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COMMSCOPE TECHNOLOGIES LLC TEST REPORT

SCOPE OF WORK

EMC TESTING – ONECELL

REPORT NUMBER

105014439LEX-001

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EMC TEST REPORT (FULL COMPLIANCE)

Report Number: 105014439LEX-001

Project Number: G105014439

Report Issue Date: 8/16/2022

Model(s) Tested: ONECELL

Standards: FCC Title 47 CFR Part 27

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Dr.
Lexington, KY 40510
USA

Client:
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900 Chelmsford St.
Lowell, MA 01851
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Report prepared by



Ben Coolbear,
Engineer

Report reviewed by



Brian Lackey, EMC Team Leader

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results, and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
6	Occupied Bandwidth FCC 47 CFR Part 2.1049	Pass
7	Maximum Peak Output Power and Peak to Average Ratio FCC 47 CFR Parts 2.1046, 27.50(j)(2) and (4)	Pass
8	Band Edge FCC 47 CFR Parts 2.1051, 2.1053, and 27.53(l)(1)	Pass
9	Radiated Spurious Emissions FCC 47 CFR Parts 2.1053 and 27.53(l)(1)	Pass
10	Conducted Spurious Emissions FCC 47 CFR Parts 2.1051, and 27.53(l)(1)	Pass
11	Frequency Stability FCC 47 CFR Parts 2.1055 and 27.54	Pass



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	COMMSCOPE TECHNOLOGIES LLC
Address:	900 Chelmsford St. Lowell, MA 01851 USA
Contact:	Zac Johnson
Email:	zac.johnson@commscope.com
Manufacturer Information	
Manufacturer Name:	COMMSCOPE TECHNOLOGIES LLC
Manufacturer Address:	900 Chelmsford St. Lowell, MA 01851 USA



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	ONECELL
Model Numbers	n77c radio
Receive Date	6/1/2022
Test Start Date	6/30/2022
Test End Date	8/12/2022
Device Received Condition	Good
Test Sample Type	Production
Input Rating	Internal provided by host
Frequency Band(s)	5G n77 C
Modulation Type(s)	QPSK, 16-QAM, 64-QAM, 256-QAM
Test Channel(s)	3720 MHz, 3840 MHz, 3960 MHz
Description of Equipment Under Test (provided by client)	
5G Band n77c base station with four outputs.	

4.1 Variant Models:

There were no variant models covered by this evaluation.



5 System Setup and Method

5.1 Method:

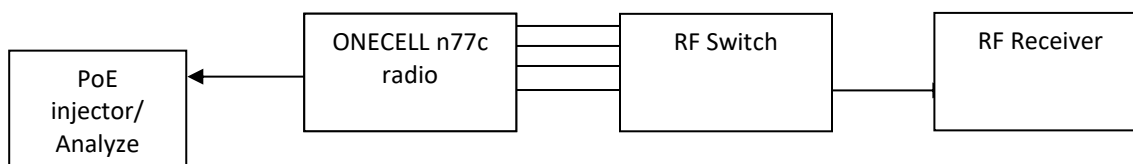
Configuration as required by ANSI C63.4: 2014 and ANSI C63.26:2015

No.	Descriptions of EUT Exercising
1	The ONECELL was powered for the duration of the evaluation. Serial communications were established with the device, and a test script was sent to the device to enable and initiate transmissions on three specific frequencies: 3720MHz, 3840MHz, 3960MHz. Each frequency was also evaluated for these modulations QPSK, 16-QAM, 64-QAM, 256-QAM.

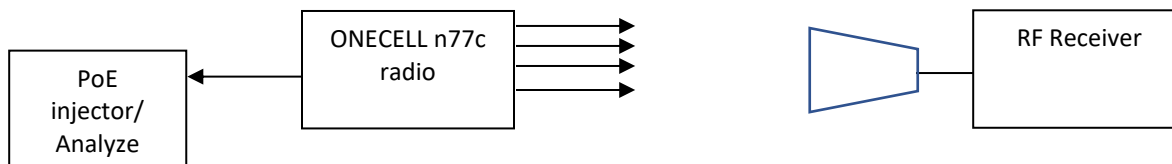
Cables					
Qty	Description	Length (m)	Shielding	Ferrites	Termination
1	Serial Cable	0.5	none	None	No
1	Ethernet Cable	3	none	none	PoE analyzer
4	RF cables	0.5	none	none	RF switch

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop	-	-	-
RF Switch	TBD		
PoE analyzer	TBD		

5.2 EUT Block Diagram: Conducted



5.3 EUT Block Diagram: Radiated





6 Occupied Bandwidth

6.1 Test Method

Tests are performed in accordance with ANSI C63.26:2015

6.2 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Signal Analyzer	3727	Rohde & Schwarz	FSQ	9/17/2021	9/17/2022

6.3 Test Conditions

Test Personnel:	Ben Coolbear	Test Date:	6/30/2022 - 8/12/2022
Supervising/Reviewing Engineer:	Brian Lackey	Limit Applied:	See Above
Product Standard:	FCC Part 27	Ambient Temperature:	25.8 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	53.8%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.44mbar

Deviations, Additions, or Exclusions: None

**6.4 Test Data: QPSK**

Channel	Frequency (MHz)	Antenna Port	Occupied Bandwidth (MHz)	26 dB BW (MHz)
Low	3720	Port1	38.4615	42.3077
		Port2	38.6217	42.7884
		Port3	38.4615	42.3077
		Port4	38.4615	42.3077
Mid	3840	Port1	38.4615	42.3077
		Port2	38.4615	42.4679
		Port3	38.4615	42.3077
		Port4	38.4615	42.1474
High	3961	Port1	38.4615	42.1474
		Port2	38.6218	42.6282
		Port3	38.4615	42.3077
		Port4	38.6218	41.9872

6.5 Test Data: 16-QAM

Channel	Frequency (MHz)	Antenna Port	Occupied Bandwidth (MHz)	26 dB BW (MHz)
Low	3720	Port1	38.4615	43.1090
		Port2	38.4615	43.2692
		Port3	38.4615	43.2692
		Port4	38.4615	42.6282
Mid	3840	Port1	38.4615	43.2692
		Port2	38.4615	42.7885
		Port3	38.4615	42.6282
		Port4	38.4615	42.6282
High	3961	Port1	38.4615	42.6282
		Port2	38.4615	43.2692
		Port3	38.4615	43.4294
		Port4	38.4615	43.2692

**6.6 Test Data: 64-QAM**

Channel	Frequency (MHz)	Antenna Port	Occupied Bandwidth (MHz)	26 dB BW (MHz)
Low	3720	Port1	39.2628	44.0705
		Port2	39.1025	43.9103
		Port3	39.1025	44.0705
		Port4	38.4615	44.0705
Mid	3840	Port1	38.4615	42.7885
		Port2	38.3013	43.9103
		Port3	38.4615	43.9103
		Port4	38.4615	43.9103
High	3961	Port1	38.4615	42.6282
		Port2	38.4615	45.1923
		Port3	38.4615	45.1923
		Port4	38.4615	45.1923

6.7 Test Data: 256-QAM

Channel	Frequency (MHz)	Antenna Port	Occupied Bandwidth (MHz)	26 dB BW (MHz)
Low	3720	Port1	38.6218	45.3525
		Port2	38.3013	45.5128
		Port3	38.3013	45.3526
		Port4	38.3013	45.3526
Mid	3840	Port1	38.4615	45.1923
		Port2	38.3013	45.3526
		Port3	38.3013	45.3526
		Port4	38.3013	45.3526
High	3961	Port1	38.3013	45.5128
		Port2	38.3013	45.5128
		Port3	38.3013	45.6731
		Port4	38.3013	45.6731



7 Maximum Peak Output Power and Peak to Average Ratio

7.1 Test Method

FCC Title 47 CFR 27.50(j)(2)

The power of each fixed or base station transmitting in the 3700-3980 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

FCC Title 47 CFR 27.50(j)(4)

Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (j)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

7.2 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Signal Analyzer	3727	Rohde & Schwarz	FSQ	9/17/2021	9/17/2022

7.3 Test Results

The device was found to be **compliant**. The combined EIRP to bandwidth ratio was less than 1640 W/MHz. The peak to average ratio was less than 13 dB.

7.4 Test Conditions

Test Personnel:	Ben Coolbear	Test Date:	7/1/2022 -7/5/2022
Supervising/Reviewing Engineer:	Brian Lackey	Limit Applied:	See Above
Product Standard:	FCC Part 27	Ambient Temperature:	25.9°C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	54.8%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	982.05mbar

Deviations, Additions, or Exclusions: None

**7.5 Test Data:**

Operating Mode	Frequency (MHz)	Channel Power dBm (mW)				Combined Power dBm (mW)	Antenna Gain dBi	EIRP dBm (W)	99% OBW (MHz)	Combined EIRP (W/MHz)
		1	2	3	4					
QPSK	3720	23.53 (225.4)	23.29 (213.3)	23.33 (215.3)	23.31 (214.3)	29.39 (868.3)	4	33.39 (2.181)	39.263	0.05555
	3840	22.94 (196.8)	23.08 (203.2)	23.10 (204.2)	22.98 (198.6)	29.05 (802.8)	4	33.05 (2.017)	38.462	0.05243
	3960	22.96 (197.7)	22.54 (179.5)	22.42 (174.6)	22.62 (182.8)	28.66 (734.6)	4	32.66 (1.845)	38.622	0.04777
16-QAM	3720	23.59 (228.6)	23.59 (228.6)	23.60 (229.1)	23.22 (209.9)	29.52 (896.1)	4	33.52 (2.251)	39.263	0.05733
	3840	23.03 (200.9)	23.95 (248.3)	23.00 (199.5)	23.00 (199.5)	29.29 (848.3)	4	33.29 (2.131)	38.462	0.05540
	3960	23.07 (202.8)	22.94 (196.8)	23.04 (201.4)	23.16 (207.0)	29.07 (807.9)	4	33.07 (2.029)	38.622	0.05255
64-QAM	3720	23.32 (214.8)	23.32 (214.8)	23.54 (225.9)	23.71 (235.0)	29.50 (890.5)	4	33.50 (2.237)	39.263	0.05696
	3840	22.90 (195.0)	22.92 (195.9)	23.08 (203.2)	22.94 (196.8)	28.98 (790.9)	4	32.98 (1.987)	38.462	0.05165
	3960	22.94 (196.8)	23.08 (203.2)	23.06 (202.3)	23.16 (207.0)	29.08 (809.3)	4	33.08 (2.033)	38.622	0.05263
256-QAM	3720	23.30 (213.8)	23.31 (214.3)	23.24 (210.9)	23.24 (210.9)	29.29 (849.8)	4	33.29 (2.135)	39.263	0.05436
	3840	22.96 (197.7)	22.94 (196.8)	22.92 (195.9)	22.91 (195.4)	28.95 (785.8)	4	32.95 (1.974)	38.462	0.05132
	3960	22.69 (185.8)	22.75 (188.4)	22.95 (197.2)	23.10 (204.2)	28.90 (775.6)	4	32.90 (1.948)	38.622	0.05044

Operating Mode	Frequency (MHz)	PAR (dB)			
		1	2	3	4
QPSK	3720	8.11	8.14	8.27	8.21
	3840	8.08	8.17	8.11	8.21
	3960	8.04	8.14	8.04	8.17
16-QAM	3720	8.14	8.17	8.33	8.14
	3840	8.14	8.17	8.17	8.27
	3960	8.14	8.11	8.14	8.24
64-QAM	3720	8.21	8.17	8.24	8.27
	3840	8.21	8.24	8.17	8.30
	3960	8.11	8.14	8.11	8.24
256-QAM	3720	8.17	8.17	8.21	8.17
	3840	8.11	8.14	8.14	8.17
	3960	8.04	8.11	8.11	8.24



8 Band Edge

8.1 Test Limits

FCC Part 27.53(I)(1)

For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (I)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.2 Test Method

Tests are performed in accordance with ANSI C63.26.

8.3 Test Equipment Used

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde & Schwarz	ESU40	3/10/2022	3/10/2023

8.4 Test Results

The device was found to be **compliant**. The transmissions were within the band edge limits.

8.5 Test Conditions

Test Personnel:	Ben Coolbear	Test Date:	7/15/2022
Supervising/Reviewing Engineer:			
(Where Applicable)	Brian Lackey	Limit Applied:	See Above
Product Standard:	FCC Part 27	Ambient Temperature:	25.6C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	52.2%
Pretest Verification w / Ambient			
Signals or BB Source:	Yes	Atmospheric Pressure:	985.4mbar

Deviations, Additions, or Exclusions: None.



8.6 Test Data

QPSK:

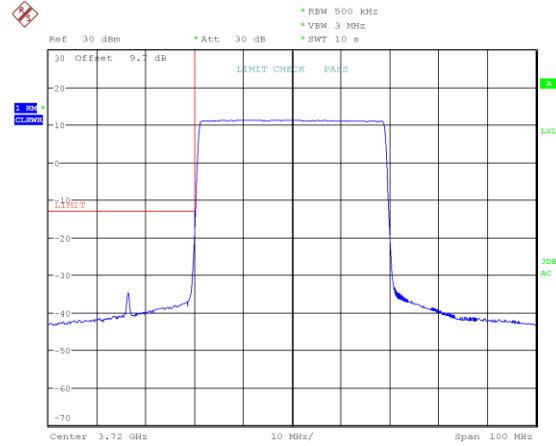


16-QAM:

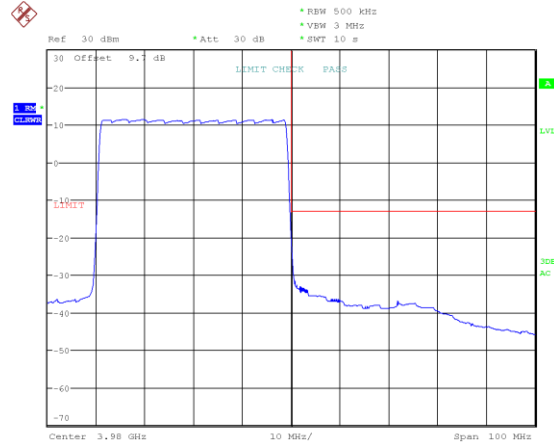




64-QAM:

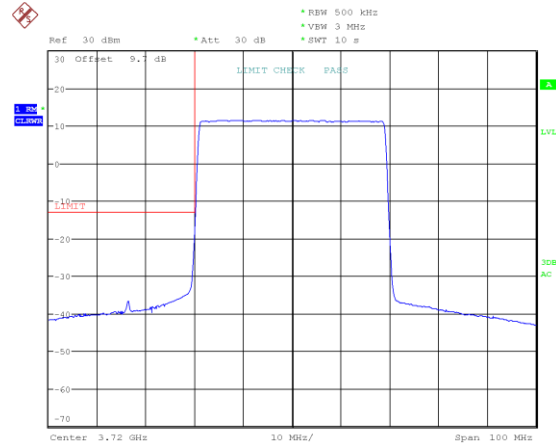


Date: 20.JUL.2022 21:09:34

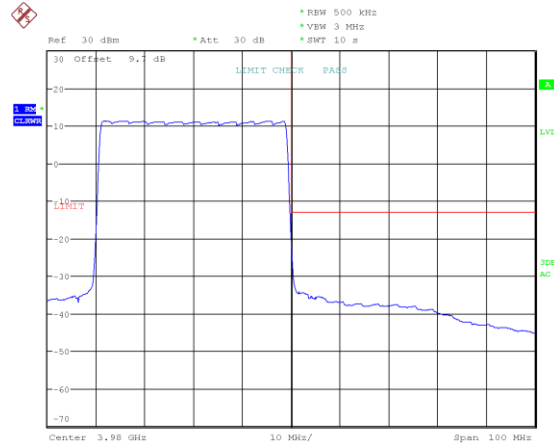


Date: 20.JUL.2022 21:11:53

256-QAM:



Date: 20.JUL.2022 21:21:20



Date: 20.JUL.2022 21:18:26



9 Radiated Spurious Emissions

9.1 Test Limits

FCC Part 27.53(I)(1)

(1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (I)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

9.2 Test Method

Tests are performed in accordance with ANSI C63.26:2015.

TEST SITE: 10m ALSE

Site Designation: 10m Chamber

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	3.9dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.0dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.7dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required.



9.3 Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB/m}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 32 \text{ dB}\mu\text{V/m}$$

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$
$$NF = \text{Net Reading in dB}\mu\text{V}$$

Example:

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$



9.4 Test Equipment Used

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	8181	Rohde & Schwarz	ESW44	11/16/2021	11/16/2022
Bilog Antenna	7085	ETS	3142C	10/5/2021	10/5/2022
Horn Antenna	4001	ETS	3117	2/23/2022	2/23/2023
System Controller	4096	ETS Lindgren	2090	Verify at Time of Use	Verify at Time of Use
System Controller	3957	Sunol Sciences	SC99V	Verify at Time of Use	Verify at Time of Use
Preamplifier	3918	Rohde & Schwarz	TS-PR18	1/13/2022	1/13/2023
Coaxial Cable	3074			1/13/2022	1/13/2023
Coaxial Cable	2588			1/13/2022	1/13/2023
Coaxial Cable	2593			1/13/2022	1/13/2023
Coaxial Cable	8185			1/13/2022	1/13/2023
Coaxial Cable	8188			1/13/2022	1/13/2023
Coaxial Cable	3339			1/13/2022	1/13/2023
Preamplifier	3919	Rohde & Schwarz	TS-PR3	1/13/2022	1/13/2023
Coaxial Cable	3172			1/13/2022	1/13/2023
Coaxial Cable	2590			1/13/2022	1/13/2023
Coaxial Cable	8186			1/13/2022	1/13/2023
Coaxial Cable	8187			1/13/2022	1/13/2023
Preamplifier (18-40GHz)	3921	Rohde & Schwarz	TS-PR40	1/13/2022	1/13/2023
Horn Antenna (18-40GHz)	3779	ETS	3116c	7/30/2021	9/28/2022 ⁽¹⁾

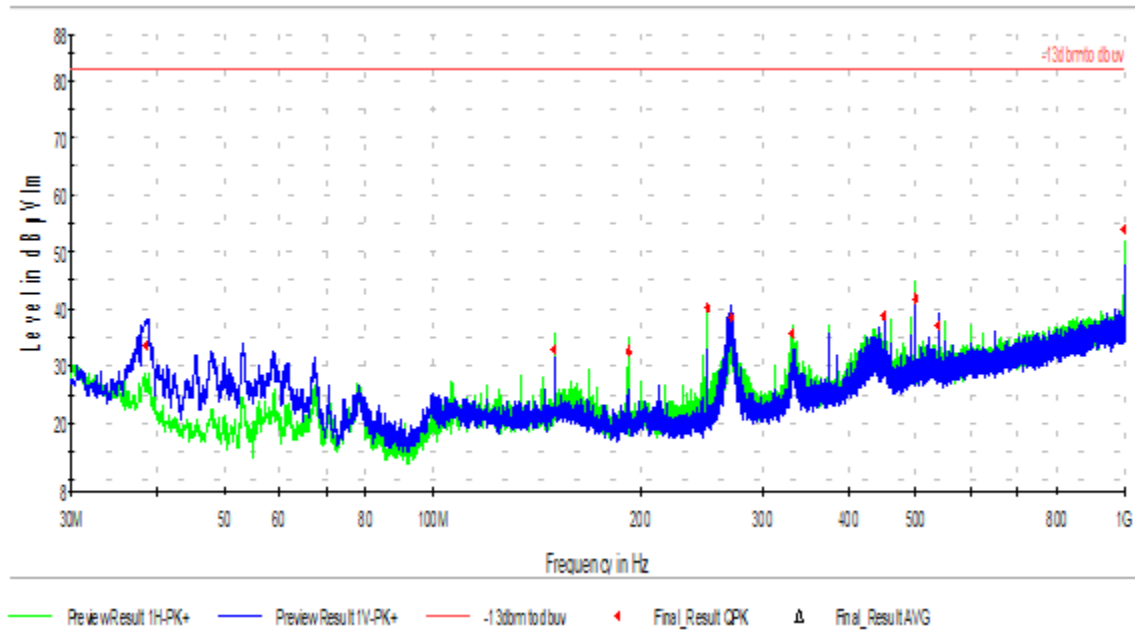
9.5 Software Utilized

Name	Manufacturer	Version
EMC32	Rohde & Schwarz	Version 10.60.20

9.6 Test Results

The sample tested was found to be **compliant**. The data presented represents the worst-case emissions with the device positioned in three orthogonal positions. All observed emissions outside of the band of operation were attenuated by at least 20dB.

1 Operating under a calibration extension during the time of testing.

**9.7 Test Data: 30 MHz – 1 GHz****9.7.1 QPSK, Channel 3840 MHz**

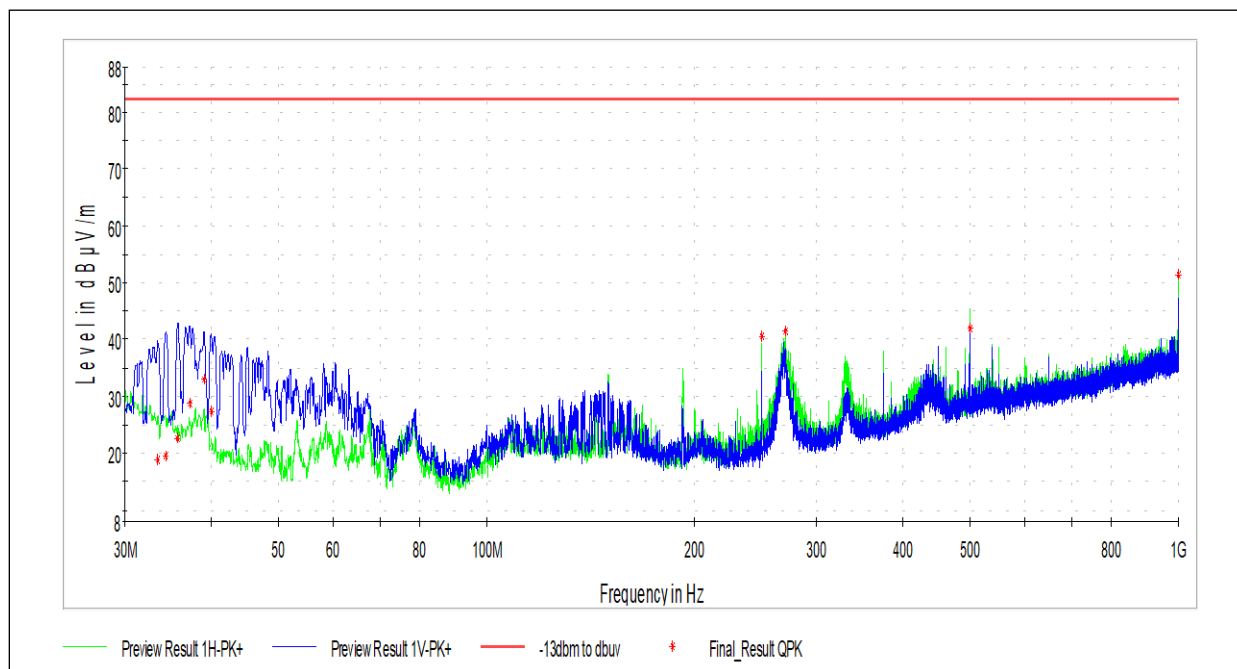
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
38.514444	33.54	82.250	48.71	120.000	136.0	V	295.0	21.43
149.956667	32.88	82.250	49.37	120.000	174.0	H	38.0	21.47
191.936111	32.70	82.250	49.55	120.000	146.0	H	79.0	20.67
249.974444	40.25	82.250	42.00	120.000	120.0	H	239.0	21.55
270.128889	38.51	82.250	43.74	120.000	153.0	V	332.0	23.21
331.885556	35.65	82.250	46.60	120.000	100.0	H	305.0	24.86
449.956111	38.78	82.250	43.47	120.000	193.0	H	47.0	28.13
499.965000	41.75	82.250	40.50	120.000	189.0	H	250.0	29.22
537.579444	37.20	82.250	45.05	120.000	170.0	V	345.0	29.54
1000.000000	54.01	82.250	28.24	120.000	95.0	H	186.0	37.60

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



9.7.2 16-QAM, Channel 3840 MHz



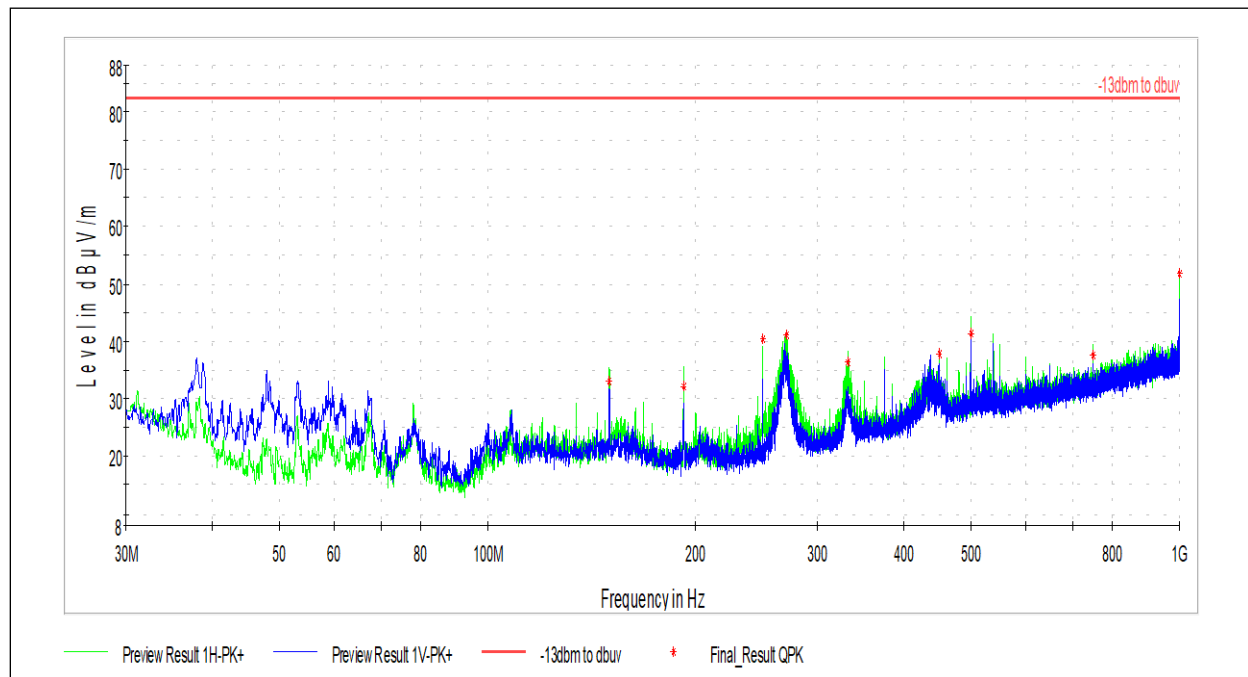
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.448889	18.87	82.250	63.38	120.000	100.0	V	80.0	25.03
34.365000	19.64	82.250	62.61	120.000	100.0	V	314.0	24.37
35.766111	22.70	82.250	59.55	120.000	99.0	V	283.0	23.35
37.221111	28.78	82.250	53.47	120.000	100.0	V	300.0	22.36
38.999444	32.95	82.250	49.30	120.000	100.0	V	303.0	21.05
39.969444	27.37	82.250	54.88	120.000	100.0	V	304.0	20.39
249.974444	40.58	82.250	41.67	120.000	123.0	H	260.0	21.55
270.506111	41.55	82.250	40.70	120.000	100.0	H	301.0	23.41
499.965000	41.90	82.250	40.35	120.000	193.0	H	248.0	29.22
1000.000000	51.43	82.250	30.82	120.000	133.0	H	183.0	37.60

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



9.7.3 64-QAM, Channel 3840 MHz



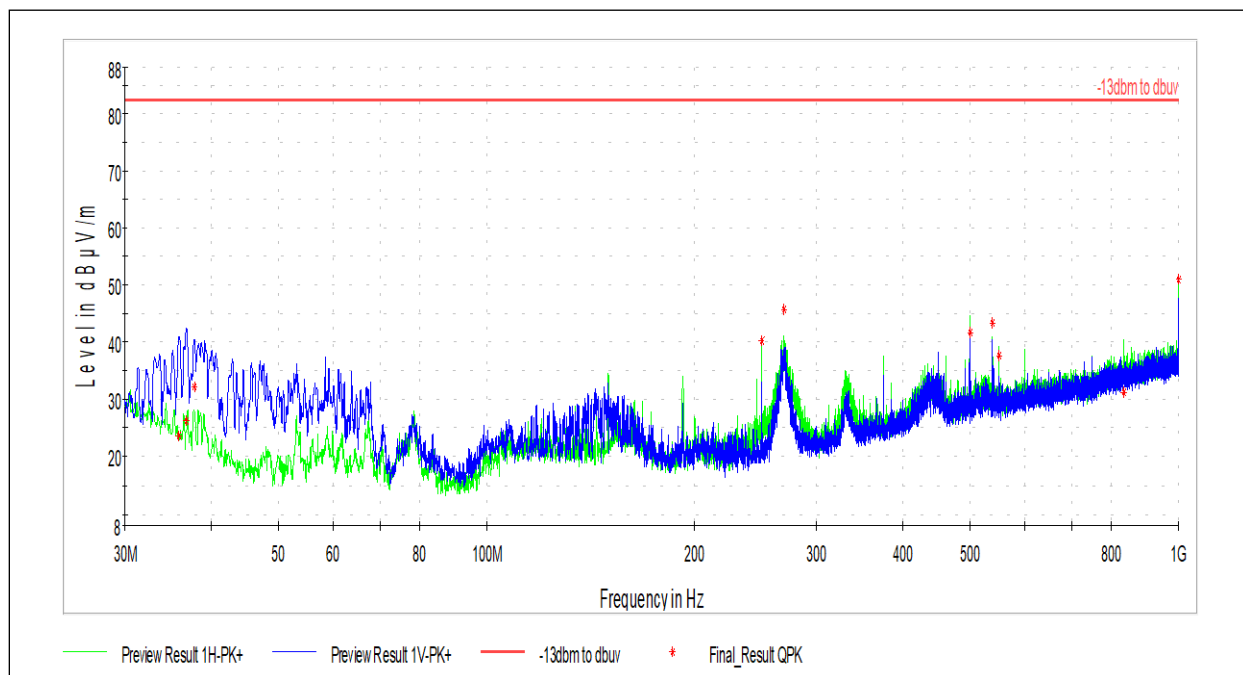
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
149.956667	33.04	82.250	49.21	120.000	188.0	H	37.0	21.47
191.936111	32.18	82.250	50.07	120.000	106.0	H	58.0	20.67
249.974444	40.33	82.250	41.92	120.000	120.0	H	241.0	21.55
270.075000	41.19	82.250	41.06	120.000	100.0	H	294.0	23.41
331.562222	36.47	82.250	45.78	120.000	99.0	H	104.0	24.86
450.010000	37.76	82.250	44.49	120.000	198.0	H	282.0	28.13
499.965000	41.29	82.250	40.96	120.000	189.0	H	249.0	29.22
750.009444	37.66	82.250	44.59	120.000	105.0	H	214.0	33.65
1000.000000	51.81	82.250	30.44	120.000	136.0	H	184.0	37.60
149.956667	33.04	82.250	49.21	120.000	188.0	H	37.0	21.47

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



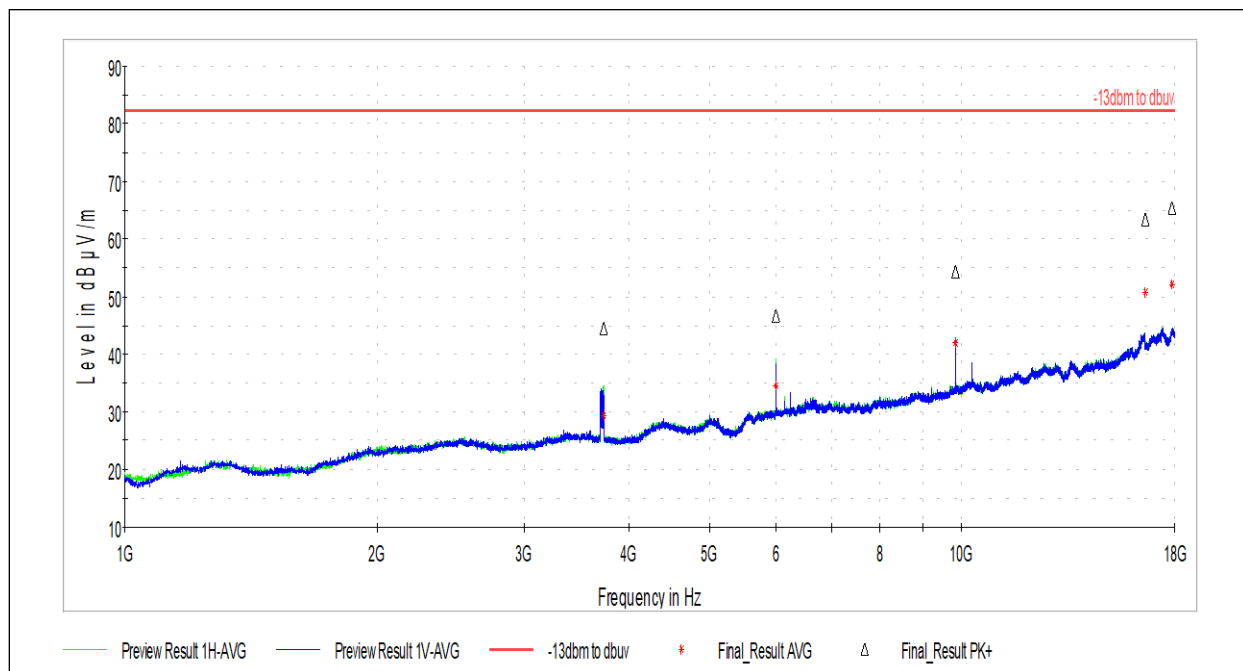
9.7.4 256-QAM, Channel 3840 MHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.927778	23.67	82.250	58.58	120.000	100.0	V	291.0	23.24
36.790000	26.21	82.250	56.04	120.000	100.0	V	300.0	22.65
37.760000	32.15	82.250	50.10	120.000	100.0	V	293.0	21.99
249.974444	40.37	82.250	41.88	120.000	131.0	H	262.0	21.55
268.781667	45.83	82.250	36.42	120.000	105.0	H	303.0	23.38
499.965000	41.76	82.250	40.49	120.000	187.0	H	254.0	29.22
537.579444	43.41	82.250	38.84	120.000	154.0	H	326.0	30.04
549.973889	37.74	82.250	44.51	120.000	146.0	H	186.0	30.10
833.106111	31.34	82.250	50.91	120.000	155.0	H	80.0	35.44
1000.000000	50.91	82.250	31.34	120.000	147.0	H	176.0	37.60

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.

**9.8 Test Data: 1 GHz – 18 GHz****9.8.1 QPSK, Channel 3720 MHz**

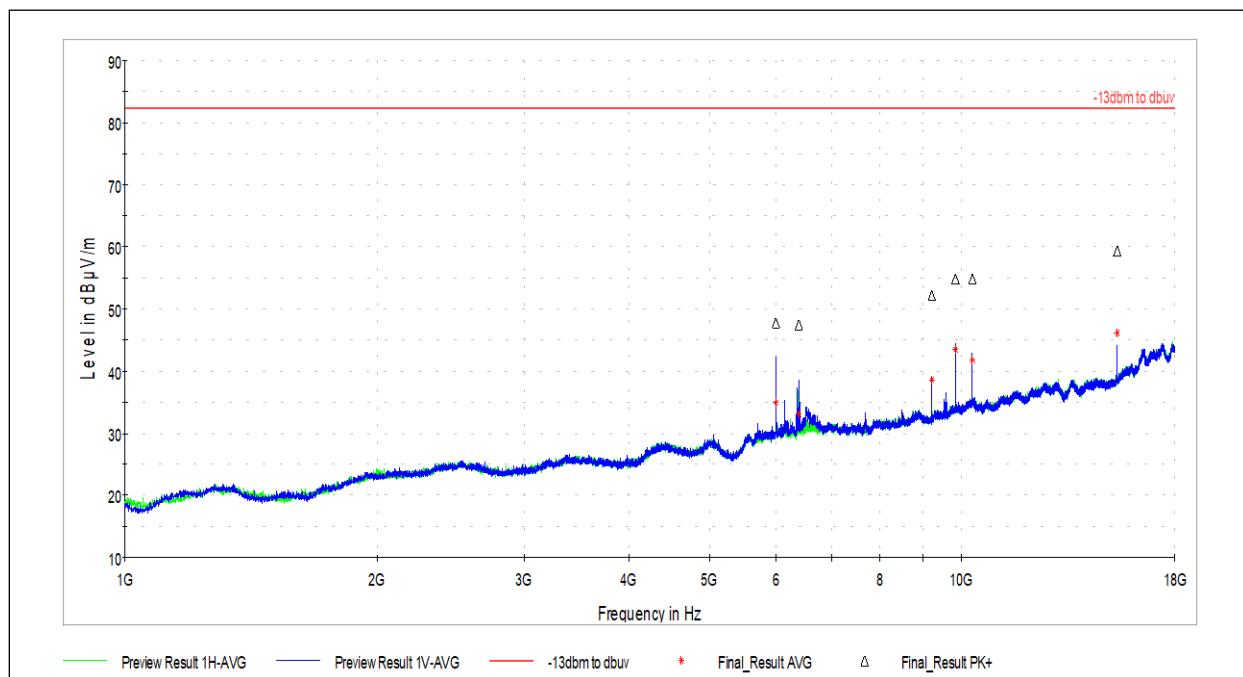
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3732.500000	29.41	82.250	52.84	1000.000	360.0	H	139.0	7.04
6000.000000	34.46	82.250	47.79	1000.000	135.0	H	200.0	10.97
9830.500000	41.97	82.250	40.28	1000.000	155.0	V	96.0	16.56
16590.000000	50.69	82.250	31.56	1000.000	100.0	V	13.0	26.40
17848.500000	52.20	82.250	30.05	1000.000	262.0	V	130.0	27.75

Test Personnel:	Michael Carlson	Test Date:	8/4/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	74.3 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	983.8 mbar

Deviations, Additions, or Exclusions: None



9.8.2 QPSK, Channel 3840 MHz



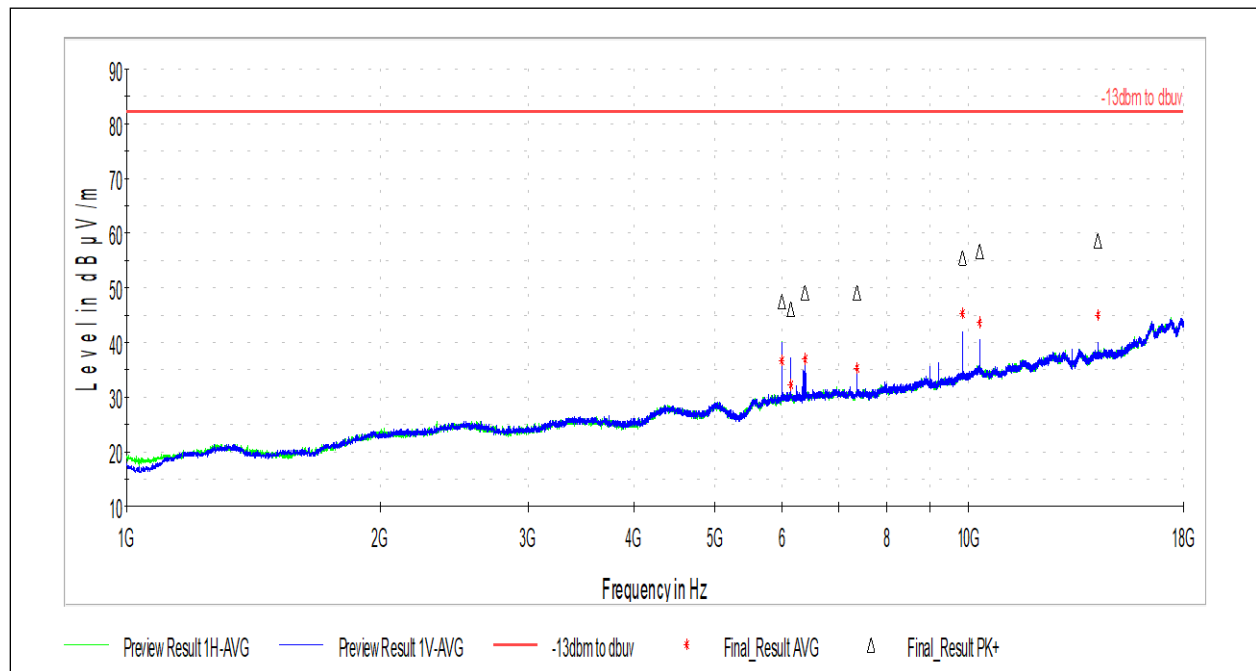
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	34.93	82.250	47.32	1000.000	209.0	V	163.0	11.03
6389.000000	33.05	82.250	49.20	1000.000	410.0	V	156.0	11.80
9216.000000	38.70	82.250	43.55	1000.000	136.0	V	112.0	15.59
9830.500000	43.52	82.250	38.73	1000.000	173.0	V	182.0	16.56
10312.000000	41.84	82.250	40.41	1000.000	286.0	V	326.0	17.61
15360.000000	46.22	82.250	36.03	1000.000	216.0	V	235.0	23.09

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: None.



9.8.3 QPSK, Channel 3960 MHz



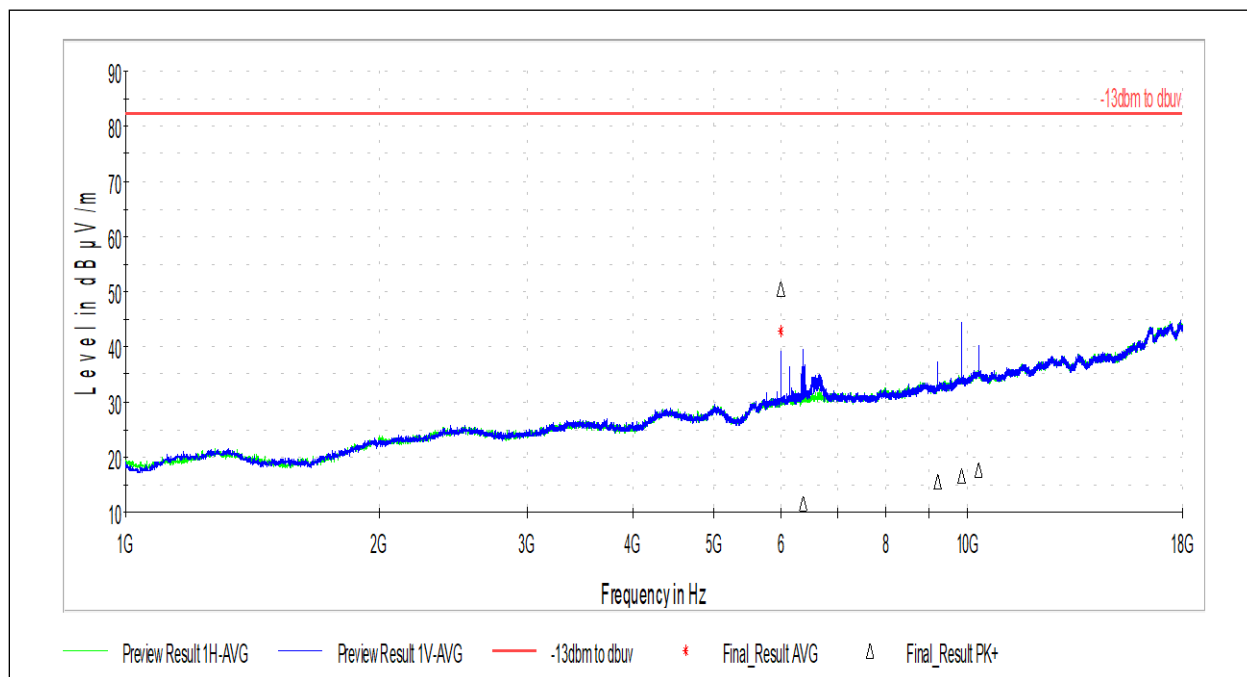
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	36.70	82.250	45.55	1000.000	100.0	H	193.0	10.97
6144.000000	32.17	82.250	50.08	1000.000	345.0	V	268.0	11.29
6390.000000	37.05	82.250	45.20	1000.000	410.0	V	157.0	11.80
7373.000000	35.40	82.250	46.85	1000.000	283.0	V	302.0	12.49
9830.500000	45.30	82.250	36.95	1000.000	305.0	V	124.0	16.56
10312.500000	43.69	82.250	38.56	1000.000	226.0	V	328.0	17.61
14254.000000	44.94	82.250	37.31	1000.000	227.0	V	252.0	21.65

Test Personnel:	Michael Carlson	Test Date:	8/7/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6°C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: None.



9.8.4 16-QAM, Channel 3720 MHz



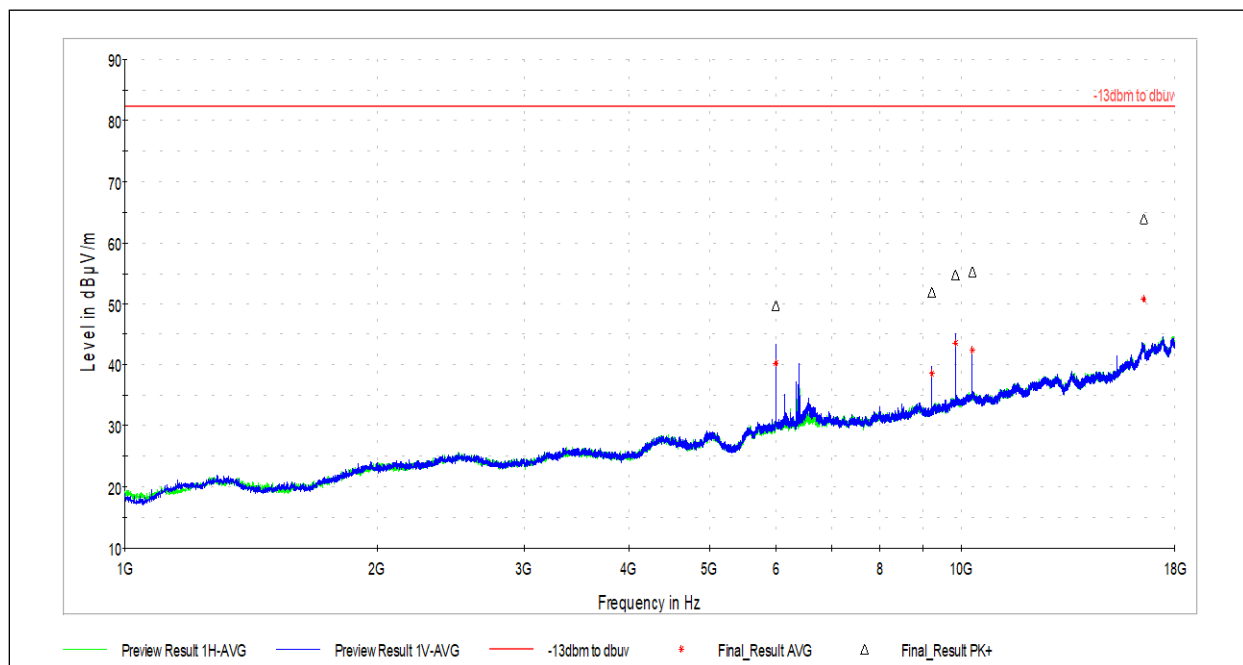
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	42.79	82.250	39.46	1000.000	100.0	V	290.0	11.03
6376.000000	-488.22	82.250	570.47	1000.000	100.0	V	147.0	11.78
9216.000000	-484.41	82.250	566.66	1000.000	201.0	V	124.0	15.59
9830.500000	-483.44	82.250	565.69	1000.000	204.0	V	123.0	16.56
10312.500000	-482.39	82.250	564.64	1000.000	202.0	V	123.0	17.61

Test Personnel:	Ben Coolbear	Test Date:	8/7/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: None.



9.8.5 16-QAM, Channel 3840 MHz



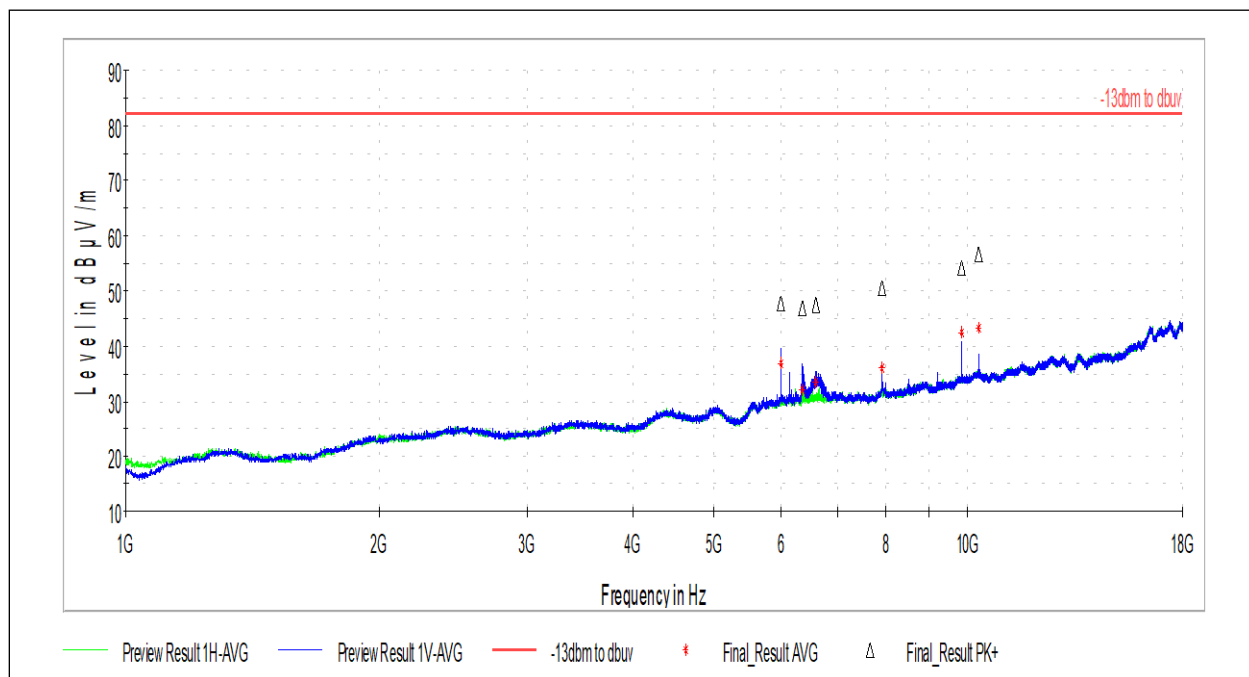
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	40.31	82.250	41.94	1000.000	294.0	V	120.0	11.03
9216.000000	38.59	82.250	43.66	1000.000	100.0	V	159.0	15.59
9830.500000	43.55	82.250	38.70	1000.000	377.0	V	205.0	16.56
10312.500000	42.45	82.250	39.80	1000.000	313.0	V	330.0	17.61
16521.000000	50.77	82.250	31.48	1000.000	100.0	H	60.0	26.16

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBμV
Product Standard:	FCC Part 27.53	Ambient Temperature:	°C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	mbar

Deviations, Additions, or Exclusions: None.



9.8.6 16-QAM, Channel 3960 MHz



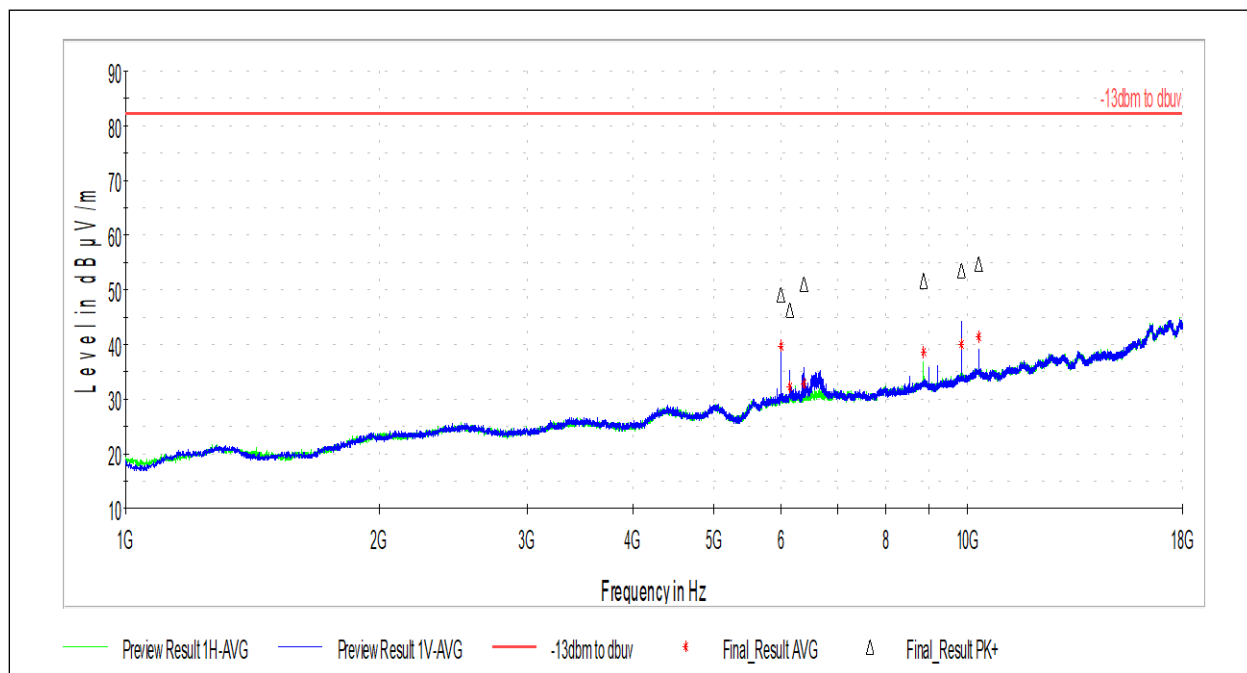
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	36.75	82.250	45.50	1000.000	100.0	V	282.0	11.03
6371.500000	31.96	82.250	50.29	1000.000	220.0	V	139.0	11.77
6606.500000	33.52	82.250	48.73	1000.000	291.0	V	-1.0	11.78
7910.000000	36.06	82.250	46.19	1000.000	290.0	V	180.0	13.31
9830.500000	42.31	82.250	39.94	1000.000	410.0	V	265.0	16.56
10312.500000	43.36	82.250	38.89	1000.000	210.0	V	328.0	17.61

Test Personnel:	Michael Carlson	Test Date:	24.6
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: None.



9.8.7 64-QAM, Channel 3720 MHz



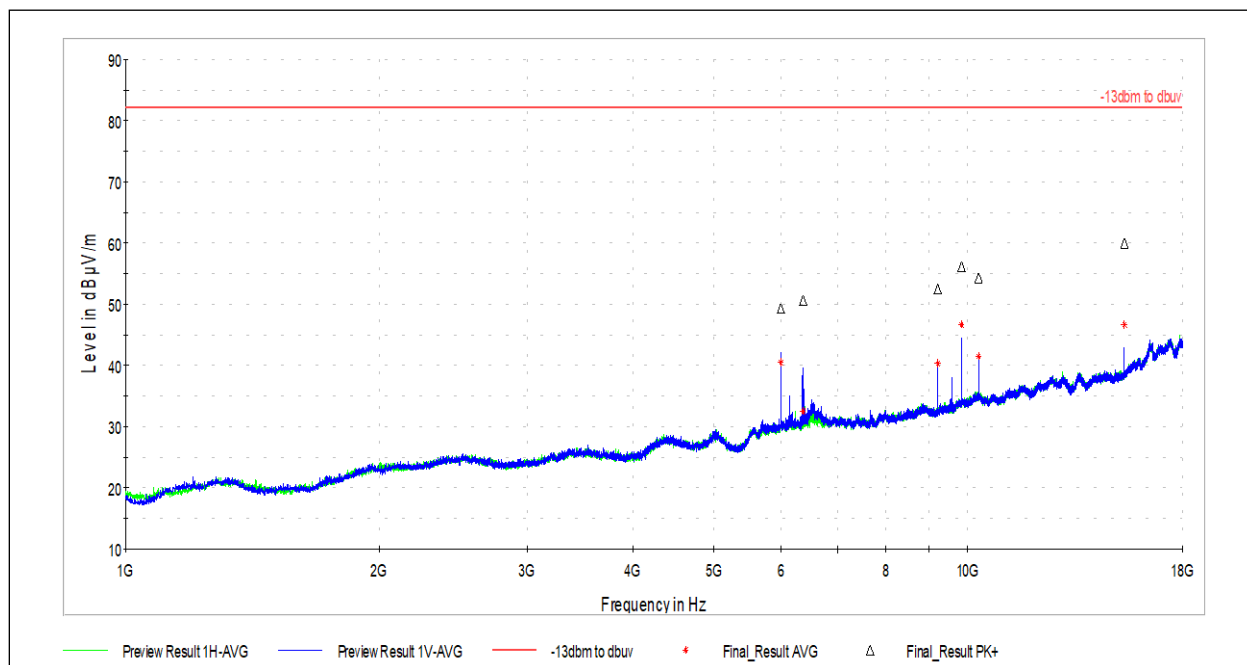
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	39.62	82.250	42.63	1000.000	340.0	V	118.0	11.03
6144.000000	32.28	82.250	49.97	1000.000	118.0	V	267.0	11.29
6389.000000	32.73	82.250	49.52	1000.000	100.0	V	136.0	11.80
8863.500000	38.64	82.250	43.61	1000.000	410.0	H	206.0	15.12
9830.500000	39.90	82.250	42.35	1000.000	276.0	V	256.0	16.56
10312.000000	41.37	82.250	40.88	1000.000	211.0	V	332.0	17.61

Test Personnel:	Michael Carlson	Test Date:	8/7/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient		Atmospheric Pressure:	987.4 mbar
Signals or BB Source:	Yes		

Deviations, Additions, or Exclusions: None.



9.8.8 64-QAM, Channel 3840 MHz



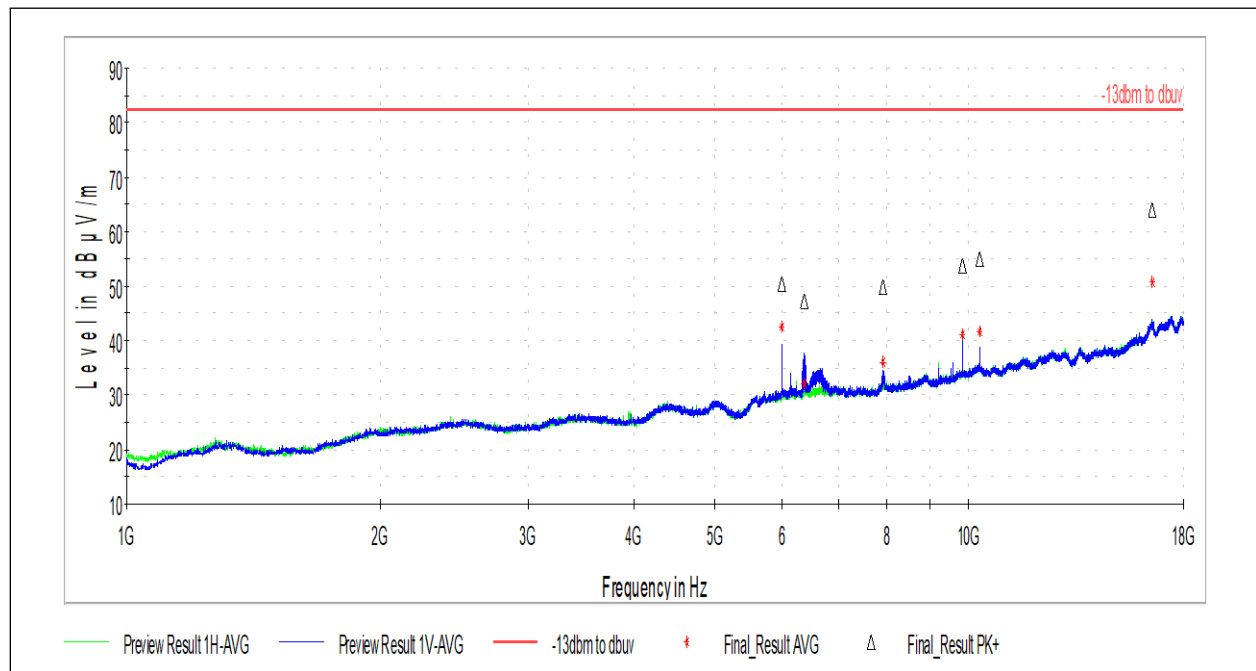
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	40.48	82.250	41.77	1000.000	271.0	V	120.0	11.03
6377.000000	32.54	82.250	49.71	1000.000	410.0	V	0.0	11.78
9216.000000	40.28	82.250	41.97	1000.000	172.0	V	182.0	15.59
9830.500000	46.67	82.250	35.58	1000.000	302.0	V	109.0	16.56
10312.000000	41.44	82.250	40.81	1000.000	410.0	V	108.0	17.61
15360.000000	46.62	82.250	35.63	1000.000	410.0	V	304.0	23.09

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBμV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2%
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: None.



9.8.9 64-QAM, Channel 3960 MHz



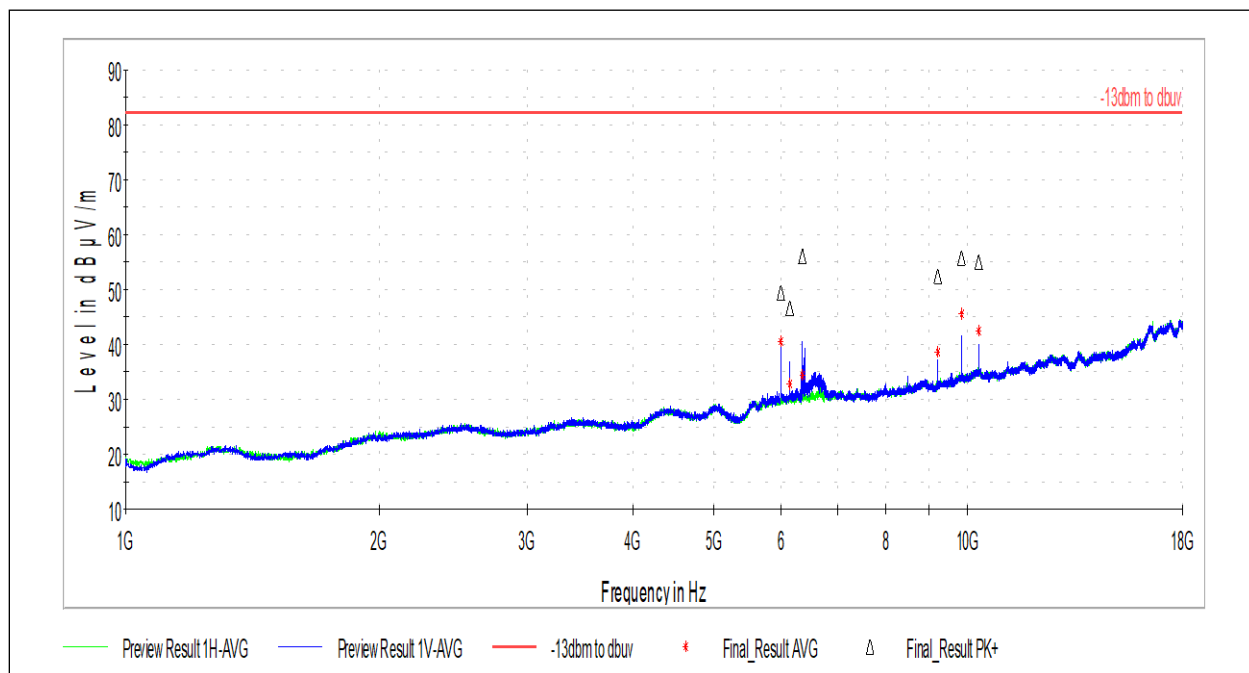
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	42.44	82.250	39.81	1000.000	100.0	V	290.0	11.03
6374.000000	32.03	82.250	50.22	1000.000	410.0	V	204.0	11.77
7918.500000	36.06	82.250	46.19	1000.000	410.0	V	239.0	13.33
9830.500000	41.20	82.250	41.05	1000.000	366.0	V	216.0	16.56
10312.000000	41.75	82.250	40.50	1000.000	410.0	H	289.0	17.58
16514.000000	50.78	82.250	31.47	1000.000	100.0	V	182.0	26.14

Test Personnel:	Michael Carlson	Test Date:	8/7/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: None.



9.8.10 256-QAM, Channel 3720 MHz



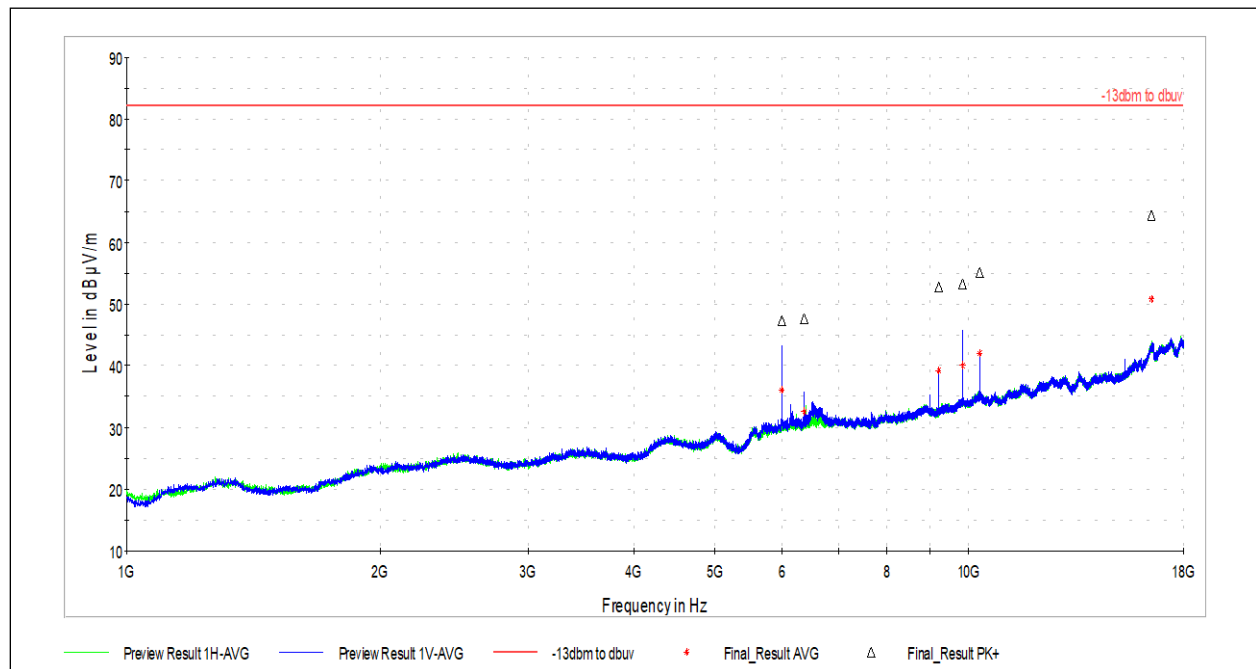
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	40.65	82.250	41.60	1000.000	410.0	V	195.0	11.03
6144.000000	32.78	82.250	49.47	1000.000	219.0	V	293.0	11.29
6368.500000	34.48	82.250	47.77	1000.000	100.0	V	146.0	11.76
9216.000000	38.64	82.250	43.61	1000.000	226.0	V	264.0	15.59
9830.500000	45.55	82.250	36.70	1000.000	284.0	V	290.0	16.56
10312.500000	42.62	82.250	39.63	1000.000	230.0	V	328.0	17.61

Test Personnel:	Ben Coolbear	Test Date:	8/7/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient		Atmospheric Pressure:	987.4 mbar
Signals or BB Source:	Yes		

Deviations, Additions, or Exclusions: None.



9.8.11 256-QAM, Channel 3840 MHz



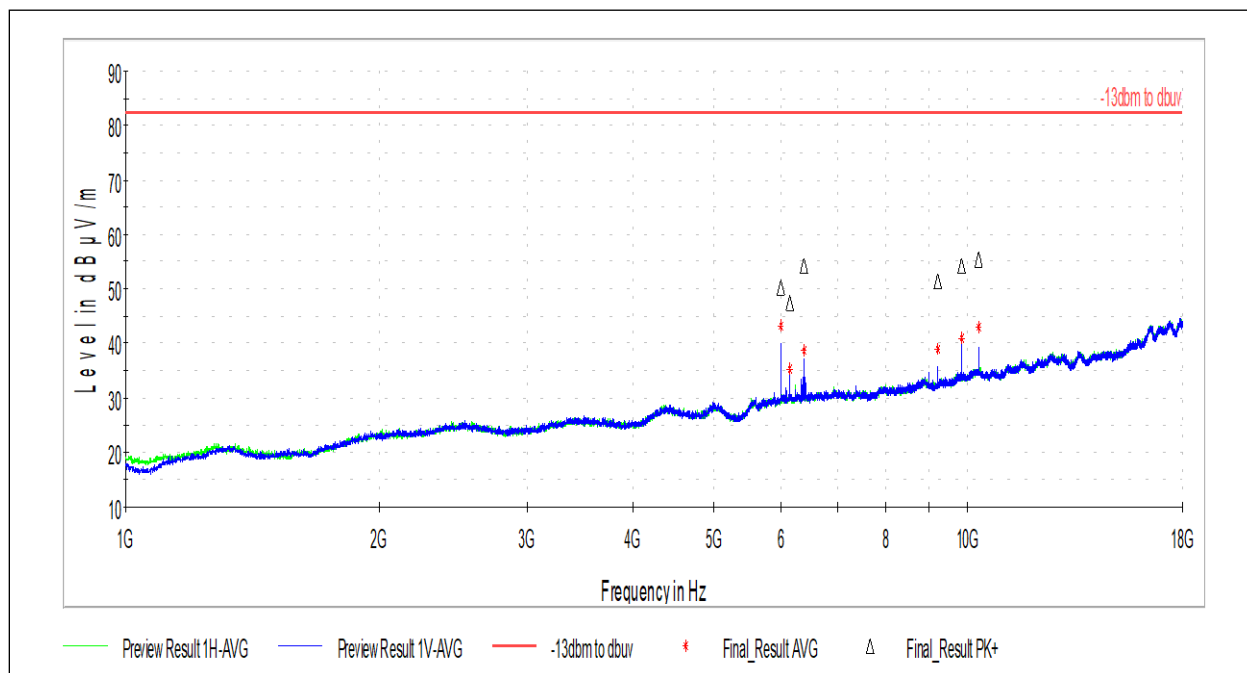
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	36.02	82.250	46.23	1000.000	295.0	V	123.0	11.03
6373.500000	32.64	82.250	49.61	1000.000	410.0	V	148.0	11.77
9216.000000	39.24	82.250	43.01	1000.000	100.0	V	160.0	15.59
9830.500000	40.00	82.250	42.25	1000.000	201.0	V	182.0	16.56
10312.000000	41.97	82.250	40.28	1000.000	337.0	V	318.0	17.61
16496.500000	50.87	82.250	31.38	1000.000	100.0	H	159.0	26.06

Test Personnel:	Michael Carlson	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBμV
Product Standard:	FCC Part 27.53	Ambient Temperature:	23.4 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	72.2 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: None.



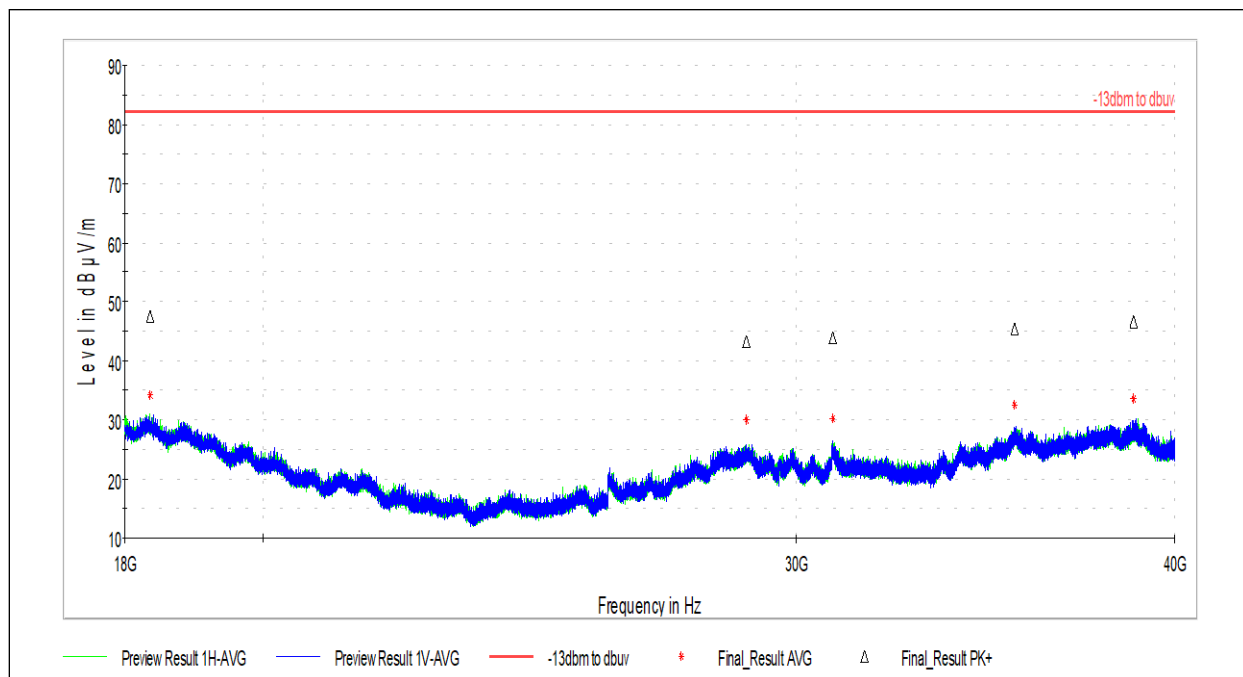
9.8.12 256-QAM, Channel 3960 MHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
6000.000000	43.22	82.250	39.03	1000.000	100.0	V	290.0	11.03
6144.000000	35.18	82.250	47.07	1000.000	146.0	V	278.0	11.29
6390.000000	38.68	82.250	43.57	1000.000	100.0	V	146.0	11.80
9216.000000	38.91	82.250	43.34	1000.000	410.0	H	290.0	15.56
9830.500000	41.06	82.250	41.19	1000.000	376.0	V	216.0	16.56
10312.500000	42.79	82.250	39.46	1000.000	239.0	V	336.0	17.61

Test Personnel:	Ben Coolbear	Test Date:	8/7/2022
Supervising/Reviewing Engineer:	NA	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27.53	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient		Atmospheric Pressure:	987.4 mbar
Signals or BB Source:	Yes		

Deviations, Additions, or Exclusions: None.

**9.9 Test Data: 18 GHz – 40 GHz****9.9.1 QPSK, Channel 3840 MHz**

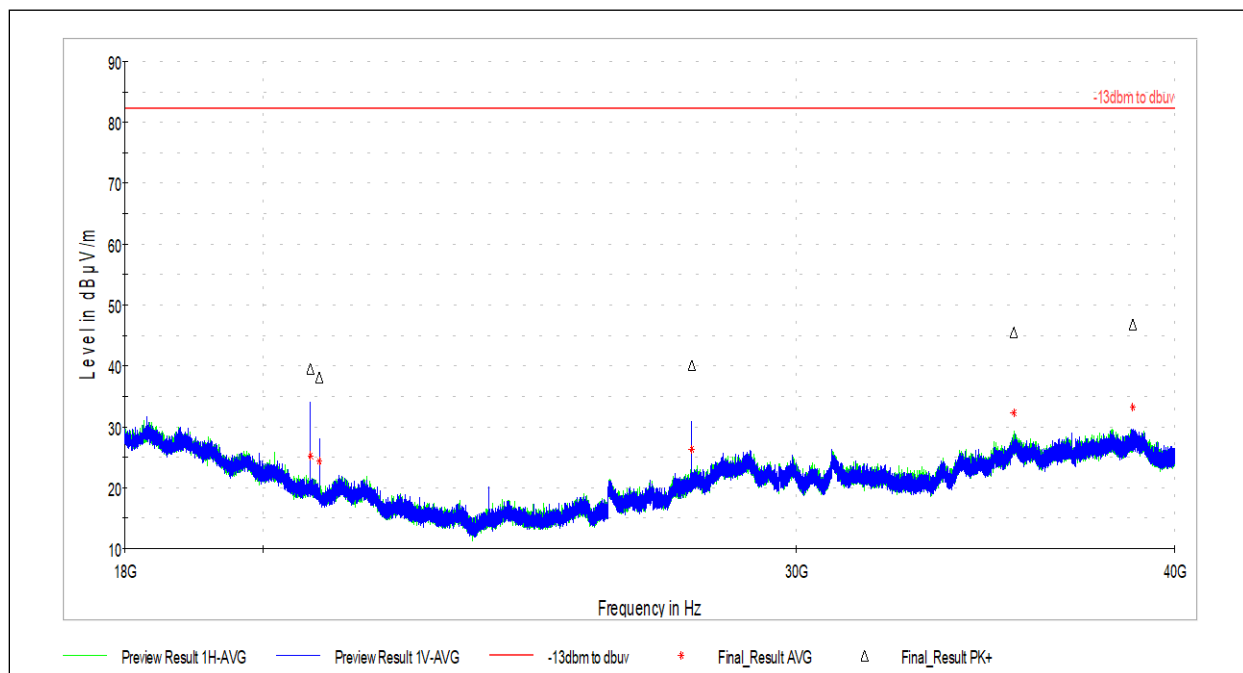
Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18342.500000	34.29	82.250	47.96	1000.000	410.0	H	270.0	19.74
28875.500000	30.01	82.250	52.24	1000.000	119.0	V	135.0	9.63
30836.500000	30.12	82.250	52.13	1000.000	100.0	V	188.0	11.47
35406.000000	32.45	82.250	49.80	1000.000	100.0	H	319.0	12.25
38760.500000	33.54	82.250	48.71	1000.000	251.0	V	218.0	11.57

Test Personnel:	David Perry	Test Date:	8/5/2022
Supervising/Reviewing Engineer:	Brian Lackey	Limit Applied:	-13 dB μ V
Product Standard:	FCC Part 27	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



9.9.2 16-QAM, Channel 3840 MHz



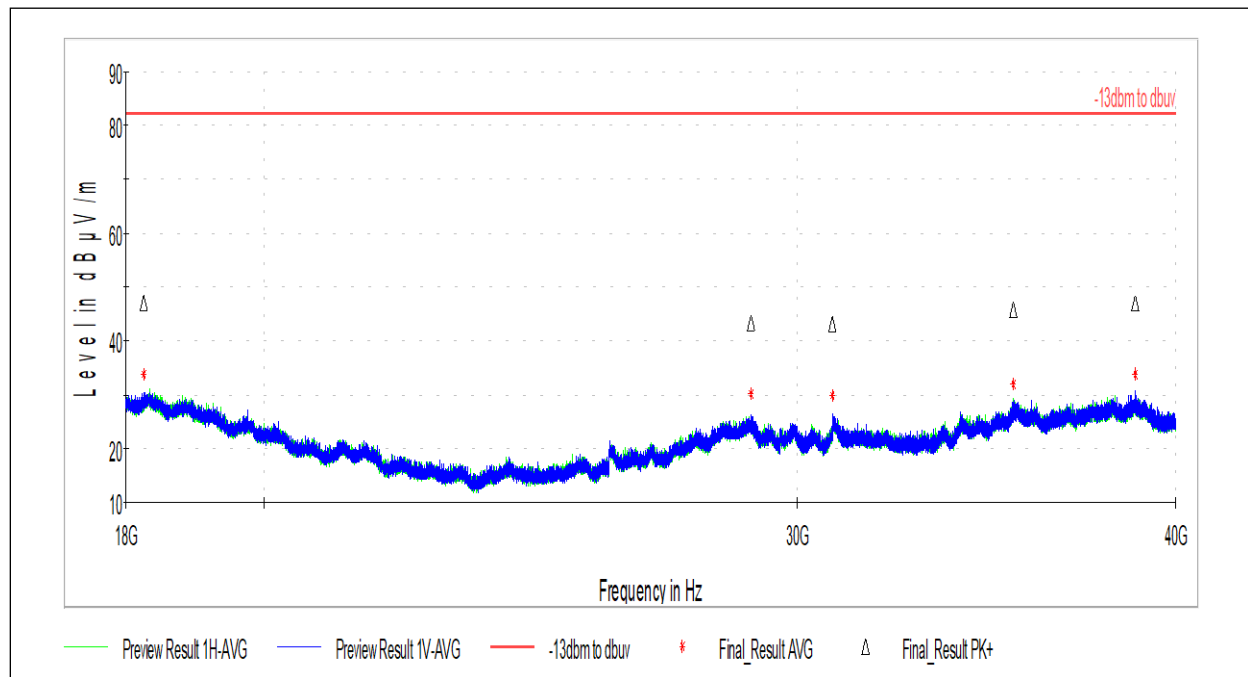
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20723.000000	25.24	82.250	57.01	1000.000	100.0	V	36.0	11.35
20868.500000	24.36	82.250	57.89	1000.000	325.0	V	348.0	10.90
27698.500000	26.26	82.250	55.99	1000.000	100.0	V	100.0	8.02
35392.500000	32.33	82.250	49.92	1000.000	100.0	H	287.0	12.24
38729.500000	33.19	82.250	49.06	1000.000	100.0	H	0.0	11.45

Test Personnel:	David Perry	Test Date:	8/8/2022
Supervising/Reviewing Engineer:	Brian Lackey	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	985.6 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



9.9.3 64-QAM, Channel 3840 MHz



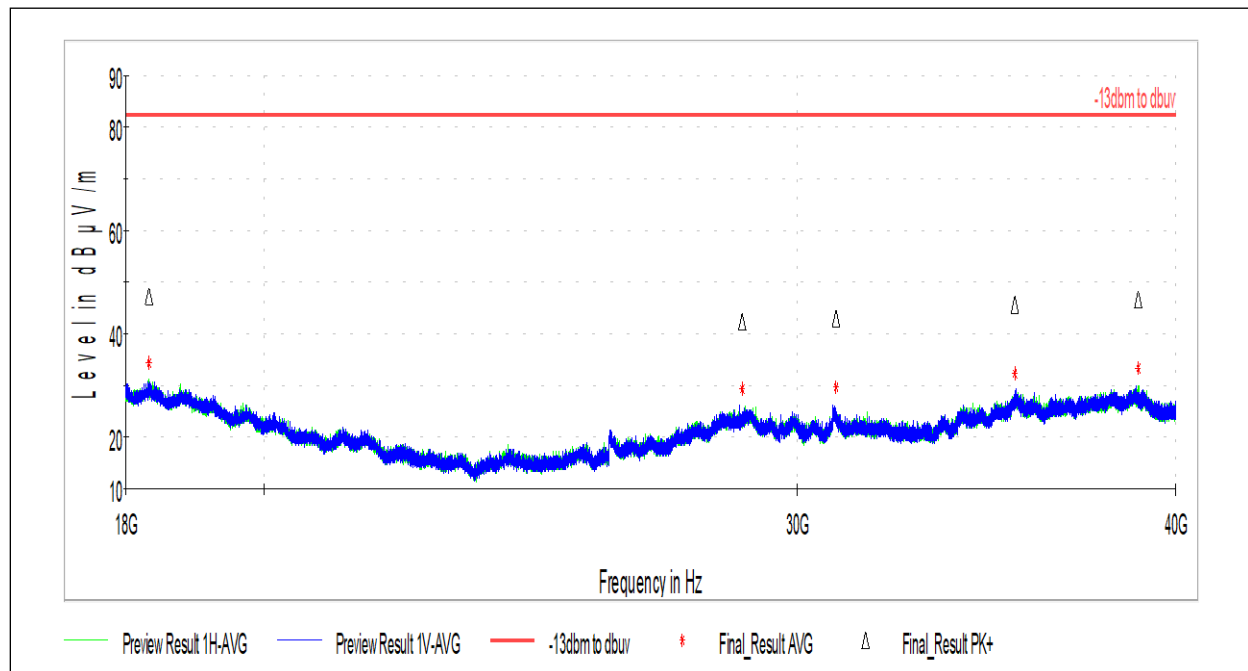
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18245.000000	33.79	82.250	48.46	1000.000	410.0	V	268.0	20.12
28949.000000	30.11	82.250	52.14	1000.000	332.0	V	175.0	9.71
30802.000000	29.99	82.250	52.26	1000.000	100.0	V	12.0	11.40
35355.500000	31.99	82.250	50.26	1000.000	100.0	H	0.0	12.25
38788.000000	33.64	82.250	48.61	1000.000	119.0	V	350.0	11.56

Test Personnel:	David Perry	Test Date:	8/8/2022
Supervising/Reviewing Engineer:	Brian Lackey	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



9.9.4 256-QAM, Channel 3840 MHz



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18315.500000	34.24	82.250	48.01	1000.000	350.0	V	203.0	19.82
28768.000000	29.19	82.250	53.06	1000.000	192.0	V	167.0	9.27
30894.500000	29.57	82.250	52.68	1000.000	358.0	H	109.0	11.41
35394.000000	32.25	82.250	50.00	1000.000	210.0	V	35.0	12.19
38860.500000	33.17	82.250	49.08	1000.000	300.0	H	146.0	11.43

Test Personnel:	David Perry	Test Date:	8/8/2022
Supervising/Reviewing Engineer:	Brian Lackey	Limit Applied:	-13 dBµV
Product Standard:	FCC Part 27	Ambient Temperature:	24.6 °C
Input Voltage:	48VDC via PoE injector	Relative Humidity:	63.8 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	987.4 mbar

Deviations, Additions, or Exclusions: Testing represents the worst case of low, middle, and high channels.



10 Conducted Spurious Emissions

10.1 Test Limits

FCC Part 27.53(I)(1)

(1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (I)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

10.2 Test Method

Tests are performed in accordance with ANSI C63.26:2015 § 11.11 Emissions in nonrestricted frequency bands.

10.3 Test Equipment Used

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	2327	Rohde & Schwarz	ES126	9/30/2019	9/30/2020

10.4 Test Results

The device was found to be **compliant**. All spurious emissions were found to be attenuated more than 26dB below the level of the fundamental.

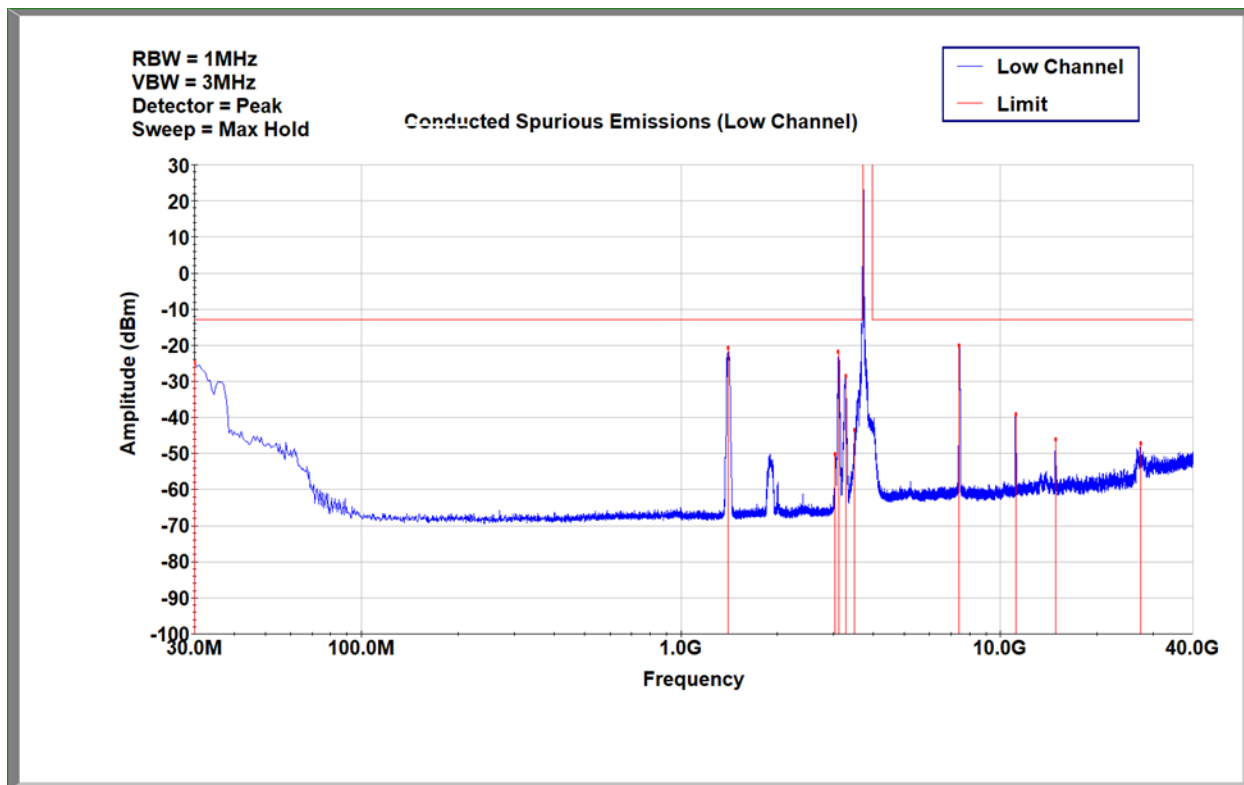
10.5 Test Conditions

Test Personnel:	Ben Coolbear	Test Date:	7/21/2022
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Limit Applied:	See Above
Product Standard:	FCC Part 27	Ambient Temperature:	25.4 °C
			45.2
Input Voltage:	48VDC via PoE injector	Relative Humidity:	%
Pretest Verification w / Ambient			
Signals or BB Source:	Yes	Atmospheric Pressure:	28.8 mbar



10.6 Test Data

10.6.1 QPSK, Channel 3720 MHz

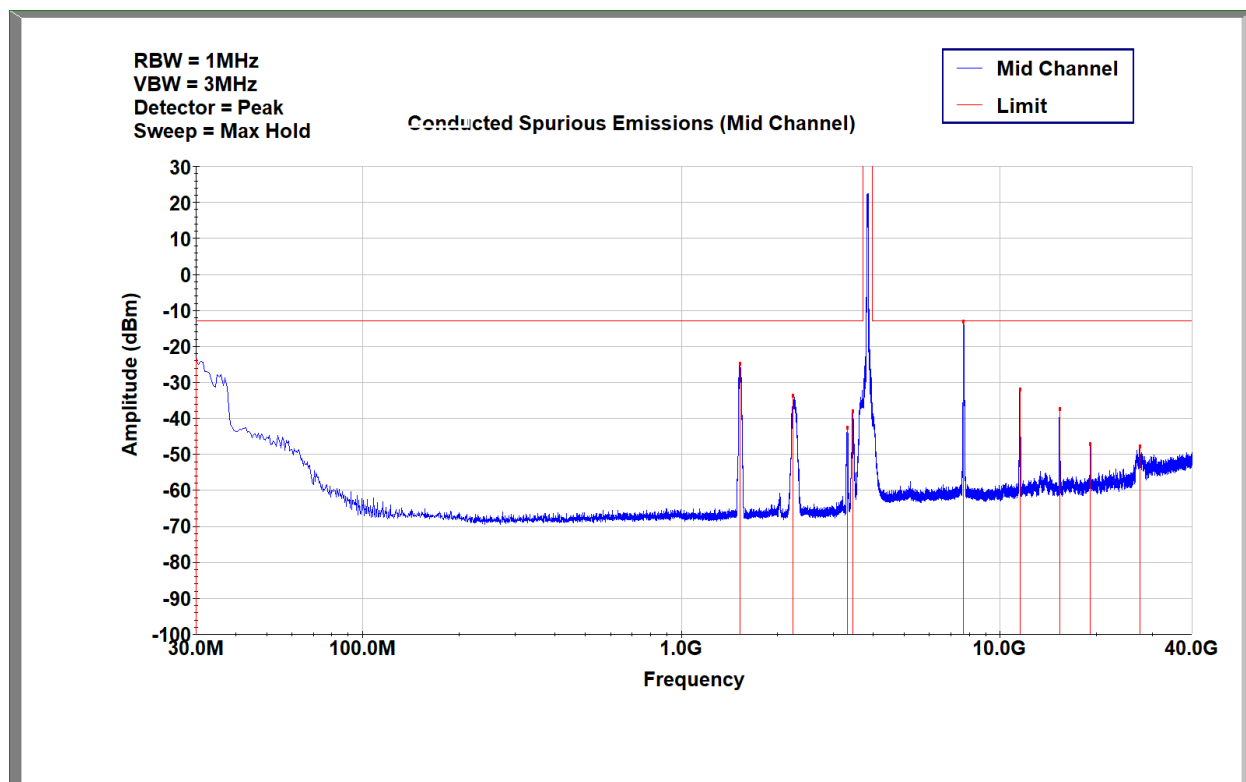


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor
30.00	-24.807	*	-13	*	6.061
1406.50	-20.750	*	-13	*	6.507
3038.50	-50.147	*	-13	*	6.731
3108.50	-21.864	*	-13	*	6.717
3272.50	-28.588	*	-13	*	6.619
3497.50	-43.534	*	-13	*	6.837
7411.00	-20.013	*	-13	*	7.875
11147.50	-39.108	*	-13	*	7.745
14845.00	-46.142	*	-13	*	9.052
27390.00	-47.223	*	-13	*	11.947

Note: RMS was measured only on emissions near the limit line.



10.6.2 QPSK, Channel 3840 MHz

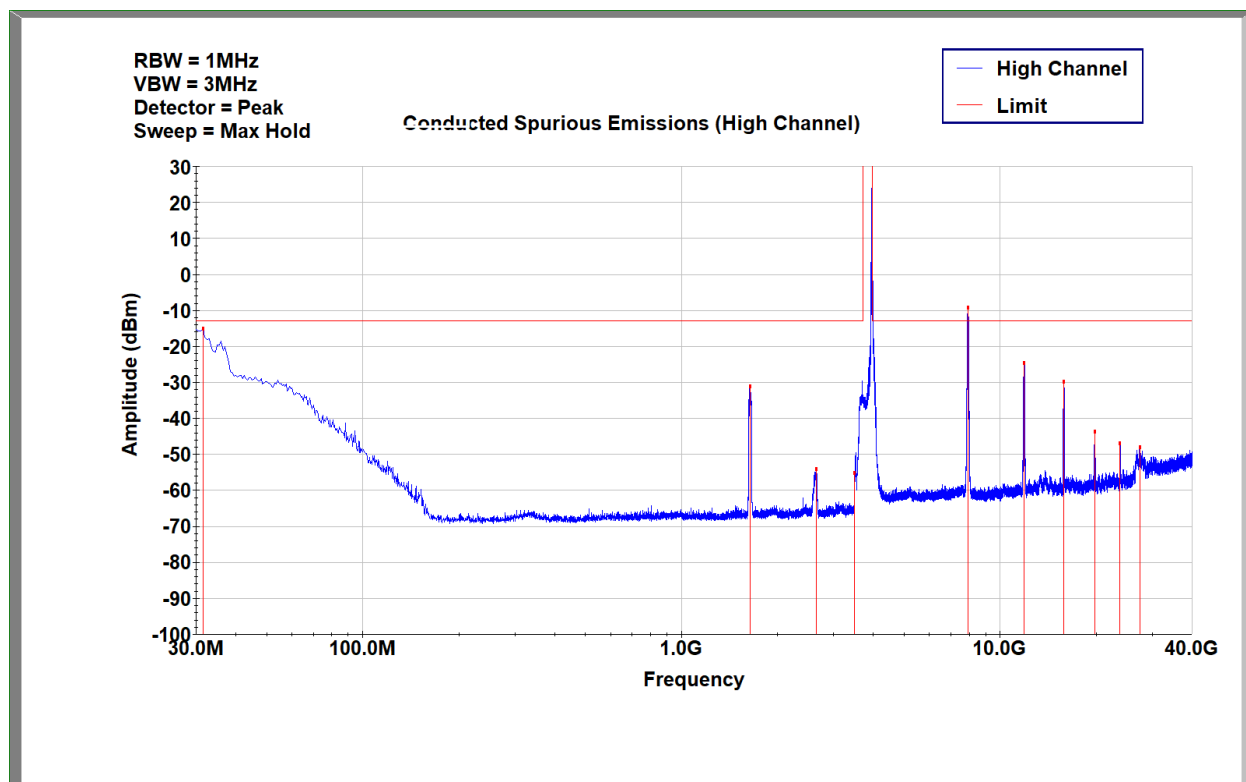


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
30.00	-24.061	*	-13	*	6.061
1526.50	-24.792	*	-13	*	6.504
2240.00	-33.634	*	-13	*	6.519
3308.50	-42.563	*	-13	*	6.627
3441.00	-38.037	*	-13	*	6.762
7681.50	-13.047	-25.491	-13	12.491	7.869
11530.00	-31.925	*	-13	*	8.034
15371.00	-37.385	*	-13	*	8.996
19199.50	-47.045	*	-13	*	9.225
27379.50	-47.768	*	-13	*	11.878

Note: RMS was measured only on emissions near the limit line.



10.6.3 QPSK, Channel 3960 MHz

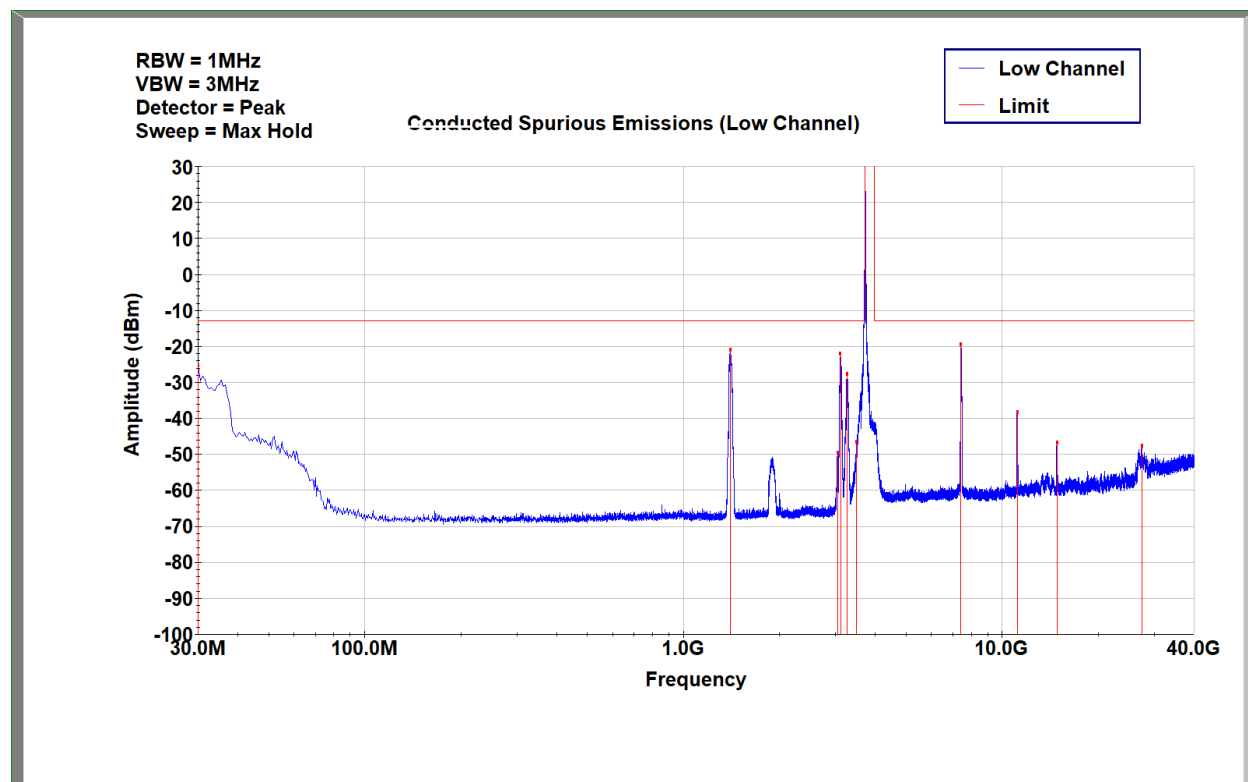


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
31.50	-14.995	*	-13	*	6.063
1643.00	-31.181	*	-13	*	6.59
2642.00	-54.024	*	-13	*	6.559
3497.00	-55.219	*	-13	*	6.837
7914.50	-9.229	-20.527	-13	7.527	7.883
11885.50	-24.693	*	-13	*	8.58
15828.00	-29.807	*	-13	*	9.443
19820.50	-43.589	*	-13	*	9.425
23769.00	-46.885	*	-13	*	10.185
27389.00	-48.058	*	-13	*	11.94

Note: RMS was measured only on emissions near the limit line.



10.6.4 16-QAM, Channel 3720 MHz

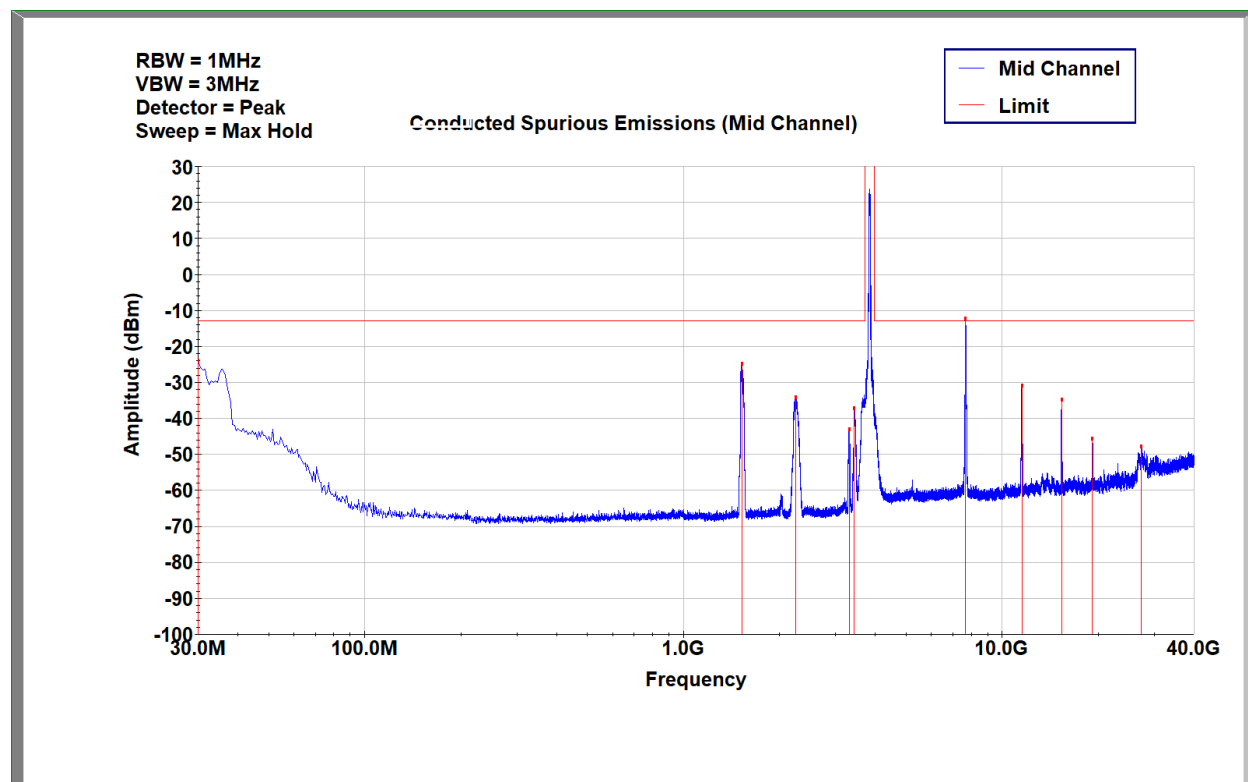


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin	Correction Factor (dB)
30	-25.218	*	-13	*	6.061
1406	-20.884	*	-13	*	6.507
3041	-49.472	*	-13	*	6.733
3107.5	-22.014	*	-13	*	6.719
3269.5	-27.736	*	-13	*	6.62
3496.5	-46.56	*	-13	*	6.837
7423	-19.358	*	-13	*	7.932
11147	-38.295	*	-13	*	7.744
14837	-46.657	*	-13	*	8.996
27389.5	-47.675	*	-13	*	11.944

Note: RMS was measured only on emissions near the limit line.



10.6.5 16-QAM, Channel 3840 MHz

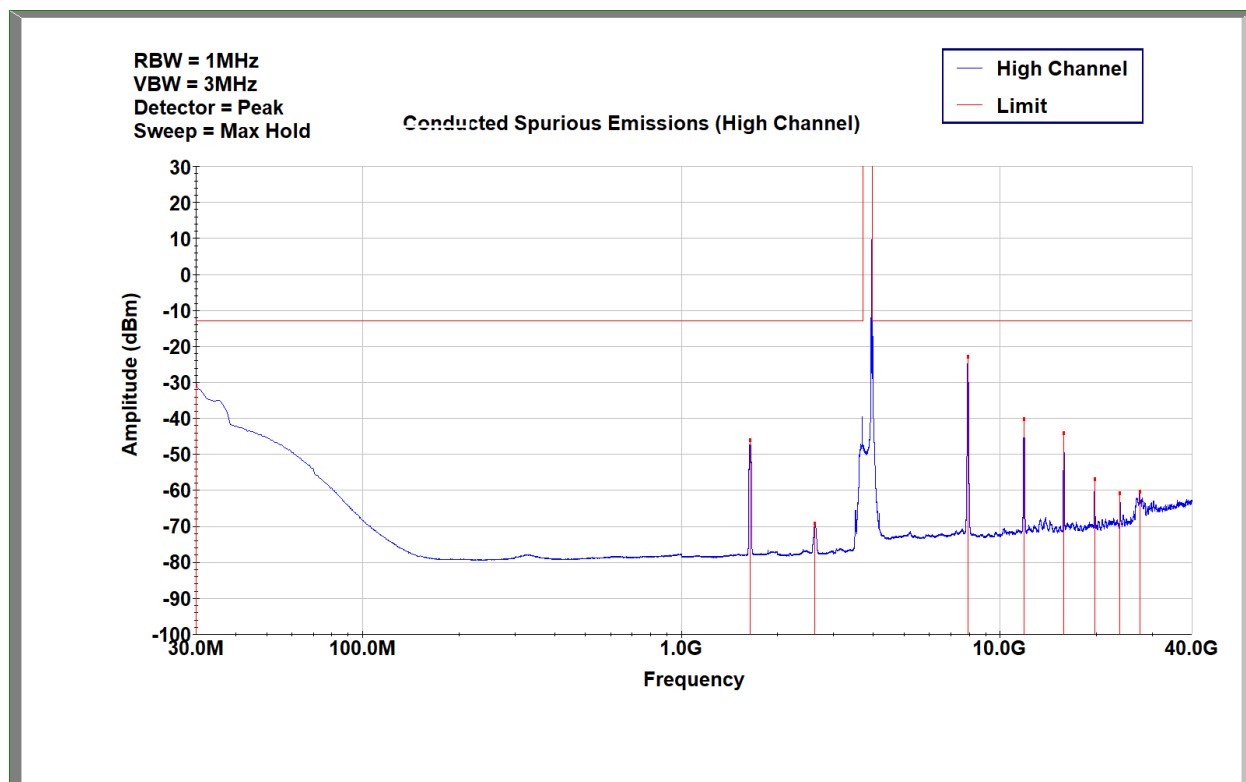


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin	Correction Factor (dB)
30.00	-23.937	*	-13	*	6.061
1526.00	-24.878	*	-13	*	6.507
2249.50	-34.176	*	-13	*	6.733
3311.50	-43.104	*	-13	*	6.719
3437.00	-37.257	*	-13	*	6.62
7680.00	-12.195	-24.504	-13	11.504	6.837
11525.00	-30.976	*	-13	*	7.932
15367.00	-34.746	*	-13	*	7.744
19205.50	-45.610	*	-13	*	8.996
27371.00	-47.832	*	-13	*	11.944

Note: RMS was measured only on emissions near the limit line.



10.6.6 16-QAM, Channel 3960 MHz

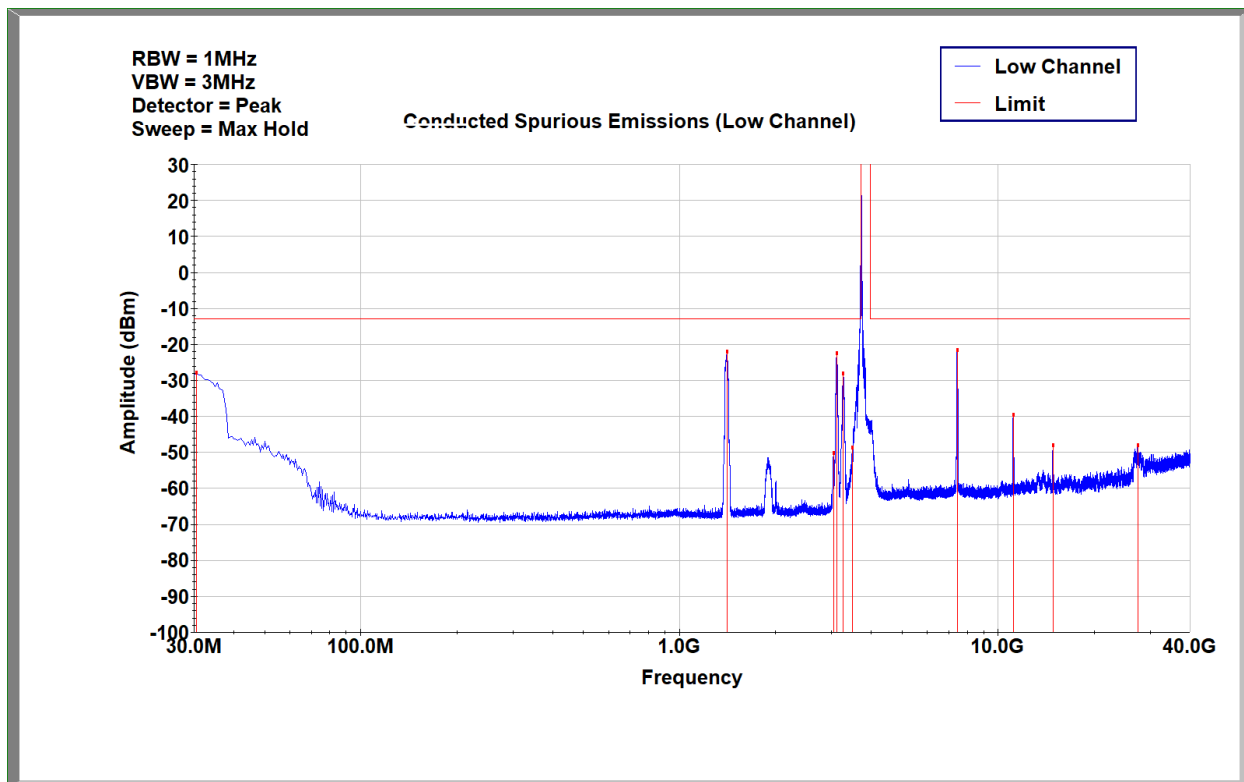


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin	Correction Factor (dB)
30.00	-30.941	*	-13	*	6.061
1642.50	-46.146	*	-13	*	6.591
2623.00	-69.235	*	-13	*	6.553
7913.50	-22.839	*	-13	*	7.885
11880.50	-40.232	*	-13	*	8.622
15834.50	-44.071	*	-13	*	9.407
19802.00	-56.913	*	-13	*	9.405
23750.00	-60.799	*	-13	*	10.239
27399.50	-60.272	*	-13	*	12.009

Note: RMS was measured only on emissions near the limit line.



10.6.7 64-QAM, Channel 3720 MHz

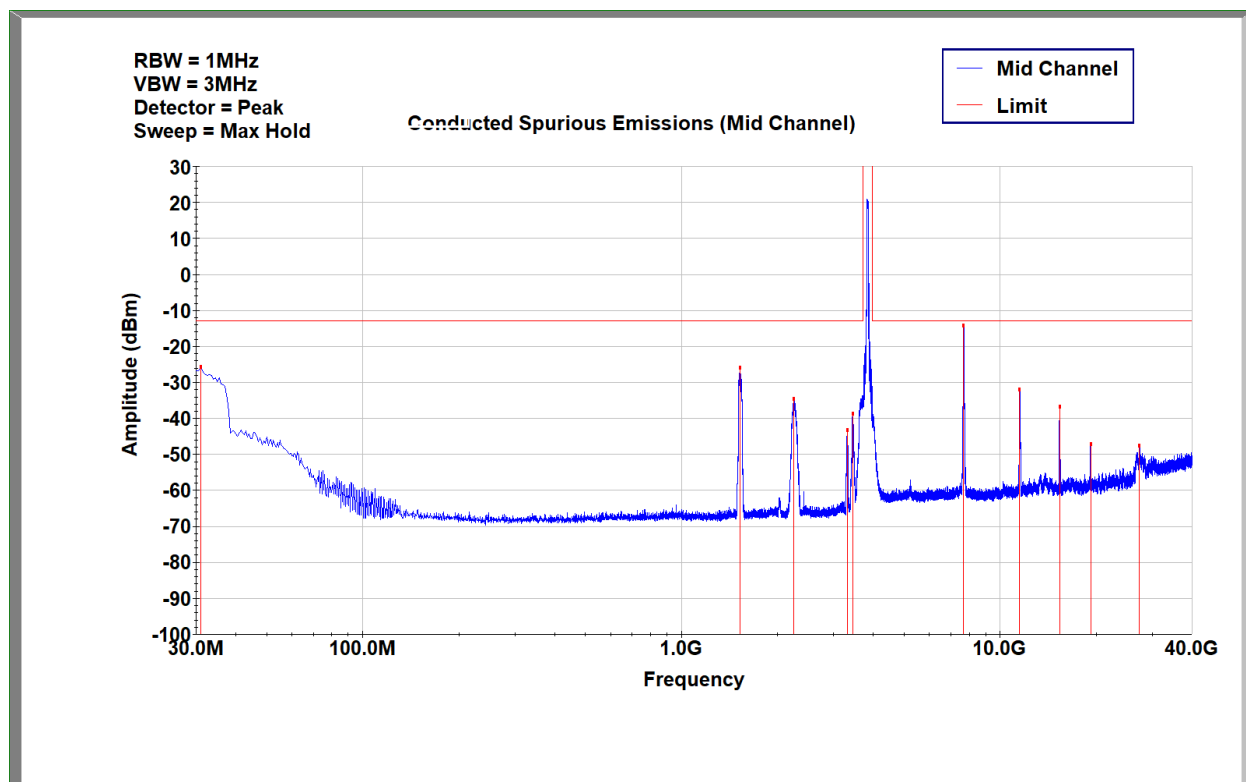


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
30.50	-27.866	*	-13	*	6.062
1409.00	-22.102	*	-13	*	6.507
3041.00	-50.157	*	-13	*	6.733
3113.00	-22.487	*	-13	*	6.708
3264.50	-28.072	*	-13	*	6.622
3488.00	-48.650	*	-13	*	6.829
7434.00	-21.488	*	-13	*	7.984
11149.00	-39.568	*	-13	*	7.749
14843.50	-48.073	*	-13	*	9.041
27398.00	-47.940	*	-13	*	11.999

Note: RMS was measured only on emissions near the limit line.



10.6.8 64-QAM, Channel 3840 MHz

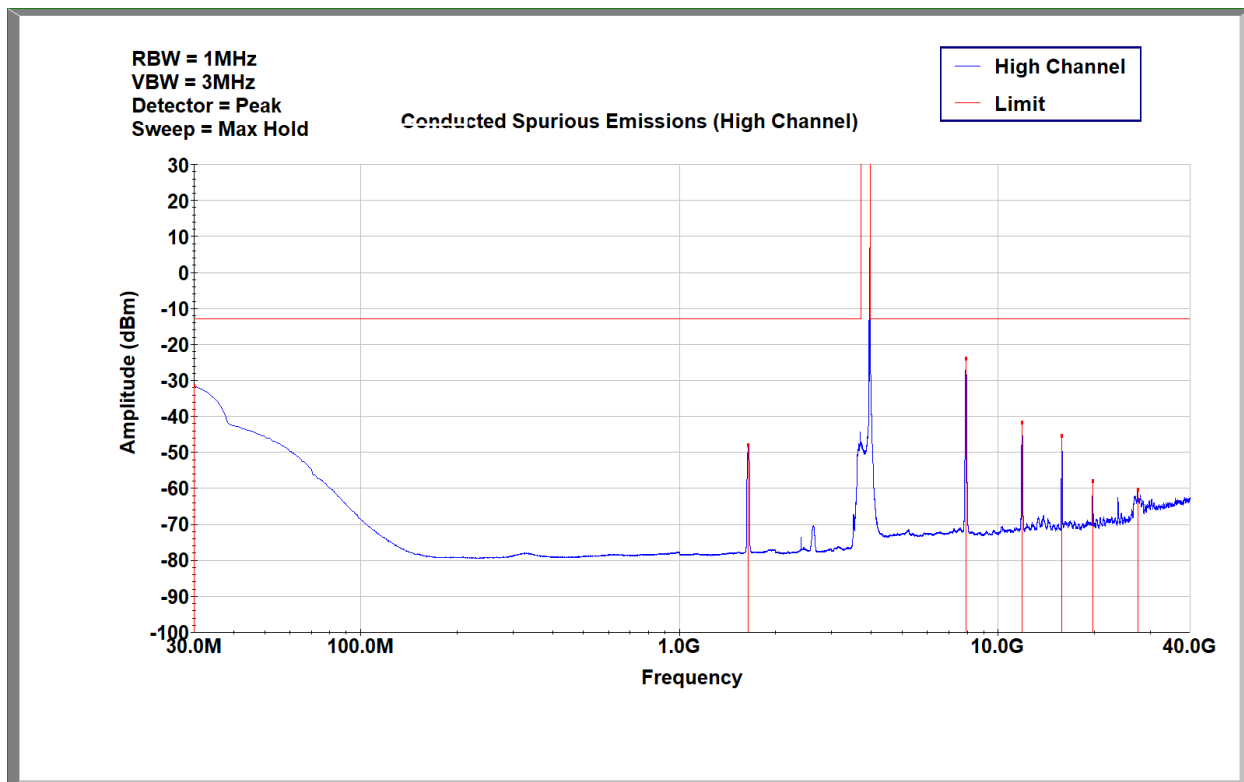


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
31.00	-25.69	*	-13	*	6.063
1523.50	-25.847	*	-13	*	6.504
2253.00	-34.522	*	-13	*	6.516
3321.00	-43.301	*	-13	*	6.651
3445.50	-38.639	*	-13	*	6.769
7675.50	-14.244	-26.034	-13	13.034	7.856
11519.50	-31.988	*	-13	*	8.029
15378.00	-36.806	*	-13	*	9.034
19220.50	-47.265	*	-13	*	9.203
27315.50	-47.635	*	-13	*	11.458

Note: RMS was measured only on emissions near the limit line.



10.6.9 64-QAM, Channel 3960 MHz

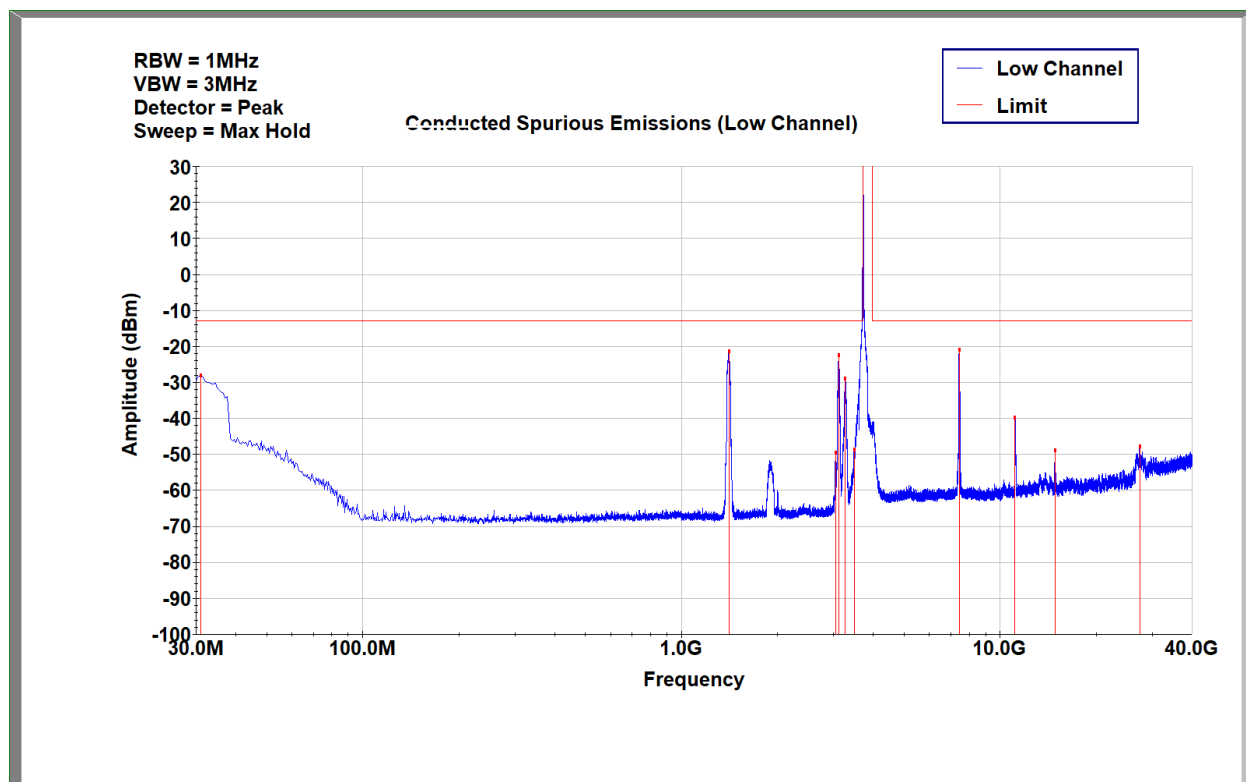


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
30.00	-31.599	*	-13	*	6.061
1645.50	-48.132	*	-13	*	6.588
7921.00	-24.052	*	-13	*	7.869
11884.50	-41.778	*	-13	*	8.588
15845.50	-45.524	*	-13	*	9.345
19802.00	-57.985	*	-13	*	9.405
27399.50	-60.267	*	-13	*	12.009

Note: RMS was measured only on emissions near the limit line.



10.6.10 256-QAM, Channel 3720 MHz

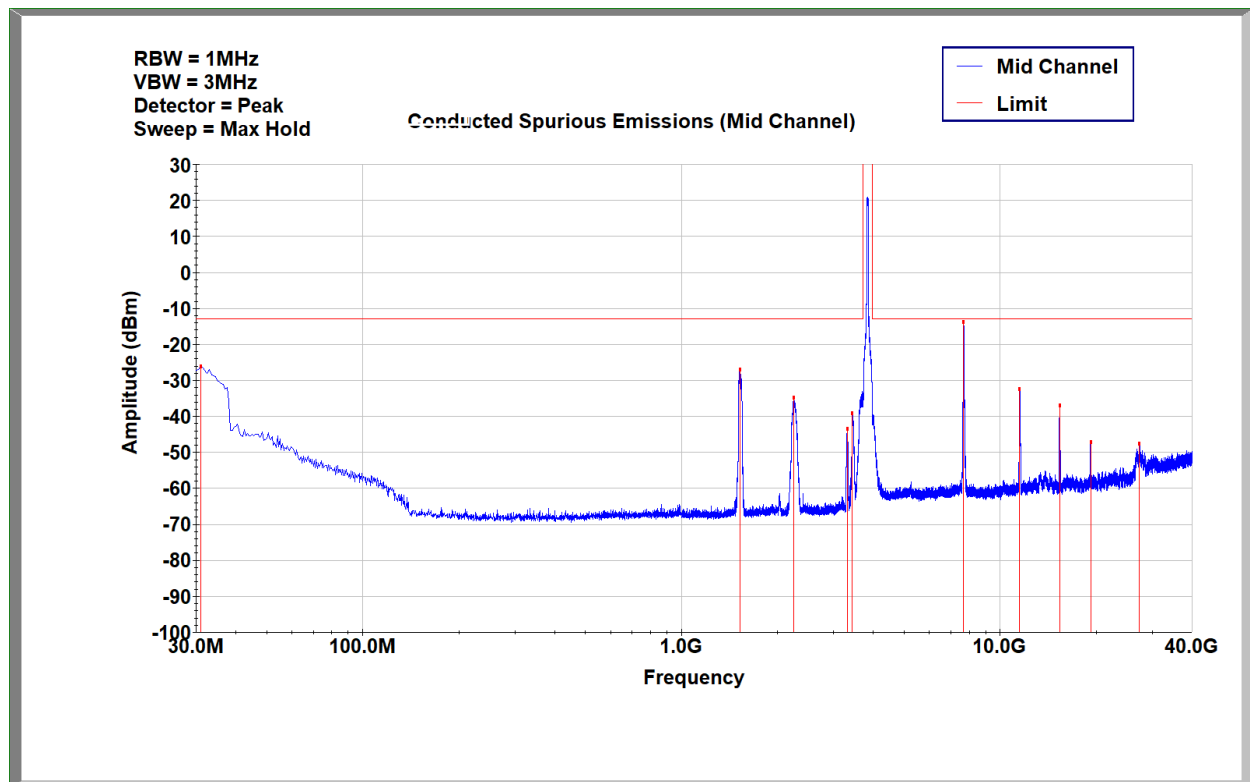


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
31.00	-28.064	*	-13	*	6.063
1408.50	-21.289	*	-13	*	6.507
3047.00	-49.583	*	-13	*	6.733
3115.50	-22.341	*	-13	*	6.704
3263.50	-28.896	*	-13	*	6.622
3495.50	-48.632	*	-13	*	6.836
7434.50	-21.026	*	-13	*	7.986
11133.50	-39.885	*	-13	*	7.712
14862.50	-48.889	*	-13	*	9.173
27394.50	-47.791	*	-13	*	11.976

Note: RMS was measured only on emissions near the limit line.



10.6.11 256-QAM, Channel 3840 MHz

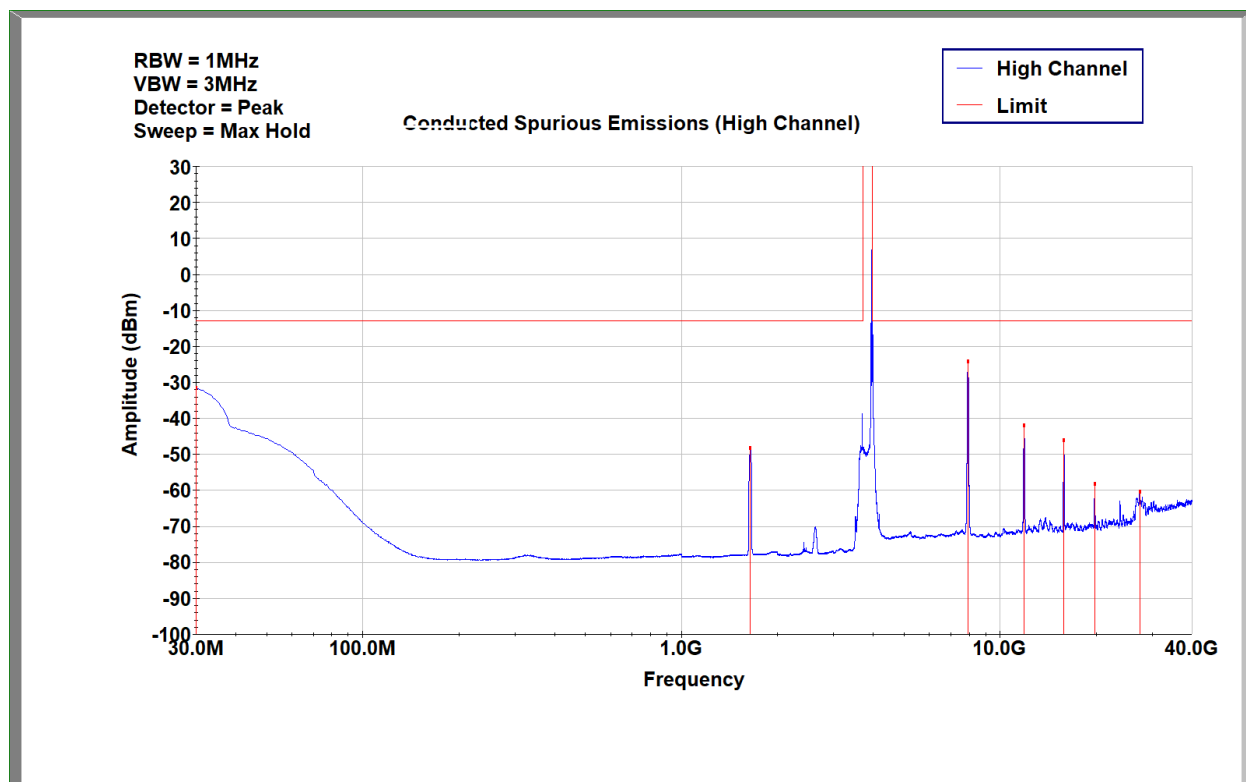


Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
31.00	-26.200	*	-13	*	6.063
1525.50	-27.068	*	-13	*	6.504
2251.50	-34.812	*	-13	*	6.516
3315.50	-43.358	*	-13	*	6.64
3437.50	-39.068	*	-13	*	6.757
7685.50	-13.735	-25.722	-13	12.722	7.878
11520.50	-32.485	*	-13	*	8.03
15361.50	-36.940	*	-13	*	8.946
19240.50	-47.224	*	-13	*	9.238
27343.50	-47.694	*	-13	*	11.642

Note: RMS was measured only on emissions near the limit line.



10.6.12 256-QAM, Channel 3960 MHz



Frequency (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Correction Factor (dB)
31.00	-28.064	*	-13	*	6.063
1408.50	-21.289	*	-13	*	6.507
3047.00	-49.583	*	-13	*	6.733
3115.50	-22.341	*	-13	*	6.704
3263.50	-28.896	*	-13	*	6.622
3495.50	-48.632	*	-13	*	6.836
7434.50	-21.026	*	-13	*	7.986
11133.50	-39.885	*	-13	*	7.712
14862.50	-48.889	*	-13	*	9.173
27394.50	-47.791	*	-13	*	11.976

Note: RMS was measured only on emissions near the limit line.



11 Frequency Stability

11.1 Test Limits

FCC Title 47 Part 27.54 Frequency stability.

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

11.2 Test Method

Tests are performed in accordance with ANSI C63.26.

11.3 Test Equipment Used

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde & Schwarz	ESU40	3/10/2022	3/10/2023

11.4 Test Results

The device was found to be **compliant**. All fundamental emissions were within the authorized bands of operation.

11.5 Test Conditions

Test Personnel:	Ben Coolbear	Test Date:	7/21/2022-8/11/2022
Supervising/Reviewing Engineer:		Limit Applied:	See Above
(Where Applicable)	NA	Ambient Temperature:	25.4 °C
Product Standard:	FCC Part 27		45.2
Input Voltage:	48VDC via PoE injector	Relative Humidity:	%
Pretest Verification w / Ambient		Atmospheric Pressure:	28.8 mbar
Signals or BB Source:	Yes		



11.6 Test Data

3.720 GHz, 40MHz wide channel, QPSK, Antenna port 1

Temperature (Deg. C)	Voltage VDC	Low Edge (GHz)	Upper Edge (GHz)	Centroid (GHz)	PPM --
-30	48.0	3.7009800	3.7390000	3.7199900	-4.25618
-20	48.0	3.7010700	3.7389367	3.7200033	-0.67191
-10	48.0	3.7010733	3.7389400	3.7200067	0.22406
0	48.0	3.7010817	3.7389383	3.7200100	1.12016
10	48.0	3.7010783	3.7389333	3.7200058	0.00000
20	40.5	3.7010800	3.7389417	3.7200108	1.34422
20	48.0	3.7010783	3.7389333	3.7200058	--
20	55.5	3.7010783	3.7389417	3.7200100	1.12016
30	48.0	3.7010783	3.7389350	3.7200067	0.22406
40	48.0	3.7010817	3.7389350	3.7200083	0.67218
50	48.0	3.7010733	3.7389333	3.7200033	-0.67204

3.840 GHz, 40MHz wide channel, QPSK, Antenna port 1

Temperature (Deg. C)	Voltage VDC	Low Edge (GHz)	Upper Edge (GHz)	Centroid (GHz)	PPM --
-30	48.0	3.8210833	3.8589433	3.8400133	0.21693
-20	48.0	3.8210817	3.8589433	3.8400125	0.00000
-10	48.0	3.8210800	3.8589417	3.8400108	-0.43398
0	48.0	3.8210817	3.8589433	3.8400125	0.00000
10	48.0	3.8210850	3.8589417	3.8400133	0.21706
20	40.5	3.8210833	3.8589433	3.8400133	0.21693
20	48.0	3.8210817	3.8589433	3.8400125	--
20	55.5	3.8210850	3.8589433	3.8400142	0.43398
30	48.0	3.8210817	3.8589417	3.8400117	-0.21693
40	48.0	3.8210833	3.8589417	3.8400125	0.00000
50	48.0	3.8210833	3.8589417	3.8400125	0.00000

3.960 GHz, 40MHz wide channel, QPSK, Antenna port 1

Temperature (Deg. C)	Voltage VDC	Low Edge (GHz)	Upper Edge (GHz)	Centroid (GHz)	PPM --
-30	48.0	3.9410733	3.9789383	3.9600058	0.2104
-20	48.0	3.9410733	3.9789383	3.9600058	0.2104
-10	48.0	3.9410750	3.9789367	3.9600058	0.2105
0	48.0	3.9410733	3.9789367	3.9600050	0.0000
10	48.0	3.9410750	3.9789367	3.9600058	0.2105
20	40.5	3.9410750	3.9789400	3.9600075	0.6313
20	48.0	3.9410750	3.9789350	3.9600050	--
20	55.5	3.9410750	3.9789417	3.9600083	0.8418
30	48.0	3.9410733	3.9789350	3.9600042	-0.2105
40	48.0	3.9410767	3.9789400	3.9600083	0.8418
50	48.0	3.9410750	3.9789417	3.9600083	0.8418



12 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	8/16/2022	105014439LEX-001	<i>JB</i>	<i>BZ</i>	Original Issue