

FCC PART 15B, CLASS B
MEASUREMENT AND TEST REPORT

For

Grandstream Networks, Inc.

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

FCC ID: YZZGVC3210

Report Type: Original Report	Product Type: Video Conference System
Report Number: RSZ171115010-00A	
Report Date: 2017-12-11	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Grandstream Networks, Inc.*'s product, model number: *GVC3210 (FCC ID: YZZGVC3210)* in this report was a *Video Conference System*, which was measured approximately: 270 mm (L) * 45 mm (W) * 80 mm (H), rated with input voltage: DC 12 V from adapter. The highest operation frequency is 5825MHz.

Adapter 1 Information (MASS POWER):

Model: NBS24J120200HU

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

Output: 12.0 V, 2.0A

Adapter 2 Information (SHENZHEN FRECOM ELECTRONICS CO., LTD.):

Model: F24W5-120200SPAU

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

Output: 12V, 2A

Adapter 3 Information (Shenzhen Sunlight Electronic Technology Co., Ltd):

Model: F24US1200200A

Input: 100-240V ~ 50/60Hz, 1.0A max

Output: 12V, 2A

**All measurement and test data in this report was gathered from production sample serial number: 1702517 (Assigned by BACL, shenzhen).The EUT supplied by the applicant was received on 2017-11-15.*

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&DSS, FCC Part 15.407 NII submissions with FCC ID: YZZGVC3210 and part of system with Bluetooth Remote Control submission with FCC ID: YZZGVC3210RMT.

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 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

Parameter		uncertainty
Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 382179, the FCC Designation No.: CN5001.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in normal condition.

Test Mode 1: HDMI&Playing&Display with computer&Talking with each other (Base 1 to Base 2 via RJ45 Cable)

EUT Exercise Software

No exercise software was used.

Equipment Modifications

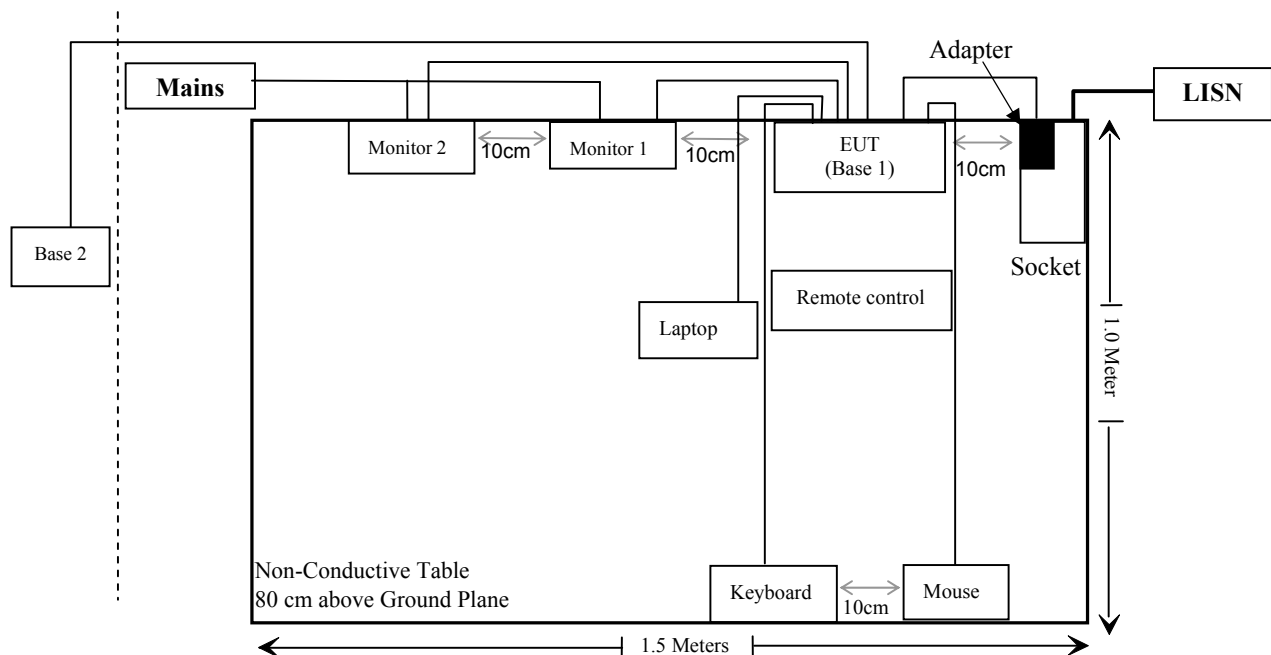
No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
SAMSUNG	Monitor 1	225MS	N/A
DELL	Monitor 2	ST2420Lb	CN-0X0K27-74261-2AF-090U
Sandisk	T-F card	N/A	3491
BULL	Socket	GN-415K	5503290068073
HP	Laptop	CQ45-m02TU	5CG33407QL
LISTED	Adapter	TYP60-1207000Z	326703
Microsoft	Keyboard	1406	0200706128743
Microsoft	Mouse	1405	0204608630856

External I/O Cable

NO.	Cable Description	Length (m)	From/Port	To
1	Un-shielding detachable AC cable	1.2	Monitor 1	Mains
2	Un-shielding detachable AC cable	1.2	Monitor 2	Mains
3	Un-shielding Detachable AC Cable	1.0	Socket	LISN
4	Un-shielding Un-detachable DC Cable	3.0	EUT	Adapter
5	Un-shielding Un-detachable HDMI Cable With Ferrite Core	4.3	Monitor 1	EUT
6	Un-shielding Un-detachable HDMI Cable With Ferrite Core	4.3	Monitor 2	EUT
7	Un-shielding Un-detachable HDMI Cable With Ferrite Core	4.3	EUT	Laptop
8	Shielding Un-detachable USB Cable	1.2	Mouse	EUT
9	Un-shielding Un-detachable AC cable	1.0	LISN	Socket
10	Shielding Un-detachable USB cable	1.2	Keyboard	EUT
11	Un-shielding Detachable RJ45 Cable	10	EUT (Base 1)	EUT (Base 2)

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2016-12-07	2017-12-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2017-11-19	2018-05-21
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2017-11-12	2018-05-12
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Agilent	Spectrum Analyzer	8564E	3943A01781	2017-01-04	2018-01-04
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-05-21	2018-05-21
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-21
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2016-12-07	2017-12-07
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369223410-001	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	1	2017-11-19	2018-05-21
Ducommun technologies	RF Cable	RG-214	2	2017-11-19	2018-05-21
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2014-12-29	2017-12-28
Ducommun Technologies	Horn Antenna	ARH-4823-02	1007726-04	2014-12-29	2017-12-28
Ducommun Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

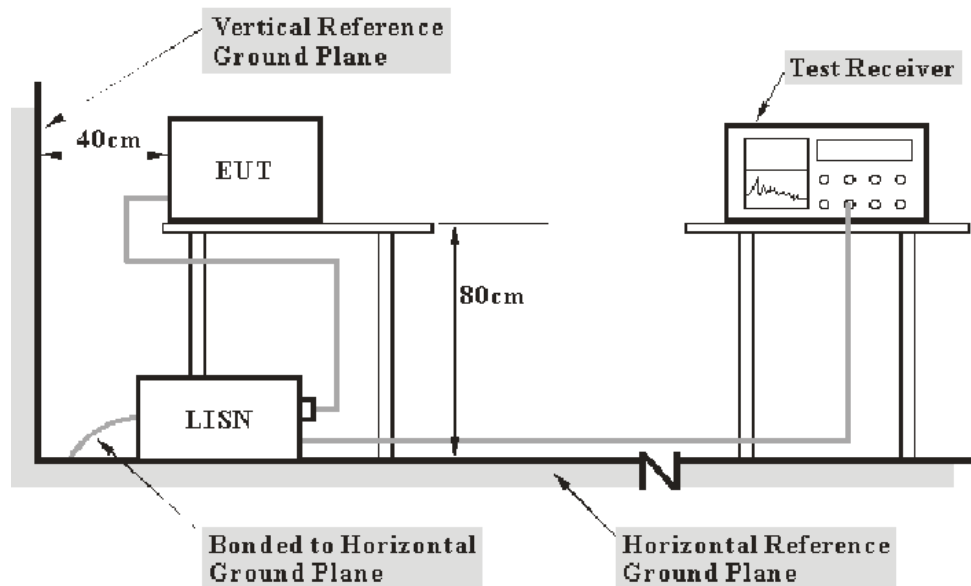
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC§15.107

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 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

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

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

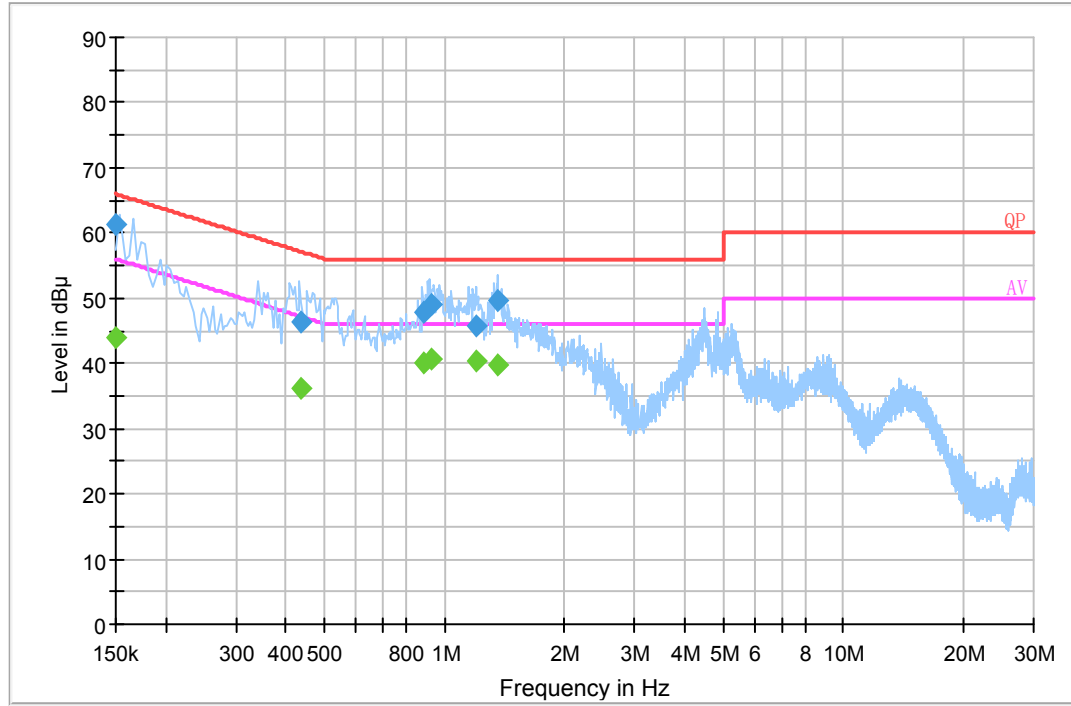
Test Data

Environmental Conditions

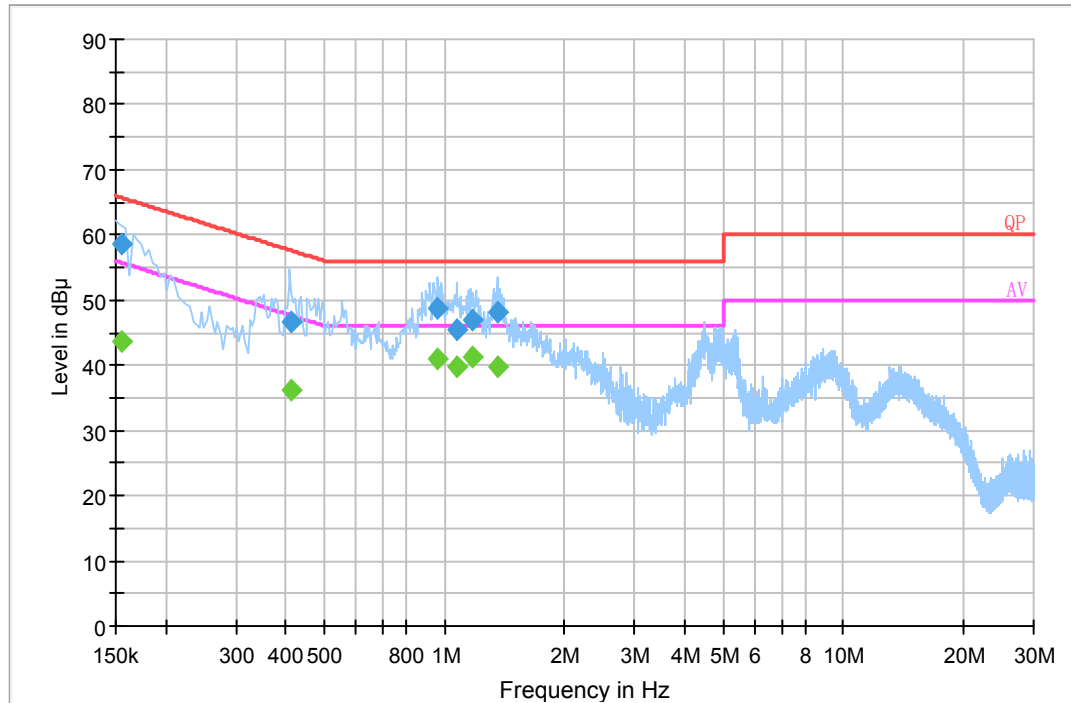
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Vincent Zheng on 2017-11-21.

Test mode 1:

For Adapter 1:**AC 120V/60 Hz, Line**

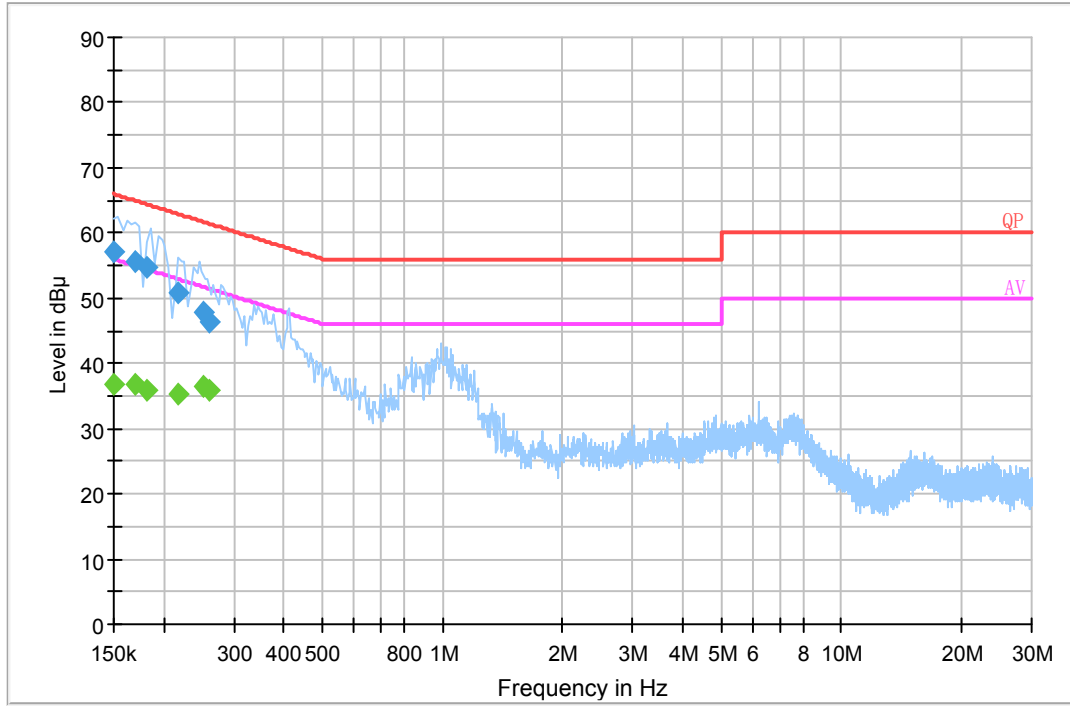
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	61.3	20.2	66.0	4.7	QP
0.435490	46.3	20.2	57.1	10.8	QP
0.884770	47.8	20.1	56.0	8.2	QP
0.932170	48.9	20.1	56.0	7.1	QP
1.207970	45.6	20.1	56.0	10.4	QP
1.357570	49.6	20.1	56.0	6.4	QP
0.150000	44.0	20.2	56.0	12.0	Ave.
0.435490	36.1	20.2	47.1	11.0	Ave.
0.884770	40.1	20.1	46.0	5.9	Ave.
0.932170	40.7	20.1	46.0	5.3	Ave.
1.207970	40.4	20.1	46.0	5.6	Ave.
1.357570	39.7	20.1	46.0	6.3	Ave.

AC 120V/60 Hz, Neutral

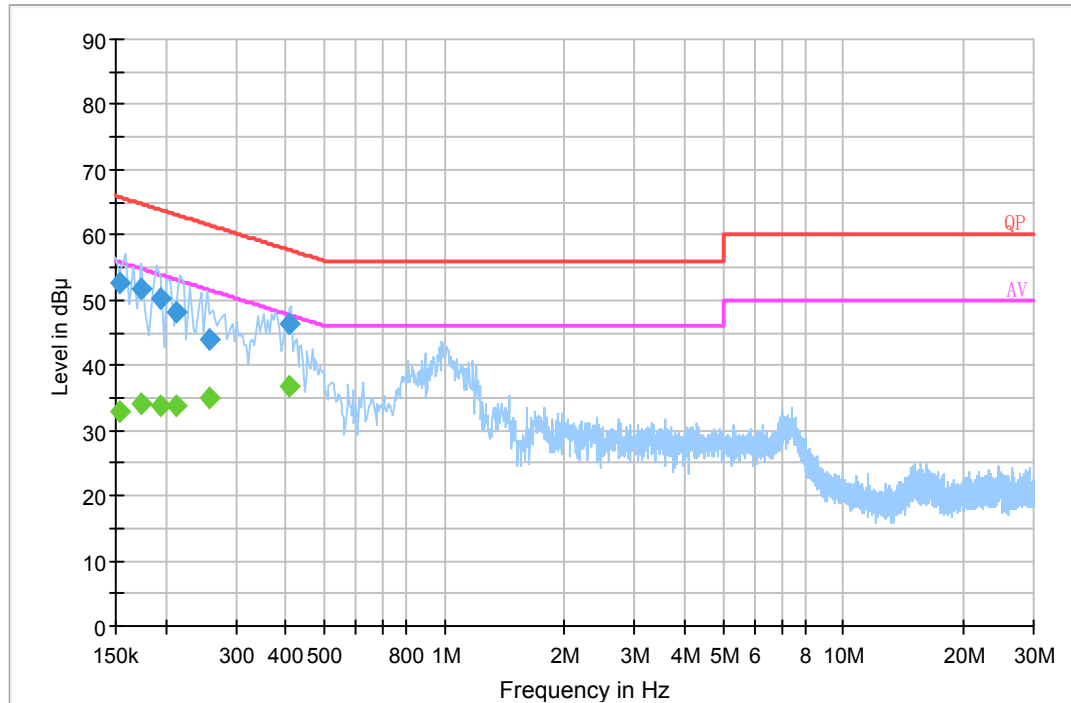
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154500	58.7	20.2	65.8	7.1	QP
0.411850	46.7	20.2	57.6	10.9	QP
0.959570	48.6	20.1	56.0	7.4	QP
1.069890	45.5	20.1	56.0	10.5	QP
1.179430	46.9	20.1	56.0	9.1	QP
1.353690	48.3	20.1	56.0	7.7	QP
0.154500	43.7	20.2	55.8	12.1	Ave.
0.411850	36.1	20.2	47.6	11.5	Ave.
0.959570	41.0	20.1	46.0	5.0	Ave.
1.069890	39.7	20.1	46.0	6.3	Ave.
1.179430	41.2	20.1	46.0	4.8	Ave.
1.353690	39.9	20.1	46.0	6.1	Ave.

Note:

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

For Adapter 2:**AC 120V/60 Hz, Line**

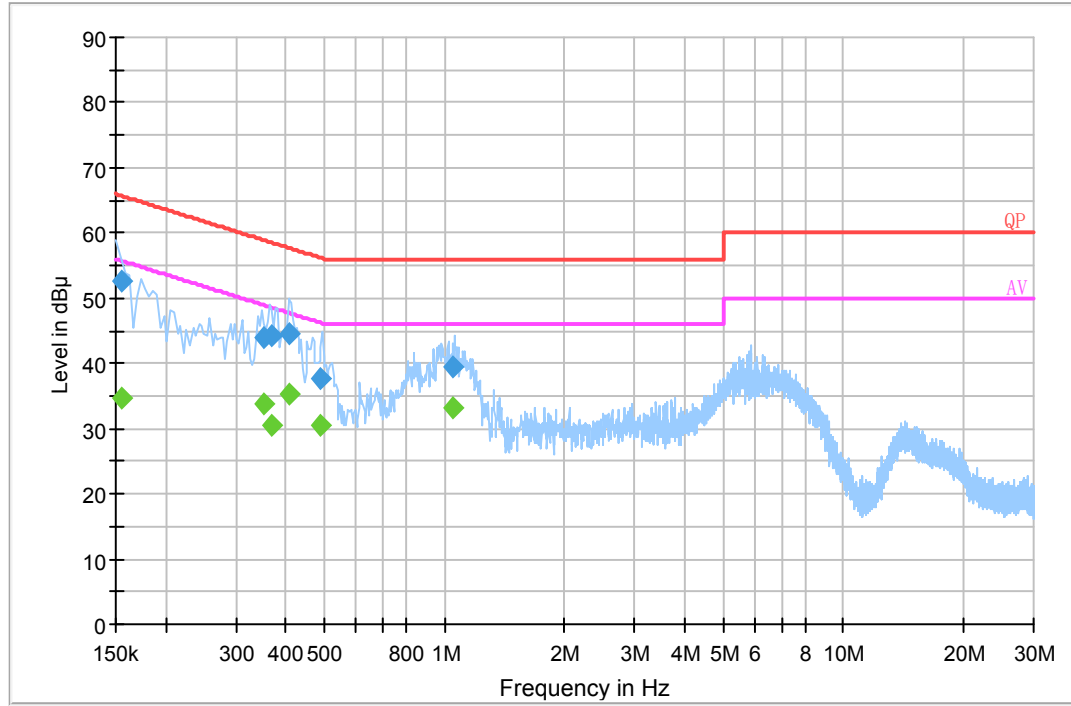
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	57.1	20.2	66.0	8.9	QP
0.169500	55.7	20.2	65.0	9.3	QP
0.181500	54.8	20.2	64.4	9.6	QP
0.217500	50.8	20.2	62.9	12.1	QP
0.250501	47.9	20.2	61.7	13.8	QP
0.261500	46.5	20.2	61.4	14.9	QP
0.150000	36.7	20.2	56.0	19.3	Ave.
0.169500	36.9	20.2	55.0	18.1	Ave.
0.181500	35.8	20.2	54.4	18.6	Ave.
0.217500	35.3	20.2	52.9	17.6	Ave.
0.250501	36.4	20.2	51.7	15.3	Ave.
0.261500	35.9	20.2	51.4	15.5	Ave.

AC 120V/60 Hz, Neutral

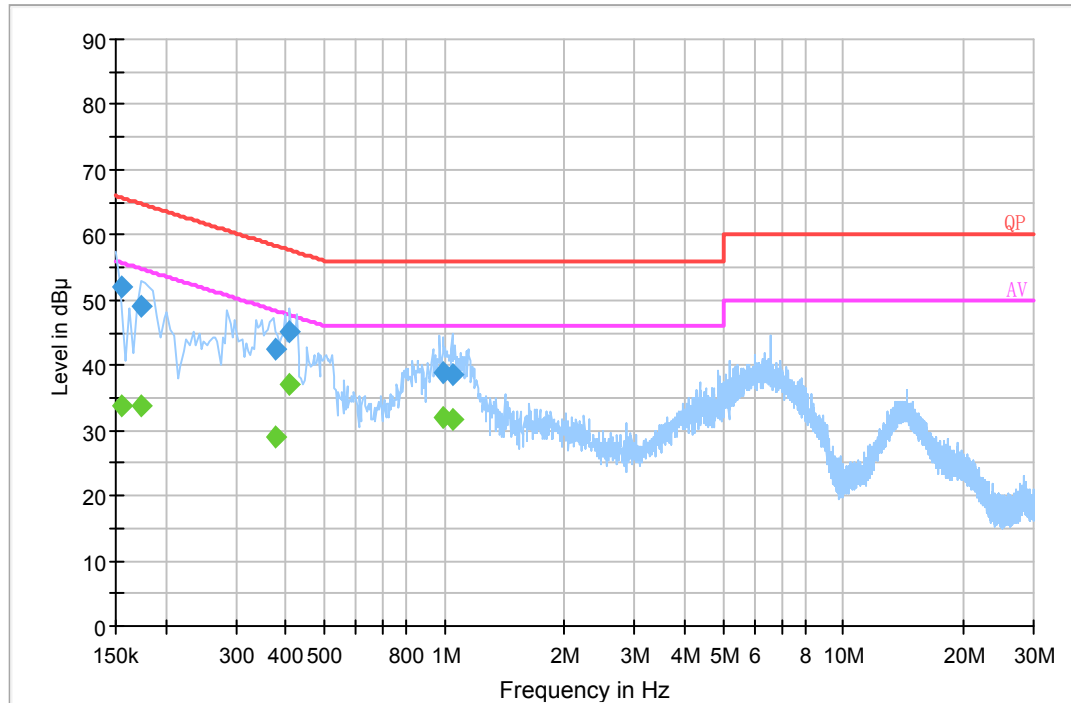
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.153500	52.8	20.2	65.8	13.0	QP
0.173500	51.9	20.2	64.8	12.9	QP
0.193500	50.2	20.2	63.9	13.7	QP
0.213500	48.0	20.2	63.1	15.1	QP
0.257500	44.1	20.2	61.5	17.4	QP
0.407790	46.5	20.2	57.7	11.2	QP
0.153500	32.9	20.2	55.8	22.9	Ave.
0.173500	34.0	20.2	54.8	20.8	Ave.
0.193500	33.6	20.2	53.9	20.3	Ave.
0.213500	33.8	20.2	53.1	19.3	Ave.
0.257500	35.1	20.2	51.5	16.4	Ave.
0.407790	36.9	20.2	47.7	10.8	Ave.

Note:

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

For Adapter 3:**AC 120V/60 Hz, Line**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154500	52.5	20.2	65.8	13.3	QP
0.352750	44.0	20.2	58.9	14.9	QP
0.368510	44.1	20.2	58.5	14.4	QP
0.407910	44.6	20.2	57.7	13.1	QP
0.486590	37.7	20.2	56.2	18.5	QP
1.046070	39.4	20.1	56.0	16.6	QP
0.154500	34.6	20.2	55.8	21.2	Ave.
0.352750	33.8	20.2	48.9	15.1	Ave.
0.368510	30.4	20.2	48.5	18.1	Ave.
0.407910	35.3	20.2	47.7	12.4	Ave.
0.486590	30.4	20.2	46.2	15.8	Ave.
1.046070	33.1	20.1	46.0	12.9	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154500	52.0	20.2	65.8	13.8	QP
0.173500	49.0	20.2	64.8	15.8	QP
0.376390	42.5	20.2	58.4	15.9	QP
0.407850	45.2	20.2	57.7	12.5	QP
0.988610	38.8	20.1	56.0	17.2	QP
1.050310	38.5	20.1	56.0	17.5	QP
0.154500	33.7	20.2	55.8	22.1	Ave.
0.173500	33.9	20.2	54.8	20.9	Ave.
0.376390	29.1	20.2	48.4	19.3	Ave.
0.407850	37.0	20.2	47.7	10.7	Ave.
0.988610	31.9	20.1	46.0	14.1	Ave.
1.050310	31.7	20.1	46.0	14.3	Ave.

Note:

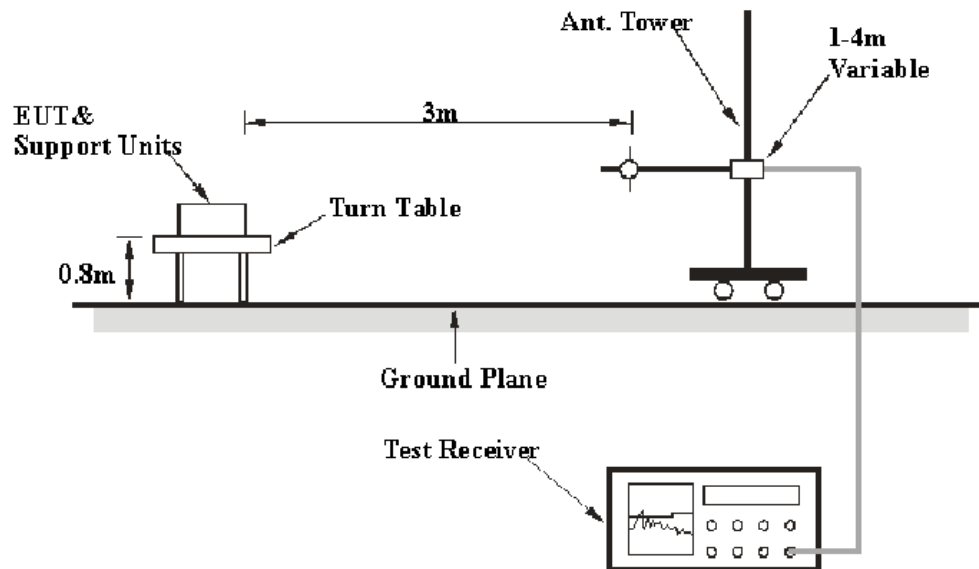
- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation
- 3) Margin = Limit – Corrected Amplitude

FCC §15.109 - RADIATED EMISSIONS

Applicable Standard

According to FCC§15.109

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 29.2 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	Measurement
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.

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

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

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.

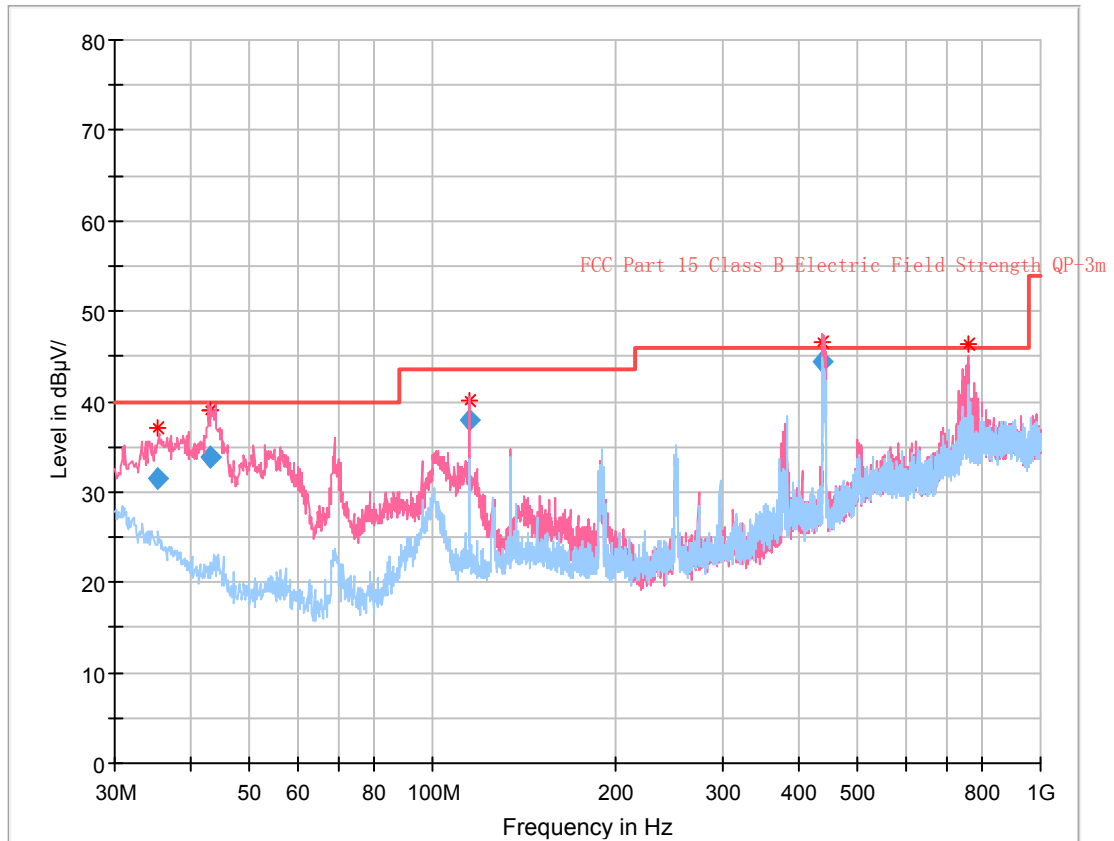
Test Data

Environmental Conditions

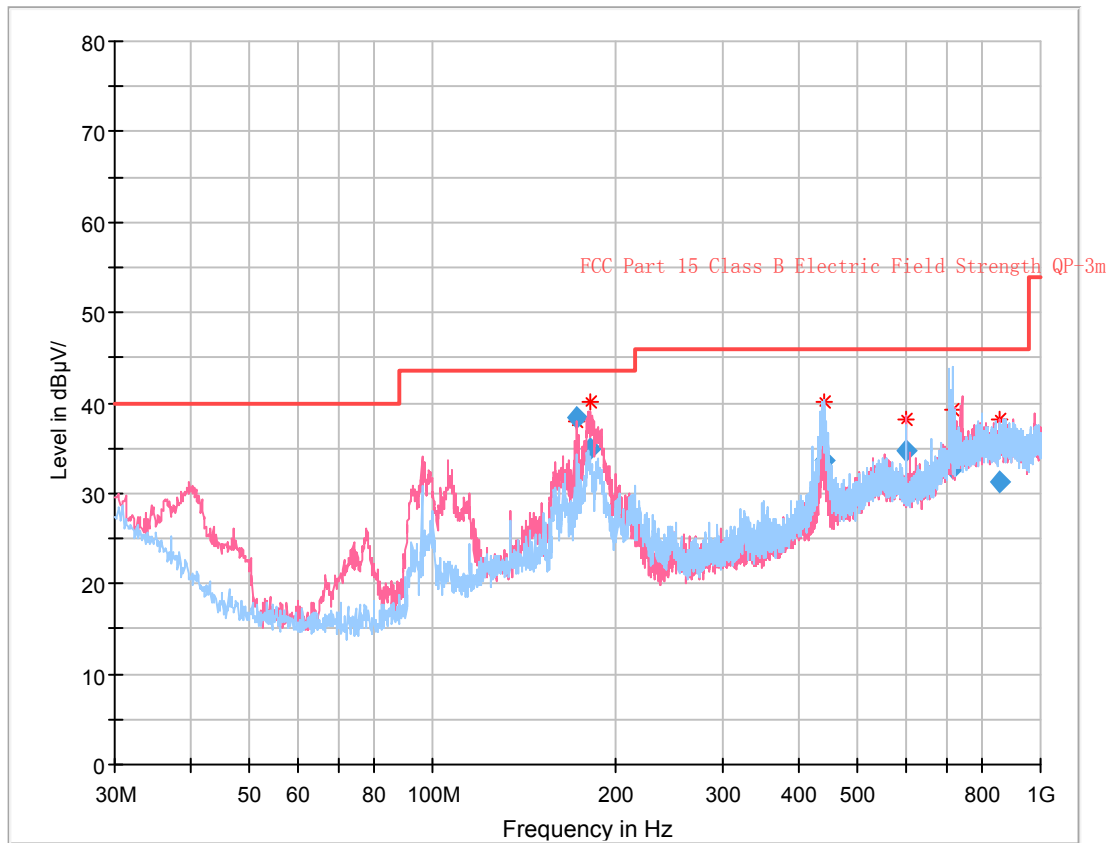
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Vincent Zheng on 2017-11-21.

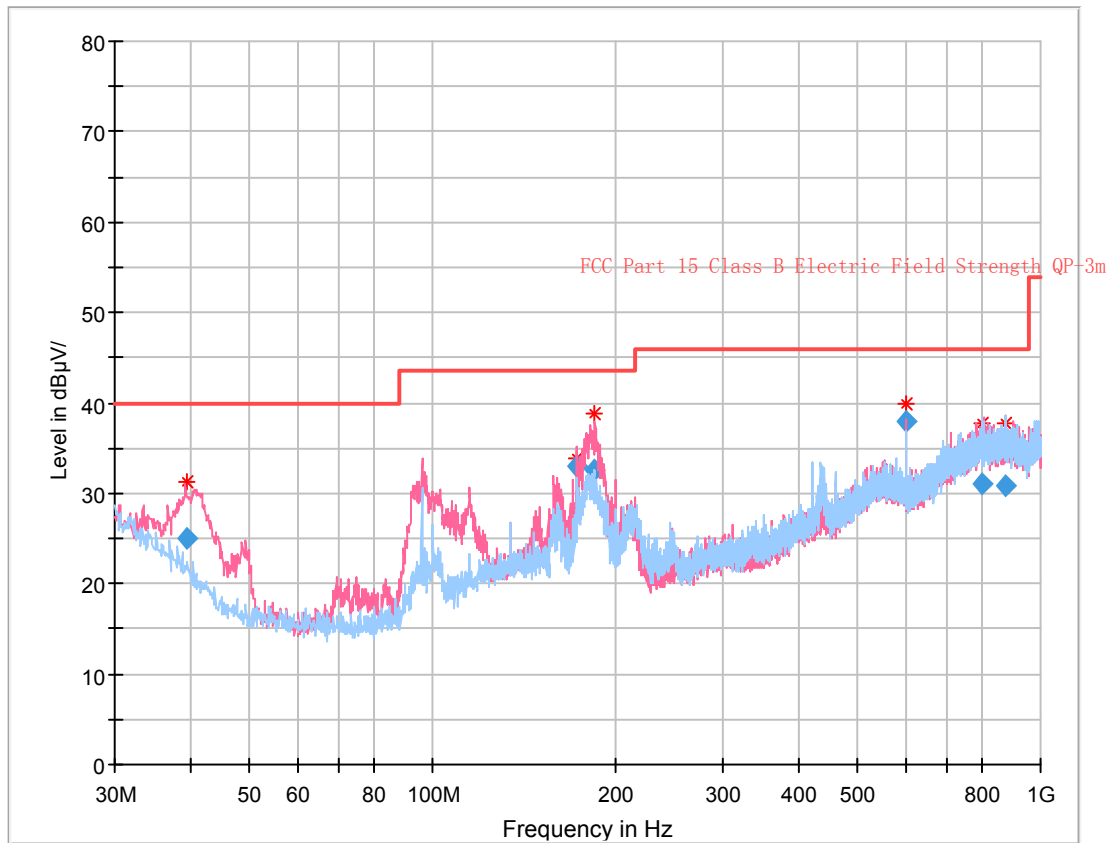
Test mode 1:

For Adapter 1:**30 MHz – 1 GHz:**

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
35.393125	31.40	100.0	V	78.0	-3.2	40.00	8.60
42.928625	33.90	107.0	V	191.0	-8.3	40.00	6.10
43.052125	33.87	115.0	V	171.0	-8.4	40.00	6.13
115.212500	37.87	100.0	V	0.0	-6.8	43.50	5.63
438.784375	44.42	160.0	V	38.0	0.2	46.00	1.58
763.173875	36.50	106.0	V	315.0	8.0	46.00	9.50

For Adapter 2:**30 MHz – 1 GHz:**

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
172.796875	38.47	105.0	V	238.0	-5.8	43.50	5.03
181.397875	34.83	107.0	V	10.0	-5.5	43.50	8.67
439.759375	33.55	105.0	H	144.0	0.2	46.00	12.45
599.968750	34.62	171.0	V	153.0	3.5	46.00	11.38
716.465500	32.83	120.0	H	150.0	7.0	46.00	13.17
855.982250	31.27	400.0	V	189.0	9.1	46.00	14.73

For Adapter 3:**30 MHz – 1 GHz:**

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
39.363625	24.99	100.0	V	329.0	-5.7	40.00	15.01
172.802875	33.02	108.0	V	263.0	-5.8	43.50	10.48
184.752875	32.58	101.0	V	31.0	-5.6	43.50	10.92
599.987125	37.98	196.0	V	95.0	3.5	46.00	8.02
800.329250	30.97	125.0	H	211.0	9.0	46.00	15.03
874.731750	30.85	202.0	H	31.0	9.4	46.00	15.15

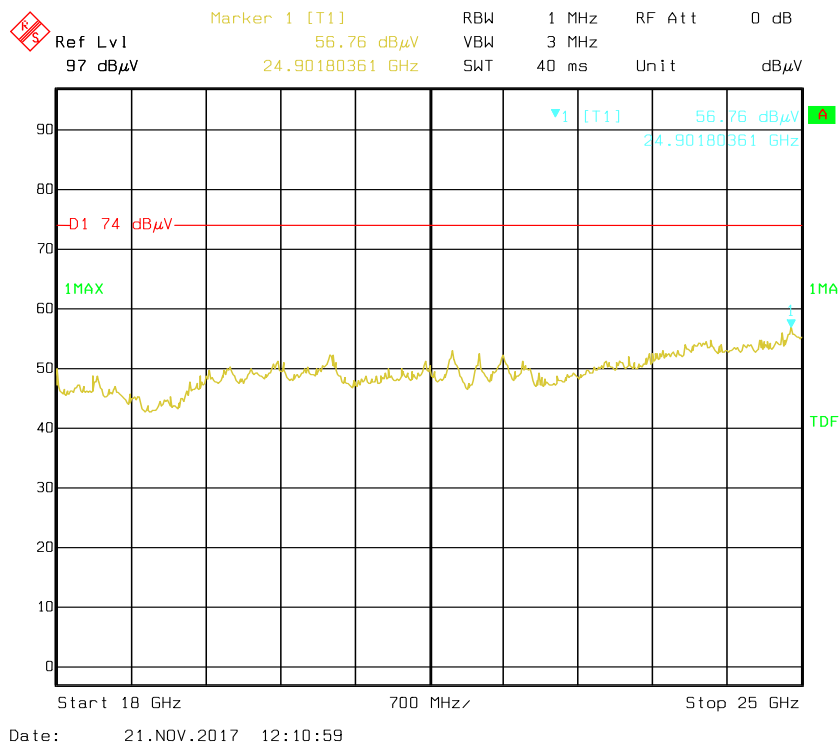
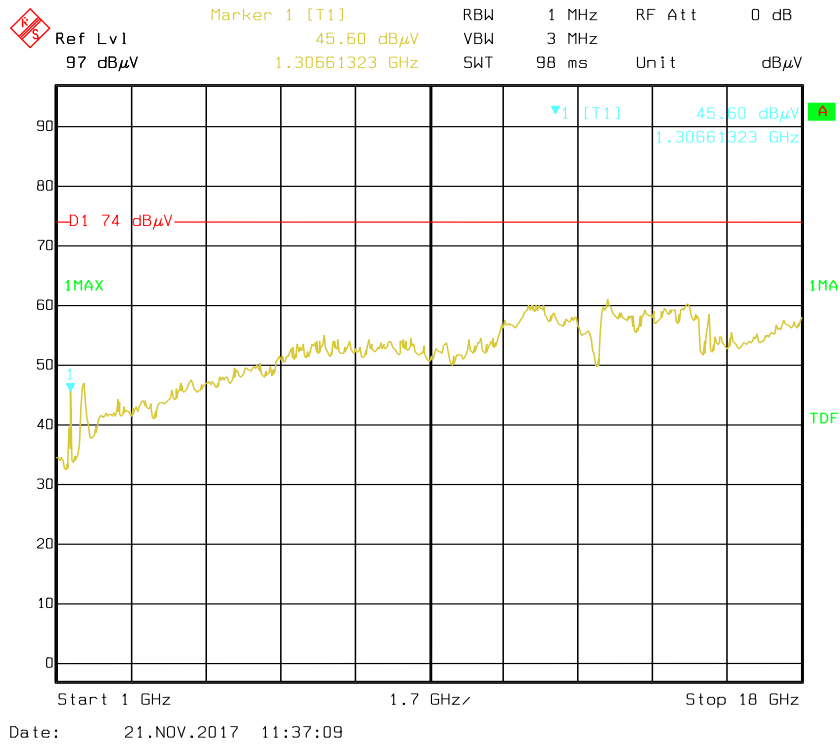
1GHz – 29.2 GHz: (worst case as below)

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
1301.76	54.76	PK	107	2.3	H	-8.04	46.72	74	27.28
1301.76	52.51	Ave.	107	2.3	H	-8.04	44.47	54	9.53
1301.76	53.43	PK	43	2.1	V	-8.04	45.39	74	28.61
1301.76	50.48	Ave.	43	2.1	V	-8.04	42.44	54	11.56
1600.00	55.32	PK	264	1.3	H	-5.35	49.97	74	24.03
1600.00	41.21	Ave.	210	1.0	H	-5.35	35.86	54	18.14
1600.00	56.17	PK	11	2.1	V	-5.35	50.82	74	23.18
1600.00	40.30	Ave.	312	1.7	V	-5.35	34.95	54	19.05

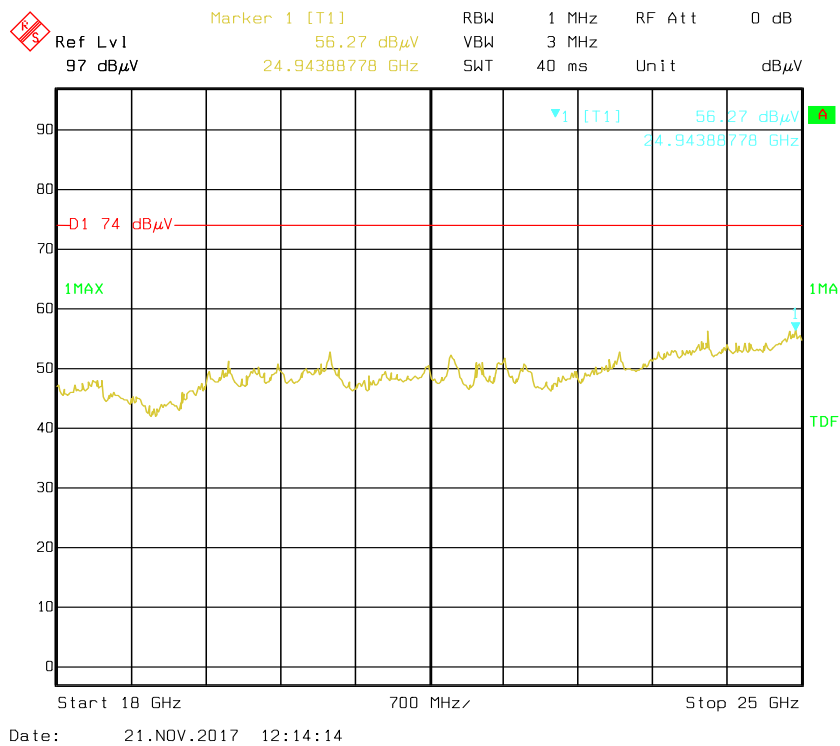
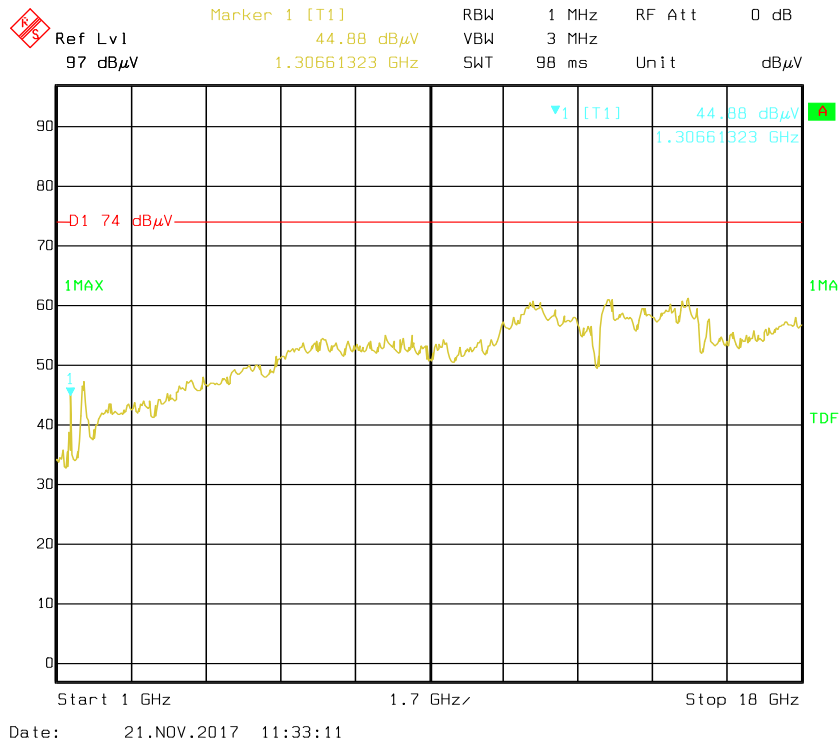
Note:

- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude
- 4) All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

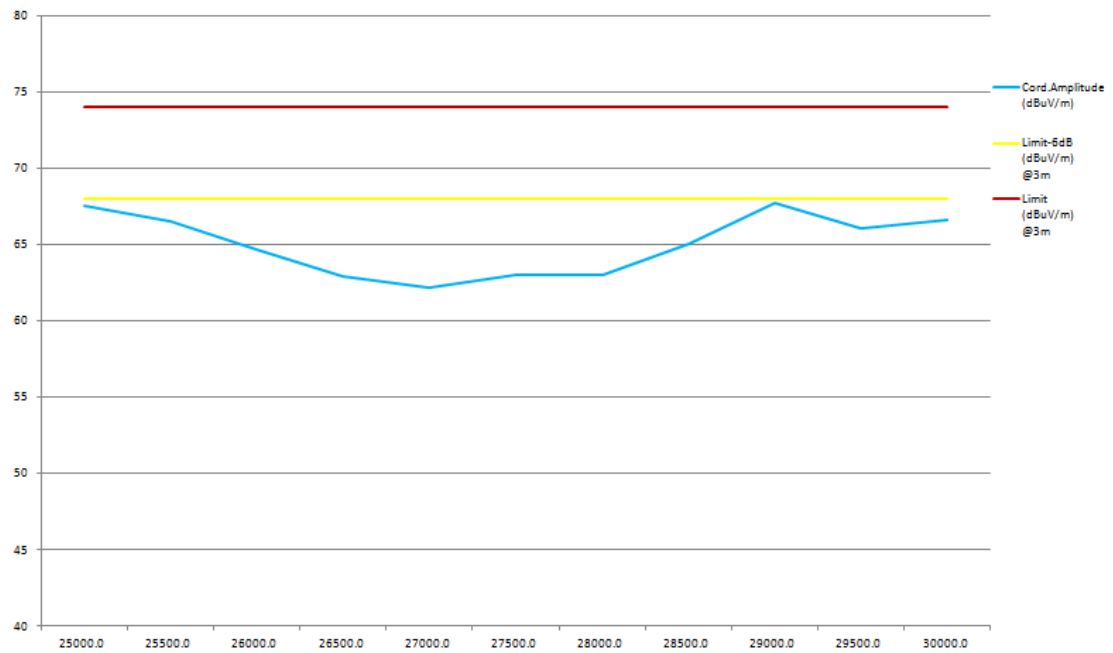
Pre-scan for Horizontal



Pre-scan for Vertical



Worst case for 25GHz to 30GHz



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