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

GE Grid Solutions

Model Number: CapMD Radio

FCC ID: 2BFVO-CAPMDRAD

UST Project: 25-0028
Issue Date: May 7, 2025

Total Pages: 54

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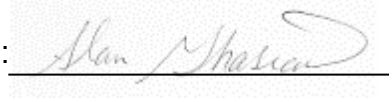
I certify that I am authorized to sign for the Test Agency and that the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date: May 7, 2025

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: GE Grid Solutions
ADDRESS: 1925 Calumet St. Clearwater, FL 33765 USA
MODEL: CapMD Radio
FCC ID: 2BFVO-CAPMDRAD
DATE: May 7, 2025

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

Equipment type: Low Power, 2.4GHz Transceiver

Technical:
Operating Frequency range: 2403.5 MHz – 2476.5 MHz
Type of modulation: O-QPSK
Data/Bit Rate: 250 kbps – 2 Mbps
Antenna Gain: +4.5 dBi (Dipole)
Maximum Output Power: +4 dBm (rated)
Software Used to Program EUT: Bliss
EUT Firmware Number: N/A
Power Setting: maximum level

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 is prepared to convey test results and information concerning the suitability of this exact product for public distribution according to FCC Rules and Regulations Part 2, 15, and Part 15.247.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on March 21, 2025 in good operating condition.

1.3 Product Description

The Equipment Under Test (EUT) is the GE Grid Solutions model CapMD Radio. The EUT is device used for utilities maintenance. GE's CapMD Radio is intended for use in conjunction with the CapMD Sensor(s) to enhance information about capacitor bank.

The EUT can be installed various GE Grid Solutions host products one of which is a Ground Receiver system. The EUT provides the host device with the ability to wirelessly communicate with the CapMD Sensors to relay information such as the capacitor bank status.

The EUT incorporates IEEE 802.15.4, ZigBee technology. This report is an assessment of the ZigBee transceiver compared to FCC Part 15 Subpart C and Part 15.247 limits.

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 has been fully described and registered with the FCC. Its designation number is US5301. Additionally, this site has been fully described and submitted to Industry Canada (IC), and has been approved 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	REMARKS	CABLES P/D
EUT/ GE Grid Solutions	CapMD Radio	Engineering Sample	FCC ID: 2BFVO-CAPMDRAD (Pending)	PU
AC/DC Power Supply Salom	SSW2725US	22063N	Only used for testing purposes.	PU

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.

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	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	3/10/2026
Loop Antenna	ETS Lindgren	6502	9810-3246	11/15/2026 2 yr.
Bicolog Antenna	Aaronia AG	Bicolog* 20100E	20400600036	9/25/2025 2 yr.
Horn Antenna	A.H. Systems	SAS-571	605	3/15/2027 2 yr.
High Pass Filter	Microwave Circuits	H3R020G2	001DC9528	7/2/2025
Attenuator	MECA	604-20-1	N/A	3/7/2026
LISN	Solar Electronics	9247-50-TS-50-N	955825 and 955824	4/28/2025

Radiated Emissions Cable	US Tech	N/A	N/A	1/23/2026
Radiated Emissions Cable	Times Microwave Systems	LMR400	19424	3/07/2026
Radiated Emissions Cable	BRACKE M	BM96603.60	N/A	3/11/2026
Radiated Emissions Cable	Times Microwave Systems	LMR400	N/A	4/03/2026
Conducted Emissions Cable	US Tech	N/A	N/A	3/12/2026

Note 1: The calibration interval of the above test instruments are 12 months unless stated otherwise and 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 requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

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 2.402 GHz to 2.476 GHz, 3 test frequencies will be used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

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)

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)

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 is 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	Molex	Dipole	2203550001	+4.5	SMA

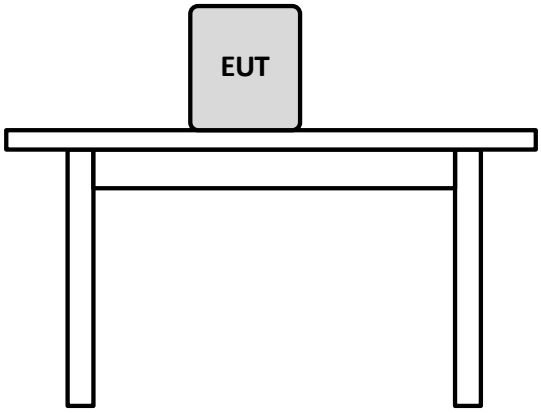

Figure 1. Block Diagram of Test Configuration

Note: A PC used to program EUT for intentional spurious emissions

2.7 Restricted Bands of Operation (Part 15.205)

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))

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 may also be expressed logarithmically in dB.

No Duty Cycle correction was applied for testing purposes.

2.9 Antenna Conducted Intentional and Spurious Emissions (CFR 15.209, 15.247(d))

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 that were related to the transmitter. Antenna Conducted Emissions of a significant magnitude that fell within restricted bands were then measured as radiated emissions in the EMC Chamber. The conducted emissions graphs are found in the figures below. The limit for antenna conducted power is 1 Watt (30 dBm) per 15.247 (b)(3).

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

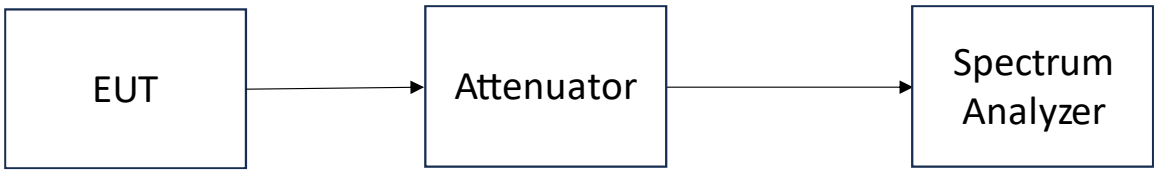

Figure 2. Bench Test Setup

Test Date: June 6-11, 2024

Tested by
Signature:  Name: Gabriel Medina

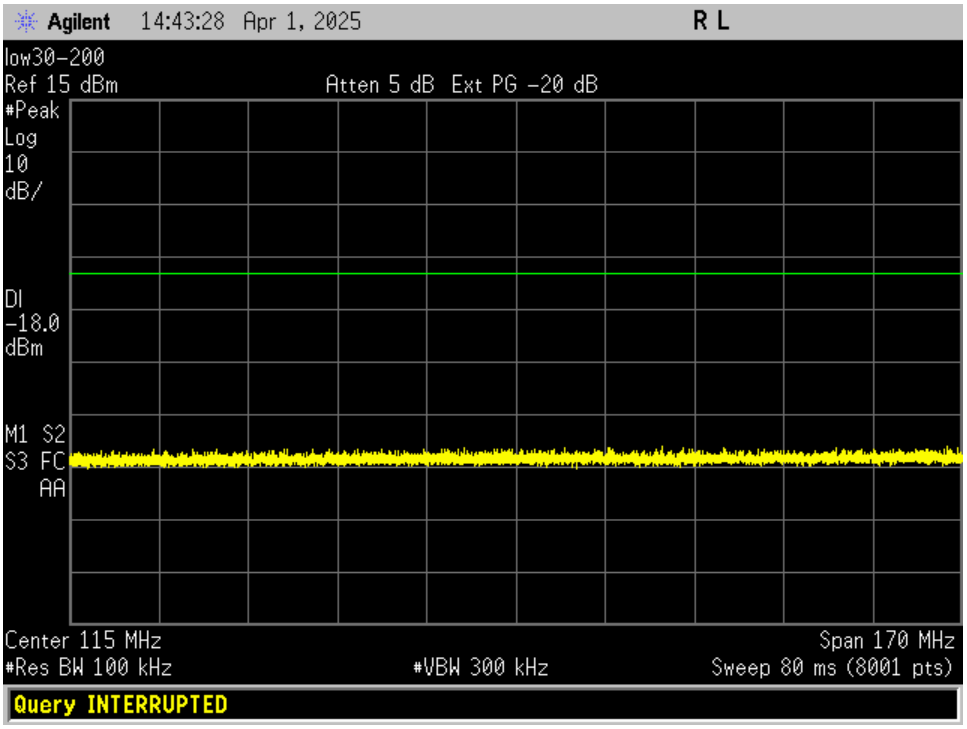

Figure 3. Low Channel, Cond Spurious Emissions 30 MHz - 200 MHz

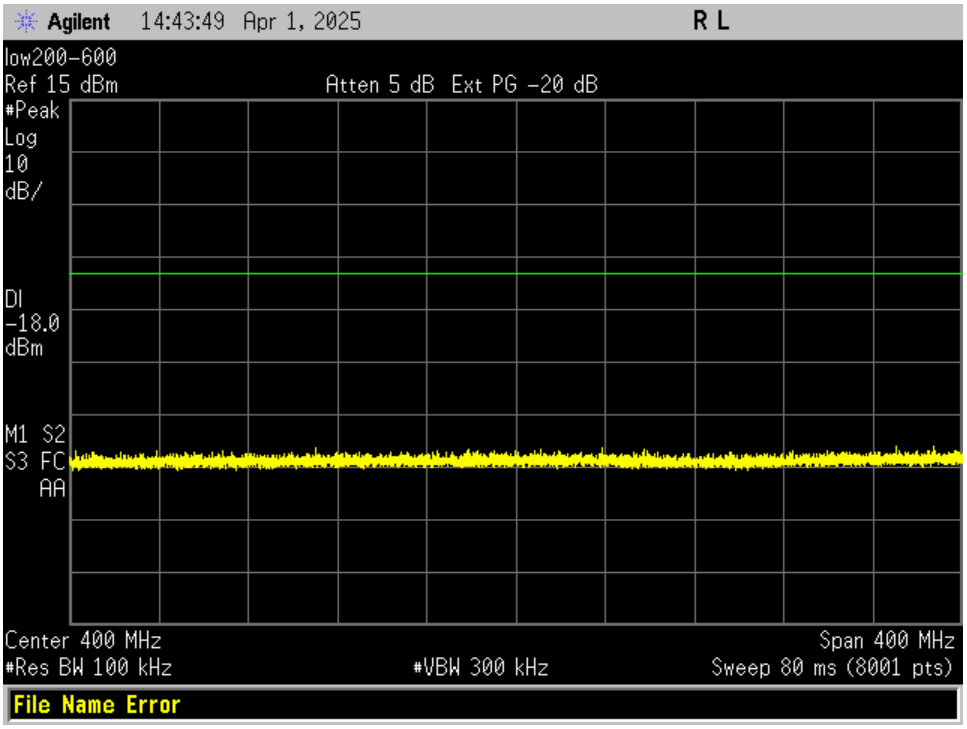

Figure 4. Low Channel, Cond Spurious Emissions 200 MHz - 600 MHz

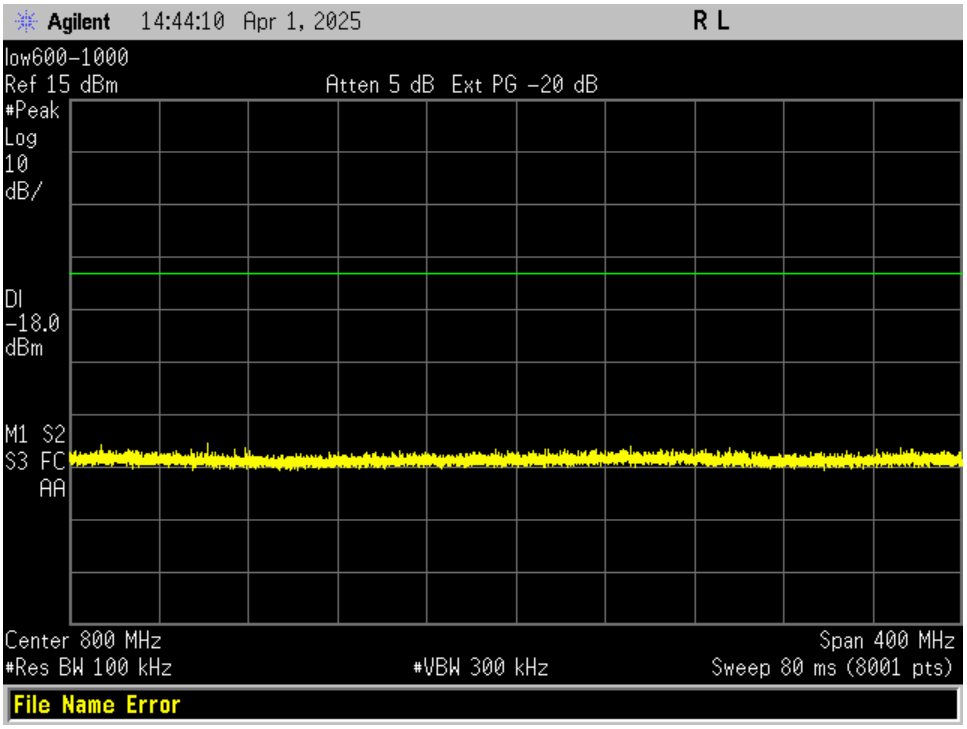

Figure 5. Low Channel, Cond Spurious Emissions 600 MHz - 1000 MHz

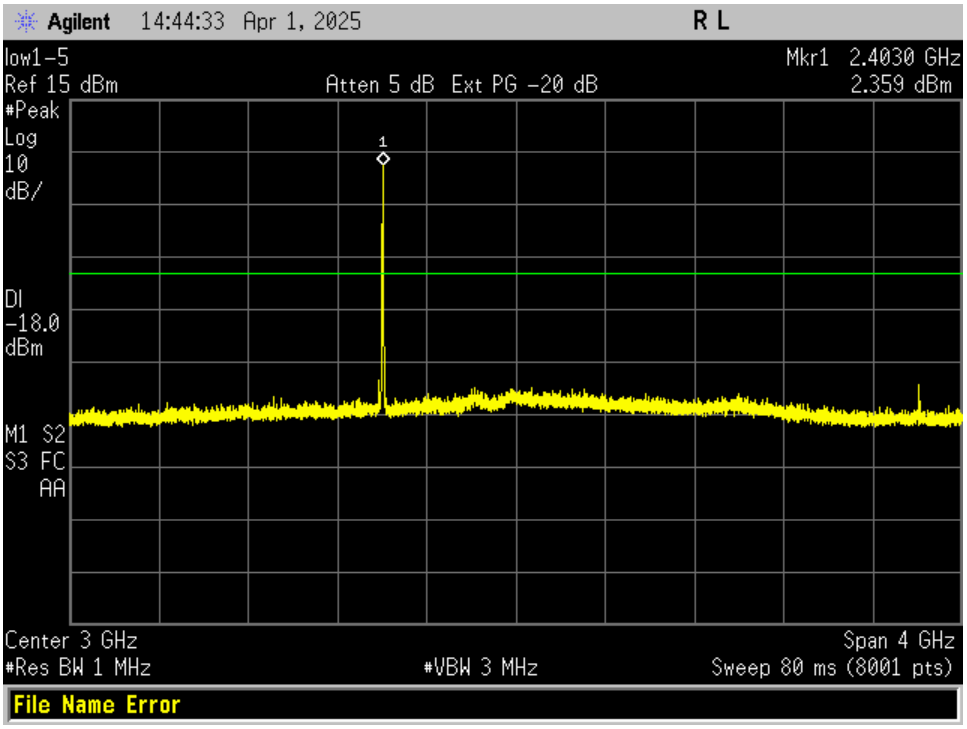

Figure 6. Low Channel, Cond Spurious Emissions 1 GHz - 5 GHz

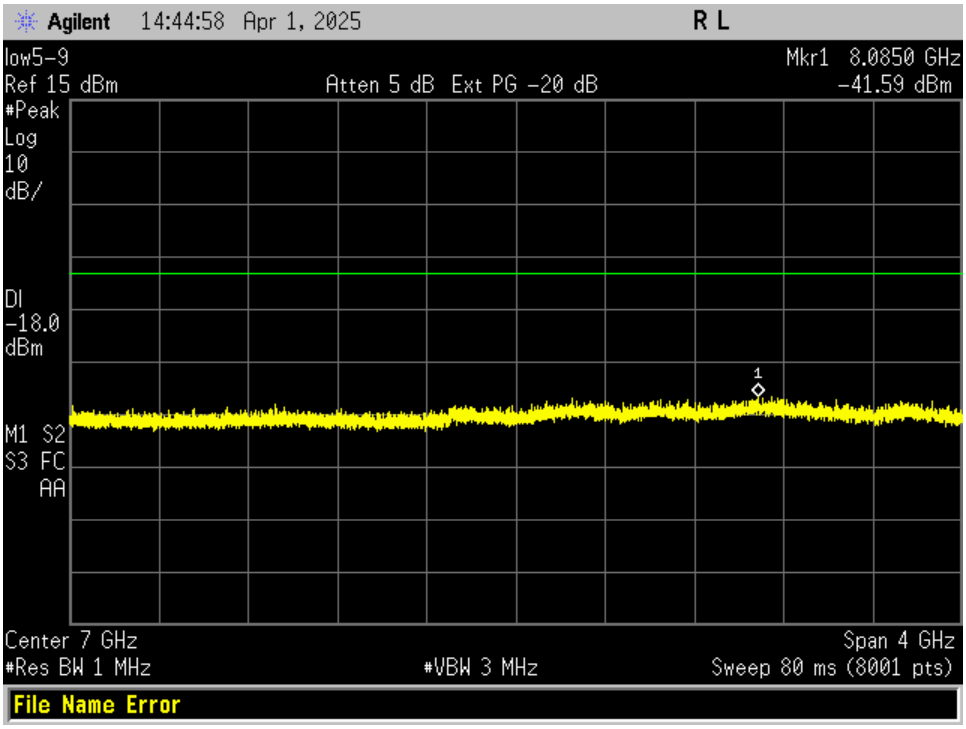

Figure 7. Low Channel, Cond Spurious Emissions 5 GHz - 9 GHz

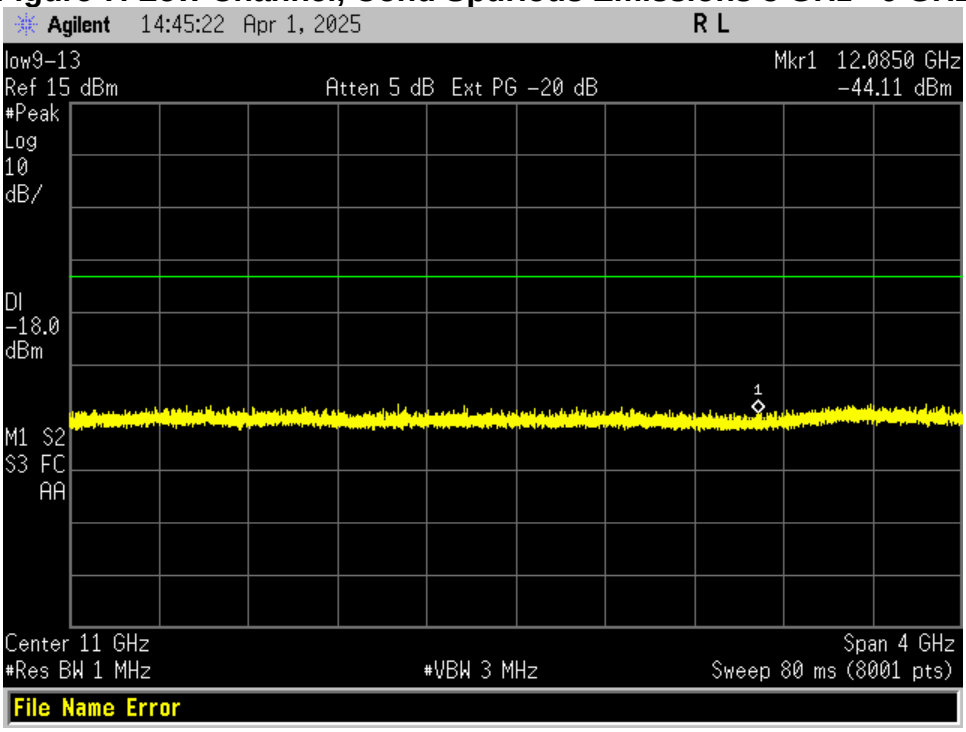

Figure 8. Low Channel, Cond Spurious Emissions 9 GHz – 13 GHz

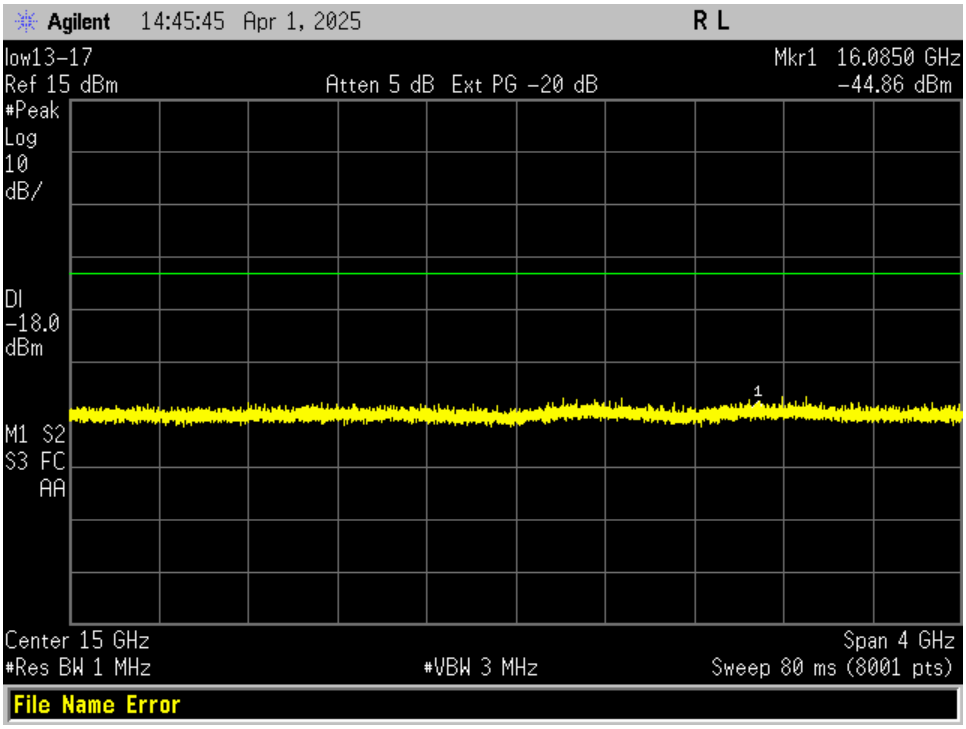

Figure 9. Low Channel, Cond Spurious Emissions 13 GHz – 17 GHz

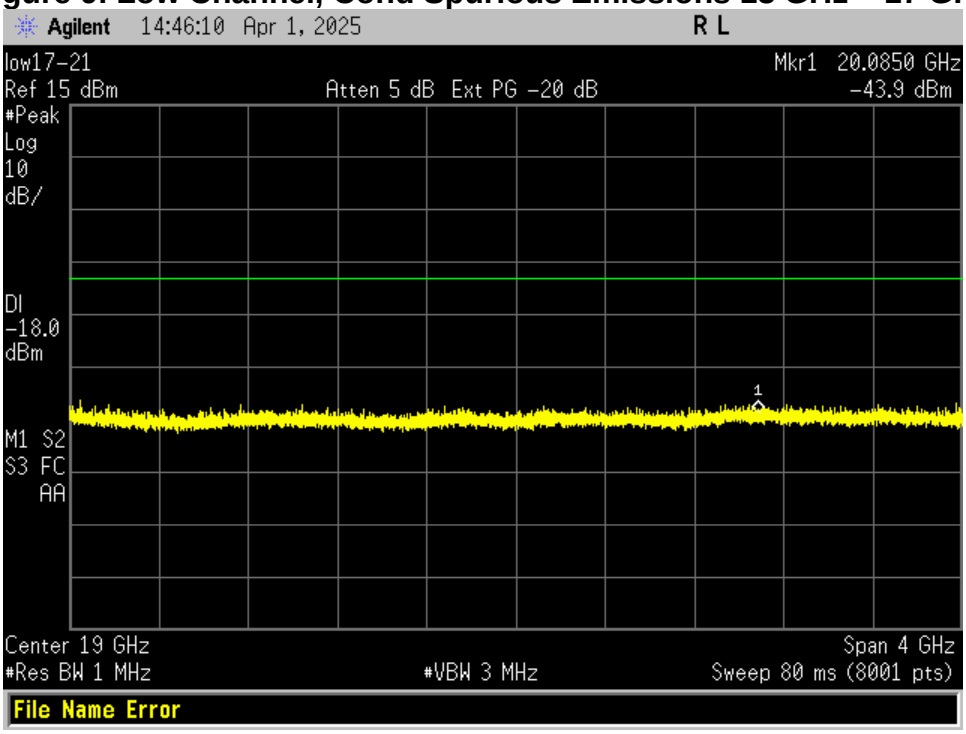

Figure 10. Low Channel, Cond Spurious Emissions 17 GHz – 21 GHz

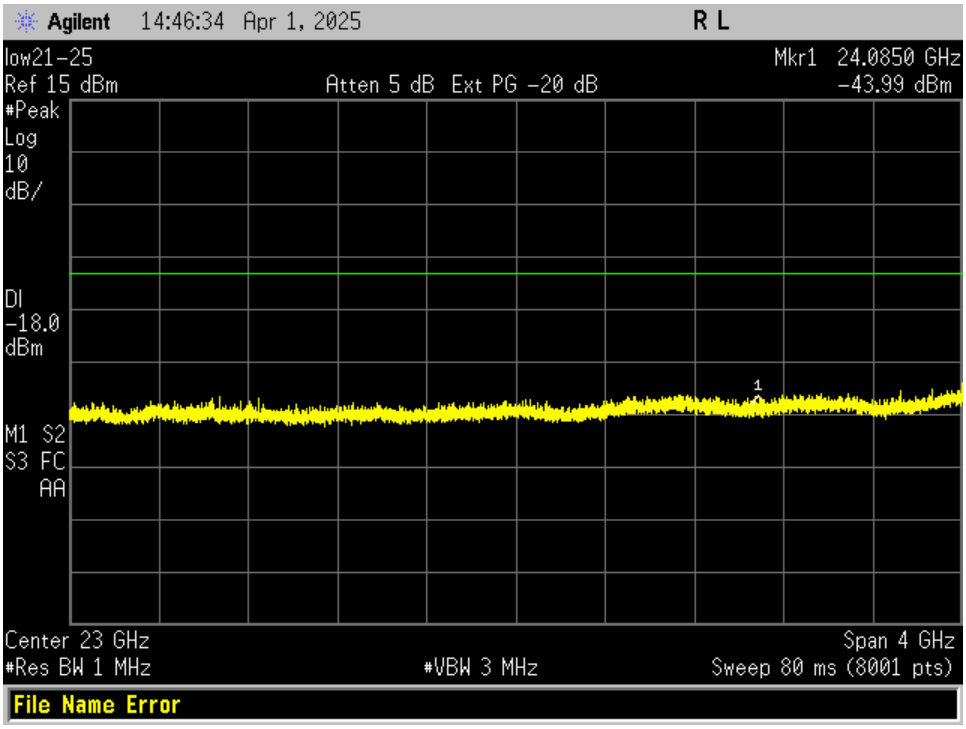

Figure 11. Low Channel, Cond Spurious Emissions 21 GHz – 25 GHz

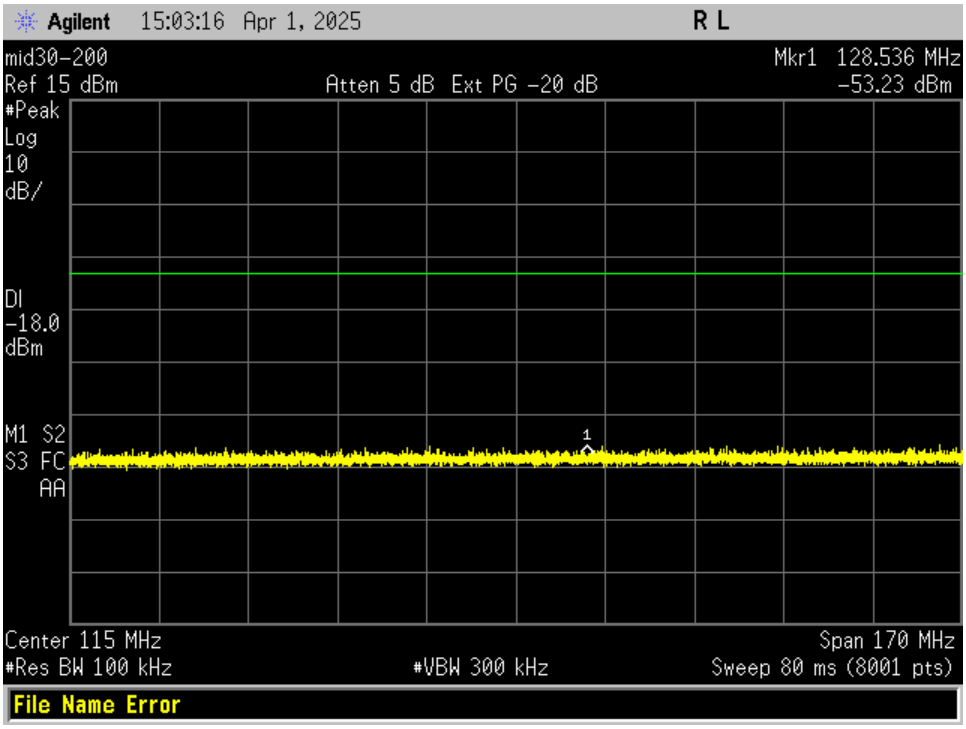

Figure 12. Middle Channel, Cond Spurious Emissions 30 MHz - 200 MHz

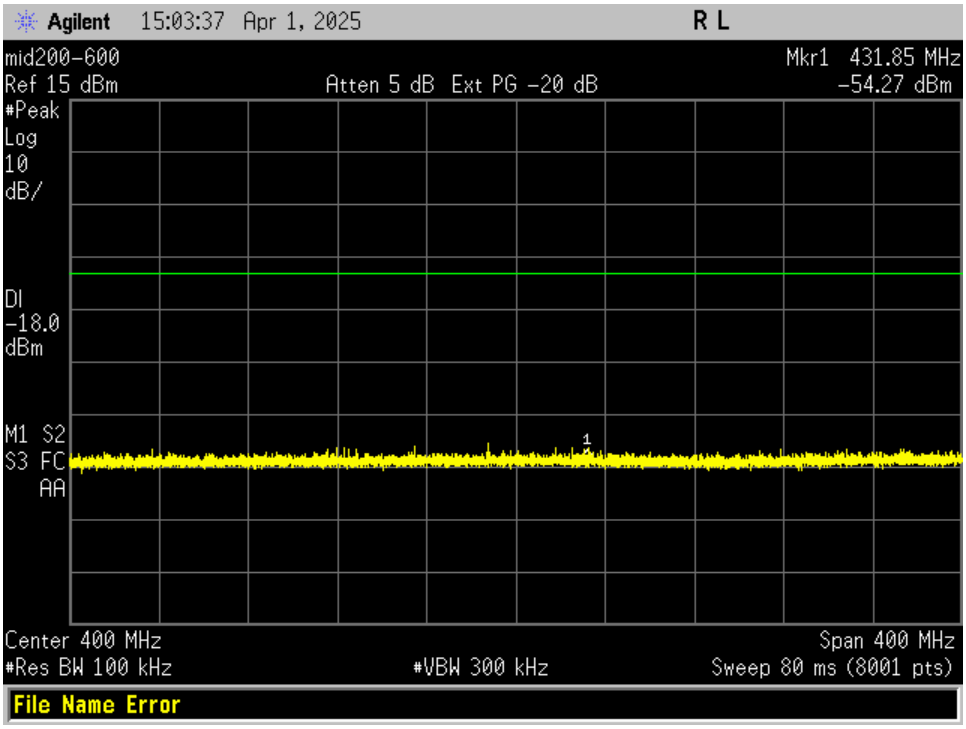

Figure 13. Middle Channel, Cond Spurious Emissions 200 MHz - 600 MHz

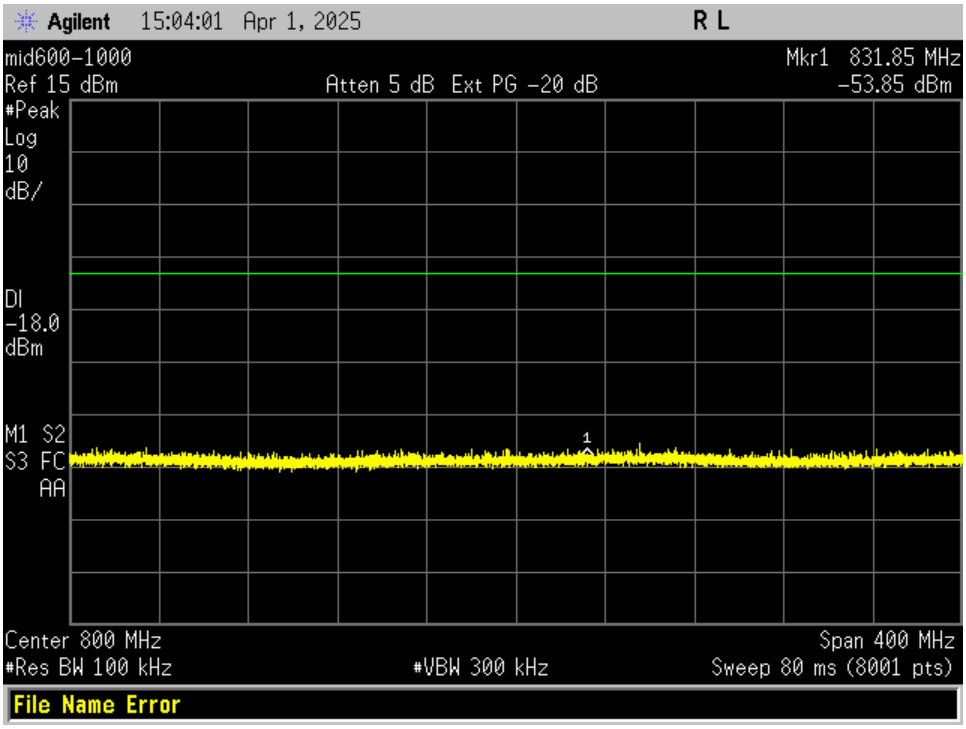

Figure 14. Middle Channel, Cond Spurious Emissions 600 MHz - 1000 MHz

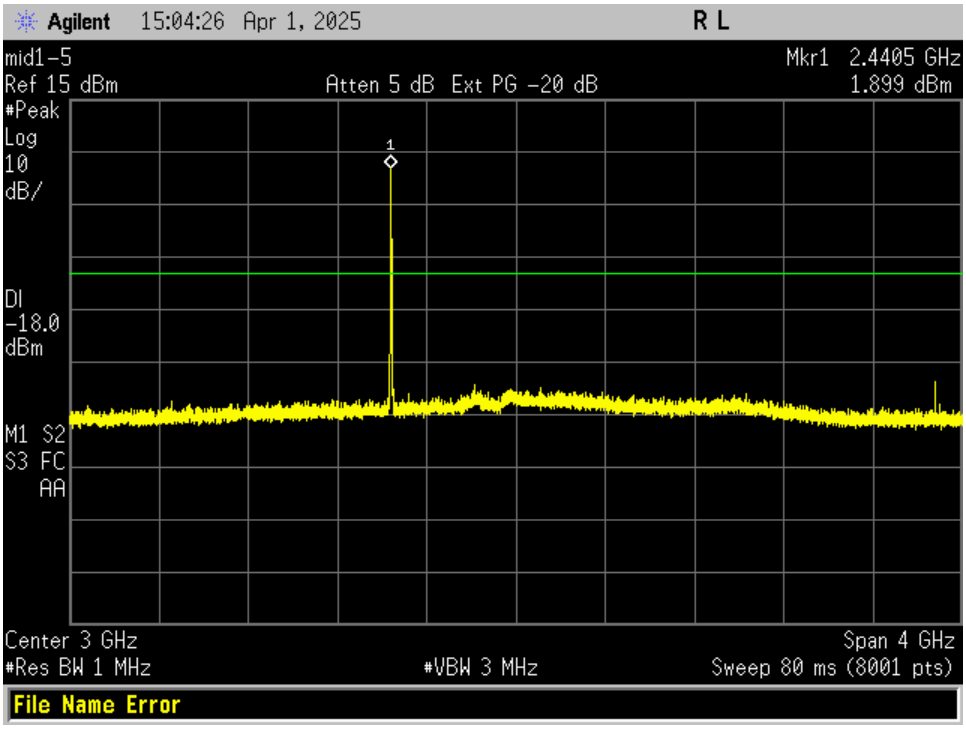

Figure 15. Middle Channel, Cond Spurious Emissions 1 GHz - 5 GHz

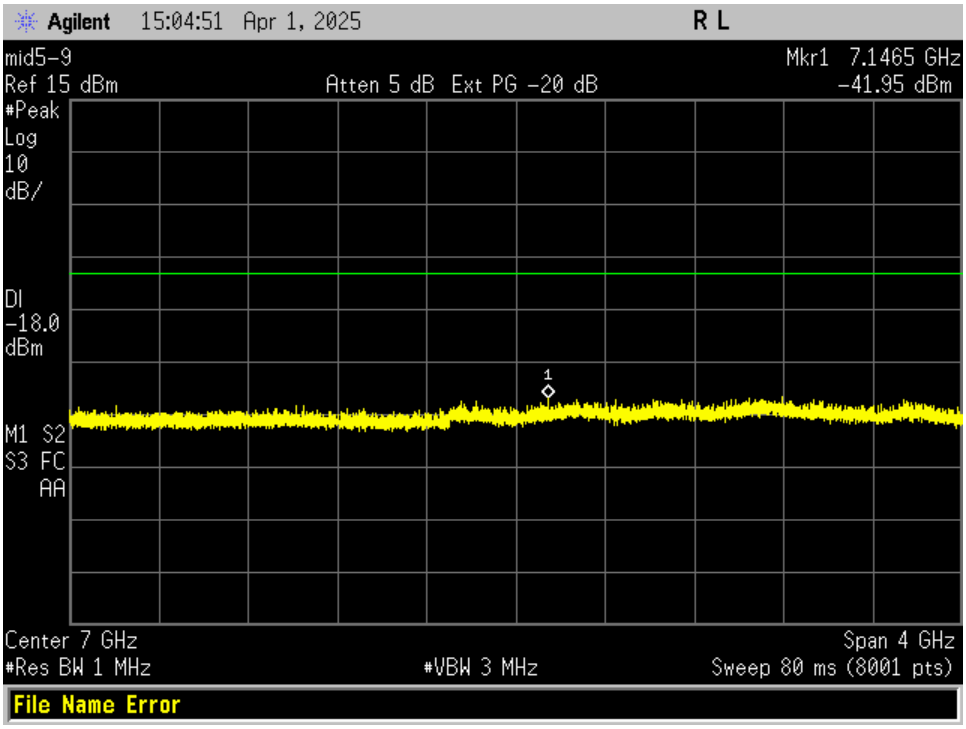

Figure 16. Middle Channel, Cond Spurious Emissions 5 GHz - 9 GHz

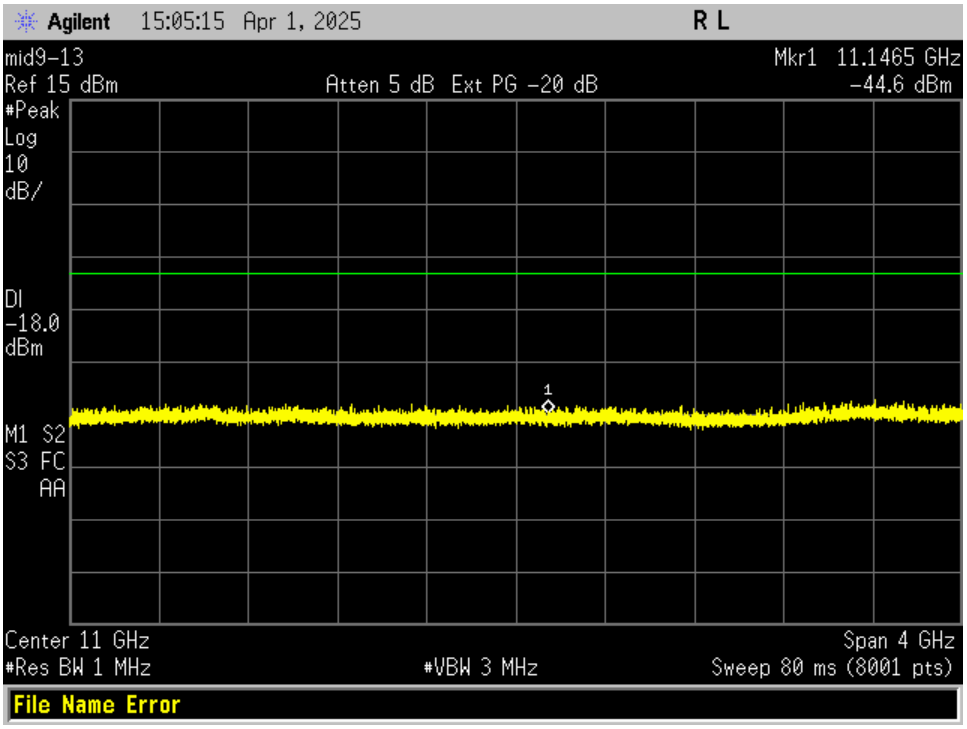

Figure 17. Middle Channel, Cond Spurious Emissions 9 GHz – 13 GHz

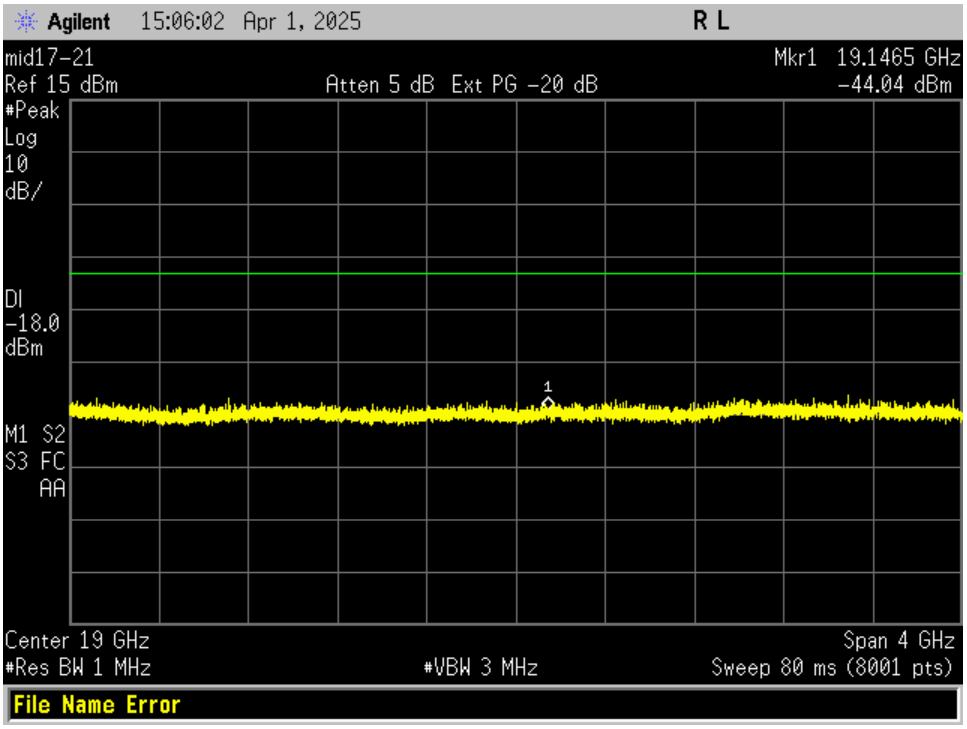

Figure 18. Middle Channel, Cond Spurious Emissions 13 GHz – 17 GHz

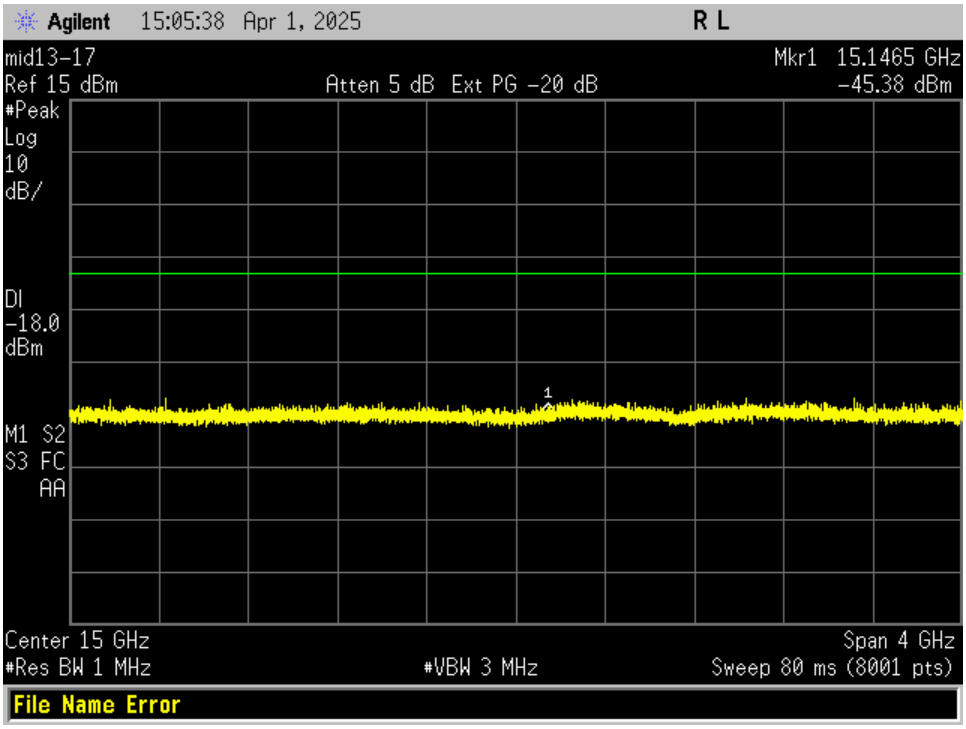

Figure 19. Middle Channel, Cond Spurious Emissions 17 GHz – 21 GHz

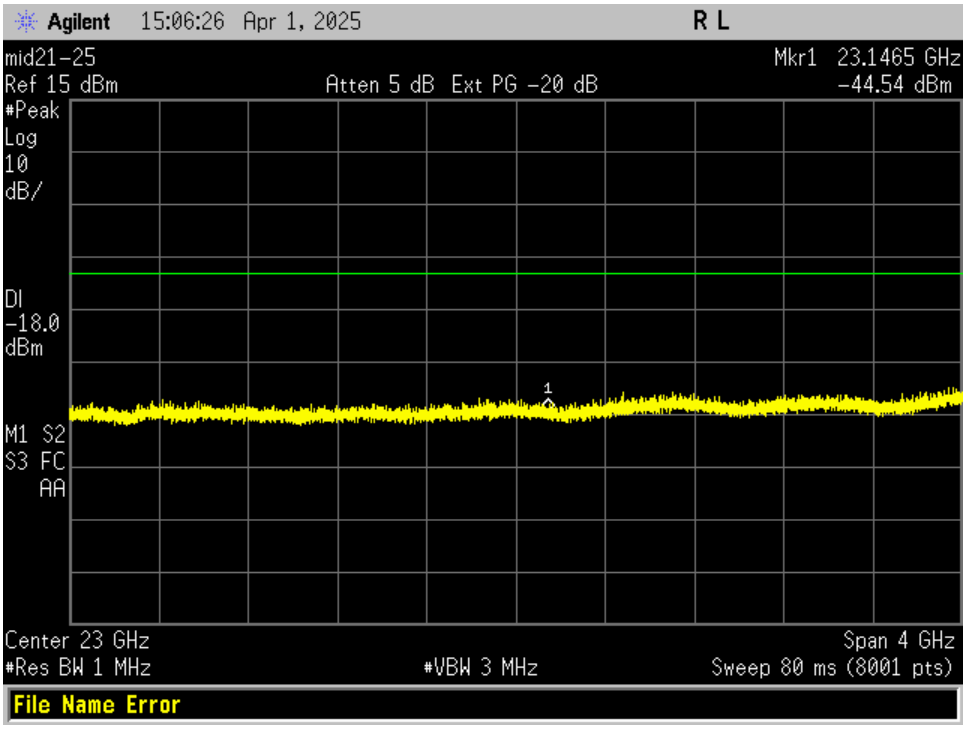

Figure 20. Middle Channel, Cond Spurious Emissions 21 GHz – 25 GHz

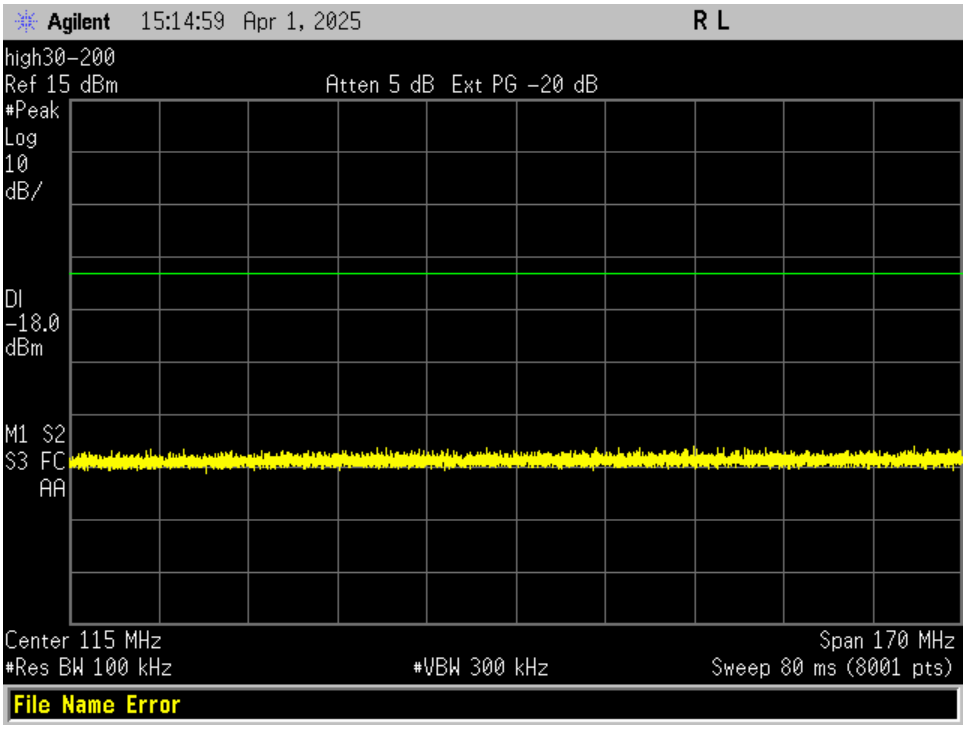

Figure 21. High Channel, Cond Spurious Emissions 30 MHz - 200 MHz

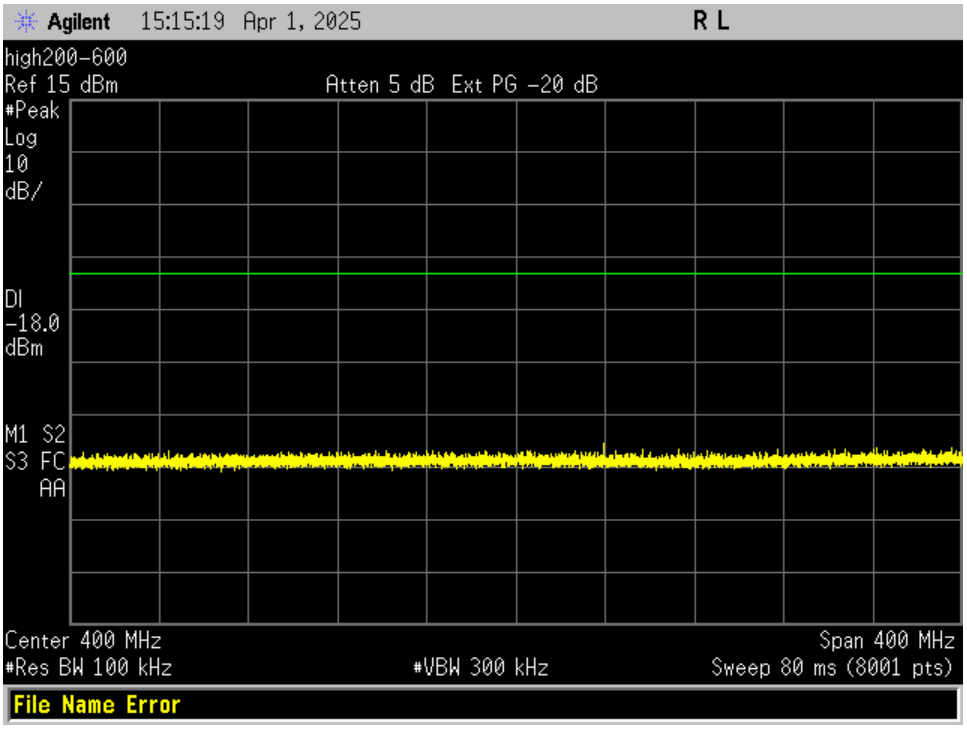

Figure 22. High Channel, Cond Spurious Emissions 200 MHz - 600 MHz

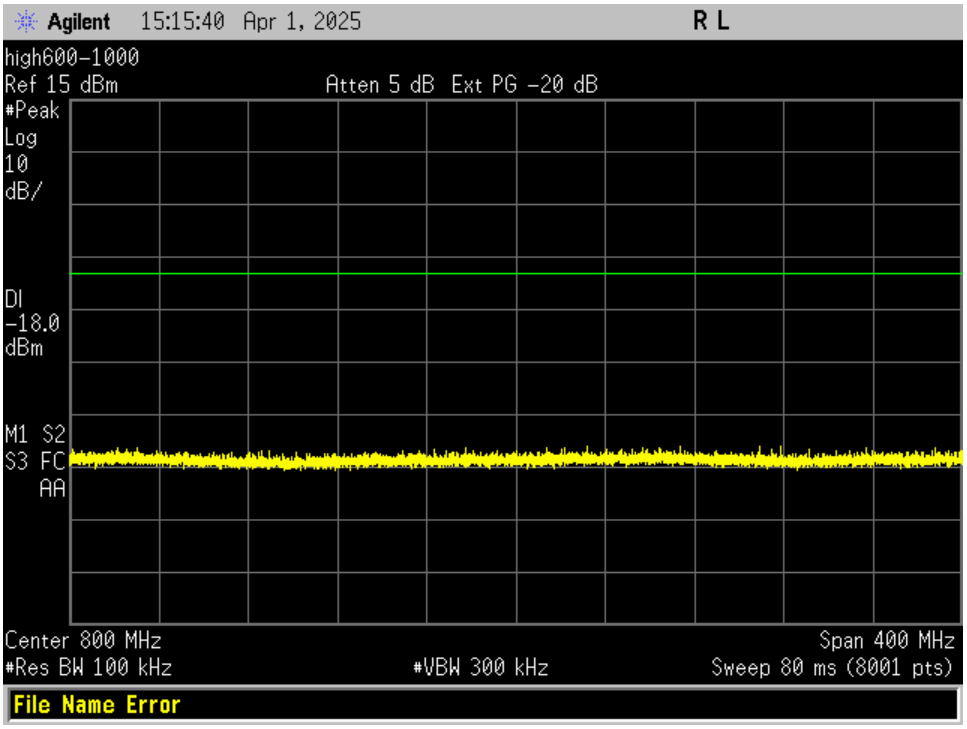

Figure 23. High Channel, Cond Spurious Emissions 600 MHz - 1000 MHz

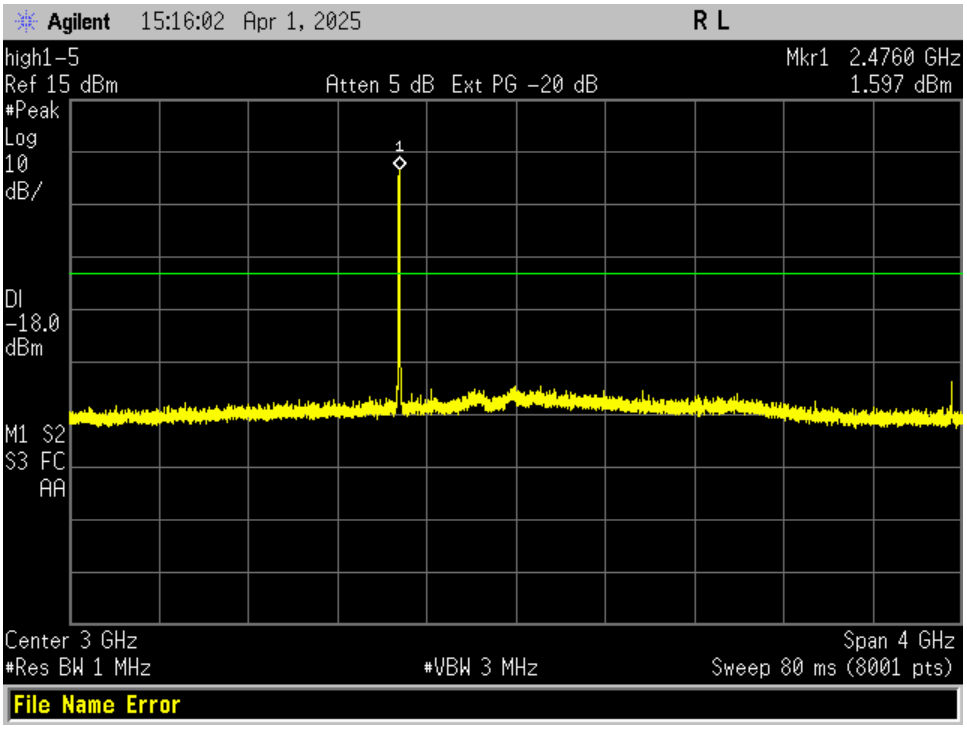

Figure 24. High Channel, Cond Spurious Emissions 1 GHz - 5 GHz

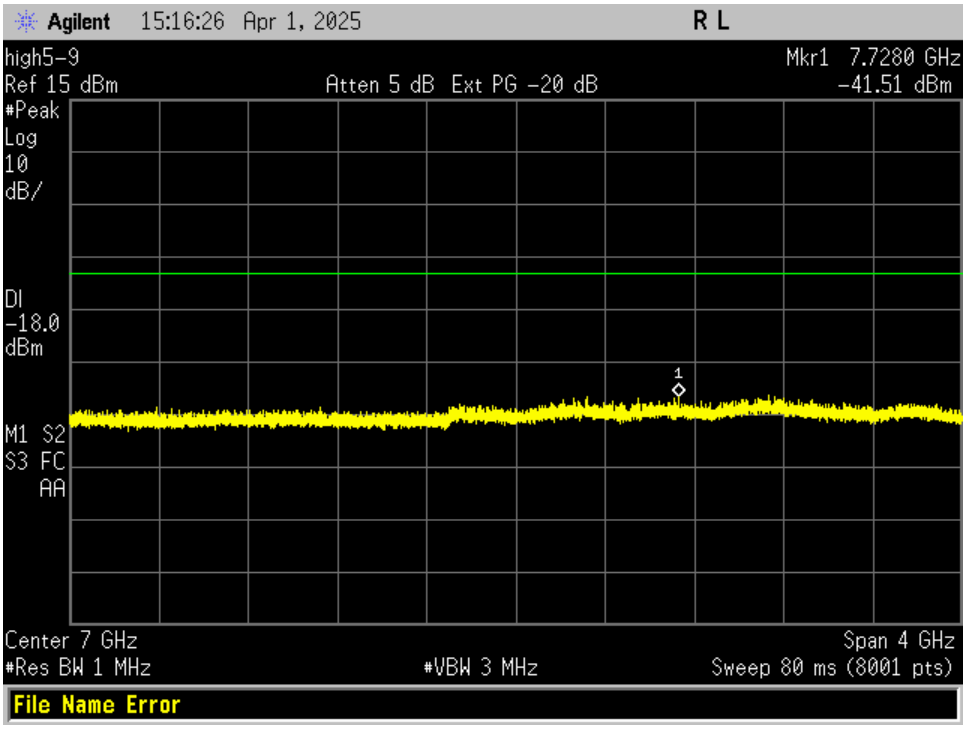

Figure 25. High Channel, Cond Spurious Emissions 5 GHz - 9 GHz

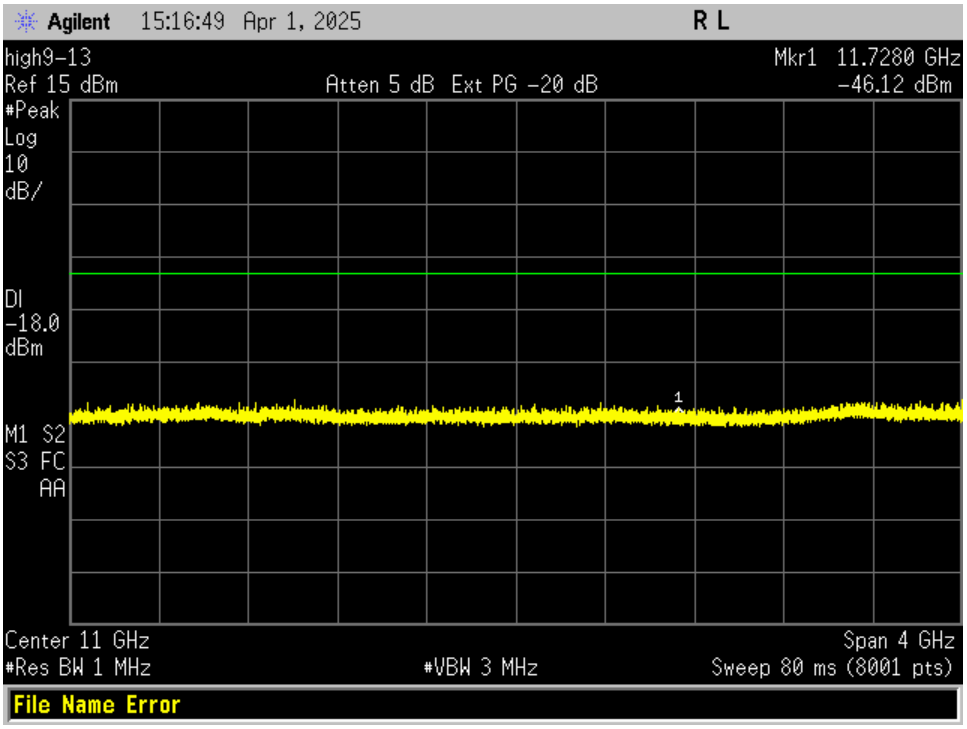

Figure 26. High Channel, Cond Spurious Emissions 9 GHz – 13 GHz

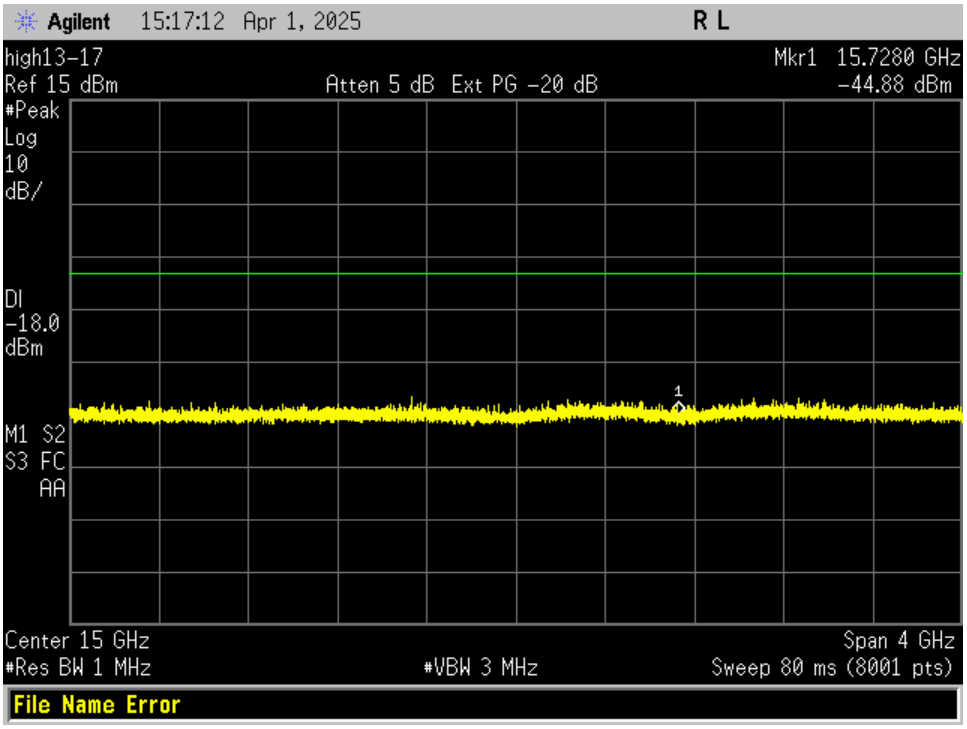

Figure 27. High Channel, Cond Spurious Emissions 13 GHz – 17 GHz

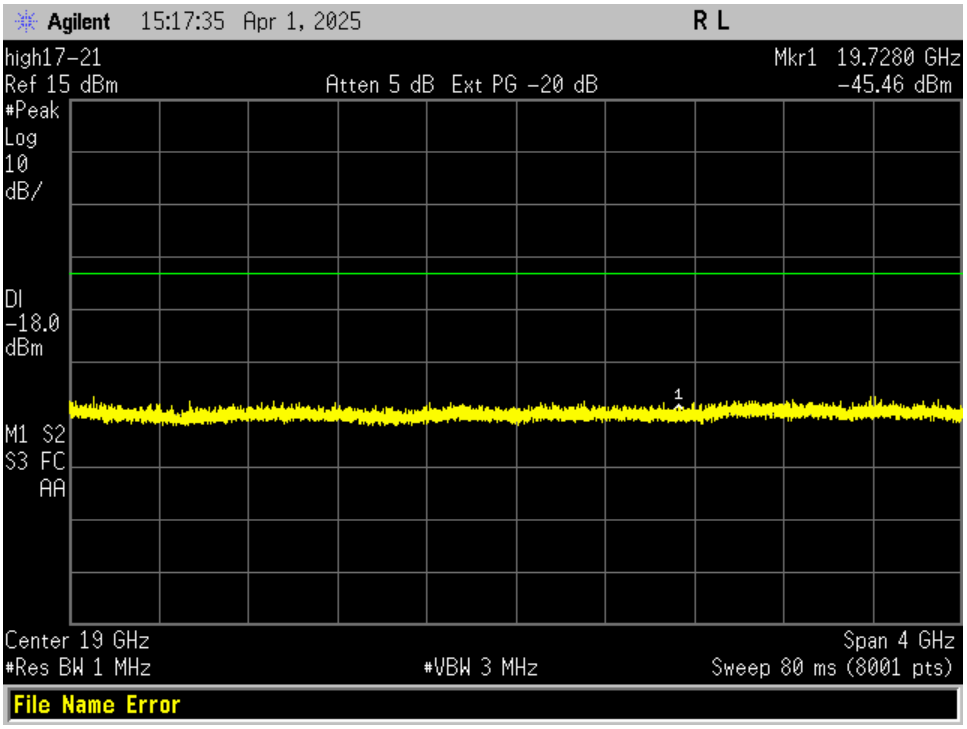

Figure 28. High Channel, Cond Spurious Emissions 17 GHz – 21 GHz

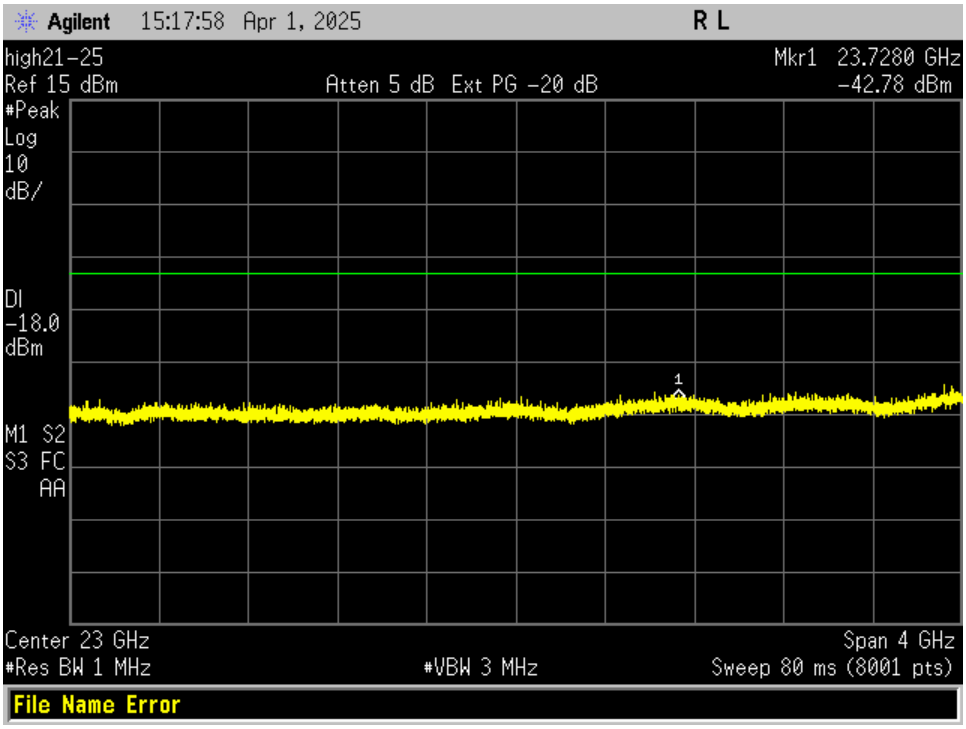

Figure 29. High Channel, Cond Spurious Emissions 21 GHz – 25 GHz

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d))

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 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 where the signal was maximized was recorded for reproducibility purposes. Additionally, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum. The EUT azimuth was recorded for reproducibility purposes. The EUT was measured when both maxima were simultaneously satisfied.

For radiated measurements, the EUT was set into a continuous transmit 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.

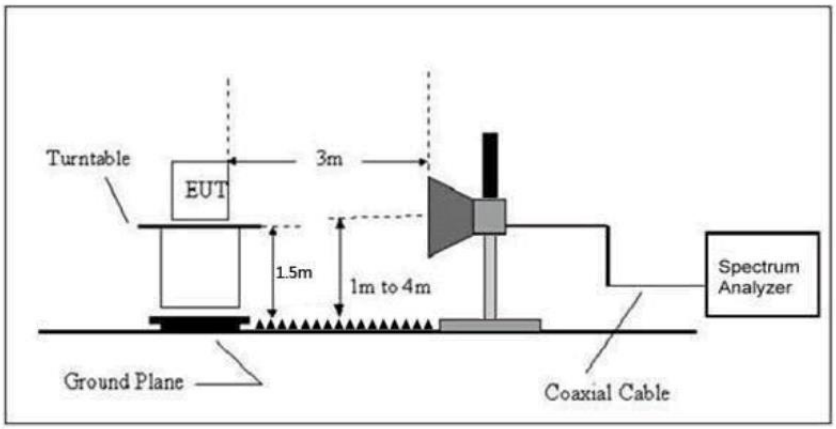

Figure 30. Radiated Emissions Setup (Fundamental and Harmonics)

Table 5. Radiated Fundamental & Harmonic Emissions- PEAK

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
Low Channel - PEAK								
2402.00	103.49	0.00	-5.03	98.46	--	3.0m./VERT	--	**PK**
4807.00	58.81	0.00	2.55	61.36	74.0	3.0m./VERT	12.6	**PK**
7212.00	45.73	0.00	10.35	56.08	74.0	3.0m./VERT	17.9	**PK**
Mid Channel – PEAK								
2440.00	100.08	0.00	-4.73	95.35	--	3.0m./VERT	--	**PK**
4880.00	58.64	0.00	3.09	61.73	74.0	3.0m./VERT	12.3	**PK**
7318.00	46.17	0.00	10.01	56.18	74.0	3.0m./VERT	17.8	**PK**
High Channel– PEAK								
2476.50	101.04	0.00	-4.49	96.55	--	3.0m./VERT	--	**PK**
4953.90	56.76	0.00	3.49	60.25	74.0	3.0m./VERT	13.7	**PK**
7430.25	42.90	0.00	8.69	51.59	74.0	3.0m./VERT	22.4	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209& 15.247.
2. No other signals detected within 20 dB of specification limit. Harmonics are 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.

Sample Calculation at 2403.99 MHz:

Magnitude of Measured Frequency	103.49	dBuV
+Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-5.03	dB/m
Corrected Result	98.46	dBuV/m

Test Date: April 2, 2025

Tested by
Signature: 

Name: Gabriel Medina

Table 6. Radiated Fundamental & Harmonic Emissions- AVERAGE

Test: FCC Part 15,247(d)								
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**Detector**
Low Channel - Average								
2402.00	89.25	0.00	-5.03	84.22	--	3.0m./VERT	--	**AVG**
4807.00	50.47	0.00	2.02	52.49	54.0	3.0m./HORZ	1.5	**AVG**
7212.00	35.30	0.00	10.35	45.65	54.0	3.0m./VERT	8.4	**AVG**
Mid Channel–Average								
2440.00	87.23	0.00	-4.73	82.50	--	3.0m./VERT	--	**AVG**
4880.00	49.11	0.00	1.80	50.91	54.0	3.0m./VERT	3.1	**AVG**
7318.30	38.12	0.00	10.01	48.13	54.0	3.0m./VERT	5.9	**AVG**
High Channel–Average								
2476.5	84.51	0.00	-4.49	80.02	--	3.0m./VERT	--	**AVG**
4953.90	46.53	0.00	3.49	50.02	54.0	3.0m./VERT	4.0	**AVG**
7430.25	32.91	0.00	8.69	41.60	54.0	3.0m./VERT	12.4	**AVG**

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 are 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.

Sample Calculation at 2403.52 MHz:

Magnitude of Measured Frequency	89.25	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	-5.03	dB/m
Corrected Result	84.22	dBuV/m

Test Date: April 2, 2025

Tested by
Signature:  Name: Gabriel Medina

2.11 Band Edge Measurements (CFR 15.247(d))

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 conducted 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 was set to its highest rated output power level during testing. The results are collected and presented below.

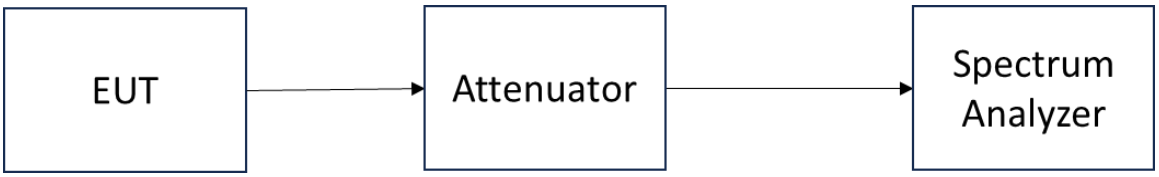

Figure 31. Bench Test Setup

Figure 32. Band Edge Compliance, Low Channel

Green line = 20 dB below measured fundamental peak

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

Measured Result	44.20	dB
Band Edge Limit	20.00	dB
Band Edge Margin	24.20	dB

Test Date: April 4, 2025

Tested by
Signature: Name: Gabriel Medina

Figure 33. Band Edge Compliance, High Channel

Green line = 20 dB below measured fundamental peak

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

Measured Result	46.45	dB
Band Edge Limit	20.00	dB
Band Edge Margin	26.45	dB

Test Date: April 4, 2025

Tested by
Signature: Name: Gabriel Medina

2.12 Six (6) dB Bandwidth (CFR 15.247(a)(2))

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 and figures below.

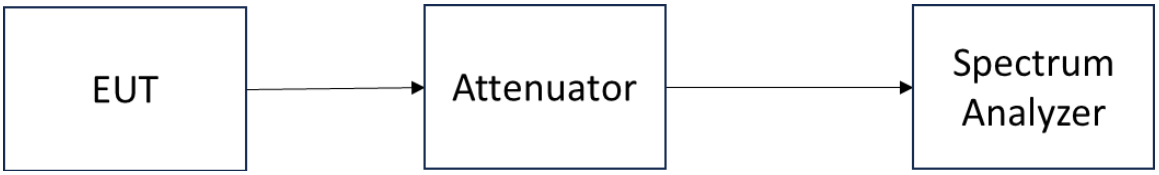

Figure 34. Bench Test Setup – Six dB bandwidth

Table 7. Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
2403.50	1.538	0.5
2440.00	1.552	0.5
2476.50	1.552	0.5

Test Date: April 1, 2025

Tested by
Signature: 

Name: Gabriel Medina

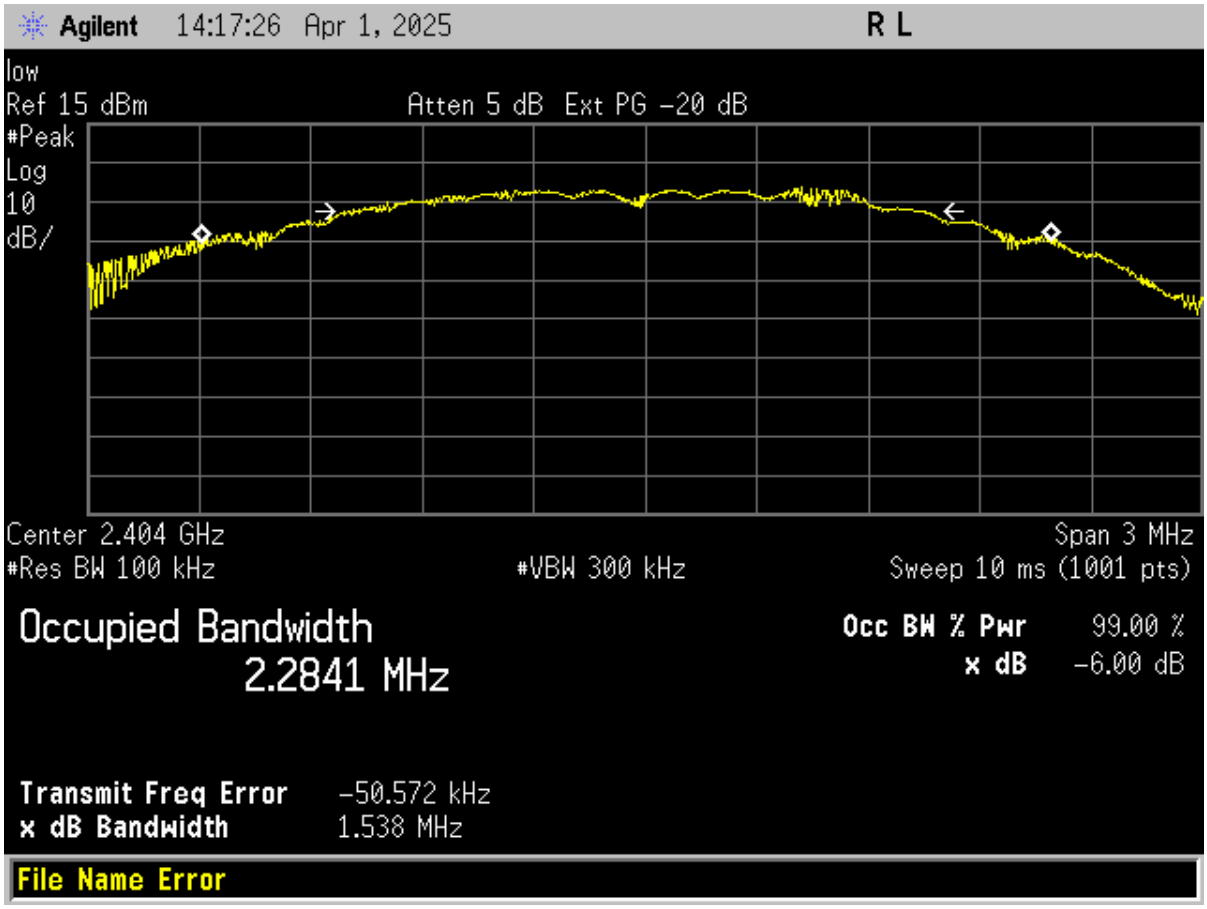

Figure 35. Low Channel DTS Bandwidth

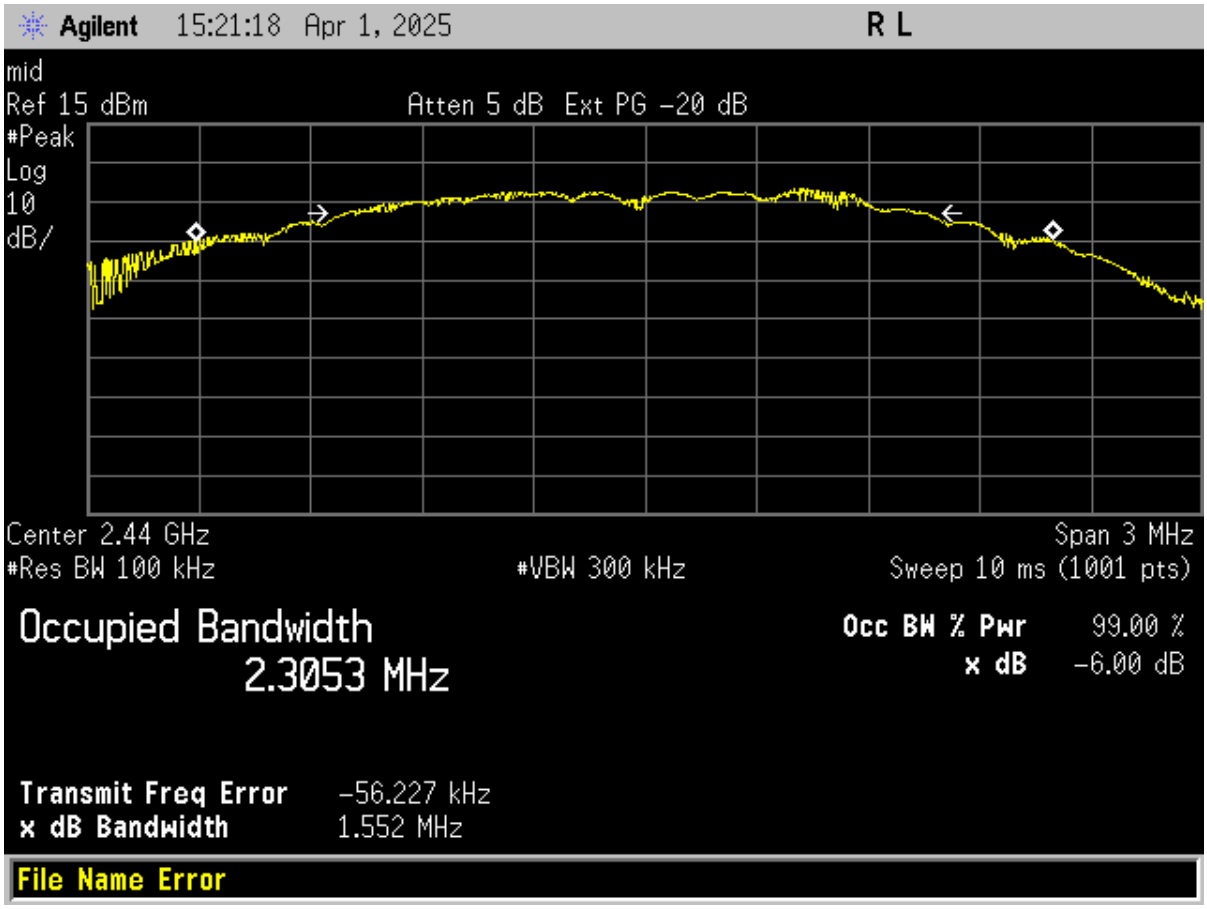

Figure 36. Mid Channel DTS Bandwidth

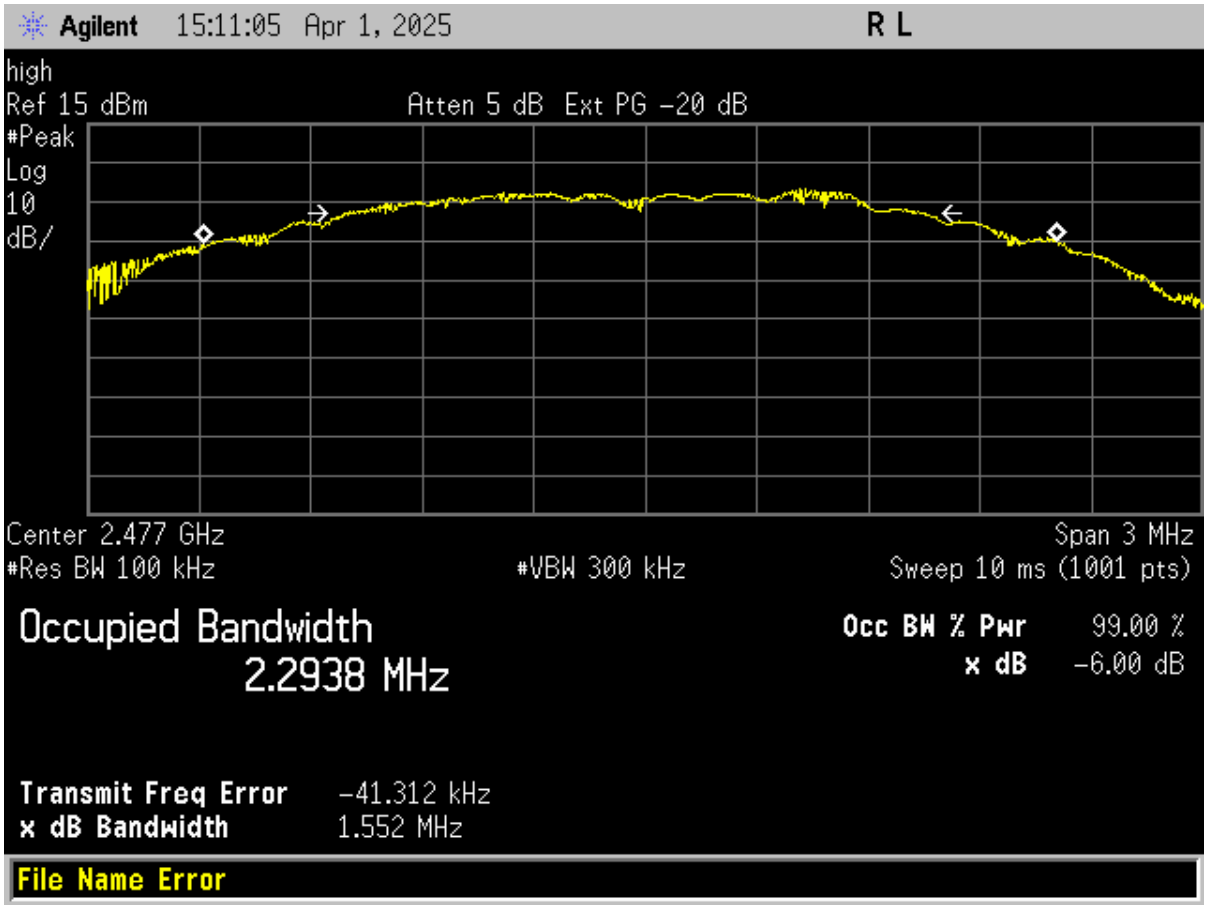

Figure 37. High Channel DTS Bandwidth

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 maximum data rate.

Peak power within the band 2400 MHz to 2483.5 MHz was measured per ANSI C63.10-2013 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, and attenuators to the antenna output terminals on the EUT. The spectrum analyzer was set to a RBW of 1 MHz, and the VBW ≥ RBW. The integration method was used. Peak antenna conducted output power is tabulated below.

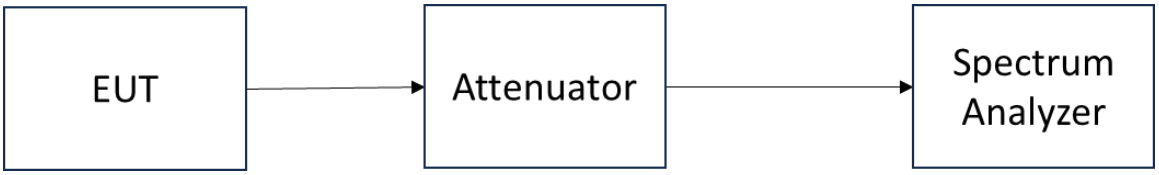

Figure 38. Bench Test Setup – Conducted Output Power

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)
2403.50	1.73	1.490	1000
2440.00	1.61	1.449	1000
2476.50	1.89	1.545	1000

Test Date: April 1, 2025

Tested by
Signature: 

Name: Gabriel Medina

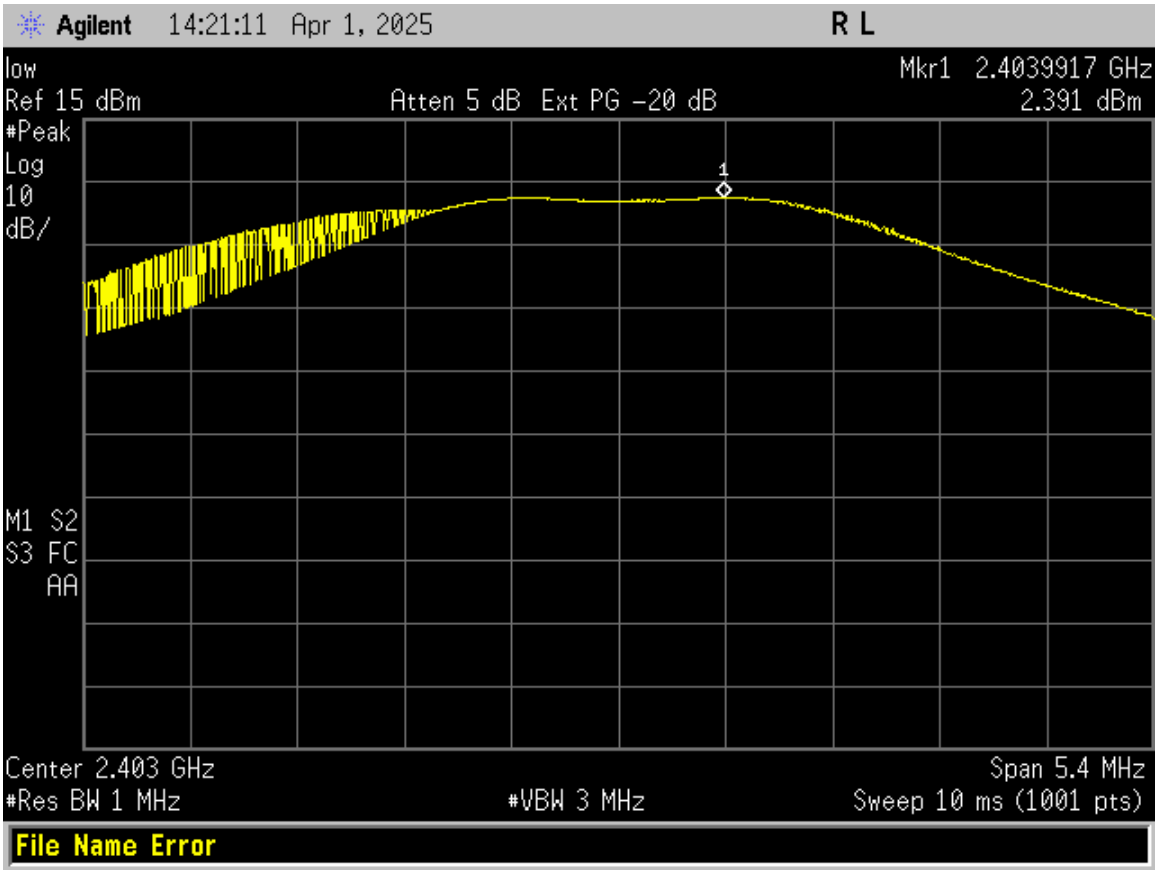

Figure 39. Low Channel Conducted Maximum Output Power

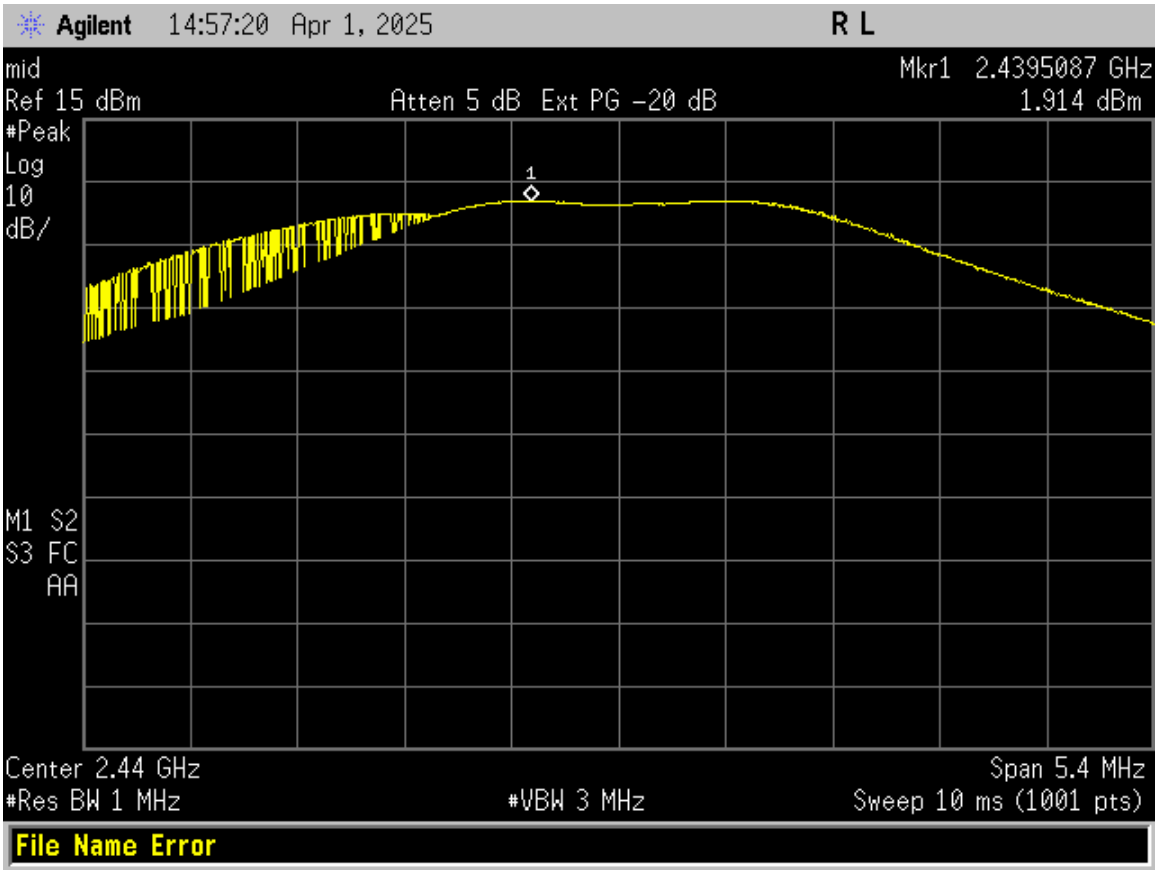

Figure 40. Mid Channel Conducted Maximum Output Power

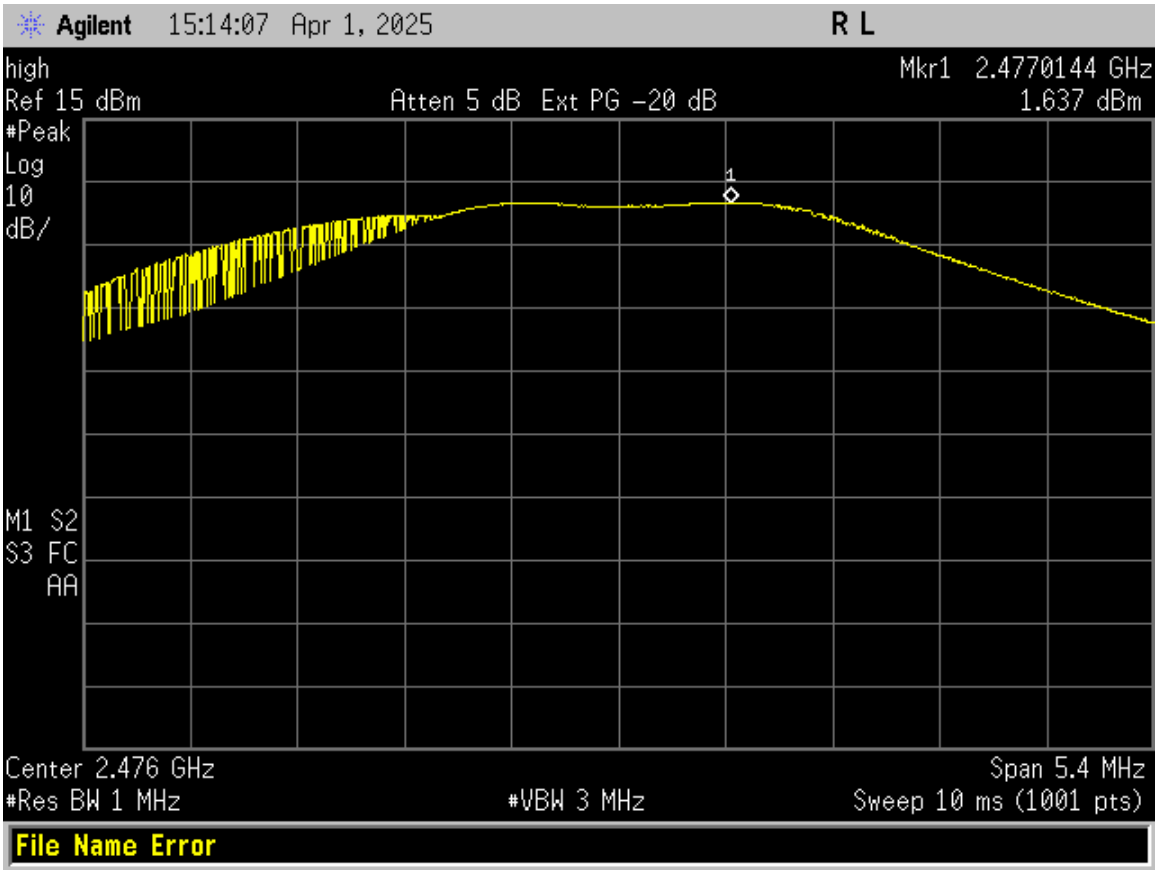

Figure 41. High Channel Conducted Maximum Output Power

2.14 Power Spectral Density (CFR 15.247(e))

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 30 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 and figures below. All are less than +8 dBm per 3 kHz band.

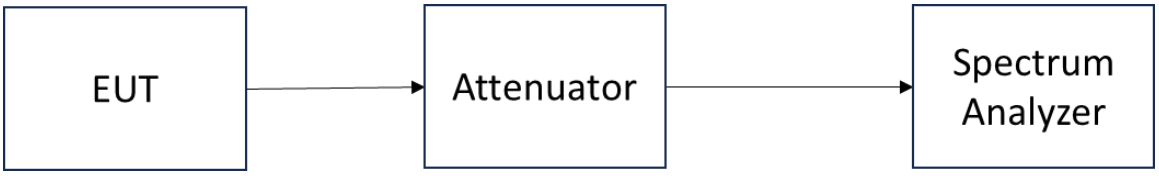

Figure 42. Bench Test Setup - PSD

Table 9. Power Spectral Density for Low, Mid and High Bands

Frequency (MHz)	Measured Result	Corrected Result (dBm/3 kHz)	FCC Limit (dBm/3 kHz)
2403.50	-6.12	-16.12	+8.0
2440.00	-6.66	-16.66	+8.0
2476.50	-7.11	-17.11	+8.0

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

Test Date: April 1, 2025

Tested by
Signature: 

Name: Gabriel Medina

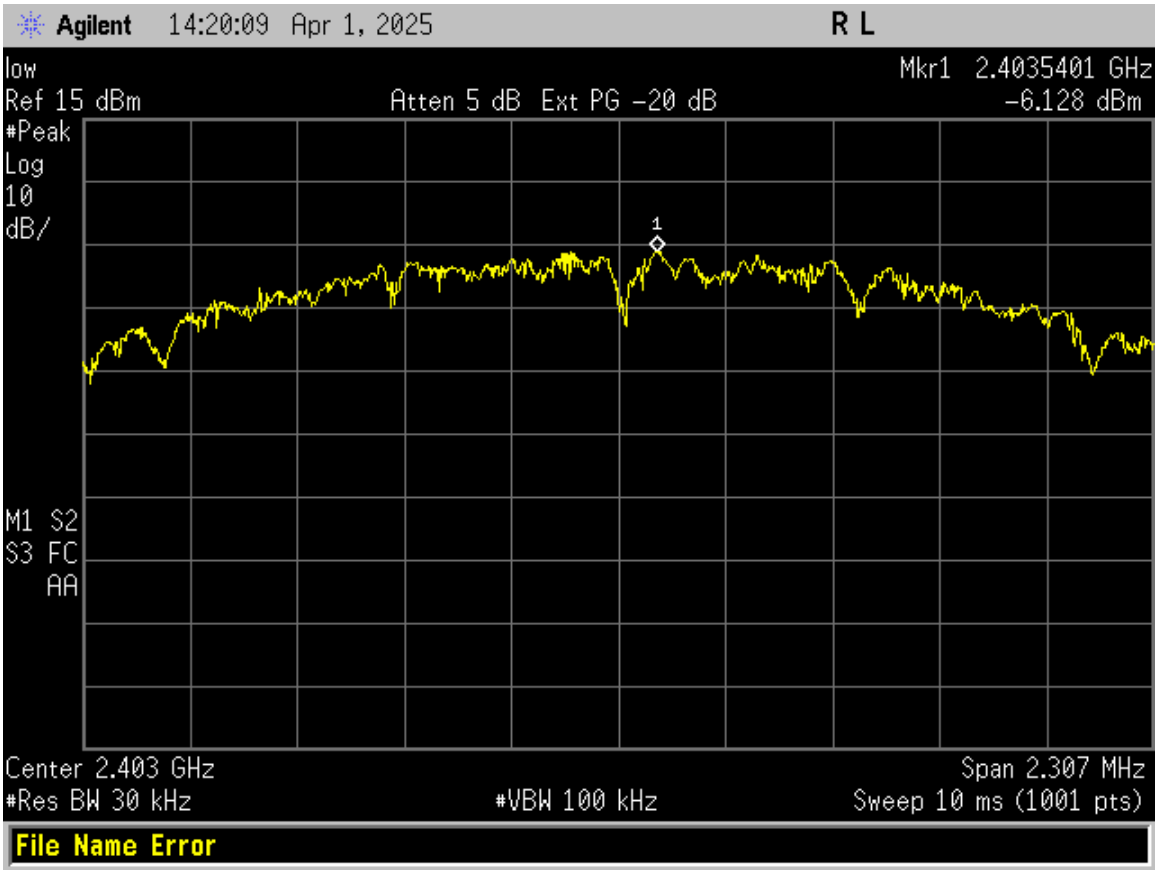

Figure 43. Low Channel PSD

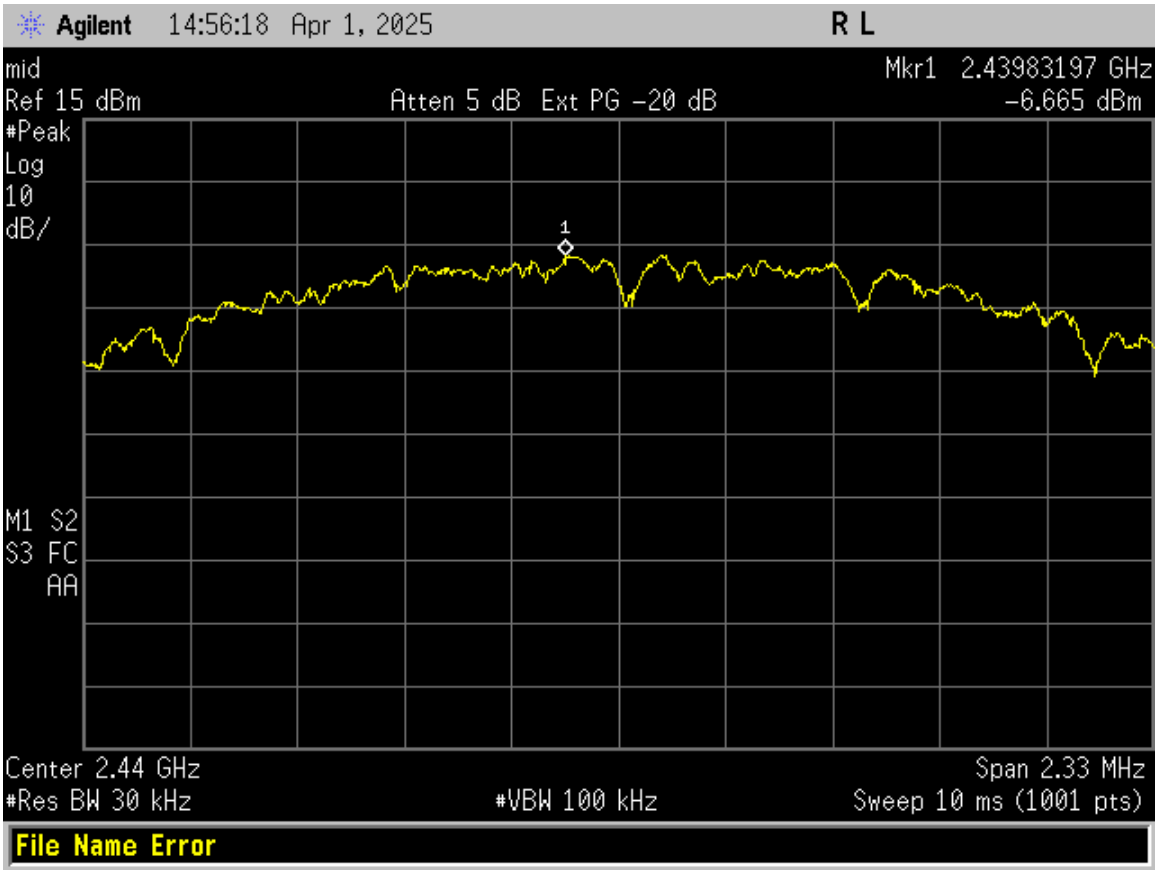

Figure 44. Mid Channel PSD

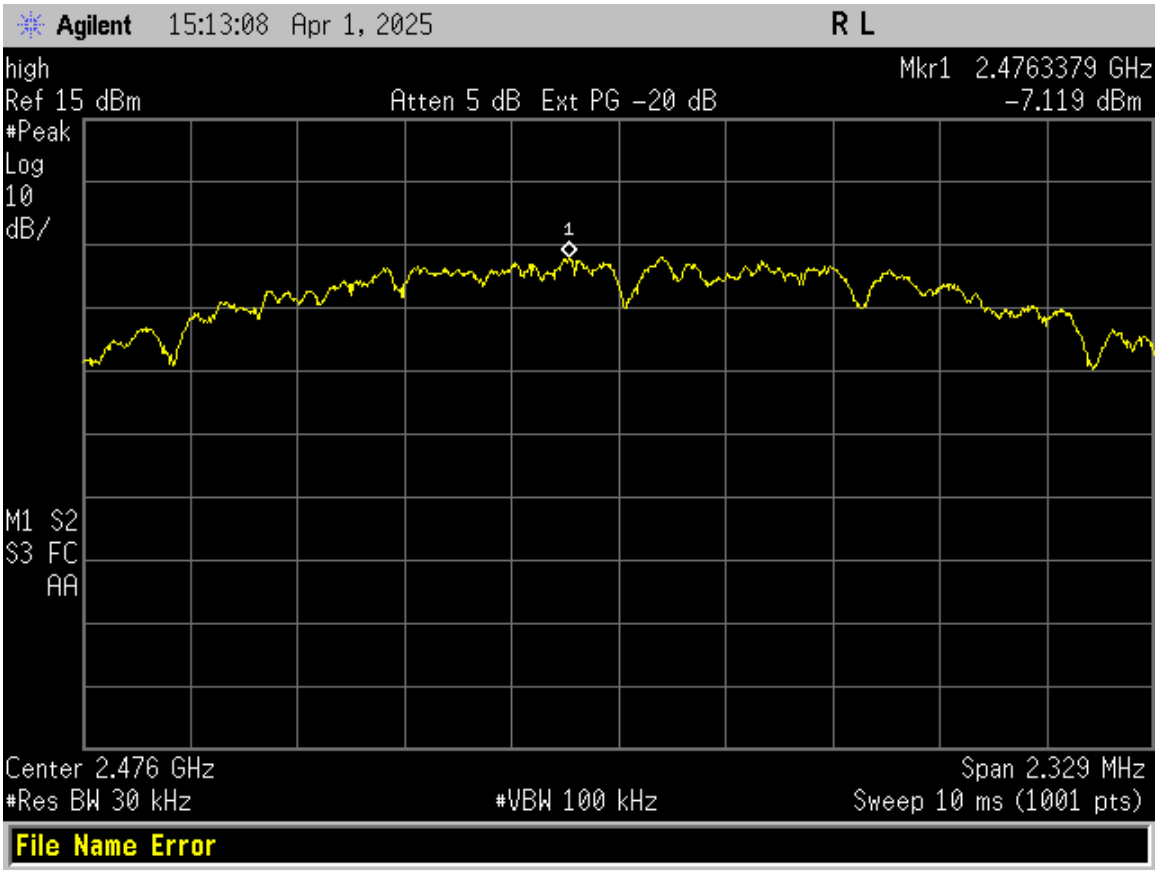

Figure 45. High Channel PSD

2.15 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207)

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 7.4 dB from the applicable limit. All other emissions were at least 11.9 dB from the limit. Those results are given in the table following.

Table 10. 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						
0.2848	32.03	0.49	32.52	50.7	18.2	**PK**
0.4197	39.72	0.32	40.04	47.5	7.4	**PK**
2.5967	32.13	0.25	32.38	46.0	13.6	**PK**
5.5950	29.30	0.34	29.64	50.0	20.4	**PK**
9.7967	28.84	0.43	29.27	50.0	20.7	**PK**
16.5950	31.79	0.44	32.23	50.0	17.8	**PK**
22.2950	25.20	0.77	25.97	50.0	24.0	**PK**
Neutral @ 120 Vac / 60Hz						
0.2848	31.94	0.69	32.63	50.7	18.1	**PK**
0.4197	35.10	0.52	35.62	47.5	11.9	**PK**
3.3967	30.11	0.44	30.55	46.0	15.4	**PK**
8.7967	27.55	0.61	28.16	50.0	21.8	**PK**
17.4950	27.74	0.41	28.15	50.0	21.9	**PK**
25.5950	25.43	0.41	25.84	50.0	24.2	**PK**

Test Date: April 1, 2025

Tested by
Signature:  Name: Gabriel Medina

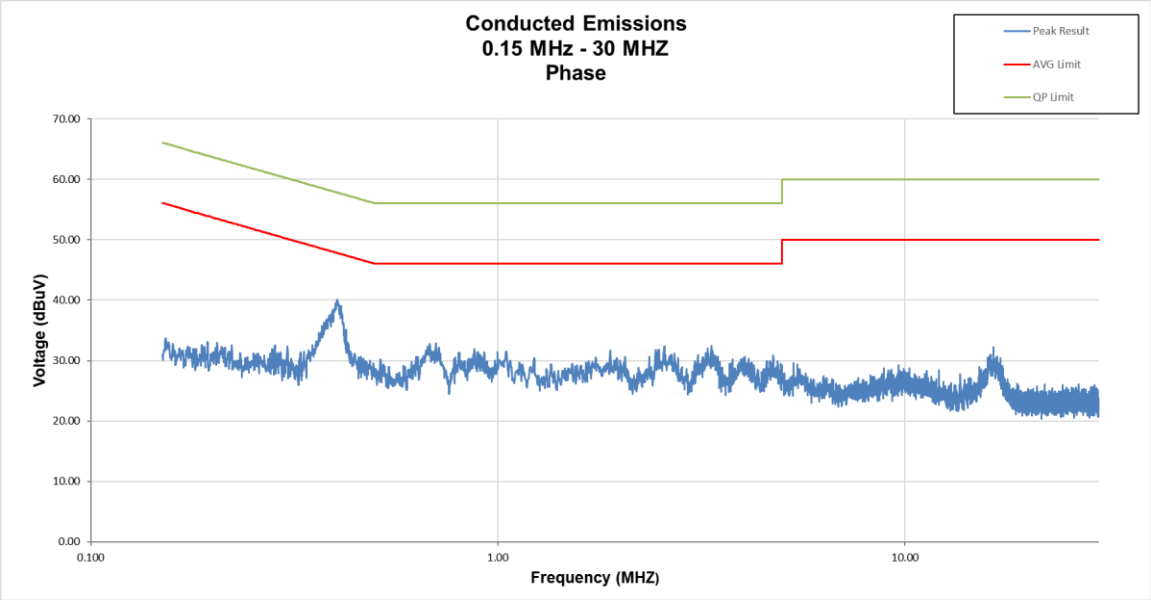

Figure 46. Conducted Emission, Phase 0.150 MHz – 30 MHz

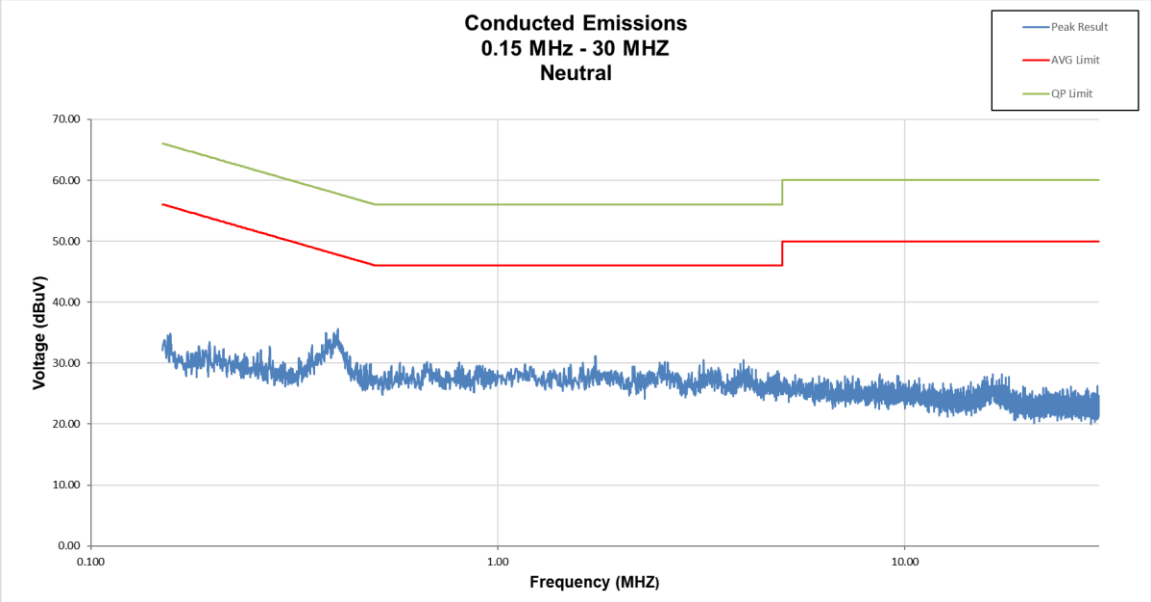

Figure 47. Conducted Emission, Neutral 0.150 MHz – 30 MHz

2.16 Intentional Radiator, Radiated Emissions (CFR 15.209)

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

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

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data were maximized for magnitude by rotating the turn-table through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters 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 below. These results are meant to show that this EUT has met the intentional transmitter requirements of CFR Part 15.209.

Table 11. Spurious Radiated Emissions (150 kHz-30MHz)

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 other emissions were more than 20 dB below the applicable limit.							

Test Date: April 3, 2025

Tested by Signature:  Name: Gabriel Medina

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

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 other emissions were more than 20 dB below the applicable limit.							

Test Date: April 3, 2025

Tested by Signature:  Name: Gabriel Medina

Table 13. Spurious Radiated Emissions (1 GHz – 25 GHz)

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**
Except for Fundamental and Harmonics emissions, all other emissions are more than 20 dB below the applicable limit.							

Test Date: April 3, 2025

Tested by Signature:  Name: Gabriel Medina

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 ±5.39 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 ±5.18 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna (1 GHz to 26 GHz) is ±5.21 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.