99 % Occupied bandwidth:

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. Conducted Output Power

10.1. Block diagram of test setup

Same as section 8.1

10.2. Limits

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 3			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (b) (1) ISED RSS-247 Clause 5.4 (b)	Peak Conducted Output Power	Hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel: 1 watt or 30dBm; Hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel : 125 mW or 21dBm	2400-2483.5

10.3. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Measure the maximum output power of EUT by spectrum analyzer with PK detector and RBW=3 MHz (above 20 dB bandwidth of measured signal), VBW=8 MHz

Note: The attenuator loss was inputted into spectrum analyzer as amplitude offset.

10.4. Results

Test Mode	Ant.	Freq. (MHz)	Conducted Peak Power (dBm)	Conducted Limit (dBm)	Verdict
DH5	Ant1	2402	6.29	≤20.97	PASS
		2441	6.53	≤20.97	PASS
		2480	6.96	≤20.97	PASS
2DH5	Ant1	2402	8.82	≤20.97	PASS
		2441	9.62	≤20.97	PASS
		2480	9.56	≤20.97	PASS
3DH5	Ant1	2402	9.73	≤20.97	PASS
		2441	10.20	≤20.97	PASS
		2480	7.54	≤20.97	PASS

10.5. Original test data

DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480

2DH5_Ant1_2402

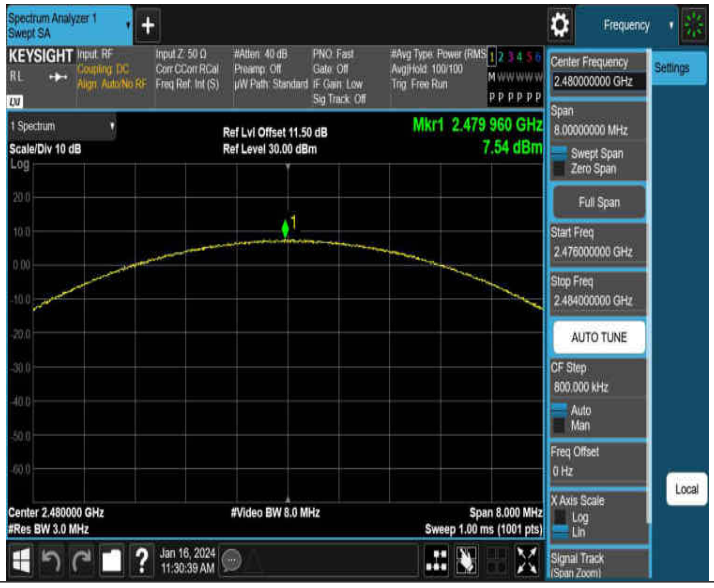
2DH5_Ant1_2441

2DH5_Ant1_2480

3DH5_Ant1_2402

3DH5_Ant1_2441

3DH5_Ant1_2480



11. Carrier Hopping Channel Separation

11.1. Block diagram of test setup

Same as section 8.1

11.2. Limits

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 3			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) ISED RSS-247 Clause 5.1 (b)	Carrier Hopping Channel Separation	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel.	2400-2483.5

11.3. Test Procedure

Connect the UUT to the spectrum Analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
RBW	Start with the RBW set to approximately 30 % of the channel spacing; adjust as necessary to best identify the center of each individual channel.
VBW	≥ RBW
Trace	Max hold
Sweep time	Auto couple

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Compliance of an EUT with the appropriate regulatory limit shall be determined.

A plot of the data shall be included in the test report.

11.4. Results

Test Mode	Ant.	Freq. (MHz)	Result (MHz)	Limit (MHz)	Verdict
DH5	Ant1	Hop	1.166	≥0.903	PASS
2DH5	Ant1	Hop	1.01	≥0.025	PASS
3DH5	Ant1	Hop	0.882	≥0.025	PASS

11.5. Original test data

DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop

12. Number of Hopping Frequency

12.1. Block diagram of test setup

Same as section 8.1

12.2. Limits

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3		
Section	Test Item	Limit
CFR 47 15.247 (a) (1) III ISED RSS-247 Clause 5.1 (d)	Number of Hopping Frequency	at least 15 hopping channels

12.3. Test Procedure

Connect the EUT to the spectrum Analyzer and use the following settings:

Detector	Peak
RBW	To identify clearly the individual channels, set the RBW to less than 30 % of the channel spacing or the 20 dB bandwidth, whichever is smaller.
VBW	≥RBW
Span	The frequency band of operation
Trace	Max hold
Sweep time	Auto couple

Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer.

Count the quantity of peaks to get the number of hopping channels.

FHSS Mode: 79 Channels observed.

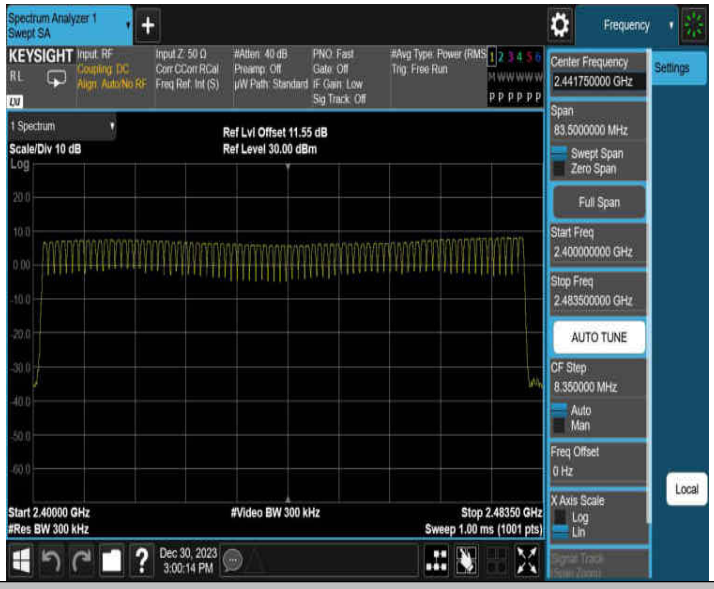
AFHSS Mode: 20 Channels declared.

12.4. Results

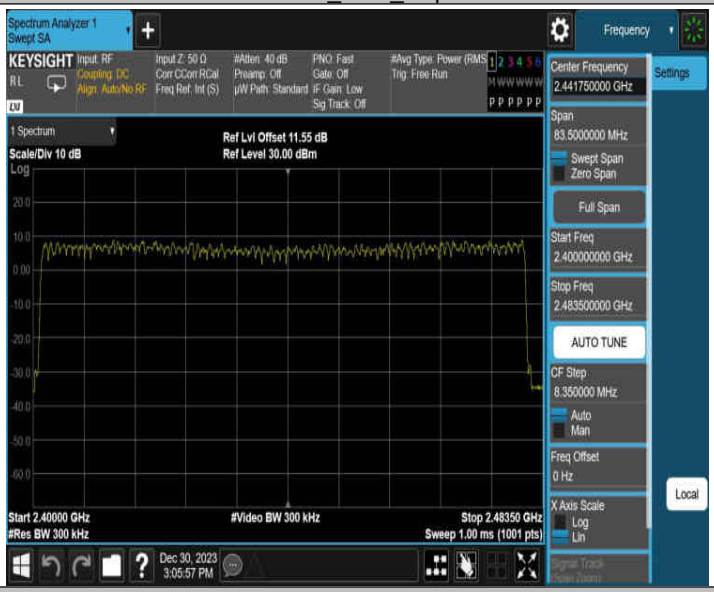
Test Mode	Ant.	Freq. (MHz)	Result (Num)	Limit (Num)	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

12.5. Original test data

DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop

13. Time of Occupancy (Dwell Time)

13.1. Block diagram of test setup

Same as section 8.1

13.2. Limits

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3		
Section	Test Item	Limit
CFR 47 15.247 (a) (1) III ISED RSS-247 Clause 5.1 (d)	Time of Occupancy (Dwell Time)	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.

13.3. Test Procedure

Connect the UUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Average
RBW	1 MHz
VBW	≥ RBW
Span	zero span
Trace	Clear Write
Sweep time	As necessary to capture the entire dwell time per hopping channel

Connect the UUT to the spectrum Analyzer and use the following settings:

a. The transmitter output (antenna port) was connected to the spectrum analyzer

b. Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.

c. Use a video trigger with the trigger level set to enable triggering only on full pulses.

d. Sweep Time is more than once pulse time.

e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.

f. Measure the maximum time duration of one single pulse.

g. Set the EUT for DH5, DH3 and DH1 packet transmitting.

h. Measure the maximum time duration of one single pulse.

A Period Time = (channel number)*0.4

For FHSS Mode (79 Channel):

DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)

DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)

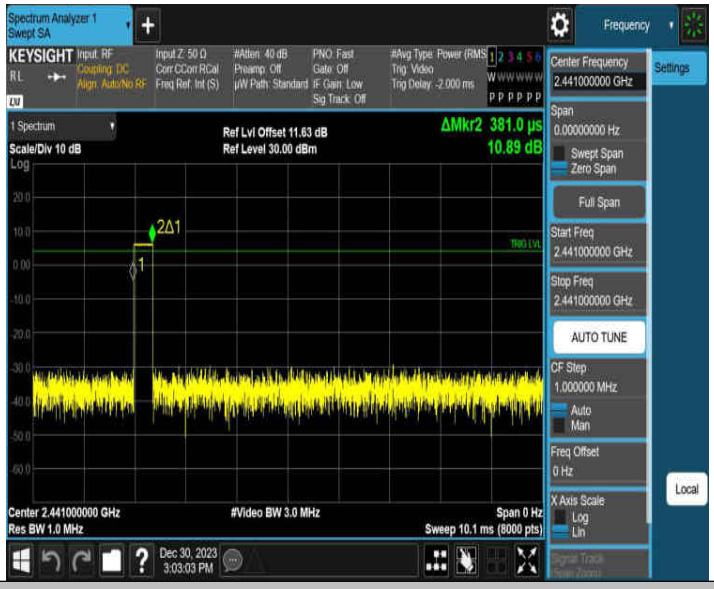
DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

13.4. Results

Test Mode	Ant.	Freq. (MHz)	Burst Width (ms)	Total Hops (Num)	Result (s)	Limit (s)	Verdict
DH1	Ant1	Hop	0.381	320	0.122	≤0.4	PASS
DH3	Ant1	Hop	1.637	160	0.262	≤0.4	PASS
DH5	Ant1	Hop	2.885	106.67	0.308	≤0.4	PASS
2DH1	Ant1	Hop	0.390	320	0.125	≤0.4	PASS
2DH3	Ant1	Hop	1.642	160	0.263	≤0.4	PASS
2DH5	Ant1	Hop	2.889	106.67	0.308	≤0.4	PASS
3DH1	Ant1	Hop	0.390	320	0.125	≤0.4	PASS
3DH3	Ant1	Hop	1.640	160	0.262	≤0.4	PASS
3DH5	Ant1	Hop	2.892	106.67	0.308	≤0.4	PASS

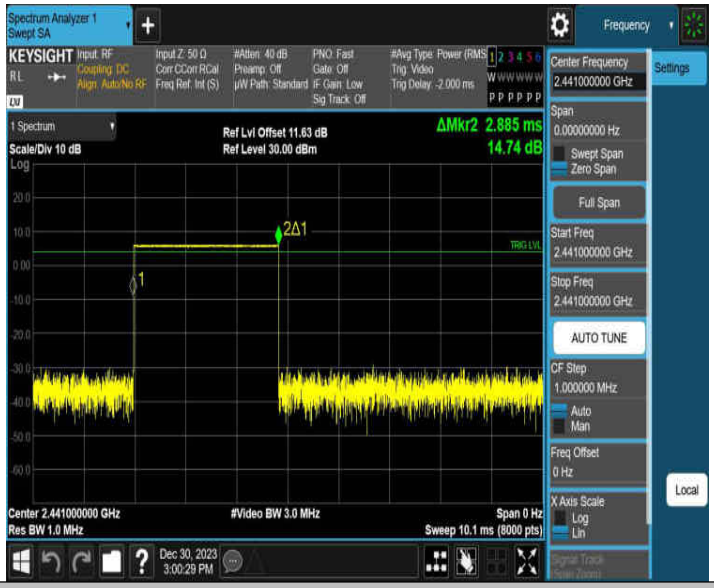
13.5. Original test data

DH1_Ant1_Hop

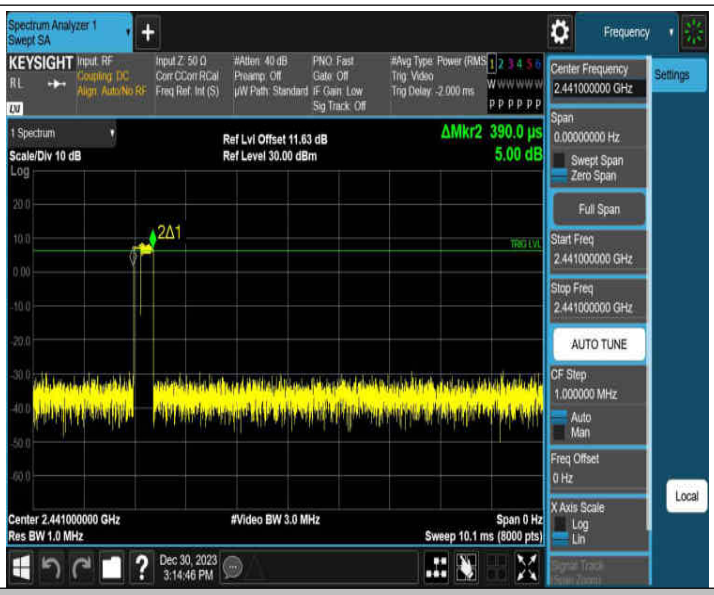


DH3_Ant1_Hop

DH5_Ant1_Hop



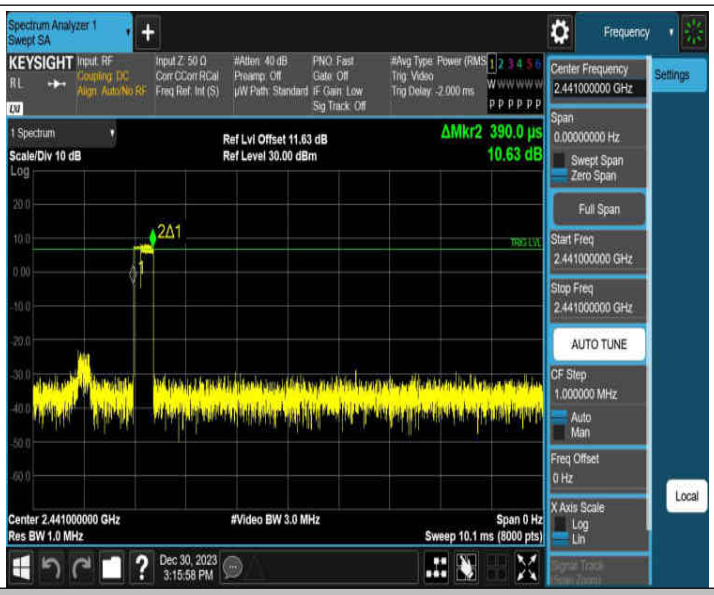
2DH1_Ant1_Hop



2DH3_Ant1_Hop

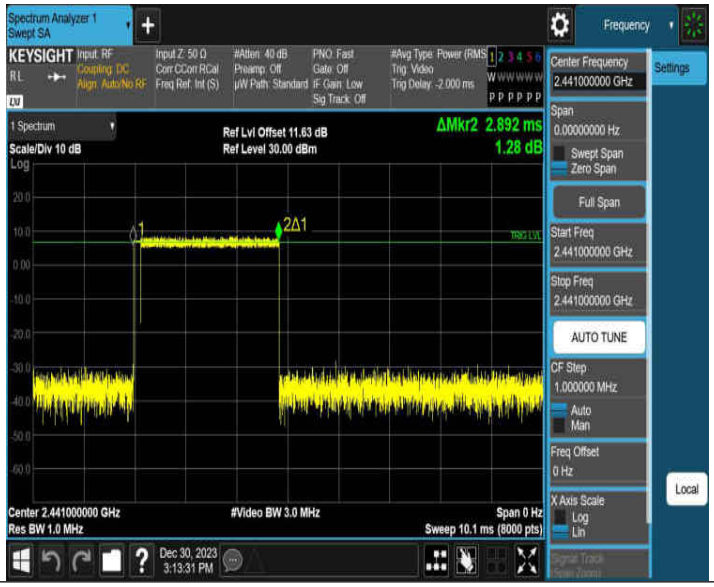
2DH5_Ant1_Hop

3DH1_Ant1_Hop



3DH3_Ant1_Hop

3DH5_Ant1_Hop



14. Conducted Spurious Emission

14.1. Block diagram of test setup

Same as section 8.1

14.2. Limits

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d) ISED RSS-247 5.5	Conducted Spurious Emission	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

14.3. Test Procedure

Please refer to the ANSI C63.10 section 6.10.

For Band edge use the following settings:

Detector	Peak
RBW	100 kHz
VBW	300 kHz
Span	wide enough to fully capture the emission being measured
Trace	Max hold
Sweep time	Auto couple.

For Spurious Emission use the following settings:

Detector	Peak
RBW	100 kHz
VBW	300 kHz
Span	wide enough to fully capture the emission being measured
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

14.4. Results

Band edge:

Test Mode	Ant.	Ch Name	Freq. (MHz)	Ref Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
DH5	Ant1	Low	2402	1.37	-48.82	≤-18.63	PASS
		High	2480	2.09	-48.38	≤-17.91	PASS
		Low	Hop_2402	6.93	-47.01	≤-13.07	PASS
		High	Hop_2480	7.98	-45.53	≤-12.02	PASS
2DH5	Ant1	Low	2402	0.71	-48.58	≤-19.29	PASS
		High	2480	6.99	-44.97	≤-13.01	PASS
		Low	Hop_2402	0.84	-48.99	≤-19.17	PASS
		High	Hop_2480	7.95	-45.85	≤-12.05	PASS
3DH5	Ant1	Low	2402	6.81	-45.82	≤-13.19	PASS
		High	2480	7.48	-45.74	≤-12.52	PASS
		Low	Hop_2402	4.45	-47.79	≤-15.55	PASS
		High	Hop_2480	7.77	-47.88	≤-12.23	PASS

Spurious Emission:

Test Mode	Ant.	Freq. (MHz)	Freq. Range (MHz)	Ref Level (dBm)	Result (dBm)	Limit (dBm)	Verdict
DH5	Ant1	2402	30~1000	1.37	-61.82	≤-18.63	PASS
			1000~26500	1.37	-49.52	≤-18.63	PASS
		2441	30~1000	2.71	-61.33	≤-17.29	PASS
			1000~26500	2.71	-45.52	≤-17.29	PASS
		2480	30~1000	2.09	-61.52	≤-17.91	PASS
			1000~26500	2.09	-50.02	≤-17.91	PASS
2DH5	Ant1	2402	30~1000	0.71	-59.45	≤-19.29	PASS
			1000~26500	0.71	-50.01	≤-19.29	PASS
		2441	30~1000	4.88	-62.05	≤-15.12	PASS
			1000~26500	4.88	-48.64	≤-15.12	PASS
		2480	30~1000	6.99	-59.69	≤-13.01	PASS
			1000~26500	6.99	-49.11	≤-13.01	PASS
3DH5	Ant1	2402	30~1000	6.81	-59.7	≤-13.19	PASS
			1000~26500	6.81	-49.4	≤-13.19	PASS
		2441	30~1000	6.92	-59.42	≤-13.08	PASS
			1000~26500	6.92	-49.42	≤-13.08	PASS
		2480	30~1000	7.48	-59.78	≤-12.52	PASS
			1000~26500	7.48	-49.19	≤-12.52	PASS

14.5. Original test data

Band edge:

DH5_Ant1_Low_2402

DH5_Ant1_High_2480

DH5_Ant1_Low_Hop_2402