

FCC TEST REPORT

Product Name: Intelligent Accelerating Card
Trade Mark: Cambricon
Model No.: MLU370-S/D Series
Report Number: 210508002EMC-1
Test Standards: FCC 47 CFR Part 15 Subpart B
FCC ID: 2ARVF-MLU370-S
Test Result: PASS
Date of Issue: July 28, 2021

Prepared for:

Cambricon Technologies Corporation Limited
11/F, Block D, Zhizhen Tower, No.7 Zhichun Road, Haidian District,
Beijing, China

Prepared by:

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Version

Version No.	Date	Description
V1.0	July 28, 2021	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Cambricon Technologies Corporation Limited
Address of Applicant:	11/F, Block D, Zhizhen Tower, No.7 Zhichun Road, Haidian District, Beijing, China
Manufacturer:	Cambricon Technologies Corporation Limited
Address of Manufacturer:	11/F, Block D, Zhizhen Tower, No.7 Zhichun Road, Haidian District, Beijing, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Intelligent Accelerating Card
Model No.:	MLU370-S4
Add. Model No.:	See Note
Trade Mark:	Cambricon
DUT Stage:	Production Unit
Rated Voltage:	12Vdc
Classification of digital devices:	Class B
Highest Internal Frequency:	1 GHz
Software Version:	V1.0
Hardware Version:	V1.0
Sample Received Date:	June 4, 2021
Sample Tested Date:	July 6, 2021 to July 7, 2021

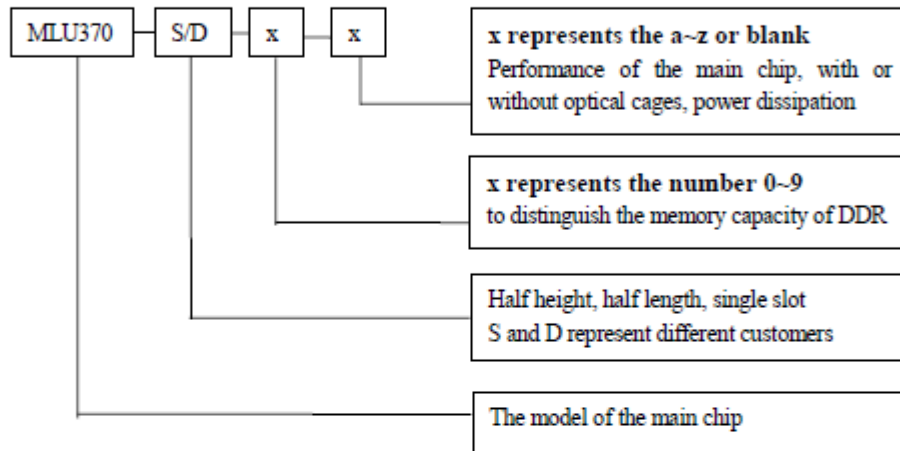
Note: Product MODEL DESCRIPTION AND DIFFERENCE is attached below

Cambricon Technologies Corporation Limited

MODEL DESCRIPTION AND DIFFERENCE

MLU370-S/D series are Intelligence Accelerating Card. They contain many models as follows and the main test model is MLU370-S4.

We Cambricon Technologies Corporation Limited , hereby declare that the layout of PCB in the MLU370-S/D series are same, and the size are same too. We'll be responsible for any consequences caused by other differences in the MLU370-S/D series.



1.2.2 Description of Accessories

None.

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
Lenovo server	Lenovo	7X06	J300WMKL	Applicant
Monitor	DELL	D2421H	CN-OT4HMW-BO3 00-062-2VE-A00	UnionTrust
keyboard	DELL	KB212-B	CN-0N291F-7158- 624-006P-A01	UnionTrust
Mouse	DELL	MS111-T	CN-0KW2YH-7161 6-5AH-0SV7	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/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.

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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-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	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109	ANSI C63.4-2014	PASS



3. EQUIPMENT LIST

Radiated Emission Test – 3m SAC						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	3 m SAC	ETS-LINDGREN	3m	N/A	Jan. 22, 2021	Jan. 21, 2024
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2022
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Nov. 10, 2020	Nov. 9, 2021
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2023
<input checked="" type="checkbox"/>	Preamplifier	ETS-Lindgren	118385	00201874	Nov. 10, 2020	Nov. 9, 2021
<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						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	LISN	R&S	ESH2-Z5	860014/024	Nov. 18, 2020	Nov.17, 2021
<input checked="" type="checkbox"/>	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 18, 2020	Nov.17, 2021
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	101181	Nov. 18, 2020	Nov.17, 2021
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 18, 2020	Nov.17, 2021
<input checked="" type="checkbox"/>	Shielding room	ETS-Lindgren	843	Euroshiedpn-C T001270-1246	N/A	N/A
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.1603323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

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

4.1.2 Record of Normal Environment

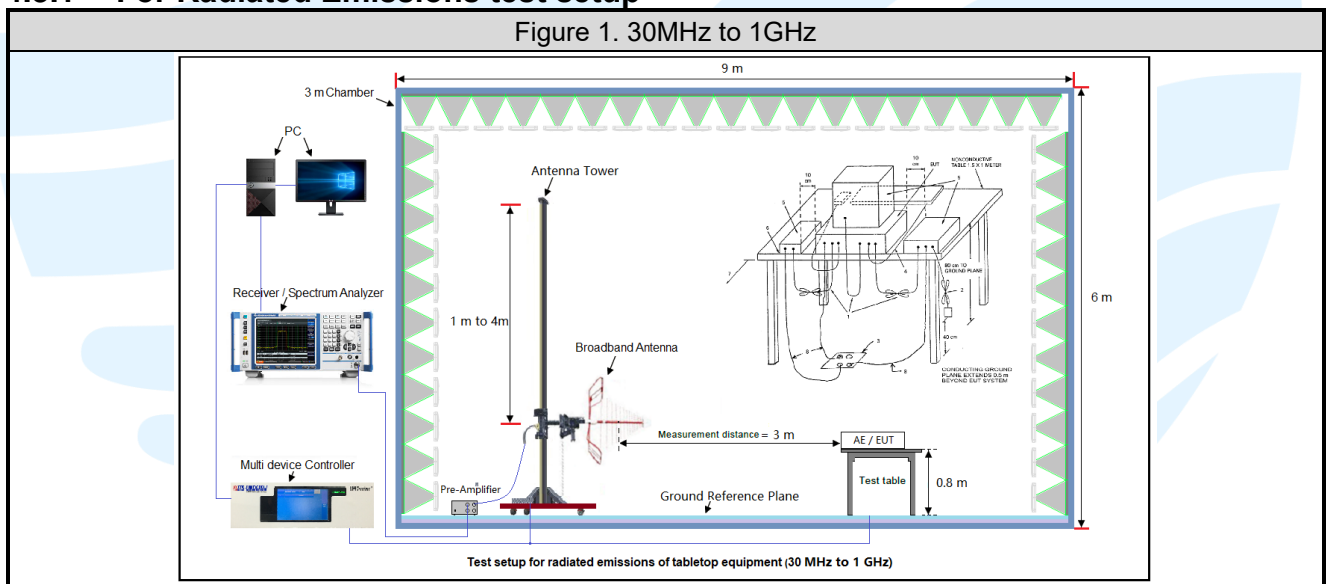
Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Conducted Emission	24.8	54.0	99.7	David Zhang
Radiated Emission	24.7	68.0	99.1	Fire Huo

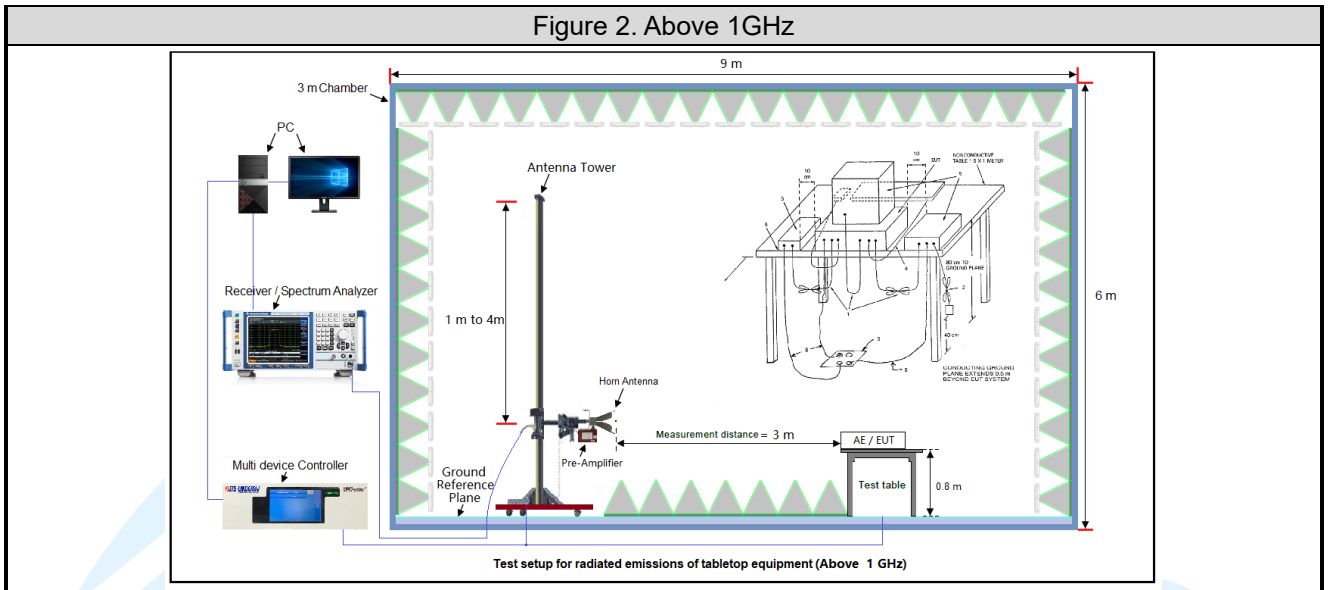
4.2 TEST MODES

Test Item	Test Modes
Radiated Emission	TM1: Normal working
Conducted Emission	TM1: Normal working

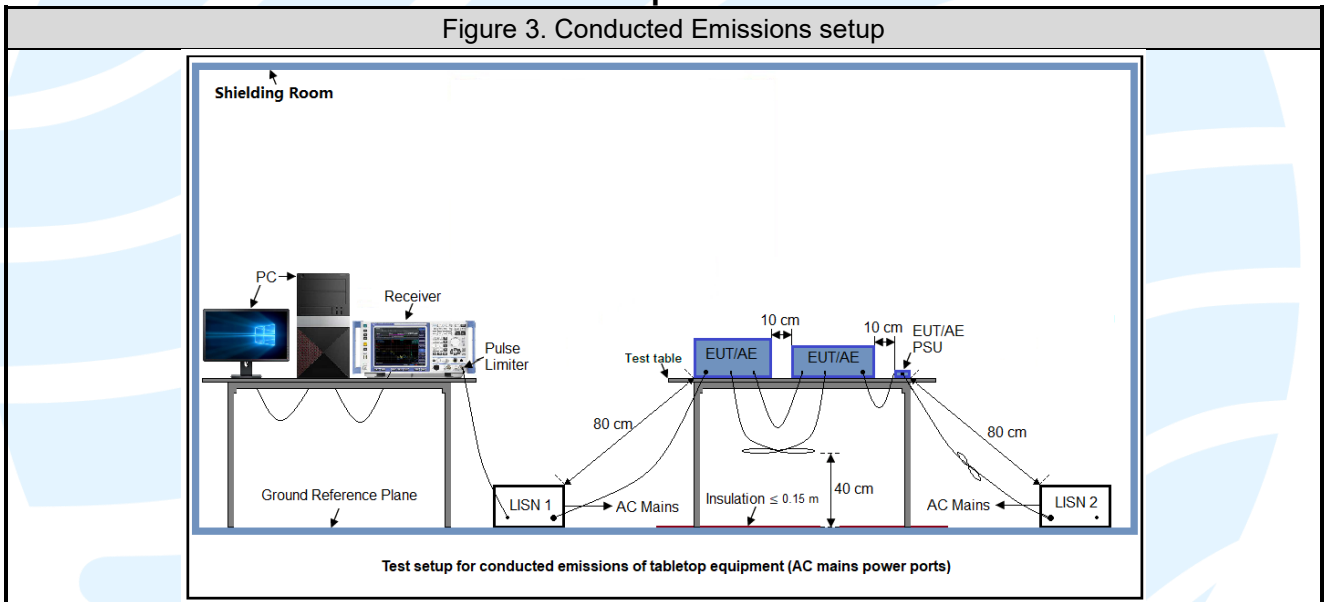
4.3 TEST SETUP

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	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	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
4	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

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

Remark:

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

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

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

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- 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:

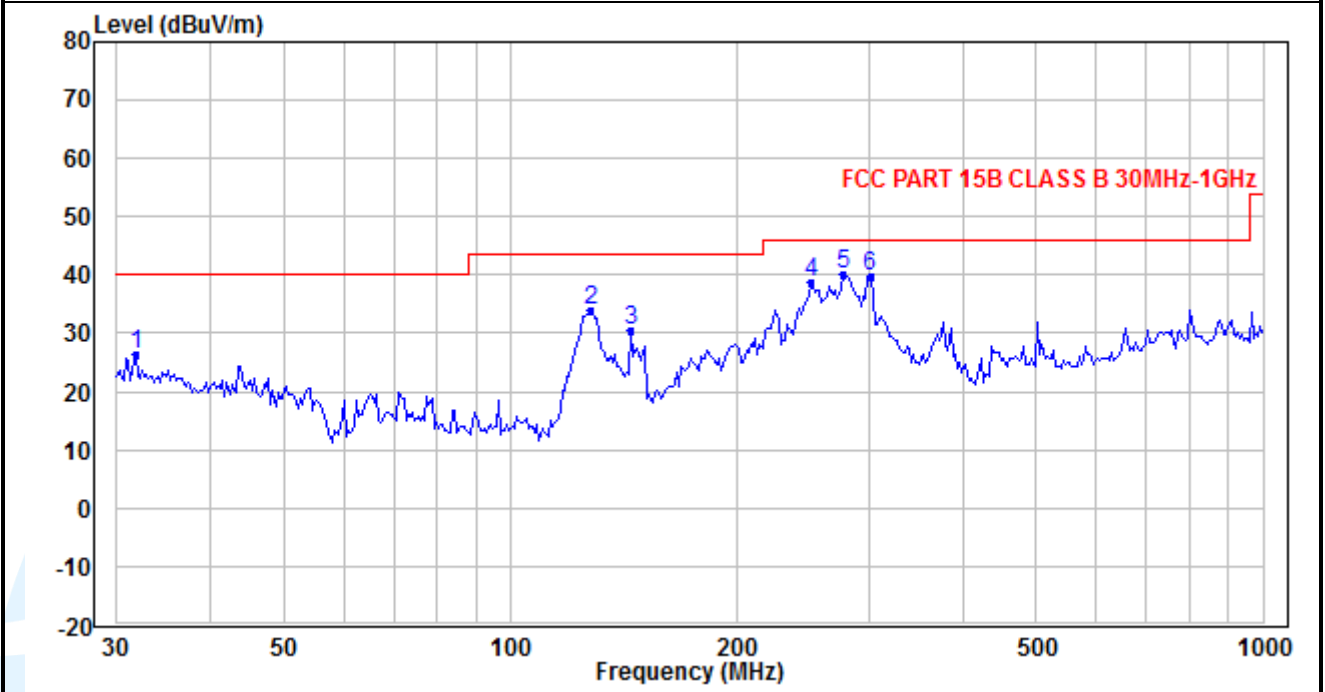
- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal 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):
 Test Mode 1
 Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	31.735	31.36	-4.86	26.50	40.00	-13.50	QP
2	127.586	49.91	-15.95	33.96	43.50	-9.54	QP
3	144.790	46.05	-15.62	30.43	43.50	-13.07	QP
4	250.486	47.55	-8.93	38.62	46.00	-7.38	QP
5	276.382	48.02	-7.76	40.26	46.00	-5.74	QP
6	300.699	46.53	-6.60	39.93	46.00	-6.07	QP

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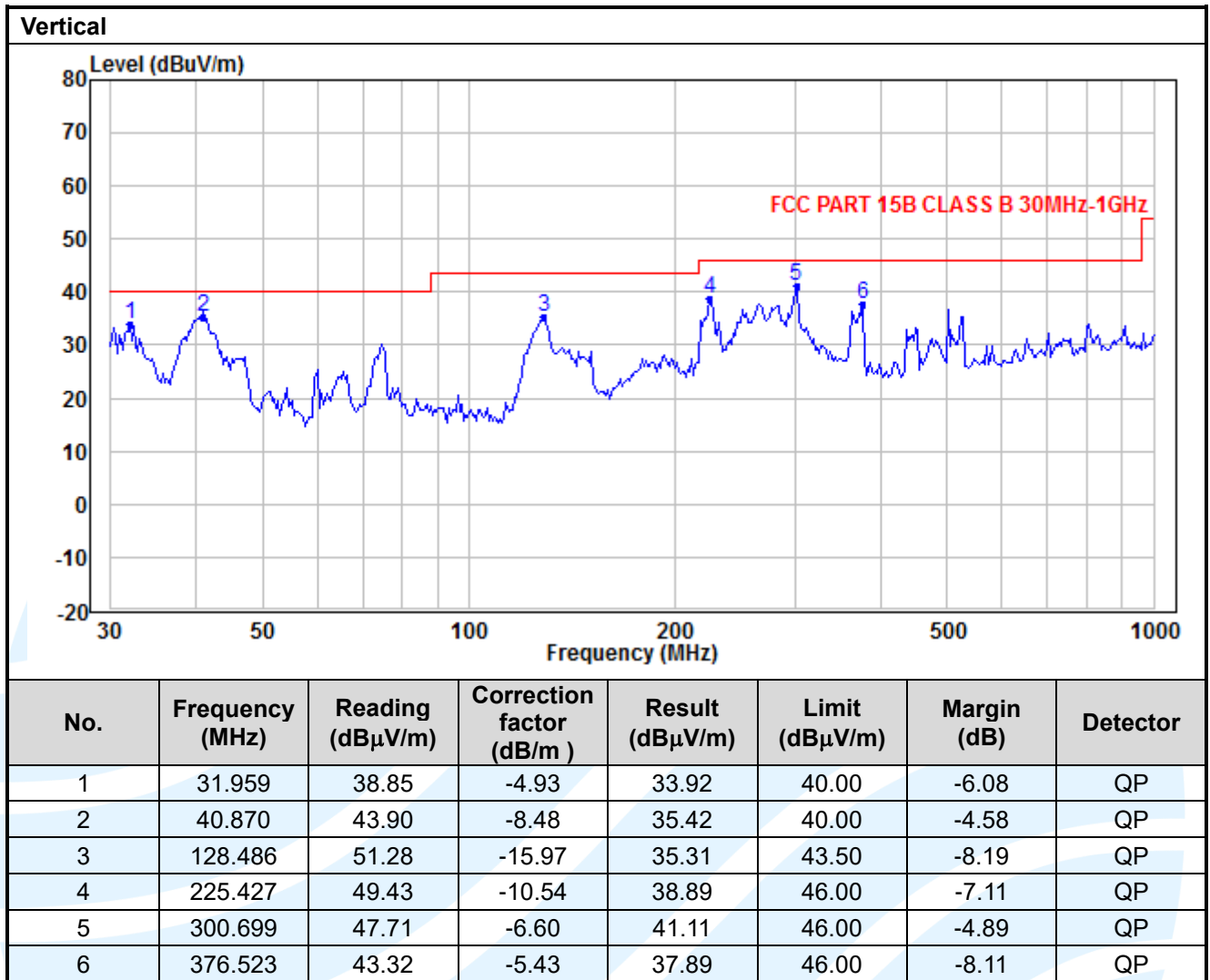
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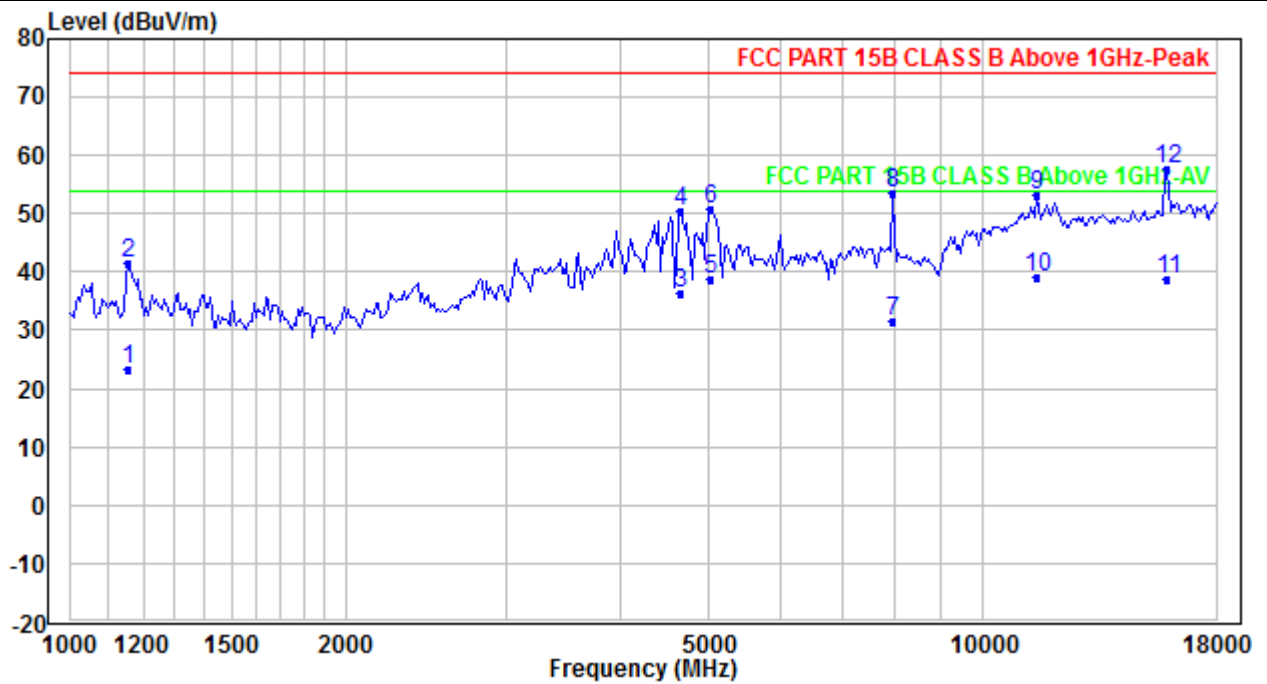
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Above 1GHz (Peak & Average)
 Test Mode 1
 Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	1155.818	36.59	-13.22	23.37	54.00	-30.63	Average
2	1155.818	54.59	-13.22	41.37	74.00	-32.63	Peak
3	4668.133	38.95	-2.43	36.52	54.00	-17.48	Average
4	4668.133	52.95	-2.43	50.52	74.00	-23.48	Peak
5	5033.218	40.84	-2.11	38.73	54.00	-15.27	Average
6	5033.218	52.84	-2.11	50.73	74.00	-23.27	Peak
7	7953.829	29.26	2.45	31.71	54.00	-22.29	Average
8	7953.829	51.26	2.45	53.71	74.00	-20.29	Peak
9	11456.650	45.94	7.12	53.06	74.00	-20.94	Average
10	11456.650	31.94	7.12	39.06	54.00	-14.94	Peak
11	15938.420	27.00	11.75	38.75	54.00	-15.25	Average
12	15938.420	46.00	11.75	57.75	74.00	-16.25	Peak

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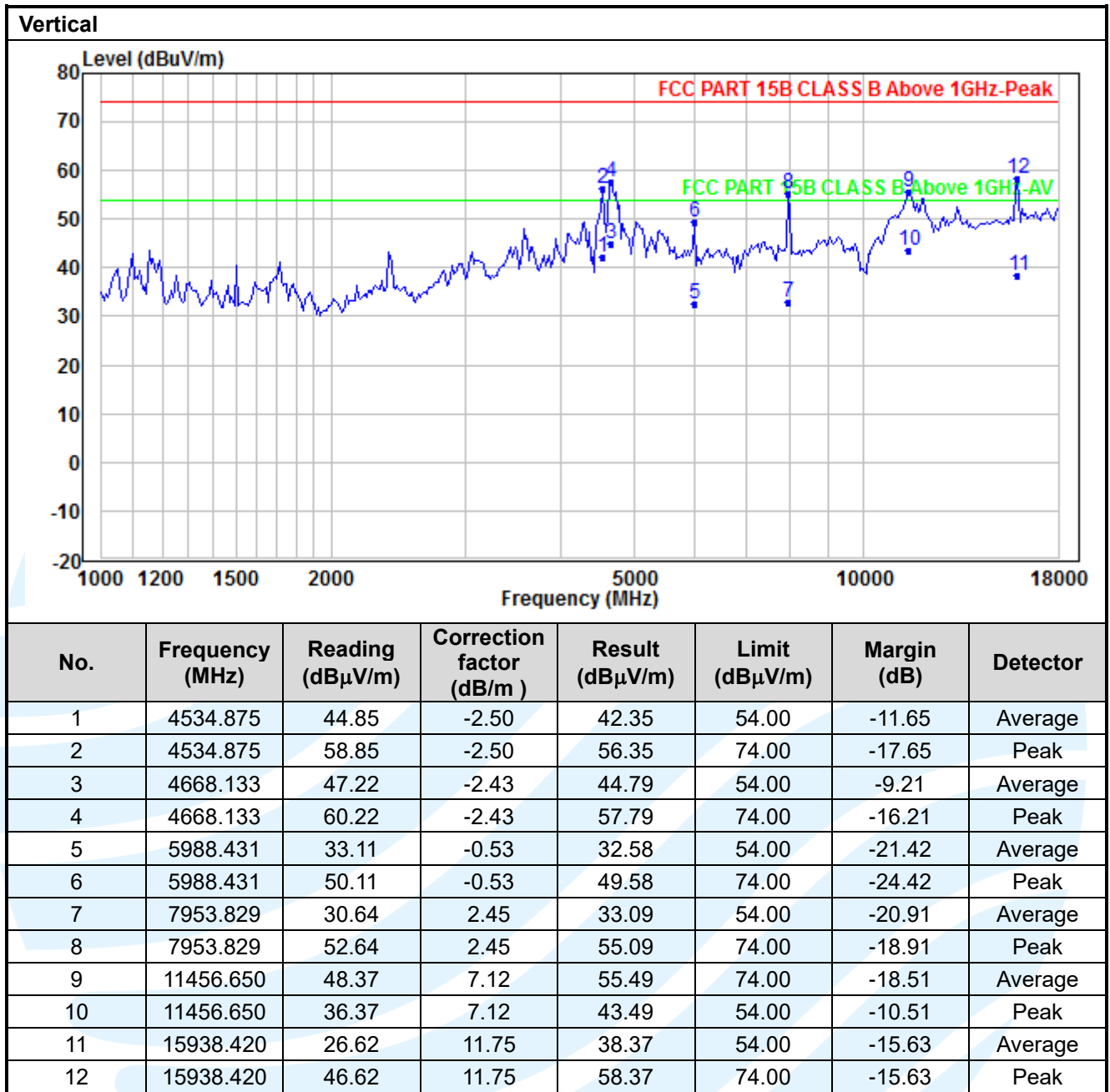
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Remark:

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. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
5. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits.

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6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

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

Remark:

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

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

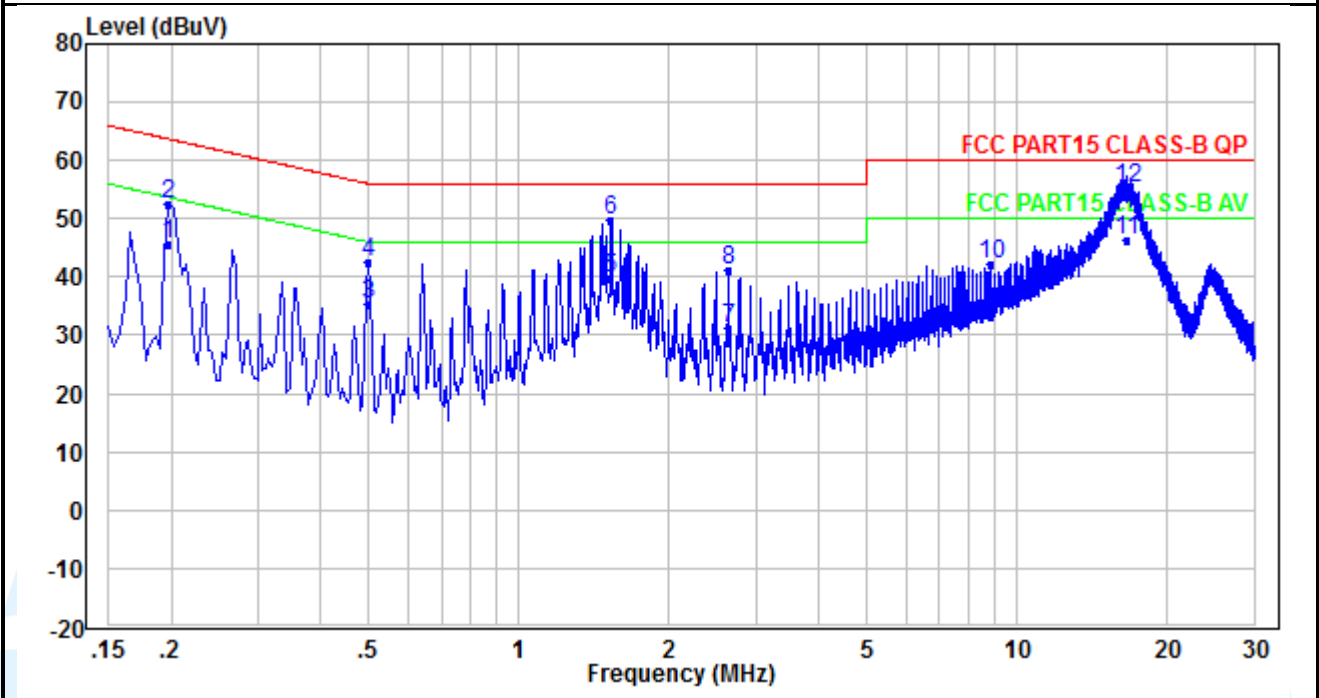
- 1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- 2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with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

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:
 Quasi Peak and Average:
 Test Mode 1

Live Line



No.	Frequency (MHz)	Reading (dB μ V)	Correction factor (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)	Detector
1	0.198	35.73	9.74	45.47	53.69	-8.22	Average
2	0.198	42.73	9.74	52.47	63.69	-11.22	QP
3	0.498	25.65	9.83	35.48	46.03	-10.55	Average
4	0.498	32.65	9.83	42.48	56.03	-13.55	QP
5	1.534	29.98	9.88	39.86	46.00	-6.14	Average
6	1.534	39.98	9.88	49.86	56.00	-6.14	QP
7	2.634	21.28	9.93	31.21	46.00	-14.79	Average
8	2.634	31.28	9.93	41.21	56.00	-14.79	QP
9	8.889	22.89	10.24	33.13	50.00	-16.87	Average
10	8.889	31.89	10.24	42.13	60.00	-17.87	QP
11	16.649	35.85	10.44	46.29	50.00	-3.71	Average
12	16.649	44.85	10.44	55.29	60.00	-4.71	QP

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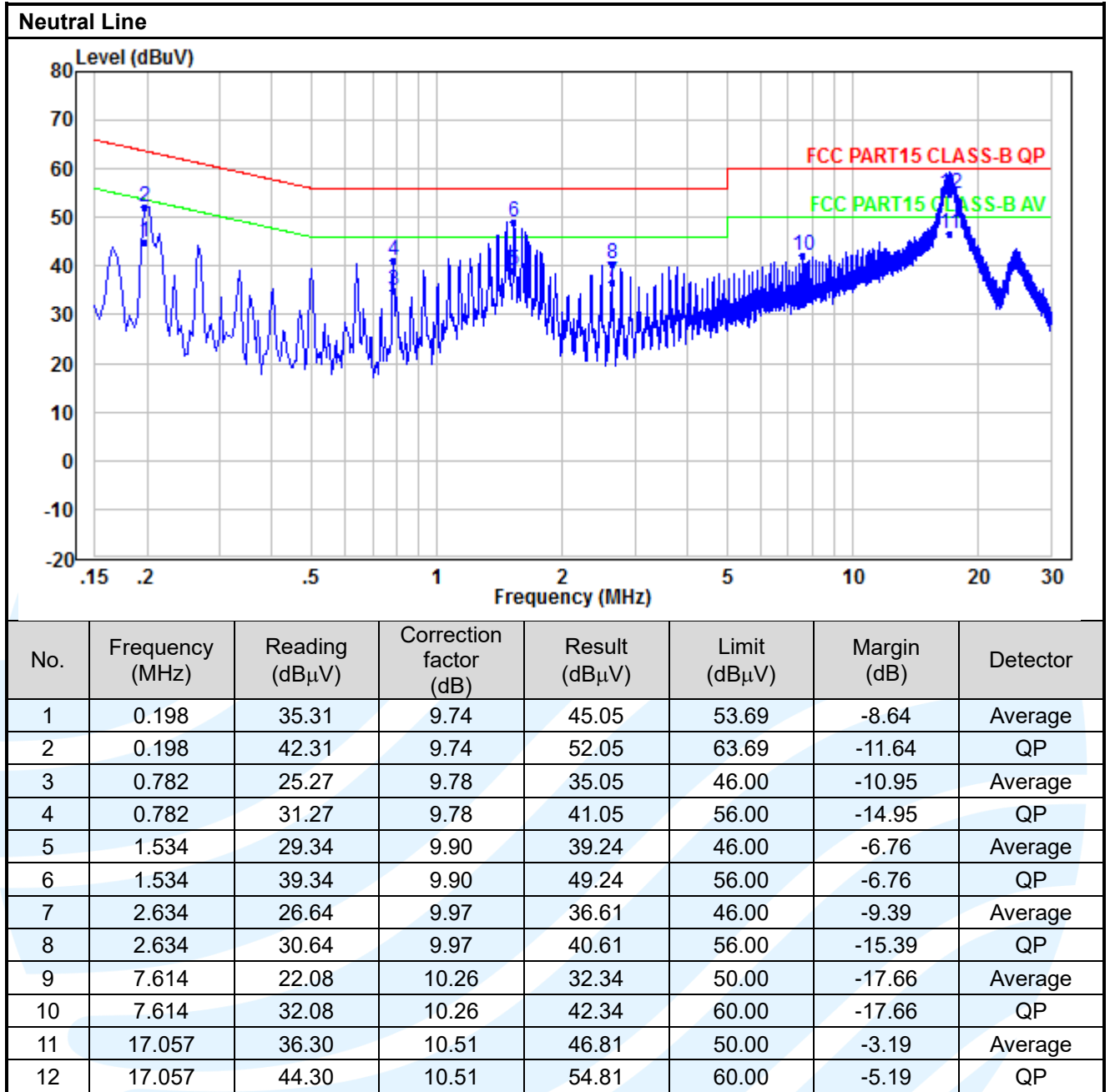
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Remark:

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.

APPENDIX 1 PHOTOS OF TEST SETUP



Radiated emission Test Setup-2 (Above 1 GHz)



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Conducted Emission Test Setup-3



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

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