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

For the

Armilla Tech Ltd

Model Number: ATWR-V4

FCC ID: 2BLAU-ATWR-V4

UST Project: 24-0179
Issue Date: September 9, 2024

Total Pages: 40

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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: September 9, 2024

NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Armilla Tech Ltd
MODEL: ATWR-V4
FCC ID: 2BLAU-ATWR-V4
IC: N/A
DATE: September 9, 2024

This report concerns (check one): ☒ Original ☐ Class II Permissive Change

Equipment type: 900 MHz ISM Radio Transceiver Module.

Technical Information:

Radio Technology:	DTS
Frequency of Operation (MHz):	903 – 928
Output Power (dBm):	+20 dBm (rated)
Type of Modulation:	FSK
Data/Bit Rate:	100 kbps
Antenna Gain (dBi):	2.0
Software used to program EUT:	Tera Term
EUT firmware:	V4.28
Power setting:	“20”

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1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to IC RSS-247 and FCC Rules and Regulations Part 15, Section 247.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on October 3, 2023 in good operating condition.

1.3 Product Description

The EUT is a wrist-wearable device for sports usage enabling the coach to send a displayable message to the player's screen. This is a rechargeable device. The device has FSK radio that operates in 900 MHz ISM range, a display, a vibrator and a battery. The device vibrates for short periods of time whenever a new message is received. The device can be turned off and on by the push button key.

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 v03r05 for Digital Transmission Systems Operating Under section 15.247.

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 appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site is fully described and registered with the FCC. Its designation number is US5301. Additionally, this site is fully described and submitted to Industry Canada (IC) under file number 9900A-1.

1.6 Related Submittal(s)/Grant(s)

The EUT is subject to the following FCC Equipment Authorizations:

a) Certification of the transmitter incorporated within the EUT, see test data presented herein.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC/IC ID	CABLES P/D
EUT/ Armilla Tech	ATWR-V4	Engineering Sample	FCC ID: 2BLAU-ATWR-V4	N/A

S= Shielded, U= Unshielded, 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 included herein.

Table 2. Test Instruments

TEST INSTRUMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
Spectrum Analyzer	Agilent	E4440A	MY45304803	7/21/2025 2 yr.
Spectrum Analyzer	Agilent	E4407B	US41442935	9/21/2024 2 yr.
Spectrum Analyzer	Rigol*	DSA815	DSA8A180300138	2/22/2026 2 yr.
Rf Preamp 100 Khz To 1.3 Ghz	Hewlett-Packard	8447D	1937A01611	6/17/2025
Preamp 1.0 Ghz To 26.0 Ghz	Hewlett-Packard	8449B	3008A00914	3/04/2025
Loop Antenna	ETS Lindgren	6502	9810-3246	12/07/2024 2 yr.
Biconical Antenna	EMCO	3110B	9307-1431	1/13/2025 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.
High Pass Filter	Microwave Circuits	H3R020G2	001DC9528	7/02/2025
LISN X 2	Solar Electronics	9247-50-TS-50-N	955824 and 955825	4/28/2025

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 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 6.8)

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.

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 over a frequency range greater than 10 MHz, 3 test frequencies will be 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.

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.

2.6 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.

Table 4. Antenna

Manufacturer	Model	Type	Gain (dBi)	Connector
Taoglas	ILA.09	Chip antenna	+1.57	soldered

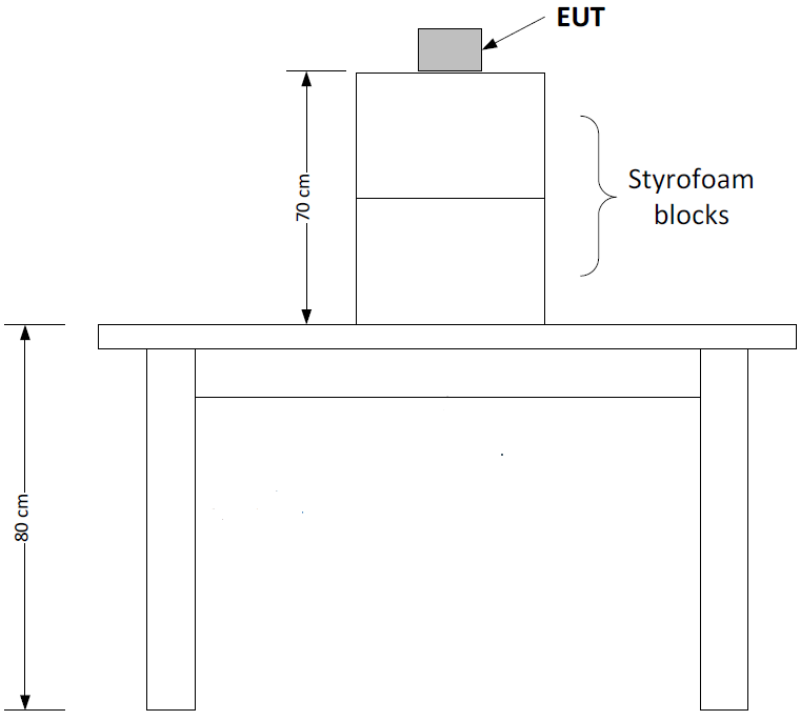

Figure 1. Block Diagram of Test Configuration

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 2.10).

2.8 Transmitter Duty Cycle (Part15.35 (c), RSS-Gen 6.10)

The EUT employs pulse transmission. However, for testing purpose the EUT was programmed to transmit at a rate >98%. The pulse transmission requirements of this subpart were acknowledged and considered during testing.

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 Correction Factor may also be expressed logarithmically in dB.

In this case the Duty Cycle has been provided by the manufacturer in the Theory of Operation exhibit. The Duty Cycle Correction factor has been determined to be -20 dB based on the explanation within the Theory of Operation.

2.9 Antenna Conducted Intentional and Spurious Emissions (CFR 15.209, 15.247(d)) (IC RSS 247, 5.5))

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 generated or used in this case, 25 GHz. A conducted scan was performed on the EUT to identify and record spurious signals 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, scanned up through the 10^{th} harmonic of the fundamental frequency. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

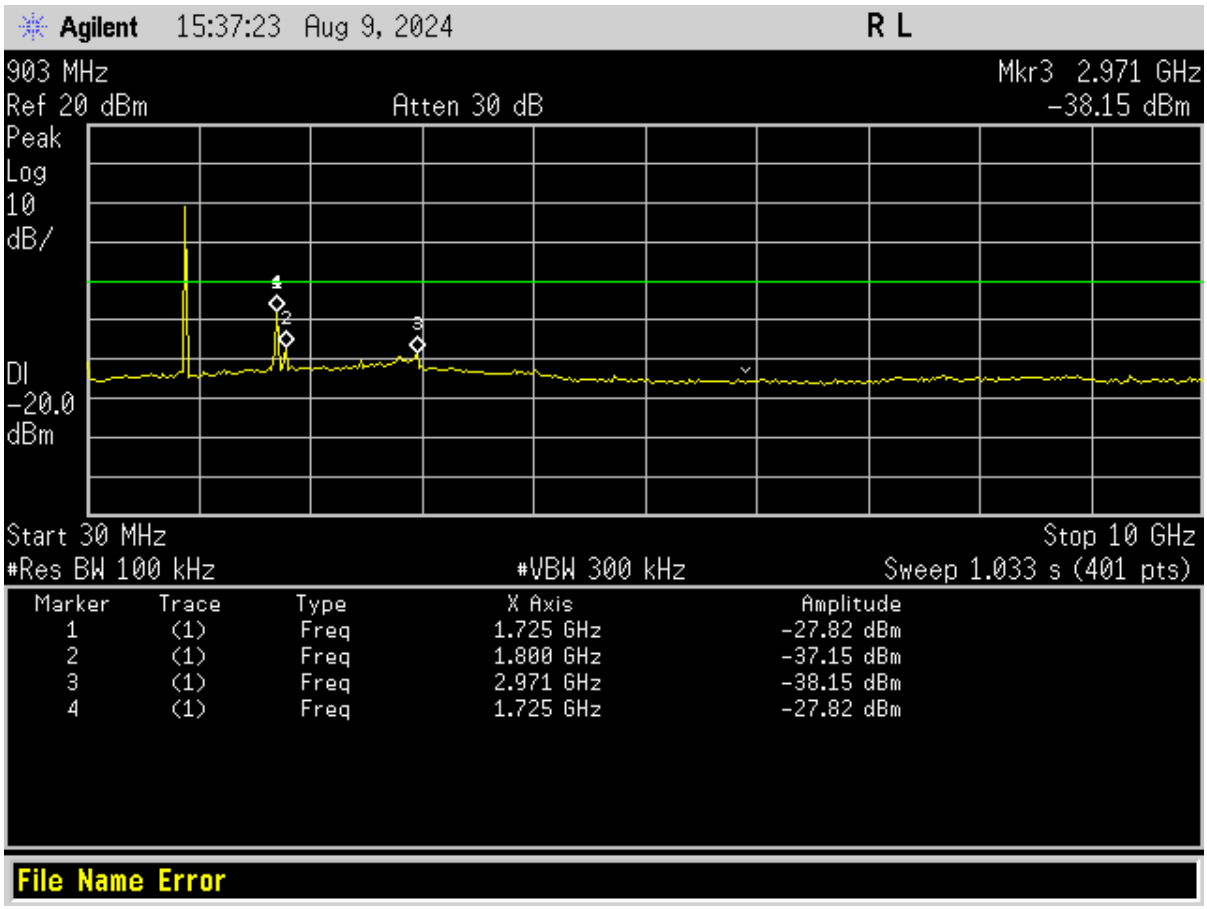

Figure 2. Low Channel Active, 30-10,000 MHz

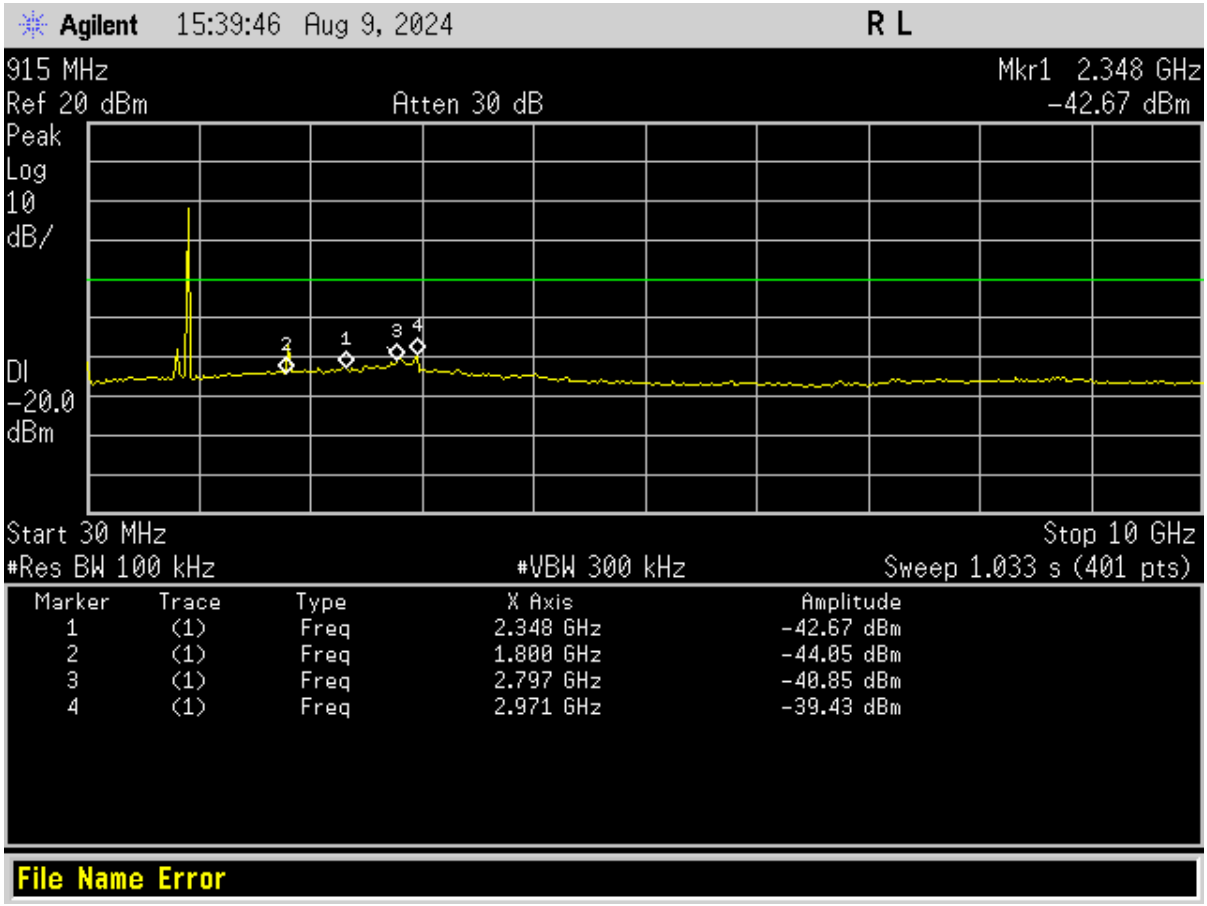

Figure 3. Mid Channel Active, 30-10,000 MHz

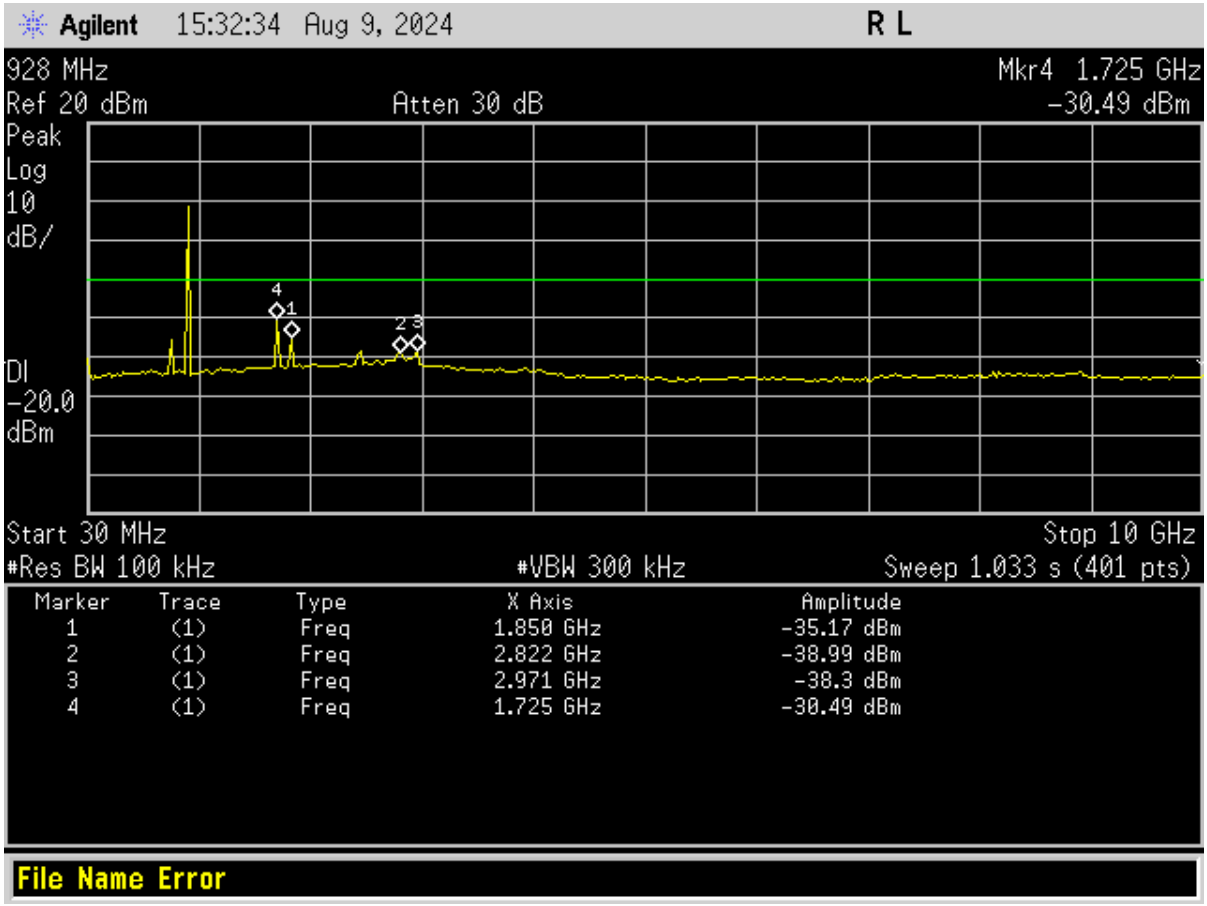

Figure 4. High Channel Active, 30-10,000 MHz

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d), RSS-247, 5.5)

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. The exact antenna height with the maximized signal was recorded for reproducibility purposes. Additionally, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum signals. 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 ≥ RBW. The results of peak radiated spurious emissions falling within restricted bands are given in Table 6 below.

For Average measurements above 1 GHz, the emissions were measured using RBW = 1 MHz and VBW = 10 Hz or the duty cycle correction factor was applied to the Peak recorded value.

Table 5. Radiated Fundamental & Harmonic Emissions, LCH

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector
903.00	70.02	25.60	95.62	--	3.0m./VERT	--	**PK**
903.00	50.02	25.60	75.62	--	3.0m./VERT	--	**PK**
1806.00	78.73	-7.23	71.50	75.6	3.0m./HORZ	4.1	**PK**
1806.00	58.73	-3.57	55.16	55.6	3.0m./HORZ	0.4	**PK**
2709.00	61.47	-3.71	57.76	74.0*	3.0m./VERT	16.2	**PK**
2709.00	41.47	-3.71	37.76	54.0*	3.0m./VERT	16.2	**PK**
3612.00	64.74	-0.60	64.14	74.0*	3.0m./VERT	9.9	**PK**
3612.00	44.74	-0.60	44.14	54.0*	3.0m./VERT	9.9	**PK**
4515.00	62.91	2.65	65.56	74.0*	3.0m./VERT	8.4	**PK**
4515.00	42.91	2.65	45.56	54.0*	3.0m./VERT	8.4	**PK**
5418.00	48.69	5.82	54.51	74.0*	3.0m./VERT	19.5	**PK**
5418.00	28.69	5.82	34.51	54.0*	3.0m./VERT	19.5	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, 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.
4. Emissions measurements compared to AVG limits were correct using a Duty Cycle Correction Factor of -20 dB.

Sample Calculation at 1806.00MHz:

Magnitude of Measured Frequency	78.73	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	-7.23	dB/m
Corrected Result	71.50	dBuV/m

Test Date: August 5 - 8, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

Table 6. Radiated Fundamental & Harmonic Emissions, MCH

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector
915.00	72.95	25.58	98.53	--	3.0m./VERT	--	**PK**
915.00	52.95	25.58	78.53	--	3.0m./VERT	--	**PK**
1830.00	77.31	-7.00	70.31	78.5	3.0m./VERT	8.2	**PK**
1830.00	57.31	-7.00	50.31	58.5	3.0m./VERT	8.2	**PK**
2745.00	57.61	-3.37	54.24	74.0*	3.0m./HORZ	19.8	**PK**
2745.00	37.61	-3.37	34.24	54.0*	3.0m./HORZ	19.8	**PK**
3660.00	60.93	-1.10	59.83	74.0*	3.0m./VERT	14.2	**PK**
3660.00	40.93	-1.10	39.83	54.0*	3.0m./VERT	14.2	**PK**
4575.00	60.41	2.56	62.97	74.0*	3.0m./VERT	11.0	**PK**
4575.00	40.41	2.56	42.97	54.0*	3.0m./VERT	11.0	**PK**
5490.00	48.48	6.49	54.97	74.0*	3.0m./HORZ	19.0	**PK**
5490.00	28.48	6.54	35.02	54.0*	3.0m./HORZ	19.0	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, 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.
4. Emissions measurements compared to AVG limits were correct using a Duty Cycle Correction Factor of -20 dB.

Sample Calculation at 1830.00MHz:

Magnitude of Measured Frequency	77.31	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	-7.00	dB/m
Corrected Result	70.31	dBuV/m

Test Date: August 5 - 8, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

Table 7. Radiated Fundamental & Harmonic Emissions, HCH

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector
928.00	77.47	25.60	103.07	--	3.0m./VERT	--	**PK**
928.00	57.47	25.60	83.07	--	3.0m./VERT	--	**PK**
1856.00	74.27	-6.21	68.06	83.1	3.0m./HORZ	15.0	**PK**
1856.00	54.27	-6.21	48.06	63.1	3.0m./HORZ	15.0	**PK**
2784.00	61.76	-4.57	57.19	74.0	3.0m./VERT	16.8	**PK**
2784.00	41.76	-4.57	37.19	54.0	3.0m./VERT	16.8	**PK**
3712.00	54.09	0.88	54.97	74.0	3.0m./HORZ	19.0	**PK**
3712.00	34.09	0.88	34.97	54.0	3.0m./HORZ	19.0	**PK**
4640.00	61.91	2.57	64.48	74.0	3.0m./VERT	9.5	**PK**
4640.00	41.91	2.57	44.48	54.0	3.0m./VERT	9.5	**PK**
5568.00	50.64	6.36	57.00	74.0	3.0m./HORZ	17.0	**PK**
5568.00	30.64	6.36	37.00	54.0	3.0m./HORZ	17.0	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, 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.
4. Emissions measurements compared to AVG limits were correct using a Duty Cycle Correction Factor of -20 dB.

Sample Calculation at 1856.00MHz:

Magnitude of Measured Frequency	74.27	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	-6.21	dB/m
Corrected Result	68.06	dBuV/m

Test Date: August 5 - 8, 2024

Tested By
Signature: Elliott T Chaves Name: Elliott Chaves

2.11 Band Edge Measurements (CFR 15.247(d), RSS-247, 5.5)

Band Edge measurements are made following the guidelines in ANSI C63.10-2013 Clause 6.10 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Restricted band and band edge tests are 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. The results are collected and presented below.

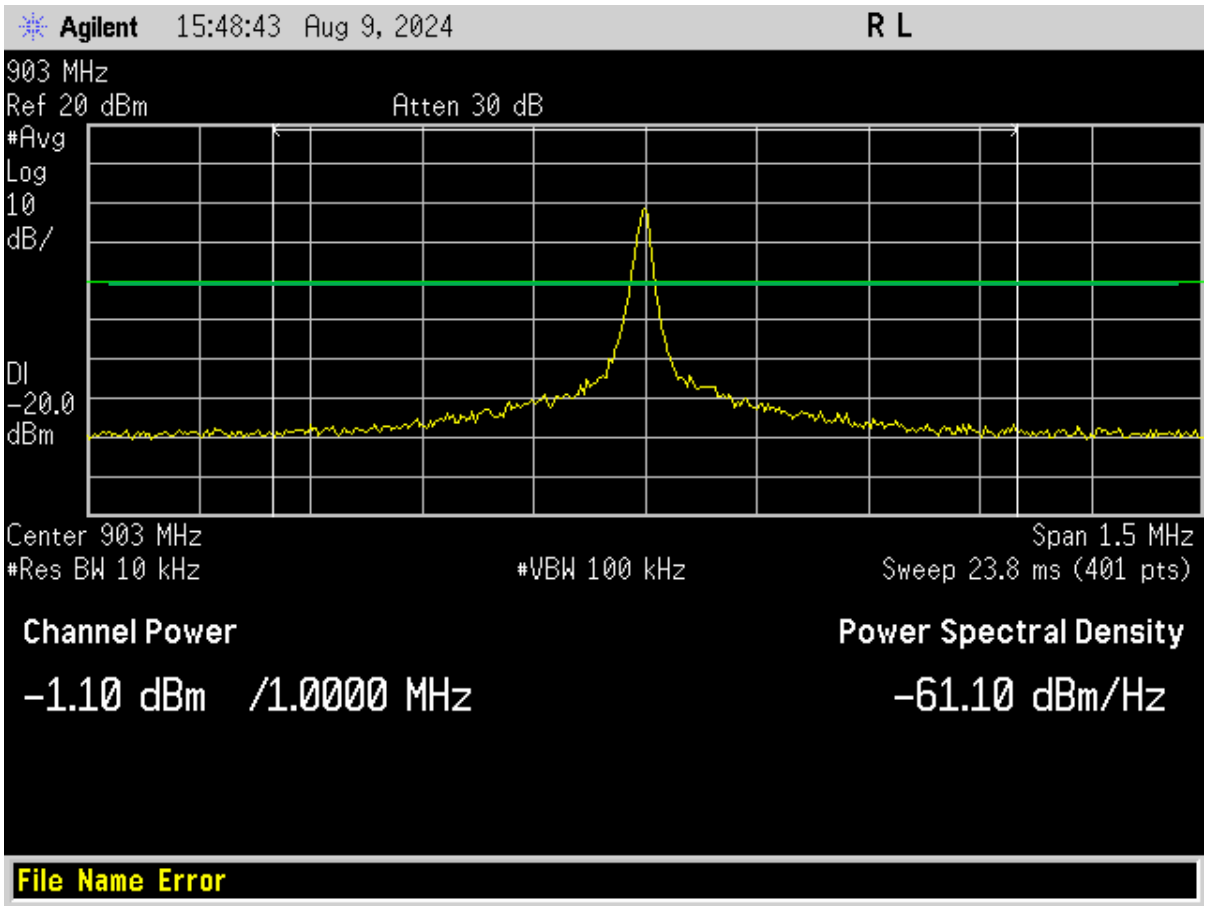

Figure 5. Band Edge Compliance Low Channel Delta - Peak

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

Test Date: August 15, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

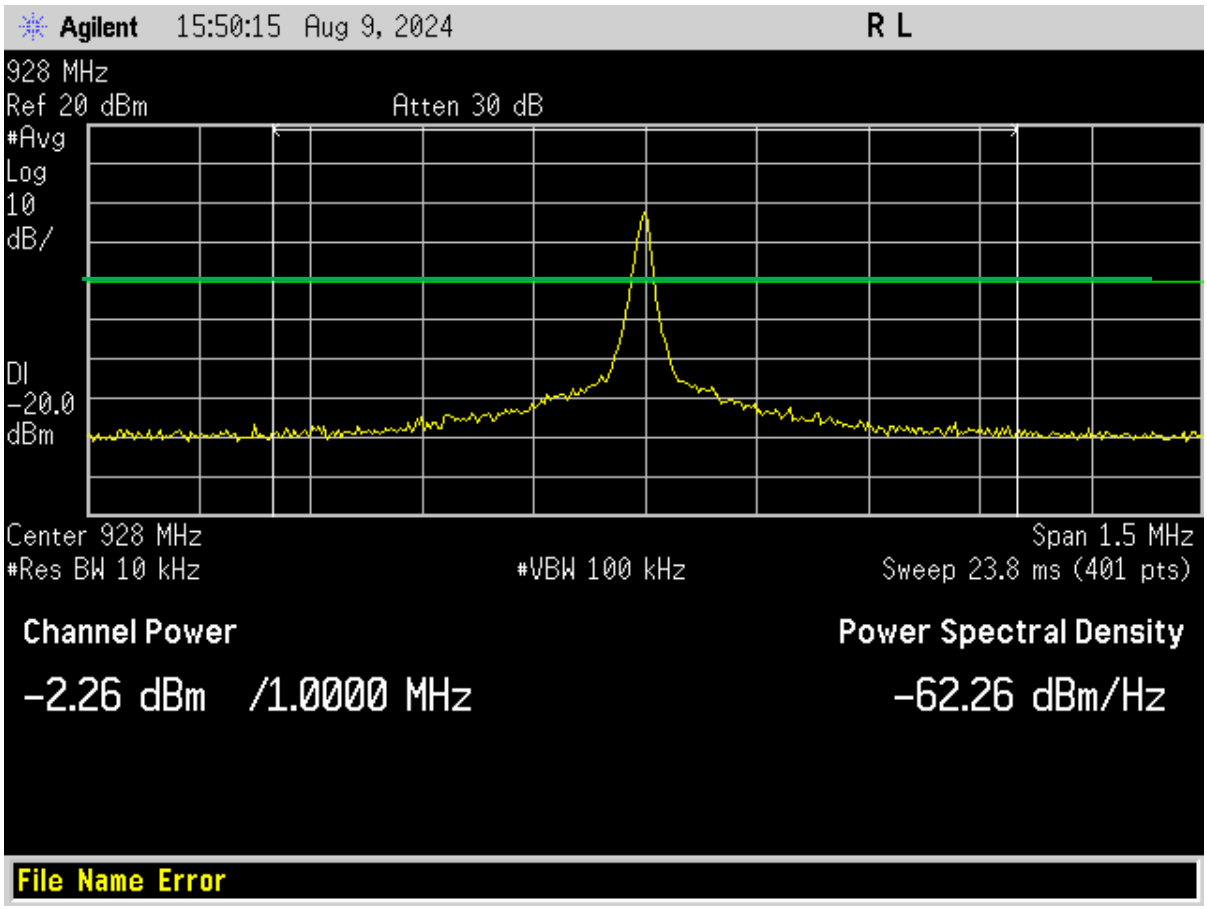

Figure 6. Band Edge Compliance High Channel Delta - Peak

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

Test Date: August 15, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

2.12 Six (6) dB Bandwidth (CFR 15.247(a)(2), RSS-247, 5.2(a))

The EUT antenna port was connected to a spectrum analyzer having a 50 Ω input impedance. Measurements were performed per ANSI C63.10-2013, clause 11.8. The RBW was set to 100 kHz and the VBW ≥ RBW. The results of this test are given in the table below and figures below.

Table 8. Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (KHz)	Minimum FCC Bandwidth (KHz)
902.75	554.92	500
913.75	558.57	500
927.25	551.07	500

Test Date: August 15, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

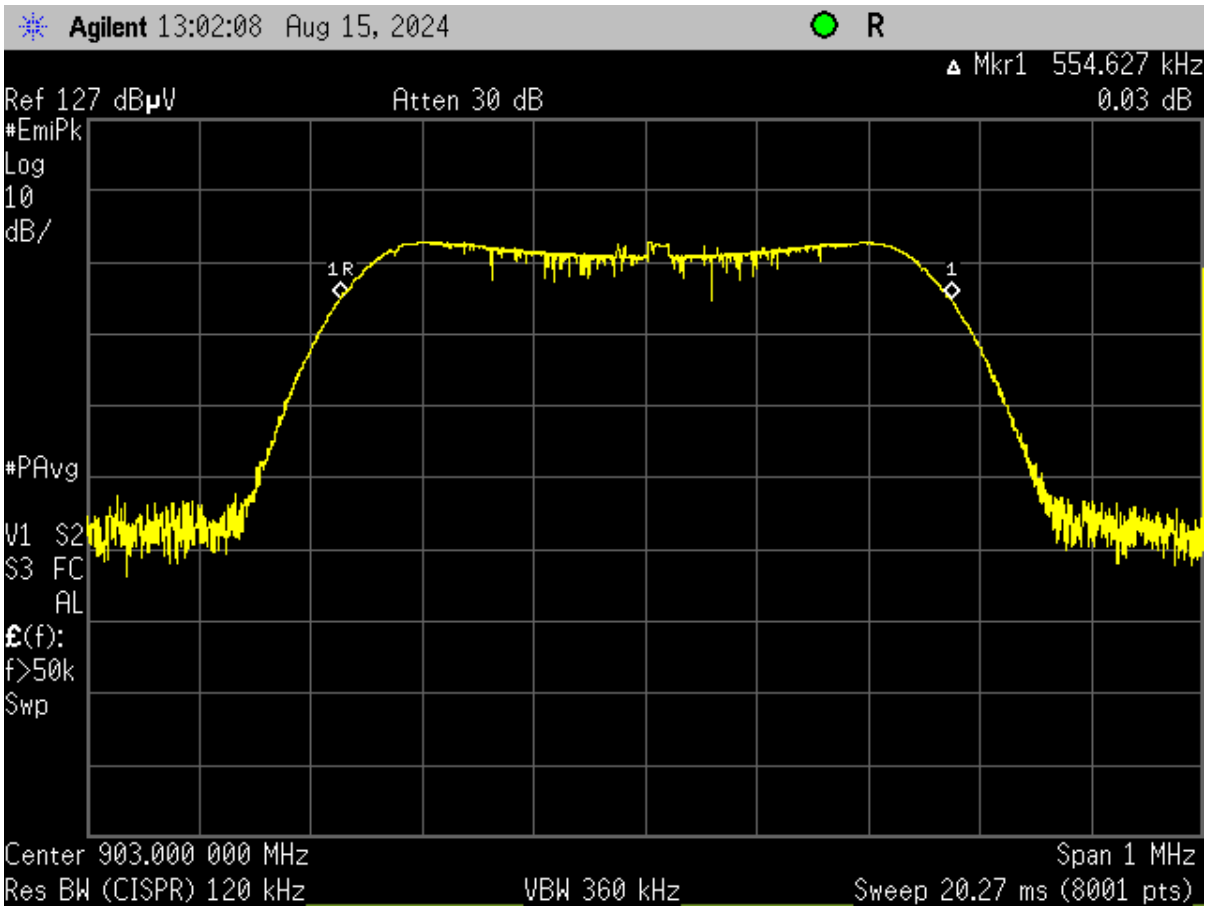

Figure 7. 6 dB Bandwidth Low Channel

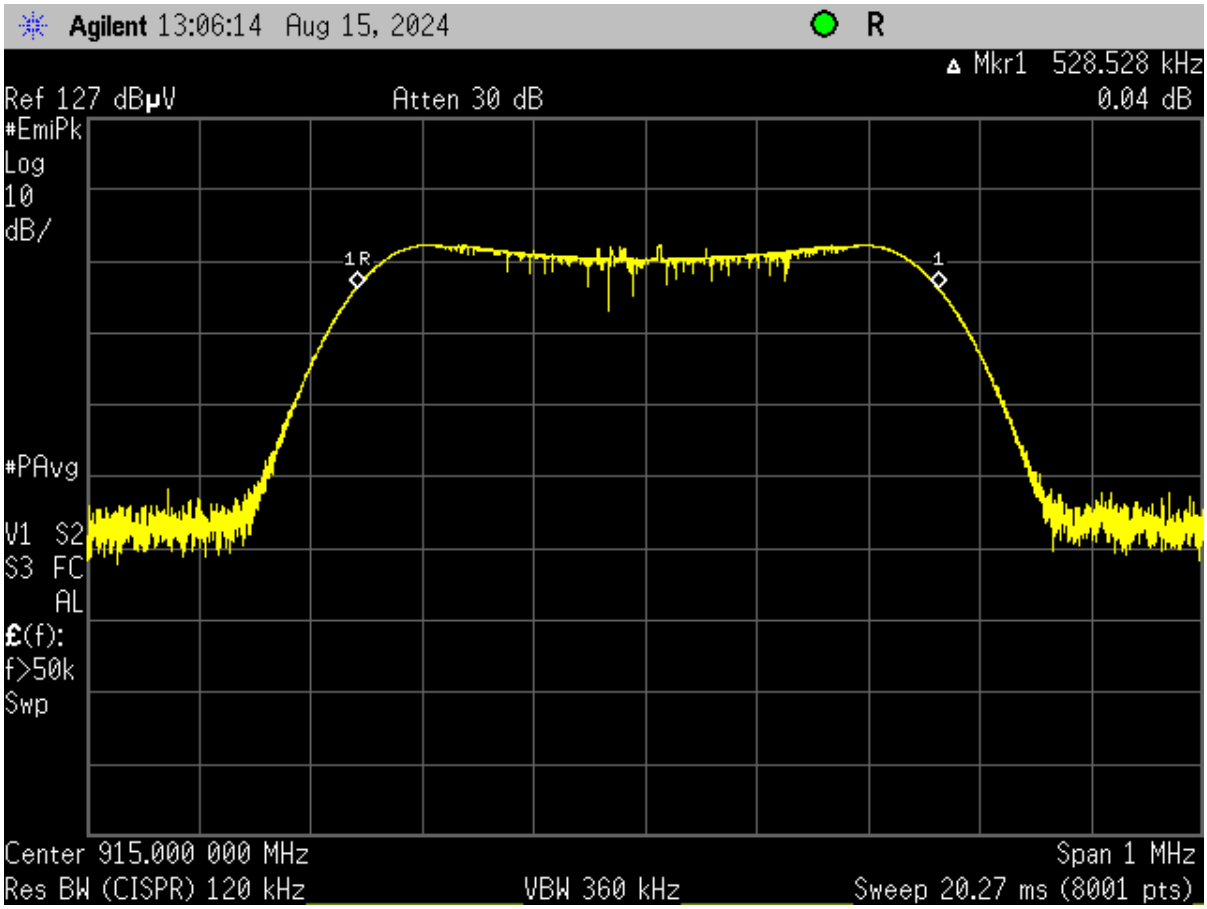

Figure 8. 6 dB Bandwidth Mid Channel

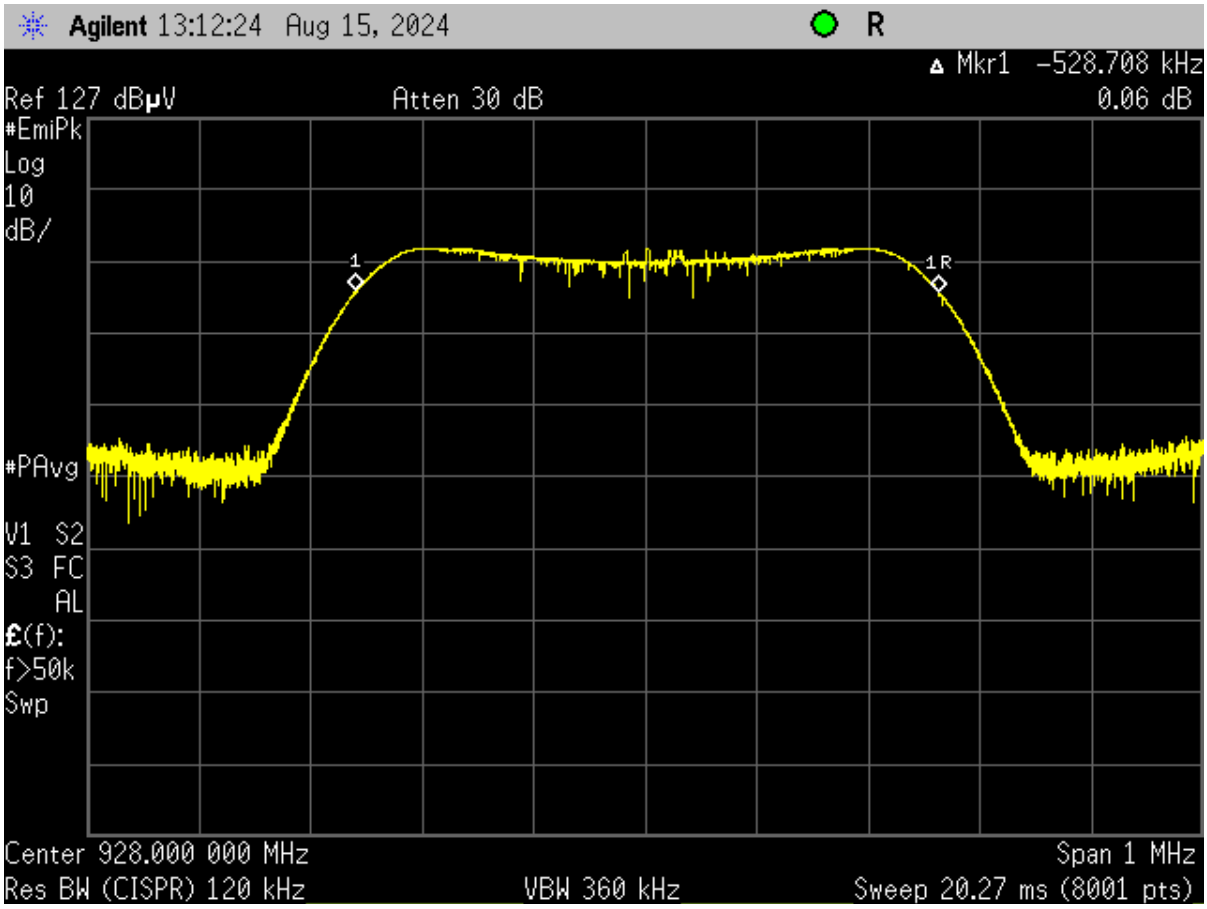

Figure 9. 6 dB Bandwidth High Channel

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

The transmitter was programmed to operate at a maximum output power across the bandwidth. For this test, the output power of the radio was set to the default value, +2.6 dBm.

Peak power 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 to a RBW of1 MHz, and the VBW ≥ RBW. Peak antenna conducted output power is tabulated in the table below.

Table 9. 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)
902.75	2.97	1.98	1000
915.75	3.09	2.04	1000
927.25	2.98	1.99	1000

Test Date: August 9, 2024

Tested By
Signature: Elliott K. Chaves Name: Elliott Chaves

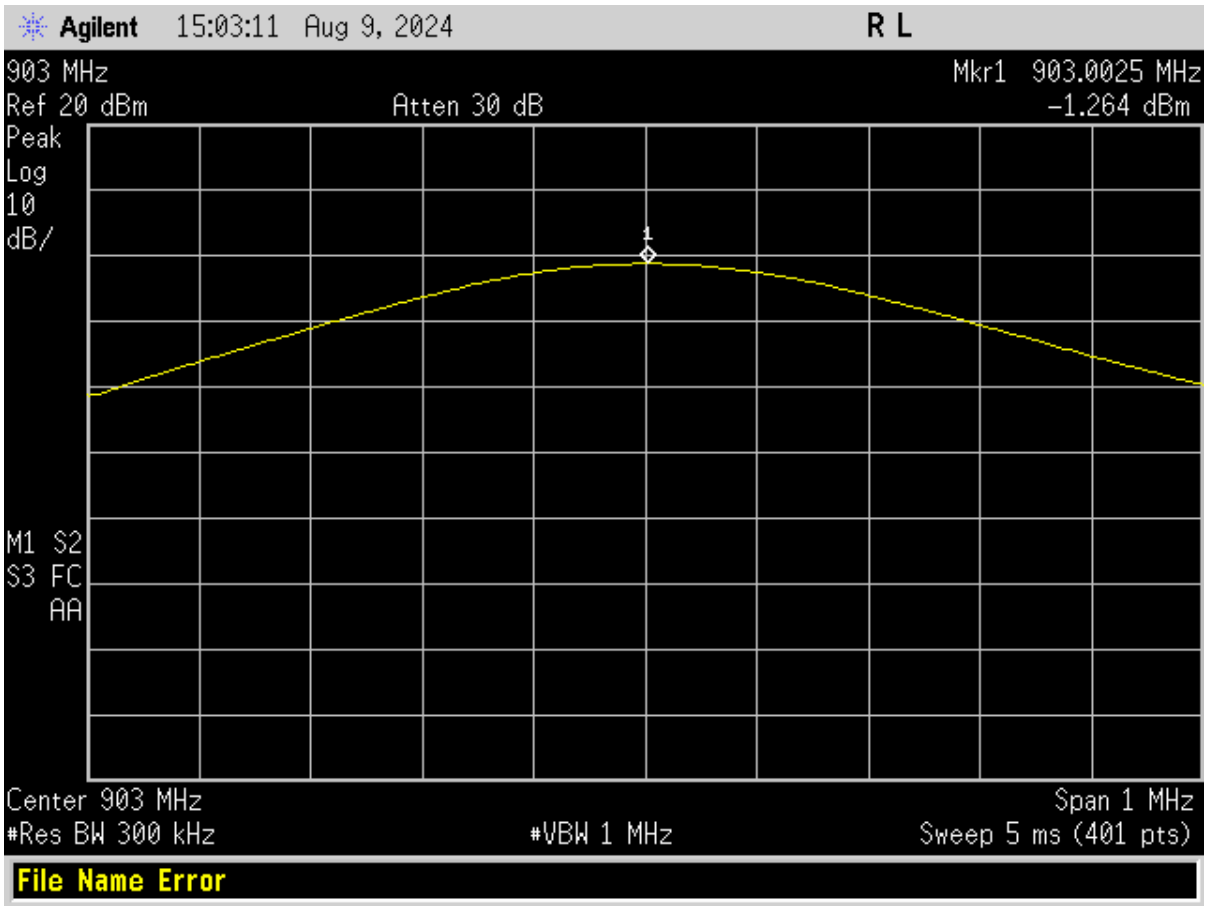

Figure 10. Peak Antenna Conducted Output Power, Low Channel

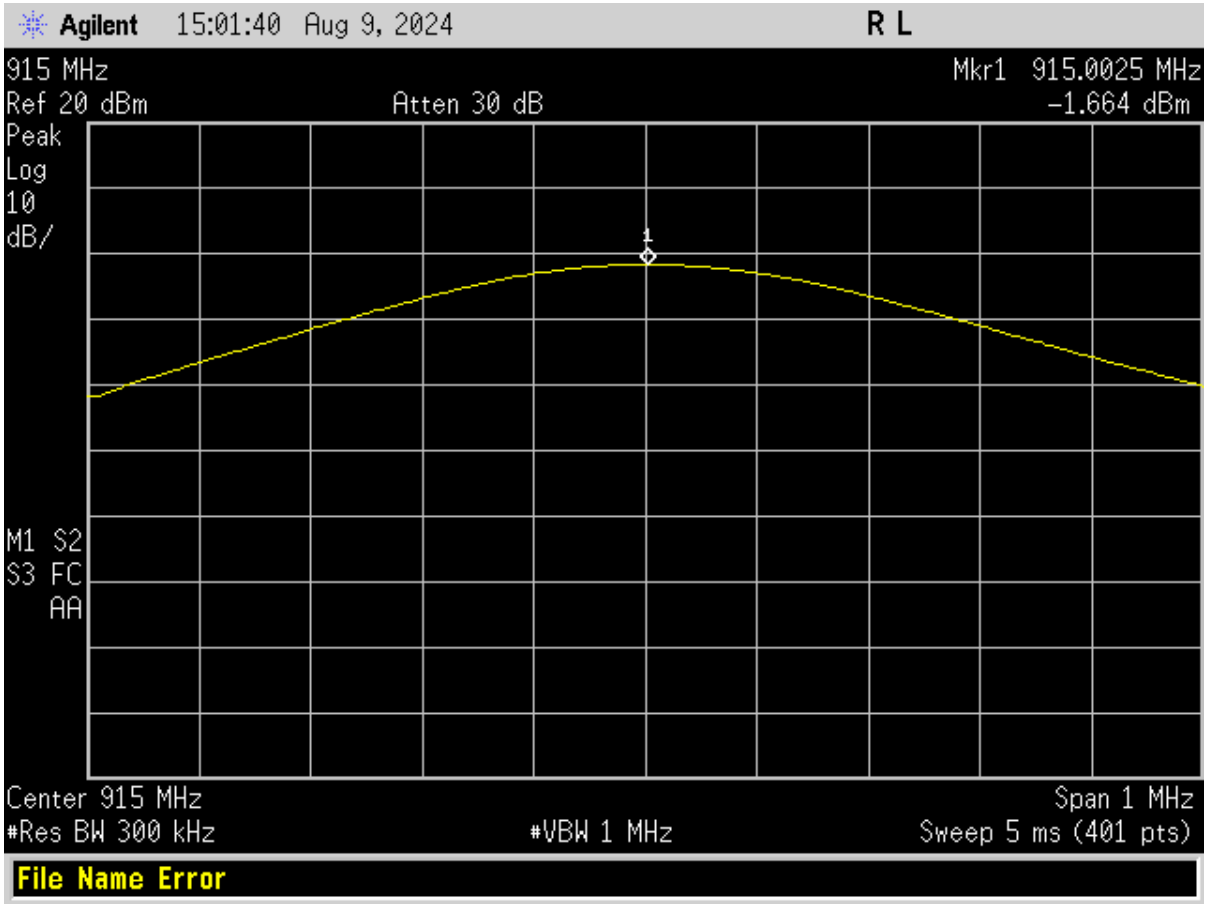

Figure 11. Peak Antenna Conducted Output Power, Mid Channel

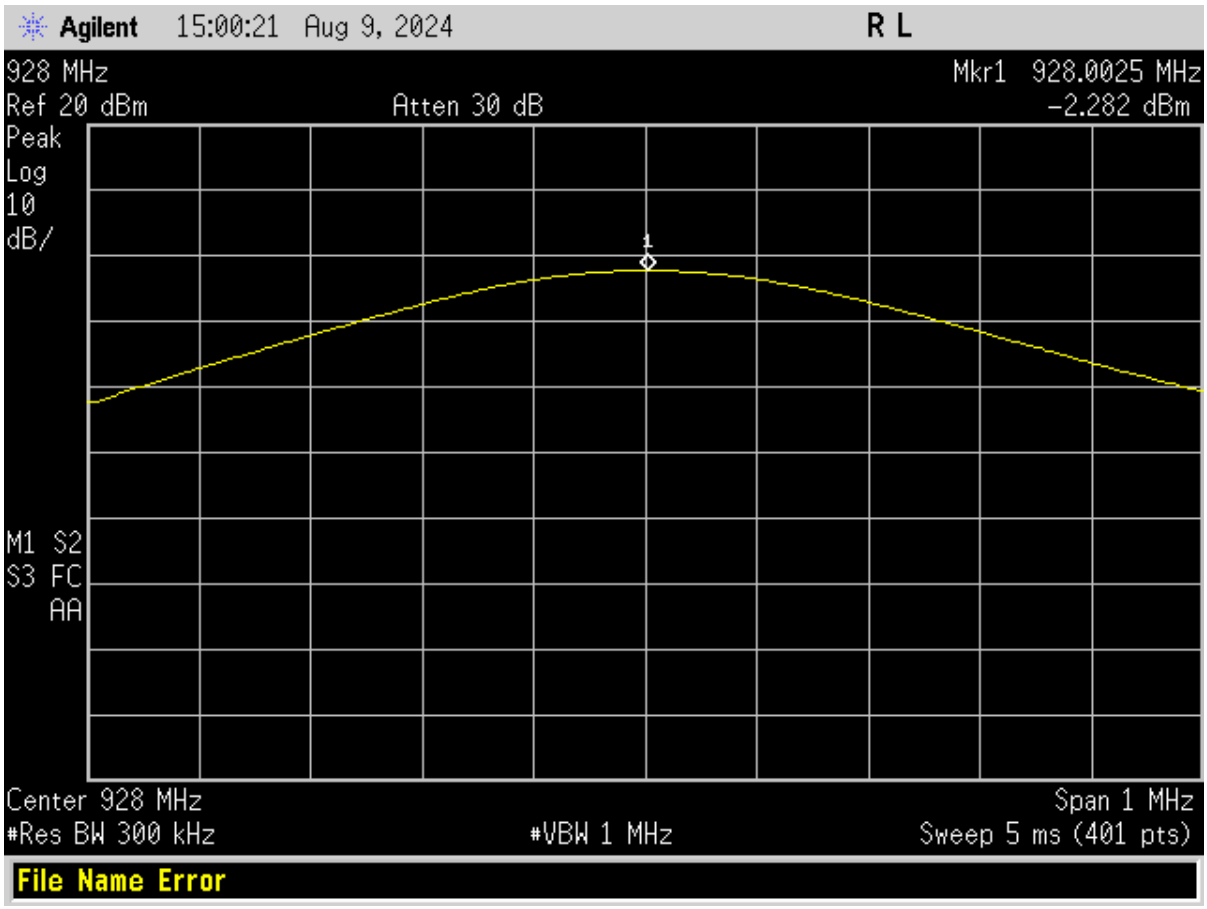

Figure 12. Peak Antenna Conducted Output Power, High Channel

2.14 Power Spectral Density (CFR 15.247(e), RSS-247, 5.2(b))

The transmitter was placed into a continuous mode of operation at all applicable frequencies. The measurements were performed per the procedures of ANSI C63.10-2013. The RBW was set to 3 kHz and the Video Bandwidth was set to ≥ RBW. The trace capture time was set to (Span/3 kHz).

In accordance with 15.247 (e), the power spectral density shall be no greater than +8 dBm per any 3 kHz band.

Results are shown in the table below and figures below. All are less than +8 dBm per 3 kHz band. See figures below.

Table 10. Power Spectral Density for Low, Mid and High Bands

Frequency (MHz)	Measured Result (dBm/3kHz)	FCC Limit (dBm/3 kHz)
902.75	1.760	+8.0
915.75	0.423	+8.0
927.25	1.750	+8.0

Note: dBm/Hz correct to dBm/kHz using the following formula, 10 log RBW ref/RBW measured.

Test Date: August 9, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

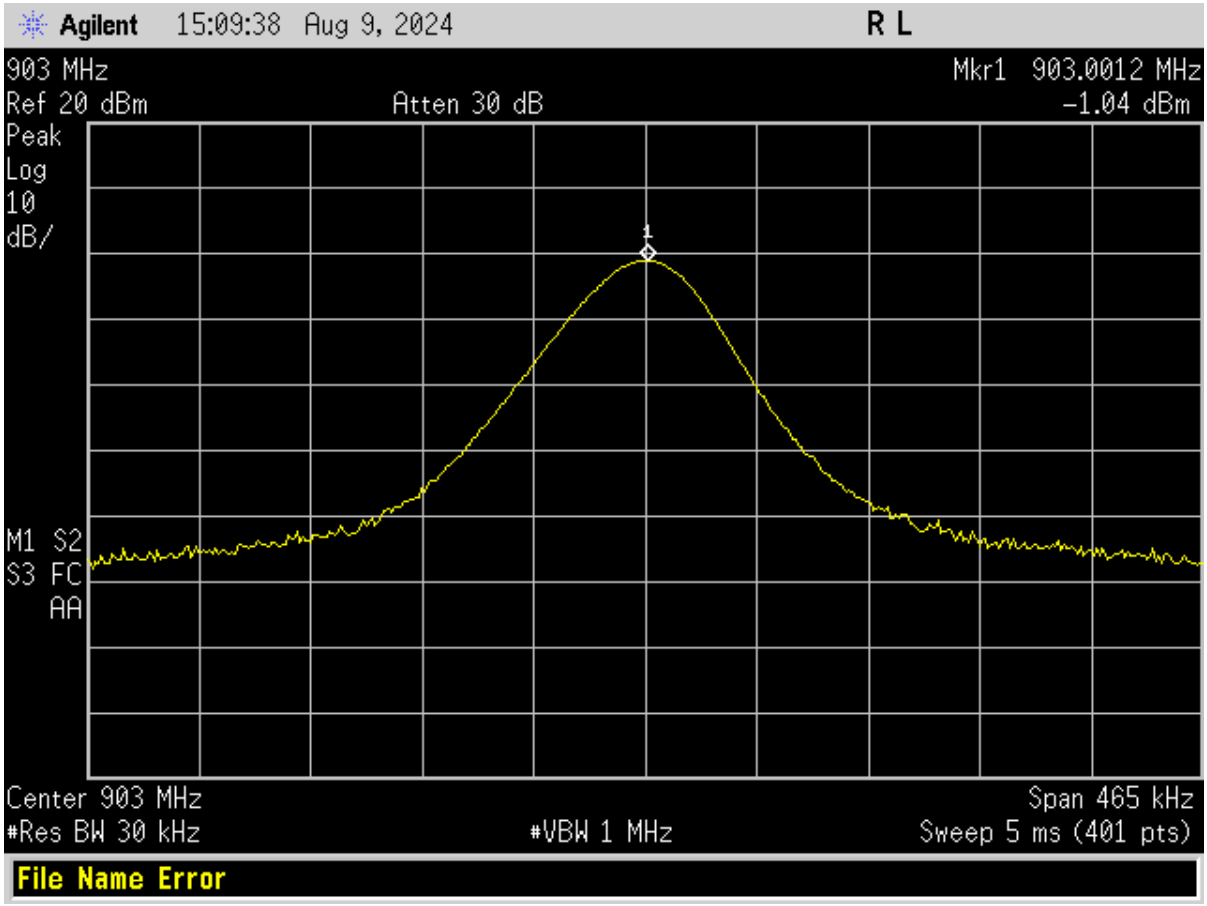

Figure 13. Power Spectral Density, Low Channel

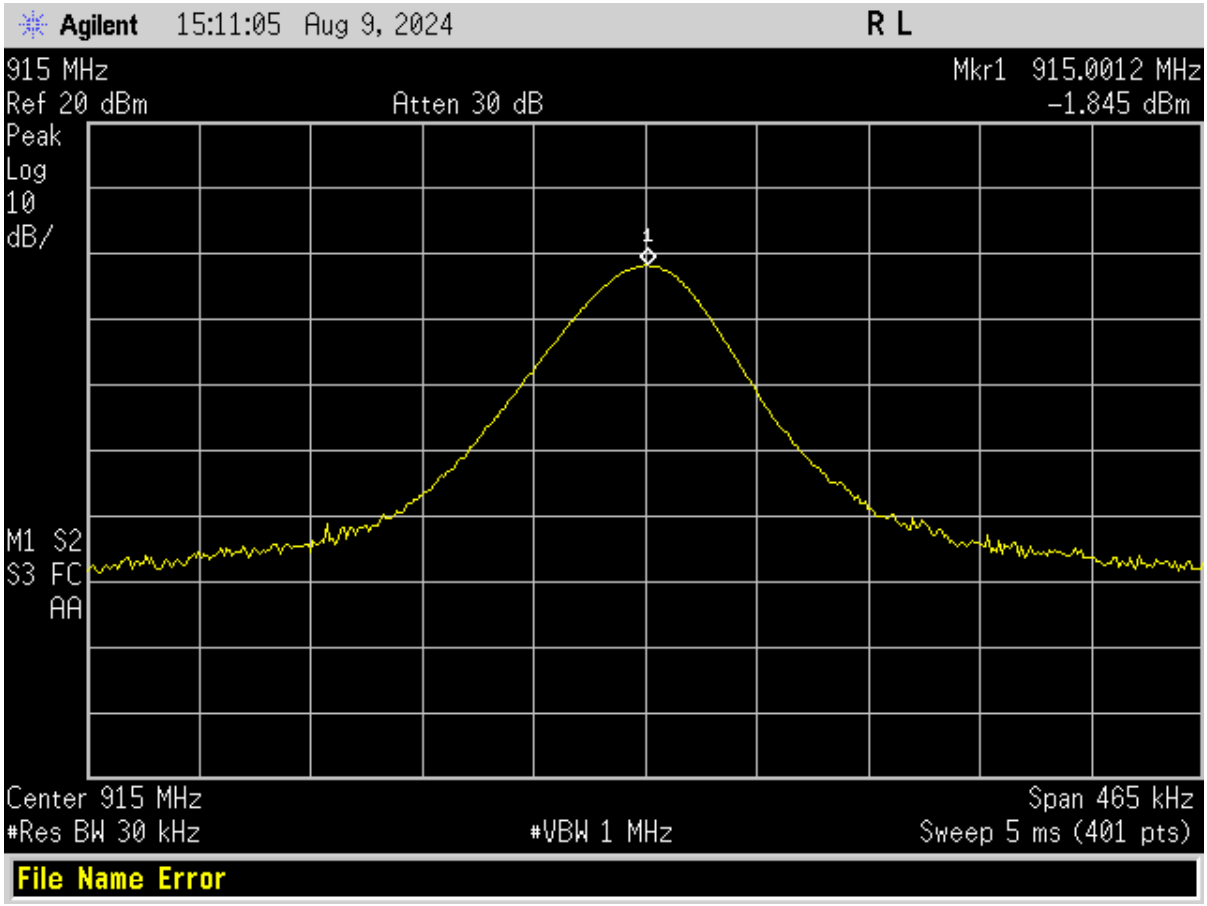

Figure 14. Power Spectral Density, Mid Channel

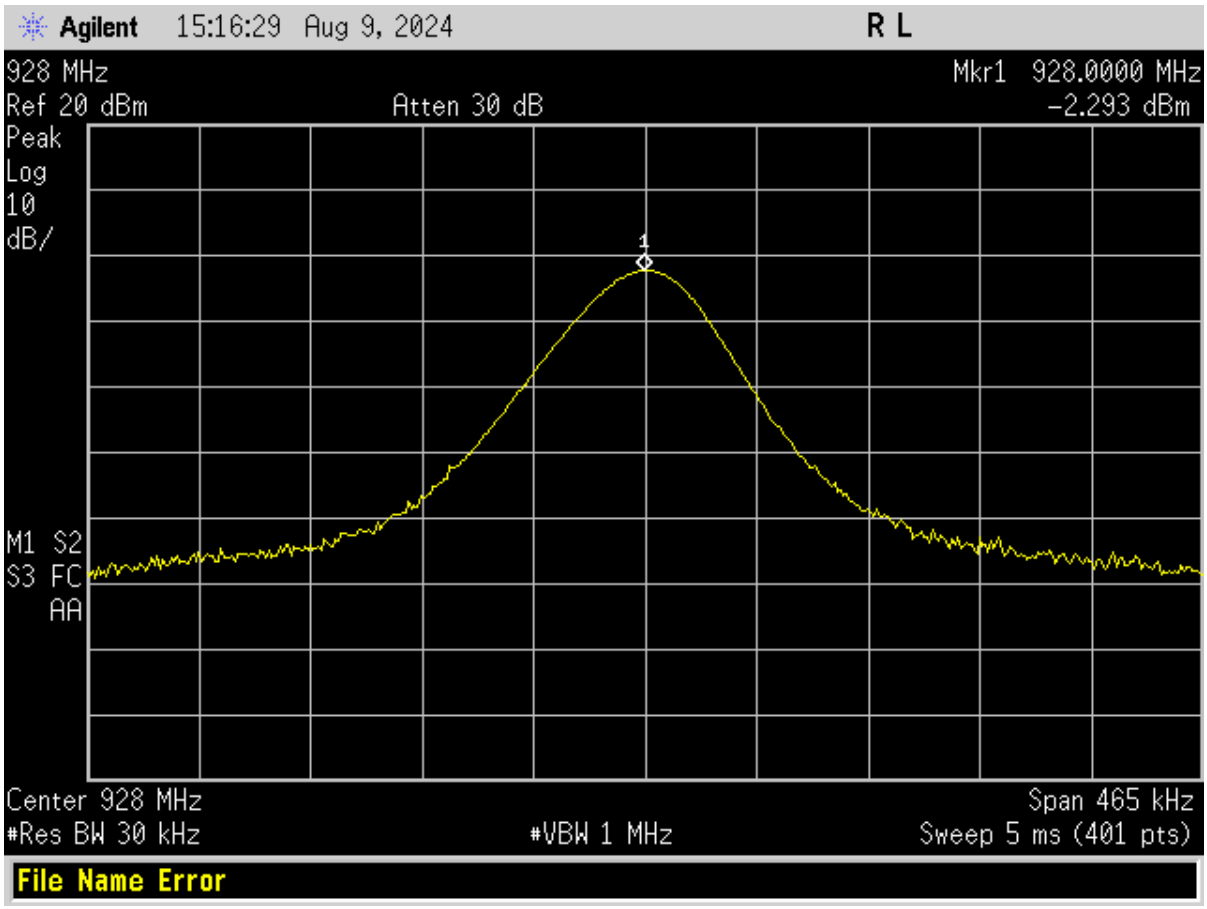

Figure 15. Power Spectral Density, High Channel

2.15 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 15.207, per ANSI C63.10:2013, Clause 6.2, with a spectrum analyzer connected to an 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 was 3.2 dB from the applicable limit. All other emissions were at least 9.5 dB from the limit. Those results are given in the following table.

Table 11. Power Line Conducted Emissions

Conducted Emissions 150 kHz to 30 MHz						
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL (dB)**	**Corrected Results (dBuV)**	**AVG Limits (dBuV)**	**Margin (dB)**	**Detector**
Phase @ 120 Vac / 60Hz						
0.1547	50.80	1.75	52.55	55.7	3.2	**PK**
0.5192	32.64	0.38	33.02	46.0	13.0	**PK**
1.2200	31.09	0.26	31.35	46.0	14.7	**PK**
6.3250	29.82	0.39	30.21	50.0	19.8	**PK**
10.3833	28.07	0.19	28.26	50.0	21.7	**PK**
21.3667	27.69	0.74	28.43	50.0	21.6	**PK**
Neutral @ 120 Vac / 60Hz						
0.1529	44.16	2.16	46.32	55.8	9.5	**PK**
0.5600	31.54	0.55	32.09	46.0	13.9	**PK**
2.3933	31.13	0.44	31.57	46.0	14.4	**PK**
7.3000	29.61	0.58	30.19	50.0	19.8	**PK**
11.0667	27.96	0.38	28.34	50.0	21.7	**PK**
28.7833	28.78	0.43	29.22	50.0	20.8	**PK**

Sample Calculation At: 0.1547 MHz

Magnitude of Measured Frequency	50.80	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	1.75	dB
Corrected Result	52.55	dBuV/m

Test Date: August 7, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

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

The test data provided is to support the verification requirement for radiated emissions coming for the EUT in a transmitting state per 15.209 and was 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 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 table following. These results are meant to show that this EUT has met the intentional transmitter requirements of CFR Part 15.209.

Any emissions found that were outside the restricted bands were compared to limits based on Part 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 15.247(b)(3), 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.

Table 12. Spurious Radiated Emissions (150 kHz-30MHz)

Test: FCC Part 15.209, 15.247							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
Except for the fundamental and harmonics emissions reported in this report, all other spurious emissions were more than 20 dB below the applicable limit.							

Sample Calculation: N/A

Test Date: August 5 – 8, 2024

Tested By
Signature: Elliott T. Chaves Name: Elliott Chaves

Table 13. Spurious Radiated Emissions (30 MHz – 1 GHz), Part 15.209(a)

Test: FCC Part 15.209, 15.247							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
Except for the fundamental and harmonics emissions reported in this report, all other spurious emissions were more than 20 dB below the applicable limit.							

Sample Calculation: N/A

Test Date: August 5 – 8, 2024

Tested By
Signature: Elliott K. Chaves Name: Elliott Chaves

Table 14. Spurious Radiated Emissions – (Above 1 GHz)

Test: FCC Part 15.209,15.247							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
Except for the fundamental and harmonics emissions reported in this report, all other spurious emissions were more than 20 dB below the applicable limit.							

Sample Calculation: N/A

Test Date: August 5 – 8, 2024

Tested By
Signature: Elliott K. Chaves Name: Elliott Chaves

2.17 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4-2:2011. A coverage factor of k=2 was used to give a level of confidence of approximately 95%.

2.17.1 Conducted Emissions Measurement Uncertainty

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

2.17.2 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 is ±5.1 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.

END TEST REPORT