



Appendix A

RF Test Data for 2.4G BT (Conducted Measurement)

Product Name: Cartoon speaker

Trade Mark: N/A

Test Model: XV-BC8

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan



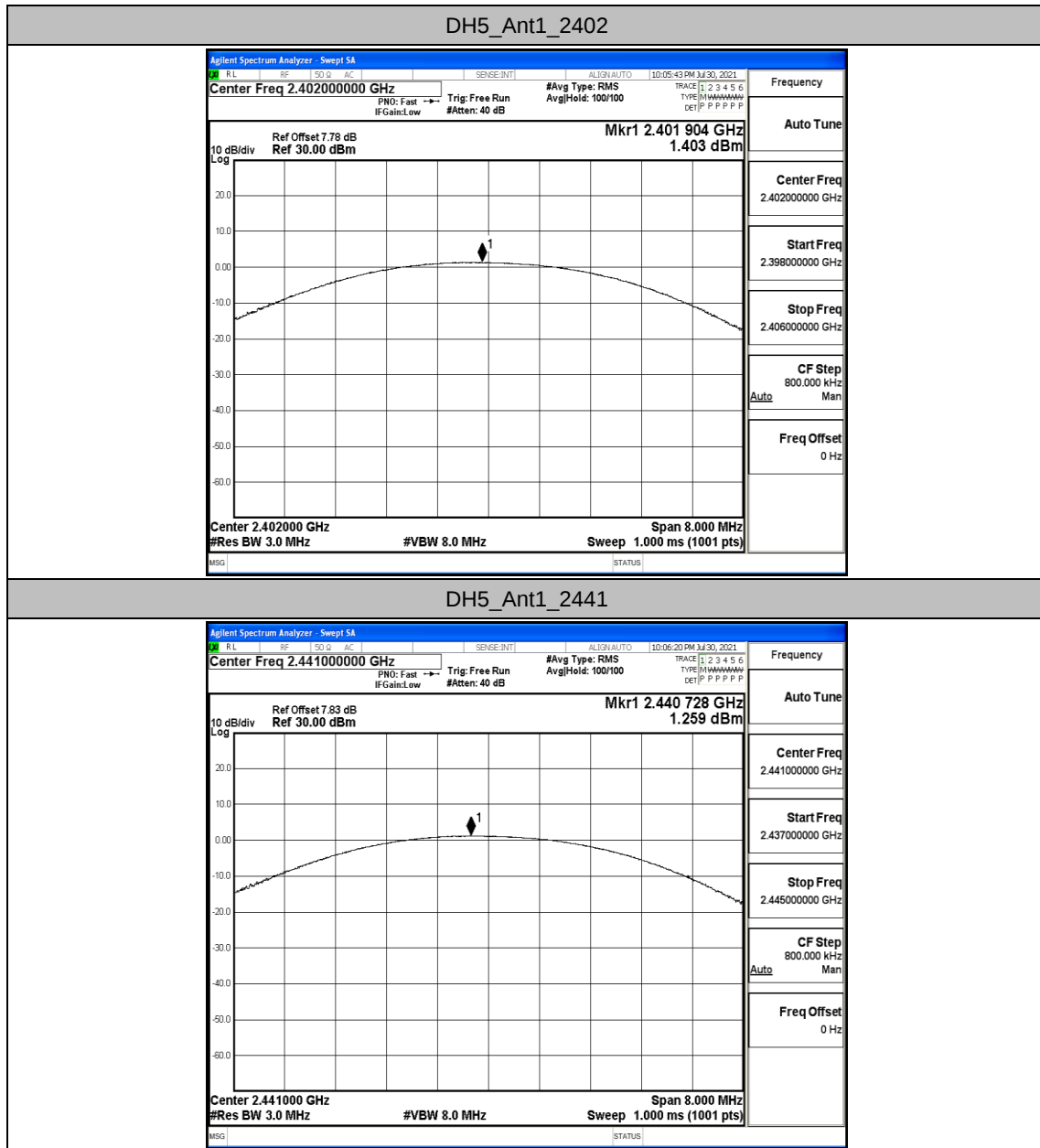
Appendix A.1: Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	1.4	≤20.97	PASS
		2441	1.26	≤20.97	PASS
		2480	0.69	≤20.97	PASS
2DH5	Ant1	2402	2.05	≤20.97	PASS
		2441	1.73	≤20.97	PASS
		2480	1.21	≤20.97	PASS

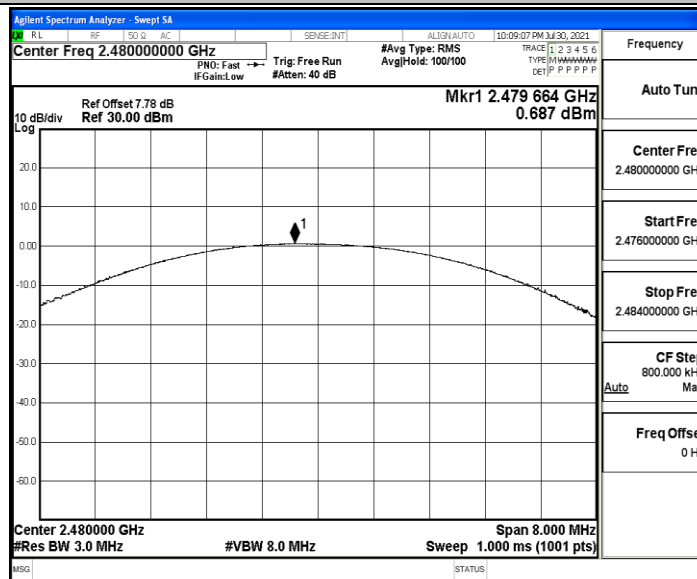


Test Graphs

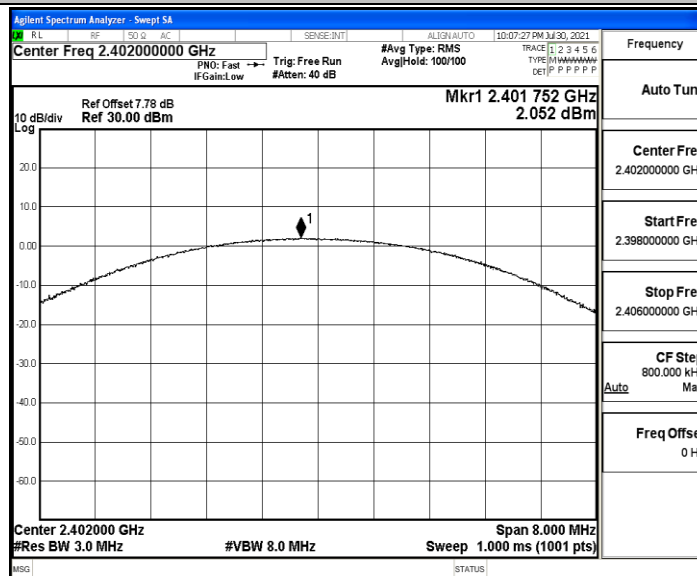




DH5_Ant1_2480

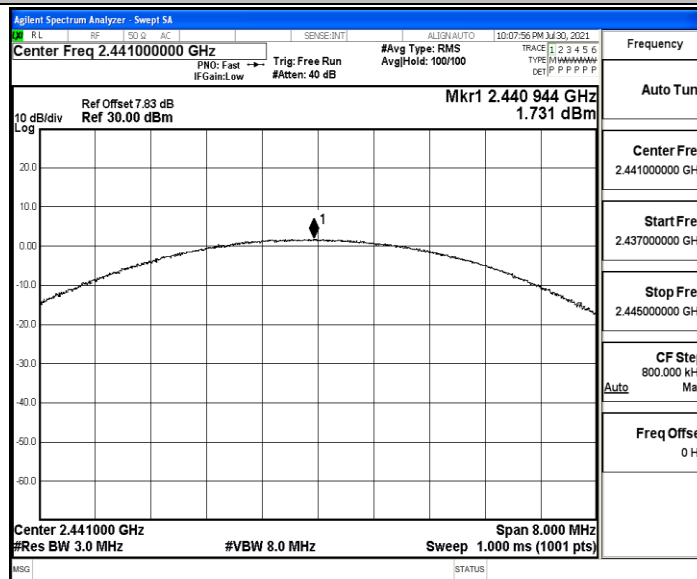


2DH5_Ant1_2402

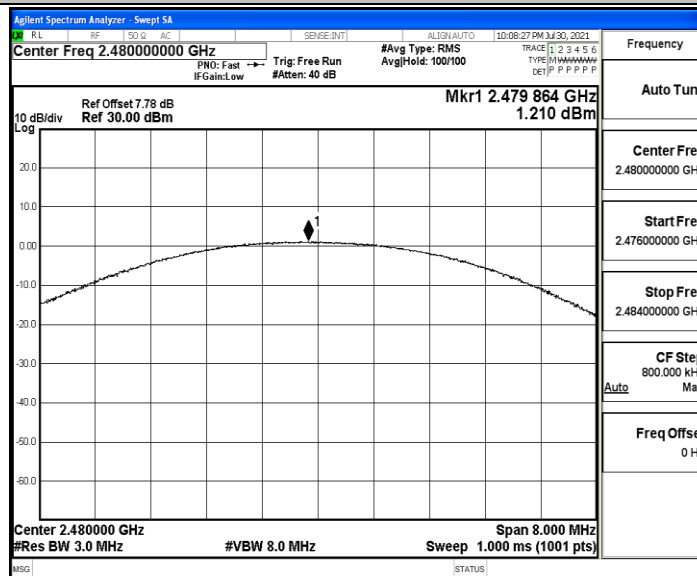




2DH5_Ant1_2441



2DH5_Ant1_2480





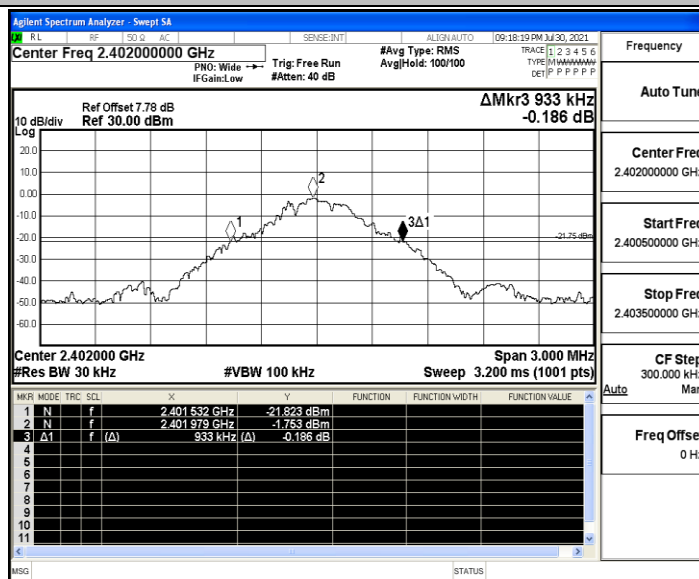
Appendix A.2: 20dB Emission Bandwidth

Test Result

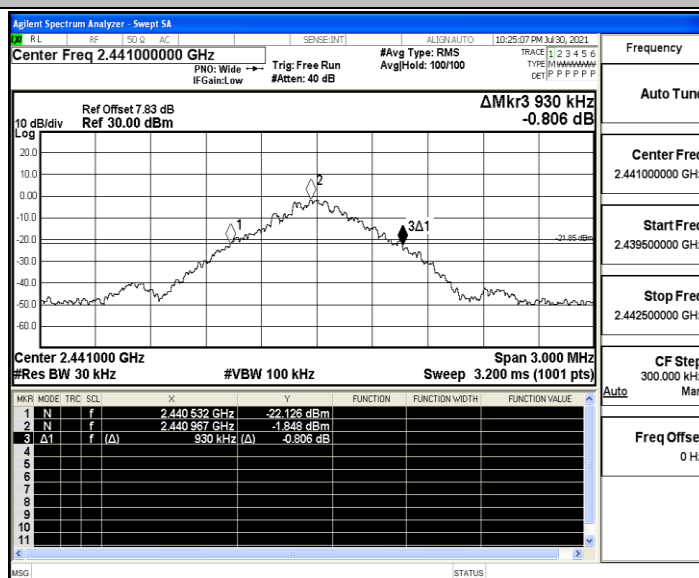
TestMode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.933	2401.532	2402.465	---	PASS
		2441	0.930	2440.532	2441.462	---	PASS
		2480	0.957	2479.523	2480.480	---	PASS
2DH5	Ant1	2402	1.383	2401.301	2402.684	---	PASS
		2441	1.380	2440.301	2441.681	---	PASS
		2480	1.371	2479.304	2480.675	---	PASS



DH5 Ant1 2402



DH5 Ant1 2441





Agilent Spectrum Analyzer - Sweep SA

RL RF SO G AC SENSE INT ALIGN AUTO 09-27-00 PM 3:03, 2021 TRACE [1] 2 3 4 5 6 TYPE [RAW] WAVE DET [P P P P P P]

Center Freq 2.480000000 GHz #Avg Type: RMS AvgHold: 100/100
 PRI: Wide → IF Gain: Low #Atten: 40 dB

Frequency Auto Tune

Ref Offset 7.78 dB Ref 30.00 dBm **ΔMrk3 957 kHz 0.306 dB**

The spectrum plot displays a noisy signal centered around 2.48 GHz. A prominent peak is labeled '30.1' at approximately -23.34 dBm. The x-axis represents frequency from 2.475 GHz to 2.485 GHz, and the y-axis represents power level from -60 dBm to 20 dBm.

MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.479 523 GHz	-23.040 dBm			
2	N	f		2.479 964 GHz	-2.336 dBm			
3	Δ1	f	(Δ)	957 kHz (Δ)	0.306 dB			

Center 2.480000 GHz Span 3.000 MHz
#Res BW 30 kHz #VBW 100 kHz Sweep 3.200 ms (1001 pts)

Auto CF Step 300.000 kHz Mar Freq Offset 0 Hz

Agilent Spectrum Analyzer - Sweep SA

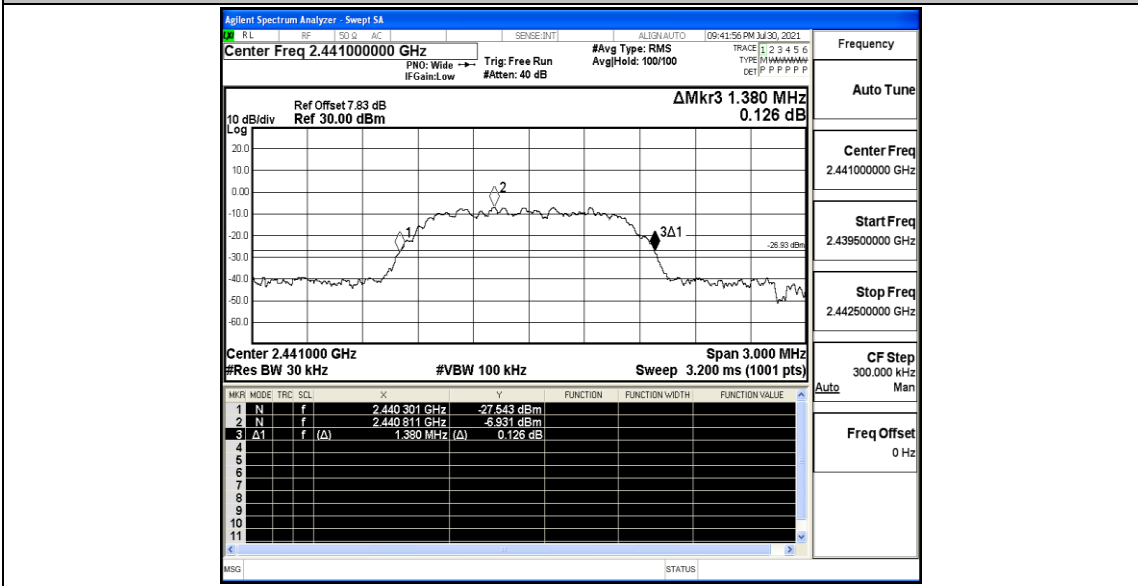
FREQ	R/L	BW	S/G	A/C	SENSE INT	ALIGN AUTO	DATE/TIME
Center Freq 2.4020000 GHz							09:34:08 PM Jul 30, 2021
PNO: Wide → IF Gain Low					#Avg Type: RMS AvgHold: 100/100		TRACE [1] 2 3 4 5 6 TYPE [ANALOG] DET [PPPP]
		Trig: Free Run #Atten: 40 dB					

Frequency Auto Tuning Center Frequency 2.40200000 GHz Start Frequency 2.40050000 GHz Stop Frequency 2.40350000 GHz Span 3.000 MHz Res BW 30 kHz VBW 100 kHz Sweep 3.200 ms (1001 pts)

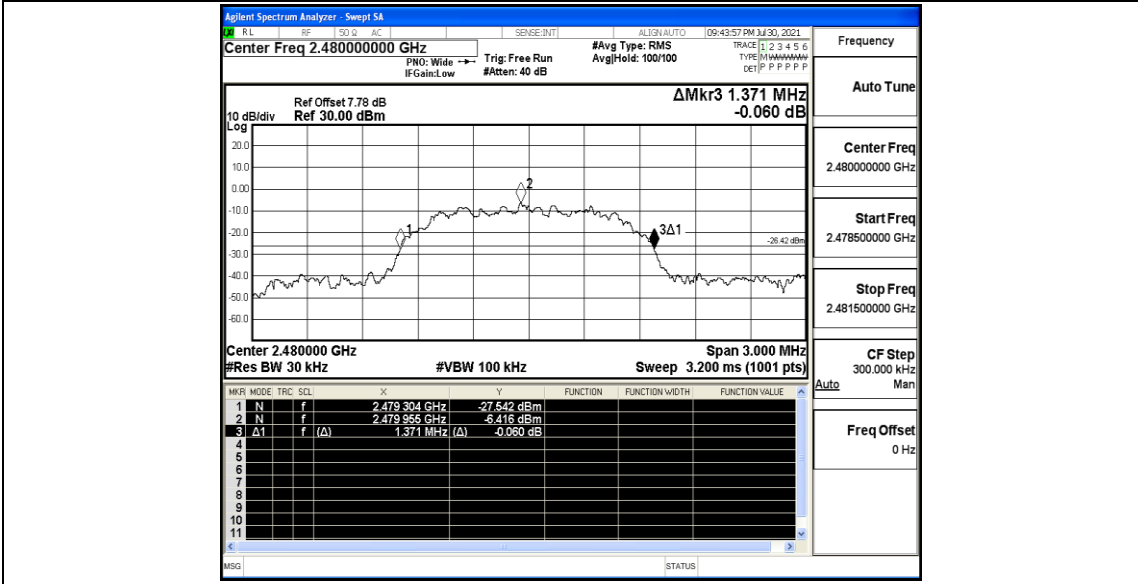
MNR MODE	TIC SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1 N	f	2.401301 GHz	-26.667 dBm			
2 N	f	2.401811 GHz	-6.664 dBm			
3 Δ1	f (Δ)	1.383 MHz (Δ)	-0.168 dB			
4						
5						
6						
7						
8						
9						
10						
11						



2DH5_Ant1_2441



2DH5_Ant1_2480





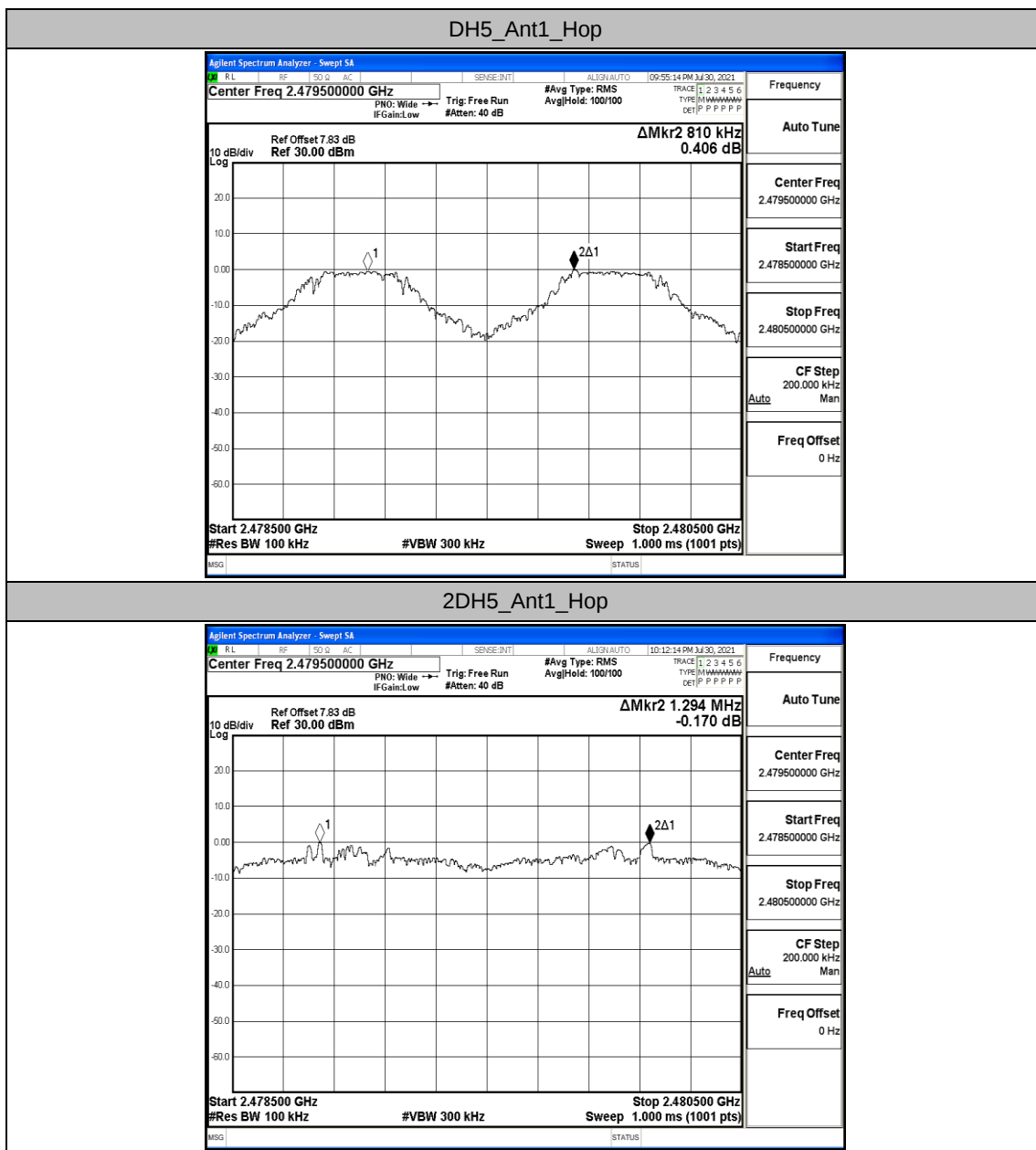
Appendix A.3: Carrier frequency separation

Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	Hop	0.81	≥ 0.638	PASS
2DH5	Ant1	Hop	1.294	≥ 0.922	PASS



Test Graphs





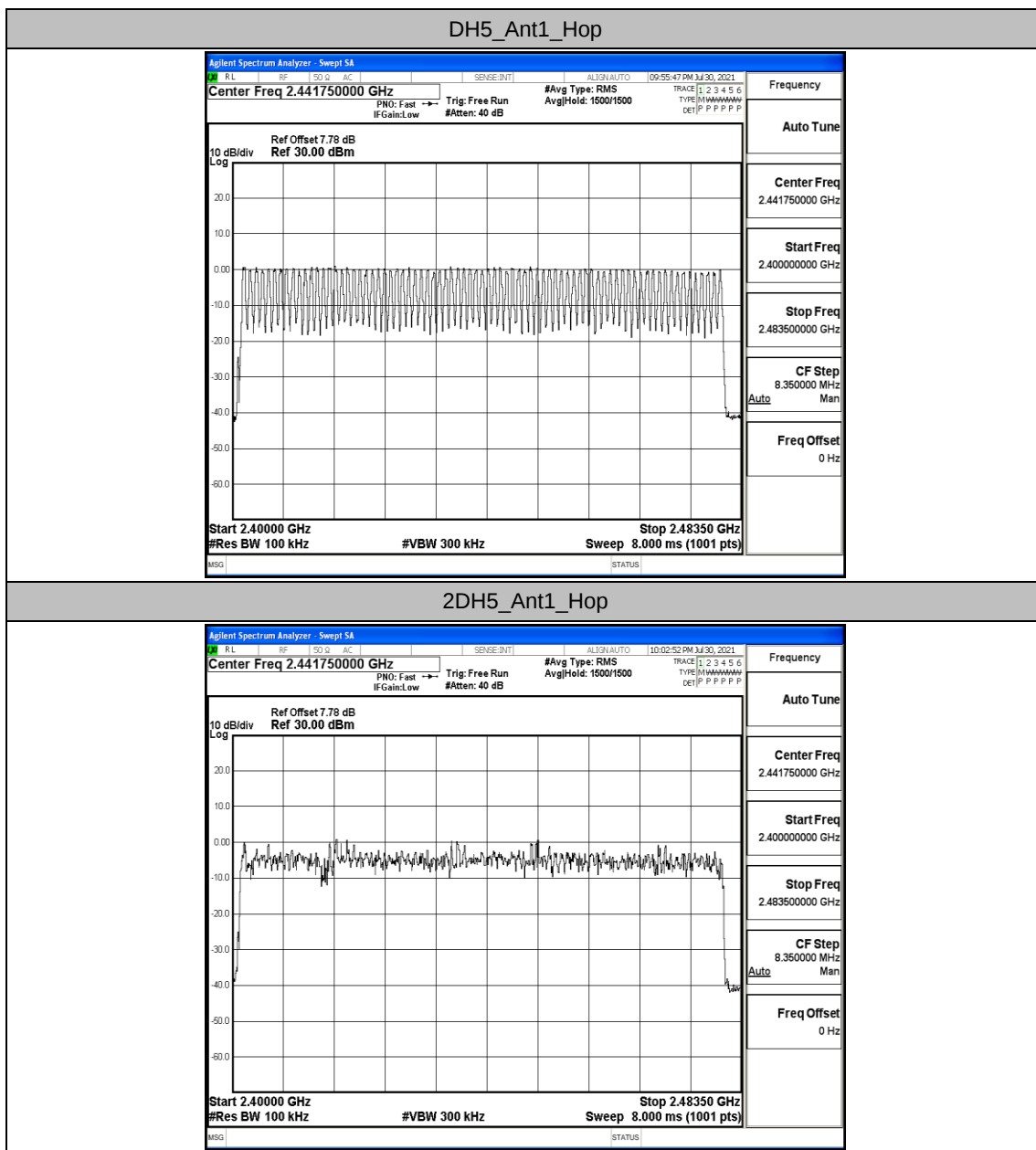
Appendix A.4: Number of hopping channels

Test Result

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



Test Graphs





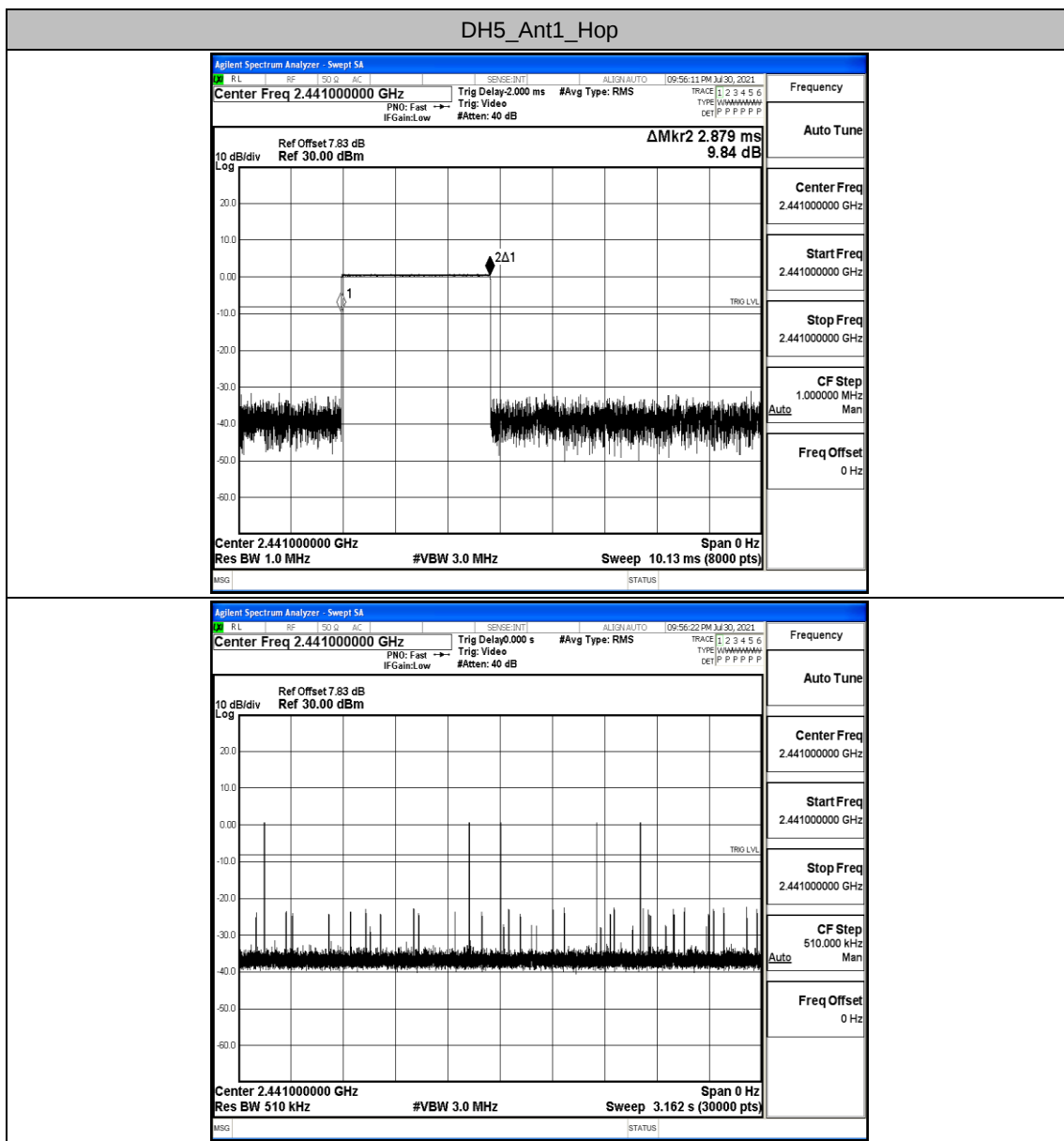
Appendix A.5.1: Time of occupancy

Test Result

TestMode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.88	60	0.173	≤0.4	PASS
2DH5	Ant1	Hop	2.89	120	0.346	≤0.4	PASS

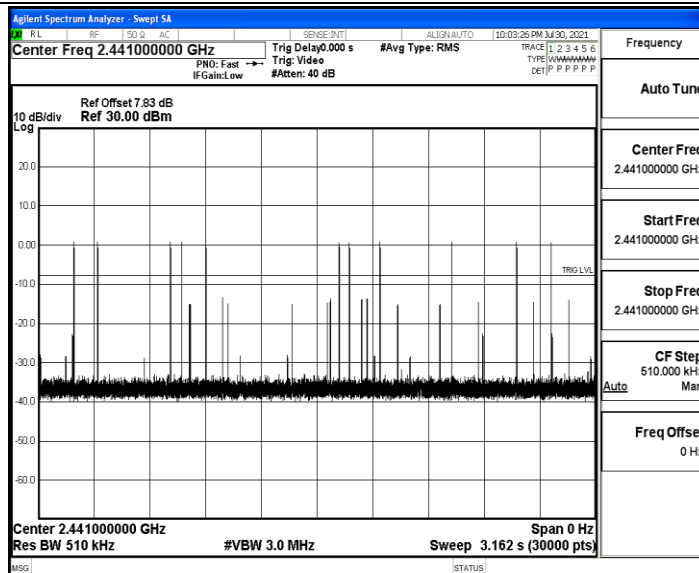
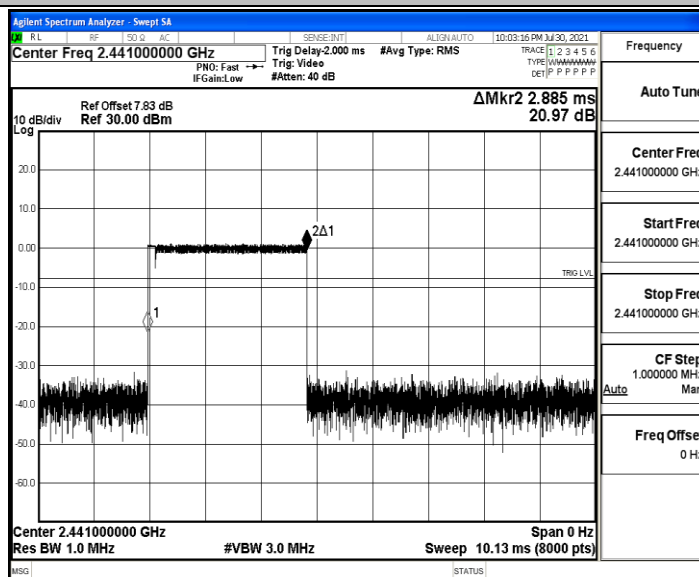


Test Graphs





2DH5_Ant1_Hop





Appendix A.5.2: Duty Cycle

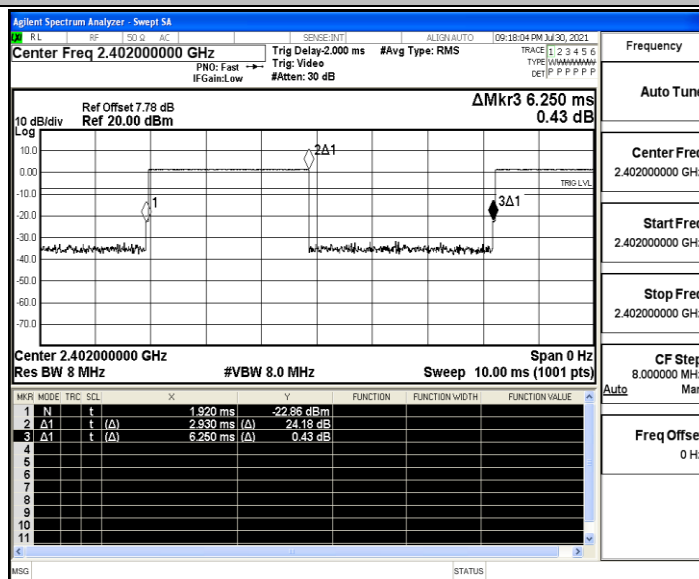
Test Result

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
DH5	Ant1	2402	2.93	6.25	0.4688	46.88	3.29	---	PASS
		2441	2.93	6.25	0.4688	46.88	3.29	---	PASS
		2480	2.93	6.25	0.4688	46.88	3.29	---	PASS
2DH5	Ant1	2402	2.92	6.24	0.4679	46.79	3.30	---	PASS
		2441	2.94	6.25	0.4704	47.04	3.28	---	PASS
		2480	2.94	6.25	0.4704	47.04	3.28	---	PASS

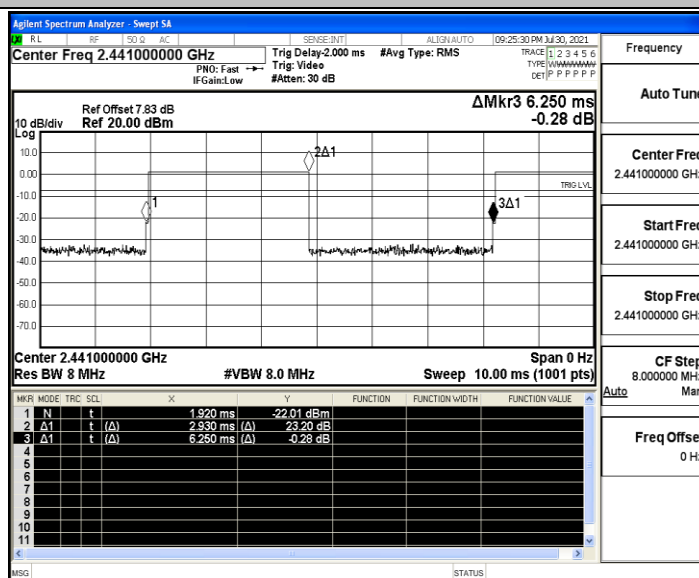


Test Graphs

DH5_Ant1_2402



DH5_Ant1_2441





Agilent Spectrum Analyzer - Swept SA

RL RF SO G AC SERVE-INT ALIGN AUTO 09-27-25 PM 3:30, 2021

Center Freq 2.480000000 GHz Trg Delay: 2.000 ms #Avg Type: RMS
 PNO: Fast IF Gain: Low Trig: Video #Atten: 30 dB
 TRACE [1] 2 3 4 5 6
 TYPE [ANALOG] DET [P P P P P]

Frequency Auto Tune

Ref Offset 7.78 dB
 Ref 20.00 dBm

**ΔMkr 6.250 ms
 -0.31 dB**

The figure shows a spectrum analyzer screen with a frequency range from 2.470 GHz to 2.490 GHz. A signal is visible around 2.48 GHz. A marker is placed at 6.250 ms, indicating a frequency offset of -0.31 dB. The reference level is set to 20.00 dBm.

MKR MODE	TRG SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1 N	t	1.920 ms	-22.42 dBm			
2 Δ1	t (Δ)	2.930 ms (Δ)	23.07 dB			
3 Δ1	t (Δ)	6.250 ms (Δ)	-0.31 dB			

Center 2.480000000 GHz Span 0 Hz
 Res BW 8 MHz #VBW 8.0 MHz Sweep 10.00 ms (1001 pts)

CF Step 8.000000 MHz
 Auto Man

Freq Offset 0 Hz

Agilent Spectrum Analyzer - Sweep SA

RL RF SO G AC SENSE INT ALIGN AUTO 09:33:54 PM Jul 30, 2021

Center Freq 2.402000000 GHz Trig Delay: 2.000 ms #Avg Type: RMS TRACE [1 2 3 4 5 6] TYP: [AAAAAAW] DET: P P P P P

PNO: Fast IF Gain: Low Trig: Video #Atten: 30 dB

Ref Offset 7.78 dB
Ref 20.00 dBm

ΔMkr 3.6240 mHz
-0.21 dB

Log

Center 2.402000000 GHz Span 0 Hz
Res BW 8 MHz #VBW 8.0 Mhz Sweep 15.00 ms (1001 pts)

MkR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	t		1.910 ms	-22.35 dBm			
2	Δ1	t	(Δ)	2.920 ms (Δ)	24.01 dB			
3	Δ1	t	(Δ)	6.240 ms (Δ)	-0.21 dB			
4								
5								
6								
7								
8								
9								
10								
11								

Auto Mar

Freq Offse 0 HZ

[illegible]

2DH5_Ant1_2480

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.480000000 GHz

Ref Offset 7.78 dB

Ref 20.00 dBm

DMkr3 6.250 ms

-0.35 dB

Trig Delay 2.000 ms

#Avg Type: RMS

Trig: Video

#Atten: 30 dB

PN0: Fast

IF Gain: Low

Trace 1 2 3 4 5 6

Type: (MMMMMMH)

DETP: P P P P P

Frequency

Auto Tune

Center Freq 2.480000000 GHz

Start Freq 2.480000000 GHz

Stop Freq 2.480000000 GHz

CF Step 8.0000000 MHz

Man

Freq Offset 0 Hz

Span 0 Hz

Res BW 8 MHz

#VBW 8.0 MHz

Sweep 10.00 ms (1001 pts)

Mkr	Mode	Trig	SCL	X	Y	Function	Function Width	Function Value
1	N	t		1.920 ms	-22.52 dBm			
2	Δ1	t	(Δ)	2.940 ms (Δ)	21.97 dB			
3	Δ1	t	(Δ)	6.250 ms (Δ)	-0.35 dB			
4								
5								
6								
7								
8								
9								
10								
11								

MISC

STATUS



Appendix A.6: Band edge measurements

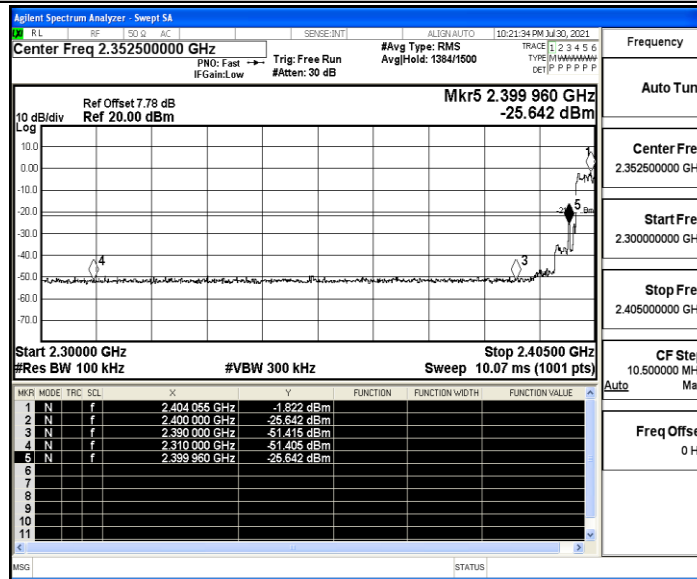
Test Result

TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-1.82	-25.64	≤ -21.82	PASS
		High	2480	0.04	-44.34	≤ -19.96	PASS
		Low	Hop_2402	0.22	-49.59	≤ -19.78	PASS
		High	Hop_2480	0.01	-47.78	≤ -19.99	PASS
2DH5	Ant1	Low	2402	-2.30	-25.89	≤ -22.3	PASS
		High	2480	0.17	-44.31	≤ -19.83	PASS
		Low	Hop_2402	-2.39	-49.45	≤ -22.39	PASS
		High	Hop_2480	-0.15	-48.14	≤ -20.15	PASS

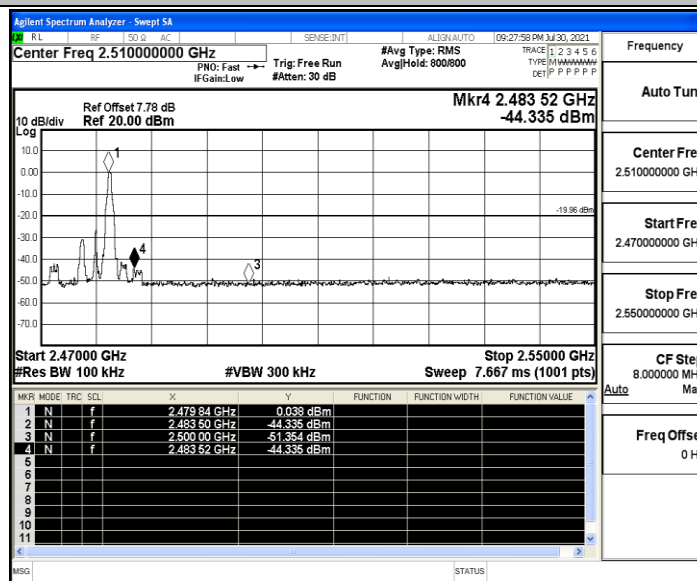


Test Graphs

DH5_Ant1_Low_2402

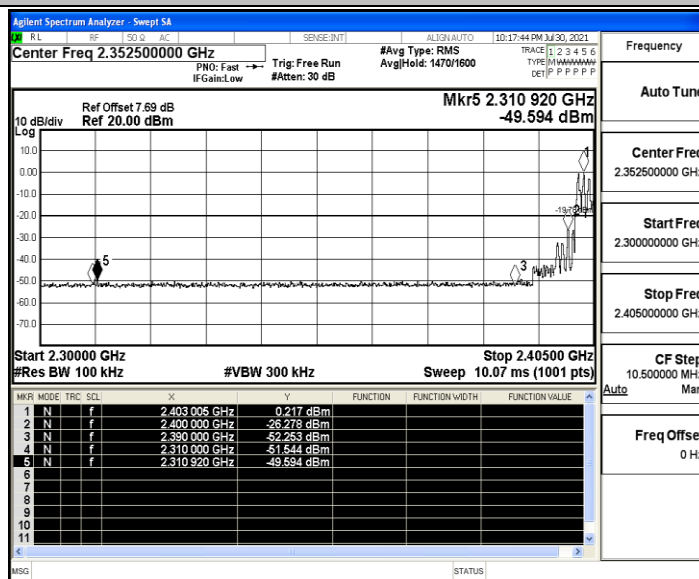


DH5_Ant1_High_2480

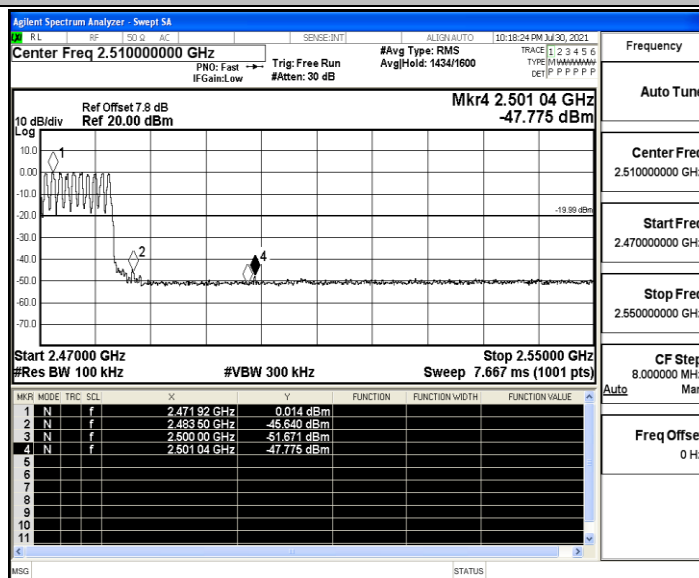




DH5_Ant1_Low_Hop_2402

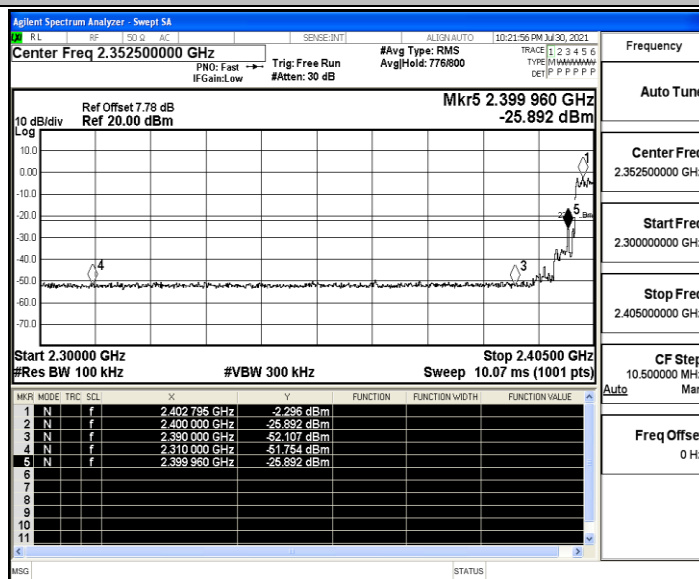


DH5_Ant1_High_Hop_2480

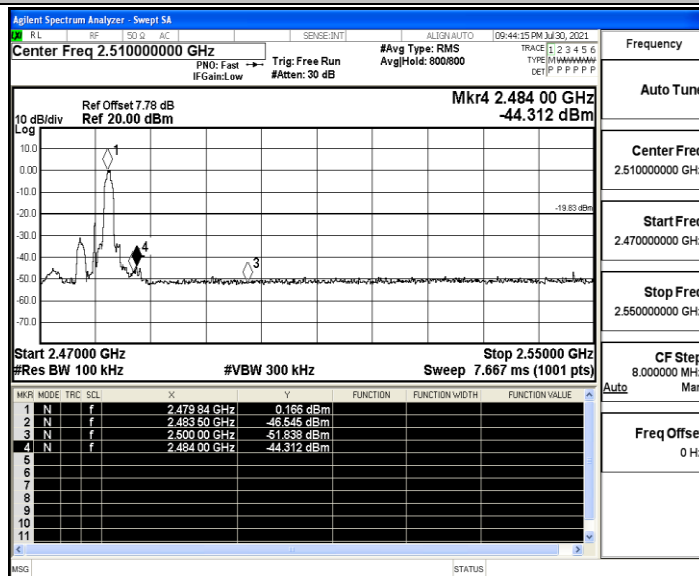




2DH5_Ant1_Low_2402

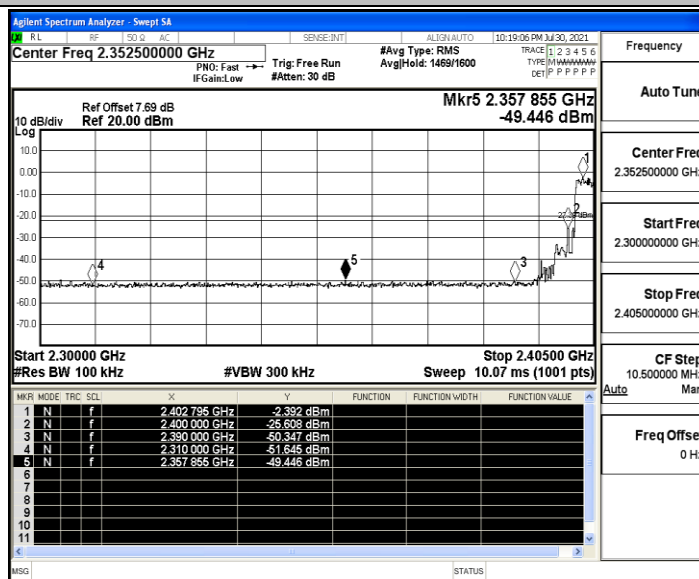


2DH5_Ant1_High_2480

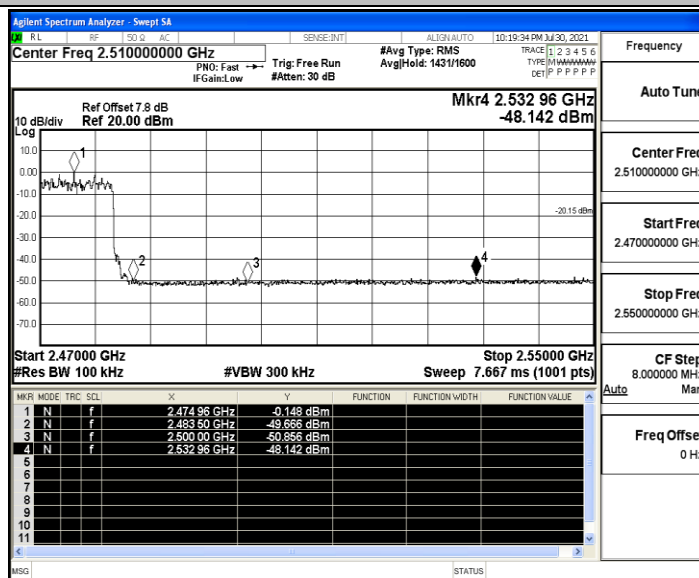




2DH5_Ant1_Low_Hop_2402



2DH5_Ant1_High_Hop_2480





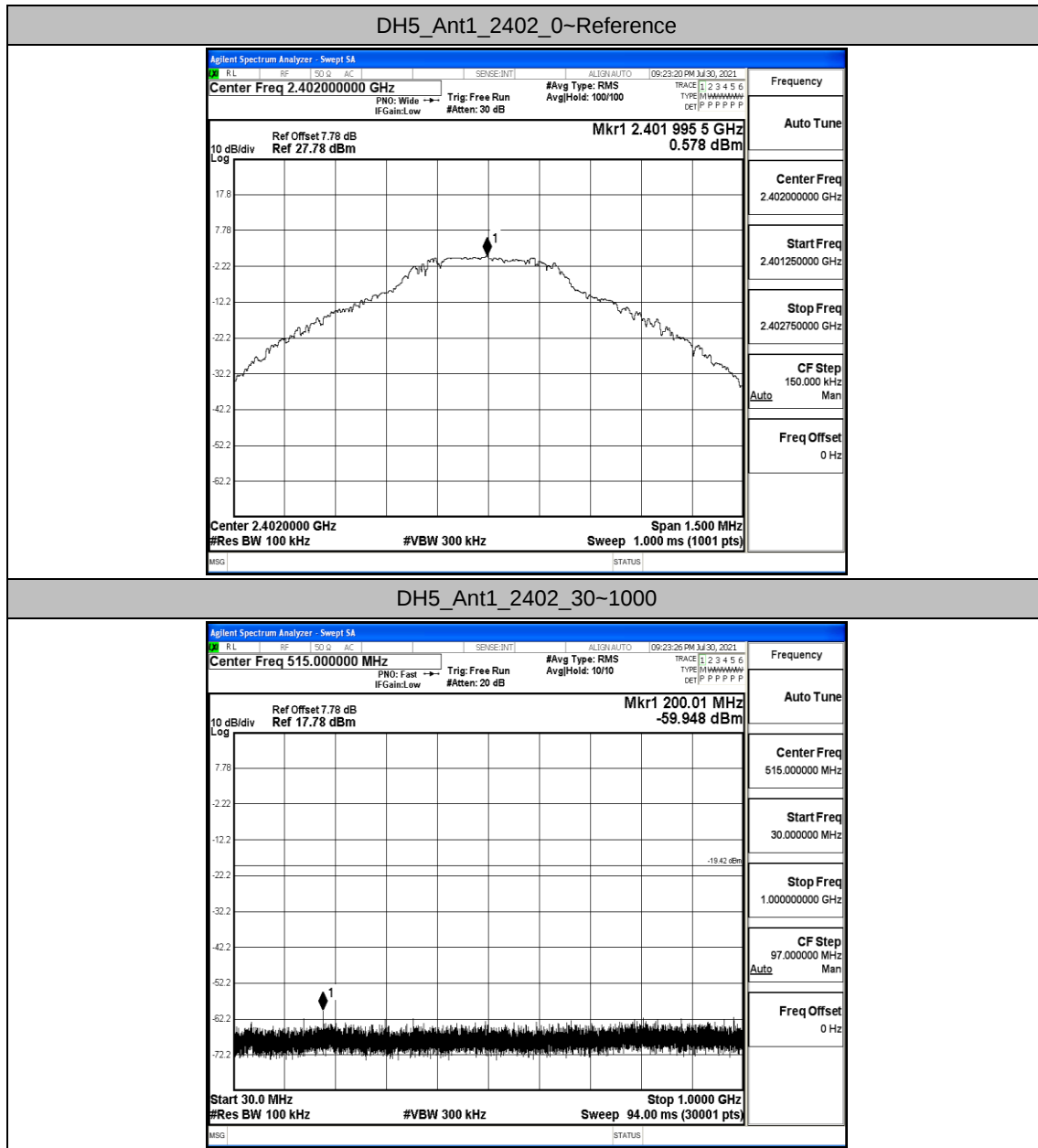
Appendix A.7: Conducted Spurious Emission

Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	0.58	0.58	---	PASS
			30~1000	0.58	-59.95	≤-19.42	PASS
			1000~26500	0.58	-44.99	≤-19.42	PASS
		2441	Reference	0.58	0.58	---	PASS
			30~1000	0.58	-58	≤-19.42	PASS
			1000~26500	0.58	-45.11	≤-19.42	PASS
		2480	Reference	-0.63	-0.63	---	PASS
			30~1000	-0.63	-60.49	≤-20.63	PASS
			1000~26500	-0.63	-45.64	≤-20.63	PASS
2DH5	Ant1	2402	Reference	0.71	0.71	---	PASS
			30~1000	0.71	-59.44	≤-19.29	PASS
			1000~26500	0.71	-47.35	≤-19.29	PASS
		2441	Reference	0.54	0.54	---	PASS
			30~1000	0.54	-59.7	≤-19.46	PASS
			1000~26500	0.54	-47.8	≤-19.46	PASS
		2480	Reference	-0.04	-0.04	---	PASS
			30~1000	-0.04	-58.86	≤-20.04	PASS
			1000~26500	-0.04	-46.89	≤-20.04	PASS

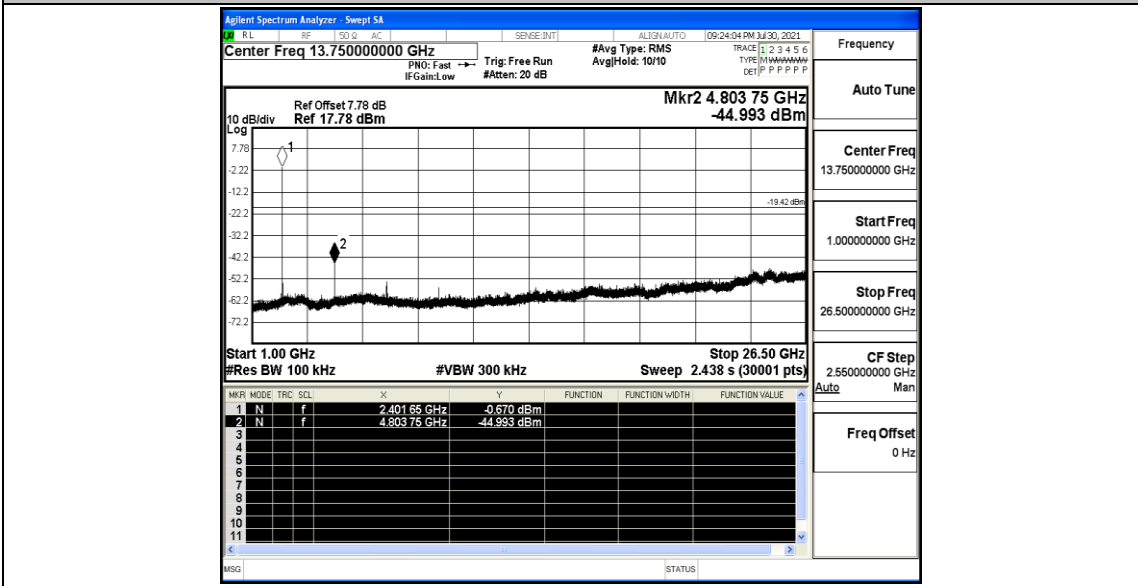


Test Graphs

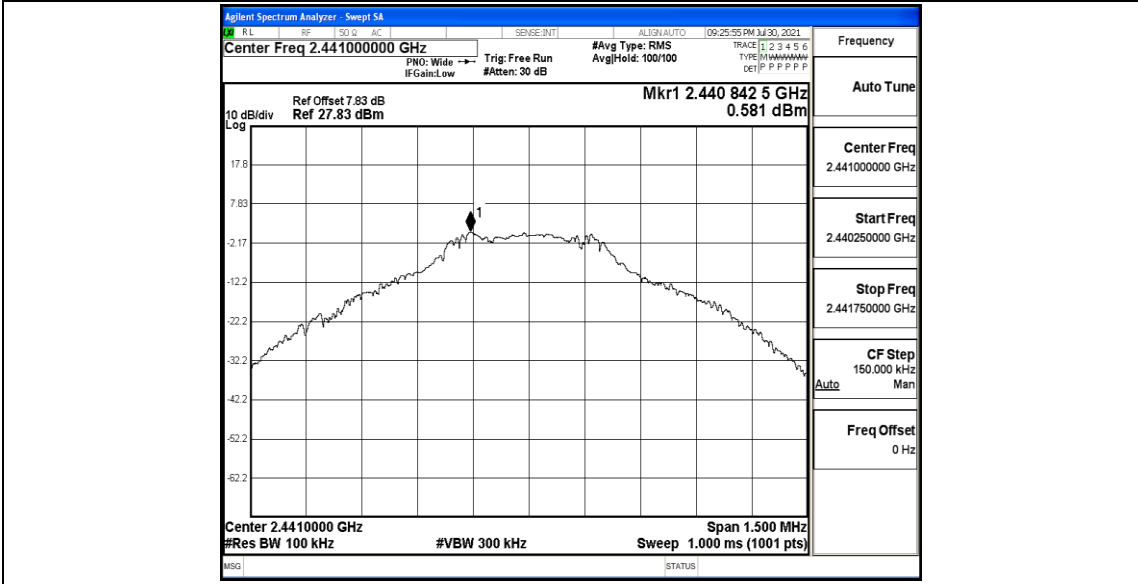




DH5_Ant1_2402_1000~26500

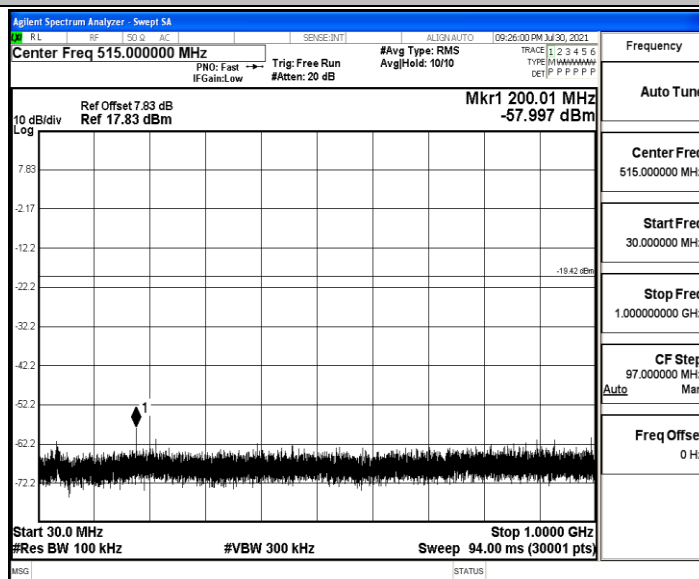


DH5_Ant1_2441_0~Reference

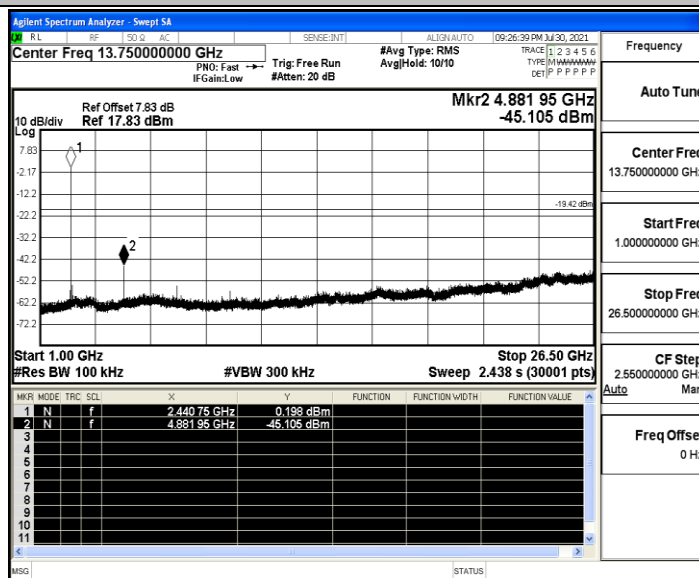




DH5_Ant1_2441_30~1000

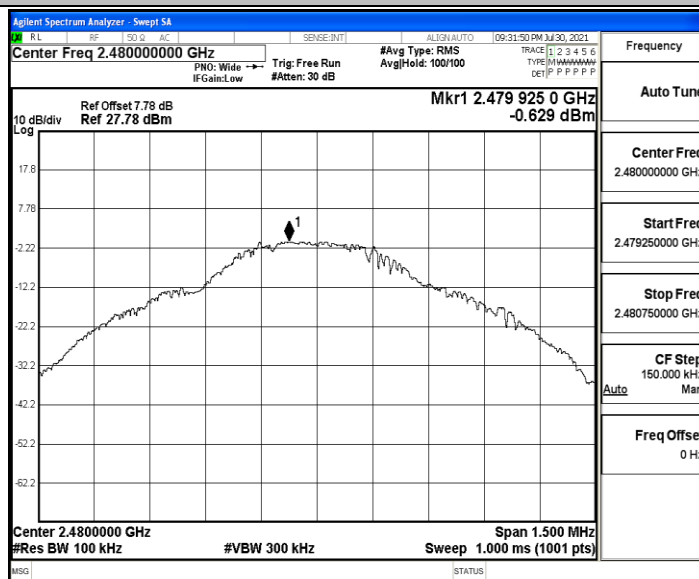


DH5_Ant1_2441_1000~26500

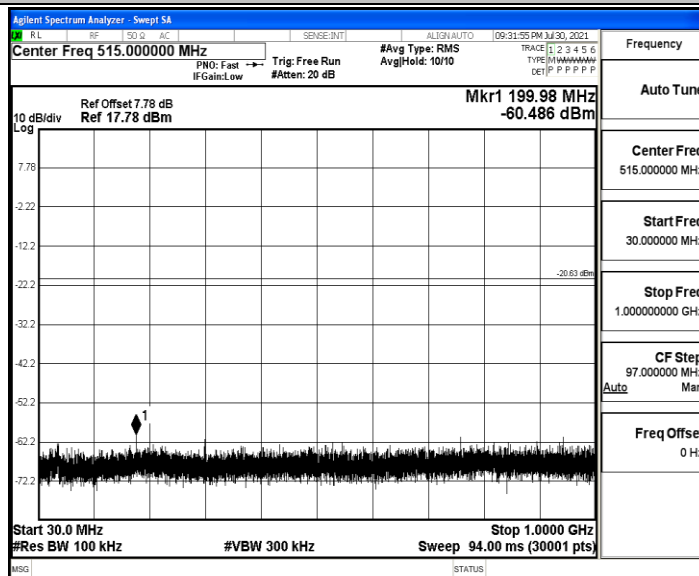




DH5_Ant1_2480_0-Reference

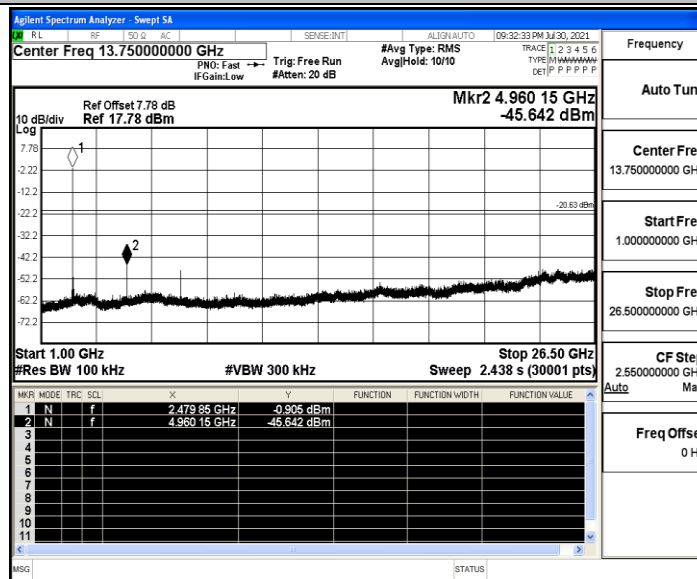


DH5_Ant1_2480_30-1000

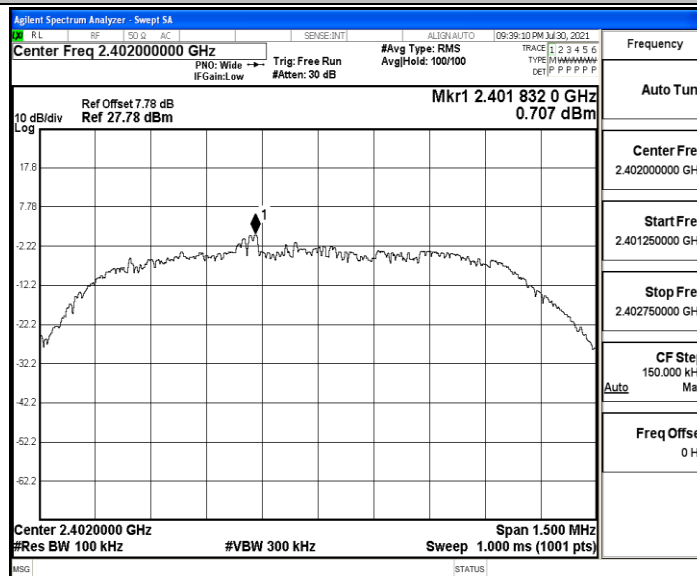




DH5_Ant1_2480_1000~26500

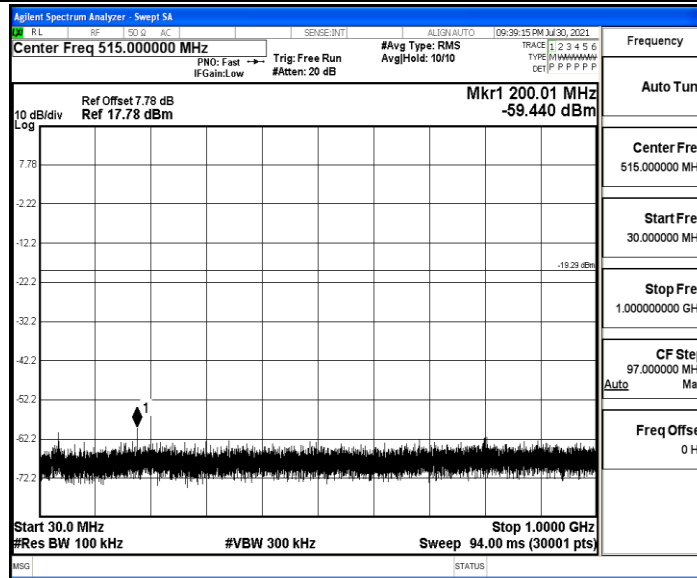


2DH5_Ant1_2402_0~Reference

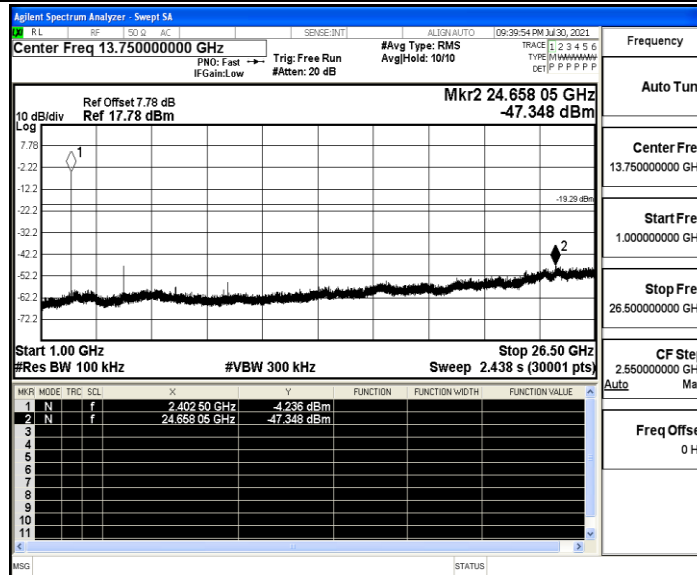




2DH5_Ant1_2402_30~1000

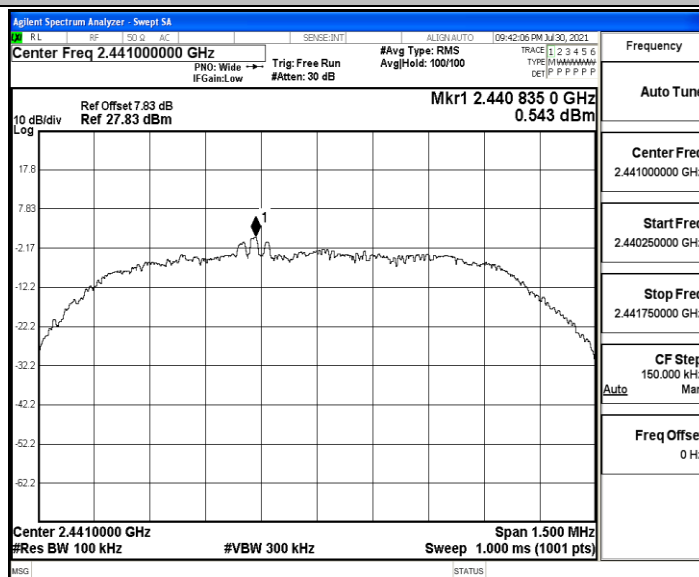


2DH5_Ant1_2402_1000~26500

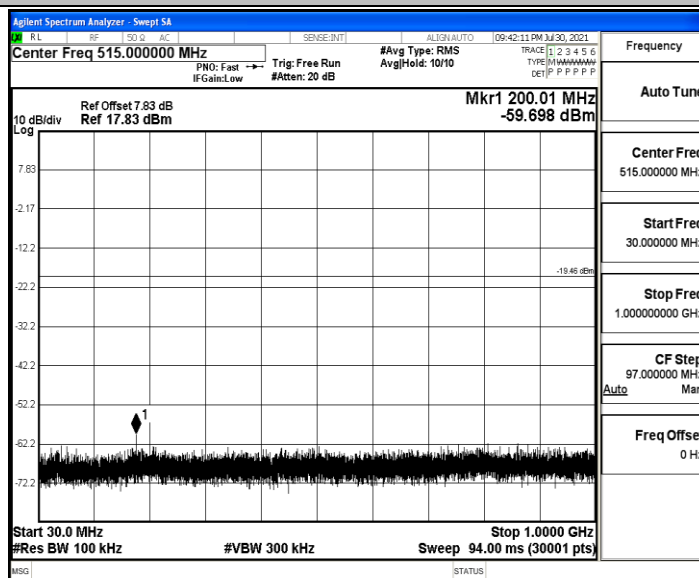


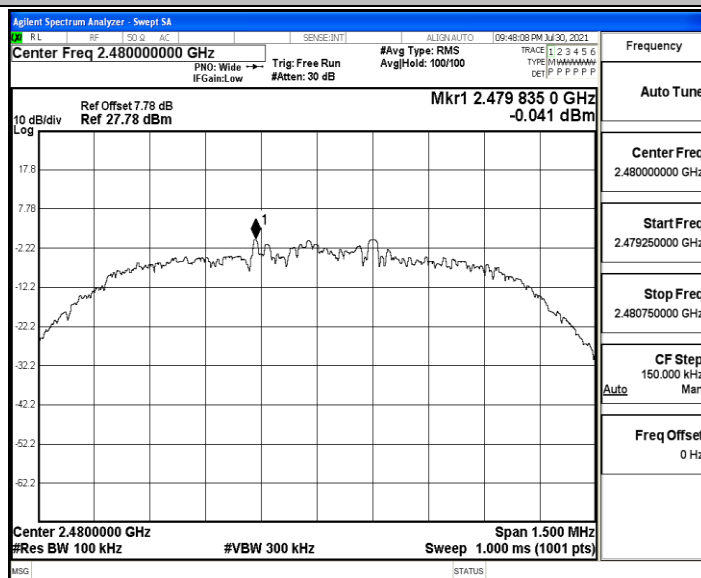
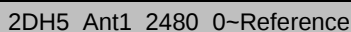
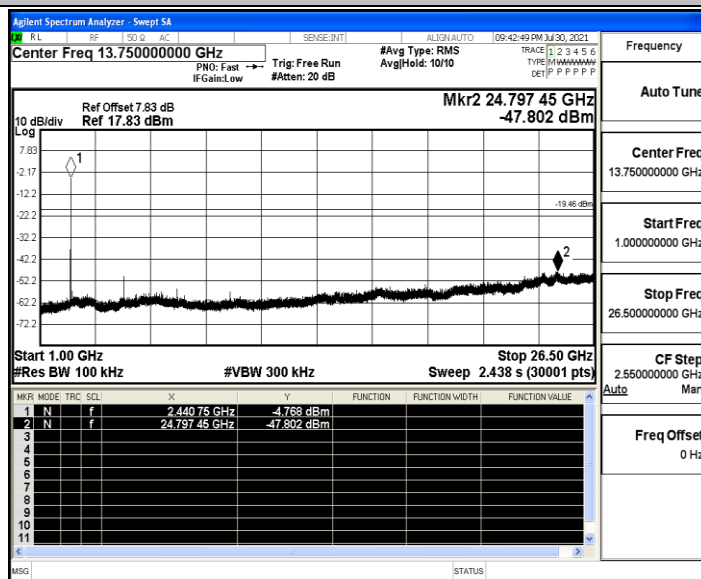
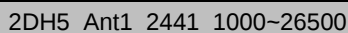


2DH5_Ant1_2441_0~Reference



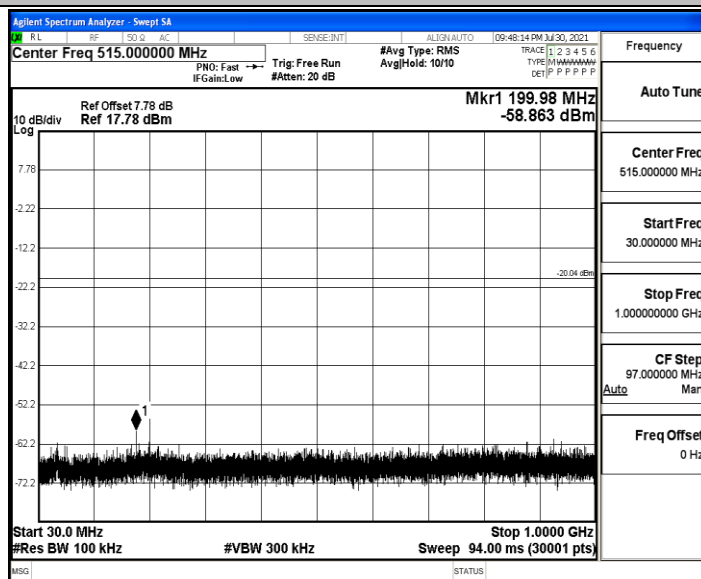
2DH5_Ant1_2441_30~1000



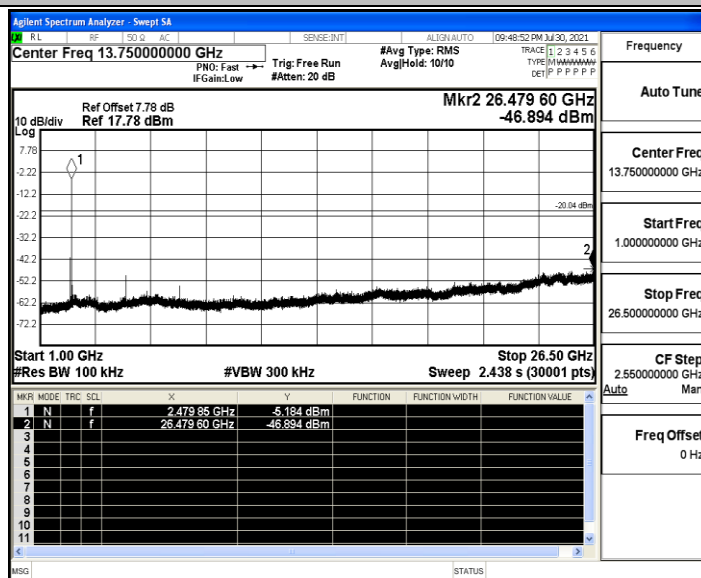




2DH5_Ant1_2480_30~1000



2DH5_Ant1_2480_1000~26500





Appendix 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	-49.03	≤-41.20	48.20	≤54	PASS
				AV	2353.655	-48.46	≤-41.20	48.77	≤54	PASS
				AV	2390.000	-48.51	≤-41.20	48.72	≤54	PASS
				Peak	2310.000	-40.67	≤-21.20	56.56	≤74	PASS
				Peak	2387.360	-37.84	≤-21.20	59.39	≤74	PASS
				Peak	2390.000	-39.16	≤-21.20	58.07	≤74	PASS
		High	2480	AV	2483.500	-44.29	≤-41.20	52.94	≤54	PASS
				AV	2484.000	-43.86	≤-41.20	53.37	≤54	PASS
				AV	2500.000	-58.89	≤-41.20	38.34	≤54	PASS
				Peak	2483.500	-36.53	≤-21.20	60.70	≤74	PASS
				Peak	2484.160	-35.53	≤-21.20	61.70	≤74	PASS
				Peak	2500.000	-40.09	≤-21.20	57.14	≤74	PASS
2DH5	Ant1	Low	2402	AV	2310.000	-48.92	≤-41.20	48.31	≤54	PASS
				AV	2380.850	-48.49	≤-41.20	48.74	≤54	PASS
				AV	2390.000	-48.58	≤-41.20	48.65	≤54	PASS
				Peak	2310.000	-41.32	≤-21.20	55.91	≤74	PASS
				Peak	2351.555	-38.53	≤-21.20	58.70	≤74	PASS
				Peak	2390.000	-40.77	≤-21.20	56.46	≤74	PASS
		High	2480	AV	2483.500	-44.4	≤-41.20	52.83	≤54	PASS
				AV	2483.680	-44.39	≤-41.20	52.84	≤54	PASS
				AV	2500.000	-48.02	≤-41.20	49.21	≤54	PASS
				Peak	2483.500	-36.96	≤-21.20	60.27	≤74	PASS
				Peak	2484.480	-35.83	≤-21.20	61.40	≤74	PASS
				Peak	2500.000	-40.34	≤-21.20	56.89	≤74	PASS
		Low	Hop_2402	Peak	2310.000	-40.58	≤-21.20	56.65	≤74	PASS
				Peak	2333.285	-38.46	≤-21.20	58.77	≤74	PASS
				Peak	2390.000	-40.58	≤-21.20	56.65	≤74	PASS
		High	Hop_2480	Peak	2483.500	-39.57	≤-21.20	57.66	≤74	PASS
				Peak	2494.480	-37.06	≤-21.20	60.17	≤74	PASS
				Peak	2500.000	-38.03	≤-21.20	59.20	≤74	PASS

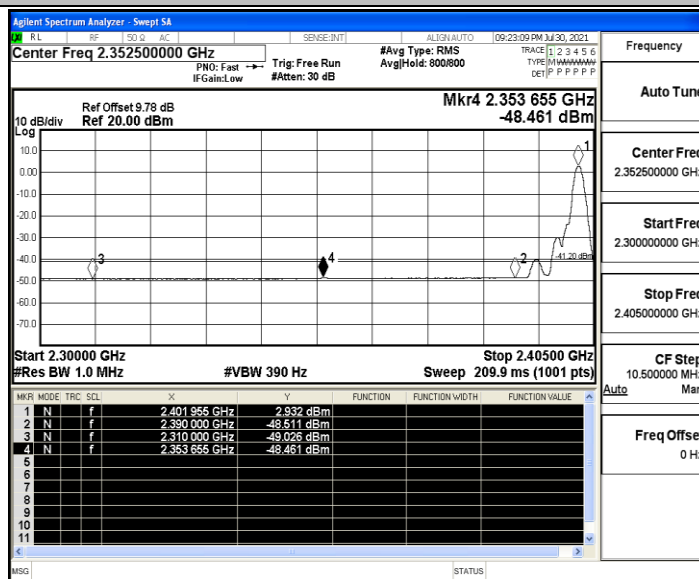
Note:

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.

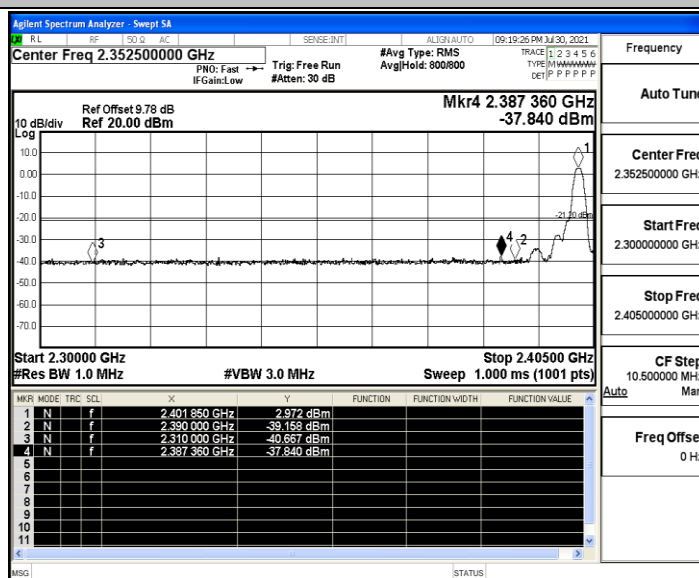


Test Graphs

DH5_Ant1_Low_2402_AV

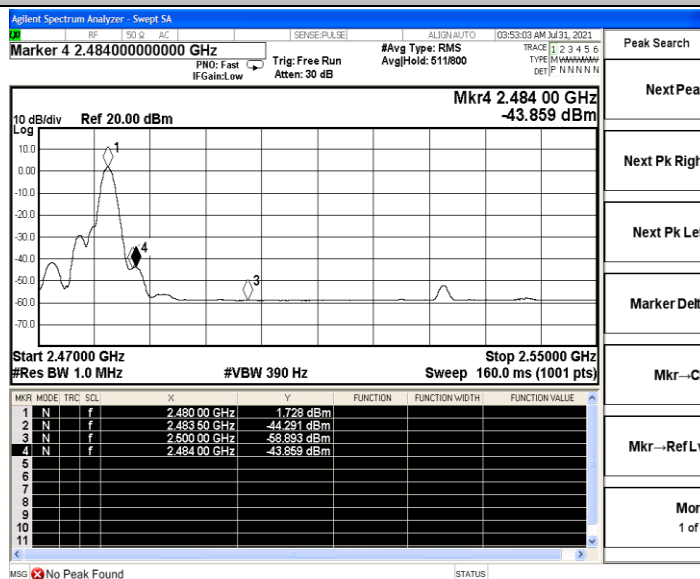


DH5_Ant1_Low_2402_Peak





DH5_Ant1_High_2480_AV



Peak Search

Next Peak

Next Pk Right

Next Pk Left

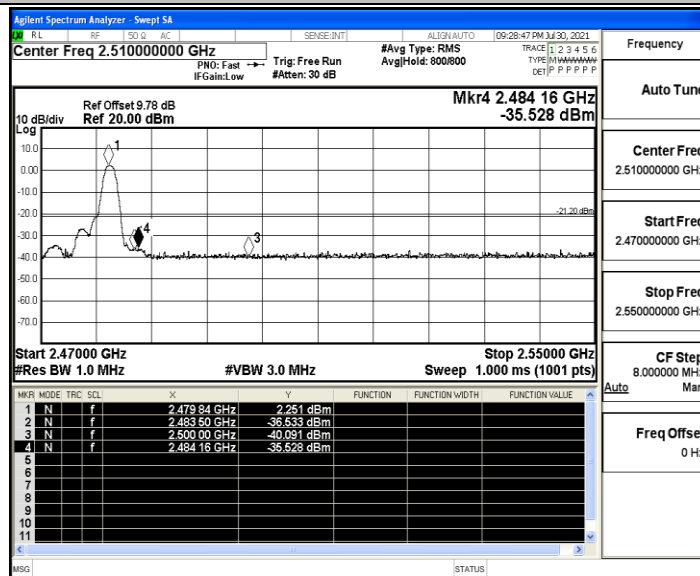
Marker Delta

Mkr--CF

Mkr--Ref Lvl

More
1 of 2

DH5_Ant1_High_2480_Peak



Frequency

Auto Tune

Center Freq
2.510000000 GHz

Start Freq
2.470000000 GHz

Stop Freq
2.550000000 GHz

CF Step
8.000000 MHz

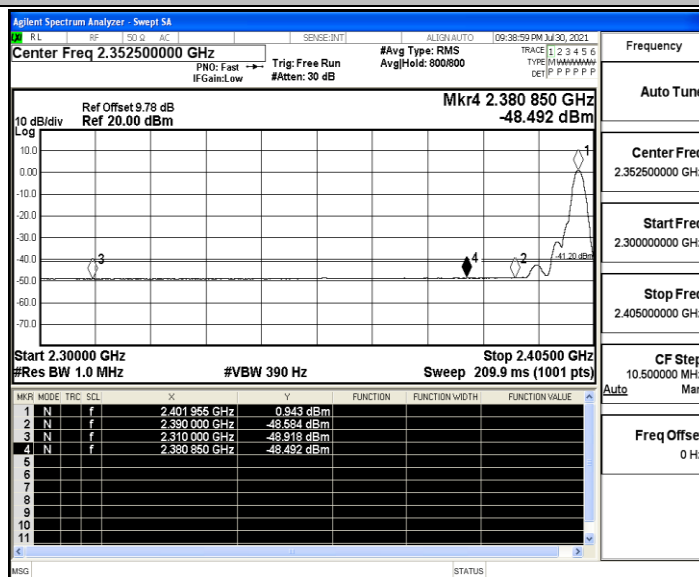
Auto

Man

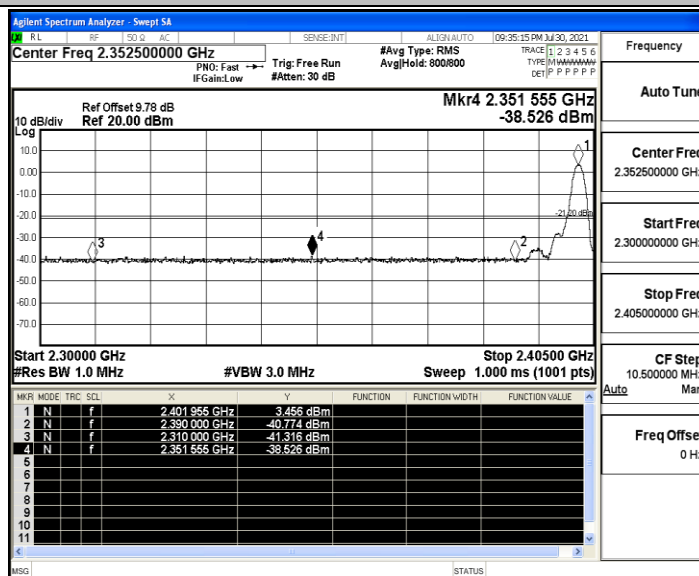
Freq Offset
0 Hz



2DH5_Ant1_Low_2402_AV

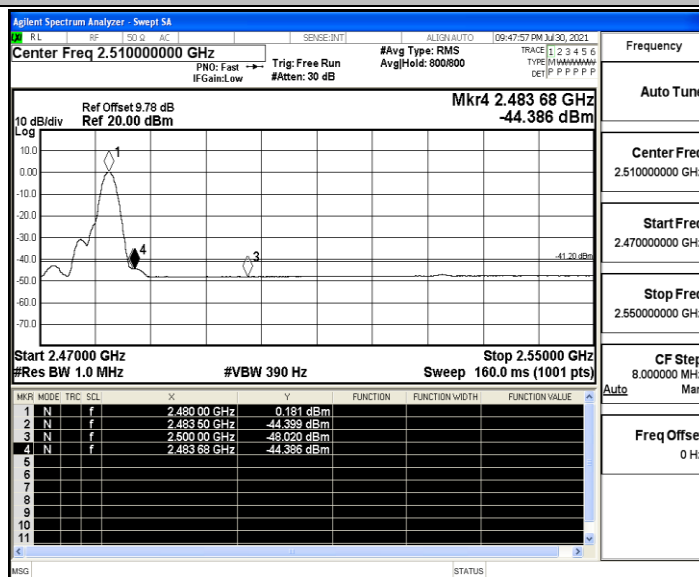


2DH5_Ant1_Low_2402_Peak

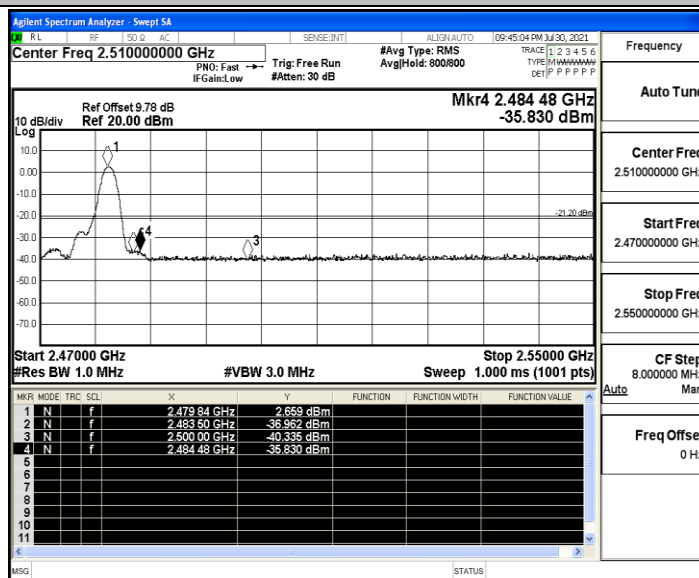




2DH5_Ant1_High_2480_AV

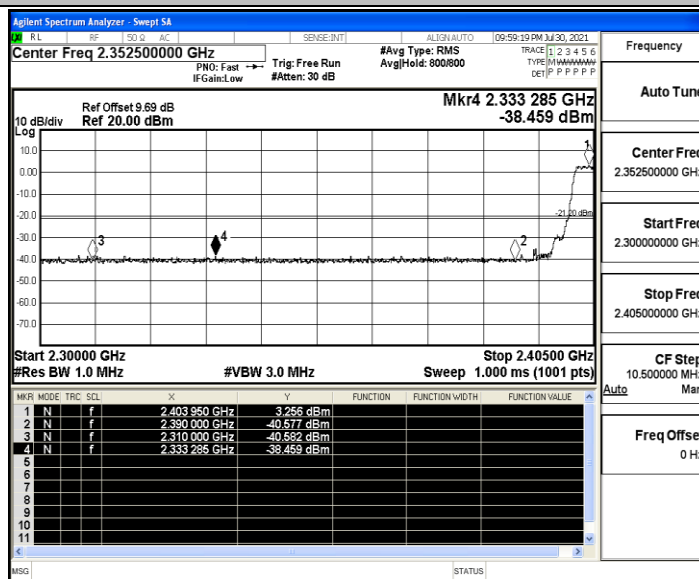


2DH5_Ant1_High_2480_Peak





2DH5_Ant1_Low_Hop_2402_Peak



2DH5_Ant1_High_Hop_2480_Peak

