



Appendix A

RF Test Data for BT V2.1 (DSS) (Conducted Measurement)

Product Name: Switch wireless controller

Test Model: HS-SW531

Environmental Conditions

Temperature:	23.7℃
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Kay Hu
Supervised by:	Li Huan



A.1 20dB Emission Bandwidth

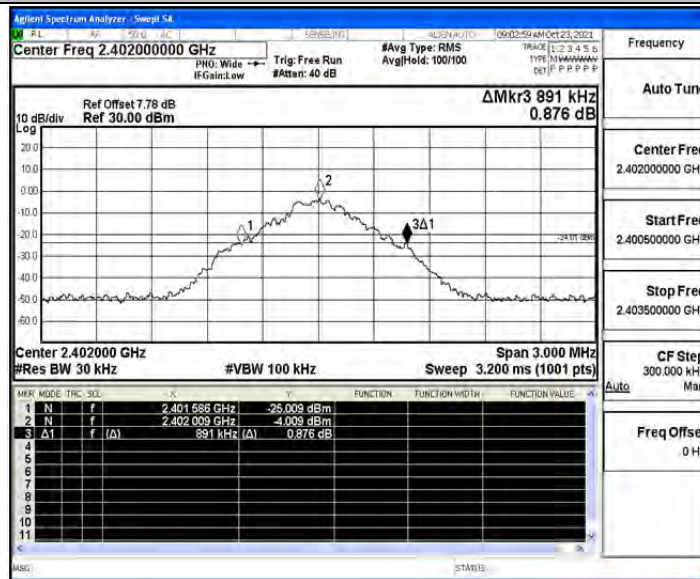
Test Result

TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.891	2401.586	2402.477	---	PASS
		2441	0.843	2440.565	2441.408	---	PASS
		2480	0.855	2479.556	2480.411	---	PASS
2DH5	Ant1	2402	1.287	2401.355	2402.642	---	PASS
		2441	1.356	2440.313	2441.669	---	PASS
		2480	1.338	2479.322	2480.660	---	PASS
3DH5	Ant1	2402	1.317	2401.337	2402.654	---	PASS
		2441	1.293	2440.340	2441.633	---	PASS
		2480	1.260	2479.355	2480.615	---	PASS

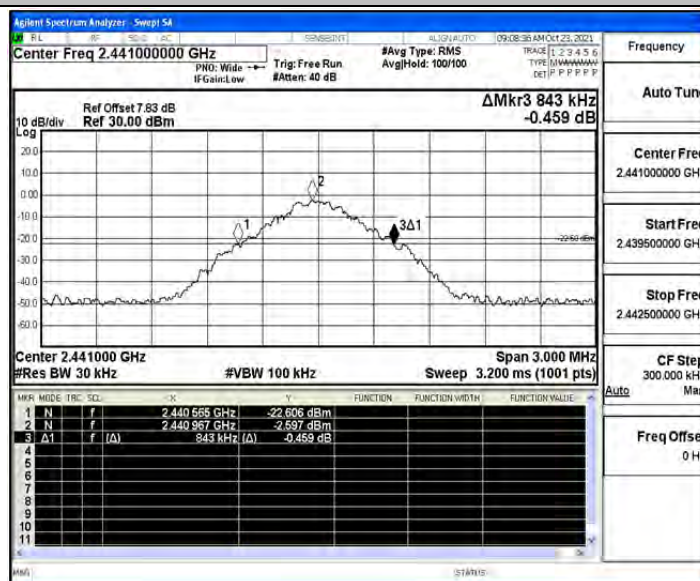


Test Graphs

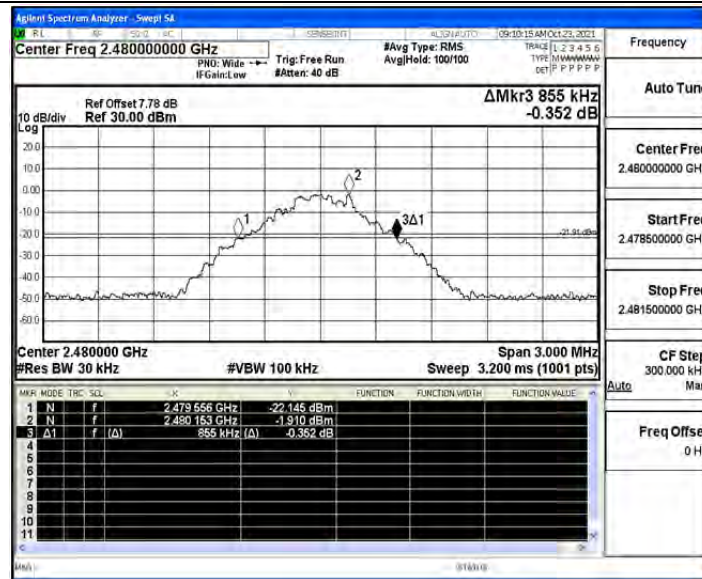
DH5_Ant1_2402



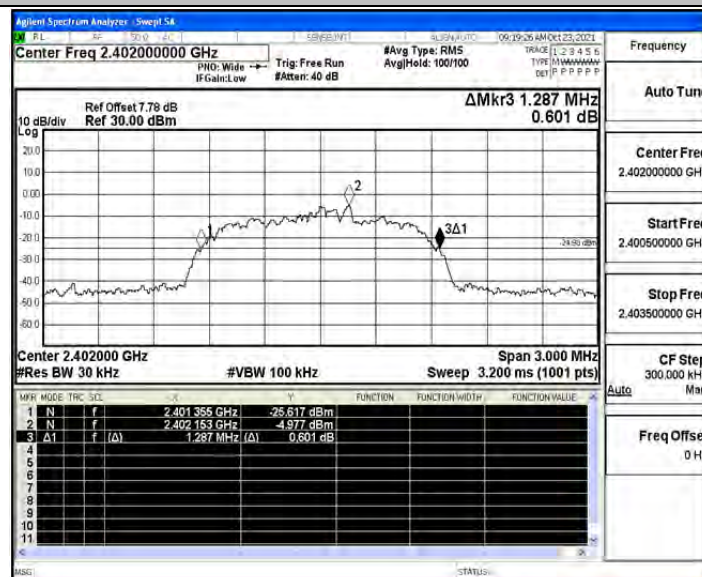
DH5_Ant1_2441



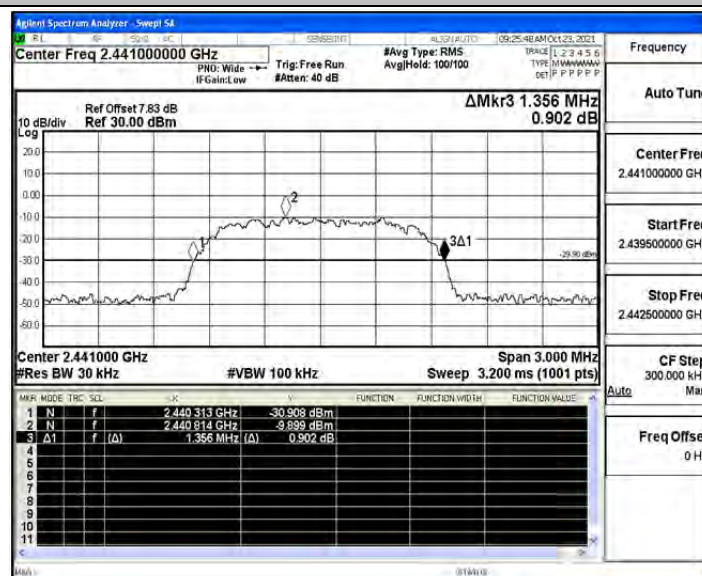
DH5_Ant1_2480



2DH5_Ant1_2402

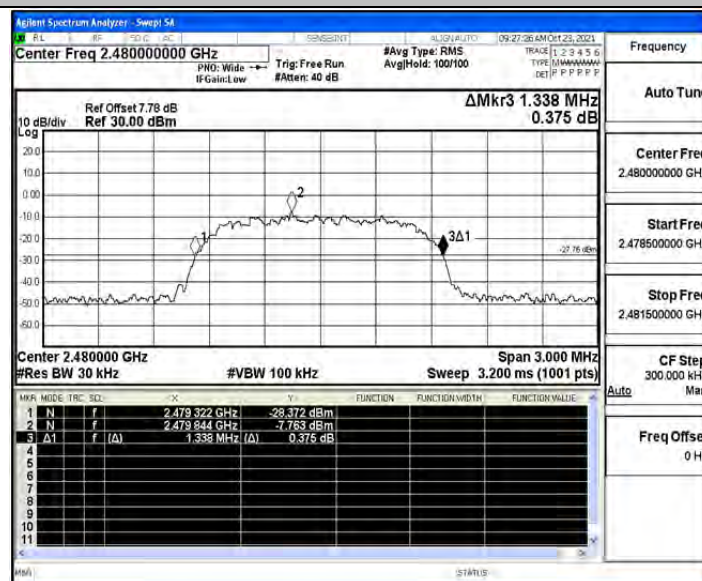


2DH5_Ant1_2441

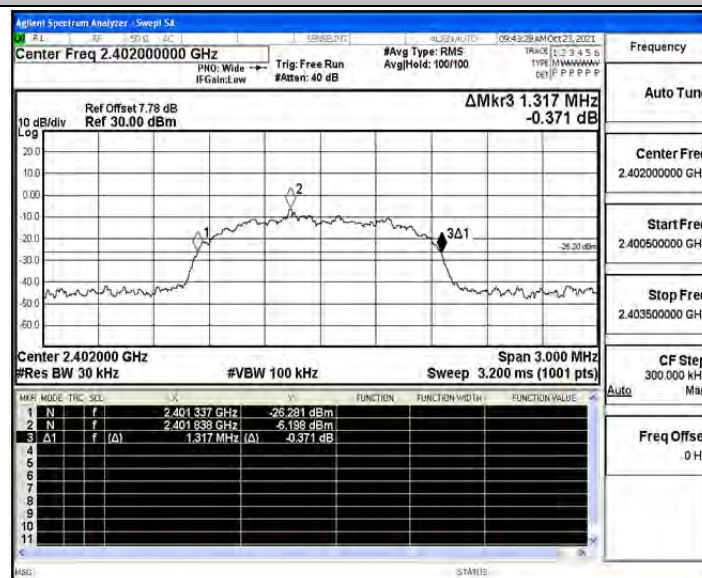




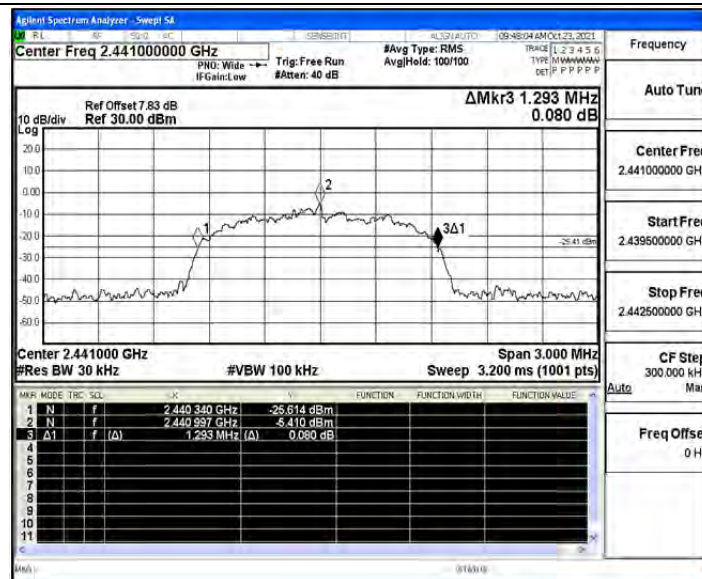
2DH5_Ant1_2480



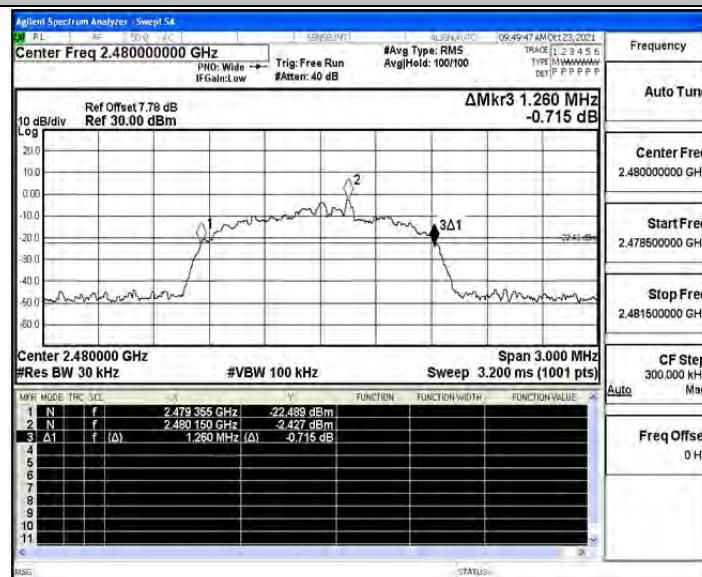
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480





A.2 Maximum peak conducted output power

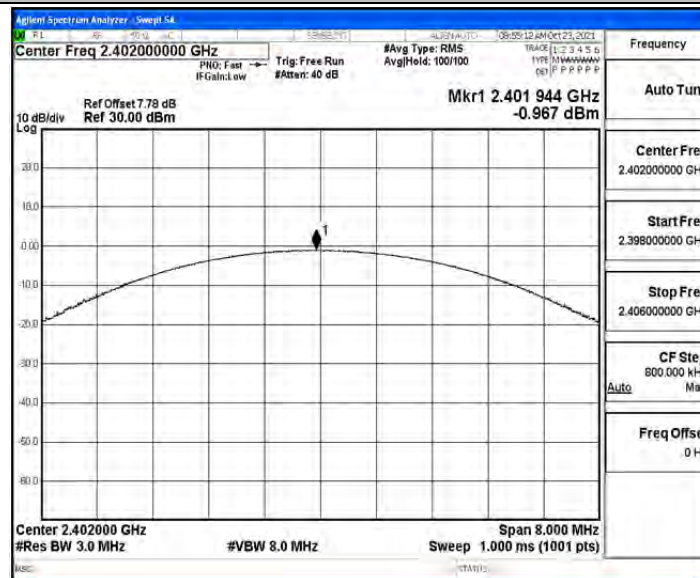
Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	-0.97	≤20.97	PASS
		2441	0.12	≤20.97	PASS
		2480	0.63	≤20.97	PASS
2DH5	Ant1	2402	-1.15	≤20.97	PASS
		2441	-0.54	≤20.97	PASS
		2480	-0.12	≤20.97	PASS
3DH5	Ant1	2402	-1	≤20.97	PASS
		2441	-0.59	≤20.97	PASS
		2480	-0.08	≤20.97	PASS

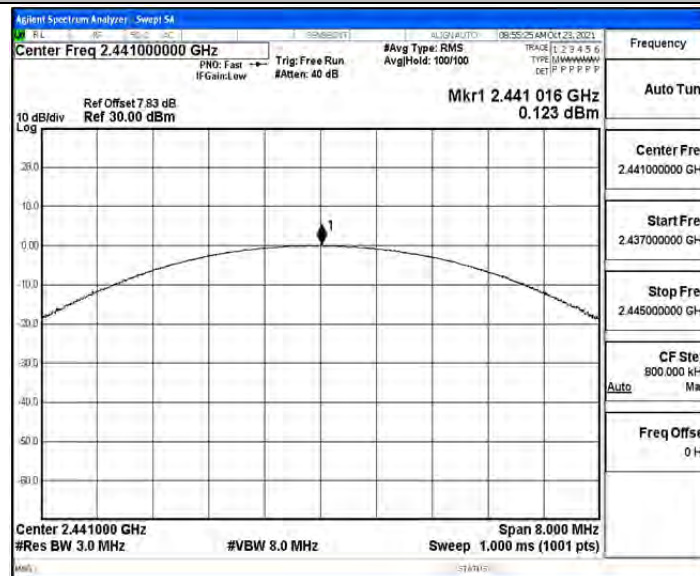


Test Graphs

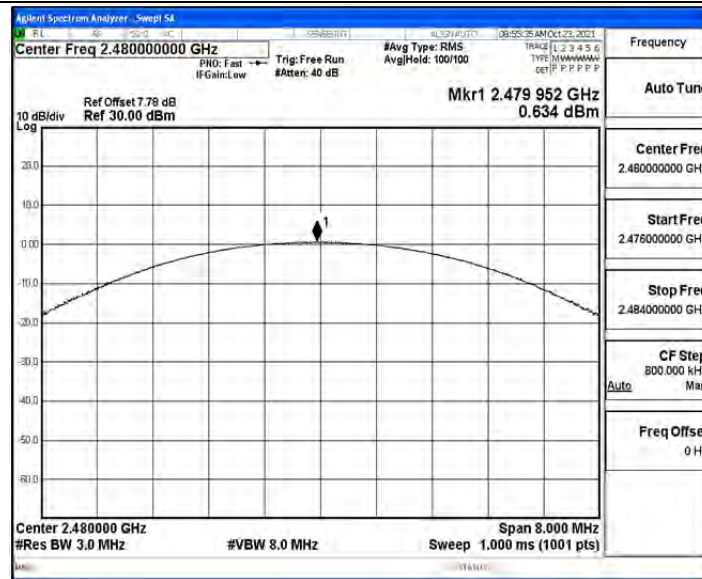
DH5_Ant1_2402



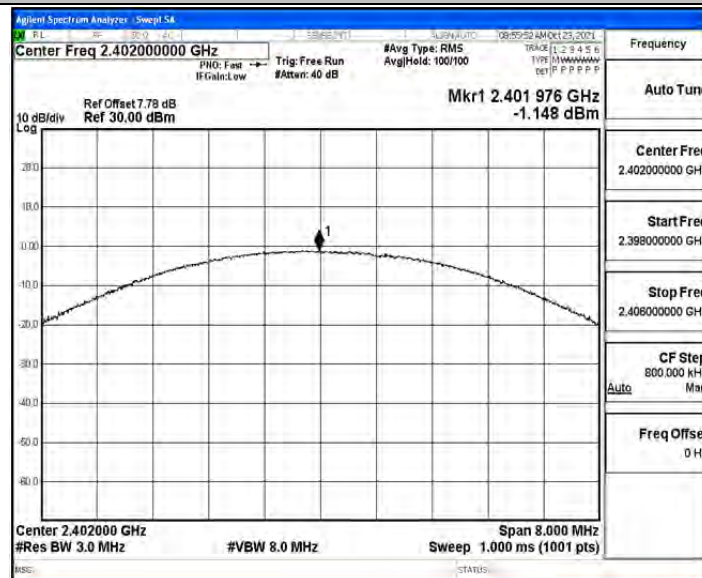
DH5_Ant1_2441



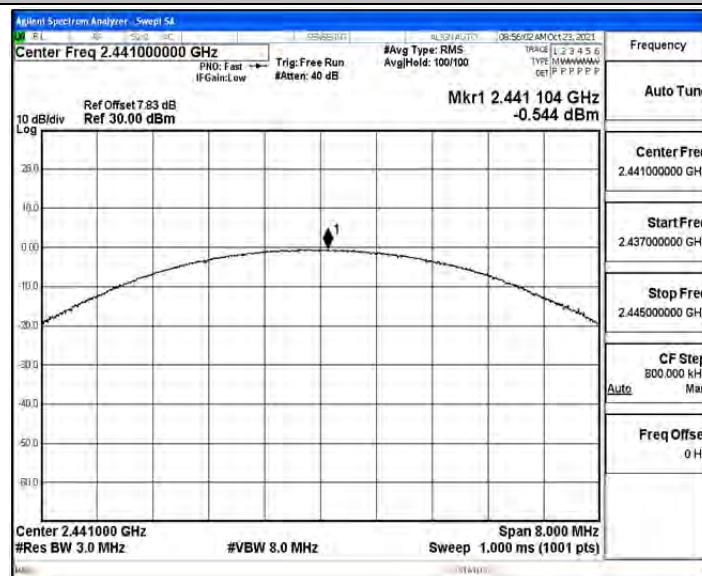
DH5_Ant1_2480



2DH5_Ant1_2402

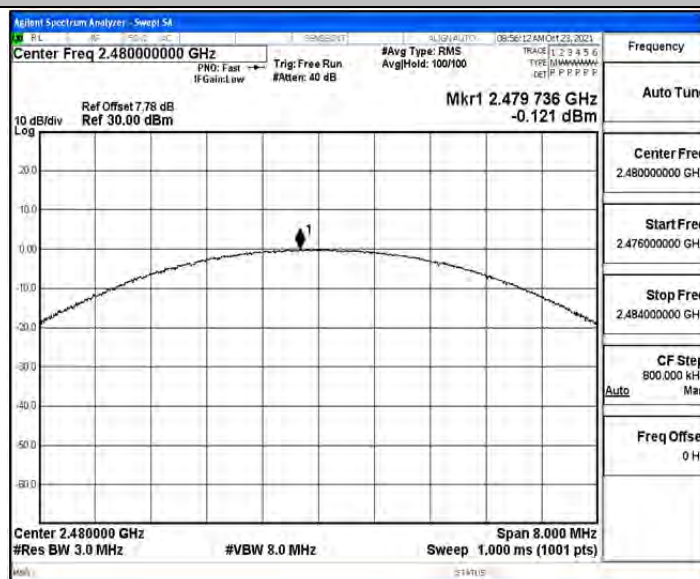


2DH5_Ant1_2441

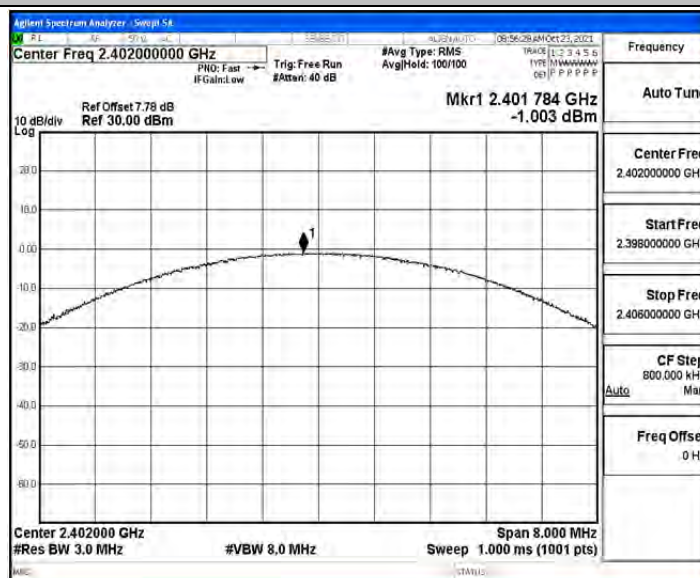




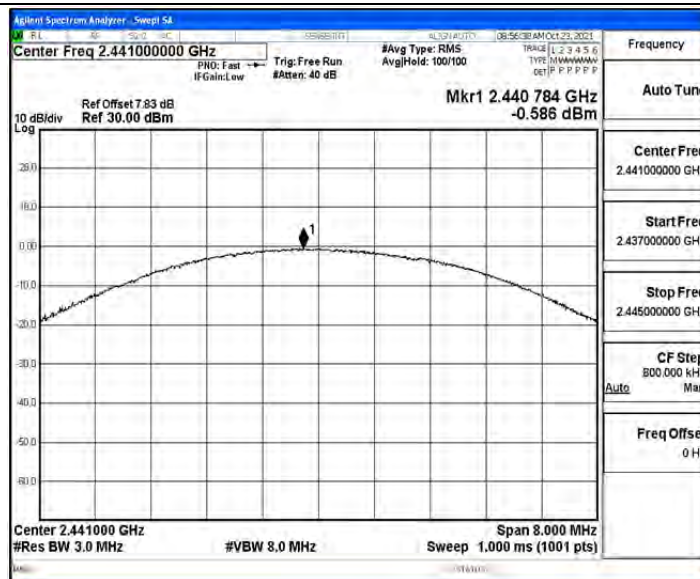
2DH5_Ant1_2480



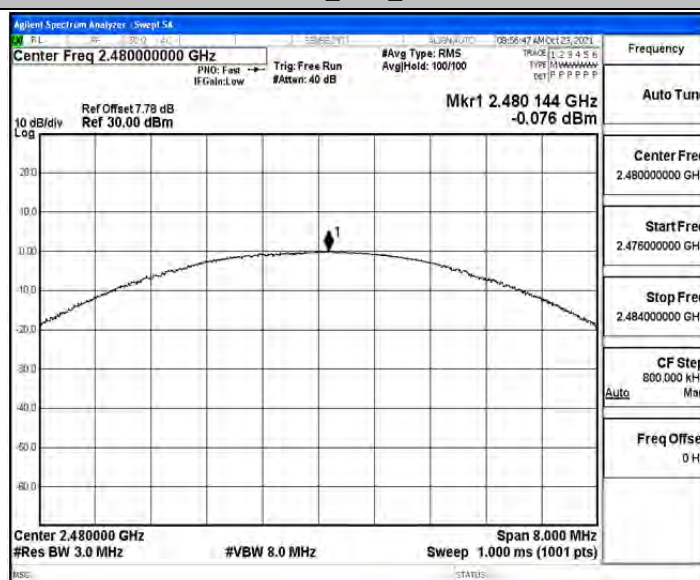
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480





A.3 Carrier frequency separation

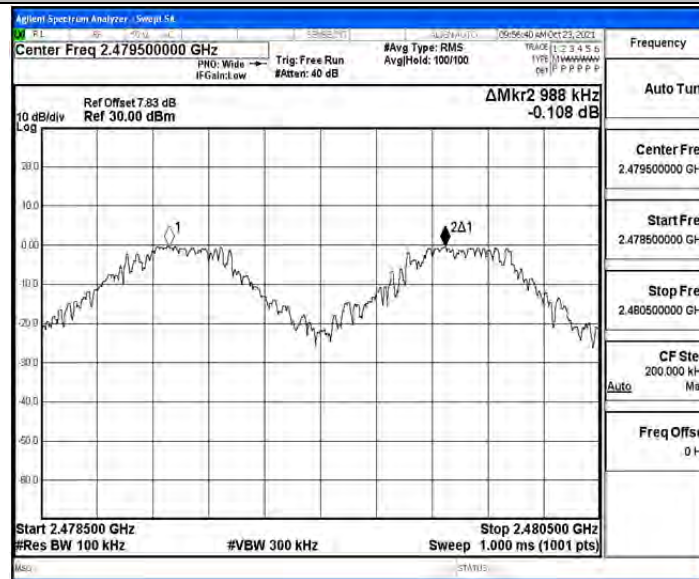
Test Result

TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.988	≥ 0.891	PASS
2DH5	Ant1	Hop	1.168	≥ 0.904	PASS
3DH5	Ant1	Hop	1.212	≥ 0.878	PASS

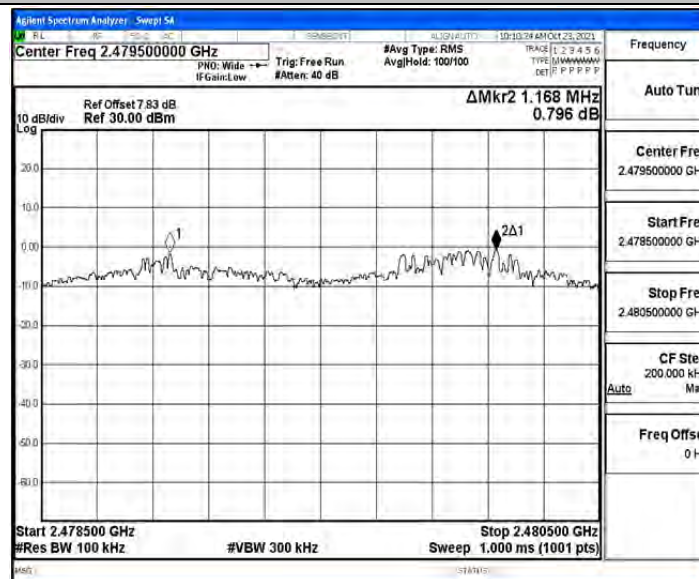


Test Graphs

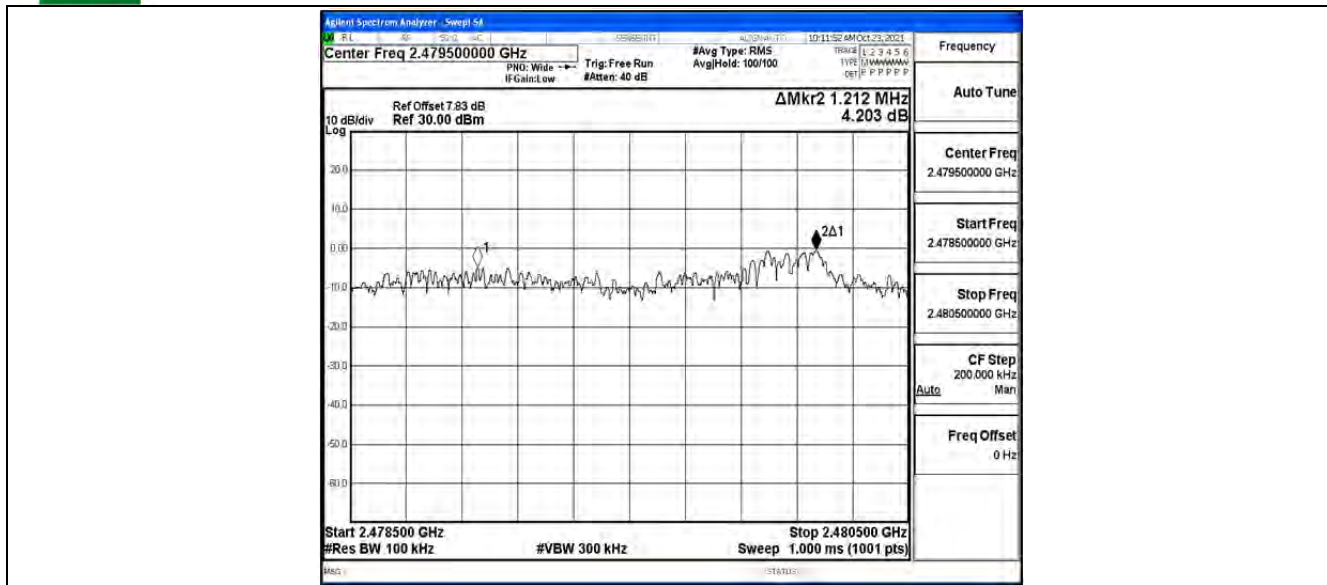
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop





A.4 Time of occupancy

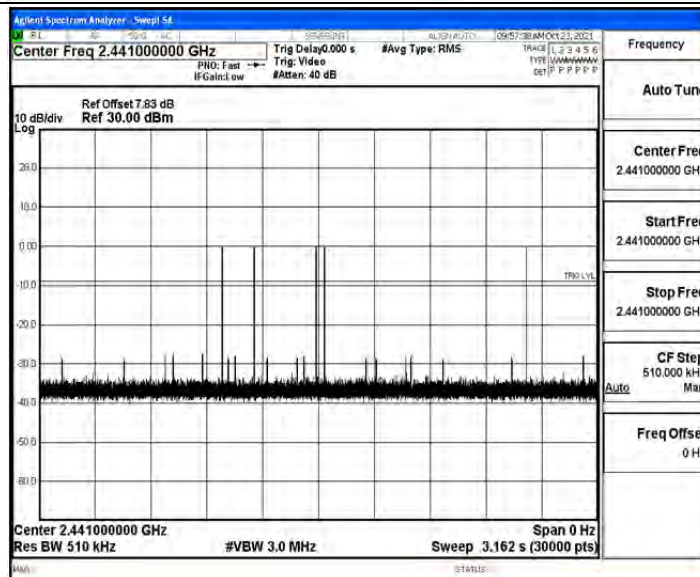
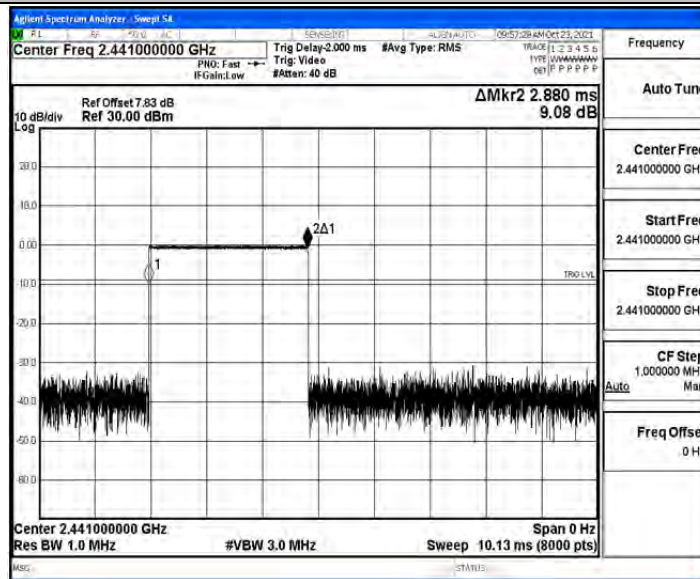
Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.88	70	0.202	≤0.4	PASS
2DH5	Ant1	Hop	2.88	90	0.26	≤0.4	PASS
3DH5	Ant1	Hop	2.89	110	0.317	≤0.4	PASS

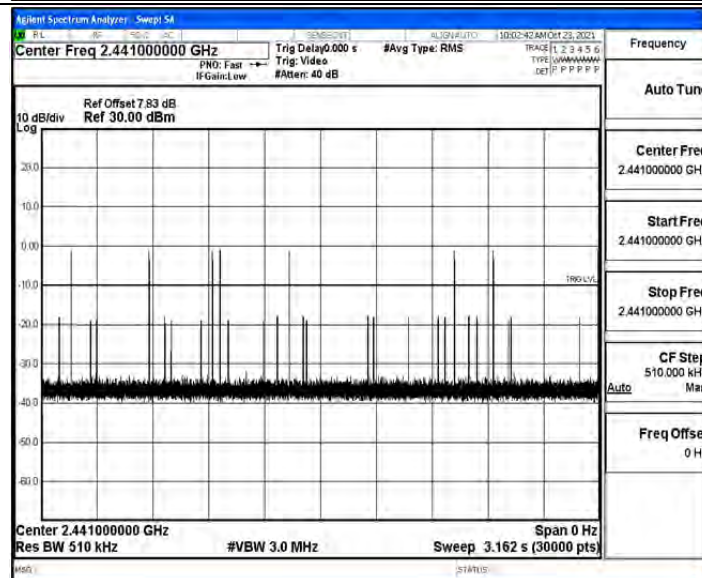
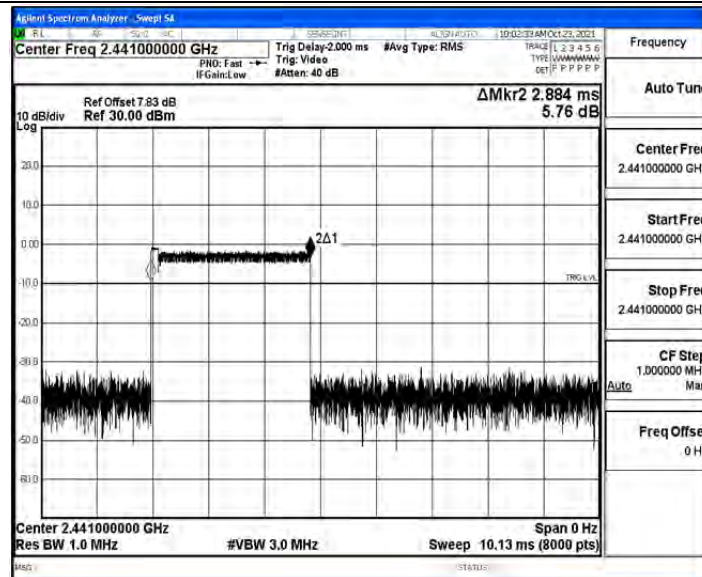


Test Graphs

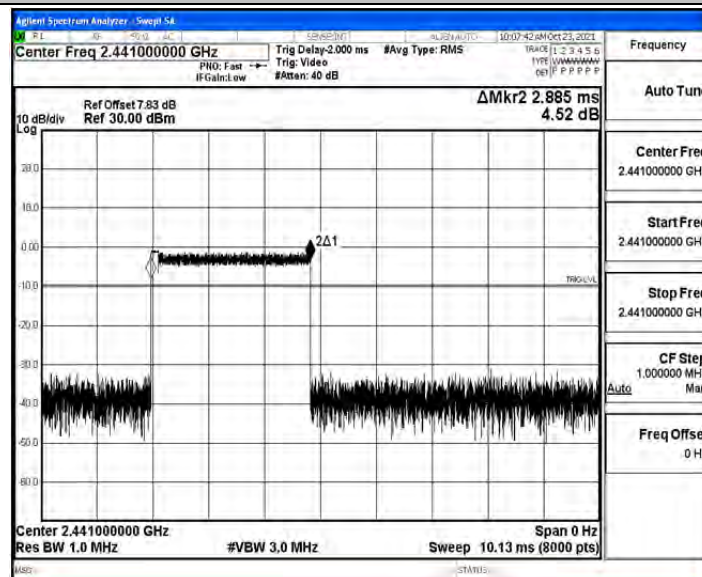
DH5_Ant1_Hop

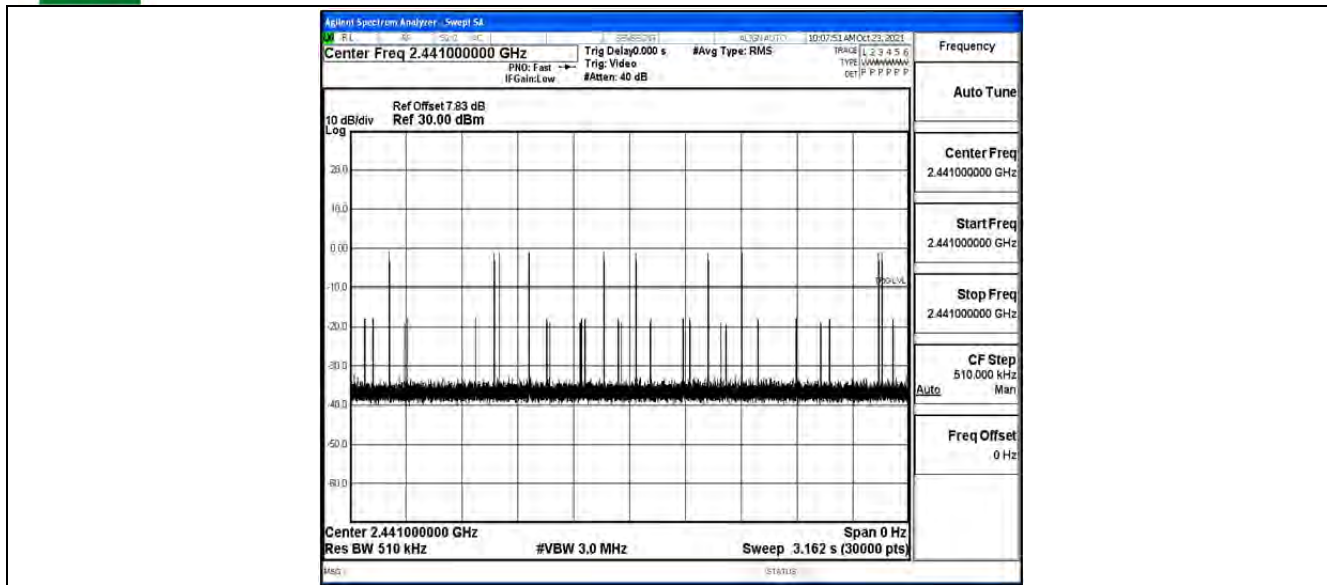


2DH5_Ant1_Hop



3DH5_Ant1_Hop







A.5 Number of hopping channels

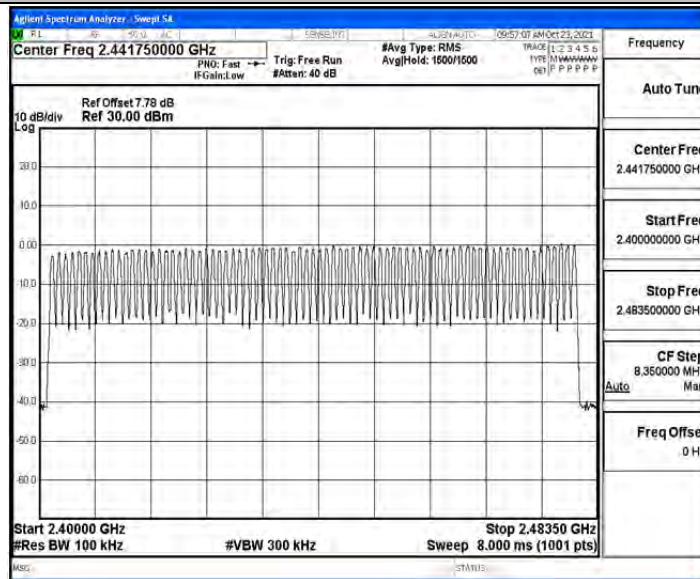
Test Result

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

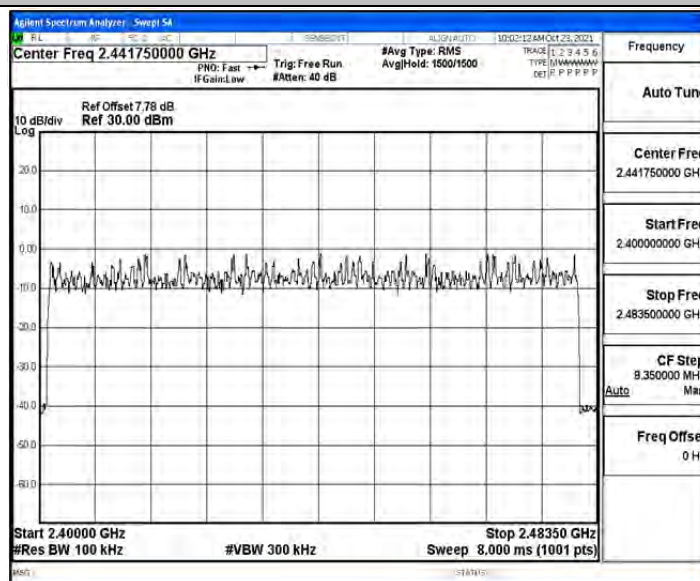


Test Graphs

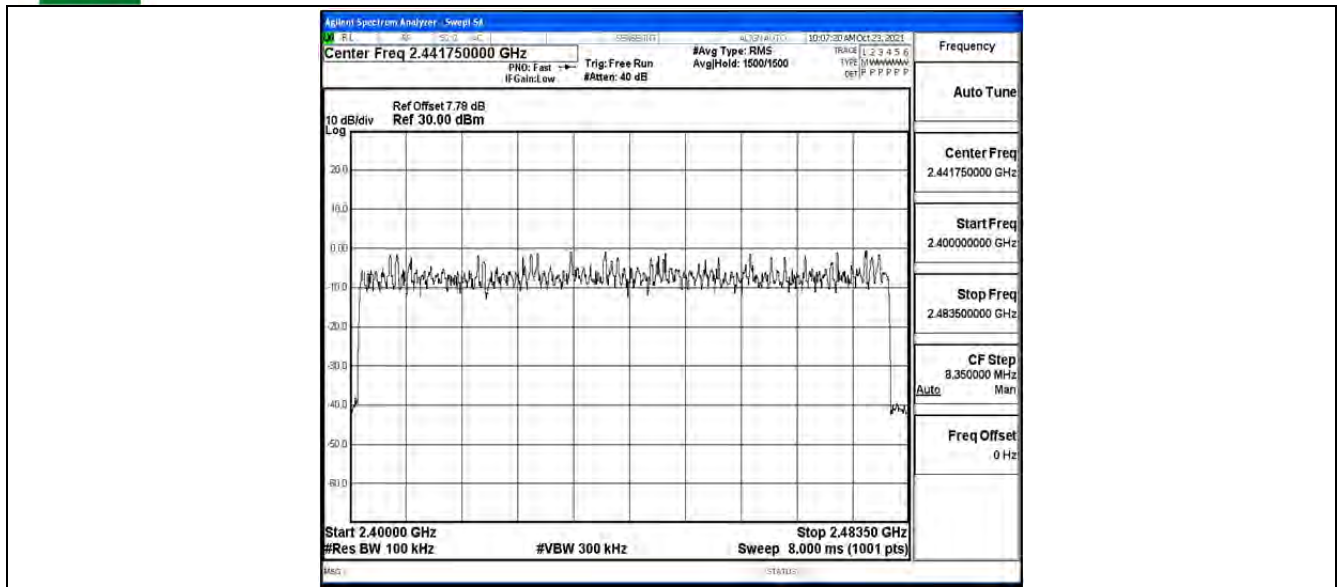
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop





A.6 Band edge measurements

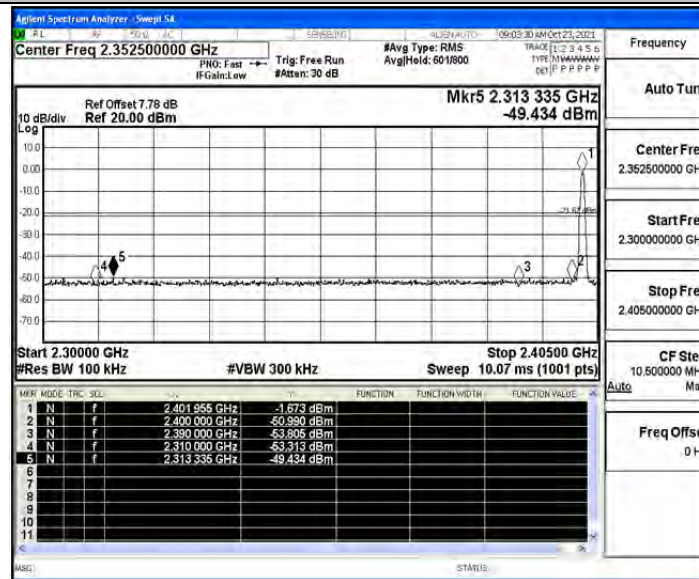
Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-1.67	-49.43	≤ -21.67	PASS
		High	2480	0.67	-47.44	≤ -19.33	PASS
		Low	Hop_2402	-1.41	-49.9	≤ -21.41	PASS
		High	Hop_2480	0.23	-48.49	≤ -19.77	PASS
2DH5	Ant1	Low	2402	-1.72	-49.21	≤ -21.72	PASS
		High	2480	-0.62	-48.83	≤ -20.62	PASS
		Low	Hop_2402	-4.02	-49.66	≤ -24.02	PASS
		High	Hop_2480	-1.04	-43.68	≤ -21.04	PASS
3DH5	Ant1	Low	2402	-1.30	-49.37	≤ -21.3	PASS
		High	2480	-0.10	-48.42	≤ -20.1	PASS
		Low	Hop_2402	-2.20	-50.08	≤ -22.2	PASS
		High	Hop_2480	-2.51	-48.84	≤ -22.51	PASS

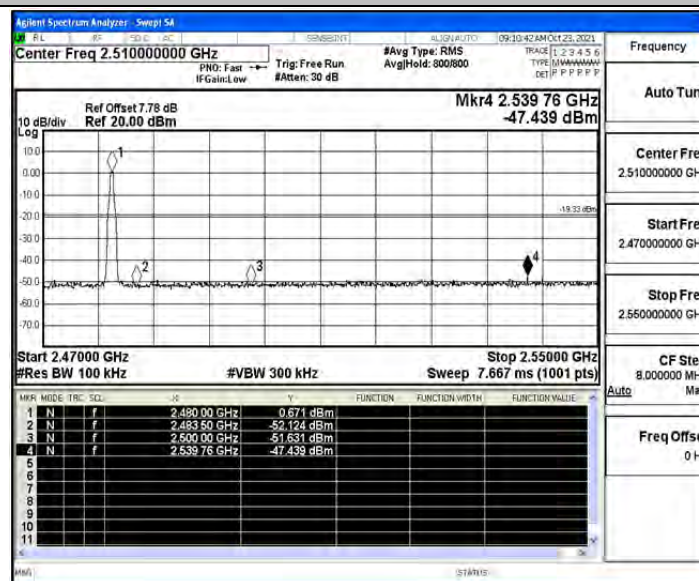


Test Graphs

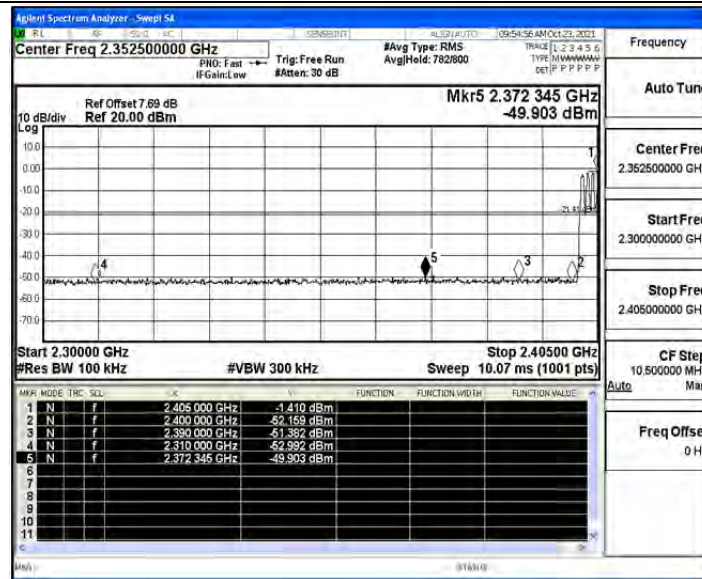
DH5_Ant1_Low_2402



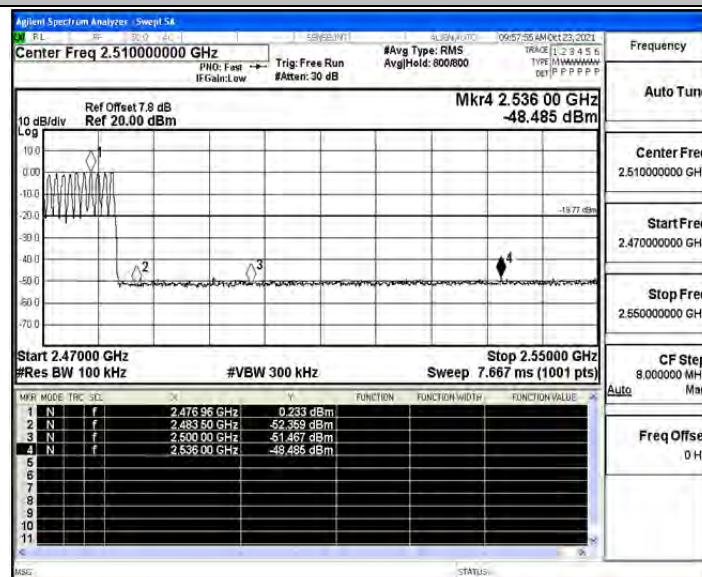
DH5_Ant1_High_2480



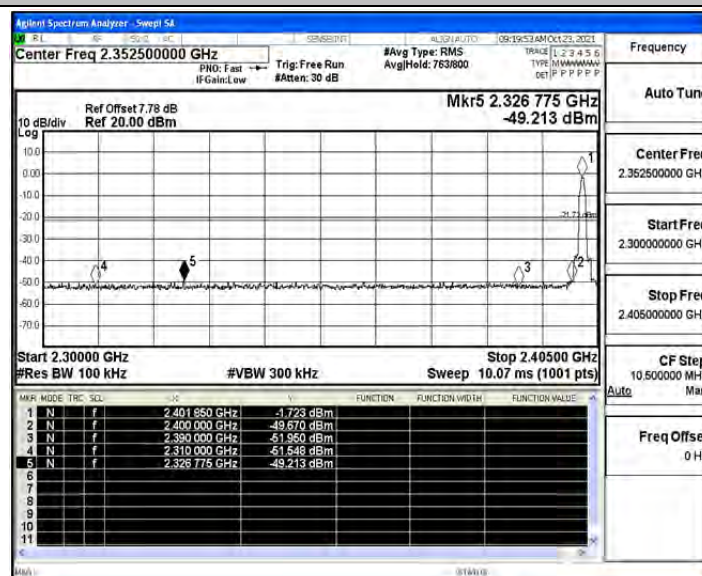
DH5_Ant1_Low_Hop_2402



DH5_Ant1_High_Hop_2480

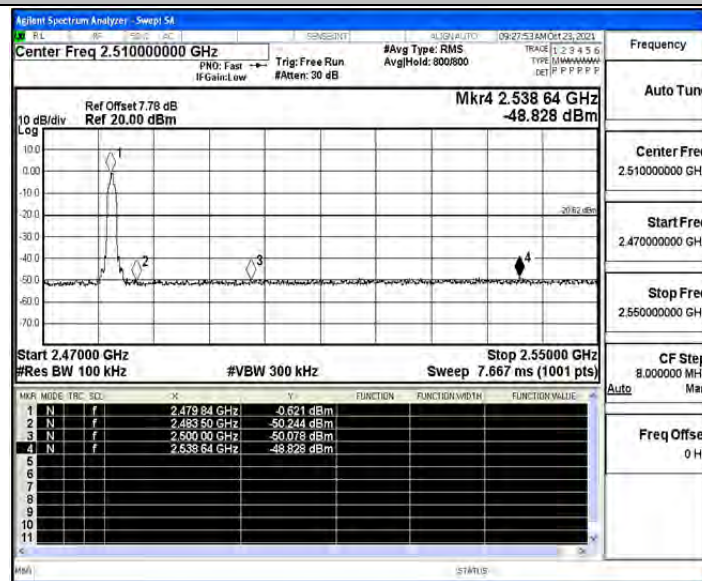


2DH5_Ant1_Low_2402

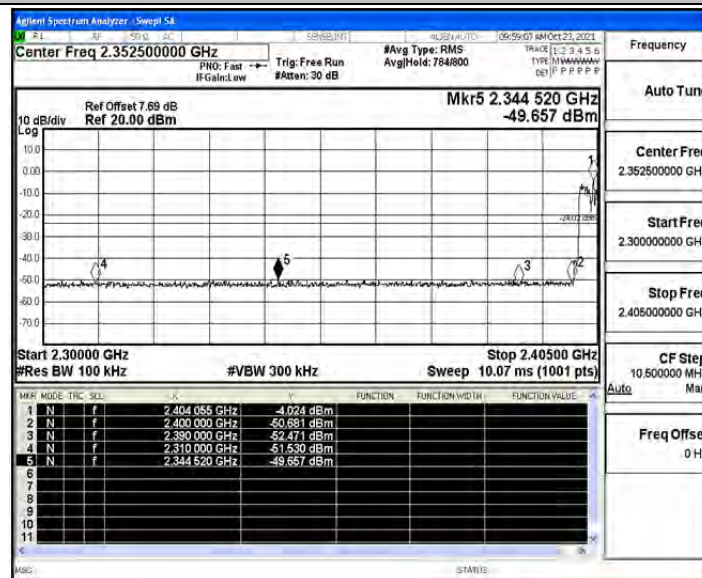




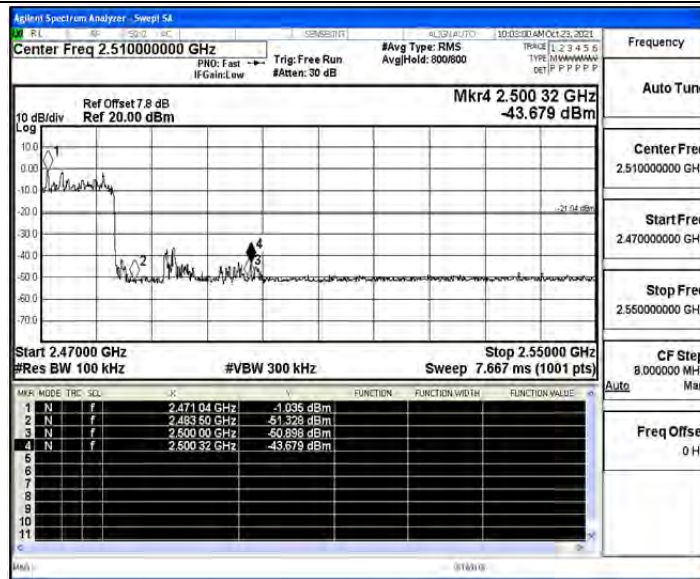
2DH5_Ant1_High_2480



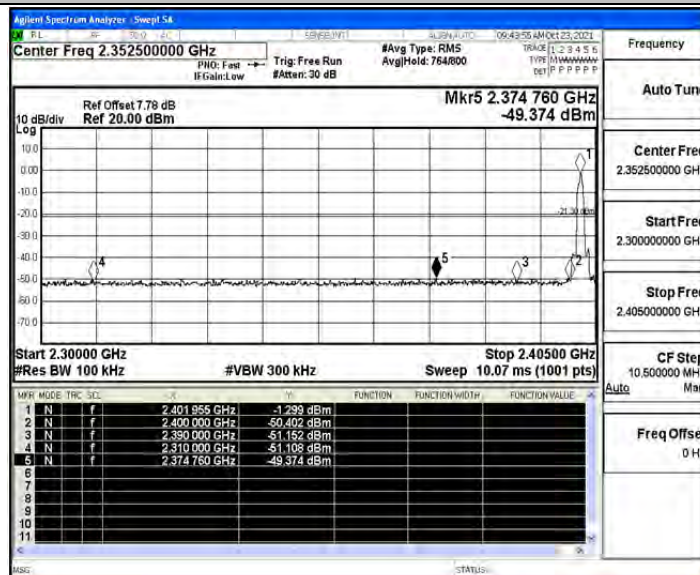
2DH5_Ant1_Low_Hop_2402



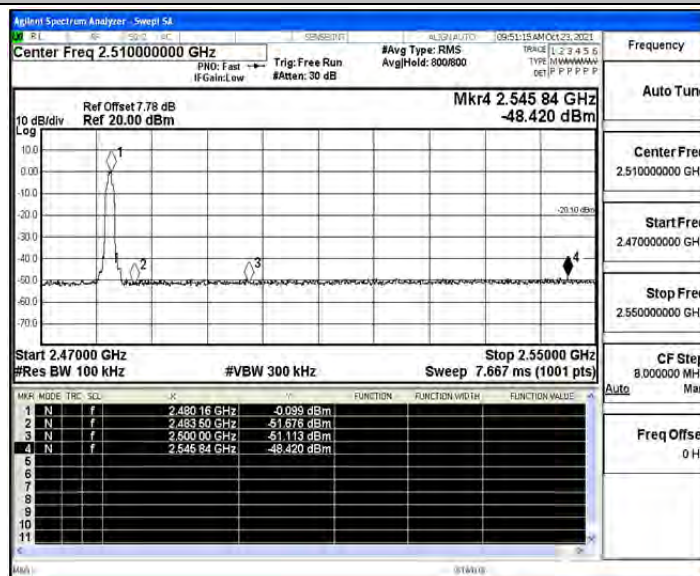
2DH5_Ant1_High_Hop_2480



3DH5_Ant1_Low_2402

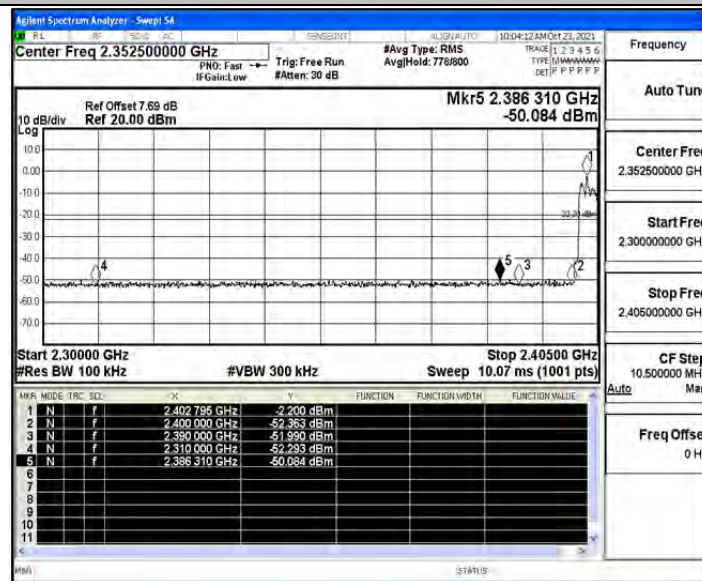


3DH5_Ant1_High_2480

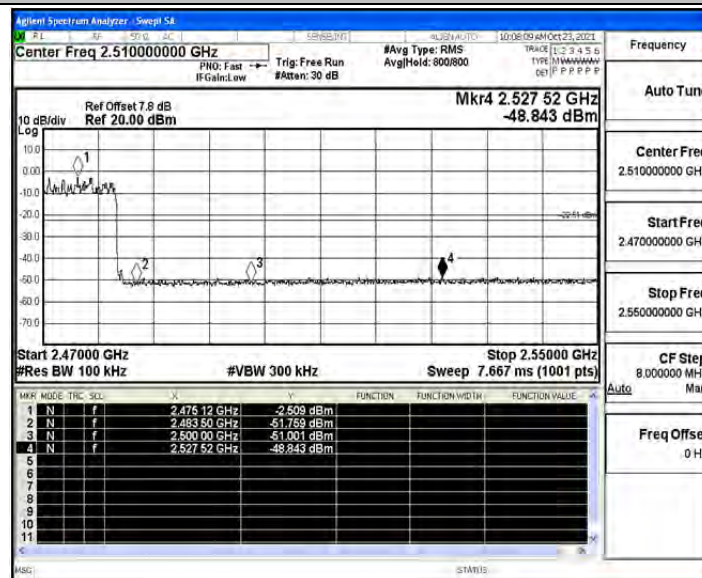




3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480





A.7 Conducted Spurious Emission

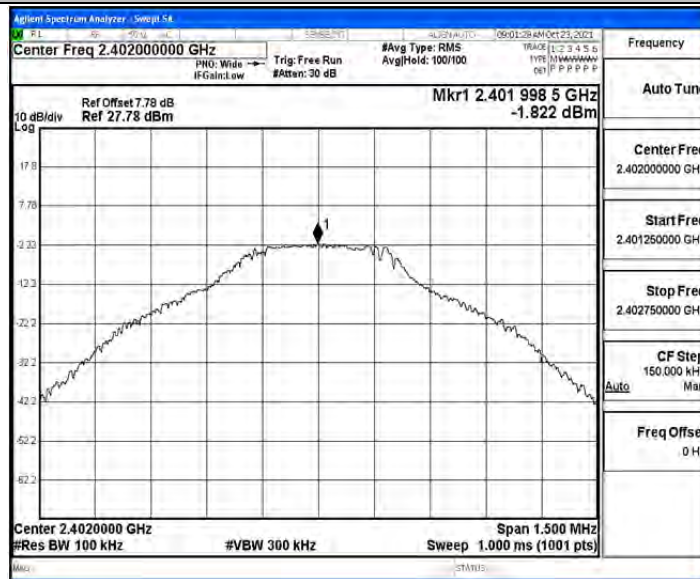
Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	-1.82	-1.82	---	PASS
			30~1000	-1.82	-62.21	≤ -21.82	PASS
			1000~26500	-1.82	-48.06	≤ -21.82	PASS
		2441	Reference	-0.86	-0.86	---	PASS
			30~1000	-0.86	-47.56	≤ -20.86	PASS
			1000~26500	-0.86	-48.08	≤ -20.86	PASS
		2480	Reference	0.07	0.07	---	PASS
			30~1000	0.07	-61.52	≤ -19.93	PASS
			1000~26500	0.07	-47.54	≤ -19.93	PASS
2DH5	Ant1	2402	Reference	-1.73	-1.73	---	PASS
			30~1000	-1.73	-60.63	≤ -21.73	PASS
			1000~26500	-1.73	-47.7	≤ -21.73	PASS
		2441	Reference	-4.55	-4.55	---	PASS
			30~1000	-4.55	-61.13	≤ -24.55	PASS
			1000~26500	-4.55	-47.28	≤ -24.55	PASS
		2480	Reference	-1.61	-1.61	---	PASS
			30~1000	-1.61	-61.2	≤ -21.61	PASS
			1000~26500	-1.61	-47.77	≤ -21.61	PASS
3DH5	Ant1	2402	Reference	-2.14	-2.14	---	PASS
			30~1000	-2.14	-61.77	≤ -22.14	PASS
			1000~26500	-2.14	-47.35	≤ -22.14	PASS
		2441	Reference	-2.03	-2.03	---	PASS
			30~1000	-2.03	-60.75	≤ -22.03	PASS
			1000~26500	-2.03	-46.29	≤ -22.03	PASS
		2480	Reference	-0.29	-0.29	---	PASS
			30~1000	-0.29	-61.33	≤ -20.29	PASS
			1000~26500	-0.29	-46.68	≤ -20.29	PASS

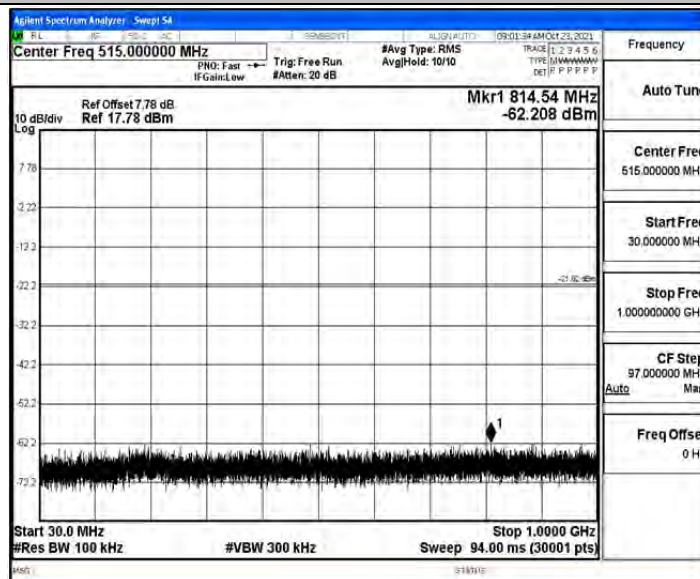


Test Graphs

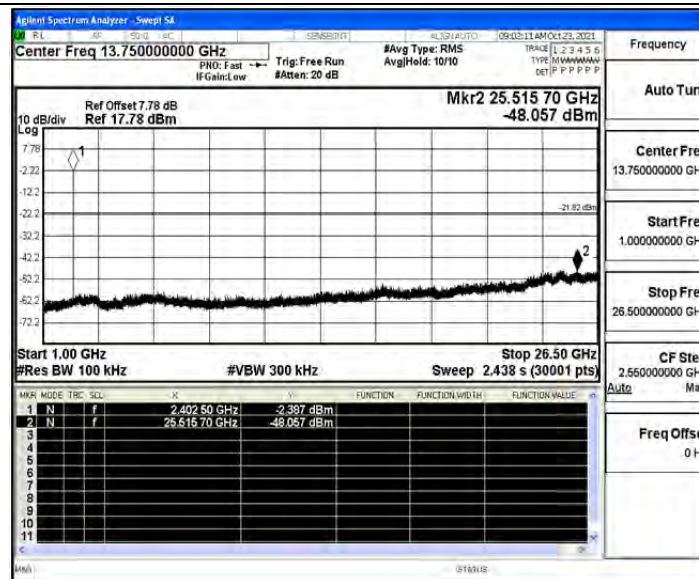
DH5_Ant1_2402_0-Reference



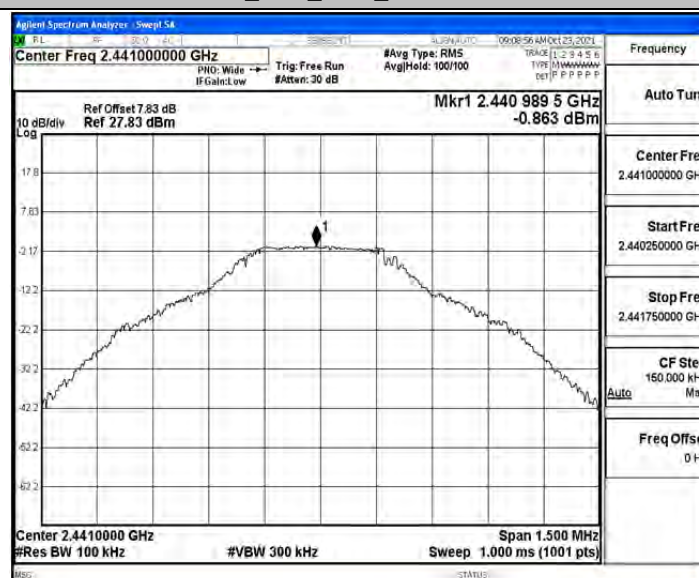
DH5_Ant1_2402_30-1000



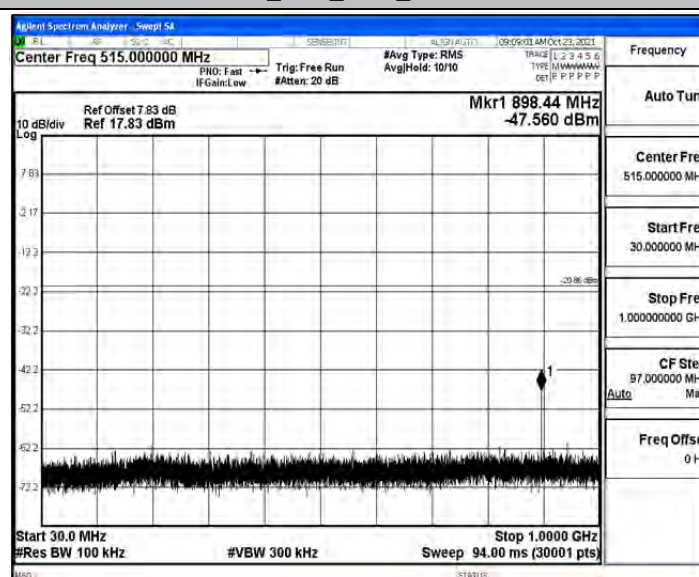
DH5_Ant1_2402_1000-26500



DH5_Ant1_2441_0-Reference

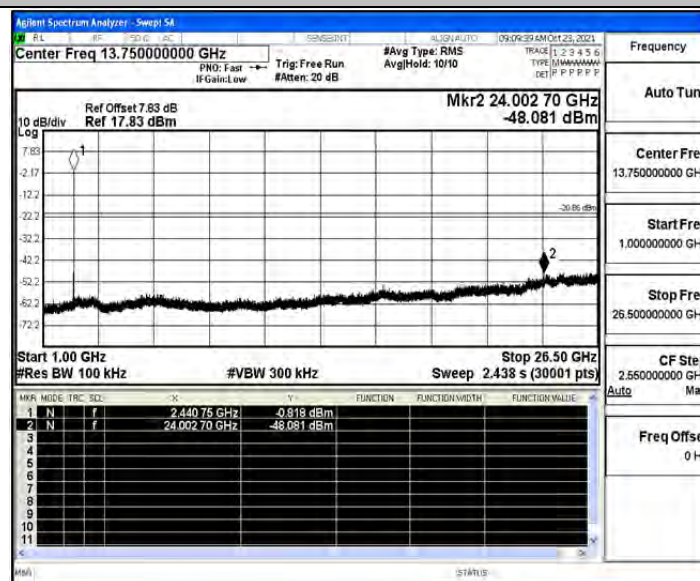


DH5_Ant1_2441_30~1000

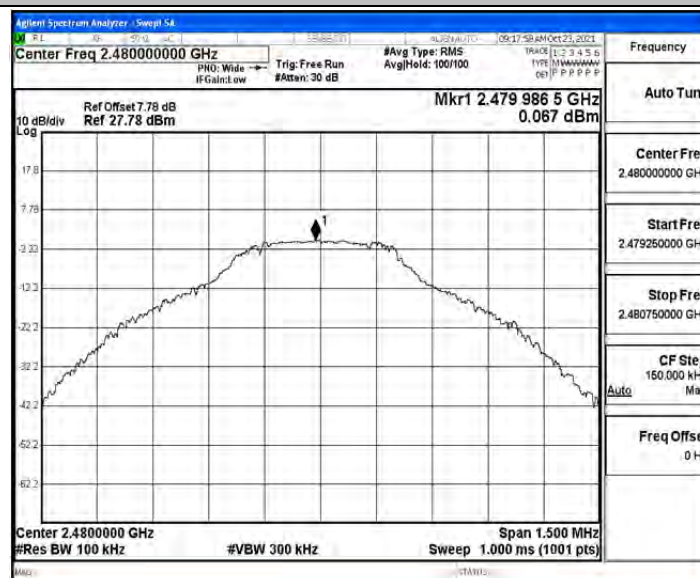




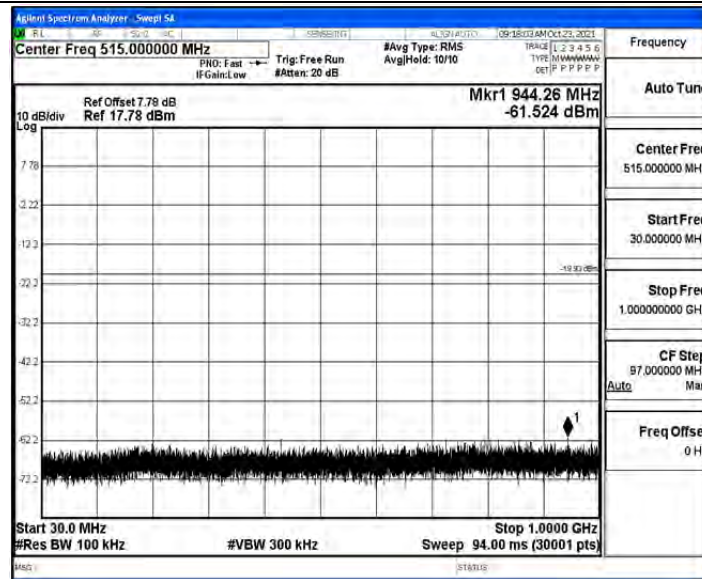
DH5_Ant1_2441_1000~26500



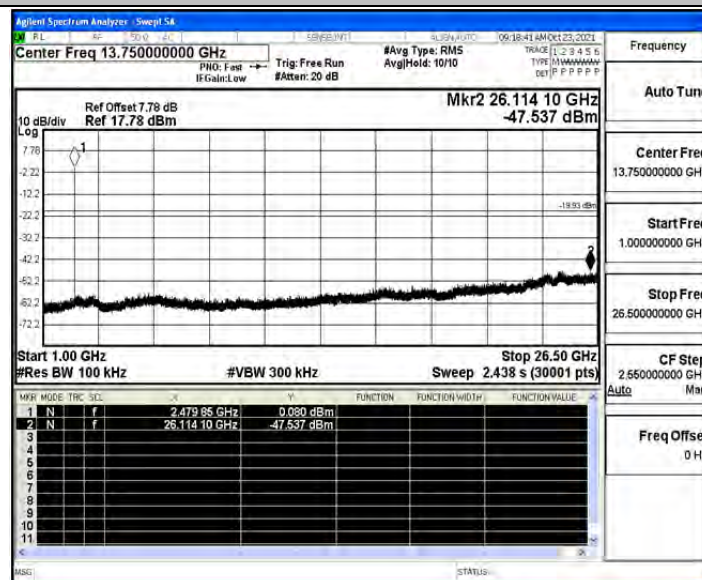
DH5_Ant1_2480_0~Reference



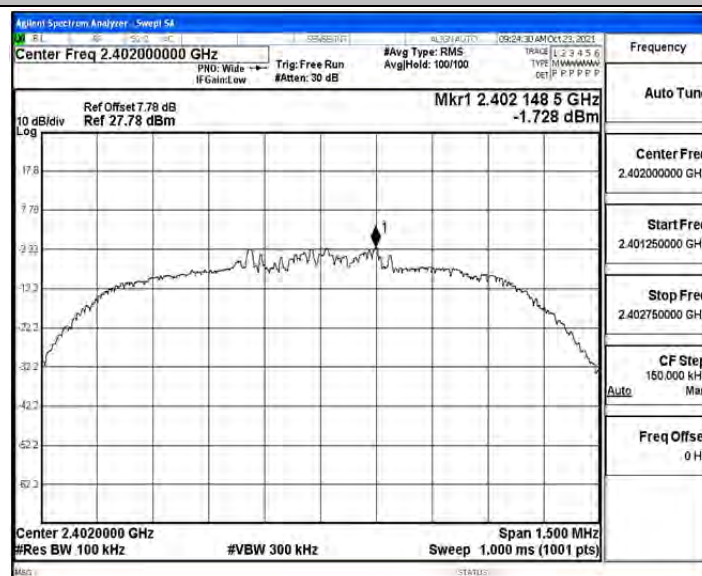
DH5_Ant1_2480_30~1000



DH5_Ant1_2480_1000~26500

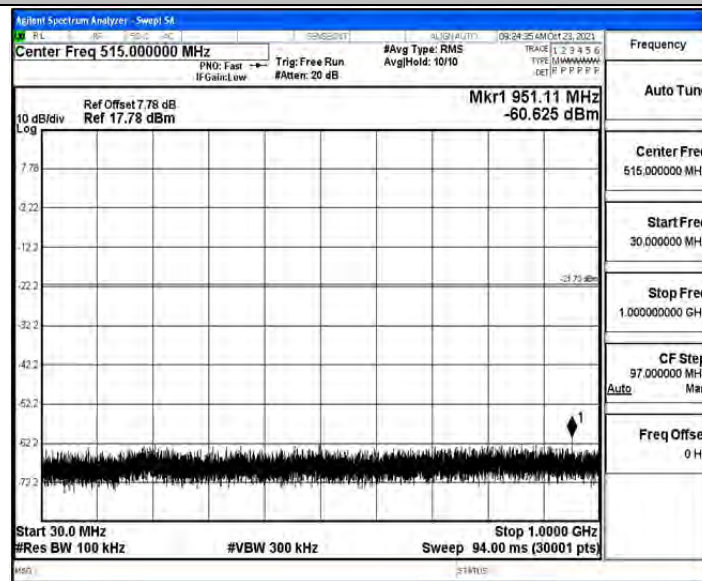


2DH5_Ant1_2402_0~Reference

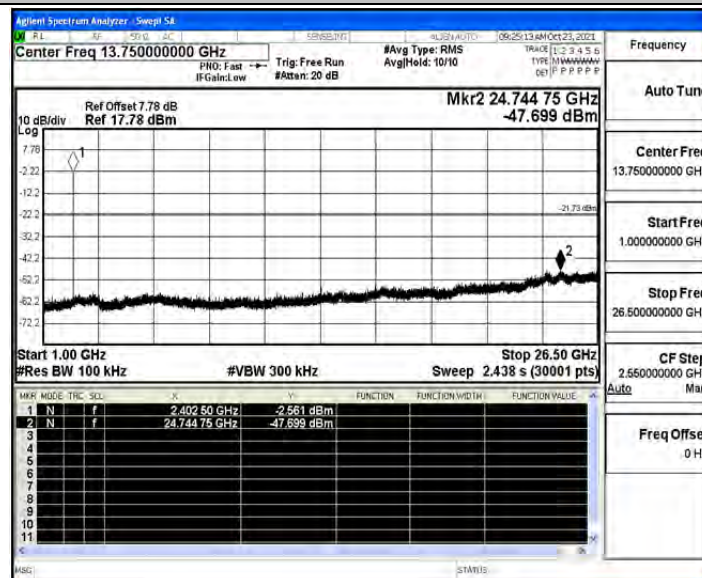




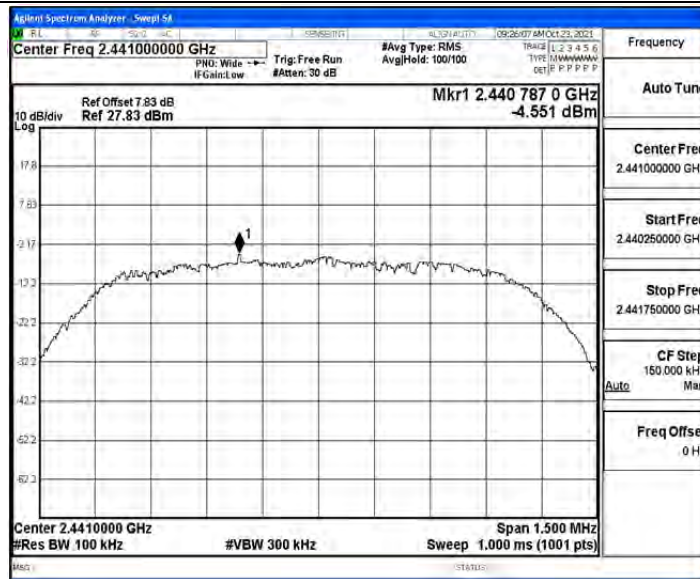
2DH5_Ant1_2402_30~1000



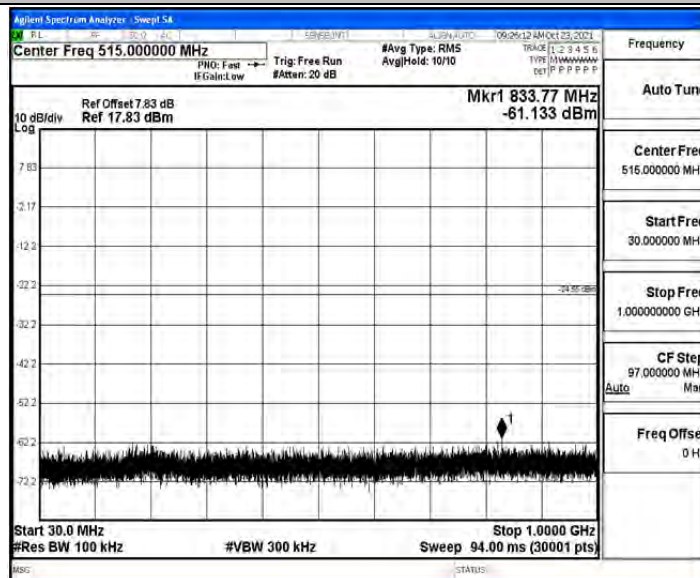
2DH5_Ant1_2402_1000~26500



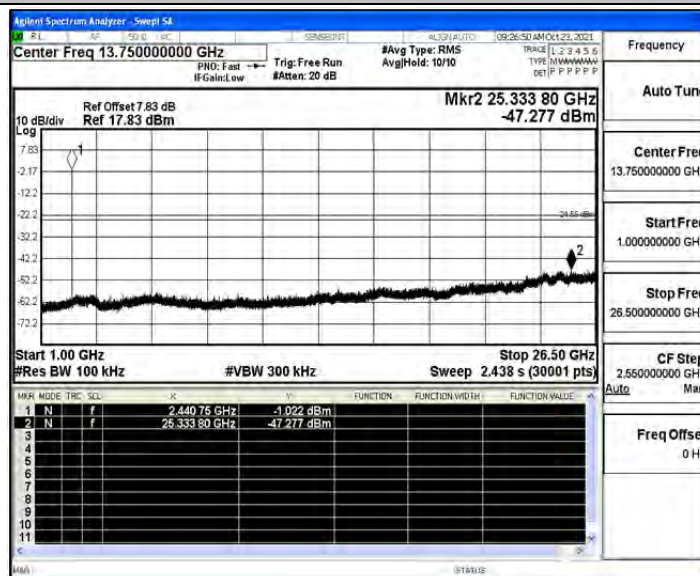
2DH5_Ant1_2441_0~Reference



2DH5_Ant1_2441_30~1000

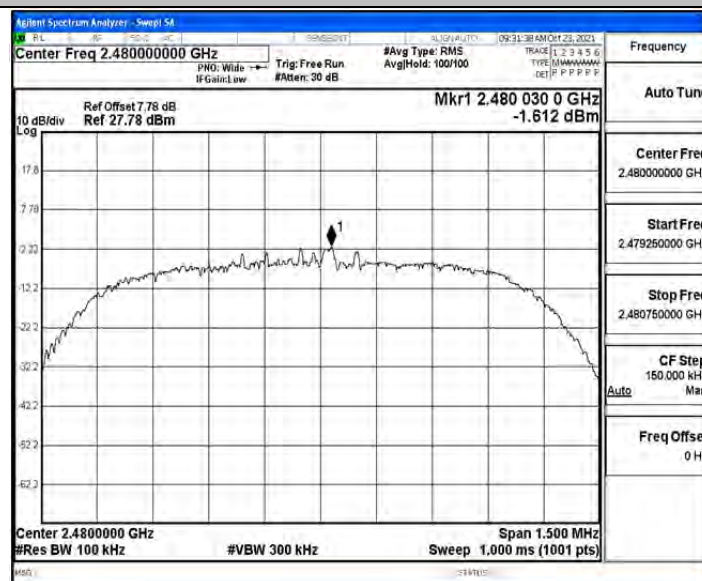


2DH5_Ant1_2441_1000~26500

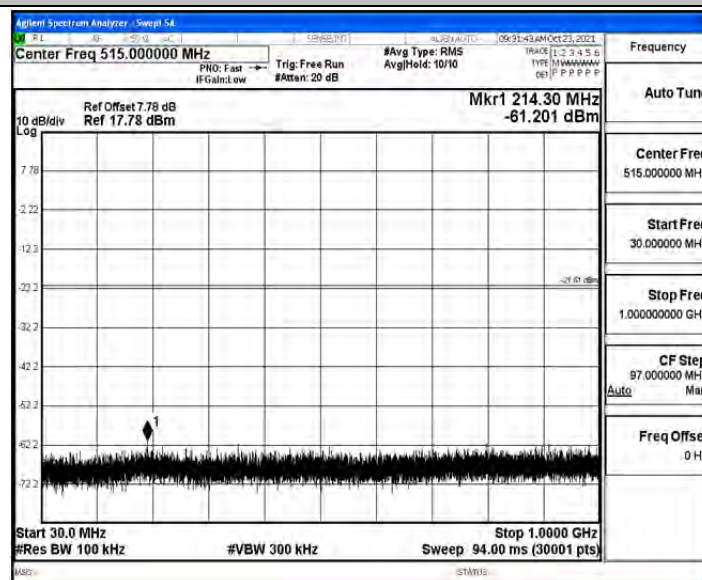




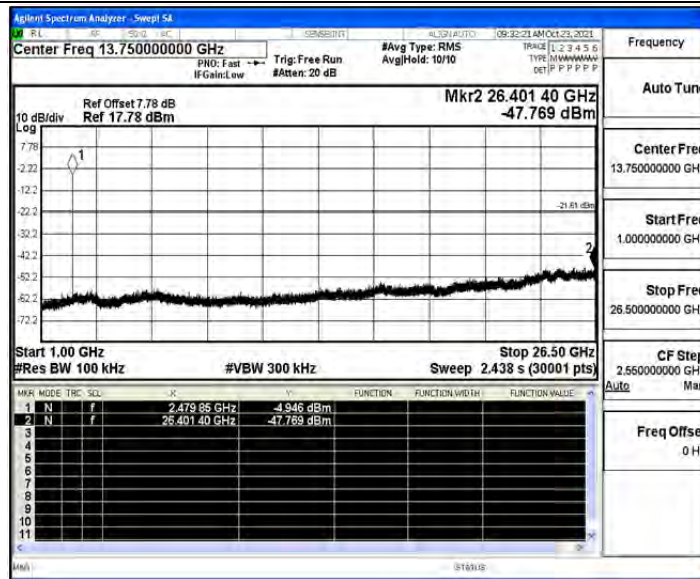
2DH5_Ant1_2480_0~Reference



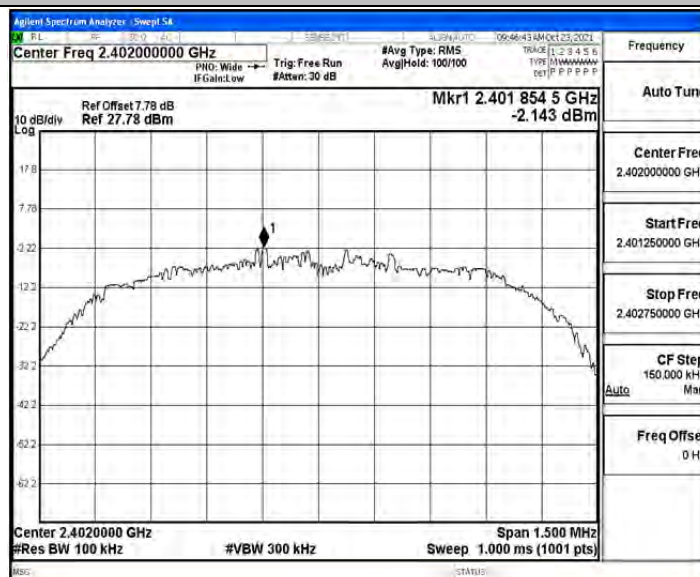
2DH5_Ant1_2480_30~1000



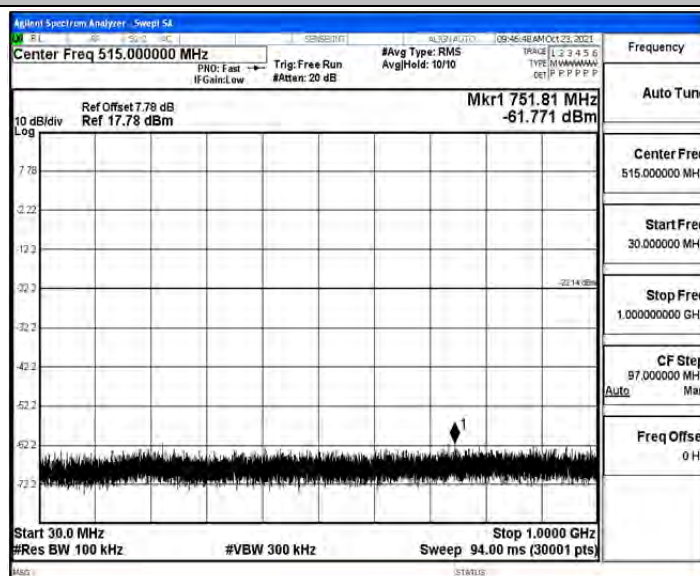
2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference



3DH5_Ant1_2402_30~1000



[illegible]

Agilent Spectrum Analyzer - Sweep 54

Center Freq 2.441000000 GHz

Ref Offset 7.83 dB
Ref 27.83 dBm

Trig: Free Run
#Atten: 30 dB

#Avg Type: RMS
Avg/Hold: 100/100

Span 1.500 MHz

Auto

Frequency

Auto Tun

Center Freq 2.441000000 GHz

Start Freq 2.440250000 GHz

Stop Freq 2.441750000 GHz

CF Step 150.000 kHz

Auto

Freq Offset 0 Hz

Center 2.4410000 GHz
#Res BW 100 kHz

#VBW 300 kHz

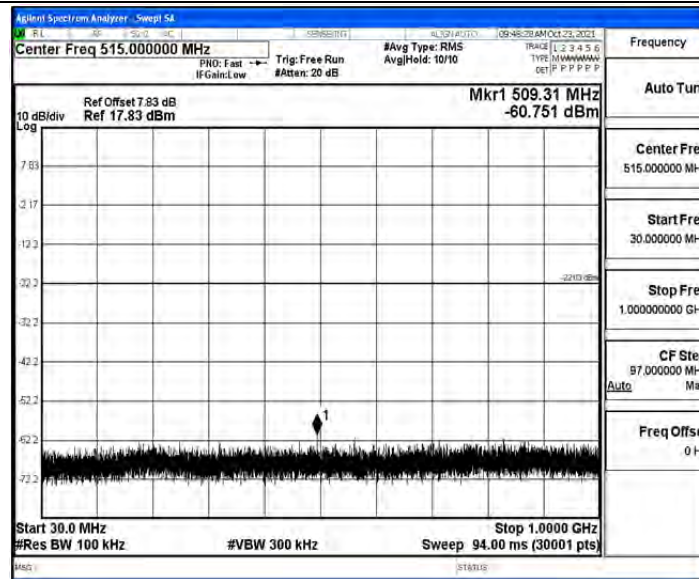
Span 1.500 MHz
Sweep 1.000 ms (1001 pts)

10 dB/div
Log

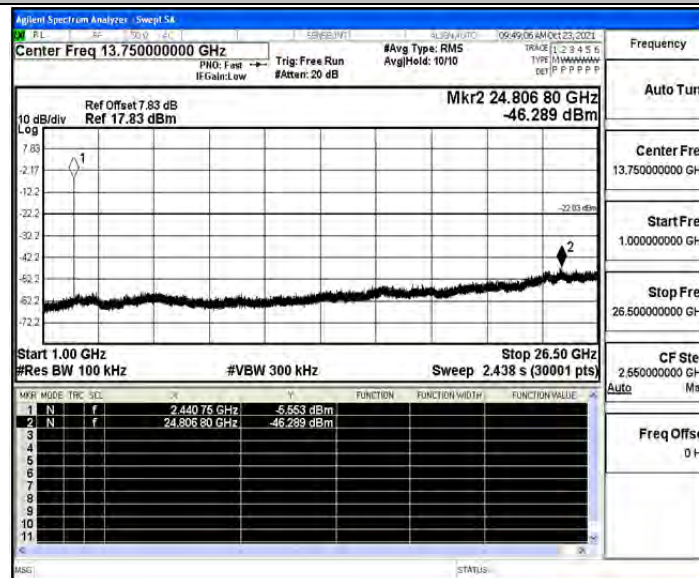
17.8
7.83
-1.7
-12.3
-22.3
-32.3
-42.3
-52.3
-62.3

Mkr1 2.440 968 5 GHz
-2.027 dBm

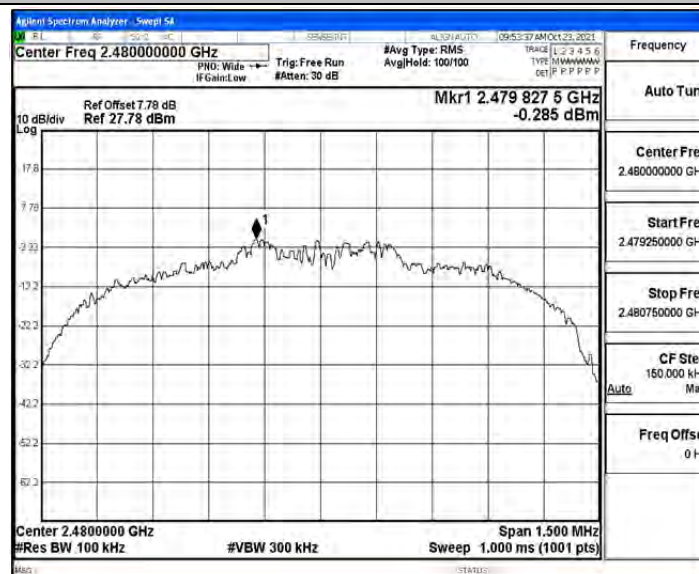
37 / 49



3DH5_Ant1_2441_1000~26500

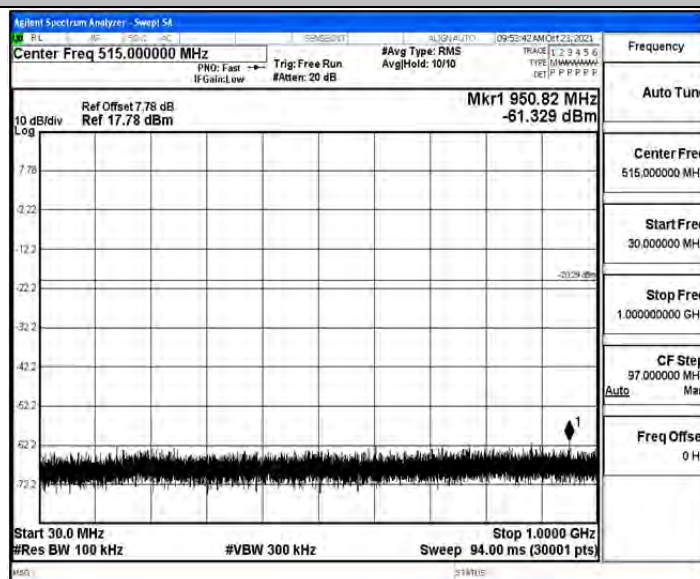


3DH5_Ant1_2480_0~Reference

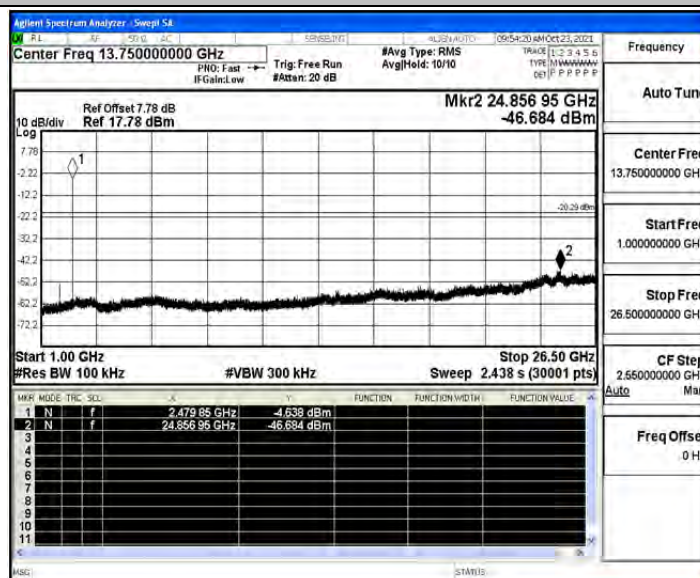




3DH5_Ant1_2480_30~1000



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	-49.2	≤-41.20	46.00	≤54	PASS
				AV	2388.305	-48.44	≤-41.20	46.76	≤54	PASS
				AV	2390.000	-48.79	≤-41.20	46.41	≤54	PASS
				Peak	2310.000	-41.53	≤-21.20	53.67	≤74	PASS
				Peak	2342.105	-38.39	≤-21.20	56.81	≤74	PASS
				Peak	2390.000	-40.78	≤-21.20	54.42	≤74	PASS
		High	2480	AV	2483.500	-47.92	≤-41.20	47.28	≤54	PASS
				AV	2483.520	-47.92	≤-41.20	47.28	≤54	PASS
				AV	2500.000	-48.05	≤-41.20	47.15	≤54	PASS
				Peak	2483.500	-40.36	≤-21.20	54.84	≤74	PASS
				Peak	2485.520	-37.53	≤-21.20	57.67	≤74	PASS
				Peak	2500.000	-39	≤-21.20	56.20	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-40.88	≤-21.20	54.32	≤74	PASS
				Peak	2324.465	-38.06	≤-21.20	57.14	≤74	PASS
				Peak	2390.000	-40.31	≤-21.20	54.89	≤74	PASS
		High	Hop_2480	Peak	2483.500	-39.8	≤-21.20	55.40	≤74	PASS
				Peak	2498.480	-37.91	≤-21.20	57.29	≤74	PASS
				Peak	2500.000	-39.97	≤-21.20	55.23	≤74	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-49.01	≤-41.20	46.19	≤54	PASS
				AV	2387.780	-48.42	≤-41.20	46.78	≤54	PASS
				AV	2390.000	-48.6	≤-41.20	46.60	≤54	PASS
				Peak	2310.000	-40.51	≤-21.20	54.69	≤74	PASS
				Peak	2373.605	-37.62	≤-21.20	57.58	≤74	PASS
				Peak	2390.000	-40.73	≤-21.20	54.47	≤74	PASS
		High	2480	AV	2483.500	-47.88	≤-41.20	47.32	≤54	PASS
				AV	2495.760	-47.83	≤-41.20	47.37	≤54	PASS
				AV	2500.000	-47.83	≤-41.20	47.37	≤54	PASS
				Peak	2483.500	-39.93	≤-21.20	55.27	≤74	PASS
				Peak	2499.600	-37.05	≤-21.20	58.15	≤74	PASS
				Peak	2500.000	-40	≤-21.20	55.20	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-41.64	≤-21.20	53.56	≤74	PASS
				Peak	2384.840	-36.54	≤-21.20	58.66	≤74	PASS
				Peak	2390.000	-41.45	≤-21.20	53.75	≤74	PASS
		High	Hop_2480	Peak	2483.500	-39.67	≤-21.20	55.53	≤74	PASS
				Peak	2498.800	-38.38	≤-21.20	56.82	≤74	PASS
				Peak	2500.000	-39.17	≤-21.20	56.03	≤74	PASS



3DH5	Ant1	Low	2402	AV	2310.000	-48.91	≤ -41.20	46.29	≤ 54	PASS
				AV	2389.145	-48.46	≤ -41.20	46.74	≤ 54	PASS
				AV	2390.000	-48.59	≤ -41.20	46.61	≤ 54	PASS
				Peak	2310.000	-41.64	≤ -21.20	53.56	≤ 74	PASS
				Peak	2310.290	-37.43	≤ -21.20	57.77	≤ 74	PASS
				Peak	2390.000	-37.99	≤ -21.20	57.21	≤ 74	PASS
		High	2480	AV	2483.500	-47.82	≤ -41.20	47.38	≤ 54	PASS
				AV	2483.520	-47.82	≤ -41.20	47.38	≤ 54	PASS
				AV	2500.000	-47.96	≤ -41.20	47.24	≤ 54	PASS
				Peak	2483.500	-40.46	≤ -21.20	54.74	≤ 74	PASS
				Peak	2486.880	-37.48	≤ -21.20	57.72	≤ 74	PASS
				Peak	2500.000	-40.27	≤ -21.20	54.93	≤ 74	PASS
		Low	Hop_24 02	Peak	2310.000	-41.3	≤ -21.20	53.90	≤ 74	PASS
				Peak	2342.315	-38.4	≤ -21.20	56.80	≤ 74	PASS
				Peak	2390.000	-41.28	≤ -21.20	53.92	≤ 74	PASS
		High	Hop_24 80	Peak	2483.500	-39.33	≤ -21.20	55.87	≤ 74	PASS
				Peak	2485.520	-37.6	≤ -21.20	57.60	≤ 74	PASS
				Peak	2500.000	-40.18	≤ -21.20	55.02	≤ 74	PASS

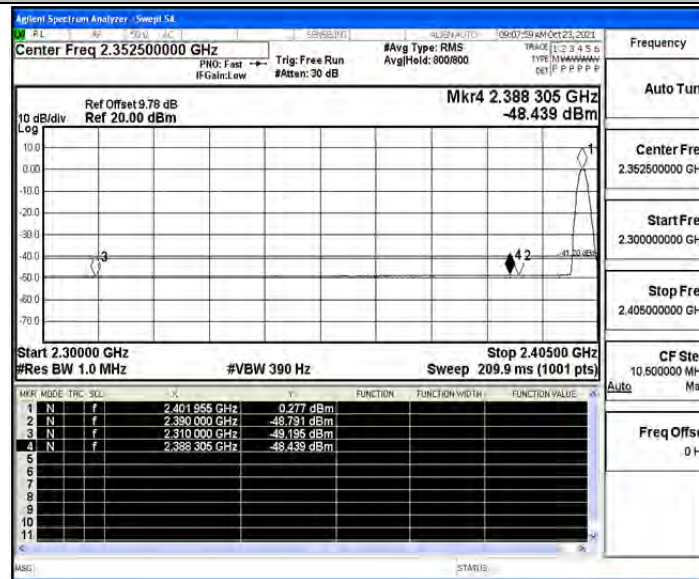
Note:

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.

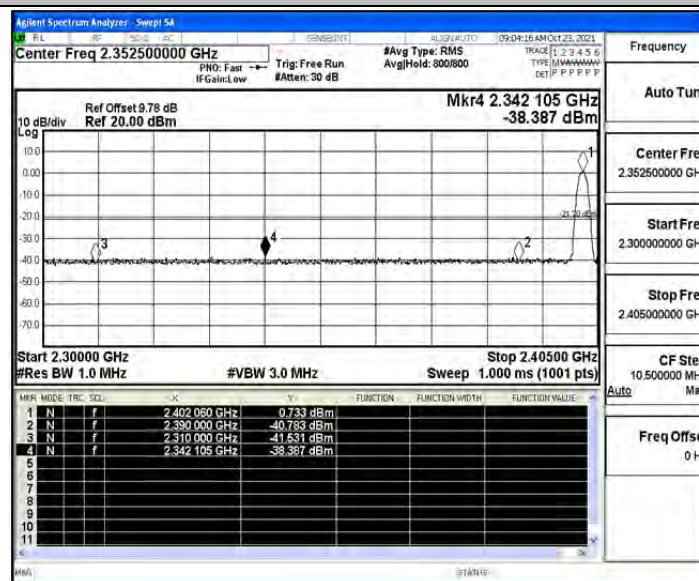


Test Graphs

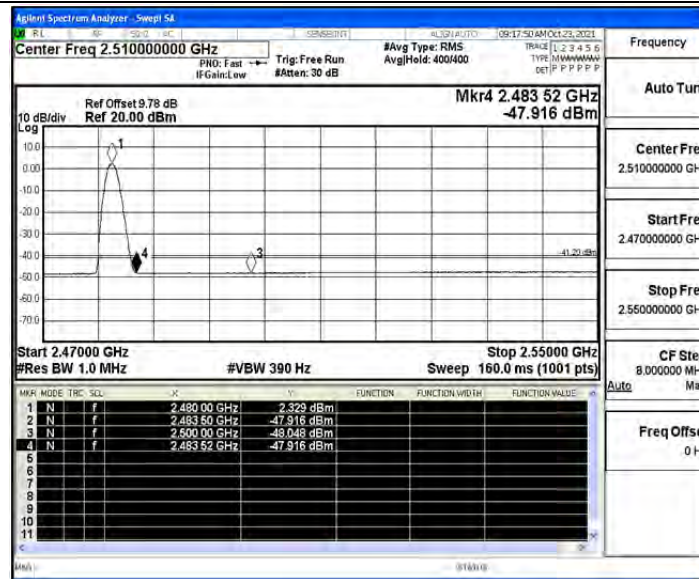
DH5_Ant1_Low_2402_AV



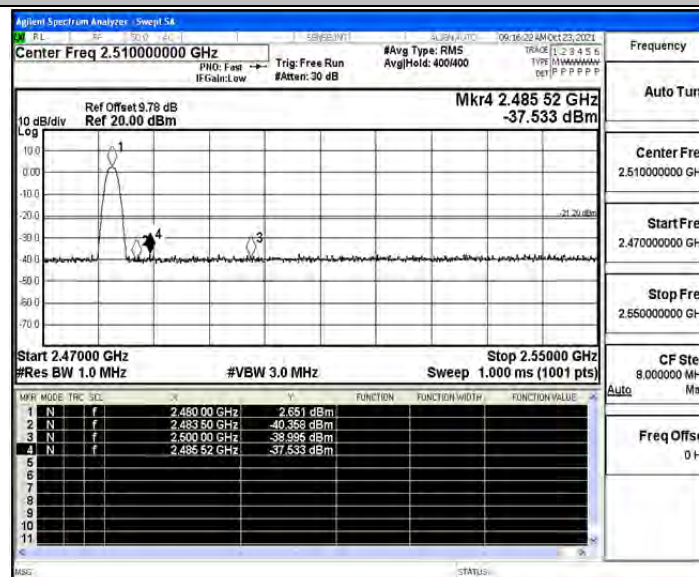
DH5_Ant1_Low_2402_Peak



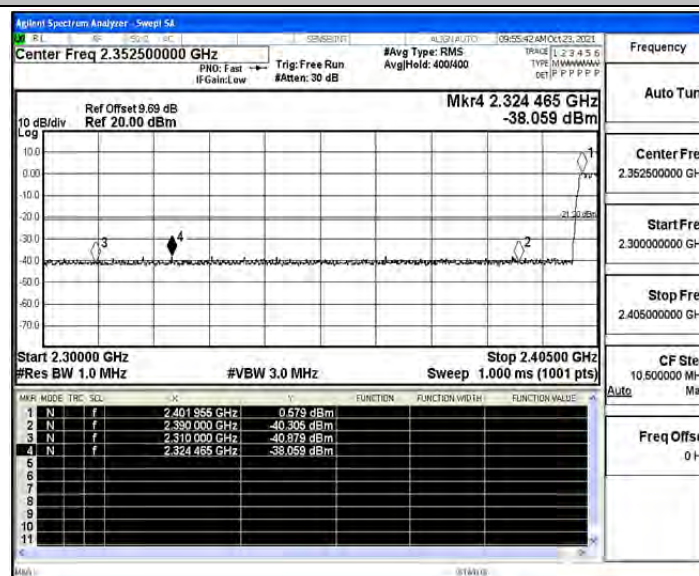
DH5_Ant1_High_2480_AV



DH5_Ant1_High_2480_Peak

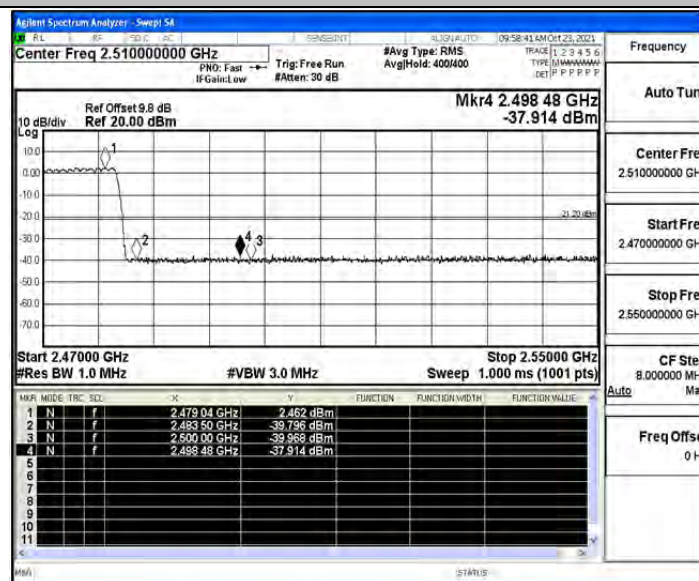


DH5_Ant1_Low_Hop_2402_Peak

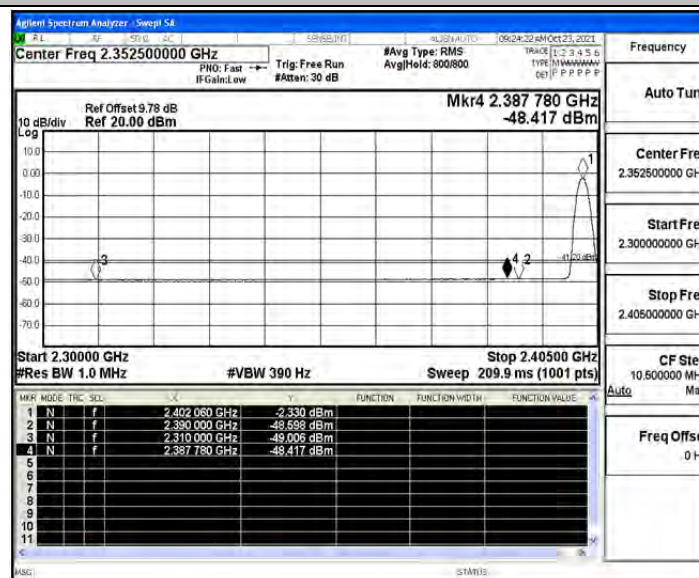




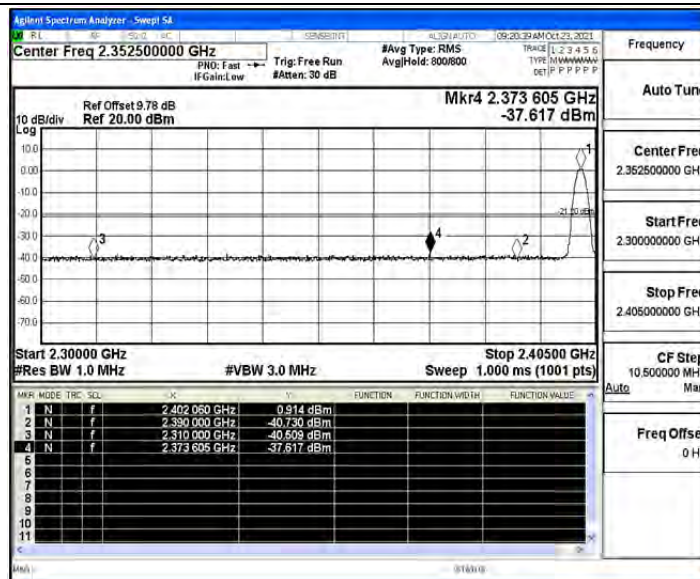
DH5_Ant1_High_Hop_2480_Peak



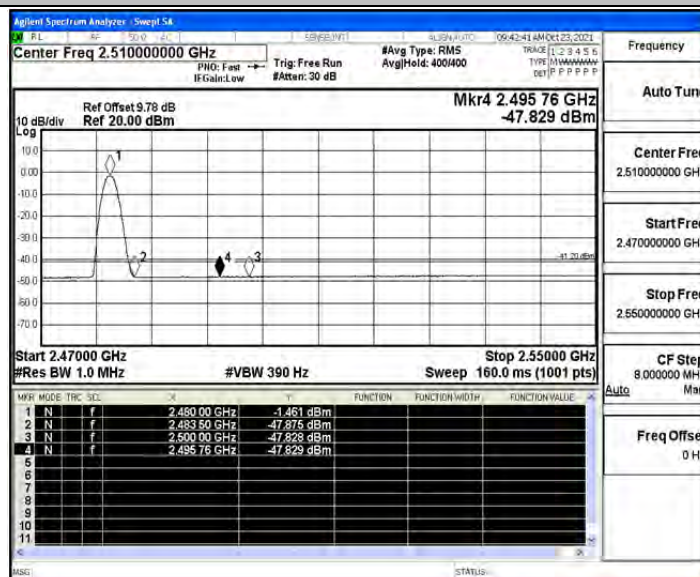
2DH5_Ant1_Low_2402_AV



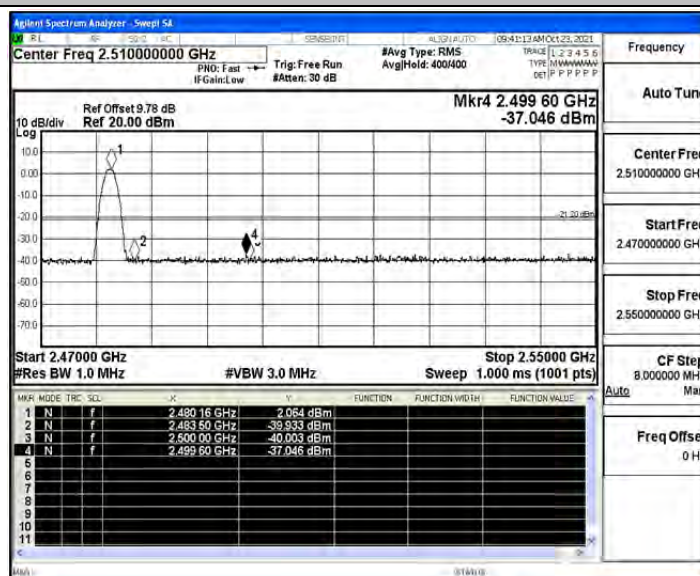
2DH5_Ant1_Low_2402_Peak



2DH5_Ant1_High_2480_AV

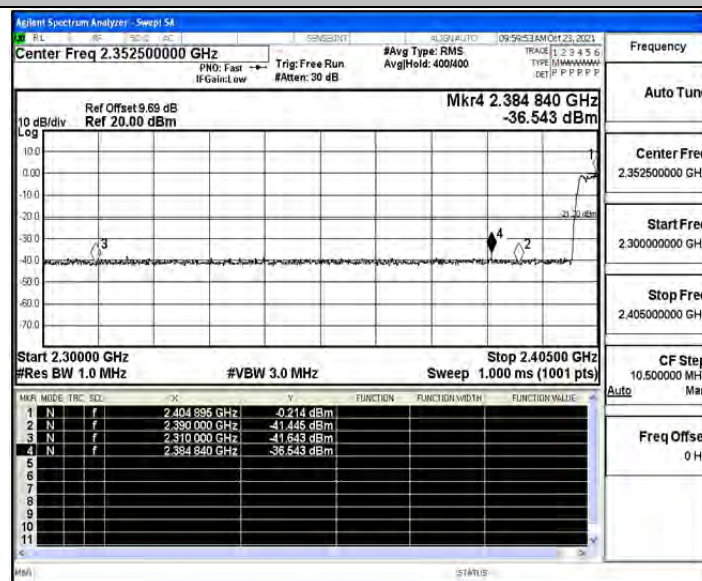


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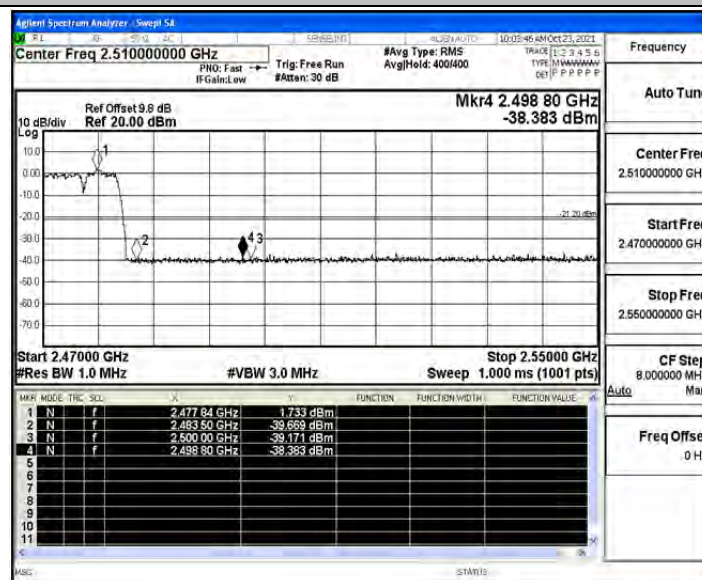




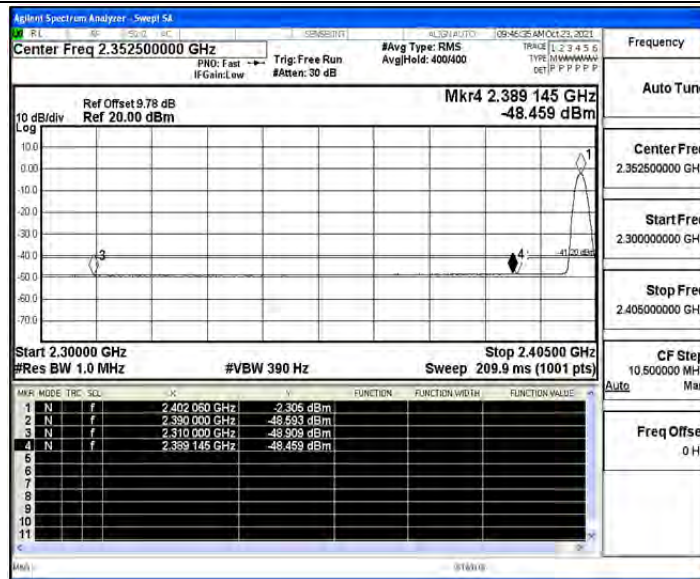
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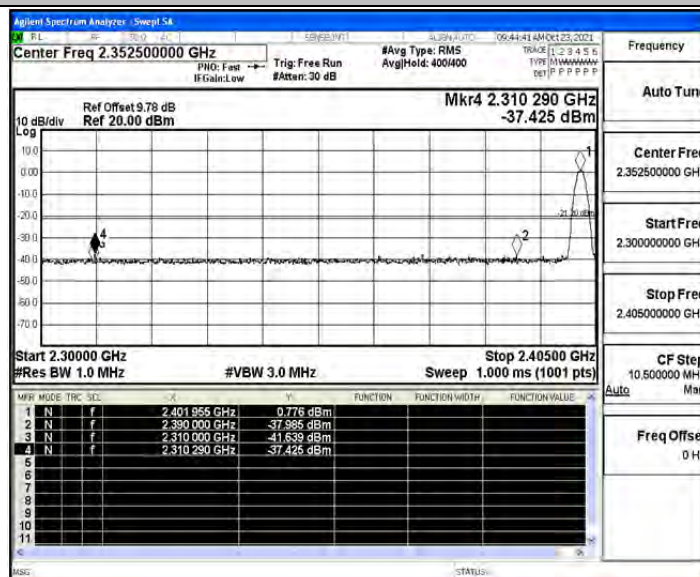
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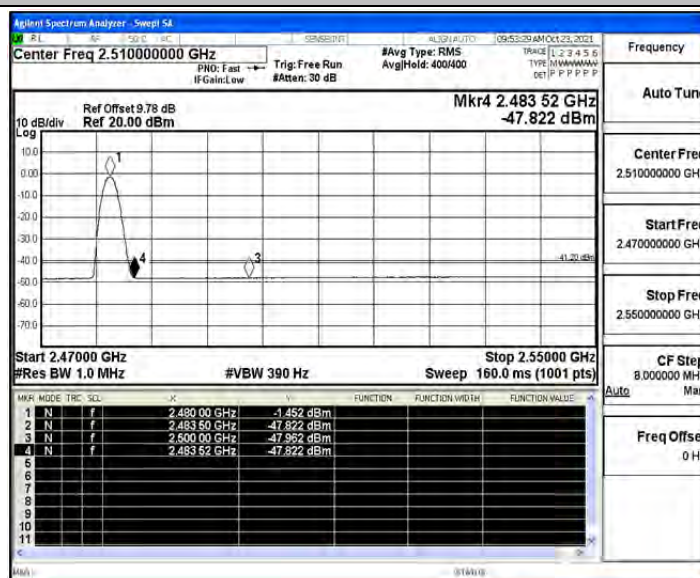
3DH5_Ant1_Low_2402_AV



3DH5_Ant1_Low_2402_Peak

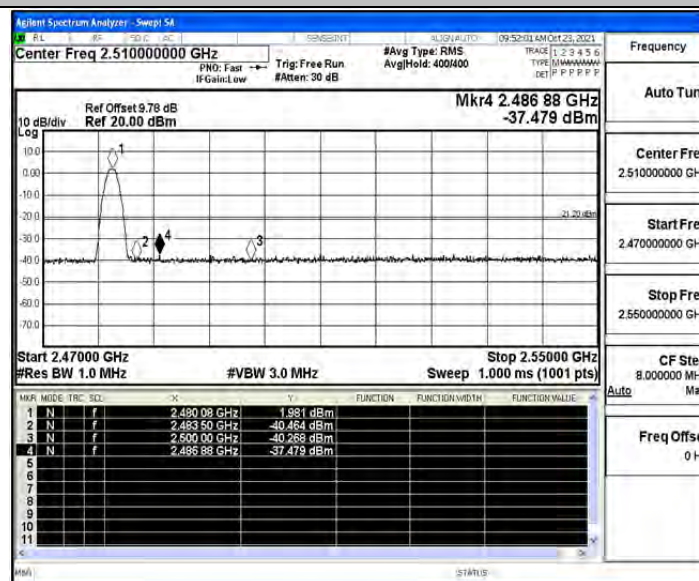


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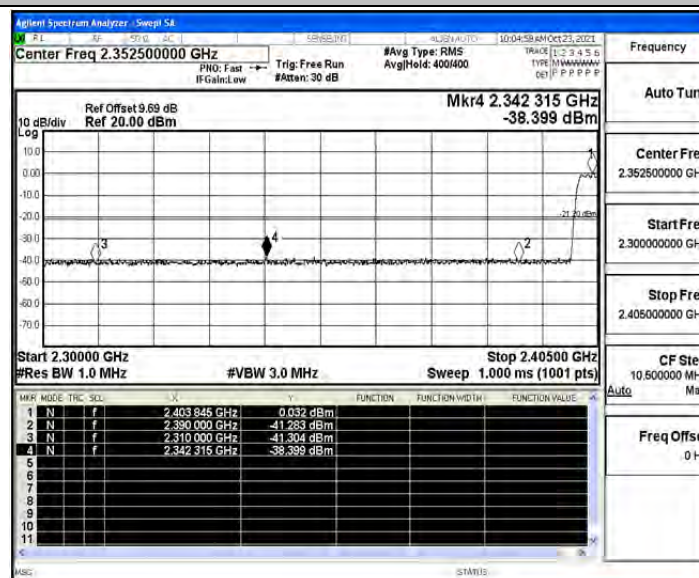




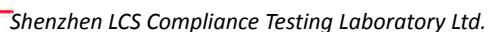
3DH5_Ant1_High_2480_Peak



3DH5_Ant1_Low_Hop_2402_Peak



3DH5_Ant1_High_Hop_2480_Peak



FCC ID: 2A2OL-SW531

Report No.: LCS211018085AEA

