



Appendix A

RF Test Data for BT V5.2 (DSS) (Conducted Measurement)

Product Name: TWS Headphones

Trade Mark: LIBMING

Test Model: E02

Environmental Conditions

Temperature:	23.5 ° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Wunder Wu
Supervised by:	Li Huan



A.1 20dB Emission Bandwidth

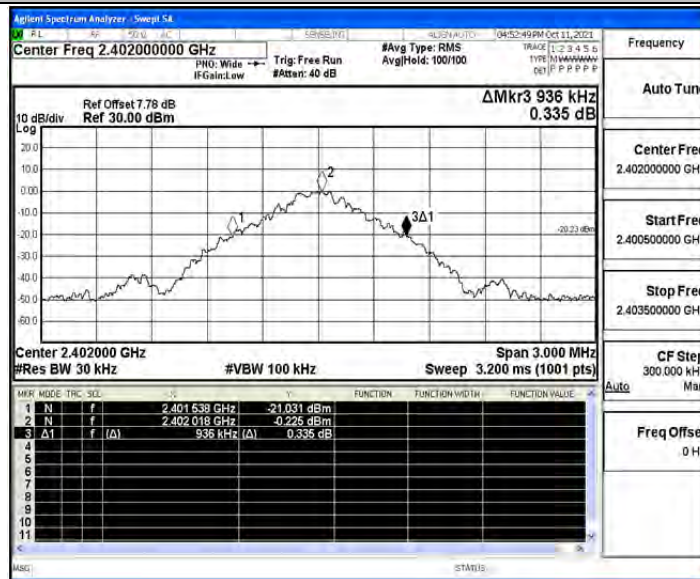
Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.936	2401.538	2402.474	---	PASS
		2441	0.594	2440.901	2441.495	---	PASS
		2480	0.951	2479.541	2480.492	---	PASS
2DH5	Ant1	2402	1.311	2401.343	2402.654	---	PASS
		2441	1.359	2440.304	2441.663	---	PASS
		2480	1.284	2479.370	2480.654	---	PASS
3DH5	Ant1	2402	1.374	2401.310	2402.684	---	PASS
		2441	1.374	2440.322	2441.696	---	PASS
		2480	1.281	2479.367	2480.648	---	PASS

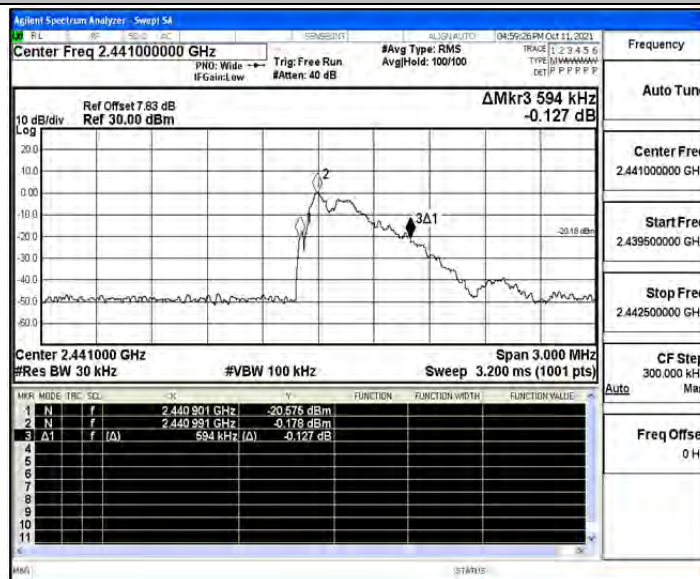


Test Graphs

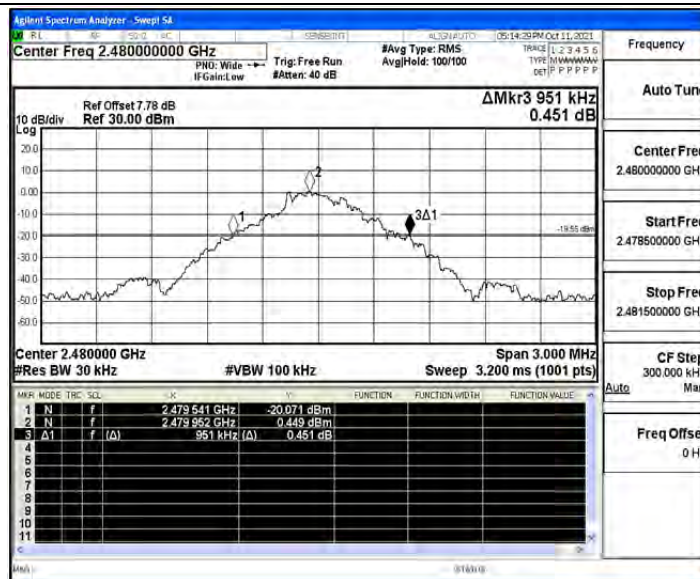
DH5_Ant1_2402



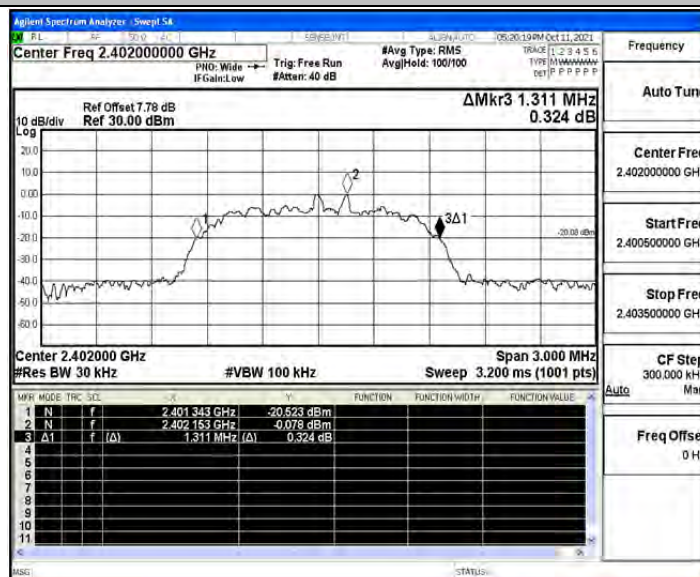
DH5_Ant1_2441



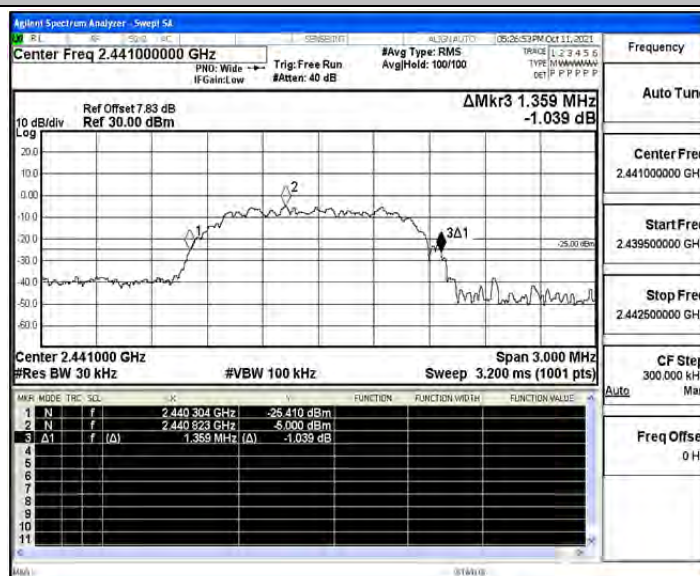
DH5_Ant1_2480



2DH5_Ant1_2402

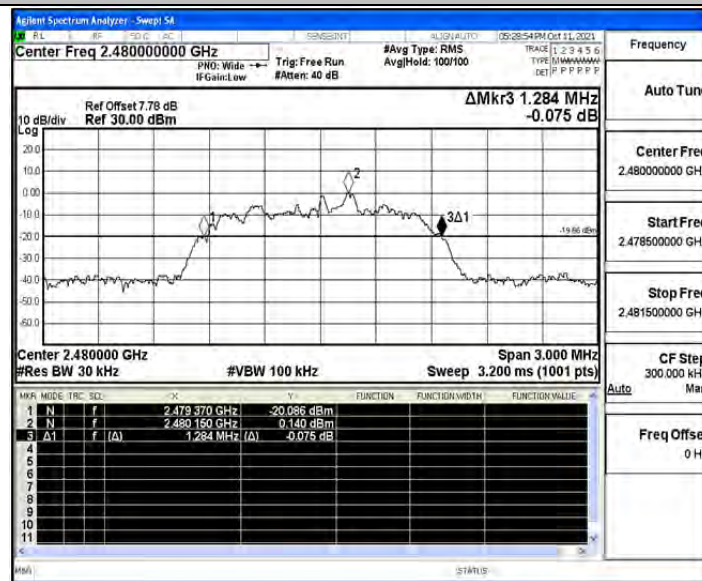


2DH5_Ant1_2441

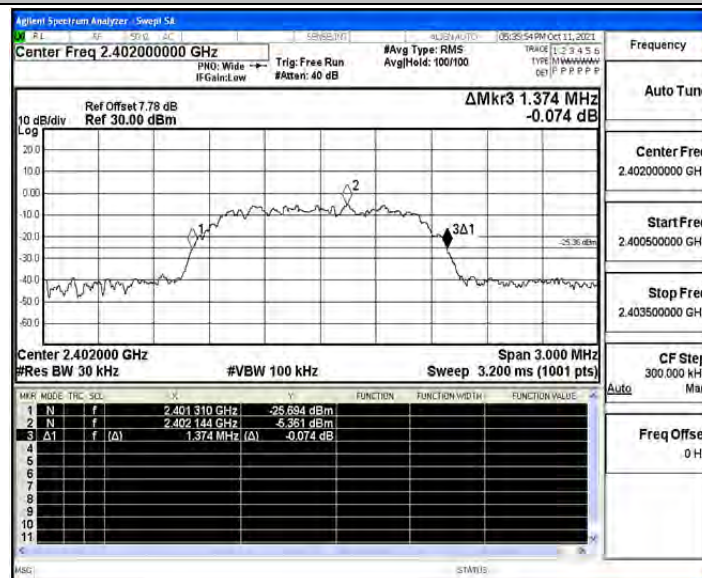




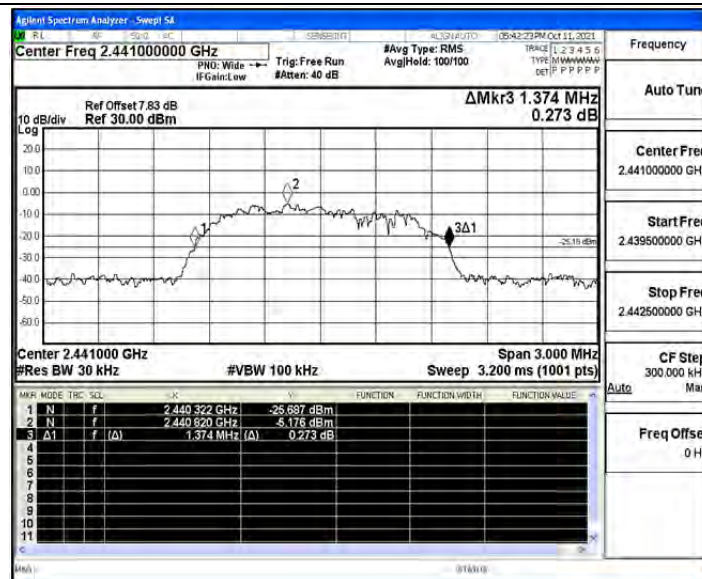
2DH5_Ant1_2480



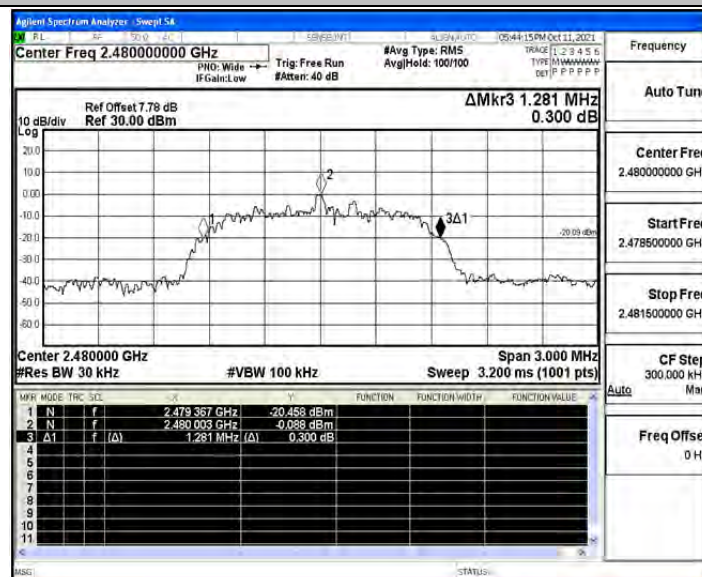
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480





A.2 Maximum peak conducted output power

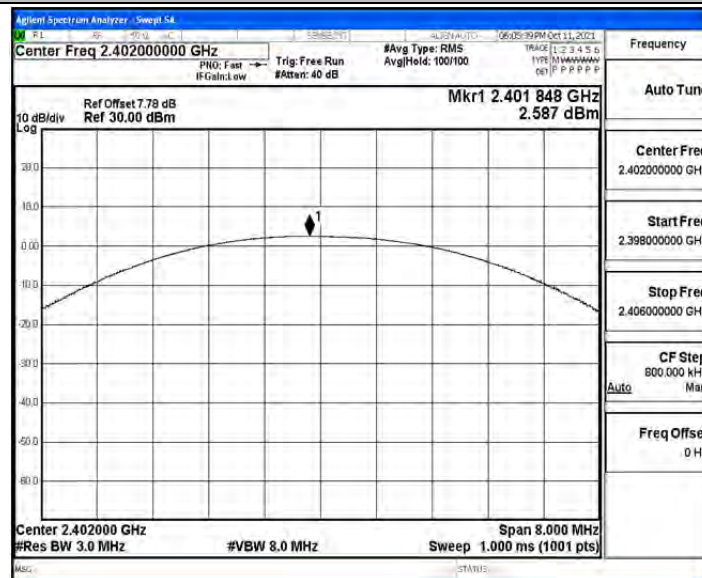
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	2.59	≤ 20.97	PASS
		2441	2.87	≤ 20.97	PASS
		2480	2.93	≤ 20.97	PASS
2DH5	Ant1	2402	3.28	≤ 20.97	PASS
		2441	3.57	≤ 20.97	PASS
		2480	3.59	≤ 20.97	PASS
3DH5	Ant1	2402	3.25	≤ 20.97	PASS
		2441	3.47	≤ 20.97	PASS
		2480	3.55	≤ 20.97	PASS

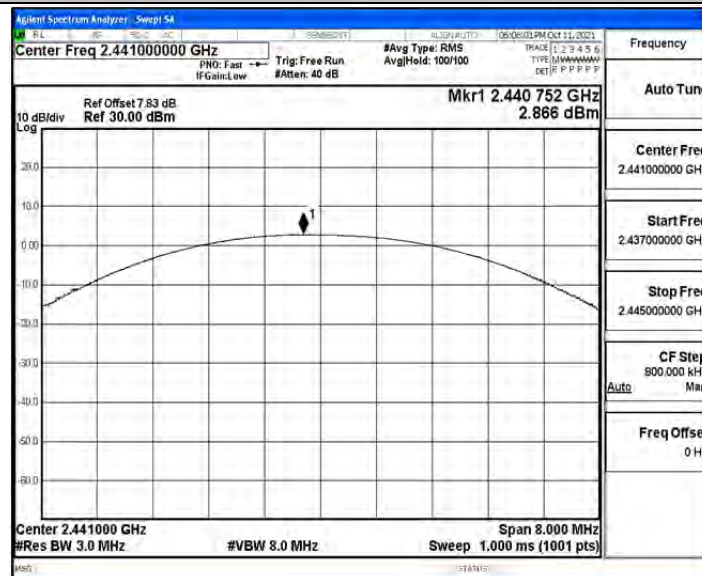


Test Graphs

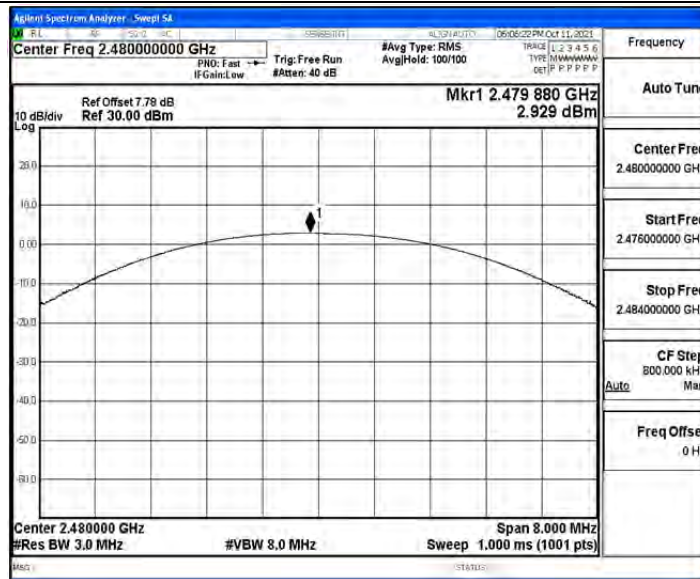
DH5_Ant1_2402



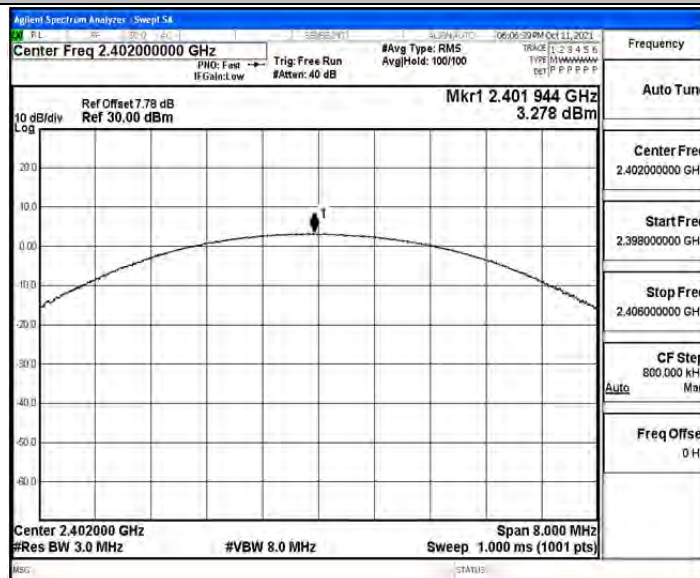
DH5_Ant1_2441



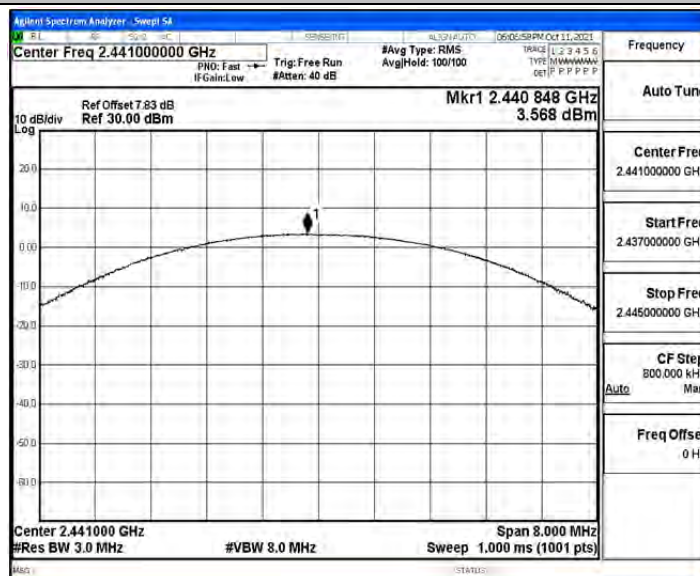
DH5_Ant1_2480



2DH5_Ant1_2402

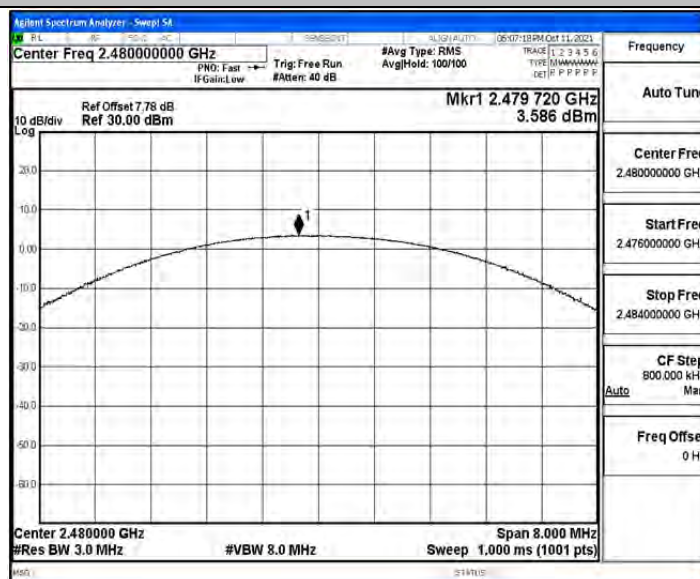


2DH5_Ant1_2441

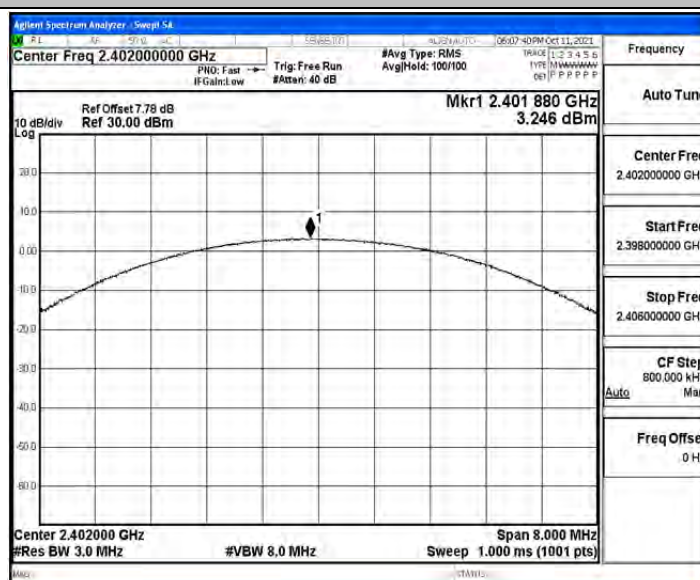




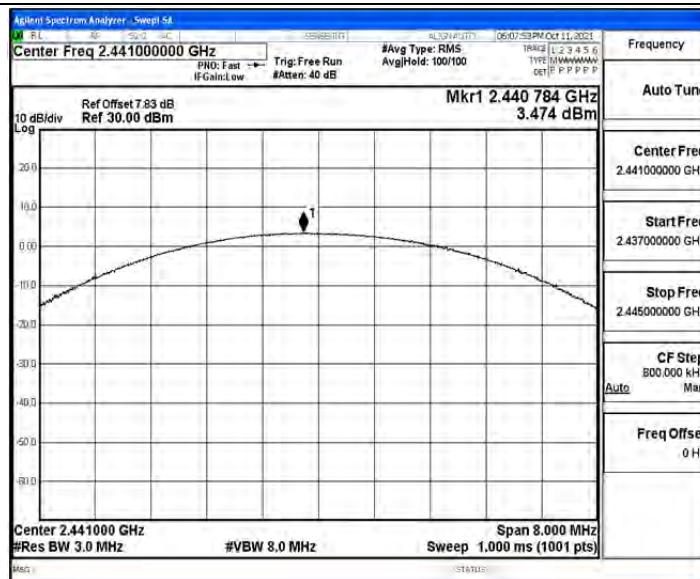
2DH5_Ant1_2480



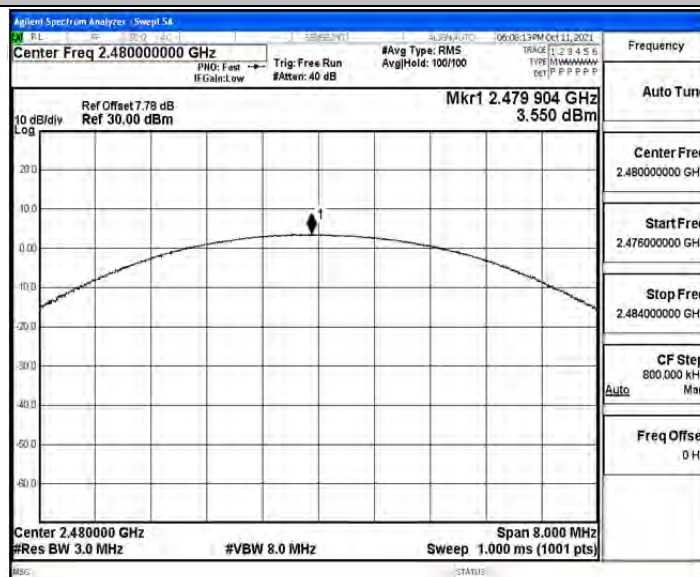
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480





A.3 Carrier frequency separation

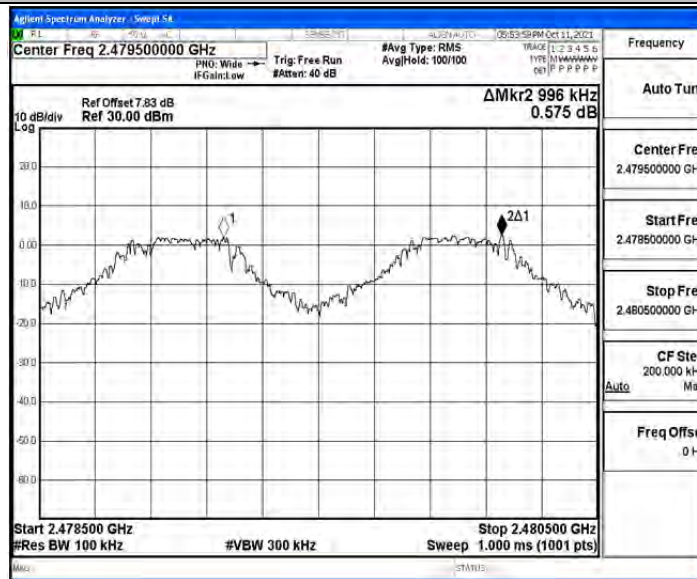
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	0.996	≥ 0.951	PASS
2DH5	Ant1	Hop	1.054	≥ 0.906	PASS
3DH5	Ant1	Hop	1.238	≥ 0.916	PASS

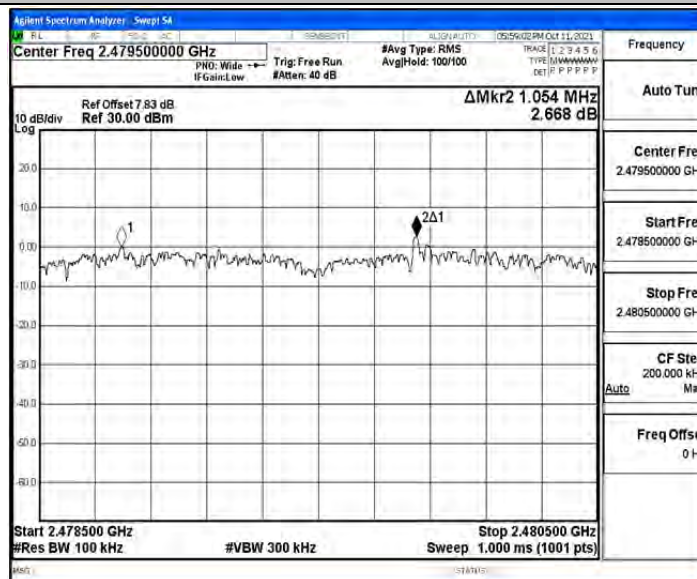


Test Graphs

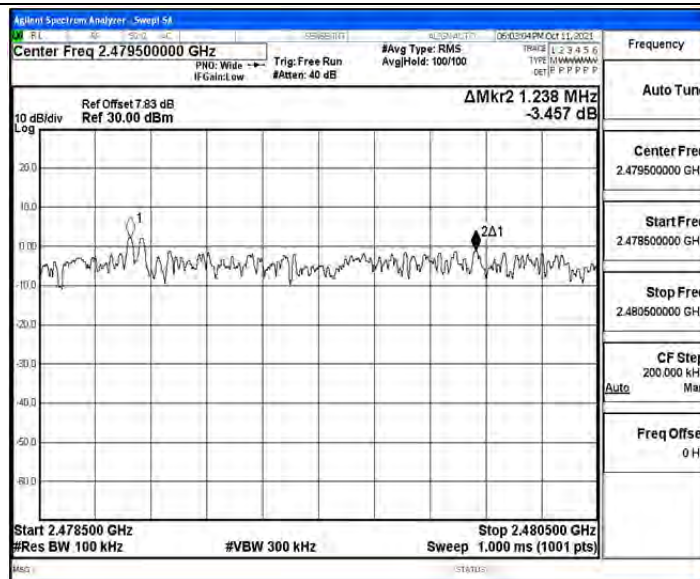
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop





A.4 Time of occupancy

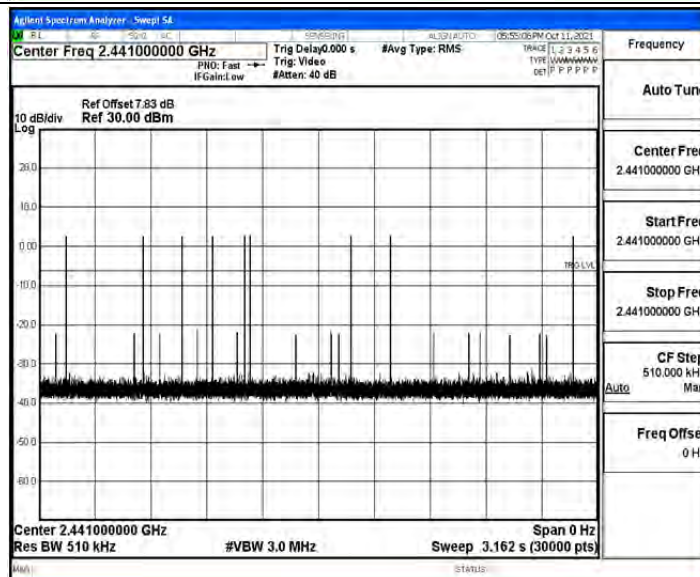
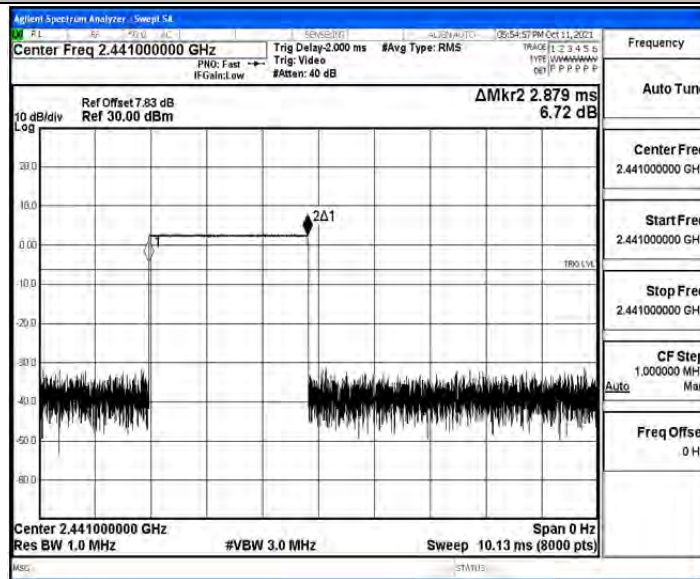
Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.88	100	0.288	≤0.4	PASS
2DH5	Ant1	Hop	2.89	30	0.087	≤0.4	PASS
3DH5	Ant1	Hop	2.89	60	0.173	≤0.4	PASS

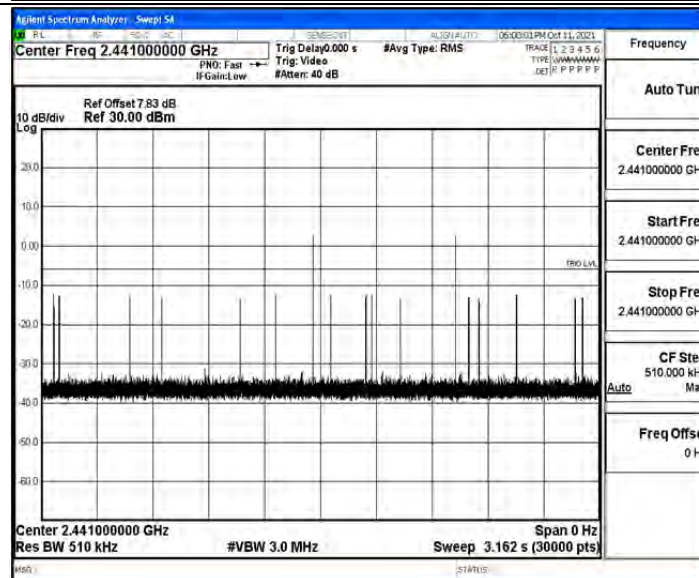
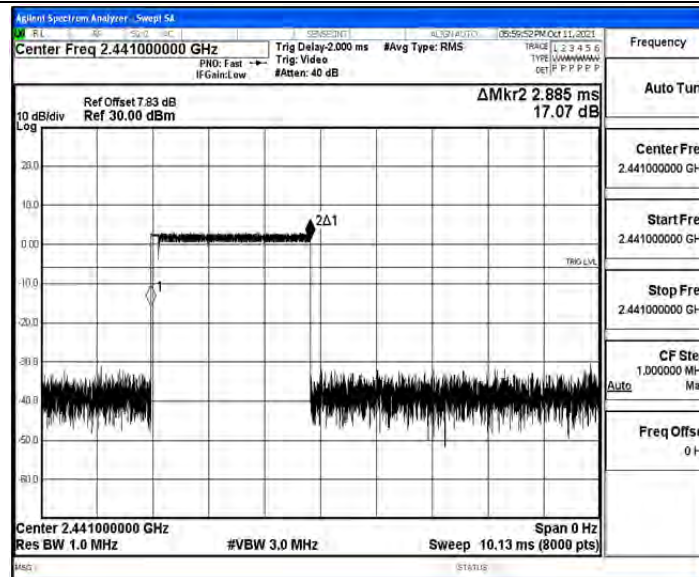


Test Graphs

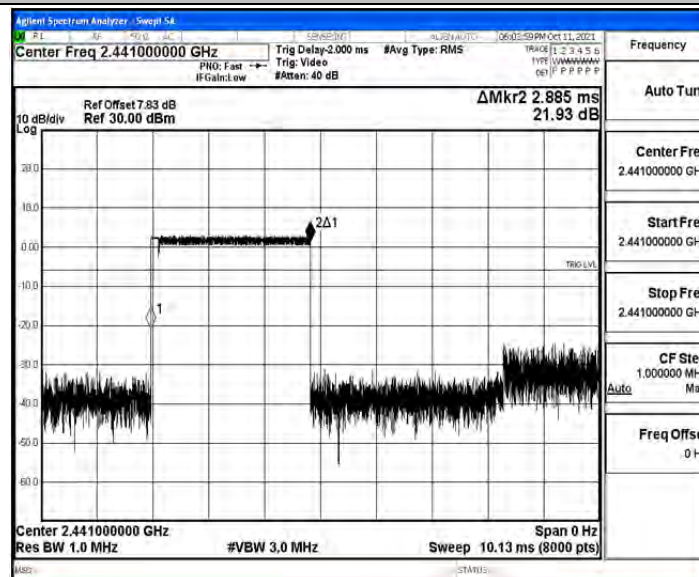
DH5_Ant1_Hop

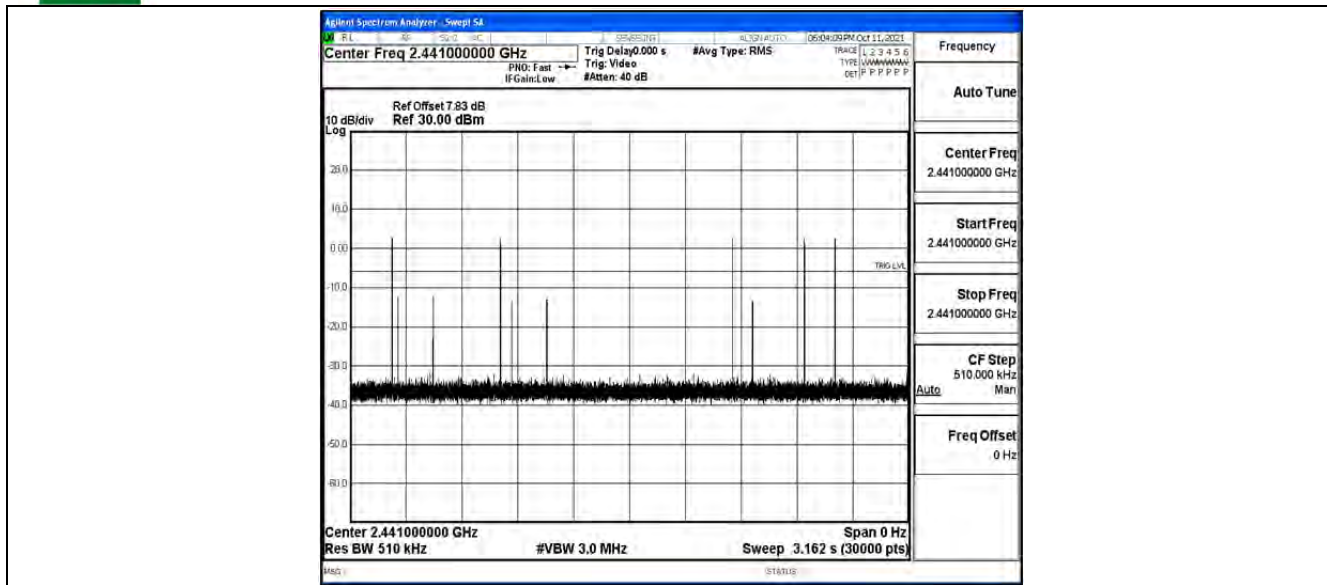


2DH5_Ant1_Hop



3DH5_Ant1_Hop







A.5 Number of hopping channels

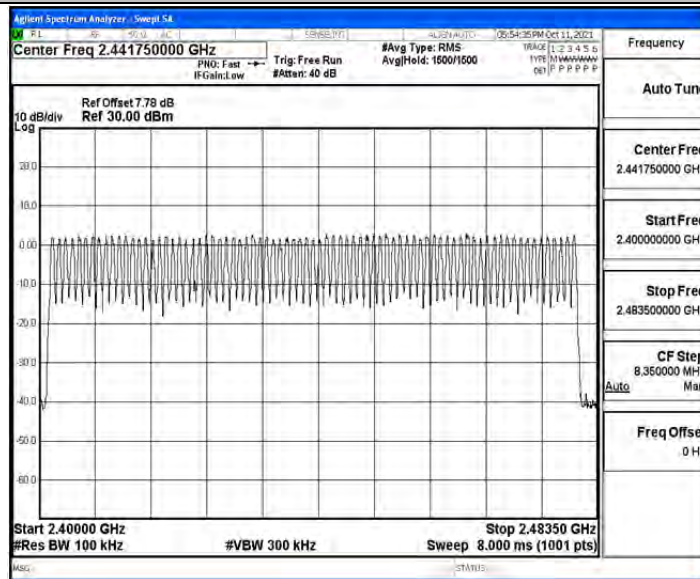
Test Result

TestMode	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

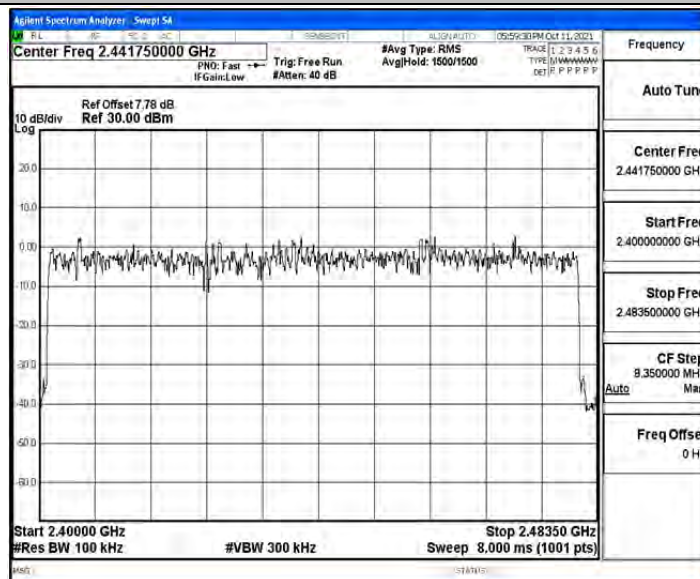


Test Graphs

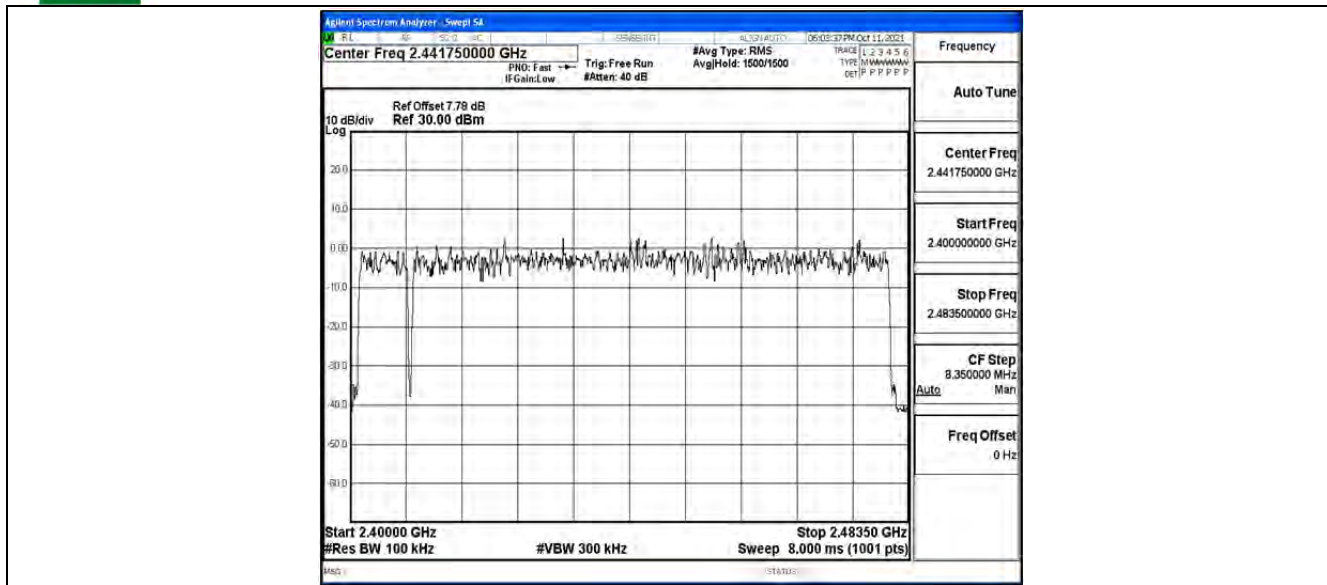
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop





A.6 Band edge measurements

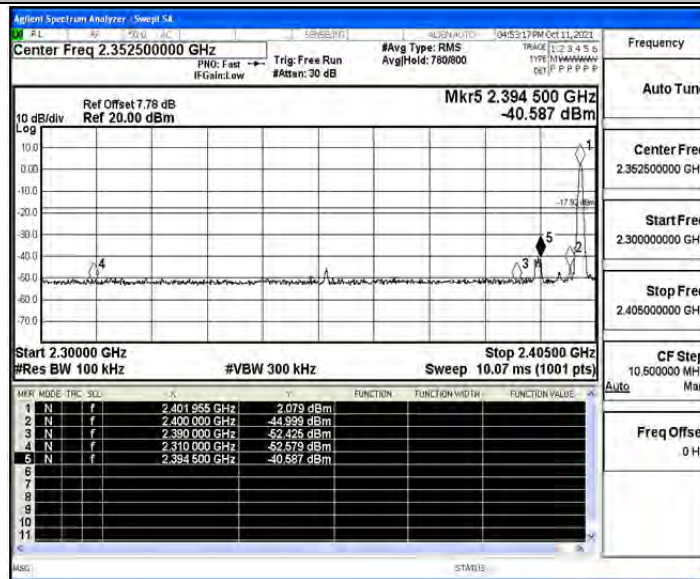
Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	2.08	-40.59	≤ -17.92	PASS
		High	2480	2.74	-41.71	≤ -17.26	PASS
		Low	Hop_2402	0.51	-46.14	≤ -19.49	PASS
		High	Hop_2480	2.17	-42.73	≤ -17.83	PASS
2DH5	Ant1	Low	2402	1.41	-45.11	≤ -18.59	PASS
		High	2480	1.78	-43.22	≤ -18.22	PASS
		Low	Hop_2402	-0.08	-48.96	≤ -20.08	PASS
		High	Hop_2480	2.51	-42.37	≤ -17.49	PASS
3DH5	Ant1	Low	2402	2.14	-42.3	≤ -17.86	PASS
		High	2480	2.61	-44.4	≤ -17.39	PASS
		Low	Hop_2402	-0.95	-47.42	≤ -20.95	PASS
		High	Hop_2480	2.72	-43.18	≤ -17.28	PASS

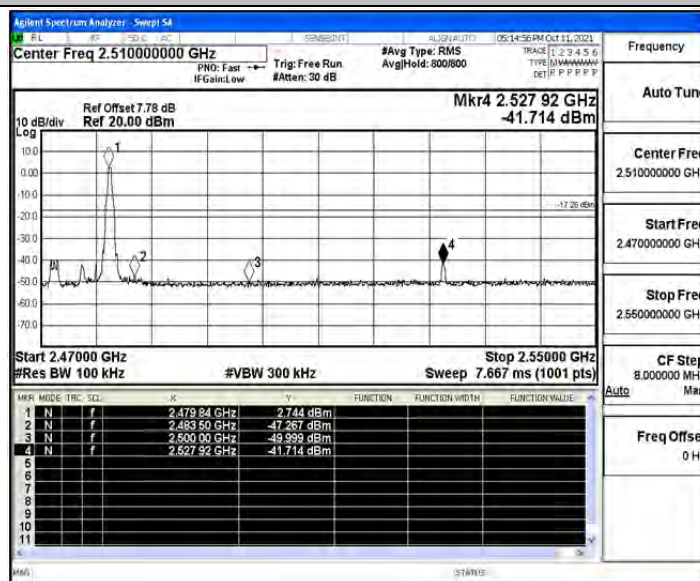


Test Graphs

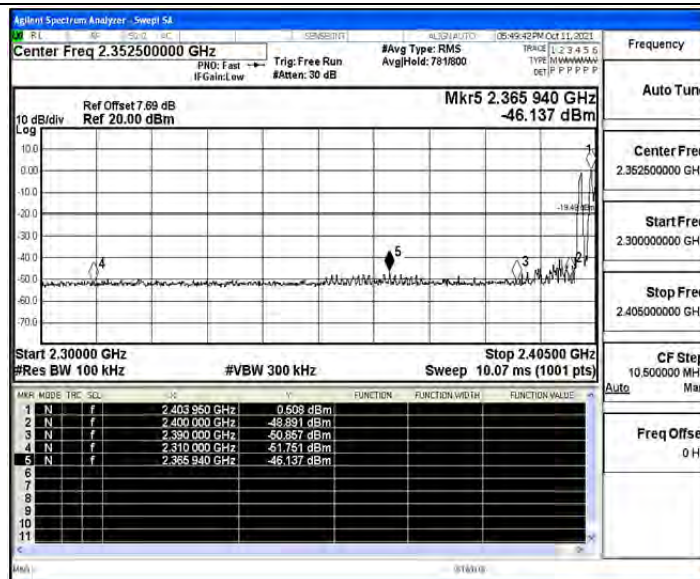
DH5_Ant1_Low_2402



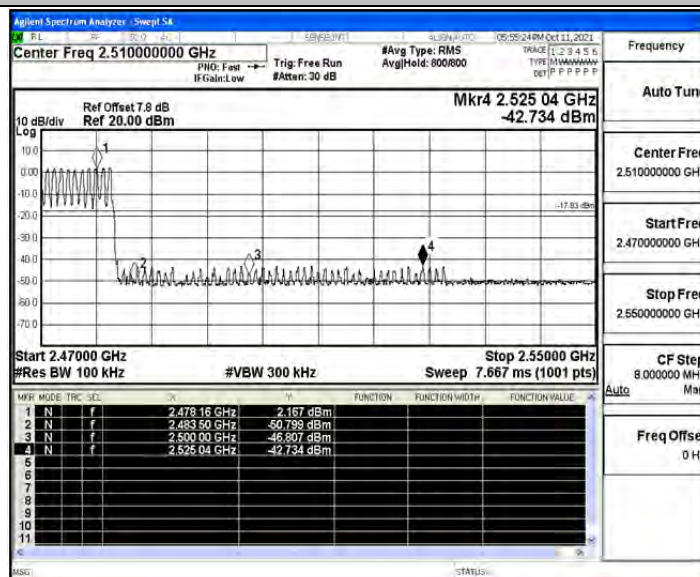
DH5_Ant1_High_2480



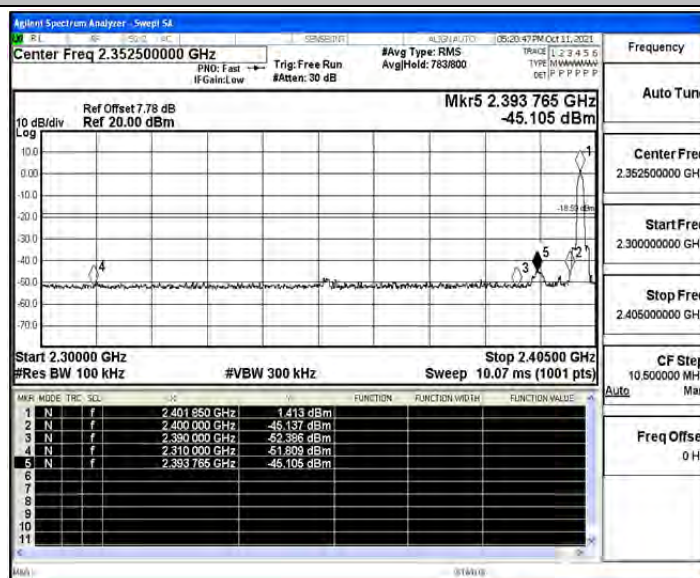
DH5_Ant1_Low_Hop_2402



DH5_Ant1_High_Hop_2480

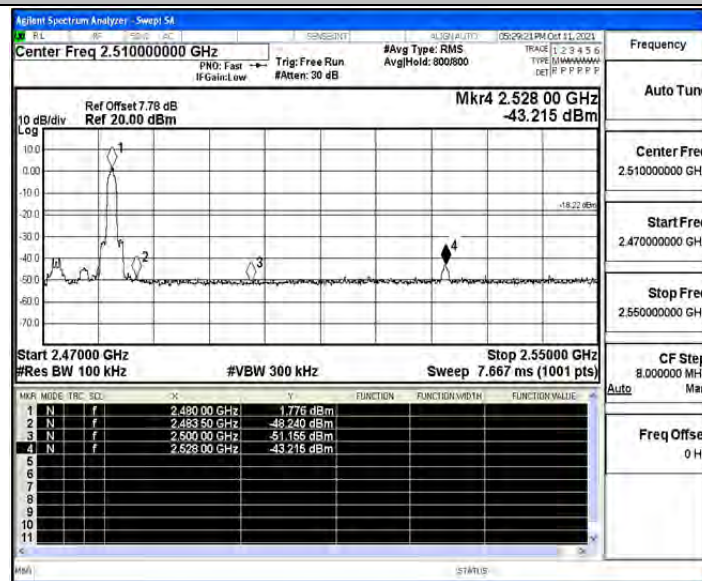


2DH5_Ant1_Low_2402

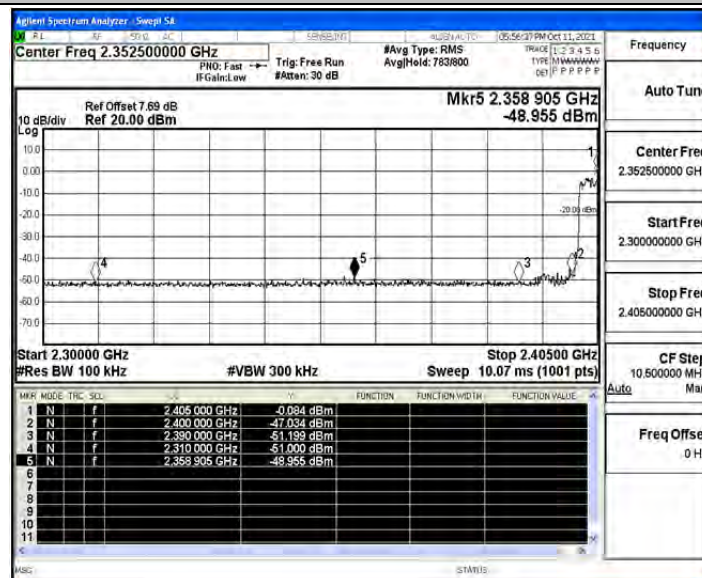




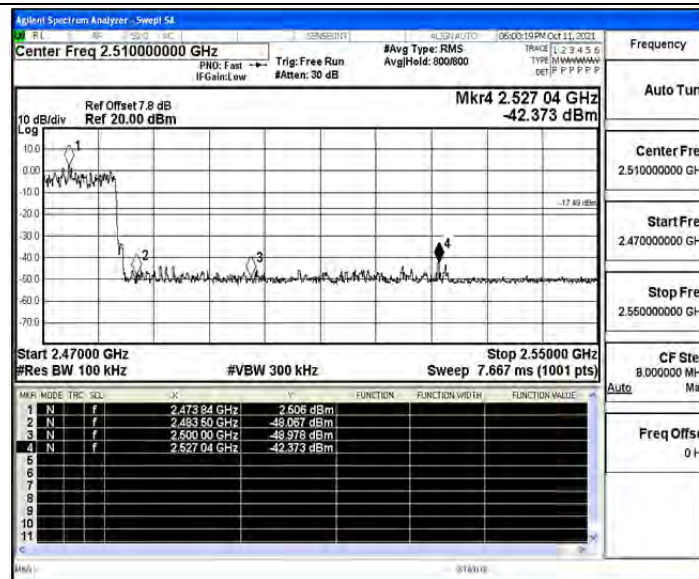
2DH5_Ant1_High_2480



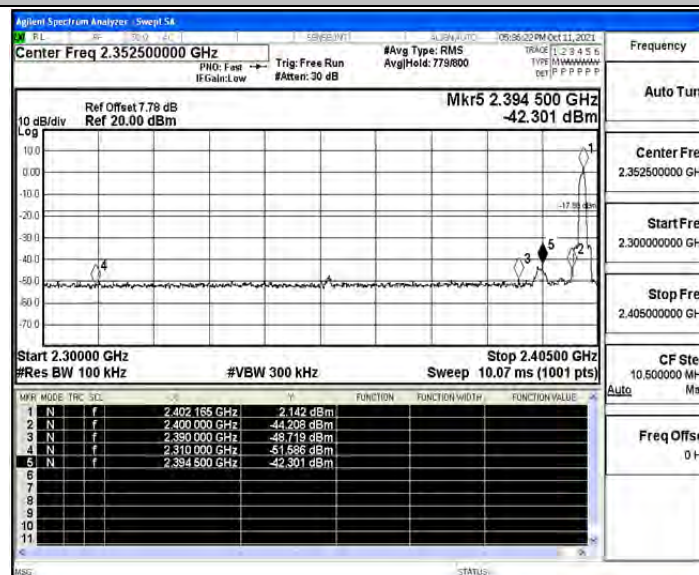
2DH5_Ant1_Low_Hop_2402



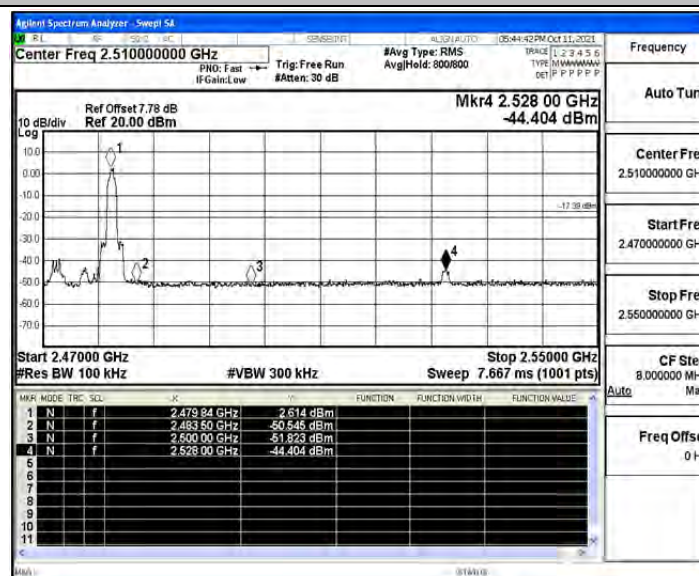
2DH5_Ant1_High_Hop_2480



3DH5_Ant1_Low_2402

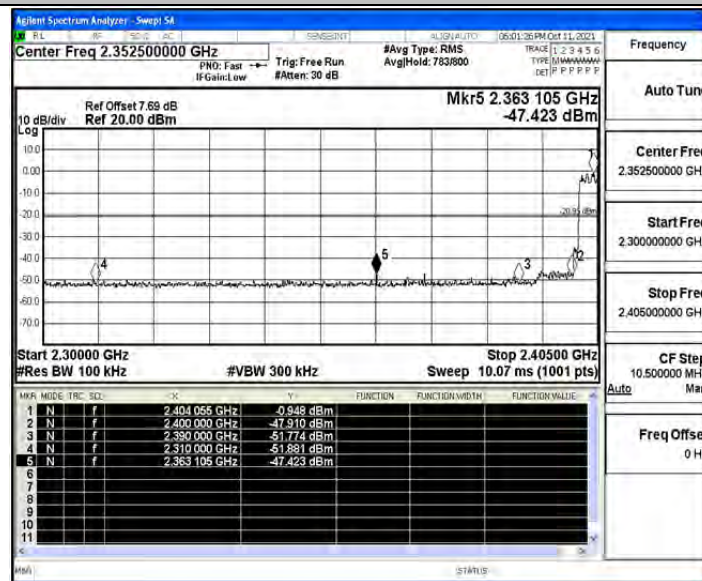


3DH5_Ant1_High_2480

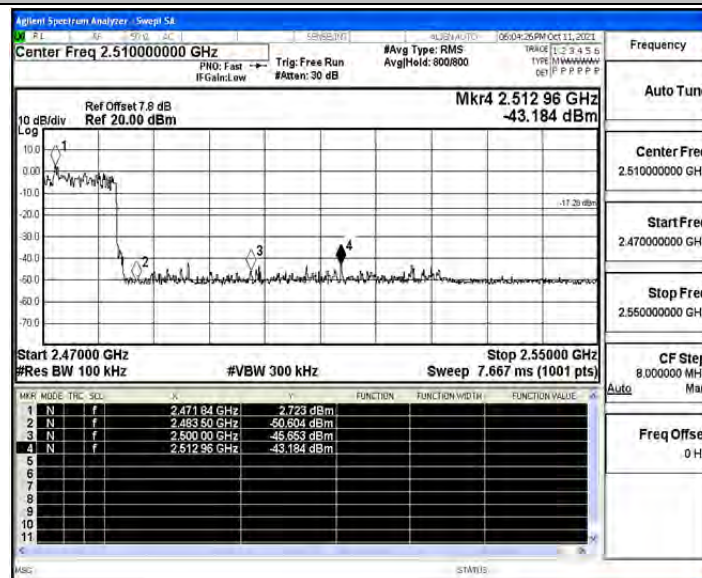




3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480





A.7 Conducted Spurious Emission

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	2.03	2.03	---	PASS
			30~1000	2.03	-55.78	≤ -17.98	PASS
			1000~26500	2.03	-38.91	≤ -17.98	PASS
		2441	Reference	2.20	2.20	---	PASS
			30~1000	2.20	-55.34	≤ -17.8	PASS
			1000~26500	2.20	-40.11	≤ -17.8	PASS
		2480	Reference	2.72	2.72	---	PASS
			30~1000	2.72	-54.62	≤ -17.28	PASS
			1000~26500	2.72	-40.57	≤ -17.28	PASS
2DH5	Ant1	2402	Reference	2.13	2.13	---	PASS
			30~1000	2.13	-54.42	≤ -17.87	PASS
			1000~26500	2.13	-40.98	≤ -17.87	PASS
		2441	Reference	0.01	0.01	---	PASS
			30~1000	0.01	-28.52	≤ -19.99	PASS
			1000~26500	0.01	-43.92	≤ -19.99	PASS
		2480	Reference	2.01	2.01	---	PASS
			30~1000	2.01	-55.45	≤ -18	PASS
			1000~26500	2.01	-43.79	≤ -18	PASS
3DH5	Ant1	2402	Reference	1.02	1.02	---	PASS
			30~1000	1.02	-55.4	≤ -18.98	PASS
			1000~26500	1.02	-43	≤ -18.98	PASS
		2441	Reference	1.66	1.66	---	PASS
			30~1000	1.66	-54.77	≤ -18.34	PASS
			1000~26500	1.66	-41.89	≤ -18.34	PASS
		2480	Reference	2.27	2.27	---	PASS
			30~1000	2.27	-55.56	≤ -17.73	PASS
			1000~26500	2.27	-38.95	≤ -17.73	PASS

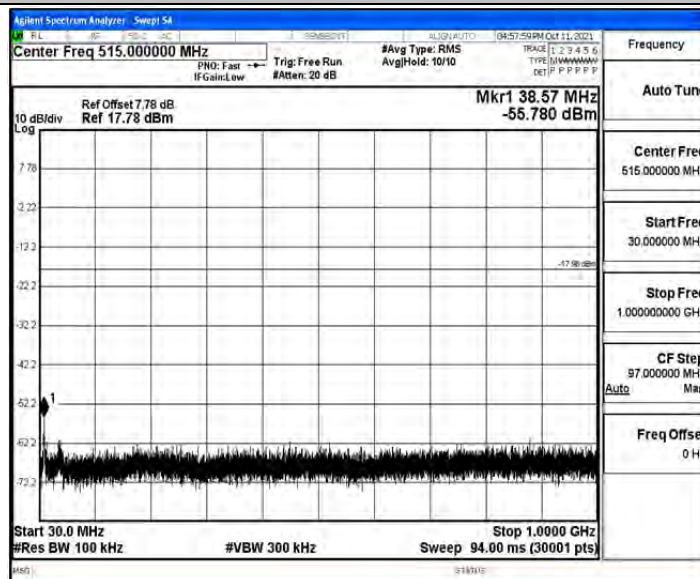


Test Graphs

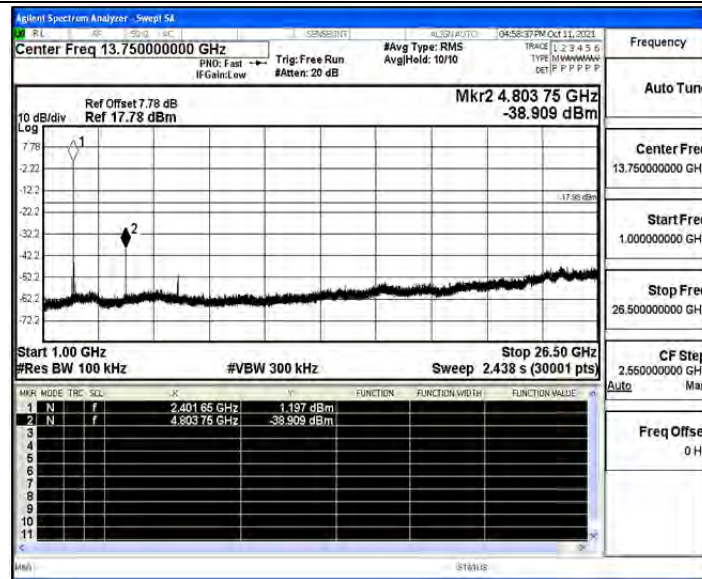
DH5_Ant1_2402_0~Reference



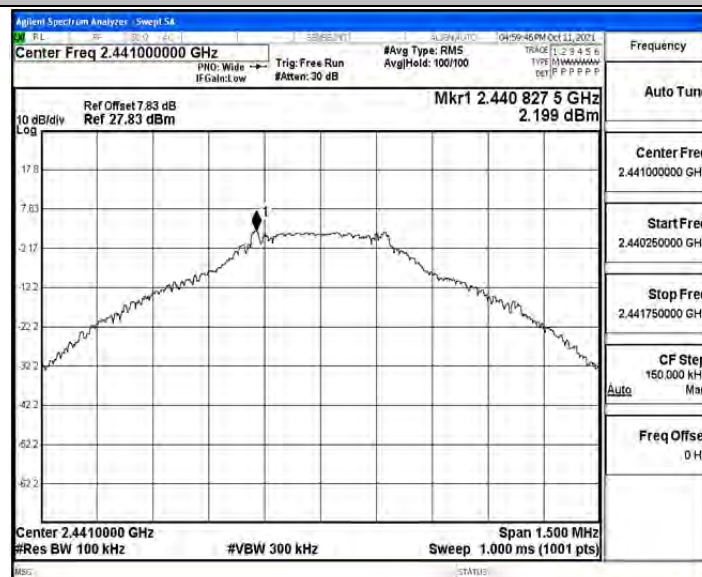
DH5_Ant1_2402_30~1000



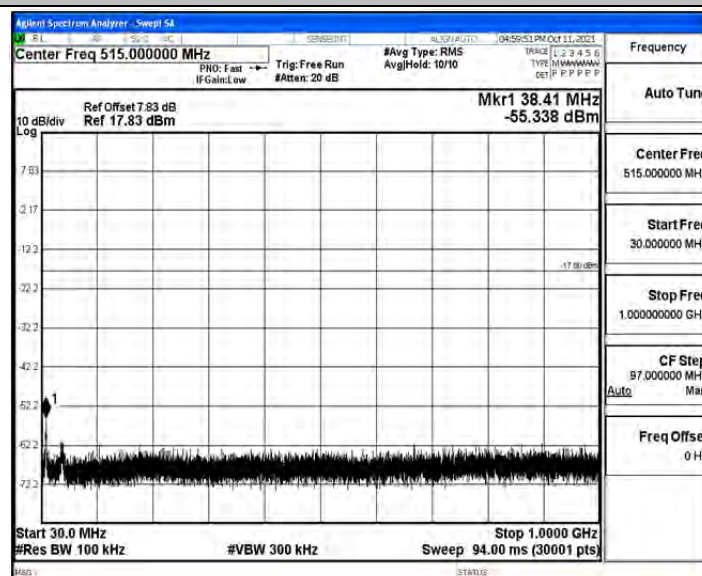
DH5_Ant1_2402_1000~26500



DH5_Ant1_2441_0-Reference

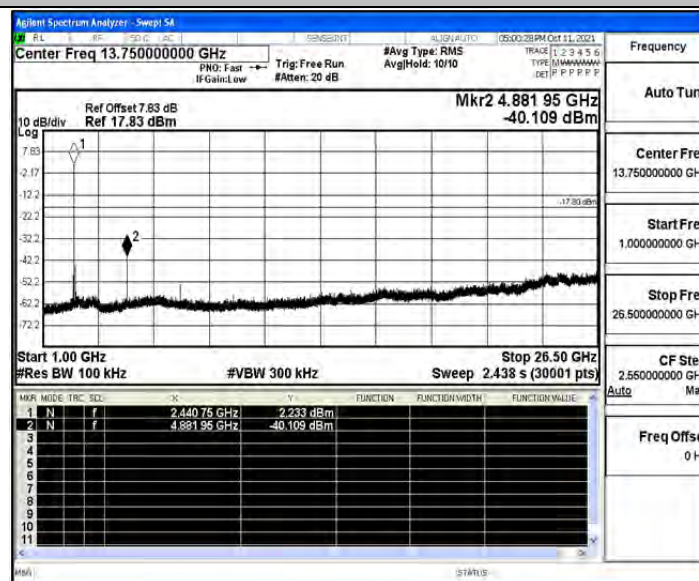


DH5_Ant1_2441_30~1000

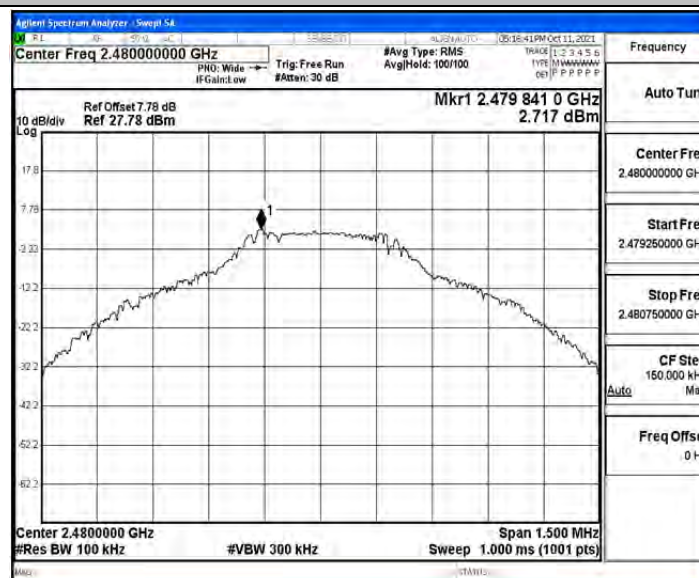




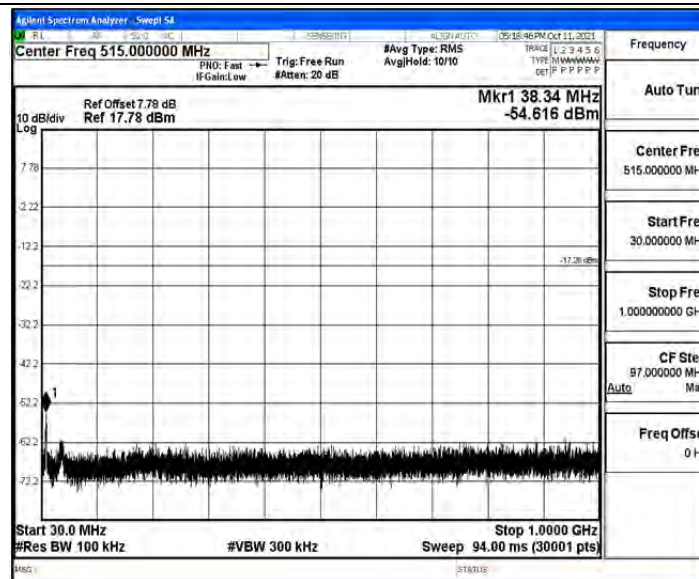
DH5_Ant1_2441_1000~26500



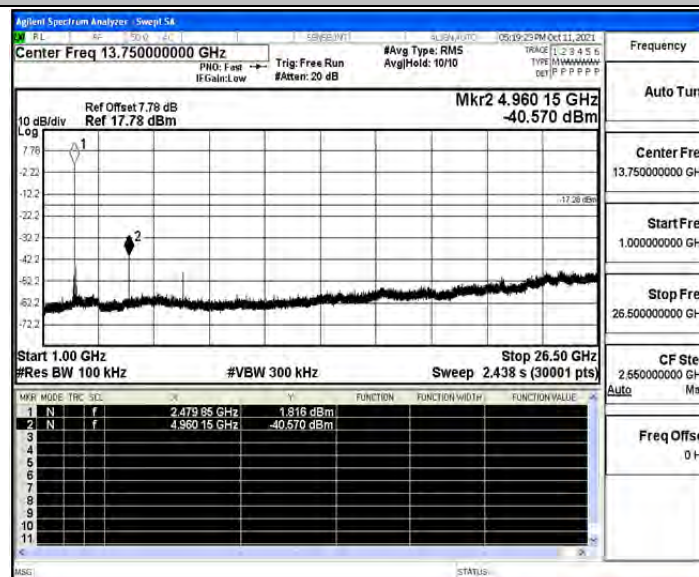
DH5_Ant1_2480_0~Reference



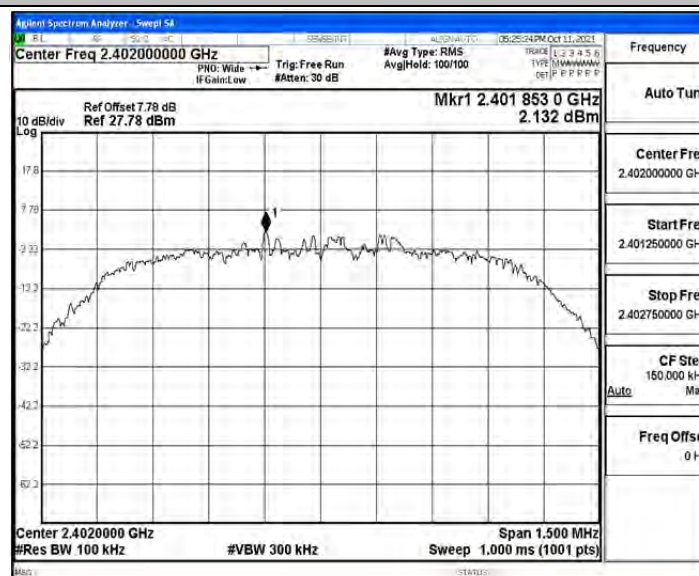
DH5_Ant1_2480_30~1000



DH5_Ant1_2480_1000~26500

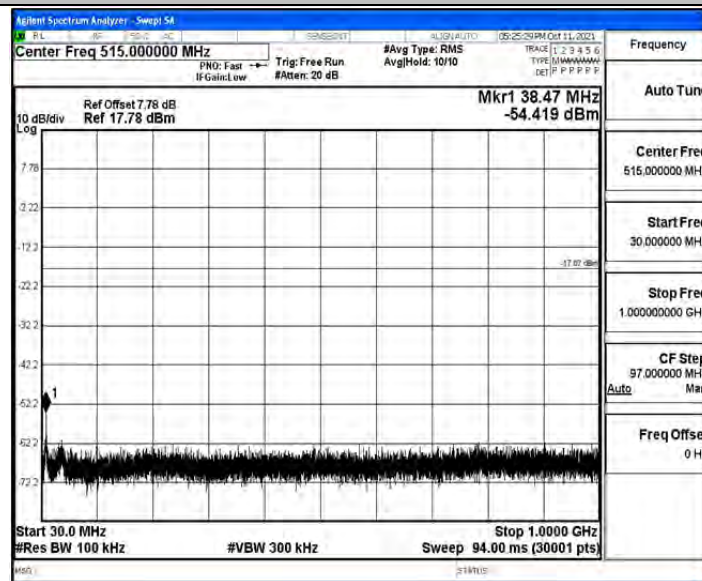


2DH5_Ant1_2402_0~Reference

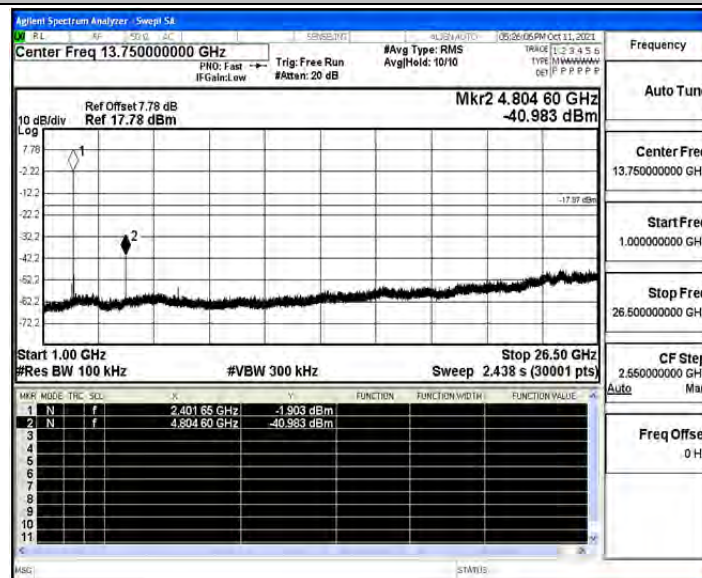




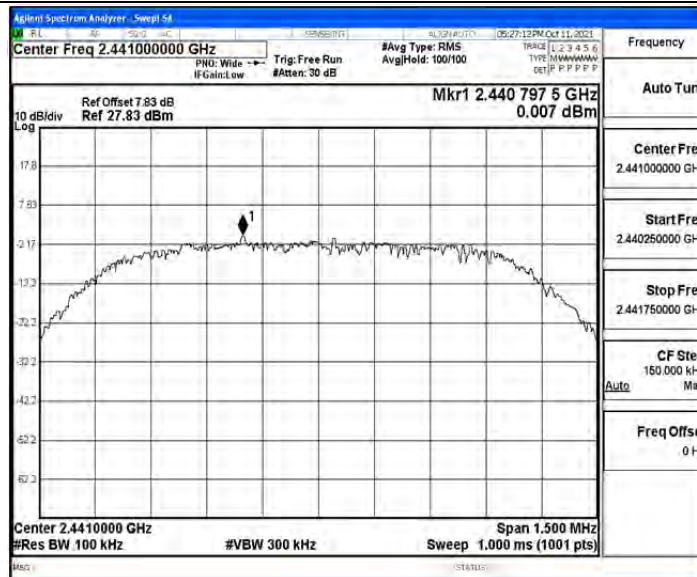
2DH5_Ant1_2402_30~1000



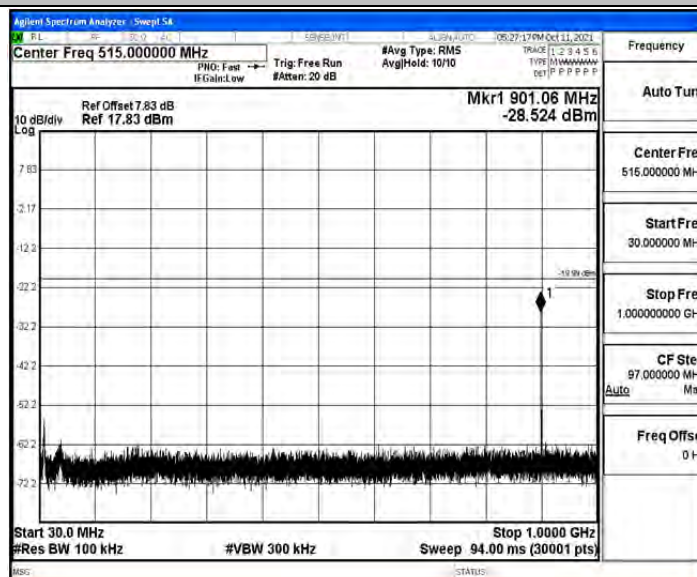
2DH5_Ant1_2402_1000~26500



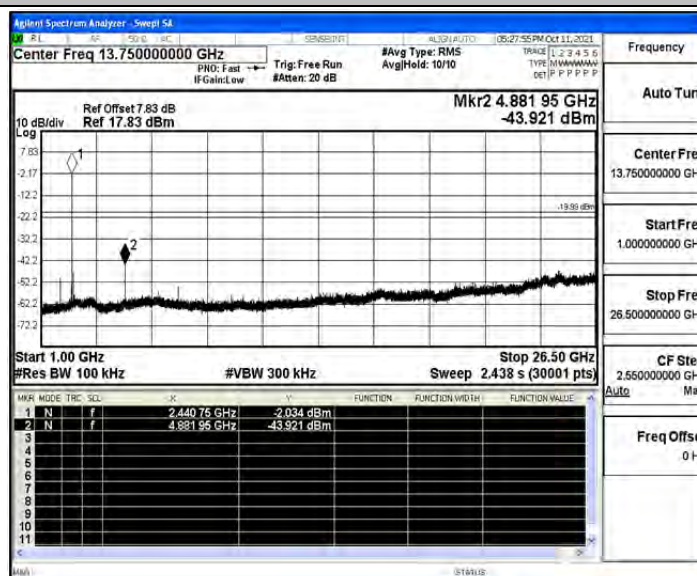
2DH5_Ant1_2441_0~Reference



2DH5_Ant1_2441_30~1000

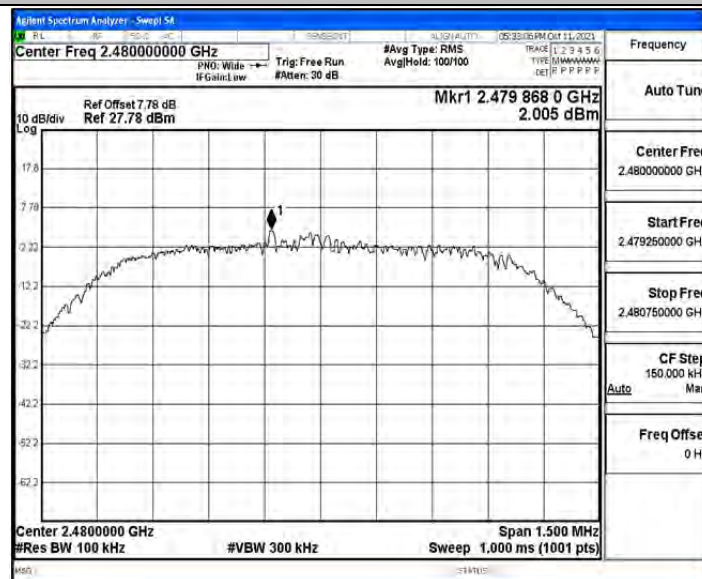


2DH5_Ant1_2441_1000~26500

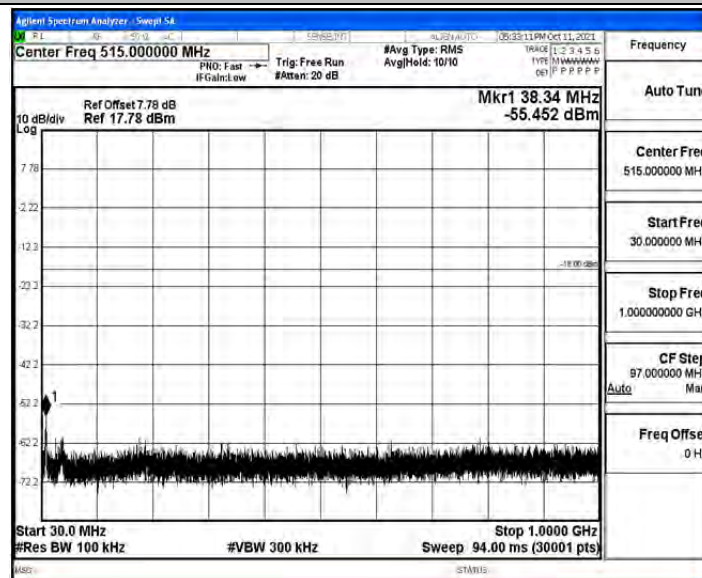




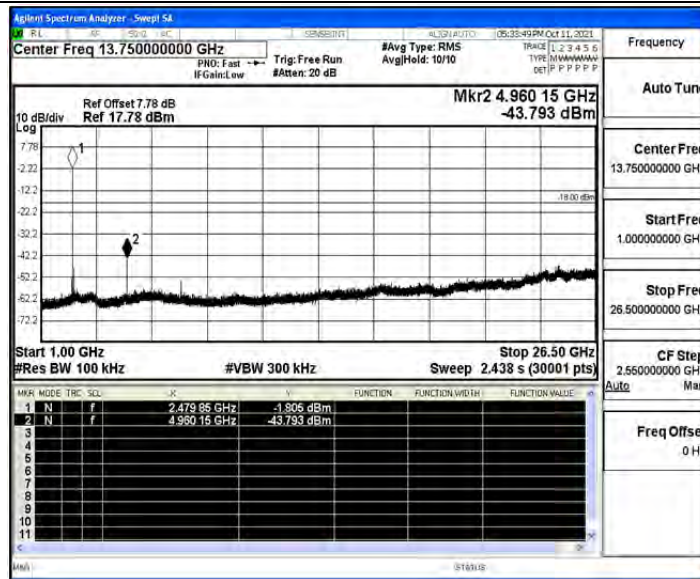
2DH5_Ant1_2480_0~Reference



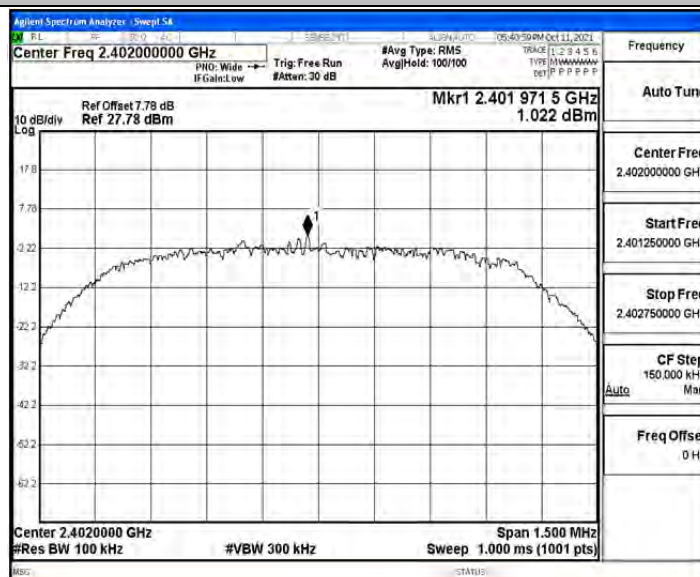
2DH5_Ant1_2480_30~1000



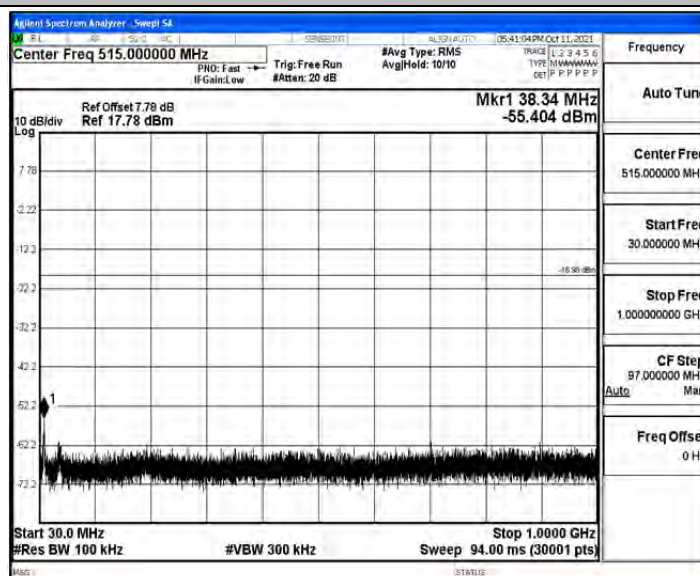
2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference

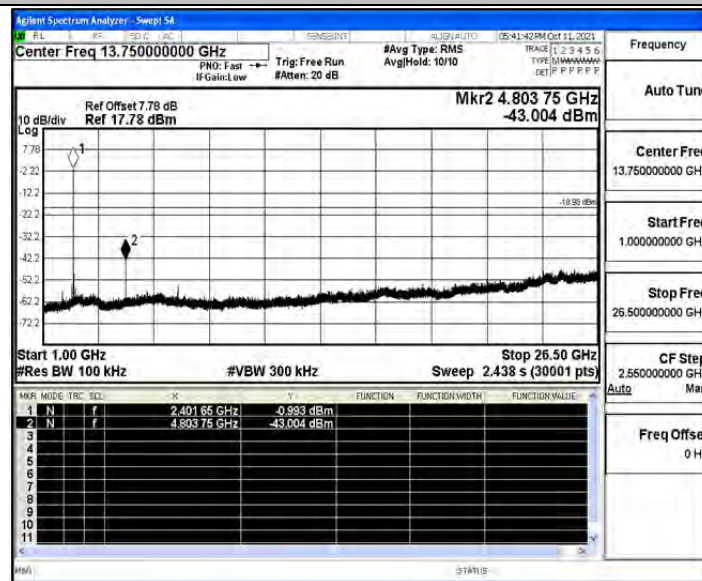


3DH5_Ant1_2402_30~1000

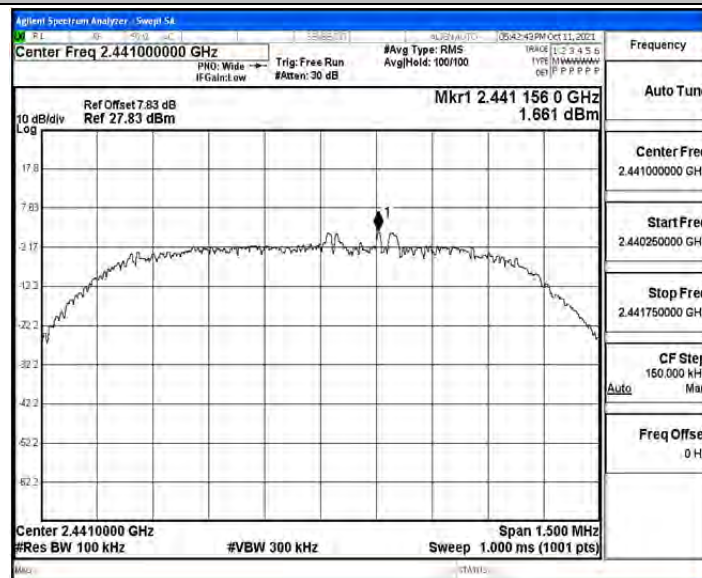




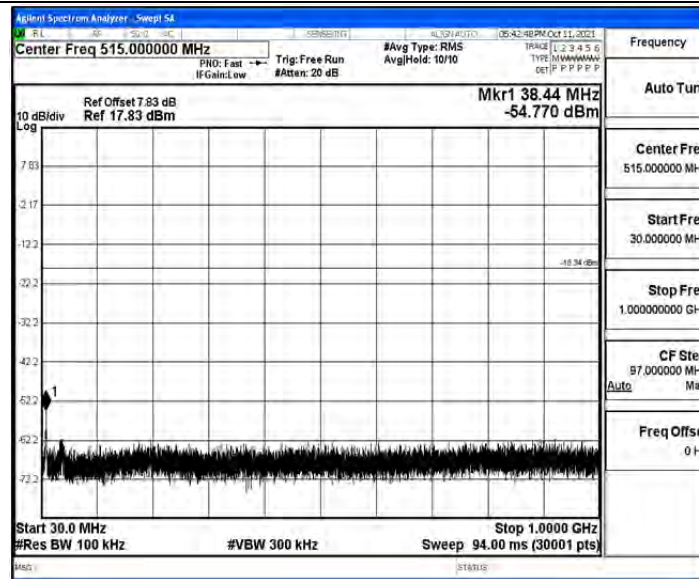
3DH5_Ant1_2402_1000~26500



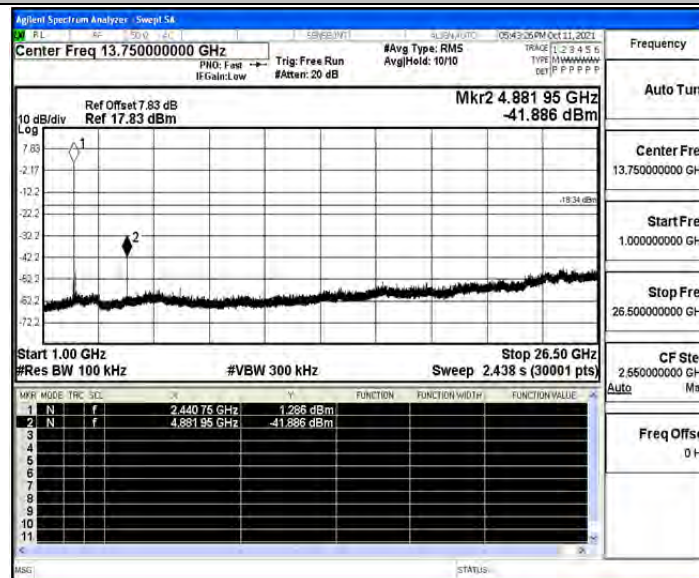
3DH5_Ant1_2441_0~Reference



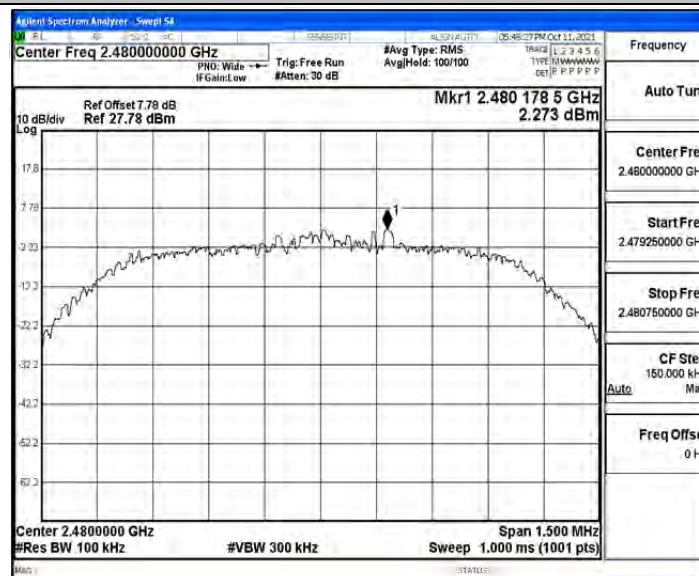
3DH5_Ant1_2441_30~1000



3DH5_Ant1_2441_1000~26500

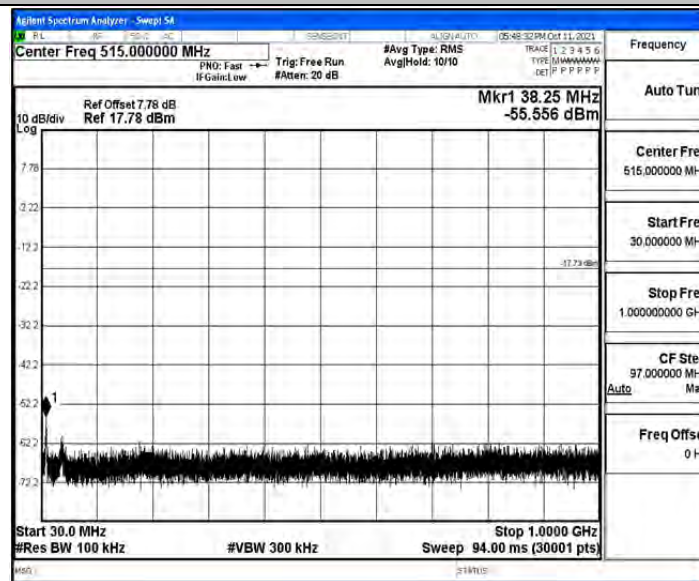


3DH5_Ant1_2480_0~Reference

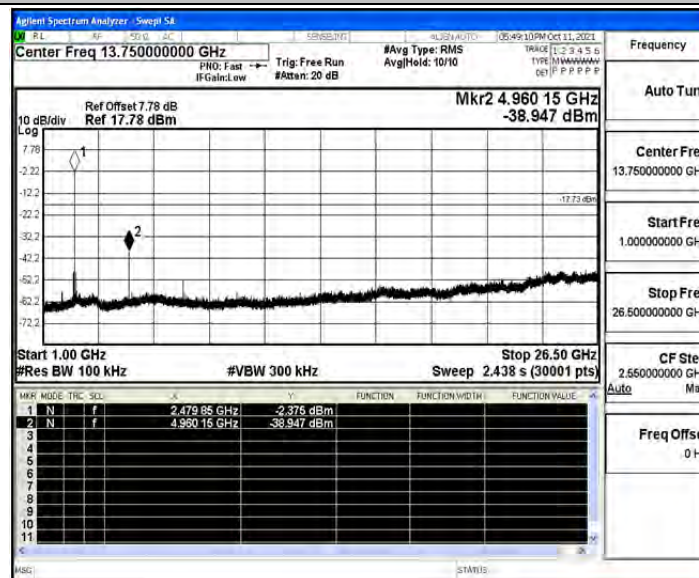




3DH5_Ant1_2480_30~1000



3DH5_Ant1_2480_1000~26500





A.8 Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Channel	Detector	Freq. [MHz]	Result [dBm]	Limit [dBm]	Result [dBUV/m]	Limit [dBUV/m]	Verdict
DH5	Ant1	Low	2402	AV	2310.000	-48.75	≤-41.20	46.45	≤54	PASS
				AV	2354.075	-45.01	≤-41.20	50.19	≤54	PASS
				AV	2390.000	-48.42	≤-41.20	46.78	≤54	PASS
				Peak	2310.000	-40.46	≤-21.20	54.74	≤74	PASS
				Peak	2341.685	-38	≤-21.20	57.20	≤74	PASS
				Peak	2390.000	-39.04	≤-21.20	56.16	≤74	PASS
		High	2480	AV	2483.500	-45.61	≤-41.20	49.59	≤54	PASS
				AV	2483.520	-45.6	≤-41.20	49.60	≤54	PASS
				AV	2500.000	-47.86	≤-41.20	47.34	≤54	PASS
				Peak	2483.500	-37.51	≤-21.20	57.69	≤74	PASS
				Peak	2483.760	-37.06	≤-21.20	58.14	≤74	PASS
				Peak	2500.000	-39.71	≤-21.20	55.49	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-41.11	≤-21.20	54.09	≤74	PASS
				Peak	2379.590	-37.67	≤-21.20	57.53	≤74	PASS
				Peak	2390.000	-40.51	≤-21.20	54.69	≤74	PASS
		High	Hop_2480	Peak	2483.500	-39.48	≤-21.20	55.72	≤74	PASS
				Peak	2486.720	-35.91	≤-21.20	59.29	≤74	PASS
				Peak	2500.000	-39.22	≤-21.20	55.98	≤74	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-48.74	≤-41.20	46.46	≤54	PASS
				AV	2353.970	-45.68	≤-41.20	49.52	≤54	PASS
				AV	2390.000	-48.33	≤-41.20	46.87	≤54	PASS
				Peak	2310.000	-39.12	≤-21.20	56.08	≤74	PASS
				Peak	2382.845	-38.26	≤-21.20	56.94	≤74	PASS
				Peak	2390.000	-39.67	≤-21.20	55.53	≤74	PASS
		High	2480	AV	2483.500	-45.95	≤-41.20	49.25	≤54	PASS
				AV	2483.520	-45.95	≤-41.20	49.25	≤54	PASS
				AV	2500.000	-47.81	≤-41.20	47.39	≤54	PASS
				Peak	2483.500	-38.6	≤-21.20	56.60	≤74	PASS
				Peak	2484.240	-37.27	≤-21.20	57.93	≤74	PASS
				Peak	2500.000	-39.75	≤-21.20	55.45	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-41.1	≤-21.20	54.10	≤74	PASS
				Peak	2389.145	-37.36	≤-21.20	57.84	≤74	PASS
				Peak	2390.000	-39.97	≤-21.20	55.23	≤74	PASS
		High	Hop_2480	Peak	2483.500	-39.7	≤-21.20	55.50	≤74	PASS
				Peak	2494.080	-36.73	≤-21.20	58.47	≤74	PASS
				Peak	2500.000	-39.88	≤-21.20	55.32	≤74	PASS
3DH5	Ant1	Low	2402	AV	2310.000	-48.64	≤-41.20	46.56	≤54	PASS



				AV	2354.075	-45.66	≤-41.20	49.54	≤54	PASS
				AV	2390.000	-48.35	≤-41.20	46.85	≤54	PASS
				Peak	2310.000	-40.61	≤-21.20	54.59	≤74	PASS
				Peak	2380.535	-38.03	≤-21.20	57.17	≤74	PASS
				Peak	2390.000	-38.78	≤-21.20	56.42	≤74	PASS
		High	2480	AV	2483.500	-46.11	≤-41.20	49.09	≤54	PASS
				AV	2483.520	-46.11	≤-41.20	49.09	≤54	PASS
				AV	2500.000	-47.9	≤-41.20	47.30	≤54	PASS
				Peak	2483.500	-36.77	≤-21.20	58.43	≤74	PASS
				Peak	2483.840	-36.24	≤-21.20	58.96	≤74	PASS
				Peak	2500.000	-39	≤-21.20	56.20	≤74	PASS
		Low	Hop_24 02	Peak	2310.000	-39.92	≤-21.20	55.28	≤74	PASS
				Peak	2355.125	-37.97	≤-21.20	57.23	≤74	PASS
				Peak	2390.000	-40.67	≤-21.20	54.53	≤74	PASS
		High	Hop_24 80	Peak	2483.500	-39.96	≤-21.20	55.24	≤74	PASS
				Peak	2494.960	-35.73	≤-21.20	59.47	≤74	PASS
				Peak	2500.000	-38.08	≤-21.20	57.12	≤74	PASS

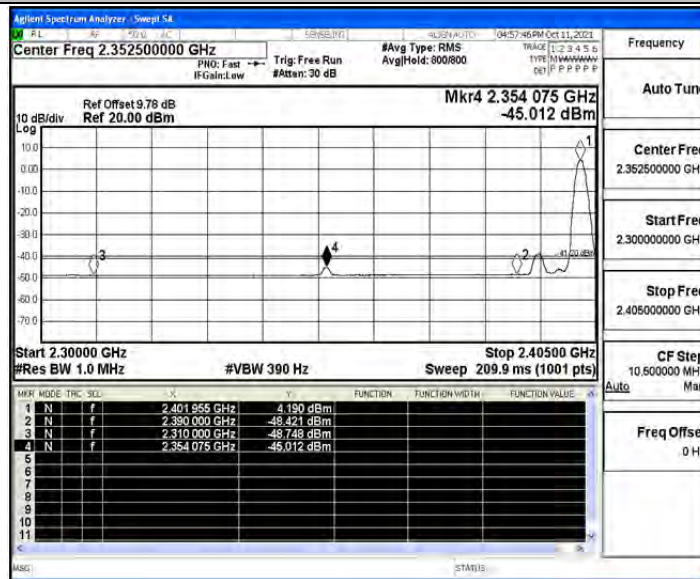
Note:

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.

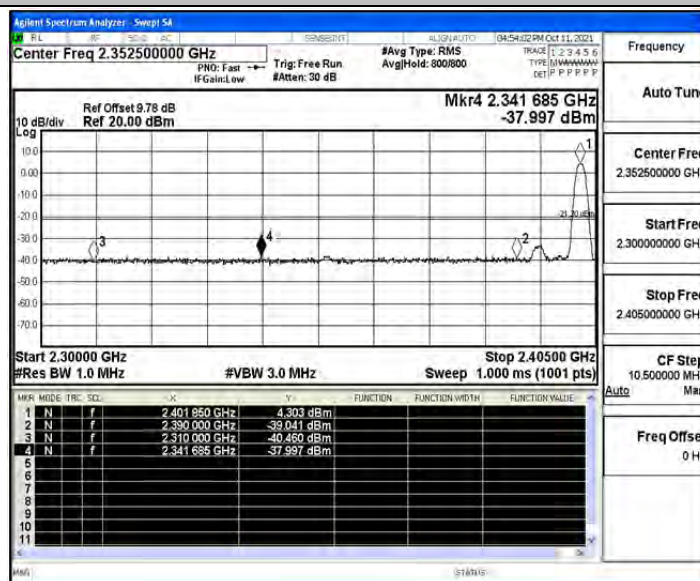


Test Graphs

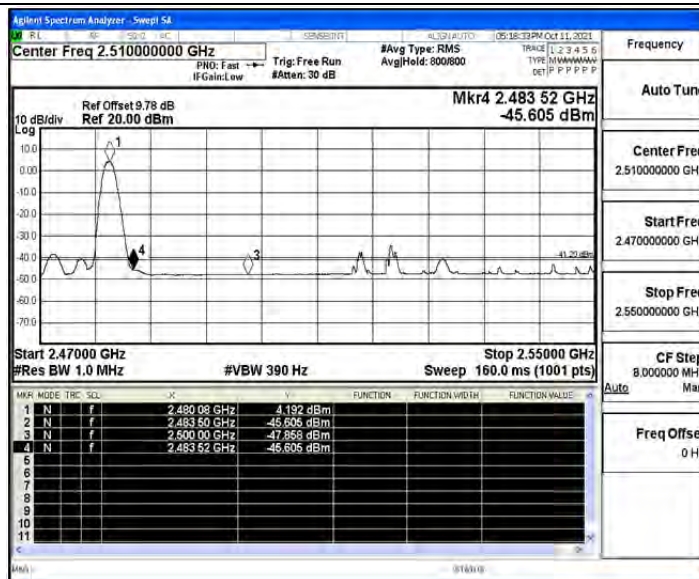
DH5_Ant1_Low_2402_AV



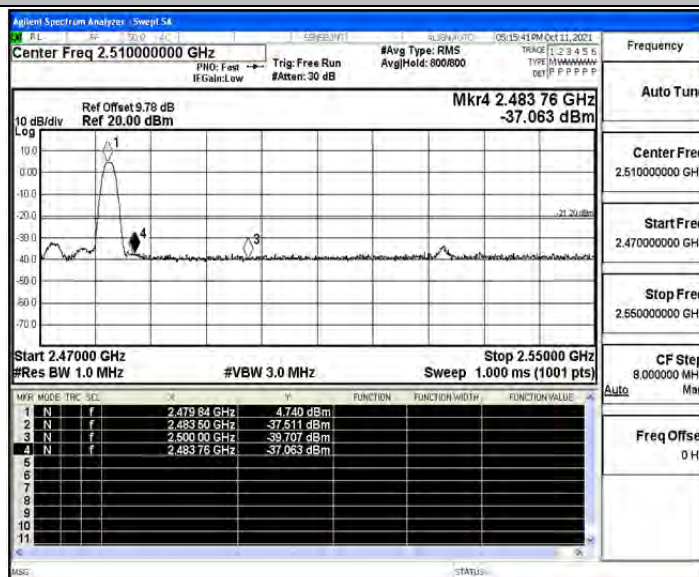
DH5_Ant1_Low_2402_Peak



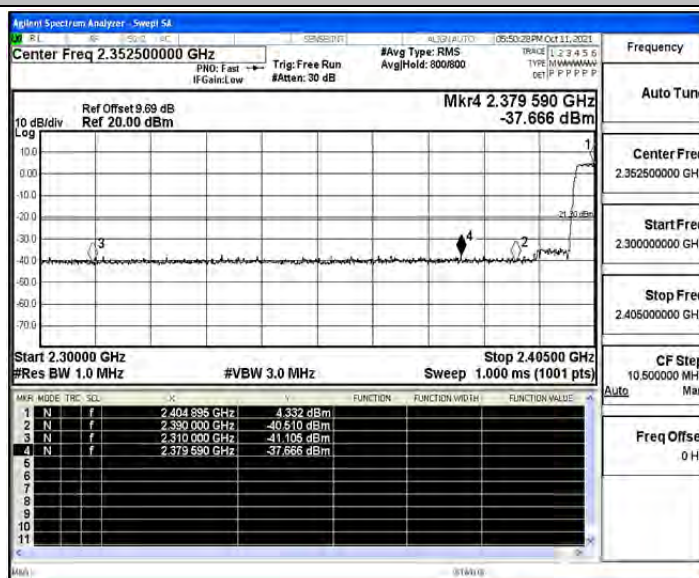
DH5_Ant1_High_2480_AV



DH5_Ant1_High_2480_Peak

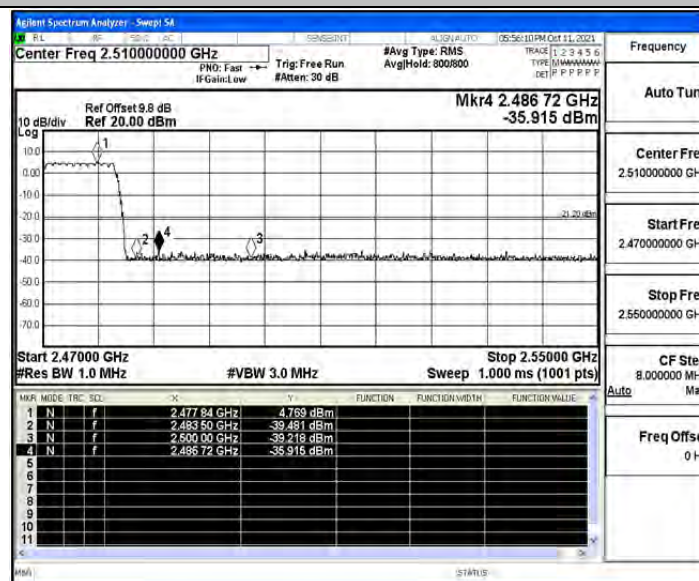


DH5_Ant1_Low_Hop_2402_Peak

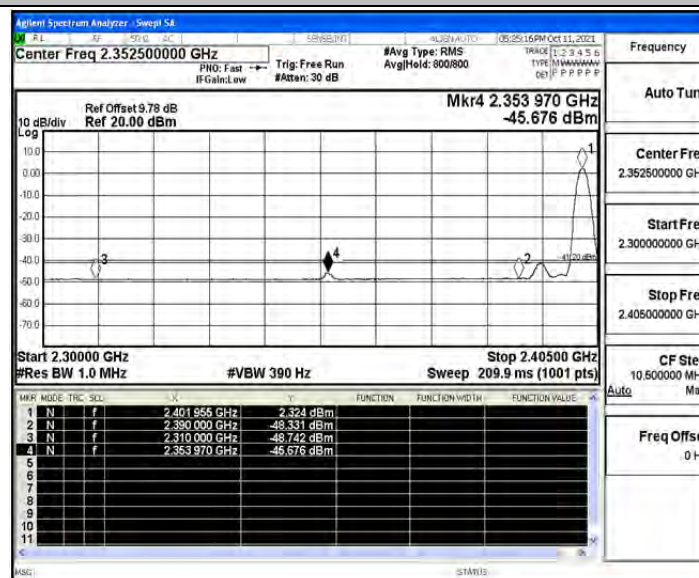




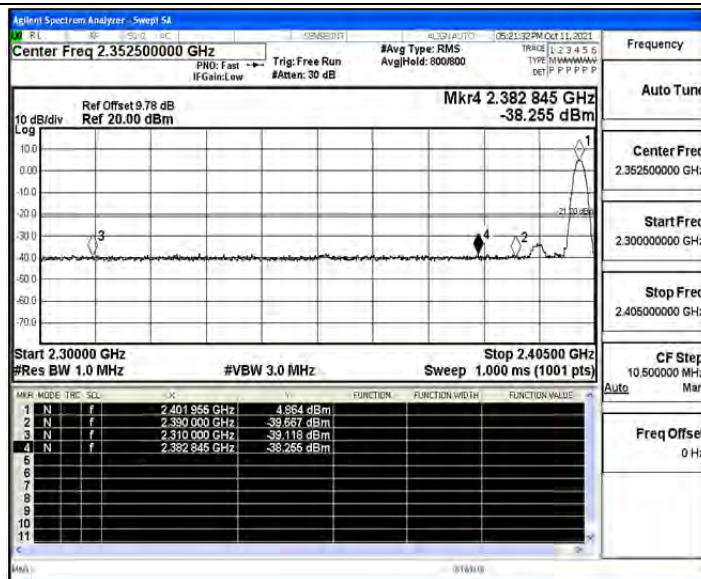
DH5_Ant1_High_Hop_2480_Peak



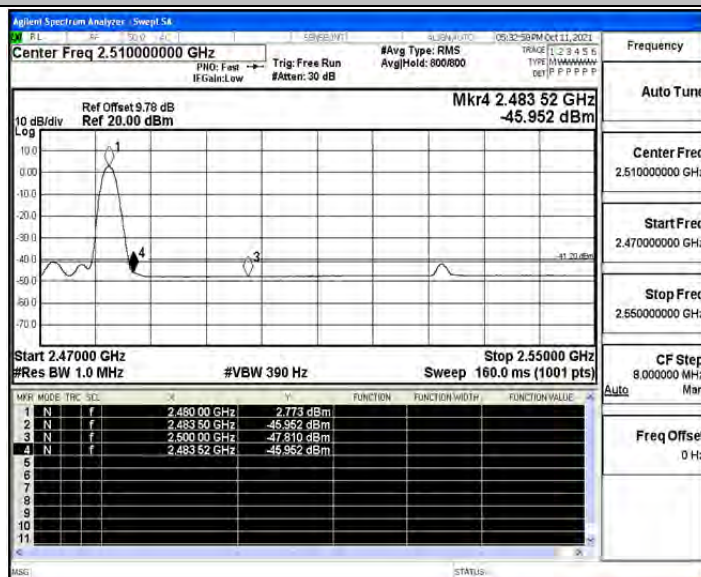
2DH5_Ant1_Low_2402_AV



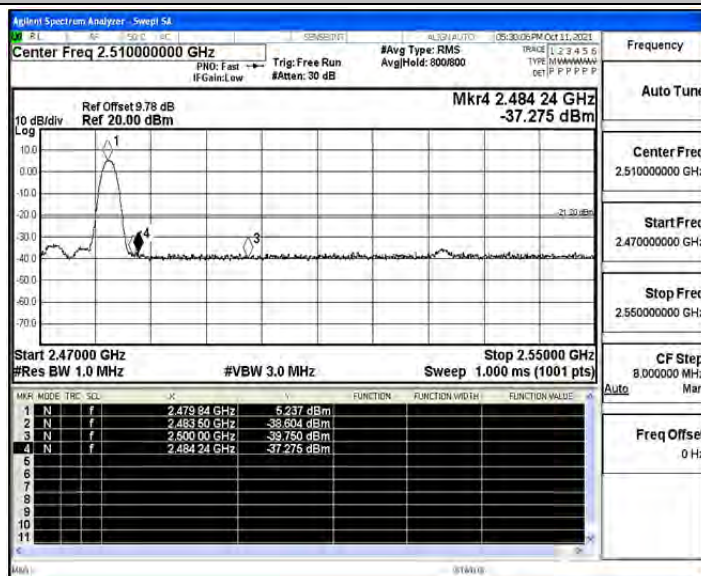
2DH5_Ant1_Low_2402_Peak



2DH5_Ant1_High_2480_AV

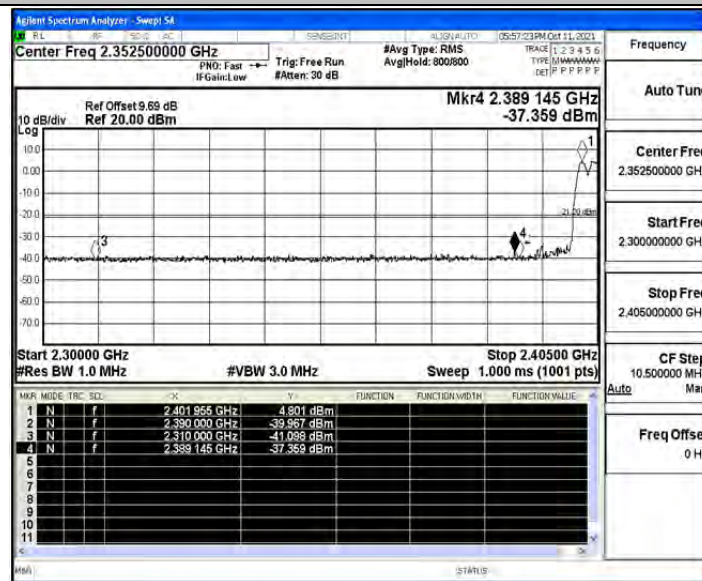


2DH5_Ant1_High_2480_Peak

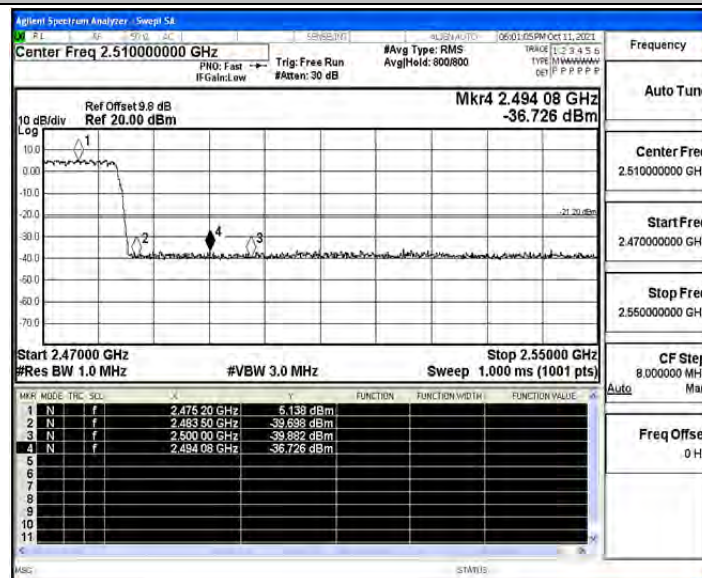




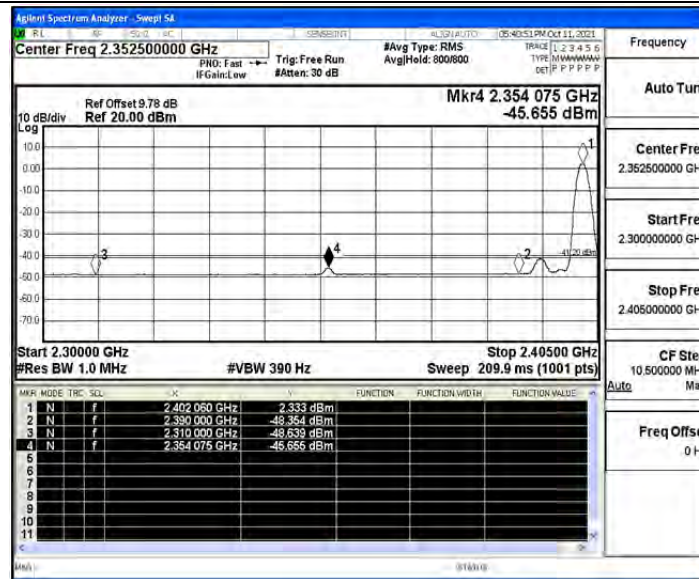
2DH5_Ant1_Low_Hop_2402_Peak



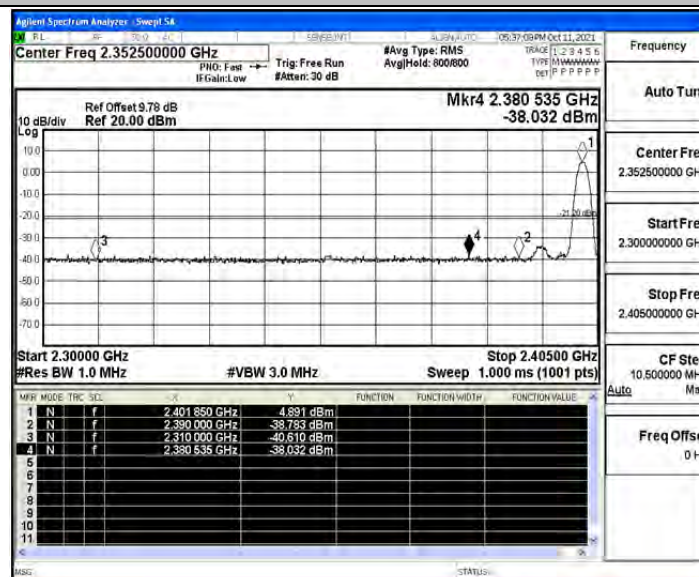
2DH5_Ant1_High_Hop_2480_Peak



3DH5_Ant1_Low_2402_AV



3DH5_Ant1_Low_2402_Peak

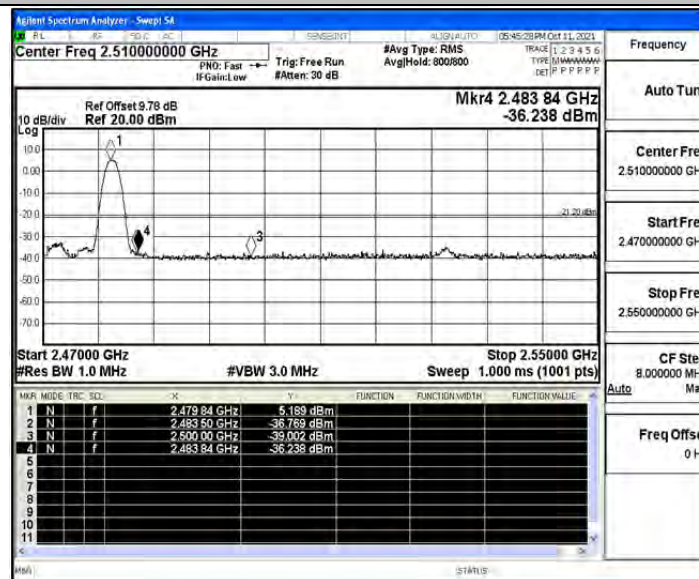


3DH5_Ant1_High_2480_AV

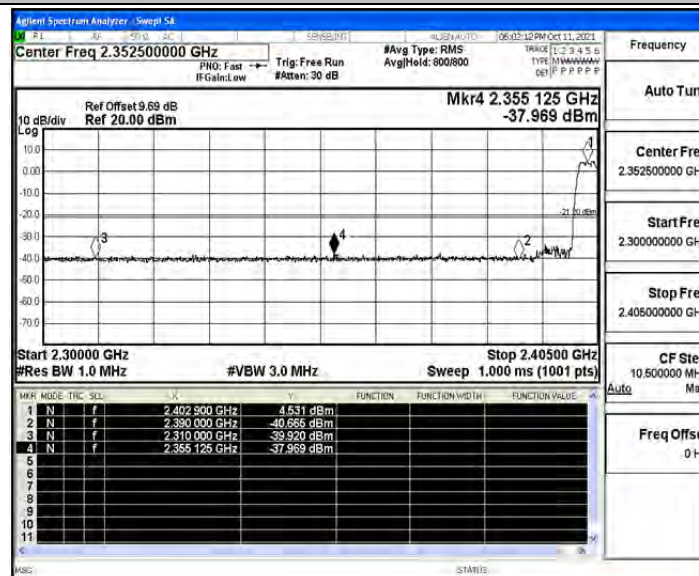




3DH5_Ant1_High_2480_Peak



3DH5_Ant1_Low_Hop_2402_Peak



3DH5_Ant1_High_Hop_2480_Peak

