



Appendix Test Data for BT(BDR/EDR) (Conducted Measurement)

Product Name: Wireless Earbuds

Trade Mark: **LOGIC**

Test Model: Logic TW38S

FCC ID: O55TWS5025

Environmental Conditions

Temperature:	23.5°C
Relative Humidity:	58%
ATM Pressure:	100.0 kPa
Test Engineer:	Allen Lai
Supervised by:	Max Zhang
NOTE	N/A

Appendix A: 20dB Emission Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	20db EBW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
DH5	Ant1	2402	0.951	2401.514	2402.465	---	---
DH5	Ant1	2441	0.957	2440.511	2441.468	---	---
DH5	Ant1	2480	0.960	2479.511	2480.471	---	---
2DH5	Ant1	2402	1.275	2401.349	2402.624	---	---
2DH5	Ant1	2441	1.317	2440.316	2441.633	---	---
2DH5	Ant1	2480	1.281	2479.346	2480.627	---	---
3DH5	Ant1	2402	1.299	2401.331	2402.630	---	---
3DH5	Ant1	2441	1.308	2440.328	2441.636	---	---
3DH5	Ant1	2480	1.311	2479.328	2480.639	---	---

Note: offset(dB) = cable loss(dB) + attenuator factor(dB)





Test Graphs



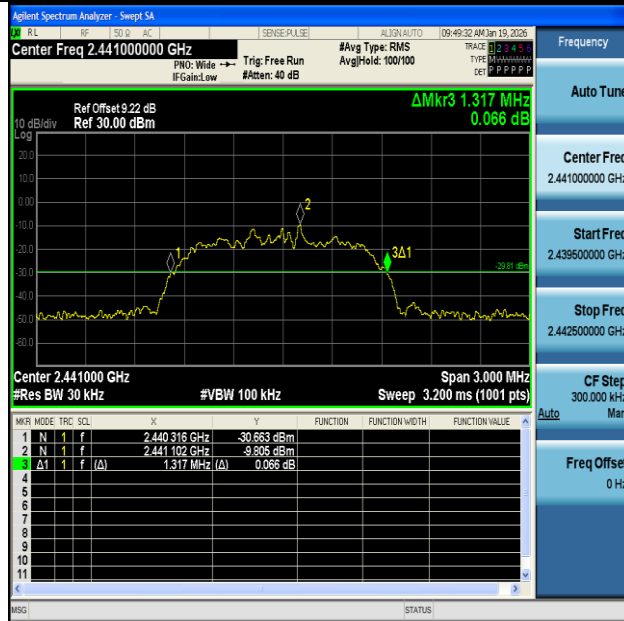


DH5-Ant1-2480



2DH5-Ant1-2402





2DH5-Ant1-2441



2DH5-Ant1-2480



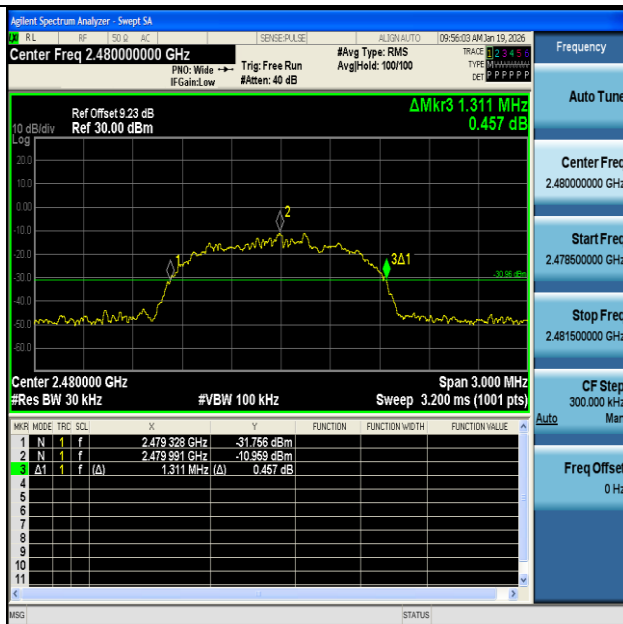


3DH5-Ant1-2402



3DH5-Ant1-2441







Appendix B: Occupied Channel Bandwidth

Test Result

Test Mode	Antenna	Frequency [MHz]	OCB [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
DH5	Ant1	2402	0.88021	2401.5405	2402.4207	---	---
DH5	Ant1	2441	0.87502	2440.5411	2441.4161	---	---
DH5	Ant1	2480	0.89249	2479.5347	2480.4272	---	---
2DH5	Ant1	2402	1.1769	2401.3893	2402.5662	---	---
2DH5	Ant1	2441	1.1807	2440.3851	2441.5658	---	---
2DH5	Ant1	2480	1.1817	2479.3849	2480.5666	---	---
3DH5	Ant1	2402	1.2002	2401.3728	2402.5730	---	---
3DH5	Ant1	2441	1.1846	2440.3832	2441.5678	---	---
3DH5	Ant1	2480	1.1959	2479.3770	2480.5729	---	---

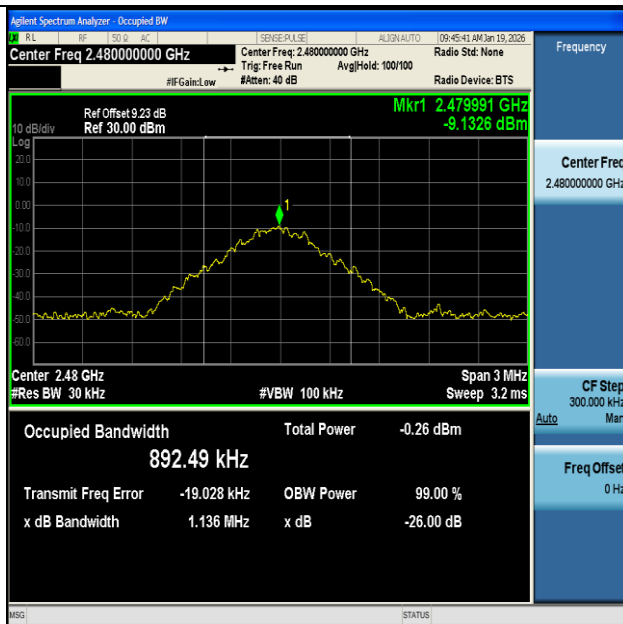
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



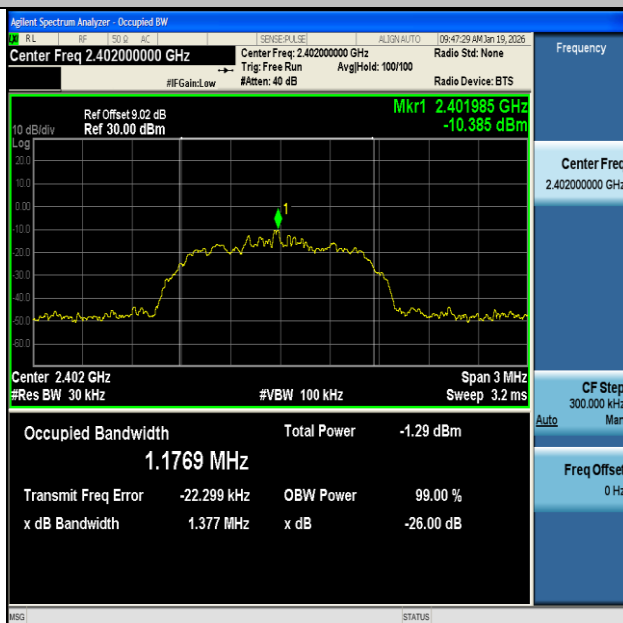


Test Graphs



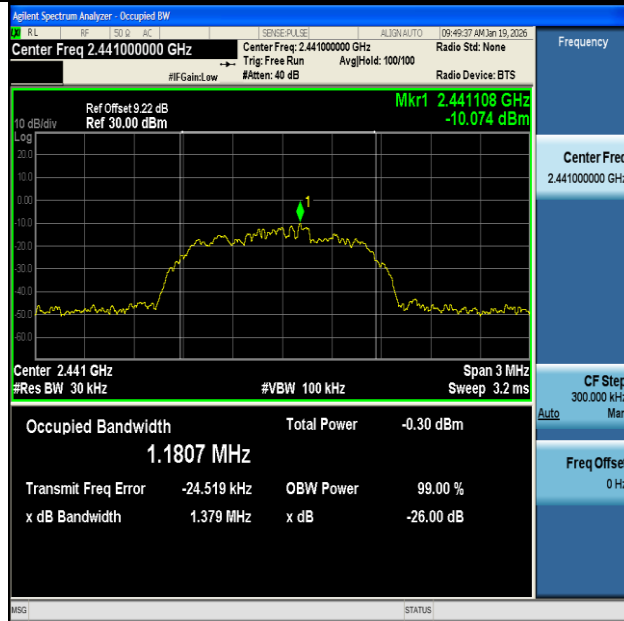


DH5-Ant1-2480

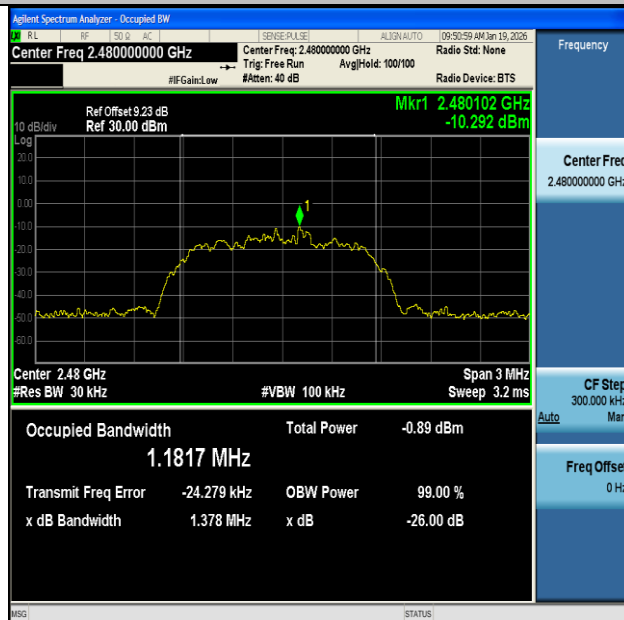


2DH5-Ant1-2402



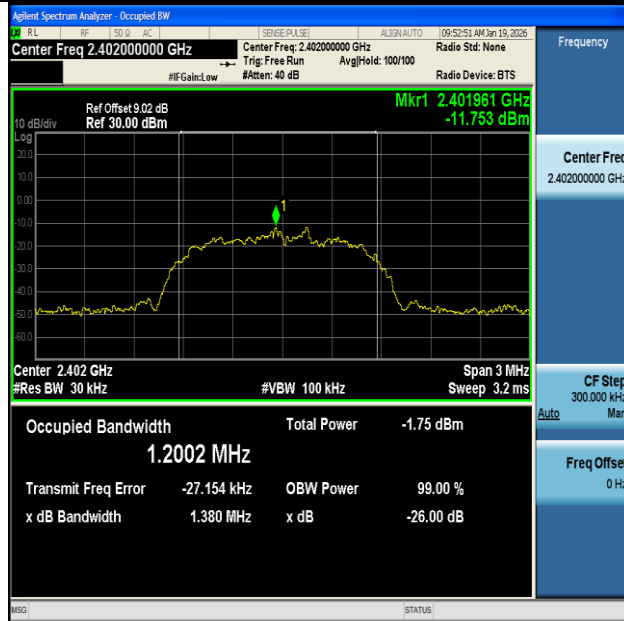


2DH5-Ant1-2441

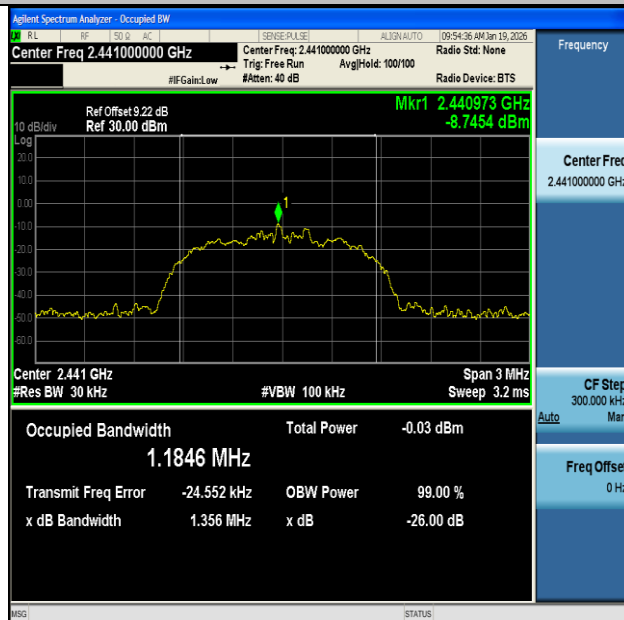


2DH5-Ant1-2480



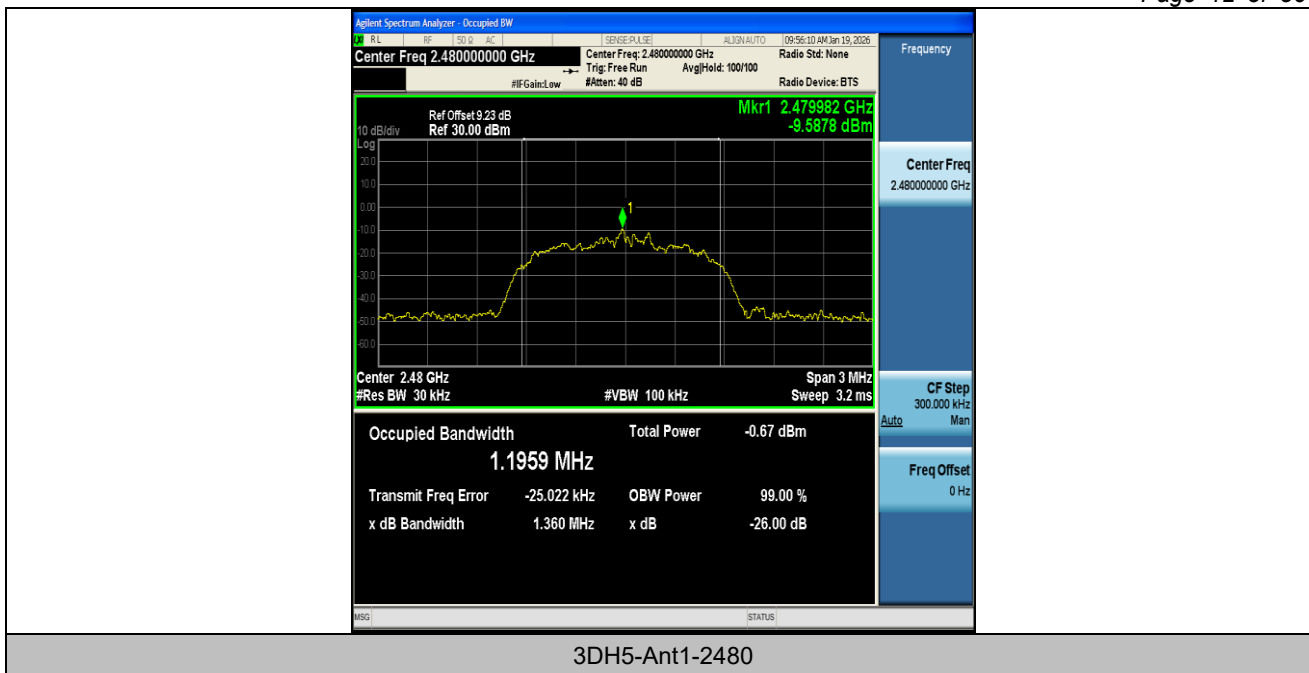


3DH5-Ant1-2402



3DH5-Ant1-2441







Appendix C: Maximum peak conducted output power

Test Result

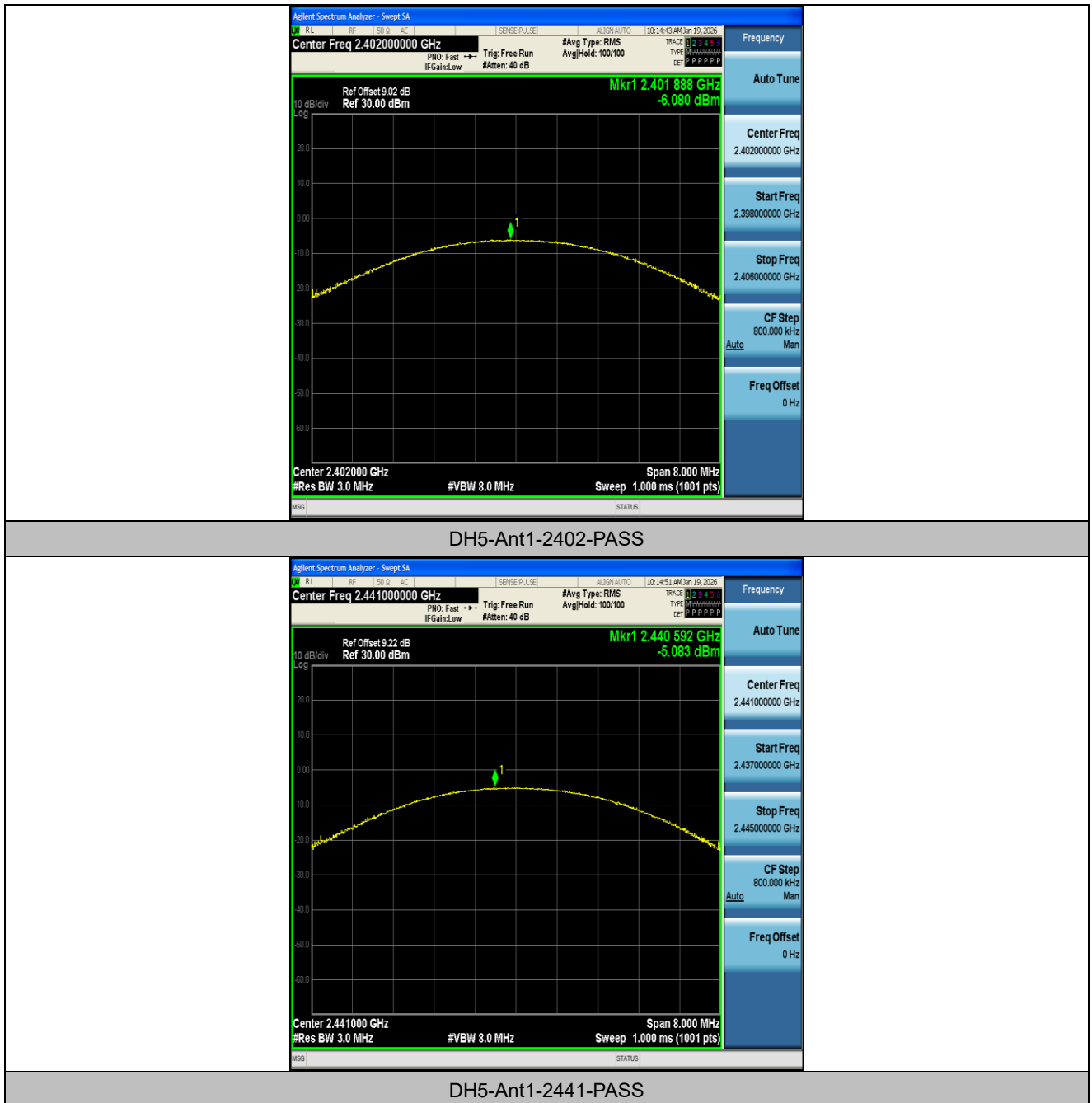
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Conducted Limit [dBm]	Verdict
DH5	Ant1	2402	-6.08	≤30	PASS
DH5	Ant1	2441	-5.08	≤30	PASS
DH5	Ant1	2480	-5.44	≤30	PASS
2DH5	Ant1	2402	-5.59	≤20.97	PASS
2DH5	Ant1	2441	-4.57	≤20.97	PASS
2DH5	Ant1	2480	-4.90	≤20.97	PASS
3DH5	Ant1	2402	-5.21	≤20.97	PASS
3DH5	Ant1	2441	-4.13	≤20.97	PASS
3DH5	Ant1	2480	-4.46	≤20.97	PASS

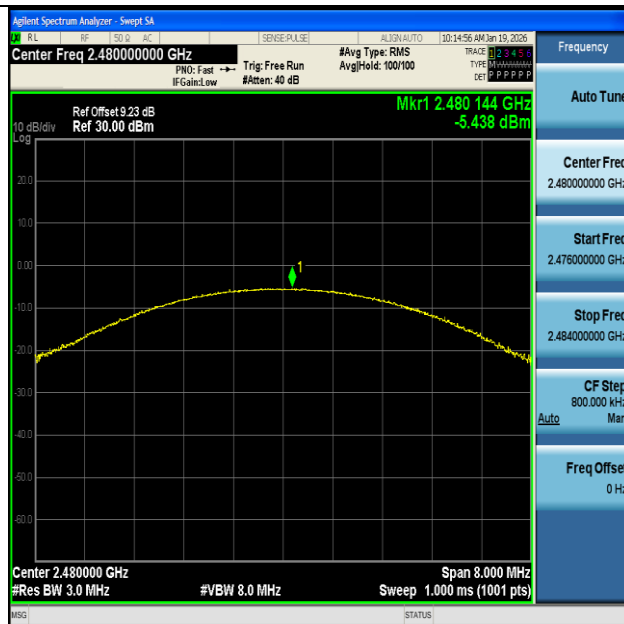
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



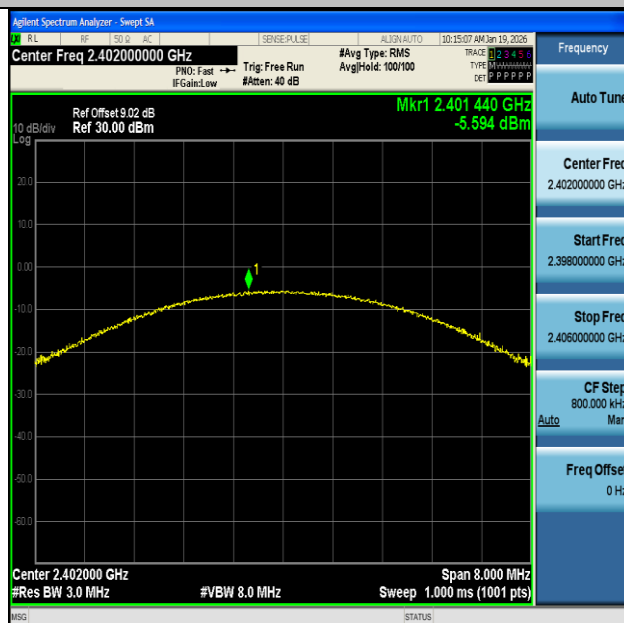


Test Graphs



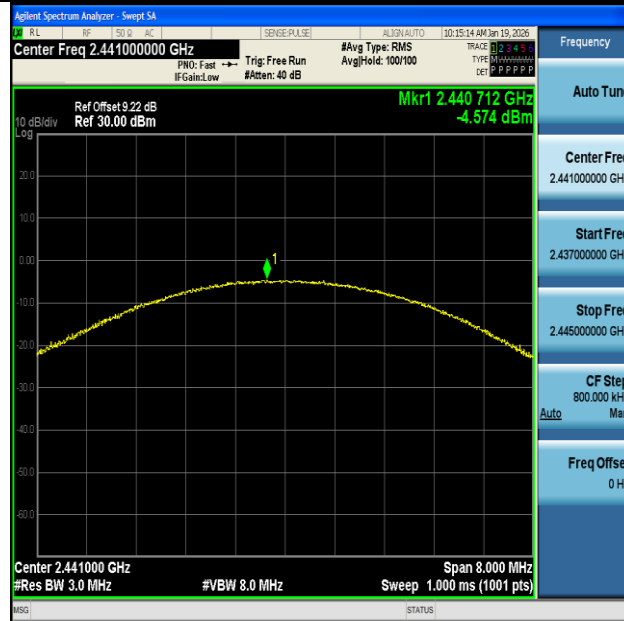


DH5-Ant1-2480-PASS

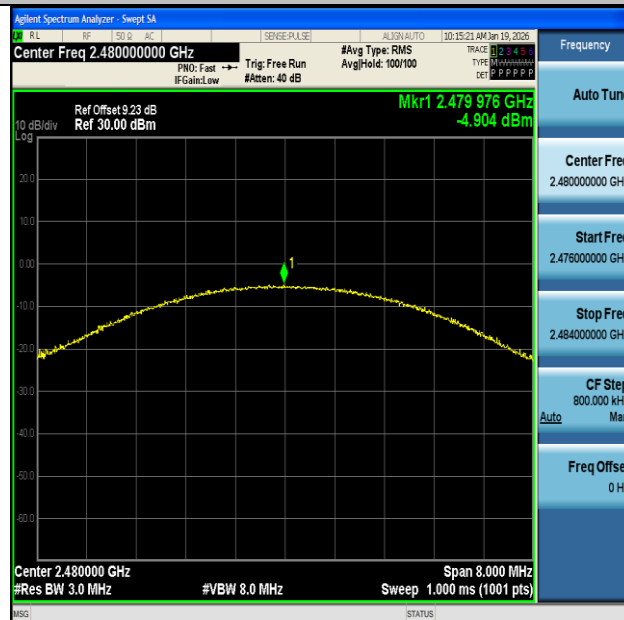


2DH5-Ant1-2402-PASS



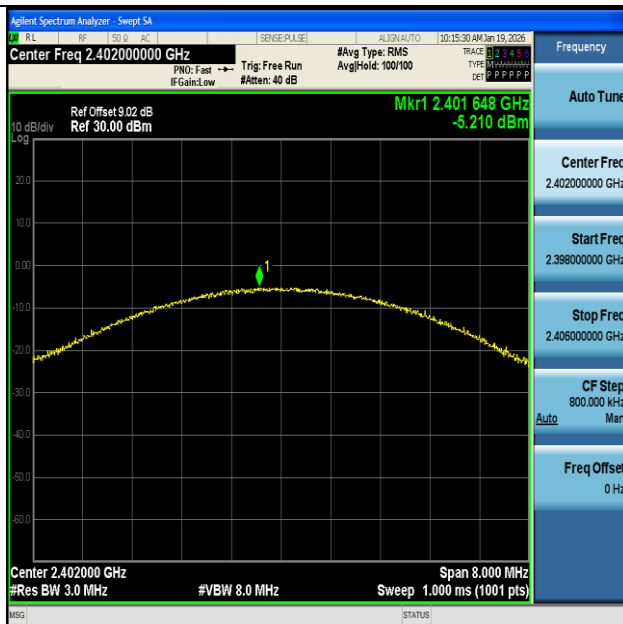


2DH5-Ant1-2441-PASS

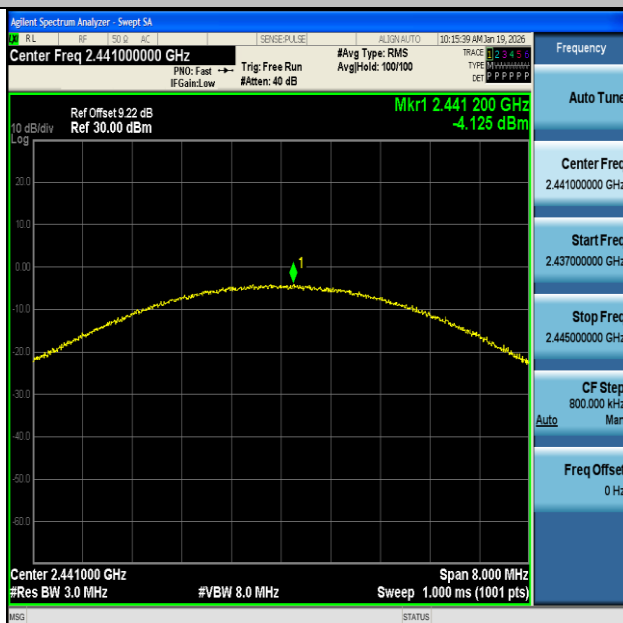


2DH5-Ant1-2480-PASS



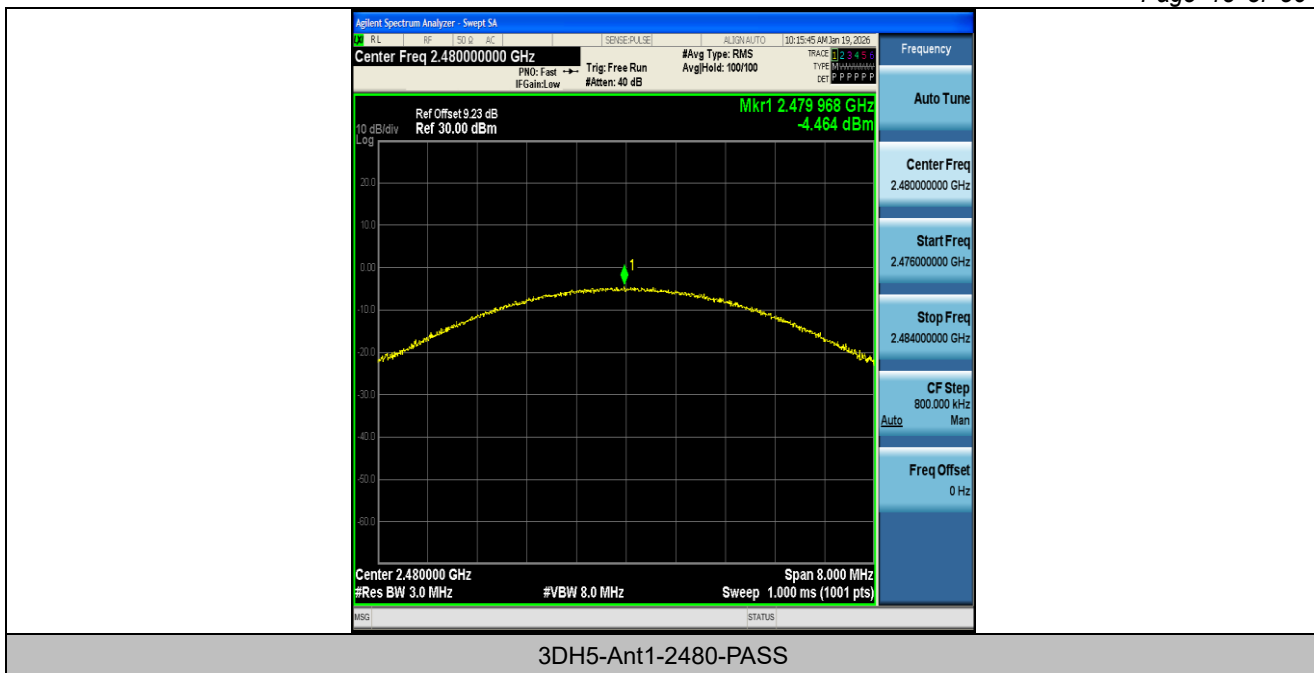


3DH5-Ant1-2402-PASS



3DH5-Ant1-2441-PASS







Appendix D: Carrier frequency separation

Test Result

Test Mode	Antenna	Frequency [MHz]	Result [MHz]	Limit [MHz]	Verdict
DH5	Ant1	Hop	0.994	≥0.960	PASS
2DH5	Ant1	Hop	1.006	≥0.878	PASS
3DH5	Ant1	Hop	1.02	≥0.874	PASS

Note: offset(dB) = cable loss(dB) + attenuator factor(dB)





Test Graphs





3DH5-Ant1-Hop-PASS



Appendix E: Time of occupancy

Test Result

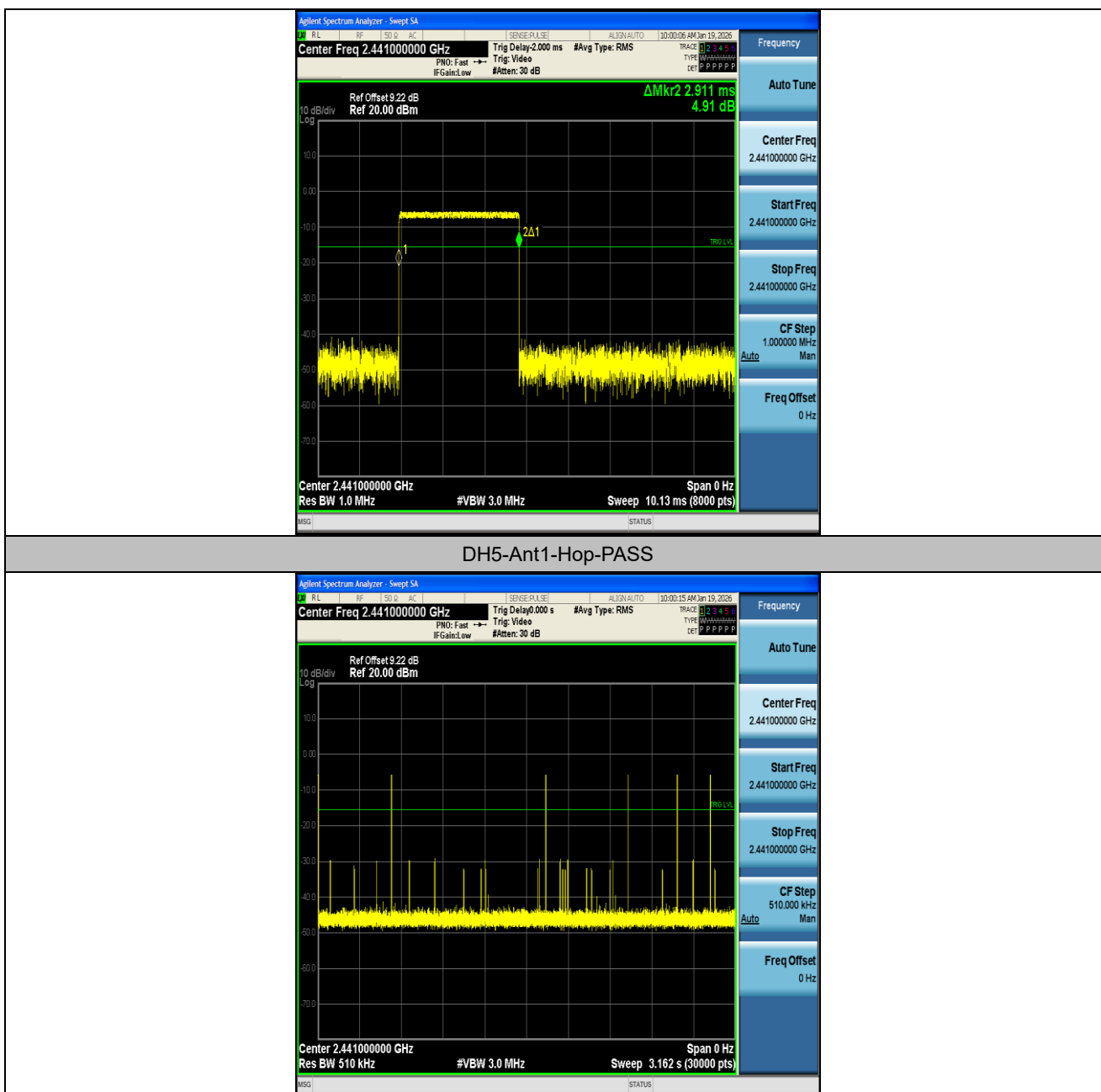
Test Mode	Antenna	Frequency [MHz]	Burst Width [ms]	TotalHops [Num]	Result [s]	Limit [s]	Verdict
DH5	Ant1	Hop	2.911	60	0.175	≤0.4	PASS
2DH5	Ant1	Hop	2.917	130	0.379	≤0.4	PASS
3DH5	Ant1	Hop	2.920	100	0.292	≤0.4	PASS

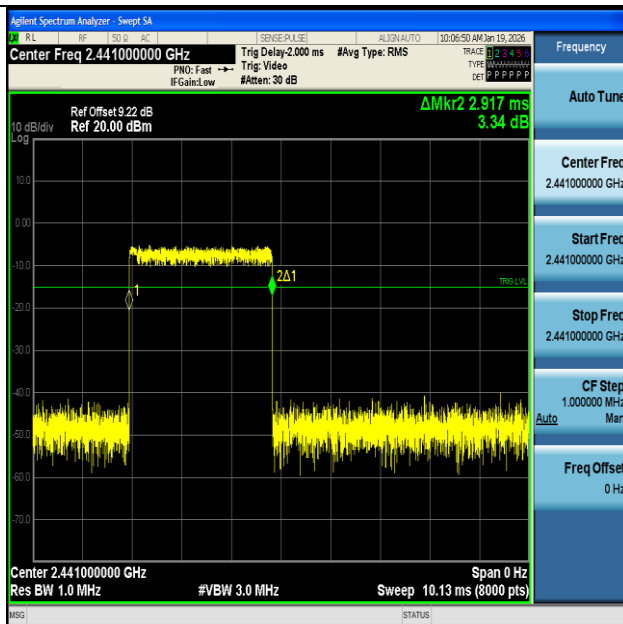
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



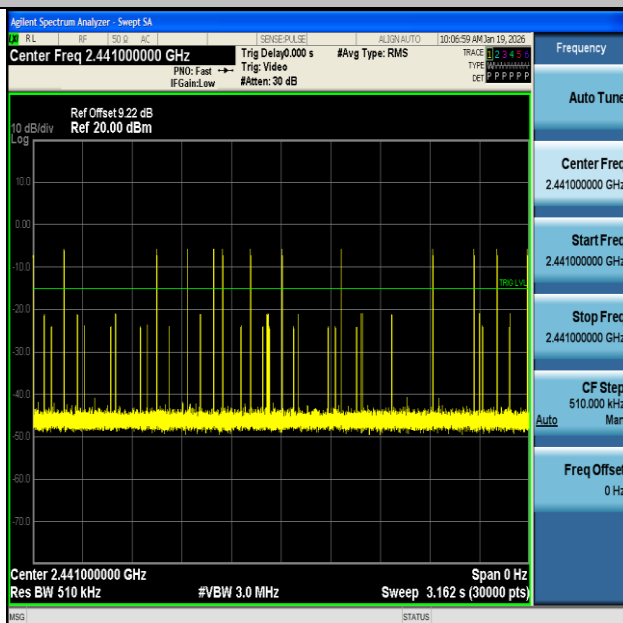


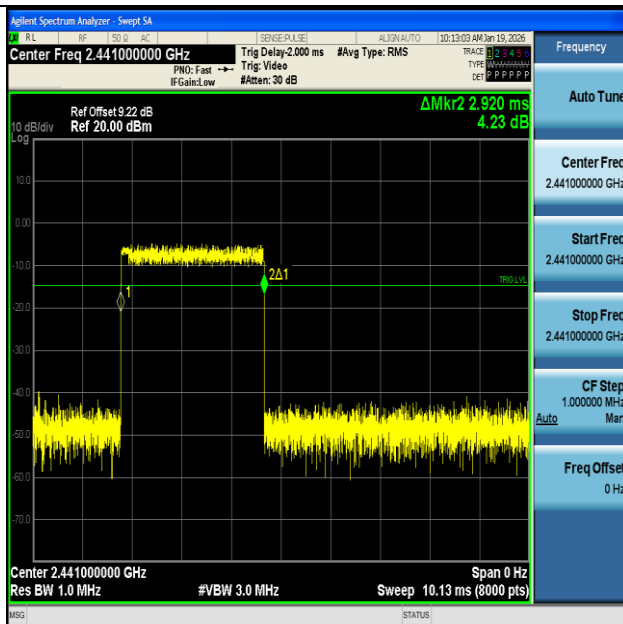
Test Graphs



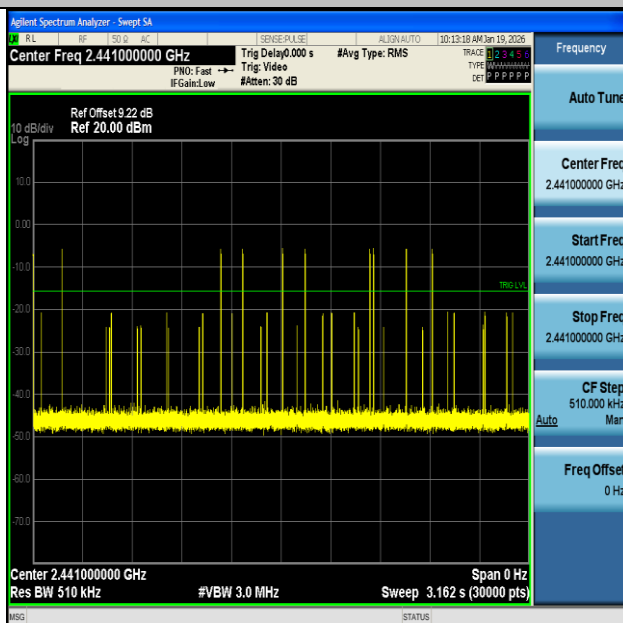


2DH5-Ant1-Hop-PASS





3DH5-Ant1-Hop-PASS





Appendix F: Number of hopping channels

Test Result

Test Mode	Antenna	Frequency [MHz]	Result [Num]	Limit [Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

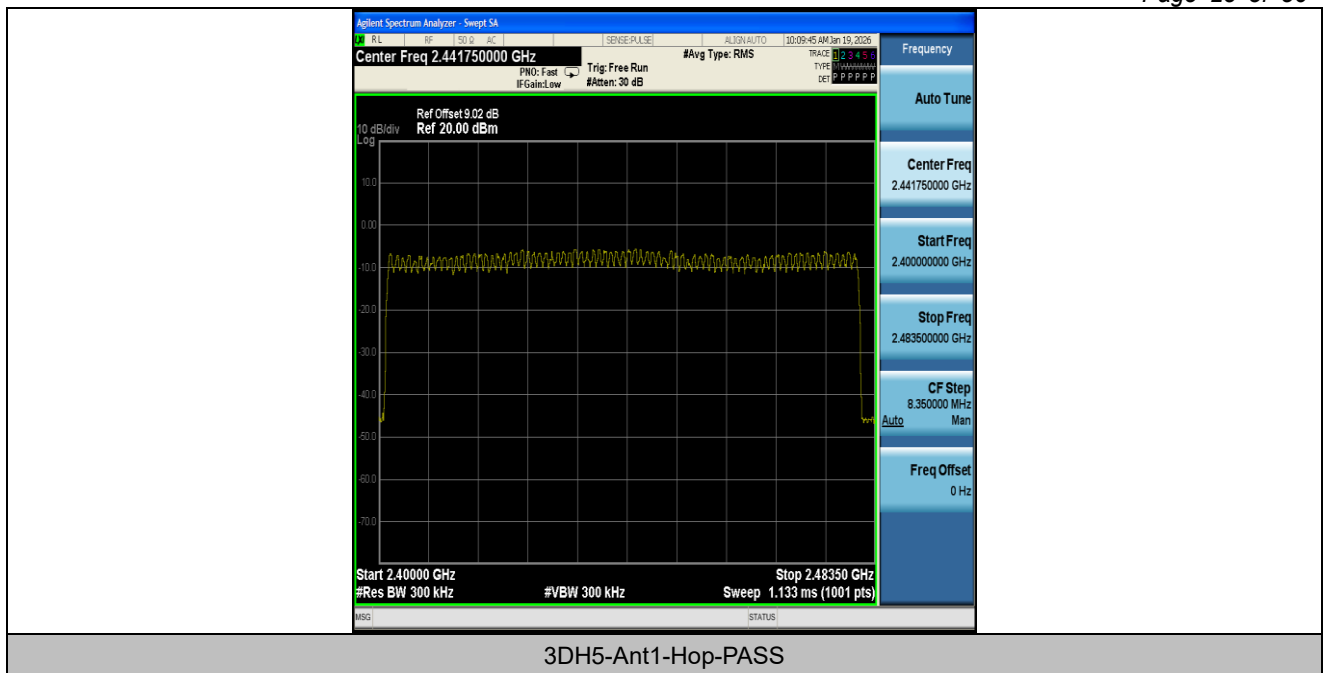
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)





Test Graphs







Appendix G: Band edge measurements

Test Result

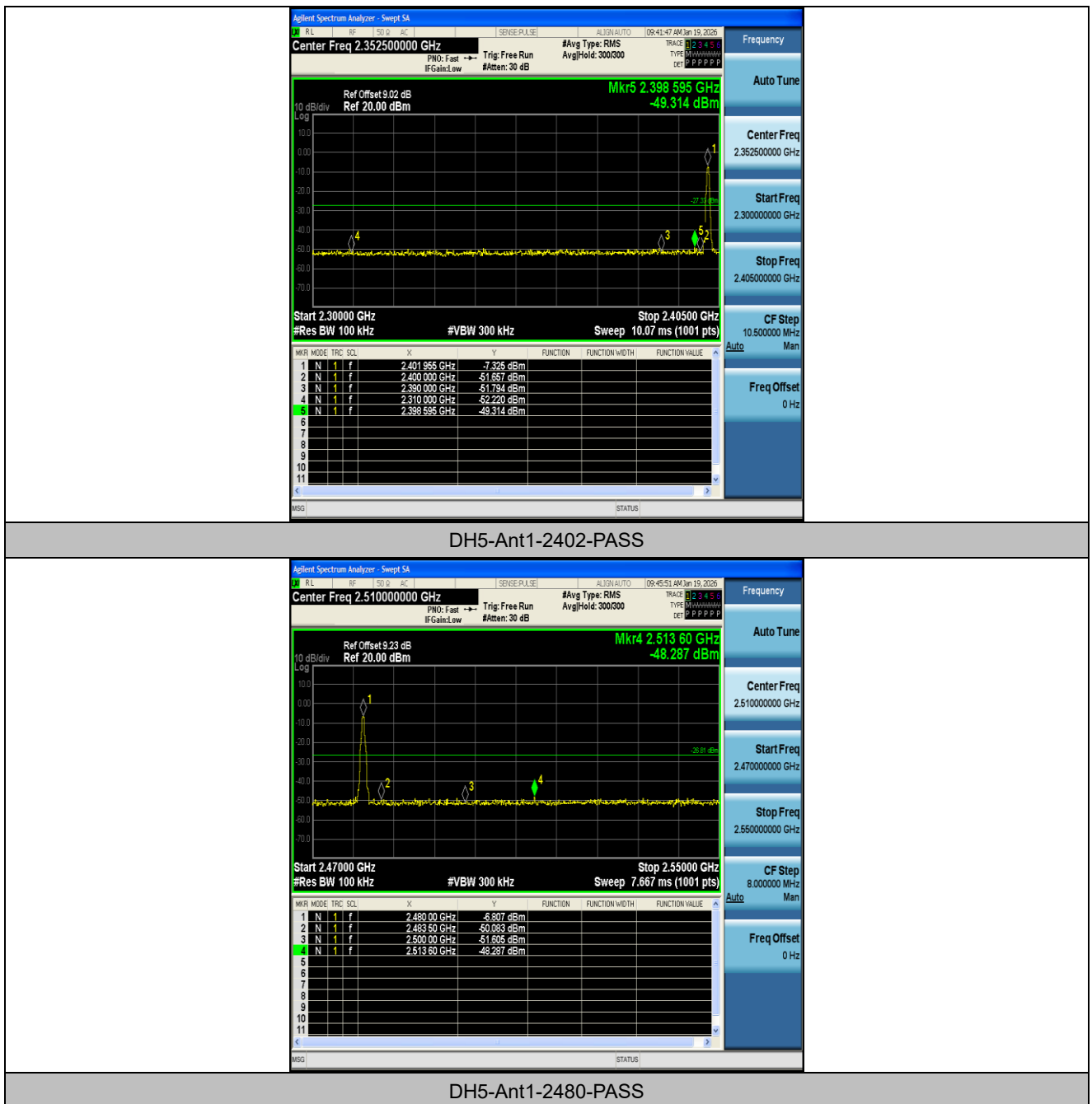
Test Mode	Antenna	Ch.Name	Frequency [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-7.33	-49.31	≤-27.33	PASS
DH5	Ant1	High	2480	-6.81	-48.29	≤-26.81	PASS
DH5	Ant1	Low	Hop_2402	-8.51	-49.73	≤-28.51	PASS
DH5	Ant1	High	Hop_2480	-6.31	-47.56	≤-26.31	PASS
2DH5	Ant1	Low	2402	-8.00	-49.67	≤-28	PASS
2DH5	Ant1	High	2480	-7.07	-48.37	≤-27.07	PASS
2DH5	Ant1	Low	Hop_2402	-8.63	-49.38	≤-28.63	PASS
2DH5	Ant1	High	Hop_2480	-8.68	-47.65	≤-28.68	PASS
3DH5	Ant1	Low	2402	-7.80	-48.09	≤-27.8	PASS
3DH5	Ant1	High	2480	-7.05	-48.53	≤-27.05	PASS
3DH5	Ant1	Low	Hop_2402	-8.25	-48.92	≤-28.25	PASS
3DH5	Ant1	High	Hop_2480	-10.45	-47.86	≤-30.45	PASS

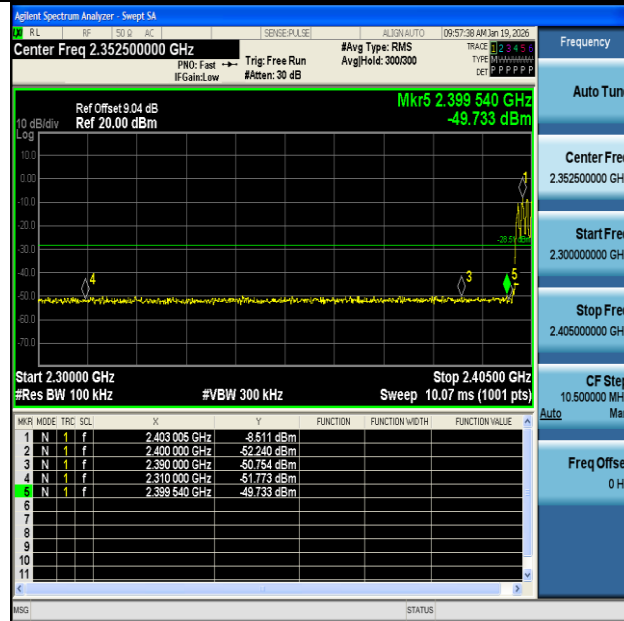
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



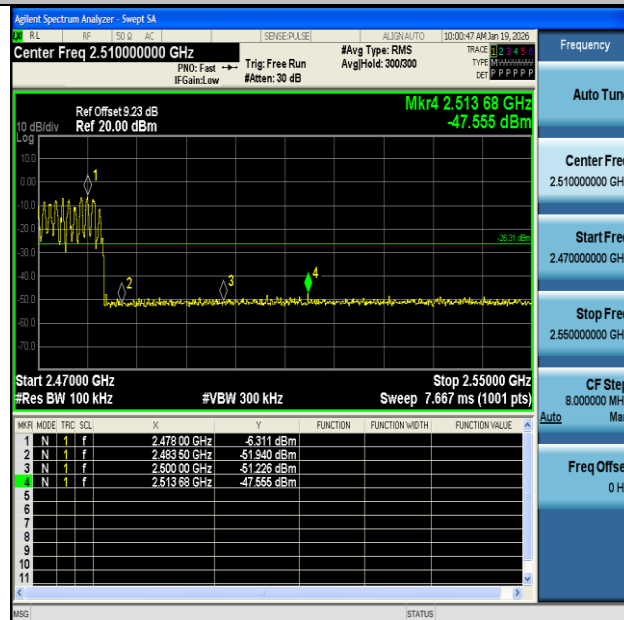


Test Graphs



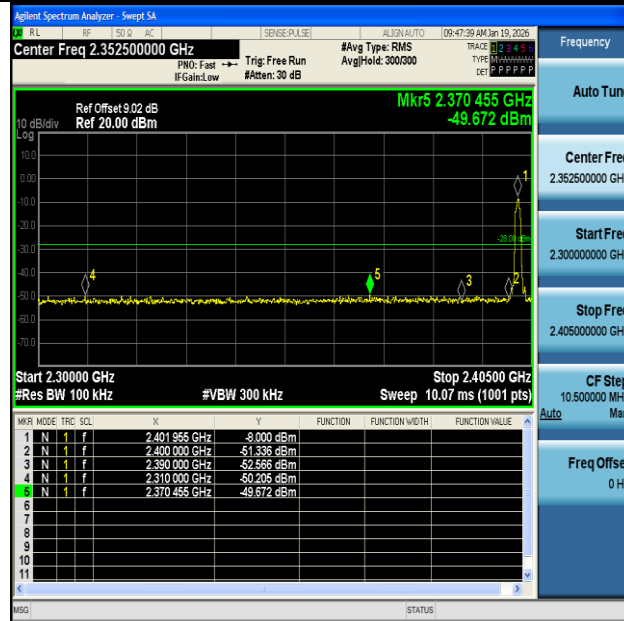


DH5-Ant1-Hop_2402-PASS

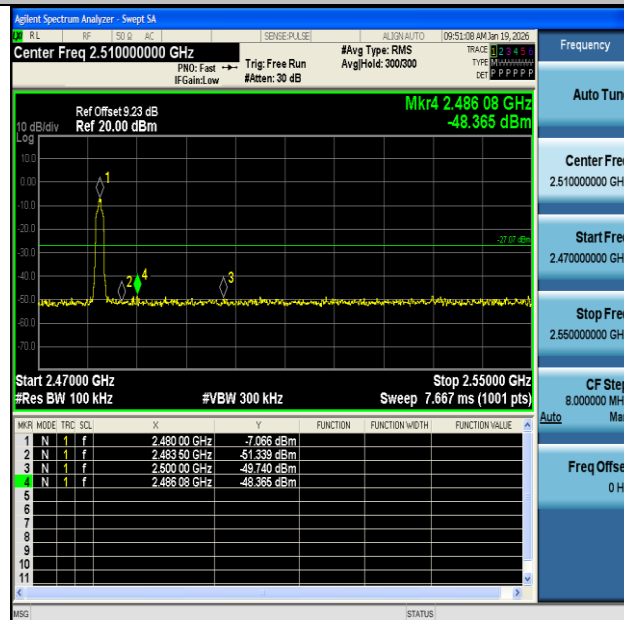


DH5-Ant1-Hop_2480-PASS



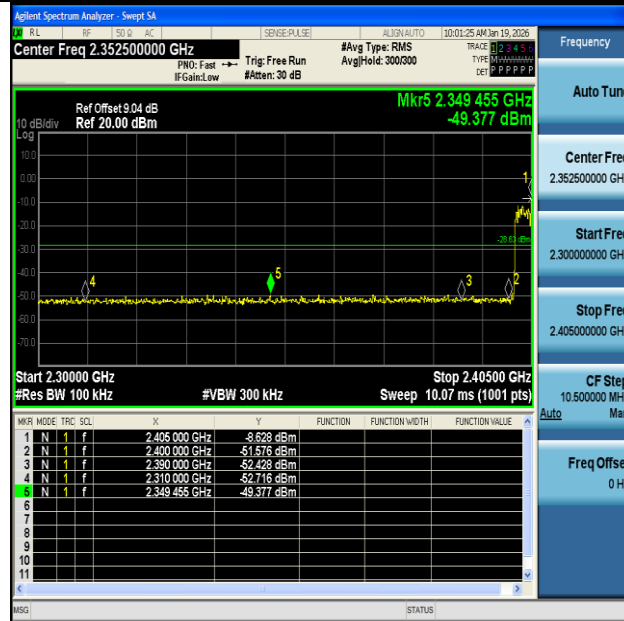


2DH5-Ant1-2402-PASS

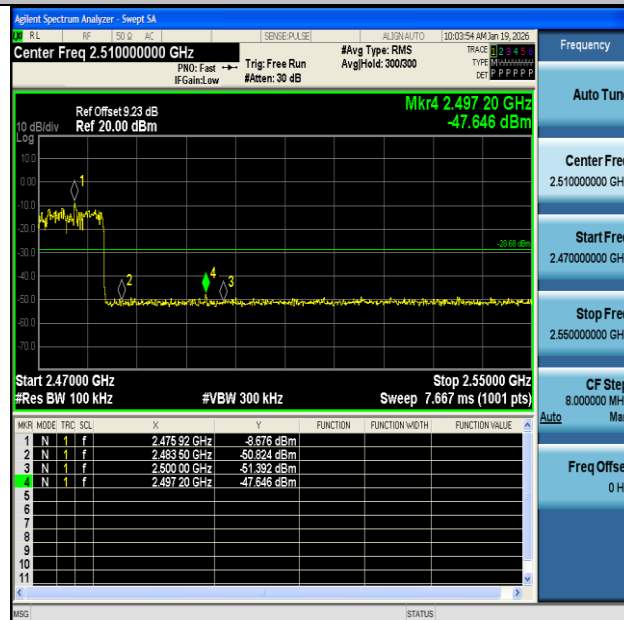


2DH5-Ant1-2480-PASS



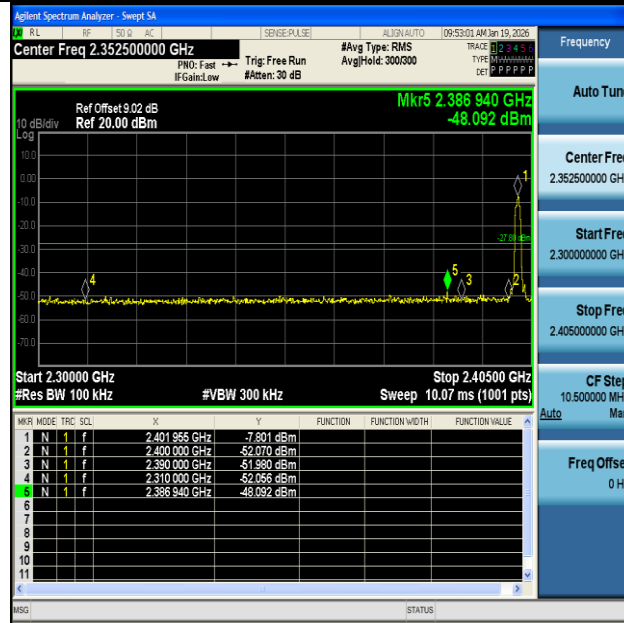


2DH5-Ant1-Hop_2402-PASS

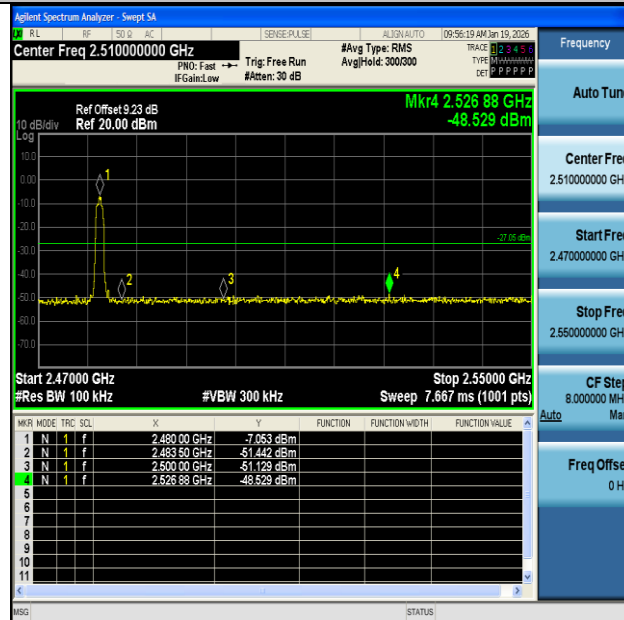


2DH5-Ant1-Hop_2480-PASS



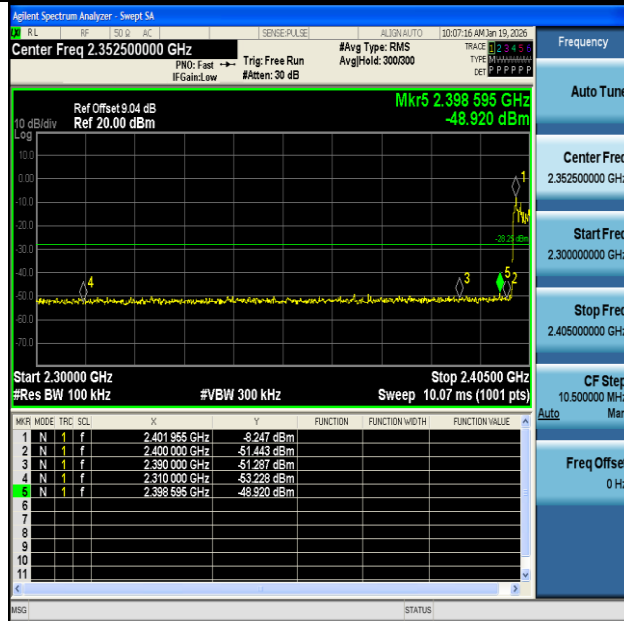


3DH5-Ant1-2402-PASS

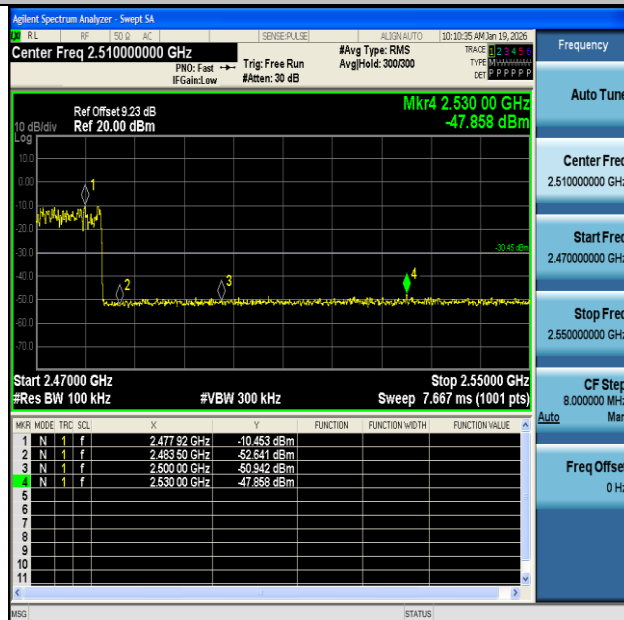


3DH5-Ant1-2480-PASS





3DH5-Ant1-Hop_2402-PASS



3DH5-Ant1-Hop_2480-PASS





Appendix H: Conducted Spurious Emission

Test Result

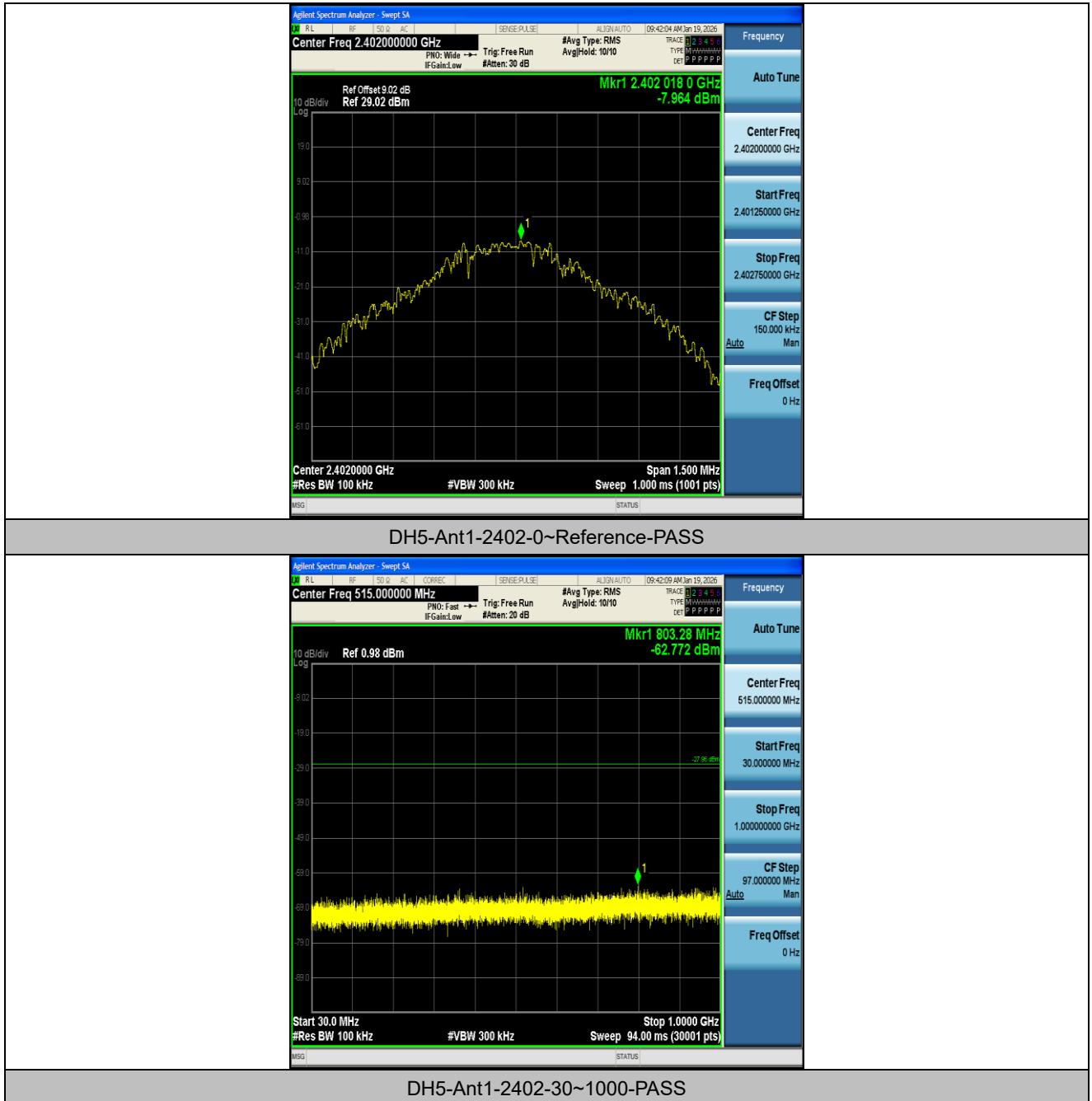
Test Mode	Antenna	Frequency [MHz]	Freq. Range [MHz]	Ref. Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	0~Reference	-7.96	-7.96	---	PASS
DH5	Ant1	2402	30~1000	-7.96	-62.77	≤ -27.96	PASS
DH5	Ant1	2402	1000~26500	-7.96	-32.03	≤ -27.96	PASS
DH5	Ant1	2441	0~Reference	-7.04	-7.04	---	PASS
DH5	Ant1	2441	30~1000	-7.04	-62.23	≤ -27.04	PASS
DH5	Ant1	2441	1000~26500	-7.04	-31.04	≤ -27.04	PASS
DH5	Ant1	2480	0~Reference	-7.07	-7.07	---	PASS
DH5	Ant1	2480	30~1000	-7.07	-62.97	≤ -27.07	PASS
DH5	Ant1	2480	1000~26500	-7.07	-35.57	≤ -27.07	PASS
2DH5	Ant1	2402	0~Reference	-9.92	-9.92	---	PASS
2DH5	Ant1	2402	30~1000	-9.92	-62.11	≤ -29.92	PASS
2DH5	Ant1	2402	1000~26500	-9.92	-32.17	≤ -29.92	PASS
2DH5	Ant1	2441	0~Reference	-9.94	-9.94	---	PASS
2DH5	Ant1	2441	30~1000	-9.94	-63.16	≤ -29.94	PASS
2DH5	Ant1	2441	1000~26500	-9.94	-36.88	≤ -29.94	PASS
2DH5	Ant1	2480	0~Reference	-7.06	-7.06	---	PASS
2DH5	Ant1	2480	30~1000	-7.06	-62.82	≤ -27.06	PASS
2DH5	Ant1	2480	1000~26500	-7.06	-38.18	≤ -27.06	PASS
3DH5	Ant1	2402	0~Reference	-9.98	-9.98	---	PASS
3DH5	Ant1	2402	30~1000	-9.98	-62.41	≤ -29.98	PASS
3DH5	Ant1	2402	1000~26500	-9.98	-36.74	≤ -29.98	PASS
3DH5	Ant1	2441	0~Reference	-7.48	-7.48	---	PASS
3DH5	Ant1	2441	30~1000	-7.48	-61.72	≤ -27.48	PASS
3DH5	Ant1	2441	1000~26500	-7.48	-35.22	≤ -27.48	PASS
3DH5	Ant1	2480	0~Reference	-8.38	-8.38	---	PASS
3DH5	Ant1	2480	30~1000	-8.38	-61.91	≤ -28.38	PASS
3DH5	Ant1	2480	1000~26500	-8.38	-37.73	≤ -28.38	PASS

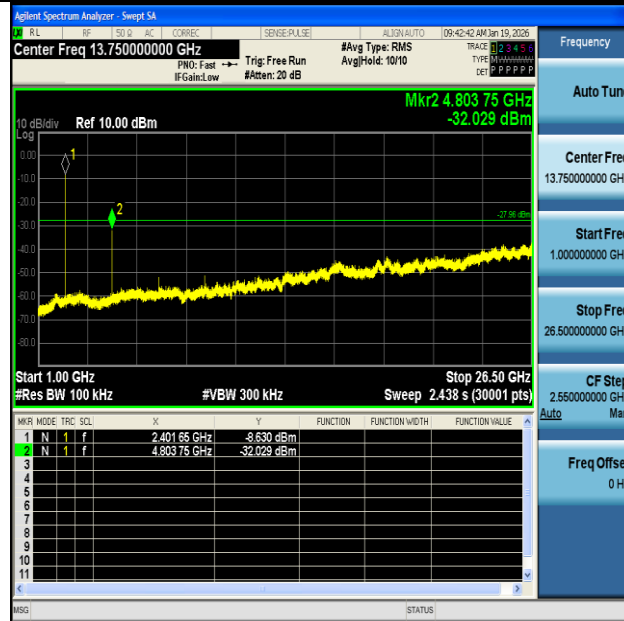
Note: offset(dB) in Reference test plots = cable loss(dB) + attenuator factor(dB); For spurious emissions plots from 30MHz to 26.5GHz, the cable loss and attenuator factors have been set in the 'Input Correction' of the Spectrum Analyzer during the test.



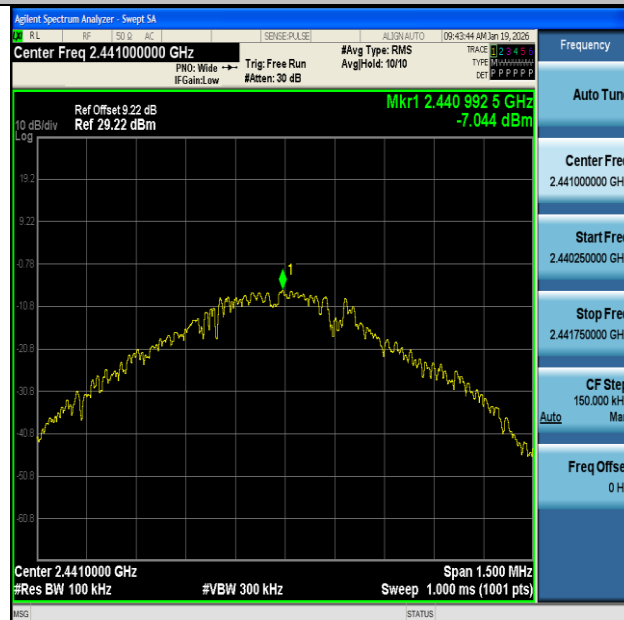


Test Graphs



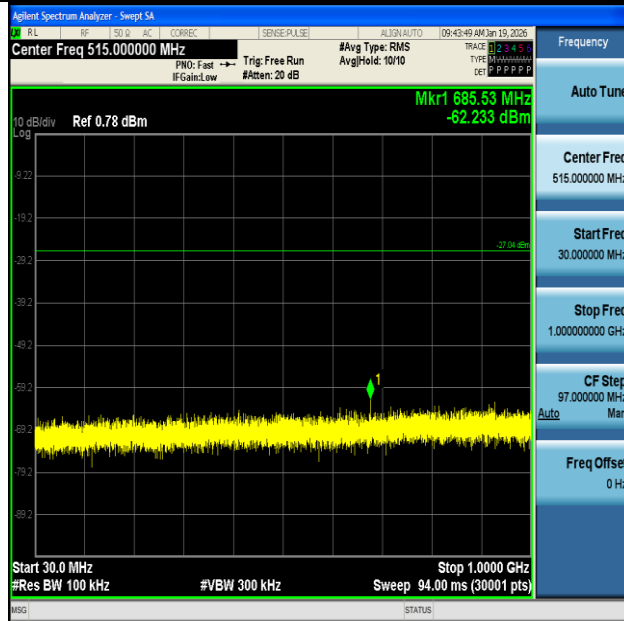


DH5-Ant1-2402-1000~26500-PASS

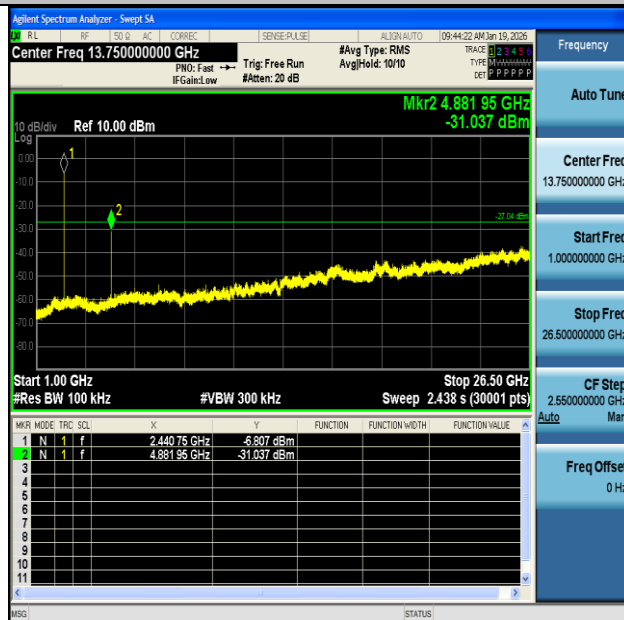


DH5-Ant1-2441-0~Reference-PASS



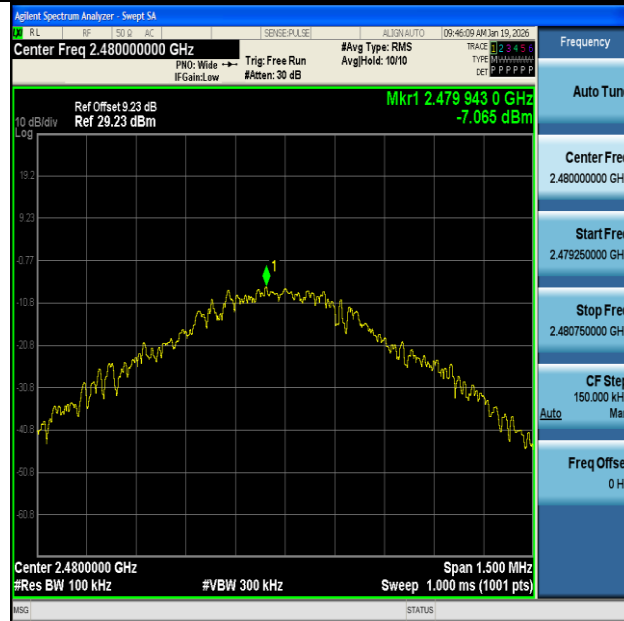


DH5-Ant1-2441-30~1000-PASS

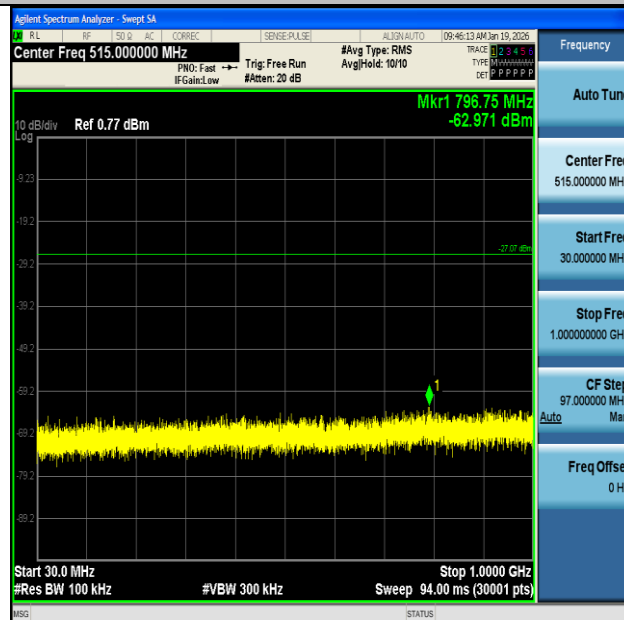


DH5-Ant1-2441-1000~26500-PASS



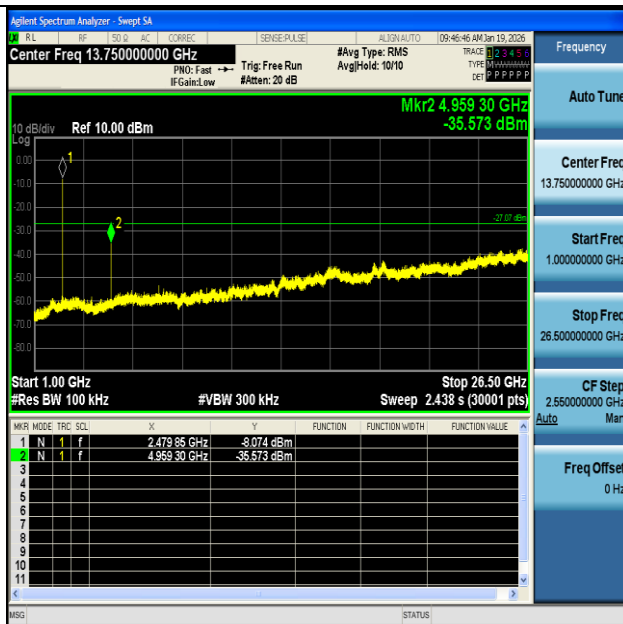


DH5-Ant1-2480-0~Reference-PASS

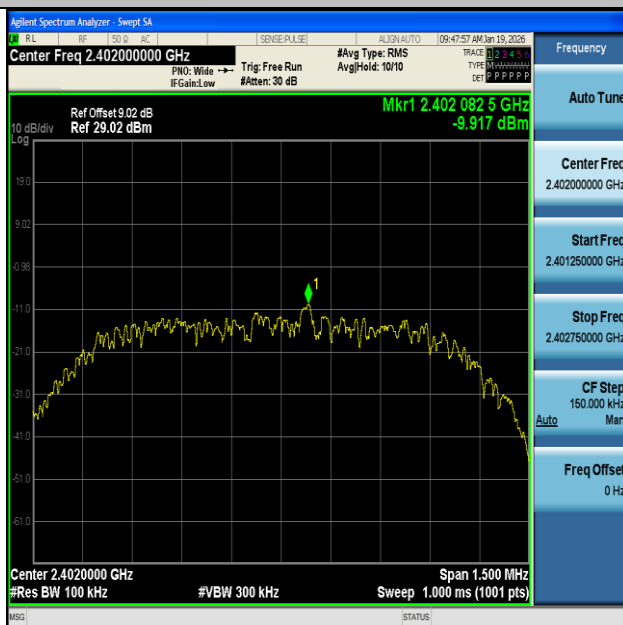


DH5-Ant1-2480-30~1000-PASS



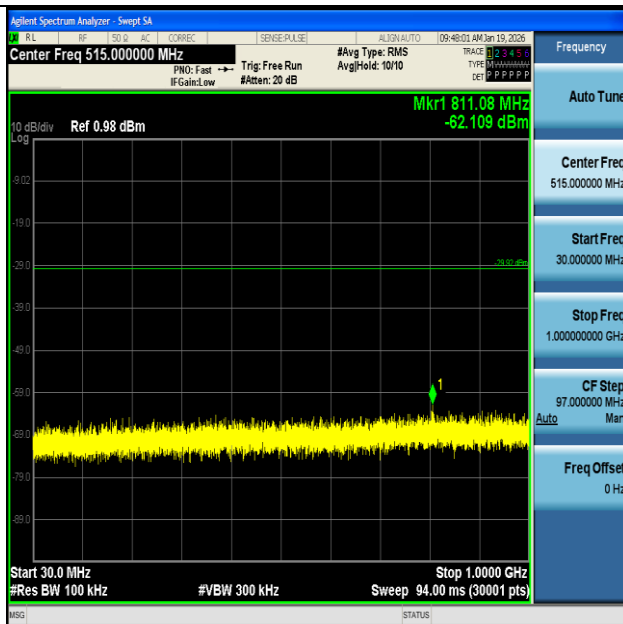


DH5-Ant1-2480-1000~26500-PASS

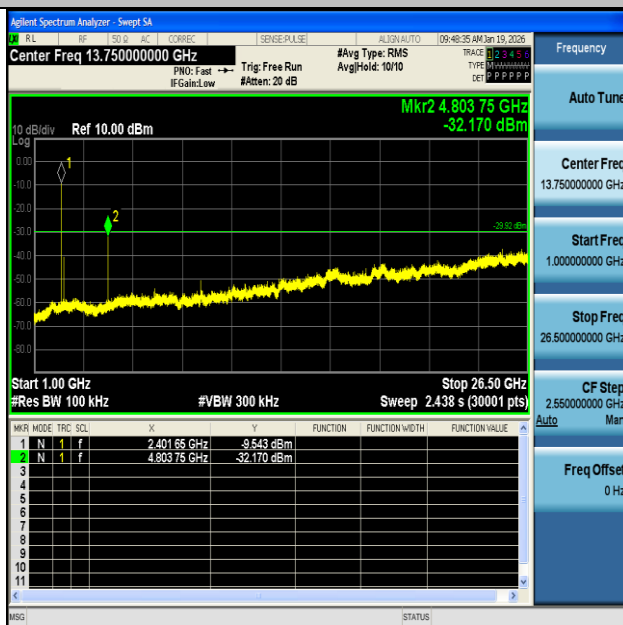


2DH5-Ant1-2402-0~Reference-PASS



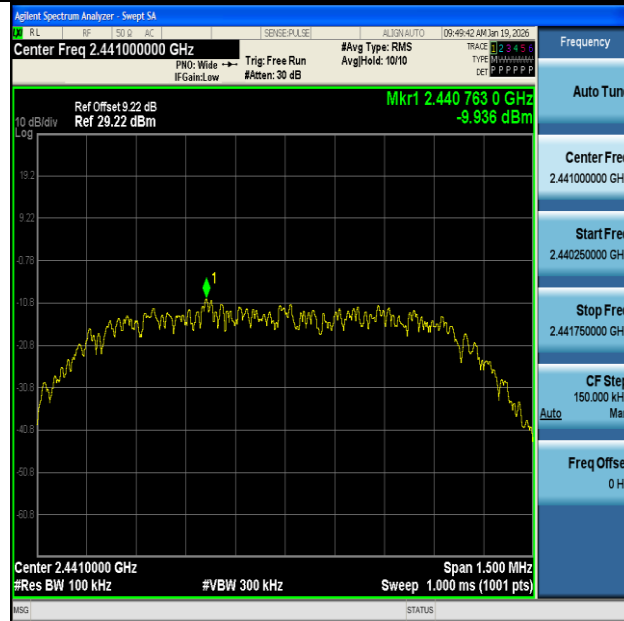


2DH5-Ant1-2402-30~1000-PASS

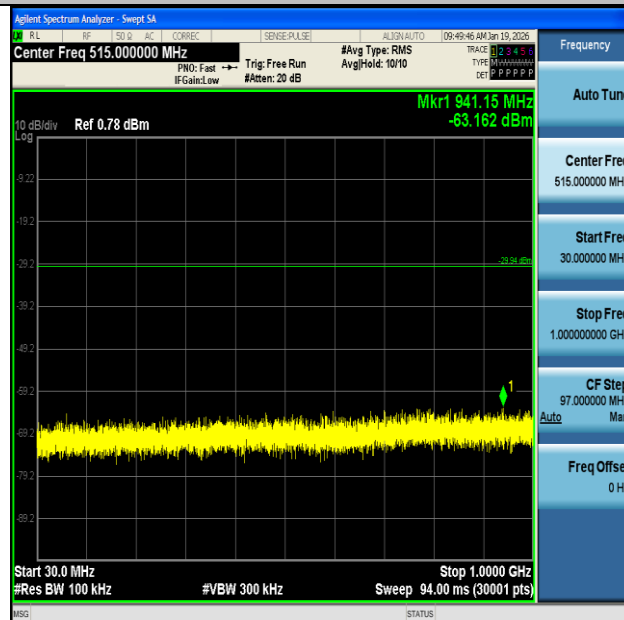


2DH5-Ant1-2402-1000~26500-PASS



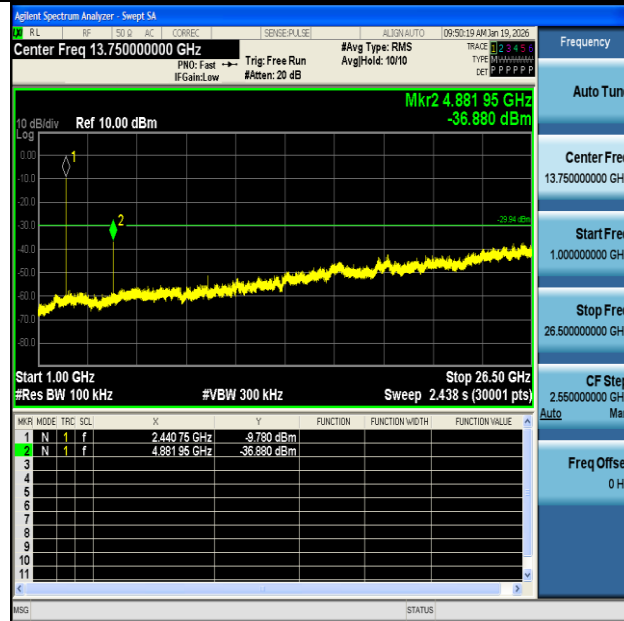


2DH5-Ant1-2441-0~Reference-PASS



2DH5-Ant1-2441-30~1000-PASS



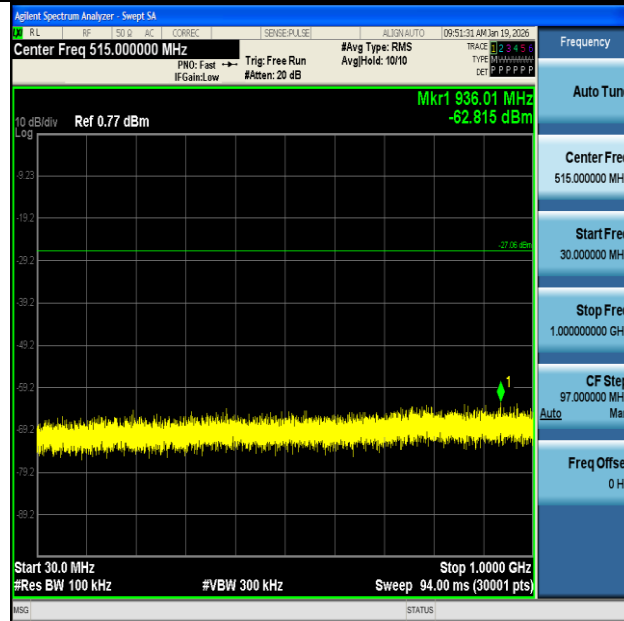


2DH5-Ant1-2441-1000~26500-PASS

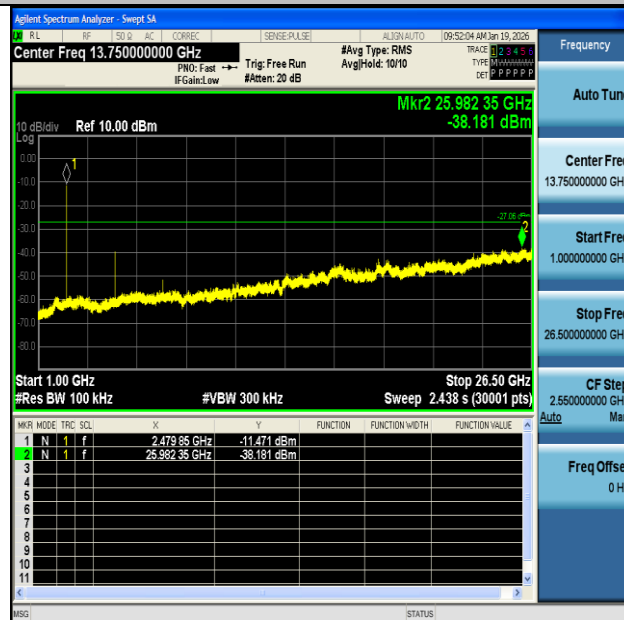


2DH5-Ant1-2480-0~Reference-PASS



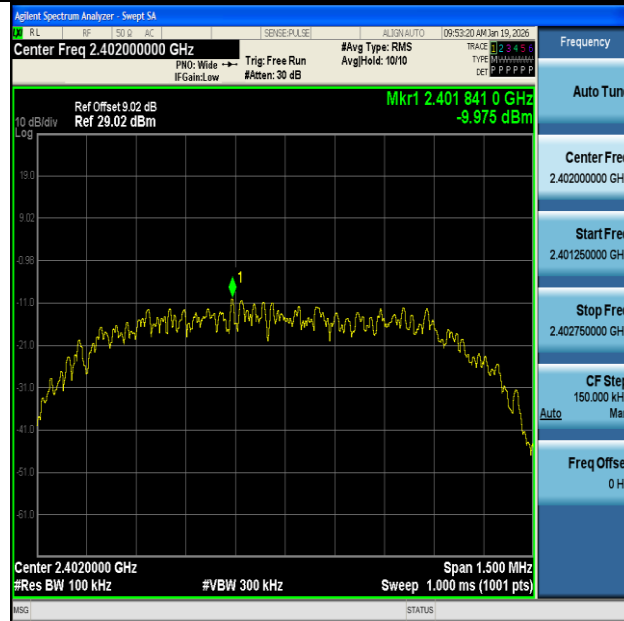


2DH5-Ant1-2480-30~1000-PASS

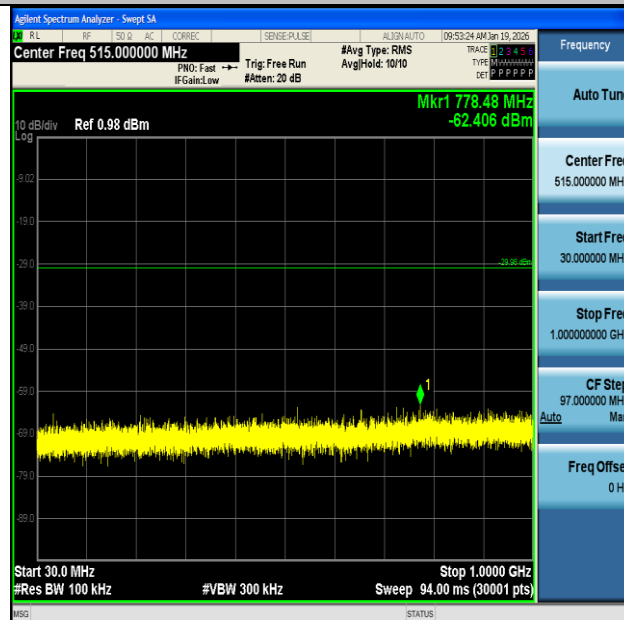


2DH5-Ant1-2480-1000~26500-PASS



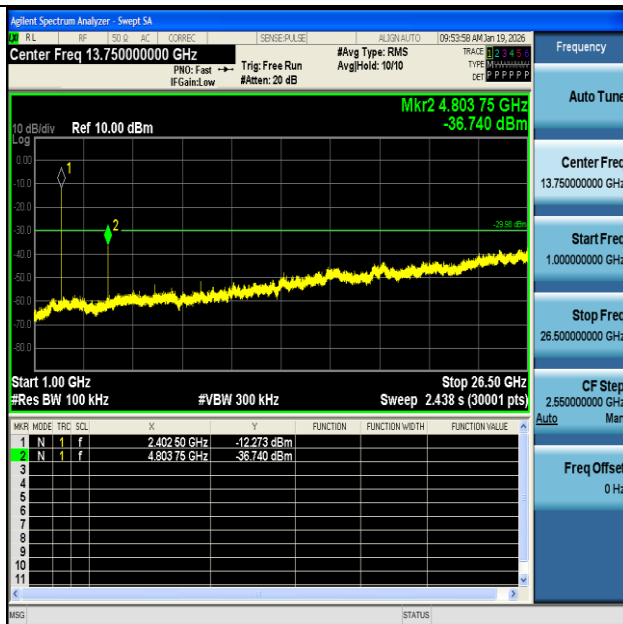


3DH5-Ant1-2402-0~Reference-PASS

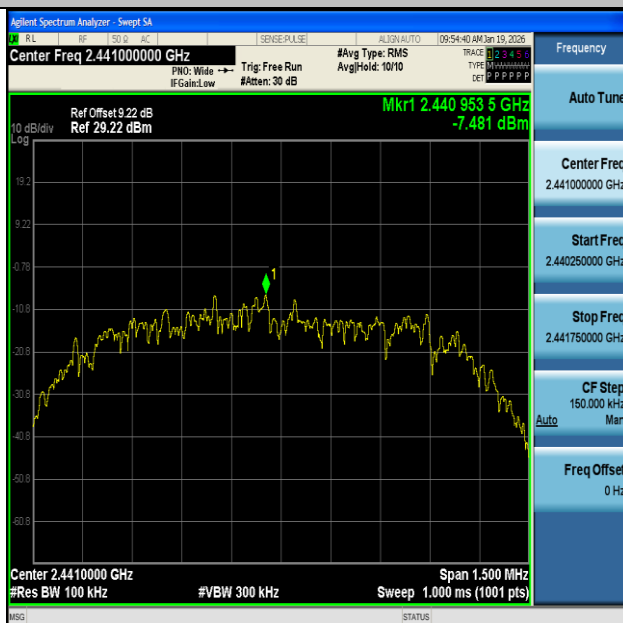


3DH5-Ant1-2402-30~1000-PASS



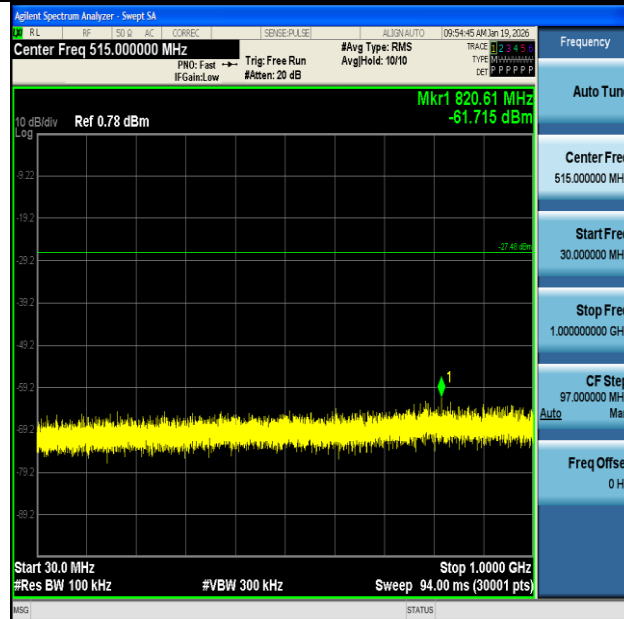


3DH5-Ant1-2402-1000~26500-PASS

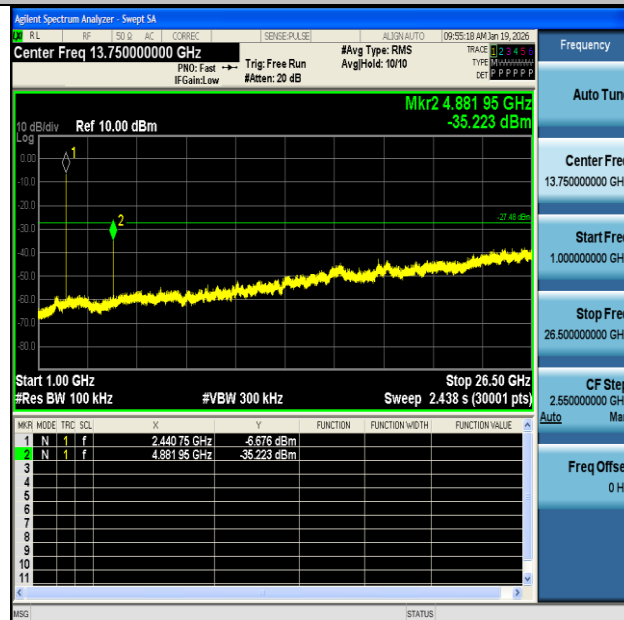


3DH5-Ant1-2441-0~Reference-PASS





3DH5-Ant1-2441-30~1000-PASS

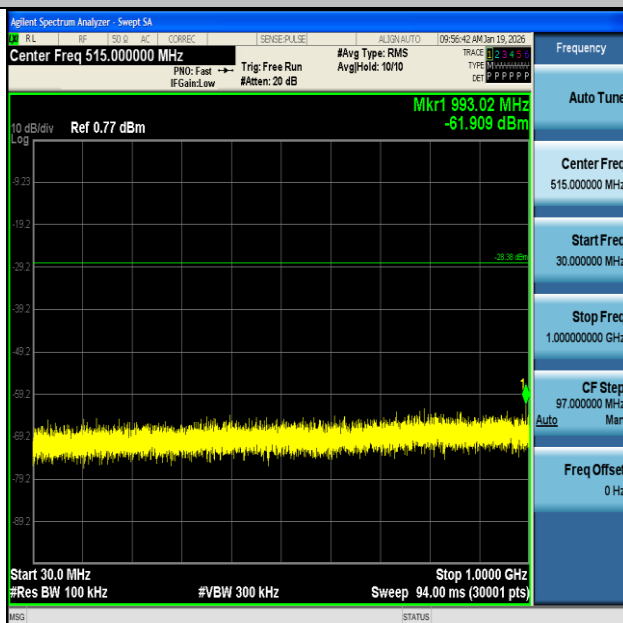


3DH5-Ant1-2441-1000~26500-PASS



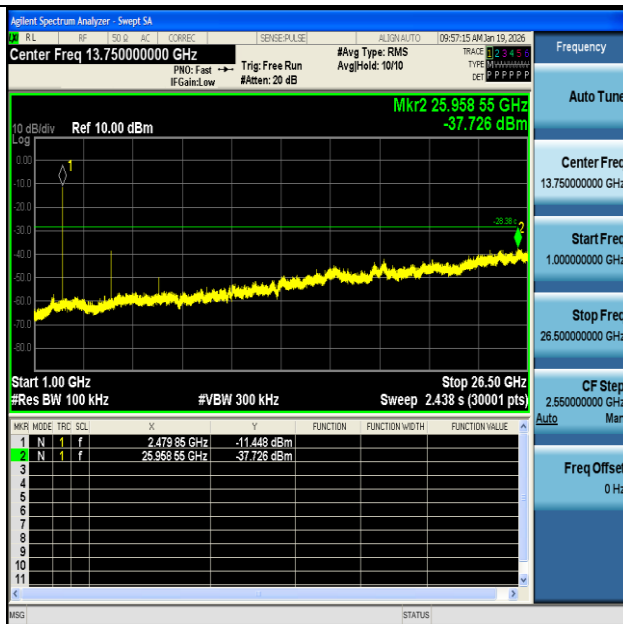


3DH5-Ant1-2480-0~Reference-PASS



3DH5-Ant1-2480-30~1000-PASS





3DH5-Ant1-2480-1000~26500-PASS





Appendix I: Duty Cycle

Test Result

Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]
DH5	Ant1	2402	2.90	3.75	77.33	1.12
DH5	Ant1	2441	2.90	3.75	77.33	1.12
DH5	Ant1	2480	2.91	3.75	77.60	1.10
2DH5	Ant1	2402	2.90	3.75	77.33	1.12
2DH5	Ant1	2441	2.91	3.75	77.60	1.10
2DH5	Ant1	2480	2.91	3.75	77.60	1.10
3DH5	Ant1	2402	2.92	3.75	77.87	1.09
3DH5	Ant1	2441	2.91	3.75	77.60	1.10
3DH5	Ant1	2480	2.91	3.75	77.60	1.10

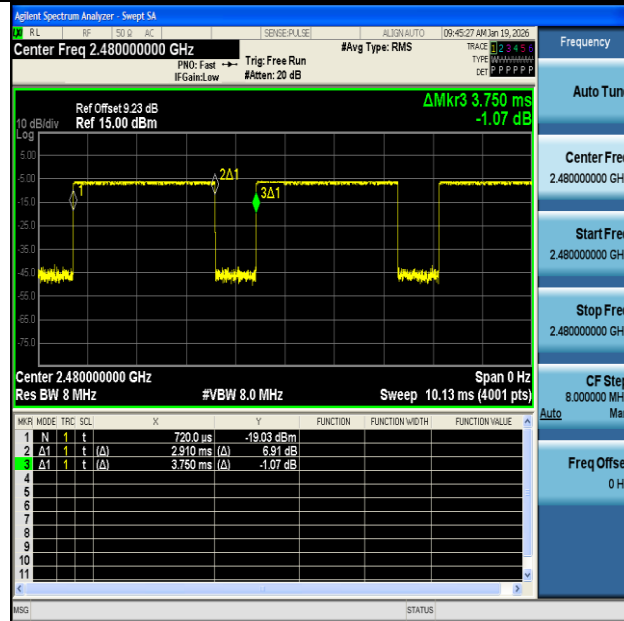
Note: offset(dB) = cable loss(dB) + attenuator factor(dB)



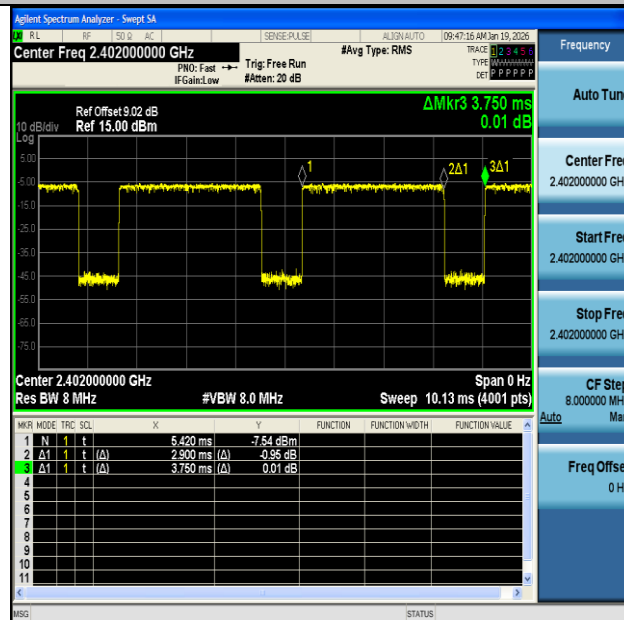


Test Graphs



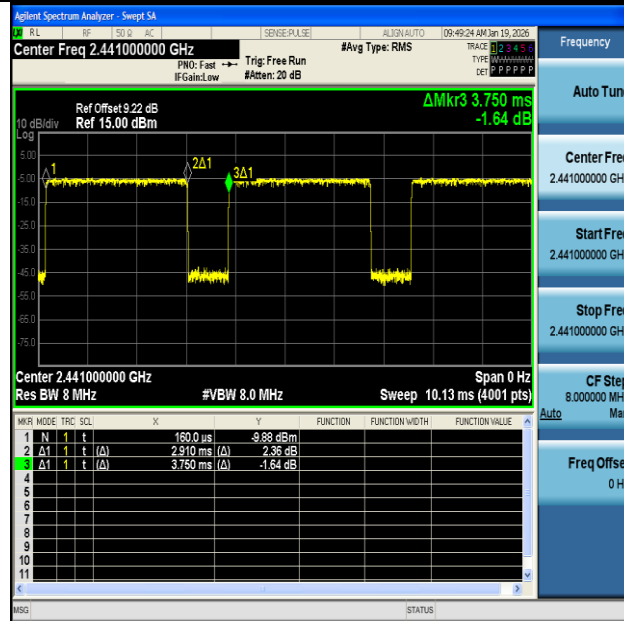


NTNV-DH5-Ant1-2480

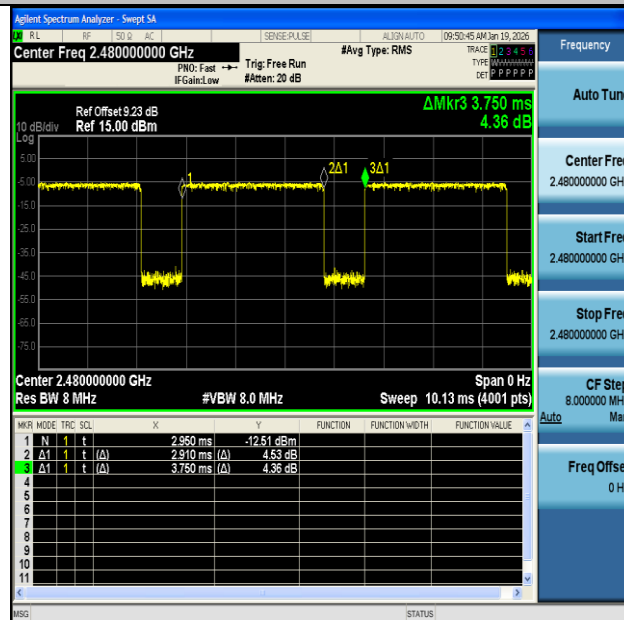


NTNV-2DH5-Ant1-2402



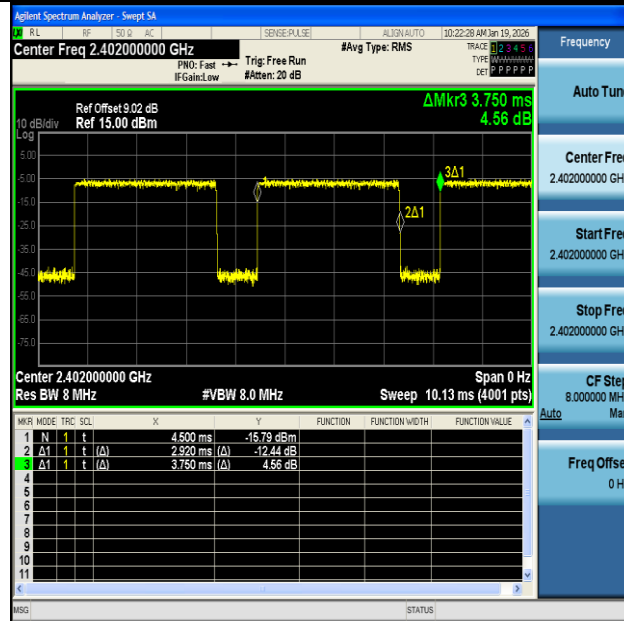


NTNV-2DH5-Ant1-2441

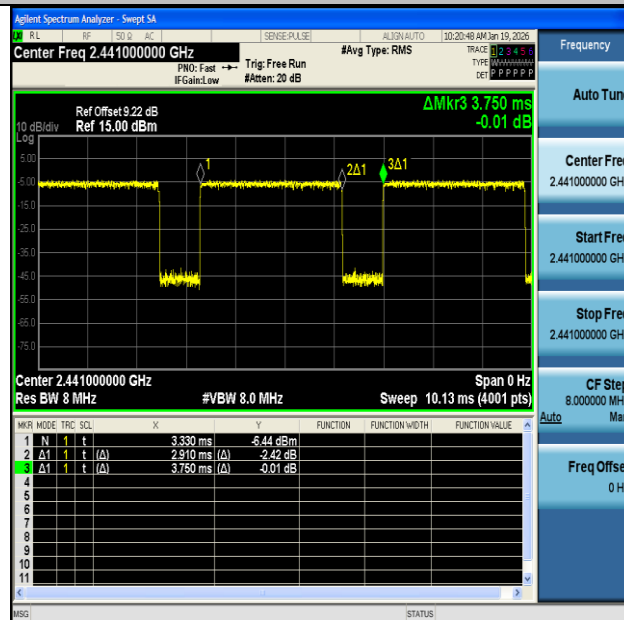


NTNV-2DH5-Ant1-2480



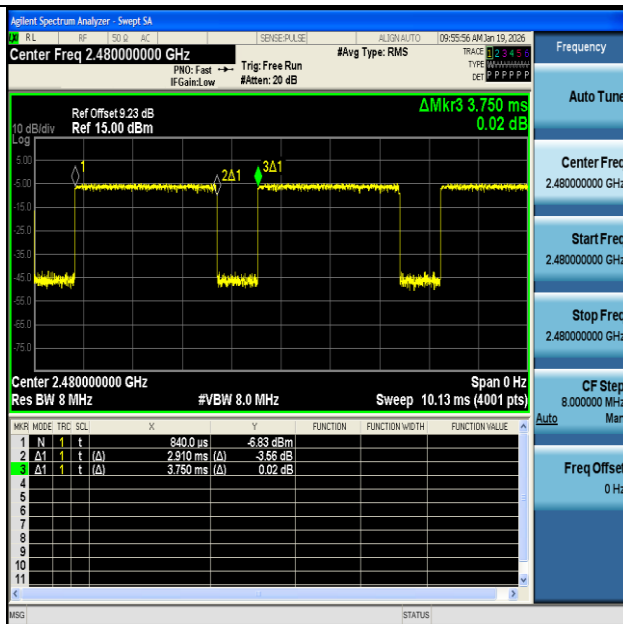


NTNV-3DH5-Ant1-2402



NTNV-3DH5-Ant1-2441





NTNV-3DH5-Ant1-2480

