

FCC & ISSED TEST REPORT

Product Name: IP Phone
Trade Mark: GRANDSTREAM
Model No.: GRP2604P
Add. Model No.: GRP2604
Report Number: 200630014EMC-1
Test Standards: FCC 47 CFR Part 15 Subpart B
ICES-003 Issue 6
FCC ID: YZZGRP2604P
Test Result: PASS
Date of Issue: July 18, 2020

Prepared for:

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

Prepared by:

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Technical Director

Version

Version No.	Date	Description
V1.0	July 18, 2020	Original



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CONTENTS

1. GENERAL INFORMATION	4
1.1 CLIENT INFORMATION	4
1.2 EUT INFORMATION	4
1.2.1 GENERAL DESCRIPTION OF EUT	4
1.2.2 DESCRIPTION OF ACCESSORIES	4
1.3 DESCRIPTION OF SUPPORT UNITS	5
1.4 TEST LOCATION	5
1.5 TEST FACILITY	6
1.6 DEVIATION FROM STANDARDS	6
1.7 ABNORMALITIES FROM STANDARD CONDITIONS	6
1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
1.9 MEASUREMENT UNCERTAINTY	6
2. TEST SUMMARY	7
3. EQUIPMENT LIST	7
4. TEST CONFIGURATION	8
4.1 ENVIRONMENTAL CONDITIONS FOR TESTING	8
4.1.1 NORMAL OR EXTREME TEST CONDITIONS	8
4.1.2 RECORD OF NORMAL ENVIRONMENT	8
4.2 TEST MODES	8
4.3 TEST SETUP	9
4.3.1 FOR RADIATED EMISSIONS TEST SETUP	9
4.3.2 FOR CONDUCTED EMISSIONS TEST SETUP	10
4.4 SYSTEM TEST CONFIGURATION	10
5. REFERENCE DOCUMENTS FOR TESTING	11
6. EMC REQUIREMENTS SPECIFICATION	11
6.1 RADIATED EMISSION	11
6.2 CONDUCTED EMISSION	41

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:	Grandstream Networks, Inc.
Model No.:	GRP2604P
Add. Model No.:	GRP2604
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:	1.0.0.23
Hardware Version:	V1.2
Sample Received Date:	July 5, 2020
Sample Tested Date:	July 14, 2020 to July 17, 2020
Remark: Compared with GRP2604, GRP2604P support POE function, but only the BOM is different, the PCB is the same. Declared by manufacturer.	

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)	
Model No.:	Ethernet Cable (RJ45)
Cable Type:	Unshielded without ferrite
Length:	1.50 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	GRP2603P	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 518109

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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	±3.2 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. 24, 2019	Nov. 23, 2020
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May. 30, 2020	May. 29, 2021
☐	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	January. 11, 2020	January. 10, 2021
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	June 19, 2020	June 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
☒	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	AC 120V/60Hz or/and AC 240V/50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

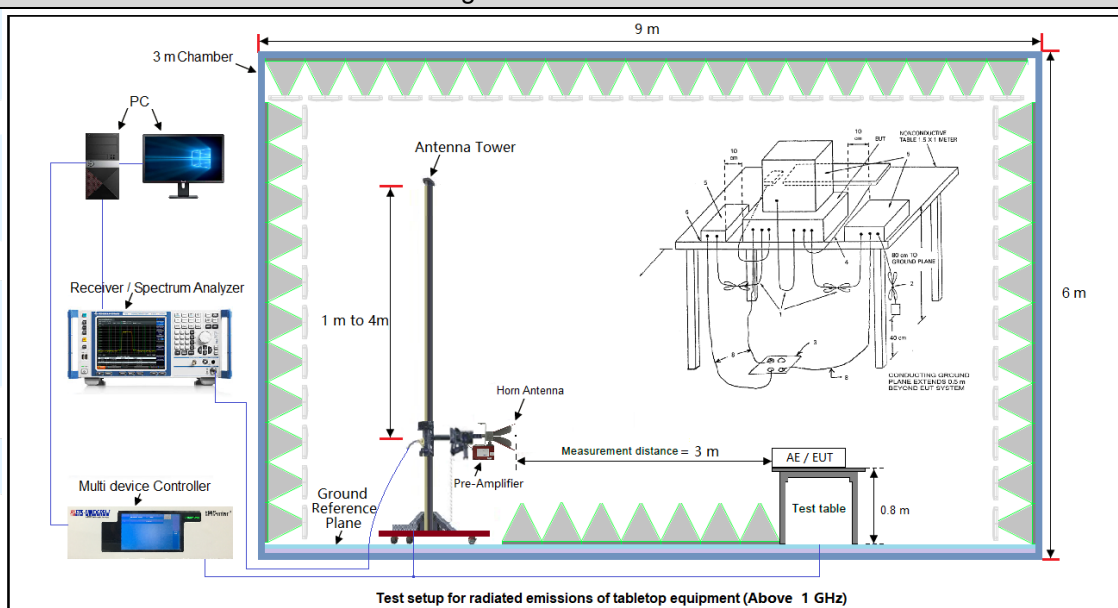
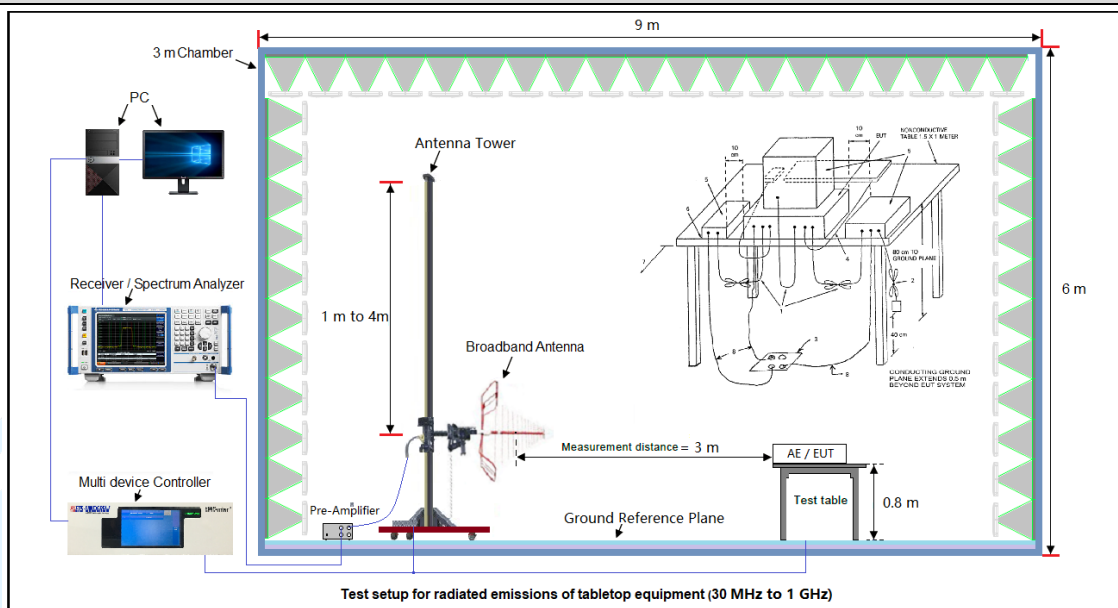
4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Conducted Emission	24.9	70	99.3	Tripp Jiang
Radiated Emission	25.5	57	100.62	Fire Huo

4.2 TEST MODES

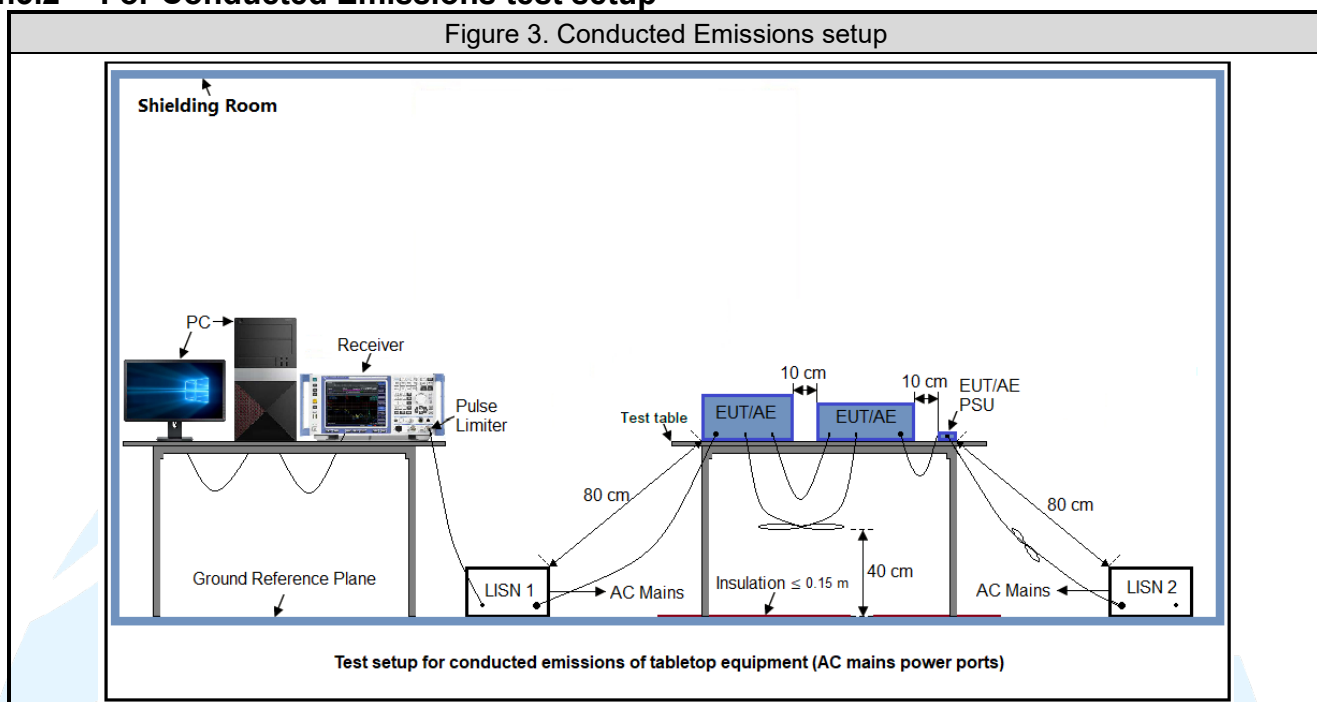
Test Item	EMI Test Modes
Radiated Emission	TM1: AC120V/60Hz (Adaptor1) + Hands Free (with GRP2604P) TM2: AC120V/60Hz (Adaptor1) + Ringing (with GRP2604P) TM3: AC120V/60Hz (Adaptor1) + Handset (with GRP2604P) TM4: AC120V/60Hz (Adaptor1) + Headset (with GRP2604P) TM5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4(with GRP2604P) TM6: Worse from mode 1~5 (Adaptor2 with GRP2604P) TM7: Worse from mode 1~5 (Adaptor3 with GRP2604P) TM8: Worse from mode 1~5 (Adaptor1 with GRP2604) TM9: Worse from mode 1~5 (Adaptor2 with GRP2604) TM10: Worse from mode 1~5 (Adaptor3 with GRP2604) TM11: AC120V/60Hz (POE) +Worse from mode 1~4(with GRP2604P)
Conducted Emission	TM1: AC120V/60Hz (Adaptor1) + Hands Free (with GRP2604P) TM2: AC120V/60Hz (Adaptor1) + Ringing (with GRP2604P) TM3: AC120V/60Hz (Adaptor1) + Handset (with GRP2604P) TM4: AC120V/60Hz (Adaptor1) + Headset (with GRP2604P) TM5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4(with GRP2604P) TM6: Worse from mode 1~5 (Adaptor2 with GRP2604P) TM7: Worse from mode 1~5 (Adaptor3 with GRP2604P) TM8: Worse from mode 1~5 (Adaptor1 with GRP2604) TM9: Worse from mode 1~5 (Adaptor2 with GRP2604) TM10: Worse from mode 1~5 (Adaptor3 with GRP2604) TM11: AC120V/60Hz (POE) +Worse from mode 1~4(with GRP2604P)

4.3.1 For Radiated Emissions test setup



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	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
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

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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

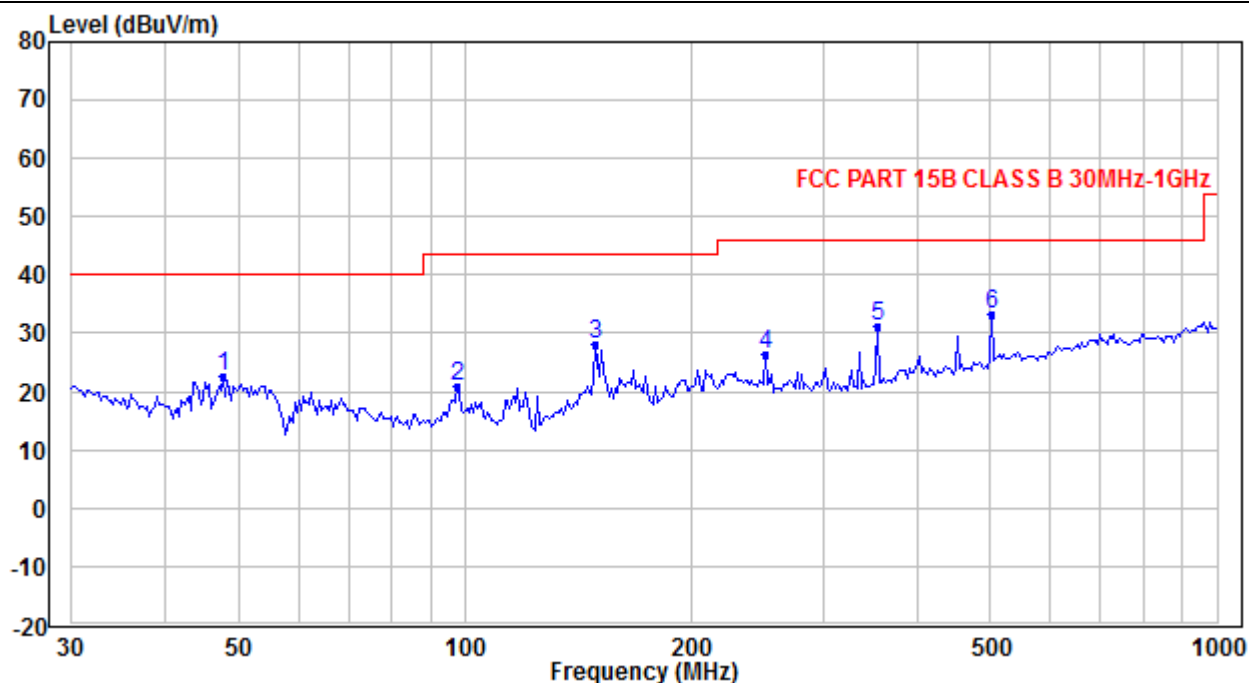
Test Result: Pass

The measurement data as follows:

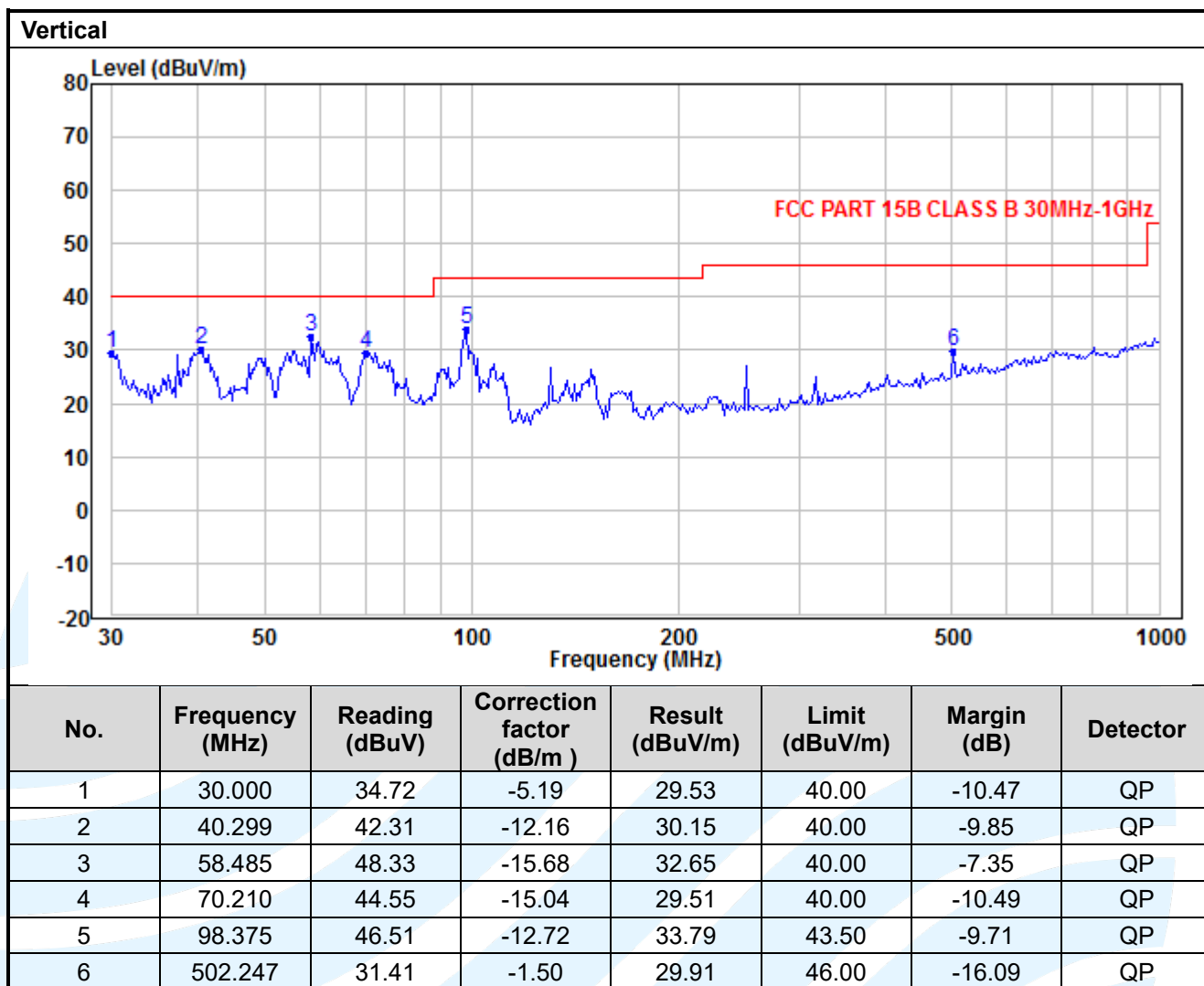
Below 1GHz(Quasi Peak):

TM1

Horizontal



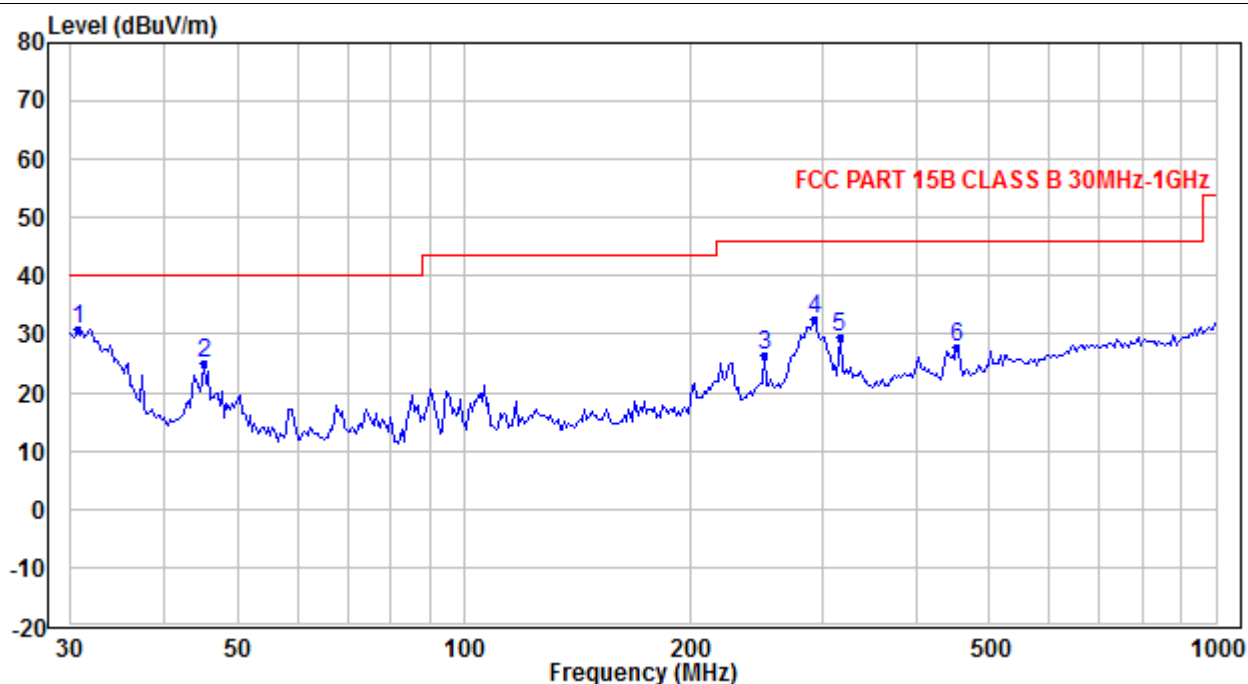
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	47.703	37.23	-14.62	22.61	40.00	-17.39	QP
2	97.686	34.26	-13.25	21.01	43.50	-22.49	QP
3	148.917	39.65	-11.56	28.09	43.50	-15.41	QP
4	250.486	33.38	-6.97	26.41	46.00	-19.59	QP
5	353.447	36.35	-5.03	31.32	46.00	-14.68	QP
6	502.247	34.60	-1.28	33.32	46.00	-12.68	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	30.639	37.15	-6.19	30.96	40.00	-9.04	QP
2	45.095	38.72	-13.73	24.99	40.00	-15.01	QP
3	250.486	33.28	-6.97	26.31	46.00	-19.69	QP
4	292.364	38.53	-6.05	32.48	46.00	-13.52	QP
5	315.860	34.99	-5.41	29.58	46.00	-16.42	QP
6	452.001	30.68	-2.76	27.92	46.00	-18.08	QP

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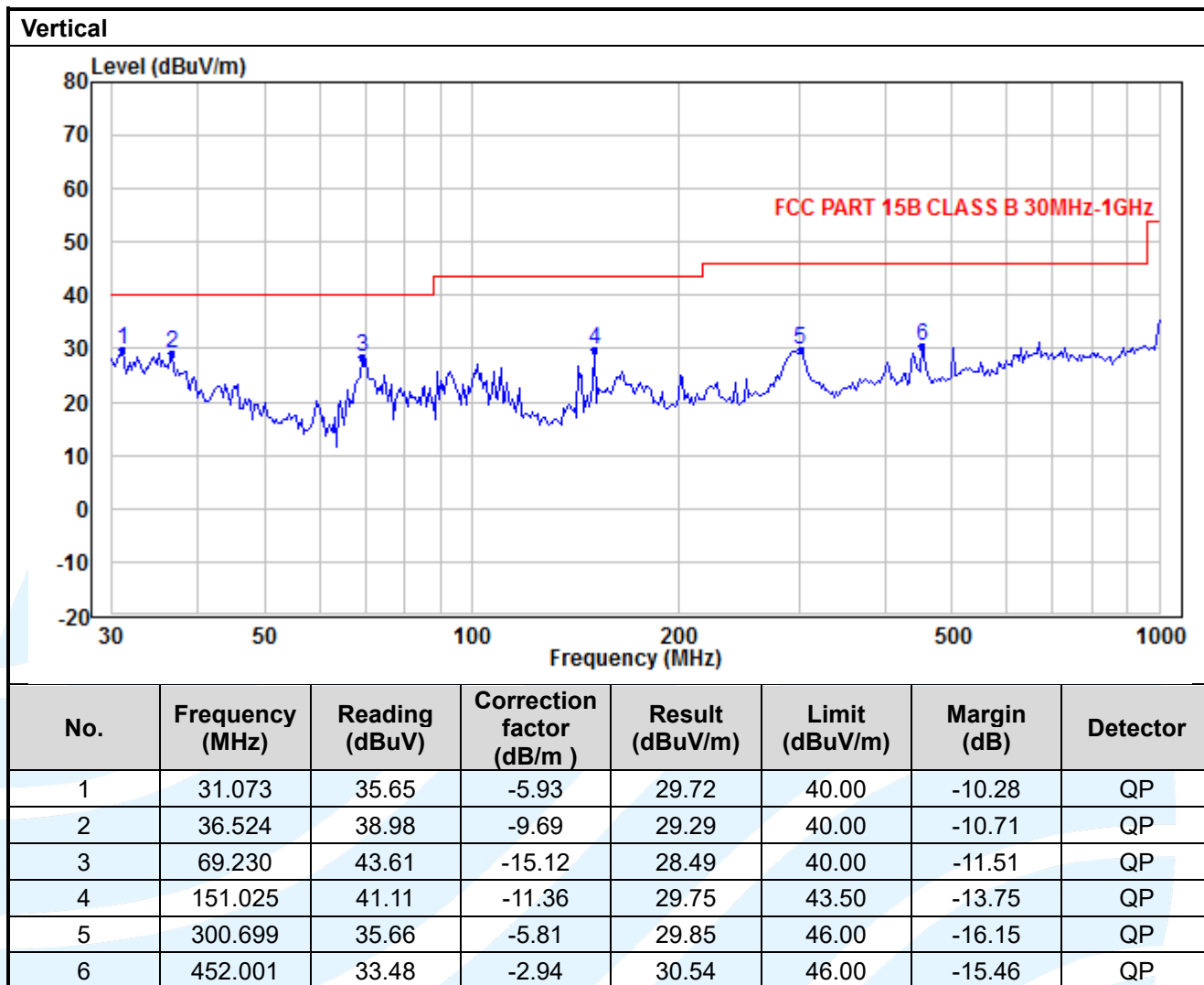
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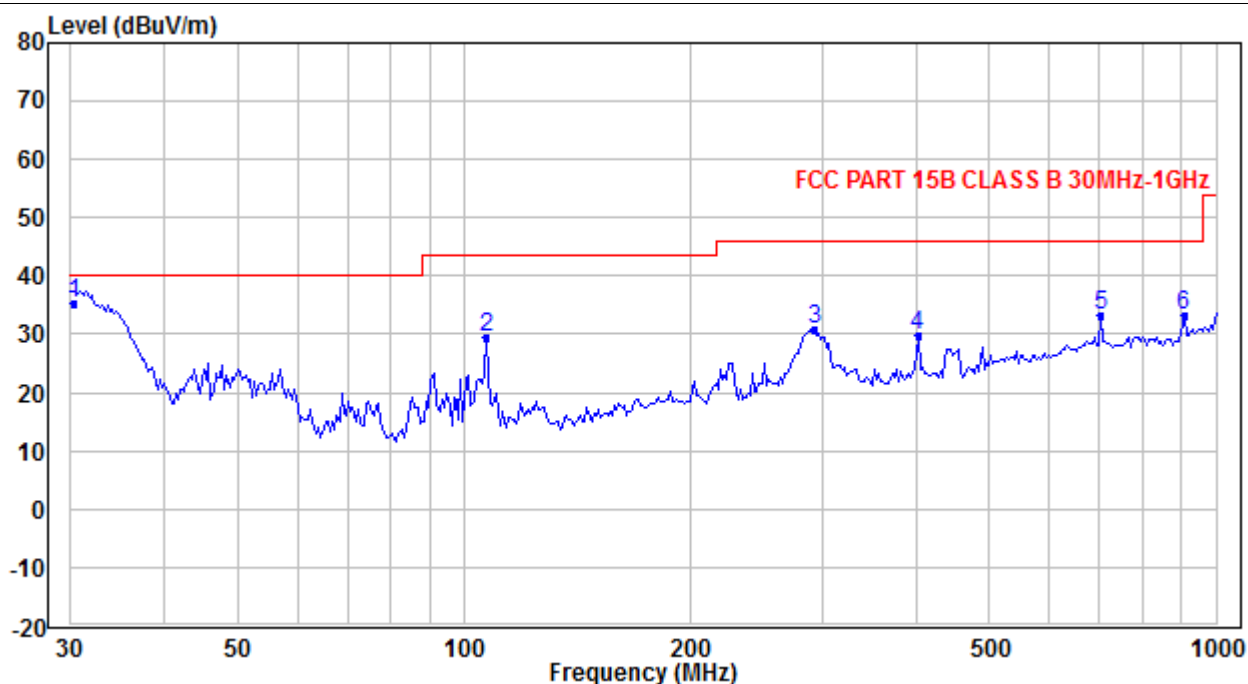
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Below 1GHz(Quasi Peak):

TM7

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.212	41.42	-5.93	35.49	40.00	-4.51	QP
2	107.031	42.40	-13.04	29.36	43.50	-14.14	QP
3	292.364	37.07	-6.05	31.02	46.00	-14.98	QP
4	401.105	33.15	-3.21	29.94	46.00	-16.06	QP
5	703.731	30.53	2.70	33.23	46.00	-12.77	QP
6	906.304	28.58	4.64	33.22	46.00	-12.78	QP

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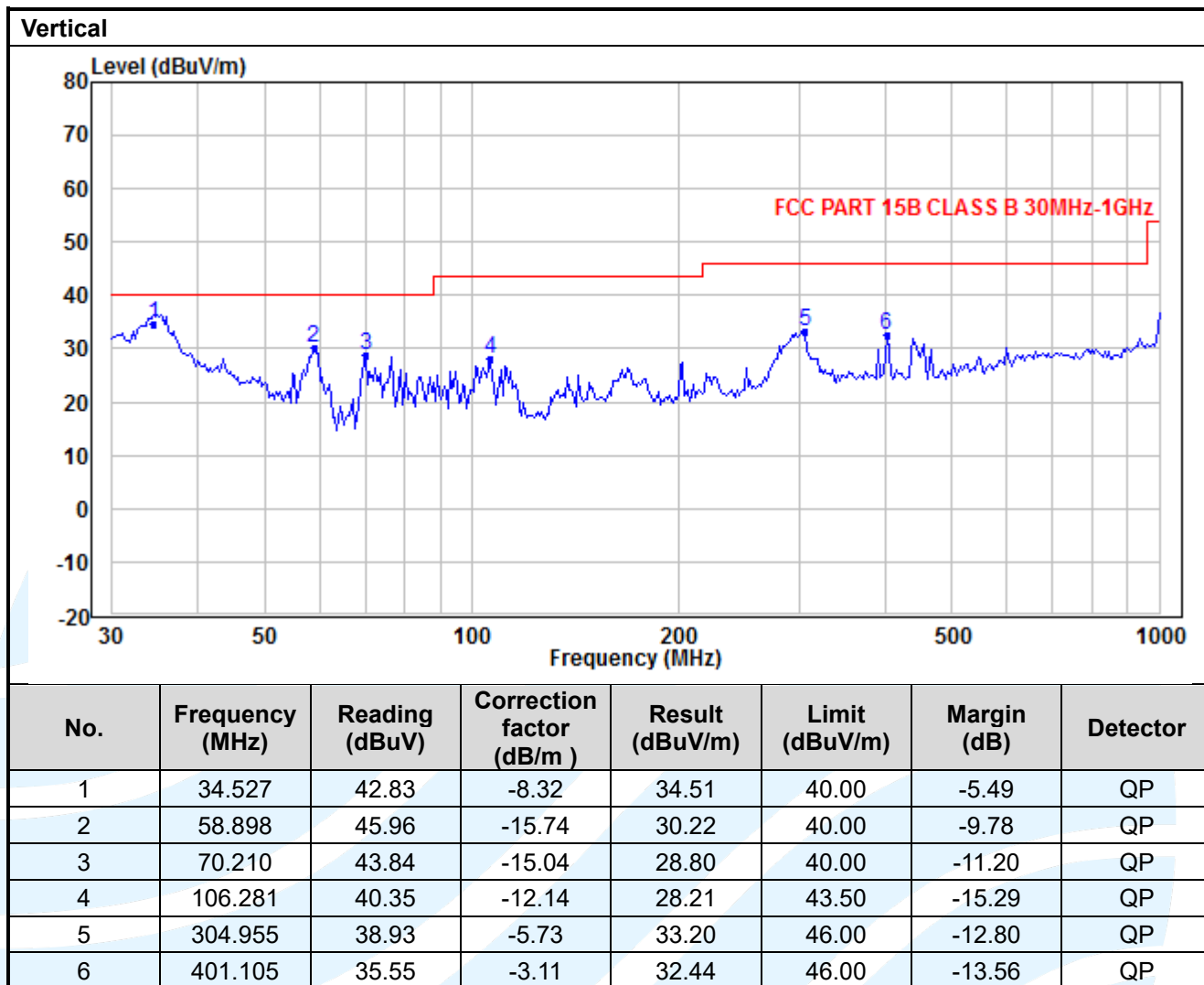
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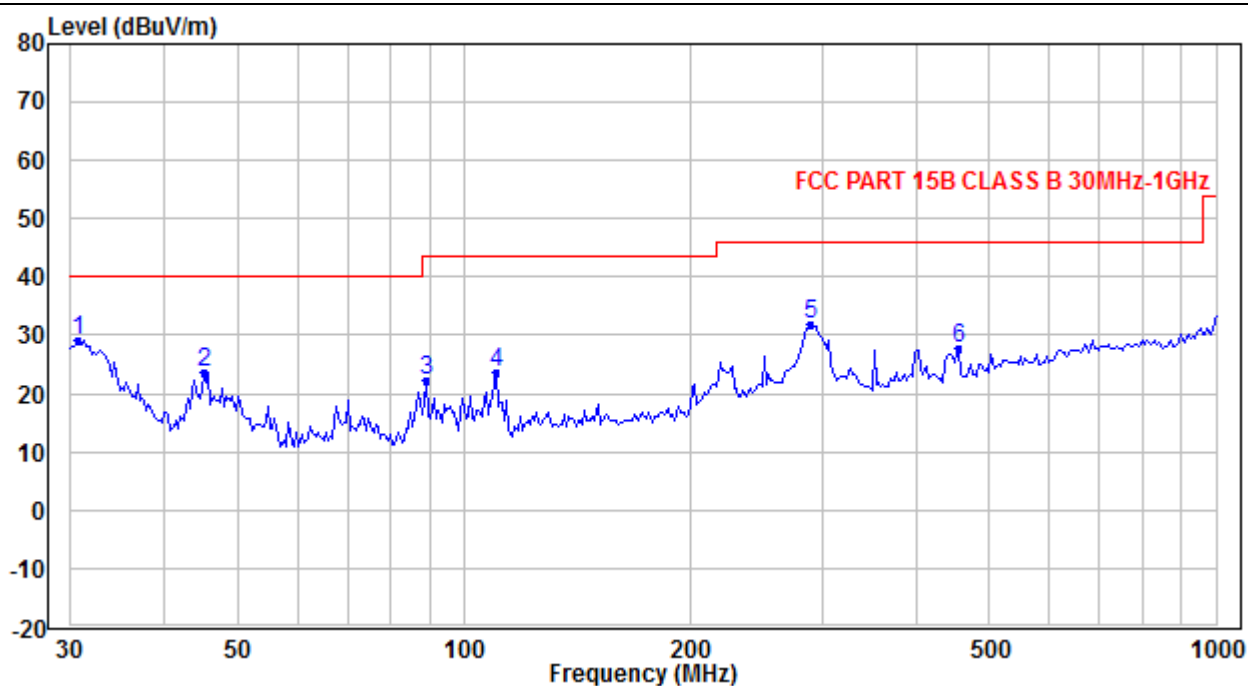
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Below 1GHz(Quasi Peak):

TM8

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.639	35.38	-6.19	29.19	40.00	-10.81	QP
2	45.095	37.45	-13.73	23.72	40.00	-16.28	QP
3	89.158	36.02	-13.84	22.18	43.50	-21.32	QP
4	110.082	36.48	-13.00	23.48	43.50	-20.02	QP
5	288.284	38.02	-6.12	31.90	46.00	-14.10	QP
6	455.189	30.41	-2.72	27.69	46.00	-18.31	QP

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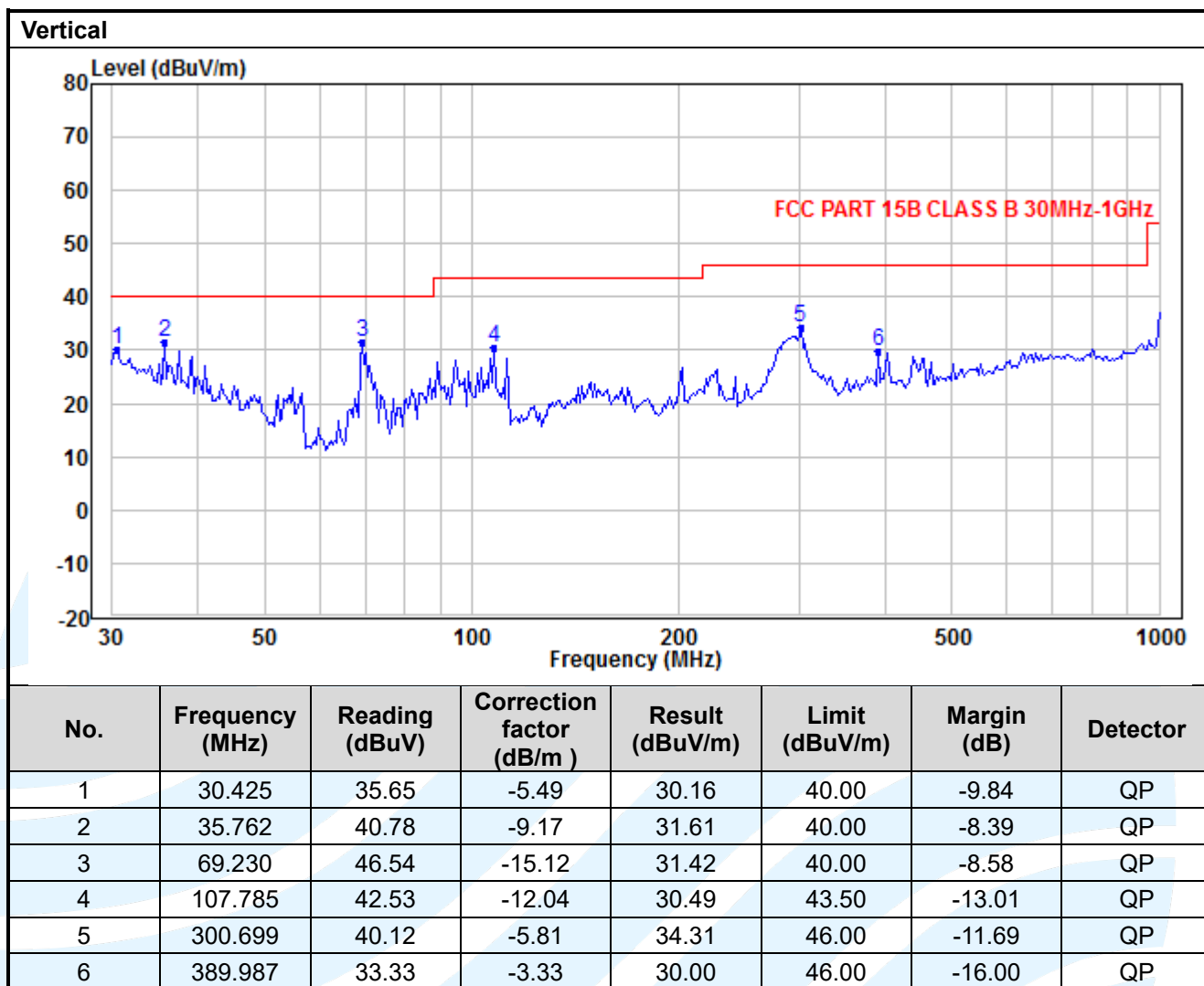
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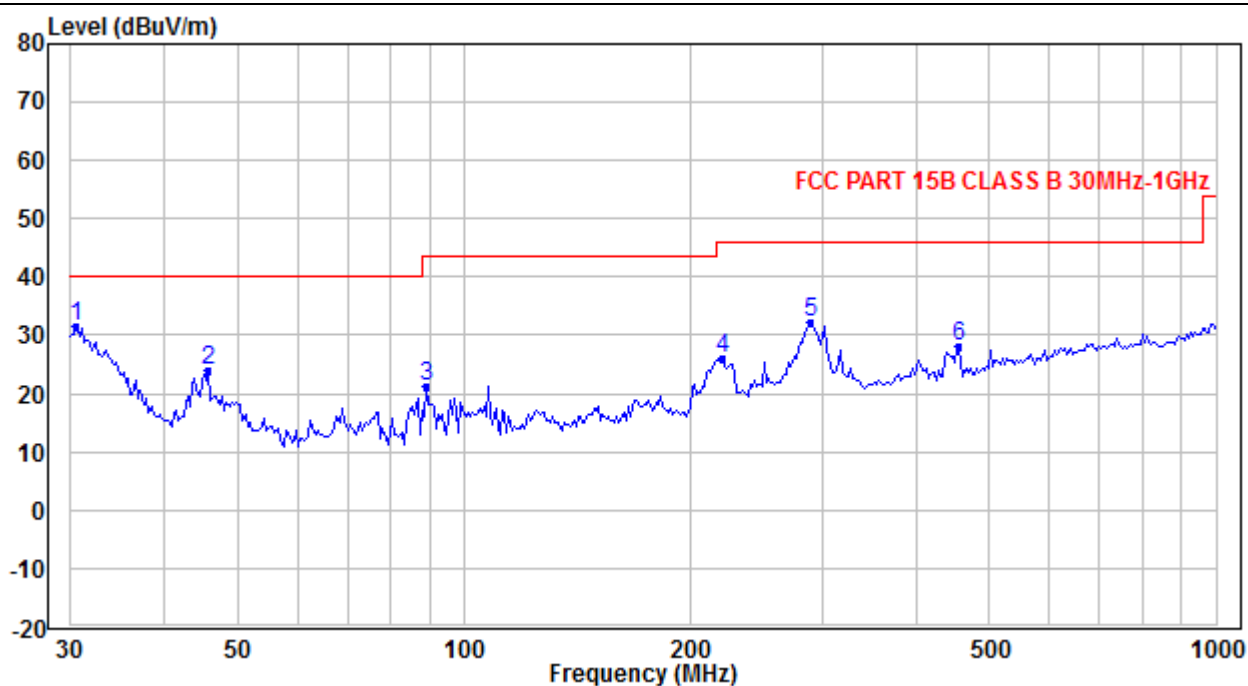
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Below 1GHz(Quasi Peak):

TM9

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.425	37.49	-6.06	31.43	40.00	-8.57	QP
2	45.733	37.80	-13.95	23.85	40.00	-16.15	QP
3	89.158	35.13	-13.84	21.29	43.50	-22.21	QP
4	220.724	34.60	-8.41	26.19	46.00	-19.81	QP
5	288.284	38.21	-6.12	32.09	46.00	-13.91	QP
6	455.189	30.73	-2.72	28.01	46.00	-17.99	QP

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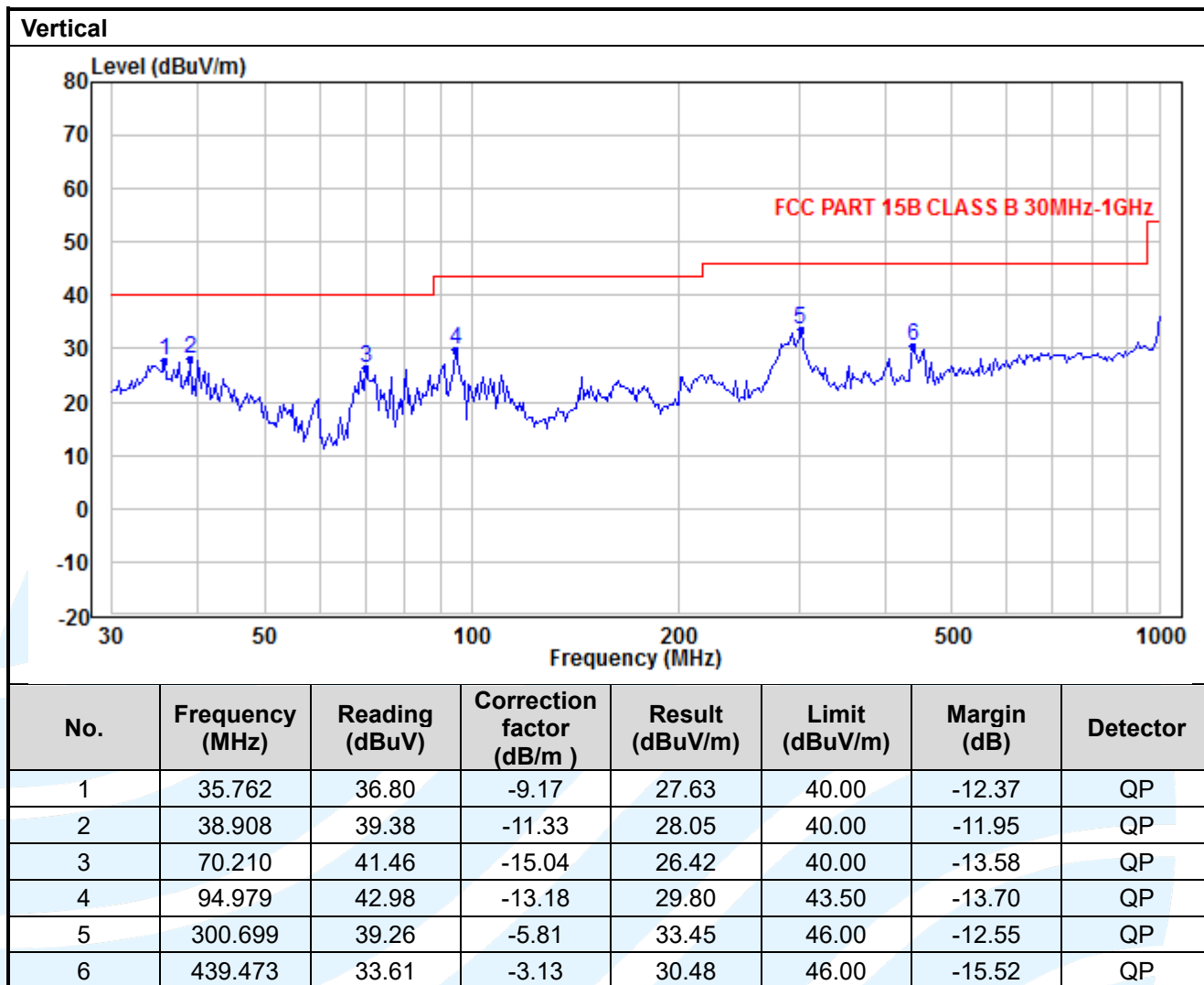
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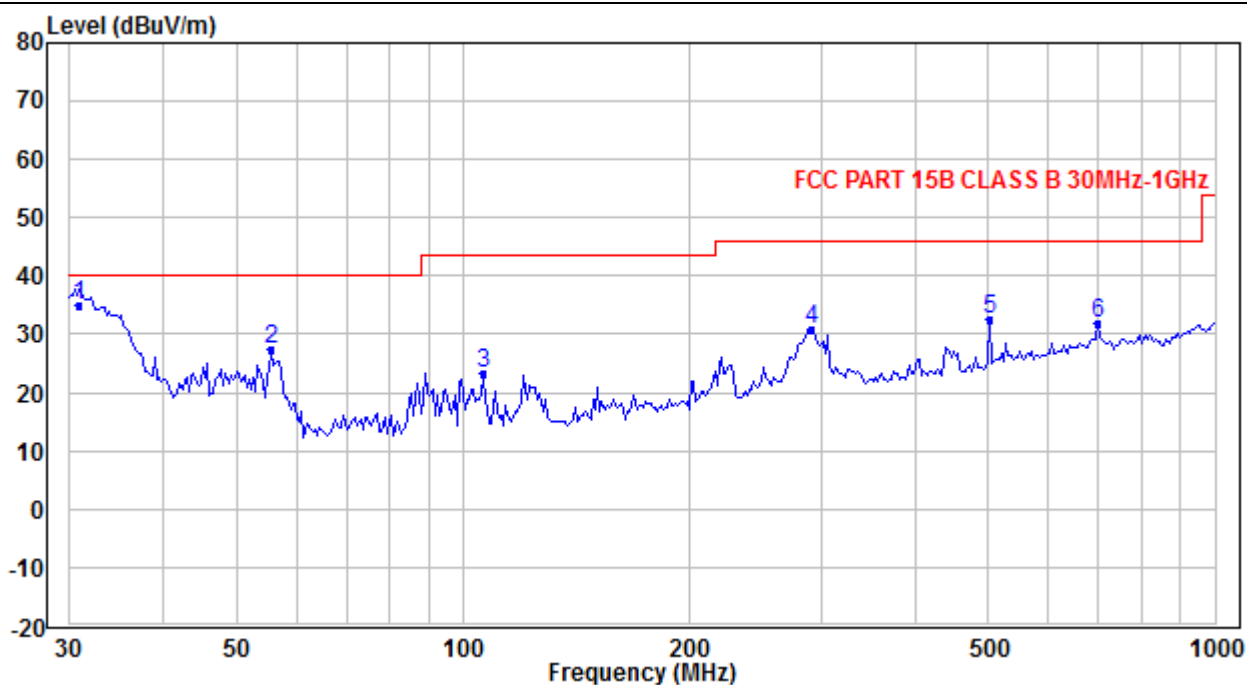
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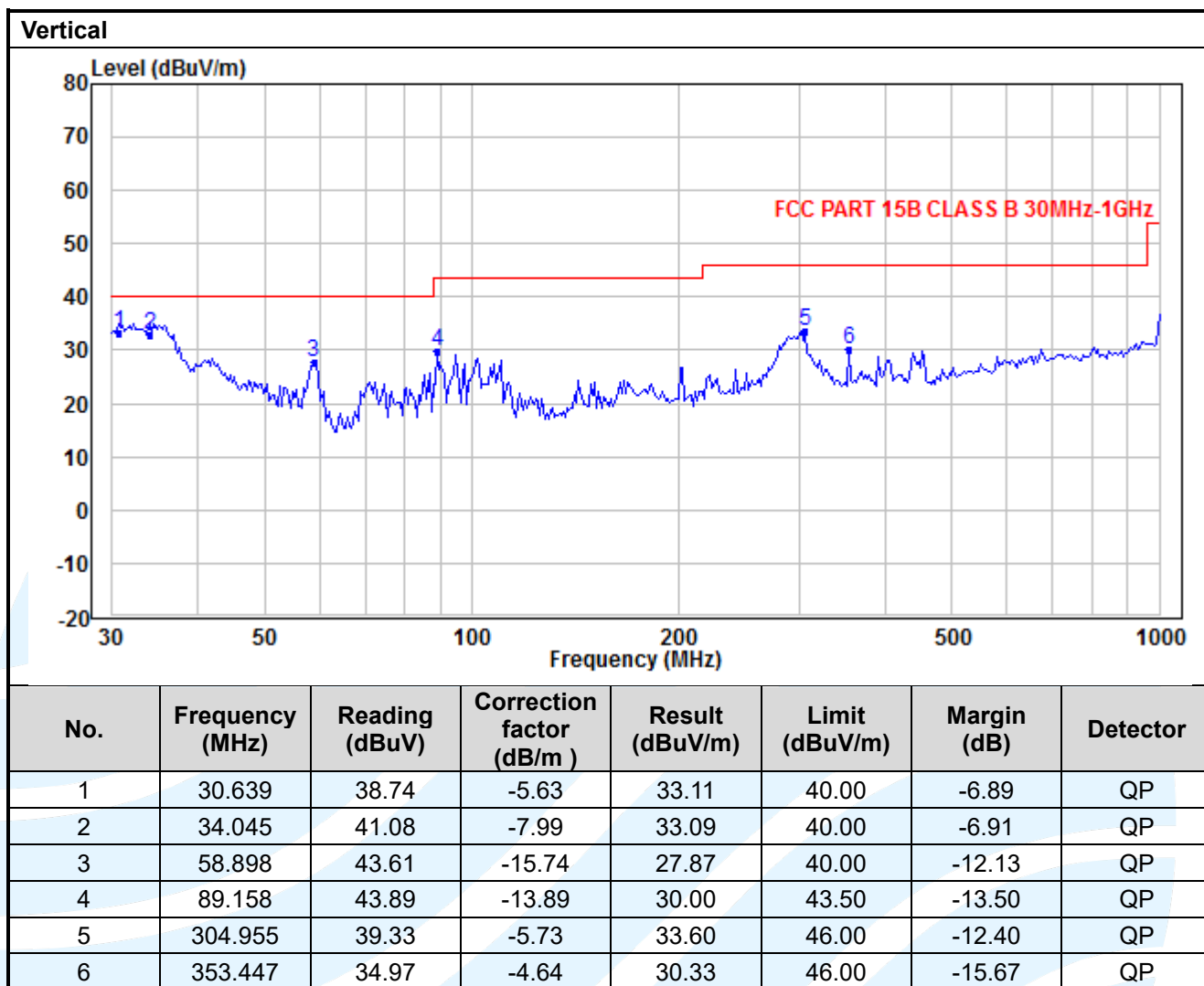
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Below 1GHz(Quasi Peak):
TM10
Horizontal



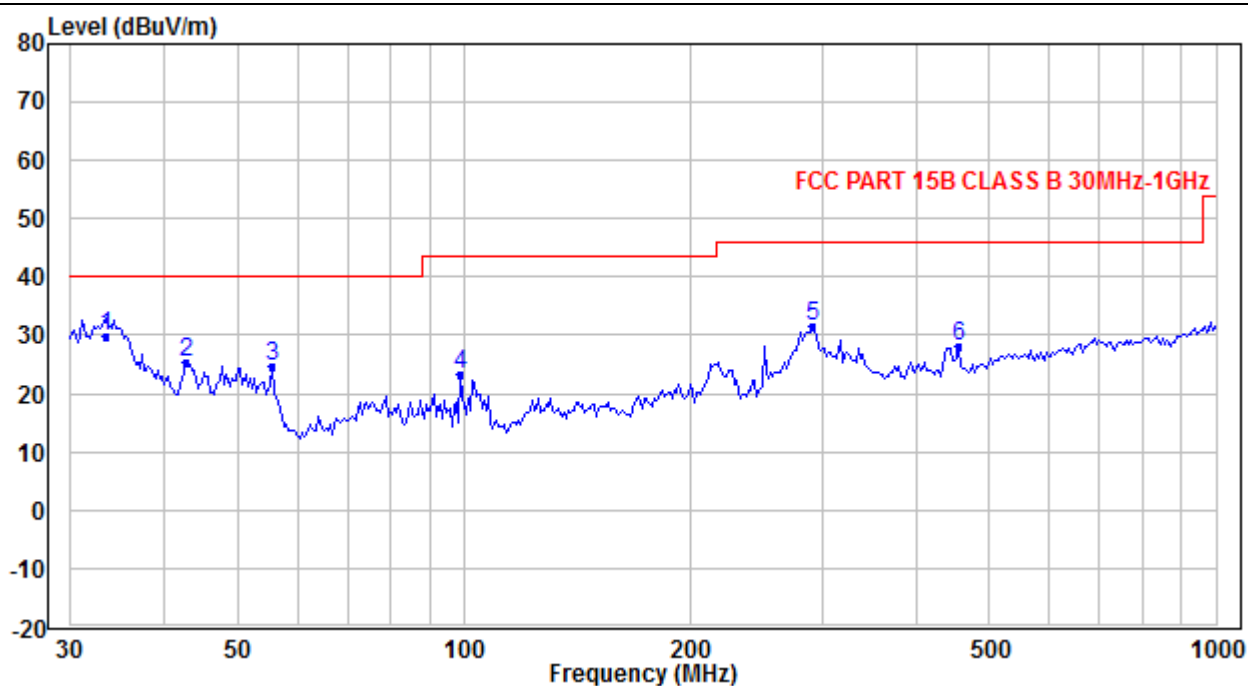
No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.855	41.22	-6.32	34.90	40.00	-5.10	QP
2	55.678	43.00	-15.63	27.37	40.00	-12.63	QP
3	106.281	36.47	-13.05	23.42	43.50	-20.08	QP
4	290.317	37.03	-6.09	30.94	46.00	-15.06	QP
5	502.247	33.70	-1.28	32.42	46.00	-13.58	QP
6	698.804	29.04	2.68	31.72	46.00	-14.28	QP



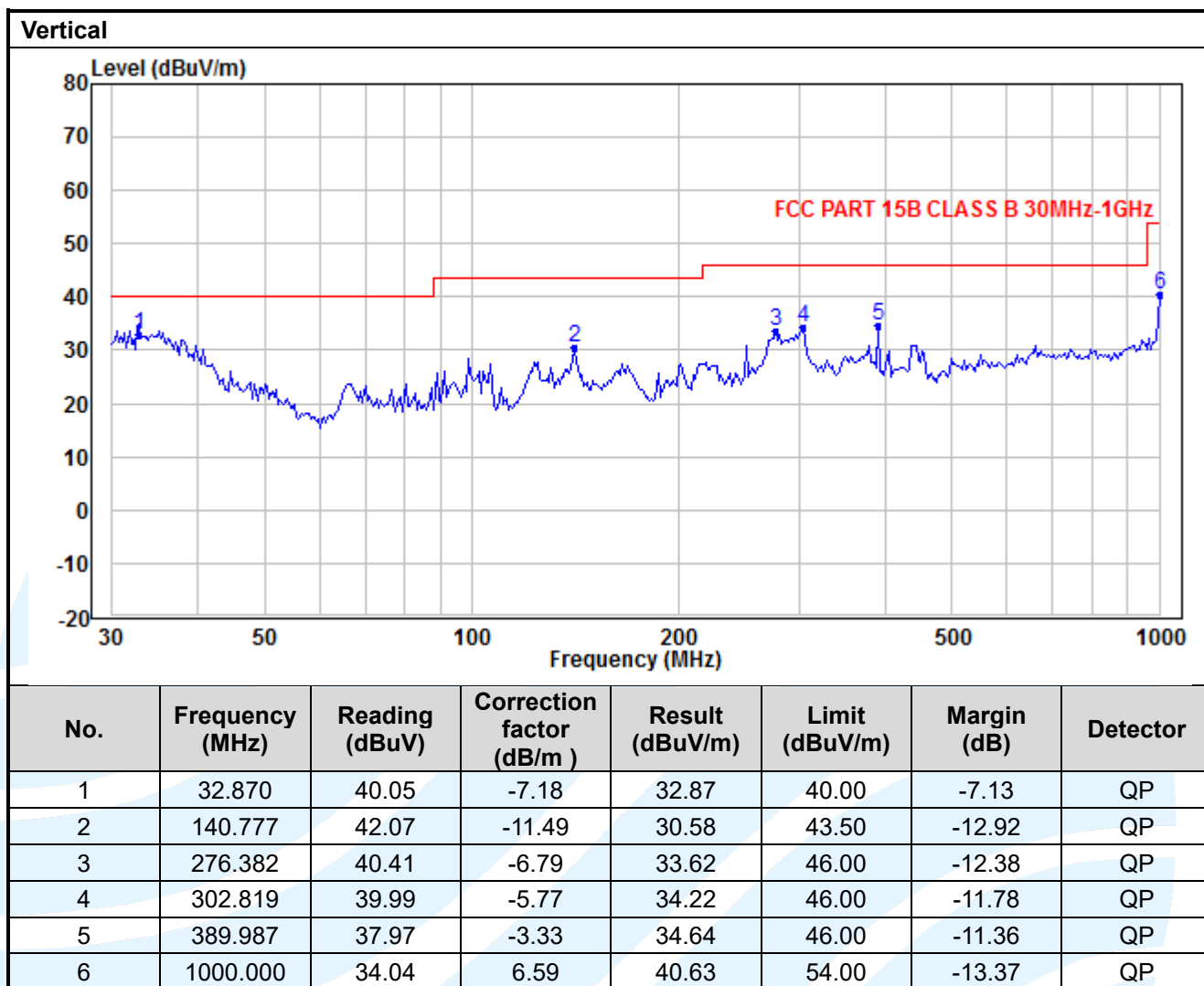
Below 1GHz(Quasi Peak):

TM11

Horizontal



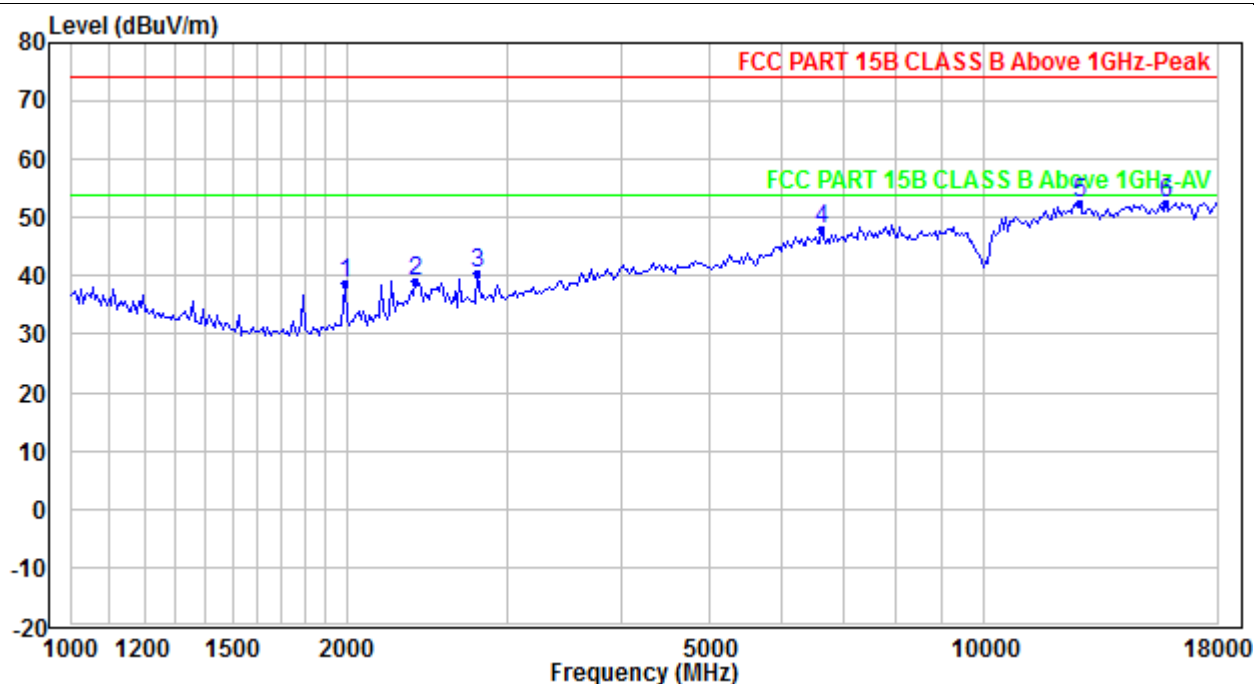
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1	33.335	37.82	-7.85	29.97	40.00	-10.03	QP
2	42.630	38.33	-12.90	25.43	40.00	-14.57	QP
3	55.678	40.26	-15.63	24.63	40.00	-15.37	QP
4	99.069	36.29	-13.15	23.14	43.50	-20.36	QP
5	290.317	37.60	-6.09	31.51	46.00	-14.49	QP
6	455.189	30.73	-2.72	28.01	46.00	-17.99	QP



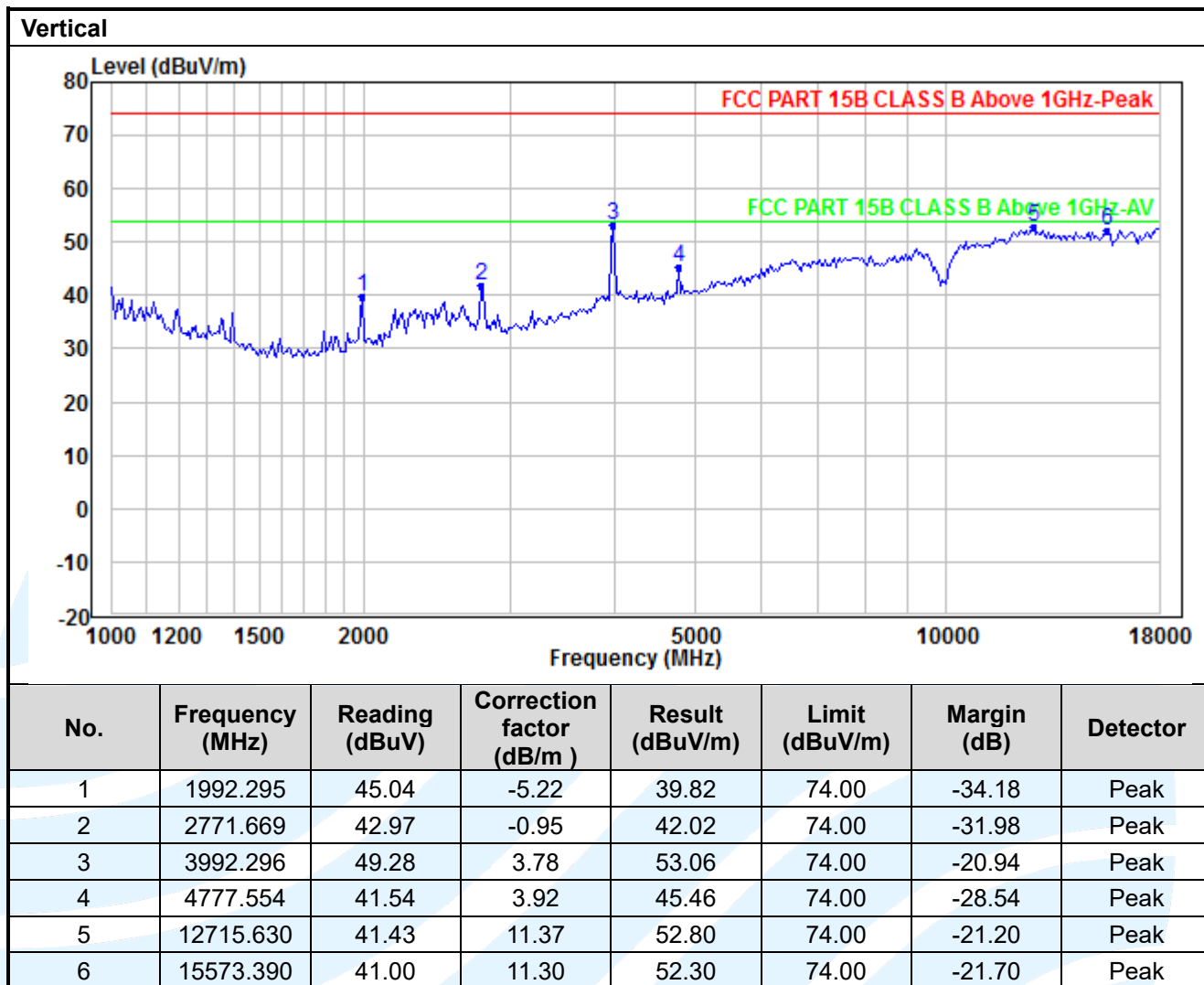
Above 1GHz(Peak & Average)

TM1

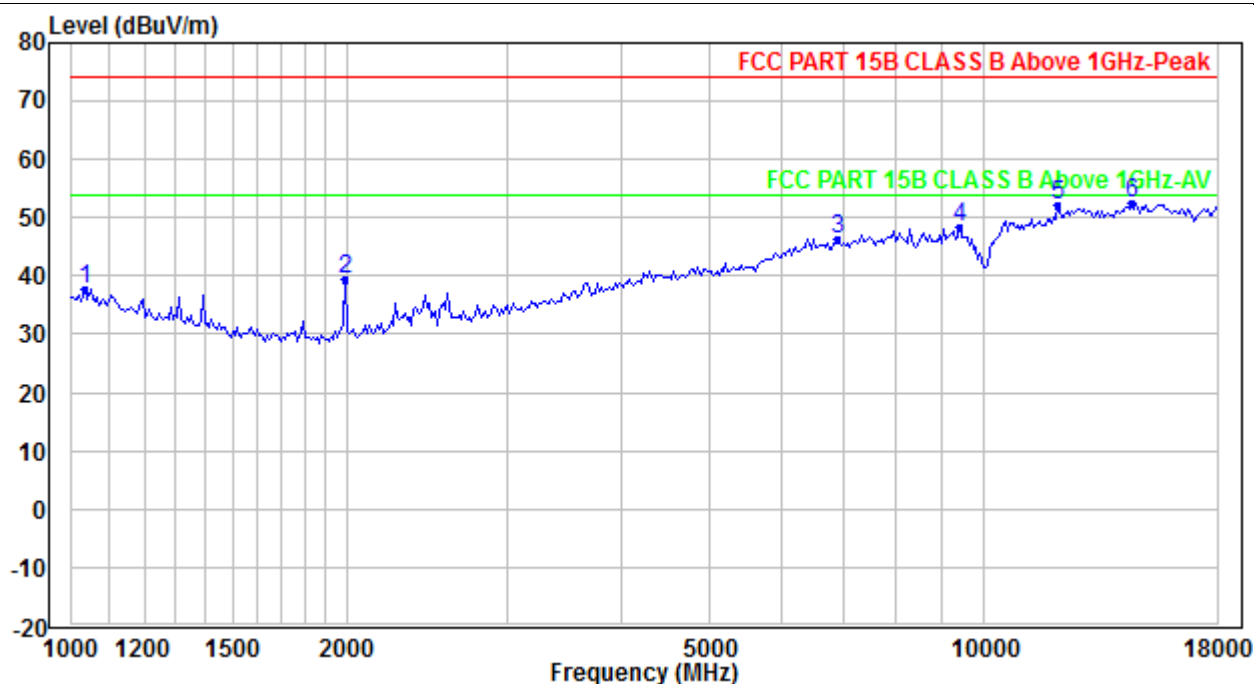
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1992.295	43.57	-4.72	38.85	74.00	-35.15	Peak
2	2384.166	40.20	-1.11	39.09	74.00	-34.91	Peak
3	2787.770	40.63	-0.28	40.35	74.00	-33.65	Peak
4	6646.506	41.14	6.77	47.91	74.00	-26.09	Peak
5	12715.630	41.24	11.16	52.40	74.00	-21.60	Peak
6	15846.370	41.21	11.38	52.59	74.00	-21.41	Peak



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	1035.365	46.29	-8.44	37.85	74.00	-36.15	Peak
2	1992.295	44.01	-4.72	39.29	74.00	-34.71	Peak
3	6921.535	39.90	6.58	46.48	74.00	-27.52	Peak
4	9408.664	40.33	8.00	48.33	74.00	-25.67	Peak
5	12069.740	42.53	9.52	52.05	74.00	-21.95	Peak
6	14527.680	39.10	13.28	52.38	74.00	-21.62	Peak

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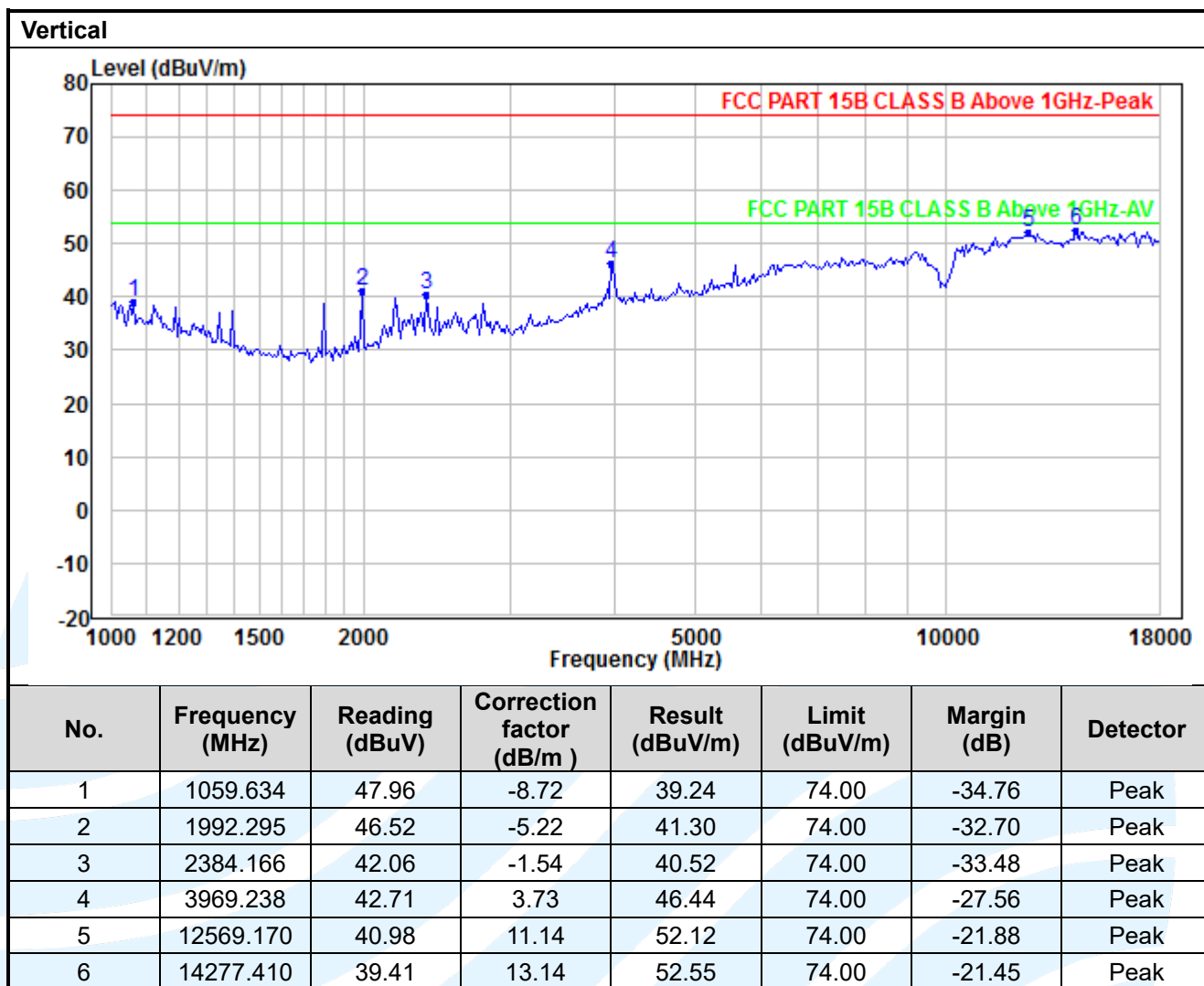
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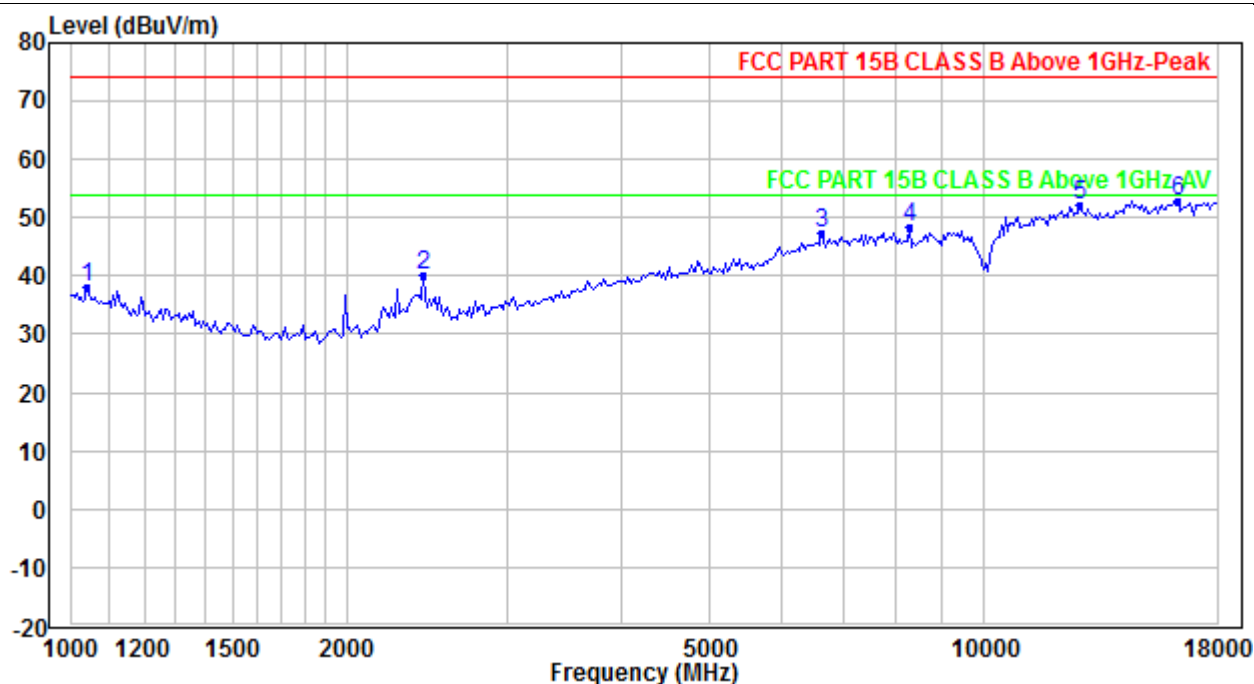
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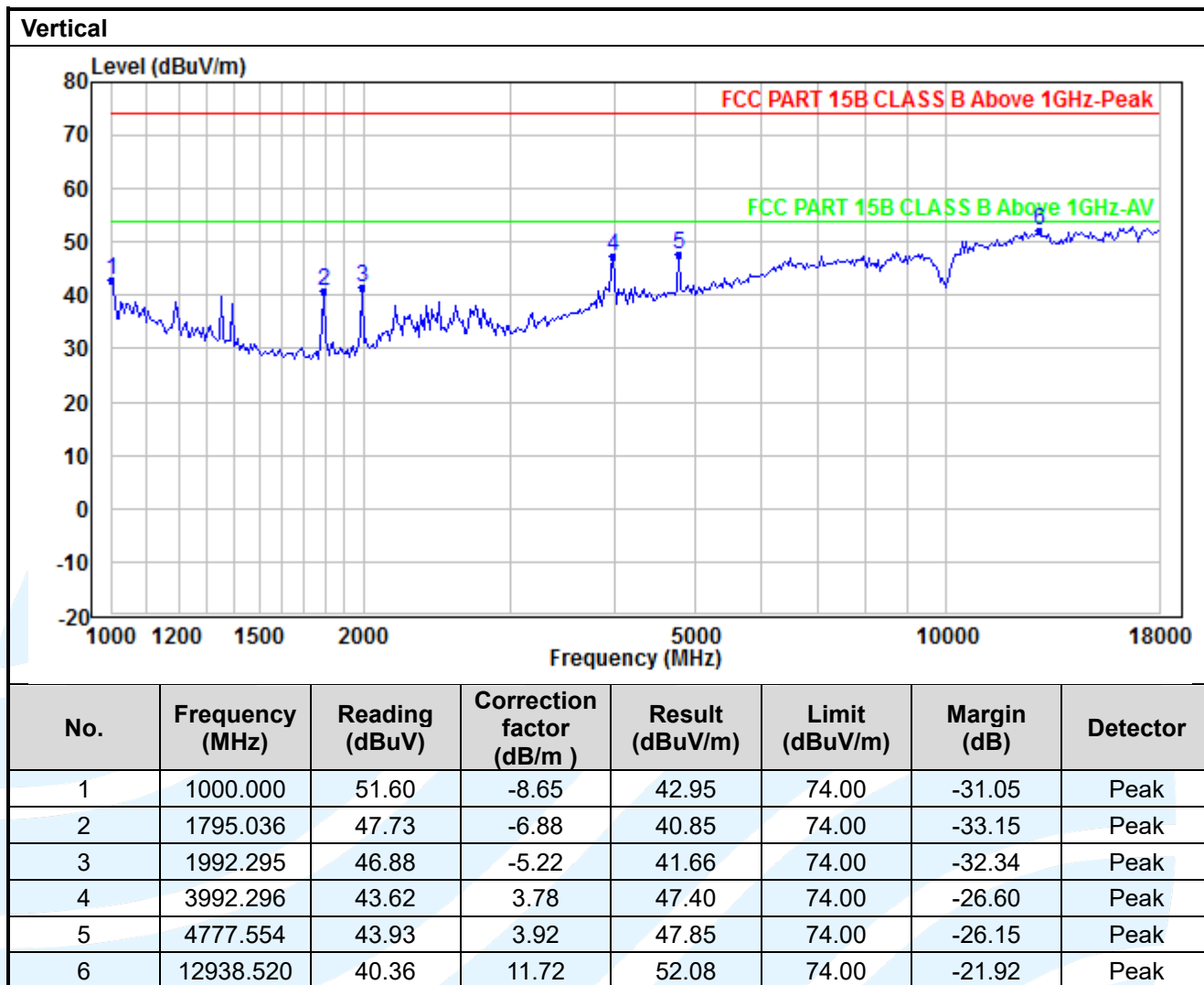
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Above 1GHz(Peak & Average)
TM7
Horizontal



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB/m)	Result (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	1041.380	46.57	-8.44	38.13	74.00	-35.87	Peak
2	2425.957	40.99	-0.89	40.10	74.00	-33.90	Peak
3	6646.506	40.43	6.77	47.20	74.00	-26.80	Peak
4	8282.955	41.26	6.96	48.22	74.00	-25.78	Peak
5	12715.630	40.85	11.16	52.01	74.00	-21.99	Peak
6	16312.020	40.62	12.23	52.85	74.00	-21.15	Peak



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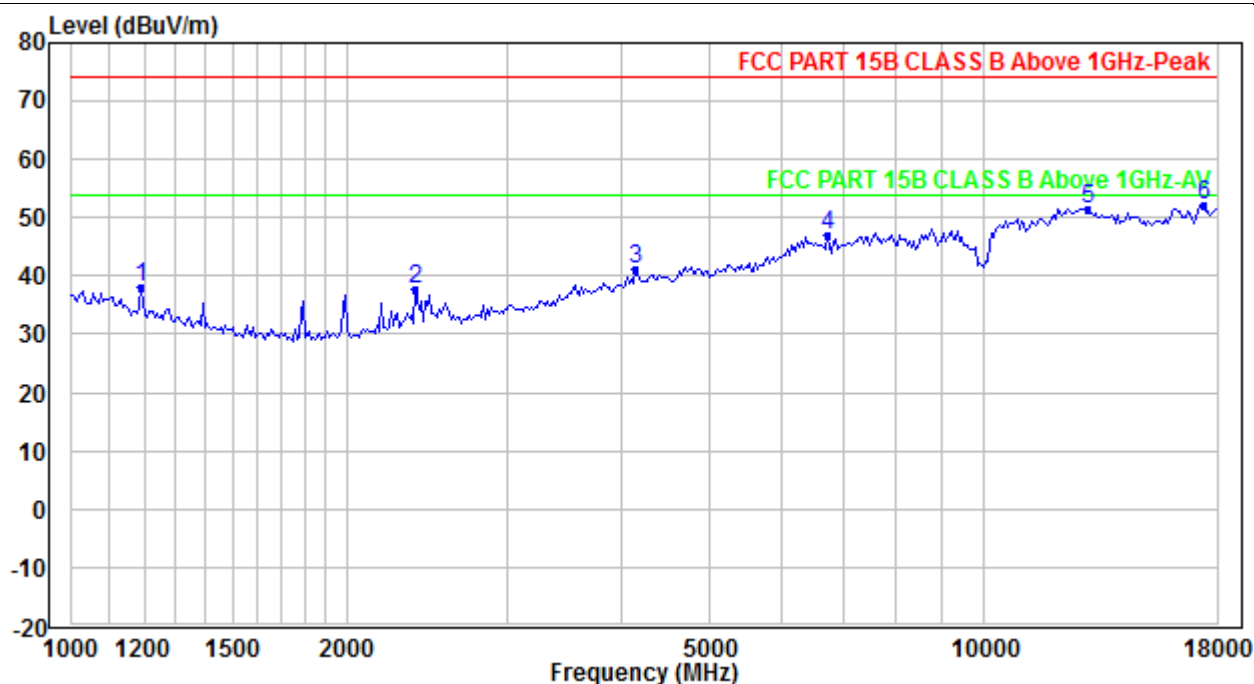
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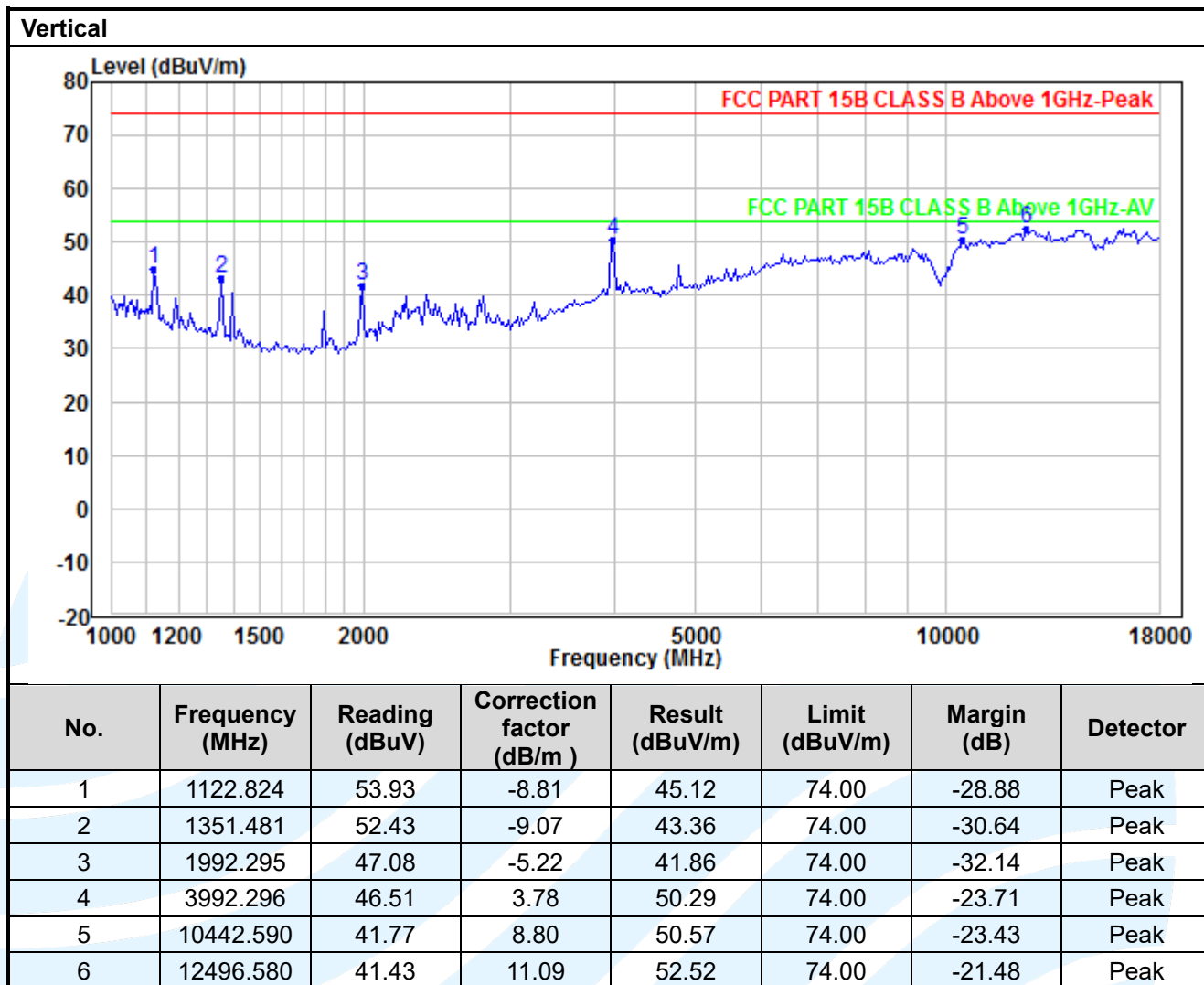
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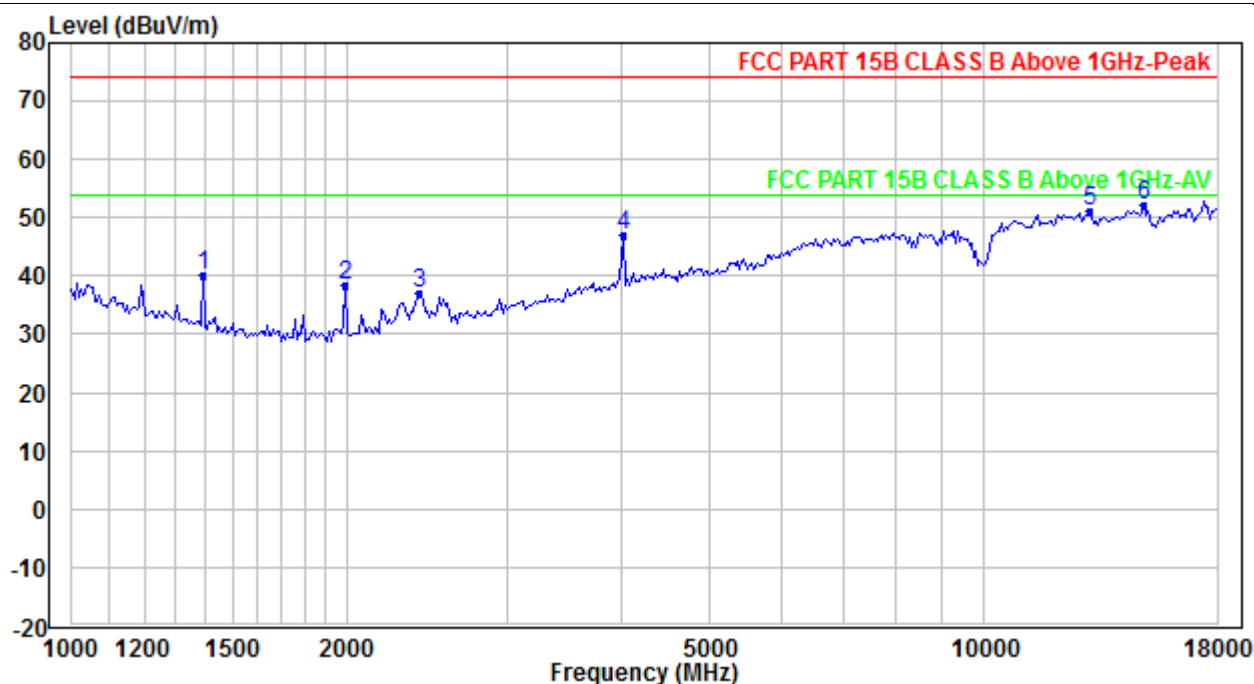
Above 1GHz(Peak & Average)
TM8
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1189.782	46.48	-8.43	38.05	74.00	-35.95	Peak
2	2384.166	38.76	-1.11	37.65	74.00	-36.35	Peak
3	4157.495	37.33	3.89	41.22	74.00	-32.78	Peak
4	6723.951	40.13	6.72	46.85	74.00	-27.15	Peak
5	13013.680	39.91	11.65	51.56	74.00	-22.44	Peak
6	17385.170	38.93	13.22	52.15	74.00	-21.85	Peak



Above 1GHz(Peak & Average)
TM9
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1391.194	48.37	-8.36	40.01	74.00	-33.99	Peak
2	1992.295	43.07	-4.72	38.35	74.00	-35.65	Peak
3	2398.016	37.97	-0.92	37.05	74.00	-36.95	Peak
4	4015.488	43.18	3.71	46.89	74.00	-27.11	Peak
5	13089.280	39.38	11.63	51.01	74.00	-22.99	Peak
6	14954.580	39.85	12.21	52.06	74.00	-21.94	Peak

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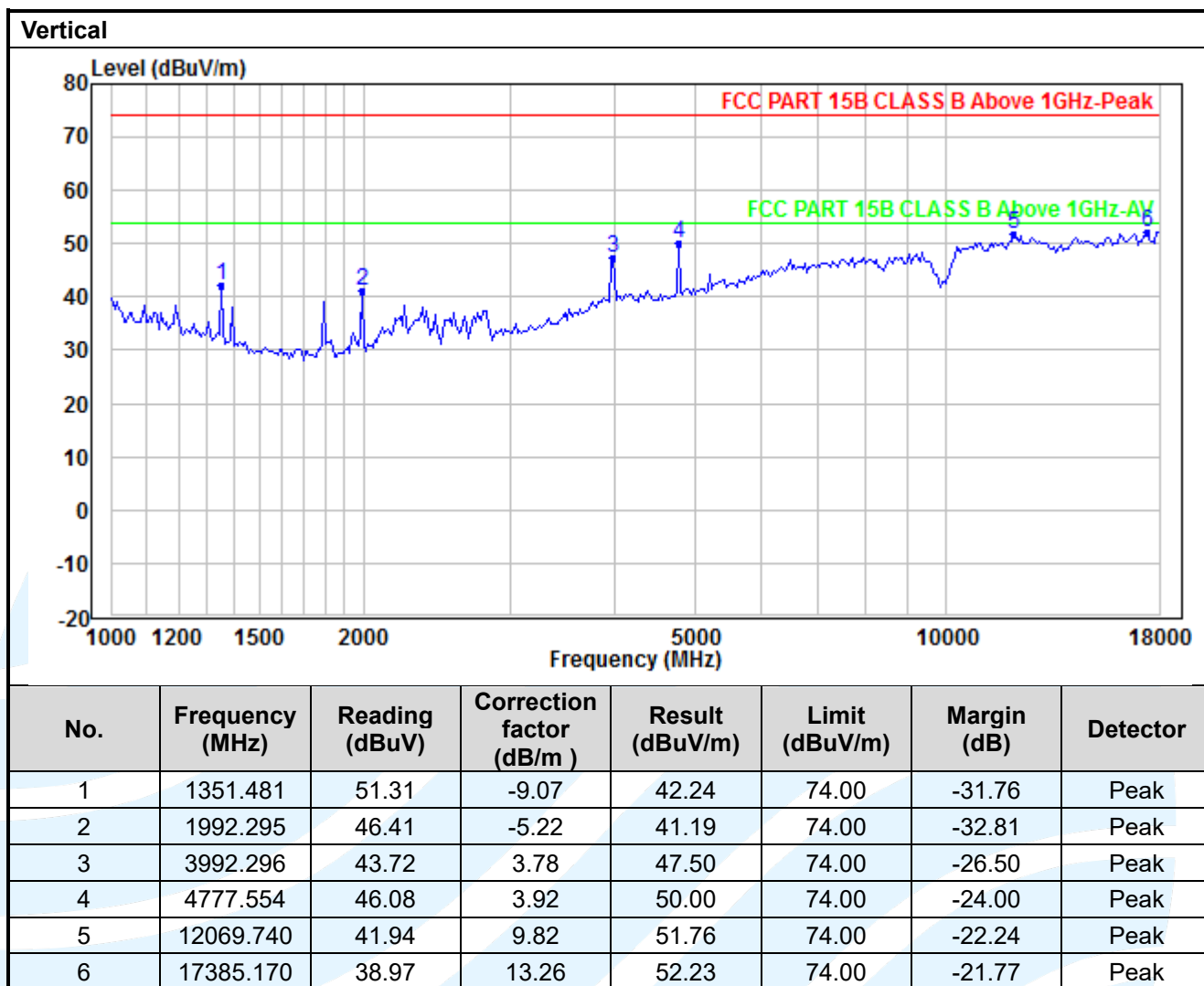
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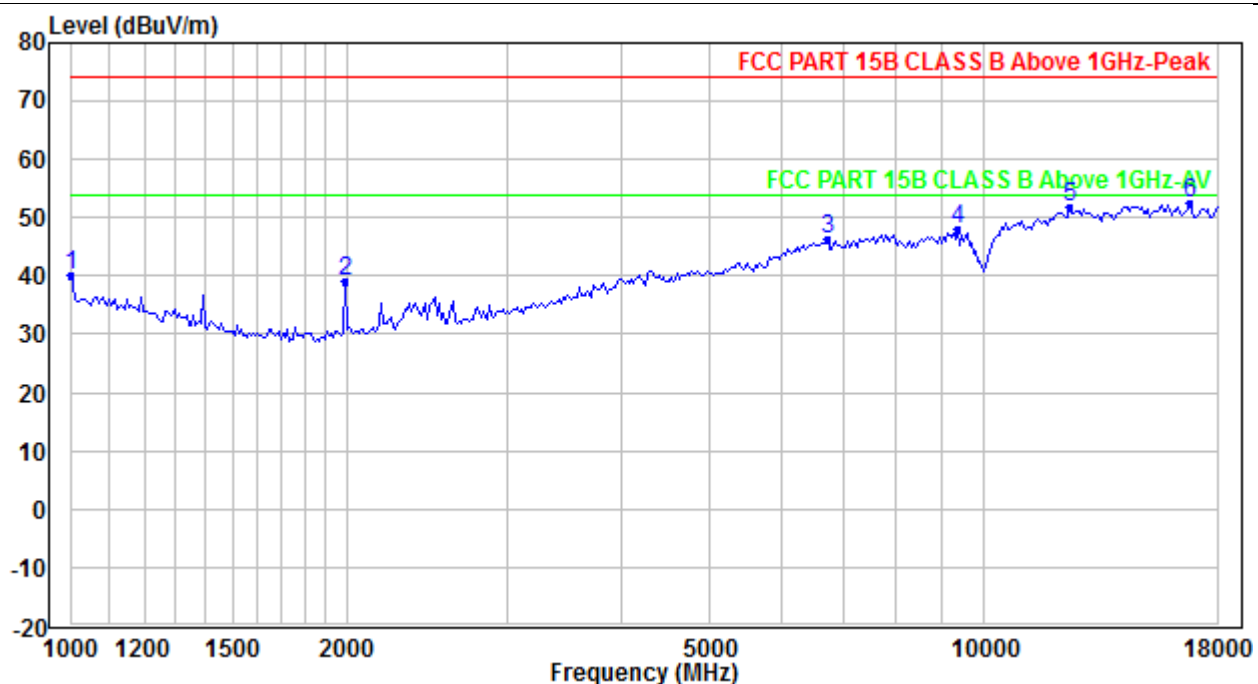
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Above 1GHz(Peak & Average)
TM10
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1000.000	48.68	-8.45	40.23	74.00	-33.77	Peak
2	1992.295	43.83	-4.72	39.11	74.00	-34.89	Peak
3	6723.951	39.48	6.72	46.20	74.00	-27.80	Peak
4	9354.324	39.89	8.01	47.90	74.00	-26.10	Peak
5	12424.410	41.13	10.66	51.79	74.00	-22.21	Peak
6	16791.350	40.49	11.99	52.48	74.00	-21.52	Peak

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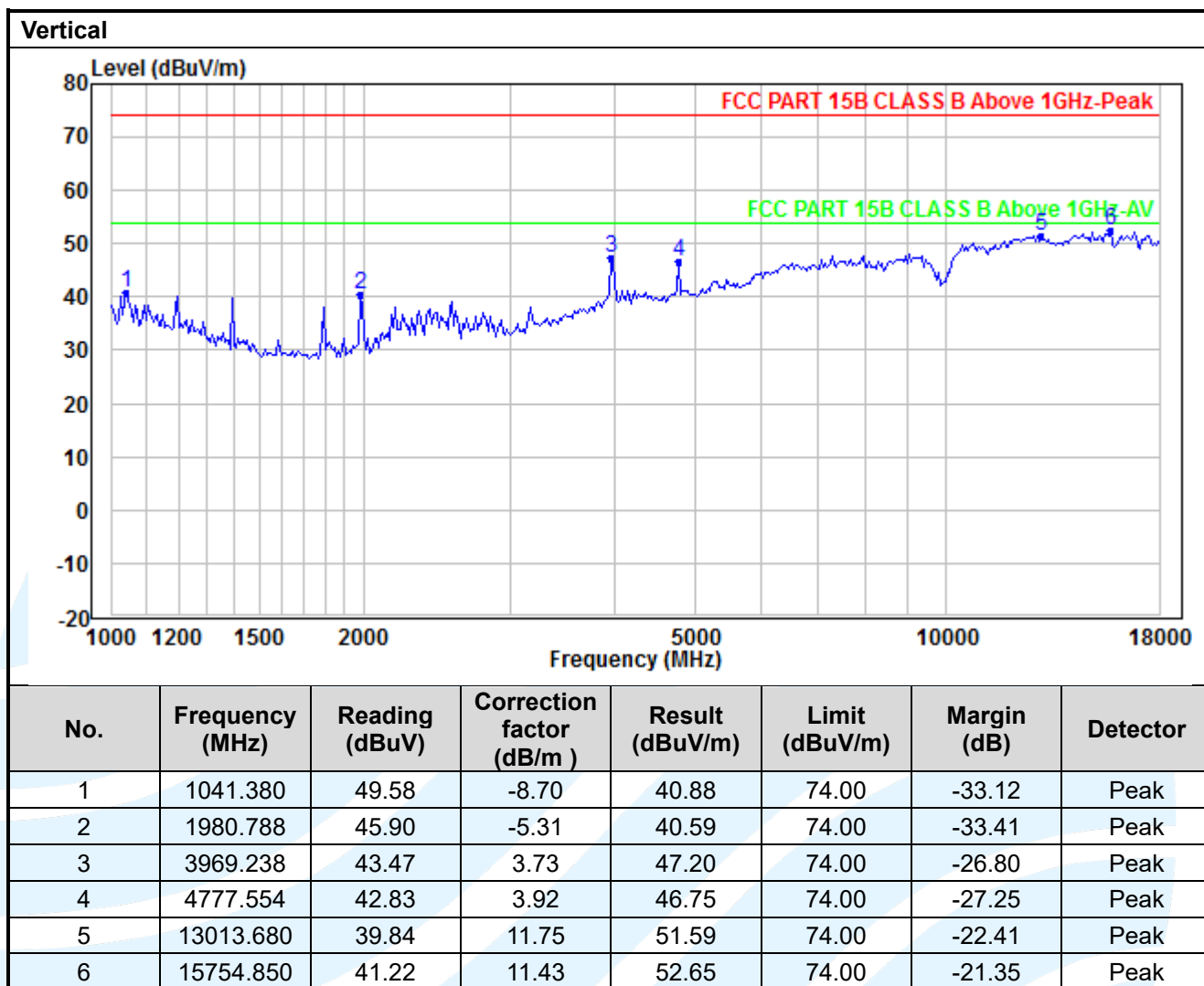
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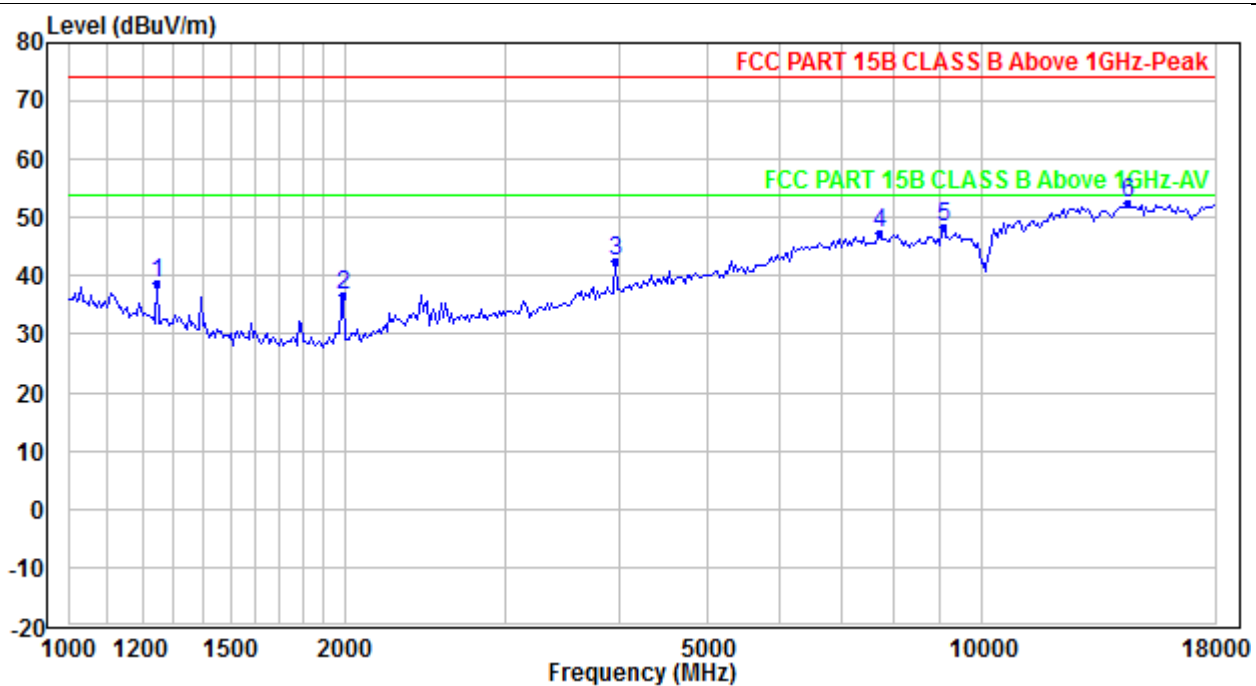
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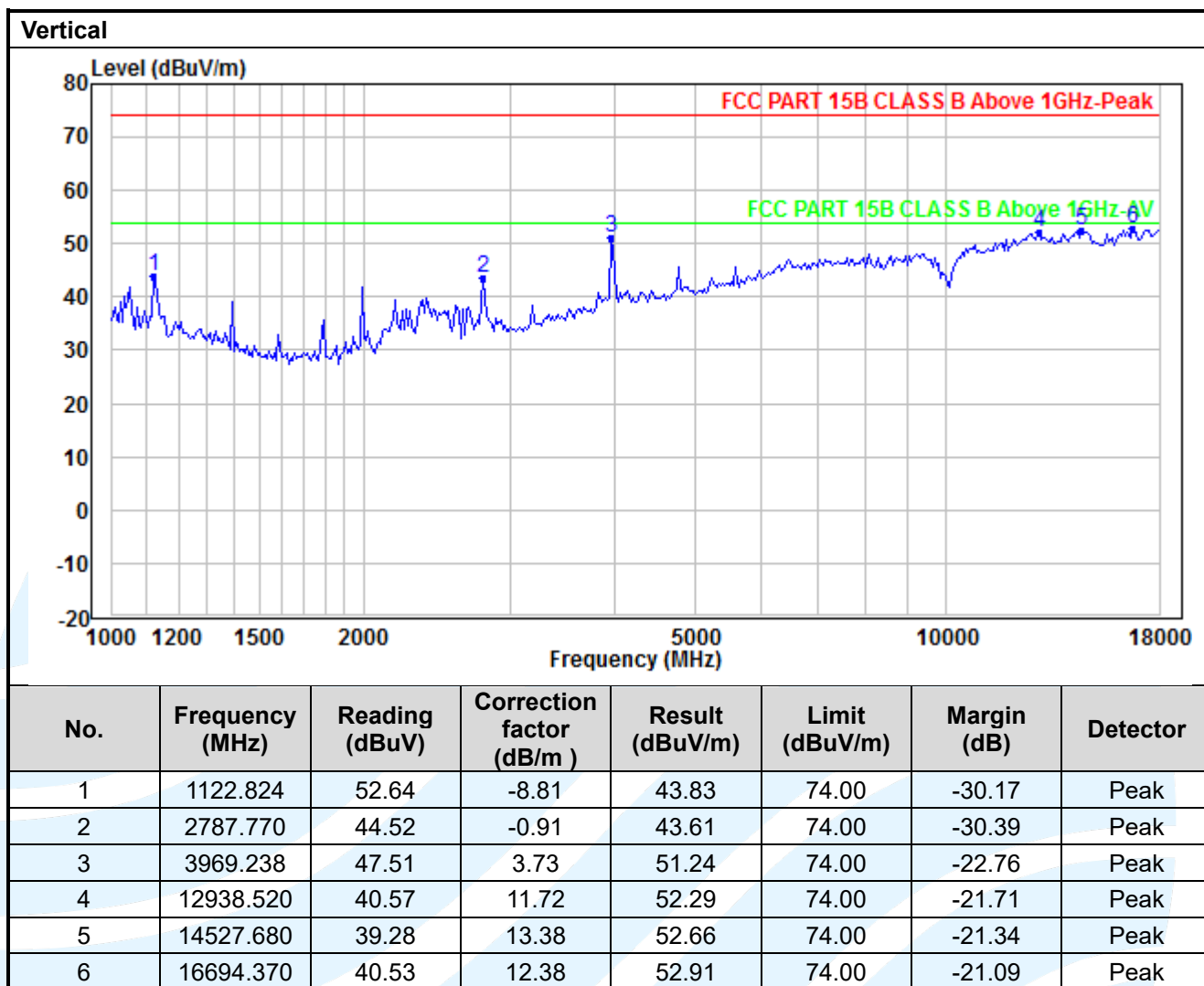
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Above 1GHz(Peak & Average)
TM11
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1246.212	47.07	-8.41	38.66	74.00	-35.34	Peak
2	1992.295	41.49	-4.72	36.77	74.00	-37.23	Peak
3	3969.238	38.83	3.64	42.47	74.00	-31.53	Peak
4	7726.777	40.54	6.65	47.19	74.00	-26.81	Peak
5	9087.293	41.22	7.26	48.48	74.00	-25.52	Peak
6	14443.770	38.96	13.39	52.35	74.00	-21.65	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.

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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.

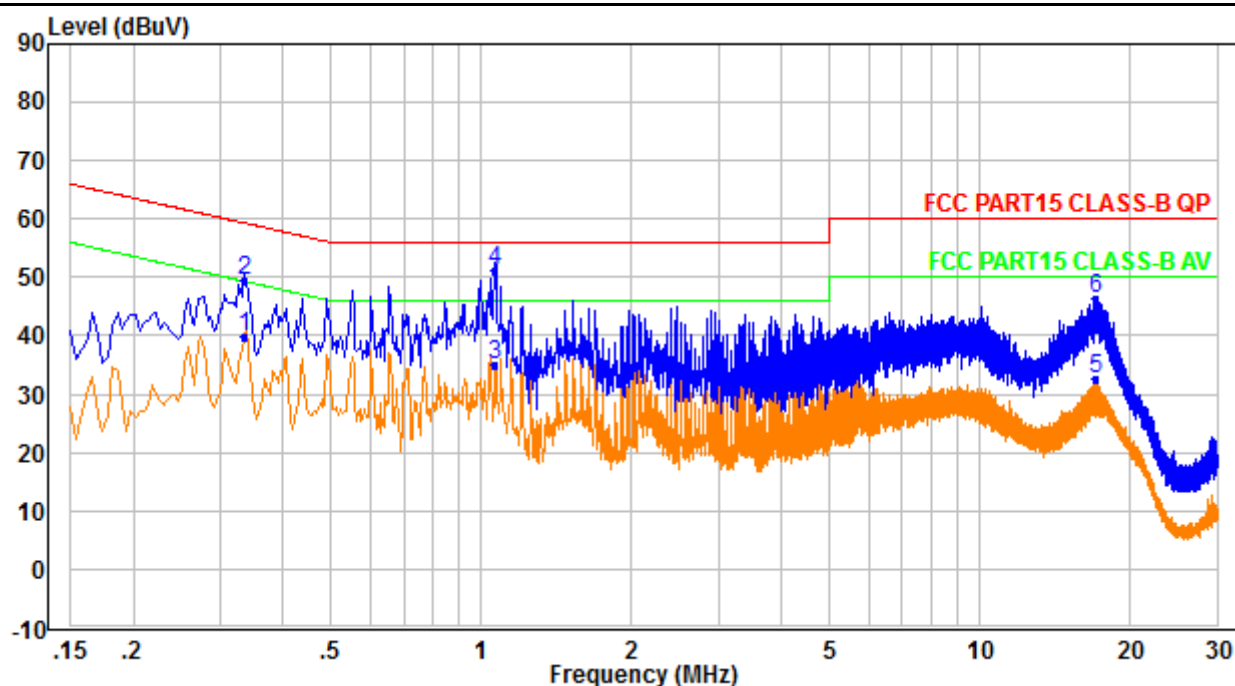
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

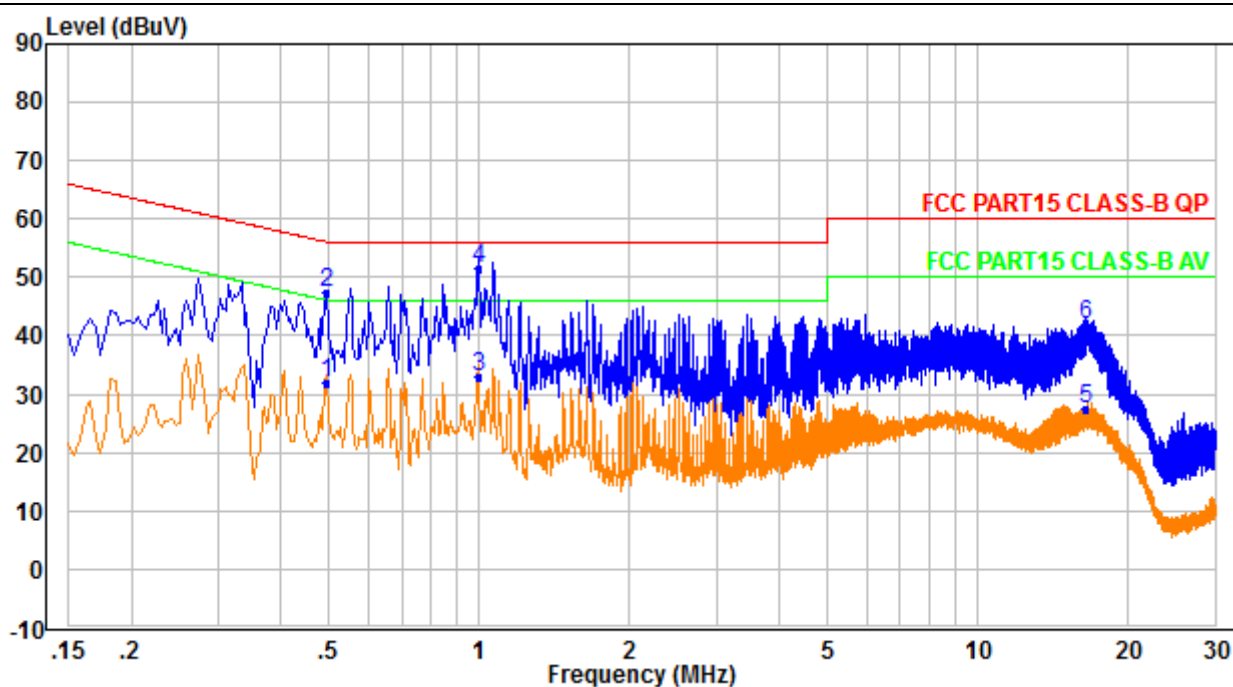
TM5

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.334	30.71	9.20	39.91	49.35	-9.44	Average
2	0.334	40.31	9.20	49.51	59.35	-9.84	QP
3	1.066	25.50	9.44	34.94	46.00	-11.06	Average
4	1.066	41.90	9.44	51.34	56.00	-4.66	QP
5	17.197	22.51	9.95	32.46	50.00	-17.54	Average
6	17.197	36.41	9.95	46.36	60.00	-13.64	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.494	22.60	9.35	31.95	46.10	-14.15	Average
2	0.494	37.90	9.35	47.25	56.10	-8.85	QP
3	0.994	23.40	9.42	32.82	46.00	-13.18	Average
4	0.994	42.10	9.42	51.52	56.00	-4.48	QP
5	16.505	17.41	9.93	27.34	50.00	-22.66	Average
6	16.505	31.91	9.93	41.84	60.00	-18.16	QP

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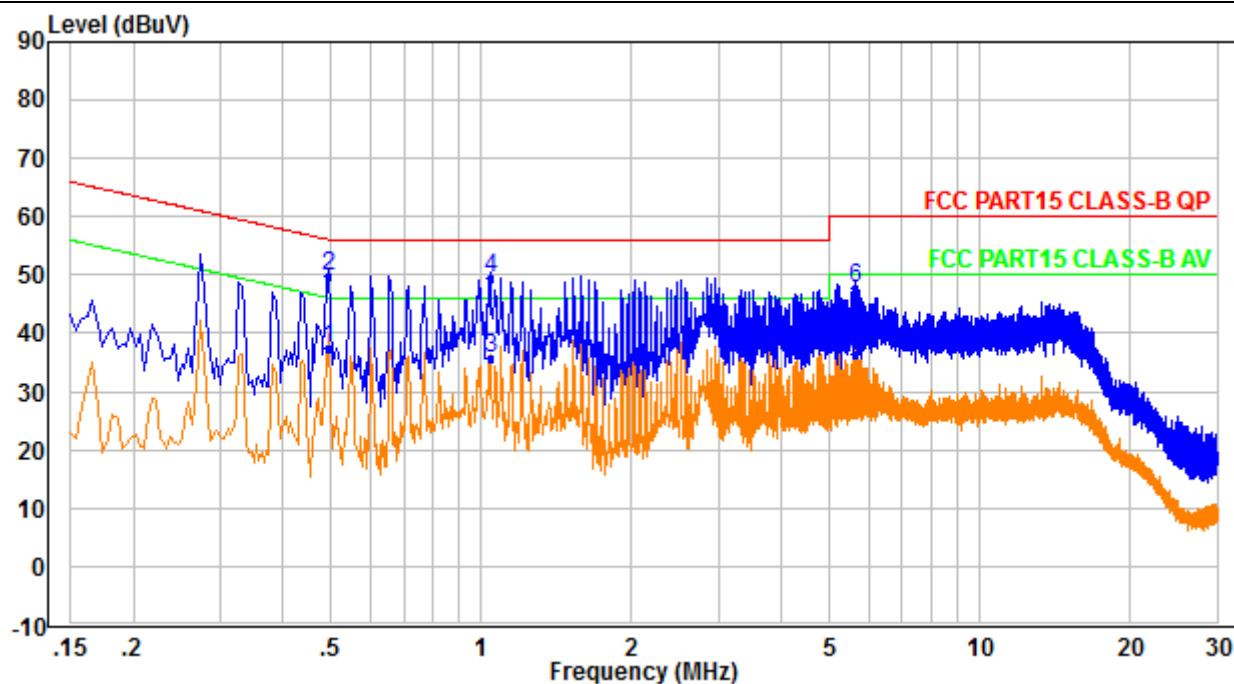
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Quasi Peak and Average:

TM6

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.494	28.10	9.32	37.42	46.10	-8.68	Average
2	0.494	40.50	9.32	49.82	56.10	-6.28	QP
3	1.042	26.40	9.43	35.83	46.00	-10.17	Average
4	1.042	39.90	9.43	49.33	56.00	-6.67	QP
5	5.638	26.90	9.60	36.50	50.00	-13.50	Average
6	5.638	38.00	9.60	47.60	60.00	-12.40	QP

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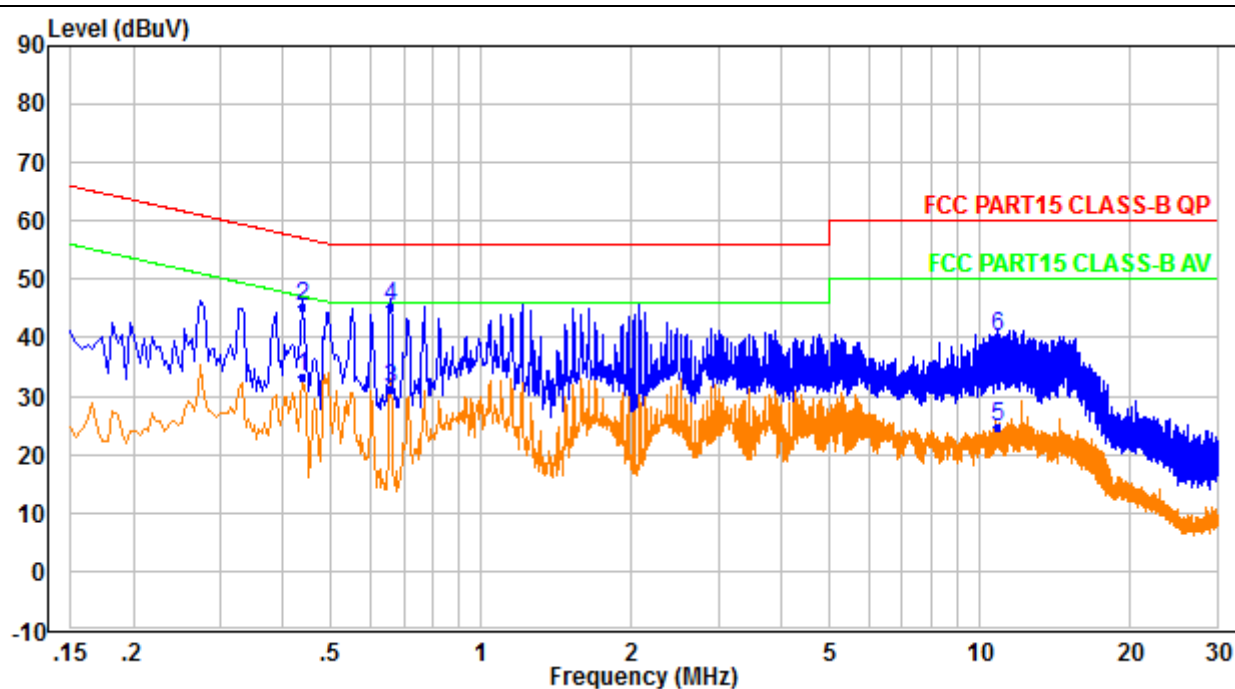
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Neutral Line



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.438	23.90	9.25	33.15	47.10	-13.95	Average
2	0.438	36.00	9.25	45.25	57.10	-11.85	QP
3	0.658	21.90	9.39	31.29	46.00	-14.71	Average
4	0.658	36.10	9.39	45.49	56.00	-10.51	QP
5	10.849	14.91	9.71	24.62	50.00	-25.38	Average
6	10.849	30.61	9.71	40.32	60.00	-19.68	QP

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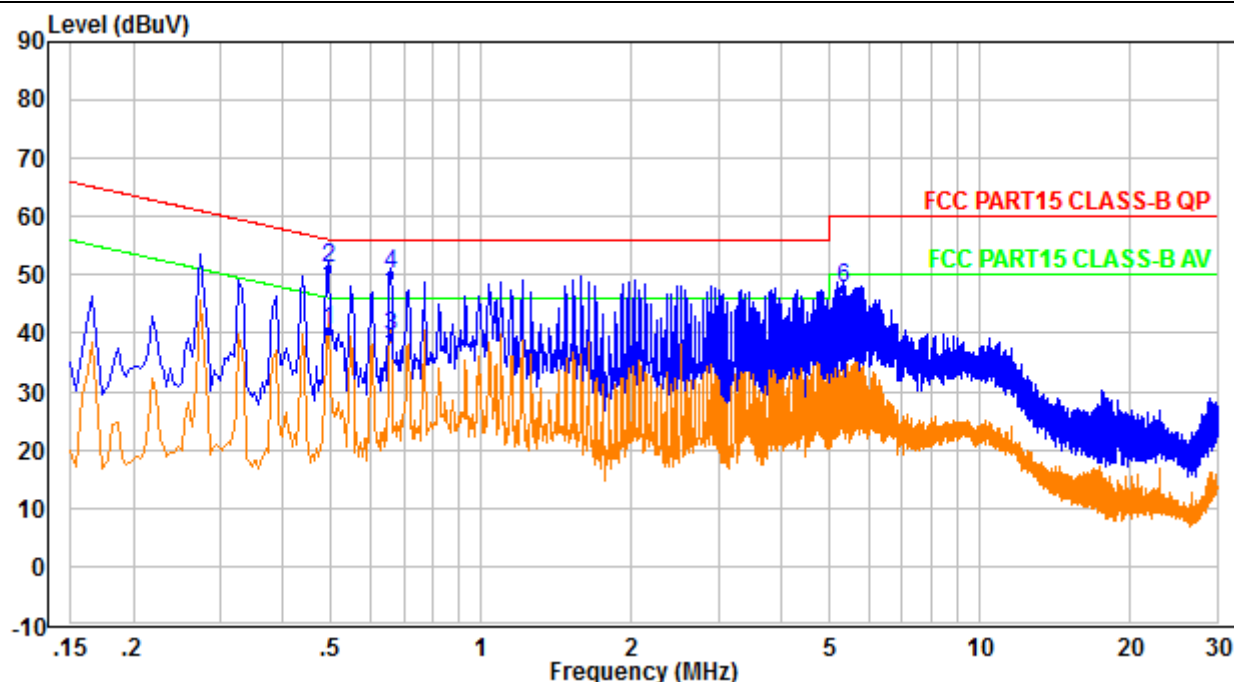
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Quasi Peak and Average:

TM7

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.494	31.10	9.32	40.42	46.10	-5.68	Average
2	0.494	41.70	9.32	51.02	56.10	-5.08	QP
3	0.658	30.20	9.38	39.58	46.00	-6.42	Average
4	0.658	40.80	9.38	50.18	56.00	-5.82	QP
5	5.314	26.10	9.59	35.69	50.00	-14.31	Average
6	5.314	38.30	9.59	47.89	60.00	-12.11	QP

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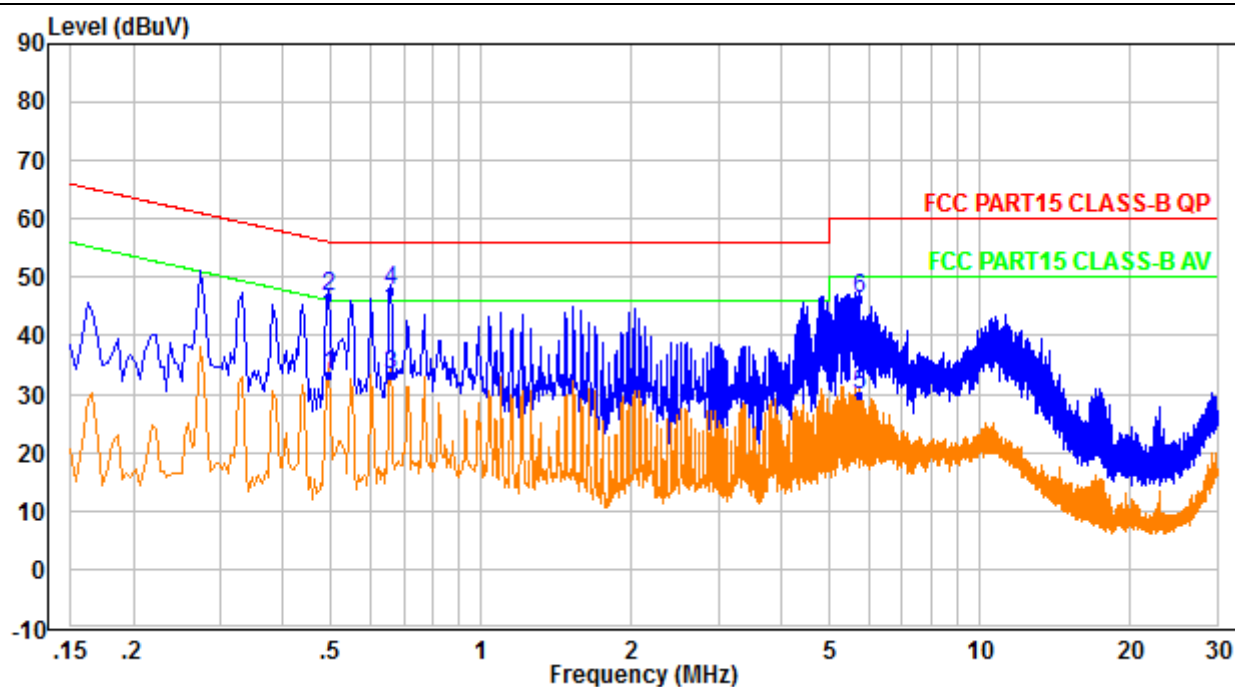
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Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.494	24.10	9.35	33.45	46.10	-12.65	Average
2	0.494	37.50	9.35	46.85	56.10	-9.25	QP
3	0.658	23.90	9.39	33.29	46.00	-12.71	Average
4	0.658	38.30	9.39	47.69	56.00	-8.31	QP
5	5.750	20.40	9.60	30.00	50.00	-20.00	Average
6	5.750	36.60	9.60	46.20	60.00	-13.80	QP

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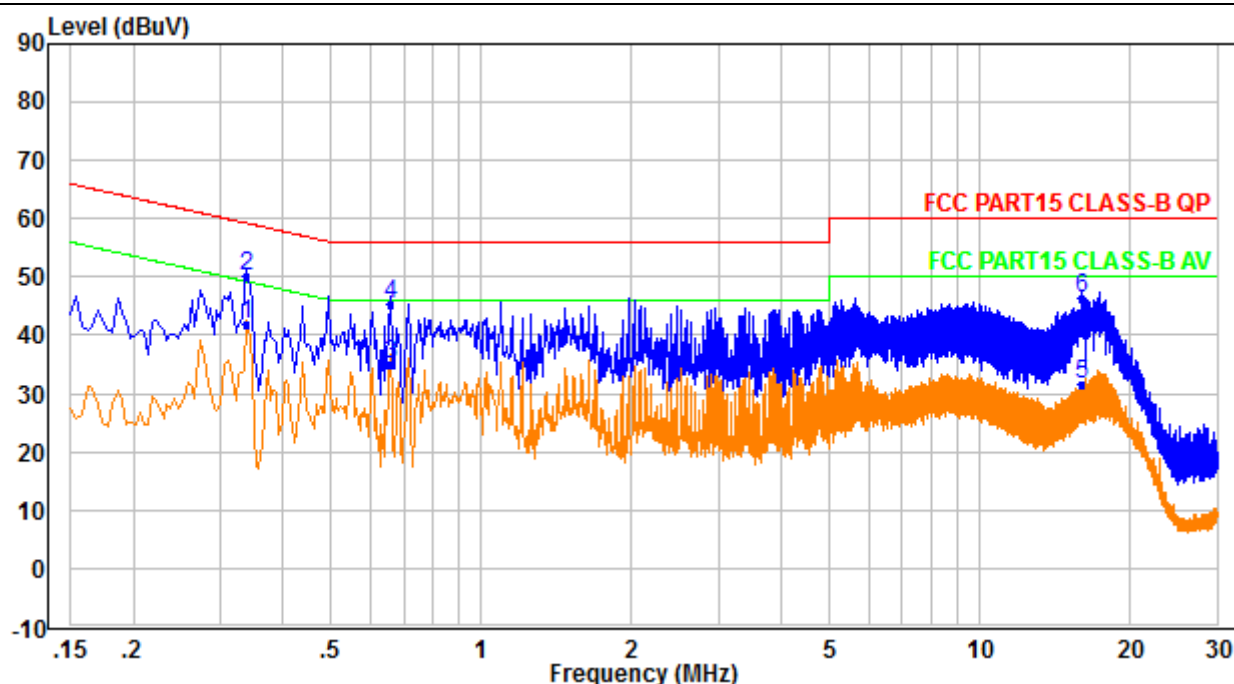
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UTTR-EMC-FCCPART15B-V1.0

Quasi Peak and Average:

TM8

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.338	32.81	9.20	42.01	49.25	-7.24	Average
2	0.338	41.11	9.20	50.31	59.25	-8.94	QP
3	0.658	25.60	9.38	34.98	46.00	-11.02	Average
4	0.658	36.10	9.38	45.48	56.00	-10.52	QP
5	15.981	21.60	9.92	31.52	50.00	-18.48	Average
6	15.981	36.60	9.92	46.52	60.00	-13.48	QP

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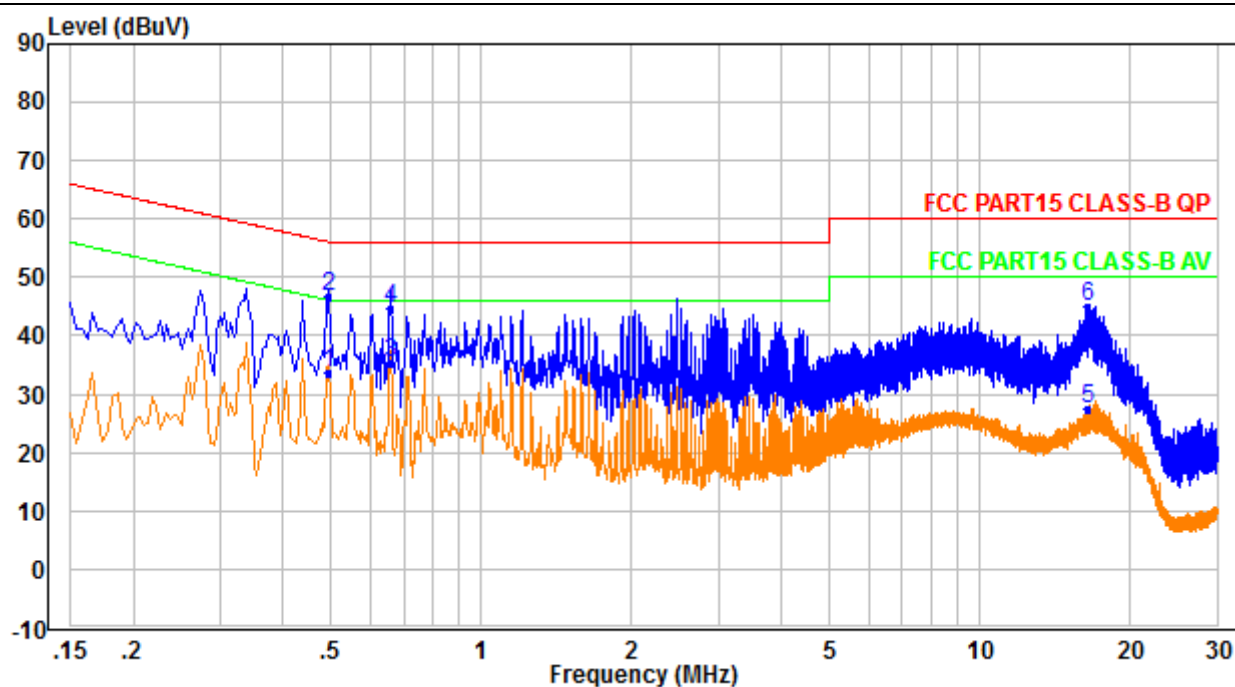
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UTTR-EMC-FCCPART15B-V1.0

Neutral Line



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.494	24.30	9.35	33.65	46.10	-12.45	Average
2	0.494	37.20	9.35	46.55	56.10	-9.55	QP
3	0.658	26.10	9.39	35.49	46.00	-10.51	Average
4	0.658	35.10	9.39	44.49	56.00	-11.51	QP
5	16.465	17.61	9.93	27.54	50.00	-22.46	Average
6	16.465	35.01	9.93	44.94	60.00	-15.06	QP

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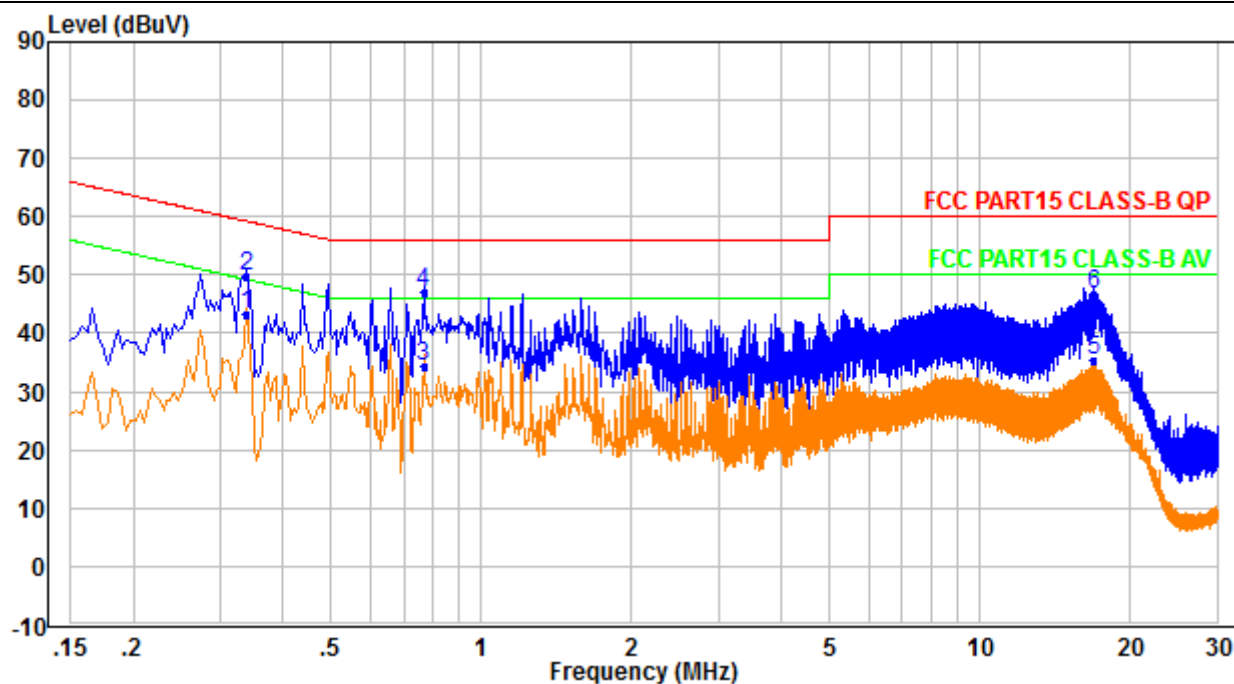
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UTTR-EMC-FCCPART15B-V1.0

Quasi Peak and Average:

TM9

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.338	34.21	9.20	43.41	49.25	-5.84	Average
2	0.338	40.71	9.20	49.91	59.25	-9.34	QP
3	0.766	24.90	9.42	34.32	46.00	-11.68	Average
4	0.766	37.50	9.42	46.92	56.00	-9.08	QP
5	16.905	25.41	9.94	35.35	50.00	-14.65	Average
6	16.905	36.61	9.94	46.55	60.00	-13.45	QP

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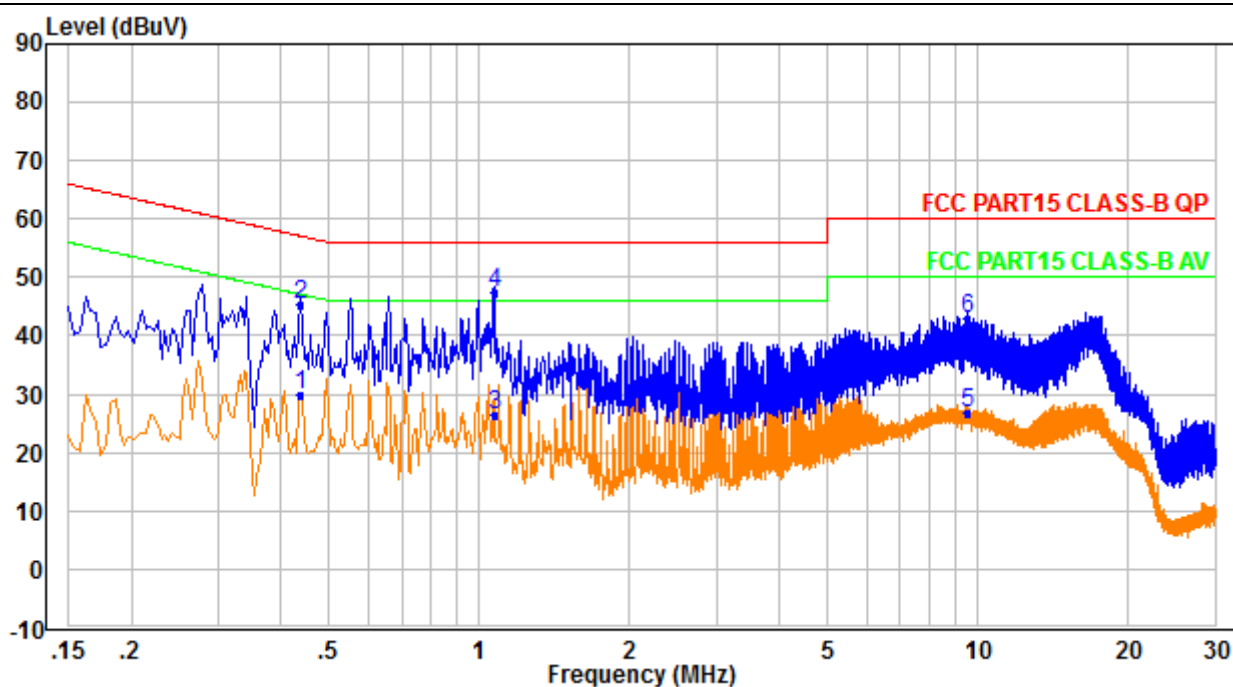
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UTTR-EMC-FCCPART15B-V1.0

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.334	33.51	9.20	42.71	49.35	-6.64	Average
2	0.334	41.11	9.20	50.31	59.35	-9.04	QP
3	2.578	17.10	9.60	26.70	46.00	-19.30	Average
4	2.578	35.80	9.60	45.40	56.00	-10.60	QP
5	16.385	21.90	9.93	31.83	50.00	-18.17	Average
6	16.385	35.70	9.93	45.63	60.00	-14.37	QP

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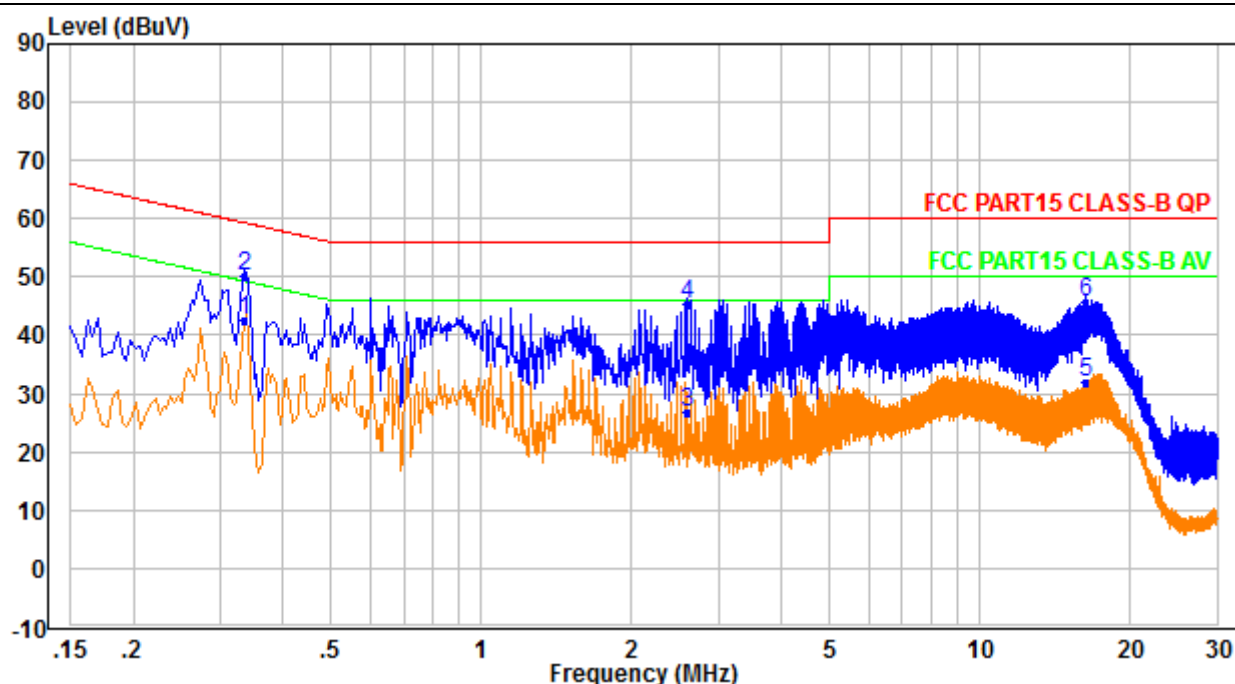
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UTTR-EMC-FCCPART15B-V1.0

Quasi Peak and Average:

TM10

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.334	33.51	9.20	42.71	49.35	-6.64	Average
2	0.334	41.11	9.20	50.31	59.35	-9.04	QP
3	2.578	17.10	9.60	26.70	46.00	-19.30	Average
4	2.578	35.80	9.60	45.40	56.00	-10.60	QP
5	16.385	21.90	9.93	31.83	50.00	-18.17	Average
6	16.385	35.70	9.93	45.63	60.00	-14.37	QP

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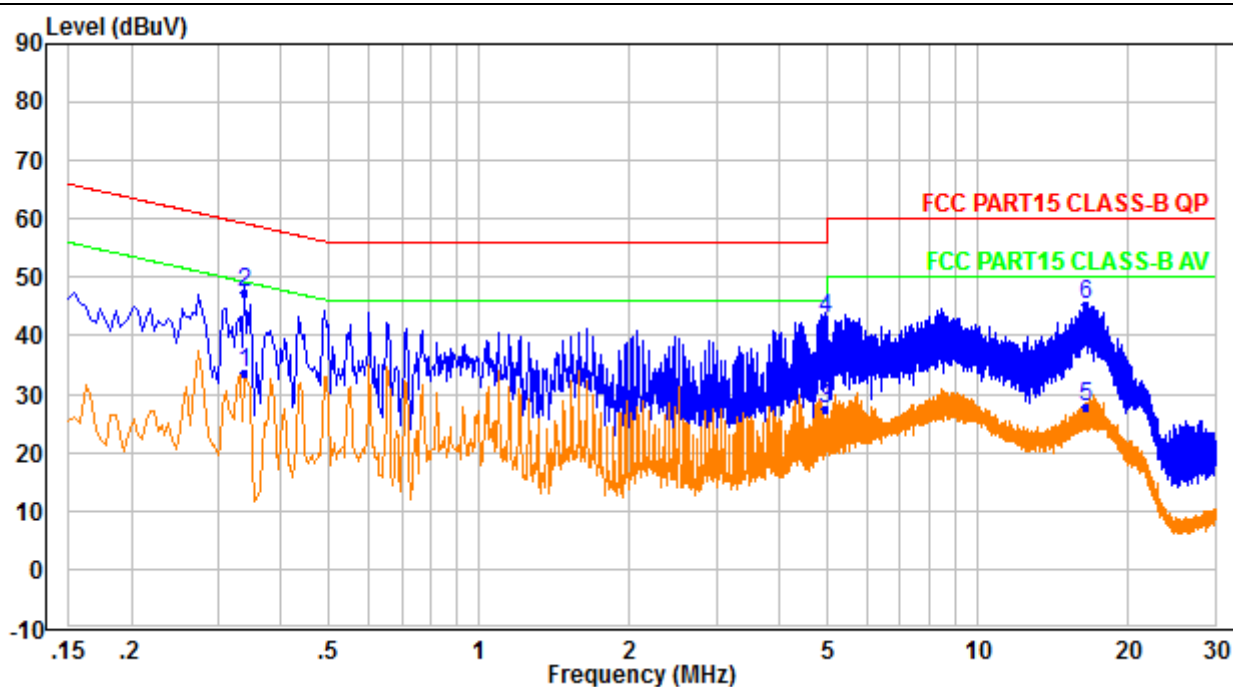
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UTTR-EMC-FCCPART15B-V1.0

Neutral Line



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.338	24.41	9.18	33.59	49.25	-15.66	Average
2	0.338	38.21	9.18	47.39	59.25	-11.86	QP
3	4.930	17.80	9.58	27.38	46.00	-18.62	Average
4	4.930	33.30	9.58	42.88	56.00	-13.12	QP
5	16.497	17.81	9.93	27.74	50.00	-22.26	Average
6	16.497	35.51	9.93	45.44	60.00	-14.56	QP

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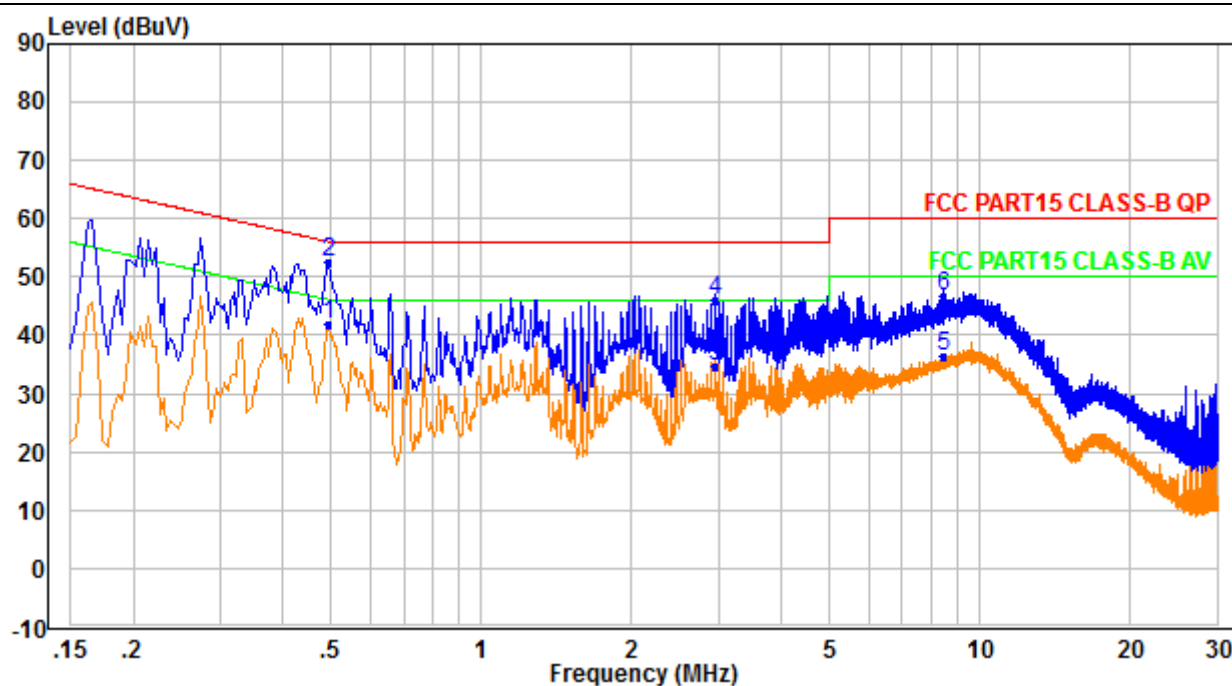
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UTTR-EMC-FCCPART15B-V1.0

Quasi Peak and Average:

TM11

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.494	32.60	9.32	41.92	46.10	-4.18	Average
2	0.494	43.10	9.32	52.42	56.10	-3.68	QP
3	2.954	25.10	9.60	34.70	46.00	-11.30	Average
4	2.954	36.40	9.60	46.00	56.00	-10.00	QP
5	8.481	26.80	9.66	36.46	50.00	-13.54	Average
6	8.481	36.90	9.66	46.56	60.00	-13.44	QP

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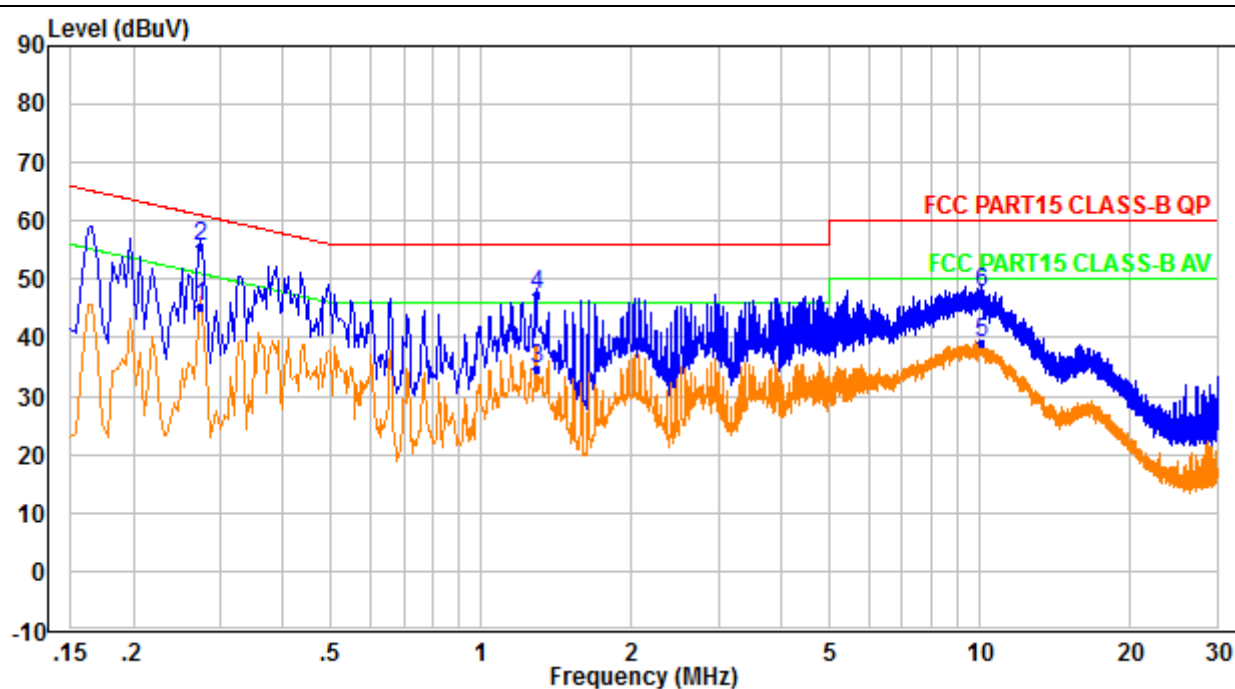
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UTTR-EMC-FCCPART15B-V1.0

Neutral Line



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.274	36.31	9.16	45.47	51.00	-5.53	Average
2	0.274	46.51	9.16	55.67	61.00	-5.33	QP
3	1.290	25.31	9.48	34.79	46.00	-11.21	Average
4	1.290	37.81	9.48	47.29	56.00	-8.71	QP
5	10.073	29.51	9.68	39.19	50.00	-10.81	Average
6	10.073	38.21	9.68	47.89	60.00	-12.11	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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***** End of Report *****

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