

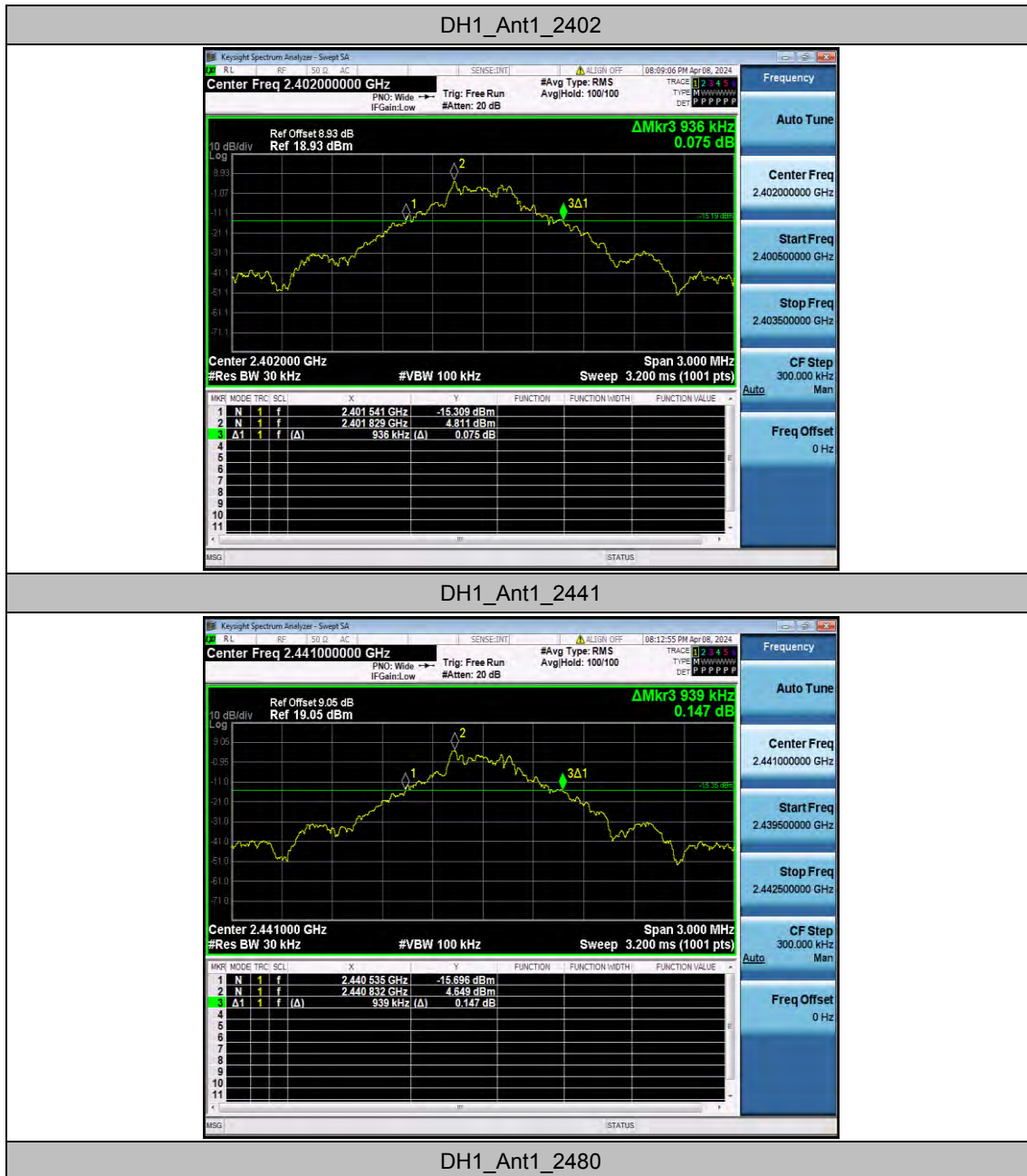
Case No. : <u>CTA24051100201</u>	
Ambient Condition: <u>22</u> °C, <u>53</u> %RH	
According Standard: ■Part15C	
Test Date: <u>2024.4.8</u>	Test Engineer: <u>Evan ouyang</u>

Appendix A.1: 20dB Emission Bandwidth

Test Result

TestMode	Antenna	Freq(MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	0.936	2401.541	2402.477	---	---
		2441	0.939	2440.535	2441.474	---	---
		2480	0.930	2479.577	2480.507	---	---
2DH1	Ant1	2402	1.200	2401.427	2402.627	---	---
		2441	1.188	2440.439	2441.627	---	---
		2480	1.164	2479.457	2480.621	---	---
3DH1	Ant1	2402	1.206	2401.466	2402.672	---	---
		2441	1.203	2440.469	2441.672	---	---
		2480	1.209	2479.463	2480.672	---	---

Test Graphs



The screenshot displays a Keysight Spectrum Analyzer interface. The main display shows a spectrum plot with a yellow trace. The center frequency is 2.40200000 GHz. A measurement of 3 dB bandwidth (3Δf) is shown at 1.200 MHz, with a value of -0.291 dB. The plot also shows a reference offset of 8.93 dB and a reference level of 18.93 dBm. The span is 3.000 MHz, and the resolution bandwidth (Res BW) is 30 kHz. The sweep time is 3.200 ms (1001 pts).

Below the plot, a table shows the measurement results:

MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401 427 GHz	-14.986 dBm			
2	N	1	f	2.401 871 GHz	5.015 dBm			
3	Δf	1	f (Δ)	1.200 MHz (Δ)	-0.291 dB			

The right sidebar contains various controls and settings:

- Frequency:** Center Freq 2.40200000 GHz
- Auto Tune**
- Start Freq:** 2.400500000 GHz
- Stop Freq:** 2.403500000 GHz
- CF Step:** 300.000 kHz
- Auto**
- Freq Offset:** 0 Hz

Keysight Spectrum Analyzer - Sweep SA

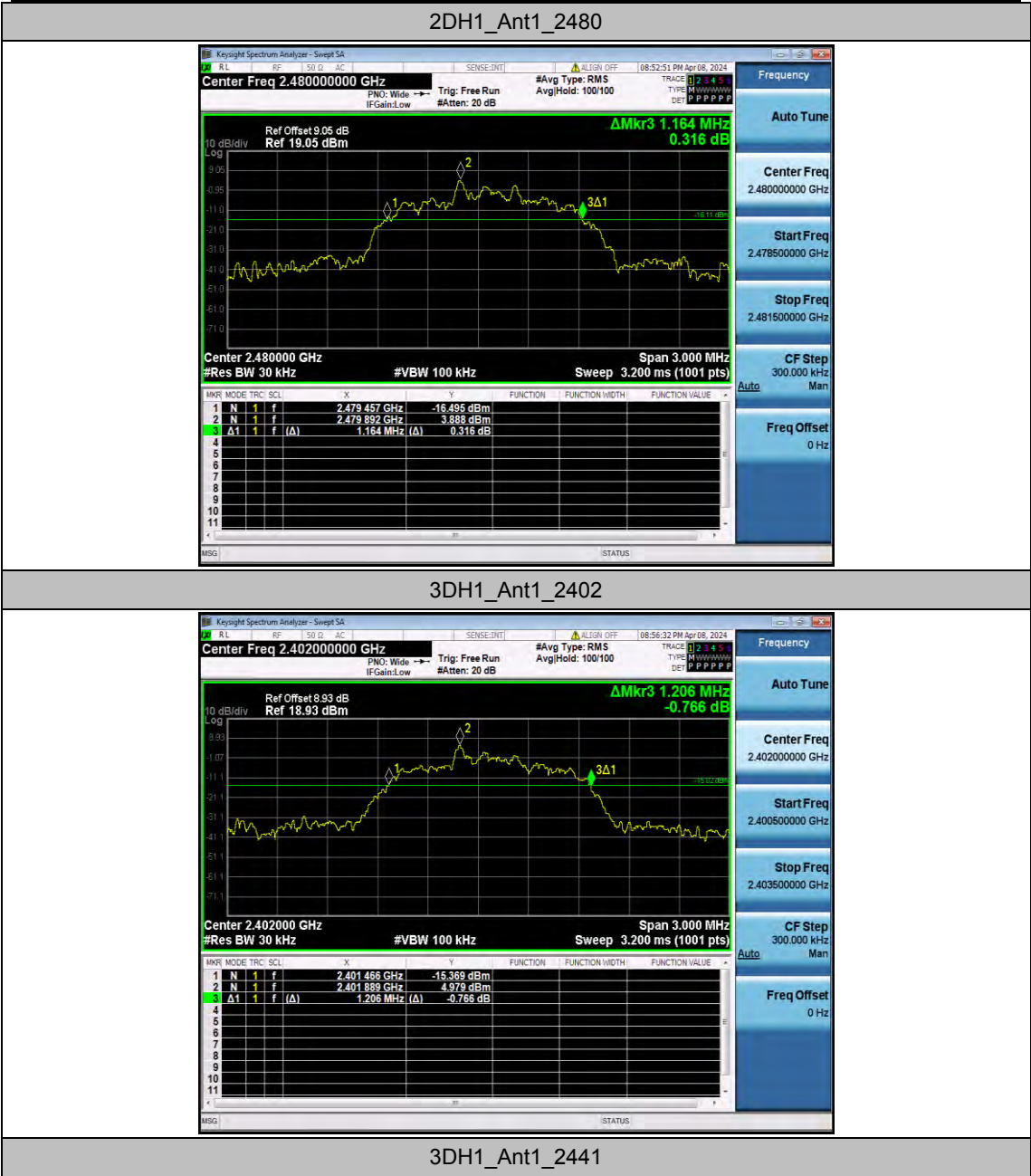
Center Freq 2.441000000 GHz

Ref Offset 9.05 dB
Ref 19.05 dBm

ΔMkr3 1.188 MHz
-0.400 dB

Center 2.441000 GHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 3.200 ms (1001 pts)

MARK	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.440 439 GHz	-15.613 dBm			
2	N	1	f	2.440 868 GHz	4.760 dBm			
3	Δ1	1	f (Δ)	1.188 MHz (Δ)	-0.400 dB			



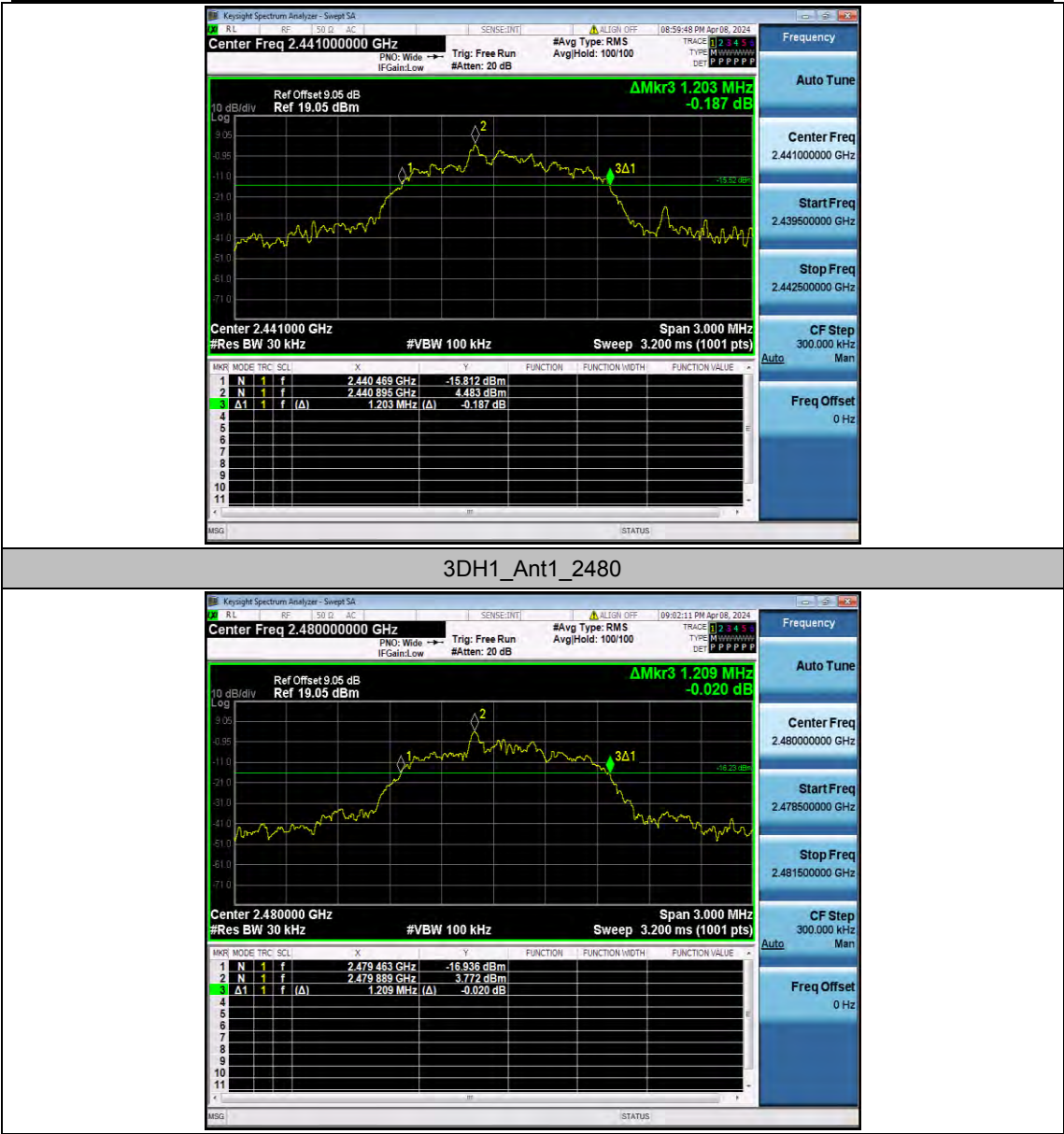
3DH1_Ant1_2402

Frequency

Auto Tune

Center Freq
2.40200000 GHzStart Freq
2.400500000 GHzStop Freq
2.403500000 GHzCF Step
300.000 kHz
ManFreq Offset
0 Hz

3DH1_Ant1_2441



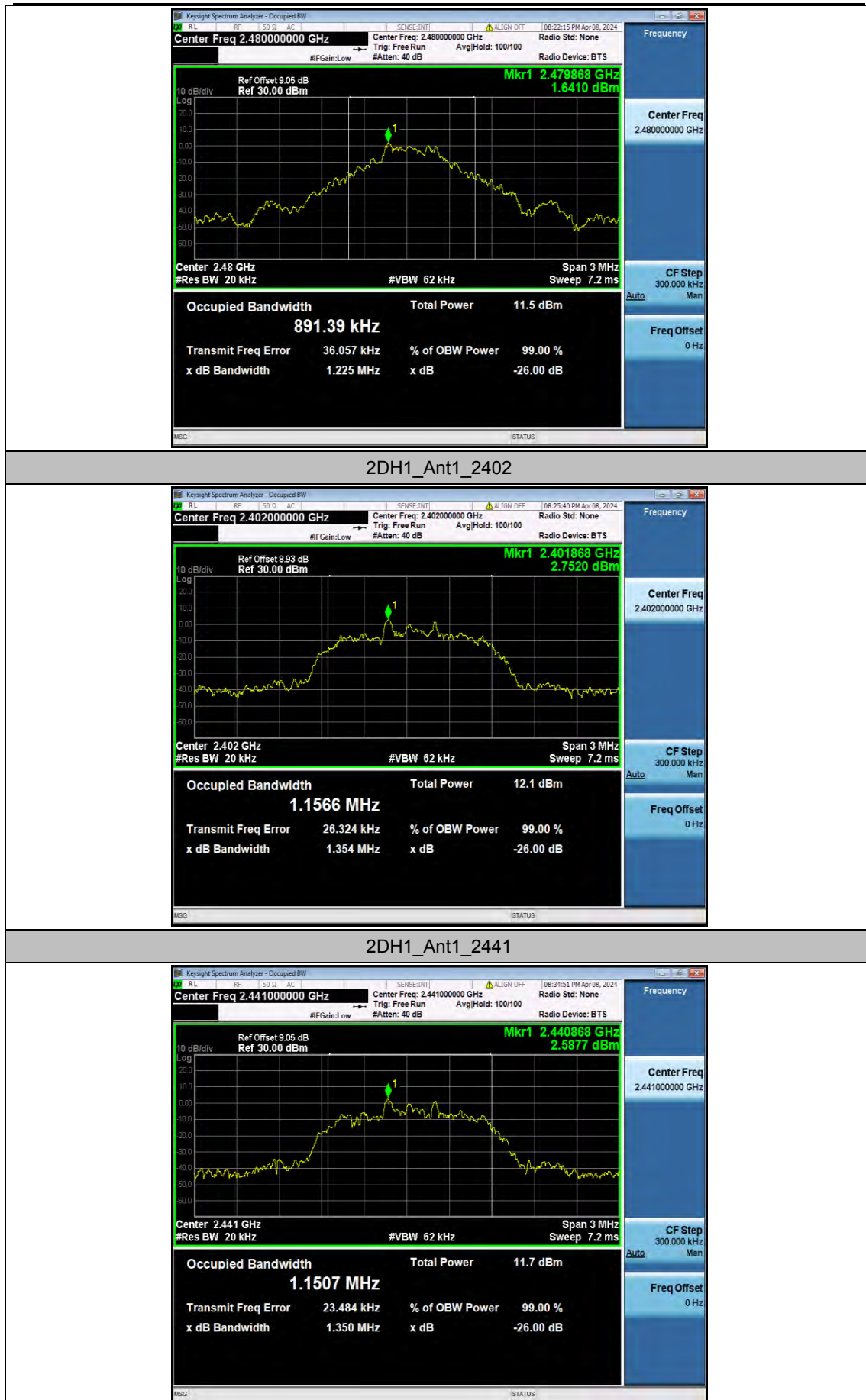
Appendix A.2: Occupied Channel Bandwidth

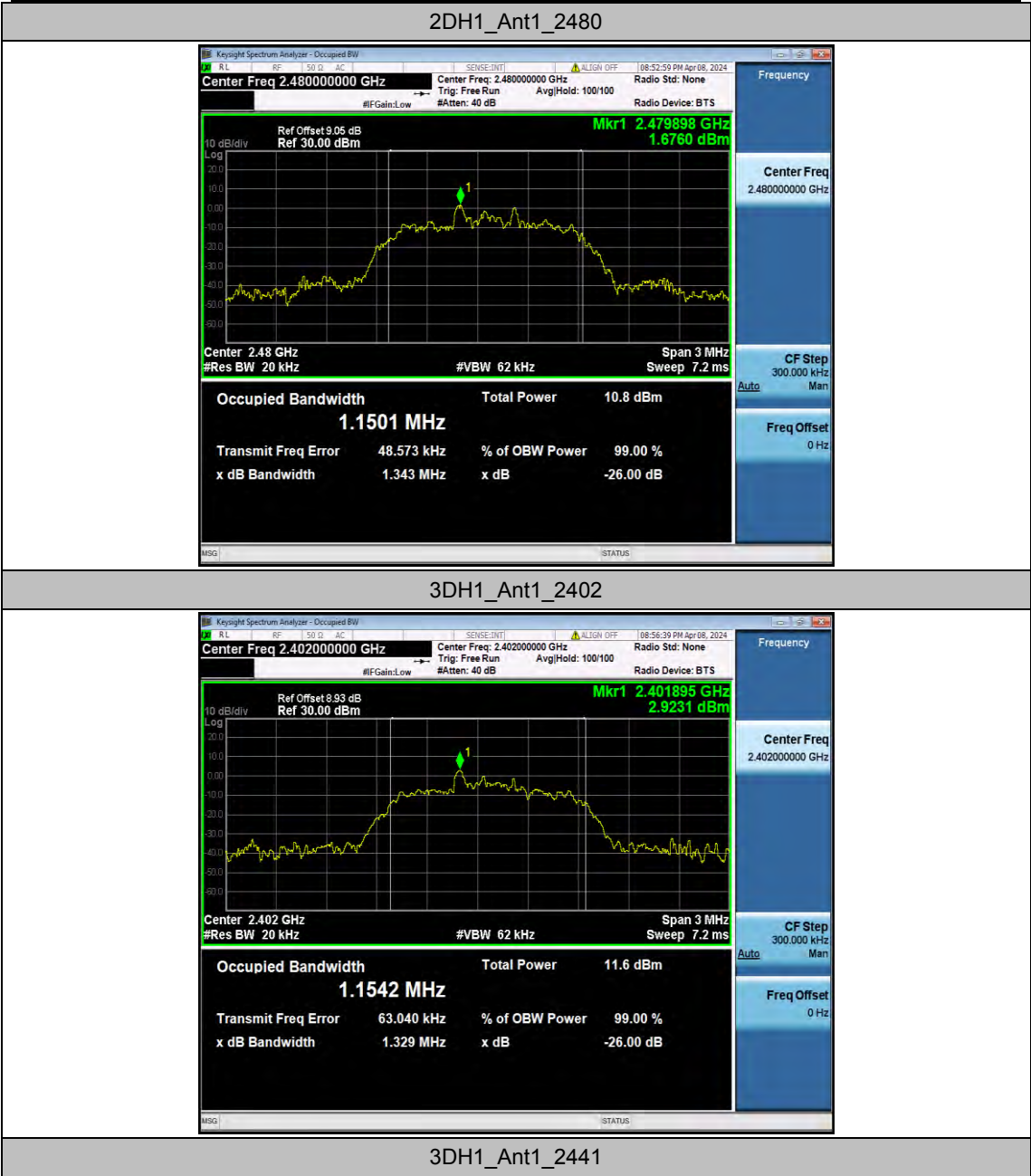
Test Result

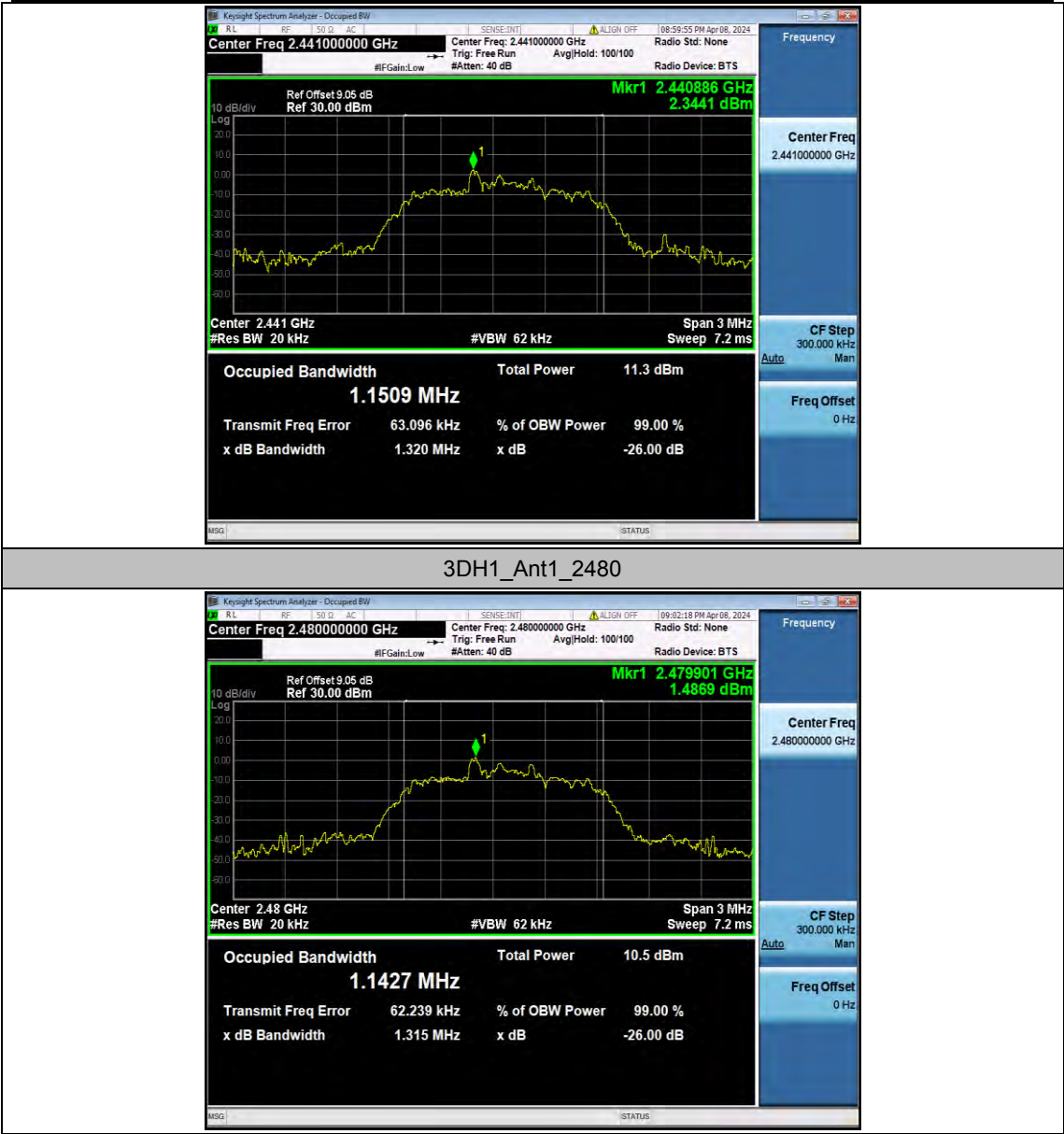
TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	0.90358	2401.5480	2402.4516	---	---
		2441	0.90758	2440.5452	2441.4528	---	---
		2480	0.89139	2479.5904	2480.4818	---	---
2DH1	Ant1	2402	1.1566	2401.4480	2402.6046	---	---
		2441	1.1507	2440.4481	2441.5988	---	---
		2480	1.1501	2479.4735	2480.6236	---	---
3DH1	Ant1	2402	1.1542	2401.4859	2402.6401	---	---
		2441	1.1509	2440.4877	2441.6386	---	---
		2480	1.1427	2479.4909	2480.6336	---	---

Test Graphs









Appendix A.3: Maximum conducted output power

Test Result Peak

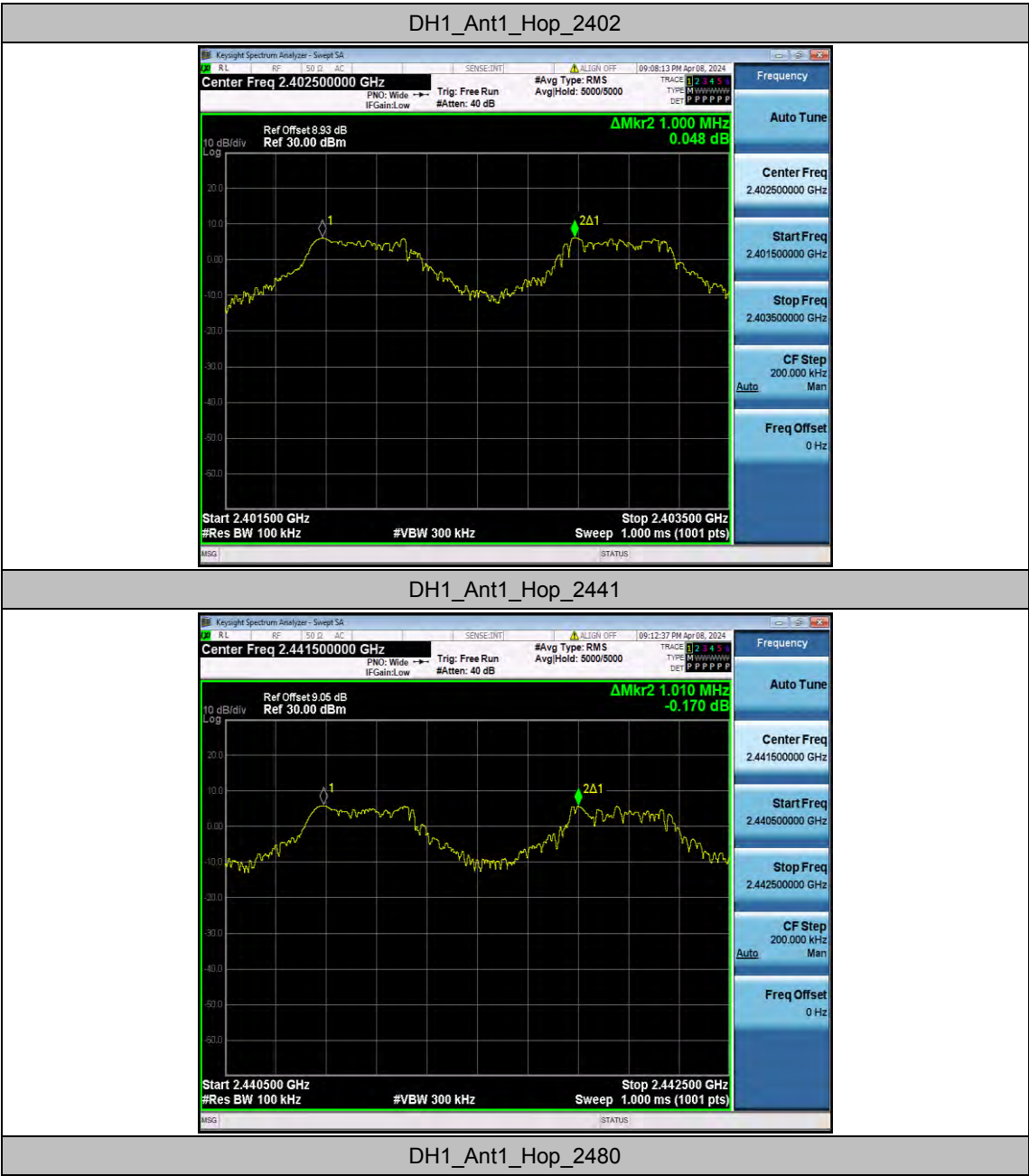
Test Mode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH1	Ant1	2402	6.35	≤30.00	PASS
		2441	6.25	≤30.00	PASS
		2480	5.62	≤30.00	PASS
2DH1	Ant1	2402	6.37	≤20.97	PASS
		2441	6.24	≤20.97	PASS
		2480	5.32	≤20.97	PASS
3DH1	Ant1	2402	6.36	≤20.97	PASS
		2441	6.16	≤20.97	PASS
		2480	5.30	≤20.97	PASS

Appendix A.4: Carrier frequency separation

Test Result

TestMode	Antenna	Freq(MHz)	Result[MHz]	Limit[MHz]	Verdict
DH1	Ant1	Hop_2402	1.00	≥ 0.939	PASS
		Hop_2441	1.01	≥ 0.939	PASS
		Hop_2480	0.992	≥ 0.939	PASS
2DH1	Ant1	Hop_2402	0.99	≥ 0.800	PASS
		Hop_2441	1.01	≥ 0.800	PASS
		Hop_2480	1.002	≥ 0.800	PASS
3DH1	Ant1	Hop_2402	0.848	≥ 0.806	PASS
		Hop_2441	1.164	≥ 0.806	PASS
		Hop_2480	1.00	≥ 0.806	PASS

Test Graphs





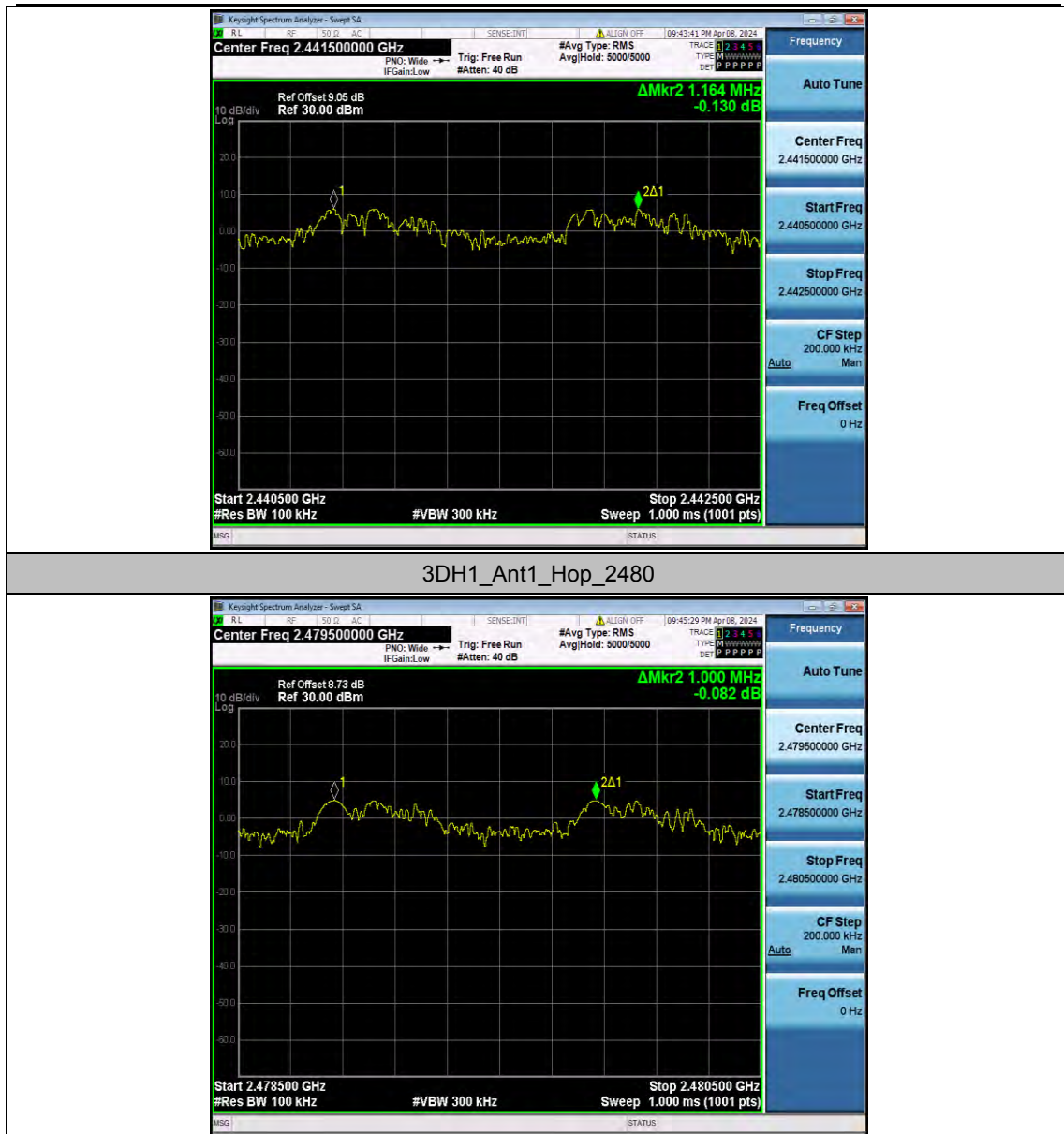
2DH1_Ant1_Hop_2480



3DH1_Ant1_Hop_2402



3DH1_Ant1_Hop_2441

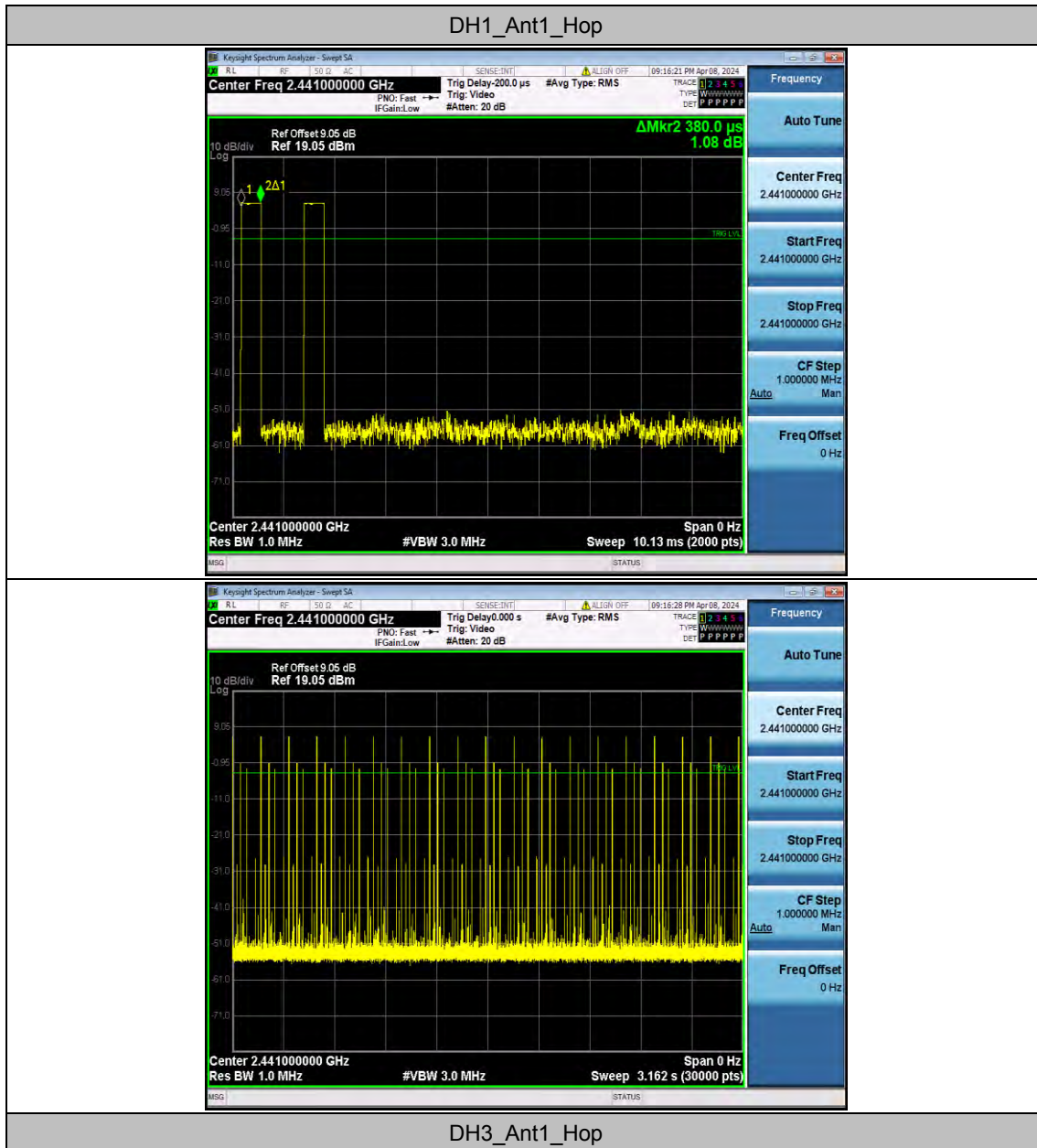


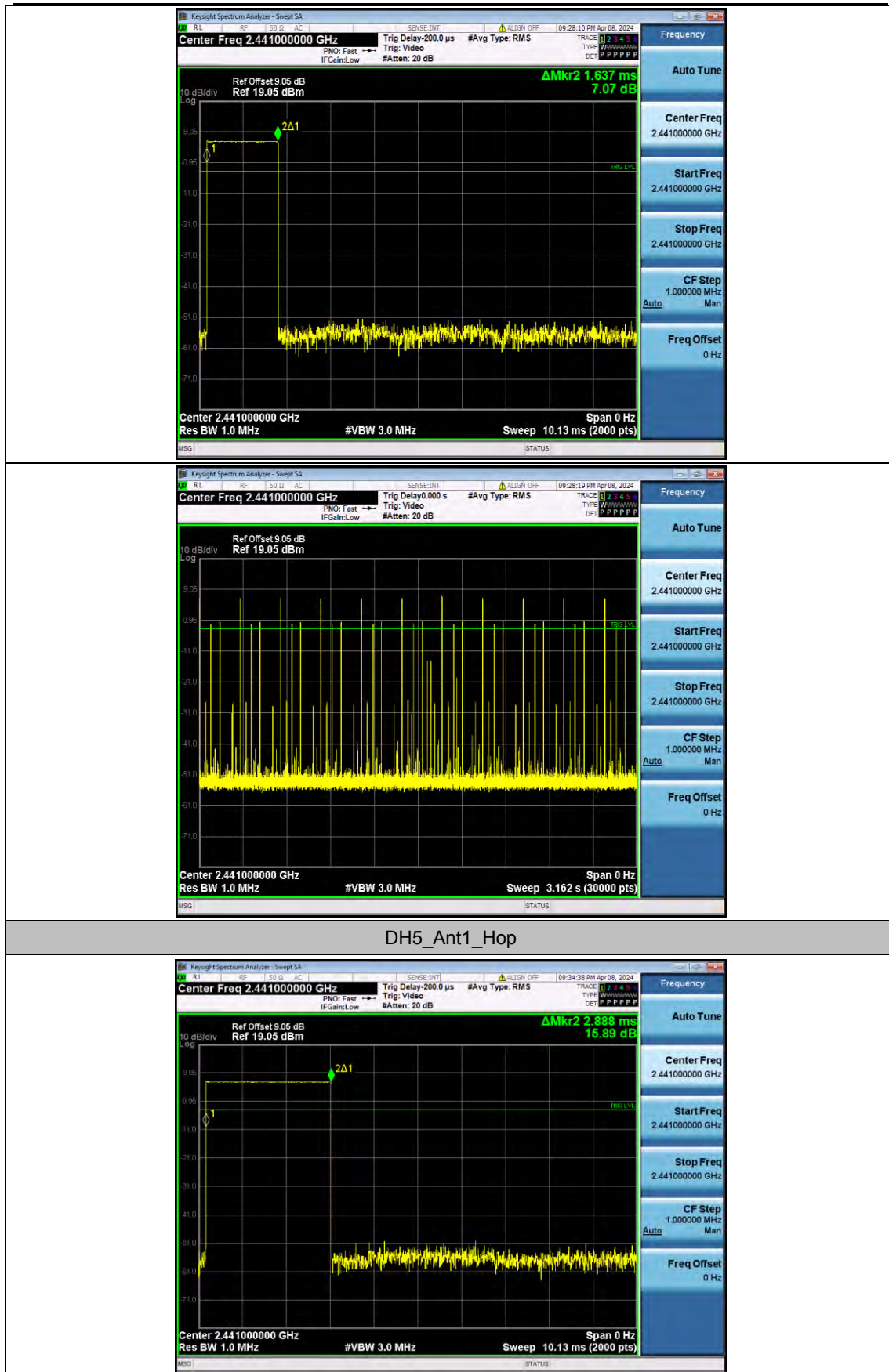
Appendix A.5: Time of occupancy

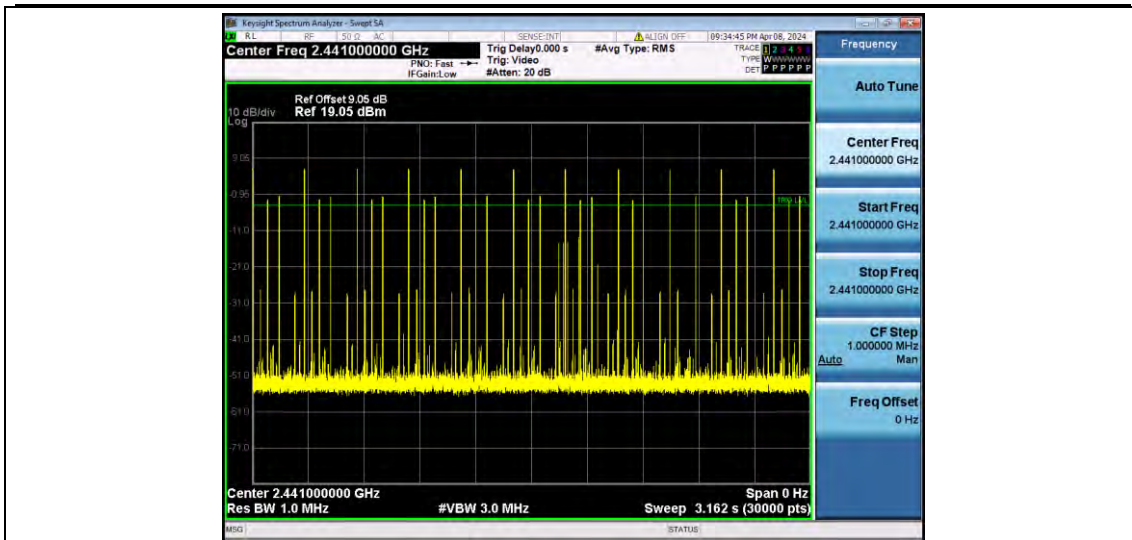
Test Result

TestMode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.380	330	0.125	≤0.4	PASS
DH3	Ant1	Hop	1.637	150	0.246	≤0.4	PASS
DH5	Ant1	Hop	2.888	110	0.318	≤0.4	PASS
2DH1	Ant1	Hop	0.380	330	0.125	≤0.4	PASS
2DH3	Ant1	Hop	1.626	160	0.26	≤0.4	PASS
2DH5	Ant1	Hop	2.878	110	0.317	≤0.4	PASS
3DH1	Ant1	Hop	0.375	310	0.116	≤0.4	PASS
3DH3	Ant1	Hop	1.631	160	0.261	≤0.4	PASS
3DH5	Ant1	Hop	2.878	110	0.317	≤0.4	PASS

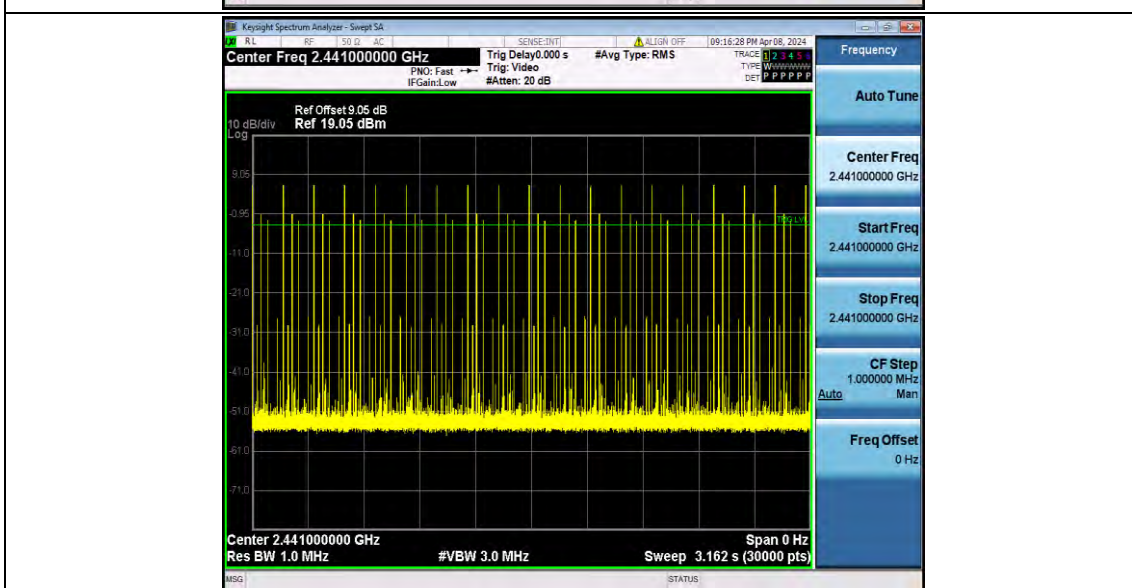
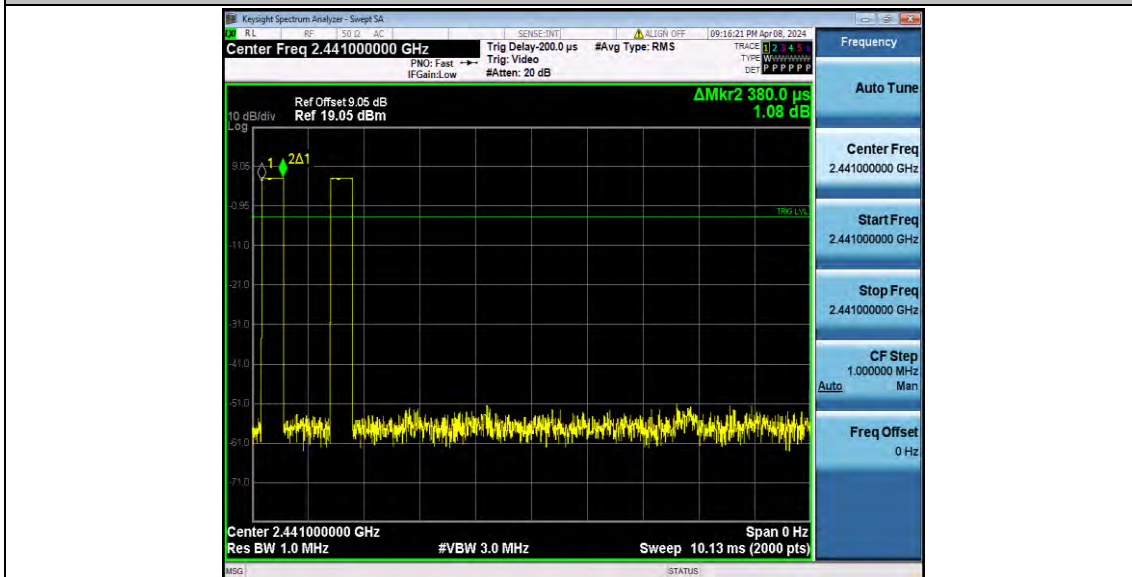
Test Graphs



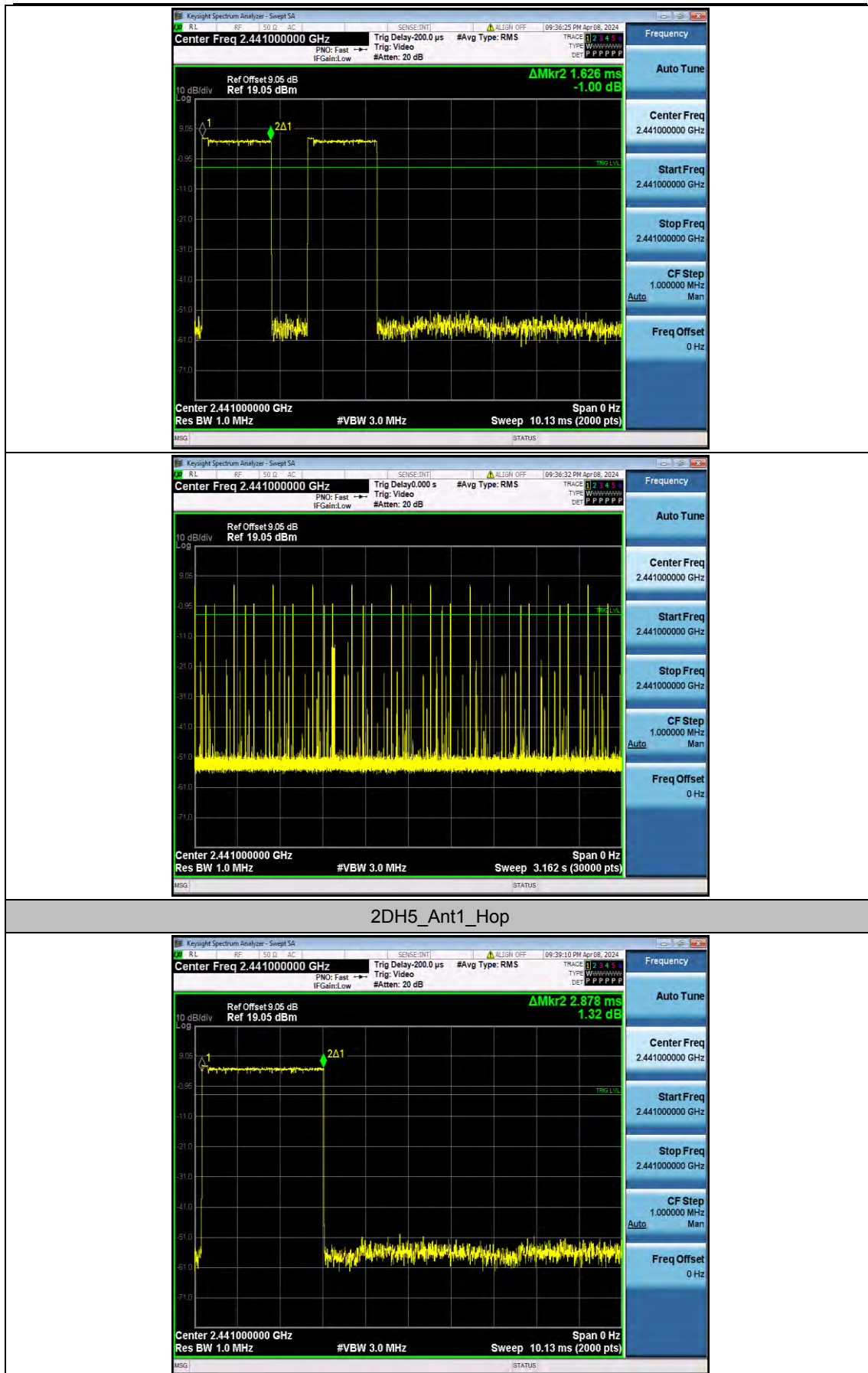


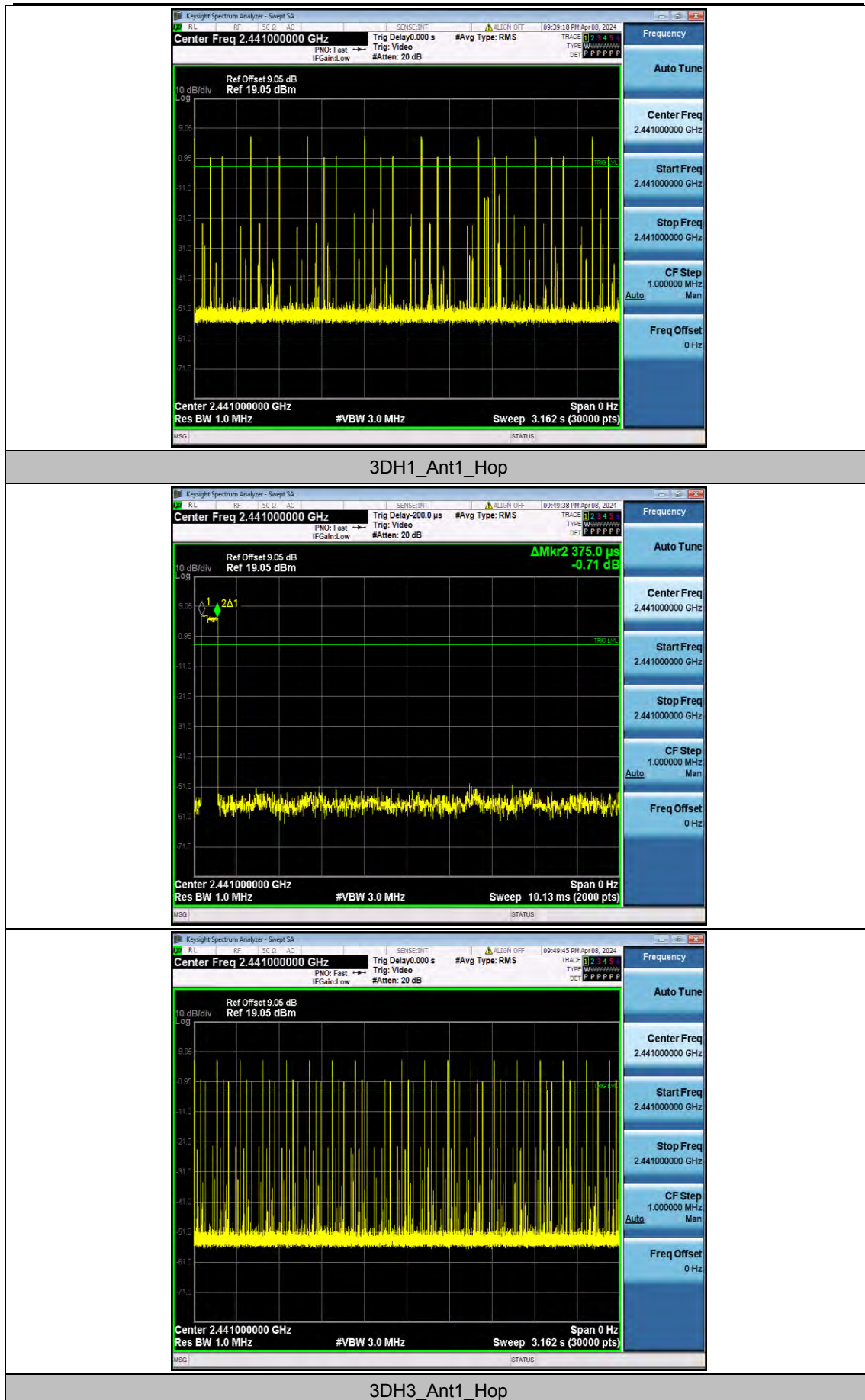


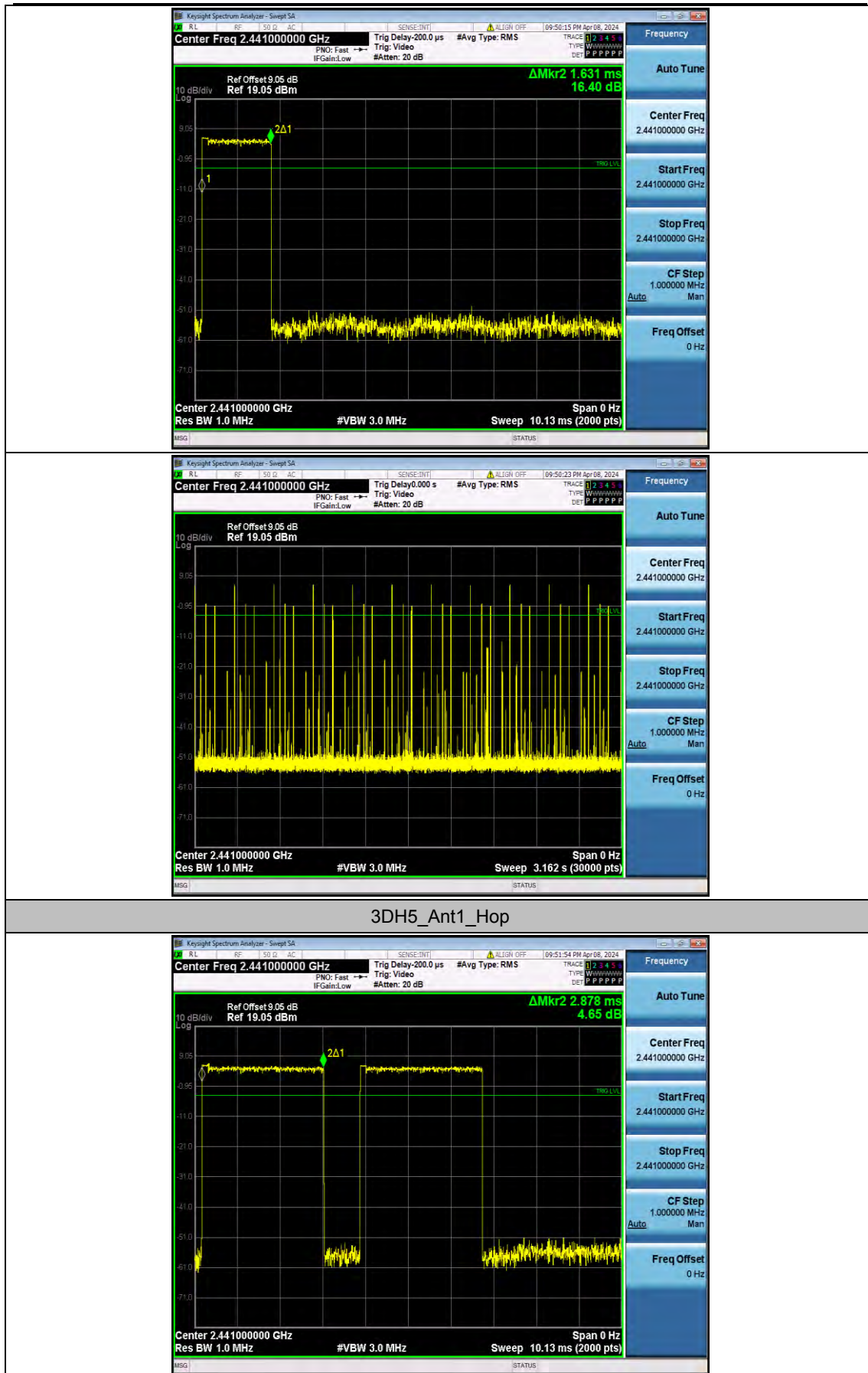
2DH1_Ant1_Hop



2DH3_Ant1_Hop







3DH5_Ant1_Hop

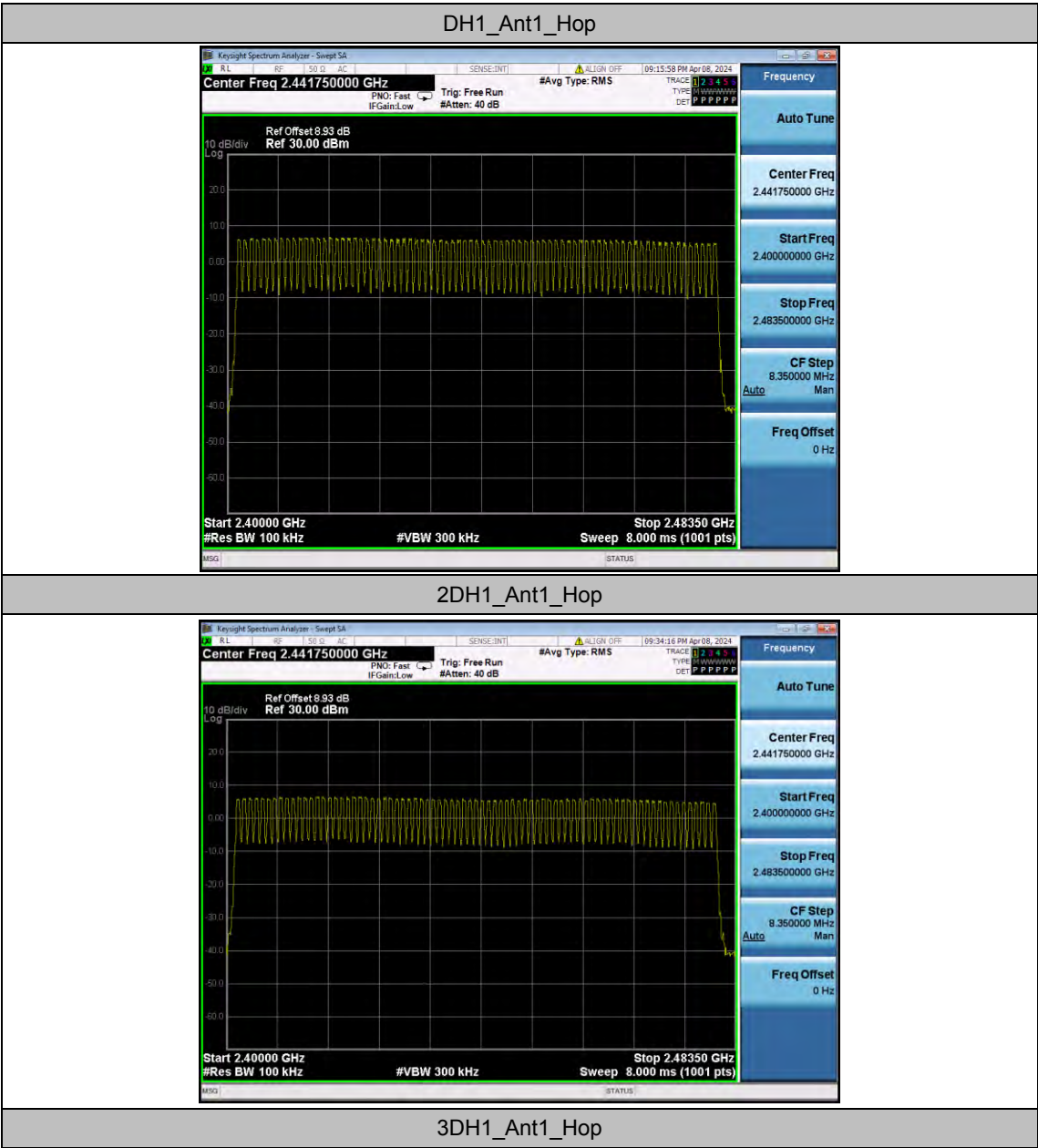


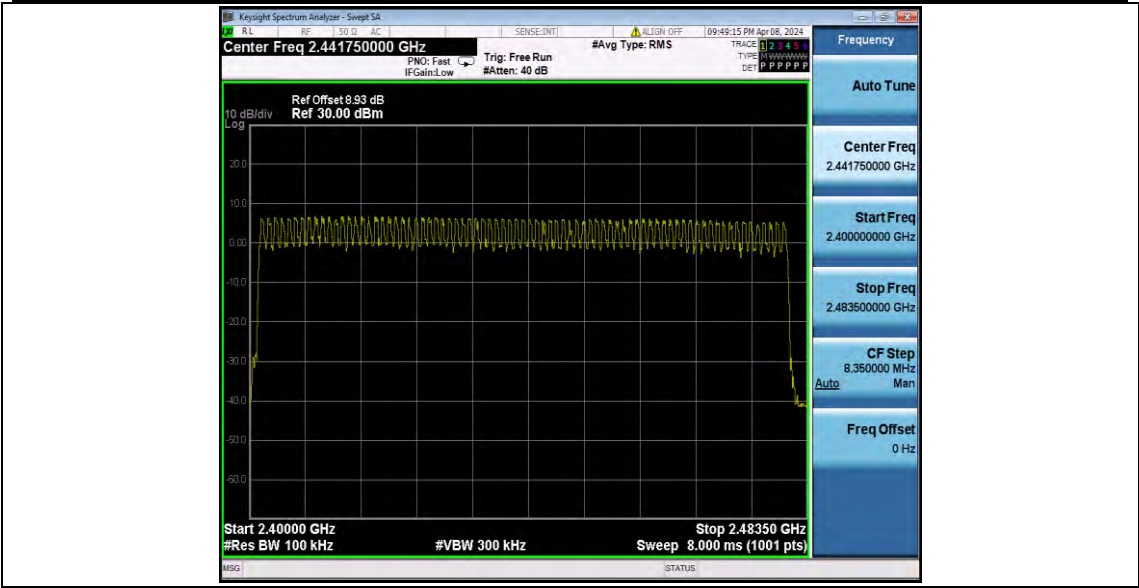
Appendix A.6: Number of hopping channels

Test Result

TestMode	Antenna	Freq(MHz)	Result[Num]	Limit[Num]	Verdict
DH1	Ant1	Hop	79	≥15	PASS
2DH1	Ant1	Hop	79	≥15	PASS
3DH1	Ant1	Hop	79	≥15	PASS

Test Graphs





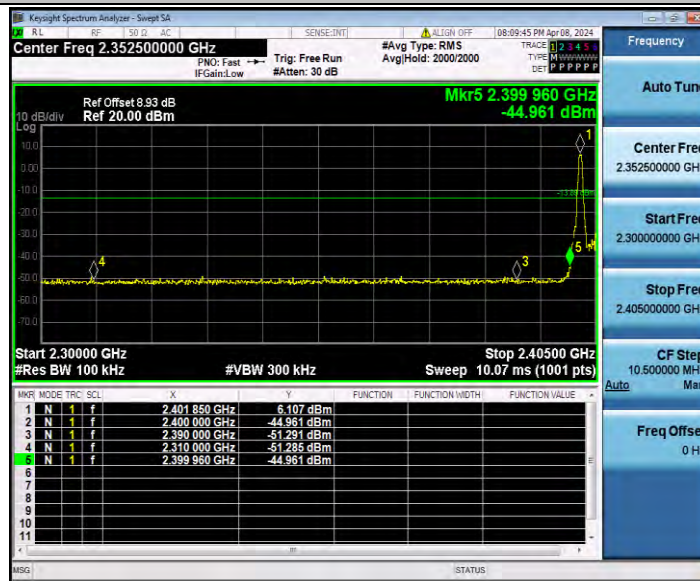
Appendix A.7: Band edge measurements

Test Result

TestMode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	Low	2402	6.11	-44.96	≤ -13.89	PASS
		High	2480	5.18	-48.42	≤ -14.82	PASS
		Low	Hop_2402	6.01	-49.03	≤ -13.99	PASS
		High	Hop_2480	5.56	-49	≤ -14.44	PASS
2DH1	Ant1	Low	2402	6.16	-35.46	≤ -13.84	PASS
		High	2480	5.14	-42.32	≤ -14.86	PASS
		Low	Hop_2402	5.87	-47.95	≤ -14.13	PASS
		High	Hop_2480	5.49	-48.47	≤ -14.51	PASS
3DH1	Ant1	Low	2402	6.20	-29.76	≤ -13.81	PASS
		High	2480	5.15	-41.73	≤ -14.85	PASS
		Low	Hop_2402	6.18	-43.74	≤ -13.83	PASS
		High	Hop_2480	5.46	-48.46	≤ -14.54	PASS

Test Graphs

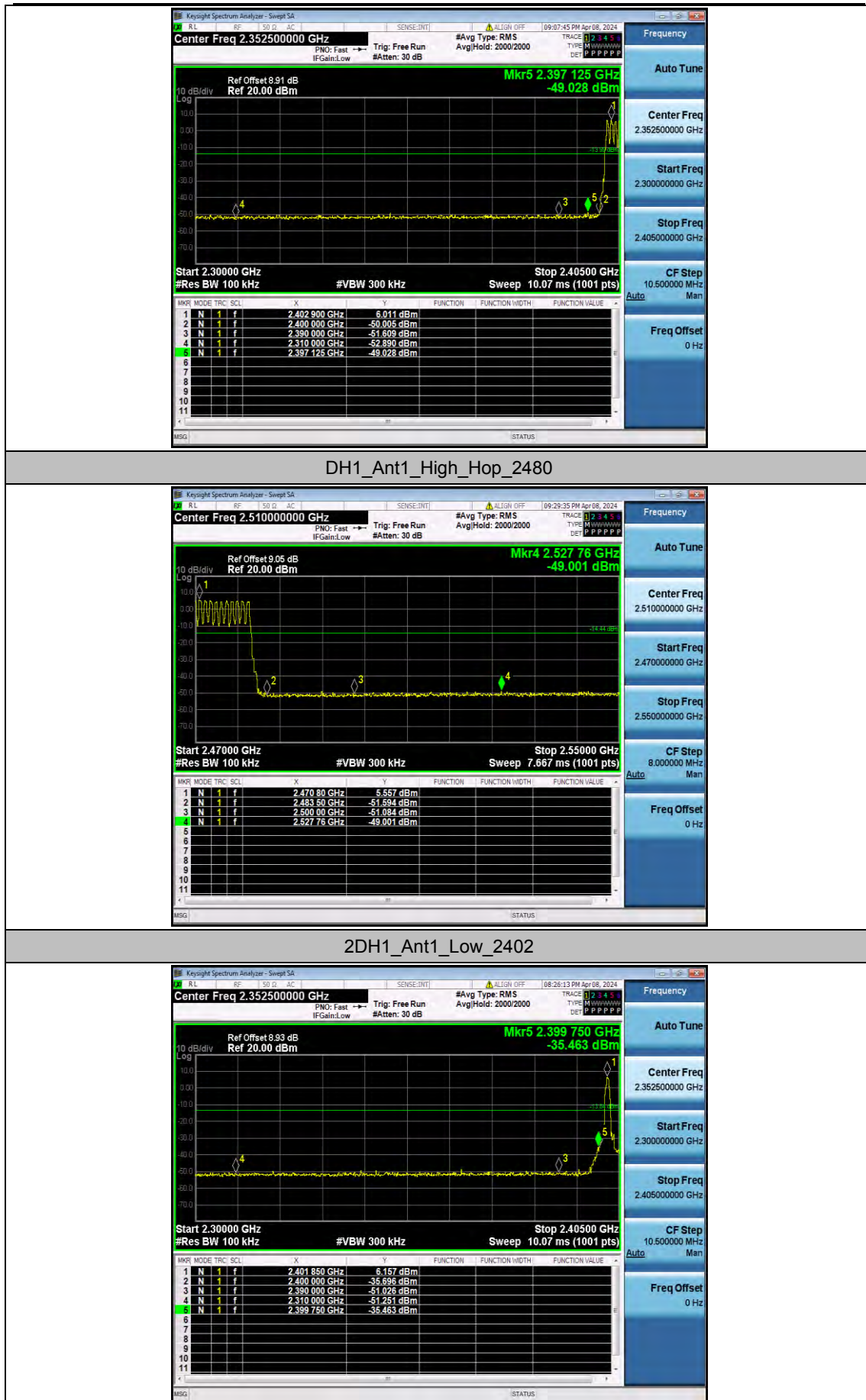
DH1_Ant1_Low_2402

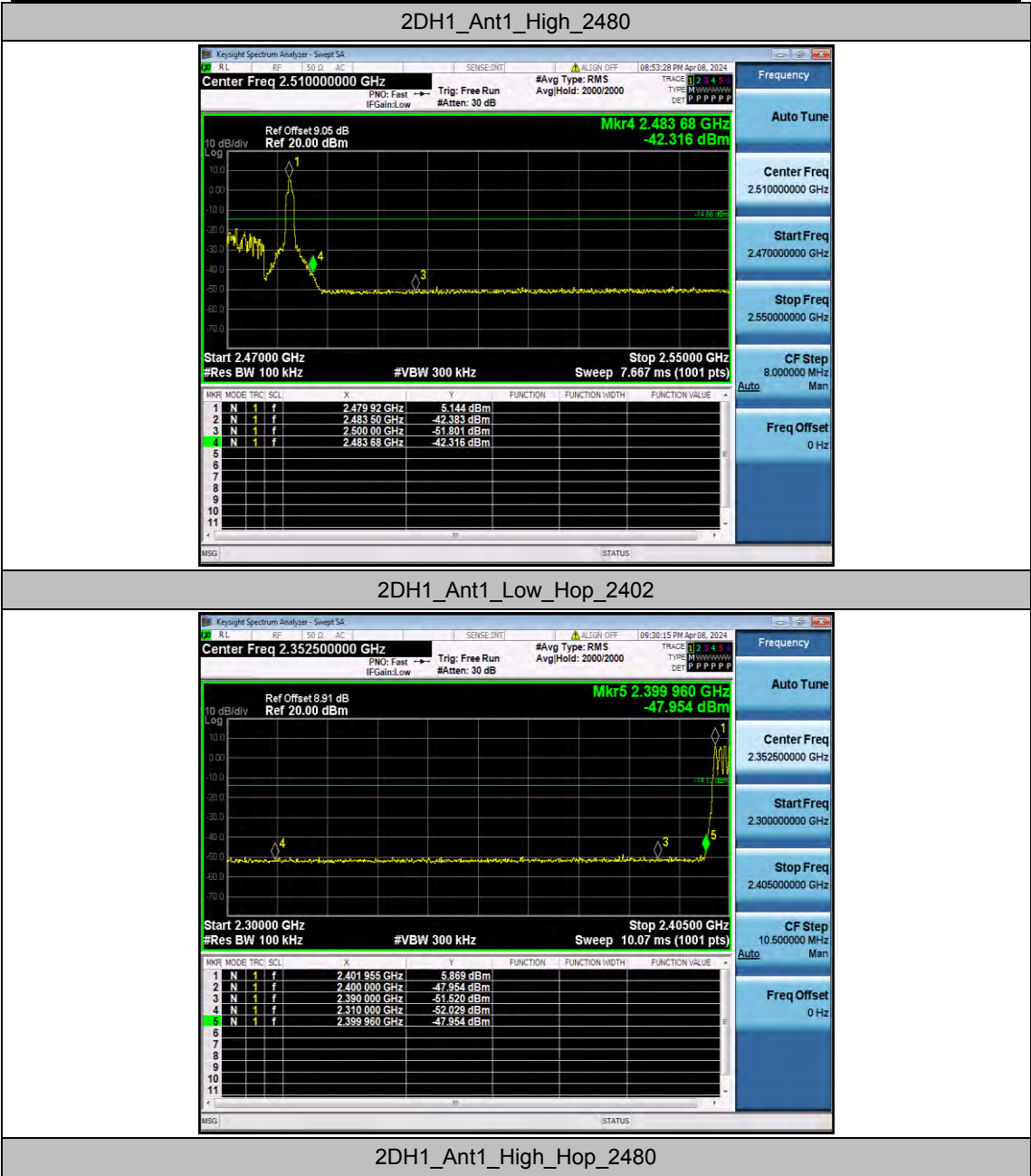


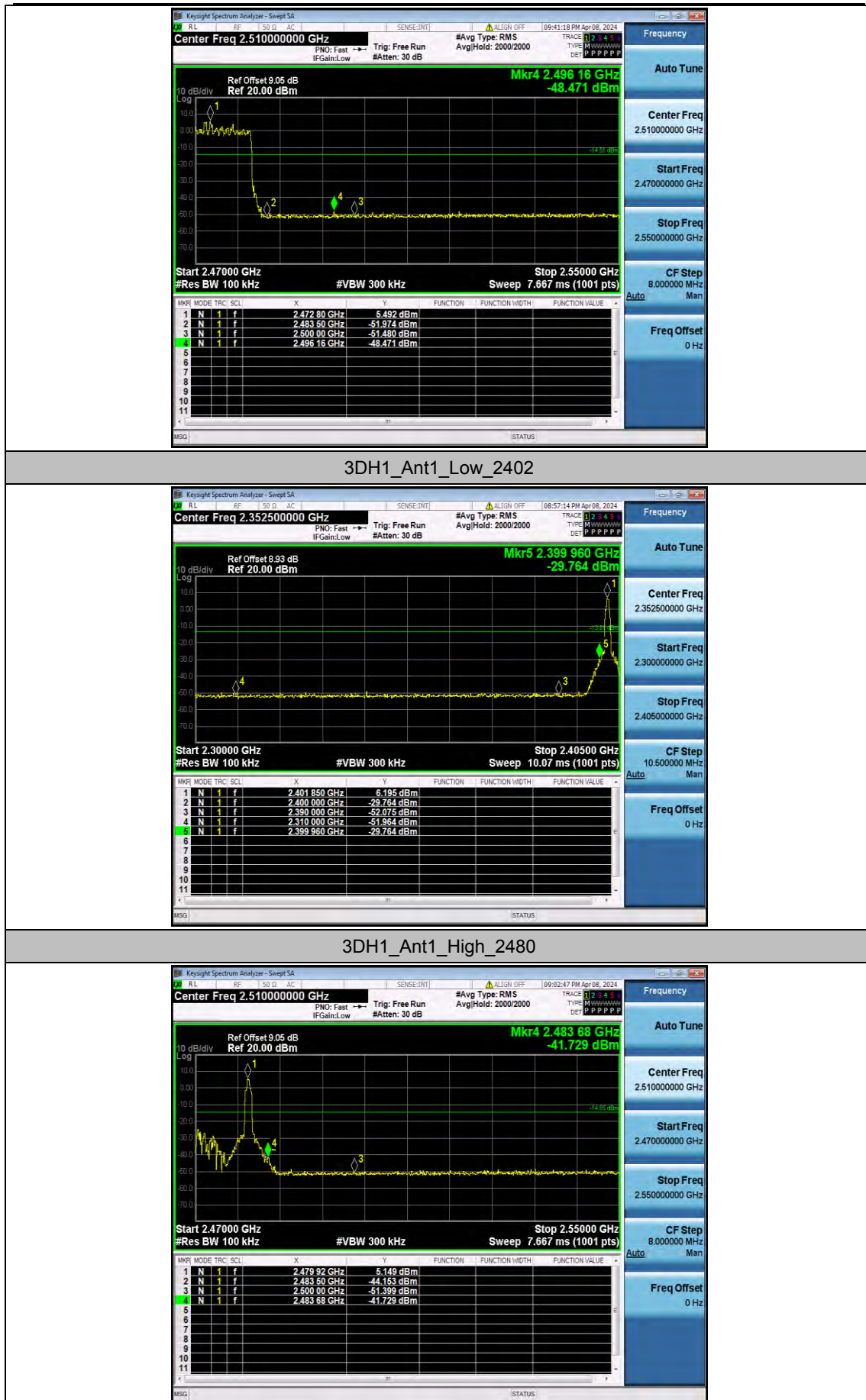
DH1_Ant1_High_2480



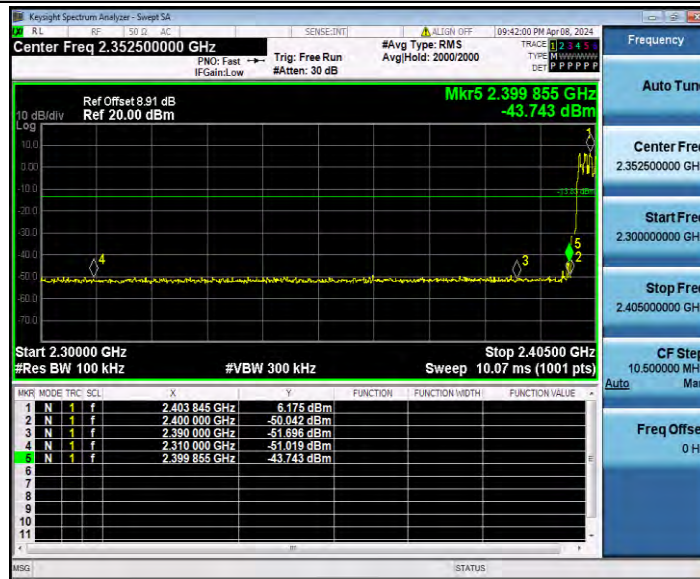
DH1_Ant1_Low_Hop_2402



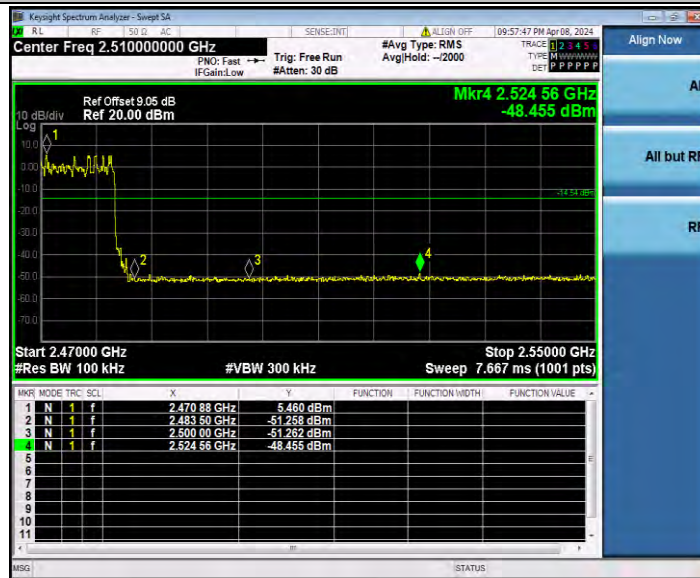




3DH1_Ant1_Low_Hop_2402



3DH1_Ant1_High_Hop_2480

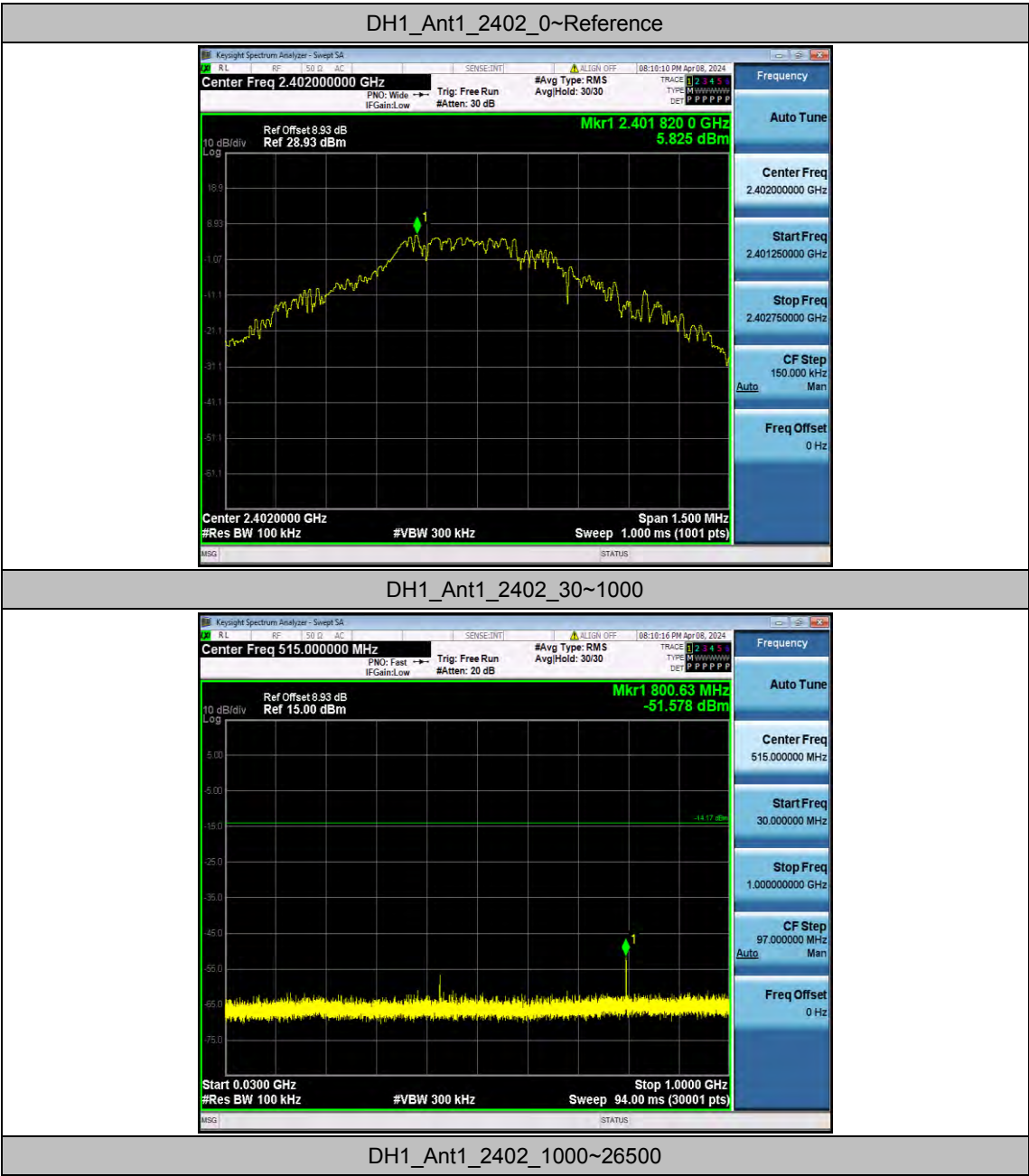


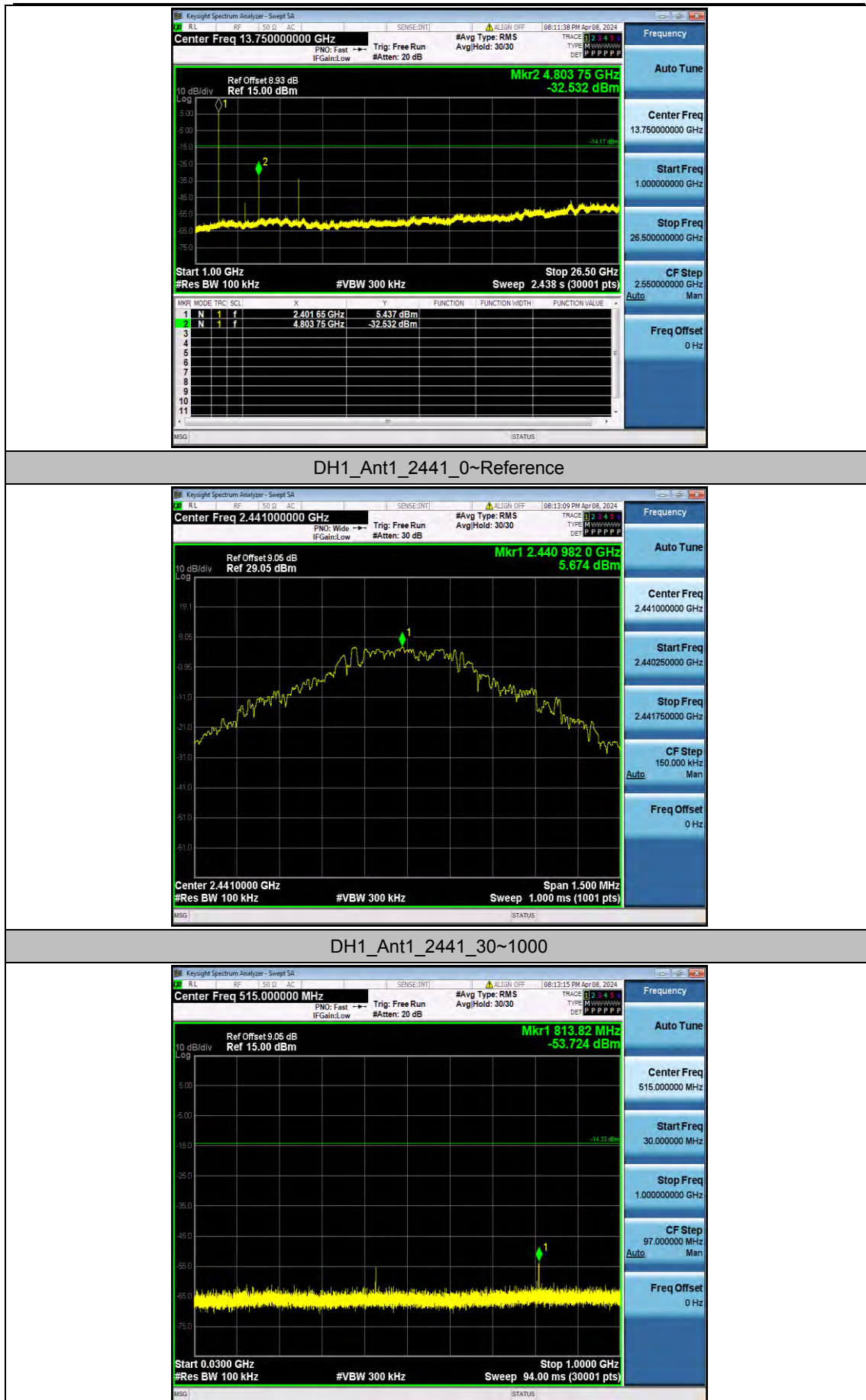
Appendix A.8: Conducted Spurious Emission

Test Result

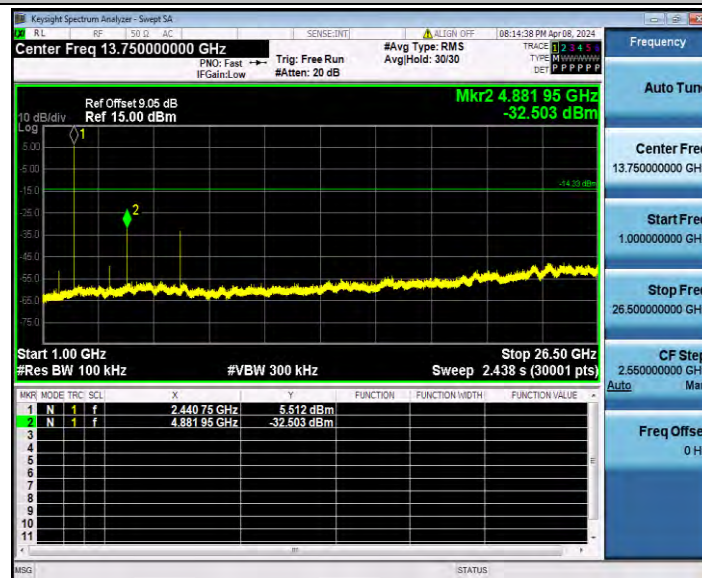
TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH1	Ant1	2402	Reference	5.83	5.83	---	PASS
			30~1000	5.83	-51.58	≤-14.17	PASS
			1000~26500	5.83	-32.53	≤-14.17	PASS
		2441	Reference	5.67	5.67	---	PASS
			30~1000	5.67	-53.72	≤-14.33	PASS
			1000~26500	5.67	-32.5	≤-14.33	PASS
		2480	Reference	5.01	5.01	---	PASS
			30~1000	5.01	-53.35	≤-14.99	PASS
			1000~26500	5.01	-31.17	≤-14.99	PASS
2DH1	Ant1	2402	Reference	6.06	6.06	---	PASS
			30~1000	6.06	-53.19	≤-13.94	PASS
			1000~26500	6.06	-33.92	≤-13.94	PASS
		2441	Reference	5.78	5.78	---	PASS
			30~1000	5.78	-53.25	≤-14.22	PASS
			1000~26500	5.78	-30.78	≤-14.22	PASS
		2480	Reference	5.06	5.06	---	PASS
			30~1000	5.06	-52.99	≤-14.94	PASS
			1000~26500	5.06	-29.28	≤-14.94	PASS
3DH1	Ant1	2402	Reference	5.61	5.61	---	PASS
			30~1000	5.61	-53.72	≤-14.39	PASS
			1000~26500	5.61	-32.57	≤-14.39	PASS
		2441	Reference	5.86	5.86	---	PASS
			30~1000	5.86	-52.98	≤-14.14	PASS
			1000~26500	5.86	-31.5	≤-14.14	PASS
		2480	Reference	4.39	4.39	---	PASS
			30~1000	4.39	-53.36	≤-15.61	PASS
			1000~26500	4.39	-31.32	≤-15.61	PASS

Test Graphs





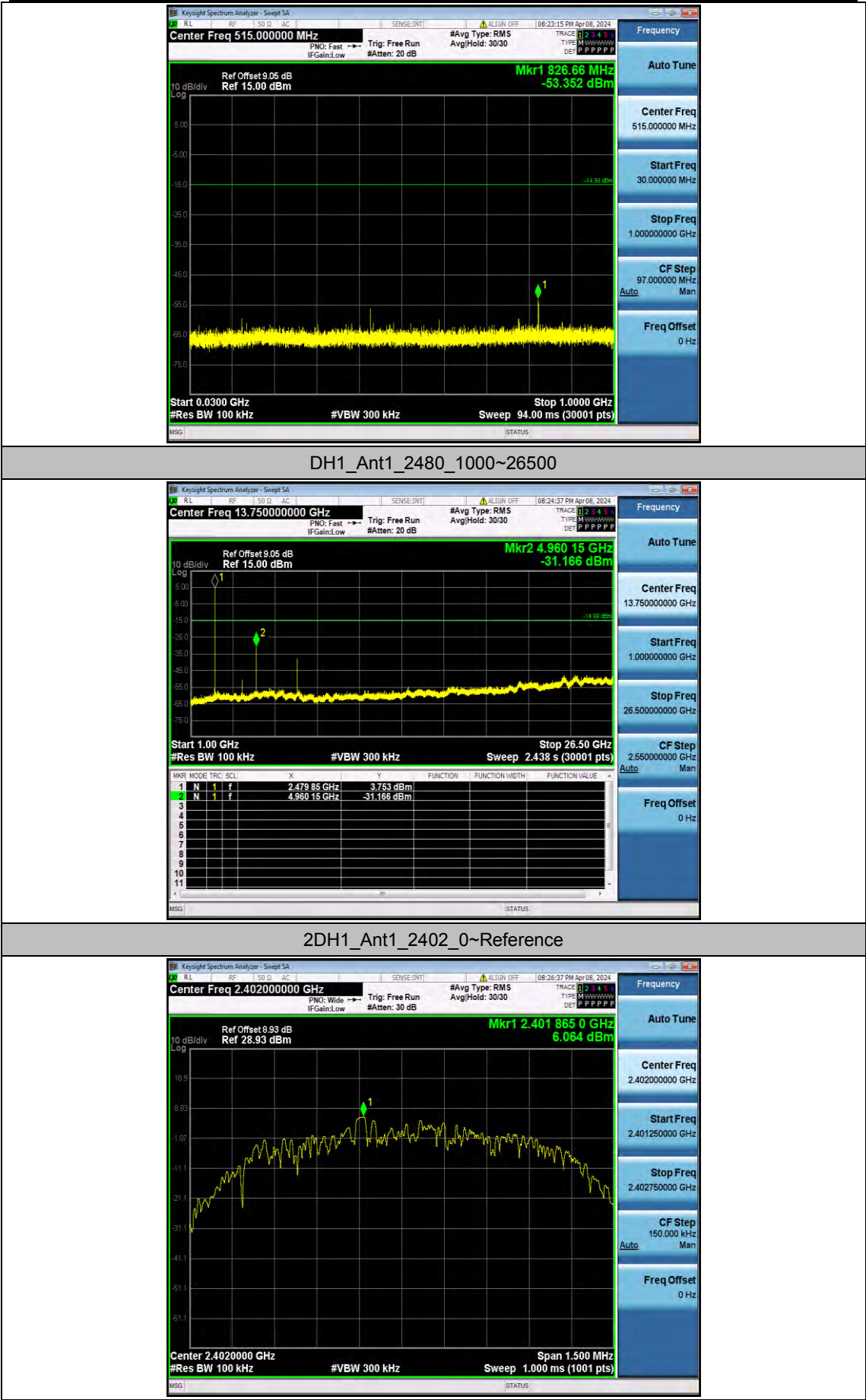
DH1_Ant1_2441_1000~26500

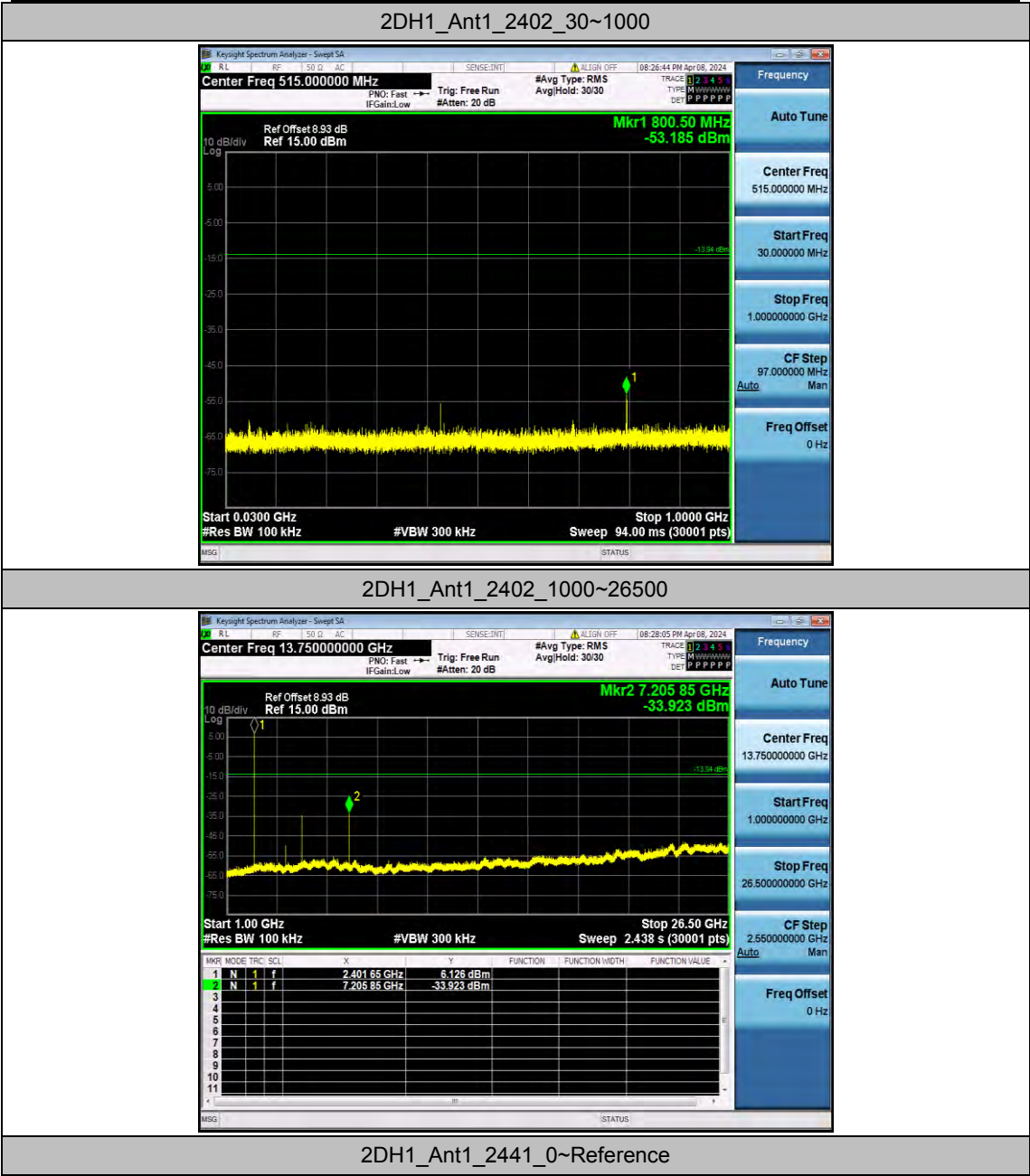


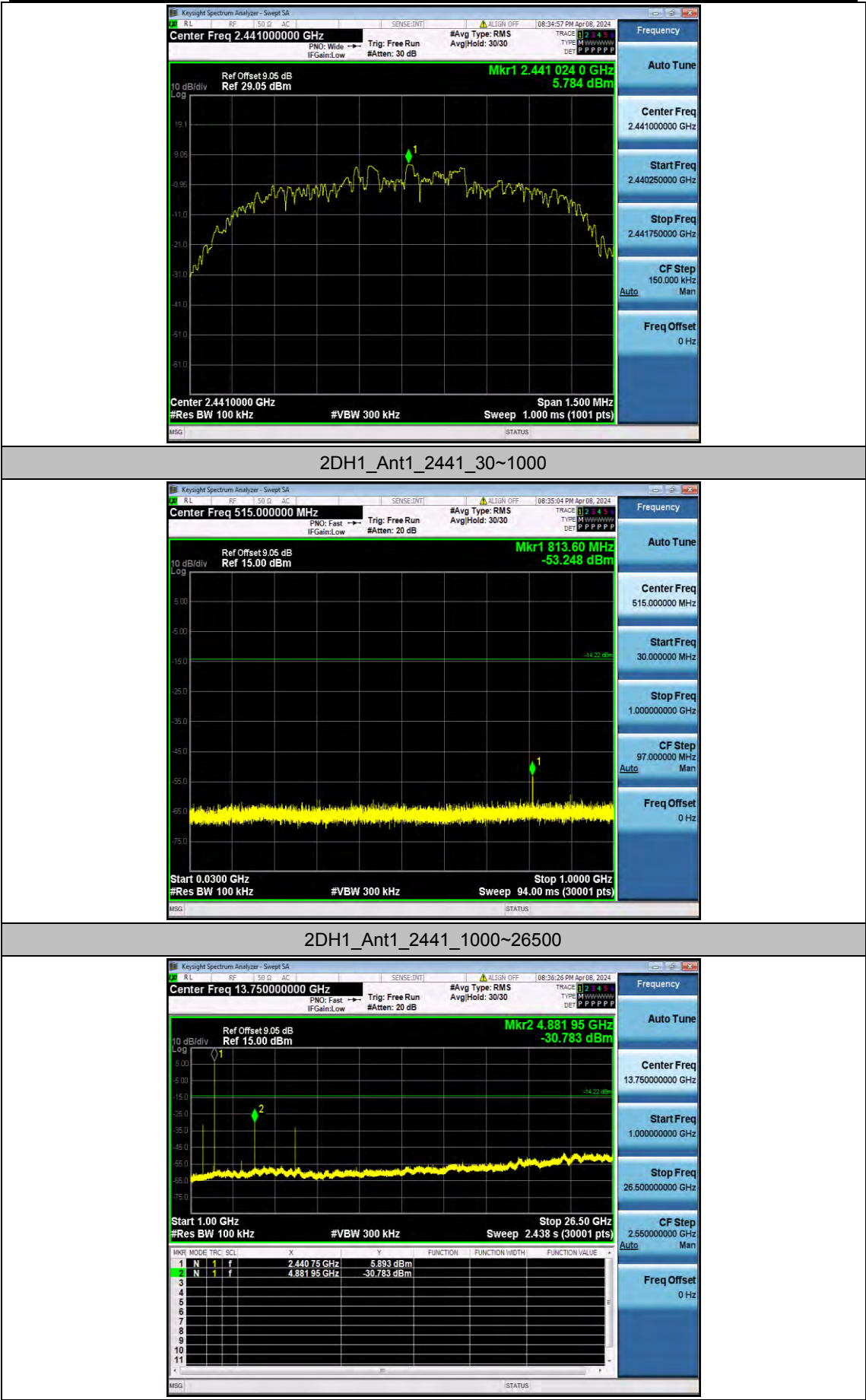
DH1_Ant1_2480_0~Reference

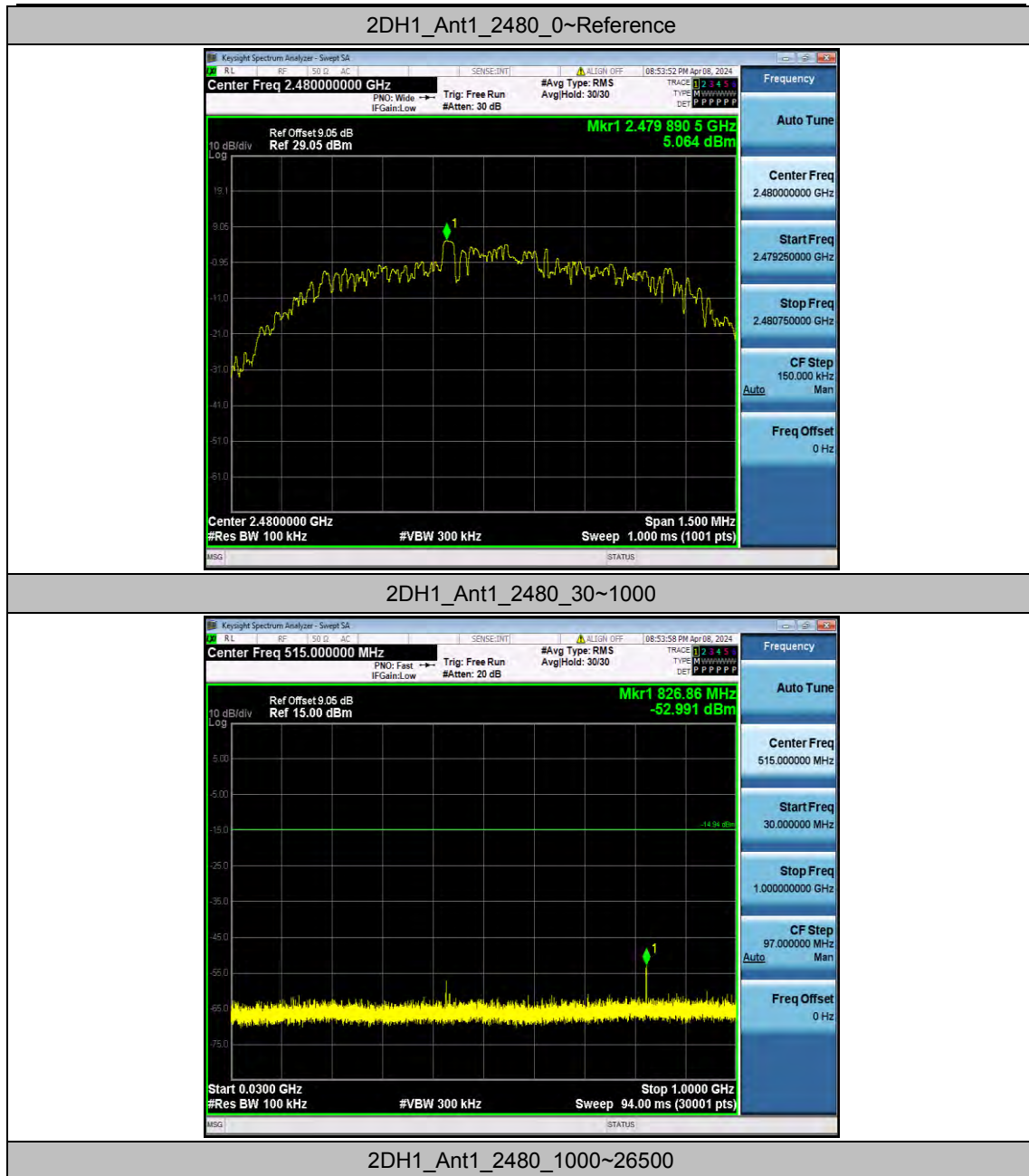


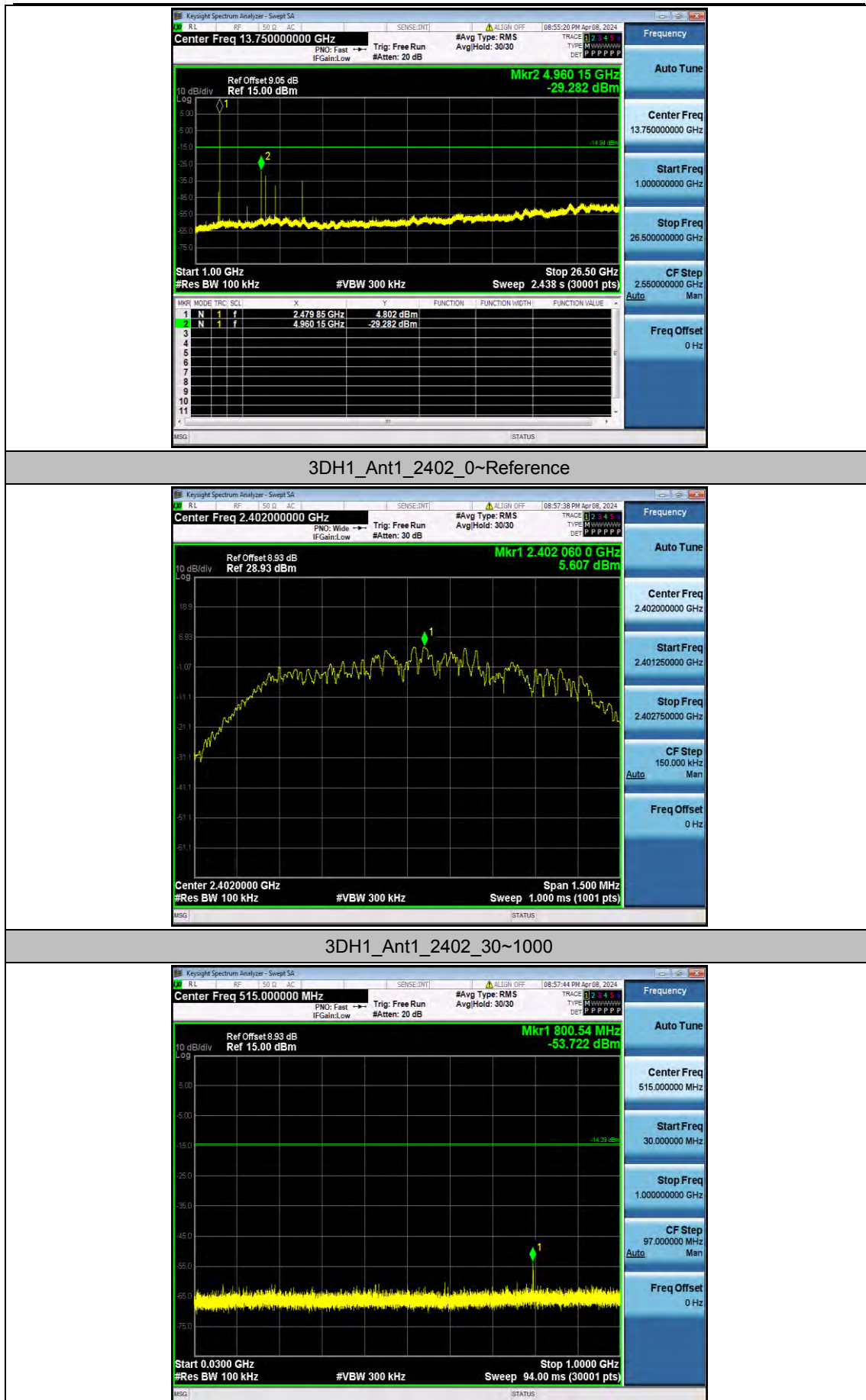
DH1_Ant1_2480_30~1000

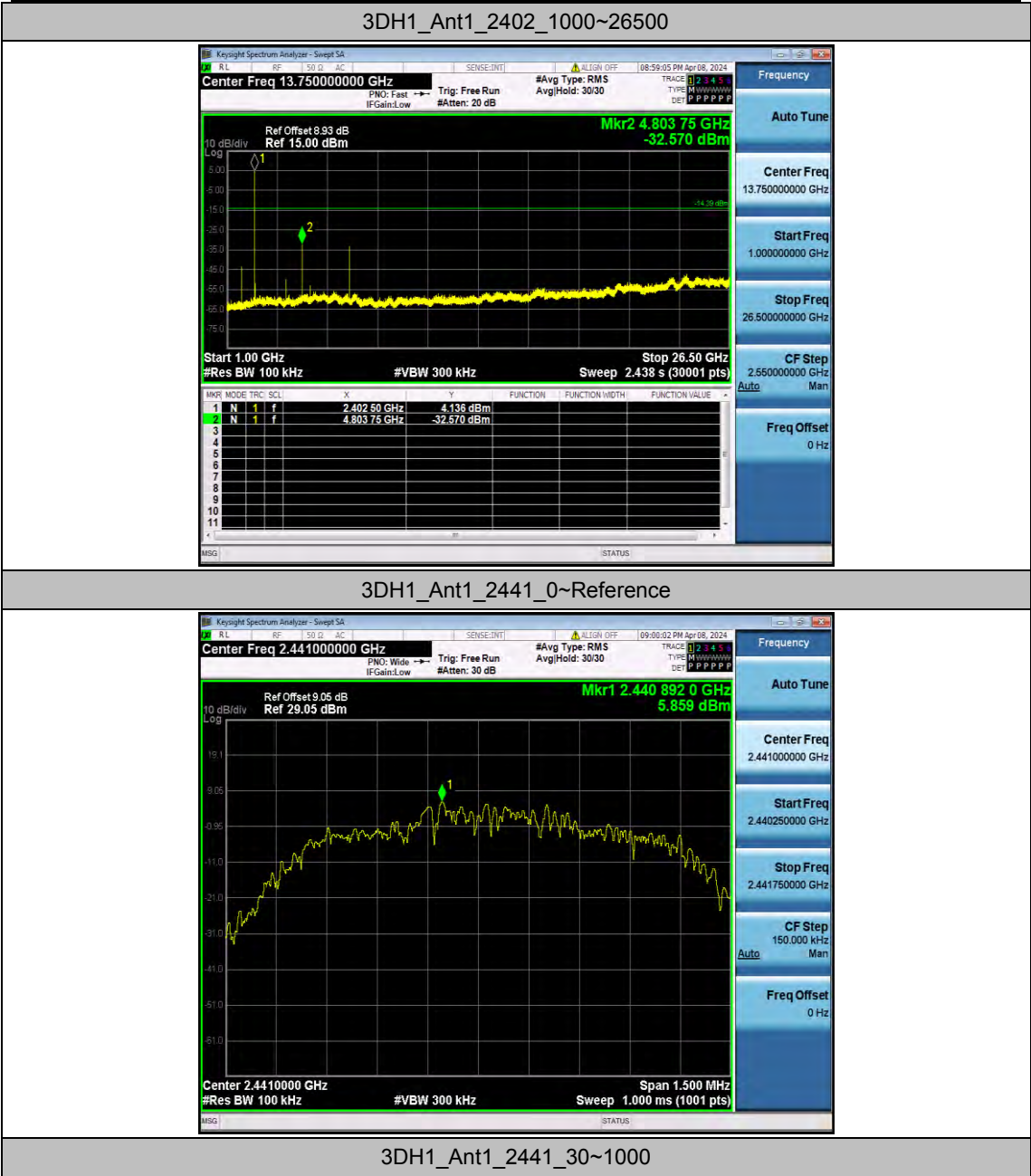


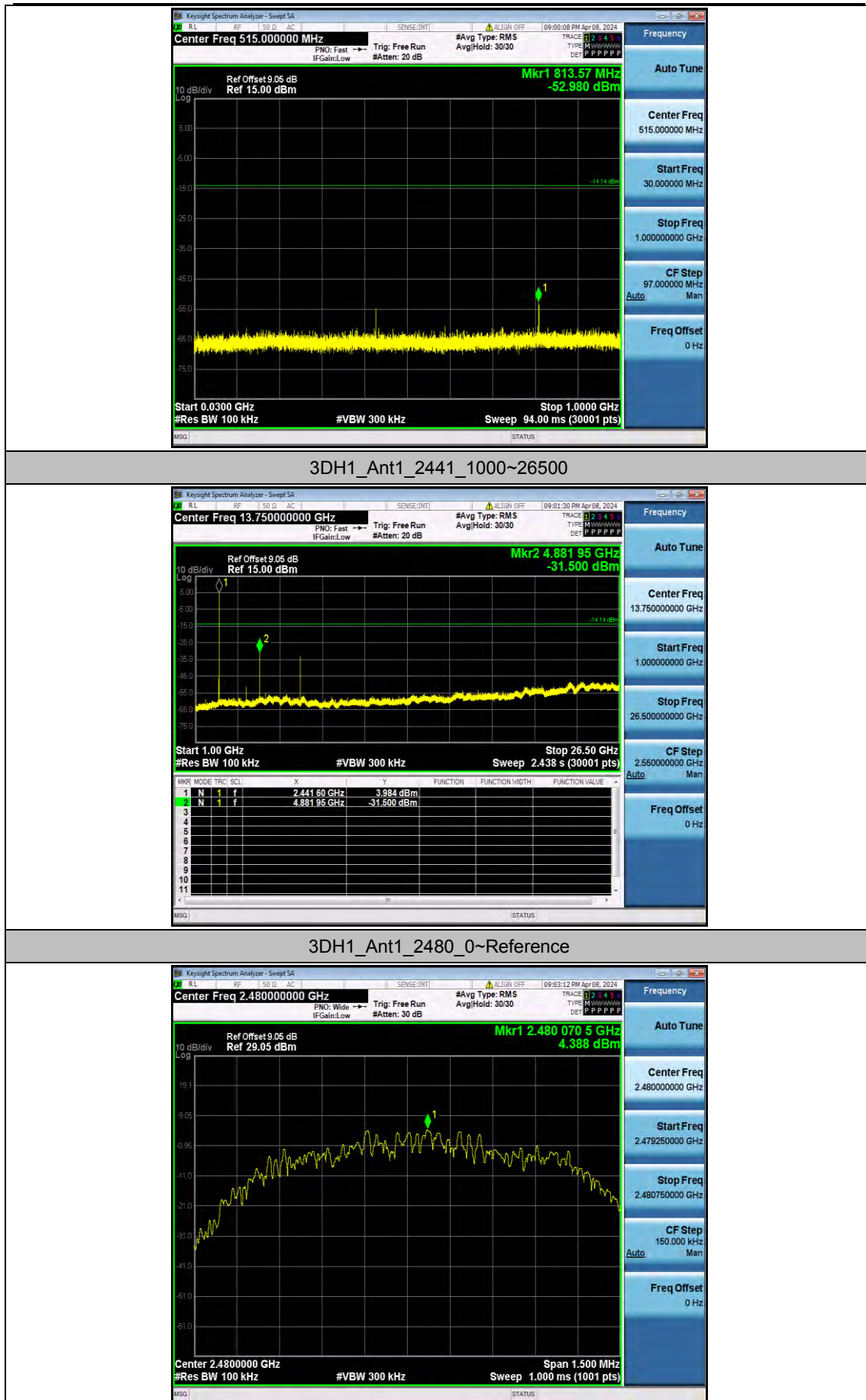


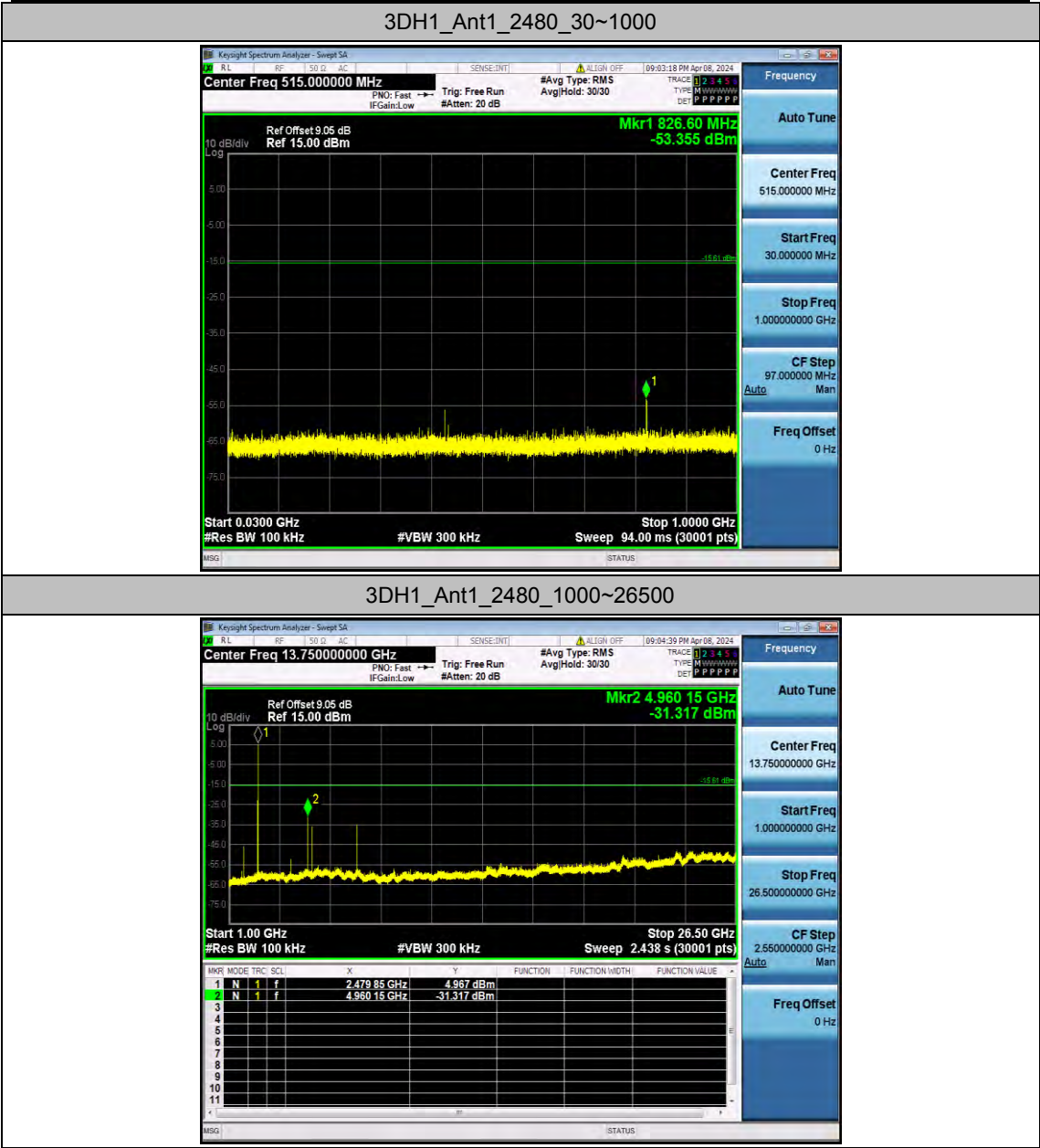












Appendix A.9: Emissions in Restricted Bands

Test Result

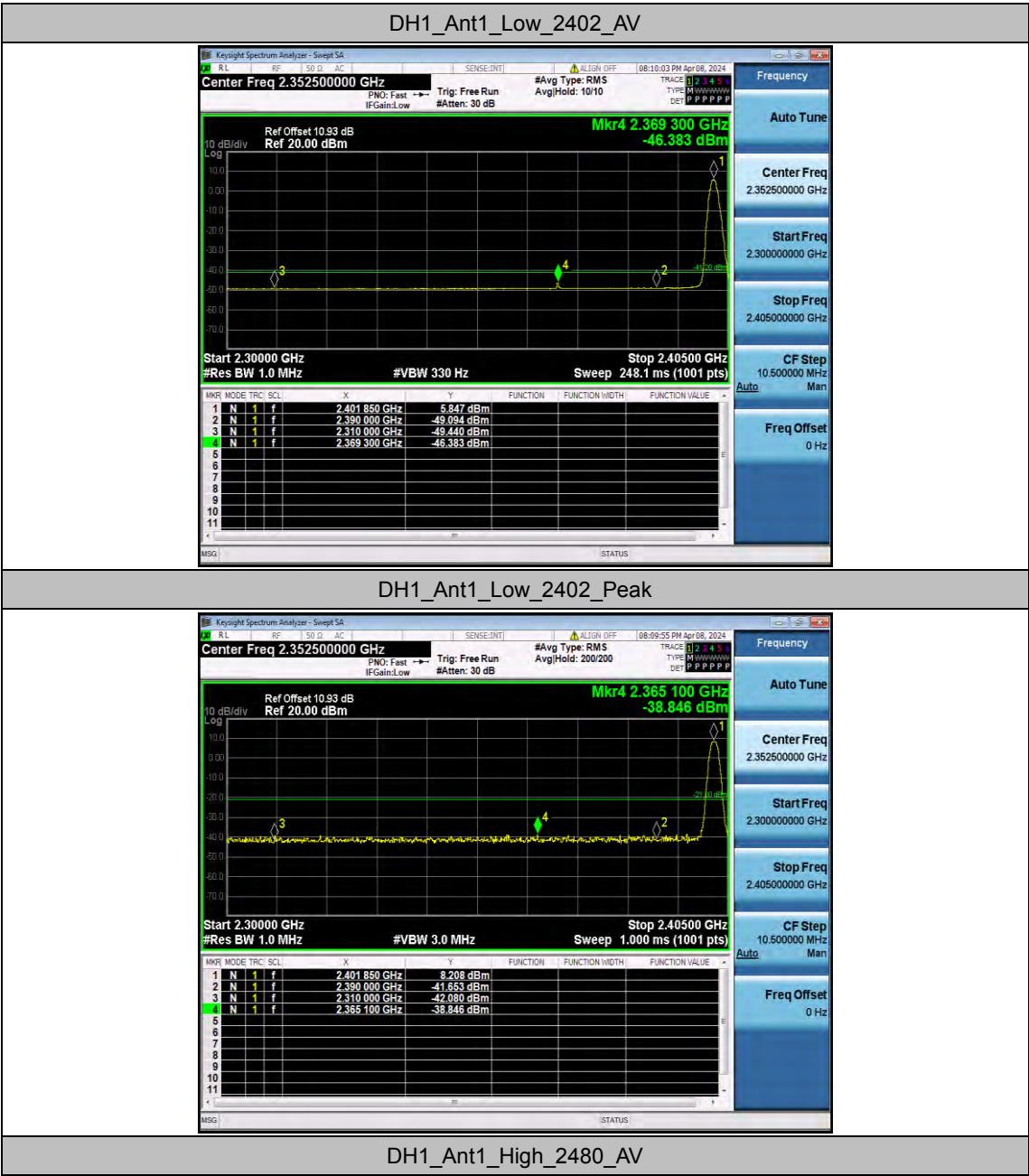
TestMode	Antenna	ChName	Freq(MHz)	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
DH1	Ant1	Low	2402	AV	2310.000	-49.44	≤-41.20	45.76	≤54	PASS
				AV	2369.300	-46.38	≤-41.20	48.82	≤54	PASS
				AV	2390.000	-49.09	≤-41.20	46.11	≤54	PASS
				Peak	2310.000	-42.08	≤-21.20	53.12	≤74	PASS
				Peak	2365.100	-38.85	≤-21.20	56.35	≤74	PASS
				Peak	2390.000	-41.65	≤-21.20	53.55	≤74	PASS
		High	2480	AV	2483.500	-47.89	≤-41.20	47.31	≤54	PASS
				AV	2483.520	-47.89	≤-41.20	47.31	≤54	PASS
				AV	2500.000	-48.64	≤-41.20	46.56	≤54	PASS
				Peak	2483.500	-41.53	≤-21.20	53.67	≤74	PASS
				Peak	2483.760	-38.64	≤-21.20	56.56	≤74	PASS
				Peak	2500.000	-41	≤-21.20	54.20	≤74	PASS
2DH1	Ant1	Low	2402	AV	2310.000	-49.4	≤-41.20	45.80	≤54	PASS
				AV	2372.030	-48.09	≤-41.20	47.11	≤54	PASS
				AV	2390.000	-49.01	≤-41.20	46.19	≤54	PASS
				Peak	2310.000	-41.47	≤-21.20	53.73	≤74	PASS
				Peak	2364.680	-38.33	≤-21.20	56.87	≤74	PASS
				Peak	2390.000	-41.3	≤-21.20	53.90	≤74	PASS
		High	2480	AV	2483.500	-47.46	≤-41.20	47.74	≤54	PASS
				AV	2484.960	-47.17	≤-41.20	48.03	≤54	PASS
				AV	2500.000	-48.82	≤-41.20	46.38	≤54	PASS
				Peak	2483.500	-43.64	≤-21.20	51.56	≤74	PASS
				Peak	2495.760	-39.63	≤-21.20	55.57	≤74	PASS
				Peak	2500.000	-43.02	≤-21.20	52.18	≤74	PASS
3DH1	Ant1	Low	2402	AV	2310.000	-49.34	≤-41.20	45.86	≤54	PASS
				AV	2376.860	-48.89	≤-41.20	46.31	≤54	PASS
				AV	2390.000	-49.04	≤-41.20	46.16	≤54	PASS
				Peak	2310.000	-42.29	≤-21.20	52.91	≤74	PASS
				Peak	2375.810	-39.02	≤-21.20	56.18	≤74	PASS
				Peak	2390.000	-41.54	≤-21.20	53.66	≤74	PASS
		High	2480	AV	2483.500	-47.2	≤-41.20	48.00	≤54	PASS
				AV	2484.000	-44.7	≤-41.20	50.50	≤54	PASS
				AV	2500.000	-48.75	≤-41.20	46.45	≤54	PASS
				Peak	2483.500	-41.03	≤-21.20	54.17	≤74	PASS
				Peak	2484.800	-34.62	≤-21.20	60.58	≤74	PASS

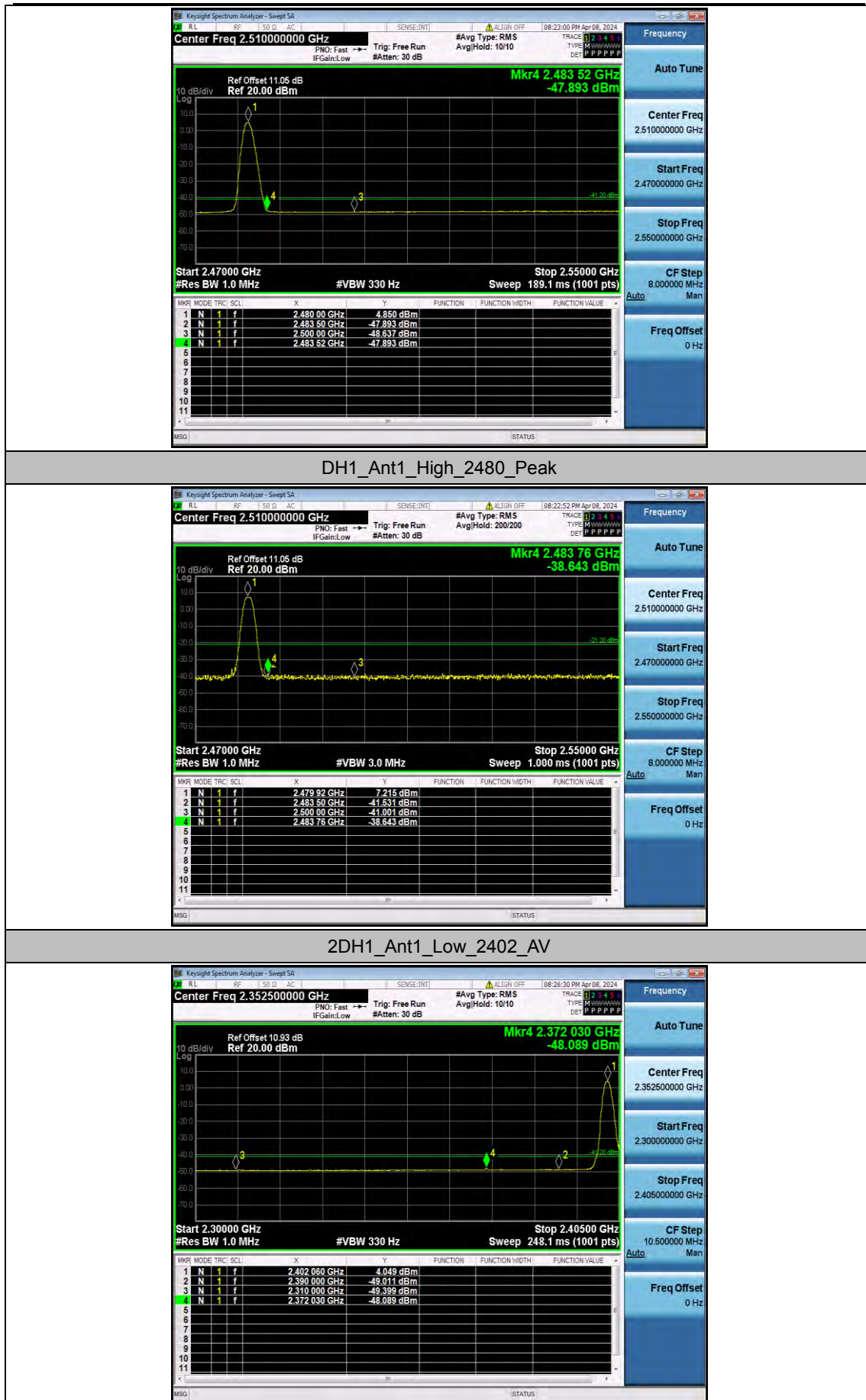
				Peak	2500.000	-41.03	≤ -21.20	54.17	≤ 74	PASS
--	--	--	--	------	----------	--------	---------------	-------	-----------	------

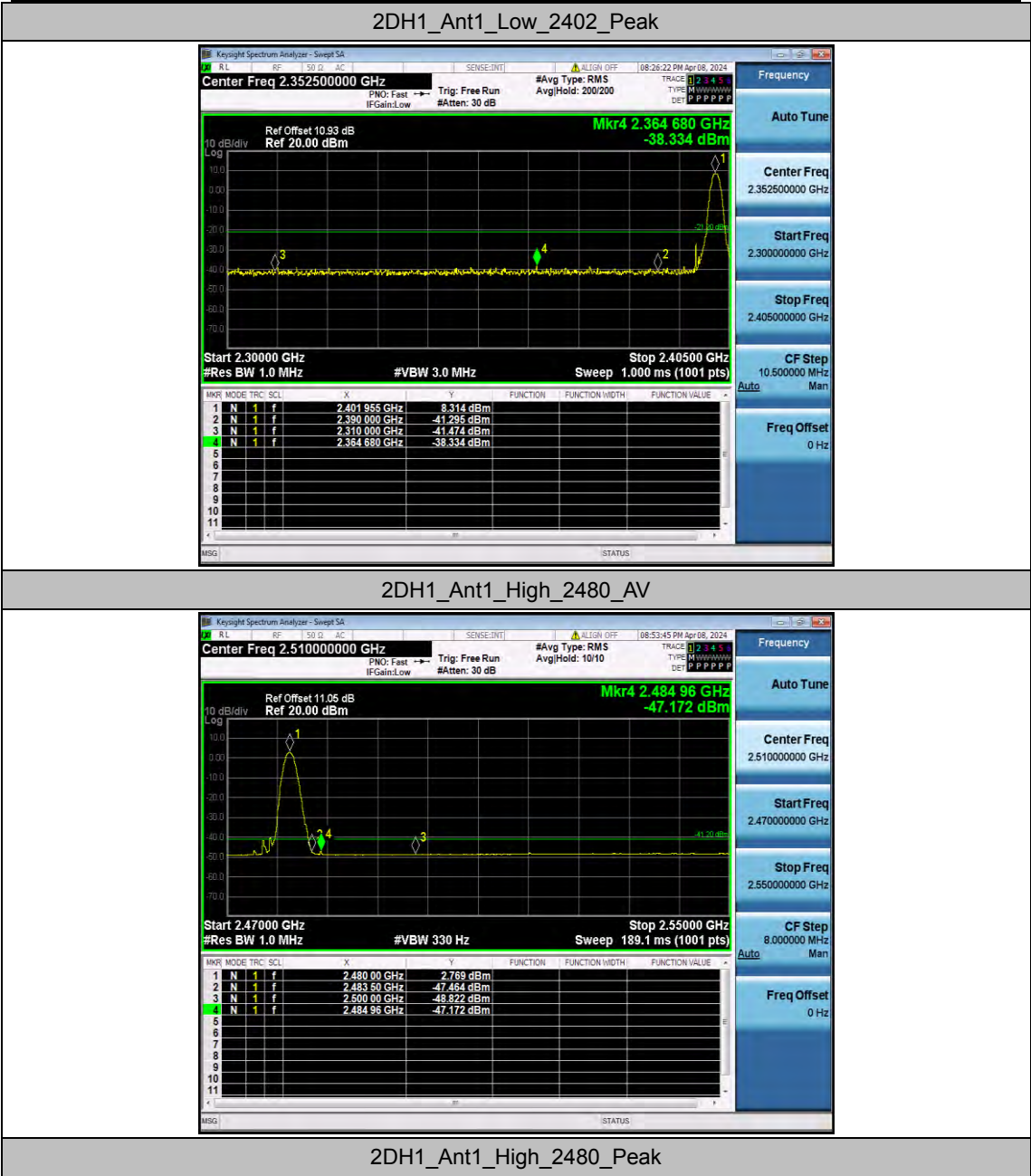
Note:

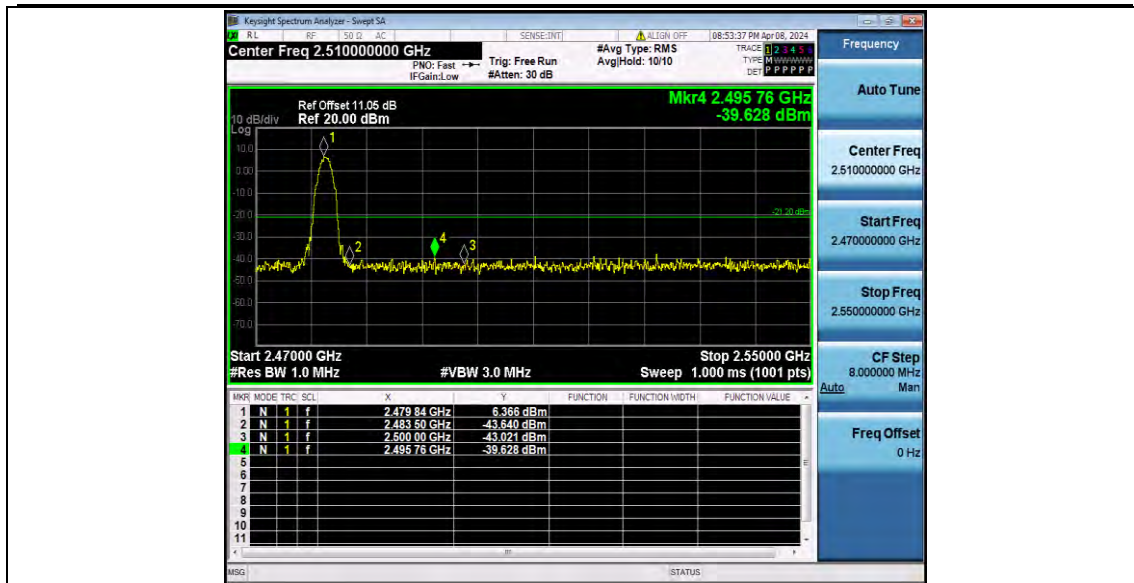
1. The Antenna Gain is compensated in the graph.
2. The Duty Cycle Factor and RBW Factor is compensated in the graph.
3. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Test Graphs









3DH1_Ant1_Low_2402_AV



3DH1_Ant1_Low_2402_Peak

