



Appendix A

RF Test Data for BT (Conducted Measurement)

Product Name: True wireless earbuds

Test Model: Happy Plugs Air 1 Zen

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan



A.1 20dB Emission Bandwidth

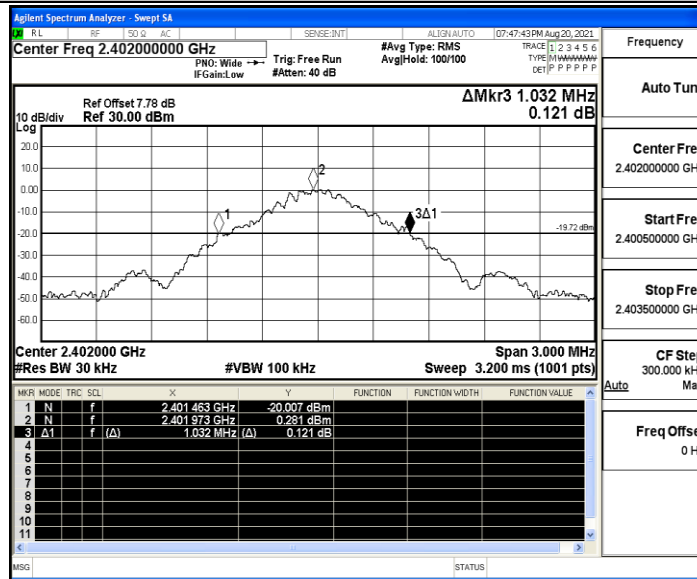
Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	1.032	2401.463	2402.495	---	PASS
		2441	0.975	2440.529	2441.504	---	PASS
		2480	1.035	2479.463	2480.498	---	PASS
2DH5	Ant1	2402	1.302	2401.358	2402.660	---	PASS
		2441	1.341	2440.328	2441.669	---	PASS
		2480	1.338	2479.328	2480.666	---	PASS
3DH5	Ant1	2402	1.308	2401.346	2402.654	---	PASS
		2441	1.293	2440.349	2441.642	---	PASS
		2480	1.317	2479.343	2480.660	---	PASS

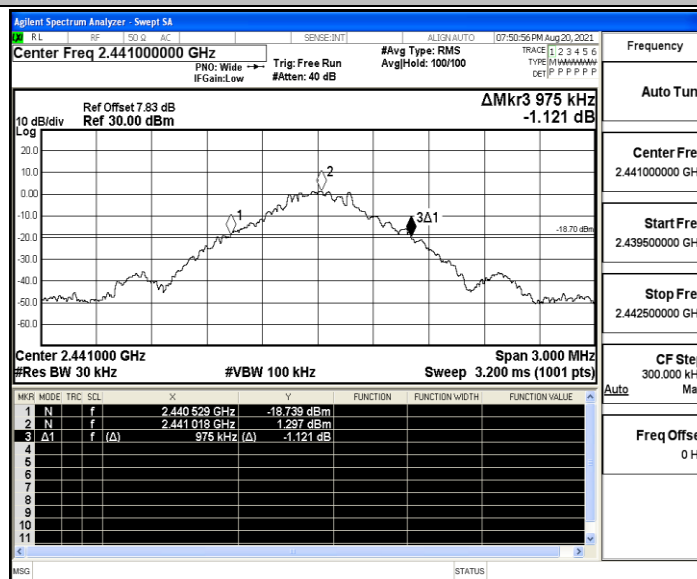


Test Graphs

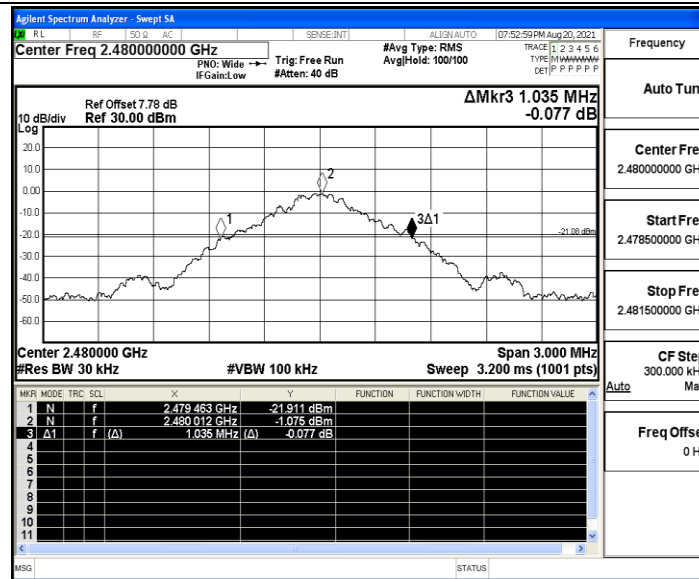
DH5_Ant1_2402



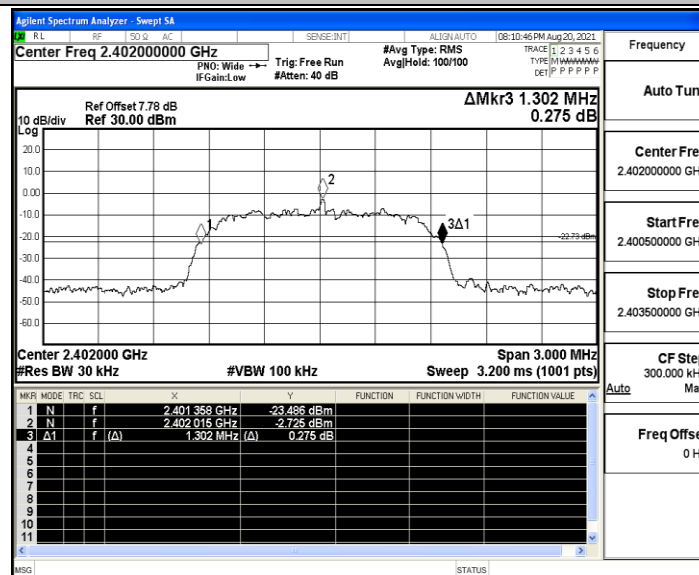
DH5_Ant1_2441



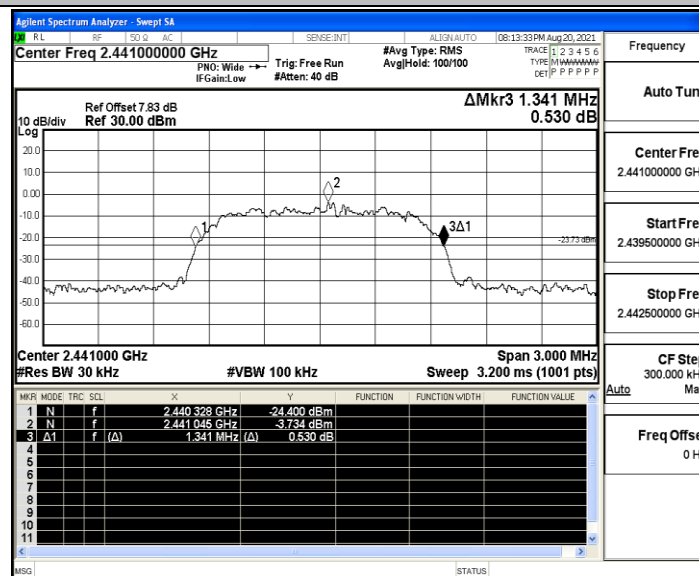
DH5_Ant1_2480



2DH5_Ant1_2402

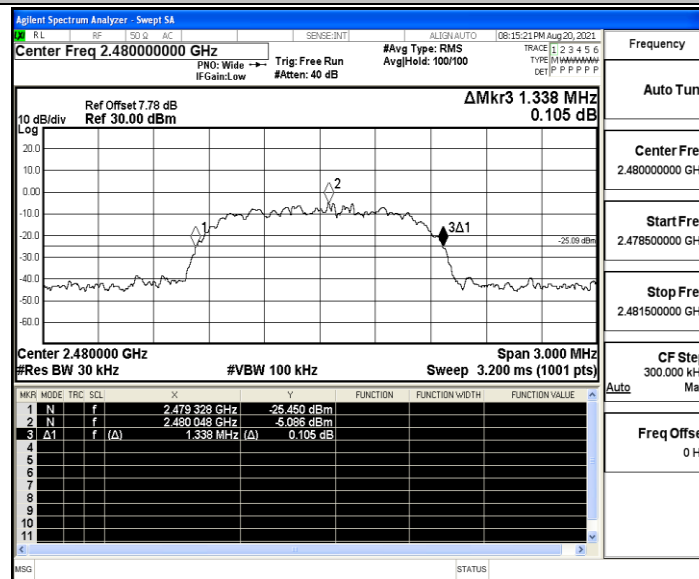


2DH5_Ant1_2441

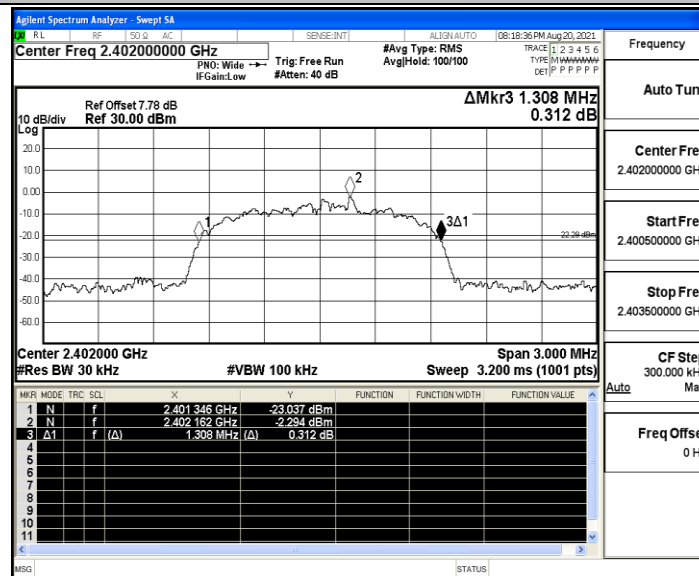




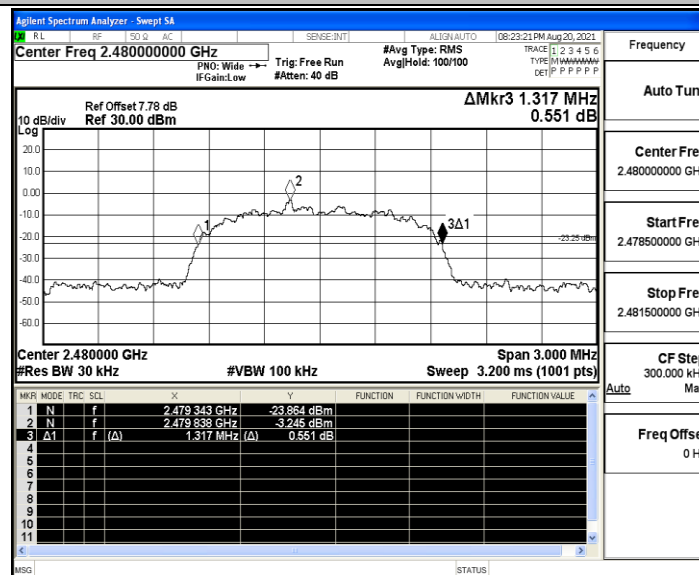
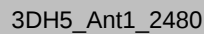
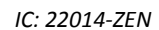
2DH5_Ant1_2480



3DH5_Ant1_2402



3DH5_Ant1_2441





A.2 Occupied Channel Bandwidth

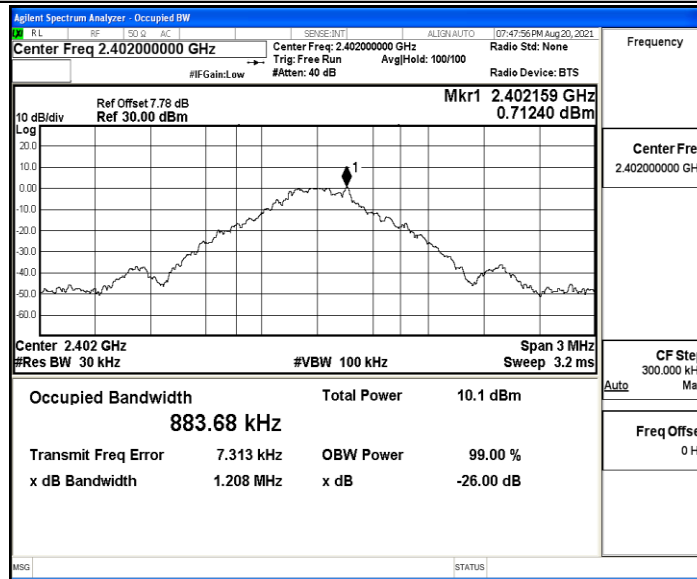
Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.88368	2401.565	2402.449	---	PASS
		2441	0.91697	2440.545	2441.462	---	PASS
		2480	0.92063	2479.544	2480.464	---	PASS
2DH5	Ant1	2402	1.1890	2401.406	2402.595	---	PASS
		2441	1.1730	2440.412	2441.585	---	PASS
		2480	1.1895	2479.405	2480.594	---	PASS
3DH5	Ant1	2402	1.1840	2401.410	2402.594	---	PASS
		2441	1.1896	2440.403	2441.593	---	PASS
		2480	1.2065	2479.394	2480.601	---	PASS

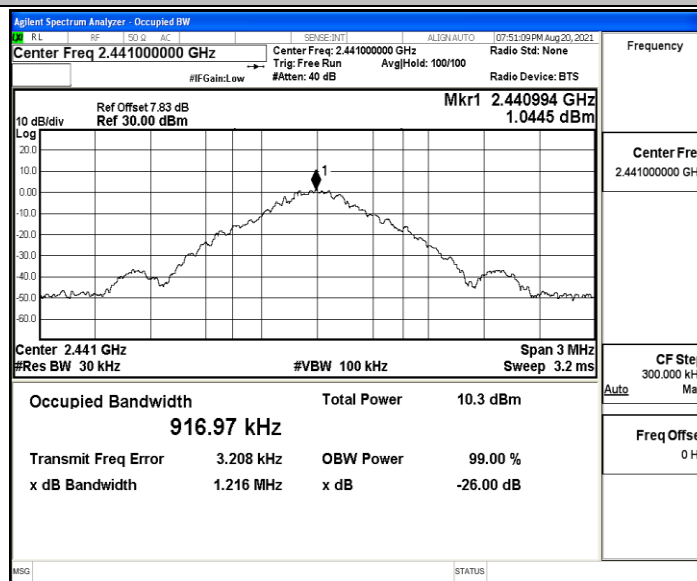


Test Graphs

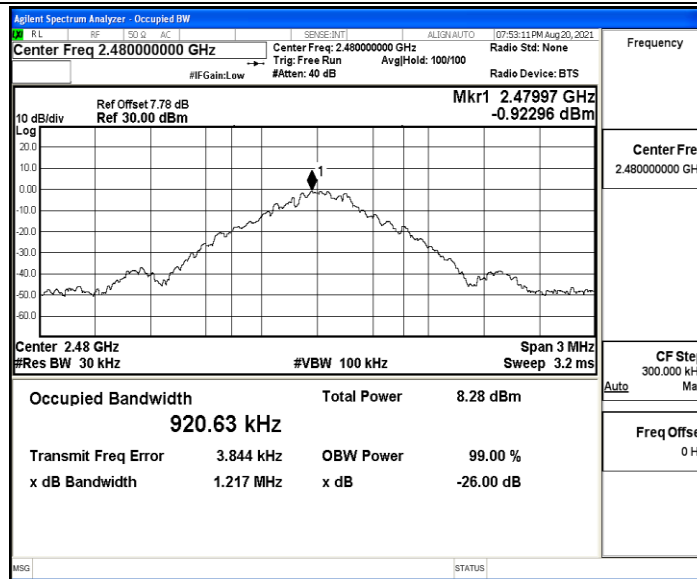
DH5_Ant1_2402



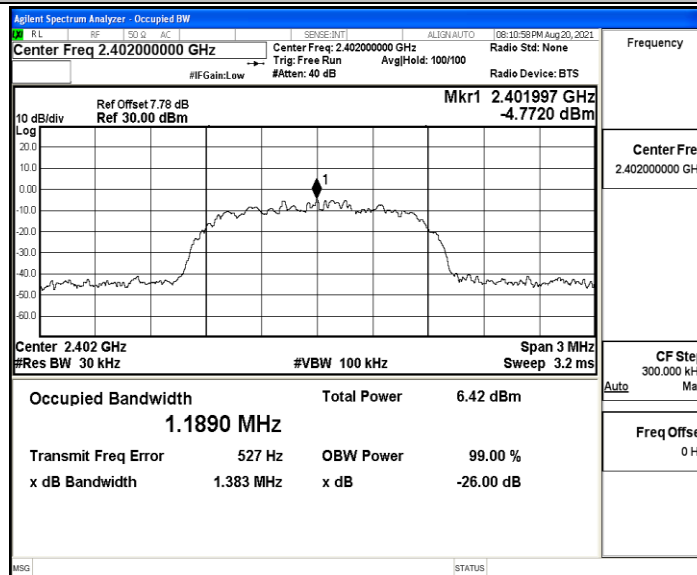
DH5_Ant1_2441



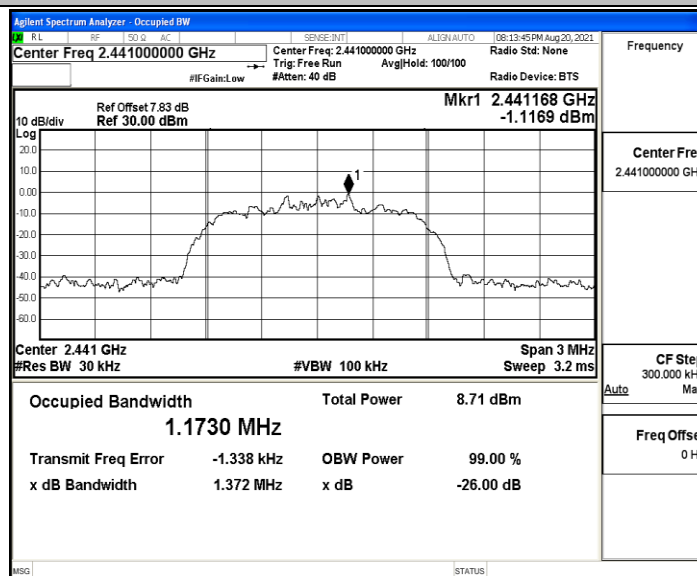
DH5_Ant1_2480



2DH5_Ant1_2402

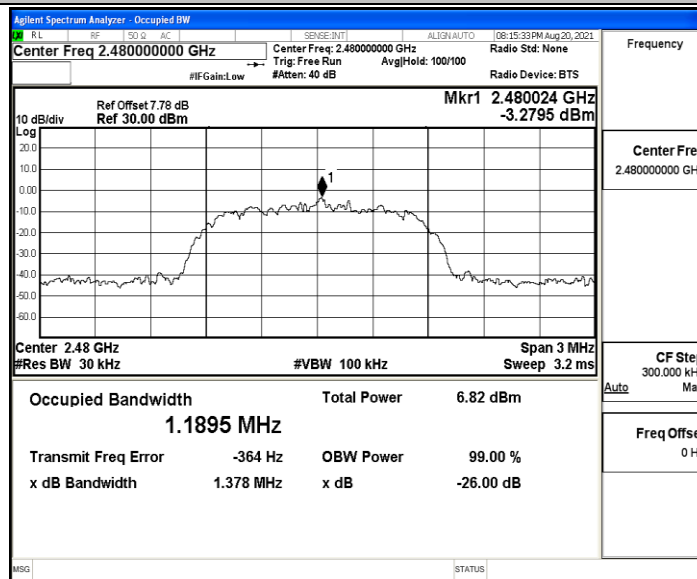


2DH5_Ant1_2441

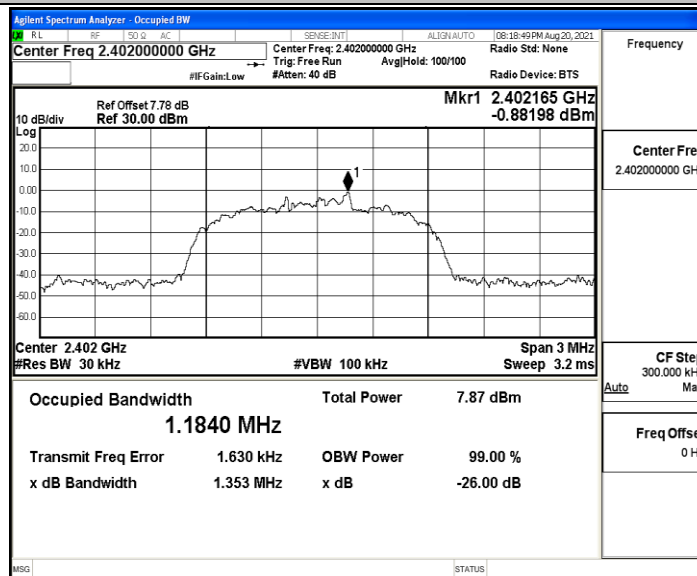




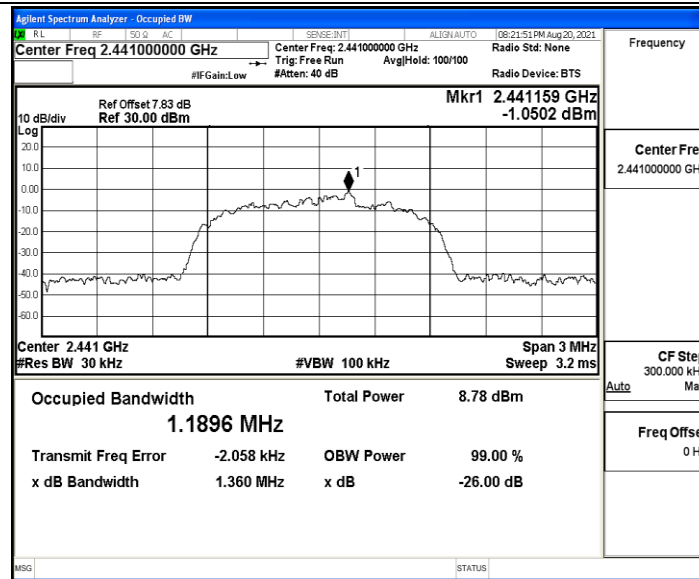
2DH5_Ant1_2480



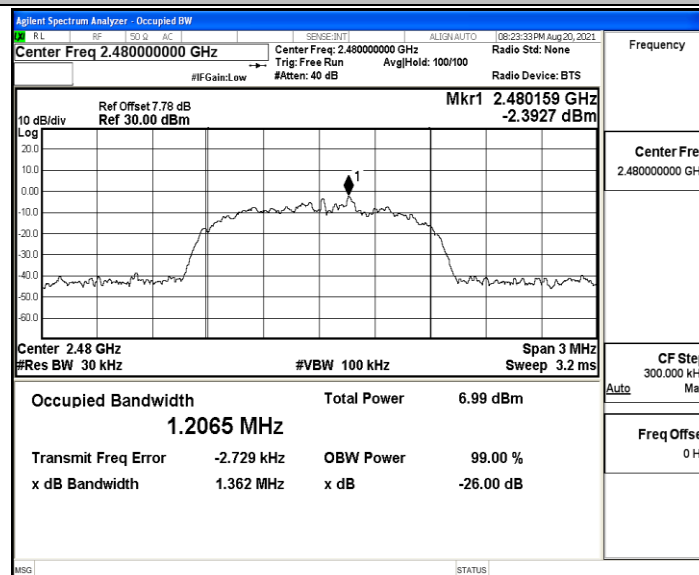
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480





A.3 Maximum conducted output power

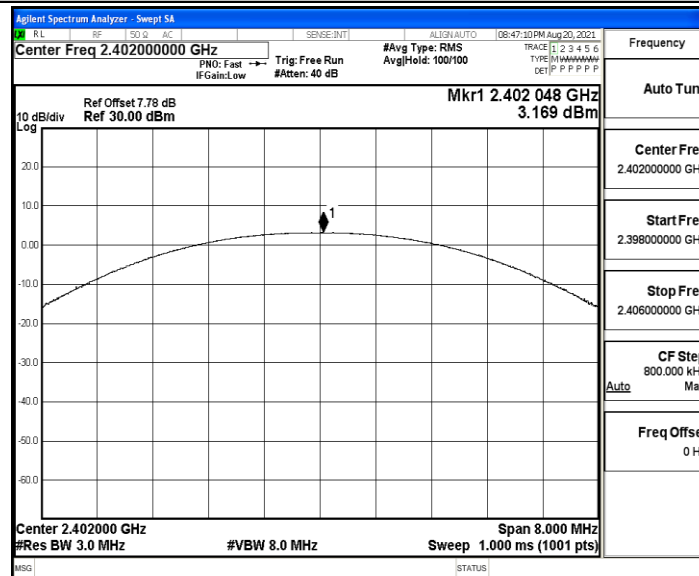
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	3.17	≤ 20.97	PASS
		2441	4.42	≤ 20.97	PASS
		2480	2.9	≤ 20.97	PASS
2DH5	Ant1	2402	2.11	≤ 20.97	PASS
		2441	3.46	≤ 20.97	PASS
		2480	2	≤ 20.97	PASS
3DH5	Ant1	2402	2.55	≤ 20.97	PASS
		2441	1.74	≤ 20.97	PASS
		2480	2.3	≤ 20.97	PASS

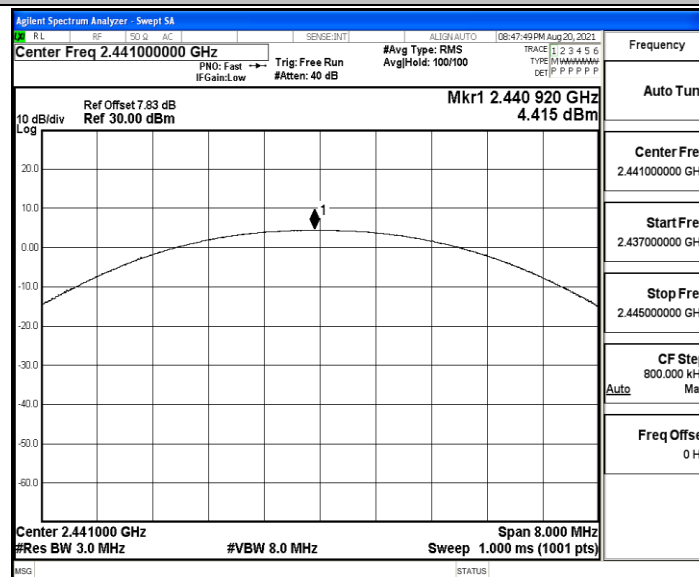


Test Graphs

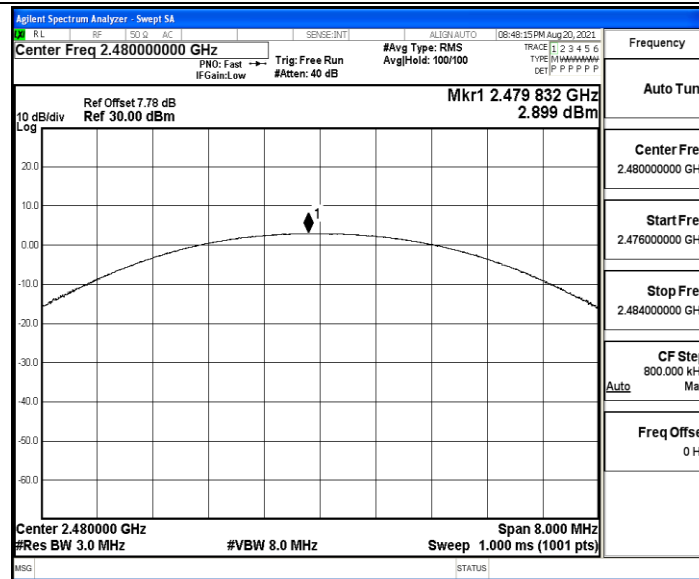
DH5_Ant1_2402



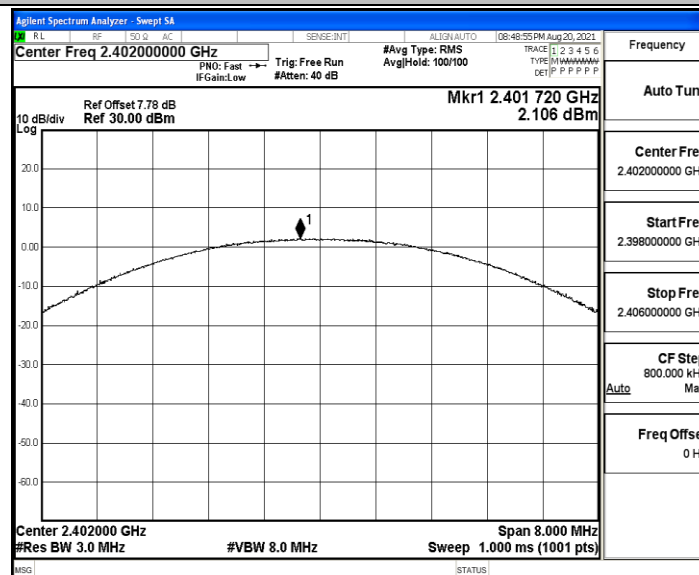
DH5_Ant1_2441



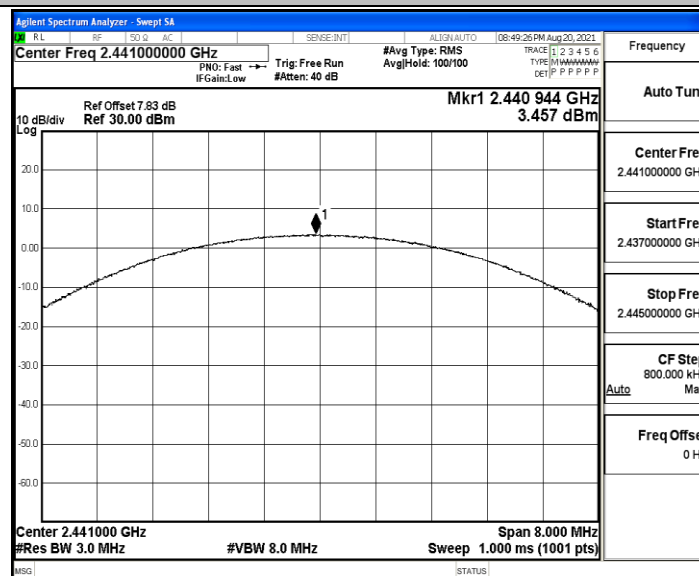
DH5_Ant1_2480



2DH5_Ant1_2402

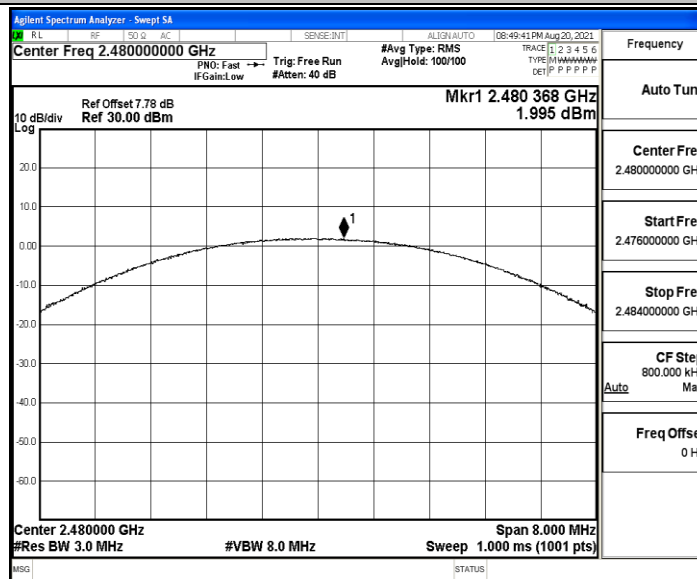


2DH5_Ant1_2441

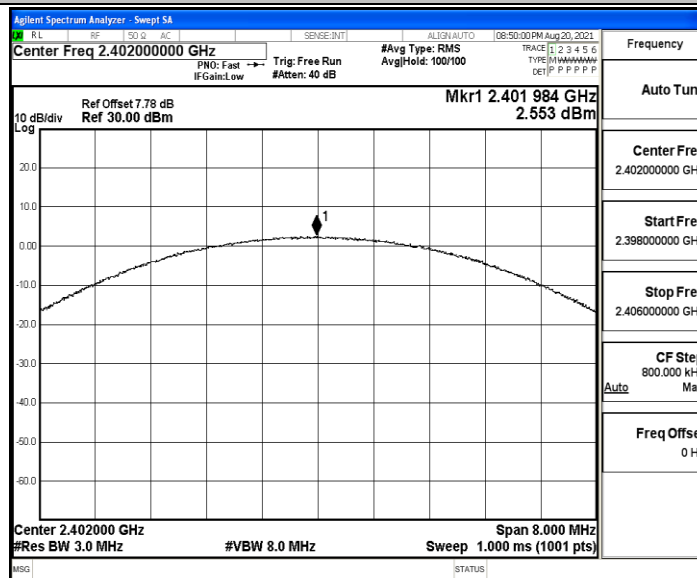




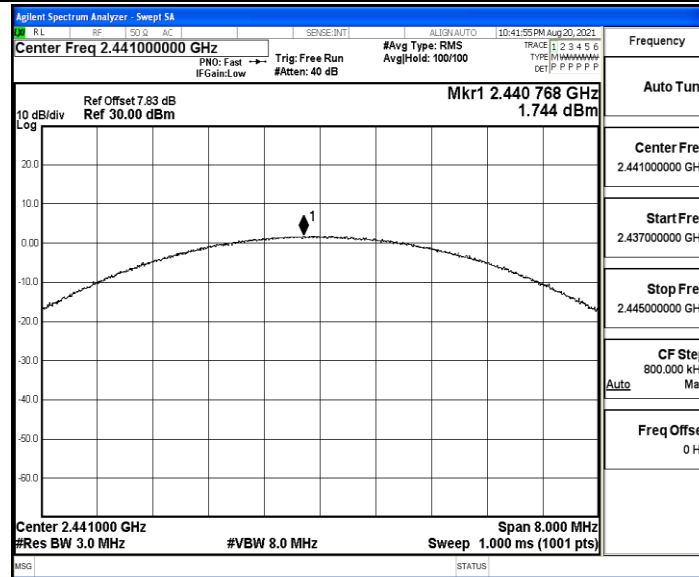
2DH5_Ant1_2480



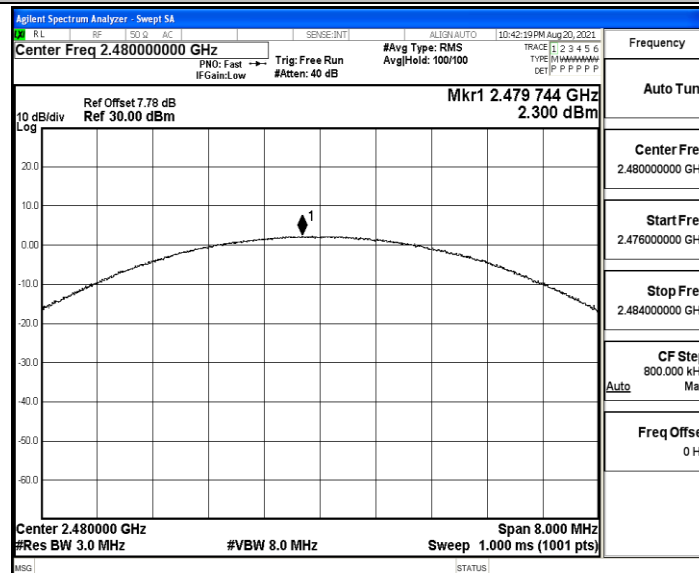
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480





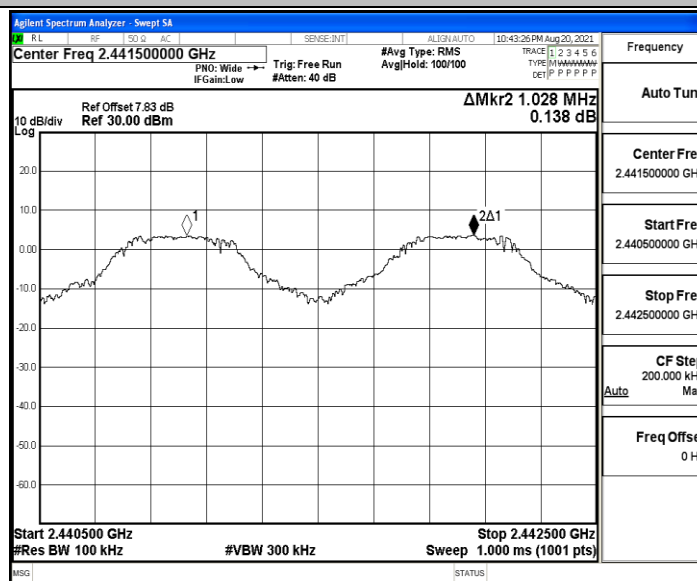
A.4 Carrier frequency separation

Test Result

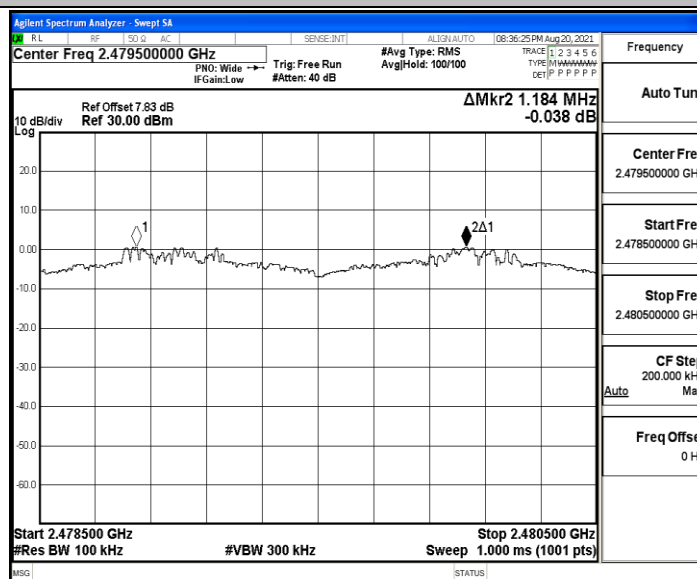
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	1.028	≥ 0.690	PASS
2DH5	Ant1	Hop	1.184	≥ 0.894	PASS
3DH5	Ant1	Hop	0.98	≥ 0.878	PASS

Test Graphs

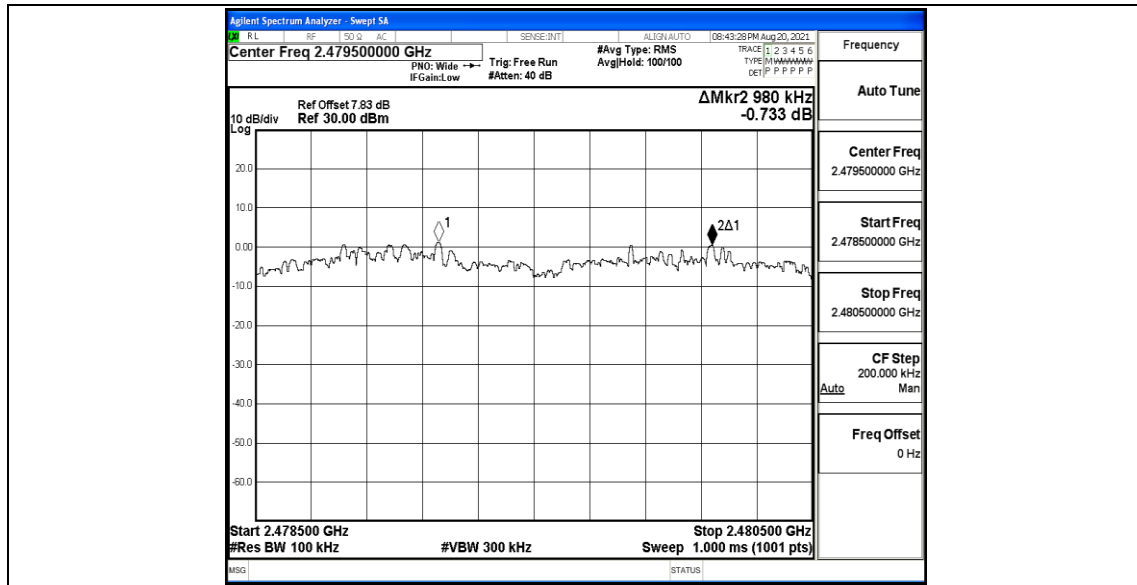
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop





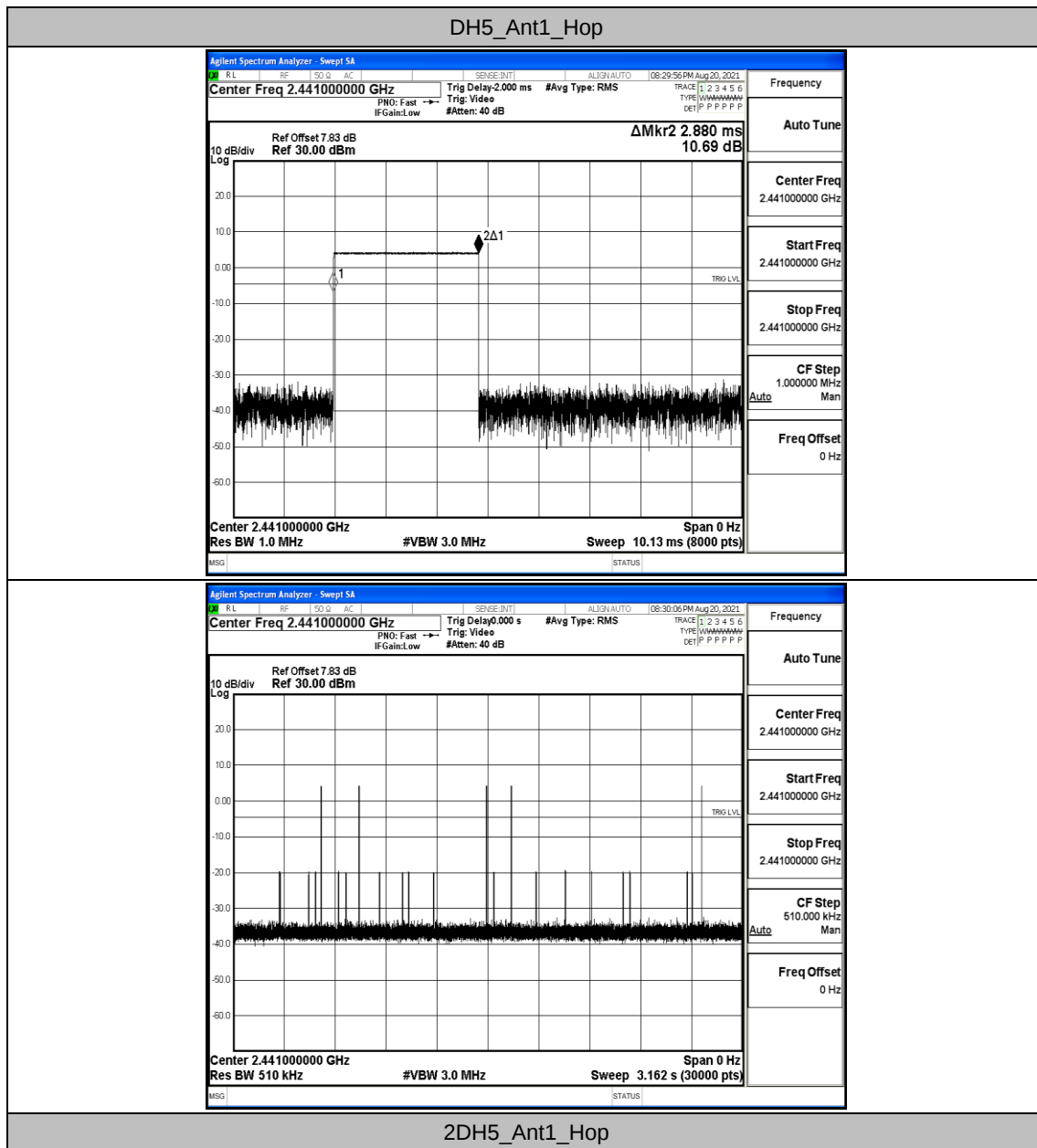
A.5 Time of occupancy

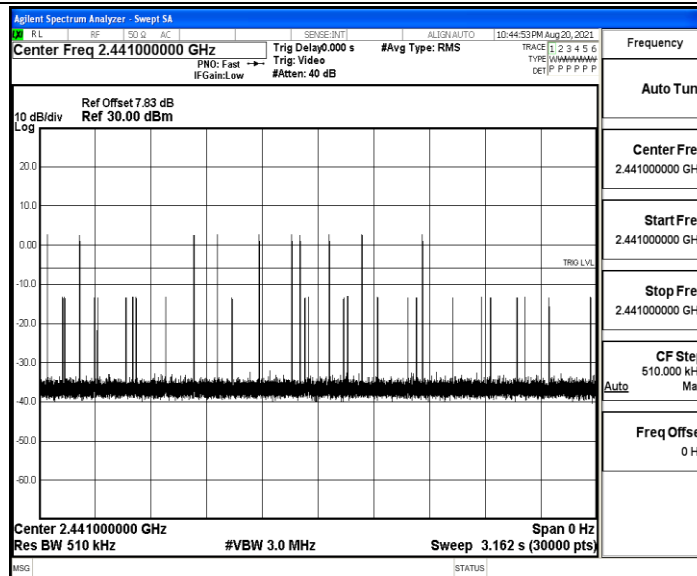
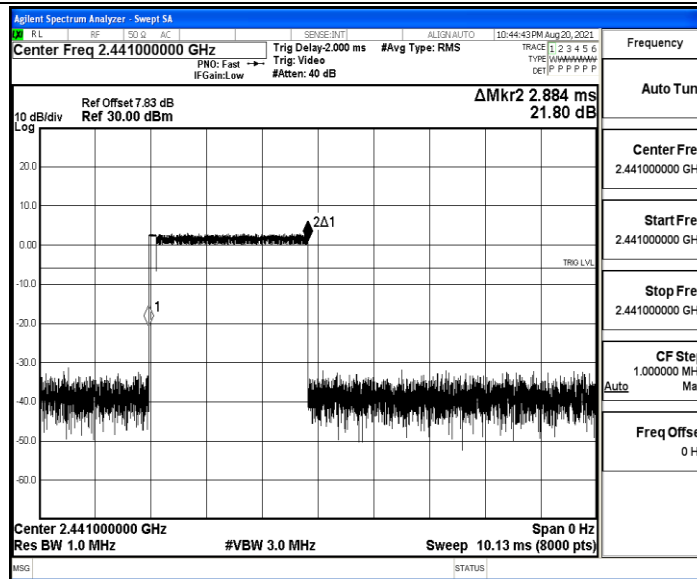
Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.88	60	0.173	≤0.4	PASS
2DH5	Ant1	Hop	2.88	110	0.317	≤0.4	PASS
3DH5	Ant1	Hop	2.89	60	0.173	≤0.4	PASS

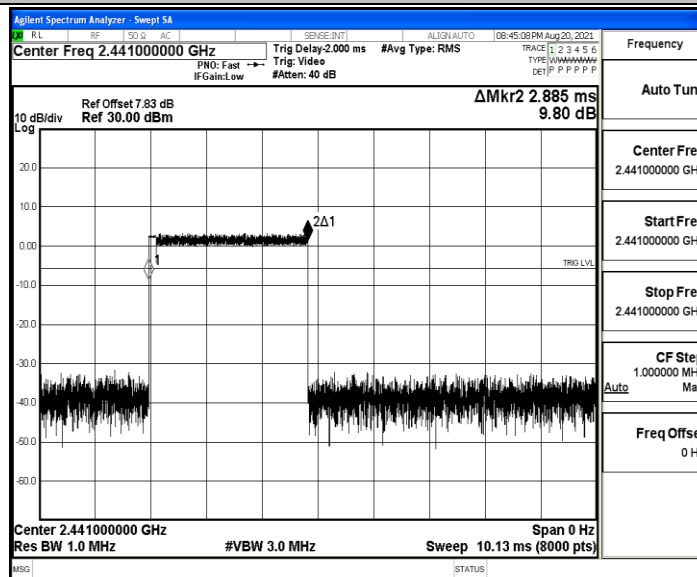


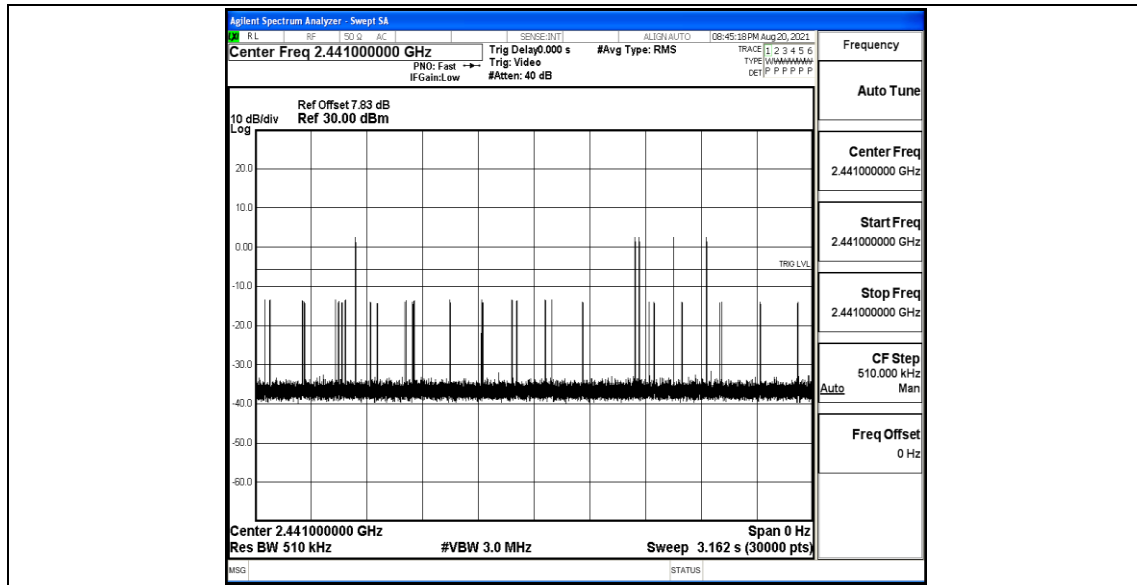
Test Graphs





3DH5_Ant1_Hop





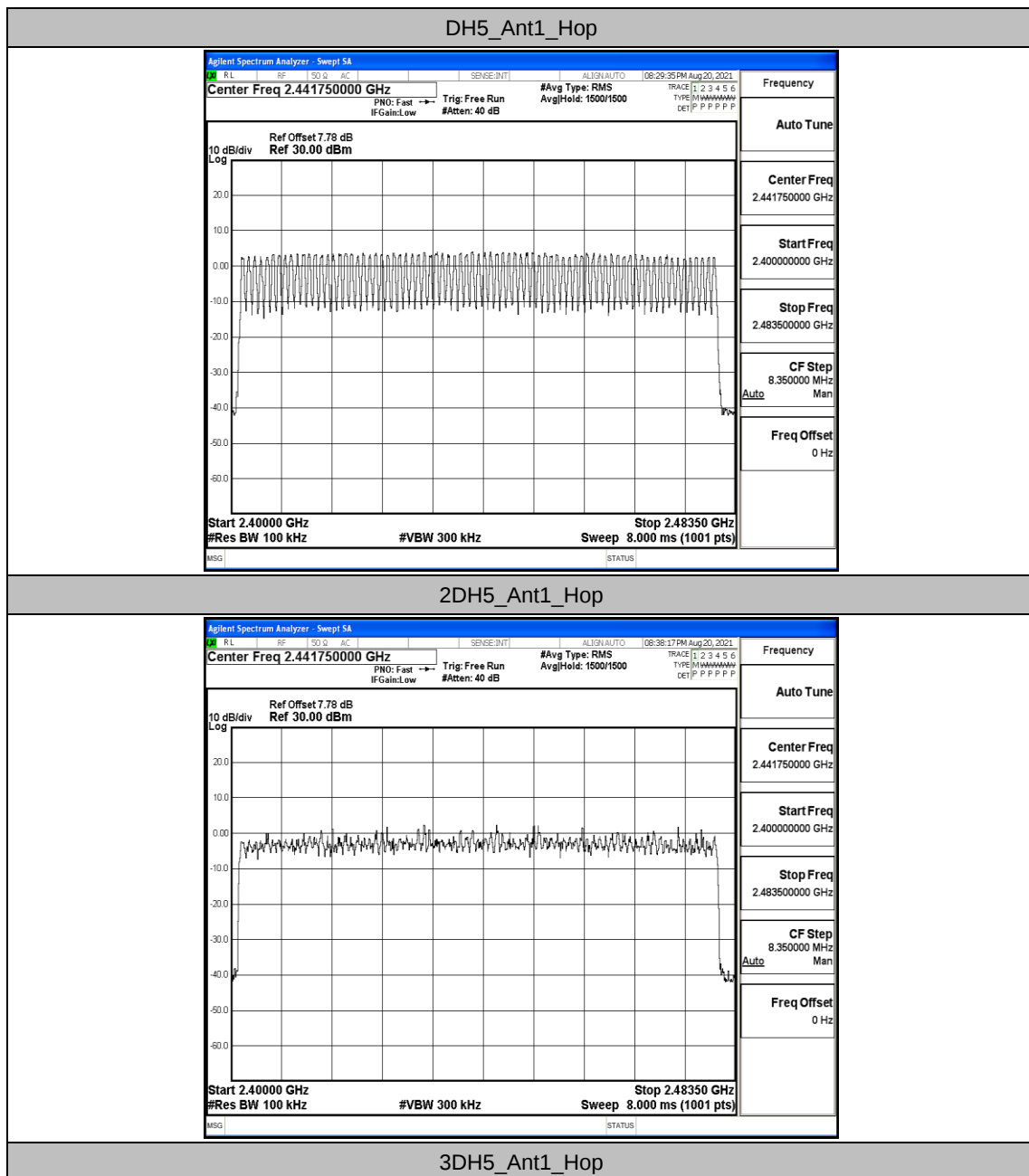


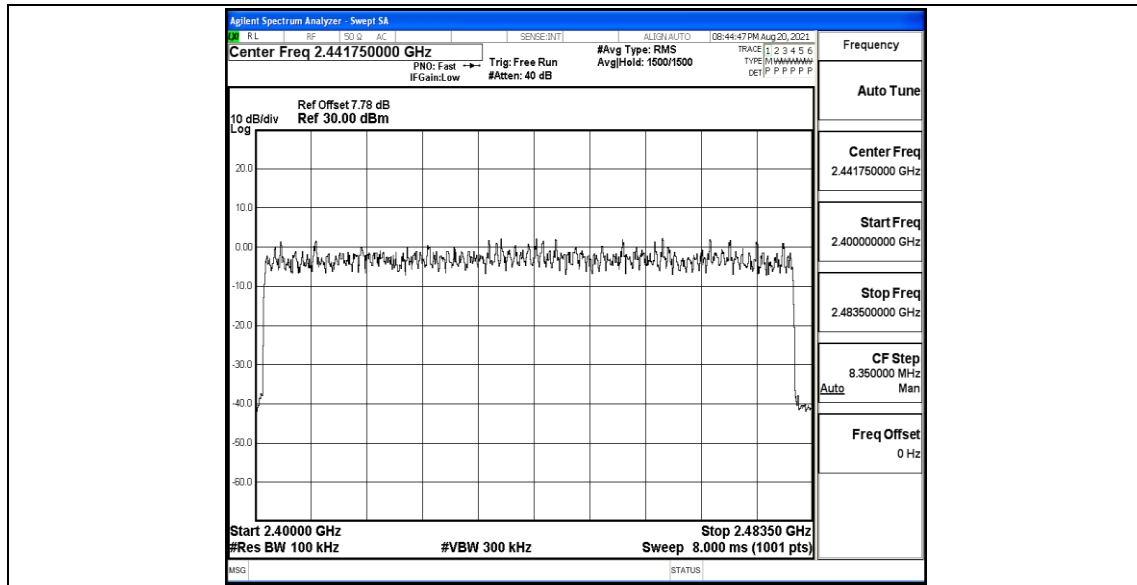
A.6 Number of hopping channels

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.7 Band edge measurements

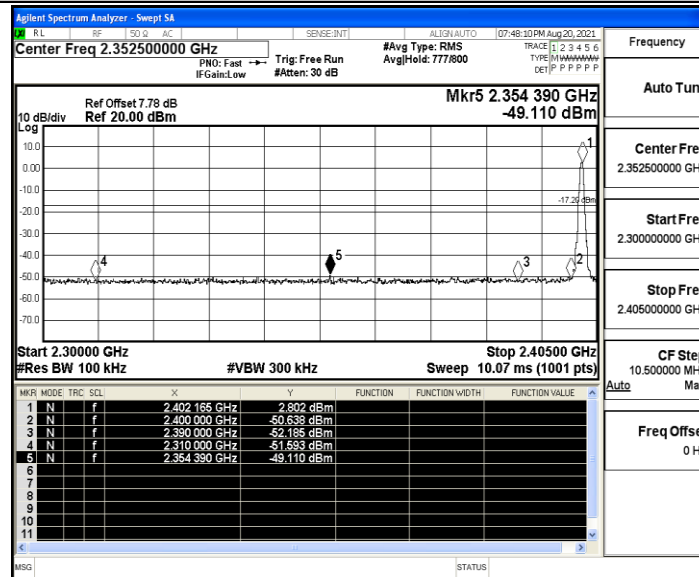
Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	2.80	-49.11	≤ -17.2	PASS
		High	2480	2.05	-47.72	≤ -17.95	PASS
		Low	Hop_2402	2.75	-49.13	≤ -17.25	PASS
		High	Hop_2480	3.21	-48.55	≤ -16.79	PASS
2DH5	Ant1	Low	2402	-0.24	-49.49	≤ -20.24	PASS
		High	2480	0.75	-48.73	≤ -19.25	PASS
		Low	Hop_2402	-1.55	-49.77	≤ -21.55	PASS
		High	Hop_2480	1.71	-48.58	≤ -18.29	PASS
3DH5	Ant1	Low	2402	0.87	-49.6	≤ -19.13	PASS
		High	2480	1.28	-48.72	≤ -18.72	PASS
		Low	Hop_2402	-1.72	-49.91	≤ -21.72	PASS
		High	Hop_2480	0.86	-48.1	≤ -19.14	PASS

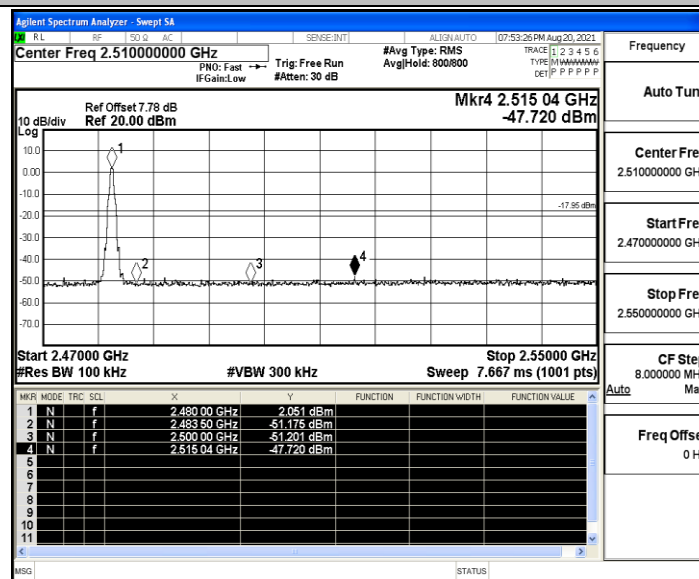


Test Graphs

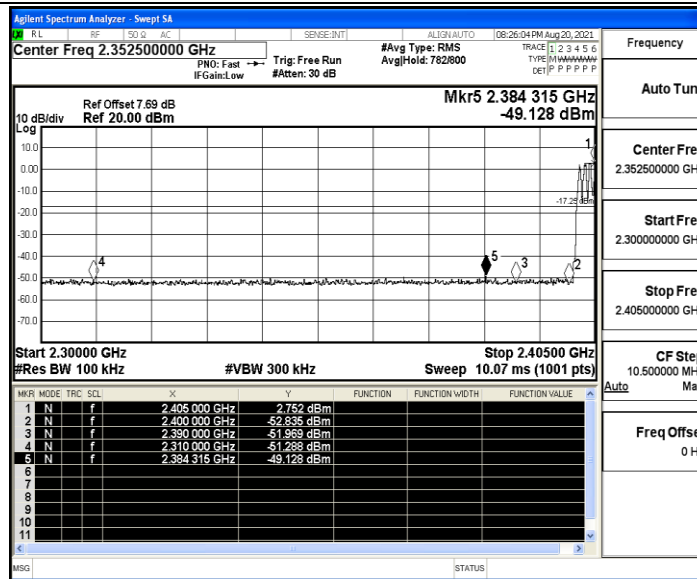
DH5_Ant1_Low_2402



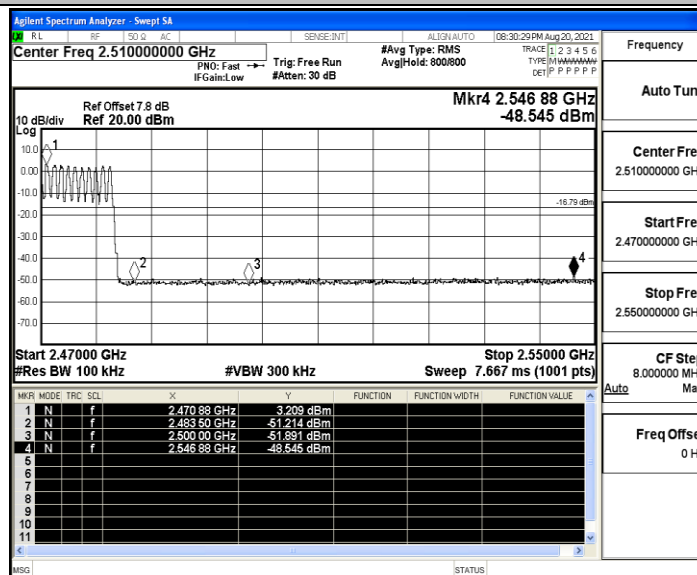
DH5_Ant1_High_2480



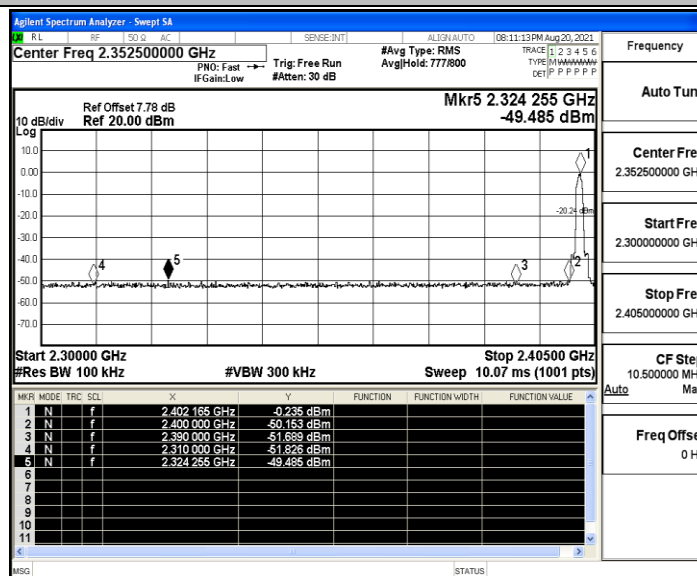
DH5_Ant1_Low_Hop_2402



DH5_Ant1_High_Hop_2480

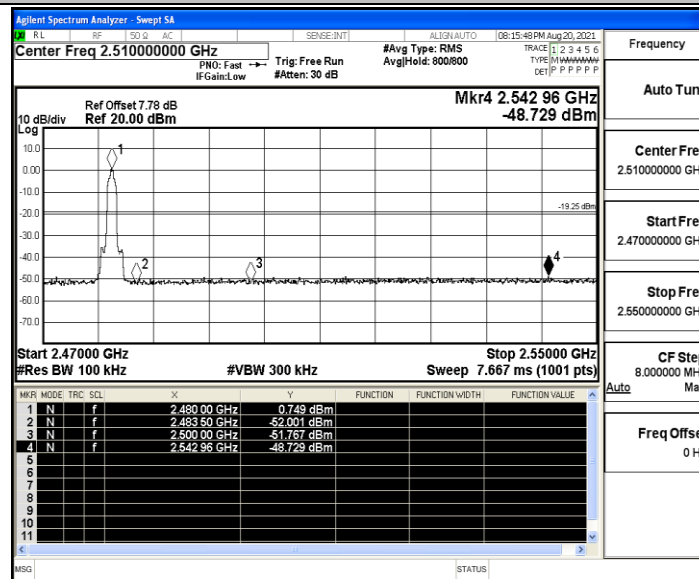


2DH5_Ant1_Low_2402

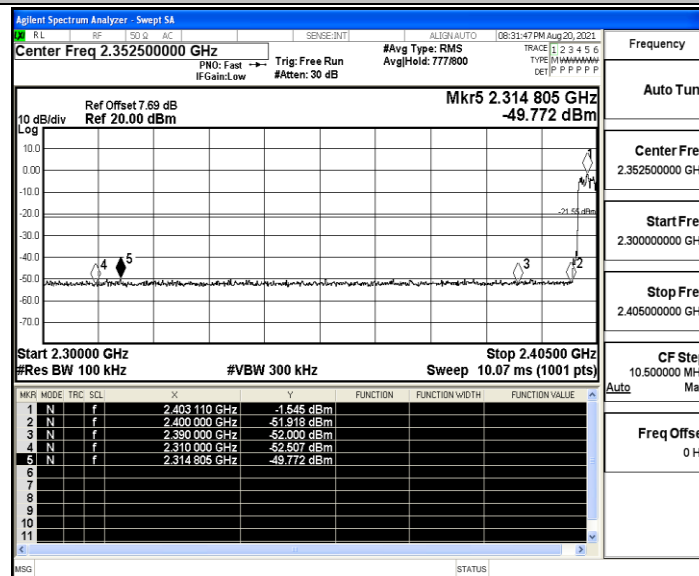




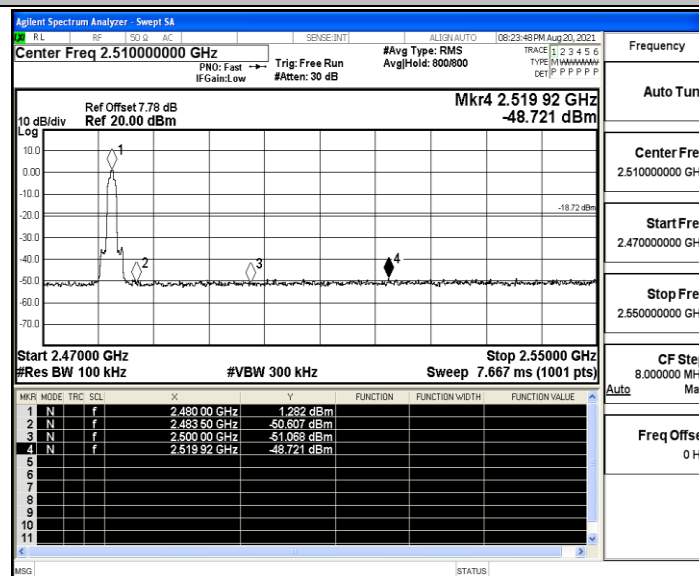
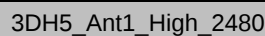
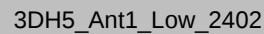
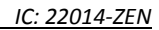
2DH5_Ant1_High_2480



2DH5_Ant1_Low_Hop_2402

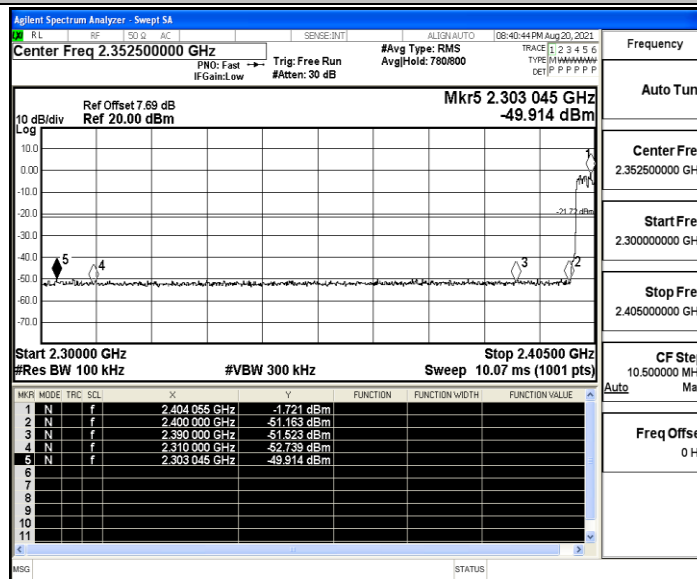


2DH5_Ant1_High_Hop_2480

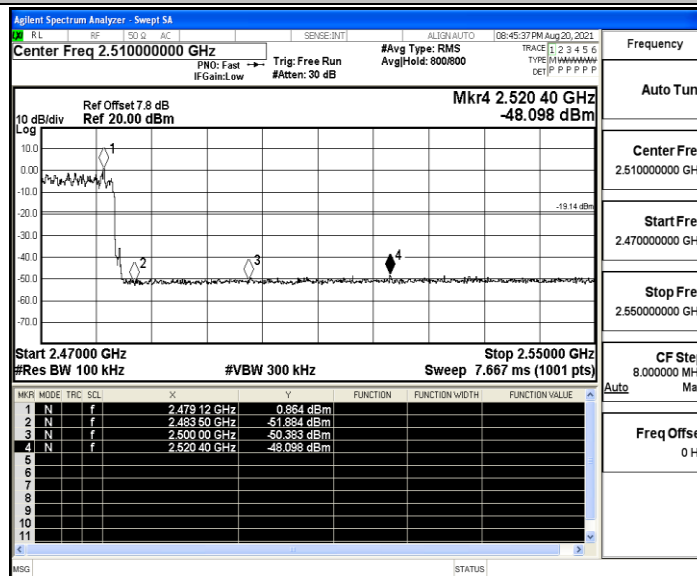




3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480





A.8 Conducted Spurious Emission

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	2.81	2.81	---	PASS
			30~1000	2.81	-58.75	≤-17.19	PASS
			1000~26500	2.81	-47.56	≤-17.19	PASS
		2441	Reference	3.57	3.57	---	PASS
			30~1000	3.57	-59.26	≤-16.44	PASS
			1000~26500	3.57	-48.06	≤-16.44	PASS
		2480	Reference	1.33	1.33	---	PASS
			30~1000	1.33	-58.68	≤-18.67	PASS
			1000~26500	1.33	-46.71	≤-18.67	PASS
2DH5	Ant1	2402	Reference	0.90	0.90	---	PASS
			30~1000	0.90	-59.04	≤-19.1	PASS
			1000~26500	0.90	-47.55	≤-19.1	PASS
		2441	Reference	2.09	2.09	---	PASS
			30~1000	2.09	-59.36	≤-17.91	PASS
			1000~26500	2.09	-47.76	≤-17.91	PASS
		2480	Reference	-1.53	-1.53	---	PASS
			30~1000	-1.53	-57.76	≤-21.53	PASS
			1000~26500	-1.53	-47.67	≤-21.53	PASS
3DH5	Ant1	2402	Reference	1.25	1.25	---	PASS
			30~1000	1.25	-58.45	≤-18.75	PASS
			1000~26500	1.25	-47.88	≤-18.75	PASS
		2441	Reference	2.47	2.47	---	PASS
			30~1000	2.47	-58.66	≤-17.53	PASS
			1000~26500	2.47	-47.19	≤-17.53	PASS
		2480	Reference	0.30	0.30	---	PASS
			30~1000	0.30	-58.48	≤-19.7	PASS
			1000~26500	0.30	-47.52	≤-19.7	PASS



Test Graphs

