

TEST REPORT

Product Name: IP Phone
Trade Mark: GRANDSTREAM
Model No. / HVIN: GRP2634
Report Number: 200829040EMC-1
Test Standards: FCC 47 CFR Part 15 Subpart B
ICES-003 Issue 6
FCC ID: YZZGRP2634
IC: 11964A-GRP2634
Test Result: PASS
Date of Issue: December 14, 2020

Prepared for:

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

Prepared by:

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Version

Version No.	Date	Description
V1.0	December 14, 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. / HVIN:	GRP2634
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:	5825 MHz
Sample Received Date:	November 3, 2020
Sample Tested Date:	November 5, 2020 to November 8, 2020

1.2.2 Description of Accessories

Adapter(1)	
Model No.:	GQ12-120100-AU
Input:	100-240 V~50/60 Hz 0.4A Max
Output:	12.0 V $\equiv$ 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:	12.0 V $\equiv$ 1.0 A
DC Cable:	2.5 Meter, Unshielded without ferrite

Adapter(3)	
Model No.:	F12US1200100A
Input:	100-240 V~50/60 Hz 0.5A Max
Output:	12.0 V $\equiv$ 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	

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	YEE	VE120-MV	N/A	UnionTrust
Standard POE Power supply	TP-LINK	TL-POE160S	N/A	UnionTrust
IP Phone	GRANDSTREAM	GRP2624	N/A	Applicant

2) 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: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109

Telephone: +86 (0) 755 2823 0888

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1.5 TEST FACILITY

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

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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	±3.2 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 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
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 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
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	Nov. 24, 2019	Nov. 23, 2020
☐	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2019	Nov. 23, 2020
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Nov. 16, 2019	Nov. 15, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May. 30, 2020	May. 29, 2021
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 19, 2020	Jun. 18, 2021
☐	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☐	Highpass Filter (1.2GHz~18GHz)	Micro-Tronics	HPM50108	G552	Nov. 24, 2019	Nov. 23, 2020
☐	Highpass Filter (3GHz~18GHz)	Micro-Tronics	HPM50117	G005	Nov. 24, 2019	Nov. 23, 2020
☒	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	ETS-Lindgren	3816/2SH	00201088	Nov. 24, 2019	Nov. 23, 2020
☒	Test Software	Audix	e3	Software Version: 9.160323		

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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 (%)
NT/NV	+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

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Conducted Emission	25.4	42	99.97	Tripp Jiang
Radiated Emission	25.6	57	100.62	Fire Huo

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 1~4
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 1~4
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

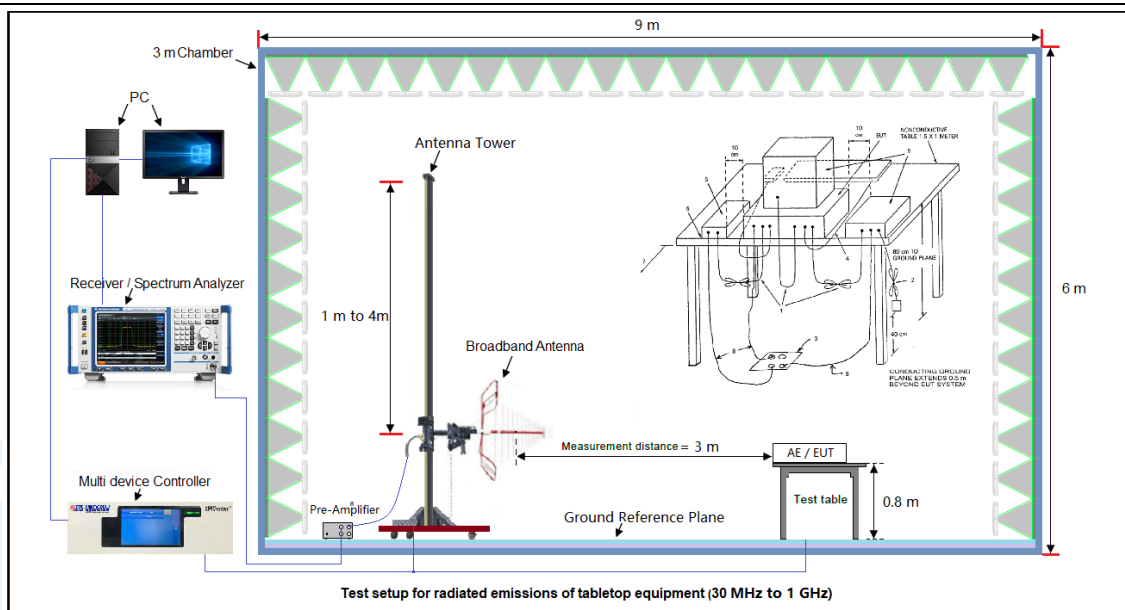
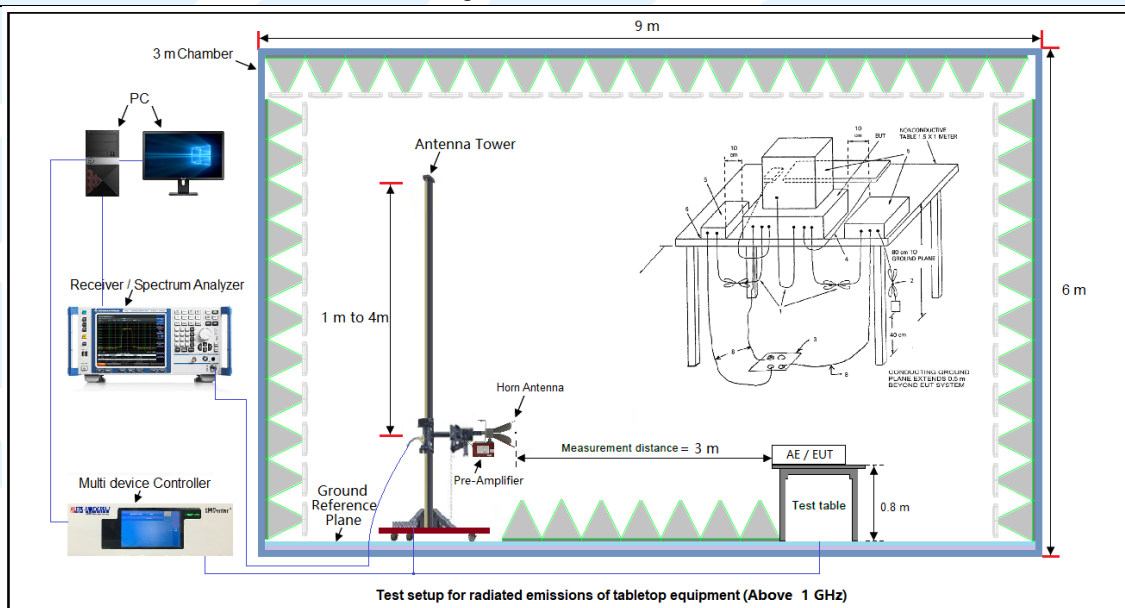
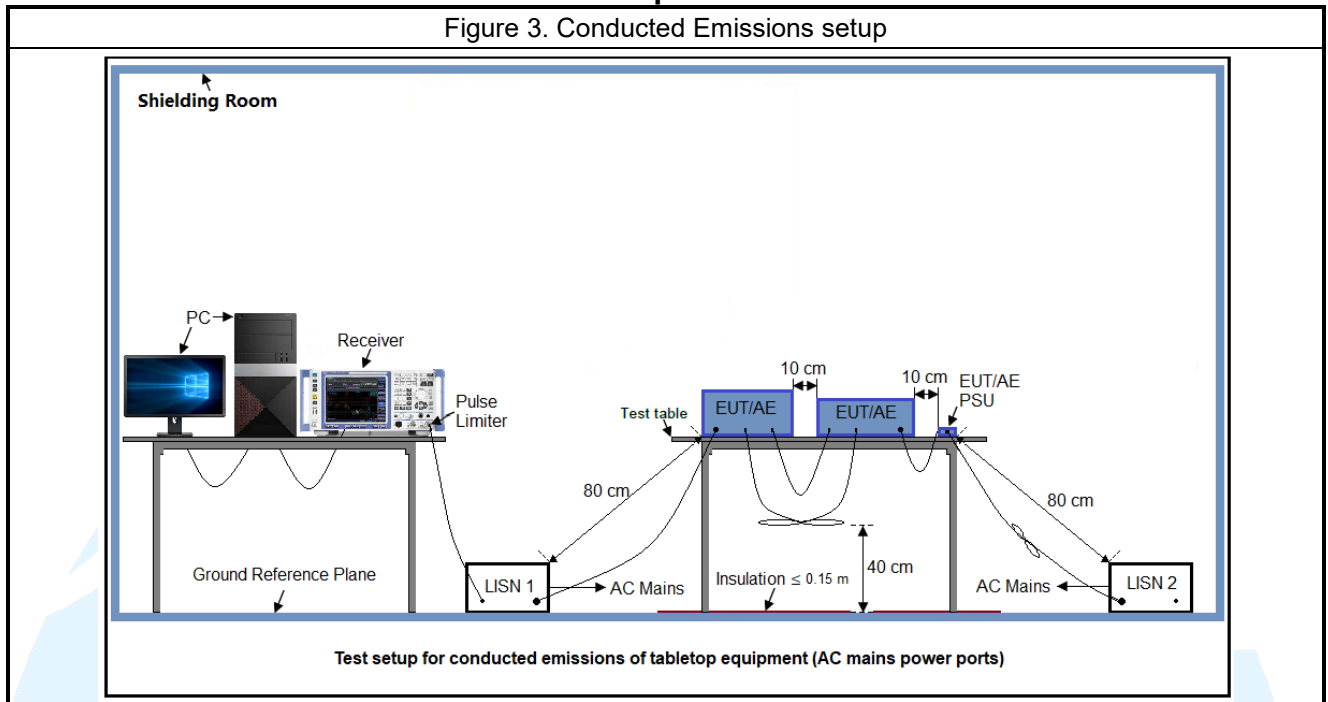


Figure 2. Above 1GHz



4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



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
$30 \leq f \leq 1\,000$	Quasi Peak	120 kHz	300 kHz
$f \geq 1000$	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 (dB μ V/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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
- 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.

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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.

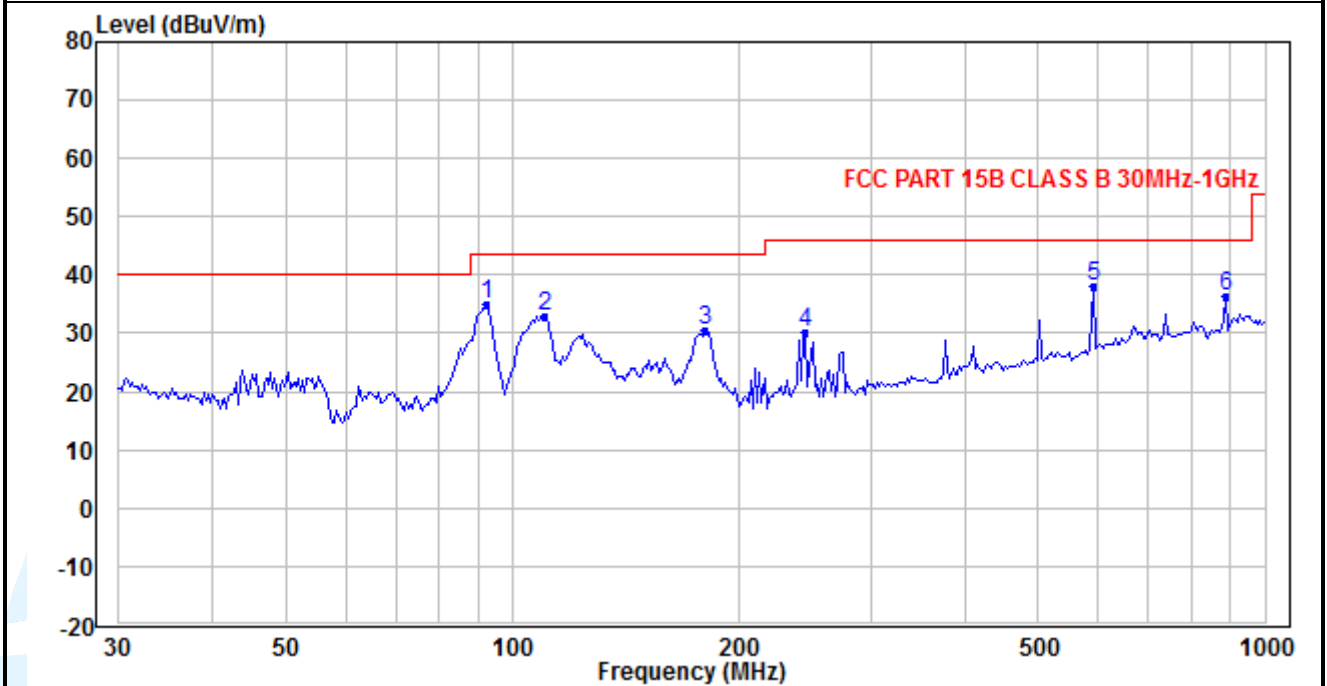
Test Result: Pass

The measurement data as follows:

Below 1GHz(Quasi Peak):

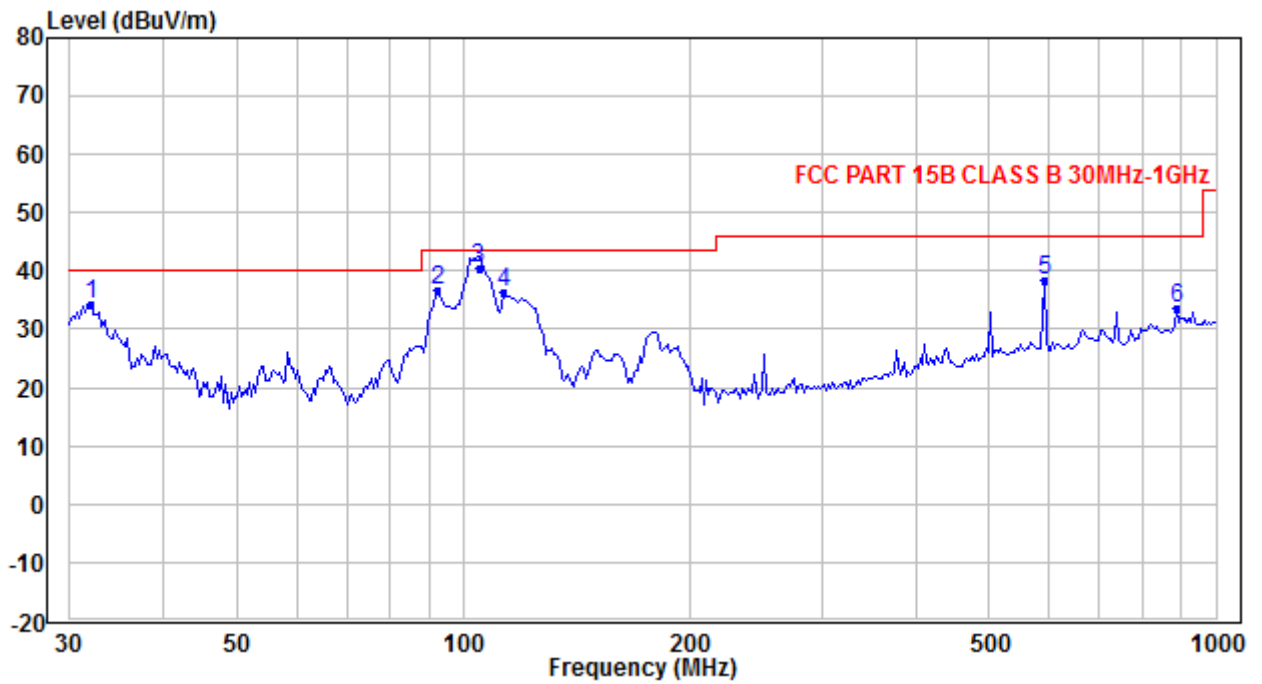
TM3

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	92.346	47.94	-12.93	35.01	43.50	-8.49	QP
2	110.082	45.48	-12.39	33.09	43.50	-10.41	QP
3	180.030	40.73	-10.11	30.62	43.50	-12.88	QP
4	245.261	37.75	-7.43	30.32	46.00	-15.68	QP
5	590.351	37.47	0.56	38.03	46.00	-7.97	QP
6	887.398	31.53	4.89	36.42	46.00	-9.58	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	31.959	40.59	-6.40	34.19	40.00	-5.81	QP
2	92.346	49.47	-12.93	36.54	43.50	-6.96	QP
3	104.798	52.76	-12.34	40.42	43.50	-3.08	QP
4	113.220	48.84	-12.46	36.38	43.50	-7.12	QP
5	590.351	38.30	0.21	38.51	46.00	-7.49	QP
6	887.398	28.86	4.64	33.50	46.00	-12.50	QP

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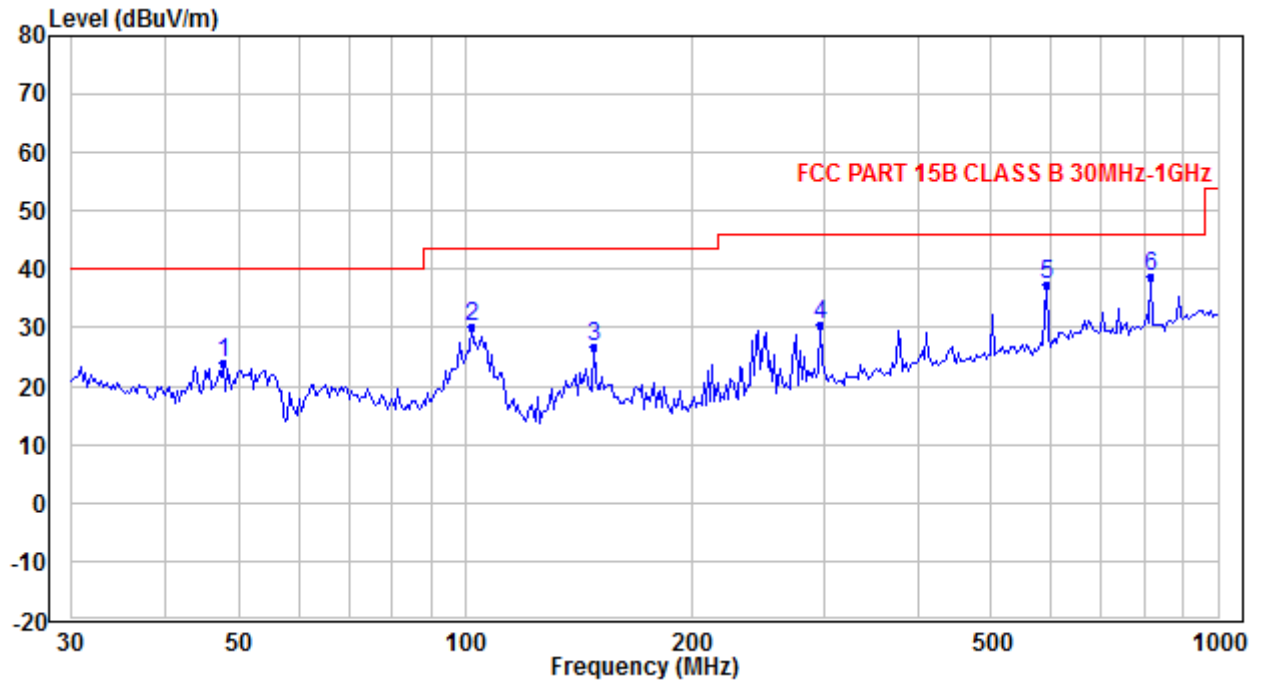
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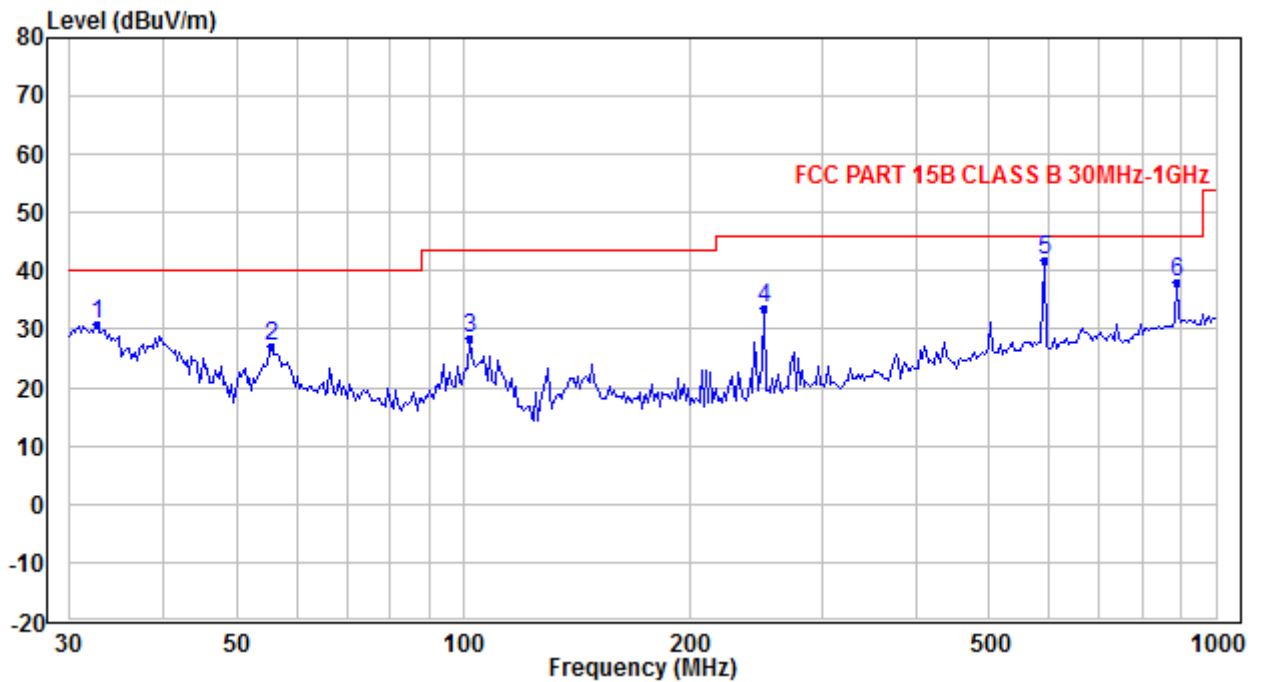
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Below 1GHz(Quasi Peak):
TM6
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	47.703	37.38	-13.34	24.04	40.00	-15.96	QP
2	101.893	42.56	-12.31	30.25	43.50	-13.25	QP
3	147.875	38.20	-11.41	26.79	43.50	-16.71	QP
4	296.502	36.29	-5.86	30.43	46.00	-15.57	QP
5	590.351	36.89	0.56	37.45	46.00	-8.55	QP
6	815.635	34.89	3.96	38.85	46.00	-7.15	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.640	37.84	-6.81	31.03	40.00	-8.97	QP
2	55.678	41.60	-14.54	27.06	40.00	-12.94	QP
3	101.893	40.67	-12.31	28.36	43.50	-15.14	QP
4	250.486	40.86	-7.13	33.73	46.00	-12.27	QP
5	590.351	41.73	0.21	41.94	46.00	-4.06	QP
6	887.398	33.60	4.64	38.24	46.00	-7.76	QP

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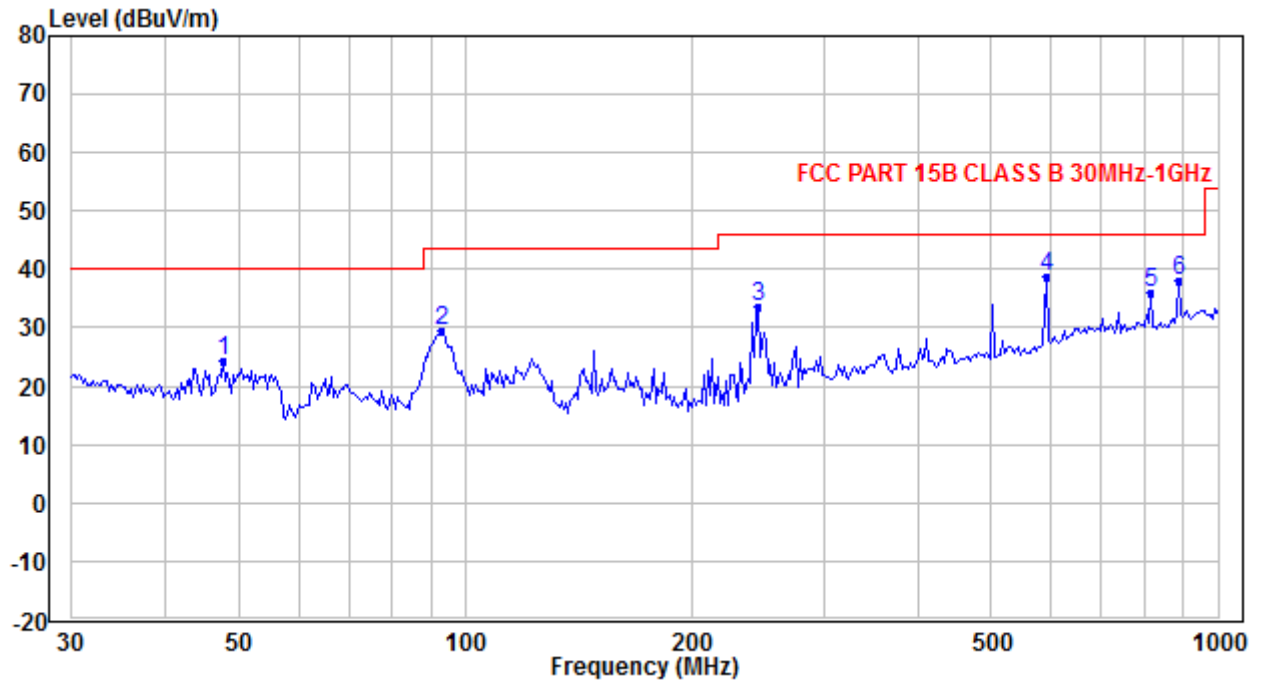
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Below 1GHz(Quasi Peak):
TM7
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	47.703	37.83	-13.34	24.49	40.00	-15.51	QP
2	92.997	42.39	-12.87	29.52	43.50	-13.98	QP
3	245.261	41.13	-7.43	33.70	46.00	-12.30	QP
4	590.351	38.30	0.56	38.86	46.00	-7.14	QP
5	815.635	32.11	3.96	36.07	46.00	-9.93	QP
6	887.398	33.23	4.89	38.12	46.00	-7.88	QP

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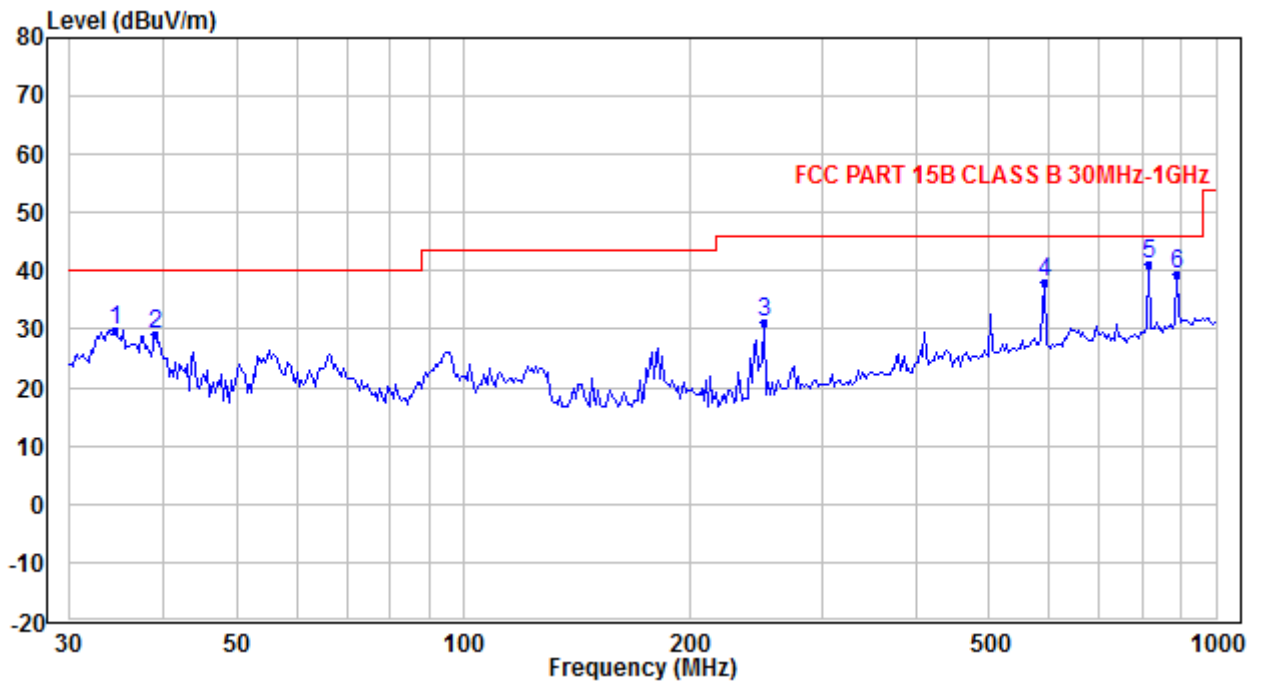
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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.527	37.96	-7.98	29.98	40.00	-10.02	QP
2	38.908	39.67	-10.66	29.01	40.00	-10.99	QP
3	250.486	38.49	-7.13	31.36	46.00	-14.64	QP
4	590.351	38.03	0.21	38.24	46.00	-7.76	QP
5	815.635	37.65	3.60	41.25	46.00	-4.75	QP
6	887.398	34.73	4.64	39.37	46.00	-6.63	QP

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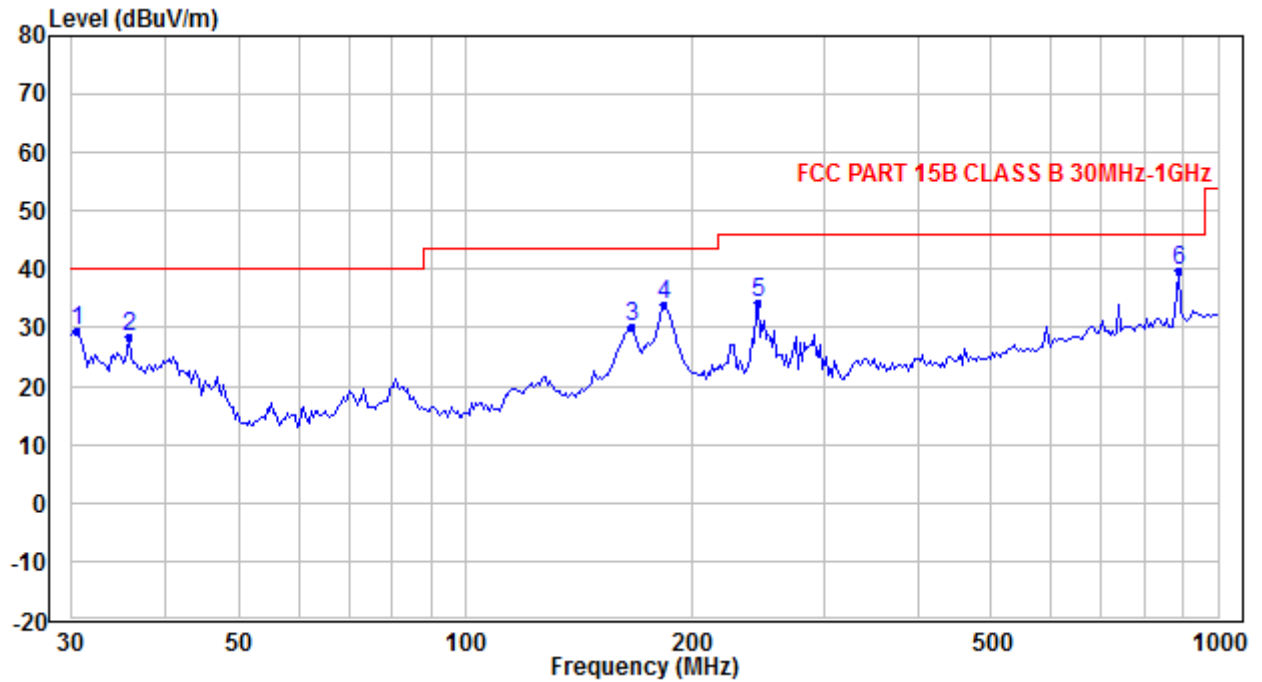
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Below 1GHz(Quasi Peak):
TM8
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.425	35.32	-5.70	29.62	40.00	-10.38	QP
2	35.762	36.79	-8.28	28.51	40.00	-11.49	QP
3	166.639	40.93	-10.68	30.25	43.50	-13.25	QP
4	183.866	44.00	-10.20	33.80	43.50	-9.70	QP
5	245.261	41.75	-7.43	34.32	46.00	-11.68	QP
6	887.398	34.73	4.89	39.62	46.00	-6.38	QP

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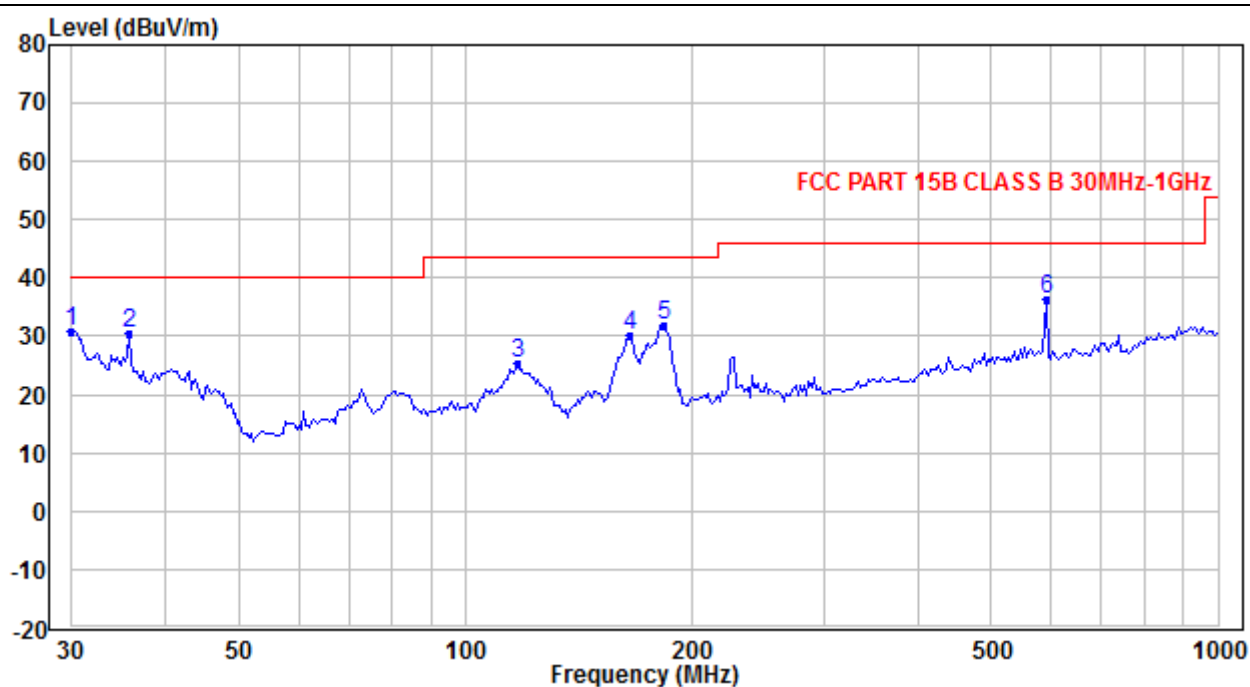
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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.000	36.09	-5.19	30.90	40.00	-9.10	QP
2	35.762	39.20	-8.73	30.47	40.00	-9.53	QP
3	117.269	37.82	-12.54	25.28	43.50	-18.22	QP
4	165.472	41.07	-10.90	30.17	43.50	-13.33	QP
5	183.866	41.99	-10.20	31.79	43.50	-11.71	QP
6	590.351	36.00	0.21	36.21	46.00	-9.79	QP

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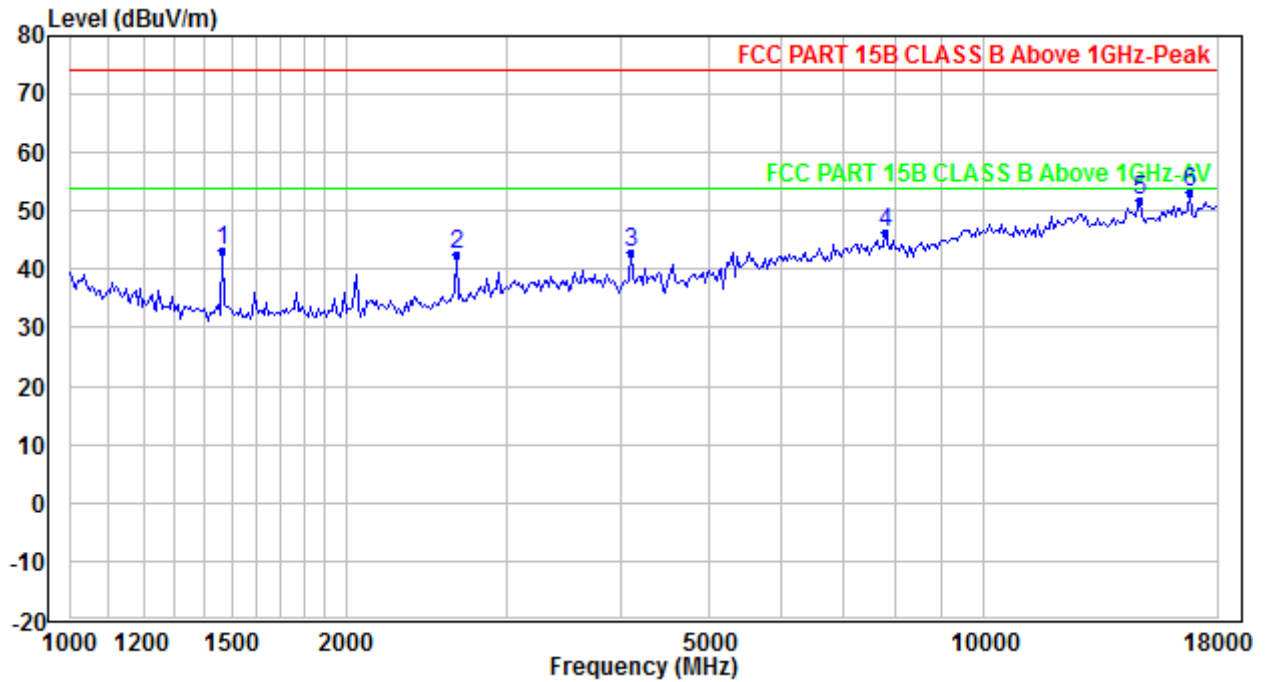
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Above 1GHz(Peak & Average)
TM3
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1465.642	55.40	-12.32	43.08	74.00	-30.92	Peak
2	2646.164	50.94	-8.51	42.43	74.00	-31.57	Peak
3	4109.610	46.93	-4.04	42.89	74.00	-31.11	Peak
4	7816.810	44.31	1.84	46.15	74.00	-27.85	Peak
5	14782.330	39.72	12.23	51.95	74.00	-22.05	Peak
6	16791.350	40.89	12.34	53.23	74.00	-20.77	Peak

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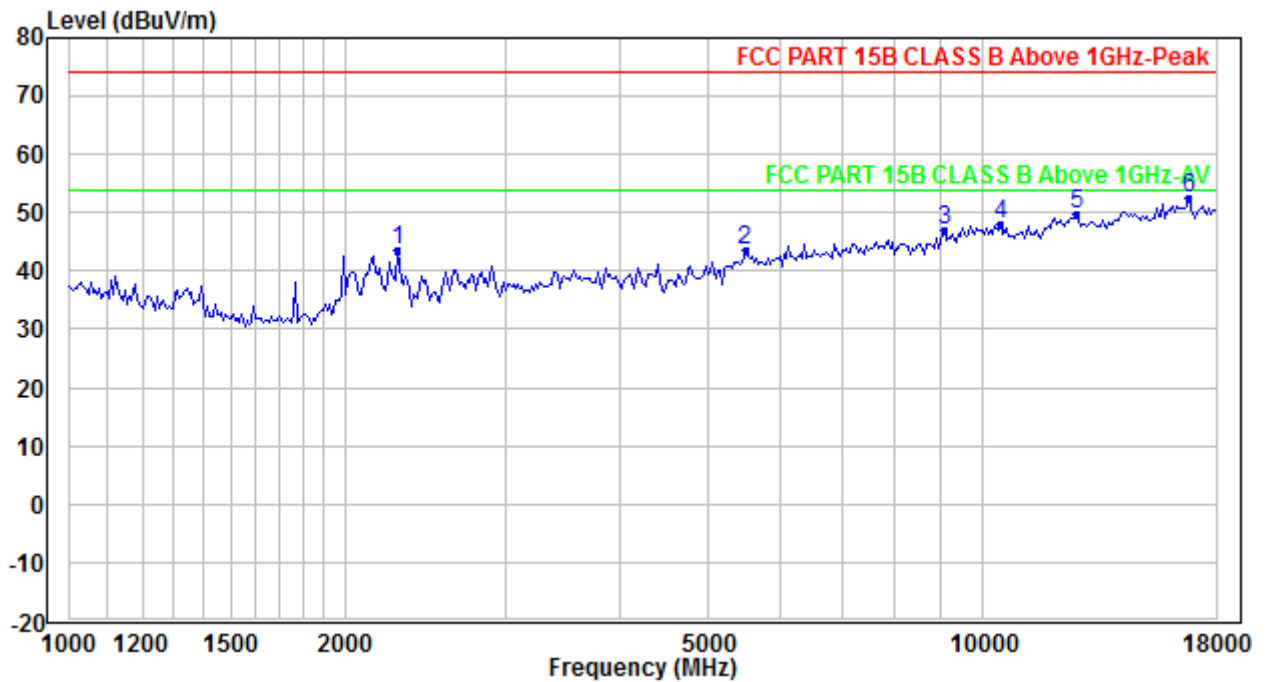
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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2289.430	53.54	-9.90	43.64	74.00	-30.36	Peak
2	5490.089	43.99	-0.41	43.58	74.00	-30.42	Peak
3	9087.293	42.90	4.04	46.94	74.00	-27.06	Peak
4	10442.590	42.30	5.81	48.11	74.00	-25.89	Peak
5	12642.190	40.16	9.58	49.74	74.00	-24.26	Peak
6	16791.350	39.75	12.59	52.34	74.00	-21.66	Peak

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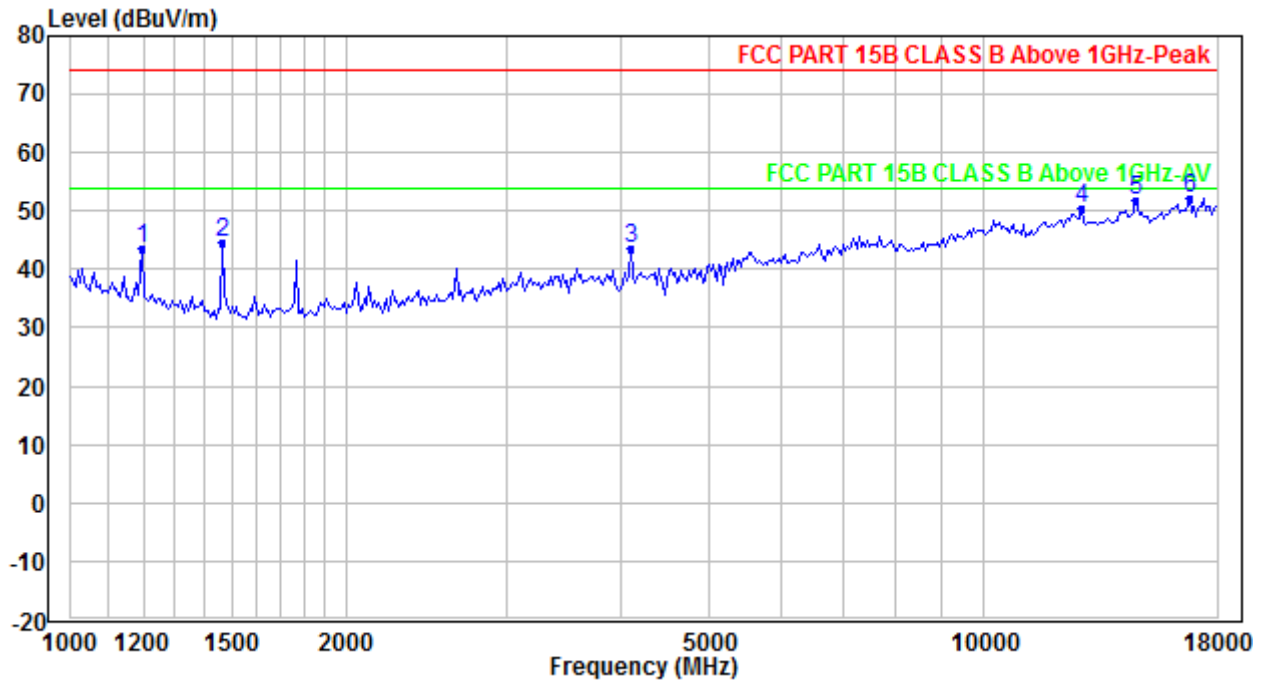
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Above 1GHz(Peak & Average)
TM6
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1196.693	54.89	-11.42	43.47	74.00	-30.53	Peak
2	1465.642	57.04	-12.32	44.72	74.00	-29.28	Peak
3	4109.610	47.54	-4.04	43.50	74.00	-30.50	Peak
4	12789.500	40.71	9.62	50.33	74.00	-23.67	Peak
5	14696.950	39.54	12.38	51.92	74.00	-22.08	Peak
6	16791.350	39.85	12.34	52.19	74.00	-21.81	Peak

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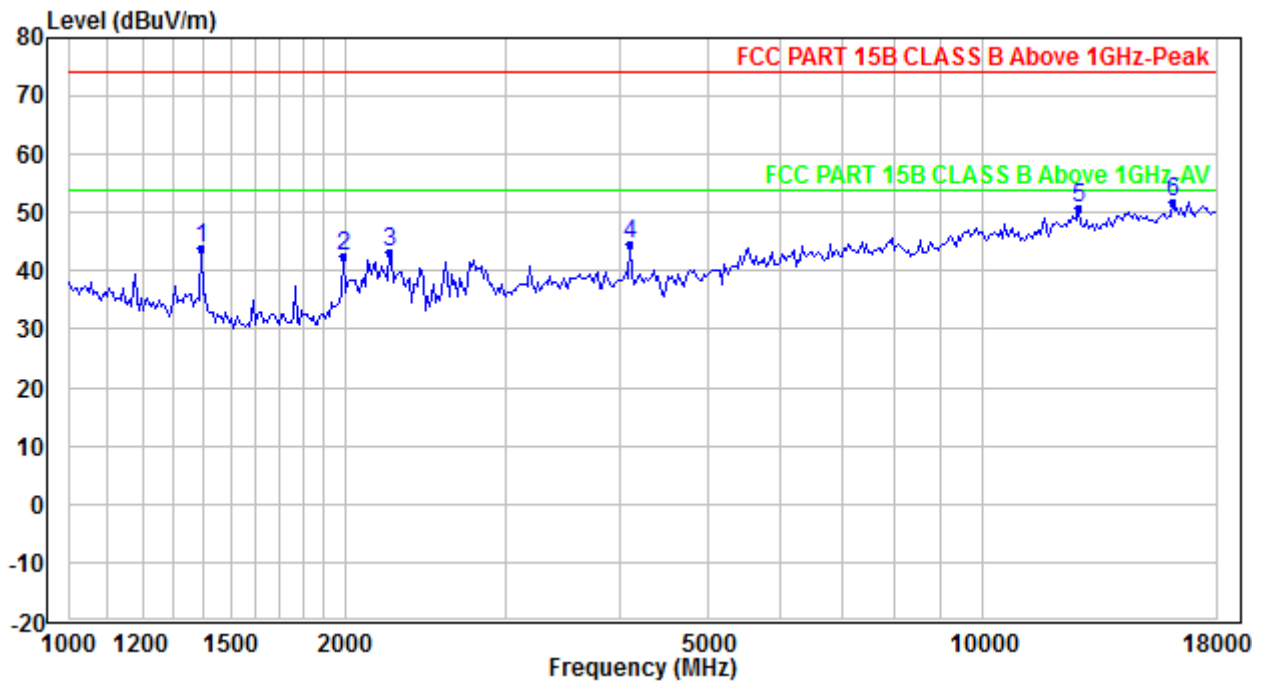
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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1391.194	56.76	-12.86	43.90	74.00	-30.10	Peak
2	1992.295	53.10	-10.39	42.71	74.00	-31.29	Peak
3	2236.995	53.12	-10.03	43.09	74.00	-30.91	Peak
4	4109.610	48.52	-4.00	44.52	74.00	-29.48	Peak
5	12715.630	41.18	9.69	50.87	74.00	-23.13	Peak
6	16124.140	39.99	11.93	51.92	74.00	-22.08	Peak

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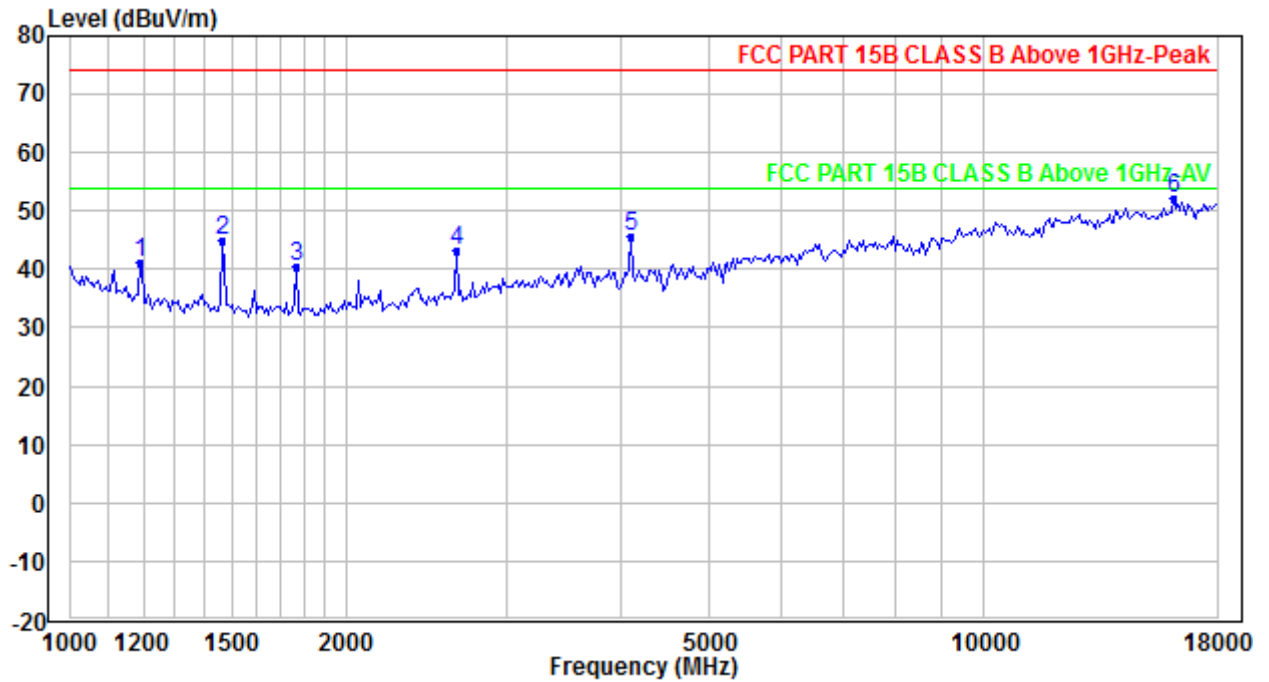
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Above 1GHz(Peak & Average)
TM7
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1189.782	52.43	-11.40	41.03	74.00	-32.97	Peak
2	1465.642	57.17	-12.32	44.85	74.00	-29.15	Peak
3	1764.113	51.63	-11.00	40.63	74.00	-33.37	Peak
4	2646.164	51.88	-8.51	43.37	74.00	-30.63	Peak
5	4109.610	49.76	-4.04	45.72	74.00	-28.28	Peak
6	16124.140	40.23	11.78	52.01	74.00	-21.99	Peak

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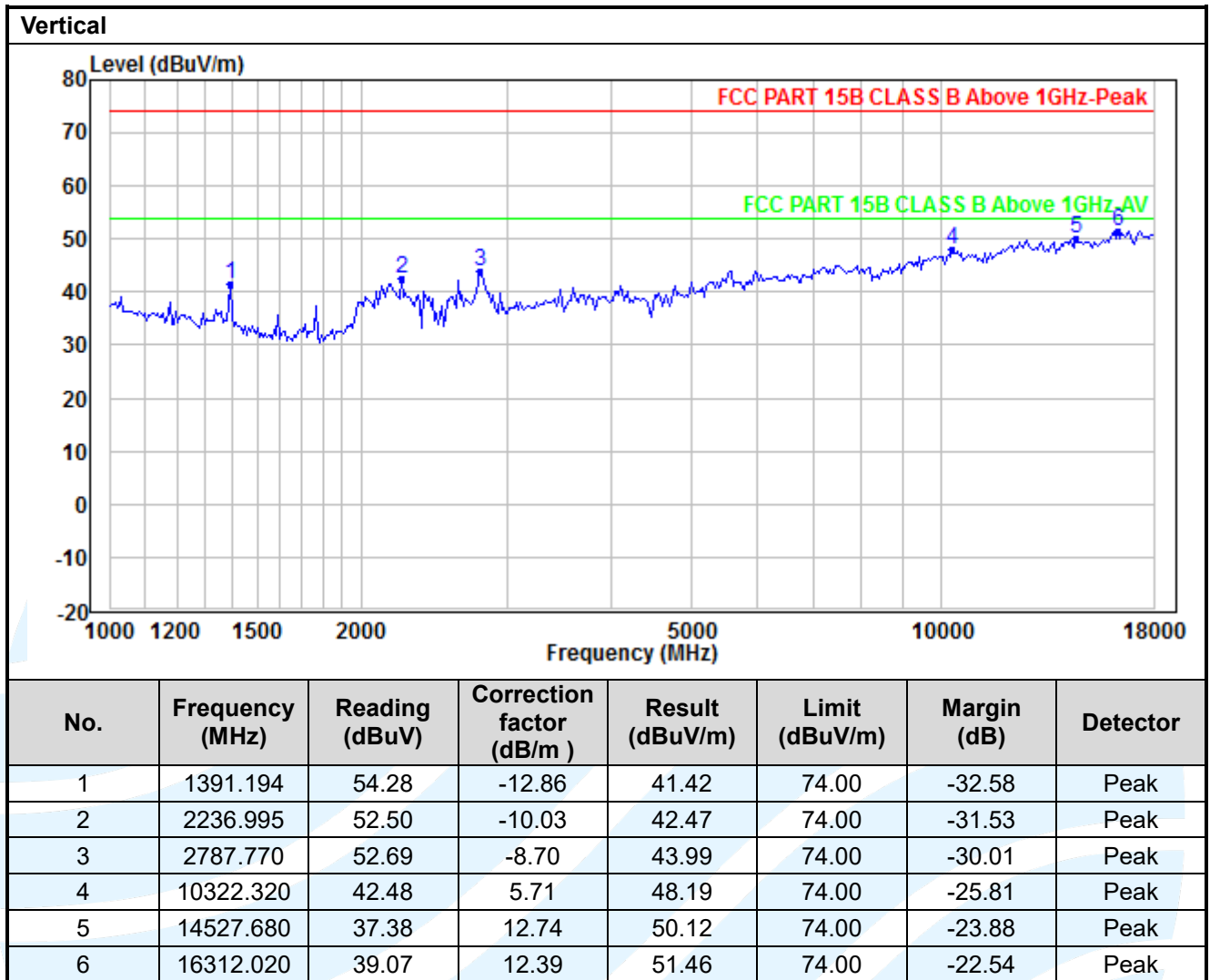
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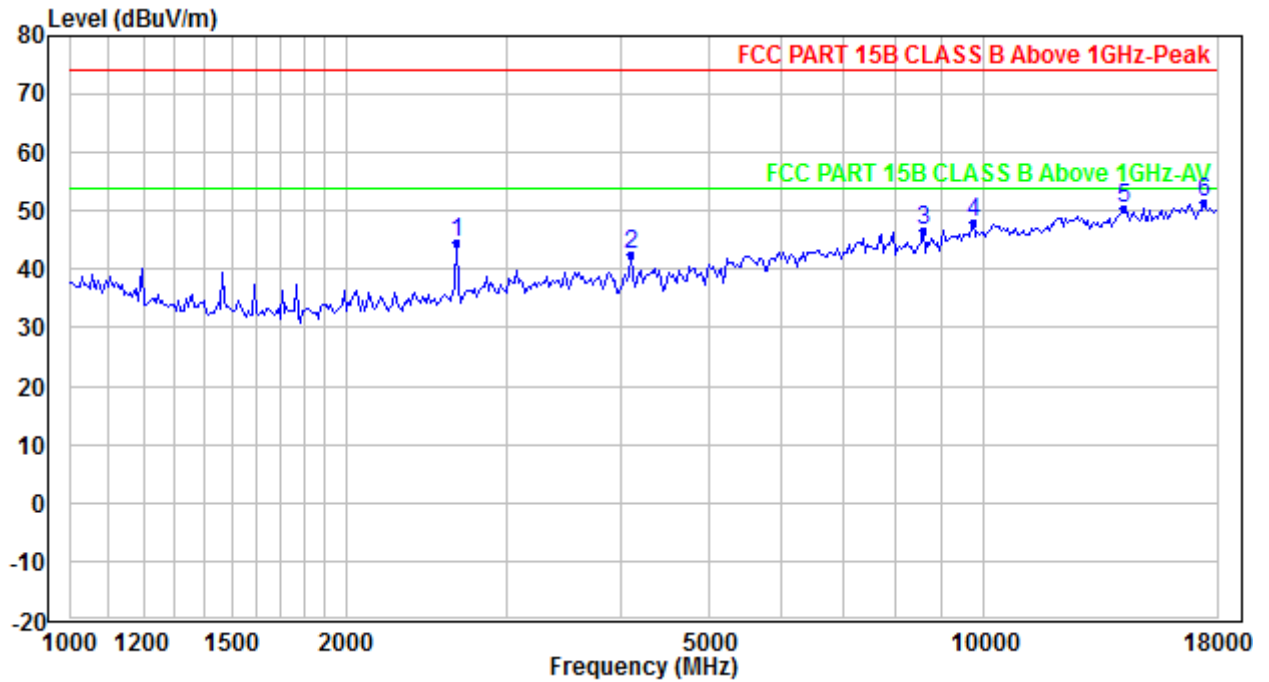
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Above 1GHz(Peak & Average)
TM8
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2646.164	53.19	-8.51	44.68	74.00	-29.32	Peak
2	4109.610	46.57	-4.04	42.53	74.00	-31.47	Peak
3	8575.881	43.59	3.00	46.59	74.00	-27.41	Peak
4	9741.401	43.09	4.85	47.94	74.00	-26.06	Peak
5	14194.950	38.23	12.25	50.48	74.00	-23.52	Peak
6	17385.170	38.21	13.42	51.63	74.00	-22.37	Peak

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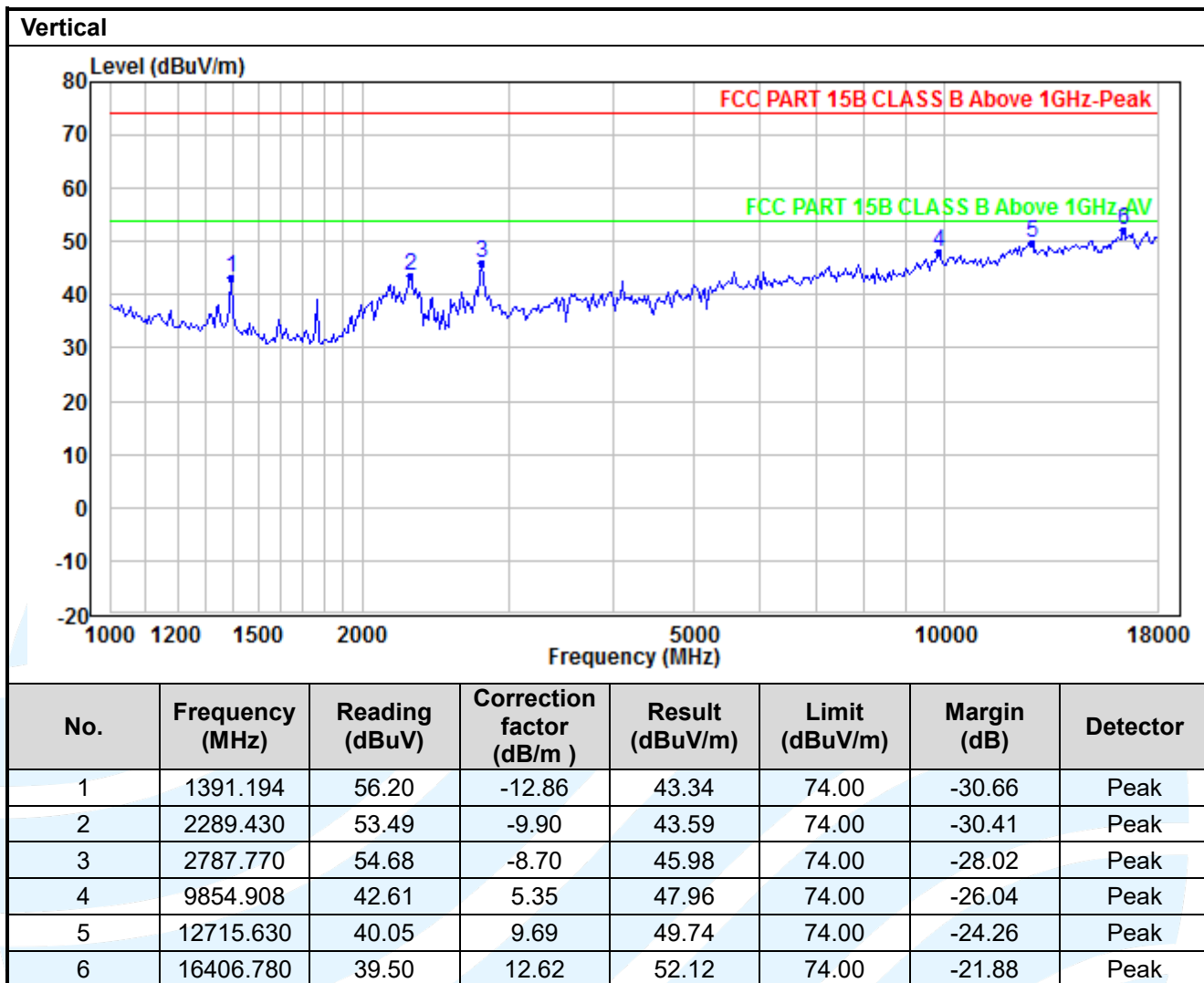
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Remark:

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.

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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.

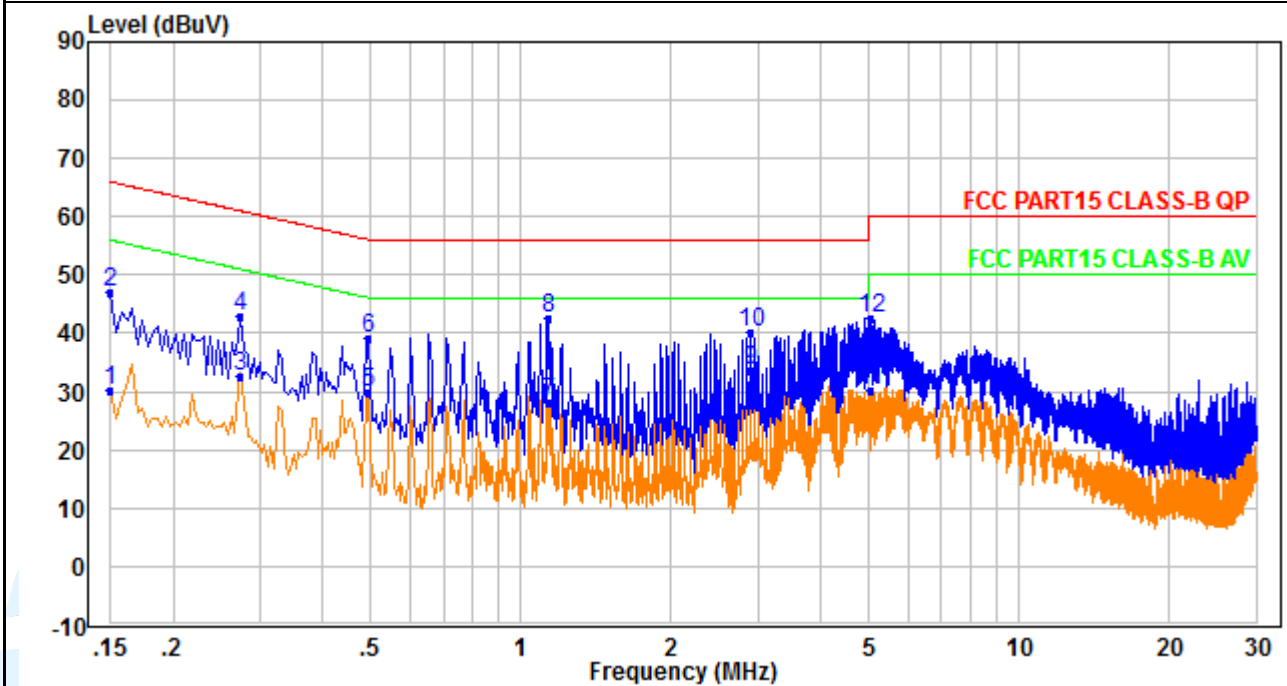
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

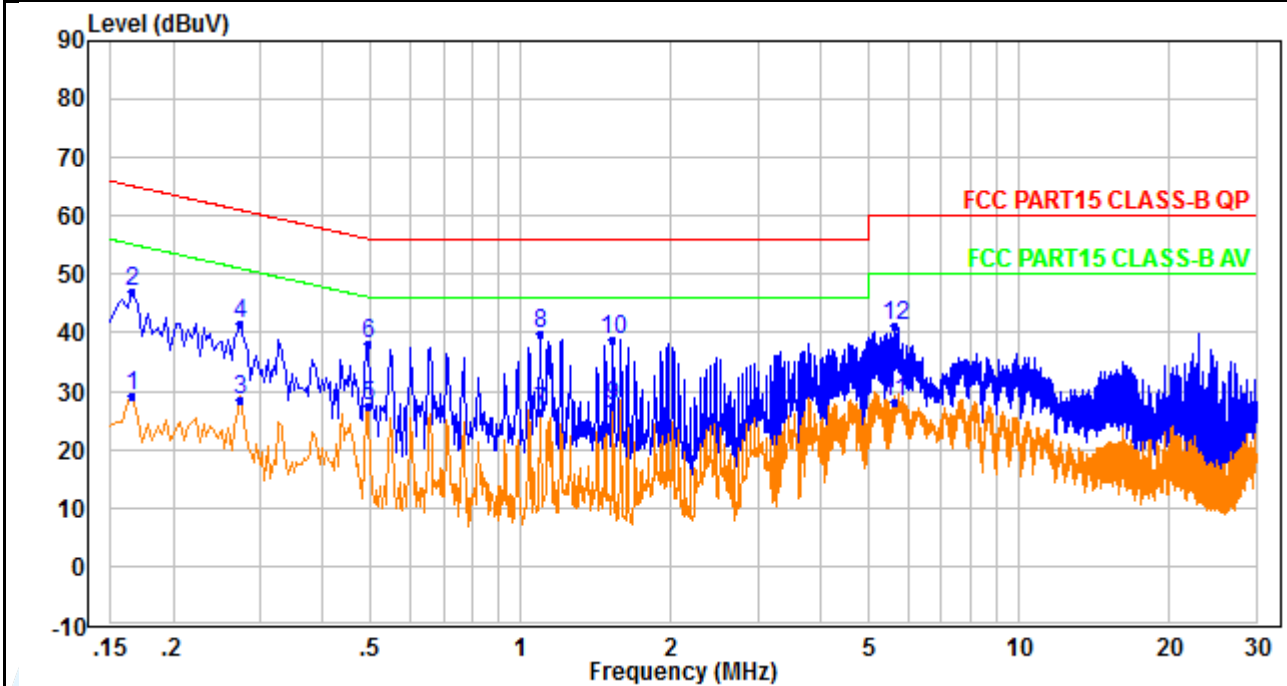
TM1

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	21.03	9.03	30.06	56.00	-25.94	Average
2	0.150	37.88	9.03	46.91	66.00	-19.09	QP
3	0.274	23.56	9.17	32.73	51.00	-18.27	Average
4	0.274	33.85	9.17	43.02	61.00	-17.98	QP
5	0.494	20.40	9.30	29.70	46.10	-16.40	Average
6	0.494	29.89	9.30	39.19	56.10	-16.91	QP
7	1.134	18.66	9.43	28.09	46.00	-17.91	Average
8	1.134	33.07	9.43	42.50	56.00	-13.50	QP
9	2.898	23.87	9.61	33.48	46.00	-12.52	Average
10	2.898	30.58	9.61	40.19	56.00	-15.81	QP
11	5.034	20.54	9.63	30.17	50.00	-19.83	Average
12	5.034	32.95	9.63	42.58	60.00	-17.42	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.166	20.10	9.05	29.15	55.16	-26.01	Average
2	0.166	38.00	9.05	47.05	65.16	-18.11	QP
3	0.274	19.48	9.15	28.63	51.00	-22.37	Average
4	0.274	32.48	9.15	41.63	61.00	-19.37	QP
5	0.494	18.21	9.33	27.54	46.10	-18.56	Average
6	0.494	28.88	9.33	38.21	56.10	-17.89	QP
7	1.094	17.01	9.42	26.43	46.00	-19.57	Average
8	1.094	30.50	9.42	39.92	56.00	-16.08	QP
9	1.530	17.92	9.51	27.43	46.00	-18.57	Average
10	1.530	29.30	9.51	38.81	56.00	-17.19	QP
11	5.634	18.60	9.65	28.25	50.00	-21.75	Average
12	5.634	31.65	9.65	41.30	60.00	-18.70	QP

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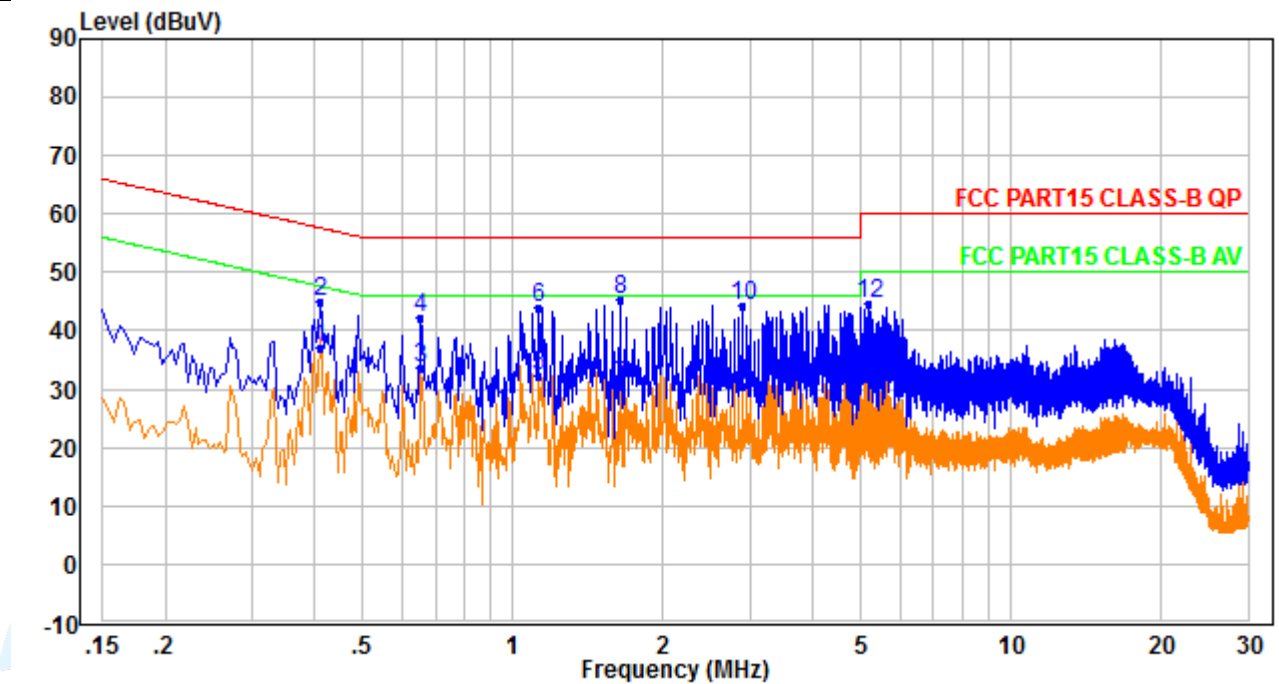
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TM6
Live Line


No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.410	27.99	9.19	37.18	47.65	-10.47	Average
2	0.410	35.70	9.19	44.89	57.65	-12.76	QP
3	0.654	24.15	9.36	33.51	46.00	-12.49	Average
4	0.654	33.02	9.36	42.38	56.00	-13.62	QP
5	1.130	22.91	9.43	32.34	46.00	-13.66	Average
6	1.130	34.39	9.43	43.82	56.00	-12.18	QP
7	1.642	21.09	9.54	30.63	46.00	-15.37	Average
8	1.642	35.80	9.54	45.34	56.00	-10.66	QP
9	2.894	20.99	9.61	30.60	46.00	-15.40	Average
10	2.894	34.80	9.61	44.41	56.00	-11.59	QP
11	5.194	22.41	9.64	32.05	50.00	-17.95	Average
12	5.194	34.84	9.64	44.48	60.00	-15.52	QP

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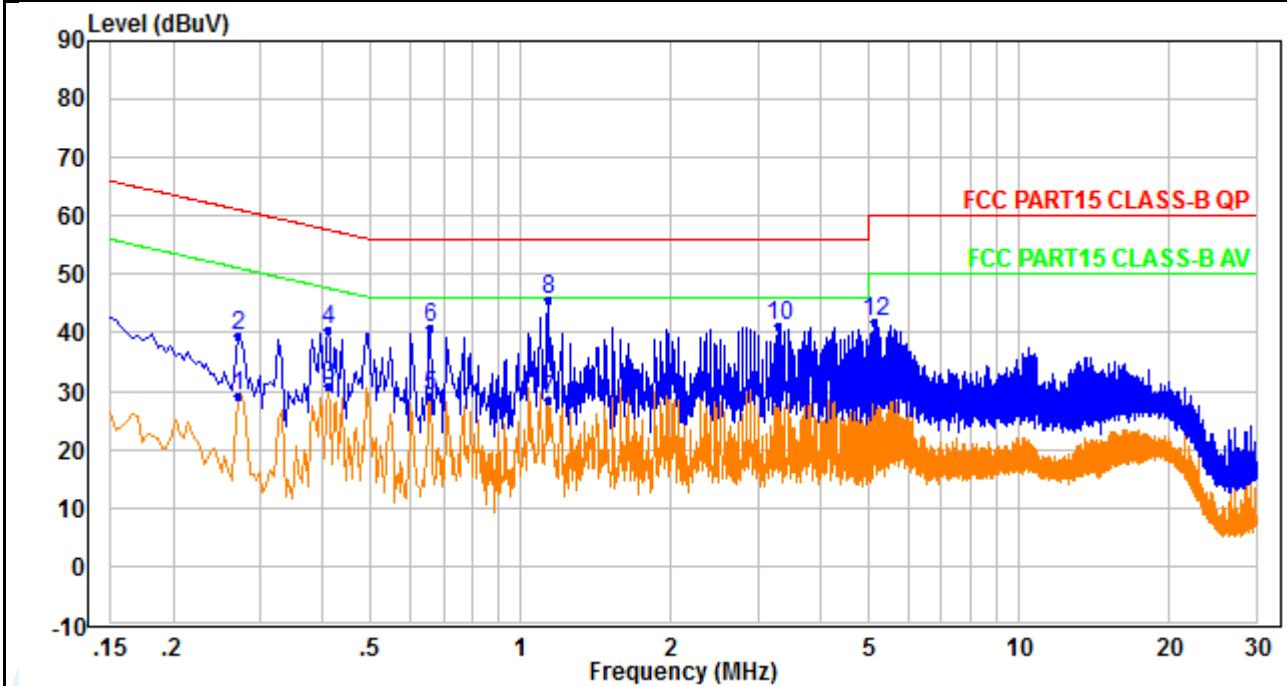
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Neutral Line



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.270	20.17	9.15	29.32	51.12	-21.80	Average
2	0.270	30.42	9.15	39.57	61.12	-21.55	QP
3	0.410	21.67	9.18	30.85	47.65	-16.80	Average
4	0.410	31.27	9.18	40.45	57.65	-17.20	QP
5	0.658	19.77	9.37	29.14	46.00	-16.86	Average
6	0.658	31.37	9.37	40.74	56.00	-15.26	QP
7	1.134	19.05	9.43	28.48	46.00	-17.52	Average
8	1.134	36.11	9.43	45.54	56.00	-10.46	QP
9	3.282	19.12	9.62	28.74	46.00	-17.26	Average
10	3.282	31.54	9.62	41.16	56.00	-14.84	QP
11	5.142	20.14	9.63	29.77	50.00	-20.23	Average
12	5.142	32.42	9.63	42.05	60.00	-17.95	QP

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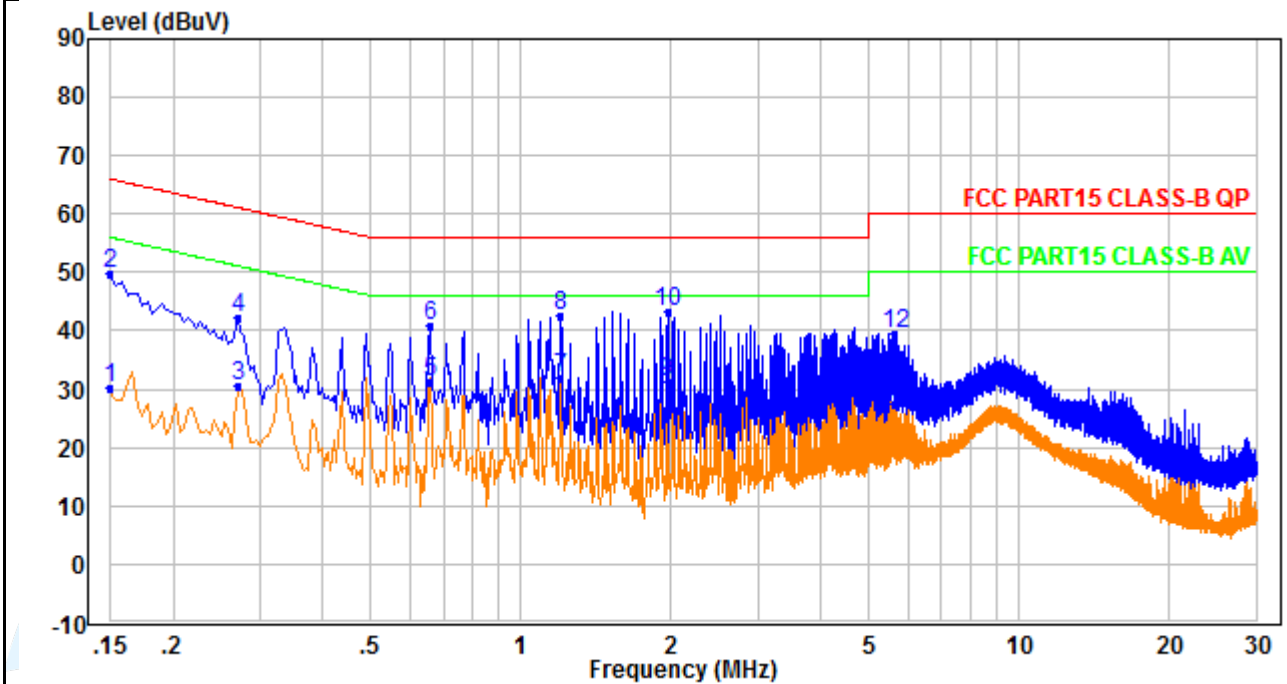
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TM7
Live Line


No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	21.06	9.03	30.09	56.00	-25.91	Average
2	0.150	40.60	9.03	49.63	66.00	-16.37	QP
3	0.270	21.36	9.16	30.52	51.12	-20.60	Average
4	0.270	32.94	9.16	42.10	61.12	-19.02	QP
5	0.658	21.98	9.36	31.34	46.00	-14.66	Average
6	0.658	31.40	9.36	40.76	56.00	-15.24	QP
7	1.202	22.49	9.46	31.95	46.00	-14.05	Average
8	1.202	33.24	9.46	42.70	56.00	-13.30	QP
9	1.970	21.69	9.59	31.28	46.00	-14.72	Average
10	1.970	33.56	9.59	43.15	56.00	-12.85	QP
11	5.634	17.77	9.65	27.42	50.00	-22.58	Average
12	5.634	29.97	9.65	39.62	60.00	-20.38	QP

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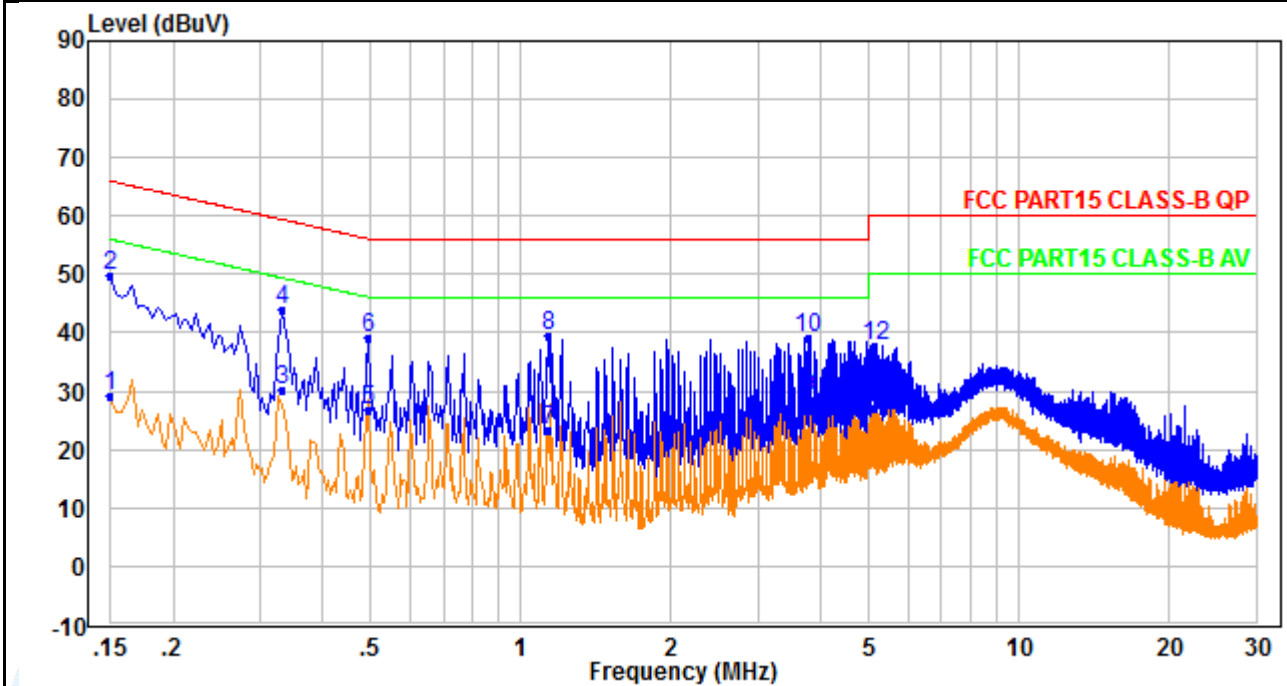
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Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	20.15	9.03	29.18	56.00	-26.82	Average
2	0.150	40.71	9.03	49.74	66.00	-16.26	QP
3	0.330	21.13	9.17	30.30	49.45	-19.15	Average
4	0.330	34.77	9.17	43.94	59.45	-15.51	QP
5	0.494	17.46	9.33	26.79	46.10	-19.31	Average
6	0.494	29.95	9.33	39.28	56.10	-16.82	QP
7	1.134	14.06	9.43	23.49	46.00	-22.51	Average
8	1.134	30.11	9.43	39.54	56.00	-16.46	QP
9	3.770	19.35	9.63	28.98	46.00	-17.02	Average
10	3.770	29.43	9.63	39.06	56.00	-16.94	QP
11	5.138	17.61	9.63	27.24	50.00	-22.76	Average
12	5.138	28.16	9.63	37.79	60.00	-22.21	QP

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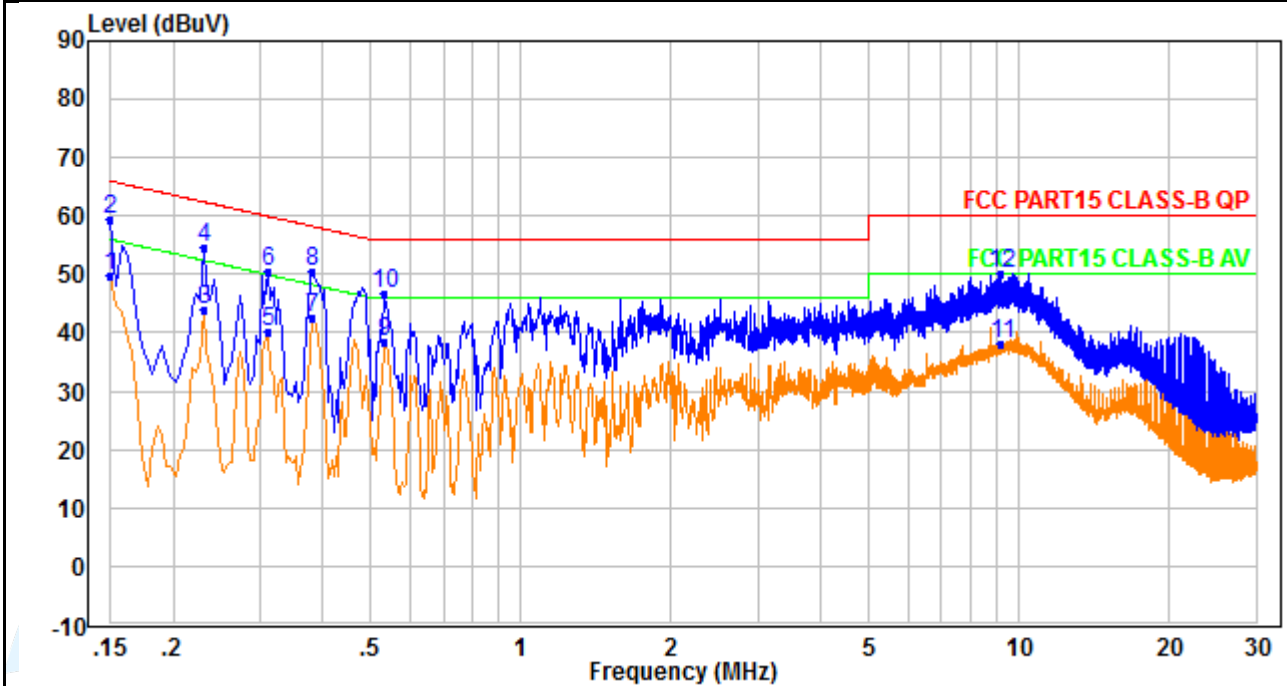
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TM8
Live Line


No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	40.79	9.03	49.82	56.00	-6.18	Average
2	0.150	50.38	9.03	59.41	66.00	-6.59	QP
3	0.230	34.80	9.11	43.91	52.45	-8.54	Average
4	0.230	45.48	9.11	54.59	62.45	-7.86	QP
5	0.310	30.88	9.20	40.08	49.97	-9.89	Average
6	0.310	41.29	9.20	50.49	59.97	-9.48	QP
7	0.382	33.52	9.18	42.70	48.24	-5.54	Average
8	0.382	41.35	9.18	50.53	58.24	-7.71	QP
9	0.530	29.13	9.31	38.44	46.00	-7.56	Average
10	0.530	37.51	9.31	46.82	56.00	-9.18	QP
11	9.225	28.52	9.66	38.18	50.00	-11.82	Average
12	9.225	40.46	9.66	50.12	60.00	-9.88	QP

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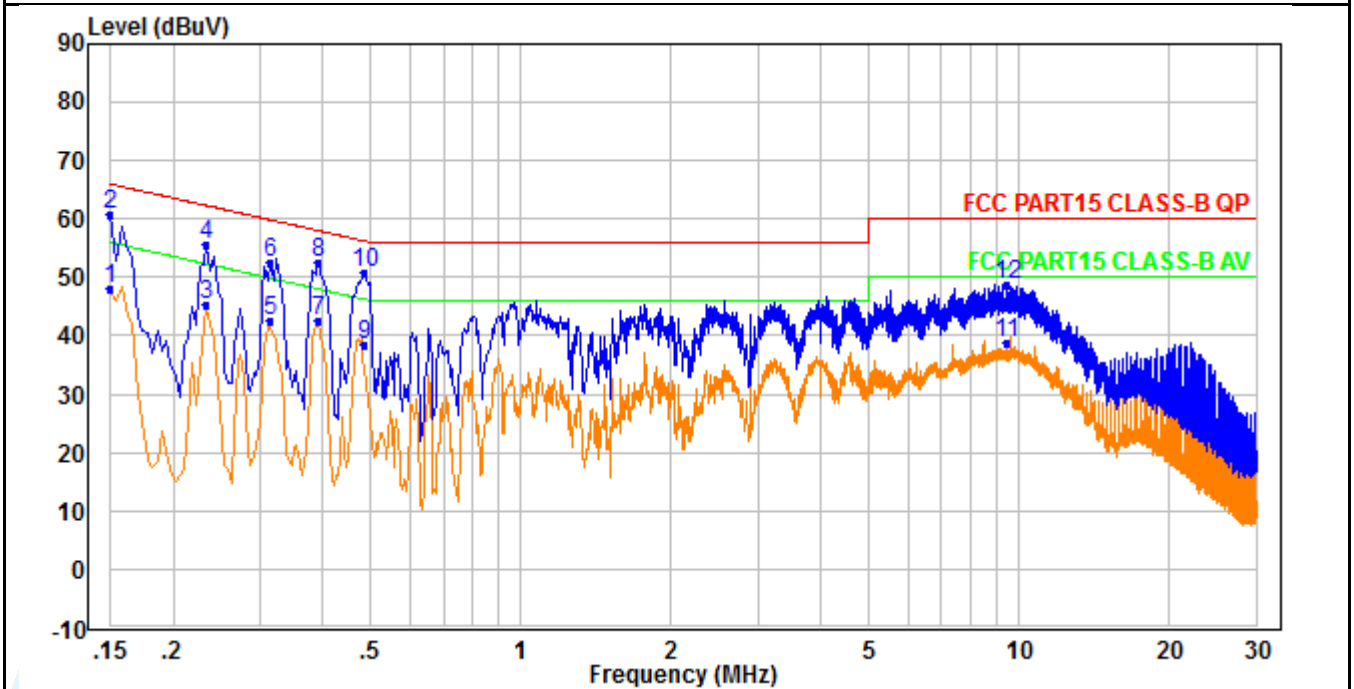
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Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	38.90	9.03	47.93	56.00	-8.07	Average
2	0.150	51.84	9.03	60.87	66.00	-5.13	QP
3	0.234	36.10	9.11	45.21	52.31	-7.10	Average
4	0.234	46.51	9.11	55.62	62.31	-6.69	QP
5	0.314	33.23	9.18	42.41	49.86	-7.45	Average
6	0.314	43.22	9.18	52.40	59.86	-7.46	QP
7	0.390	33.26	9.16	42.42	48.06	-5.64	Average
8	0.390	43.33	9.16	52.49	58.06	-5.57	QP
9	0.486	28.97	9.32	38.29	46.24	-7.95	Average
10	0.486	41.59	9.32	50.91	56.24	-5.33	QP
11	9.473	28.97	9.66	38.63	50.00	-11.37	Average
12	9.473	39.20	9.66	48.86	60.00	-11.14	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.

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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 for EUT external and internal photographs.

***** 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.
