

FCC PART 15B, CLASS B TEST REPORT

For

Grandstream Networks, Inc.

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

FCC ID: YZZ-GXW4216

Report Type: Original Report	Product Type: Analog IP Gateway
Report Number: RSZ181225006-00	
Report Date: 2019-02-20	
Xiangguang Kong <i>Xiangguang Kong</i>	
Reviewed By: Engineer	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Analog IP Gateway
Tested Model	GXW4216
Voltage Range	DC 12.0V from adapter
Measure	44.0 cm (L) *18.5 cm (W) *4.4 cm (H)
Highest operating frequency	400 MHz
Date of Test	Jan 16, 2019~ Jan 23, 2019
Sample serial number	181225006
Received date	2018-12-25
Sample/EUT Status	Good condition
Adapter information	Model: NBS65A120500M3 Input: AC 100-240V, 50/60Hz, 1.5 A Output: DC 12.0V, 5.0 A

Objective

This test report is prepared on behalf of *Grandstream Networks, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A, 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)/Grant(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 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
Radiated Emissions	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.: 342867, the FCC Designation No.: CN1221.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

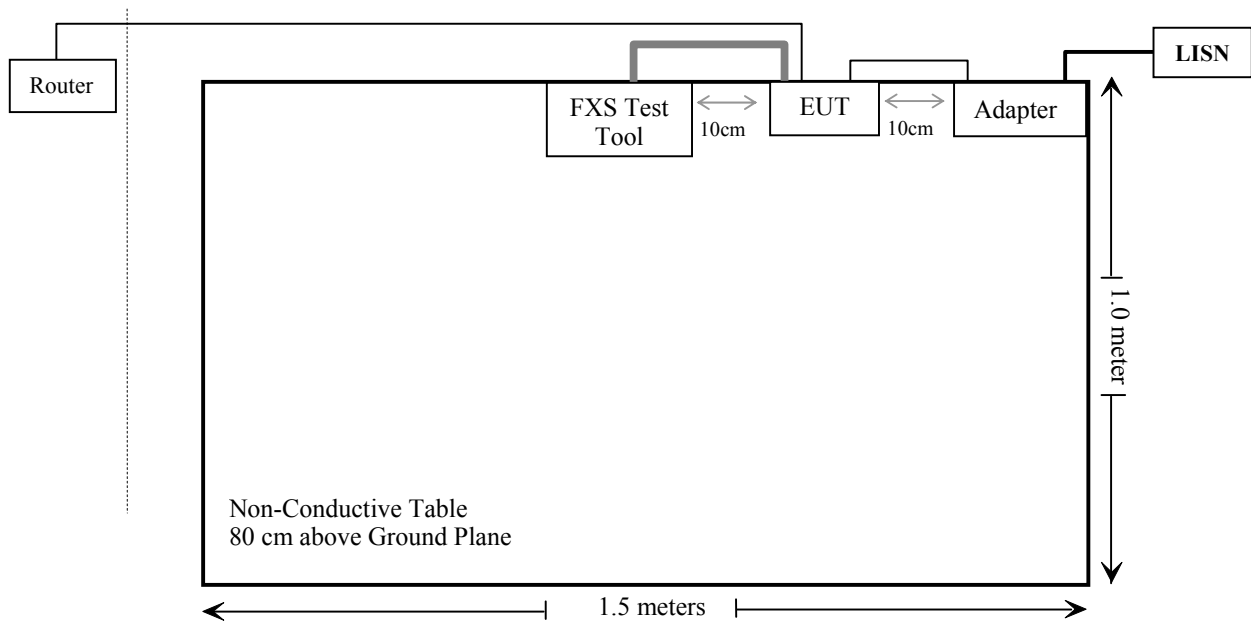
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
ASKPCB	FXS test tool	E239218	N/A
Sagem	Router	F@ST 1704N	3c81d839027c

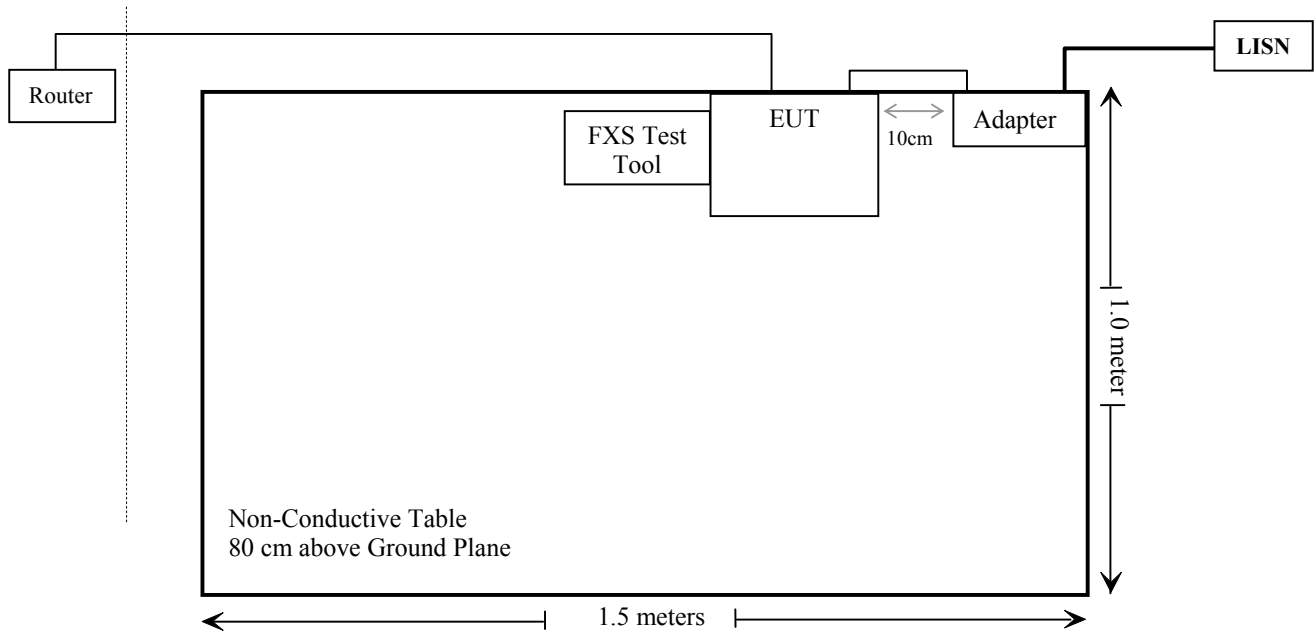
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded detachable AC cable	1.0	Adapter	LISN
Unshielded un-detachable DC cable	0.95	Adapter	EUT
Unshielded detachable RJ45 cable	10.0	EUT	Router
Unshielded detachable RJ11 cable	0.75	EUT	FXS test tool

Block Diagram of Test Setup RJ11:



50-pin Telco connectors:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Spurious 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	2018-07-11	2019-07-11
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2018-12-21	2019-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-11-12	2019-05-12
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Unknown	Conducted Emission Cable	78652	UF A210B-1-0720-504504	2018-11-12	2019-05-12
Radiated Emission Test					
A.H.System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-06-23	2019-06-23
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-05-12
Sonoma instrument	Amplifier	310N	186238	2018-11-12	2019-05-12
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019-01-11	2020-01-11
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-07-11	2021-07-10
Ducommun technologies	RF Cable	104PEA	218124002	2018-11-12	2019-05-12
Ducommun technologies	RF Cable	RG-214	1	2018-11-12	2019-05-12
Ducommun technologies	RF Cable	RG-214	2	2018-11-12	2019-05-12
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR

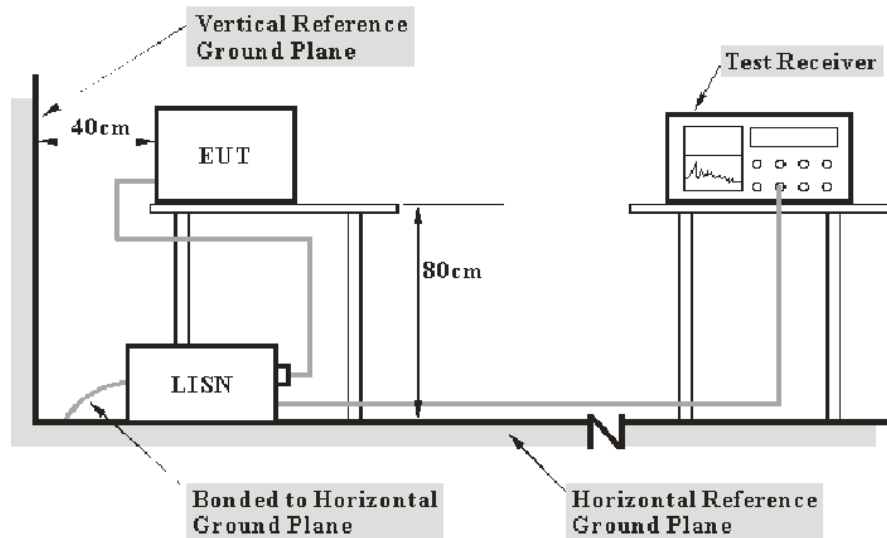
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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 per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

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

During the conducted emission test, the host PC was connected to the first LISN and the other relevant equipments were connected to the second LISN.

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

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

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN 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 7 dB 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 EUT complied with the FCC Part 15.107,

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

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

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

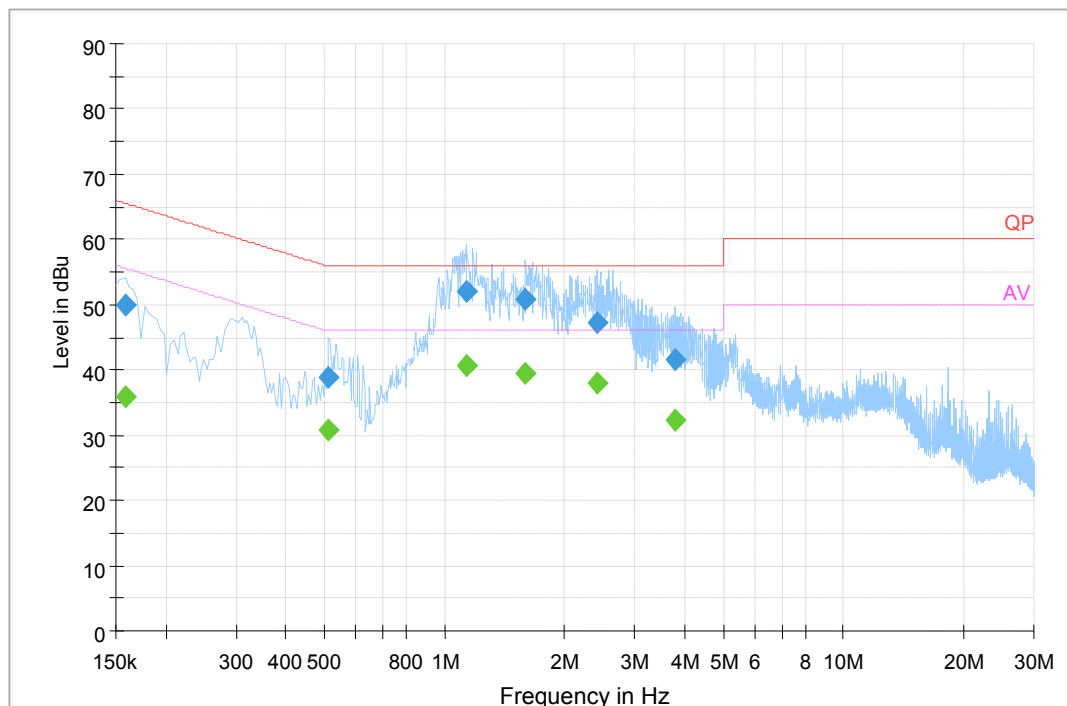
Environmental Conditions

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

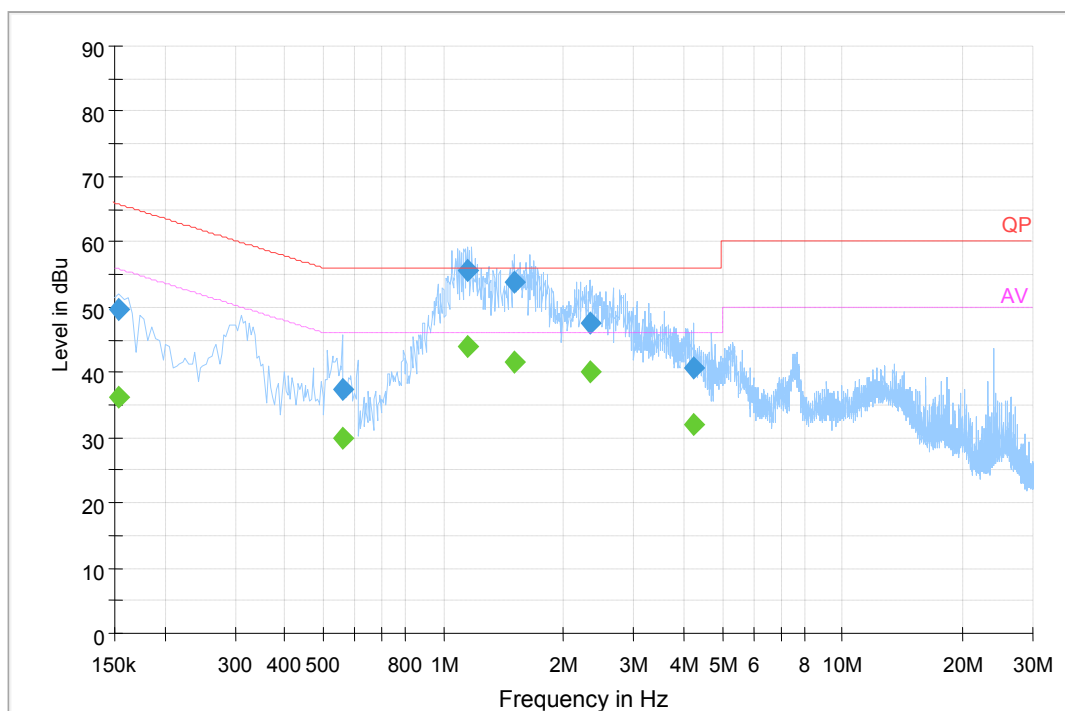
The testing was performed by Joson Xiao on 2019-01-16.

EUT Operation Mode: Full load

RJ11 Port:
AC 120V/60 Hz, Line

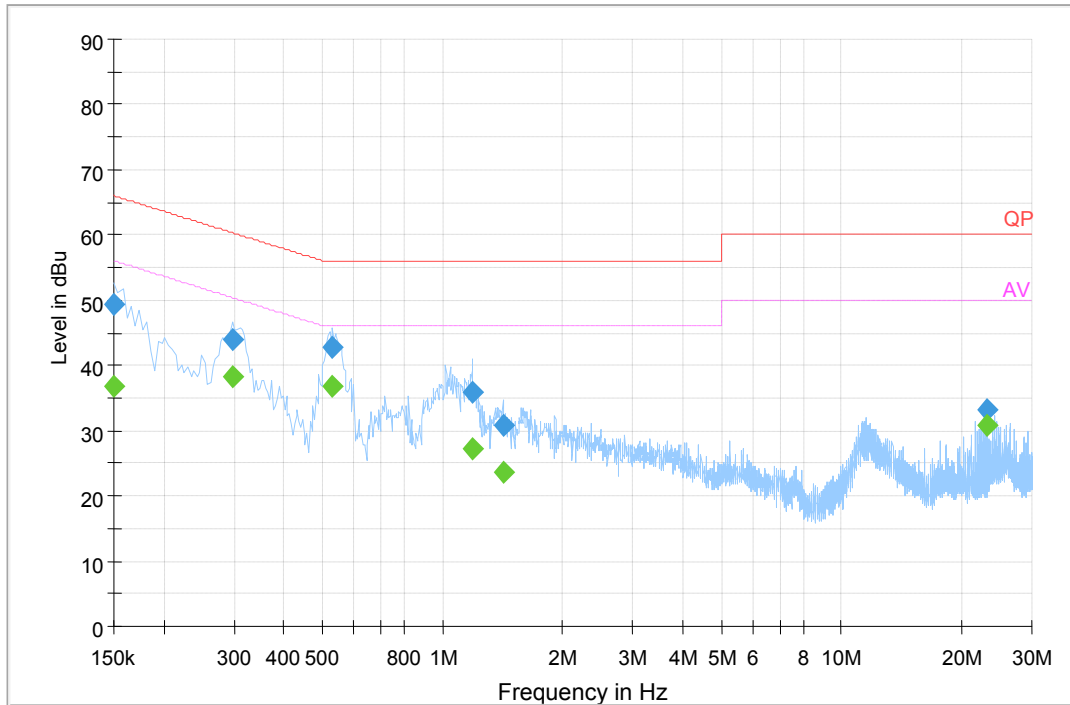


Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.158000	50.0	19.8	65.6	15.6	QP
0.514000	38.7	19.8	56.0	17.3	QP
1.130000	52.0	19.8	56.0	4.0	QP
1.598000	51.0	19.9	56.0	5.0	QP
2.414000	47.4	19.9	56.0	8.6	QP
3.782000	41.6	20.0	56.0	14.4	QP
0.158000	35.8	19.8	55.6	19.8	Ave.
0.514000	30.9	19.8	46.0	15.1	Ave.
1.130000	40.6	19.8	46.0	5.4	Ave.
1.598000	39.6	19.9	46.0	6.4	Ave.
2.414000	37.8	19.9	46.0	8.2	Ave.
3.782000	32.4	20.0	46.0	13.6	Ave.

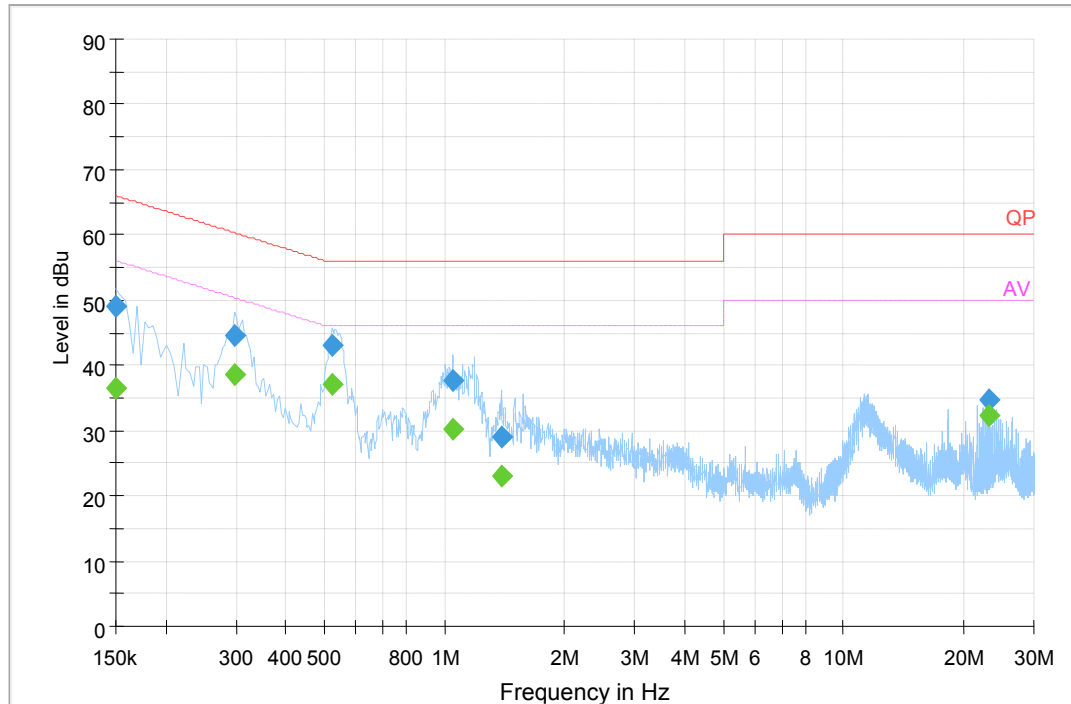
AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Detector (PK/Ave./QP)
0.154000	49.7	19.8	65.8	16.1	QP
0.558000	37.3	19.7	56.0	18.7	QP
1.154000	55.5	19.8	56.0	0.5	QP
1.506000	53.9	19.9	56.0	2.1	QP
2.330000	47.4	19.9	56.0	8.6	QP
4.226000	40.5	20.0	56.0	15.5	QP
0.154000	36.2	19.8	55.8	19.6	Ave.
0.558000	30.0	19.7	46.0	16	Ave.
1.154000	44.0	19.8	46.0	2.0	Ave.
1.506000	41.6	19.9	46.0	4.4	Ave.
2.330000	40.0	19.9	46.0	6.0	Ave.
4.226000	32.1	20.0	46.0	13.9	Ave.

**50-pin Telco connectors:
AC 120V/60 Hz, Line**



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	49.4	19.8	66.0	16.6	QP
0.298000	44.0	19.8	60.3	16.3	QP
0.530000	42.9	19.8	56.0	13.1	QP
1.186000	35.8	19.7	56.0	20.2	QP
1.418000	30.8	19.8	56.0	25.2	QP
23.130000	33.2	20.3	60.0	26.8	QP
0.150000	36.8	19.8	56.0	19.2	Ave.
0.298000	38.3	19.8	50.3	12.0	Ave.
0.530000	36.9	19.8	46.0	9.1	Ave.
1.186000	27.2	19.7	46.0	18.8	Ave.
1.418000	23.7	19.8	46.0	22.3	Ave.
23.130000	30.8	20.3	50.0	19.2	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dB μ V)	Correction Factor (dB)	Limit (dB μ V)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	49.1	19.8	66.0	16.9	QP
0.298000	44.4	19.8	60.3	15.9	QP
0.522000	43.2	19.8	56.0	12.8	QP
1.050000	37.6	19.8	56.0	18.4	QP
1.386000	29.1	19.8	56.0	26.9	QP
23.130000	34.5	20.3	60.0	25.5	QP
0.150000	36.3	19.8	56.0	19.7	Ave.
0.298000	38.7	19.8	50.3	11.6	Ave.
0.522000	37.2	19.8	46.0	8.8	Ave.
1.050000	30.2	19.8	46.0	15.8	Ave.
1.386000	23.1	19.8	46.0	22.9	Ave.
23.130000	32.3	20.3	50.0	17.7	Ave.

Note:

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

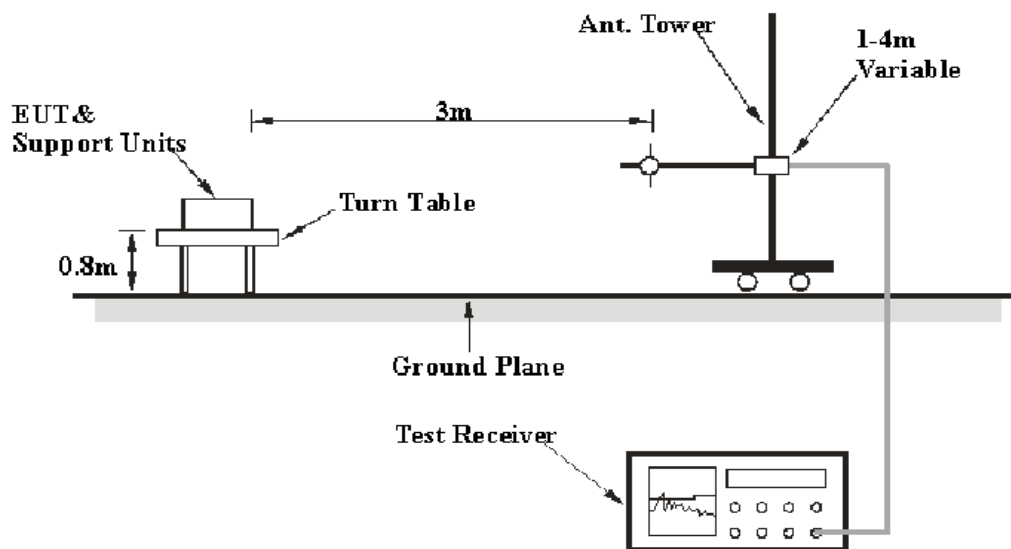
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

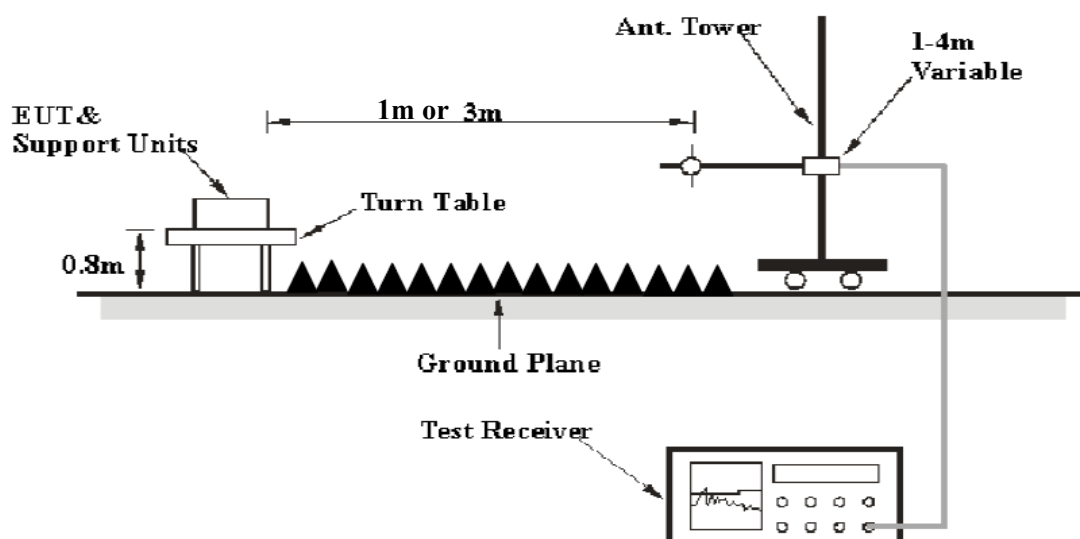
FCC §15.109

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 2 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Measurment
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies 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 7 dB 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 data in the following table, the EUT complied with the FCC §15.109 Class B,

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

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

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.

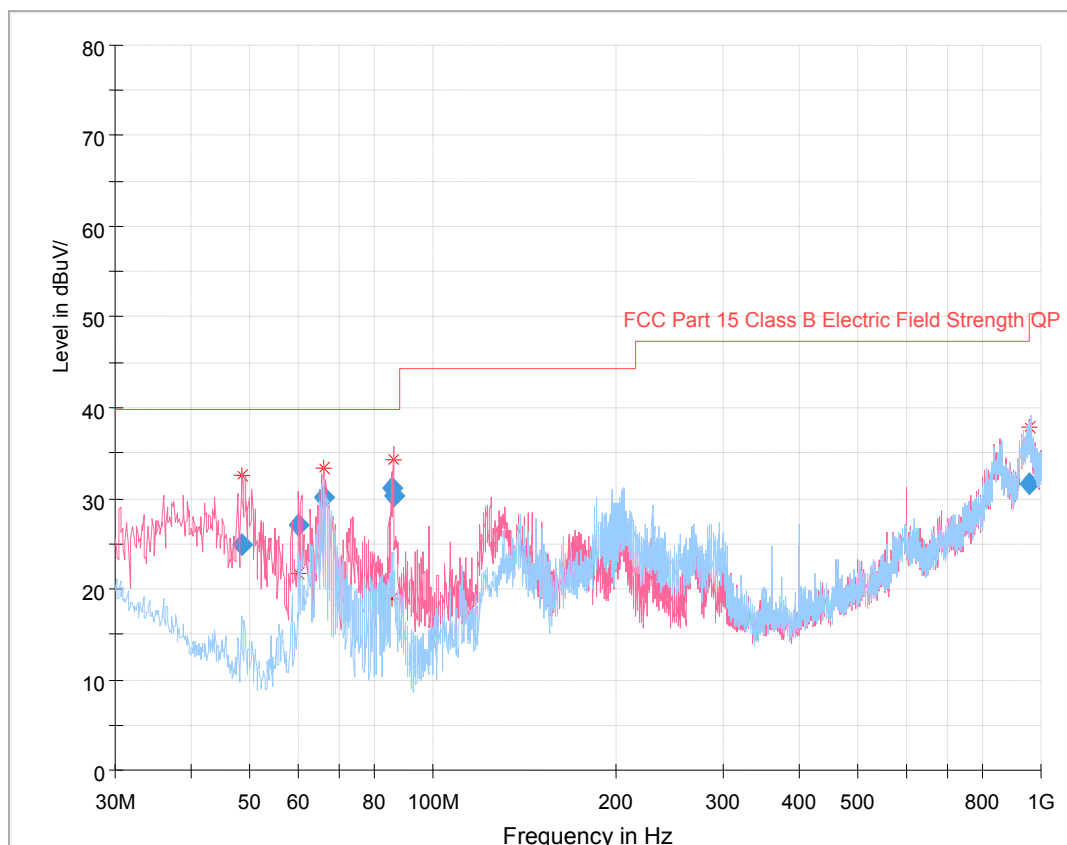
Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Andy Yu on 2019-01-16 and Leo Huang on 2019-01-23.

EUT Operation Mode: Full load

RJ11 Port:
30 MHz~1 GHz:

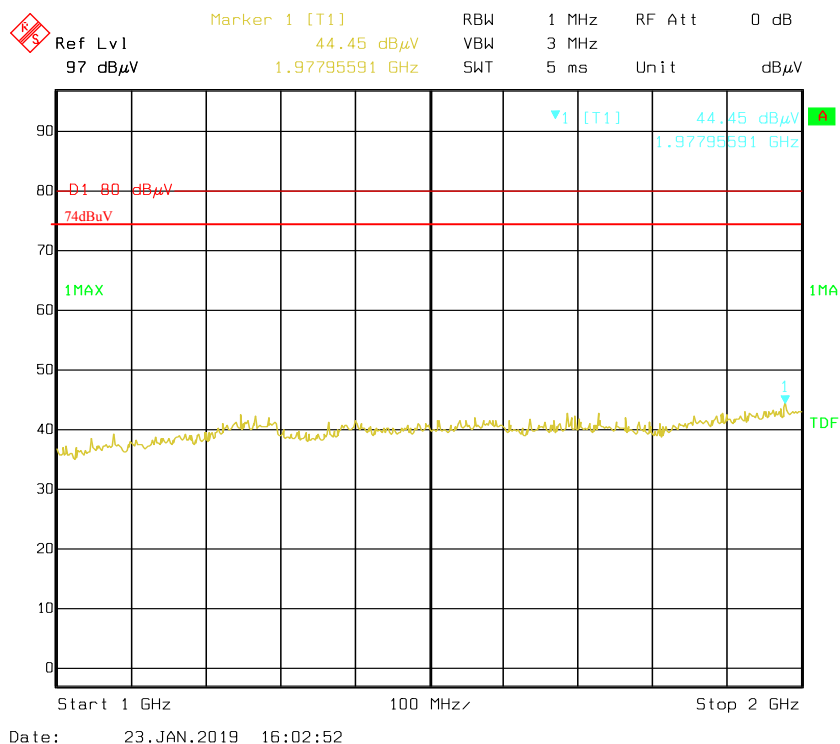


Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
48.583125	25.0	130.0	V	71.0	-19.0	40.00	15.0
60.192000	27.12	130.0	V	320.0	-20.2	40.00	12.88
66.223000	30.05	107.0	V	78.0	-20.5	40.00	9.95
85.353875	31.35	123.0	V	274.0	-19.5	40.00	8.65
86.505375	30.38	116.0	V	81.0	-19.4	40.00	9.62
953.424000	31.56	274.0	H	255.0	9.7	46.00	14.44

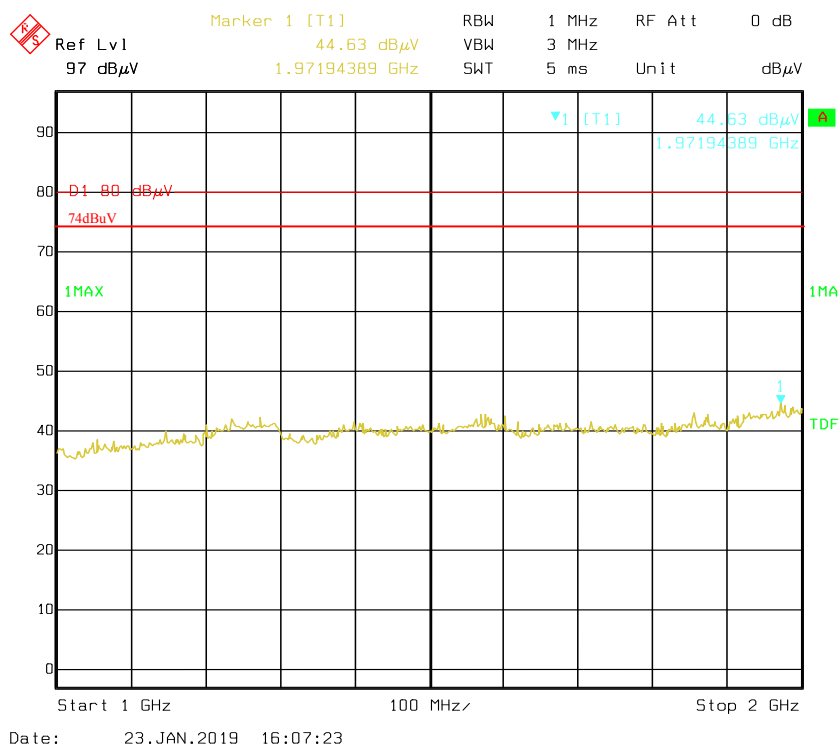
1 GHz – 2 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1243.54	44.31	PK	360	1.2	H	-3.66	40.65	74	33.35
1243.54	29.43	Ave.	360	1.2	H	-3.66	25.77	54	28.23
1243.54	43.16	PK	231	1.5	V	-3.66	39.50	74	34.50
1243.54	28.48	Ave.	231	1.5	V	-3.66	24.82	54	29.18
1977.96	46.15	PK	137	1.8	H	-1.60	44.55	74	29.45
1977.96	30.00	Ave.	137	1.8	H	-1.60	28.40	54	25.60
1977.96	44.31	PK	323	2.1	V	-1.60	42.71	74	31.29
1977.96	29.83	Ave.	323	2.1	V	-1.60	28.23	54	25.77

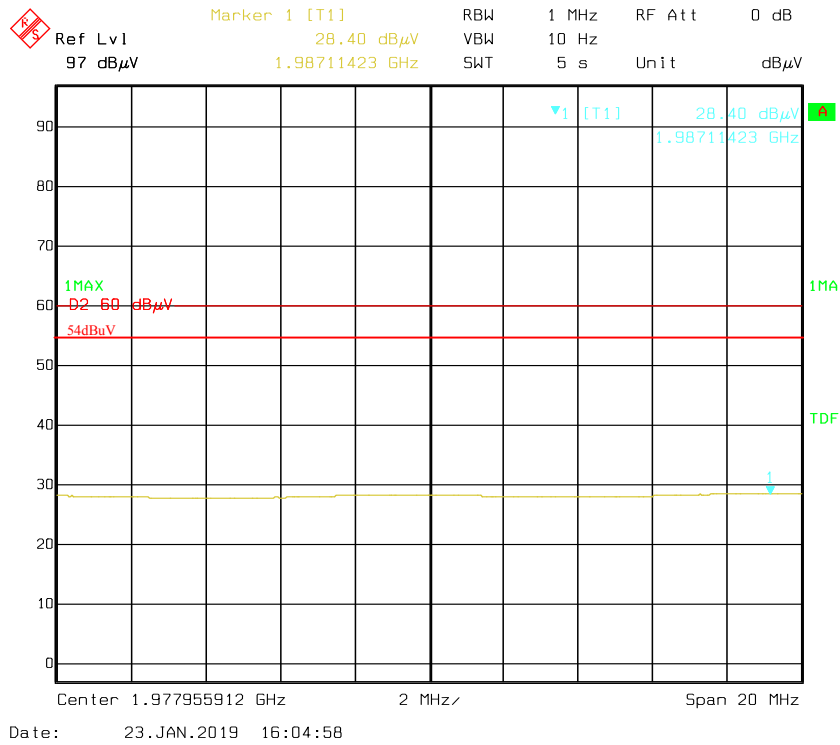
Horizontal - Peak



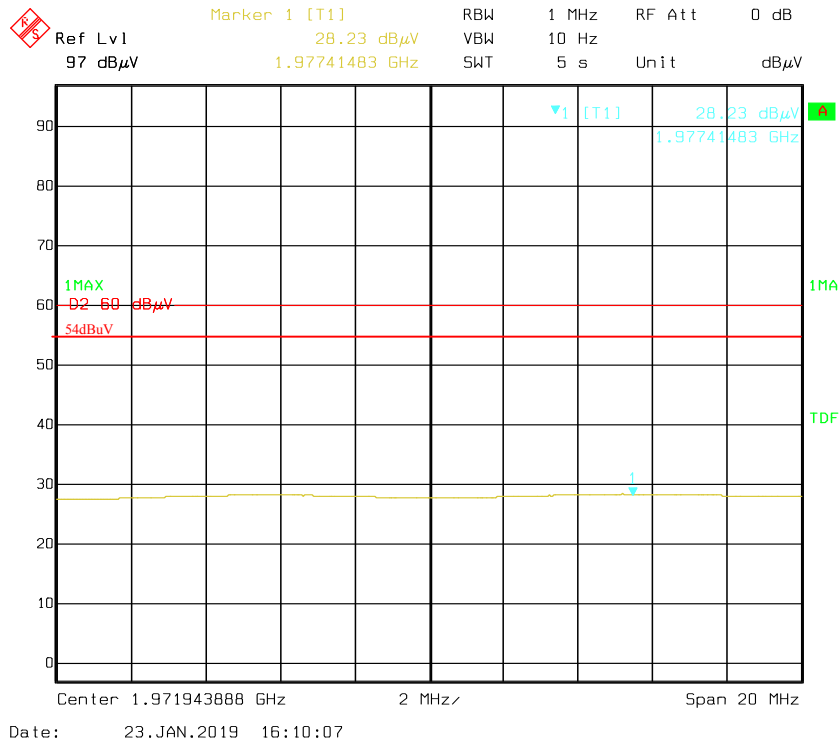
Vertical - Peak

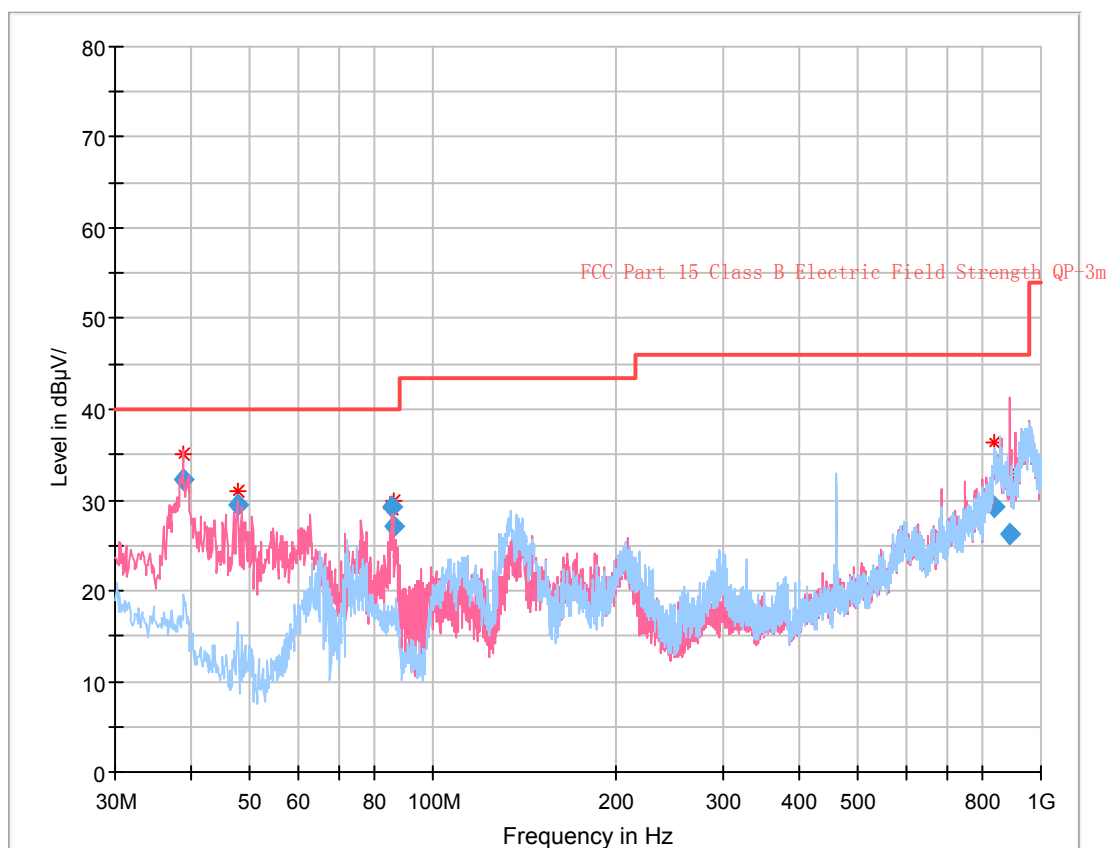


Horizontal – Average



Vertical - Average



**50-pin Telco connectors:
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)
38.964250	32.24	104.0	V	61.0	-13.1	40.00	7.76
47.810375	29.39	109.0	V	357.0	-18.6	40.00	10.61
85.509500	29.33	107.0	V	290.0	-19.5	40.00	10.67
86.029750	27.02	109.0	V	0.0	-19.4	40.00	12.98
837.542375	29.31	260.0	V	176.0	5.7	46.00	16.69
890.531750	26.21	280.0	V	21.0	4.7	46.00	19.79

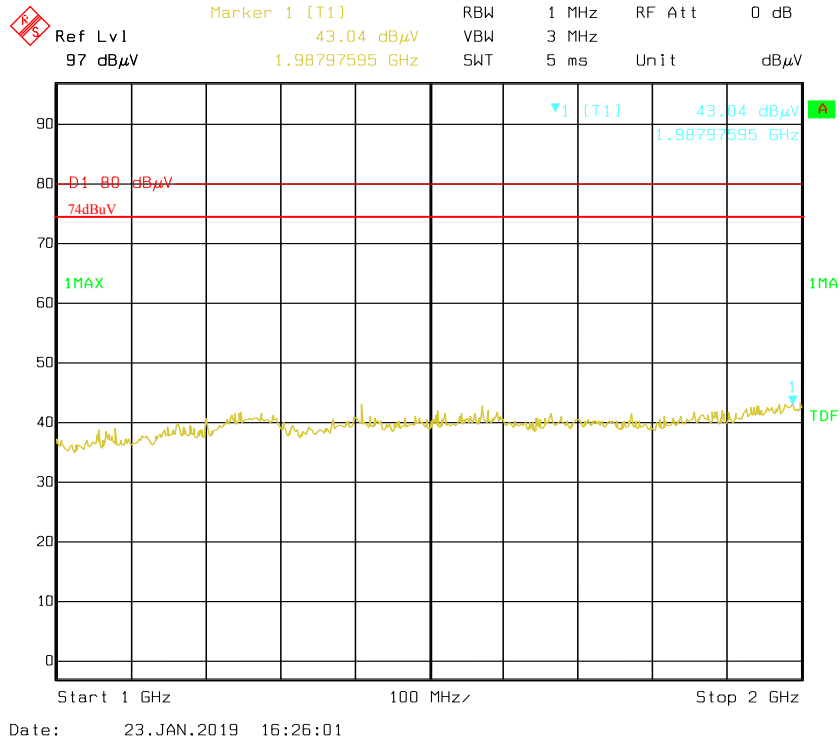
1 GHz – 2GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1354.26	44.47	PK	219	2.1	H	-2.36	42.11	74	31.89
1354.26	29.37	Ave.	219	2.1	H	-2.36	27.01	54	26.99
1354.26	43.49	PK	305	1.5	V	-2.36	41.13	74	32.87
1354.26	28.61	Ave.	305	1.5	V	-2.36	26.25	54	27.75
1987.96	45.62	PK	167	1.6	H	-1.50	44.12	74	29.88
1987.96	29.97	Ave.	167	1.6	H	-1.50	28.47	54	25.53
1987.96	44.28	PK	161	1.5	V	-1.50	42.78	74	31.22
1987.96	28.46	Ave.	161	1.5	V	-1.50	26.96	54	27.04

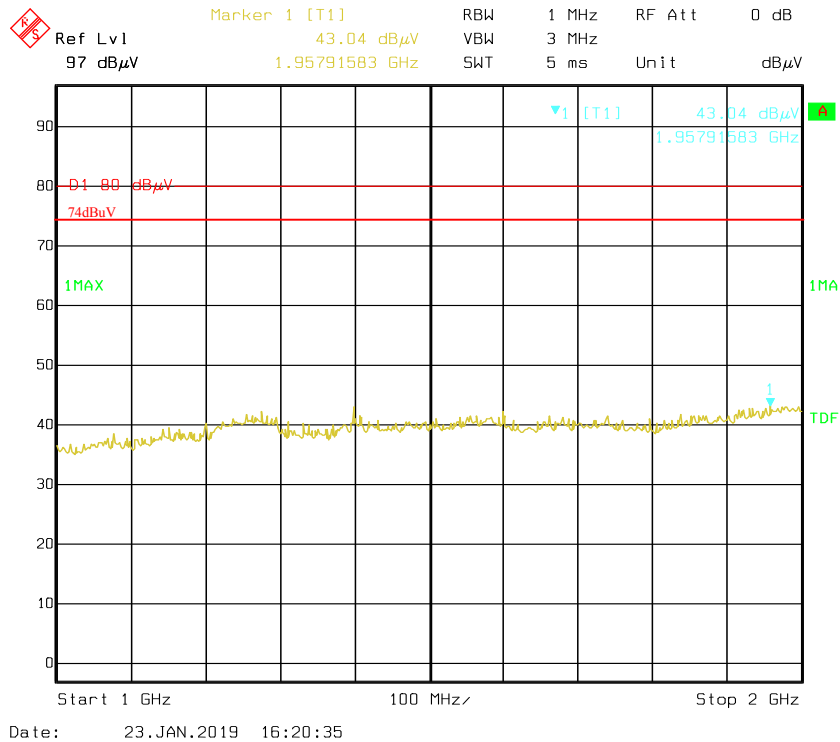
Note:

- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

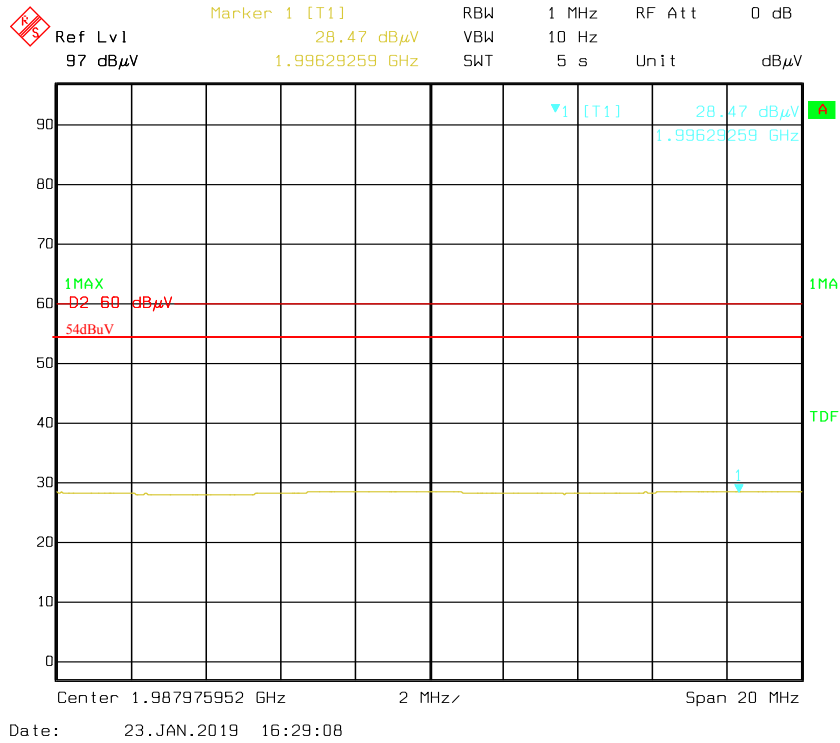
Horizontal – Peak



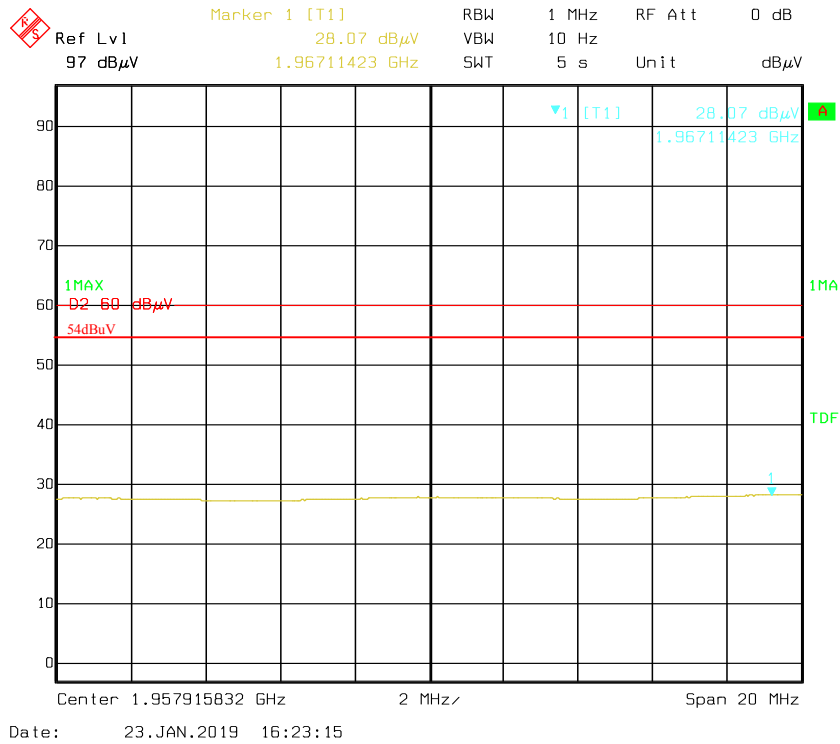
Vertical - Peak



Horizontal – Average



Vertical - Average



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