

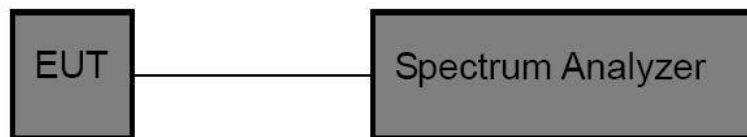


9 20DB Occupy Bandwidth Test

9.1 Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)
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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	0.957	2401.538	2402.495	---	---
DH5	Ant1	2441	0.951	2440.538	2441.489	---	---
DH5	Ant1	2480	0.945	2479.544	2480.489	---	---
2DH5	Ant1	2402	1.377	2401.316	2402.693	---	---
2DH5	Ant1	2441	1.284	2440.370	2441.654	---	---
2DH5	Ant1	2480	1.344	2479.328	2480.672	---	---

R:

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.954	2401.535	2402.489	---	---
DH5	Ant1	2441	0.951	2440.538	2441.489	---	---
DH5	Ant1	2480	0.969	2479.520	2480.489	---	---
2DH5	Ant1	2402	1.311	2401.343	2402.654	---	---
2DH5	Ant1	2441	1.290	2440.367	2441.657	---	---
2DH5	Ant1	2480	1.275	2479.373	2480.648	---	---



Test Graphs:

L:

DH5-Ant1-2402



DH5-Ant1-2441



DH5-Ant1-2480



2DH5-Ant1-2402



2DH5-Ant1-2441



2DH5-Ant1-2480





R:

DH5-Ant1-2402



DH5-Ant1-2441



DH5-Ant1-2480



2DH5-Ant1-2402



2DH5-Ant1-2441



2DH5-Ant1-2480



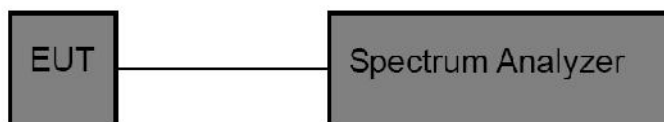


10 Carrier Frequency Separation Test

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:

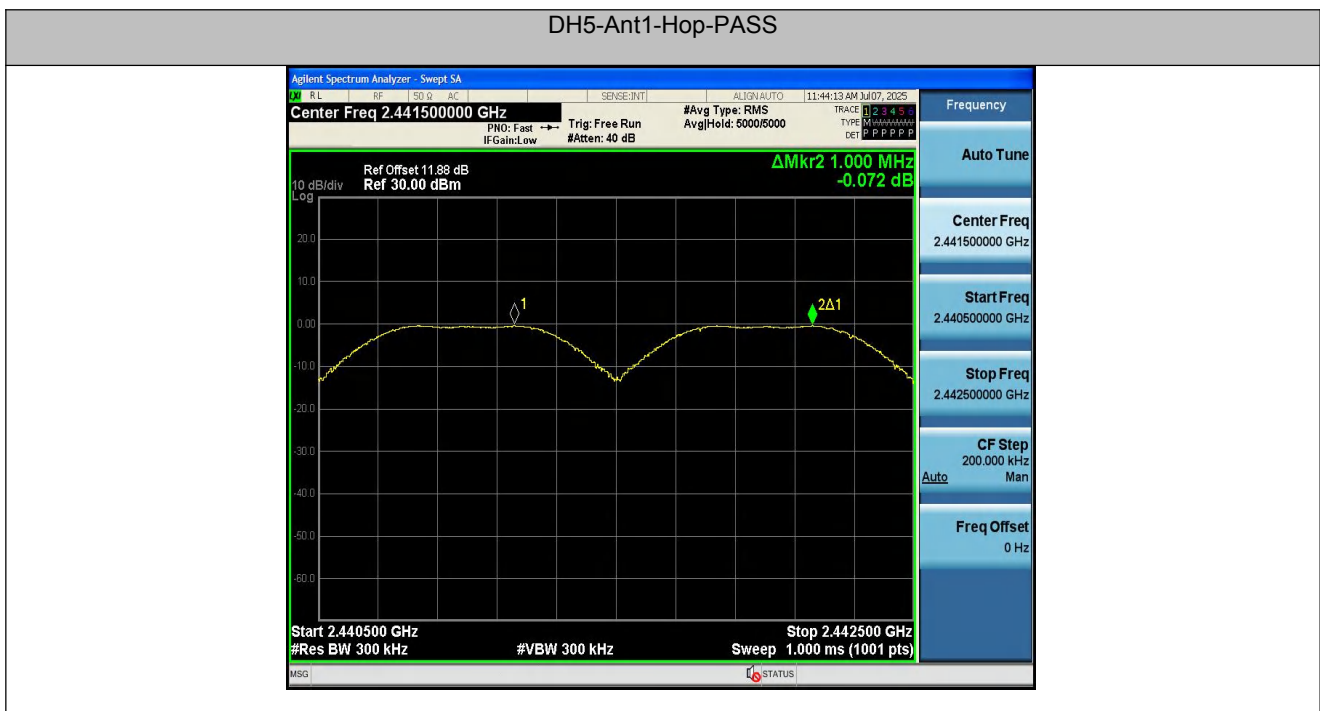
TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1	≥ 0.957	PASS
2DH5	Ant1	Hop	1.338	≥ 0.918	PASS

R:

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.994	≥ 0.969	PASS
2DH5	Ant1	Hop	1.314	≥ 1.311	PASS

Test Graphs:

L:





2DH5-Ant1-Hop-PASS



R:

DH5-Ant1-Hop-PASS





Report No.: PTC25070214101E-FC01

2DH5-Ant1-Hop-PASS



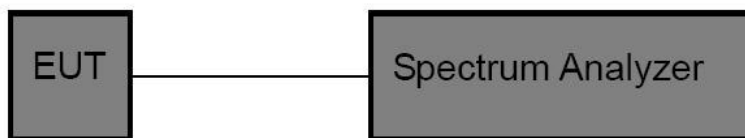


11 Number of Hopping Channel Test

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:

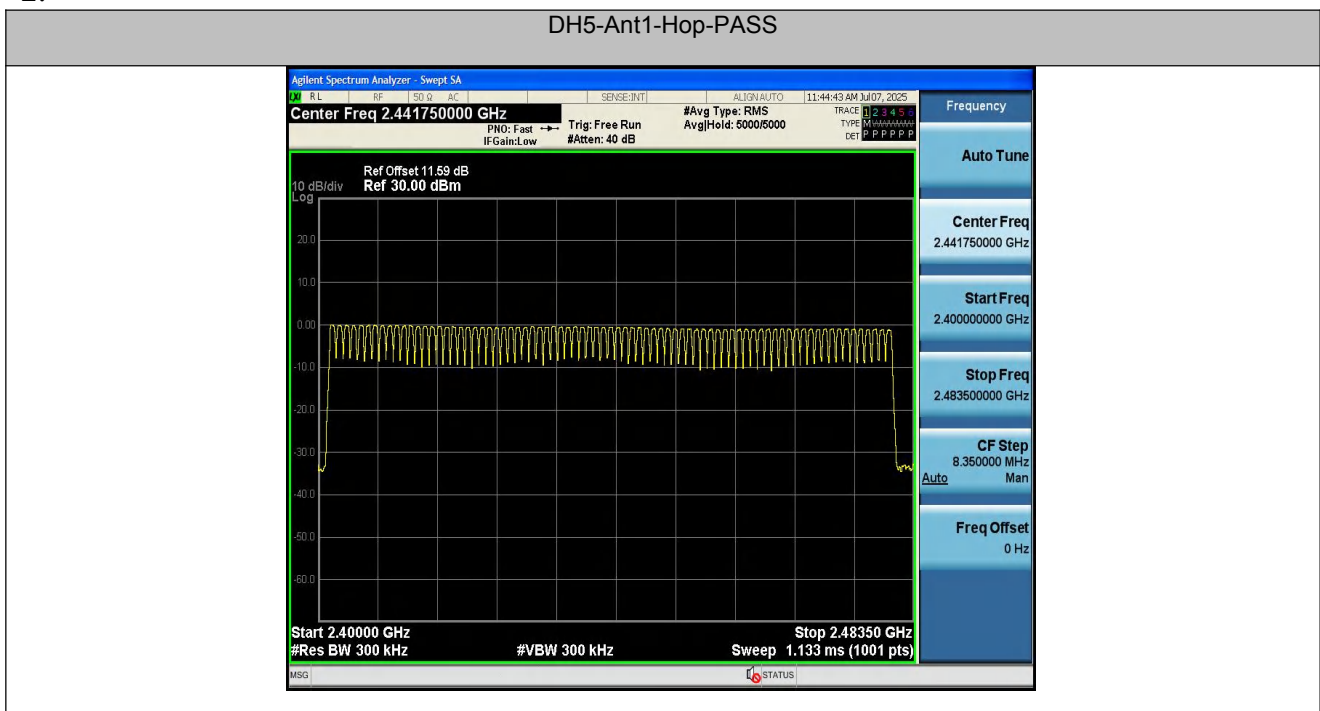
TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS

R:

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

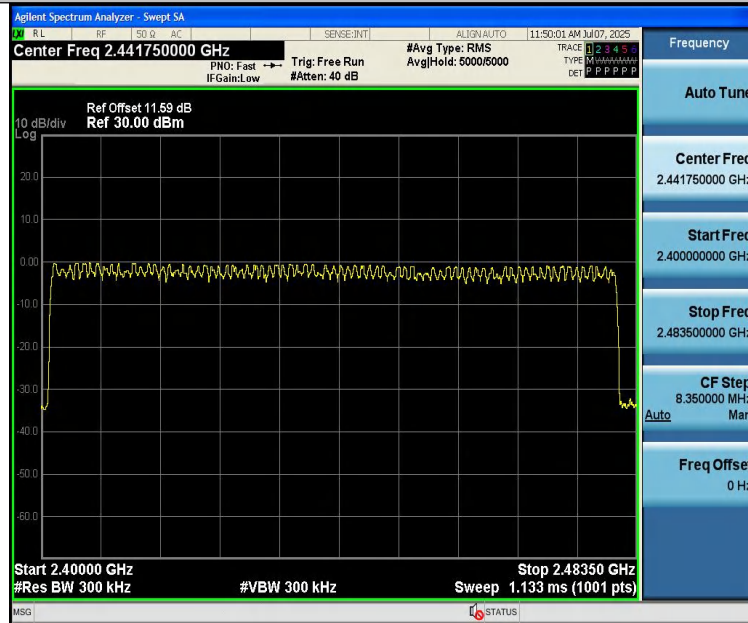
Test Graphs:

L:



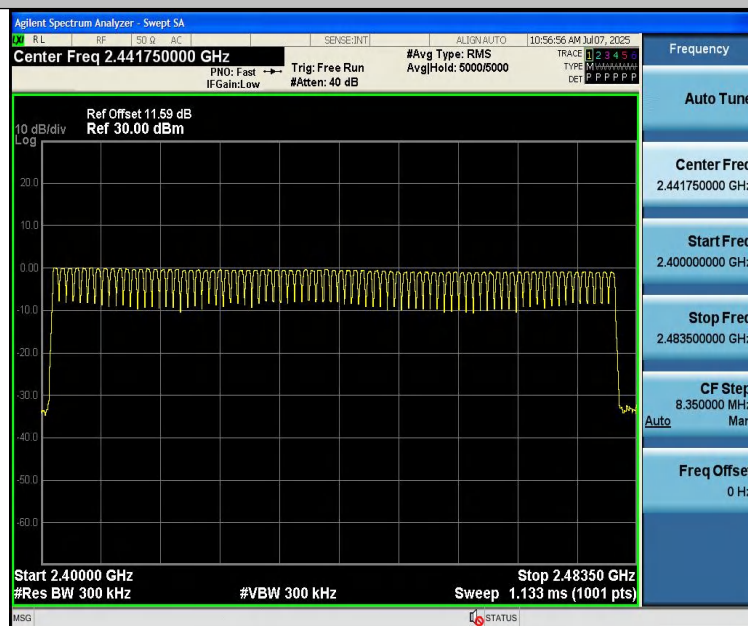


2DH5-Ant1-Hop-PASS



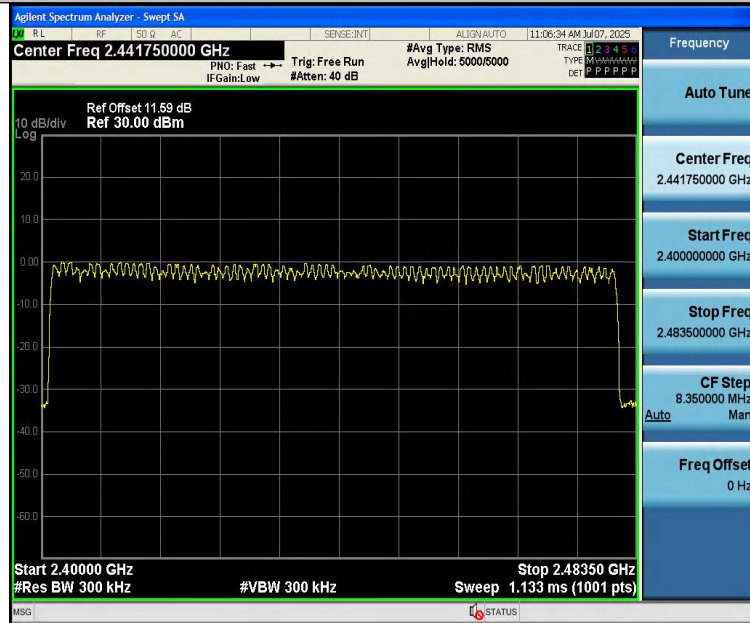
R:

DH5-Ant1-Hop-PASS





2DH5-Ant1-Hop-PASS



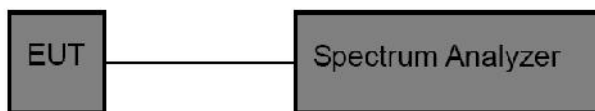


12 Dwell Time Test

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

L:

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.885	106.67	0.308	≤0.4	PASS
2DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
DH1	Ant1	Hop	0.380	320	0.122	≤0.4	PASS
2DH1	Ant1	Hop	0.391	320	0.125	≤0.4	PASS
DH3	Ant1	Hop	1.638	160	0.262	≤0.4	PASS
2DH3	Ant1	Hop	1.643	160	0.263	≤0.4	PASS

R:

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.884	106.67	0.308	≤0.4	PASS
2DH5	Ant1	Hop	2.891	106.67	0.308	≤0.4	PASS
DH1	Ant1	Hop	0.380	320	0.122	≤0.4	PASS
2DH1	Ant1	Hop	0.390	320	0.125	≤0.4	PASS
DH3	Ant1	Hop	1.637	160	0.262	≤0.4	PASS
2DH3	Ant1	Hop	1.642	160	0.263	≤0.4	PASS

Note:

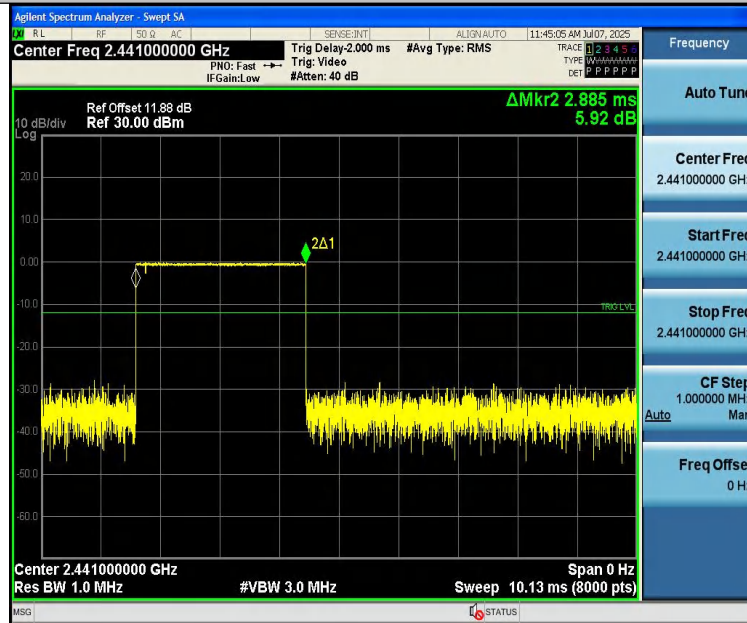
- 1.DH1/2DH1 Dwell Time: Reading * (1600/2)*31.6/(channel number).
- 2.DH3/2DH3 Dwell Time: Reading * (1600/4)*31.6/(channel number).
- 3.DH5/2DH5 Dwell Time: Reading * (1600/6)*31.6/(channel number).



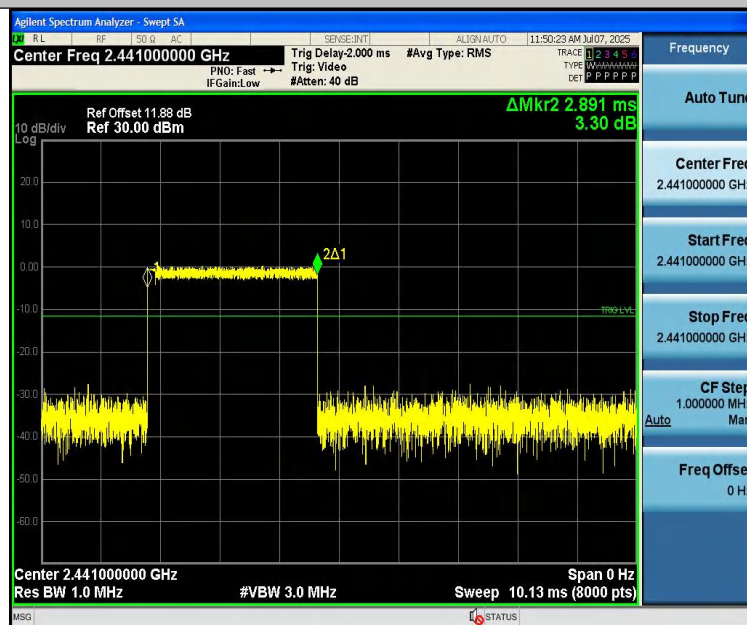
Test Graphs:

L:

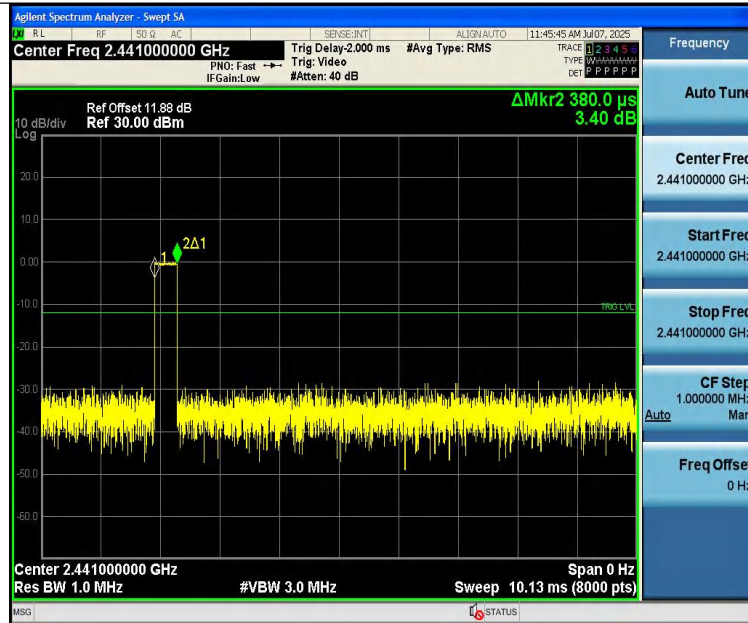
DH5-Ant1-Hop-PASS



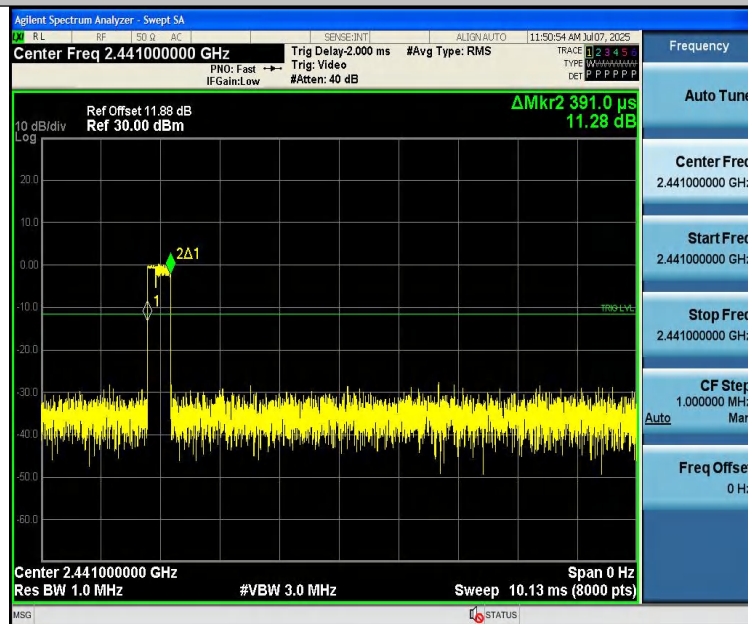
2DH5-Ant1-Hop-PASS



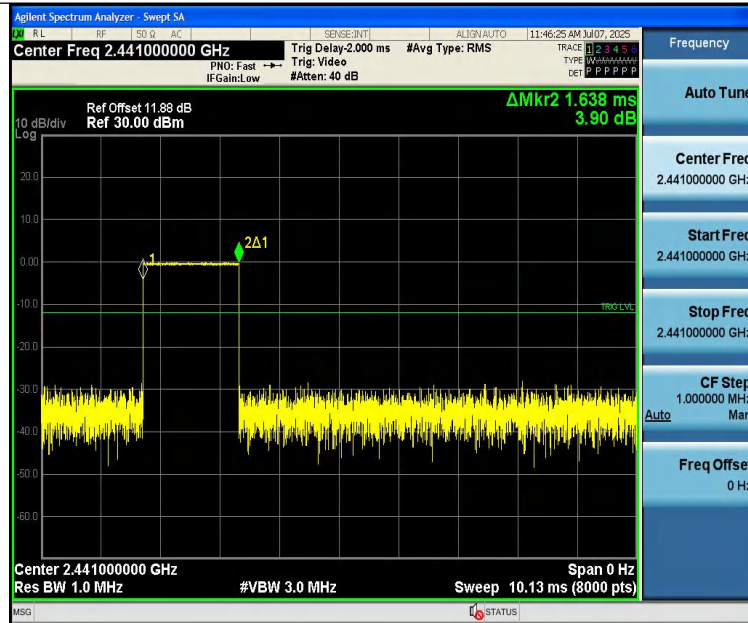
DH1-Ant1-Hop-PASS



2DH1-Ant1-Hop-PASS



DH3-Ant1-Hop-PASS



2DH3-Ant1-Hop-PASS





R:

DH5-Ant1-Hop-PASS



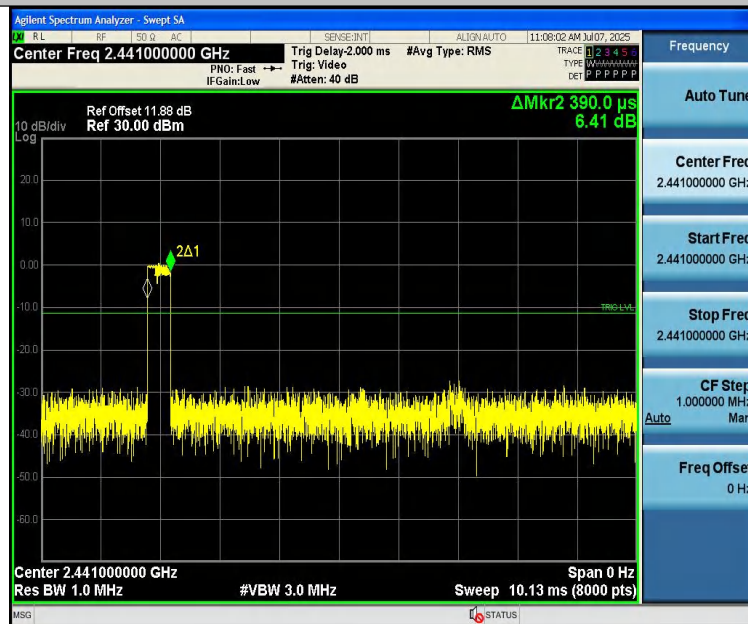
2DH5-Ant1-Hop-PASS



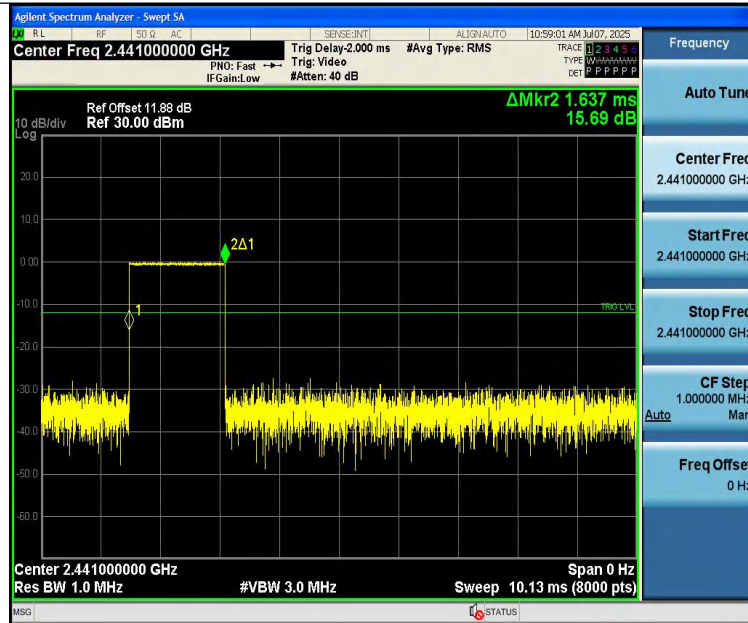
DH1-Ant1-Hop-PASS



2DH1-Ant1-Hop-PASS



DH3-Ant1-Hop-PASS



2DH3-Ant1-Hop-PASS

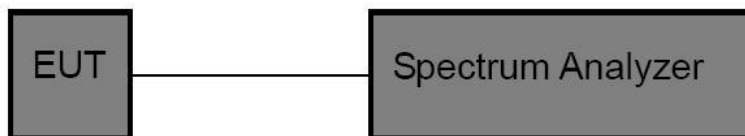


13 100kHz Bandwidth of Frequency Band Edge Requirement

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	-0.08	-46.2	≤-20.08	PASS
DH5	Ant1	High	2480	-1.15	-45.35	≤-21.15	PASS
DH5	Ant1	Low	Hop_2402	-0.87	-45.85	≤-20.87	PASS
DH5	Ant1	High	Hop_2480	-1.01	-45.04	≤-21.01	PASS
2DH5	Ant1	Low	2402	0.15	-45.97	≤-19.85	PASS
2DH5	Ant1	High	2480	-1.14	-46.17	≤-21.14	PASS
2DH5	Ant1	Low	Hop_2402	-3.82	-46.96	≤-23.82	PASS
2DH5	Ant1	High	Hop_2480	-1.84	-45.76	≤-21.84	PASS

R:

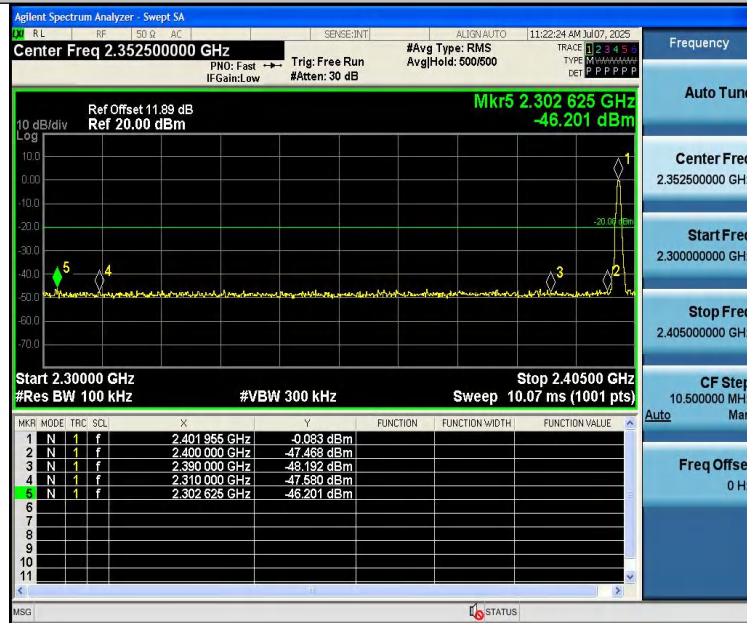
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-0.32	-46.12	≤-20.32	PASS
DH5	Ant1	High	2480	-1.54	-45.82	≤-21.54	PASS
DH5	Ant1	Low	Hop_2402	-1.35	-45.82	≤-21.35	PASS
DH5	Ant1	High	Hop_2480	-1.45	-45.64	≤-21.45	PASS
2DH5	Ant1	Low	2402	-0.20	-45.68	≤-20.2	PASS
2DH5	Ant1	High	2480	-1.19	-45.77	≤-21.19	PASS
2DH5	Ant1	Low	Hop_2402	-4.07	-45.96	≤-24.07	PASS
2DH5	Ant1	High	Hop_2480	-0.92	-45.79	≤-20.92	PASS



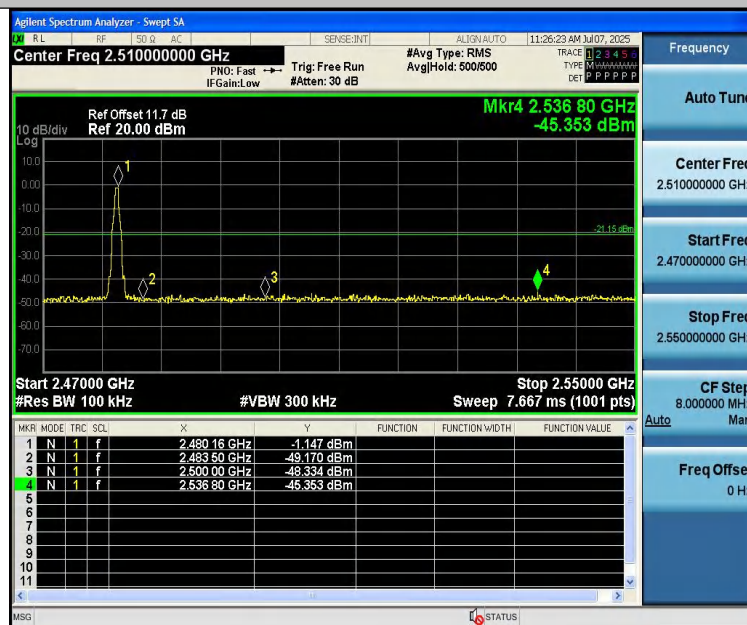
Test Graphs:

L:

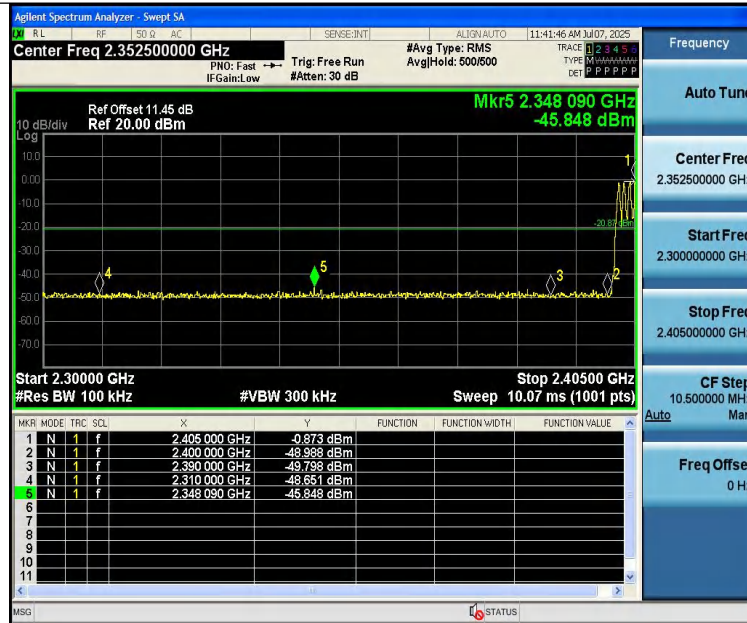
DH5-Ant1-2402-PASS



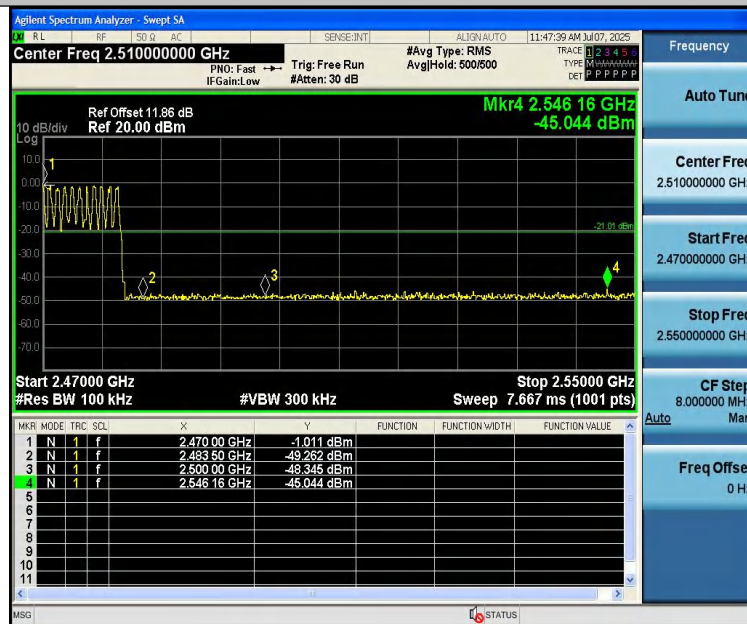
DH5-Ant1-2480-PASS



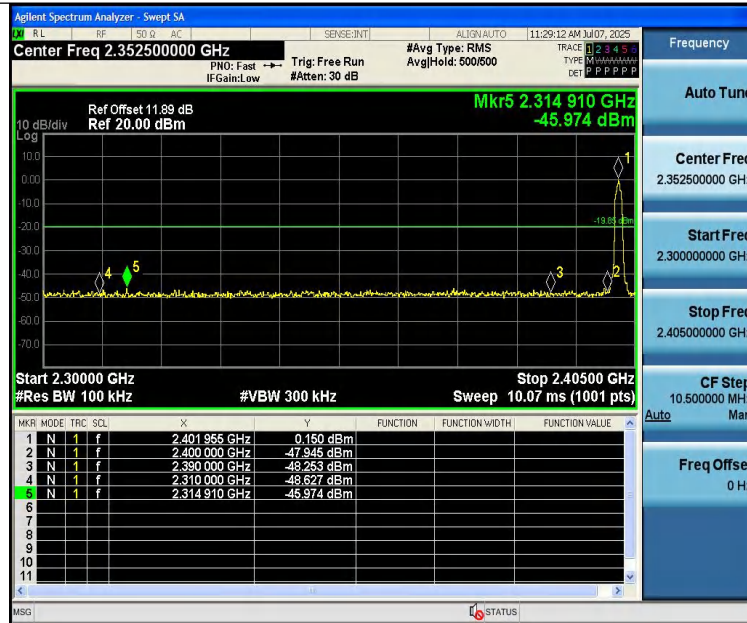
DH5-Ant1-Hop_2402-PASS



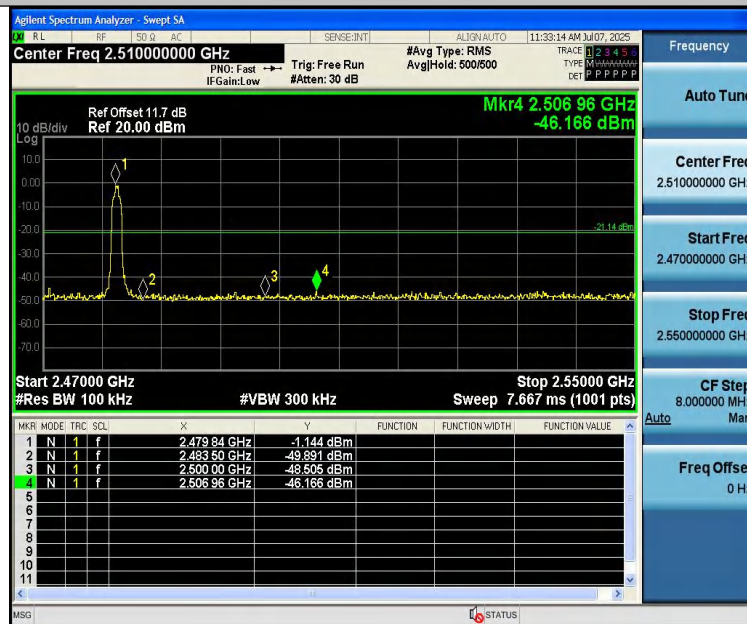
DH5-Ant1-Hop_2480-PASS



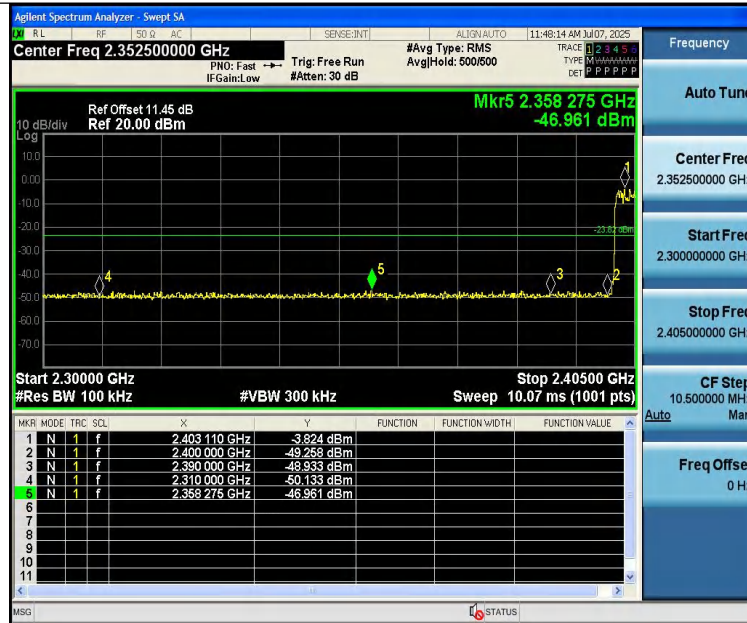
2DH5-Ant1-2402-PASS



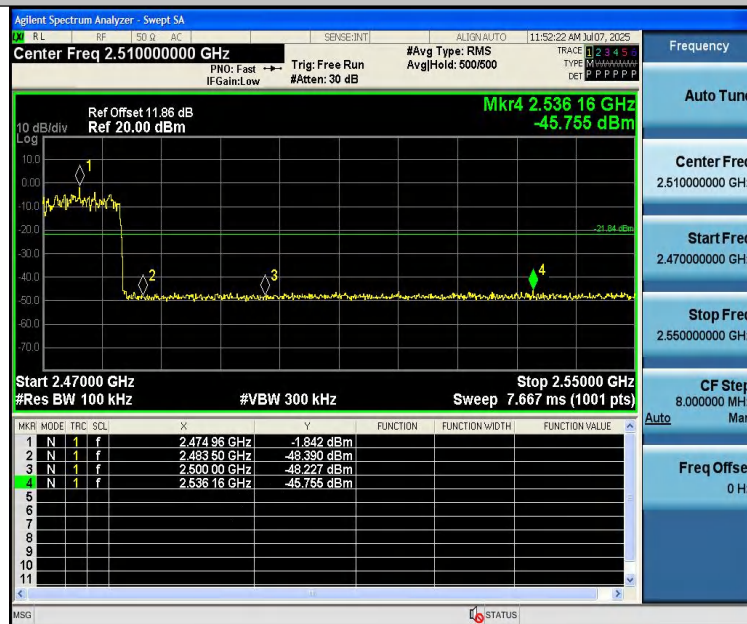
2DH5-Ant1-2480-PASS



2DH5-Ant1-Hop_2402-PASS



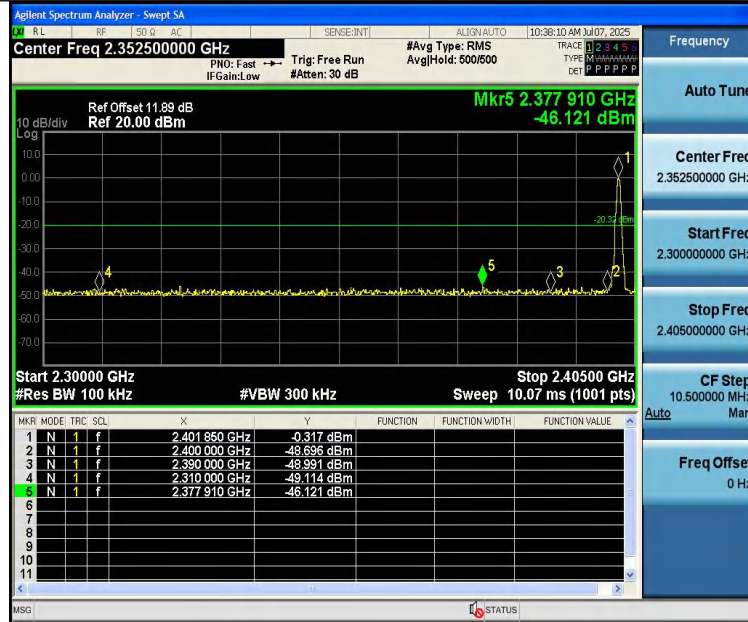
2DH5-Ant1-Hop_2480-PASS



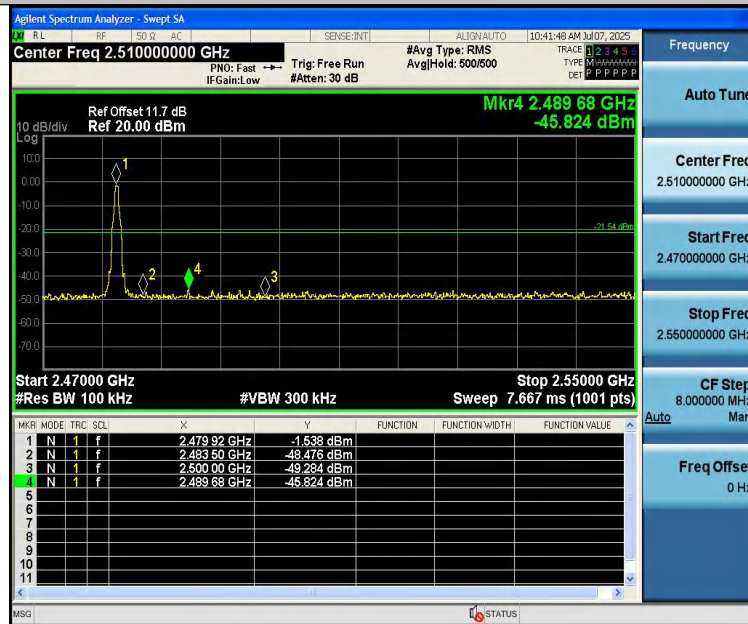


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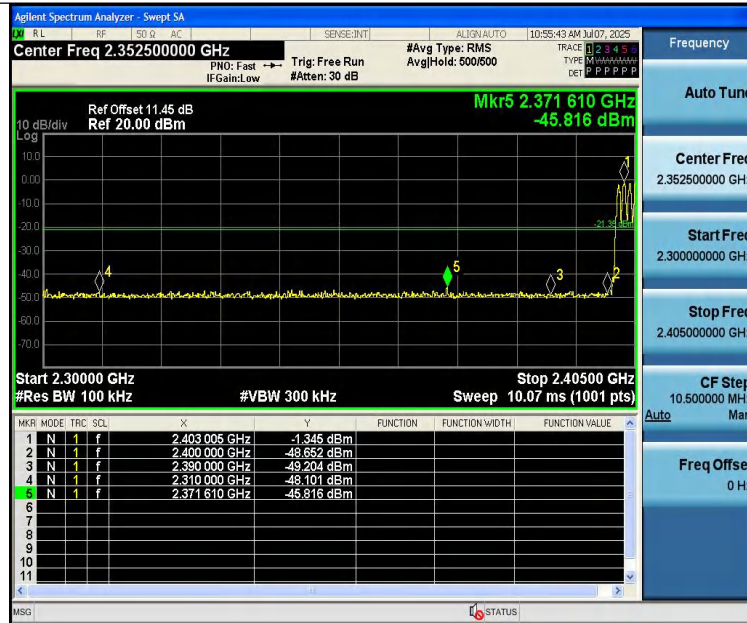
DH5-Ant1-2402-PASS



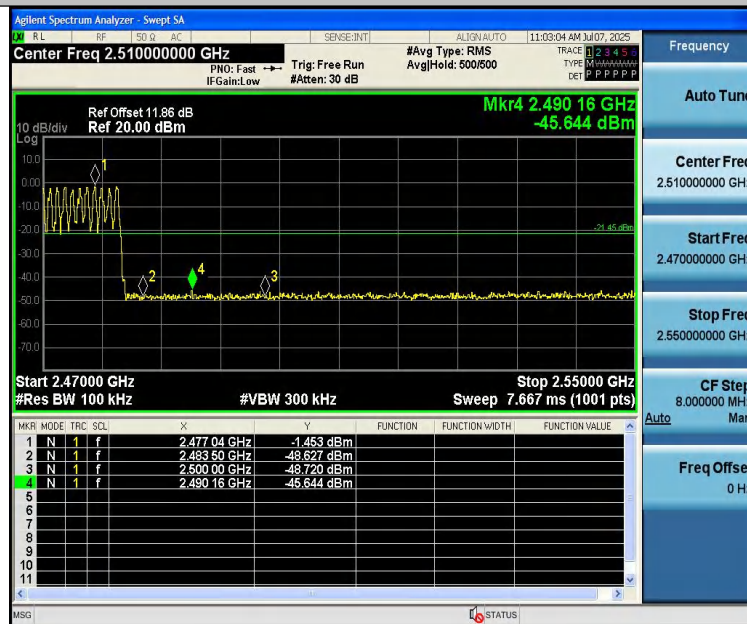
DH5-Ant1-2480-PASS



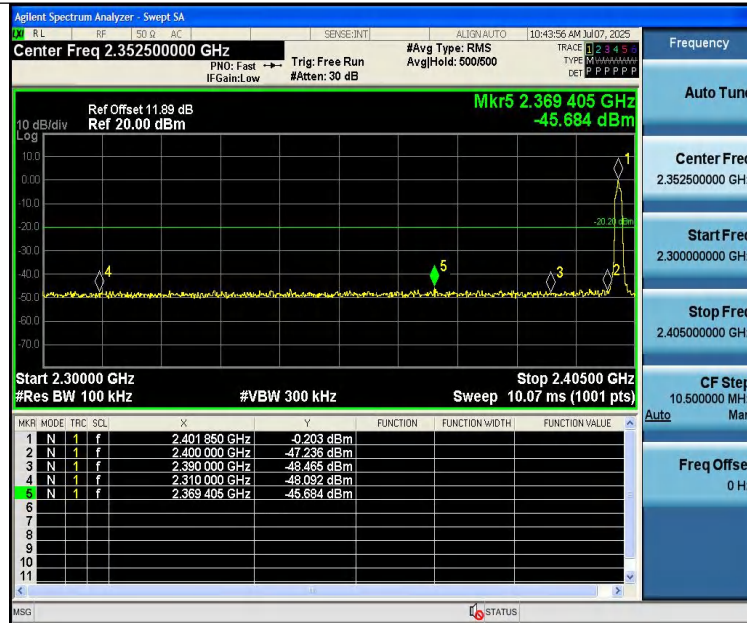
DH5-Ant1-Hop_2402-PASS



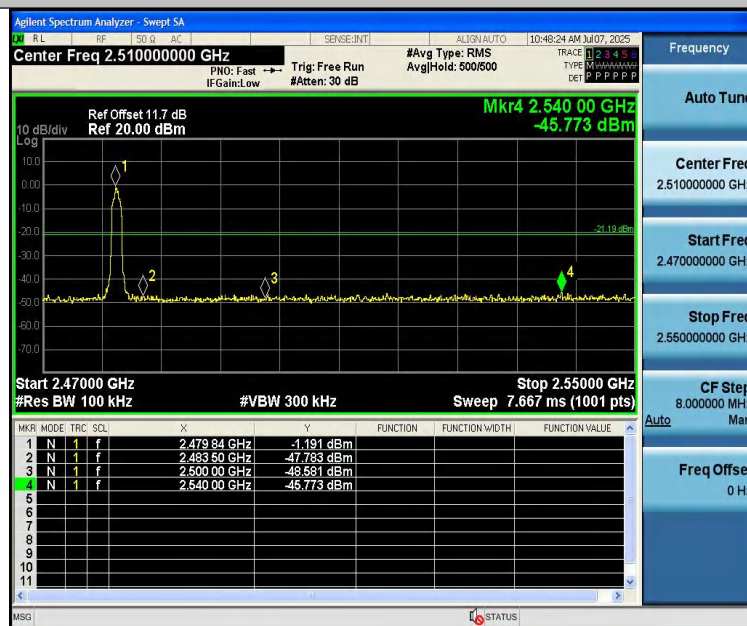
DH5-Ant1-Hop_2480-PASS



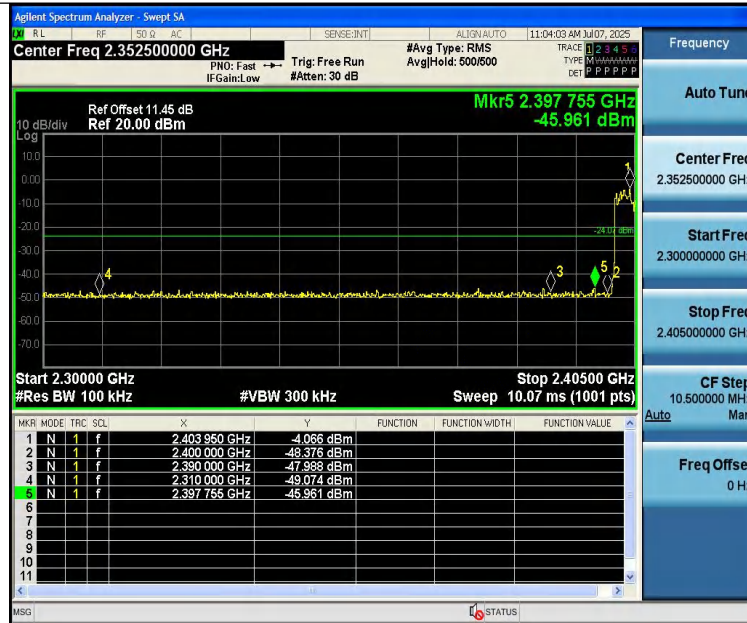
2DH5-Ant1-2402-PASS



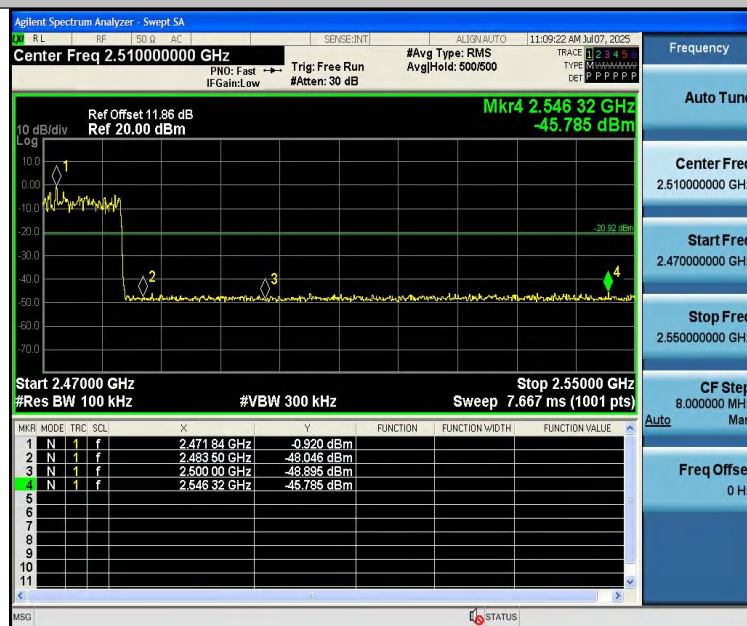
2DH5-Ant1-2480-PASS



2DH5-Ant1-Hop_2402-PASS



2DH5-Ant1-Hop_2480-PASS





Conducted Emission Method

Test Result

L:

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	0~Reference	-0.02	-0.02	---	PASS
DH5	Ant1	2402	30~1000	-0.02	-57.09	≤ -20.02	PASS
DH5	Ant1	2402	1000~26500	-0.02	-37.47	≤ -20.02	PASS
DH5	Ant1	2441	0~Reference	-0.55	-0.55	---	PASS
DH5	Ant1	2441	30~1000	-0.55	-57.62	≤ -20.55	PASS
DH5	Ant1	2441	1000~26500	-0.55	-31.01	≤ -20.55	PASS
DH5	Ant1	2480	0~Reference	-1.50	-1.50	---	PASS
DH5	Ant1	2480	30~1000	-1.50	-57.13	≤ -21.5	PASS
DH5	Ant1	2480	1000~26500	-1.50	-31.69	≤ -21.5	PASS
2DH5	Ant1	2402	0~Reference	0.05	0.05	---	PASS
2DH5	Ant1	2402	30~1000	0.05	-56.26	≤ -19.95	PASS
2DH5	Ant1	2402	1000~26500	0.05	-37.35	≤ -19.95	PASS
2DH5	Ant1	2441	0~Reference	-0.51	-0.51	---	PASS
2DH5	Ant1	2441	30~1000	-0.51	-57.68	≤ -20.51	PASS
2DH5	Ant1	2441	1000~26500	-0.51	-30.9	≤ -20.51	PASS
2DH5	Ant1	2480	0~Reference	-1.19	-1.19	---	PASS
2DH5	Ant1	2480	30~1000	-1.19	-57.73	≤ -21.19	PASS
2DH5	Ant1	2480	1000~26500	-1.19	-31.79	≤ -21.19	PASS



R:

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	0~Reference	-0.44	-0.44	---	PASS
DH5	Ant1	2402	30~1000	-0.44	-58.36	≤ -20.44	PASS
DH5	Ant1	2402	1000~26500	-0.44	-37.57	≤ -20.44	PASS
DH5	Ant1	2441	0~Reference	-0.86	-0.86	---	PASS
DH5	Ant1	2441	30~1000	-0.86	-58.37	≤ -20.86	PASS
DH5	Ant1	2441	1000~26500	-0.86	-30.88	≤ -20.86	PASS
DH5	Ant1	2480	0~Reference	-1.51	-1.51	---	PASS
DH5	Ant1	2480	30~1000	-1.51	-58.36	≤ -21.51	PASS
DH5	Ant1	2480	1000~26500	-1.51	-32.26	≤ -21.51	PASS
2DH5	Ant1	2402	0~Reference	-0.22	-0.22	---	PASS
2DH5	Ant1	2402	30~1000	-0.22	-58.27	≤ -20.22	PASS
2DH5	Ant1	2402	1000~26500	-0.22	-37.48	≤ -20.22	PASS
2DH5	Ant1	2441	0~Reference	-0.76	-0.76	---	PASS
2DH5	Ant1	2441	30~1000	-0.76	-57.59	≤ -20.76	PASS
2DH5	Ant1	2441	1000~26500	-0.76	-30.84	≤ -20.76	PASS
2DH5	Ant1	2480	0~Reference	-1.26	-1.26	---	PASS
2DH5	Ant1	2480	30~1000	-1.26	-58.77	≤ -21.26	PASS
2DH5	Ant1	2480	1000~26500	-1.26	-31.89	≤ -21.26	PASS



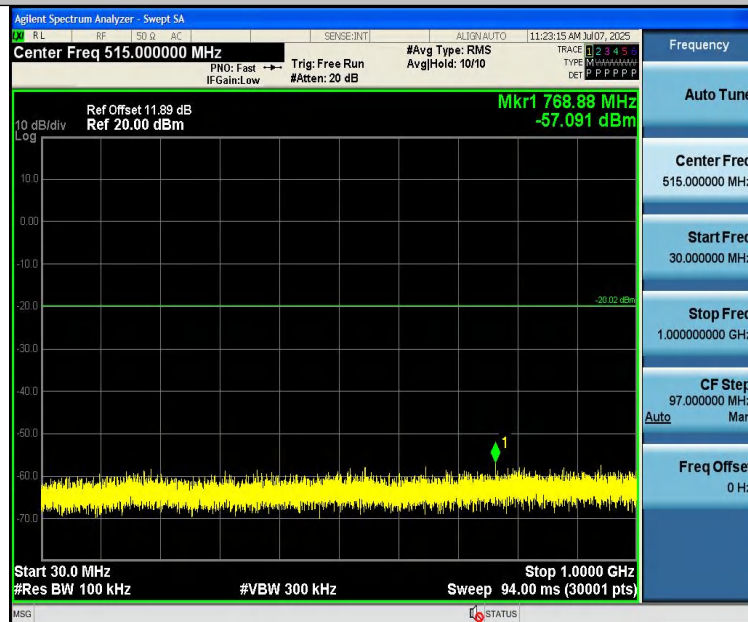
Test Graphs:

L:

DH5-Ant1-2402-0~Reference-PASS



DH5-Ant1-2402-30~1000-PASS



DH5-Ant1-2402-1000~26500-PASS