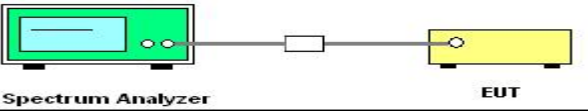


6.5. Carrier Frequencies Separation

6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2014
Limit:	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, whichever is greater.
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Hopping mode
Test Procedure:	1. The testing follows ANSI C63.10:2014 Measurement Guidelines. 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Enable the EUT hopping function. 5. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold. 6. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.
Test Result:	PASS

6.5.2. Test data

GFSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit ((2/3*20dB BW MHz))	Result
Lowest	0.996	0.636	PASS
Middle	1	0.636	PASS
Highest	0.994	0.628	PASS

Pi/4 DQPSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit ((2/3*20dB BW MHz))	Result
Lowest	1.01	0.909	PASS
Middle	1.006	0.889	PASS
Highest	1.002	0.892	PASS

8DPSK mode			
Test channel	Carrier Frequencies Separation (MHz)	Limit ((2/3*20dB BW MHz))	Result
Lowest	1.002	0.857	PASS
Middle	1.01	0.869	PASS
Highest	1.002	0.919	PASS

Test plots as follows:

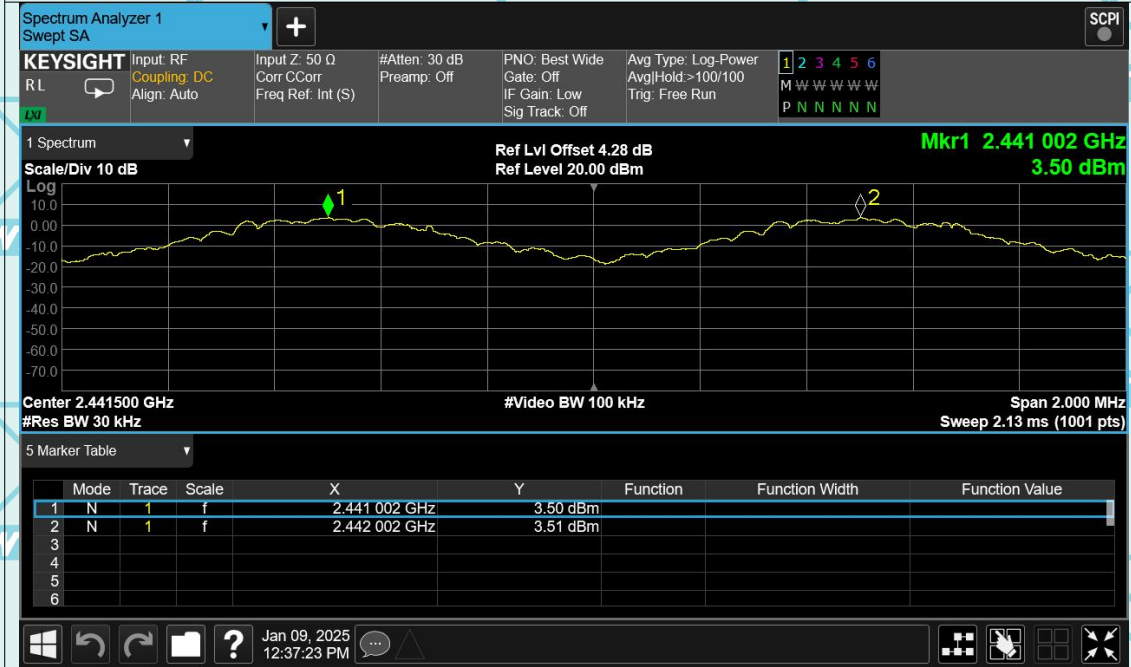
Report No.: WSCT-ANAB-R&E250100003A-BT

Test Graphs

CFS NVNT 1-DH5 2402MHz Ant1

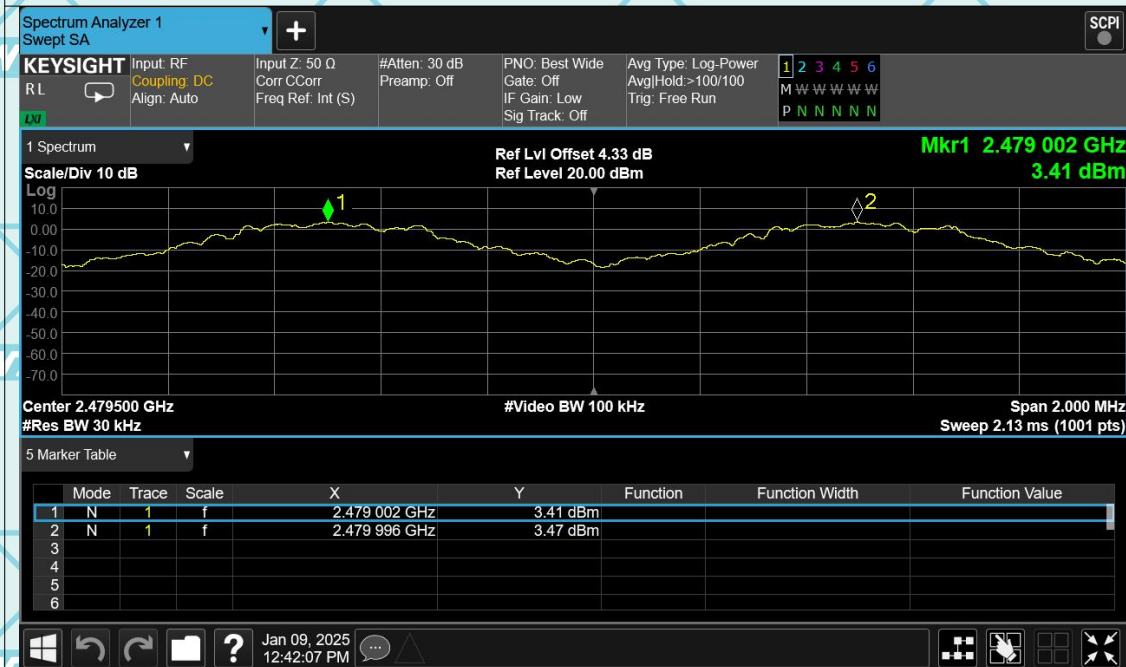


CFS NVNT 1-DH5 2441MHz Ant1

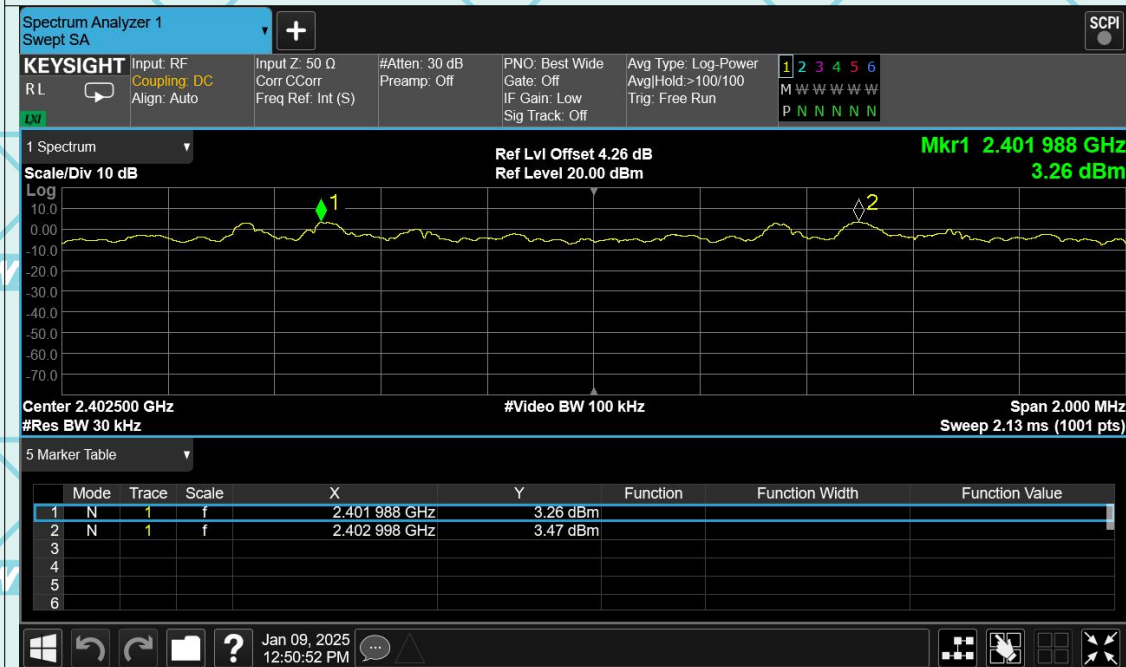


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CFS NVNT 1-DH5 2480MHz Ant1



CFS NVNT 2-DH5 2402MHz Ant1



Report No.: WSCT-ANAB-R&E250100003A-BT

CFS NVNT 2-DH5 2441MHz Ant1

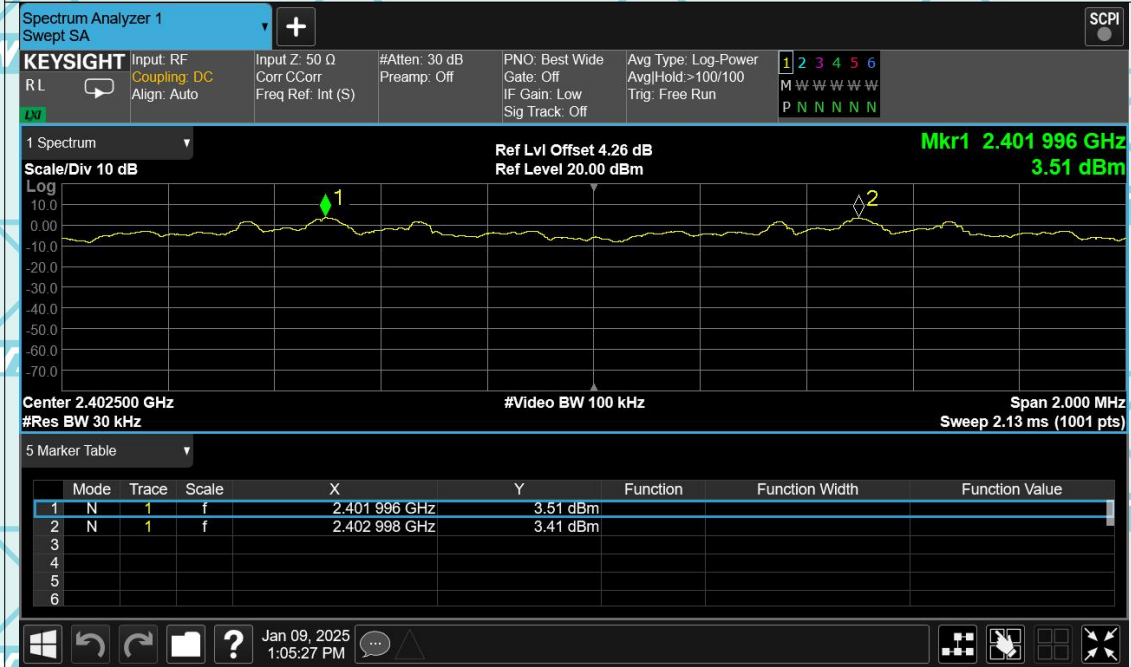


CFS NVNT 2-DH5 2480MHz Ant1



Report No.: WSCT-ANAB-R&E250100003A-BT

CFS NVNT 3-DH5 2402MHz Ant1

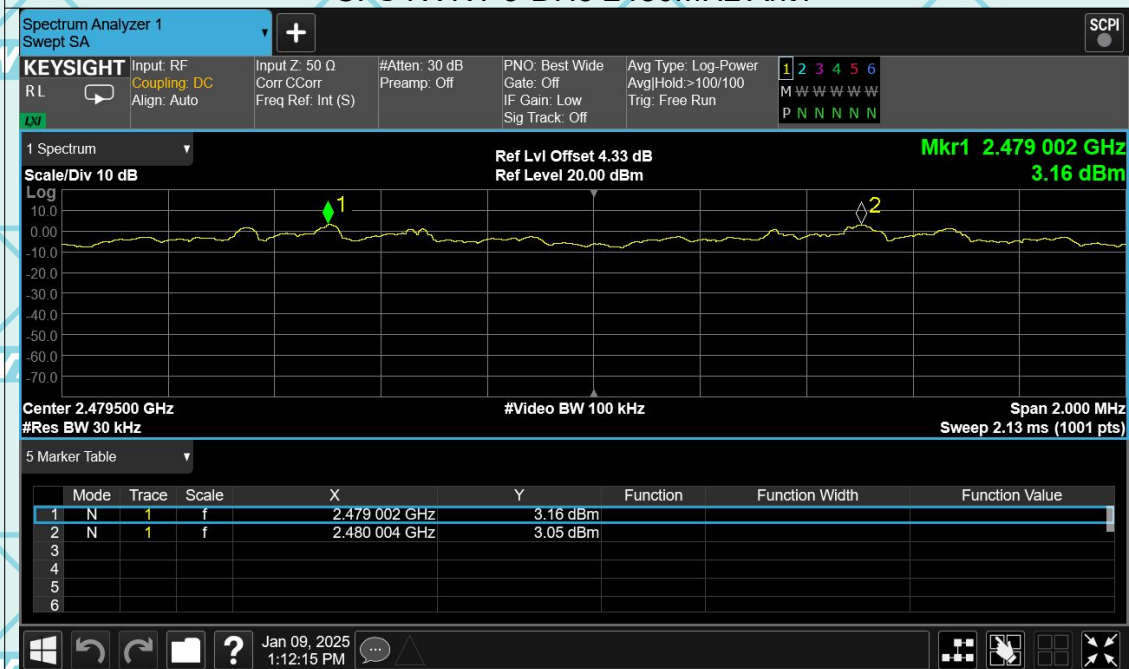


CFS NVNT 3-DH5 2441MHz Ant1



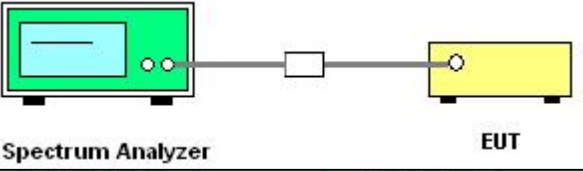
Report No.: WSCT-ANAB-R&E250100003A-BT

CFS NVNT 3-DH5 2480MHz Ant1



6.6. Hopping Channel Number

6.6.1. Test Specification

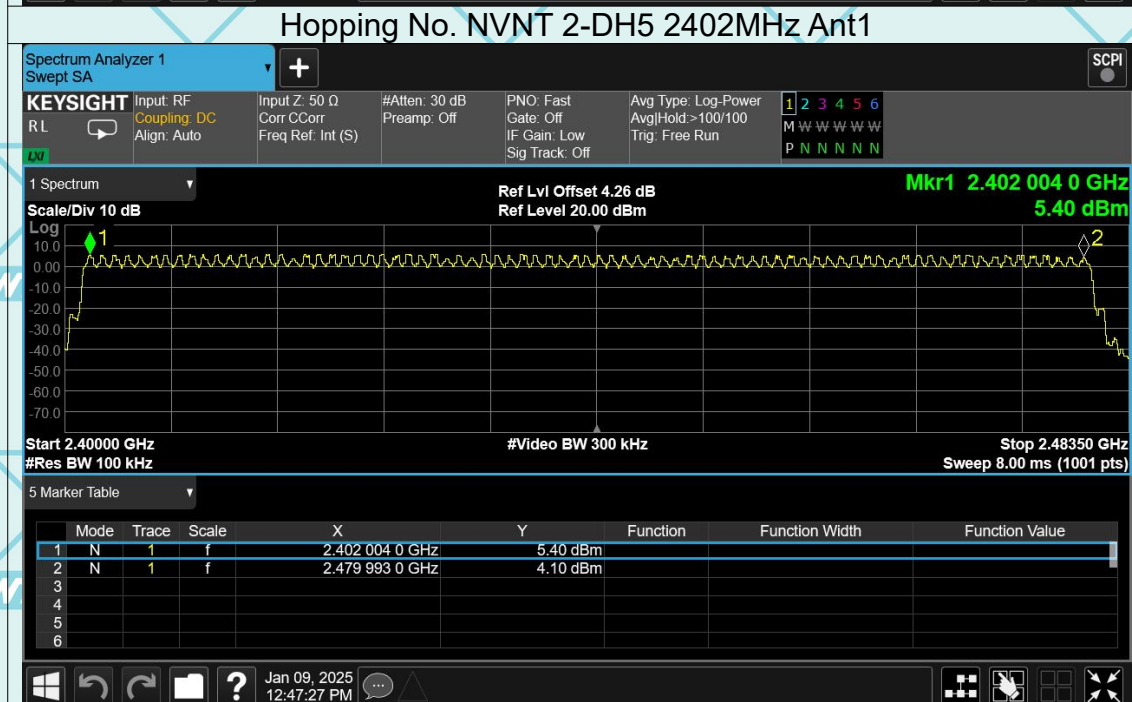
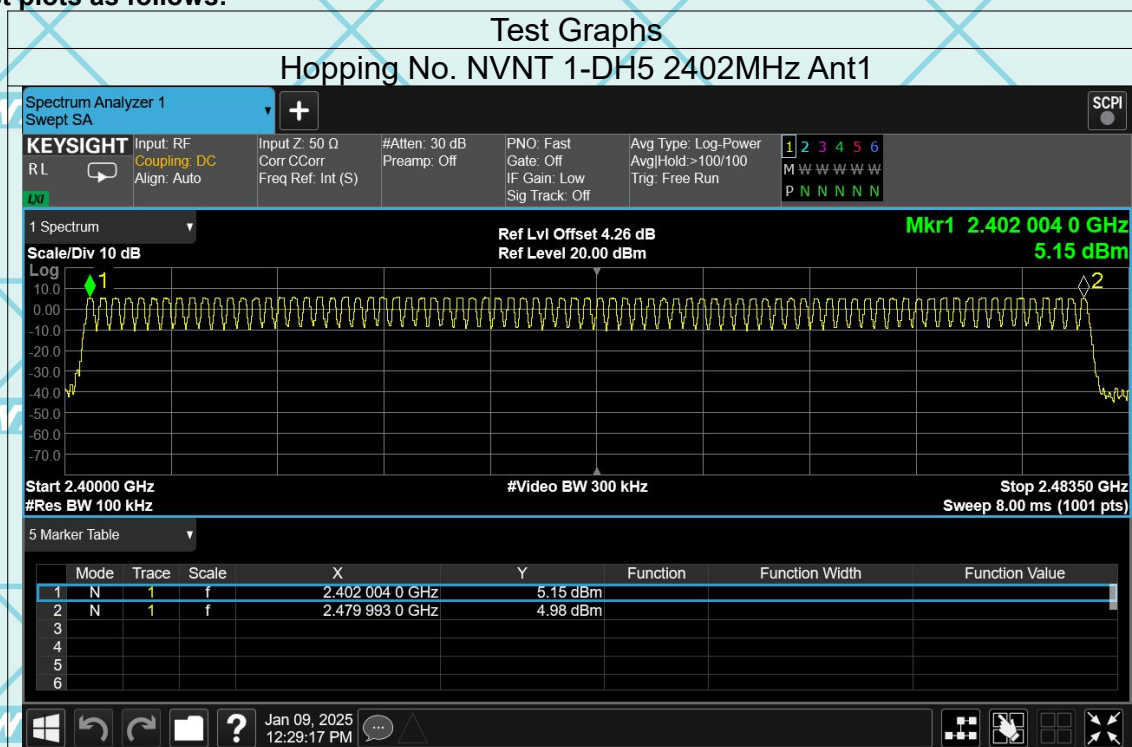
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2014
Limit:	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Hopping mode
Test Procedure:	1. The testing follows ANSI C63.10:2014 Measurement Guidelines. 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Enable the EUT hopping function. 5. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold. 6. The number of hopping frequency used is defined as the number of total channel. 7. Record the measurement data in report.
Test Result:	PASS

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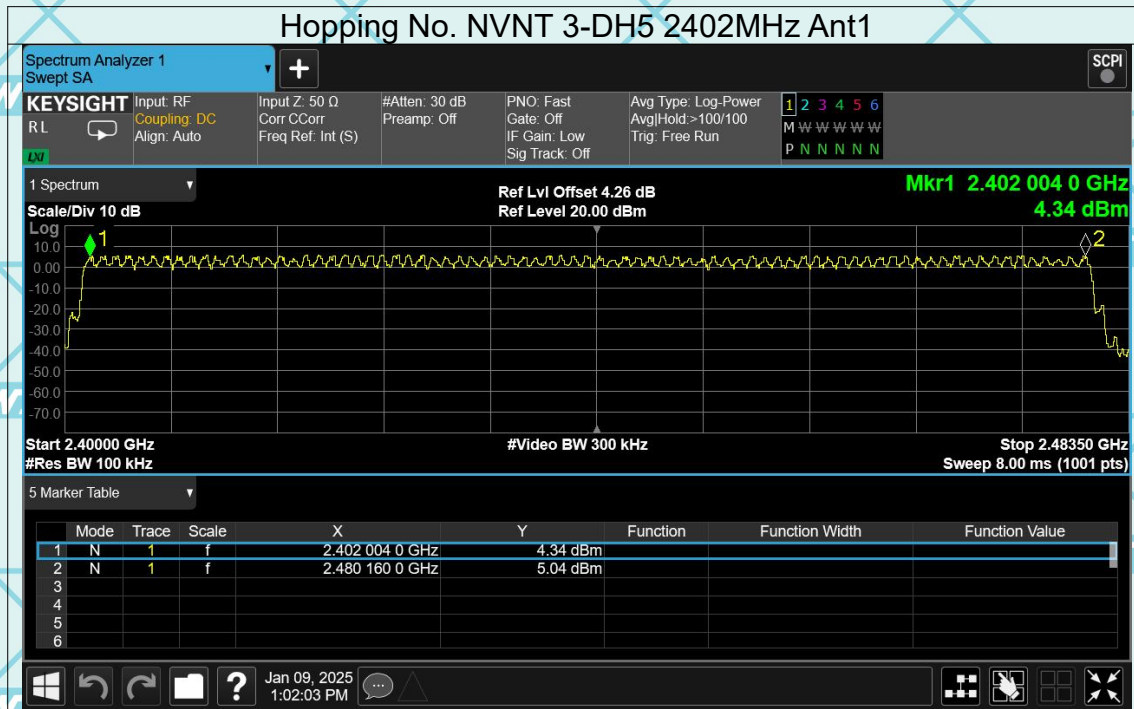
Test data

Mode	Hopping channel numbers	Limit	Result
GFSK, P/4-DQPSK, 8DPSK	79	15	PASS

Test plots as follows:

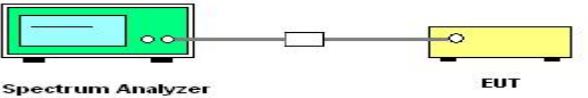


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6.7. Dwell Time

6.7.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2014
Limit:	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.
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Hopping mode
Test Procedure:	1. The testing follows ANSI C63.10:2014 Measurement Guidelines. 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Enable the EUT hopping function. 5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel; VBW $\geq$ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. 6. Measure and record the results in the test report.
Test Result:	PASS

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6.7.2. Test Data

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2402	0.384	122.112	318	31600	400	Pass
1-DH1	2441	0.384	122.496	319	31600	400	Pass
1-DH1	2480	0.382	121.476	318	31600	400	Pass
1-DH3	2402	1.638	265.356	162	31600	400	Pass
1-DH3	2441	1.638	255.528	156	31600	400	Pass
1-DH3	2480	1.639	257.323	157	31600	400	Pass
1-DH5	2402	2.888	352.336	122	31600	400	Pass
1-DH5	2441	2.887	256.943	89	31600	400	Pass
1-DH5	2480	2.888	294.576	102	31600	400	Pass

Note: 1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels.

For DH1, With channel hopping rate $(1600 / 2 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 2 / 79) \times (0.4 \times 79) = 320$ hops

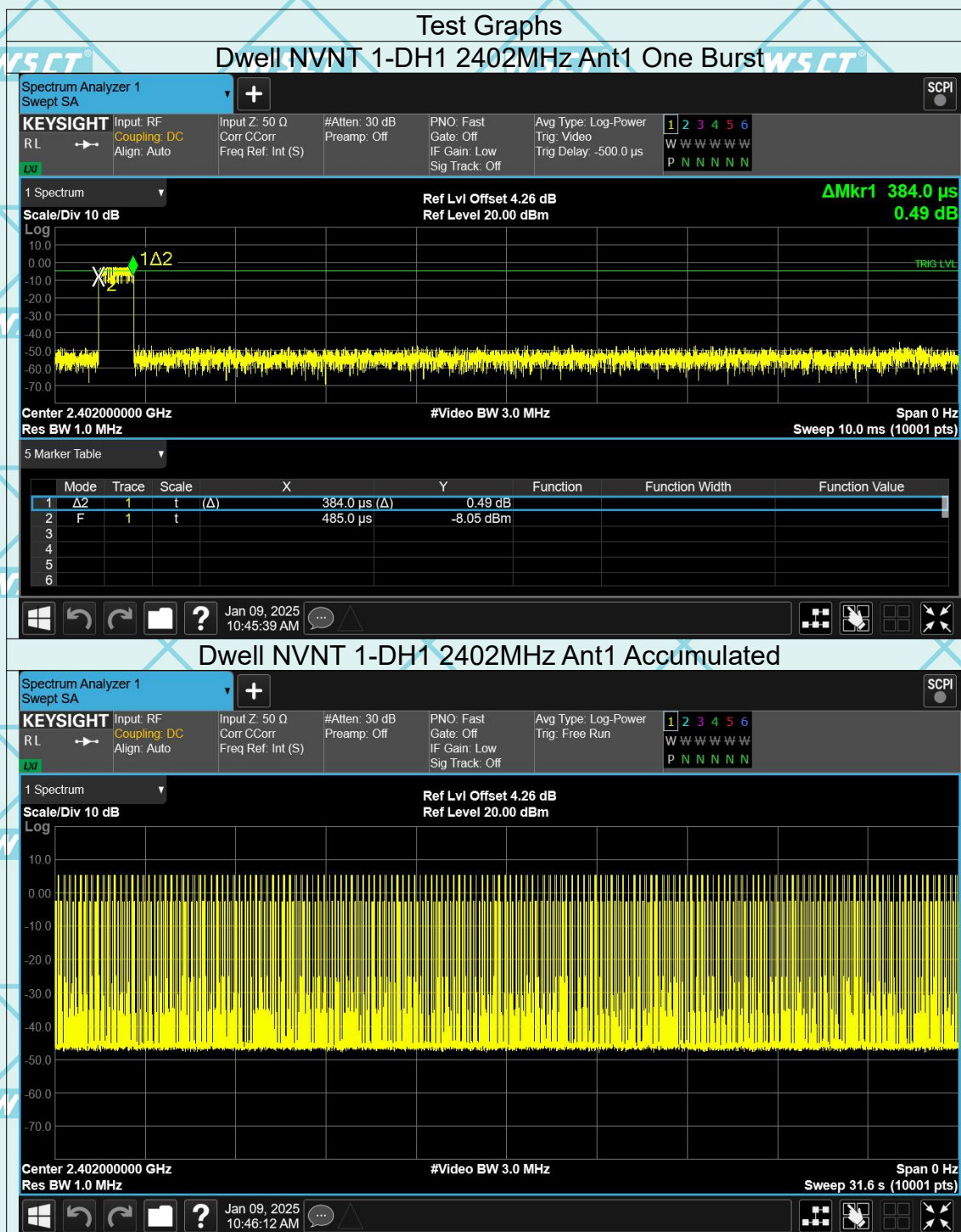
For DH3, With channel hopping rate $(1600 / 4 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 4 / 79) \times (0.4 \times 79) = 160$ hops

For DH5, With channel hopping rate $(1600 / 6 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops

2. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Test plots as follows:

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Dwell NVNT 1-DH1 2441MHz Ant1 One Burst



Dwell NVNT 1-DH1 2441MHz Ant1 Accumulated

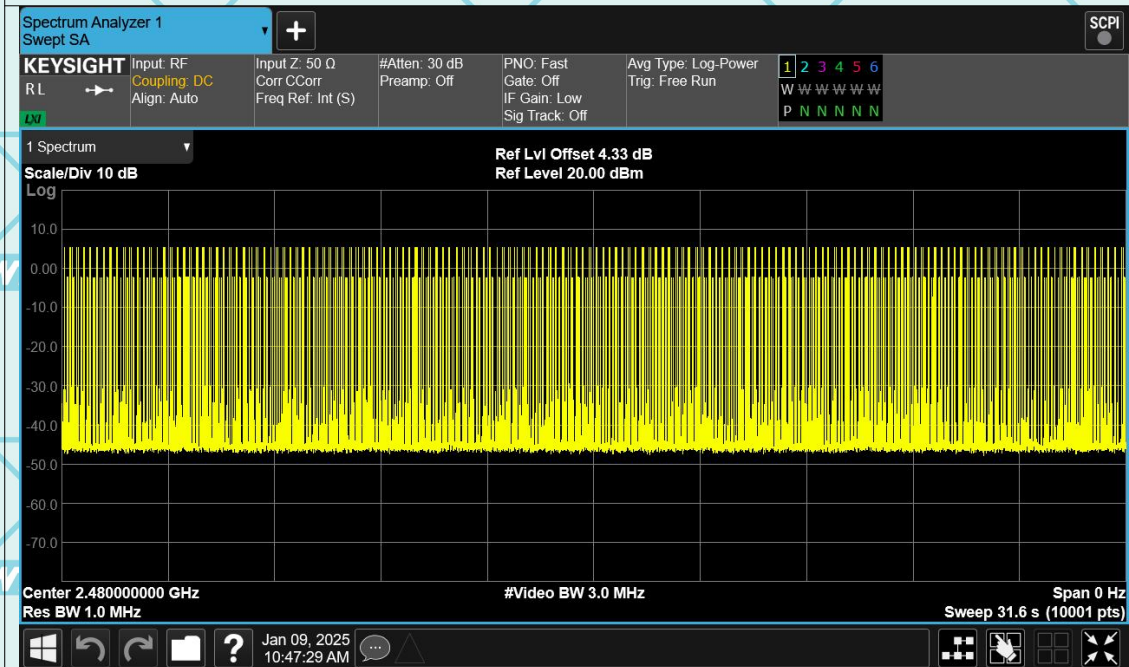


Report No.: WSCT-ANAB-R&E250100003A-BT

Dwell NVNT 1-DH1 2480MHz Ant1 One Burst



Dwell NVNT 1-DH1 2480MHz Ant1 Accumulated

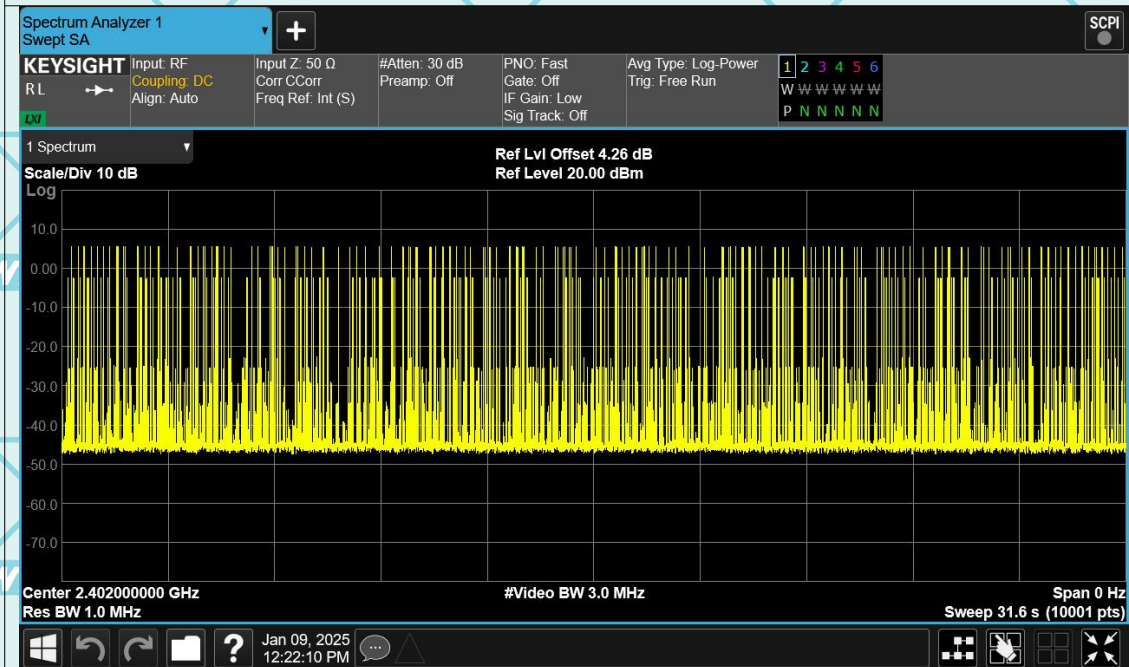


Report No.: WSCT-ANAB-R&E250100003A-BT

Dwell NVNT 1-DH3 2402MHz Ant1 One Burst



Dwell NVNT 1-DH3 2402MHz Ant1 Accumulated

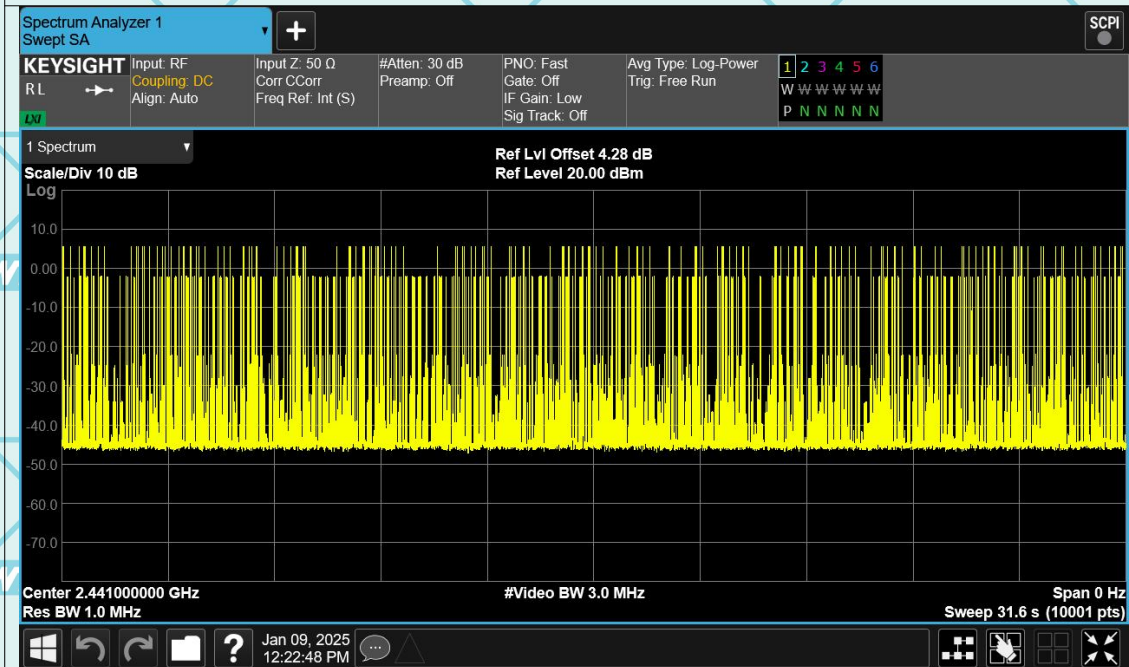


Report No.: WSCT-ANAB-R&E250100003A-BT

Dwell NVNT 1-DH3 2441MHz Ant1 One Burst

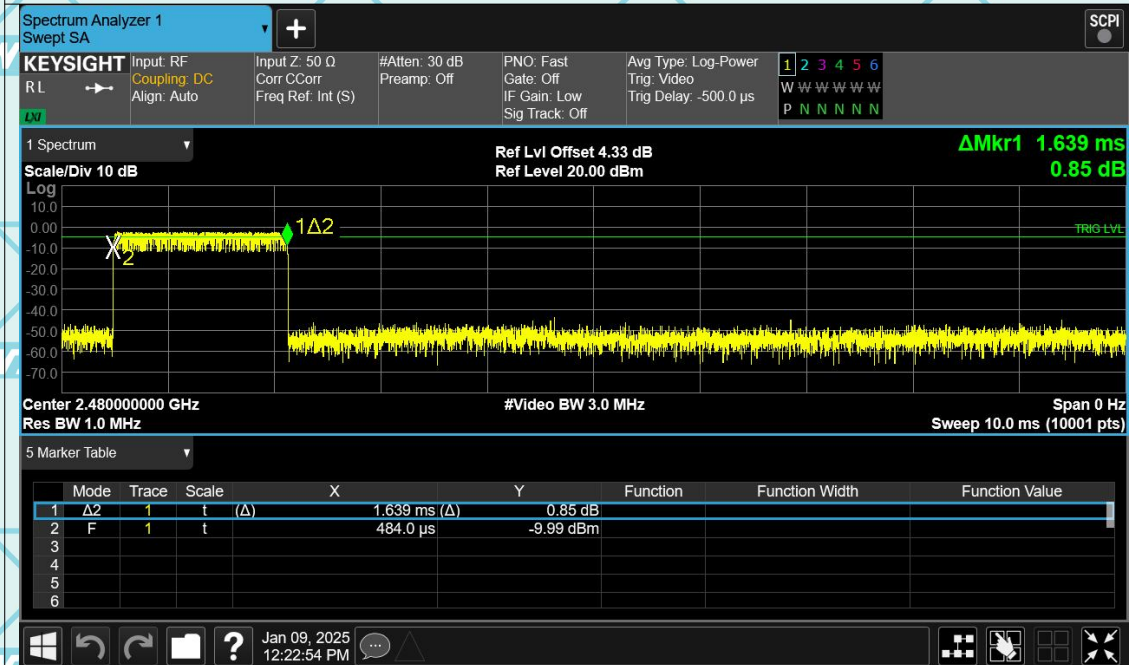


Dwell NVNT 1-DH3 2441MHz Ant1 Accumulated



Report No.: WSCT-ANAB-R&E250100003A-BT

Dwell NVNT 1-DH3 2480MHz Ant1 One Burst



Dwell NVNT 1-DH3 2480MHz Ant1 Accumulated

