ACCREDITED
Certificate #4312.01

TEST REPORT

Product Name:	IP Phone
Trade Mark:	GRANDSTREAM
Model No.:	GRP2614
HVIN:	GRP2614V2CW
Report Number:	220105006EMC-1
Test Standards:	FCC 47 CFR Part 15 Subpart B ICES-003 Issue 7
FCC ID:	YZZGRP2614V2CW
Test Result:	PASS
Date of Issue:	March 29, 2022

Prepared for:

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

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
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Approved by:	Kevin Liang Assistant Manager	Date:	March 29, 2022

UnionTrust Laboratories * Certified *

Version

Version No.	Date	Description
V1.0	March 29, 2022	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. / HVIN:	GRP2614
Trade Mark:	GRANDSTREAM
DUT Stage:	Identical Prototype
Rated Voltage:	☒ 100-240V~50/60Hz
	☒ Powered by POE port
Classification of digital devices:	Class B
Highest Internal Frequency:	5825 MHz
Sample Received Date:	January 6, 2022
Sample Tested Date:	February 12, 2022 to February 21, 2022

Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.

1.2.2 Description of Accessories

Adapter(1)	
Model No.:	GQ12-120100-AU
Input:	100-240 V~50/60 Hz 0.4A Max
Output:	12 V⎓ 1.0 A
DC Cable:	2.5 Meter, Unshielded without ferrite

Adapter(2)	
Model No.:	DSA-12PFU-12 FUS 120100
Input:	100-240 V~50/60 Hz 0.5A
Output:	12 V⎓ 1.0 A 12.0W
DC Cable:	2.5 Meter, Unshielded without ferrite

Adapter(3)	
Model No.:	F12US1200100A
Input:	100-240 V~50/60 Hz 0.5A max
Output:	12 V⎓ 1.0 A
DC Cable:	2.5 Meter, Unshielded without ferrite

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

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

Others
1x Handset, 1x Phone Stand

Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	B40-80	MP12NEQ6	UnionTrust
USB disk	Kingston	DTSE9	N/A	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust
Headset	YEY	VE120-MV	N/A	UnionTrust
Standard POE Power supply	TP-LINK	TL-POE160S	N/A	UnionTrust
IP Phone	GRANDSTREAM	GRP2615	N/A	Applicant

Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Ethernet Cable	RJ45	1.5 Unshielded without ferrite	UnionTrust
2	Ethernet Cable	RJ45	2.0 Unshielded without ferrite	UnionTrust
3	Ethernet Cable	RJ45	5.0 Unshielded without ferrite	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua 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 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 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	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 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 7 Section 3.2.1	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109 ICES-003 Issue 7 Section 3.2.2	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 SAC	ETS-LINDGREN	3m	N/A	Jan. 22, 2021	Jan. 21, 2024
☒	Receiver	R&S	ESIB26	100114	Nov. 05, 2021	Nov. 04, 2022
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 11, 2021	Nov. 10, 2023
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 11, 2021	Nov. 10, 2023
☒	Preamplifier	HP	8447F	2805A02960	Nov. 05, 2021	Nov. 04, 2022
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2023
☒	Pre-amplifier	ETS-Lindgren	00118385	00201874	Nov. 06, 2021	Nov. 05, 2022
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 14, 2020	Nov. 13, 2023
☒	Pre-amplifier	ETS-Lindgren	00118384	00202652	Nov. 17, 2020	Nov. 16, 2022
☒	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. 05, 2021	Nov. 04, 2022
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 05, 2021	Nov. 04, 2022
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 05, 2021	Nov. 04, 2022
☒	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 05, 2021	Nov. 04, 2022
☒	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 (V)	Relative Humidity (%)
NV/NT	+15 to +35	Powered by POE Port or Powered by DC 12V/1.0A	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test sample

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Conducted Emission	25.6	50	100.55	220105009-A04/4	Davin Zhang
Radiated Emission	24.1	46	100.15		Asia Yan

4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	**Test Mode1: AC120V/60Hz (Adaptor1) + Hands Free** Test Mode 2: AC120V/60Hz (Adaptor1) + Ringing Test Mode 3: AC120V/60Hz (Adaptor1) + Handset **Test Mode 4: AC120V/60Hz (Adaptor1) + Headset** Test Mode 5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 Test Mode 6: Worse from mode 1~5 (Adaptor2) Test Mode 7: Worse from mode 1~5 (Adaptor3) Test Mode 8: AC120V/60Hz (POE) +Worse from mode 1~4
Conducted Emission	Test Mode1: AC120V/60Hz (Adaptor1) + Hands Free Test Mode 2: AC120V/60Hz (Adaptor1) + Ringing Test Mode 3: AC120V/60Hz (Adaptor1) + Handset Test Mode 4: AC120V/60Hz (Adaptor1) + Headset Test Mode 5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 Test Mode 6: Worse from mode 1~5 (Adaptor2) Test Mode 7: Worse from mode 1~5 (Adaptor3) **Test Mode 8: AC120V/60Hz (POE) +Worse from mode 1~4(Mode4)**
Remark: The above test modes in boldface were the worst cases.	

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz

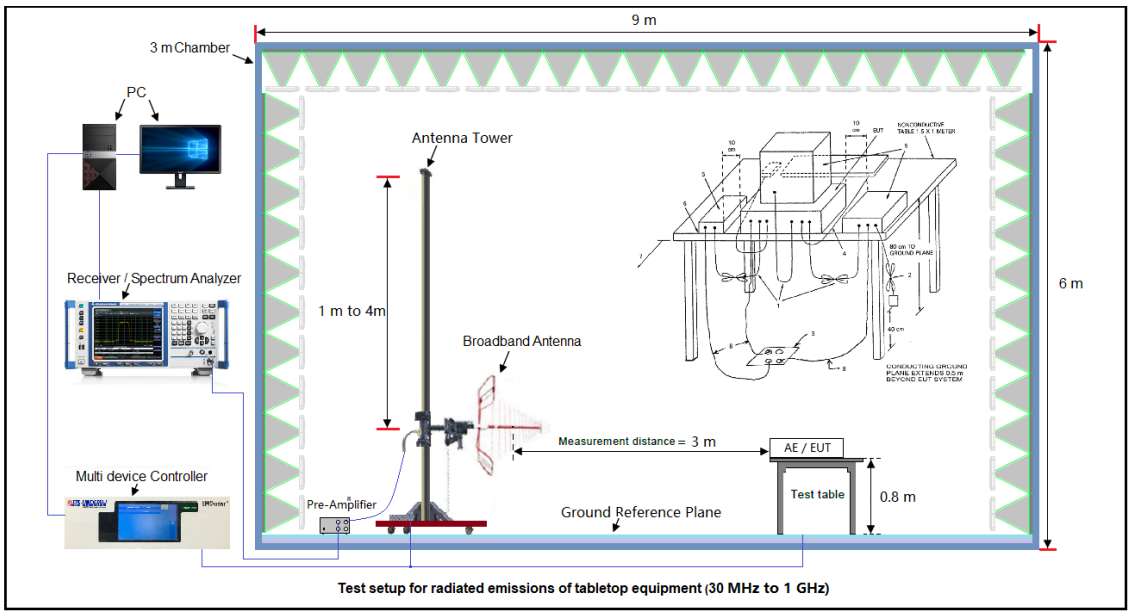
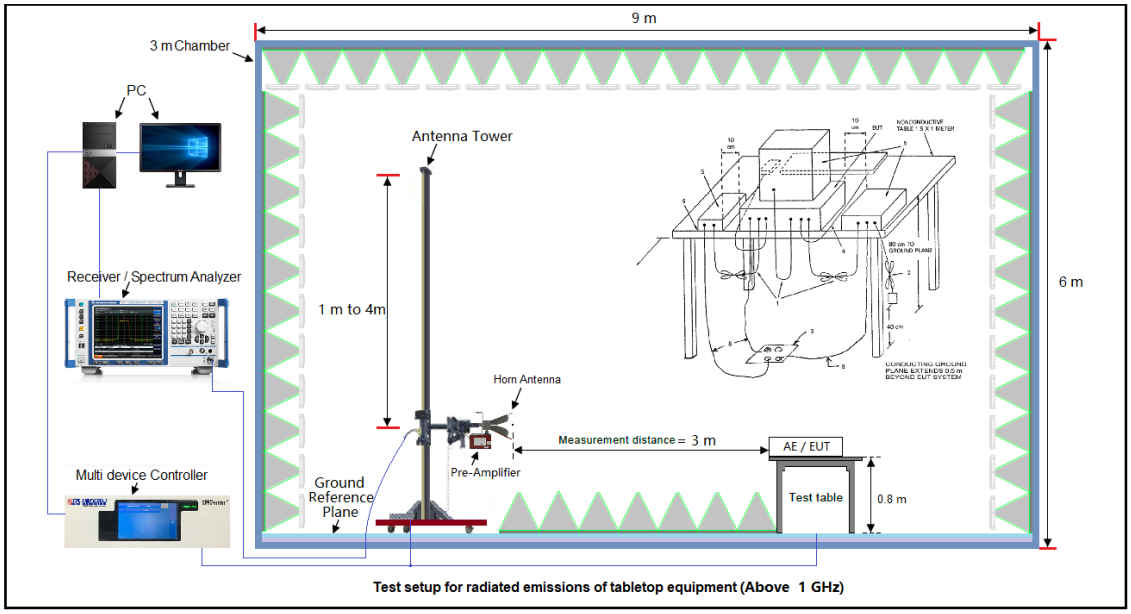
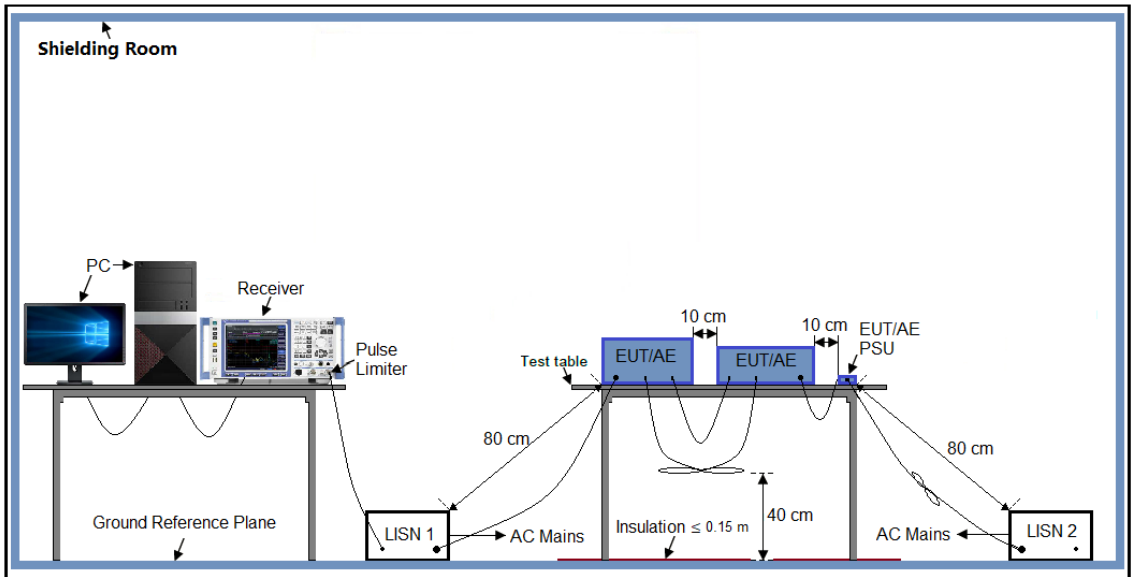


Figure 2. Above 1GHz



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 7	Information Technology Equipment (Including Digital Apparatus)
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 7 Clause 3.2.2

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

FCC 47 CFR Part 15 Subpart B

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 – 1000	54.0	--	--
Above 1000	--	74.0	54.0

ICES-003 Issue 7

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30 – 88	40.0	--	--
88 – 216	43.5	--	--
216 – 230	46.0		

230 – 960	47.0	--	--
960 – 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.

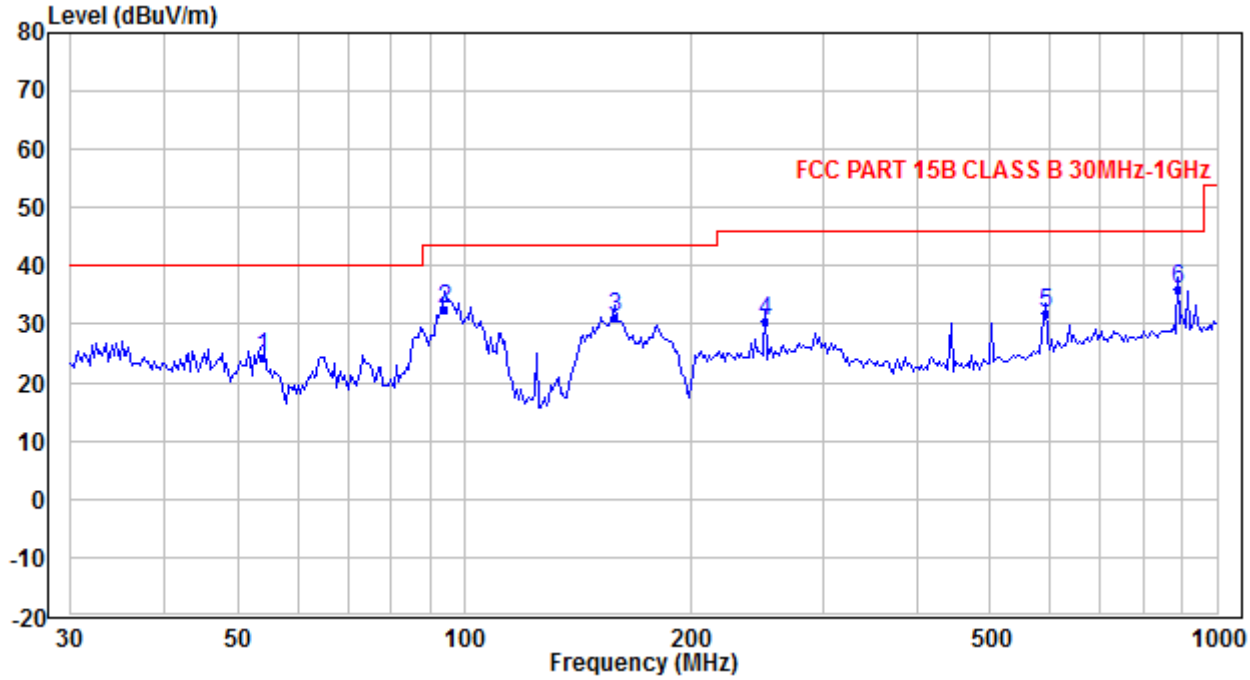
Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

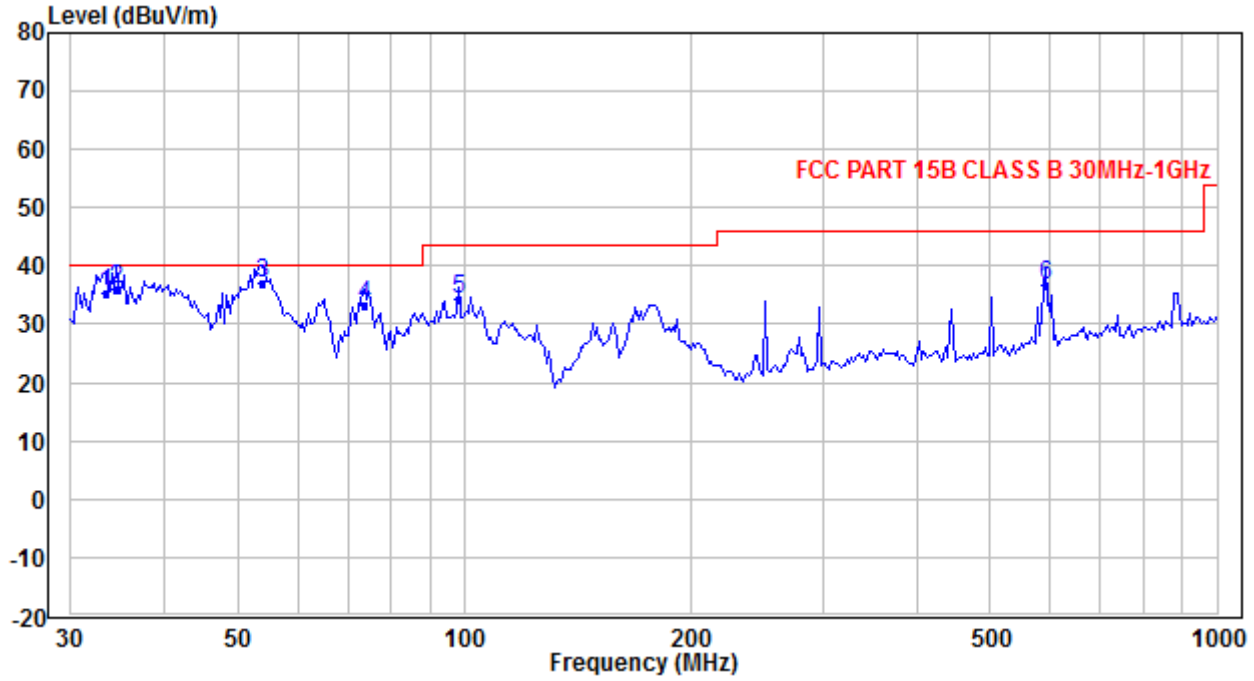
The measurement data for FCC 47 CFR Part 15 Subpart B as follows:

Below 1GHz(Quasi Peak):
Test Mode4
Horizontal



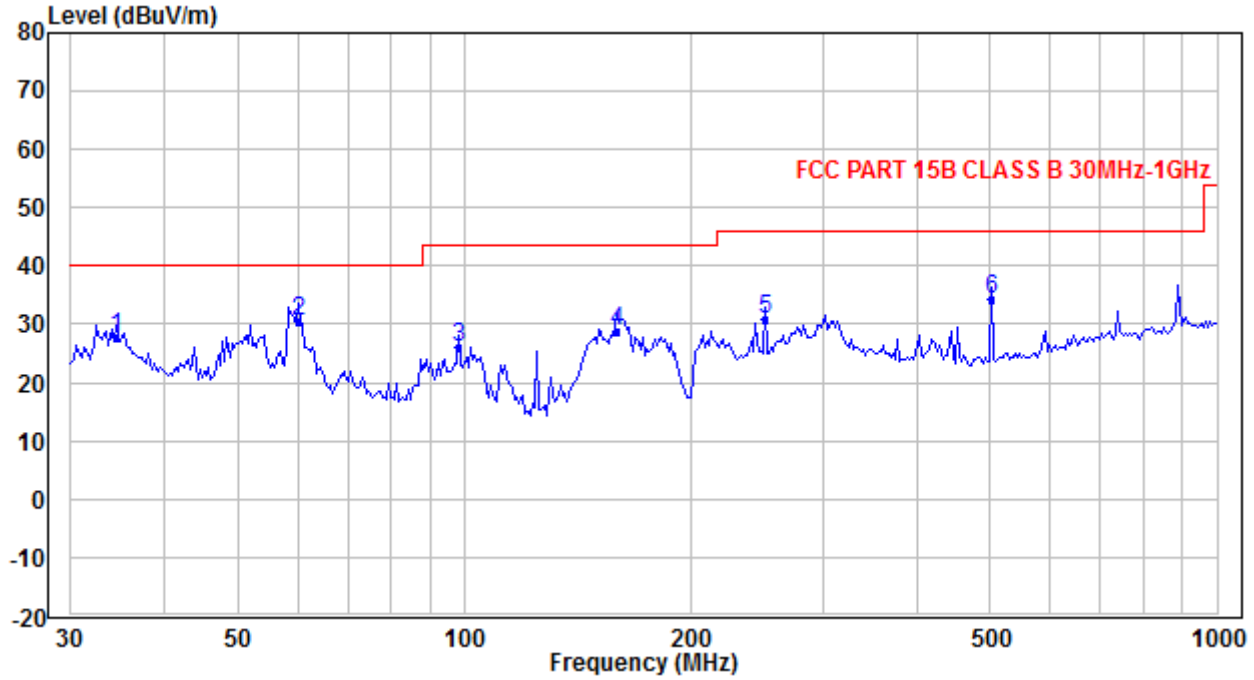
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	53.756	41.03	-16.61	24.42	40.00	-15.58	QP
2	94.314	48.64	-15.96	32.68	43.50	-10.82	QP
3	158.640	45.18	-14.01	31.17	43.50	-12.33	QP
4	250.486	39.37	-8.82	30.55	46.00	-15.45	QP
5	590.351	32.83	-1.08	31.75	46.00	-14.25	QP
6	887.398	31.82	4.12	35.94	46.00	-10.06	QP

Vertical



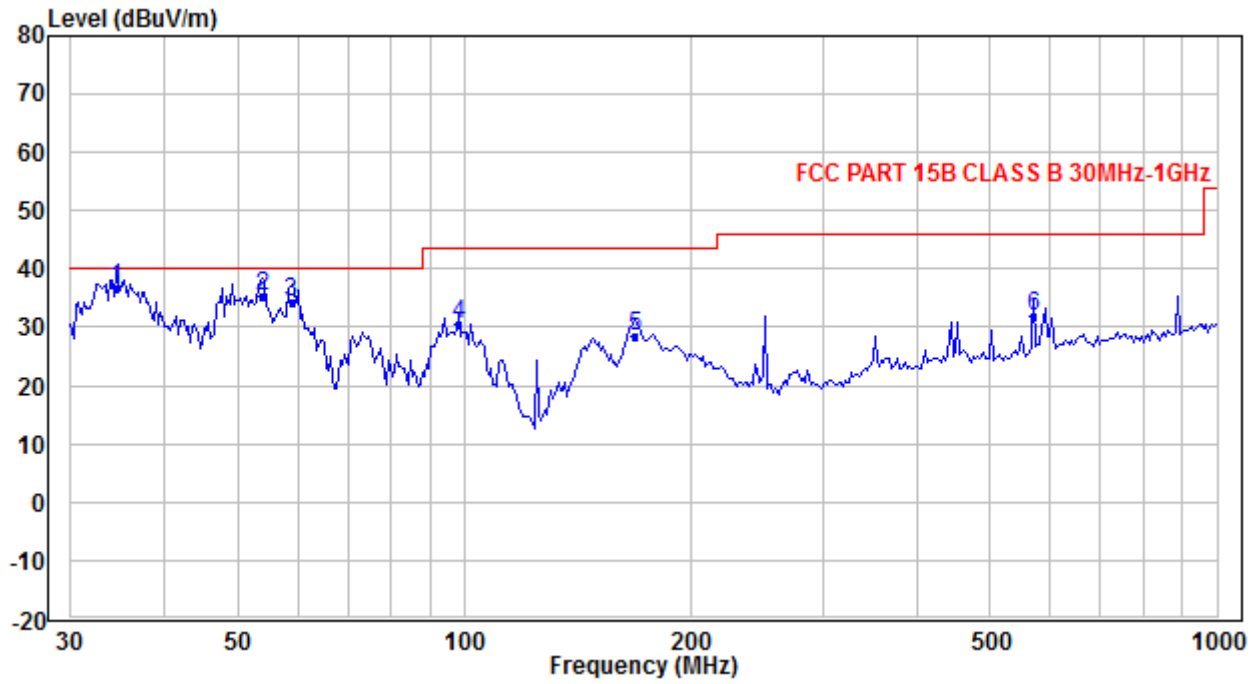
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	33.335	40.11	-4.87	35.24	40.00	-4.76	QP
2	34.527	40.69	-4.60	36.09	40.00	-3.91	QP
3	53.756	53.59	-16.61	36.98	40.00	-3.02	QP
4	73.750	50.62	-17.48	33.14	40.00	-6.86	QP
5	98.375	50.24	-16.04	34.20	43.50	-9.30	QP
6	590.351	37.78	-1.08	36.70	46.00	-9.30	QP

Below 1GHz(Quasi Peak):
Test Mode6
Horizontal



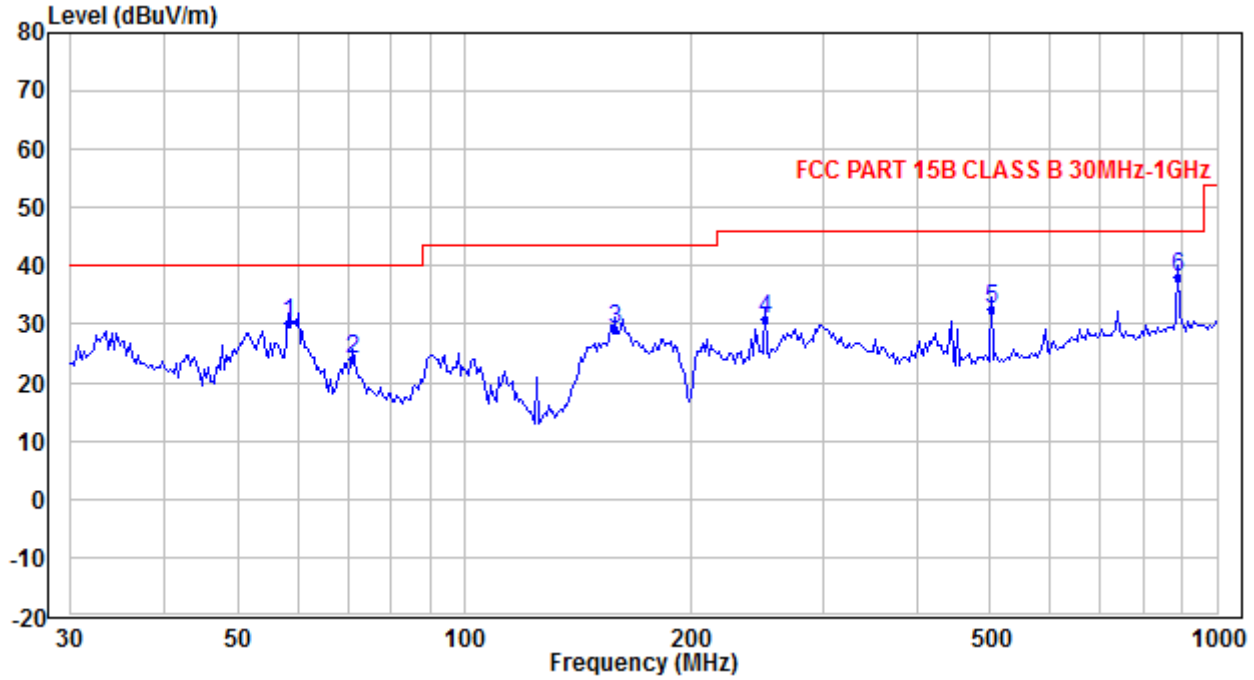
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	34.527	32.50	-4.60	27.90	40.00	-12.10	QP
2	60.153	47.94	-17.45	30.49	40.00	-9.51	QP
3	98.375	42.04	-16.04	26.00	43.50	-17.50	QP
4	159.759	42.47	-13.59	28.88	43.50	-14.62	QP
5	250.486	39.74	-8.82	30.92	46.00	-15.08	QP
6	502.247	36.92	-2.71	34.21	46.00	-11.79	QP

Vertical



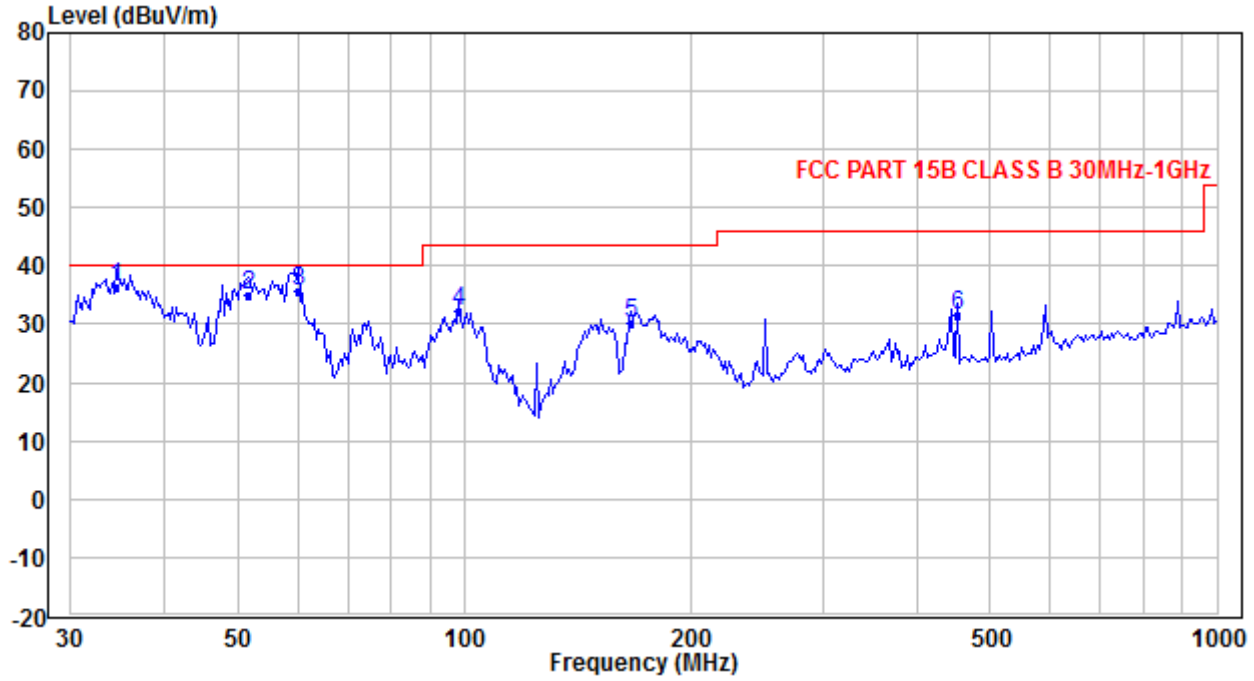
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	34.527	41.25	-4.60	36.65	40.00	-3.35	QP
2	53.756	51.88	-16.61	35.27	40.00	-4.73	QP
3	58.898	51.68	-17.23	34.45	40.00	-5.55	QP
4	98.375	46.53	-16.04	30.49	43.50	-13.01	QP
5	168.997	40.07	-11.75	28.32	43.50	-15.18	QP
6	569.969	33.58	-1.69	31.89	46.00	-14.11	QP

Below 1GHz(Quasi Peak):
Test Mode7
Horizontal



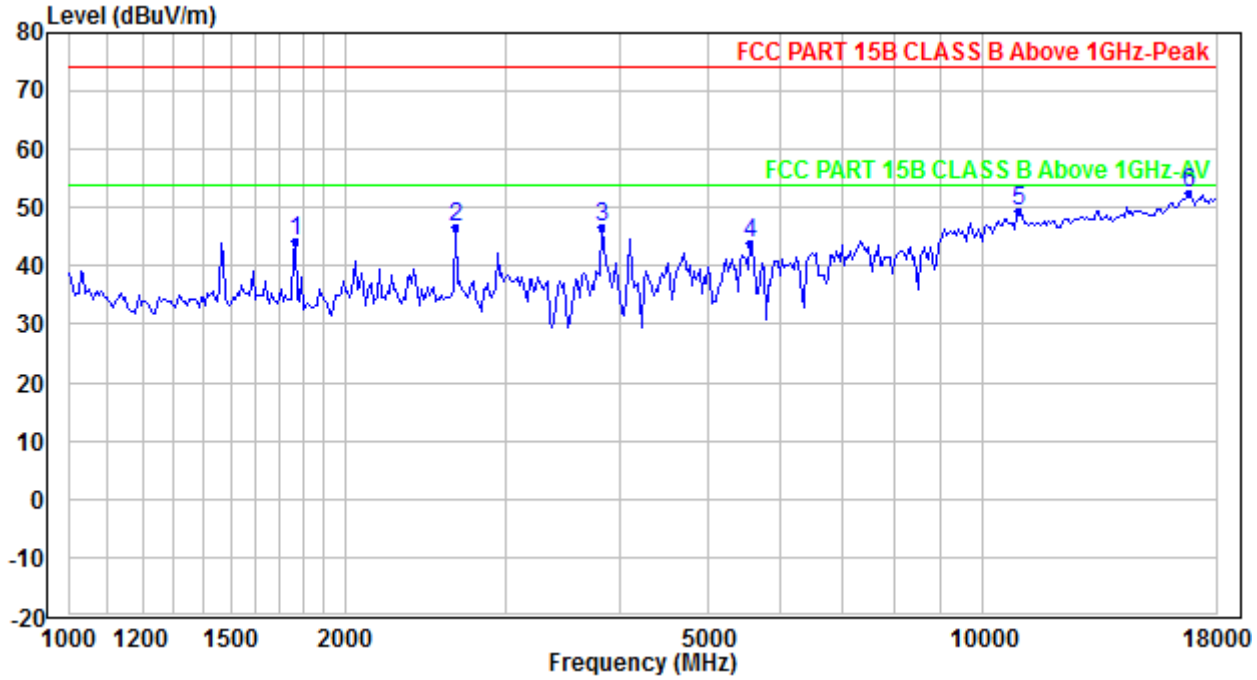
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	58.485	47.33	-17.28	30.05	40.00	-9.95	QP
2	71.203	41.15	-17.29	23.86	40.00	-16.14	QP
3	158.640	43.25	-14.01	29.24	43.50	-14.26	QP
4	250.486	39.68	-8.82	30.86	46.00	-15.14	QP
5	502.247	35.31	-2.71	32.60	46.00	-13.40	QP
6	887.398	33.86	4.12	37.98	46.00	-8.02	QP

Vertical



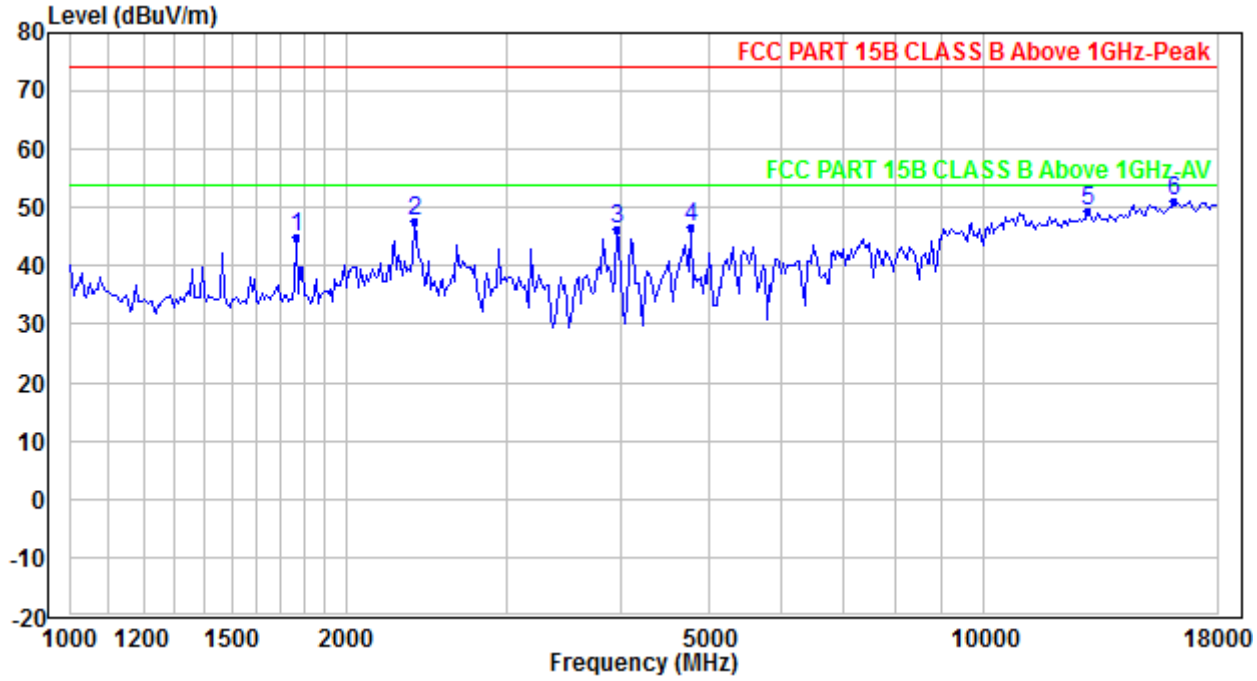
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	34.527	41.02	-4.60	36.42	40.00	-3.58	QP
2	51.536	50.69	-15.63	35.06	40.00	-4.94	QP
3	60.153	53.27	-17.45	35.82	40.00	-4.18	QP
4	98.375	48.31	-16.04	32.27	43.50	-11.23	QP
5	166.639	42.60	-12.31	30.29	43.50	-13.21	QP
6	452.001	35.59	-4.04	31.55	46.00	-14.45	QP

Above 1GHz(Peak & Average)
Test Mode1
Horizontal



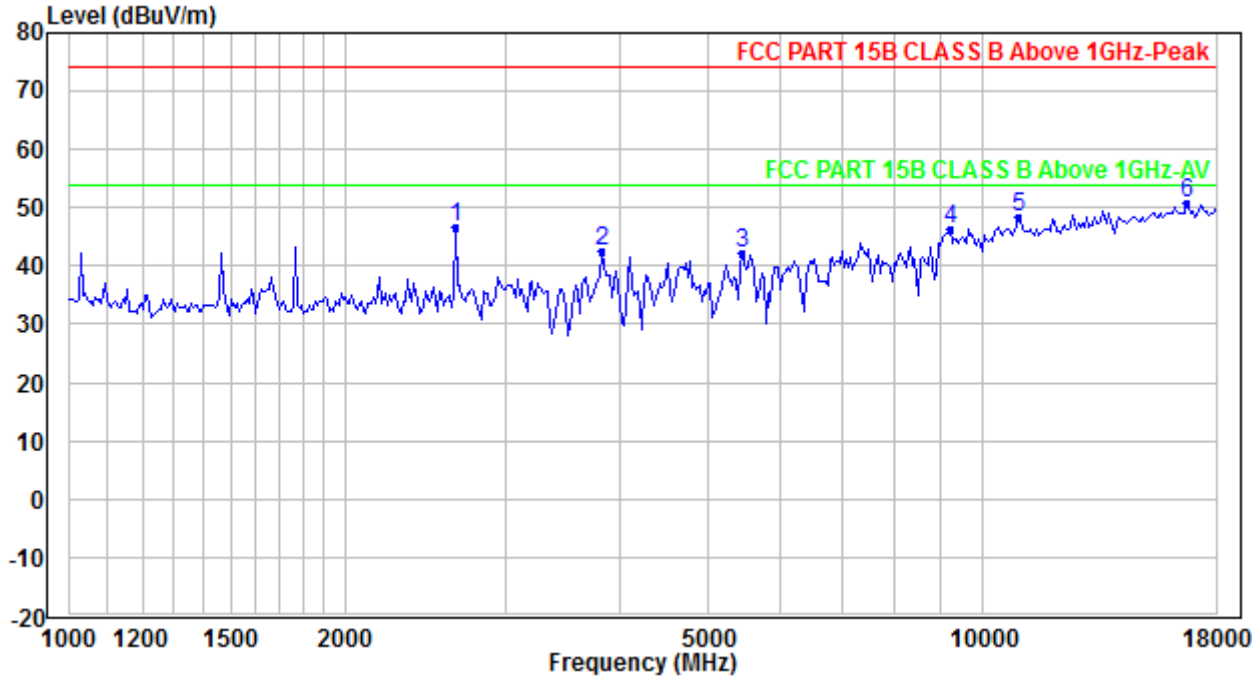
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	1764.113	55.10	-10.79	44.31	74.00	-29.69	Peak
2	2646.164	54.33	-7.72	46.61	74.00	-27.39	Peak
3	3833.661	50.31	-3.69	46.62	74.00	-27.38	Peak
4	5554.060	43.86	0.02	43.88	74.00	-30.12	Peak
5	10937.880	42.08	7.29	49.37	74.00	-24.63	Peak
6	16791.350	39.90	12.61	52.51	74.00	-21.49	Peak

Vertical



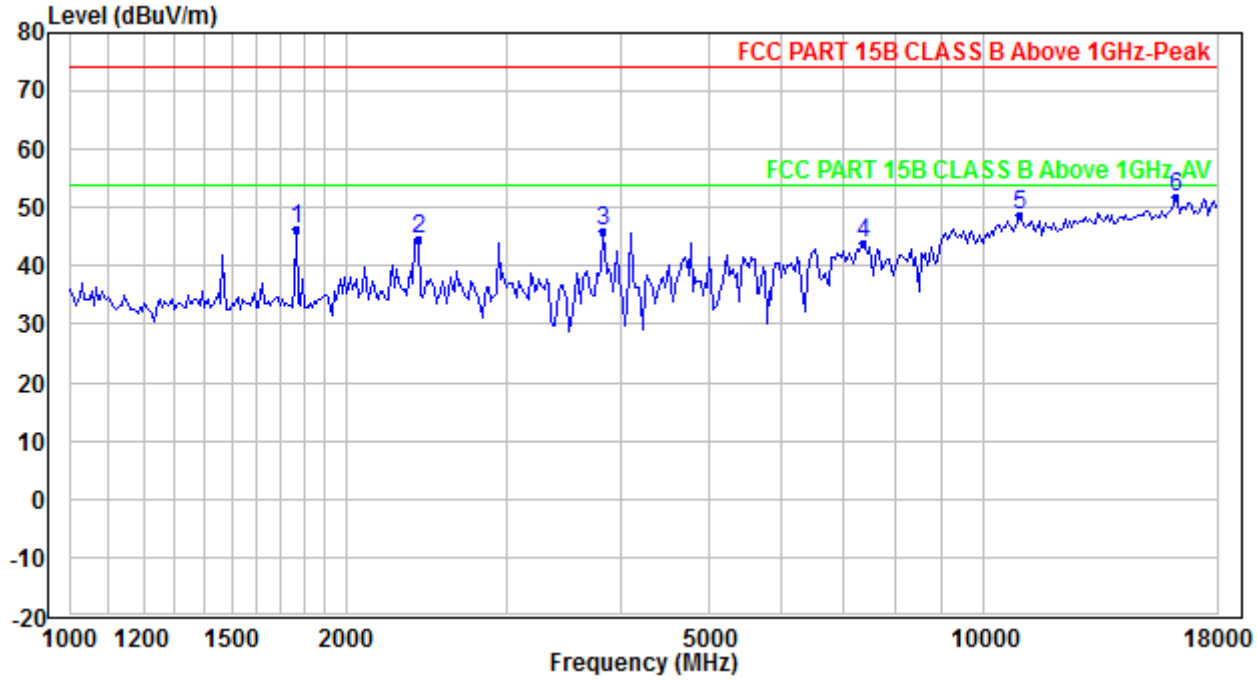
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	1764.113	55.76	-10.79	44.97	74.00	-29.03	Peak
2	2384.166	56.06	-8.46	47.60	74.00	-26.40	Peak
3	3969.238	49.43	-3.21	46.22	74.00	-27.78	Peak
4	4777.554	48.91	-2.37	46.54	74.00	-27.46	Peak
5	13013.680	38.80	10.57	49.37	74.00	-24.63	Peak
6	16124.140	39.22	11.97	51.19	74.00	-22.81	Peak

Above 1GHz(Peak & Average)
Test Mode6
Horizontal



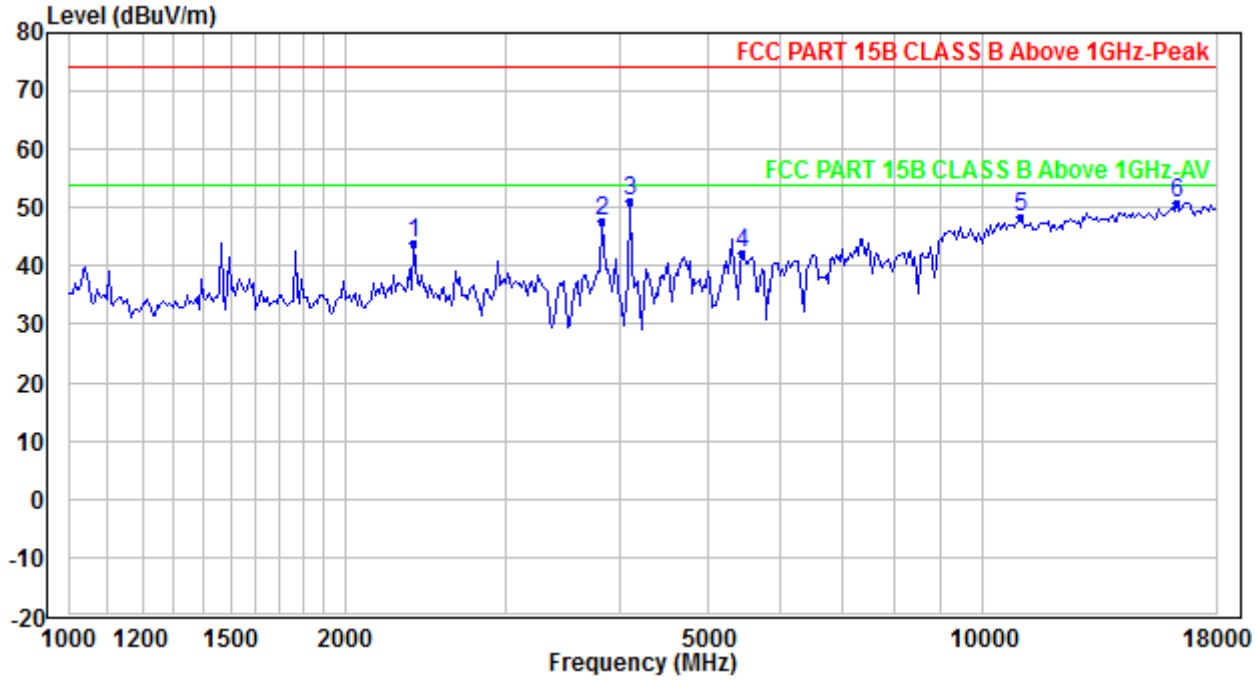
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	2646.164	54.56	-7.72	46.84	74.00	-27.16	Peak
2	3833.661	46.21	-3.69	42.52	74.00	-31.48	Peak
3	5458.380	42.24	-0.08	42.16	74.00	-31.84	Peak
4	9193.178	41.01	5.15	46.16	74.00	-27.84	Peak
5	10937.880	41.16	7.29	48.45	74.00	-25.55	Peak
6	16694.370	38.36	12.52	50.88	74.00	-23.12	Peak

Vertical



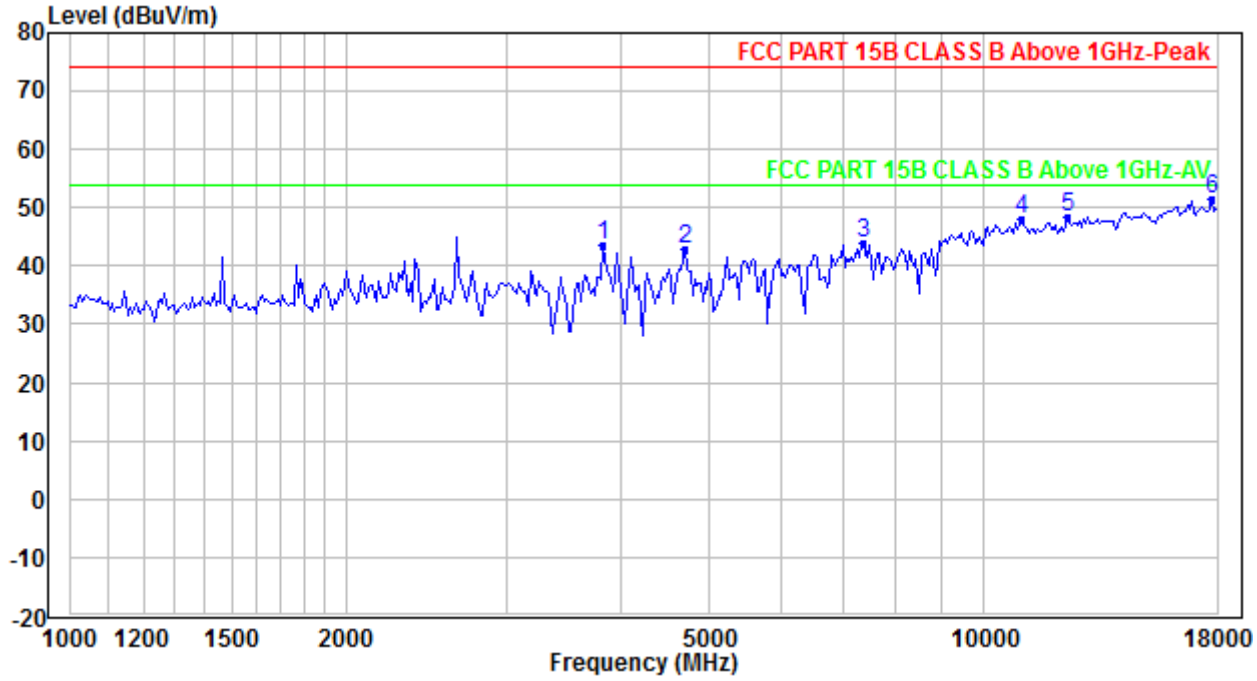
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	1764.113	57.08	-10.79	46.29	74.00	-27.71	Peak
2	2398.016	52.86	-8.42	44.44	74.00	-29.56	Peak
3	3833.661	49.64	-3.69	45.95	74.00	-28.05	Peak
4	7376.898	42.13	1.70	43.83	74.00	-30.17	Peak
5	10937.880	41.51	7.29	48.80	74.00	-25.20	Peak
6	16217.810	39.82	12.06	51.88	74.00	-22.12	Peak

Above 1GHz(Peak & Average)
Test Mode7
Horizontal



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	2384.166	52.52	-8.46	44.06	74.00	-29.94	Peak
2	3833.661	51.38	-3.69	47.69	74.00	-26.31	Peak
3	4109.610	54.22	-2.94	51.28	74.00	-22.72	Peak
4	5458.380	42.40	-0.08	42.32	74.00	-31.68	Peak
5	11001.420	40.85	7.42	48.27	74.00	-25.73	Peak
6	16312.020	38.80	12.15	50.95	74.00	-23.05	Peak

Vertical



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	3833.661	47.35	-3.69	43.66	74.00	-30.34	Peak
2	4695.251	45.14	-2.42	42.72	74.00	-31.28	Peak
3	7376.898	42.37	1.70	44.07	74.00	-29.93	Peak
4	11001.420	40.79	7.42	48.21	74.00	-25.79	Peak
5	12352.650	40.17	8.27	48.44	74.00	-25.56	Peak
6	17792.680	37.37	14.20	51.57	74.00	-22.43	Peak

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. 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. So, only the peak measurements were shown in the report.
7. The limit of ICES-003 in the 230MHz to 960MHz band is higher than that of FCC Part 15B, so the radiation emission test data conform to the limit of ICES-003.

6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107
ICES-003 Issue 7 Section 3.2.1

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:

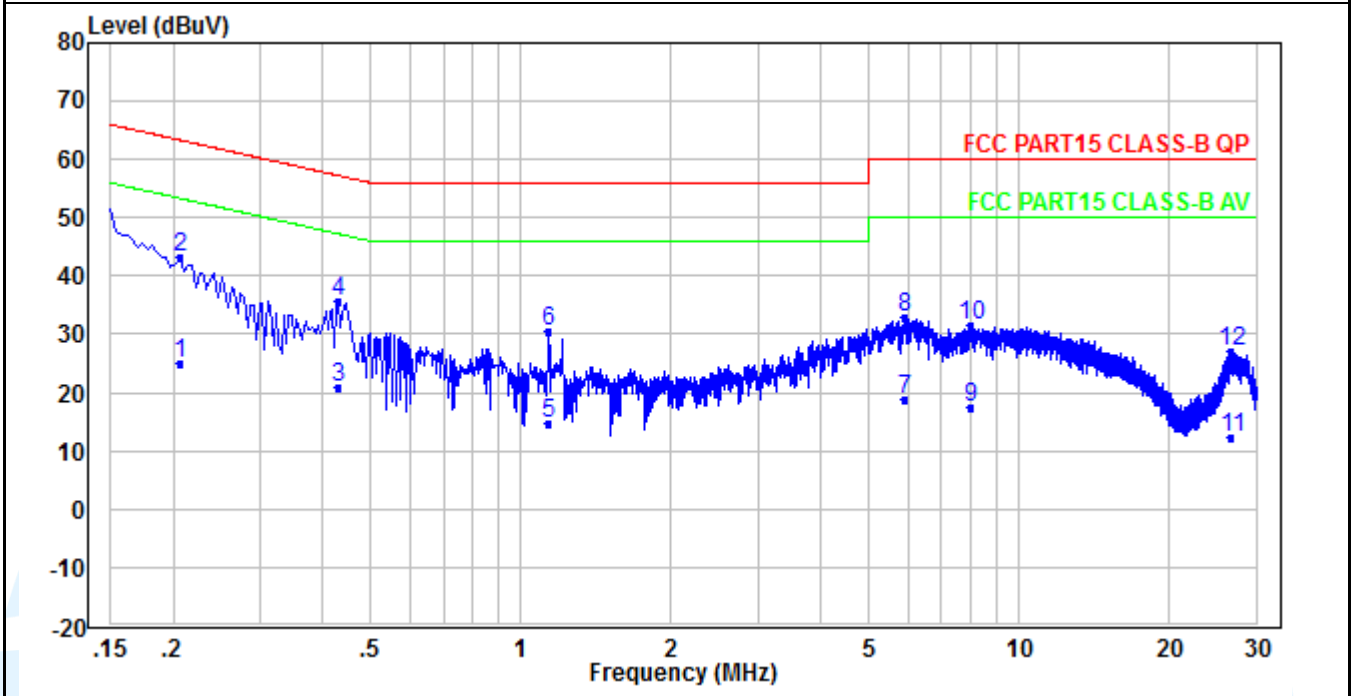
1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak 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

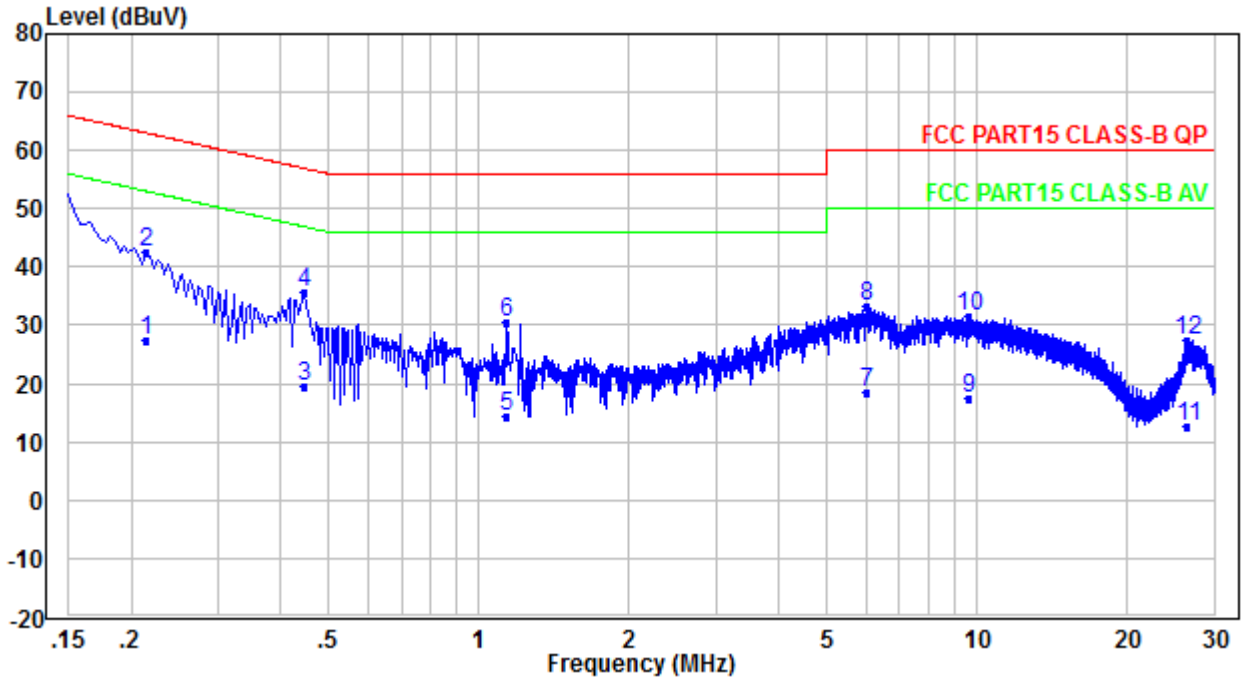
The measurement data as follows:
Quasi Peak and Average:
Test Mode8

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.206	15.78	9.40	25.18	53.37	-28.19	Average
2	0.206	33.78	9.40	43.18	63.37	-20.19	QP
3	0.430	11.38	9.42	20.80	47.25	-26.45	Average
4	0.430	26.38	9.42	35.80	57.25	-21.45	QP
5	1.138	5.19	9.42	14.61	46.00	-31.39	Average
6	1.138	21.19	9.42	30.61	56.00	-25.39	QP
7	5.906	9.42	9.55	18.97	50.00	-31.03	Average
8	5.906	23.42	9.55	32.97	60.00	-27.03	QP
9	7.985	8.02	9.46	17.48	50.00	-32.52	Average
10	7.985	22.02	9.46	31.48	60.00	-28.52	QP
11	26.804	2.82	9.40	12.22	50.00	-37.78	Average
12	26.804	17.82	9.40	27.22	60.00	-32.78	QP

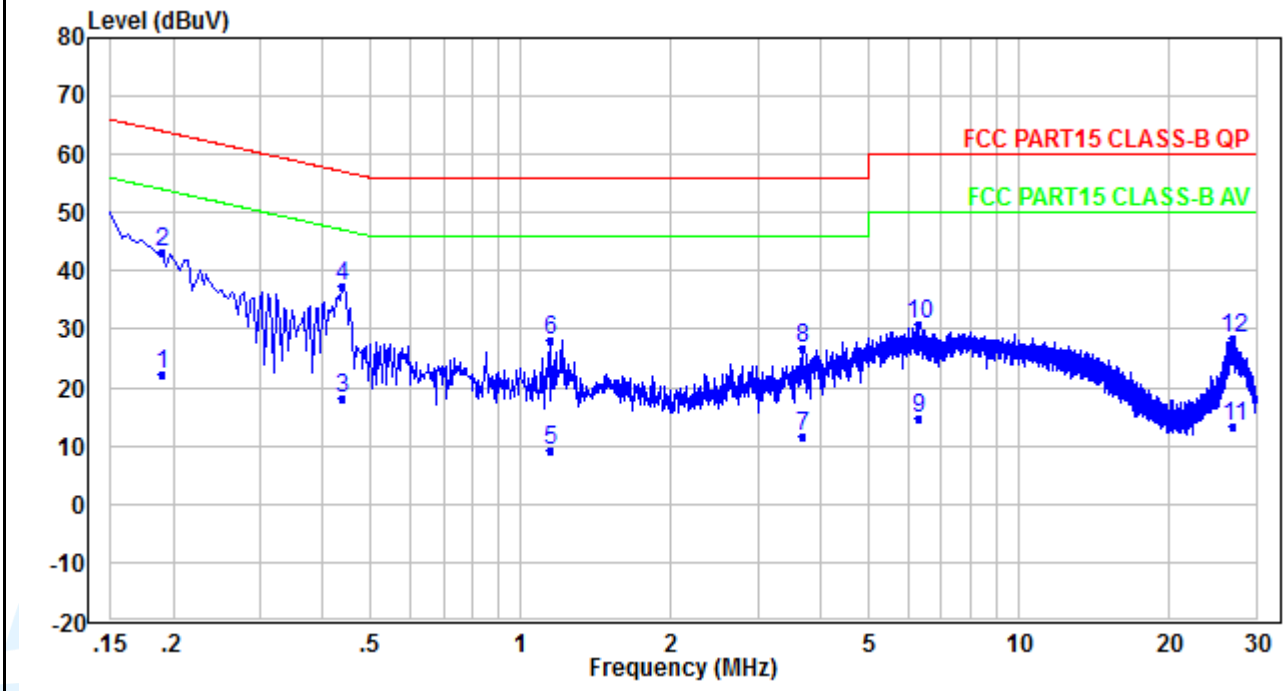
Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.214	18.03	9.40	27.43	53.05	-25.62	Average
2	0.214	33.03	9.40	42.43	63.05	-20.62	QP
3	0.446	10.20	9.42	19.62	46.95	-27.33	Average
4	0.446	26.20	9.42	35.62	56.95	-21.33	QP
5	1.138	5.04	9.42	14.46	46.00	-31.54	Average
6	1.138	21.04	9.42	30.46	56.00	-25.54	QP
7	6.010	8.80	9.55	18.35	50.00	-31.65	Average
8	6.010	23.80	9.55	33.35	60.00	-26.65	QP
9	9.665	8.08	9.41	17.49	50.00	-32.51	Average
10	9.665	22.08	9.41	31.49	60.00	-28.51	QP
11	26.532	3.16	9.39	12.55	50.00	-37.45	Average
12	26.532	18.16	9.39	27.55	60.00	-32.45	QP

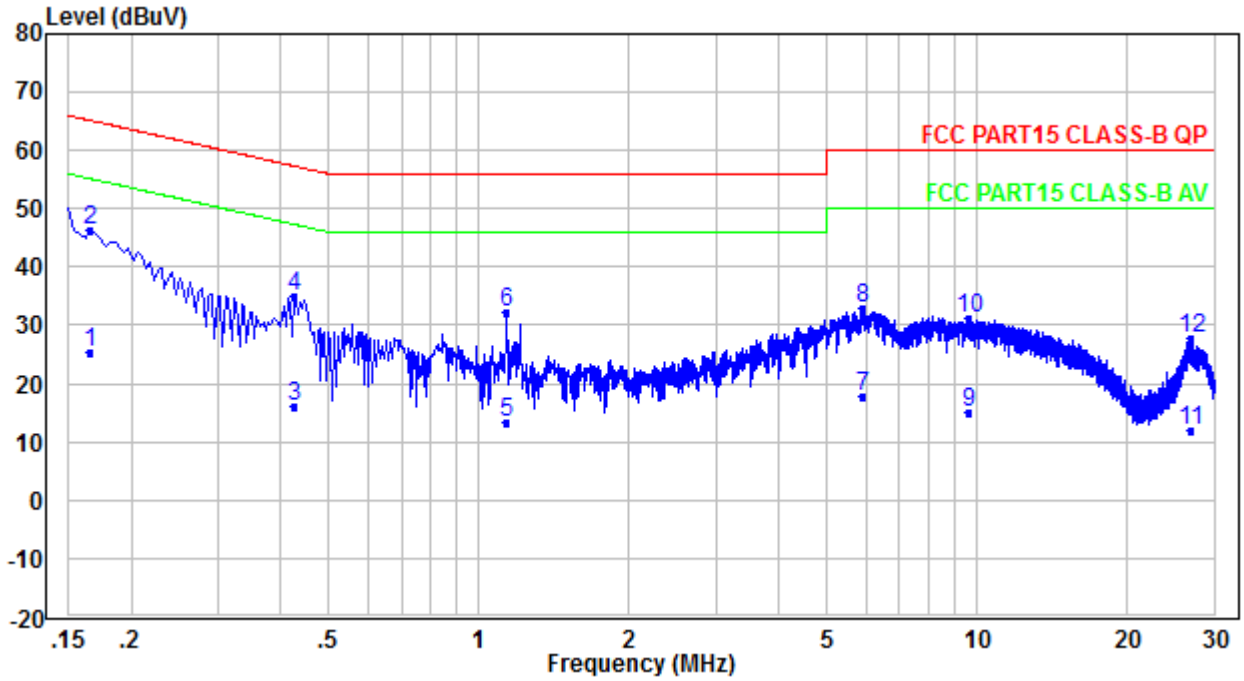
Quasi Peak and Average:
Test Mode4

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.190	12.75	9.39	22.14	54.04	-31.90	Average
2	0.190	33.75	9.39	43.14	64.04	-20.90	QP
3	0.438	8.87	9.40	18.27	47.10	-28.83	Average
4	0.438	27.87	9.40	37.27	57.10	-19.83	QP
5	1.142	-0.30	9.35	9.05	46.00	-36.95	Average
6	1.142	18.70	9.35	28.05	56.00	-27.95	QP
7	3.682	2.18	9.50	11.68	46.00	-34.32	Average
8	3.682	17.18	9.50	26.68	56.00	-29.32	QP
9	6.306	5.14	9.55	14.69	50.00	-35.31	Average
10	6.306	21.14	9.55	30.69	60.00	-29.31	QP
11	27.048	3.98	9.38	13.36	50.00	-36.64	Average
12	27.048	18.98	9.38	28.36	60.00	-31.64	QP

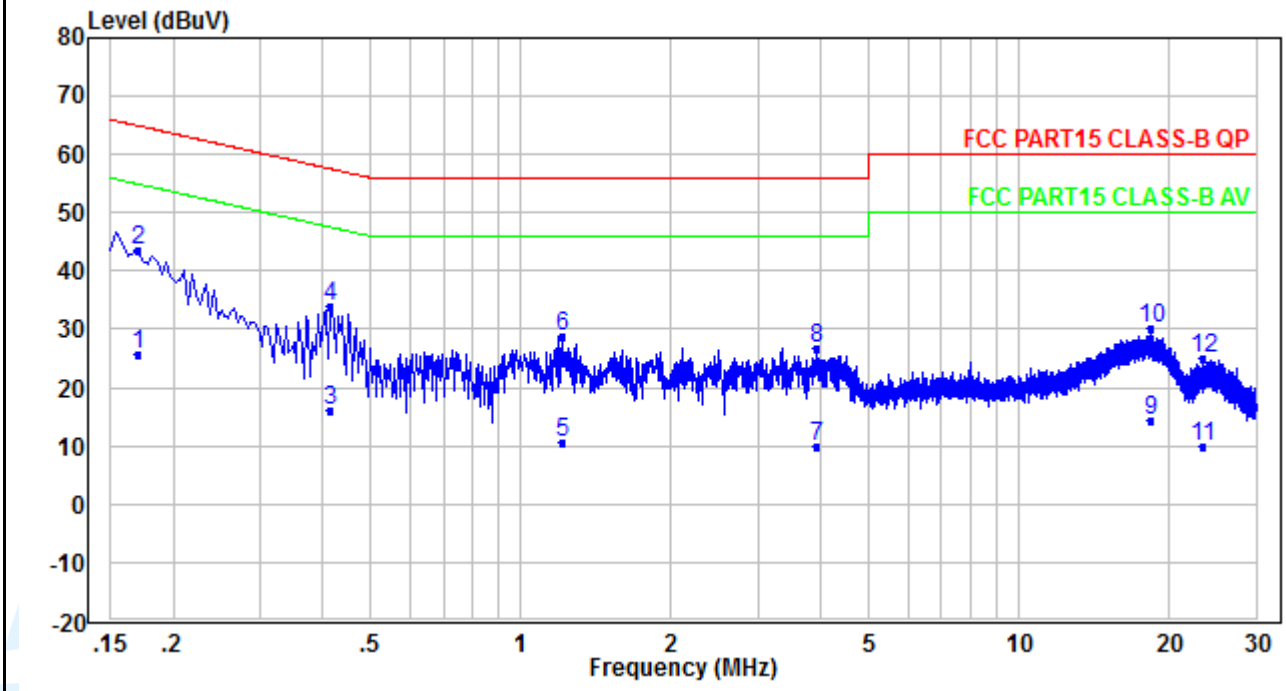
Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.166	15.79	9.41	25.20	55.16	-29.96	Average
2	0.166	36.79	9.41	46.20	65.16	-18.96	QP
3	0.426	6.53	9.42	15.95	47.33	-31.38	Average
4	0.426	25.53	9.42	34.95	57.33	-22.38	QP
5	1.138	3.75	9.42	13.17	46.00	-32.83	Average
6	1.138	22.75	9.42	32.17	56.00	-23.83	QP
7	5.930	8.22	9.55	17.77	50.00	-32.23	Average
8	5.930	23.22	9.55	32.77	60.00	-27.23	QP
9	9.649	5.68	9.41	15.09	50.00	-34.91	Average
10	9.649	21.68	9.41	31.09	60.00	-28.91	QP
11	26.944	2.42	9.41	11.83	50.00	-38.17	Average
12	26.944	18.42	9.41	27.83	60.00	-32.17	QP

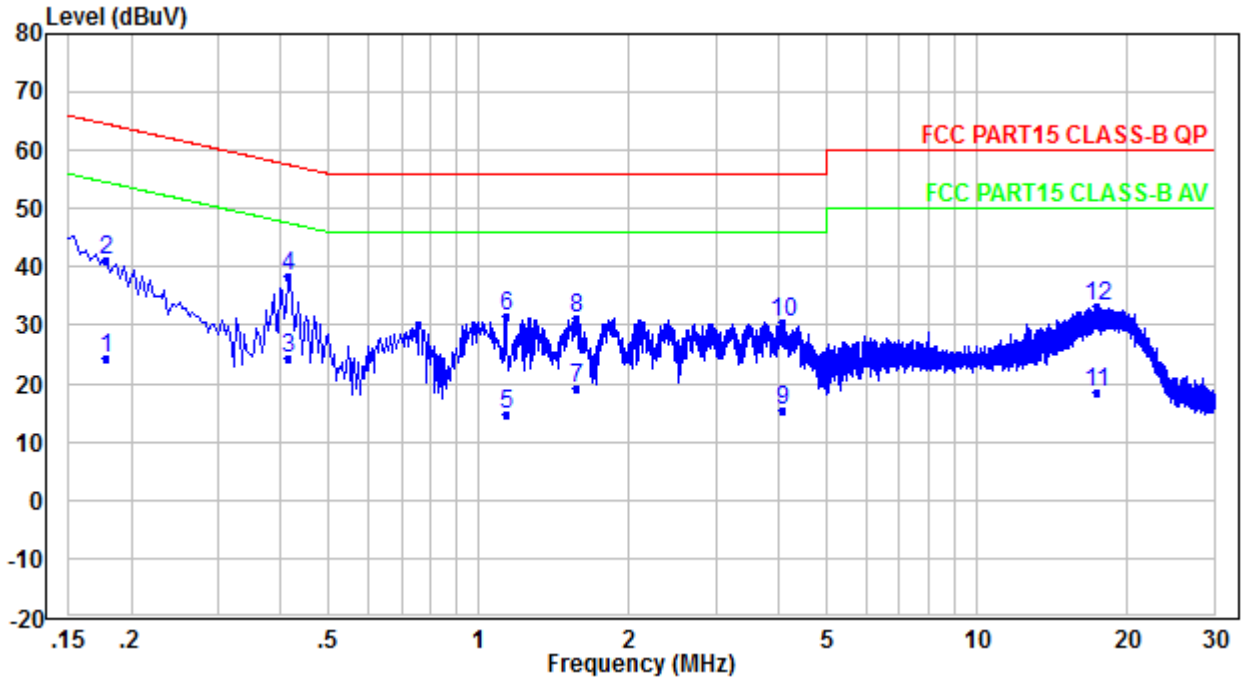
Quasi Peak and Average:
Test Mode6

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.170	16.28	9.40	25.68	54.96	-29.28	Average
2	0.170	34.28	9.40	43.68	64.96	-21.28	QP
3	0.414	6.70	9.40	16.10	47.57	-31.47	Average
4	0.414	24.70	9.40	34.10	57.57	-23.47	QP
5	1.214	1.38	9.37	10.75	46.00	-35.25	Average
6	1.214	19.38	9.37	28.75	56.00	-27.25	QP
7	3.942	0.24	9.53	9.77	46.00	-36.23	Average
8	3.942	17.24	9.53	26.77	56.00	-29.23	QP
9	18.497	5.03	9.25	14.28	50.00	-35.72	Average
10	18.497	21.03	9.25	30.28	60.00	-29.72	QP
11	23.464	0.73	9.31	10.04	50.00	-39.96	Average
12	23.464	15.73	9.31	25.04	60.00	-34.96	QP

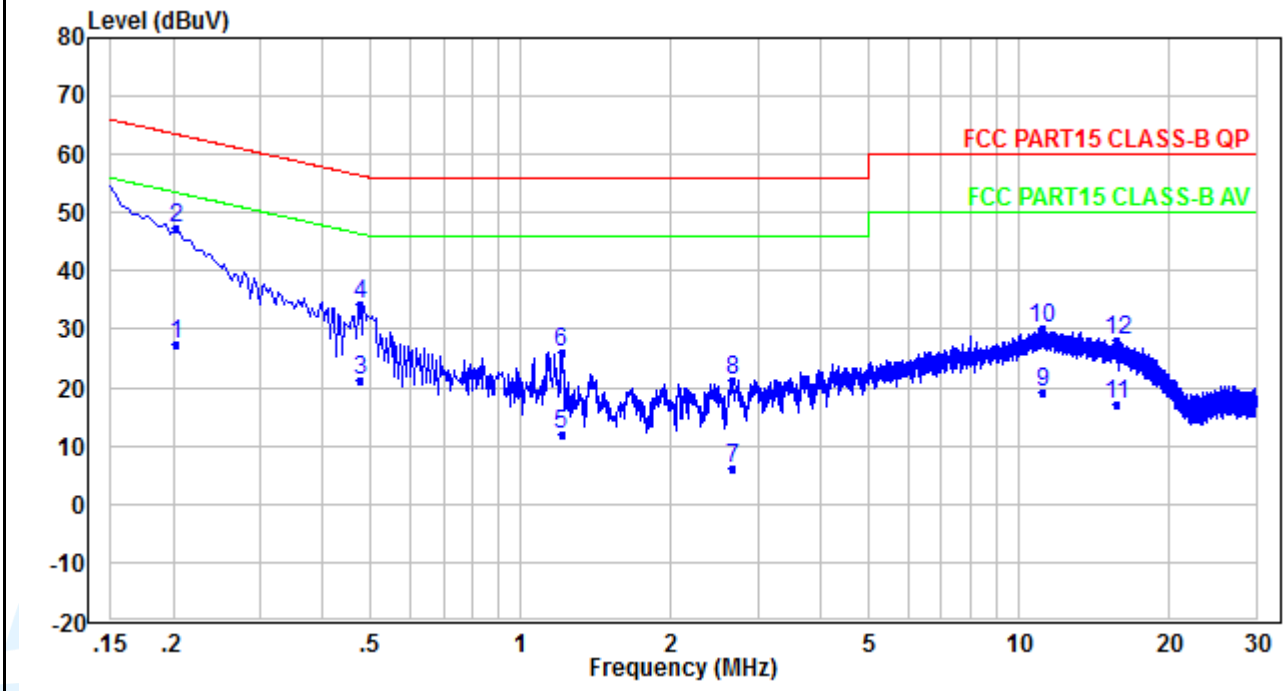
Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.178	14.89	9.40	24.29	54.58	-30.29	Average
2	0.178	31.89	9.40	41.29	64.58	-23.29	QP
3	0.414	15.05	9.41	24.46	47.57	-23.11	Average
4	0.414	29.05	9.41	38.46	57.57	-19.11	QP
5	1.134	5.30	9.42	14.72	46.00	-31.28	Average
6	1.134	22.30	9.42	31.72	56.00	-24.28	QP
7	1.570	9.66	9.45	19.11	46.00	-26.89	Average
8	1.570	21.66	9.45	31.11	56.00	-24.89	QP
9	4.078	5.98	9.52	15.50	46.00	-30.50	Average
10	4.078	20.98	9.52	30.50	56.00	-25.50	QP
11	17.397	9.09	9.29	18.38	50.00	-31.62	Average
12	17.397	24.09	9.29	33.38	60.00	-26.62	QP

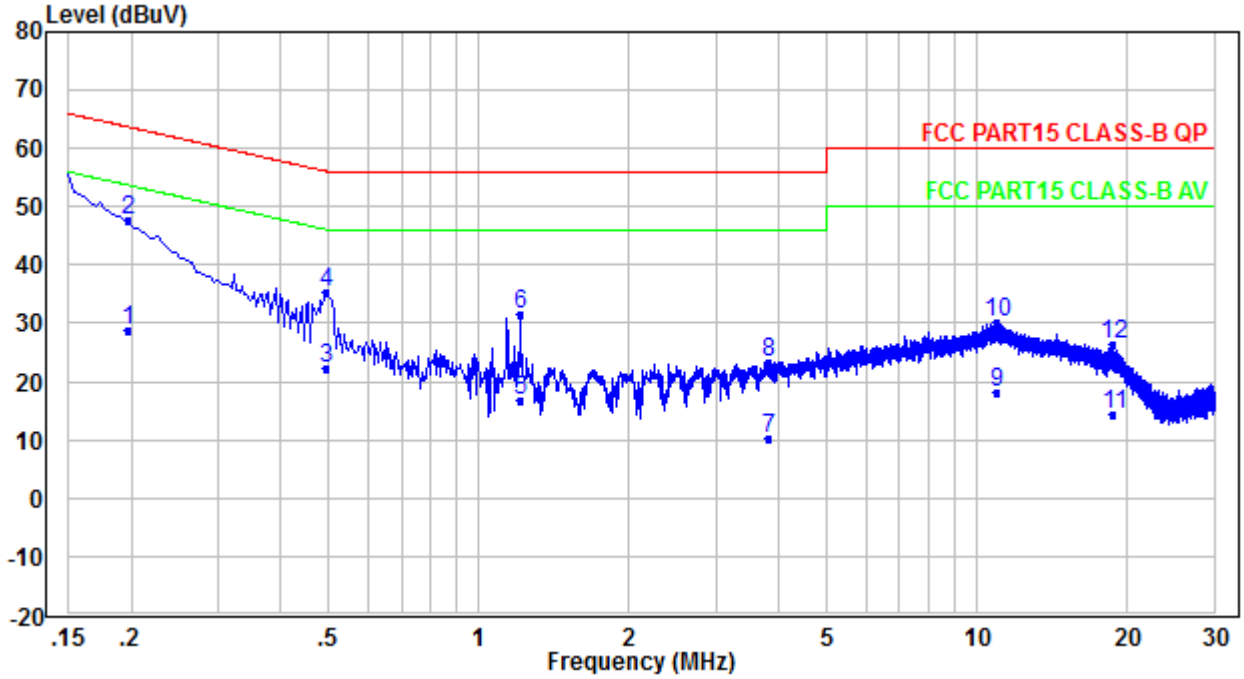
Quasi Peak and Average:
Test Mode7

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.202	17.87	9.39	27.26	53.53	-26.27	Average
2	0.202	37.87	9.39	47.26	63.53	-16.27	QP
3	0.474	11.88	9.39	21.27	46.44	-25.17	Average
4	0.474	24.88	9.39	34.27	56.44	-22.17	QP
5	1.206	2.74	9.37	12.11	46.00	-33.89	Average
6	1.206	16.74	9.37	26.11	56.00	-29.89	QP
7	2.654	-3.14	9.43	6.29	46.00	-39.71	Average
8	2.654	11.86	9.43	21.29	56.00	-34.71	QP
9	11.137	9.61	9.40	19.01	50.00	-30.99	Average
10	11.137	20.61	9.40	30.01	60.00	-29.99	QP
11	15.753	7.90	9.29	17.19	50.00	-32.81	Average
12	15.753	18.90	9.29	28.19	60.00	-31.81	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.198	19.31	9.40	28.71	53.69	-24.98	Average
2	0.198	38.31	9.40	47.71	63.69	-15.98	QP
3	0.494	12.86	9.42	22.28	46.10	-23.82	Average
4	0.494	25.86	9.42	35.28	56.10	-20.82	QP
5	1.210	7.23	9.43	16.66	46.00	-29.34	Average
6	1.210	22.23	9.43	31.66	56.00	-24.34	QP
7	3.818	0.84	9.51	10.35	46.00	-35.65	Average
8	3.818	13.84	9.51	23.35	56.00	-32.65	QP
9	11.001	8.70	9.39	18.09	50.00	-31.91	Average
10	11.001	20.70	9.39	30.09	60.00	-29.91	QP
11	18.841	4.97	9.25	14.22	50.00	-35.78	Average
12	18.841	16.97	9.25	26.22	60.00	-33.78	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.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

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

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.