Intertek
731 Enterprise Drive
Lexington, KY 40510

Tel 859 226 1000
Fax 859 226 1040

www.intertek.com

Dormakaba USA Inc.
TEST REPORT

SCOPE OF WORK
EMC TESTING – CENCON X

REPORT NUMBER
105956124LEX-002

ISSUE DATE
10/30/2024

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DOCUMENT CONTROL NUMBER
Non-Specific EMC Report Shell Rev. December 2017

EMC TEST REPORT

(FULL COMPLIANCE)

Report Number: 105956124LEX-002
Project Number: G105956124

Report Issue Date: 10/30/2024

Model Tested: Cencon X

Standards: FCC Title 47 CFR Part 15.247
RSS-247 Issue 3
RSS-GEN Issue 5

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

Client:
Dormakaba USA Inc.
1525 Bull Lea Rd. #100
Lexington, KY 40511
USA

Report prepared by

David Perry,
EMC Engineer

Report reviewed by

Michael Carlson,
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	Frequency Stability (ANSI C63.10 (2020) §6.8.1 and §6.8.2)	Pass
7	Occupied/DTS Bandwidth (ANSI C63.10 (2020) §6.9.3 and §11.8)	Pass
8	Fundamental Emission Output Power (ANSI C63.10 (2020) §11.9)	Pass
9	Maximum Power Spectral Density (ANSI C63.10 (2020) §11.10)	Pass
10	Conducted Spurious Emissions (ANSI C63.10 (2020) §11.11)	Pass
11	Radiated Spurious Emissions ANSI C63.10 (2020) §6.3 §6.5 and §6.6	Pass
12	Antenna Requirement (FCC Part 15.203, RSS-Gen Issue 5 § 6.8)	Pass

3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Dormakaba USA Inc.
Address:	1525 Bull Lea Rd. #100 Lexington, KY 40511 USA
Contact:	Tejaswi Desari
Email:	Tejaswi.dasari@dormakaba.com
Manufacturer Information	
Manufacturer Name:	Dormakaba USA Inc.
Manufacturer Address:	1525 Bull Lea Rd. #100 Lexington, KY 40511 USA

4 Description of Equipment under Test

Equipment Under Test	
Product Name	Cencon X
Part Number	CNXLLLLLLLLDZZ000
Serial Number	DZZ3288091124N
Receive Date	10/21/2024
Test Start Date	10/22/2024
Test End Date	10/23/2024
Device Received Condition	Good
Test Sample Type	Production
Transmit Band	2402MHz – 2480MHz Bluetooth
Nominal DTS Bandwidth	1000kHz
Antenna Type	Integral Antenna
Antenna Gain[1]	1.5dBi
Rated Voltage	2 x 9VDC Batteries
Description of Equipment Under Test (provided by client)	
The Cencon X is a lock with BLE capabilities	

[1] This information was provided by the client and may affect compliance. Intertek does not make any claim of compliance for values other than those shown.

5 System Setup and Method

5.1 Method:

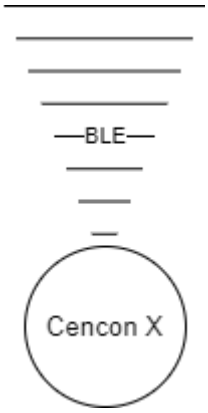
Configuration as required by ANSI C63.10 (2020)

No.	Descriptions of EUT Exercising
1	The transmitter was transmitted constantly on low, mid, or high channel.

Cables					
QTY	Description	Length (m)	Shielding	Ferrites	Termination
-	-	-	-	-	-

Support Equipment (Accessories)		
Description	Manufacturer	Model Number
-	-	-

5.2 EUT Block Diagram:



6 Frequency Stability

6.1 Test Method:

Tests are performed in accordance with ANSI C63.10 §6.8.1 and §6.8.2

6.2 Test Limits:

Title 47 CFR 2.1055(a)

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section

Title 47 CFR 2.1055(b)

Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

Title 47 CFR 2.1055(d)

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer

RSS-GEN §6.11

For licensed devices, the following measurement conditions apply:

a. at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer’s rated supply voltage
b. at the temperature of +20°C (+68°F) and at ±15% of the manufacturer's rated supply voltage

For license-exempt devices, the following conditions apply:

a. at the temperatures of -20°C (-4°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer’s rated supply voltage
b. at the temperature of +20°C (+68°F) and at ±15% of the manufacturer's rated supply voltage

RSS-GEN §8.11

If the frequency stability of the license-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation. In addition, its occupied bandwidth shall be entirely outside the restricted bands and the prohibited TV bands of 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-602 MHz, unless otherwise indicated.

6.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Spectrum Analyzer	8305	Rohde & Schwarz	FSW26	9/20/2024	9/20/2025
Environmental Chamber	3949	TestEquity	115A	1/24/2024	1/24/2025
RMS Clamp Meter	8191	Fluke	381	1/25/2024	1/25/2025

6.4 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Receiver step size and proximity to noise floor.	2.89

No measurement correction based on measurement uncertainty is performed.

6.5 Test Conditions

Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
David Perry	N/A	10/22/2024	19.8°C	44.7%	992.2mbar

6.6 Test Results:

The sample tested was found to Comply.

6.7 Test Data: Temperature and Voltage Variation

6.7.1 Low Channel

Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)
-30	2402.00	2401.99
-20	2402.00	2401.99
-10	2402.00	2401.99
0	2402.00	2401.99
10	2402.00	2402.00
20	2402.00	2401.99
30	2402.00	2401.99
40	2402.00	2401.98
50	2402.00	2401.98

Nominal Voltage (V)	Relative Voltage (%)	Test Voltage (V)	Nominal Frequency (MHz)	Measure Frequency (MHz)
9	85	7.65	2402	2401.99
9	115	10.35	2402	2401.99

6.7.2 Mid Channel

Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)
-30	2426.00	2425.99
-20	2426.00	2426.00
-10	2426.00	2426.00
0	2426.00	2426.00
10	2426.00	2425.99
20	2426.00	2425.99
30	2426.00	2425.98
40	2426.00	2425.98
50	2426.00	2425.98

Nominal Voltage (V)	Relative Voltage (%)	Test Voltage (V)	Nominal Frequency (MHz)	Measure Frequency (MHz)
9	85	7.65	2426	2425.99
9	115	10.35	2426	2425.99

6.7.3 High Channel

Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)
-30	2480.00	2479.99
-20	2480.00	2479.99
-10	2480.00	2480.00
0	2480.00	2480.01
10	2480.00	2480.01
20	2480.00	2479.99
30	2480.00	2479.99
40	2480.00	2479.99
50	2480.00	2479.99

Nominal Voltage (V)	Relative Voltage (%)	Test Voltage (V)	Nominal Frequency (MHz)	Measure Frequency (MHz)
9	85	7.65	2480	2479.99
9	115	10.35	2480	2479.99

7 Occupied/DTS Bandwidth

7.1 Test Method:

Tests are performed in accordance with ANSI C63.10 §6.9.3 and §11.8.

7.2 Test Limits:

Title 47 CFR 15.247(a)

(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

RSS-247 §5.2

a. The minimum 6 dB bandwidth shall be 500 kHz.

RSS-GEN §6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

7.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Spectrum Analyzer	8305	Rohde & Schwarz	FSW26	9/20/2024	9/20/2025

7.4 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Receiver step size and proximity to noise floor.	2.89

No measurement correction based on measurement uncertainty is performed.

7.5 Test Conditions

Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
David Perry	N/A	10/22/2024	19.8°C	44.7%	992.2mbar

7.6 Test Results:

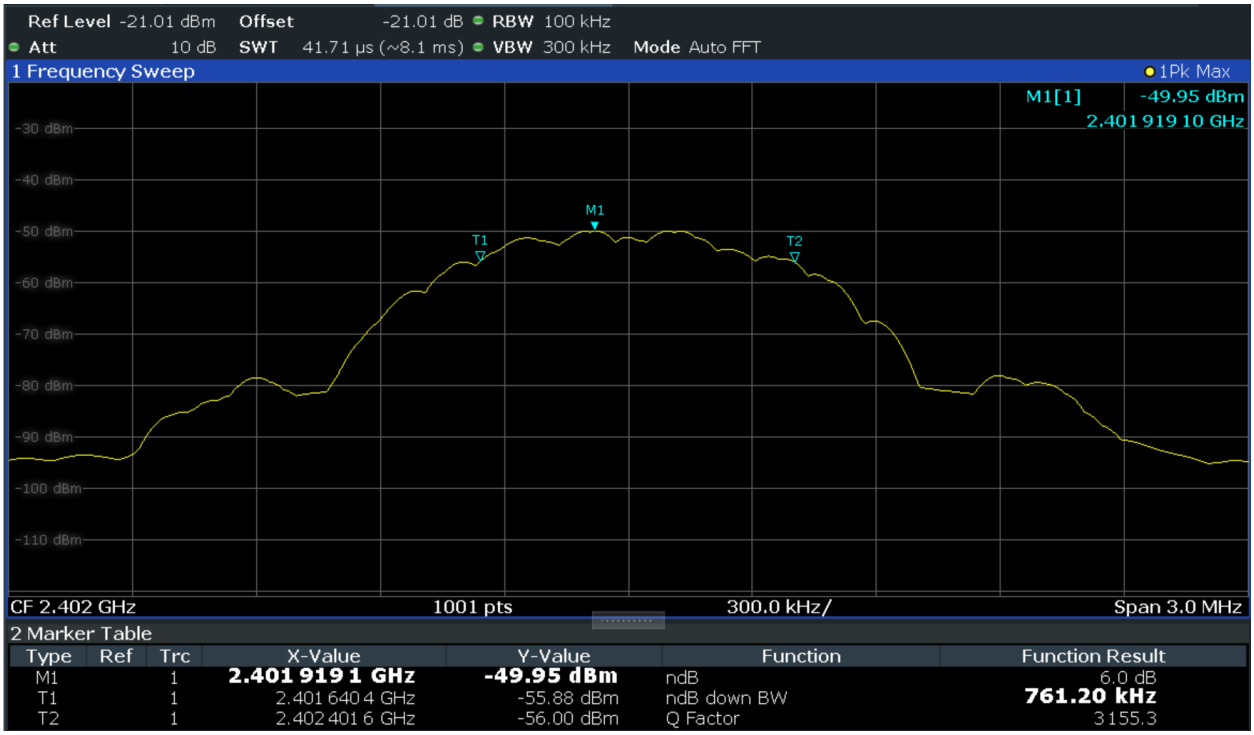
The sample tested was found to Comply. The 6dB bandwidth was at least 500 kHz.

7.7 Test Data:

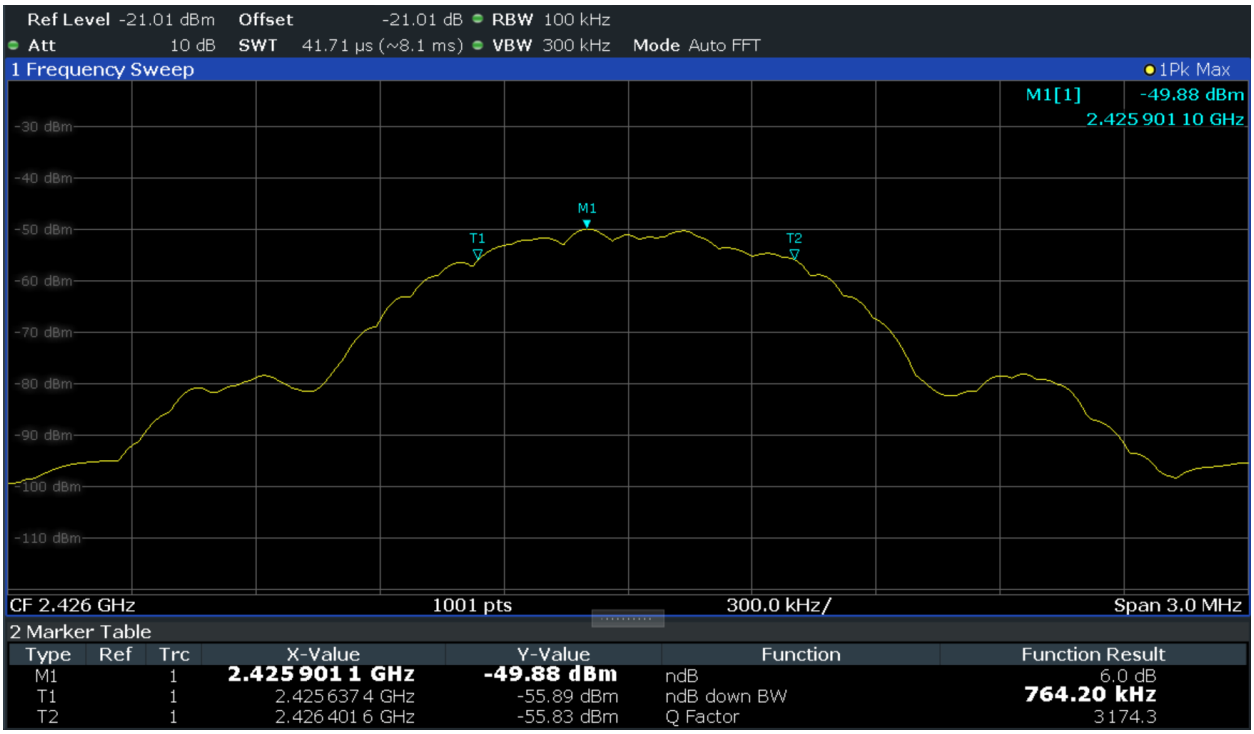
Frequency (MHz)	6dB Bandwidth (kHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)
2402	761.2	1150	1060	500
2426	764.2	1140	1067	500
2480	749.3	1130	1046	500

7.8 Test Plots: Occupied Channel Bandwidth (6dB Bandwidth)

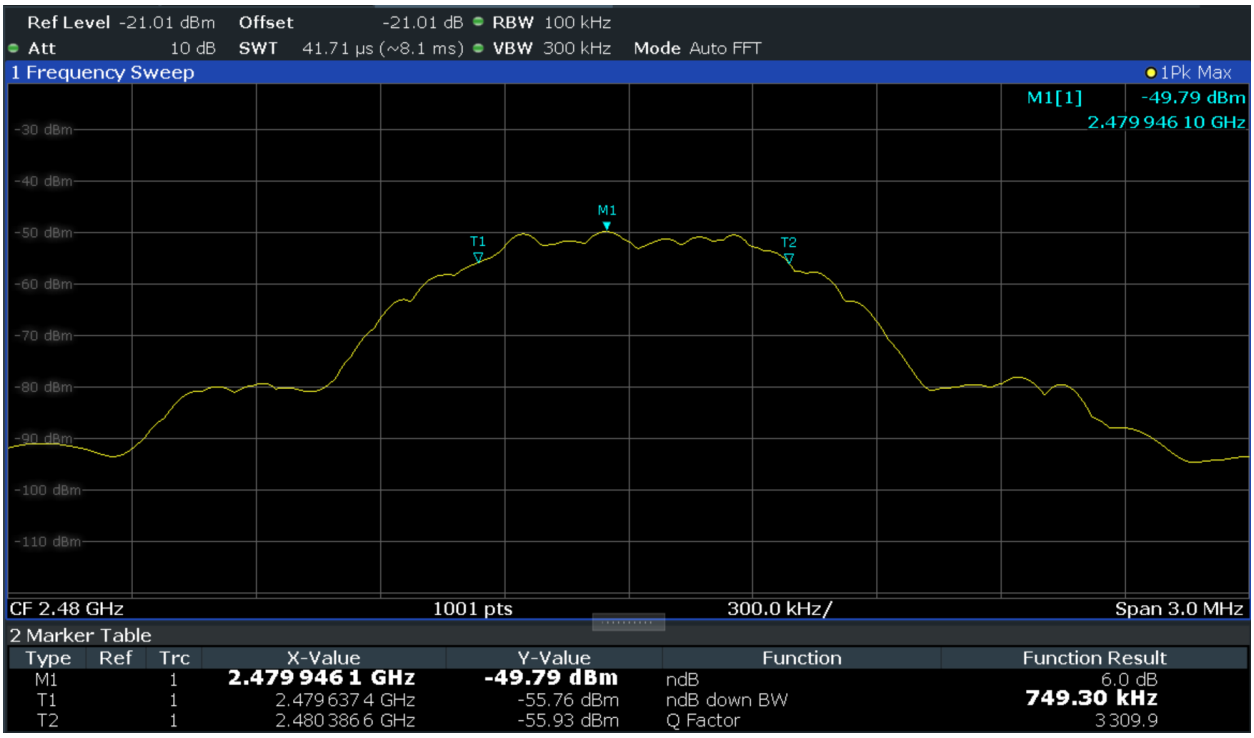
7.8.1 Low Channel



7.8.2 Mid Channel



7.8.3 High Channel



7.9 Test Plots: Occupied Channel Bandwidth (20dB Bandwidth)

7.9.1 Low Channel

7.9.2 Mid Channel

7.9.3 High Channel

7.10 Test Plots: Occupied Channel Bandwidth (99% Bandwidth)

7.10.1 Low Channel

7.10.2 Mid Channel

7.10.3 High Channel

8 Fundamental Emissions Output Power

8.1 Test Method:

Tests are performed in accordance with ANSI C63.10 §11.9.

8.2 Test Limits:

47 CFR 15.247(b)

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

RSS-247 §5.4

d. For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

8.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Spectrum Analyzer	8305	Rohde & Schwarz	FSW26	9/20/2024	9/20/2025

8.4 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Receiver Reading Signal Chain Loss Signal Chain Loss Interpolation Sine Wave Voltage Proximity to Noise Floor Mismatch, EUT-signal chain-receiver	1.2

No measurement correction based on measurement uncertainty is performed.

8.5 Test Conditions

Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
David Perry	N/A	10/23/2024	21.3°C	43.9%	985.4mbar

8.6 Test Results:

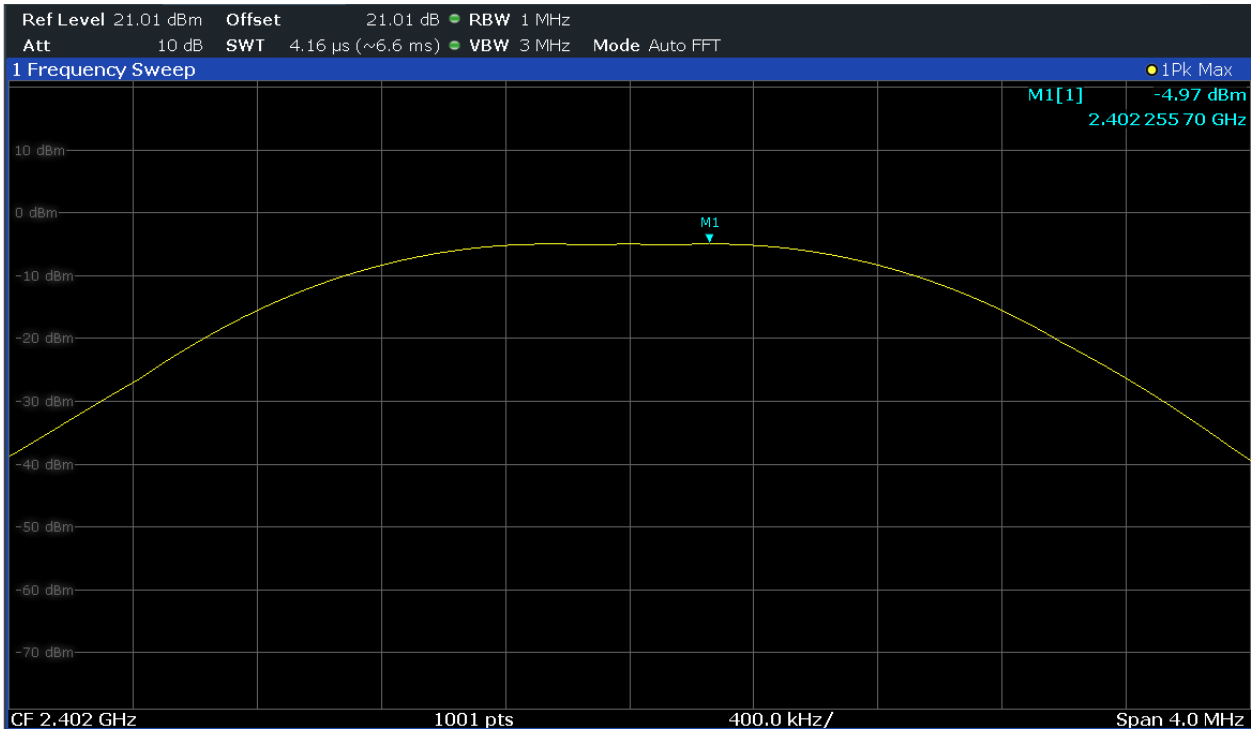
The sample tested was found to Comply. The conducted output power was less than 1 W. The EIRP was last than 4 W.

8.7 Test Data:

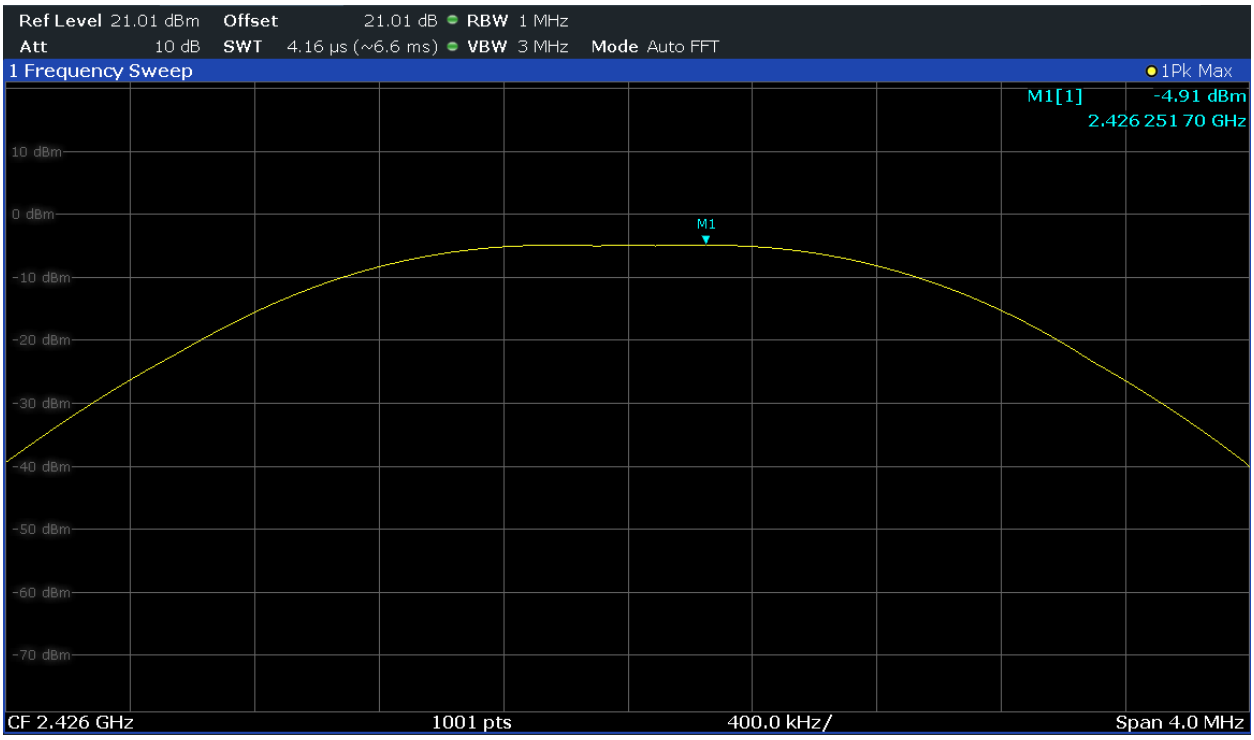
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Output Power Limit (W)	EIRP Limit (W)
2402	-4.97	3.18E-04	1.5	-3.47	4.50E-04	1	4
2426	-4.91	3.23E-04	1.5	-3.41	4.56E-04	1	4
2480	-4.72	3.37E-04	1.5	-3.22	4.76E-04	1	4

8.8 Test Plots: Output Power

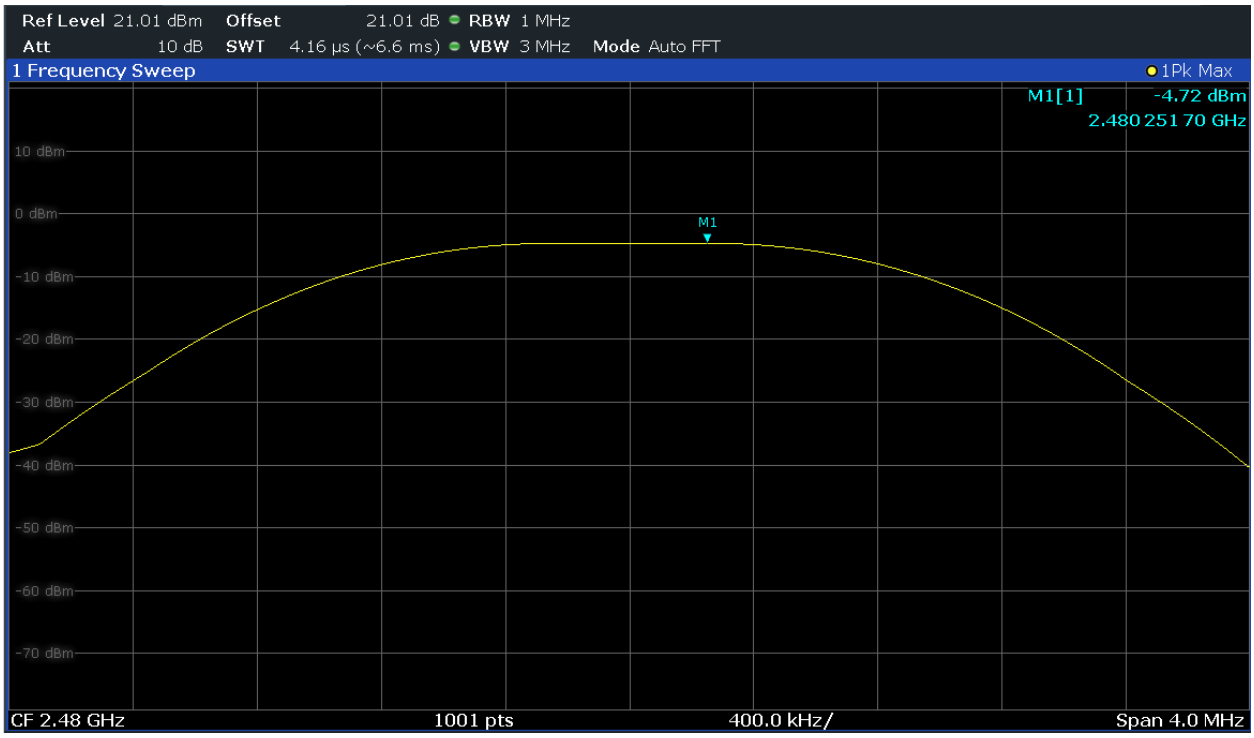
8.8.1 Low Channel



8.8.2 Mid Channel



8.8.3 High Channel



9 Maximum Power Spectral Density (PSD)

9.1 Test Method:

Tests are performed in accordance with ANSI C63.10 §11.10.

9.2 Test Limits:

47 CFR 15.247(e)

> For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

RSS-247 §5.2

b. The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

9.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Spectrum Analyzer	8305	Rohde & Schwarz	FSW26	9/20/2024	9/20/2025

9.4 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Receiver Reading Signal Chain Loss Signal Chain Loss Interpolation Sine Wave Voltage Proximity to Noise Floor Mismatch, EUT-signal chain-receiver	1.2

No measurement correction based on measurement uncertainty is performed.

9.5 Test Conditions

Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
David Perry	N/A	10/23/2024	21.3°C	43.9%	985.4mbar

9.6 Test Results:

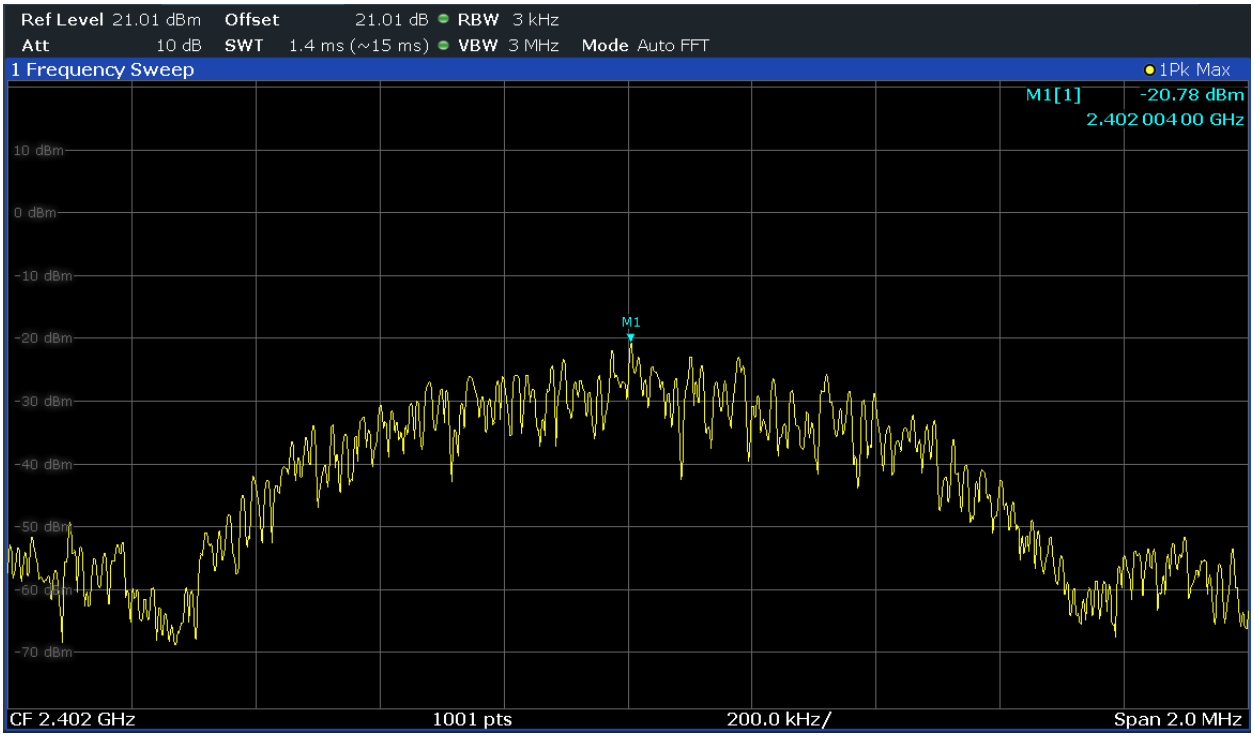
The sample tested was found to Comply. The power spectral density was less than 8 dBm/3kHz.

9.7 Test Data:

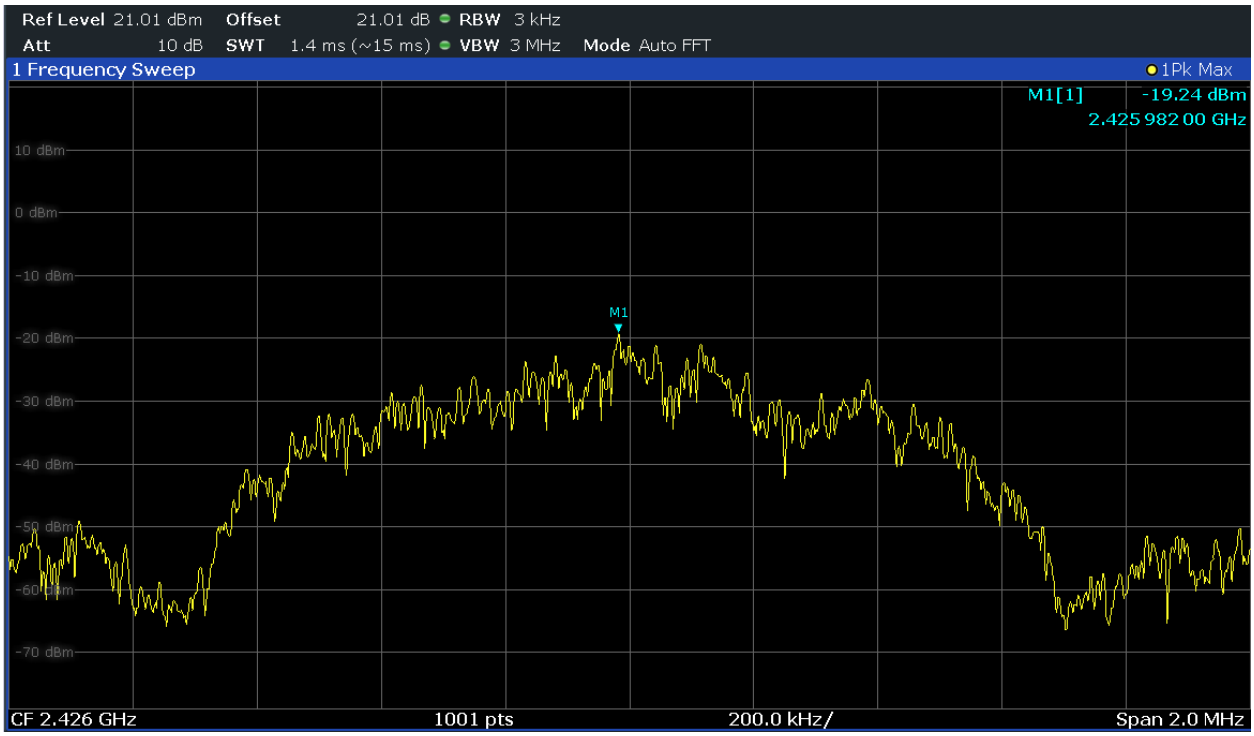
Frequency (MHz)	Max Conducted PSD (dBm/3kHz)	Antenna Gain (dBi)	PSD EIRP (dBm/3kHz)	Limit (dBm/3kHz)
2402	-20.78	1.5	-19.28	8
2426	-19.24	1.5	-17.74	8
2480	-21.77	1.5	-20.27	8

9.8 Test Plots: Power Spectral Density

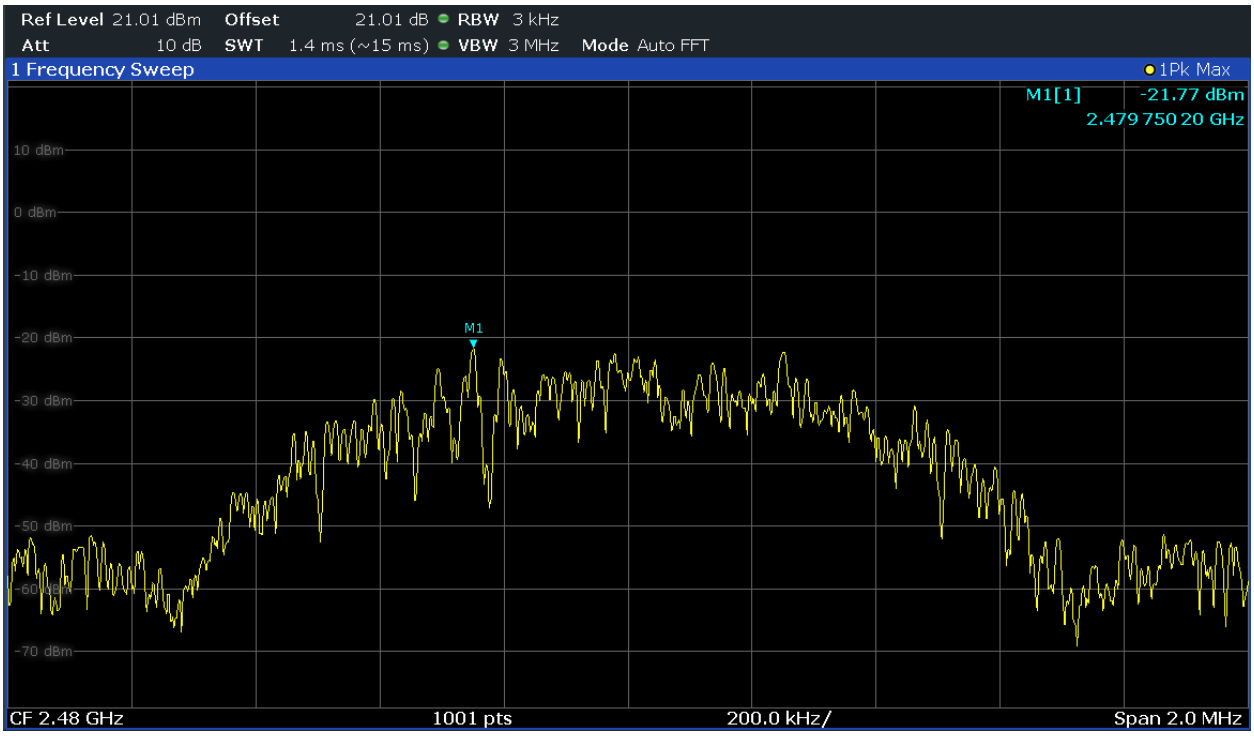
9.8.1 Low Channel



9.8.2 Mid Channel



9.8.3 High Channel



10 Conducted Spurious Emissions

10.1 Test Method:

Tests are performed in accordance with ANSI C63.10 §11.11.

10.2 Test Limits:

47 CFR 15.247(d)

> In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

RSS-247 §5.5

> In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

10.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
Spectrum Analyzer	8305	Rohde & Schwarz	FSW26	9/20/2024	9/20/2025

10.4 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Receiver Reading Signal Chain Loss Signal Chain Loss Interpolation Sine Wave Voltage Proximity to Noise Floor Mismatch, EUT-signal chain-receiver	1.2

No measurement correction based on measurement uncertainty is performed.

10.5 Test Conditions

Test Personnel	Supervising / Reviewing Engineer	Test Date	Ambient Temperature	Relative Humidity	Pressure
David Perry	N/A	10/23/2024	21.3°C	43.9%	985.4mbar

10.6 Test Results:

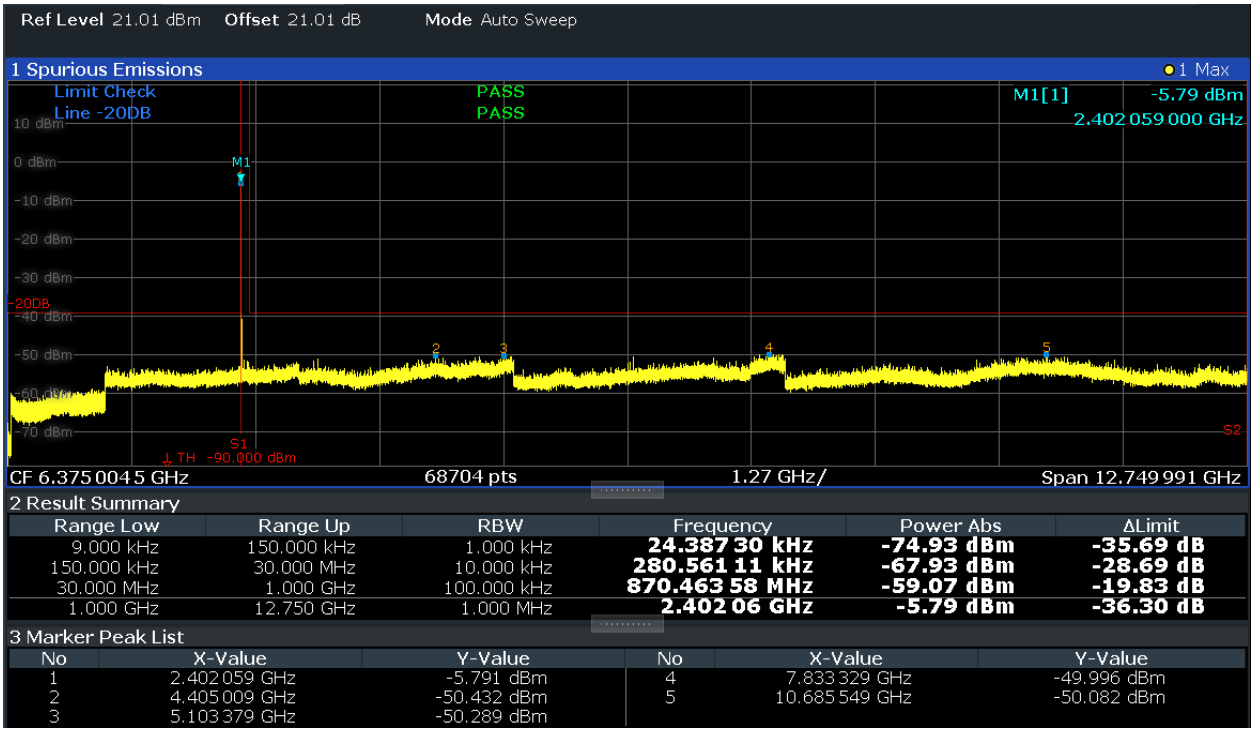
The sample tested was found to Comply.

10.7 Test Data:

Frequency (MHz)	Reference Level Max PSD (dBm)	Highest 3 Unwanted Emissions Level (dBm)	Margin (dB)	Limit (dB)
2402	-20.78	-49.996 -50.082 -50.289	9.216 9.302 9.509	-40.78
2426	-19.24	-50.193 -48.914 -49.921	10.953 9.674 10.681	-39.24
2480	-21.77	-47.789 -49.373 -49.334	6.019 7.603 7.564	-41.77

10.8 Test Plots: Emissions in Non-Restrictive Bands

10.8.1 Low Channel



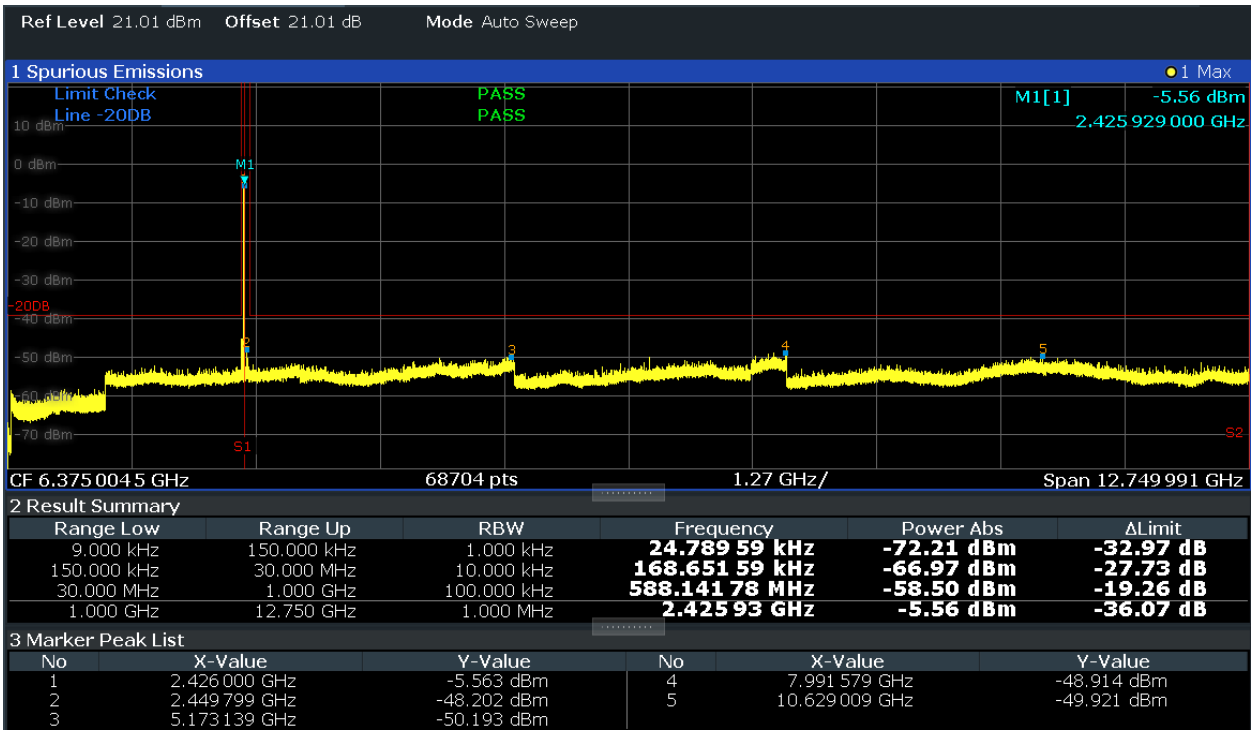
2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	**24.387 30 kHz**	**-74.93 dBm**	**-35.69 dB**
150.000 kHz	30.000 MHz	10.000 kHz	**280.561 11 kHz**	**-67.93 dBm**	**-28.69 dB**
30.000 MHz	1.000 GHz	100.000 kHz	**870.463 58 MHz**	**-59.07 dBm**	**-19.83 dB**
1.000 GHz	12.750 GHz	1.000 MHz	**2.402 06 GHz**	**-5.79 dBm**	**-36.30 dB**

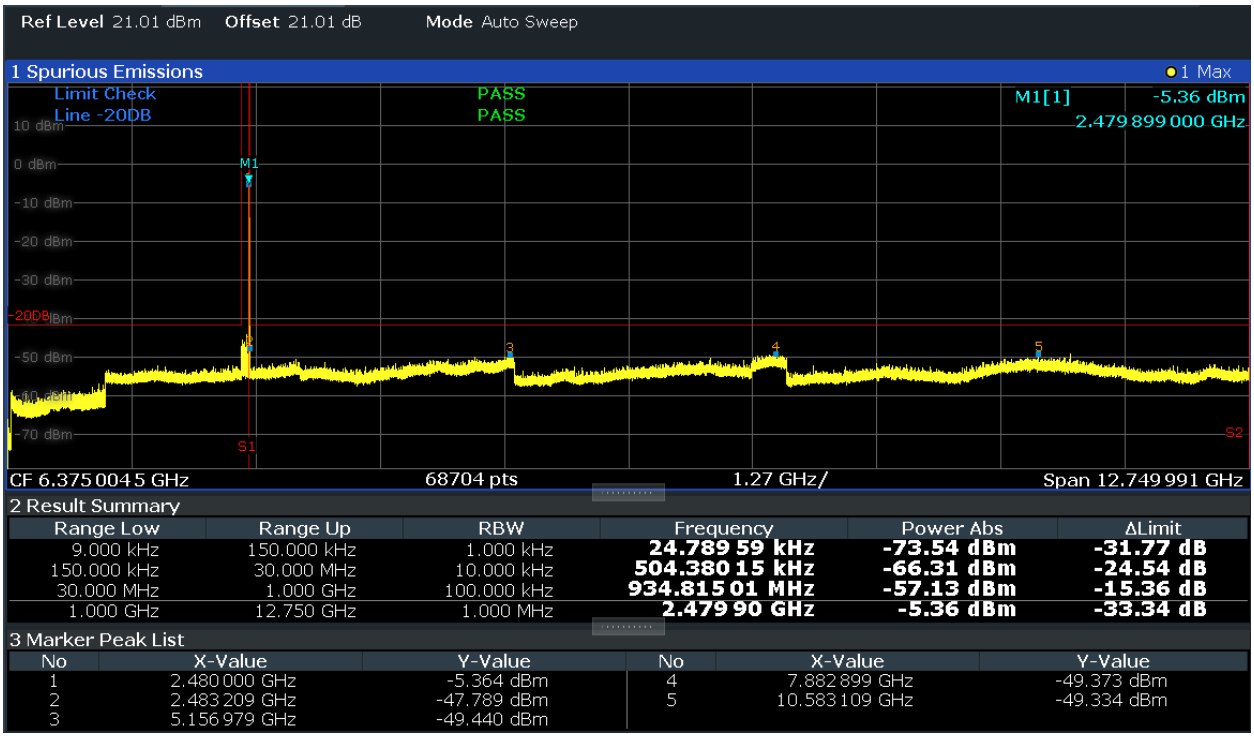
3 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	2.402 059 GHz	-5.791 dBm	4	7.833 329 GHz	-49.996 dBm
2	4.405 009 GHz	-50.432 dBm	5	10.685 549 GHz	-50.082 dBm
3	5.103 379 GHz	-50.289 dBm			

10.8.2 Mid Channel



10.8.3 High Channel



2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	**24.789 59 kHz**	**-73.54 dBm**	**-31.77 dB**
150.000 kHz	30.000 MHz	10.000 kHz	**504.380 15 kHz**	**-66.31 dBm**	**-24.54 dB**
30.000 MHz	1.000 GHz	100.000 kHz	**934.815 01 MHz**	**-57.13 dBm**	**-15.36 dB**
1.000 GHz	12.750 GHz	1.000 MHz	**2.479 90 GHz**	**-5.36 dBm**	**-33.34 dB**

3 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	2.480 000 GHz	-5.364 dBm	4	7.882 899 GHz	-49.373 dBm
2	2.483 209 GHz	-47.789 dBm	5	10.583 109 GHz	-49.334 dBm
3	5.156 979 GHz	-49.440 dBm			

11 Radiated Spurious Emissions

11.1 Test Method:

Tests are performed in accordance with ANSI C63.10 §6.3 §6.5 and §6.6.

11.2 Test Limits:

47 CFR 15.247(d)

> In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

RSS-247 §5.5

> In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

11.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	8258	Rohde & Schwarz	ESW44	10/10/2024	10/10/2025
Horn Antenna (18-40GHz)	3779	ETS	3116c	8/28/2024	8/28/2025
Horn Antenna (1-18GHz)	3780	ETS	3117	7/18/2024	7/18/2025
Bilog Antenna (30MHz-1GHz)	7085	SunAR	JB6	3/18/2024	3/18/2025
Magnetic Loop Antenna	2366	ETS	6502	9/16/2024	9/16/2025
System Controller	3957	Sunol Sciences	SC99V	Verify at Time of Use	Verify at Time of Use
Preamplifier (1-18GHz)	3918	Rohde & Schwarz	TS-PR18	3/1/2024	3/1/2025
18-40GHz Signal Path with Preamplifier	7020, 3921, 7021	-	-	1/12/2024	1/12/2025
30M-1G 3m Signal Path with Preamplifier	8311, 3919, 3172, 2592, 8188, 8185	-	-	1/12/2024	1/12/2025
1-18GHz Signal Path with Preamplifier	3074, 3918, 8310, 2593, 8188, 8185	-	-	3/1/2024	3/1/2025
1-18GHz Signal Path without Preamplifier	3074, 8310, 2593, 8188, 8185	-	-	3/1/2024	3/1/2025

11.4 Measurement Uncertainty

Description	Expanded Uncertainty (k=2)
Receiver Reading Cable Loss Cable Loss Interpolation Antenna Factor Sine Wave Voltage Proximity to Noise Floor Mismatch, Antenna-Preamp Mismatch, Preamp-Receiver Antenna Factor Interpolation Antenna Directivity Phase Center Location Cross-Polarization Site Imperfections Table Effect Measurement Distance variation Table Height	4.6

No measurement correction based on measurement uncertainty is performed.

11.5 Test Software Used:

Description	Manufacturer	Version
EMC32	Rohde & Schwarz	10.60.20

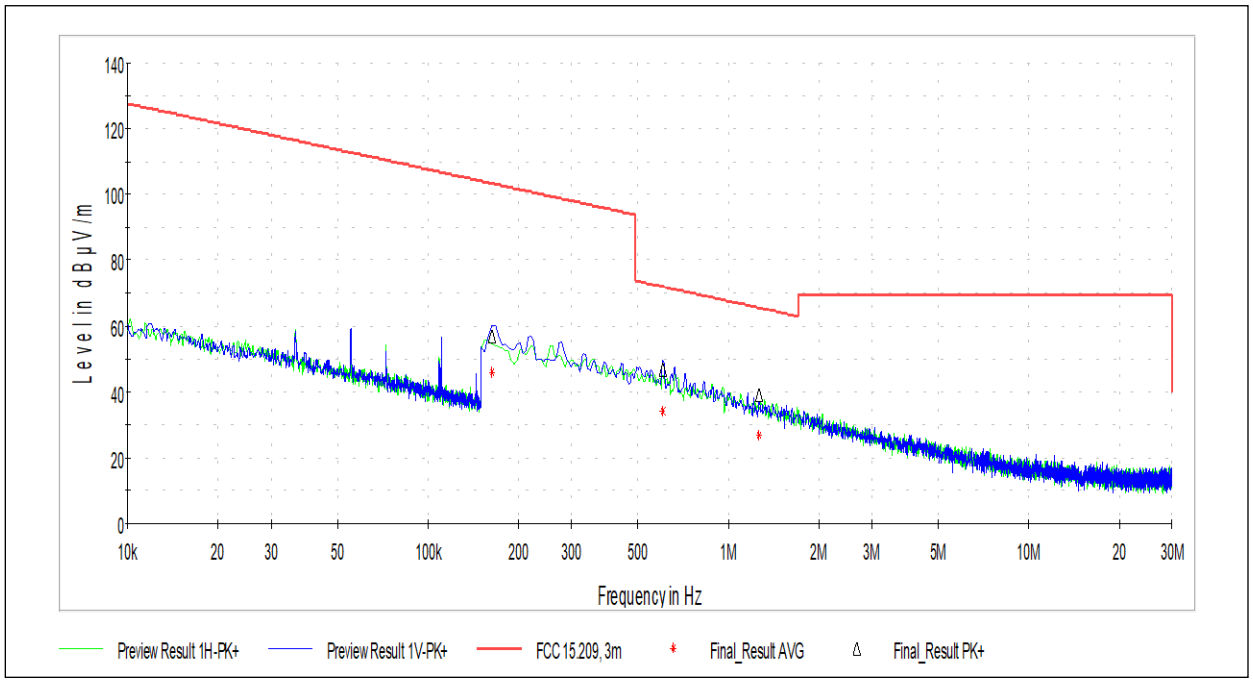
11.6 Test Results:

The sample tested was found to Comply. The device was investigated in three orthogonal axes.

11.7 Test Data: Radiated Spurious Emissions, General

11.7.1 Frequency Range 9kHz – 30MHz

11.7.1.1 Mid Channel



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.163169	57.07	103.35	46.28	100.0	V	286.0	12.1
0.606530	46.71	71.95	25.24	100.0	V	16.0	11.9
1.264985	39.01	65.59	26.58	100.0	V	309.0	12.0

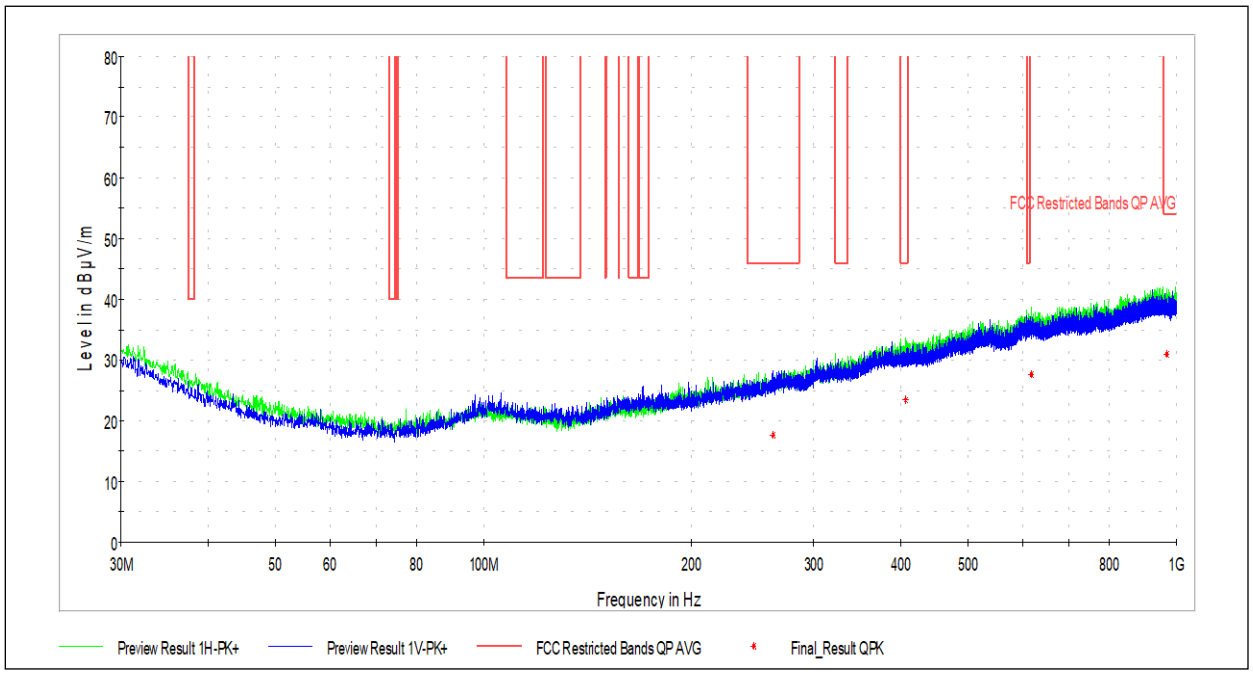
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
0.163169	45.96	103.35	57.39	100.0	V	286.0	12.1
0.606530	34.27	71.95	37.69	100.0	V	16.0	11.9
1.264985	26.75	65.59	38.84	100.0	V	309.0	12.0

Test Personnel:	David Perry	Test Date:	10/23/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	21.3°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	43.9%
		Atmospheric Pressure:	985.4mbar

Deviations, Additions, or Exclusions: None

11.7.2 Frequency Range 30MHz – 1GHz

11.7.2.1 Low Channel

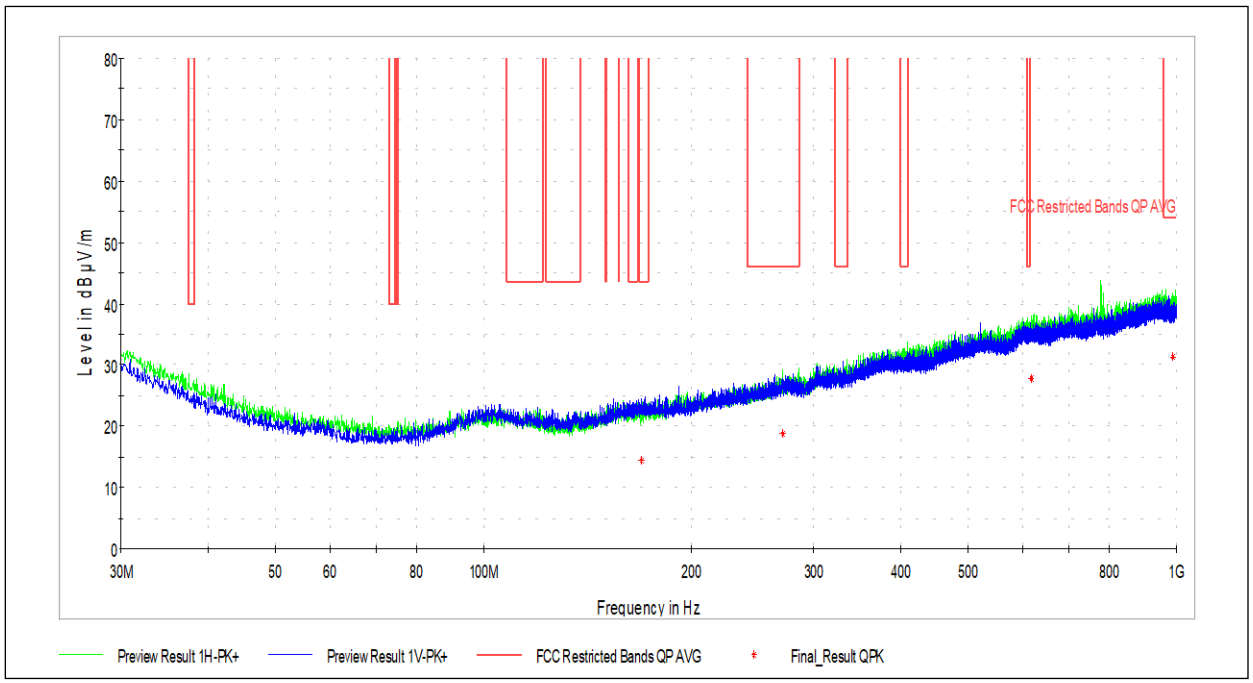


Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
262.045556	17.70	46.02	28.32	116.0	V	267.0	20.3
406.791111	23.45	46.02	22.57	382.0	H	224.0	25.0
617.442778	27.67	-	-	400.0	H	132.0	29.9
969.175556	31.00	53.98	22.98	327.0	H	116.0	33.2

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.7.2.2 Middle Channel

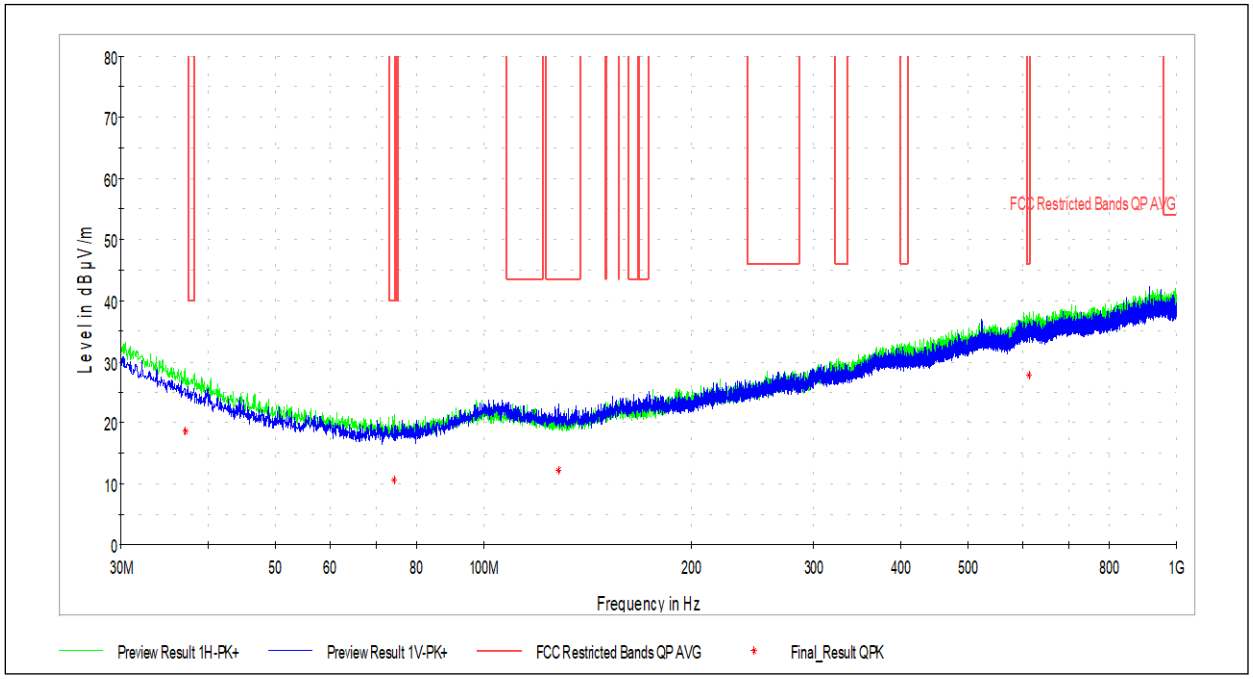


Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
168.925556	14.41	43.52	29.11	255.0	V	35.0	17.5
270.560000	18.78	46.02	27.25	331.0	H	259.0	21.0
617.604444	27.75	-	-	95.0	H	-2.0	29.9
987.174444	31.34	53.98	22.63	105.0	H	133.0	33.3

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.7.2.3 High Channel



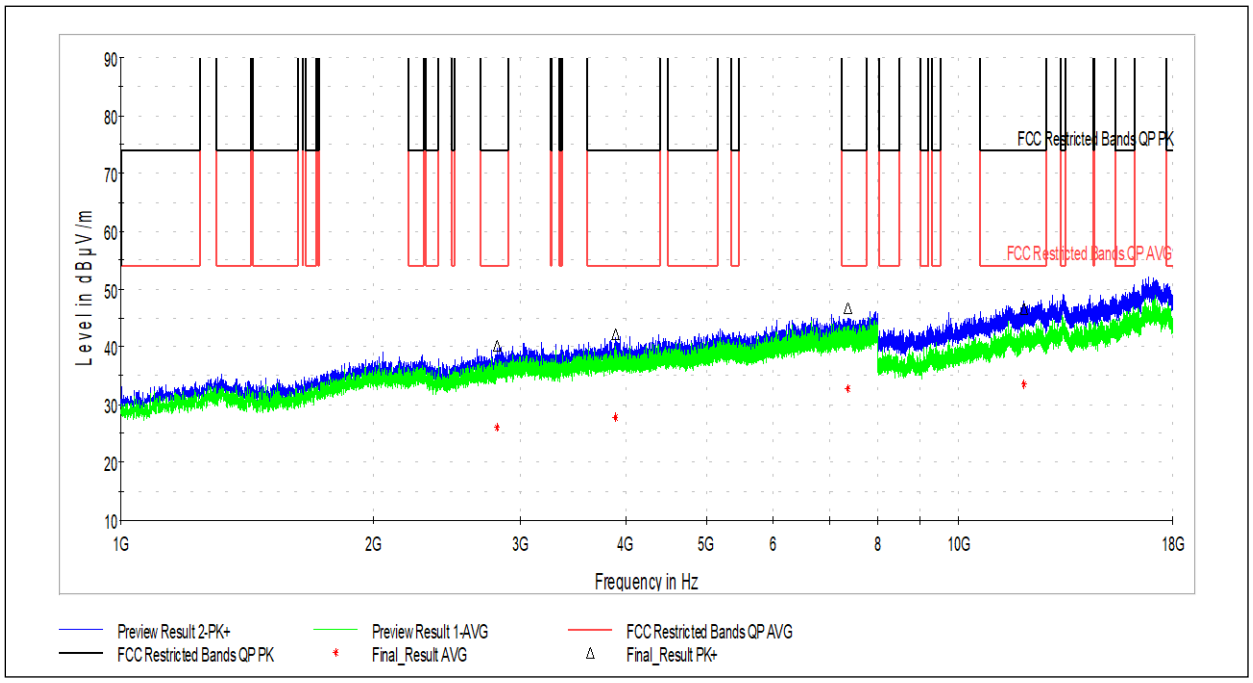
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.113333	18.63	-	-	285.0	H	141.0	20.9
74.296667	10.71	40.00	29.29	323.0	H	196.0	13.4
128.185556	12.13	43.52	31.40	199.0	V	0.0	15.5
612.970000	27.71	46.02	18.31	350.0	H	264.0	29.8

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.7.3 Frequency Range 1GHz – 18GHz

11.7.3.1 Low Channel



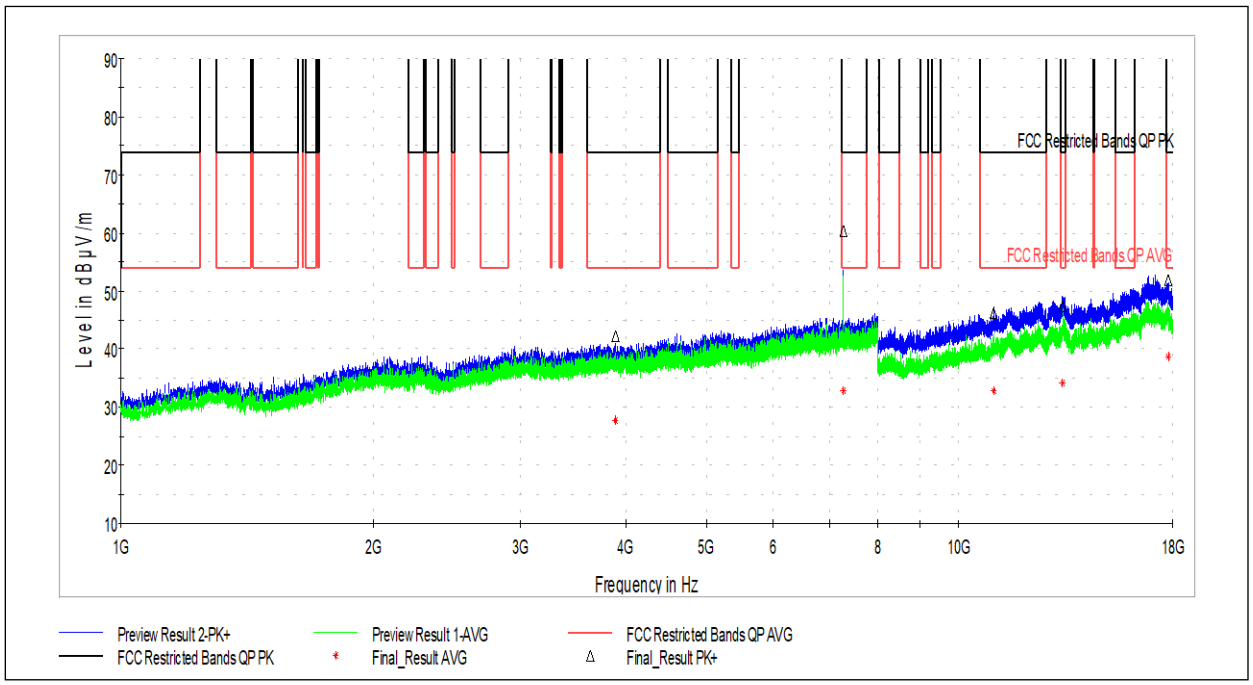
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2810.666667	40.15	73.98	33.83	410.0	H	197.0	6.1
3889.055556	42.19	73.98	31.79	100.0	V	205.0	8.3
7376.611111	46.80	73.98	27.18	410.0	H	78.0	13.4
11968.750000	46.47	73.98	27.51	100.0	H	0.0	20.2

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2810.666667	26.04	53.98	27.94	410.0	H	197.0	6.1
3889.055556	27.74	53.98	26.24	100.0	V	205.0	8.3
7376.611111	32.67	53.98	21.31	410.0	H	78.0	13.4
11968.750000	33.51	53.98	20.47	100.0	H	0.0	20.2

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.7.3.2 Middle Channel



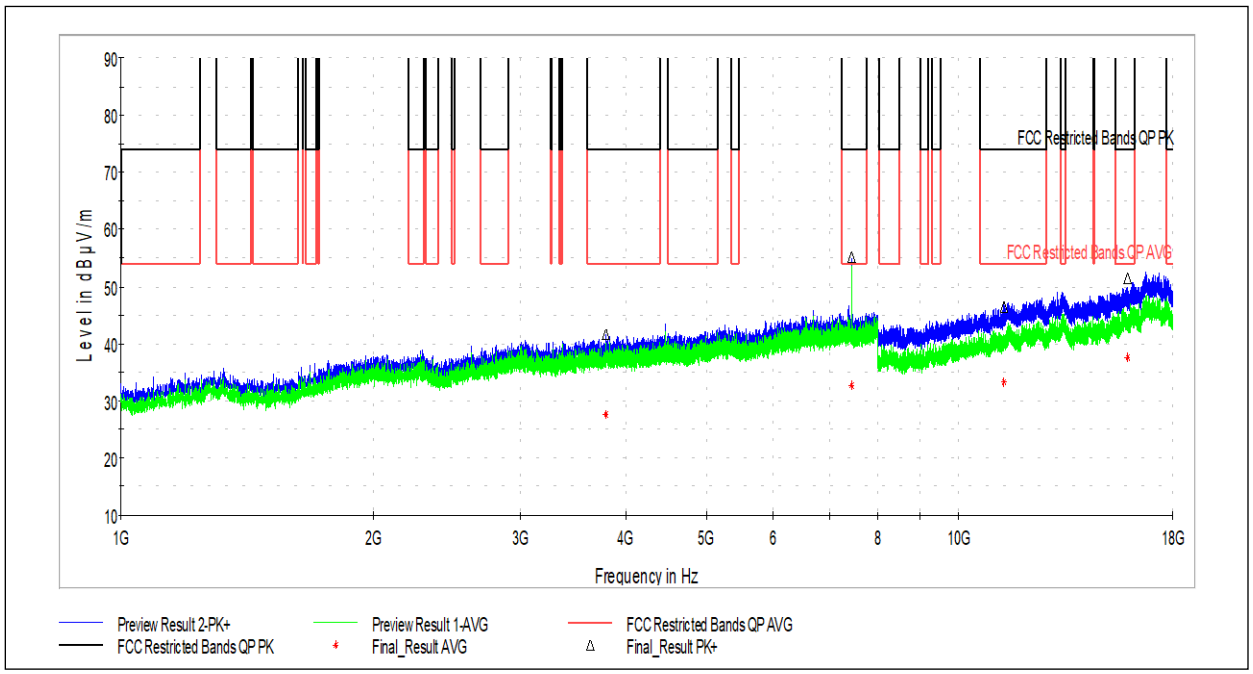
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3893.333333	42.25	73.98	31.73	410.0	V	0.0	8.3
7277.833333	60.30	73.98	13.68	290.0	V	311.0	13.3
11007.500000	46.09	73.98	27.89	410.0	V	140.0	19.3
13284.375000	47.31	73.98	26.67	116.0	H	0.0	21.5
17794.375000	51.77	73.98	22.21	410.0	V	222.0	26.1

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3893.333333	27.75	53.98	26.23	410.0	V	0.0	8.3
7277.833333	32.83	53.98	21.15	290.0	V	311.0	13.3
11007.500000	32.76	53.98	21.22	410.0	V	140.0	19.3
13284.375000	34.10	53.98	19.88	116.0	H	0.0	21.5
17794.375000	38.63	53.98	15.35	410.0	V	222.0	26.1

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.7.3.3 High Channel



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3789.888889	41.77	73.98	32.21	109.0	H	220.0	8.1
7439.611111	55.18	73.98	18.80	296.0	V	45.0	13.4
11329.375000	46.41	73.98	27.57	410.0	H	174.0	19.4
15890.000000	51.46	73.98	22.52	410.0	H	208.0	24.1

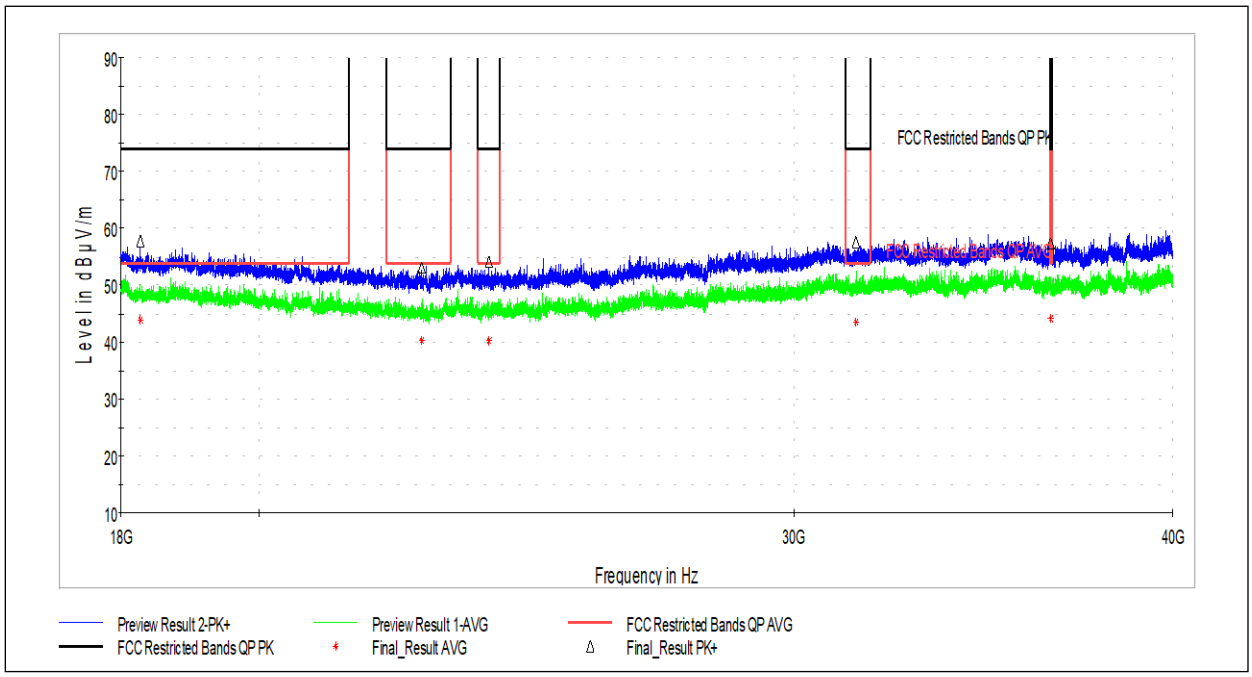
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3789.888889	27.61	53.98	26.37	109.0	H	220.0	8.1
7439.611111	32.71	53.98	21.27	296.0	V	45.0	13.4
11329.375000	33.28	53.98	20.70	410.0	H	174.0	19.4
15890.000000	37.63	53.98	16.35	410.0	H	208.0	24.1

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.7.4 Frequency Range 18GHz – 40GHz

11.7.4.1 Mid Channel



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18260.0000	57.70	73.98	16.28	410.0	V	0.0	28.5
22617.0000	53.12	73.98	20.86	410.0	V	336.0	14.6
23800.0000	54.02	73.98	19.96	410.0	V	0.0	13.7
31441.0000	57.58	73.98	16.40	100.0	H	0.0	22.6
36464.0000	57.43	73.98	16.55	410.0	V	0.0	23.5

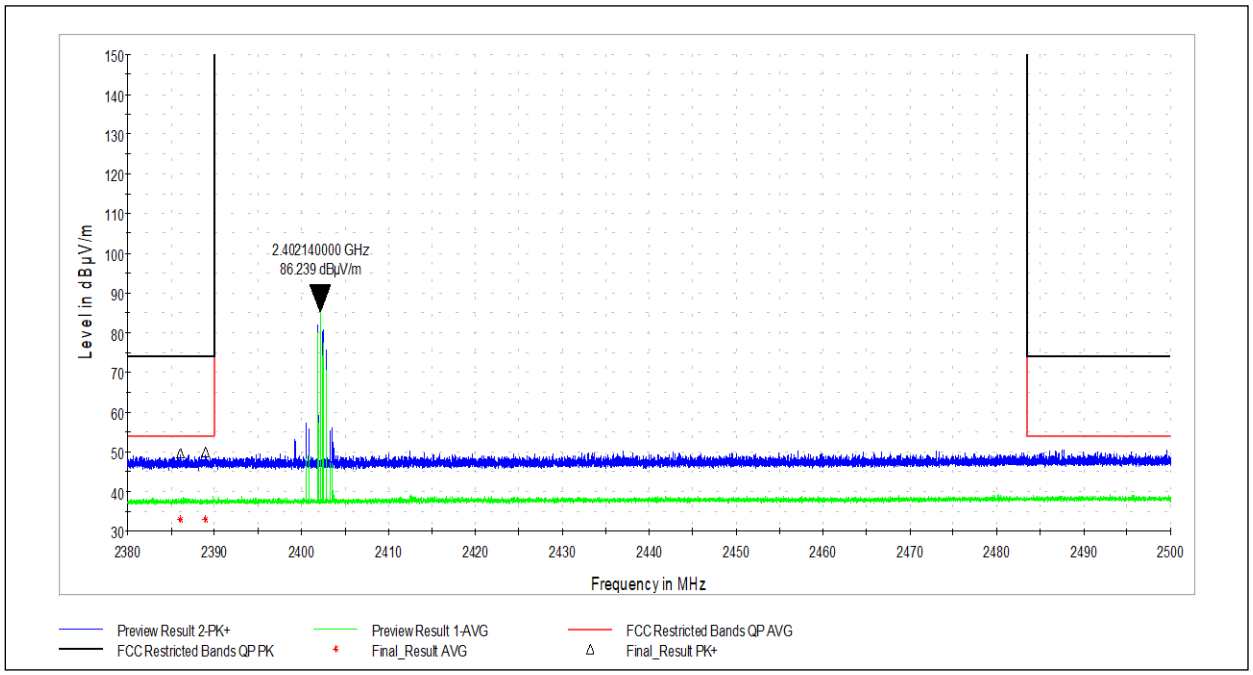
Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18260.0000	43.87	53.98	10.11	410.0	V	0.0	28.5
22617.0000	40.16	53.98	13.82	410.0	V	336.0	14.6
23800.0000	40.16	53.98	13.82	410.0	V	0.0	13.7
31441.0000	43.57	53.98	10.41	100.0	H	0.0	22.6
36464.0000	44.17	53.98	9.81	410.0	V	0.0	23.5

Test Personnel:	David Perry	Test Date:	10/23/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	21.3°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	43.9%
		Atmospheric Pressure:	985.4mbar

Deviations, Additions, or Exclusions: None

11.8 Test Data: Radiated Emissions, Band Edge

11.8.1 Low Channel Band Edge



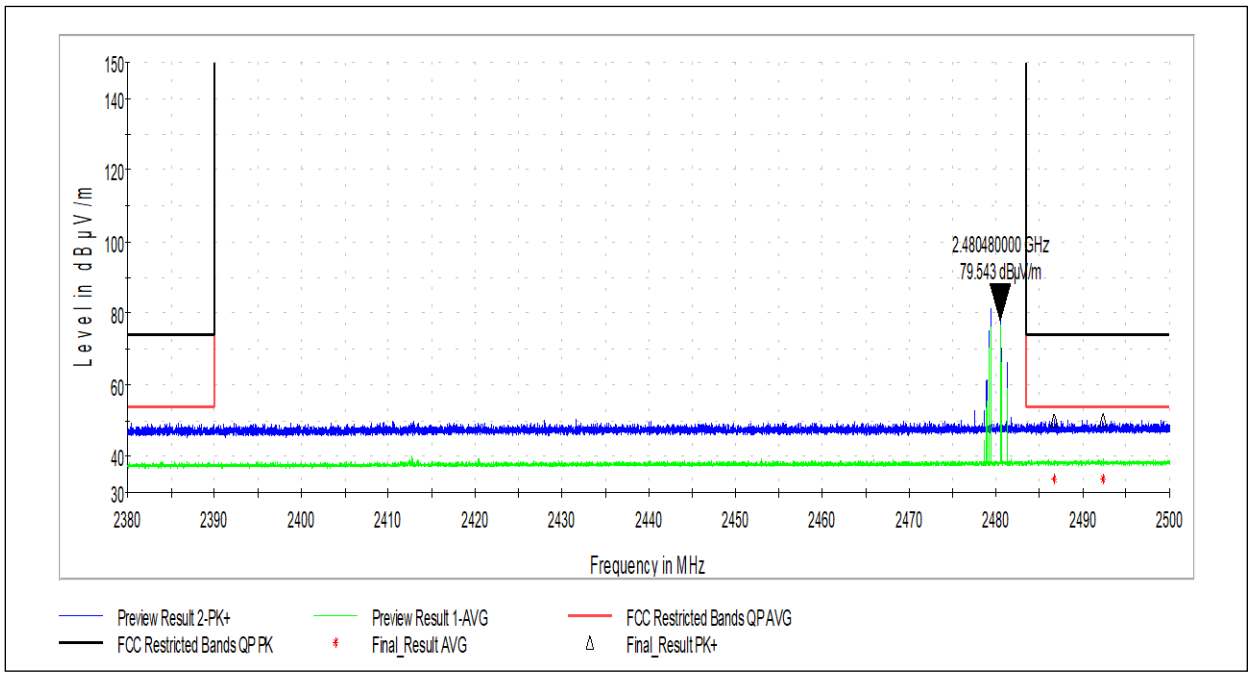
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2386.053333	49.67	73.98	24.31	306.0	V	0.0	38.5
2388.906667	50.07	73.98	23.91	410.0	V	0.0	38.5

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2386.053333	32.96	53.98	21.02	306.0	V	0.0	38.5
2388.906667	32.95	53.98	21.03	410.0	V	0.0	38.5

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

11.8.2 High Channel Band Edge



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2486.72666	50.22	73.98	23.76	152.0	V	298.0	38.8
2492.32000	50.27	73.98	23.71	257.0	H	11.0	38.8

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2486.72666	33.77	53.98	20.21	152.0	V	298.0	38.8
2492.32000	33.81	53.98	20.17	257.0	H	11.0	38.8

Test Personnel:	Michael Carlson	Test Date:	10/22/2024
Supervising/Reviewing Engineer: (Where Applicable)	N/A	Limit Applied:	See Section 11.2
Product Standard:	FCC 15.247 RSS-247	Ambient Temperature:	19.8°C
Input Voltage:	2 x 9VDC Batteries	Relative Humidity:	44.7%
		Atmospheric Pressure:	992.2mbar

Deviations, Additions, or Exclusions: None

12 Antenna Requirement

12.1 Test Limits

FCC Part 15.203:

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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

RSS-Gen Issue 5 § 6.8:

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the license-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

License-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the license-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of license-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

12.2 Test Results

The device was found to be **compliant**. The device has an internal, permanently affixed antenna.

13 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	10/30/2024	105956124LEX-002	JP	MC	Original Issue