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CERTIFICATE # 4821.01

Bay Area Compliance Labs Corp.

FCC PART 15B, CLASS B
TEST REPORT

For

Crestron Electronics Inc

15 Volvo Drive, Rockleigh, New Jersey 07647, USA

FCC ID:EROUC-2

Report Type:	**Product Type:**
Original Report	Tabletop Conference System

Report Number:	RSZ200120001-00A
Report Date:	2020-04-02
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Tabletop Conference System
Tested Model	M201928001
Voltage Range	DC 48V from POE
Highest operating frequency	5825 MHz
Date of Test	2020-02-28 to 2020-03-24
Sample serial number	RSZ200120001-RF-S1(Assigned by BACL, Shenzhen)
Received date	2020-01-19
Sample/EUT Status	Good condition
POE information	Model: G0720-480-050 Input: 100-240V~ 50/60Hz 0.75A Output: DC 48.0V, 0.5A 24W

Objective

This test report is prepared on behalf of *Crestron Electronics 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)

Part 15.247 DTS, DSS and Part 15.407 NII submissions with FCC ID: EROUC-2.

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 expended 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: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. 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 operation mode 1: Talking

EUT operation mode 2: Playing with the laptop

EUT Exercise Software

N/A

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

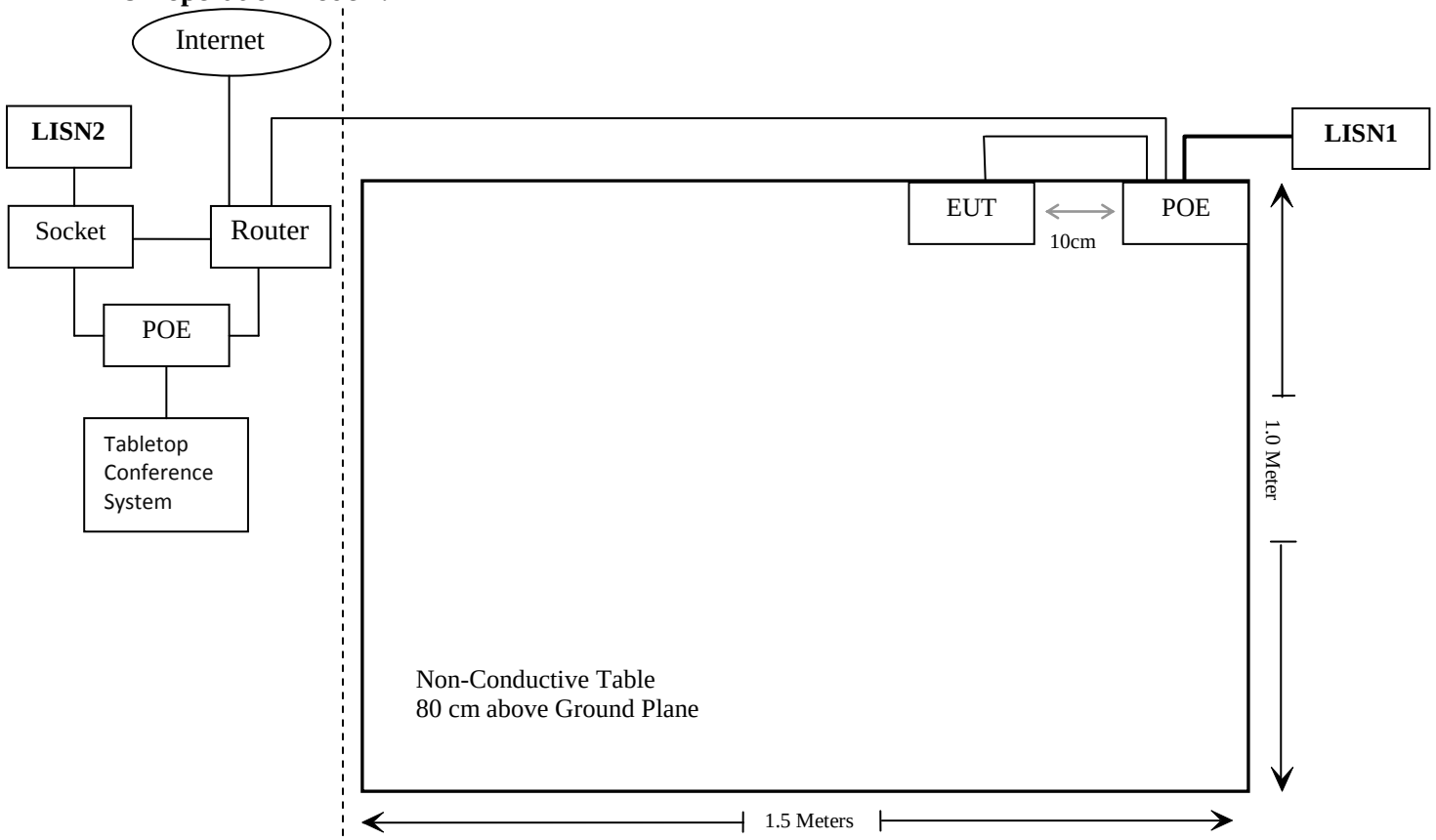
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-212	A37209315081183
HIKVISION	Router	DS-3WR03-E	10021642429
HP	Laptop	Compaq CQ45	5CG33407QL
GOSPELL	POE	G0720-480-050	Unknown
Crestron	Tabletop Conference System	M201928001	Unknown

External I/O Cable

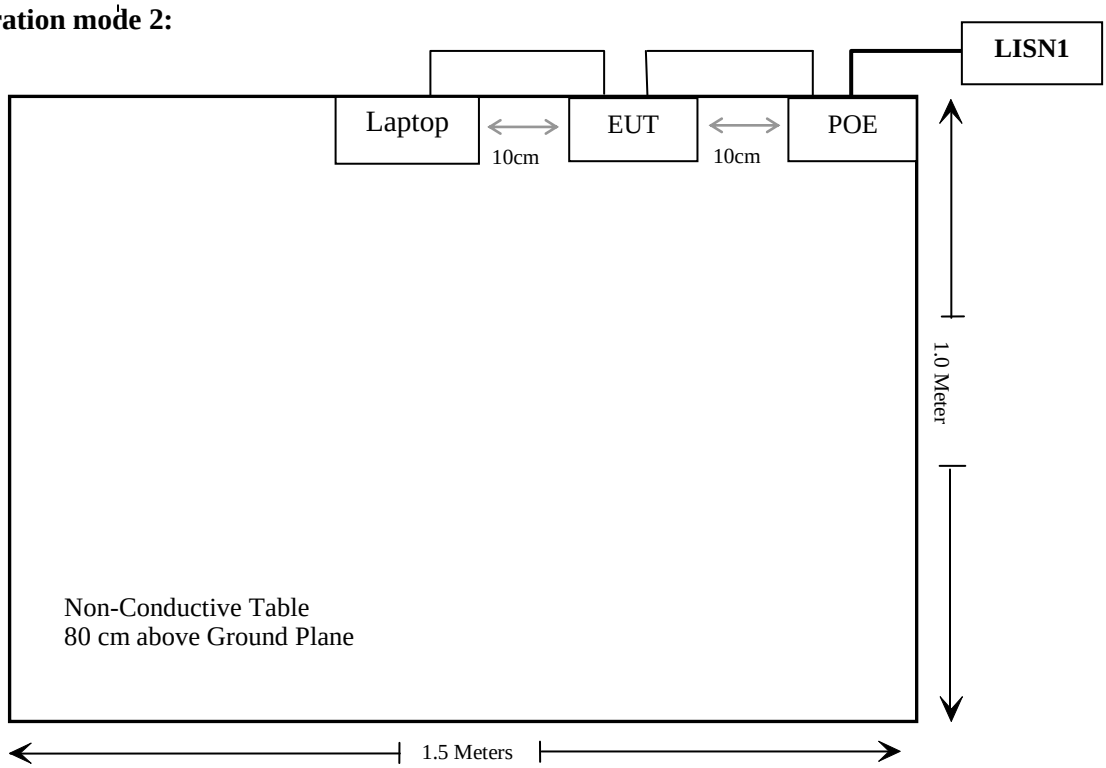
Cable Description	Length (m)	From/Port	To
Un-shielded Detachable AC Cable	1.0	LISN1	POE
Un-shielded Detachable RJ45 Cable	3.1	POE	EUT
Un-shielded Detachable RJ45 Cable	3.1	POE	Router
Un-shielded Detachable RJ45 Cable	8.0	Router	Internet
Un-shielded Un-detachable AC Cable	1.2	LISN2	Socket
Un-shielded Un-detachable AC Cable	1.5	Router	Socket
Un-shielded Detachable AC Cable	1.0	POE	Socket
Un-shielded Detachable RJ45 Cable	3.1	POE	Tabletop Conference System
Un-shielded Detachable RJ45 Cable	3.1	Router	Tabletop Conference System
Un-shielded Detachable USB Cable	1.8	EUT	Laptop

Block Diagram of Test Setup

EUT operation mode 1:



EUT operation mode 2:



SUMMARY OF TEST RESULTS

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

EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019/7/9	2020/7/8
Rohde & Schwarz	LISN	ENV216	101613	2020/1/22	2021/1/21
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknow	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8
Sonoma instrument	Pre-amplifier	310 N	186238	2019/4/20	2020/4/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknow	Cable 2	RF Cable 2	Unknow	2019/11/29	2020/11/28
Unknow	Cable	Chamber Cable 1	Unknow	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/07/21
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknow	RF Cable	W1101-EQ1 OUT	Unknow	2019/11/29	2020/11/28
Ducommun Technolagies	Horn antenna	ARH-4223-02	1007726-02 1304	2017/12/6	2020/12/5
Ducommun Technolagies	Horn antenna	ARH-2823-02	1007726-02 1302	2017/12/6	2020/12/5

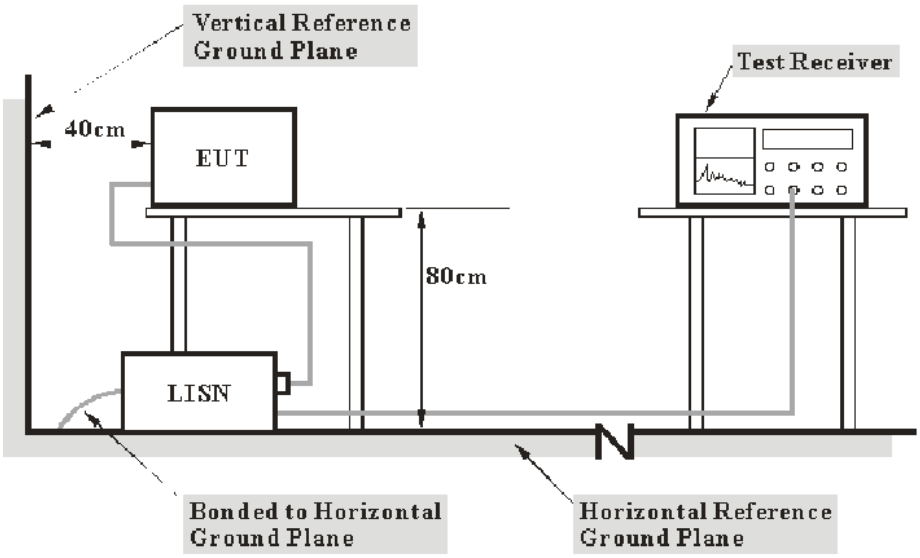
*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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 conncected 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:

Correction Factor = LISN VDF + Cable Loss + 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107.

Test Data

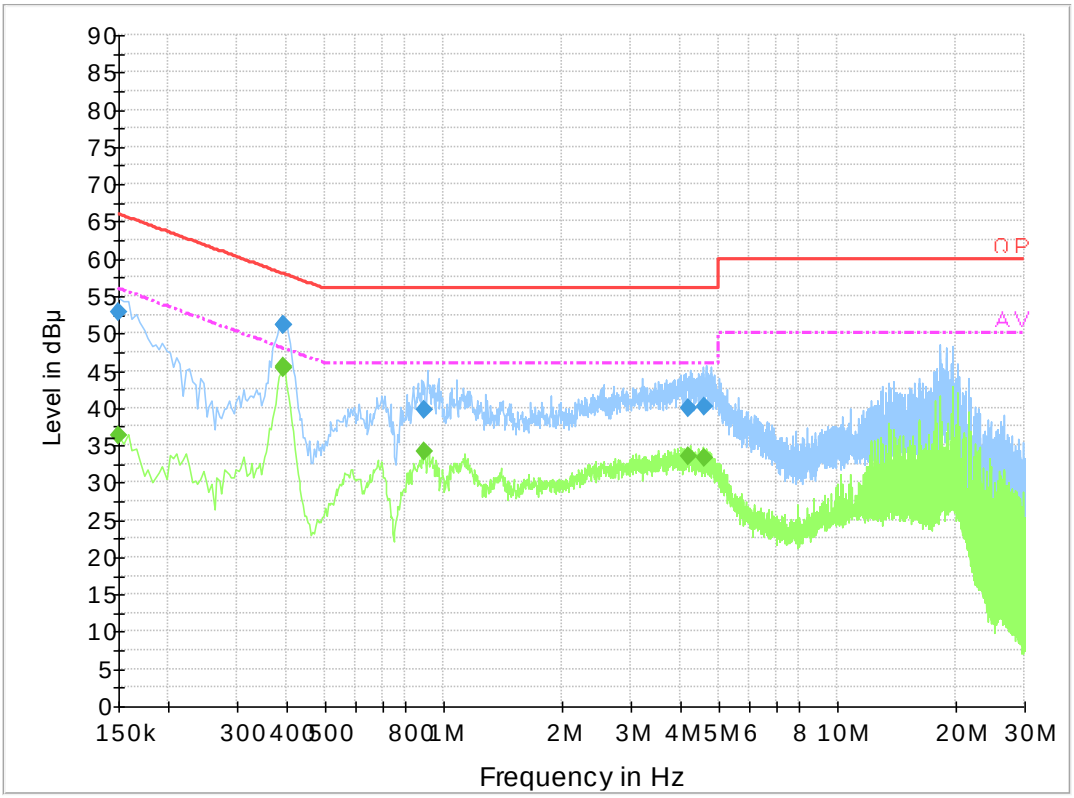
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2020-02-28.

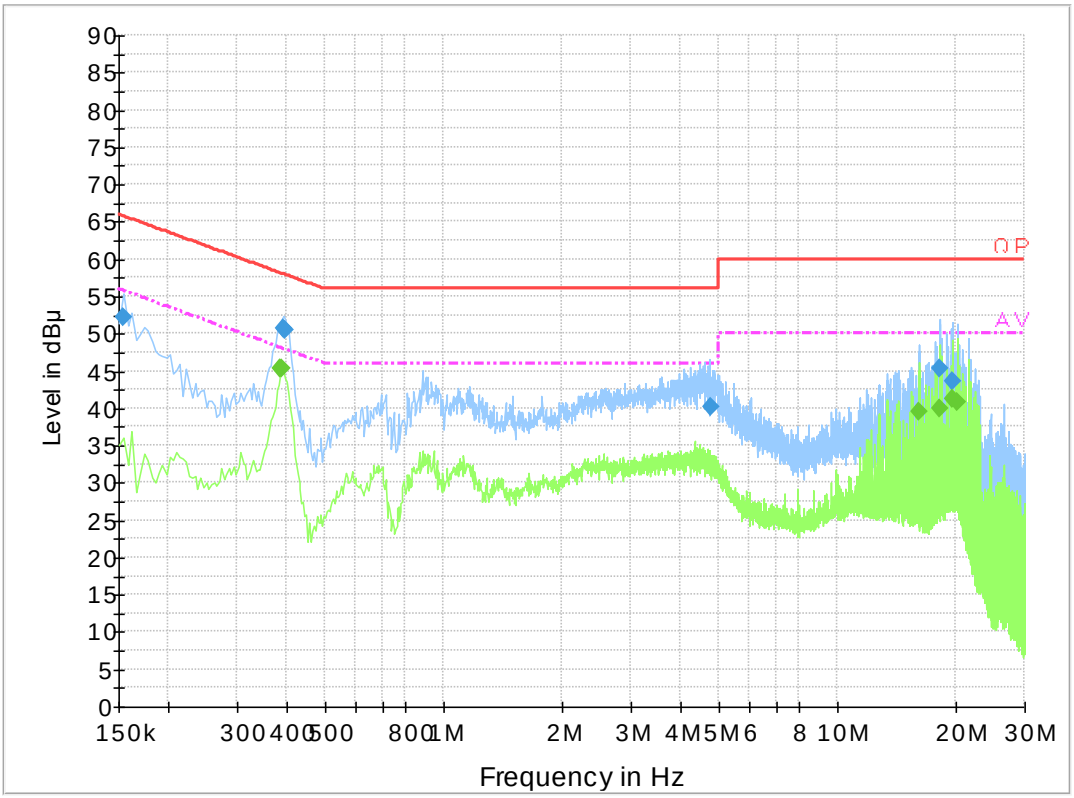
EUT Operation Mode 1:

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	52.9	19.8	66.0	13.1	QP
0.391790	51.1	19.9	58.0	6.9	QP
0.392090	51.0	19.9	58.0	7.0	QP
0.896350	39.7	19.8	56.0	16.3	QP
4.202250	40.0	19.9	56.0	16.0	QP
4.608370	40.1	19.9	56.0	15.9	QP
0.150000	36.3	19.8	56.0	19.7	Ave.
0.391790	45.6	19.9	48.0	2.4	Ave.
0.392090	45.2	19.9	48.0	2.8	Ave.
0.896350	34.1	19.8	46.0	11.9	Ave.
4.202250	33.5	19.9	46.0	12.5	Ave.
4.608370	33.2	19.9	46.0	12.8	Ave.

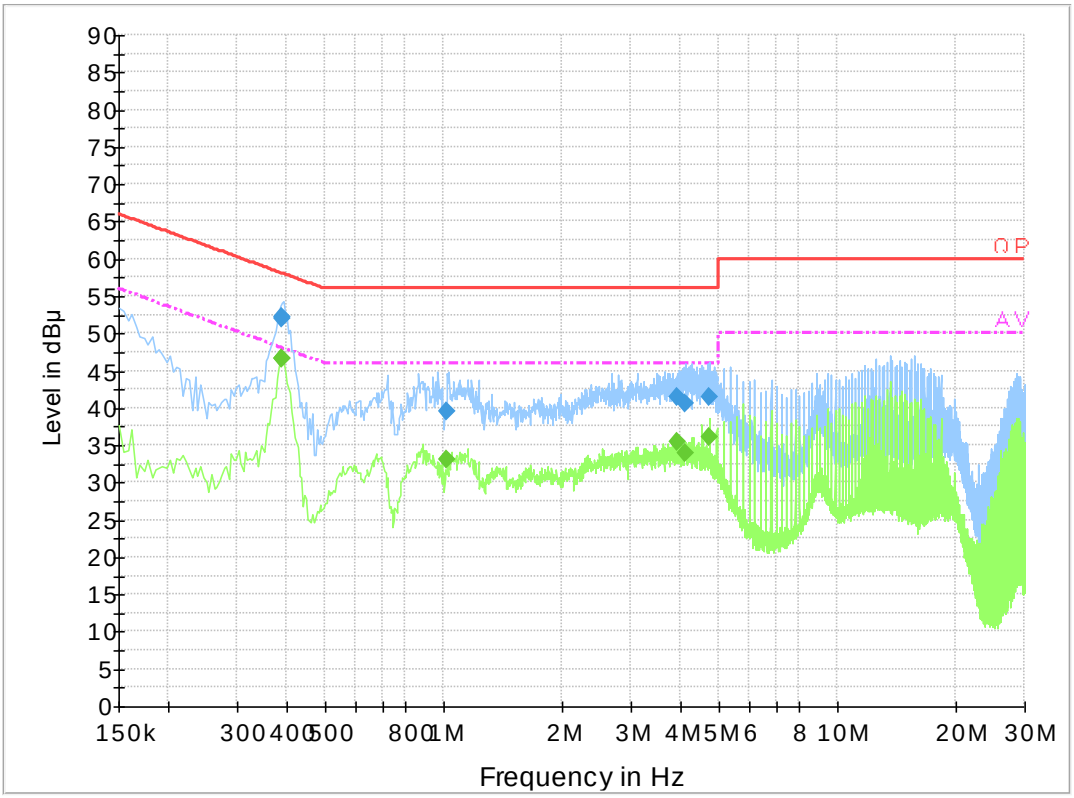
AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.154000	52.1	19.8	65.8	13.7	QP
0.391790	50.7	19.8	58.0	7.3	QP
0.396090	50.5	19.8	57.9	7.4	QP
4.778810	40.2	19.9	56.0	15.8	QP
18.243470	45.3	20.3	60.0	14.7	QP
19.706350	43.5	20.4	60.0	16.5	QP
0.386000	45.3	19.8	48.1	2.8	Ave.
0.390000	45.3	19.8	48.1	2.8	Ave.
16.230000	39.6	20.1	50.0	10.4	Ave.
18.242000	39.9	20.3	50.0	10.1	Ave.
19.710000	41.3	20.4	50.0	8.7	Ave.
20.258000	40.8	20.4	50.0	9.2	Ave.

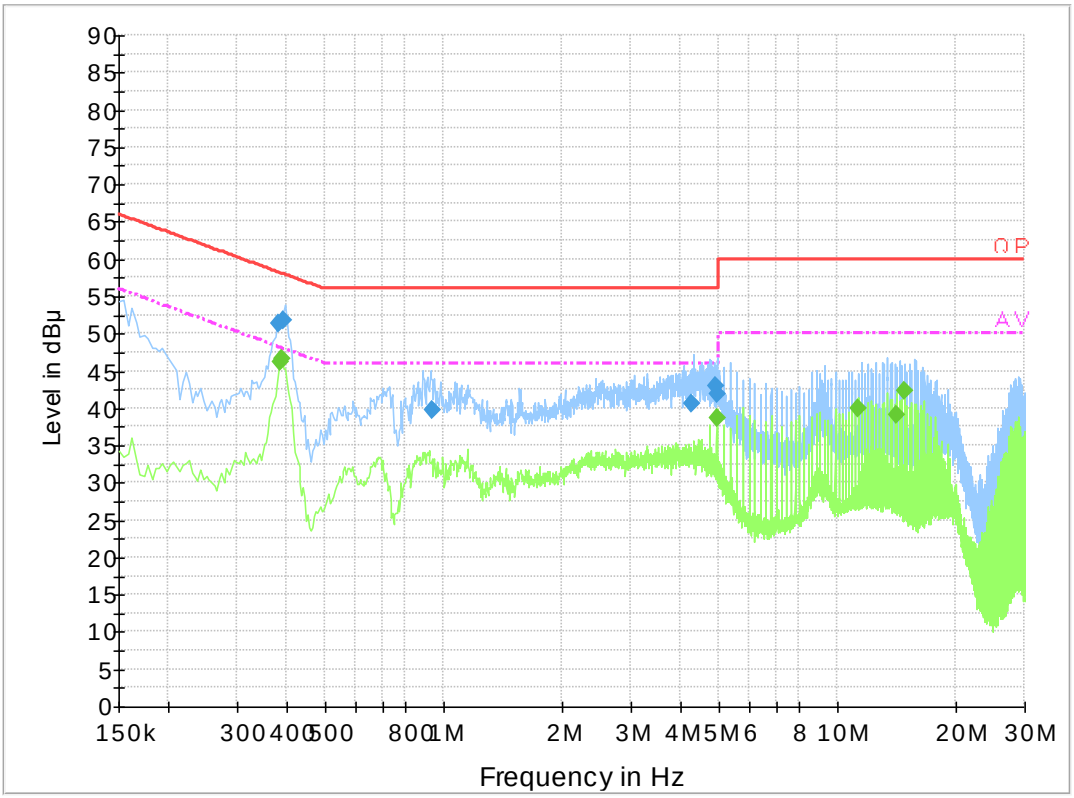
EUT Operation Mode 2:

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.388090	52.1	19.9	58.1	6.0	QP
0.388210	52.1	19.9	58.1	6.0	QP
1.022490	39.4	19.9	56.0	16.6	QP
3.918510	41.4	19.9	56.0	14.6	QP
4.108110	40.5	19.9	56.0	15.5	QP
4.738870	41.5	19.9	56.0	14.5	QP
0.388090	46.6	19.9	48.1	1.5	Ave.
0.388210	46.6	19.9	48.1	1.5	Ave.
1.022490	33.2	19.9	46.0	12.8	Ave.
3.918510	35.4	19.9	46.0	10.6	Ave.
4.108110	34.0	19.9	46.0	12.0	Ave.
4.738870	36.0	19.9	46.0	10.0	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.384210	51.3	19.8	58.2	6.9	QP
0.392030	51.7	19.8	58.0	6.3	QP
0.936050	39.7	19.8	56.0	16.3	QP
4.277050	40.5	19.9	56.0	15.5	QP
4.947750	42.9	19.9	56.0	13.1	QP
4.951690	41.9	19.9	56.0	14.1	QP
0.386000	46.1	19.8	48.1	2.0	Ave.
0.390000	46.5	19.8	48.1	1.6	Ave.
4.950000	38.6	19.9	46.0	7.4	Ave.
11.342000	40.0	20.0	50.0	10.0	Ave.
14.230000	39.0	19.9	50.0	11.0	Ave.
14.846000	42.3	19.9	50.0	7.7	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

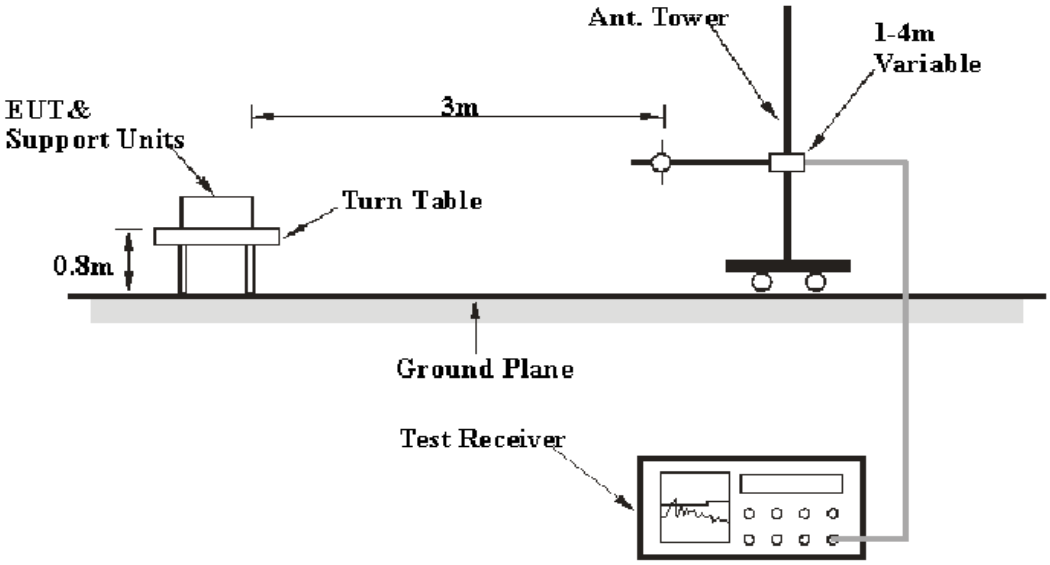
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

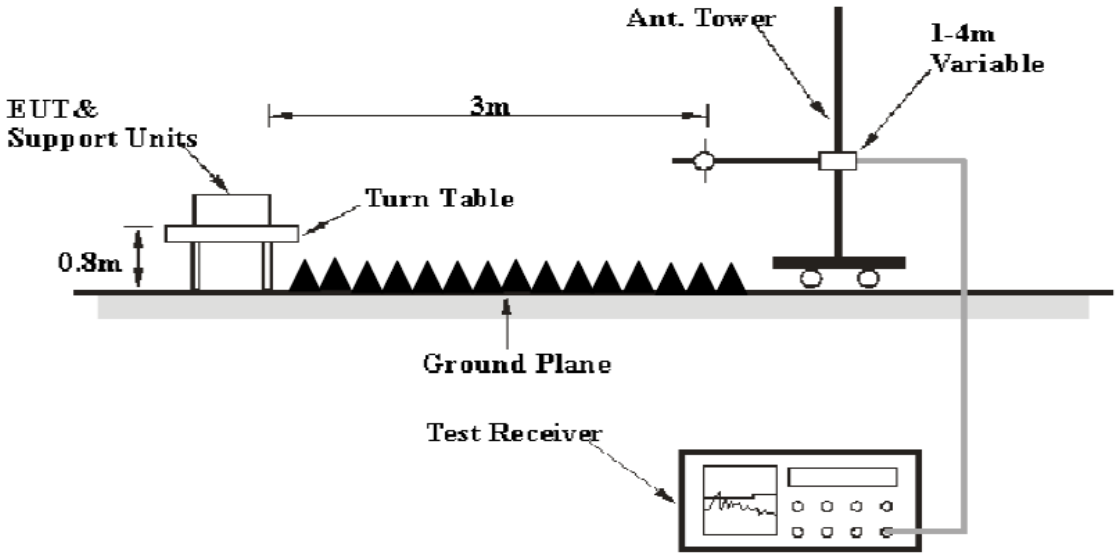
FCC §15.109

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 30GHz.

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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B.

Test Data

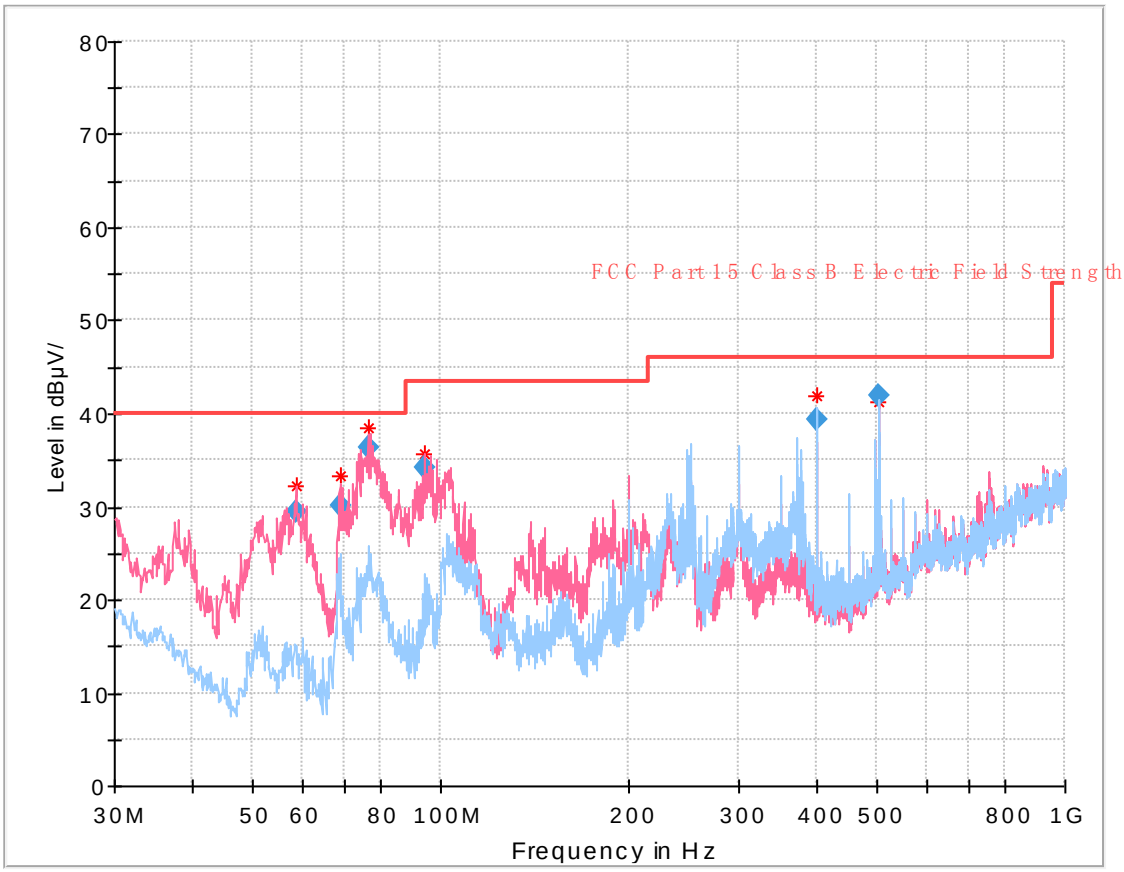
Environmental Conditions

Temperature:	23℃
Relative Humidity:	60 %
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang on 2020-03-16 and Zero Yan on 2020-03-17 for below 1G and Leo Huang on 2020-03-24 for above 1G.

EUT Operation Mode 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)
58.748250	29.46	126.0	V	13.0	-20.1	40.00	10.54
69.044875	30.04	110.0	V	342.0	-20.6	40.00	9.96
76.541250	36.35	102.0	V	166.0	-20.2	40.00	3.65
94.350875	34.22	122.0	V	240.0	-18.2	43.50	9.28
400.001875	39.33	121.0	H	317.0	-10.3	46.00	6.67
503.785875	41.96	180.0	H	344.0	-5.1	46.00	4.04

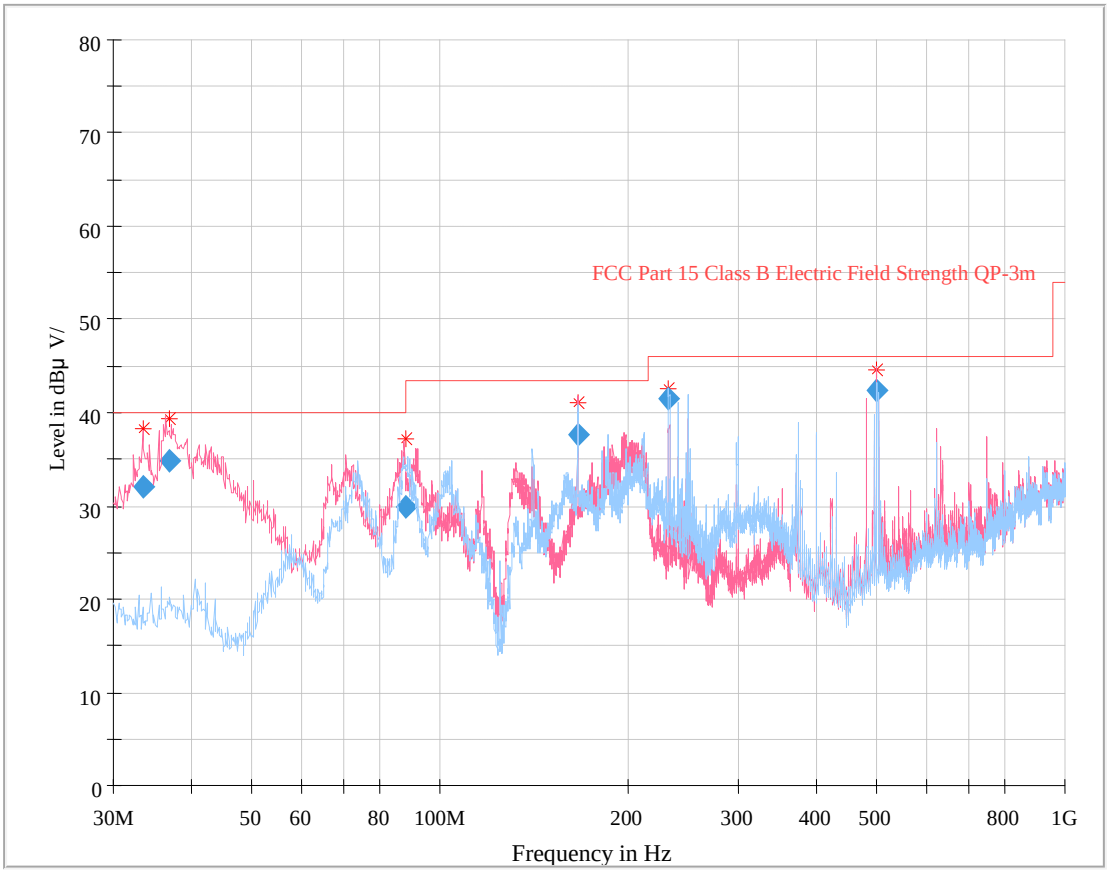
Above 1GHz:

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)
1362.55	43.16	PK	299	1.6	H	-3.52	39.64	74	34.36
1362.55	28.63	Ave.	299	1.6	H	-3.52	25.11	54	28.89
1362.55	43.29	PK	195	2.3	V	-3.52	39.77	74	34.23
1362.55	28.63	Ave.	195	2.3	V	-3.52	25.11	54	28.89
2237.82	44.72	PK	240	2.1	H	-0.56	44.16	74	29.84
2237.82	28.66	Ave.	240	2.1	H	-0.56	28.10	54	25.90
2237.82	43.84	PK	156	1.7	V	-0.56	43.28	74	30.72
2237.82	28.51	Ave.	156	1.7	V	-0.56	27.95	54	26.05

Note:
Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
Corrected Amplitude = Correction Factor + Reading
Margin = Limit - Corrected Amplitude

EUT Operation Mode 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)
33.535125	32.03	102.0	V	114.0	-9.7	40.00	7.97
36.912875	34.75	102.0	V	0.0	-11.8	40.00	5.25
88.144000	29.97	119.0	V	262.0	-19.2	43.50	13.53
166.290125	37.56	110.0	V	143.0	-14.7	43.50	5.94
232.354750	41.55	134.0	H	224.0	-14.0	46.00	4.45
500.008250	42.89	161.0	H	186.0	-5.2	46.00	3.11

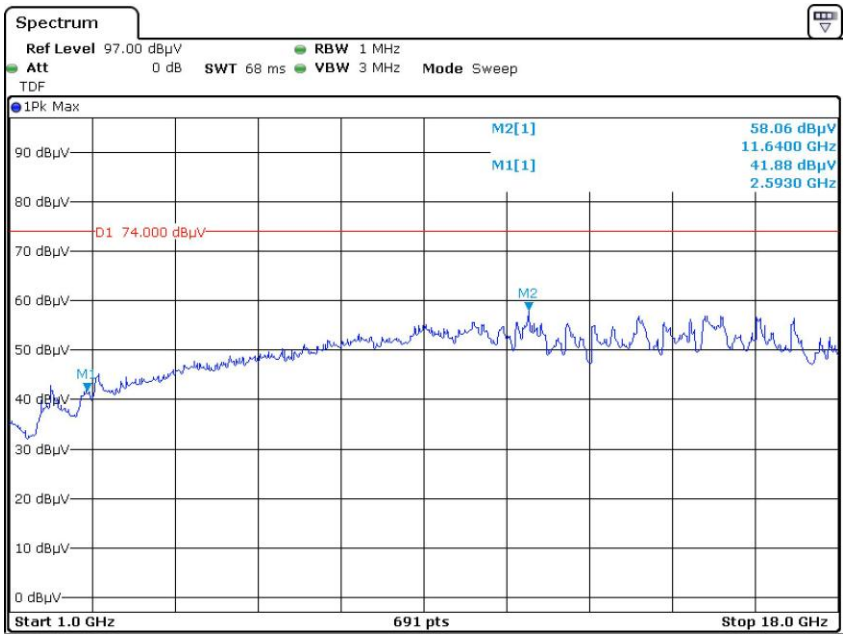
Above 1GHz:

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)
1354.60	43.22	PK	6	1.7	H	-3.62	39.60	74	34.40
1354.60	28.71	Ave.	6	1.7	H	-3.62	25.09	54	28.91
1354.60	43.56	PK	48	2.2	V	-3.62	39.94	74	34.06
1354.60	28.41	Ave.	48	2.2	V	-3.62	24.79	54	29.21
2593.00	43.62	PK	275	2.3	H	0.04	43.66	74	30.34
2593.00	28.43	Ave.	275	2.3	H	0.04	28.47	54	25.53
2593.00	43.29	PK	73	1.2	H	0.04	43.33	74	30.67
2593.00	28.39	Ave.	73	1.2	H	0.04	28.43	54	25.57

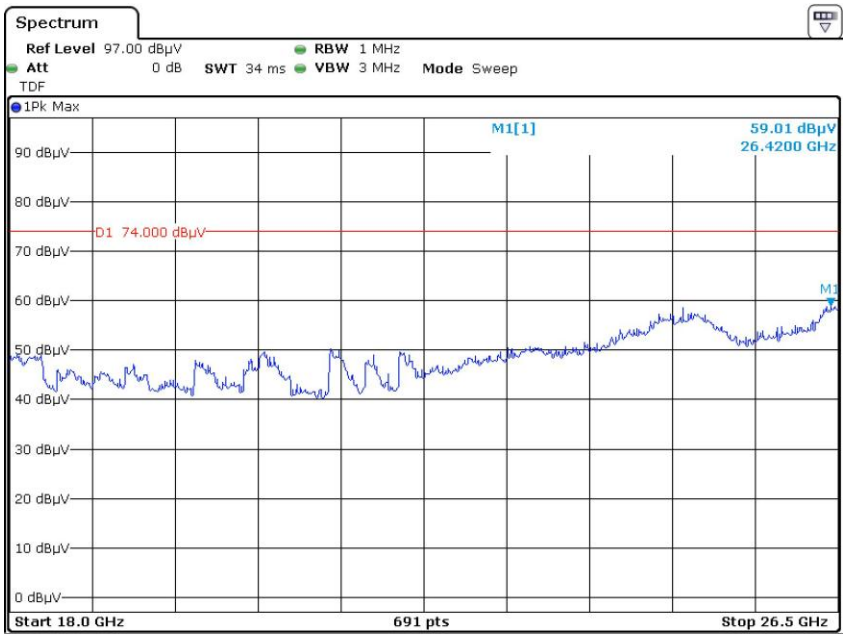
Note:
Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
Corrected Amplitude = Correction Factor + Reading
Margin = Limit - Corrected Amplitude

Pre-scan for peak (Test mode 2)

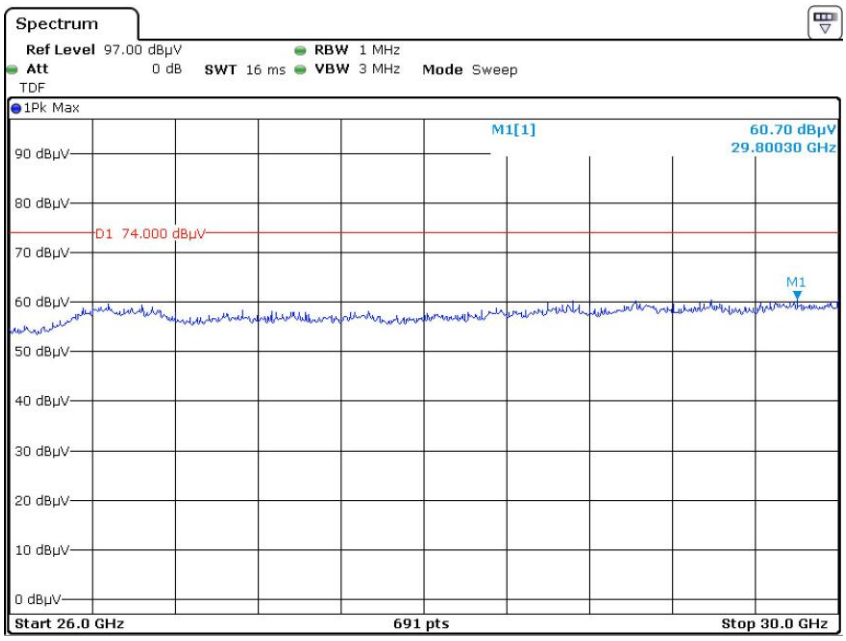
Horizontal



Date: 24.MAR.2020 10:26:00

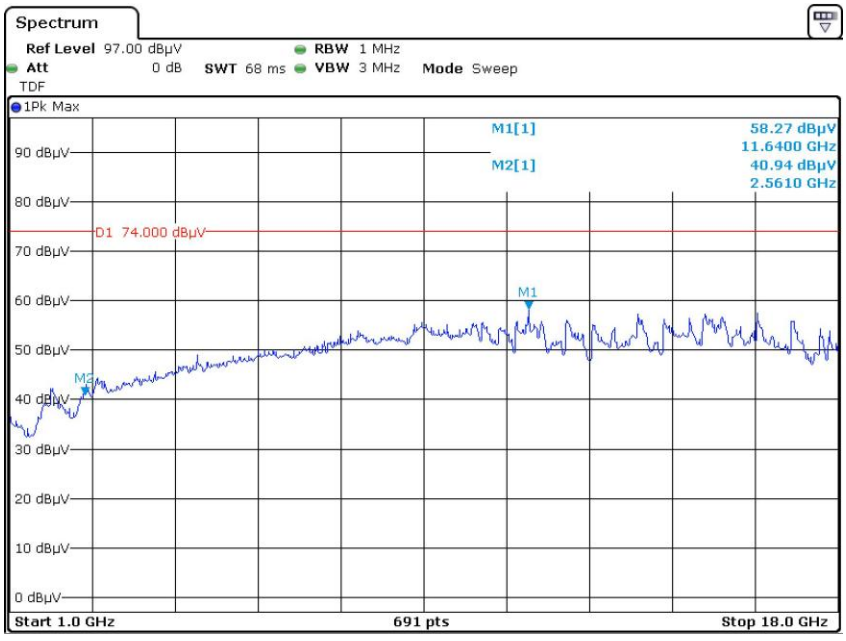


Date: 24.MAR.2020 11:14:15



Date: 24.MAR.2020 11:48:59

Vertical



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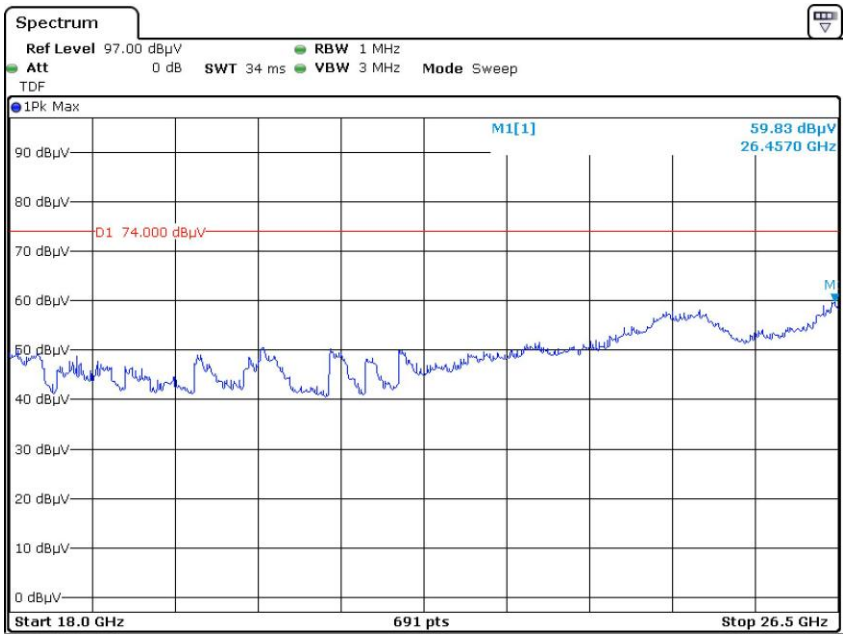

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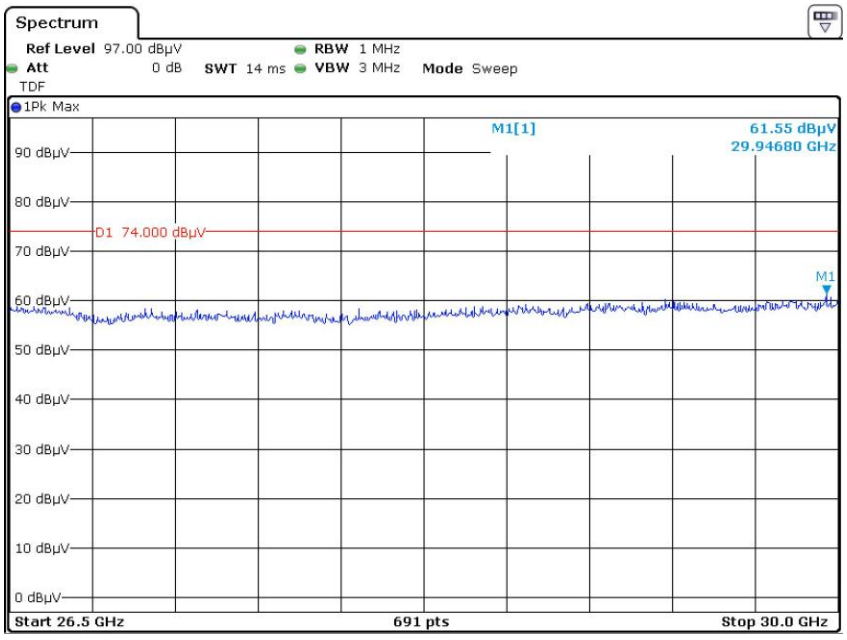
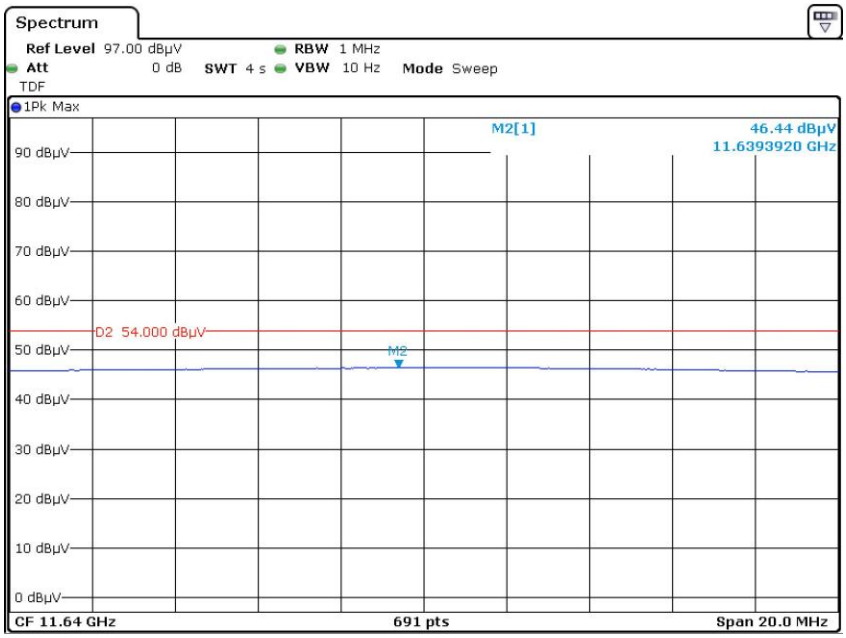


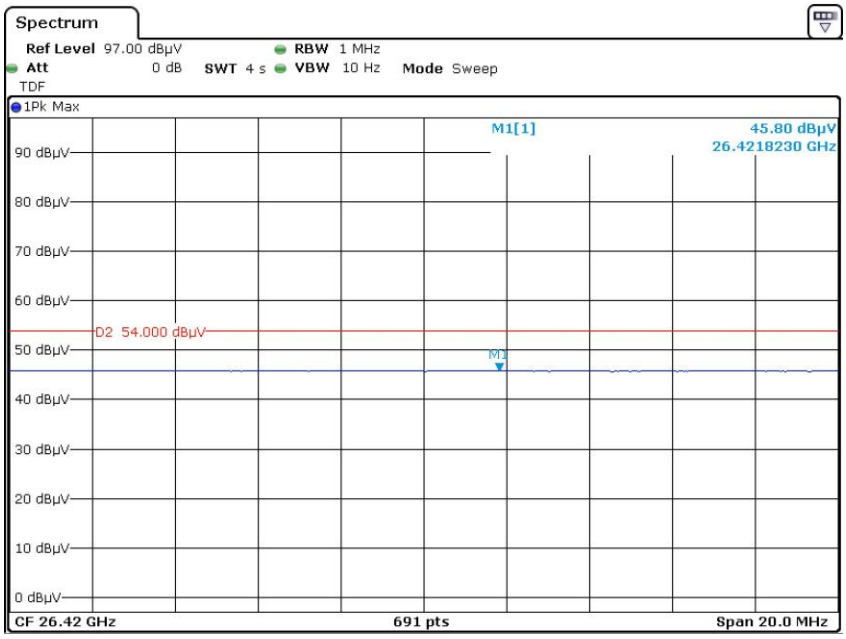
Date: 24.MAR.2020 11:54:37

Pre-scan for Average

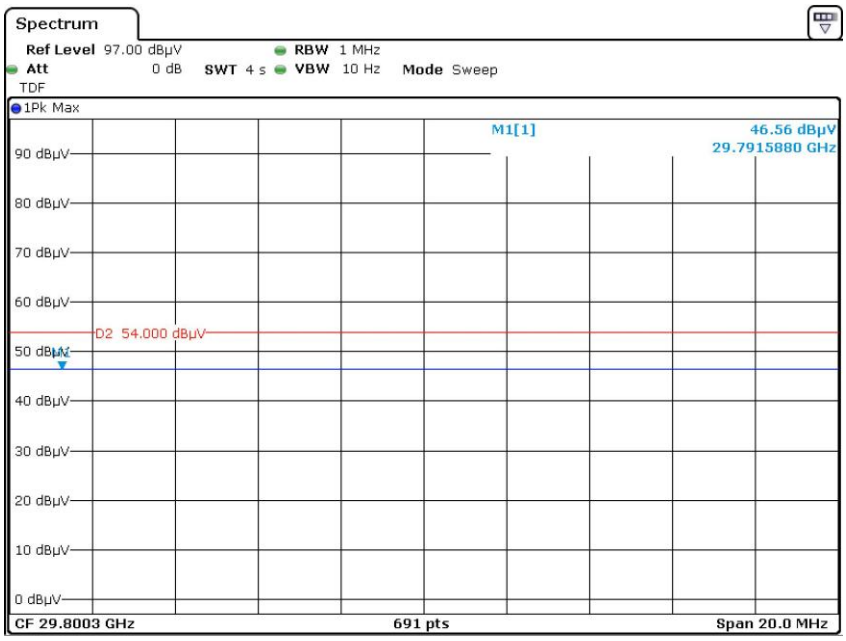
Horizontal



Date: 24.MAR.2020 10:28:35



Date: 24.MAR.2020 11:17:03



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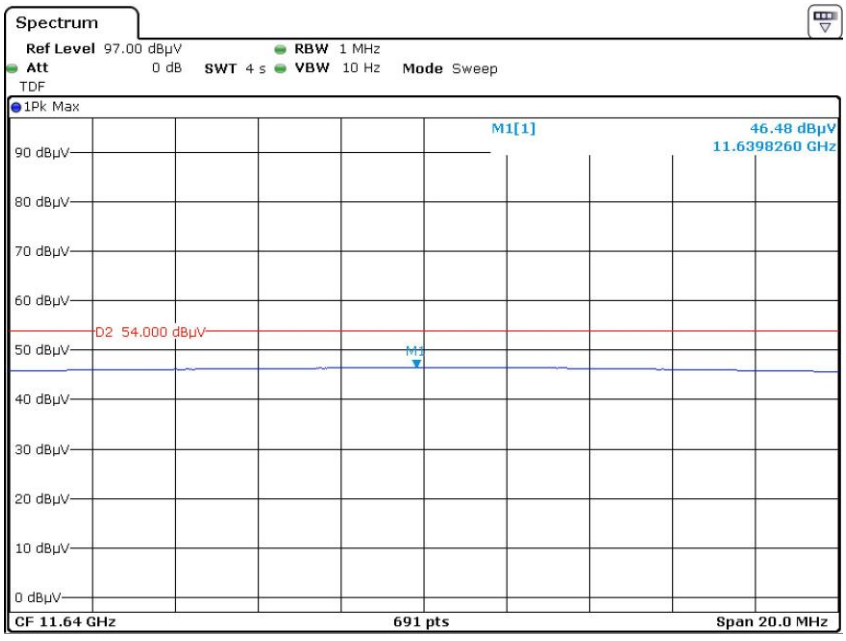
Vertical



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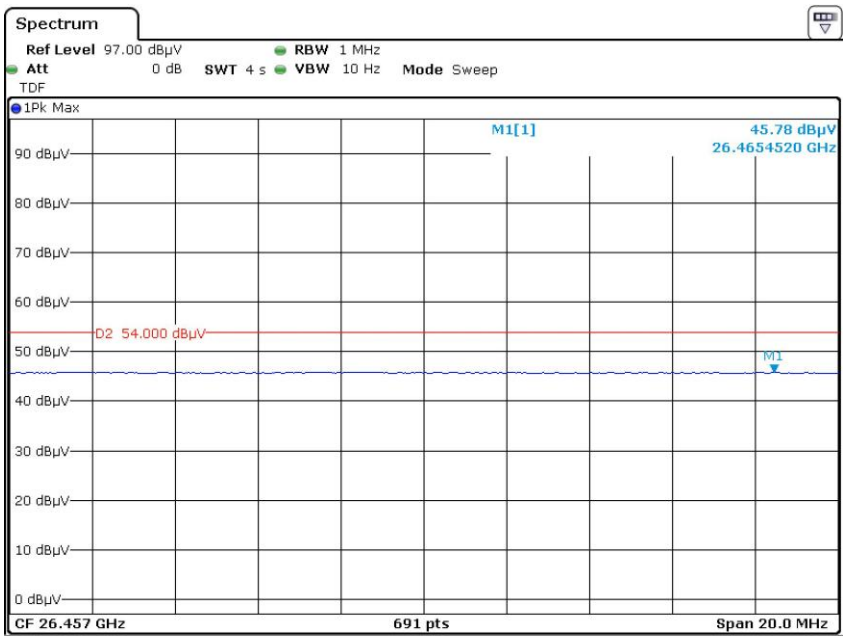

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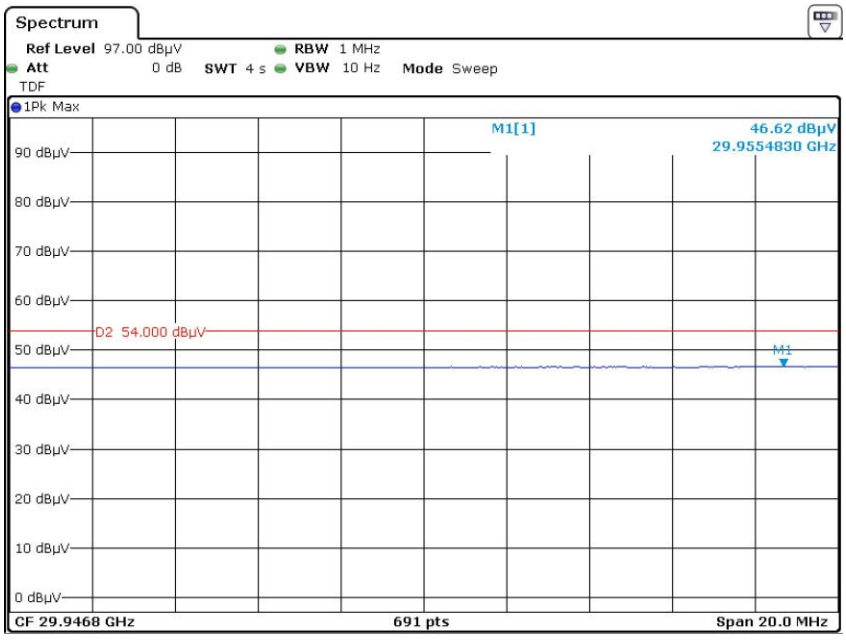

Date: 24.MAR.2020 11:58:19

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