

TEST REPORT

Product Name: HD Intercom & Facility Control Station

Trade Mark: GRANDSTREAM

Model No.: GSC3570

Add. Model No.: N/A

Report Number: 191008003EMC-1

Test Standards: FCC 47 CFR Part 15 Subpart B

ICES-003 Issue 6

Test Result: PASS

Date of Issue: November 5, 2019

Prepared for:

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

Prepared by:

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November 5, 2019

Technical Director



Version

Version No.	Date	Description
V1.0	November 5, 2019	Original





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1. GENERAL INFORMATION 1.1 CLIENT INFORMATION

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

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	HD Intercom & Facility Control Station	
Model No.:	GSC3570	
Add. Model No.:	N/A	
Trade Mark:	GRANDSTREAM	
DUT Stage:	Identical Prototype	
	☑ Powered by 5V == 2A Adapter (USB Port)	
Rated Voltage:	☑ Powered by 12V == 1A	
Classification of digital devices:	Class B	
Highest Internal Frequency:	5825 MHz	
Software Version:	0.0.0.8	
Hardware Version:	V1.4	
Sample Received Date:	September 30, 2019	
Sample Tested Date:	September 30, 2019 to October 25, 2019	

1.2.2 Description of Accessories

N/A

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
Standard POE Power supply	TP-LINK	TL-POE160S	N/A	UnionTrust
IP Phone	GRANDSTREAM	GXV3380	20NFDTJK12F665 04	Applicant
Wireless Home Router	SAGEMCOM	FAST5280	N/A	UnionTrust
Micro SD	Kingston	16GB	N/A	UnionTrust
DC Source	KIKUSUI	PWR400L	LK003024	UnionTrust

2) Support Cable

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

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1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New

District, Shenzhen, China 518109 Telephone: +86 (0) 755 2823 0888 Fax: +86 (0) 755 2823 0886

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.

N	No. Item		Measurement Uncertainty		
	1	Conducted emission 9KHz-150KHz	±3.8 dB		
	2	Conducted emission 150KHz-30MHz	±3.4 dB		



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3	Radiated emission 9KHz-30MHz	±4.9 dB
4 Radiated emission 30MHz-1GHz		±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases						
Test Item Test Requirement Test Method Resu						
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)		
\boxtimes	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021		
\boxtimes	Receiver	R&S	ESIB26	100114	Nov. 24, 2018	Nov. 24, 2019		
	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 03, 2018	Dec. 03, 2019		
\boxtimes	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 08, 2018	Dec. 08, 2019		
\boxtimes	6dB Attenuator	Talent	RA6A5-N- 18	18103001	Dec. 08, 2018	Dec. 08, 2019		
\boxtimes	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2018	Nov. 24, 2019		
\boxtimes	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 18, 2019	May 18, 2020		
	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jan. 05, 2019	Jan. 05, 2020		
\boxtimes	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A		
\boxtimes	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)		
	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 24, 2018	Nov. 24, 2019		
	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2018	Nov. 24, 2019		
	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2018	Nov. 24, 2019		
\boxtimes	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 24, 2018	Nov. 24, 2019		
\boxtimes	Test Software	Audix	e3	Sof	Software Version: 9.160323			



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					
lest Condition	Temperature (°C)	Voltage	Relative Humidity (%)			
NT/NV	+15 to +35 AC 120V/60Hz or 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	24.7	40	99.61	Bert Xiong
Radiated Emission	24.6	56.0	100.1	Asia Yan

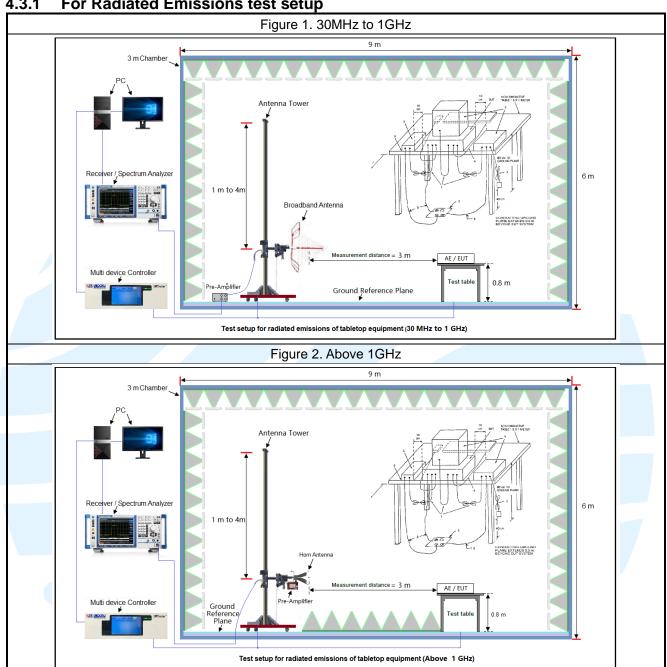
4.2 TEST MODES

Test Item	EMI Test Modes		
	TM1: AC120V/60Hz (Adaptor) + WLAN IDLE + Ringing		
	TM2: AC120V/60Hz (Adaptor) + WLAN IDLE + Voice		
Radiated Emission	TM3: AC240V/50Hz + Worse from mode 1~2		
	TM4: AC120V/60Hz (POE) +Worse from mode 1~2		
	TM5: DC 12V (DC Port) +Worse from mode 1~2		
	TM1: AC120V/60Hz (Adaptor) + WLAN IDLE + Ringing		
	TM2: AC120V/60Hz (Adaptor) + WLAN IDLE + Voice		
Conducted Emission	TM3: AC240V/50Hz + Worse from mode 1~2		
	TM4: AC120V/60Hz (POE) +Worse from mode 1~2		
	TM5: DC 12V (DC Port) +Worse from mode 1~2		



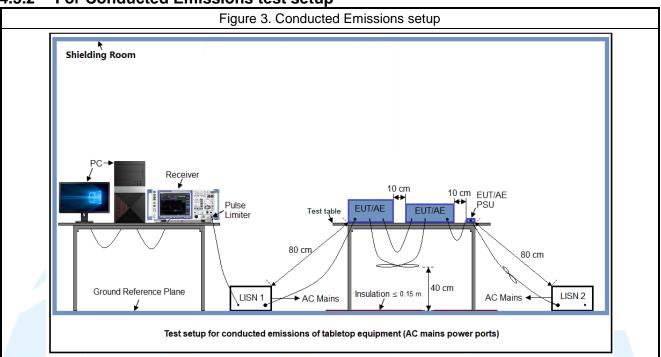
4.3 TEST SETUP

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.

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5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ICES-003 Issue 6	Information Technology Equipment (Including Digital Apparatus) —Limits and Methods of Measurement
3	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
5	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION 6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109 ICES-003 Issue 6 Clause 6.2

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f)	Dotostor type	Measurement red	ceiver bandwidth
(MHz)	Detector type	RBW	VBW
30 ≤ f ≤ 1 000	Quasi Peak	120 kHz	300 kHz
f ≥1000	Peak	1 MHz	3 MHz
1 ≥ 1000	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

Fraguency (MHz)	limits at 3m (dBμV/m)			
Frequency (MHz)	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:

- 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.



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Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

- 1. From 30 MHz to 1GHz test procedure as below:
- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.
- 2. Above 1GHz test procedure as below:
- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

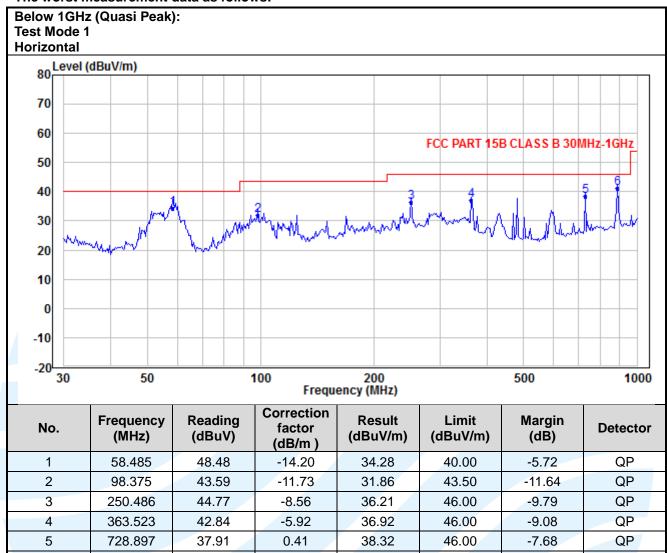


6

887.398

38.39

The worst measurement data as follows:



2.71

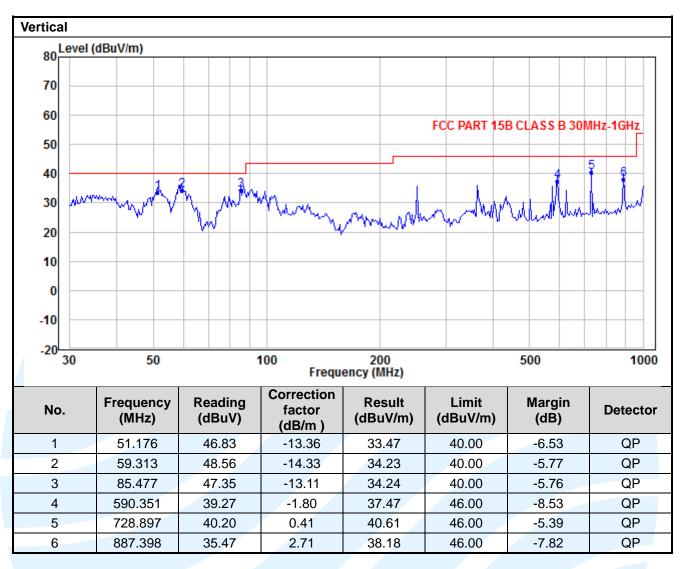
41.10

46.00

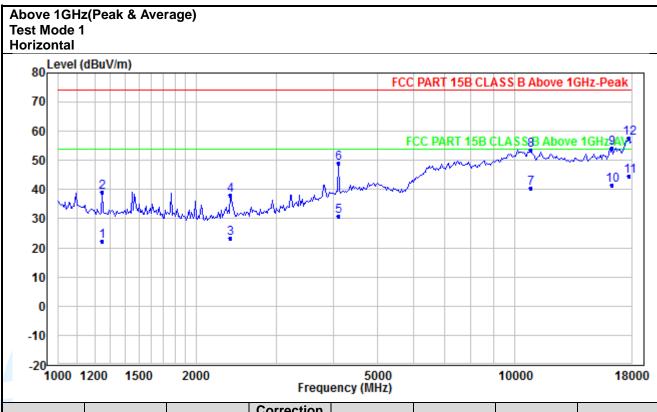
-4.90

QP



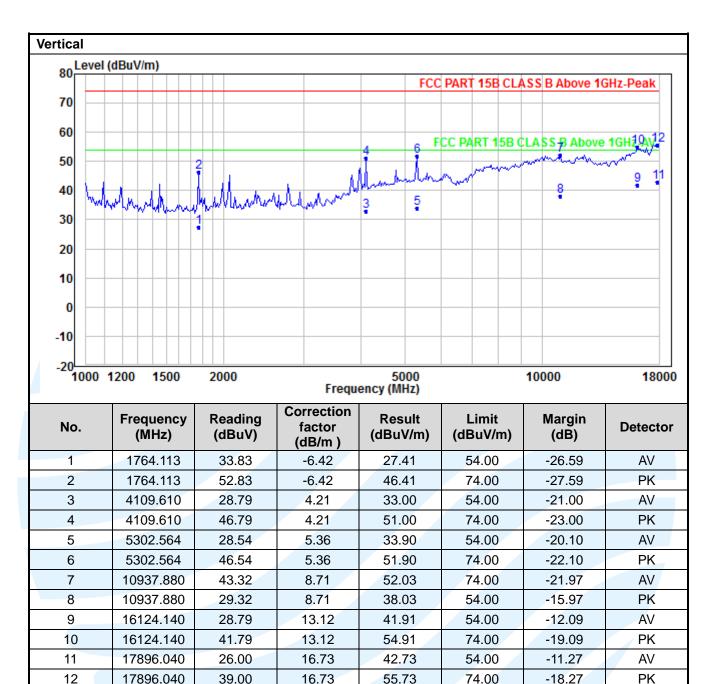






No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1246.212	33.51	-11.33	22.18	54.00	-31.82	AV
2	1246.212	50.51	-11.33	39.18	74.00	-34.82	PK
3	2384.166	26.10	-2.86	23.24	54.00	-30.76	AV
4	2384.166	41.10	-2.86	38.24	74.00	-35.76	PK
5	4109.610	28.27	2.74	31.01	54.00	-22.99	AV
6	4109.610	46.27	2.74	49.01	74.00	-24.99	PK
7	10811.890	29.58	11.05	40.63	54.00	-13.37	AV
8	10811.890	42.58	11.05	53.63	74.00	-20.37	PK
9	16312.020	41.49	12.85	54.34	74.00	-19.66	AV
10	16312.020	28.49	12.85	41.34	54.00	-12.66	PK
11	17792.680	27.07	17.63	44.70	54.00	-9.30	AV
12	17792.680	40.07	17.63	57.70	74.00	-16.30	PK





Remark:

- 1. Correct Factor = Antenna Factor + Cable Loss Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
- 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 6.2

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range	Limits (dB(μV)			
(MHz)	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.

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.

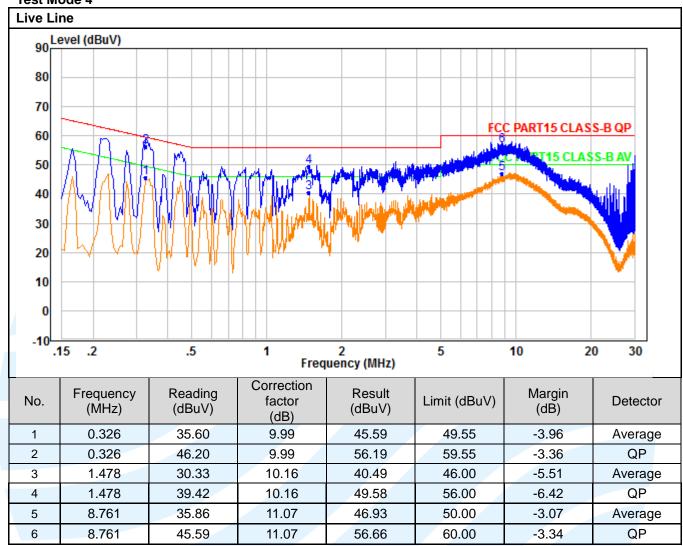
Test Result: Pass



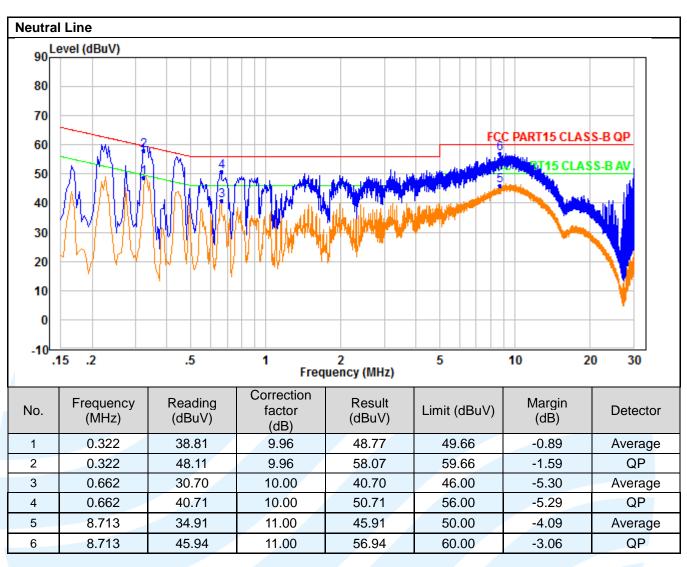
The measurement data as follows:

Quasi Peak and Average:

Test Mode 4







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.

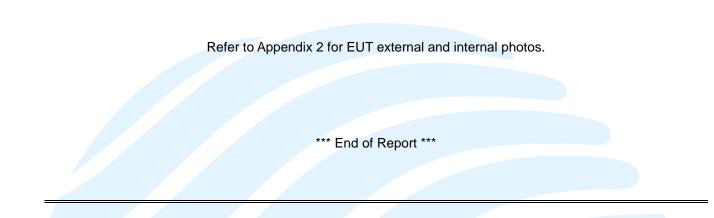


APPENDIX 1 PHOTOS OF TEST SETUP

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

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APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS



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