

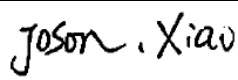
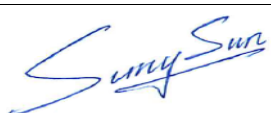
FCC PART 15B, CLASS B
MEASUREMENT AND TEST REPORT

For

Grandstream Networks, Inc.

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

FCC ID: YZZUCM6208

Report Type: Original Report	Product Type: IP PBX
Test Engineer: Joson Xiao	
Report Number: RSZ160512013-00	
Report Date: 2016-05-30	
Reviewed By: EMC Manager	
Prepared By:	
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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.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Grandstream Networks, Inc.*'s product, model number: *UCM6208 (FCC ID: YZZUCM6208)* in this report is a *IP PBX*, which was measured approximately: 44 cm (L) x 18.8 cm (W) x 4.4 cm (H), rated with input voltage: DC 12V /1.5A from power adapter or POE supply. The highest operating frequency is 1GHz.

Adapter information:

Model: F18W8-120150SPAU

Input: AC 100-240V 50/60Hz 0.6A

Output: DC 12V 1.5A

** All measurement and test data in this report was gathered from production sample serial number 1602261 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2016-05-12.*

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)

No related submittal(s).

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

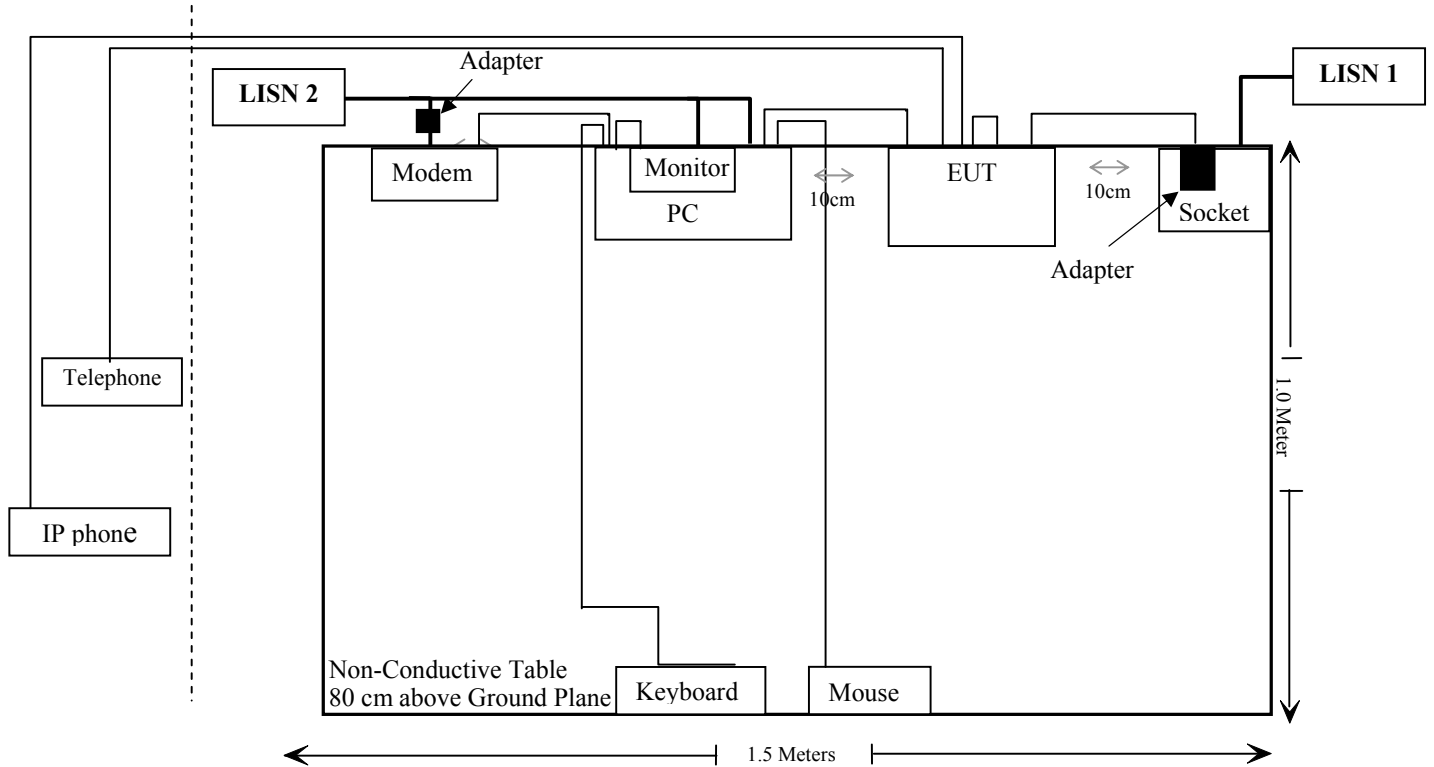
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-415K	5503290068073
DELL	Monitor	E178FPc	070072
DELL	PC	DCSCSF	127BP2X
ECOM	Modem	56000bps	21654684
LISTED	Adapter1	TYP60-1207000Z	326703
Microsoft	Keyboard	1406	0200706128743
Microsoft	Mouse	1405	0204608630856
Kingston	SD card	N/A	N/A
Tecalst	flash disk	N/A	N/A
Kinhao	Telephone	N/A	N/A
Grandstream	IP phone	GXP2130	N/A
Ligowave	POE	FAS4800070-C55	N/A

External I/O Cable

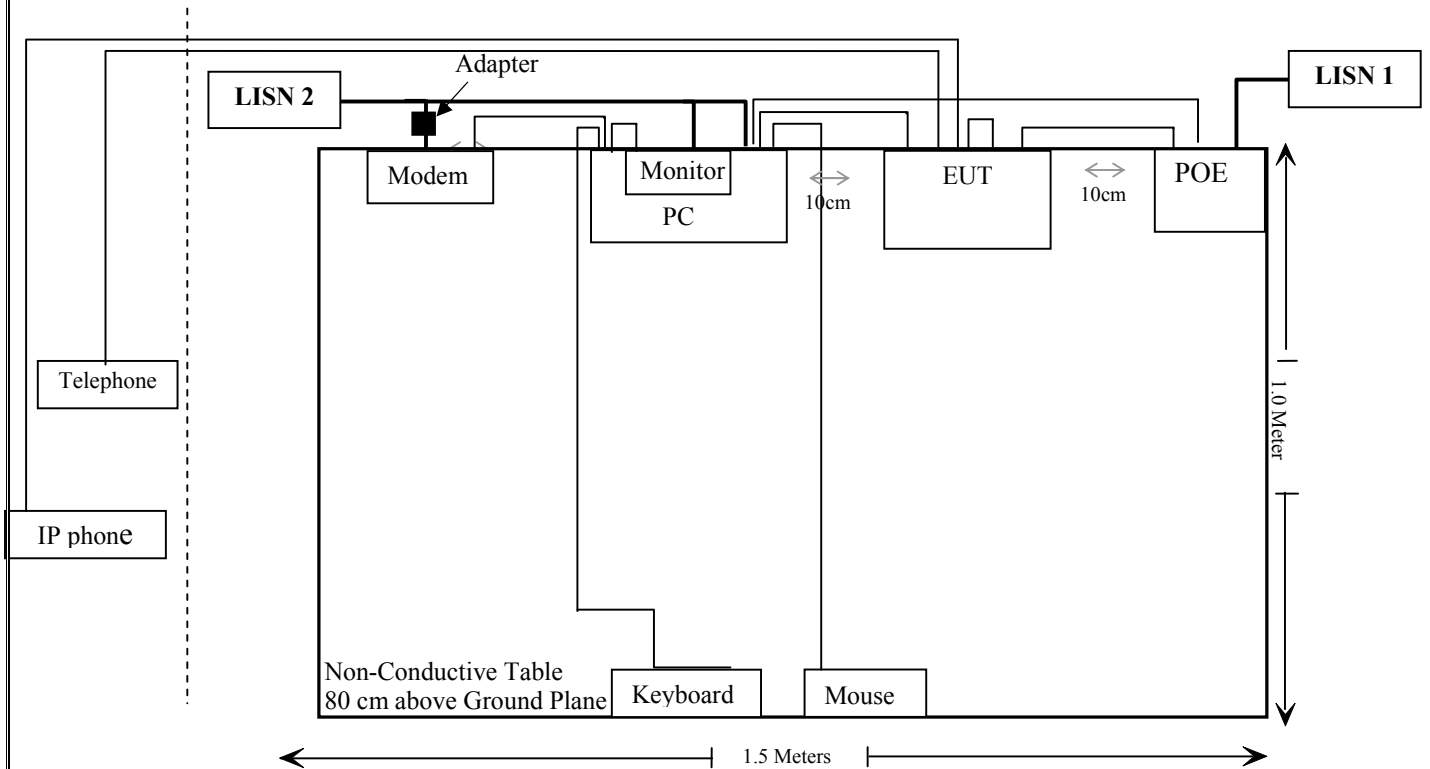
Cable Description	Length (m)	From/Port	To
Un-shielding Un-detachable AC cable	1.0	socket	Mains
Un-shielding Un-detachable DC cable	2.5	adapter	EUT
Un-shielding detachable RJ11 cable	1.4	EUT	EUT
Un-shielding detachable RJ45 cable	10.0	EUT	IP Phone
Un-shielding detachable RJ11 cable	10.0	EUT	telephone
Un-shielding detachable RJ45 cable	1.6	EUT	PC
Un-shielding detachable AC cable	1.5	PC	Mains
Un-shielding detachable AC cable	1.5	Monitor	Mains
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	adapter1
Un-shielding detachable AC cable	1.5	adapter1	Mains
Un-shielding detachable AC cable	1.0	POE	Mains
Un-shielding detachable RJ45 cable	1.4	POE	EUT
Un-shielding detachable RJ45 cable	1.8	POE	PC

Block Diagram of Test Setup

Test Set up Connect: Power by adapter



Test Set up Connect: Power by POE



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§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

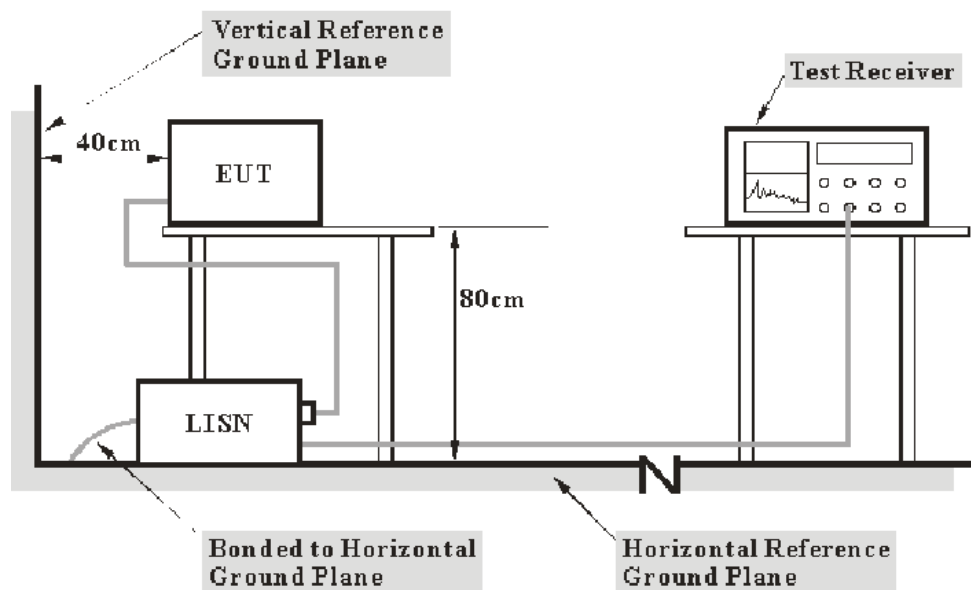
Measurement Uncertainty

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 (AMN) 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, the worst margin reading as below:

8.8 dB at 12.045250 MHz in the **Line** conducted mode from Power by POE

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

$$L_m + U_{(L_m)} \leq L_{\text{lim}} + U_{\text{cispr}}$$

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

Test Data

Environmental Conditions

Temperature:	24~27 °C
Relative Humidity:	53~60 %
ATM Pressure:	101.0 kPa

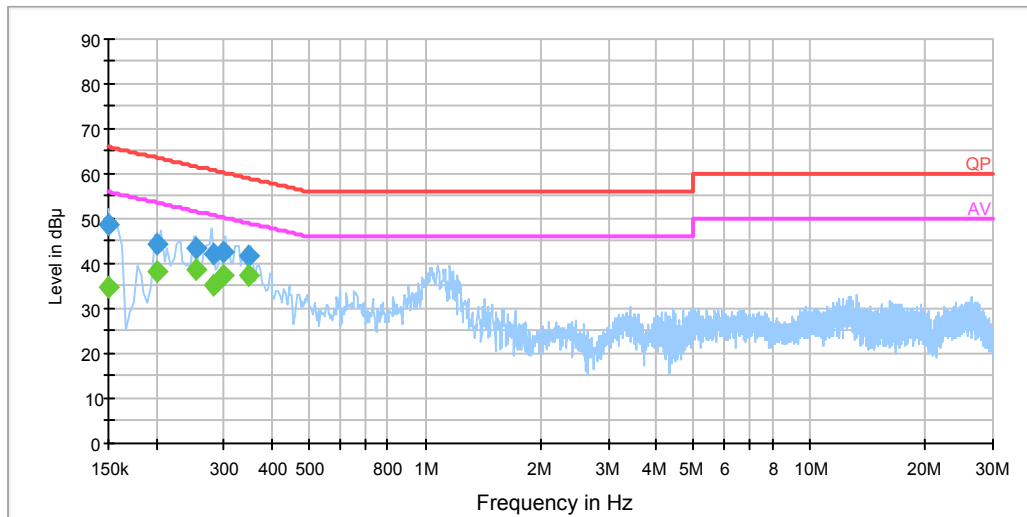
The testing was performed by Joson Xiao from 2016-06-01 to 2016-06-10.

EUT operation mode: Transmitting

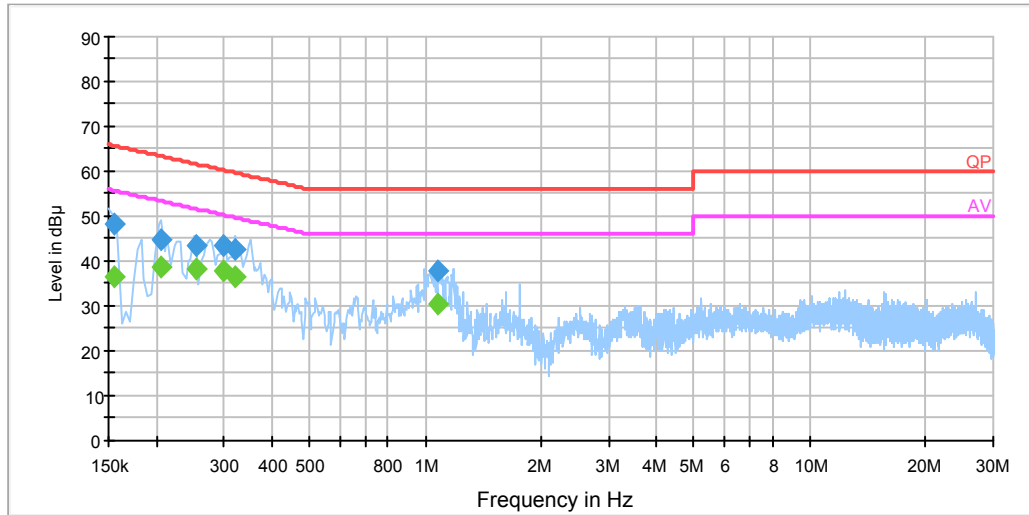
Test Set up Connect: Power by adapter

AC 120V/60 Hz, Line

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.150000	48.7	20.0	66.0	17.3	QP
0.201500	44.5	20.0	63.5	19.0	QP
0.253500	43.7	19.9	61.6	17.9	QP
0.281500	42.1	19.9	60.8	18.7	QP
0.297470	42.7	19.9	60.3	17.6	QP
0.348750	41.8	19.9	59.0	17.2	QP
0.150000	34.9	20.0	56.0	21.1	Ave.
0.201500	38.4	20.0	53.5	15.1	Ave.
0.253500	38.7	19.9	51.6	12.9	Ave.
0.281500	35.0	19.9	50.8	15.8	Ave.
0.297470	37.6	19.9	50.3	12.7	Ave.
0.348750	37.3	19.9	49.0	11.7	Ave.

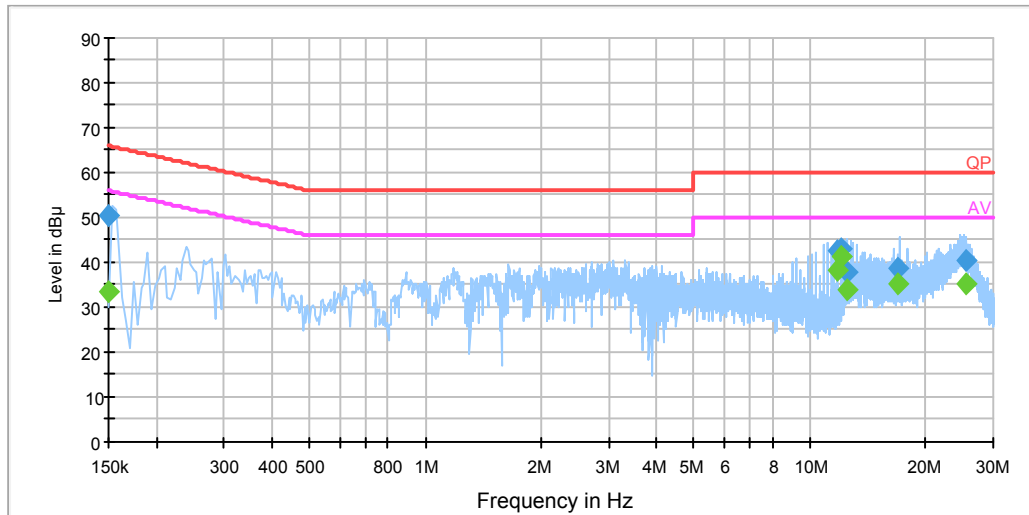
AC 120V/60 Hz, Neutral**EMI Auto Test N**

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.154500	48.1	20.0	65.8	17.7	QP
0.205500	45.0	20.0	63.4	18.4	QP
0.254500	43.4	19.9	61.6	18.2	QP
0.297470	43.5	19.9	60.3	16.8	QP
0.321170	42.7	19.9	59.7	17.0	QP
1.077650	38.0	20.0	56.0	18.0	QP
0.154500	36.7	20.0	55.8	19.1	Ave.
0.205500	38.8	20.0	53.4	14.6	Ave.
0.254500	38.1	19.9	51.6	13.5	Ave.
0.297470	38.0	19.9	50.3	12.3	Ave.
0.321170	36.5	19.9	49.7	13.2	Ave.
1.077650	30.4	20.0	46.0	15.6	Ave.

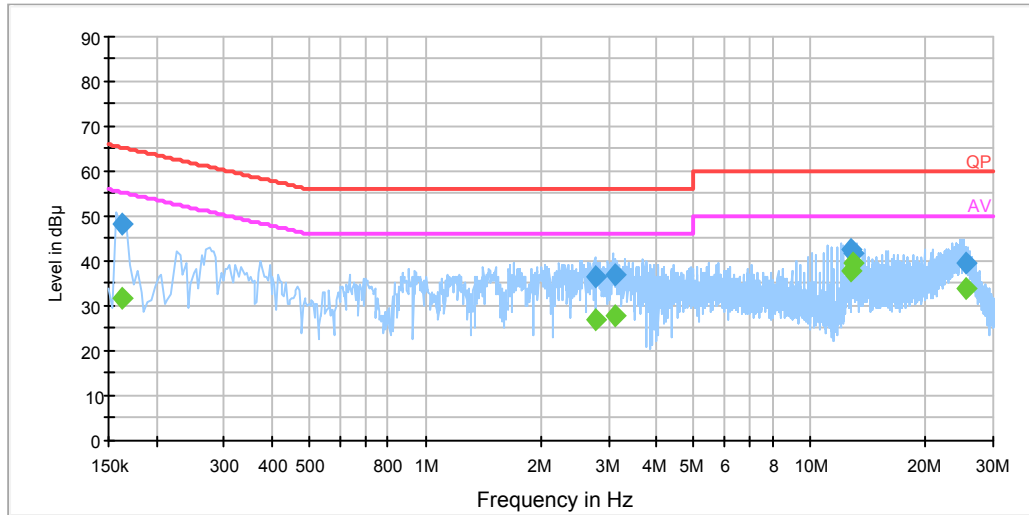
Test Set up Connect: Power by POE

AC 120V/60 Hz, Line

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.150000	50.3	20.0	66.0	15.7	QP
11.808790	42.7	20.1	60.0	17.3	QP
12.045250	43.0	20.1	60.0	17.0	QP
12.518170	38.0	20.1	60.0	22.0	QP
16.997050	38.9	20.1	60.0	21.1	QP
25.514890	40.4	20.2	60.0	19.6	QP
0.150000	33.6	20.0	56.0	22.4	Ave.
11.808790	38.1	20.1	50.0	11.9	Ave.
12.045250	41.2	20.1	50.0	8.8	Ave.
12.518170	33.9	20.1	50.0	16.1	Ave.
16.997050	35.1	20.1	50.0	14.9	Ave.
25.514890	35.1	20.2	50.0	14.9	Ave.

AC 120V/60 Hz, Neutral**EMI Auto Test N**

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.162500	48.1	20.0	65.3	17.3	QP
2.760570	36.4	20.0	56.0	19.6	QP
3.099950	37.0	20.0	56.0	19.0	QP
12.746810	42.5	20.1	60.0	17.5	QP
12.979270	41.9	20.1	60.0	18.1	QP
25.350070	39.5	20.2	60.0	20.5	QP
0.162500	31.8	20.0	55.3	23.6	Ave.
2.760570	26.9	20.0	46.0	19.1	Ave.
3.099950	27.9	20.0	46.0	18.2	Ave.
12.746810	37.8	20.1	50.0	12.2	Ave.
12.979270	39.6	20.1	50.0	10.4	Ave.
25.350070	34.1	20.2	50.0	15.9	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

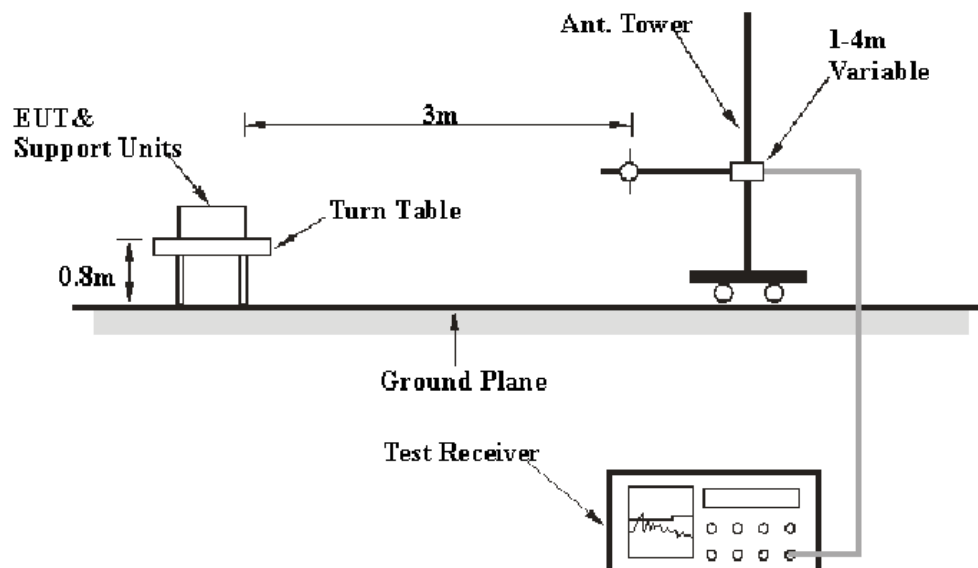
Measurement Uncertainty

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 expanded 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
30MHz~200MHz	Horizontal	4.04 dB (k=2, 95% level of confidence)
	Vertical	4.52 dB (k=2, 95% level of confidence)
200MHz~1GHz	Horizontal	4.72 dB (k=2, 95% level of confidence)
	Vertical	5.81 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 5GHz.

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
1 GHz – 5 GHz	1 MHz	3 MHz	-	Peak
1 GHz – 5 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, the worst margin reading as below:

5.05 dB at 374.982250 MHz in the Vertical polarization. From Power by adapter

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

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

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

Test Data

Environmental Conditions

Temperature:	24~27 °C
Relative Humidity:	53~60 %
ATM Pressure:	101.0 kPa

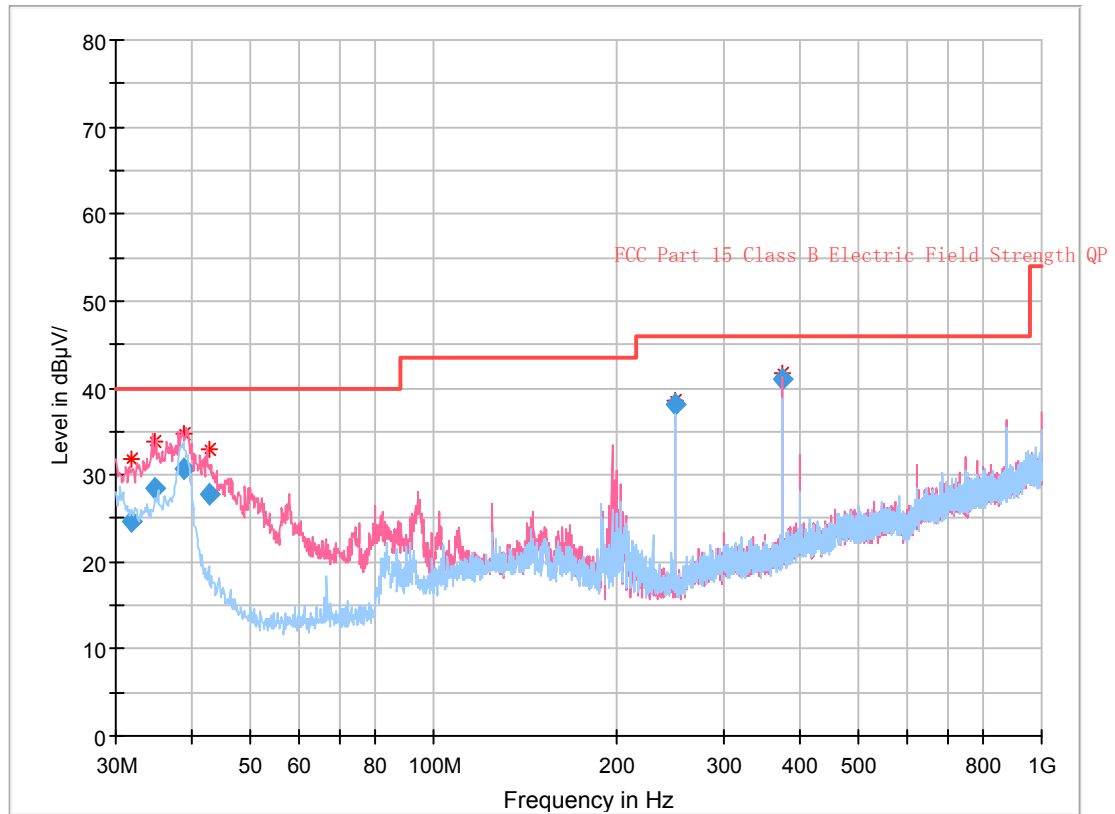
The testing was performed by Joson Xiao from 2016-05-26 to 2016-06-10.

Test mode: Transmitting

Test Set up Connect: Power by adapter

30 MHz~1 GHz:

Full Spectrum



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
31.716625	24.65	123.0	V	16.0	-1.4	40.00	15.35
34.705625	28.39	100.0	V	226.0	-3.9	40.00	11.61
38.785750	30.69	107.0	V	166.0	-6.6	40.00	9.31
42.658250	27.70	110.0	V	26.0	-9.4	40.00	12.30
249.992000	38.18	100.0	V	57.0	-8.6	46.00	7.82
374.982250	40.95	104.0	V	50.0	-5.4	46.00	5.05

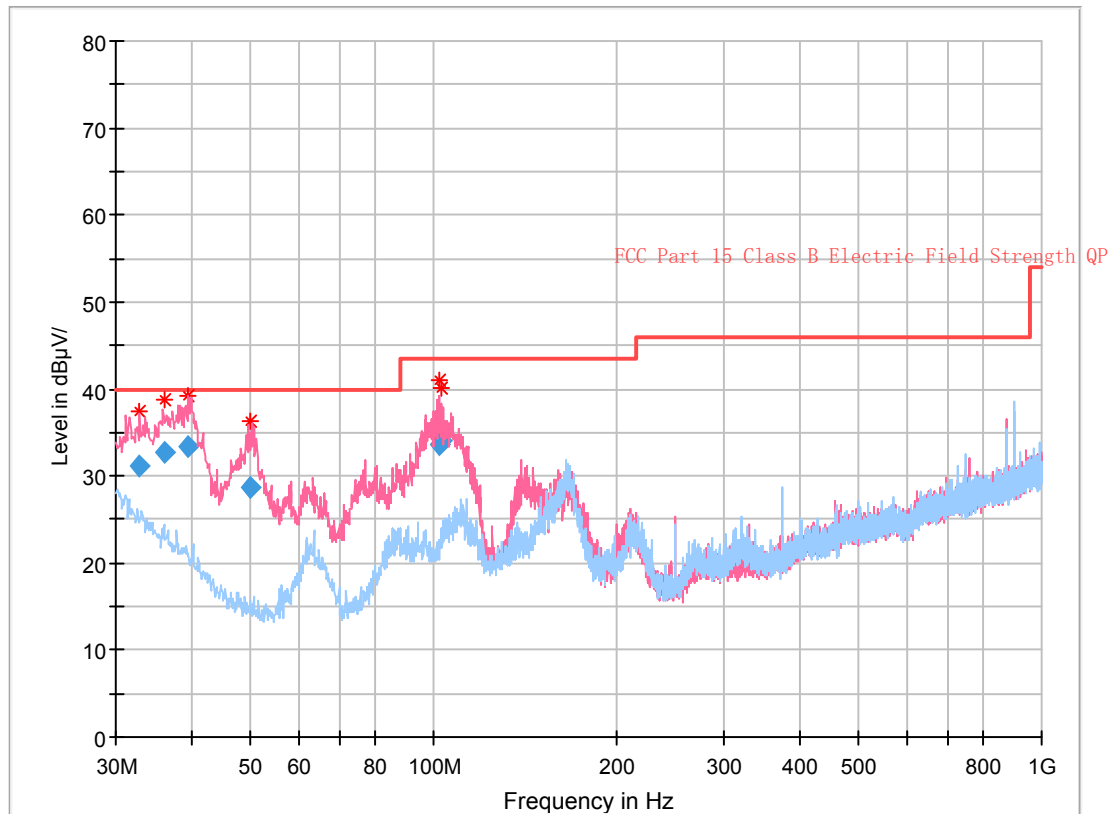
Above 1 GHz:

Frequency	Receiver		Turntable	Rx Antenna		Corrected	Corrected	FCC Part 15B	
(MHz)	Reading (dBμV)	Detector PK/QP/AV	Degree	Height (m)	Polar (H / V)	Factor (dB/m)	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1124.94	51.58	PK	343	1.3	H	-12.07	39.51	74	34.49
1124.94	43.51	Ave.	343	1.3	H	-12.07	31.44	54	22.56
1125.11	52.11	PK	256	1.8	V	-12.07	40.04	74	33.96
1125.11	45.68	Ave.	256	1.8	V	-12.07	33.61	54	20.39
1886.73	46.38	PK	333	2.2	H	-9.83	36.55	74	37.45
1886.73	30.98	Ave.	333	2.2	H	-9.83	21.15	54	32.85
1886.32	48.61	PK	293	1.5	V	-9.83	38.78	74	35.22
1886.32	31.54	Ave.	293	1.5	V	-9.83	21.71	54	32.29

Test Set up Connect: Power by POE

30 MHz~1 GHz:

Full Spectrum



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
32.887875	31.18	105.0	V	100.0	-2.4	40.00	8.82
36.141625	32.68	117.0	V	100.0	-4.9	40.00	7.32
39.456750	33.28	133.0	V	183.0	-7.0	40.00	6.72
50.045500	28.74	170.0	V	121.0	-13.6	40.00	11.26
102.526750	33.65	100.0	V	312.0	-10.0	43.50	9.85
103.218125	33.95	108.0	V	296.0	-9.8	43.50	9.55

Above 1 GHz:

Frequency	Receiver		Turntable	Rx Antenna		Corrected	Corrected	FCC Part 15B	
(MHz)	Reading (dBμV)	Detector PK/QP/AV	Degree	Height (m)	Polar (H / V)	Factor (dB/m)	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1125.86	52.06	PK	351	1.4	H	-12.07	39.99	74	34.01
1125.86	44.27	Ave.	351	1.4	H	-12.07	32.2	54	21.8
1885.98	50.36	PK	328	2.2	H	-9.83	40.53	74	33.47
1885.98	32.03	Ave.	328	2.2	H	-9.83	22.2	54	31.8

Note:

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

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