



Certificate #4312.01

# FCC & ISED TEST REPORT

**Product Name:** 2-Line Essential IP Phone  
**Trade Mark:** GRANDSTREAM  
**Model No. / HVIN:** GRP2602G  
**FCC ID:** YZZGRP2602G  
**Report Number:** 220409011EMC-1  
**Test Standards:** FCC 47 CFR Part 15 Subpart B  
 ICES-003 Issue 7  
**Test Result:** PASS  
**Date of Issue:** May 19, 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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Date: May 19, 2022

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

**Version**

Version No.	Date	Description
V1.0	May 19, 2022	Original

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## 1. GENERAL INFORMATION

### 1.1 CLIENT INFORMATION

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

### 1.2 EUT INFORMATION

#### 1.2.1 General Description of EUT

<b>Product Name:</b>	2-Line Essential IP Phone
<b>Model No. / HVIN:</b>	GRP2602G
<b>Add. Model No. / HVIN:</b>	N/A
<b>Trade Mark:</b>	GRANDSTREAM
<b>DUT Stage:</b>	Identical Prototype
<b>Rated Voltage:</b>	DC 5.0V from adapter and DC 48V from POE
<b>Classification of digital devices:</b>	Class B
<b>Highest Internal Frequency:</b>	1.3 GHz
<b>Software Version:</b>	1.0.3.54 (Provided by the customer)
<b>Hardware Version:</b>	V1.0 (Provided by the customer)
<b>Sample Received Date:</b>	April 14, 2022
<b>Sample Tested Date:</b>	April 26, 2022 to April 30, 2022

#### 1.2.2 Description of Accessories

Adapter 1	
<b>Model No.:</b>	F06US0500060A
<b>Input:</b>	Input: 100-240 V~50/60 Hz 0.2A max
<b>Output:</b>	5.0 V = 0.6 A
<b>DC Cable:</b>	1.80 Meter, Unshielded without ferrite
<b>Manufacturer:</b>	Shenzhen Sunlight ElectronicTechnology Co., Ltd.

Adapter 2	
<b>Model No.:</b>	GQ06-050060-ZU
<b>Input:</b>	Input: 100-240 V~50/60 Hz 0.3A Max
<b>Output:</b>	5.0 V = 0.6 A
<b>DC Cable:</b>	1.80 Meter, Unshielded without ferrite
<b>Manufacturer:</b>	DONGGUAN GANGQI ELECTRONIC CO.LTD.

Adapter 3	
<b>Model No.:</b>	PS05L050K0600UD
<b>Input:</b>	Input: 100-240 V~50/60 Hz 0.25A Max
<b>Output:</b>	5.0 V = 0.6 A
<b>DC Cable:</b>	1.80 Meter, Unshielded without ferrite
<b>Manufacturer:</b>	Shenzhen Flypower Technology Co., Ltd.

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Cable (1)	
<b>Description:</b>	Ethernet Cable
<b>Cable Type:</b>	Unshielded without ferrite
<b>Length:</b>	1.5 Meter

Cable (2)	
<b>Description:</b>	Phone Cord
<b>Cable Type:</b>	Unshielded without ferrite
<b>Length:</b>	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	Supplied by
Notebook	Lenovo	B40-80	MP12NEQ6	UnionTrust
mouse	DELL	MS111	CN-011D3V-738	UnionTrust
Wireless Home Router	SAGEMCOM	FAST5280	N/A	UnionTrust
Headset	YEY	VE120-MV	N/A	UnionTrust
Standard POE Power supply	TP-LINK	TL-POE160S	N/A	UnionTrust
IP Phone	N/A	D2	N/A	UnionTrust

#### 2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Ethernet Cable	RJ45	1.5 Unshielded without ferrite	UnionTrust
2	Ethernet Cable	RJ45	3.0 Unshielded without ferrite	UnionTrust

### 1.4 TEST LOCATION

#### Shenzhen UnionTrust Quality and Technology Co., Ltd.

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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 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

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**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**

<b>FCC 47 CFR Part 15 Subpart B Test Cases</b>			
<b>Test Item</b>	<b>Test Requirement</b>	<b>Test Method</b>	<b>Result</b>
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	Cal. Due date
<input checked="" type="checkbox"/>	3m SAC	ETS-LINDGREN	3m	N/A	Jan. 22, 2021	Jan. 21, 2024
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 5, 2021	Nov. 4, 2022
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov.11, 2021	Nov.10, 2023
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov.11, 2021	Nov.10, 2023
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A029 60	Nov. 5, 2021	Nov. 4, 2022
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 17, 2022	Apr. 16, 2024
<input checked="" type="checkbox"/>	Preamplifier	ETS-LINDGREN	00118385	00201874	Nov. 06, 2021	Nov. 05, 2022
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 05, 2021	Nov. 04, 2022
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 05, 2021	Nov. 04, 2022
<input checked="" type="checkbox"/>	LISN	R&S	ESH2-Z5	860014/024	Nov. 05, 2021	Nov. 04, 2022
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.20151119i		



## 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	1: AC 120V/60Hz 2: AC 240V/50Hz	20 to 75
<b>Remark:</b> 1) NV: Normal Voltage; NT: Normal Temperature			

#### 4.1.2 Record of Normal Environment and Test Sample

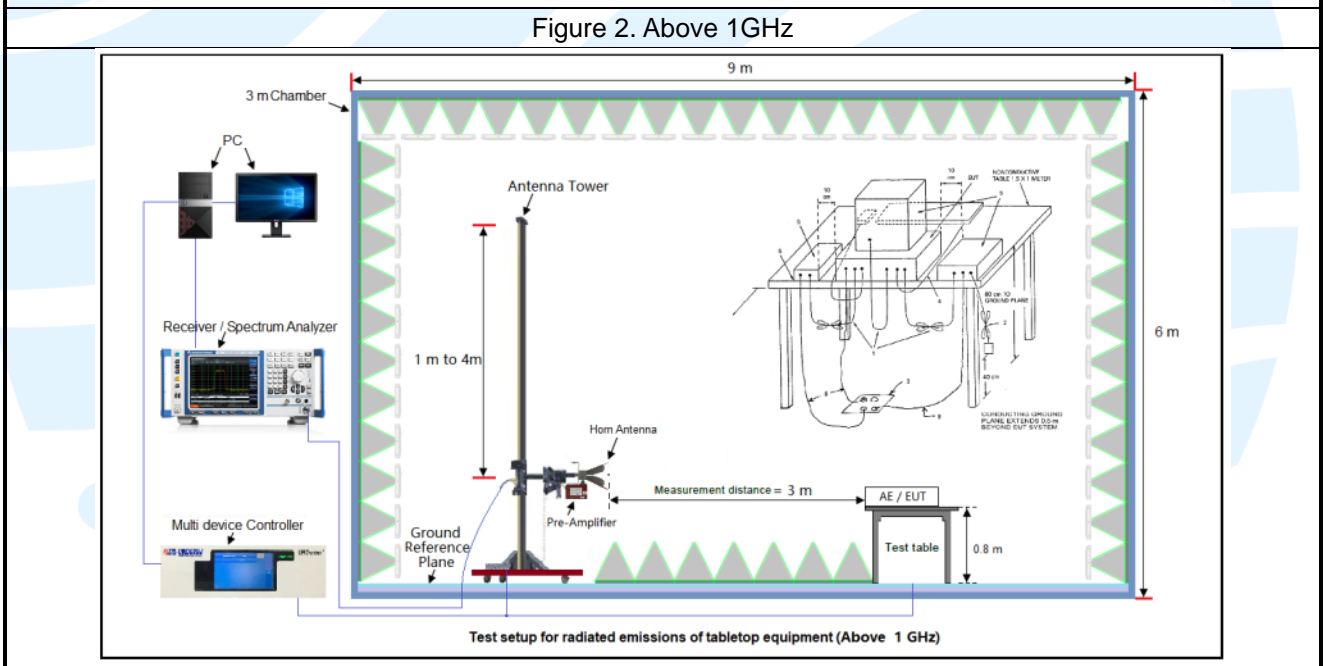
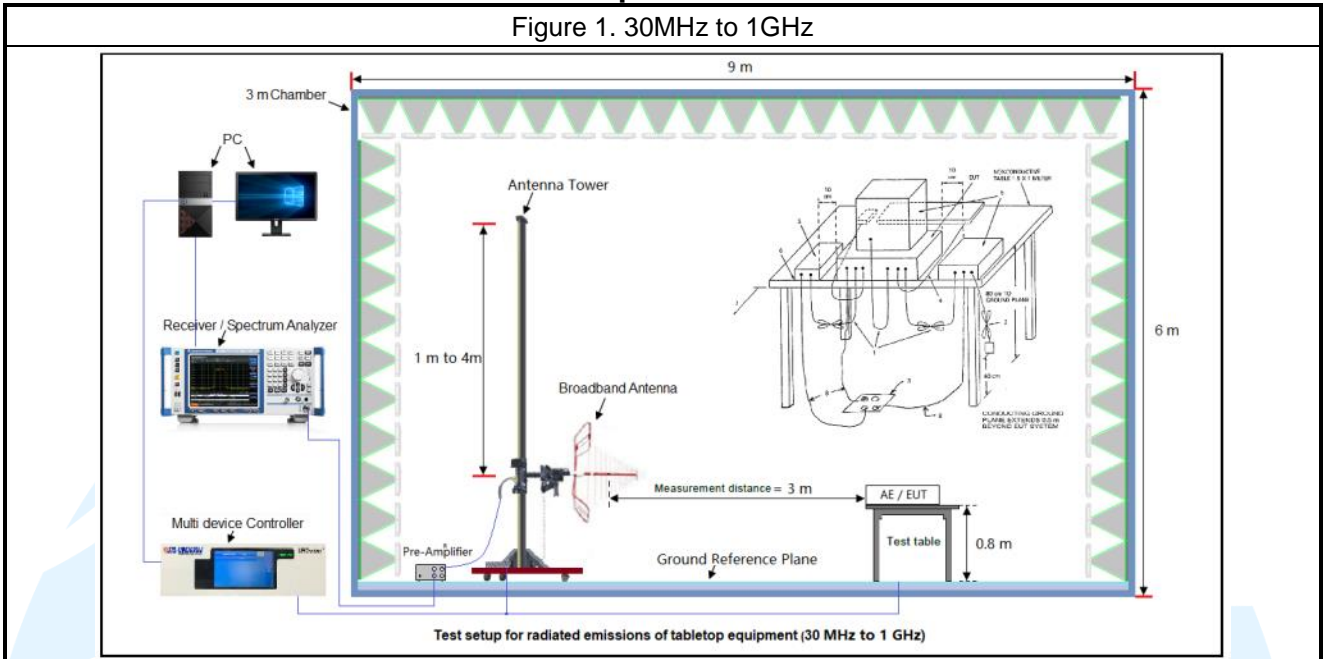
Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)	Sample No.	Tested by
Conducted Emission	24.4	46	101.1	220409012	David Zhang
Radiated Emission	22.5	52	100.2	-A01/2	Lucas Ouyang

### 4.2 TEST MODES

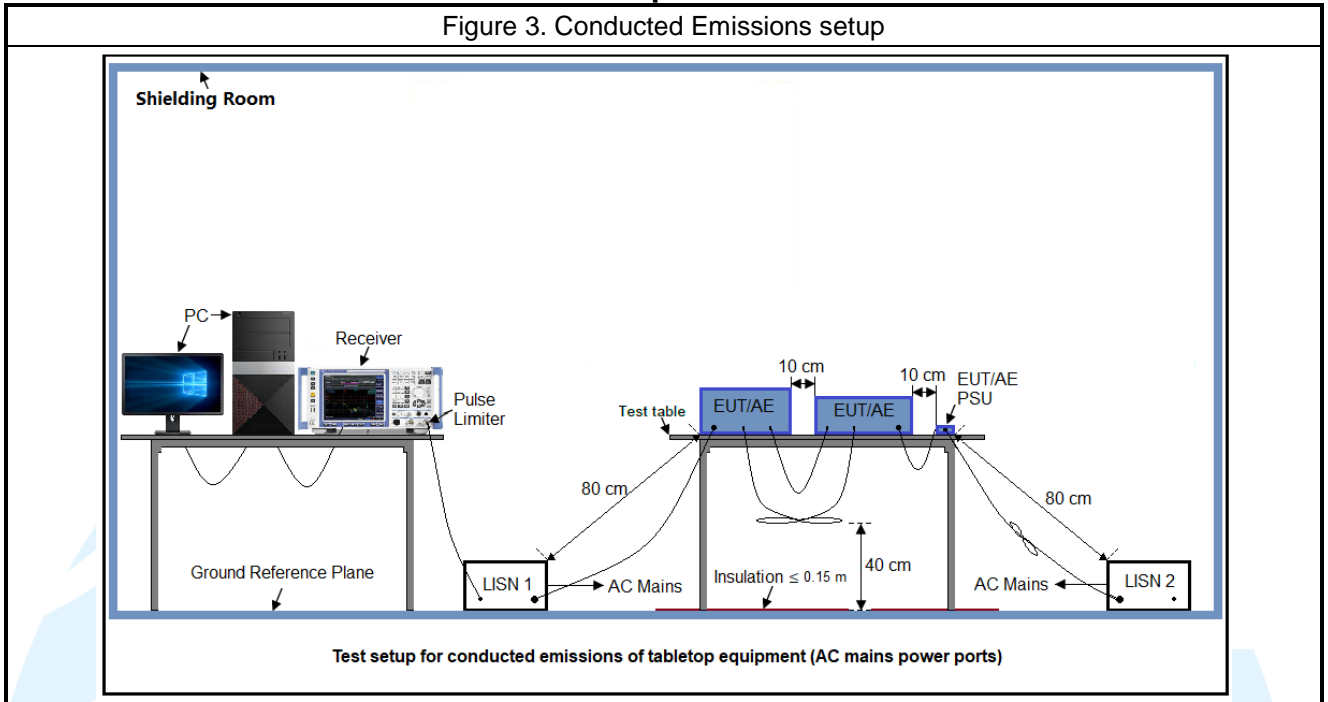
Test Item	EMI Test Modes
Radiated Emission (30MHz-1000MHz)	TM1: AC120V/60Hz (Adaptor1) +Hands Free TM2: AC120V/60Hz (Adaptor1) + Ringing TM3: AC120V/60Hz (Adaptor1) + Handset TM4: AC120V/60Hz (Adaptor1) + Headset TM5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 TM6: Worse from mode 1~5 (Adaptor2) TM7: Worse from mode 1~5 (Adaptor3) <b>TM8: Worse from mode 1~5 (PoE)</b>
Radiated Emission (Above 1GHz)	<b>TM1: AC120V/60Hz (Adaptor1) +Hands Free</b> 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: Worse from mode 1~5 (PoE)
Conducted Emission	TM1: AC120V/60Hz (Adaptor1) +Hands Free <b>TM2: AC120V/60Hz (Adaptor1) + Ringing</b> 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: Worse from mode 1~5 (PoE)

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup



4.3.2 For Conducted Emissions test 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 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
$30 \leq f \leq 1\,000$	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

**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	--	--

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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.

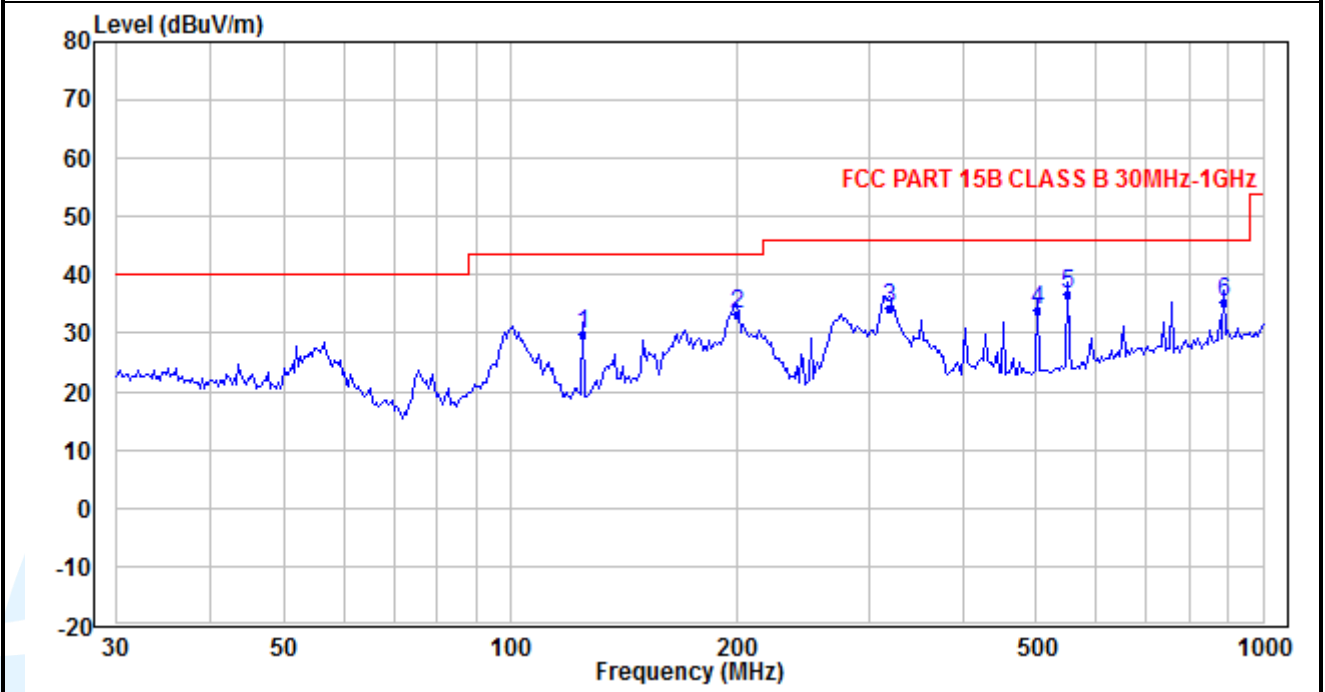
**Equipment Used:** Refer to section 3 for details.

**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 Mode 1: Worst case for Adapter 1  
 Horizontal



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	124.925	45.58	-15.82	29.76	43.50	-13.74	QP
2	200.043	43.80	-10.69	33.11	43.50	-10.39	QP
3	318.088	40.21	-5.96	34.25	46.00	-11.75	QP
4	502.247	36.70	-2.71	33.99	46.00	-12.01	QP
5	550.290	38.54	-1.90	36.64	46.00	-9.36	QP
6	887.398	31.14	4.12	35.26	46.00	-10.74	QP

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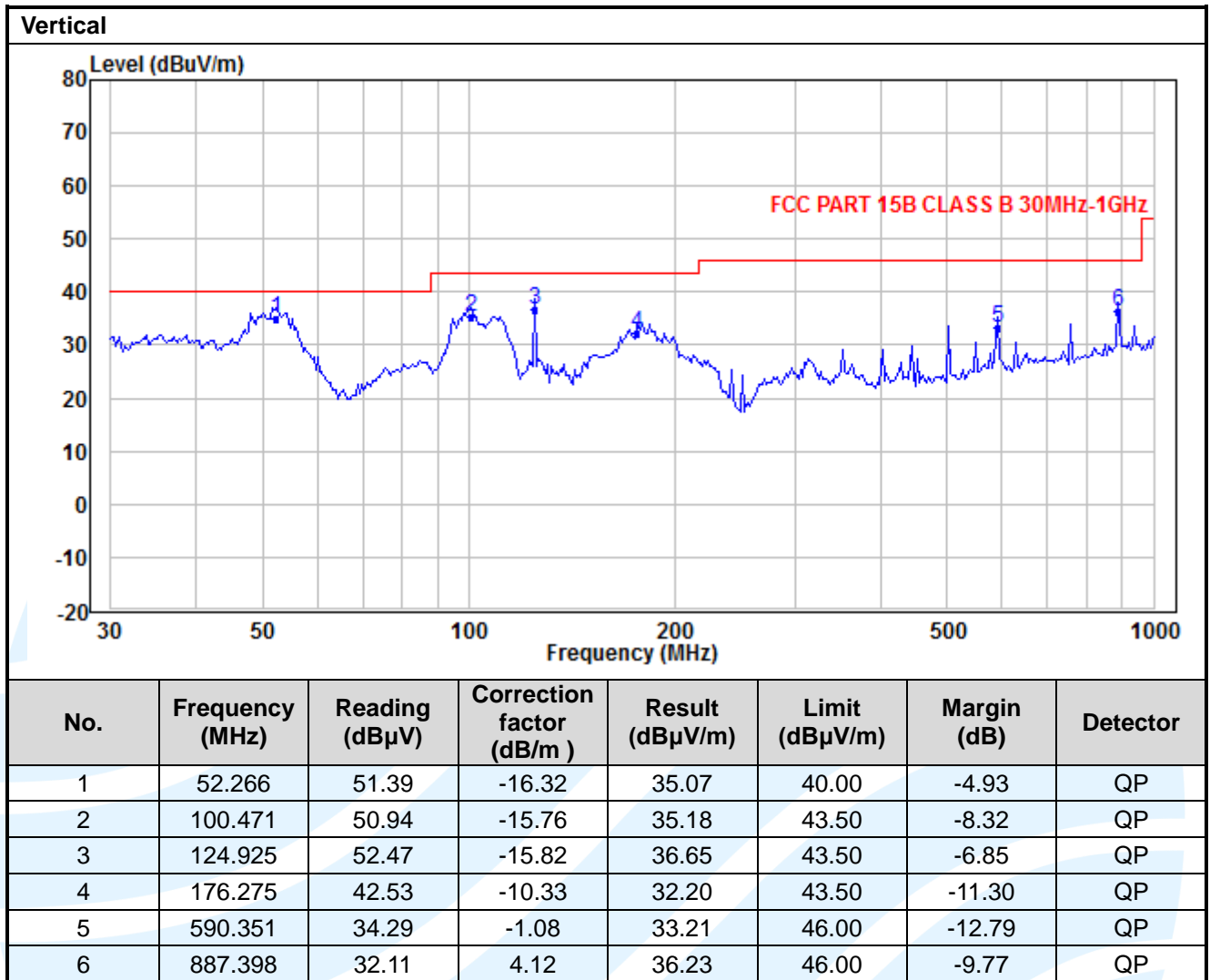
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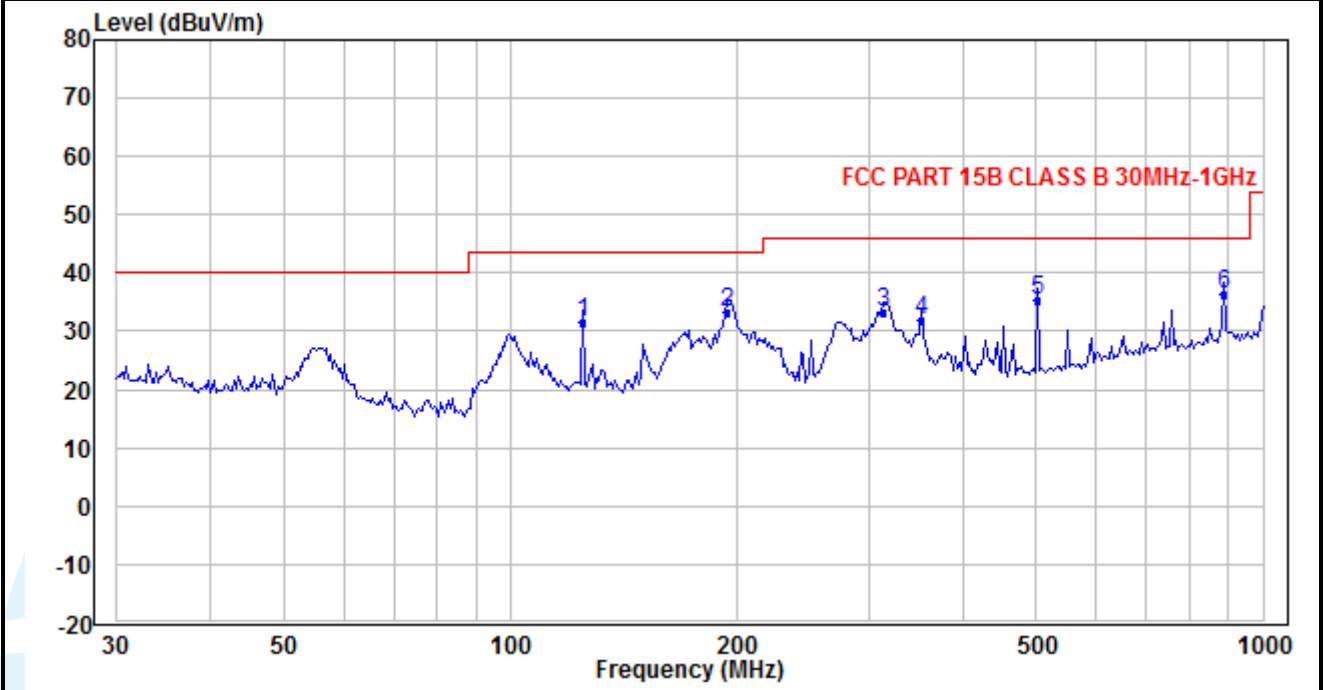
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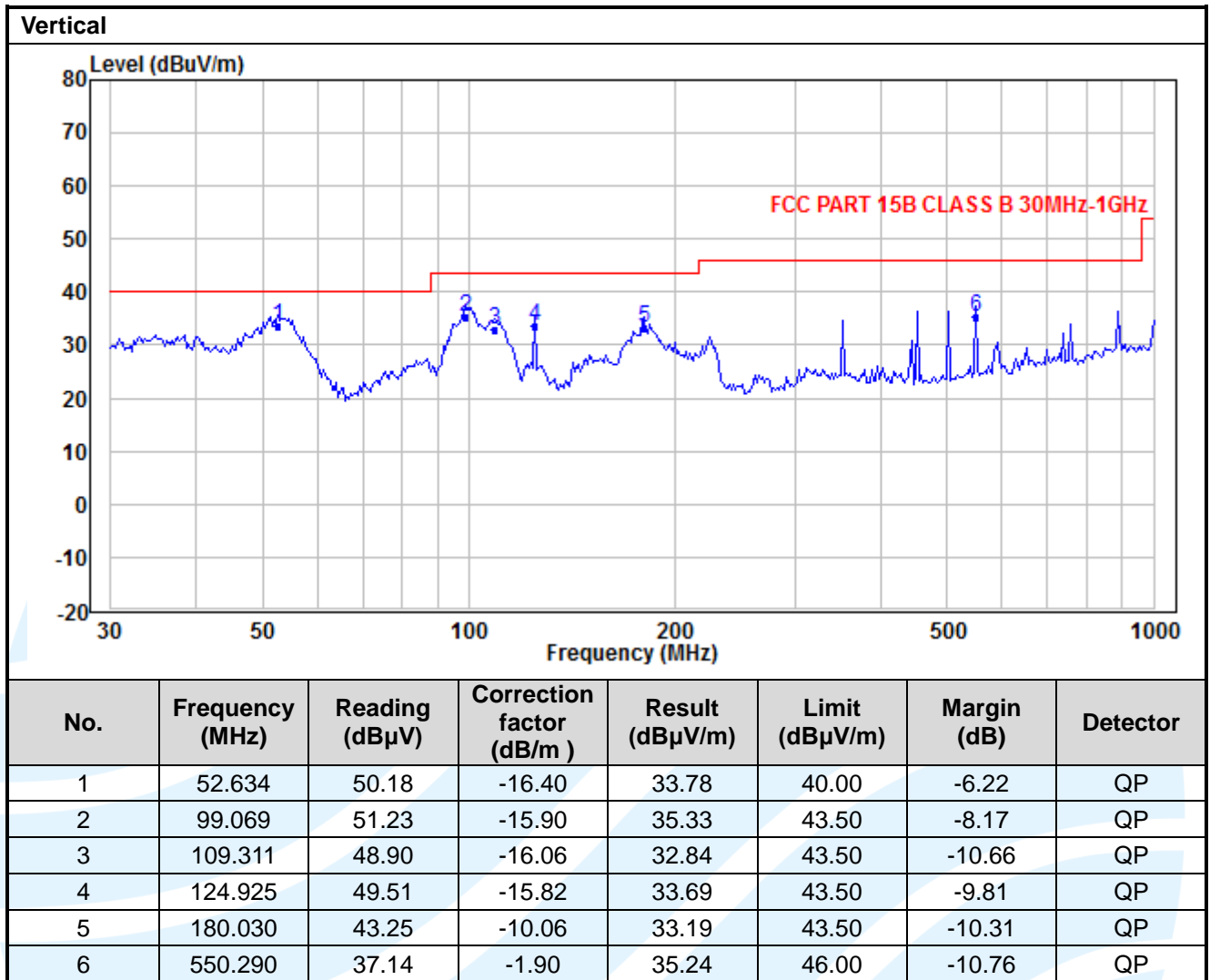
The measurement data for FCC 47 CFR Part 15 Subpart B as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 6: Worst from Mode 1 for Adapter 2  
 Horizontal



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	124.925	47.30	-15.82	31.48	43.50	-12.02	QP
2	194.499	43.81	-10.48	33.33	43.50	-10.17	QP
3	313.648	39.07	-5.94	33.13	46.00	-12.87	QP
4	350.972	37.03	-5.08	31.95	46.00	-14.05	QP
5	502.247	38.14	-2.71	35.43	46.00	-10.57	QP
6	887.398	32.24	4.12	36.36	46.00	-9.64	QP





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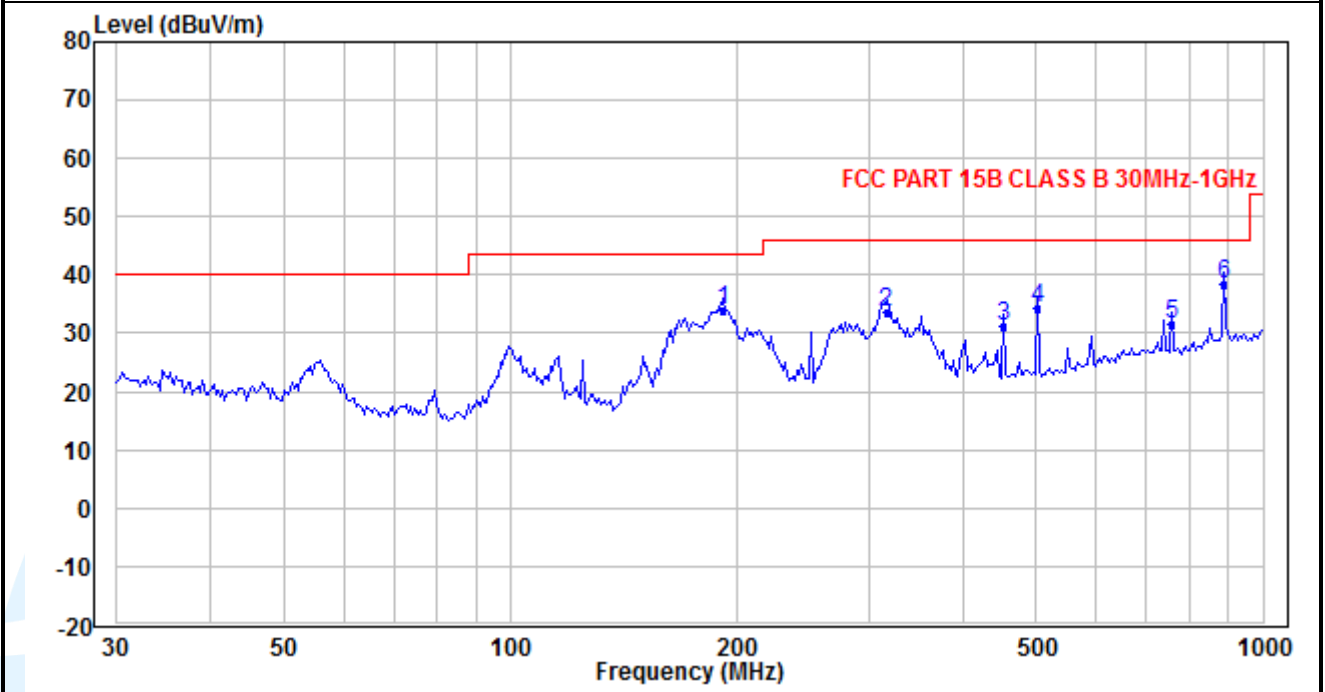
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The measurement data for FCC 47 CFR Part 15 Subpart B as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 7: Worst from Mode 1 for Adapter 3  
 Horizontal



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	191.784	44.21	-10.28	33.93	43.50	-9.57	QP
2	315.860	39.60	-5.91	33.69	46.00	-12.31	QP
3	452.001	35.30	-4.04	31.26	46.00	-14.74	QP
4	502.247	37.06	-2.71	34.35	46.00	-11.65	QP
5	754.963	29.98	1.71	31.69	46.00	-14.31	QP
6	887.398	34.45	4.12	38.57	46.00	-7.43	QP

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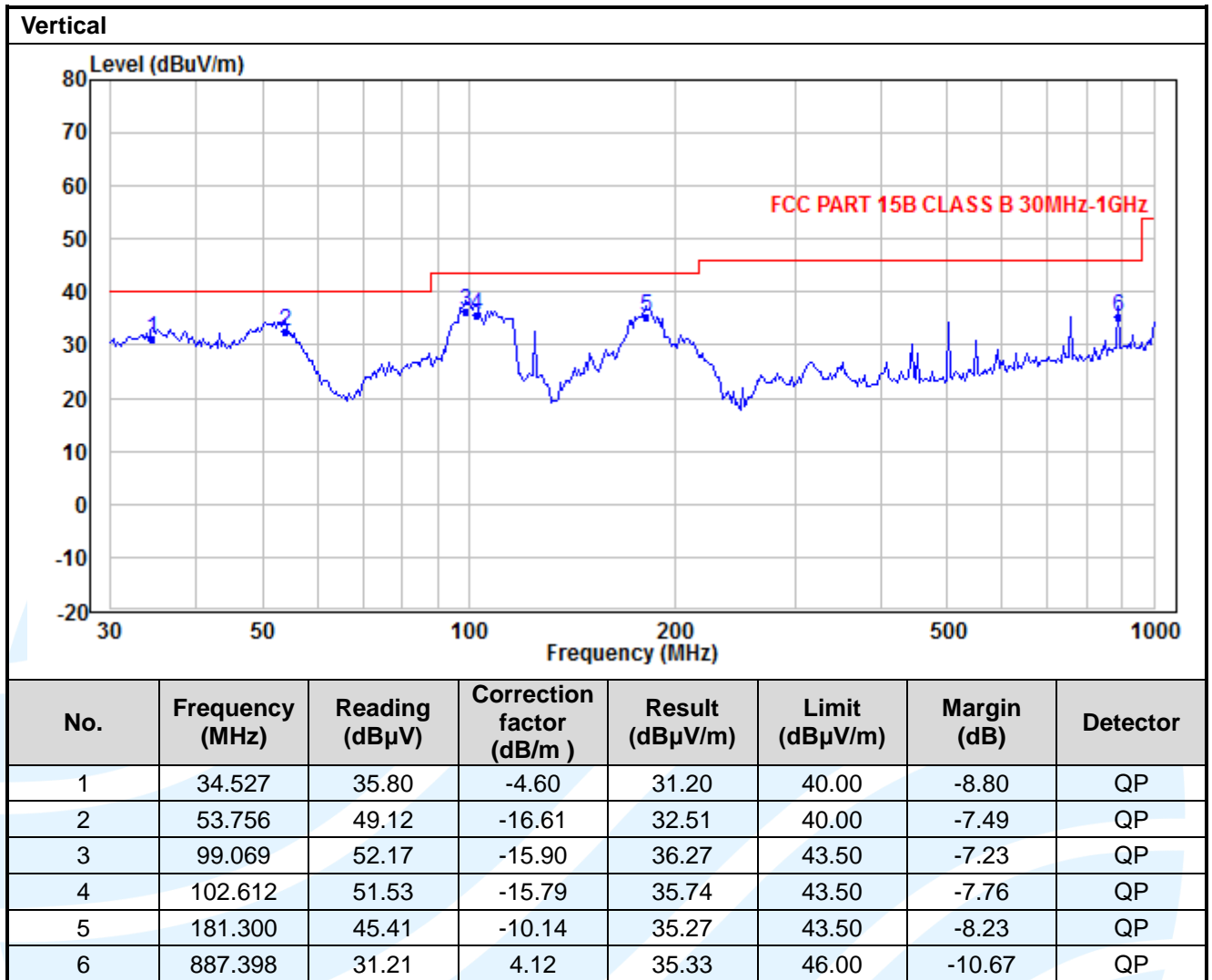
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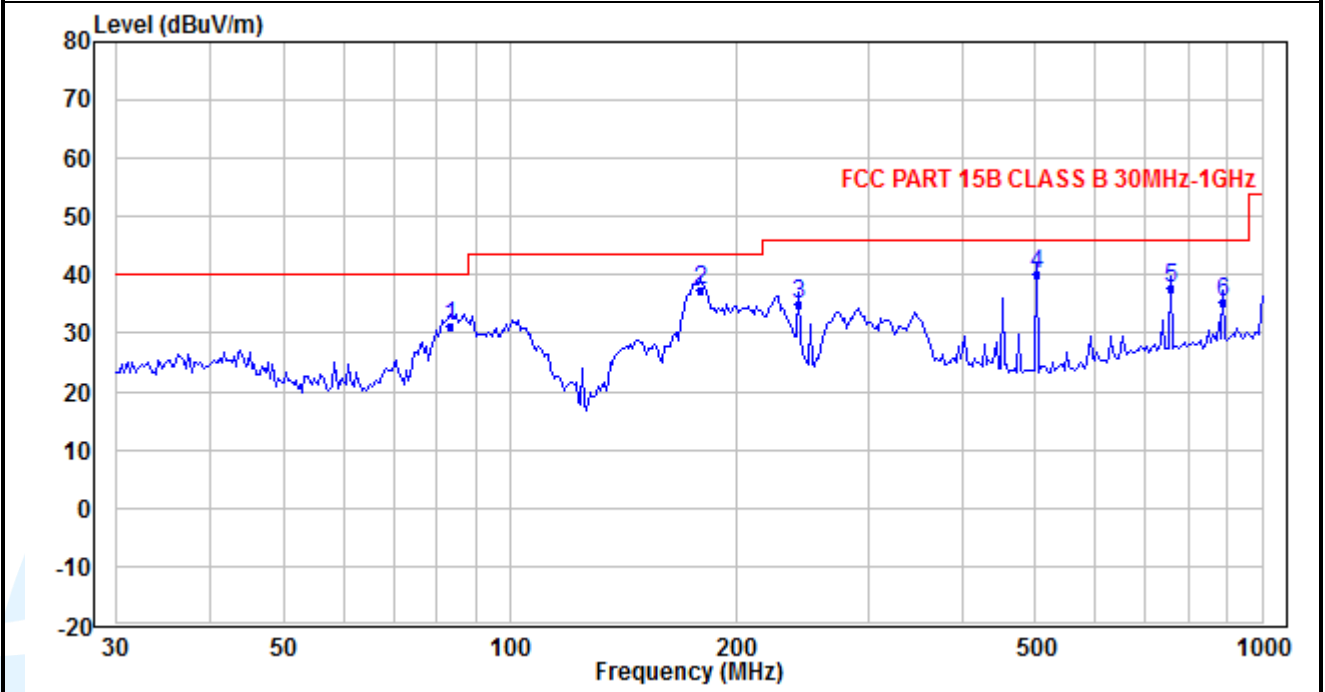
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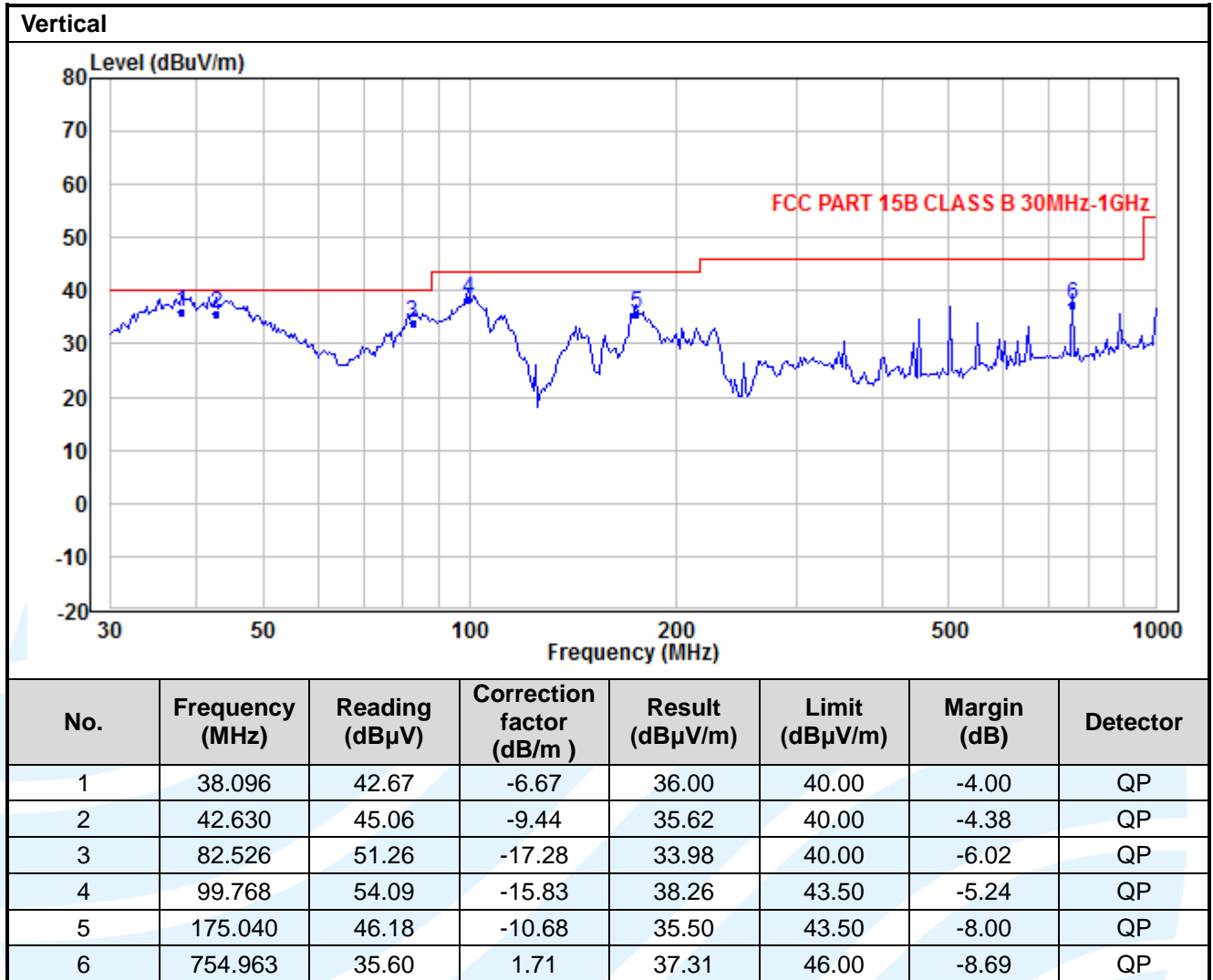
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The measurement data for FCC 47 CFR Part 15 Subpart B as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 8: Worst from Mode 1 for PoE  
 Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	83.108	48.33	-17.11	31.22	40.00	-8.78	QP
2	178.770	47.15	-9.75	37.40	43.50	-6.10	QP
3	241.838	44.07	-8.99	35.08	46.00	-10.92	QP
4	502.247	42.82	-2.71	40.11	46.00	-5.89	QP
5	754.963	35.98	1.71	37.69	46.00	-8.31	QP
6	887.398	31.22	4.12	35.34	46.00	-10.66	QP



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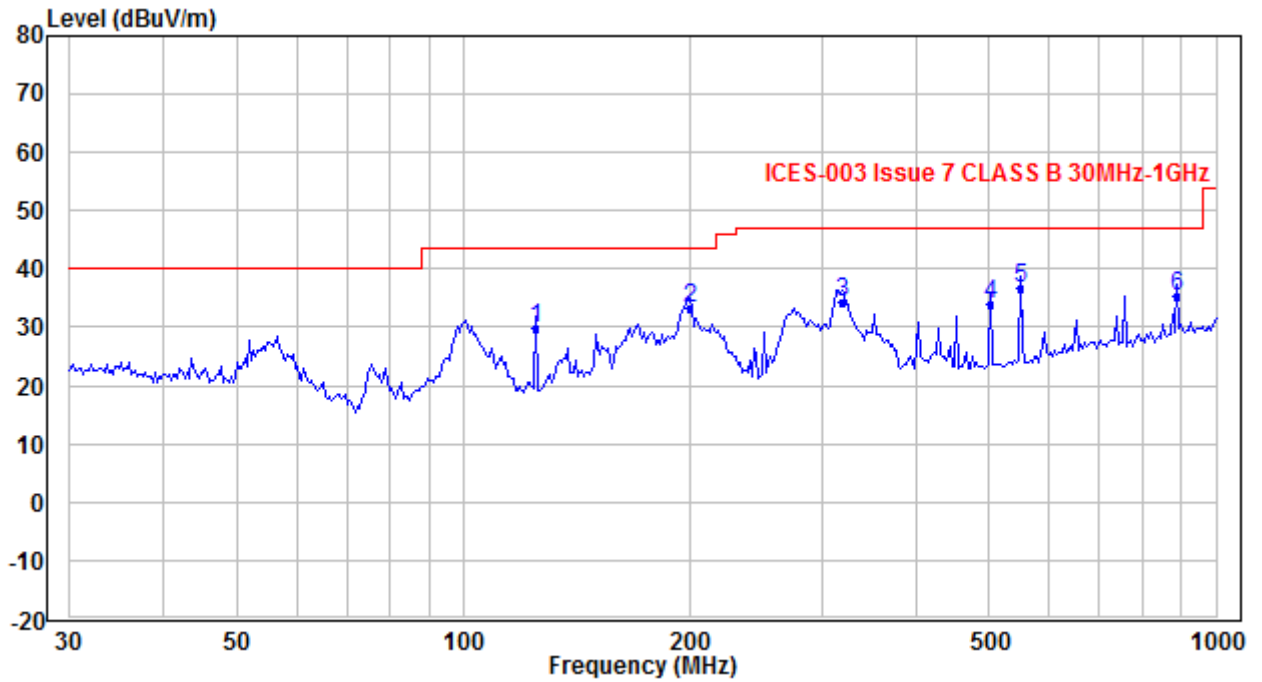
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The measurement data for ICES-003 Issue 7 as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 1: Worst case for Adapter 1  
 Horizontal



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	124.925	45.58	-15.82	29.76	43.50	-13.74	QP
2	200.043	43.80	-10.69	33.11	43.50	-10.39	QP
3	318.088	40.21	-5.96	34.25	47.00	-12.75	QP
4	502.247	36.70	-2.71	33.99	47.00	-13.01	QP
5	550.290	38.54	-1.90	36.64	47.00	-10.36	QP
6	887.398	31.14	4.12	35.26	47.00	-11.74	QP

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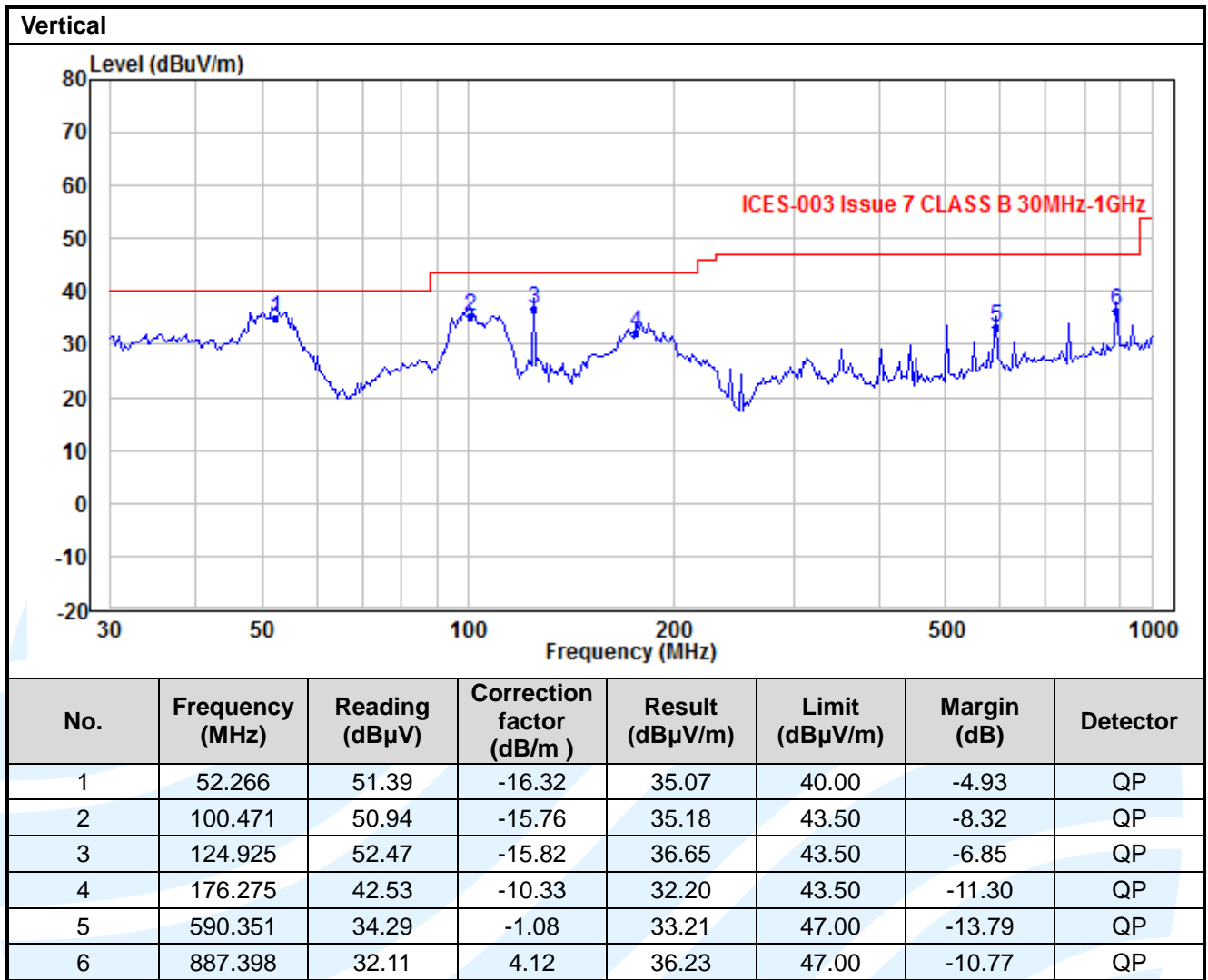
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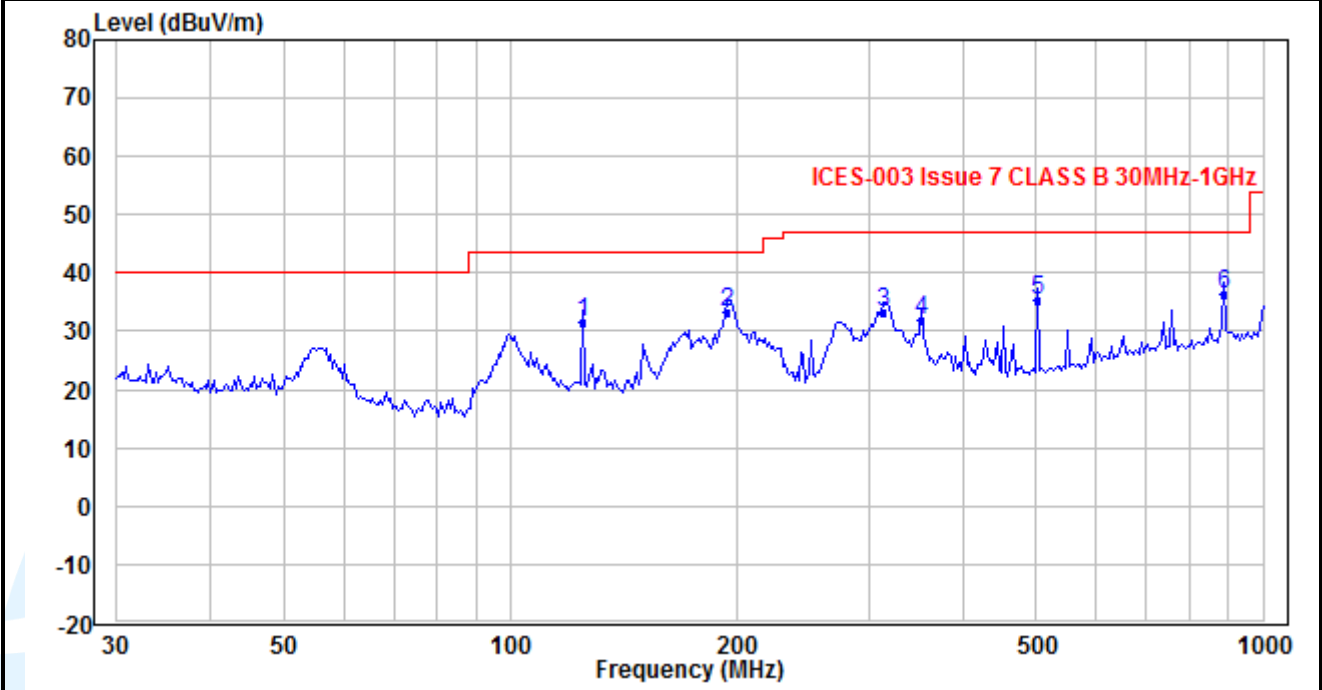
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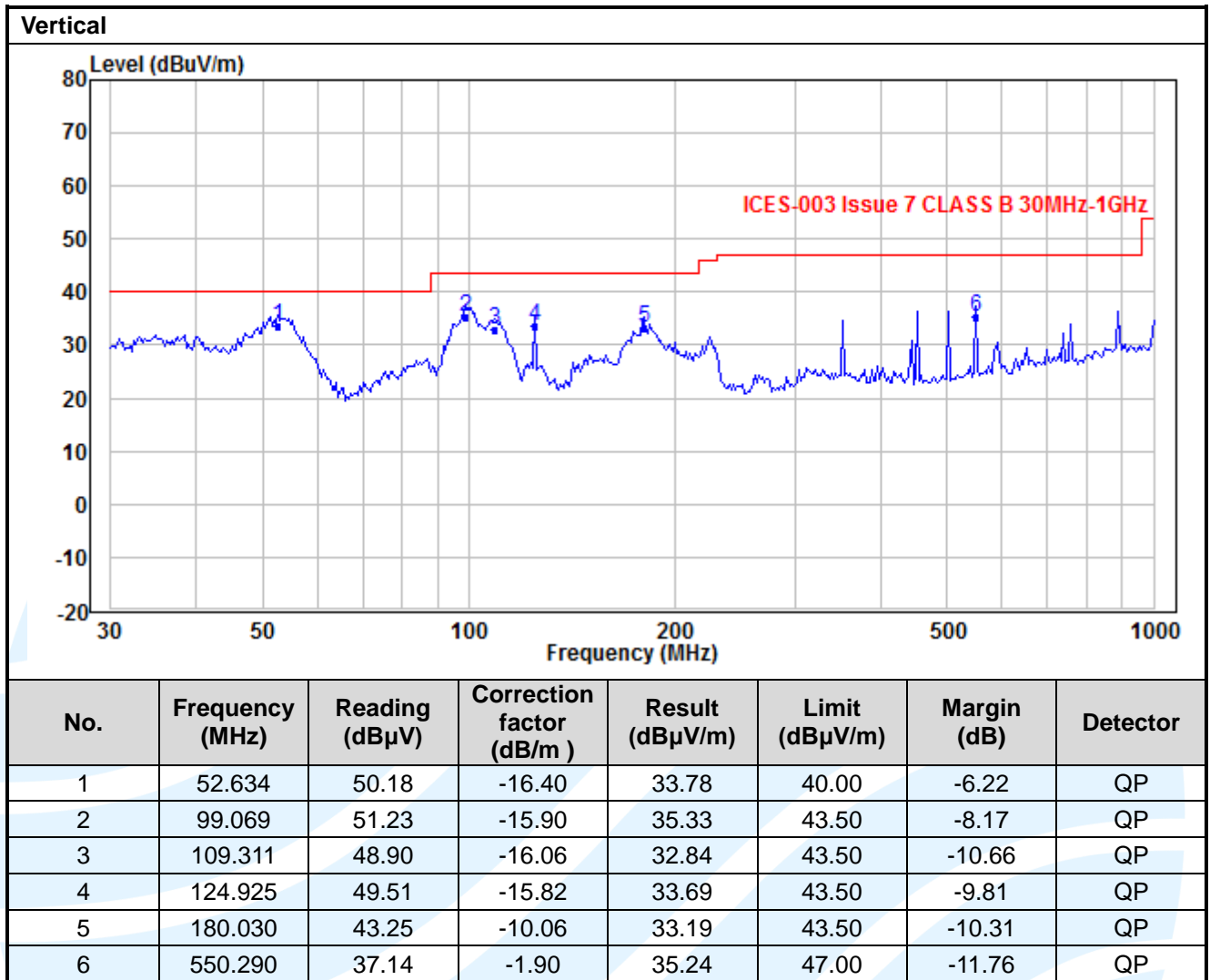
The measurement data for ICES-003 Issue 7 as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 6: Worst from Mode 1 for Adapter 2  
 Horizontal



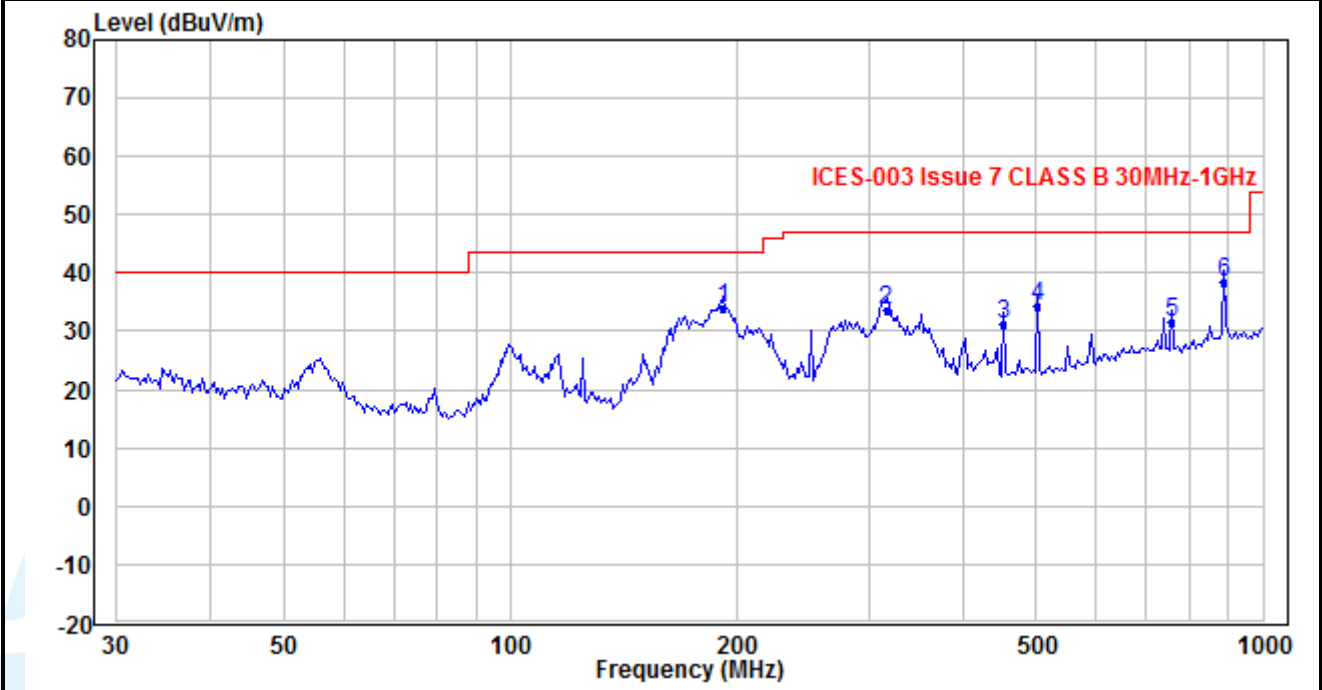
No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	124.925	47.30	-15.82	31.48	43.50	-12.02	QP
2	194.499	43.81	-10.48	33.33	43.50	-10.17	QP
3	313.648	39.07	-5.94	33.13	47.00	-13.87	QP
4	350.972	37.03	-5.08	31.95	47.00	-15.05	QP
5	502.247	38.14	-2.71	35.43	47.00	-11.57	QP
6	887.398	32.24	4.12	36.36	47.00	-10.64	QP



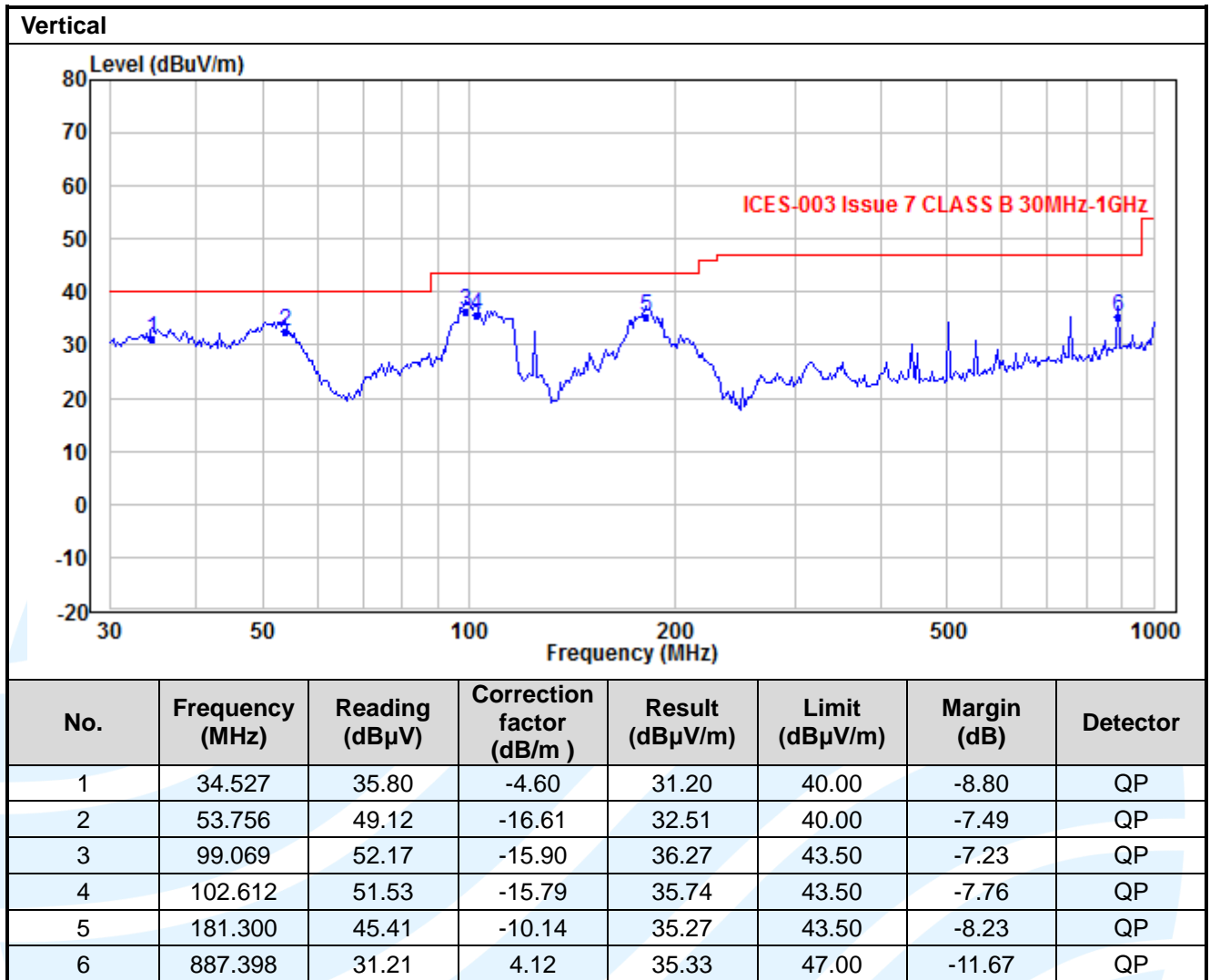


The measurement data for ICES-003 Issue 7 as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 7: Worst from Mode 1 for Adapter 3  
 Horizontal



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	191.784	44.21	-10.28	33.93	43.50	-9.57	QP
2	315.860	39.60	-5.91	33.69	47.00	-13.31	QP
3	452.001	35.30	-4.04	31.26	47.00	-15.74	QP
4	502.247	37.06	-2.71	34.35	47.00	-12.65	QP
5	754.963	29.98	1.71	31.69	47.00	-15.31	QP
6	887.398	34.45	4.12	38.57	47.00	-8.43	QP



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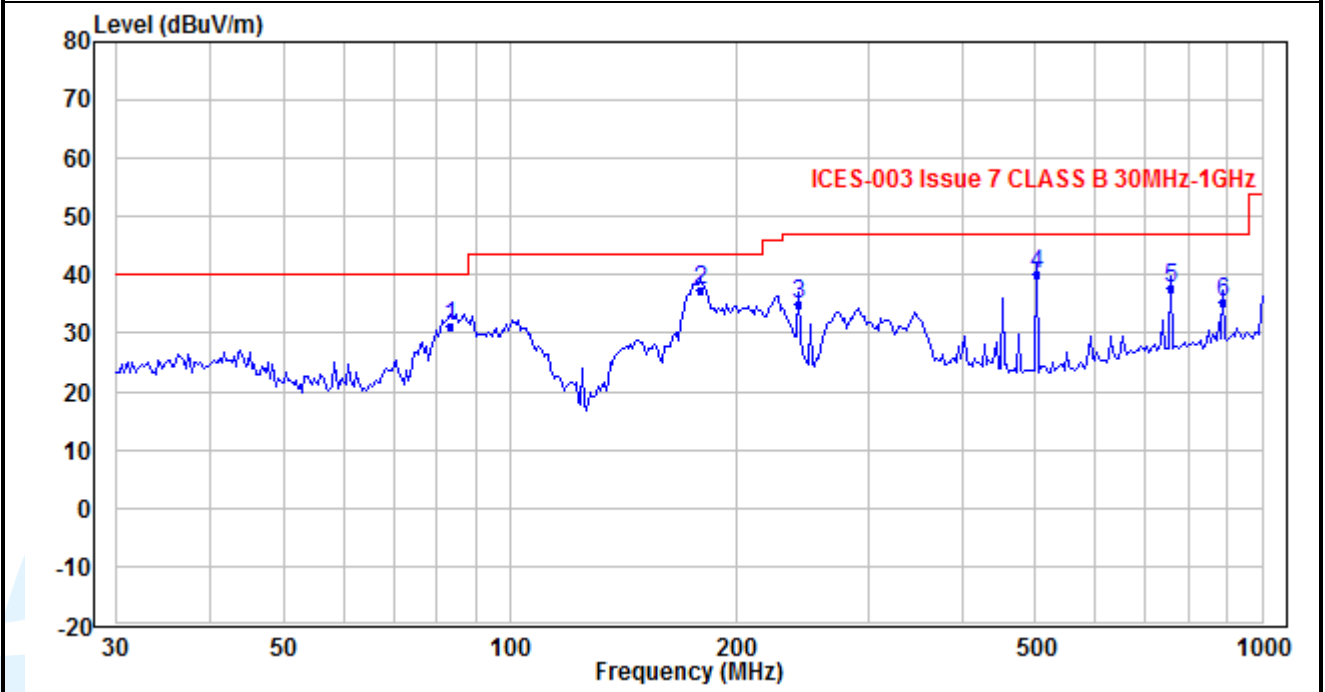
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The measurement data for ICES-003 Issue 7 as follows:

Below 1GHz(Quasi Peak):  
 Test Mode 8: Worst from Mode 1 for PoE  
 Horizontal



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	83.108	48.33	-17.11	31.22	40.00	-8.78	QP
2	178.770	47.15	-9.75	37.40	43.50	-6.10	QP
3	241.838	44.07	-8.99	35.08	47.00	-11.92	QP
4	502.247	42.82	-2.71	40.11	47.00	-6.89	QP
5	754.963	35.98	1.71	37.69	47.00	-9.31	QP
6	887.398	31.22	4.12	35.34	47.00	-11.66	QP

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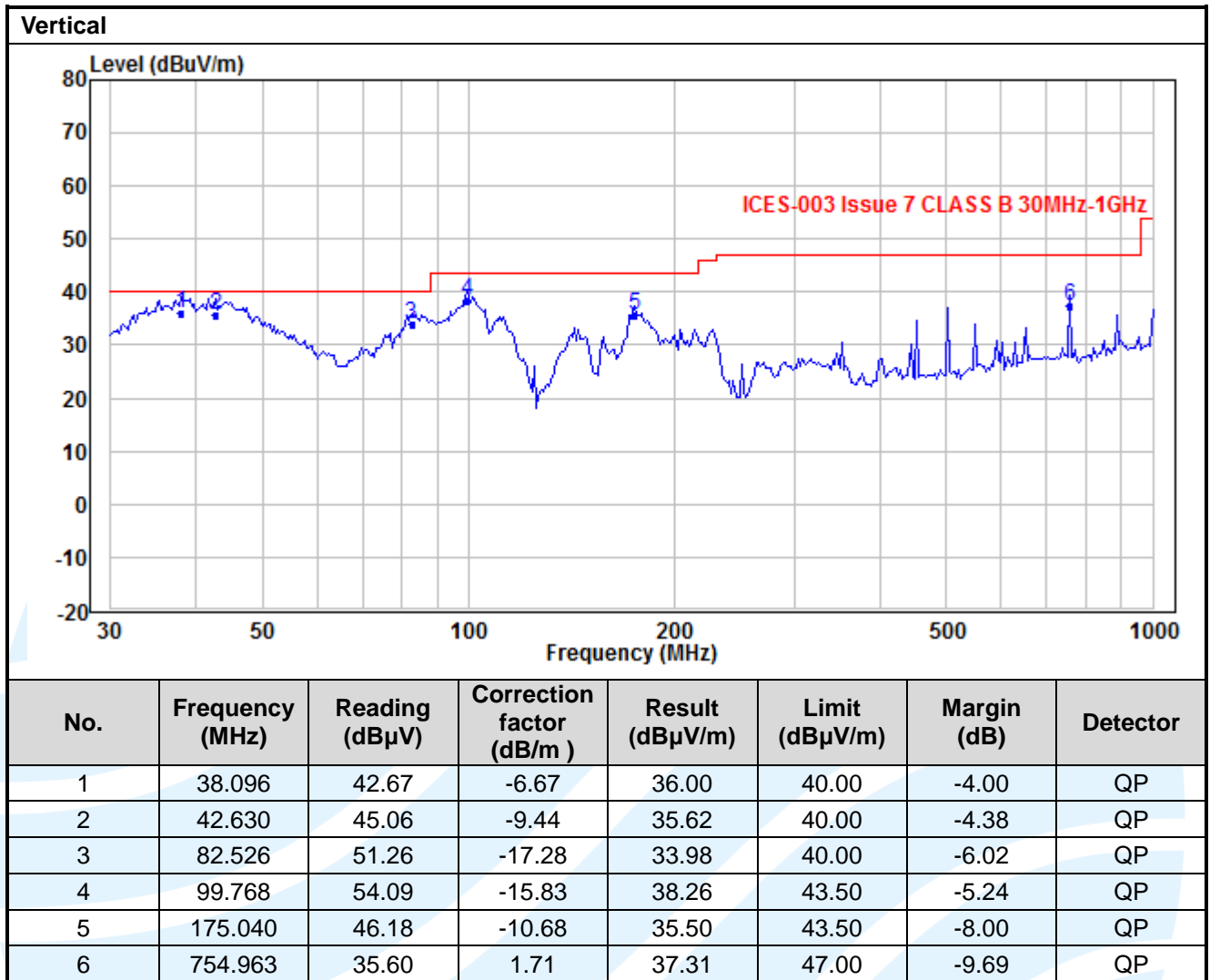
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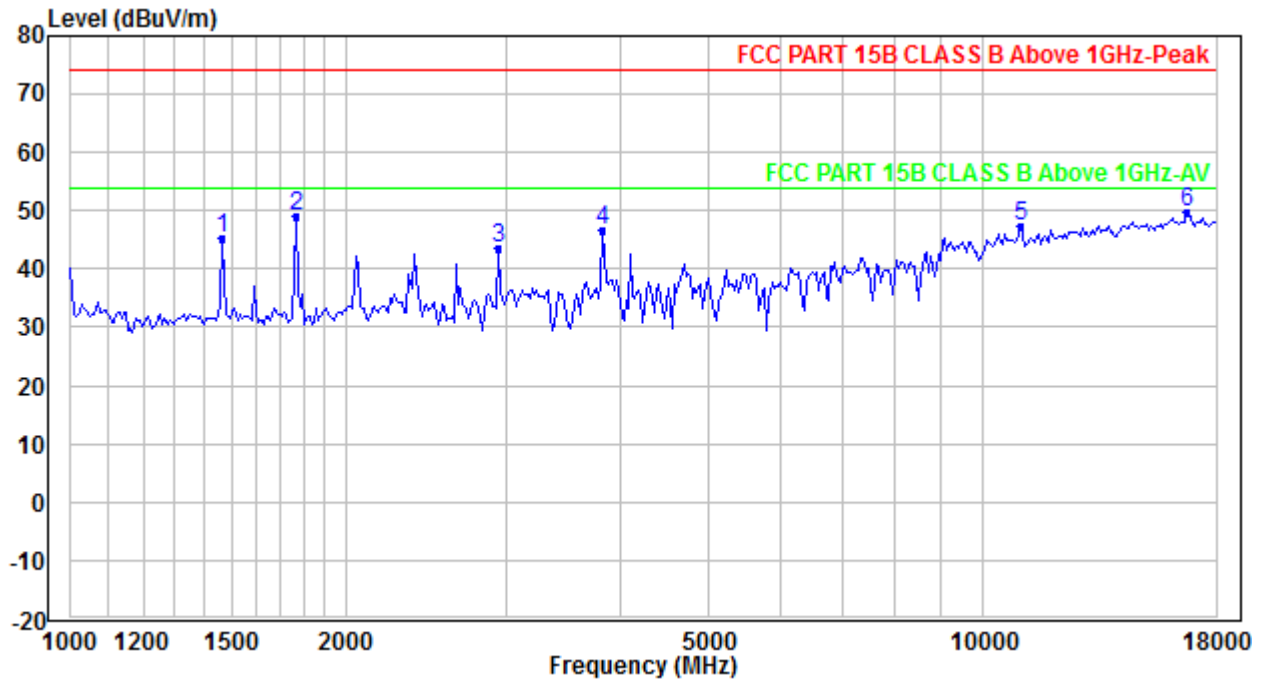
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**Above 1GHz(Peak & Average)  
Test Mode 1-Worst Case for Adapter 1  
Horizontal**



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	1465.642	57.57	-12.42	45.15	74.00	-28.85	Peak
2	1764.113	59.97	-10.79	49.18	74.00	-24.82	Peak
3	2936.954	50.52	-6.93	43.59	74.00	-30.41	Peak
4	3833.661	50.37	-3.69	46.68	74.00	-27.32	Peak
5	11001.420	40.04	7.42	47.46	74.00	-26.54	Peak
6	16694.370	37.12	12.52	49.64	74.00	-24.36	Peak

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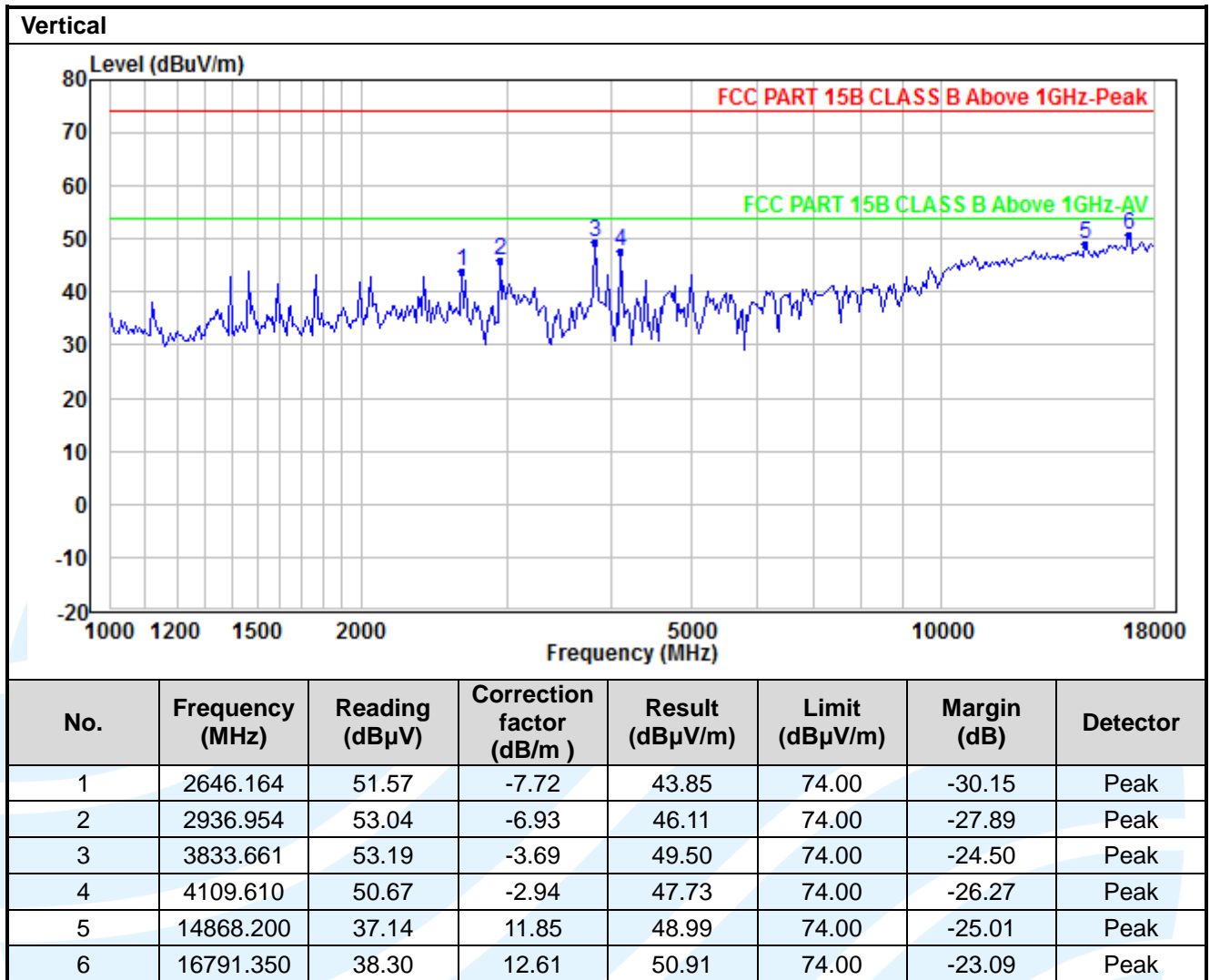
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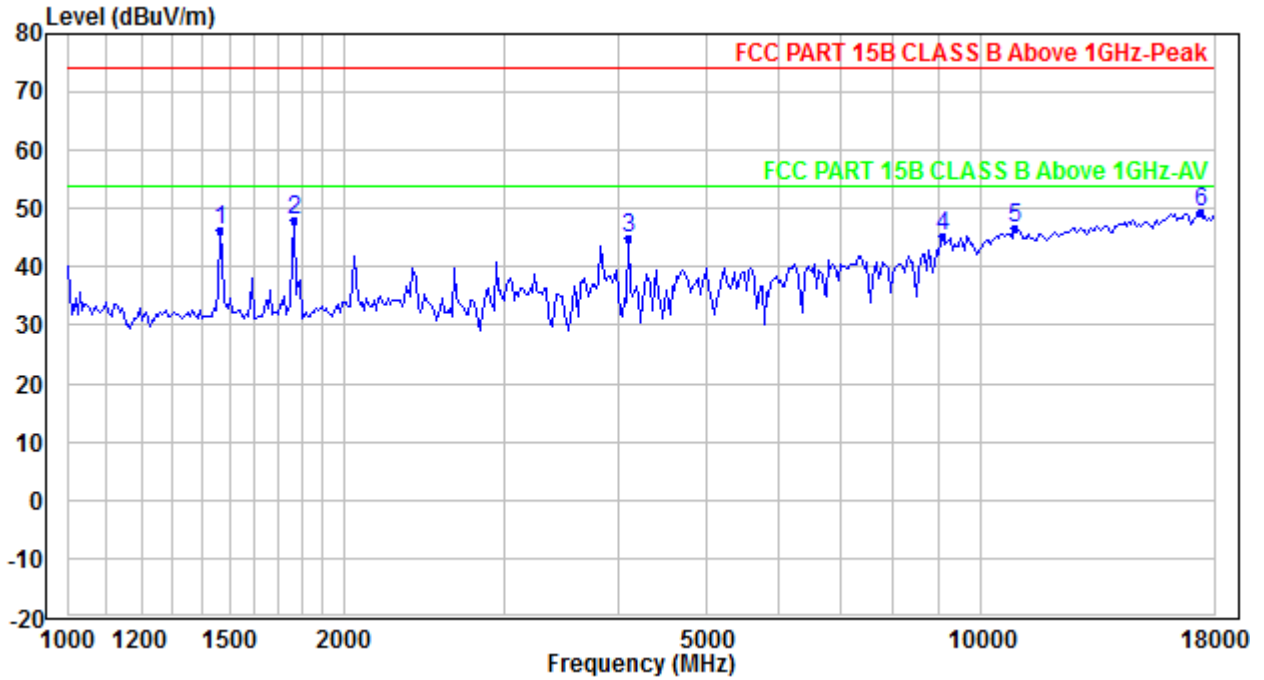
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**Remark:**

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.

**Above 1GHz(Peak & Average)  
Test Mode 6-Worst Case for Adapter 2  
Horizontal**



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	1465.642	58.71	-12.42	46.29	74.00	-27.71	Peak
2	1764.113	58.79	-10.79	48.00	74.00	-26.00	Peak
3	4109.610	47.85	-2.94	44.91	74.00	-29.09	Peak
4	9087.293	40.04	5.09	45.13	74.00	-28.87	Peak
5	10874.700	39.67	7.14	46.81	74.00	-27.19	Peak
6	17385.170	36.21	13.33	49.54	74.00	-24.46	Peak

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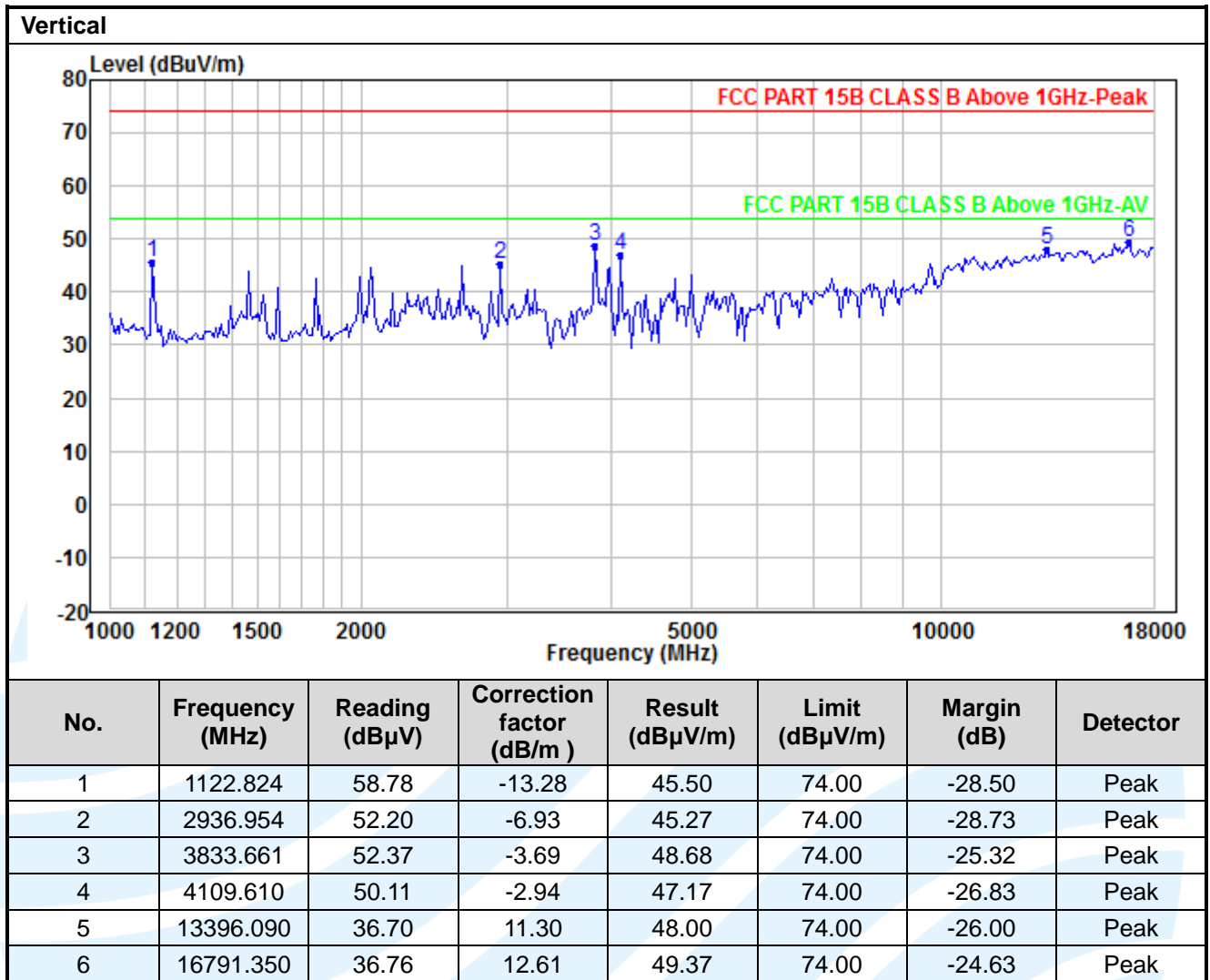
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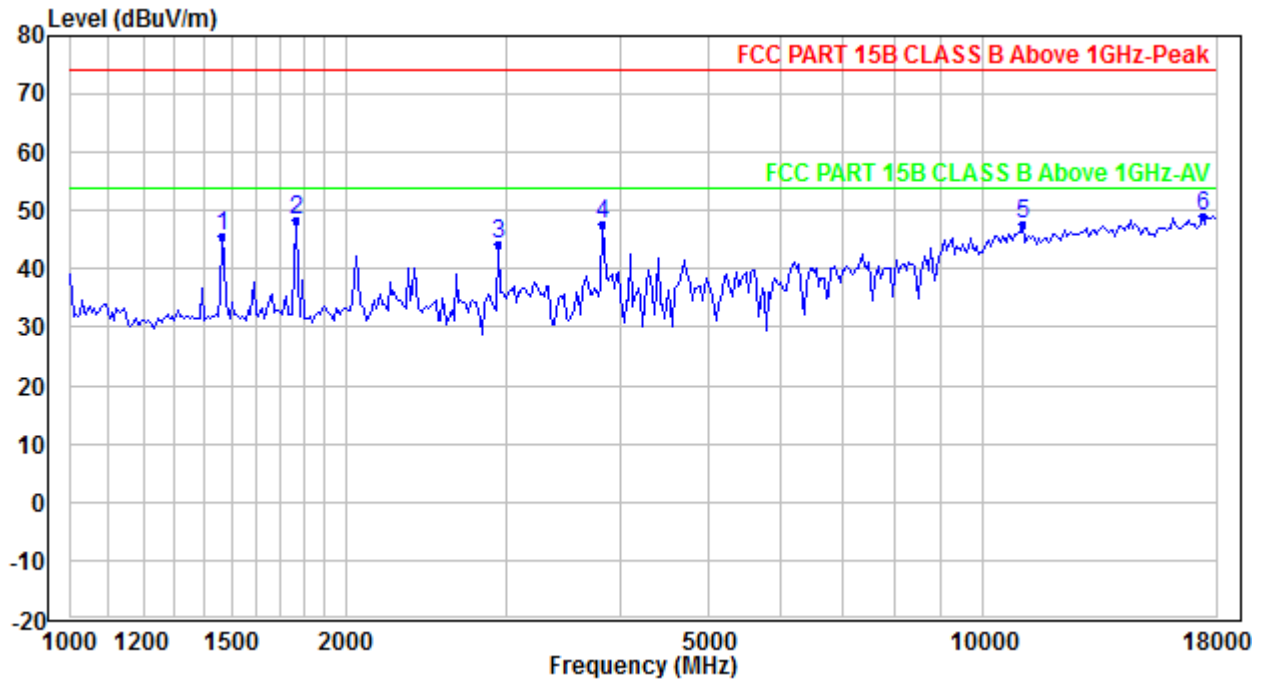




Remark:

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.

**Above 1GHz(Peak & Average)  
Test Mode 7-Worst Case for Adapter 3  
Horizontal**



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	1465.642	57.95	-12.42	45.53	74.00	-28.47	Peak
2	1764.113	59.05	-10.79	48.26	74.00	-25.74	Peak
3	2936.954	51.31	-6.93	44.38	74.00	-29.62	Peak
4	3833.661	51.26	-3.69	47.57	74.00	-26.43	Peak
5	11065.320	40.19	7.38	47.57	74.00	-26.43	Peak
6	17385.170	35.73	13.33	49.06	74.00	-24.94	Peak

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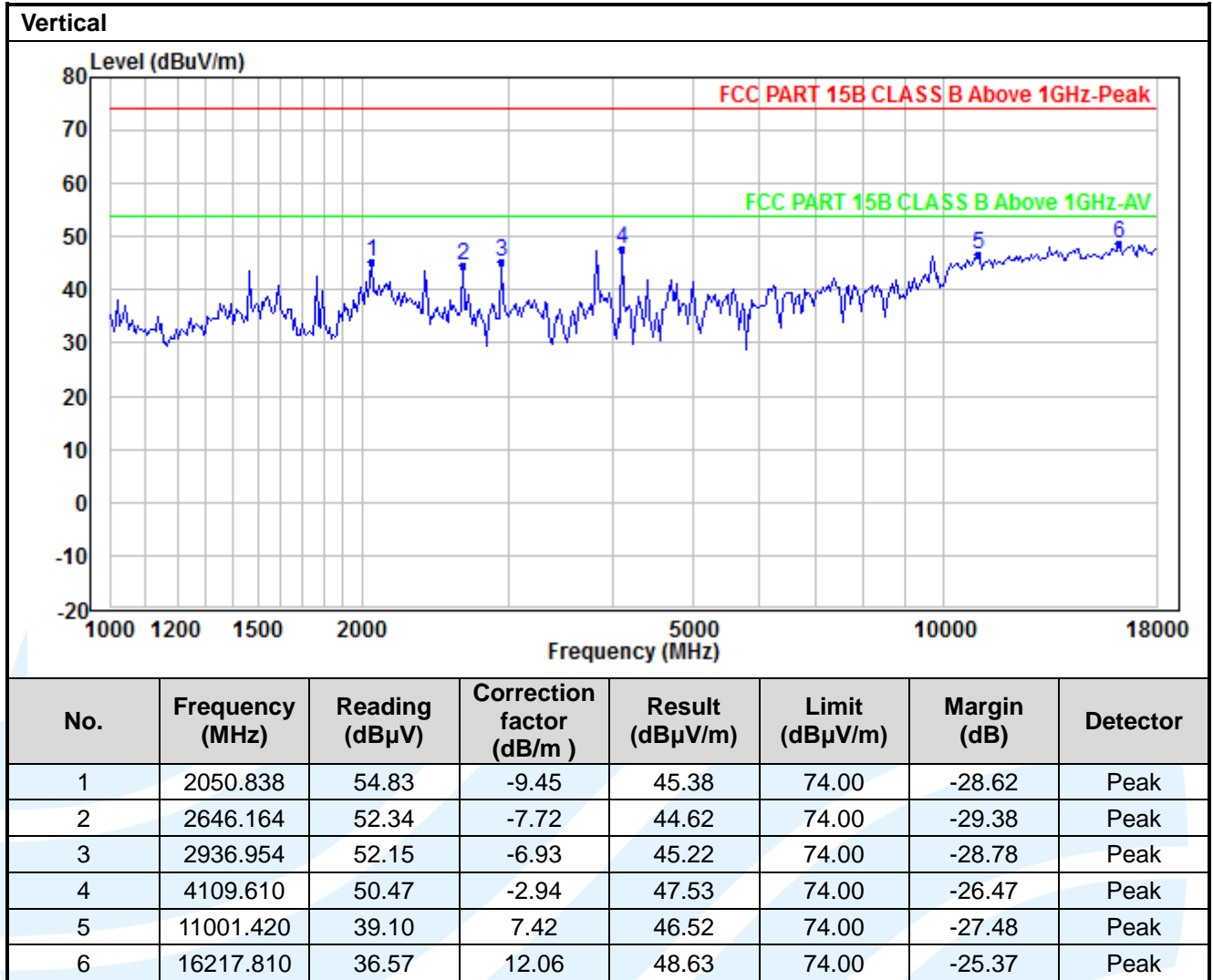
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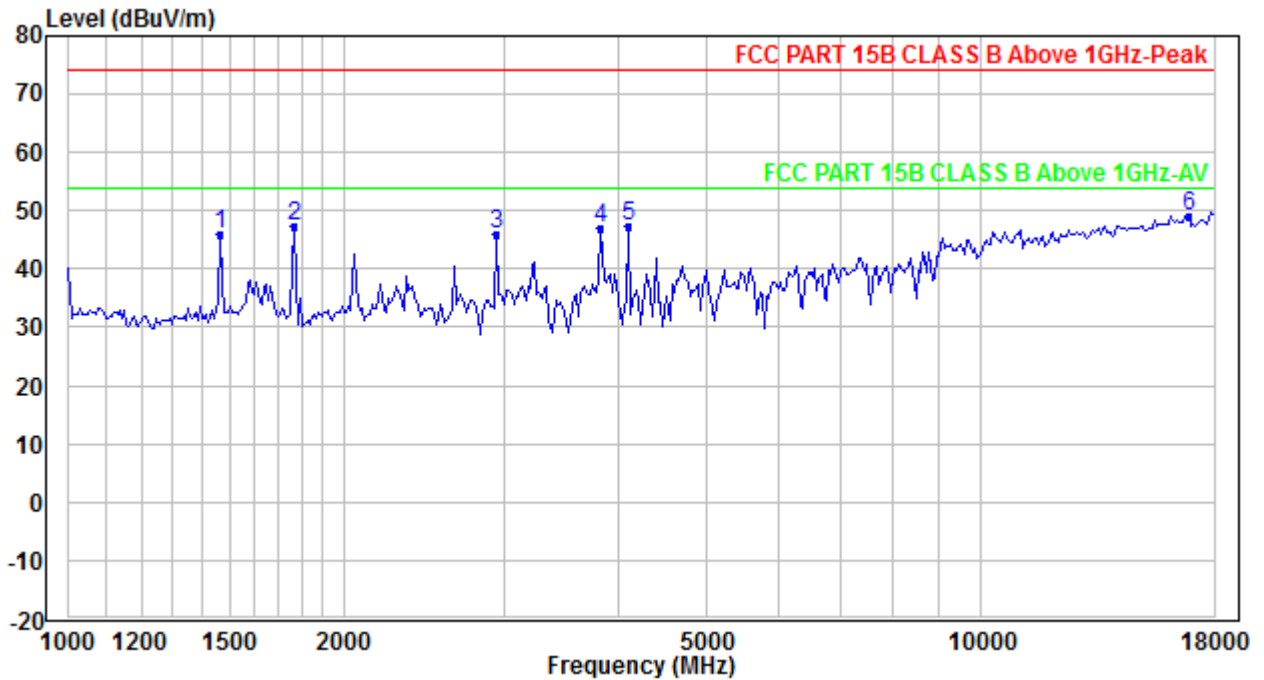
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Remark:

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.

Above 1GHz(Peak & Average)  
 Test Mode 8-Worst Case for PoE  
 Horizontal



No.	Frequency (MHz)	Reading (dB $\mu$ V)	Correction factor (dB/m)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Detector
1	1465.642	58.37	-12.42	45.95	74.00	-28.05	Peak
2	1764.113	58.08	-10.79	47.29	74.00	-26.71	Peak
3	2936.954	52.82	-6.93	45.89	74.00	-28.11	Peak
4	3833.661	50.76	-3.69	47.07	74.00	-26.93	Peak
5	4109.610	50.25	-2.94	47.31	74.00	-26.69	Peak
6	16888.890	36.39	12.68	49.07	74.00	-24.93	Peak

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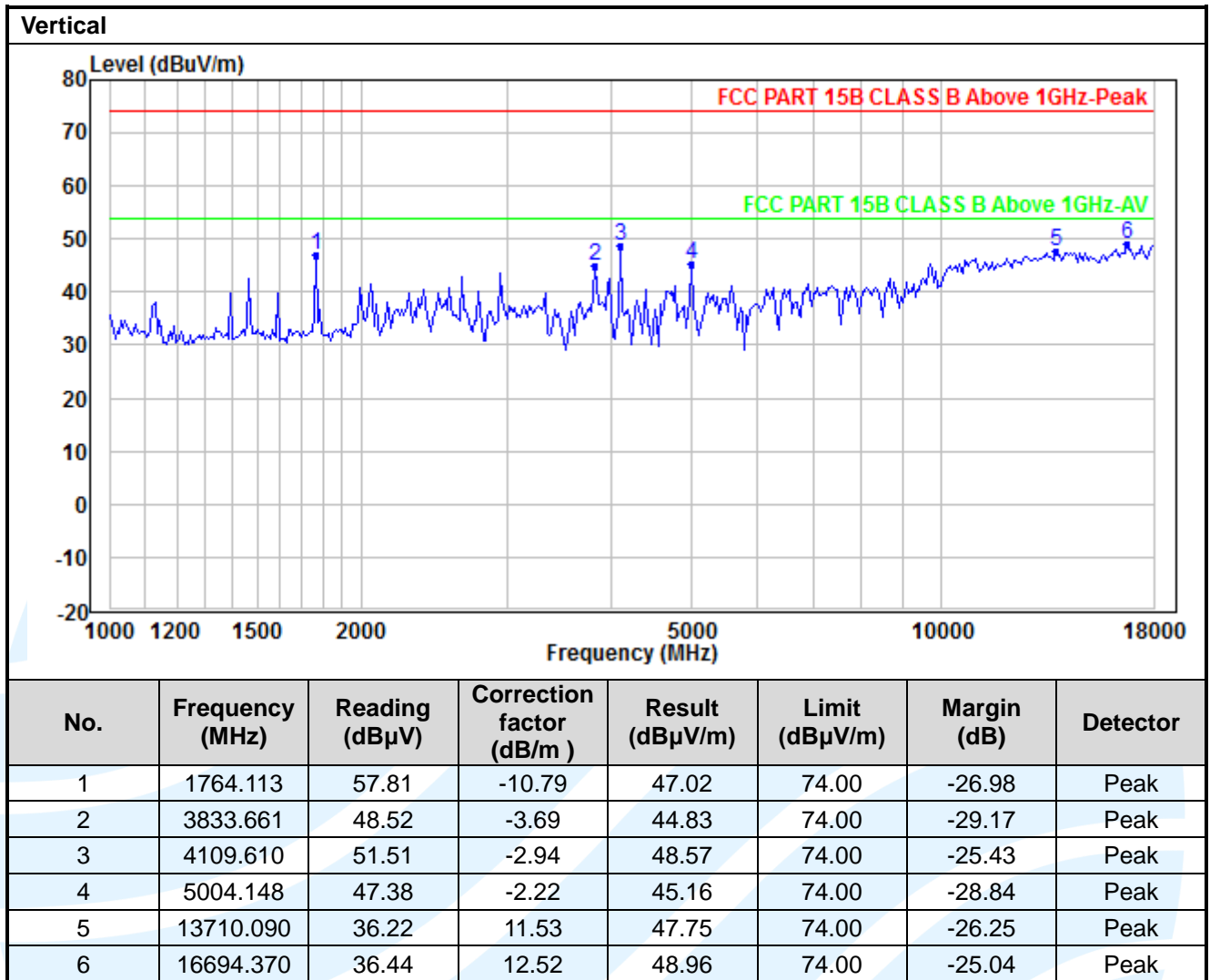
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Remark:

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.

## 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:**

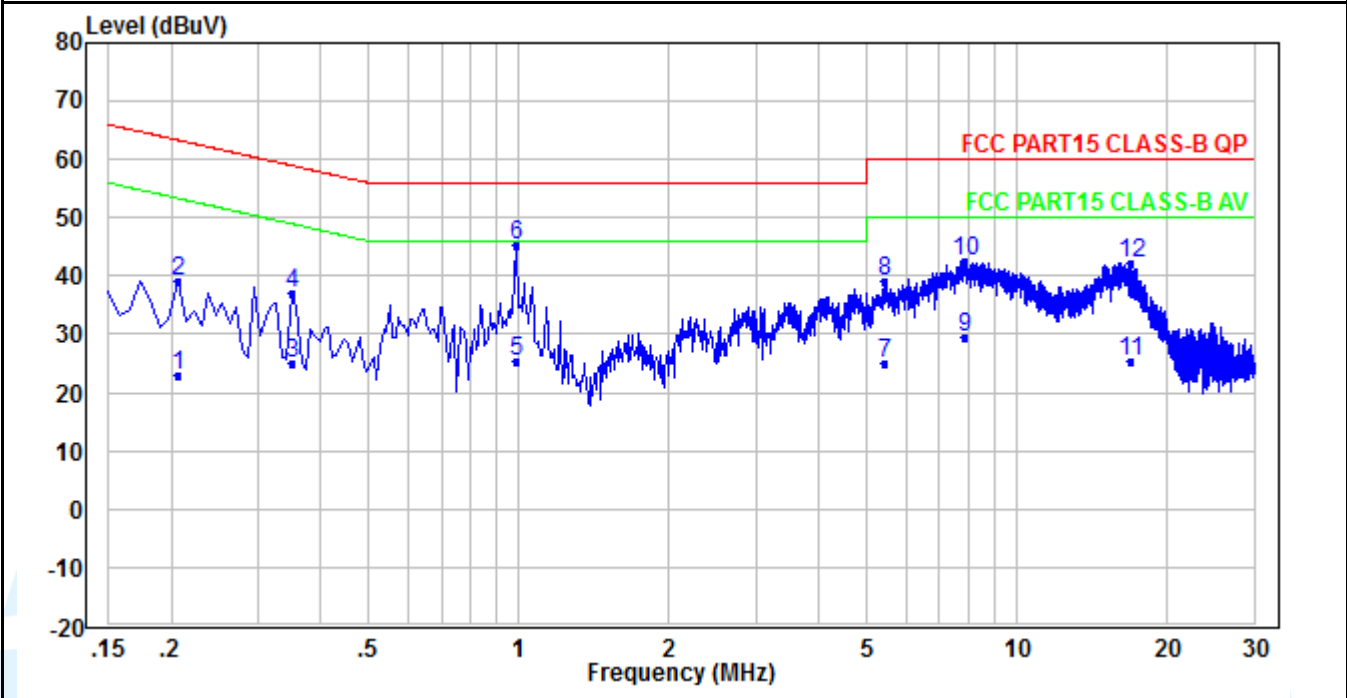
- 1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- 2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with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

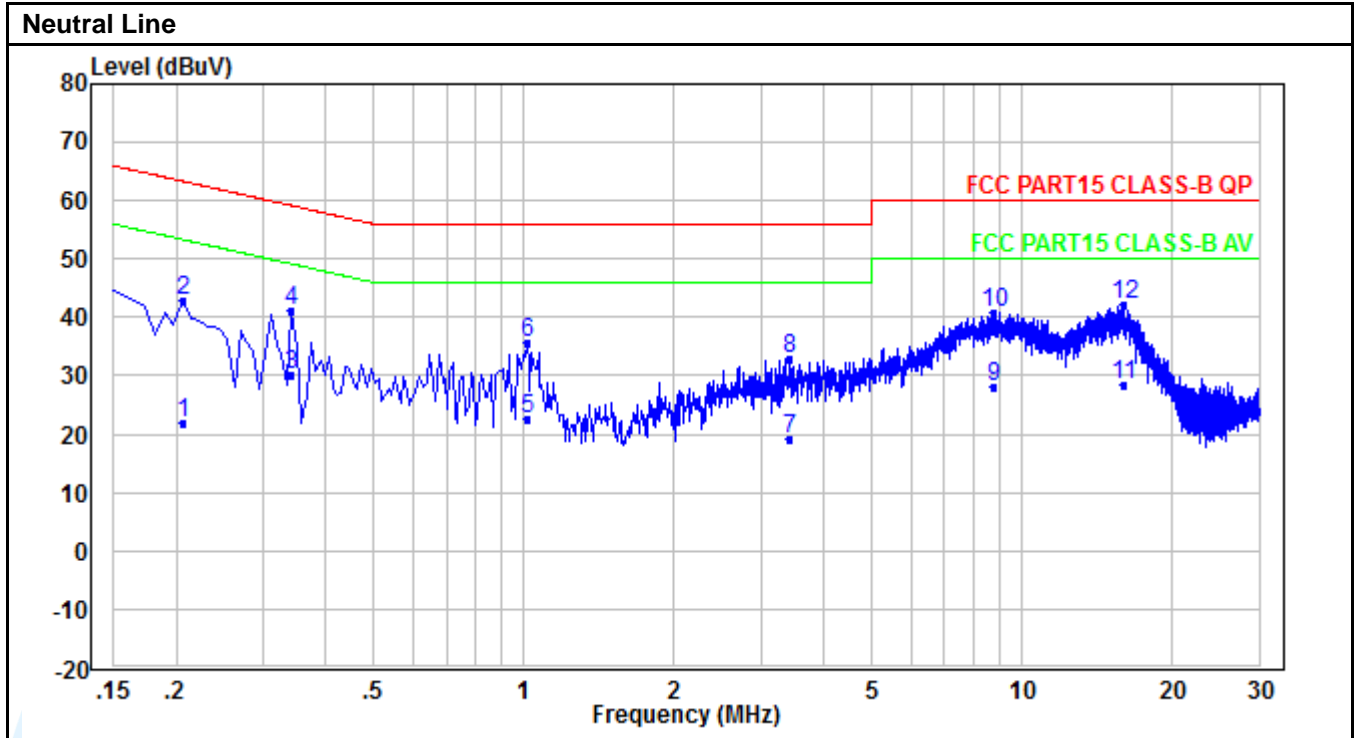
**Test Result:** Pass

The measurement data as follows:  
 Quasi Peak and Average:  
 Mode 2 - Worst case for Adapter 1

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.206	12.88	10.12	23.00	53.37	-30.37	Average
2	0.206	28.88	10.12	39.00	63.37	-24.37	QP
3	0.350	14.89	10.13	25.02	48.96	-23.94	Average
4	0.350	26.89	10.13	37.02	58.96	-21.94	QP
5	0.990	15.05	10.22	25.27	46.00	-20.73	Average
6	0.990	35.05	10.22	45.27	56.00	-10.73	QP
7	5.413	14.60	10.36	24.96	50.00	-25.04	Average
8	5.413	28.60	10.36	38.96	60.00	-21.04	QP
9	7.852	18.93	10.49	29.42	50.00	-20.58	Average
10	7.852	31.93	10.49	42.42	60.00	-17.58	QP
11	16.915	14.35	10.92	25.27	50.00	-24.73	Average
12	16.915	31.35	10.92	42.27	60.00	-17.73	QP



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.206	11.81	10.11	21.92	53.37	-31.45	Average
2	0.206	32.81	10.11	42.92	63.37	-20.45	QP
3	0.342	20.08	10.12	30.20	49.16	-18.96	Average
4	0.342	31.08	10.12	41.20	59.16	-17.96	QP
5	1.014	12.52	10.15	22.67	46.00	-23.33	Average
6	1.014	25.52	10.15	35.67	56.00	-20.33	QP
7	3.429	8.77	10.29	19.06	46.00	-26.94	Average
8	3.429	22.77	10.29	33.06	56.00	-22.94	QP
9	8.828	17.42	10.57	27.99	50.00	-22.01	Average
10	8.828	30.42	10.57	40.99	60.00	-19.01	QP
11	15.995	17.48	10.85	28.33	50.00	-21.67	Average
12	15.995	31.48	10.85	42.33	60.00	-17.67	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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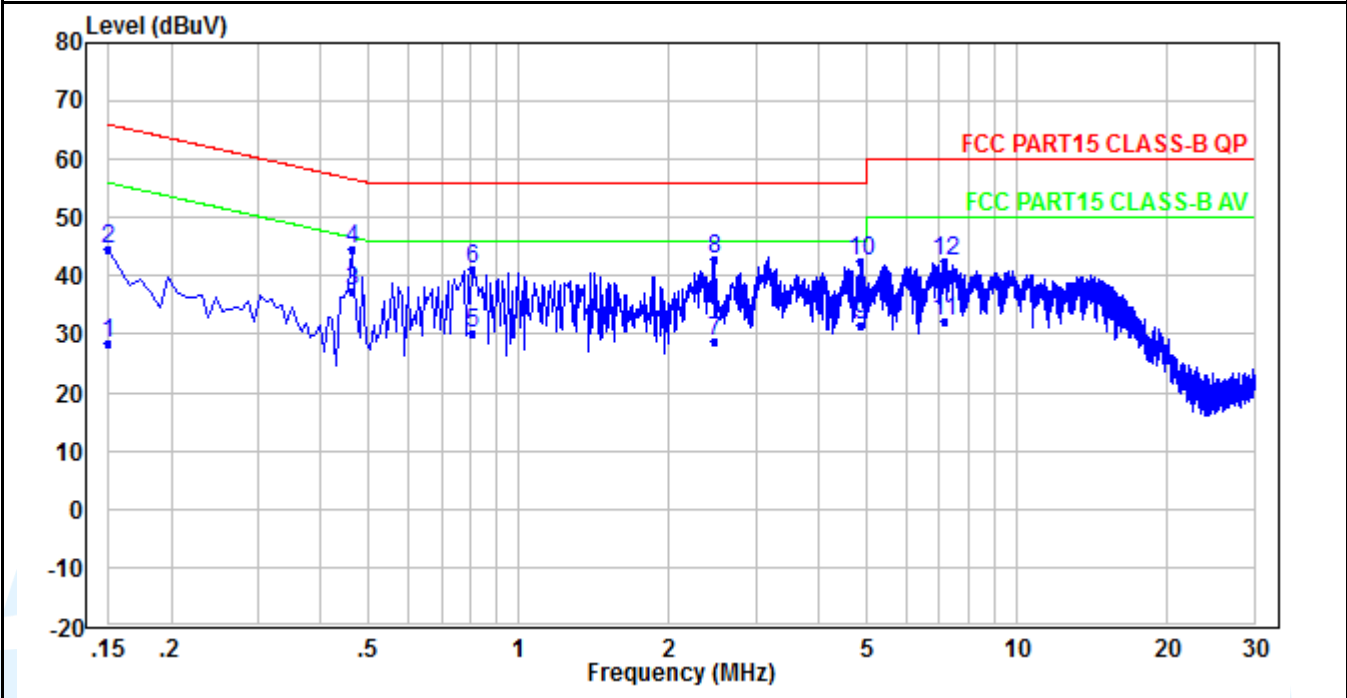
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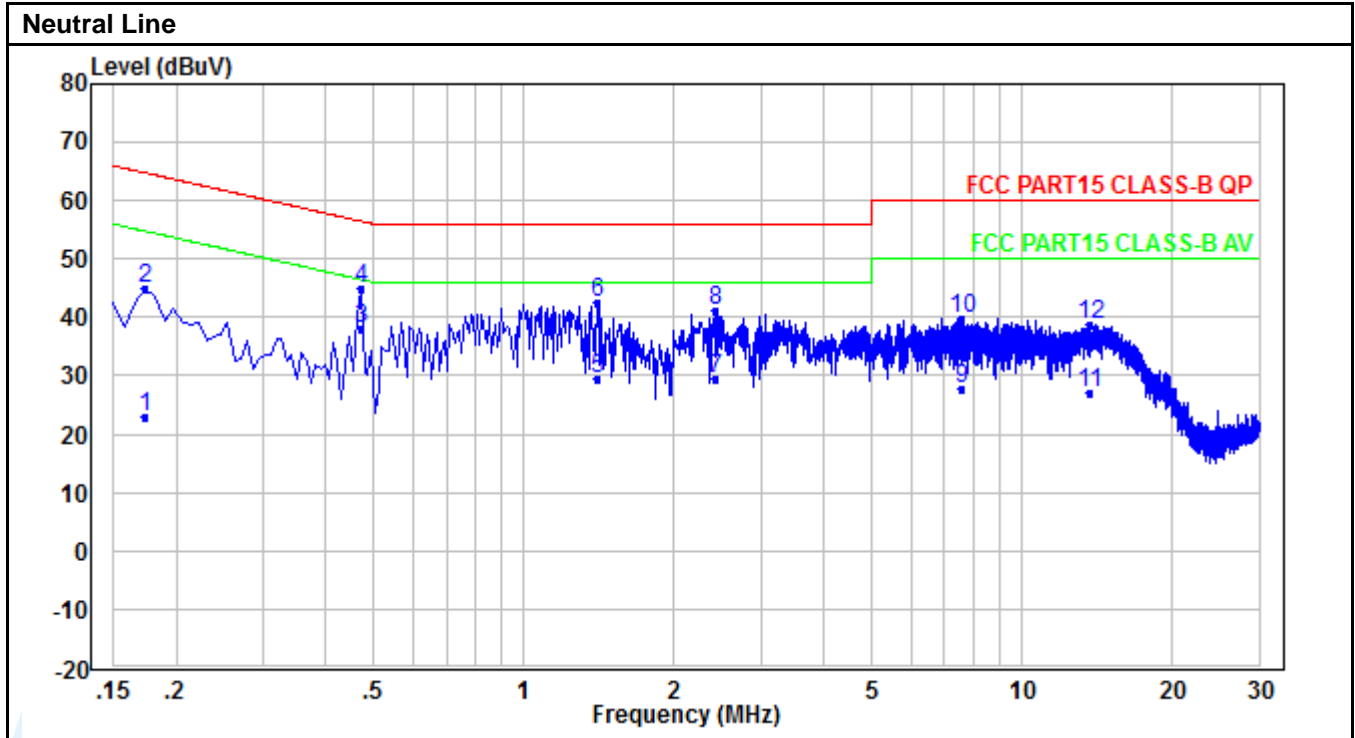


The measurement data as follows:  
 Quasi Peak and Average:  
 Mode 6 - for Adapter 2

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	18.43	10.12	28.55	56.00	-27.45	Average
2	0.150	34.43	10.12	44.55	66.00	-21.45	QP
3	0.462	27.38	10.15	37.53	46.66	-9.13	Average
4	0.462	34.38	10.15	44.53	56.66	-12.13	QP
5	0.806	20.07	10.19	30.26	46.00	-15.74	Average
6	0.806	31.07	10.19	41.26	56.00	-14.74	QP
7	2.470	18.50	10.25	28.75	46.00	-17.25	Average
8	2.470	32.50	10.25	42.75	56.00	-13.25	QP
9	4.869	21.15	10.32	31.47	46.00	-14.53	Average
10	4.869	32.15	10.32	42.47	56.00	-13.53	QP
11	7.165	21.90	10.47	32.37	50.00	-17.63	Average
12	7.165	31.90	10.47	42.37	60.00	-17.63	QP



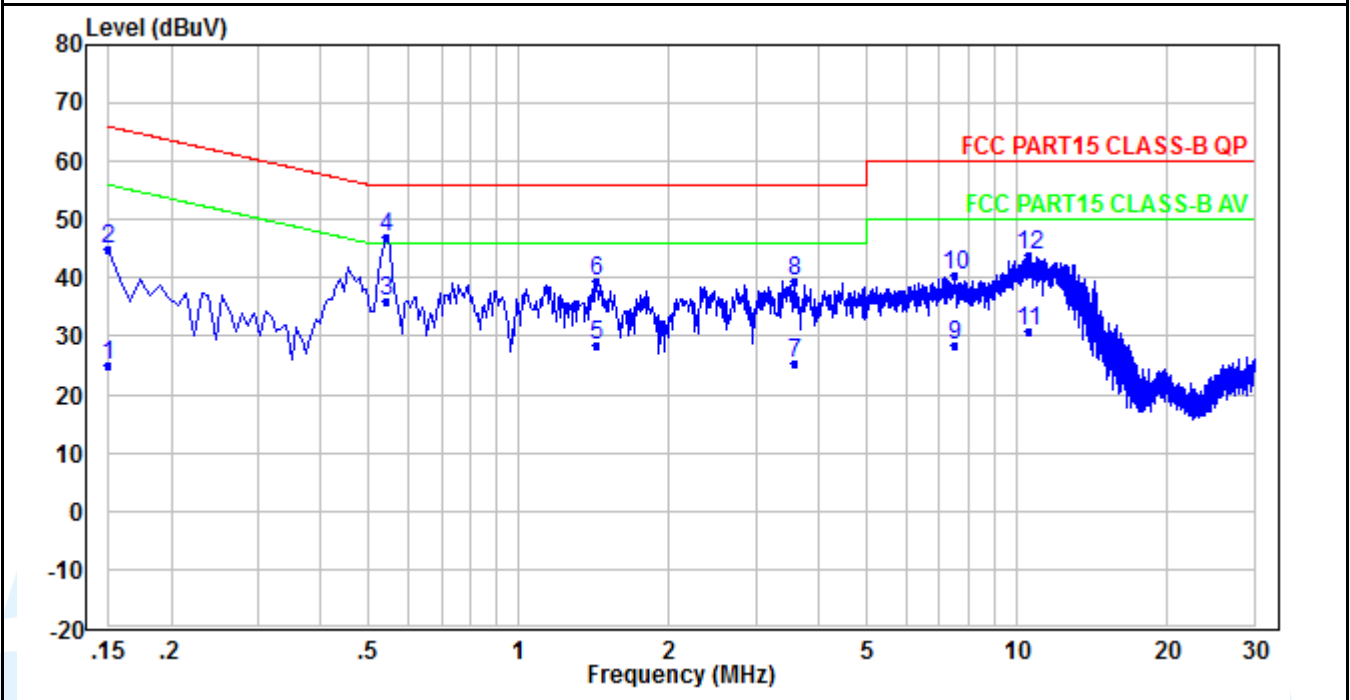
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.174	12.69	10.12	22.81	54.77	-31.96	Average
2	0.174	34.69	10.12	44.81	64.77	-19.96	QP
3	0.470	27.84	10.13	37.97	46.52	-8.55	Average
4	0.470	34.84	10.13	44.97	56.52	-11.55	QP
5	1.406	19.33	10.16	29.49	46.00	-16.51	Average
6	1.406	32.33	10.16	42.49	56.00	-13.51	QP
7	2.430	19.11	10.22	29.33	46.00	-16.67	Average
8	2.430	31.11	10.22	41.33	56.00	-14.67	QP
9	7.605	17.26	10.50	27.76	50.00	-22.24	Average
10	7.605	29.26	10.50	39.76	60.00	-20.24	QP
11	13.667	16.14	10.78	26.92	50.00	-23.08	Average
12	13.667	28.14	10.78	38.92	60.00	-21.08	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.

The measurement data as follows:  
 Quasi Peak and Average:  
 Mode 7 - for Adapter 3

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.158	9.93	10.13	20.06	55.57	-35.51	Average
2	0.158	28.93	10.13	39.06	65.57	-26.51	QP
3	0.542	19.69	10.16	29.85	46.00	-16.15	Average
4	0.542	30.69	10.16	40.85	56.00	-15.15	QP
5	1.022	10.00	10.22	20.22	46.00	-25.78	Average
6	1.022	24.00	10.22	34.22	56.00	-21.78	QP
7	3.341	7.63	10.27	17.90	46.00	-28.10	Average
8	3.341	23.63	10.27	33.90	56.00	-22.10	QP
9	5.109	9.92	10.33	20.25	50.00	-29.75	Average
10	5.109	21.92	10.33	32.25	60.00	-27.75	QP
11	10.900	14.02	10.64	24.66	50.00	-25.34	Average
12	10.900	27.02	10.64	37.66	60.00	-22.34	QP

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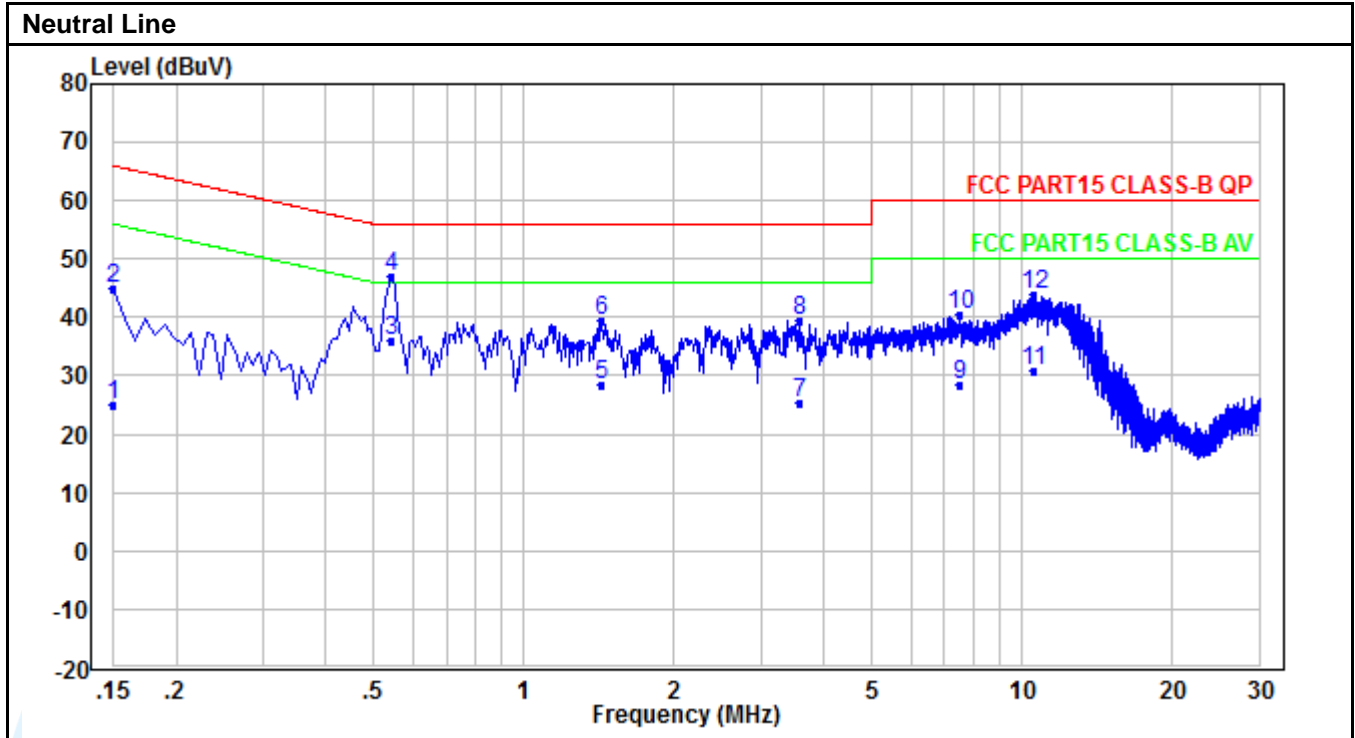
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No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	14.79	10.11	24.90	56.00	-31.10	Average
2	0.150	34.79	10.11	44.90	66.00	-21.10	QP
3	0.542	25.78	10.13	35.91	46.00	-10.09	Average
4	0.542	36.78	10.13	46.91	56.00	-9.09	QP
5	1.438	18.42	10.16	28.58	46.00	-17.42	Average
6	1.438	29.42	10.16	39.58	56.00	-16.42	QP
7	3.565	15.15	10.30	25.45	46.00	-20.55	Average
8	3.565	29.15	10.30	39.45	56.00	-16.55	QP
9	7.541	17.95	10.50	28.45	50.00	-21.55	Average
10	7.541	29.95	10.50	40.45	60.00	-19.55	QP
11	10.572	20.27	10.63	30.90	50.00	-19.10	Average
12	10.572	33.27	10.63	43.90	60.00	-16.10	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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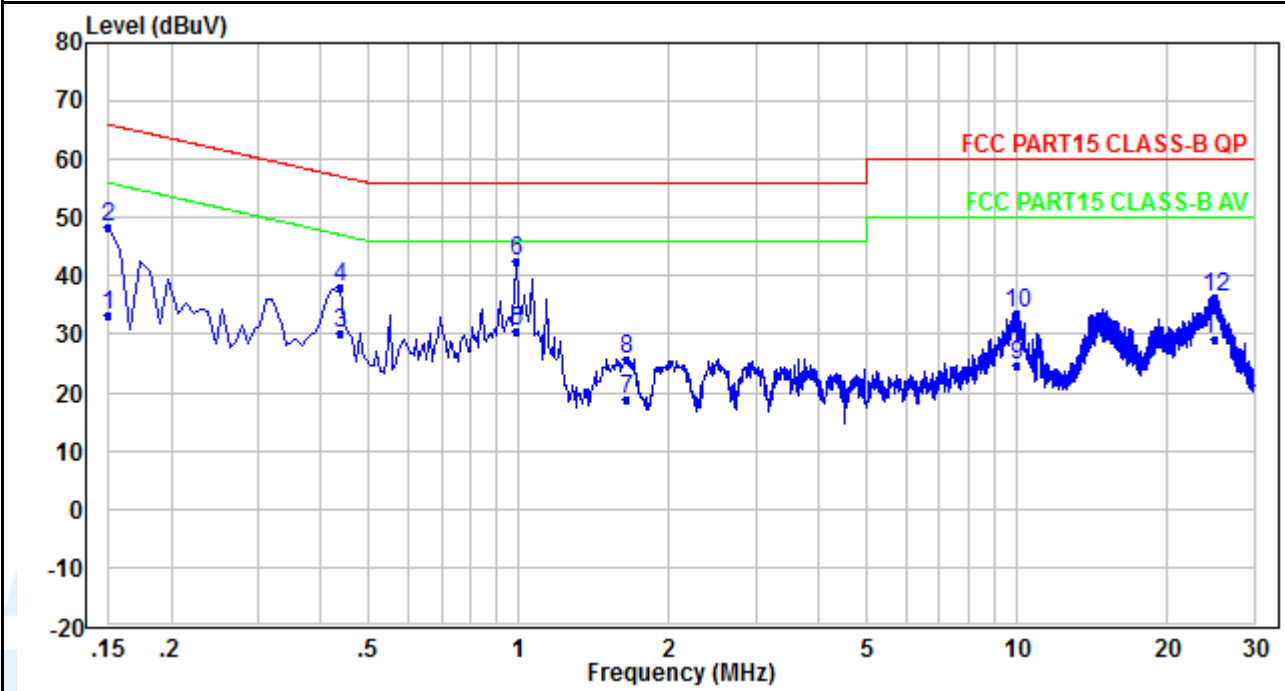
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The measurement data as follows:  
 Quasi Peak and Average:  
 Mode 8 - for PoE

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	23.11	10.12	33.23	56.00	-22.77	Average
2	0.150	38.11	10.12	48.23	66.00	-17.77	QP
3	0.438	19.97	10.14	30.11	47.10	-16.99	Average
4	0.438	27.97	10.14	38.11	57.10	-18.99	QP
5	0.990	20.24	10.22	30.46	46.00	-15.54	Average
6	0.990	32.24	10.22	42.46	56.00	-13.54	QP
7	1.646	8.51	10.24	18.75	46.00	-27.25	Average
8	1.646	15.51	10.24	25.75	56.00	-30.25	QP
9	10.028	13.92	10.58	24.50	50.00	-25.50	Average
10	10.028	22.92	10.58	33.50	60.00	-26.50	QP
11	25.001	18.31	10.94	29.25	50.00	-20.75	Average
12	25.001	25.31	10.94	36.25	60.00	-23.75	QP

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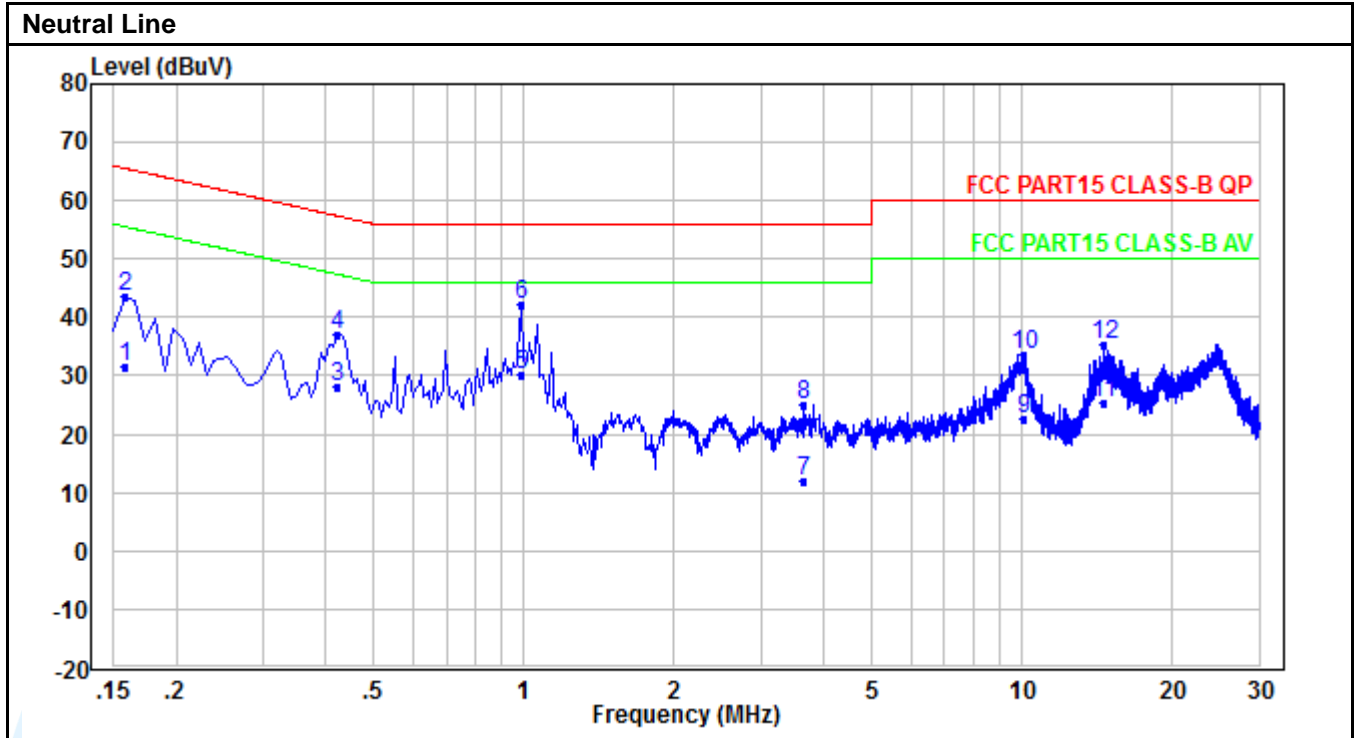
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No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.158	21.50	10.12	31.62	55.57	-23.95	Average
2	0.158	33.50	10.12	43.62	65.57	-21.95	QP
3	0.422	17.98	10.12	28.10	47.41	-19.31	Average
4	0.422	26.98	10.12	37.10	57.41	-20.31	QP
5	0.990	20.05	10.15	30.20	46.00	-15.80	Average
6	0.990	32.05	10.15	42.20	56.00	-13.80	QP
7	3.661	1.70	10.30	12.00	46.00	-34.00	Average
8	3.661	14.70	10.30	25.00	56.00	-31.00	QP
9	10.108	12.09	10.61	22.70	50.00	-27.30	Average
10	10.108	23.09	10.61	33.70	60.00	-26.30	QP
11	14.643	14.41	10.81	25.22	50.00	-24.78	Average
12	14.643	24.41	10.81	35.22	60.00	-24.78	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.

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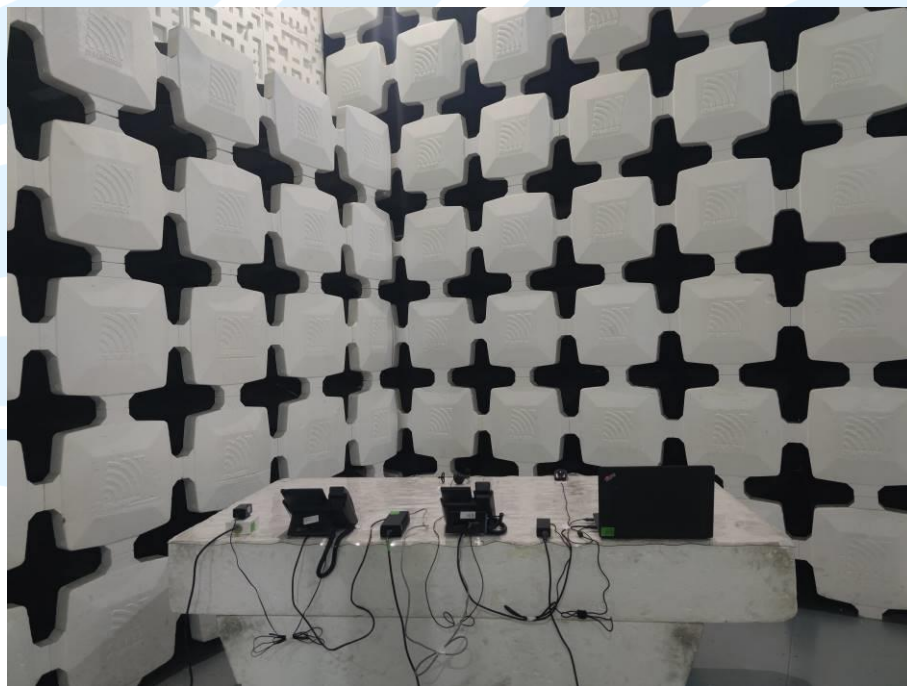
E-mail: info@uttlab.com

<http://www.uttlab.com>

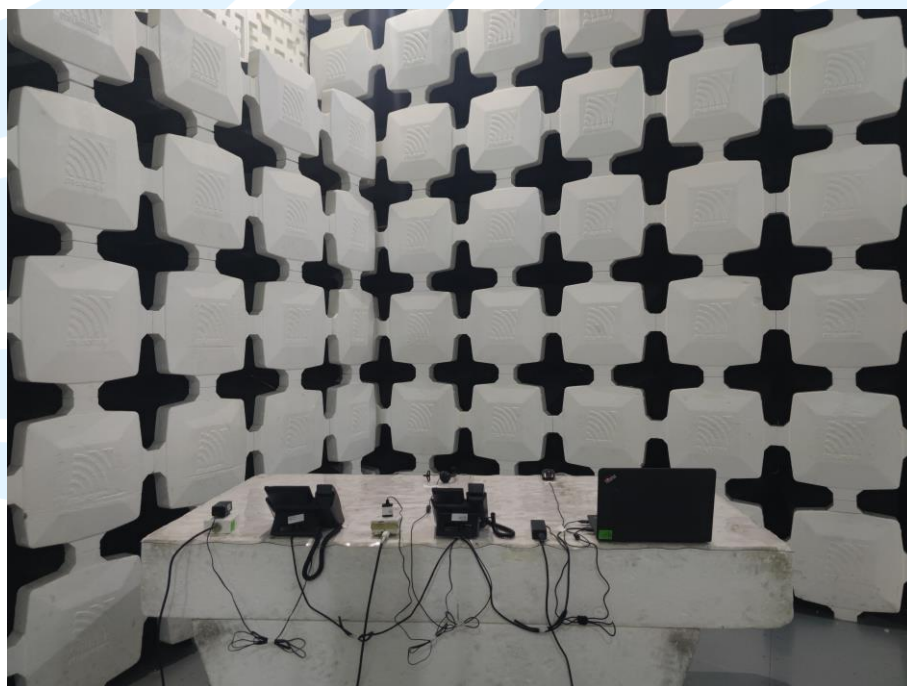
UTTR-EMC-ICES003-V1.2

APPENDIX 1 PHOTOS OF TEST SETUP

Radiated emission Test Setup-1 (30 MHz~1 GHz)

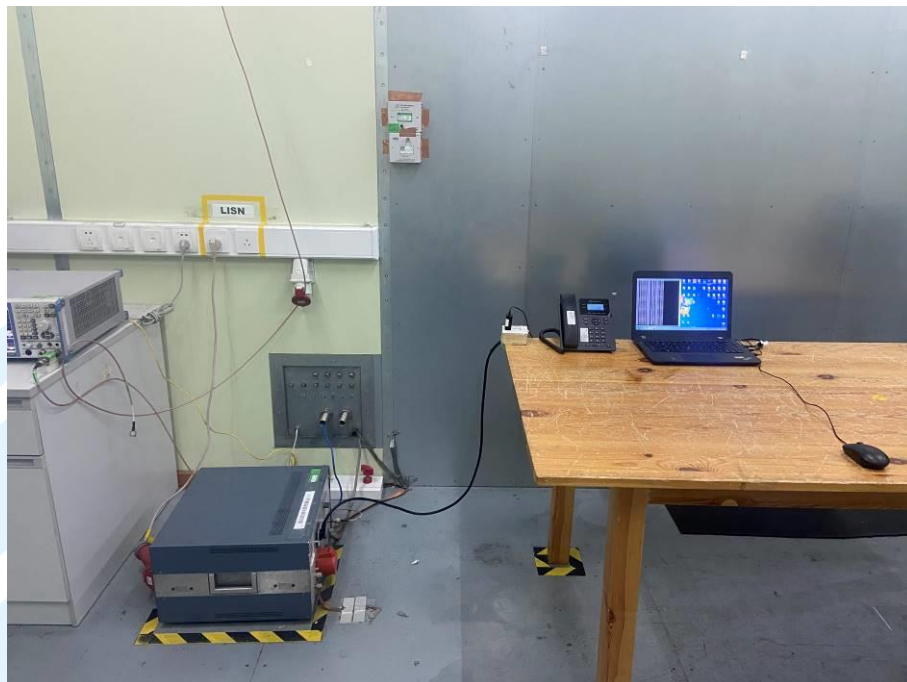


Radiated emission Test Setup-2 (Above 1 GHz)





Conducted Emission Test Setup-3



APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

EUT EXTERNAL PHOTOS



EUT Photo



EUT Photo



EUT Photo



EUT Photo



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EUT Photo – Adapter 1



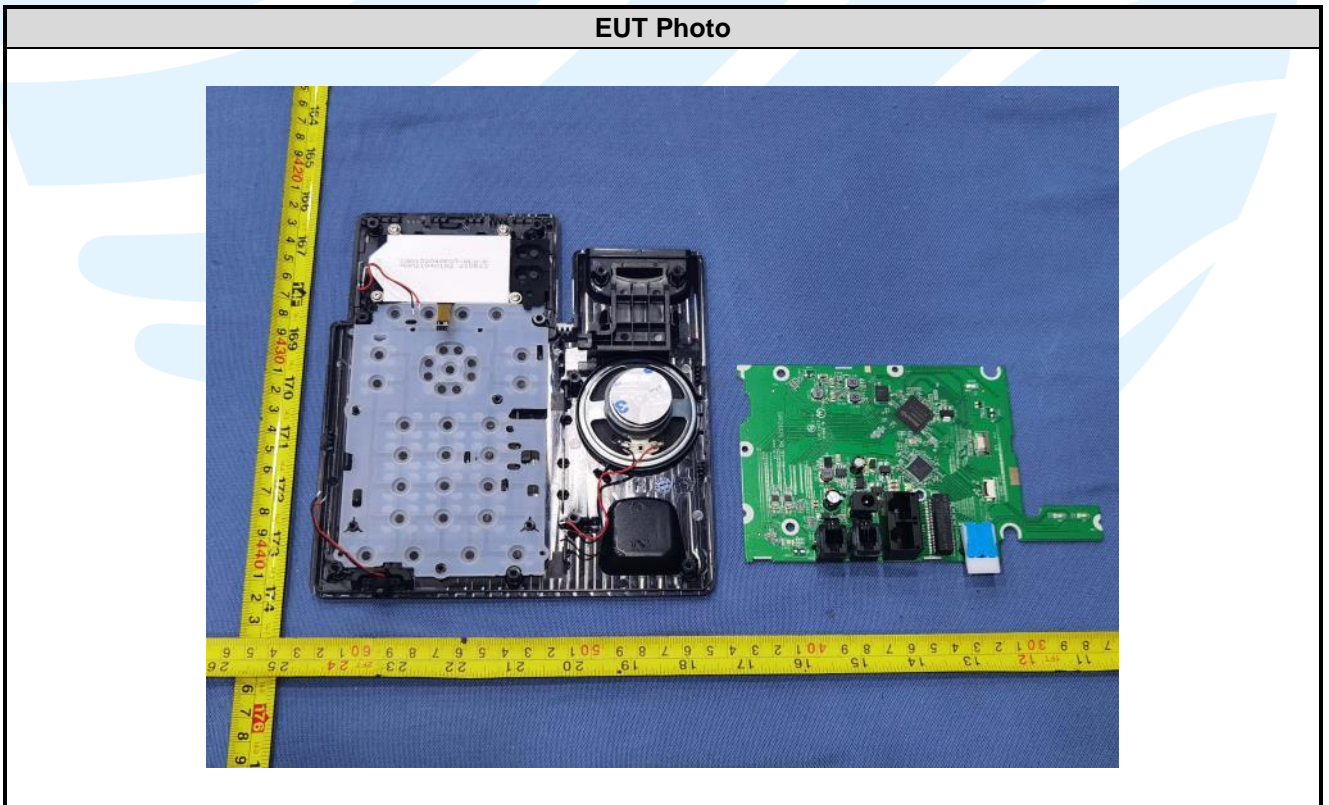
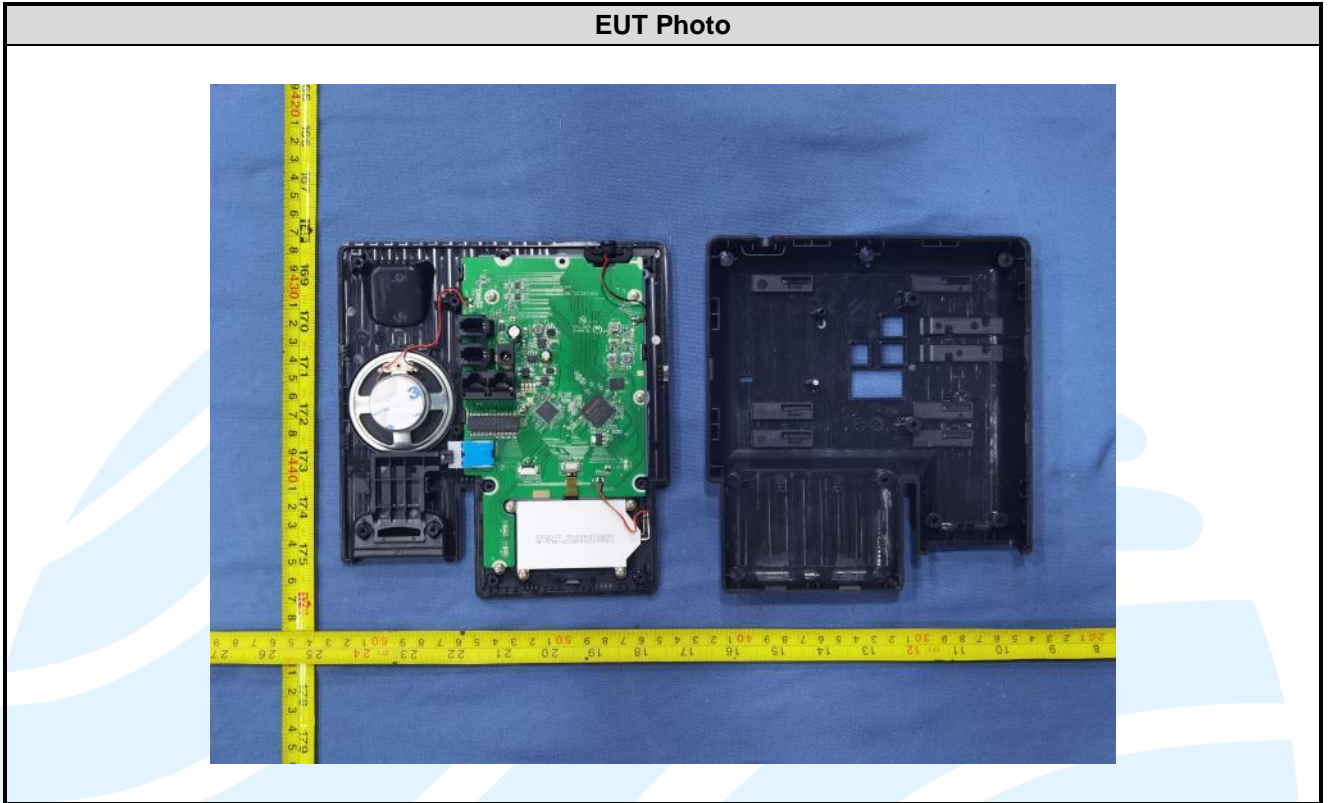
EUT Photo – Adapter 2



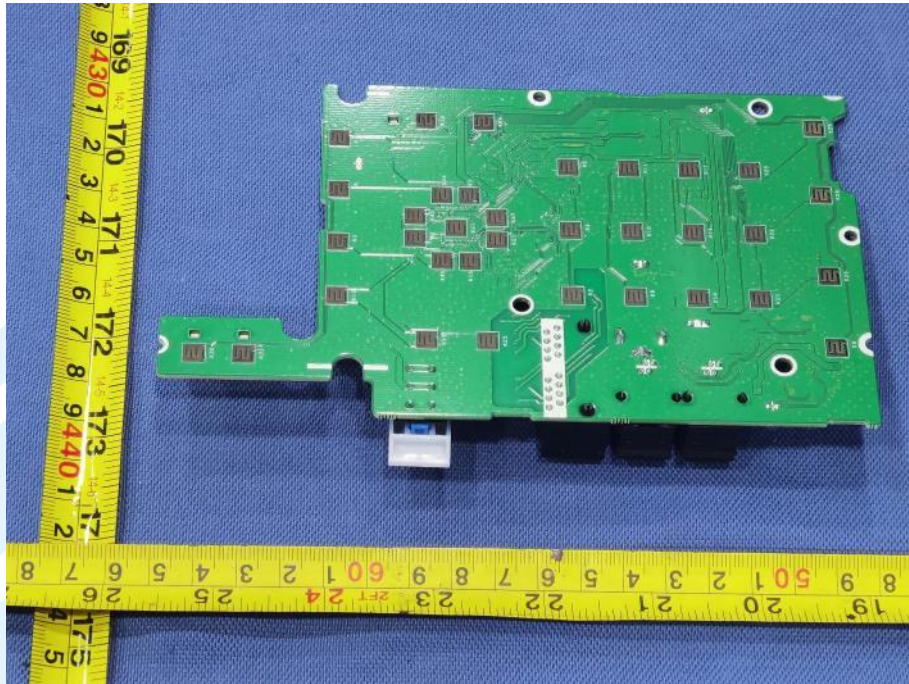
EUT Photo – Adapter 3



EUT INTERNAL PHOTOS



EUT Photo



EUT Photo





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

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