Testing Tomorrow's Technology

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 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices

For the

Digital Monitoring Products, Inc.

Model: XT75

FCC ID: CCKPC0252
IC: 5251A-PC0252

UST Project: 24-0308
Issue Date: October 7, 2024

Total Pages in This Report: 42

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I certify that I am authorized to sign for the Test Agency and that 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: 

Title: Compliance Engineer – President

Date October 7, 2024

NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANYS NAME: Digital Monitoring Products, Inc.

MODEL: XT75

FCC ID: CCKPC0252

IC: 5251A-PC0252

DATE: October 7, 2024

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

Equipment type: FHSS Transmitter Module

Technical:
903.32 – 926.68 MHz (Channels 0-52)
Type of modulation:
2-FSK
Data/Bit Rate: N/A
Antenna Gain: +1.9 dBi (Dipole Antenna)
Maximum Output Power: +21.25 dBm
Software used to program EUT: proprietary software.
EUT firmware number: V241
Power setting: default value selected.

Report prepared by:
US Tech
3505 Francis Circle
Alpharetta, GA30004

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1 General Information

1.1 Purpose of this Report

This report means to convey test results and information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 247 and IC RSS 247 Issue 8.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on October 10, 2024 in good operating condition.

1.3 Product Description

The Equipment under Test (EUT) is the Digital Monitoring Products, Inc. Model XT75. The XT75 is a security control panel that monitors various security-related activities. It communicates via a standard serial interface. Its primary function is to communicate status changes from any wireless transmitters to the Central Station. It also relays data to the transmitters regarding check-in time, system state, and message acknowledgements.

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 Frequency Hopping Spread Spectrum Operating Under section 15.247.

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 are provided in separate Appendices.

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.

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.
b) Verification under 15.101 as a digital device and receiver.

1.6.2 Verification of the Digital apparatus

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Digital Monitoring Products, Inc.	XT75	Engineering Sample	FCC ID: CCKPC0252 (Pending) IC: 5251A-PC0252 (Pending)	PU
AC Power Supply	MGT1650	1705C	None	PU
Antenna See antenna details	--	--		

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

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 NEXT CALIBRATION
Spectrum Analyzer	Agilent	E4440A	MY45304803	7/21/2025 2 yr.
Spectrum Analyzer	Rigol	DSA815	DSA8A180300138	2/22/2026 2 yr.
Loop Antenna	ETS Lindgren	6502	9810-3246	12/7/2024 2 yr.
Biconical Antenna	EMCO	3110B	9307-1431	9/25/2025 2 yr.
Log Periodic Antenna	EMCO	3146	9305-3600	3/13/2026 2 yr.
Horn Antenna	EMCO	3115	9107-3723	3/13/2025 2 yr.
Pre-Amplifier	Hewlett-Packard	8449B	3008A00480	3/4/2025
Pre-Amplifier	Hewlett-Packard	8447D	1937A01611	6/17/2025
LISN X 2	Solar Electronics	9247-50-TS-50-N	955824 and 955825	4/28/2025
High Pass Filter	Microwave Circuits Inc.	H3R020G2	001DC9528	7/2/2025
High Pass Filter	Mini-Circuits Inc.	VHP-16	N/A	7/2/2025
Attenuator	MECA	604-20-1	N/A	3/4/2025

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

2.2 Modifications to EUT Hardware

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m), RSS-Gen 6.8)

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 903.326 MHz to 926.679 MHz, 3 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 5 times the highest internal clock frequency.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35, RSS-Gen 6.9, 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.

2.6 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
Antenna	Digital Monitoring Products, Inc.	Dipole	Dipole Antenna	1.9	Screw Terminal

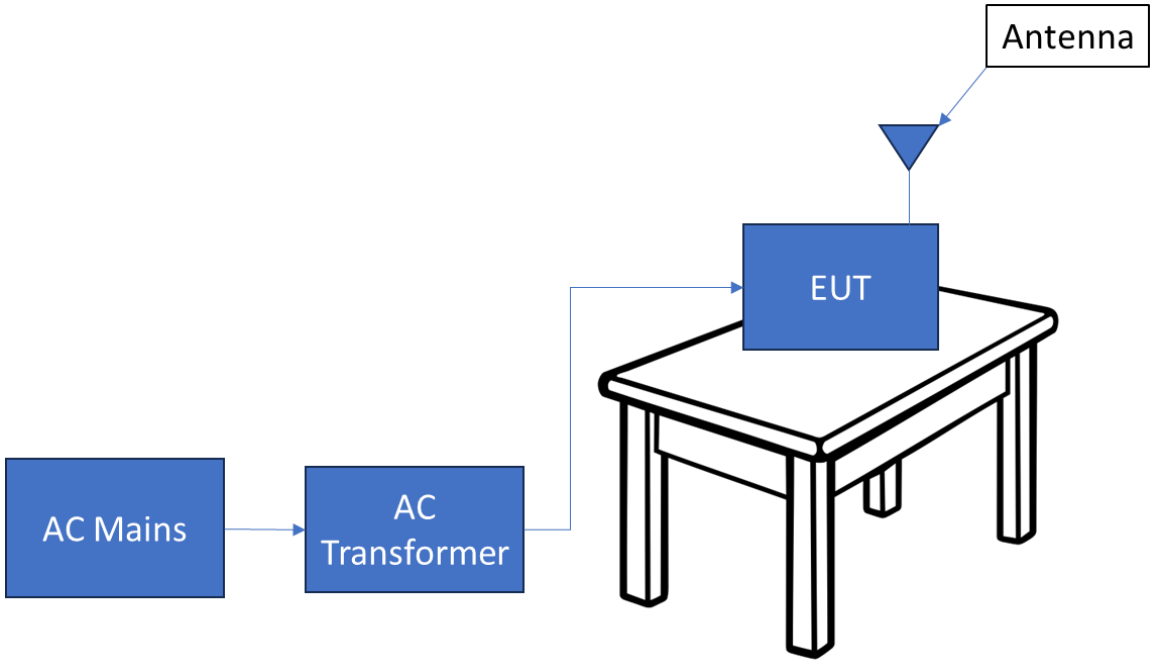


Figure 1. Test Configuration

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

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious emissions cannot exceed the limits of 15.209. Radiated harmonics and other spurious emissions are examined for this requirement see paragraph 2.1

2.8 Transmitter Duty Cycle (CFR 35 (c), RSS-Gen 6.10)

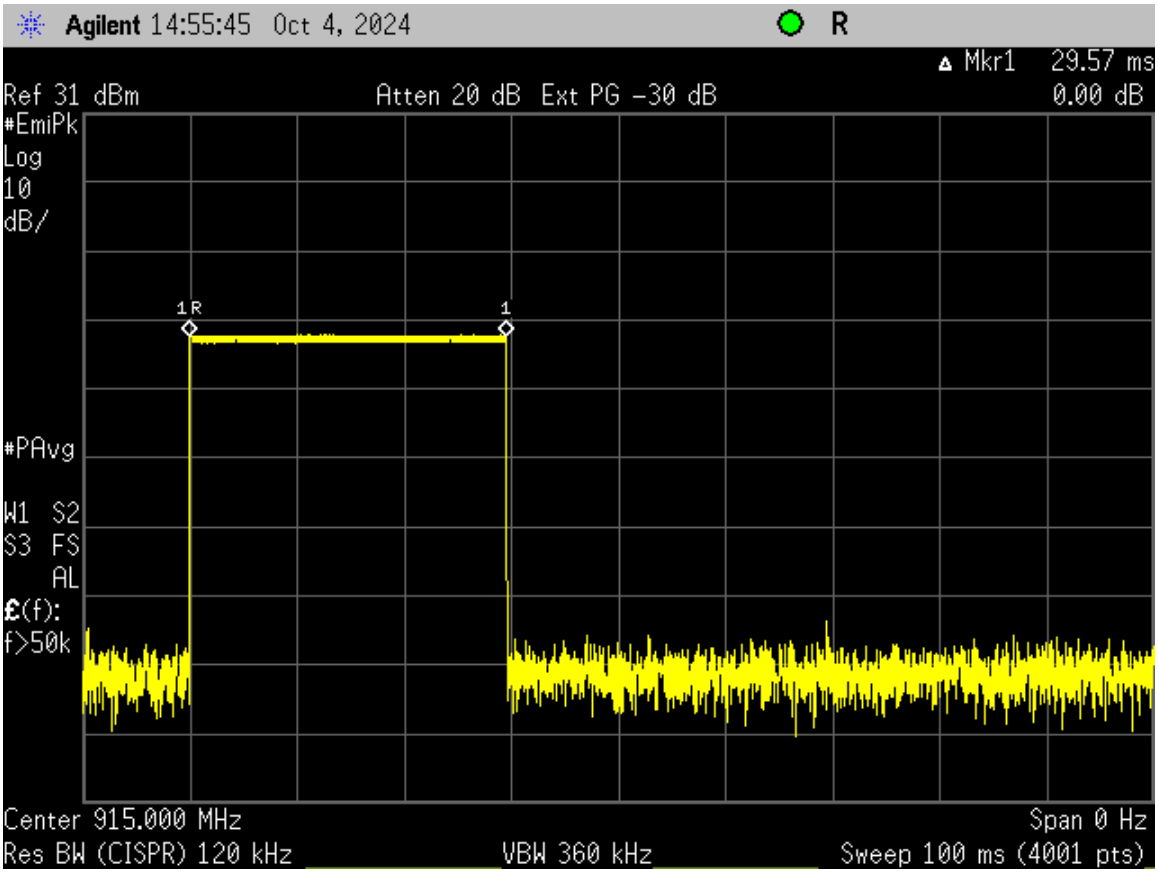


Figure 2. Duty Cycle 100ms Sweep

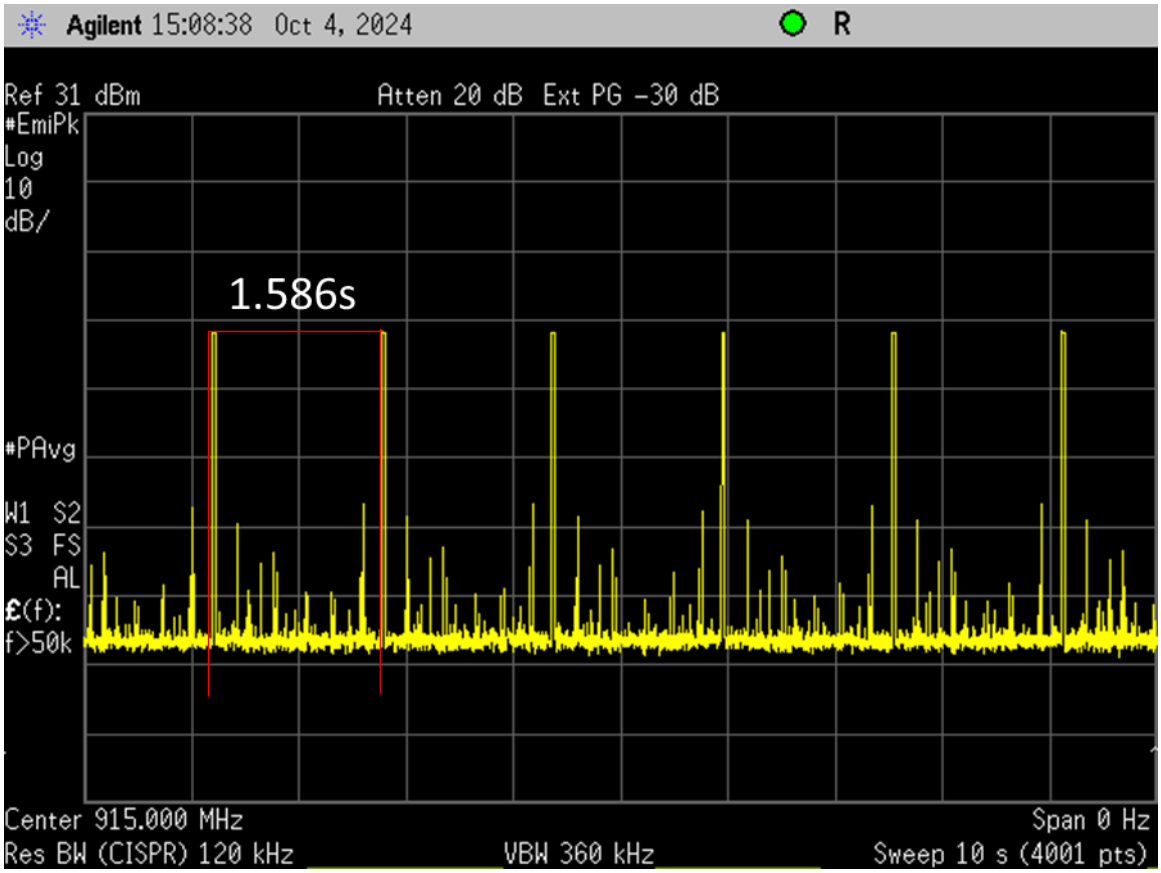


Figure 3. Transmitter Pulse Width

Total Time On from Figure 2 = 29.57 ms (Transmitter Pulse Width)
Total Pulse Train from Figure 3 = 1.586 s (Pulse Train)

Total Time On (A)/Total Pulse Train (B) = 29.57 ms/1586 ms Numeric Duty Cycle
Duty Cycle = 20 Log (A/B) = -34.59 dB

NOTE: The transmitter was programmed to transmit at >98% duty cycle, therefore the duty cycle factor calculated above will be applied wherever applicable (where the detection mode was AVG). For this report the Duty Cycle correction factor applied is -20 dB

2.9 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207, RSS-247 5.1 & 5.2)

Power line conducted emissions testing was performed to ensure that with the EUT in operation (exercising all transmitter functions), the complete system continues to meet the applicable requirements for CFR 15.207. These measurements were completed and displayed along with the 15.107 power line test data in the sections below.

The EUT is powered transformer rated for Primary: 120 VAC 60 Hz 60 W Secondary: 16.5 VAC 50VA

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d), RSS 247 5.1 & 5.2)

Radiated Spurious measurements: The EUT was placed into a continuous transmit mode of operation (>98%) duty cycle) and tested per ANSI 63.10:2013 and ANSI C63.10:2013. A preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the device. A preliminary scan was performed on the EUT to find the worst-case results. The EUT was tested in X, Y, and Z axes or in the orientation of normal operation if the device is designed to operate in a fixed position.

Radiated measurements were then conducted between the frequency range of 9 kHz (or lowest frequency used/generated by the device) up to the tenth harmonic of the device (no greater than 40 GHz). In the band below 30 MHz, a resolution bandwidth (RBW) of 9 kHz was used. Emissions below 1 GHz were tested with a RBW of 120 kHz, and emissions above 1 GHz were tested with a RBW of 1 MHz. All video bandwidth settings were at least three times the RBW value.

The EUT was investigated with CFR 15.209, General requirements for unwanted spurious emissions. The conducted spurious method as described below was used to investigate all other emissions emanating from the antenna port.

Conducted Spurious measurements: The EUT was put into a Frequency Hopping mode 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 10 GHz. A conducted scan was performed on the EUT to identify and record the spurious signals that were related to the transmitter.

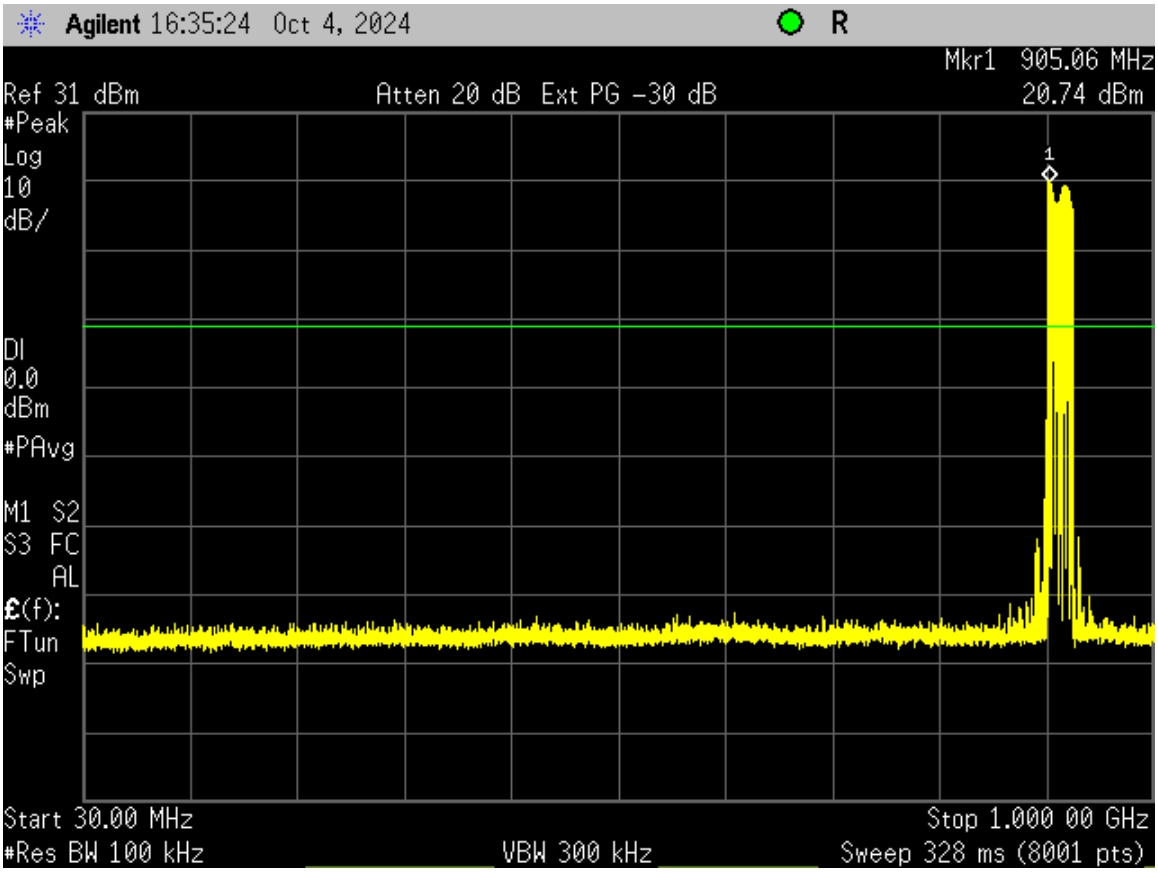


Figure 4. Antenna Conducted Emissions 30 MHz to 1000 MHz

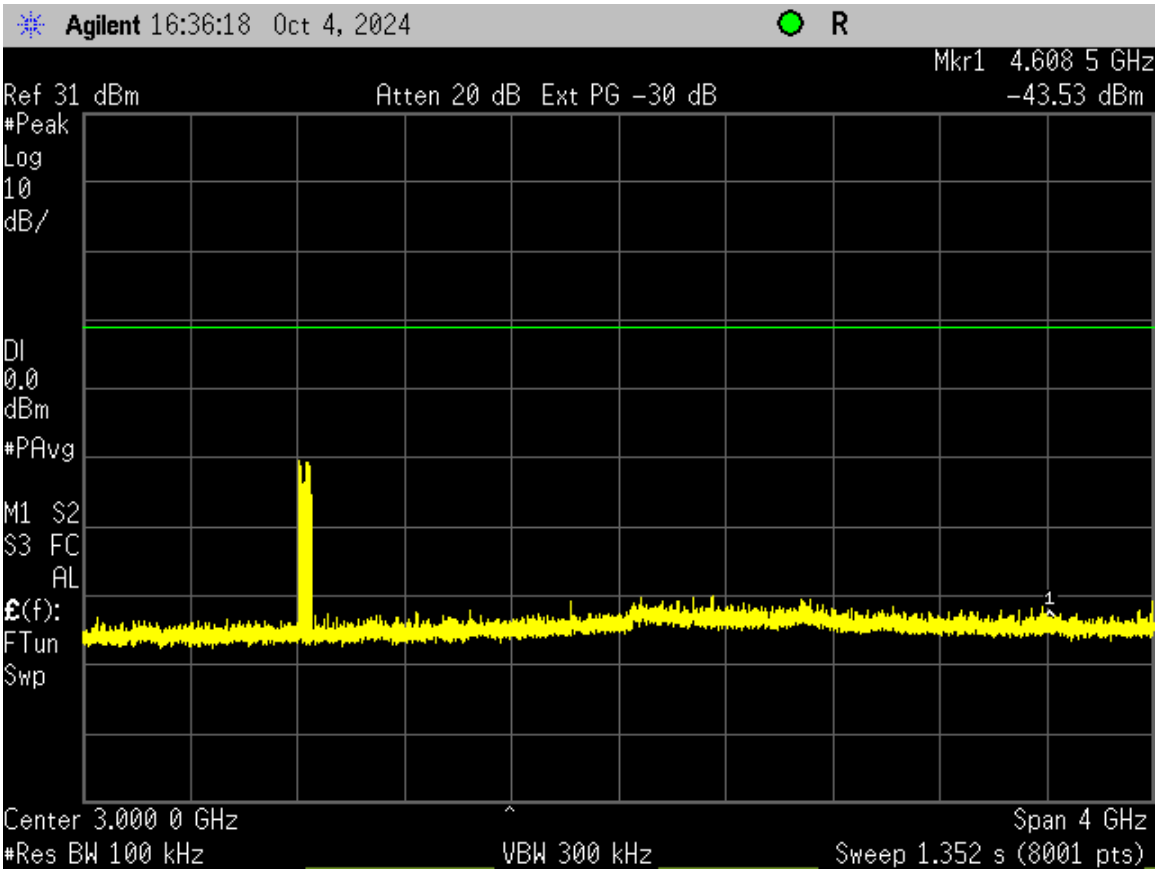


Figure 5. Antenna Conducted Emissions, 1000 MHz to 5000 MHz

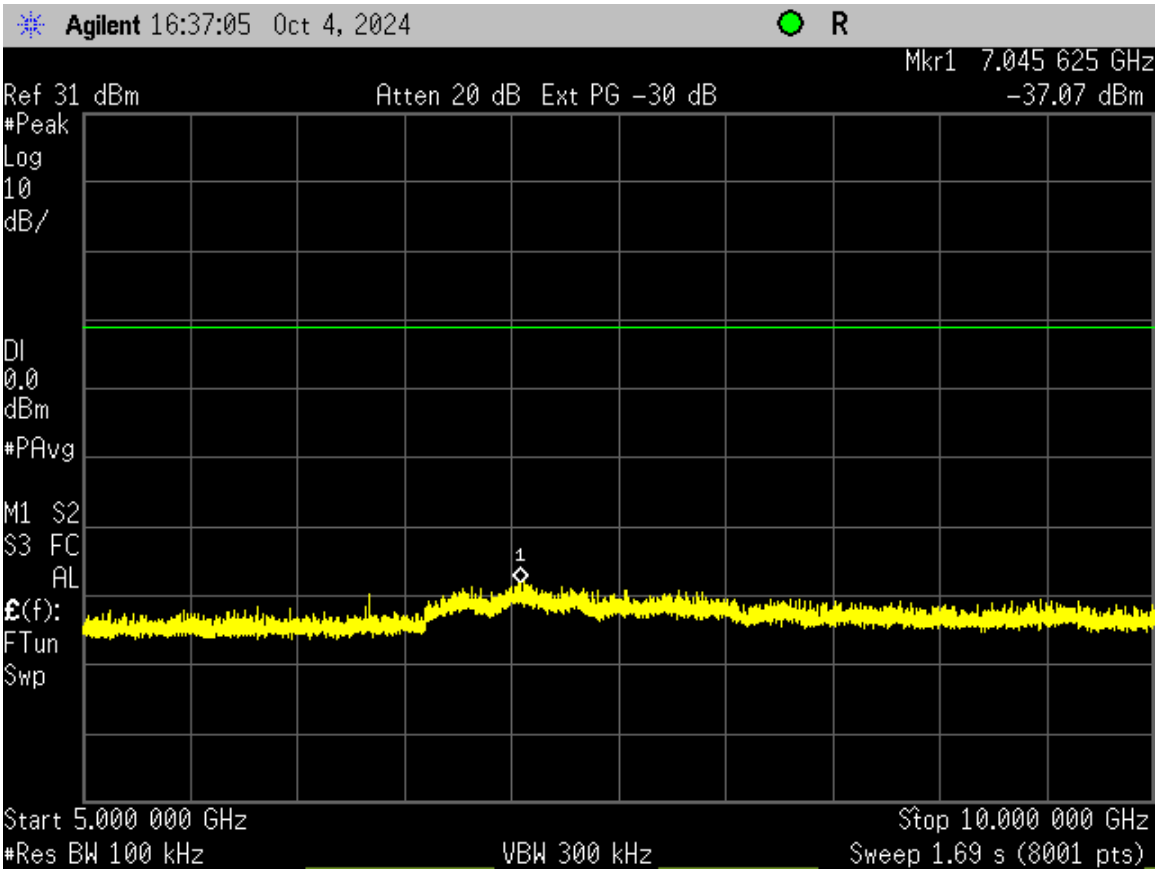


Figure 6. Antenna Conducted Emissions, 5000 MHz – 10000 MHz

Table 5. Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Factor (dB)**	**AF+CA -AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector Mode**
Low Channel								
903.31	96.69	0.00	25.60	122.29	--	3.0m./VERT	--	PK
2710.00	63.23	0.00	-5.82	57.41	74.0	3.0m./VERT	16.6	PK
3613.00	58.22	0.00	-0.27	57.95	74.0	3.0m./VERT	16.1	PK
4516.00	48.28	0.00	2.58	50.86	74.0	3.0m./VERT	23.1	PK
5419.00	47.62	0.00	2.90	50.52	74.0	3.0m./VERT	23.5	PK
6373.00	48.16	0.00	5.55	53.71	74.0	3.0m./VERT	20.3	PK
7226.00	52.05	0.00	8.10	60.15	74.0	3.0m./VERT	13.9	PK
Mid Channel								
914.99	97.79	0.00	25.58	123.37	--	3.0m./VERT	--	PK
2744.00	63.54	0.00	-5.49	58.05	74.0	3.0m./VERT	15.9	PK
3660.00	55.47	0.00	-0.40	55.07	74.0	3.0m./VERT	18.9	PK
4575.00	47.94	0.00	2.26	50.20	74.0	3.0m./VERT	23.8	PK
5489.00	41.47	0.00	3.59	45.06	74.0	3.0m./VERT	28.9	PK
6404.00	47.62	0.00	5.58	53.20	74.0	3.0m./VERT	20.8	PK
7319.00	45.97	0.00	9.39	55.36	74.0	3.0m./VERT	18.6	PK
High Channel								
926.66	96.39	0.00	25.60	121.99	--	3.0m./VERT	--	PK
2780.00	65.64	0.00	-5.66	59.98	74.0	3.0m./VERT	14.0	PK
3706.00	53.44	0.00	-0.11	53.33	74.0	3.0m./VERT	20.7	PK
4633.00	49.29	0.00	2.57	51.86	74.0	3.0m./VERT	22.1	PK
5560.00	47.09	0.00	3.75	50.84	74.0	3.0m./VERT	23.2	PK
6486.00	46.36	0.00	5.19	51.55	74.0	3.0m./VERT	22.4	PK
7413.00	39.91	0.00	8.60	48.51	74.0	3.0m./VERT	25.5	PK

1. Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
2. The EUT was placed in three orthogonal positions, and the transmitter was in constant broadcast mode with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst-case.

Sample Calculation at 903.31 MHz:

Magnitude of Measured Frequency	96.69	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	25.60	dB/m
Corrected Result	122.29	dBuV/m

Test Date: October 4, 2024
Tested By
Signature: _____ Name: Gabriel Medina

Table 6. Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Factor (dB)**	**AF+CA -AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector Mode**
Low Channel								
903.31	96.63	0.00	25.60	122.23	--	3m./VERT	--	QP
2710.00	63.23	-20.00	-5.82	37.41	54.0	3.0m./VERT	16.6	AVG
3613.00	58.22	-20.00	-0.27	37.95	54.0	3.0m./VERT	16.1	AVG
4516.00	48.28	-20.00	2.58	30.86	54.0	3.0m./VERT	23.1	AVG
5419.00	47.62	-20.00	2.90	30.52	54.0	3.0m./VERT	23.5	AVG
6373.00	48.16	-20.00	5.55	33.71	54.0	3.0m./VERT	20.3	AVG
7226.00	52.05	-20.00	8.10	40.15	54.0	3.0m./VERT	13.9	AVG
Mid Channel								
914.99	97.79	0.00	25.58	122.97	--	3m./VERT	--	QP
2744.00	63.54	-20.00	-5.49	38.05	54.0	3.0m./VERT	15.9	AVG
3660.00	55.47	-20.00	-0.40	35.07	54.0	3.0m./VERT	18.9	AVG
4575.00	47.94	-20.00	2.26	30.20	54.0	3.0m./VERT	23.8	AVG
5489.00	41.47	-20.00	3.59	25.06	54.0	3.0m./VERT	28.9	AVG
6404.00	47.62	-20.00	5.58	33.20	54.0	3.0m./VERT	20.8	AVG
7319.00	45.97	-20.00	9.39	35.36	54.0	3.0m./VERT	18.6	AVG
High Channel								
926.66	96.39	0.00	25.60	121.74	--	3m./VERT	--	QP
2780.00	65.64	-20.00	-5.66	39.98	54.0	3.0m./VERT	14.0	AVG
3706.00	53.44	-20.00	-0.11	33.33	54.0	3.0m./VERT	20.7	AVG
4633.00	49.29	-20.00	2.57	31.86	54.0	3.0m./VERT	22.1	AVG
5560.00	47.09	-20.00	3.75	30.84	54.0	3.0m./VERT	23.2	AVG
6486.00	46.36	-20.00	5.19	31.55	54.0	3.0m./VERT	22.4	AVG
7413.00	39.91	-20.00	8.60	28.51	54.0	3.0m./VERT	25.5	AVG

1. The EUT was placed in three orthogonal positions, and the transmitter was in constant broadcast mode with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 903.31 MHz:

Magnitude of Measured Frequency	96.63	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	25.60	dB/m
Corrected Result	122.23	dBuV/m

Test Date: October 4, 2024
Tested By
Signature:  Name: Gabriel Medina

2.11 Band Edge Measurements – (CFR 15.247 (d))

Band Edge measurements are made following the guidelines in FCC KDB 558074 D01 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Antenna port conducted measurements are performed to demonstrate compliance with the requirement of 15.247(d) 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, the Spectrum Analyzer frequency was set to span large enough (usually around 3 MHz) to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation. Conducted measurements are performed with RBW ≥1% of the frequency span. In all cases, the VBW is set ≥ RBW. See figure and calculations below for more detail. This measurement was performed with the EUT continuously transmitting on the low and high channels as well as in normal use mode (frequency hopping ON).

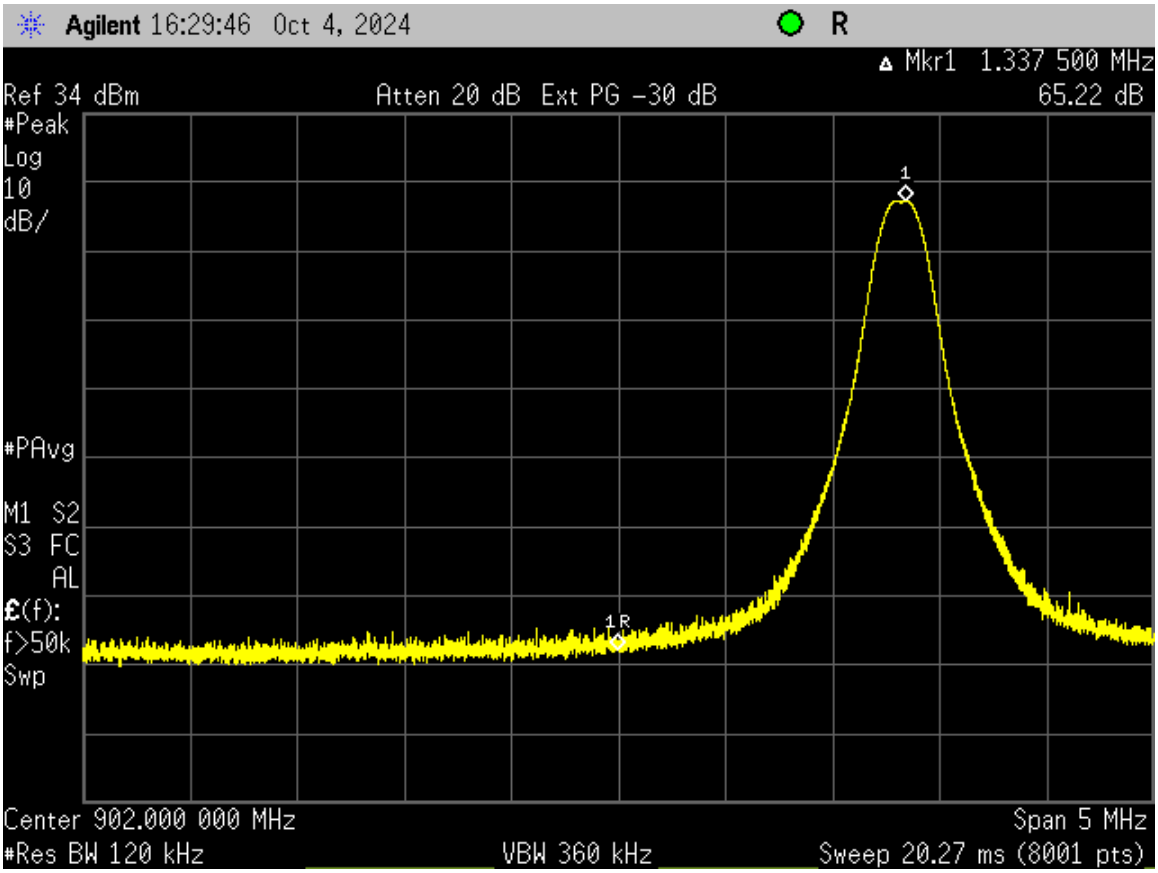


Figure 7. Band Edge Compliance, Low Channel Delta – Hopping Off

Calculation of worst-case lower band edge measurement:

Measured Result	65.22 dB
Band Edge Limit	20.00 dB
Band Edge Margin	45.22 dB

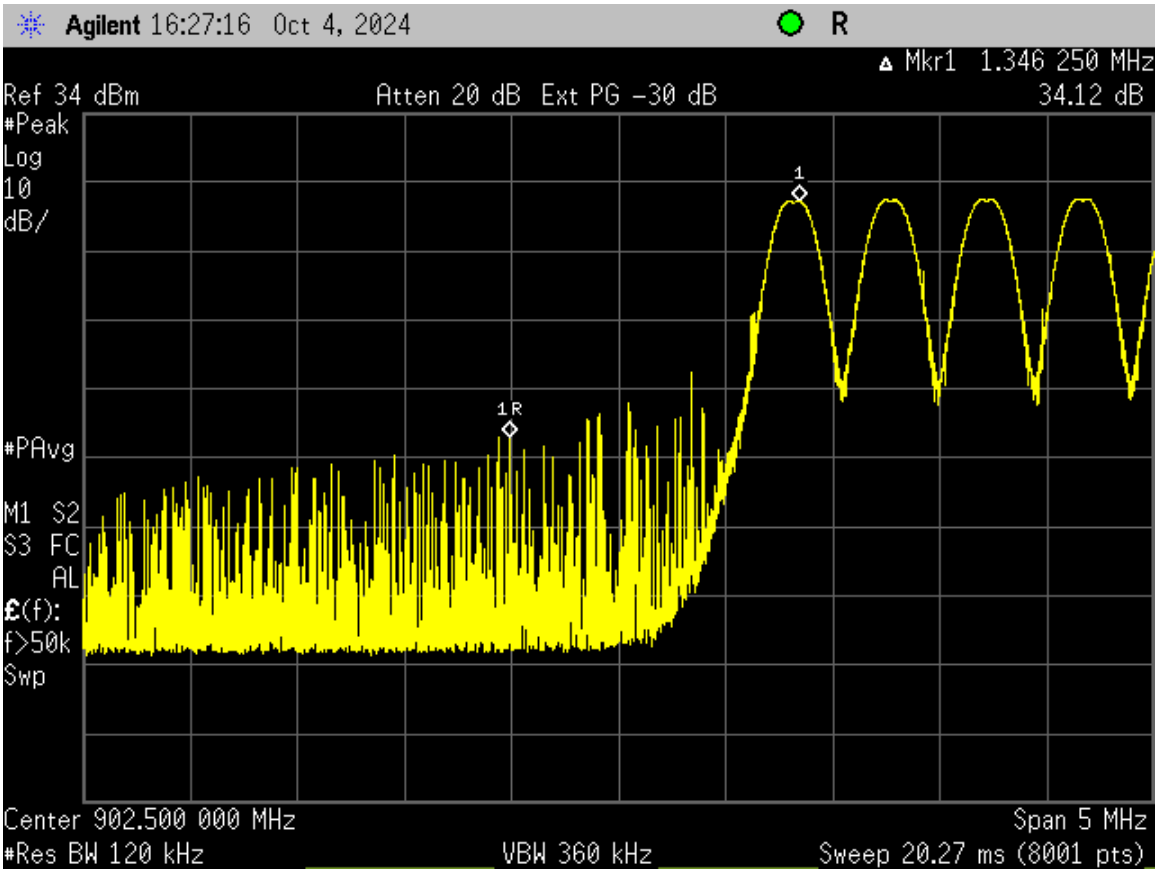


Figure 8. Band Edge Compliance, Low Channel Delta – Hopping On

Calculation of worst-case lower band edge measurement:

Measured Result	34.12 dB
Band Edge Limit	20.00 dB
Band Edge Margin	14.12 dB

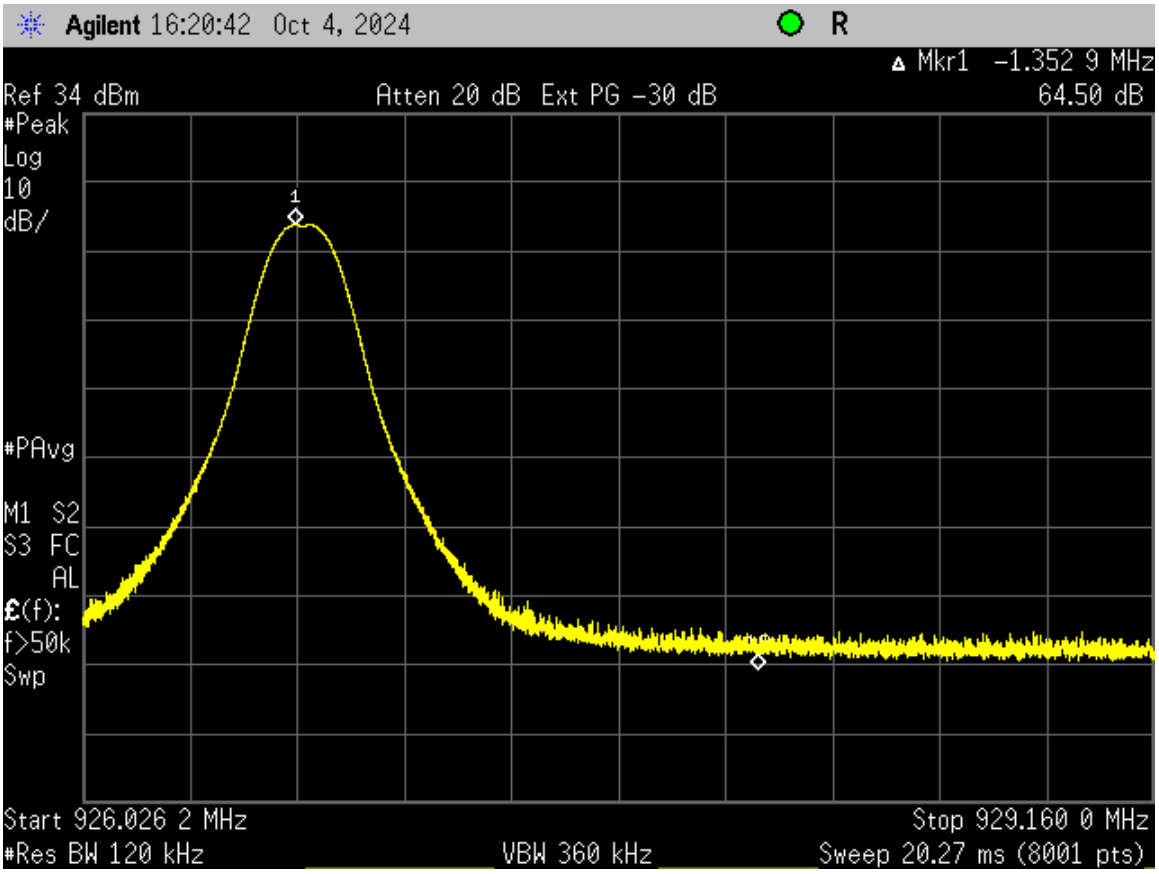


Figure 9. Band Edge Compliance, High Channel Delta – Hopping Off

Calculation of worst-case upper band edge measurement:

Measured Result	64.50 dB
Band Edge Limit	20.00 dB
Band Edge Margin	44.50 dB

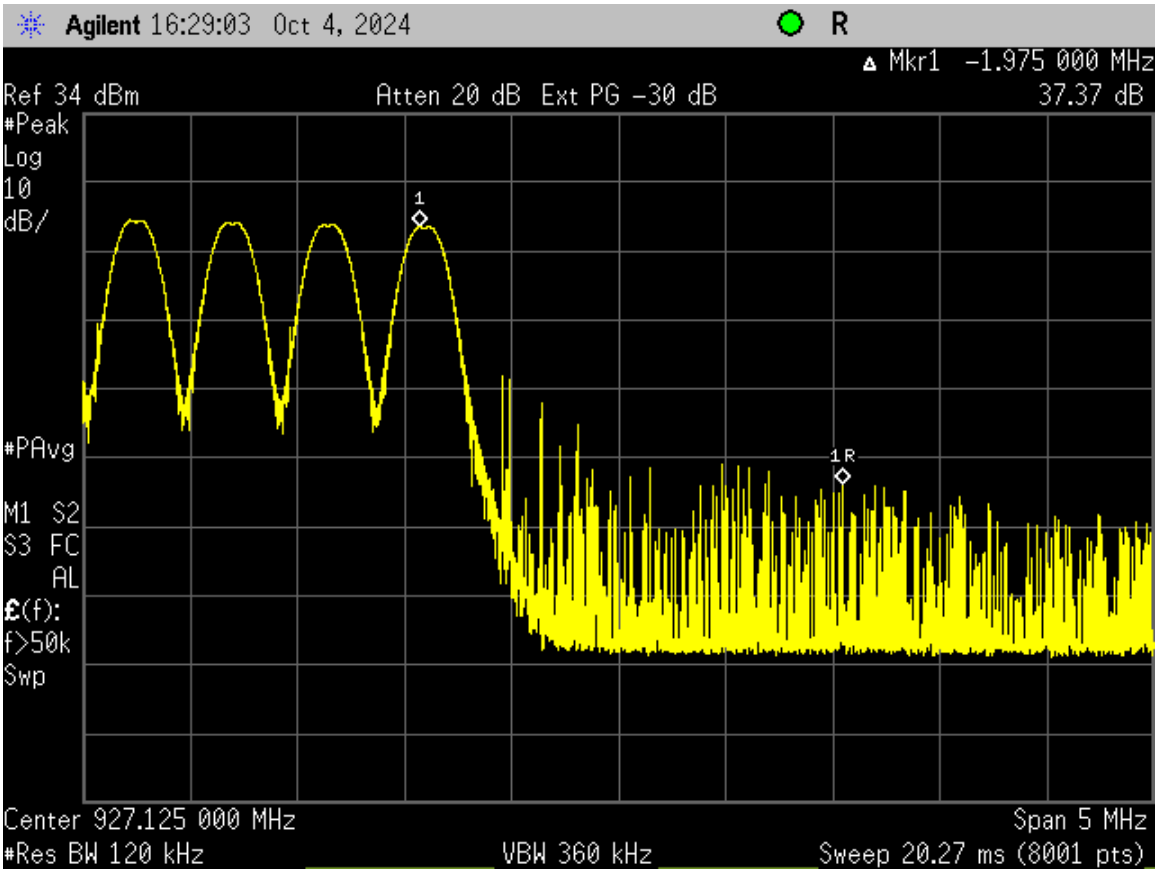


Figure 10. Band Edge Compliance, High Channel Delta – Hopping On

Calculation of worst-case upper band edge measurement:

Measured Result	37.37 dB
Band Edge Limit	20.00 dB
Band Edge Margin	17.37 dB

2.12 99% Occupied Bandwidth (IC RSS 247 5.1 & 5.2,CFR 15.247 (a) (1))

For frequency hopping systems operating in the 902-928 MHz band the maximum allowed 20 dB bandwidth is 500 kHz.

These measurements were performed while the EUT was in a constant transmit mode. A method similar to the marker delta method was used to capture the points. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW ≥ RBW. The results of this test are given in Table 12 and Figures 21-23.

Table 7. 20 dB Bandwidth and 99% Occupied Bandwidth

Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
903.32	69.76	70.50
915.00	69.59	70.13
926.68	69.57	70.19

Test Date: October 4, 2024
Tested By
Signature:  Name: Gabriel Medina

Figure 11. Twenty dB Bandwidth – Low Channel

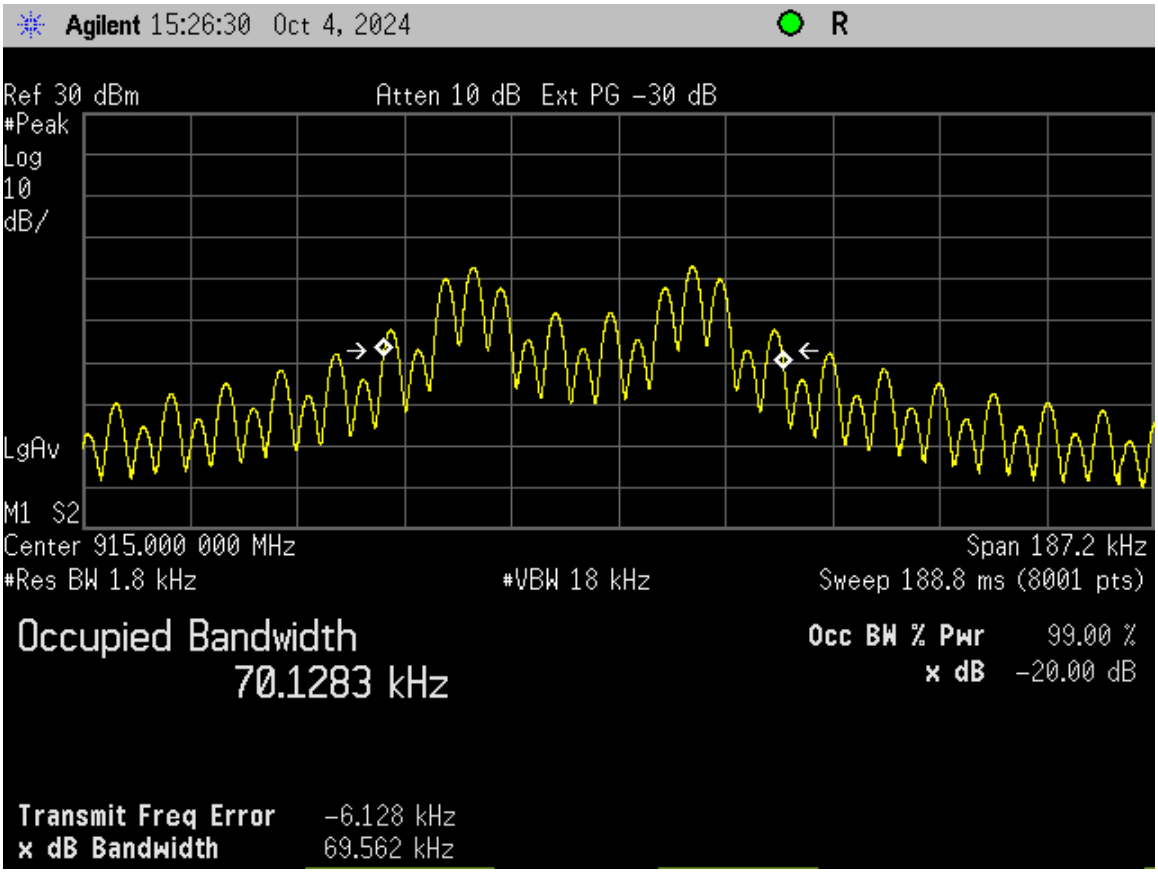


Figure 12. Twenty dB Bandwidth – Mid Channel

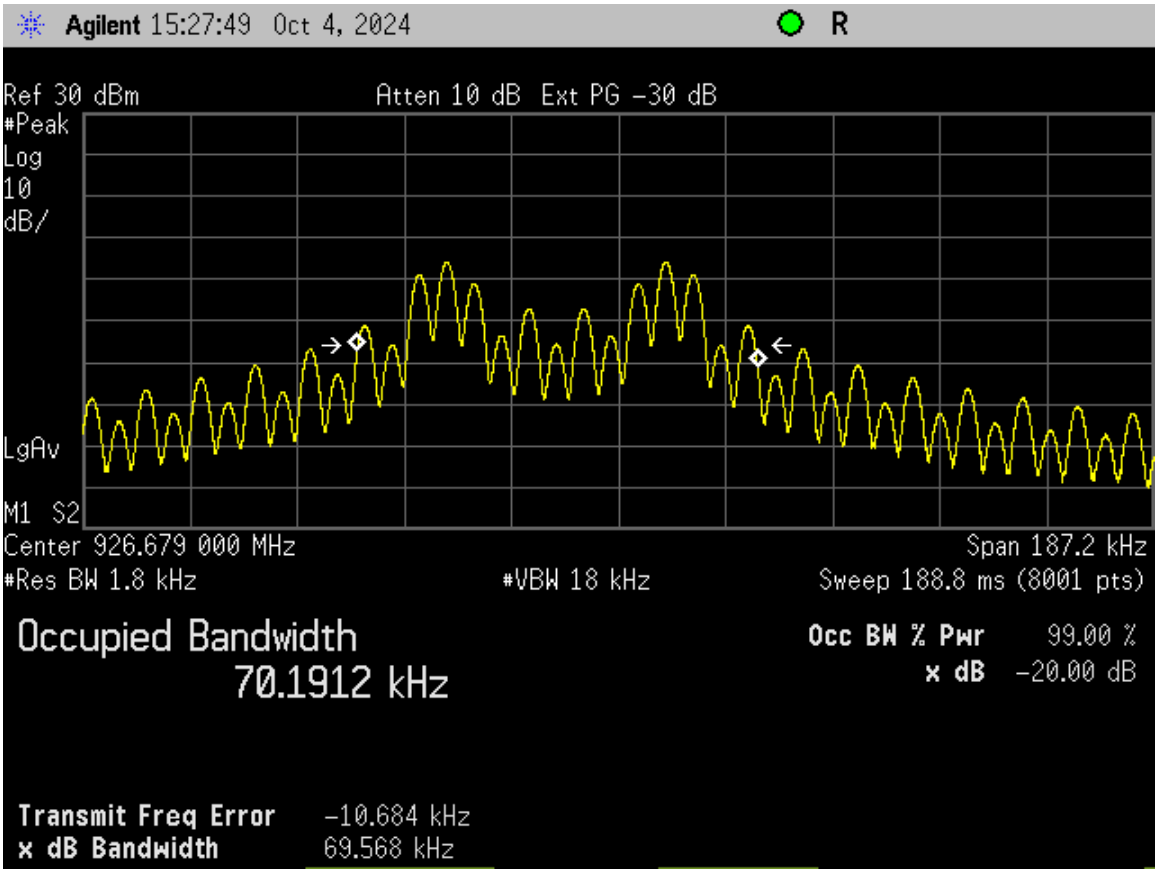


Figure 13. Twenty dB Bandwidth – High Channel

2.13 Number of Hopping Frequencies (CFR 15.247 (a)(1)) (CRF 15.247(b)(1))

Frequency hopping systems in the 902-928 MHz band shall have at least 50 hopping frequencies if the 20 dB bandwidth is less than 250 kHz. If the 20 dB bandwidth is 250 kHz or greater, then the system shall have at least 25 hopping frequencies. Since the EUT has a 20 dB bandwidth less than 250 kHz, then at least 50 hopping frequencies shall be used.

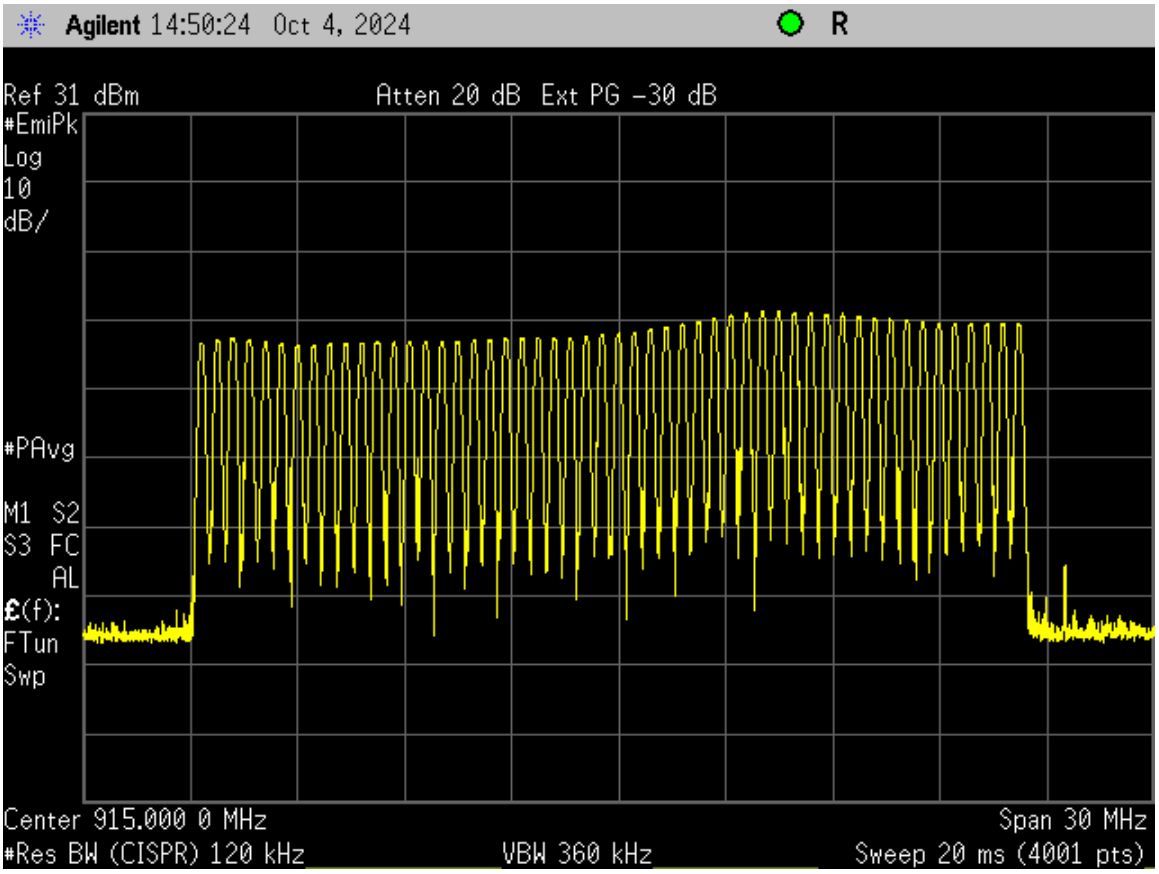


Figure 14. Hopping Channels 0 through 52

Test Date: October 4, 2024
Tested By
Signature: _____ Name: Gabriel Medina

2.14 Maximum Peak Conducted Output Power (CFR 15.247 (b) (3))

For frequency hopping systems in the 902-928 MHz band with at least 50 hopping channels, the maximum peak conducted output power of the intentional radiator shall not exceed 1 watt. For systems with less than 50 hopping channels, but at least 25 hopping channels, the maximum peak conducted output power of the intentional radiator shall not exceed .25 watts. Since the EUT has 52 hopping channels, the maximum peak conducted output power shall not exceed 1 watt (30dBm).

Peak power within the band 903.32 MHz to 926.67 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.

Table 8. Peak Antenna Conducted Output Power per Part 15.247 (b) (3)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Converted Data (mW)	FCC Limit (mW Maximum)
903.32	21.25	133.35	1000
915.00	19.35	86.09	1000
926.66	18.16	65.46	1000

Test Date: October 4, 2024
Tested By
Signature: _____ Name: Gabriel Medina

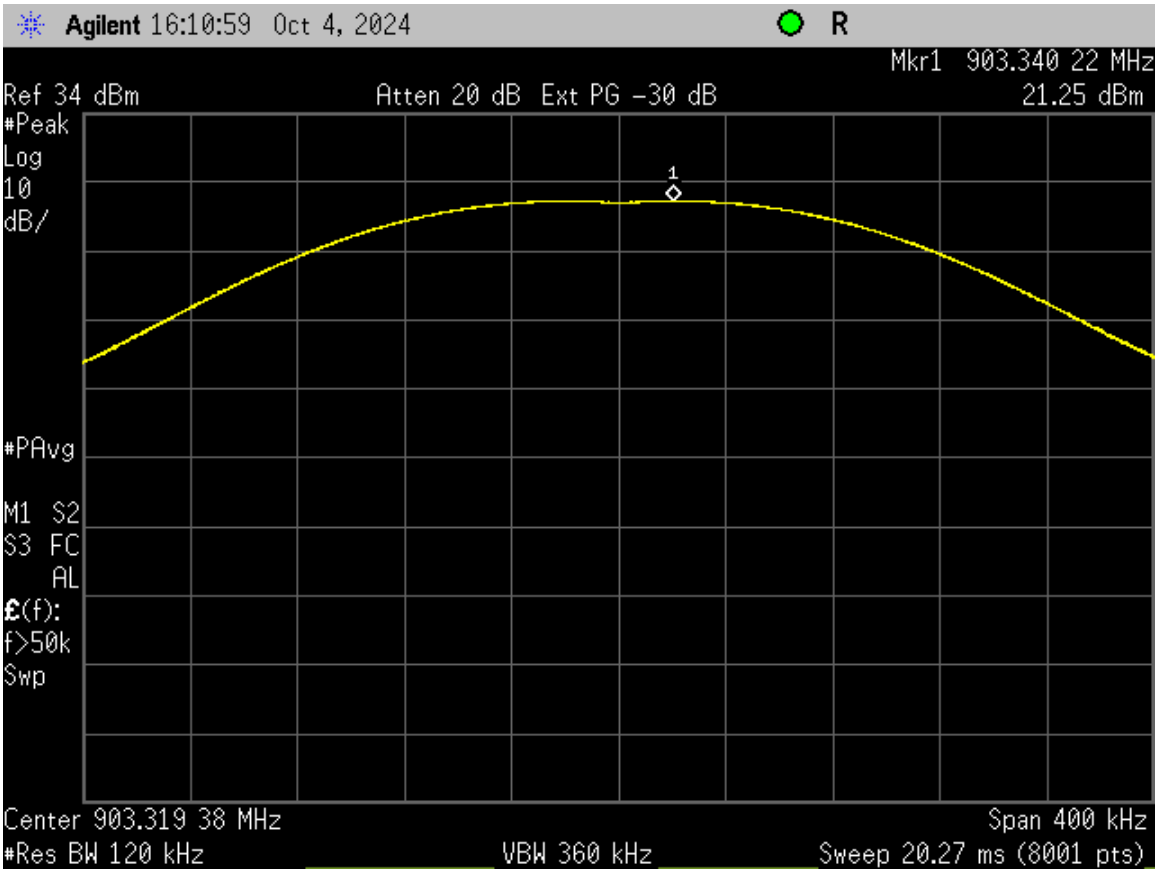


Figure 15. Peak Antenna Conducted Output Power, Low Channel

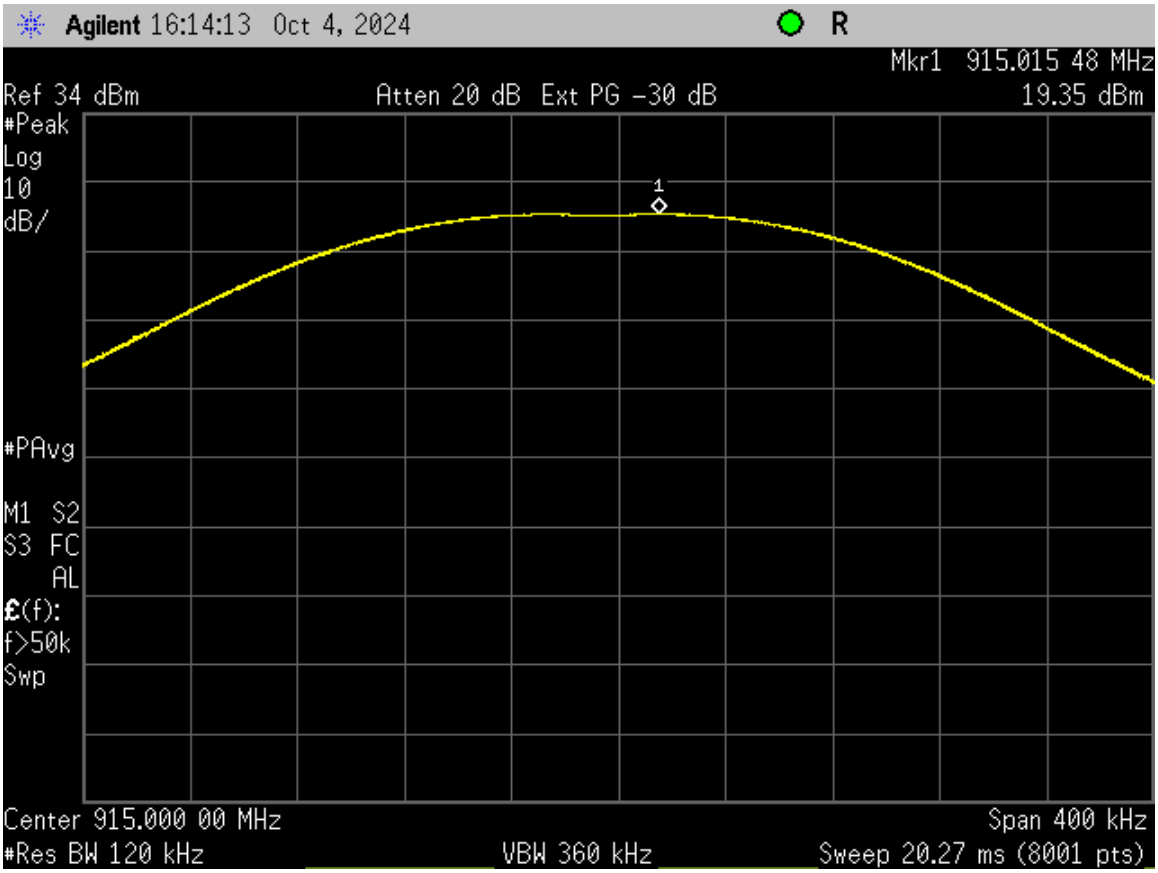


Figure 16. Peak Antenna Conducted Output Power, Mid Channel

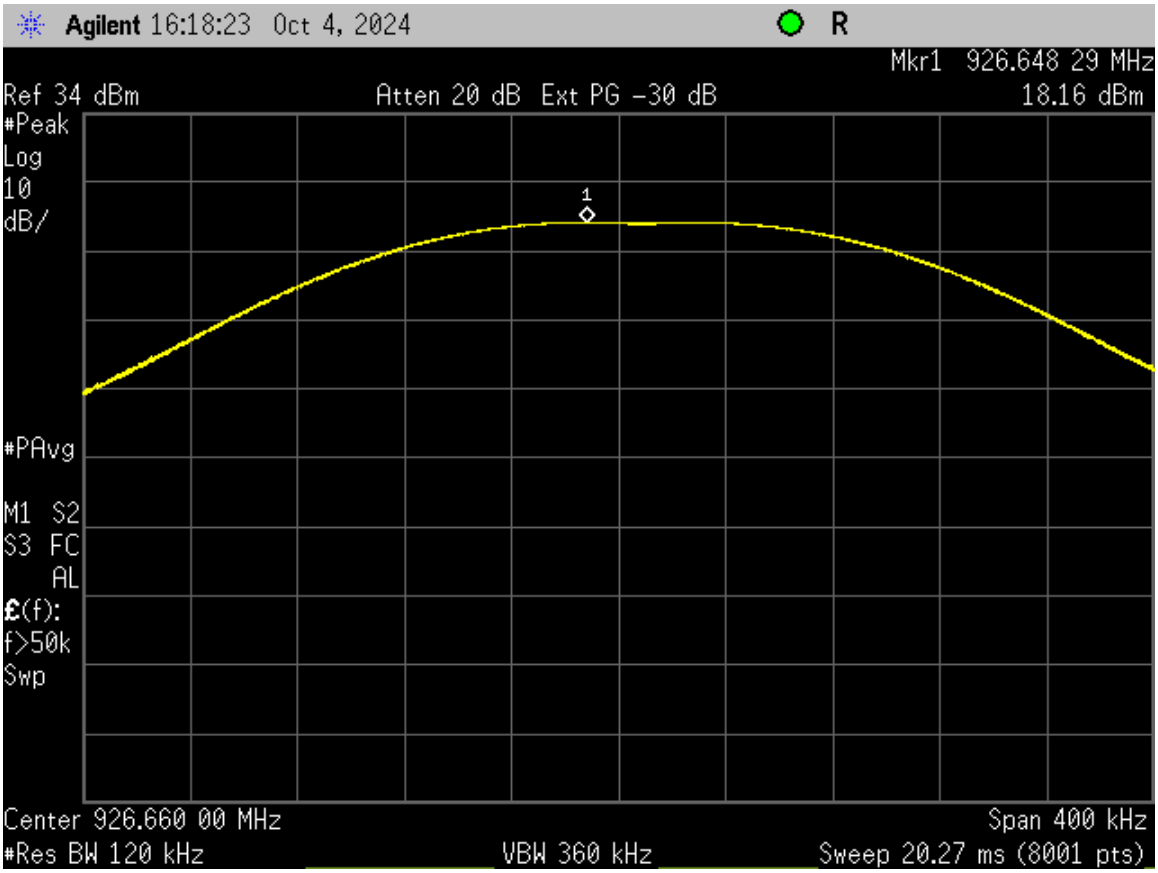


Figure 17. Peak Antenna Conducted Output Power, High Channel

2.15 Frequency Separation (CRF 15.247(a)(1))

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. In this case, the 20 dB bandwidth of the hopping channel is greater than the 25 kHz, so the minimum requirement used was the 69.75 kHz

The test procedures outlined in ANSI 63.10:2013 were used to conduct measurements. The EUT hopping function was enabled during the testing.

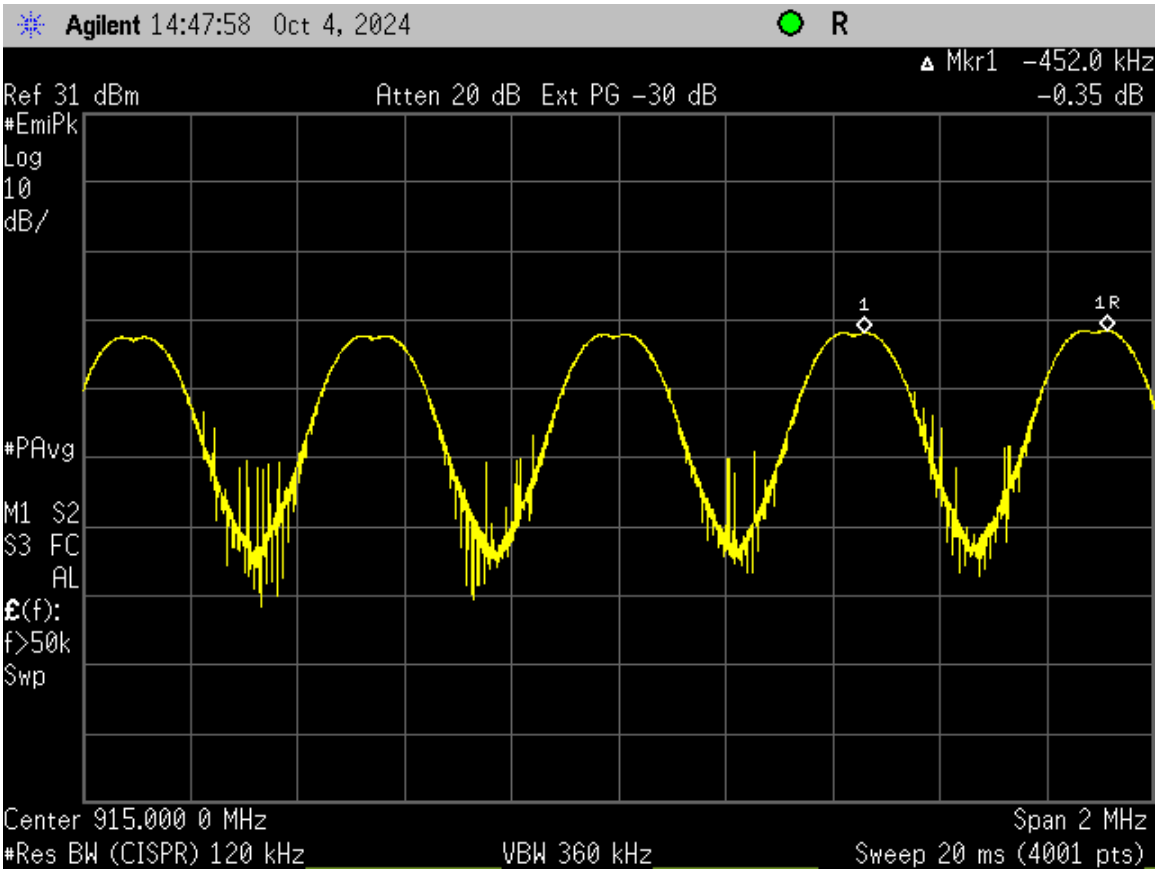


Figure 18. Channel Separation

Measured Delta (Figure 27)	452.00 kHz
-Limit(**20 dB Bandwidth or 25 kHz**)	69.75 kHz
Margin	382.25 kHz

Test Date: October 4, 2024
Tested By
Signature: Name: Gabriel Medina

2.16 Average Time of Occupancy (CFR 15.247(a)(1))

Frequency hopping systems in the 902-928 MHz bands with a 20 dB bandwidth less than 250 kHz shall have an average time occupancy that is not greater than 0.4 seconds within a 20 second period. If the 20 dB bandwidth of the hopping channels is 250 kHz or greater, than the average time of occupancy shall not be greater than 0.4 seconds within a 10 second period. In this case, since the 20 dB bandwidth was less than 250 kHz, the average time of occupancy shall not be greater than 0.4 seconds within a 20 second period.

The test procedures outline in the ANSI 63.10:2013 was used to conduct measurements.

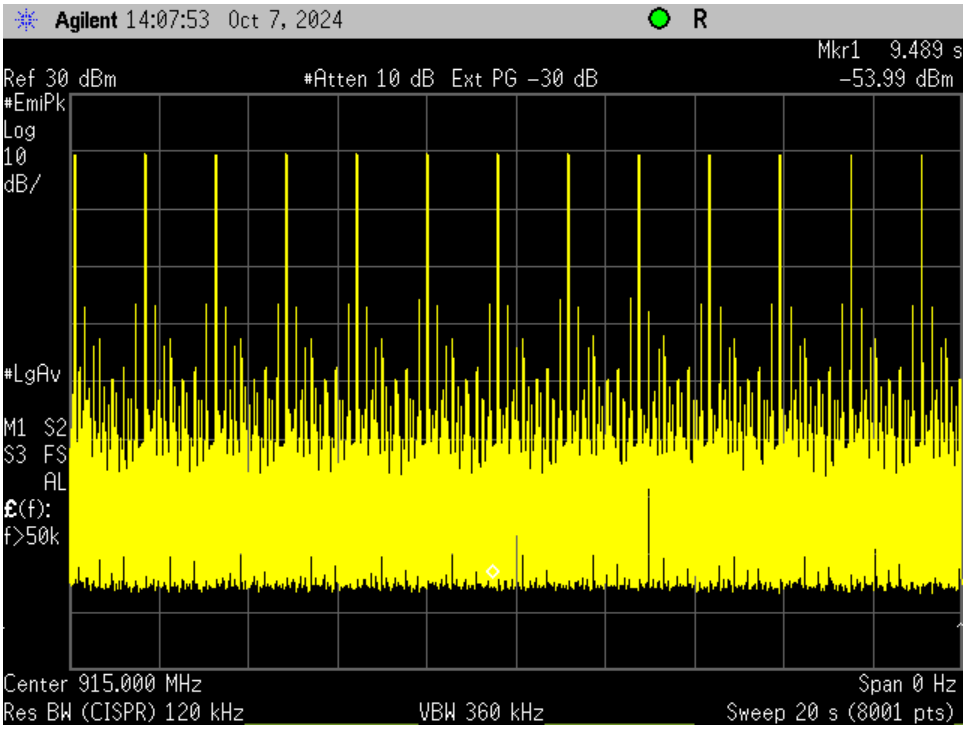


Figure 19. Average Time of Occupancy

Times on	On time (Figure 2) (ms)	Total Time (time on * times on) (ms)
13	29.57	384.41

Limit	400.00 ms
-Total Time on	384.41 ms
Margin	15.59 ms

Test Date: October 7, 2024
Tested By
Signature: _____ Name: Gabriel Medina

2.17 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207, RSS-Gen 8.8)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.107, per ANSI C63.4:2014 with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions were determined to be produced when the EUT was operating under continuous transmission. The worst-case measurement occurred on the neutral line at 0.5392 MHz. The emission level was 14.5 dB from the applicable limit. All other emissions were at least 15.3 dB from the limit. Those results are given in the table following.

Table 9. Transmitter Power Line Conducted Emissions Test Data, Part 15.207

150KHz to 30 MHz						
Frequency (MHz)	**Test Data (dBuv)**	**LISN+CL-PA (dB)**	**Results (dBuV)**	**AVG Limits (dBuV)**	**Margin (dB)**	**Detector PK, QP, or AVG**
120 VAC, 60 Hz Phase						
0.3443	31.96	0.55	32.51	49.1	16.6	**PK**
0.5392	31.12	0.37	31.49	46.0	14.5	**PK**
1.7667	30.50	0.25	30.75	46.0	15.3	**PK**
5.1417	27.76	0.35	28.11	50.0	21.9	**PK**
12.3167	27.07	0.27	27.34	50.0	22.7	**PK**
22.1333	26.78	0.79	27.57	50.0	22.4	**PK**
120VAC, 60 Hz Neutral						
0.1949	34.01	1.37	35.38	53.8	18.4	**PK**
0.8992	29.66	0.44	30.10	46.0	15.9	**PK**
1.0533	29.58	0.44	30.02	46.0	16.0	**PK**
5.0167	29.29	0.51	29.80	50.0	20.2	**PK**
13.0167	26.82	0.43	27.25	50.0	22.7	**PK**
25.8667	26.23	0.43	26.66	50.0	23.3	**PK**

Sample Calculation at 0.3443 MHz:

Magnitude of Measured Frequency	31.96	dBuV
+ Cable Loss+ LISN Loss	0.55	dB
Corrected Result	32.51	dBuV

Test Date: October 7, 2024
Tested By
Signature:  Name: Gabriel Medina

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

The test data provided herein is to support the verification requirement for radiated emissions coming from the EUT in a transmitting state per 15.209. Emissions were investigated from 9kHz or the lowest operating clock frequency to 10 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 was maximized for magnitude by rotating the turntable through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters as a part of the measurement procedure.

The worst-case radiated emission was greater than 20.0 dB below the specification limit. The results are shown in the following table. These results are meant to show that this EUT has met the intentional transmitter requirements of CFR Part 15.209.

Table 10. Spurious Radiated Emissions (9 kHz- 30 MHz)

Test: FCC Part 15.209							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
All emissions were more than 20 dB below the applicable limit.							

Sample Calculation: N/A

Test Date: October 4, 2024
Tested By
Signature: _____ Name: Gabriel Medina

Table 11. Spurious Radiated Emissions 30 MHz to 1000 MHz

Test: FCC Part 15.109/15.209							
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**QP Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or QP**
30.00	34.62	-8.26	26.36	40.0	3m./HORZ	13.6	**PK**
70.60	43.08	-14.61	28.47	40.0	3m./HORZ	11.5	**PK**
150.00	35.77	-11.26	24.51	40.0	3m./HORZ	19.0	**PK**
85.57	45.56	-14.84	30.72	40.0	3m./HORZ	9.3	**QP**
300.00	42.57	-8.26	34.31	46.0	3m./HORZ	11.7	**PK**
43.30	35.34	-12.24	23.30	40.0	3m./VERT	16.7	**PK**
79.07	46.92	-14.98	31.94	40.0	3m./VERT	8.1	**QP**
460.80	32.94	-6.17	26.77	46.0	3m./VERT	19.2	**PK**

Sample Calculation at 85.57 MHz:

Magnitude of Measured Frequency	45.56	dBuV
+ Cable Loss+ LISN Loss	-14.84	dB
Corrected Result	30.72	dBuV

Test Date: October 4, 2024
Tested By
Signature:  Name: Gabriel Medina

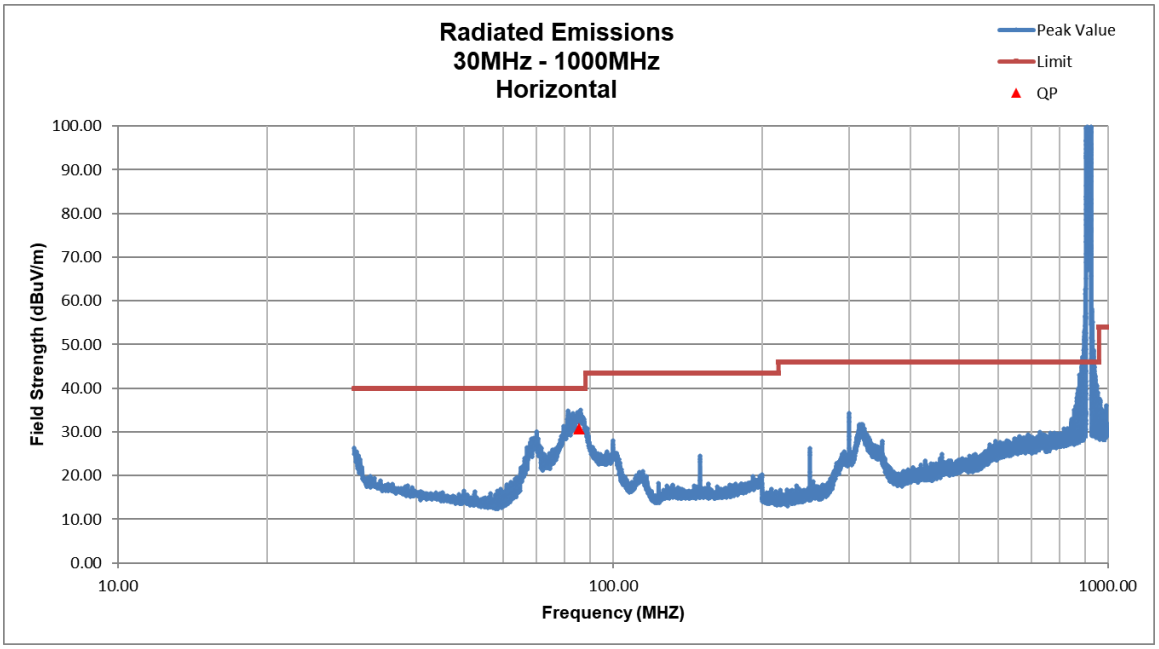


Figure 20. Spurious Radiated Emissions 30 MHz - 1000 MHz – Horizontal

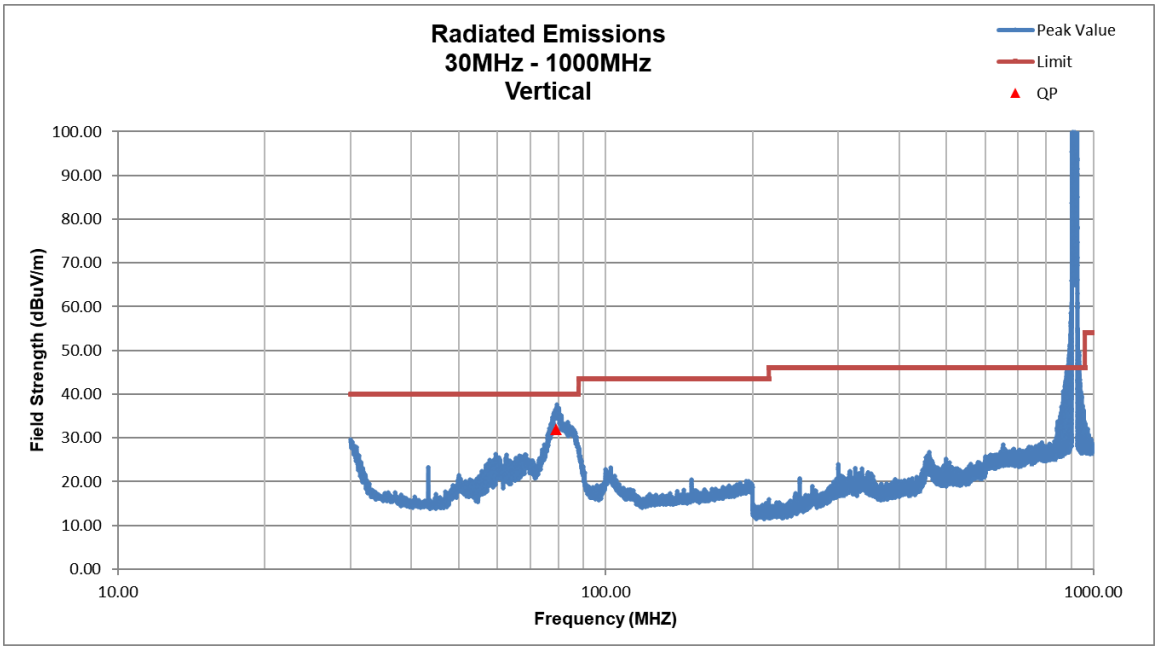
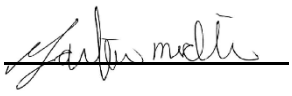


Figure 21. Spurious Radiated Emissions 30 MHz - 1000 MHz – Vertical

Table 12. Spurious Radiated Emissions 1 GHz to 10 GHz

Test: FCC Part 15.109/15.209							
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**AVG Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or AVG**
All emissions other than harmonics of the intentional radiator were more than 20 dB below the applicable limit.							

Sample Calculation: N/A

Test Date: October 4, 2024
Tested By
Signature:  Name: Gabriel Medina

2.19 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%.

2.19.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.8 dB.

The data listed in this test report **does have** sufficient margin to negate the effects of uncertainty. Therefore, the EUT **unconditionally** meets this requirement.

2.19.2 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 ± 5.2 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna (1 GHz to 18 GHz) is ± 5.2 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.