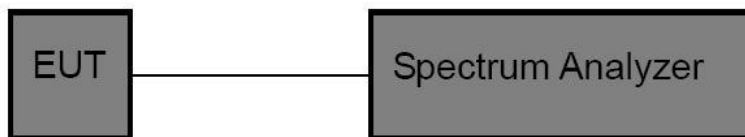


9 20DB Occupy Bandwidth Test

9.1 Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)
---------------	------------------------------------

9.2 Test Setup



9.3 Test Procedure

Using the following spectrum analyzer settings:

1. Span= approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.
2. Set the RBW = 30 kHz.
3. Set the VBW = 100 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

9.4 Test Data

Test Item	:	20dB BW	Test Mode	:	CH Low ~ CH High
Test Voltage	:	3.7V	Temperature	:	24.5°C
Test Result	:	PASS	Humidity	:	55%RH



L:

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.963	2401.505	2402.468	---	---
DH5	Ant1	2441	0.963	2440.505	2441.468	---	---
DH5	Ant1	2480	0.960	2479.508	2480.468	---	---
2DH5	Ant1	2402	1.281	2401.340	2402.621	---	---
2DH5	Ant1	2441	1.296	2440.337	2441.633	---	---
2DH5	Ant1	2480	1.284	2479.340	2480.624	---	---
3DH5	Ant1	2402	1.353	2401.289	2402.642	---	---
3DH5	Ant1	2441	1.323	2440.316	2441.639	---	---
3DH5	Ant1	2480	1.293	2479.337	2480.630	---	---

R:

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.951	2401.508	2402.459	---	---
DH5	Ant1	2441	0.957	2440.508	2441.465	---	---
DH5	Ant1	2480	0.957	2479.508	2480.465	---	---
2DH5	Ant1	2402	1.281	2401.343	2402.624	---	---
2DH5	Ant1	2441	1.347	2440.298	2441.645	---	---
2DH5	Ant1	2480	1.281	2479.343	2480.624	---	---
3DH5	Ant1	2402	1.320	2401.310	2402.630	---	---
3DH5	Ant1	2441	1.293	2440.331	2441.624	---	---
3DH5	Ant1	2480	1.245	2479.349	2480.594	---	---



Test Graphs:

L:

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



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



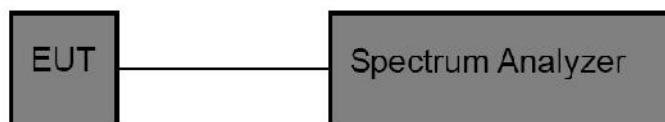


10 Carrier Frequency Separation Test

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	:	3.7V	Temperature	:	24.5°C
Test Result	:	PASS	Humidity	:	55%RH

L:

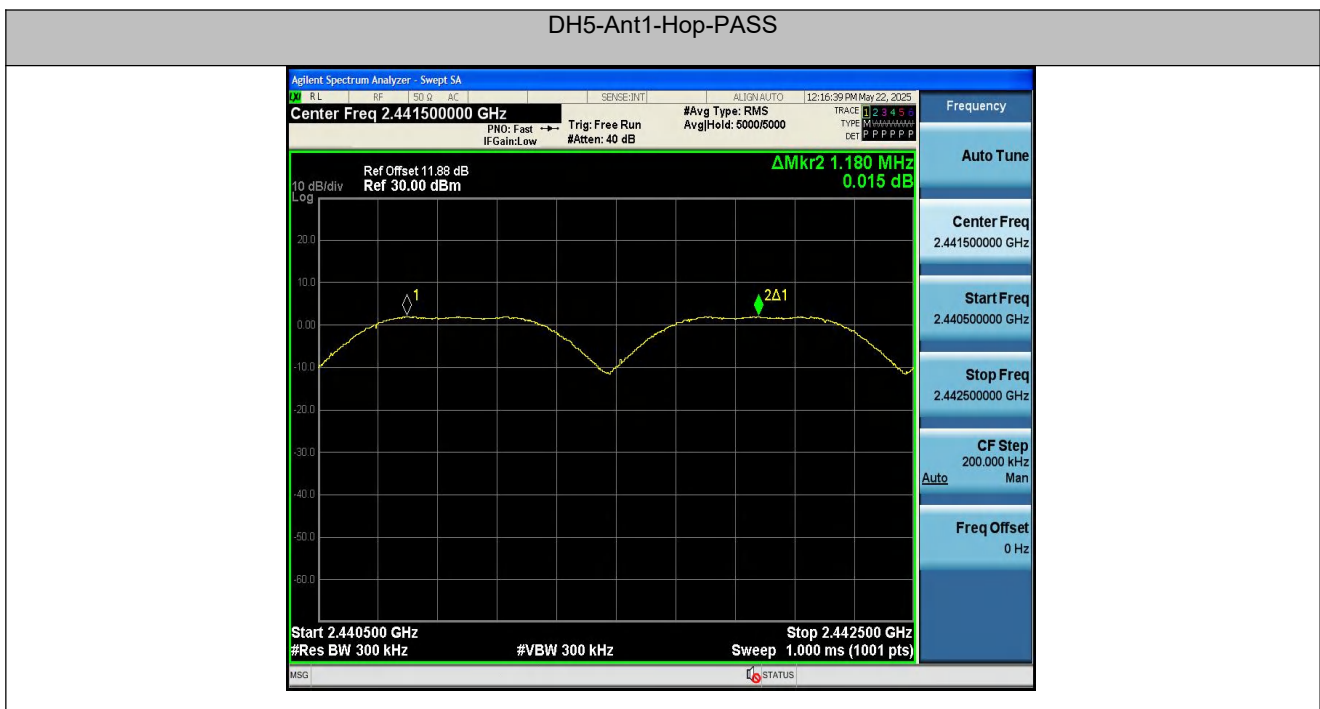
TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.18	≥0.642	PASS
2DH5	Ant1	Hop	1.012	≥0.864	PASS
3DH5	Ant1	Hop	1.002	≥0.902	PASS

R:

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.322	≥0.638	PASS
2DH5	Ant1	Hop	1.02	≥0.898	PASS
3DH5	Ant1	Hop	1.15	≥0.880	PASS

Test Graphs:

L:





2DH5-Ant1-Hop-PASS



3DH5-Ant1-Hop-PASS





R:

DH5-Ant1-Hop-PASS



2DH5-Ant1-Hop-PASS



3DH5-Ant1-Hop-PASS



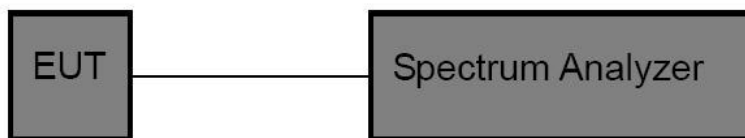


11 Number of Hopping Channel Test

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	: 3.7V	Temperature	: 24.5°C
Test Result	: PASS	Humidity	: 55%RH

L:

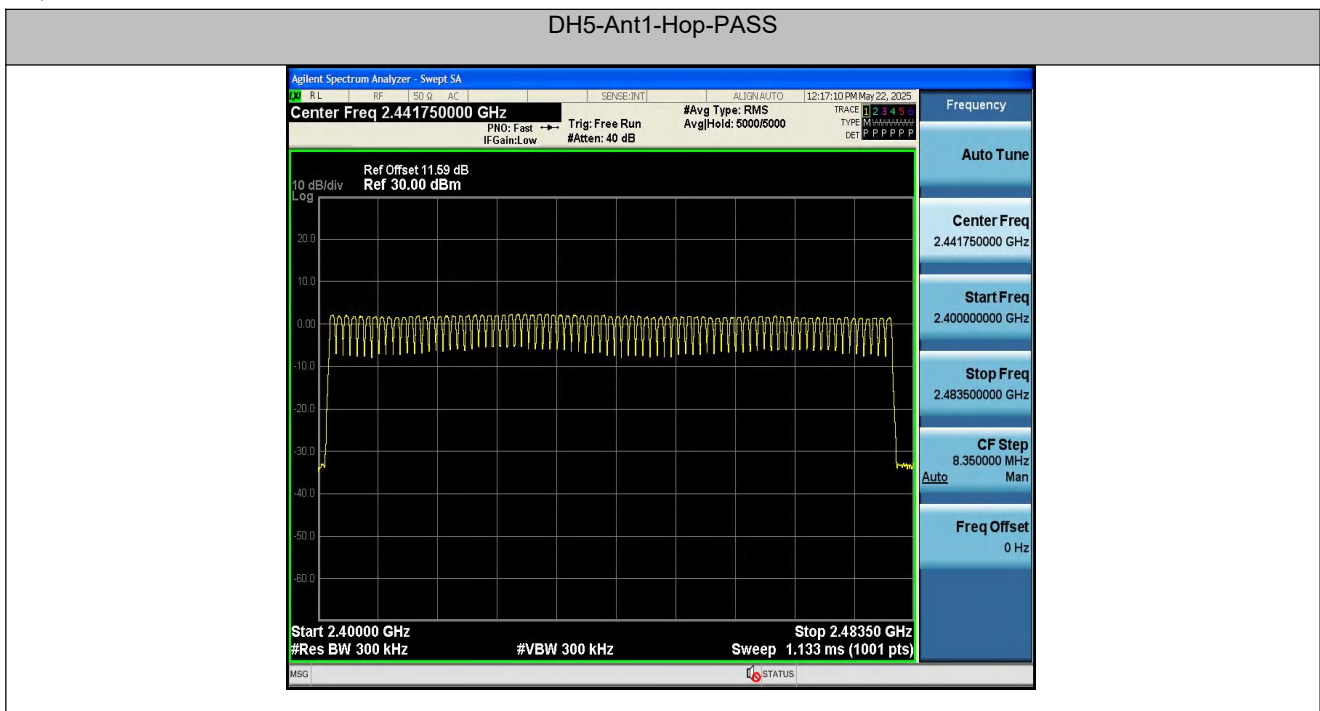
TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

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

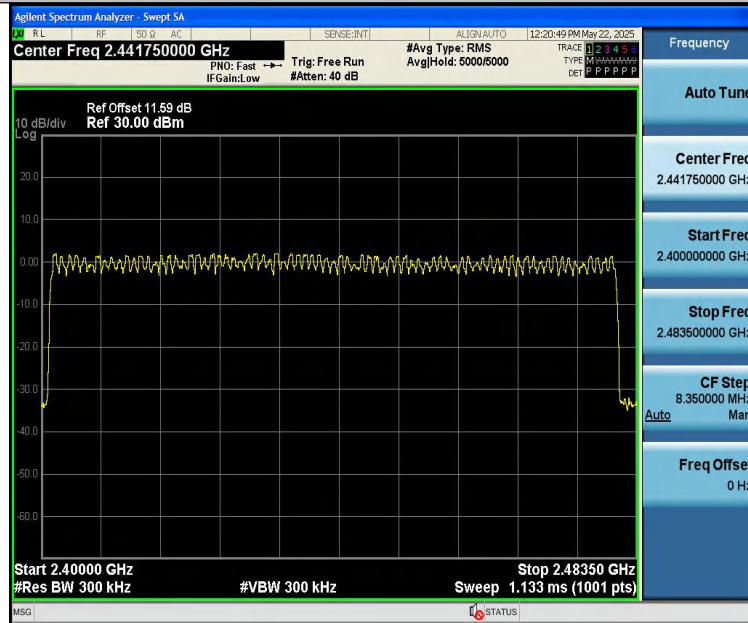
Test Graphs:

L:





2DH5-Ant1-Hop-PASS



3DH5-Ant1-Hop-PASS



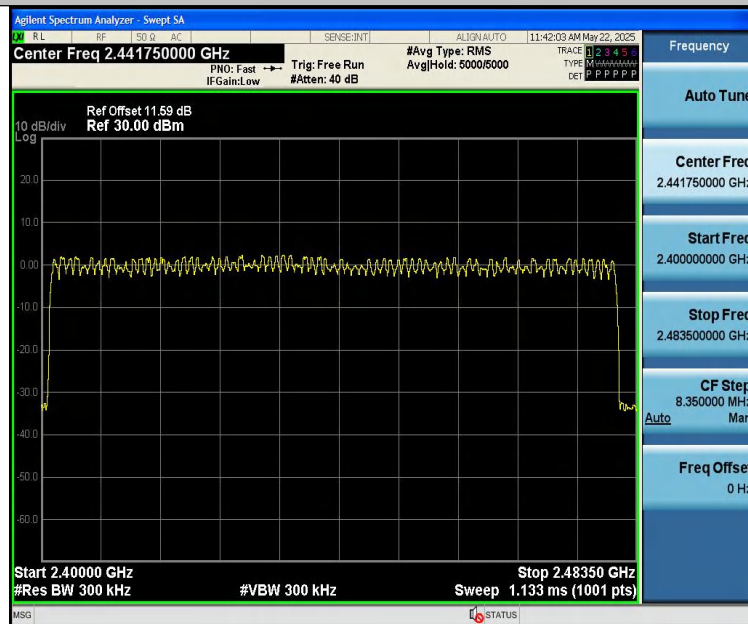


R:

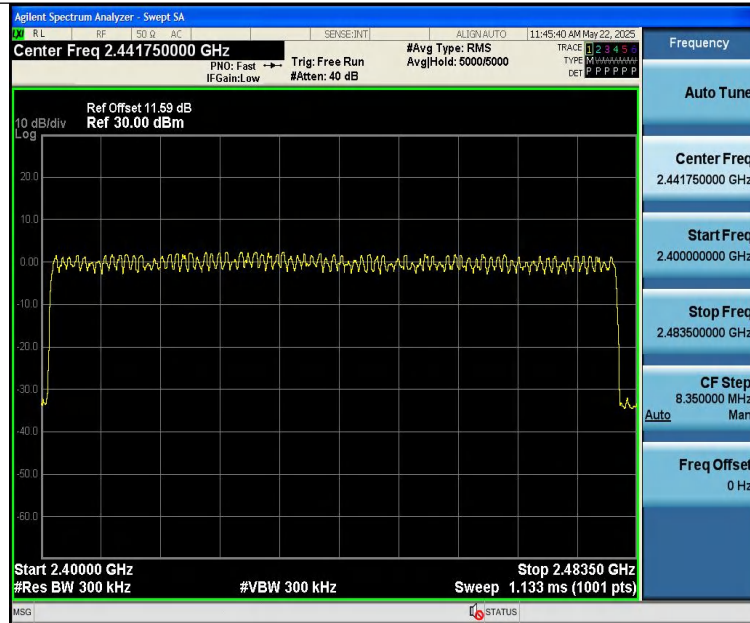
DH5-Ant1-Hop-PASS



2DH5-Ant1-Hop-PASS



3DH5-Ant1-Hop-PASS



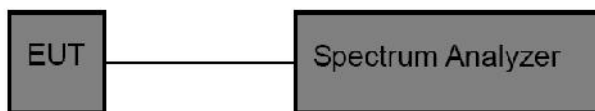


12 Dwell Time Test

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 Voltage : 3.7V
Test Result : PASS

Test Mode : CH Low ~ CH High
Temperature : 24.5°C
Humidity : 55%RH

L:

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.908	106.67	0.31	≤0.4	PASS
2DH5	Ant1	Hop	2.915	106.67	0.311	≤0.4	PASS
3DH5	Ant1	Hop	2.918	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	1.661	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	2.916	106.67	0.311	≤0.4	PASS
3DH5	Ant1	Hop	2.918	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	1.662	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

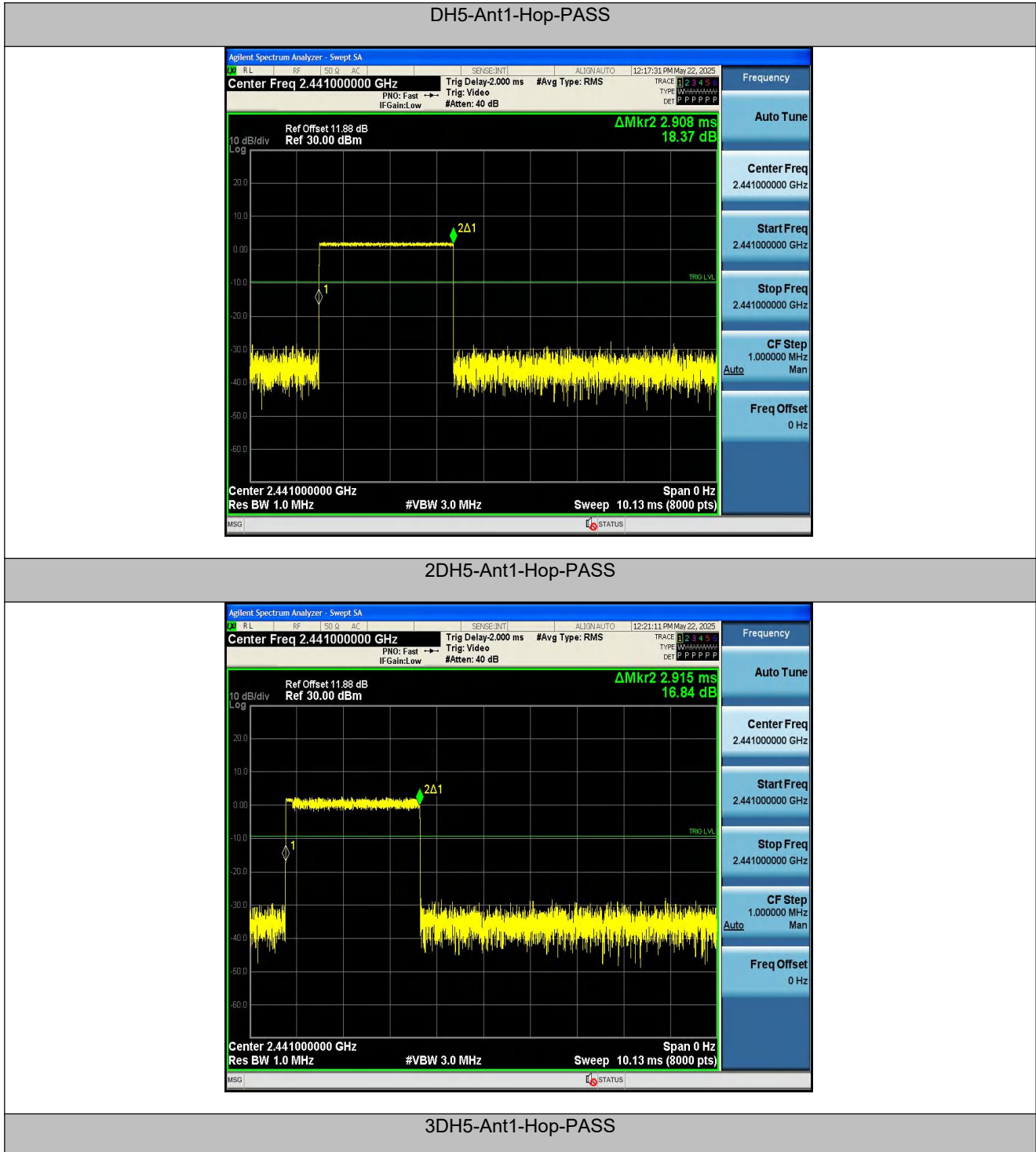
Note:

- 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).



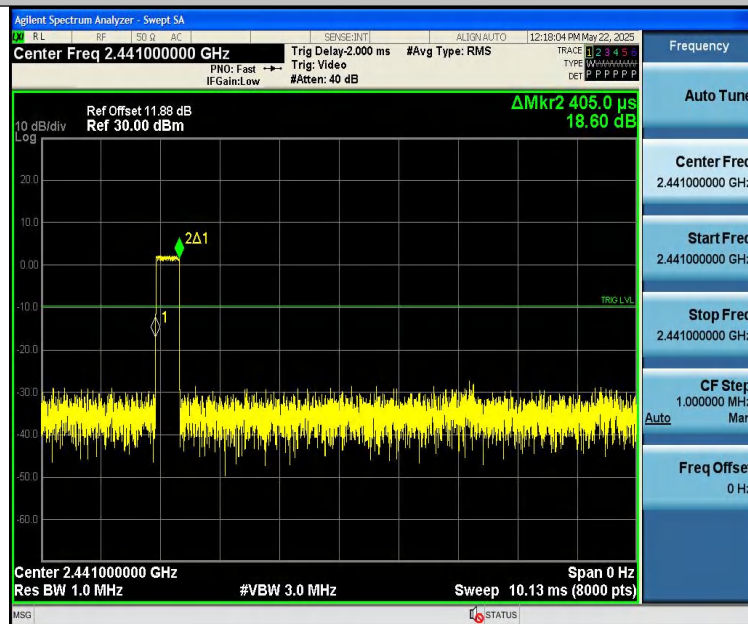
Test Graphs:

L:

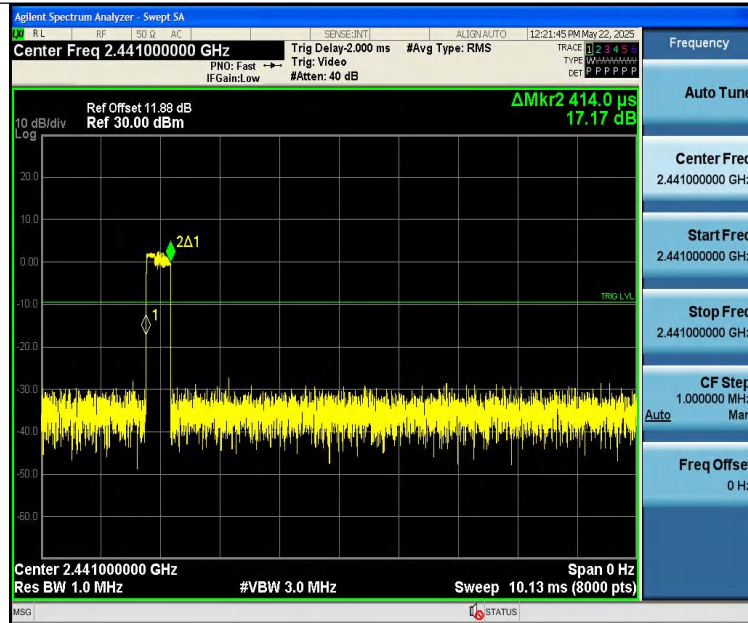




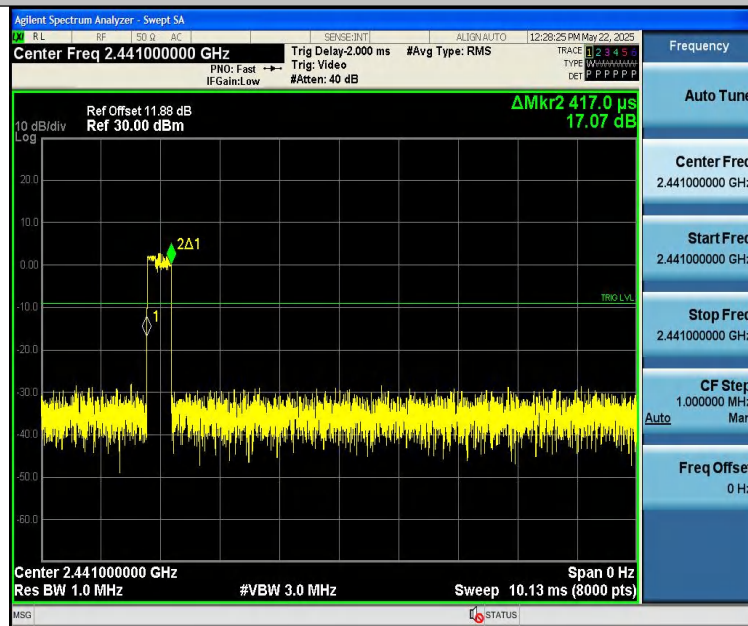
DH1-Ant1-Hop-PASS



2DH1-Ant1-Hop-PASS



3DH1-Ant1-Hop-PASS



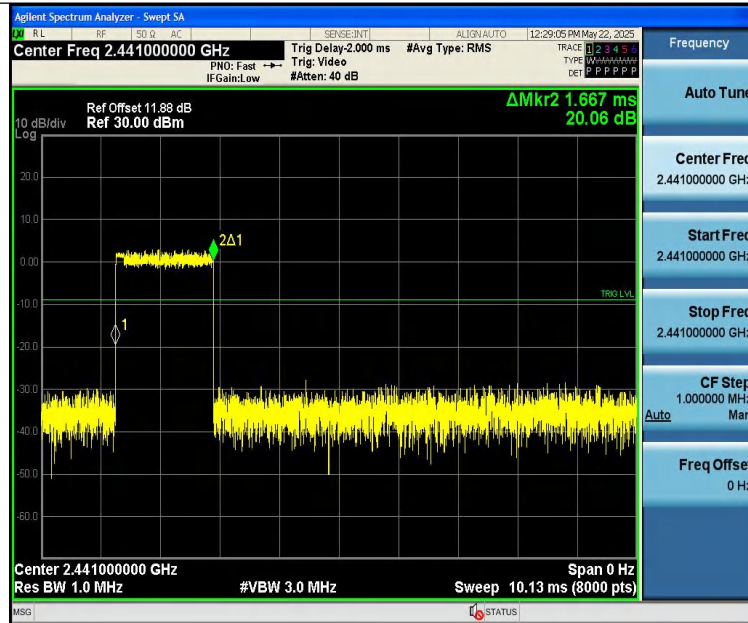
DH3-Ant1-Hop-PASS



2DH3-Ant1-Hop-PASS



3DH3-Ant1-Hop-PASS



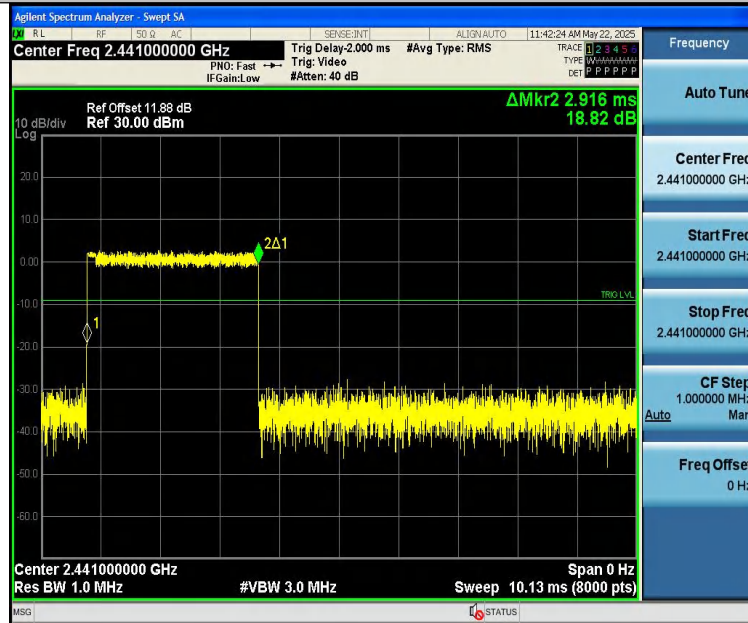
R:

DH5-Ant1-Hop-PASS





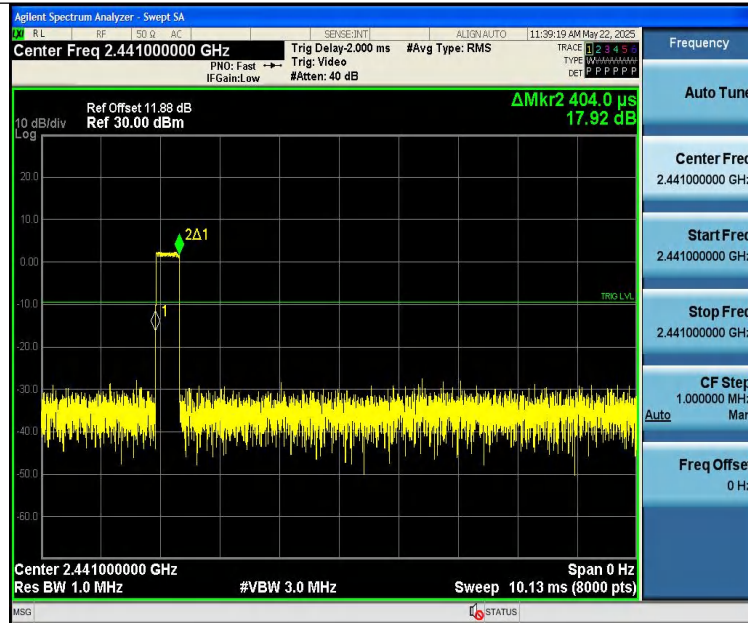
2DH5-Ant1-Hop-PASS



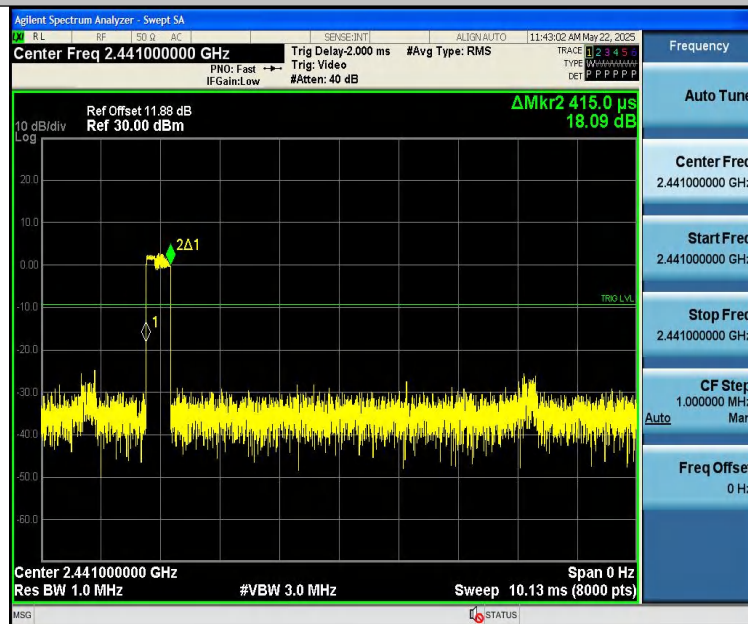
3DH5-Ant1-Hop-PASS



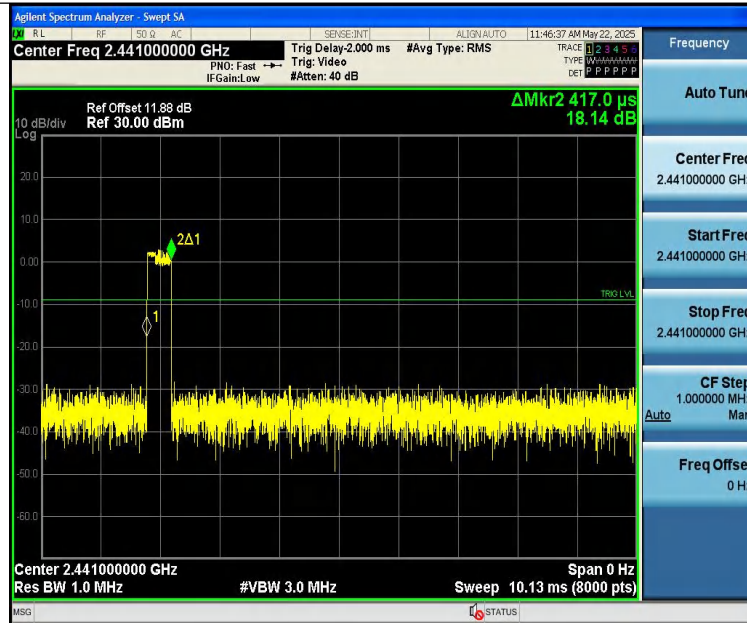
DH1-Ant1-Hop-PASS



2DH1-Ant1-Hop-PASS



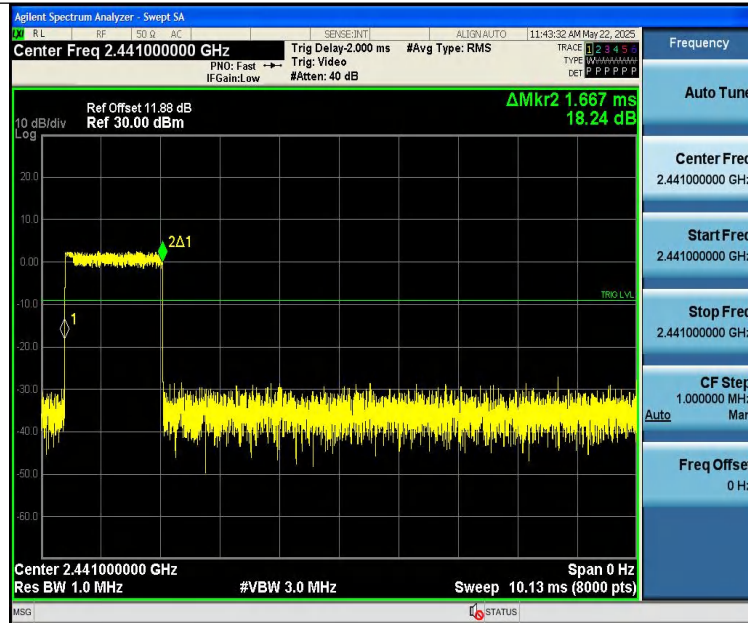
3DH1-Ant1-Hop-PASS



DH3-Ant1-Hop-PASS



2DH3-Ant1-Hop-PASS



3DH3-Ant1-Hop-PASS

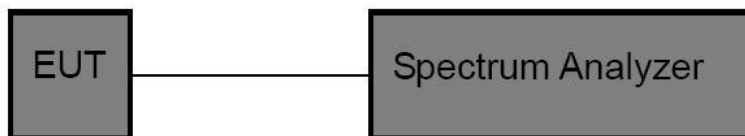


13 100kHz Bandwidth of Frequency Band Edge Requirement

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 is 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 Voltage : 3.7V
Test Result : PASS

Test Mode : CH Low ~ CH High
Temperature : 24.5°C
Humidity : 55%RH

L:

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	2.21	-46.05	≤-17.79	PASS
DH5	Ant1	High	2480	1.57	-45.42	≤-18.44	PASS
DH5	Ant1	Low	Hop_2402	0.97	-46.34	≤-19.04	PASS
DH5	Ant1	High	Hop_2480	0.99	-45.79	≤-19.01	PASS
2DH5	Ant1	Low	2402	2.27	-45.72	≤-17.73	PASS
2DH5	Ant1	High	2480	1.54	-45.62	≤-18.46	PASS
2DH5	Ant1	Low	Hop_2402	-3.42	-45.91	≤-23.42	PASS
2DH5	Ant1	High	Hop_2480	1.52	-45.99	≤-18.48	PASS
3DH5	Ant1	Low	2402	1.70	-45.53	≤-18.31	PASS
3DH5	Ant1	High	2480	1.02	-46.49	≤-18.98	PASS
3DH5	Ant1	Low	Hop_2402	0.07	-46.48	≤-19.93	PASS
3DH5	Ant1	High	Hop_2480	0.64	-45.83	≤-19.36	PASS



R:

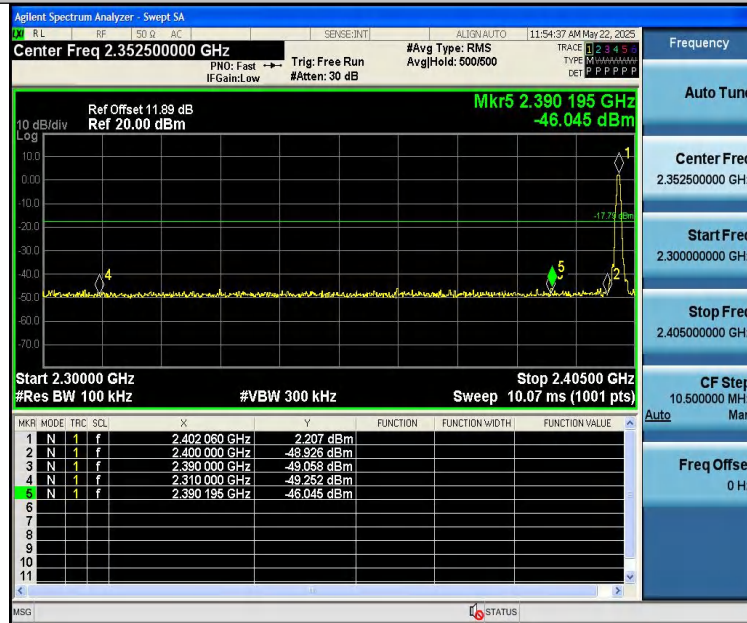
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	2.02	-46.44	≤ -17.98	PASS
DH5	Ant1	High	2480	0.92	-45.95	≤ -19.08	PASS
DH5	Ant1	Low	Hop_2402	0.56	-46.38	≤ -19.44	PASS
DH5	Ant1	High	Hop_2480	1.48	-45.99	≤ -18.52	PASS
2DH5	Ant1	Low	2402	-0.27	-46.06	≤ -20.27	PASS
2DH5	Ant1	High	2480	0.09	-45.89	≤ -19.91	PASS
2DH5	Ant1	Low	Hop_2402	-2.56	-46.26	≤ -22.56	PASS
2DH5	Ant1	High	Hop_2480	-0.27	-45.78	≤ -20.27	PASS
3DH5	Ant1	Low	2402	0.35	-45.43	≤ -19.65	PASS
3DH5	Ant1	High	2480	1.51	-45.54	≤ -18.49	PASS
3DH5	Ant1	Low	Hop_2402	-2.43	-45.73	≤ -22.43	PASS
3DH5	Ant1	High	Hop_2480	1.19	-45.76	≤ -18.81	PASS



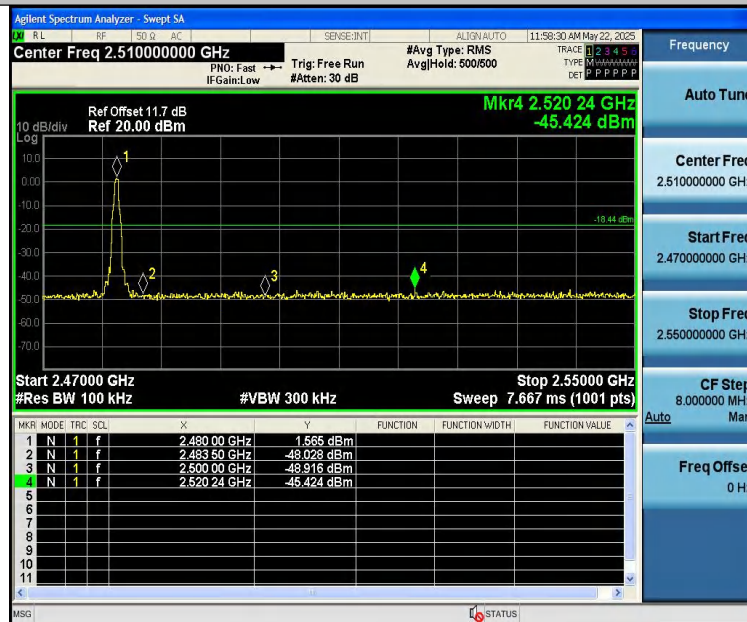
Test Graphs:

L:

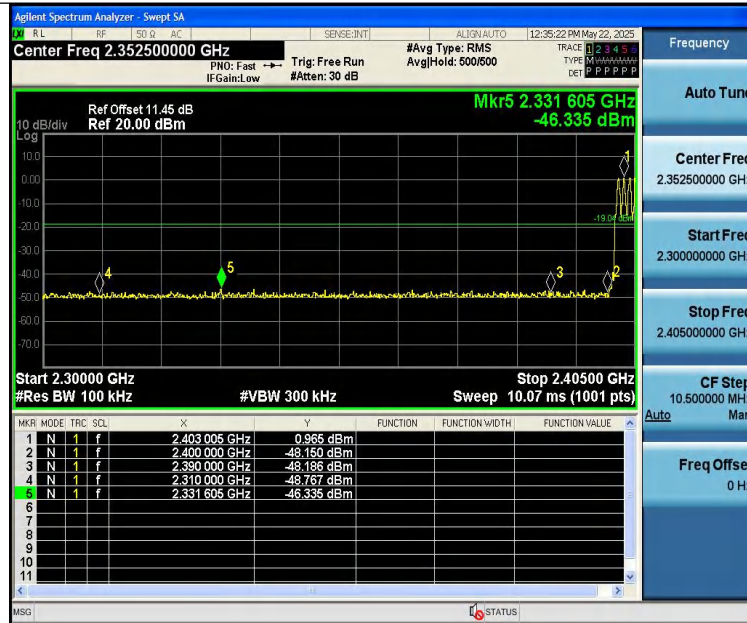
DH5-Ant1-2402-PASS



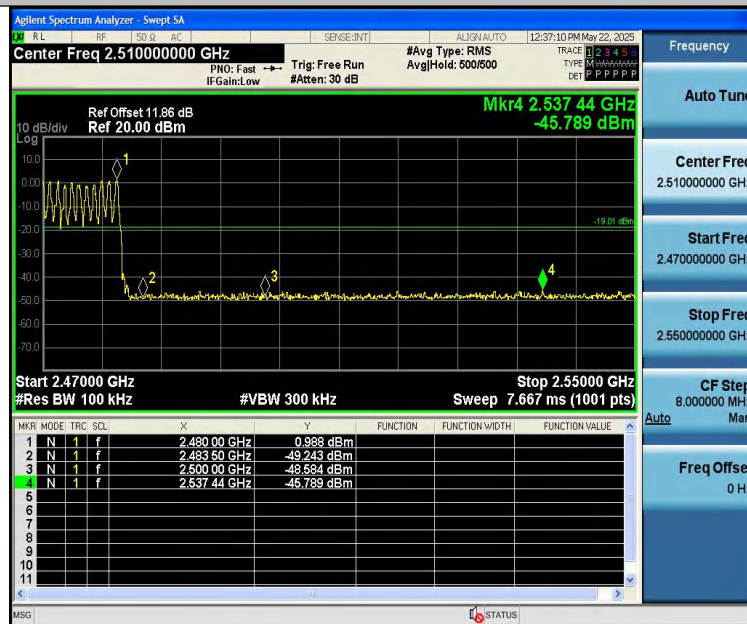
DH5-Ant1-2480-PASS



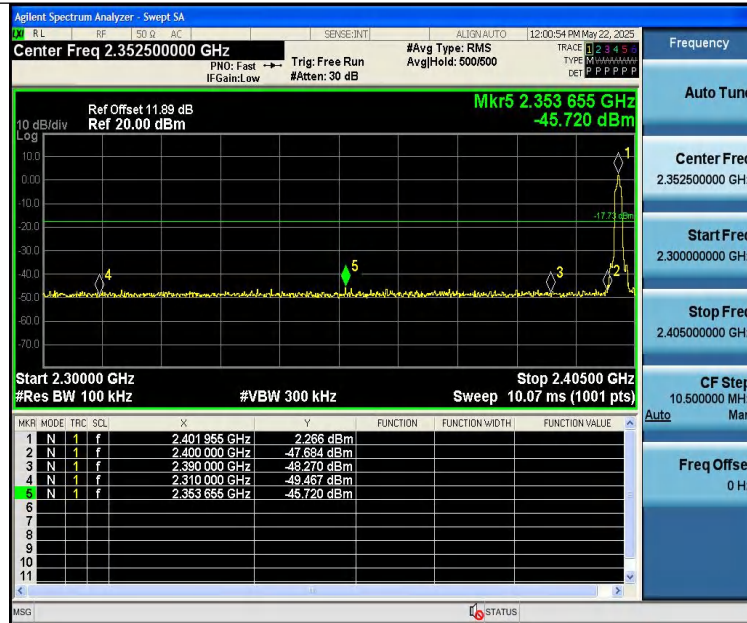
DH5-Ant1-Hop_2402-PASS



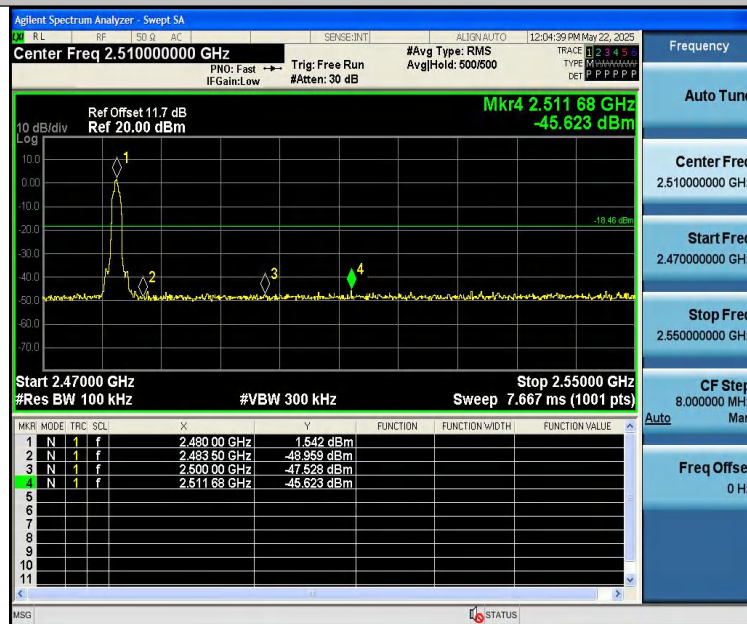
DH5-Ant1-Hop_2480-PASS



2DH5-Ant1-2402-PASS



2DH5-Ant1-2480-PASS



2DH5-Ant1-Hop_2402-PASS