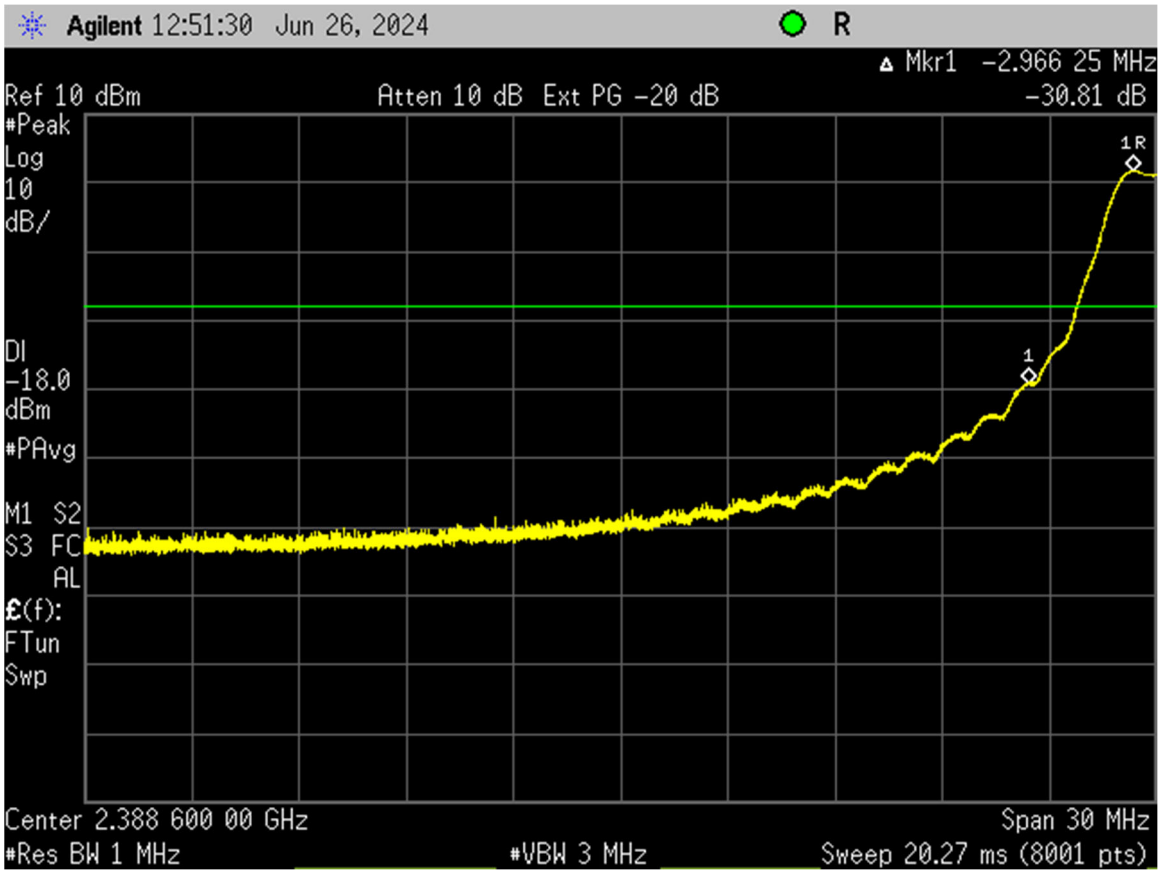


Figure 17. Band Edge Compliance – Sensor Low Channel Delta – Peak

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

Measured Result	-30.81	dB
Band Edge Limit	-20.00	dB
Band Edge Margin	10.81	dB

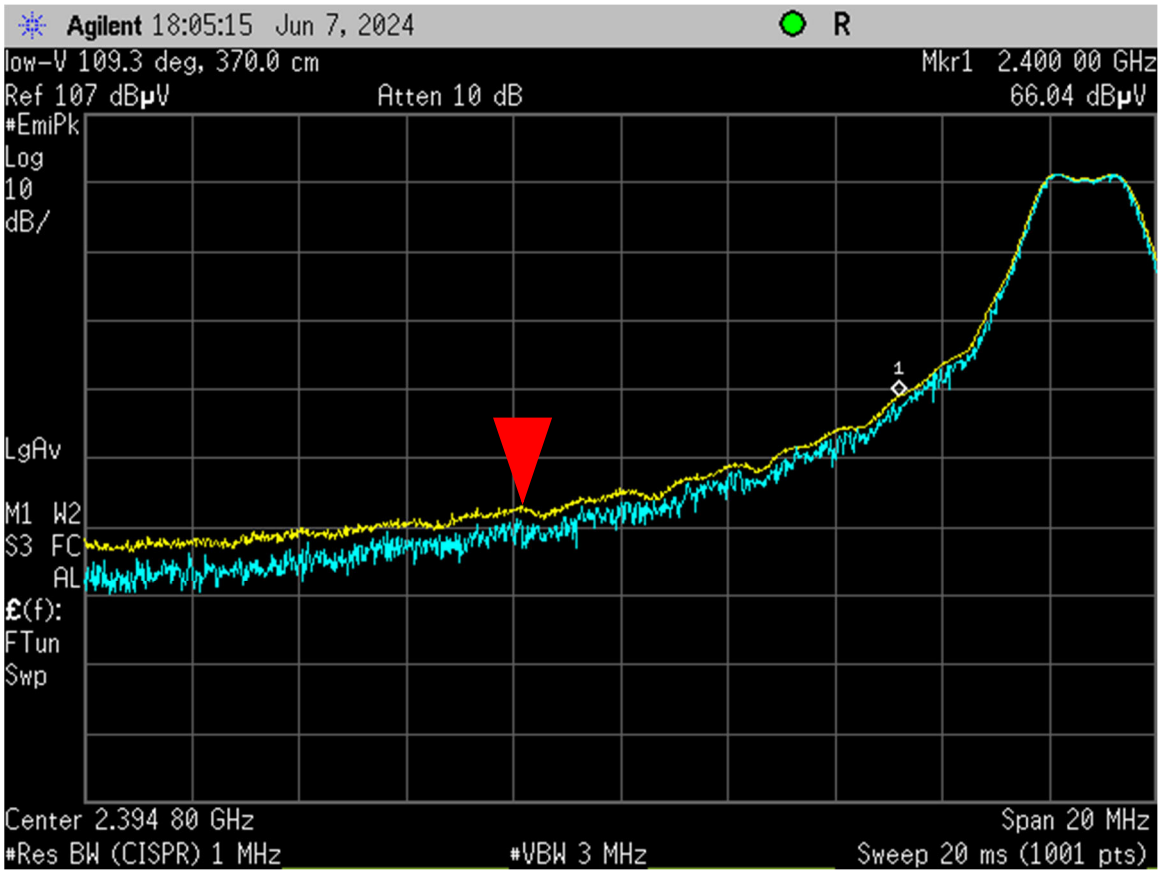


Figure 18. Sensor Low Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	Duty-Cycle Correction	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2390	48.23	0.00	-5.55	42.68	74.0	3.0m./Vert	31.32	**PK**
2390	48.27	-1.41	-5.55	41.27	54.0	3.0m./Vert	12.73	**PK**

Duty Cycle is 85% : 20*Log(0.85) = -1.41

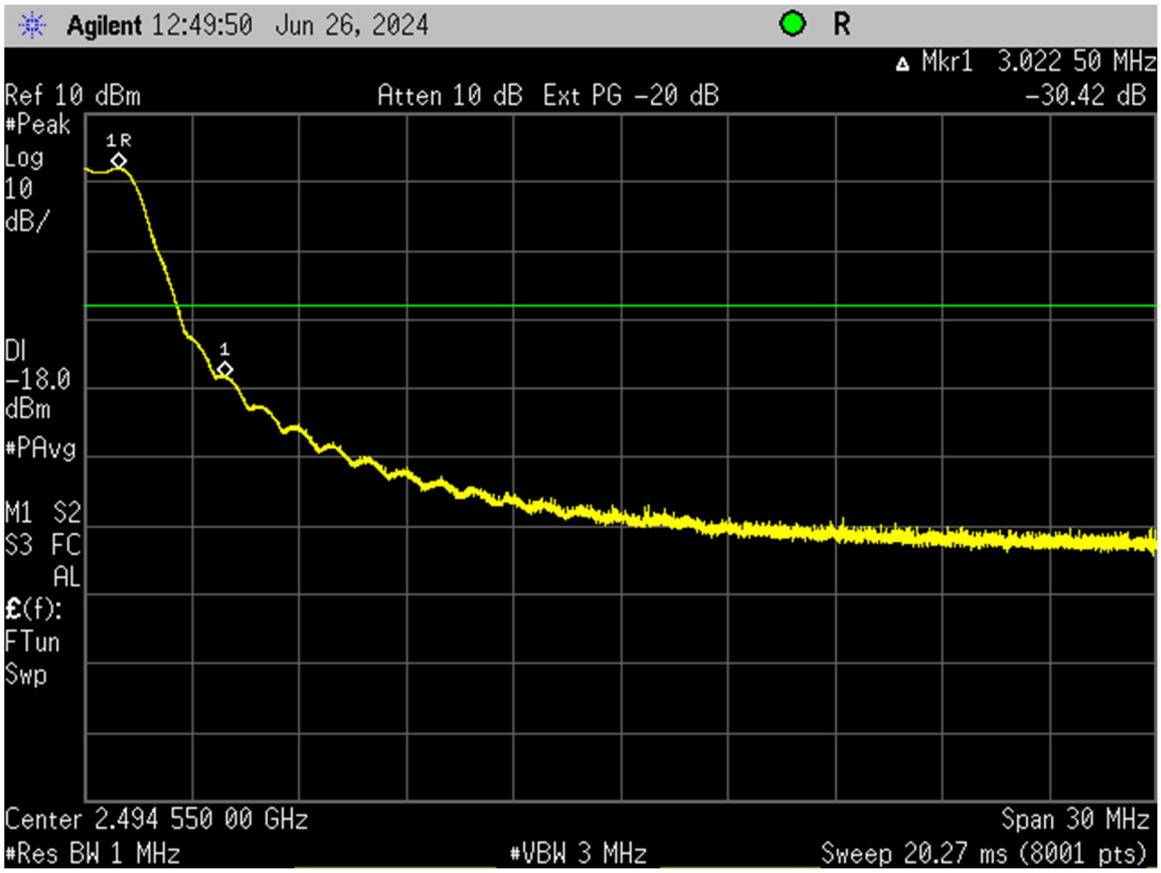


Figure 19. Band Edge Compliance – Sensor High Channel Delta – Peak

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

Measured Result	-30.42	dB
Band Edge Limit	-20.00	dB
Band Edge Margin	10.42	dB

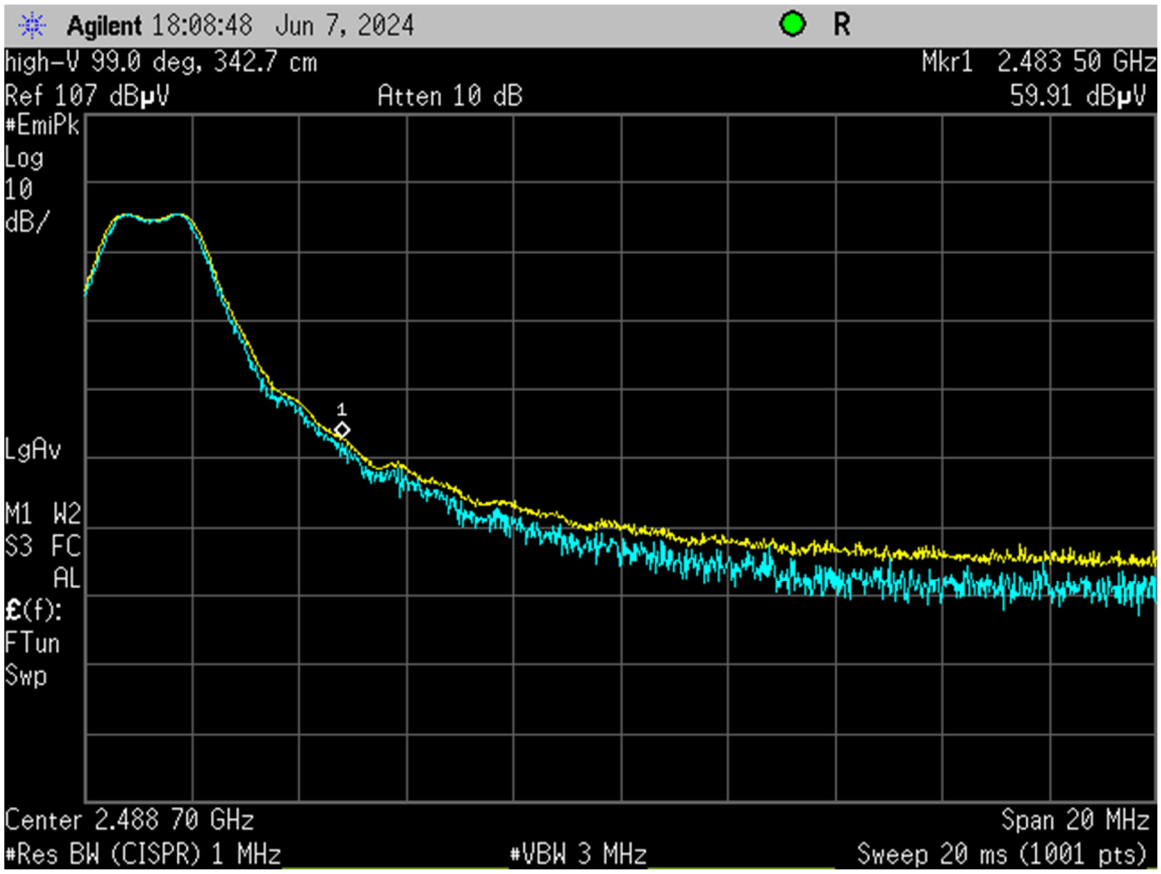


Figure 20. Sensor High Channel Restricted Band – Peak

Frequency (MHz)	Test Data (dBuV)	Duty-Cycle Correction	AF+CA-AMP+DC (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector PK/QP/AVG
2483.5	59.91	0.00	-5.55	54.34	74.0	3.0m./HORZ	19.66	**PK**
2483.5	59.91	-1.41	-5.55	52.93	54.0	3.0m./HORZ	1.07	**PK**

Duty Cycle is 85% : 20*Log(0.85) = -1.41

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 and figures below.

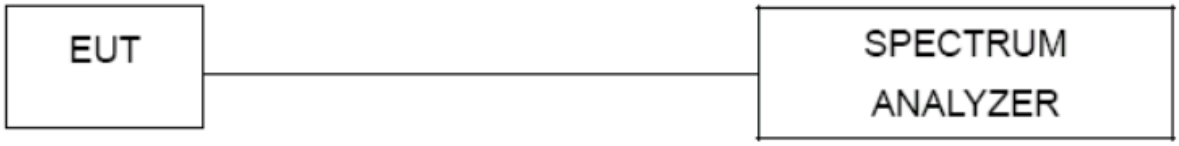


Figure 21. Bench Test Setup

Table 7. Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
2403.5	1.550	0.5
2443.5	1.560	0.5
2480	1.568	0.5

Test Date: June 6, 2024

Tested by
Signature: Ian Charboneau Name: Ian Charboneau

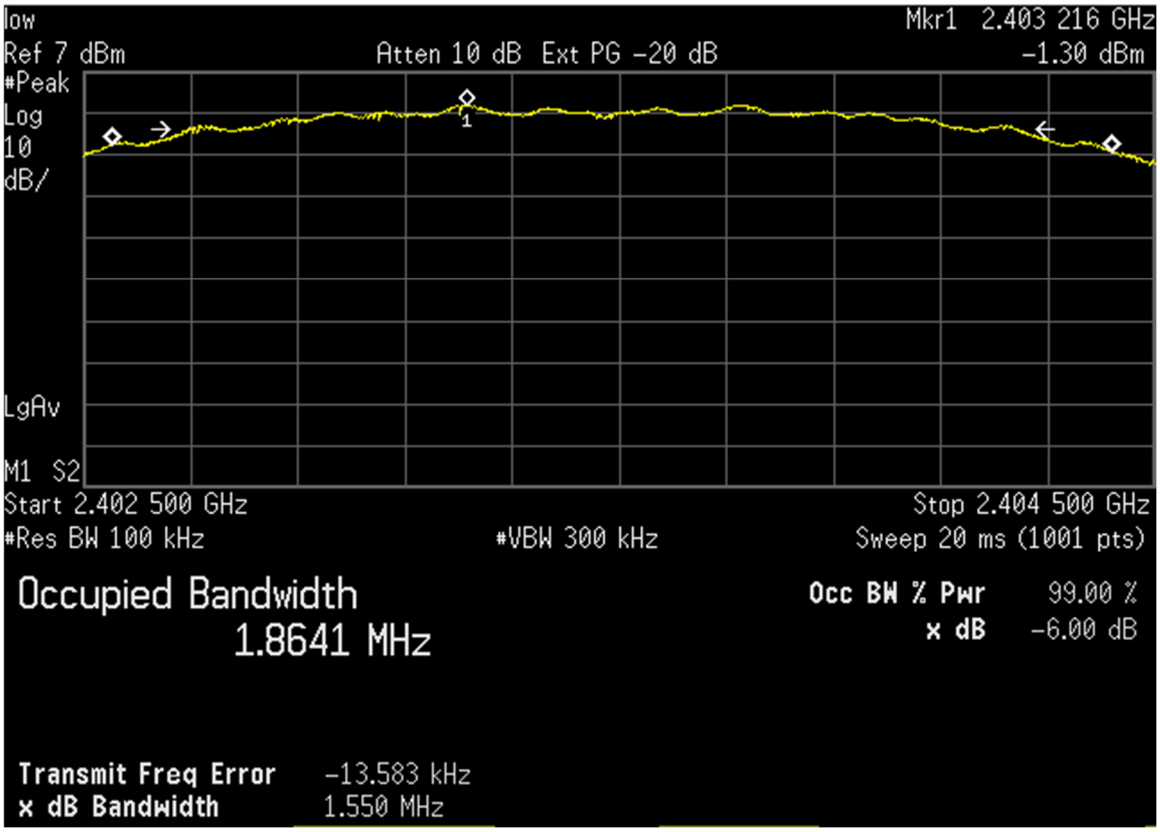


Figure 22. 6 dB Bandwidth Sensor Low Channel

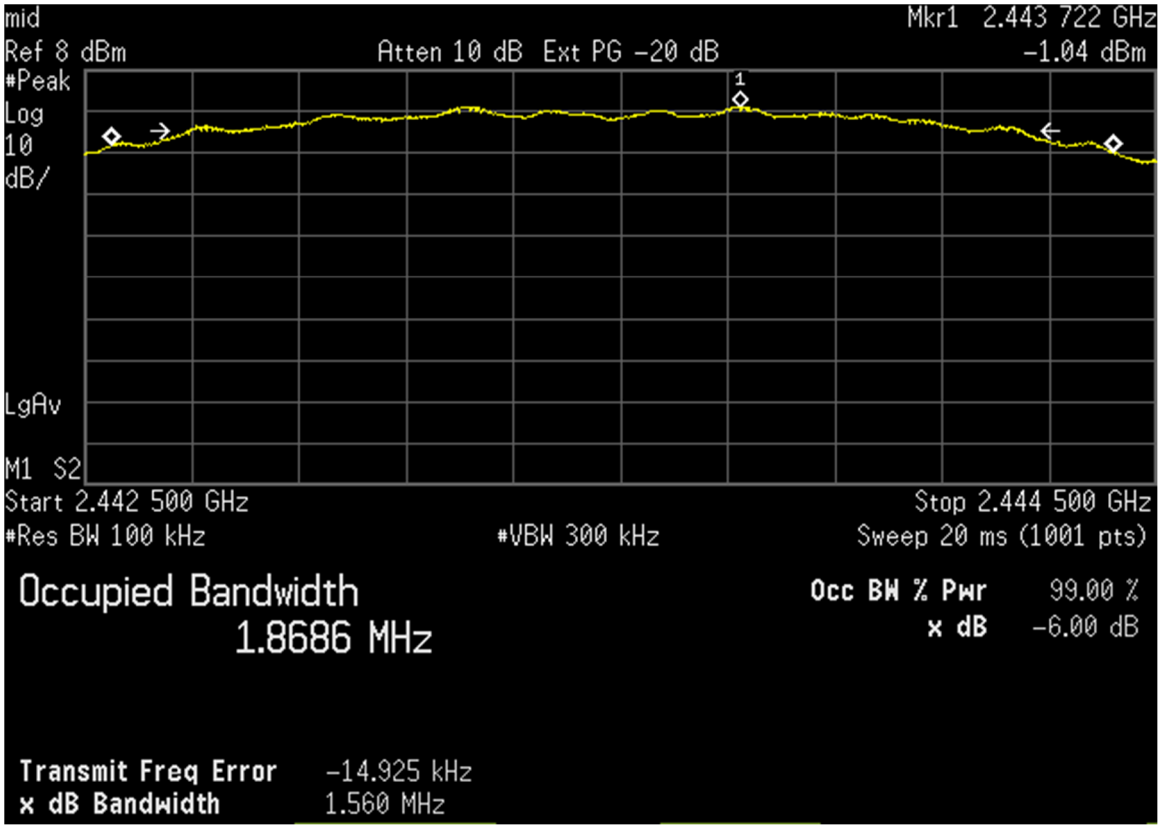


Figure 23. 6 dB Bandwidth Sensor Mid Channel

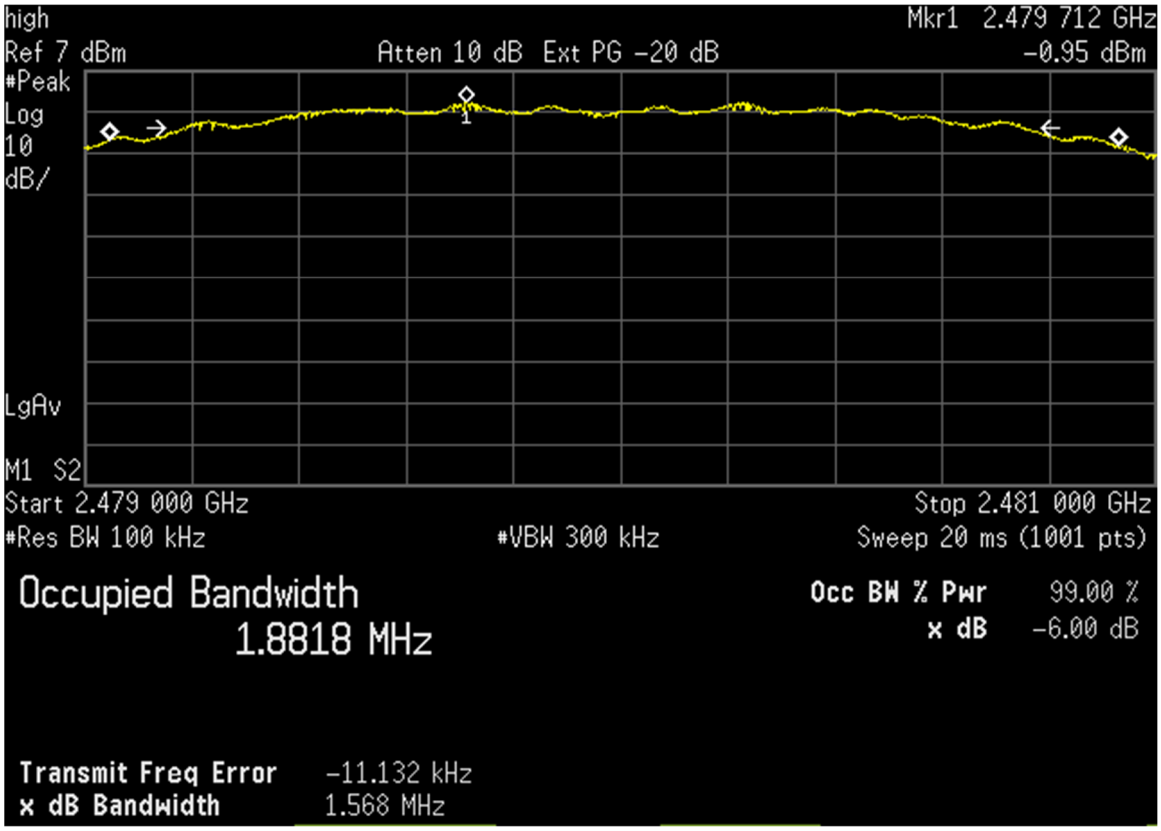


Figure 24. 6 dB Bandwidth Sensor High Channel

2.13 Occupied Bandwidth, (99% Bandwidth) (RSS-GEN (6.6))

The EUT antenna port was connected to a spectrum analyzer having a 50Ω input impedance. Measurements were performed similar to the method of FCC, KDB Publication No. 558074 v03r05 for a bandwidth of 20 dB. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW ≥ RBW. The results of this test are given in Table 17 and presented in the figures in section 2.12 above.

Figure 25. Bench Test Setup

Table 8. 99% Occupied Bandwidth

Frequency (MHz)	99% Occupied Bandwidth (MHz)
2403.5	2.279
2443.5	2.299
2480.0	2.332

Test Date: June 6, 2024

Tested by
Signature: Ian Charboneau Name: Ian Charboneau

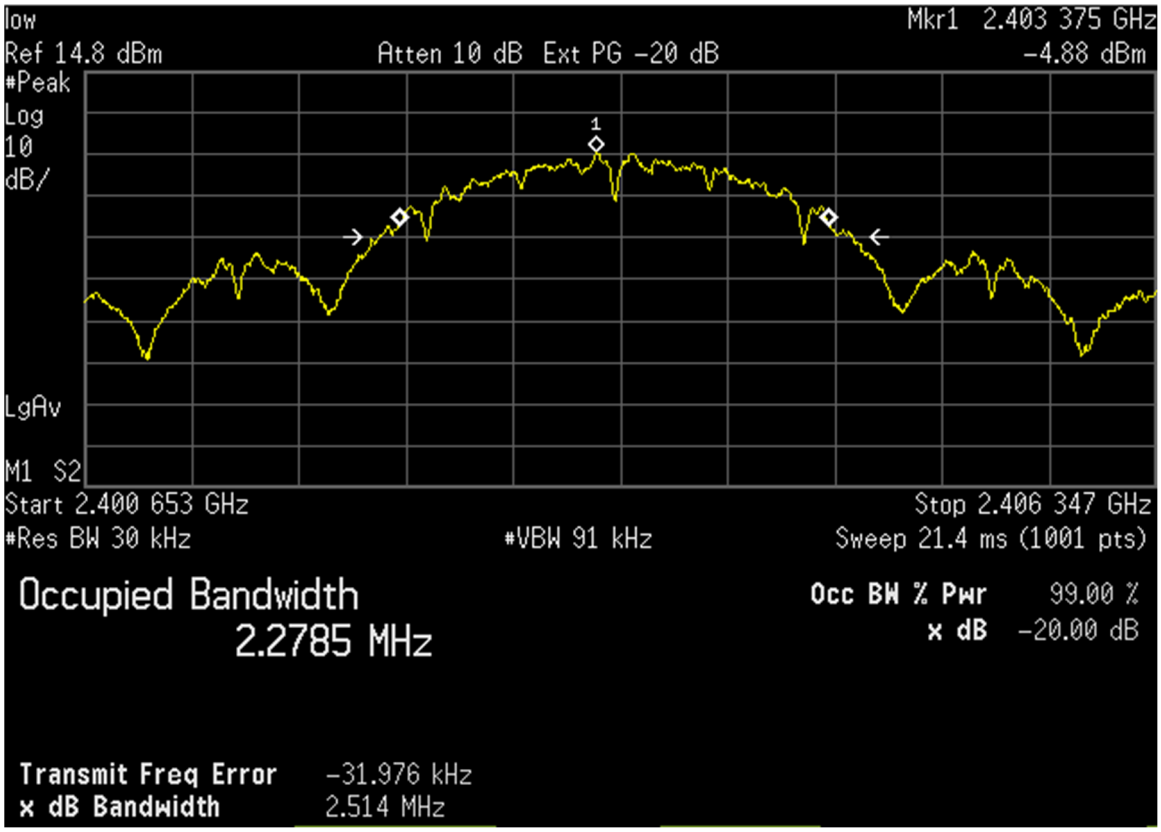


Figure 26. 99% Occupied Bandwidth Sensor Low Channel

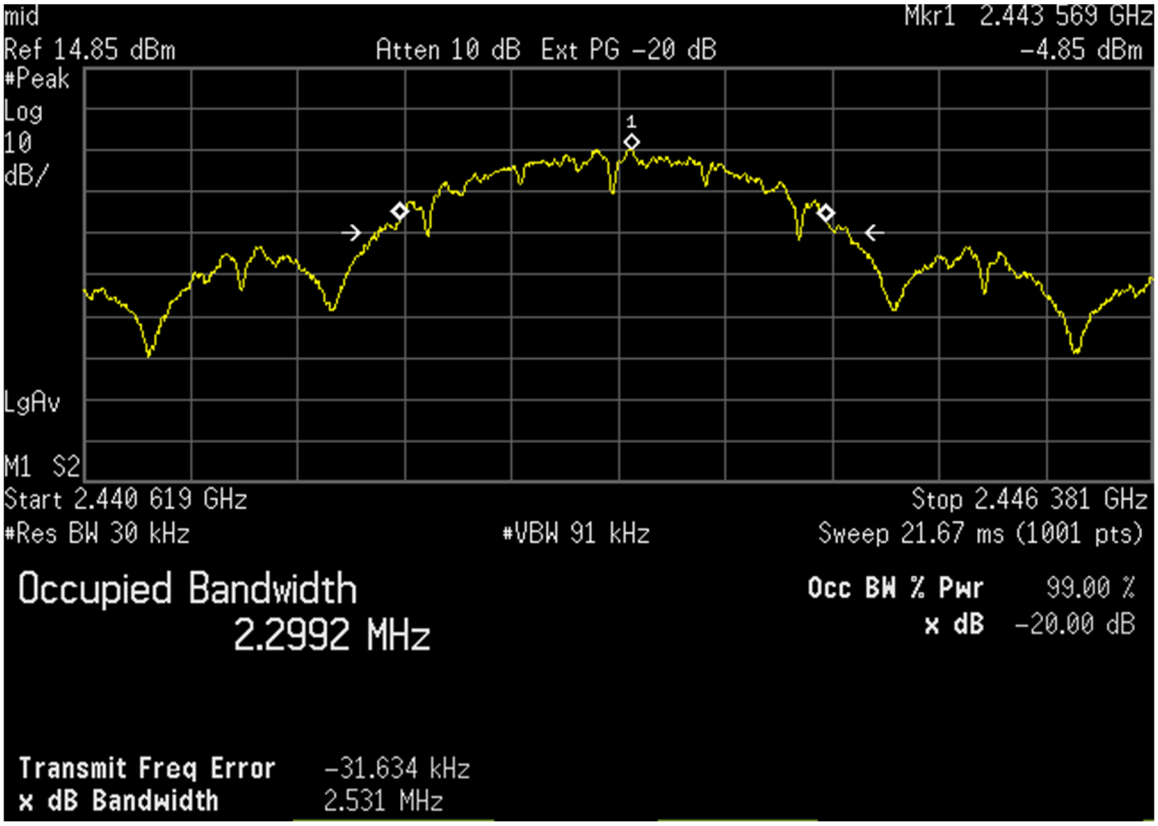


Figure 27. 99% Occupied Bandwidth Sensor Mid Channel

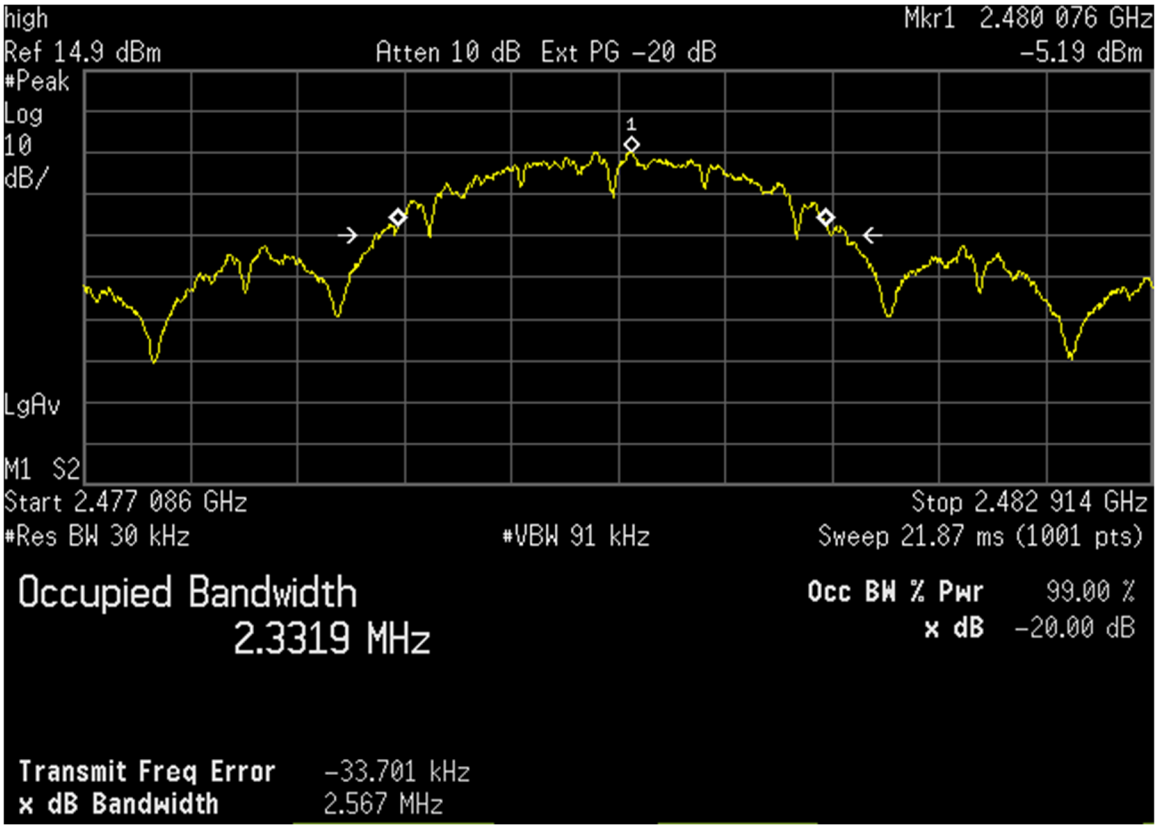


Figure 28. 99% Occupied Bandwidth Sensor High Channel

2.14 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, with 11Mbps for mode b, 54 Mbps for made g, and MSC-7 for mode n, in order to meet all test requirements.

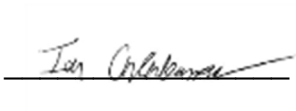
Peak power within the band 2400 MHz to 2483.5 MHz was measured per ANSI C63.10-2013 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, and attenuators to the antenna output terminals on the EUT. The spectrum analyzer was set to a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

Figure 29. Bench Test Setup

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)
2403.5	1.60	1.45	1000
2443.5	1.85	1.53	1000
2480	1.99	1.58	1000

Test Date: June 6, 2024

Tested by
Signature:  Name: Ian Charboneau

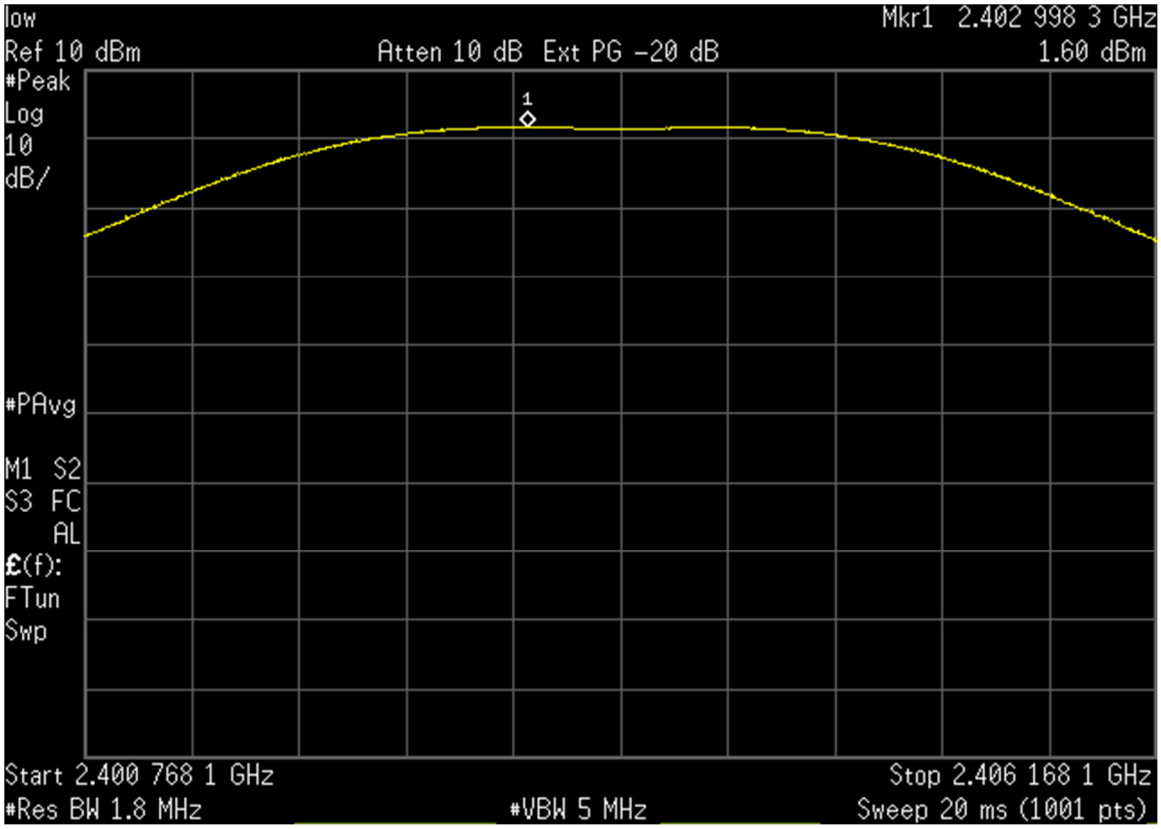


Figure 30. Peak Antenna Conducted Output Power, Sensor Low Channel

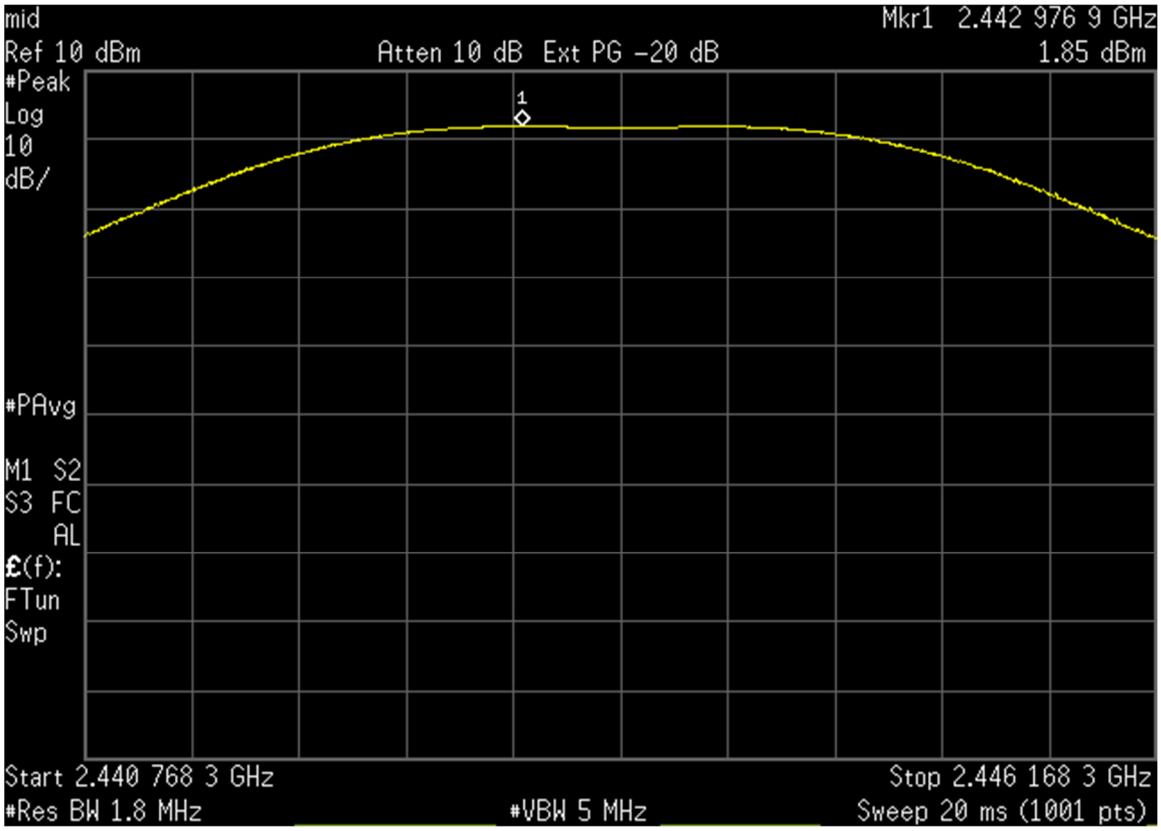


Figure 31. Peak Antenna Conducted Output Power, Sensor Mid Channel

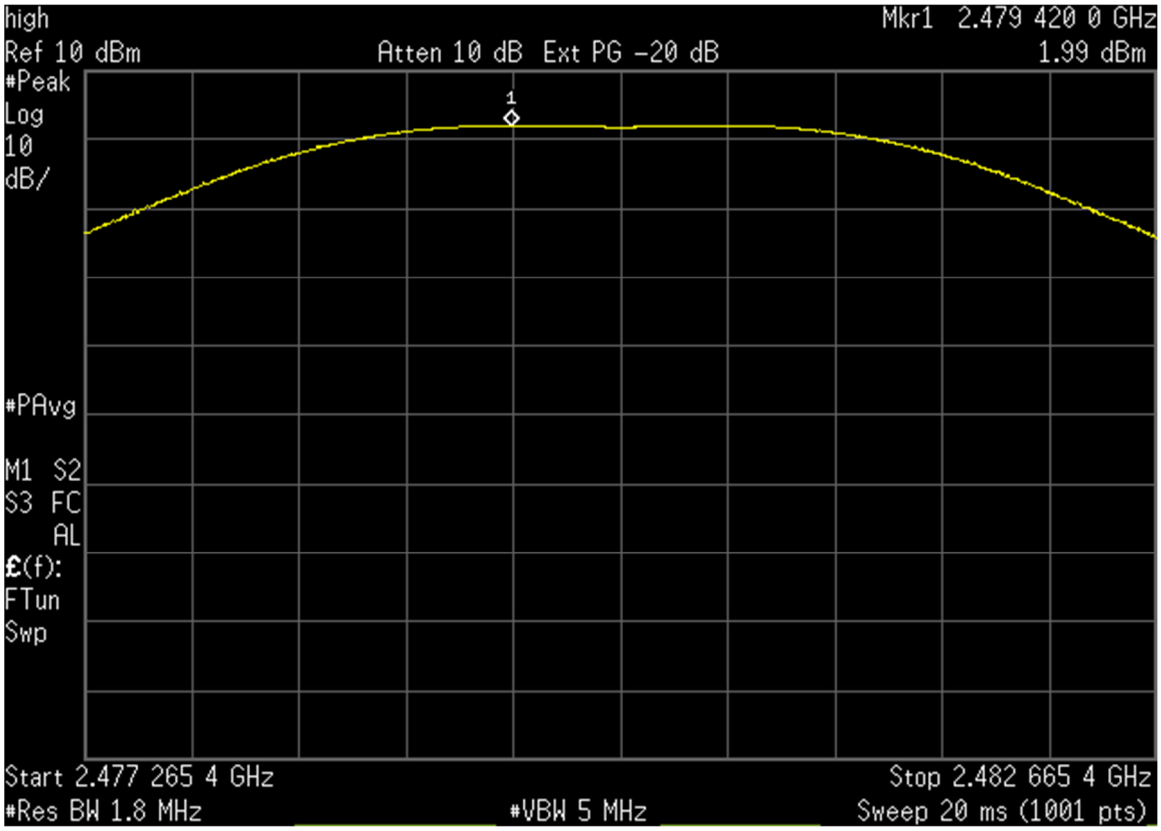


Figure 32. Peak Antenna Conducted Output Power, Sensor High Channel

2.15 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.

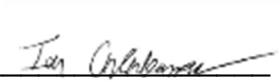
Results are shown in the table and figures below. All are less than +8 dBm per 3 kHz band.

Figure 33. Bench Test Setup

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

Frequency (MHz)	Measured Result (dBm/3kHz)	FCC Limit (dBm/3 kHz)
2403.5	-4.65	+8.0
2443.5	-4.81	+8.0
2480.0	-4.91	+8.0

Test Date: June 6, 2024

Tested by
Signature:  Name: Ian Charboneau

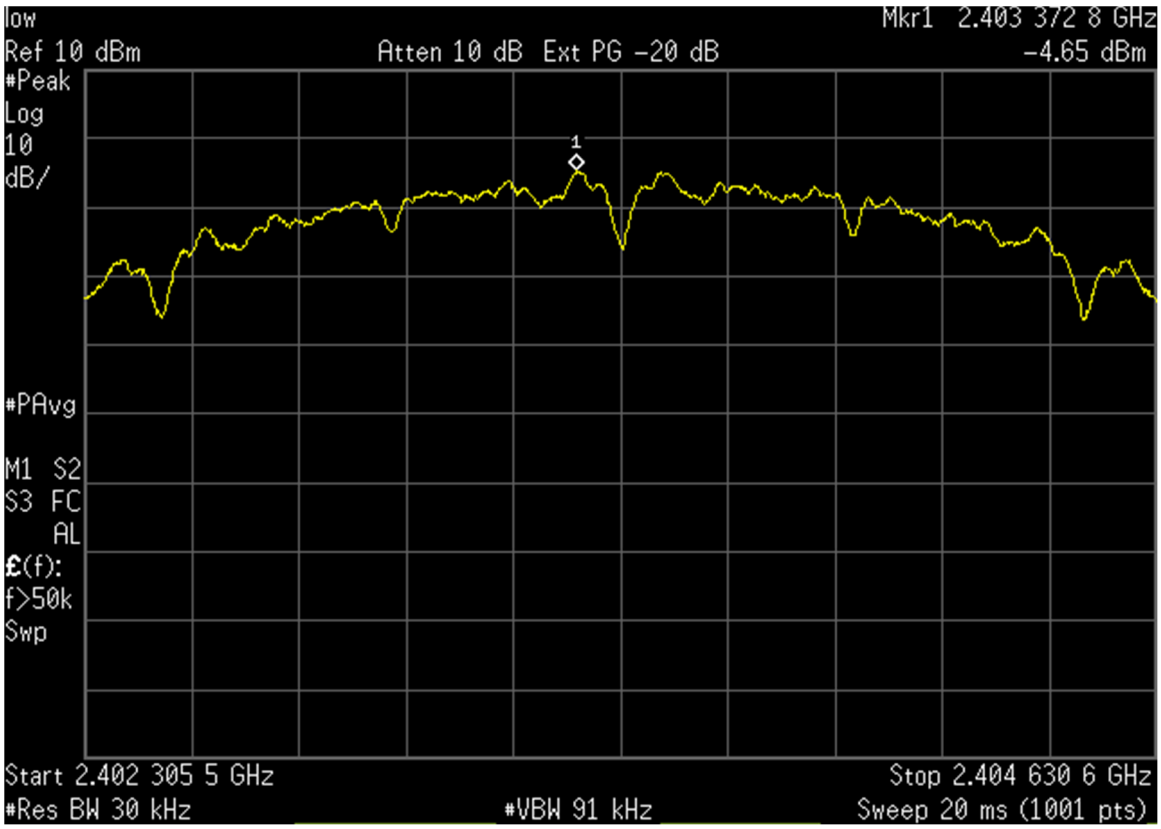


Figure 34. Power Spectral Density, Sensor Low Channel

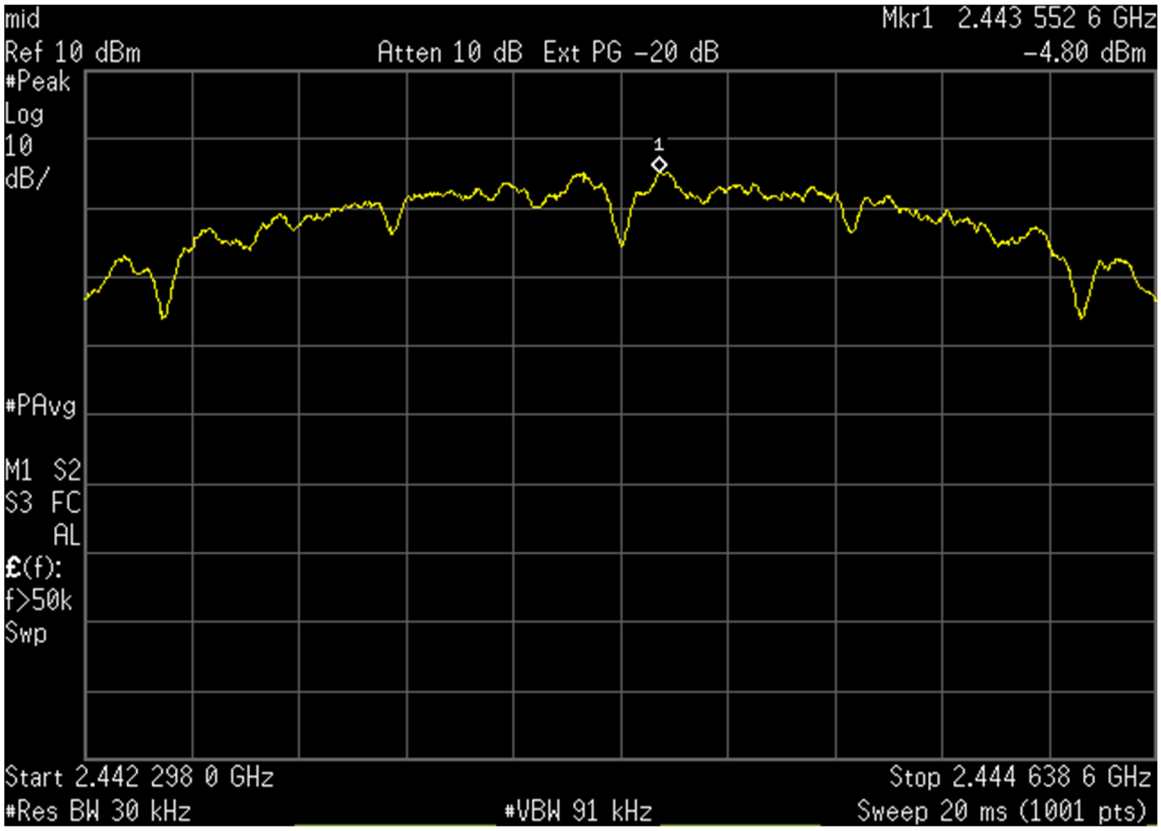


Figure 35. Power Spectral Density, Sensor Mid Channel

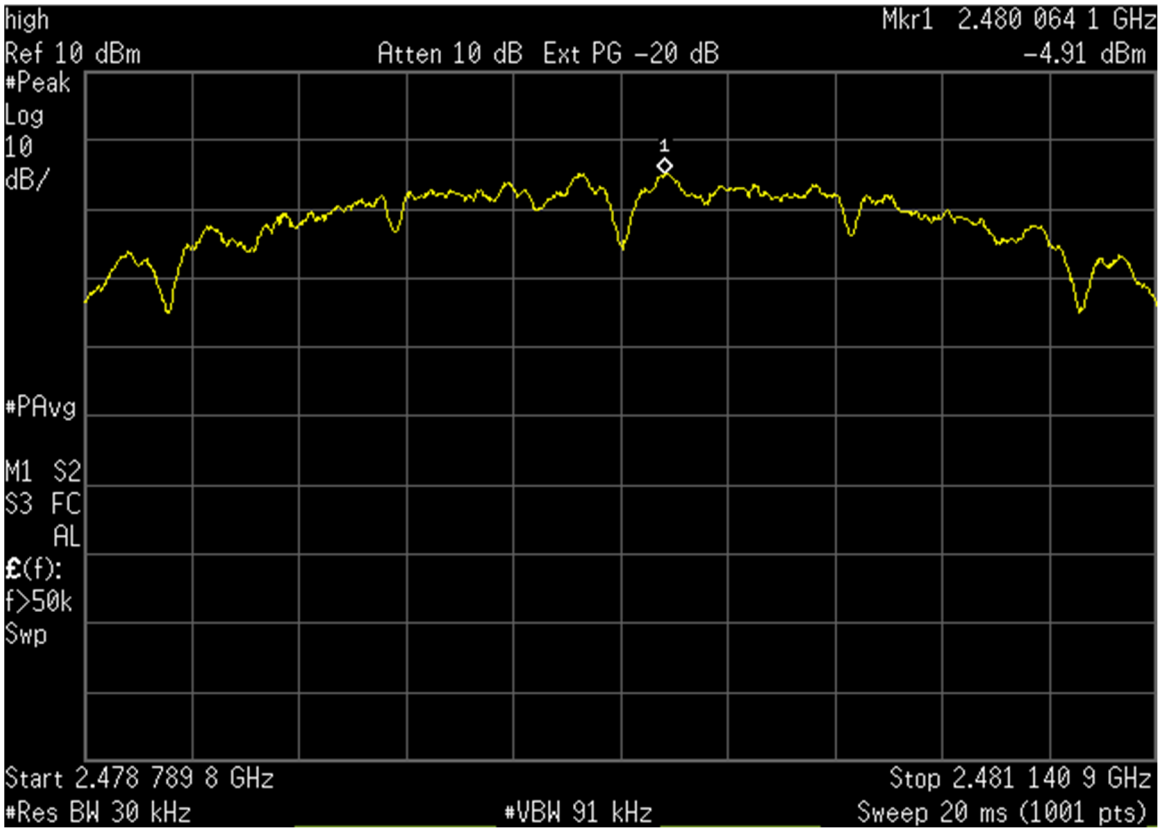


Figure 36. Power Spectral Density, Sensor High Channel

2.16 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.

This device does not connect to AC powerlines. This test is not applicable

Test Date: June 11, 2024
Tested by
Signature:  Name: Ian Charboneau

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

The test data provided herein is to support the verification requirement for radiated emissions coming 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**
21.5*	40.92	9.23	50.15	70*	3m/x	19.85	**PK**
21.5*	37.10	9.23	46.33	50	3m/x	3.67	**QP**
All other emissions were more than 20 dB below the applicable limit.							

Note(*):Emission is not in restricted Band, sufficiently attenuated below Fundamental
AF = antenna factor.
CL = cable loss.
PA = preamplifier gain.

Sample Calculation At: 21.50 MHz

Magnitude of Measured Frequency	40.92	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-9.23	dB
Corrected Result	50.15	dBuV/m

Test Date: June 6, 2024

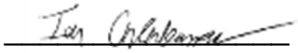
Tested by
Signature:  Name: Ian Charboneau

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

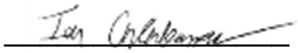
Test: FCC Part 15.209							
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP/AVG**
62.65	47.83	-15.24	32.59	40.0	3m./HORZ	7.4	**PK**
92.75	50.01	-15.10	34.91	43.5	3m./HORZ	8.6	**PK**
144.25	43.99	-11.87	32.12	43.5	3m./HORZ	11.4	**PK**
191.60	44.93	-9.75	35.17	43.5	3m./HORZ	8.3	**PK**
31.9	46.20	-11.27	34.93	40.0	3m./VERT	5.1	**PK**
35.15	48.15	-11.91	36.25	40.0	3m./VERT	3.8	**PK**
38.15	48.62	-12.21	36.42	40.0	3m./VERT	3.6	**PK**
59.5	52.47	-15.85	36.61	40.0	3m./VERT	3.4	**PK**
62.65	52.31	-15.84	36.47	40.0	3m./VERT	3.5	**QK**
90.15	48.64	-14.47	34.17	43.5	3m./VERT	9.3	**PK**
120.35	51.07	-12.58	38.49	43.5	3m./VERT	5.0	**PK**
184.9	48.05	-9.69	38.36	43.5	3m./VERT	5.1	**PK**
486.43	38.09	-6.63	31.46	46.0	3m./VERT	14.5	**PK**
590.22	37.06	-5.08	31.97	46.0	3m./VERT	14.0	**PK**
746.36	39.69	-2.64	37.05	46.0	3m./VERT	8.9	**PK**
878.01	34.48	-1.35	33.13	46.0	3m./VERT	12.9	**PK**

AF is antenna factor. CL is cable loss. PA is preamplifier gain.

Sample Calculation At: 62.65MHz

Magnitude of Measured Frequency	47.83	dBuV
Additional Factor	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain	-15.24	dB
Corrected Result	32.59	dBuV/m

Test Date: June 6, 2024

Tested by
Signature:  Name: Ian Charboneau

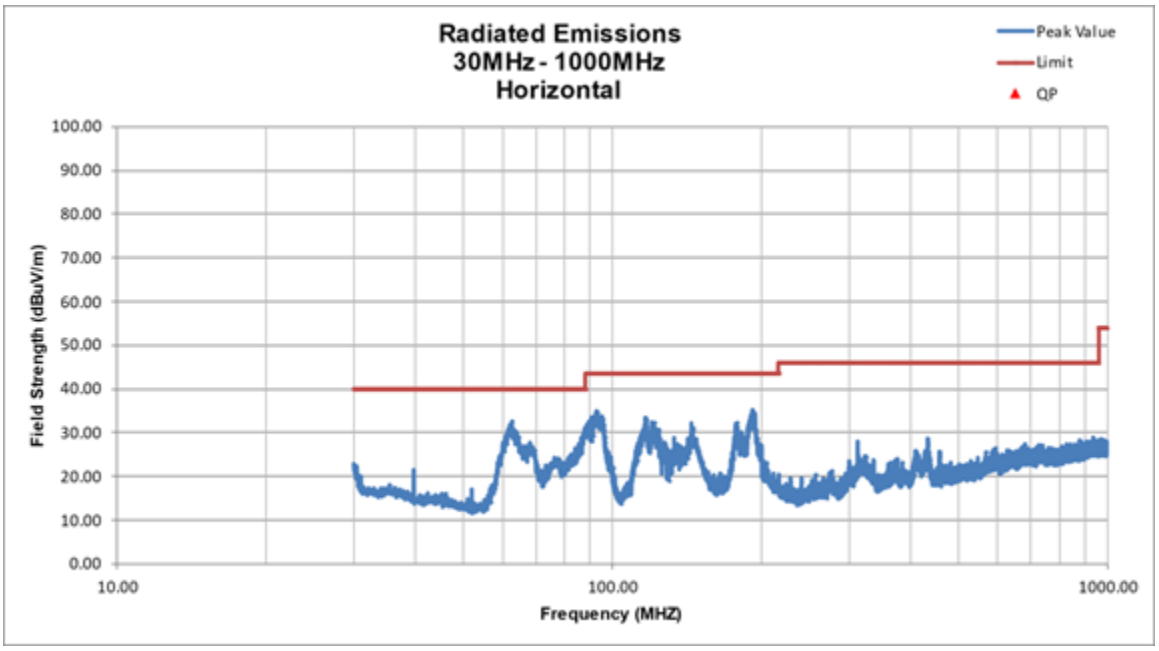


Figure 37. Radiated Emission, 30 MHz - 1000 MHz – Horizontal

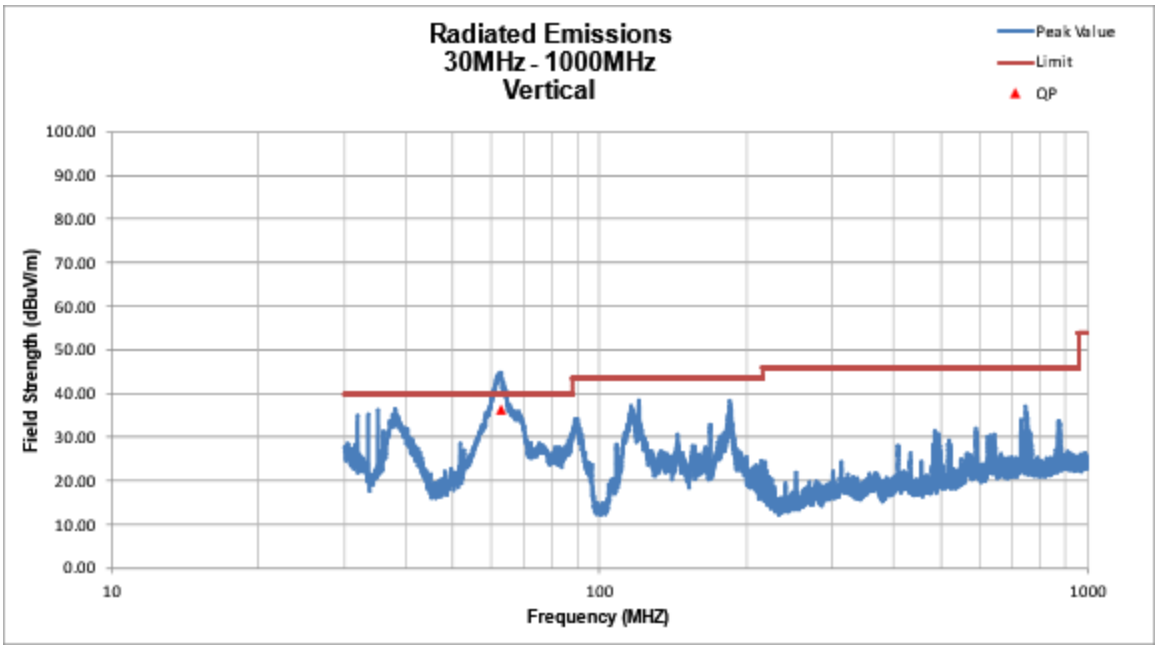


Figure 38. Radiated Emissions, 30 MHz - 1000 MHz - Vertical

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: June 6, 2024

Tested by
Signature:  Name: Ian Charboneau

2.18 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%.

2.18.1 Conducted Emissions Measurement Uncertainty

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

2.18.2 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 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.