



FCC PART 15B, CLASS B TEST REPORT

For

Grandstream Networks, Inc.

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

FCC ID: YZZGRP2614

Report Type: Original Report	Product Type: IP Phone
Report Number: <u>RSZ190219002-00A</u>	
Report Date: <u>2019-04-09</u>	
Rocky Kang	
Reviewed By: <u>RF Engineer</u>	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	IP Phone
Tested Model	GRP2614
Voltage Range	DC 12V from adapter or DC 48V from POE
Measure	234 mm (L) * 214 mm (W) * 82.4 mm (H)
Highest operating frequency	5825 MHz
Date of Test	2019-04-02 to 2019-04-09
Sample serial number	190219002
Received date	2019-02-19
Sample/EUT Status	Good condition

Adapter 1 (MASSPOWER) Information:

Model: PEA-120100VA

Input: AC100-240V, 50/60Hz, 0.3A

Output: DC12.0V ,1.0A

Adapter 2 (SUNLIGHT) Information:

Model: F12US1200100A

Input: AC100-240V, 50/60Hz, 0.5A max

Output: DC12.0V ,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)

FCC Part 15.247 DSS&DTS and Part 15.407 NII submissions with FCC ID: YZZGRP2614.

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		$\pm 1.95\text{dB}$
Emissions, radiated	Below 1GHz	$\pm 4.75\text{dB}$
	Above 1GHz	$\pm 4.88\text{dB}$

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 normal mode.

EUT Exercise Software

No exercise software was made to the EUT tested.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

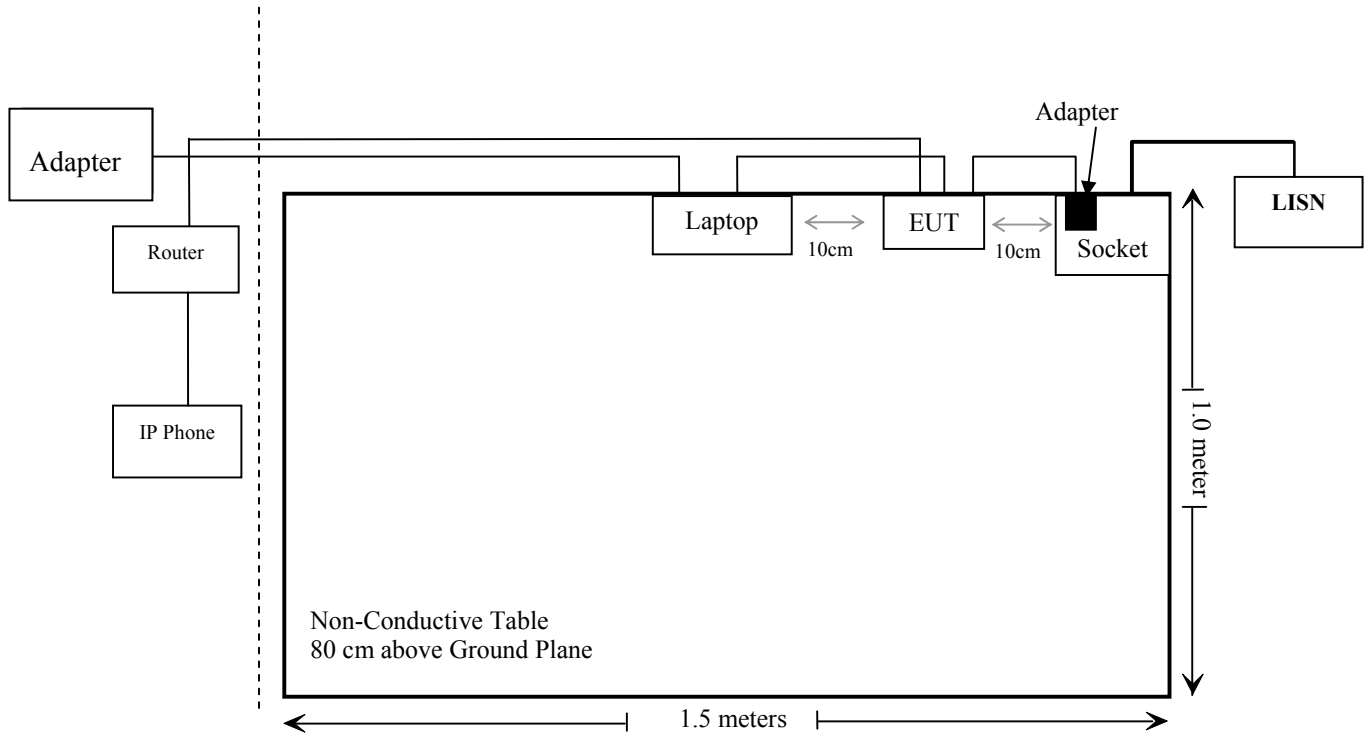
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-415K	5503290068073
Un-known	Router	Un-known	Un-known
Grandstream	IP phone	GXV3370	Un-known
Gigabit	POE	Un-known	Un-known
Un-known	Laptop	Un-known	Un-known

External I/O Cable

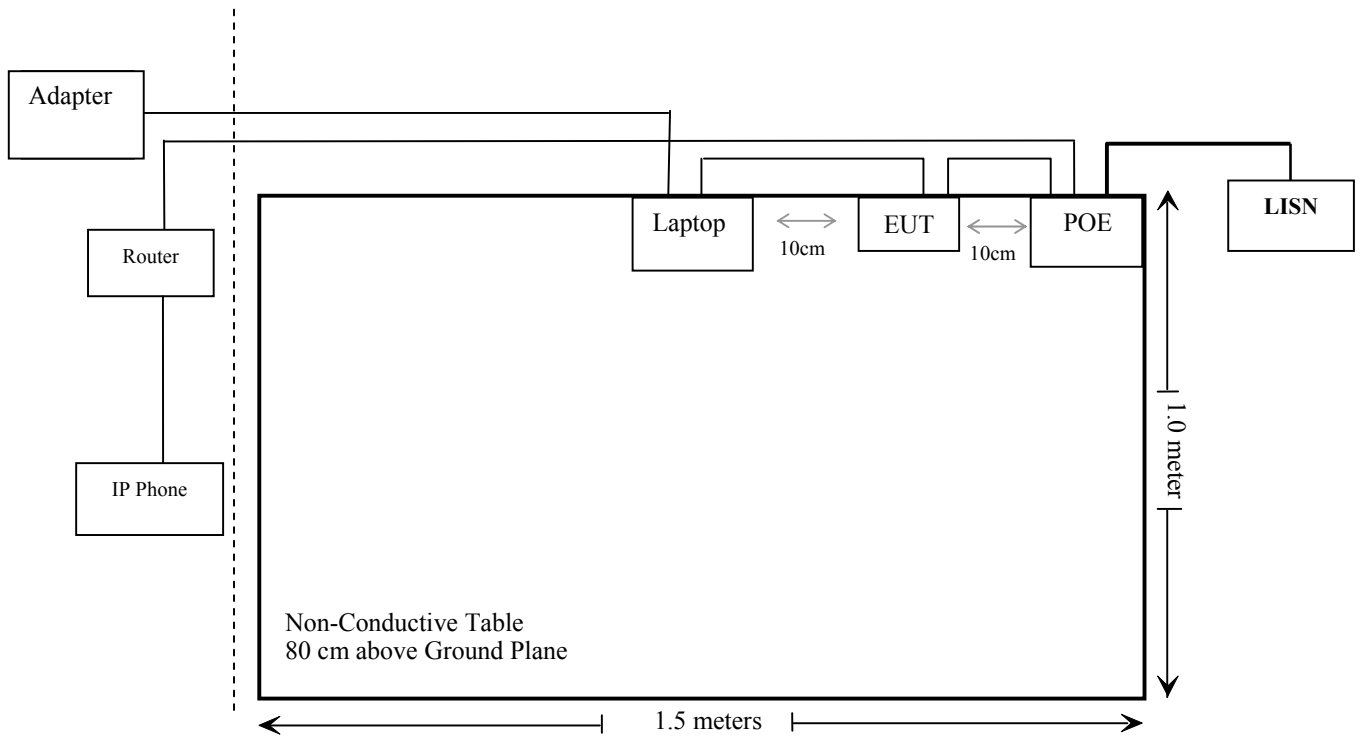
Cable Description	Length (m)	From/Port	To
Unshielded un-detachable AC cable	1.0	Socket	LISN
Unshielded un-detachable DC cable	2.55	Adapter	EUT
Unshielded detachable RJ45 cable	12	EUT	Laptop
Unshielded detachable RJ45 cable	1.0	Router	IP phone
Unshielded detachable RJ45 cable	10	EUT	Router
Unshielded detachable RJ45 cable	1.0	EUT	POE

Block Diagram of Test Setup

Powered by Adapter:



Powered by POE:



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	2019-11-12
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	2019-11-12
Radiated Emission Test					
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	Signal Analyzer	FSV40	101473	2019-01-09	2020-01-08
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	ESR	1316.3003K03-101746-zn	2018-07-11	2019-07-11
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	2019-11-12
Ducommun technologies	RF Cable	RG-214	1	2018-11-19	2019-05-21
Ducommun technologies	RF Cable	RG-214	2	2018-11-12	2019-11-12
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-11-12	2019-11-12
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Agilent	Spectrum Analyzer	8564E	3943A01781	2019-01-04	2020-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun technologies	Horn Antenna	ARH-2823-02	1007726-03	2017-12-29	2020-12-28

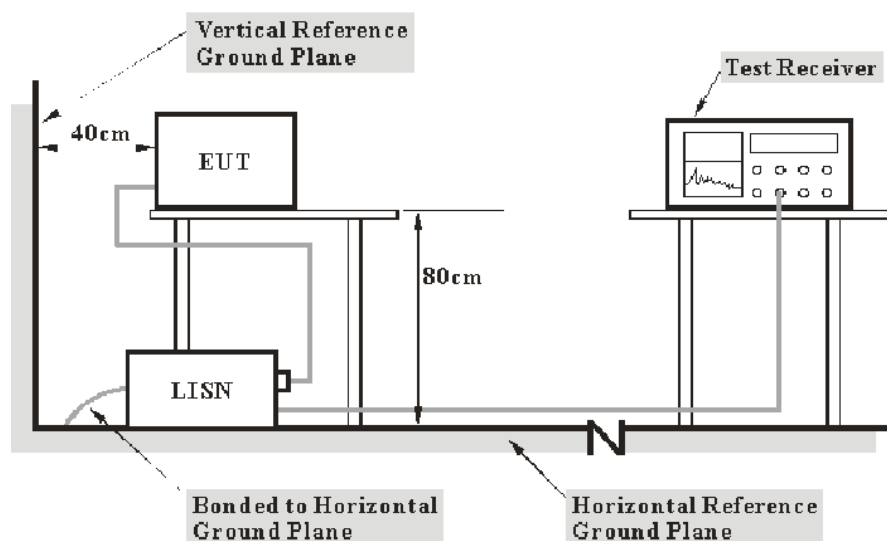
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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 adapter and AC mains port of POE were 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

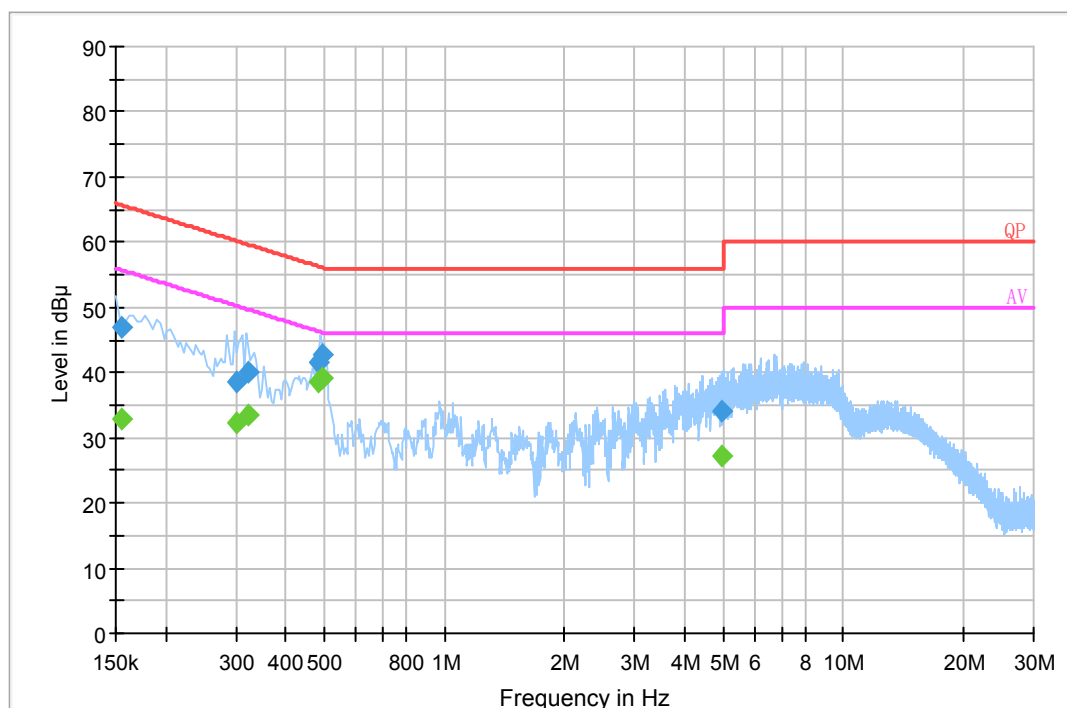
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2019-04-02.

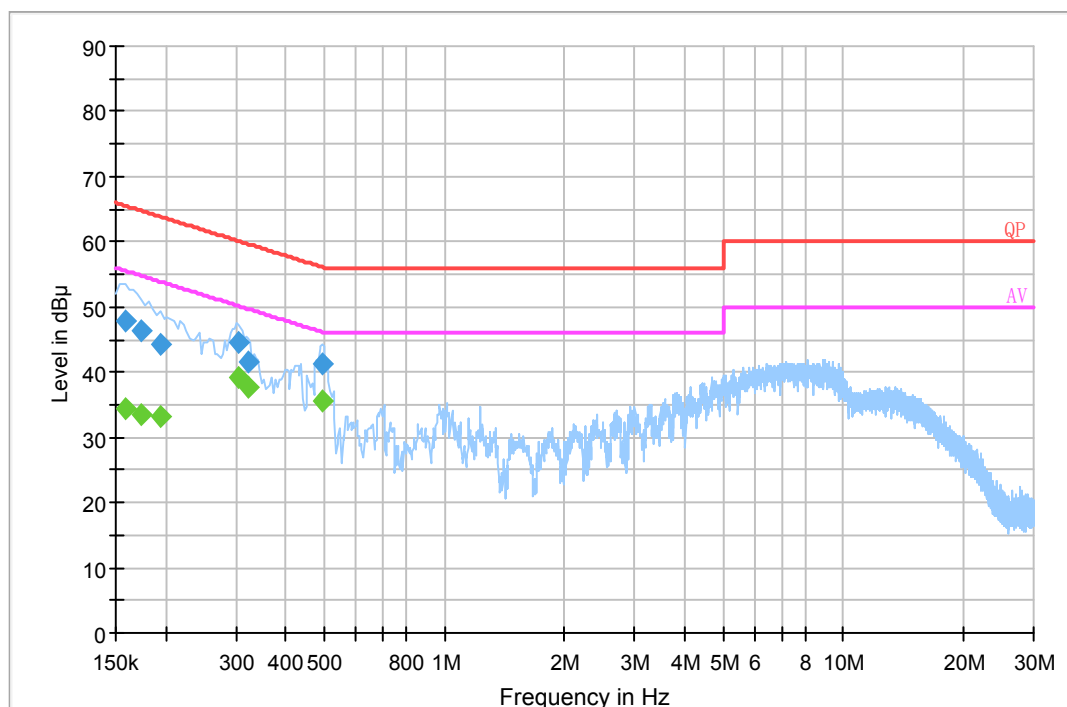
EUT Operation Mode: Talking

Powered by Adapter 1 (MASSPOWER):

AC 120V/60 Hz, Line



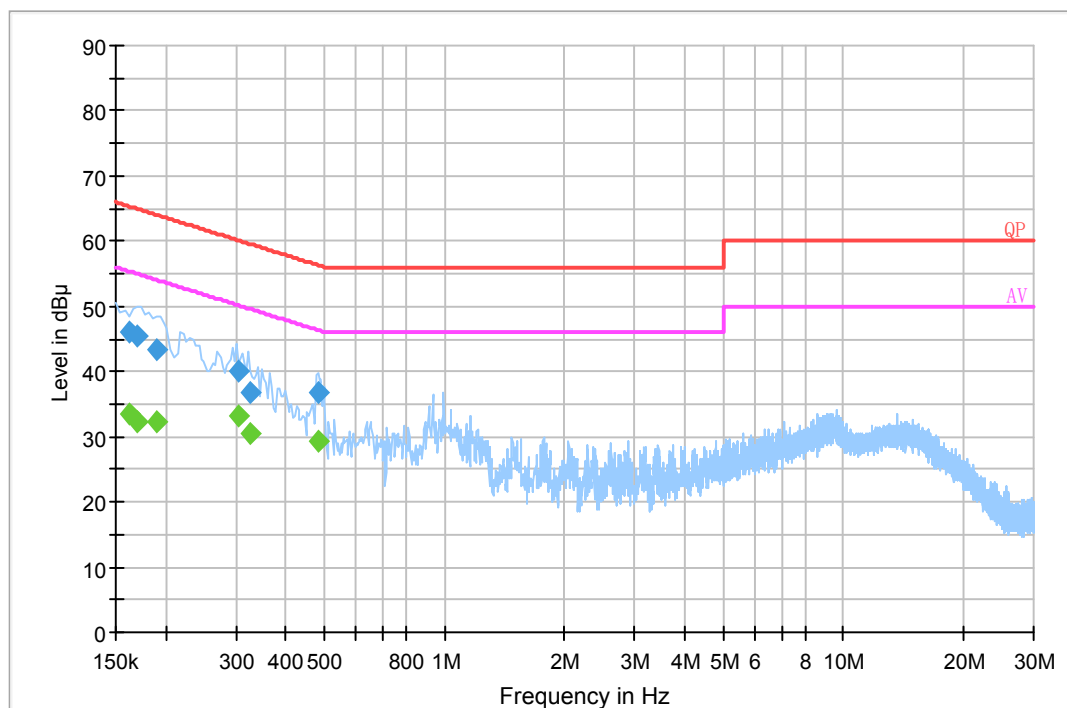
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154500	46.9	19.8	65.8	18.9	QP
0.302500	38.5	19.8	60.2	21.7	QP
0.322770	39.9	19.8	59.6	19.7	QP
0.485170	41.7	19.8	56.3	14.6	QP
0.494650	42.6	19.8	56.1	13.5	QP
4.967090	34.0	20.1	56.0	22	QP
0.154500	33.0	19.8	55.8	22.8	Ave.
0.302500	32.4	19.8	50.2	17.8	Ave.
0.322770	33.6	19.8	49.6	16	Ave.
0.485170	38.6	19.8	46.3	7.7	Ave.
0.494650	39.3	19.8	46.1	6.8	Ave.
4.967090	27.2	20.1	46.0	18.8	Ave.

AC 120V/60 Hz, Neutral

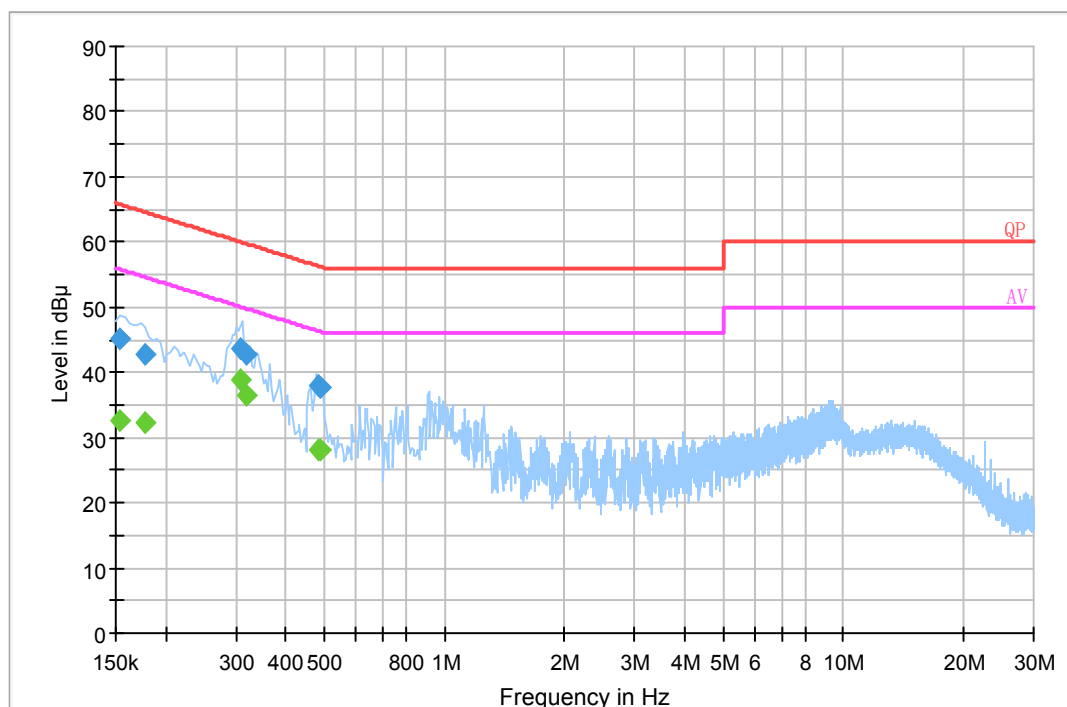
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.158500	47.7	19.7	65.5	17.8	QP
0.173500	46.2	19.7	64.8	18.6	QP
0.193500	44.3	19.7	63.9	19.6	QP
0.305470	44.6	19.8	60.1	15.5	QP
0.322770	41.7	19.7	59.6	17.9	QP
0.494590	41.3	19.8	56.1	14.8	QP
0.158500	34.4	19.7	55.5	21.1	Ave.
0.173500	33.4	19.7	54.8	21.4	Ave.
0.193500	33.2	19.7	53.9	20.7	Ave.
0.305470	39.2	19.8	50.1	10.9	Ave.
0.322770	37.6	19.7	49.6	12	Ave.
0.494590	35.5	19.8	46.1	10.6	Ave.

Powered by Adapter 2 (SUNLIGHT):

AC 120 V/60 Hz, Line:



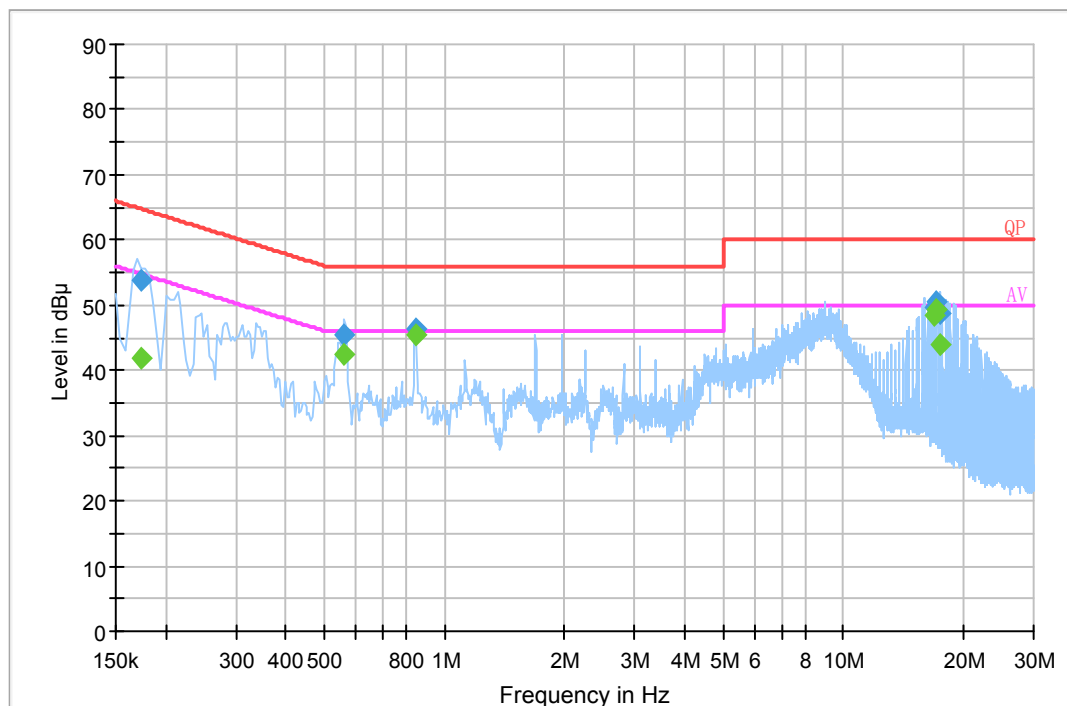
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.161500	46.0	19.8	65.4	19.4	QP
0.169500	45.6	19.8	65.0	19.4	QP
0.189500	43.3	19.8	64.1	20.8	QP
0.305470	40.1	19.8	60.1	20.0	QP
0.326830	36.9	19.8	59.5	22.6	QP
0.482770	36.7	19.8	56.3	19.6	QP
0.161500	33.4	19.8	55.4	22.0	Ave.
0.169500	32.2	19.8	55.0	22.8	Ave.
0.189500	32.4	19.8	54.1	21.7	Ave.
0.305470	33.1	19.8	50.1	17.0	Ave.
0.326830	30.4	19.8	49.5	19.1	Ave.
0.482770	29.2	19.8	46.3	17.1	Ave.

AC 120V/ 60 Hz, Neutral:

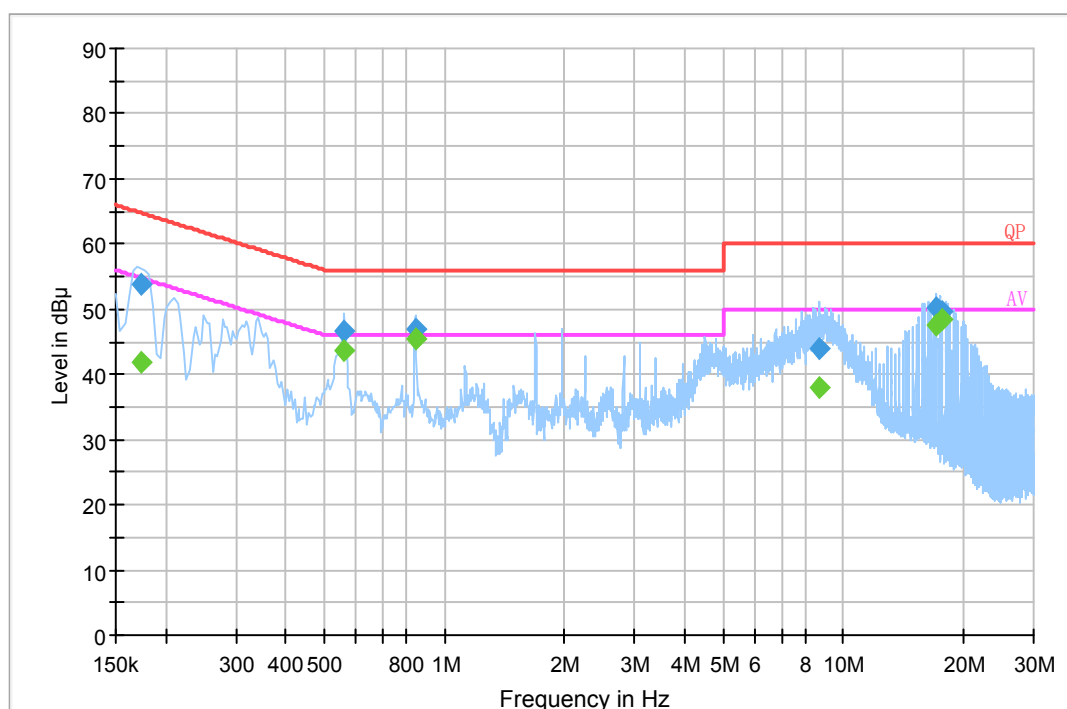
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.154000	45.3	19.8	65.8	20.5	QP
0.177500	42.7	19.7	64.6	21.9	QP
0.309350	43.6	19.8	60.0	16.4	QP
0.317230	42.7	19.8	59.8	17.1	QP
0.485170	37.8	19.8	56.3	18.5	QP
0.486710	37.7	19.8	56.2	18.5	QP
0.154000	32.6	19.8	55.8	23.2	Ave.
0.177500	32.3	19.7	54.6	22.3	Ave.
0.309350	39.0	19.8	50.0	11	Ave.
0.317230	36.3	19.8	49.8	13.5	Ave.
0.485170	28.0	19.8	46.3	18.3	Ave.
0.486710	28.0	19.8	46.2	18.2	Ave.

Powered by POE:

AC 120 V/60 Hz, Line:



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.173500	53.8	19.8	64.8	11.0	QP
0.561570	45.5	19.7	56.0	10.5	QP
0.845310	46.4	19.7	56.0	9.6	QP
16.896470	49.6	20.2	60.0	10.4	QP
17.176330	50.4	20.2	60.0	9.6	QP
17.452010	48.8	20.2	60.0	11.2	QP
0.173500	41.7	19.8	54.8	13.1	Ave.
0.561570	42.5	19.7	46.0	3.5	Ave.
0.845310	45.5	19.7	46.0	0.5	Ave.
16.896470	48.5	20.2	50.0	1.5	Ave.
17.176330	49.3	20.2	50.0	0.7	Ave.
17.452010	44.0	20.2	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)
0.173500	53.8	19.7	64.8	11	QP
0.561570	46.7	19.7	56.0	9.3	QP
0.845310	47.0	19.7	56.0	9	QP
8.739050	44.1	20.1	60.0	15.9	QP
17.176390	50.3	20.2	60.0	9.7	QP
17.735990	49.6	20.2	60.0	10.4	QP
0.173500	41.9	19.7	54.8	12.9	Ave.
0.561570	43.7	19.7	46.0	2.3	Ave.
0.845310	45.4	19.7	46.0	0.6	Ave.
8.739050	38.0	20.1	50.0	12	Ave.
17.176390	47.4	20.2	50.0	2.6	Ave.
17.735990	48.5	20.2	50.0	1.5	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

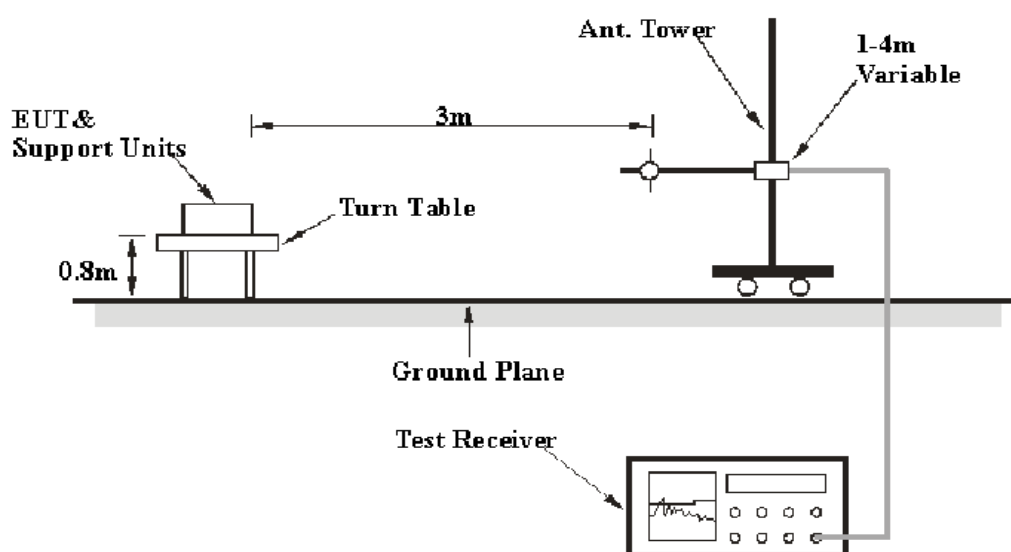
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

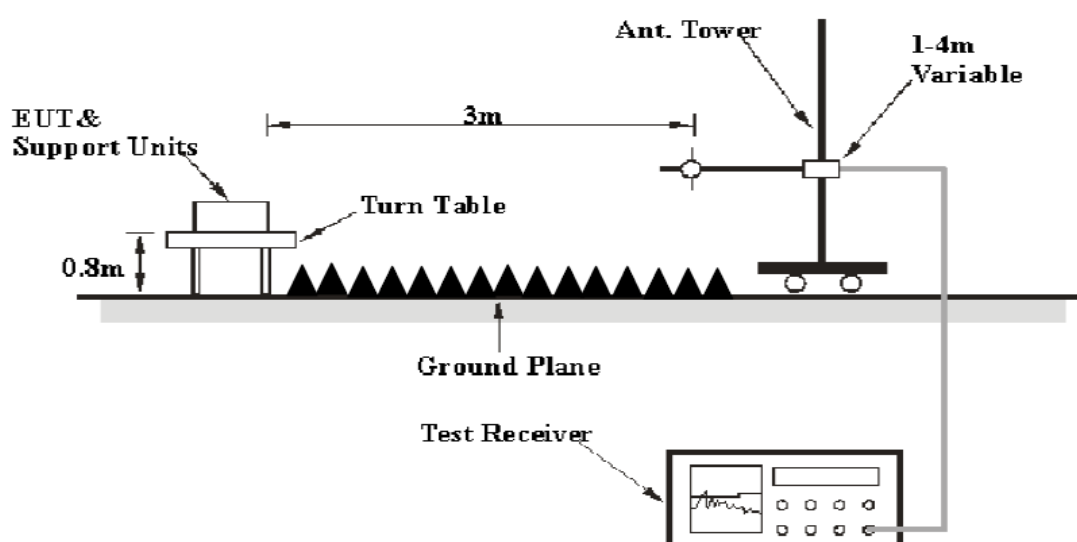
FCC §15.109

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 30 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

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

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

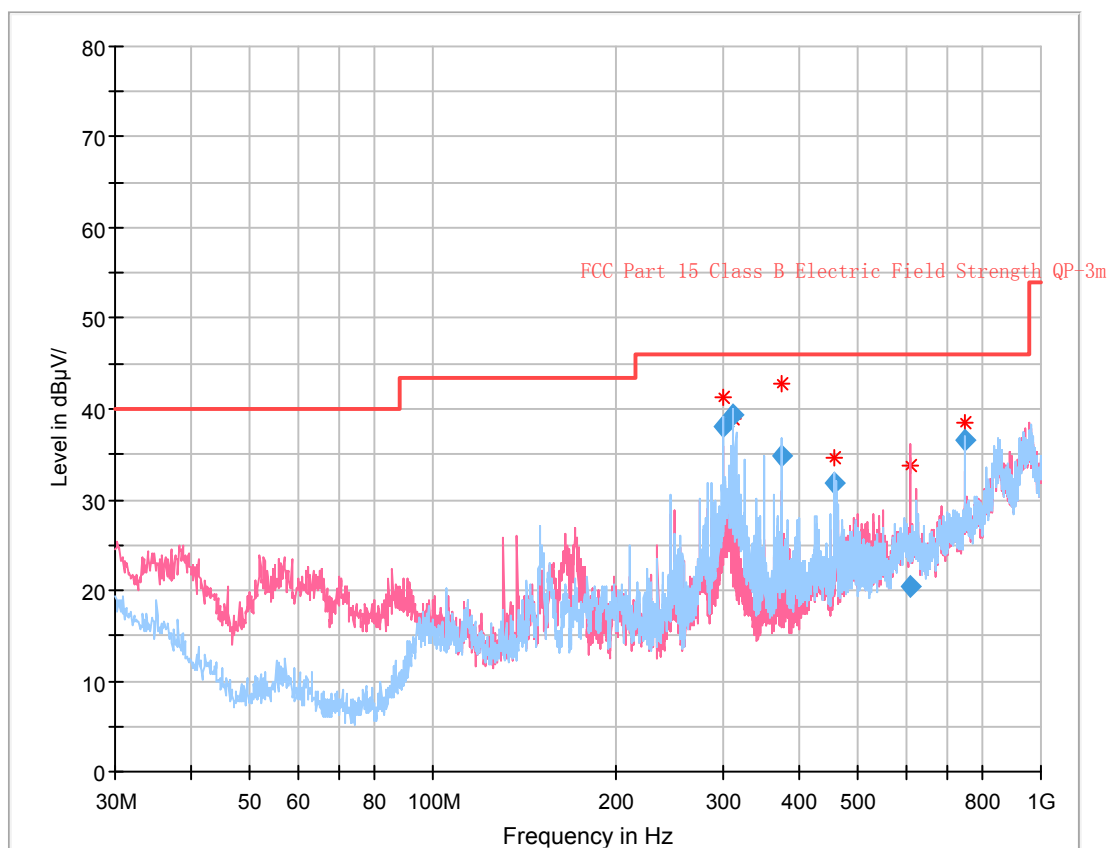
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Huang on 2019-04-09.

EUT Operation Mode: Talking

Powered by Adapter 1 (MASSPOWER):

30 MHz~1 GHz:



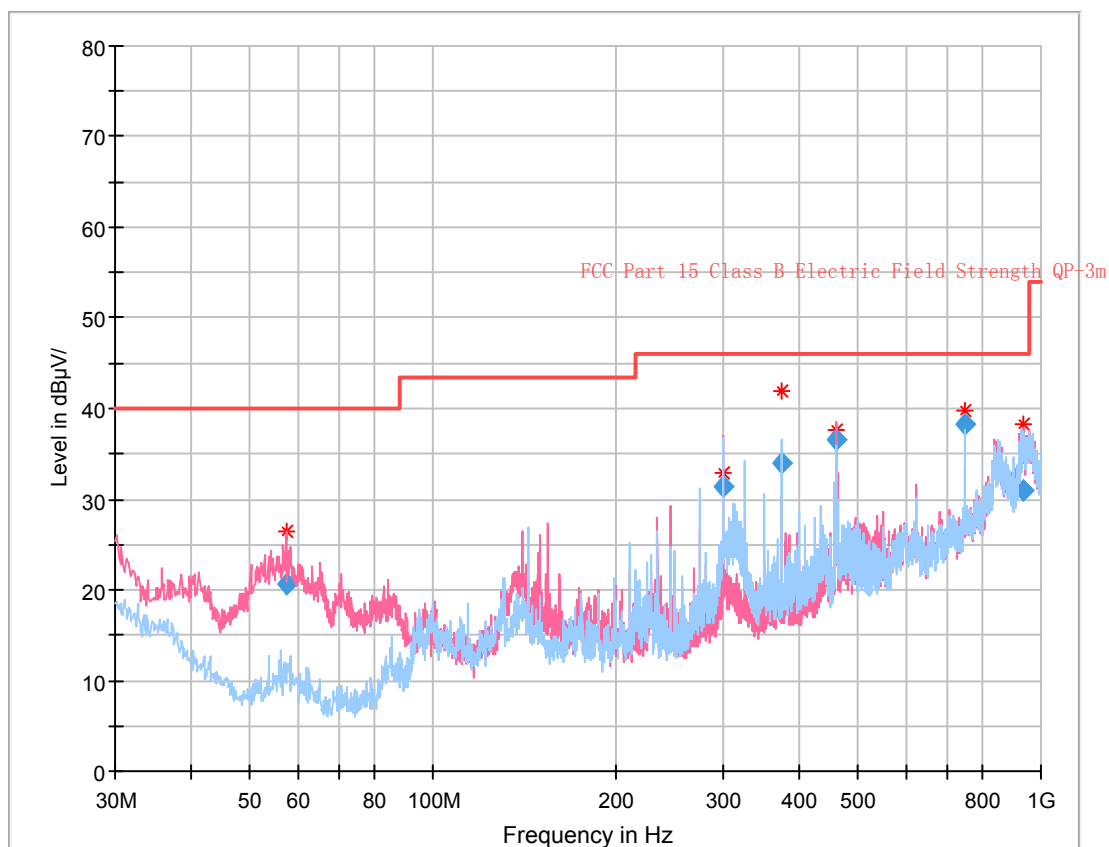
Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
375.045750	34.85	129.0	H	110.0	-10.6	46.00	11.15
456.269500	31.91	102.0	H	55.0	-8.1	46.00	14.09
750.007250	36.51	111.0	H	121.0	-0.4	46.00	9.49
312.322375	39.40	106.0	H	168.0	-10.7	46.00	6.60
300.011625	38.13	110.0	H	205.0	-10.6	46.00	7.87
609.418500	20.45	107.0	V	158.0	-1.9	46.00	25.55

1 GHz – 30 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)
1367.48	43.42	PK	276	2.3	H	-2.26	41.16	74	32.84
1367.48	28.62	Ave.	276	2.3	H	-2.26	26.36	54	27.64
1367.48	44.26	PK	73	1.2	V	-2.26	42.00	74	32.00
1367.48	28.61	Ave.	73	1.2	V	-2.26	26.35	54	27.65
2781.23	43.51	PK	264	2.2	H	2.43	45.94	74	28.06
2781.23	28.42	Ave.	264	2.2	H	2.43	30.85	54	23.15
2781.23	44.21	PK	305	1.6	V	2.43	46.64	74	27.36
2781.23	28.97	Ave.	305	1.6	V	2.43	31.40	54	22.60

Powered by Adapter 2 (SUNLIGHT):

30 MHz~1 GHz:



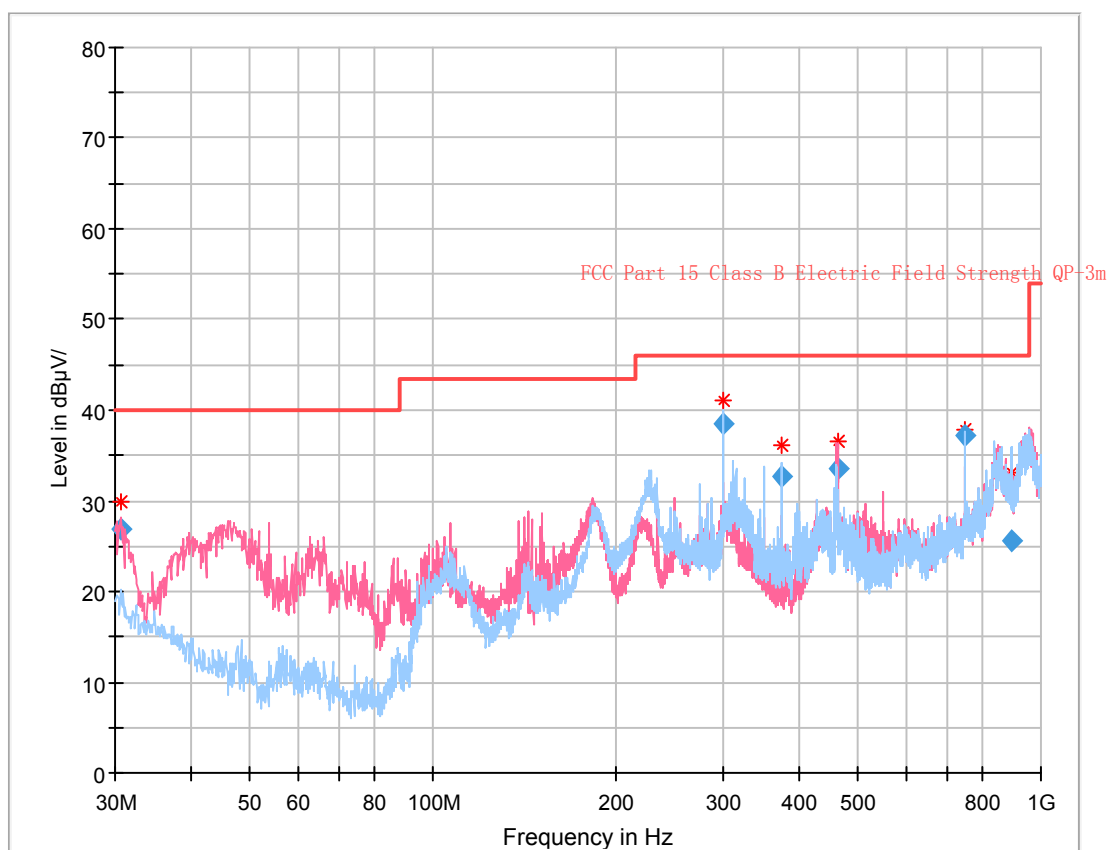
Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
57.319500	20.54	109.0	V	159.0	-20.0	40.00	19.46
299.987375	31.42	203.0	V	139.0	-10.6	46.00	14.58
375.017750	34.06	141.0	H	49.0	-10.6	46.00	11.94
461.310500	36.52	109.0	V	187.0	-8.0	46.00	9.48
750.019250	38.31	102.0	H	207.0	-0.4	46.00	7.69
936.325250	30.96	346.0	V	145.0	8.4	46.00	15.04

1 GHz – 30 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)
1412.53	43.29	PK	182	2.4	H	-2.06	41.23	74	32.77
1412.53	28.64	Ave.	182	2.4	H	-2.06	26.58	54	27.42
1412.53	44.31	PK	299	1.8	V	-2.06	42.25	74	31.75
1412.53	28.73	Ave.	299	1.8	V	-2.06	26.67	54	27.33
2817.46	43.81	PK	6	1.4	H	2.53	46.34	74	27.66
2817.46	28.54	Ave.	6	1.4	H	2.53	31.07	54	22.93
2817.46	44.26	PK	75	2.1	V	2.53	46.79	74	27.21
2817.46	28.86	Ave.	75	2.1	V	2.53	31.39	54	22.61

Powered by POE:

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)
30.687375	26.91	100.0	V	69.0	-8.1	40.00	13.09
300.005500	38.50	135.0	H	313.0	-10.6	46.00	7.50
374.997250	32.65	102.0	H	122.0	-10.6	46.00	13.35
462.974500	33.51	117.0	V	92.0	-8.0	46.00	12.49
750.009875	37.18	100.0	H	130.0	-0.4	46.00	8.82
895.575375	25.61	223.0	H	261.0	4.4	46.00	20.39

1 GHz – 30 GHz:

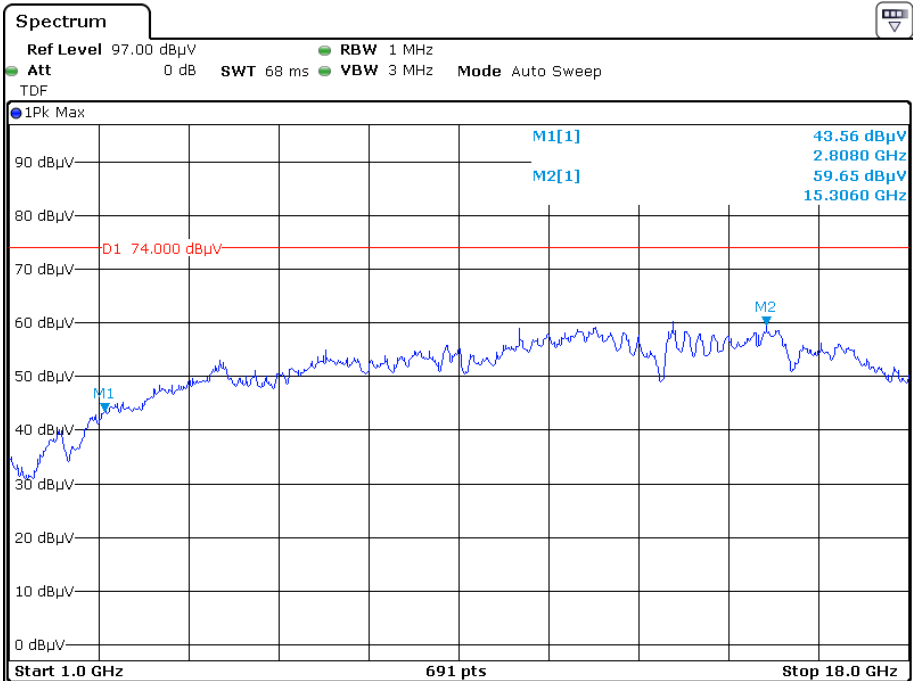
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1326.97	43.25	PK	128	2.5	H	-2.88	40.37	74	33.63
1326.97	28.70	Ave.	128	2.5	H	-2.88	25.82	54	28.18
1326.97	43.36	PK	187	2.1	V	-2.88	40.48	74	33.52
1326.97	28.81	Ave.	187	2.1	V	-2.88	25.93	54	28.07
2782.16	43.45	PK	58	2.2	H	2.43	45.88	74	28.12
2782.16	29.58	Ave.	58	2.2	H	2.43	32.01	54	21.99
2782.16	44.53	PK	203	1.6	V	2.43	46.96	74	27.04
2782.16	29.60	Ave.	203	1.6	V	2.43	32.03	54	21.97

Note:

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

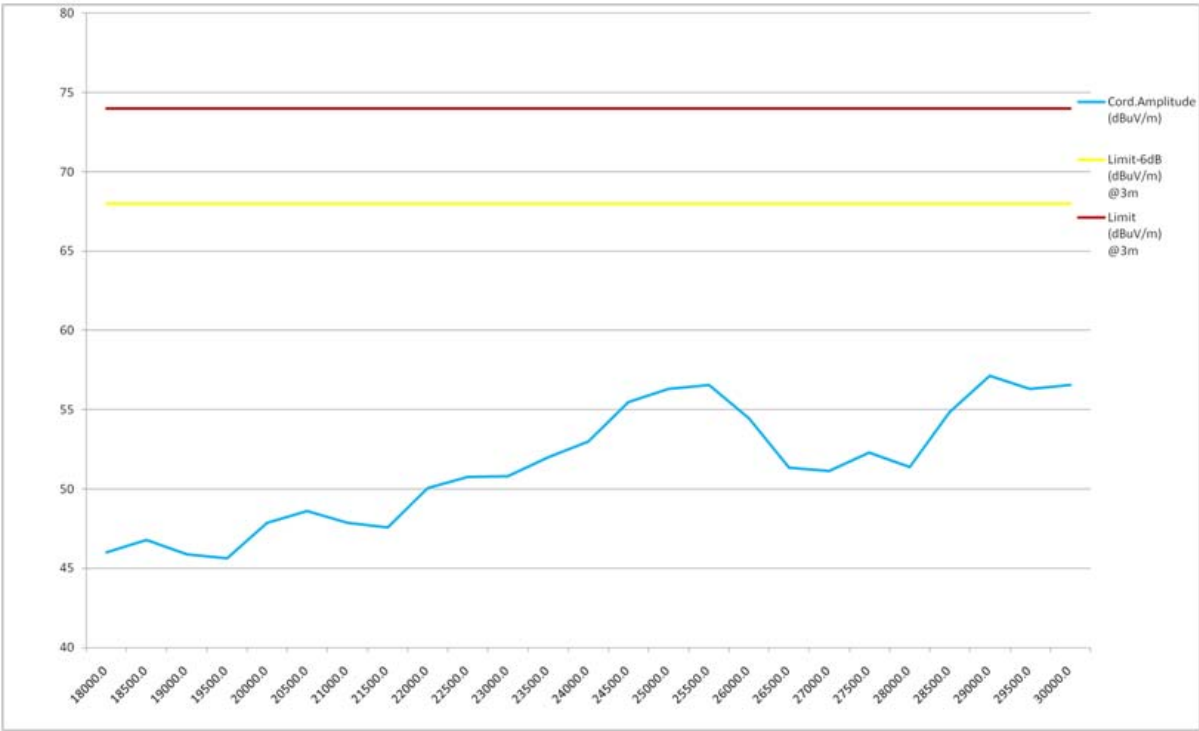
Pre-scan for peak

Horizontal – Peak (1-18 GHz)

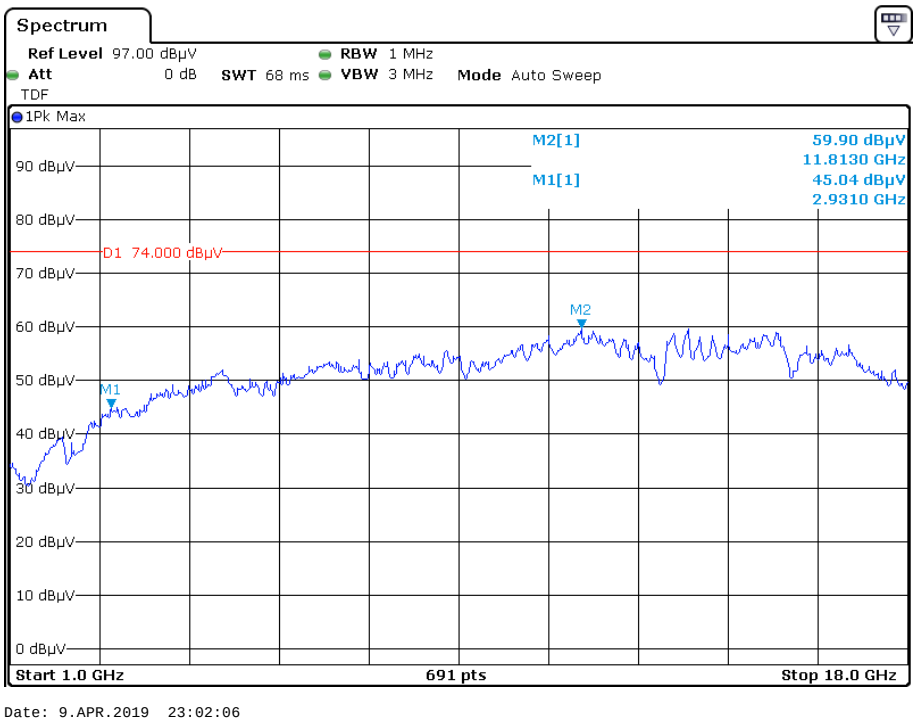


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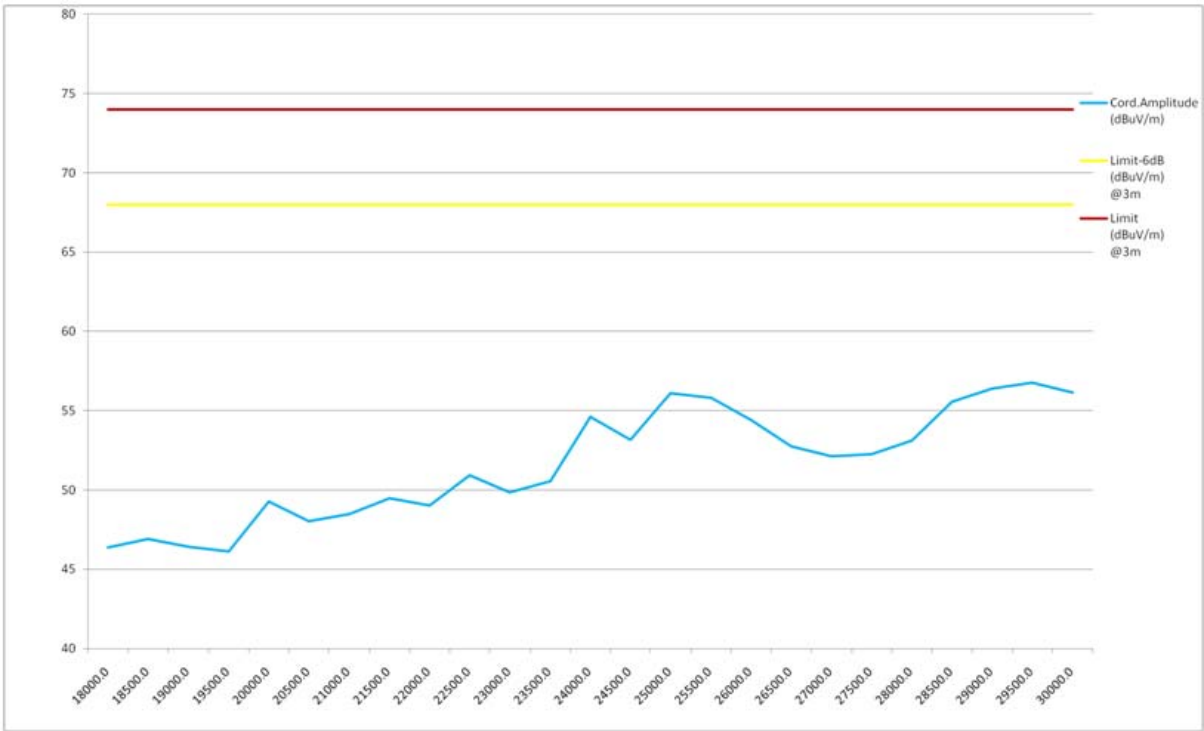
Horizontal – Peak (Above 18 GHz)



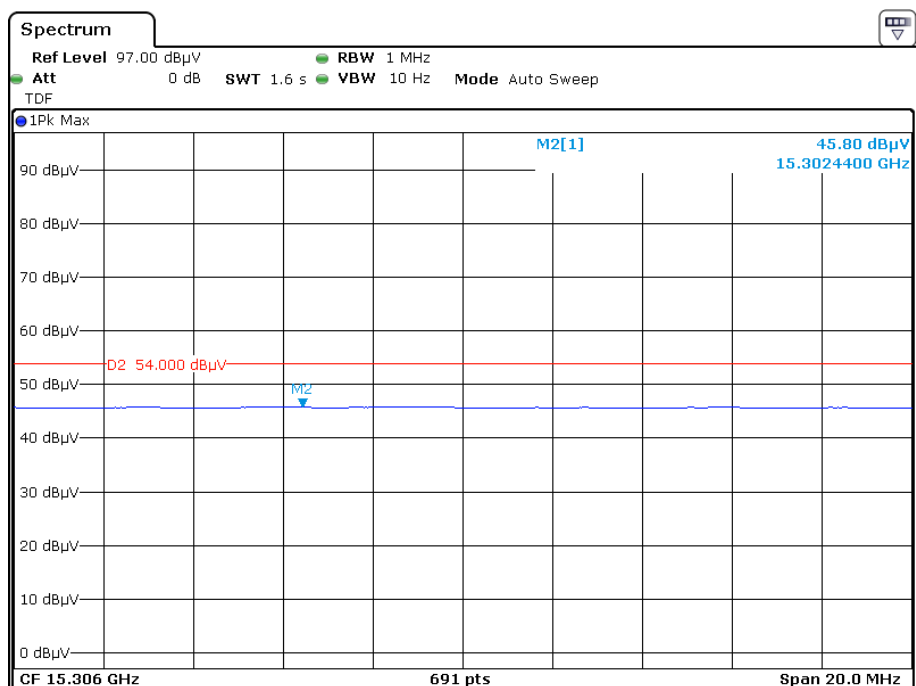
Vertical - Peak (1-18 GHz)



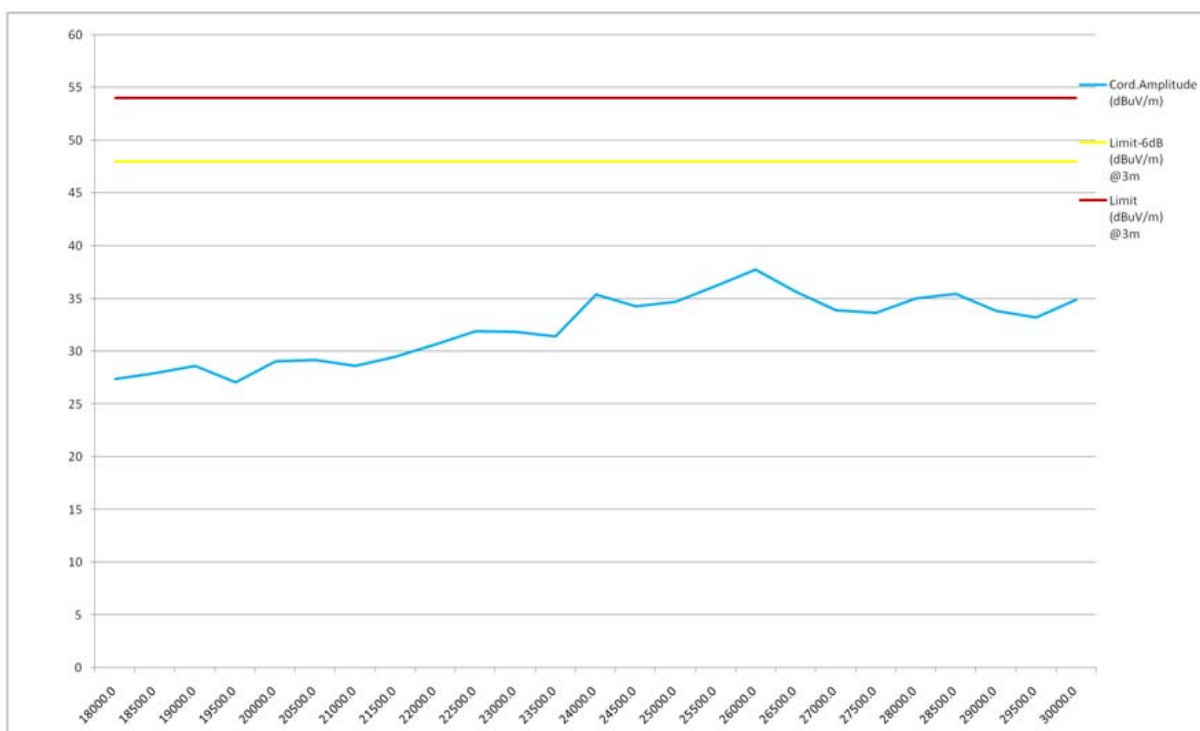
Vertical - Peak (Above 18 GHz)



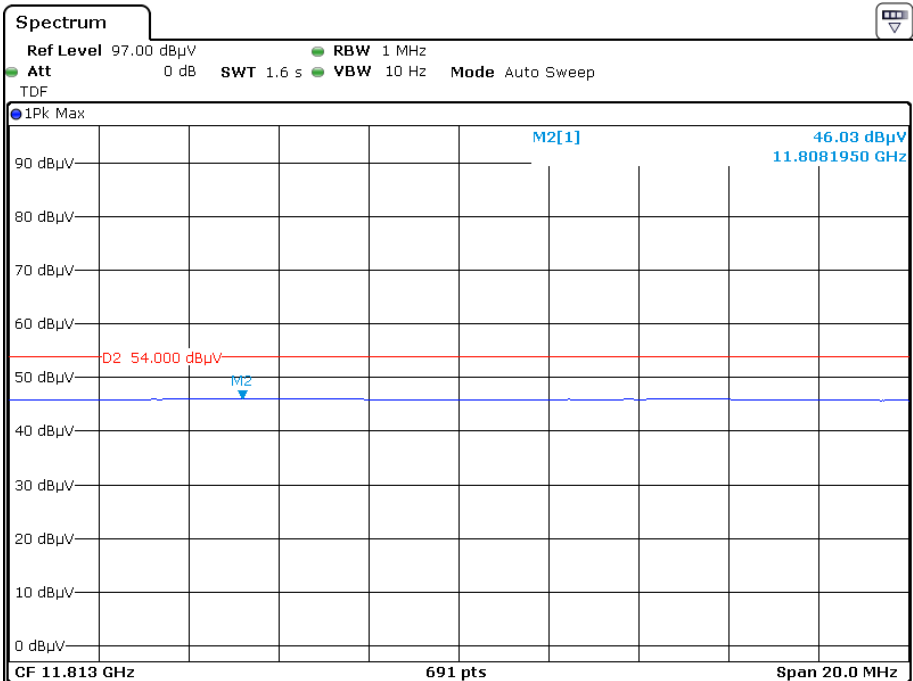
Horizontal – Average



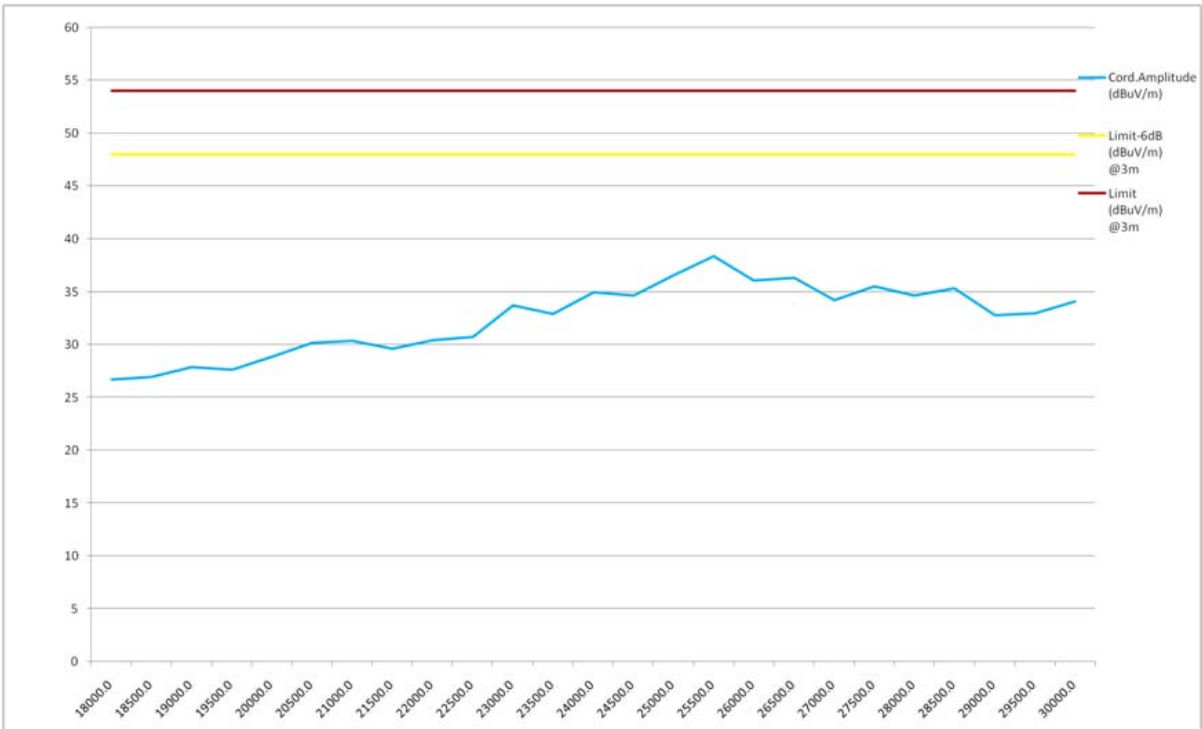
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Vertical - Average



Date: 9.APR.2019 23:04:57



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