



Appendix A

RF Test Data for BT (Conducted Measurement)

Product Name: True wireless earbuds

Test Model: Happy Plugs - Hope

Environmental Conditions

Temperature:	21.1° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan



A.1 20dB Emission Bandwidth

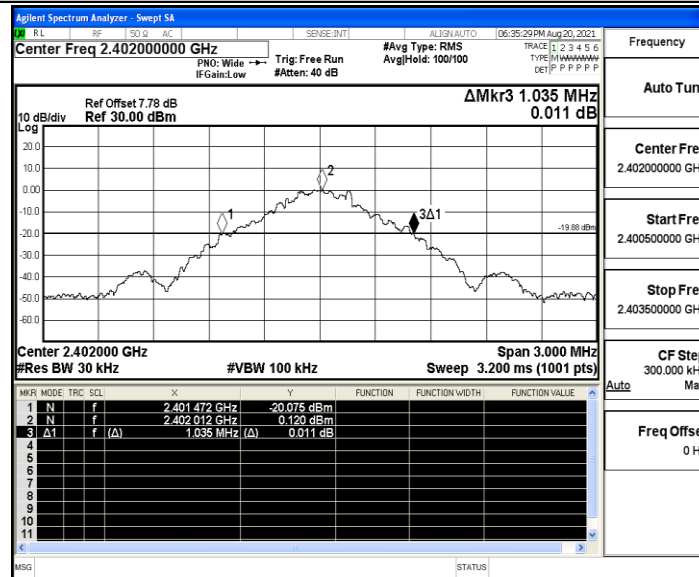
Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	1.035	2401.472	2402.507	---	PASS
		2441	0.966	2440.538	2441.504	---	PASS
		2480	0.966	2479.532	2480.498	---	PASS
2DH5	Ant1	2402	1.296	2401.361	2402.657	---	PASS
		2441	1.317	2440.343	2441.660	---	PASS
		2480	1.335	2479.331	2480.666	---	PASS
3DH5	Ant1	2402	1.284	2401.361	2402.645	---	PASS
		2441	1.314	2440.346	2441.660	---	PASS
		2480	1.299	2479.343	2480.642	---	PASS

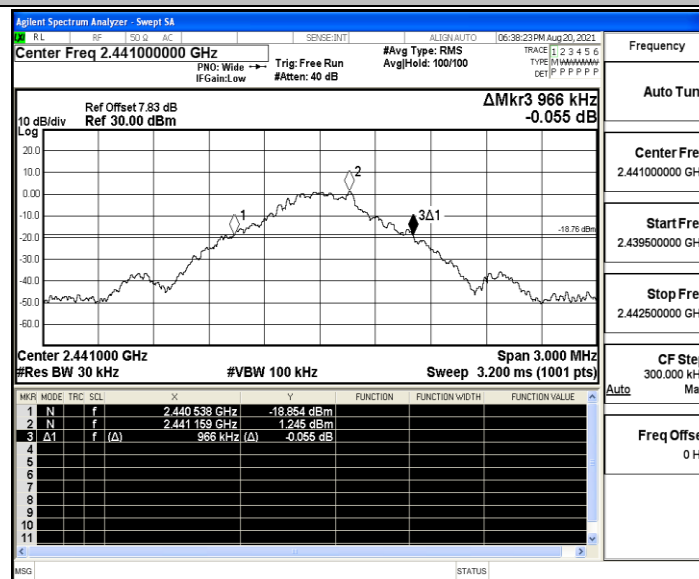


Test Graphs

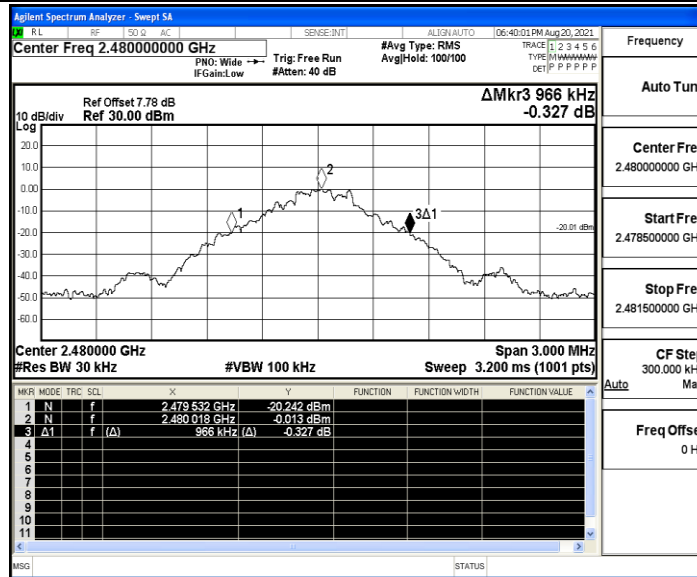
DH5_Ant1_2402



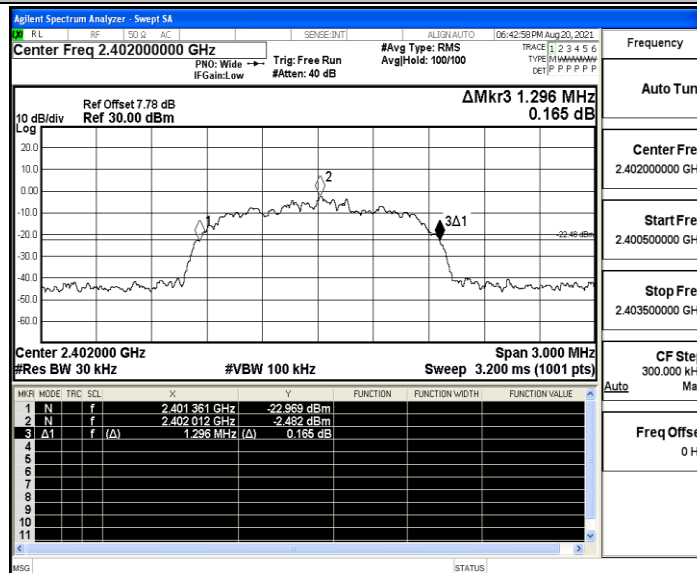
DH5_Ant1_2441



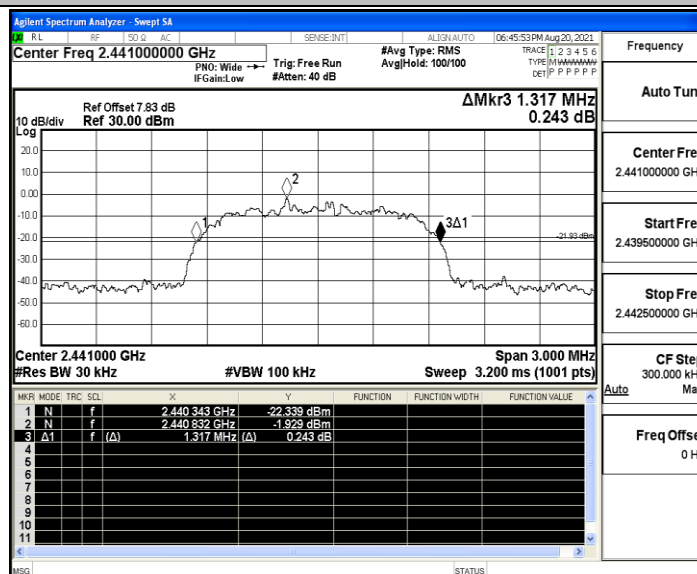
DH5_Ant1_2480



2DH5_Ant1_2402

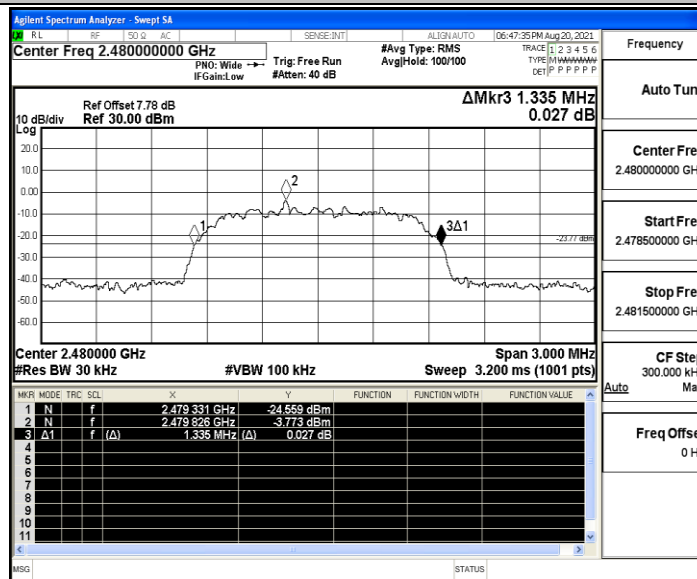


2DH5_Ant1_2441

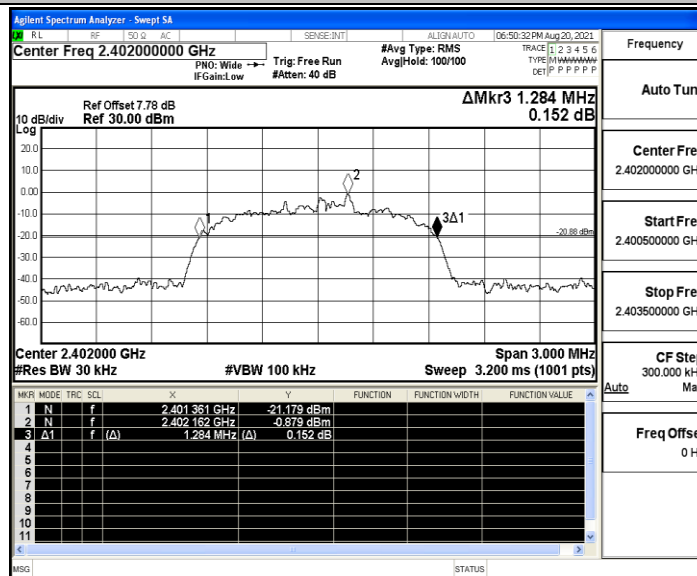




2DH5_Ant1_2480



3DH5_Ant1_2402



3DH5_Ant1_2441





A.2 Maximum conducted output power

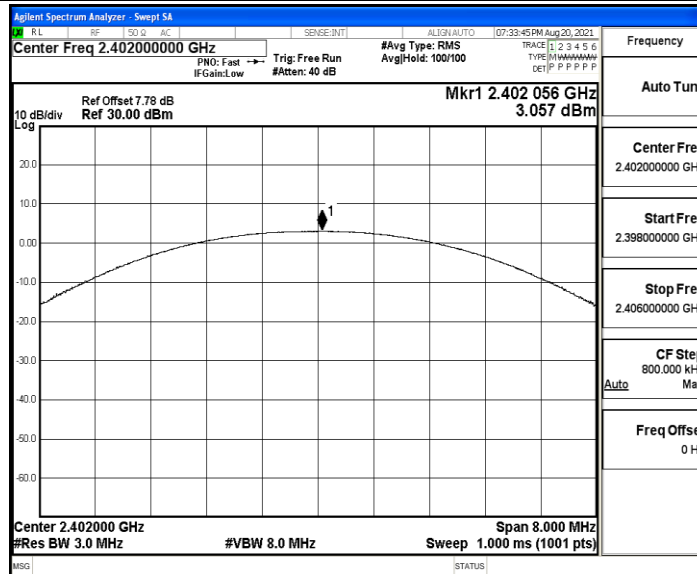
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	3.06	≤30	PASS
		2441	4.35	≤30	PASS
		2480	2.85	≤30	PASS
2DH5	Ant1	2402	2.2	≤20.97	PASS
		2441	3.42	≤20.97	PASS
		2480	2.02	≤20.97	PASS
3DH5	Ant1	2402	2.39	≤20.97	PASS
		2441	3.59	≤20.97	PASS
		2480	2.29	≤20.97	PASS

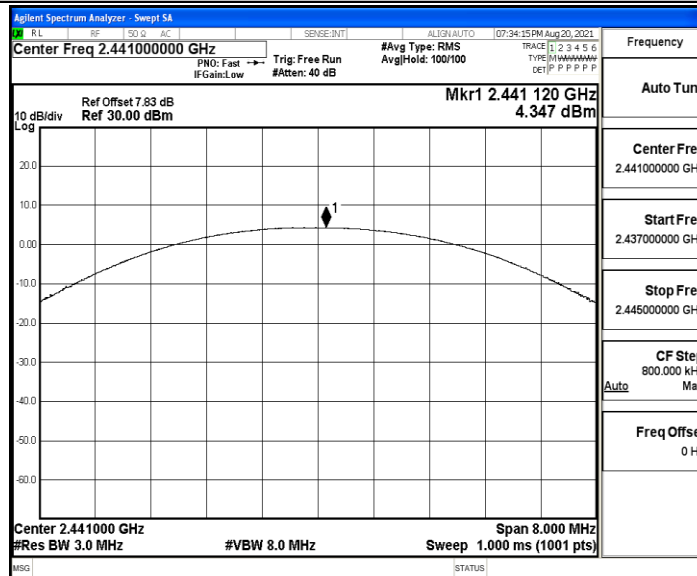


Test Graphs

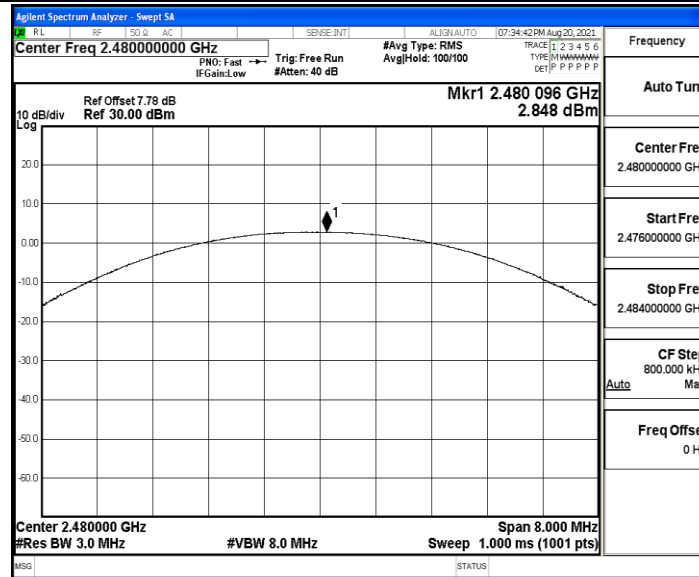
DH5_Ant1_2402



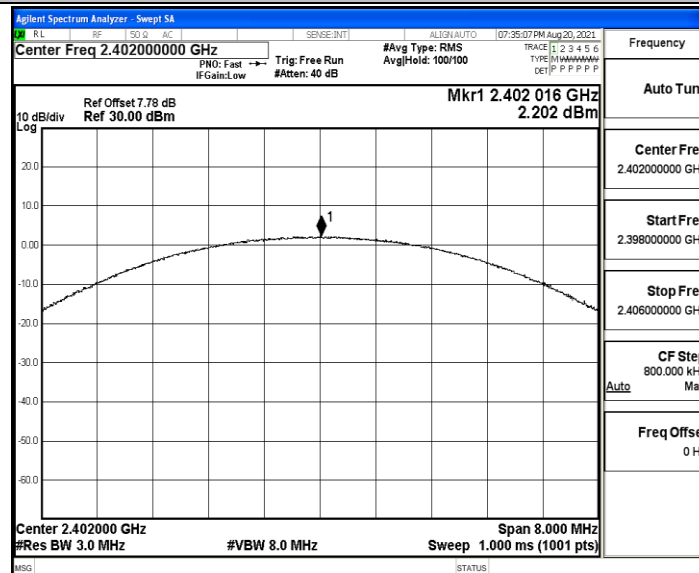
DH5_Ant1_2441



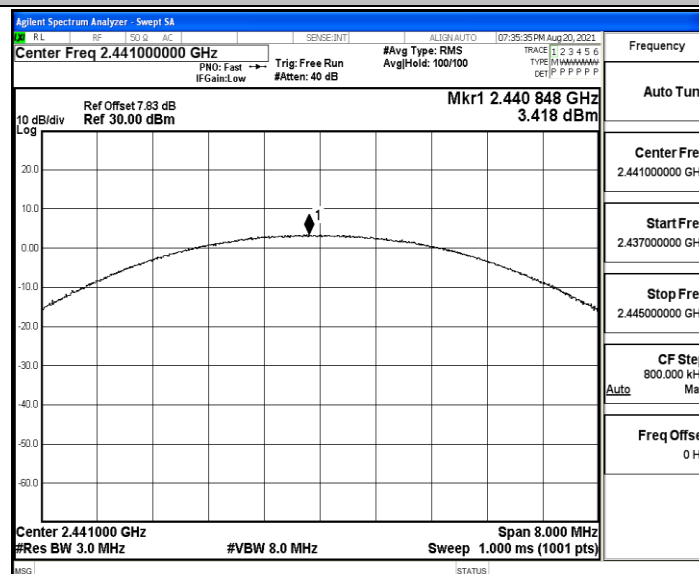
DH5_Ant1_2480



2DH5_Ant1_2402

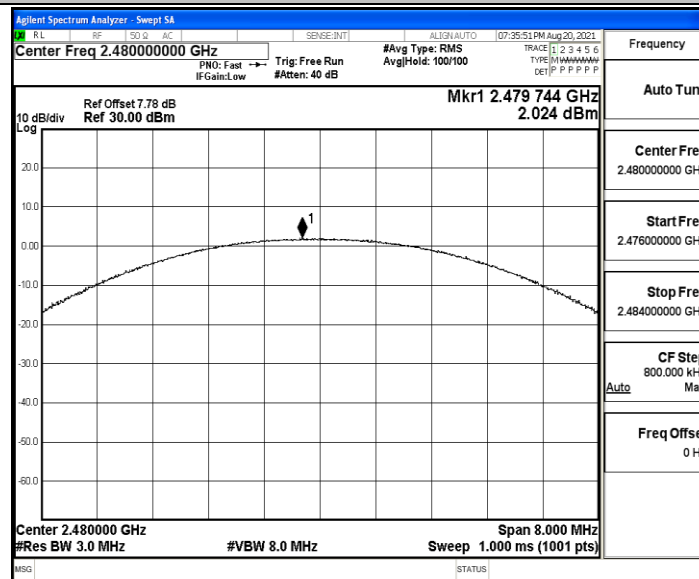


2DH5_Ant1_2441

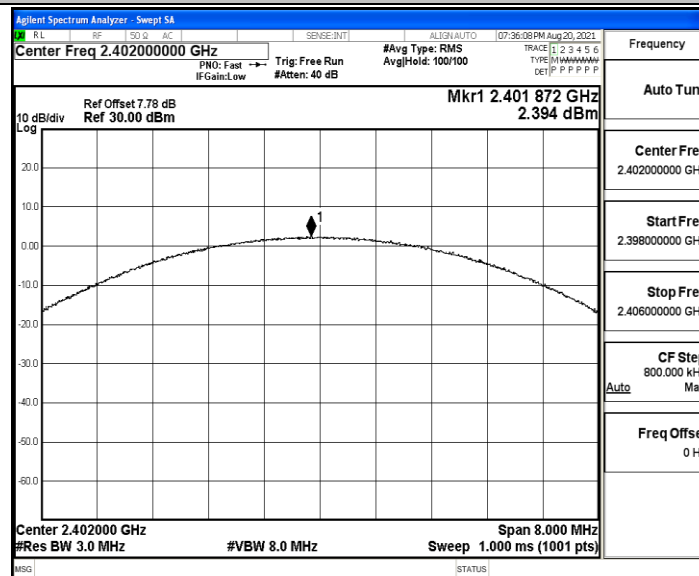




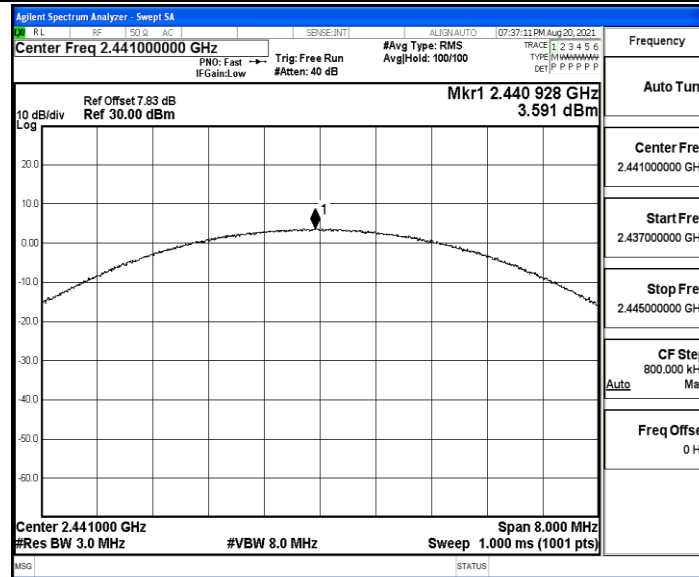
2DH5_Ant1_2480



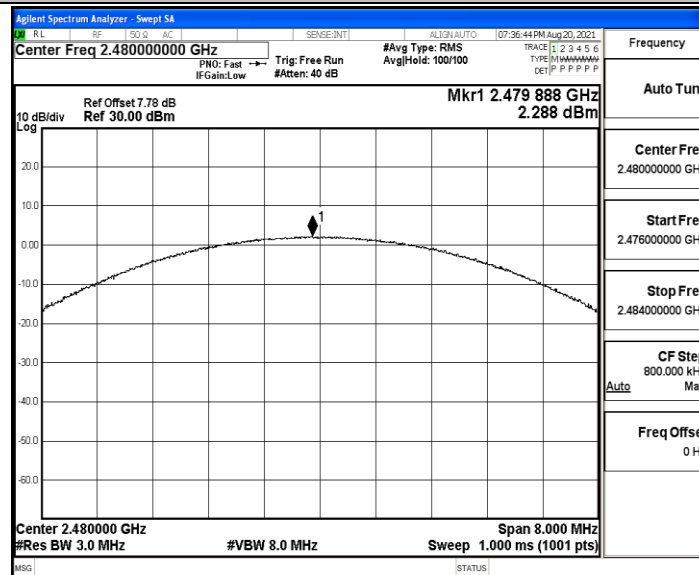
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



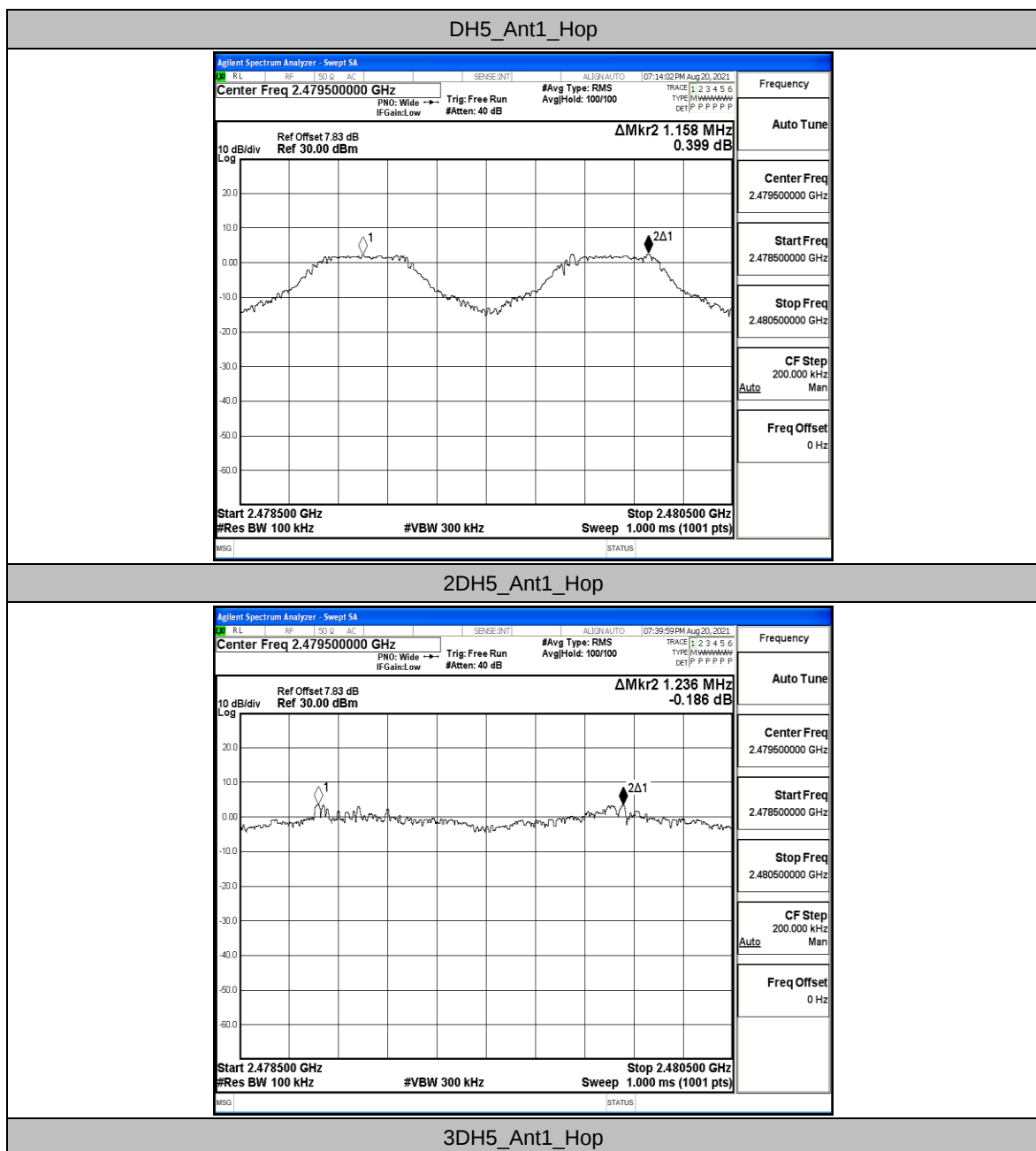


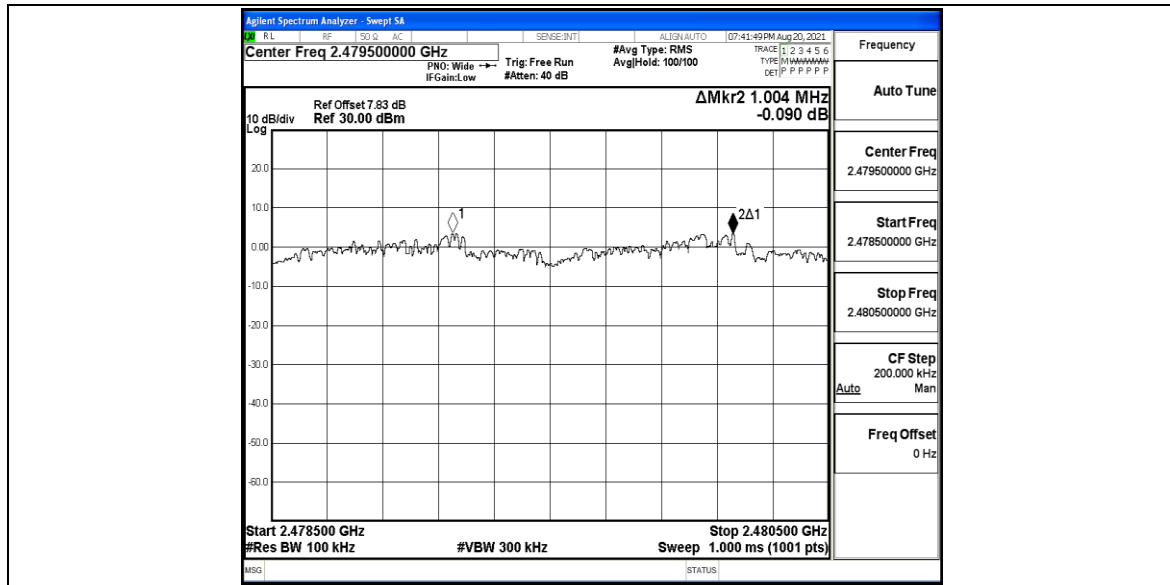
A.3 Carrier frequency separation

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	1.158	≥ 1.035	PASS
2DH5	Ant1	Hop	1.236	≥ 0.890	PASS
3DH5	Ant1	Hop	1.004	≥ 0.876	PASS

Test Graphs





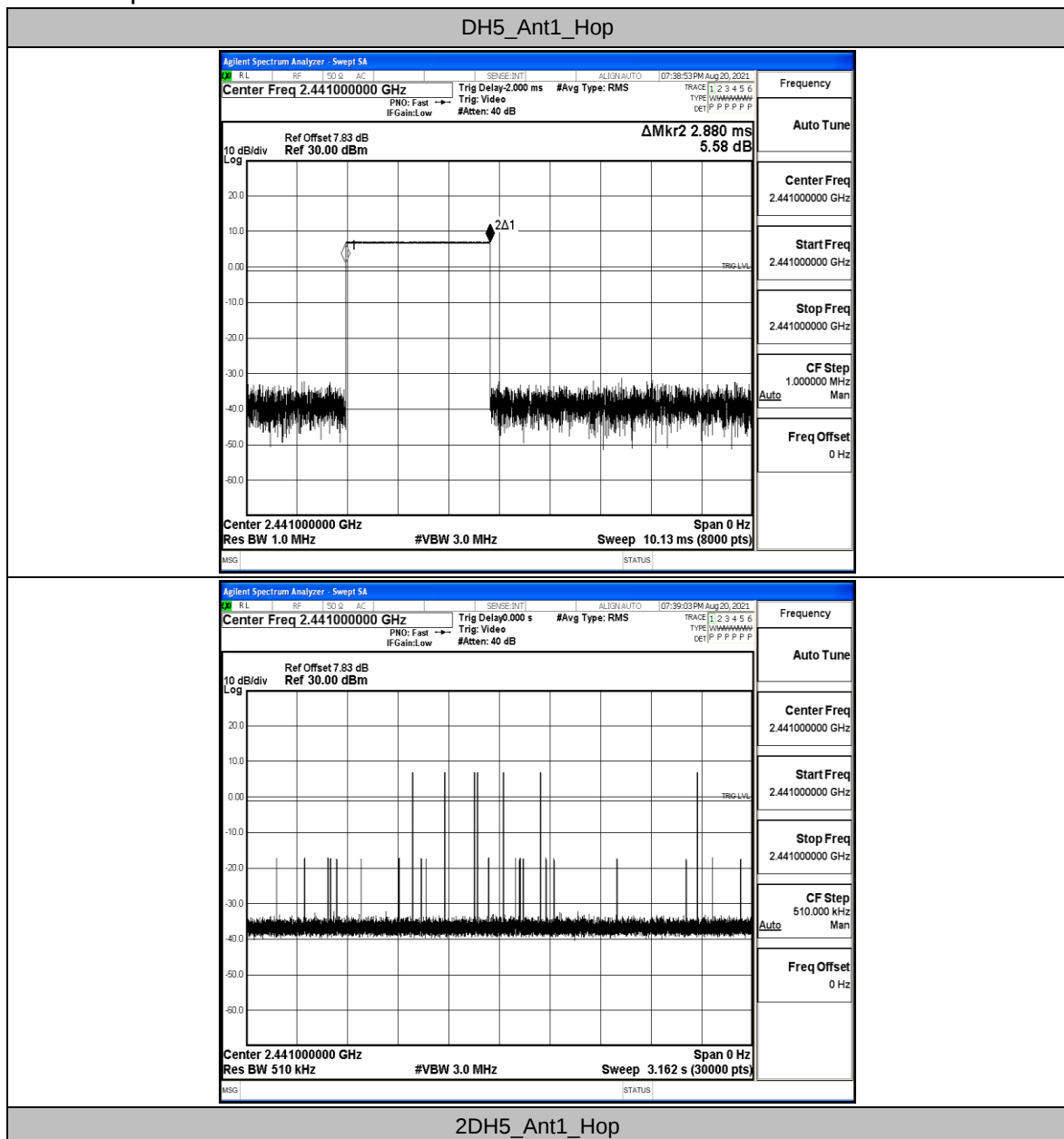


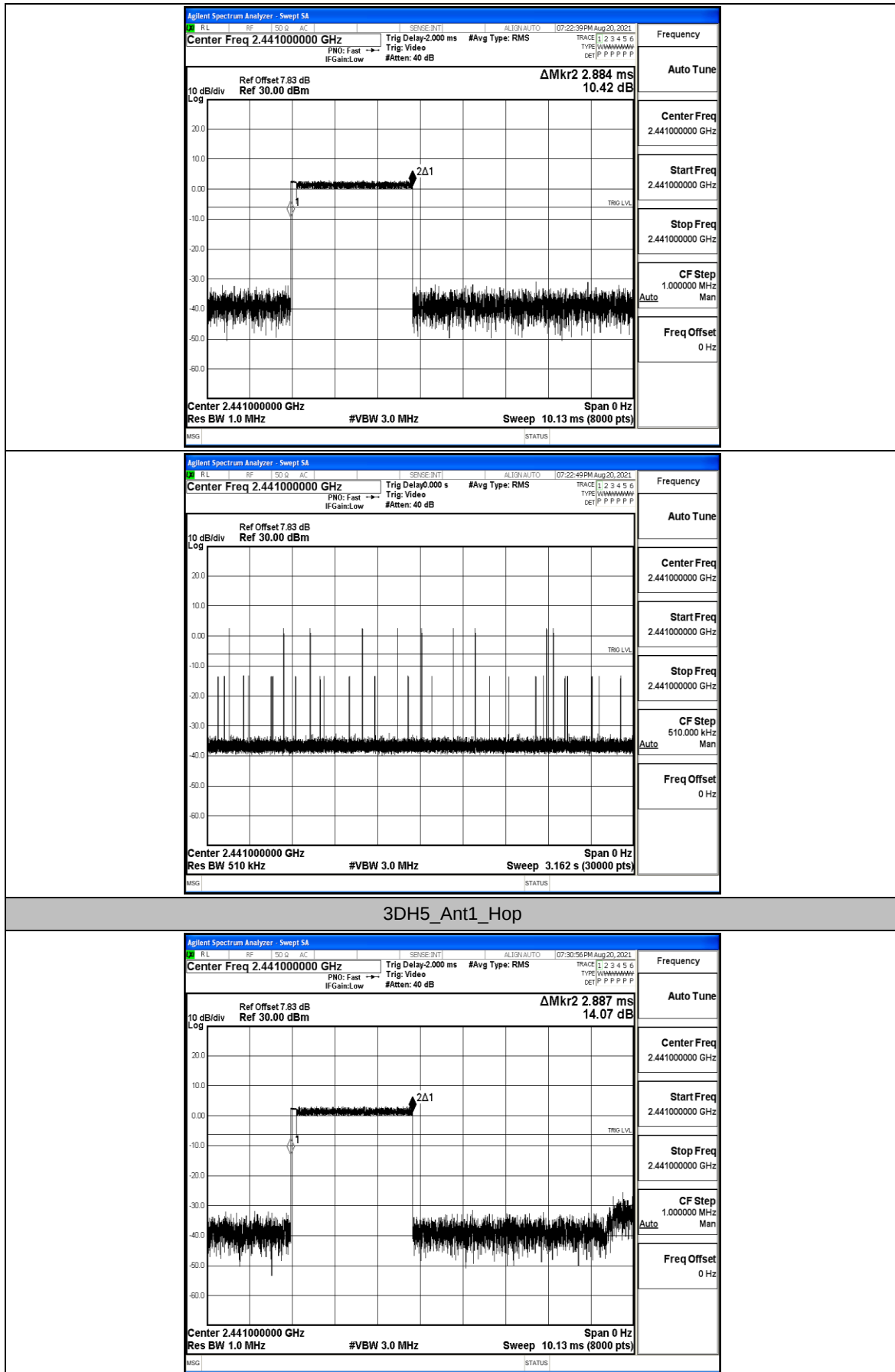
A.4 Time of occupancy

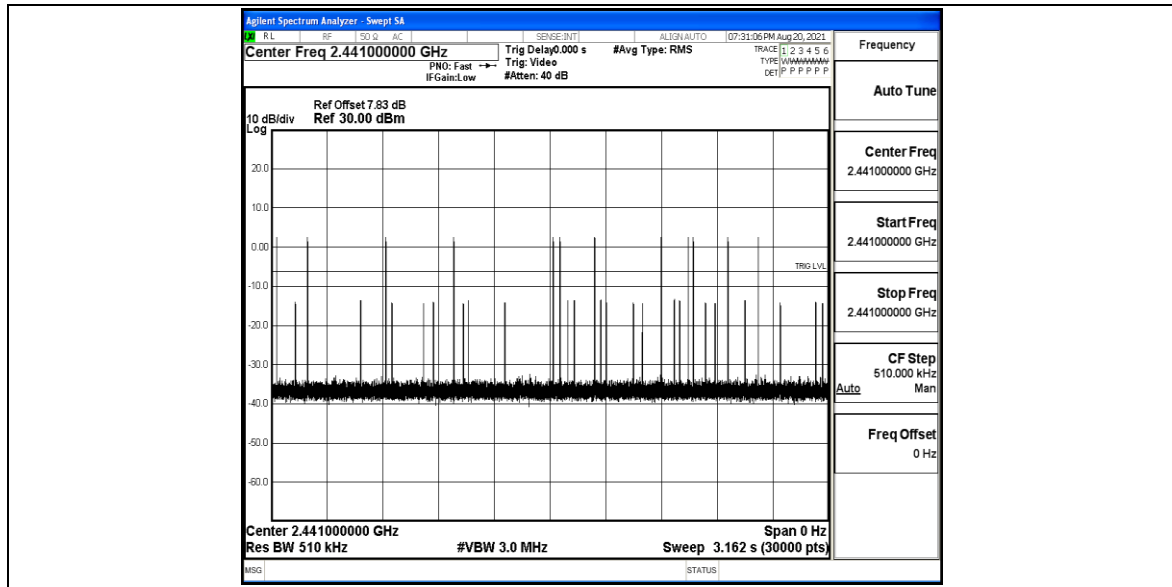
Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.88	80	0.23	≤0.4	PASS
2DH5	Ant1	Hop	2.88	110	0.317	≤0.4	PASS
3DH5	Ant1	Hop	2.89	130	0.375	≤0.4	PASS

Test Graphs







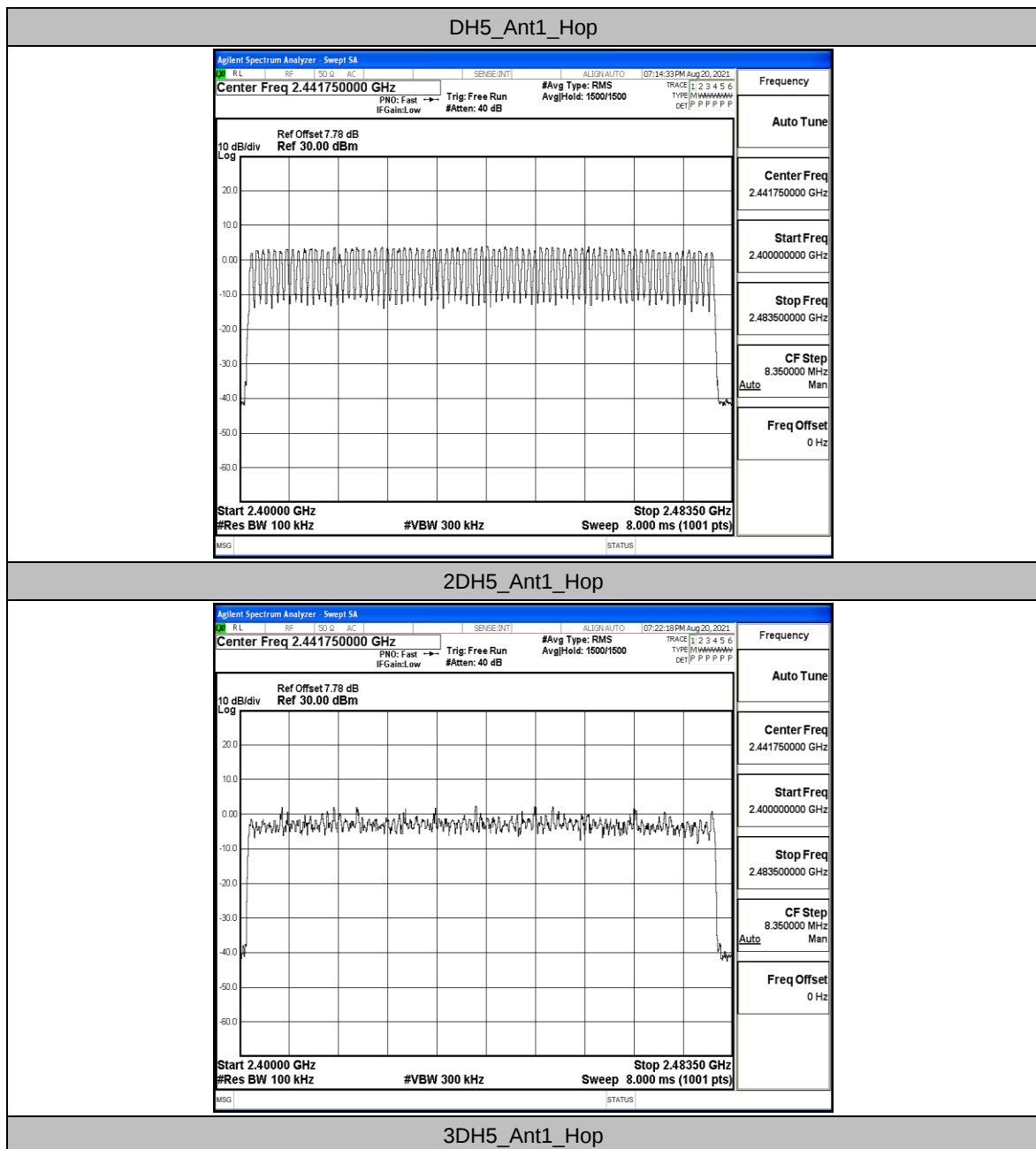


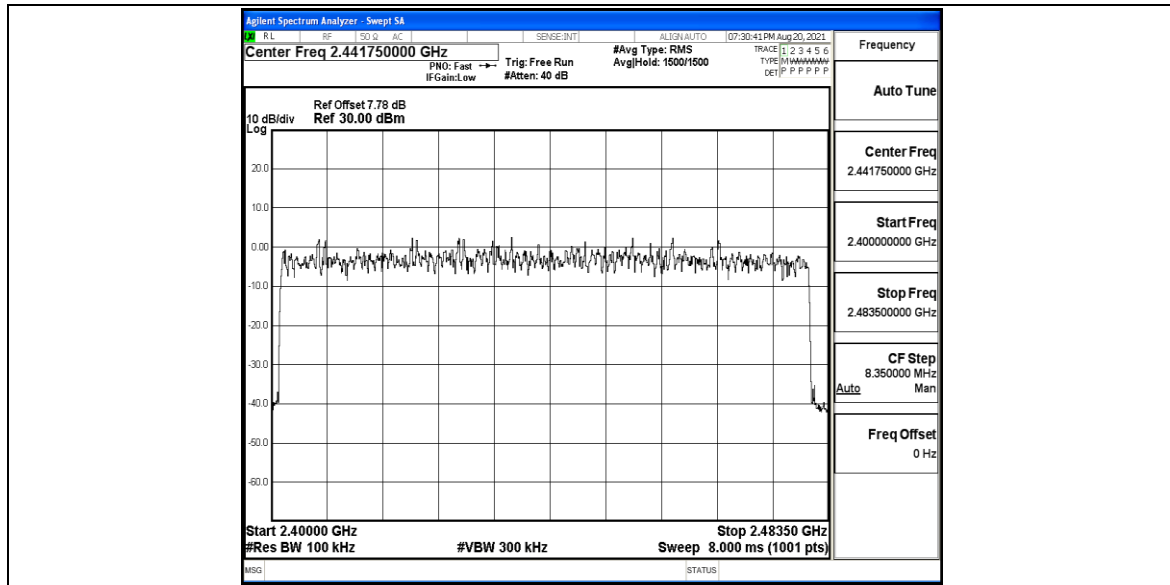
A.5 Number of hopping channels

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







A.6 Band edge measurements

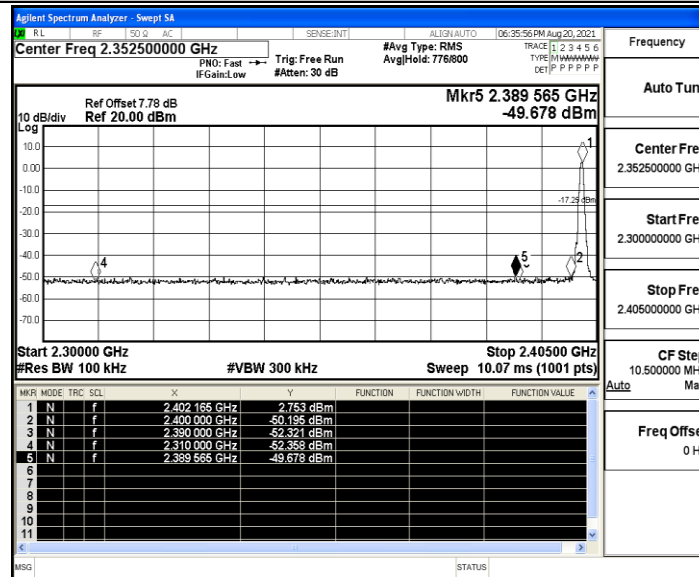
Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	2.75	-49.68	≤ -17.25	PASS
		High	2480	2.47	-47.61	≤ -17.53	PASS
		Low	Hop_2402	2.09	-49.68	≤ -17.91	PASS
		High	Hop_2480	2.69	-48.62	≤ -17.31	PASS
2DH5	Ant1	Low	2402	0.14	-49.74	≤ -19.86	PASS
		High	2480	0.73	-48.85	≤ -19.27	PASS
		Low	Hop_2402	-2.49	-49.57	≤ -22.49	PASS
		High	Hop_2480	1.53	-48.65	≤ -18.47	PASS
3DH5	Ant1	Low	2402	1.30	-49.34	≤ -18.7	PASS
		High	2480	1.26	-47.77	≤ -18.74	PASS
		Low	Hop_2402	-2.27	-50.02	≤ -22.27	PASS
		High	Hop_2480	1.07	-48.89	≤ -18.93	PASS

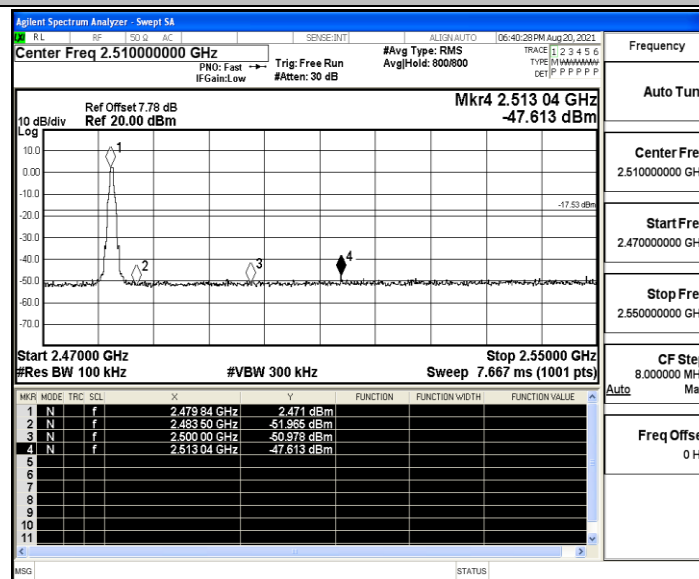


Test Graphs

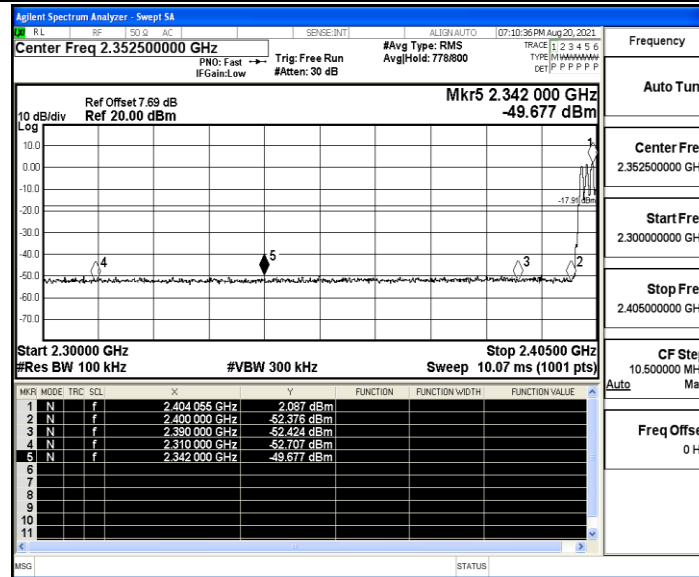
DH5_Ant1_Low_2402



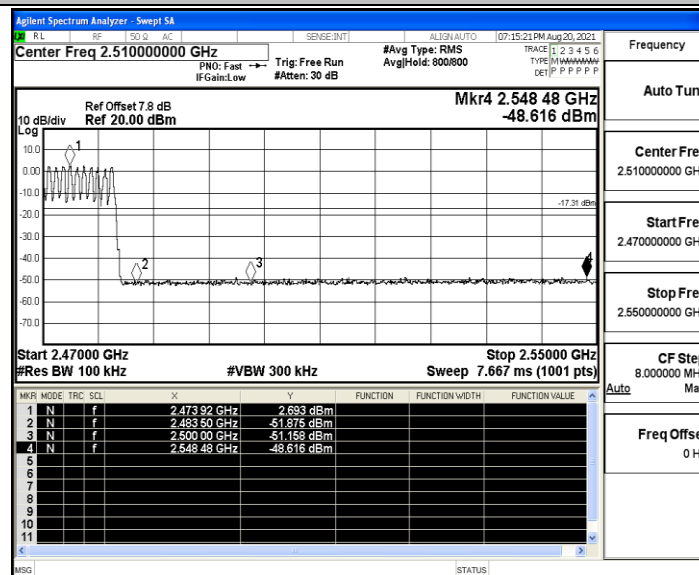
DH5_Ant1_High_2480



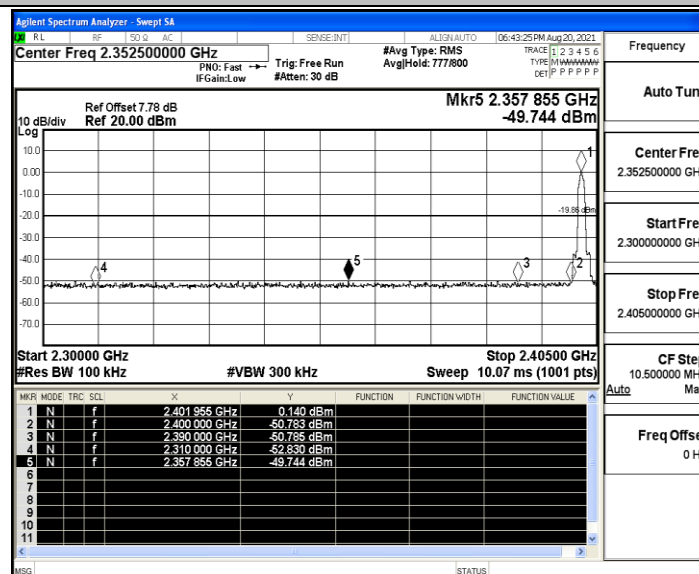
DH5_Ant1_Low_Hop_2402



DH5_Ant1_High_Hop_2480

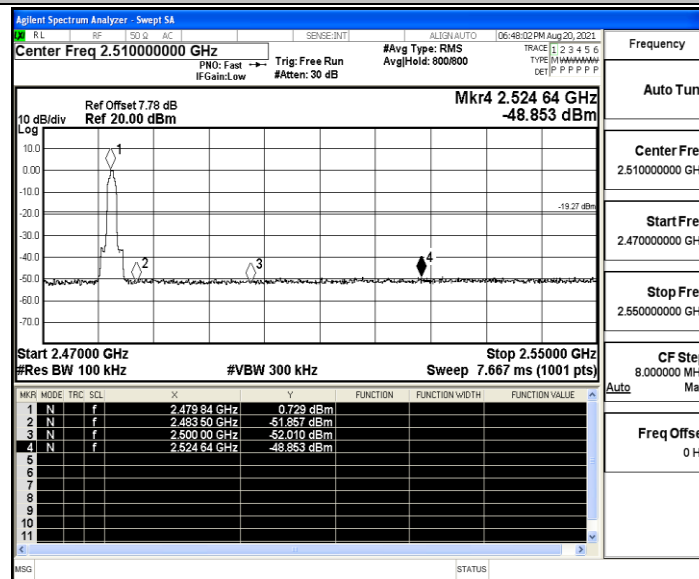


2DH5_Ant1_Low_2402

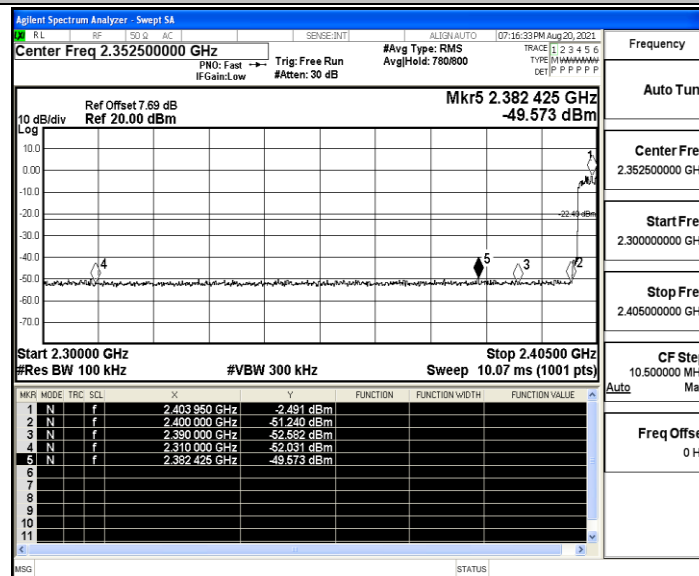




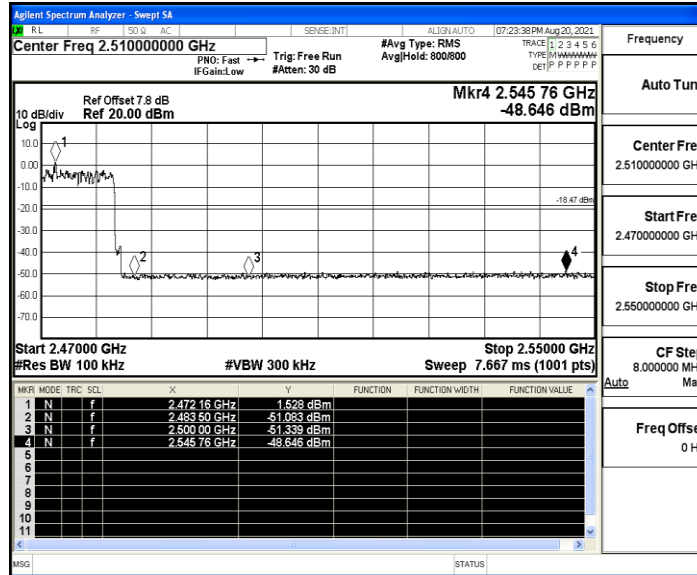
2DH5_Ant1_High_2480



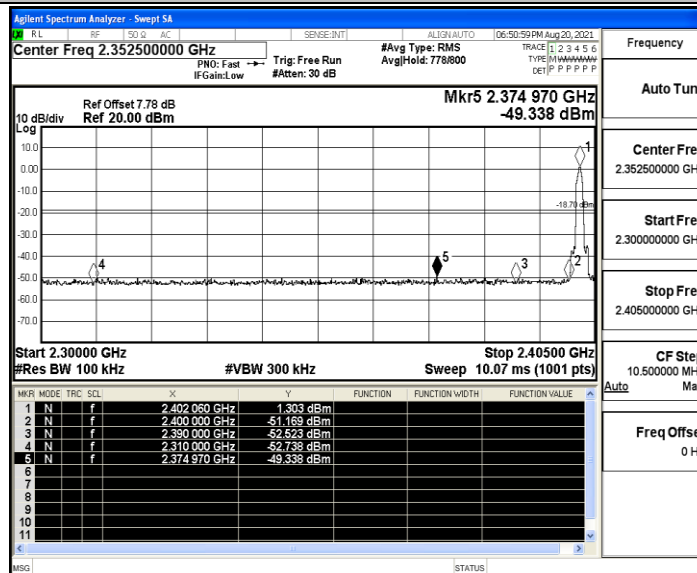
2DH5_Ant1_Low_Hop_2402



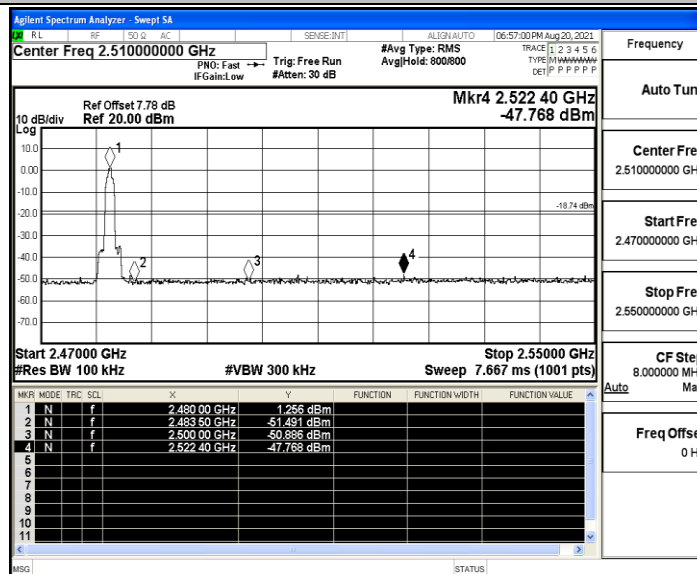
2DH5_Ant1_High_Hop_2480



3DH5_Ant1_Low_2402

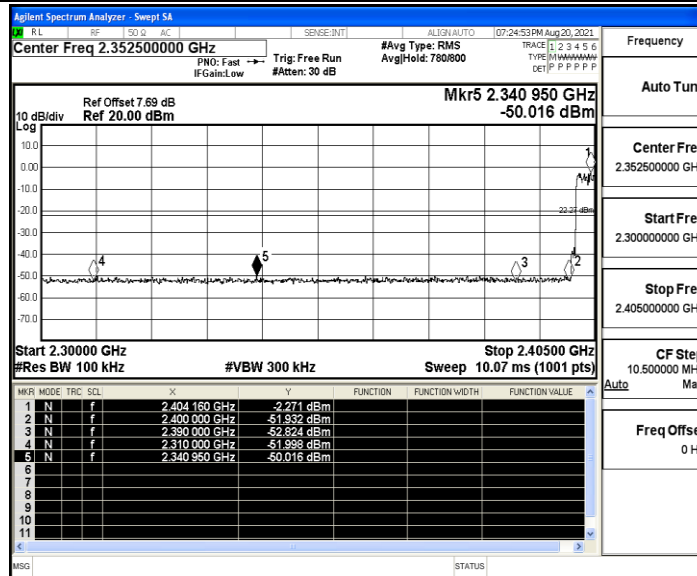


3DH5_Ant1_High_2480

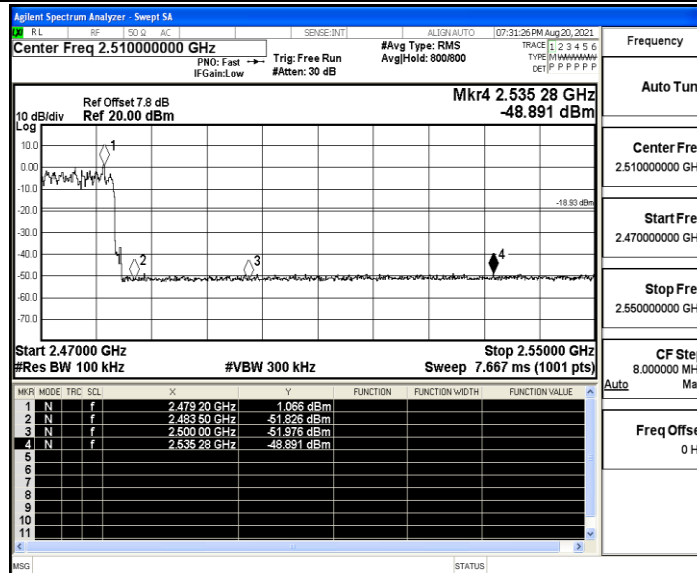




3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480





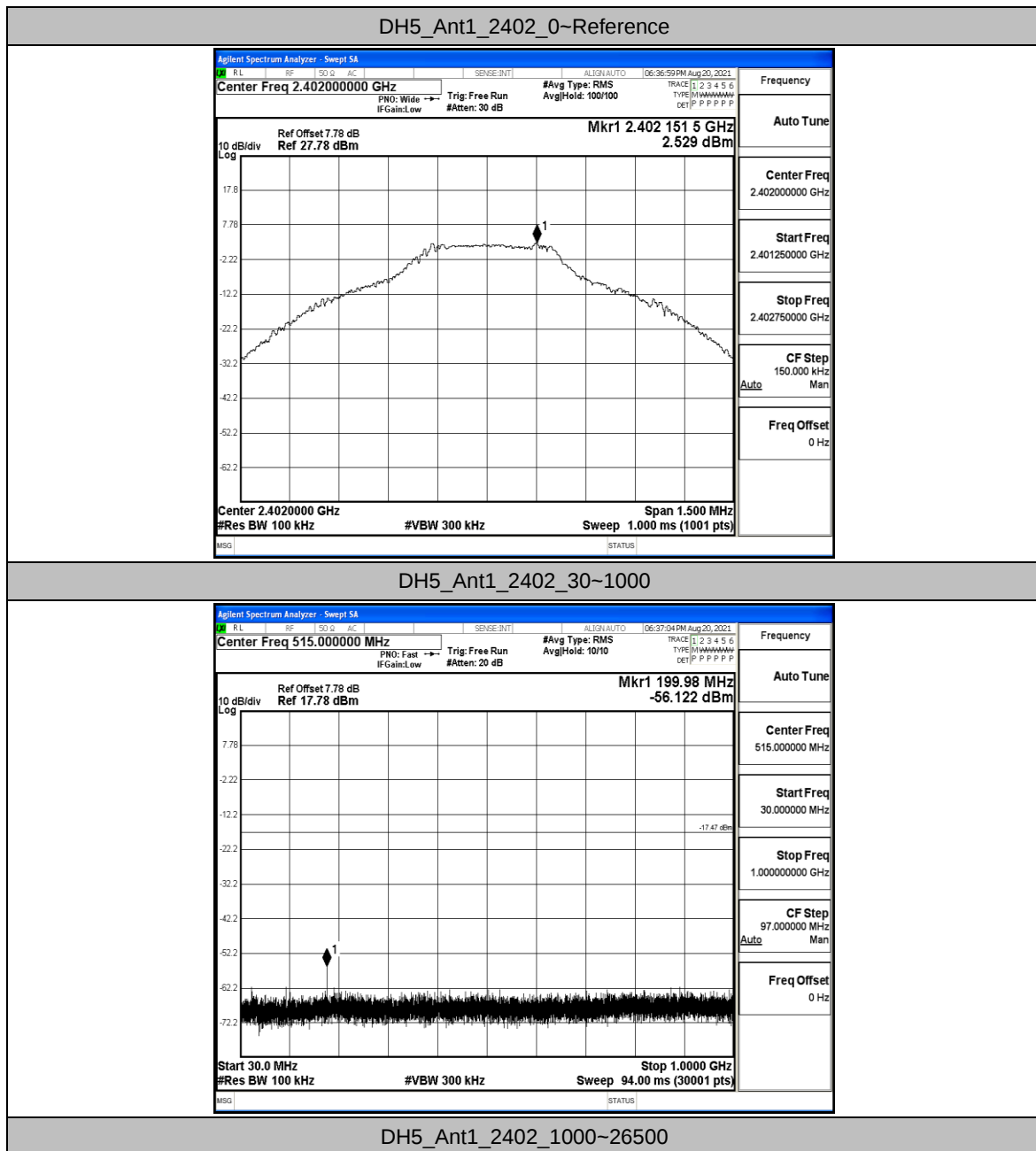
A.7 Conducted Spurious Emission

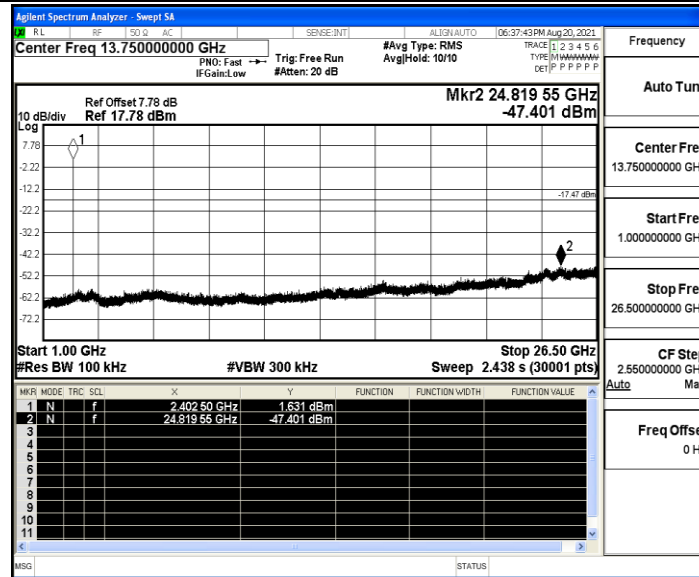
Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	2.53	2.53	---	PASS
			30~1000	2.53	-56.12	≤ -17.47	PASS
			1000~26500	2.53	-47.4	≤ -17.47	PASS
		2441	Reference	2.91	2.91	---	PASS
			30~1000	2.91	-56.03	≤ -17.09	PASS
			1000~26500	2.91	-47.5	≤ -17.09	PASS
		2480	Reference	2.15	2.15	---	PASS
			30~1000	2.15	-55.33	≤ -17.85	PASS
			1000~26500	2.15	-47.4	≤ -17.85	PASS
2DH5	Ant1	2402	Reference	0.47	0.47	---	PASS
			30~1000	0.47	-56.55	≤ -19.53	PASS
			1000~26500	0.47	-46.61	≤ -19.53	PASS
		2441	Reference	2.24	2.24	---	PASS
			30~1000	2.24	-55.55	≤ -17.76	PASS
			1000~26500	2.24	-47.21	≤ -17.76	PASS
		2480	Reference	0.85	0.85	---	PASS
			30~1000	0.85	-55.29	≤ -19.15	PASS
			1000~26500	0.85	-47.51	≤ -19.15	PASS
3DH5	Ant1	2402	Reference	0.90	0.90	---	PASS
			30~1000	0.90	-56	≤ -19.1	PASS
			1000~26500	0.90	-47.74	≤ -19.1	PASS
		2441	Reference	2.33	2.33	---	PASS
			30~1000	2.33	-55.71	≤ -17.67	PASS
			1000~26500	2.33	-47.34	≤ -17.67	PASS
		2480	Reference	0.15	0.15	---	PASS
			30~1000	0.15	-55.83	≤ -19.86	PASS
			1000~26500	0.15	-46.7	≤ -19.86	PASS

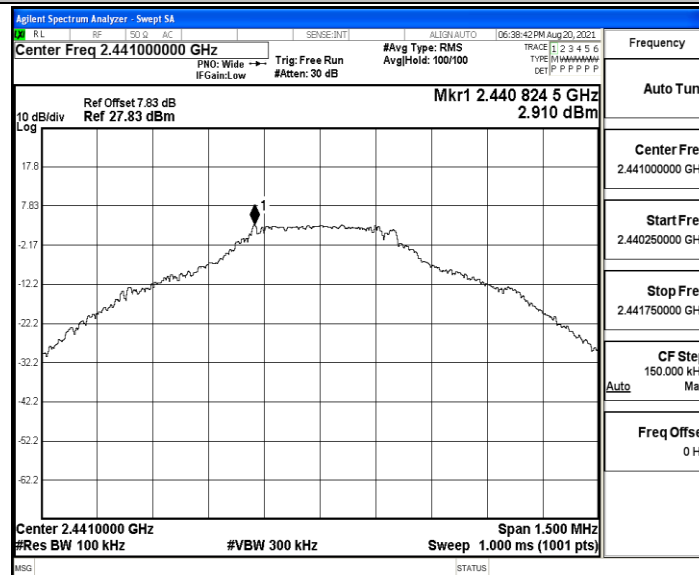


Test Graphs

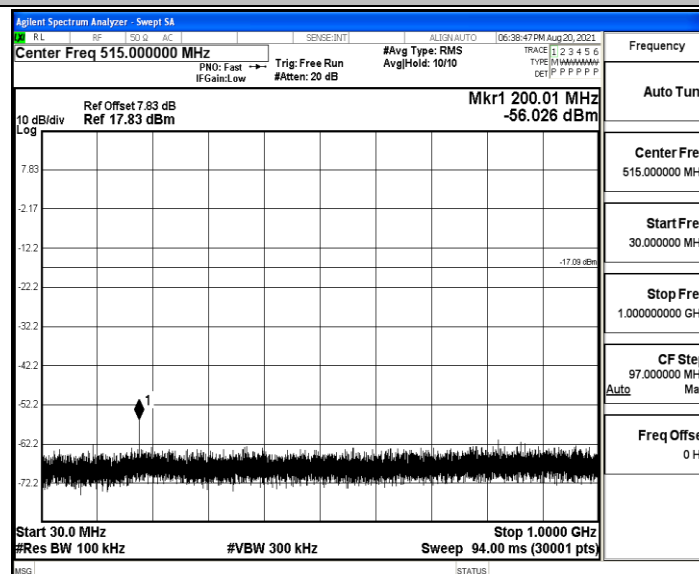




DH5_Ant1_2441_0~Reference

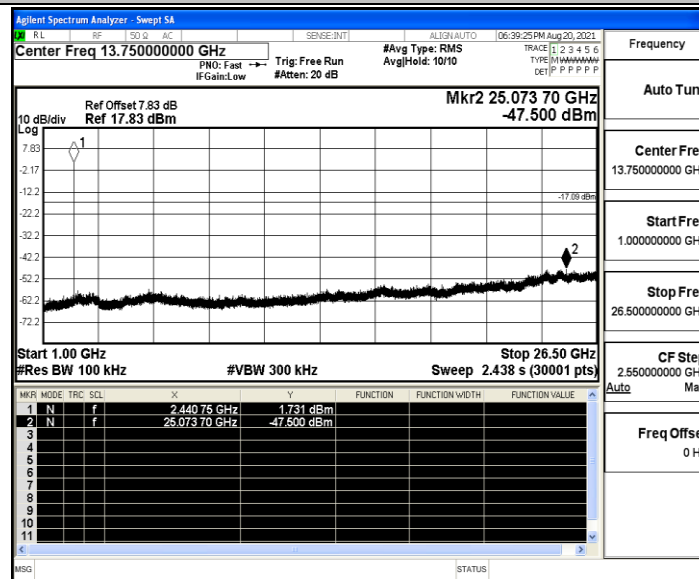


DH5_Ant1_2441_30~1000

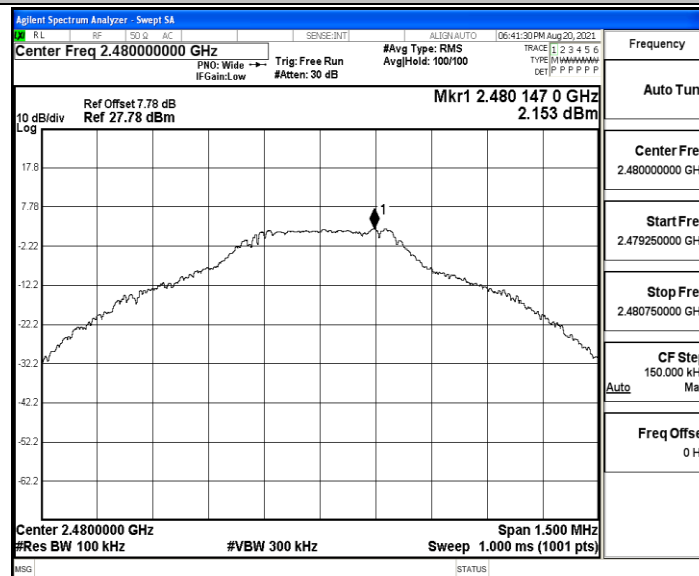




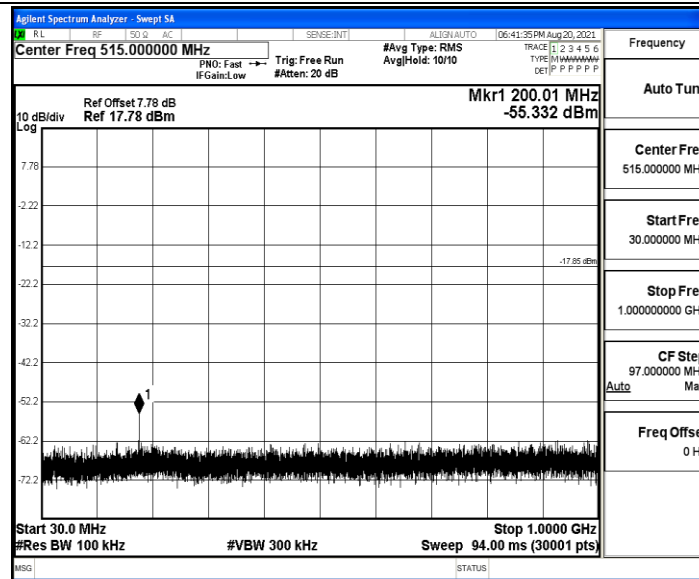
DH5_Ant1_2441_1000~26500



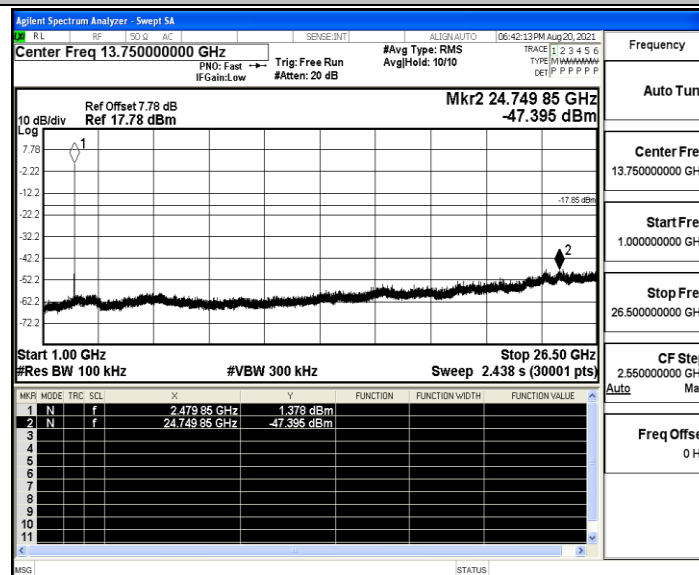
DH5_Ant1_2480_0~Reference



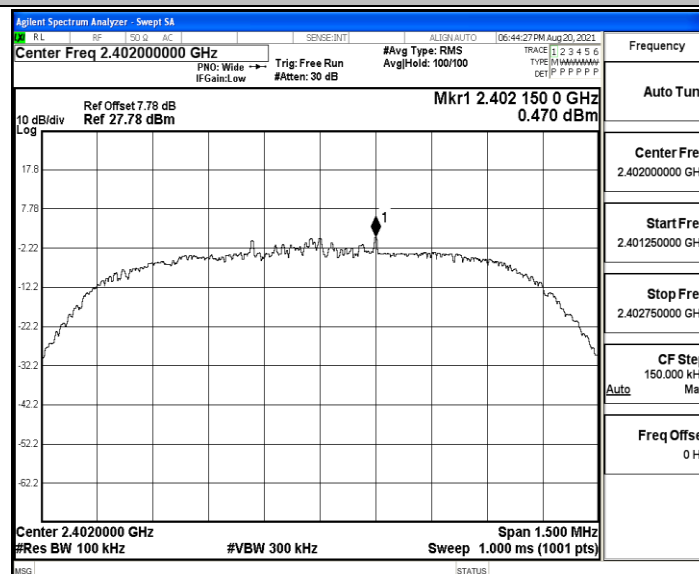
DH5_Ant1_2480_30~1000



DH5_Ant1_2480_1000~26500

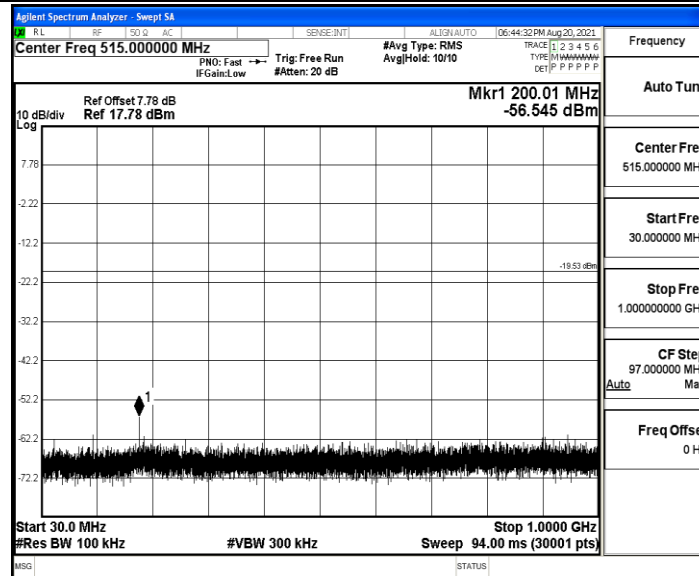


2DH5_Ant1_2402_0~Reference

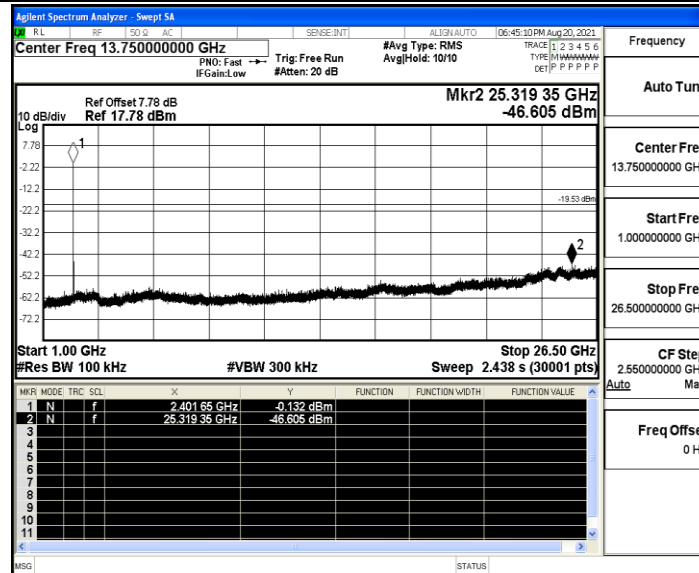




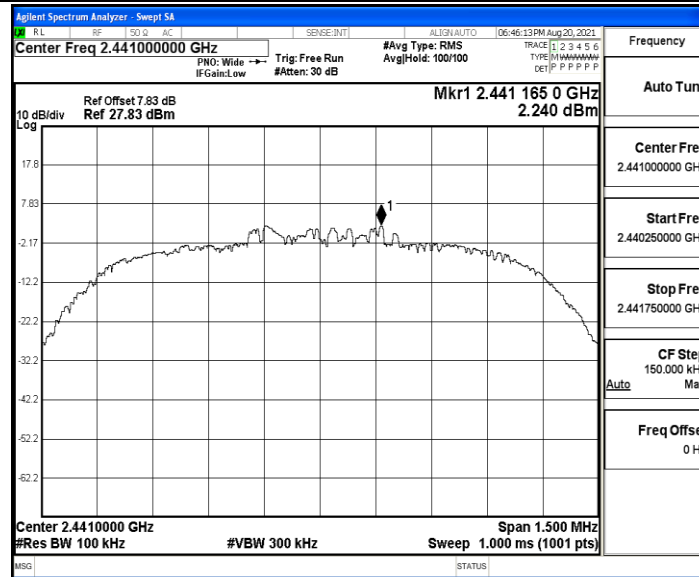
2DH5_Ant1_2402_30~1000



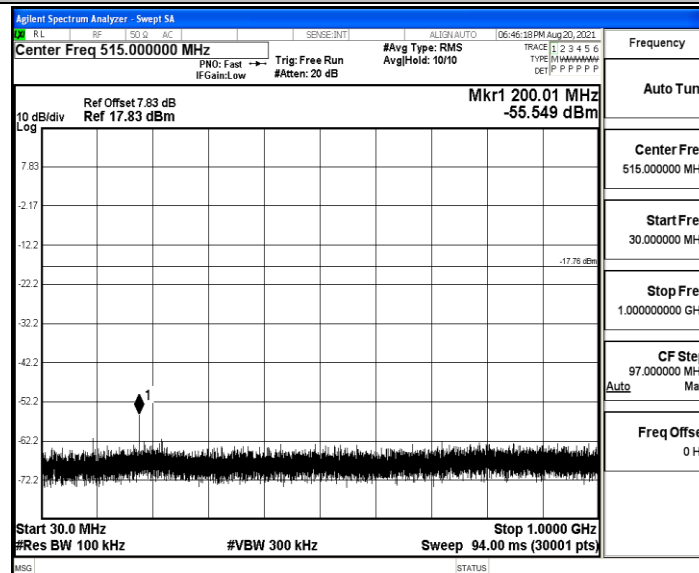
2DH5_Ant1_2402_1000~26500



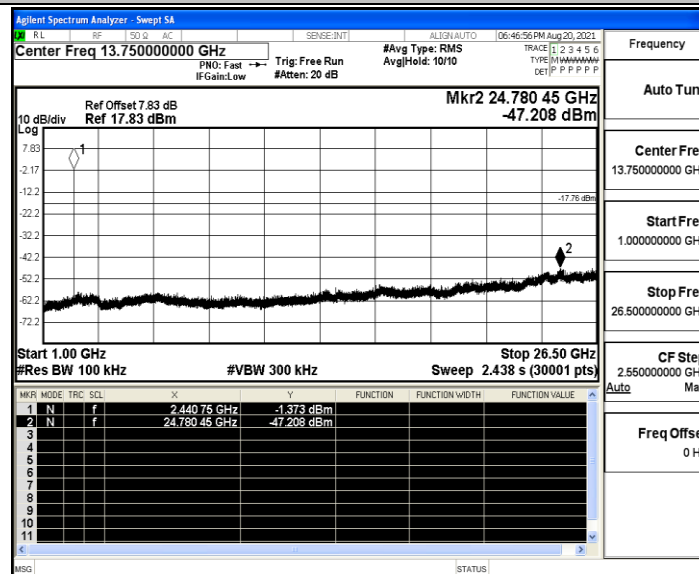
2DH5_Ant1_2441_0~Reference



2DH5_Ant1_2441_30~1000

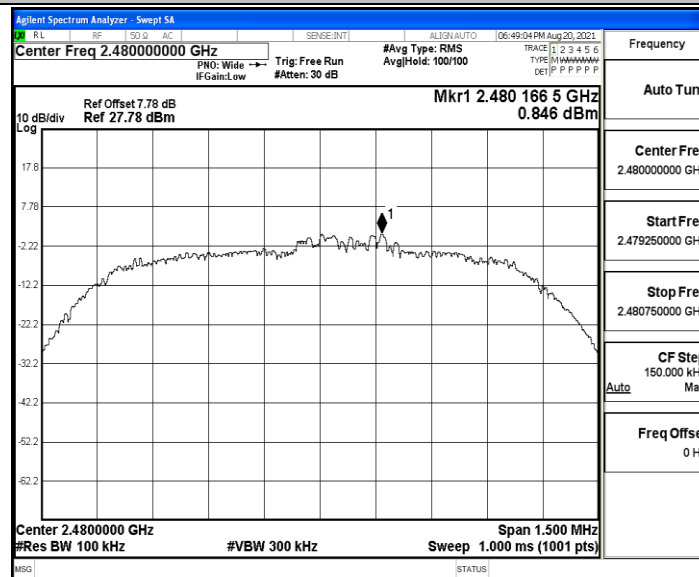


2DH5_Ant1_2441_1000~26500

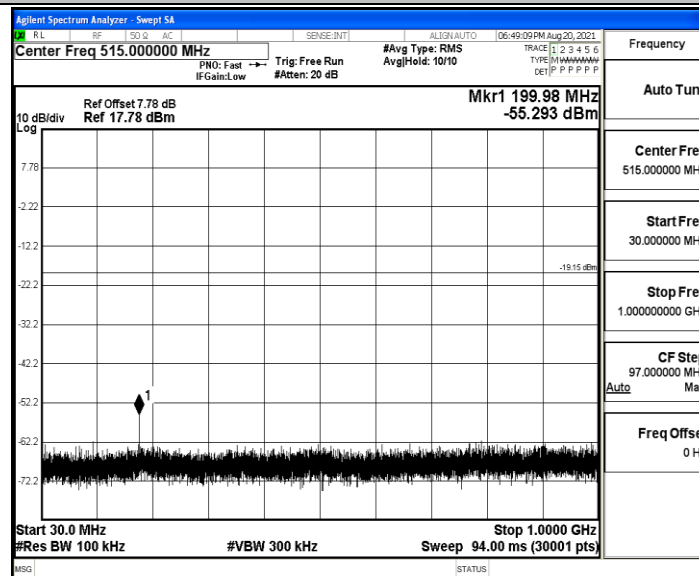




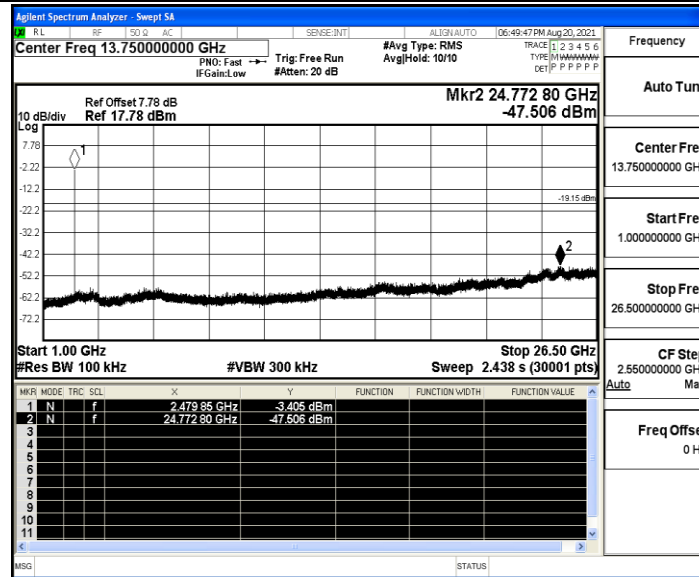
2DH5_Ant1_2480_0~Reference



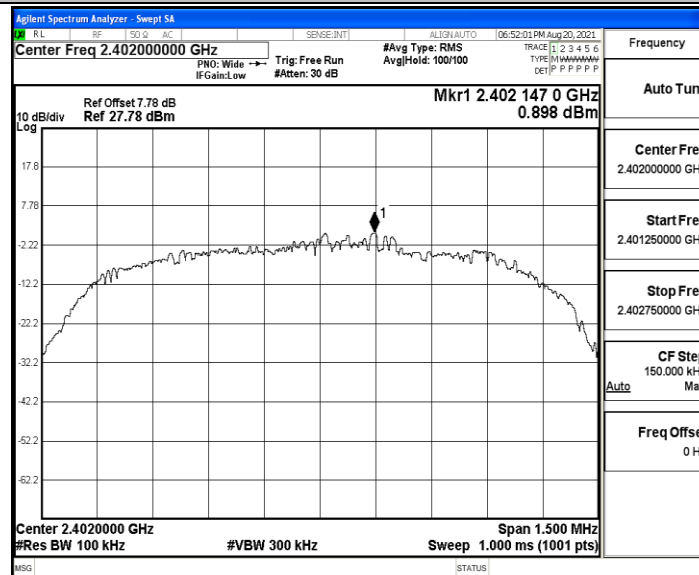
2DH5_Ant1_2480_30~1000



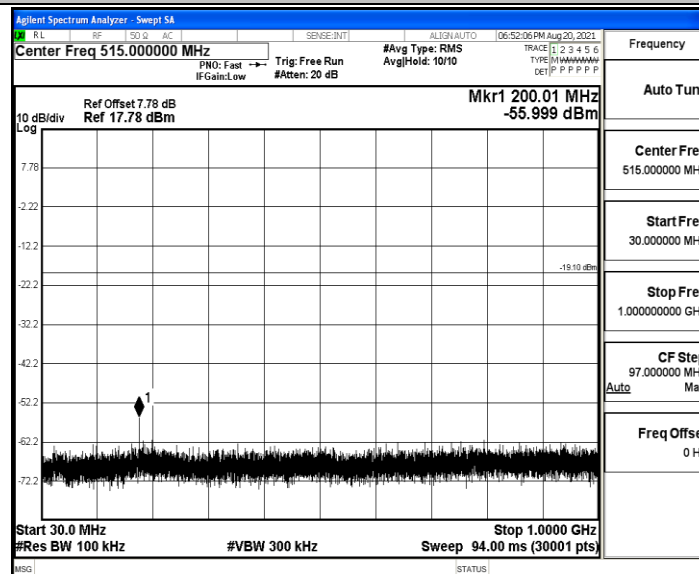
2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference

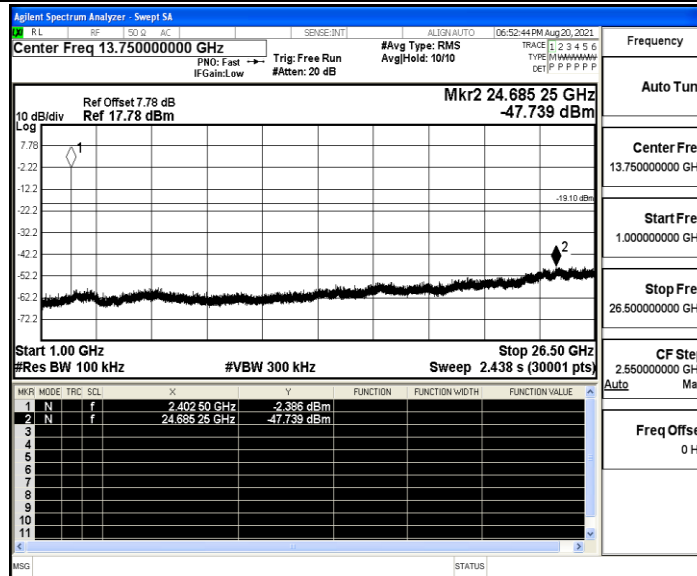


3DH5_Ant1_2402_30~1000

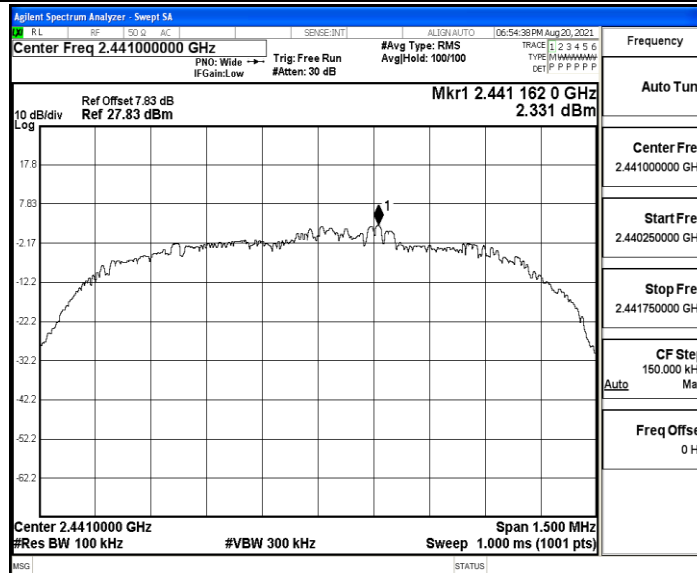




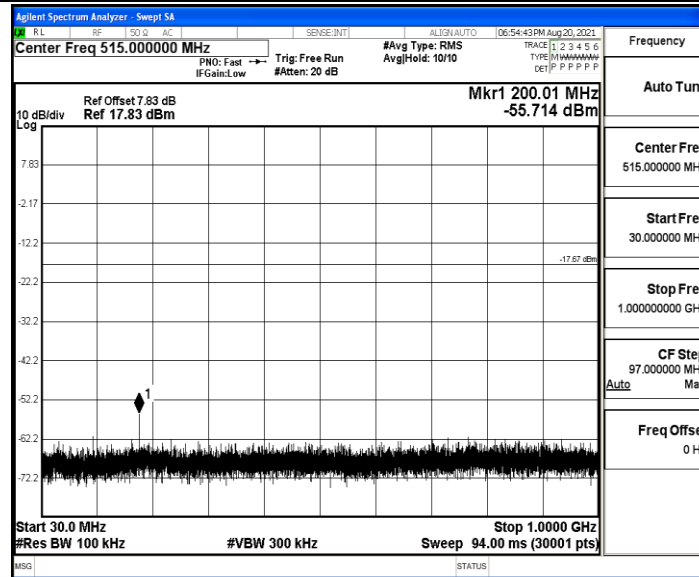
3DH5_Ant1_2402_1000~26500



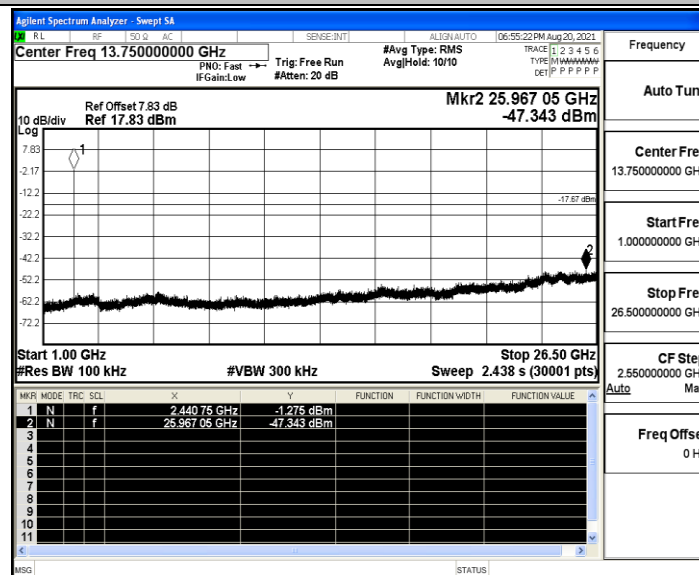
3DH5_Ant1_2441_0~Reference



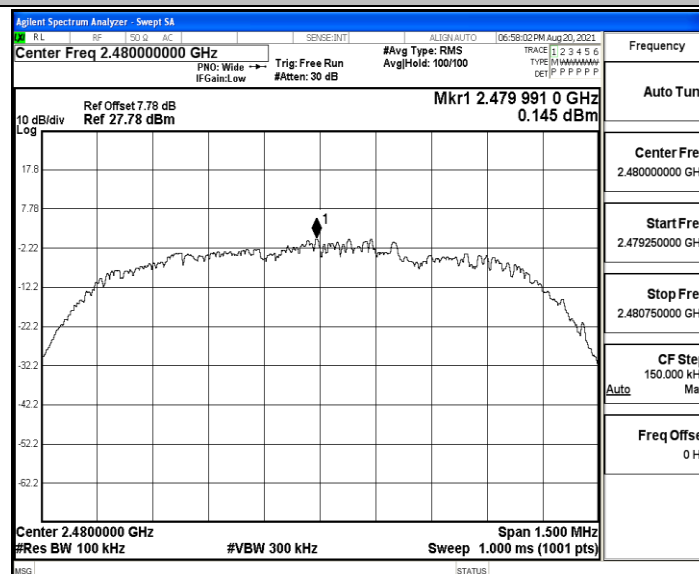
3DH5_Ant1_2441_30~1000



3DH5_Ant1_2441_1000~26500

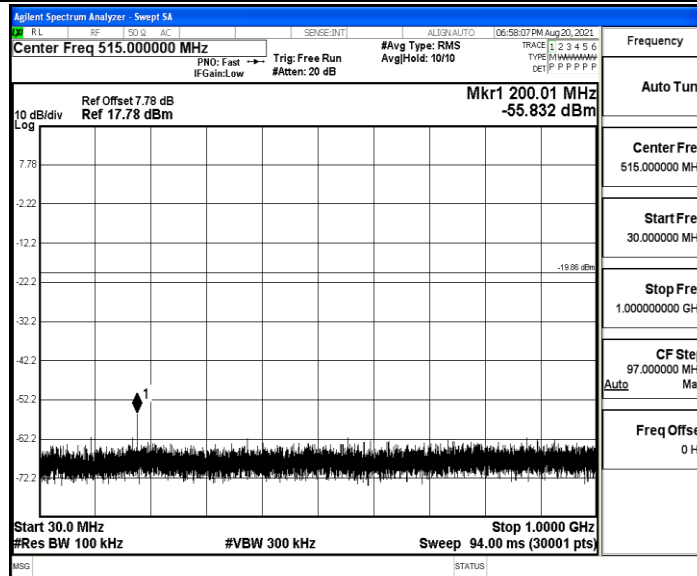


3DH5_Ant1_2480_0~Reference

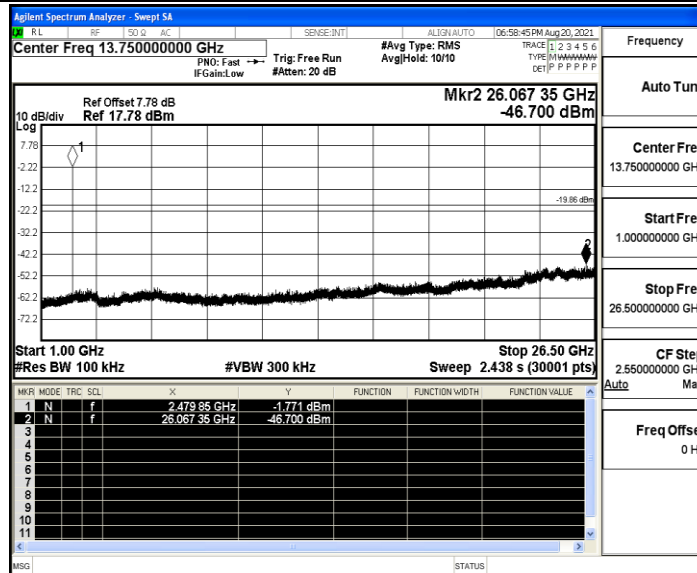




3DH5_Ant1_2480_30~1000



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	-48.83	≤-41.20	46.37	≤54	PASS
				AV	2386.730	-48.26	≤-41.20	46.94	≤54	PASS
				AV	2390.000	-48.38	≤-41.20	46.82	≤54	PASS
				Peak	2310.000	-40.95	≤-21.20	54.25	≤74	PASS
				Peak	2388.725	-38.09	≤-21.20	57.11	≤74	PASS
				Peak	2390.000	-40.04	≤-21.20	55.16	≤74	PASS
		High	2480	AV	2483.500	-47.63	≤-41.20	47.57	≤54	PASS
				AV	2483.520	-47.63	≤-41.20	47.57	≤54	PASS
				AV	2500.000	-47.77	≤-41.20	47.43	≤54	PASS
				Peak	2483.500	-40.13	≤-21.20	55.07	≤74	PASS
				Peak	2489.680	-37.77	≤-21.20	57.43	≤74	PASS
				Peak	2500.000	-40.69	≤-21.20	54.51	≤74	PASS
		Low	Hop_24 02	Peak	2310.000	-39.38	≤-21.20	55.82	≤74	PASS
				Peak	2375.180	-38.24	≤-21.20	56.96	≤74	PASS
				Peak	2390.000	-40.01	≤-21.20	55.19	≤74	PASS
		High	Hop_24 80	Peak	2483.500	-40.24	≤-21.20	54.96	≤74	PASS
				Peak	2484.560	-37.92	≤-21.20	57.28	≤74	PASS
				Peak	2500.000	-39.13	≤-21.20	56.07	≤74	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-48.8	≤-41.20	46.40	≤54	PASS
				AV	2381.585	-48.3	≤-41.20	46.90	≤54	PASS
				AV	2390.000	-48.37	≤-41.20	46.83	≤54	PASS
				Peak	2310.000	-40.94	≤-21.20	54.26	≤74	PASS
				Peak	2380.745	-37.49	≤-21.20	57.71	≤74	PASS
				Peak	2390.000	-40.66	≤-21.20	54.54	≤74	PASS
		High	2480	AV	2483.500	-47.49	≤-41.20	47.71	≤54	PASS
				AV	2483.520	-47.49	≤-41.20	47.71	≤54	PASS
				AV	2500.000	-47.84	≤-41.20	47.36	≤54	PASS
				Peak	2483.500	-39.96	≤-21.20	55.24	≤74	PASS
				Peak	2496.480	-37.81	≤-21.20	57.39	≤74	PASS
				Peak	2500.000	-38.66	≤-21.20	56.54	≤74	PASS
		Low	Hop_24 02	Peak	2310.000	-40.44	≤-21.20	54.76	≤74	PASS
				Peak	2363.315	-37.39	≤-21.20	57.81	≤74	PASS
				Peak	2390.000	-38.61	≤-21.20	56.59	≤74	PASS
		High	Hop_24 80	Peak	2483.500	-39.54	≤-21.20	55.66	≤74	PASS
				Peak	2486.480	-37.16	≤-21.20	58.04	≤74	PASS
				Peak	2500.000	-40.07	≤-21.20	55.13	≤74	PASS
3DH5	Ant1	Low	2402	AV	2310.000	-48.76	≤-41.20	46.44	≤54	PASS



				AV	2388.515	-48.27	≤ -41.20	46.93	≤ 54	PASS
				AV	2390.000	-48.37	≤ -41.20	46.83	≤ 54	PASS
				Peak	2310.000	-39.41	≤ -21.20	55.79	≤ 74	PASS
				Peak	2382.425	-37.87	≤ -21.20	57.33	≤ 74	PASS
				Peak	2390.000	-38.43	≤ -21.20	56.77	≤ 74	PASS
		High	2480	AV	2483.500	-47.51	≤ -41.20	47.69	≤ 54	PASS
				AV	2483.520	-47.51	≤ -41.20	47.69	≤ 54	PASS
				AV	2500.000	-47.8	≤ -41.20	47.40	≤ 54	PASS
				Peak	2483.500	-39.39	≤ -21.20	55.81	≤ 74	PASS
				Peak	2493.760	-36.66	≤ -21.20	58.54	≤ 74	PASS
				Peak	2500.000	-39.6	≤ -21.20	55.60	≤ 74	PASS
		Low	Hop_24 02	Peak	2310.000	-41.58	≤ -21.20	53.62	≤ 74	PASS
				Peak	2375.600	-38.02	≤ -21.20	57.18	≤ 74	PASS
				Peak	2390.000	-40.3	≤ -21.20	54.90	≤ 74	PASS
		High	Hop_24 80	Peak	2483.500	-39.01	≤ -21.20	56.19	≤ 74	PASS
				Peak	2488.560	-37.6	≤ -21.20	57.60	≤ 74	PASS
				Peak	2500.000	-39.51	≤ -21.20	55.69	≤ 74	PASS

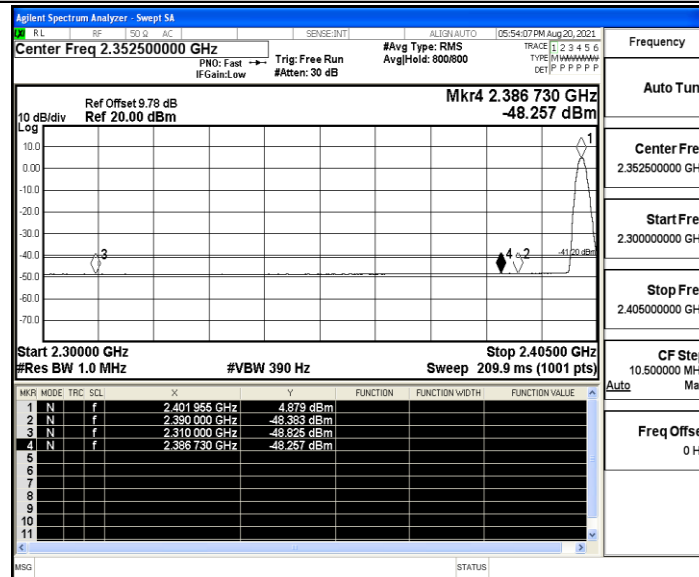
Note:

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.

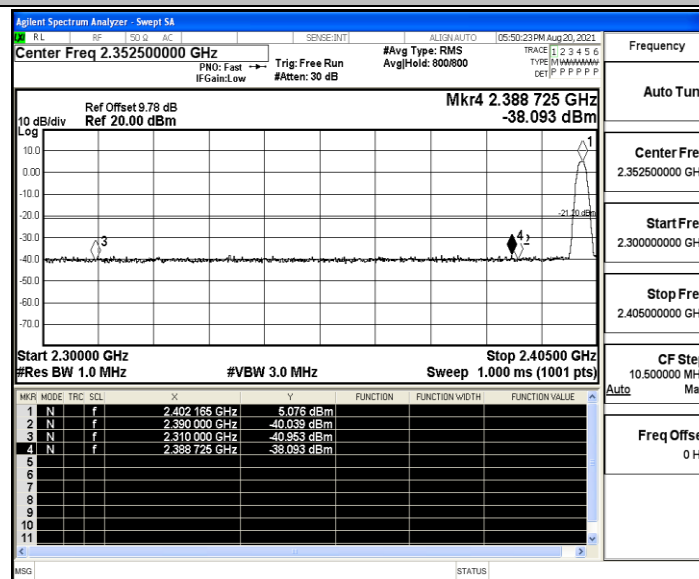


Test Graphs

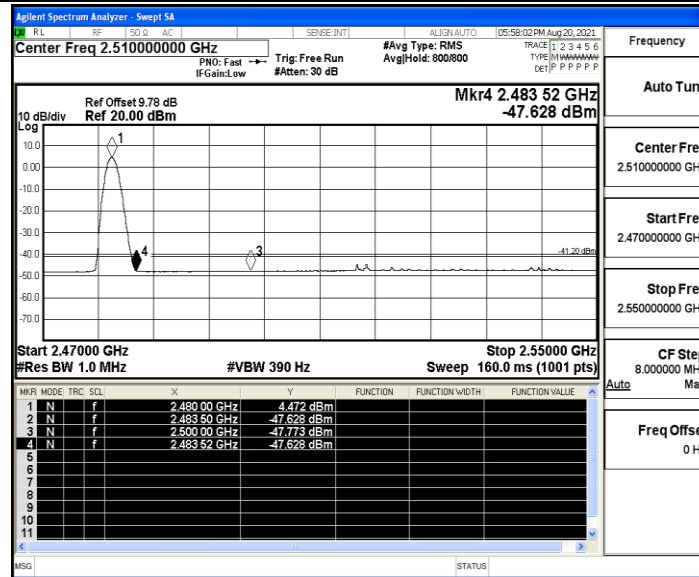
DH5_Ant1_Low_2402_AV



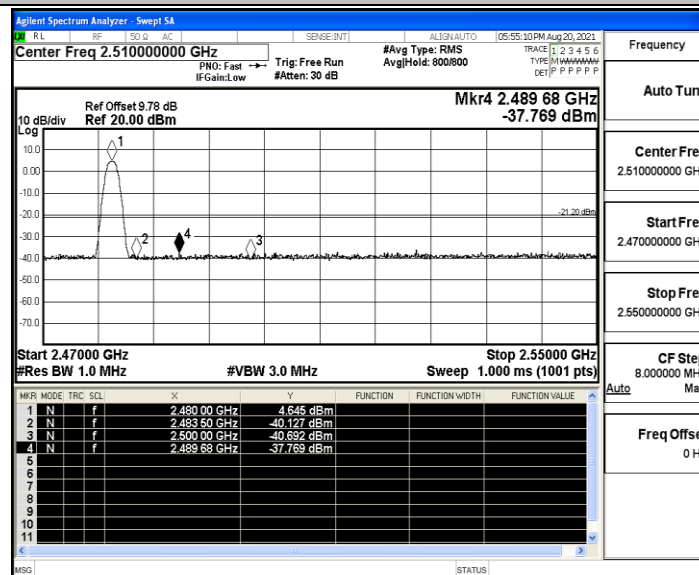
DH5_Ant1_Low_2402_Peak



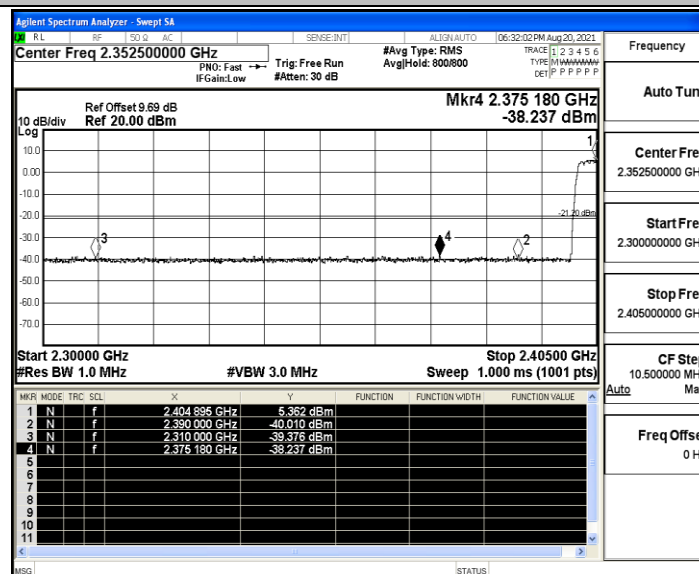
DH5_Ant1_High_2480_AV



DH5_Ant1_High_2480_Peak

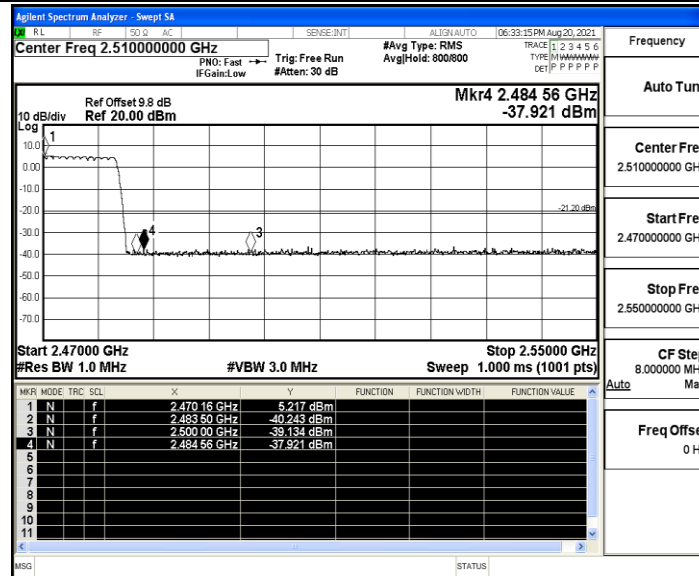


DH5_Ant1_Low_Hop_2402_Peak

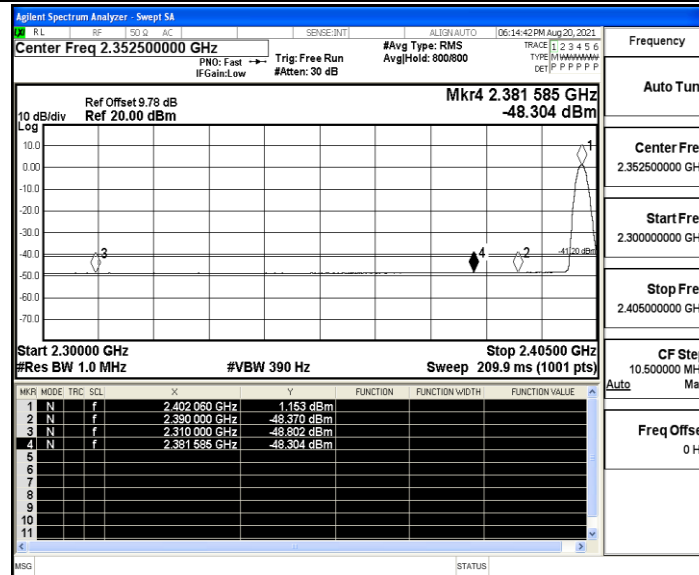




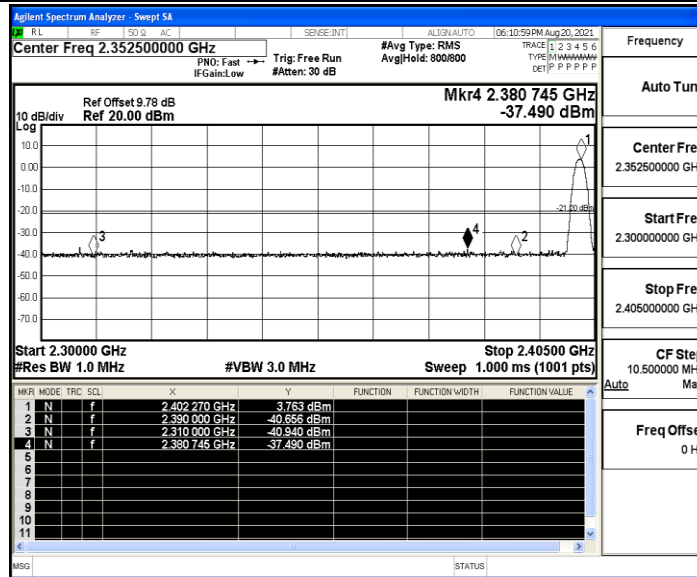
DH5_Ant1_High_Hop_2480_Peak



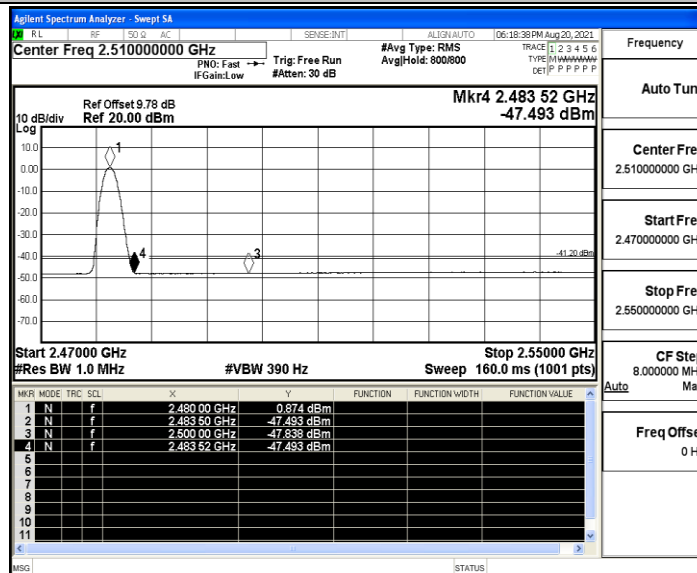
2DH5_Ant1_Low_2402_AV



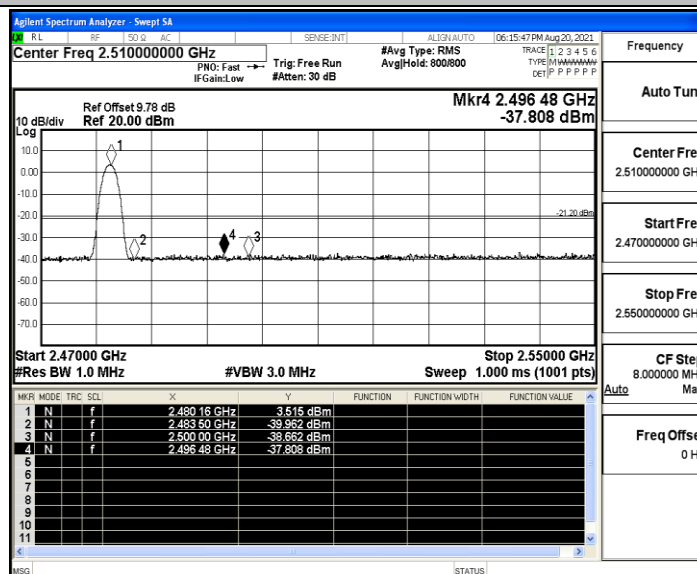
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2DH5_Ant1_High_2480_AV

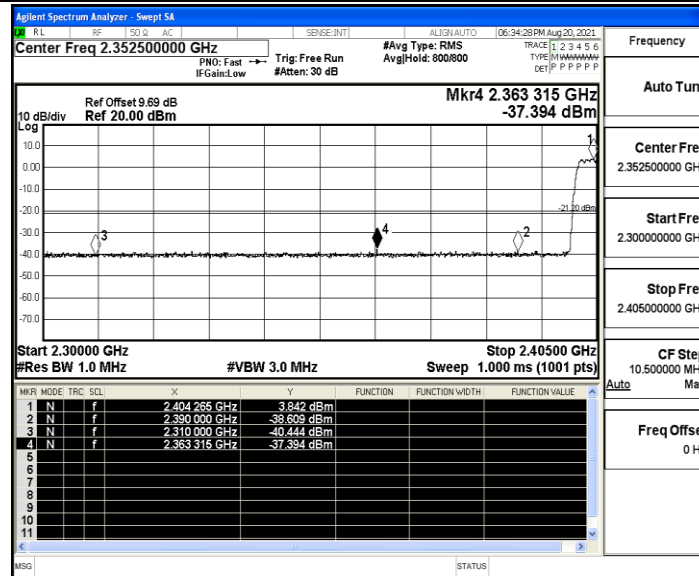


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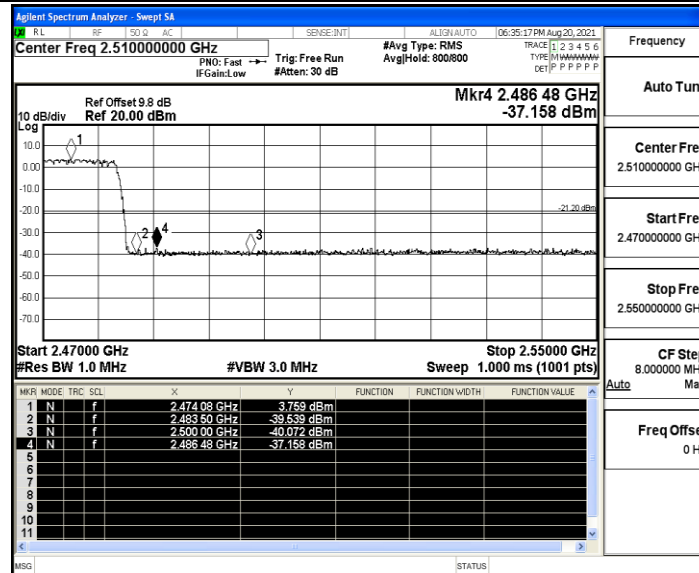




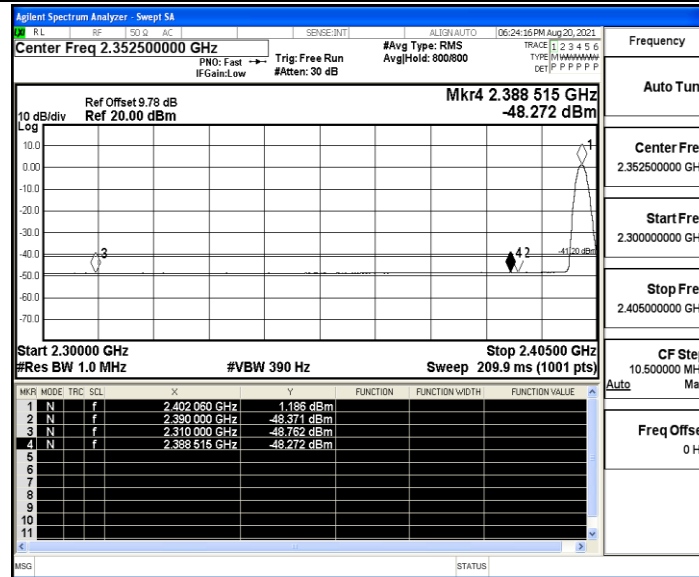
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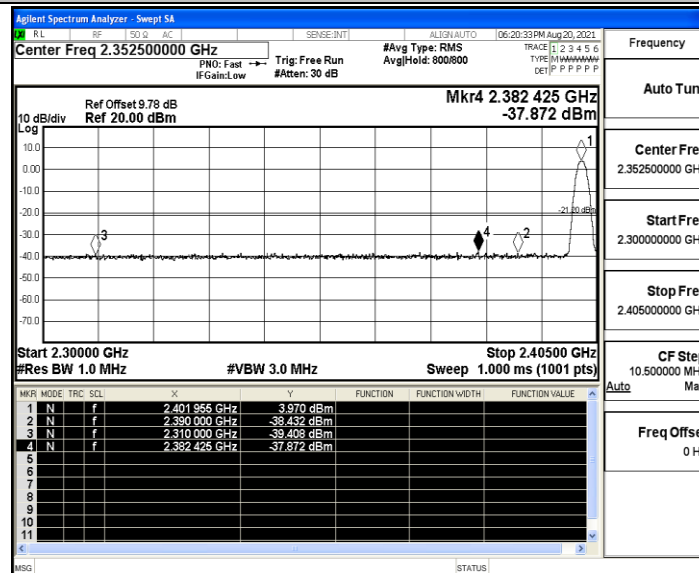
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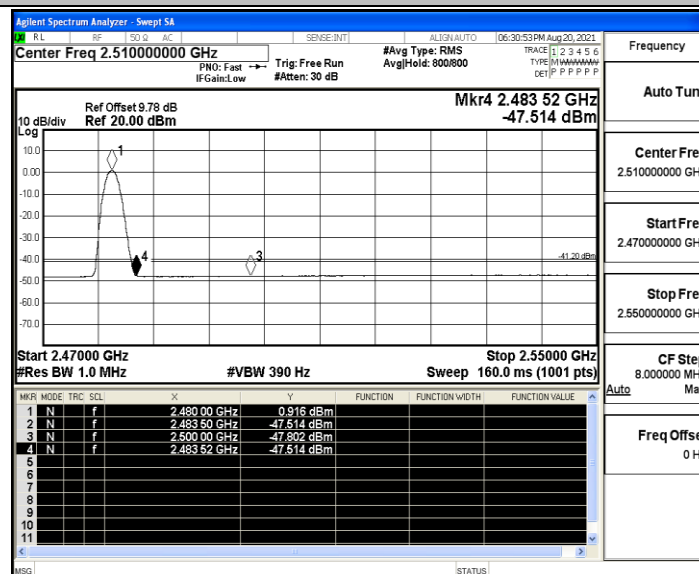
3DH5_Ant1_Low_2402_AV



3DH5_Ant1_Low_2402_Peak

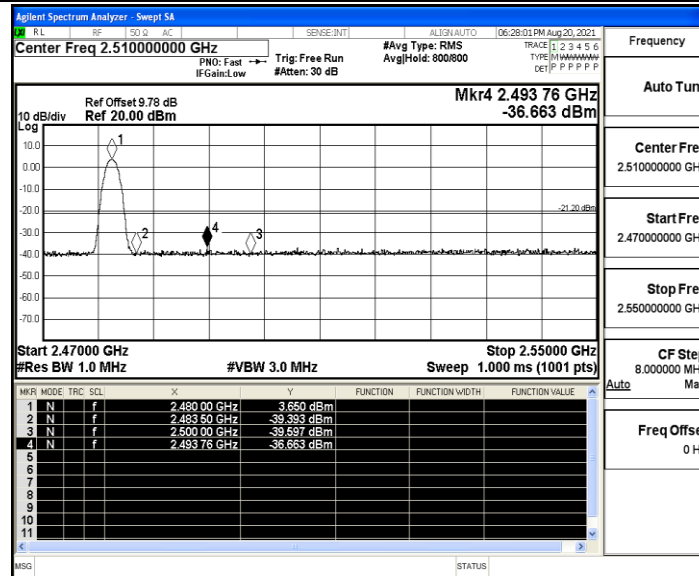


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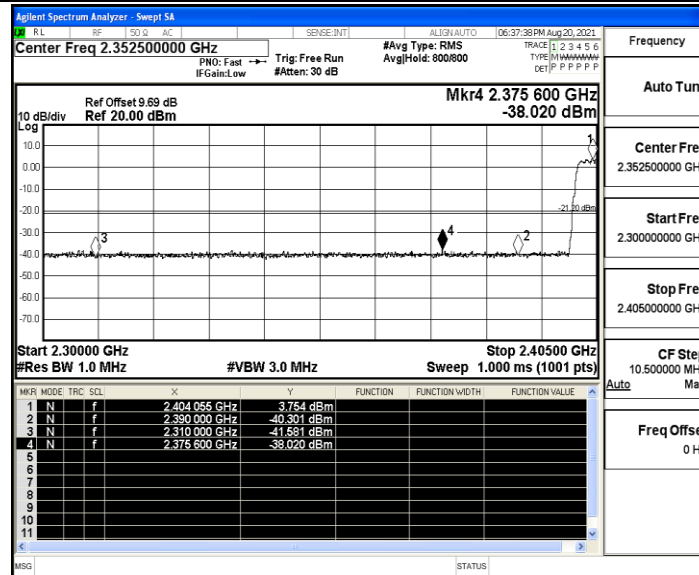




3DH5_Ant1_High_2480_Peak



3DH5_Ant1_Low_Hop_2402_Peak



3DH5_Ant1_High_Hop_2480_Peak

