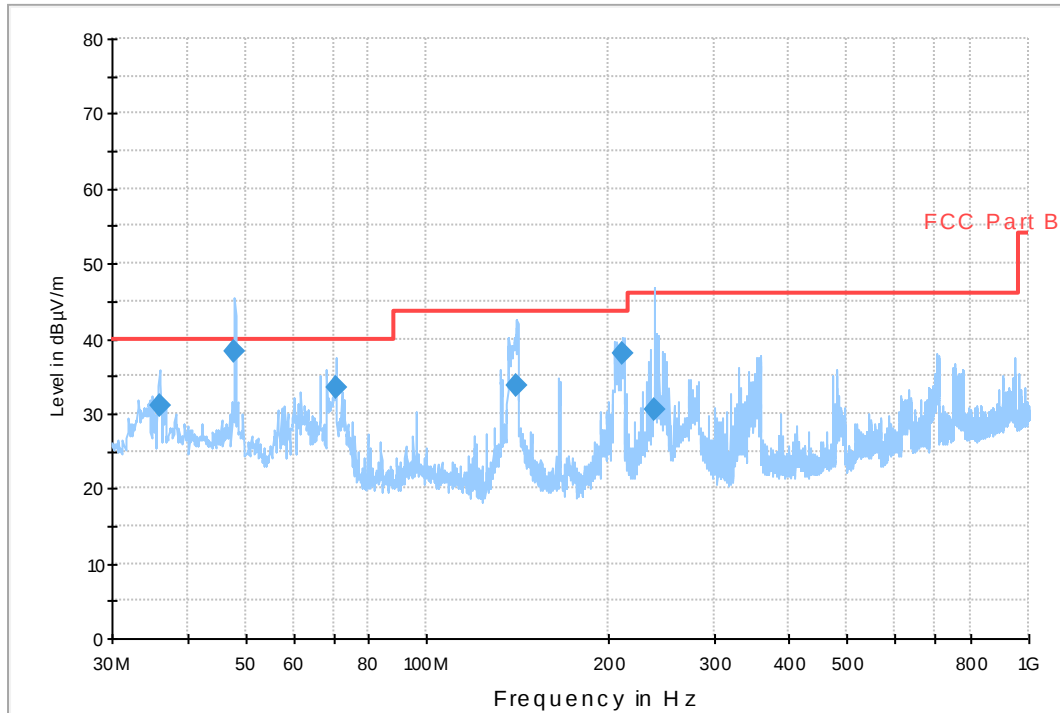


Fig A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
35.917000	31.1	115.0	V	176.0	-19.8	8.9	40.0	
47.945000	38.2	100.0	V	45.0	-18.0	1.8	40.0	
70.643000	33.4	100.0	V	249.0	-22.3	6.6	40.0	
140.968000	33.8	100.0	V	186.0	-20.8	9.7	43.5	
211.390000	38.0	109.0	H	20.0	-18.6	5.5	43.5	
238.744000	30.5	120.0	H	98.0	-17.4	15.5	46.0	

15B RE - 1GHz-3GHz

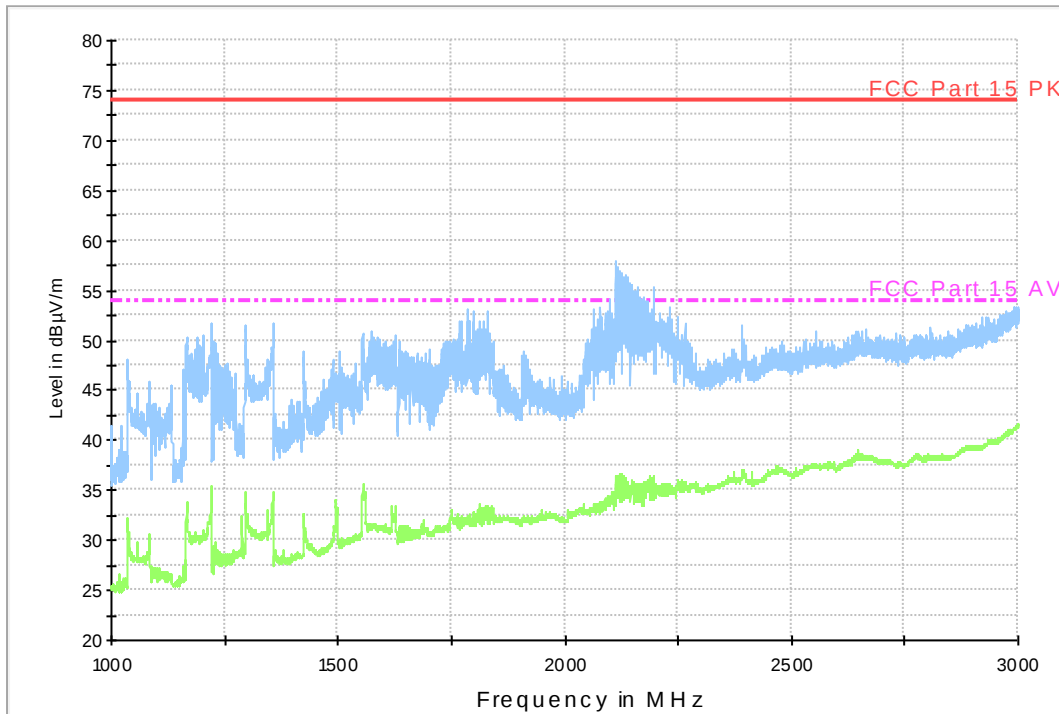


Fig A.8 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

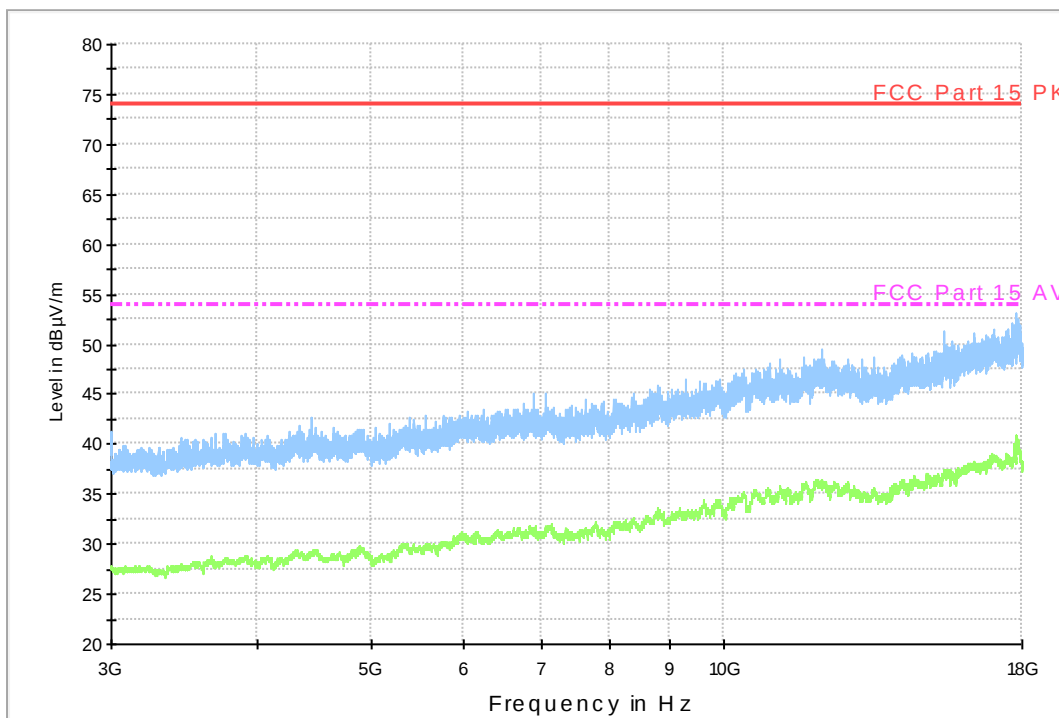


Fig A.9 Radiated Emission from 3GHz to 18GHz

A.2 Conducted Emission

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 EUT is operating in the USB mode and charging mode. During the test EUT 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 DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to EUT, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency		

A.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.5 Measurement Results

Measurement uncertainty: $U= 2.9$ dB, $k=2$.

Charging Mode, Set.1

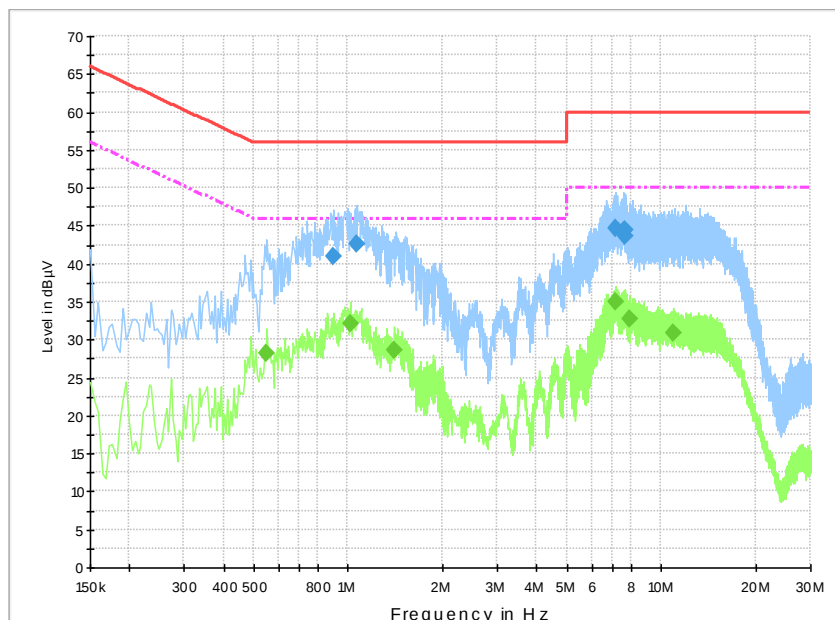


Fig A.10 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.901500	41.0	GND	L1	10.2	15.0	56.0
1.068000	42.6	GND	L1	10.2	13.4	56.0
7.165500	44.6	GND	L1	10.5	15.4	60.0
7.597500	44.2	GND	L1	10.4	15.8	60.0
7.647000	44.6	GND	L1	10.5	15.4	60.0
7.683000	43.7	GND	L1	10.5	16.4	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.550500	28.3	GND	L1	10.1	17.7	46.0
1.014000	32.2	GND	L1	10.2	13.8	46.0
1.401000	28.7	GND	L1	10.2	17.3	46.0
7.125000	35.1	GND	L1	10.5	14.9	50.0
7.966500	32.7	GND	L1	10.5	17.3	50.0
10.968000	30.8	GND	L1	10.6	19.2	50.0

Charging Mode, Set.2

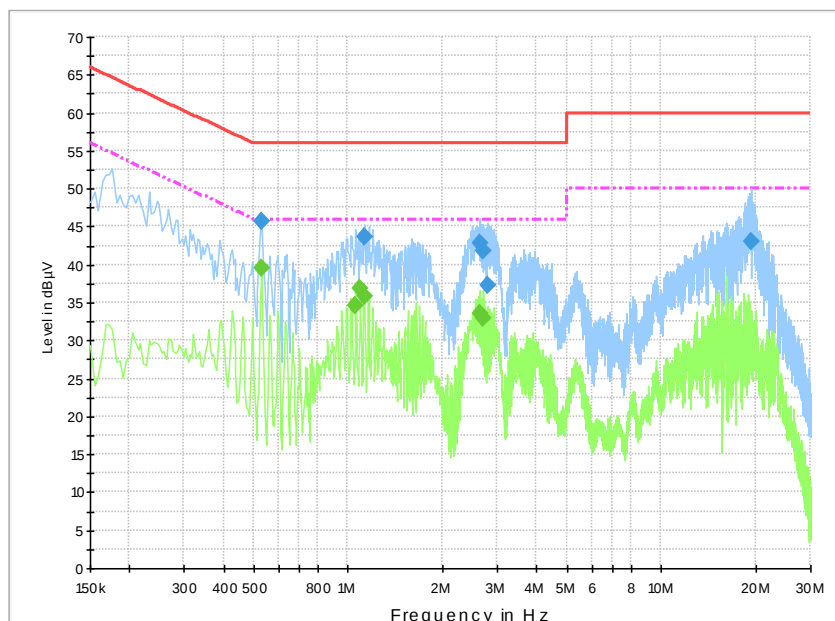


Fig A.11 Conducted Emission

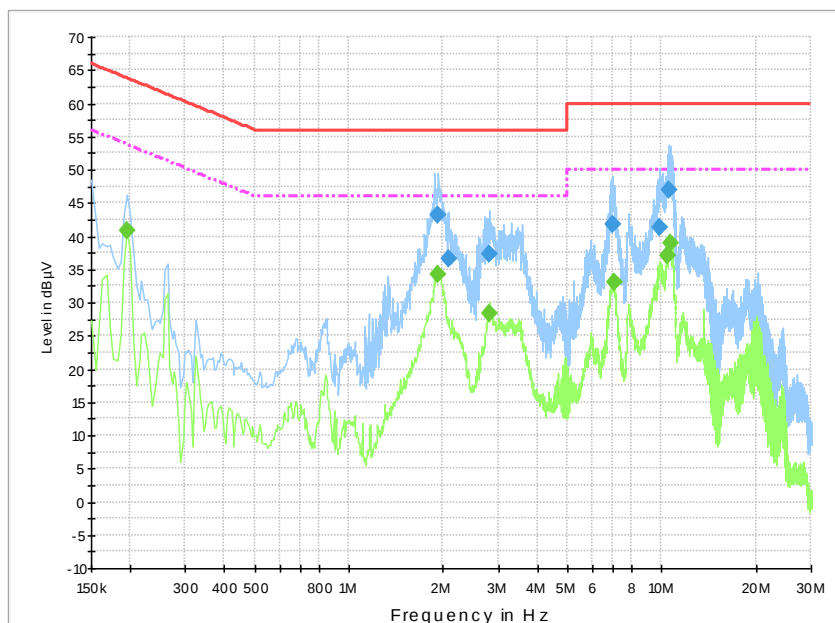
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.528000	45.7	GND	L1	10.1	10.3	56.0
1.126500	43.7	GND	L1	10.2	12.3	56.0
2.643000	42.9	GND	L1	10.2	13.1	56.0
2.710500	41.8	GND	L1	10.2	14.2	56.0
2.782500	37.3	GND	L1	10.2	18.7	56.0
19.302000	42.9	GND	L1	11.2	17.1	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.528000	39.6	GND	L1	10.1	6.4	46.0
1.059000	34.6	GND	L1	10.2	11.4	46.0
1.090500	36.8	GND	L1	10.2	9.2	46.0
1.126500	35.9	GND	L1	10.2	10.1	46.0
2.643000	33.5	GND	L1	10.2	12.5	46.0
2.710500	33.0	GND	L1	10.2	13.0	46.0

USB Mode, Set.3



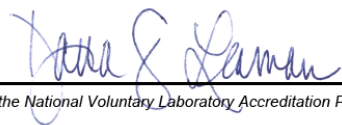
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.932000	43.2	GND	L1	10.2	12.8	56.0
2.080500	36.6	GND	L1	10.2	19.4	56.0
2.800500	37.2	GND	L1	10.2	18.8	56.0
6.985500	41.8	GND	L1	10.5	18.2	60.0
9.843000	41.4	GND	L1	10.6	18.6	60.0
10.549500	47.0	GND	N	10.6	13.0	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.195000	40.9	GND	L1	10.1	12.9	53.8
1.927500	34.3	GND	L1	10.2	11.7	46.0
2.805000	28.4	GND	L1	10.2	17.6	46.0
7.017000	33.0	GND	N	10.5	17.0	50.0
10.396500	37.0	GND	N	10.6	13.0	50.0
10.621500	38.9	GND	N	10.6	11.1	50.0

ANNEX B: Accreditation Certificate

United States Department of Commerce National Institute of Standards and Technology  Certificate of Accreditation to ISO/IEC 17025:2005	
NVLAP LAB CODE: 600118-0	
Telecommunication Technology Labs, CAICT Beijing China	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i>	
2016-09-29 through 2017-09-30 <i>Effective Dates</i>	  <i>For the National Voluntary Laboratory Accreditation Program</i>

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