



# FCC PART 15B, CLASS B

## MEASUREMENT AND TEST REPORT

For

### Grandstream Networks, Inc.

126 Brookline Ave, 3rd Floor Boston, MA 02215, USA

**FCC ID:YZZGWN7610**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Wireless Access point
<b>Test Engineer:</b> <u>Simon Wang</u>	<i>Simon Wang</i>
<b>Report Number:</b> <u>RSZ160602008-00A</u>	
<b>Report Date:</b> <u>2016-07-11</u>	
<b>Reviewed By:</b> <u>RF Engineer</u>	<i>Bell Hu</i>
<b>Prepared By:</b> Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>	

**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
OBJECTIVE .....	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY .....	3
TEST FACILITY .....	3
<b>SYSTEM TEST CONFIGURATION (FCC §15.27).....</b>	<b>4</b>
JUSTIFICATION .....	4
EUT EXERCISE SOFTWARE .....	4
EQUIPMENT MODIFICATIONS .....	4
SUPPORT EQUIPMENT LIST AND DETAILS .....	4
EXTERNAL I/O CABLE .....	5
BLOCK DIAGRAM OF TEST SETUP .....	5
<b>SUMMARY OF TEST RESULTS .....</b>	<b>7</b>
<b>FCC §15.107 – AC LINE CONDUCTED EMISSIONS.....</b>	<b>8</b>
APPLICABLE STANDARD .....	8
MEASUREMENT UNCERTAINTY.....	8
EUT SETUP .....	8
EMI TEST RECEIVER SETUP.....	9
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST PROCEDURE .....	9
CORRECTED FACTOR & MARGIN CALCULATION .....	9
TEST RESULTS SUMMARY .....	10
TEST DATA .....	10
<b>FCC §15.109 - RADIATED EMISSIONS .....</b>	<b>15</b>
APPLICABLE STANDARD .....	15
MEASUREMENT UNCERTAINTY.....	15
TEST SYSTEM SETUP .....	15
EMI TEST RECEIVER SETUP.....	16
TEST PROCEDURE .....	16
TEST EQUIPMENT LIST AND DETAILS.....	16
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	16
TEST RESULTS SUMMARY .....	17
TEST DATA .....	17

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

The *Grandstream Networks, Inc.* 's product, model number: *GWN7610 (FCC ID: YZZGWN7610)* in this report was a *Wireless Access point*, which was measured approximately: 20.0 cm (L) x20.0 cm (W) x 6.0 cm (H), rated with input voltage: DC 24 V from adapter or powered by POE supply. And the highest operational frequency range is 5825MHz.

*\*All measurement and test data in this report was gathered from production sample serial number 1602422 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-06-02.*

### Objective

This test report is prepared on behalf of *Grandstream Networks, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

### Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS and Part 15E NII submissions with FCC ID: YZZGWN7610.

### Test Methodology

All measurements contained in this report were conducted with 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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz, and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

### Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION (FCC §15.27)

### Justification

The system was configured for testing in normal condition.

### EUT Exercise Software

No exercise software was used.

### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

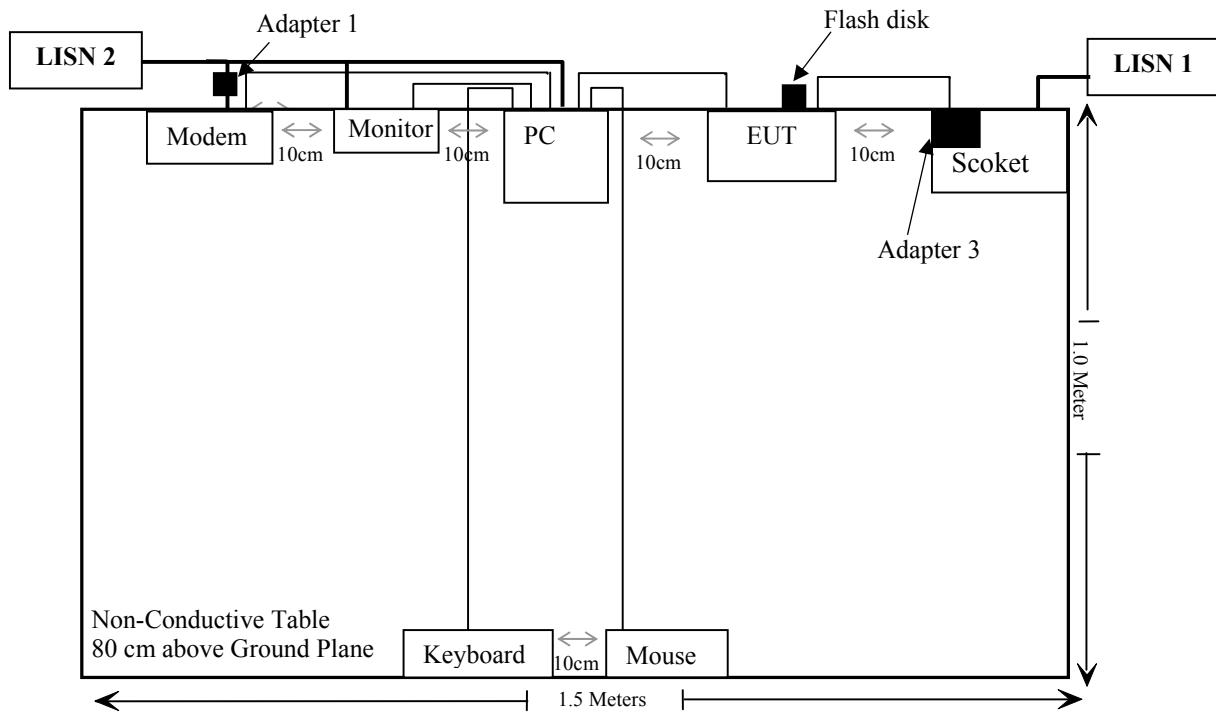
Manufacturer	Description	Model	Serial Number
DELL	Monitor	E178FPc	070072
DELL	PC	DCSCSF	127BP2X
DELL	Keyboard	1406	0200706128743
DELL	Mouse	1405	0204608630856
ECOM	Modem	56000bps	21654684
LISTED	Adapter 1	TYP60-1207000Z	326703
Kingston	Disk	DT1/2GB	N/A
NETGEAR	POE	FS108P	1DL294310006A
NETGEAR	Adapter 2	DSA-0421S-50	330-10142-01
Mass power	Adapter 3	NBS24J240100VU	1604

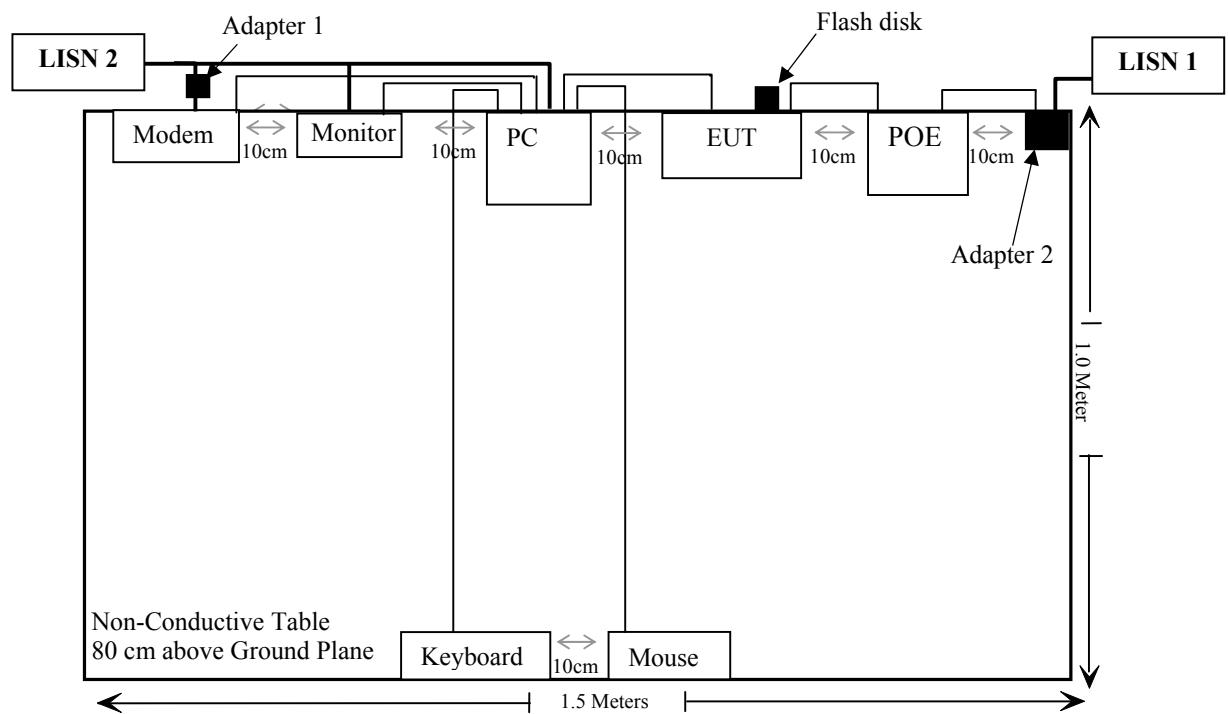
## External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding detachable AC cable	1.5	PC	LISN 2
Un-shielding detachable AC cable	1.5	Monitor	LISN 2
Shielded detachable VGA cable	1.4	PC	Monitor
Shielded Un-detachable USB cable	1.6	Keyboard	PC
Shielded undetachable USB cable	1.6	Mouse	PC
Shielded detachable RS232 cable	1.7	Modem	PC
Un-shielding Un-detachable DC cable	1.6	Modem	Adapter 1
Un-shielding detachable AC cable	1.5	Adapter 1	LISN 2
Un-shielding detachable RJ45 cable	1.6	EUT	PC
Un-shielding Un-detachable DC cable	1.0	EUT	Adapter 3
Un-shielding detachable AC cable	0.9	Adapter 3	LISN 1
Un-shielding Un-detachable DC cable	0.8	POE	Adapter 2
Un-shielding detachable RJ45 cable	1.0	POE	EUT
Un-shielding detachable AC cable	0.9	Adapter 2	LISN 1

## Block Diagram of Test Setup

Test Set up Connect: Powered by Adapter 3



*Test Set up Connect: Powered by POE*

## **SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Results</b>
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

## FCC §15.107 – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

According to FCC§15.107

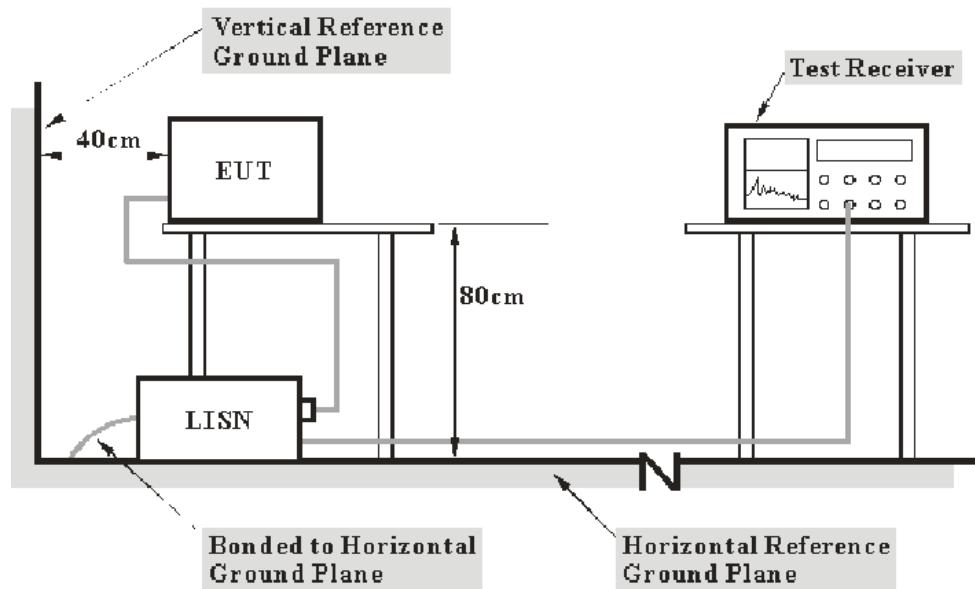
### Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN and receiver, LISN voltage division factor, LISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Port	Expanded Measurement uncertainty
AC Mains	3.34 dB (k=2, 95% level of confidence)

### EUT Setup



**Note:**

1. Support units were connected to second LISN.
2. Both of LISNs (AMIN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2015-12-15	2016-12-14
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2016-06-01	2017-05-31
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2016-05-14	2017-05-14
Rohde & Schwarz	LISN	ESH3Z5	100113	NCR	NCR
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

## Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

## Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the recorded data in following table,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cisp}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

<b>Temperature:</b>	27 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Simon Wang on 2016-07-09.*

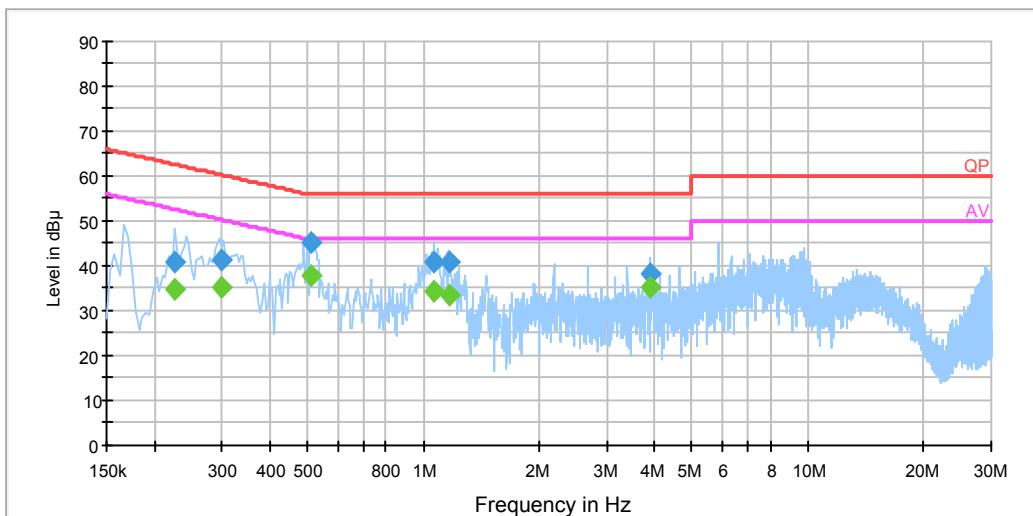
*EUT operation mode: Transmitting*

Tested mode: communication with PC

Powered by Adapter

AC 120V/60 Hz, Line

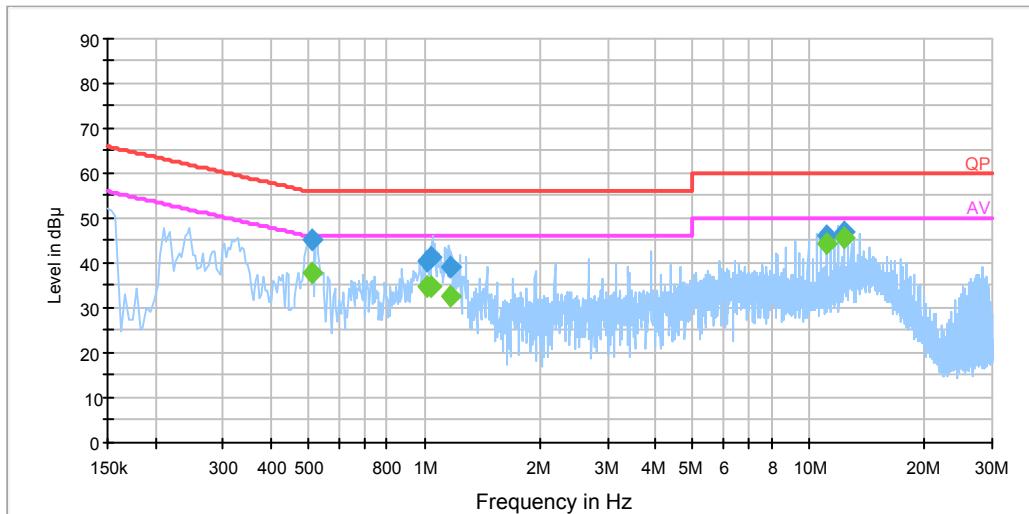
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Corrected Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Remark (PK/QP/Ave.)
0.225500	41.0	20.0	62.6	21.6	QP
0.297500	41.5	19.9	60.3	18.8	QP
0.510230	45.2	19.9	56.0	10.8	QP
1.070010	40.7	20.0	56.0	15.3	QP
1.176510	41.1	20.0	56.0	14.9	QP
3.883710	38.4	20.0	56.0	17.6	QP
0.225500	35.0	20.0	52.6	17.6	Ave.
0.297500	35.4	19.9	50.3	14.9	Ave.
0.510230	37.8	19.9	46.0	8.2	Ave.
1.070010	34.4	20.0	46.0	11.6	Ave.
1.176510	33.3	20.0	46.0	12.7	Ave.
3.883710	35.0	20.0	46.0	11.0	Ave.

## AC 120V/60 Hz, Neutral

EMI Auto Test N

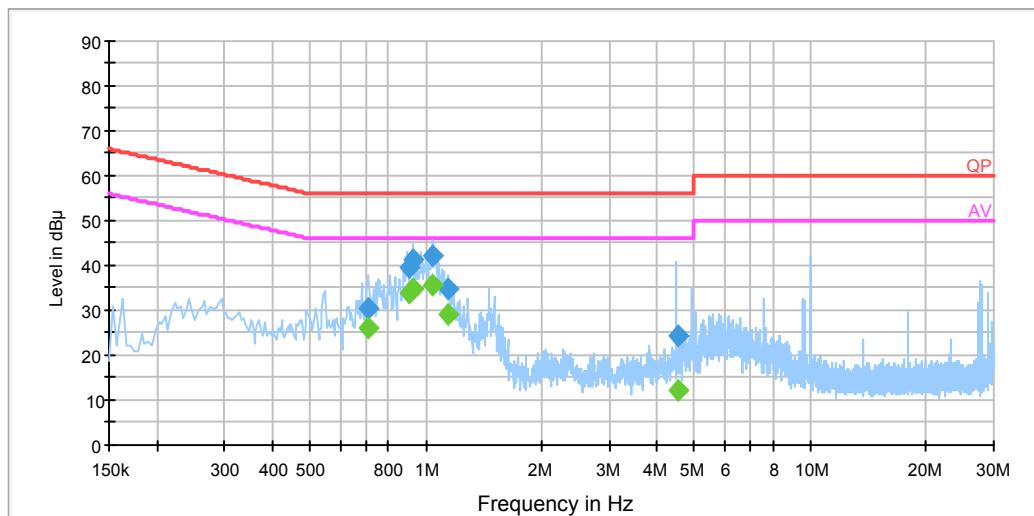


Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Corrected Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Remark (PK/QP/Ave.)
0.510410	45.1	19.9	56.0	10.9	QP
1.022850	40.5	20.0	56.0	15.5	QP
1.046250	41.2	20.0	56.0	14.8	QP
1.172570	39.0	20.0	56.0	17.0	QP
11.178390	46.1	20.1	60.0	13.9	QP
12.392150	46.8	20.1	60.0	13.2	QP
0.510410	37.8	19.9	46.0	8.2	Ave.
1.022850	34.8	20.0	46.0	11.2	Ave.
1.046250	35.0	20.0	46.0	11.0	Ave.
1.172570	32.8	20.0	46.0	13.2	Ave.
11.178390	44.3	20.1	50.0	5.7	Ave.
12.392150	45.7	20.1	50.0	4.3	Ave.

**Powered by PoE**

**AC 120V/60 Hz, Line**

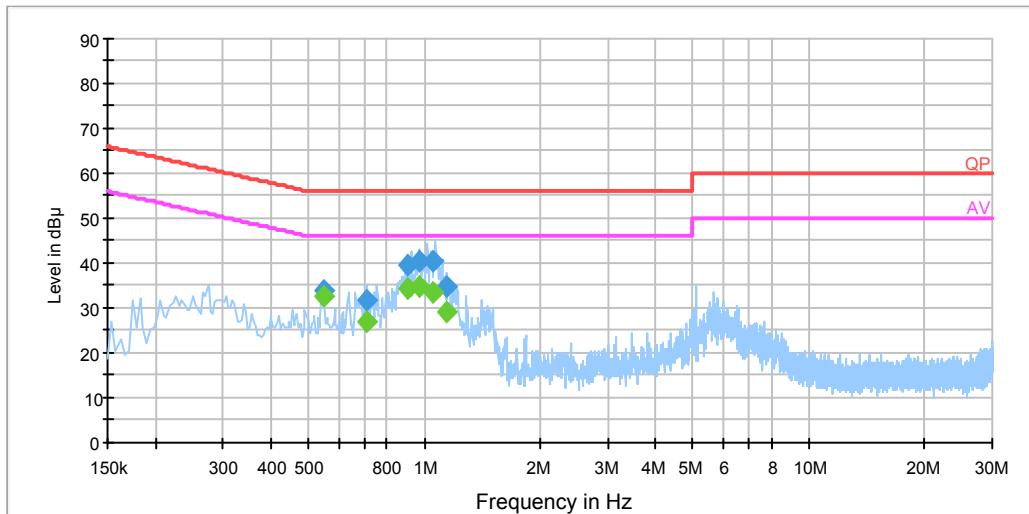
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Corrected Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Remark (PK/QP/Ave.)
0.711410	30.6	19.9	56.0	25.4	QP
0.903350	39.5	20.0	56.0	16.5	QP
0.924110	41.4	20.0	56.0	14.6	QP
1.046310	42.0	20.0	56.0	14.0	QP
1.144870	34.6	20.0	56.0	21.4	QP
4.514830	24.3	20.0	56.0	31.7	QP
0.711410	26.1	19.9	46.0	19.9	Ave.
0.903350	33.9	20.0	46.0	12.1	Ave.
0.924110	34.8	20.0	46.0	11.2	Ave.
1.046310	35.7	20.0	46.0	10.3	Ave.
1.144870	29.3	20.0	46.0	16.7	Ave.
4.514830	12.3	20.0	46.0	33.7	Ave.

## AC 120V/60 Hz, Neutral

EMI Auto Test N



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V)	Corrected Factor (dB)	Limit (dB $\mu$ V)	Margin (dB)	Remark (PK/QP/Ave.)
0.545810	34.0	19.9	56.0	22.0	QP
0.707350	31.9	19.9	56.0	24.1	QP
0.900470	39.5	20.0	56.0	16.5	QP
0.975450	40.2	20.0	56.0	15.8	QP
1.057950	40.3	20.0	56.0	15.7	QP
1.140870	34.8	20.0	56.0	21.2	QP
0.545810	32.8	19.9	46.0	13.2	Ave.
0.707350	27.0	19.9	46.0	19.0	Ave.
0.900470	34.4	20.0	46.0	11.6	Ave.
0.975450	34.8	20.0	46.0	11.2	Ave.
1.057950	33.5	20.0	46.0	12.5	Ave.
1.140870	29.2	20.0	46.0	16.8	Ave.

**Note:**

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation
- 3) Margin = Limit – Corrected Amplitude

## FCC §15.109 - RADIATED EMISSIONS

### Applicable Standard

According to FCC§15.109

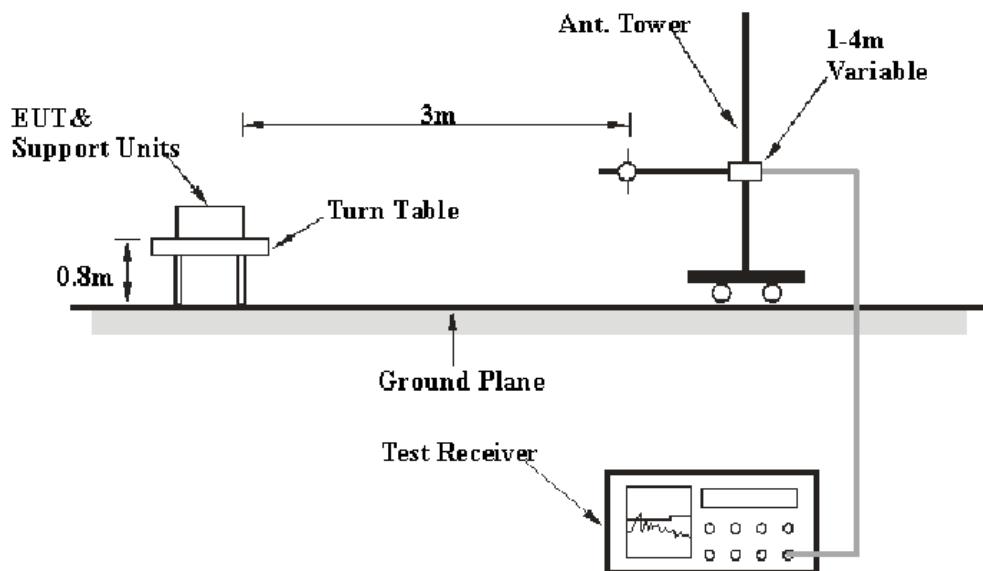
### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.81 dB for 30MHz-1GHz and 4.88 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Measurement uncertainty
30 MHz~200 MHz	Horizontal	4.04 dB (k=2, 95% level of confidence)
	Vertical	4.52 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	Horizontal	4.72 dB (k=2, 95% level of confidence)
	Vertical	5.81 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.64 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.88 dB (k=2, 95% level of confidence)

### Test System Setup



The radiated emission tests were performed in the 3 meters chamber test site.

## EMI Test Receiver Setup

According to FCC 15.33 requirements, the EUT system was measured from 30 MHz to 30 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	-	Peak
Above 1 GHz	1 MHz	10 Hz	-	Average

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode for below 1 GHz, and Peak and Average for above 1 GHz.

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TDK	Chamber	Chamber A	2#	2015-10-15	2018-10-15
HP	Amplifier	HP8447E	1937A01046	2016-05-06	2017-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-12-15	2016-12-14
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Rohde & Schwarz	Auto test Software	EMC32	V9.10	NCR	NCR
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2015-12-11	2016-12-11
Mini	Pre-Amplifier	ZVA-183-S+	5969001149	2016-04-23	2017-04-23
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
TDK	Chamber	Chamber B	1#	2013-07-22	2016-07-22

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the recorded data in following table

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisor}$$

In BACL.,  $U_{(Lm)}$  is less than  $U_{cisor}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

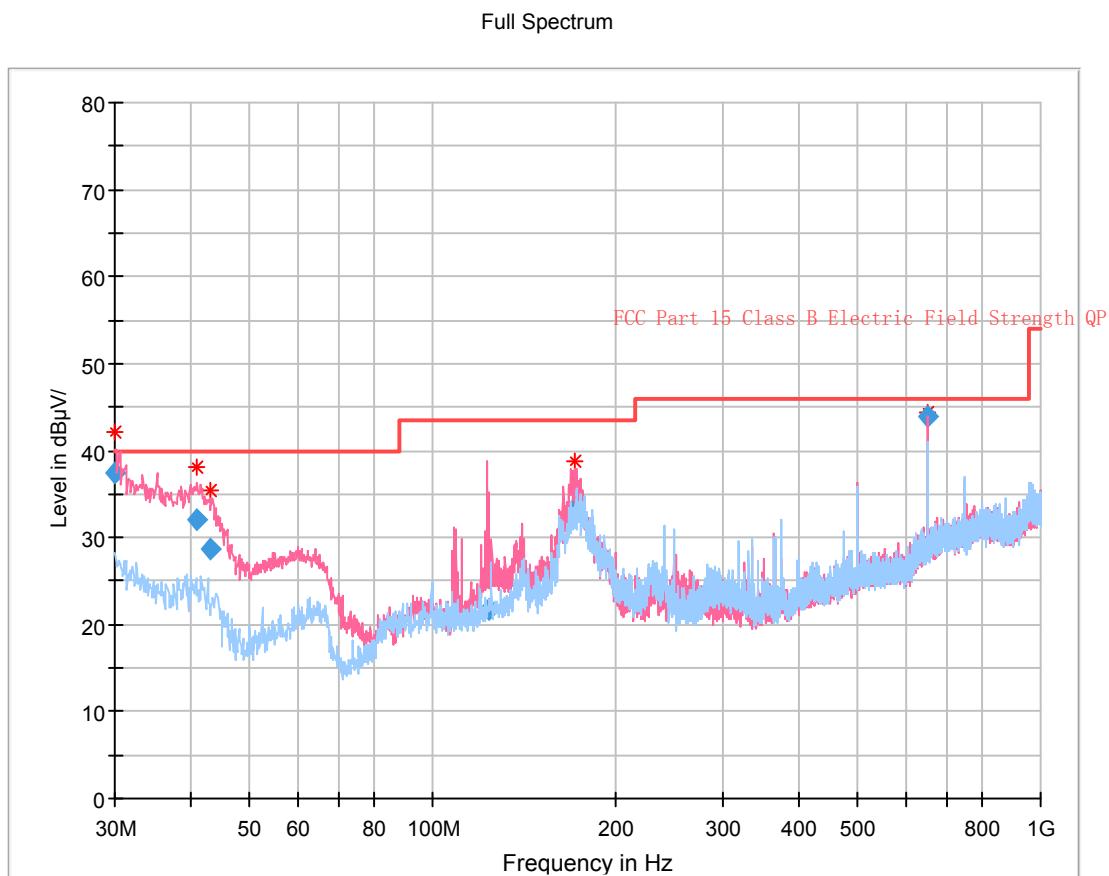
Temperature:	27 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

*The testing was performed by Simon Wang on 2016-07-09.*

*Tested mode: communication with PC*

**Powered by Adapter**

**30 MHz~1 GHz:**



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.092625	37.48	106.0	V	82.0	-1.8	40.00	2.52
40.832000	32.01	104.0	V	132.0	-8.3	40.00	7.99
43.049750	28.64	118.0	V	332.0	-10.0	40.00	11.36
123.344250	21.68	107.0	V	159.0	-7.8	43.50	21.82
171.261875	33.45	102.0	V	136.0	-8.0	43.50	10.05
650.007250	43.94	105.0	V	352.0	2.4	46.00	<b>2.06</b>

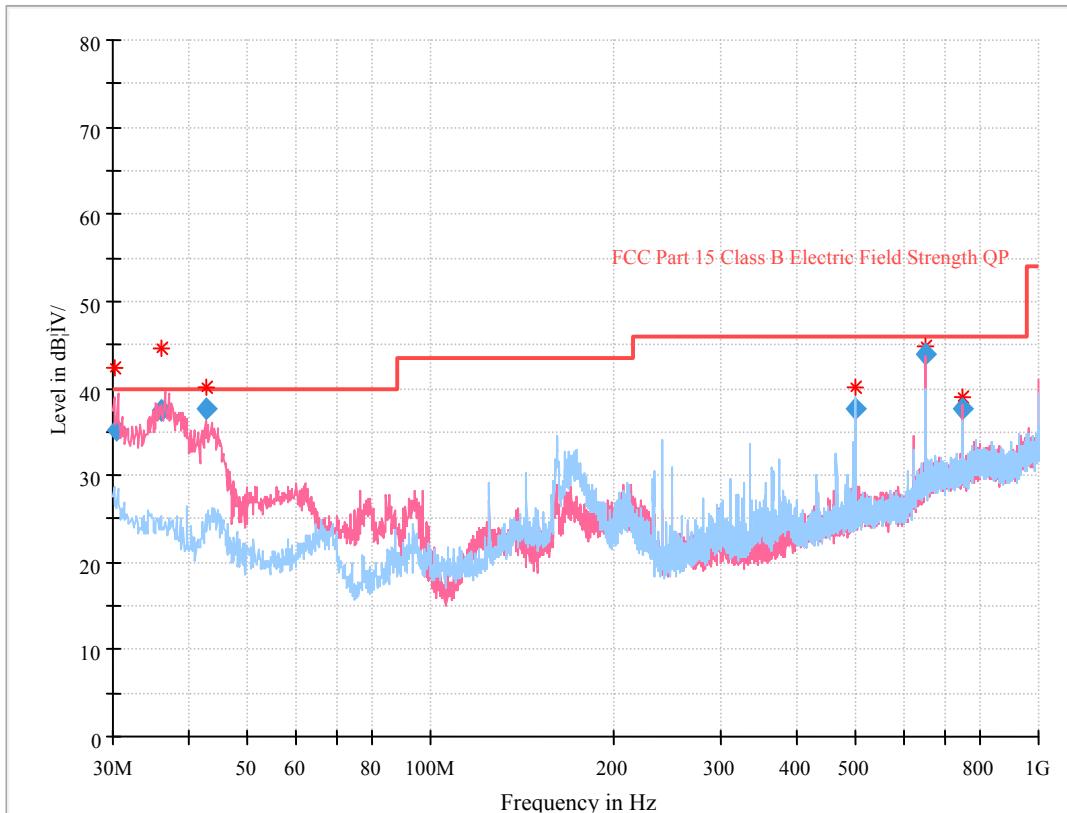
**Above 1 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dB $\mu$ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1312.6	43.01	PK	217	1.7	H	-0.38	42.63	74	31.37
1312.6	25.73	Ave.	217	1.7	H	-0.38	25.35	54	28.65
1312.6	42.35	PK	238	2.2	V	-0.38	41.97	74	32.03
1312.6	25.29	Ave.	238	2.2	V	-0.38	24.91	54	29.09

**Powered by PoE**

**30 MHz~1 GHz:**

Full Spectrum



Frequency (MHz)	Corrected Amplitude (dB $\mu$ V/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.150375	35.11	103.0	V	211.0	-1.8	40	4.89
36.135000	37.46	105.0	V	159.0	-5.3	40	2.54
42.856000	37.54	104.0	V	243.0	-9.9	40	2.46
500.020125	37.74	189.0	H	216.0	-1.5	46	8.26
650.001750	43.84	122.0	V	335.0	2.4	46	2.16
750.011000	37.59	106.0	V	118.0	3.9	46	8.41

**Above 1 GHz:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dB $\mu$ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1256.7	42.35	PK	340	1.5	H	-0.38	41.97	74	32.03
1256.7	25.63	Ave.	340	1.5	H	-0.38	25.25	54	28.75
1256.7	41.76	PK	247	2.3	V	-0.38	41.38	74	32.62
1256.7	24.98	Ave.	247	2.3	V	-0.38	24.60	54	29.40

**Note:**

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
- 3) Margin = Limit – Corrected Amplitude
- 4) The emission more than 20dB below the limit was not required to be recorded.

**\*\*\*\*\* END OF REPORT \*\*\*\*\***