



Appendix A

RF Test Data for BT (Conducted Measurement)

Product Name: Langsdom AirSwim

Test Model: BE15

Environmental Conditions

Temperature:	23.8° C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Paddi Chen
Supervised by:	Nick Peng





A.1 20dB Emission Bandwidth

Test Result

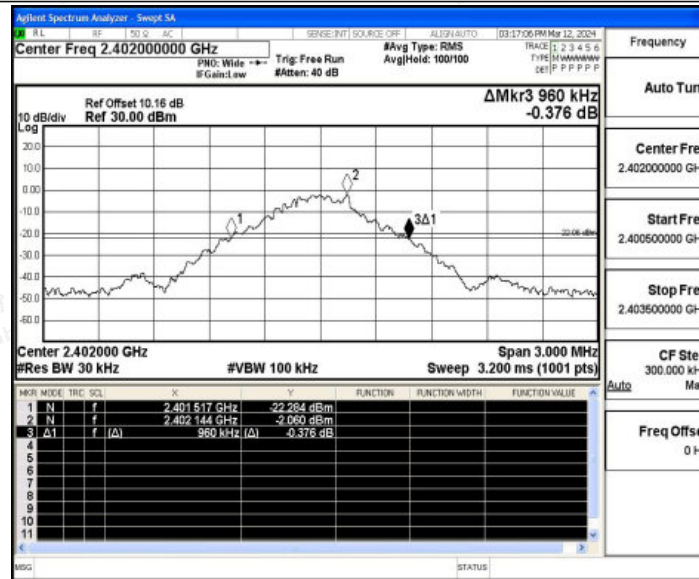
TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.960	2401.517	2402.477	---	---
		2441	1.017	2440.460	2441.477	---	---
		2480	0.987	2479.499	2480.486	---	---
2DH5	Ant1	2441	1.299	2440.346	2441.645	---	---
		2480	1.299	2479.346	2480.645	---	---
3DH5	Ant1	2402	1.305	2401.331	2402.636	---	---
		2441	1.302	2440.334	2441.636	---	---
		2480	1.296	2479.337	2480.633	---	---



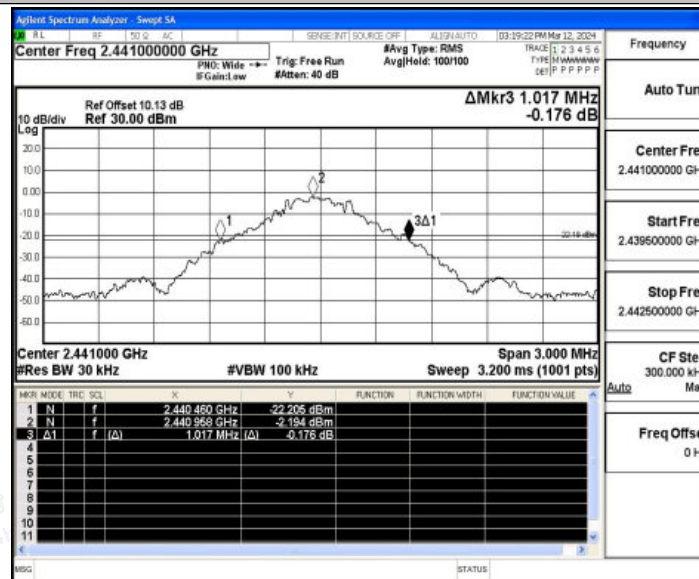


Test Graphs

DH5_Ant1_2402

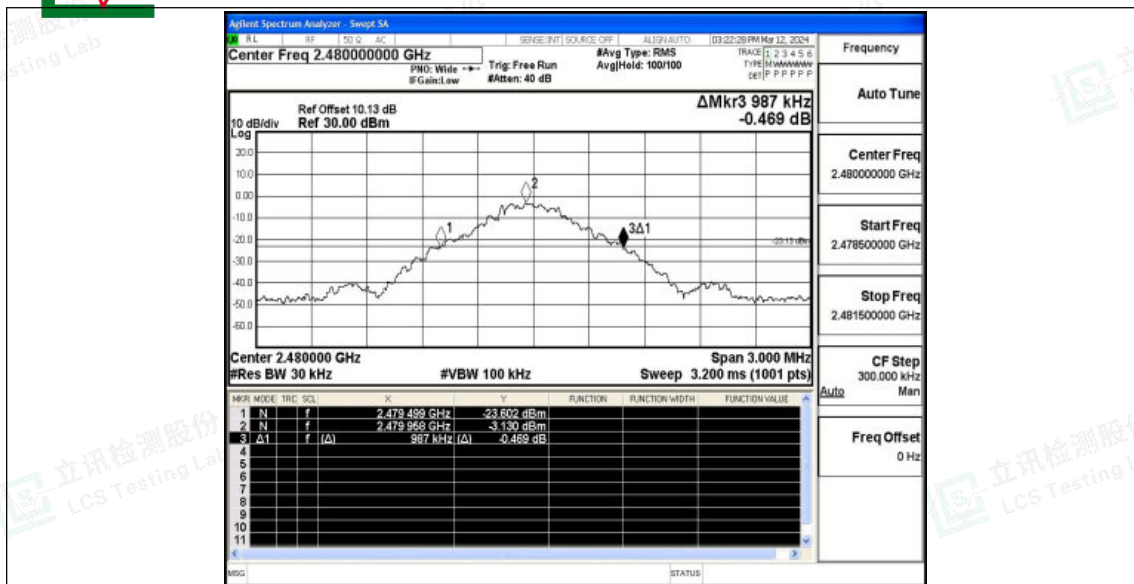


DH5_Ant1_2441

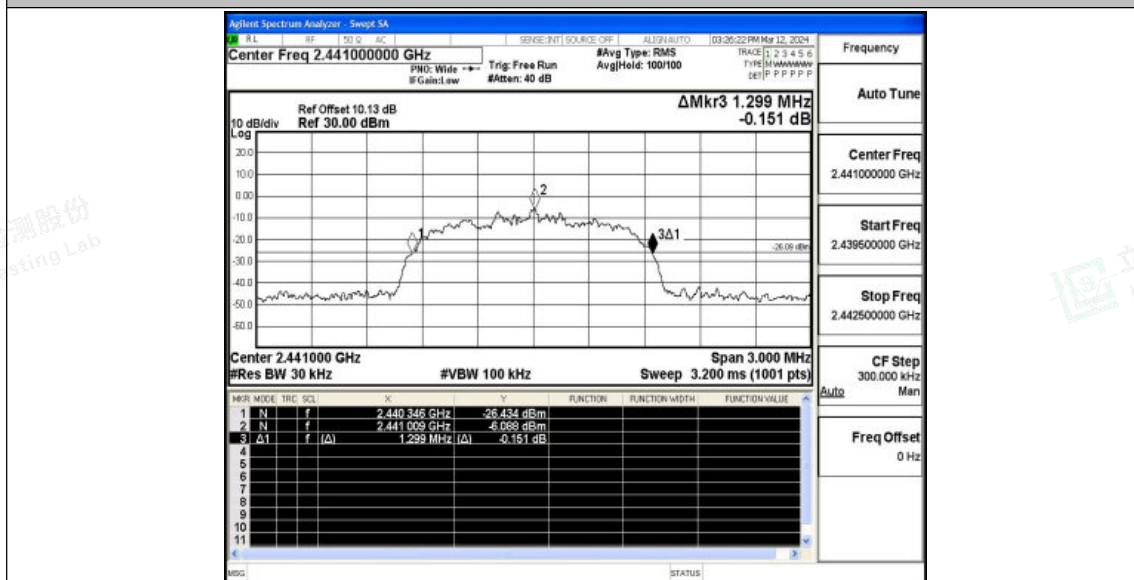


DH5_Ant1_2480



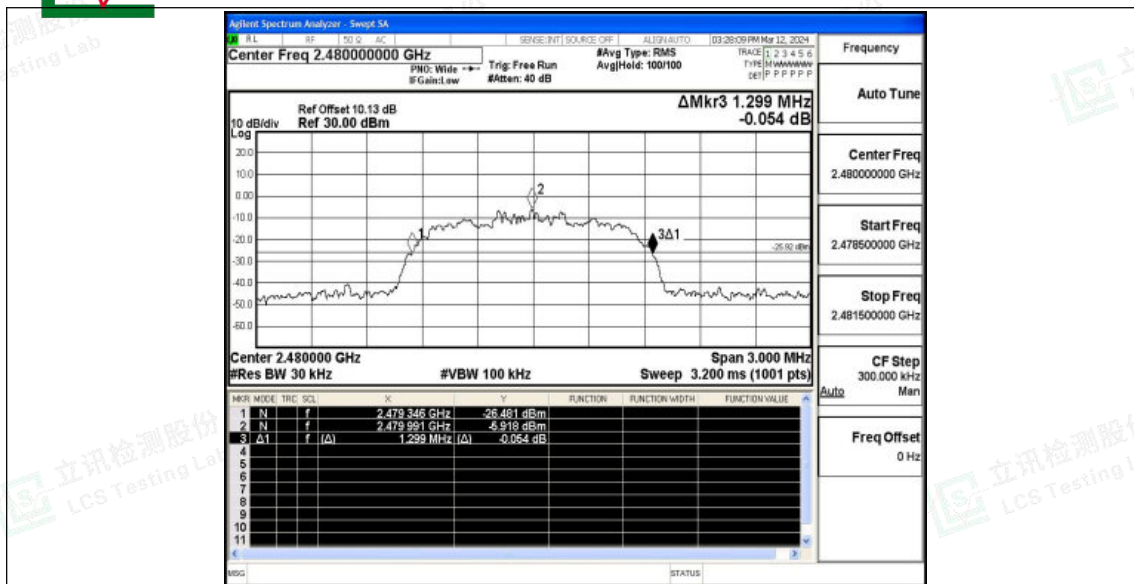


2DH5_Ant1_2441

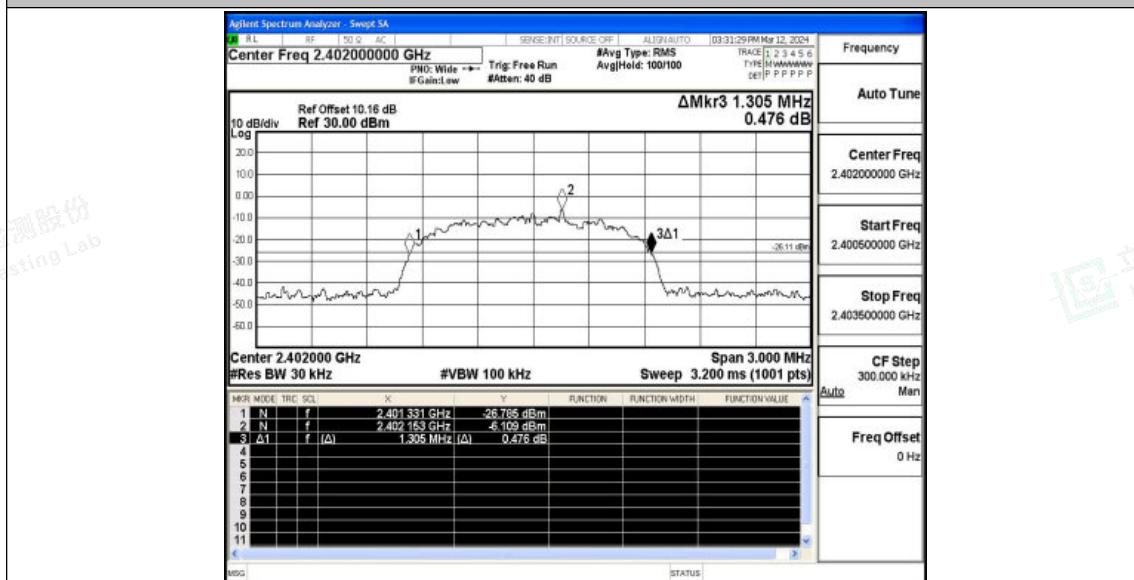


2DH5_Ant1_2480



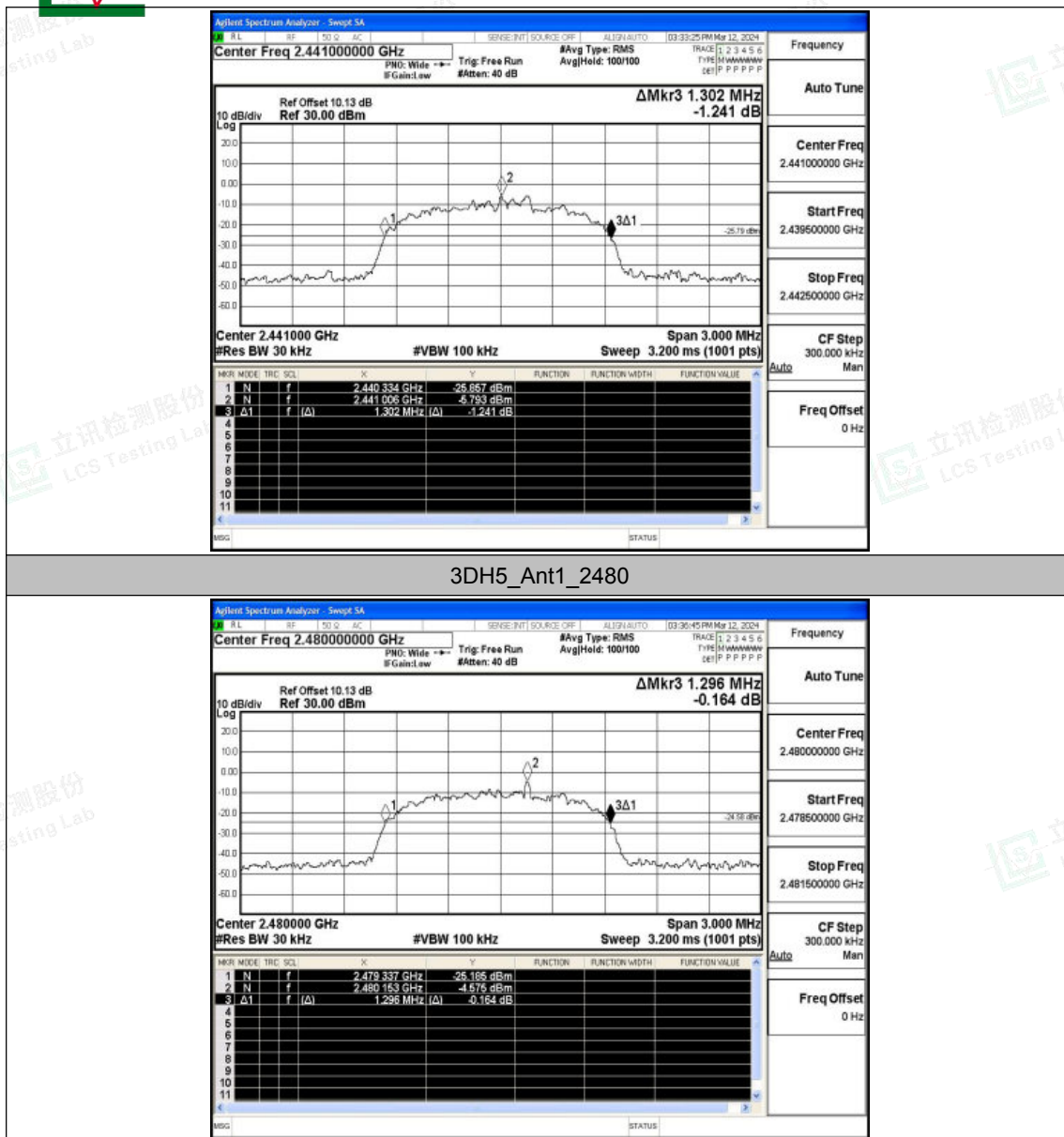


3DH5_Ant1_2402



3DH5_Ant1_2441







Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	0.77	≤21	PASS
		2441	0.97	≤21	PASS
		2480	0.11	≤21	PASS
2DH5	Ant1	2402	-0.71	≤21	PASS
		2441	-0.78	≤21	PASS
		2480	-0.69	≤21	PASS
3DH5	Ant1	2402	-0.87	≤21	PASS
		2441	-0.74	≤21	PASS
		2480	-0.61	≤21	PASS

Agilent Spectrum Analyzer - Sweep SA

Center Freq 2.402000000 GHz

PRO: Fast Trig: Free Run Avg Type: RMS AvgHold: 100/100

Ref Offset 10.16 dB Ref 30.00 dBm

Mkr1 2.401 776 GHz 0.768 dBm

10 dB/div Log

Center 2.402000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 8.000 MHz Sweep 1.000 ms (1001 pts)

Frequency

Auto Tune

Center Freq 2.402000000 GHz

Start Freq 2.398000000 GHz

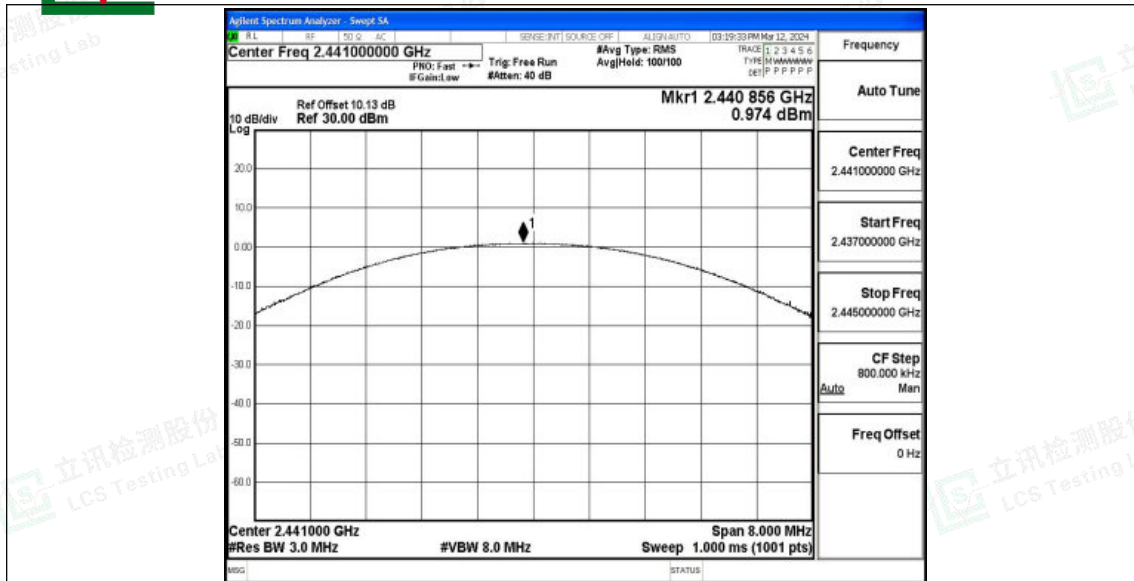
Stop Freq 2.406000000 GHz

CF Step 800.000 kHz Auto Man

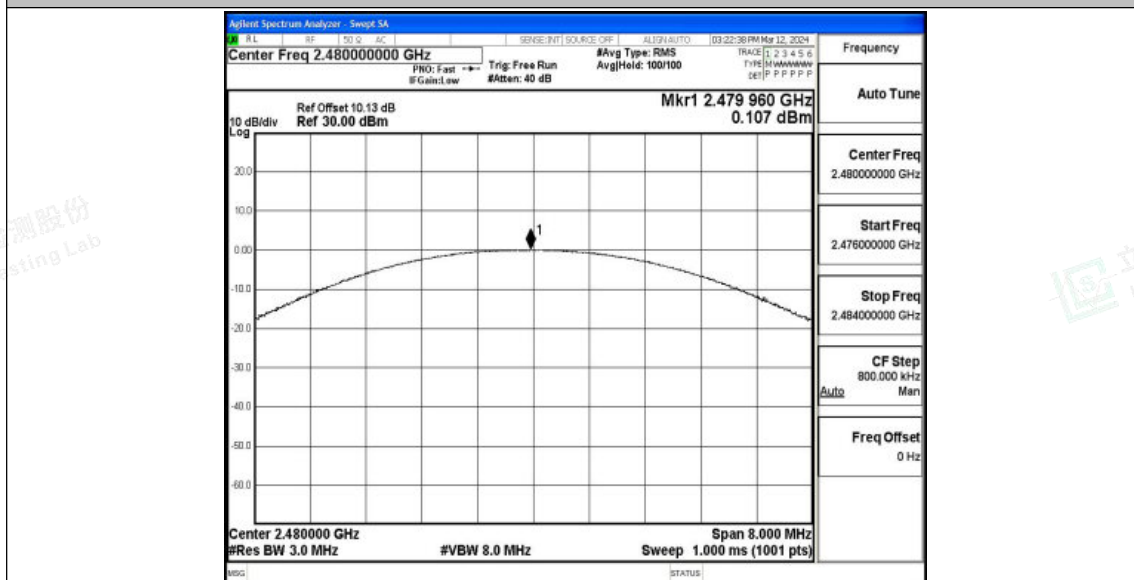
Freq Offset 0 Hz



Shenzhen LCS Compliance Testing Laboratory Ltd.
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen,
518000, China
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
Scan code to check authenticity

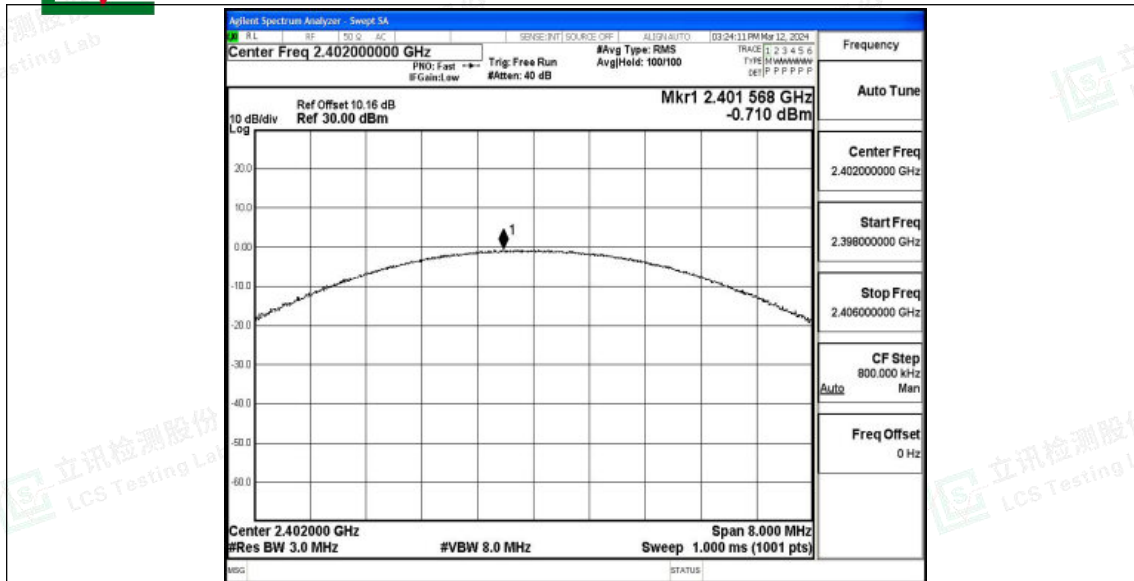


DH5_Ant1_2480

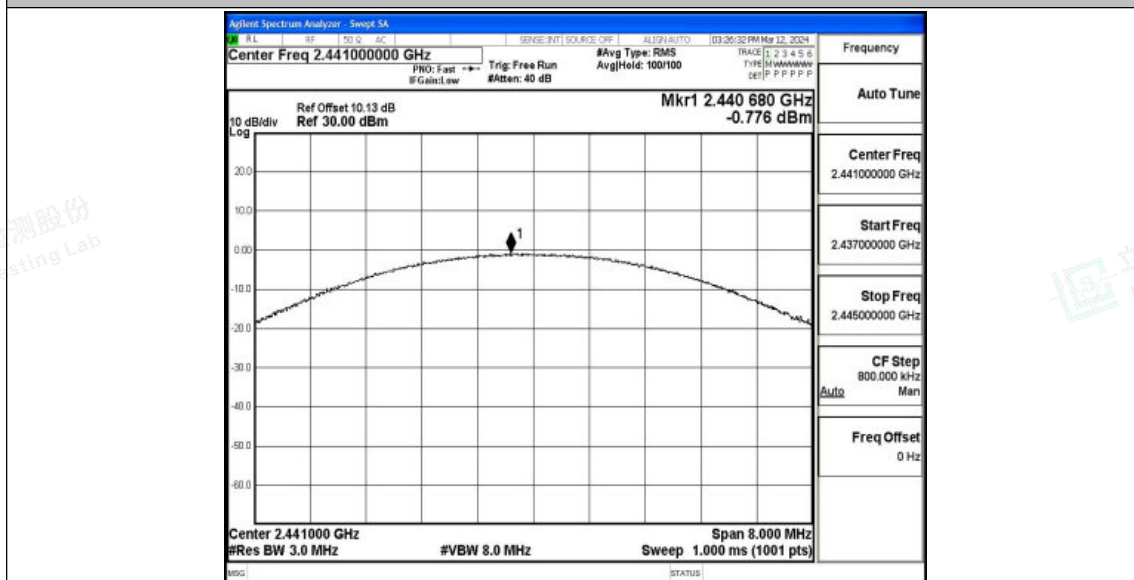


2DH5_Ant1_2402



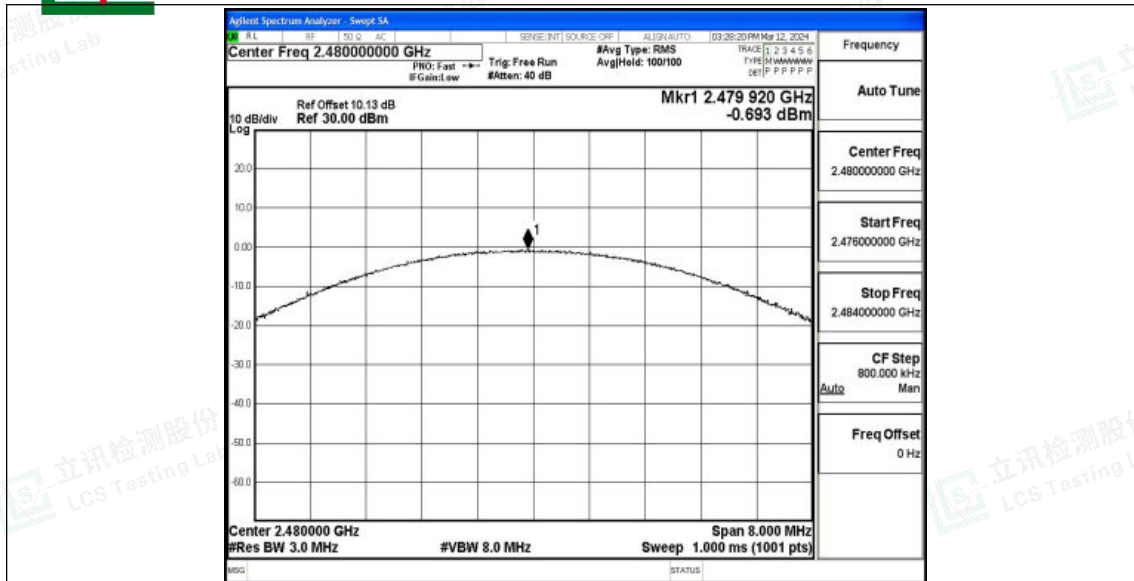


2DHS_Ant1_2441

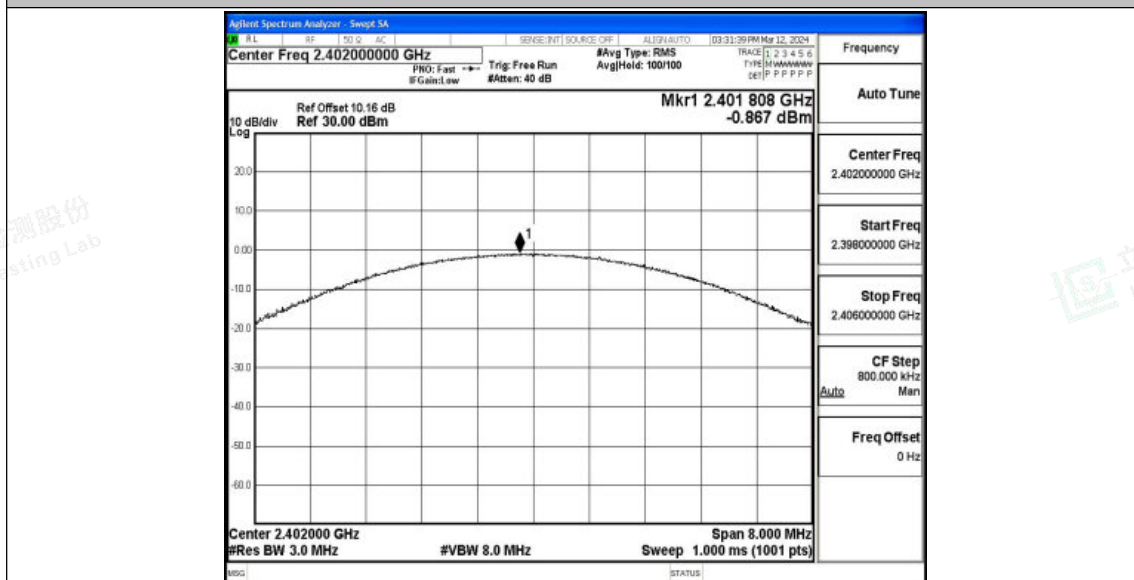


2DHS_Ant1_2480



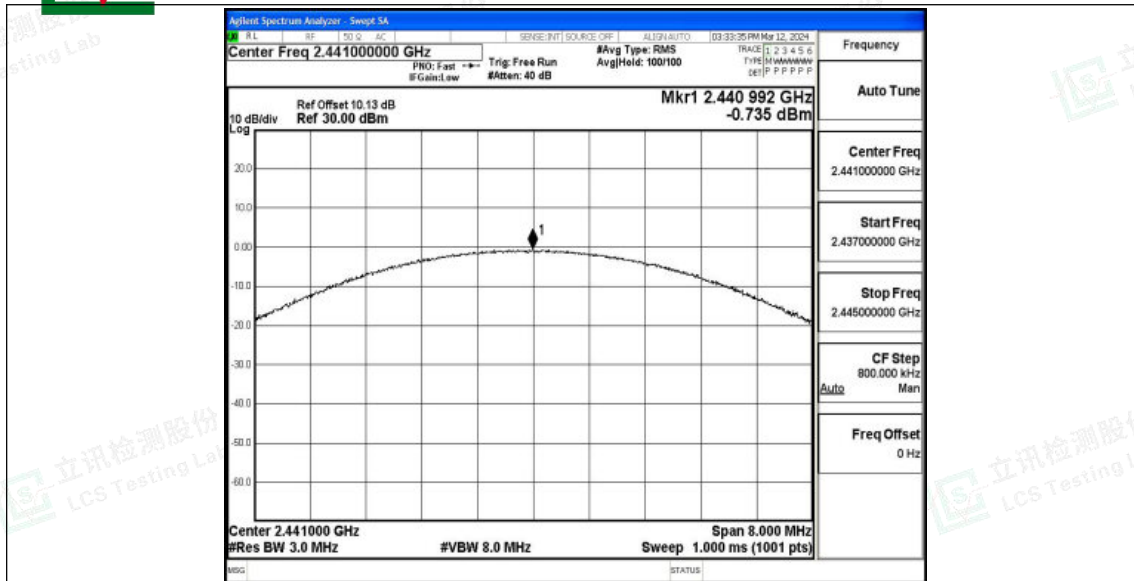


3DH5_Ant1_2402

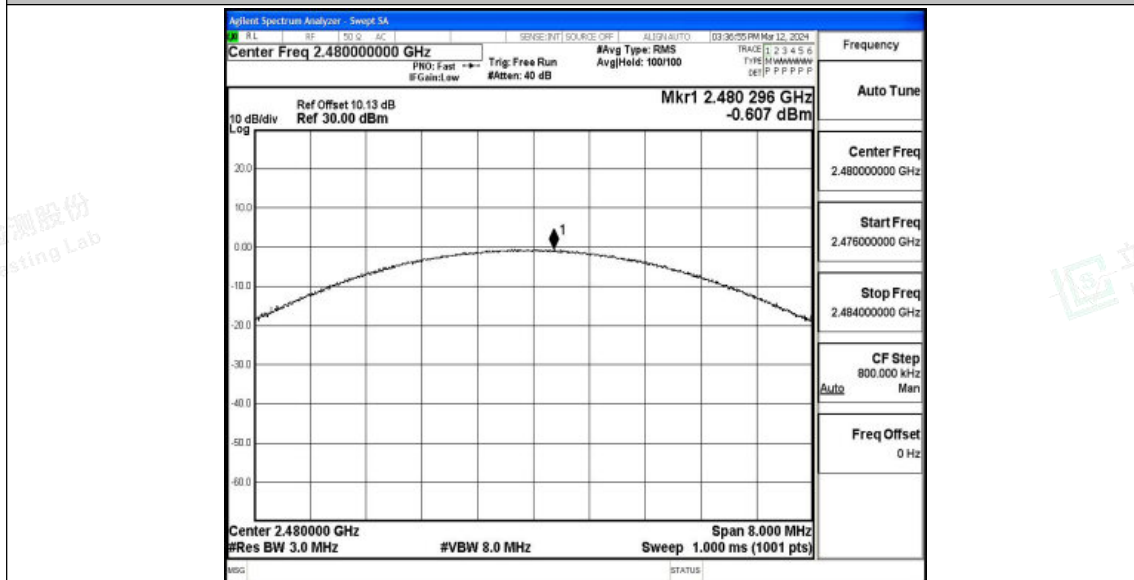


3DH5_Ant1_2441





3DH5_Ant1_2480



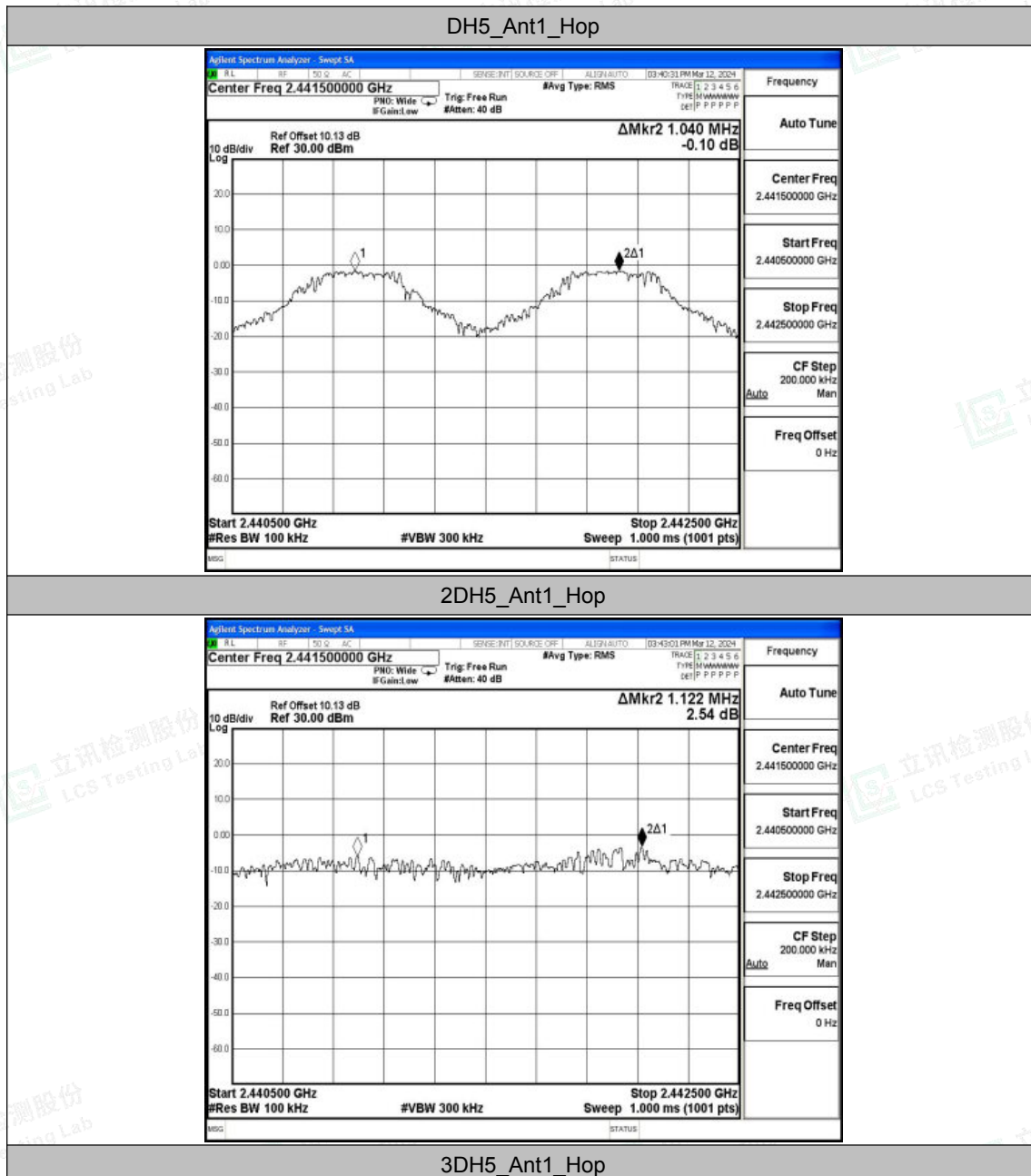


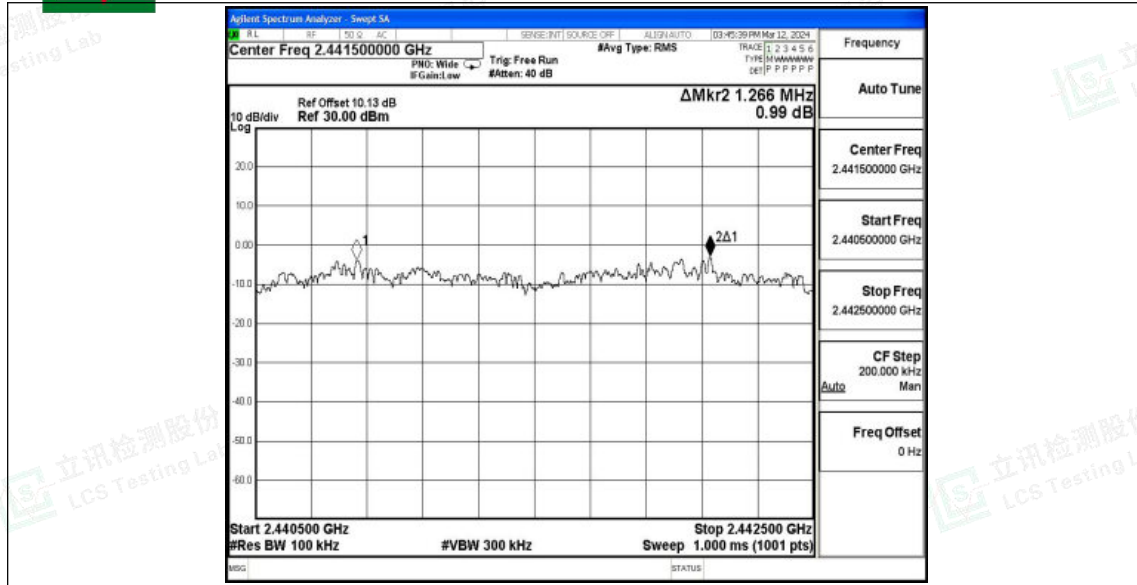
A.3 Carrier frequency separation

Test Result

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.04	≥ 0.678	PASS
2DH5	Ant1	Hop	1.122	≥ 0.866	PASS
3DH5	Ant1	Hop	1.266	≥ 0.870	PASS

Test Graphs







A.4 Time of occupancy

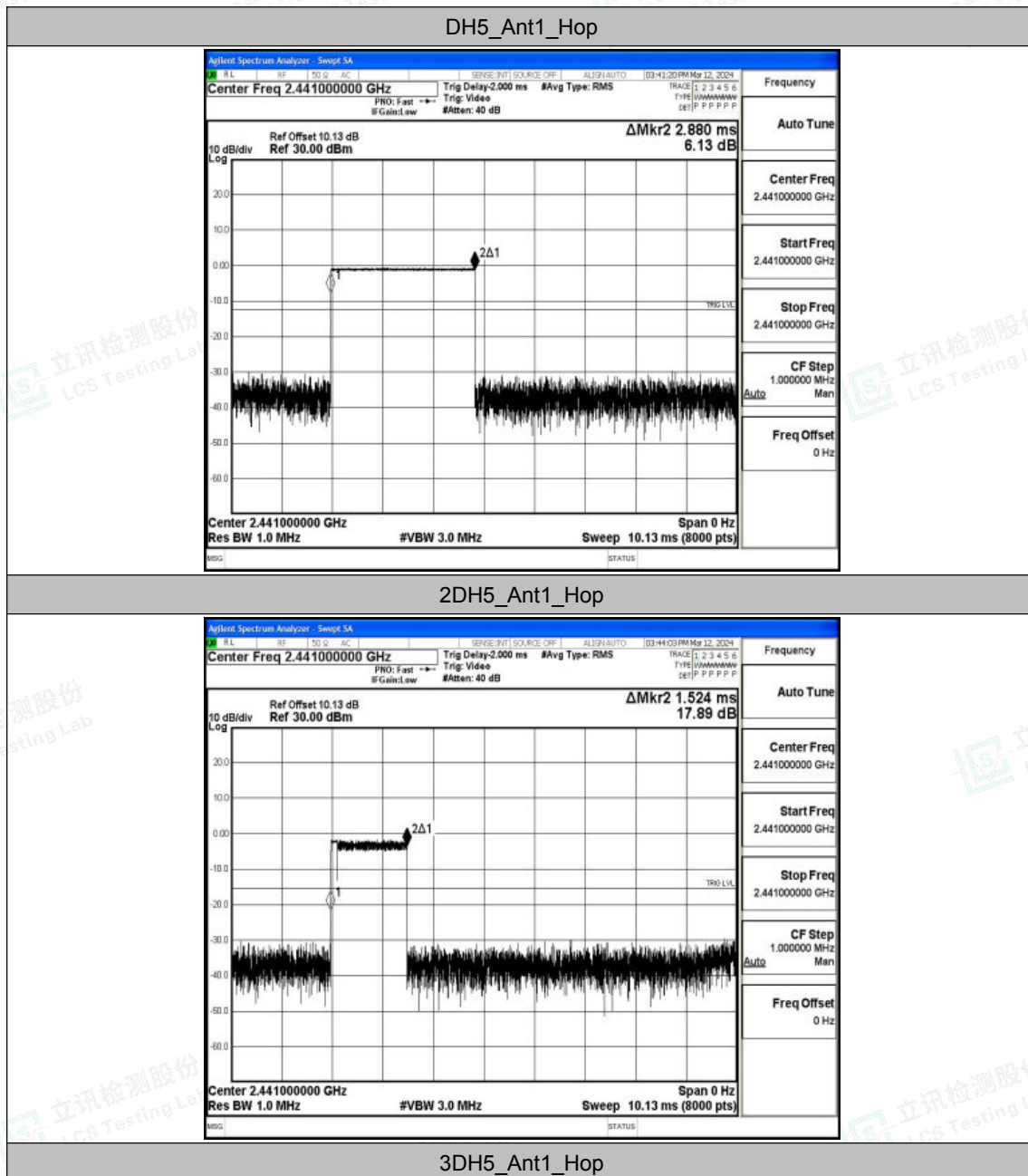
Test Result

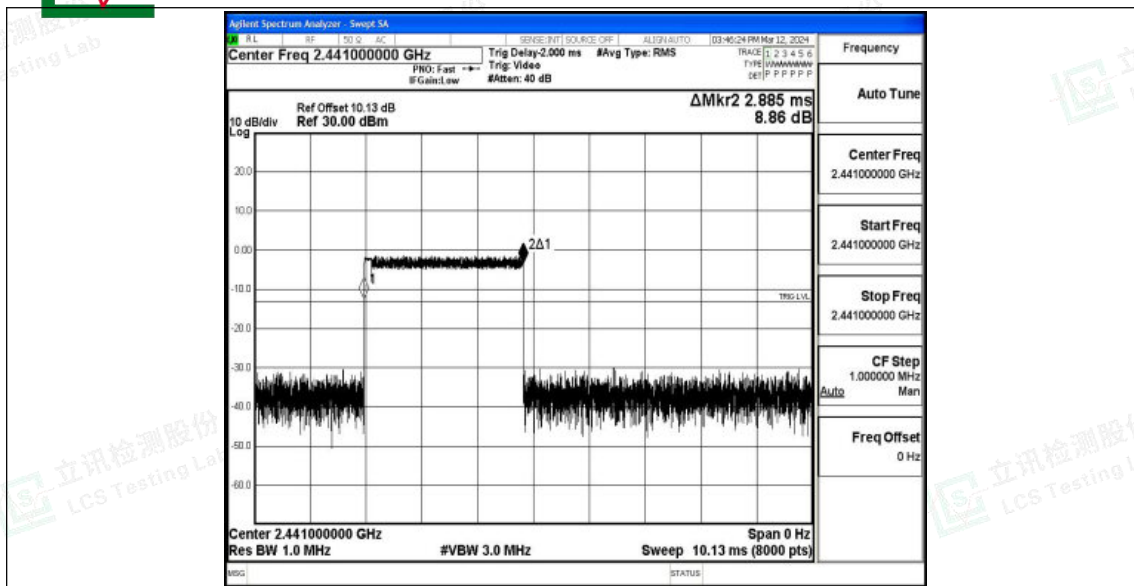
TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.880	106.67	0.307	≤0.4	PASS
2DH5	Ant1	Hop	1.524	106.67	0.163	≤0.4	PASS
3DH5	Ant1	Hop	2.885	106.67	0.308	≤0.4	PASS





Test Graphs







A.5 Number of hopping channels

Test Result

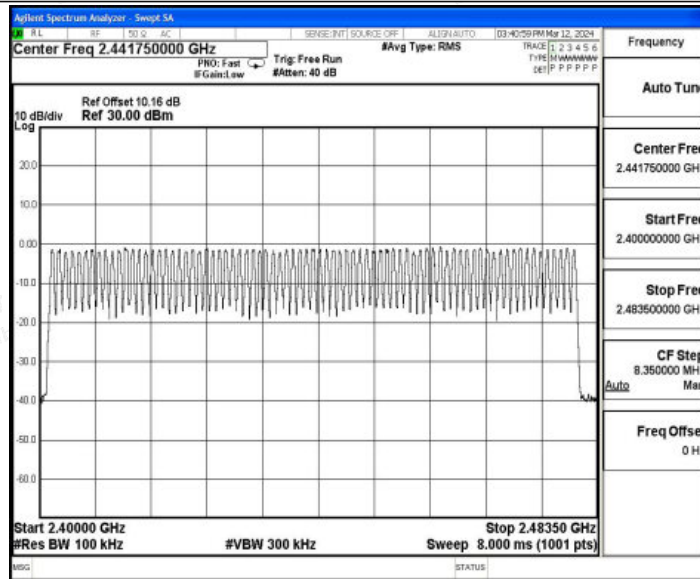
TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS



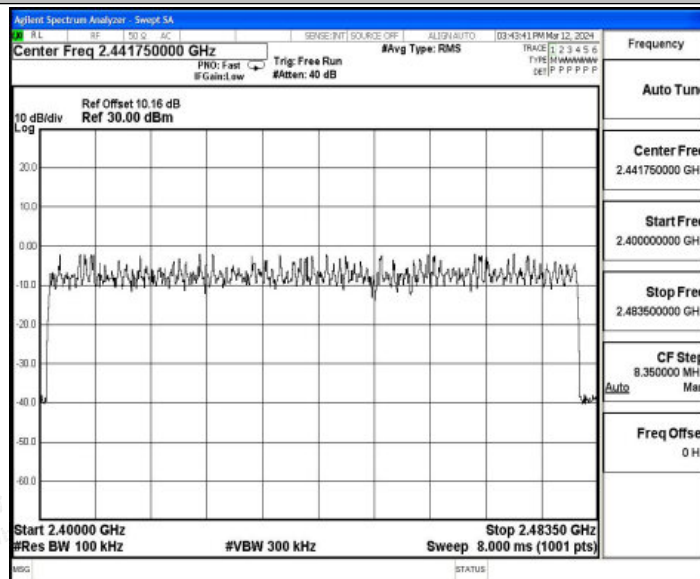


Test Graphs

DH5_Ant1_Hop

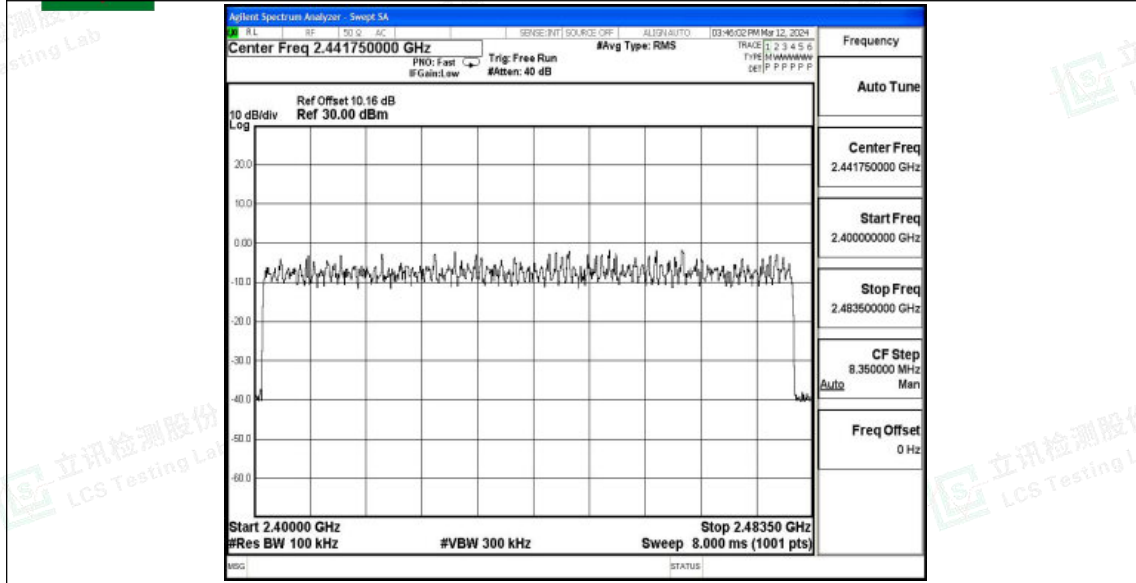


2DH5_Ant1_Hop



3DH5_Ant1_Hop







A.6 Band edge measurements

Test Result

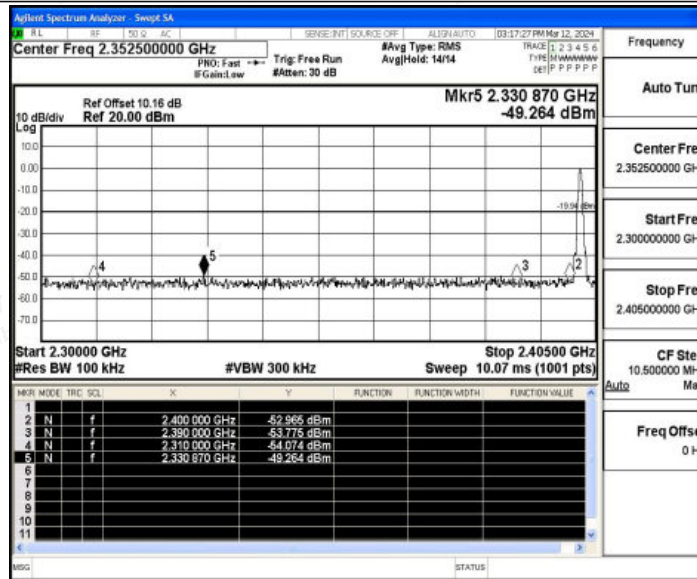
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	0.06	-49.26	≤-19.94	PASS
		High	2480	-1.14	-48.51	≤-21.14	PASS
		Low	Hop_2402	-1.87	-47.83	≤-21.87	PASS
		High	Hop_2480	-1.18	-46.65	≤-21.18	PASS
2DH5	Ant1	Low	2402	-3.14	-48.47	≤-23.14	PASS
		High	2480	-2.89	-48.72	≤-22.89	PASS
		Low	Hop_2402	-5.61	-48.13	≤-25.61	PASS
		High	Hop_2480	-2.73	-46.77	≤-22.73	PASS
3DH5	Ant1	Low	2402	-2.93	-49.13	≤-22.93	PASS
		High	2480	-3.44	-48.65	≤-23.44	PASS
		Low	Hop_2402	-6.32	-47.95	≤-26.32	PASS
		High	Hop_2480	-3.42	-46.9	≤-23.42	PASS



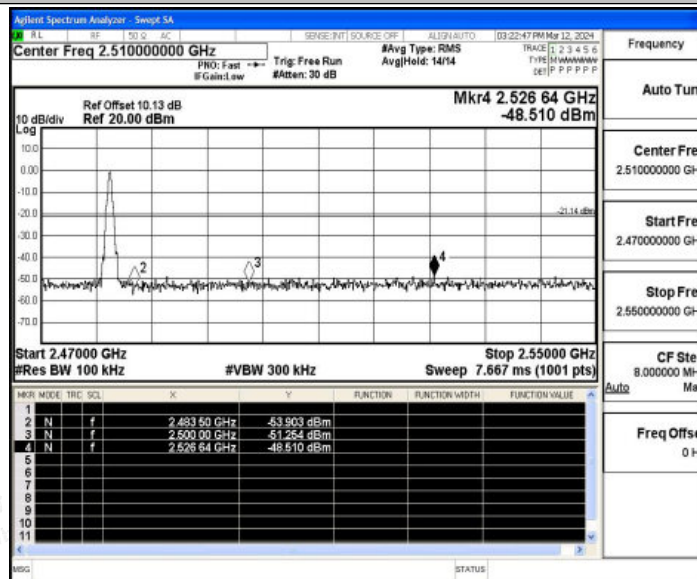


Test Graphs

DH5_Ant1_Low_2402

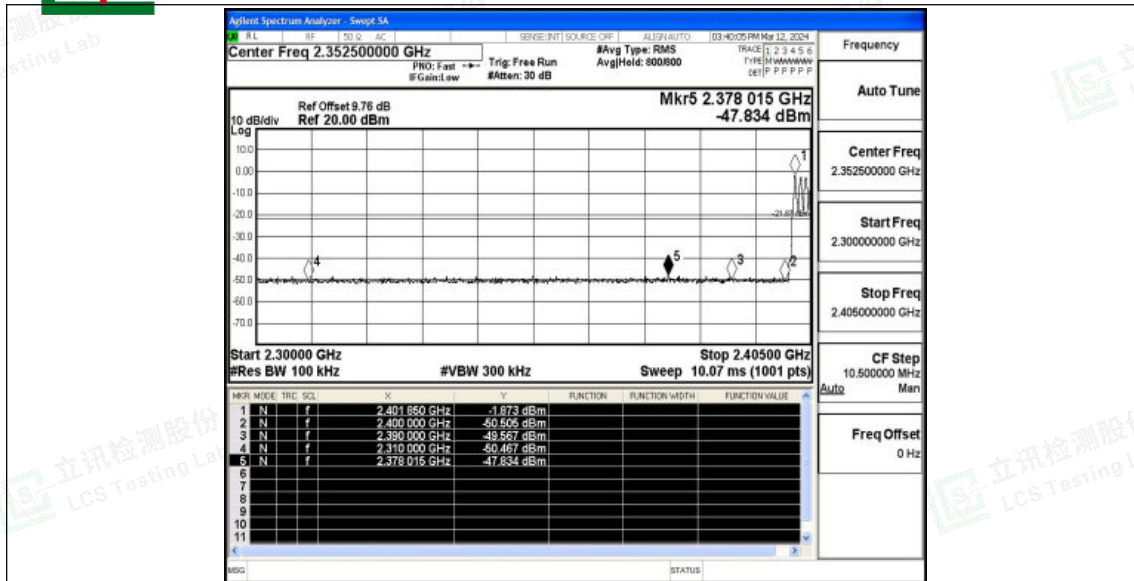


DH5_Ant1_High_2480

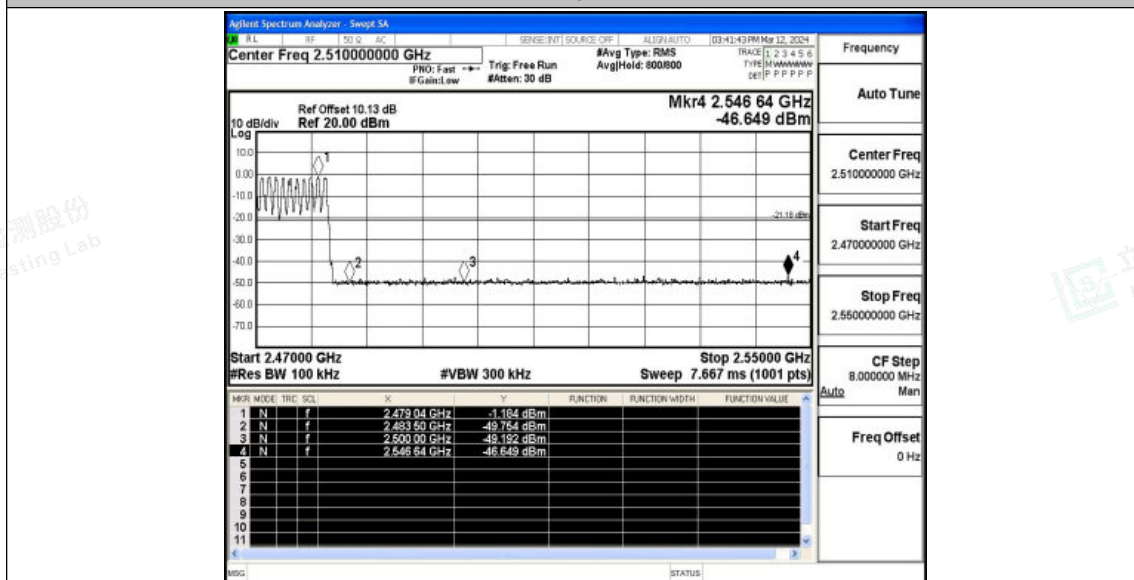


DH5_Ant1_Low_Hop_2402



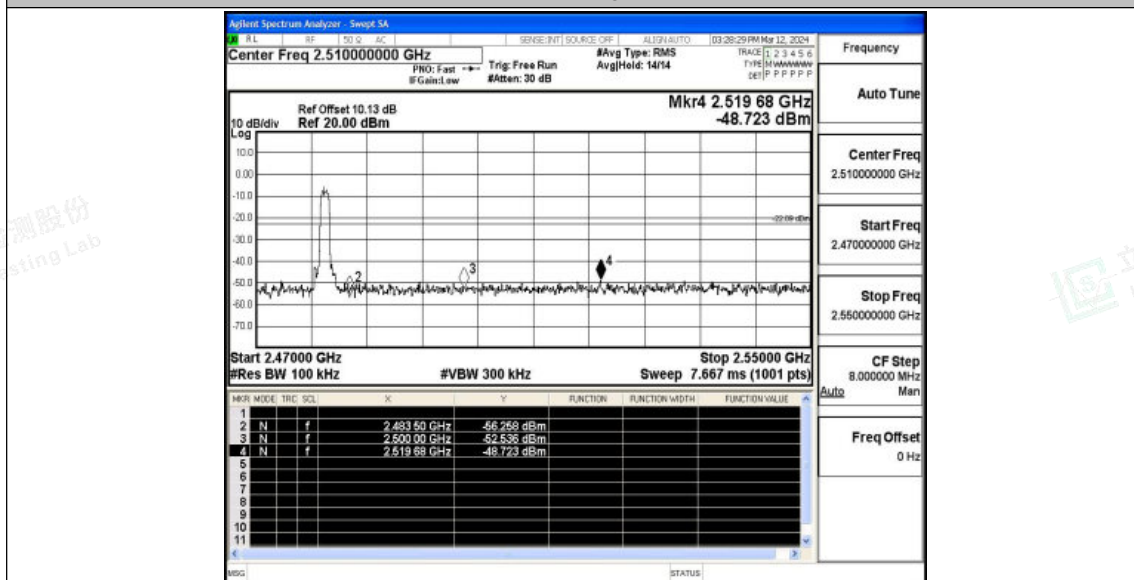
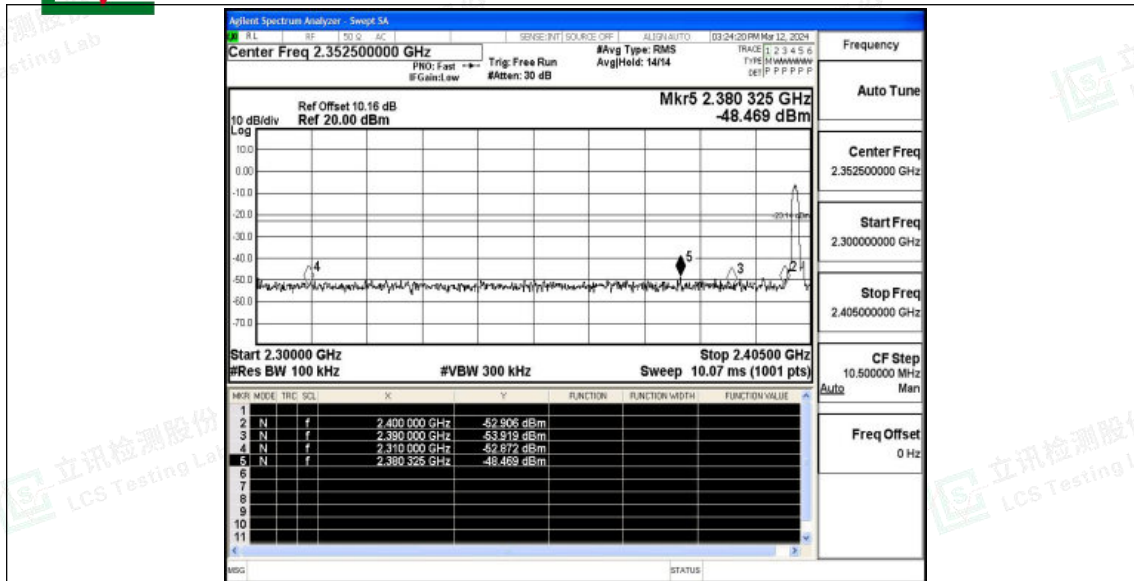


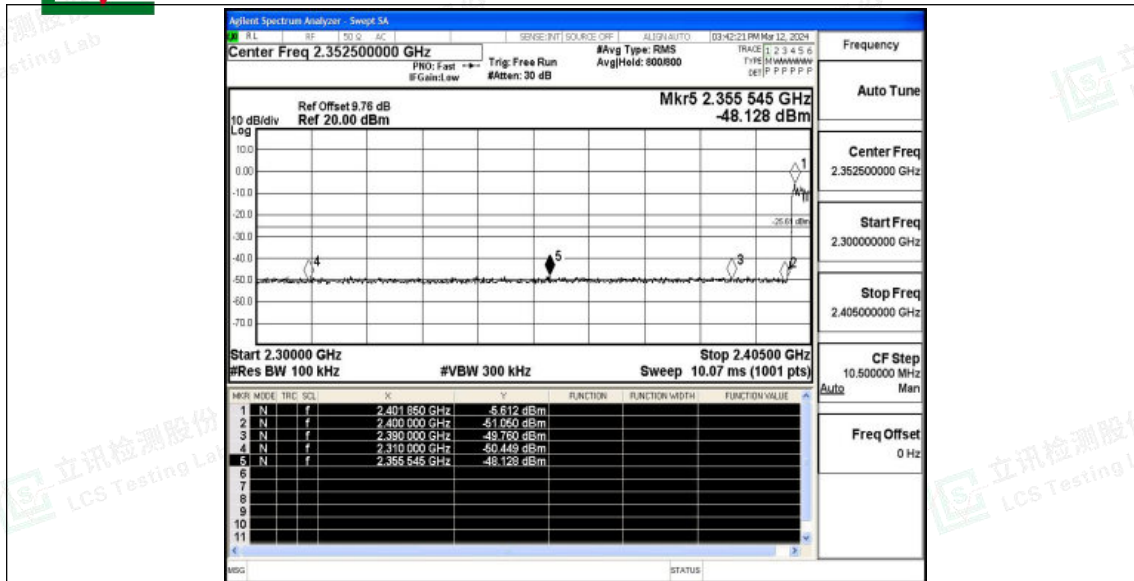
DH5_Ant1_High_Hop_2480



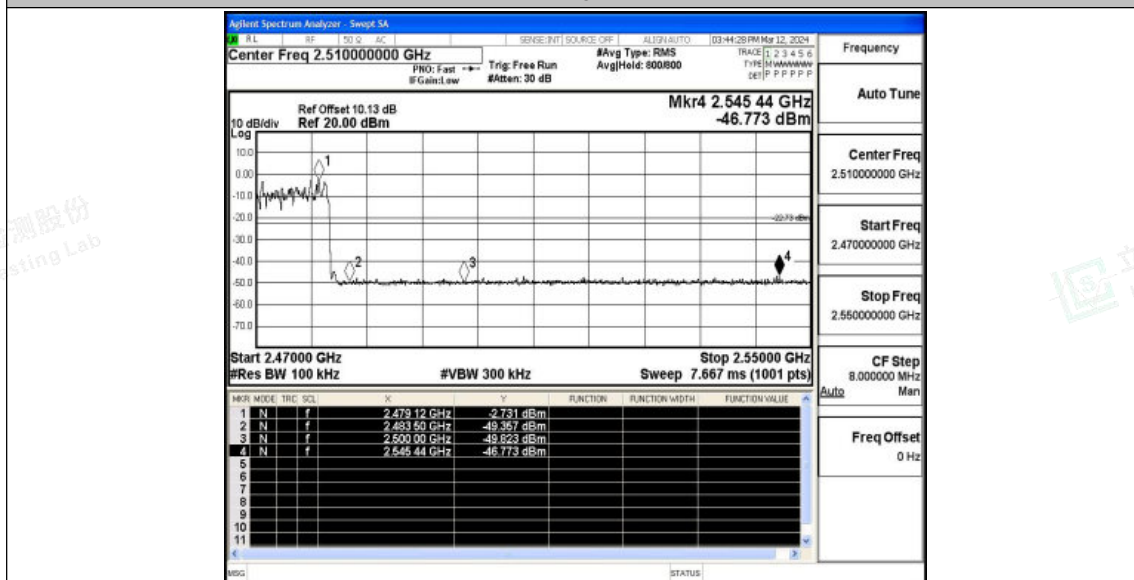
2DH5_Ant1_Low_2402





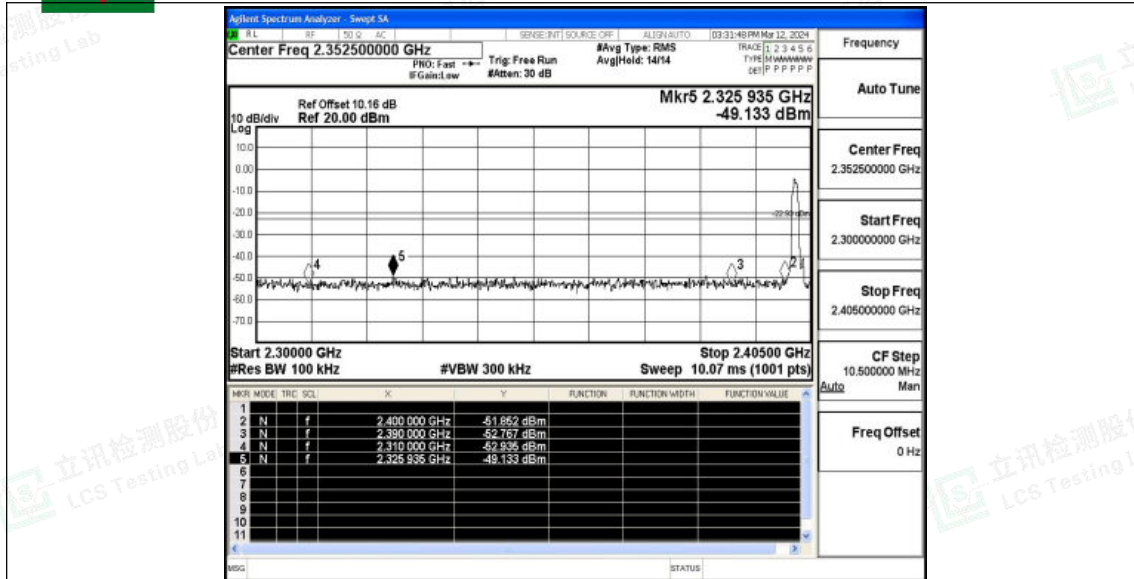


2DH5_Ant1_High_Hop_2480

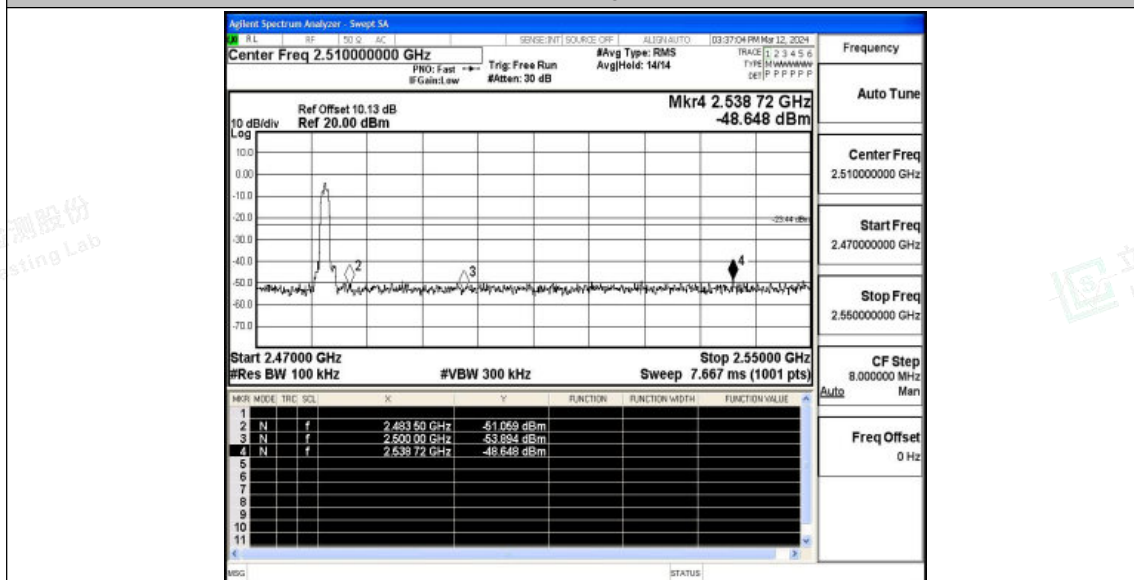


3DH5_Ant1_Low_2402



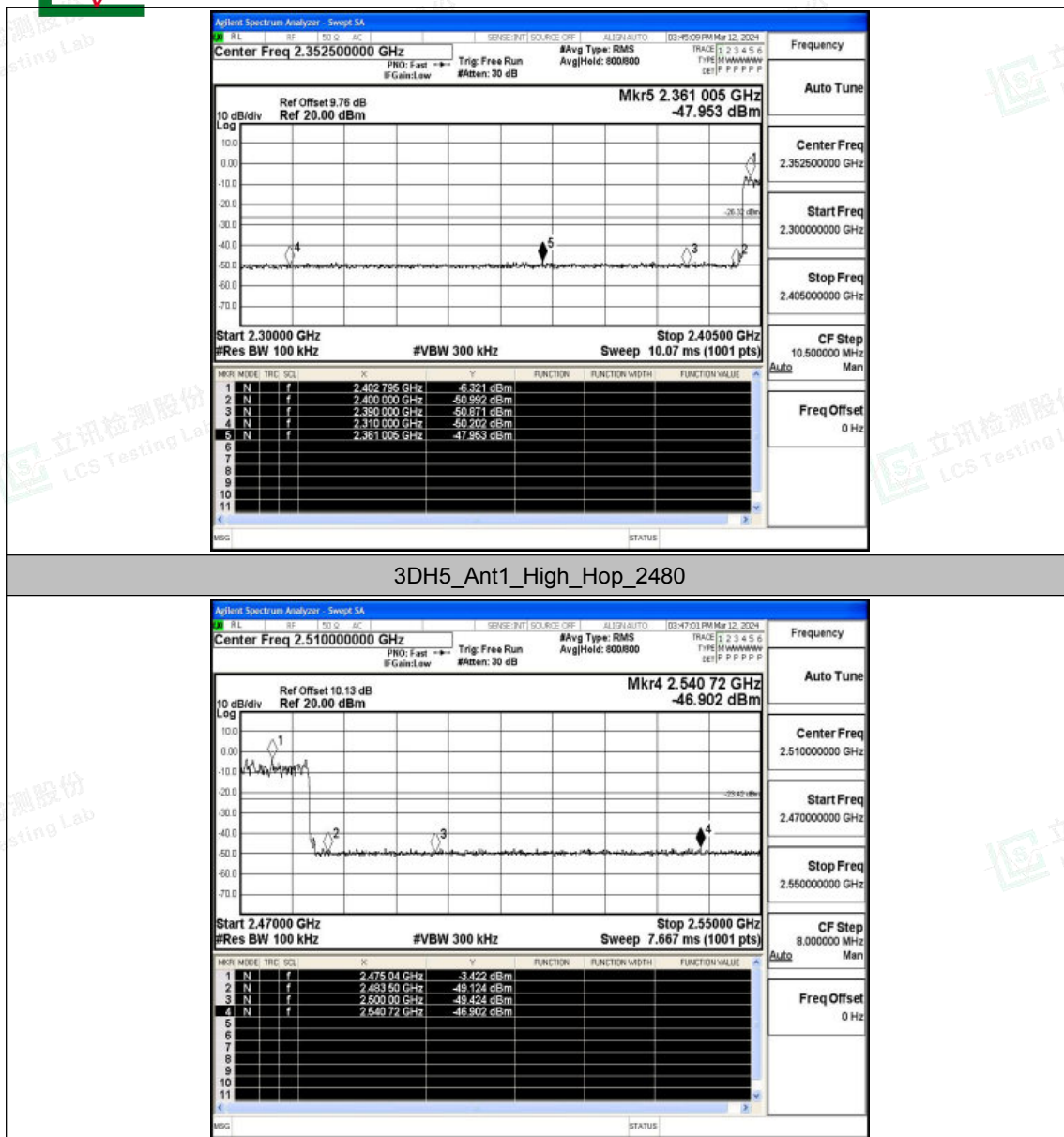


3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402







A.7 Conducted Spurious Emission

Test Result

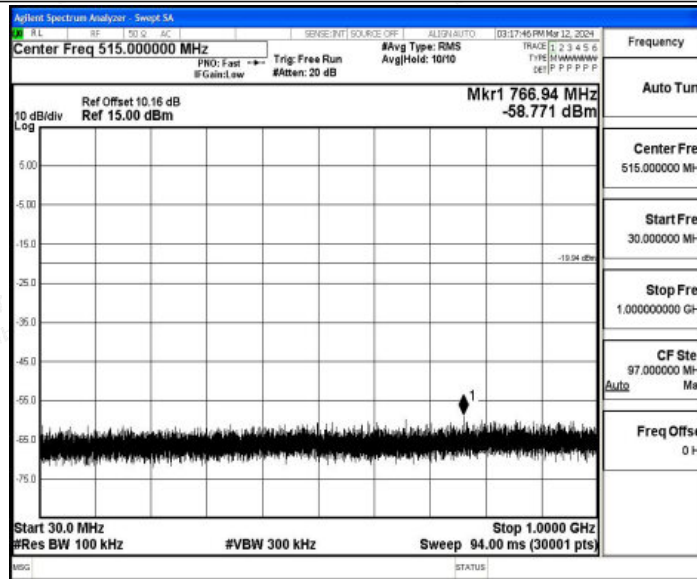
TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	30~1000	0.06	-58.77	≤-19.94	PASS
			1000~26500	0.06	-47.1	≤-19.94	PASS
		2441	30~1000	-0.26	-59.48	≤-20.26	PASS
			1000~26500	-0.26	-46.59	≤-20.26	PASS
		2480	30~1000	-1.14	-59.3	≤-21.14	PASS
			1000~26500	-1.14	-47.47	≤-21.14	PASS
2DH5	Ant1	2402	30~1000	-3.14	-60.01	≤-23.14	PASS
			1000~26500	-3.14	-47.06	≤-23.14	PASS
		2441	30~1000	-2.85	-59.08	≤-22.85	PASS
			1000~26500	-2.85	-46.59	≤-22.85	PASS
		2480	30~1000	-2.89	-59.53	≤-22.89	PASS
			1000~26500	-2.89	-47.25	≤-22.89	PASS
3DH5	Ant1	2402	30~1000	-2.93	-58.95	≤-22.93	PASS
			1000~26500	-2.93	-46.68	≤-22.93	PASS
		2441	30~1000	-2.92	-59.85	≤-22.92	PASS
			1000~26500	-2.92	-45.97	≤-22.92	PASS
		2480	30~1000	-3.44	-59.33	≤-23.44	PASS
			1000~26500	-3.44	-46.77	≤-23.44	PASS



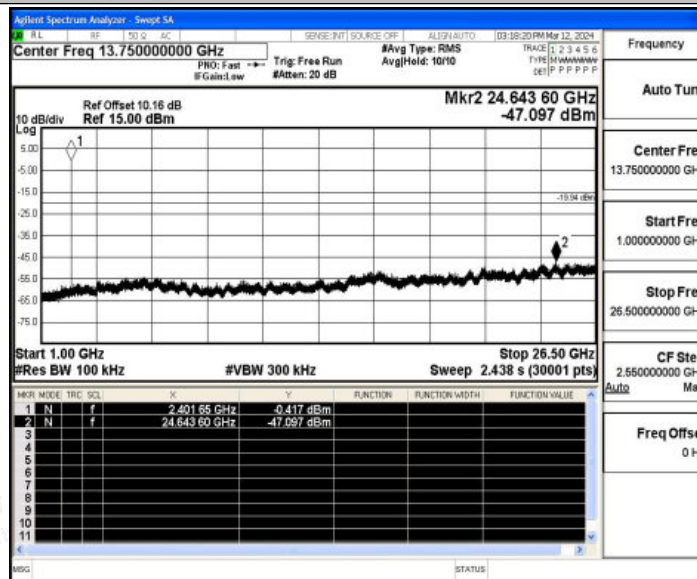


Test Graphs

DH5_Ant1_2402_30~1000

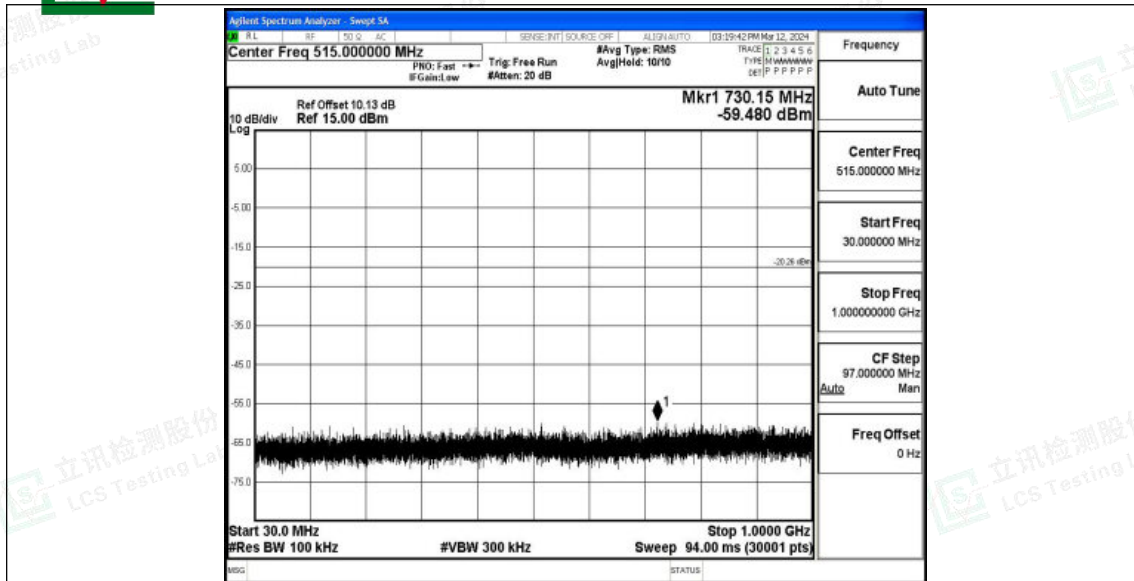


DH5_Ant1_2402_1000~26500

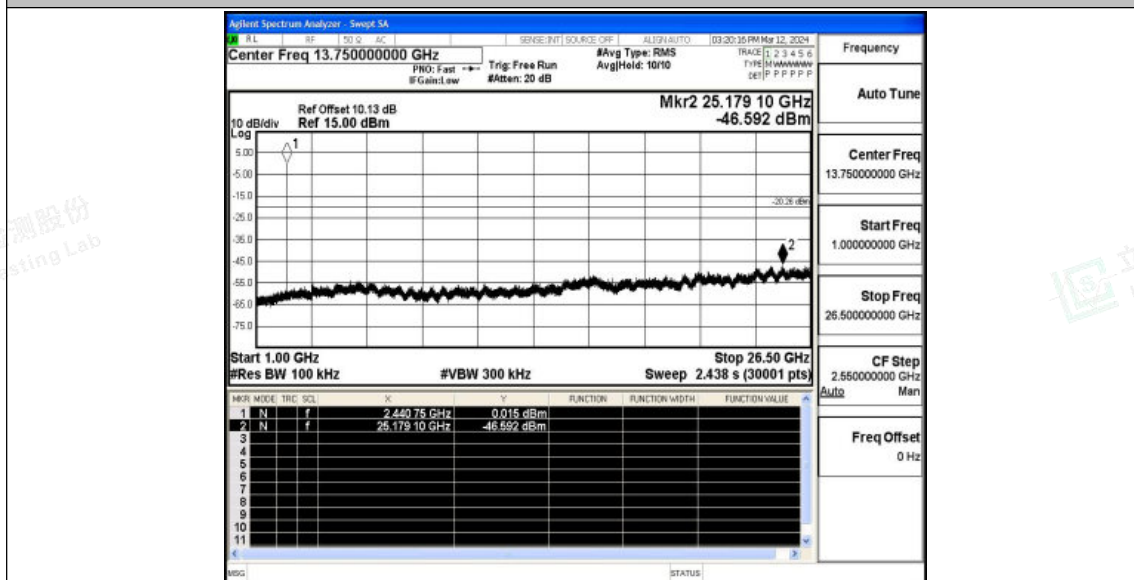


DH5_Ant1_2441_30~1000



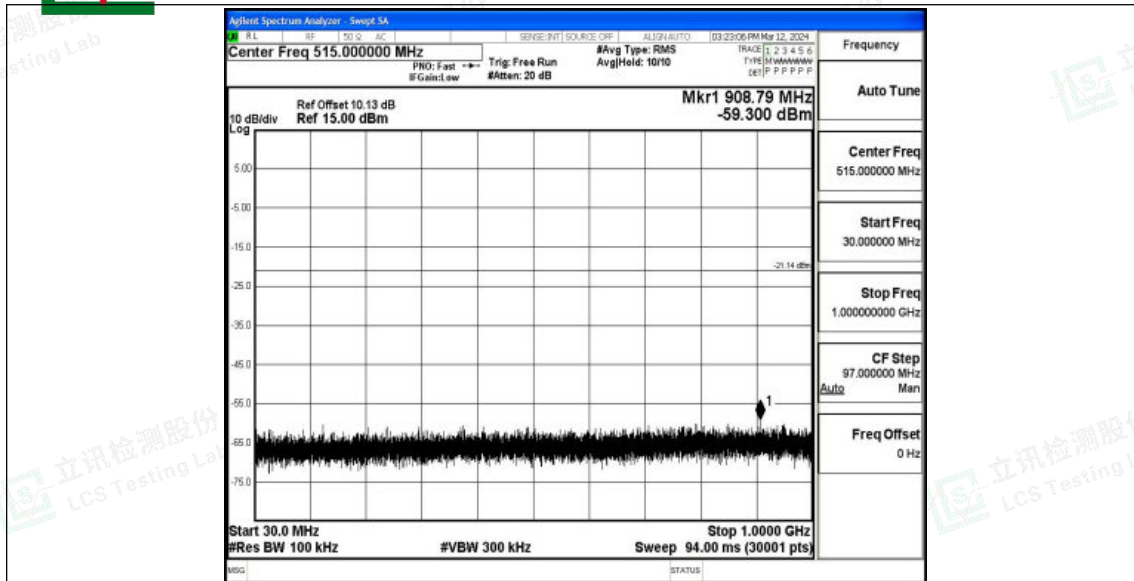


DH5_Ant1_2441_1000~26500

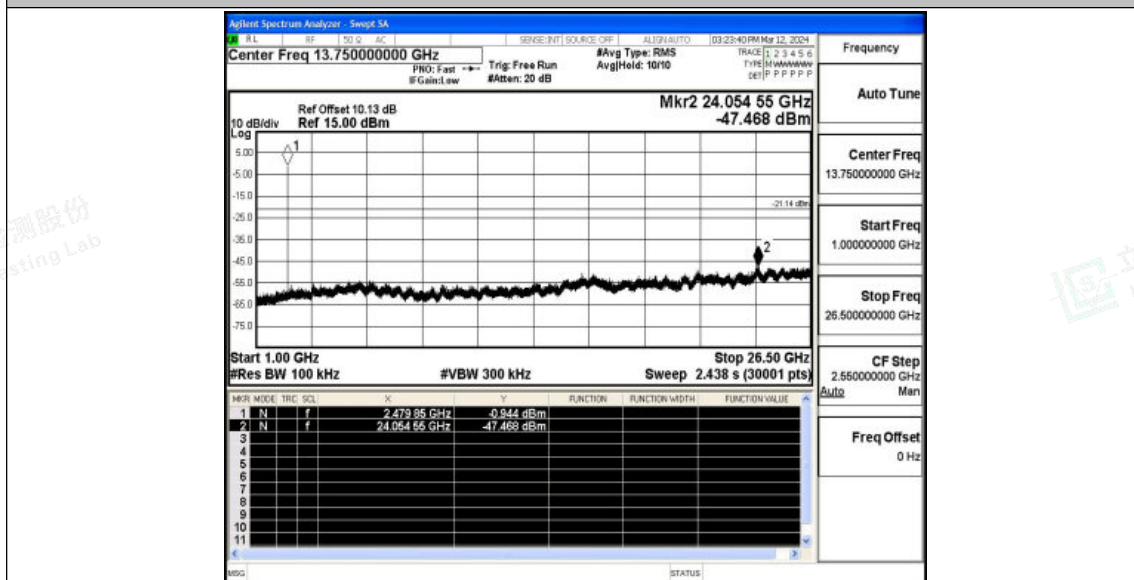


DH5_Ant1_2480_30~1000



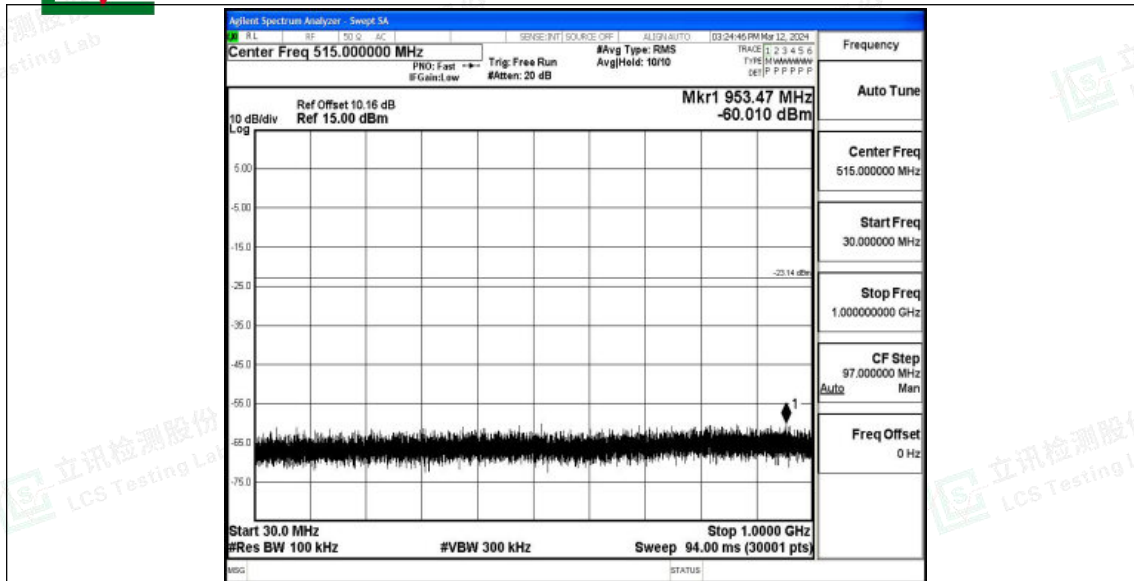


DH5_Ant1_2480_1000~26500

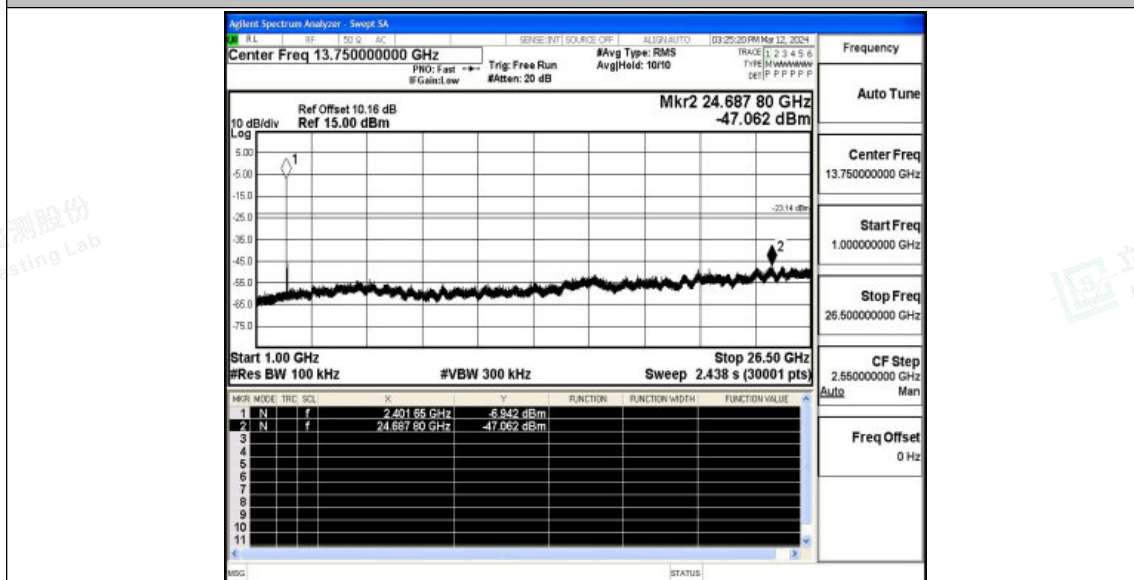


2DH5_Ant1_2402_30~1000



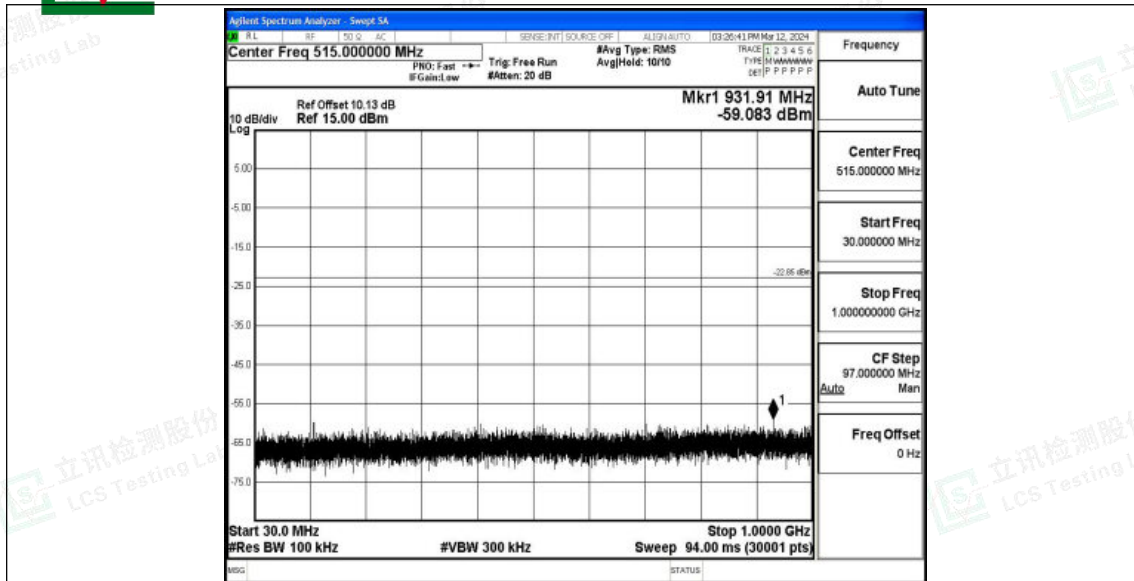


2DH5_Ant1_2402_1000~26500

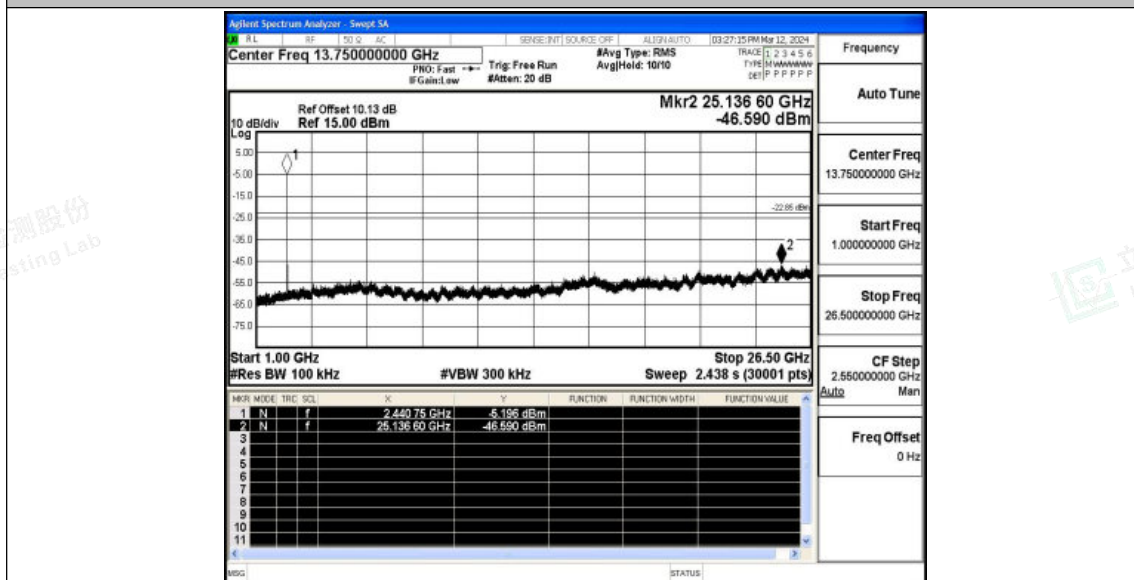


2DH5_Ant1_2441_30~1000



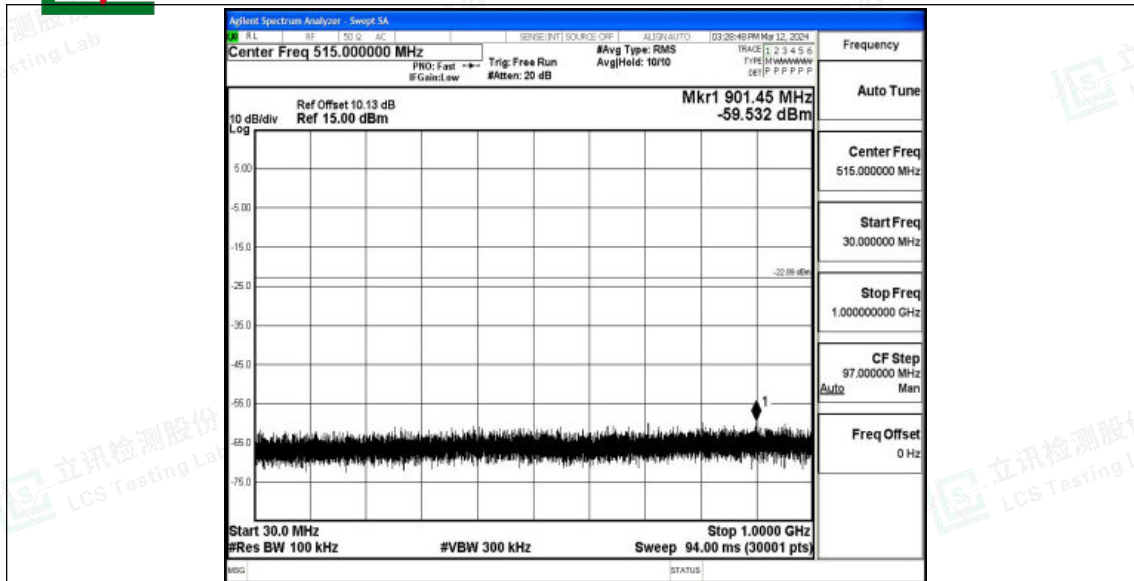


2DH5_Ant1_2441_1000~26500

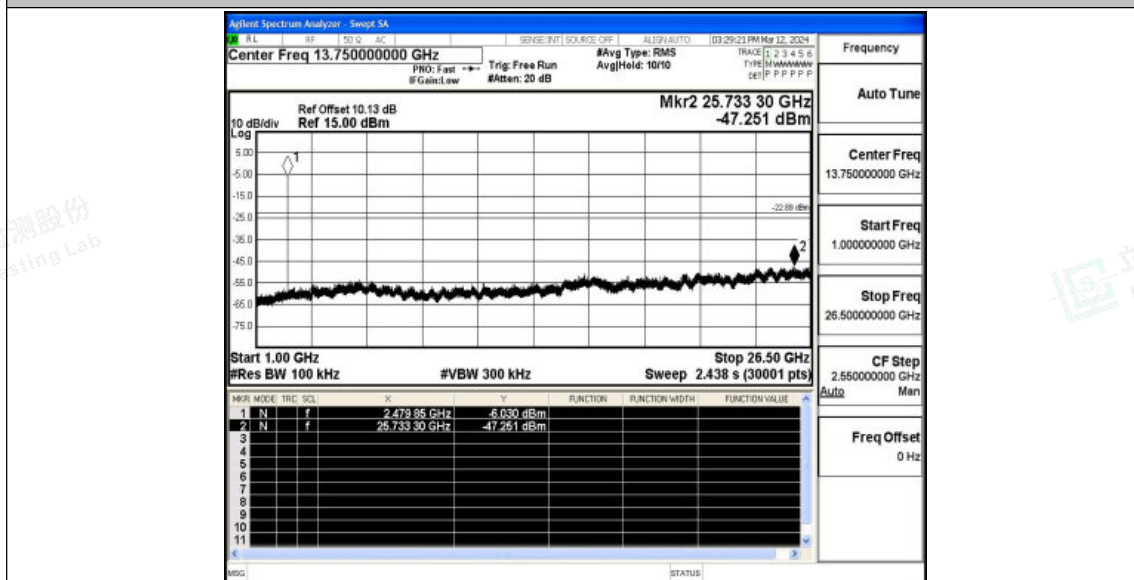


2DH5_Ant1_2480_30~1000



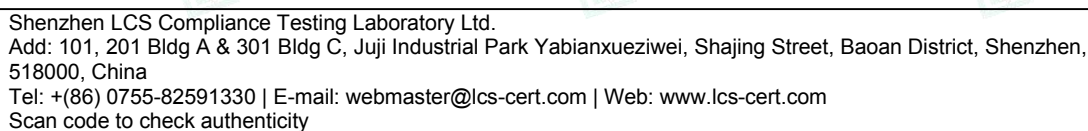
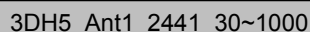
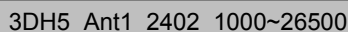


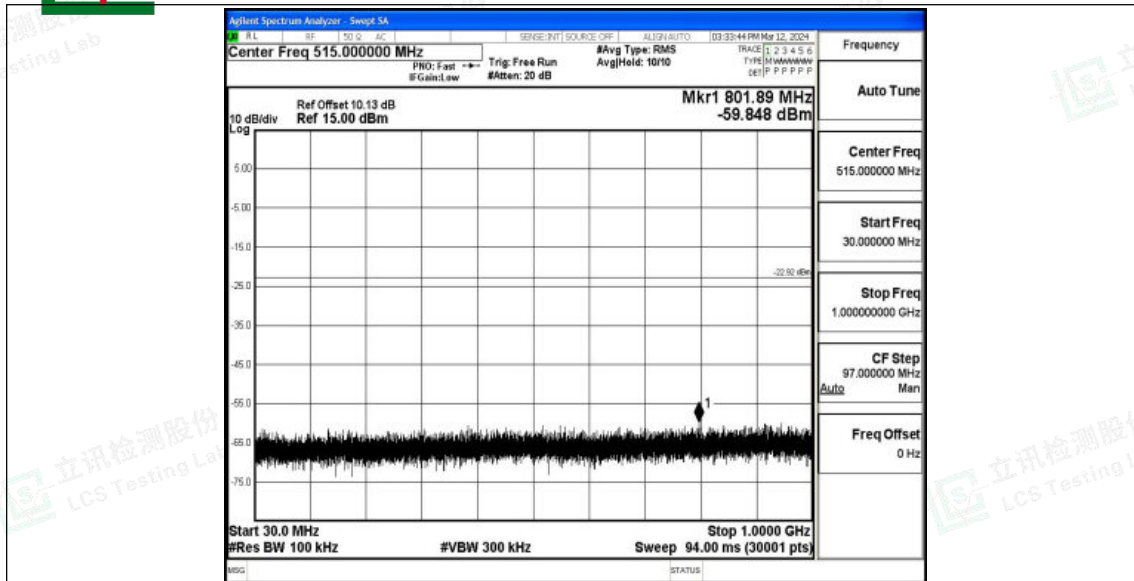
2DH5_Ant1_2480_1000~26500



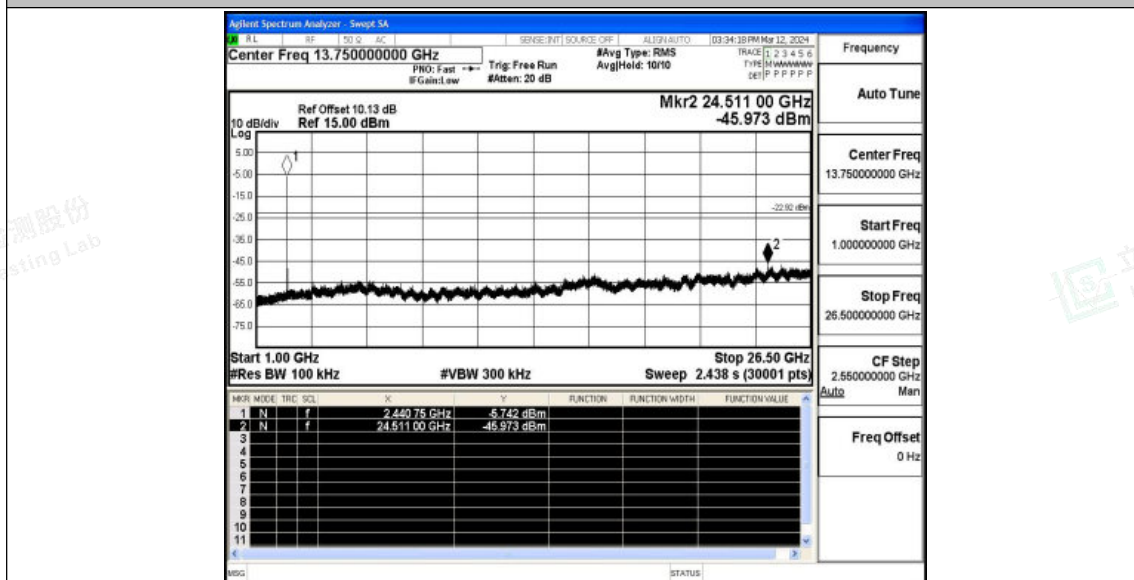
3DH5_Ant1_2402_30~1000





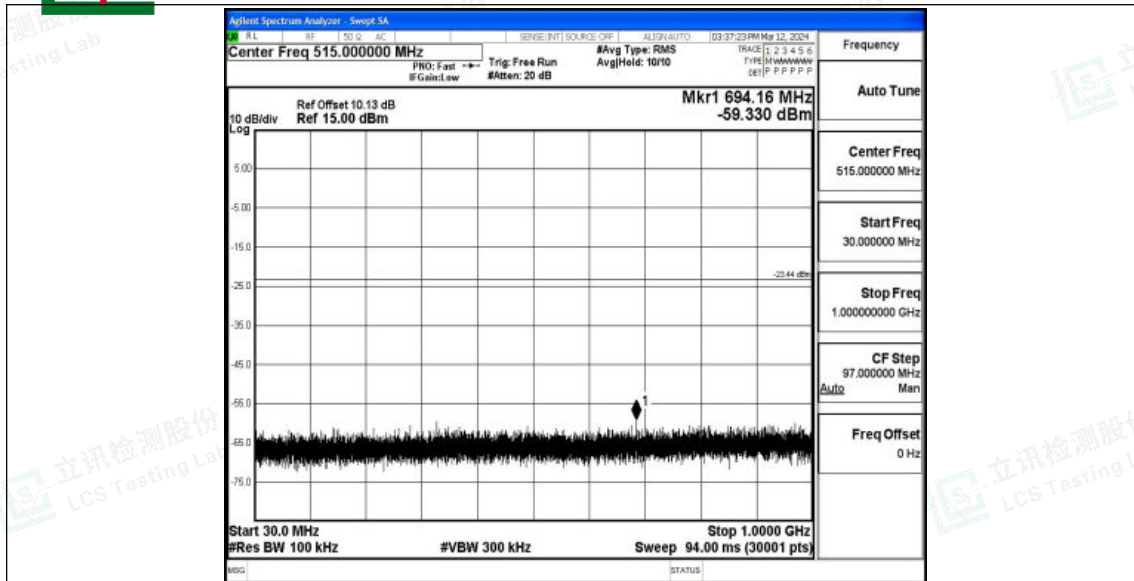


3DH5_Ant1_2441_1000~26500

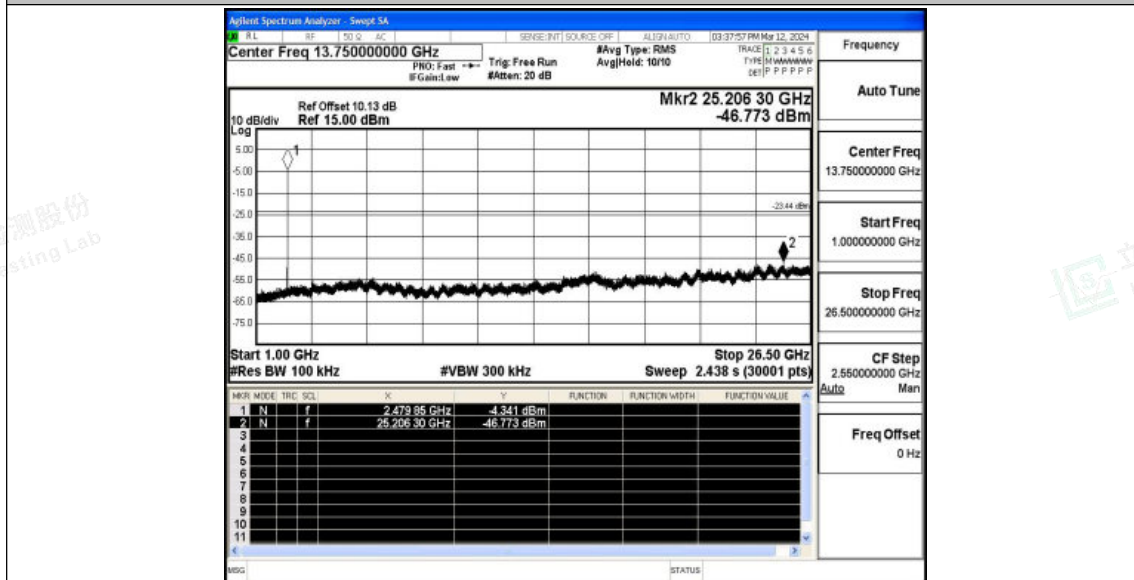


3DH5_Ant1_2480_30~1000





3DH5_Ant1_2480_1000~26500





Reference Level

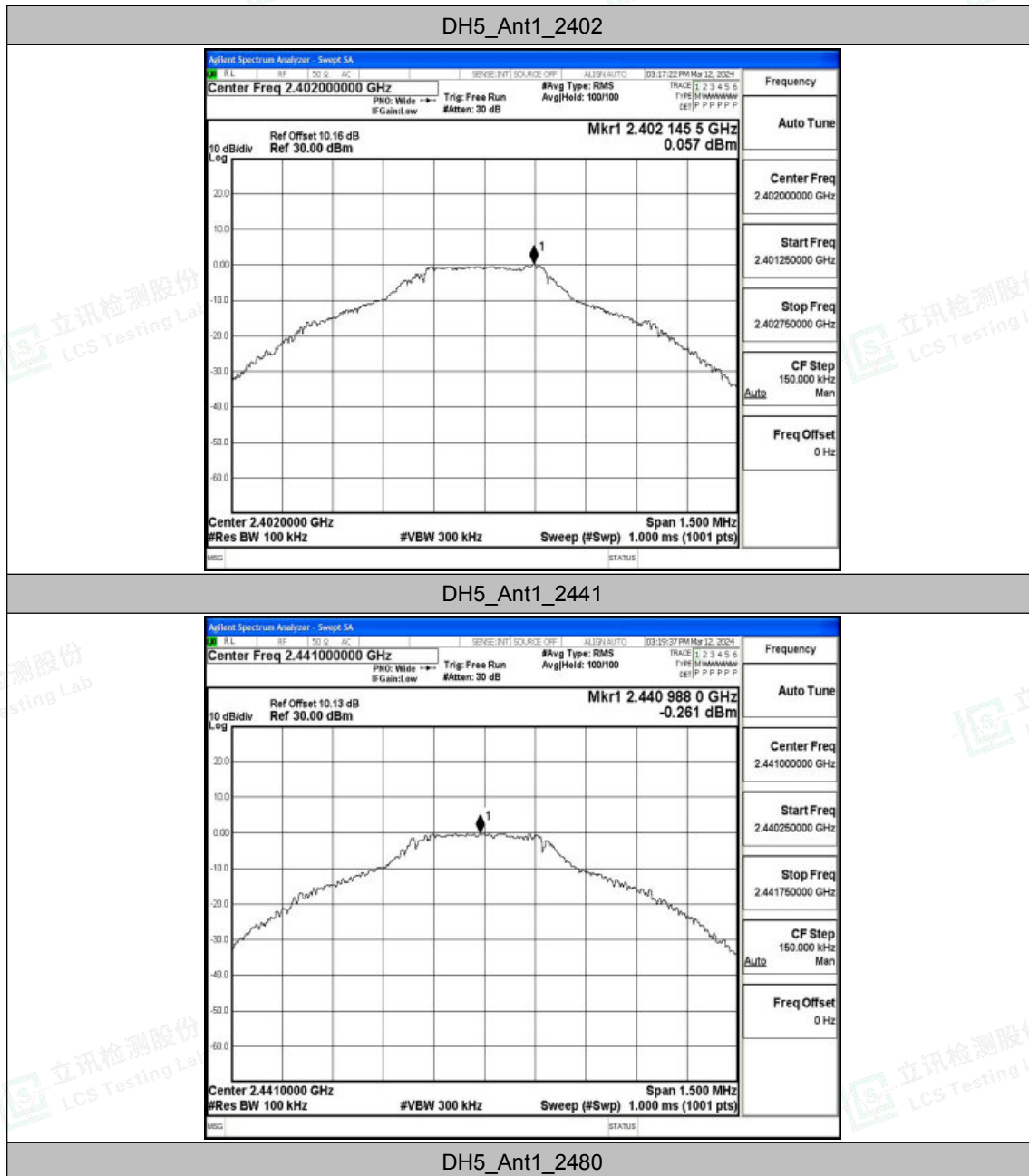
Test Result

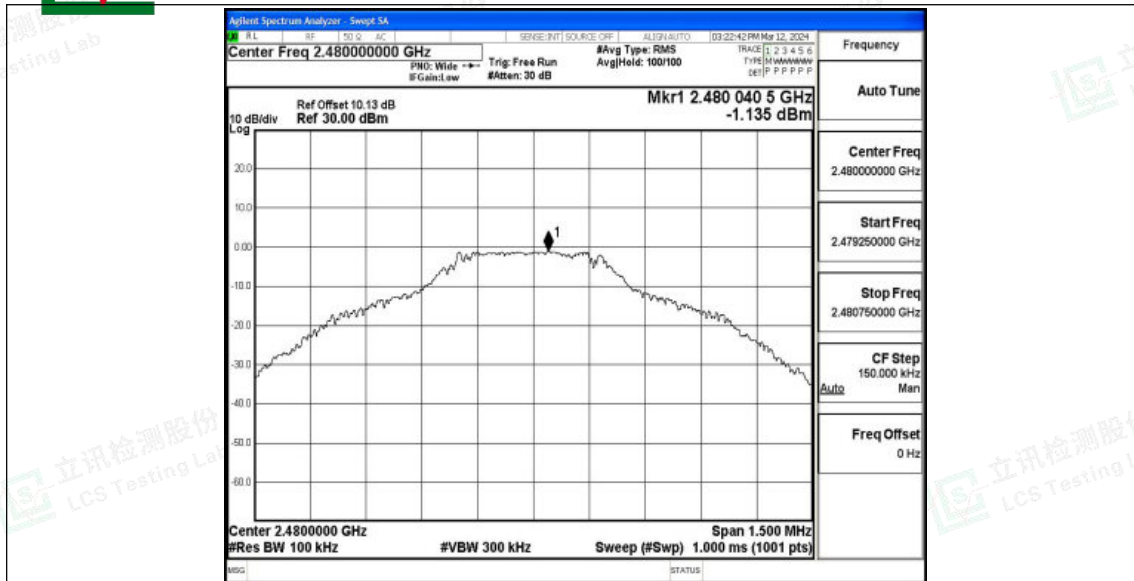
TestMode	Antenna	ChName	Frequency[MHz]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	2402.15	0.06	---	PASS
		2441	2440.99	-0.26	---	PASS
		2480	2480.04	-1.14	---	PASS
2DH5	Ant1	2402	2402.17	-3.14	---	PASS
		2441	2441.14	-2.85	---	PASS
		2480	2480.12	-2.89	---	PASS
3DH5	Ant1	2402	2402.14	-2.93	---	PASS
		2441	2441.06	-2.92	---	PASS
		2480	2479.95	-3.44	---	PASS



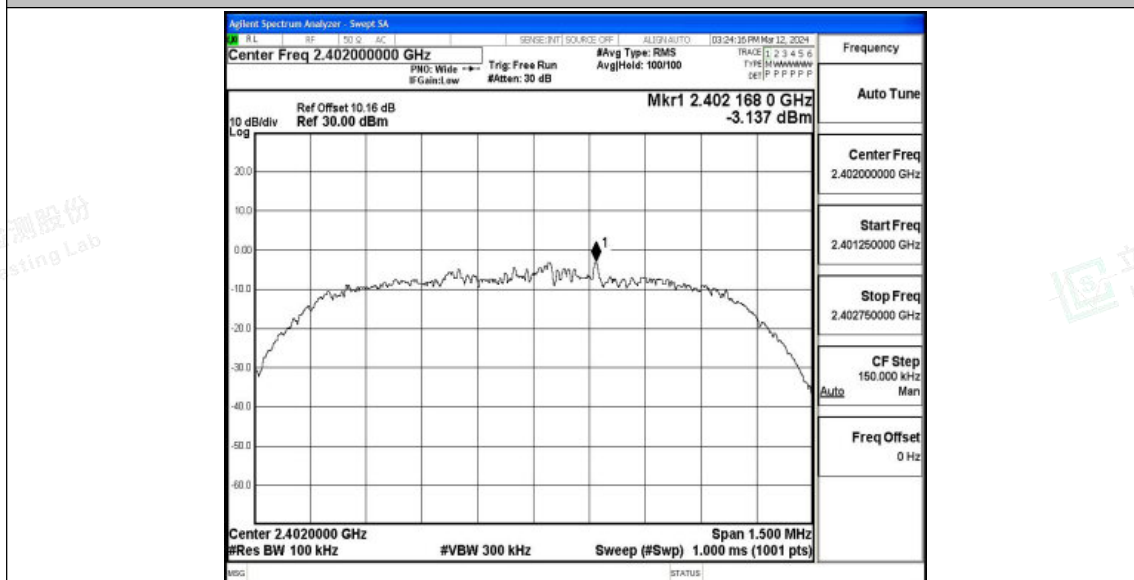


Test Graphs



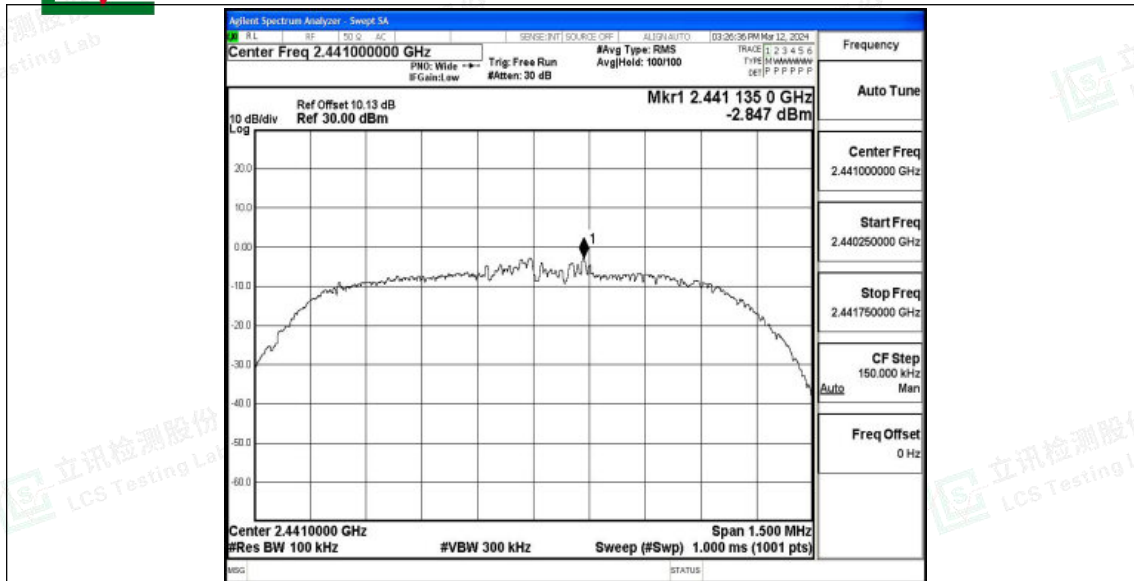


2DH5_Ant1_2402

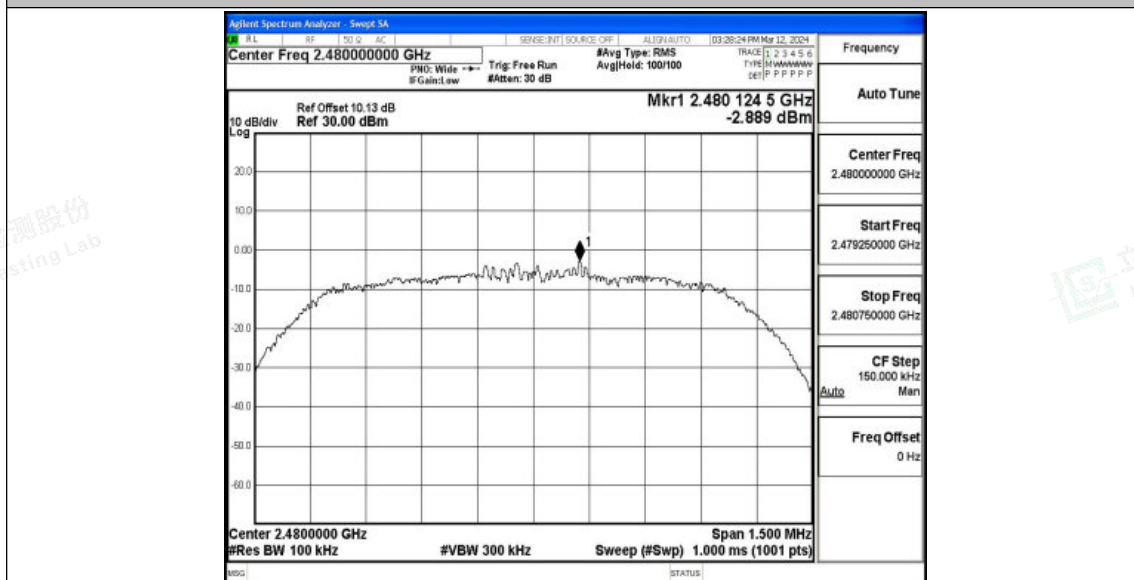


2DH5_Ant1_2441



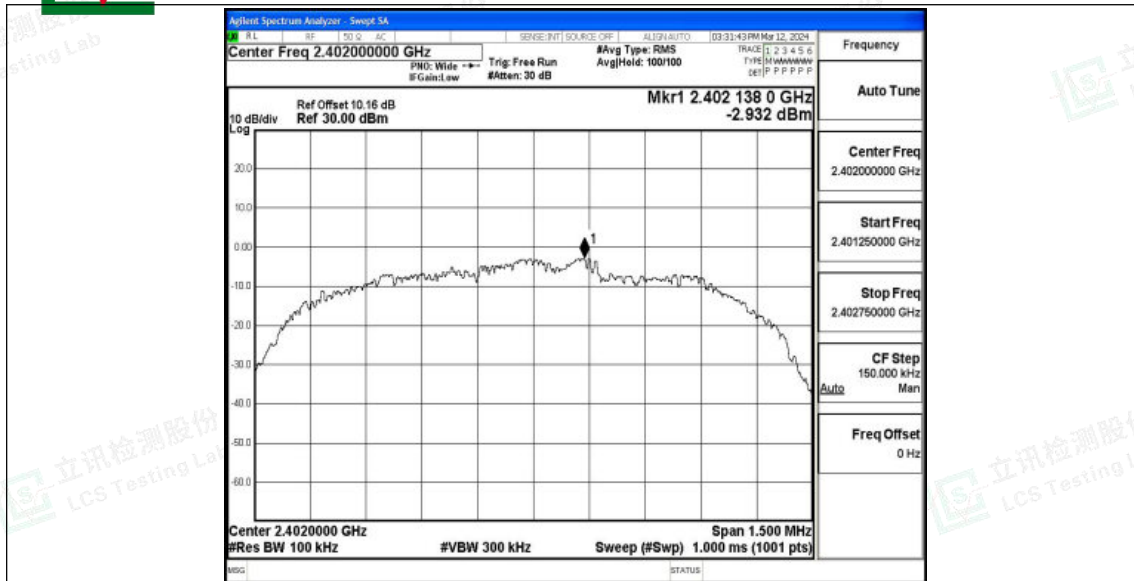


2DH5_Ant1_2480

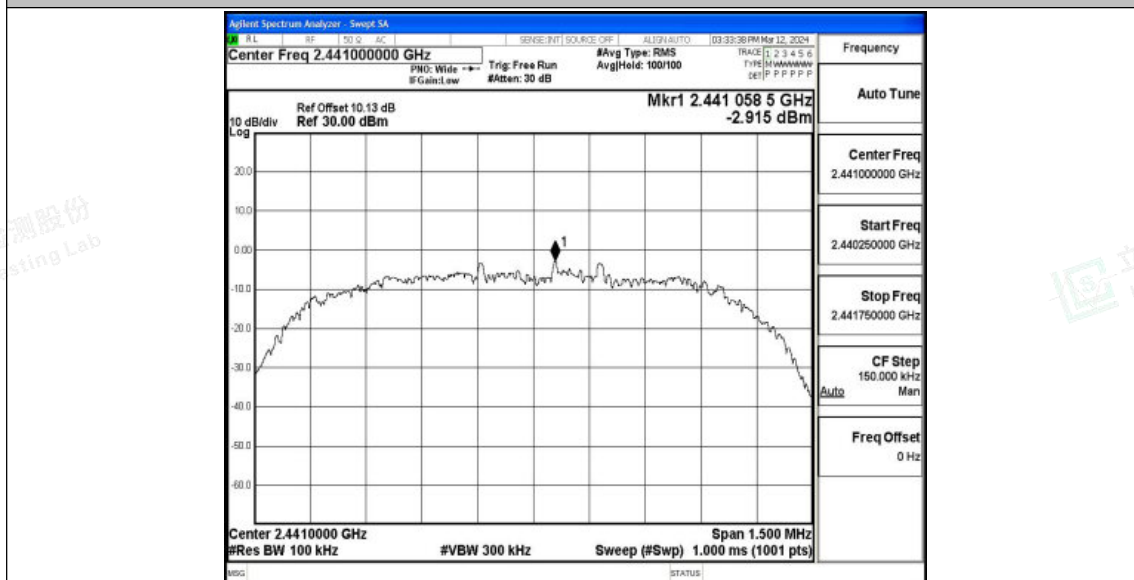


3DH5_Ant1_2402



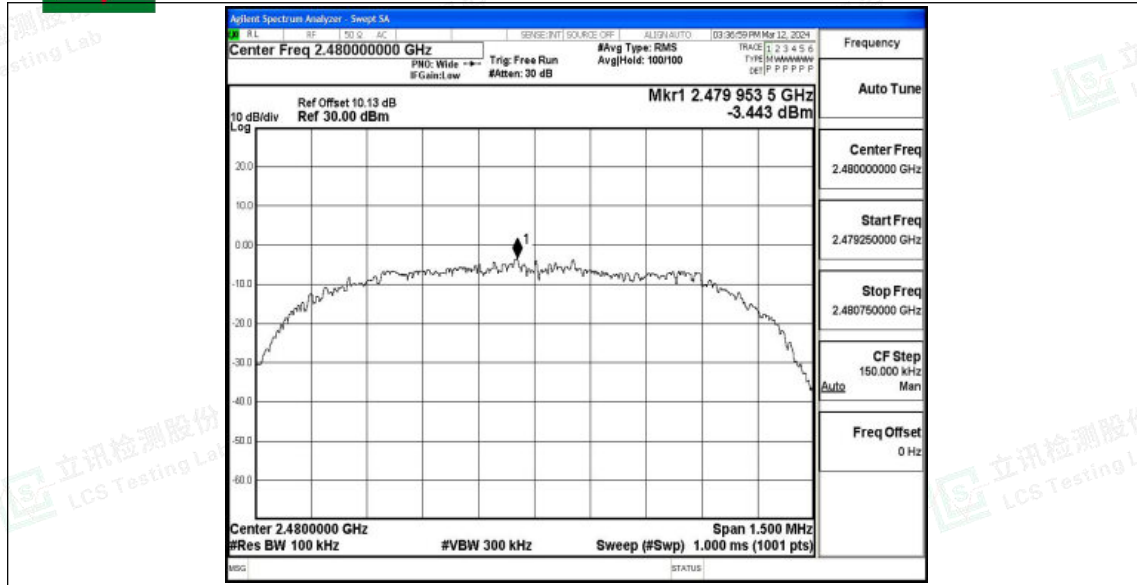


3DH5_Ant1_2441



3DH5_Ant1_2480









A.8 Duty Cycle

Test Result

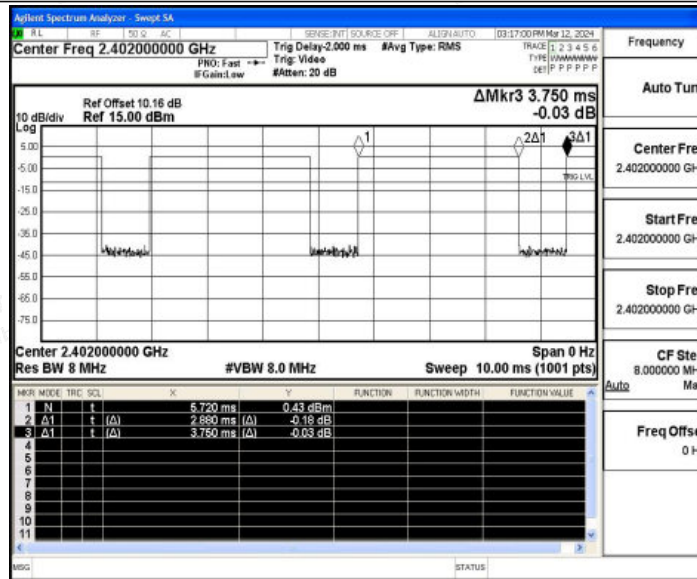
TestMode	Antenna	Frequency[MHz]	ON Time[ms]	Period[ms]	Duty Cycle[%]	Duty Cycle Factor[dB]	1/T Factor[kHz]
DH5	Ant1	2402	2.88	3.75	76.80	1.15	0.35
		2441	2.89	3.75	77.07	1.13	0.35
		2480	2.88	3.75	76.80	1.15	0.35
2DH5	Ant1	2441	2.89	3.75	77.07	1.13	0.35
		2480	2.89	3.75	77.07	1.13	0.35
3DH5	Ant1	2402	2.89	3.75	77.07	1.13	0.35
		2441	2.88	3.75	76.80	1.15	0.35
		2480	2.89	3.75	77.07	1.13	0.35



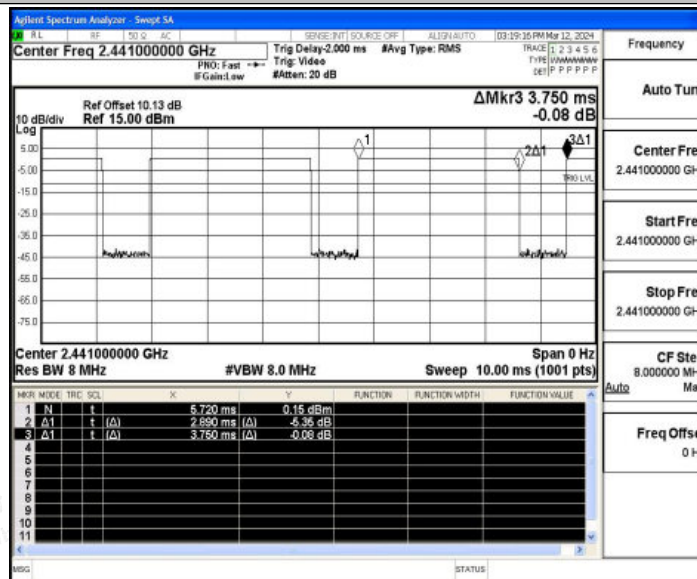


Test Graphs

DH5_Ant1_2402

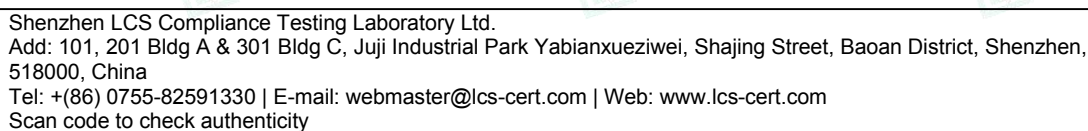
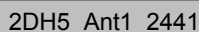


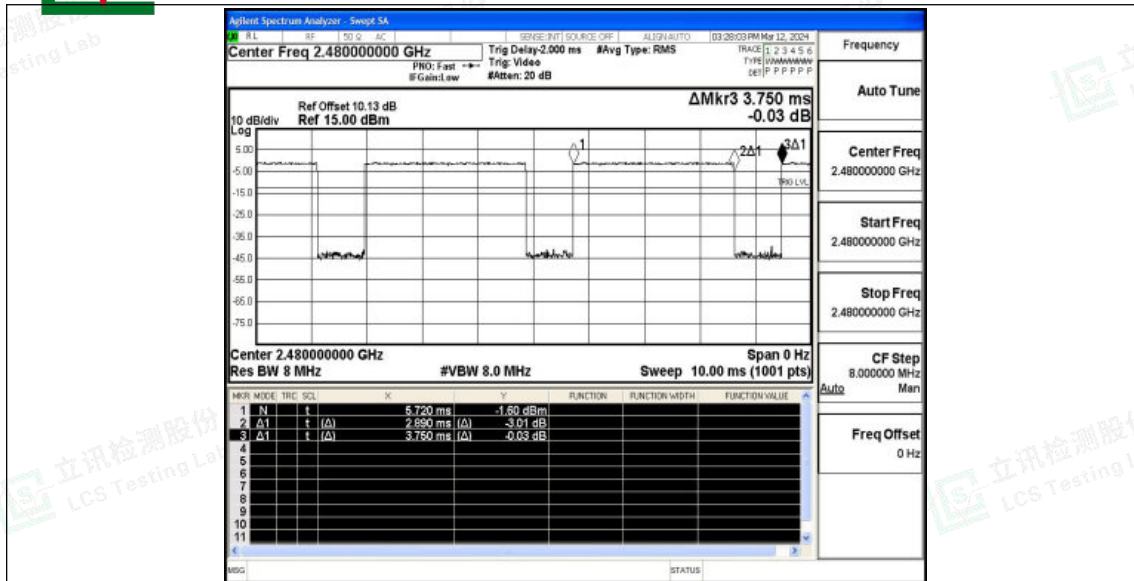
DH5_Ant1_2441



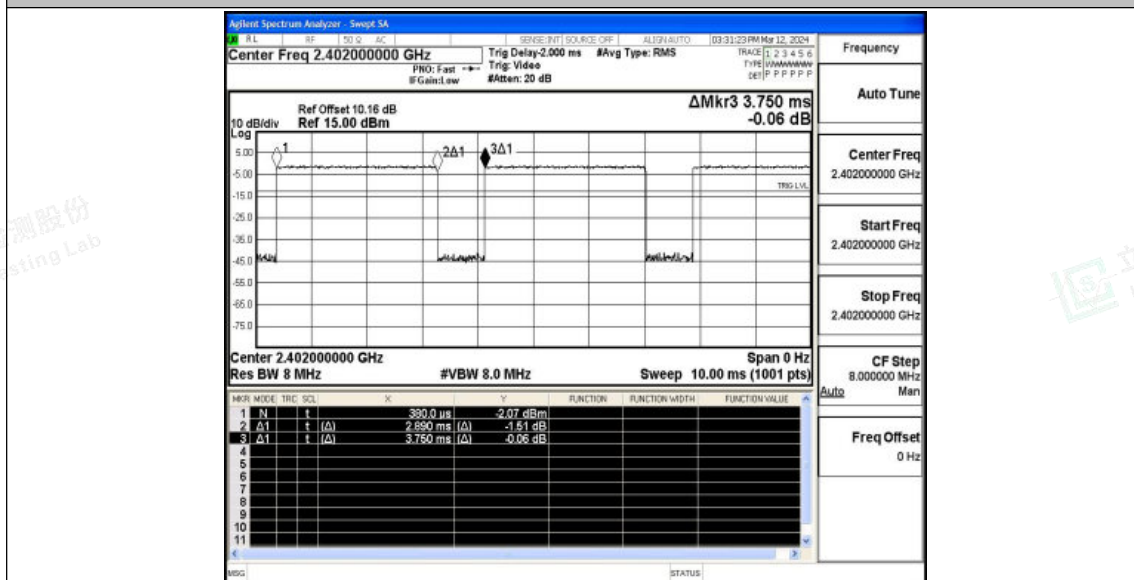
DH5_Ant1_2480





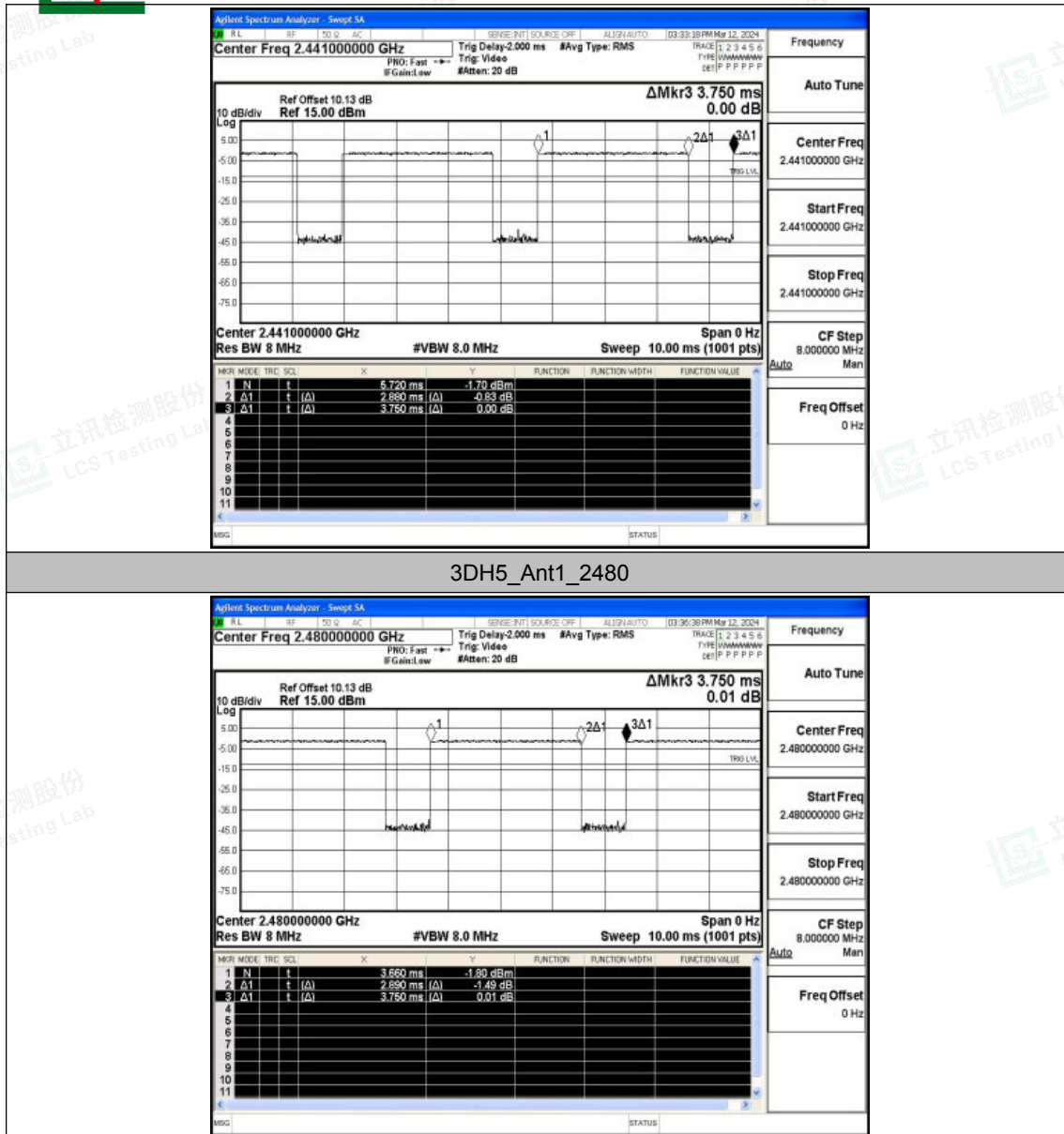


3DH5_Ant1_2402



3DH5_Ant1_2441







A.9 Emissions in Restricted Bands

Test Result

TestMode	Antenna	ChName	Frequency [MHz]	Detector	Freq [MHz]	Result [dBm]	Limit [dBm]	Result [dBuV/m]	Limit [dBuV/m]	Verdict
DH5	Ant1	Low	2402	AV	2310.000	-46.73	≤-41.20	48.47	≤54	PASS
				AV	2346.620	-45.66	≤-41.20	49.54	≤54	PASS
				AV	2390.000	-47	≤-41.20	48.20	≤54	PASS
				Peak	2310.000	-39.92	≤-21.20	55.28	≤74	PASS
				Peak	2327.825	-37.11	≤-21.20	58.09	≤74	PASS
				Peak	2390.000	-39.52	≤-21.20	55.68	≤74	PASS
		High	2480	AV	2483.500	-46.22	≤-41.20	48.98	≤54	PASS
				AV	2496.880	-45.63	≤-41.20	49.57	≤54	PASS
				AV	2500.000	-46.21	≤-41.20	48.99	≤54	PASS
				Peak	2483.500	-40.33	≤-21.20	54.87	≤74	PASS
				Peak	2484.800	-37.1	≤-21.20	58.10	≤74	PASS
				Peak	2500.000	-38.15	≤-21.20	57.05	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-40.11	≤-21.20	55.09	≤74	PASS
				Peak	2378.225	-36.75	≤-21.20	58.45	≤74	PASS
				Peak	2390.000	-40.75	≤-21.20	54.45	≤74	PASS
		High	Hop_2480	Peak	2483.500	-40.29	≤-21.20	54.91	≤74	PASS
				Peak	2492.160	-36.84	≤-21.20	58.36	≤74	PASS
				Peak	2500.000	-39.64	≤-21.20	55.56	≤74	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-47.23	≤-41.20	47.97	≤54	PASS
				AV	2386.415	-45.69	≤-41.20	49.51	≤54	PASS
				AV	2390.000	-46.45	≤-41.20	48.75	≤54	PASS
				Peak	2310.000	-39.35	≤-21.20	55.85	≤74	PASS
				Peak	2361.530	-36.63	≤-21.20	58.57	≤74	PASS
				Peak	2390.000	-37.76	≤-21.20	57.44	≤74	PASS
		High	2480	AV	2483.500	-46.71	≤-41.20	48.49	≤54	PASS
				AV	2485.360	-45.68	≤-41.20	49.52	≤54	PASS
				AV	2500.000	-46.28	≤-41.20	48.92	≤54	PASS
				Peak	2483.500	-39.58	≤-21.20	55.62	≤74	PASS
				Peak	2491.120	-36.69	≤-21.20	58.51	≤74	PASS
				Peak	2500.000	-39.51	≤-21.20	55.69	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-40.51	≤-21.20	54.69	≤74	PASS
				Peak	2371.085	-37.42	≤-21.20	57.78	≤74	PASS
				Peak	2390.000	-40.53	≤-21.20	54.67	≤74	PASS
		High	Hop_2480	Peak	2483.500	-40.18	≤-21.20	55.02	≤74	PASS
				Peak	2494.640	-37.36	≤-21.20	57.84	≤74	PASS





3DH5	Ant1	Low	2402	Peak	2500.000	-39.34	≤ -21.20	55.86	≤ 74	PASS
				AV	2310.000	-46.5	≤ -41.20	48.70	≤ 54	PASS
				AV	2379.800	-45.57	≤ -41.20	49.63	≤ 54	PASS
				AV	2390.000	-46.67	≤ -41.20	48.53	≤ 54	PASS
				Peak	2310.000	-40.78	≤ -21.20	54.42	≤ 74	PASS
				Peak	2344.100	-36.42	≤ -21.20	58.78	≤ 74	PASS
		High	2480	Peak	2390.000	-40.11	≤ -21.20	55.09	≤ 74	PASS
				AV	2483.500	-46.47	≤ -41.20	48.73	≤ 54	PASS
				AV	2487.680	-45.81	≤ -41.20	49.39	≤ 54	PASS
				AV	2500.000	-46.26	≤ -41.20	48.94	≤ 54	PASS
				Peak	2483.500	-40.89	≤ -21.20	54.31	≤ 74	PASS
				Peak	2495.920	-36.87	≤ -21.20	58.33	≤ 74	PASS
		Low	Hop_240 2	Peak	2500.000	-39.74	≤ -21.20	55.46	≤ 74	PASS
				Peak	2310.000	-40.11	≤ -21.20	55.09	≤ 74	PASS
				Peak	2314.910	-37.12	≤ -21.20	58.08	≤ 74	PASS
		High	Hop_248 0	Peak	2390.000	-39.83	≤ -21.20	55.37	≤ 74	PASS
				Peak	2483.500	-38.67	≤ -21.20	56.53	≤ 74	PASS
				Peak	2499.680	-36.65	≤ -21.20	58.55	≤ 74	PASS
				Peak	2500.000	-40.1	≤ -21.20	55.10	≤ 74	PASS

Note:

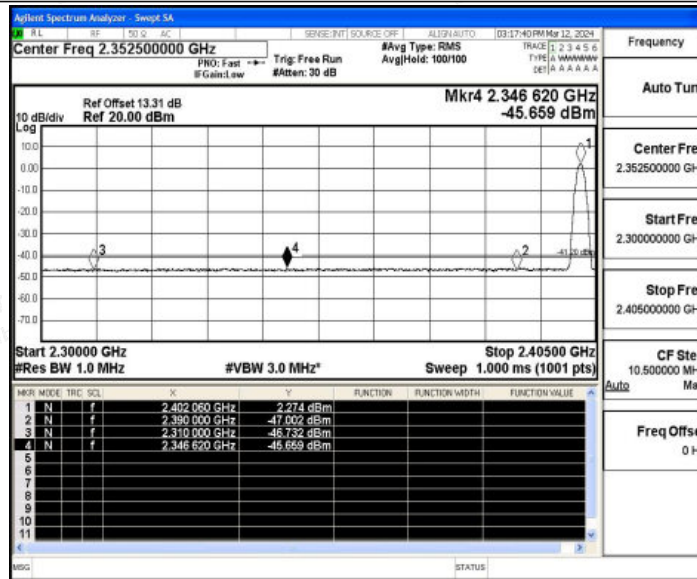
1. The Antenna Gain is compensated in the graph. The Correction Factor is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.



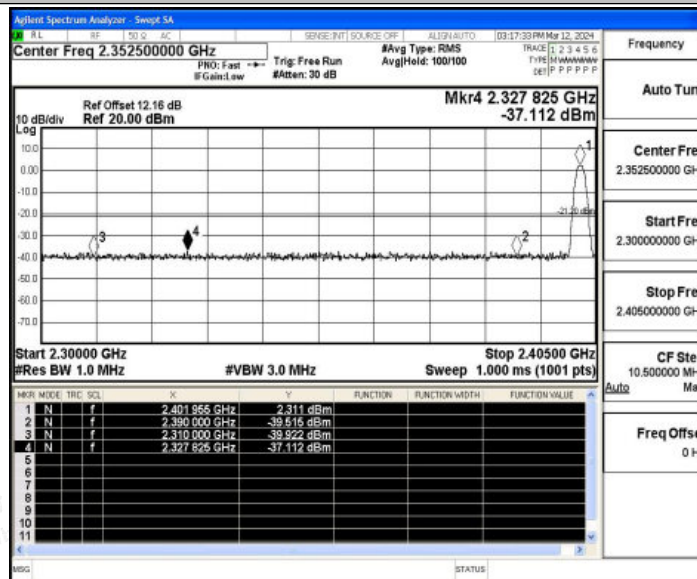


Test Graphs

DH5_Ant1_Low_2402_AV

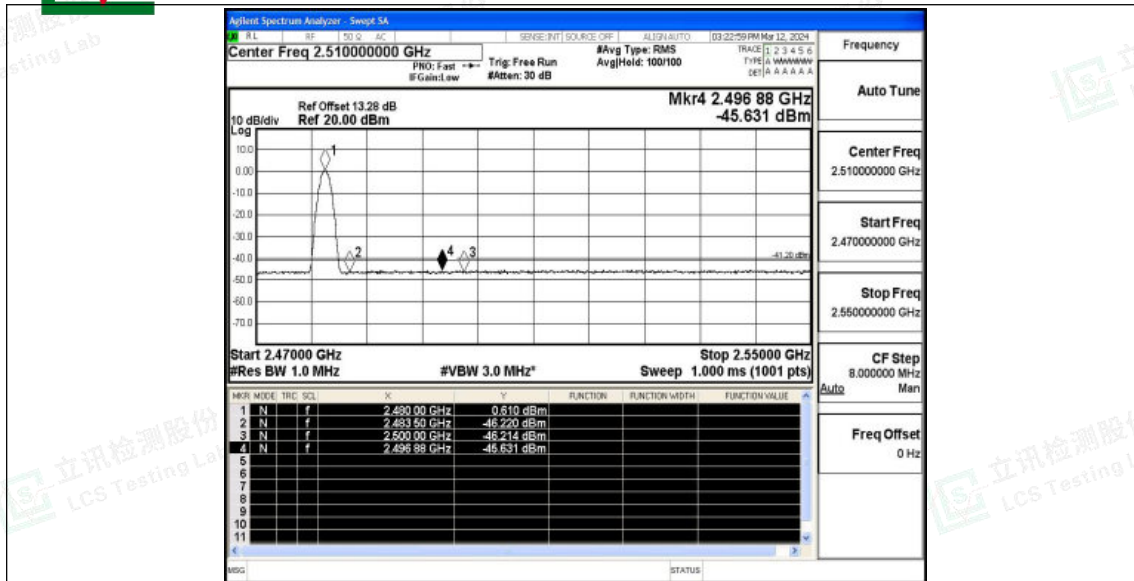


DH5_Ant1_Low_2402_Peak

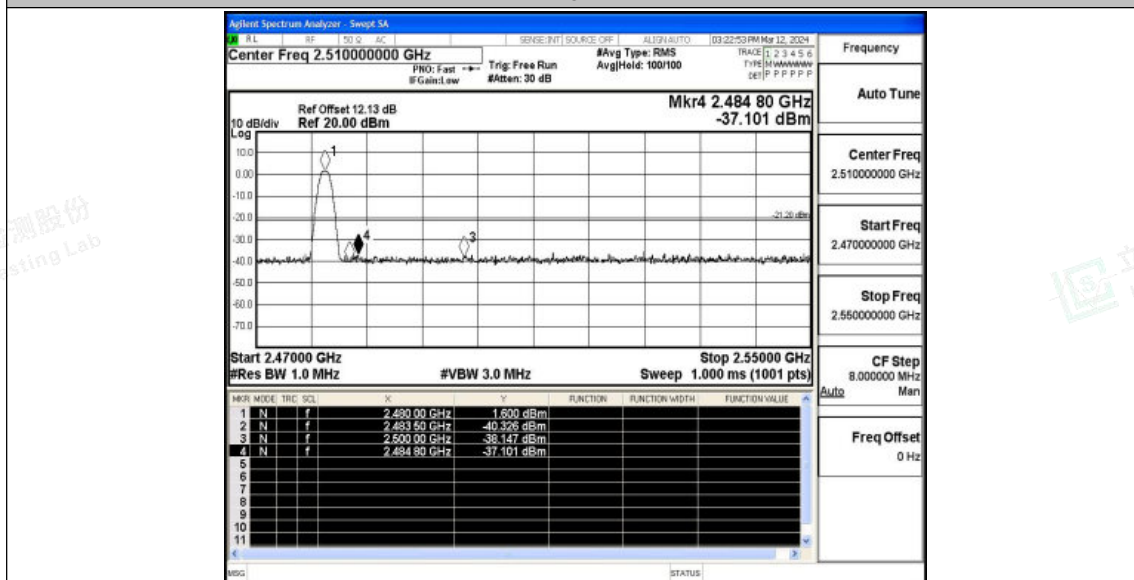


DH5_Ant1_High_2480_AV



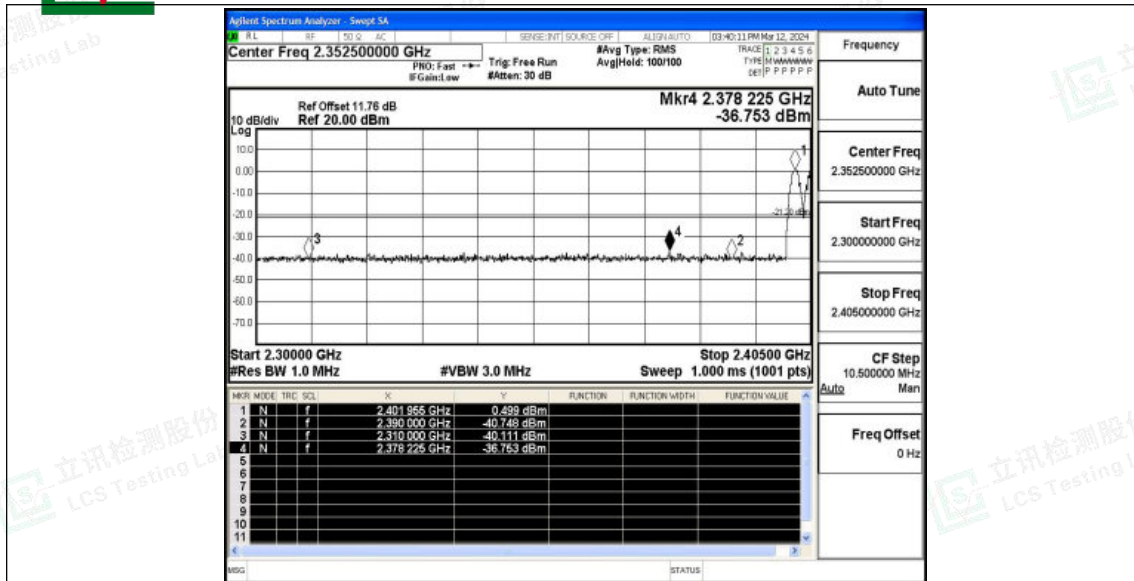


DH5_Ant1_High_2480_Peak

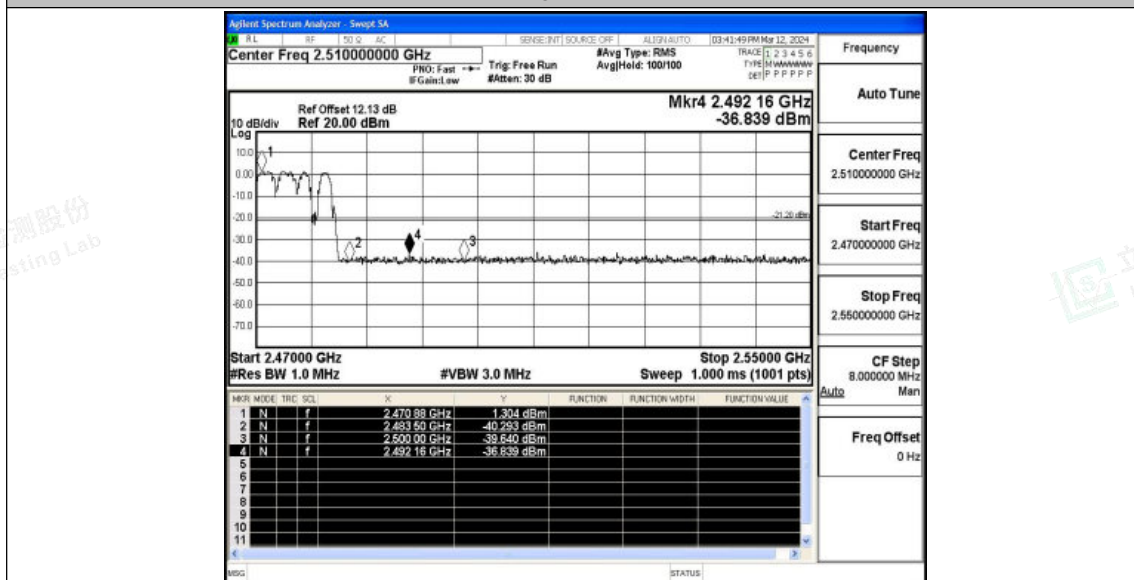


DH5_Ant1_Low_Hop_2402_Peak



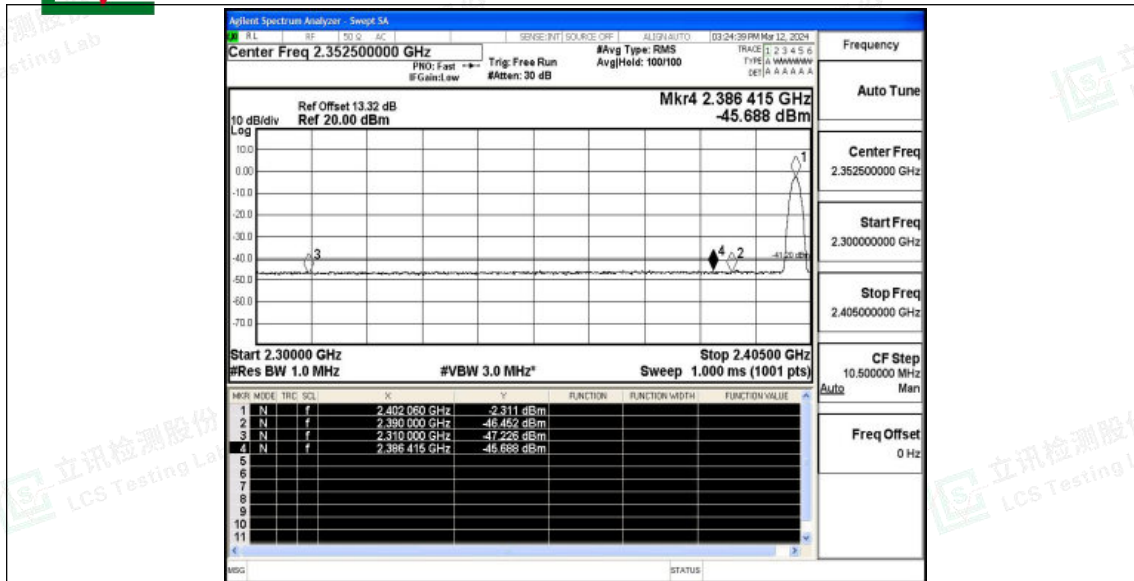


DH5_Ant1_High_Hop_2480_Peak



2DH5_Ant1_Low_2402_AV



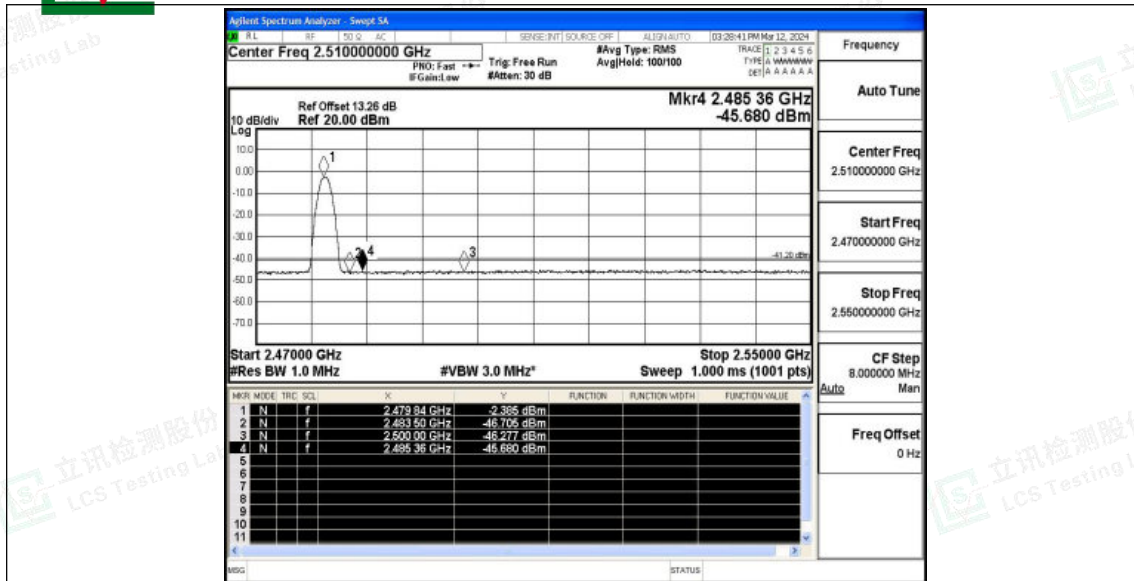


2DH5_Ant1_Low_2402_Peak

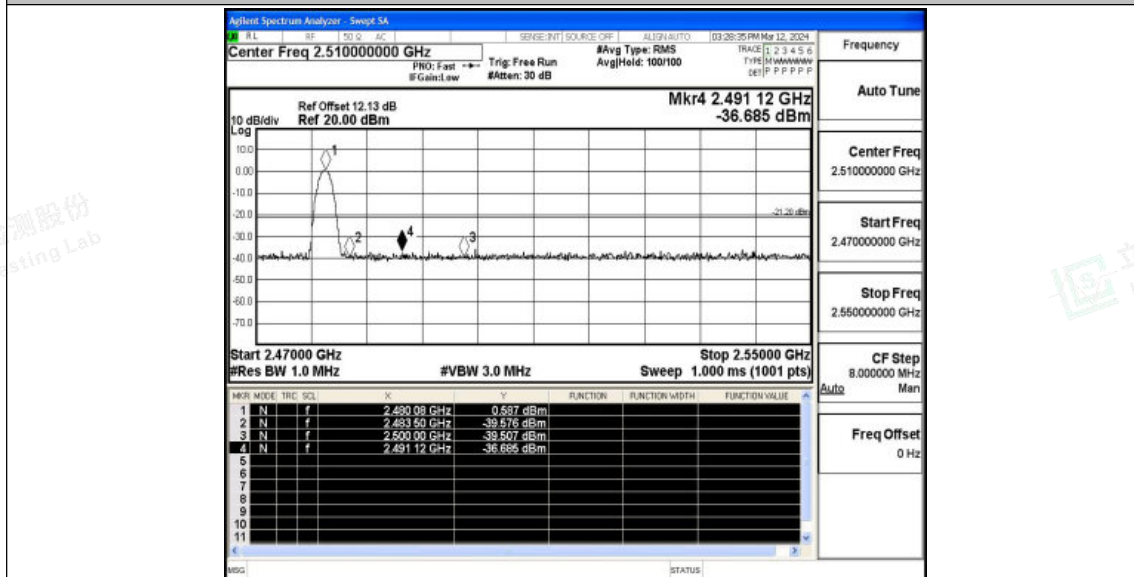


2DH5_Ant1_High_2480_AV



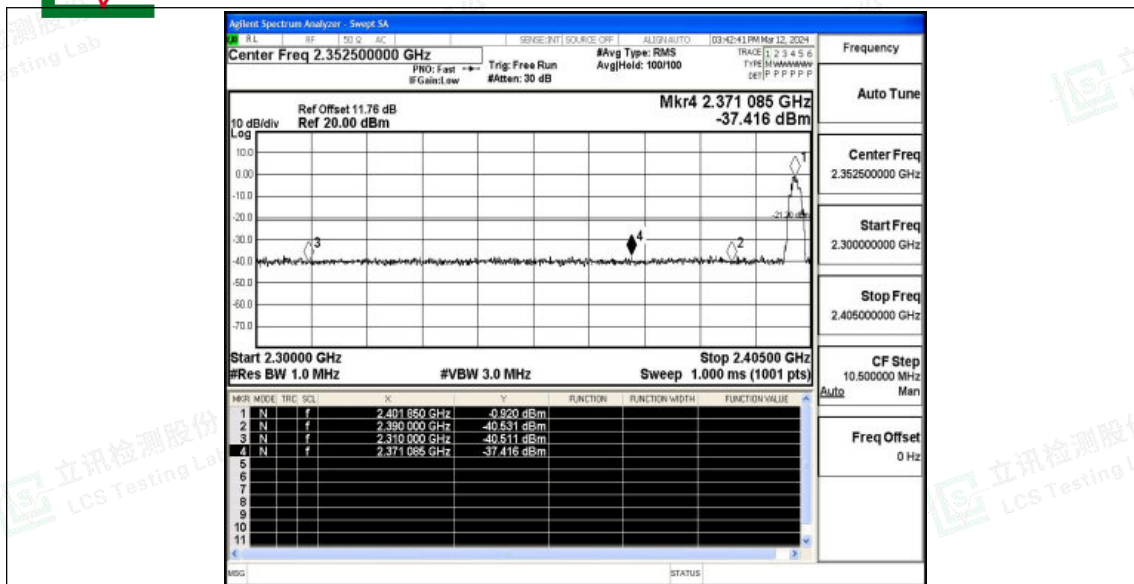


2DH5_Ant1_High_2480_Peak

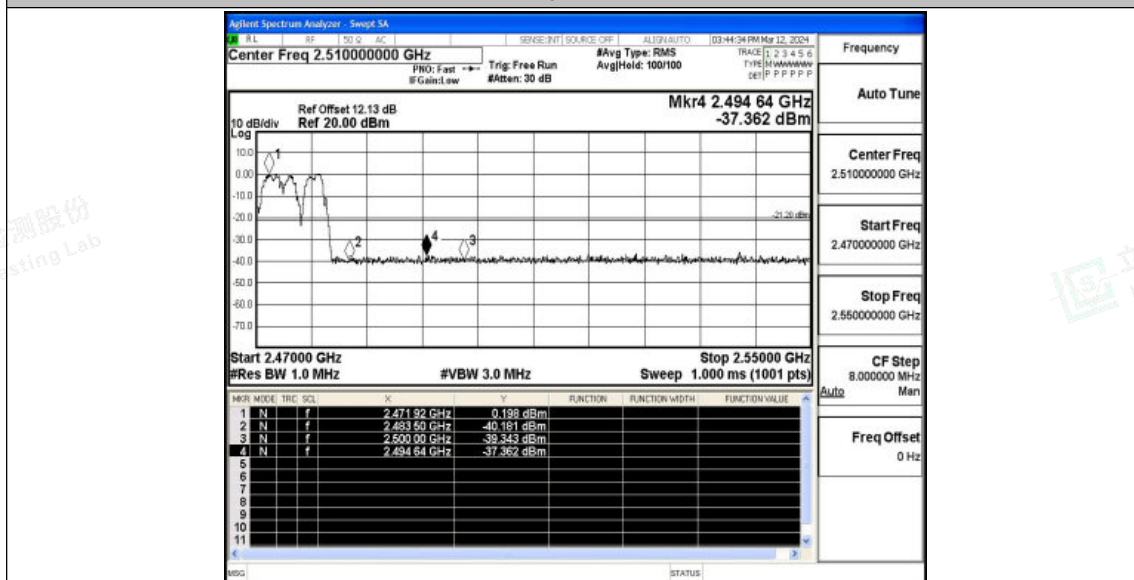


2DH5_Ant1_Low_Hop_2402_Peak



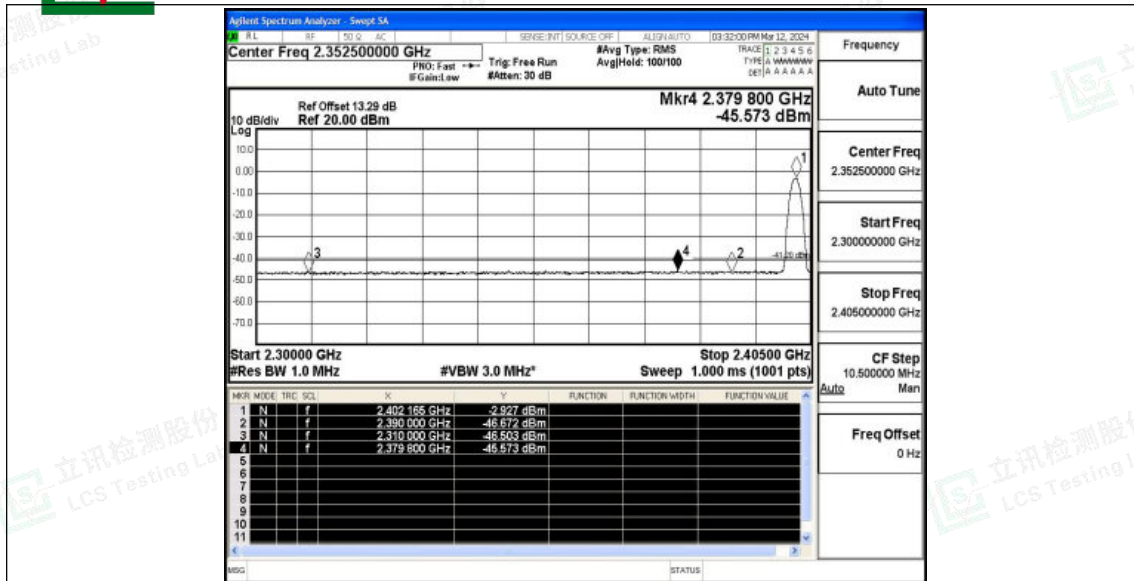


2DH5_Ant1_High_Hop_2480_Peak

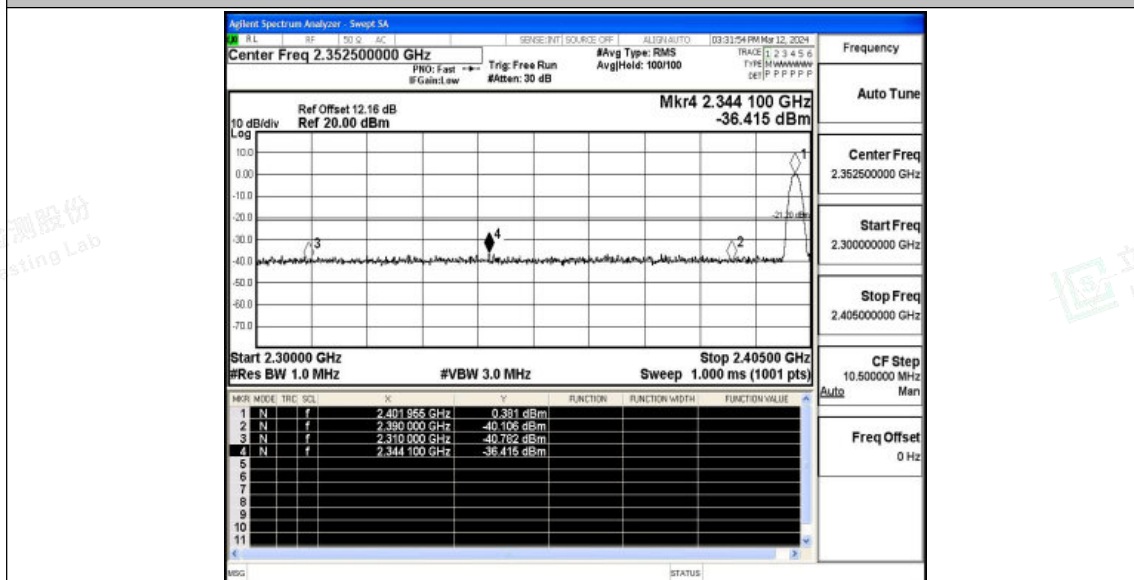


3DH5_Ant1_Low_2402_AV



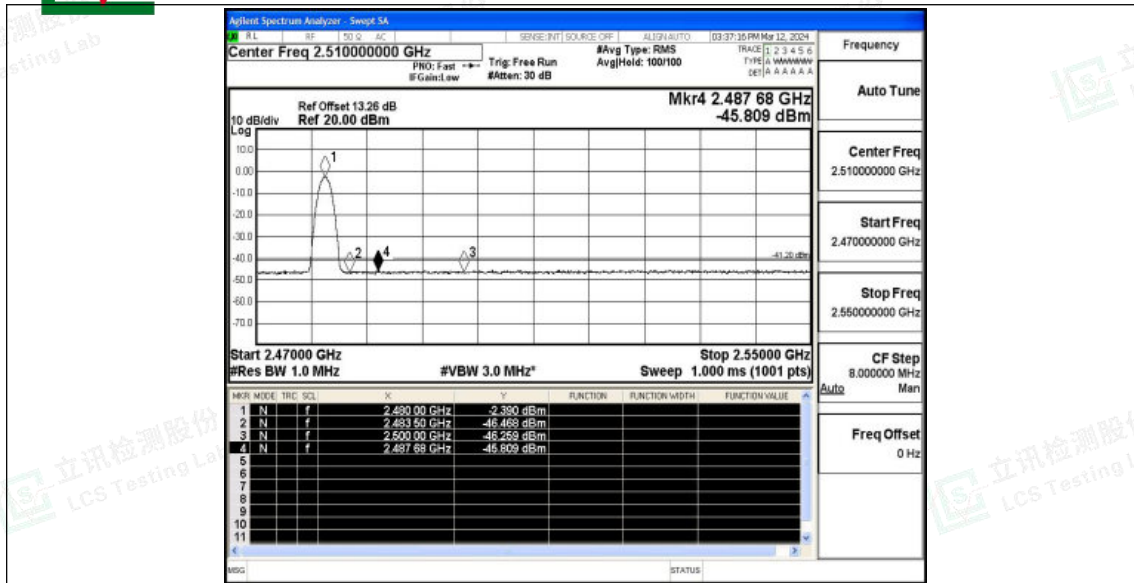


3DH5_Ant1_Low_2402_Peak

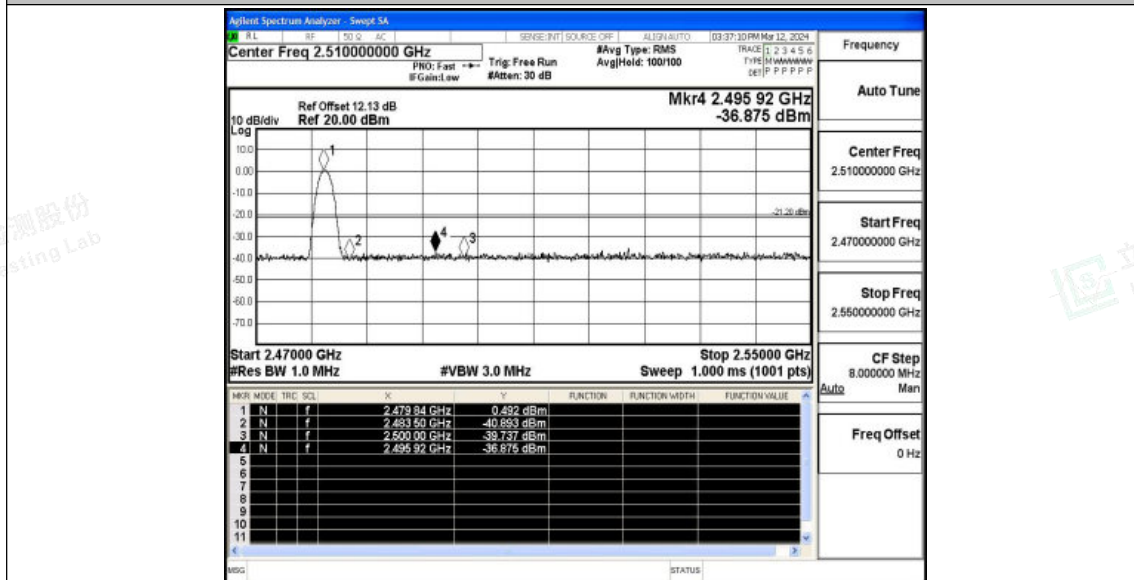


3DH5_Ant1_High_2480_AV





3DH5_Ant1_High_2480_Peak



3DH5_Ant1_Low_Hop_2402_Peak



