FCC & ISED TEST REPORT

Product Name:	IP Phone
Trade Mark:	GRANDSTREAM
Model No.:	GRP2613
Add. Model No.:	N/A
Report Number:	200227002EMC-1
Test Standards:	FCC 47 CFR Part 15 Subpart B ICES-003 Issue 6
FCC ID:	YZZGRP2613V2
Test Result:	PASS
Date of Issue:	April 21, 2020

Prepared for:

Grandstream Networks, Inc.
126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

Prepared by:

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Date: April 21, 2020

Version

Version No.	Date	Description
V1.0	April 21, 2020	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks,Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA
Manufacturer:	Grandstream Networks,Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	IP Phone
Model No.:	GRP2613
Add. Model No.:	N/A
Trade Mark:	GRANDSTREAM
DUT Stage:	Production Unit
Rated Voltage:	☒ 100-240V~50/60Hz
	☒ Powered by POE port
Classification of digital devices:	Class B
Highest Internal Frequency:	1.3 GHz
Software Version:	0.2.21.58
Hardware Version:	V2.1
Sample Received Date:	February 27, 2020
Sample Tested Date:	March 3, 2020 to April 7, 2020

1.2.2 Description of Accessories

Adapter 1	
Model No.:	GQ06-050060-ZU
Input:	100-240 V~50/60 Hz 0.3 A Max
Output:	5.0 V ⎓ 0.6 A
DC Cable:	1.50 Meter, Unshielded without ferrite

Adapter 2	
Model No.:	PS05L050K0600UD
Input:	100-240 V~50/60 Hz 0.25 A Max
Output:	5.0 V ⎓ 0.6 A
DC Cable:	1.50 Meter, Unshielded without ferrite

Adapter 3	
Model No.:	F06US0500060A
Input:	100-240 V~50/60 Hz 0.2 A Max
Output:	5.0 V ⎓ 0.6 A
DC Cable:	1.50 Meter, Unshielded without ferrite

Cable (1)	
Description:	Ethernet Cable (RJ45)
Cable Type:	Unshielded without ferrite
Length:	1.5 Meter

Cable (2)	
Description:	Phone Cord (RJ9)
Cable Type:	Unshielded without ferrite
Length:	3.5 Meter

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	FCC ID	Supplied by
Notebook	Lenovo	B40-80	MP12NEQ6	N/A	UnionTrust
Notebook	DELL	Latitude 3400	6GJQKT2	N/A	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	N/A	UnionTrust
Mouse	DELL	MOCZUL	CN-0V7623-73826-65K-00XR	N/A	UnionTrust
Headset	YEY	VE120-MV	N/A	N/A	UnionTrust
Standard POE Power supply	TP-LINK	TL-POE160S	N/A	N/A	UnionTrust
IP Phone	GRANDSTREAM	GRP2612	N/A	N/A	Applicant

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Ethernet Cable	RJ45	1.0 Unshielded without ferrite	UnionTrust
2	Ethernet Cable	RJ45	5.0 Unshielded without ferrite	UnionTrust
3	Ethernet Cable	RJ45	2.0 Unshielded without ferrite	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.5 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Conducted Emission	FCC 47 CFR Part 15.107 ICES-003 Issue 6 Section 6.1	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109 ICES-003 Issue 6 Section 6.2	ANSI C63.4-2014	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 16, 2019	Nov. 15, 2020
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 18, 2019	May 18, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 24, 2019	Nov. 23, 2020
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2019	Nov. 23, 2020
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020
☒	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	AC 120V/60Hz or AC 240V/50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Conducted Emission	25.9	50.0	100.3	Bert Xiong
Radiated Emission	25.5	52.0	100.3	Asia Yan

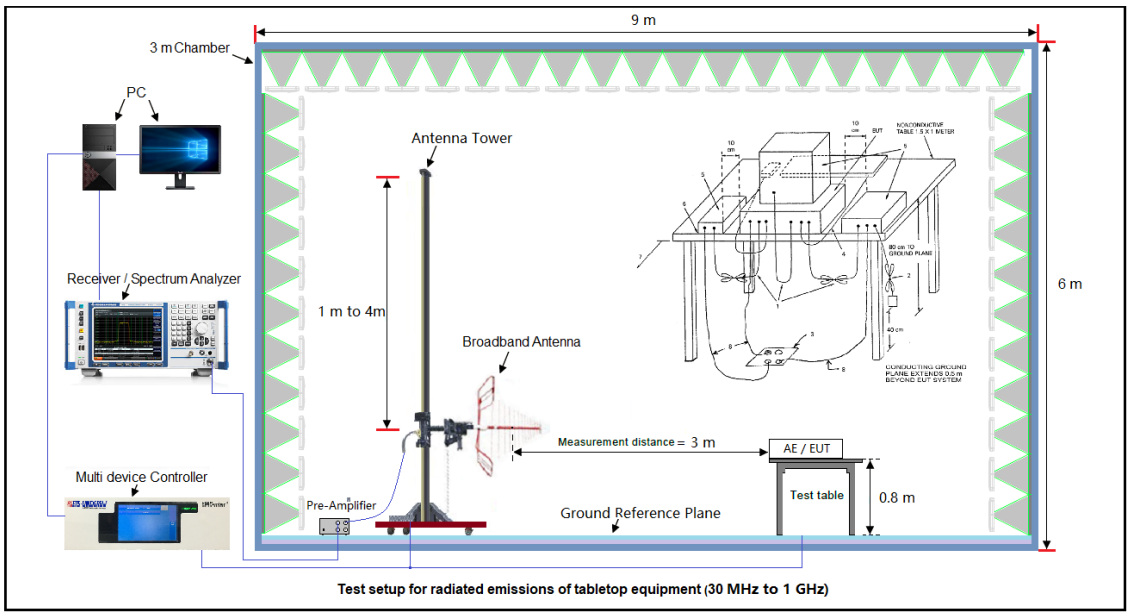
4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	**TM1: AC120V/60Hz (Adaptor1) + Hands Free** TM2: AC120V/60Hz (Adaptor1) + Ringing TM3: AC120V/60Hz (Adaptor1) + Handset TM4: AC120V/60Hz (Adaptor1) + Headset TM5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 **TM6: Worse from mode 1~5 (Adaptor2)** **TM7: Worse from mode 1~5 (Adaptor3)** **TM8: AC120V/60Hz (POE) +Worse from mode 1~3**
Conducted Emission	TM1: AC120V/60Hz (Adaptor1) + Hands Free TM2: AC120V/60Hz (Adaptor1) + Ringing **TM3: AC120V/60Hz (Adaptor1) + Handset** TM4: AC120V/60Hz (Adaptor1) + Headset TM5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 **TM6: Worse from mode 1~5 (Adaptor2)** **TM7: Worse from mode 1~5 (Adaptor3)** **TM8: AC120V/60Hz (POE) +Worse from mode 1~3**

4.3 TEST SETUP

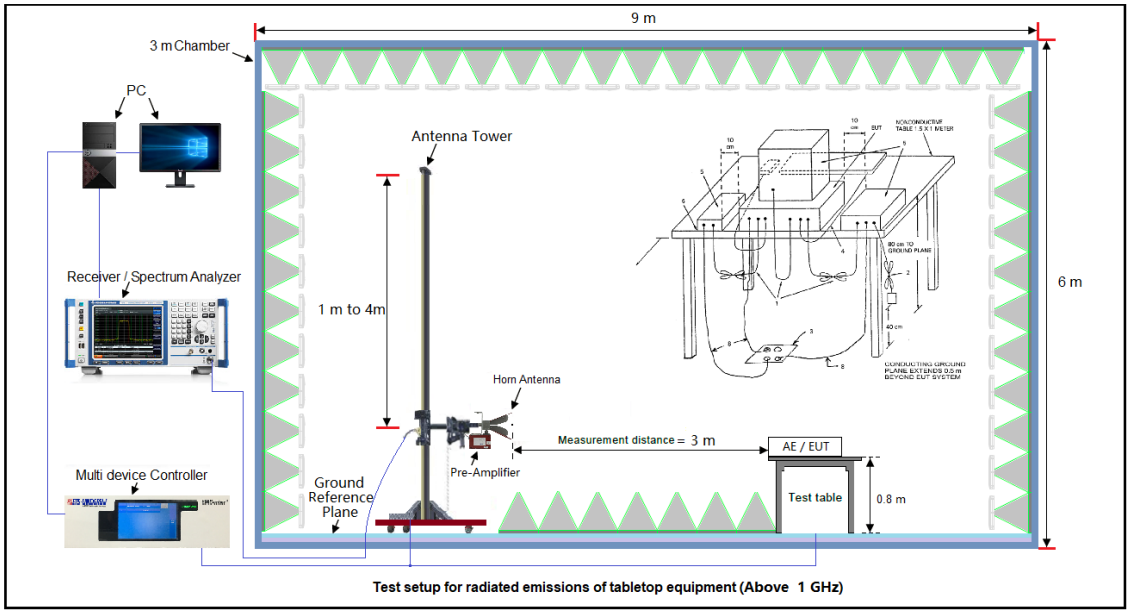
4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

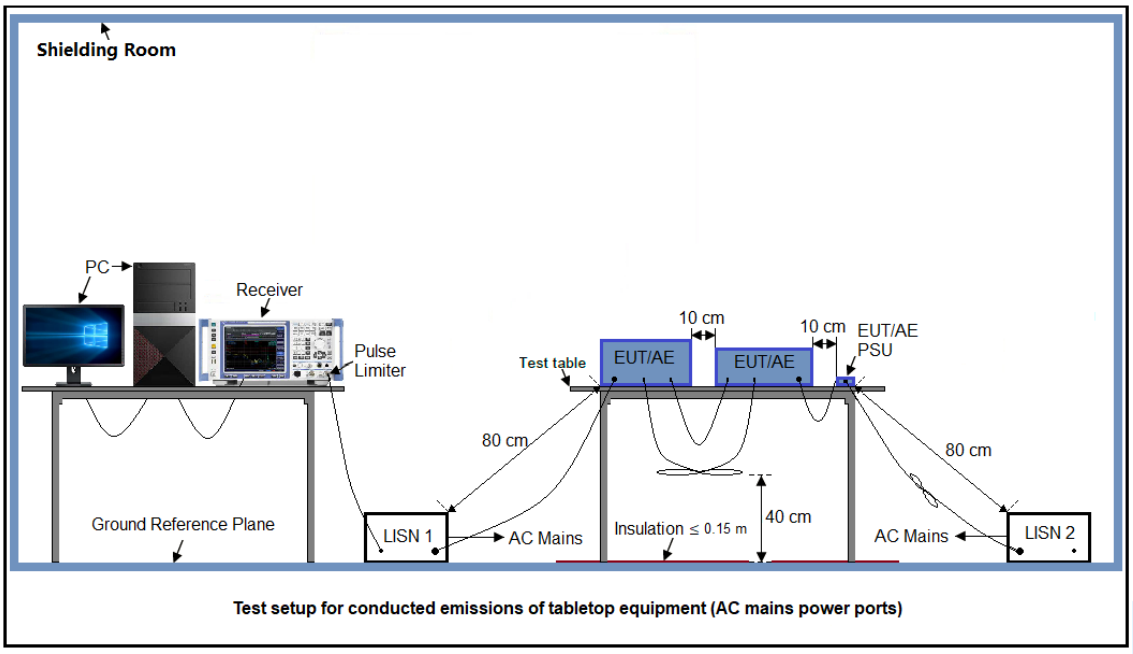
Figure 2. Above 1GHz



Test setup for radiated emissions of tabletop equipment (Above 1 GHz)

4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



Test setup for conducted emissions of tabletop equipment (AC mains power ports)

4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ICES-003 Issue 6	Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement
3	ANSI C63.4-2014	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
4	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
5	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109
ICES-003 Issue 6 Clause 6.2

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
30 ≤ f ≤ 1 000	Quasi Peak	120 kHz	300 kHz
f ≥1000	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Limits:

Limits for Class B devices

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

1. From 30 MHz to 1GHz test procedure as below:

1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

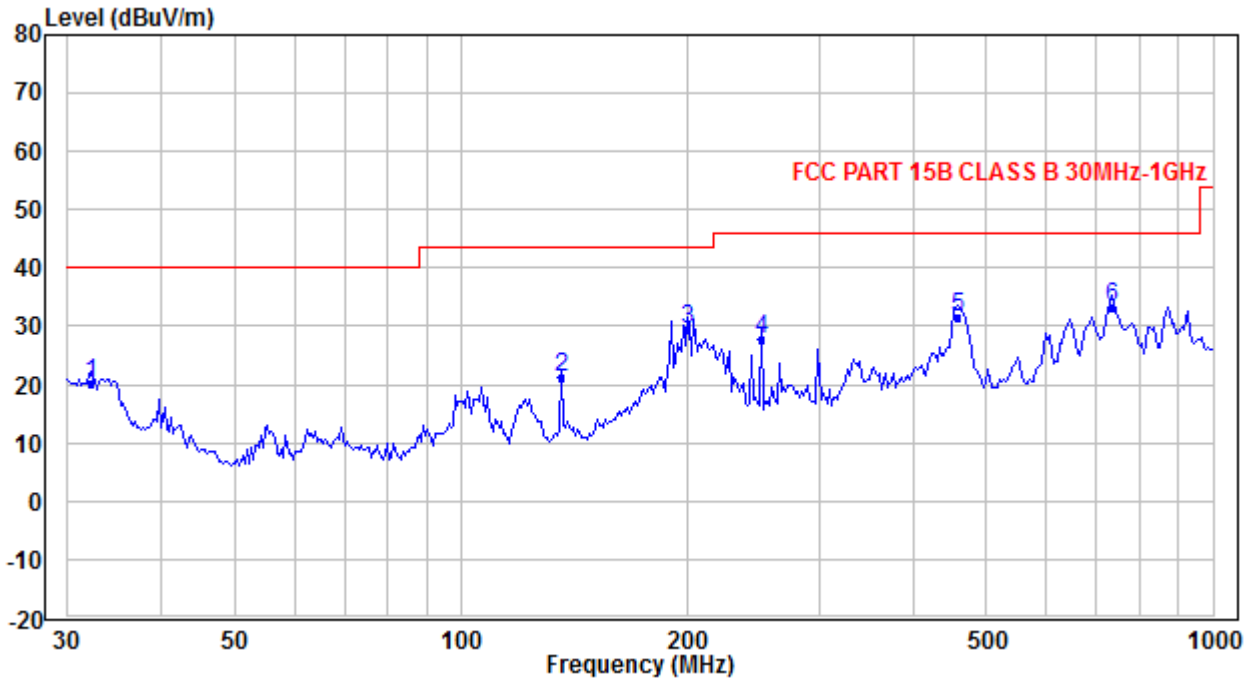
1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

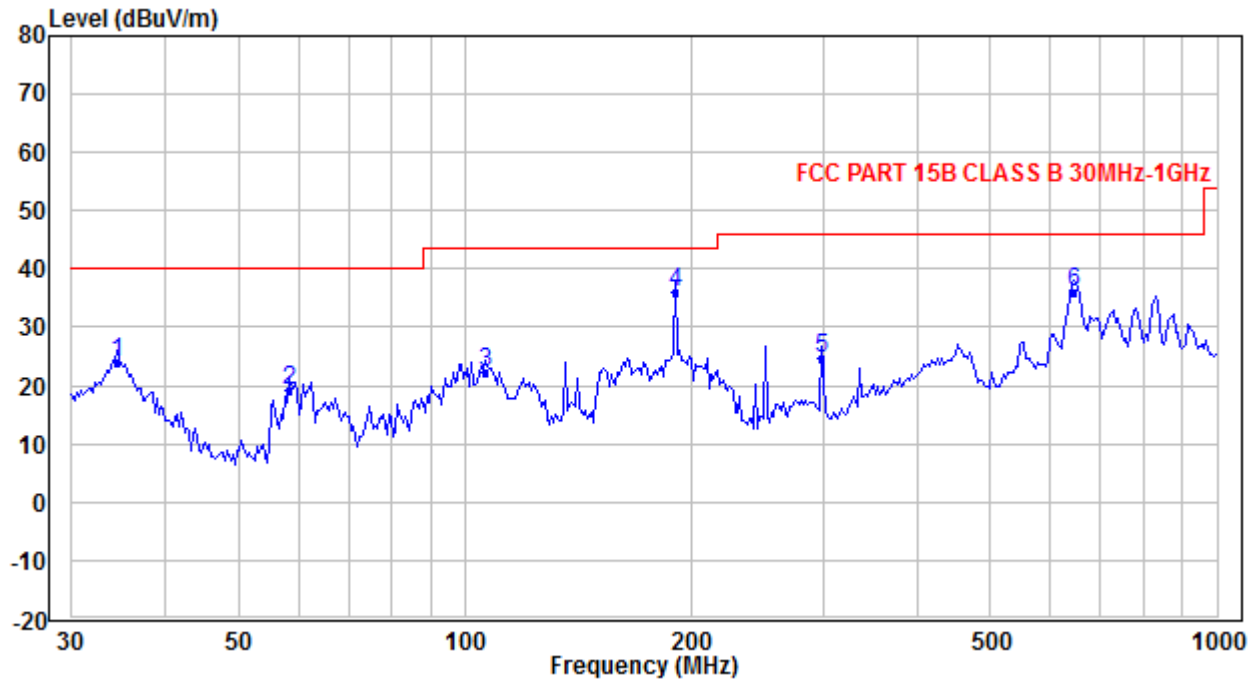
The measurement data as follows:

Below 1GHz(Quasi Peak):
TM1
Horizontal



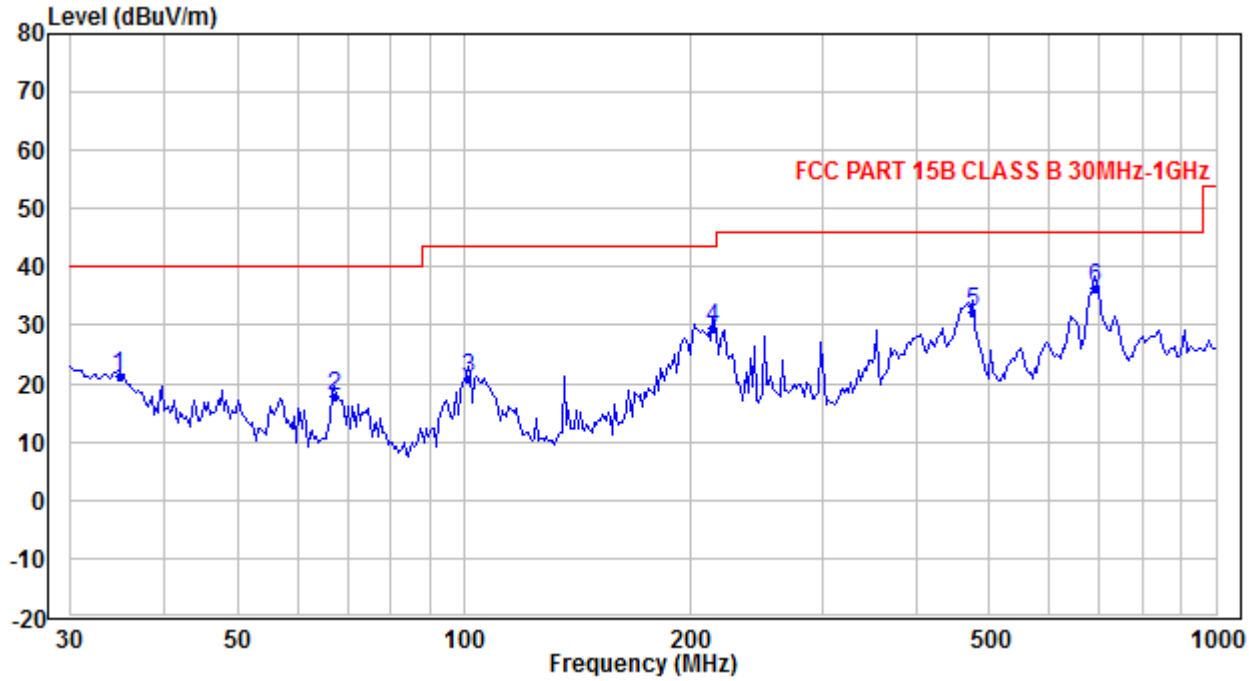
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.184	32.63	-12.51	20.12	40.00	-19.88	QP
2	135.916	39.43	-18.21	21.22	43.50	-22.28	QP
3	200.043	45.29	-15.85	29.44	43.50	-14.06	QP
4	250.486	41.12	-13.27	27.85	46.00	-18.15	QP
5	458.399	39.94	-8.45	31.49	46.00	-14.51	QP
6	734.037	36.77	-3.52	33.25	46.00	-12.75	QP

Vertical



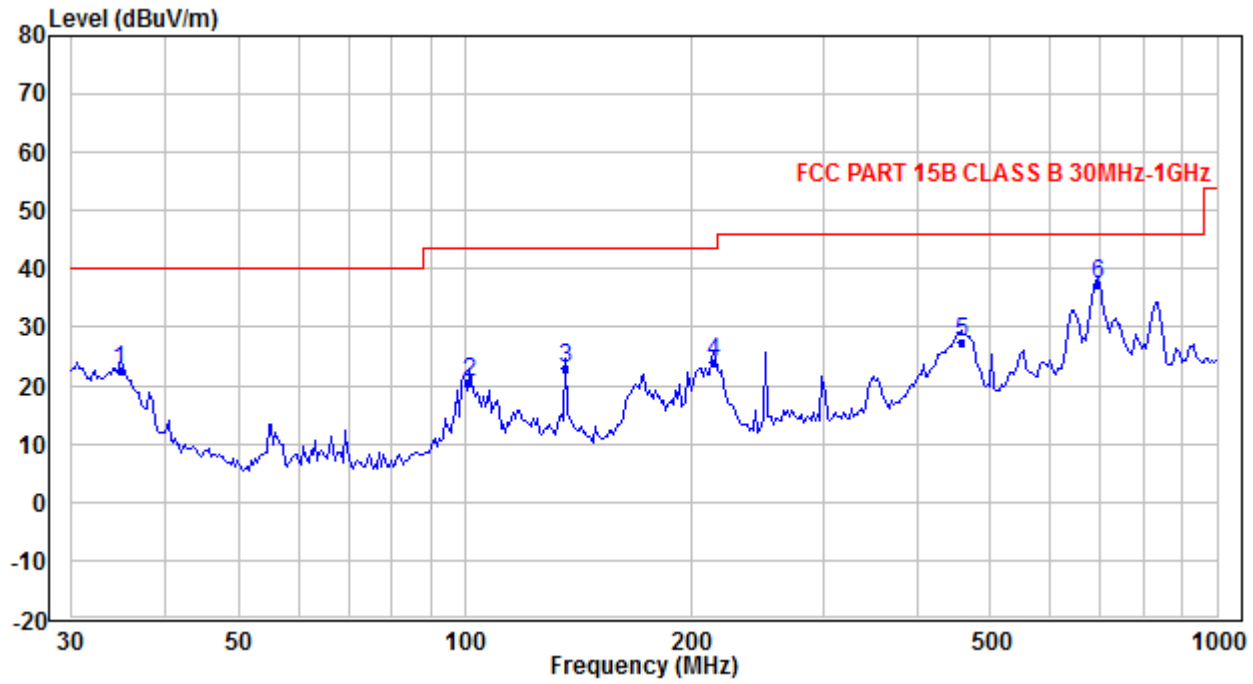
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.527	37.94	-14.00	23.94	40.00	-16.06	QP
2	58.485	39.87	-20.56	19.31	40.00	-20.69	QP
3	106.281	40.47	-18.19	22.28	43.50	-21.22	QP
4	190.441	52.45	-16.29	36.16	43.50	-7.34	QP
5	298.593	36.81	-12.05	24.76	46.00	-21.24	QP
6	646.822	42.22	-6.11	36.11	46.00	-9.89	QP

Below 1GHz(Quasi Peak):
TM6
Horizontal



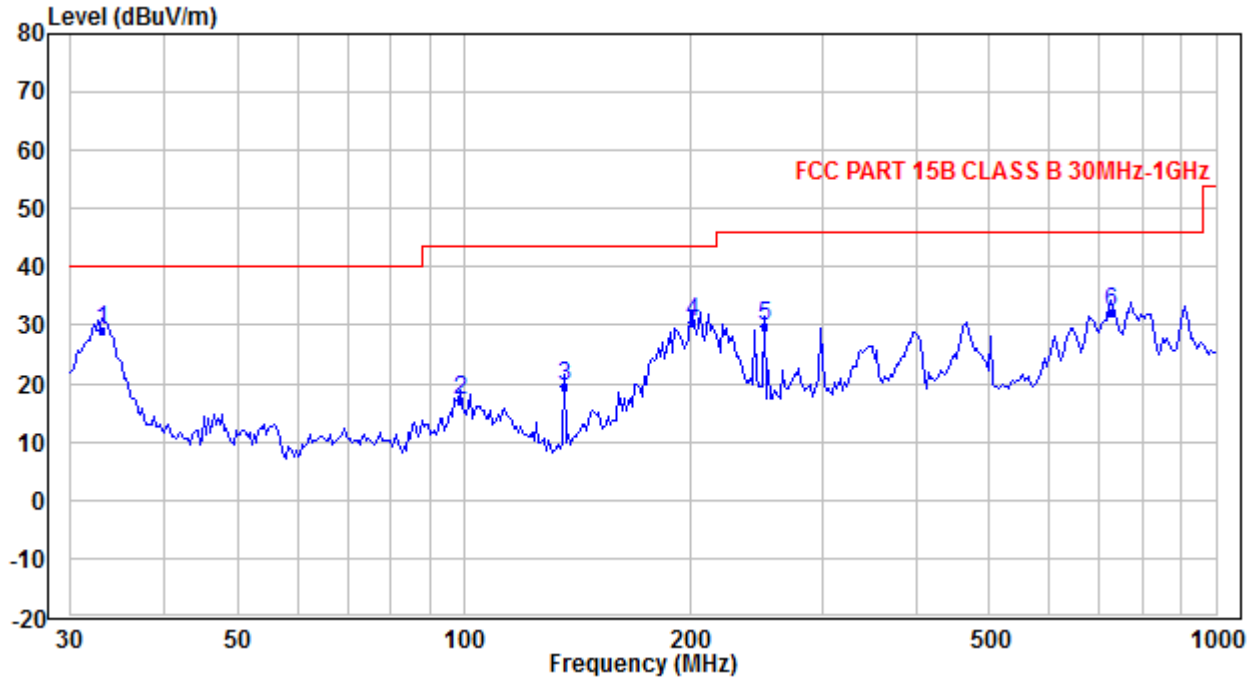
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.770	34.98	-13.83	21.15	40.00	-18.85	QP
2	67.311	38.08	-20.41	17.67	40.00	-22.33	QP
3	101.180	39.13	-18.12	21.01	43.50	-22.49	QP
4	214.606	44.77	-15.19	29.58	43.50	-13.92	QP
5	474.791	40.19	-7.98	32.21	46.00	-13.79	QP
6	689.051	39.68	-3.25	36.43	46.00	-9.57	QP

Vertical



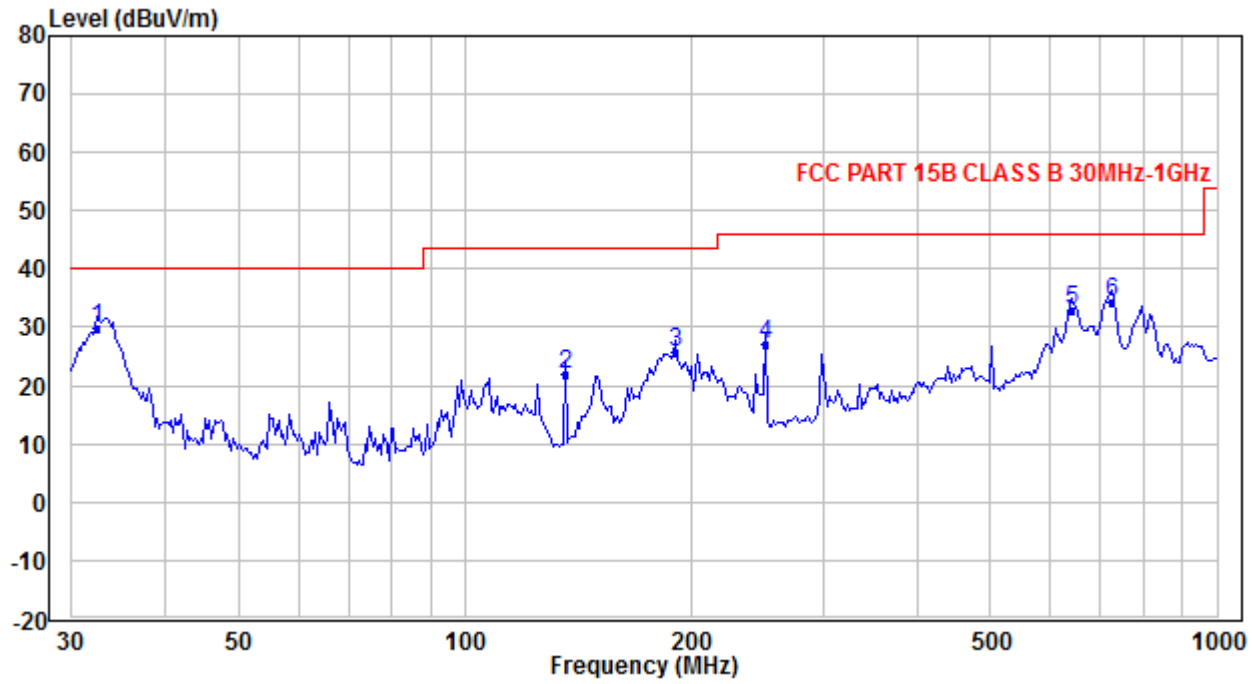
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.770	36.79	-14.15	22.64	40.00	-17.36	QP
2	101.180	38.73	-18.12	20.61	43.50	-22.89	QP
3	135.916	41.04	-18.21	22.83	43.50	-20.67	QP
4	214.606	39.25	-15.19	24.06	43.50	-19.44	QP
5	458.399	35.94	-8.55	27.39	46.00	-18.61	QP
6	693.910	41.93	-4.43	37.50	46.00	-8.50	QP

Below 1GHz(Quasi Peak):
TM7
Horizontal



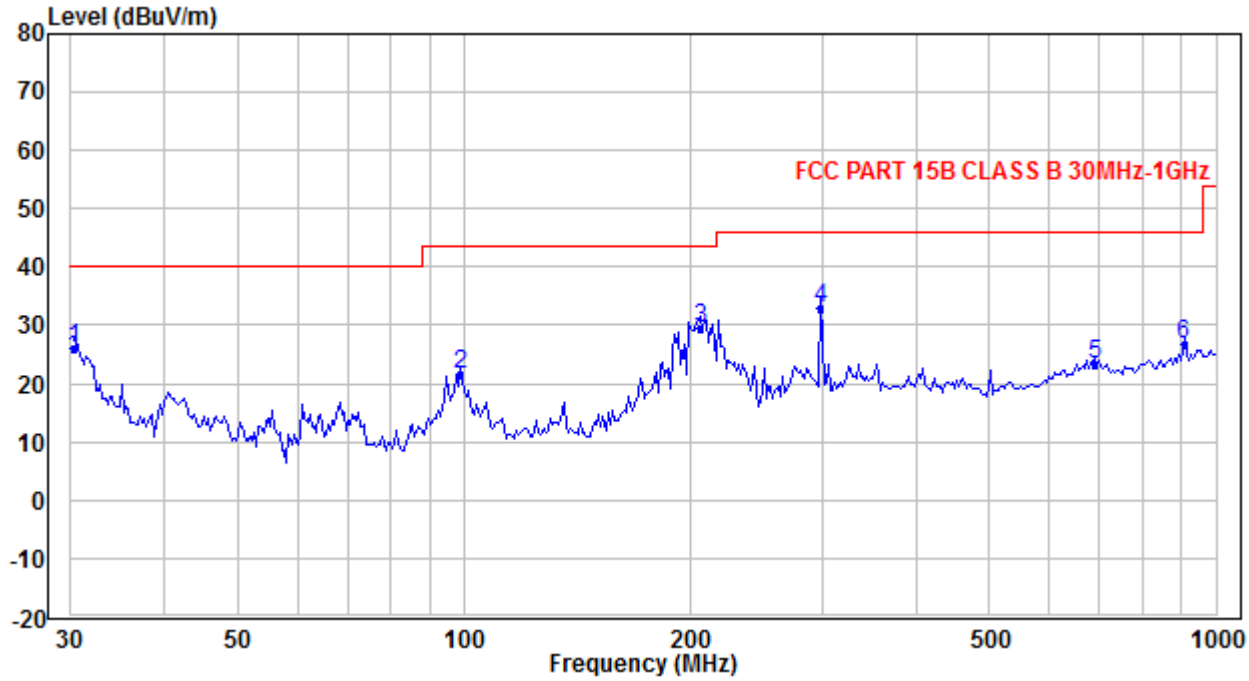
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	33.101	42.08	-12.98	29.10	40.00	-10.90	QP
2	99.069	35.18	-18.21	16.97	43.50	-26.53	QP
3	135.916	37.85	-18.21	19.64	43.50	-23.86	QP
4	201.454	46.16	-15.77	30.39	43.50	-13.11	QP
5	250.486	42.94	-13.27	29.67	46.00	-16.33	QP
6	723.793	35.77	-3.55	32.22	46.00	-13.78	QP

Vertical



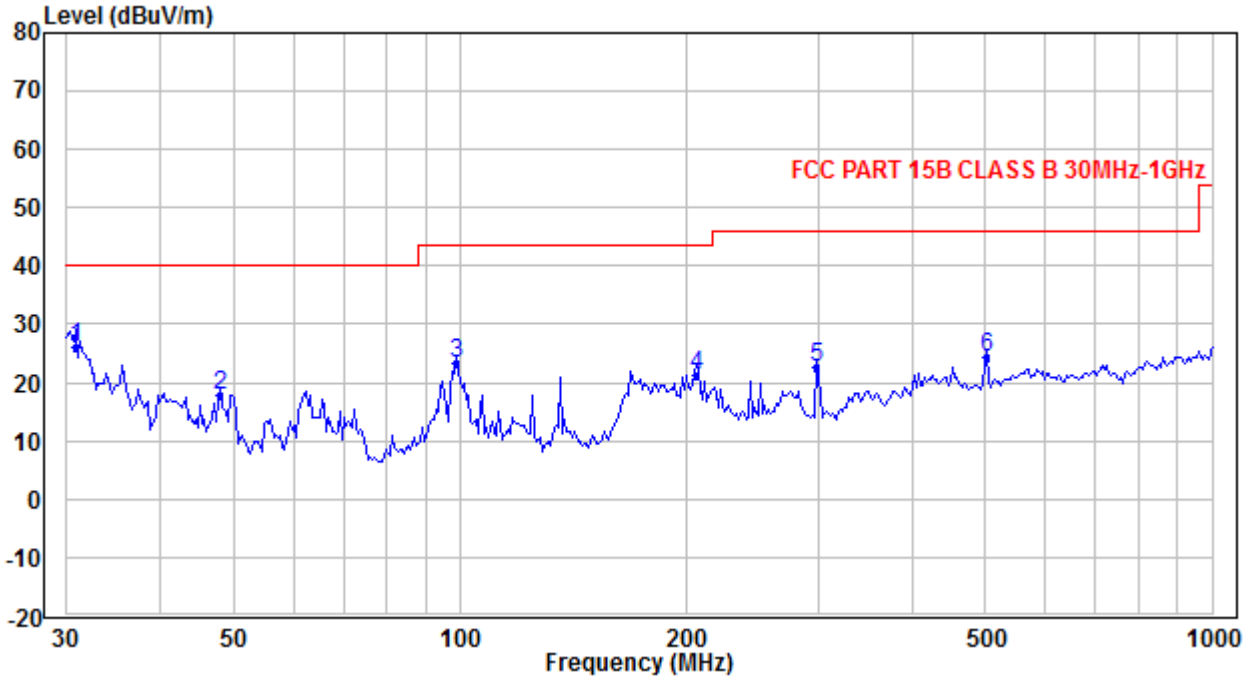
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.411	42.50	-12.63	29.87	40.00	-10.13	QP
2	135.916	40.26	-18.21	22.05	43.50	-21.45	QP
3	190.441	42.11	-16.29	25.82	43.50	-17.68	QP
4	250.486	40.28	-13.27	27.01	46.00	-18.99	QP
5	642.292	39.12	-6.09	33.03	46.00	-12.97	QP
6	723.793	38.65	-4.37	34.28	46.00	-11.72	QP

Below 1GHz(Quasi Peak):
TM8
Horizontal



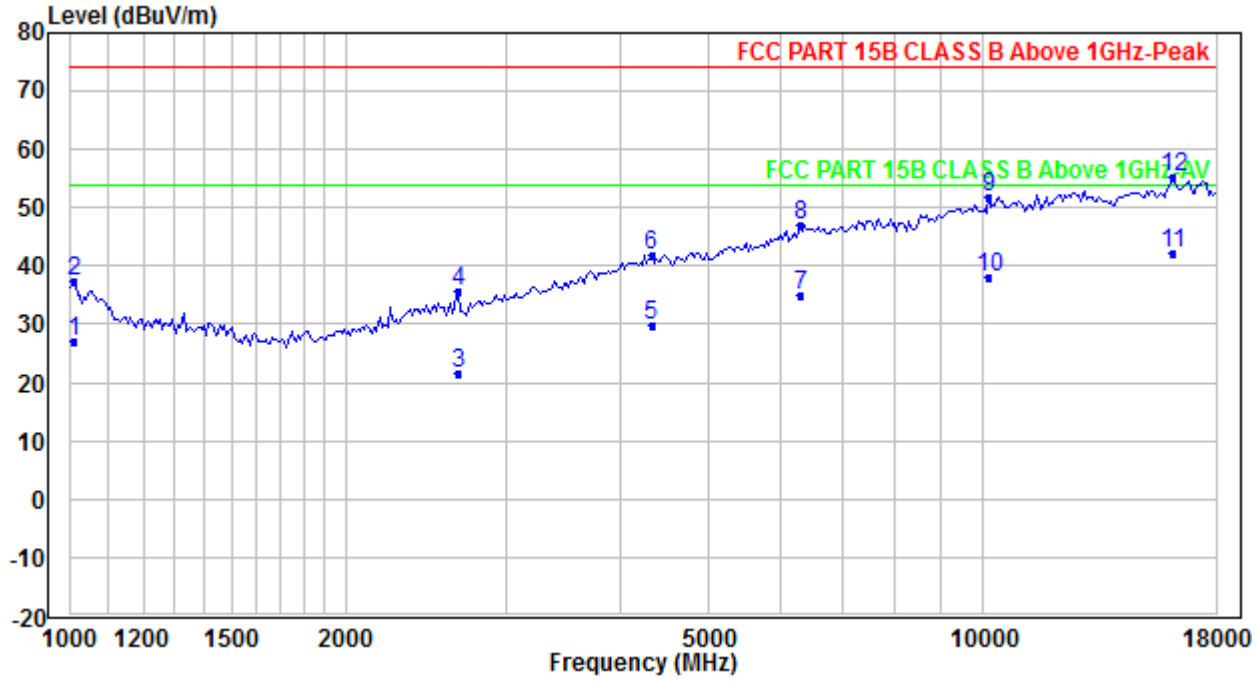
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.212	37.48	-11.50	25.98	40.00	-14.02	QP
2	99.069	39.74	-18.21	21.53	43.50	-21.97	QP
3	205.746	45.10	-15.59	29.51	43.50	-13.99	QP
4	298.593	45.06	-12.05	33.01	46.00	-12.99	QP
5	689.051	26.63	-3.25	23.38	46.00	-22.62	QP
6	906.304	27.95	-1.05	26.90	46.00	-19.10	QP

Vertical



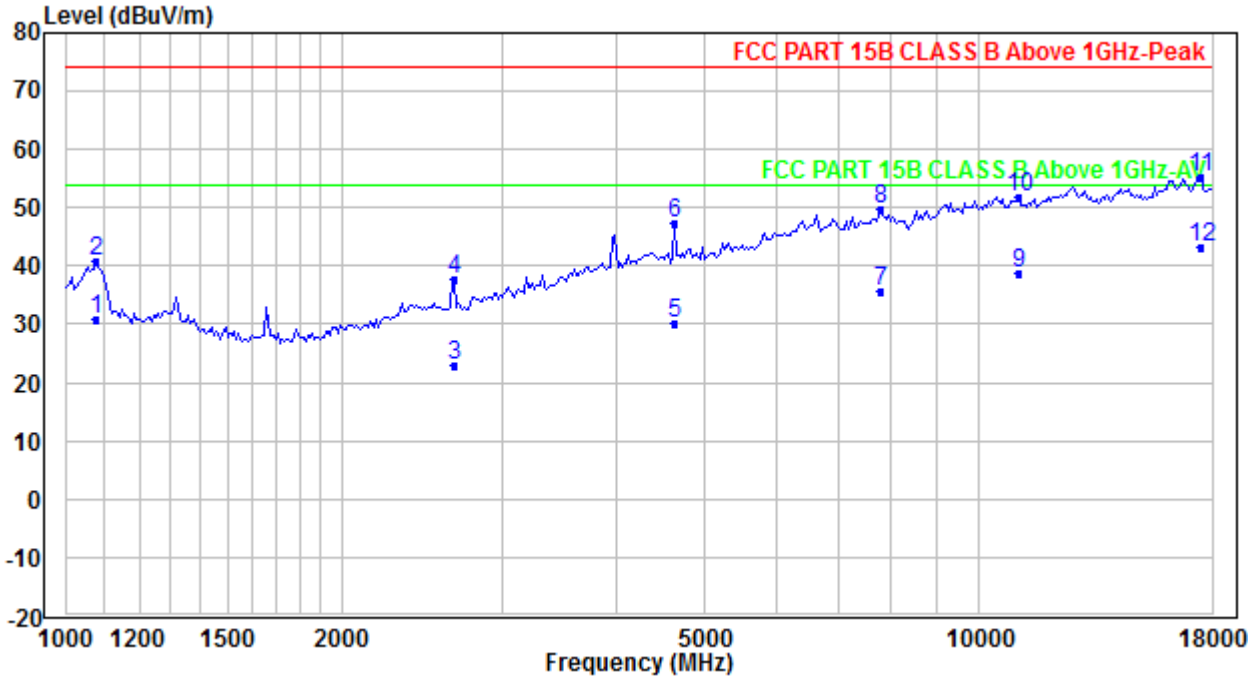
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.855	37.64	-11.63	26.01	40.00	-13.99	QP
2	48.039	37.78	-20.08	17.70	40.00	-22.30	QP
3	99.069	41.43	-18.21	23.22	43.50	-20.28	QP
4	205.746	36.98	-15.59	21.39	43.50	-22.11	QP
5	298.593	34.55	-12.05	22.50	46.00	-23.50	QP
6	502.247	31.60	-7.33	24.27	46.00	-21.73	QP

Above 1GHz(Peak & Average)
TM1
Horizontal



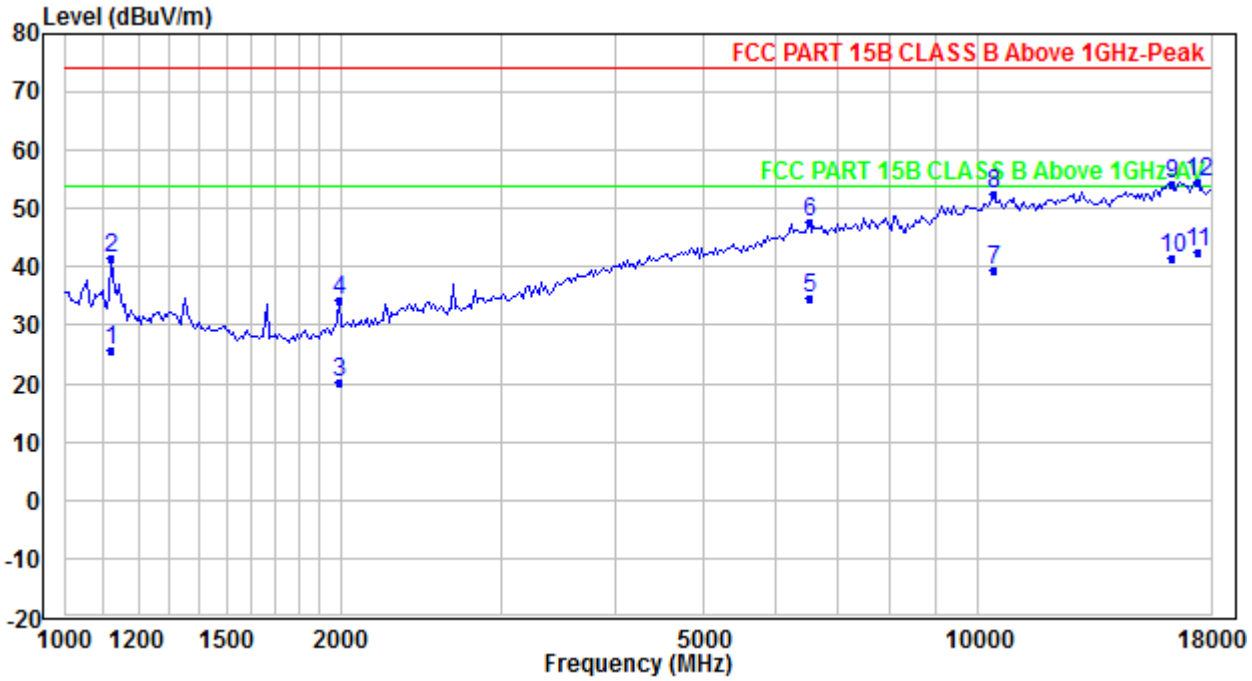
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1005.809	38.75	-11.53	27.22	54.00	-26.78	AV
2	1005.809	48.75	-11.53	37.22	74.00	-36.78	PK
3	2661.536	21.92	-0.23	21.69	54.00	-32.31	AV
4	2661.536	35.92	-0.23	35.69	74.00	-38.31	PK
5	4329.530	25.17	4.70	29.87	54.00	-24.13	AV
6	4329.530	37.17	4.70	41.87	74.00	-32.13	PK
7	6308.894	27.62	7.45	35.07	54.00	-18.93	AV
8	6308.894	39.62	7.45	47.07	74.00	-26.93	PK
9	10144.500	42.80	9.13	51.93	74.00	-22.07	PK
10	10144.500	28.80	9.13	37.93	54.00	-16.07	AV
11	16124.140	29.38	12.82	42.20	54.00	-11.80	AV
12	16124.140	42.38	12.82	55.20	74.00	-18.80	PK

Vertical



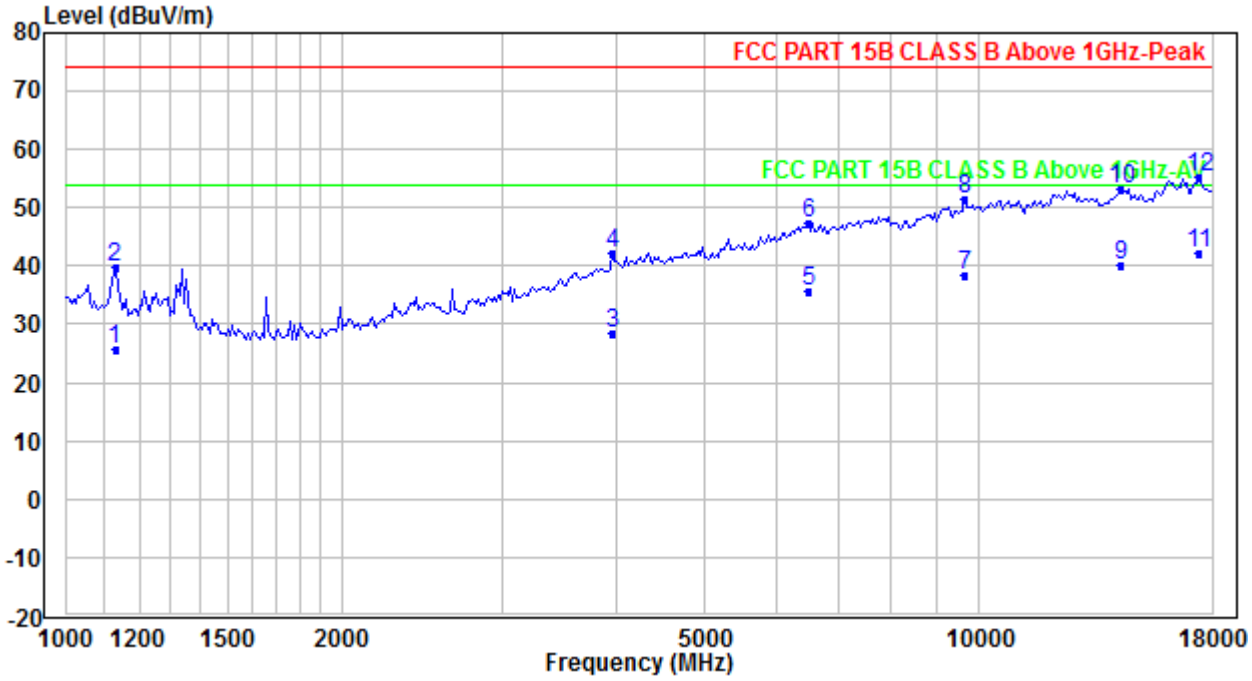
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1078.208	41.95	-11.24	30.71	54.00	-23.29	AV
2	1078.208	51.95	-11.24	40.71	74.00	-33.29	PK
3	2661.536	23.31	-0.46	22.85	54.00	-31.15	AV
4	2661.536	38.31	-0.46	37.85	74.00	-36.15	PK
5	4641.172	26.54	3.70	30.24	54.00	-23.76	AV
6	4641.172	43.54	3.70	47.24	74.00	-26.76	PK
7	7816.810	28.56	7.14	35.70	54.00	-18.30	AV
8	7816.810	42.56	7.14	49.70	74.00	-24.30	PK
9	11065.320	29.78	9.00	38.78	54.00	-15.22	AV
10	11065.320	42.78	9.00	51.78	74.00	-22.22	PK
11	17486.170	40.67	14.52	55.19	74.00	-18.81	PK
12	17486.170	28.67	14.52	43.19	54.00	-10.81	AV

Above 1GHz(Peak & Average)
TM6
Horizontal



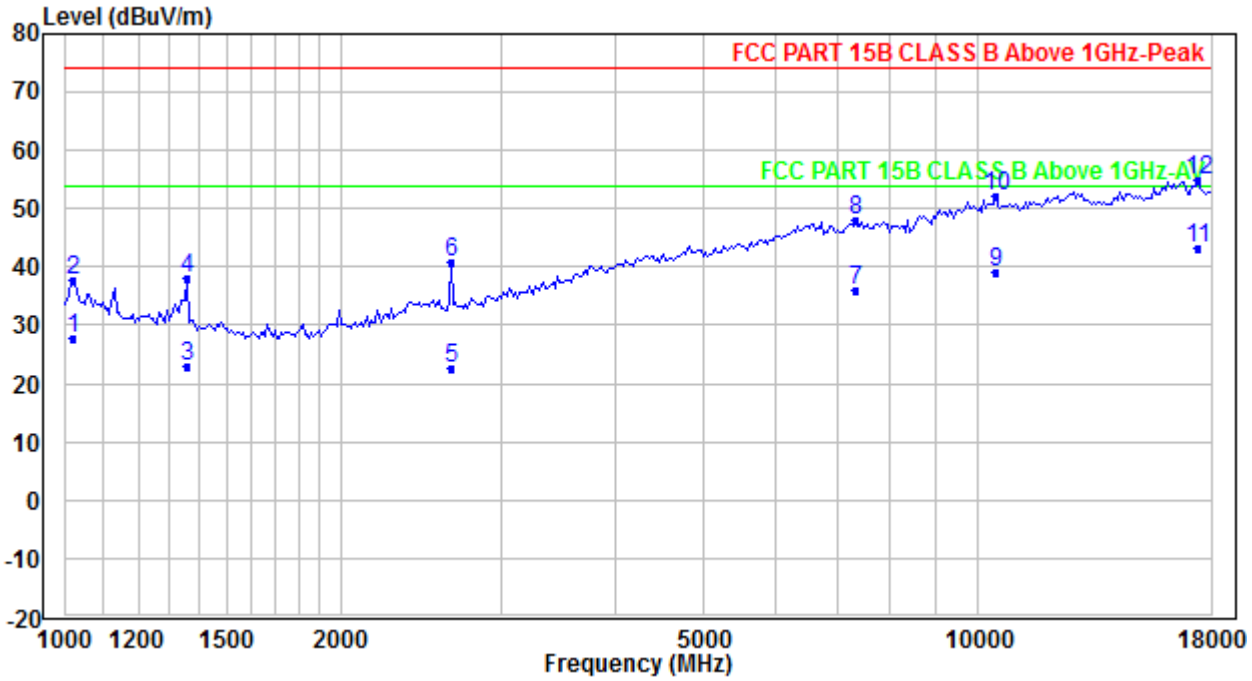
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1122.824	36.86	-11.24	25.62	54.00	-28.38	AV
2	1122.824	52.86	-11.24	41.62	74.00	-32.38	PK
3	1992.295	25.01	-4.75	20.26	54.00	-33.74	AV
4	1992.295	39.01	-4.75	34.26	74.00	-39.74	PK
5	6532.007	27.53	7.21	34.74	54.00	-19.26	AV
6	6532.007	40.53	7.21	47.74	74.00	-26.26	PK
7	10382.280	30.06	9.46	39.52	54.00	-14.48	AV
8	10382.280	43.06	9.46	52.52	74.00	-21.48	PK
9	16312.020	41.30	13.06	54.36	74.00	-19.64	PK
10	16312.020	28.30	13.06	41.36	54.00	-12.64	AV
11	17385.170	28.51	14.15	42.66	54.00	-11.34	AV
12	17385.170	40.51	14.15	54.66	74.00	-19.34	PK

Vertical



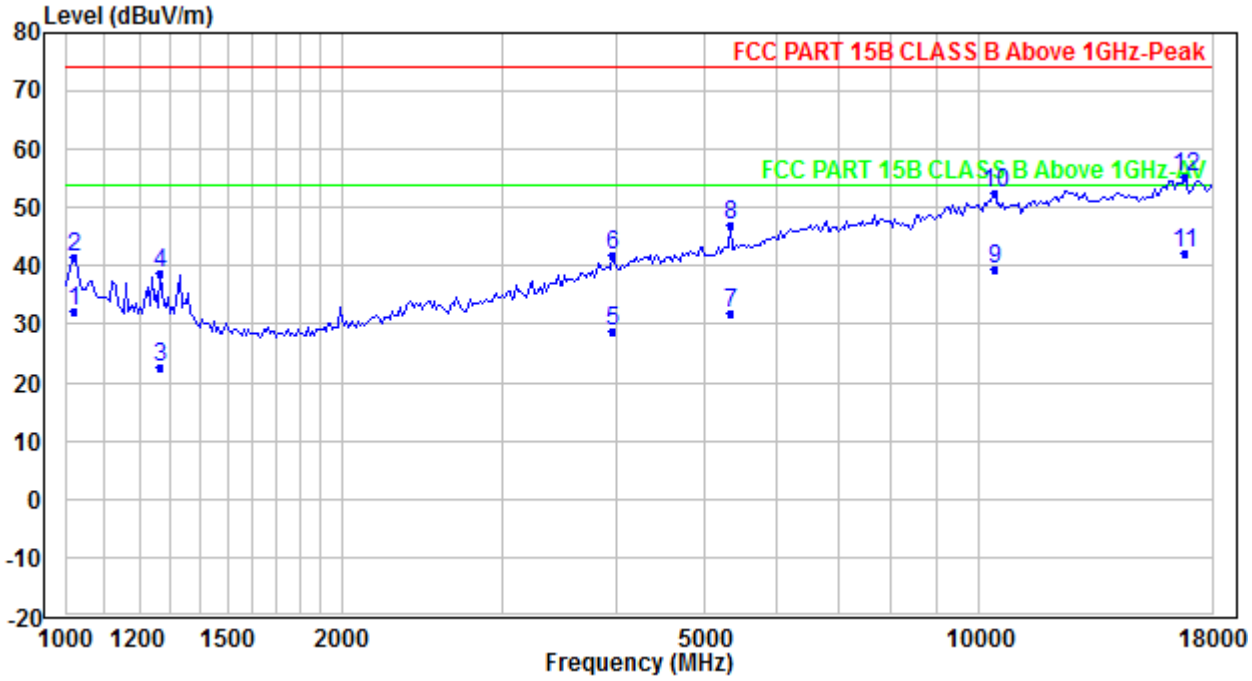
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1129.346	36.95	-11.10	25.85	54.00	-28.15	AV
2	1129.346	50.95	-11.10	39.85	74.00	-34.15	PK
3	3969.238	24.11	4.20	28.31	54.00	-25.69	AV
4	3969.238	38.11	4.20	42.31	74.00	-31.69	PK
5	6494.281	28.35	7.15	35.50	54.00	-18.50	AV
6	6494.281	40.35	7.15	47.50	74.00	-26.50	PK
7	9629.201	29.65	8.72	38.37	54.00	-15.63	AV
8	9629.201	42.65	8.72	51.37	74.00	-22.63	PK
9	14277.410	26.93	13.38	40.31	54.00	-13.69	AV
10	14277.410	39.93	13.38	53.31	74.00	-20.69	PK
11	17385.170	27.99	14.26	42.25	54.00	-11.75	AV
12	17385.170	40.99	14.26	55.25	74.00	-18.75	PK

Above 1GHz(Peak & Average)
TM7
Horizontal



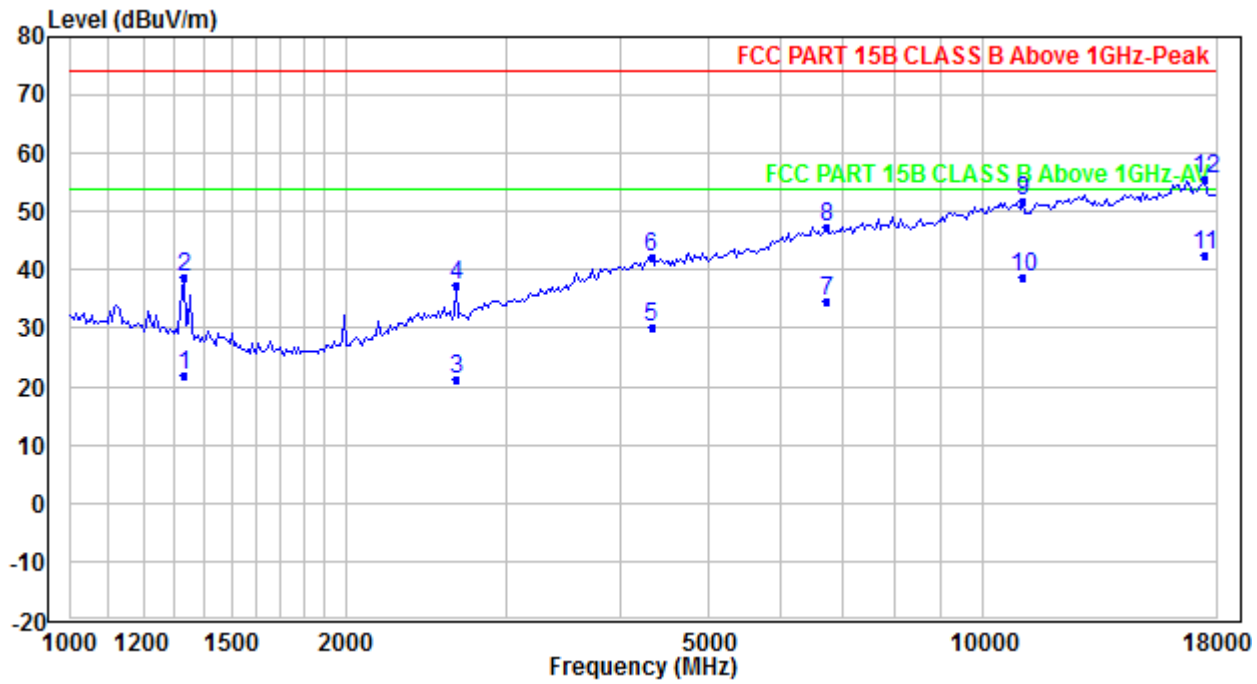
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1017.529	39.31	-11.50	27.81	54.00	-26.19	AV
2	1017.529	49.31	-11.50	37.81	74.00	-36.19	PK
3	1359.332	33.61	-10.62	22.99	54.00	-31.01	AV
4	1359.332	48.61	-10.62	37.99	74.00	-36.01	PK
5	2646.164	22.99	-0.25	22.74	54.00	-31.26	AV
6	2646.164	40.99	-0.25	40.74	74.00	-33.26	PK
7	7334.292	29.26	6.76	36.02	54.00	-17.98	AV
8	7334.292	41.26	6.76	48.02	74.00	-25.98	PK
9	10442.590	29.51	9.56	39.07	54.00	-14.93	AV
9	10442.590	42.51	9.56	52.07	74.00	-21.93	PK
11	17385.170	28.94	14.15	43.09	54.00	-10.91	AV
12	17385.170	40.94	14.15	55.09	74.00	-18.91	PK

Vertical



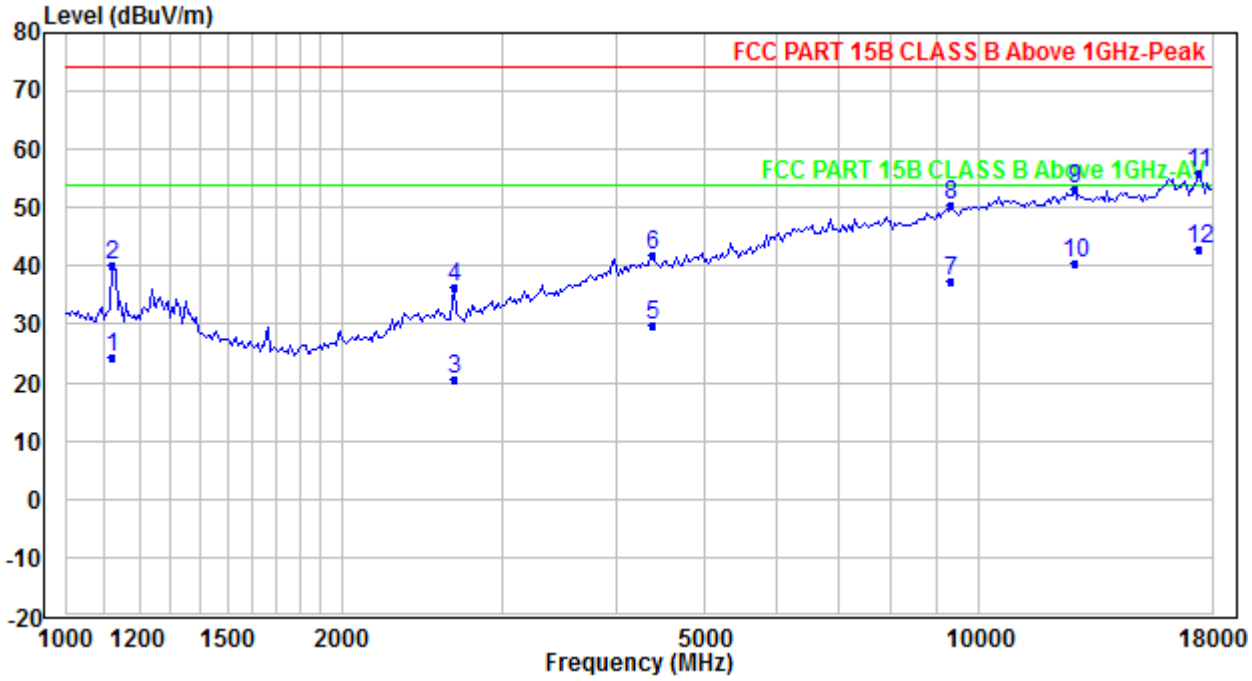
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1017.529	43.80	-11.40	32.40	54.00	-21.60	AV
2	1017.529	52.80	-11.40	41.40	74.00	-32.60	PK
3	1268.057	33.31	-10.71	22.60	54.00	-31.40	AV
4	1268.057	49.31	-10.71	38.60	74.00	-35.40	PK
5	3969.238	24.56	4.20	28.76	54.00	-25.24	AV
6	3969.238	37.56	4.20	41.76	74.00	-32.24	PK
7	5333.368	27.13	4.81	31.94	54.00	-22.06	AV
8	5333.368	42.13	4.81	46.94	74.00	-27.06	PK
9	10382.280	30.13	9.28	39.41	54.00	-14.59	AV
10	10382.280	43.13	9.28	52.41	74.00	-21.59	PK
11	16791.350	29.11	12.99	42.10	54.00	-11.90	AV
12	16791.350	42.11	12.99	55.10	74.00	-18.90	PK

Above 1GHz(Peak & Average)
TM8
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1328.199	32.53	-10.70	21.83	54.00	-32.17	AV
2	1328.199	49.53	-10.70	38.83	74.00	-35.17	PK
3	2646.164	21.55	-0.25	21.30	54.00	-32.70	AV
4	2646.164	37.55	-0.25	37.30	74.00	-36.70	PK
5	4329.530	25.49	4.70	30.19	54.00	-23.81	AV
6	4329.530	37.49	4.70	42.19	74.00	-31.81	PK
7	6723.951	27.54	6.95	34.49	54.00	-19.51	AV
8	6723.951	40.54	6.95	47.49	74.00	-26.51	PK
9	11065.320	42.59	9.20	51.79	74.00	-22.21	PK
10	11065.320	29.59	9.20	38.79	54.00	-15.21	AV
11	17486.170	28.24	14.33	42.57	54.00	-11.43	AV
12	17486.170	41.24	14.33	55.57	74.00	-18.43	PK

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1122.824	35.29	-11.12	24.17	54.00	-29.83	AV
2	1122.824	51.29	-11.12	40.17	74.00	-33.83	PK
3	2661.536	20.90	-0.46	20.44	54.00	-33.56	AV
4	2661.536	36.90	-0.46	36.44	74.00	-37.56	PK
5	4379.978	25.24	4.45	29.69	54.00	-24.31	AV
6	4379.978	37.24	4.45	41.69	74.00	-32.31	PK
7	9300.297	28.39	9.01	37.40	54.00	-16.60	AV
8	9300.297	41.39	9.01	50.40	74.00	-23.60	PK
9	12715.630	41.63	11.70	53.33	74.00	-20.67	PK
10	12715.630	28.63	11.70	40.33	54.00	-13.67	AV
11	17385.170	41.52	14.26	55.78	74.00	-18.22	AV
12	17385.170	28.52	14.26	42.78	54.00	-11.22	PK

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.
5. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
6. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits.

6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107
ICES-003 Issue 6 Section 6.1

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

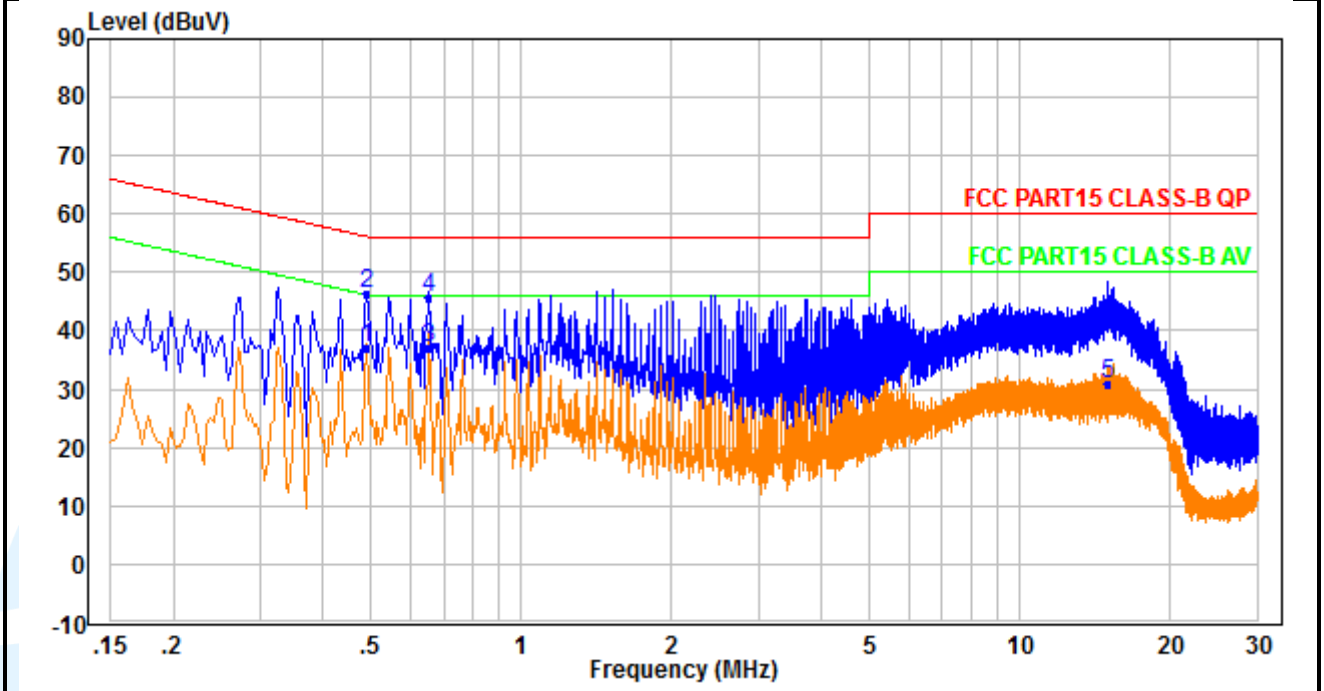
1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

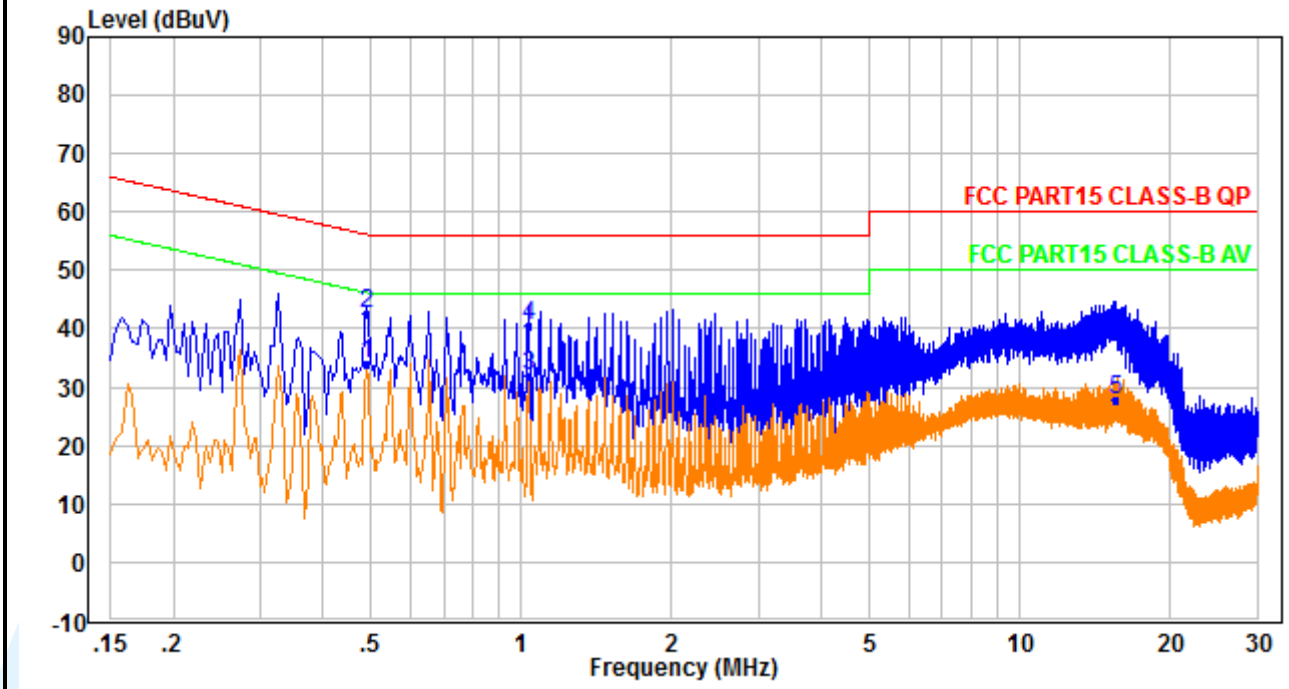
The measurement data as follows:
Quasi Peak and Average:
TM3

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.490	27.69	9.32	37.01	46.17	-9.16	Average
2	0.490	37.09	9.32	46.41	56.17	-9.76	QP
3	0.654	27.60	9.38	36.98	46.00	-9.02	Average
4	0.654	36.30	9.38	45.68	56.00	-10.32	QP
5	15.021	20.91	9.89	30.80	50.00	-19.20	Average
6	15.021	31.31	9.89	41.20	60.00	-18.80	QP

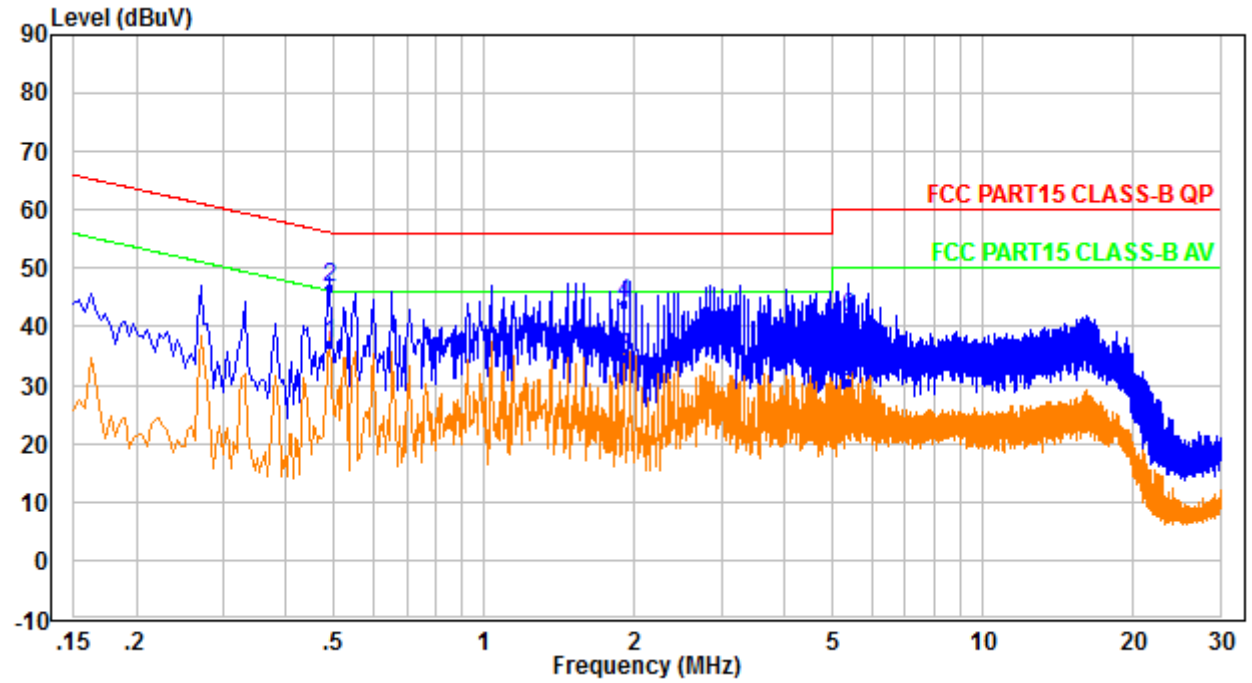
Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.490	24.60	9.34	33.94	46.17	-12.23	Average
2	0.490	33.40	9.34	42.74	56.17	-13.43	QP
3	1.034	22.60	9.43	32.03	46.00	-13.97	Average
4	1.034	31.20	9.43	40.63	56.00	-15.37	QP
5	15.609	18.00	9.91	27.91	50.00	-22.09	Average
6	15.609	28.80	9.91	38.71	60.00	-21.29	QP

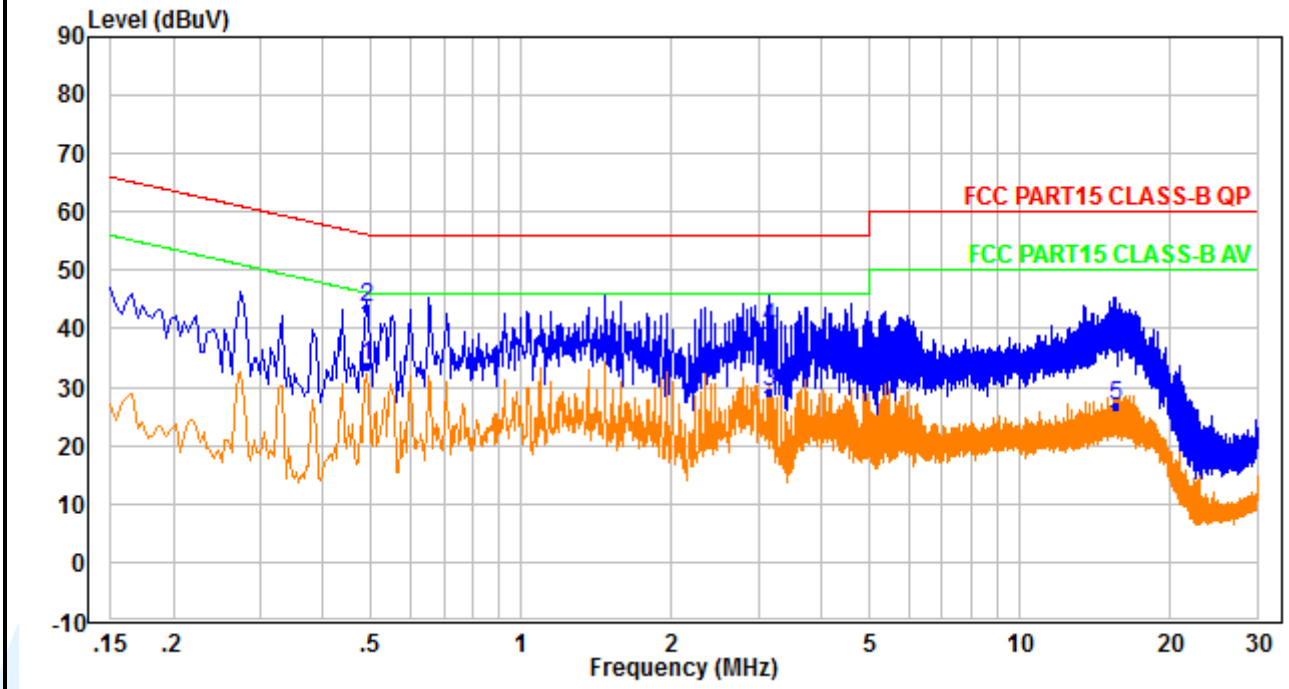
Quasi Peak and Average:
TM6

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.490	27.89	9.32	37.21	46.17	-8.96	Average
2	0.490	37.49	9.32	46.81	56.17	-9.36	QP
3	1.906	25.00	9.58	34.58	46.00	-11.42	Average
4	1.906	34.40	9.58	43.98	56.00	-12.02	QP
5	5.394	20.90	9.59	30.49	50.00	-19.51	Average
6	5.394	32.10	9.59	41.69	60.00	-18.31	QP

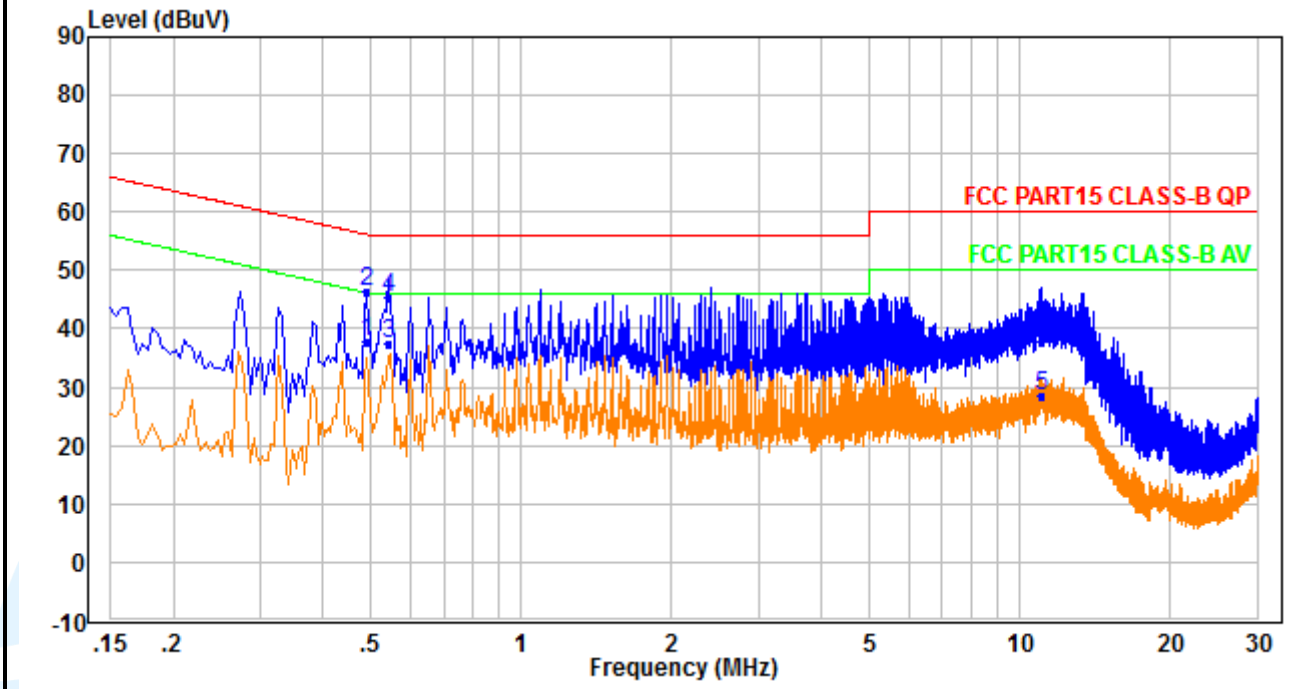
Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.490	24.30	9.34	33.64	46.17	-12.53	Average
2	0.490	34.10	9.34	43.44	56.17	-12.73	QP
3	3.158	19.49	9.62	29.11	46.00	-16.89	Average
4	3.158	30.39	9.62	40.01	56.00	-15.99	QP
5	15.613	16.90	9.91	26.81	50.00	-23.19	Average
6	15.613	28.80	9.91	38.71	60.00	-21.29	QP

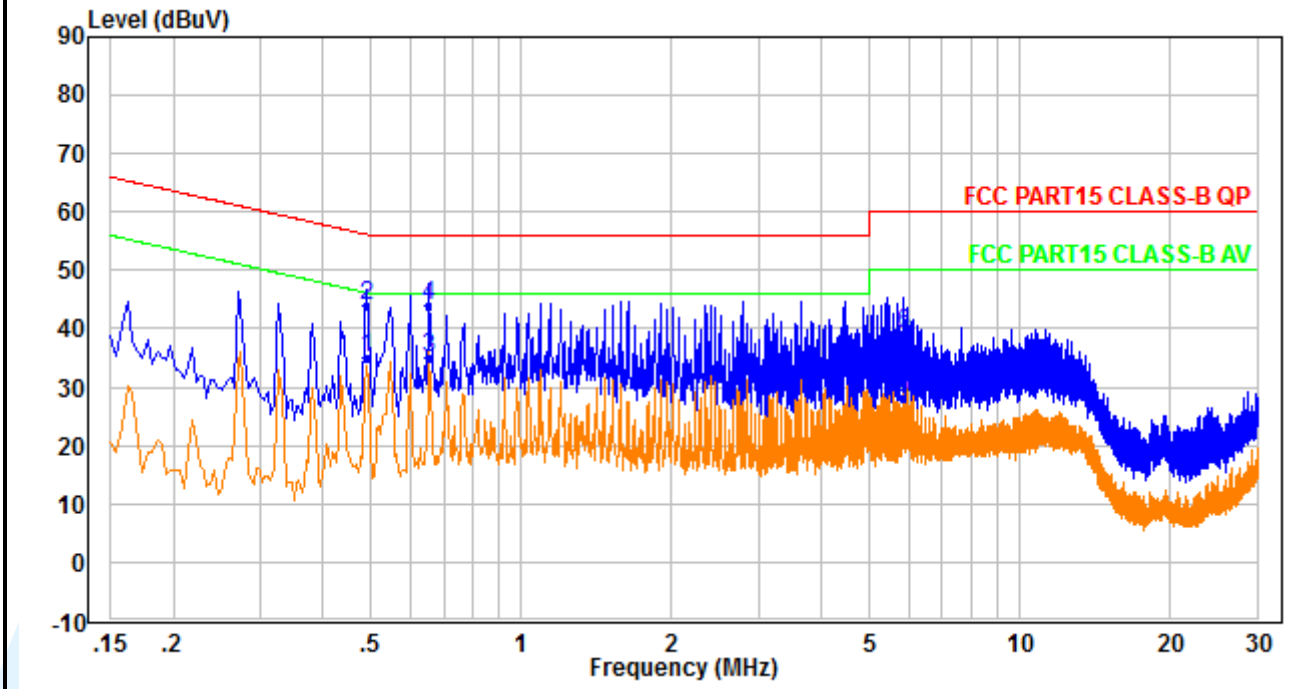
Quasi Peak and Average:
TM7

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.490	28.29	9.32	37.61	46.17	-8.56	Average
2	0.490	36.99	9.32	46.31	56.17	-9.86	QP
3	0.542	28.20	9.33	37.53	46.00	-8.47	Average
4	0.542	36.00	9.33	45.33	56.00	-10.67	QP
5	11.045	18.61	9.72	28.33	50.00	-21.67	Average
6	11.045	28.01	9.72	37.73	60.00	-22.27	QP

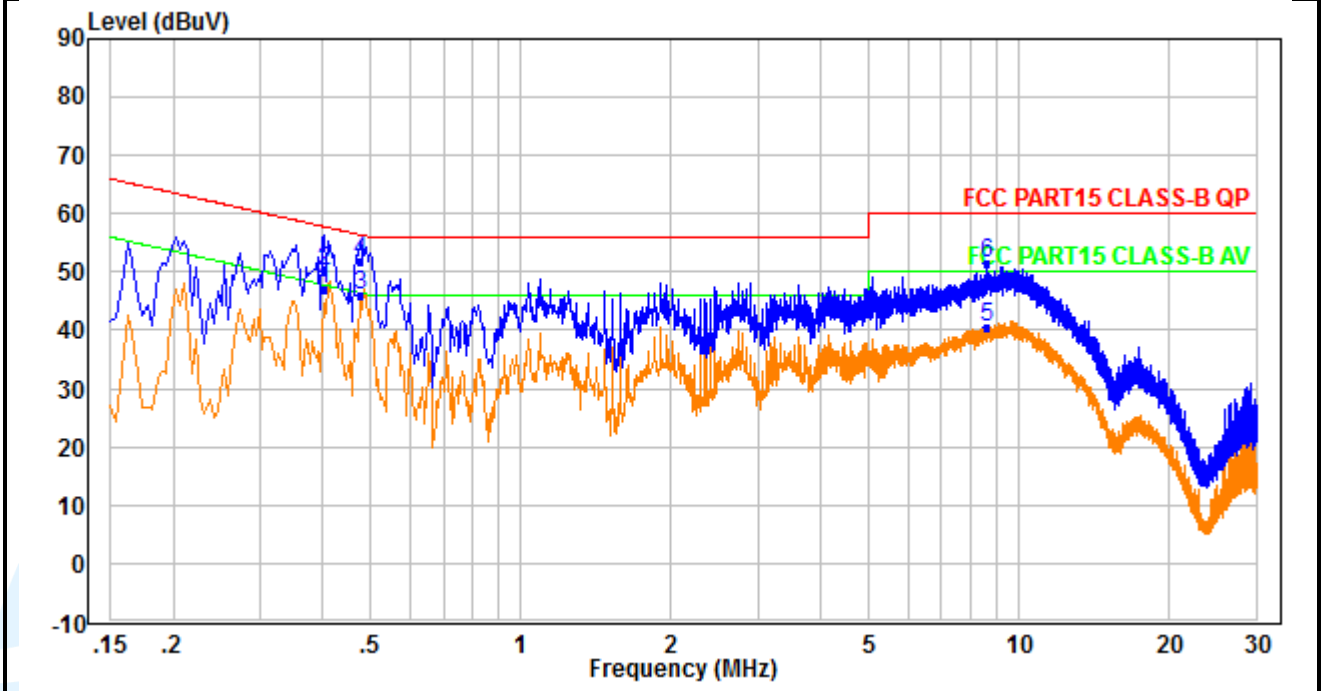
Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.490	25.60	9.34	34.94	46.17	-11.23	Average
2	0.490	34.60	9.34	43.94	56.17	-12.23	QP
3	0.654	25.60	9.38	34.98	46.00	-11.02	Average
4	0.654	34.40	9.38	43.78	56.00	-12.22	QP
5	5.826	18.60	9.60	28.20	50.00	-21.80	Average
6	5.826	29.70	9.60	39.30	60.00	-20.70	QP

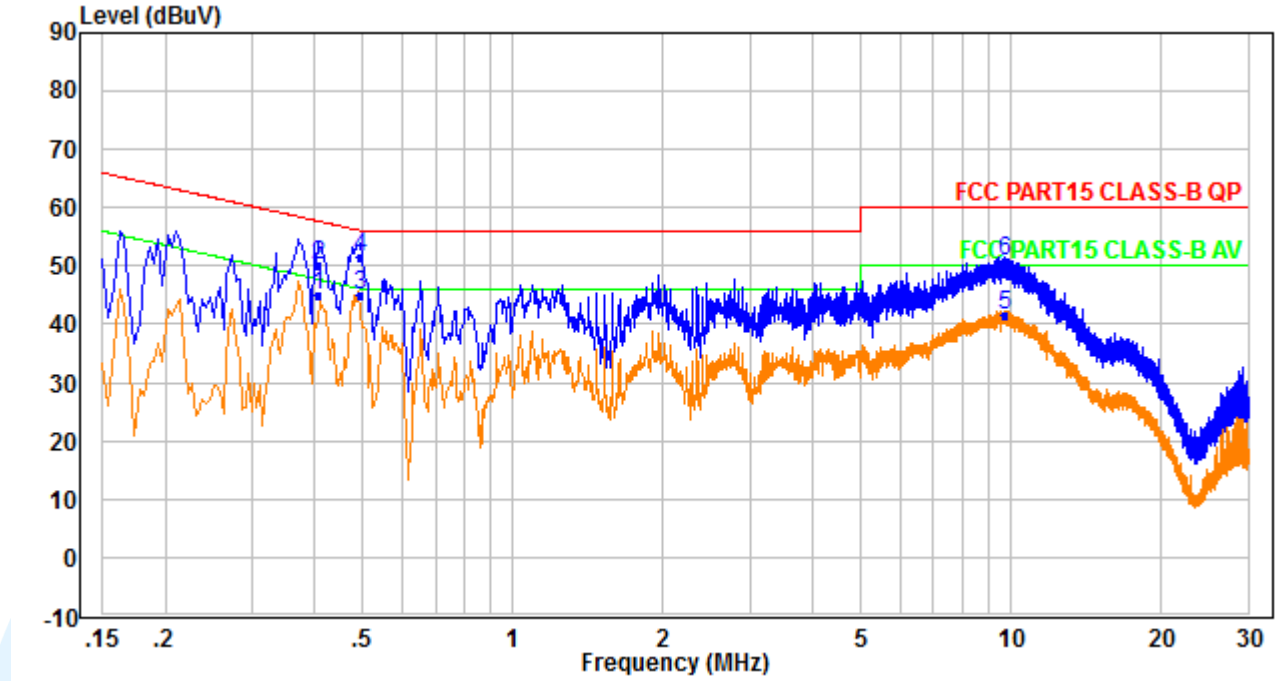
Quasi Peak and Average:
TM8

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.402	38.00	9.20	47.20	47.81	-0.61	Average
2	0.402	41.00	9.20	50.20	57.81	-7.61	QP
3	0.474	36.79	9.30	46.09	46.44	-0.35	Average
4	0.474	42.69	9.30	51.99	56.44	-4.45	QP
5	8.649	30.79	9.66	40.45	50.00	-9.55	Average
6	8.649	41.97	9.66	51.63	60.00	-8.37	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.406	35.90	9.19	45.09	47.73	-2.64	Average
2	0.406	41.10	9.19	50.29	57.73	-7.44	QP
3	0.494	35.50	9.35	44.85	46.10	-1.25	Average
4	0.494	42.30	9.35	51.65	56.10	-4.45	QP
5	9.753	32.02	9.68	41.70	50.00	-8.30	Average
6	9.753	41.00	9.68	50.68	60.00	-9.32	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

********** End of Report **********