FCC PART 15B
TEST REPORT

No. I23Z60212-EMC01

For

HMD Global Oy

Smart Phone

Model name: TA-1573

FCC ID: 2AJOTTA-1573

with

Hardware Version: V1.0

Software Version: 04US_0_170

Issued Date: 2023-05-12

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I23Z60212-EMC01	Rev.0	1st edition	2023-04-26
I23Z60212-EMC01	Rev.1	2nd edition	2023-05-09
I23Z60212-EMC01	Rev.2	3rd edition	2023-05-12

Note: the latest revision of the test report supersedes all previous version.

CONTENTS

1. Test Laboratory

1.1. Testing Location

CTTL (huayuan North Road)

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

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2023-03-25

Testing End Date: 2023-04-25

1.4. Signature

Wang Xue

(Prepared this test report)

Zhang Ying

(Reviewed this test report)

Zhang Xia

(Approved this test report)

2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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Email	reza.serafat@hmdglobal.com
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Smart Phone
Model Name	TA-1573
FCC ID:	2AJOTTA-1573

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

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	350547140019809	V1.0	04US_0_170
EUT1	350547140015252	V1.0	04US_0_170

*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	/	/
AE2	Battery	/	/
AE2	Charger1	/	/
AE3	Charger2	/	No test
AE4	Charger3	/	No test
AE5	Charger4	/	No test
AE6	Charger5	/	No test
AE7	USB Cable	/	/
AE8	Headset	/	/

AE1

Model	HQ610
Manufacturer	Fenghua Lithium Battery Co., Ltd
Capacity	4900mAh
Nominal Voltage	3.87V

AE2

Model	HQ610
Manufacturer	Huizhou Highpower Technology Co.,LTD
Capacity	4900mAh
Nominal Voltage	3.87V

AE2

Model	AD-020U
Manufacturer	AOHAI
Length of cable	/

AE3

Model	AD-020X
Manufacturer	AOHAI
Length of cable	/

AE4

Model	AD-020E
Manufacturer	AOHAI
Length of cable	/

AE5

Model	AD-020N
Manufacturer	AOHAI
Length of cable	/

AE6

Model	AD-020A
Manufacturer	AOHAI
Length of cable	/

AE7

Model	SZN-A023A
Manufacturer	Saibao (Jiangxi) Industry Co.,Ltd.
Length of cable	/

AE8

Model	JWEP1275-ZN01H
Manufacturer	Juwei electronics co., LTD
Length of cable	/

*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.1-1	EUT1 + AE1/2 + AE3 + AE7	Charger1+REAR Camera+GSM 850 idle
Set.1-2	EUT1 + AE1/2 + AE3 + AE7	Charger1+MP4+WCDMA 850 idle
Set.1-3	EUT1 + AE1/2 + AE7	USB + front camera+LTE B5 idle
Set.1-4	EUT1 + AE1/2 + AE8	FM
Set.2-1	EUT2 + AE1/2 + AE3 + AE7	2nd source Charger1+REAR Camera+GSM 850 idle
Set.2-2	EUT2 + AE1/2 + AE3 + AE7	2nd source Charger1+MP4+WCDMA 850 idle
Set.2-3	EUT2 + AE1/2 + AE7	2nd source USB + front camera+LTE B5 idle
Set.2-4	EUT2 + AE1/2 + AE8	2nd source FM
Set.3	EUT1 + EUT2 + TypeC-To-TypeC cable	OTG+ NR n71 idle

Note:

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

It supports

GSM Band	GSM900/DCS1800/PCS1900/GSM850
UMTS Band	FDD Band I(W2100) /FDD Band II(W1900) /FDD Band IV(W1700)/FDD

	Band V(W850)
LTE Band	FDD Band1/2/3/4/5/7/8/12/13/17/20/25/26/66/71, TDD Band38/39/40/41
NR Band	n25/n41/n66/n71/n77, n77 only support SA

It has MP3, Camera, USB memory, OTG,Bluetooth 5.1, Wi-Fi (802.11a/b/g/n/ac, 802.11n supports 20MHz and 40MHz bandwidth, 802.11ac supports 20MHz, 40MHz and 80MHz bandwidth) ,GPS functions.

The device contains receivers which tune and operate between 30MHz-960MHz in the following bands: GSM850, WCDMA850, LTE Band 5/12/13/26/71, NR band n71. All licensed band receivers that tune in the range of 30MHz-960MHz are investigated. Only the worst-case emissions are reported.

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	2019
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-1 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	< 4Ω
Normalised site attenuation (NSA)	< ±4 dB, 3m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 6GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 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	< 4Ω

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(huayuan North Road)**
2	Conducted Emission	15.107(a)	B.2	P	**CTTL(huayuan North Road)**

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESW44	103144	R&S	2023-10-25	1 Year
2	LISN	ENV216	101200	R&S	2023-06-29	1 year
3	Universal Radio Communication Tester	CMW500	163975	R&S	2024-01-03	1 year
4	Test Receiver	ESCI 7	100344	R&S	2024-02-21	1 Year
5	EMI Antenna	VULB 9163	01223	SCHWARZBECK	2023-07-25	1 year
6	EMI Antenna	3115	00167250	ETS-Lindgren	2023-06-20	1 year
7	Signal Generator	SML01	106247	R&S	2023-05-16	
8	Software	EMC32	/	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 MS and charging mode of MS) 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 3/10 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 EUT was tested while operating in licensed band Rx mode. All licensed band receivers that tune in the range of 30MHz-960MHz, as listed in section 3.4, are investigated. Only the worst case emissions are reported.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

The model of the PC is M4000E-17, and the serial number of the PC is M706GWXD. The software is used to let the PC keep on copying data to MS, 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 (μV/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 is 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/3MHz	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:

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.

Measurement uncertainty (worst case): U = 4.74 dB, k=2.

Measurement results for Set.1-1:

Charing 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)
17592.680	41.00	-29.70	45.25	25.45	54.00	13.00	H
17994.900	40.90	-29.06	46.66	23.30	54.00	13.10	H
17216.300	40.70	-29.49	43.36	26.83	54.00	13.30	V
17953.760	40.70	-28.94	46.66	22.98	54.00	13.30	H
17994.560	40.70	-29.06	46.66	23.10	54.00	13.30	V
17992.180	40.60	-29.06	46.66	23.00	54.00	13.40	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)
17889.500	51.20	-29.53	45.95	34.78	74.00	22.80	V
17990.480	51.00	-29.06	46.66	33.40	74.00	23.00	H
17720.520	50.80	-29.67	45.25	35.22	74.00	23.20	H
18000.000	50.60	-29.24	47.00	32.84	74.00	23.40	H
17988.780	50.60	-29.06	46.66	33.00	74.00	23.40	V
17960.900	50.50	-29.06	46.66	32.90	74.00	23.50	V

Measurement results for Set.1-2:

Charing 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)
17994.900	41.00	-29.06	46.66	23.40	54.00	13.00	V
17533.180	40.70	-29.32	44.35	25.67	54.00	13.30	H
17226.500	40.50	-29.57	43.36	26.71	54.00	13.50	V
17562.760	40.50	-29.79	45.25	25.05	54.00	13.50	H
17590.300	40.40	-29.70	45.25	24.85	54.00	13.60	H
17941.520	40.40	-28.94	46.66	22.68	54.00	13.60	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)
17757.920	51.00	-29.61	45.95	34.66	74.00	23.00	H
17789.880	50.70	-29.89	45.95	34.63	74.00	23.30	V
17956.480	50.70	-28.94	46.66	32.98	74.00	23.30	H
17470.960	50.40	-30.06	44.35	36.10	74.00	23.60	H
17788.860	50.40	-29.89	45.95	34.33	74.00	23.60	H
17997.280	50.40	-29.06	46.66	32.80	74.00	23.60	V

Measurement results for Set.1-3:

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)
6053.420	42.70	-37.82	34.40	46.12	54.00	11.30	H
6053.080	42.00	-37.82	34.40	45.42	54.00	12.00	H
17994.560	41.10	-29.06	46.66	23.50	54.00	12.90	V
17975.520	40.90	-29.06	46.66	23.30	54.00	13.10	H
17299.940	40.80	-29.69	43.36	27.13	54.00	13.20	H
17955.120	40.80	-28.94	46.66	23.08	54.00	13.20	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)
17556.640	51.80	-29.49	44.35	36.93	74.00	22.20	V
17975.520	51.70	-29.06	46.66	34.10	74.00	22.30	V
17234.320	51.40	-29.57	43.36	37.61	74.00	22.60	H
17787.840	51.30	-29.89	45.95	35.23	74.00	22.70	V
17939.140	51.20	-29.40	46.66	33.94	74.00	22.80	V
17994.560	51.10	-29.06	46.66	33.50	74.00	22.90	H

Measurement results for Set.1-4:

USB 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)
17982.660	40.70	-29.06	46.66	23.10	54.00	13.30	H
17982.320	40.60	-29.06	46.66	23.00	54.00	13.40	H
17993.540	40.60	-29.06	46.66	23.00	54.00	13.40	H
17998.980	40.40	-29.06	46.66	22.80	54.00	13.60	H
17484.560	40.40	-29.77	44.35	25.82	54.00	13.60	H
18000.000	40.40	-29.24	47.00	22.64	54.00	13.60	V

USB 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)
17378.140	51.20	-29.97	43.36	37.81	74.00	22.80	H
18000.000	50.70	-29.24	47.00	32.94	74.00	23.30	V
17665.780	50.50	-29.90	45.25	35.15	74.00	23.50	H
17989.460	50.40	-29.06	46.66	32.80	74.00	23.60	V
17692.300	50.20	-29.98	45.25	34.93	74.00	23.80	V
17713.720	50.10	-29.73	45.25	34.59	74.00	23.90	H

Measurement results for Set.2-1:

Charing 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)
17971.780	38.90	-29.06	46.66	21.30	54.00	15.10	V
17468.920	38.90	-30.06	44.35	24.60	54.00	15.10	H
17988.440	38.80	-29.06	46.66	21.20	54.00	15.20	V
17739.560	38.80	-29.67	45.95	22.51	54.00	15.20	V
17957.500	38.80	-28.94	46.66	21.08	54.00	15.20	H
17736.840	38.80	-29.67	45.25	23.22	54.00	15.20	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)
17714.060	49.10	-29.73	45.25	33.59	74.00	24.90	V
17978.920	49.10	-29.06	46.66	31.50	74.00	24.90	V
17501.560	49.10	-29.26	44.35	34.00	74.00	24.90	V
17992.860	49.00	-29.06	46.66	31.40	74.00	25.00	H
17312.520	49.00	-29.49	43.36	35.13	74.00	25.00	V
17982.320	48.90	-29.06	46.66	31.30	74.00	25.10	H

Measurement results for Set.2-2:

Charing 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)
17528.080	39.30	-29.32	44.35	24.27	54.00	14.70	H
17958.520	39.20	-28.94	46.66	21.48	54.00	14.80	H
17988.780	39.00	-29.06	46.66	21.40	54.00	15.00	H
17708.280	39.00	-29.73	45.25	23.49	54.00	15.00	H
17978.920	38.90	-29.06	46.66	21.30	54.00	15.10	V
17990.820	38.90	-29.06	46.66	21.30	54.00	15.10	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)
17445.800	49.90	-29.87	44.35	35.42	74.00	24.10	V
17582.140	49.80	-29.70	45.25	34.25	74.00	24.20	V
17799.060	49.60	-29.89	45.95	33.53	74.00	24.40	V
17752.480	49.40	-29.61	45.95	33.06	74.00	24.60	H
17990.140	49.30	-29.06	46.66	31.70	74.00	24.70	V
17703.860	49.30	-29.73	45.25	33.79	74.00	24.70	V

Measurement results for Set.2-3:

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)
6052.060	41.30	-37.82	34.40	44.72	54.00	12.70	V
17996.940	40.90	-29.06	46.66	23.30	54.00	13.10	H
17571.260	40.90	-29.79	45.25	25.45	54.00	13.10	H
17991.840	40.70	-29.06	46.66	23.10	54.00	13.30	H
17522.300	40.70	-29.32	44.35	25.67	54.00	13.30	H
17772.200	40.70	-29.63	45.95	24.37	54.00	13.30	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)
17515.160	51.30	-29.26	44.35	36.20	74.00	22.70	H
17996.600	51.10	-29.06	46.66	33.50	74.00	22.90	H
17313.200	51.00	-29.49	43.36	37.13	74.00	23.00	H
17556.980	50.80	-29.49	44.35	35.93	74.00	23.20	V
17780.020	50.80	-29.89	45.95	34.73	74.00	23.20	V
17954.100	50.60	-28.94	46.66	32.88	74.00	23.40	V

Measurement results for Set.2-4:

USB 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)
17990.500	39.60	-29.06	46.66	22.00	54.00	14.40	V
17985.400	39.40	-29.06	46.66	21.80	54.00	14.60	V
17995.900	39.40	-29.06	46.66	21.80	54.00	14.60	H
17977.900	39.40	-29.06	46.66	21.80	54.00	14.60	H
17526.000	39.20	-29.32	44.35	24.17	54.00	14.80	V
17975.500	39.00	-29.06	46.66	21.40	54.00	15.00	V

USB 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)
17991.160	50.20	-29.06	46.66	32.60	74.00	23.80	H
17230.920	49.70	-29.57	43.36	35.91	74.00	24.30	H
17972.120	49.60	-29.06	46.66	32.00	74.00	24.40	V
17969.740	49.60	-29.06	46.66	32.00	74.00	24.40	V
17995.920	49.60	-29.06	46.66	32.00	74.00	24.40	H
17439.000	49.60	-29.71	44.35	34.96	74.00	24.40	H

Measurement results for Set.3:

OTG 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)
17986.740	40.70	-29.06	46.66	23.10	54.00	13.30	V
17448.520	40.60	-29.87	44.35	26.12	54.00	13.40	V
17951.380	40.30	-28.94	46.66	22.58	54.00	13.70	V
17977.220	40.20	-29.06	46.66	22.60	54.00	13.80	H
17966.340	40.10	-29.06	46.66	22.50	54.00	13.90	V
17987.080	40.10	-29.06	46.66	22.50	54.00	13.90	V

OTG 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)
17206.100	51.00	-29.49	42.36	38.13	74.00	23.00	V
17309.120	51.00	-29.49	43.36	37.13	74.00	23.00	V
17939.820	50.90	-29.40	46.66	33.64	74.00	23.10	V
17979.600	50.90	-29.06	46.66	33.30	74.00	23.10	V
17703.520	50.70	-29.73	45.25	35.19	74.00	23.30	H
17222.080	50.70	-29.57	43.36	36.91	74.00	23.30	V

Measurement results for Set.1-1:

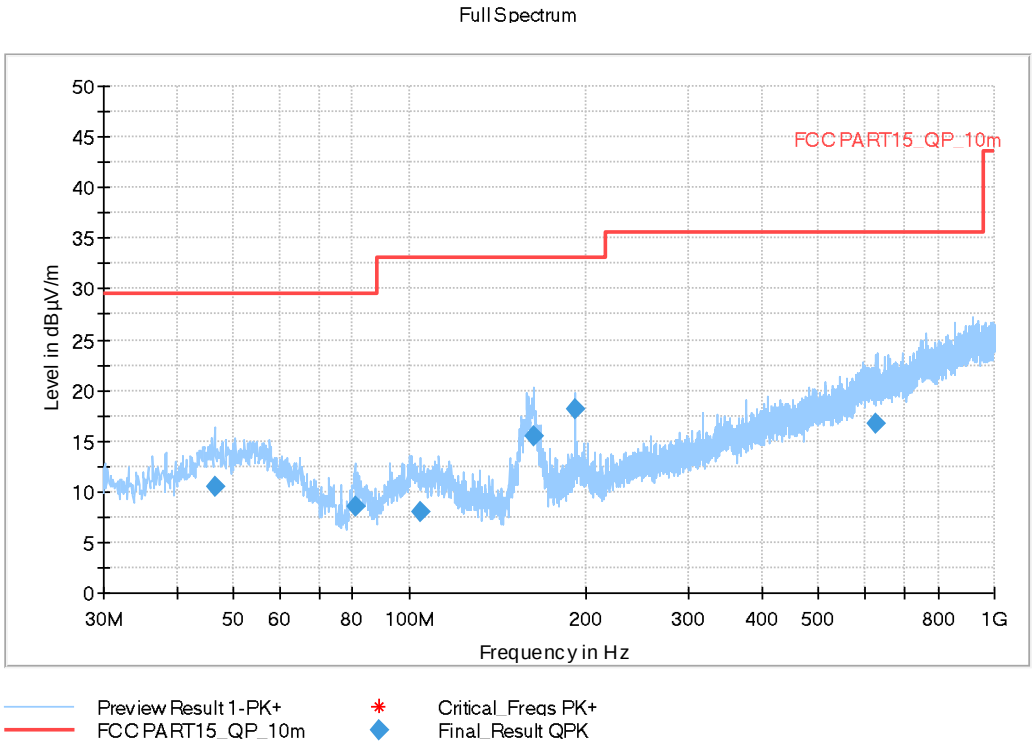

Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
46.393000	10.56	29.54	18.98	120.000	125.0	V	137.0
80.634000	8.54	29.54	21.00	120.000	202.0	V	279.0
104.108000	8.05	33.06	25.01	120.000	323.0	V	135.0
163.084000	15.42	33.06	17.64	120.000	125.0	V	112.0
192.184000	18.08	33.06	14.98	120.000	107.0	V	45.0
625.192000	16.65	35.56	18.91	120.000	107.0	V	176.0

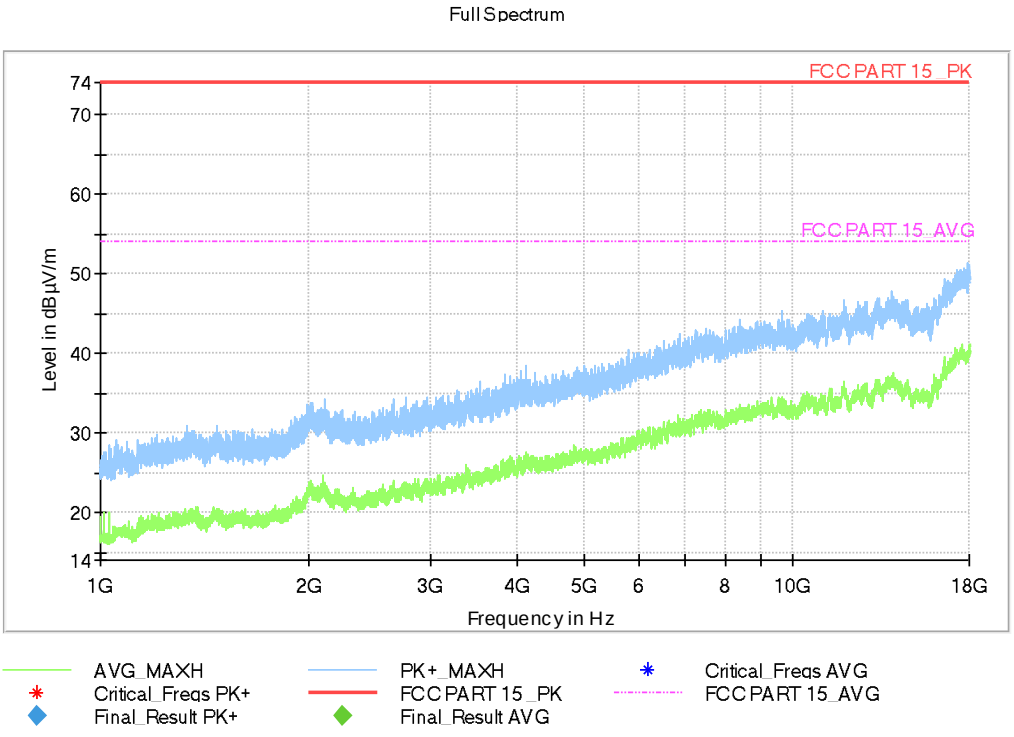

Fig A.2 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.1-2:

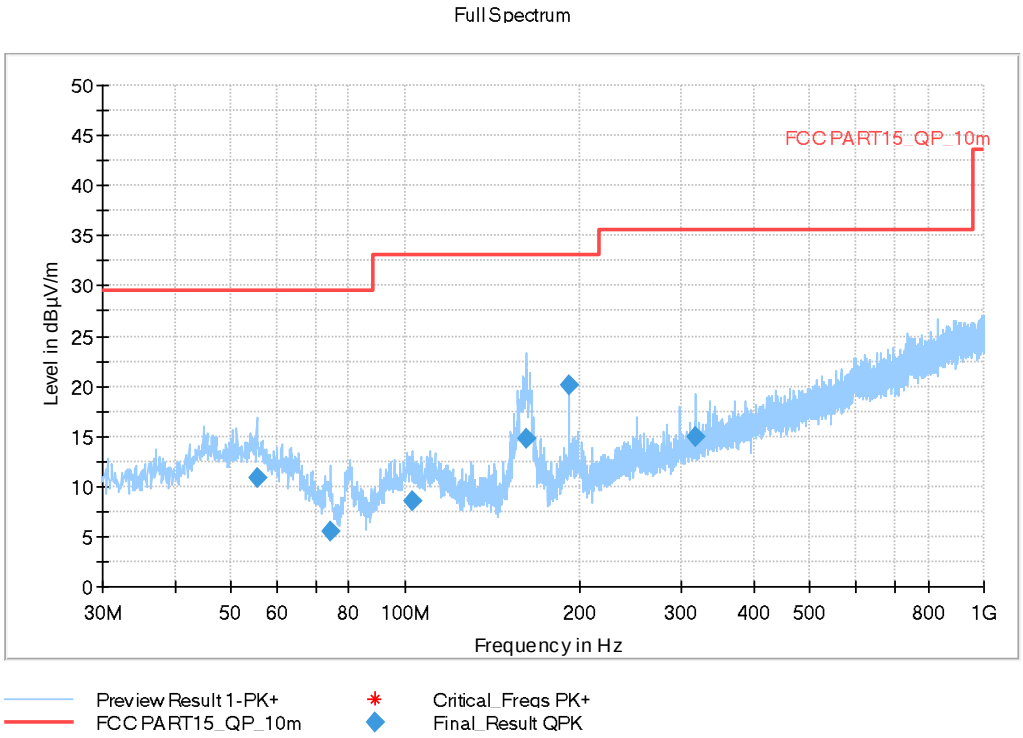

Fig A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
55.414000	10.90	29.54	18.64	120.000	175.0	V	30.0
74.426000	5.50	29.54	24.04	120.000	225.0	V	284.0
102.944000	8.59	33.06	24.47	120.000	100.0	V	125.0
161.532000	14.72	33.06	18.34	120.000	125.0	V	136.0
191.893000	20.07	33.06	12.99	120.000	100.0	V	45.0
316.635000	14.93	35.56	20.63	120.000	325.0	H	252.0

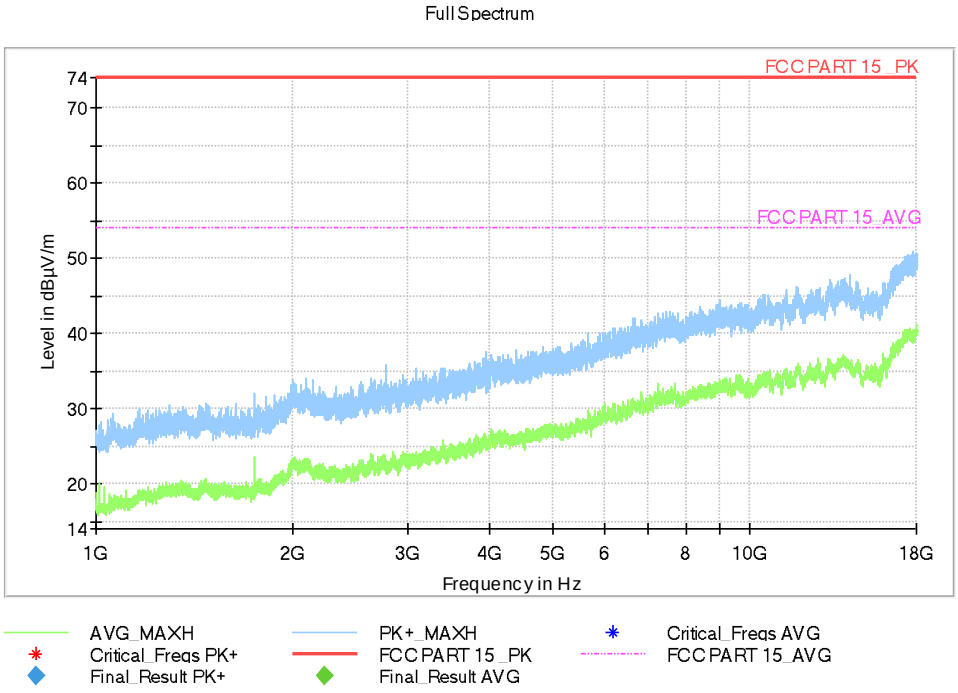

Fig A.4 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.1-3:

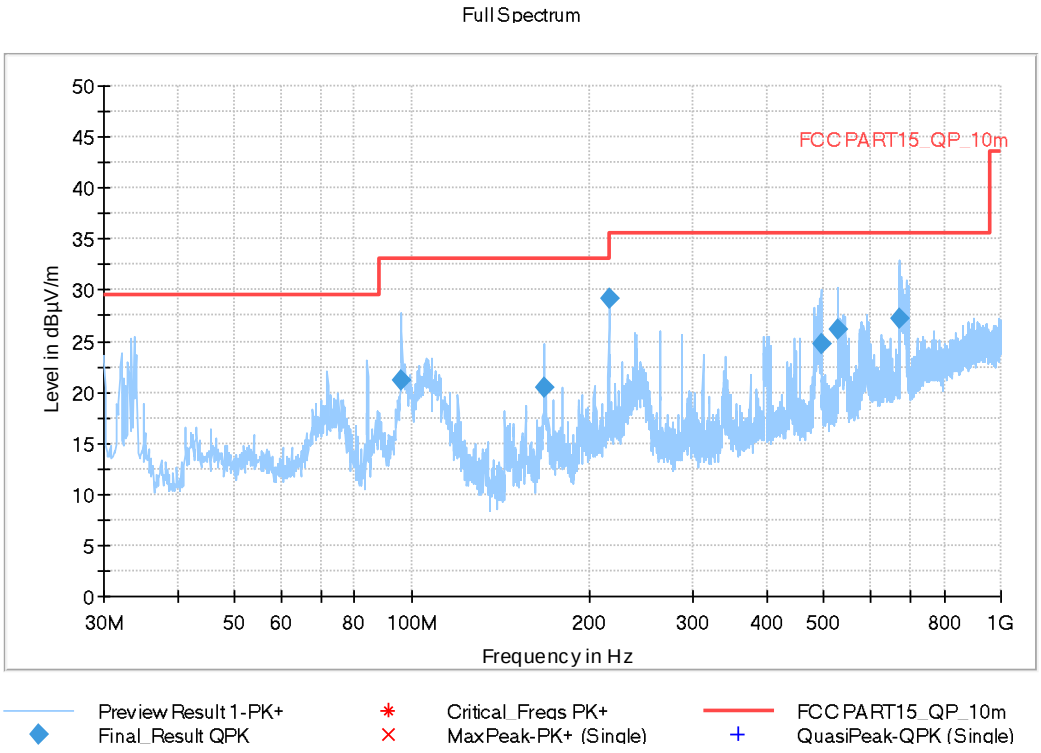

Fig A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
96.057000	21.13	33.06	11.93	120.000	100.0	V	112.0
167.934000	20.45	33.06	12.61	120.000	283.0	H	73.0
215.949000	29.10	33.06	3.96	120.000	322.0	H	72.0
494.242000	24.74	35.56	10.82	120.000	283.0	V	-5.0
528.871000	26.20	35.56	9.36	120.000	222.0	V	9.0
673.886000	27.29	35.56	8.27	120.000	175.0	V	-31.0

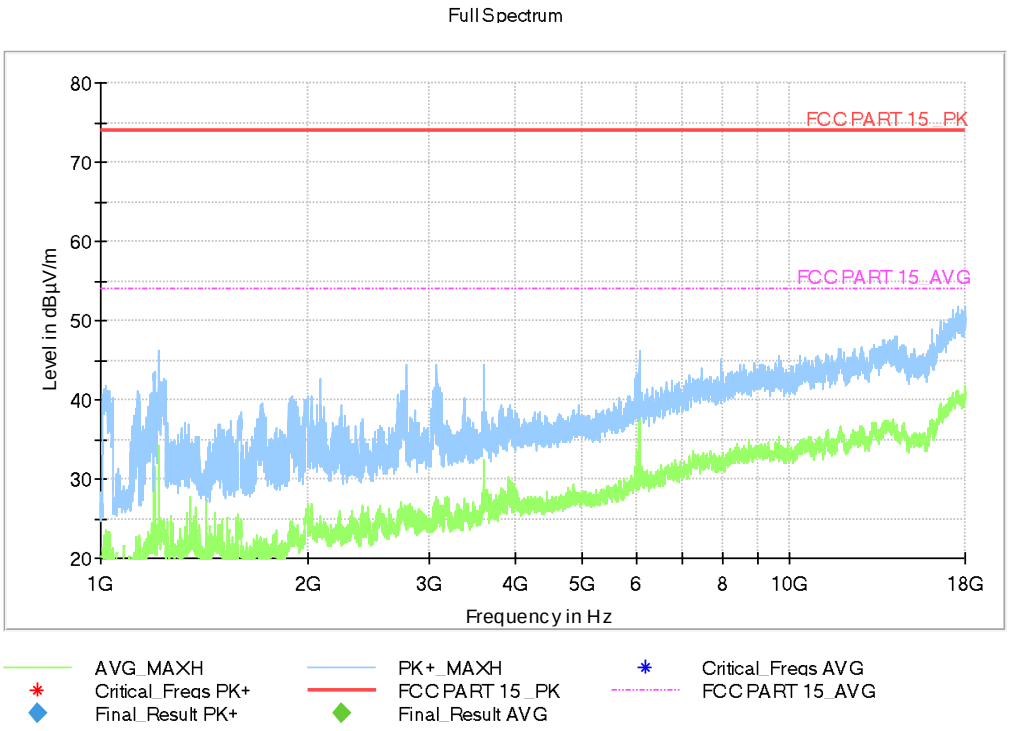

Fig A.6 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.1-4:

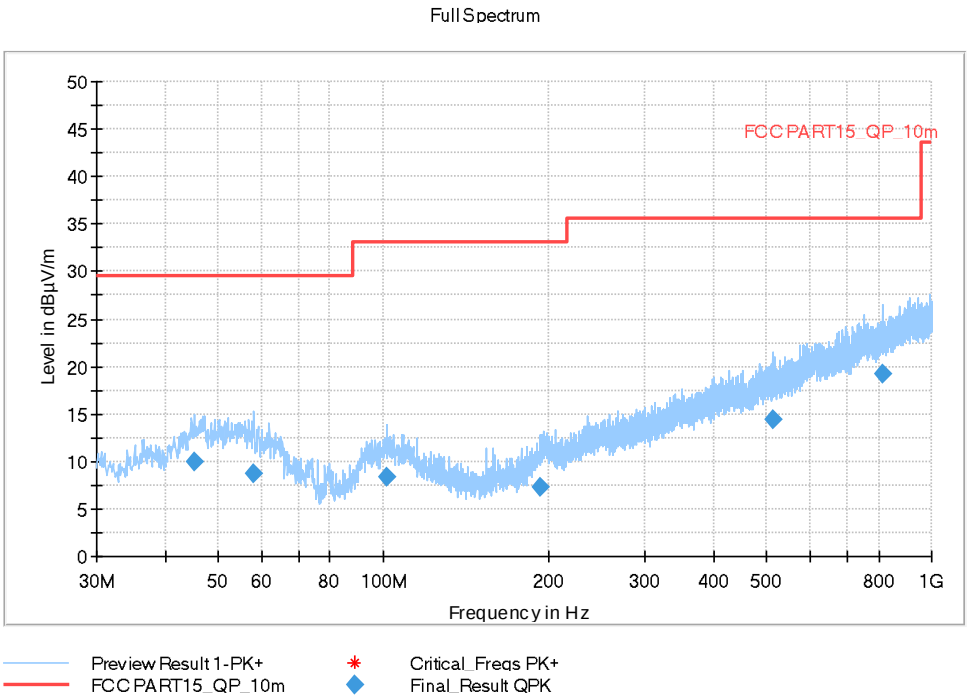

Fig A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
45.229000	10.04	29.54	19.50	120.000	107.0	H	253.0
58.130000	8.78	29.54	20.76	120.000	125.0	H	225.0
101.392000	8.34	33.06	24.72	120.000	302.0	H	112.0
192.960000	7.33	33.06	25.73	120.000	325.0	H	252.0
512.090000	14.44	35.56	21.12	120.000	183.0	V	149.0
812.596000	19.14	35.56	16.42	120.000	275.0	H	46.0

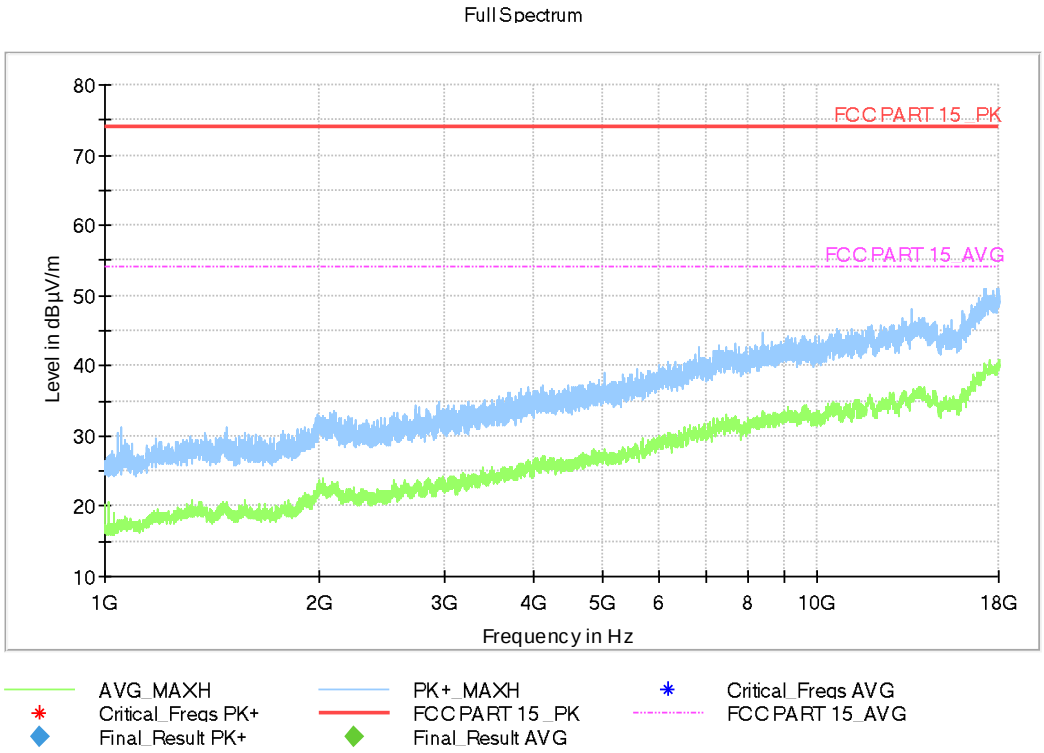

Fig A.8 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2-1:

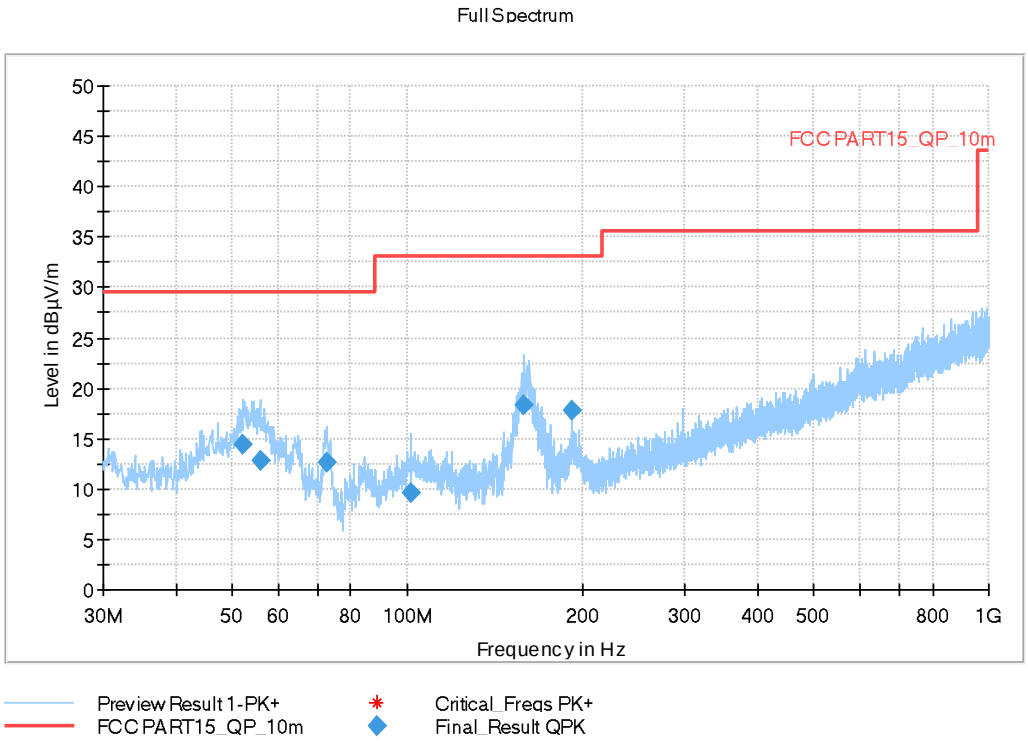

Fig A.9 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
52.213000	14.33	29.54	15.21	120.000	100.0	V	-18.0
55.802000	12.82	29.54	16.72	120.000	322.0	V	45.0
72.777000	12.64	29.54	16.90	120.000	222.0	V	265.0
101.295000	9.57	33.06	23.49	120.000	125.0	V	135.0
158.913000	18.28	33.06	14.78	120.000	175.0	V	162.0
191.505000	17.73	33.06	15.33	120.000	100.0	V	45.0

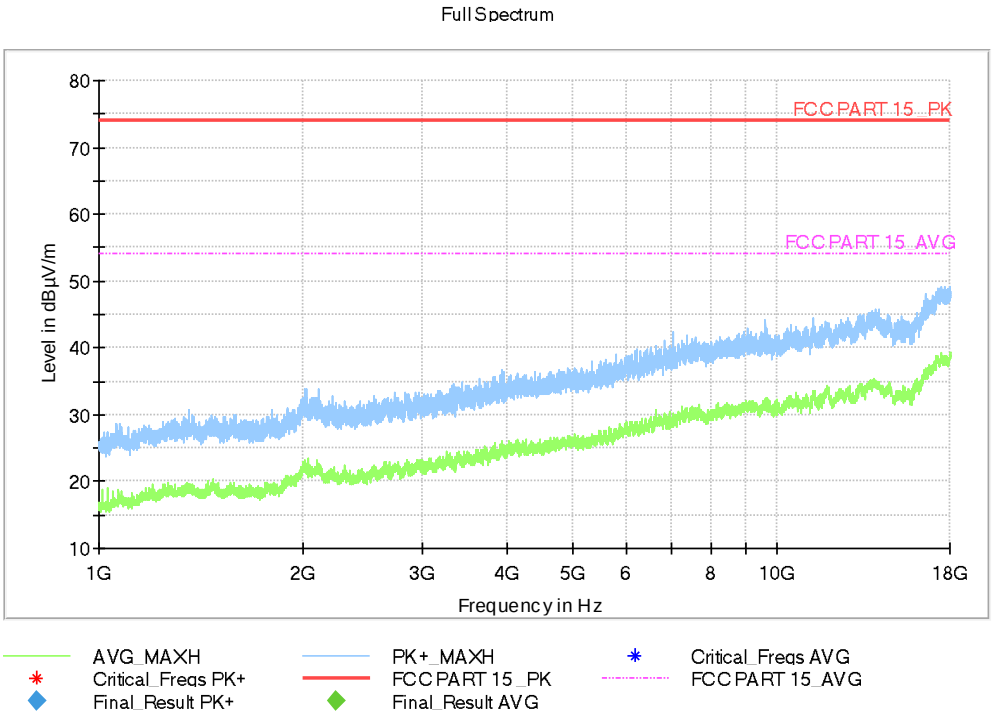

Fig A.10 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2-2:

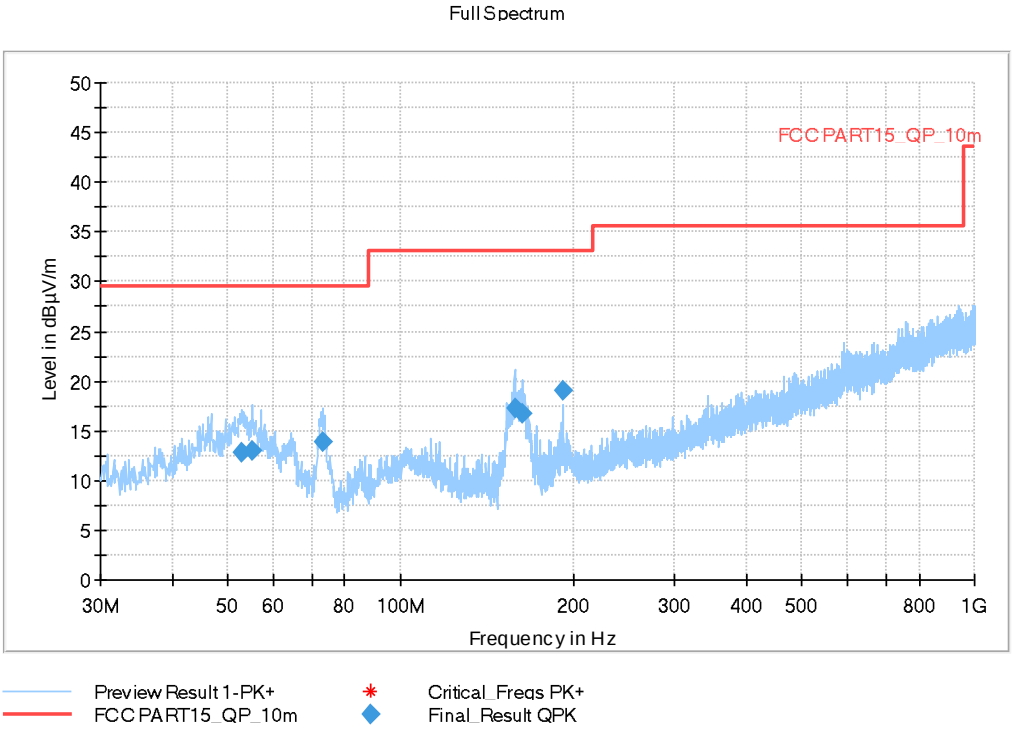

Fig A.11 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
52.795000	12.88	29.54	16.66	120.000	125.0	V	47.0
55.123000	12.99	29.54	16.55	120.000	325.0	V	-31.0
73.165000	13.87	29.54	15.67	120.000	202.0	V	38.0
158.040000	17.23	33.06	15.83	120.000	183.0	V	149.0
162.987000	16.76	33.06	16.30	120.000	100.0	V	125.0
191.602000	19.09	33.06	13.97	120.000	108.0	V	59.0

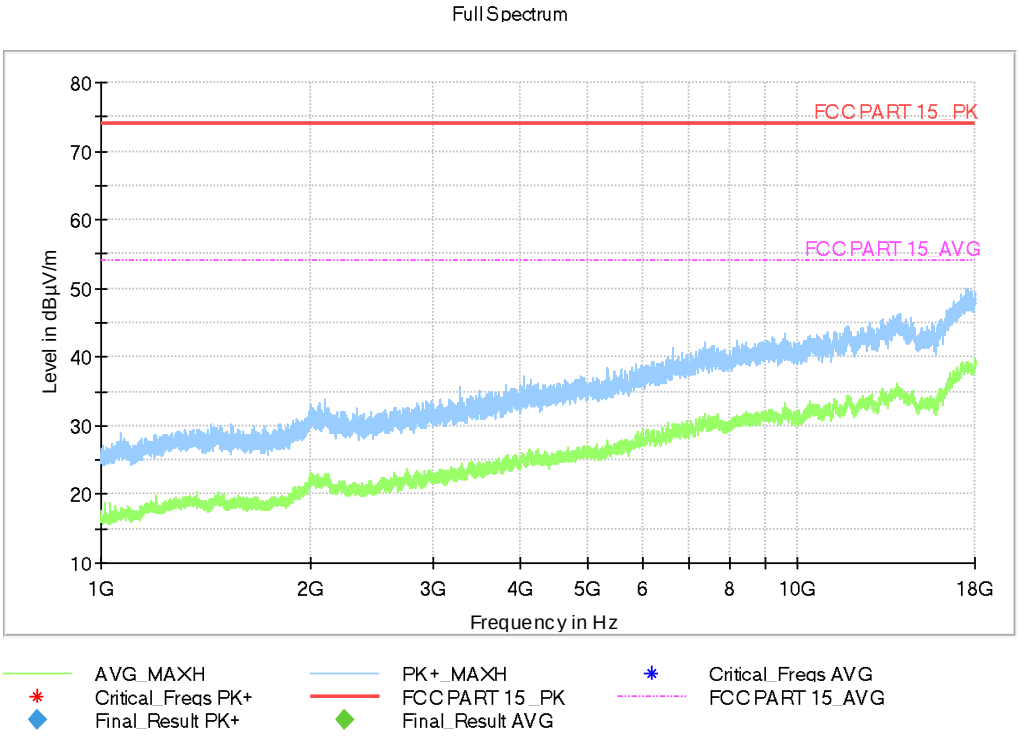

Fig A.12 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2-3:

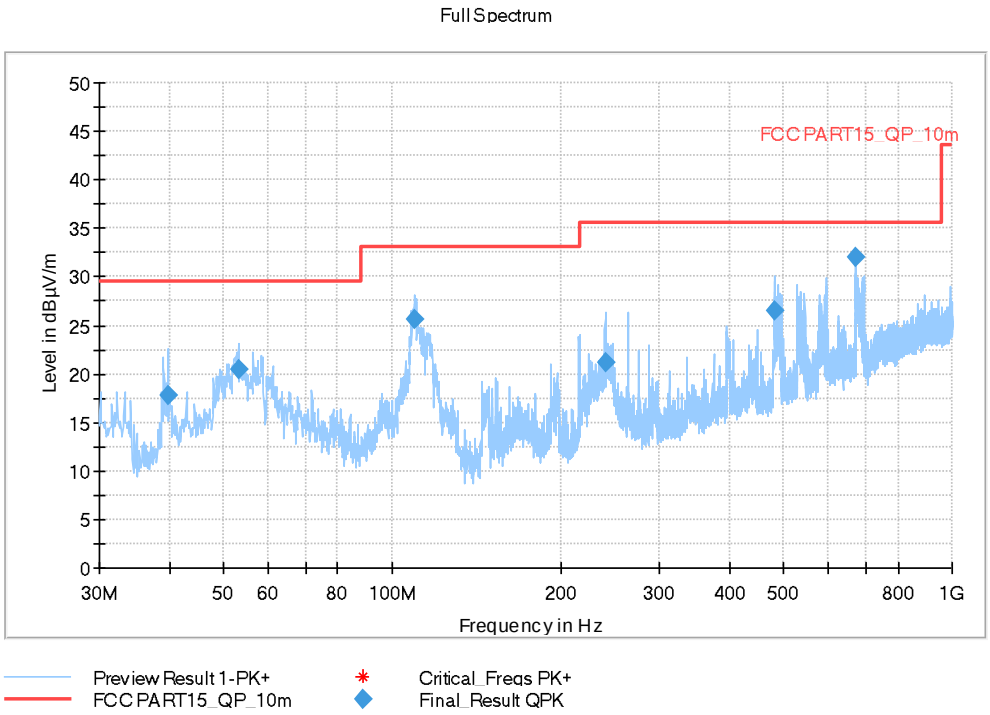

Fig A.13 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
39.797000	17.86	29.54	11.68	120.000	108.0	V	293.0
53.086000	20.54	29.54	9.00	120.000	100.0	V	137.0
109.928000	25.58	33.06	7.48	120.000	125.0	V	265.0
240.393000	21.14	35.56	14.42	120.000	322.0	H	175.0
481.923000	26.47	35.56	9.09	120.000	283.0	V	-4.0
673.110000	32.11	35.56	3.45	120.000	183.0	V	-31.0

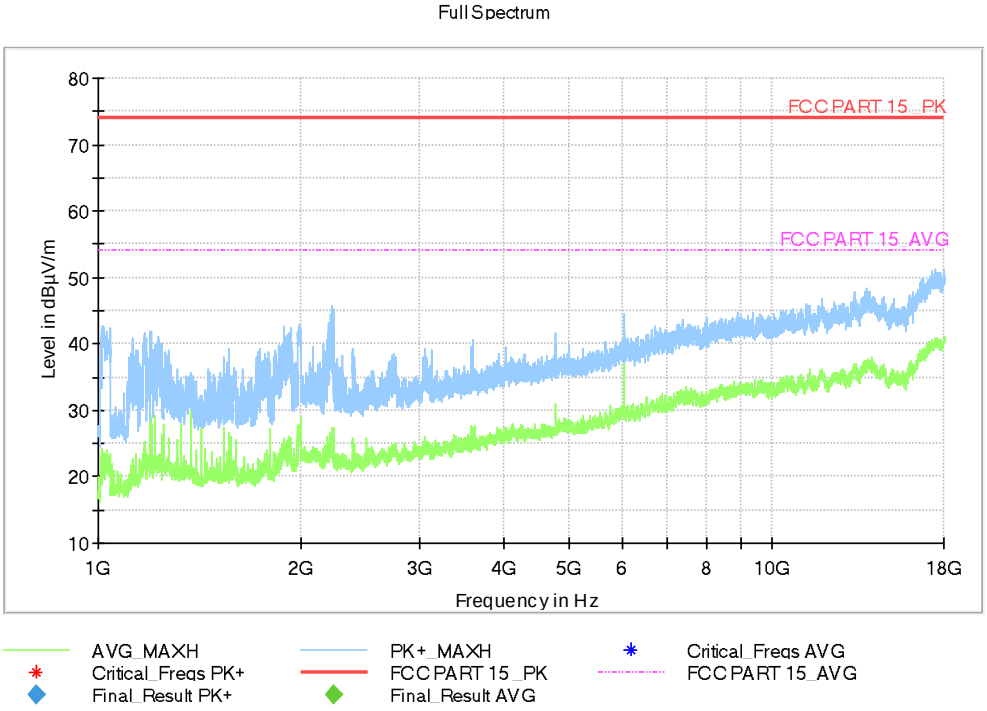

Fig A.14 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2-4:

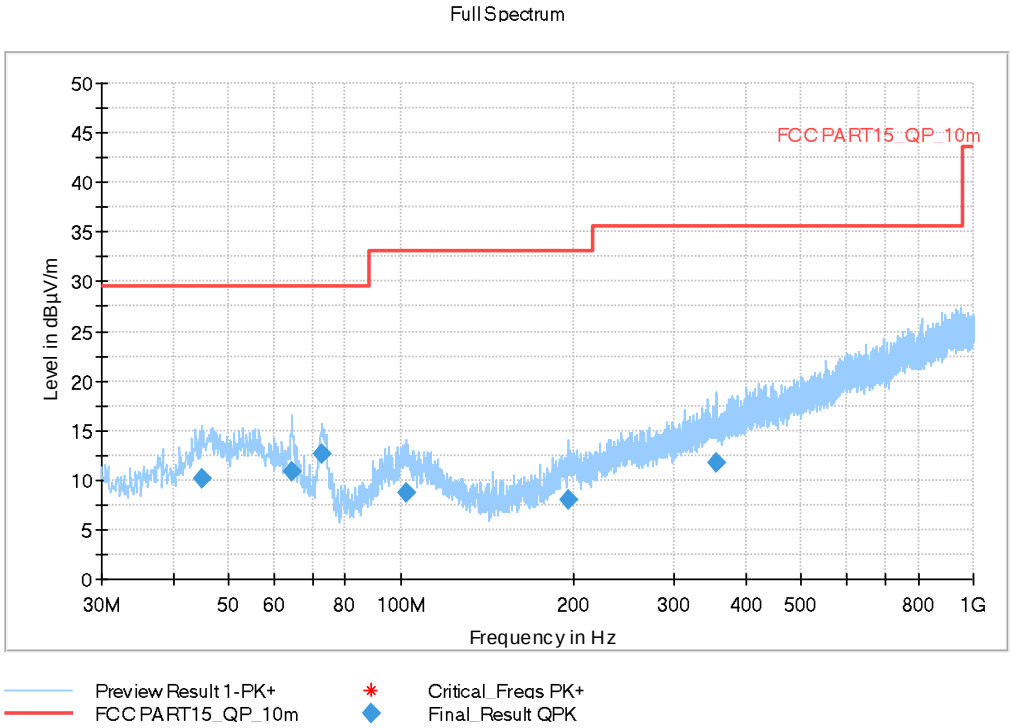

Fig A.15 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
44.938000	10.16	29.54	19.38	120.000	175.0	H	111.0
64.532000	10.81	29.54	18.73	120.000	275.0	V	46.0
72.971000	12.64	29.54	16.90	120.000	175.0	V	315.0
102.362000	8.77	33.06	24.29	120.000	125.0	V	252.0
196.452000	8.05	33.06	25.01	120.000	322.0	V	-17.0
354.853000	11.74	35.56	23.82	120.000	325.0	V	74.0

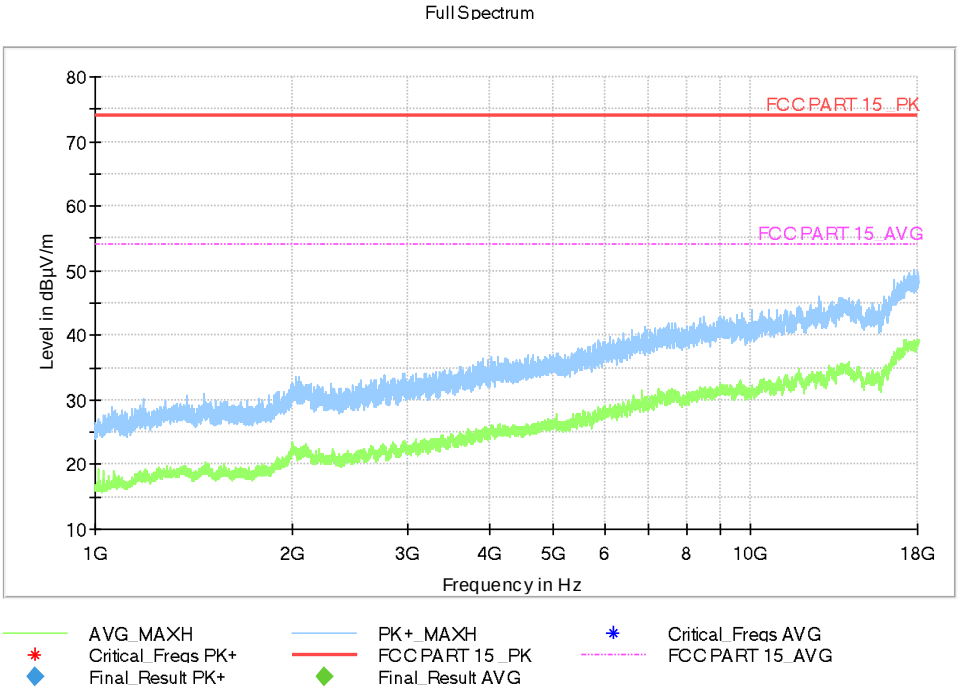

Fig A.16 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.3:

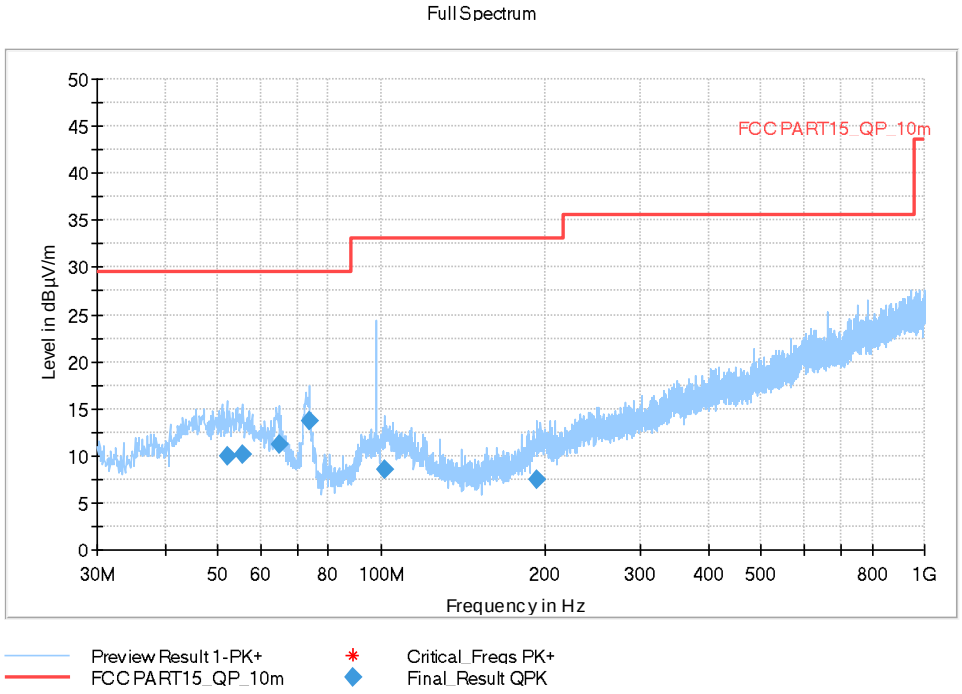

Fig A.17 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
52.019000	9.89	29.54	19.65	120.000	125.0	V	137.0
55.414000	10.20	29.54	19.34	120.000	283.0	V	292.0
64.920000	11.22	29.54	18.32	120.000	125.0	V	47.0
73.747000	13.76	29.54	15.78	120.000	183.0	V	207.0
101.295000	8.57	33.06	24.49	120.000	125.0	V	225.0
192.863000	7.56	33.06	25.50	120.000	223.0	V	137.0

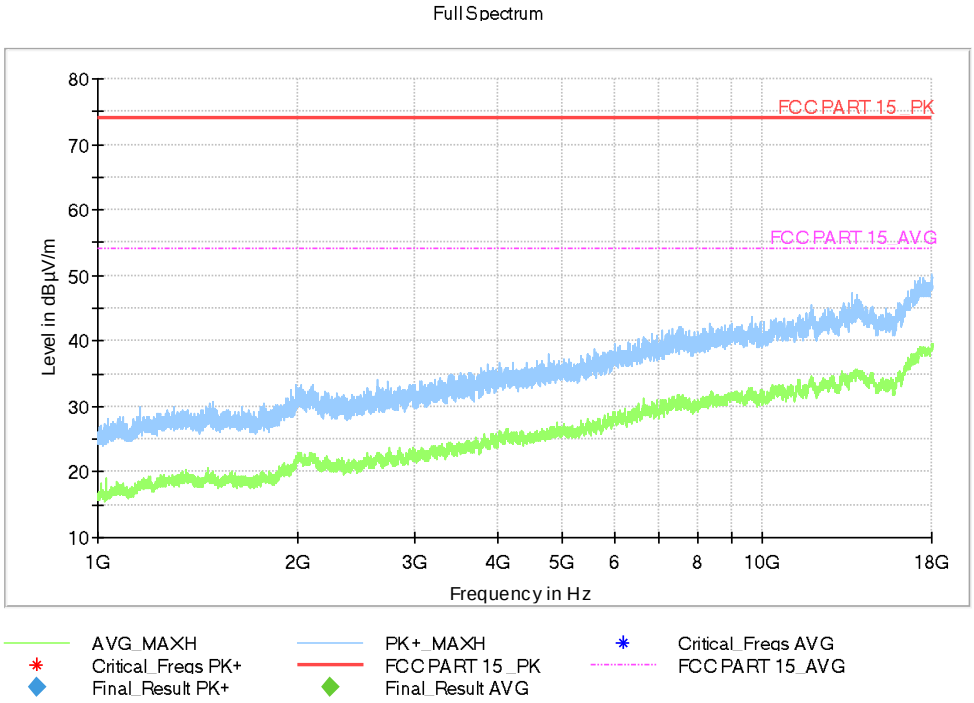

Fig A.18 Radiated Emission from 1GHz to 18GHz

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 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 DELL M4000E-17, and the serial number of the PC is M706GWXD. The software is used to let the PC keep on copying data to MS, 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*= 3.08 dB, *k*=2.

Charging Mode, Set.1-1:

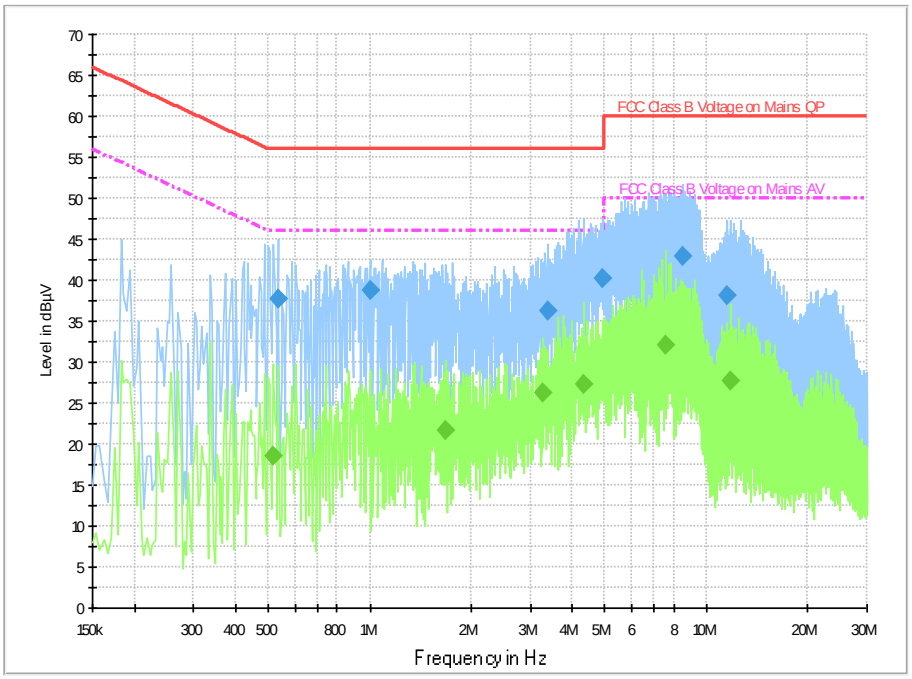

Fig A.19 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.534000	37.7	2000.0	9.000	On	N	19.7	18.3	56.0	
1.002000	38.8	2000.0	9.000	On	L1	19.7	17.2	56.0	
3.382000	36.2	2000.0	9.000	On	L1	19.6	19.8	56.0	
4.922000	40.1	2000.0	9.000	On	L1	19.6	15.9	56.0	
8.534000	42.9	2000.0	9.000	On	L1	19.7	17.1	60.0	
11.574000	38.1	2000.0	9.000	On	L1	19.7	21.9	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.514000	18.5	2000.0	9.000	On	N	19.7	27.5	46.0	
1.682000	21.6	2000.0	9.000	On	L1	19.6	24.4	46.0	
3.266000	26.3	2000.0	9.000	On	L1	19.6	19.7	46.0	
4.338000	27.2	2000.0	9.000	On	L1	19.6	18.8	46.0	
7.602000	32.1	2000.0	9.000	On	L1	19.6	17.9	50.0	
11.746000	27.6	2000.0	9.000	On	L1	19.7	22.4	50.0	

Charging Mode, Set.1-2:

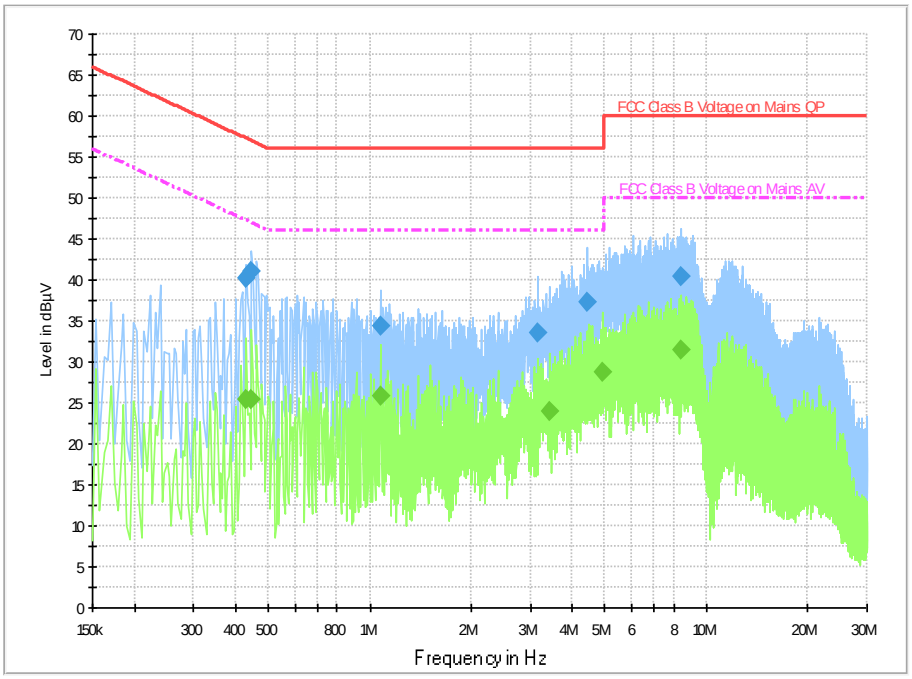

Fig A.20 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.430000	40.3	2000.0	9.000	On	L1	19.7	17.0	57.3	
0.446000	41.1	2000.0	9.000	On	L1	19.7	15.8	56.9	
1.074000	34.4	2000.0	9.000	On	L1	19.7	21.6	56.0	
3.158000	33.6	2000.0	9.000	On	L1	19.6	22.4	56.0	
4.406000	37.2	2000.0	9.000	On	L1	19.6	18.8	56.0	
8.422000	40.5	2000.0	9.000	On	L1	19.7	19.5	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.430000	25.5	2000.0	9.000	On	L1	19.7	21.8	47.3	
0.446000	25.4	2000.0	9.000	On	L1	19.7	21.6	46.9	
1.078000	25.9	2000.0	9.000	On	L1	19.7	20.1	46.0	
3.434000	24.0	2000.0	9.000	On	L1	19.6	22.0	46.0	
4.902000	28.8	2000.0	9.000	On	L1	19.6	17.2	46.0	
8.422000	31.5	2000.0	9.000	On	L1	19.7	18.5	50.0	

USB Mode, Set.1-3:

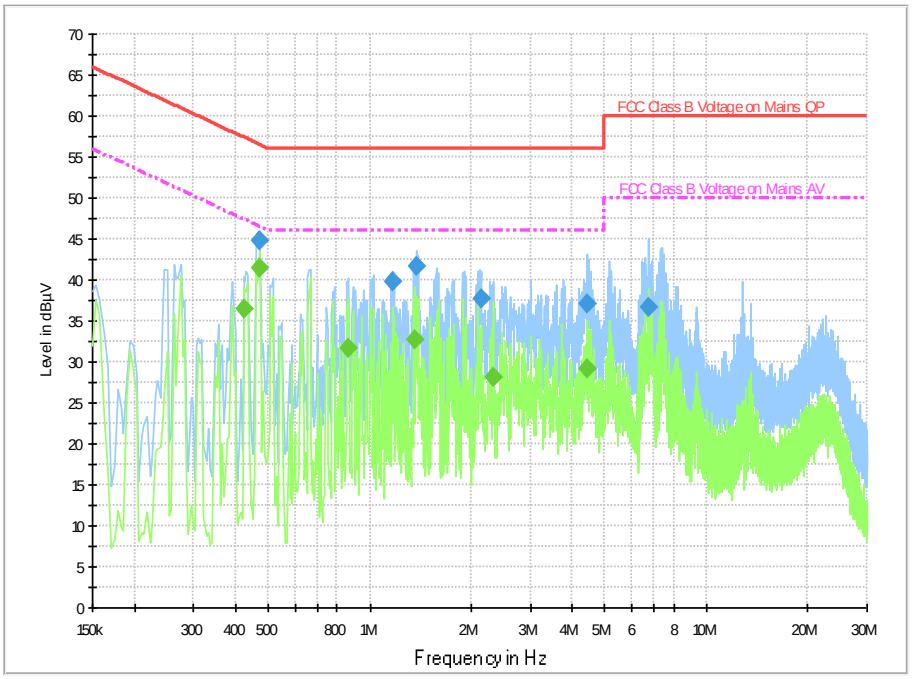

Fig A.21 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.470000	44.8	2000.0	9.000	On	L1	19.7	11.7	56.5	
1.174000	39.8	2000.0	9.000	On	L1	19.7	16.2	56.0	
1.378000	41.6	2000.0	9.000	On	L1	19.6	14.4	56.0	
2.138000	37.7	2000.0	9.000	On	N	19.6	18.3	56.0	
4.442000	37.2	2000.0	9.000	On	N	19.6	18.8	56.0	
6.710000	36.6	2000.0	9.000	On	L1	19.6	23.4	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.426000	36.5	2000.0	9.000	On	N	19.7	10.8	47.3	
0.470000	41.5	2000.0	9.000	On	N	19.7	5.0	46.5	
0.866000	31.6	2000.0	9.000	On	N	19.6	14.4	46.0	
1.354000	32.7	2000.0	9.000	On	N	19.6	13.3	46.0	
2.326000	28.1	2000.0	9.000	On	N	19.6	17.9	46.0	
4.446000	29.2	2000.0	9.000	On	N	19.6	16.8	46.0	

Charging Mode, Set.2-1:

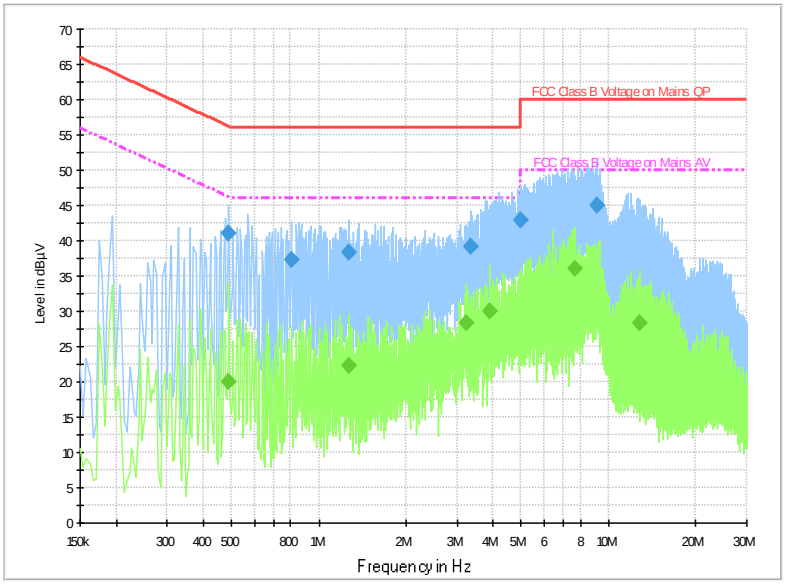

Fig A.22 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.490000	41.1	2000.0	9.000	On	N	19.7	15.1	56.2	
0.802000	37.2	2000.0	9.000	On	N	19.7	18.8	56.0	
1.270000	38.4	2000.0	9.000	On	L1	19.7	17.6	56.0	
3.354000	39.2	2000.0	9.000	On	L1	19.6	16.8	56.0	
4.982000	42.9	2000.0	9.000	On	L1	19.6	13.1	56.0	
9.162000	45.0	2000.0	9.000	On	L1	19.7	15.0	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.490000	20.1	2000.0	9.000	On	N	19.7	26.1	46.2	
1.270000	22.4	2000.0	9.000	On	L1	19.7	23.6	46.0	
3.238000	28.4	2000.0	9.000	On	L1	19.6	17.6	46.0	
3.874000	29.9	2000.0	9.000	On	L1	19.6	16.1	46.0	
7.678000	36.0	2000.0	9.000	On	L1	19.7	14.0	50.0	
12.770000	28.3	2000.0	9.000	On	L1	19.7	21.7	50.0	

Charging Mode, Set.2-2:

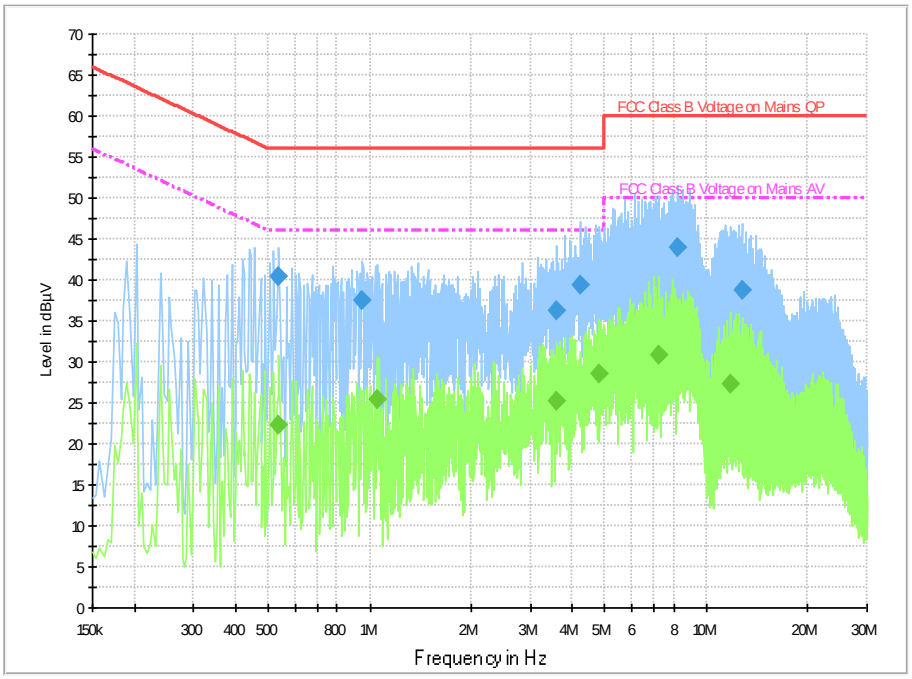

Fig A.23 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.538000	40.3	2000.0	9.000	On	L1	19.7	15.7	56.0	
0.950000	37.5	2000.0	9.000	On	L1	19.7	18.5	56.0	
3.574000	36.2	2000.0	9.000	On	L1	19.6	19.8	56.0	
4.206000	39.4	2000.0	9.000	On	L1	19.6	16.6	56.0	
8.194000	44.0	2000.0	9.000	On	L1	19.6	16.0	60.0	
12.726000	38.8	2000.0	9.000	On	L1	19.7	21.2	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.538000	22.3	2000.0	9.000	On	L1	19.7	23.7	46.0	
1.054000	25.4	2000.0	9.000	On	L1	19.7	20.6	46.0	
3.574000	25.3	2000.0	9.000	On	L1	19.6	20.7	46.0	
4.778000	28.6	2000.0	9.000	On	L1	19.6	17.4	46.0	
7.262000	30.8	2000.0	9.000	On	L1	19.6	19.2	50.0	
11.814000	27.4	2000.0	9.000	On	L1	19.7	22.6	50.0	

USB Mode, Set.3-2:

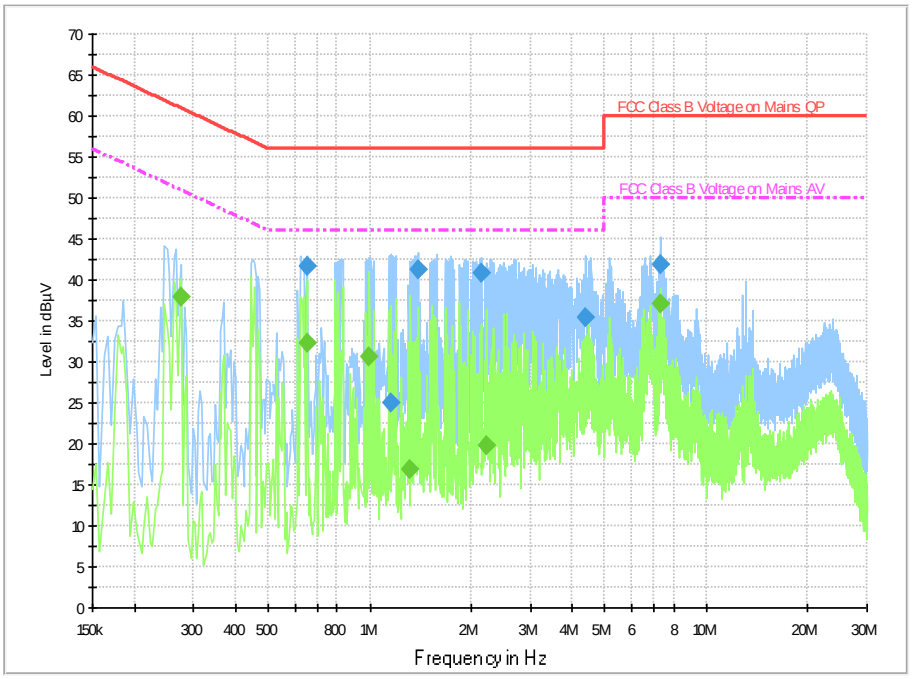

Fig A.24 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.650000	41.8	2000.0	9.000	On	L1	19.7	14.2	56.0	
1.158000	25.0	2000.0	9.000	On	L1	19.7	31.0	56.0	
1.394000	41.3	2000.0	9.000	On	L1	19.6	14.7	56.0	
2.142000	40.8	2000.0	9.000	On	N	19.6	15.2	56.0	
4.378000	35.4	2000.0	9.000	On	L1	19.6	20.6	56.0	
7.330000	41.8	2000.0	9.000	On	L1	19.6	18.2	60.0	

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.274000	37.9	2000.0	9.000	On	L1	19.7	13.1	51.0	
0.650000	32.3	2000.0	9.000	On	L1	19.7	13.7	46.0	
0.998000	30.5	2000.0	9.000	On	L1	19.7	15.5	46.0	
1.322000	17.0	2000.0	9.000	On	N	19.6	29.0	46.0	
2.210000	19.8	2000.0	9.000	On	N	19.6	26.2	46.0	
7.330000	37.1	2000.0	9.000	On	L1	19.6	12.9	50.0	

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