

FCC TEST REPORT

Product Name: Standalone Dual-Camera Palm Reader

Trade Mark:

ARMATURA

Model No.: AMT-PVR-50

Add. Model No.: AMT-PVR-51, AMT-PVR-52, AMT-PVR-53, AMT-PVR-54, AMT-PVR-55, AMT-PVR-56, AMT-PVR-57, AMT-PVR-58, AMT-PVR-59

Report Number: 24110814535RFC-1

Test Standards: FCC 47 CFR Part 15 Subpart C

FCC ID: 2A5UQ-AMT-PVR-50

Test Result: PASS

Date of Issue: January 2, 2025

Prepared for:

Armatura LLC

190 Bluegrass Valley Parkway Alpharetta, GA 30005

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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UTTR-RF-FCCPART15.209-V1.1

Version

Version No.	Date	Description
V1.0	January 2, 2025	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Armatura LLC
Address of Applicant:	190 Bluegrass Valley Parkway Alpharetta, GA 30005
Manufacturer:	Armatura LLC
Address of Manufacturer:	190 Bluegrass Valley Parkway Alpharetta, GA 30005

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Standalone Dual-Camera Palm Reader
Model No.:	AMT-PVR-50
Add. Model No.:	AMT-PVR-51, AMT-PVR-52, AMT-PVR-53, AMT-PVR-54, AMT-PVR-55, AMT-PVR-56, AMT-PVR-57, AMT-PVR-58, AMT-PVR-59 (Note 1)
Trade Mark:	
DUT Stage:	Identical Prototype
Rated Voltage:	Powered by USB port: Input: 5.0V---1.0A
Software Version:	1.0.2PVR-sdkv2-20241025T100326 (Provided by the customer)
Hardware Version:	AMT-PVS-50_MAIN-V1.1-0221202 (Provided by the customer)
Sample Received Date:	November 7, 2024
Sample Tested Date:	November 18, 2024 to November 26, 2024
Note 1: All the model numbers are identical in circuitry and electrical, the only differences are the appearance, trade name and model no. for trading purpose.	
Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.	

1.2.2 Description of Accessories

Cable	
Description:	USB Type-C to USB 3.0 Type A Cable
Connector:	USB Type-C / USB 3.0 Type A
Cable Type:	Shielded with one ferrite
Length:	1.1 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Range:	119 kHz ~ 140 kHz
Nominal Operating Frequency:	125kHz
Number of Channels:	1
Modulation type:	ASK
Antenna Type: (Provided by the customer)	induction coil antenna

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Inspiron 5593	N/A	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China
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1.6 TEST FACILITY

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

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1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 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 C Test Cases			
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203	N/A	PASS
20DB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.215(c)	ANSI C63.10-2013	PASS
Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013 Section 6.3 & 6.5 & 6.6	PASS
Radiated Emission	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	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	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	25-Oct-2024	24-Oct-2025
<input checked="" type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	28-Oct-2024	27-Oct-2025
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	29-Oct-2024	28-Oct-2025
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	29-Oct-2024	28-Oct-2025
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	25-Oct-2024	24-Oct-2025
<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	ESCI3	1166.5950.03	25-Oct-2024	24-Oct-2025
<input type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	25-Oct-2024	24-Oct-2025
<input checked="" type="checkbox"/>	LISN	R&S	EVN216	3560.6550.12	26-Sep-2024	25-Sep-2025
<input type="checkbox"/>	LISN	ETS-Lindgren	3816/2SH	00201088	25-Oct-2024	24-Oct-2025
<input checked="" type="checkbox"/>	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1		

20dB BW Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
<input checked="" type="checkbox"/>	Spectrum analyzer	R&S	FSV40-N	101653	29-Mar-2024	28-Mar-2025
<input checked="" type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	28-Oct-2024	27-Oct-2025

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. 120~60Hz 2. 240~50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Radiated Emission	24.8	61.9	100.3	S202411074612-ZJA02/2	Jackson Wu
Conducted Emission	24.6	56.1	100.4		David Du
20dB Bandwidth	20.7	46.4	100.6		Allen Zhou

4.2 TEST MODES

No.	Test Description	Frequency
1	Reader, Powered by USB Port	125kHz

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup

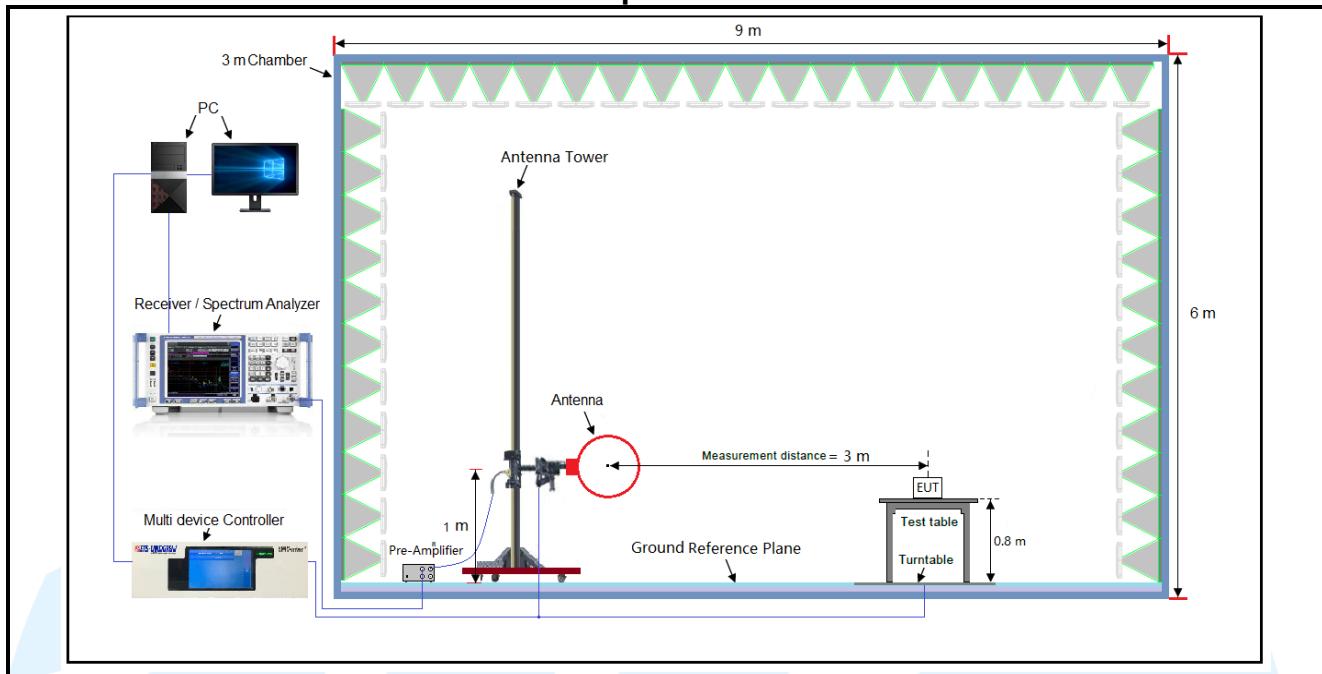


Figure 1. Below 30MHz

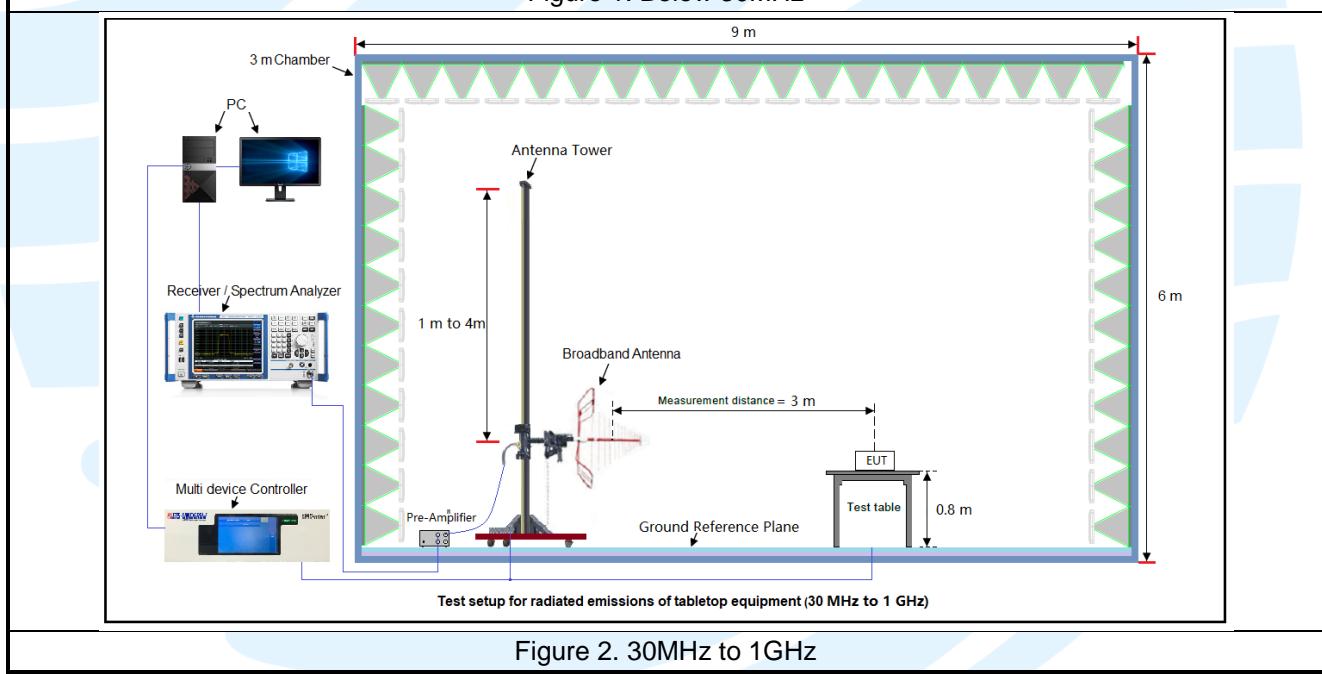


Figure 2. 30MHz to 1GHz

4.3.2 For Conducted Emissions test setup

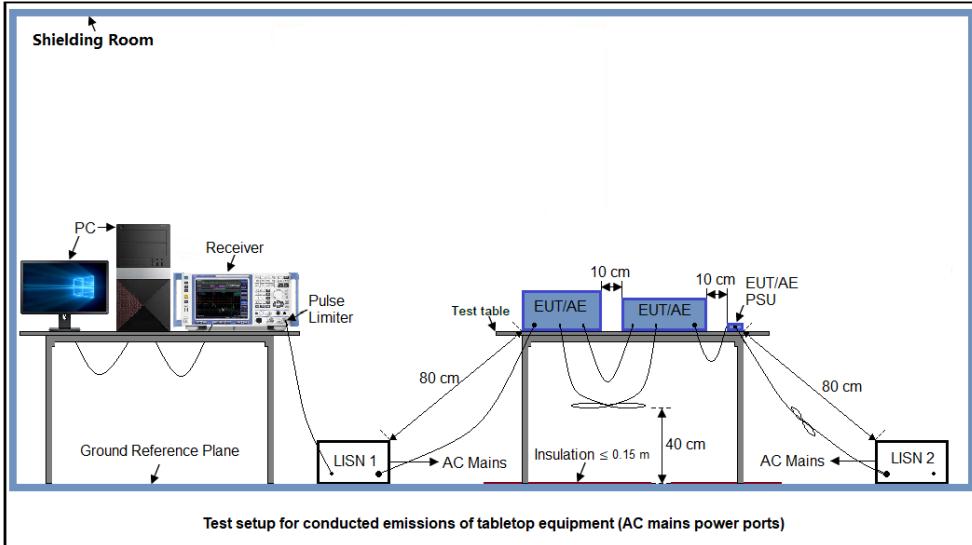


Figure 3. Conducted Emissions setup

4.3.3 For Conducted RF test setup

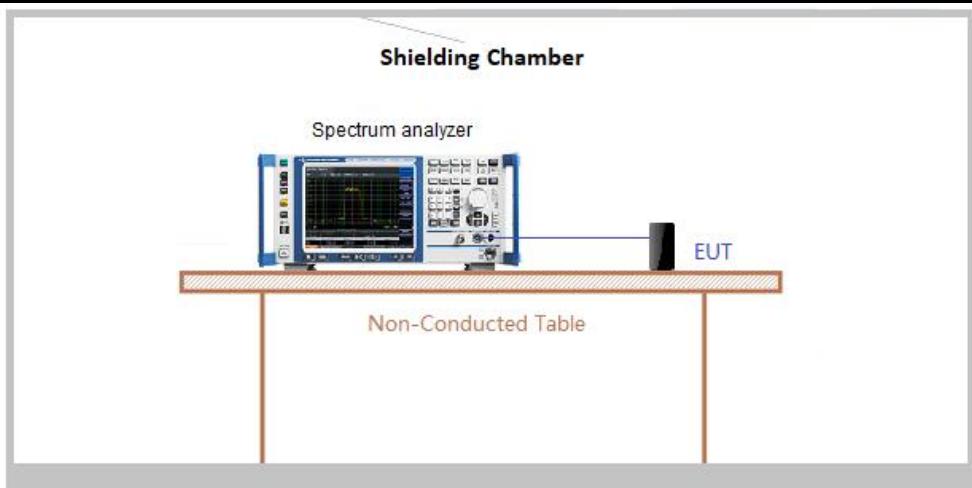


Figure 4. 20dB bandwidth setup

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

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 15	Radio Frequency Devices
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna:
This product has a permanent antenna, fulfill the requirement of this section.

5.3 20DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.215 (c)

Test Method: ANSI C63.10-2013

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency
- b) Span = approximately 2 to 5 times the OBW
- c) RBW = 1% to 5% of the OBW
- d) VBW \geq 3*RBW
- e) Sweep = auto;
- f) Detector function = peak
- g) Trace = max hold
- h) All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.4.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Frequency	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
125kHz	1.410	6.807

The test plot as follows:


5.4 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: ANSI C63.10-2013 Section 6.3 & 6.5

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/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.
4. For Below 30MHz, the measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance). the measured field strength was extrapolated to distance 300 meters, using the formula that the limit of field strength varies as the inverse distance square (80dB per decade of distance)

Example:

$$\begin{aligned}
 \text{Field strength limit for 125 kHz} &= 19.2 \mu\text{V/m} && \text{at 300m} \\
 &= 25.67 \text{ dB}\mu\text{V/m} && \text{at 300m} \\
 &= 25.67 \text{ dB}\mu\text{V/m} + 40\log(300/3) \text{ dB} && \text{at 3m} \\
 &= 105.67 \text{ dB}\mu\text{V/m} && \text{at 3m}
 \end{aligned}$$

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

- 1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

7) The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.(for portable and mobile devices)

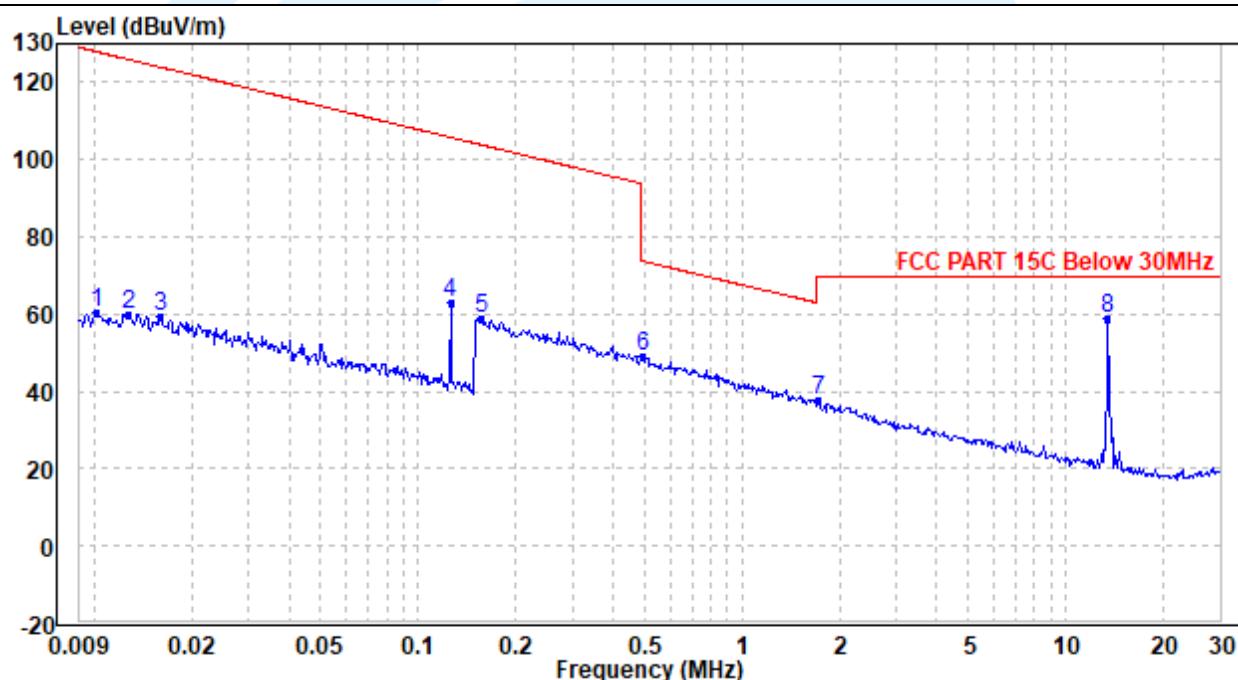
Equipment Used: Refer to section 3 for details.

Test Result: Pass

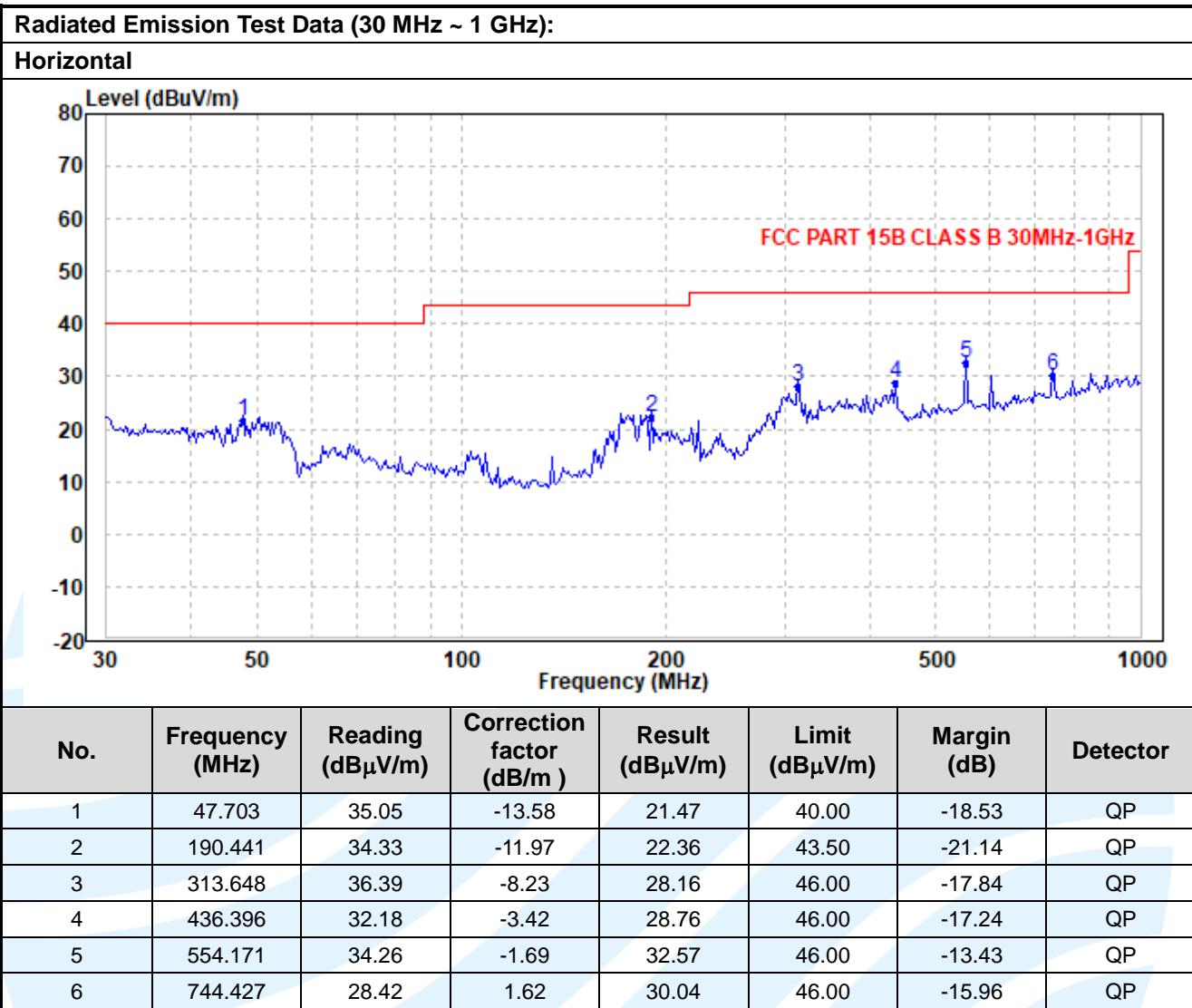
Radiated Emission Test Data (9 KHz ~ 30MHz):

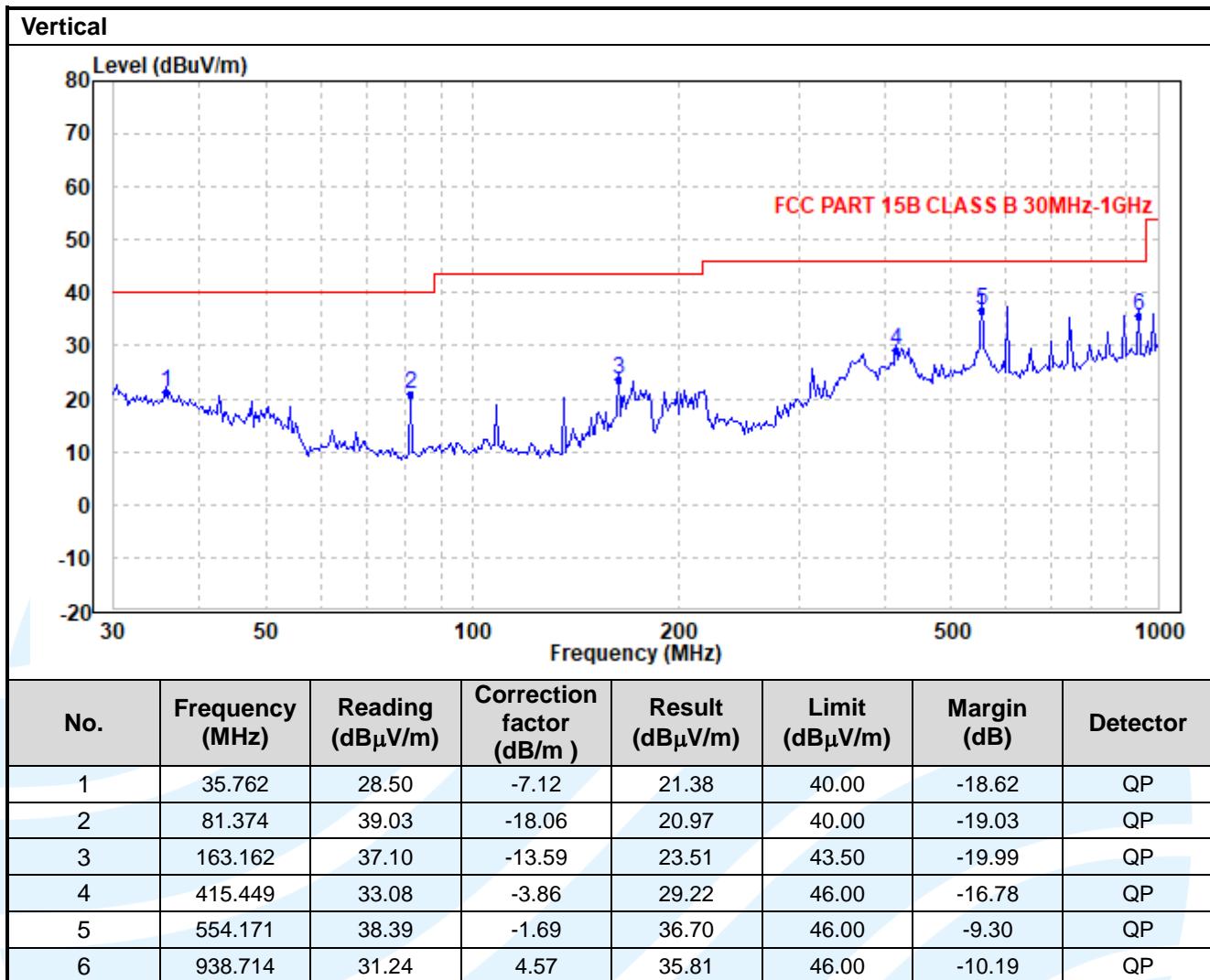
Test data:

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	0.010	71.56	-11.35	60.21	127.96	-67.75	Peak
2	0.013	72.06	-12.08	59.98	125.92	-65.94	Peak
3	0.016	72.51	-12.99	59.52	123.89	-64.37	Peak
4	0.125	81.22	-18.16	63.06	105.76	-42.70	Peak
5	0.157	77.25	-18.30	58.95	103.85	-44.90	Peak
6	0.493	67.69	-18.39	49.30	73.75	-24.45	Peak
7	1.725	55.96	-18.42	37.54	69.50	-31.96	Peak
8	13.56 MHz Fundamental wave						




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

5.5 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.207

Test Method: ANSI C63.10-2013 Section 6.2

Limits:

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 4.4.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

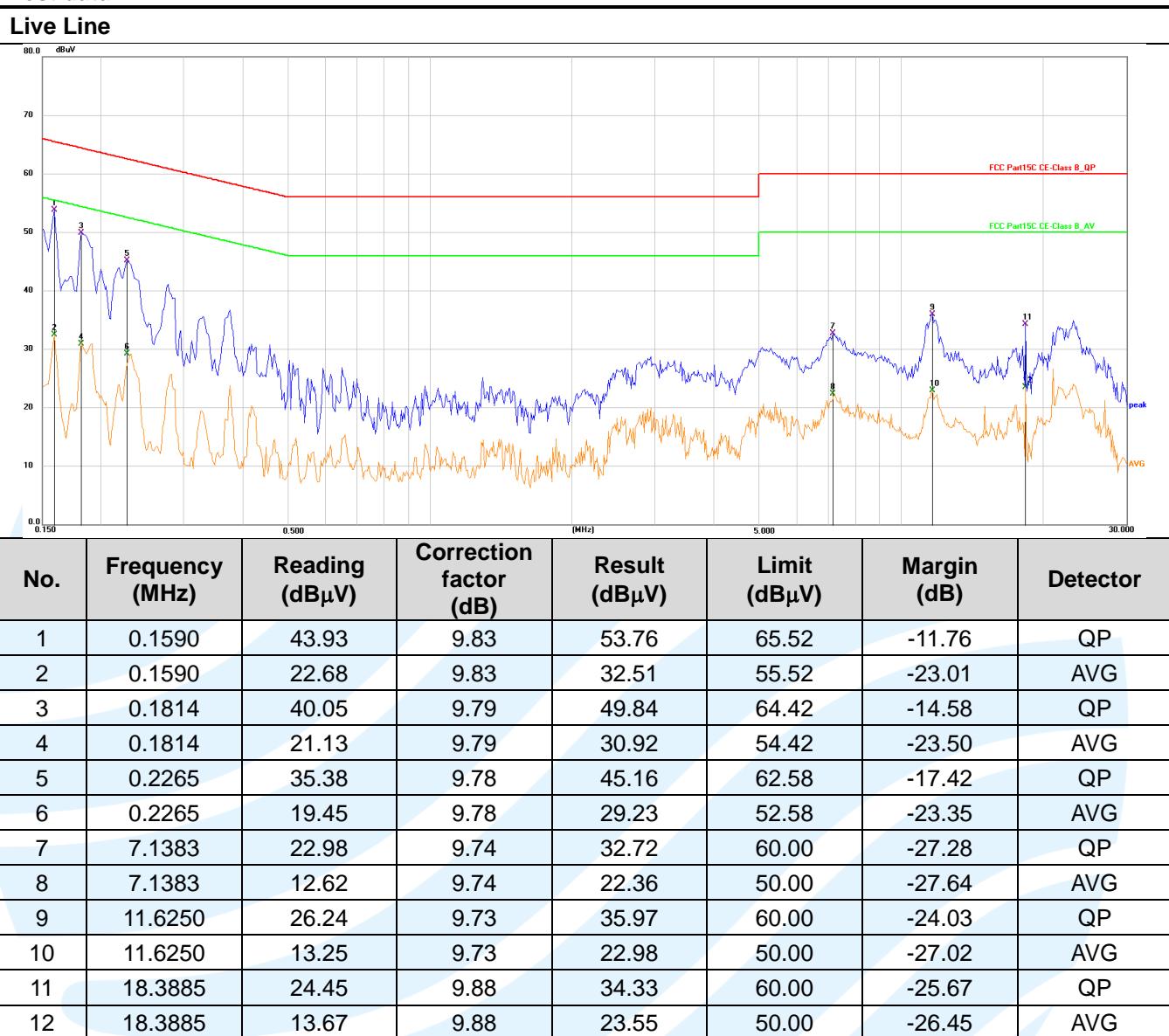
Equipment Used: Refer to section 3 for details.

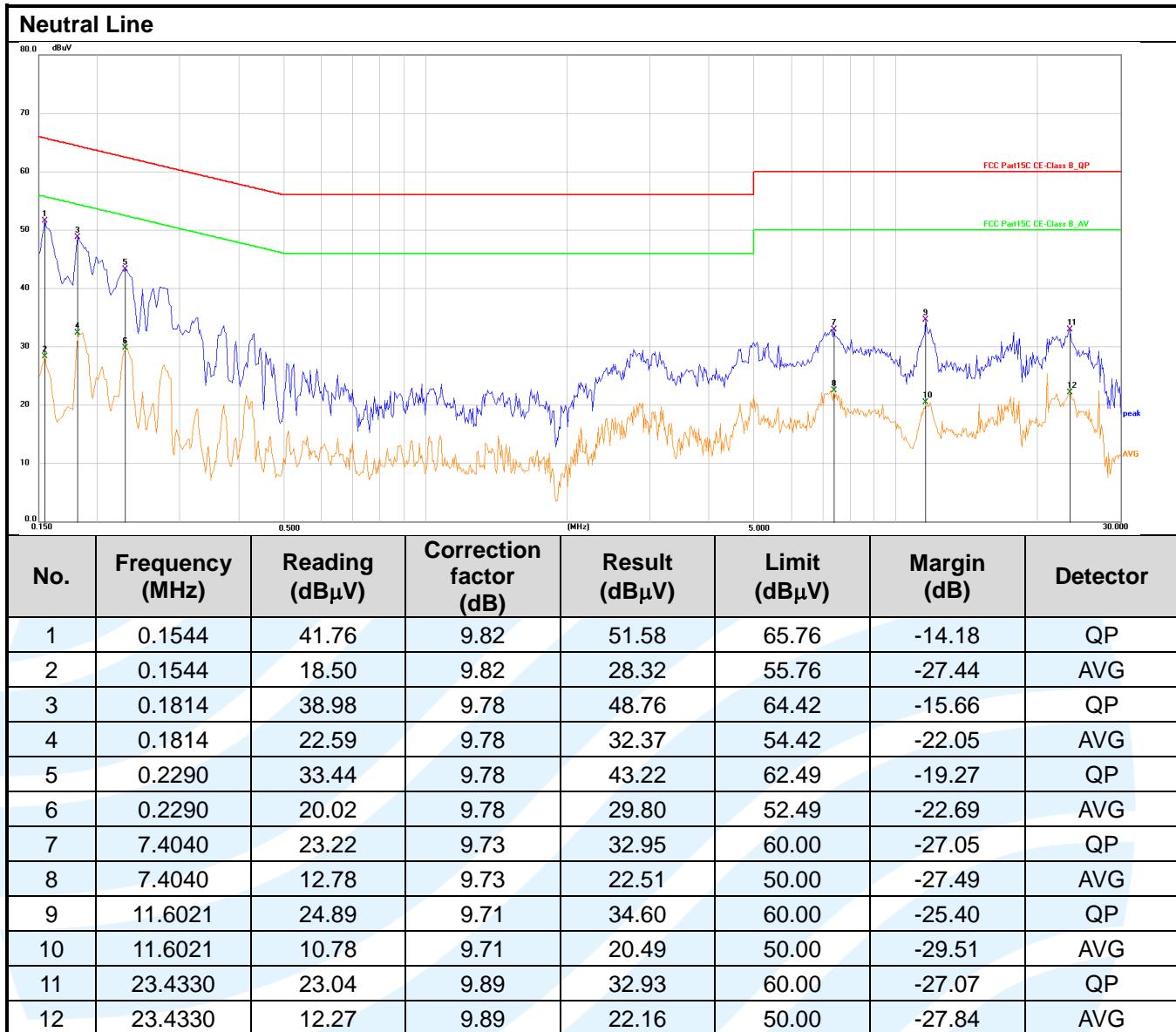
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

Test data:




Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

APPENDIX 1 PHOTOS OF TEST SETUP

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

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

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

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