Appendix A

RF Test Data for BT (Conducted Measurement)

Product Name: Personal Mobile Alarm System

Test Model: PAL 4

Environmental Conditions

Temperature:	23.9° C
Relative Humidity:	52.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Ling Zhu
Supervised by:	Li huan

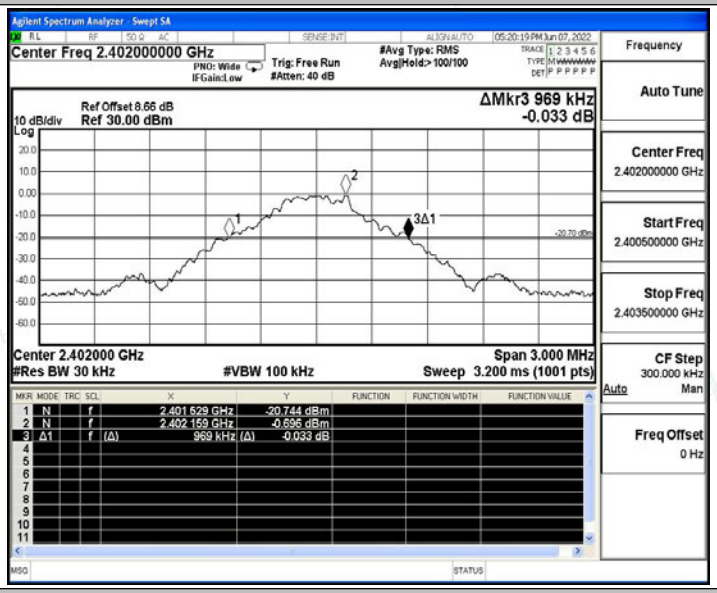
A.1 20dB Emission Bandwidth

Test Result

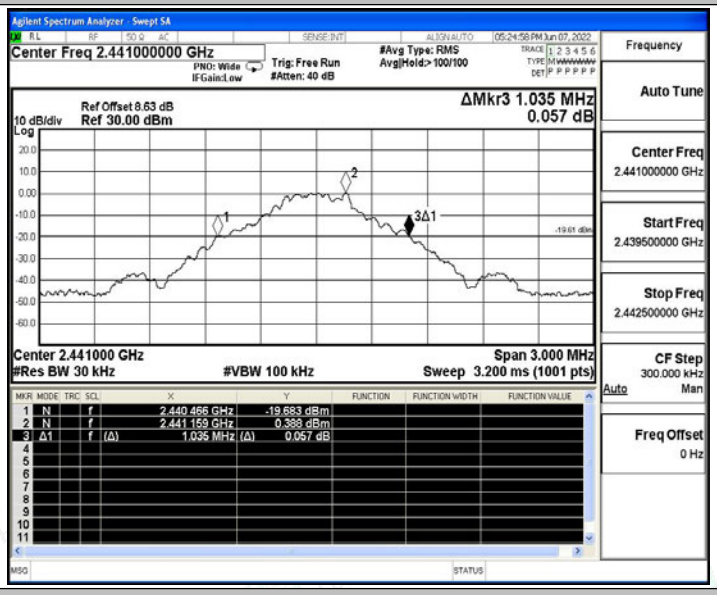
TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.969	2401.529	2402.498	---	---
		2441	1.035	2440.466	2441.501	---	---
		2480	1.041	2479.460	2480.501	---	---
2DH5	Ant1	2402	1.293	2401.361	2402.654	---	---
		2441	1.293	2440.361	2441.654	---	---
		2480	1.317	2479.340	2480.657	---	---
3DH5	Ant1	2402	1.317	2401.343	2402.660	---	---
		2441	1.299	2440.349	2441.648	---	---
		2480	1.299	2479.349	2480.648	---	---

Test Graphs

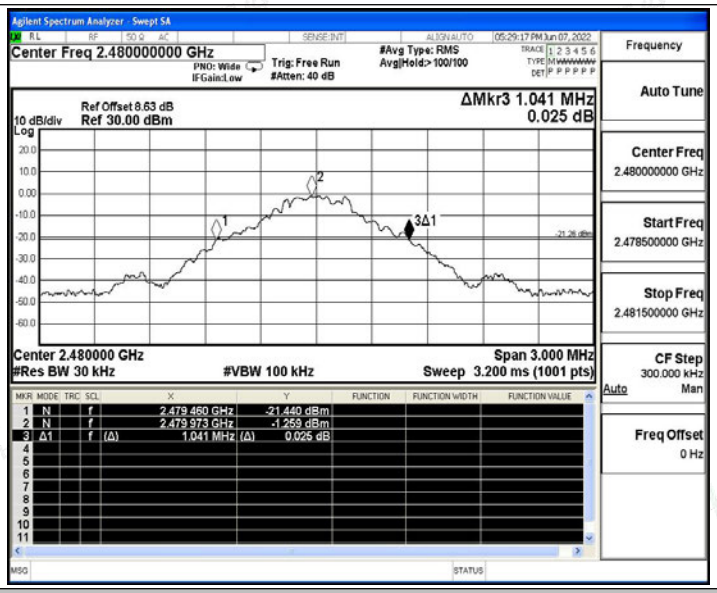
DH5_Ant1_2402



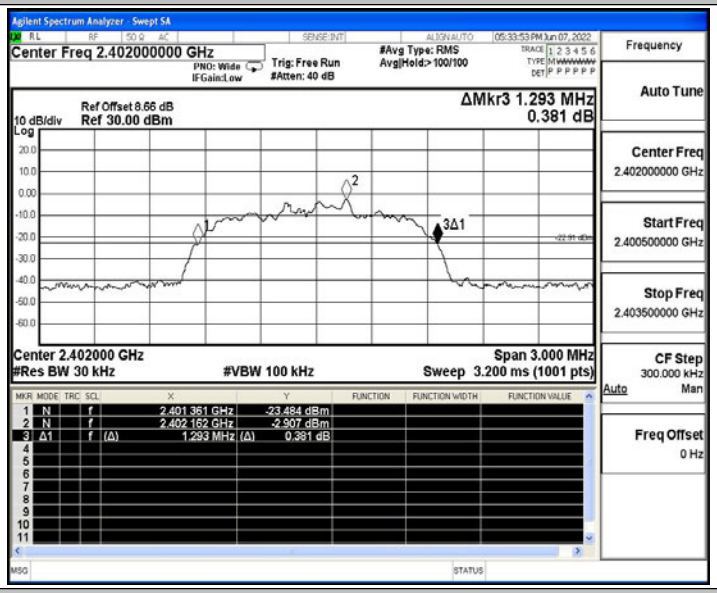
DH5_Ant1_2441



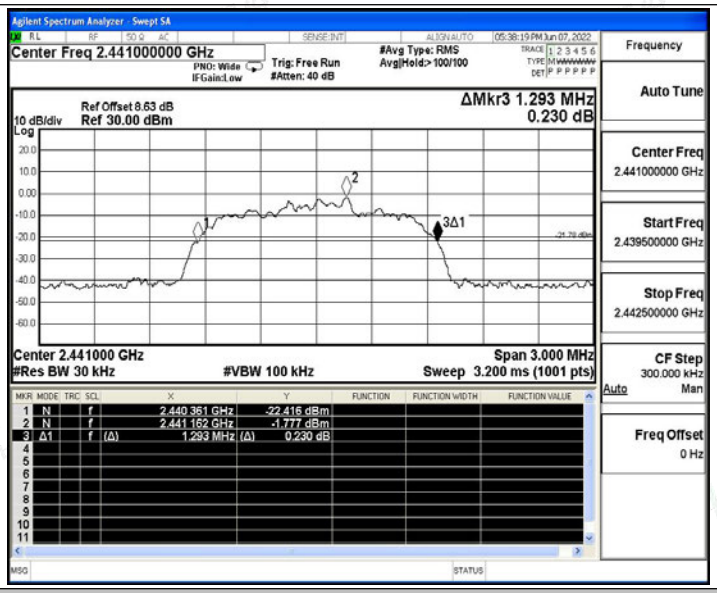
DH5_Ant1_2480



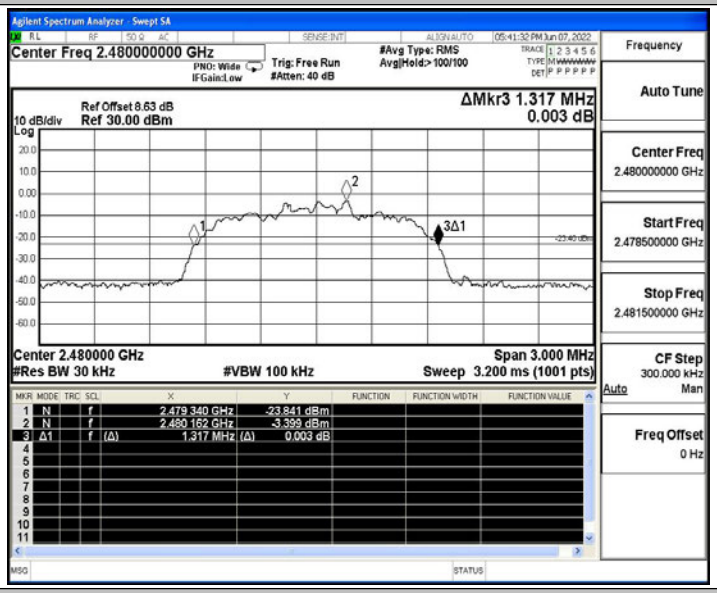
2DH5_Ant1_2402



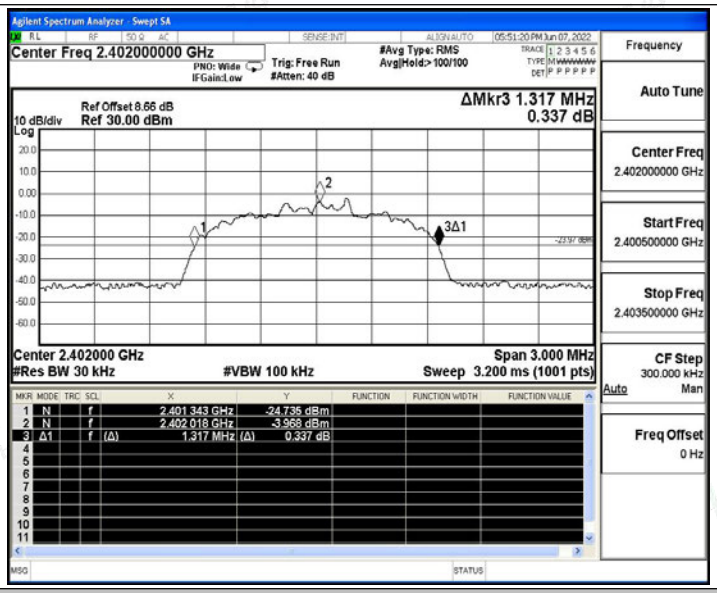
2DH5_Ant1_2441



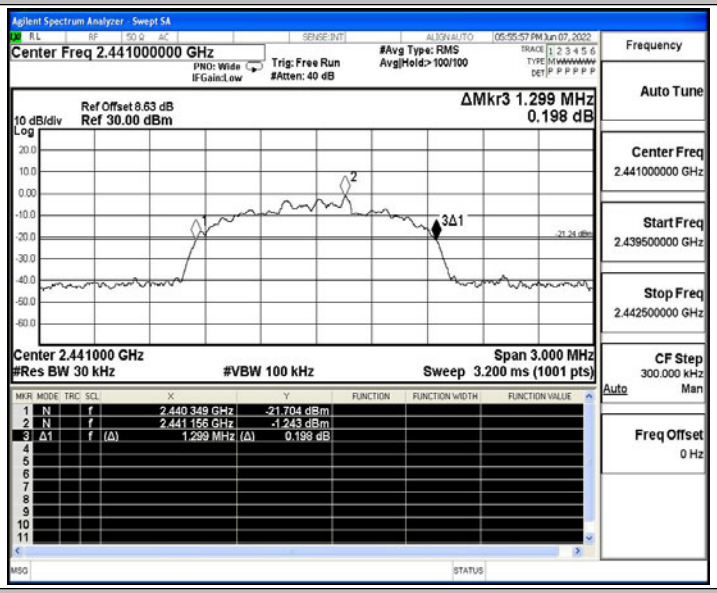
2DH5_Ant1_2480



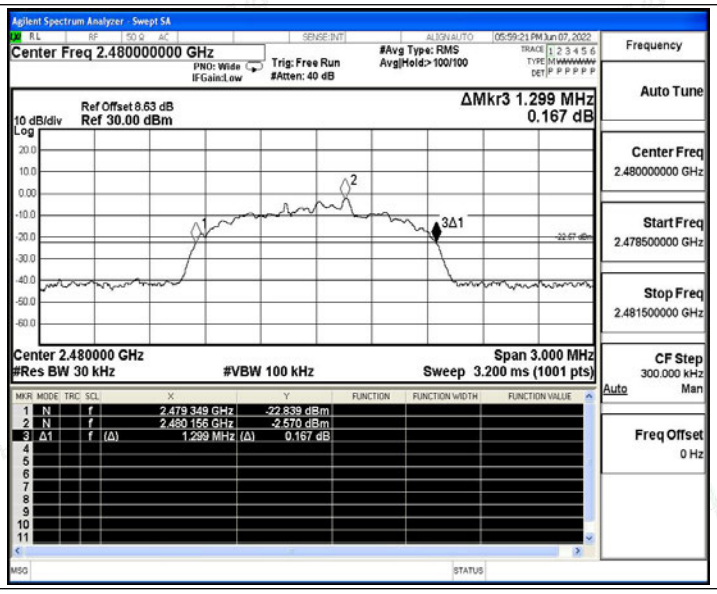
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold:> 100/100
05:59:21 PM Jun 07, 2022
Ref Offset 8.63 dB
10 dB/div Ref 30.00 dBm
Log
ΔMkr3 1.299 MHz
0.167 dB
Center 2.480000 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3.000 MHz
Sweep 3.200 ms (1001 pts)
1 N f 2.479 349 GHz -22.839 dBm
2 N f 2.480 156 GHz -2.570 dBm
3 Δ1 f (Δ) 1.299 MHz (Δ) 0.167 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto Man
Freq Offset
0 Hz

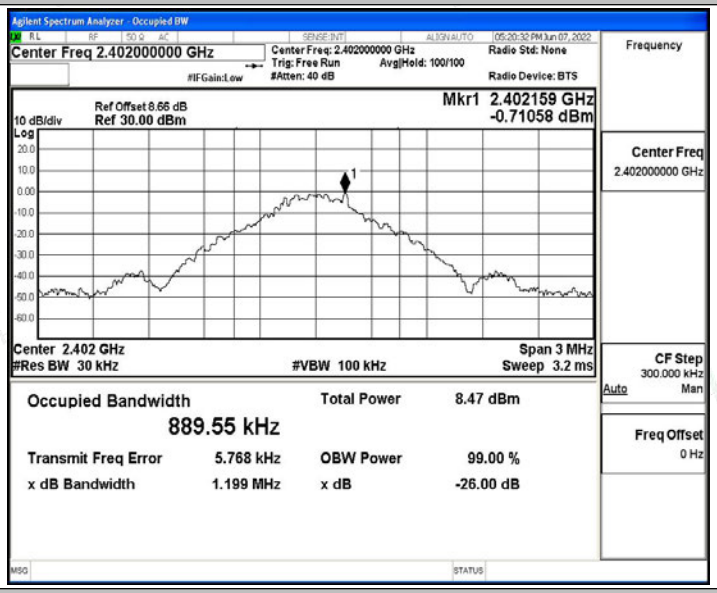
A.2 Occupied Channel Bandwidth

Test Result

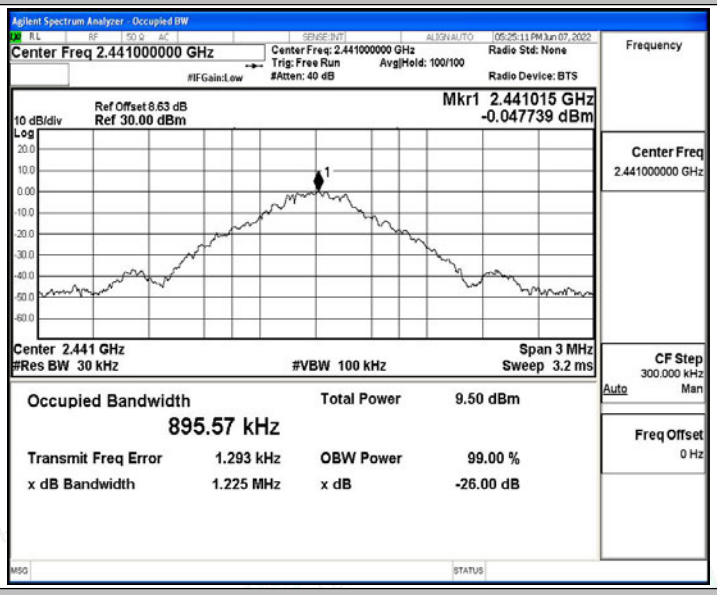
TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.88955	2401.561	2402.451	---	---
		2441	0.89557	2440.554	2441.449	---	---
		2480	0.89345	2479.551	2480.444	---	---
2DH5	Ant1	2402	1.1871	2401.405	2402.592	---	---
		2441	1.1911	2440.403	2441.594	---	---
		2480	1.1929	2479.401	2480.594	---	---
3DH5	Ant1	2402	1.1937	2401.403	2402.597	---	---
		2441	1.1962	2440.401	2441.597	---	---
		2480	1.1902	2479.402	2480.592	---	---

Test Graphs

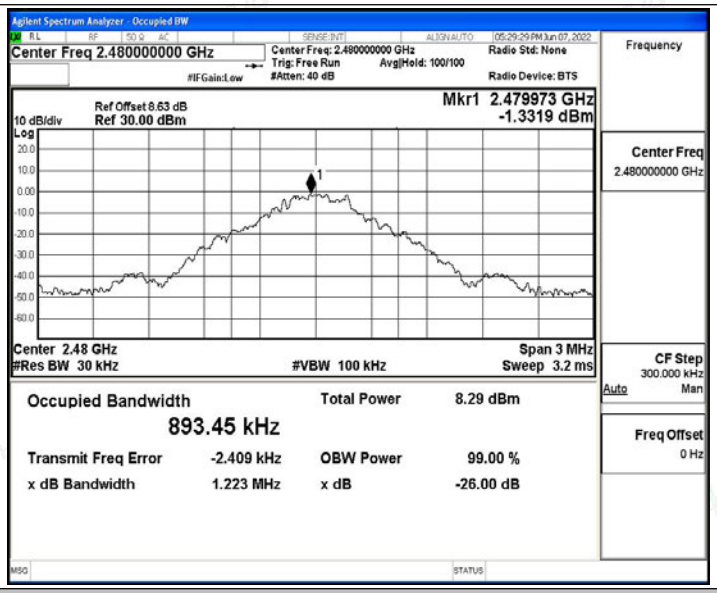
DH5_Ant1_2402



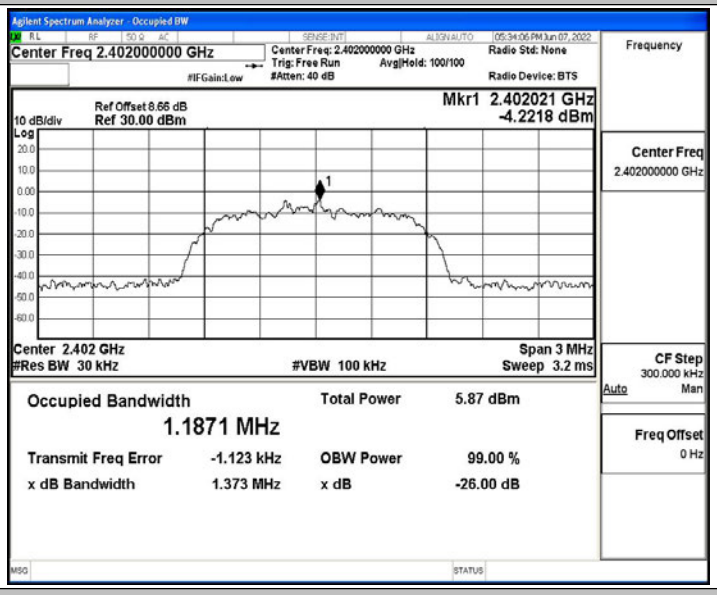
DH5_Ant1_2441



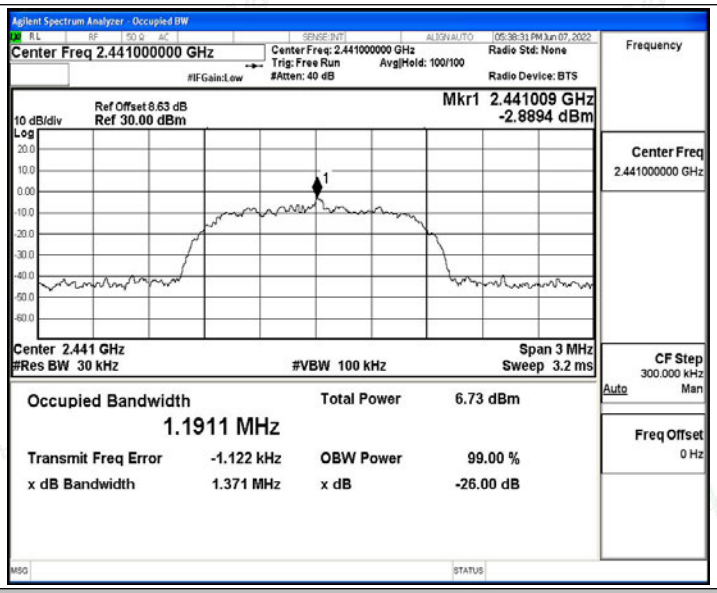
DH5_Ant1_2480



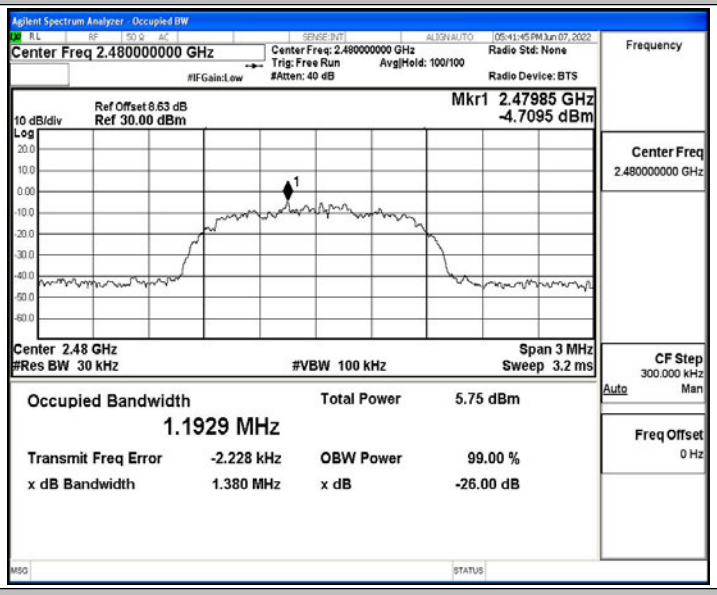
2DH5_Ant1_2402



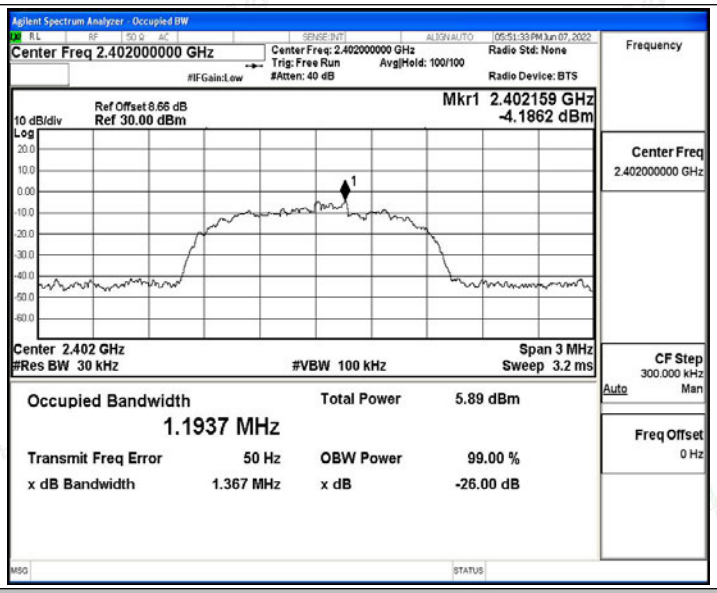
2DH5_Ant1_2441



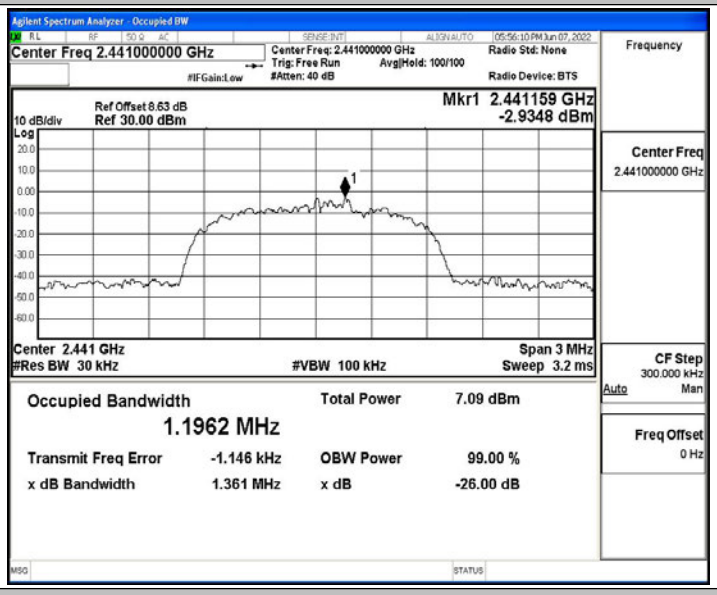
2DH5_Ant1_2480



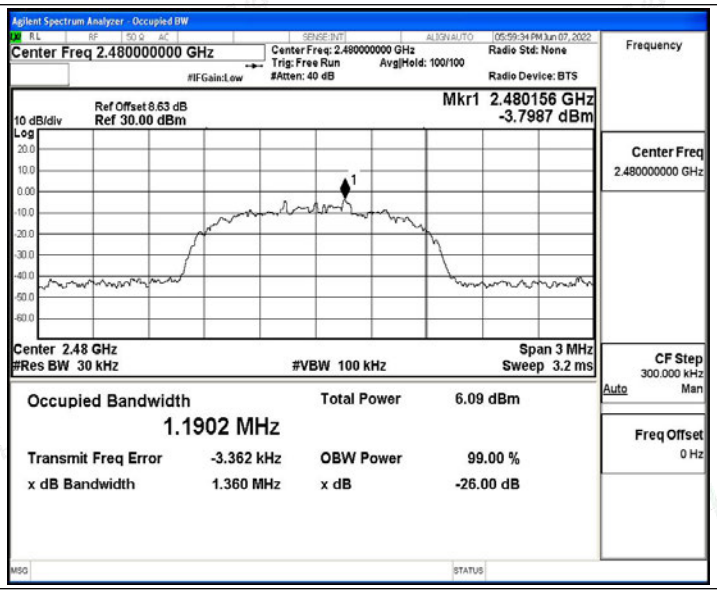
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 40 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 8.63 dB
10 dB/div
Ref 30.00 dBm
Mkr1 2.480156 GHz
-3.7987 dBm
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1902 MHz
Total Power
6.09 dBm
Transmit Freq Error
-3.362 kHz
OBW Power
99.00 %
x dB Bandwidth
1.360 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

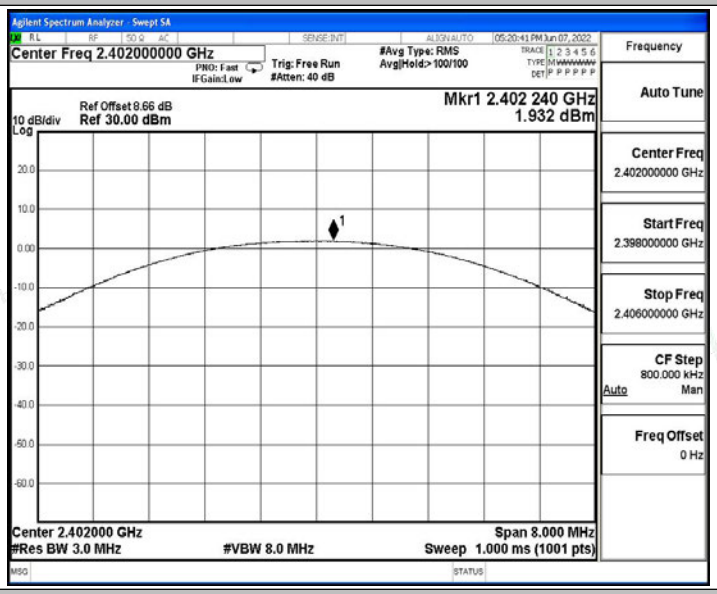
A.3 Maximum conducted output power

Test Result

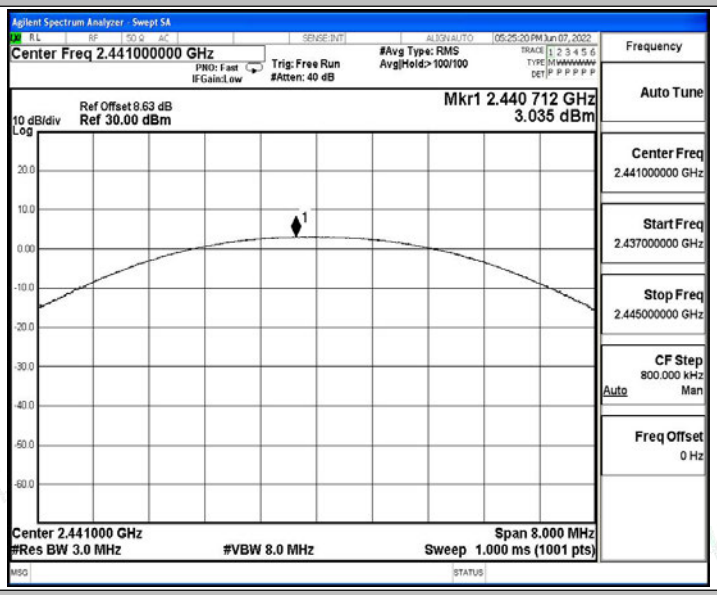
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	1.93	≤20.97	PASS
		2441	3.04	≤20.97	PASS
		2480	1.7	≤20.97	PASS
2DH5	Ant1	2402	0.94	≤20.97	PASS
		2441	2.18	≤20.97	PASS
		2480	0.86	≤20.97	PASS
3DH5	Ant1	2402	1.1	≤20.97	PASS
		2441	2.36	≤20.97	PASS
		2480	1.09	≤20.97	PASS

Test Graphs

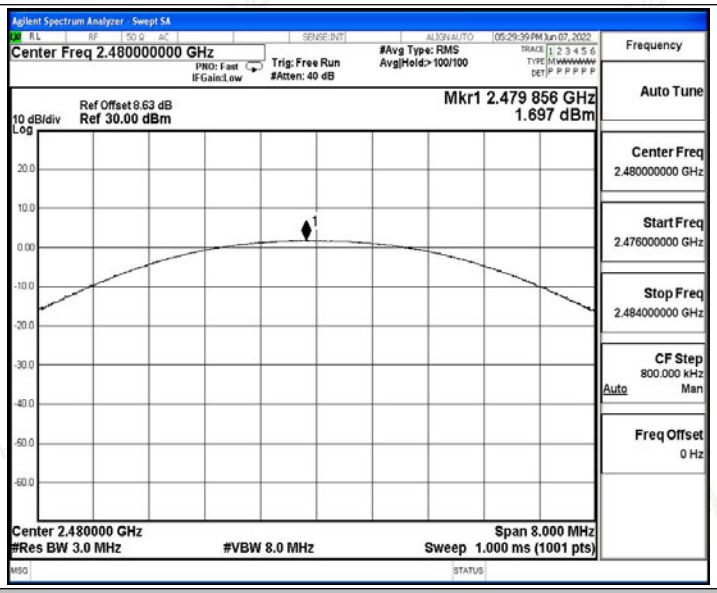
DH5_Ant1_2402



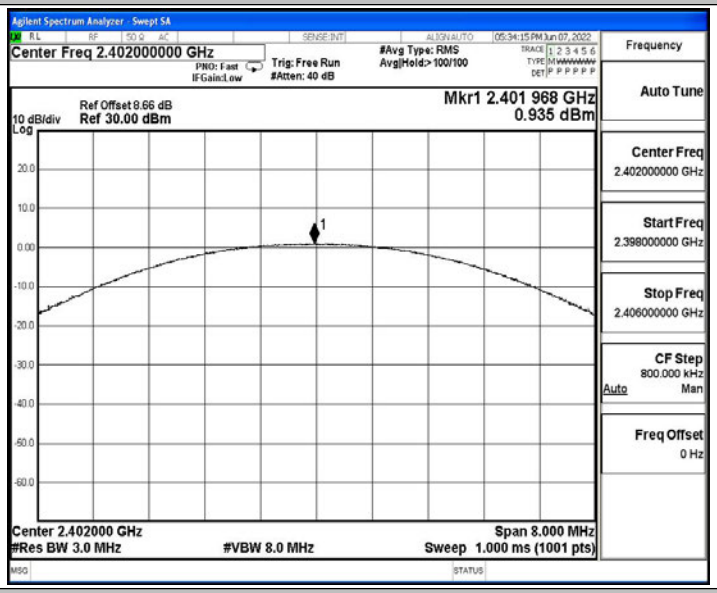
DH5_Ant1_2441



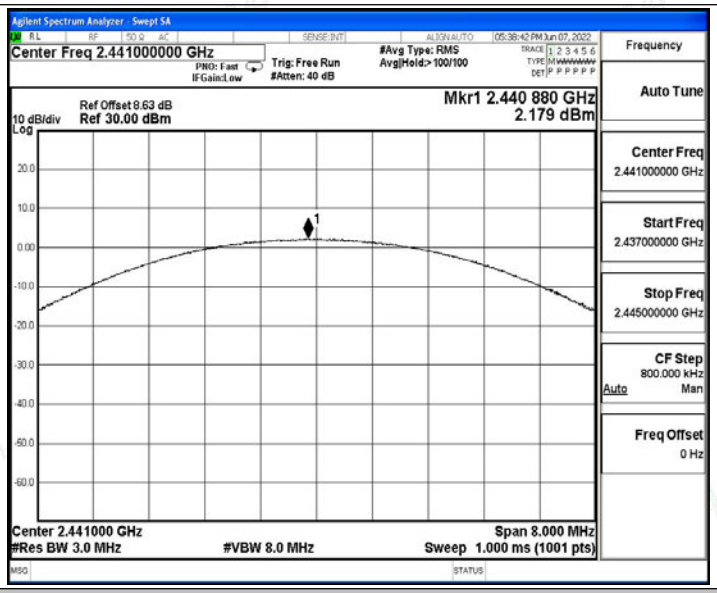
DH5_Ant1_2480



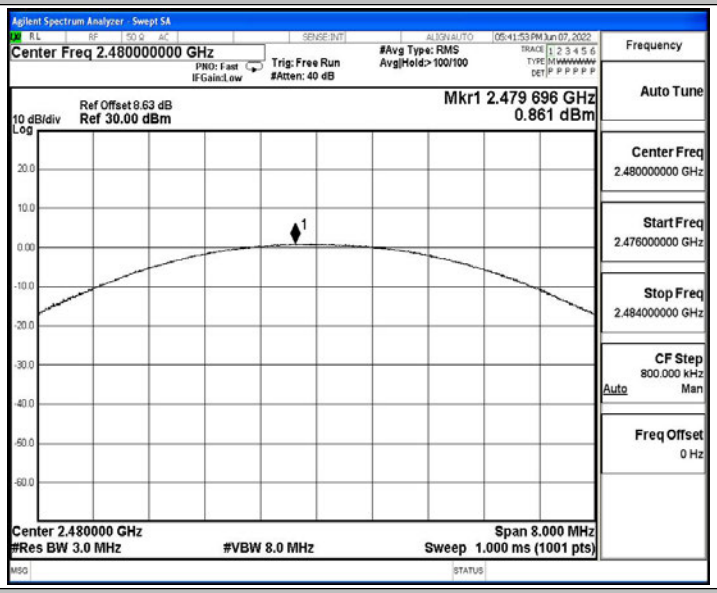
2DH5_Ant1_2402



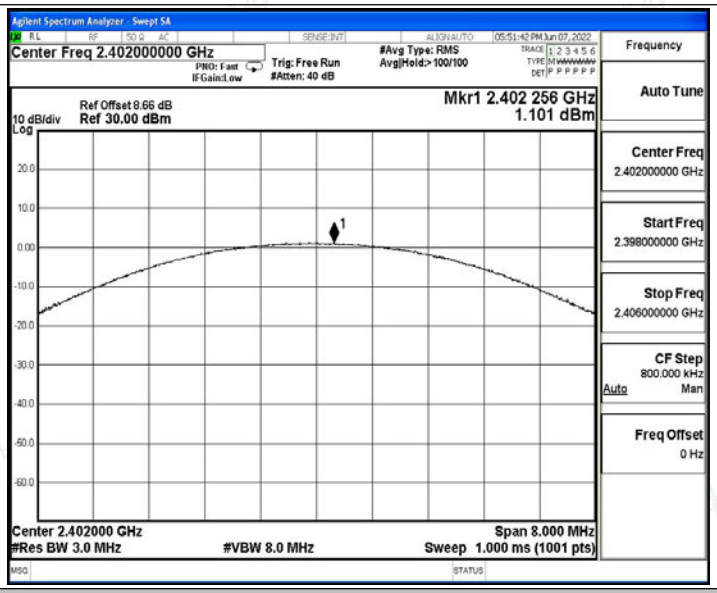
2DH5_Ant1_2441



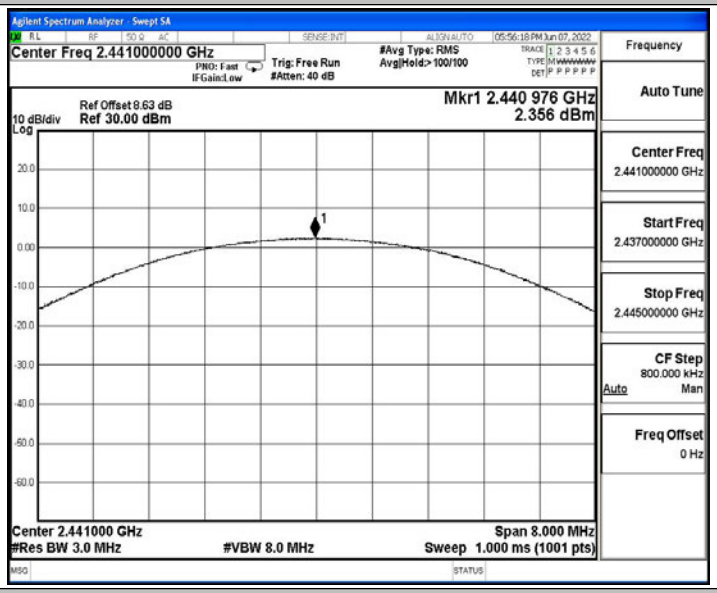
2DH5_Ant1_2480



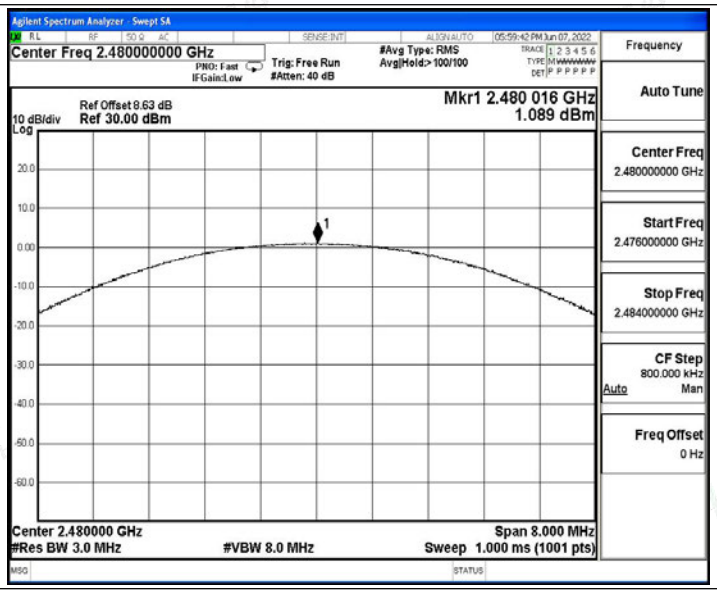
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold:> 100/100
Ref Offset 8.63 dB
10 dB/div Ref 30.00 dBm
Log
Mkr1 2.480 016 GHz
1.089 dBm
Center 2.480000 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
2.480000000 GHz
Start Freq
2.476000000 GHz
Stop Freq
2.484000000 GHz
CF Step
800.000 kHz
Auto Man
Freq Offset
0 Hz

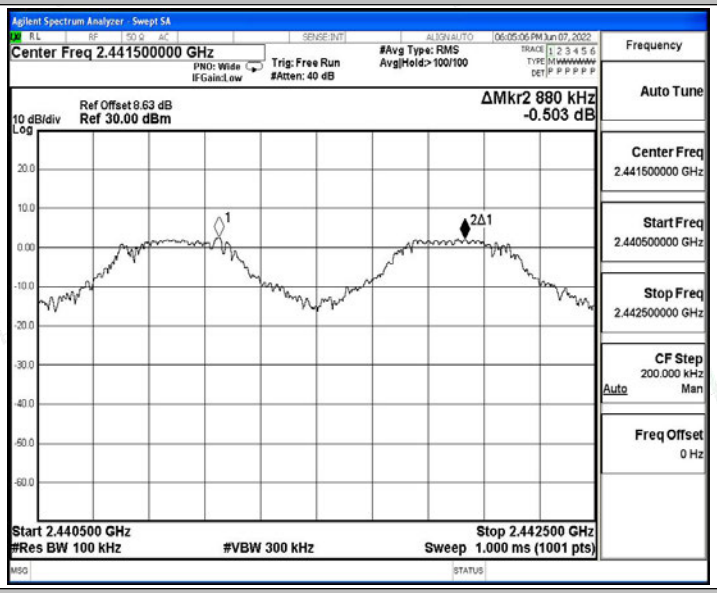
A.4 Carrier frequency separation

Test Result

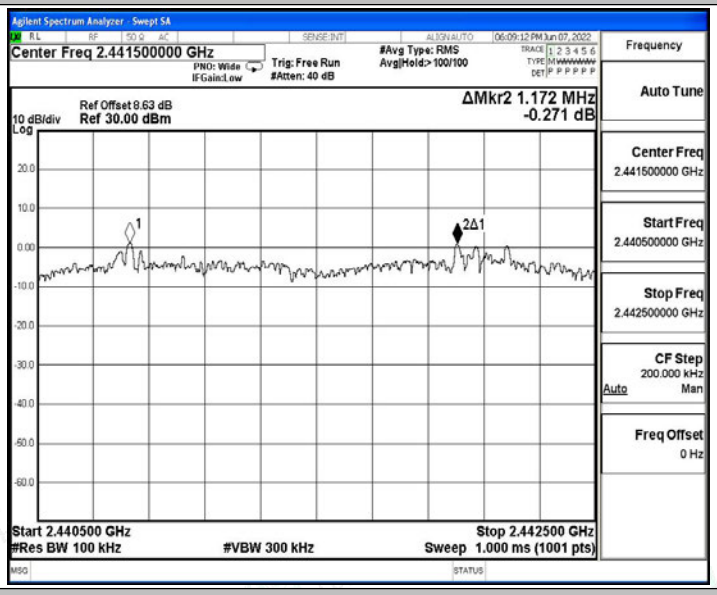
TestMode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.88	≥0.694	PASS
2DH5	Ant1	Hop	1.172	≥0.878	PASS
3DH5	Ant1	Hop	0.958	≥0.878	PASS

Test Graphs

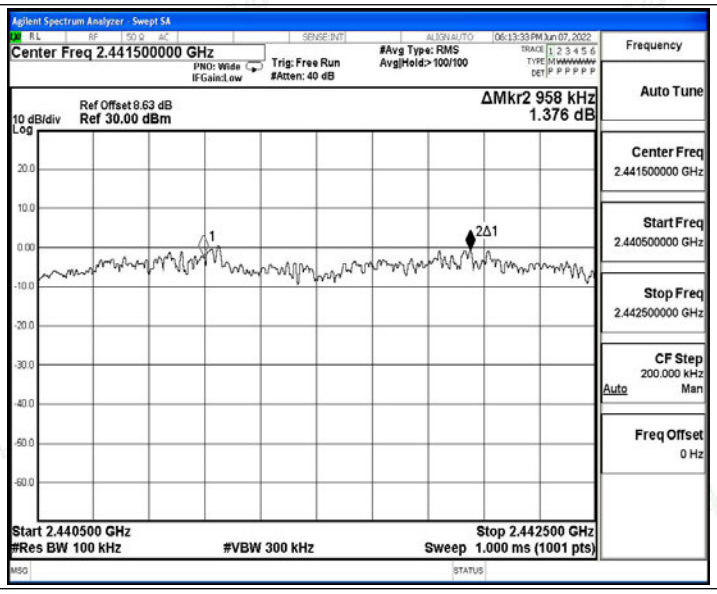
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold:> 100/100
06:13:33 PM Jun 07, 2022
Frequency
Auto Tune
Ref Offset 8.63 dB
10 dB/div Ref 30.00 dBm
Log
ΔMkr2 958 kHz
1.376 dB
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz
Start 2.440500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.442500 GHz
Sweep 1.000 ms (1001 pts)

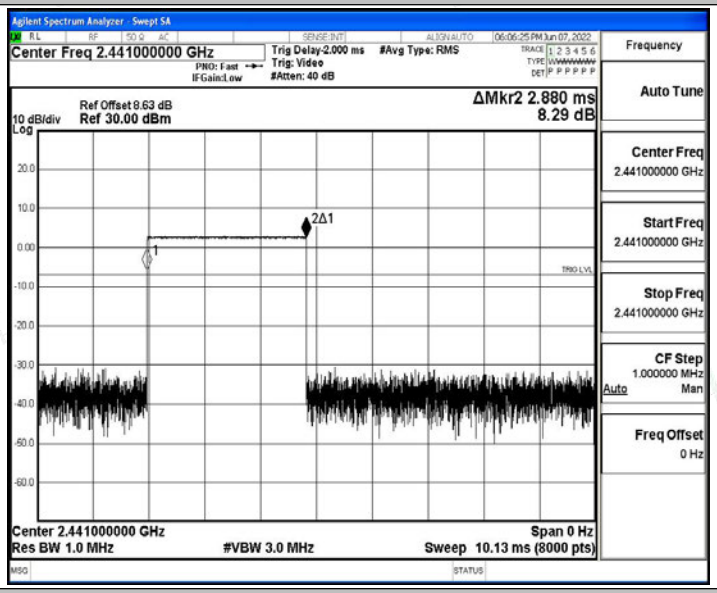
A.5 Time of occupancy

Test Result

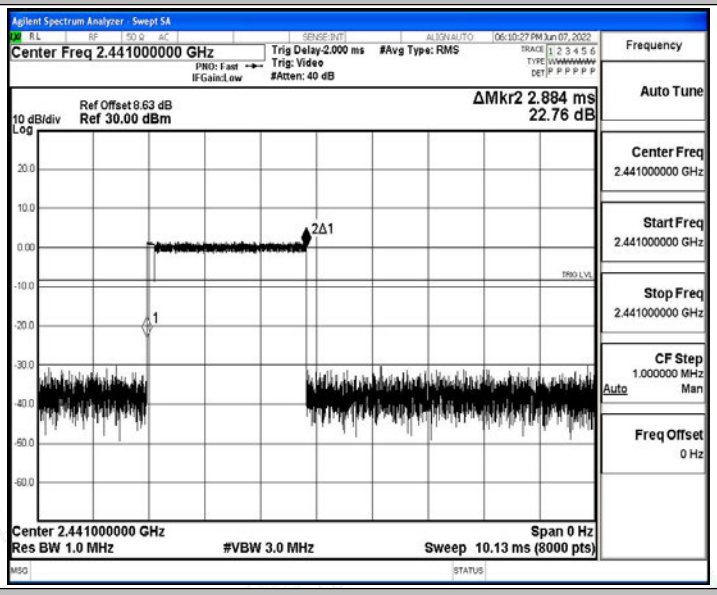
TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.88	106.67	0.307	≤0.4	PASS
2DH5	Ant1	Hop	2.88	106.67	0.308	≤0.4	PASS
3DH5	Ant1	Hop	2.89	106.67	0.308	≤0.4	PASS

Test Graphs

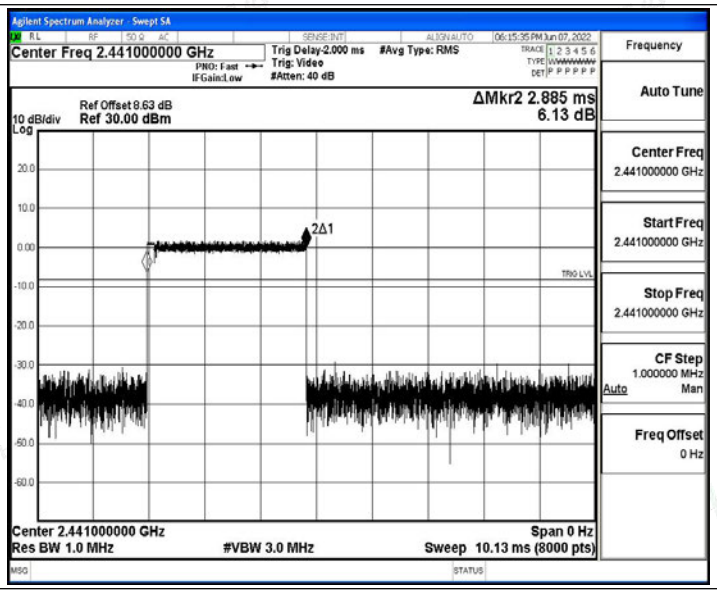
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
Trig Delay-2.000 ms
Trig: Video
#Atten: 40 dB
#Avg Type: RMS
Ref Offset 8.63 dB
10 dB/div Ref 30.00 dBm
Log
ΔMkr2 2.885 ms
6.13 dB
2Δ1
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto Man
Freq Offset
0 Hz

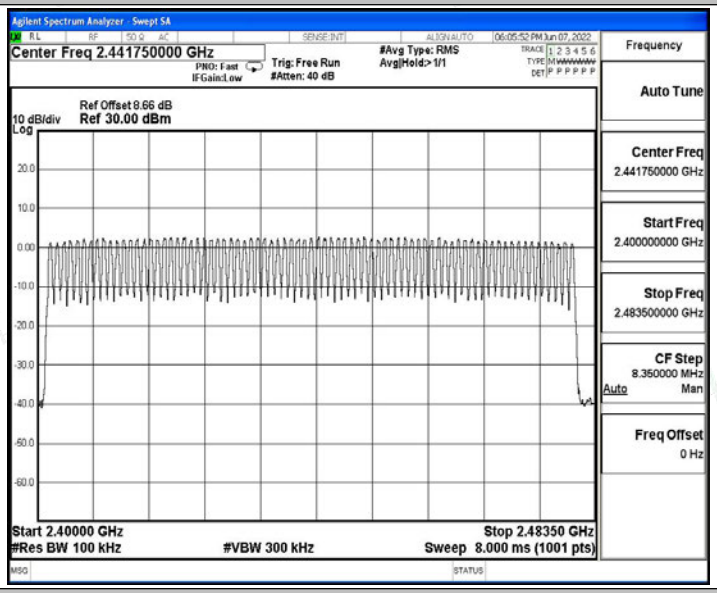
A.6 Number of hopping channels

Test Result

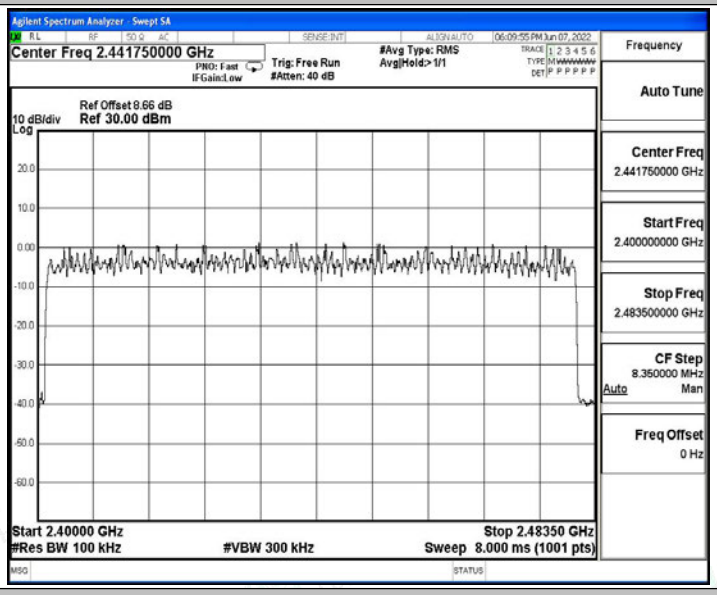
TestMode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

Test Graphs

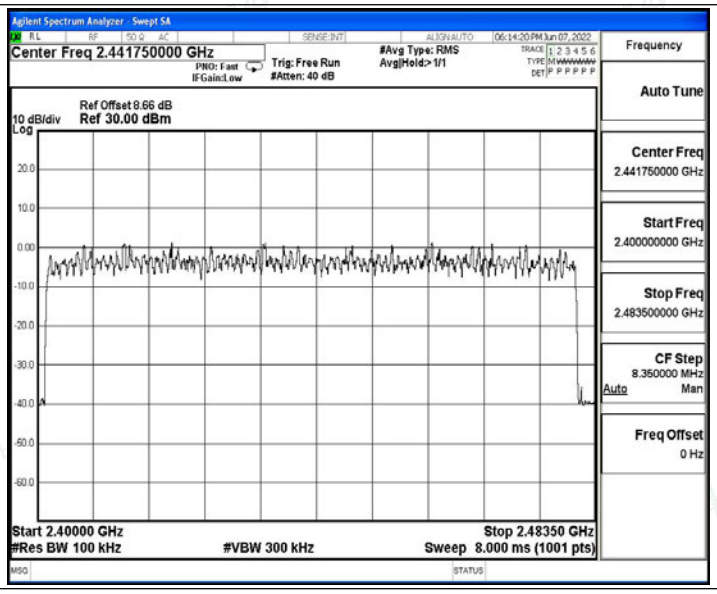
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold:> 1/1
06:14:20 PM Jun 07, 2022
Ref Offset 8.66 dB
10 dB/div
Ref 30.00 dBm
Log
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz

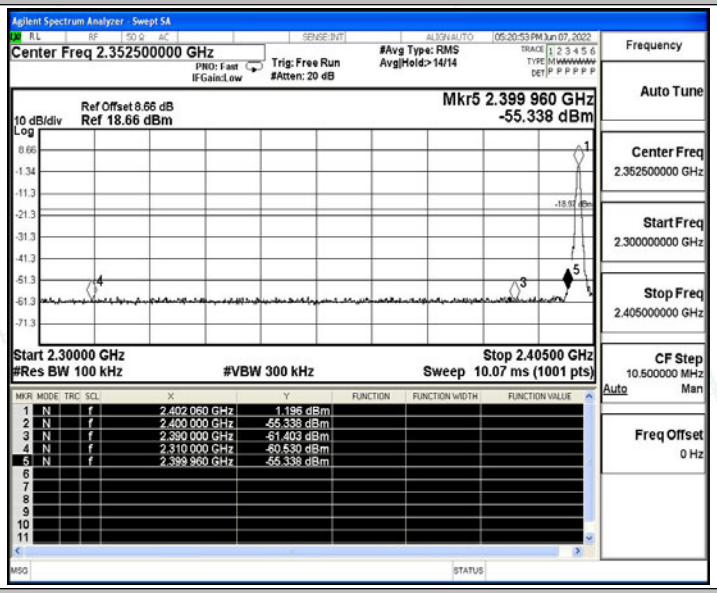
A.7 Band edge measurements

Test Result

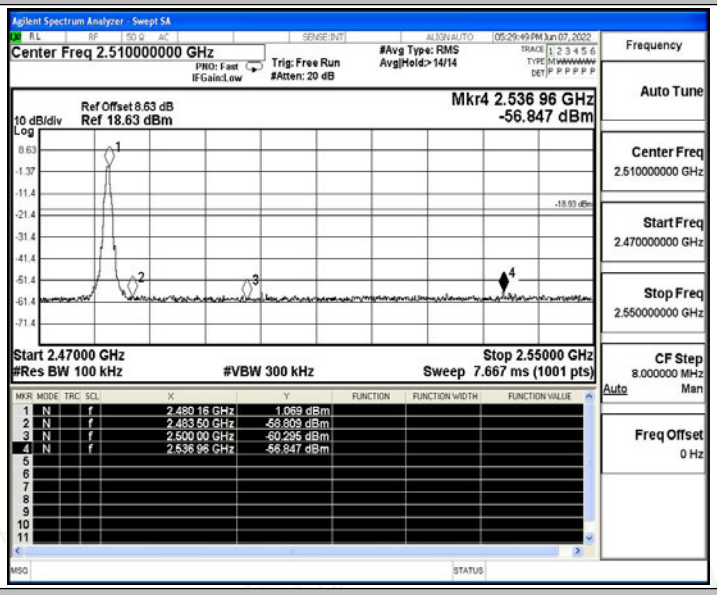
TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	1.03	-55.34	≤-18.97	PASS
		High	2480	1.07	-56.85	≤-18.93	PASS
		Low	Hop_2402	0.75	-58.38	≤-19.25	PASS
		High	Hop_2480	1.27	-57.78	≤-18.73	PASS
2DH5	Ant1	Low	2402	-1.25	-56.04	≤-21.25	PASS
		High	2480	-0.17	-56.74	≤-20.17	PASS
		Low	Hop_2402	-0.21	-58.77	≤-20.21	PASS
		High	Hop_2480	-3.30	-57.46	≤-23.3	PASS
3DH5	Ant1	Low	2402	-0.12	-55.47	≤-20.12	PASS
		High	2480	-0.62	-57.23	≤-20.62	PASS
		Low	Hop_2402	-2.44	-58.66	≤-22.44	PASS
		High	Hop_2480	0.04	-57.48	≤-19.96	PASS

Test Graphs

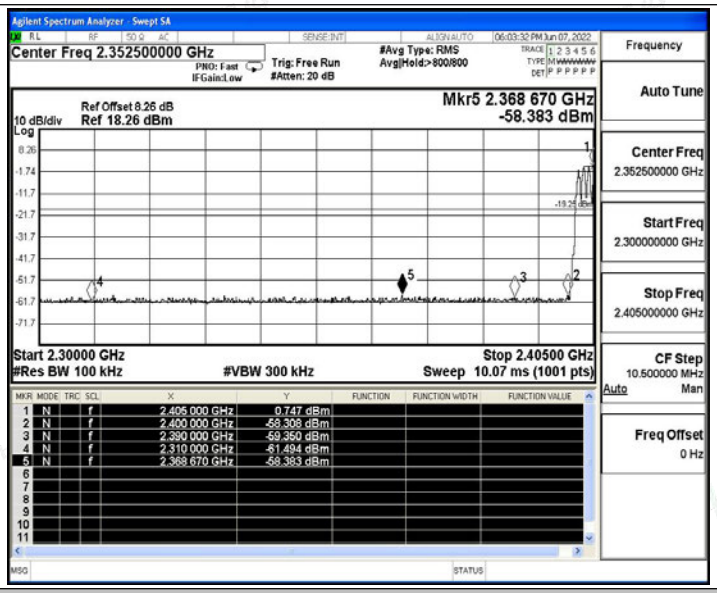
DH5_Ant1_Low_2402



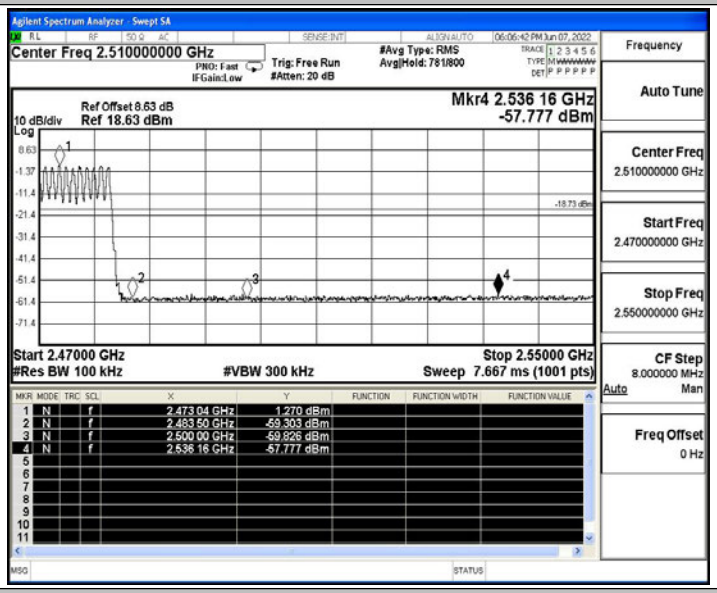
DH5_Ant1_High_2480



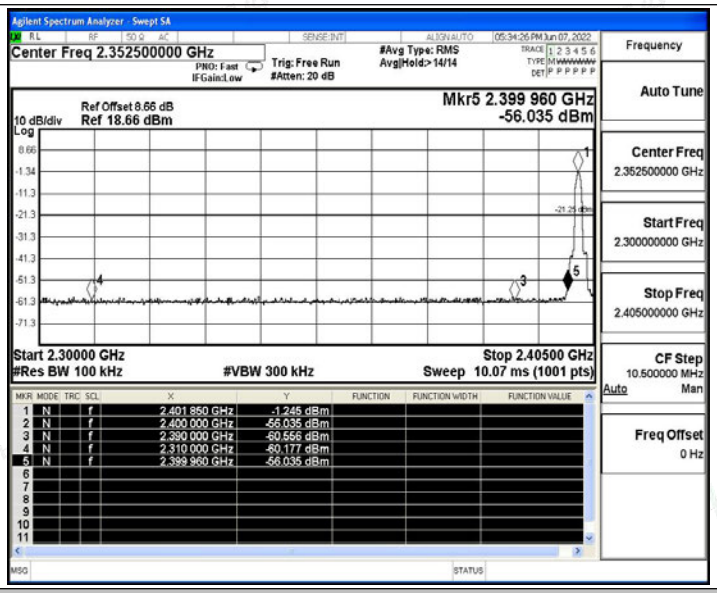
DH5_Ant1_Low_Hop_2402



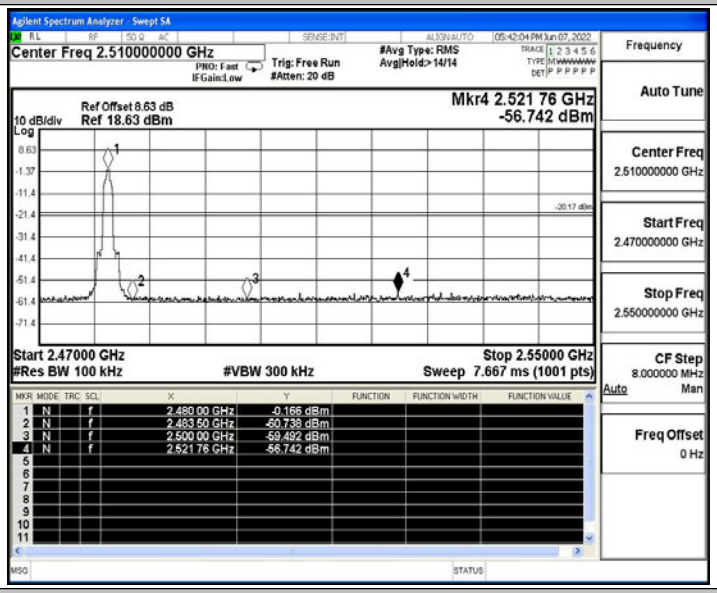
DH5_Ant1_High_Hop_2480



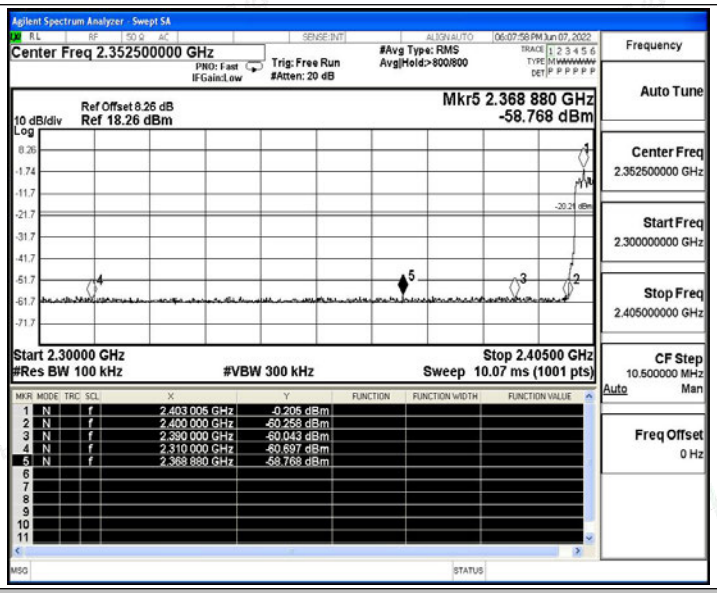
2DH5_Ant1_Low_2402



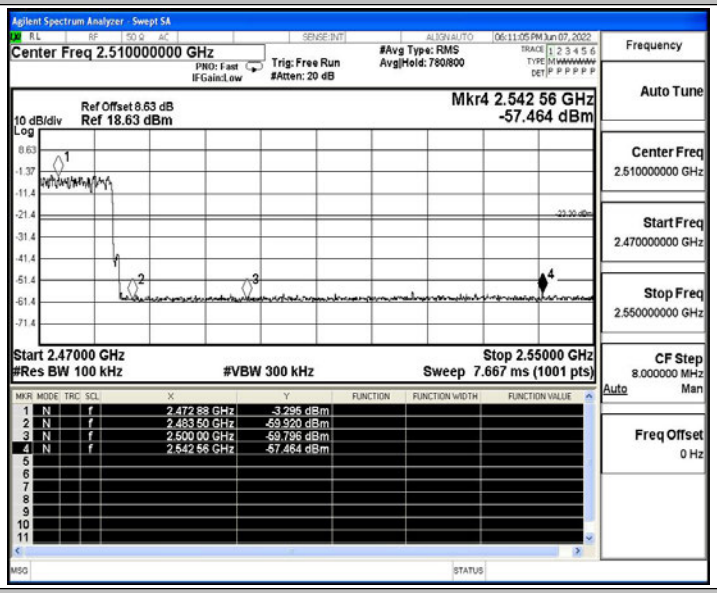
2DH5_Ant1_High_2480



2DH5_Ant1_Low_Hop_2402



2DH5_Ant1_High_Hop_2480



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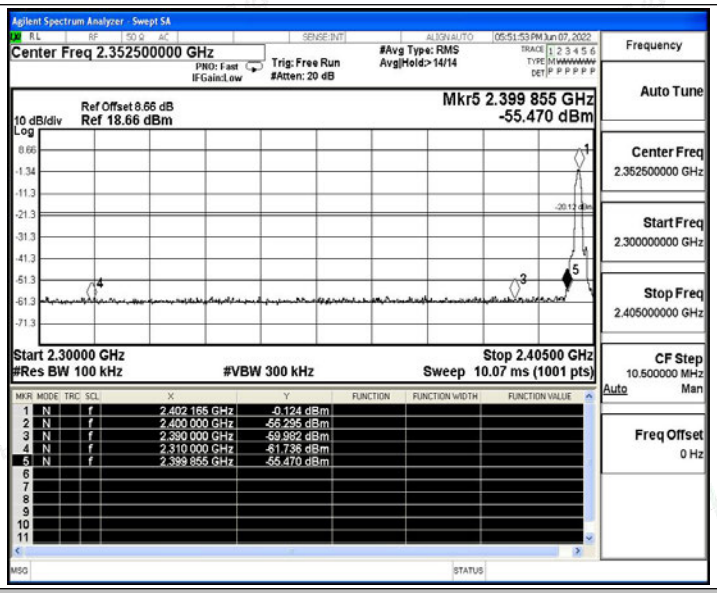
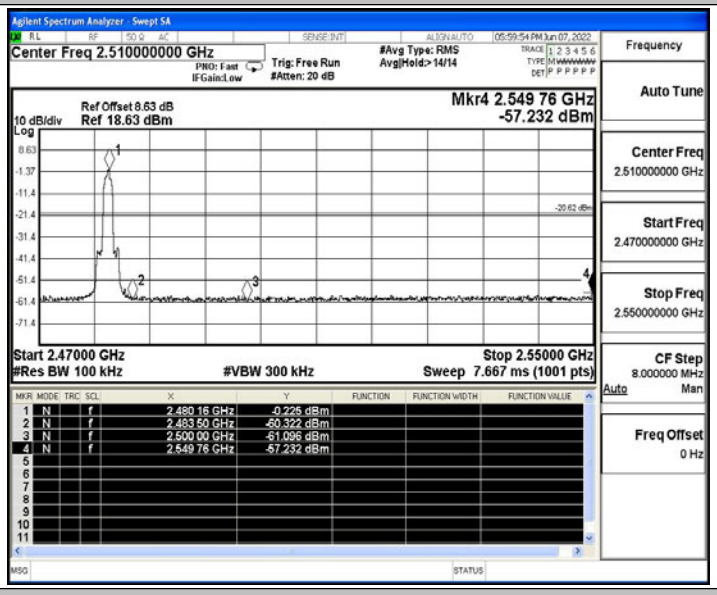
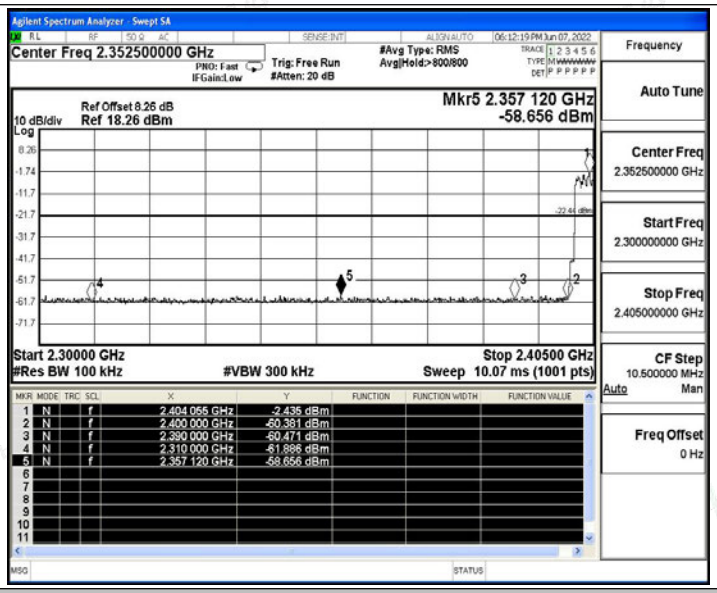


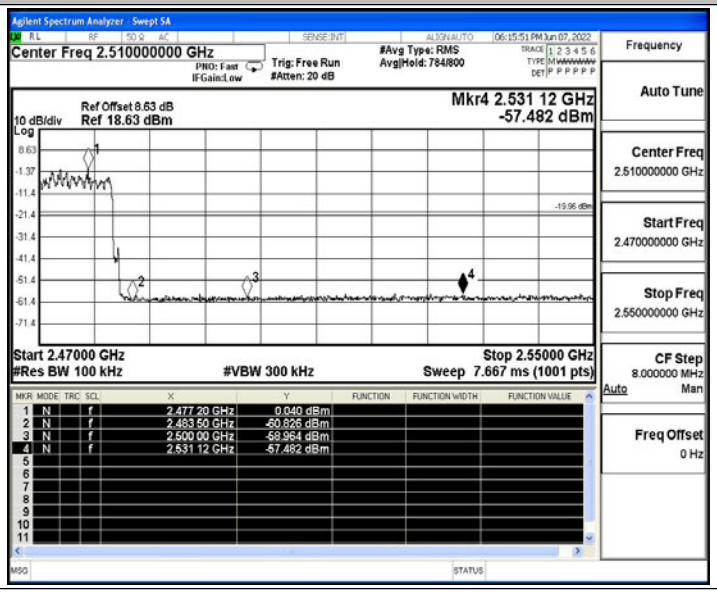
3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480



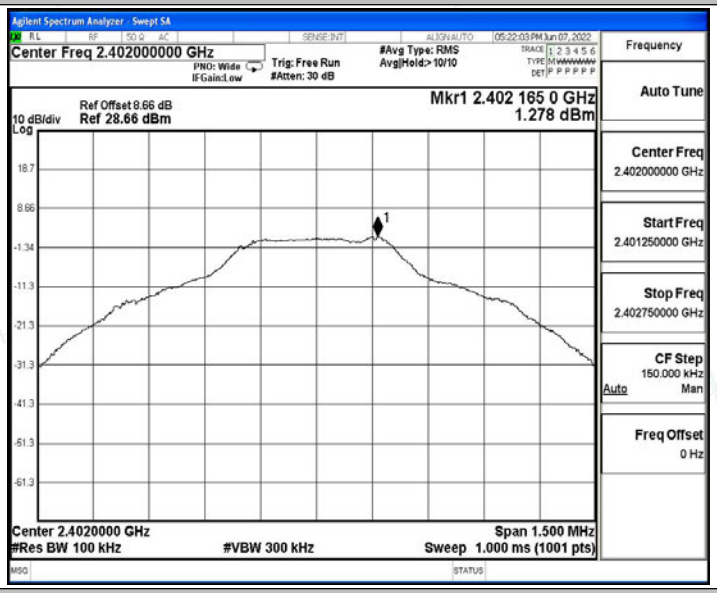
A.8 Conducted Spurious Emission

Test Result

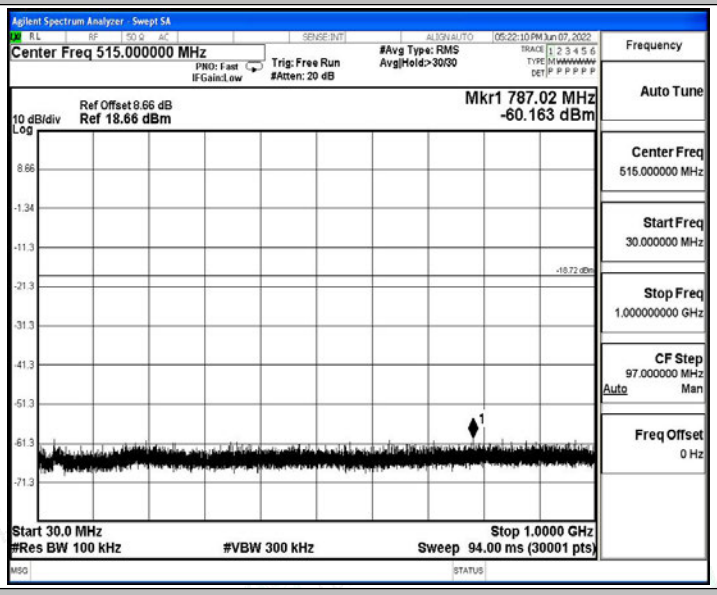
TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	1.28	1.28	---	PASS
			30~1000	1.28	-60.16	≤-18.72	PASS
			1000~26500	1.28	-45.84	≤-18.72	PASS
		2441	Reference	2.43	2.43	---	PASS
			30~1000	2.43	-60.17	≤-17.57	PASS
			1000~26500	2.43	-45.5	≤-17.57	PASS
		2480	Reference	1.15	1.15	---	PASS
			30~1000	1.15	-60.53	≤-18.85	PASS
			1000~26500	1.15	-45.94	≤-18.85	PASS
2DH5	Ant1	2402	Reference	-0.27	-0.27	---	PASS
			30~1000	-0.27	-60.4	≤-20.27	PASS
			1000~26500	-0.27	-45.95	≤-20.27	PASS
		2441	Reference	0.78	0.78	---	PASS
			30~1000	0.78	-60.47	≤-19.22	PASS
			1000~26500	0.78	-45.33	≤-19.22	PASS
		2480	Reference	-0.25	-0.25	---	PASS
			30~1000	-0.25	-60.14	≤-20.25	PASS
			1000~26500	-0.25	-45.87	≤-20.25	PASS
3DH5	Ant1	2402	Reference	-0.19	-0.19	---	PASS
			30~1000	-0.19	-59.7	≤-20.19	PASS
			1000~26500	-0.19	-45.8	≤-20.19	PASS
		2441	Reference	0.98	0.98	---	PASS
			30~1000	0.98	-59.89	≤-19.02	PASS
			1000~26500	0.98	-45.63	≤-19.02	PASS
		2480	Reference	-0.24	-0.24	---	PASS
			30~1000	-0.24	-59.74	≤-20.24	PASS
			1000~26500	-0.24	-45.34	≤-20.24	PASS

Test Graphs

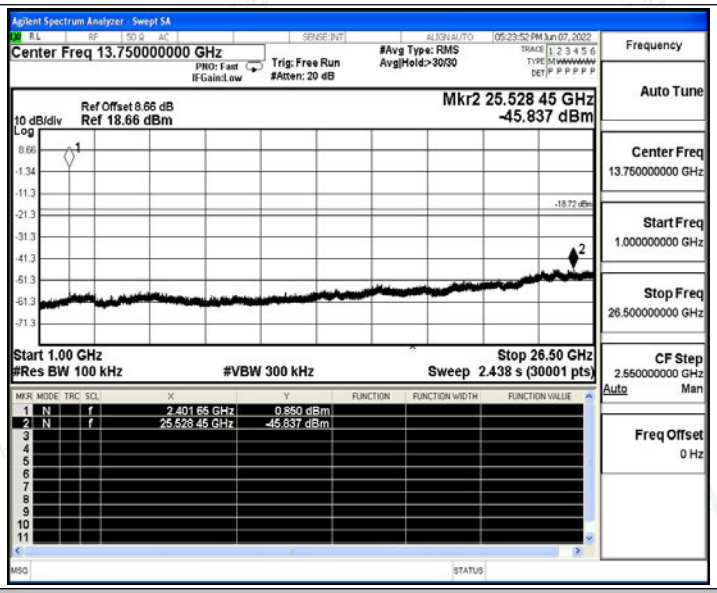
DH5_Ant1_2402_0~Reference



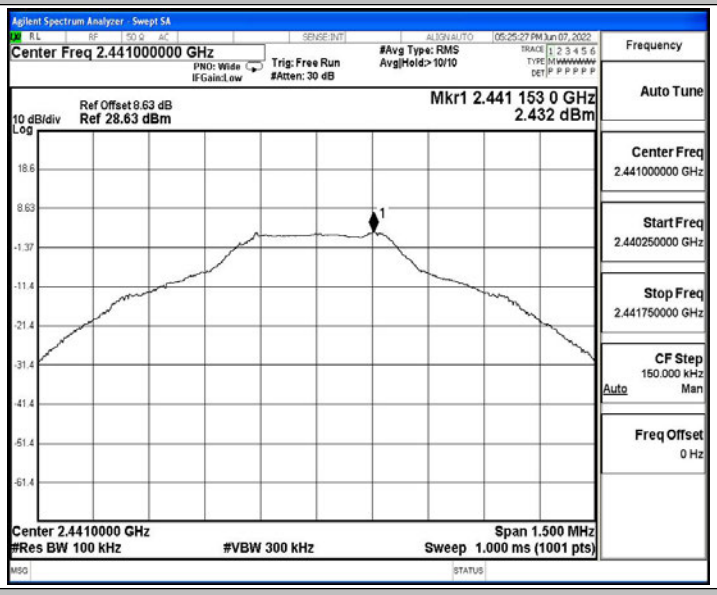
DH5_Ant1_2402_30~1000



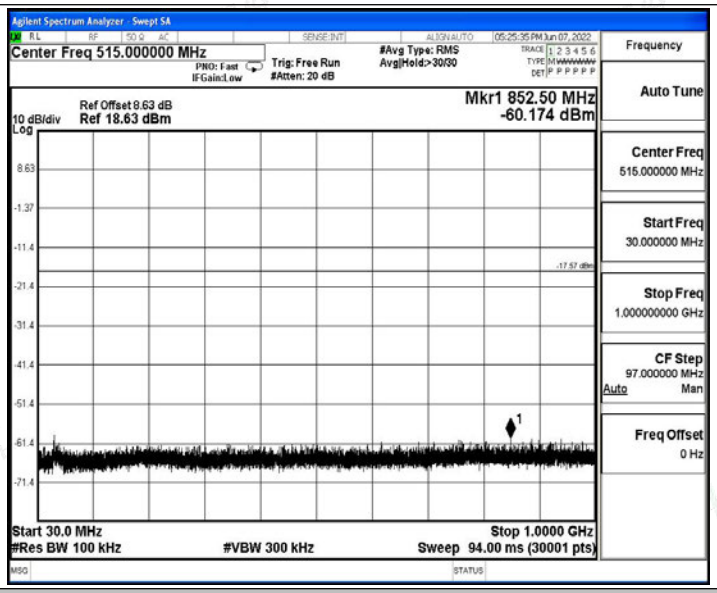
DH5_Ant1_2402_1000~26500



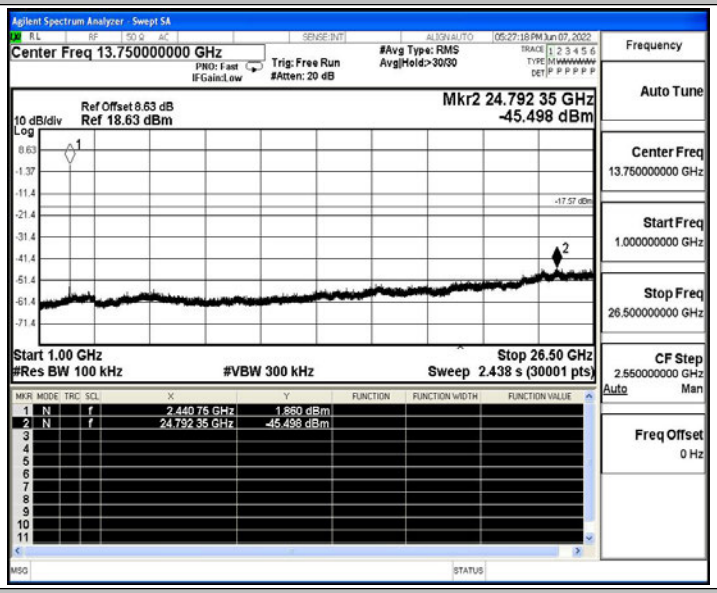
DH5_Ant1_2441_0~Reference



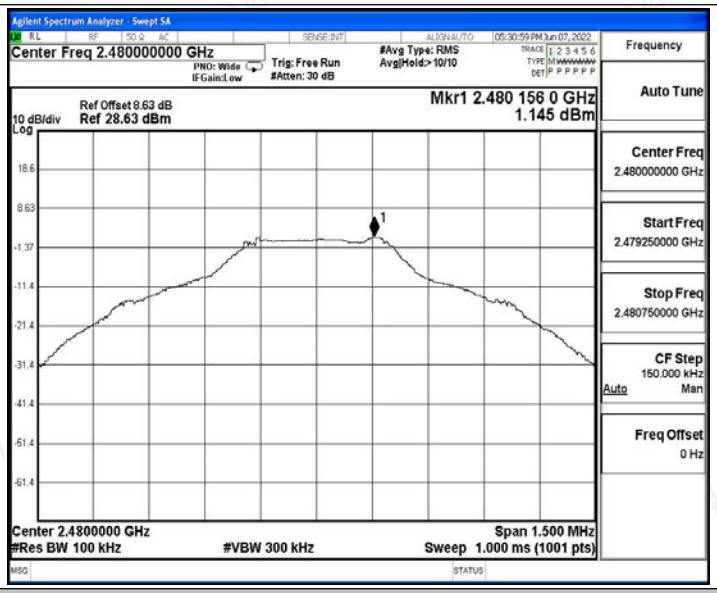
DH5_Ant1_2441_30~1000



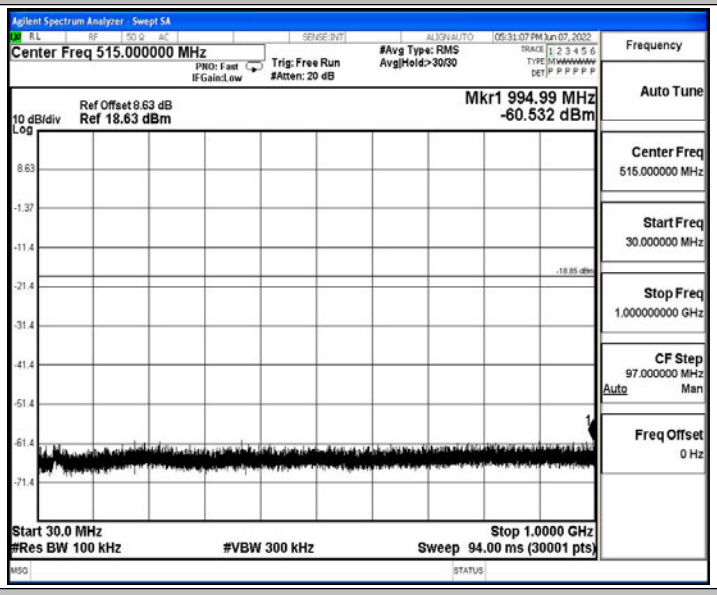
DH5_Ant1_2441_1000~26500



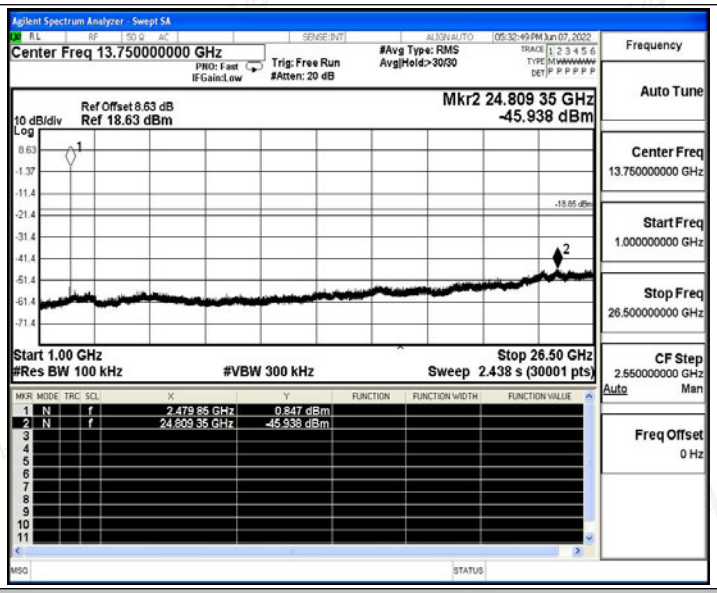
DH5_Ant1_2480_0~Reference



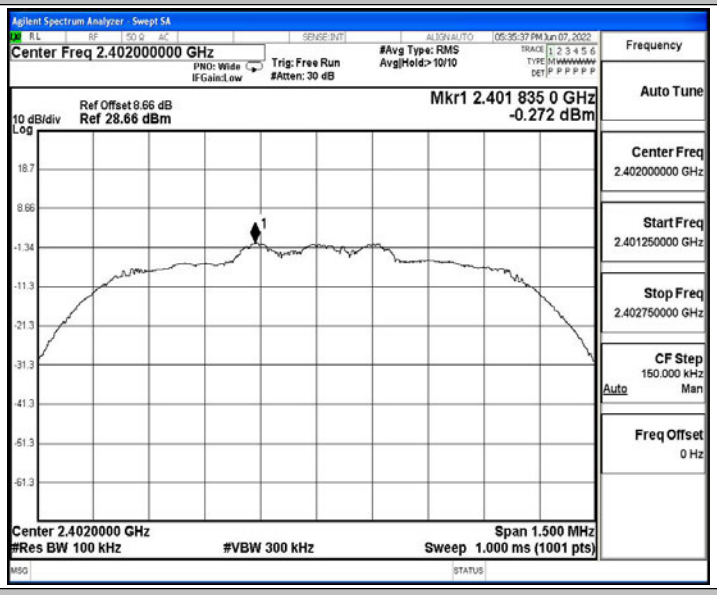
DH5_Ant1_2480_30~1000



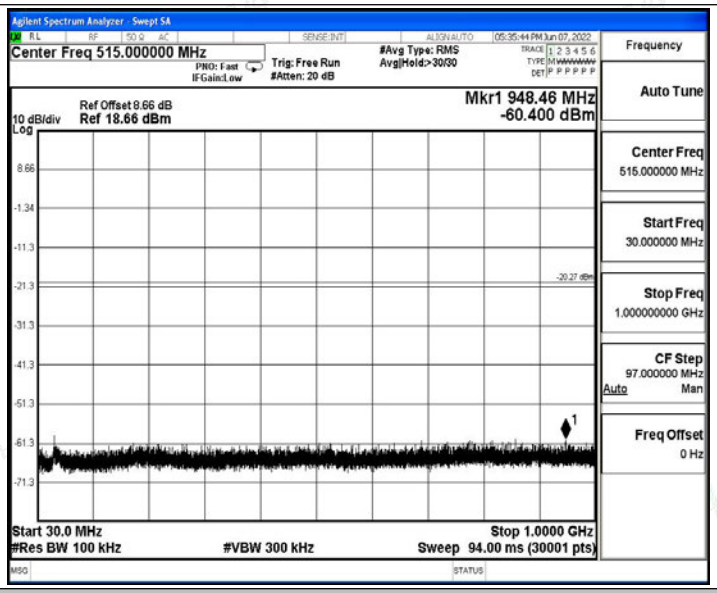
DH5_Ant1_2480_1000~26500



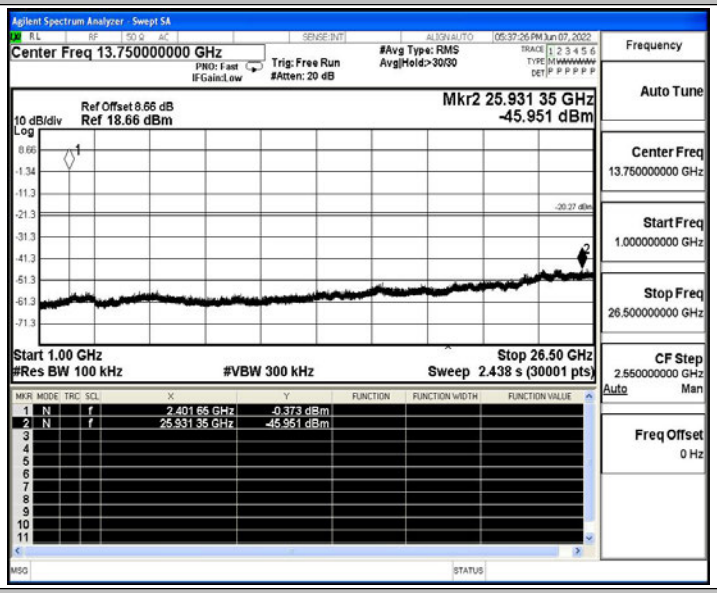
2DH5_Ant1_2402_0~Reference



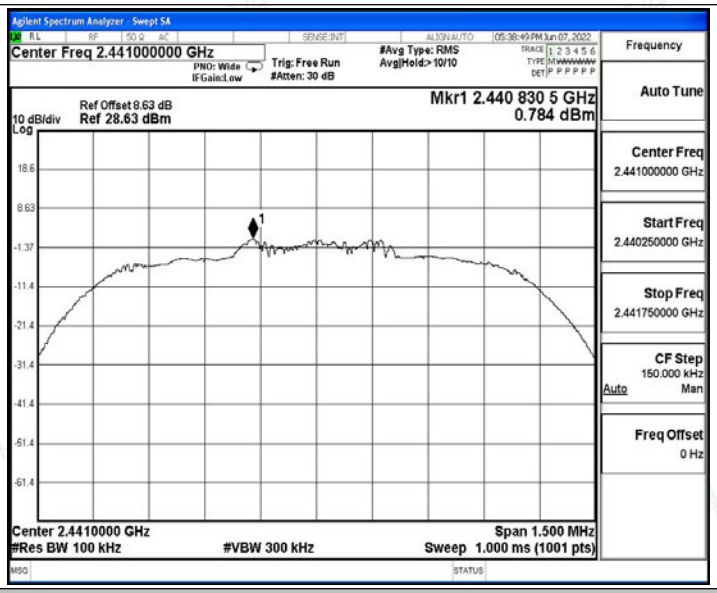
2DH5_Ant1_2402_30~1000



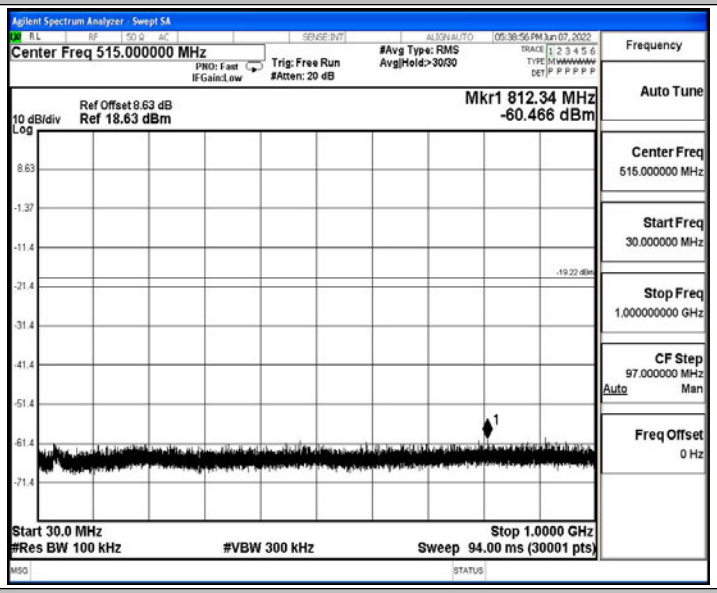
2DH5_Ant1_2402_1000~26500



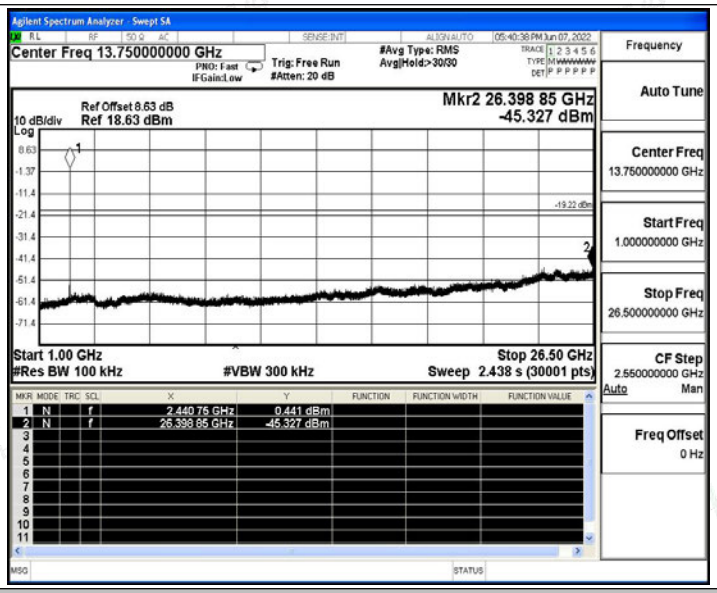
2DH5_Ant1_2441_0~Reference



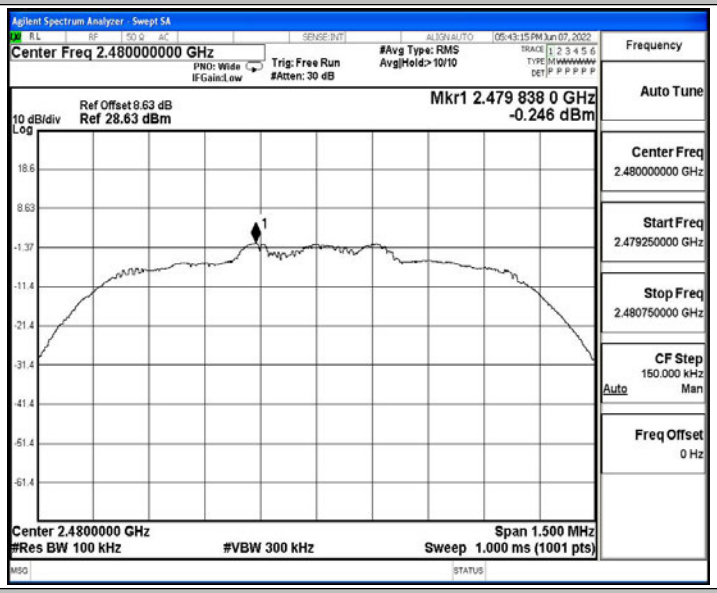
2DH5_Ant1_2441_30~1000



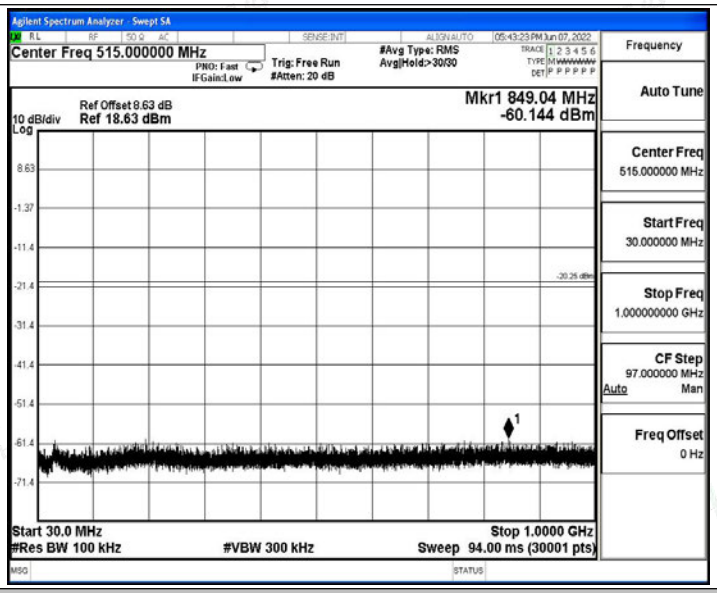
2DH5_Ant1_2441_1000~26500



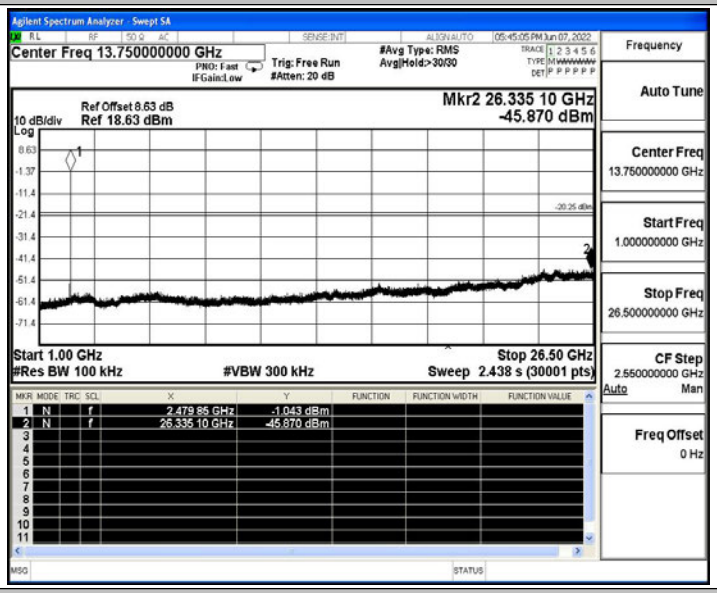
2DH5_Ant1_2480_0~Reference



2DH5_Ant1_2480_30~1000



2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference