




FCC PART 15B, CLASS B TEST REPORT

For

Grandstream Networks, Inc.

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

FCC ID: YZZGBX20

Report Type: Original Report	Product Type: Extension Module
Report Number: RSZ190705003-00	
Report Date: 2019-08-07	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Extension Module
Model	GBX20
Voltage Range	DC 12V from adapter
Highest operating frequency	600 MHz
Date of Test	2019/07/14~2019/07/25
Sample serial number	190705003
Received date	2019/07/05
Sample/EUT Status	Good condition
Adapter 1 Information (FRECOM)	Model: F12L28-120100SPAU Input: 100-240V~50/60Hz, 0.3A Output: 12V, 1A
Adapter 2 Information (MASS POWER)	Model: PEA-120100VA Input: 100-240V~50/60Hz, 0.3A Output: 12.0V, 1.0A
Adapter 3 Information (Sunlight)	Model: F12US1200100A Input: 100-240V~50/60Hz, 0.5A max Output: 12V, 1.0A

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)

Related with FCC ID: YZZGRP2615.
Related with FCC ID: YZZGXV3350.

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

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 test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will be taken into consideration for the test data recorded in the report

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

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

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

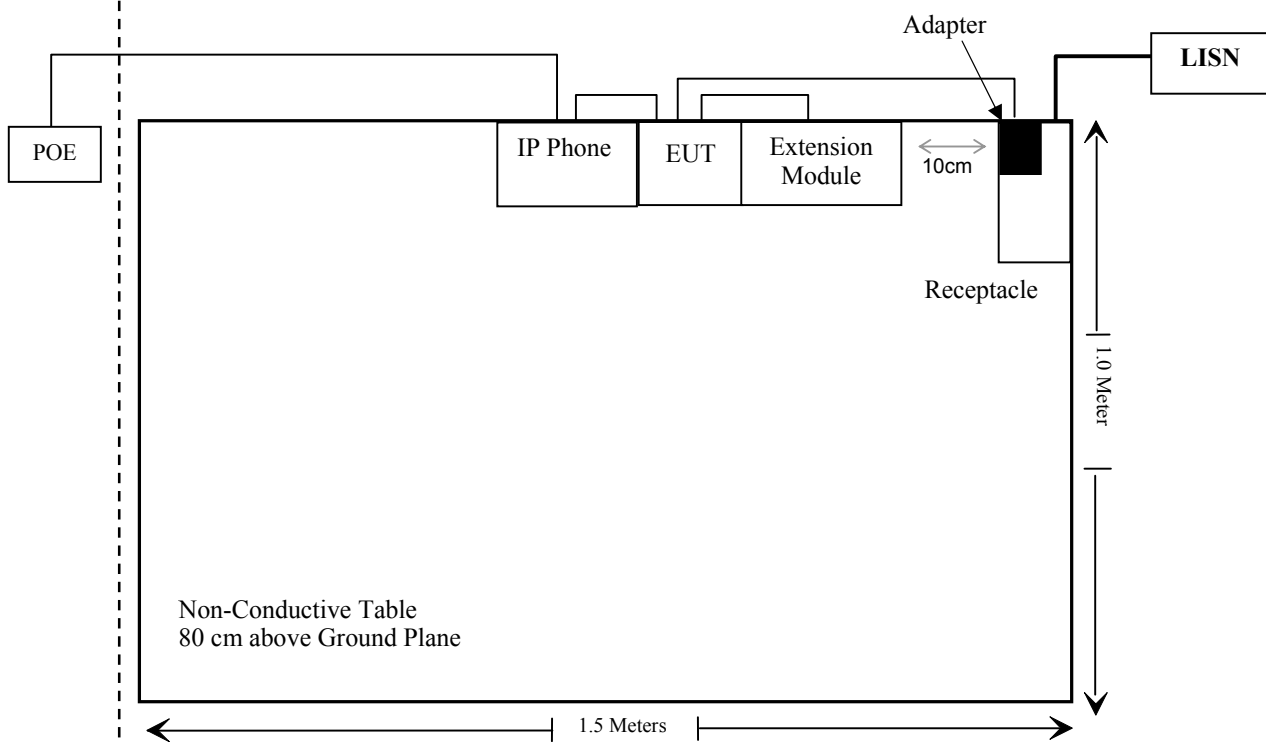
Manufacturer	Description	Model	Serial Number
XINGNIU	Socket	504	Unknown
Grandstream	IP Phone	GRP2615	Unknown
Grandstream	Extension Module	GBX20	Unknown
Netgear	POE	FS108P	1DL1733C00493

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Un-Detachable AC Cable	1.0	Socket	LISN
Unshielded Un-Detachable DC Cable	2.5	Adapter	EUT
Unshielded Detachable RJ45 Cable	9.0	IP Phone	POE
Shielded Detachable USB Cable	0.2	IP Phone	EUT
Shielded Detachable USB Cable	0.2	EUT	Extension Module

Block Diagram of Test Setup

For conducted emission:



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	2019-07-11	2020-07-11
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2019-01-25	2020-01-25
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2019-03-02	2020-03-01
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	2019-11-12
Radiated Emission Test					
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	SPECTRUM ANALYZER	FSV40-N	102259	2019-06-22	2020-06-22
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-11-12
Sonoma Instrument	Amplifier	310N	186238	2018-11-12	2019-11-12
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2019-07-09	2020-07-08
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	104PEA	218124002	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	RG-214	1	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	RG-214	2	2018-11-12	2019-11-12
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR

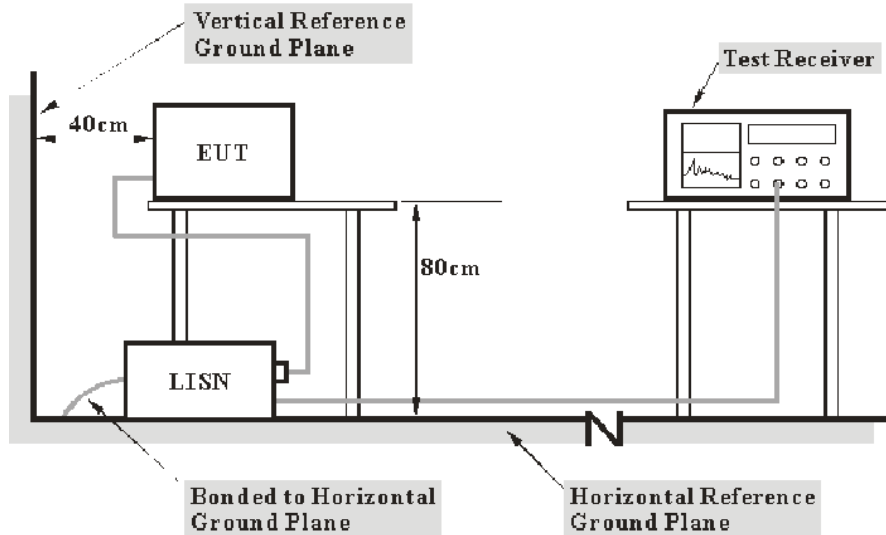
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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

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

In BAEL., $U_{(L_m)}$ 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

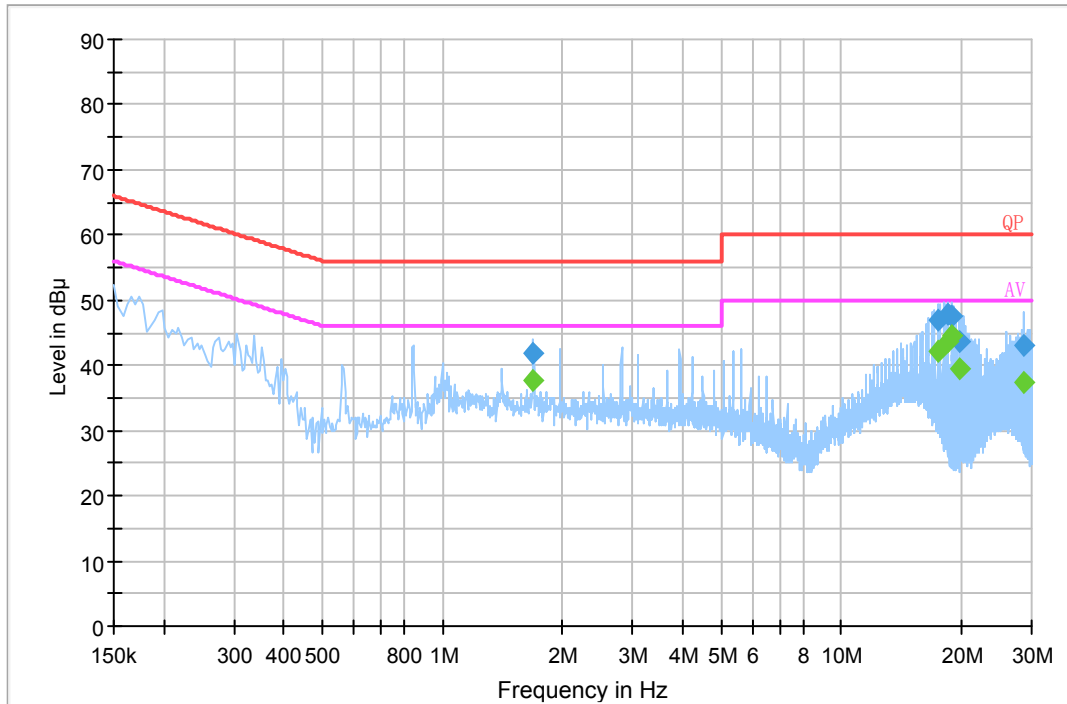
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2019-07-25.

EUT Operation Mode: Working

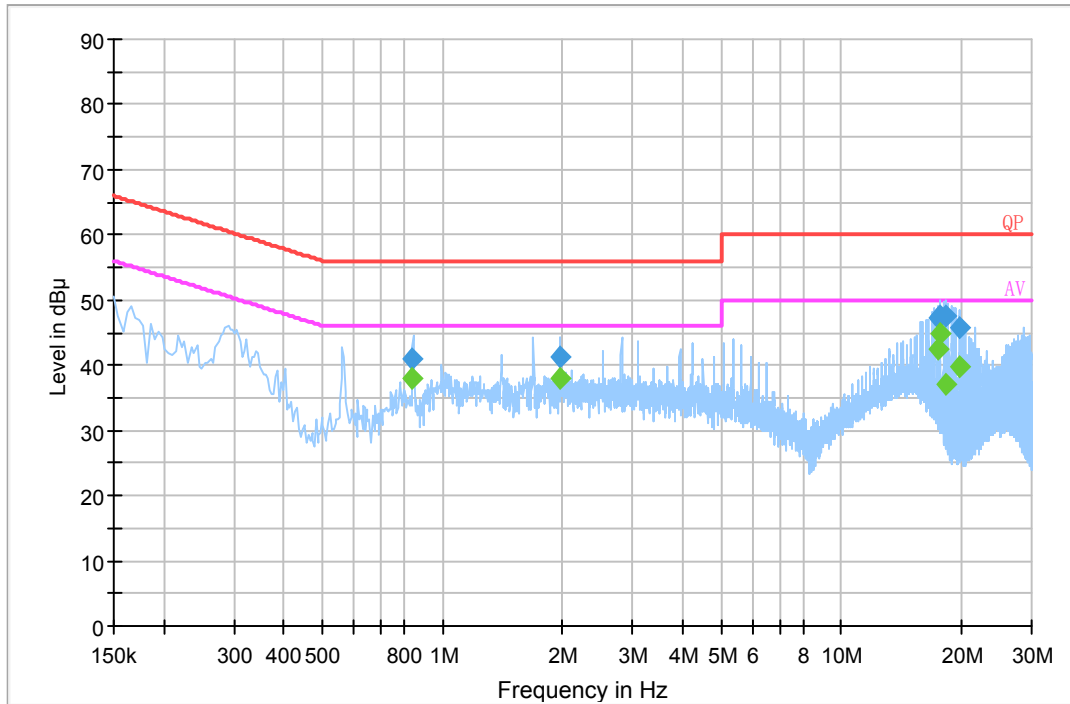
Adapter 1:

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
1.688710	41.8	19.9	56.0	14.2	QP
17.448370	47.1	20.3	60.0	12.9	QP
18.575510	47.7	20.4	60.0	12.3	QP
18.851370	47.5	20.4	60.0	12.5	QP
19.706590	43.7	20.5	60.0	16.3	QP
28.687710	43.0	20.2	60.0	17.0	QP
1.688710	37.6	19.9	46.0	8.4	Ave.
17.448370	42.3	20.3	50.0	7.7	Ave.
18.575510	43.5	20.4	50.0	6.5	Ave.
18.851370	44.6	20.4	50.0	5.4	Ave.
19.706590	39.6	20.5	50.0	10.4	Ave.
28.687710	37.4	20.2	50.0	12.6	Ave.

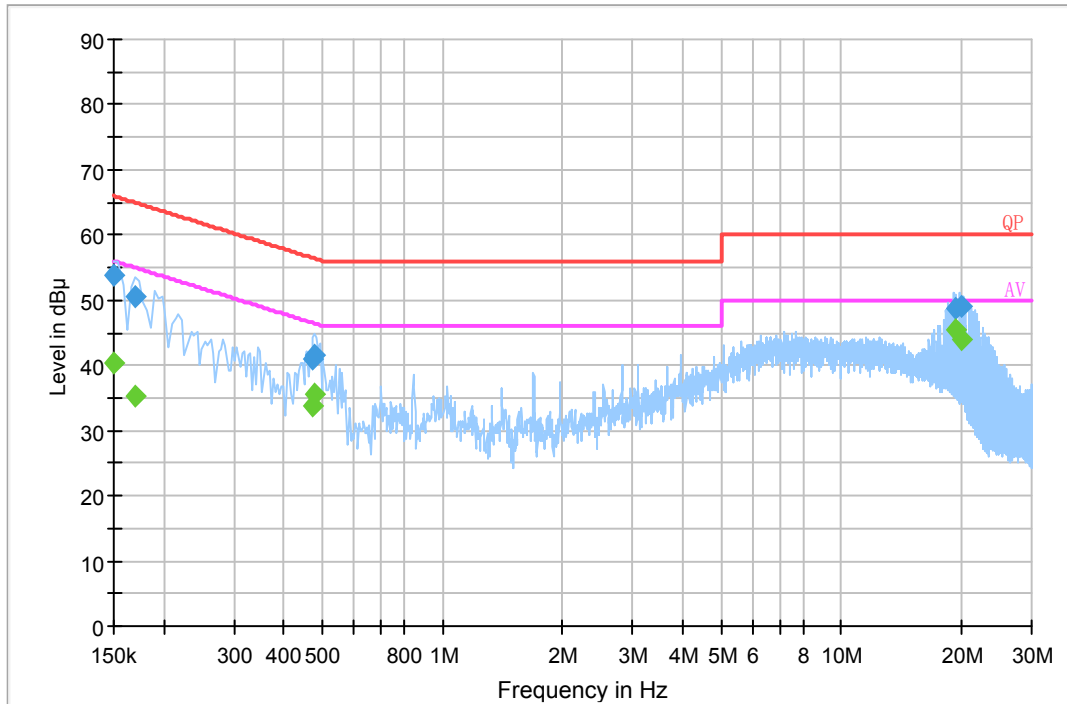
AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.841310	40.9	19.8	56.0	15.1	QP
1.968450	41.2	19.9	56.0	14.8	QP
17.452250	47.4	20.2	60.0	12.6	QP
17.732050	47.5	20.2	60.0	12.5	QP
18.299590	47.5	20.3	60.0	12.5	QP
19.702410	45.8	20.4	60.0	14.2	QP
0.841310	38.1	19.8	46.0	7.9	Ave.
1.968450	38.1	19.9	46.0	7.9	Ave.
17.452250	42.5	20.2	50.0	7.5	Ave.
17.732050	44.9	20.2	50.0	5.1	Ave.
18.299590	37.1	20.3	50.0	12.9	Ave.
19.702410	39.6	20.4	50.0	10.4	Ave.

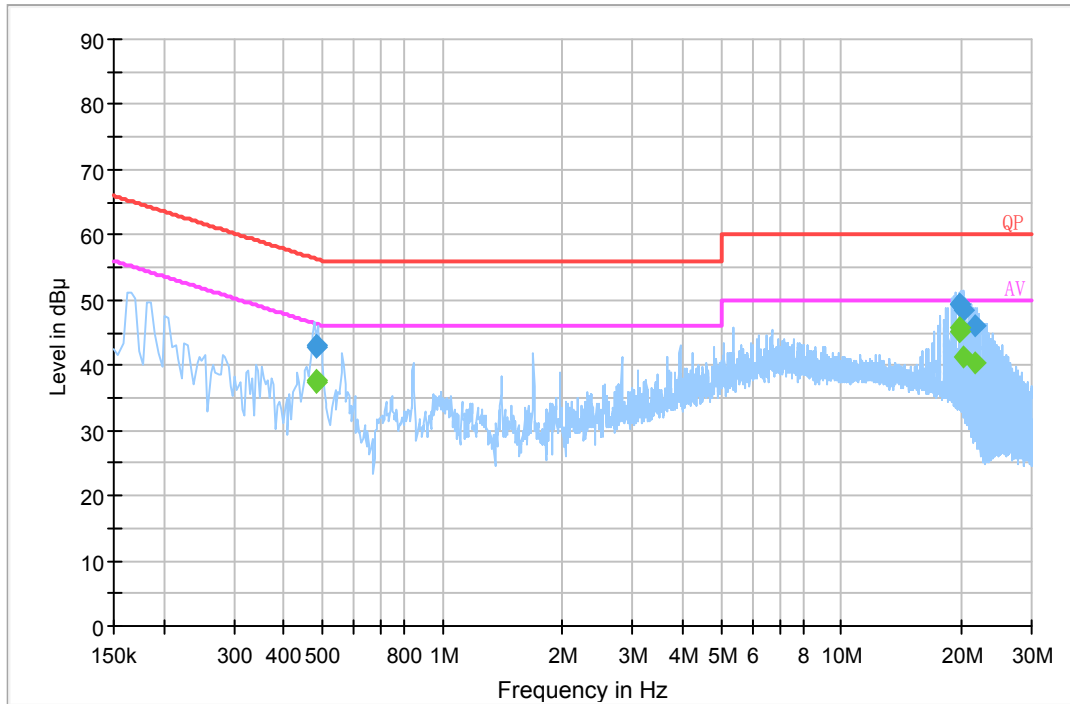
Adapter 2:

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	53.8	19.8	66.0	12.2	QP
0.169500	50.5	19.9	65.0	14.5	QP
0.474770	40.9	19.8	56.4	15.5	QP
0.478830	41.5	19.8	56.4	14.9	QP
19.434630	48.6	20.5	60.0	11.4	QP
19.994170	48.9	20.5	60.0	11.1	QP
0.150000	40.5	19.8	56.0	15.5	Ave.
0.169500	35.4	19.9	55.0	19.6	Ave.
0.474770	33.8	19.8	46.4	12.6	Ave.
0.478830	35.6	19.8	46.4	10.8	Ave.
19.434630	45.5	20.5	50.0	4.5	Ave.
19.994170	44.0	20.5	50.0	6.0	Ave.

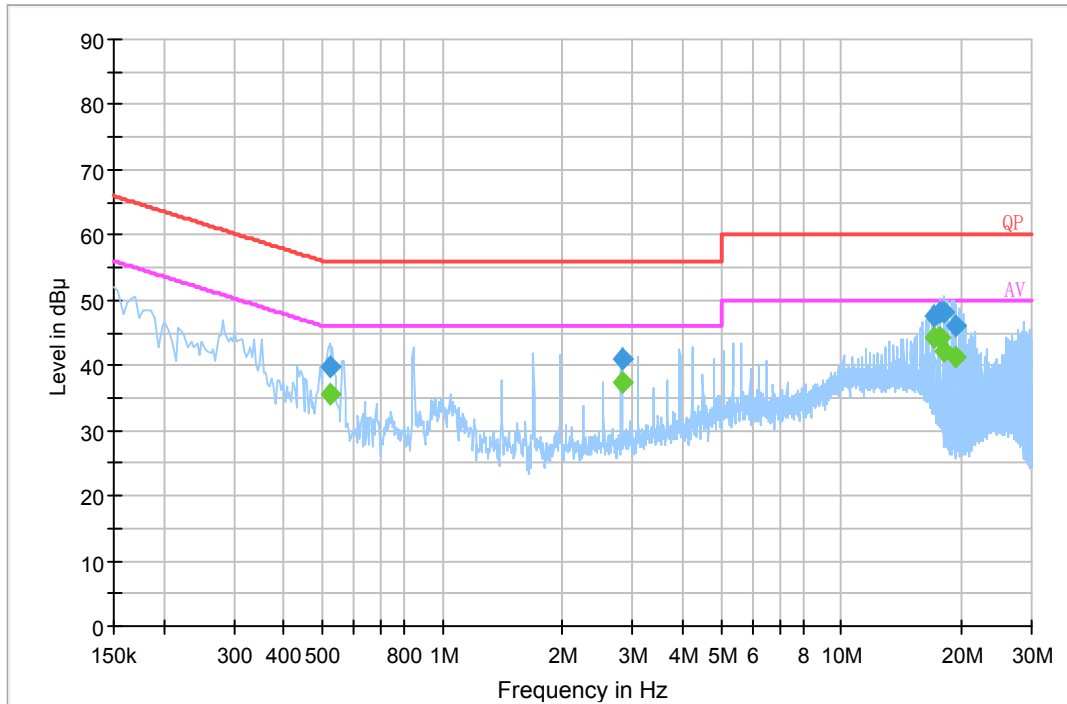
AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.482710	42.8	19.8	56.3	13.5	QP
0.482830	42.9	19.8	56.3	13.4	QP
19.702330	49.2	20.4	60.0	10.8	QP
19.702670	49.3	20.4	60.0	10.7	QP
20.262190	48.6	20.4	60.0	11.4	QP
21.676570	46.1	20.4	60.0	13.9	QP
0.482710	37.6	19.8	46.3	8.7	Ave.
0.482830	37.4	19.8	46.3	8.9	Ave.
19.702330	45.6	20.4	50.0	4.4	Ave.
19.702670	45.1	20.4	50.0	4.9	Ave.
20.262190	41.3	20.4	50.0	8.7	Ave.
21.676570	40.5	20.4	50.0	9.5	Ave.

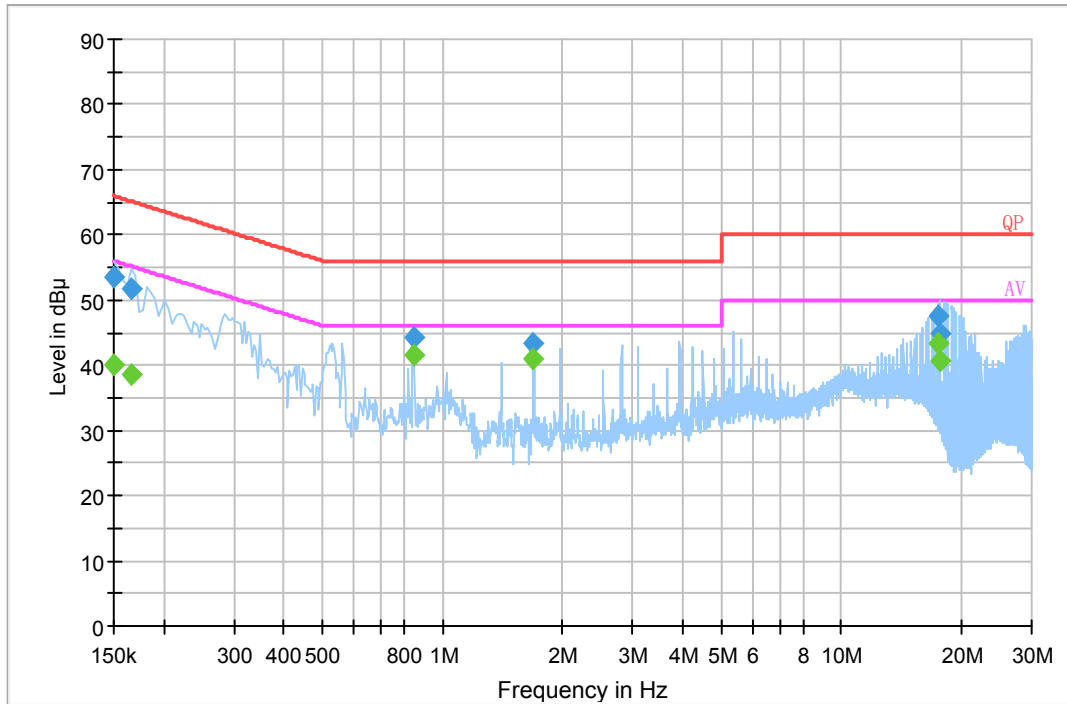
Adapter 3:

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.522170	39.8	19.8	56.0	16.2	QP
2.811790	41.1	19.9	56.0	14.9	QP
17.160570	47.5	20.2	60.0	12.5	QP
17.728110	48.3	20.3	60.0	11.7	QP
18.007910	48.1	20.3	60.0	11.9	QP
19.418410	46.0	20.5	60.0	14.0	QP
0.522170	35.4	19.8	46.0	10.6	Ave.
2.811790	37.5	19.9	46.0	8.5	Ave.
17.160570	44.3	20.2	50.0	5.7	Ave.
17.728110	44.4	20.3	50.0	5.6	Ave.
18.007910	42.1	20.3	50.0	7.9	Ave.
19.418410	41.3	20.5	50.0	8.7	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	53.6	19.8	66.0	12.4	QP
0.165500	51.7	19.8	65.2	13.5	QP
0.845310	44.2	19.8	56.0	11.8	QP
1.688650	43.4	19.8	56.0	12.6	QP
17.448250	47.4	20.2	60.0	12.6	QP
17.720050	44.9	20.2	60.0	15.1	QP
0.150000	40.0	19.8	56.0	16.0	Ave.
0.165500	38.7	19.8	55.2	16.5	Ave.
0.845310	41.5	19.8	46.0	4.5	Ave.
1.688650	41.0	19.8	46.0	5.0	Ave.
17.448250	43.5	20.2	50.0	6.5	Ave.
17.720050	40.6	20.2	50.0	9.4	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

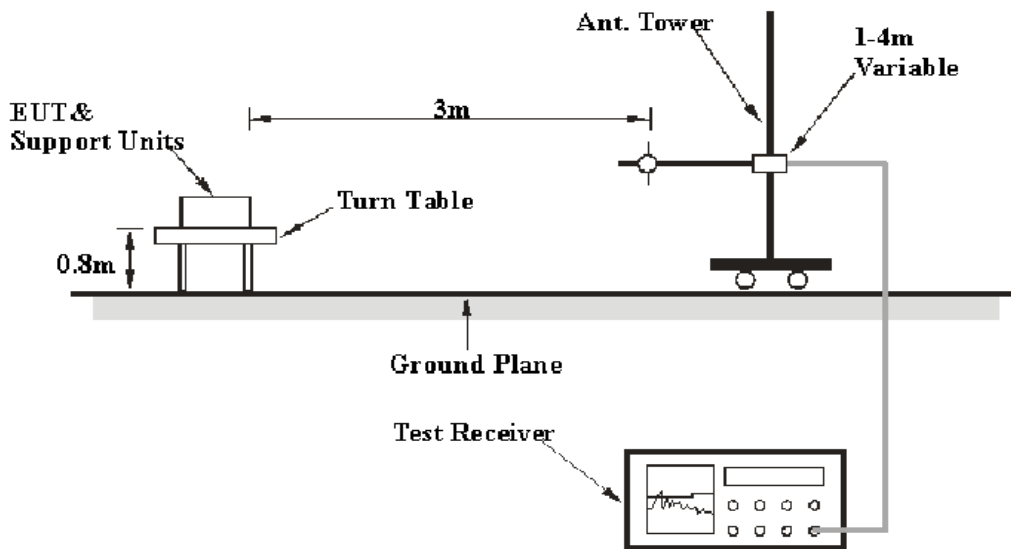
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

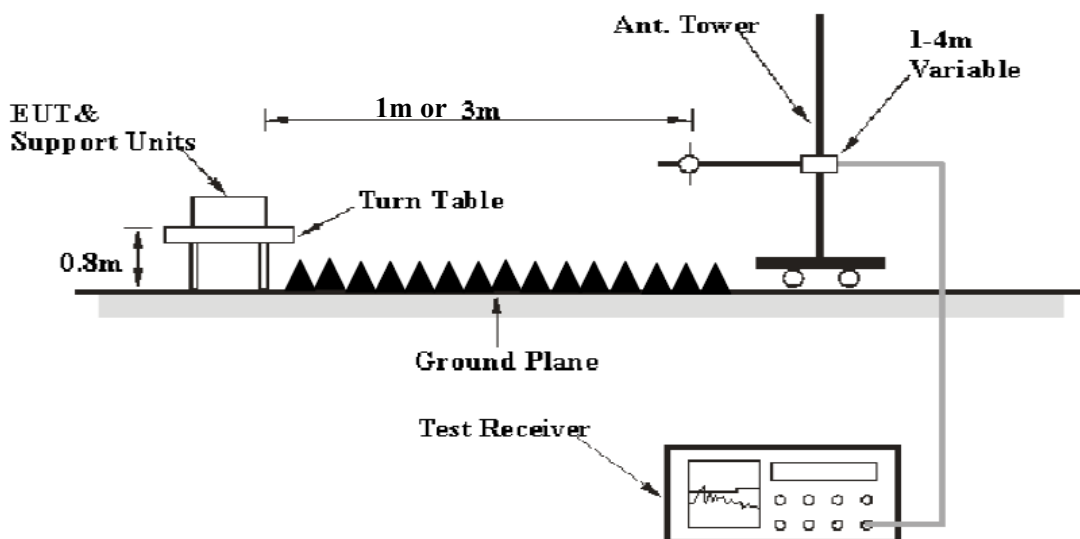
FCC §15.109

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 5 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	Measurement
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

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

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

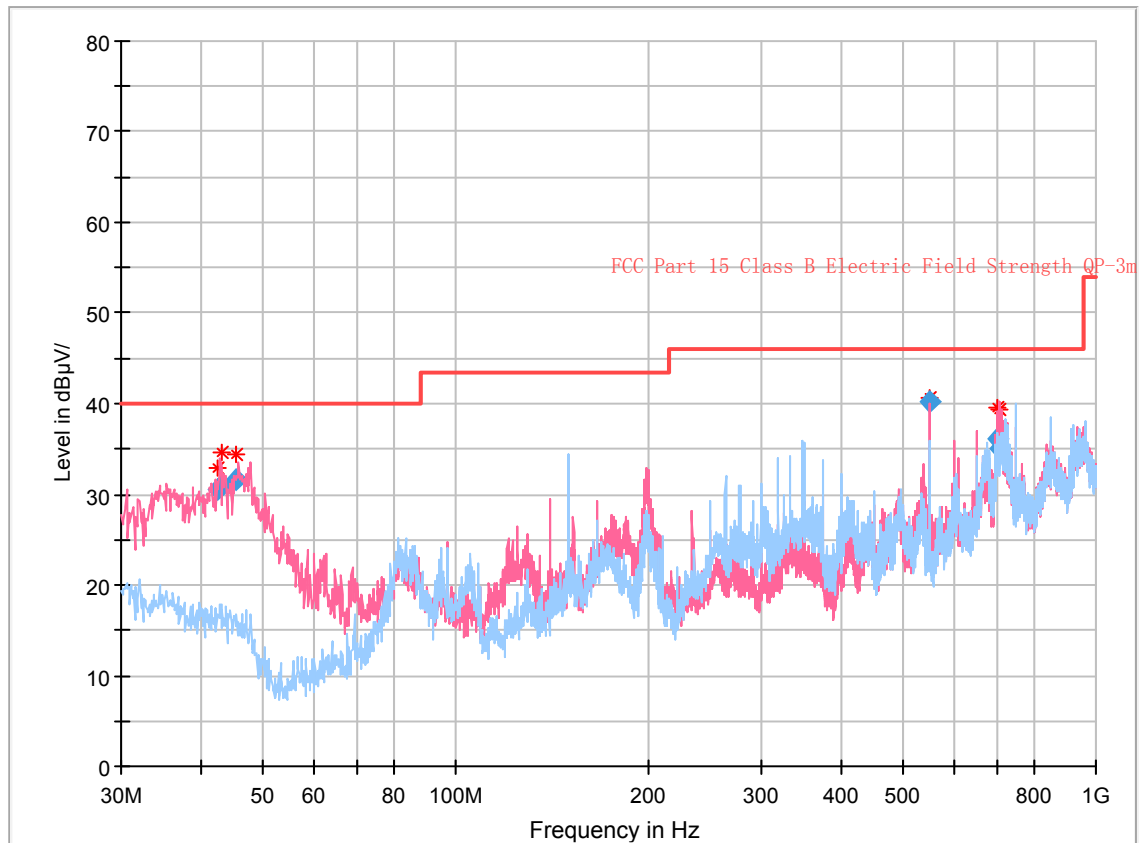
Temperature:	25~26 °C
Relative Humidity:	52~53 %
ATM Pressure:	101.0 kPa

The testing was performed by Andy Yu on 2019-07-17 and by Leo Huang on 2019-07-14.

EUT Operation Mode: Working

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)
42.460125	30.51	106.0	V	0.0	-15.5	40.00	9.49
42.962375	31.02	115.0	V	15.0	-15.9	40.00	8.98
45.283250	31.58	100.0	V	0.0	-17.4	40.00	8.42
549.983500	40.29	106.0	V	196.0	-5.5	46.00	5.71
704.148125	36.15	105.0	V	217.0	-1.1	46.00	9.85
707.139750	35.16	107.0	V	217.0	-1.1	46.00	10.84

Above 1 GHz:

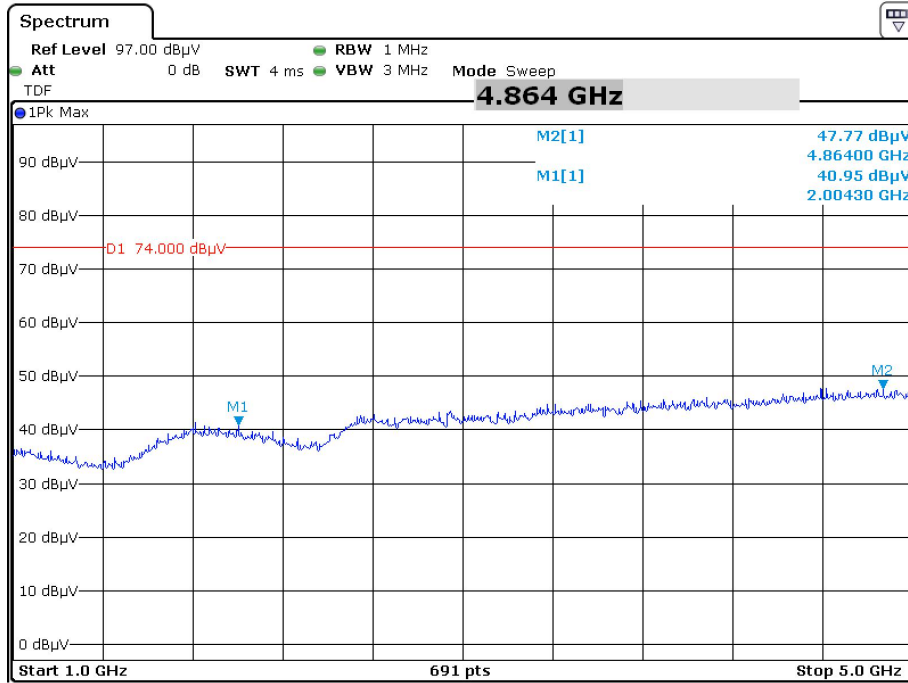
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dB μ V)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1049.52	43.21	PK	102	2.2	H	-5.98	37.23	74	36.77
1049.52	28.67	Ave.	102	2.2	H	-5.98	22.69	54	31.31
1049.52	44.31	PK	2	2.5	V	-5.98	38.33	74	35.67
1049.52	28.79	Ave.	2	2.5	V	-5.98	22.81	54	31.19
2004.30	43.64	PK	65	1.5	H	-1.29	42.35	74	31.65
2004.30	28.43	Ave.	65	1.5	H	-1.29	27.14	54	26.86
2004.30	44.16	PK	205	1.2	V	-1.29	42.87	74	31.13
2004.30	28.67	Ave.	205	1.2	V	-1.29	27.38	54	26.62

Note:

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

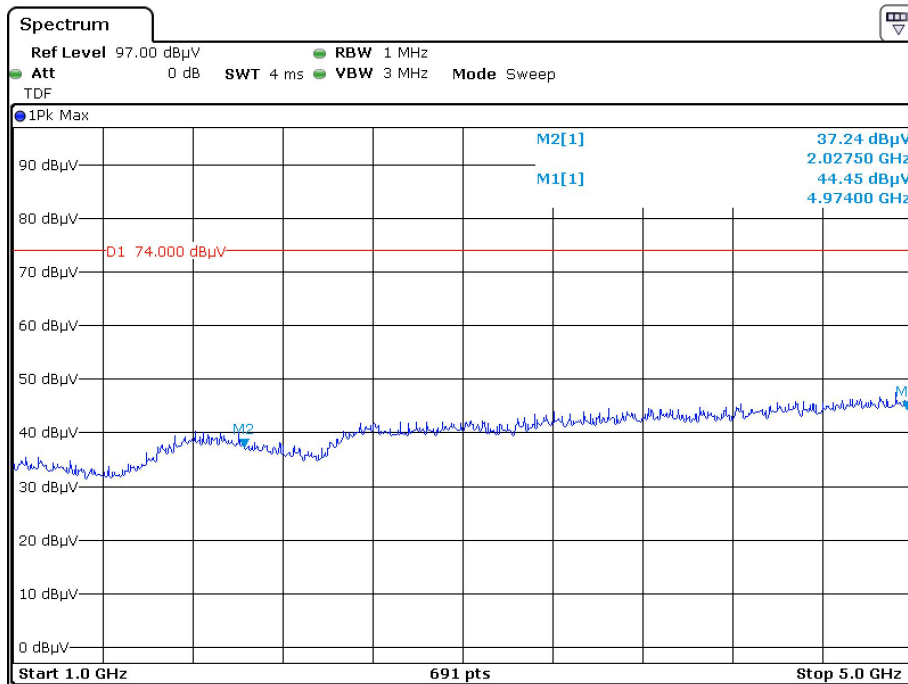
Pre-scan for Peak

Horizontal



Date: 14.JUL.2019 19:42:08

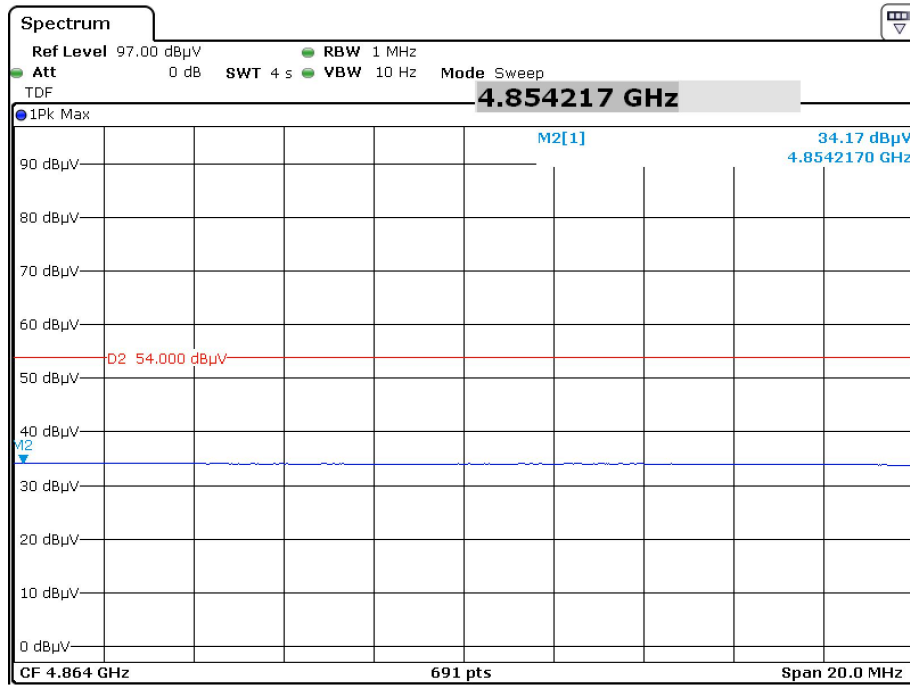
Vertical



Date: 14.JUL.2019 19:35:26

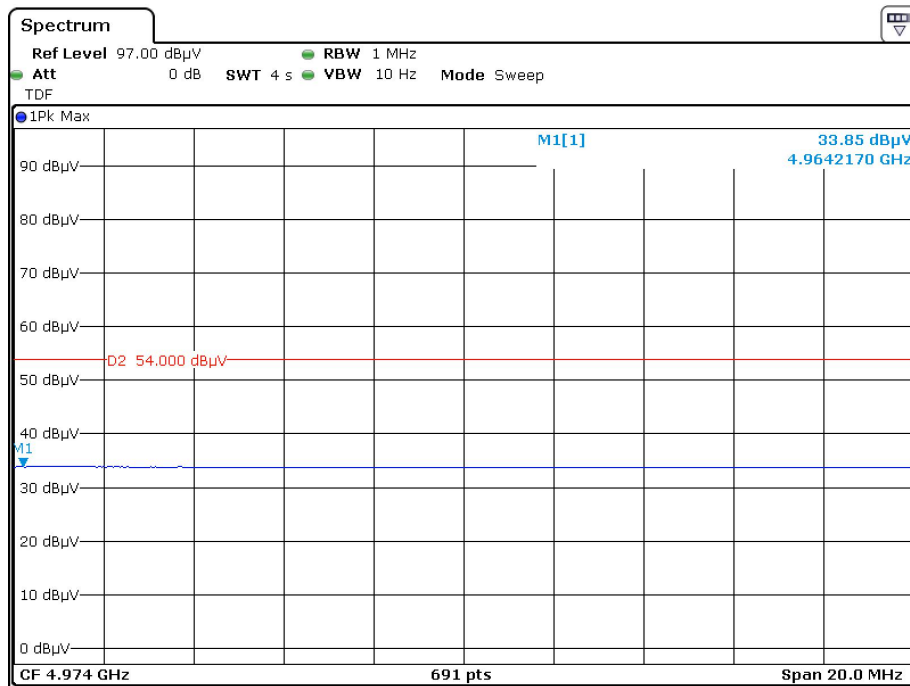
Pre-scan for Average

Horizontal



Date: 14.JUL.2019 19:42:48

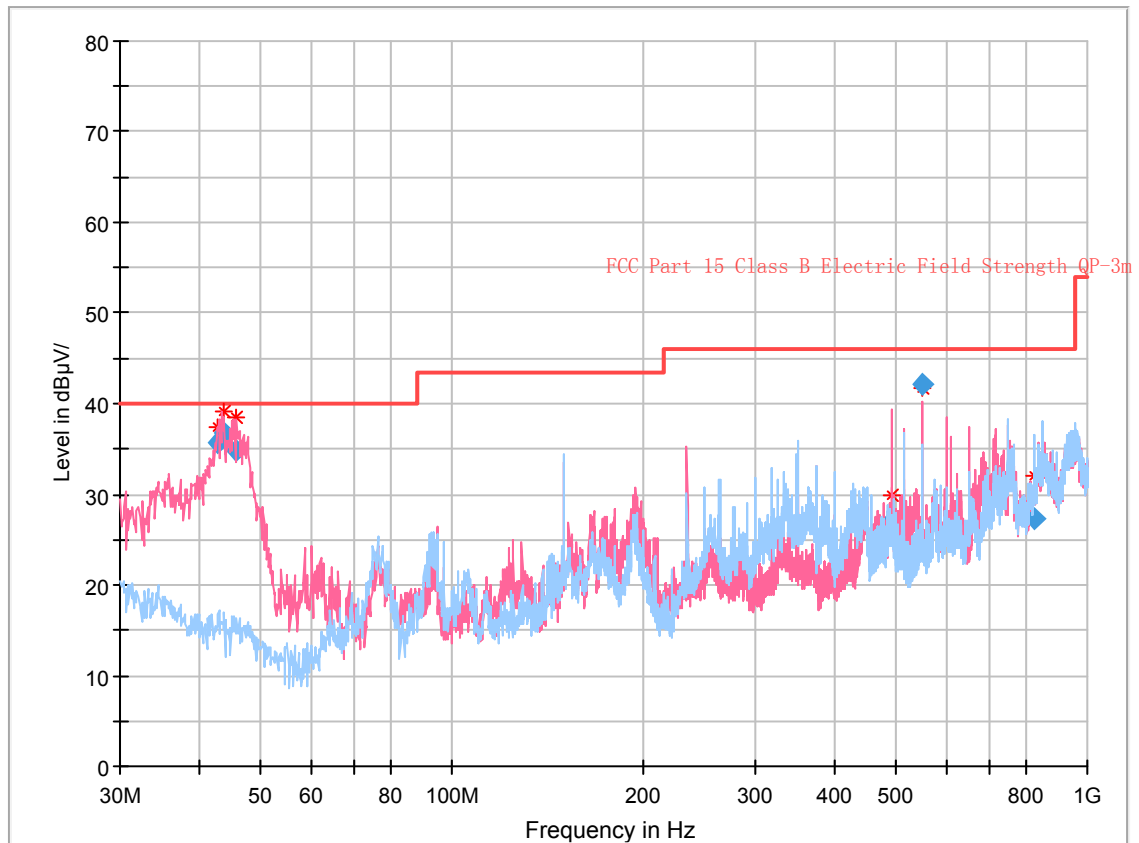
Vertical



Date: 14.JUL.2019 19:40:44

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)
42.767625	35.71	107.0	V	93.0	-15.7	40.00	4.29
43.556250	36.76	106.0	V	129.0	-16.3	40.00	3.24
45.768750	34.87	100.0	V	150.0	-17.6	40.00	5.13
492.693000	27.01	128.0	V	159.0	-7.3	46.00	18.99
549.995250	42.18	119.0	V	267.0	-5.5	46.00	3.82
828.405125	27.41	358.0	H	44.0	4.8	46.00	18.59

Above 1 GHz:

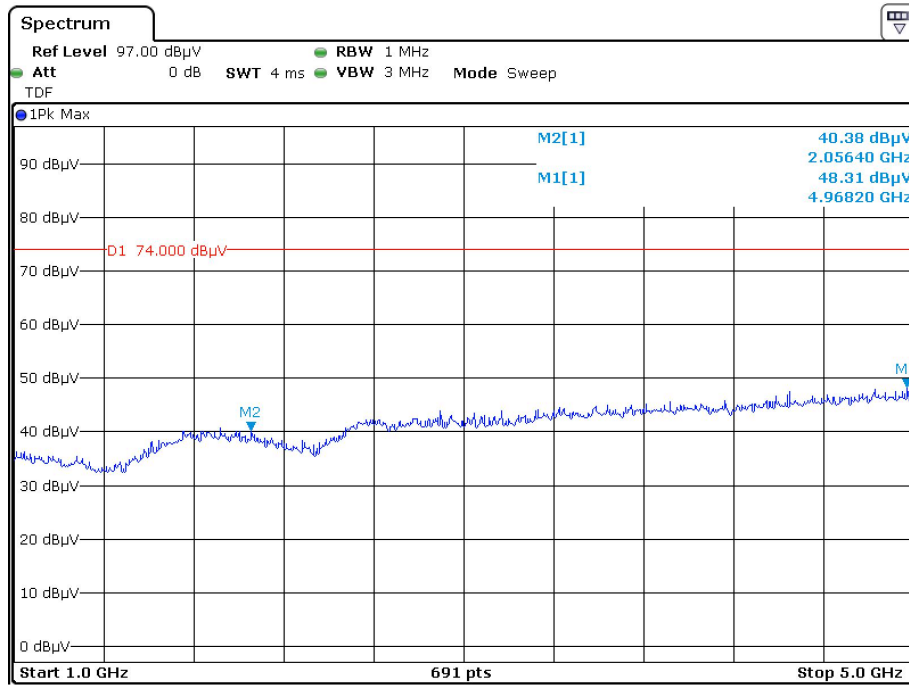
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dB μ V)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1327.46	43.65	PK	78	2.4	H	-4.21	39.44	74	34.56
1327.46	28.37	Ave.	78	2.4	H	-4.21	24.16	54	29.84
1327.46	44.26	PK	147	2.0	V	-4.21	40.05	74	33.95
1327.46	28.77	Ave.	147	2.0	V	-4.21	24.56	54	29.44
2056.40	43.65	PK	244	2.0	H	-0.91	42.74	74	31.26
2056.40	28.42	Ave.	244	2.0	H	-0.91	27.51	54	26.49
2056.40	43.98	PK	170	1.6	V	-0.91	43.07	74	30.93
2056.40	28.36	Ave.	170	1.6	V	-0.91	27.45	54	26.55

Note:

- 4) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 5) Corrected Amplitude = Correction Factor + Reading
- 6) Margin = Limit - Corrected Amplitude

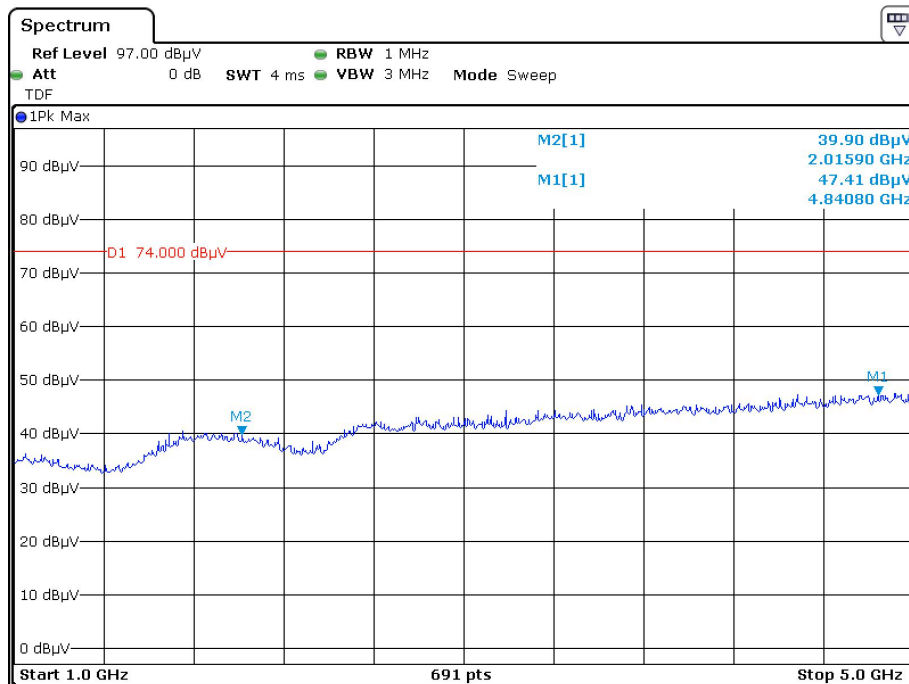
Pre-scan for Peak

Horizontal



Date: 14.JUL.2019 19:51:09

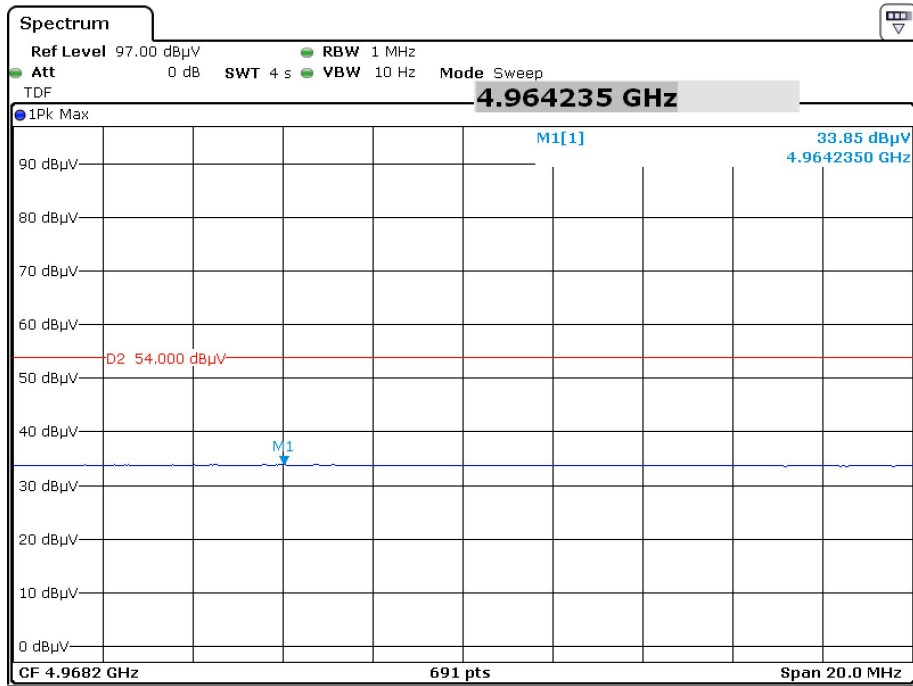
Vertical



Date: 14.JUL.2019 19:47:10

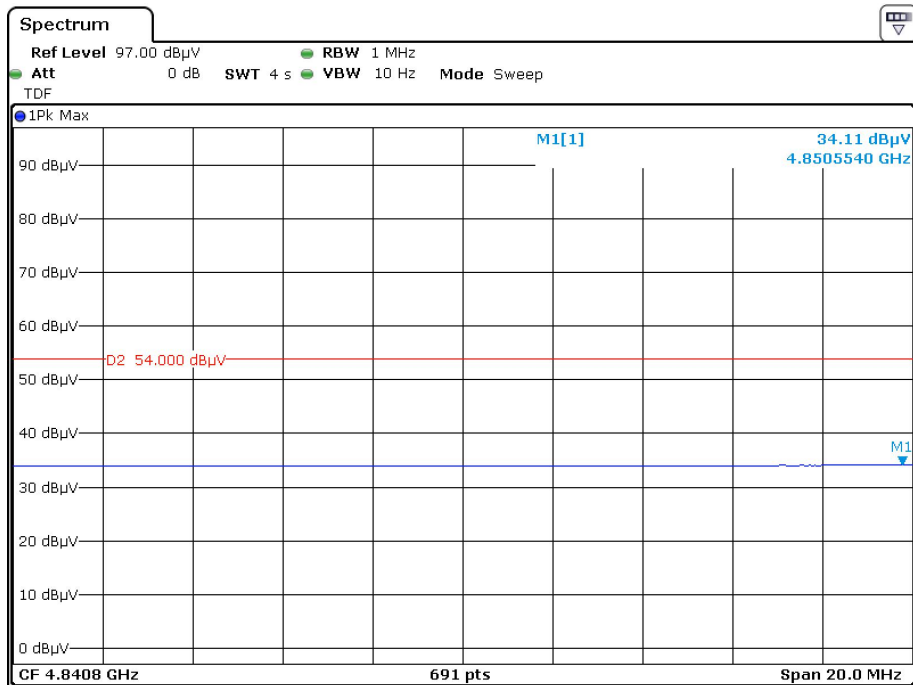
Pre-scan for Average

Horizontal



Date: 14.JUL.2019 19:51:46

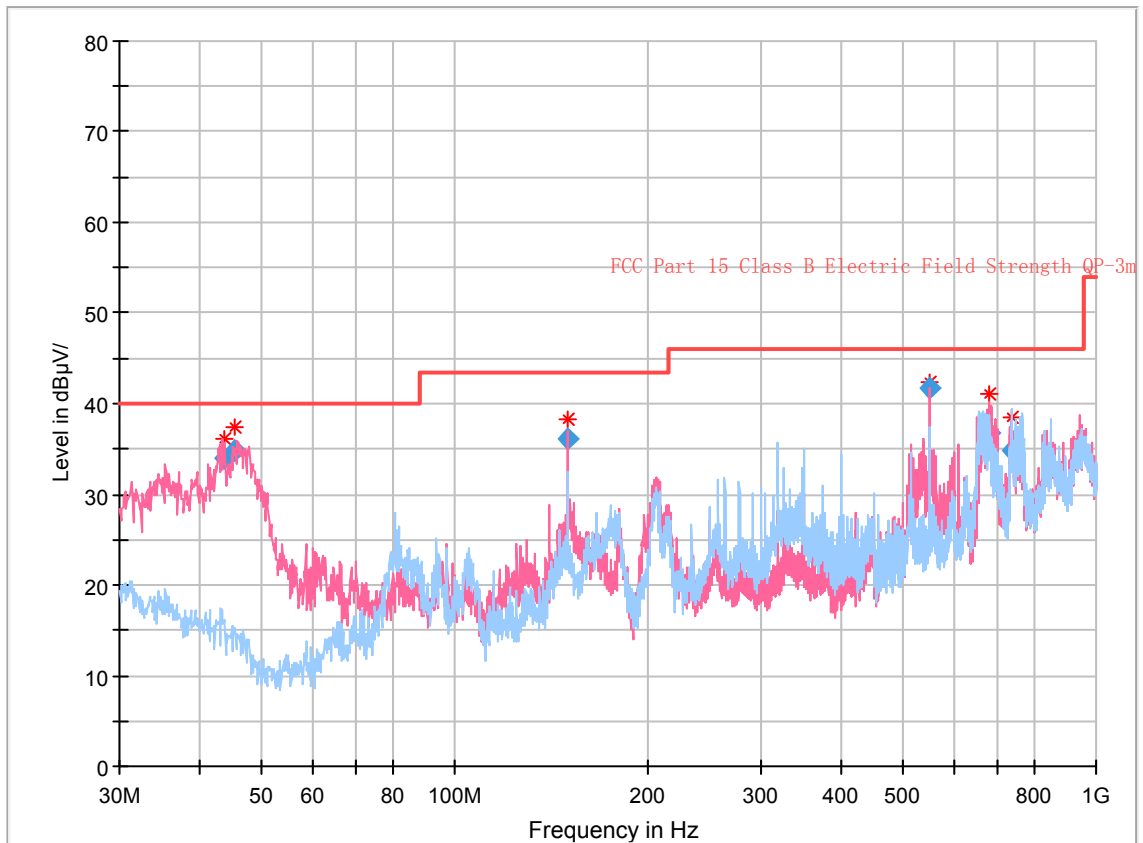
Vertical



Date: 14.JUL.2019 19:50:09

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)
43.819750	33.95	100.0	V	336.0	-16.5	40.00	6.05
45.266000	34.75	116.0	V	0.0	-17.4	40.00	5.25
150.001625	36.17	105.0	V	29.0	-14.2	43.50	7.33
549.989875	41.71	106.0	V	196.0	-5.5	46.00	4.29
681.140250	36.84	124.0	V	181.0	-2.1	46.00	9.16
736.888875	34.91	100.0	V	35.0	-0.6	46.00	11.09

Above 1 GHz:

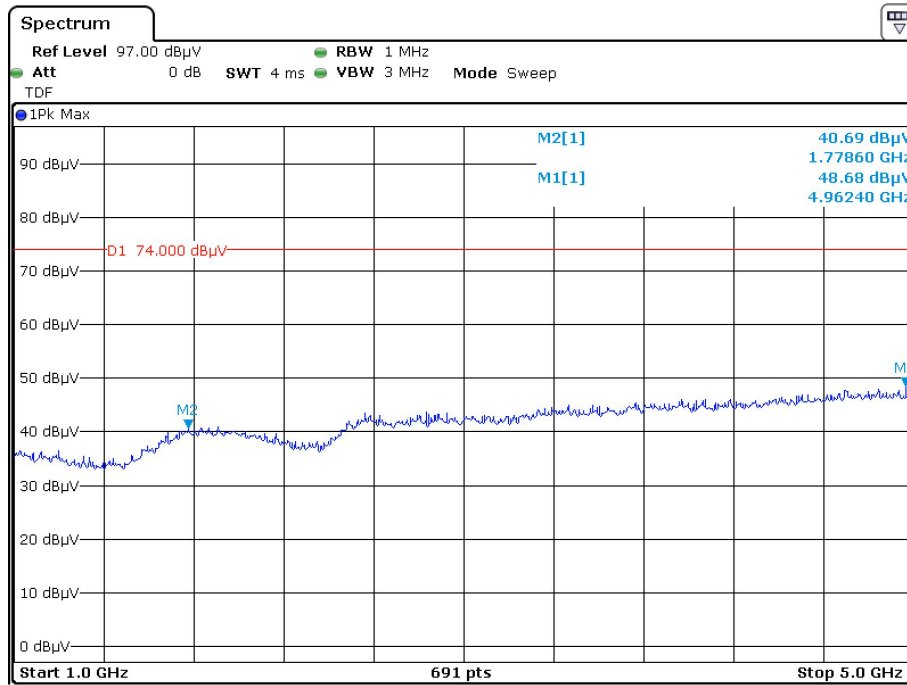
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dB μ V)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1284.05	43.62	PK	208	1.9	H	-4.41	39.21	74	34.79
1284.05	28.43	Ave.	208	1.9	H	-4.41	24.02	54	29.98
1284.05	44.16	PK	103	1.9	V	-4.41	39.75	74	34.25
1284.05	28.74	Ave.	103	1.9	V	-4.41	24.33	54	29.67
1778.60	43.57	PK	295	2.1	H	-2.05	41.52	74	32.48
1778.60	28.48	Ave.	295	2.1	H	-2.05	26.43	54	27.57
1778.60	44.62	PK	256	2.3	V	-2.05	42.57	74	31.43
1778.60	28.68	Ave.	256	2.3	V	-2.05	26.63	54	27.37

Note:

- 7) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 8) Corrected Amplitude = Correction Factor + Reading
- 9) Margin = Limit - Corrected Amplitude

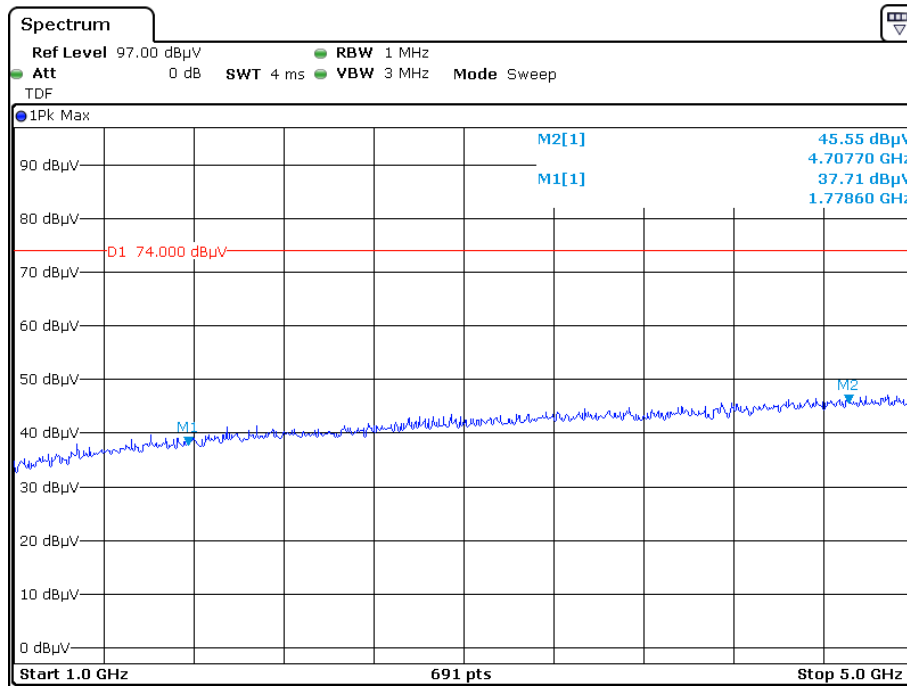
Pre-scan for Peak

Horizontal



Date: 14.JUL.2019 19:56:02

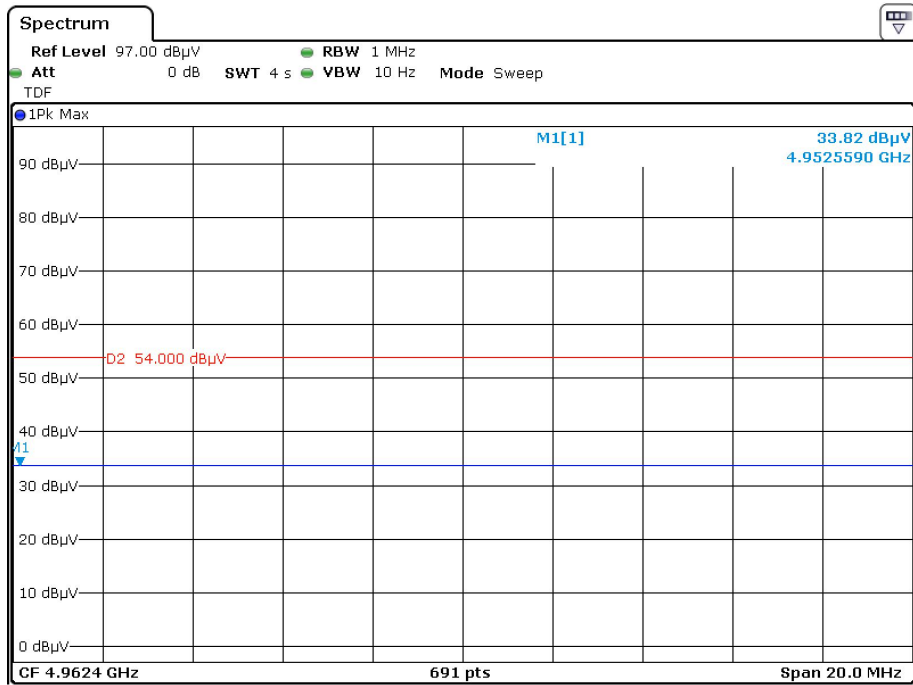
Vertical



Date: 14.JUL.2019 20:02:32

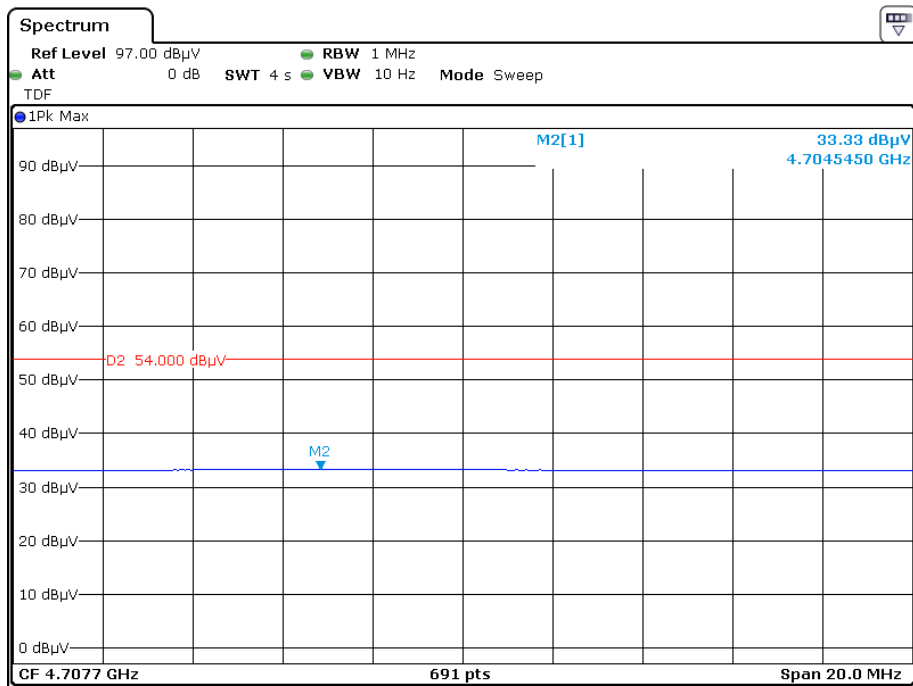
Pre-scan for Average

Horizontal



Date: 14.JUL.2019 20:00:10

Vertical



Date: 14.JUL.2019 20:07:46

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