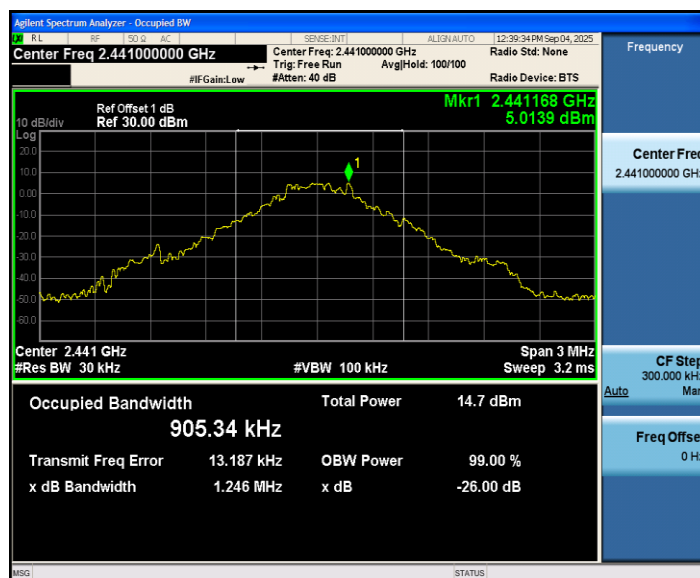


Test Graphs Of Occupied Channel Bandwidth

DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



2DH5_Ant1_2402



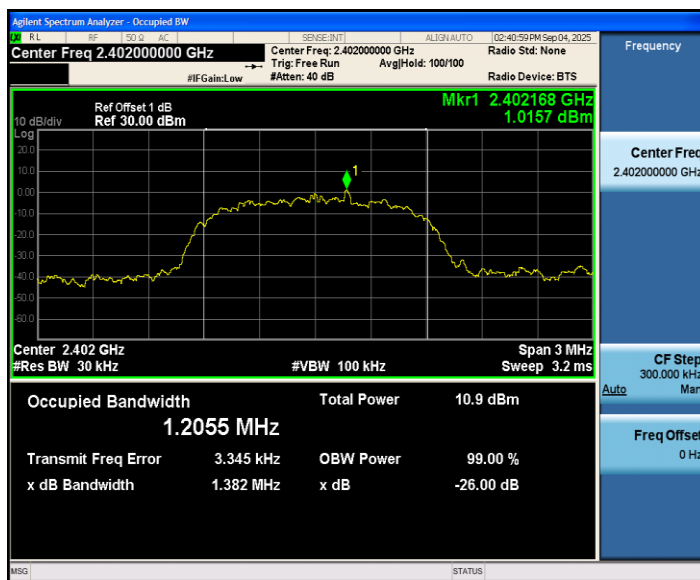
2DH5_Ant1_2441



2DH5_Ant1_2480



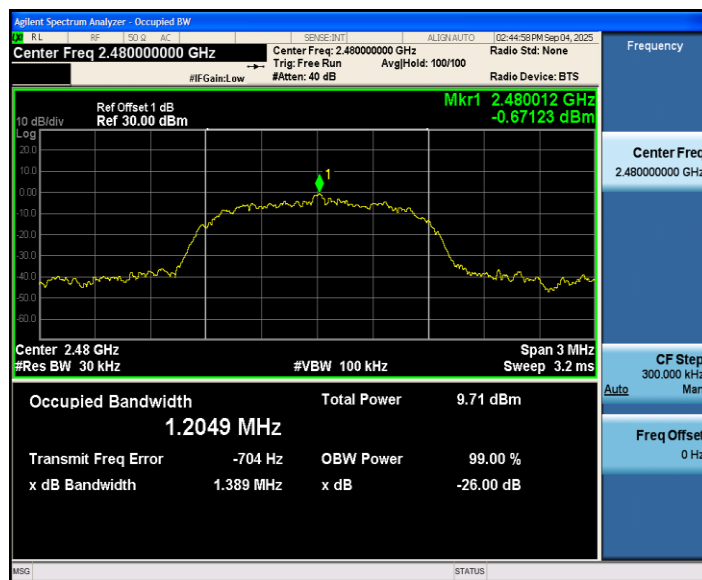
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



7.3. Output Power Measurement

7.3.1. Test Limit

The maximum out power permissible output power is 1 Watt for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts. And for antenna gain greater than 6dBi the limit shall reduce by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

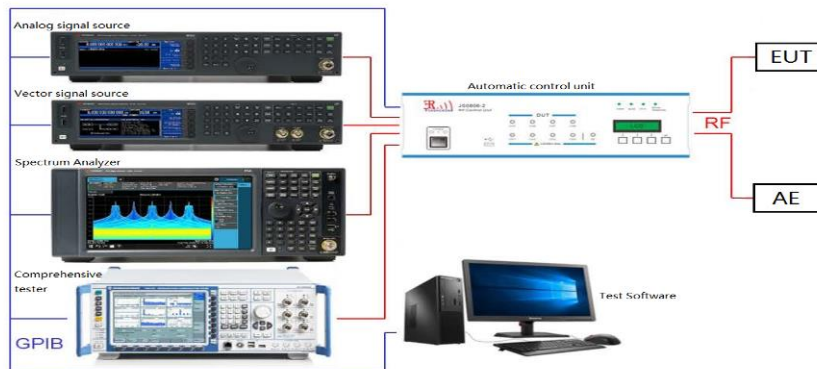
7.3.2. Test Procedure Used

ANSI C63.10-2020 - Section 7.8.5

7.3.3. Test Setting

1. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2. RBW > 20 dB bandwidth of the emission being measured.
3. VBW $\geq$ RBW.
4. Sweep: No faster than coupled (auto) time.
5. Detector function: Peak.
6. Trace: Max-hold.
7. Allow the trace to stabilize, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

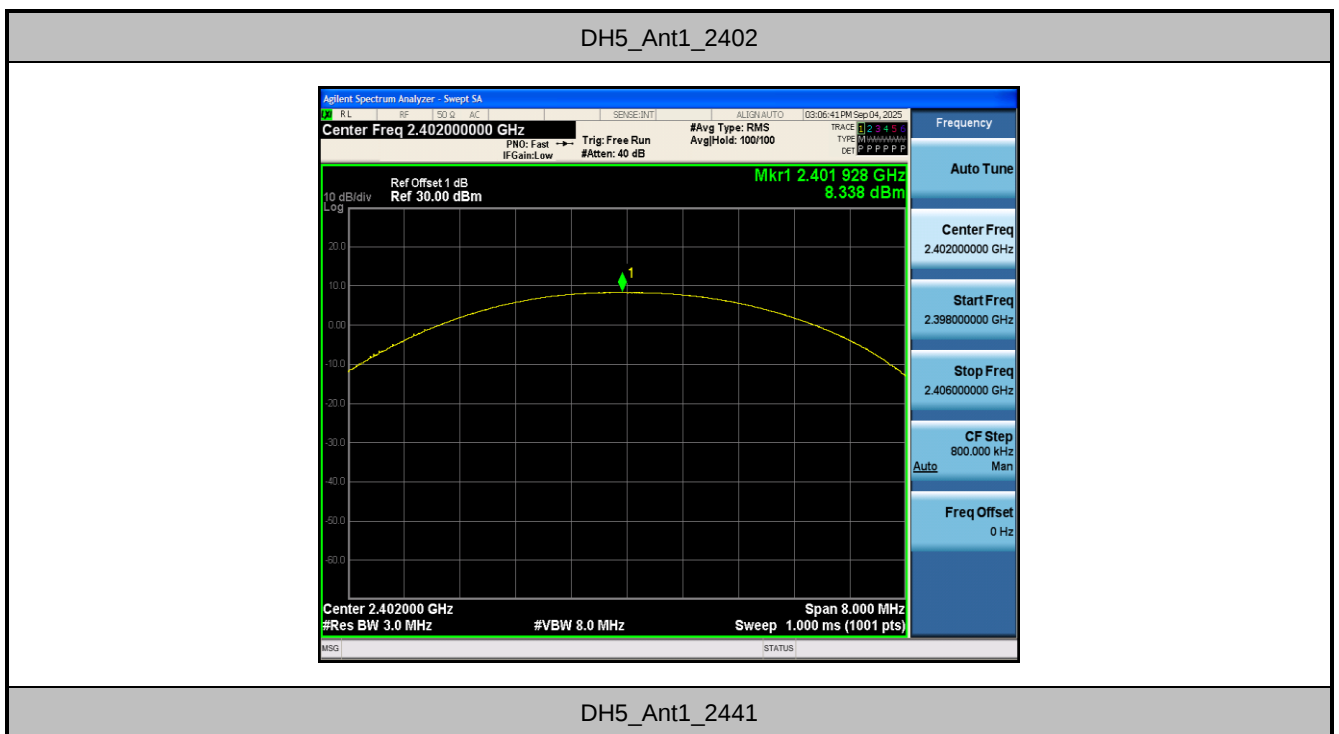
7.3.4. Test Setup

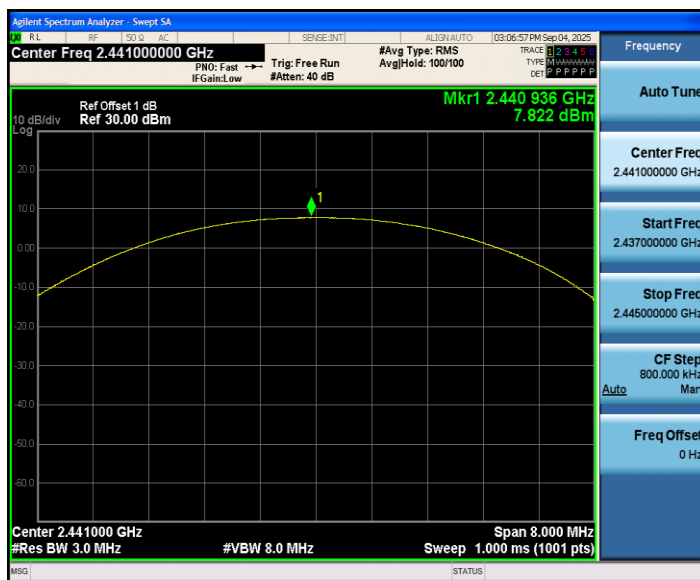


7.3.5.Test Result

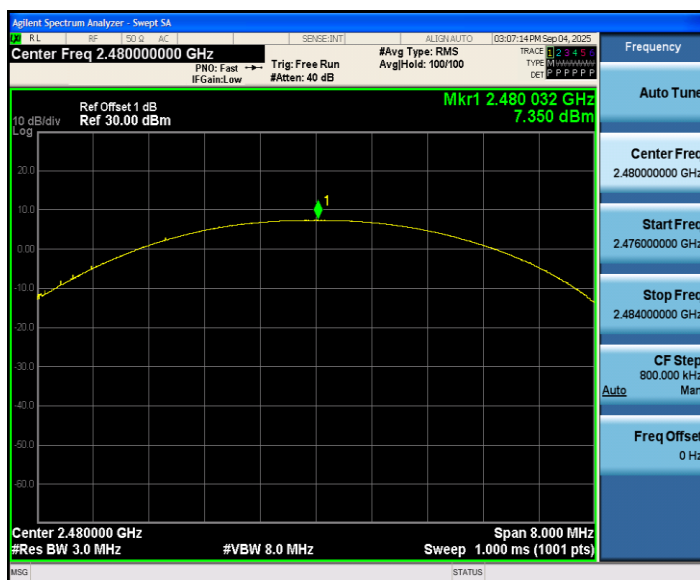
Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	8.34	≤20.97	PASS
		2441	7.82	≤20.97	PASS
		2480	7.35	≤20.97	PASS
2DH5	Ant1	2402	9.81	≤20.97	PASS
		2441	9.32	≤20.97	PASS
		2480	9.06	≤20.97	PASS
3DH5	Ant1	2402	6.25	≤20.97	PASS
		2441	5.00	≤20.97	PASS
		2480	5.66	≤20.97	PASS

Test Graphs

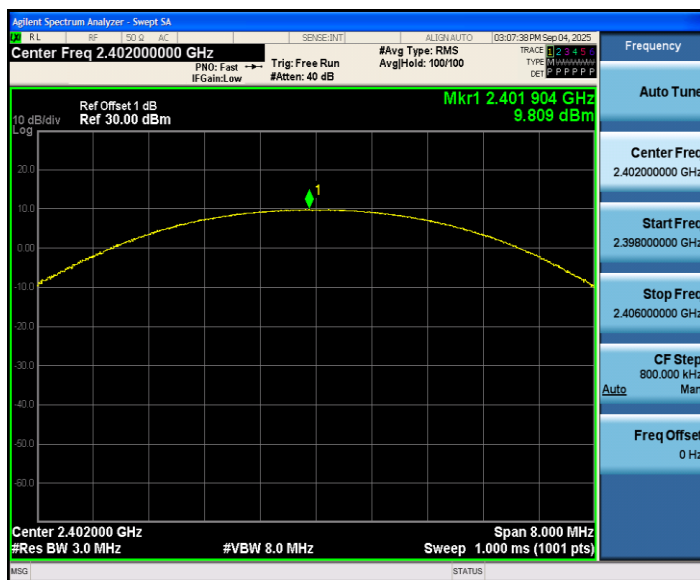




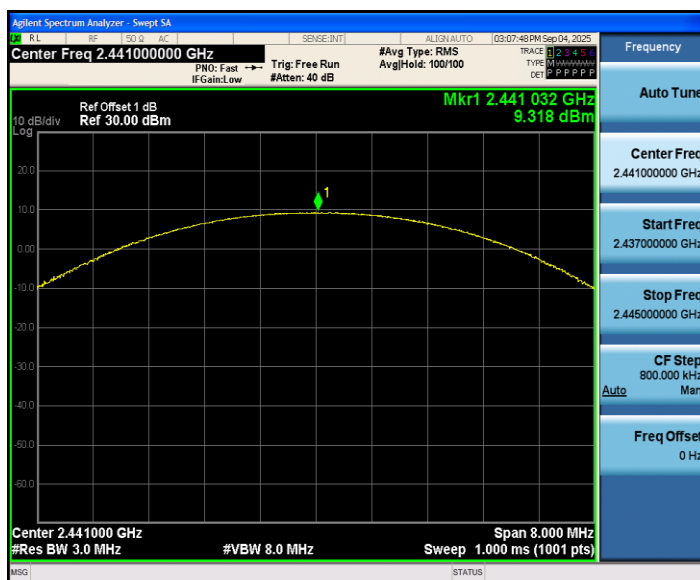
DH5_Ant1_2480



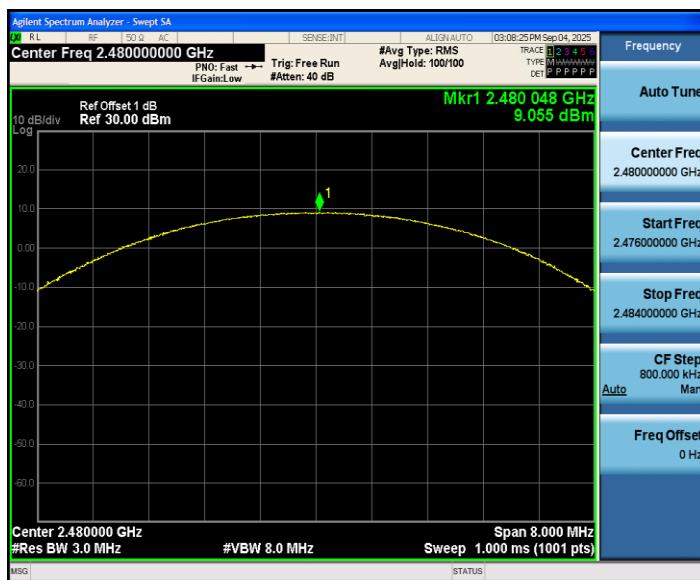
2DH5_Ant1_2402



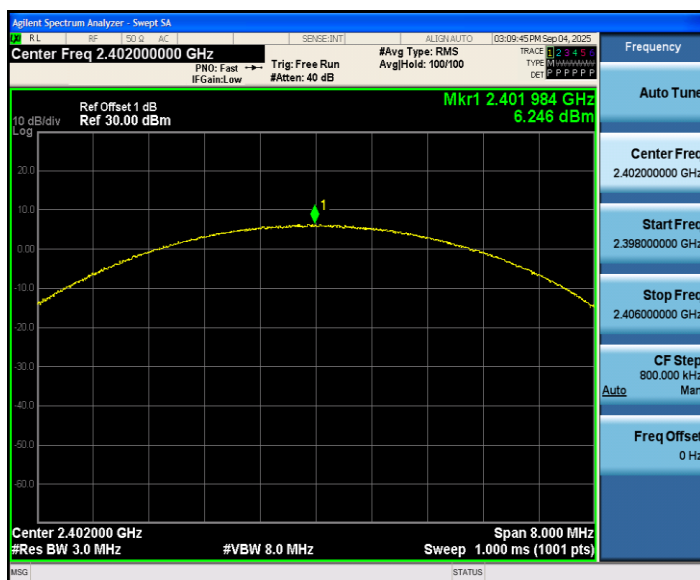
2DH5_Ant1_2441



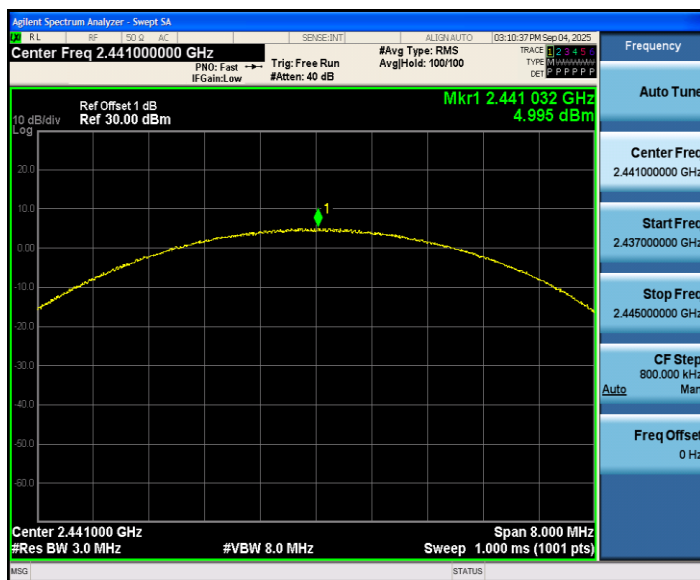
2DH5_Ant1_2480



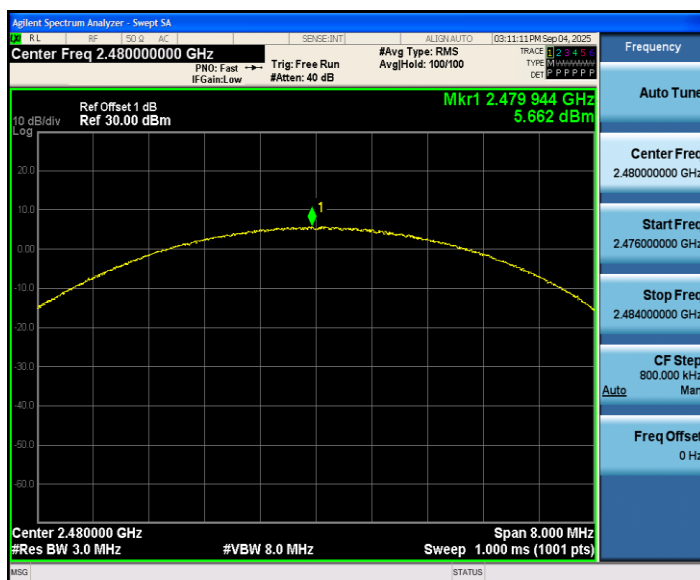
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



7.4. Carrier Frequency Separation Measurement

7.4.1. Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

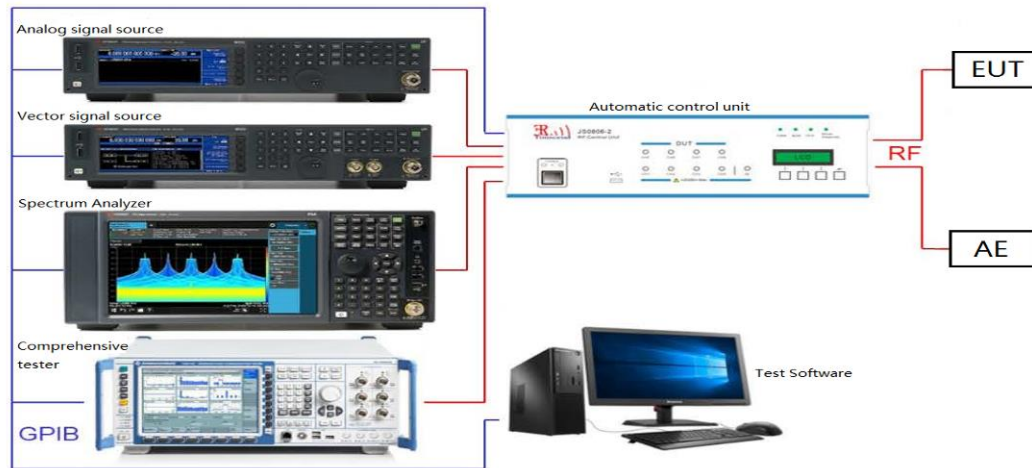
7.4.2. Test Procedure Used

ANSI C63.10-2020 - Section 7.8.2

7.4.3. Test Setting

1. Span = wide enough to capture the peaks of two adjacent channels.
2. Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. Video (or average) bandwidth (VBW) $\geq$ RBW.
4. Sweep: No faster than coupled (auto) time.
5. Detector = Peak
6. Trace mode = Max hold
7. Allowed the trace to stabilize
8. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

7.4.4.Test Setup

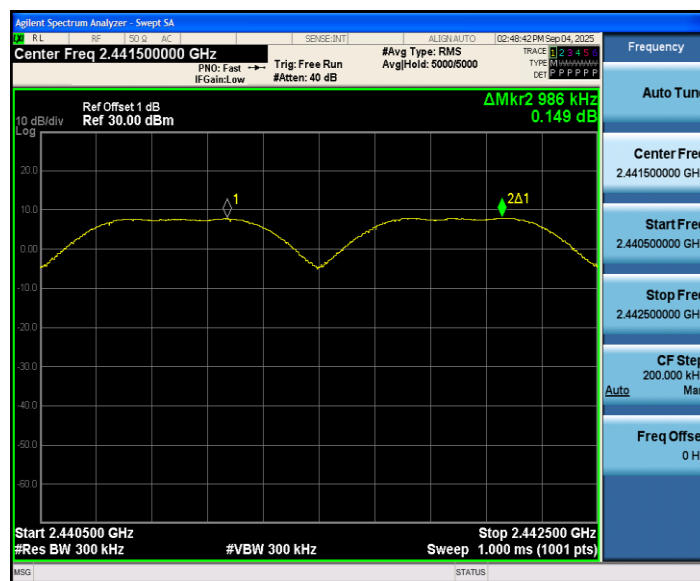


7.4.5. Test Result

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.986	≥ 0.690	PASS
2DH5	Ant1	Hop	1.02	≥ 0.910	PASS
3DH5	Ant1	Hop	0.978	≥ 0.894	PASS

Test Graphs

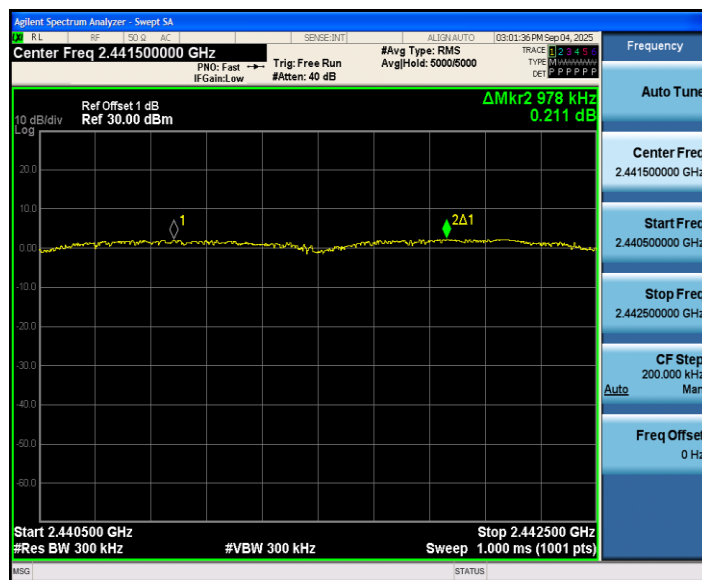
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



7.5. Number of Hopping Channels Measurement

7.5.1. Test Limit

This frequency hopping system must employ a minimum of 15 hopping channels.

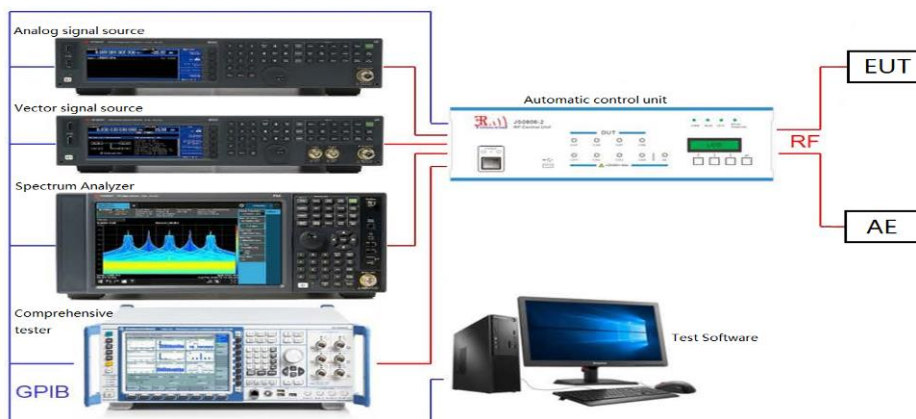
7.5.2. Test Procedure Used

ANSI C63.10-2020 - Section 7.8.3

7.5.3. Test Setting

1. Span = the frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. $VBW \geq RBW$
4. Sweep: No faster than coupled (auto) time.
5. Detector function: Peak.
6. Trace mode = Max hold
7. Allow the trace to stabilize

7.5.4. Test Setup

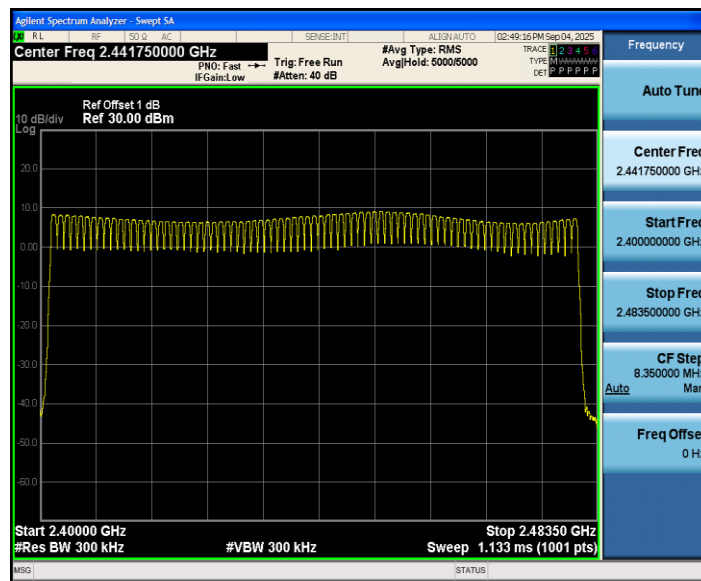


7.5.5.Test Result

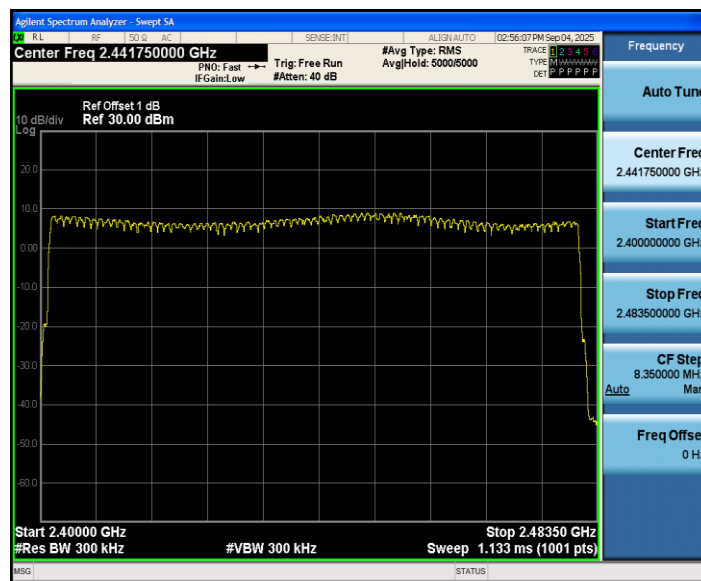
Test Mode	Antenna	Channel	Result [Num]	Limit [Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

Test Graphs

DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



7.6. Time of Occupancy Measurement

7.6.1. Test Limit

The maximum permissible time of occupancy is 400ms within a period of 400ms multiplied by the number of hopping channels employed.

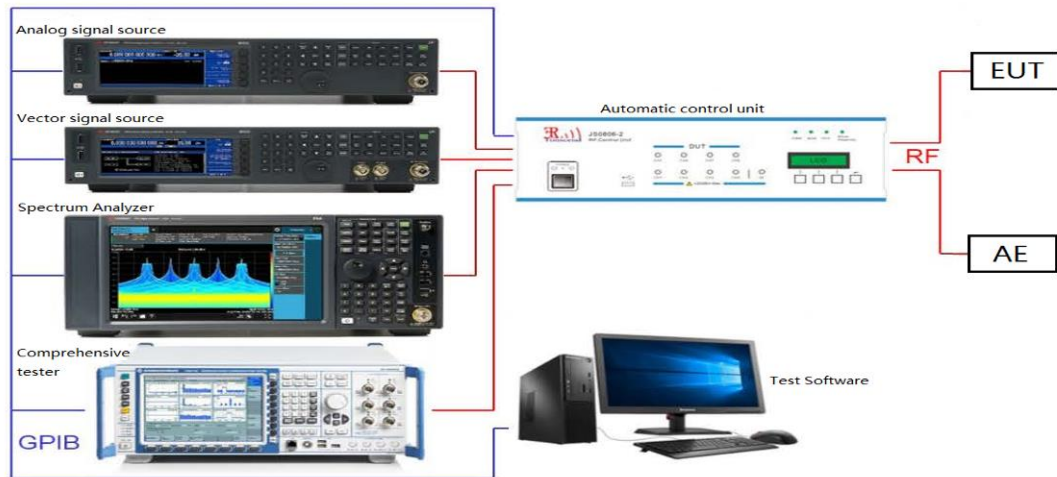
7.6.2. Test Procedure Used

ANSI C63.10-2020 - Section 7.8.4

7.6.3. Test Setting

1. Span = zero span, centered on a hopping channel.
2. RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel.
3. VBW $\geq$ RBW
4. Sweep time = Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = $1/\text{hopping rate}$) should achieve this.
5. Detector = Peak
6. Trace: Clear-write, single sweep.
7. Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

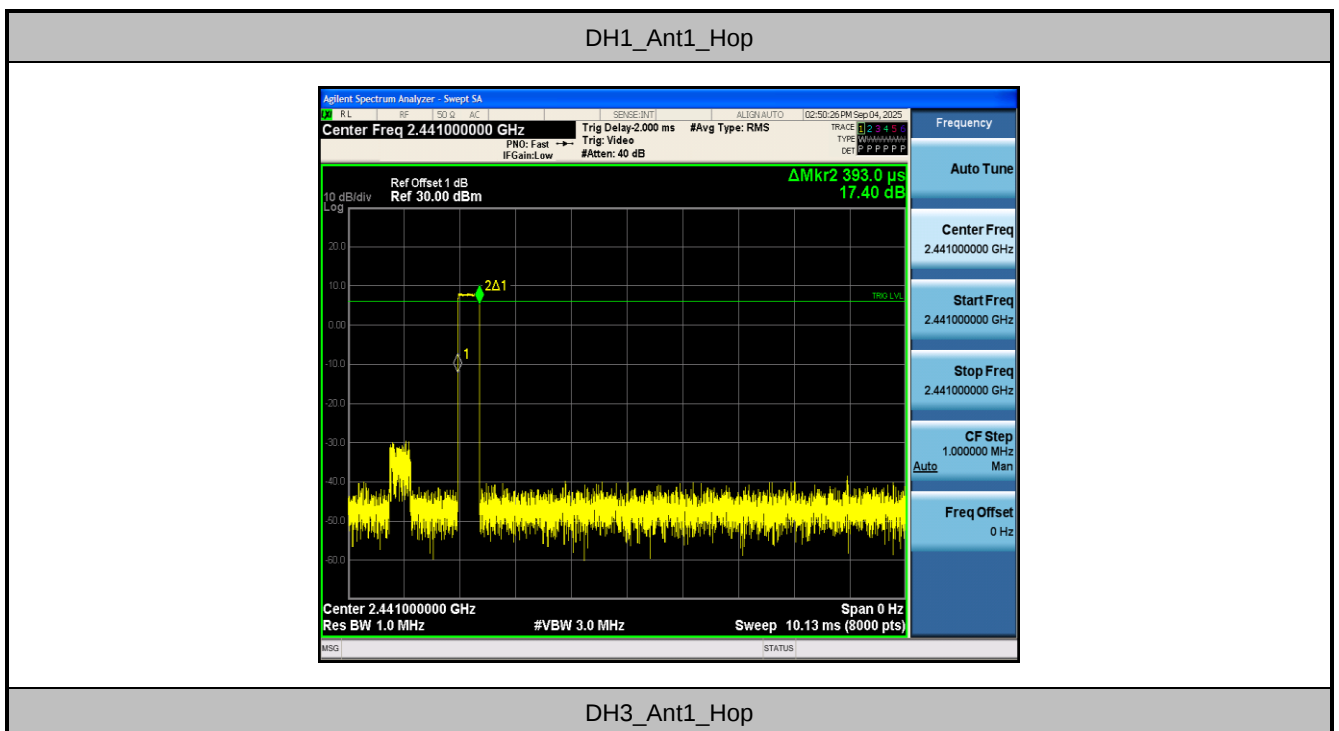
7.6.4.Test Setup

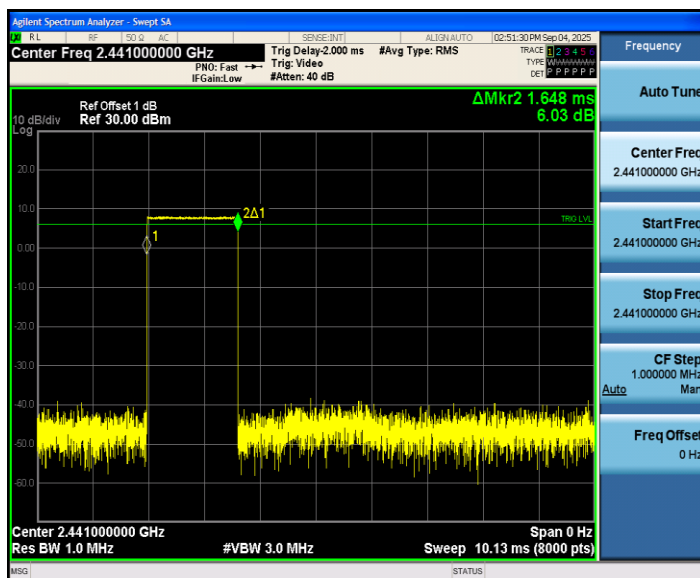


7.6.5.Test Result

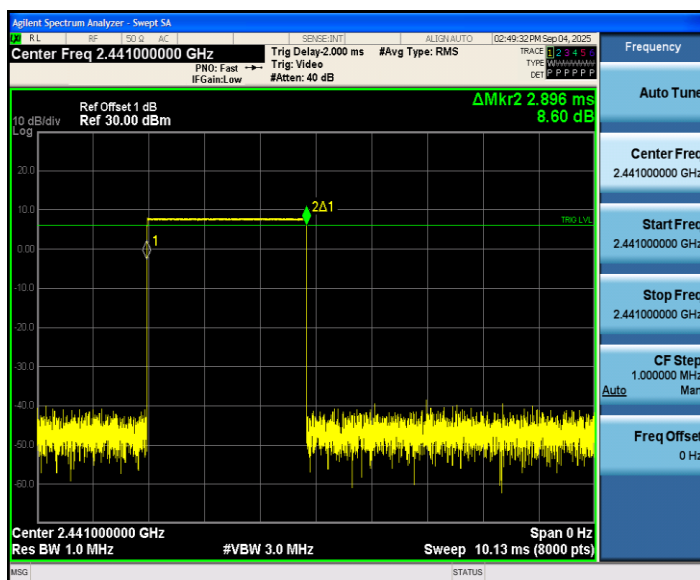
TestMode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.393	320	0.126	≤0.4	PASS
DH3	Ant1	Hop	1.648	160	0.264	≤0.4	PASS
DH5	Ant1	Hop	2.896	106.67	0.309	≤0.4	PASS
2DH1	Ant1	Hop	0.389	320	0.124	≤0.4	PASS
2DH3	Ant1	Hop	1.643	160	0.263	≤0.4	PASS
2DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
3DH1	Ant1	Hop	0.389	320	0.124	≤0.4	PASS
3DH3	Ant1	Hop	1.639	160	0.262	≤0.4	PASS
3DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS

Test Graphs

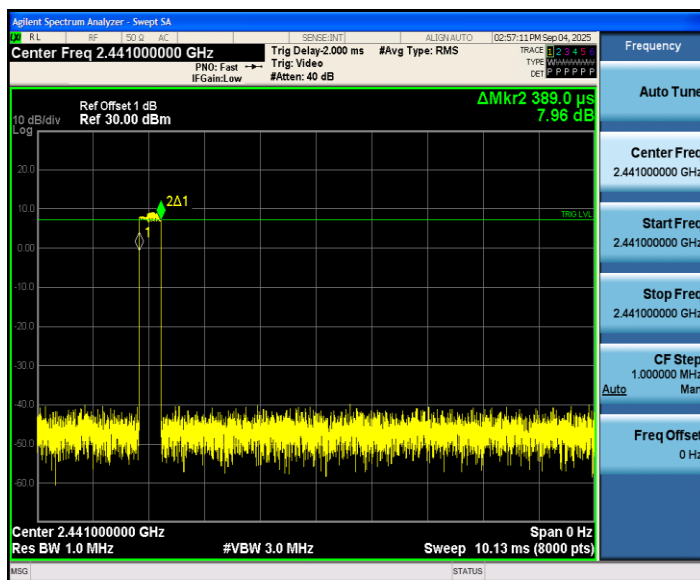




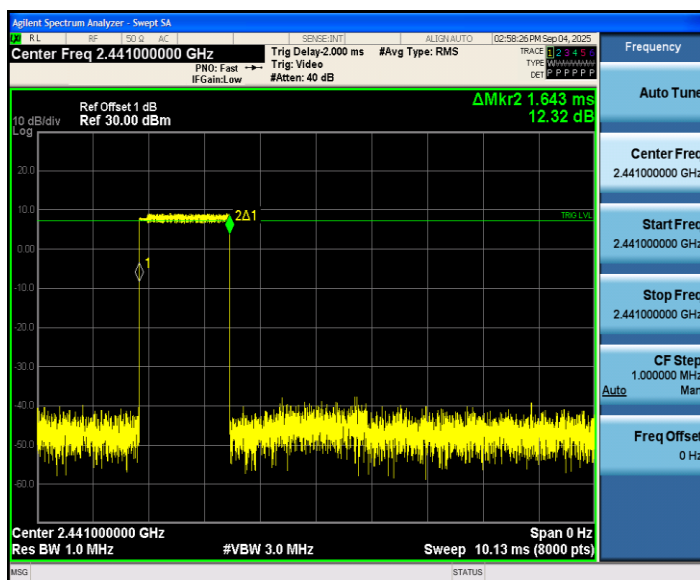
DH5_Ant1_Hop



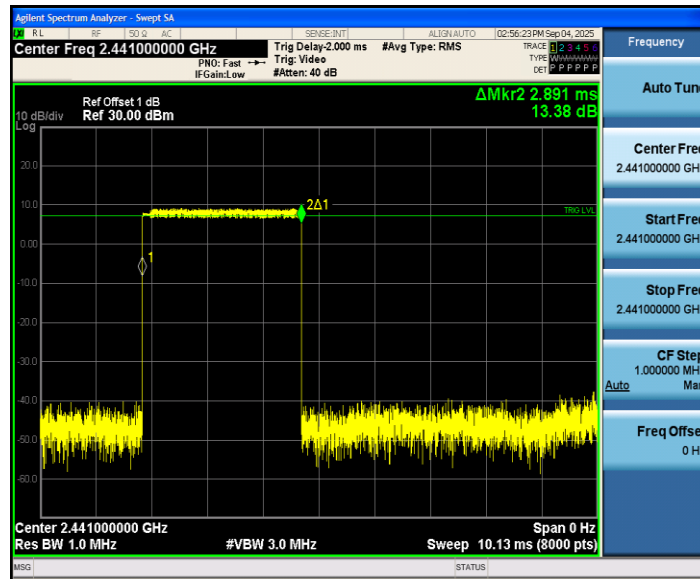
2DH1_Ant1_Hop



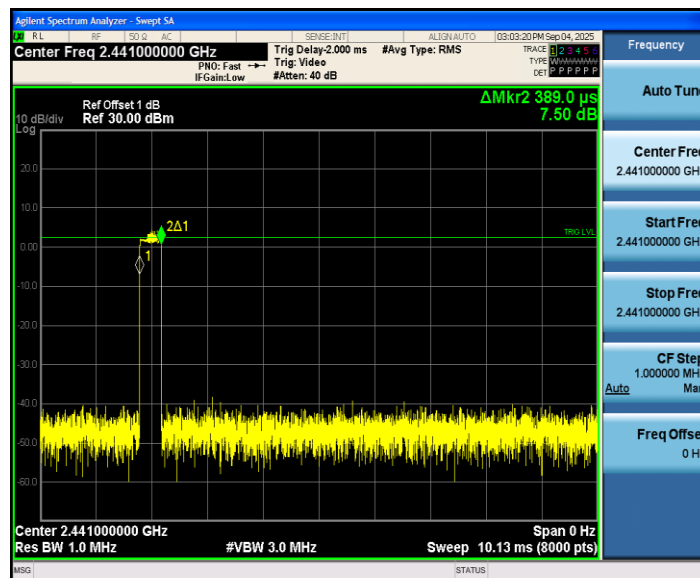
2DH3_Ant1_Hop



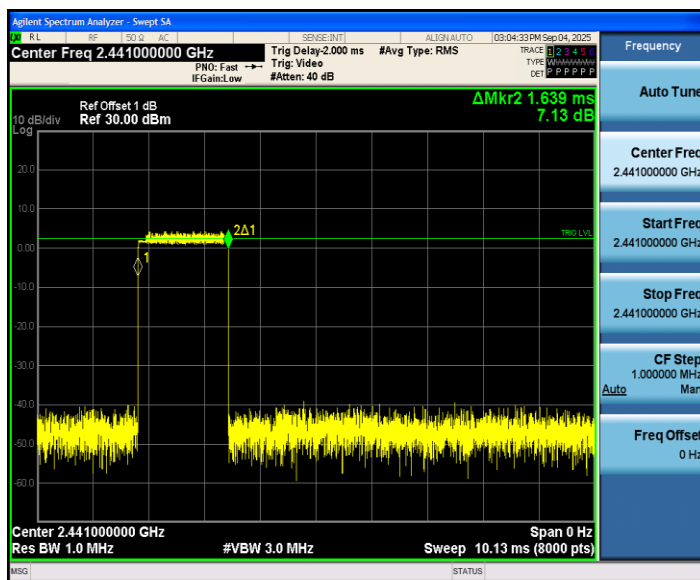
2DH5_Ant1_Hop



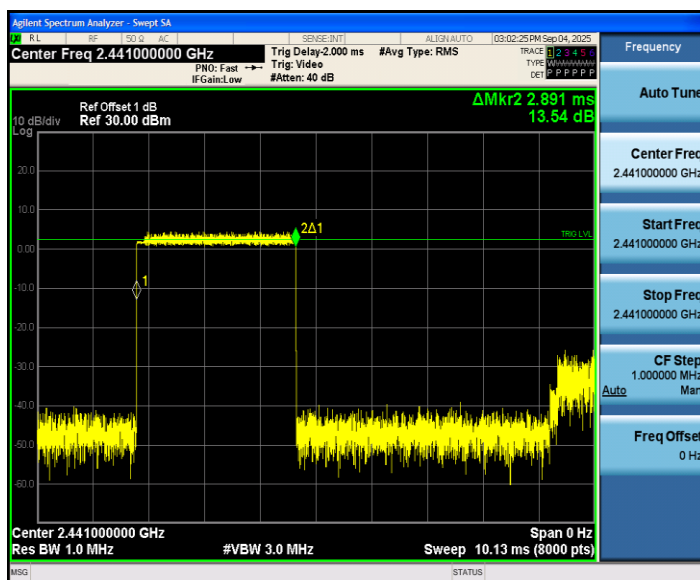
3DH1_Ant1_Hop



3DH3_Ant1_Hop



3DH5_Ant1_Hop



7.7. Band-edge Compliance Measurement

7.7.1. Test Limit

The maximum permissible emission level is 20dBc. Any emissions were lying outside of the emission bandwidth and in authorized band edges to a field strength limit specified in Section 15.209 of the Title 47 CFR.

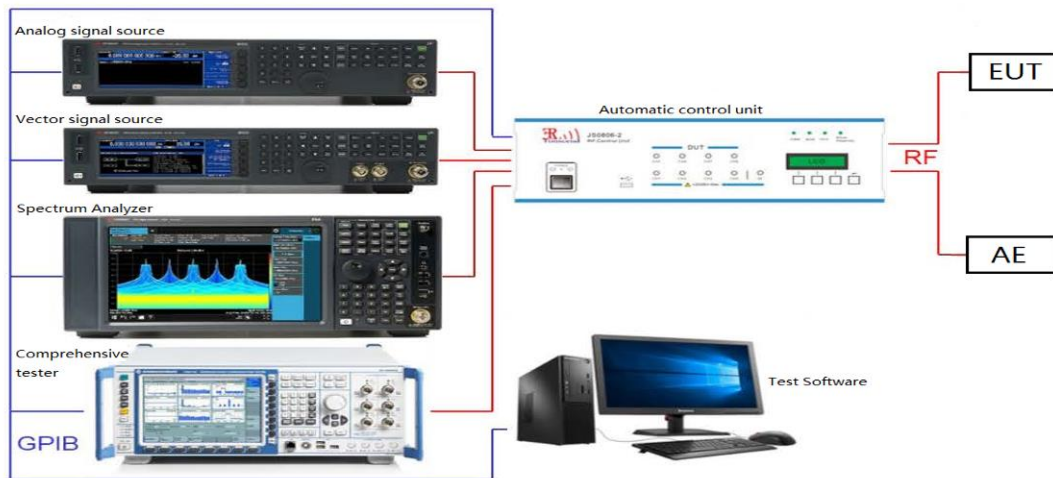
7.7.2. Test Procedure Used

ANSI C63.10-2020 - Section 6.10.4

7.7.3. Test Setting

1. Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = No faster than coupled (auto) time
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. Allow the trace to stabilize. For the test with the hopping function turned ON, this can take several minutes to achieve a reasonable probability of intercepting any emissions due to oscillator overshoot. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.

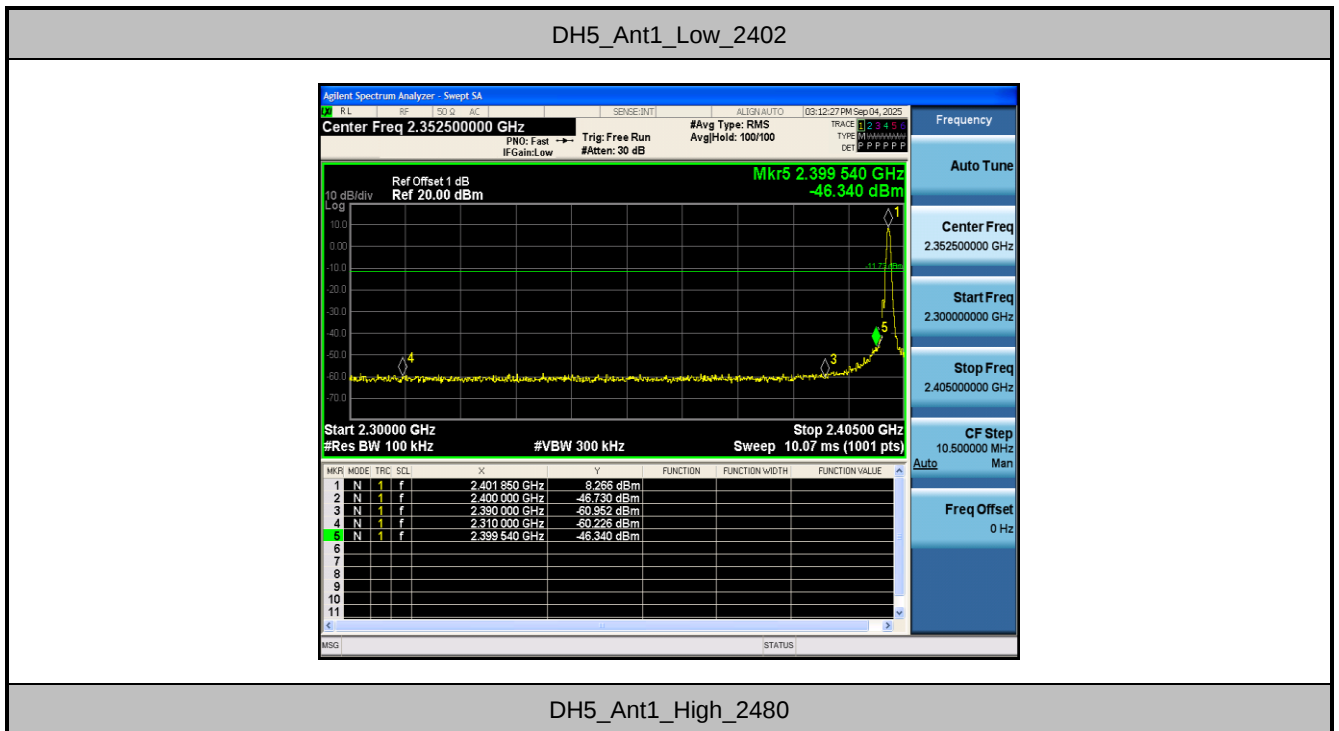
7.7.4. Test Setup

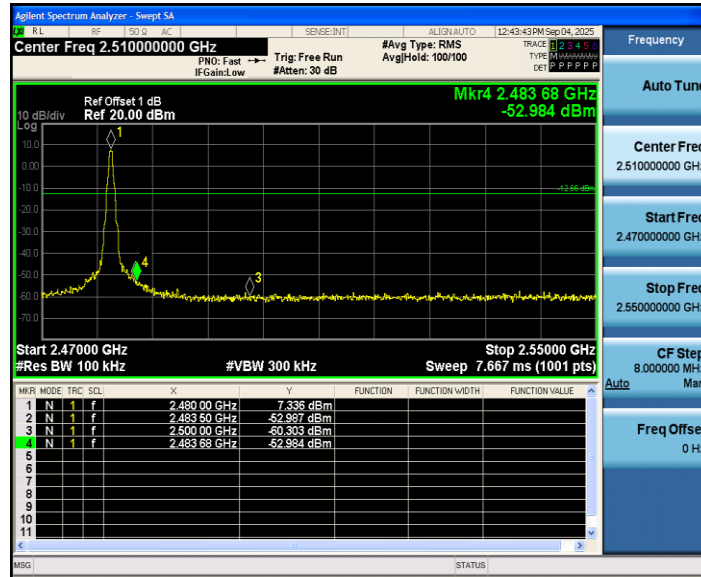


7.7.5.Test Result

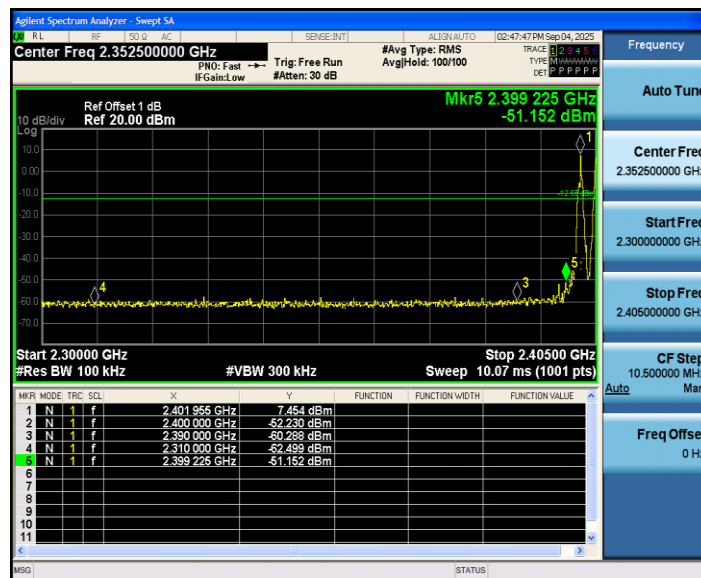
Test Mode	Antenna	Ch Name	Channel	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	8.27	-46.34	≤-11.73	PASS
		High	2480	7.34	-52.98	≤-12.66	PASS
		Low	Hop_2402	7.45	-51.15	≤-12.55	PASS
		High	Hop_2480	6.34	-54.4	≤-13.66	PASS
2DH5	Ant1	Low	2402	8.32	-39	≤-11.68	PASS
		High	2480	7.66	-51.94	≤-12.34	PASS
		Low	Hop_2402	5.24	-48.9	≤-14.76	PASS
		High	Hop_2480	3.66	-55.35	≤-16.34	PASS
3DH5	Ant1	Low	2402	2.19	-49.01	≤-17.81	PASS
		High	2480	2.56	-54.06	≤-17.44	PASS
		Low	Hop_2402	0.09	-52.58	≤-19.91	PASS
		High	Hop_2480	1.18	-56.76	≤-18.82	PASS

Test Graphs

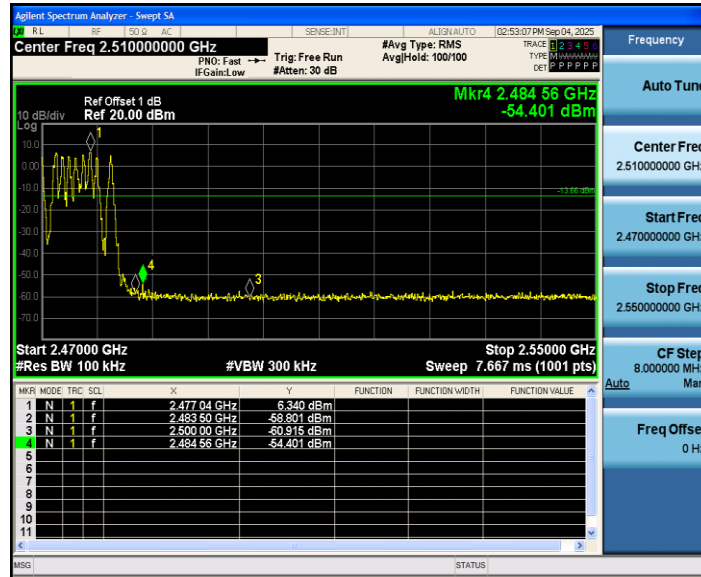




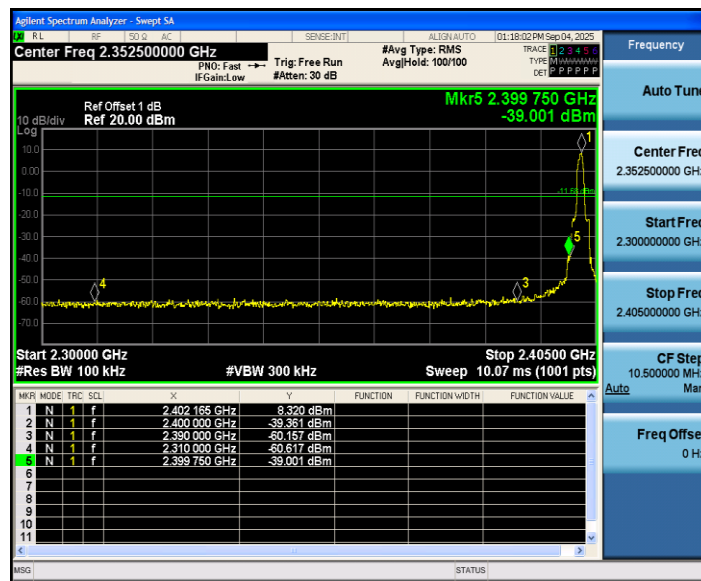
DH5_Ant1_Low_Hop_2402



DH5_Ant1_High_Hop_2480



2DH5_Ant1_Low_2402



2DH5_Ant1_High_2480