FCC PART 15 CERTIFICATION TEST REPORT

for the

GEN 7+ BLAST GUAGE

FCC ID: 2AHN8BG7P

WLL REPORT# 19027-01 REV 0

Prepared for:

Blackbox Biometrics, Inc.

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Prepared By:

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Testing Certificate AT-1448

FCC Part 15 Certification Test Report

for the

Blackbox Biometrics, Inc.

Gen 7+ Blast Gauge

FCC ID: 2AHN8BG7P

March 14, 2025

WLL Report# 19027-01 Rev 0

Prepared by:

Ryan Mascaro
RF Test Engineer

Reviewed by:

Samuel Violette
Vice President

Abstract

This report has been prepared on behalf of Blackbox Biometrics, Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Digital Transmission System (DTS) transmitter under Part 15.247 of the FCC Rules and Regulations (current at the time of testing). This certification test report documents the test configuration and test results for the Blackbox Biometrics, Inc., Gen 7+ Blast Gauge. The information provided in this report is only applicable to device herein documented as the EUT.

Radiated testing was performed in the Free-space Anechoic Chamber Test-site (FACT) 3m chamber of Washington Laboratories, Ltd., located at: 4840 Winchester Boulevard, Suite #5., Frederick, MD 21703. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Certificate AT-1448 as an independent FCC test laboratory. The ISED Canada number for Washington Laboratories is 3035A.

The Blackbox Biometrics, Inc., Gen 7+ Blast Gauge complies with the requirements for a Digital Transmission System (DTS) transmitter device under FCC Part 15.247.

Revision History	Description of Change	Date
Rev 0	Initial Release	March 14, 2025

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1 Introduction

1.1 Compliance Statement

The Blackbox Biometrics, Inc., Gen 7+ Blast Gauge complies with the requirements for a Digital Transmission System (DTS) transmitter device under FCC Part 15.247.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with ANSI C63.10-2020 "ANSI Procedures for Compliance Testing of Unlicensed Wireless Devices". The measurement equipment conforms to ANSI C63.2 "Specifications for Electromagnetic Noise and Field Strength Instrumentation". The modules were tested "stand alone" as required for modular testing and approval.

1.3 Contract Information

Customer:	Blackbox Biometrics, Inc.
Purchase Order Number:	1446
Quotation Number:	74932A

1.4 Test and Support Personnel

Washington Laboratories, LTD	Ryan Mascaro and Kent Geerlings
Customer Representative	Lucas Mullins

1.5 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Frederick, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The ISED Canada number for Washington Laboratories, Ltd. is 3035A. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory.

2 Equipment Under Test

2.1 EUT Identification

Table 1: Device Summary

Applicant:	Blackbox Biometrics, Inc
FCC ID:	2AHN8BG7P
Model:	Gen 7+
FCC Rule Parts:	§ 15.247
Frequency Range:	2402 to 2480 MHz
Peak Output Power:	-2.28 dBm (0.0006 Watts)
Antenna Type:	TAOGLAS, P/N: FXP75xx (Peak Gain: 2.5 dBi)
Calculated EIRP:	0.22 dBm (Peak)
FCC Emission Designator:	729KG1D
6dB Occupied Bandwidth:	729.6 kHz (worst-case)
Protocol:	Bluetooth Low Energy (BLE) v4.2
Keying and Modulation:	Automatic, GFSK
Type of Information:	Digital
Number of Channels:	40
Interface Cables:	None during use
Power Source & Voltage:	Lithium Battery, 3.6VDC
Worst-Case Spurious Emission:	50.096 dBuV/m (radiated)
HW Version:	207-0002-01B
SW Version:	01.02.00
Testing Dates:	2/18/2025 to 3/6/2025

2.2 EUT Description

The Gen 7+ Blast Gauge (EUT) is a wearable Blast and Impulse Monitoring Sensor System. The (EUT) will automatically wakeup and record Blast and Impulse Noise exposures while being worn. The EUT communicates with our mobile app via Bluetooth, supporting bi-directional communication between the gauge and the app.

2.3 Test Configuration and Algorithm

The EUT evaluated for emissions conducted at the antenna port, and for radiated emissions. Testing of the AC powerline is not required, as the device is battery powered only. The battery is not rechargeable, it is disposable. The EUT was investigated for worst-case radiated emissions by varying the orthogonal axis of the EUT (x, y, z). For testing of frequencies below 30MHz, the active loop antenna was rotated about its vertical and horizontal axis in accordance with ANSI C63.10-2020, clause 6.4.6 and 6.11.2. The EUT was positioned on the testing site to produce the wort-case emissions. For some of the preliminary and post-testing setups, the EUT was coupled to the support laptop, via a USB cable. This is not a typical configuration, as the laptop will never be coupled to the EUT while the device is installed in the field. For this report, the support laptop did not enter the test-site during testing. The EUT was programmed into a test mode, to dwell on the low, center, and high channels. The EUT sample was not capable of hopping or sweeping the band. Therefore, no testing was performed in a hopping enabled mode. Only the worst-case emissions are provided throughout this report.

The EUT was comprised of the following equipment, provided on the following page. All Modules, PCBs, etc. listed were considered as part of the EUT, as tested.

Table 2: System Configuration List

EUT	Description	Model	Serial Number	Rev. #
Blast Gauge	Conducted, Low	Gen 7+	--	B
Blast Gauge	Conducted, Center	Gen 7+	--	B
Blast Gauge	Conducted, High	Gen 7+	--	B
Blast Gauge	Radiated, Low	Gen 7+	--	B
Blast Gauge	Radiated, Center	Gen 7+	--	B
Blast Gauge	Radiated, High	Gen 7+	--	B
Blast Gauge	Production, SAF	Gen 7+	--	B

Table 3: Support Equipment

Name / Description	Manufacturer	Model Number	Calibration Data
Tablet (for pairing)	--	--	--
Laptop (for log files)	--	--	--
Shieled USB Cable	--	--	--
Extra Batteries	--	--	--

Table 4: EUT Port Configuration

Ref. ID	EUT Port Name	Cable Description	Qty.	Length (m)	Shielded	Termination Port ID
1	USB	USB	1	< 3	Yes	Support Laptop

3 Test Results

The table below shows the results of testing for compliance with a Digital Transmission System in accordance with FCC Part 15.247 and RSS-247 Issue 3. Full test results are shown in subsequent sub-sections.

Table 5: Testing and Results Summary

Digital Transmission System			
FCC Rule Part	**IC Rule Part**	**Description**	**Result**
15.247(a)(2)	RSS-247 [5.2 (a)]	Occupied Channel Bandwidth	Pass
15.247 (b)(3)	RSS-247 [5.4 (d)]	Transmit Output Power	Pass
15.247 (e)	RSS-247 [5.2 (b)]	Power Spectral Density	Pass
15.247 (d)	RSS-247 [5.5]	Out-of-Band Emissions (Band Edge @ 20dB below)	Pass
15.205 15.209	RSS-Gen [8.9/8.10]	General Field Strength Limits (Restricted Bands & RE Limits)	Pass
15.207	RSS-Gen [8.8]	AC Conducted Emissions	N/A

3.1 Deviations to the Test Standard

There were no deviations to the requirements of the standard(s).

3.2 Occupied Bandwidth, Digital Transmission System

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(a)(2) and RSS-247, 5.2(a) require the minimum 6dB bandwidth be at least 500 kHz.

The transmitter occupied bandwidth was measured conducted at the antenna port, by coupling the output of the EUT transmitter to the input of a spectrum analyzer. The measurement level was corrected for any cable and attenuator losses.

3.2.1 Measurement Method

This test was performed in accordance with Clause 11.8.2, Option 2, of ANSI C63.10-2020.

3.2.2 Test Data

The EUT test data is provided below.

The EUT was configured to transmit a modulated signal, with channel hopping disabled.

Table 6: Occupied Bandwidth Results

Frequency	6dB Bandwidth	Result
Low Channel, 2402 MHz	714.9 kHz	Pass
Center Channel, 2440 MHz	714.5 kHz	Pass
High Channel, 2480 MHz	729.6 kHz	Pass

Figure 1: Occupied Bandwidth, Low Channel

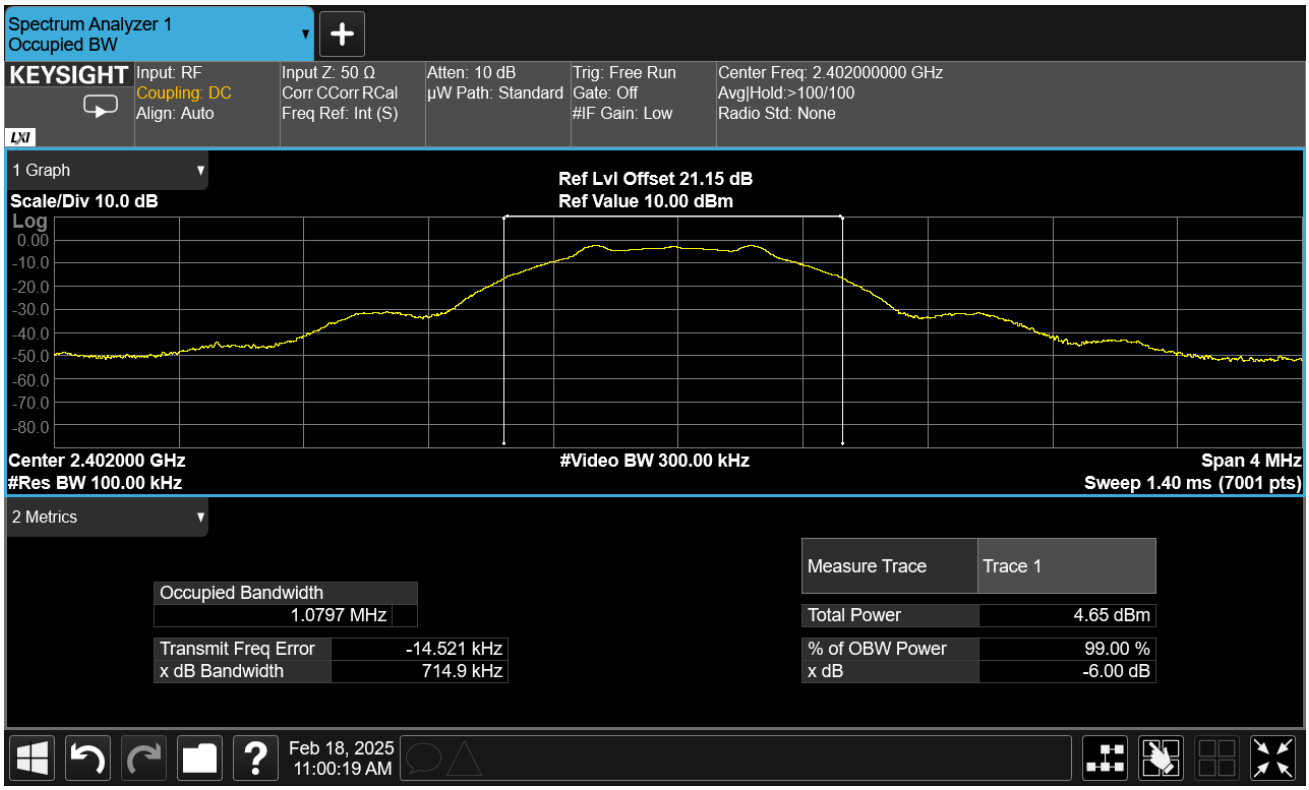


Figure 2: Occupied Bandwidth, Center Channel

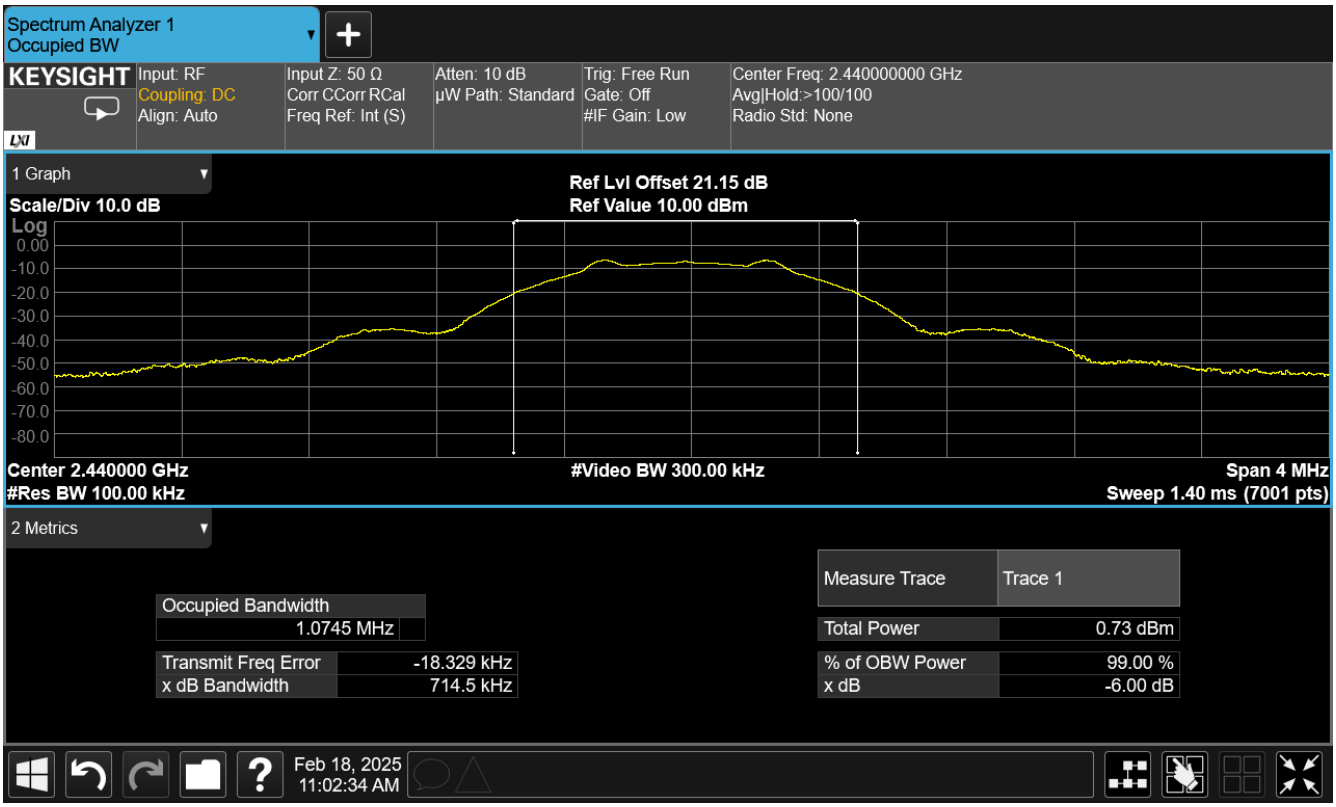
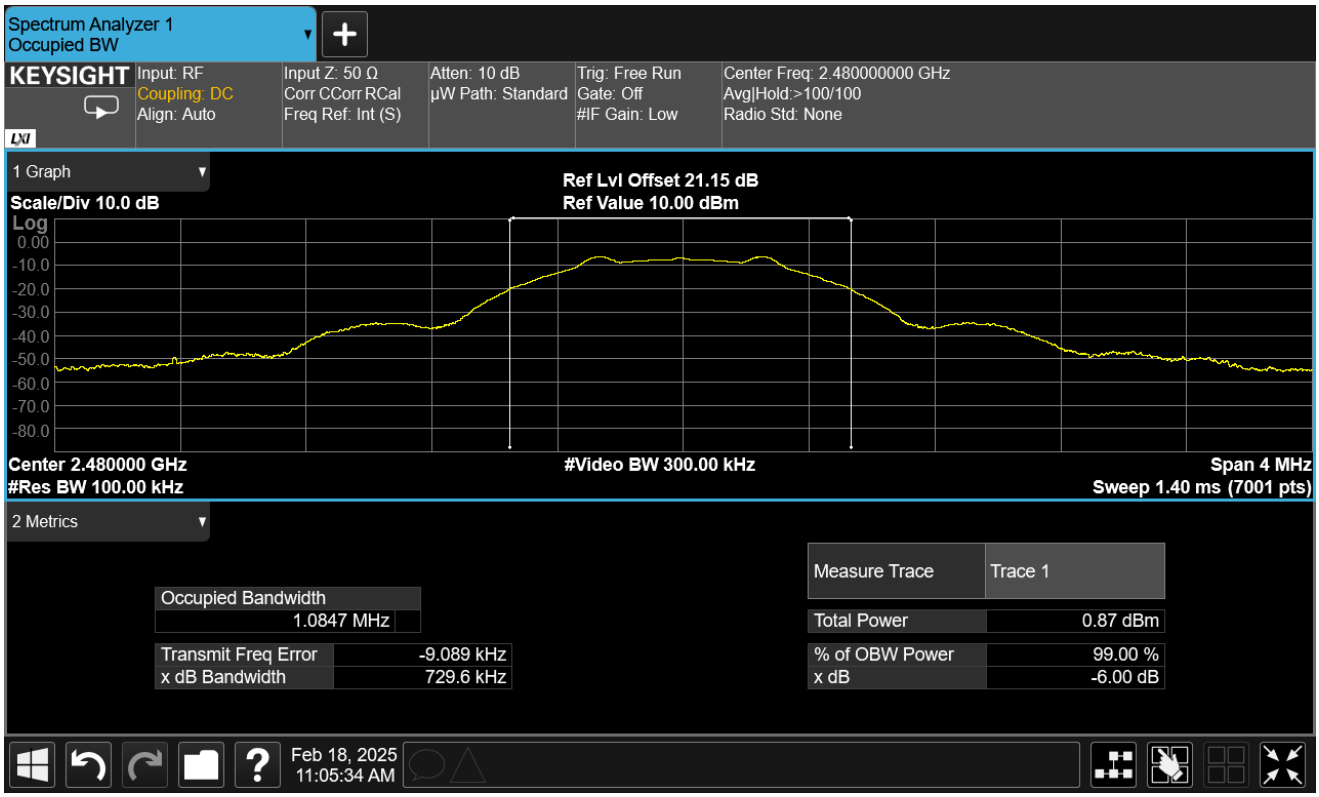


Figure 3: Occupied Bandwidth, High Channel



3.3 Conducted Peak Output Power

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(b)(3) and RSS-247, 5.4(d) require that the maximum peak conducted output power shall not exceed 30 dBm, or 1W. Additionally, the EIRP shall not exceed 36 dBm, or 4W.

The transmitter power was measured conducted at the antenna port, by coupling the output of the EUT transmitter to the input of a spectrum analyzer. The measurement level was corrected for any cable and attenuator losses.

3.3.1 Measurement Method

This test was performed in accordance with Clause 11.9.1.1 of ANSI C63.10-2020.

3.3.2 Test Data

The EUT test data is provided below.

The EUT was configured to transmit a modulated signal, with channel hopping disabled.

The EUT employs a Fusca antenna with a peak gain of 2.5 dBi.

Table 7: Conducted Output Power Results

Frequency	Conducted Power (dBm)	EIRP (dBm)	Result
Low Channel, 2402 MHz	-2.28	0.22	Pass
Center Channel, 2440 MHz	-6.26	-3.76	Pass
High Channel, 2480 MHz	-6.19	-3.69	Pass

Figure 4: Peak Output Power, Low Channel

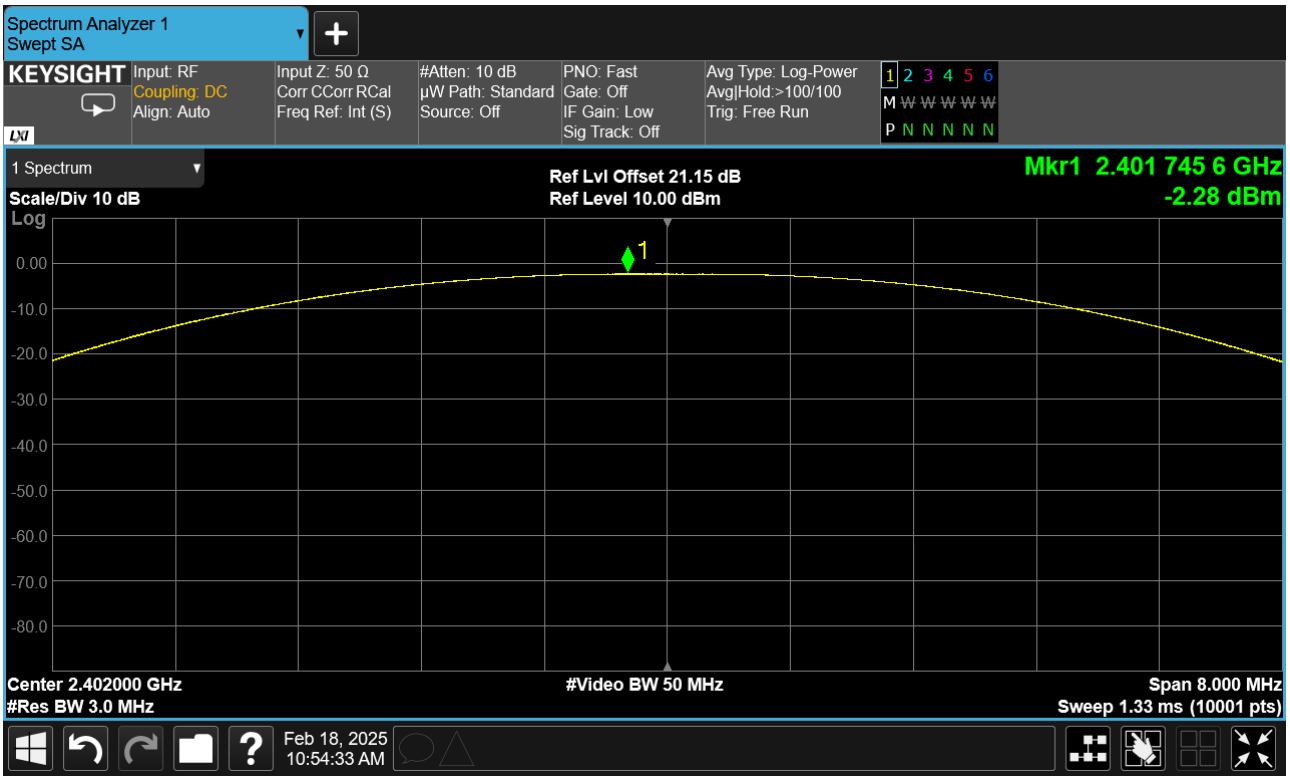


Figure 5: Peak Output Power, Center Channel

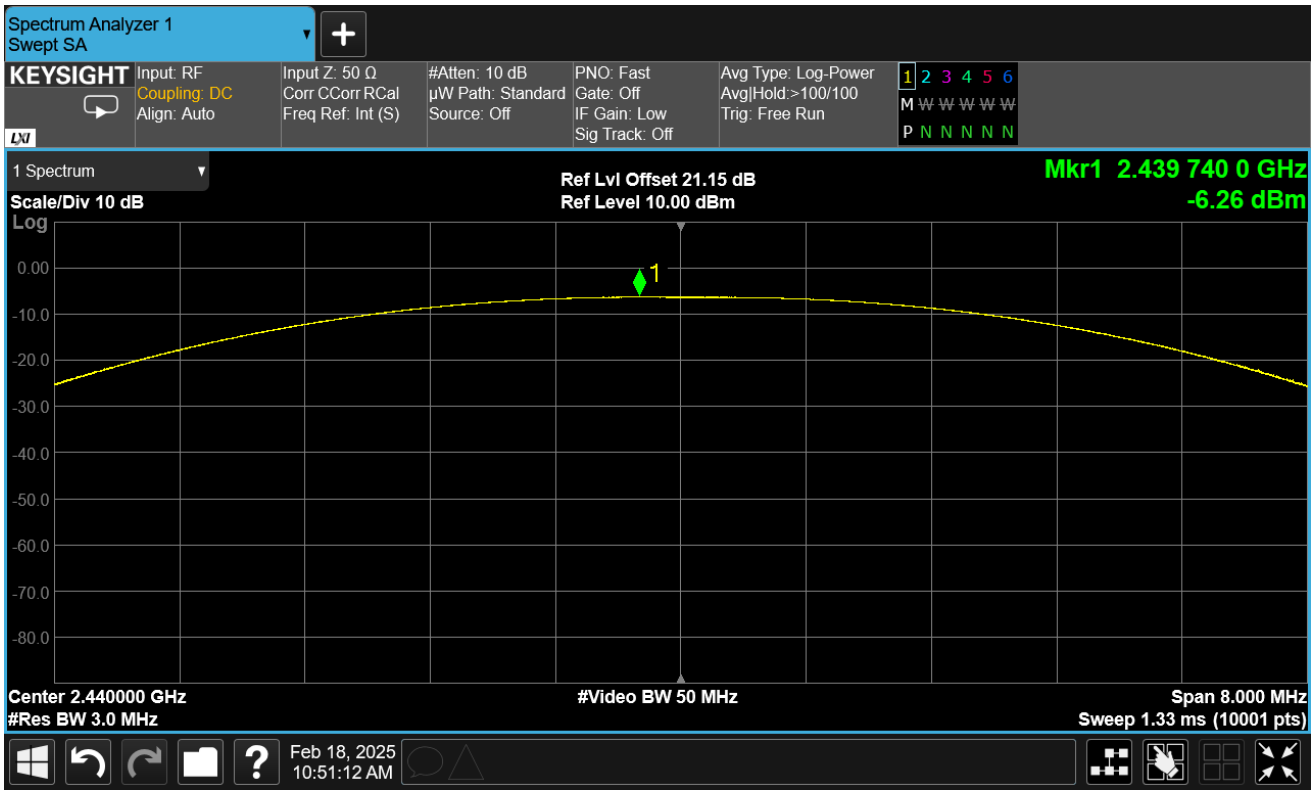
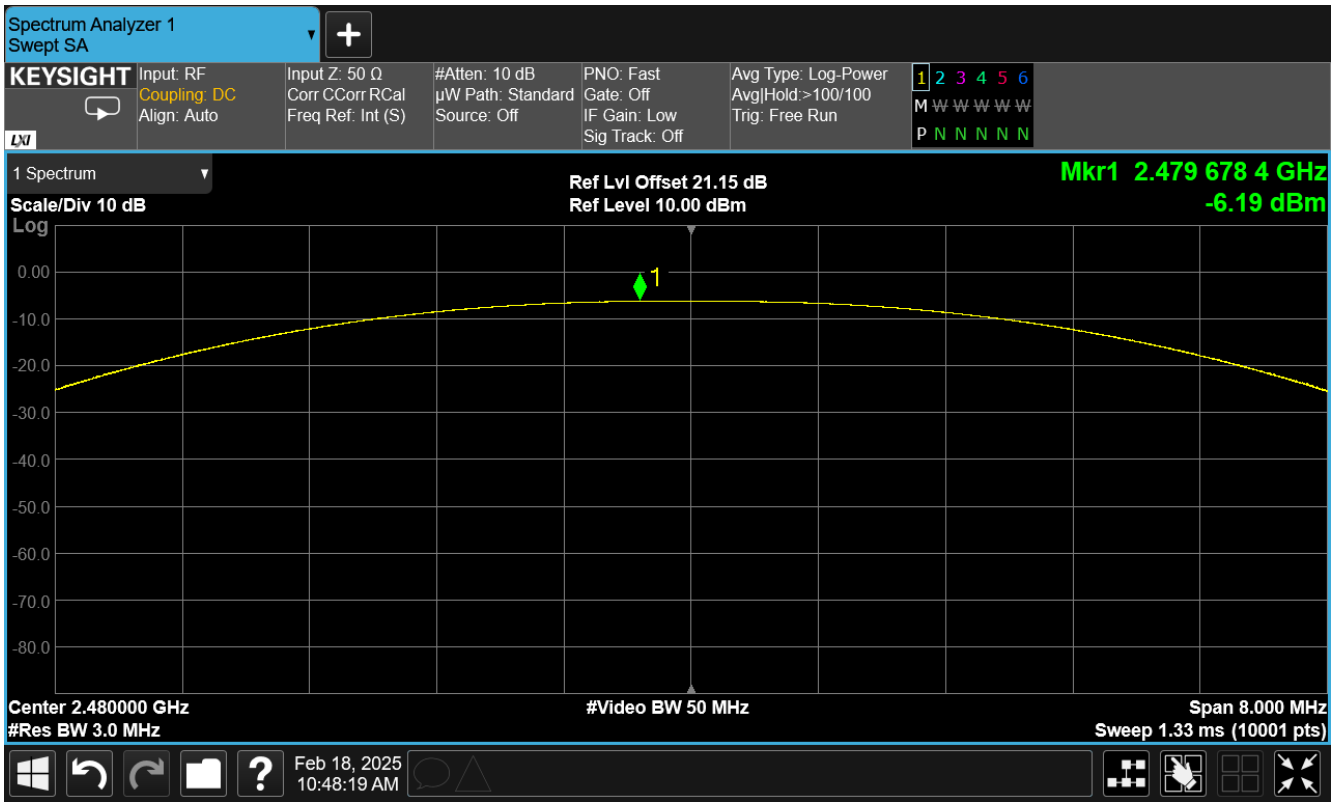


Figure 6: Peak Output Power, High Channel



3.4 Power Spectral Density

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(e) and RSS-247, 5.2(b) require that the maximum peak power spectral density shall not exceed 8 dBm in any 3 kHz band.

The transmitter peak power spectral density was measured conducted at the antenna port, by coupling the output of the EUT transmitter to the input of a spectrum analyzer. The measurement level was corrected for any cable and attenuator losses.

3.4.1 Measurement Method

This test was performed in accordance with Clause 11.10.2 of ANSI C63.10-2020.

3.4.2 Test Data

The EUT test data is provided below.

The EUT was configured to transmit a modulated signal, with channel hopping disabled.

Table 8: Power Spectral Density

Frequency	PSD (dBm/100kHz)	Limit (dBm/3kHz)	Result
Low Channel, 2402 MHz	-2.37	8.0	Pass
Center Channel, 2440 MHz	-6.30	8.0	Pass
High Channel, 2480 MHz	-6.26	8.0	Pass

Figure 7: Power Spectral Density, Low Channel

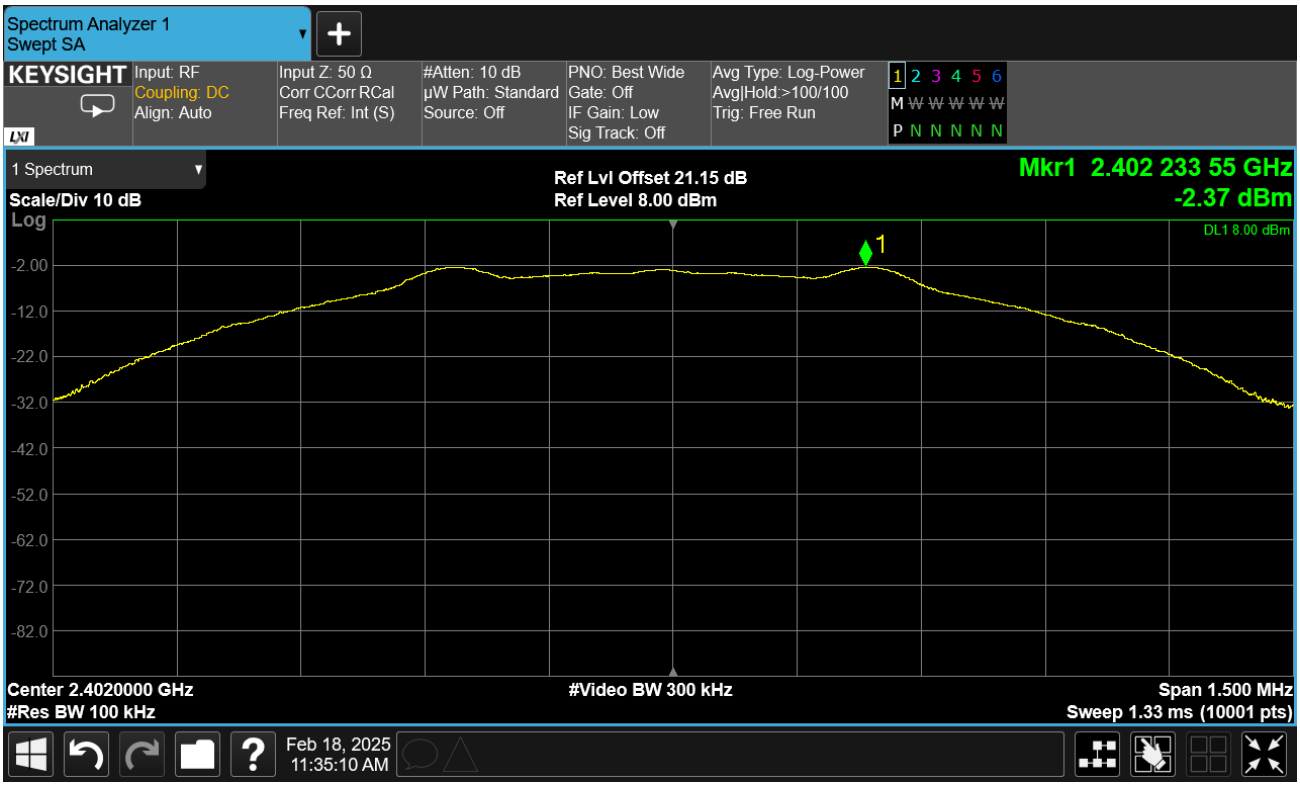


Figure 8: Power Spectral Density, Center Channel

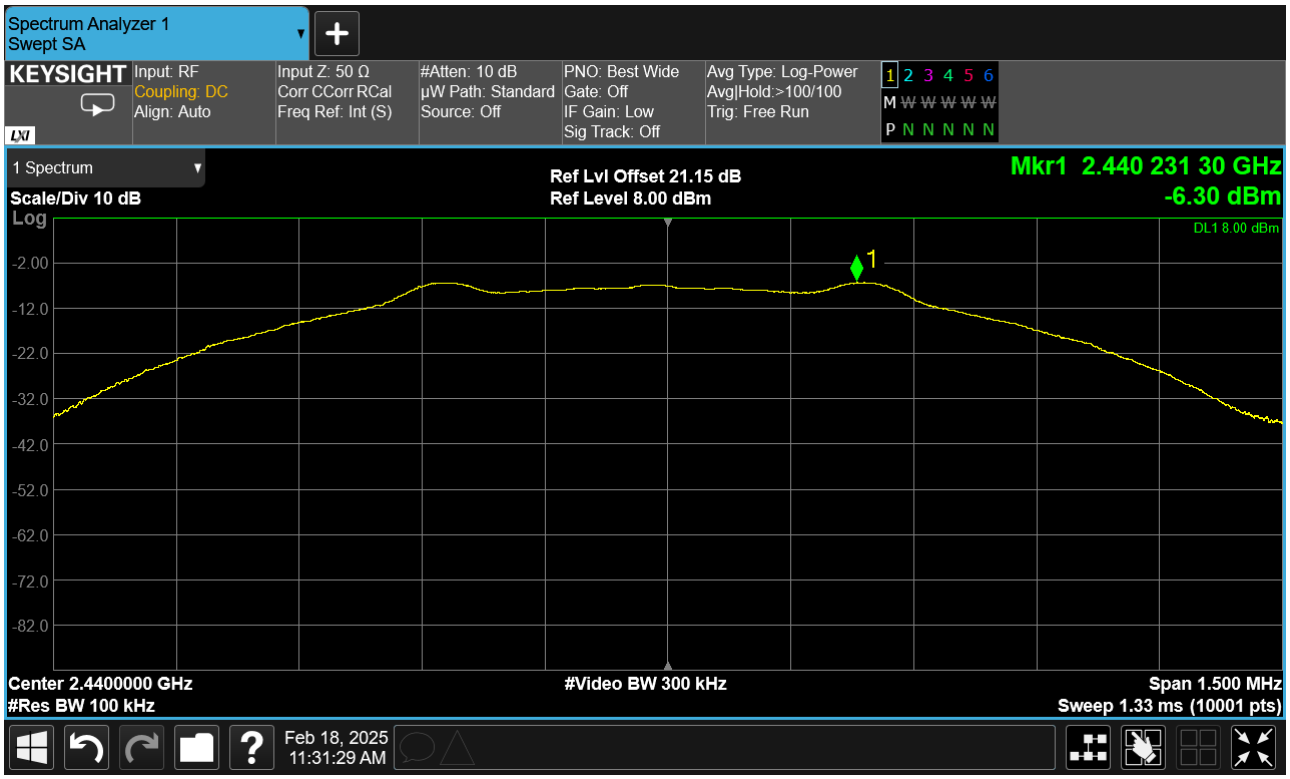
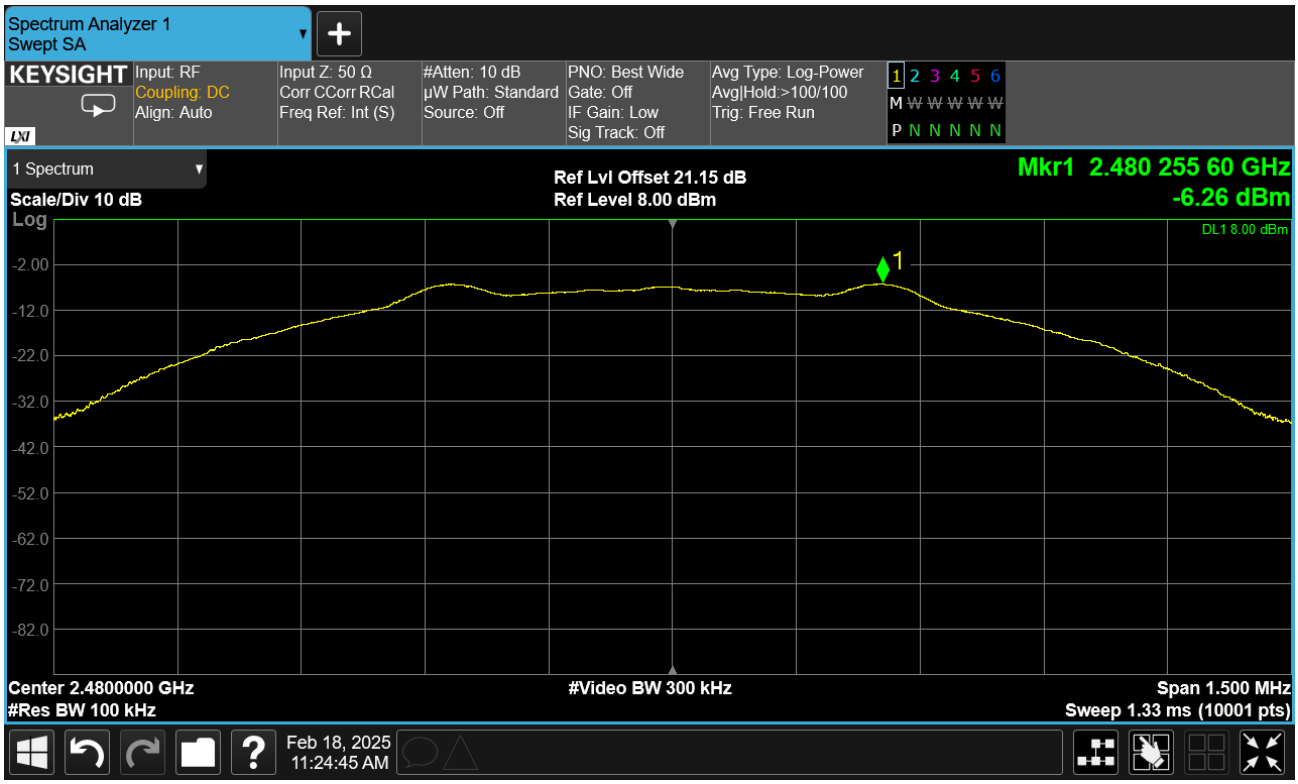


Figure 9: Power Spectral Density, High Channel



3.5 Conducted Band-edge Testing

This section provides close-up band-edge plots of the low and high channel, with respect to the nearest authorized band-edge.

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(d) and RSS-247, 5.5 require that in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the unwanted 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.

Band-edge measurements were made conducted at the antenna port, by coupling the output of the EUT transmitter to the input of a spectrum analyzer. The measurement level was corrected for any cable and attenuator losses.

3.5.1 Measurement Method

This test was performed in accordance with Clause 6.10 through Clause 6.10.4 of ANSI C63.10-2020.

3.5.2 Test Data

The EUT test data is provided below.

The EUT was configured to transmit a modulated signal, with channel hopping disabled.

Figure 10: Low Channel Band-Edge

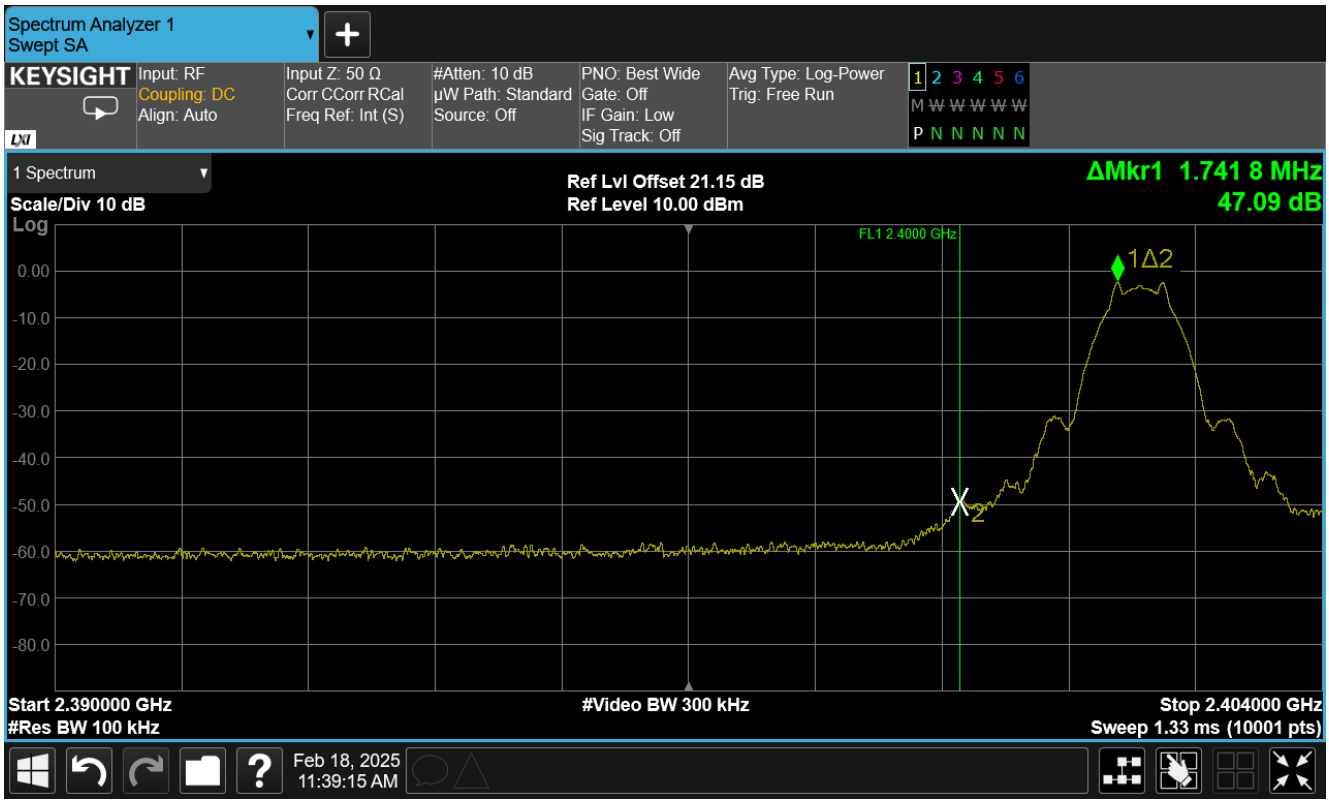
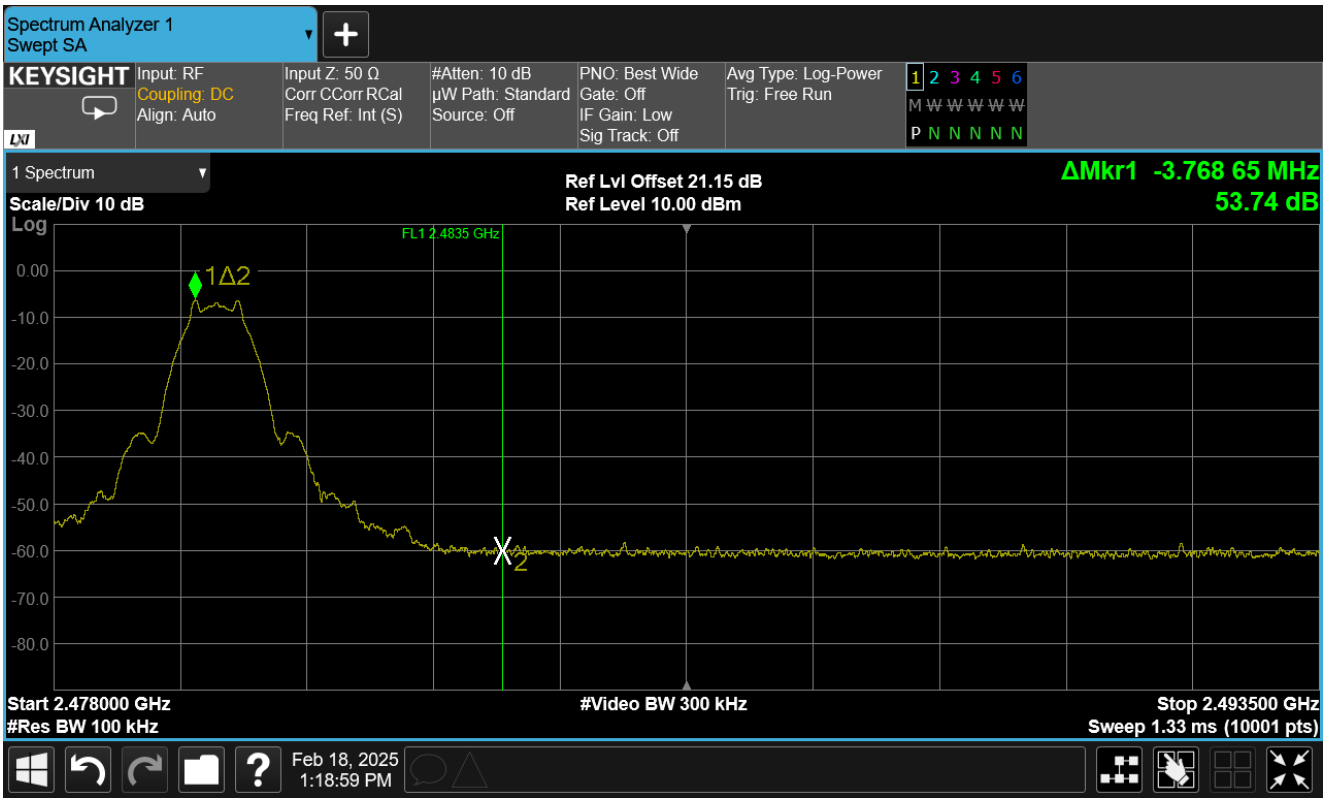


Figure 11: High Channel Band-Edge



3.6 Conducted Unwanted Spurious Emissions

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(d) and RSS-247, 5.5 require that in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the unwanted 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.

The transmitter unwanted spurious emissions were evaluated and measured conducted at the antenna port, by coupling the output of the EUT transmitter to the input of a spectrum analyzer. The measurement level was corrected for any cable and attenuator losses.

3.6.1 Measurement Method

This test was performed in accordance with Clause 11.11 of ANSI C63.10-2020.

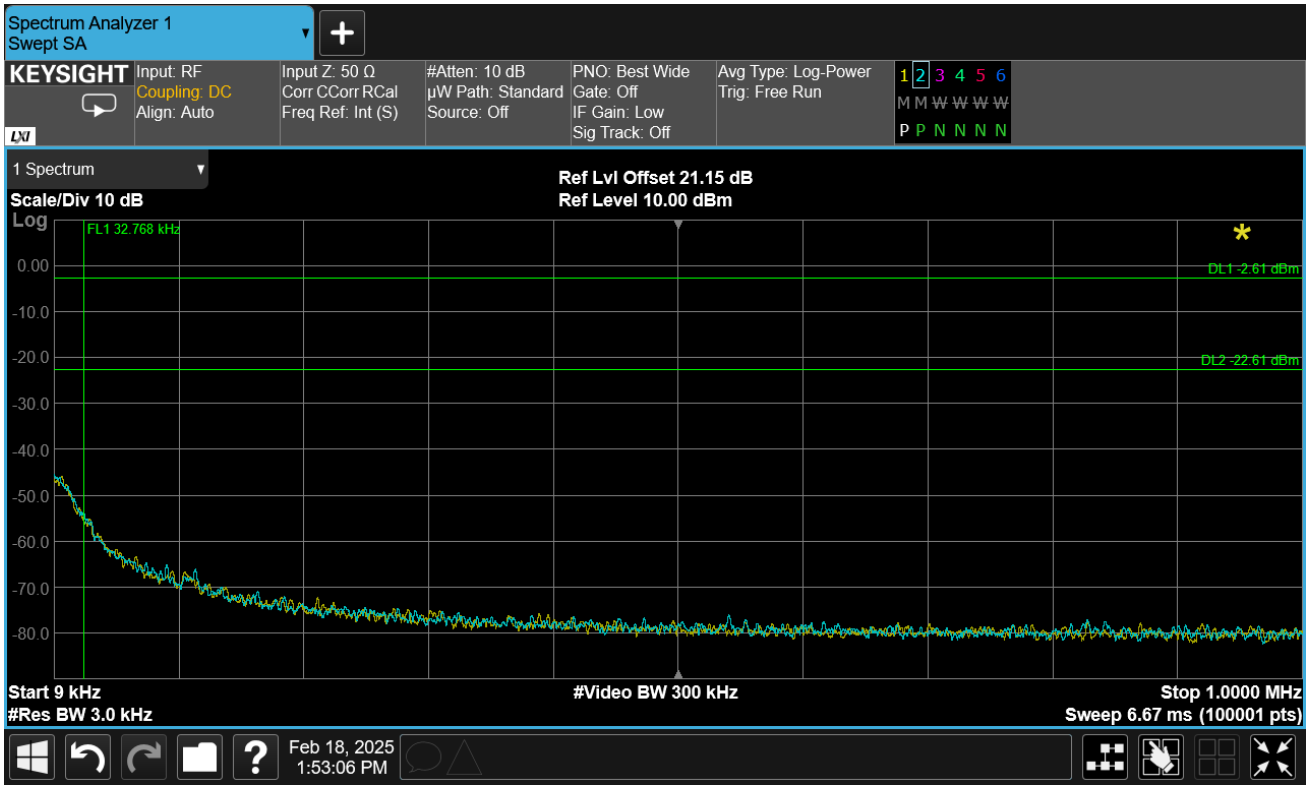
3.6.2 Test Data

The EUT test data for the low, center, and high channels are provided below.

The EUT test data is provided below.

The EUT was configured to transmit a modulated signal, with channel hopping disabled.

Figure 12: Low Channel Conducted Spurious Plot 1



Trace 1 = EUT TX On

Trace 2 = Ambient Conditions

EUT emissions are **not** detected in this frequency range.

Figure 13: Low Channel Conducted Spurious Plot 2

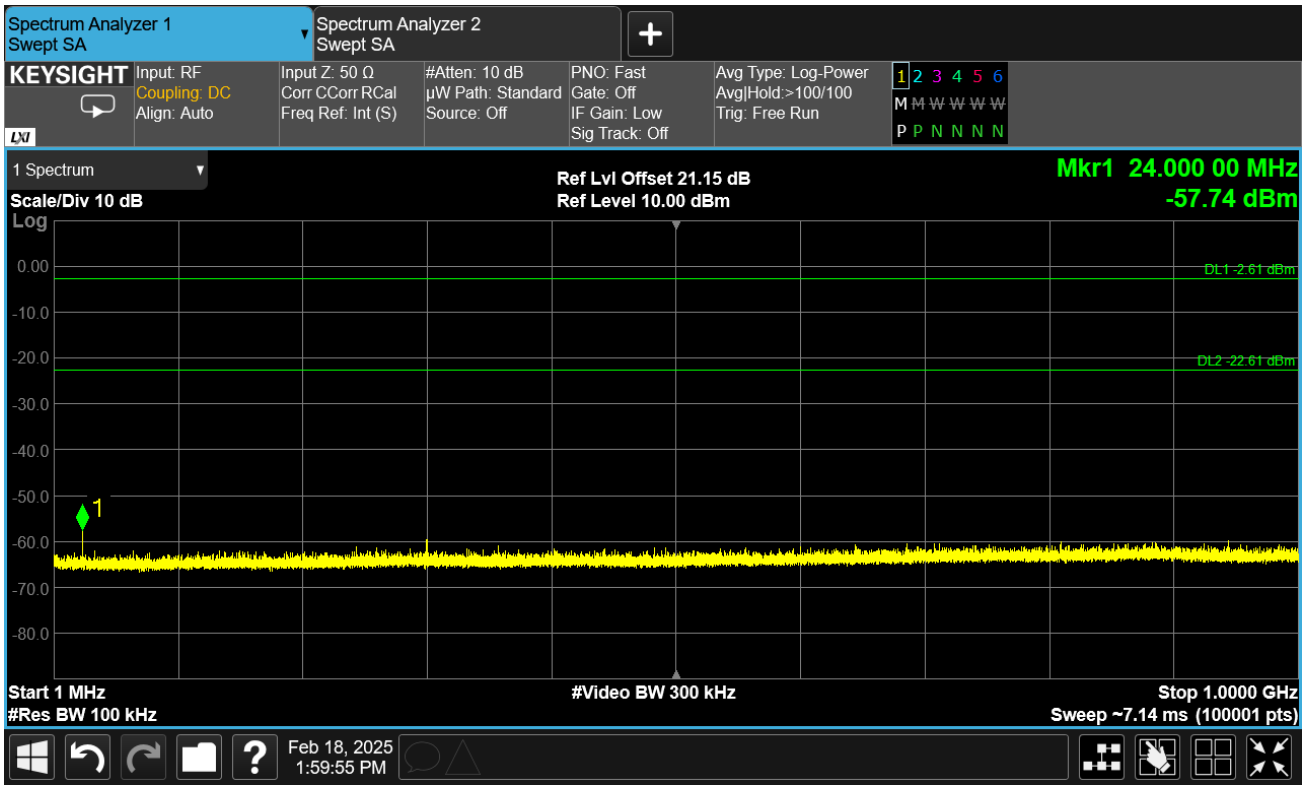


Figure 14: Low Channel Conducted Spurious Plot 3

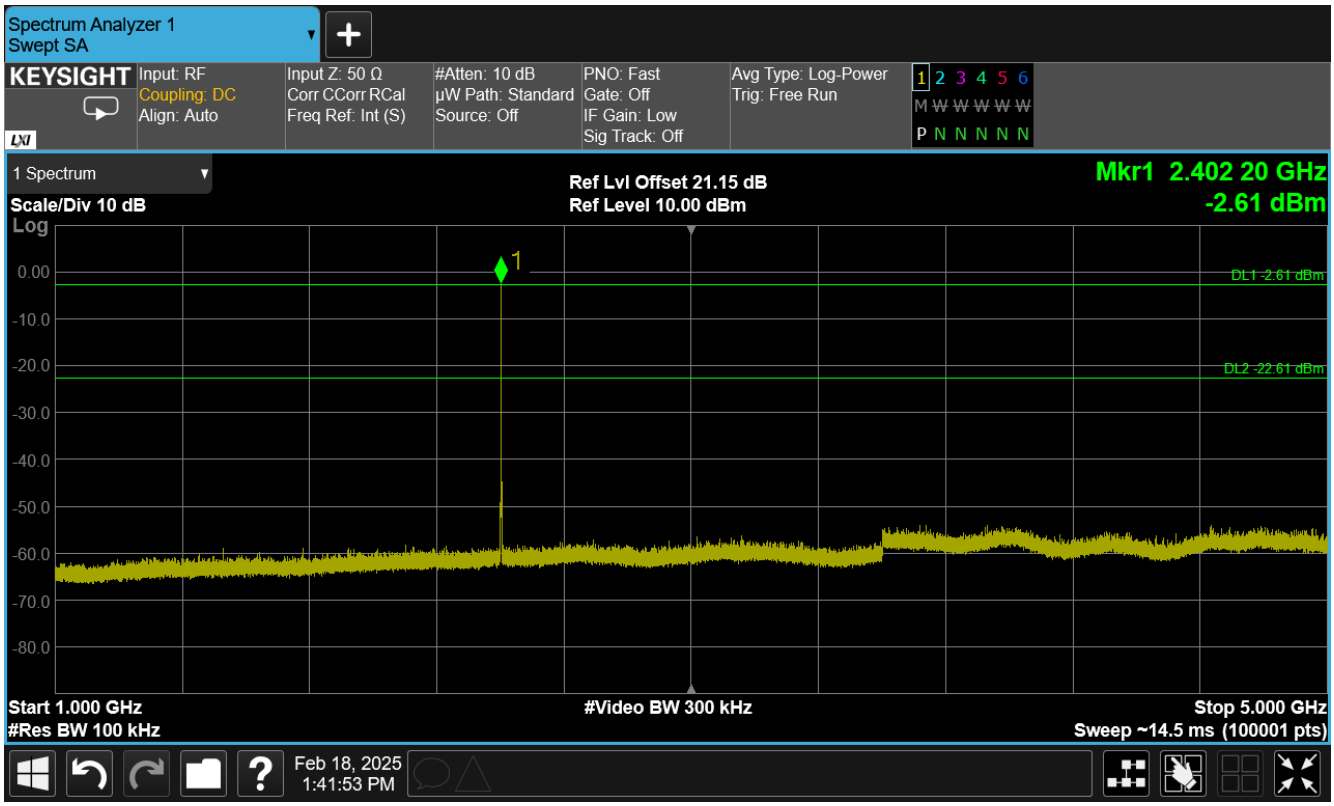


Figure 15: Low Channel Conducted Spurious Plot 4

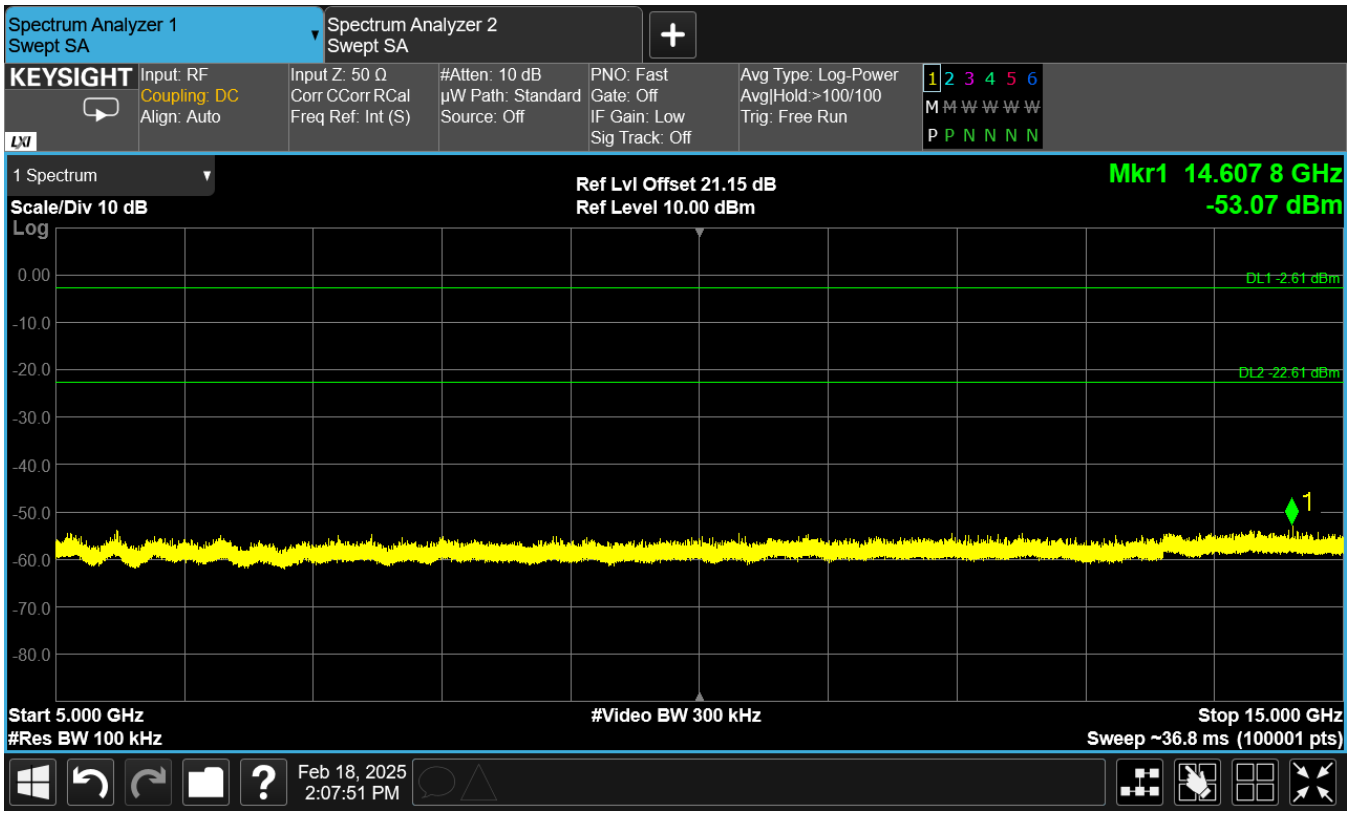


Figure 16: Low Channel Conducted Spurious Plot 5

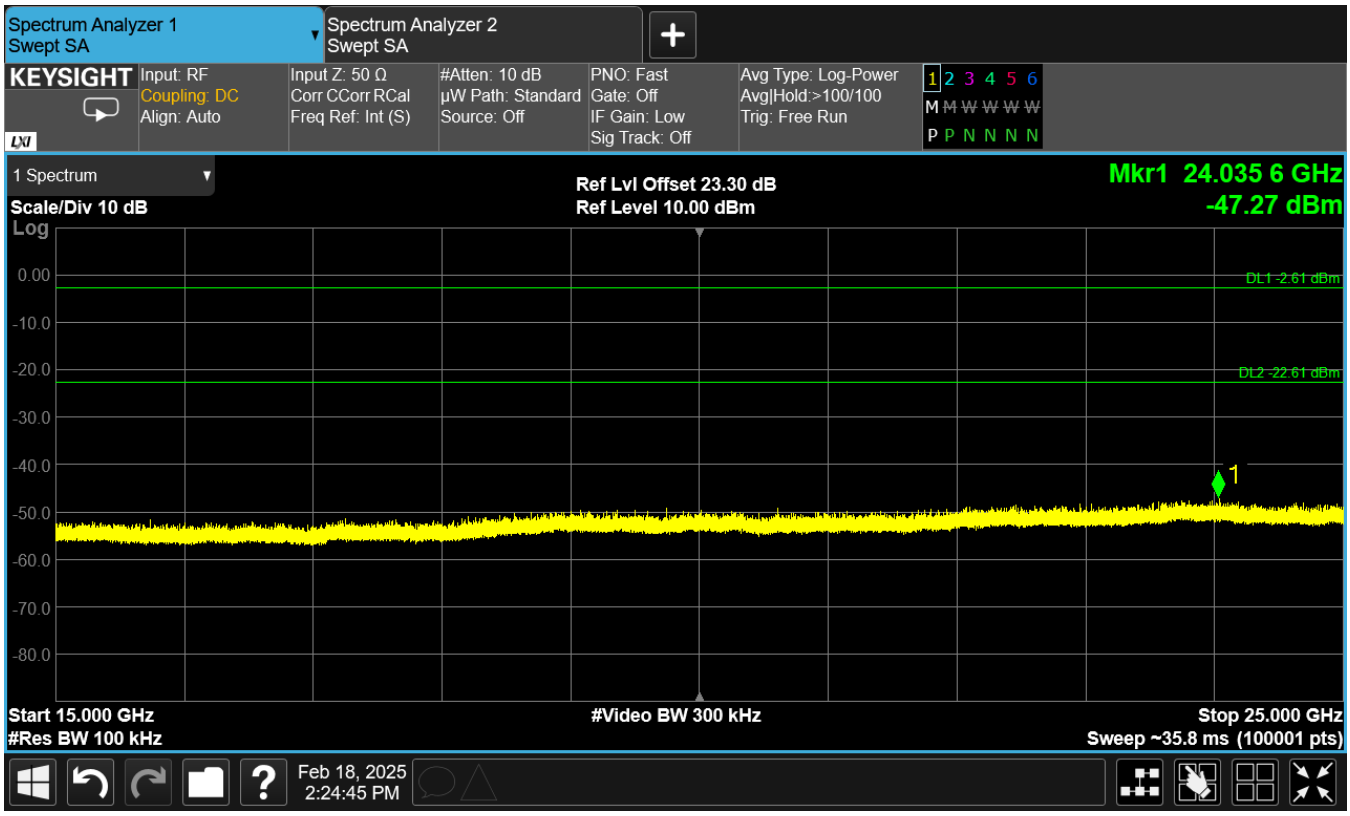
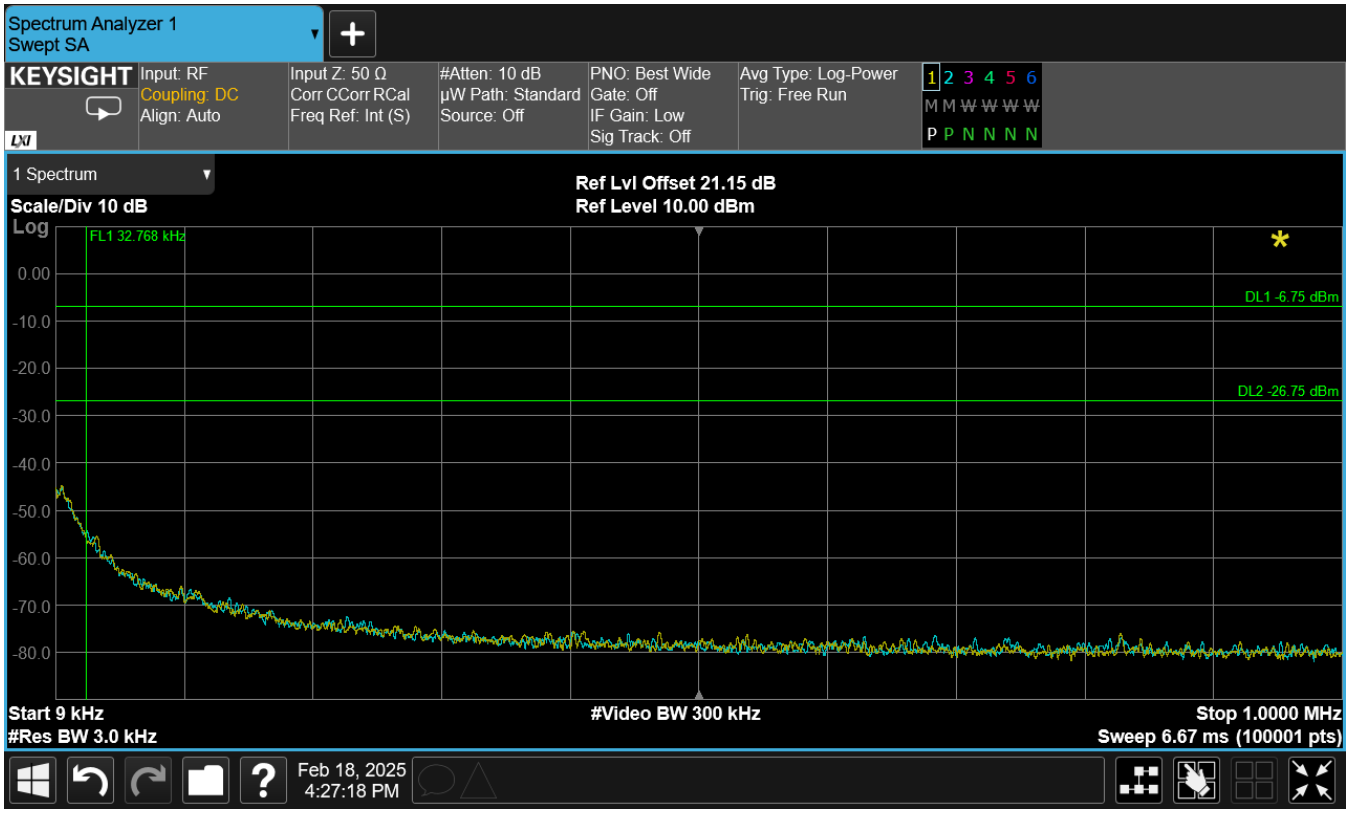


Figure 17: Center Channel Conducted Spurious Plot 1



Trace 1 = EUT TX On

Trace 2 = Ambient Conditions

EUT emissions are **not** detected in this frequency range.

Figure 18: Center Channel Conducted Spurious Plot 2

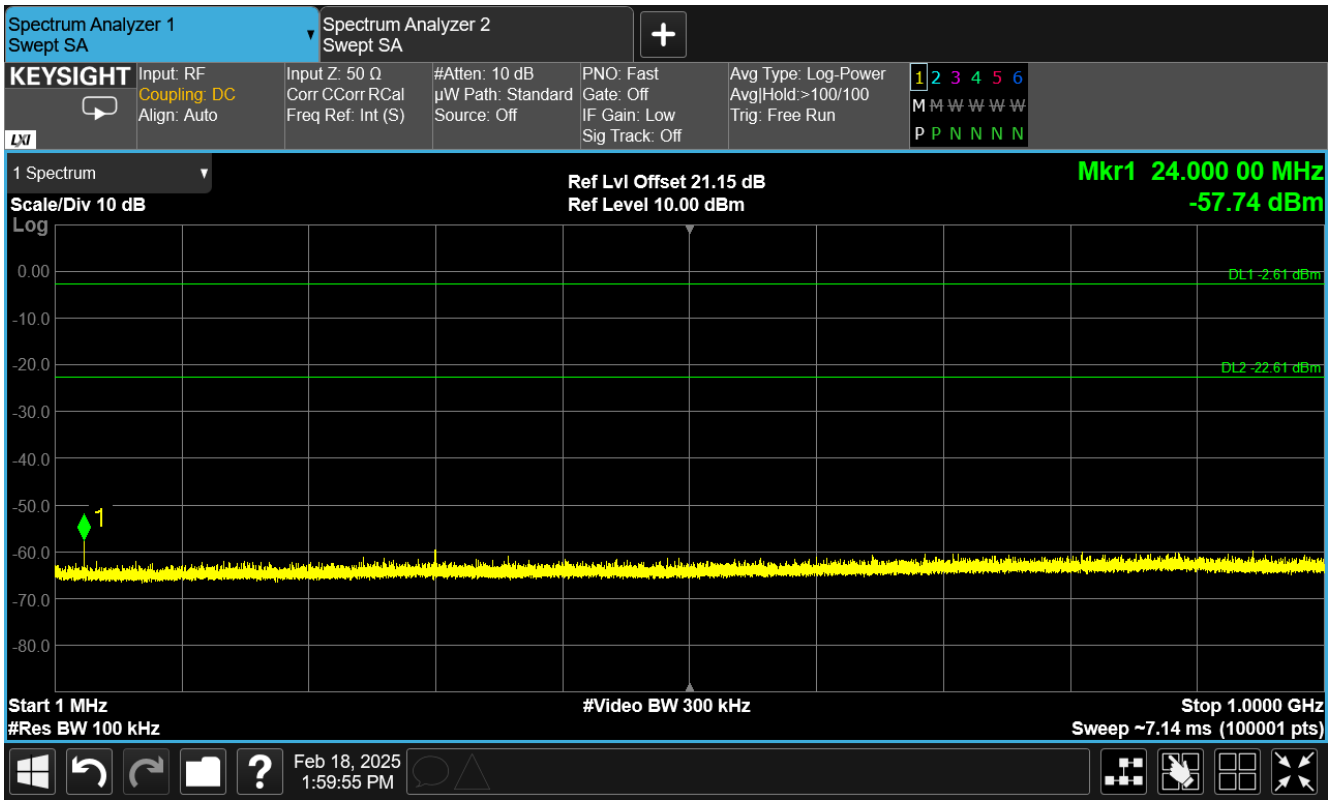


Figure 19: Center Channel Conducted Spurious Plot 3

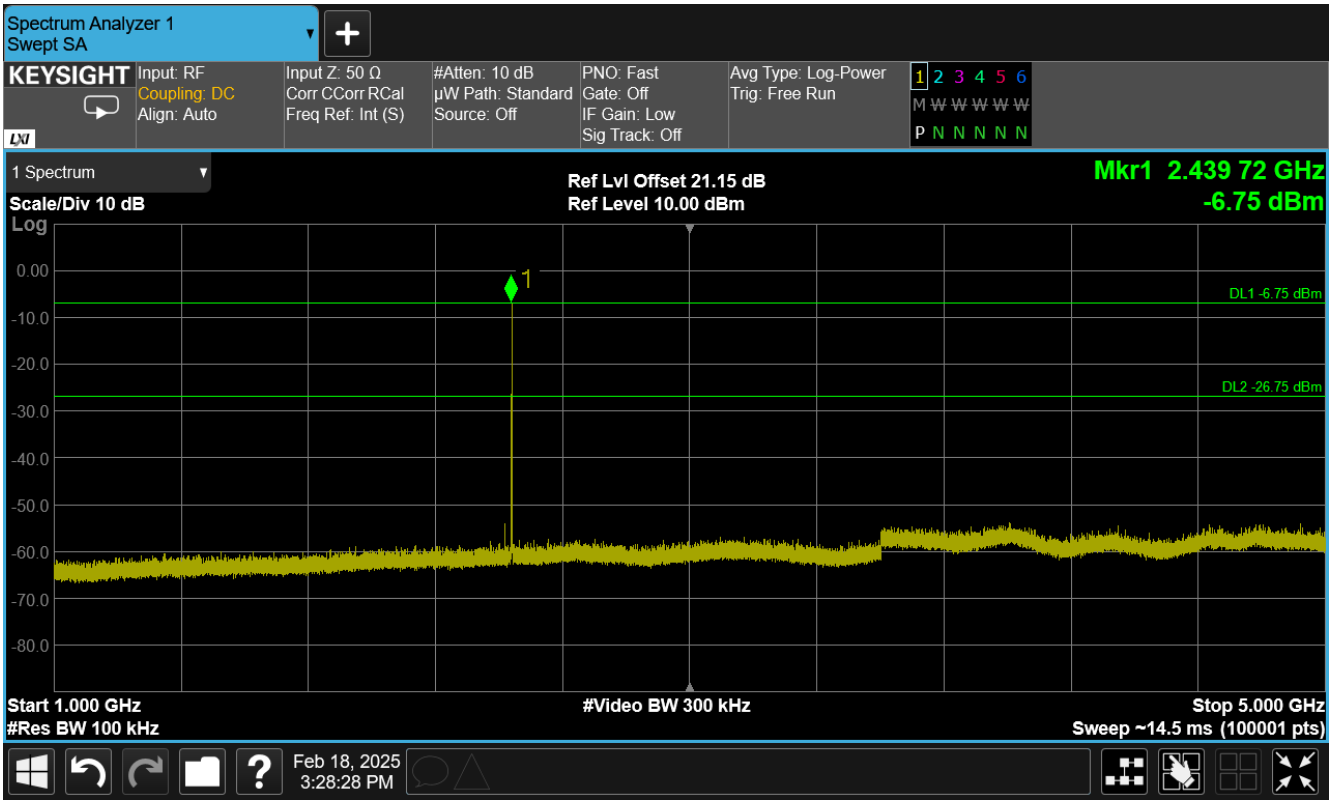


Figure 20: Center Channel Conducted Spurious Plot 4

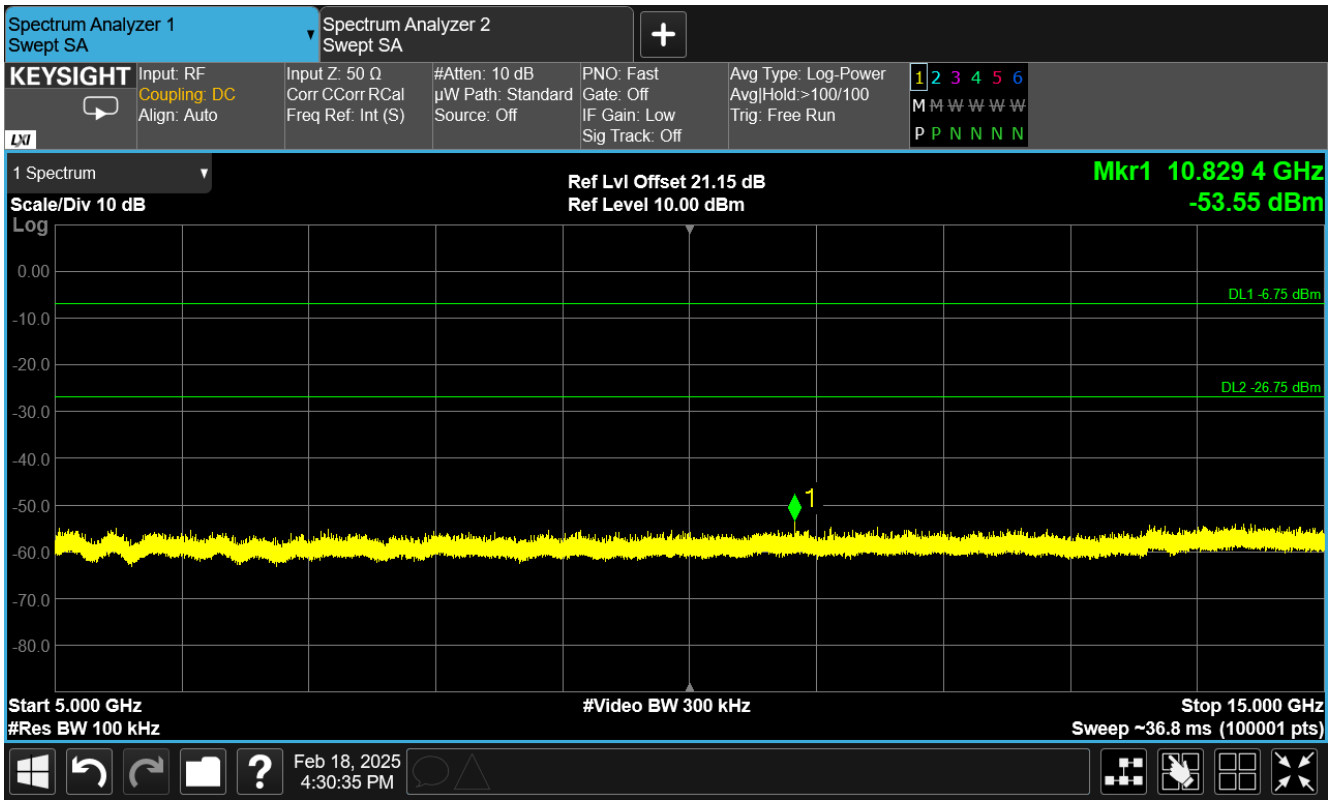


Figure 21: Center Channel Conducted Spurious Plot 5

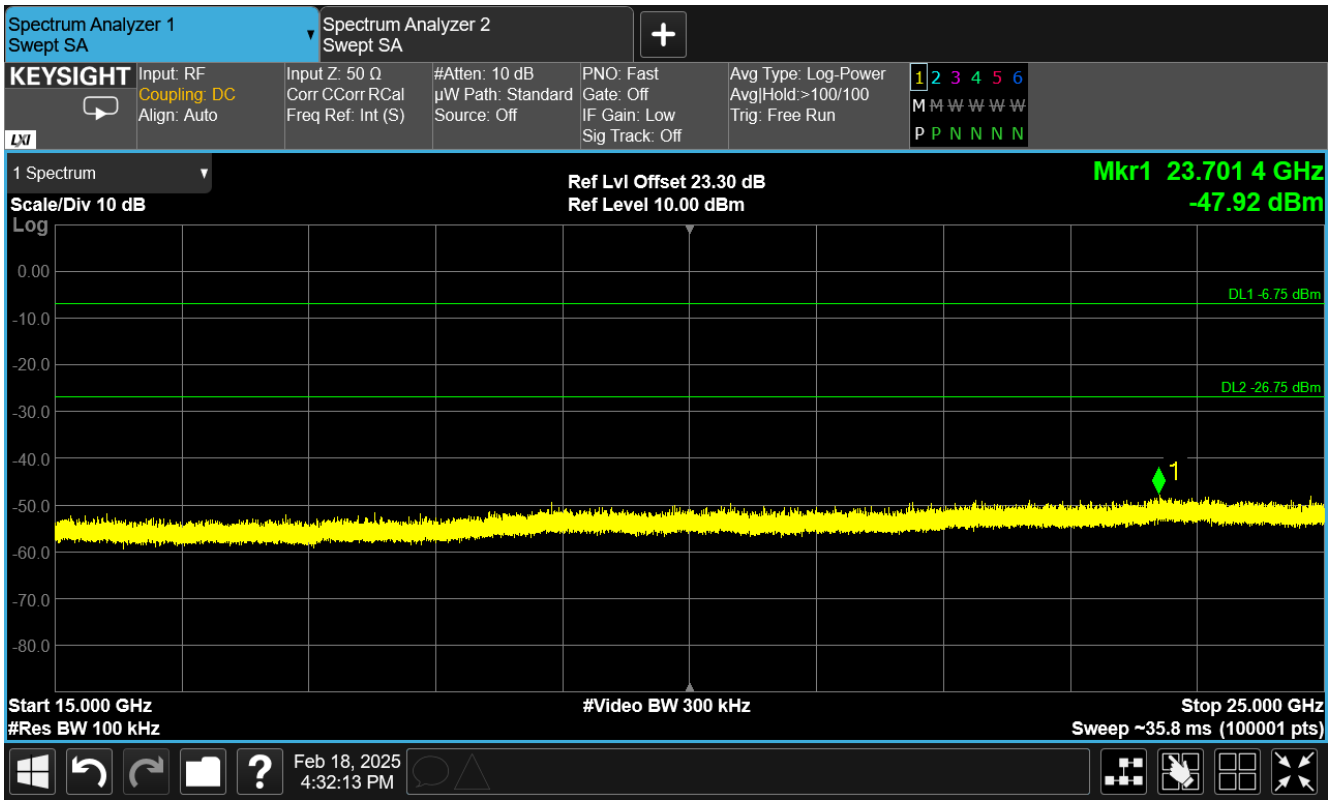
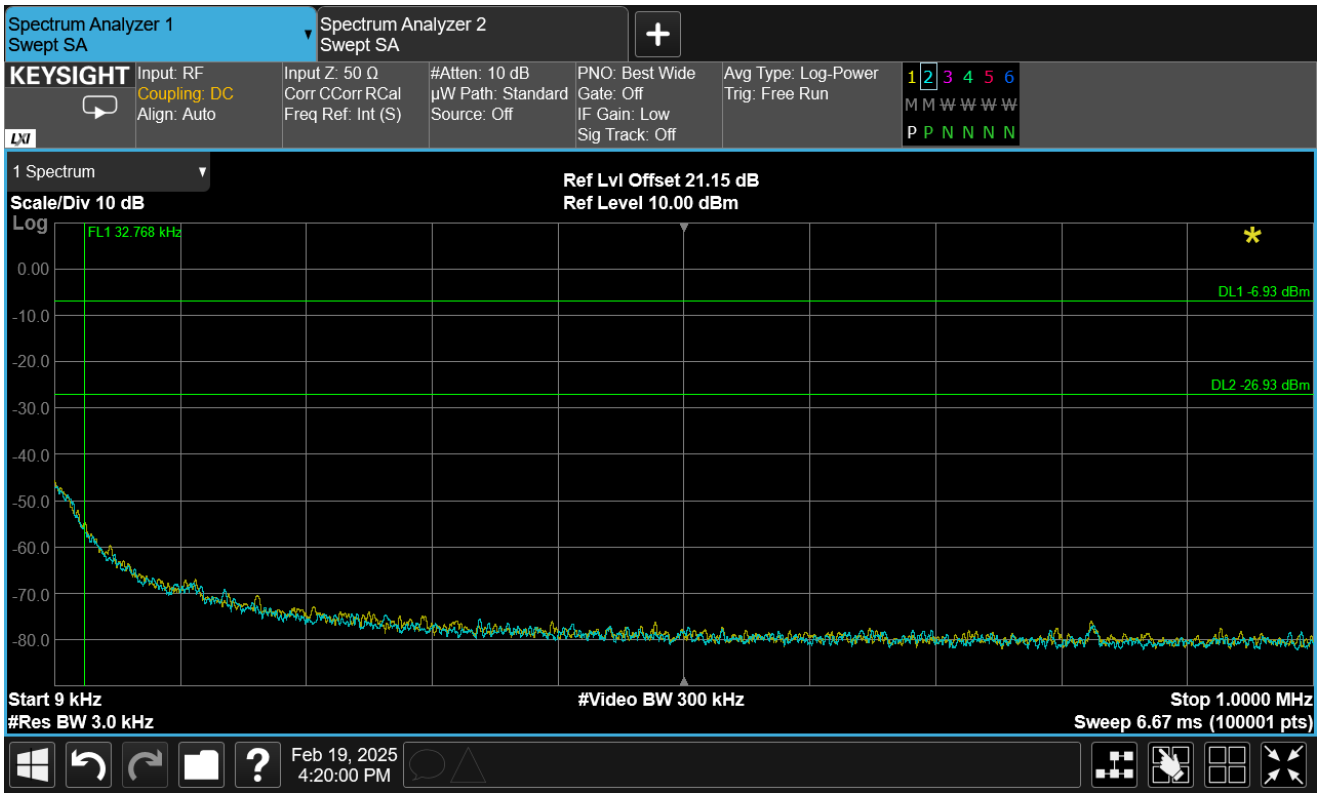


Figure 22: High Channel Conducted Spurious Plot 1



Trace 1 = EUT TX On

Trace 2 = Ambient Conditions

EUT emissions are **not** detected in this frequency range.

Figure 23: High Channel Conducted Spurious Plot 2

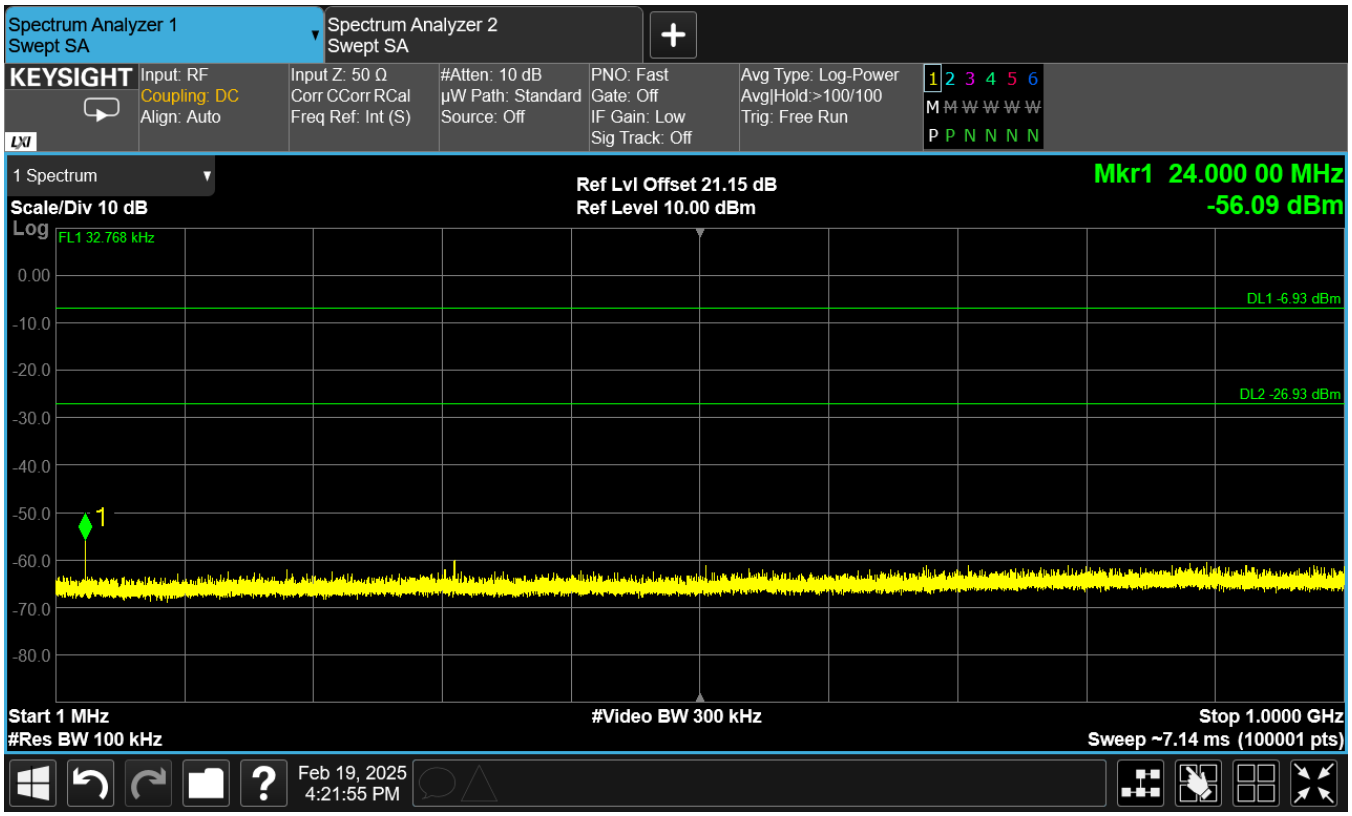


Figure 24: High Channel Conducted Spurious Plot 3

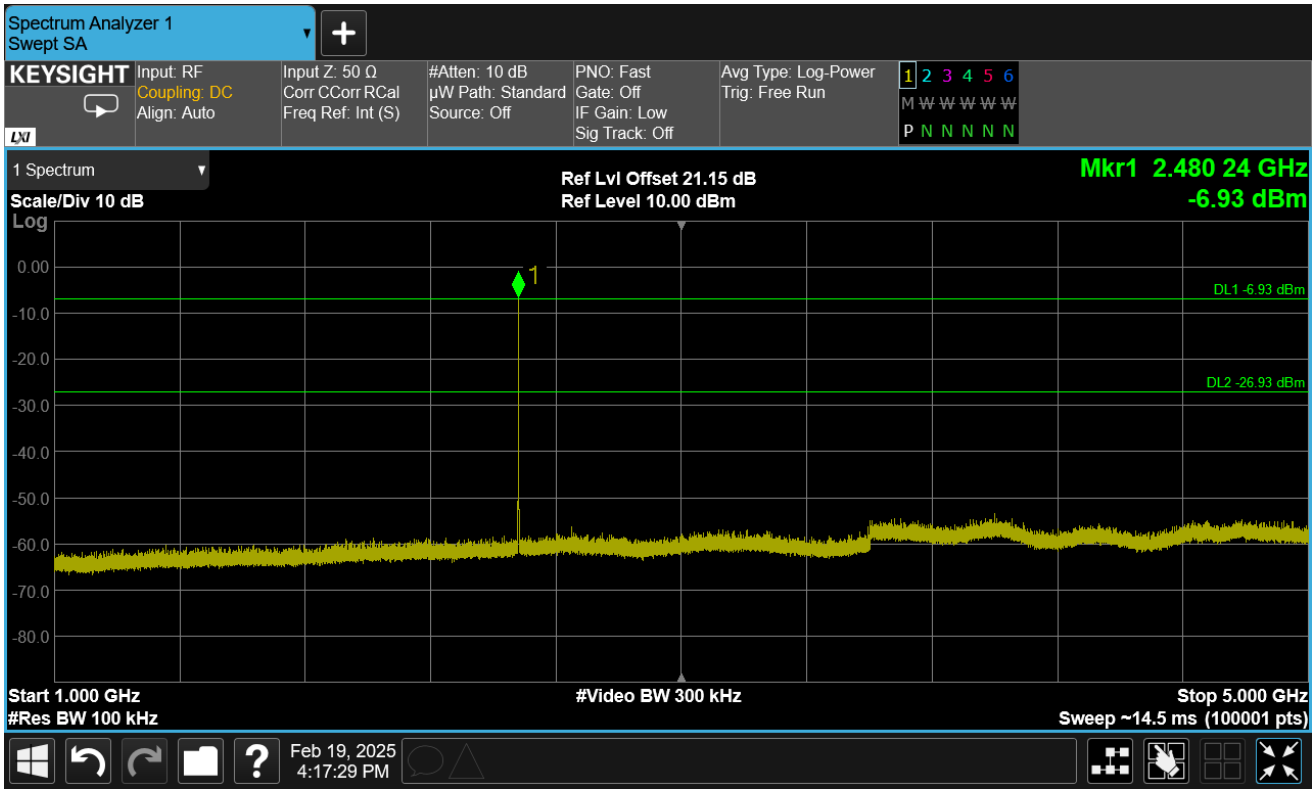


Figure 25: High Channel Conducted Spurious Plot 4

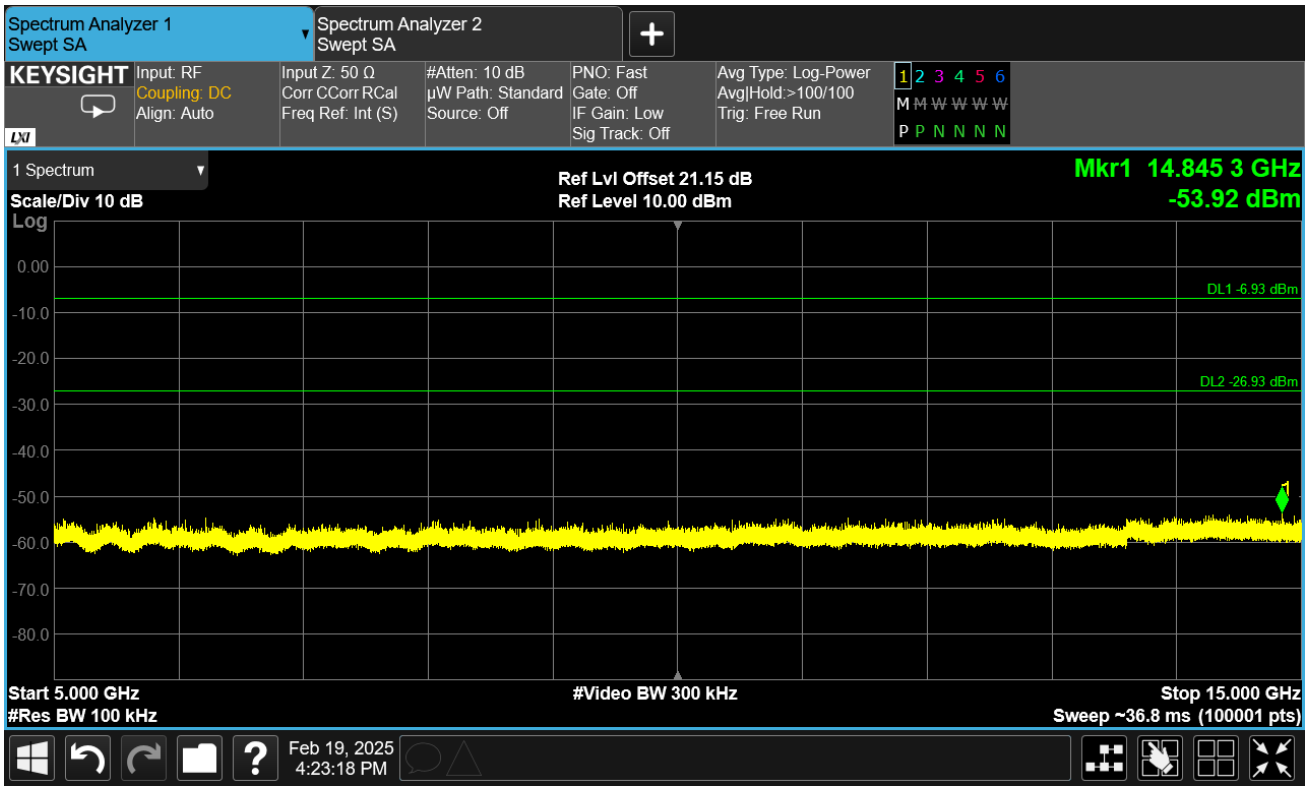
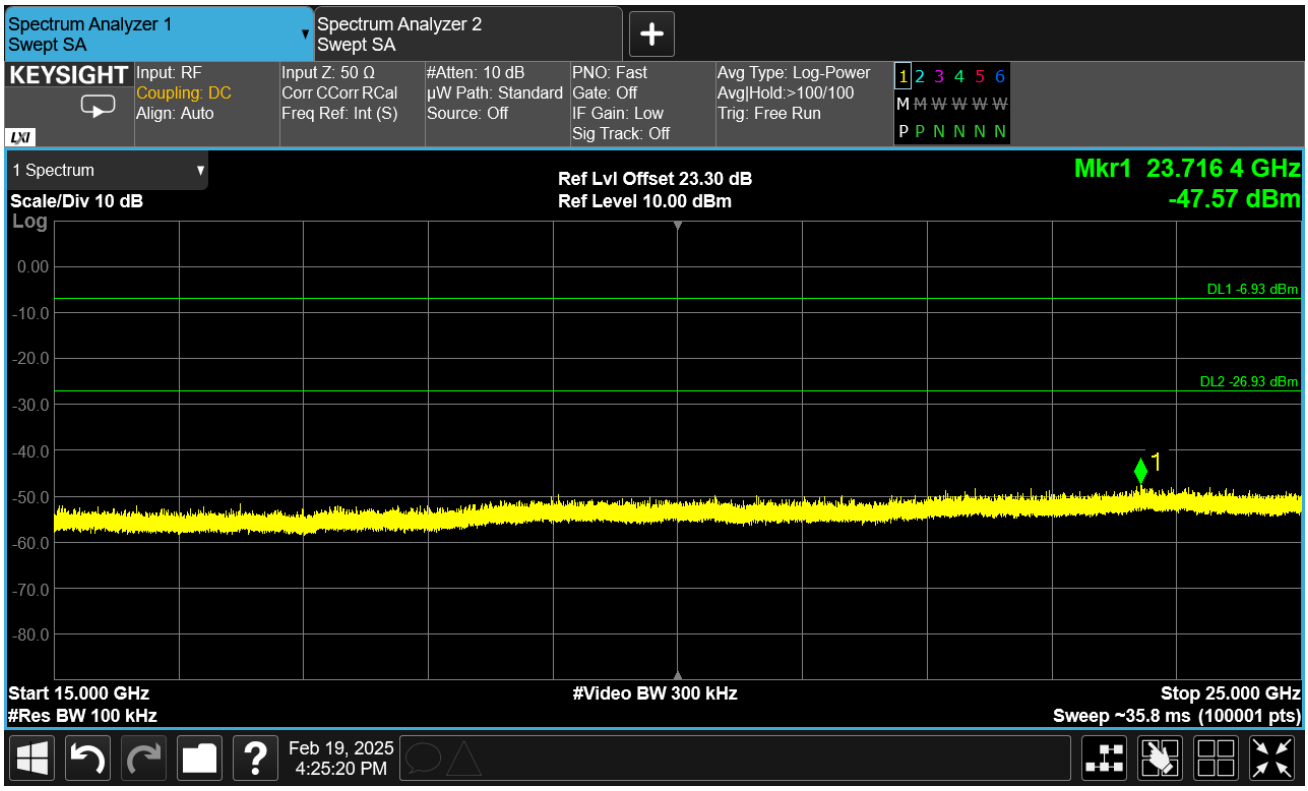


Figure 26: High Channel Conducted Spurious Plot 5



3.7 Radiated Emissions

3.7.1 Requirements

Compliance Standard: FCC Part 15.247, 15.209, 15.205

Radiated Emissions, Compliance Limits	
Frequency Range	Test Distance (3-meters)
	Limit
30 – 88 MHz	100 µV/m
88 – 216 MHz	150 µV/m
216 – 960 MHz	200 µV/m
> 960 MHz	500 µV/m

3.7.2 Test Procedure

For frequencies between 9 kHz and 30 MHz, a loop antenna was mounted at a fixed-height of 1-meter and rotated about its vertical and horizontal axis in accordance with ANSI C63.10-2020, clause 6.4.6 and 6.11.2. For frequencies above 30MHz the receiving antenna was mounted on a mast and the height of the antenna was varied between 1 and 4 meters to determine the maximum emissions. Both the horizontal and vertical field components were measured. For all radiated testing, the EUT was placed on an 80 cm high 1 X 1.5 meters non-conductive motorized turntable. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. The output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 9kHz to 26.5GHz were measured, which covers the 10th harmonic of the fundamental. Both the horizontal and vertical field components were measured. The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. Above 1GHz average measurement are recorded. Below 1Ghz, the measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. Frequencies above 1GHz were performed using a measurement bandwidth of 1 MHz with a video bandwidth setting of 10 Hz for the average measurement.

3.7.3 Test Results Summary

The EUT complies with the Radiated Emissions requirements of this section.

3.7.4 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included into the antenna factor (AF) column of the table and in the cable factor (CF) column of the table. The AF (in dB/m) and the CF (in dB) is algebraically added to the raw Spectrum Analyzer Voltage in dBµV to obtain the Radiated Electric Field in dBµV/m. This logarithm amplitude is converted to a linear amplitude, then compared to the FCC limit.

Example:

Spectrum Analyzer Voltage: VdBµV
Antenna Correction Factor: AFdB/m
Cable Correction Factor: CFdB
Pre-Amplifier Gain (if applicable): GdB
Electric Field: EdBµV/m = V dBµV + AFdB/m + CFdB - GdB
To convert to linear units of measure: EdBµV/m/20 Inv log

3.7.5 Test Data

The EUT is fully compliant, and the test data is provided on the pages below.

Some measurements were made at the noise floor, these are marked as ambient. In this case, no EUT emissions was detected.

A complete investigation of the radiated fundamental field strength was performed. The EUT was evaluated in three orthogonal axes (x, y, z). The EUT position the produced the highest radiated power was maintained during all testing.

The EUT was configured to transmit a modulated signal as follows:

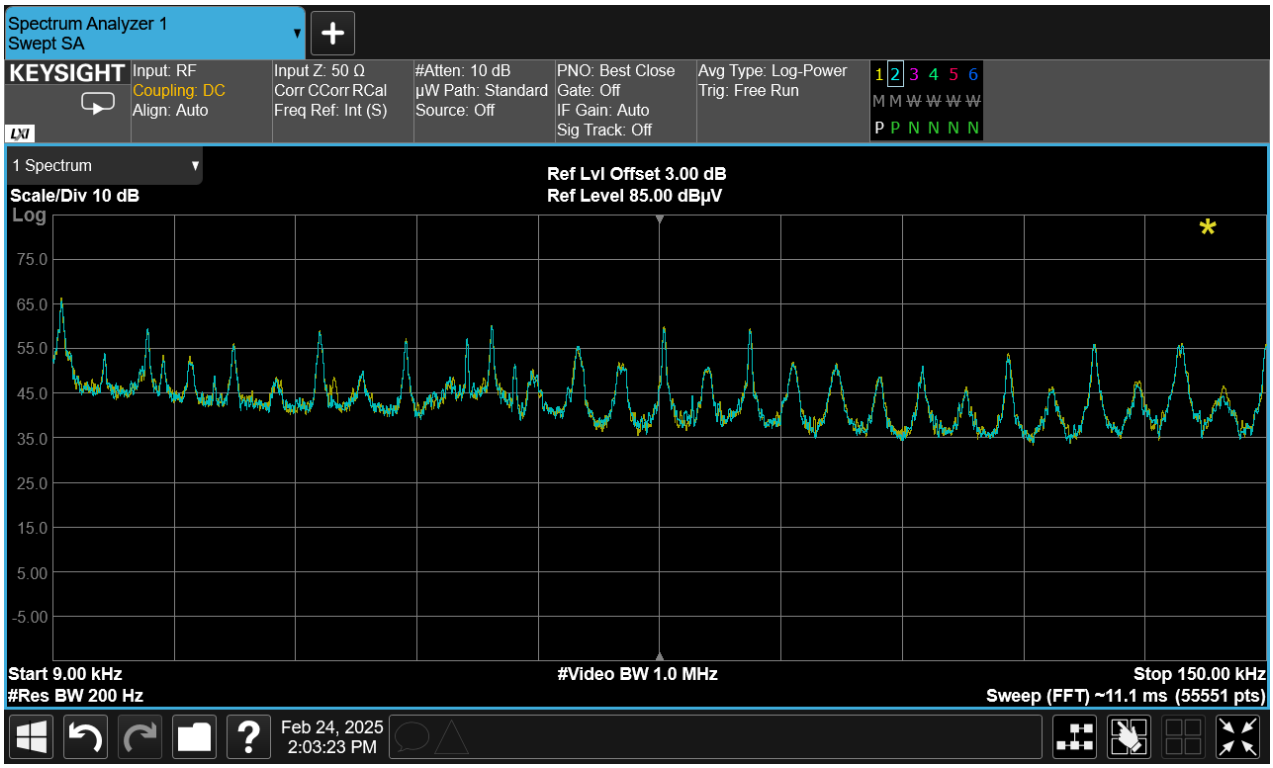
a) for testing of 9kHz to 30MHz, the EUT was set to a transmitter enabled mode, the BLE transceiver was set to dwell on the low channel.

b) for testing of 30MHz to 1GHz, the EUT was set to a transmitter enabled mode, the BLE transceiver was set to dwell on the low channel.

c) for testing of 1GHz to 26.5GHz, the EUT was set to a transmitter enabled mode, the BLE transceiver was set to dwell on the low, center, and high channels.

Final data is provided on the following pages.

Figure 27: Radiated Emissions Investigation, 9kHz to 150kHz



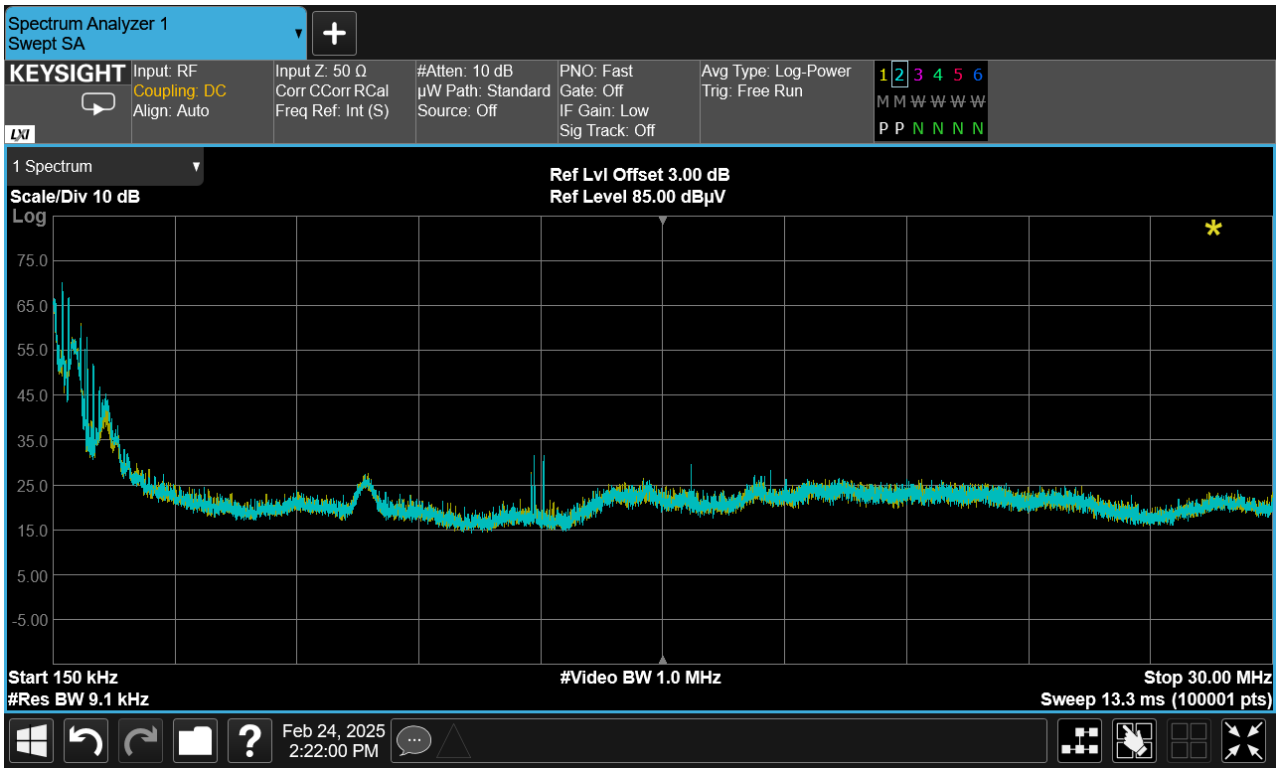
Trace 1 = EUT TX On

Trace 2 = Ambient Conditions

EUT emissions are **not** detected in this frequency range.

This plot represents all three EUT channels; Ambient

Figure 28: Radiated Emissions Investigation, 150kHz to 30MHz



Trace 1 = EUT TX On

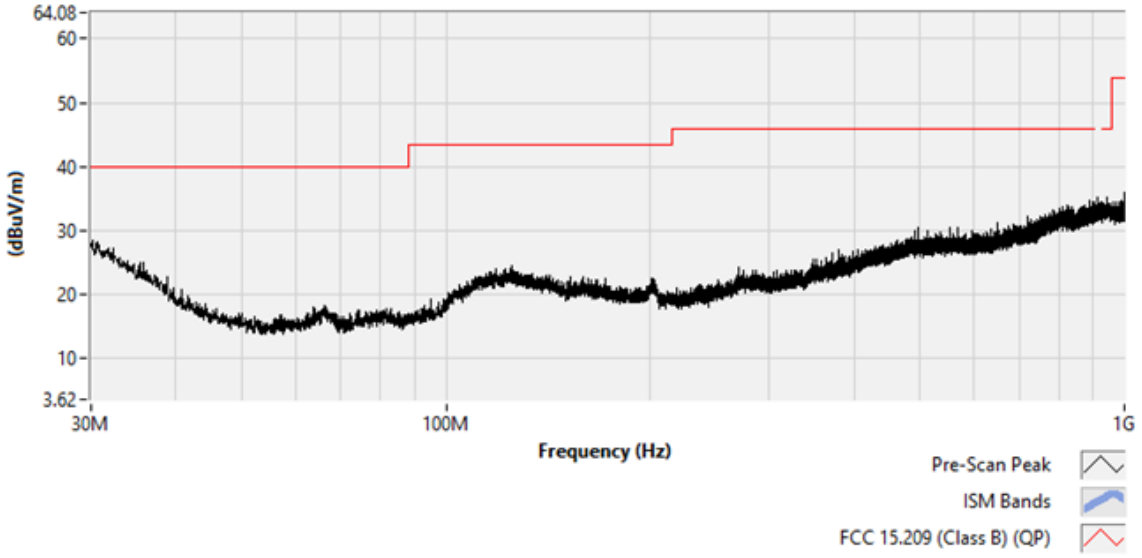
Trace 2 = Ambient Conditions

EUT emissions are **not** detected in this frequency range.

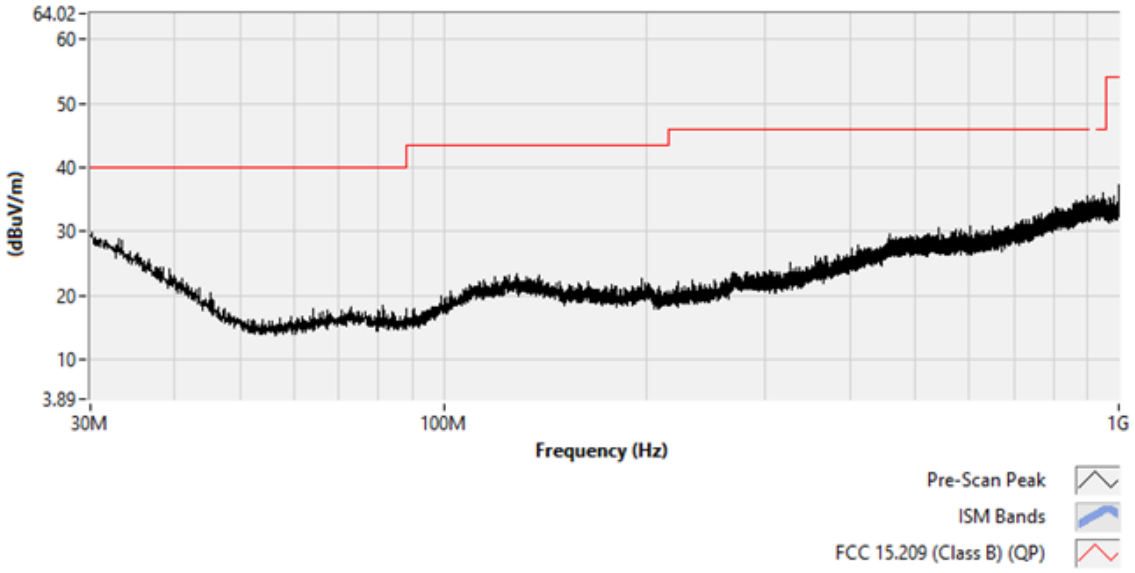
This plot represents all three EUT channels; Ambient

Table 9: Radiated Emissions Test Data, 30MHz to 1GHz

Pre-scan and Final Data (Vertical)



Pre-scan and Final Data (Horizontal)

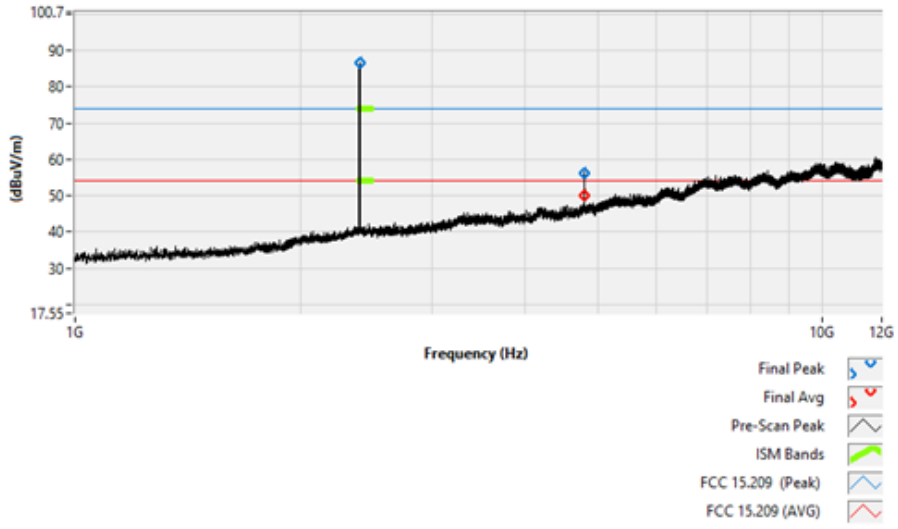


* Note: in the frequency of 30MHz to 1GHz, Peak meets QP (thousands of points)

Table 10: Radiated Emissions Test Data, Low Channel, 1GHz to 12GHz

Frequency (GHz)	Detector	Meas (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Turn Table (deg)	Antenna (cm)
2.390	Peak	43.367	74	-30.633	340	Horiz, 120
	Avg	29.053	54	-24.947	340	Horiz, 120
4.804	Peak	56.251	74	-17.749	35	Vert, 170
	Avg	50.096	54	-3.904	35	Vert, 170

Pre-scan and Final Data (Vertical)



Pre-scan and Final Data (Horizontal)

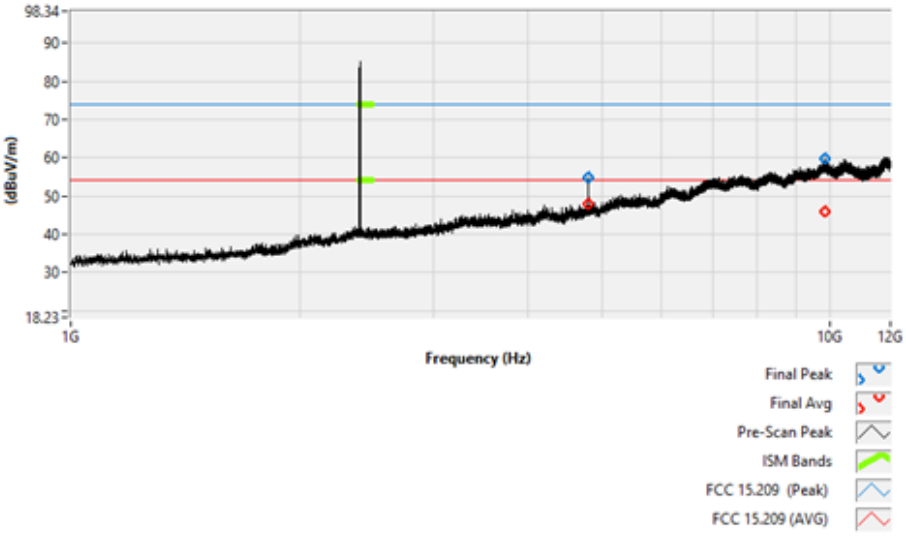
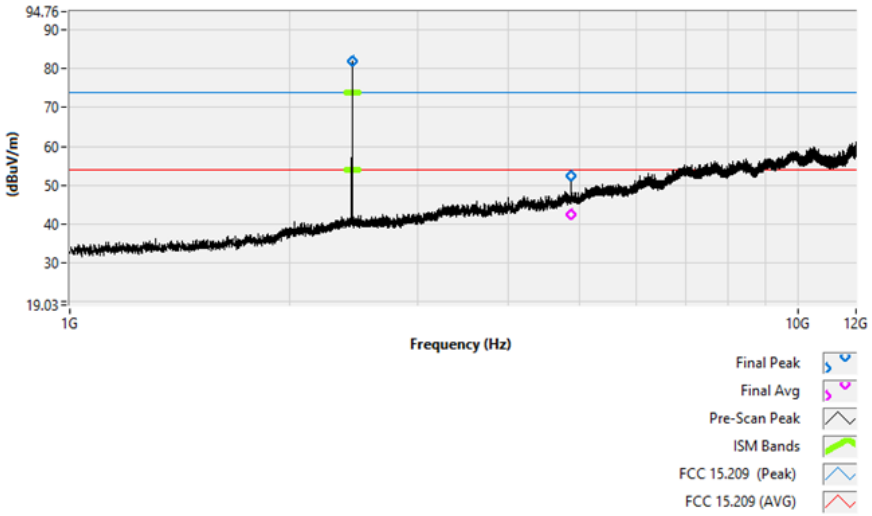


Table 11: Radiated Emissions Test Data, Center Channel, 1GHz to 12GHz

Frequency (GHz)	Detector	Meas (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Turn Table (deg)	Antenna (cm)
4.880	Peak	52.374	74	-21.626	340	Vert, 120
	Avg	42.487	54	-11.513	340	Vert, 120
9.753 Ambient	Peak	58.749	74	-15.251	35	Horiz, 160
	Avg	45.708	54	-8.292	35	Horiz, 160

Pre-scan and Final Data (Vertical)



Pre-scan and Final Data (Horizontal)

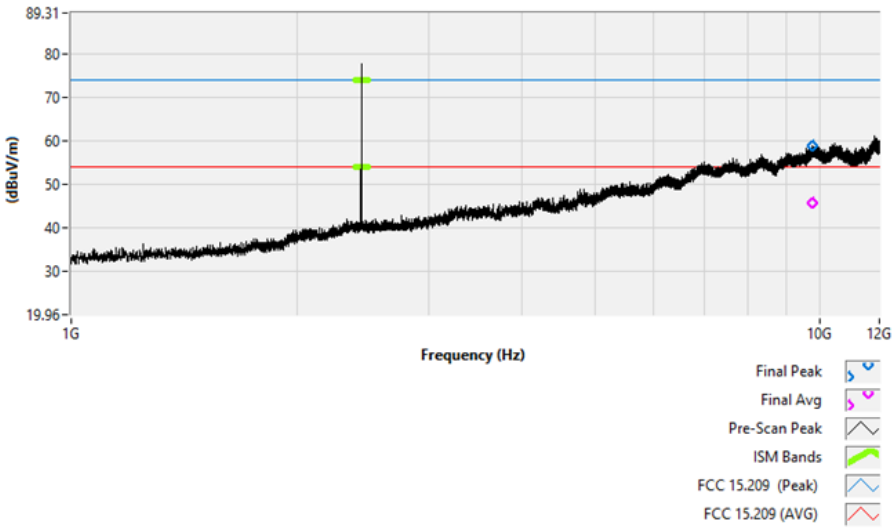
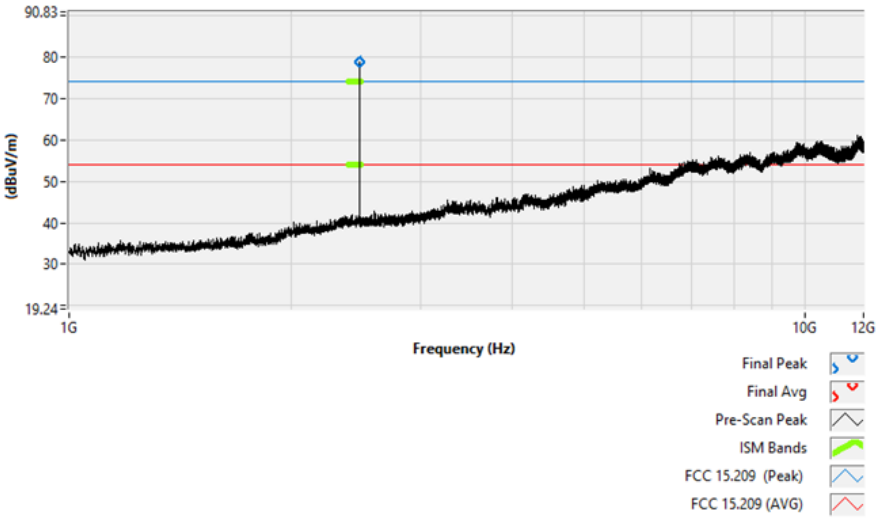


Table 12: Radiated Emissions Test Data, High Channel, 1GHz to 12GHz

Frequency (GHz)	Detector	Meas (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Turn Table (deg)	Antenna (cm)
2.4835	Peak	42.525	74	-31.475	35	Vert, 170
	Avg	29.448	54	-24.552	35	Vert, 170
11.649 Ambient	Peak	60.062	74	-13.938	46	Horiz, 150
	Avg	46.108	54	-7.892	46	Horiz, 150

Pre-scan and Final Data (Vertical)



Pre-scan and Final Data (Horizontal)

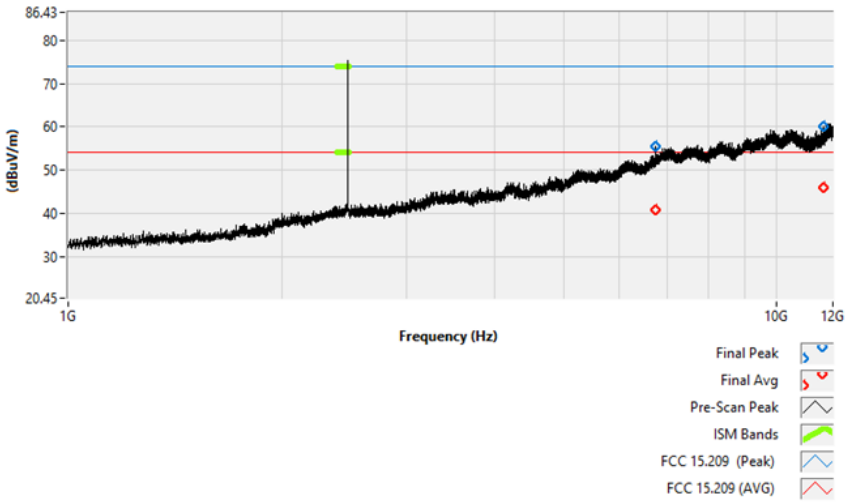
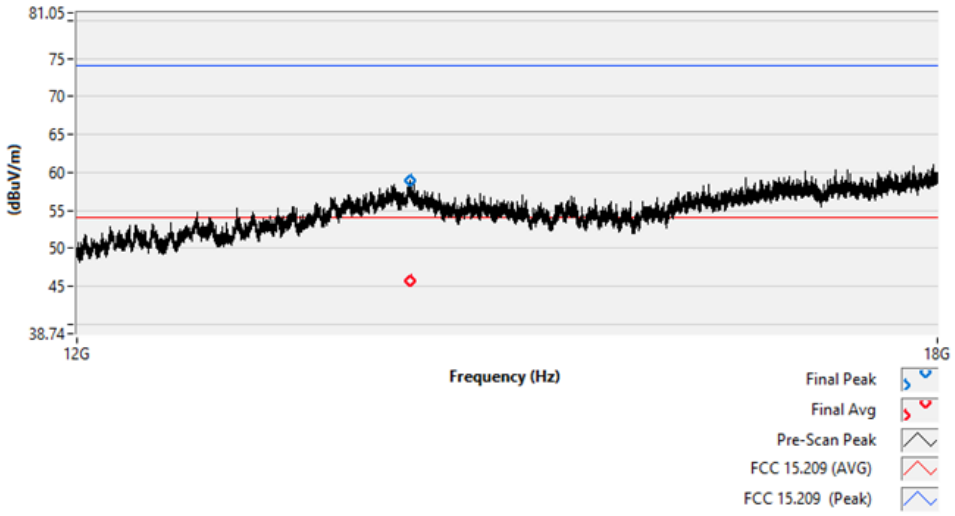


Table 13: Radiated Emissions Test Data, High Channel, 12GHz to 18GHz

Frequency (GHz)	Detector	Meas (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Turn Table (deg)	Antenna (cm)
14.039 Ambient	Peak	58.93	74	-15.07	35	Vert, 155
	Avg	45.791	54	-8.209	35	Vert, 155
17.313 Ambient	Peak	59.913	74	-14.087	340	Horiz, 155
	Avg	46.284	54	-7.716	340	Horiz, 155

Pre-scan and Final Data (Vertical)



Pre-scan and Final Data (Horizontal)

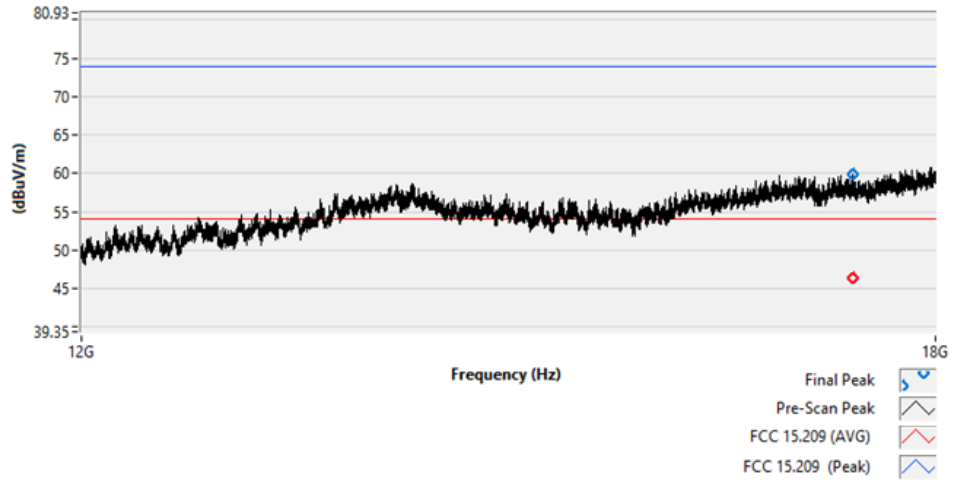
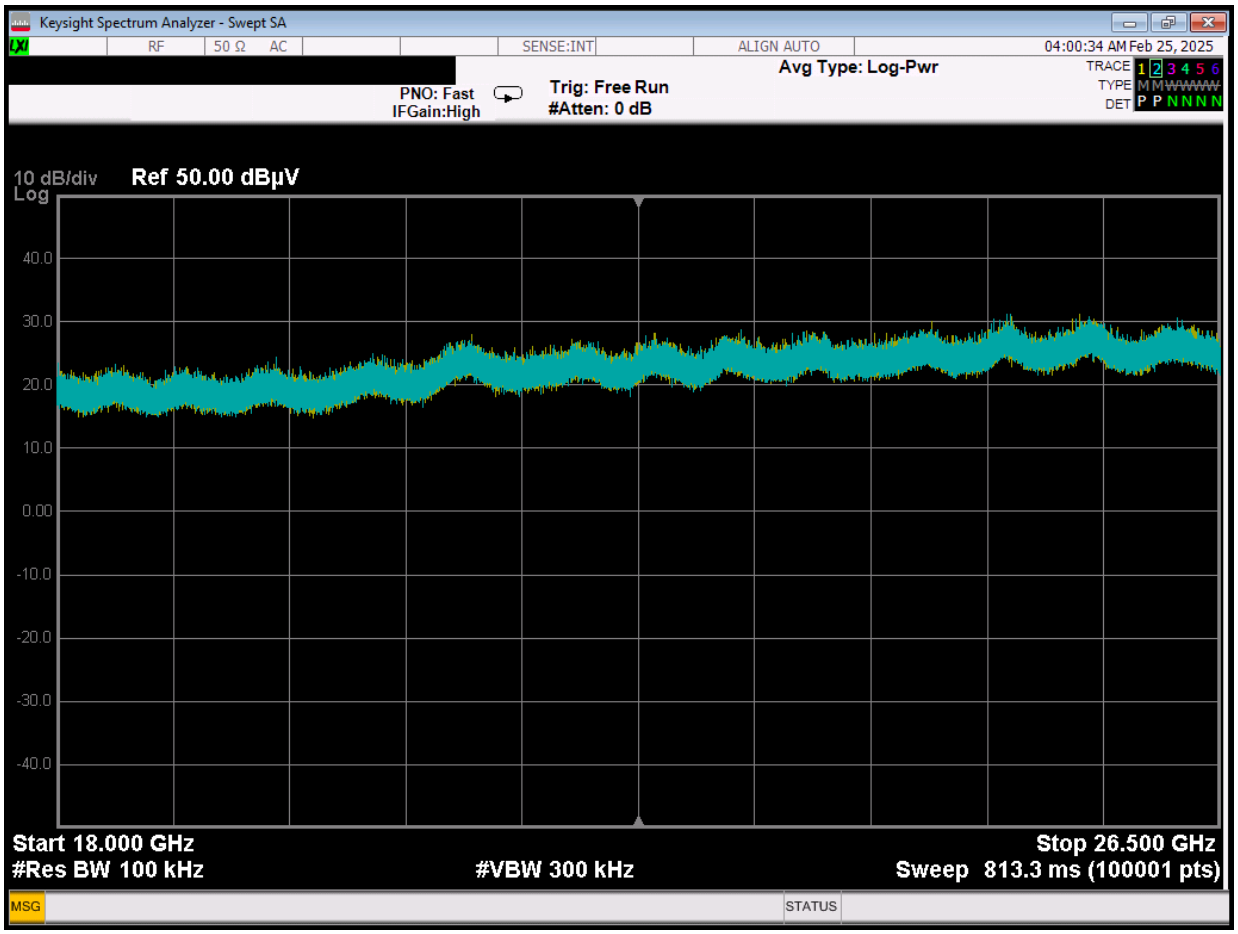


Figure 29: Radiated Emissions Investigation, 18GHz to 26.5GHz



Trace 1 = EUT TX On

Trace 2 = Ambient Conditions

EUT emissions are **not** detected in this frequency range.

<u>This plot represents all three EUT channels;</u> Ambient

4 Test Equipment

The table below provides a list of the test equipment used for measurements along with the calibration information.

Table 14: Test Equipment List

Test Name:	**Radiated Emissions**	Test Date(s): 2/21/2025 to 3/6/2025	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00823	AGILENT, EXA	SPECTRUM ANALYZER	6/21/2026
00993	KEYSIGHT, N9020B	SPECTRUM ANALYZER	11/6/2025
00031	EMCO, 6502	ACTIVE LOOP ANTENNA	6/17/2027
00644	SUNOL SCIENCES CORP.	ANTENNA, LOGPERIOD	12/2/2026
00004	ARA, DRG-118/A	ANTENNA, HORN	6/7/2027
00066	AGILENT	RF PRE-AMPLIFIER	8/21/2025
00065	ELECTRO-METRICS	RF PRE-AMPLIFIER	8/23/2025
00806	MINI-CIRCUITS, 3061	HF COAX CABLE, SMA	12/18/2025
00825	CABLE ASSOCIATES	SMA, COAXIAL CABLE	6/14/2025
00847	ASTROLABS, K48TG	SMA, COAXIAL CABLE	6/20/2025
00731	NARDA 4779-3	2W, 3DB ATTENUATOR	6/20/2025
00849	CABLE ASSOCIATES	400CM COAXIAL CABLE	1/15/2026

Test Name:	**Conducted RF Emissions**	Test Date(s): 2/18/2025 to 2/19/2025	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00993	KEYSIGHT N9020B	MXA SIGNAL ANALYZER	11/6/2025
00992	KEYSIGHT N5173B	EXG SIGNAL GENERATOR	1/8/2028
00823	AGILENT, EXA	SPECTRUM ANALYZER	6/21/2026
00885	UTIFLEX UFA2108	HF COXIAL CABLE	Cal. Before Use
N/A	WEINSCHEL, 3.5MM	20dB ATTENUATOR	Cal. Before Use
N/A	WEINSCHEL, 3.5MM	3dB ATTENUATOR	Cal. Before Use

5 Measurements

5.1.1 References

ANSI C63.2 (Jan-2016) Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 (Jan-2014) American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C63.10 (Sep-2020) American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

5.2 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 (R2002) with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1. to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{div_a{}^2} + \frac{b^2}{div_b{}^2} + \frac{c^2}{div_c{}^2} + ...}$$

where,

uc	= standard uncertainty
a, b, c,..	= individual uncertainty elements
Diva, b, c	= the individual uncertainty element divisor based on the probability distribution
Divisor	= 1.732 for rectangular distribution
Divisor	= 2 for normal distribution
Divisor	= 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = ku_c$$

where,

U = expanded uncertainty
k = coverage factor
k ≤ 2 for 95% coverage (ANSI/NCSL Z540-2 Annex G)
uc = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in the table below.

Table 15: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Conducted Emissions	CISPR11, CISPR22, CISPR32, CISPR14, FCC Part 15	± 2.63 dB
Radiated Emissions	CISPR11, CISPR22, CISPR32, CISPR14, FCC Part 15	± 4.55 dB

5.3 Environmental Conditions

Environmental Conditions During All Measurements

Ambient Temperature:	17.2 °C
Relative Humidity:	49 %