Case No. : CTA24111101001	
Ambient Condition: 23 ℃, 55 %RH	
According Standard: ■Part15C	
Test Date: 2024.9.27	**Test Engineer:** Evan ouyang

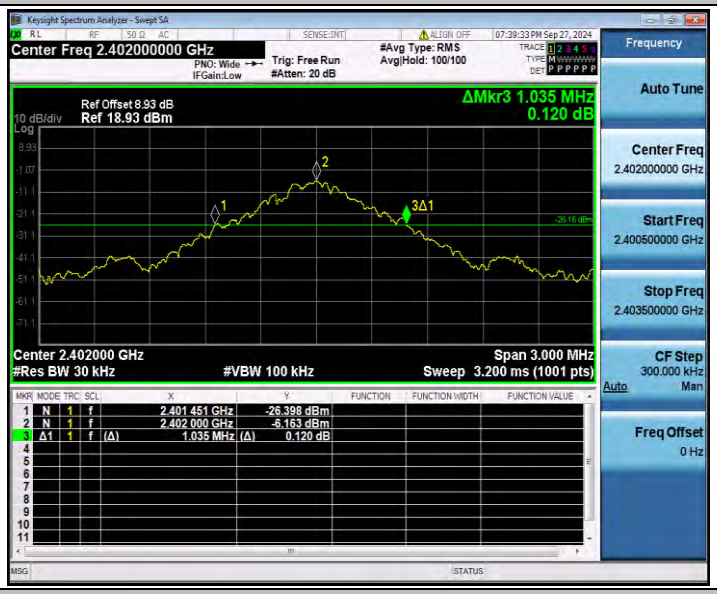
Appendix A.1: 20dB Emission Bandwidth

Test Result

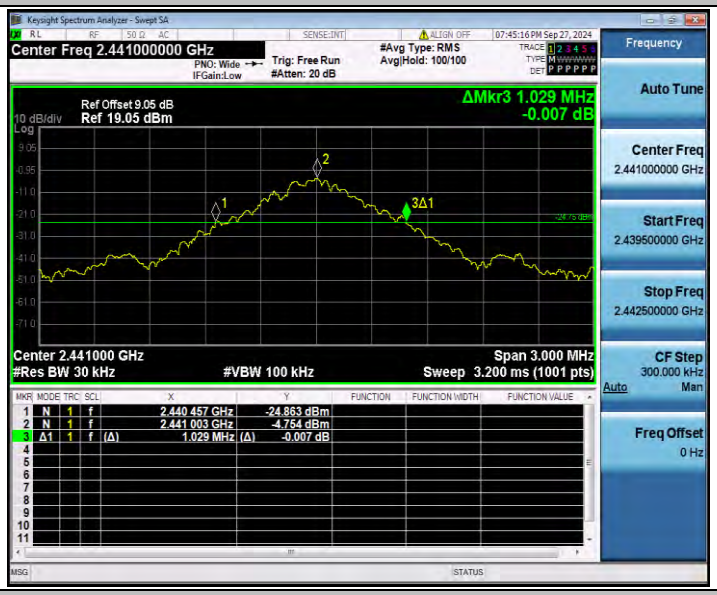
TestMode	Antenna	Freq(MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	1.035	2401.451	2402.486	---	---
		2441	1.029	2440.457	2441.486	---	---
		2480	1.038	2479.451	2480.489	---	---
2DH1	Ant1	2402	1.290	2401.355	2402.645	---	---
		2441	1.290	2440.355	2441.645	---	---
		2480	1.287	2479.355	2480.642	---	---
3DH1	Ant1	2402	1.296	2401.340	2402.636	---	---
		2441	1.299	2440.340	2441.639	---	---
		2480	1.293	2479.340	2480.633	---	---

Test Graphs

DH1_Ant1_2402



DH1_Ant1_2441



DH1_Ant1_2480

2DH1_Ant1_2402

2DH1_Ant1_2441

2DH1_Ant1_2480

3DH1_Ant1_2402

3DH1_Ant1_2441

3DH1_Ant1_2480

Appendix A.2: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	0.95727	2401.5125	2402.4697	---	---
		2441	0.95507	2440.5107	2441.4658	---	---
		2480	0.95457	2479.5115	2480.4660	---	---
2DH1	Ant1	2402	1.1911	2401.3914	2402.5825	---	---
		2441	1.1872	2440.3922	2441.5794	---	---
		2480	1.1876	2479.3913	2480.5789	---	---
3DH1	Ant1	2402	1.1978	2401.3775	2402.5753	---	---
		2441	1.1976	2440.3775	2441.5751	---	---
		2480	1.2009	2479.3746	2480.5755	---	---

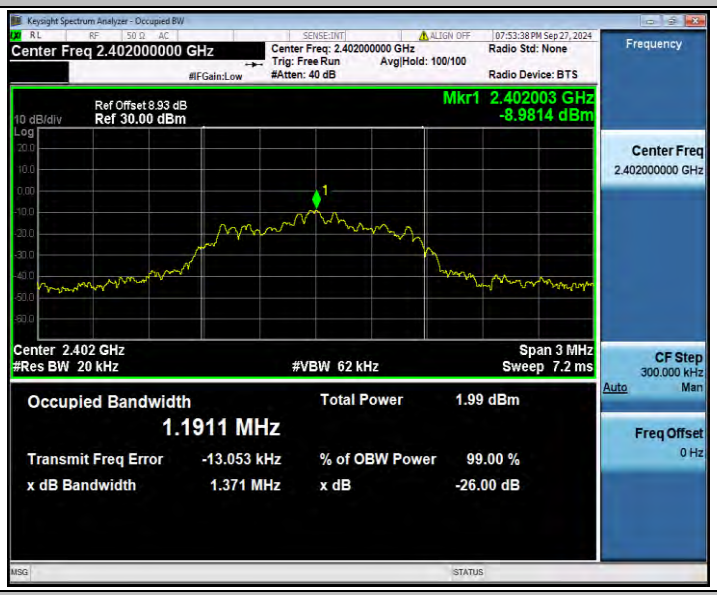
Test Graphs

DH1_Ant1_2402

DH1_Ant1_2441

DH1_Ant1_2480

2DH1_Ant1_2402



2DH1_Ant1_2441

2DH1_Ant1_2480

3DH1_Ant1_2402

3DH1_Ant1_2441

3DH1_Ant1_2480

Appendix A.3: Maximum conducted output power

Test Result Peak

Test Mode	Antenna	Freq(MHz)	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH1	Ant1	2402	-2.65	≤20.97	PASS
		2441	-1.32	≤20.97	PASS
		2480	-0.87	≤20.97	PASS
2DH1	Ant1	2402	-2.22	≤20.97	PASS
		2441	-0.74	≤20.97	PASS
		2480	-0.37	≤20.97	PASS
3DH1	Ant1	2402	-1.64	≤20.97	PASS
		2441	-0.17	≤20.97	PASS
		2480	-0.10	≤20.97	PASS

Appendix A.4: Carrier frequency separation

Test Result

TestMode	Antenna	Freq(MHz)	Result[MHz]	Limit[MHz]	Verdict
DH1	Ant1	Hop_2402	1.016	≥0.692	PASS
		Hop_2441	1.044	≥0.692	PASS
		Hop_2480	1.026	≥0.692	PASS
2DH1	Ant1	Hop_2402	0.992	≥0.860	PASS
		Hop_2441	1.02	≥0.860	PASS
		Hop_2480	1.188	≥0.860	PASS
3DH1	Ant1	Hop_2402	1.164	≥0.866	PASS
		Hop_2441	0.946	≥0.866	PASS
		Hop_2480	0.926	≥0.866	PASS

Test Graphs

DH1_Ant1_Hop_2402

DH1_Ant1_Hop_2441

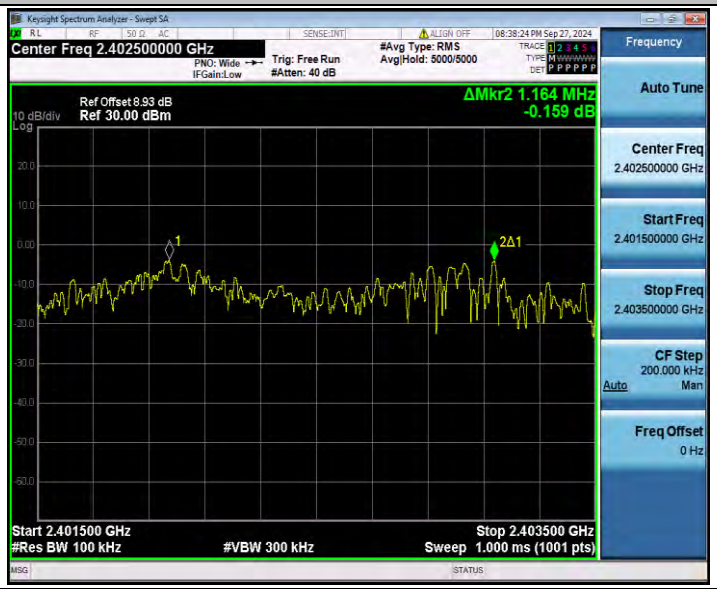
DH1_Ant1_Hop_2480

2DH1_Ant1_Hop_2402

2DH1_Ant1_Hop_2441

2DH1_Ant1_Hop_2480

3DH1_Ant1_Hop_2402



3DH1_Ant1_Hop_2441

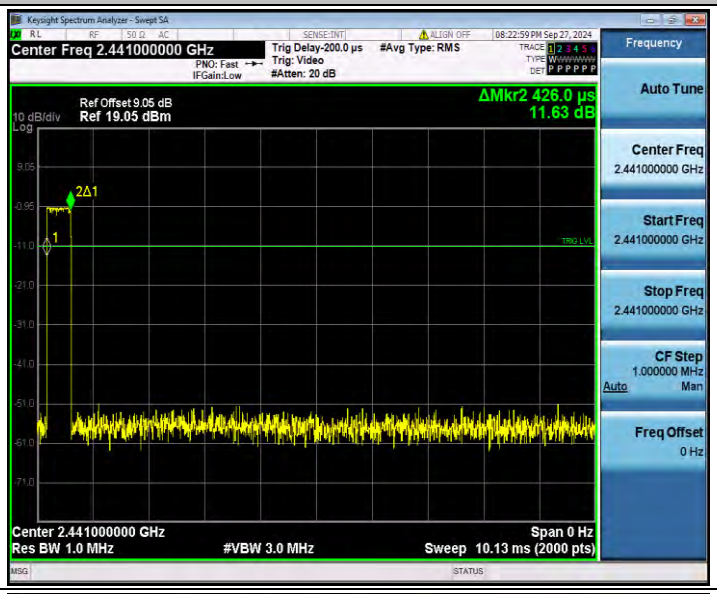
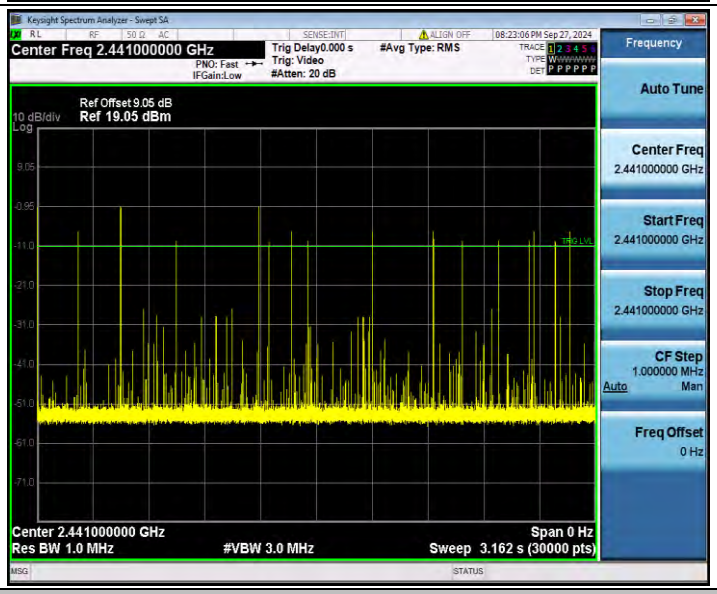
3DH1_Ant1_Hop_2480

Appendix A.5: Time of occupancy

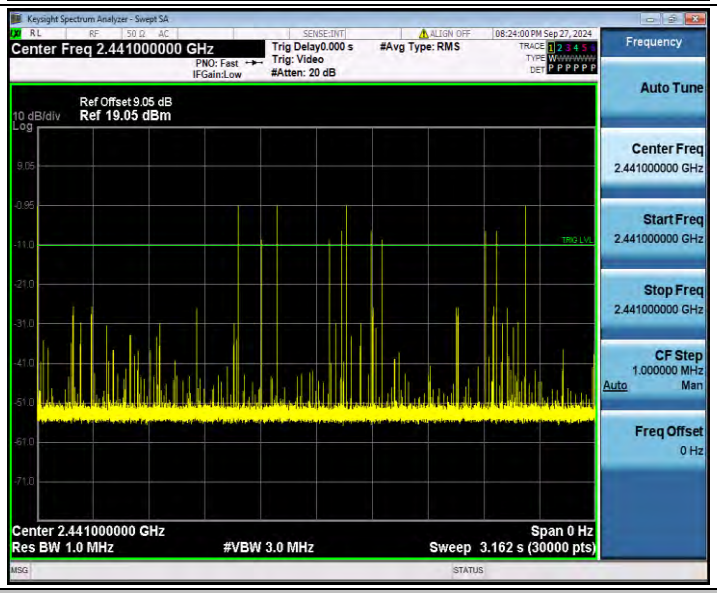
Test Result

TestMode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.426	30	0.013	≤0.4	PASS
DH3	Ant1	Hop	1.626	50	0.081	≤0.4	PASS
DH5	Ant1	Hop	2.822	30	0.085	≤0.4	PASS
2DH1	Ant1	Hop	0.481	40	0.019	≤0.4	PASS
2DH3	Ant1	Hop	1.682	60	0.101	≤0.4	PASS
2DH5	Ant1	Hop	2.883	90	0.259	≤0.4	PASS
3DH1	Ant1	Hop	0.410	70	0.029	≤0.4	PASS
3DH3	Ant1	Hop	1.662	50	0.083	≤0.4	PASS
3DH5	Ant1	Hop	2.756	60	0.165	≤0.4	PASS

Test Graphs

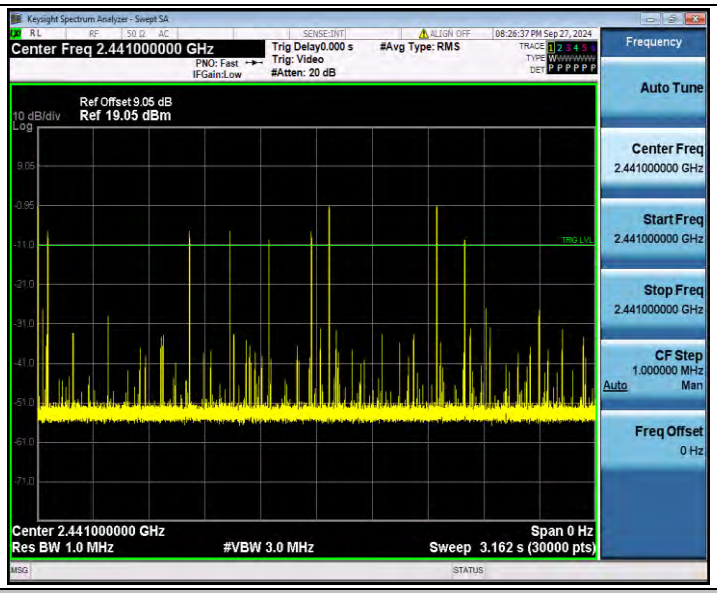
DH1_Ant1_Hop


DH3_Ant1_Hop

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay-200.0 µs
#Avg Type: RMS
Trig: Video
#Atten: 20 dB
Ref Offset 9.05 dB
10 dB/div
Ref 19.05 dBm
ΔMkr2 1.626 ms
16.65 dB
Center 2.441000000 GHz
Span 0 Hz
Res BW 1.0 MHz
#VBW 3.0 MHz
Sweep 10.13 ms (2000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Freq Offset
0 Hz

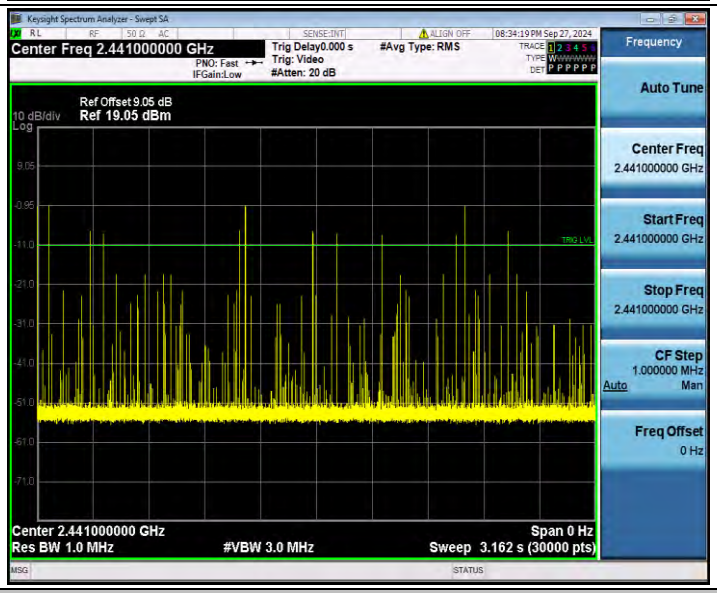

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay0.000 s
#Avg Type: RMS
Trig: Video
#Atten: 20 dB
Ref Offset 9.05 dB
10 dB/div
Ref 19.05 dBm
Center 2.441000000 GHz
Span 0 Hz
Res BW 1.0 MHz
#VBW 3.0 MHz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Freq Offset
0 Hz

DH5_Ant1_Hop

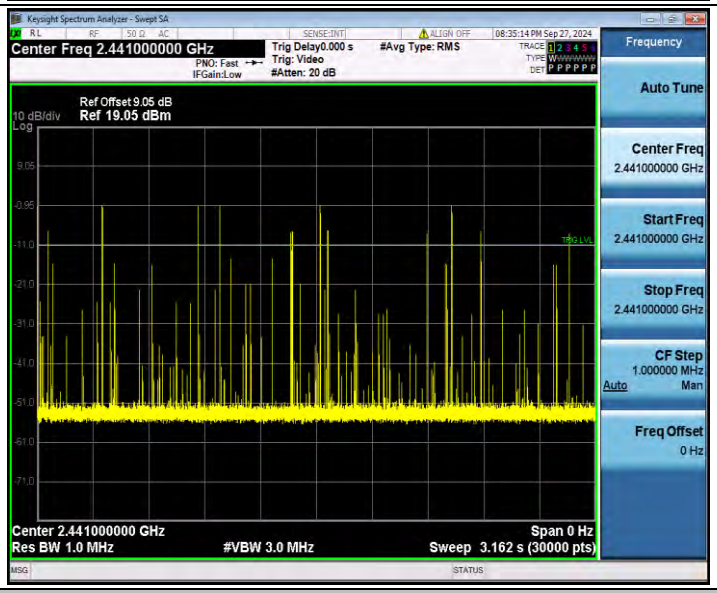
Keysight Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay-200.0 µs
#Avg Type: RMS
Trig: Video
#Atten: 20 dB
Ref Offset 9.05 dB
10 dB/div
Ref 19.05 dBm
ΔMkr2 2.822 ms
-1.23 dB
Center 2.441000000 GHz
Span 0 Hz
Res BW 1.0 MHz
#VBW 3.0 MHz
Sweep 10.13 ms (2000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Freq Offset
0 Hz



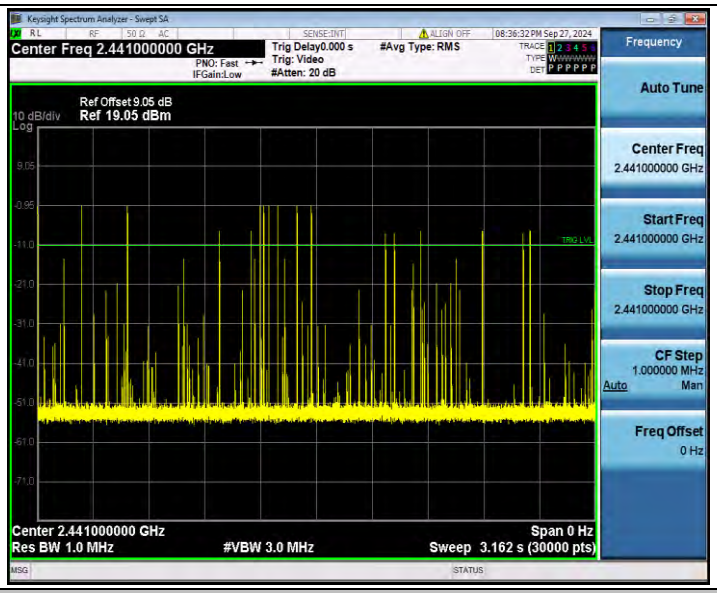
2DH1_Ant1_Hop



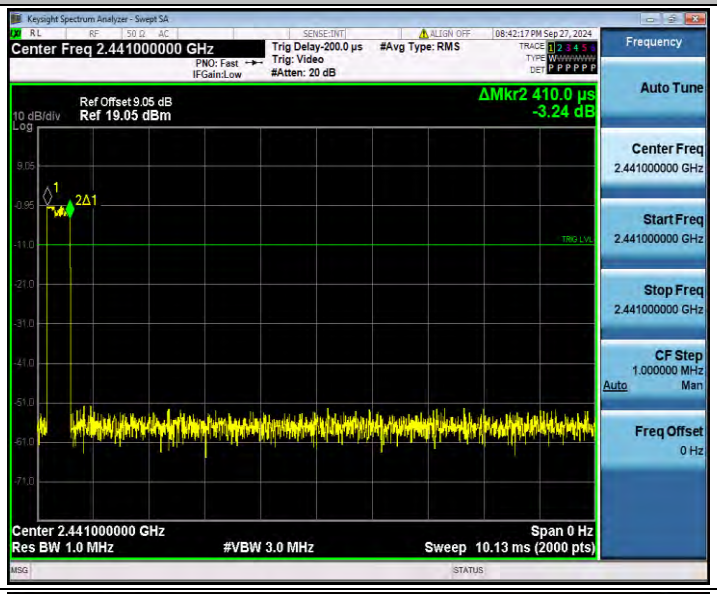
2DH3_Ant1_Hop

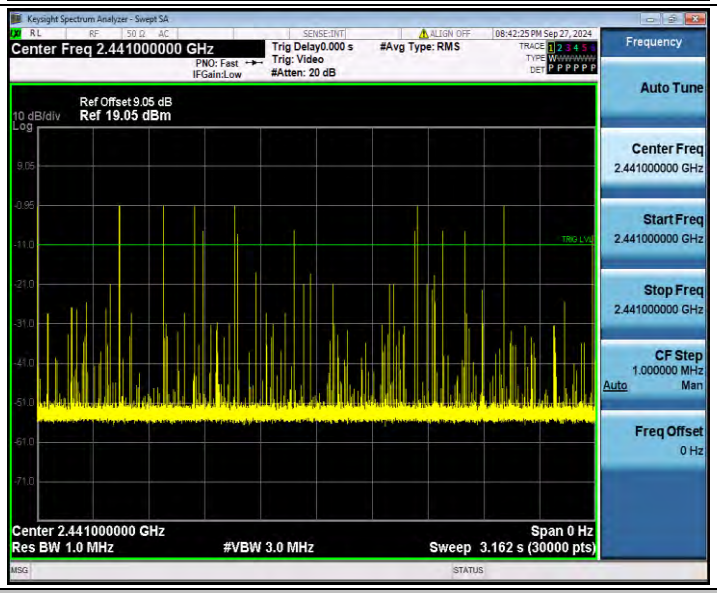


2DH5_Ant1_Hop

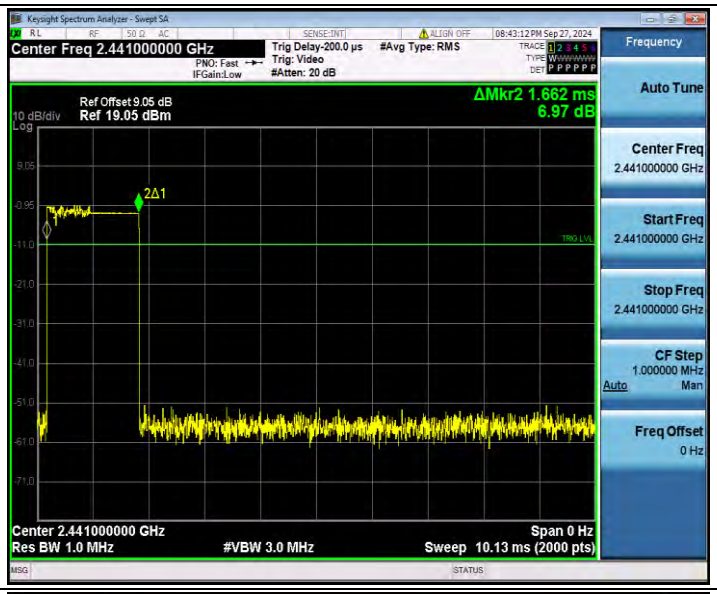


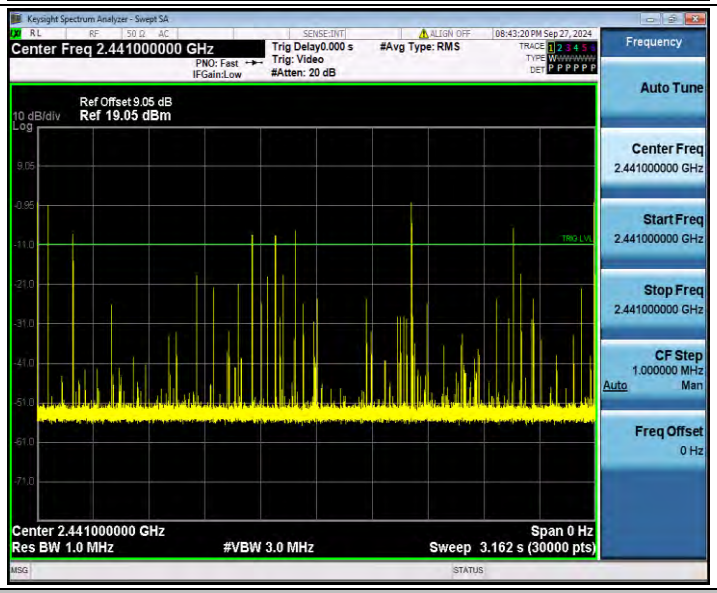
3DH1_Ant1_Hop



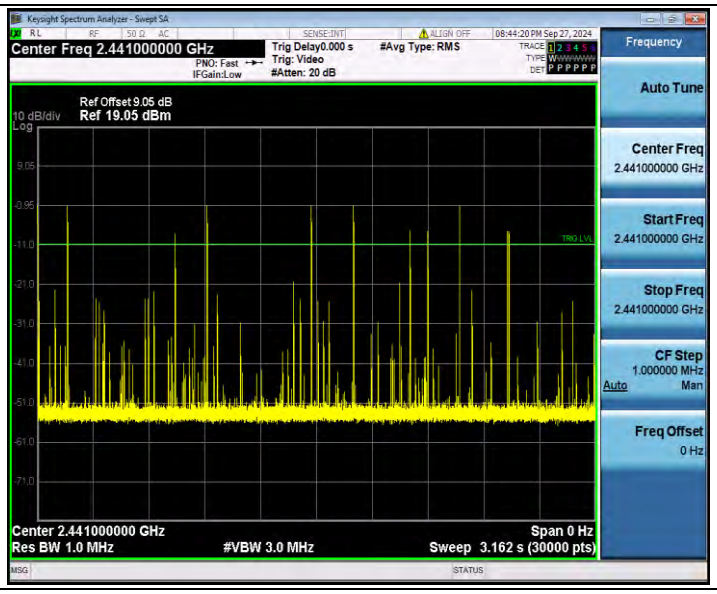


3DH3_Ant1_Hop





3DH5_Ant1_Hop

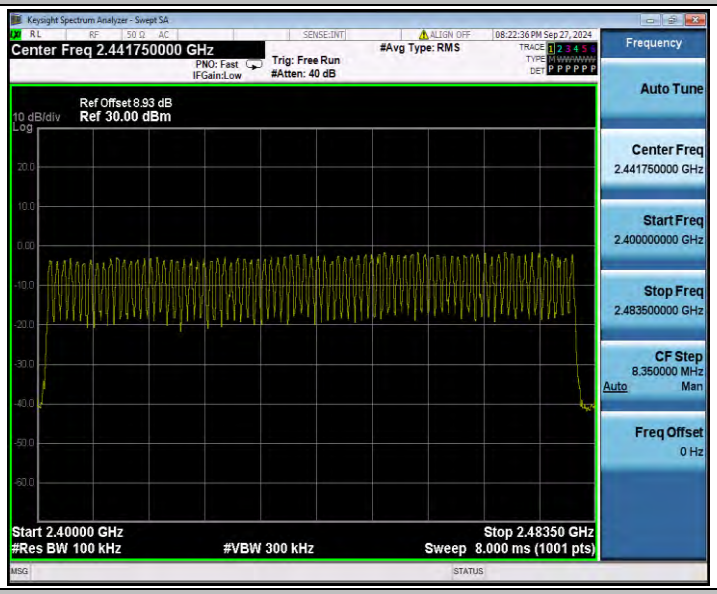

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay0.000 s
#Avg Type: RMS
PNO: Fast
Trig: Video
IFGain:Low
#Atten: 20 dB
Ref Offset 9.05 dB
10 dB/div
Ref 19.05 dBm
Log
Center 2.441000000 GHz
Span 0 Hz
Res BW 1.0 MHz
#VBW 3.0 MHz
Sweep 3.162 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

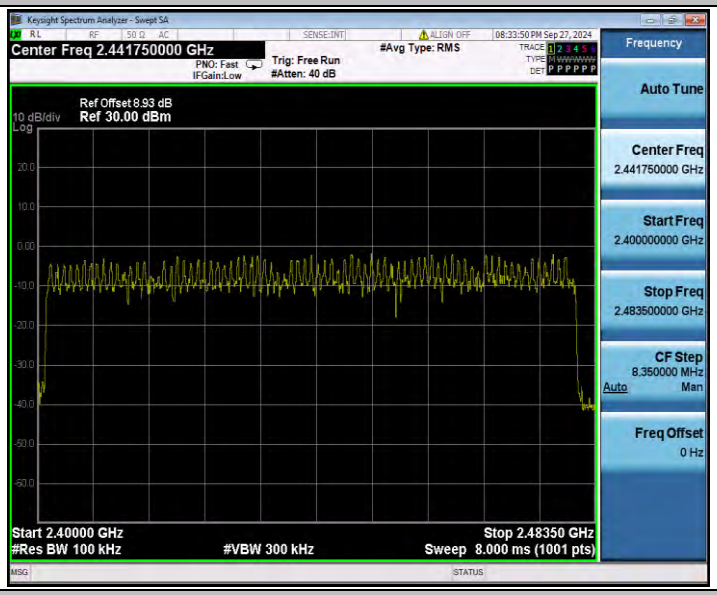
Appendix A.6: Number of hopping channels

Test Result

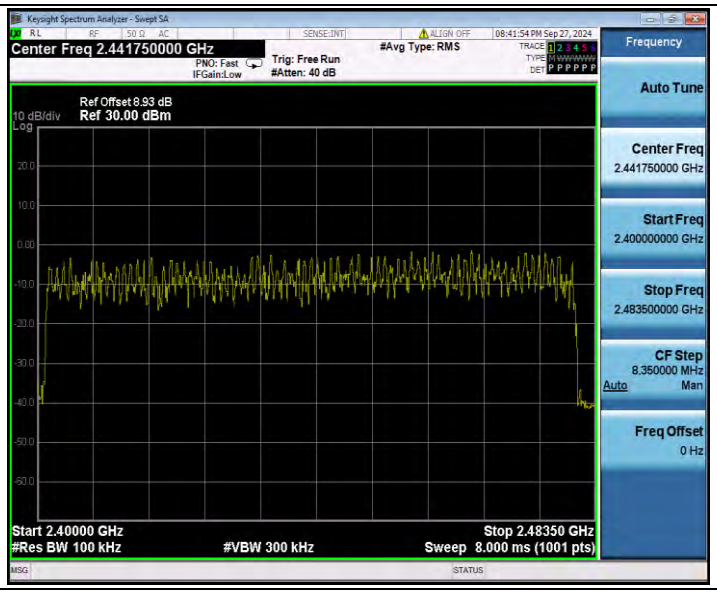
TestMode	Antenna	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
DH1	Ant1	Hop	79	≥15	PASS
2DH1	Ant1	Hop	79	≥15	PASS
3DH1	Ant1	Hop	79	≥15	PASS

Test Graphs

DH1_Ant1_Hop


2DH1_Ant1_Hop


3DH1_Ant1_Hop


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN OFF
08:41:54 PM Sep 27, 2024
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P P P P P P
Ref Offset 8.93 dB
10 dB/div
Ref 30.00 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz

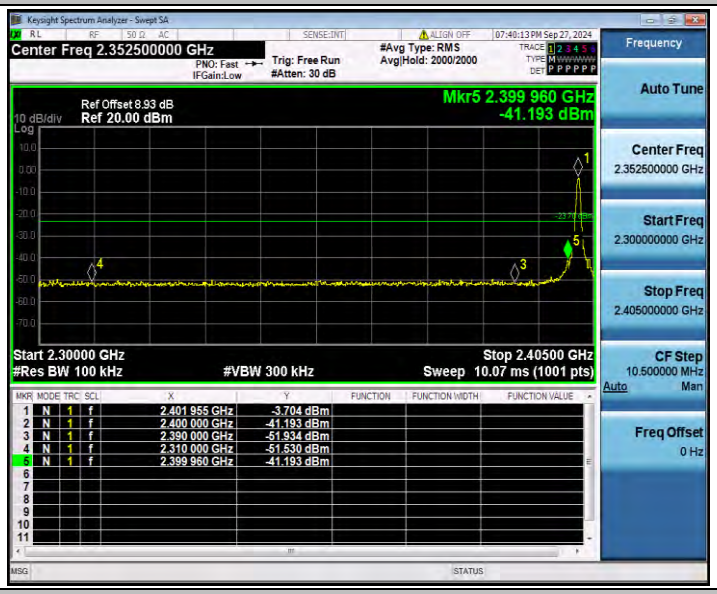
Appendix A.7: Band edge measurements

Test Result

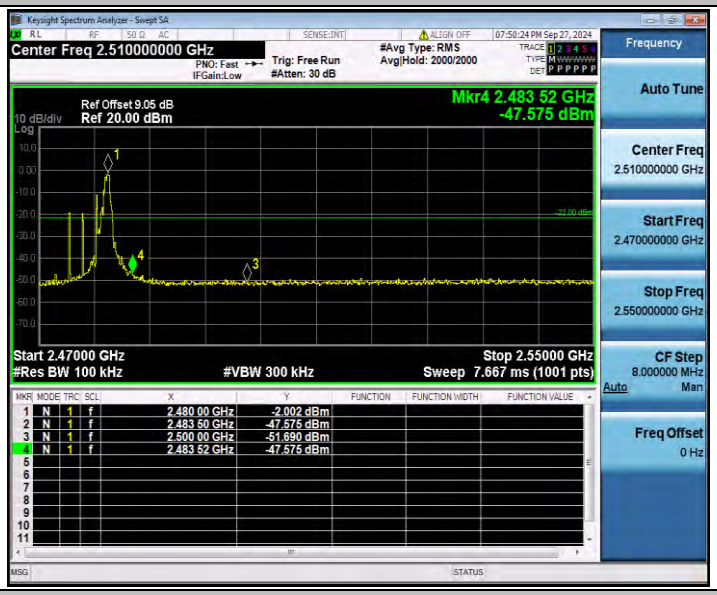
TestMode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	Low	2402	-3.70	-41.19	≤-23.7	PASS
		High	2480	-2.00	-47.58	≤-22	PASS
		Low	Hop_2402	-5.06	-46.54	≤-25.06	PASS
		High	Hop_2480	-1.79	-48.13	≤-21.79	PASS
2DH1	Ant1	Low	2402	-3.62	-38.22	≤-23.62	PASS
		High	2480	-1.82	-42.96	≤-21.82	PASS
		Low	Hop_2402	-6.52	-41.13	≤-26.52	PASS
		High	Hop_2480	-3.09	-47.72	≤-23.09	PASS
3DH1	Ant1	Low	2402	-3.51	-36.02	≤-23.51	PASS
		High	2480	-1.76	-39.44	≤-21.76	PASS
		Low	Hop_2402	-6.42	-39.89	≤-26.42	PASS
		High	Hop_2480	-2.50	-48.44	≤-22.5	PASS

Test Graphs

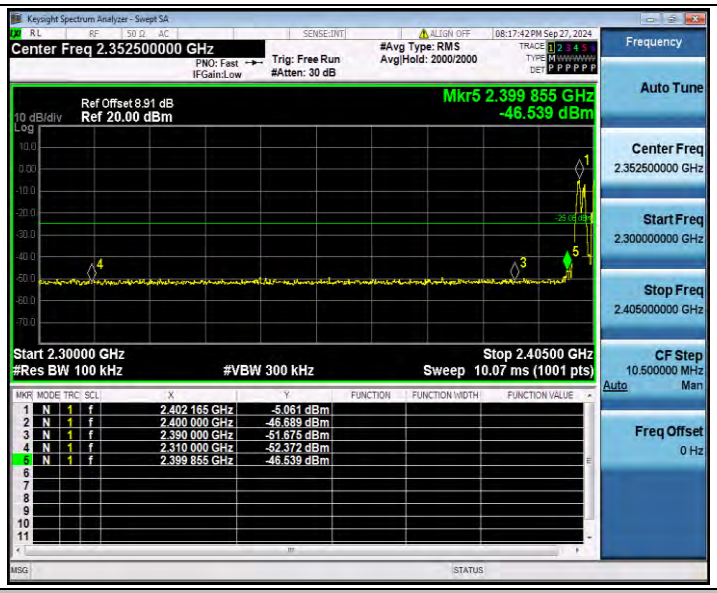
DH1_Ant1_Low_2402



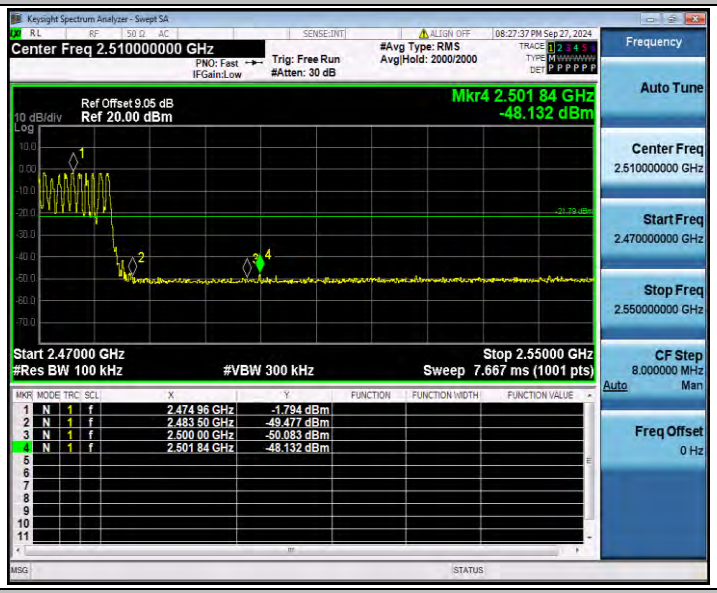
DH1_Ant1_High_2480



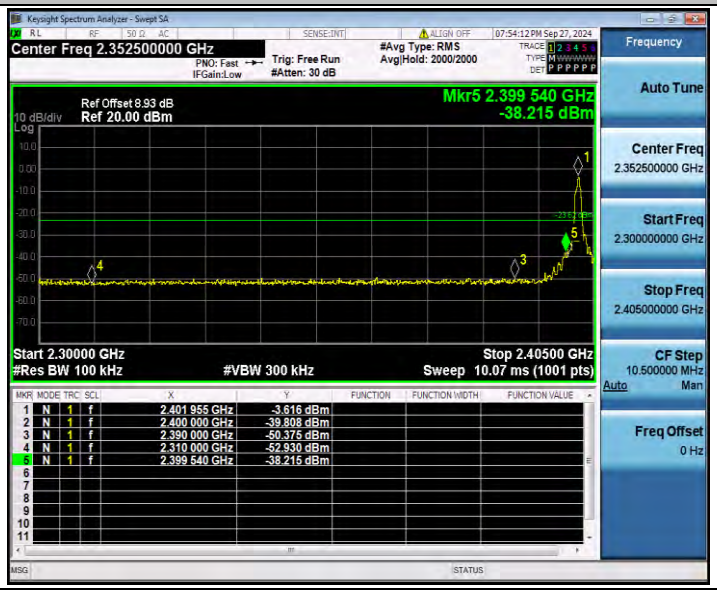
DH1_Ant1_Low_Hop_2402



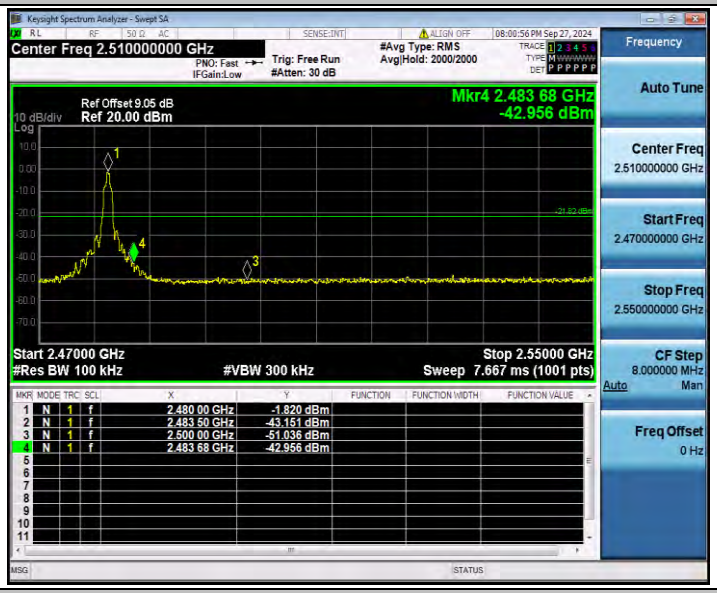
DH1_Ant1_High_Hop_2480



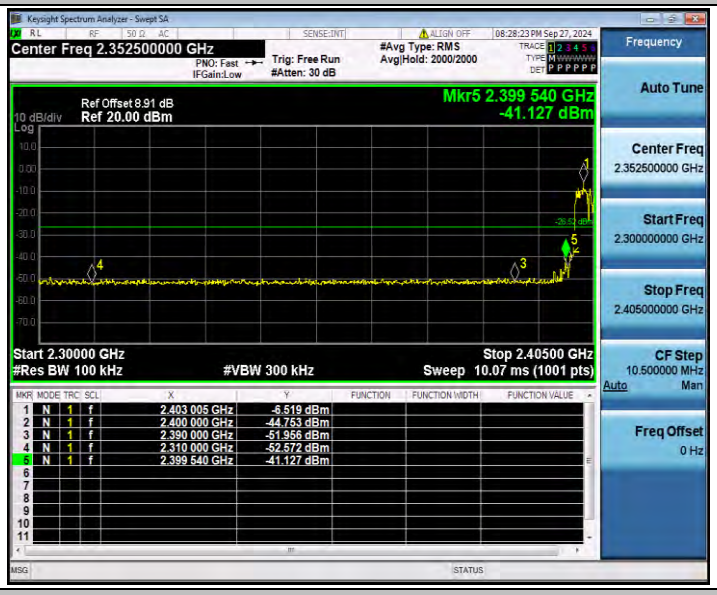
2DH1_Ant1_Low_2402



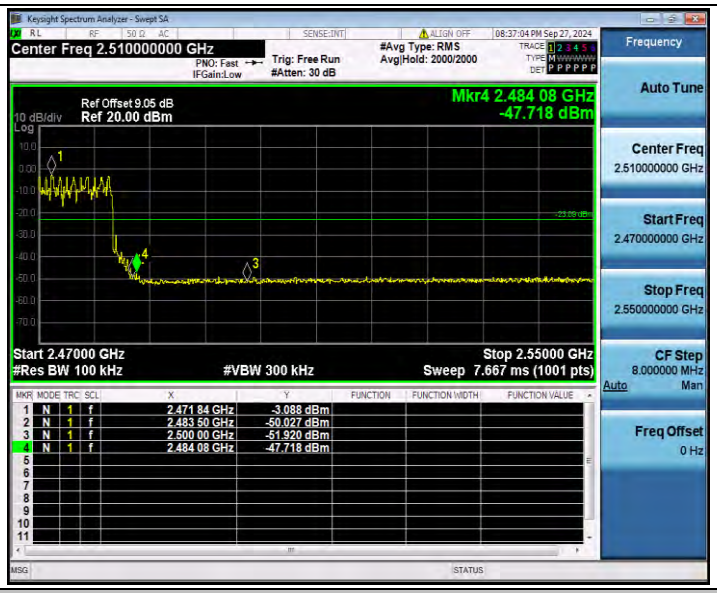
2DH1_Ant1_High_2480



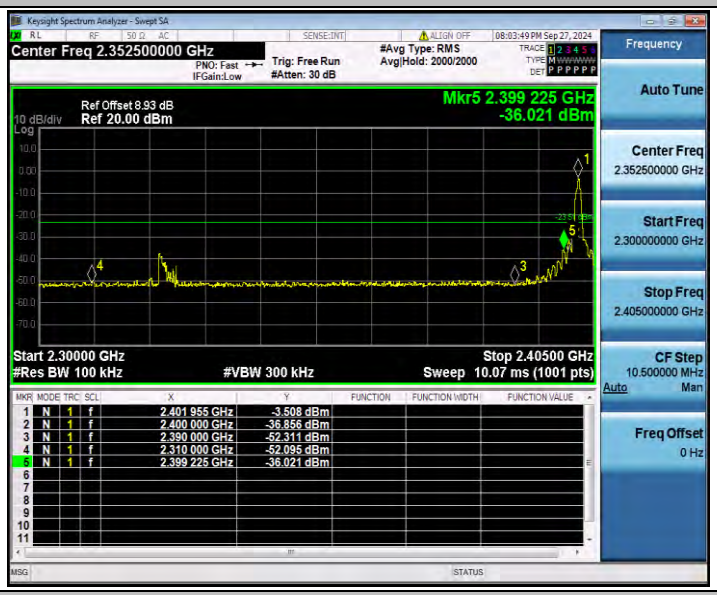
2DH1_Ant1_Low_Hop_2402



2DH1_Ant1_High_Hop_2480

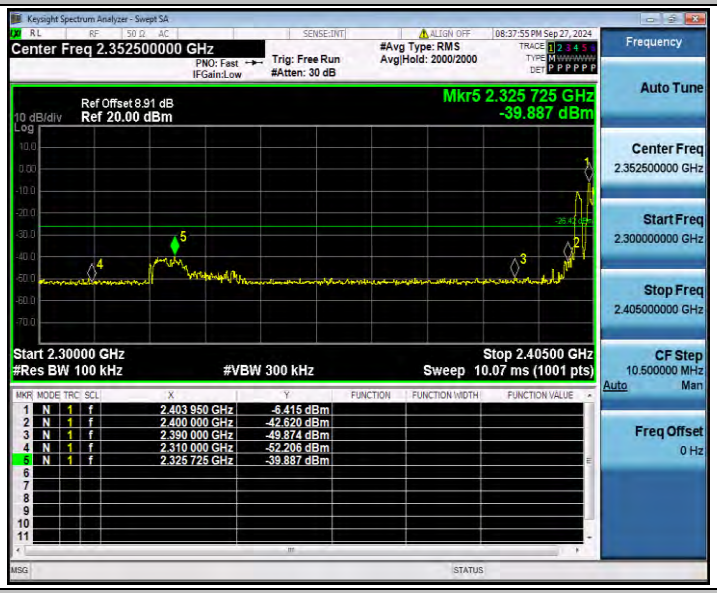


3DH1_Ant1_Low_2402

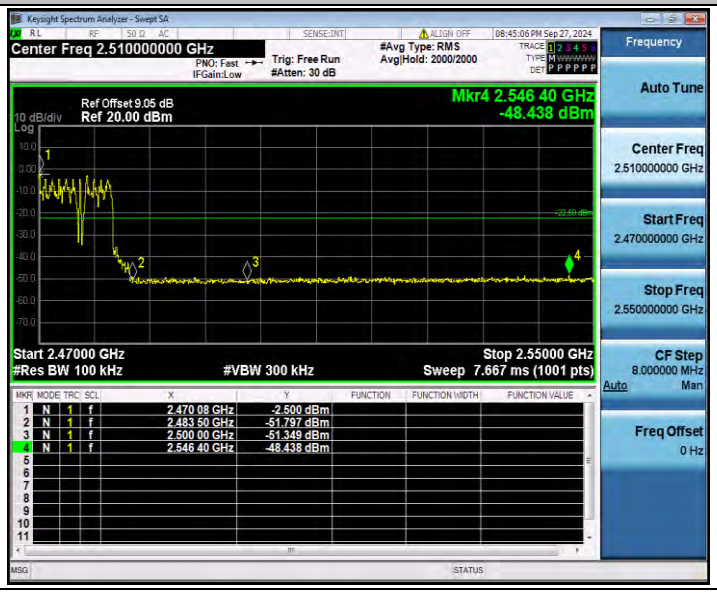


3DH1_Ant1_High_2480

3DH1_Ant1_Low_Hop_2402



3DH1_Ant1_High_Hop_2480



Appendix A.8: Conducted Spurious Emission

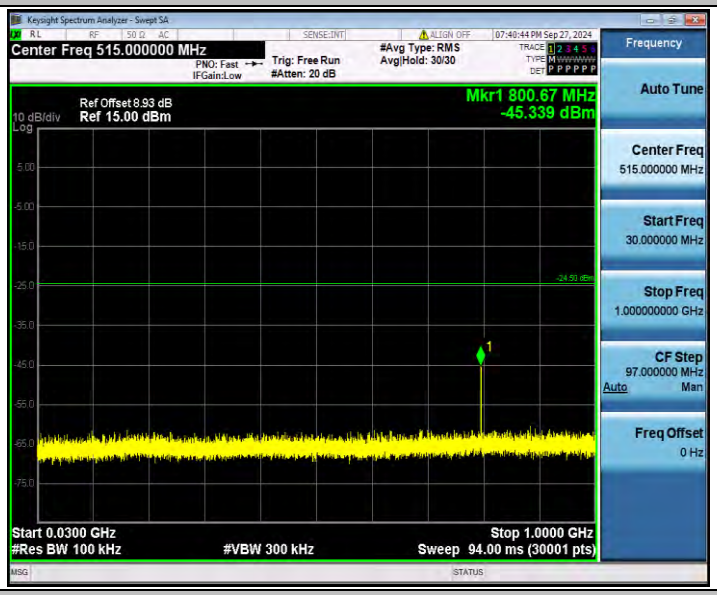
Test Result

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	2402	Reference	-4.50	-4.50	---	PASS
			30~1000	-4.50	-45.34	≤-24.5	PASS
			1000~26500	-4.50	-35.23	≤-24.5	PASS
		2441	Reference	-3.16	-3.16	---	PASS
			30~1000	-3.16	-45.18	≤-23.16	PASS
			1000~26500	-3.16	-39.3	≤-23.16	PASS
		2480	Reference	-2.61	-2.61	---	PASS
			30~1000	-2.61	-45.26	≤-22.61	PASS
			1000~26500	-2.61	-39.64	≤-22.61	PASS
2DH1	Ant1	2402	Reference	-4.43	-4.43	---	PASS
			30~1000	-4.43	-46.11	≤-24.43	PASS
			1000~26500	-4.43	-38.92	≤-24.43	PASS
		2441	Reference	-2.76	-2.76	---	PASS
			30~1000	-2.76	-45.79	≤-22.76	PASS
			1000~26500	-2.76	-39.83	≤-22.76	PASS
		2480	Reference	-2.71	-2.71	---	PASS
			30~1000	-2.71	-45.08	≤-22.71	PASS
			1000~26500	-2.71	-40.5	≤-22.71	PASS
3DH1	Ant1	2402	Reference	-4.42	-4.42	---	PASS
			30~1000	-4.42	-46.62	≤-24.42	PASS
			1000~26500	-4.42	-38.66	≤-24.42	PASS
		2441	Reference	-2.84	-2.84	---	PASS
			30~1000	-2.84	-46	≤-22.84	PASS
			1000~26500	-2.84	-39.31	≤-22.84	PASS
		2480	Reference	-2.36	-2.36	---	PASS
			30~1000	-2.36	-45.63	≤-22.36	PASS
			1000~26500	-2.36	-40.02	≤-22.36	PASS

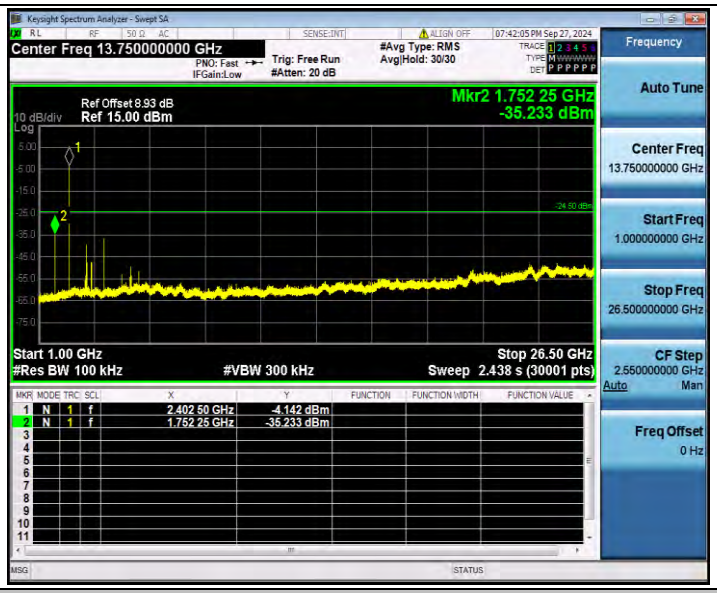
Test Graphs

DH1_Ant1_2402_0~Reference

DH1_Ant1_2402_30~1000



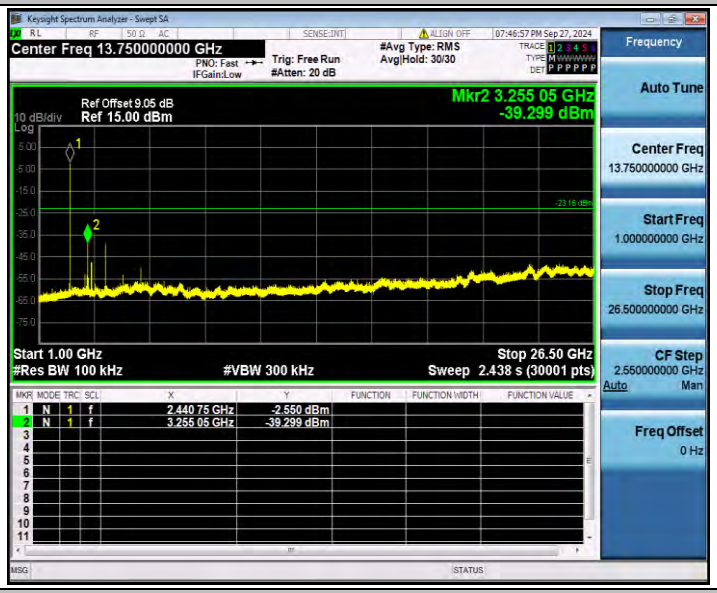
DH1_Ant1_2402_1000~26500



DH1_Ant1_2441_0~Reference

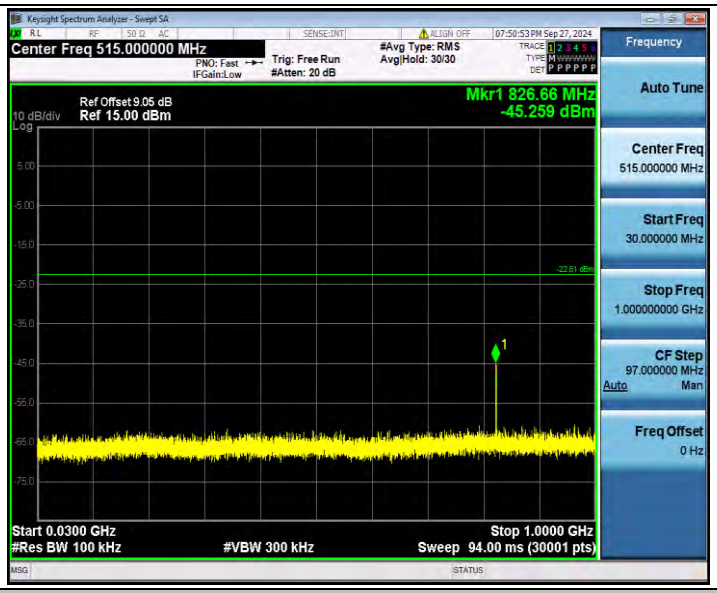
DH1_Ant1_2441_30~1000

DH1_Ant1_2441_1000~26500

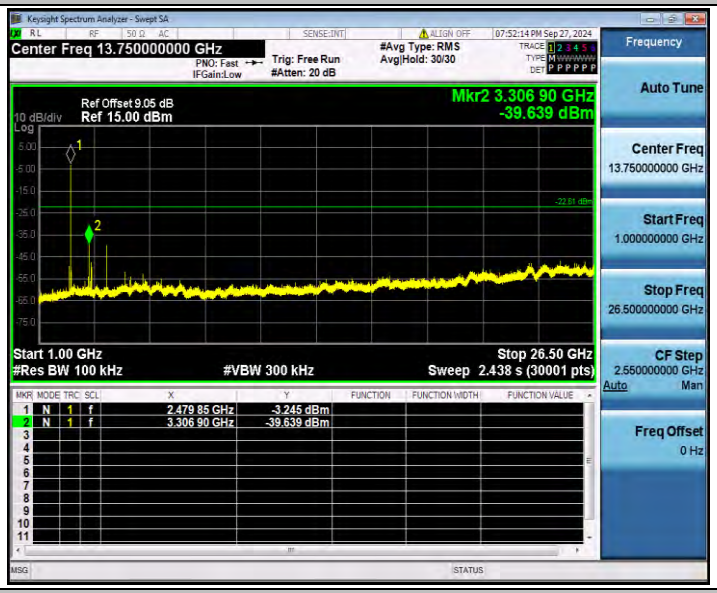


DH1_Ant1_2480_0~Reference

DH1_Ant1_2480_30~1000

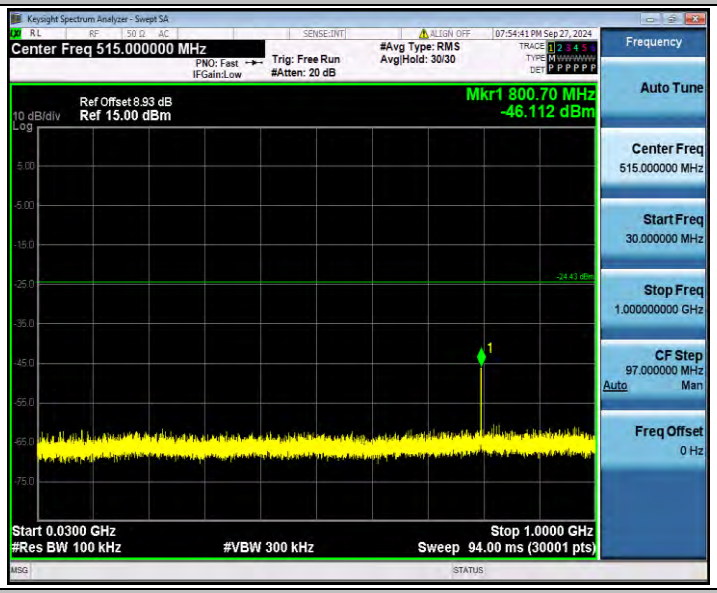


DH1_Ant1_2480_1000~26500

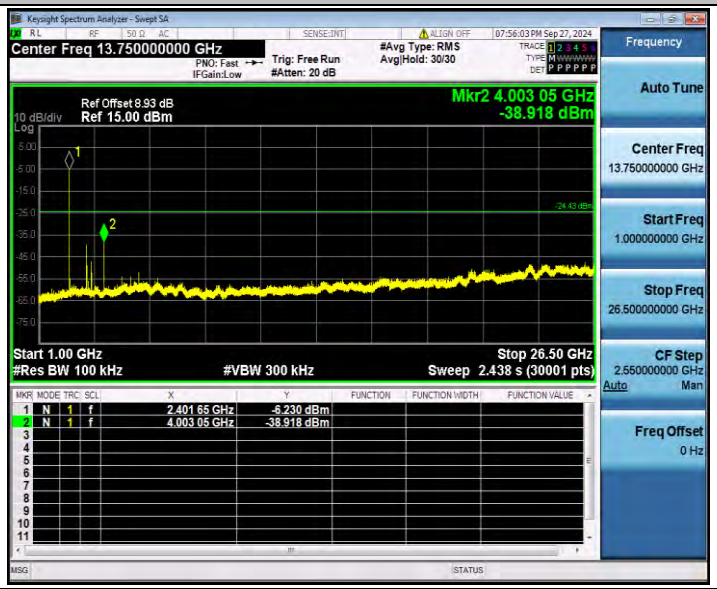


2DH1_Ant1_2402_0~Reference

2DH1_Ant1_2402_30~1000

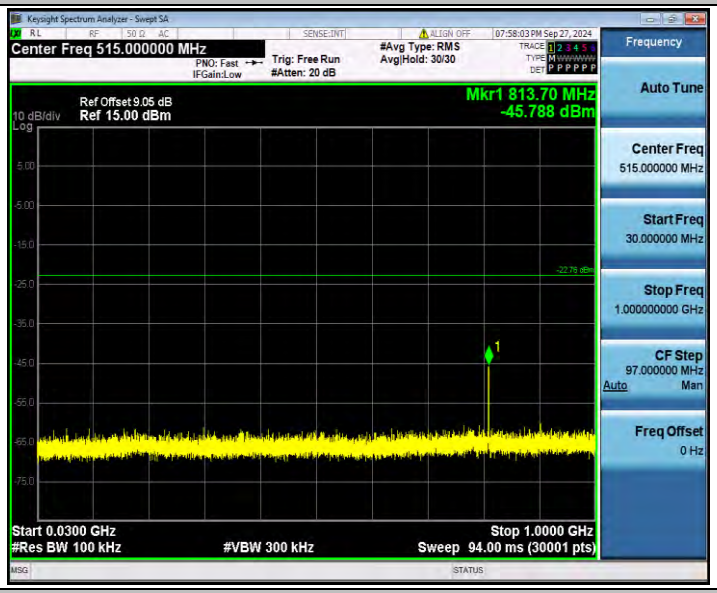


2DH1_Ant1_2402_1000~26500

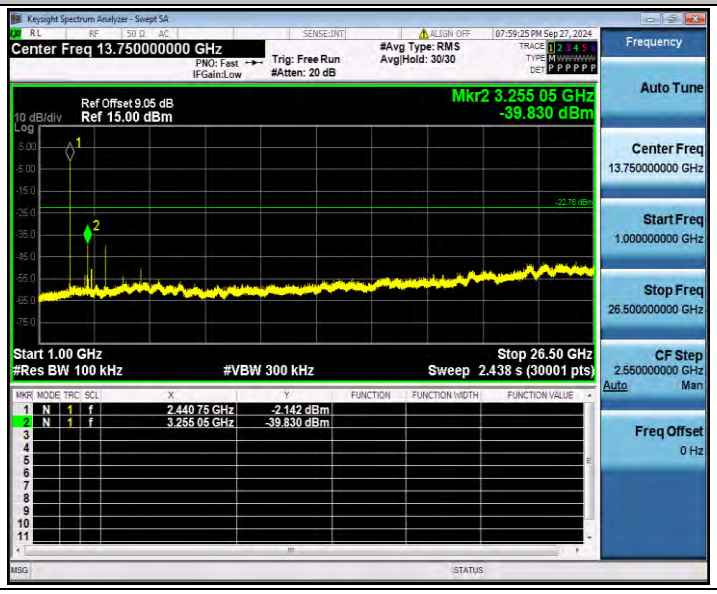


2DH1_Ant1_2441_0~Reference

2DH1_Ant1_2441_30~1000

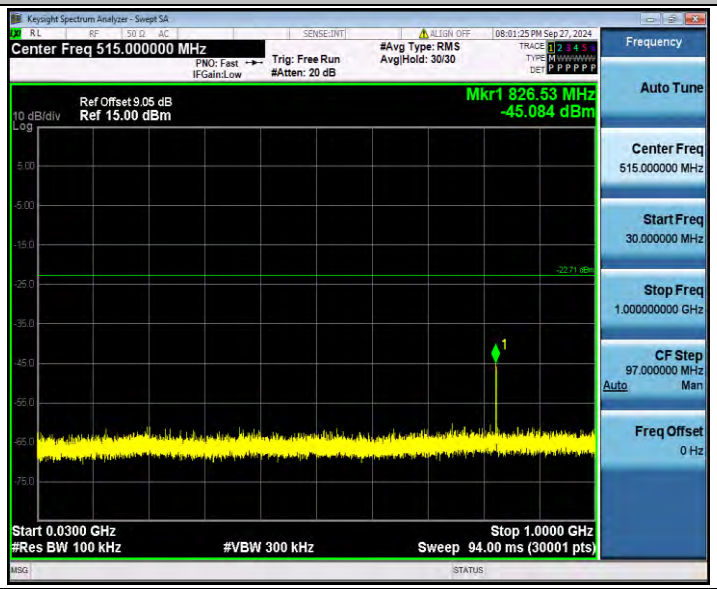


2DH1_Ant1_2441_1000~26500

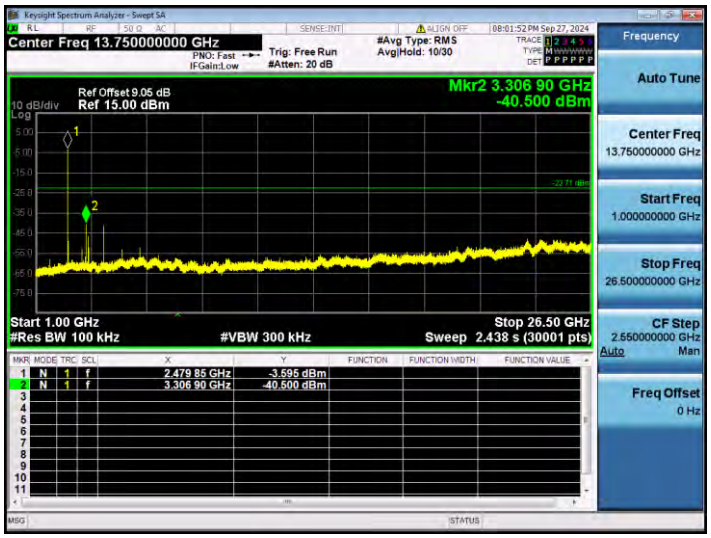


2DH1_Ant1_2480_0~Reference

2DH1_Ant1_2480_30~1000

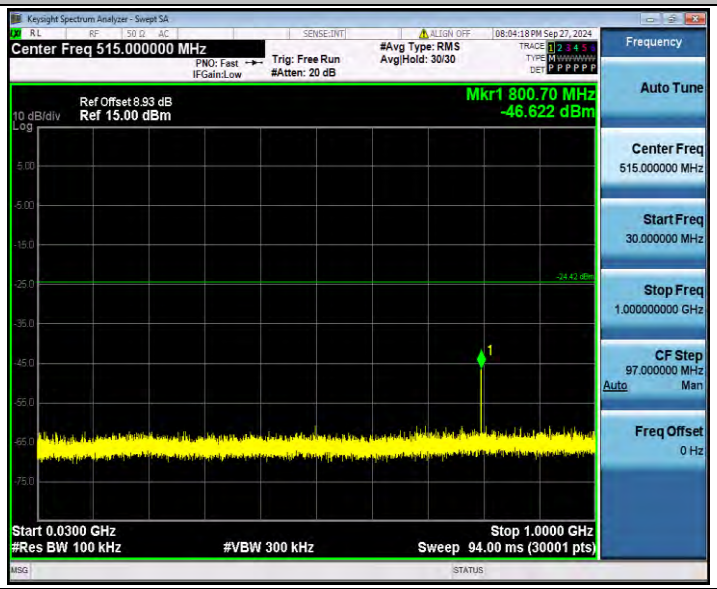


2DH1_Ant1_2480_1000~26500

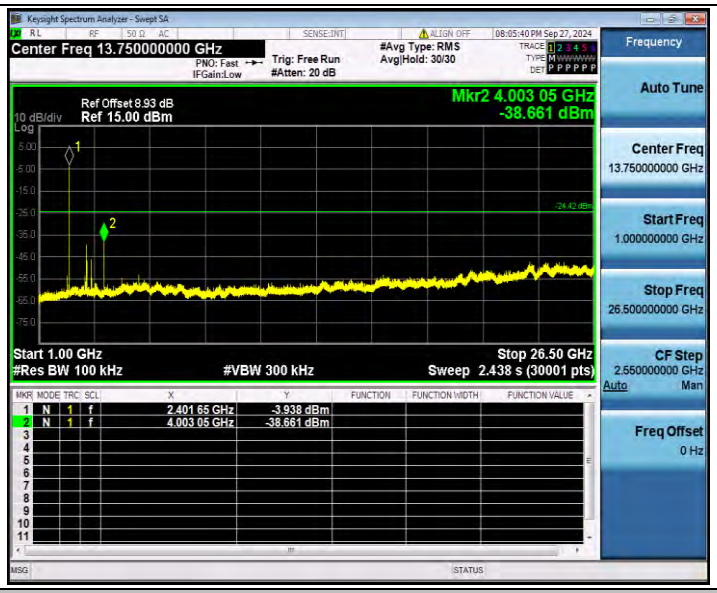


3DH1_Ant1_2402_0~Reference

3DH1_Ant1_2402_30~1000



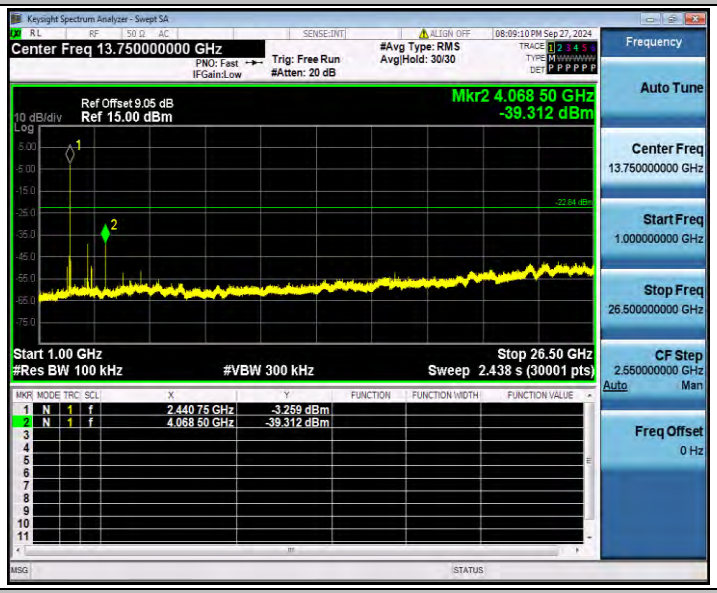
3DH1_Ant1_2402_1000~26500



3DH1_Ant1_2441_0~Reference

3DH1_Ant1_2441_30~1000

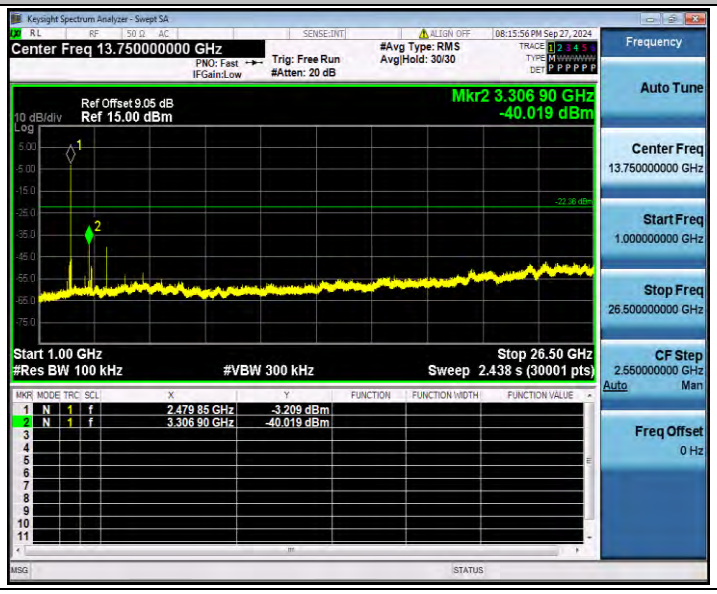
3DH1_Ant1_2441_1000~26500



3DH1_Ant1_2480_0~Reference

3DH1_Ant1_2480_30~1000

3DH1_Ant1_2480_1000~26500



Appendix A.9: Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Freq(MHz)	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
DH1	Ant1	Low	2402	AV	2310.000	-49.47	≤-41.20	45.73	≤54	PASS
				AV	2389.880	-49.15	≤-41.20	46.05	≤54	PASS
				AV	2390.000	-49.17	≤-41.20	46.03	≤54	PASS
				Peak	2310.000	-42.89	≤-21.20	52.31	≤74	PASS
				Peak	2323.625	-39.46	≤-21.20	55.74	≤74	PASS
				Peak	2390.000	-42.92	≤-21.20	52.28	≤74	PASS
		High	2480	AV	2483.500	-44.95	≤-41.20	50.25	≤54	PASS
				AV	2483.520	-44.95	≤-41.20	50.25	≤54	PASS
				AV	2500.000	-48.79	≤-41.20	46.41	≤54	PASS
				Peak	2483.500	-36.59	≤-21.20	58.61	≤74	PASS
				Peak	2484.800	-34.33	≤-21.20	60.87	≤74	PASS
				Peak	2500.000	-41.71	≤-21.20	53.49	≤74	PASS
2DH1	Ant1	Low	2402	AV	2310.000	-49.53	≤-41.20	45.67	≤54	PASS
				AV	2389.985	-48.8	≤-41.20	46.40	≤54	PASS
				AV	2390.000	-48.8	≤-41.20	46.40	≤54	PASS
				Peak	2310.000	-42.29	≤-21.20	52.91	≤74	PASS
				Peak	2378.645	-39.02	≤-21.20	56.18	≤74	PASS
				Peak	2390.000	-42.38	≤-21.20	52.82	≤74	PASS
		High	2480	AV	2483.500	-42.15	≤-41.20	53.05	≤54	PASS
				AV	2483.520	-42.15	≤-41.20	53.05	≤54	PASS
				AV	2500.000	-48.77	≤-41.20	46.43	≤54	PASS
				Peak	2483.500	-33.36	≤-21.20	61.84	≤74	PASS
				Peak	2483.760	-24.77	≤-21.20	70.43	≤74	PASS
				Peak	2500.000	-40.18	≤-21.20	55.02	≤74	PASS
3DH1	Ant1	Low	2402	AV	2310.000	-49.27	≤-41.20	45.93	≤54	PASS
				AV	2389.880	-48.65	≤-41.20	46.55	≤54	PASS
				AV	2390.000	-48.82	≤-41.20	46.38	≤54	PASS
				Peak	2310.000	-42.07	≤-21.20	53.13	≤74	PASS
				Peak	2386.625	-39.21	≤-21.20	55.99	≤74	PASS
				Peak	2390.000	-42.36	≤-21.20	52.84	≤74	PASS
		High	2480	AV	2483.500	-42.04	≤-41.20	53.16	≤54	PASS
				AV	2483.520	-42.04	≤-41.20	53.16	≤54	PASS
				AV	2500.000	-48.71	≤-41.20	46.49	≤54	PASS
				Peak	2483.500	-24.29	≤-21.20	70.91	≤74	PASS
				Peak	2483.680	-23.97	≤-21.20	71.23	≤74	PASS

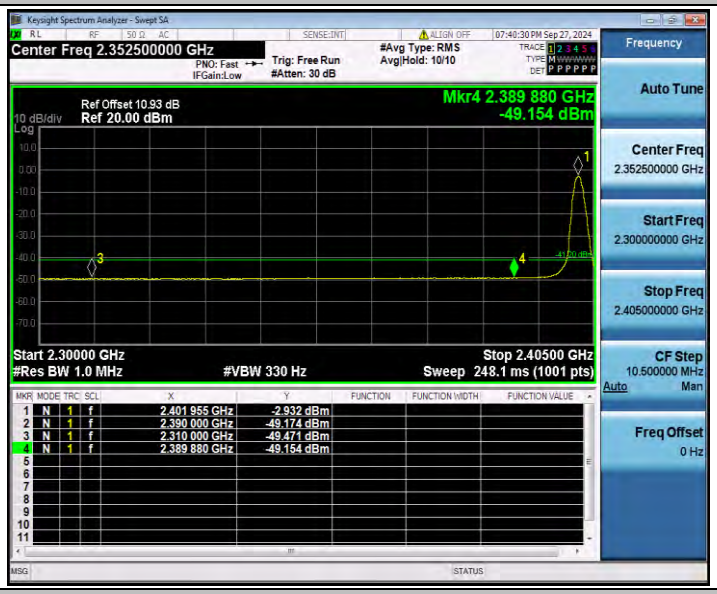
				Peak	2500.000	-40.01	≤-21.20	55.19	≤74	PASS

Note：

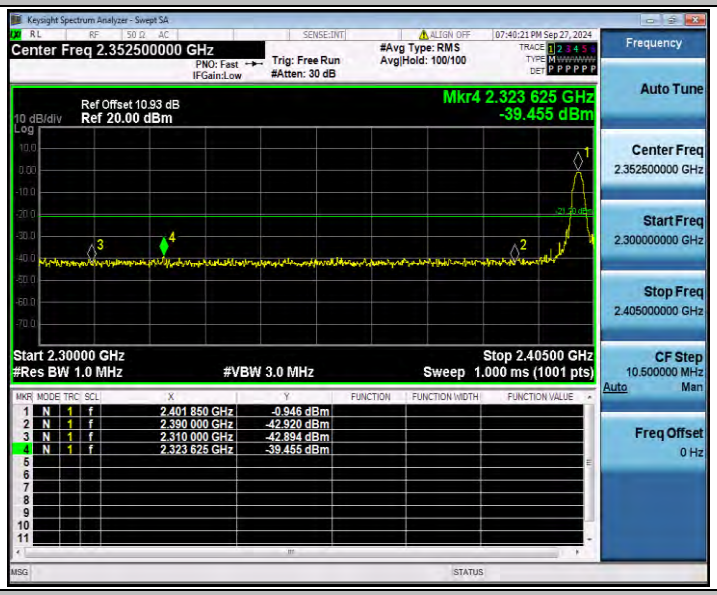
1. The Antenna Gain is compensated in the graph.
2. The Duty Cycle Factor and RBW Factor is compensated in the graph.
3. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

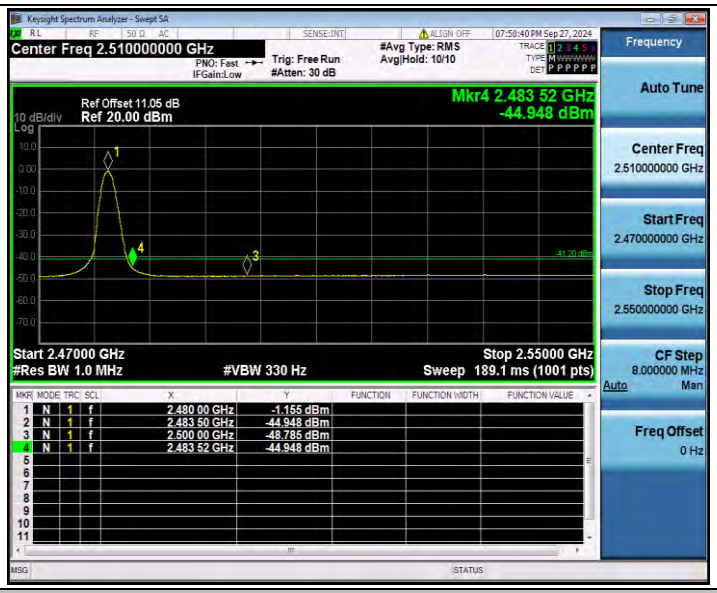
DH1_Ant1_Low_2402_AV



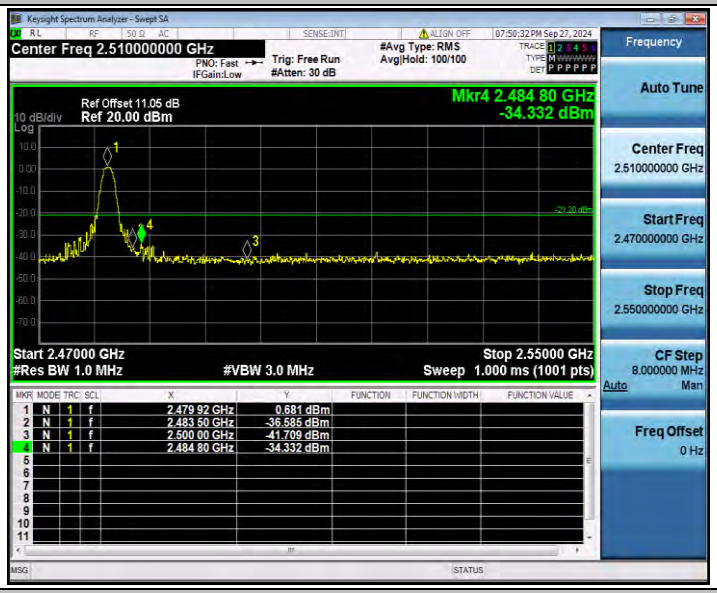
DH1_Ant1_Low_2402_Peak



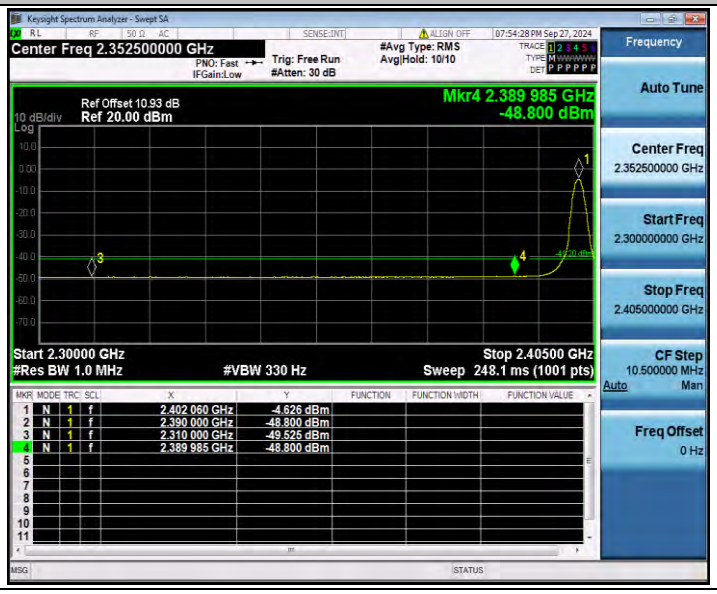
DH1_Ant1_High_2480_AV



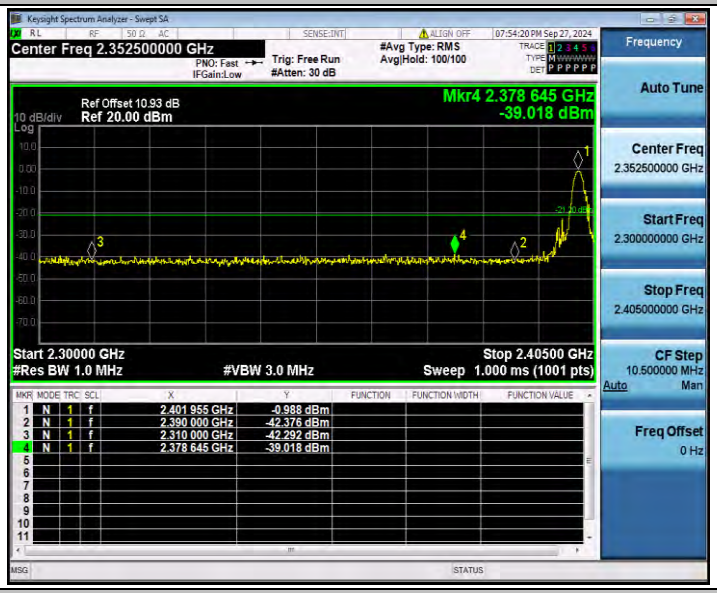
DH1_Ant1_High_2480_Peak



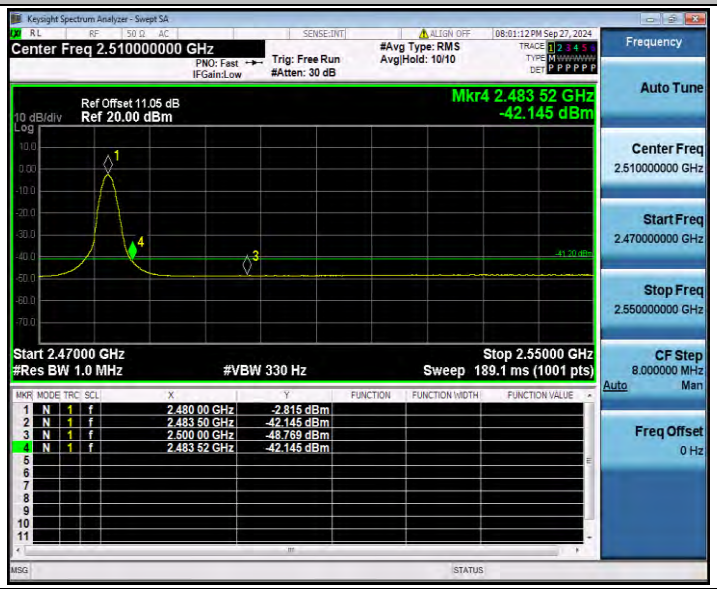
2DH1_Ant1_Low_2402_AV



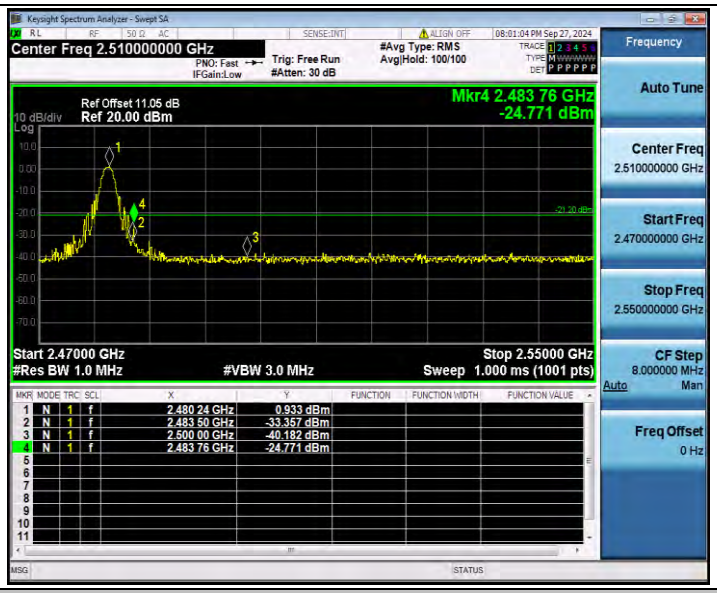
2DH1_Ant1_Low_2402_Peak



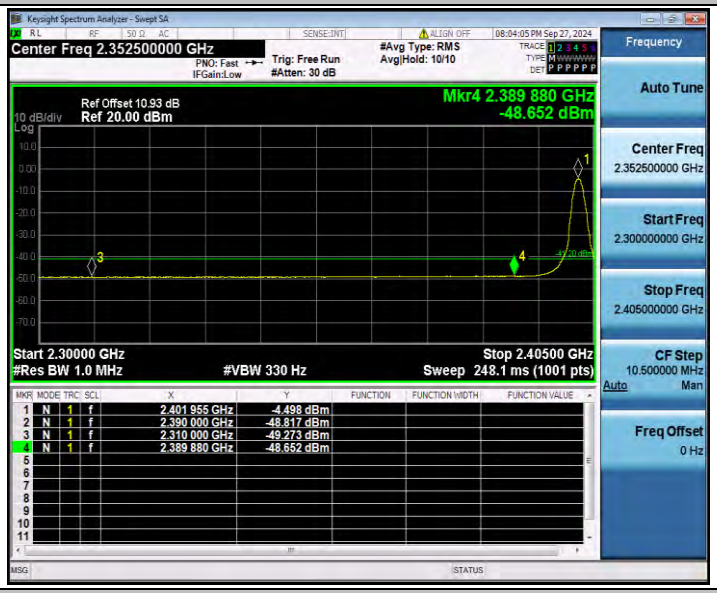
2DH1_Ant1_High_2480_AV



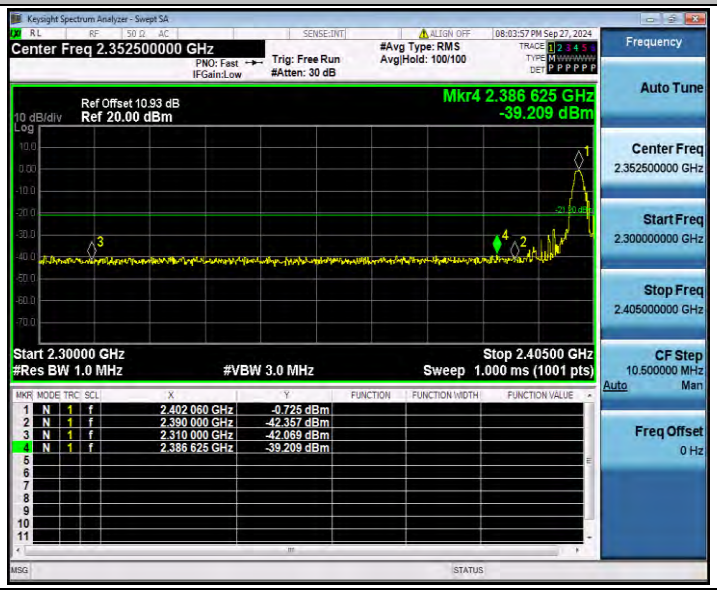
2DH1_Ant1_High_2480_Peak



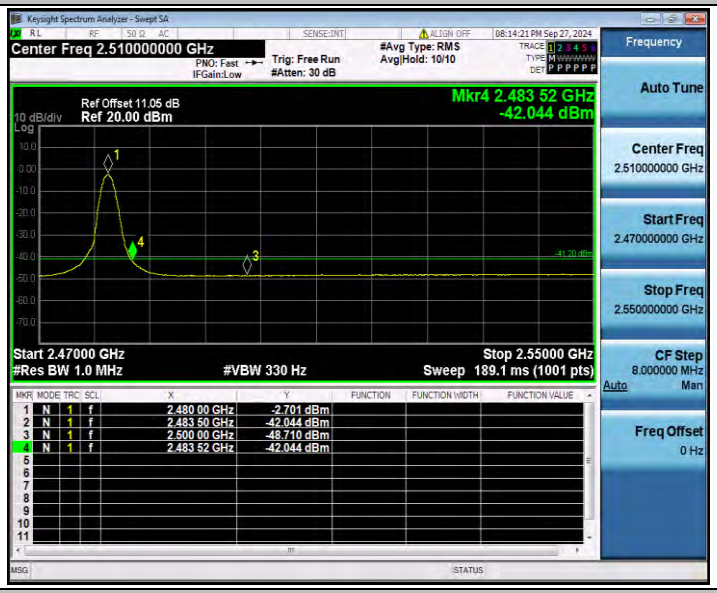
3DH1_Ant1_Low_2402_AV



3DH1_Ant1_Low_2402_Peak



3DH1_Ant1_High_2480_AV



3DH1_Ant1_High_2480_Peak