R:

DH5-Ant1-2402

DH5-Ant1-2441

DH5-Ant1-2480

2DH5-Ant1-2402

2DH5-Ant1-2441

2DH5-Ant1-2480

3DH5-Ant1-2402

3DH5-Ant1-2441

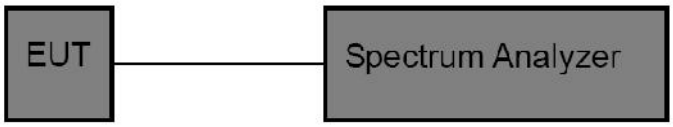
3DH5-Ant1-2480

10 Carrier Frequency Separation Test

10.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>25KHz or >two-thirds of the 20 dB bandwidth

10.2 Test Setup



10.3 Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer settings:

1. Span= Wide enough to capture the peaks of two adjacent channels
2. Set the RBW = 300 kHz.
3. Set the VBW = 300 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

10.4 Test Data

Test Item	:	Frequency Separation	Test Mode	:	CH Low ~ CH High
Test Voltage	:	3.8V	Temperature	:	24.5℃
Test Result	:	PASS	Humidity	:	55%RH

L：

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.66	≥0.638	PASS
2DH5	Ant1	Hop	0.996	≥0.890	PASS
3DH5	Ant1	Hop	1.316	≥0.860	PASS

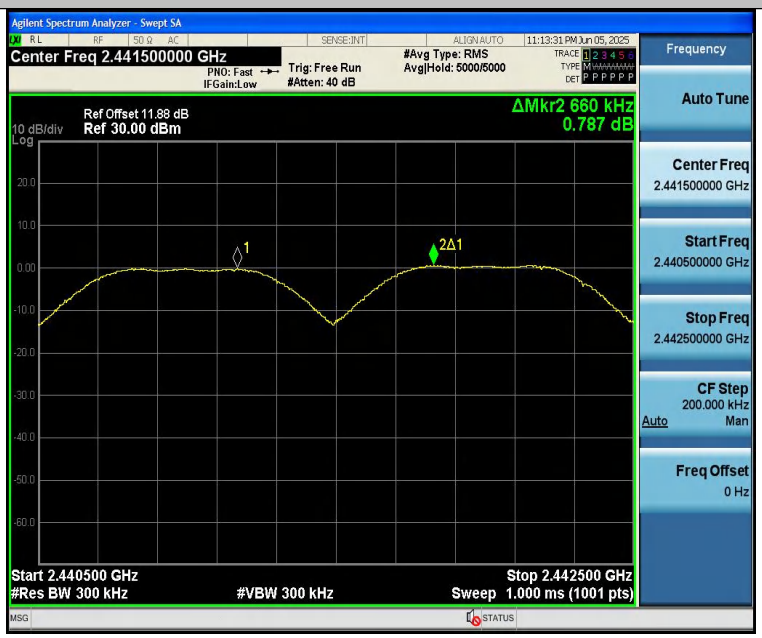
R：

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.008	≥0.642	PASS
2DH5	Ant1	Hop	0.998	≥0.882	PASS
3DH5	Ant1	Hop	1.304	≥0.888	PASS

Test Graphs:

L：

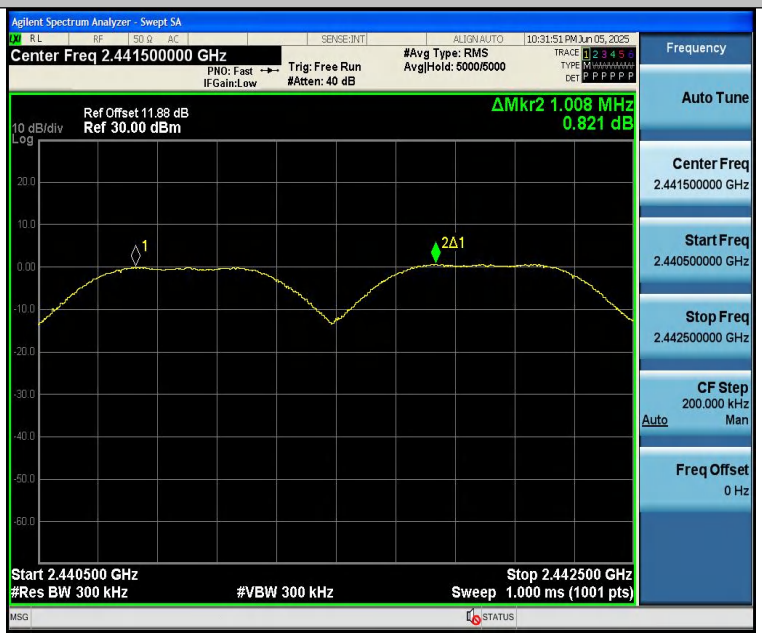
DH5-Ant1-Hop-PASS



2DH5-Ant1-Hop-PASS

3DH5-Ant1-Hop-PASS

R:

DH5-Ant1-Hop-PASS

2DH5-Ant1-Hop-PASS
3DH5-Ant1-Hop-PASS

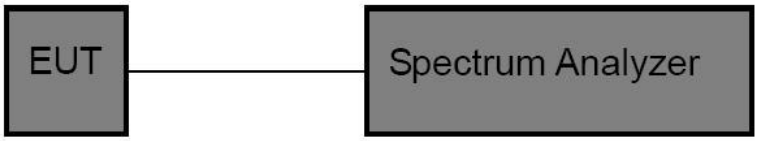
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441500000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 5000/5000
10:39:44 PM Jun 05, 2025
Ref Offset 11.88 dB
10 dB/div
Ref 30.00 dBm
Log
ΔMkr2 1.304 MHz
0.730 dB
Start 2.440500 GHz
#Res BW 300 kHz
#VBW 300 kHz
Stop 2.442500 GHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
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

11 Number of Hopping Channel Test

11.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>15 channels

11.2 Test Setup



11.3 Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer setting:

1. Span= the frequency band of operation
2. Set the RBW = 300kHz.
3. Set the VBW = 300kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

11.4 Test Data

Test Item	:	Number of Hopping Frequency	Test Mode	:	CH Low ~ CH High
Test Voltage	:	3.8V	Temperature	:	24.5℃
Test Result	:	PASS	Humidity	:	55%RH

L:

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

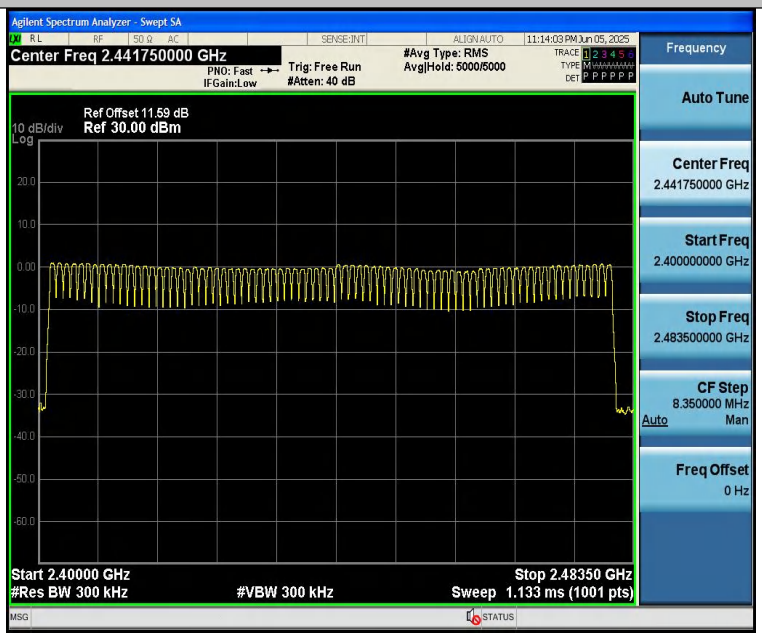
R:

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

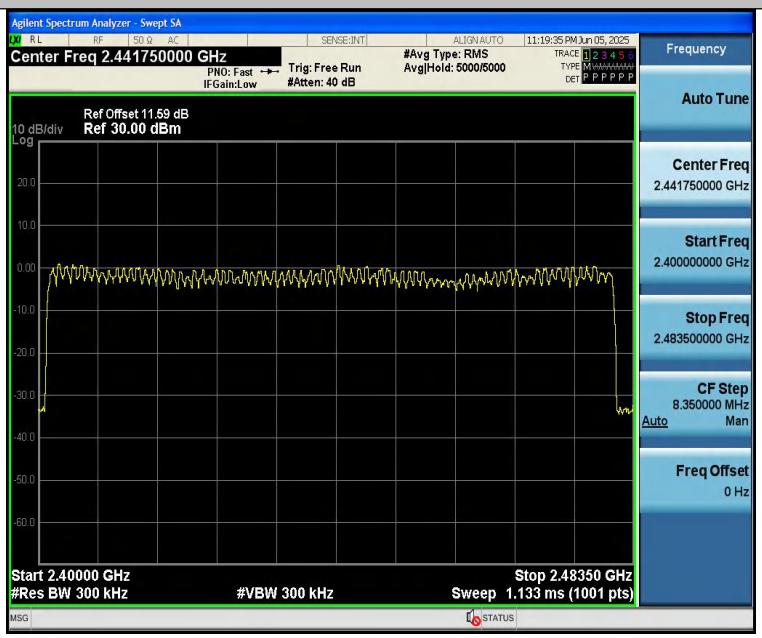
Test Graphs:

L:

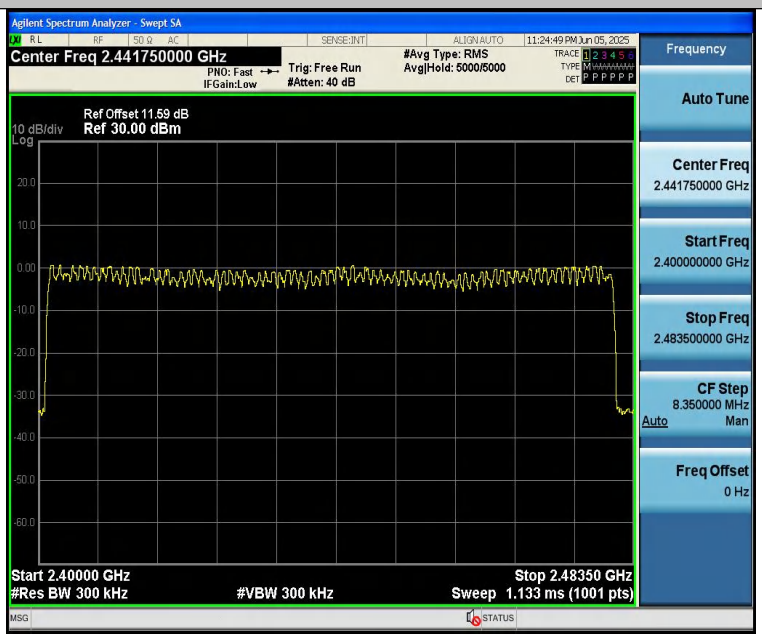
DH5-Ant1-Hop-PASS



2DH5-Ant1-Hop-PASS

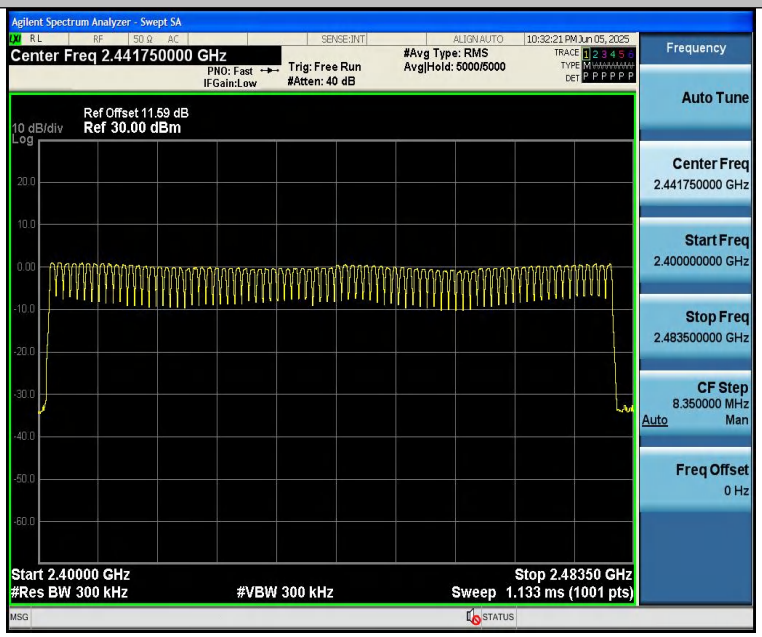


3DH5-Ant1-Hop-PASS

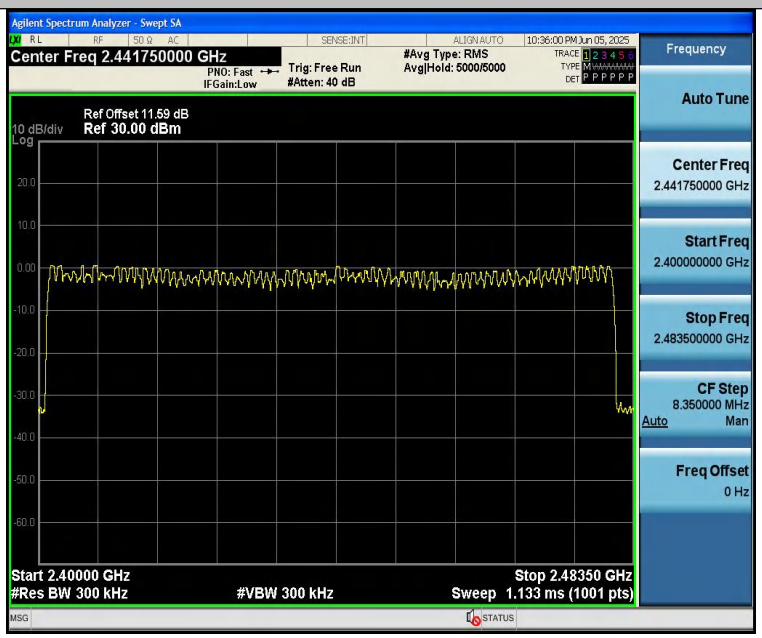


R:

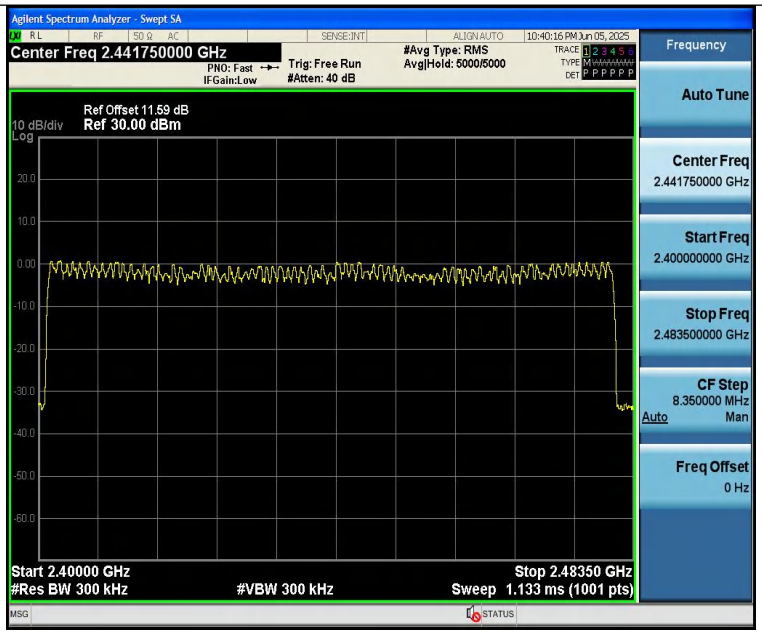
DH5-Ant1-Hop-PASS



2DH5-Ant1-Hop-PASS



3DH5-Ant1-Hop-PASS

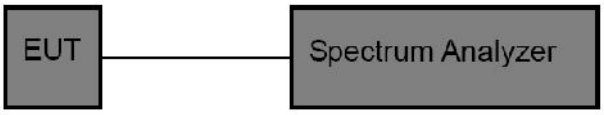

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 5000/5000
10:40:16 PM Jun 05, 2025
Ref Offset 11.59 dB
10 dB/div
Ref 30.00 dBm
Log
Start 2.40000 GHz
#Res BW 300 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 1.133 ms (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

12 Dwell Time Test

12.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	0.4 sec

12.2 Test Setup



12.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span= zero span, centered on a hopping channel
2. Set the RBW = 1 MHz.
3. Set the VBW = 3 MHz.
4. Sweep time = as necessary to capture the entire dwell time per hopping channel.
5. Detector function = peak.
6. Trace mode = clear write.
7. Allow trace to fully stabilize.

12.4 Test Data

Test Item	:	Time of Occupancy	Test Mode	:	CH Low ~ CH High
Test Voltage	:	3.8V	Temperature	:	24.5℃
Test Result	:	PASS	Humidity	:	55%RH

L:

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.910	106.67	0.31	≤0.4	PASS
2DH5	Ant1	Hop	2.914	106.67	0.311	≤0.4	PASS
3DH5	Ant1	Hop	2.917	106.67	0.311	≤0.4	PASS
DH1	Ant1	Hop	0.404	320	0.129	≤0.4	PASS
2DH1	Ant1	Hop	0.415	320	0.133	≤0.4	PASS
3DH1	Ant1	Hop	0.417	320	0.133	≤0.4	PASS
DH3	Ant1	Hop	1.661	160	0.266	≤0.4	PASS
2DH3	Ant1	Hop	1.667	160	0.267	≤0.4	PASS
3DH3	Ant1	Hop	1.667	160	0.267	≤0.4	PASS

R:

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.910	106.67	0.31	≤0.4	PASS
2DH5	Ant1	Hop	2.914	106.67	0.311	≤0.4	PASS
3DH5	Ant1	Hop	2.917	106.67	0.311	≤0.4	PASS
DH1	Ant1	Hop	0.405	320	0.13	≤0.4	PASS
2DH1	Ant1	Hop	0.414	320	0.132	≤0.4	PASS
3DH1	Ant1	Hop	0.417	320	0.133	≤0.4	PASS
DH3	Ant1	Hop	1.662	160	0.266	≤0.4	PASS
2DH3	Ant1	Hop	1.666	160	0.267	≤0.4	PASS
3DH3	Ant1	Hop	1.666	160	0.267	≤0.4	PASS

Note:

1.DH1/2DH1/3DH1 Dwell Time: Reading * (1600/2)*31.6/(channel number).

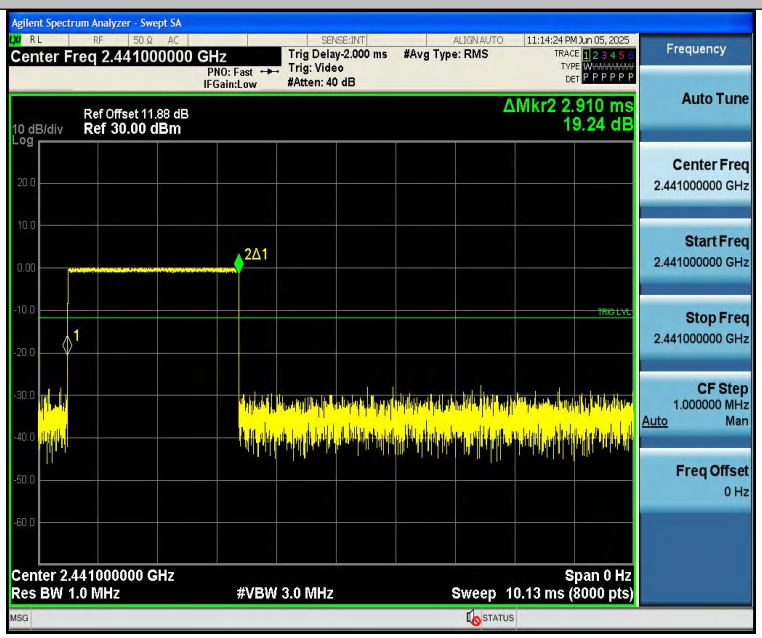
2.DH3/2DH3/3DH3 Dwell Time: Reading * (1600/4)*31.6/(channel number).

3.DH5/2DH5/3DH5 Dwell Time: Reading * (1600/6)*31.6/(channel number).

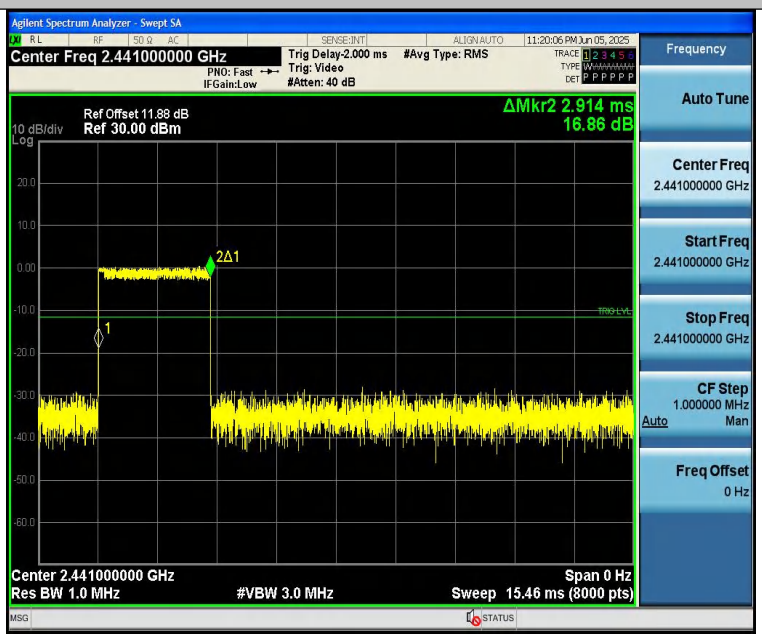
Test Graphs:

L：

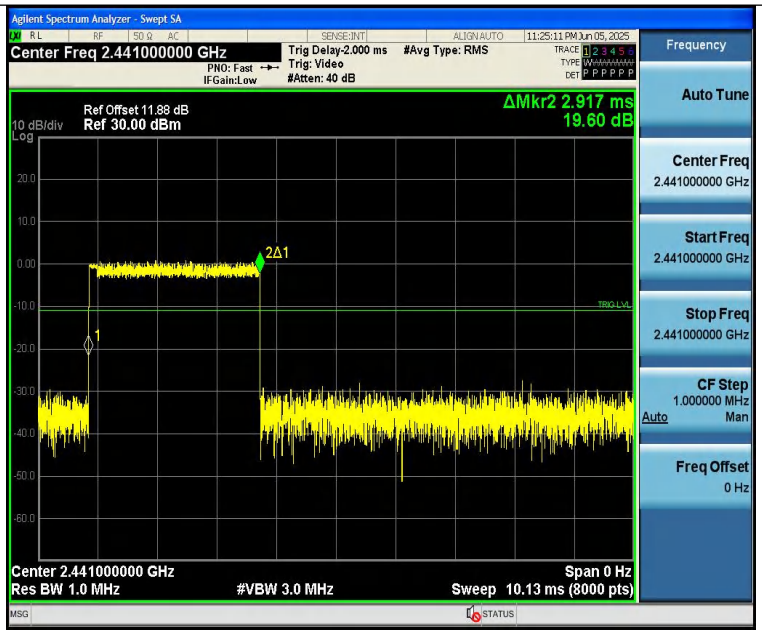
DH5-Ant1-Hop-PASS



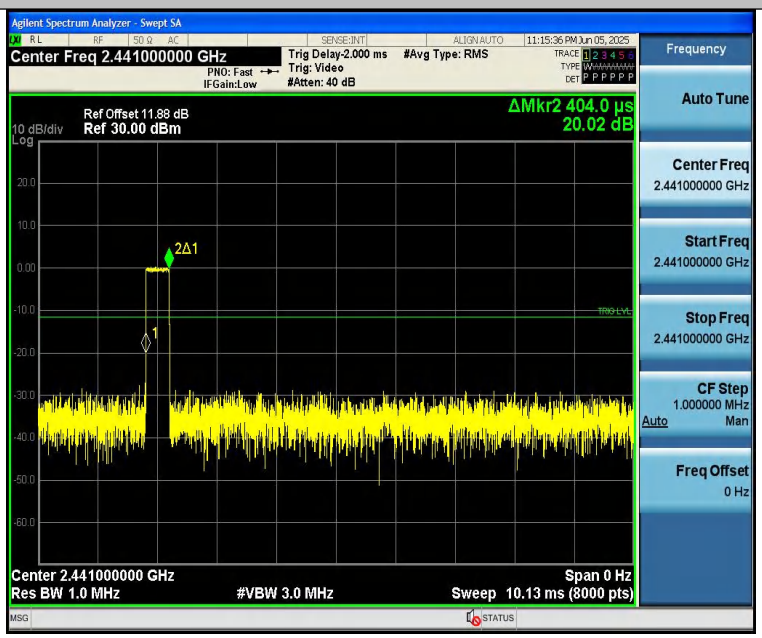
2DH5-Ant1-Hop-PASS



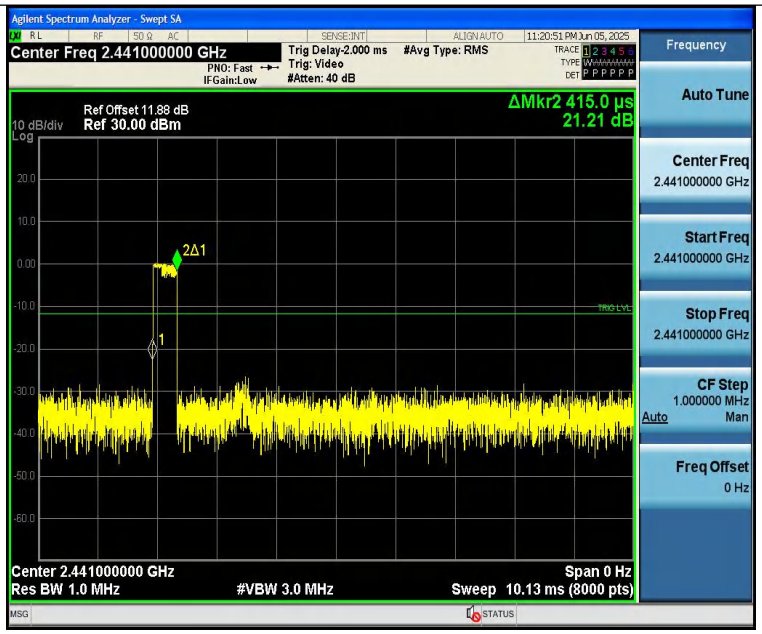
3DH5-Ant1-Hop-PASS



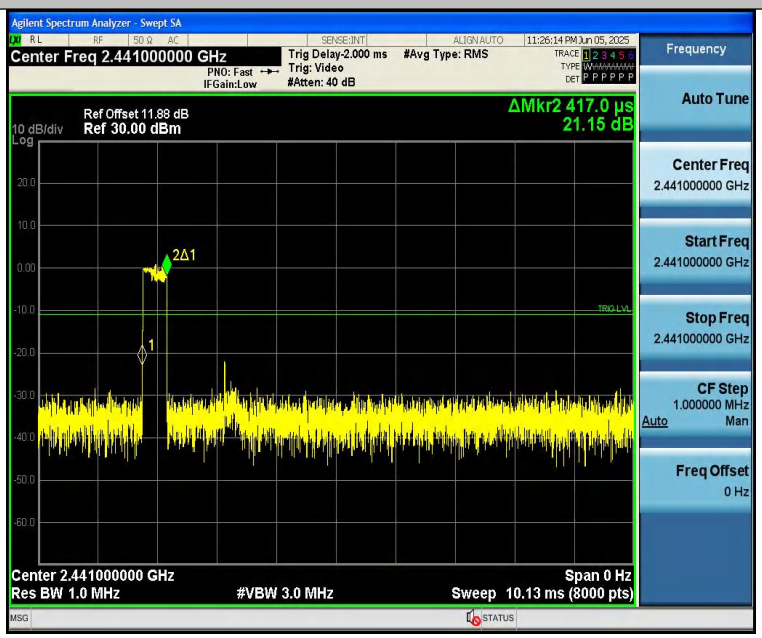
DH1-Ant1-Hop-PASS



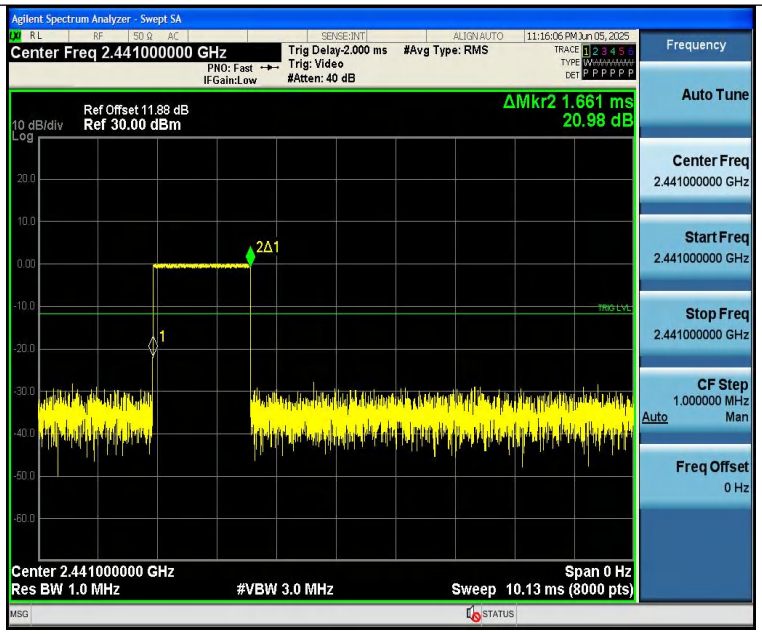
2DH1-Ant1-Hop-PASS



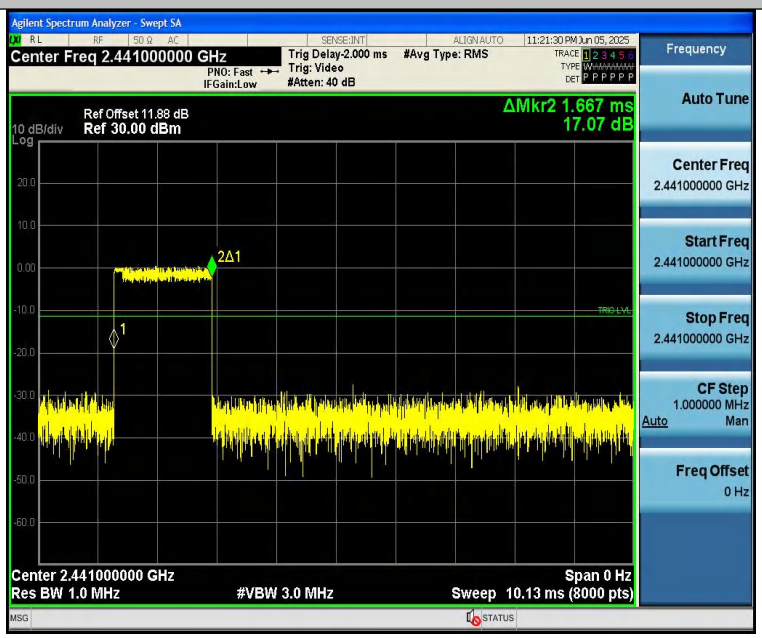
3DH1-Ant1-Hop-PASS



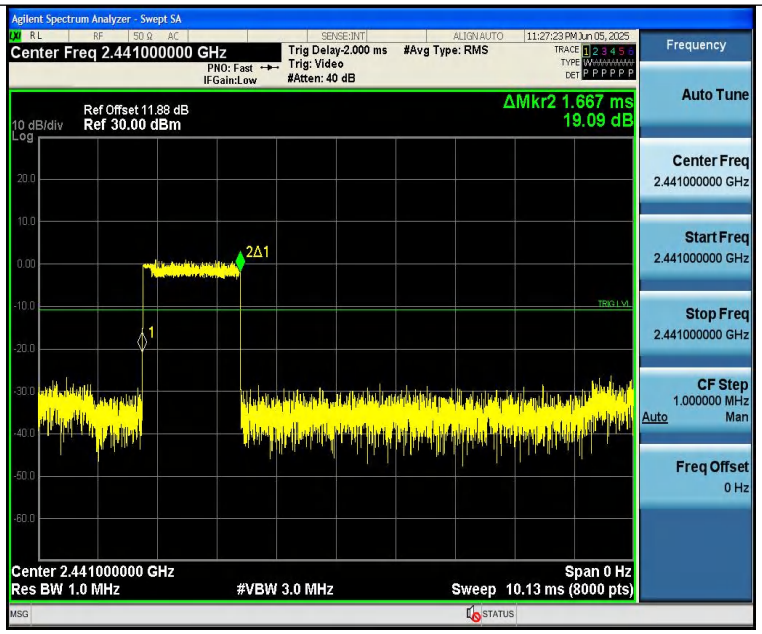
DH3-Ant1-Hop-PASS



2DH3-Ant1-Hop-PASS



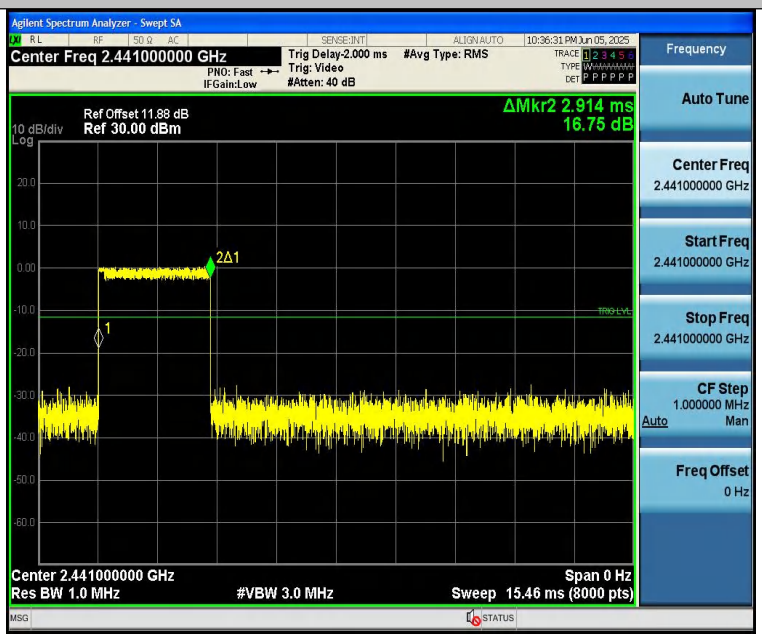
3DH3-Ant1-Hop-PASS



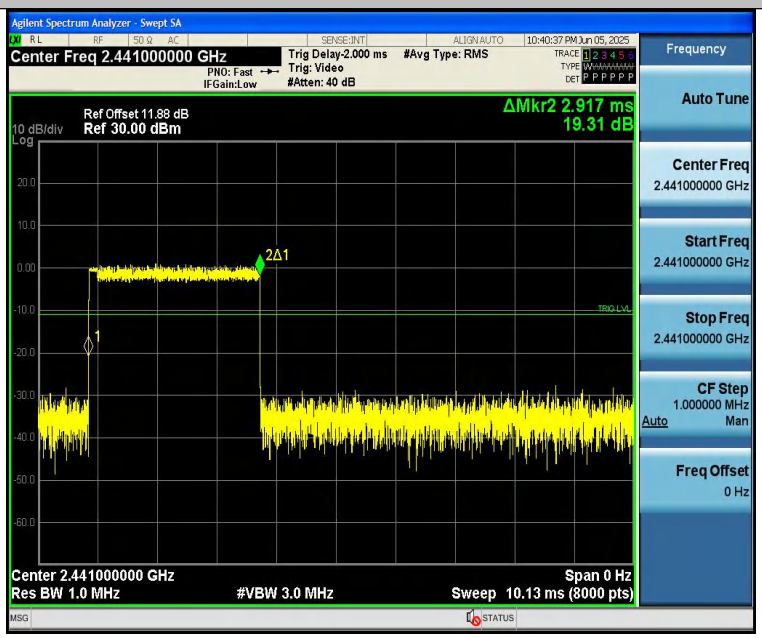
R:

DH5-Ant1-Hop-PASS

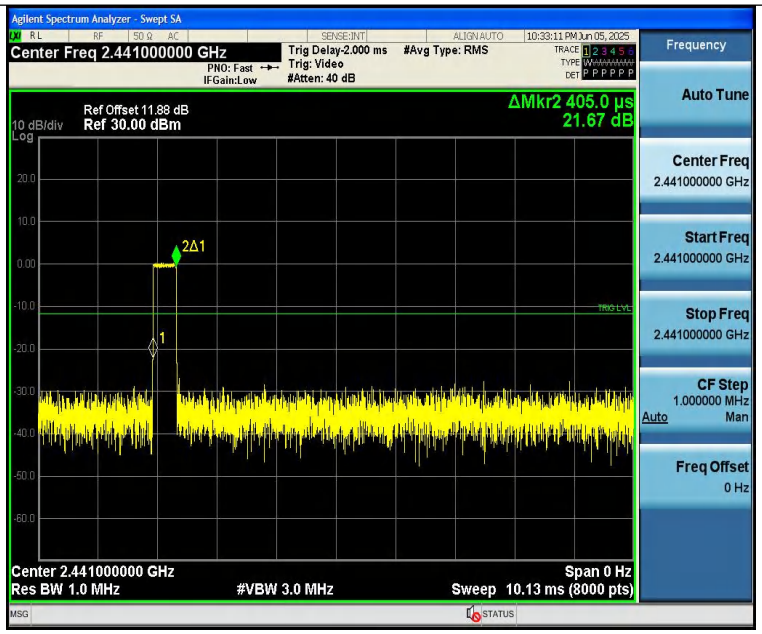
2DH5-Ant1-Hop-PASS



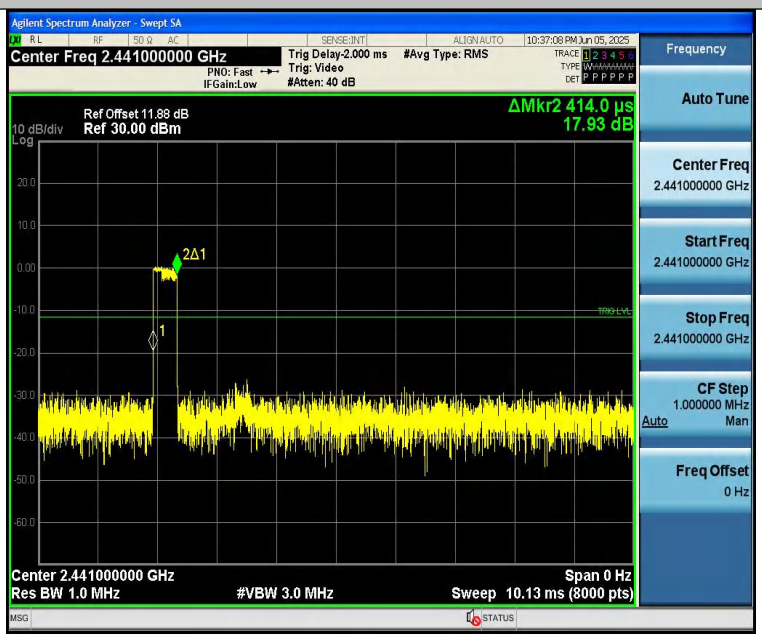
3DH5-Ant1-Hop-PASS



DH1-Ant1-Hop-PASS

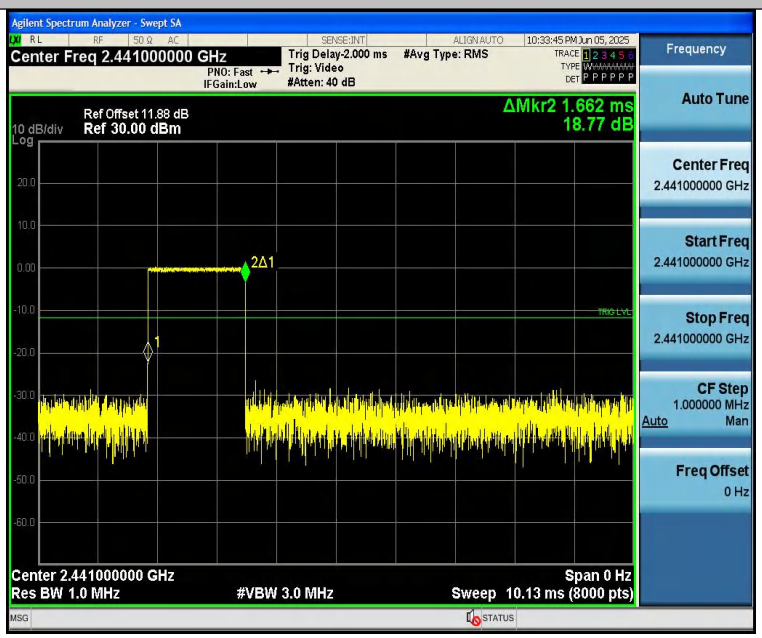


2DH1-Ant1-Hop-PASS

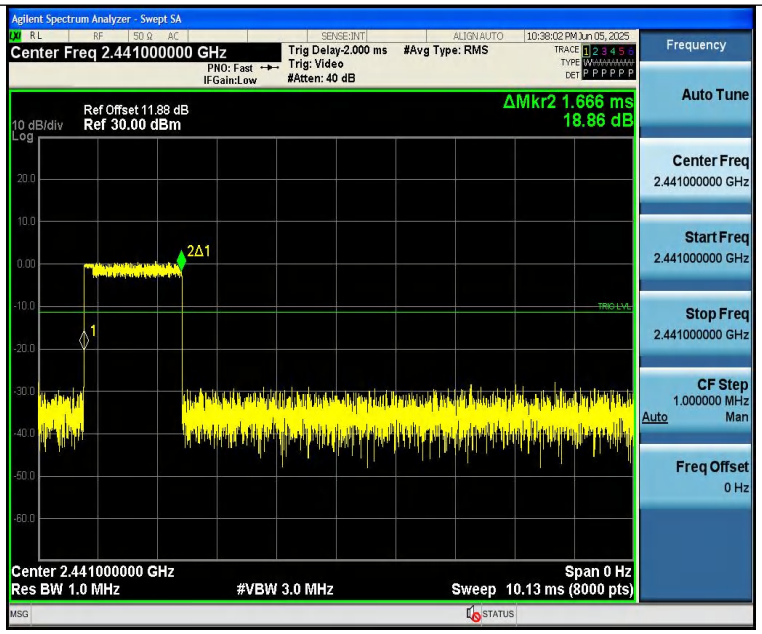


3DH1-Ant1-Hop-PASS

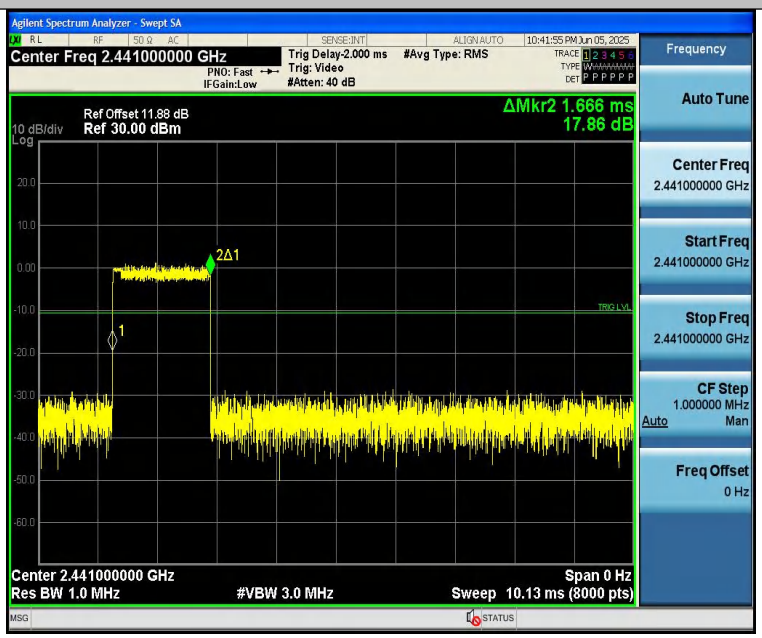
DH3-Ant1-Hop-PASS



2DH3-Ant1-Hop-PASS



3DH3-Ant1-Hop-PASS

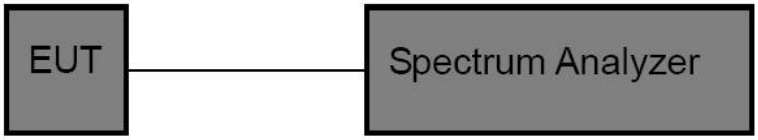


13 100kHz Bandwidth of Frequency Band Edge Requirement

13.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

13.2 Test Setup



13.3 Test Procedure

The EUT must have its hopping/Non-hopping function enabled. Using the following spectrum analyzer setting:

1. Set the RBW = 100kHz.

2. Set the VBW = 300kHz.

3. Sweep time = auto couple.

4. Detector function = peak.

5. Trace mode = max hold.

6. Allow trace to fully stabilize.

13.4 Test Data

Test Item	:	Band edge	Test Mode	:	CH Low ~ CH High
Test Voltage	:	3.8V	Temperature	:	24.5℃
Test Result	:	PASS	Humidity	:	55%RH

L：

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	0.95	-46.33	≤-19.05	PASS
DH5	Ant1	High	2480	0.36	-45.46	≤-19.64	PASS
DH5	Ant1	Low	Hop_2402	0.28	-46.24	≤-19.72	PASS
DH5	Ant1	High	Hop_2480	-0.05	-45.86	≤-20.05	PASS
2DH5	Ant1	Low	2402	-2.00	-45.9	≤-22	PASS
2DH5	Ant1	High	2480	0.31	-46.36	≤-19.69	PASS
2DH5	Ant1	Low	Hop_2402	-3.75	-46.65	≤-23.75	PASS
2DH5	Ant1	High	Hop_2480	-1.80	-45.88	≤-21.8	PASS
3DH5	Ant1	Low	2402	0.80	-46.45	≤-19.2	PASS
3DH5	Ant1	High	2480	0.36	-46.28	≤-19.64	PASS
3DH5	Ant1	Low	Hop_2402	0.35	-47.22	≤-19.66	PASS
3DH5	Ant1	High	Hop_2480	-1.71	-45.7	≤-21.71	PASS

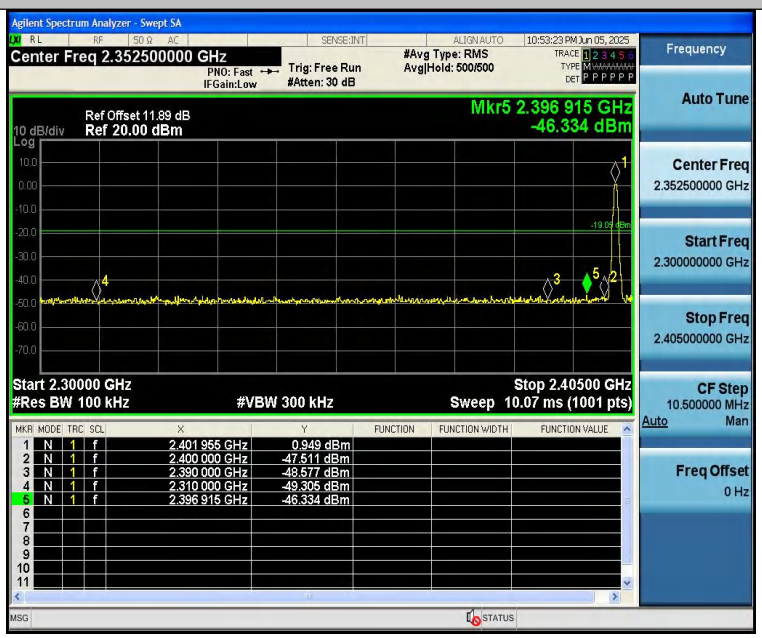
R:

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	0.67	-45.94	≤-19.33	PASS
DH5	Ant1	High	2480	0.32	-45.66	≤-19.68	PASS
DH5	Ant1	Low	Hop_2402	0.33	-46.19	≤-19.67	PASS
DH5	Ant1	High	Hop_2480	0.20	-46.17	≤-19.8	PASS
2DH5	Ant1	Low	2402	0.81	-45.62	≤-19.19	PASS
2DH5	Ant1	High	2480	0.35	-45.16	≤-19.65	PASS
2DH5	Ant1	Low	Hop_2402	-2.53	-46.86	≤-22.53	PASS
2DH5	Ant1	High	Hop_2480	0.21	-45.98	≤-19.79	PASS
3DH5	Ant1	Low	2402	0.86	-45.77	≤-19.14	PASS
3DH5	Ant1	High	2480	0.37	-45.69	≤-19.63	PASS
3DH5	Ant1	Low	Hop_2402	-2.02	-46.9	≤-22.02	PASS
3DH5	Ant1	High	Hop_2480	0.59	-45.35	≤-19.41	PASS

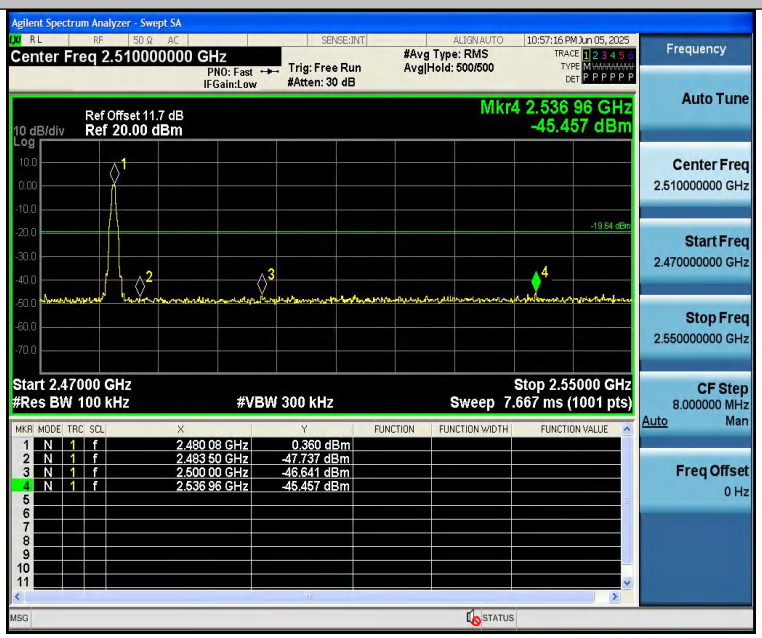
Test Graphs:

L：

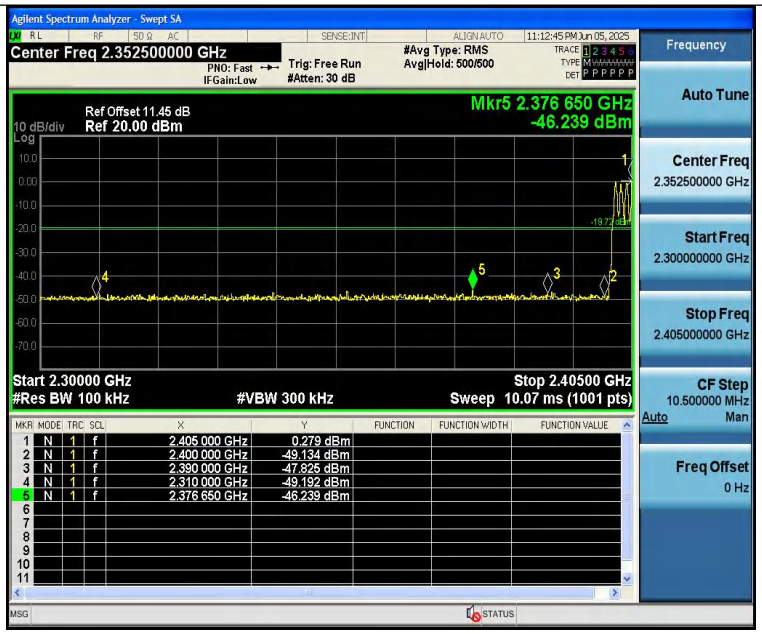
DH5-Ant1-2402-PASS



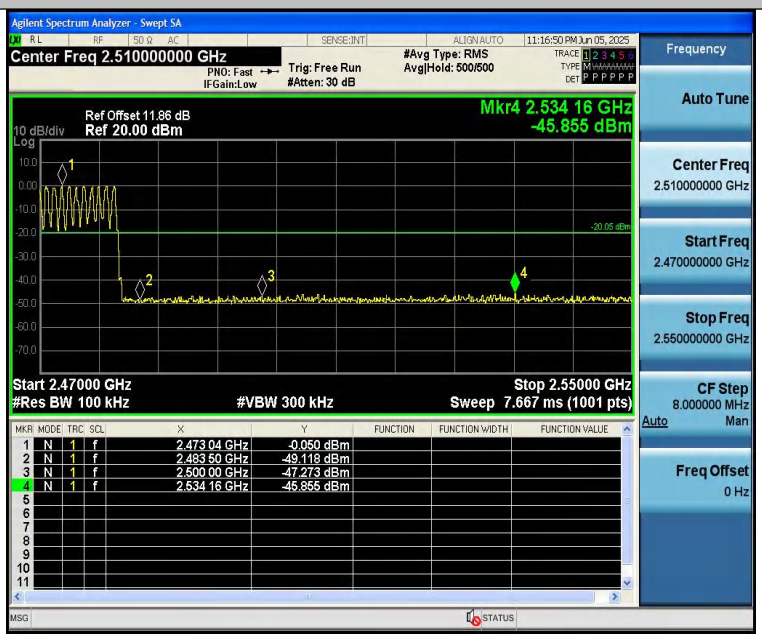
DH5-Ant1-2480-PASS



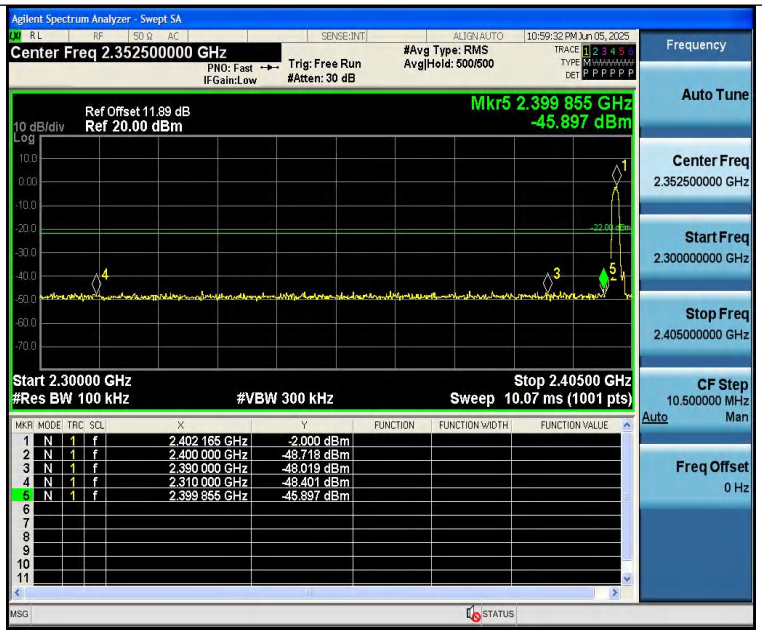
DH5-Ant1-Hop_2402-PASS



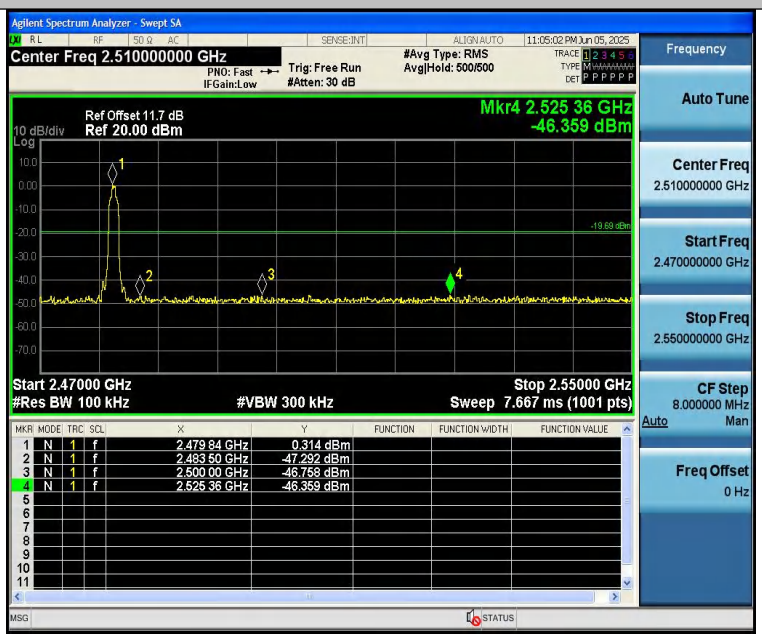
DH5-Ant1-Hop_2480-PASS



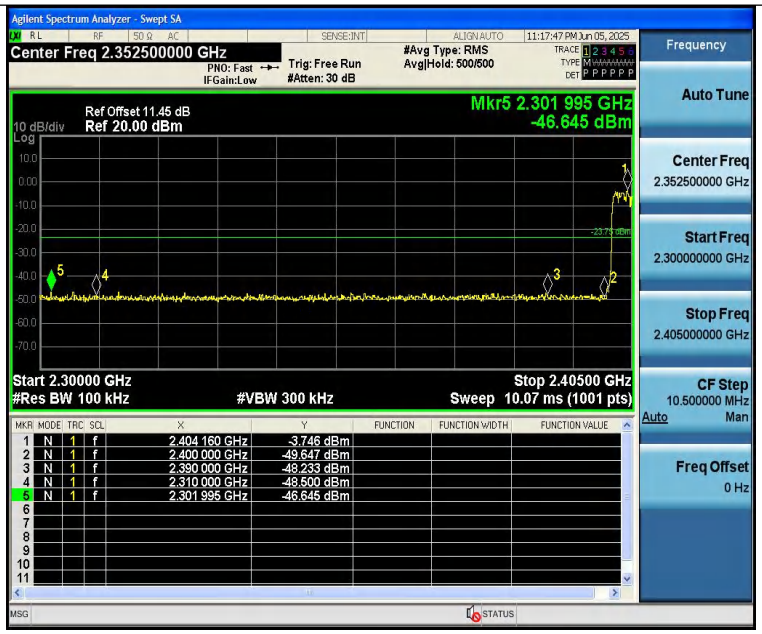
2DH5-Ant1-2402-PASS



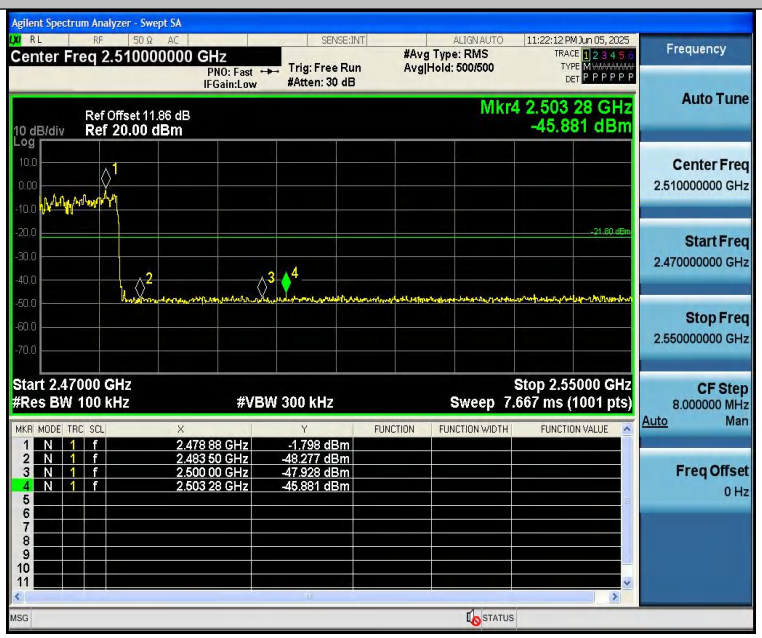
2DH5-Ant1-2480-PASS



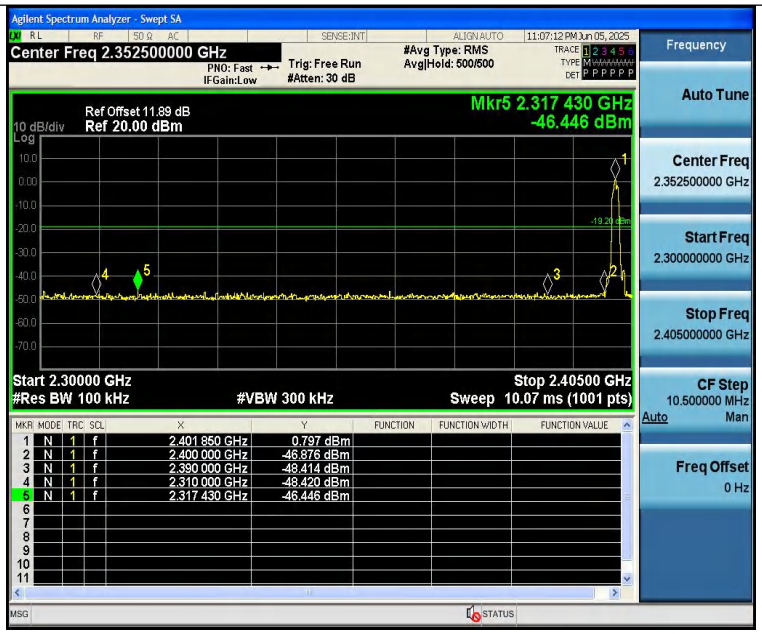
2DH5-Ant1-Hop_2402-PASS



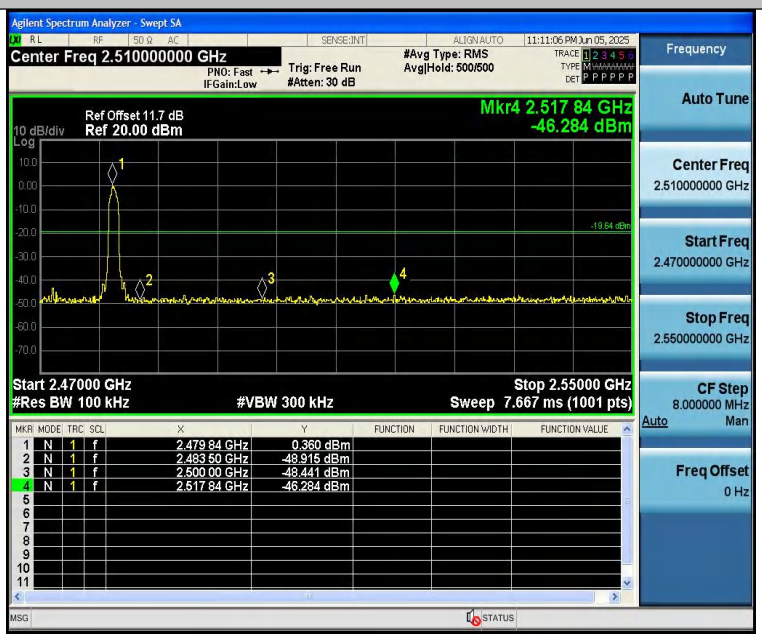
2DH5-Ant1-Hop_2480-PASS



3DH5-Ant1-2402-PASS



3DH5-Ant1-2480-PASS



3DH5-Ant1-Hop_2402-PASS