Test Report

Prepared for: Thermaco Inc.

Model: Big Dipper

Serial Number: NA

FCC ID: 2BPIM0037031747

Project No: p2550002

Test Results: Pass

To

FCC Part 15.407

Date of Issue: July 23, 2025

On the behalf of the applicant:	**Thermaco Inc** **646 Greensboro St.** **Asheboro, NC 27203**
Attention of:	**Jan Fischer** **Ph: (336)629-4651** **E-mail: janf@thermaco.com**

Prepared By
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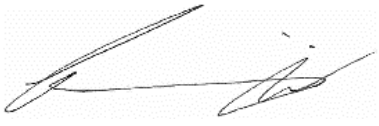
Project No: p2550002



John Michalowicz

Project Test Engineer

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
§15.203	Antenna Requirements	Pass	
§15.207 §15.407(b)(6)	Line Conducted Emissions	Pass	
§15.407(a)(1)	Conducted Output Power	Pass	
§15.407(a)(1),(5)	Power Spectral Density	Pass	
§15.403(i) 15.407(a)(5)	26dB Occupied Bandwidth	Pass	
	99% Occupied Bandwidth		
§15.407(b)(1)	Undesirable Emissions	Pass	
§15.205 §15.407(b)(1),(5),(6)(7)	General Field Strength Limits (Restricted Bands and Radiated Emission limits)	Pass	
§15.407(g)	Frequency Stability	NA	
§15.407(f)	RF Exposure	Pass	

Statements of conformity are reported as:

- Pass - the measured value is below the acceptance limit, *acceptance limit = test limit*.
- Fail - the measured value is above the acceptance limit, *acceptance limit = test limit*.

References	Description
CFR47, Part 15, Subpart B	Unintentional Radiators
CFR47, Part 15, Subpart C	Intentional Radiators
CFR47, Part 15, Subpart E	Unlicensed Nation Information Infrastructure Devices (U-NII)
ANSI C63.10-2020	American National standard for testing Unlicensed Wireless Devices
ANSI C63.4-2009	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ISO/IEC 17025:2005	General requirements for the Competence of Testing and Calibrations Laboratories
KDB 644545 D03	Guidance for IEEE 802 11ac New Rules
KDB 789033 D02	General U-NII Test Procedures New Rules V01
KDB 926956 D01	U-NII Transition Plan

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	July 23, 2025	John Michalowicz	Original Document

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ANAB

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

FCC Site Reg. #349717

IC Site Reg. #2044A-2

The applicant has been cautioned as to the following

15.21 - Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) - Special Accessories

Equipment marked to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.10-2013 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (ºC)	**Humidity (%)**	**Pressure (mbar)**
25.7 – 26.7	34.2 – 42.6	964.2 – 971.2

EUT Operation during Tests

Model:	**Big Dipper**
Serial:	**NA**
Firmware:	**NBGD-v1.0.27-wifiradiotest.hex.**
Software:	**NBGD-v1.0.27-wifiradiotest.hex**
Description:	**Commercial Grease Interceptor**
Additional Information:	**Radio Frequency Range and Operational Info:** 5150 – 5250 WiFi 802.11n **Usage: Fixed-Use/Mobile**
Receipt of Sample(s):	**June 10th 2025**
EUT Condition:	**Visual Damage** No **State of Development** Production/Production Equivalent

EUT Specifications

Equipment Code	NII
Model(s)Tested	Big Dipper
Model(s) covered	NA
Frequency Range	5150 – 5250
Bandwidths	20 MHz
Modulations	OFDM

15.203: Antenna Requirement:

X	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
	The EUT must be professionally installed
	The antenna requirement does not apply

EUT Operation during Tests

The EUT was set into a constant transmit mode using the PuTTy program and manufacturer provided test scripts. 84% duty cycle was attainable with 802.11n mode. A power setting of 15 was entered for all transmissions.

Accessories: NA

Cables:

Qty	Description	Length (M)	Shielding Y/N	Shielded Hood Y/N	Ferrite Y/N
1	USB	1	N	Y	N

Modifications to EUT(s) (Y/N): N

Output Power

Engineer:
Test Date:

Test Requirements

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

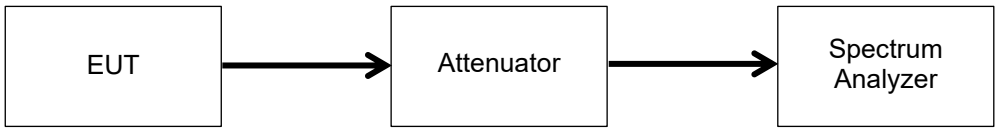
Test Procedure

The RF power was calculated using the spectrum analyzers' band power function per Method SA-1 from KDB 789033 D02 General U-NII Test Procedures New Rules v01. Measurements were made at the low, mid, and high channels of the band.

The Spectrum Analyzer was set to the following:

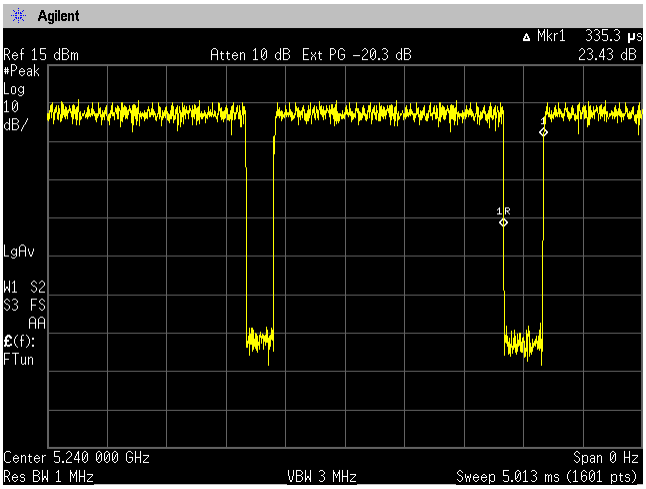
a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Sweep time = auto
d. Detector = RMS
e. 100 traces in power averaging mode

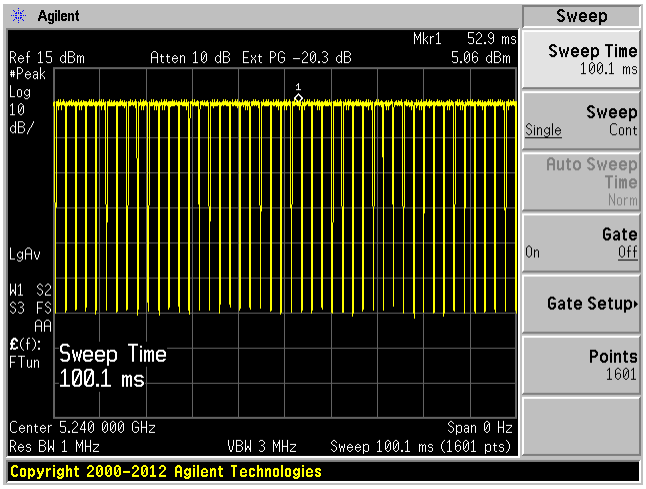
Test Setup



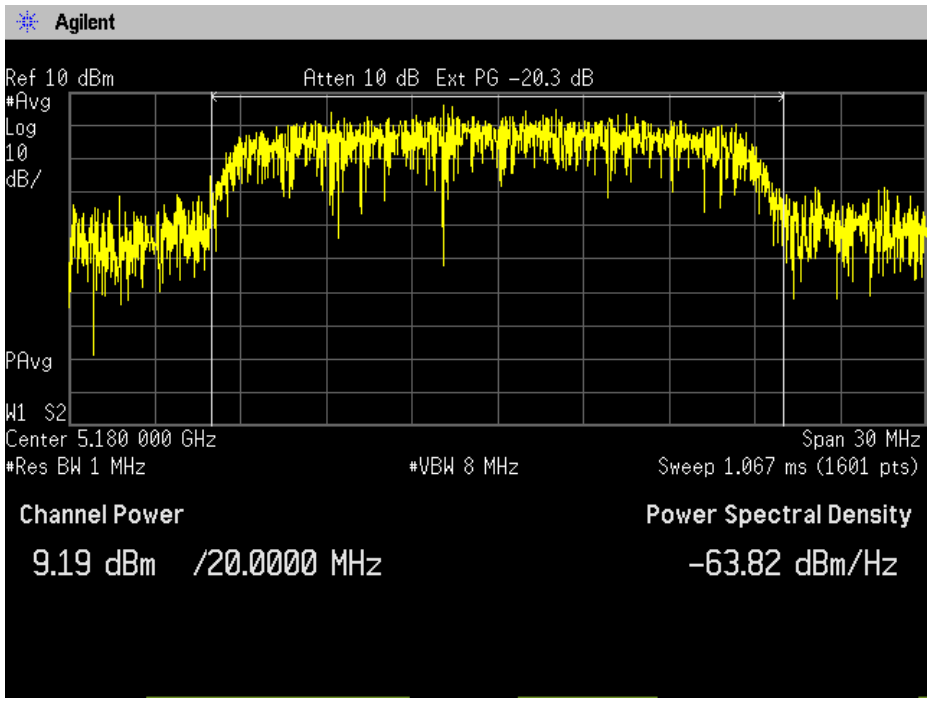
Test Results

0.335 * 45 = 15.075 = 84.92% DC
DCF = 20*log(0.842) = +1.42dB

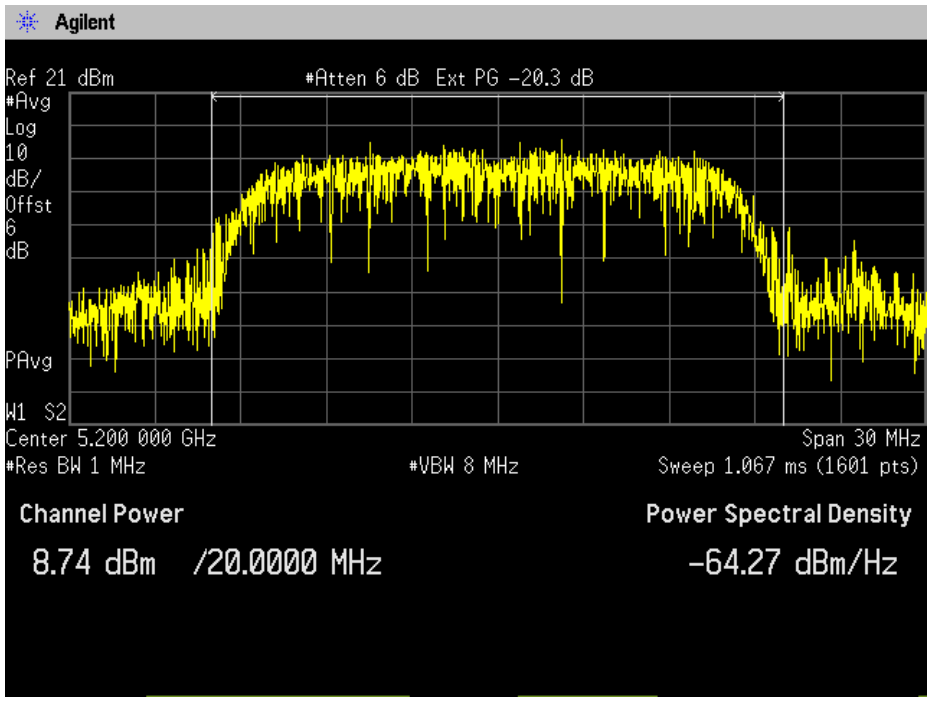




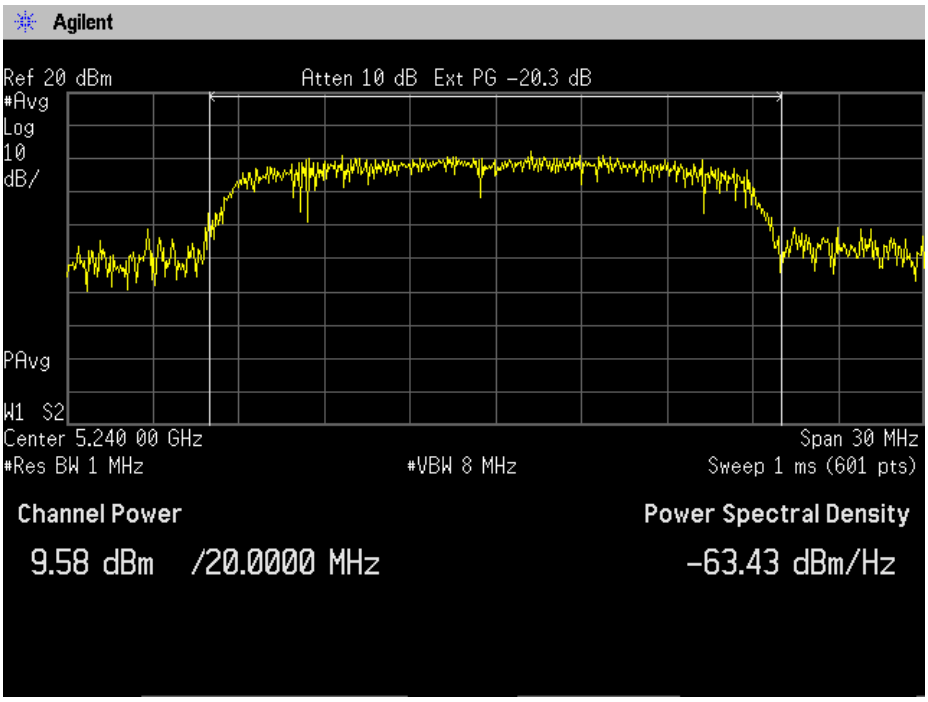
Tuned Frequency (MHz)	Mode of Operation	Measured Value (dBm)	Duty Cycle Corr.	Conducted Power (dBm)	Specification Limit	Result
5180	802.11 n	9.19	1.42	10.61	1 W (30 dBm)	Pass
5200	802.11 n	8.74	1.42	10.16	1 W (30 dBm)	Pass
5240	802.11 n	9.58	1.42	11.00	1 W (30 dBm)	Pass



Low Channel Output Power



Mid Channel Output Power



High Channel Output Power

Transmitter Power Spectral Density

Engineer: John Michalowicz
Test Date: 7/08/25

Test Requirements

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

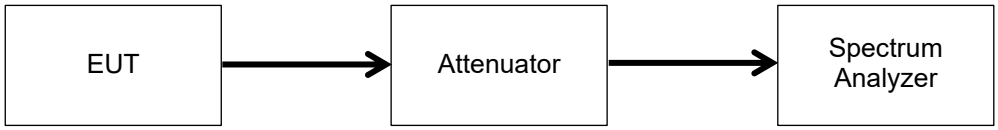
Test Procedure

The Power Spectral Density was measured using the method per SA-1 from KDB 789033 D02 General U-NII Test Procedures New Rules v01. Measurements were made at the low, mid, and high channels of the band. The maximum PSD was determine by finding the peak value across the carrier bandwidth.

The Spectrum Analyzer was set to the following:

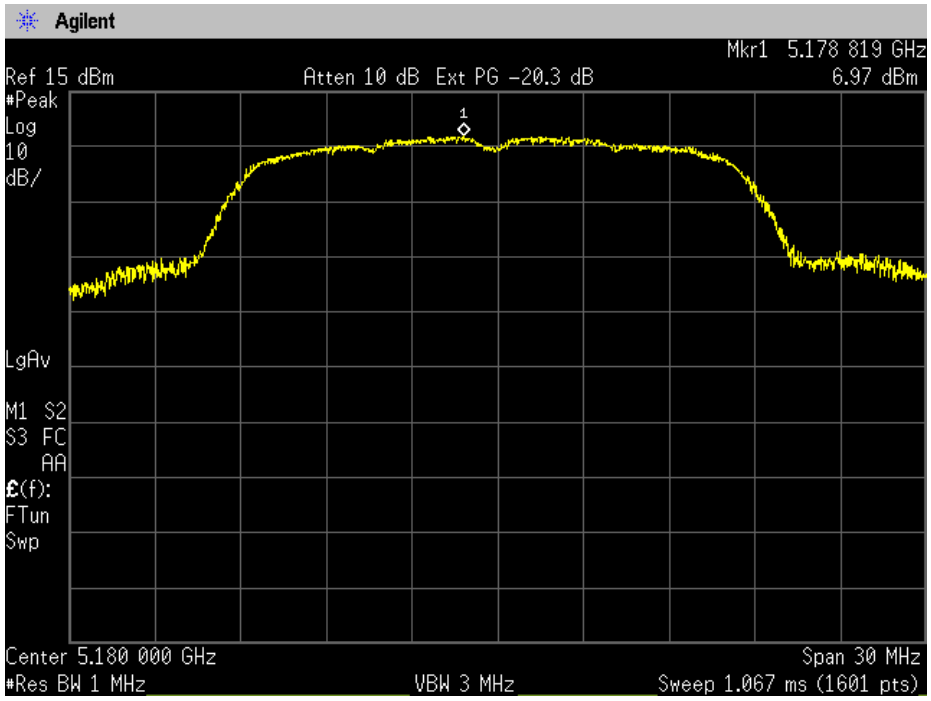
a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Span 1.5 * BW
d. Sweep time = auto
e. Detector = Peak

Test Setup

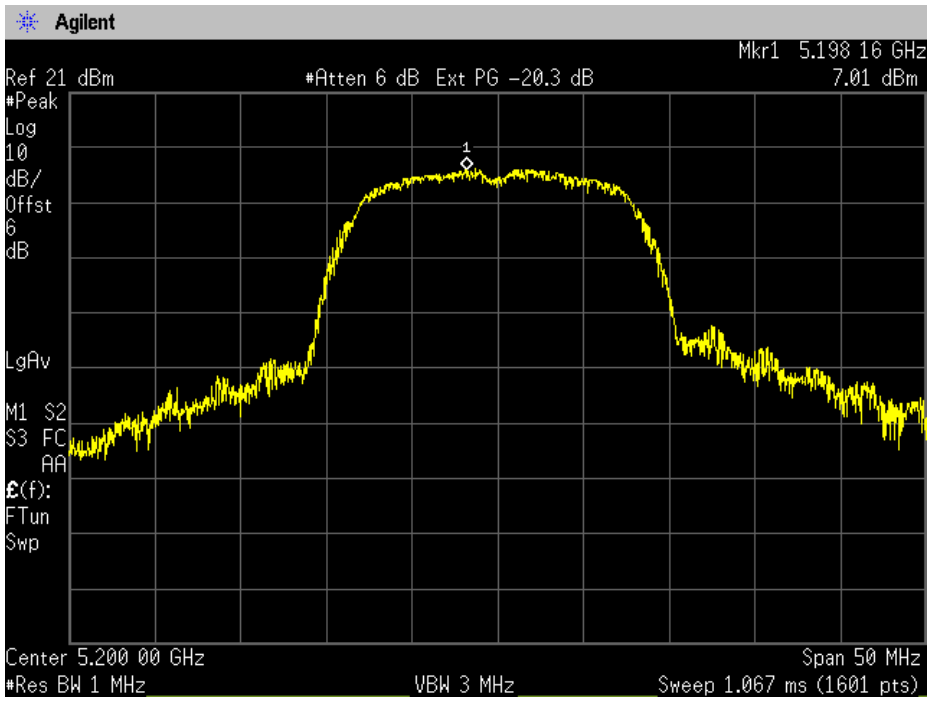


Test Results

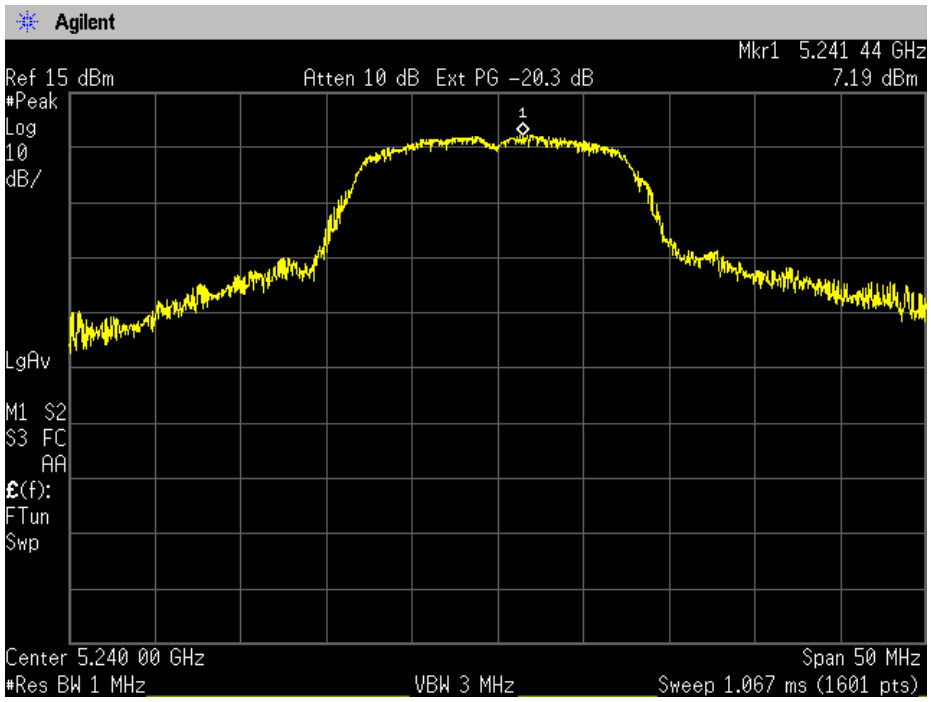
Tuned Frequency (MHz)	Mode of Operation	Measured Value (dBm)	Specification Limit	Result
5180	802.11 n	6.97	17 dBm	Pass
5200	802.11 n	7.01	17 dBm	Pass
5240	802.11 n	7.19	17 dBm	Pass



Low Channel PSD



Mid Channel PSD



High Channel PSD

Undesirable Emissions Conducted

Engineer: John Michalowicz
Test Date: 7/08/25

Test Requirements

Unwanted Emissions that fall Outside Restricted Bands

For transmitters operating in the 5.15-5.25 GHz band:

All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. As specified in § 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a maximum emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the peak and average limits of § 15.209 is not required to satisfy the -27 dBm/MHz maximum emission limit.

The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz

The provisions of §15.205 apply to intentional radiators operating under this section

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

For Conducted Unwanted Emissions in the Restricted Bands

For conducted measurements above 1000 MHz, EIRP was determined and then the field strength computed by the following:
E[dBµV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and d = 3m
E[dBµV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

Test Procedure

Per KDB 789033 D02 General U-NII Test Procedures New Rules v01 conducted RF port measurements were made in lieu of radiated. In addition, Cabinet Emissions measurements were performed in a semi-anechoic chamber with the antenna port terminated by a matching load. See additional section for Radiated Emissions.

The following criteria were addressed:

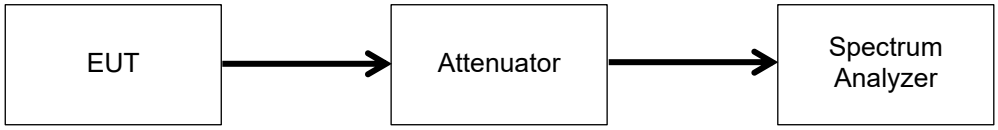
The Spectrum Analyzer was set to the following for emissions > 1000MHz:

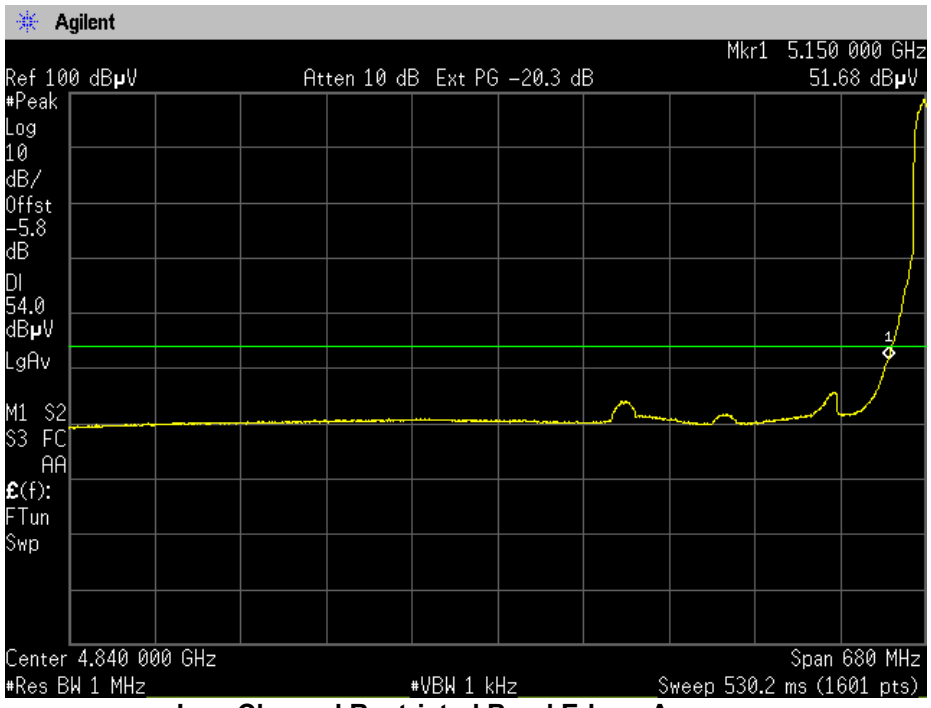
a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Detector = Peak.
d. Sweep time = auto
e. Trace mode = max hold
    1. Note: For emissions where the peak exceeded that of the average 15.209 emission limit the following was performed.
f. RBW = 1 MHz
g. VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10 Hz

For emissions below 1000MHz the Spectrum Analyzer settings were as follows:

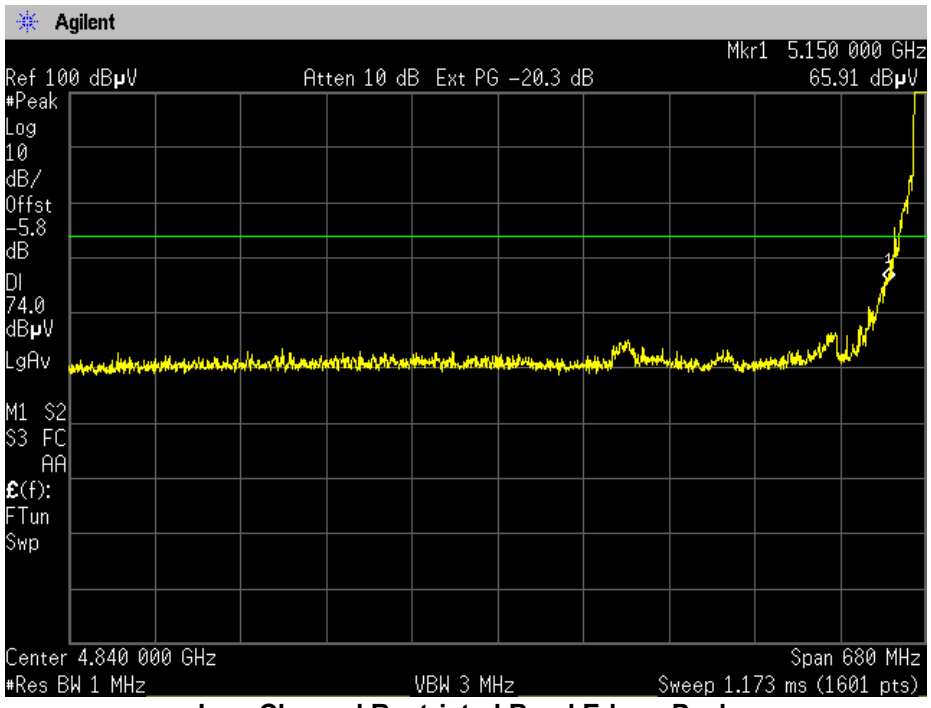
a. RBW = 100 kHz
b. VBW ≥ 300 kHz
c. Detector = Peak
d. Sweep time = auto
e. Trace mode = max hold

Test Setup

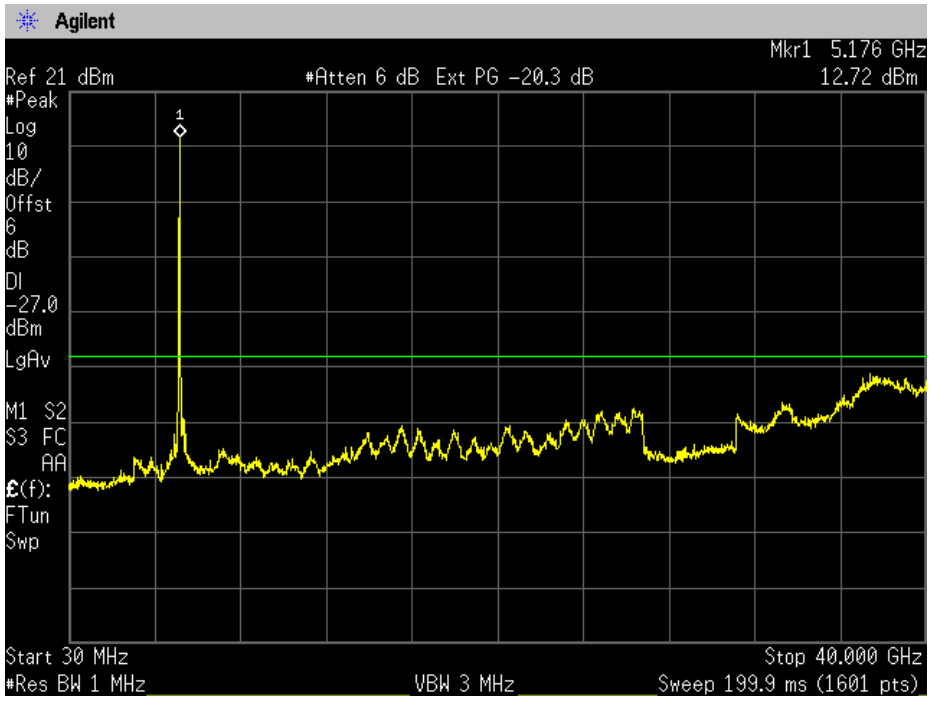




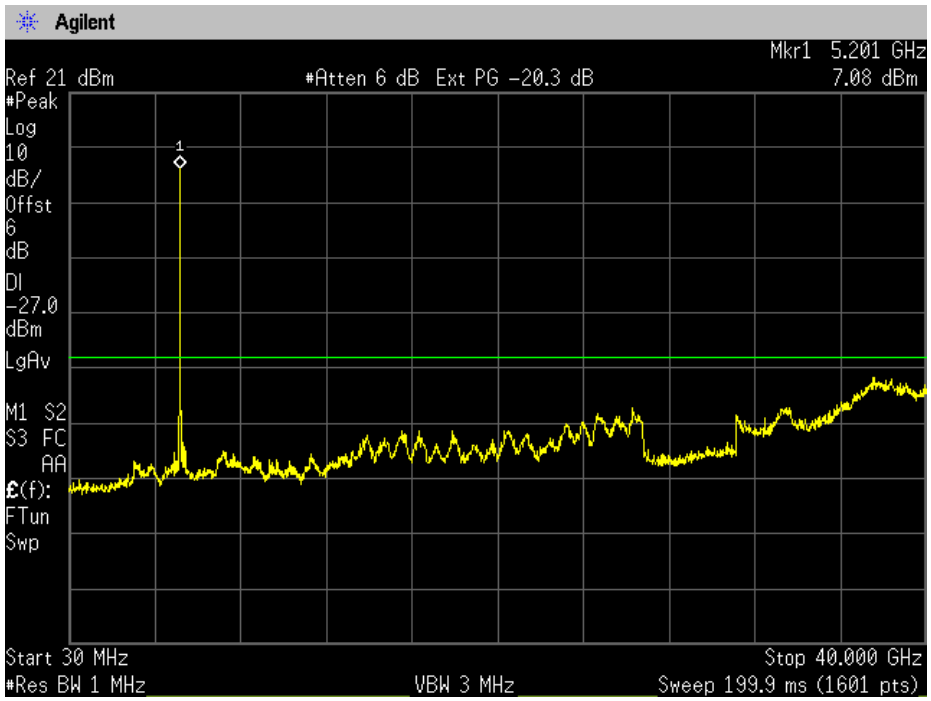
Low Channel Restricted Band Edge - Average



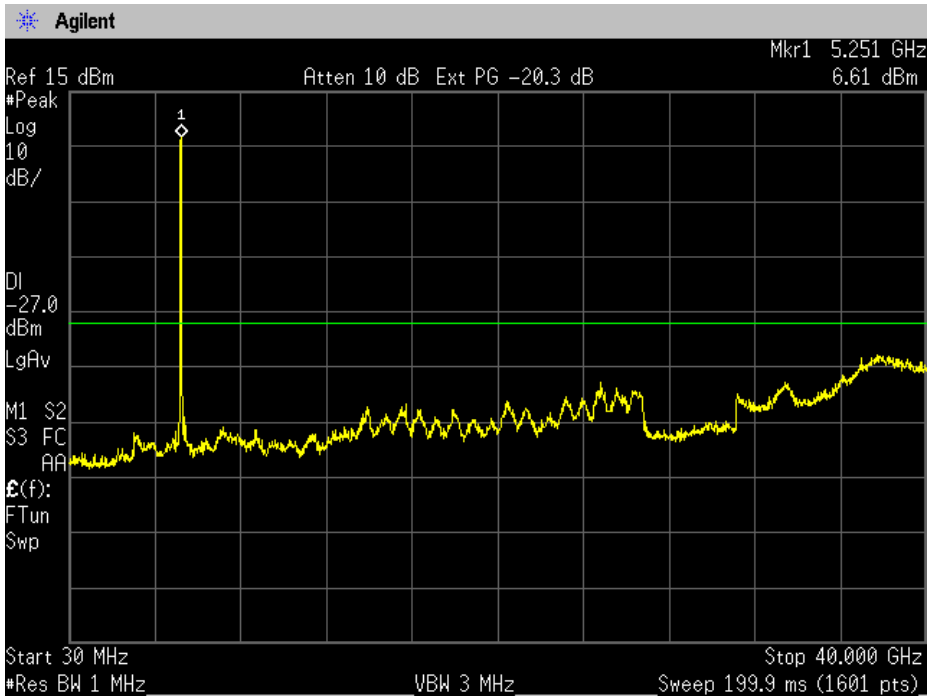
Low Channel Restricted Band Edge - Peak



Low Channel Conducted Spurious



Mid Channel Conducted Spurious



High Channel Conducted

Undesirable Emissions Radiated

Engineer: John Michalowicz
Test Date:7/12/25

Test Requirements

The provision of §15.209 were applied. In addition the requirements of §15.205 were also applied.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits

Frequency (MHz)	Frequency (microvolts/meter)	Frequency (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBµV/m) = 20 log E field strength (uV/m)

Test Procedure

The EUT was setup in accordance with ANSI C63.10. 2013 and tested per KDB 789033. The antenna was replaced with non-radiating matched load. The EUT is placed on non-conductive platform at a height of 0.8 meters above the ground plane of the semi-anechoic chambers. The EUT was rotated 360 degrees and the receive antenna raised and lowered to find the maximum emissions from 30MHz to the 10th harmonic of the fundamental. The EUT was set to the maximum power level allowed and the low, mid, and high channels were investigated for emissions.

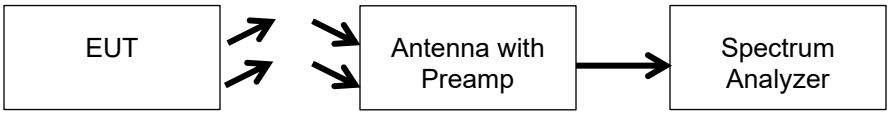
The Spectrum Analyzer was set to the following for emissions > 1000MHz:

a. (RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Detector = Peak
d. Sweep time = auto
e. Trace mode = max hold
    1. Note: For emissions where the peak exceeded that of the average 15.209 emission limit the following was performed.
f. RBW = 1 MHz
g. VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10Hz

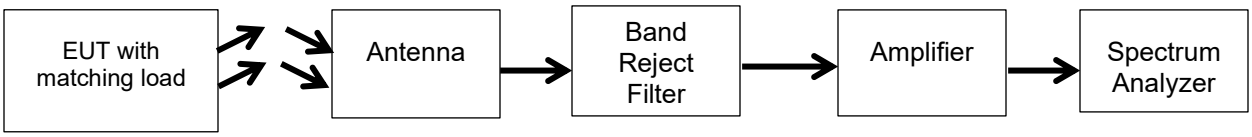
For emissions below 1000MHz the Spectrum Analyzer settings were as follows:

a. RBW = 100 kHz
b. VBW ≥ 300 kHz
c. Detector = Peak
d. Sweep time = auto
e. Trace mode = max hold
    1. Note: A quasi peak detector was used for emissions where the peak exceeded that of the average 15.209 emission limits

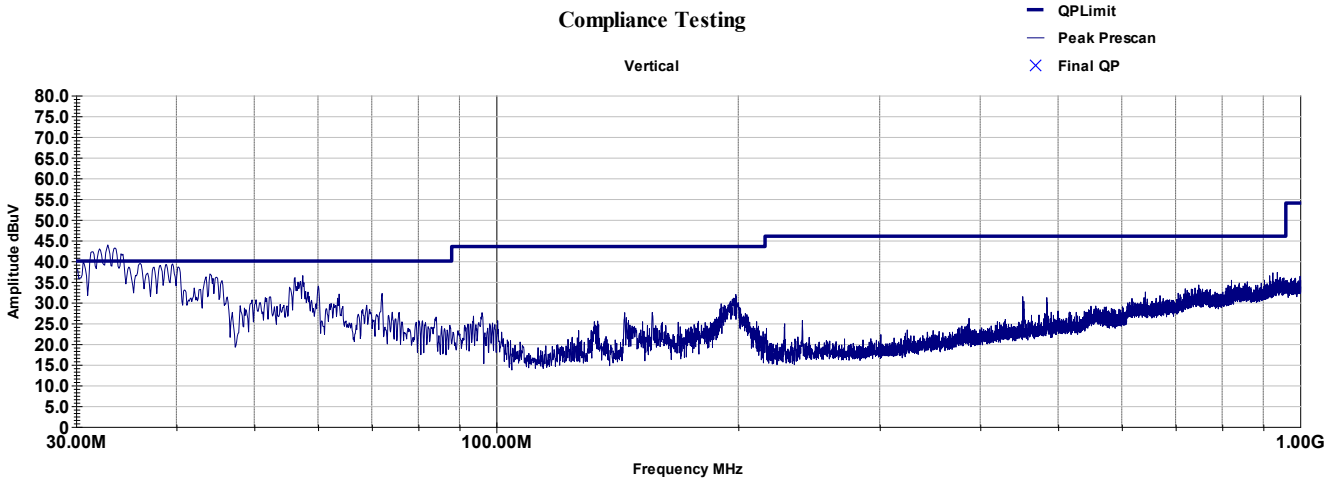
Test Setup below 1000MHz

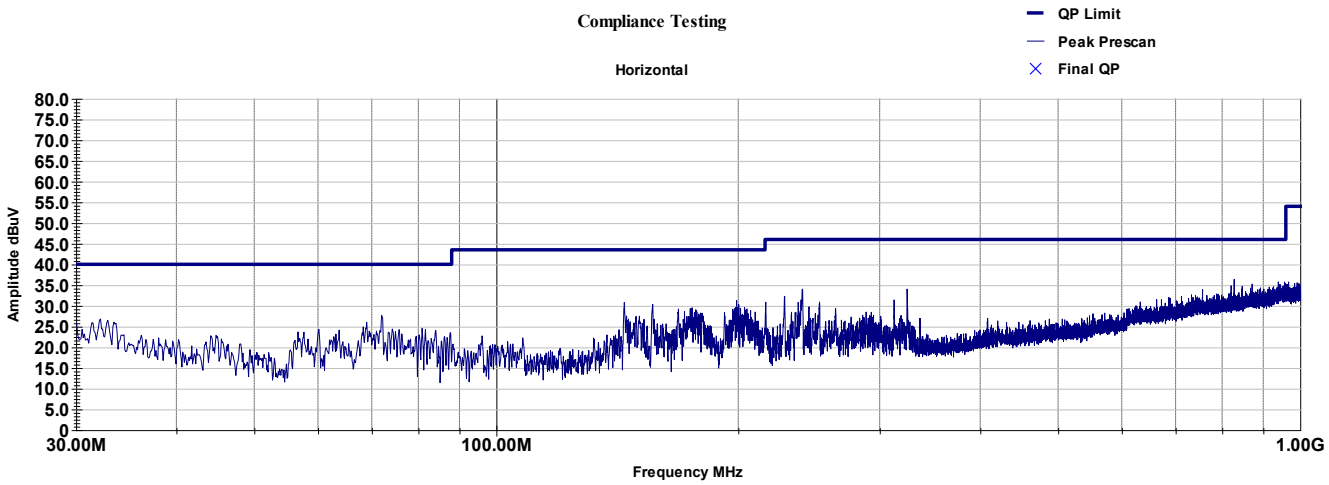


Test Setup above 1000MHz

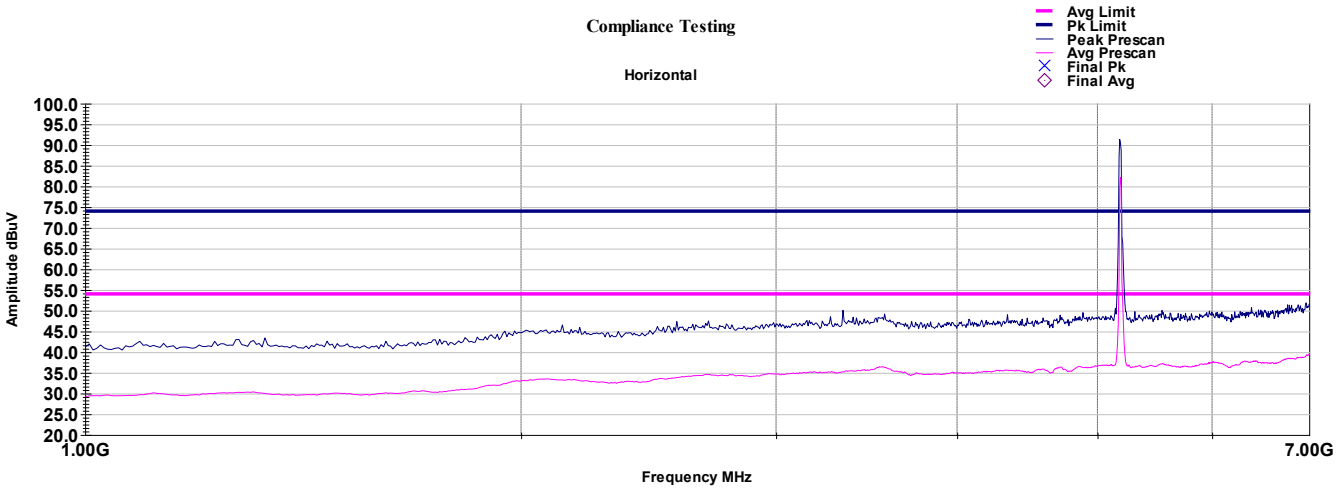


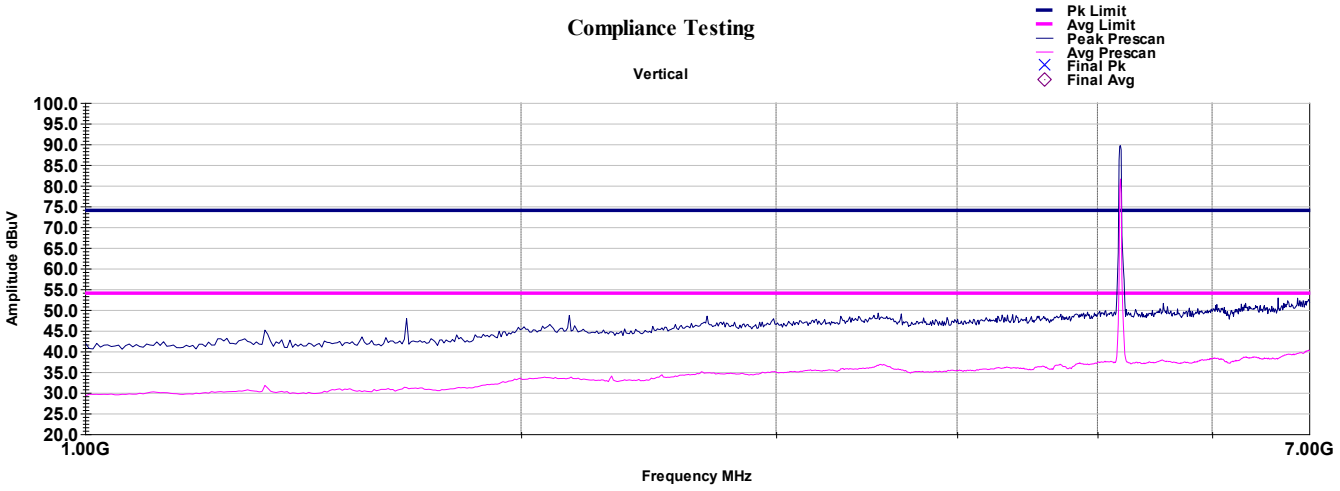
Low Channel 30 – 1000 MHz



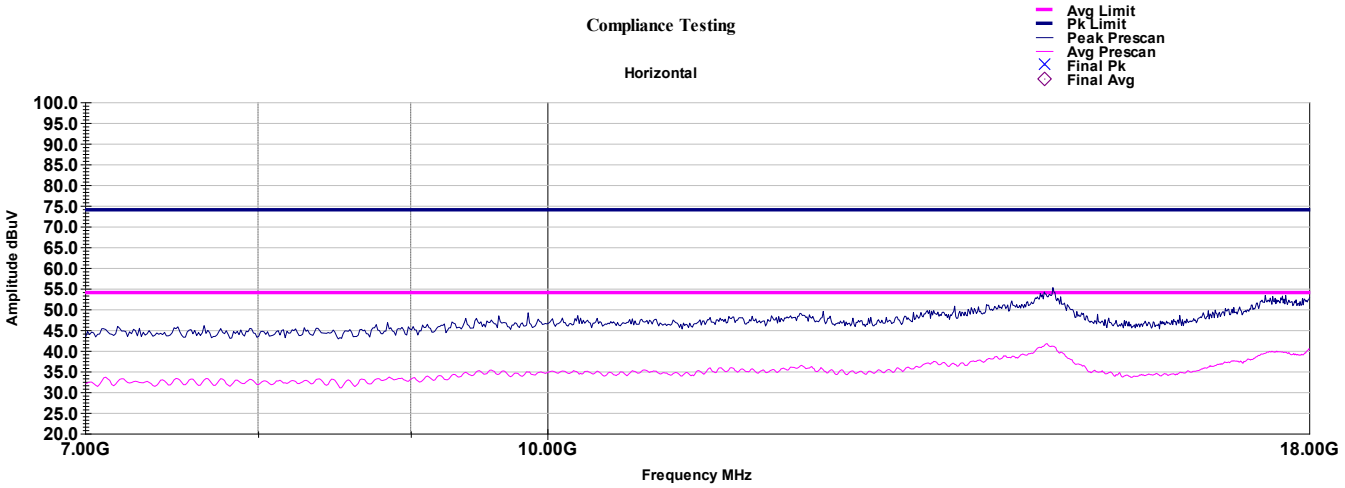


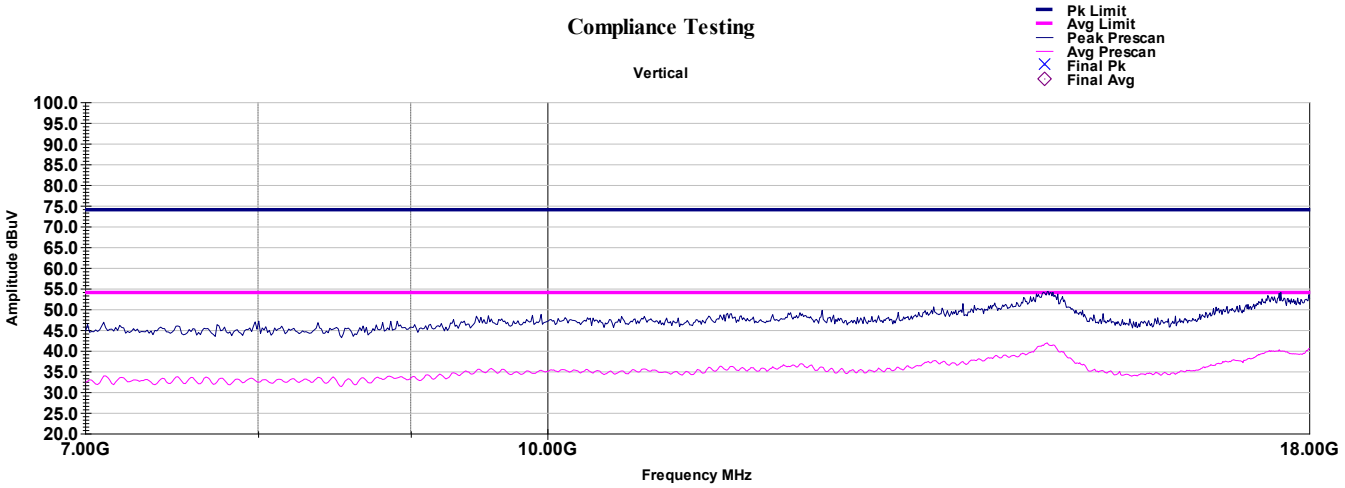
Low Channel 1 – 7 GHz



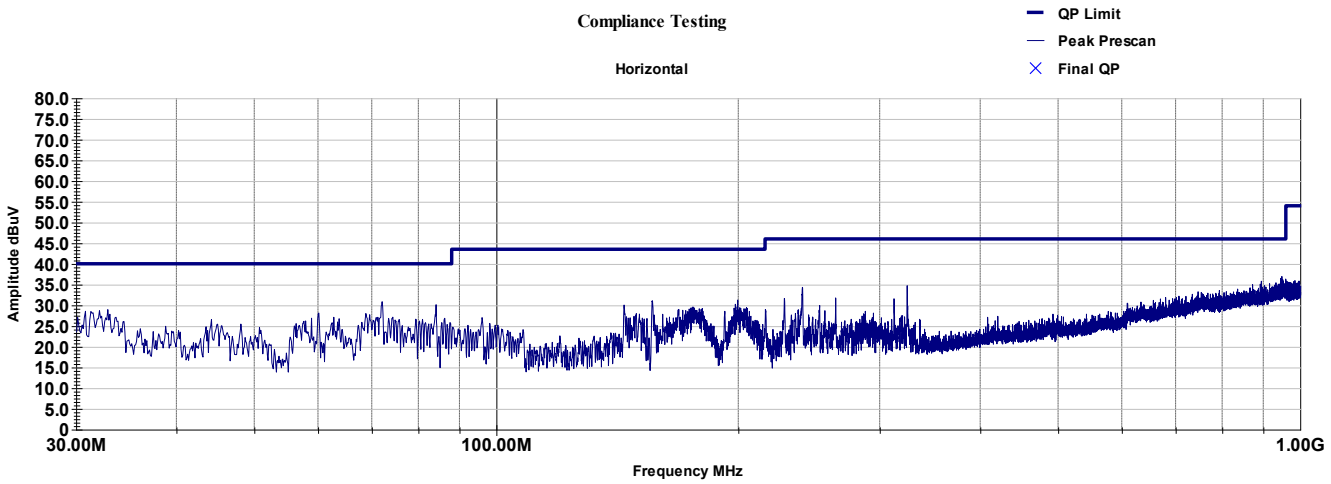


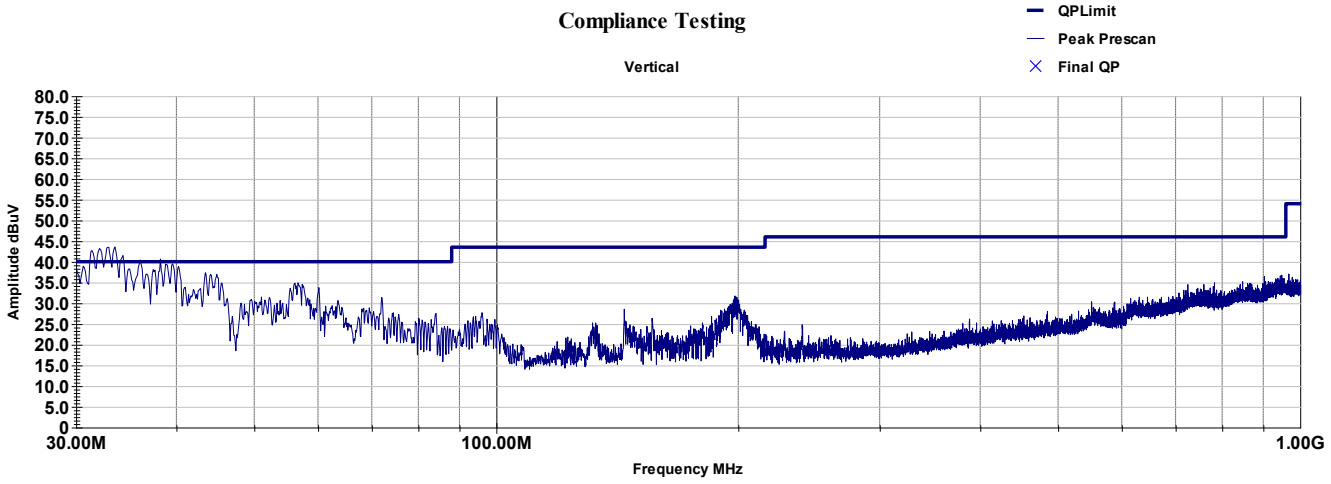
Low Channel 7 – 18 GHz



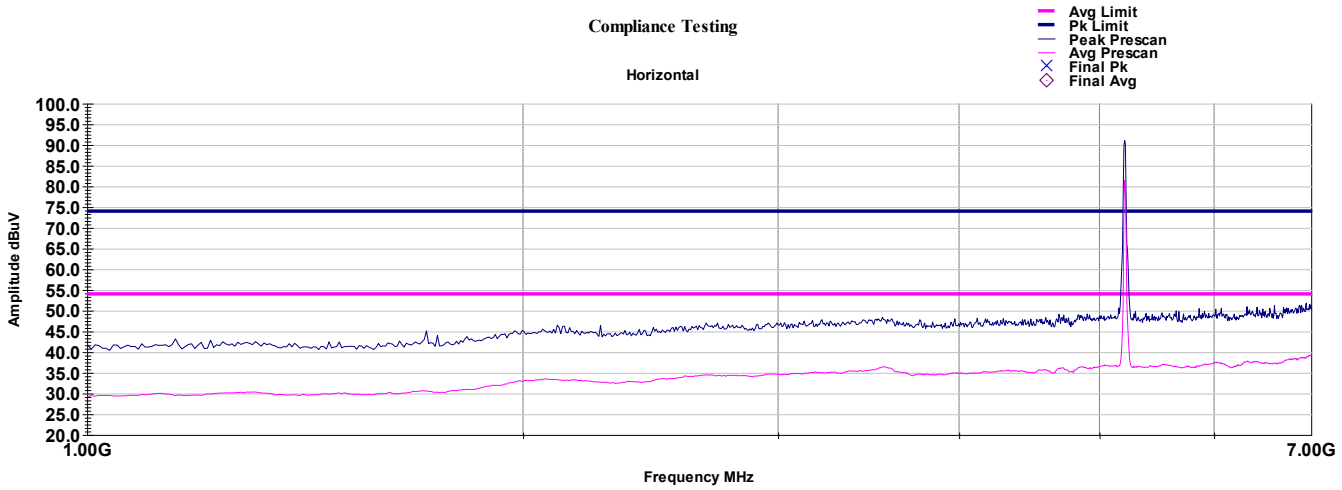


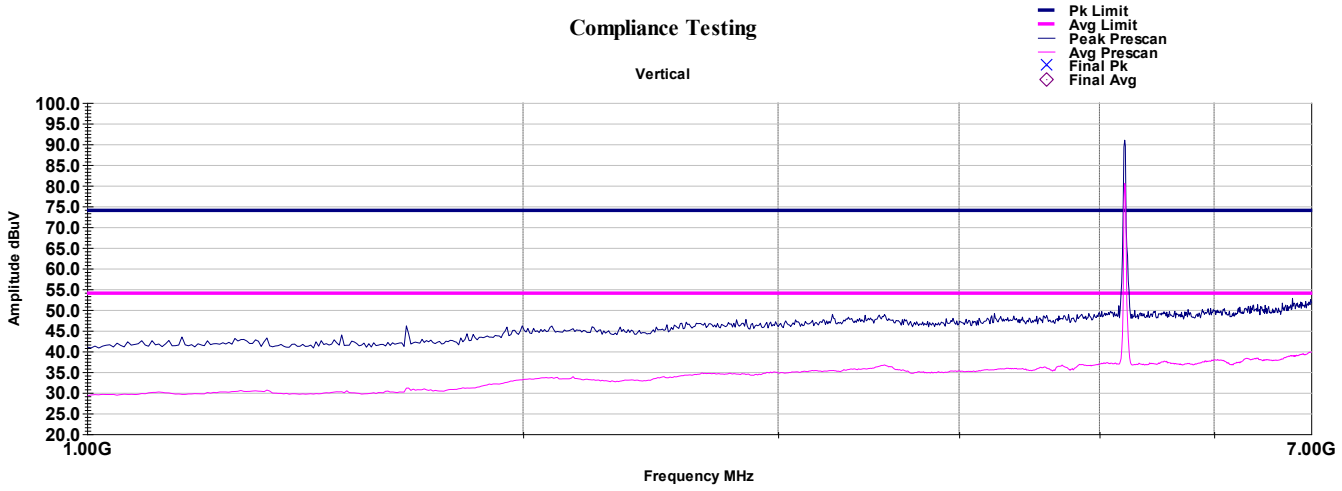
Mid Channel 30 -1000 MHz



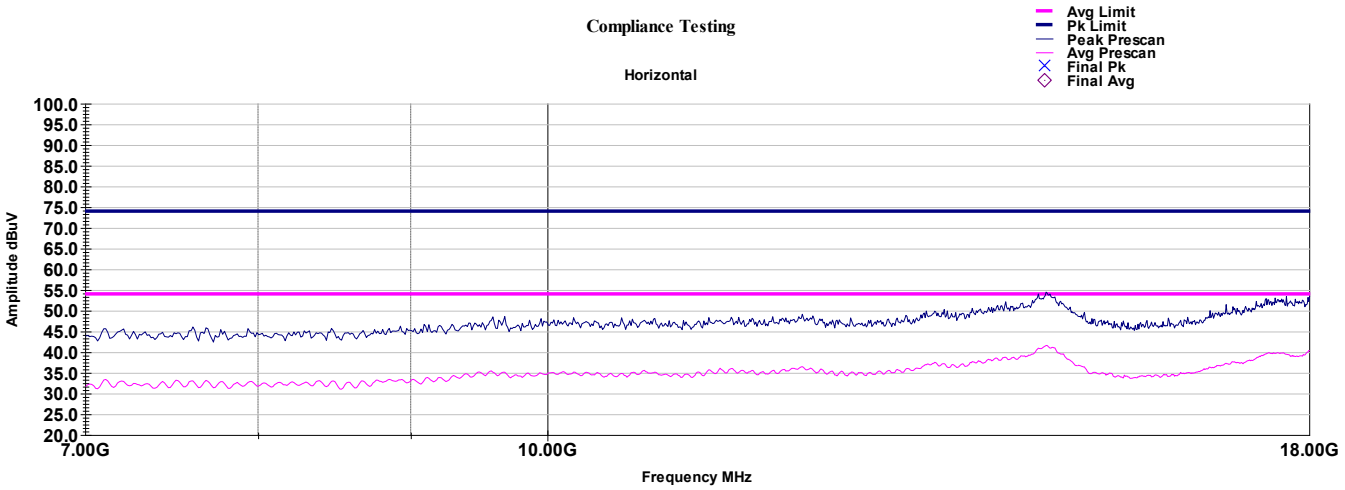


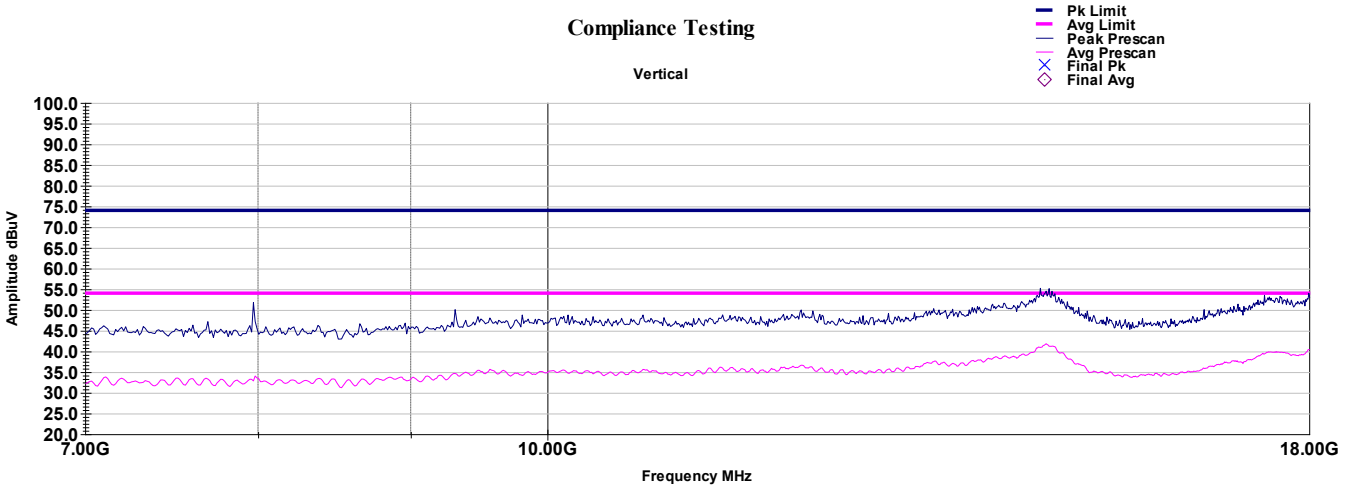
Mid Channel 1 – 7 GHz



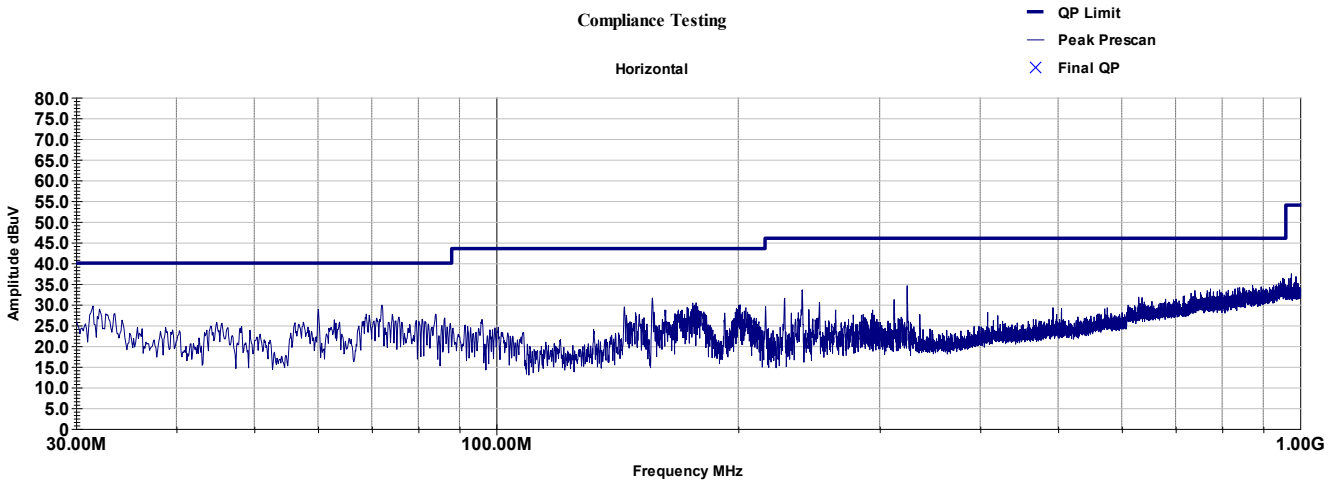


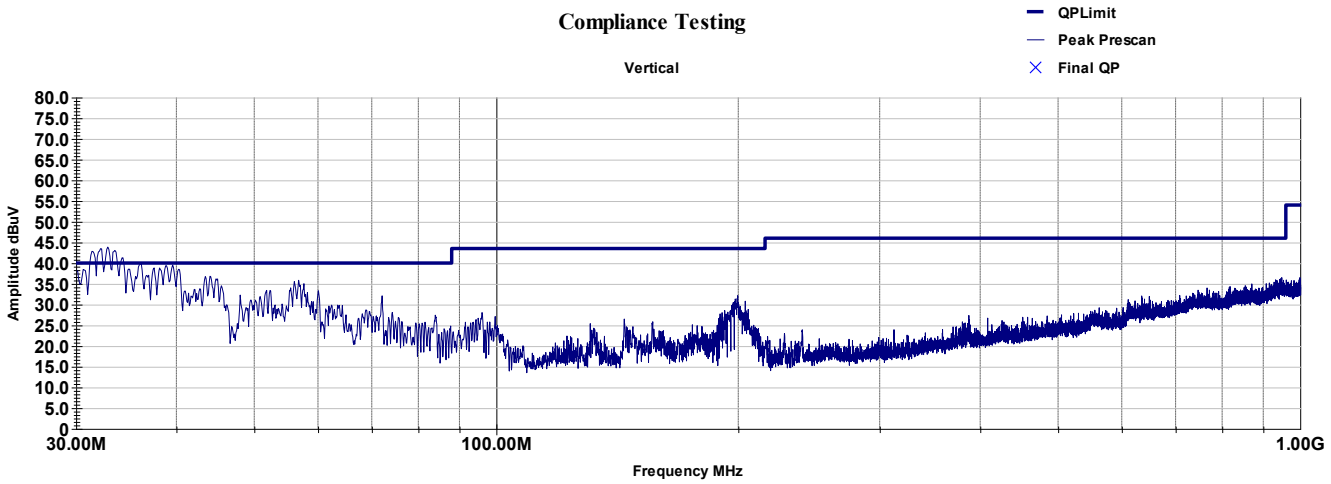
Mid Channel 7 – 18 GHz



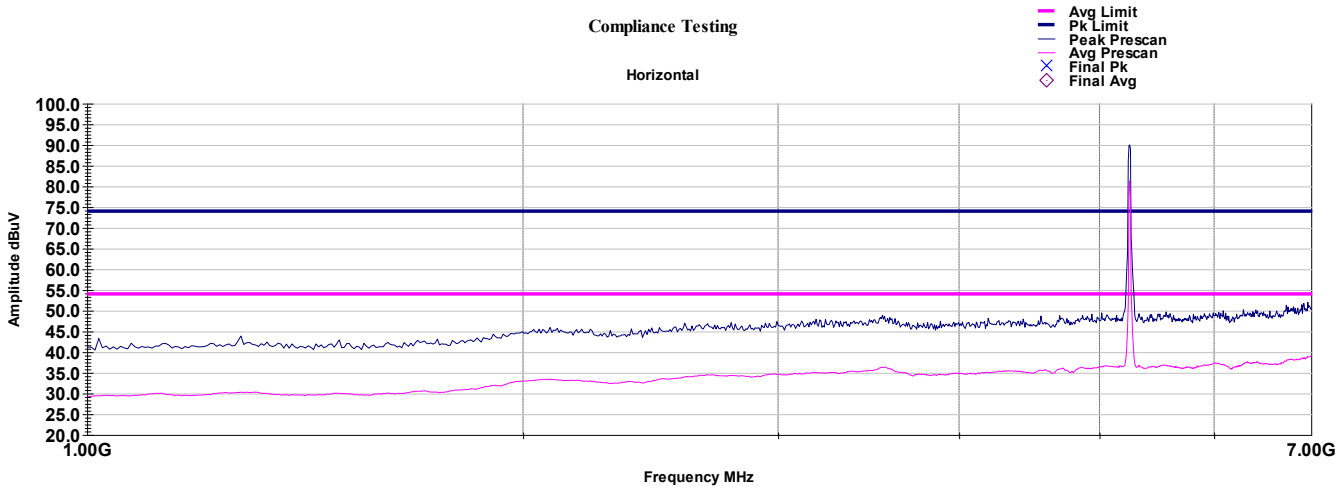


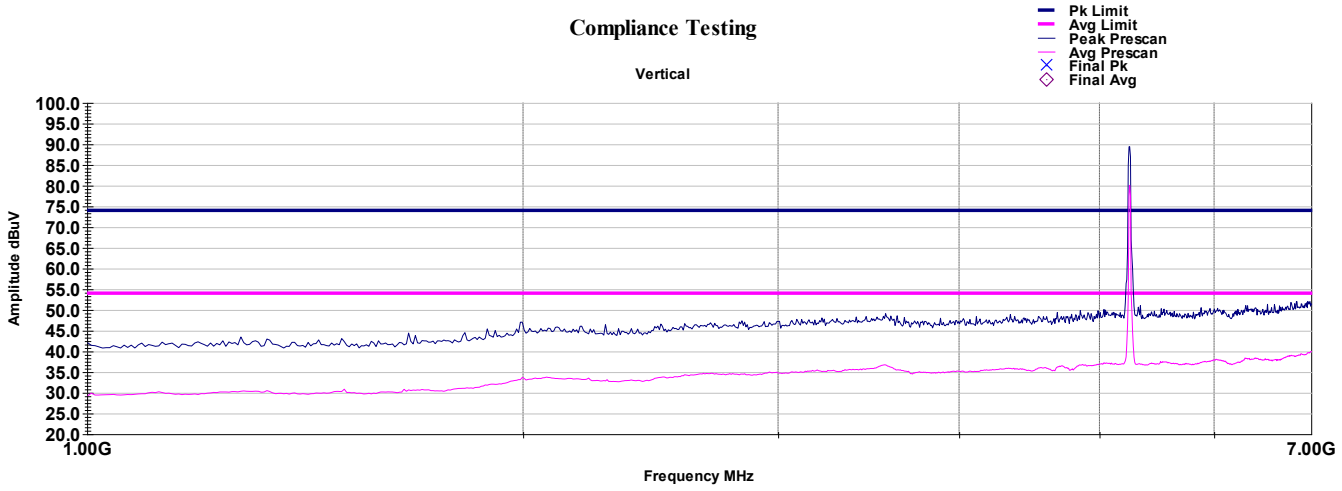
High Channel 30 -1000 MHz



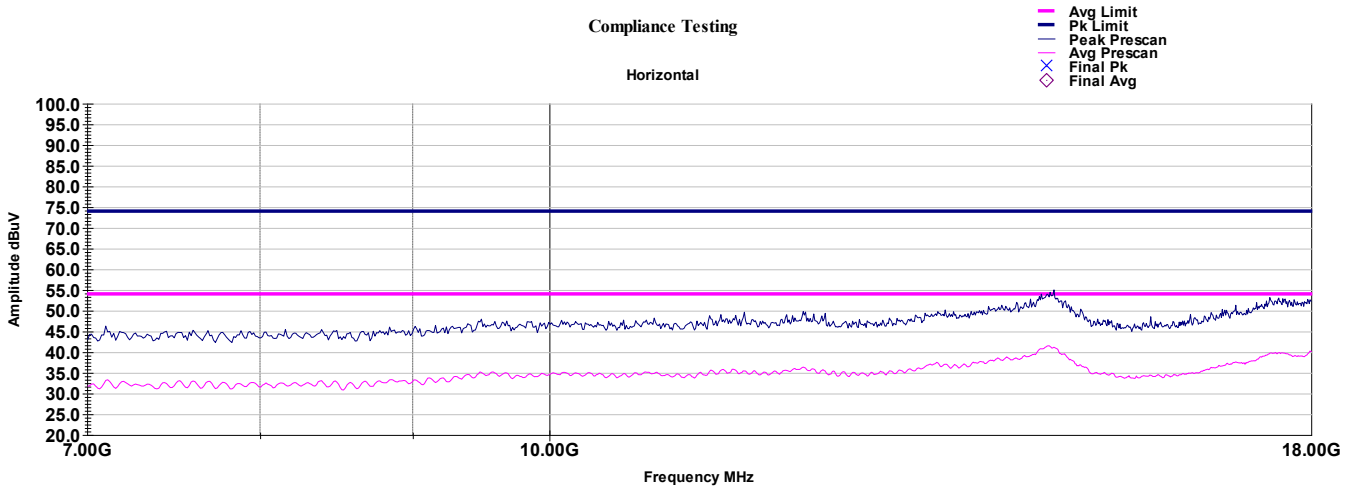


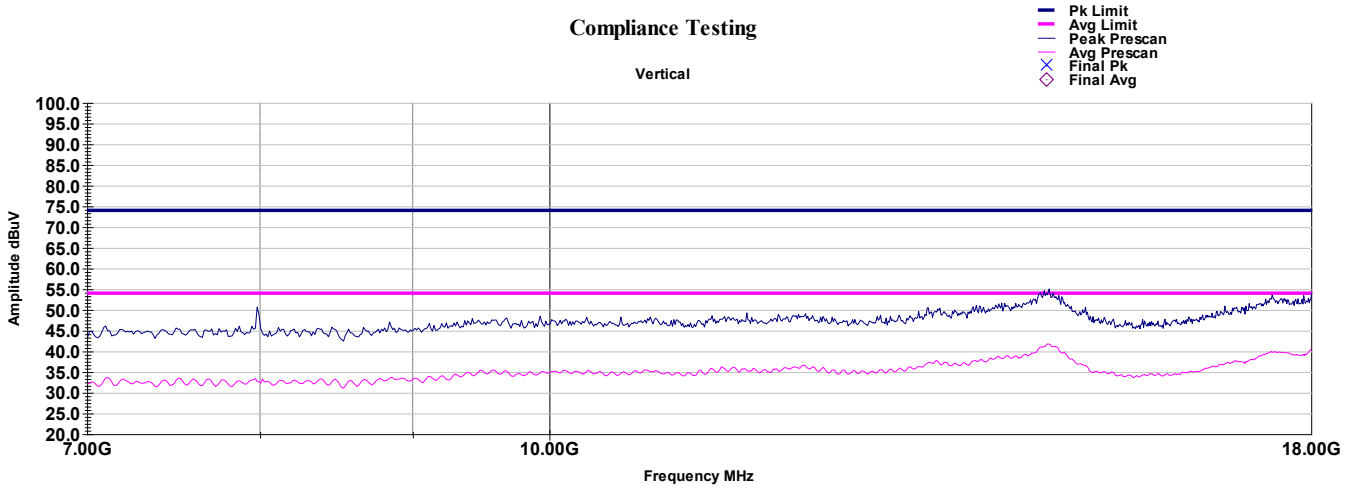
High Channel 1 – 7 GHz



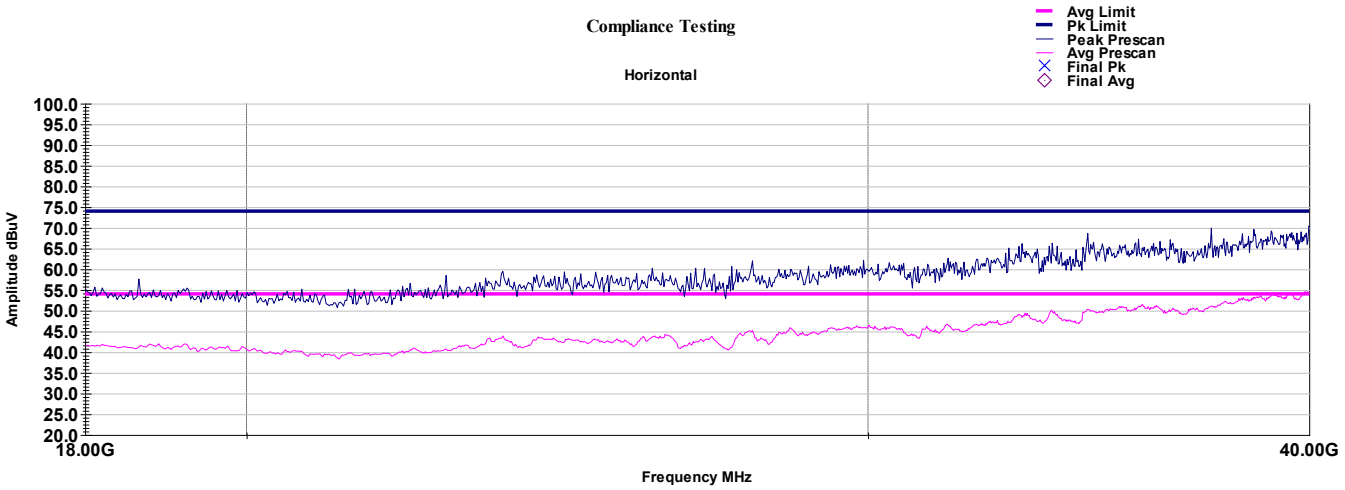


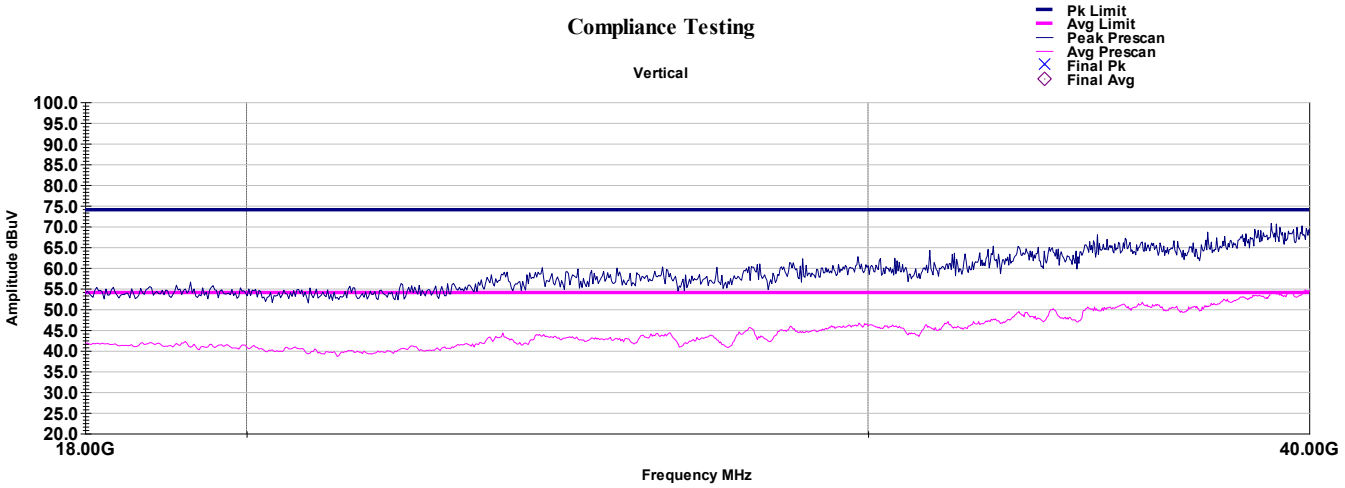
High Channel 7 – 18 GHz





Spurious Emissions above 18 GHz yielded zero emissions





Occupied Bandwidth

Engineer: John Michalowicz
Test Date: 7/08/25

Test Requirement

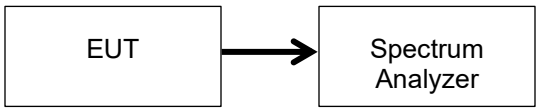
The emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement

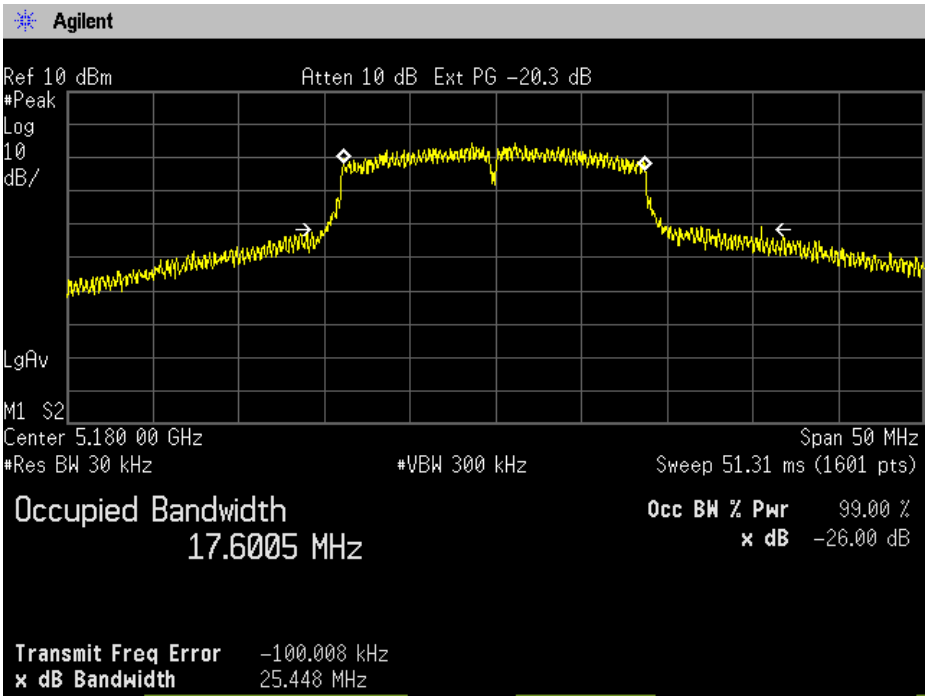
Test Procedure

The Spectrum Analyzer was set to the following parameters:

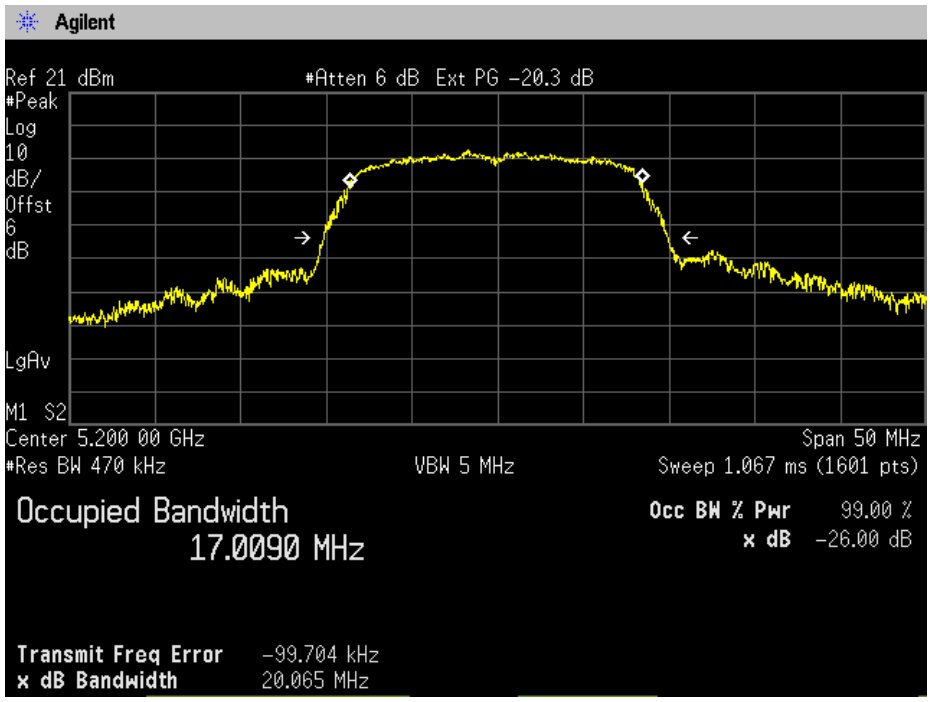
a. RBW = approximately 1% of the emission bandwidth.
b. VBW > RBW.
c. Detector = Peak.
d. Trace mode = max hold.

Test Setup

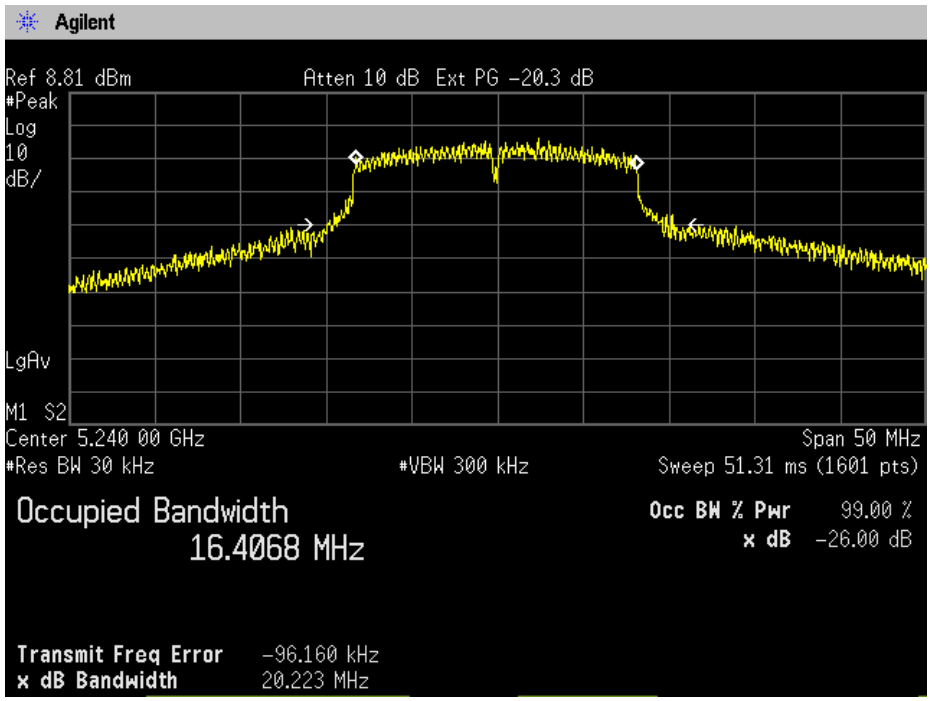




Low Channel OCBW



Mid Channel OCBW



High Channel OCBW

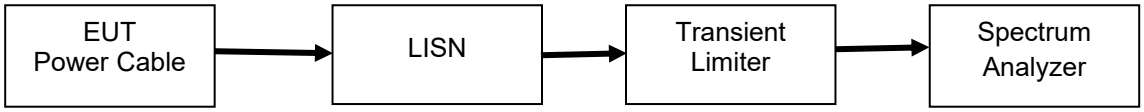
A/C Powerline Conducted Emission

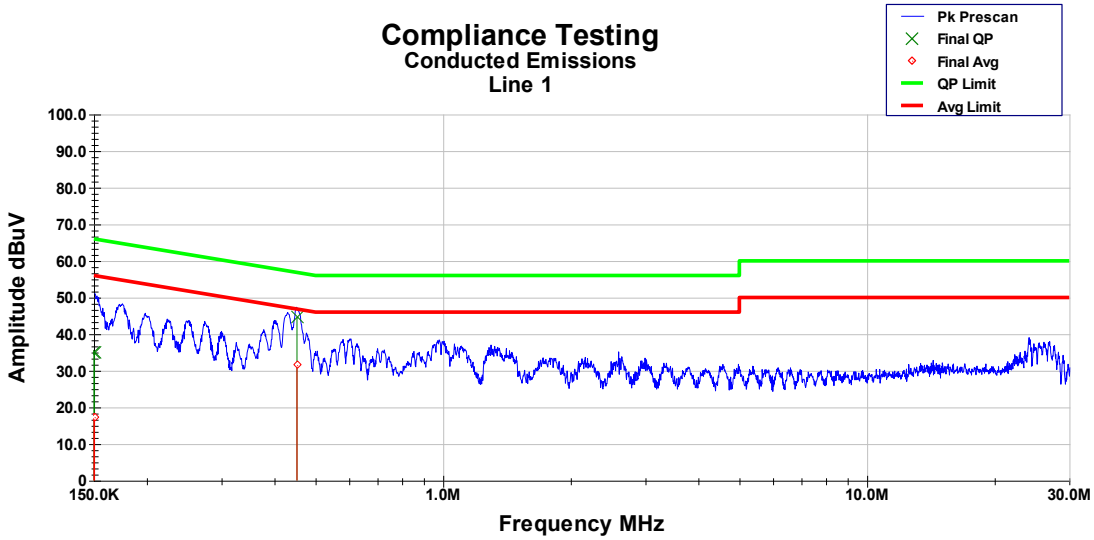
Engineer: John Michalowicz
Test Date: 7/22/25

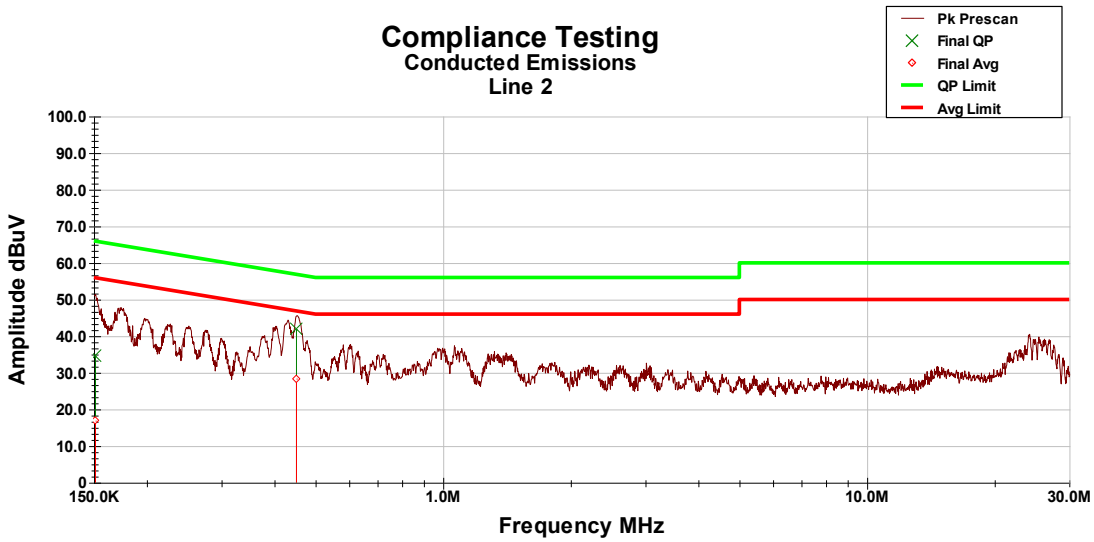
Test Procedure

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Test Setup







Peak emissions are below the average and quasi-peak limits

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna (18-40GHz)	EMCO	3116	i00085	3/18/25	3/18/27
Temp./humidity/pressure monitor (Main Lab)	Omega Engineering	iBTHX-W-5	i00686	1/25/25	1/25/26
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/13/23	7/13/26
44GHz EMI receiver	Keysight	N9038A	i00552	3/17/25	3/17/26
PSA Spectrum Analyzer	Agilent	E4448A	i00688	10/26/24	10/26/25
Bi-Log antenna	Chase	CBL6111C	i00267	3/5/24	3/5/26
Horn Antenna (1-18GHz)	ARA	DRG-118/A	i00271	8/9/24	8/9/26
Preamplifier	COM-Power	PAM-103	i00734	Verified on: 6/27/24	
Preamplifier	Eravant	SBB-0115034019-2F2F-E3	i00722	Verified on: 12/4/24	
EMI Receiver	HP	85462A	i00033	6/25/25	6/25/26
Transient Limiter	Com-Power	LIT-153	i00123	Verified on: PTV	
AC Power Source	Behlman	BL 6000	i00362	NCR	
LISN	COM-Power	LI-125A	i00446	3/18/24	3/18/26
LISN	COM-Power	LI-125A	i00448	3/18/24	3/18/26

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

Measurement Uncertainty

Measurement Uncertainty (U_{lab}) for Compliance Testing is listed in the table below.

Measurement	U_{lab}
Radio Frequency	± 3.3 x 10^{-8}
RF Power, conducted	± 1.5 dB
RF Power Density, conducted	± 1.0 dB
Conducted Emissions	± 1.8 dB
Radiated Emissions	± 4.5 dB
Temperature	± 1.5 deg C
Humidity	± 4.3 %
DC voltage	± 0.20 VDC
AC Voltage	± 1.2 VAC

The reported expanded uncertainty +/- U_{lab}(dB) has been estimated at a 95% confidence level (k=2)

U_{lab} is less than or equal to U_{ETSI} therefore

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance limit

END OF TEST REPORT