

Appendix A

RF Test Data for BT (Conducted Measurement)

Product Name: Bluetooth car model speaker

Test Model: WS-691

Environmental Conditions

Temperature:	23.8°C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Suichao Lai
Supervised by:	Yan Chen

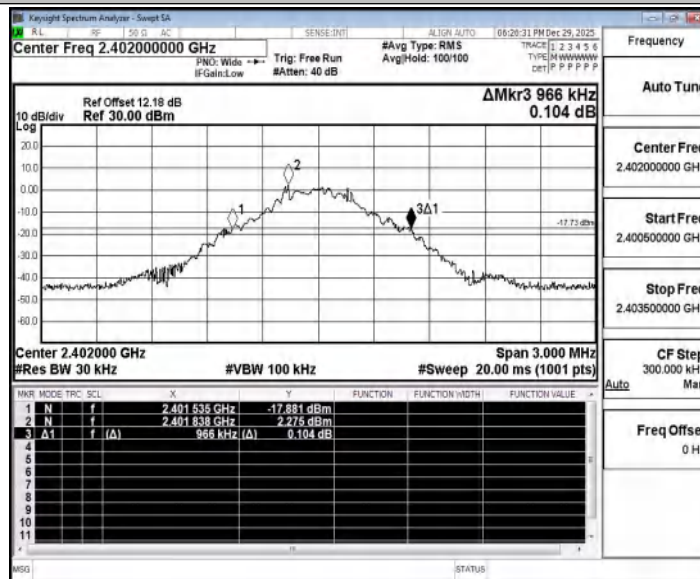
A.1 20dB Emission Bandwidth

Test Result

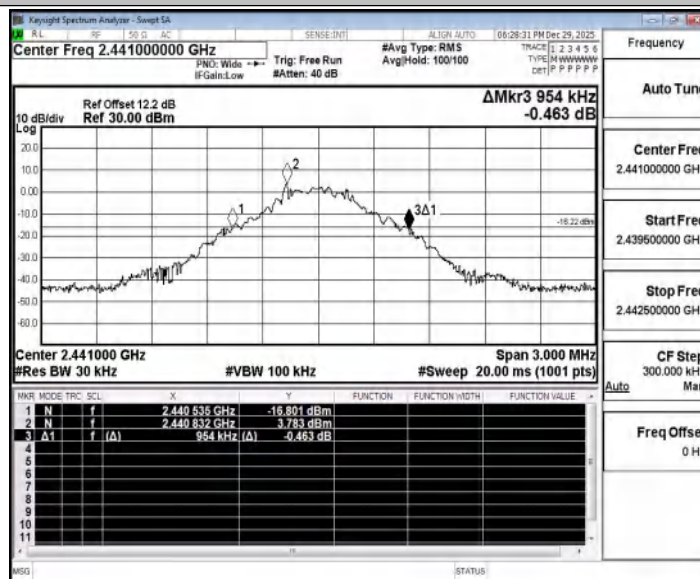
TestMode	Antenna	Freq(MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.966	2401.535	2402.501	---	---
		2441	0.954	2440.535	2441.489	---	---
		2480	0.960	2479.535	2480.495	---	---
2DH5	Ant1	2402	1.281	2401.367	2402.648	---	---
		2441	1.287	2440.358	2441.645	---	---
		2480	1.281	2479.364	2480.645	---	---
3DH5	Ant1	2402	1.296	2401.349	2402.645	---	---
		2441	1.287	2440.352	2441.639	---	---
		2480	1.299	2479.346	2480.645	---	---

Test Graphs

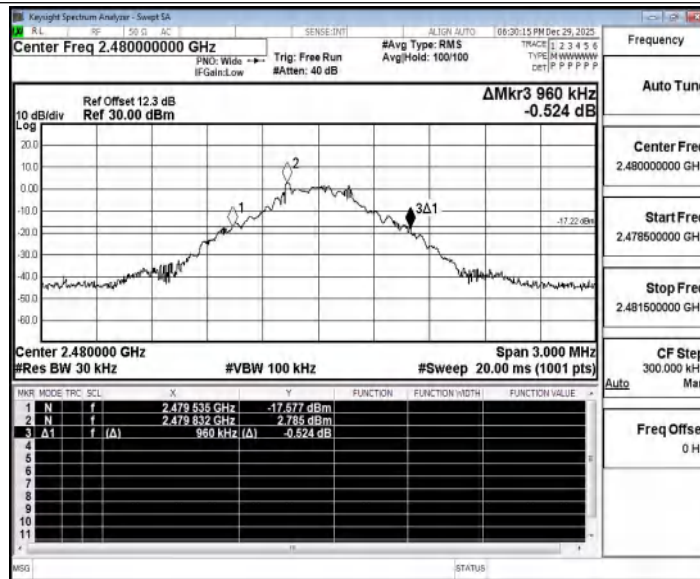
DH5_Ant1_2402



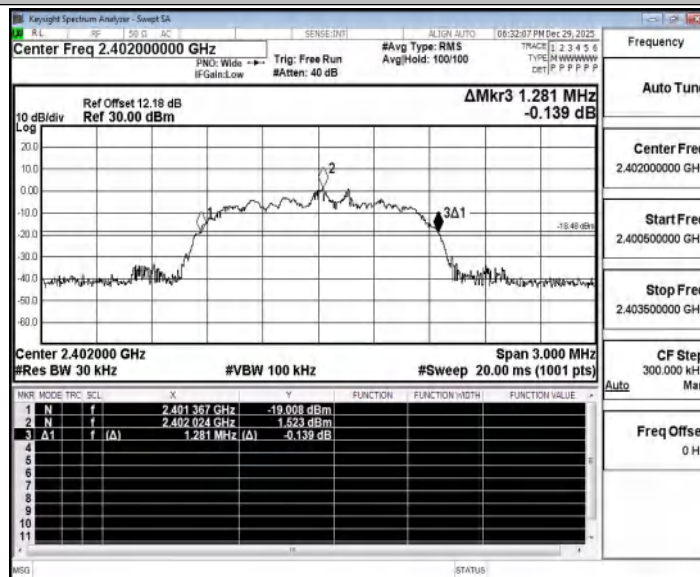
DH5_Ant1_2441



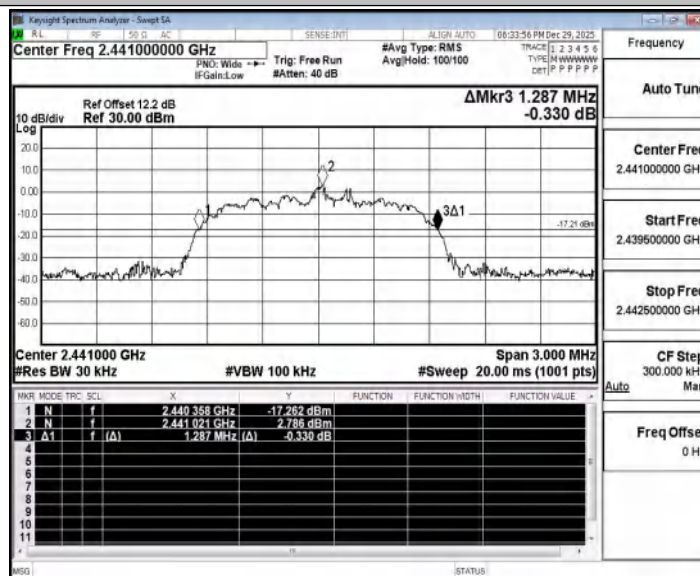
DH5_Ant1_2480



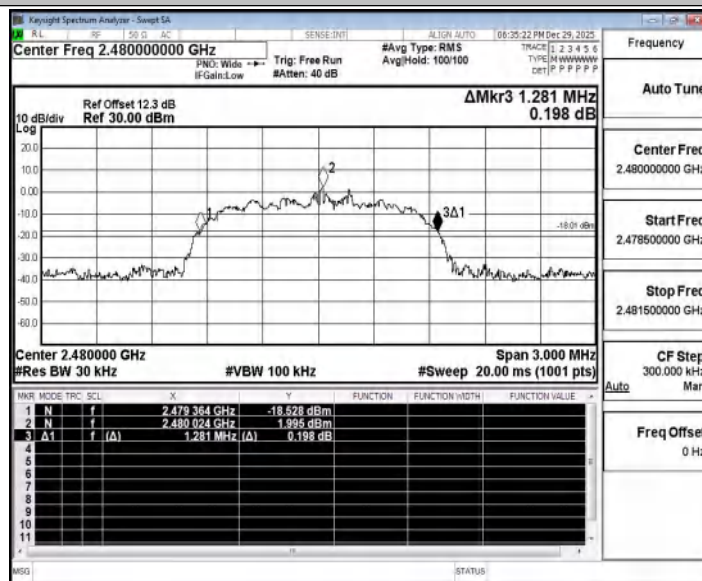
2DH5_Ant1_2402



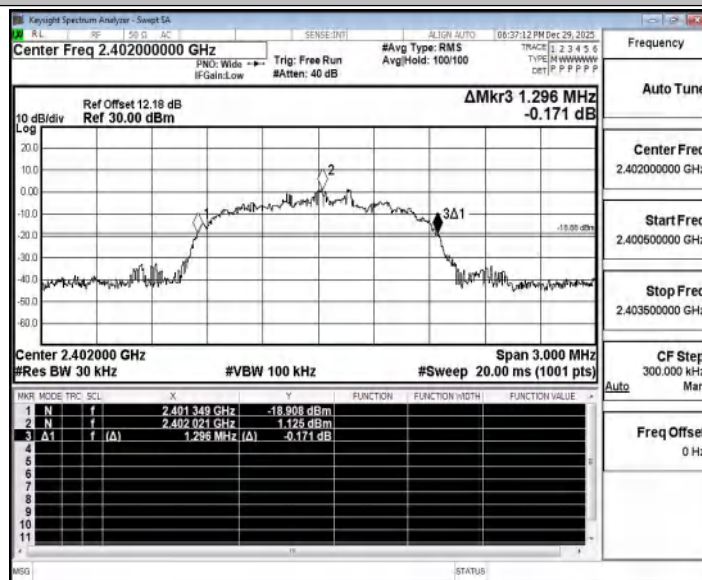
2DH5_Ant1_2441



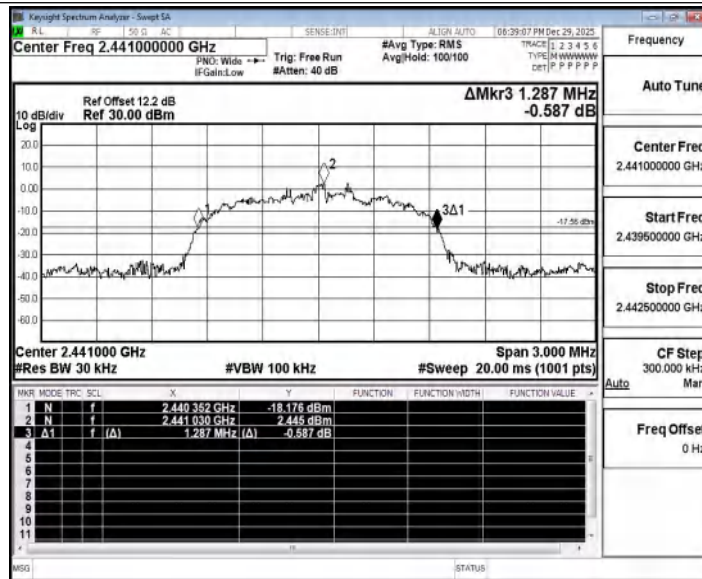
2DH5_Ant1_2480



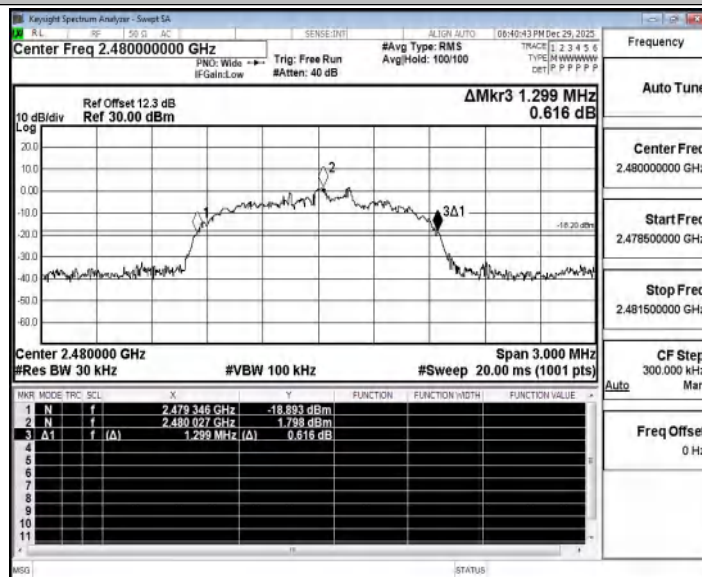
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



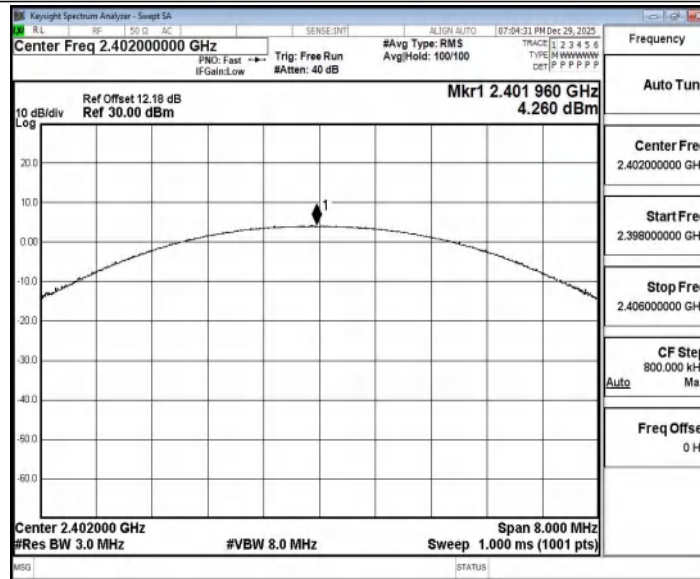
A.2 Maximum Peak conducted output power

Test Result Peak

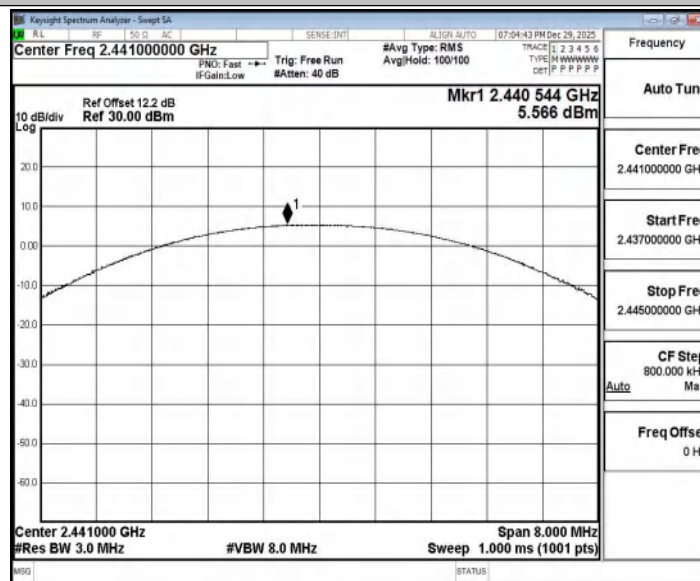
Test Mode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	4.26	≤30	PASS
		2441	5.57	≤30	PASS
		2480	4.58	≤30	PASS
2DH5	Ant1	2402	5.54	≤30	PASS
		2441	6.54	≤30	PASS
		2480	5.41	≤30	PASS
3DH5	Ant1	2402	5.78	≤30	PASS
		2441	6.71	≤30	PASS
		2480	5.61	≤30	PASS

Test Graphs

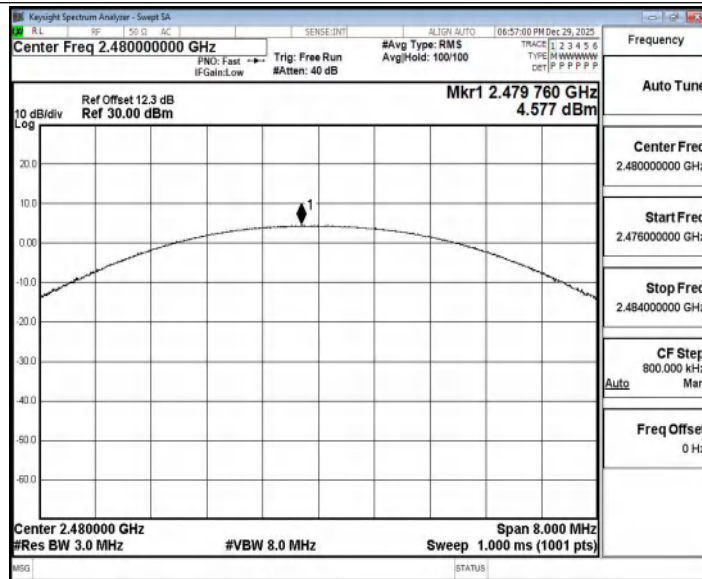
DH5_Ant1_2402



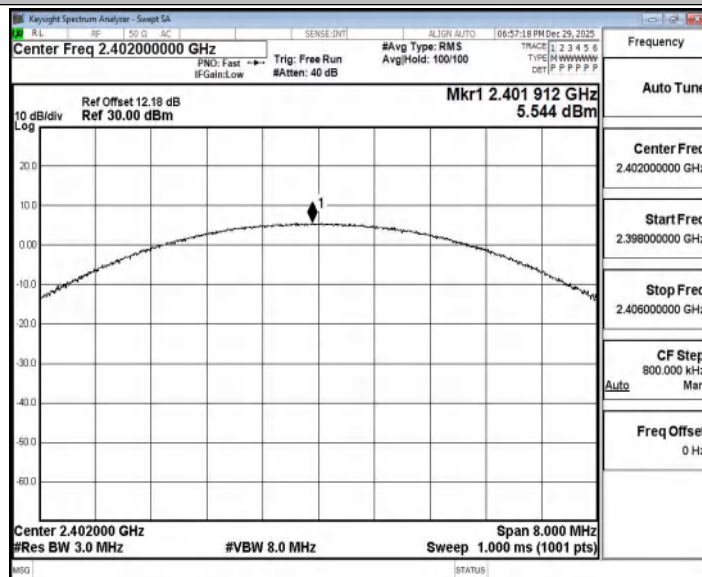
DH5_Ant1_2441



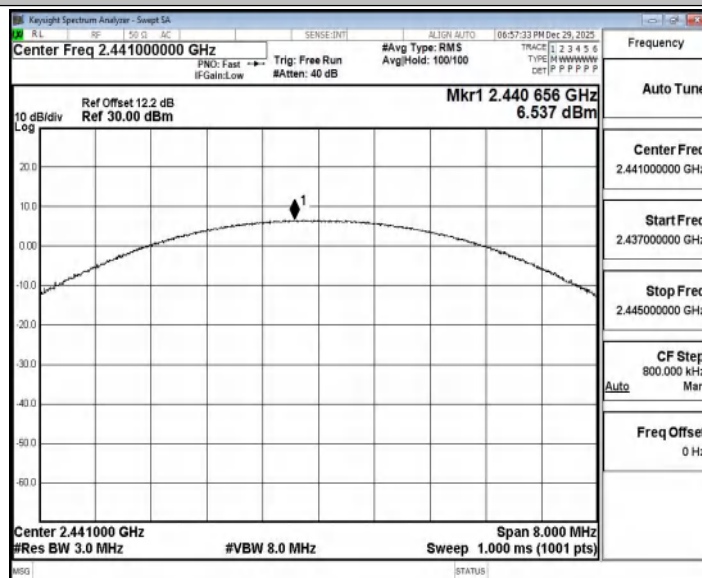
DH5_Ant1_2480



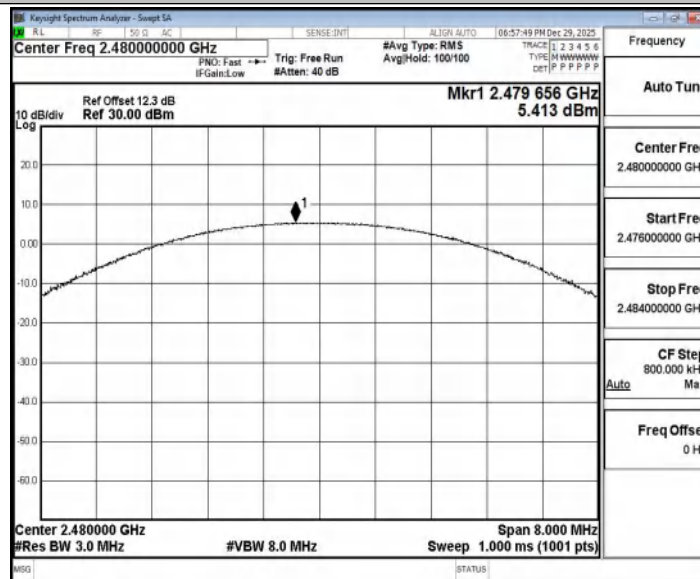
2DH5_Ant1_2402



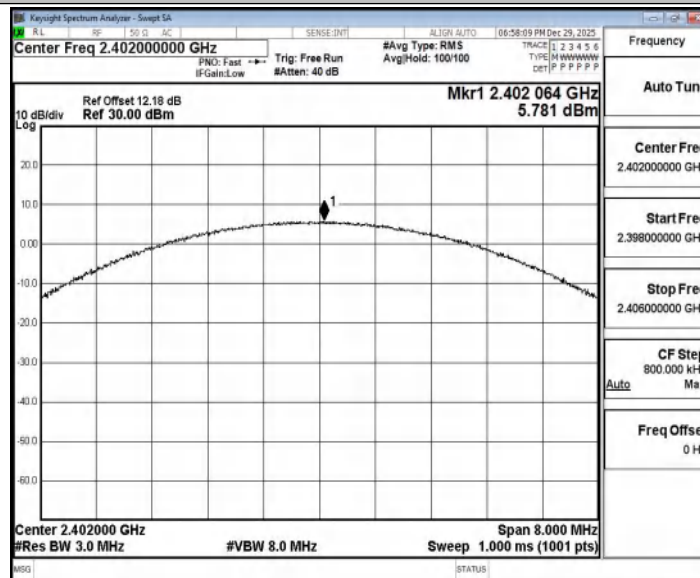
2DH5_Ant1_2441



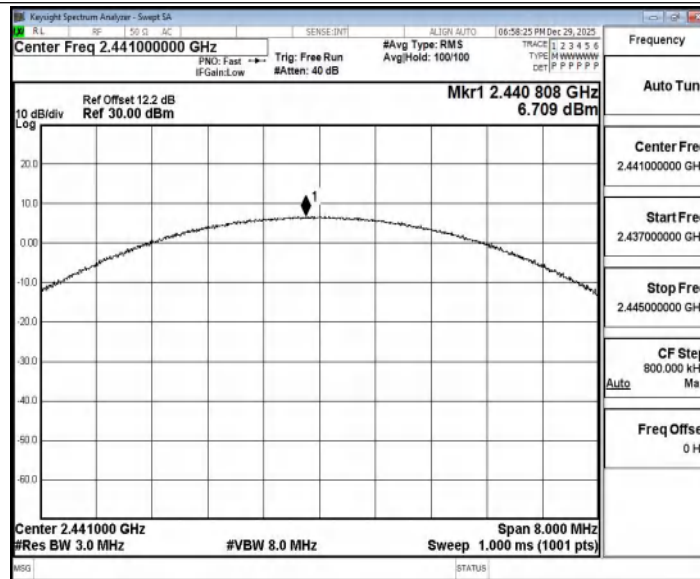
2DH5_Ant1_2480



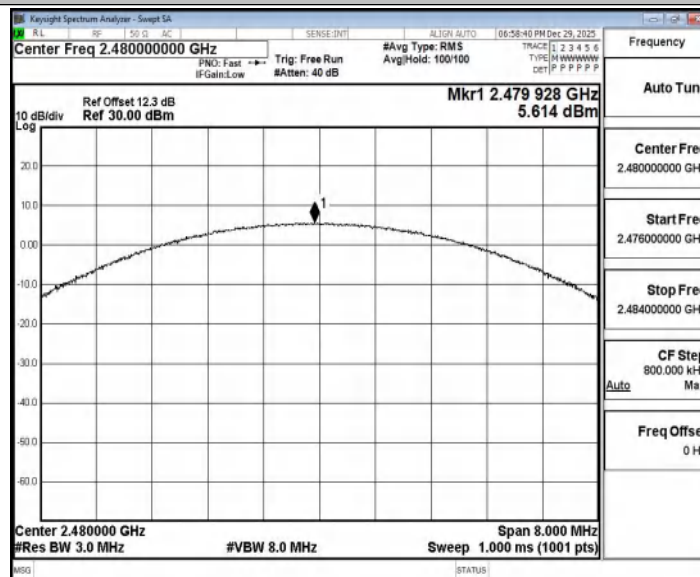
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



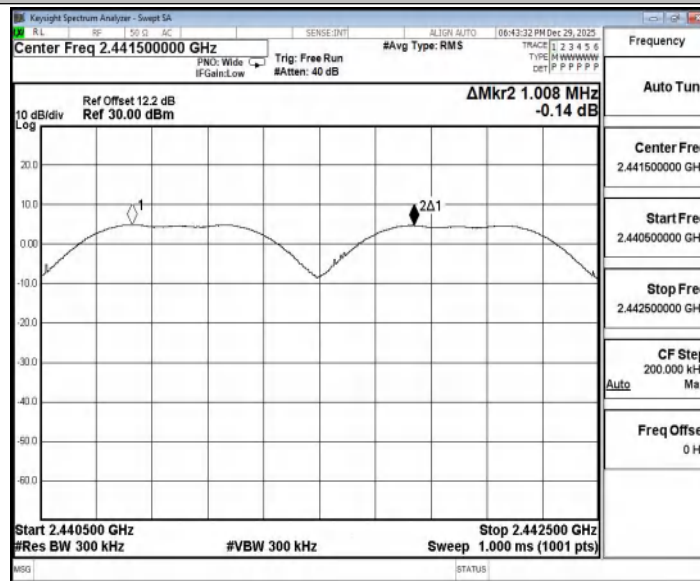
A.3 Carrier frequency separation

Test Result

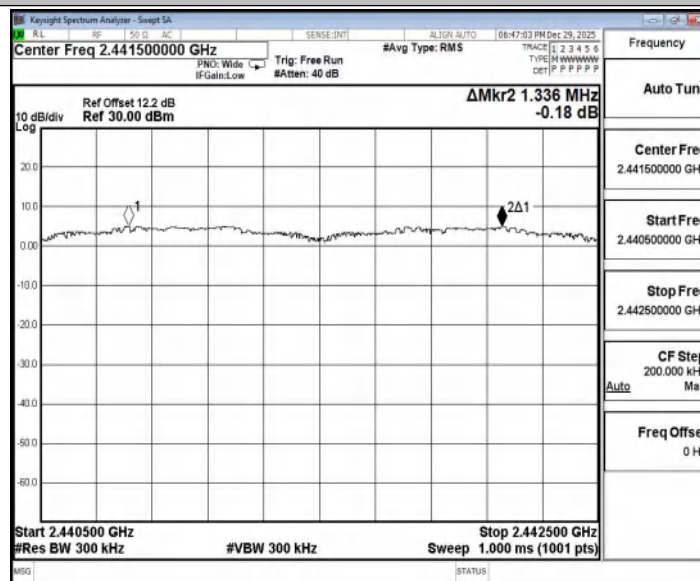
TestMode	Antenna	Freq(MHz)	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.008	≥ 0.966	PASS
2DH5	Ant1	Hop	1.336	≥ 1.287	PASS
3DH5	Ant1	Hop	0.998	≥ 0.866	PASS

Test Graphs

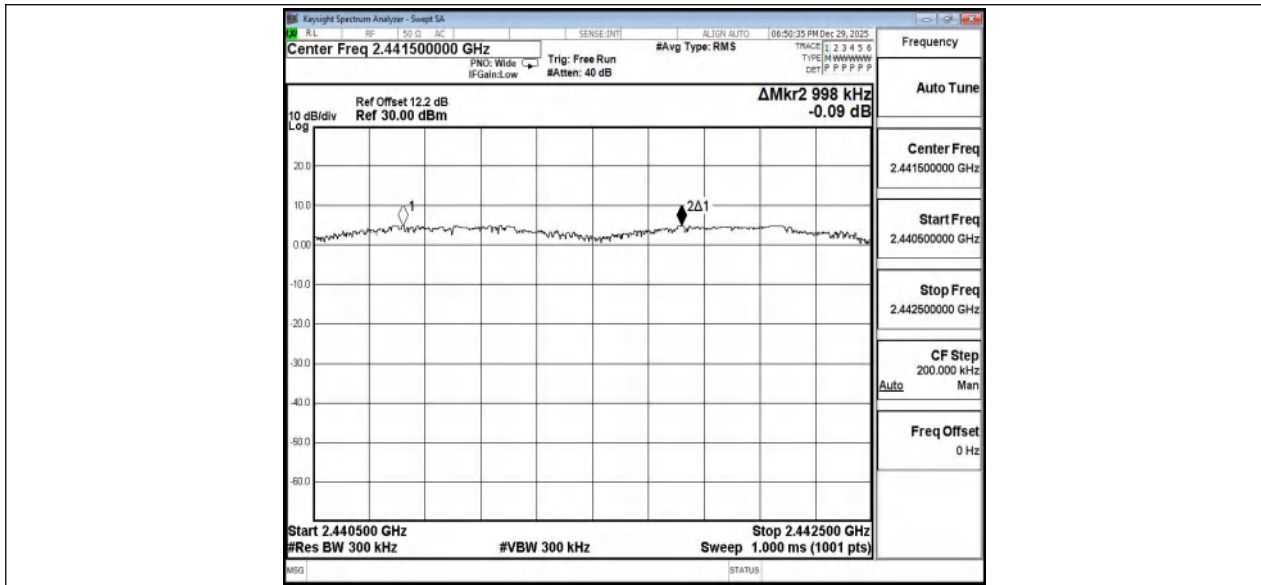
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



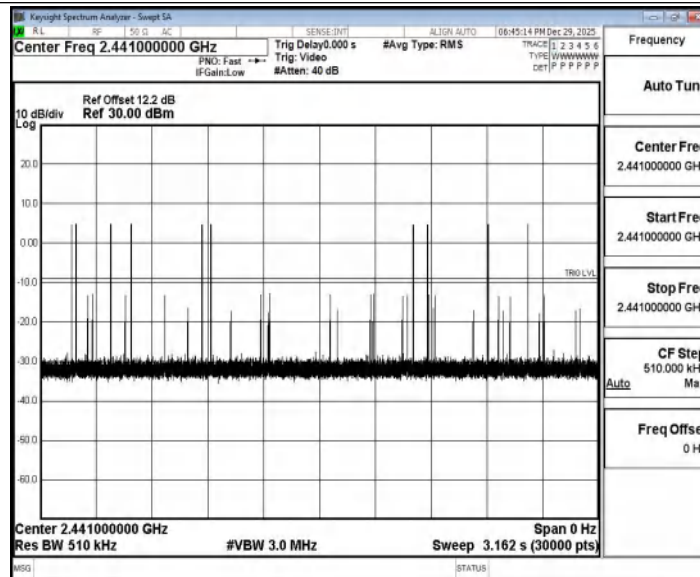
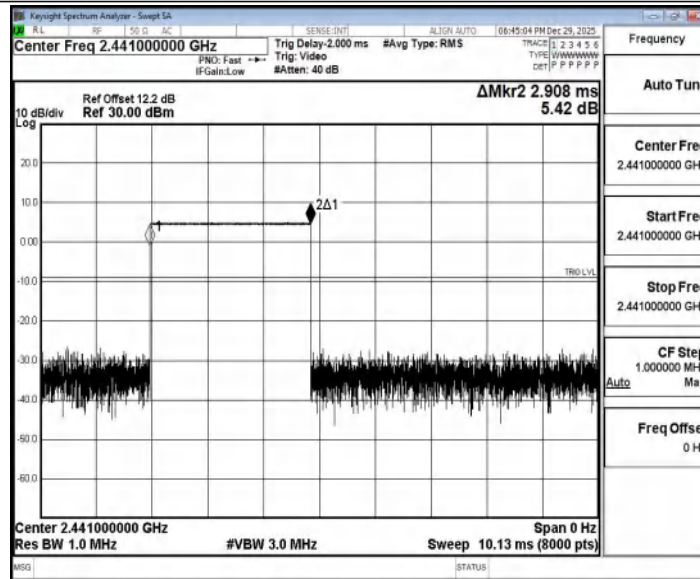
A.4 Time of occupancy

Test Result

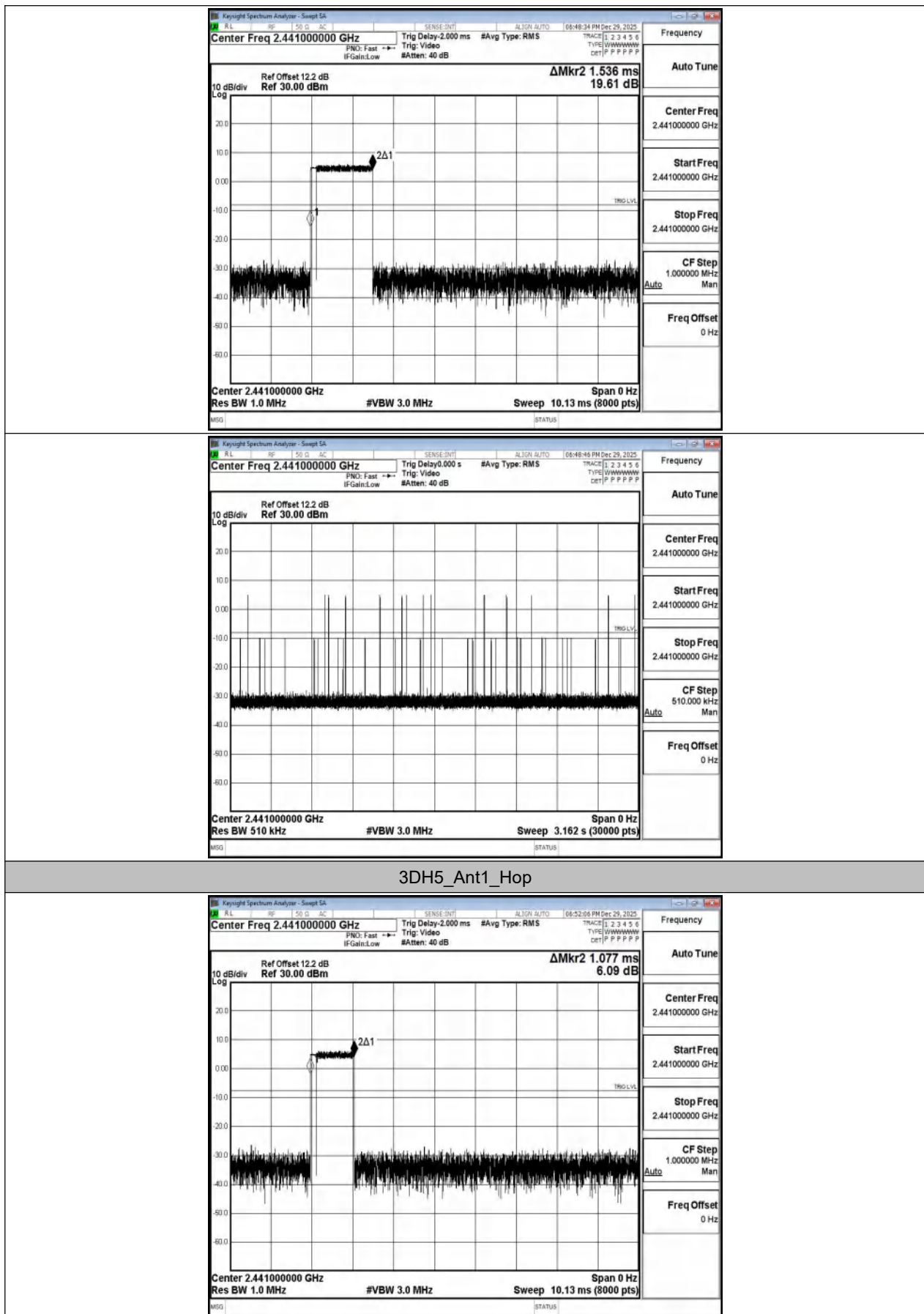
TestMode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.908	110	0.32	≤0.4	PASS
2DH5	Ant1	Hop	1.536	160	0.246	≤0.4	PASS
3DH5	Ant1	Hop	1.077	120	0.129	≤0.4	PASS

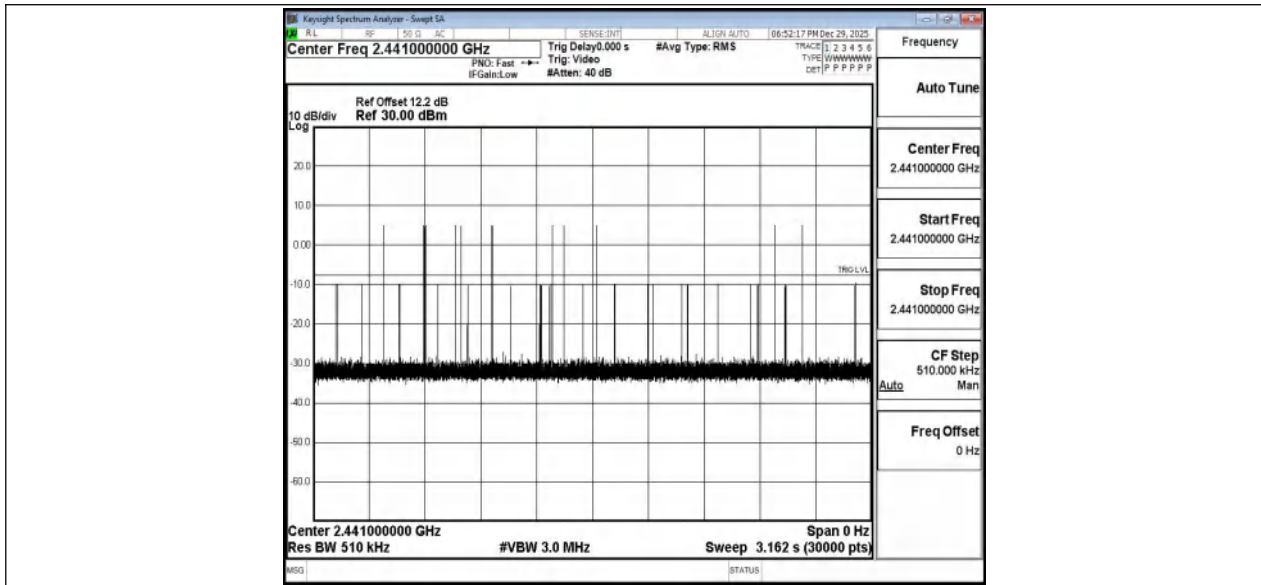
Test Graphs

DH5_Ant1_Hop



2DH5_Ant1_Hop





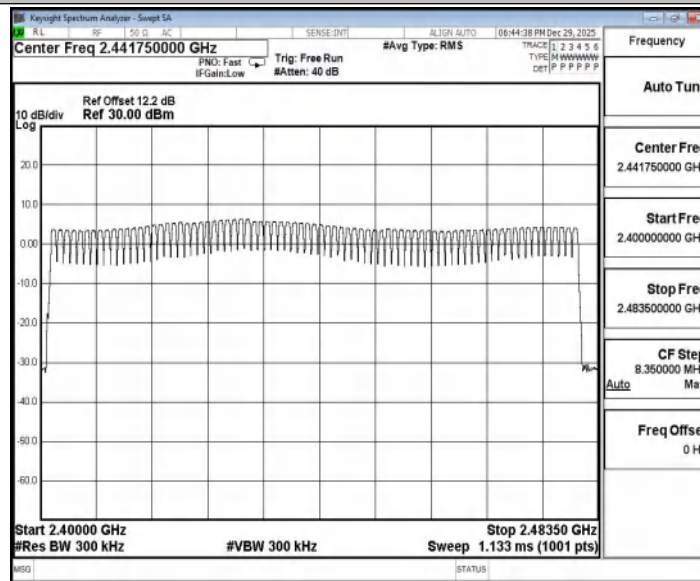
A.5 Number of hopping channels

Test Result

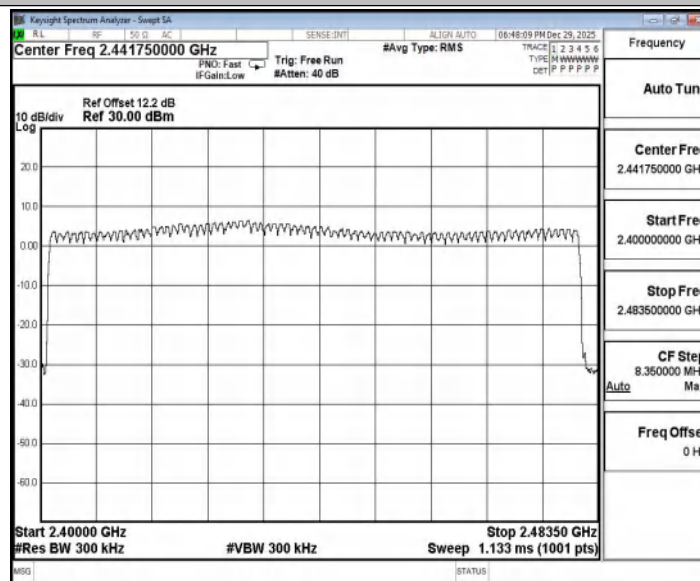
TestMode	Antenna	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

Test Graphs

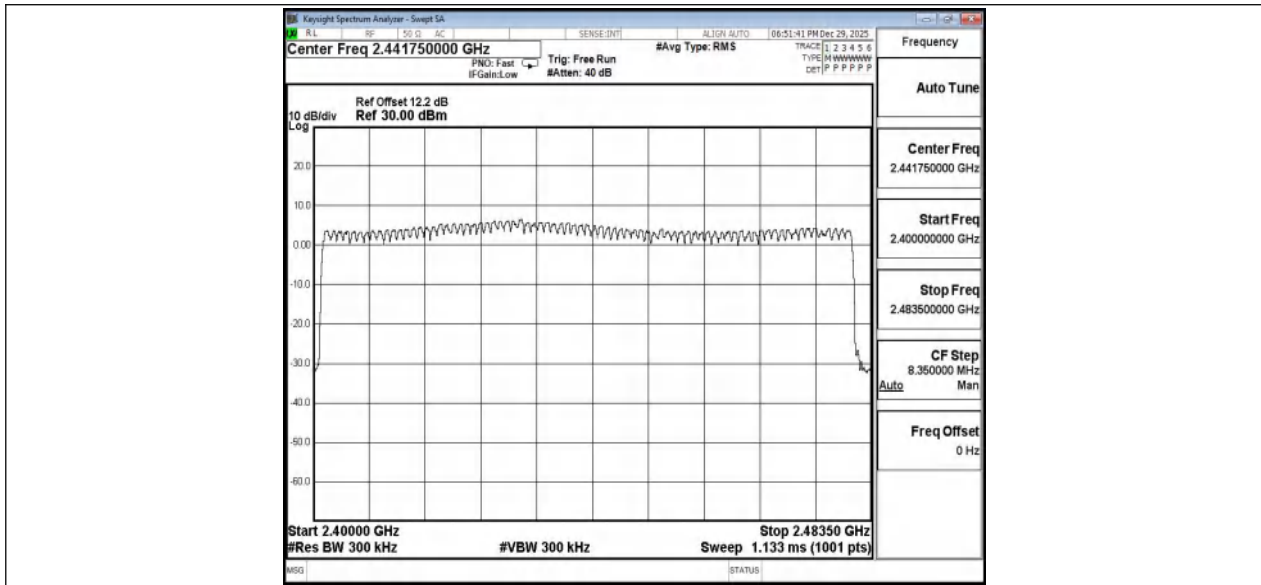
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



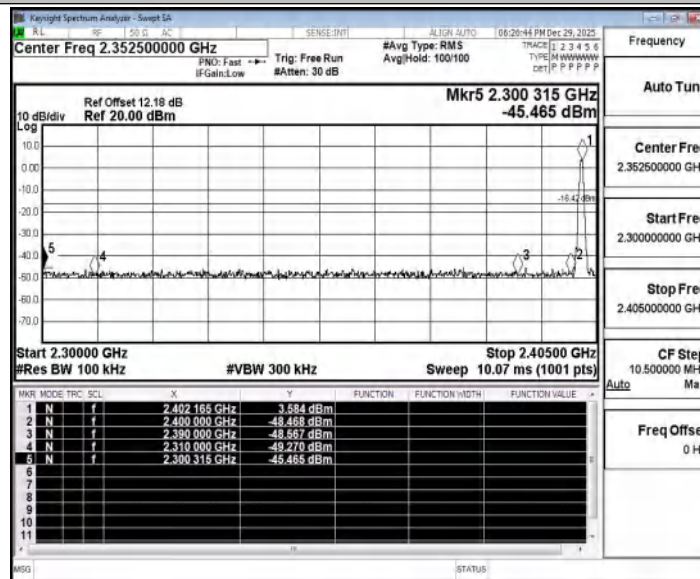
A.6 Band edge measurements

Test Result

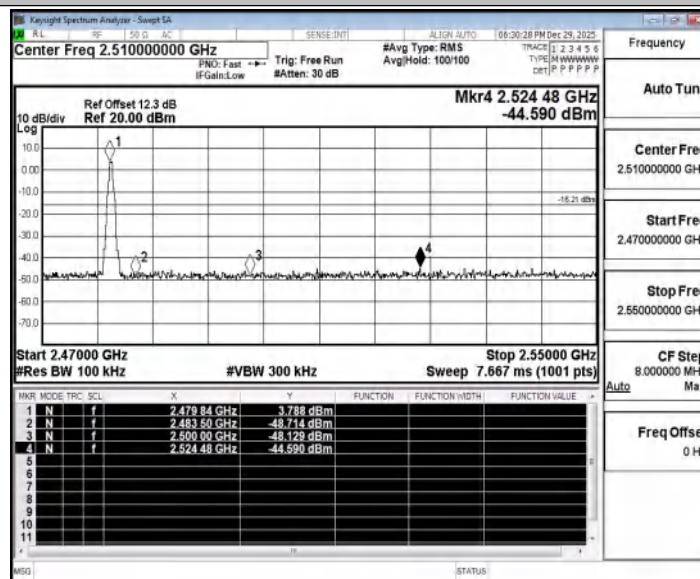
TestMode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	3.58	-45.47	≤-16.42	PASS
		High	2480	3.79	-44.59	≤-16.21	PASS
		Low	Hop_2402	2.03	-46.39	≤-17.98	PASS
		High	Hop_2480	2.58	-44.6	≤-17.42	PASS
2DH5	Ant1	Low	2402	3.17	-45.53	≤-16.83	PASS
		High	2480	1.57	-43.69	≤-18.43	PASS
		Low	Hop_2402	-1.22	-45.73	≤-21.22	PASS
		High	Hop_2480	-0.25	-43.56	≤-20.25	PASS
3DH5	Ant1	Low	2402	2.68	-45.5	≤-17.32	PASS
		High	2480	3.77	-44.16	≤-16.23	PASS
		Low	Hop_2402	-0.08	-45.26	≤-20.08	PASS
		High	Hop_2480	0.84	-44.75	≤-19.16	PASS

Test Graphs

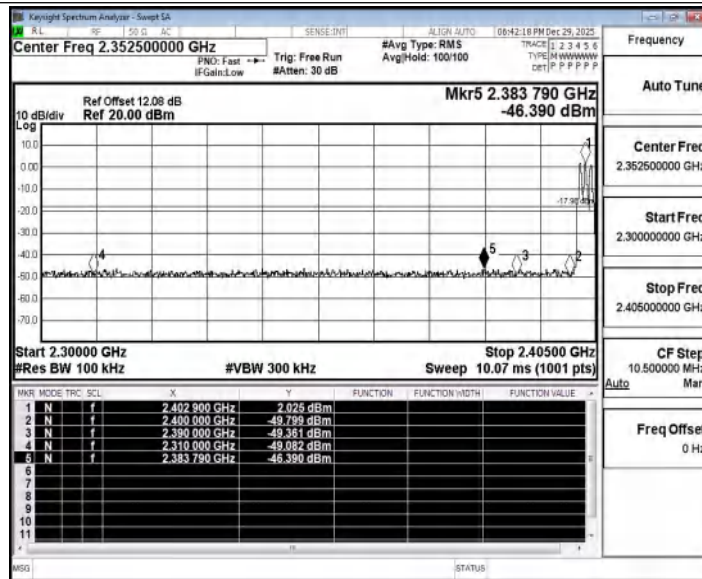
DH5_Ant1_Low_2402



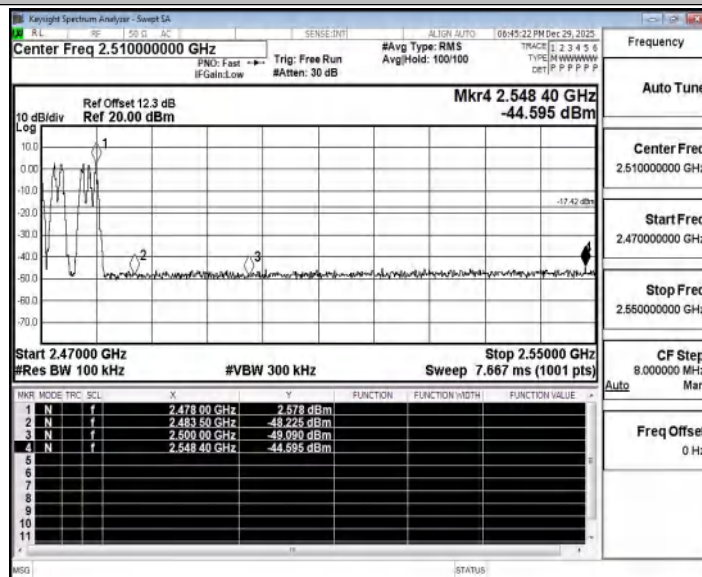
DH5_Ant1_High_2480



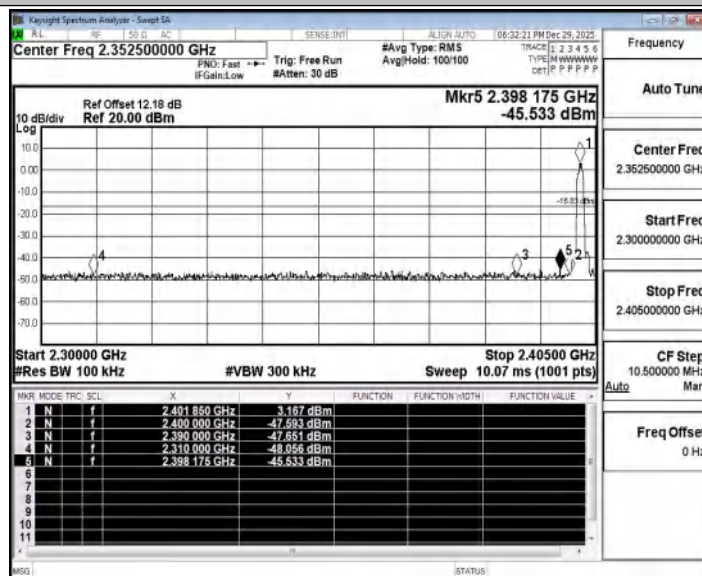
DH5_Ant1_Low_Hop_2402



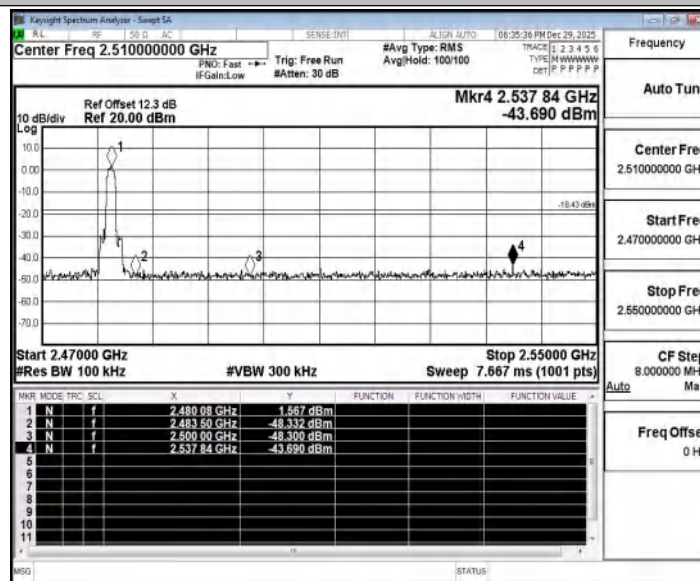
DH5_Ant1_High_Hop_2480



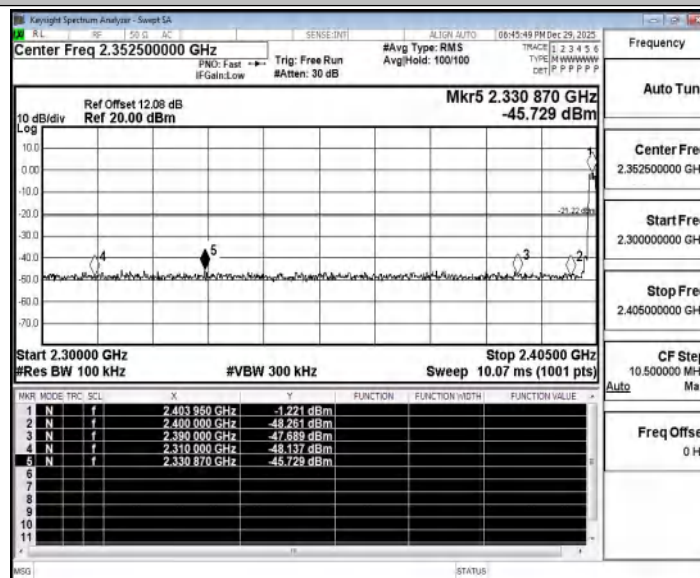
2DH5_Ant1_Low_2402



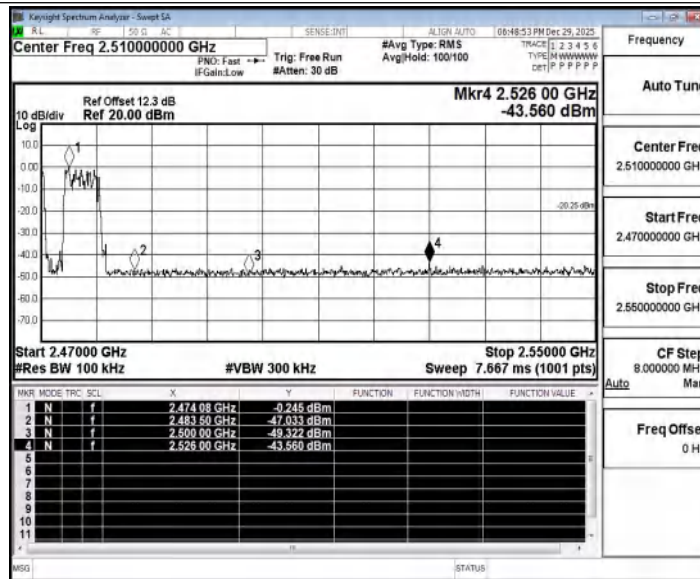
2DH5_Ant1_High_2480



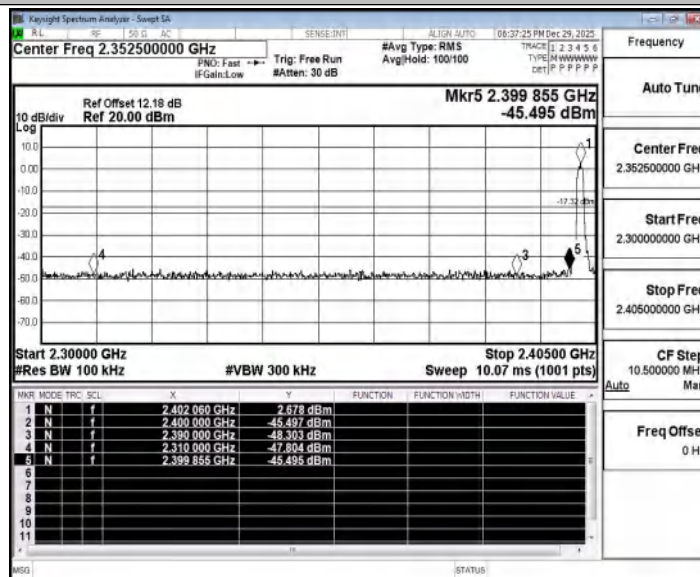
2DH5_Ant1_Low_Hop_2402



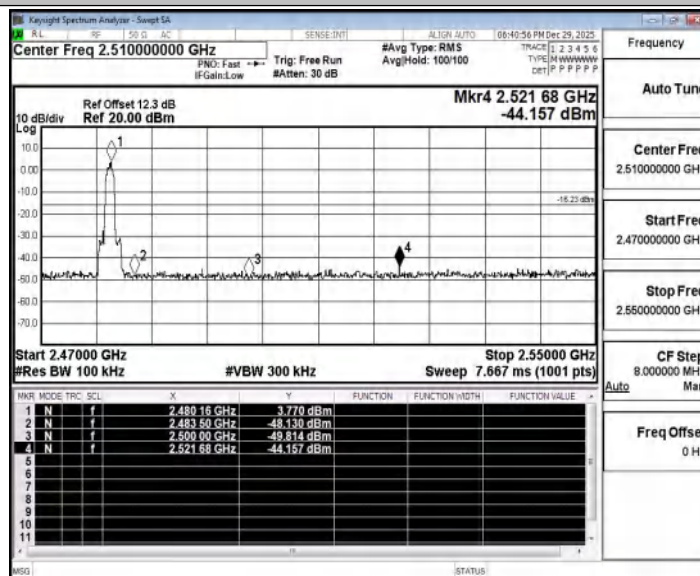
2DH5_Ant1_High_Hop_2480



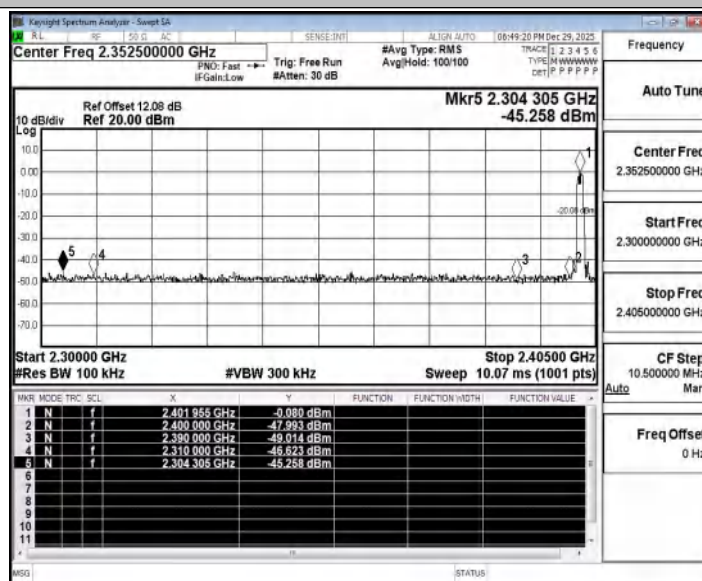
3DH5_Ant1_Low_2402



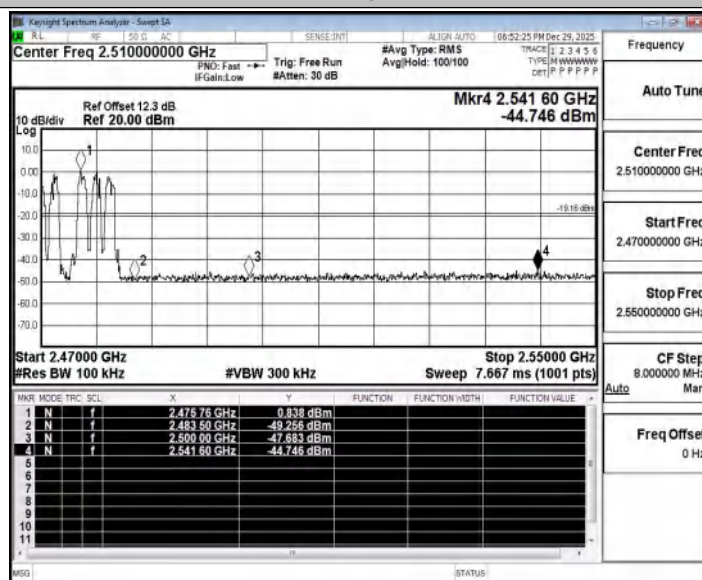
3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480



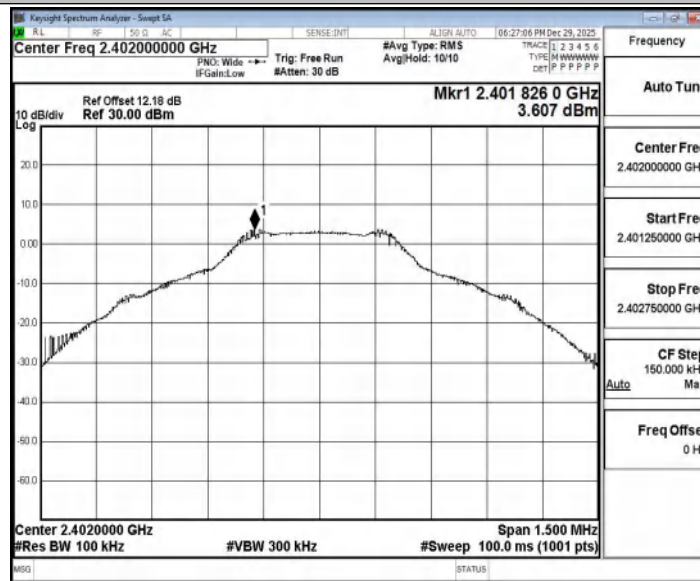
A.7 Conducted Spurious Emission

Test Result

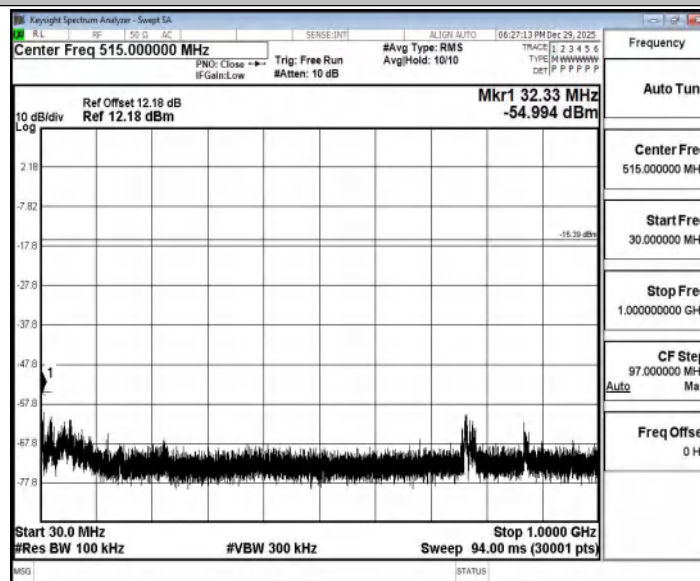
TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	3.61	3.61	---	PASS
			30~1000	3.61	-54.99	≤-16.39	PASS
			1000~26500	3.61	-54.92	≤-16.39	PASS
		2441	Reference	4.93	4.93	---	PASS
			30~1000	4.93	-55.91	≤-15.07	PASS
			1000~26500	4.93	-55.5	≤-15.07	PASS
		2480	Reference	4.03	4.03	---	PASS
			30~1000	4.03	-57.59	≤-15.97	PASS
			1000~26500	4.03	-54.29	≤-15.97	PASS
2DH5	Ant1	2402	Reference	3.42	3.42	---	PASS
			30~1000	3.42	-56.41	≤-16.58	PASS
			1000~26500	3.42	-49.9	≤-16.58	PASS
		2441	Reference	4.75	4.75	---	PASS
			30~1000	4.75	-55.96	≤-15.25	PASS
			1000~26500	4.75	-54.69	≤-15.25	PASS
		2480	Reference	3.90	3.90	---	PASS
			30~1000	3.90	-56.15	≤-16.1	PASS
			1000~26500	3.90	-54.66	≤-16.1	PASS
3DH5	Ant1	2402	Reference	3.60	3.60	---	PASS
			30~1000	3.60	-55.49	≤-16.4	PASS
			1000~26500	3.60	-54.14	≤-16.4	PASS
		2441	Reference	4.86	4.86	---	PASS
			30~1000	4.86	-55.45	≤-15.14	PASS
			1000~26500	4.86	-54.5	≤-15.14	PASS
		2480	Reference	4.00	4.00	---	PASS
			30~1000	4.00	-55.14	≤-16	PASS
			1000~26500	4.00	-54.64	≤-16	PASS

Test Graphs

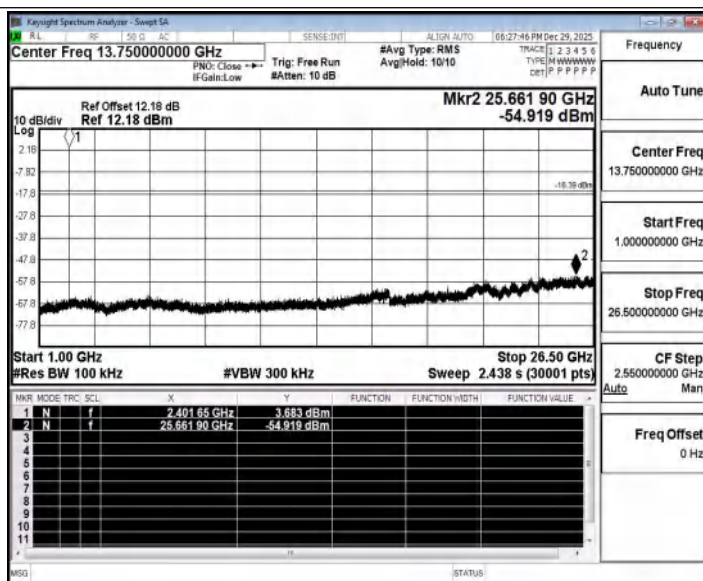
DH5_Ant1_2402_0~Reference



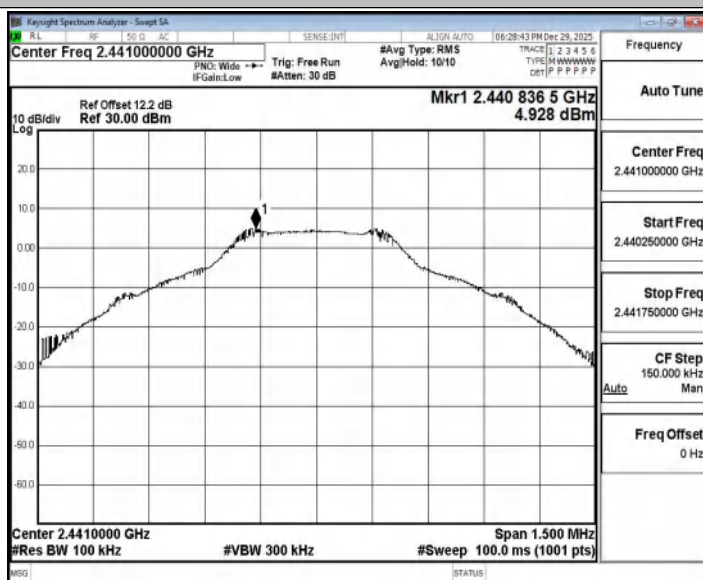
DH5_Ant1_2402_30~1000



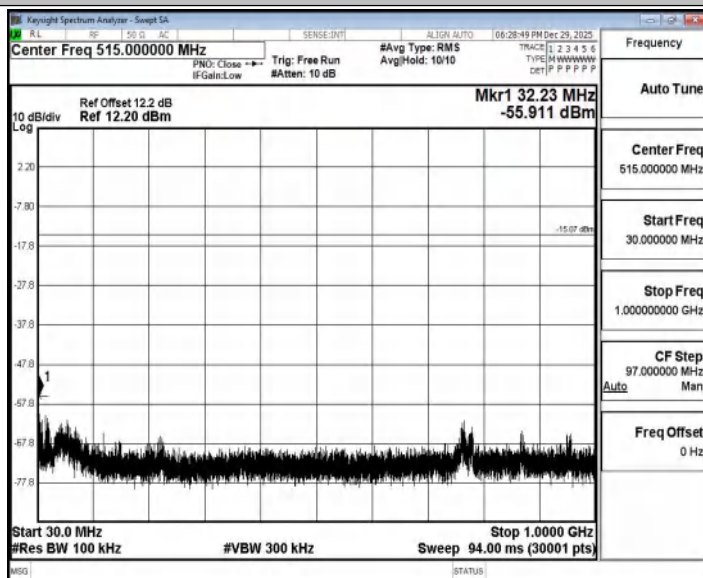
DH5_Ant1_2402_1000~26500



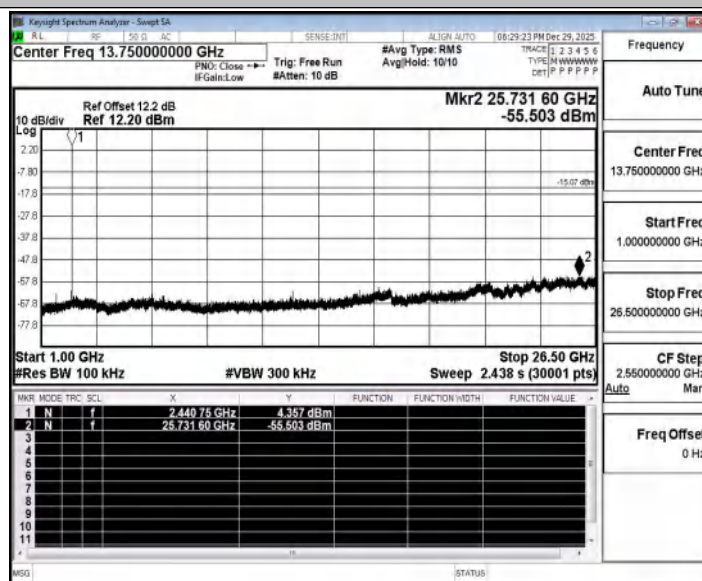
DH5_Ant1_2441_0~Reference



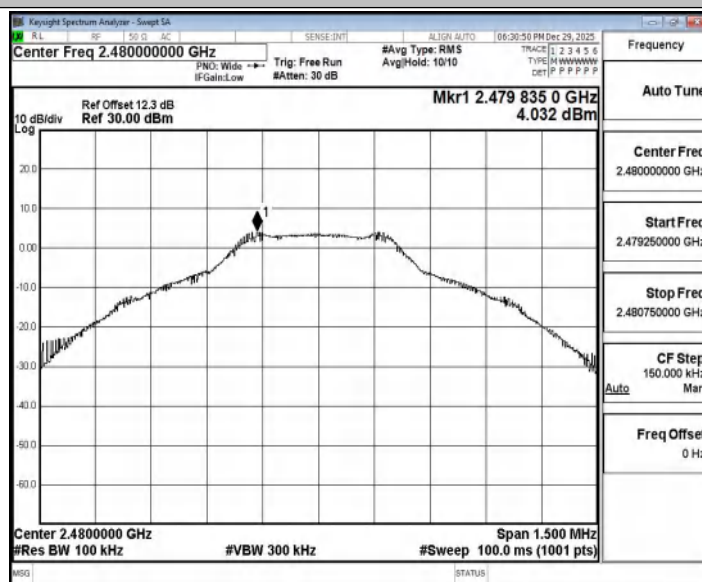
DH5_Ant1_2441_30~1000



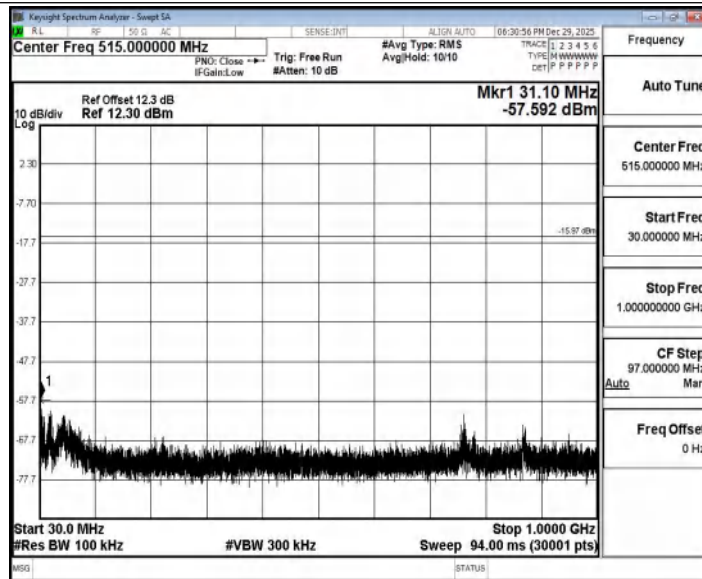
DH5_Ant1_2441_1000~26500



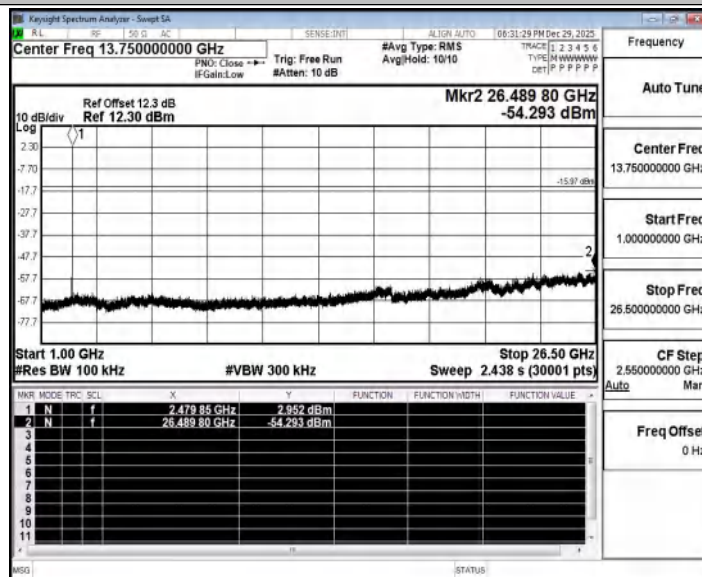
DH5_Ant1_2480_0~Reference



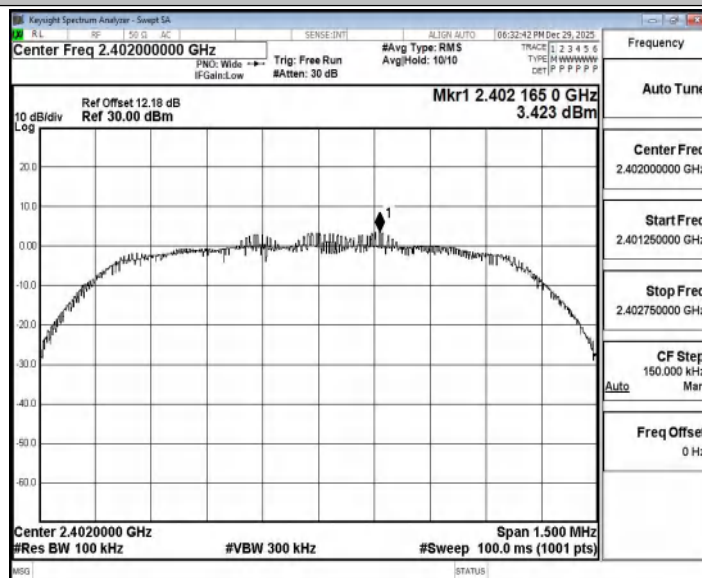
DH5_Ant1_2480_30~1000



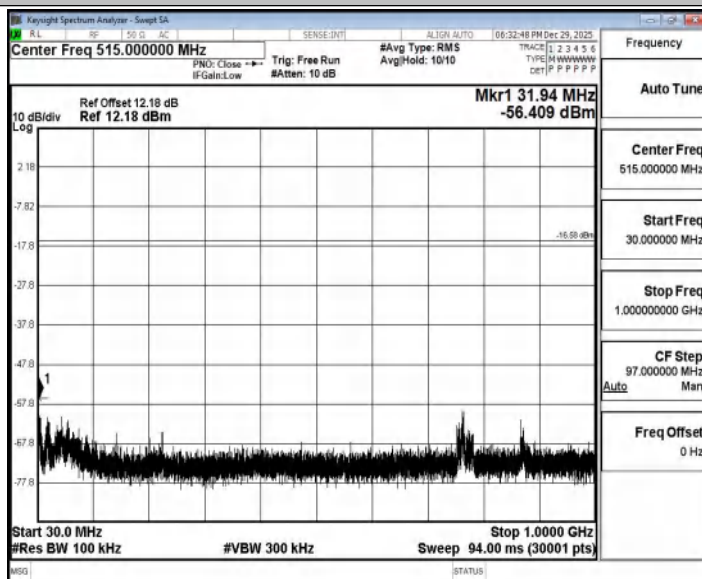
DH5_Ant1_2480_1000~26500



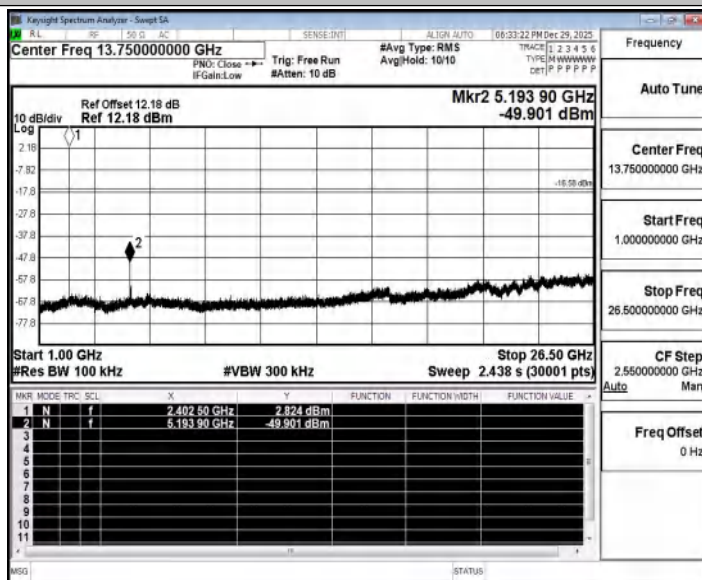
2DH5_Ant1_2402_0~Reference



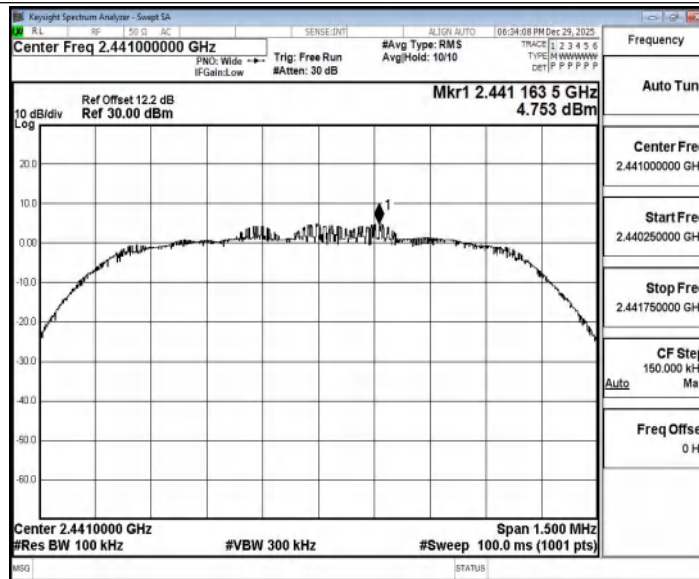
2DH5_Ant1_2402_30~1000



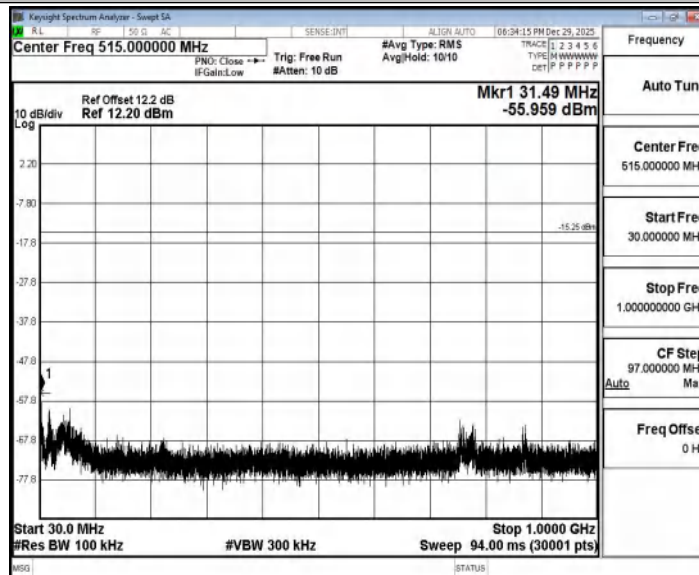
2DH5_Ant1_2402_1000~26500



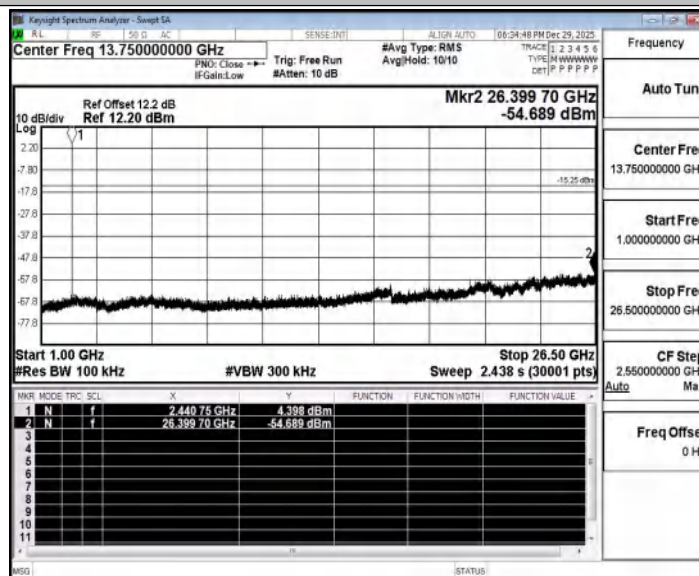
2DH5_Ant1_2441_0~Reference



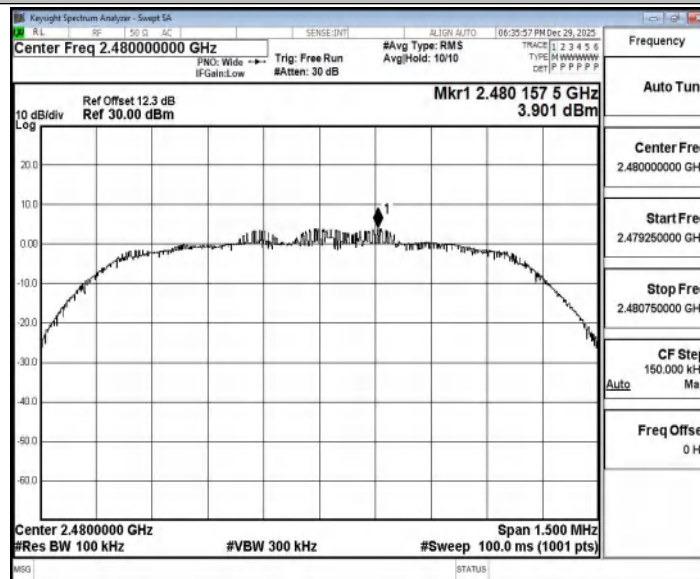
2DH5_Ant1_2441_30~1000



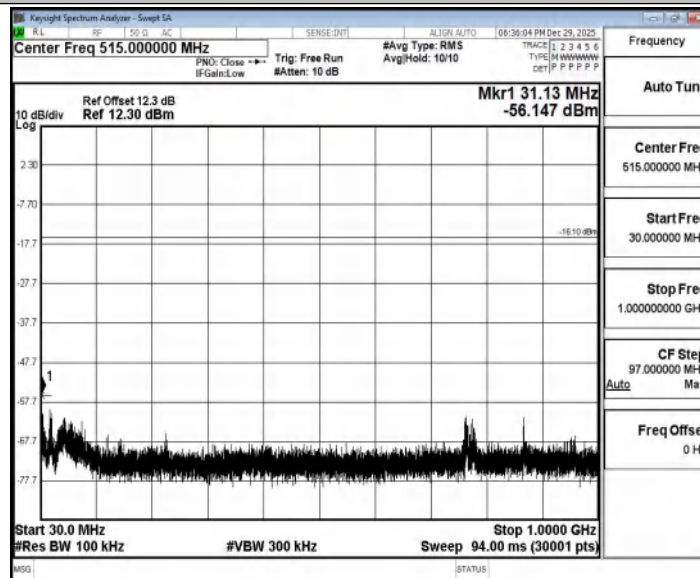
2DH5_Ant1_2441_1000~26500



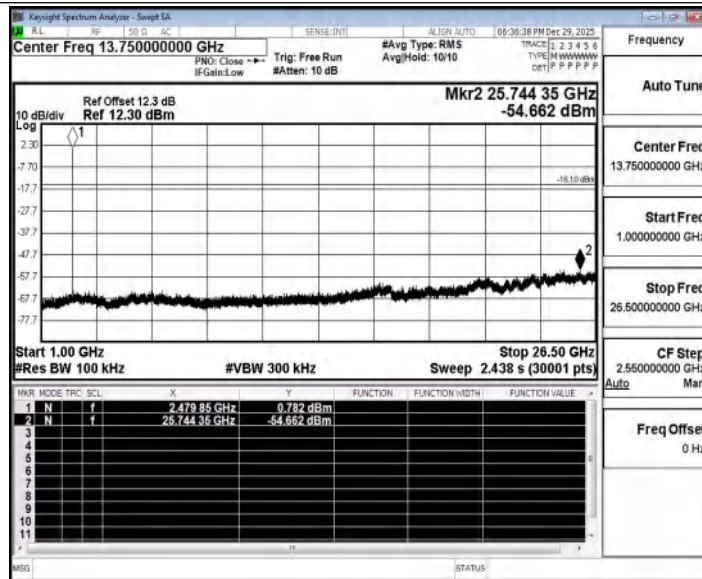
2DH5_Ant1_2480_0~Reference



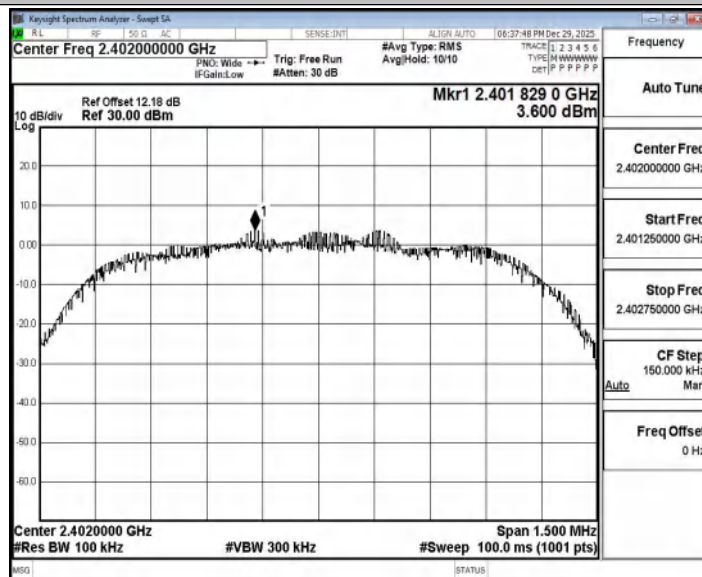
2DH5_Ant1_2480_30~1000



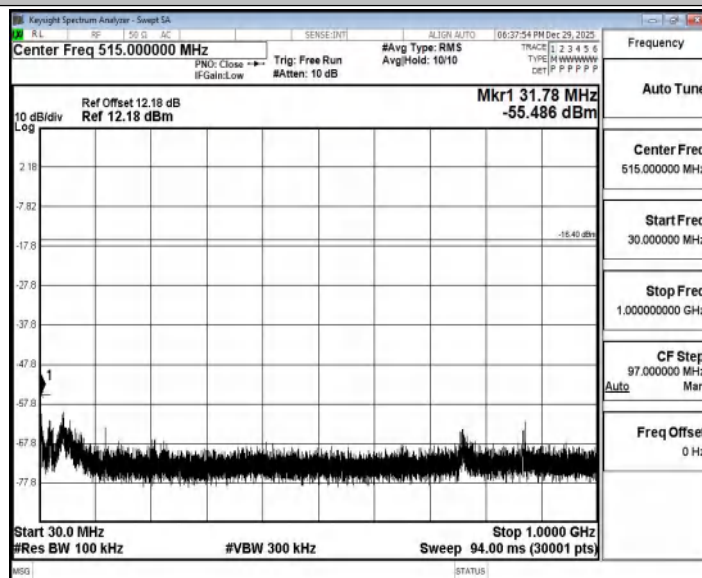
2DH5_Ant1_2480_1000~26500



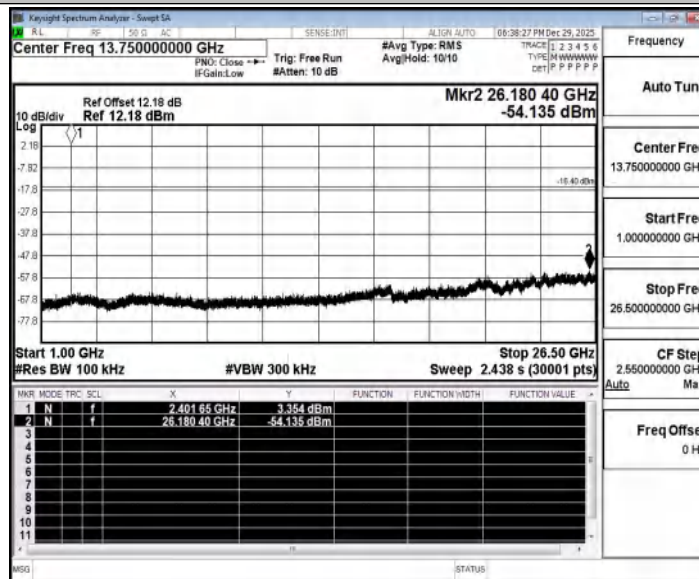
3DH5_Ant1_2402_0~Reference



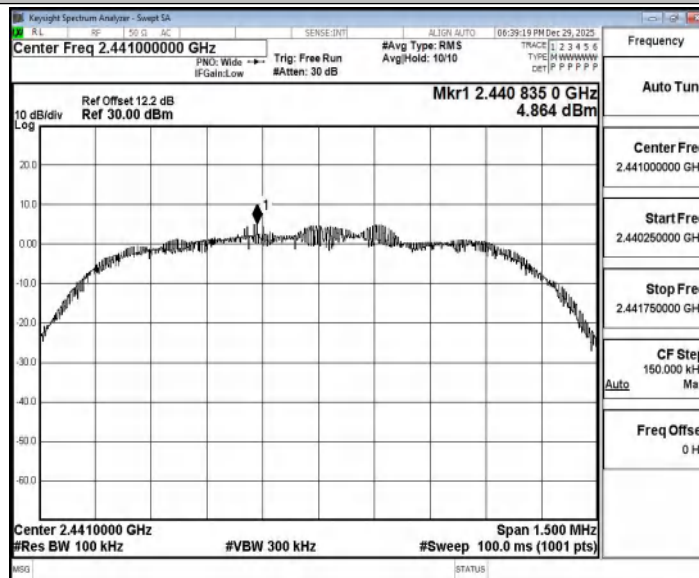
3DH5_Ant1_2402_30~1000



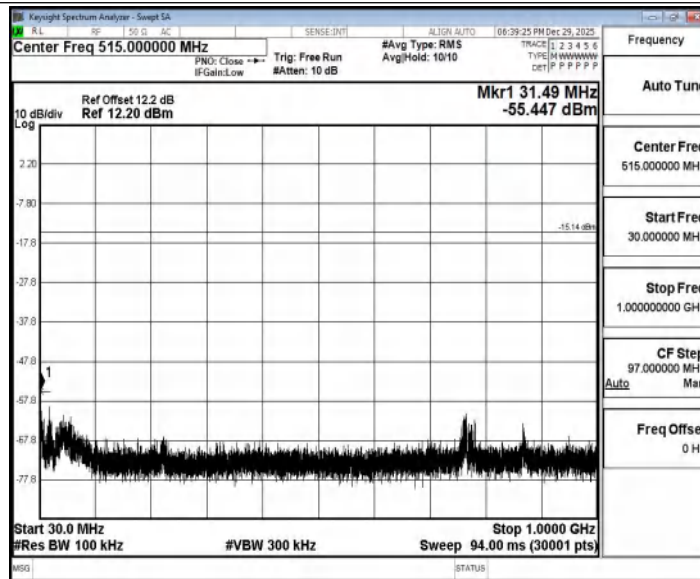
3DH5_Ant1_2402_1000~26500



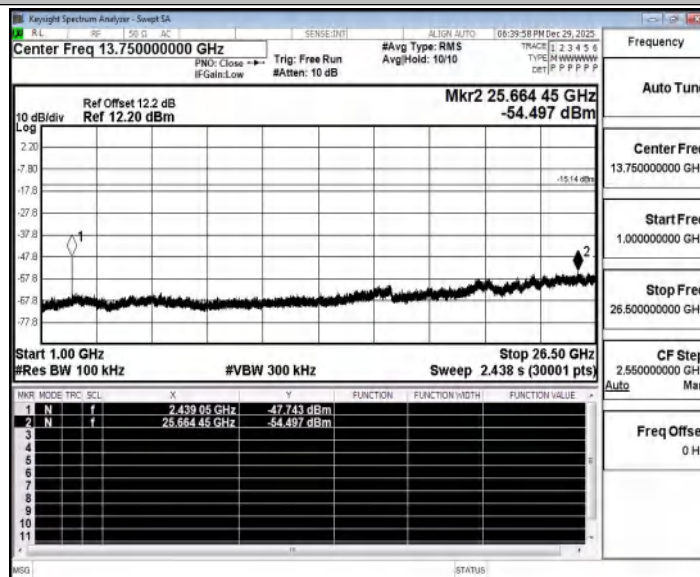
3DH5_Ant1_2441_0~Reference



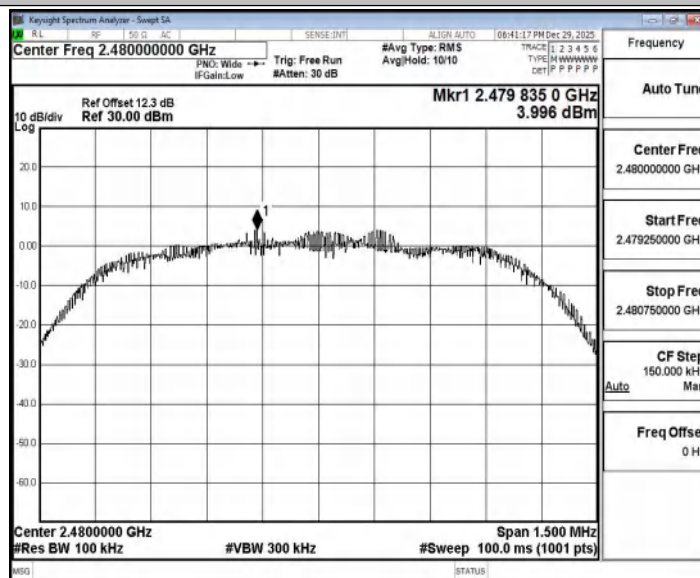
3DH5_Ant1_2441_30~1000



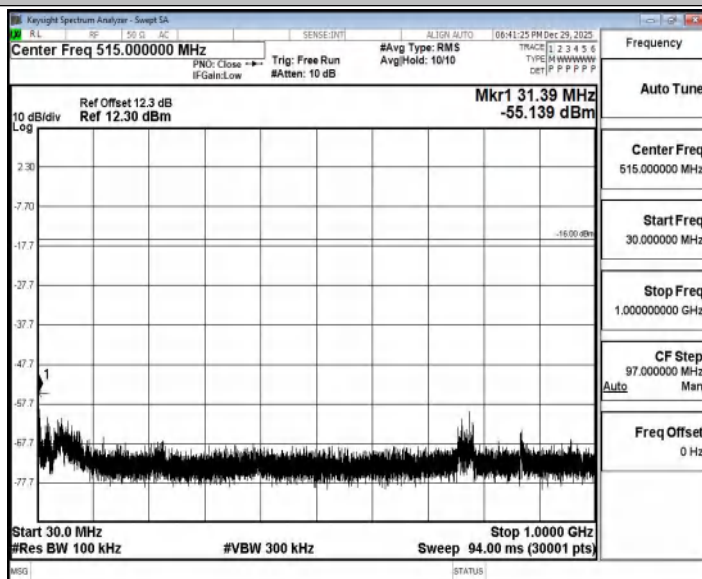
3DH5_Ant1_2441_1000~26500



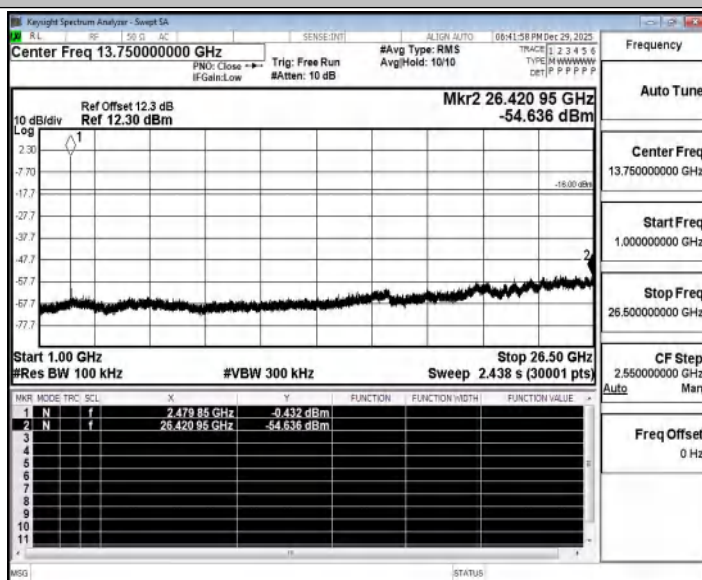
3DH5_Ant1_2480_0~Reference



3DH5_Ant1_2480_30~1000



3DH5_Ant1_2480_1000~26500



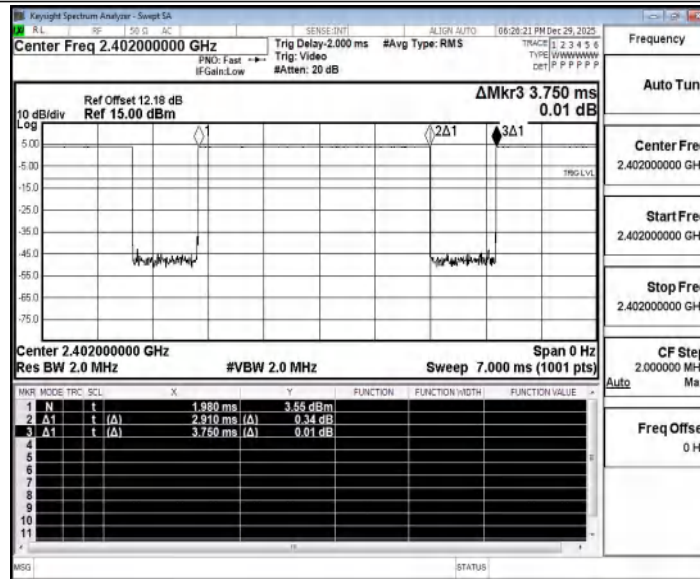
A.8 Duty Cycle

Test Result

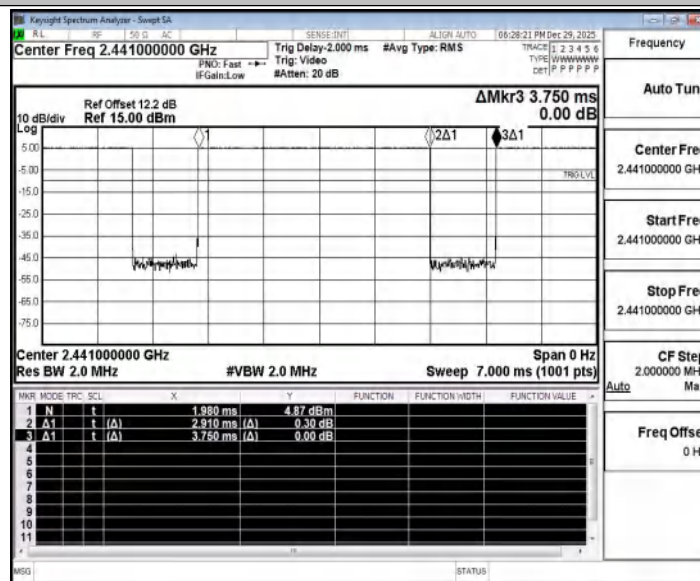
TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	DC [%]	xFactor	Limit	Verdict
DH5	Ant1	2402	2.91	3.75	77.60	1.10	---	---
		2441	2.91	3.75	77.60	1.10	---	---
		2480	2.91	3.75	77.60	1.10	---	---
2DH5	Ant1	2402	1.54	3.75	41.07	3.86	---	---
		2441	1.54	3.75	41.07	3.86	---	---
		2480	1.54	3.76	40.96	3.88	---	---
3DH5	Ant1	2402	1.08	3.75	28.80	5.41	---	---
		2441	1.08	3.76	28.72	5.42	---	---
		2480	1.08	3.75	28.80	5.41	---	---

Test Graphs

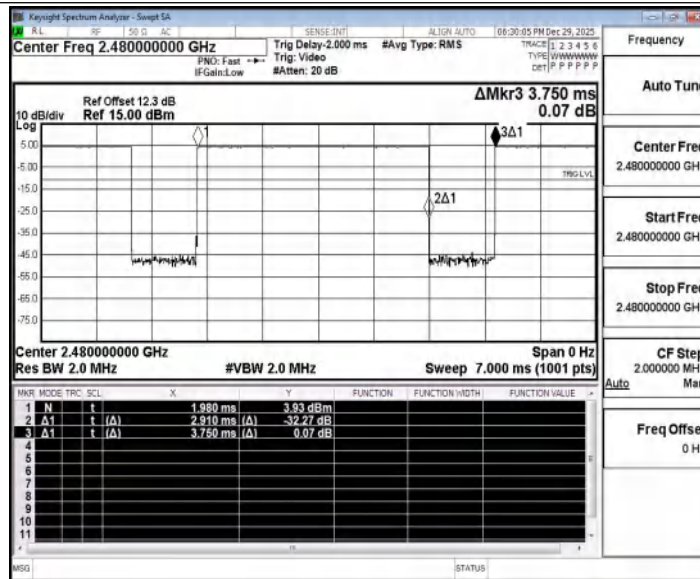
DH5_Ant1_2402



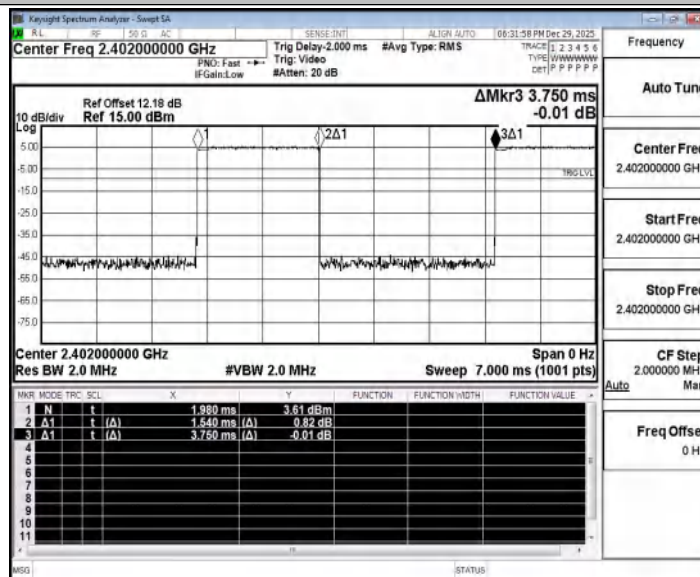
DH5_Ant1_2441



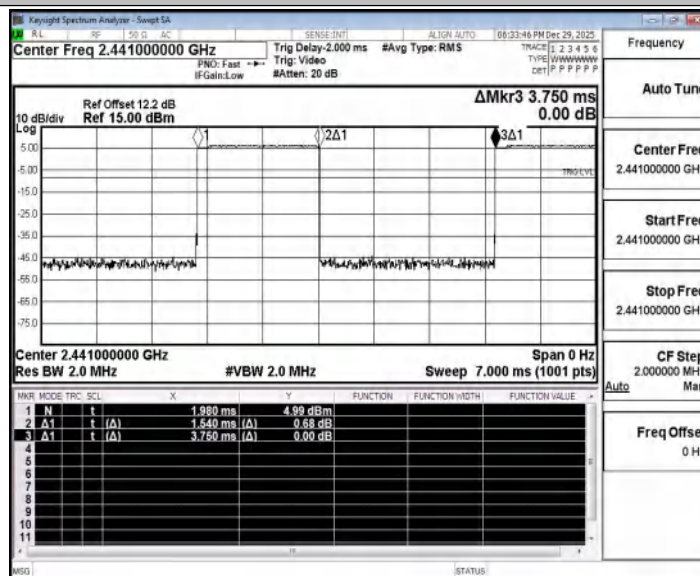
DH5_Ant1_2480



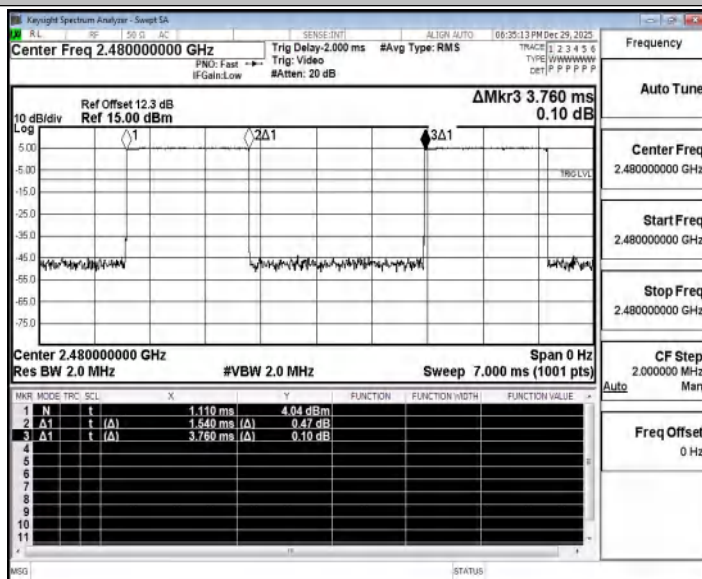
2DH5_Ant1_2402



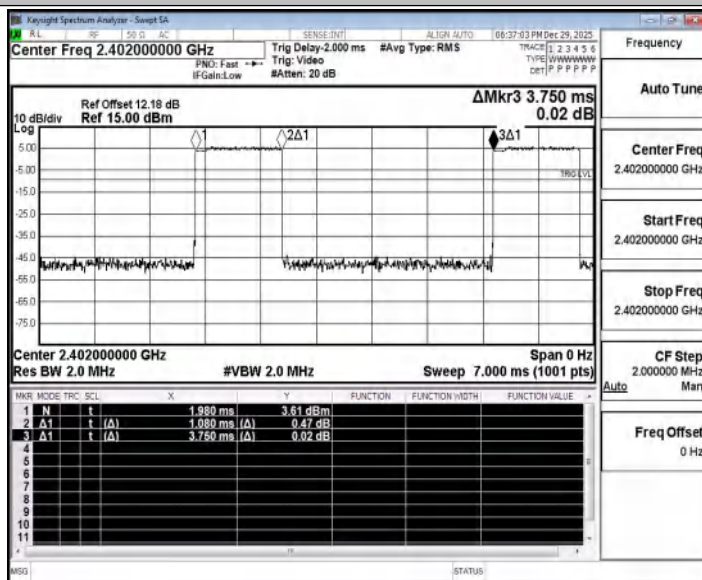
2DH5_Ant1_2441



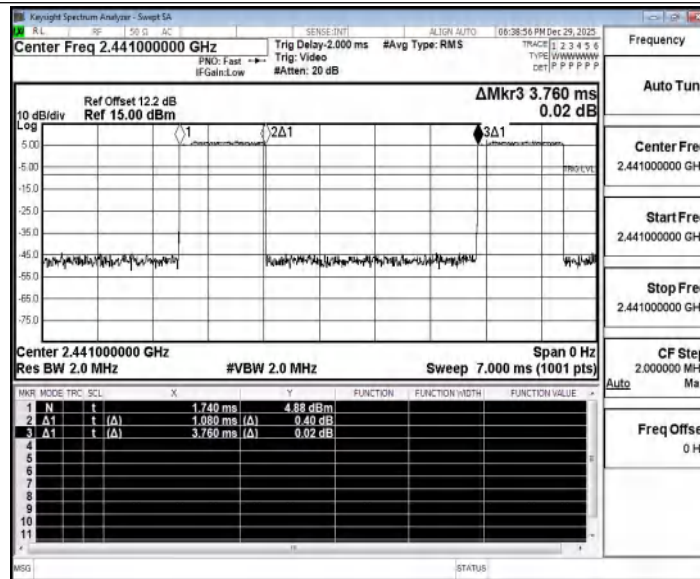
2DH5_Ant1_2480



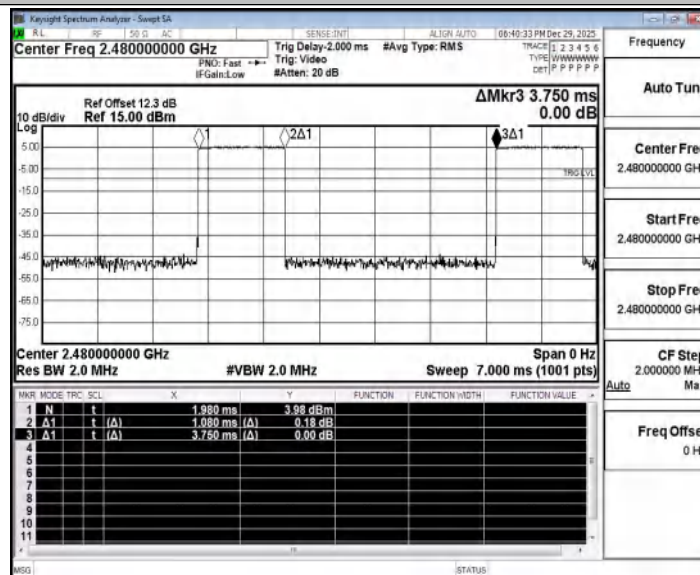
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



A.9 Emissions in Restricted Bands

Test Result

Test Mode	Antenna	Channel Name	Freq (MHz)	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Gain [dBi]	DC Factor [dB]	Result [dBUV/m]	Limit [dBUV/m]	Verdict
DH5	Ant1	Low	2402	AV	2310.000	-61.17	≤-44.30	2.21	1.10	37.40	≤54	PASS
				AV	2345.150	-60.2	≤-44.30	2.21	1.10	38.37	≤54	PASS
				AV	2390.000	-60.72	≤-44.30	2.21	1.10	37.85	≤54	PASS
				Peak	2310.000	-52.48	≤-23.20	2.21	0.00	44.99	≤74	PASS
				Peak	2364.050	-50.3	≤-23.20	2.21	0.00	47.17	≤74	PASS
				Peak	2390.000	-52.43	≤-23.20	2.21	0.00	45.04	≤74	PASS
		High	2480	AV	2483.500	-58.98	≤-44.30	2.21	1.10	39.59	≤54	PASS
				AV	2483.680	-58.62	≤-44.30	2.21	1.10	39.95	≤54	PASS
				AV	2500.000	-60.27	≤-44.30	2.21	1.10	38.30	≤54	PASS
				Peak	2483.500	-51.11	≤-23.20	2.21	0.00	46.36	≤74	PASS
				Peak	2483.920	-43.04	≤-23.20	2.21	0.00	54.43	≤74	PASS
				Peak	2500.000	-52.35	≤-23.20	2.21	0.00	45.12	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-53.03	≤-23.20	2.21	0.00	44.44	≤74	PASS
				Peak	2366.990	-50.03	≤-23.20	2.21	0.00	47.44	≤74	PASS
				Peak	2390.000	-52.66	≤-23.20	2.21	0.00	44.81	≤74	PASS
		High	Hop_2480	Peak	2483.500	-51.84	≤-23.20	2.21	0.00	45.63	≤74	PASS
				Peak	2488.480	-50.42	≤-23.20	2.21	0.00	47.05	≤74	PASS
				Peak	2500.000	-52.64	≤-23.20	2.21	0.00	44.83	≤74	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-61.17	≤-47.06	2.21	3.86	40.16	≤54	PASS
				AV	2384.105	-60.39	≤-47.06	2.21	3.86	40.94	≤54	PASS
				AV	2390.000	-60.92	≤-47.06	2.21	3.86	40.41	≤54	PASS
				Peak	2310.000	-51.99	≤-23.20	2.21	0.00	45.48	≤74	PASS
				Peak	2358.380	-50	≤-23.20	2.21	0.00	47.47	≤74	PASS
				Peak	2390.000	-50.88	≤-23.20	2.21	0.00	46.59	≤74	PASS
		High	2480	AV	2483.500	-57.91	≤-47.08	2.21	3.88	43.44	≤54	PASS
				AV	2483.520	-57.91	≤-47.08	2.21	3.88	43.44	≤54	PASS
				AV	2500.000	-60.68	≤-47.08	2.21	3.88	40.67	≤54	PASS
				Peak	2483.500	-45.25	≤-23.20	2.21	0.00	52.22	≤74	PASS
				Peak	2484.960	-43.26	≤-23.20	2.21	0.00	54.21	≤74	PASS
				Peak	2500.000	-52.38	≤-23.20	2.21	0.00	45.09	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-52.57	≤-23.20	2.21	0.00	44.90	≤74	PASS
				Peak	2328.980	-49.6	≤-23.20	2.21	0.00	47.87	≤74	PASS
				Peak	2390.000	-52	≤-23.20	2.21	0.00	45.47	≤74	PASS
		High	Hop_2480	Peak	2483.500	-50.29	≤-23.20	2.21	0.00	47.18	≤74	PASS
				Peak	2483.680	-49.53	≤-23.20	2.21	0.00	47.94	≤74	PASS
				Peak	2500.000	-53.03	≤-23.20	2.21	0.00	44.44	≤74	PASS

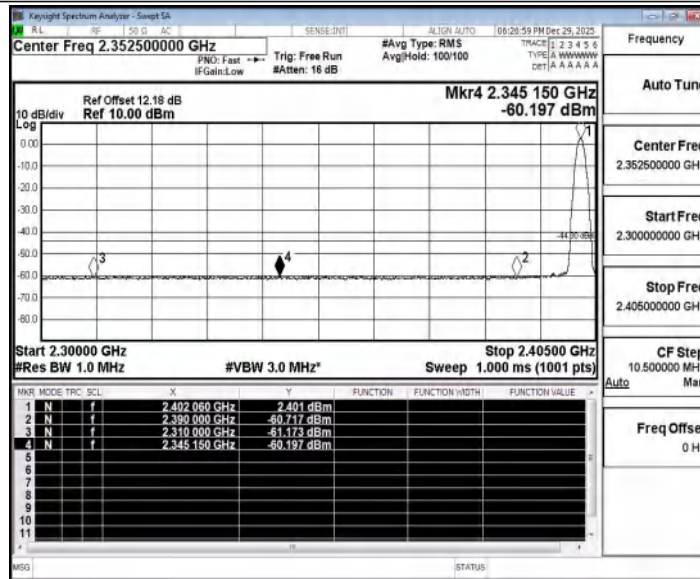
3DH5	Ant1	Low	2402	AV	2310.000	-60.58	≤-48.61	2.21	5.41	42.30	≤54	PASS
				AV	2314.385	-60.3	≤-48.61	2.21	5.41	42.58	≤54	PASS
				AV	2390.000	-60.96	≤-48.61	2.21	5.41	41.92	≤54	PASS
				Peak	2310.000	-51.91	≤-23.20	2.21	0.00	45.56	≤74	PASS
				Peak	2339.270	-50.04	≤-23.20	2.21	0.00	47.43	≤74	PASS
				Peak	2390.000	-53.13	≤-23.20	2.21	0.00	44.34	≤74	PASS
		High	2480	AV	2483.500	-58	≤-48.61	2.21	5.41	44.88	≤54	PASS
				AV	2483.520	-58	≤-48.61	2.21	5.41	44.88	≤54	PASS
				AV	2500.000	-60.62	≤-48.61	2.21	5.41	42.26	≤54	PASS
				Peak	2483.500	-43.99	≤-23.20	2.21	0.00	53.48	≤74	PASS
				Peak	2483.760	-43.19	≤-23.20	2.21	0.00	54.28	≤74	PASS
				Peak	2500.000	-52.52	≤-23.20	2.21	0.00	44.95	≤74	PASS
		Low	Hop_ 2402	Peak	2310.000	-51.31	≤-23.20	2.21	0.00	46.16	≤74	PASS
				Peak	2314.280	-49.8	≤-23.20	2.21	0.00	47.67	≤74	PASS
				Peak	2390.000	-52.84	≤-23.20	2.21	0.00	44.63	≤74	PASS
		High	Hop_ 2480	Peak	2483.500	-52.22	≤-23.20	2.21	0.00	45.25	≤74	PASS
				Peak	2485.440	-45.85	≤-23.20	2.21	0.00	51.62	≤74	PASS
				Peak	2500.000	-52.99	≤-23.20	2.21	0.00	44.48	≤74	PASS

Note:

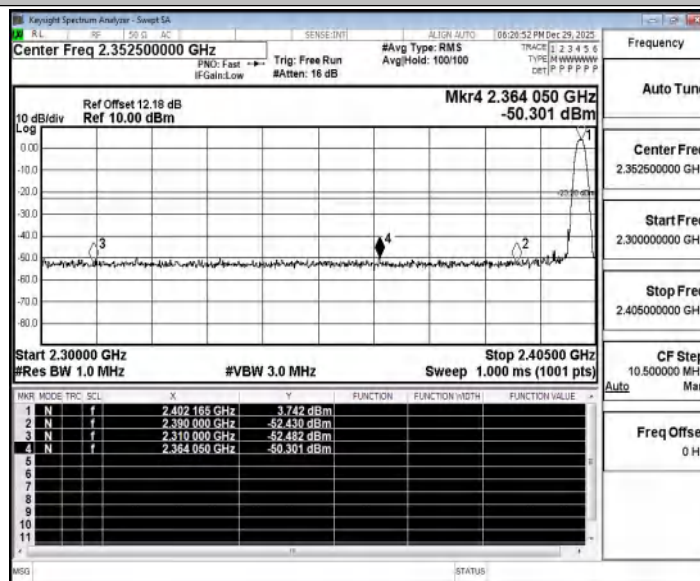
1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs

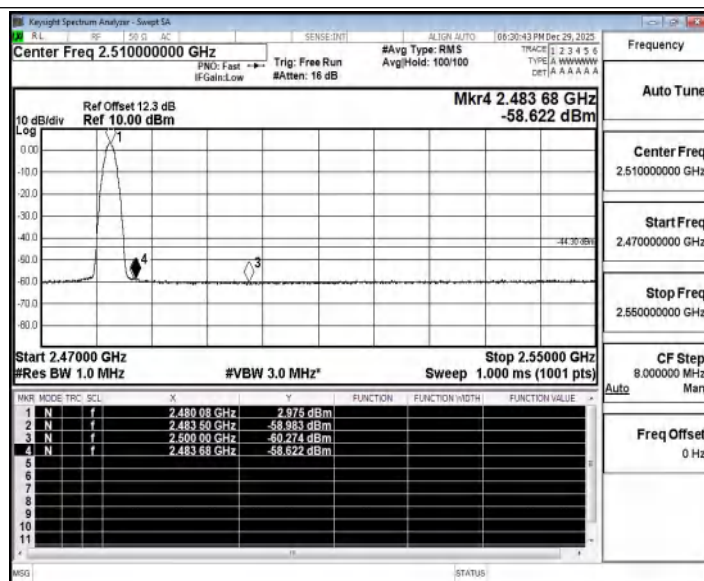
DH5_Ant1_Low_2402_AV



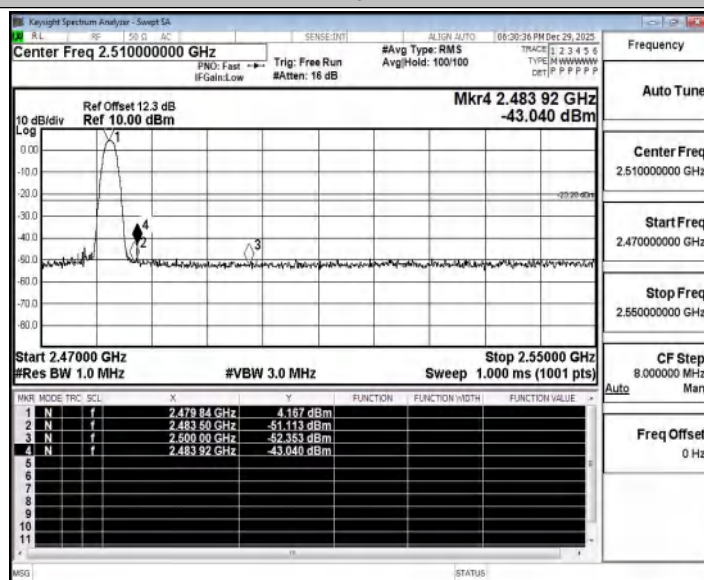
DH5_Ant1_Low_2402_Peak



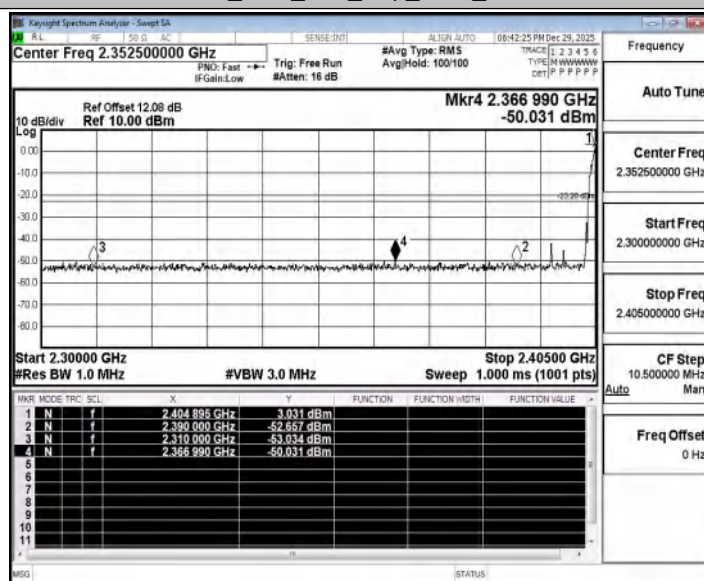
DH5_Ant1_High_2480_AV



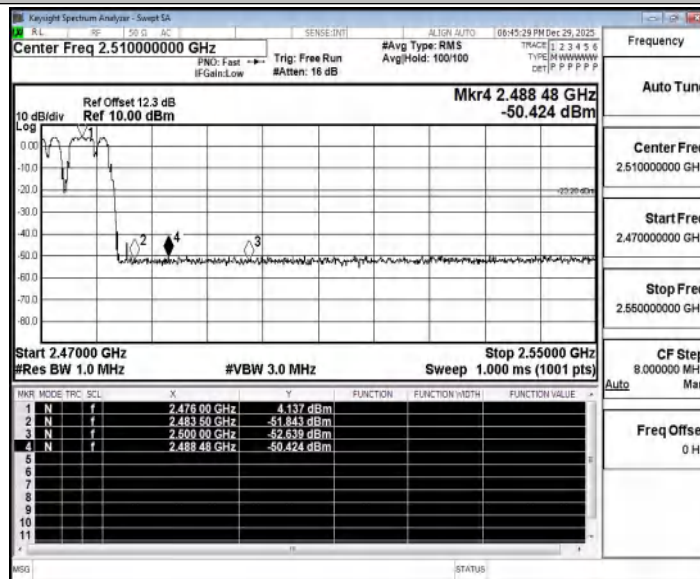
DH5_Ant1_High_2480_Peak



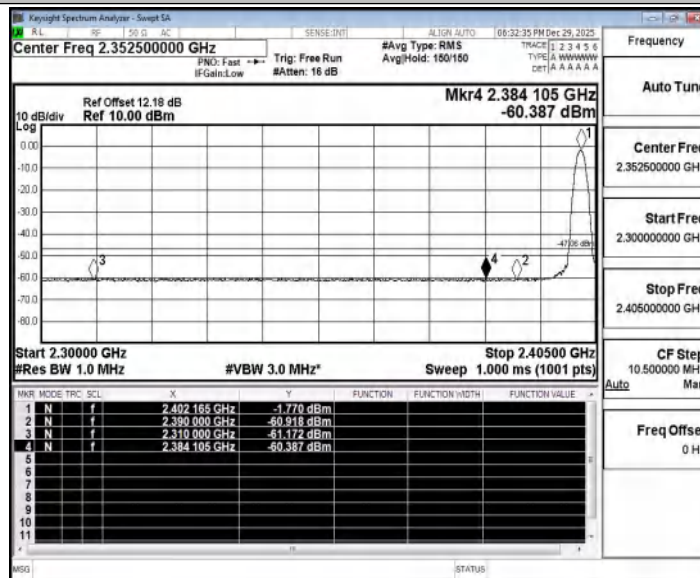
DH5_Ant1_Low_Hop_2402_Peak



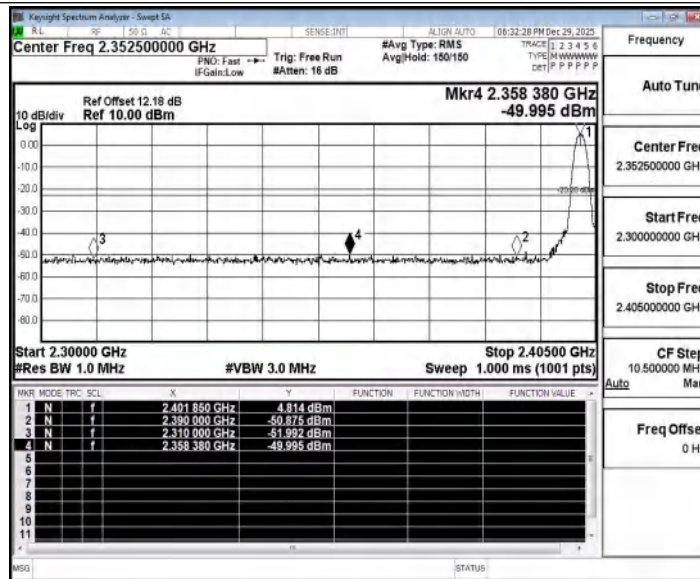
DH5_Ant1_High_Hop_2480_Peak



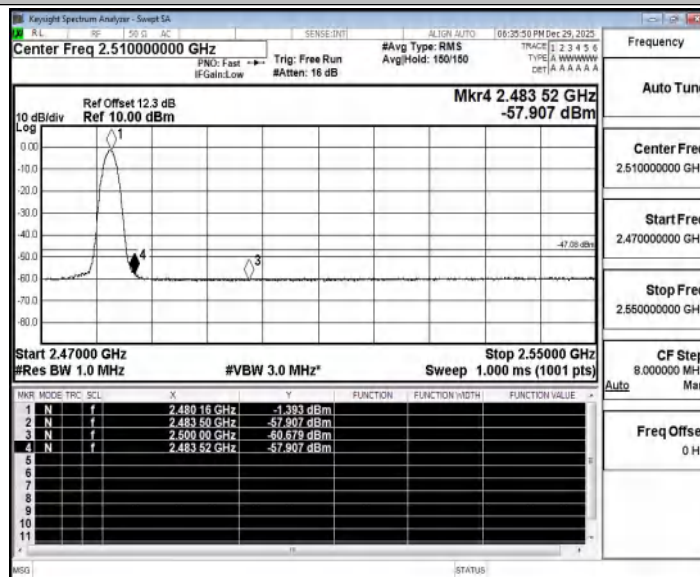
2DH5_Ant1_Low_2402_AV



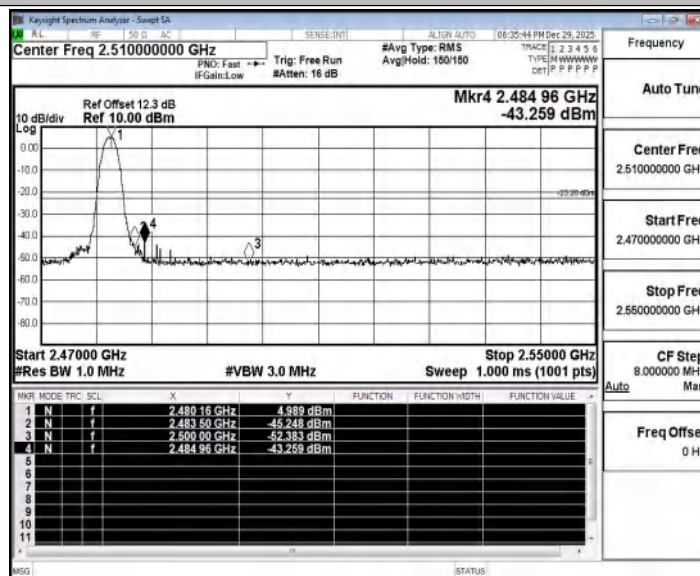
2DH5_Ant1_Low_2402_Peak



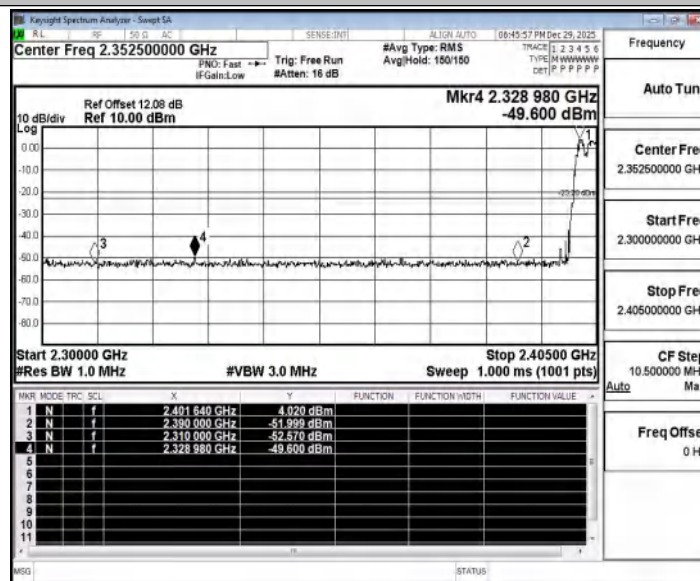
2DH5_Ant1_High_2480_AV



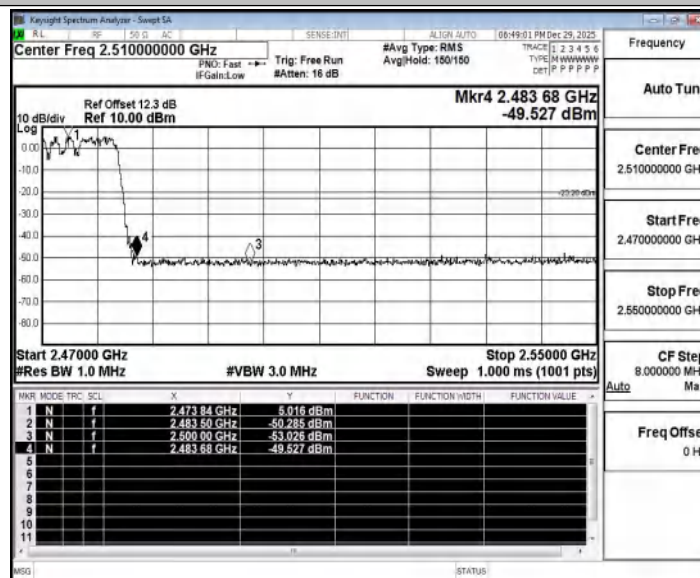
2DH5_Ant1_High_2480_Peak



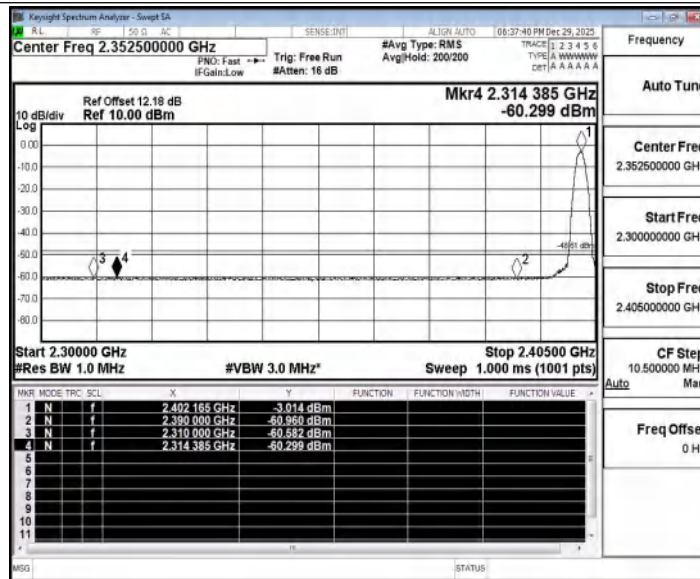
2DH5_Ant1_Low_Hop_2402_Peak



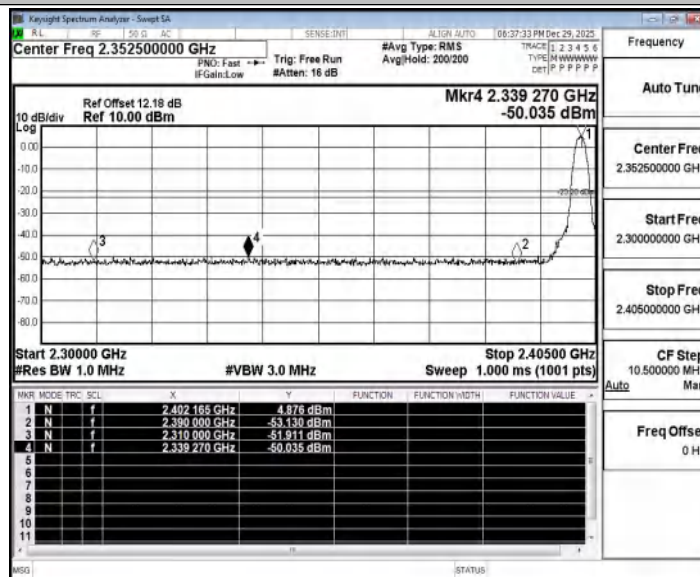
2DH5_Ant1_High_Hop_2480_Peak



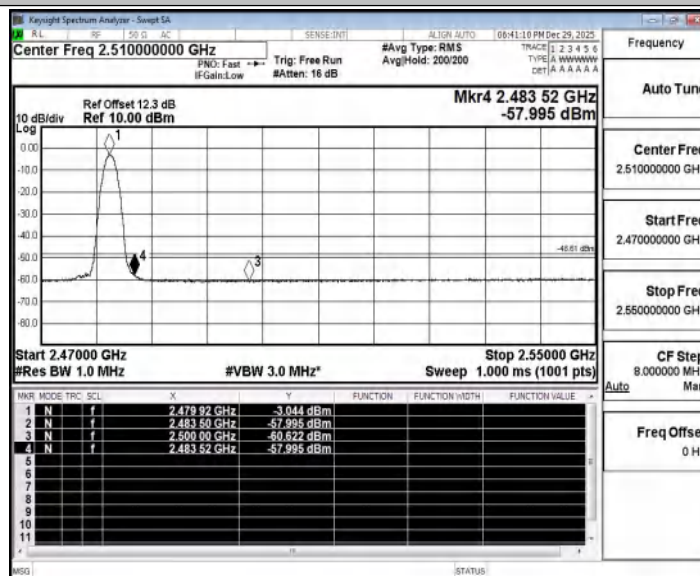
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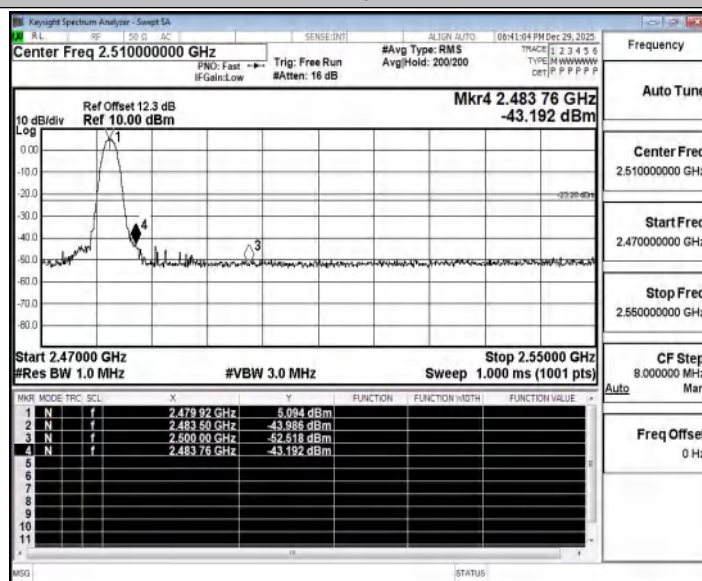
3DH5_Ant1_Low_2402_Peak



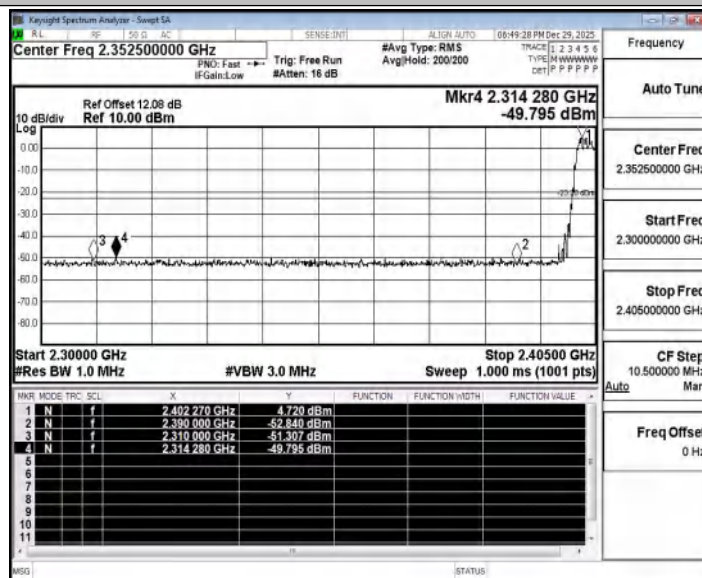
3DH5_Ant1_High_2480_AV



3DH5_Ant1_High_2480_Peak



3DH5_Ant1_Low_Hop_2402_Peak



3DH5_Ant1_High_Hop_2480_Peak

