

Testing Tomorrow's Technology

Class 2 Permissive Change Application

For

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and 15.247

And

**Innovation, Science, and Economic Development Canada
Certification Per
RSS-Gen (I5) General Requirements for Radio Apparatus
And
RSS-247 (I4) Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices**

For the

Murata Electronics North America, Inc.

Model: WIT2420

FCC ID: HSW-2420

IC: 4492A-2420

UST Project: 26-0013

Issue Date: March 9, 2026

Total Pages in This Report : 51

**3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
www.ustech-lab.com**



Testing Tomorrow's Technology

I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible for Test):

By: Alan Ghasiani

Name: Alan Ghasiani

Title: Compliance Engineer – President

Date March 9, 2026



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MEASUREMENT TECHNICAL REPORT

COMPANYS NAME: Murata Electronics North America, Inc.

MODEL: WIT2420

FCC ID: HSW-2420

IC: 4492A-2420

DATE: March 9, 2026

This report concerns (check one): ☒Original grant ☐Class II change

Equipment type: 2.4 GHz ISM Radio Transceiver

Technical: FHSS modulation
2401.6896 – 2469.888 MHz (Channels 1-11)
Type of modulation: GFSK
Data/Bit Rate: 460
Antenna Gain: Refer to Table 4
Maximum Output Power: +17.83 dBm (Measured)
Software used to program EUT: Wincom 3.11
EUT firmware number: WIT2420 v5.59
Power setting: EUT is rated +18 dBm max

☒ **Disclaimer (check if applicable):**

Unless otherwise noted, the information presented in this section has been provided by the client and is assumed to be accurate and complete. All calculations, assessments, and conclusions herein are based on the client-supplied data. The testing laboratory has not independently verified this information and shall not be held responsible for any inaccuracies or omissions in the client-provided content.

Report prepared by:	US Tech 3505 Francis Circle Alpharetta, GA 30004 FCC Lab Designation#: US3501 CANADA Lab Code: 9000A-1, CAB ID: US0031
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1. General Information

1.1. Purpose of this Report

This report is prepared as a means of showing continued compliance with FCC Rules and Regulations Part 15, Section 247 and ISSED Radio Standards Specification RSS 247 Issue 4. The changes made to the EUT are made because of discontinued parts and the following items were affected.

- Bandpass filter: Replace with new bandpass with Johanson Technology p/n: 2450LP15A0050001E
- Lowpass filter: Replace with new lowpass filter with Murata Electronic p/n: LFB2H2G45CC1D005

Based on the changes identified above the following test were performed to show that the device continues to meet the requirements:

- Fundamental and harmonic emissions
- Spurious emissions and restricted band emissions.

1.2. Characterization of Test Sample

The sample used for testing was received by US Tech on March 2, 2026 in good operating condition.

1.3. Product Description

The Equipment under Test (EUT) is the Murata, Model: WIT2420. The EUT is a frequency hopping, wireless transceiver designed for industrial monitoring and control applications.

1.4. Configuration of Tested System

The Test Sample was tested per *ANSI C63.10:2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices* for the intentional radiator aspect of the device and *ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2014)* for the unintentional radiator aspect of the device as well as FCC subpart B and C of Part 15 and per FCC KDB Publication number 558074 v05r02 for Digital Transmission Systems Operating Under section 15.247.

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Digital RF conducted and radiated emissions data below 1 GHz were taken with the measuring receiver (or spectrum analyzer's) resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements performed above 1.0 GHz were made with a RBW of 1 MHz. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was set to 3 times the RBW or as required per the standard throughout the evaluation process.

A list of EUT and Peripherals is found in Table 1. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are provided in separate exhibits.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	REMARKS	CABLES P/D
Murata Electronics North America, Inc. (EUT)	WIT2420	00F93E	FCC ID: HSW- 2420 IC: 4492A-2420	P/D
Antenna See antenna details	--	--	--	--
Acer/ Laptop Peripheral	N18Q13	NXABRAA00715206E8E7600	Contains FCC ID: RAS- MT7921 IC: 7452AMT7921	P/D
Delta Electronics / Laptop charger Peripheral	ADP- 45FE f	44MW1AGOFEF	None	P
Amazon / Mouse Peripheral	HM5129	B005EJH6RW	None	P/D

U= Unshielded S= Shielded P= Power D= Data

1.5. Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is 186022. Additionally, this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

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1.6. Related Submittals

1.6.1. The EUT is subject to the following FCC authorizations:

- a) Certification under section 15.247 as a transmitter.

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2. Tests and Measurements

2.1. Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are indicated.

Table 2. Test Instruments

TEST INSTRUMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	DATE OF LAST CALIBRATION
Spectrum Analyzer	Agilent Technologies Inc	E4440A	MY45304803	09/04/2027 2yr.
Biconical Antenna	EMCO	3110B	9307-1431	02/24/2027 2yr.
Log periodic Antenna	EMCO	3146	9110-3236	11/15/2026 2yr.
Horn Antenna	A. H. SYSTEMS	SAS-571	605	03/18/2027 2yr.
LF Pre-Amplifier	Hewlett-Packard	8447D	1937A01611	3/4/2026
HF Pre-Amplifier	Hewlett-Packard	8449B	3008A01275	2/12/2027
RF Cable	US Tech	LMR400	N/A	3/12/2026
RF Cable	US Tech	LMR 400	N/A	7/7/2026
RF Cable	Pasternack	PE300-24	1226	7/7/2026
RF Cable	US TECH	ULC-3F-T-SM-SM	2146	1/14/2027
RF Cable	Time Microwave Systems	LMR400	19424	2/13/2027
RF Cable	Time Microwave Systems	LMR400	N/A	1/14/2027
RF Cable	US Tech	None	None	7/17/2026
Attenuator	PE	47-20	59078	2/12/2027
Attenuator	Mini circuits	VAT-8 15542	30519	8/13/2026

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

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2.2. Modifications to EUT Hardware

No modifications were made by US Tech to bring the EUT into compliance with FCC Part 15.247 or IC RSS-210 requirements.

2.3. Number of Measurements for Intentional Radiators (15.31(m), RSS-Gen 6.9)

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 below.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates at 2401.69 MHz to 2469.89 MHz, three test frequencies were used.

2.4. Frequency Range of Radiated Measurements (Part 15.33, RSS-GEN 6.13)

2.4.1. Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2. Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to the range specified in 2.4.1 above, whichever is the higher range of investigation.

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2.5. Measurement Detector Function and Bandwidth (CFR 15.35, RSS-Gen 6.10, 6.13)

The radiated and conducted emissions limits shown herein are based on the following:

2.5.1. Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2. Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3. Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB.

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG) the duty cycle factor calculated will be applied.

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2.6. Transmitter Duty Cycle (CFR 35(c))

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB. The Duty Cycle declared by the manufacturer is as follows:

The maximum time a WIT2420 can transmit on a single channel is:

$$280 \text{ bytes} * 8 \text{ bits/byte} * (1/460.8 \text{ Kbps}) = 4.86 \text{ ms}$$

A WIT2420 (in any configuration or operating condition) can never transmit more than 4.86 ms during a single hop. The minimum hop duration (time on a given channel) for this maximum transmit time is 6.94 ms. Given that we have 75 channels in our hop set, it takes 521 ms to go through the entire hop table and repeat a transmission on the same channel. Therefore, the WIT2420 can only transmit for 4.86 ms on any given channel over a 100 ms period.

The transmission duty cycle correction factor is then calculated as:

$$20 * \log (4.86\text{ms}/100\text{ms}) = -26.3 \text{ dB.}$$

For the purposes of this report a duty cycle correction factor will be -20 dB.

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2.7. EUT Antenna Requirements (CFR 15.203, RSS-Gen 6.7)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB _i	TYPE OF CONNECTOR
Patch	Murata	Patch	PA200	+6.0	MMCX
Corner Reflector	Mobilemark	Corner Reflector	SCR-2400-WHT	+9.0	Reverse N-Type
Dipole	Nearson	Dipole	S181XX-2150S	+2.0	Reverse SMA

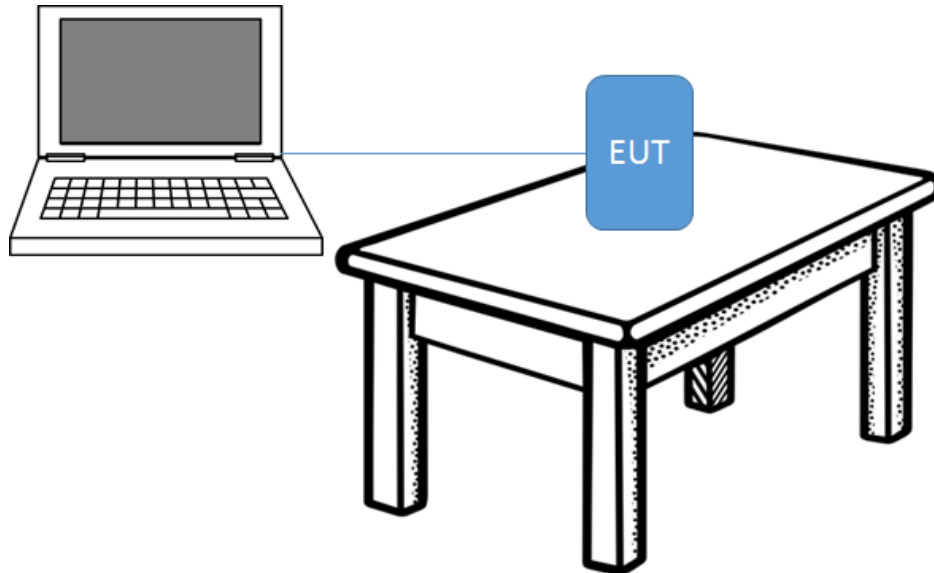


Figure 1. Test Configuration

Note: Laptop PC and evaluation board are not part of the EUT. They are peripheral devices used for programming the EUT.

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2.8. Restricted Bands of Operation (Part 15.205, RSS-Gen 8.10)

Only spurious emissions can fall in the frequency bands of CFR 15.205 and RSS-Gen 8.10. The field strength of these spurious cannot exceed the limits of 15.209 and RSS-Gen 8.9. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.10.

2.9. Antenna Conducted Intentional and Spurious Emissions (CFR 15.209, 15.247(d)), RSS-247, 6.6)

The EUT was put into a continuous-transmit mode of operation and tested per ANSI C63.10-2013 for conducted out of band emissions emanating from the antenna port over the frequency range of 30 MHz to ten times the highest clock frequency generate or used in this case, 25 GHz. A conducted scan was performed on the EUT to identify and record spurious signals that were related to the transmitter. Antenna Conducted Emissions of a significant magnitude that fell within restricted bands were then measured as radiated emissions in the EMC Chamber. The conducted emissions graphs are found in the figures below. The limit for antenna conducted power is 1 Watt (30 dBm) per 15.247 (b)(3).

For Conducted RF antenna tests, the RBW was set to 100 kHz, video bandwidth (VBW) > RBW, scan up through the 10th harmonic of the fundamental frequency. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

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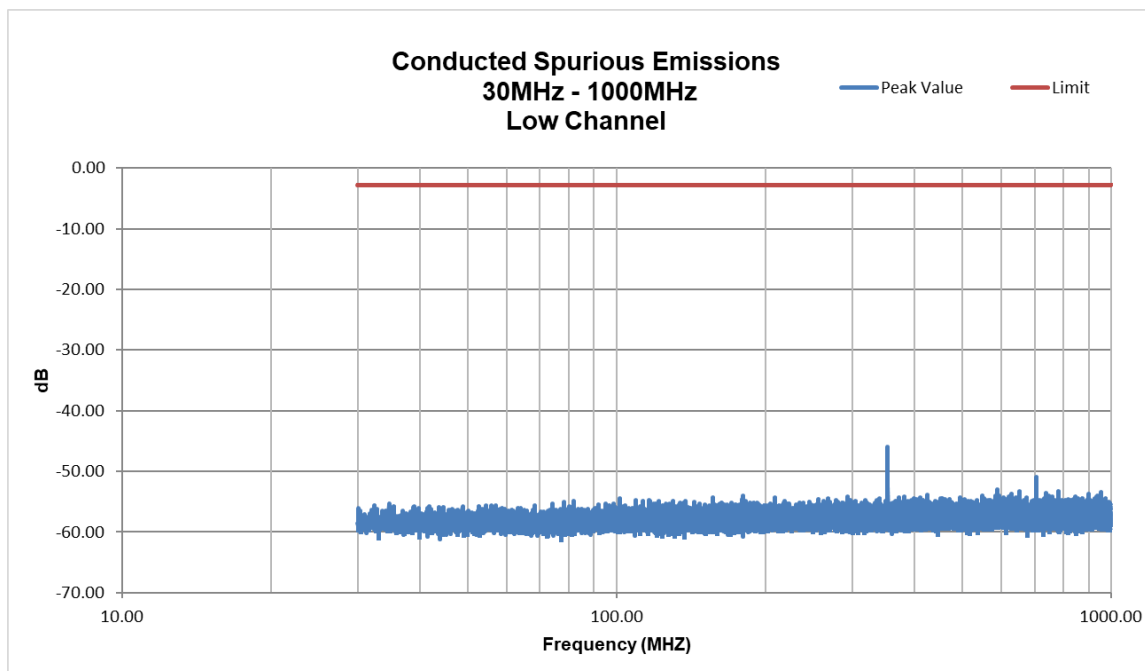


Figure 2. Antenna Conducted Emissions Low, 30 MHz – 1000 MHz

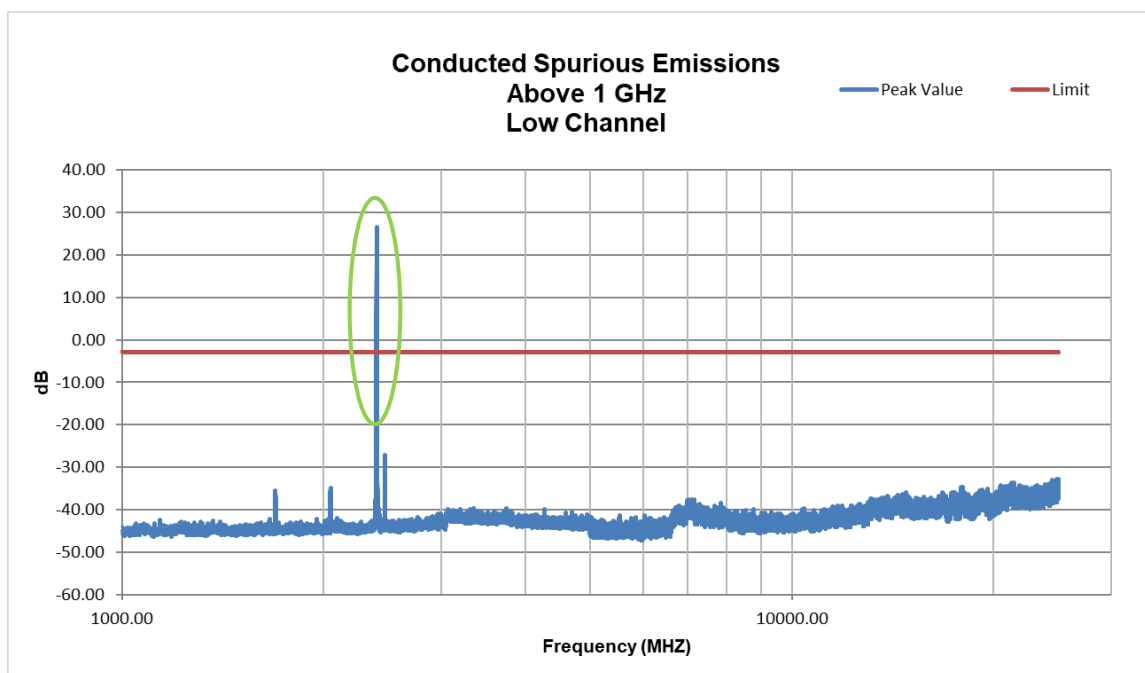


Figure 3. Antenna Conducted Emissions Low, above 1 GHz

Note: circled in green is the fundamental of the low channel

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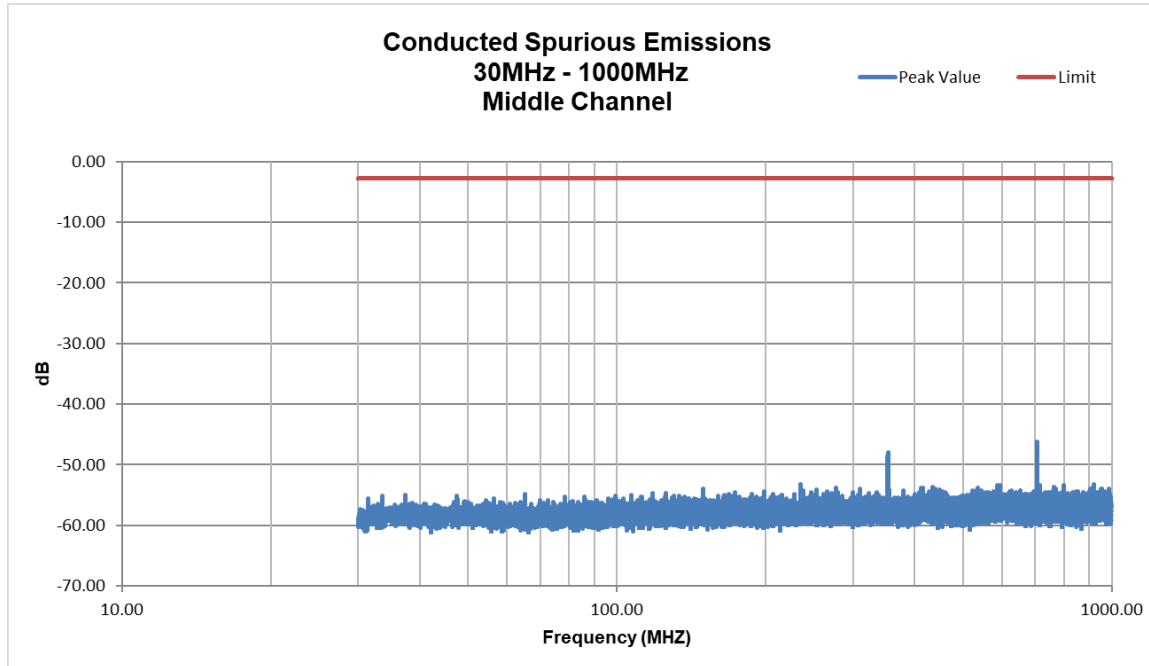


Figure 4. Antenna Conducted Emissions Mid, 30 MHz – 1000 MHz

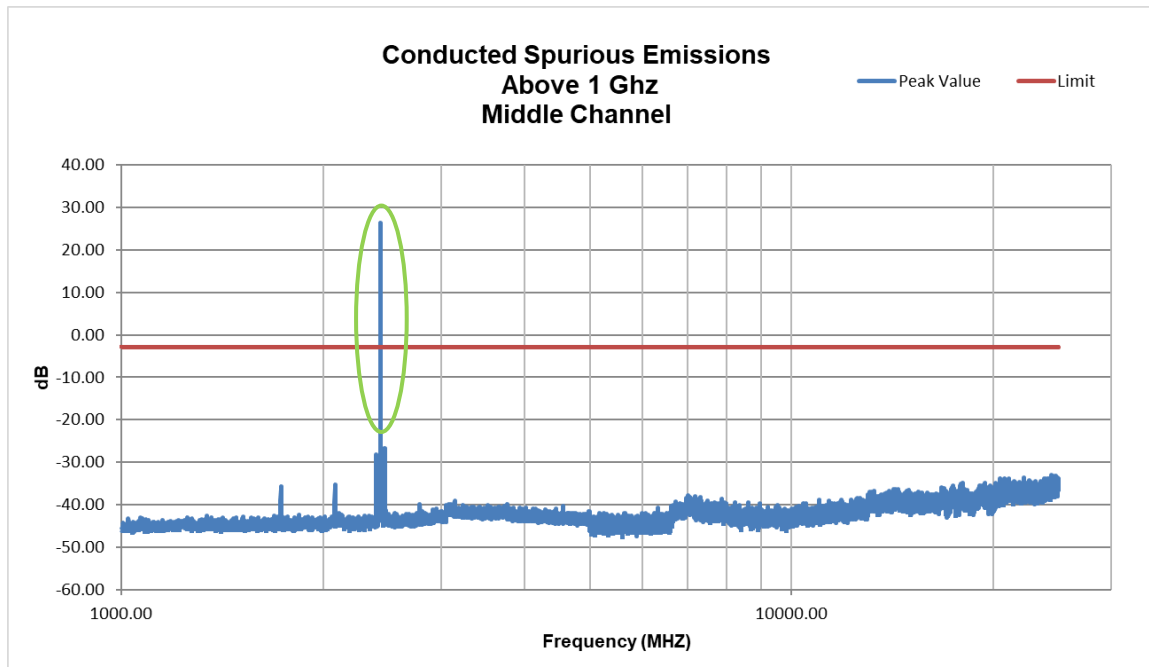


Figure 5. Antenna Conducted Emissions Mid, above 1 GHz

Note: circled in green is the fundamental of the mid channel

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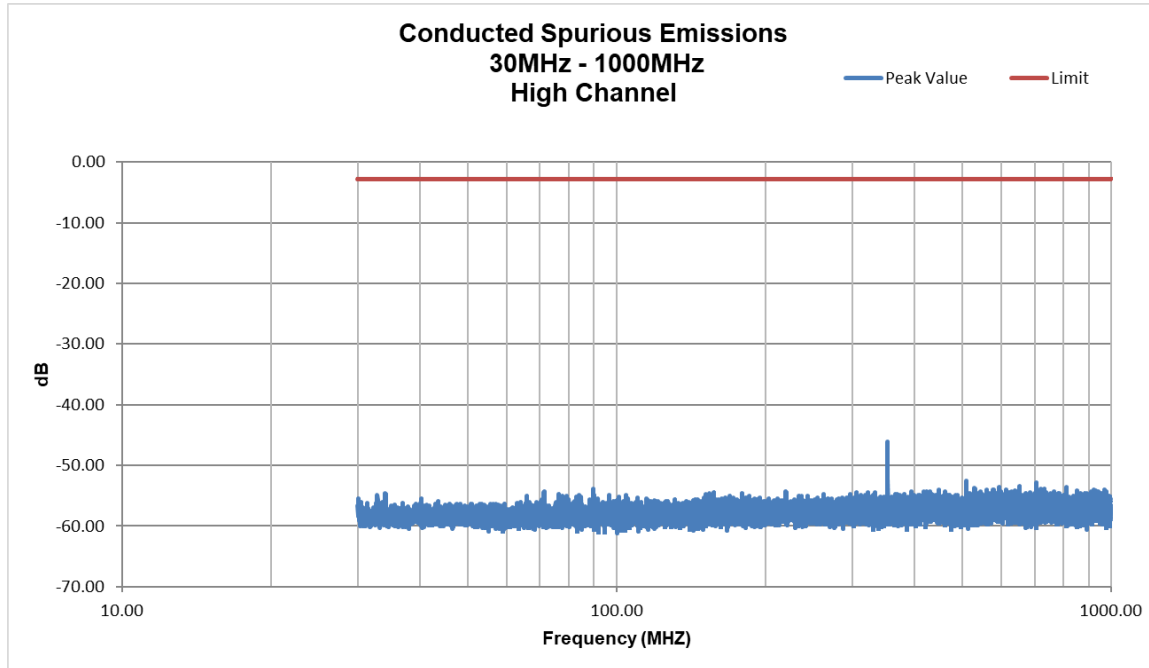


Figure 6. Antenna Conducted Emissions High, 30 MHz – 1000 MHz

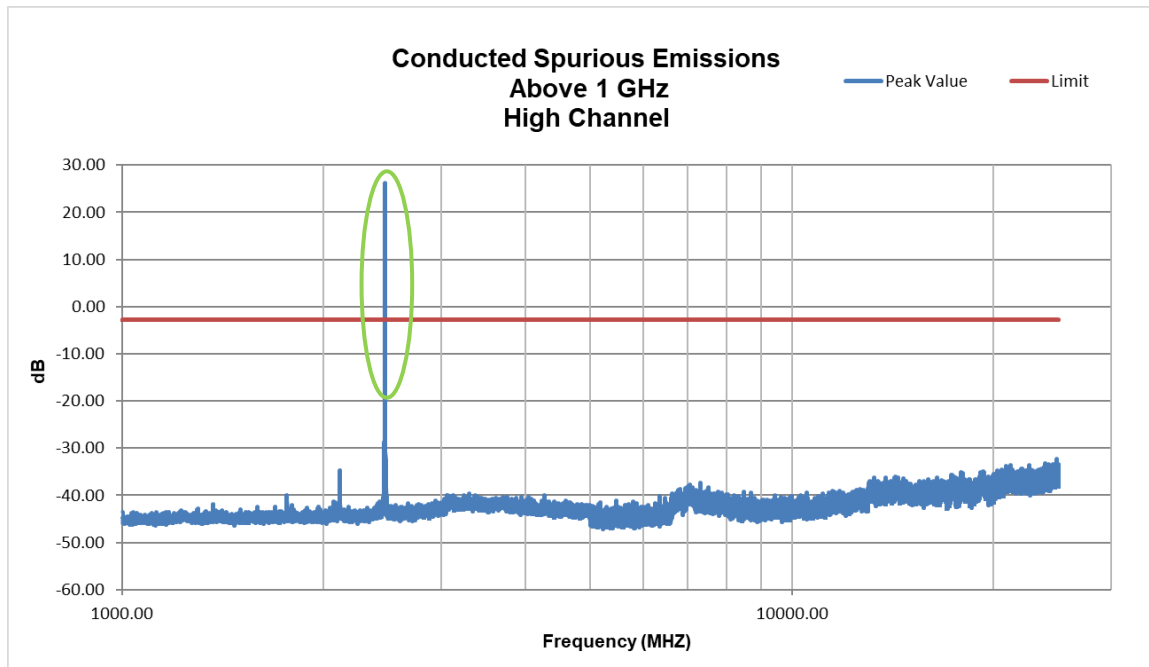


Figure 7. Antenna Conducted Emissions High, above 1 GHz

Note: circled in green is the fundamental of the high channel

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2.10. Authorized Band Band-Edge Measurements – (CFR 15.247 (d) RSS-247 6.6)

☒ Conducted Measurement Performed

Band Edge measurements are made following the guidelines in ANSI C63.10-2013 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. The EUT was test with in both a non-hopping and hopping configuration. Antenna port conducted measurements are performed to demonstrate compliance with the requirement of 15.247(d) and RSS-247 6.3 that all emissions outside of the band edges be attenuated by at least 20 dB when compared to its highest in-band value (contained in a 100 kHz band).

To capture the band edge set the Spectrum Analyzer frequency span large enough (usually around 3 MHz) to capture the peak level of the emission operating on the channel closest to the authorized band band-edge as well as any modulation products falling outside of the authorized band of operation. Conducted measurements are performed with RBW of 100 kHz and the VBW is set 300 kHz. See figures and calculations in section 2.11.1.

☐ Radiated Measurement Performed

Band Edge measurements are made following the guidelines in ANSI C63.10-2013 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. The EUT was tested in both a non-hopping and hopping configuration. Authorized band band-edge test is performed as radiated measurements. The test instrument used for testing has both Peak and Average detection. In consideration of Clause 5.8 of ANSI C63.10-2013, the EUT antenna is connected to its antenna port during testing. The EUT was set to its highest rated output power level during testing.

To capture the band edge set the Spectrum Analyzer frequency span large enough (usually around 3 MHz) to capture the peak level of the emission operating on the channel closest to the authorized band band-edge as well as any modulation products falling outside of the authorized band of operation. Radiated measurements are performed with RBW of 100 kHz and the VBW is set 300 kHz. See figures and calculations below for more detail in section 2.11.2.

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2.10.1. Authorized Band Conducted Band-Edge Measurement

This test was performed as a radiated measurement; therefore, proceed to section the following sections for the radiated measurement results.



Figure 8. Authorized Band Conducted Band-Edge Compliance, Low Channel Delta, Hopping Turned OFF -Peak

Calculation of worst-case lower band edge measurement:

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	72.14	dB
Band Edge Limit	20.00	dB
Band Edge Margin	52.14	dB

Test Date: March 4, 2026

Tested by
 Signature: 

Name: Gabriel Medina

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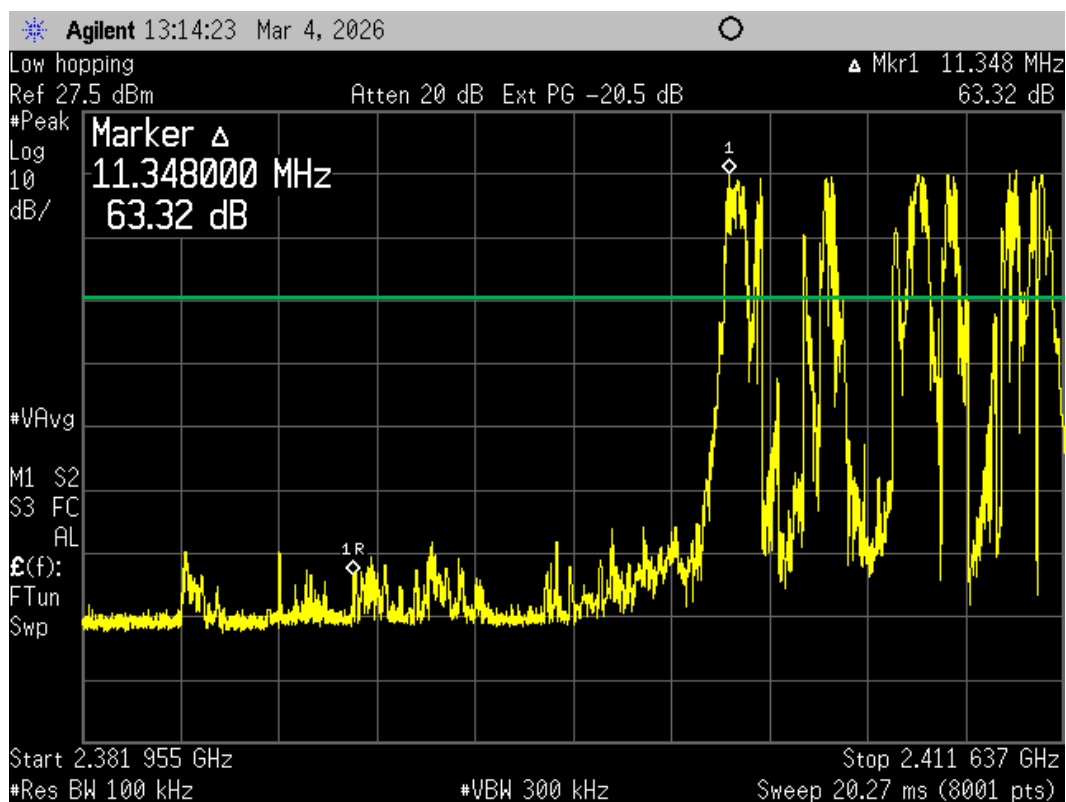


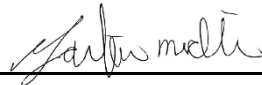
Figure 9. Authorized Band Conducted Band-Edge Compliance, Low Channel Delta, Hopping Turned ON -Peak

Calculation of worst-case lower band edge measurement:

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	63.32	dB
Band Edge Limit	20.00	dB
Band Edge Margin	43.32	dB

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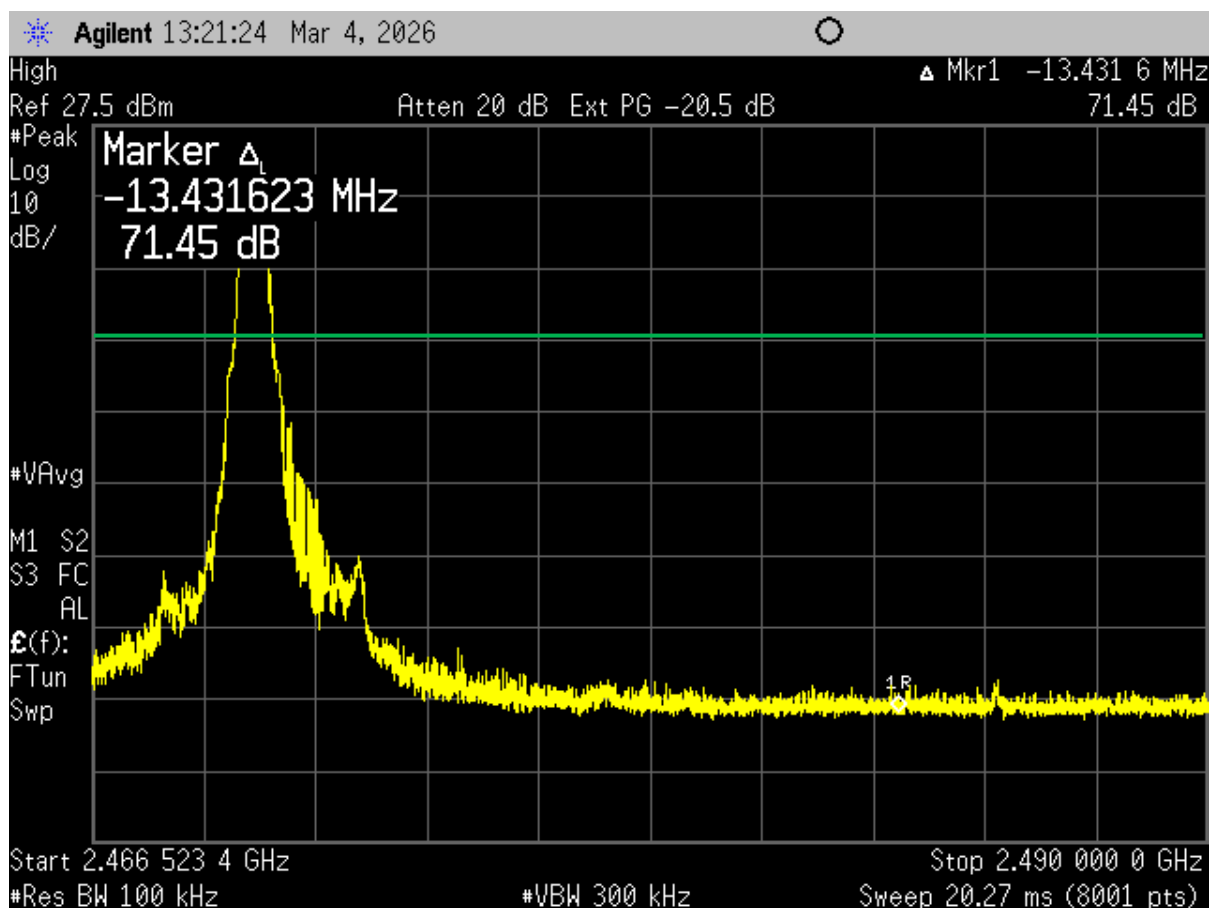


Figure 10. Authorized Band Conducted Band-Edge Compliance, High Channel Delta, Hopping Turned OFF -Peak

Calculation of worst-case lower band edge measurement:

Upper band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	71.45	dB
Band Edge Limit	20.00	dB
Band Edge Margin	51.45	dB

Test Date: March 4, 2026

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 Signature: 

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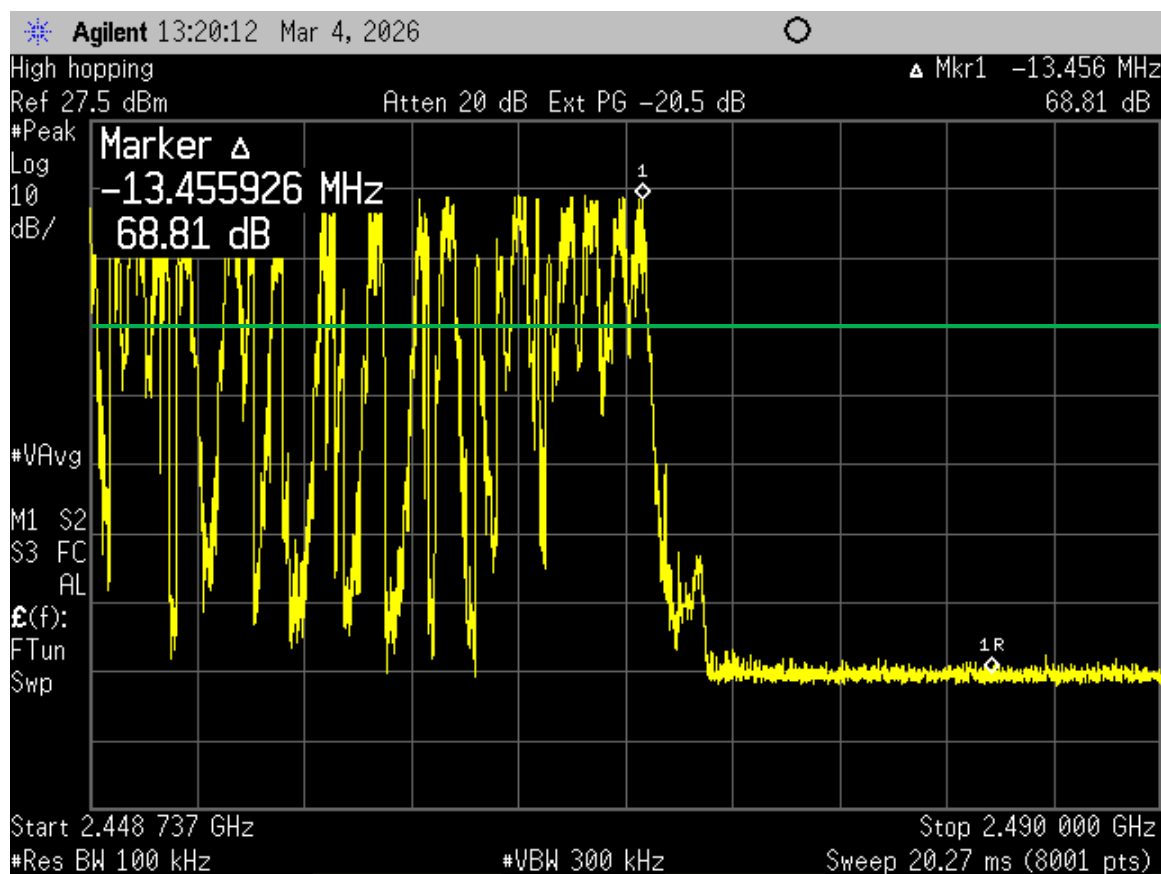


Figure 11. Authorized Band Conducted Band-Edge Compliance, High Channel Delta, Hopping Turned ON -Peak

Calculation of worst-case lower band edge measurement:

Upper band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	68.81	dB
Band Edge Limit	20.00	dB
Band Edge Margin	48.81	dB

Test Date: March 4, 2026

Tested by
Signature: 

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2.11. Restricted Band Band-Edge Measurement (CFR 154.247 (d), RSS-Gen 8.10)

On the test site, the EUT was placed on top of a non-conductive table, 80 cm above the floor for measurements below 1 GHz and 150 cm above the floor for measurements > 1 GHz. The EUT was also evaluated in three orthogonal positions to determine the worst case position. The front of the EUT faced the measurement antenna located 3 meters away. Each signal measured was maximized by raising and lowering the receive antenna between 1 and 4 meters in height while monitoring the ever changing spectrum analyzer display (with channel A in the Clear-Write mode and channel B in the Max-Hold mode) for the largest signal visible. That exact antenna height where the signal was maximized was recorded for reproducibility purposes. Also, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum. The EUT azimuth was recorded for reproducibility purposes. The EUT was measured when both maxima were simultaneously satisfied.

For radiated measurements, the EUT was set into a continuous transmission mode. Below 1 GHz, the RBW of the measuring instrument was set equal to 120 kHz. Peak measurements above 1 GHz were measured using a RBW = 1 MHz, with a VBW $\geq 3 \times \text{RBW}$. The results of peak radiated spurious emissions falling within restricted bands are given below.

The EUT was tested with each antenna type. The test results are presented below.

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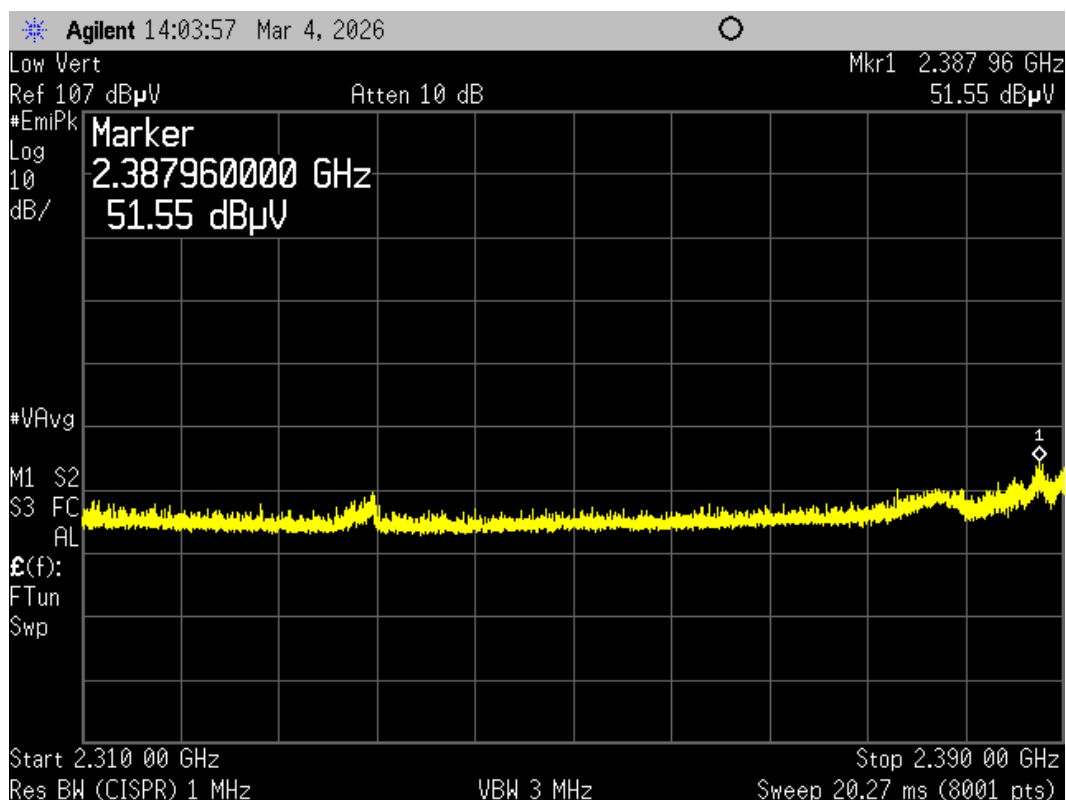


Figure 12. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz – Dipole antenna

Table 5. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz – Dipole Antenna

Test: FCC Part 15 and RSS-Gen 8.10, Restricted Bands							
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
2387.96	51.55	-4.48	47.07	54.0	3m./VERT	6.9	PK

Sample Calculation at 2387.96 MHz:

Magnitude of Measured Frequency	51.55 dBuV
+Correction Factors	-4.48 dB/m
Corrected Result	47.07 dBuV/m

Test Date: March 4, 2026

Tested by

Signature: *Gabriel Medina*

Name: Gabriel Medina

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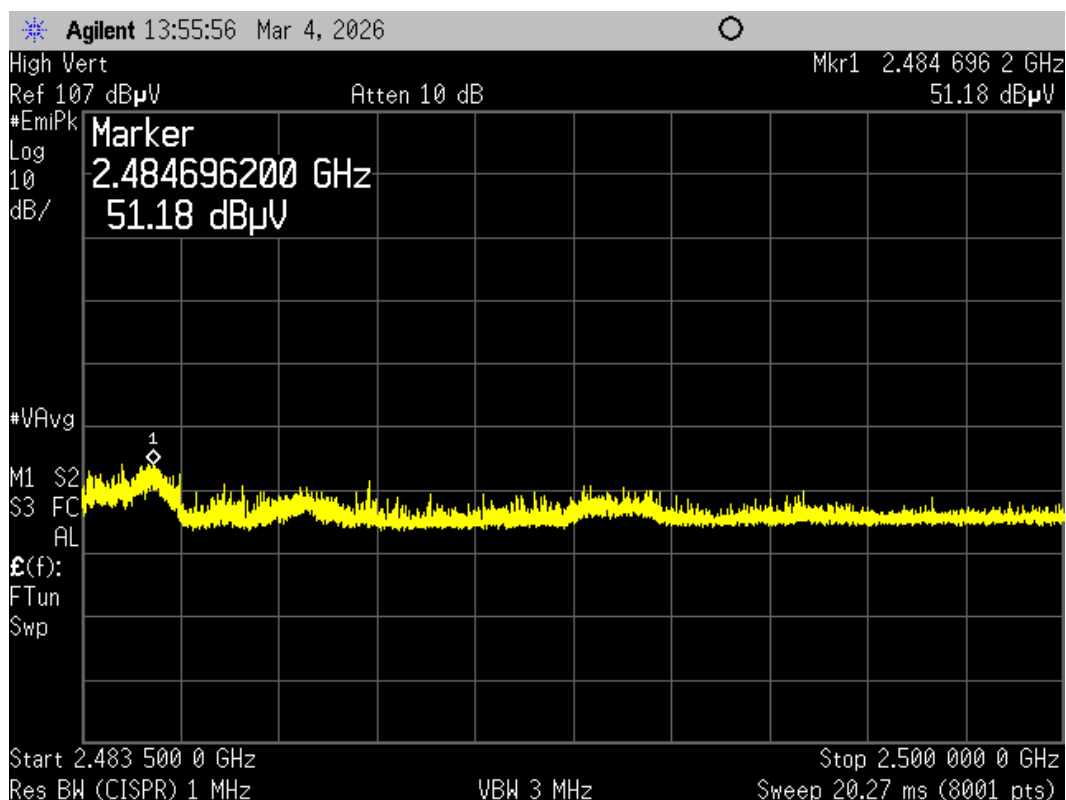


Figure 13. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz – Dipole Antenna

Table 6. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz – Dipole Antenna

Test: FCC Part 15 and RSS-Gen 8.10, Restricted Bands							
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
2484.69	51.18	-3.81	47.37	54.0	3m./VERT	6.6	PK

Sample Calculation at 2484.69 MHz:

Magnitude of Measured Frequency	51.18 dBuV
+Correction Factors	-3.81 dB/m
Corrected Result	47.37 dBuV/m

Test Date: March 4, 2026

Tested by
 Signature: *Gabriel Medina*

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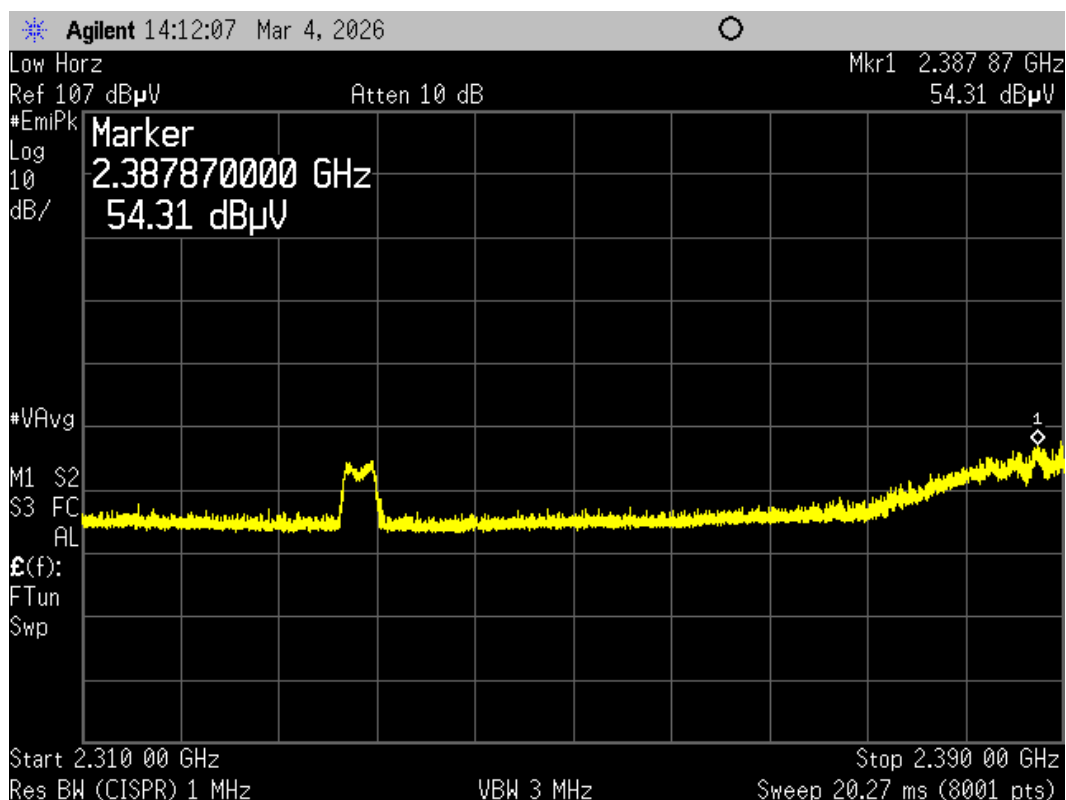


Figure 14. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz – Corner antenna

Table 7. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz – Corner Antenna

Test: FCC Part 15 and RSS-Gen 8.10, Restricted Bands							
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
2378.87	54.31	-4.43	49.88	54.0	3.m./HORZ	4.1	PK

Sample Calculation at 2378.87 MHz:

Magnitude of Measured Frequency	54.31 dBuV
+Correction Factors	-4.43 dB/m
Corrected Result	49.88 dBuV/m

Test Date: March 4, 2026

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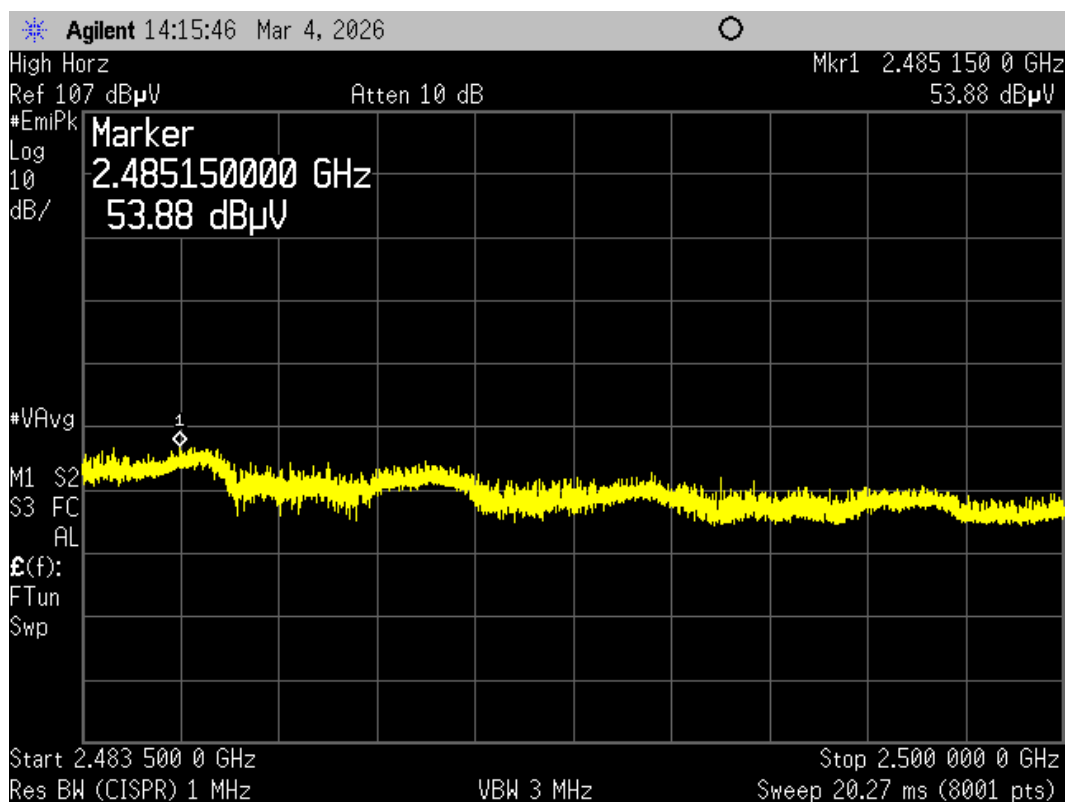


Figure 15. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz – Corner Antenna

Table 8. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz – Corner Antenna

Test: FCC Part 15 and RSS-Gen 8.10, Restricted Bands							
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
2485.15	53.88	-3.72	50.16	54.0	3m./HORZ	3.8	PK

Sample Calculation at 2485.15 MHz:

Magnitude of Measured Frequency	53.88 dBuV
+Correction Factors	-3.72 dB/m
Corrected Result	50.16 dBuV/m

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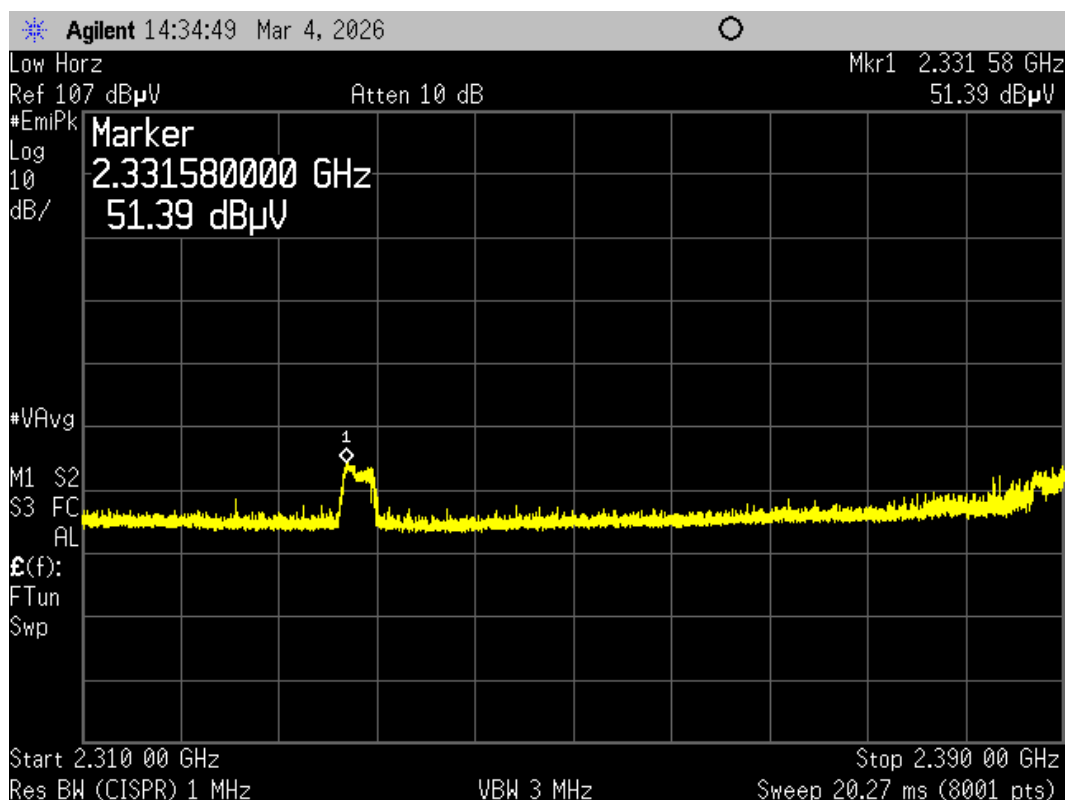


Figure 16. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz – Patch antenna

Table 9. Radiated Restricted Band Measurements PK, 2.31 GHz to 2.39 GHz – Patch Antenna

Test: FCC Part 15 and RSS-Gen 8.10, Restricted Bands							
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
2331.58	51.39	-4.99	46.40	54.0	3m./HORZ	7.6	PK

Sample Calculation at 2378.87 MHz:

Magnitude of Measured Frequency	51.39 dBuV
+Correction Factors	-4.99 dB/m
Corrected Result	46.40 dBuV/m

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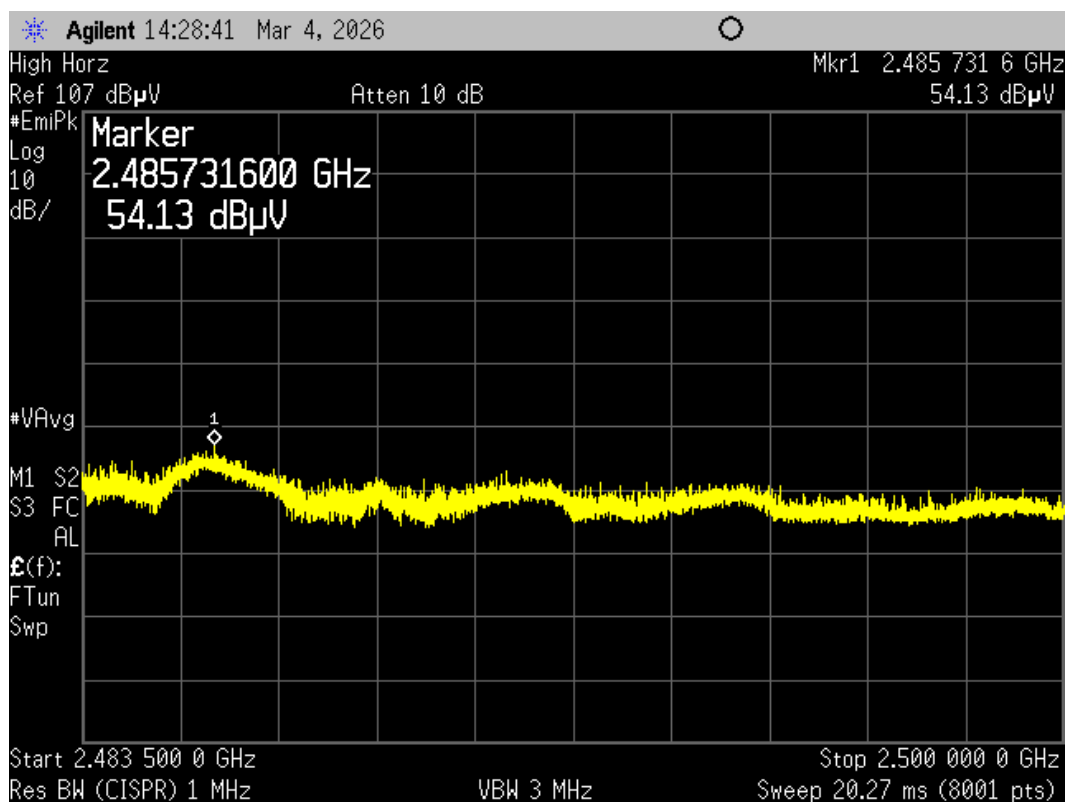


Figure 17. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz – Patch Antenna

Table 10. Radiated Restricted Band Measurements PK, 2.4835 GHz to 2.5 GHz – Patch Antenna

Test: FCC Part 15 and RSS-Gen 8.10, Restricted Bands							
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
2485.73	54.13	-3.72	50.41	54.0	3m./HORZ	3.6	PK

Sample Calculation at 2485.15 MHz:

Magnitude of Measured Frequency	53.88 dBuV
+Correction Factors	-3.72 dB/m
Corrected Result	50.16 dBuV/m

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2.12. Maximum Peak Conducted Output Power (CFR 15.247 (b) (3), RSS-247 6.2)

For frequency hopping systems in the 2400-2483.5 MHz band with at least 75 non-overlapping hopping channels, the maximum peak conducted output power of the intentional radiator shall not exceed 1 watt. For all other frequency hopping systems in this band, the maximum peak conducted output power of the intentional radiator shall not exceed 0.125 watts. Since the EUT has 75 hopping channels, the maximum peak conducted output power shall not exceed 0.125 W.

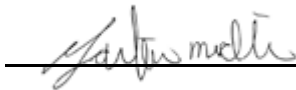
Peak power within the band 2401.6896 MHz to 2469.8880 MHz was measured per ANSI C63.10-2013 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, and attenuators to the antenna output terminals on the EUT. The spectrum analyzer was set for an impedance of 50 Ω with the RBW set greater than the 20 dB bandwidth of the EUT, and the VBW $\geq$ 3xRBW.

Table 11. Peak Antenna Conducted Output Power per Part 15.247 (b) (3) and RSS-247 6.2

Frequency of fundamental (MHz)	Raw Test Data dBm	Converted Data (mW)	FCC and IC (mW Maximum)
2401.88	17.83	0.061	0.125
2435.58	17.56	0.057	0.125
2469.69	17.18	0.052	0.125

Test Date: March 4, 2026

Tested by

Signature: 

Name: Gabriel Medina

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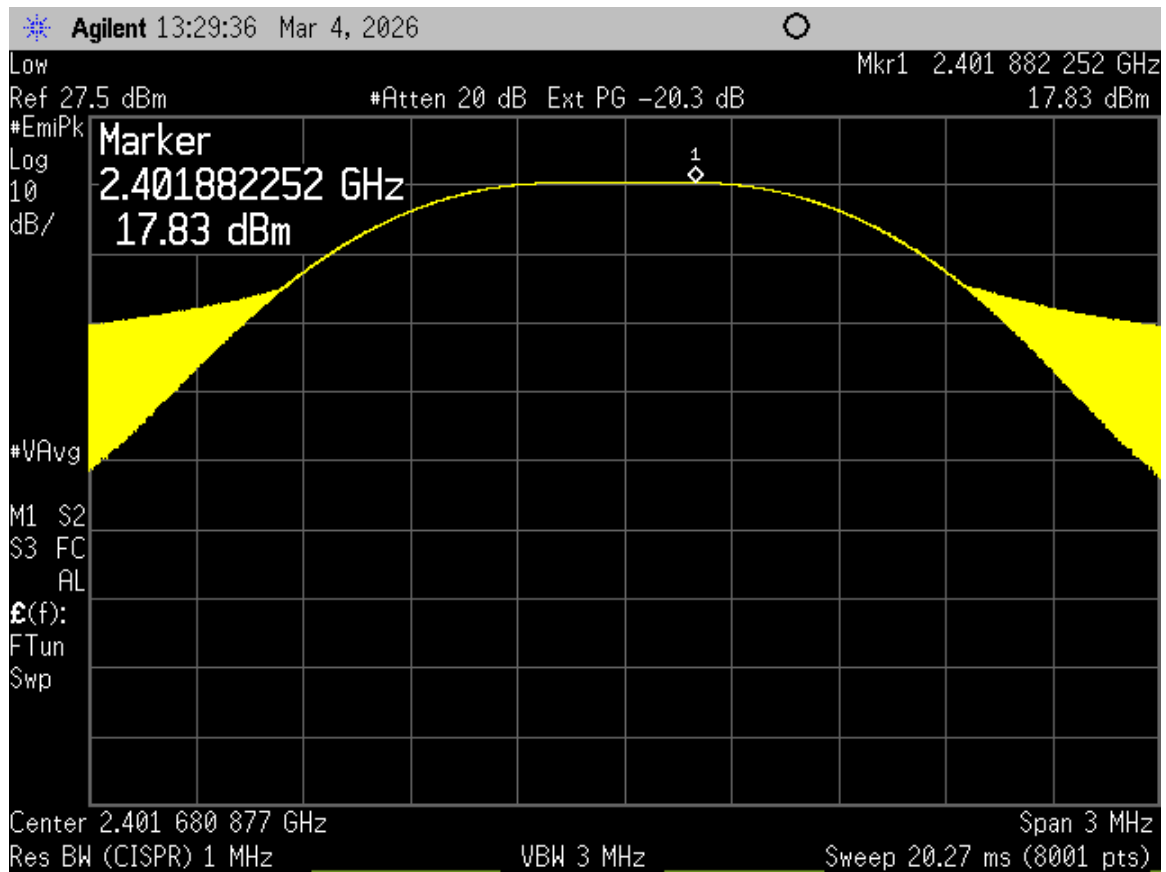


Figure 18. Peak Antenna Conducted Output Power, Low Channel

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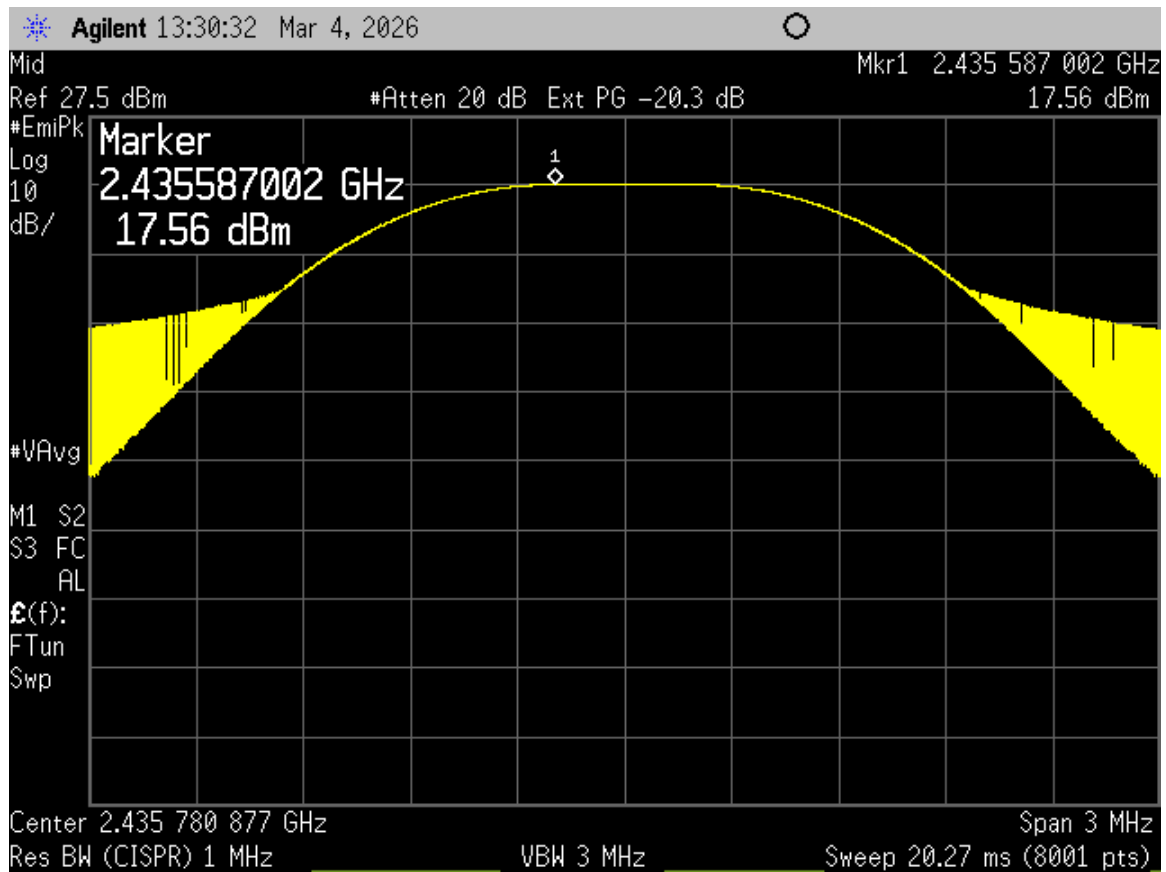


Figure 19. Peak Antenna Conducted Output Power, Mid Channel

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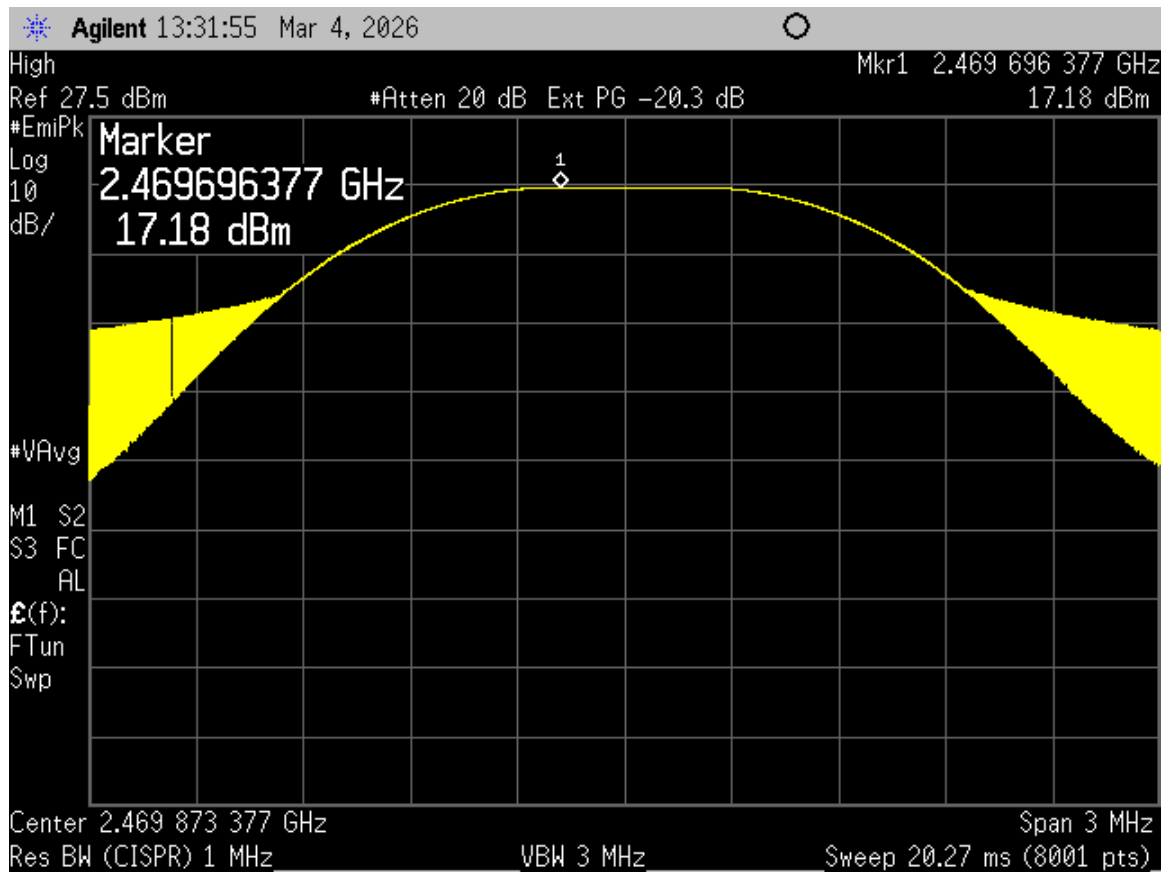


Figure 20. Peak Antenna Conducted Output Power, High Channel

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2.13. Intentional Radiator, Radiated Emissions (CFR 15.209, RSS-Gen 8.9)

The test data provided herein supports the verification requirement for radiated emissions coming for the EUT in a transmitting state per 15.209 and were investigated from 9kHz or the lowest operating clock frequency to 25 GHz and tested as detailed in ANSI C63.10:2013, Clause 6.4-6.6.

Radiated emissions within the band of 9 kHz to 30 MHz were investigated using a calibrated Loop Antenna and per the requirements of ANSI C63.10:2013.

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data were maximized for magnitude by rotating the turn-table through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters in height as a part of the measurement procedure.

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2.13.1. Intentional Radiator, Radiated Emissions – Dipole Antenna

The worst-case radiated emission in the range of 30 MHz to 1 GHz was 7.1 dB below the limit at 353.14 MHz. This signal is found below. All other radiated emissions were 7.1 dB or more below the limit.

Table 12. Spurious Radiated Emissions – Dipole Antenna (30 MHz – 1 GHz)

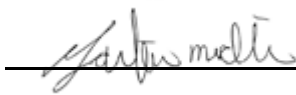
Test: FCC Part 15.209 and RSS-Gen 8.9							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP
70.62	33.49	-14.18	19.30	40.0	3m./HORZ	20.7	PK
88.15	33.17	-14.25	18.92	43.5	3m./HORZ	24.6	PK
108.01	32.23	-13.01	19.22	43.5	3m./HORZ	24.3	PK
200.00	43.72	-11.09	32.63	43.5	3m./HORZ	10.9	PK
233.35	33.79	-11.28	22.51	46.0	3m./HORZ	23.5	PK
353.14	47.03	-8.16	38.87	46.0	3m./HORZ	7.1	QP
706.37	31.06	-1.04	30.02	46.0	3m./HORZ	16.0	PK
51.60	42.63	-13.07	29.56	40.0	3m./VERT	10.4	PK
71.76	45.97	-14.97	31.00	40.0	3m./VERT	9.0	PK
95.77	40.98	-12.95	28.03	43.5	3m./VERT	15.5	PK
200.00	47.72	-11.29	36.43	43.5	3m./VERT	7.1	PK
233.35	37.12	-11.18	25.94	46.0	3m./VERT	20.1	PK
353.14	42.42	-8.26	34.15	46.0	3m./VERT	11.8	PK
397.69	31.68	-7.14	24.54	46.0	3m./VERT	21.5	PK

Sample Calculation at 70.62 MHz:

Magnitude of Measured Frequency	33.49 dBuV
+Correction Factors	-14.18 dB
Corrected Result	19.30 dBuV

Test Date: March 2-4, 2026

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Signature: 

Name: Gabriel Medina

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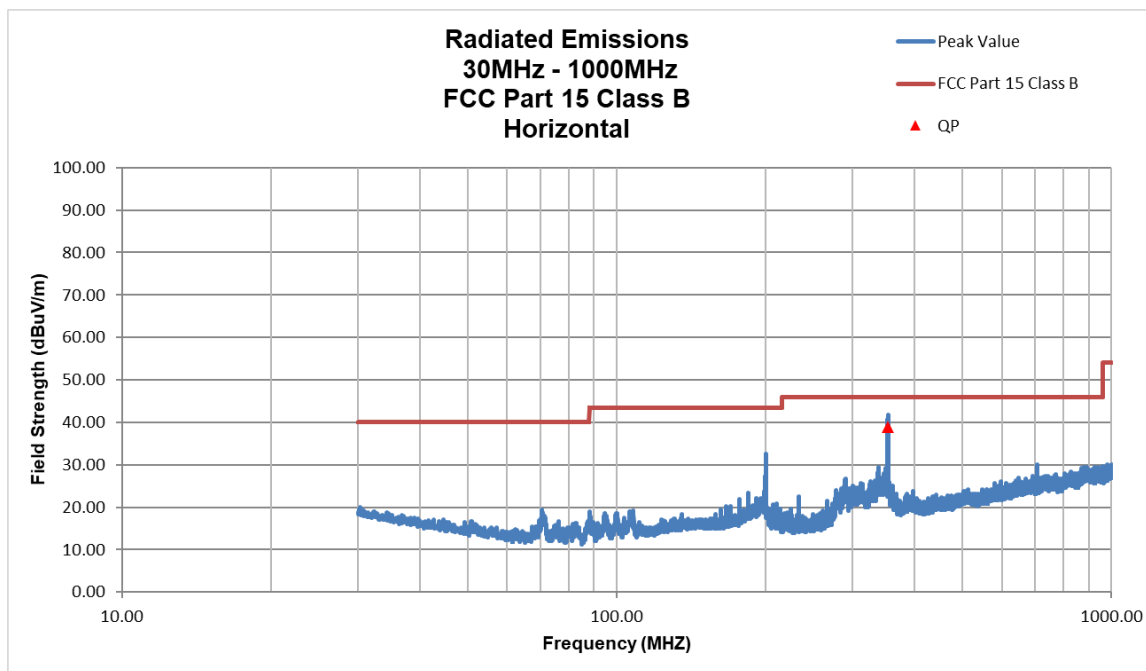


Figure 21. Intentional Radiator, Radiated Emissions Horizontal, 30 MHz – 1000 MHz – Dipole Antenna

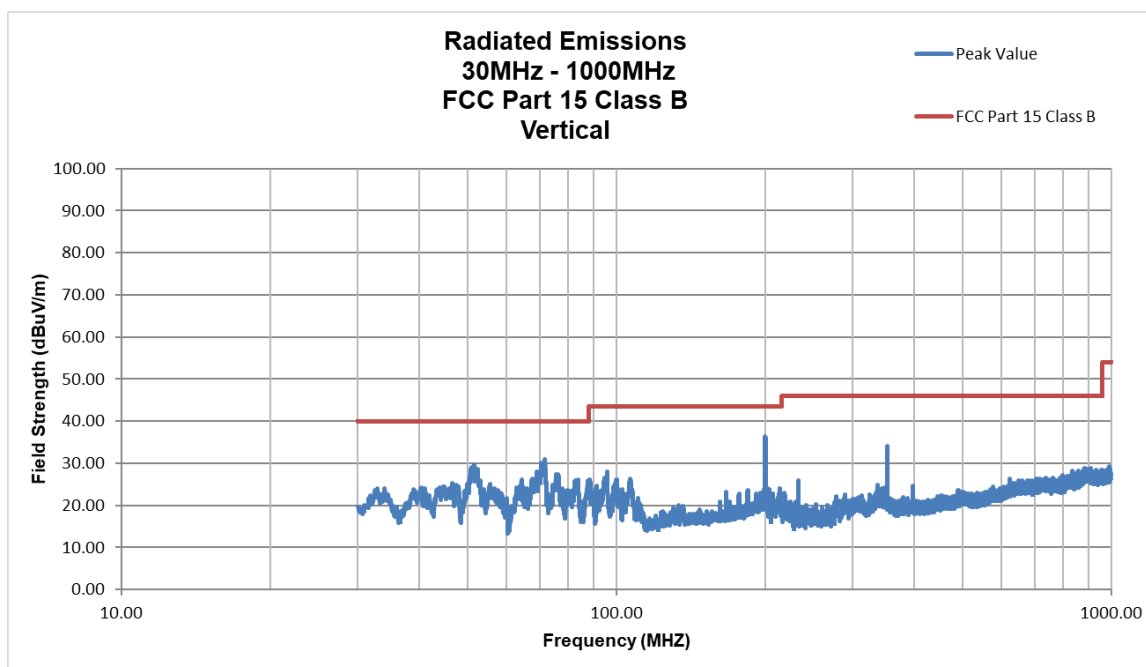


Figure 22. Intentional Radiator, Radiated Emissions Vertical, 30 MHz – 1000 MHz – Dipole Antenna

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The worst-case radiated emission in the range of Above 1 GHz was 6.3 dB below the limit at 3733.52 MHz. This signal is found below. All other radiated emissions were 7.6 dB or more below the limit.

Table 13. Spurious Radiated Emissions – Dipole Antenna (Above 1 GHz)

Test: FCC Part 15.209 and RSS-Gen 8.9							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK / AVG
1701.00	32.85	0.15	33.00	54.0	3m./HORZ	21.0	AVG
1738.00	31.54	0.20	31.74	54.0	3m./HORZ	22.3	AVG
2048.00	42.69	3.03	45.72	54.0	3m./HORZ	8.3	AVG
2081.00	42.87	2.71	45.58	54.0	3m./HORZ	8.4	AVG
2120.00	41.87	2.45	44.32	54.0	3m./HORZ	9.7	AVG
6168.00	30.73	6.36	37.09	54.0	3m./HORZ	16.91	AVG
6283.00	32.22	7.04	39.26	54.0	3m./HORZ	14.74	AVG
7298.00	26.99	8.71	35.70	54.0	3m./HORZ	18.3	AVG
8216.00	36.49	8.15	44.64	54.0	3m./HORZ	9.4	AVG
8327.00	34.52	7.78	42.30	54.0	3m./HORZ	11.7	AVG
10205.00	26.87	10.04	36.91	54.0	3m./HORZ	17.1	AVG
12830.00	23.56	16.13	39.69	54.0	3m./HORZ	14.3	AVG
2047.00	37.36	2.91	40.27	54.0	3m./VERT	13.7	AVG
2047.00	37.36	2.91	40.27	54.0	3m./VERT	13.7	AVG
2081.50	41.08	2.74	43.82	54.0	3m./VERT	10.2	AVG
2118.00	40.59	2.61	43.20	54.0	3m./VERT	10.8	AVG
3733.52	48.75	-1.02	47.73	54.0	3m./VERT	6.3	PK
3999.75	44.99	0.38	45.38	54.0	3m./VERT	8.6	PK
4228.01	44.05	0.15	44.20	54.0	3m./VERT	9.8	PK
4666.00	26.57	4.35	30.92	54.0	3m./VERT	23.1	AVG
5599.91	42.41	4.03	46.43	54.0	3m./VERT	7.6	PK
6204.00	33.37	6.80	40.17	54.0	3m./VERT	13.8	AVG
6286.00	35.64	7.05	42.69	54.0	3m./VERT	11.3	AVG
7249.00	28.95	8.59	37.54	54.0	3m./VERT	16.5	AVG
8290.00	35.34	7.78	43.12	54.0	3m./VERT	10.9	AVG
10256.00	31.21	10.34	41.55	54.0	3m./VERT	12.4	AVG
10441.00	31.14	9.89	41.03	54.0	3m./VERT	13.0	AVG
12752.00	23.56	15.11	38.67	54.0	3.00m./VERT	15.3	AVG
All emission above 13 GHz were greater than 20 dB below the applicable limit							

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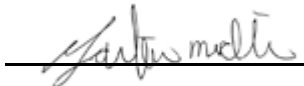
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Sample Calculation at 1701 MHz:

Magnitude of Measured Frequency	32.85 dB μ V
+Correction Factors	0.15 dB
Corrected Result	32.00 dB μ V

Test Date: March 2-4, 2026

Tested by

Signature: 

Name: Gabriel Medina

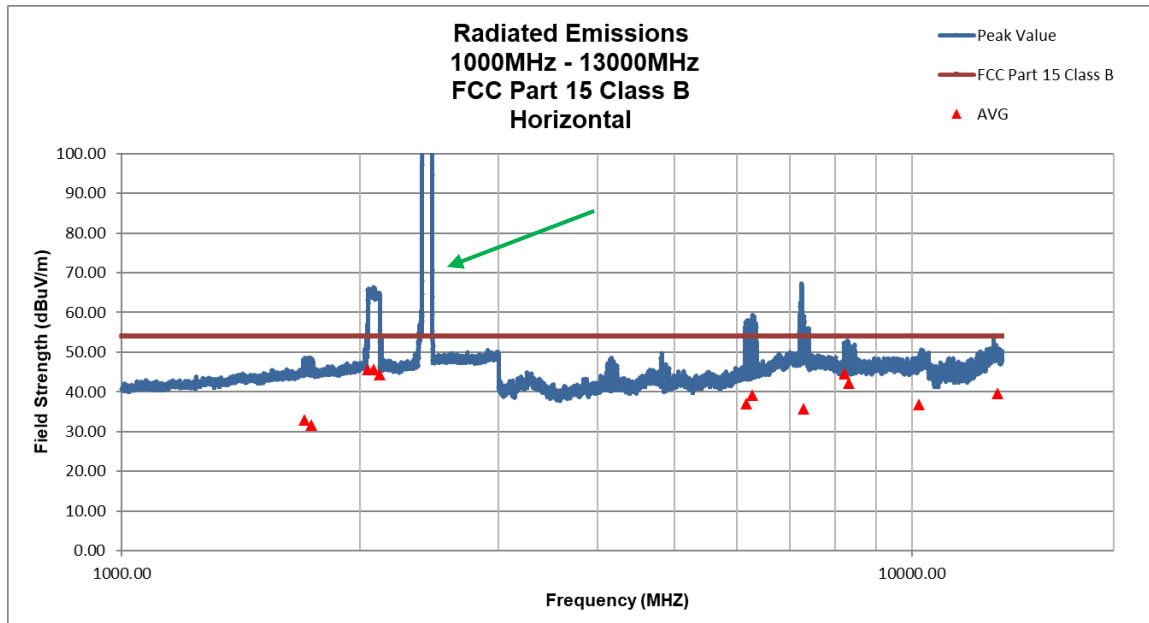
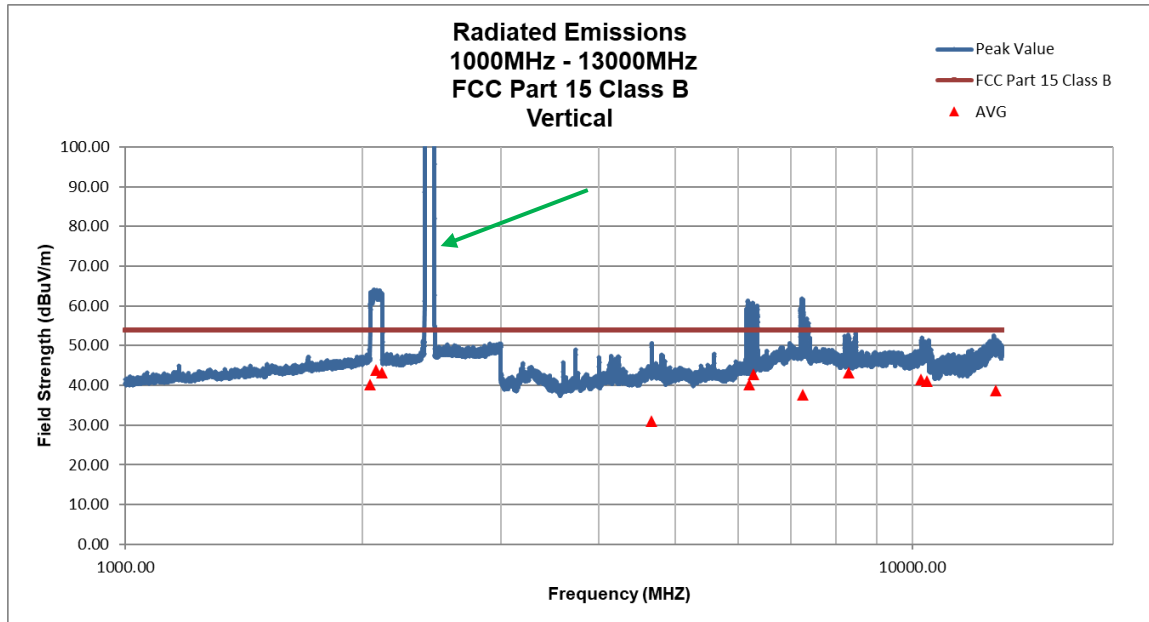


Figure 23. Intentional Radiator, Radiated Emissions Horizontal, Above 1000 MHz – Dipole Antenna

Note: Fundamental emission identified with green arrow.

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**Figure 24. Intentional Radiator, Radiated Emissions Vertical, Above 1000 MHz
– Dipole Antenna**

Note: Fundamental emission identified with green arrow.

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2.13.2. Intentional Radiator, Radiated Emissions – Corner Antenna

The worst-case radiated emission in the range of 30 MHz to 1 GHz was 4.4 dB below the limit at 50.95 MHz. This signal is found below. All other radiated emissions were 8.2 dB or more below the limit.

Table 14. Spurious Radiated Emissions – Corner Antenna (30 MHz – 1 GHz)

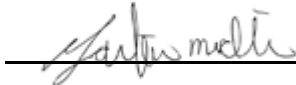
Test: FCC Part 15.209 and RSS-Gen 8.9							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP
70.74	32.75	-14.18	18.57	40.0	3m./HORZ	21.4	PK
147.43	39.92	-10.75	29.17	43.5	3m./HORZ	14.3	PK
176.96	39.13	-9.70	29.43	43.5	3m./HORZ	14.1	PK
200.00	42.88	-7.59	35.29	43.5	3m./HORZ	8.2	PK
233.35	35.55	-11.28	24.27	46.0	3m./HORZ	21.7	PK
47.81	41.93	-12.45	29.48	40.0	3m./VERT	10.5	QP
50.95	48.61	-12.96	35.65	40.0	3m./VERT	4.4	QP
71.70	44.49	-14.97	29.52	40.0	3m./VERT	10.5	PK
99.25	37.77	-12.81	24.95	43.5	3m./VERT	18.5	PK
169.58	37.44	-9.17	28.27	43.5	3m./VERT	15.2	PK
200.00	44.01	-11.29	32.72	43.5	3m./VERT	10.8	PK
233.30	35.94	-11.17	24.77	46.0	3m./VERT	21.2	PK
338.49	33.35	-8.39	24.96	46.0	3m./VERT	21.0	PK

Sample Calculation at 70.74 MHz:

Magnitude of Measured Frequency	32.75 dBuV
+Correction Factors	-14.18 dB
Corrected Result	18.57 dBuV

Test Date: March 2-4, 2026

Tested by

Signature: 

Name: Gabriel Medina

US Tech Test Report:
FCC ID:
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Customer:
Model:

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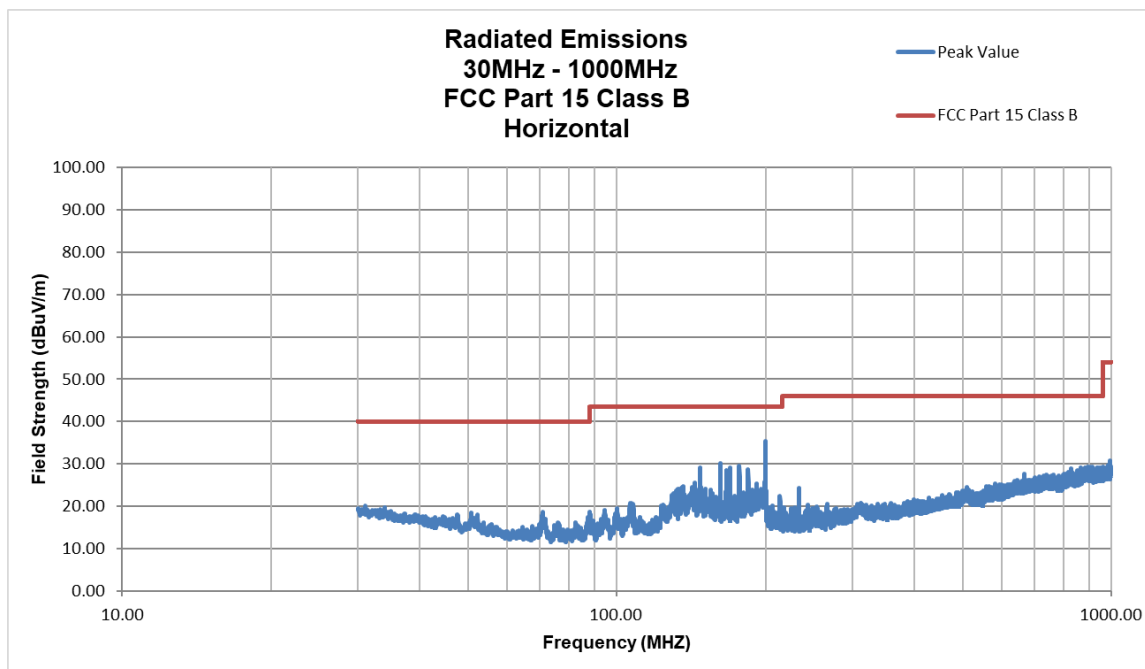


Figure 25. Intentional Radiator, Radiated Emissions Horizontal, 30 MHz – 1000 MHz – Corner Antenna

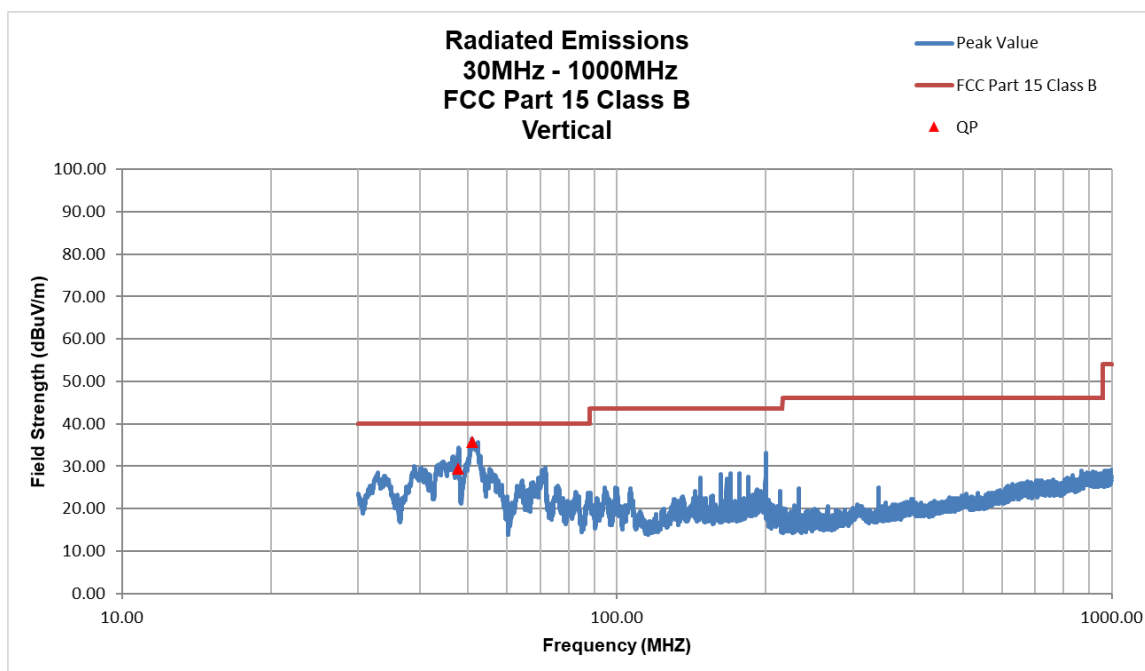


Figure 26. Intentional Radiator, Radiated Emissions Vertical, 30 MHz – 1000 MHz – Corner Antenna

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The worst-case radiated emission in the range of Above 1 GHz was 9.8 dB below the limit at 2091 MHz. This signal is found below. All other radiated emissions were 11.5 dB or more below the limit.

Table 15. Spurious Radiated Emissions – Corner Antenna (Above 1 GHz)

Test: FCC Part 15.209 and RSS-Gen 8.9							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK / AVG
2048.00	37.65	3.03	40.68	54.0	3m./HORZ	13.3	AVG
2088.00	39.69	2.68	42.37	54.0	3m./HORZ	11.6	AVG
2120.00	38.06	2.45	40.51	54.0	3m./HORZ	13.5	AVG
6167.00	31.87	6.36	38.23	54.0	3m./HORZ	15.8	AVG
6340.00	30.41	7.12	37.53	54.0	3m./HORZ	16.5	AVG
7238.00	28.11	8.47	36.58	54.0	3m./HORZ	17.4	AVG
7382.00	27.54	9.35	36.89	54.0	3m./HORZ	17.1	AVG
8209.00	32.45	8.15	40.60	54.0	3m./HORZ	13.4	AVG
10262.00	25.16	10.41	35.57	54.0	3m./HORZ	18.4	AVG
12025.00	23.19	12.56	35.75	54.0	3m./HORZ	18.3	AVG
12725.00	26.54	15.69	42.23	54.0	3m./HORZ	11.8	AVG
2052.00	39.48	3.00	42.48	54.0	3m./VERT	11.5	AVG
2091.00	41.51	2.66	44.17	54.0	3m./VERT	9.8	AVG
2120.00	35.41	2.52	37.93	54.0	3m./VERT	16.1	AVG
6212.00	32.83	6.80	39.63	54.0	3m./VERT	14.4	AVG
6309.00	30.89	6.90	37.79	54.0	3m./VERT	16.2	AVG
7243.00	27.28	8.78	36.06	54.0	3m./VERT	17.9	AVG
7343.00	25.45	9.02	34.47	54.0	3m./VERT	19.5	AVG
8349.00	32.89	8.25	41.14	54.0	3m./VERT	12.9	AVG
8434.00	31.45	8.11	39.56	54.0	3m./VERT	14.4	AVG
10284.00	30.75	9.55	40.30	54.0	3m./VERT	13.7	AVG
10421.00	28.67	9.92	38.59	54.0	3m./VERT	15.4	AVG
12854.00	26.24	15.43	41.67	54.0	3m./VERT	12.3	AVG
All emission above 13 GHz were greater than 20 dB below the applicable limit							

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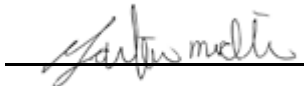
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Sample Calculation at 1701 MHz:

Magnitude of Measured Frequency	32.85 dB μ V
+Correction Factors	0.15 dB
Corrected Result	32.00 dB μ V

Test Date: March 2-4, 2026

Tested by

Signature: 

Name: Gabriel Medina

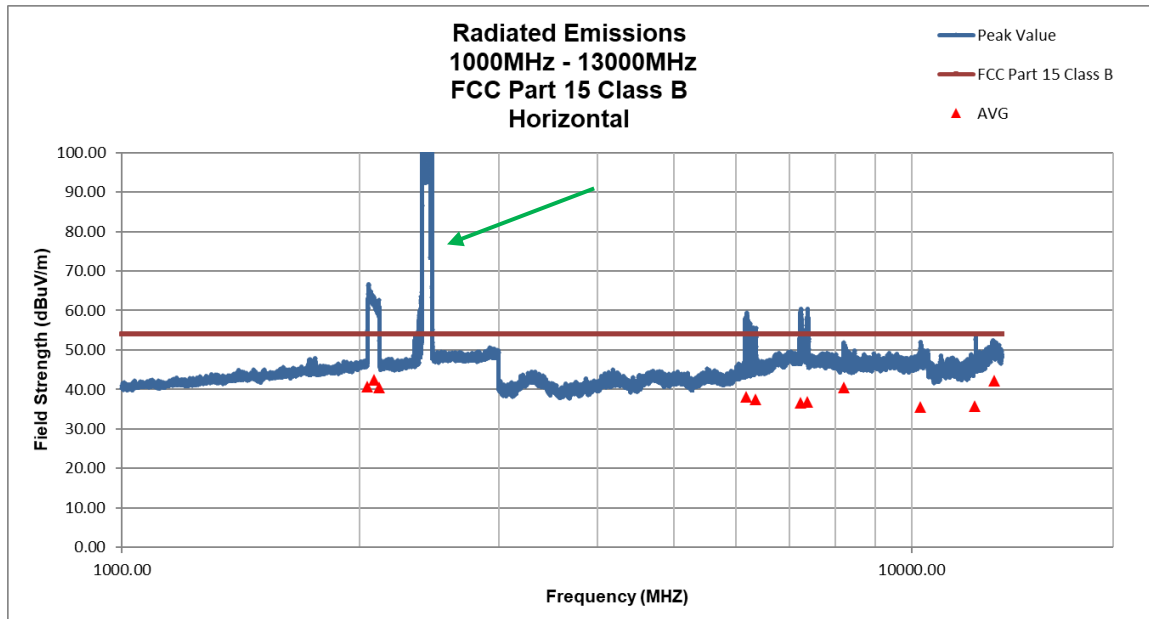
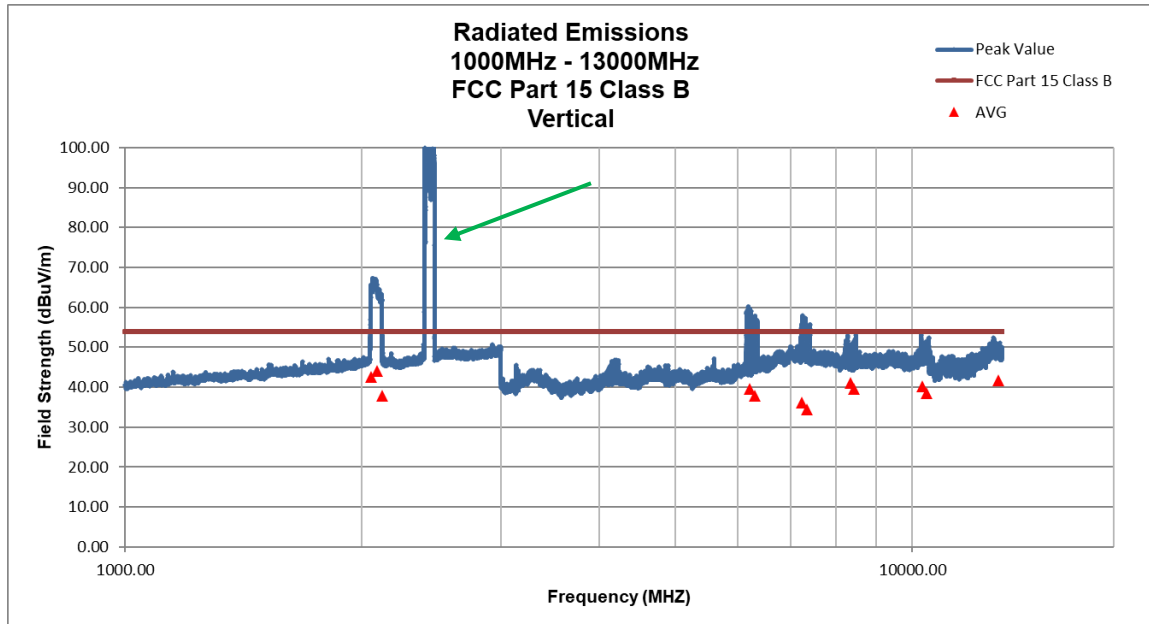


Figure 27. Intentional Radiator, Radiated Emissions Horizontal, Above 1000 MHz – Corner Antenna

Note: Fundamental emission identified with green arrow.

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**Figure 28. Intentional Radiator, Radiated Emissions Vertical, Above 1000 MHz
– Corner Antenna**

Note: Fundamental emission identified with green arrow.

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2.13.3. Intentional Radiator, Radiated Emissions – Patch Antenna

The worst-case radiated emission in the range of 30 MHz to 1 GHz was 6.3 dB below the limit at 200 MHz. This signal is found below. All other radiated emissions were 6.7 dB or more below the limit.

Table 16. Spurious Radiated Emissions – Patch Antenna (30 MHz – 1 GHz)

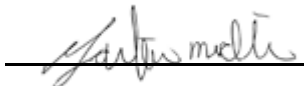
Test: FCC Part 15.209 and RSS-Gen 8.9							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP
116.47	41.02	-12.37	28.64	43.5	3m./HORZ	14.9	PK
166.64	37.28	-10.41	26.87	43.5	3m./HORZ	16.6	PK
200.00	41.49	-7.59	33.90	43.5	3m./HORZ	9.6	PK
52.20	43.81	-13.26	30.54	40.0	3m./VERT	9.5	PK
70.26	48.21	-14.88	33.33	40.0	3m./VERT	6.7	PK
166.64	44.44	-9.31	35.13	43.5	3m./VERT	8.4	PK
200.00	44.35	-7.19	37.16	43.5	3m./VERT	6.3	PK

Sample Calculation at 70.74 MHz:

Magnitude of Measured Frequency	32.75 dBuV
+Correction Factors	-14.18 dB
Corrected Result	18.57 dBuV

Test Date: March 2-4, 2026

Tested by

Signature: 

Name: Gabriel Medina

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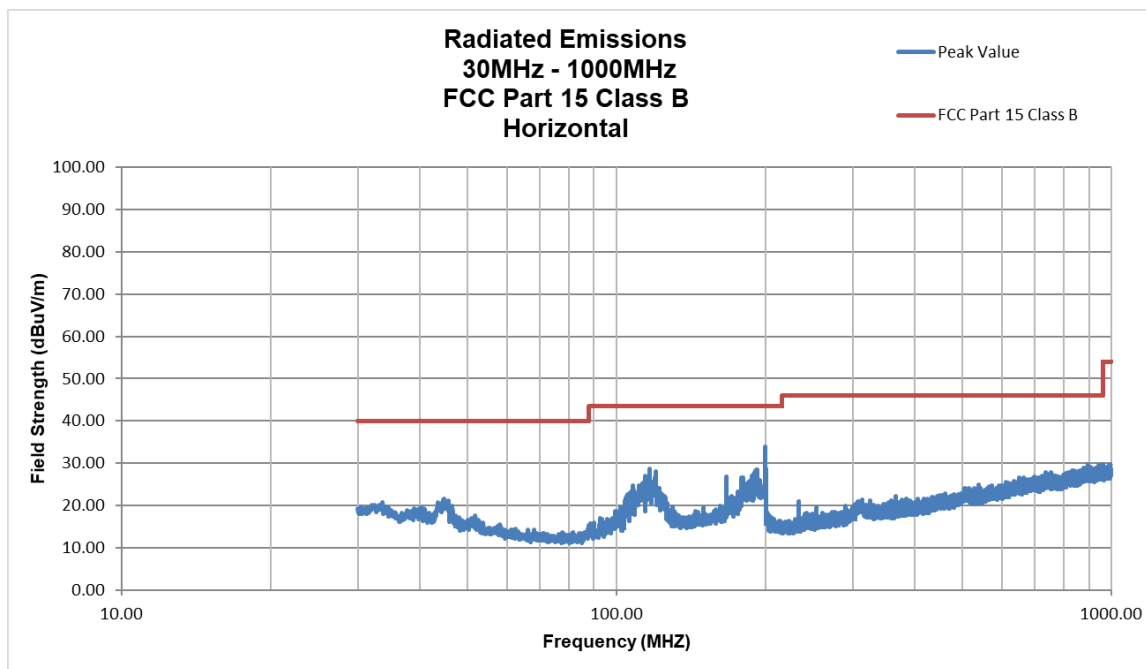


Figure 29. Intentional Radiator, Radiated Emissions Horizontal, 30 MHz – 1000 MHz – Corner Antenna

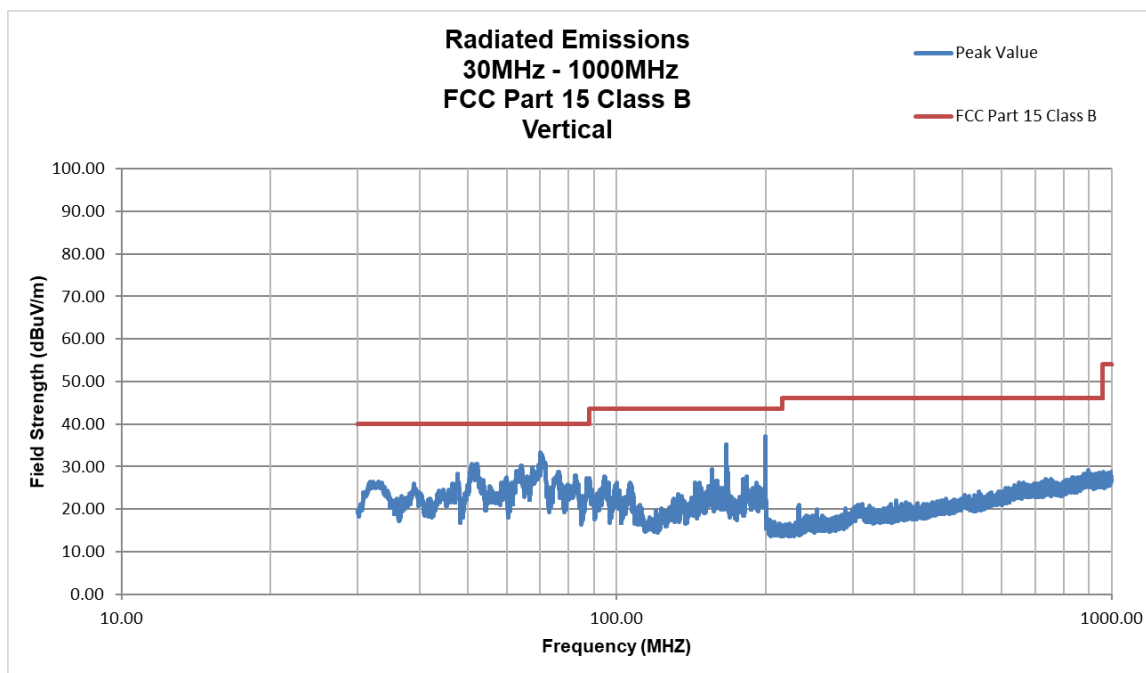


Figure 30. Intentional Radiator, Radiated Emissions Vertical, 30 MHz – 1000 MHz – Corner Antenna

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The worst-case radiated emission in the range of Above 1 GHz was 7.9 dB below the limit at 2084 MHz. This signal is found below. All other radiated emissions were 9.1 dB or more below the limit.

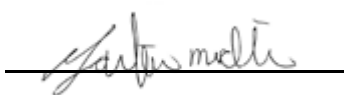
Table 17. Spurious Radiated Emissions – Patch Antenna (Above 1 GHz)

Test: FCC Part 15.209 and RSS-Gen 8.9							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK / AVG
1866.00	37.74	0.97	38.71	54.0	3.00m./HORZ	15.3	AVG
2799.00	38.54	4.78	43.32	54.0	3.00m./HORZ	10.7	AVG
6181.00	32.26	6.55	38.81	54.0	3.00m./HORZ	15.2	AVG
7279.00	29.34	8.85	38.19	54.0	3.00m./HORZ	15.8	AVG
12861.00	28.56	15.45	44.01	54.0	3.00m./HORZ	10.0	AVG
2051.00	39.07	3.00	42.07	54.0	3.00m./VERT	11.9	AVG
2084.00	43.42	2.71	46.13	54.0	3.00m./VERT	7.9	AVG
2119.00	42.34	2.61	44.95	54.0	3.00m./VERT	9.1	AVG
6187.00	33.00	6.54	39.54	54.0	3.00m./VERT	14.5	AVG
6264.00	31.52	6.78	38.30	54.0	3.00m./VERT	15.7	AVG
7268.00	30.39	9.29	39.68	54.0	3.00m./VERT	14.3	AVG
8205.00	34.57	8.09	42.66	54.0	3.00m./VERT	11.3	AVG
8460.00	35.48	8.09	43.57	54.0	3.00m./VERT	10.4	AVG
12482.00	26.58	11.96	38.54	54.0	3.0m./VERT	15.5	AVG
All emission above 13 GHz were greater than 20 dB below the applicable limit							

Sample Calculation at 1866 MHz:

Magnitude of Measured Frequency	37.74 dBuV
+Correction Factors	0.97 dB
Corrected Result	38.71 dBuV

Test Date: March 2-4, 2026

Tested by
 Signature:  Name: Gabriel Medina

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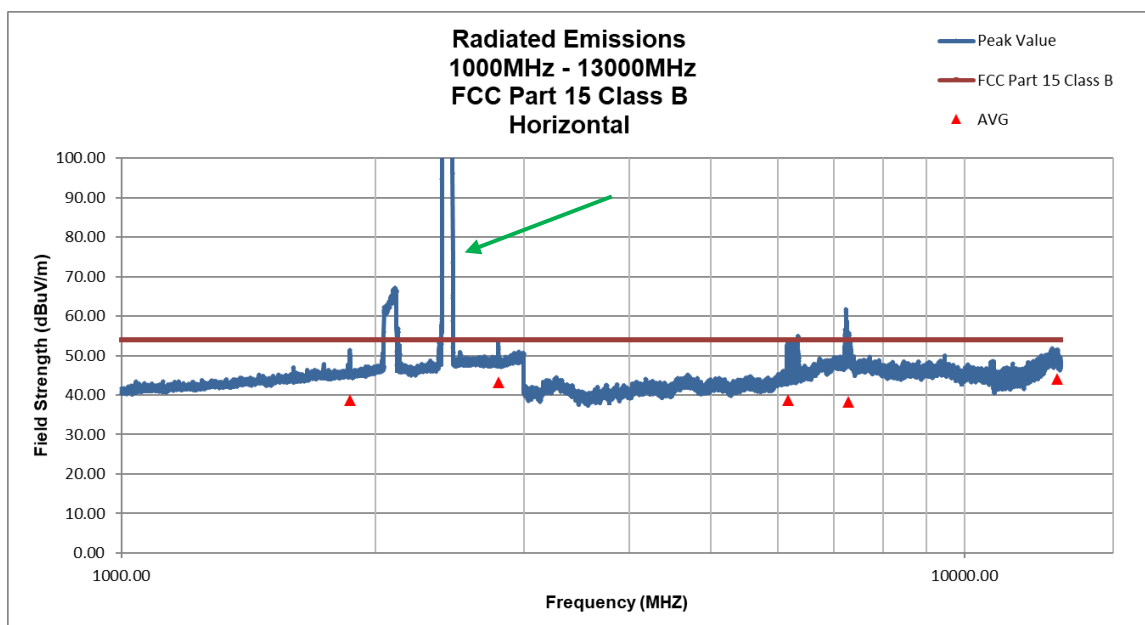


Figure 31. Intentional Radiator, Radiated Emissions Horizontal, Above 1000 MHz – Patch Antenna

Note: Fundamental emission identified with green arrow.

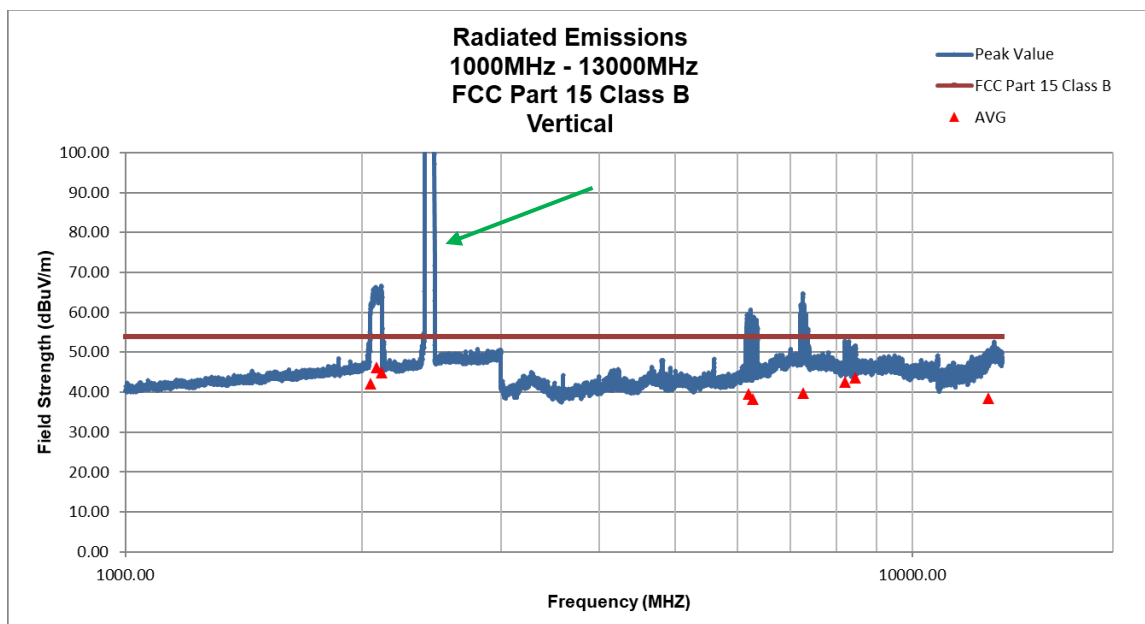


Figure 32. Intentional Radiator, Radiated Emissions Vertical, Above 1000 MHz – Patch Antenna

Note: Fundamental emission identified with green arrow.

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2.14. Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4. A coverage factor of $k=2$ was used to give a level of confidence of approximately 95%.

2.14.1. Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.85 dB.

2.14.2. Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.4 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.19 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.08 dB.

3. Conclusions

The EUT is deemed to have met the requirements of the standards cited within the test report when tested as detailed in the present test report.