4.3 TEST SETUP

The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Tune the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, the span is set to be greater than RBW.

4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

4.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

5. NUMBER OF HOPPING CHANNEL

5.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

5.3 TEST SETUP

5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

5.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

6. AVERAGE TIME OF OCCUPANCY

6.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

6.2 TEST PROCEDURE

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

b. Set RBW =1MHz/VBW =3MHz.

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.

The Dwell Time=Burst Width*Total Hops.The detailed calculations are showed as follows:

The duration for dwell time calculation: 0.4[s]*hopping number=0.4[s]*79[ch]=31.6[s*ch];

Dwell Time Calculate formula:

Dwell time = pulse time (ms) x pulse number in 31.6s

6.3 TEST SETUP

6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

6.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 LIMIT

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, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.2 TEST PROCEDURE
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 300 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

7.3 TEST SETUP

7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

8. BANDWIDTH TEST

8.1 LIMIT

FCC Part15 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)	Bandwidth	N/A	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 TEST PROCEDURE
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

8.3 TEST SETUP

8.4 EUT OPERATION CONDITIONS
Please refer to section 3.1.4 of this report.

8.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

9. OUTPUT POWER TEST

9.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)&(b)(1)	Output Power	1 W or 0.125W	2400-2483.5	PASS
		if channel separation > 2/3 bandwidthprovided thesystems operatewith an output power no greater than125 mW(20.97dBm)		

9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.

2) RBW > 20 dB bandwidth of the emission being measured.

3) VBW ≥ RBW.

4) Sweep: Auto.

5) Detector function: Peak.

6) Trace: Max hold.

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

e) A plot of the test results and setup description shall be included in the test report.

NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

9.3 TEST SETUP

9.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

9.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 EUT ANTENNA

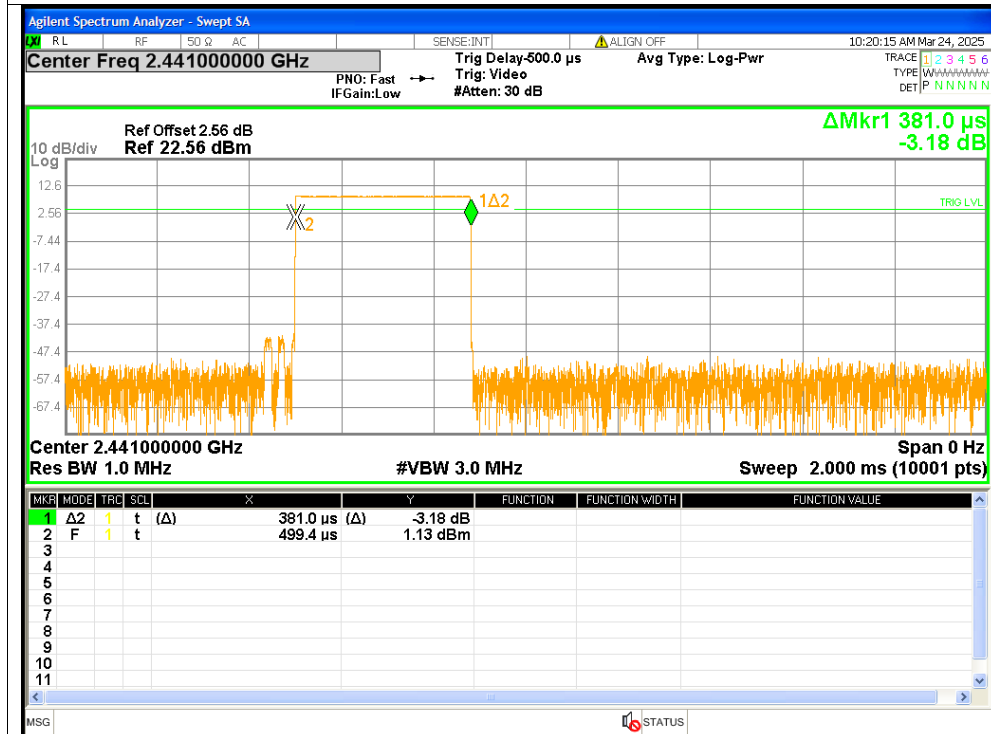The EUT antenna is PCB Antenna. It comply with the standard requirement.

APPENDIX 1-TEST DATA

1. Dwell Time

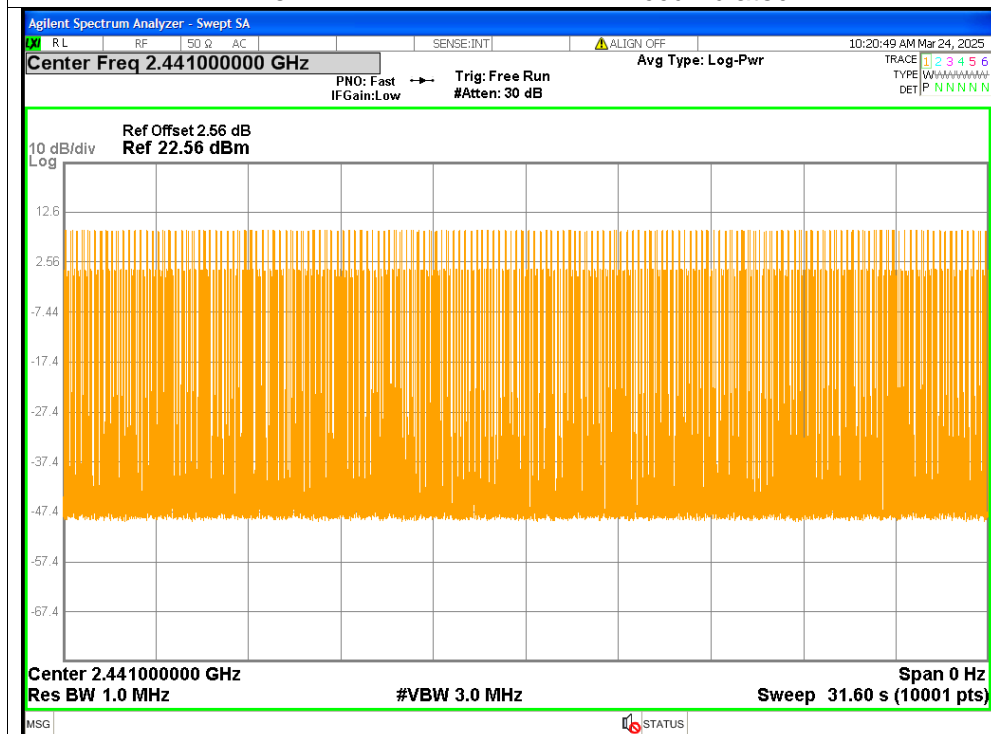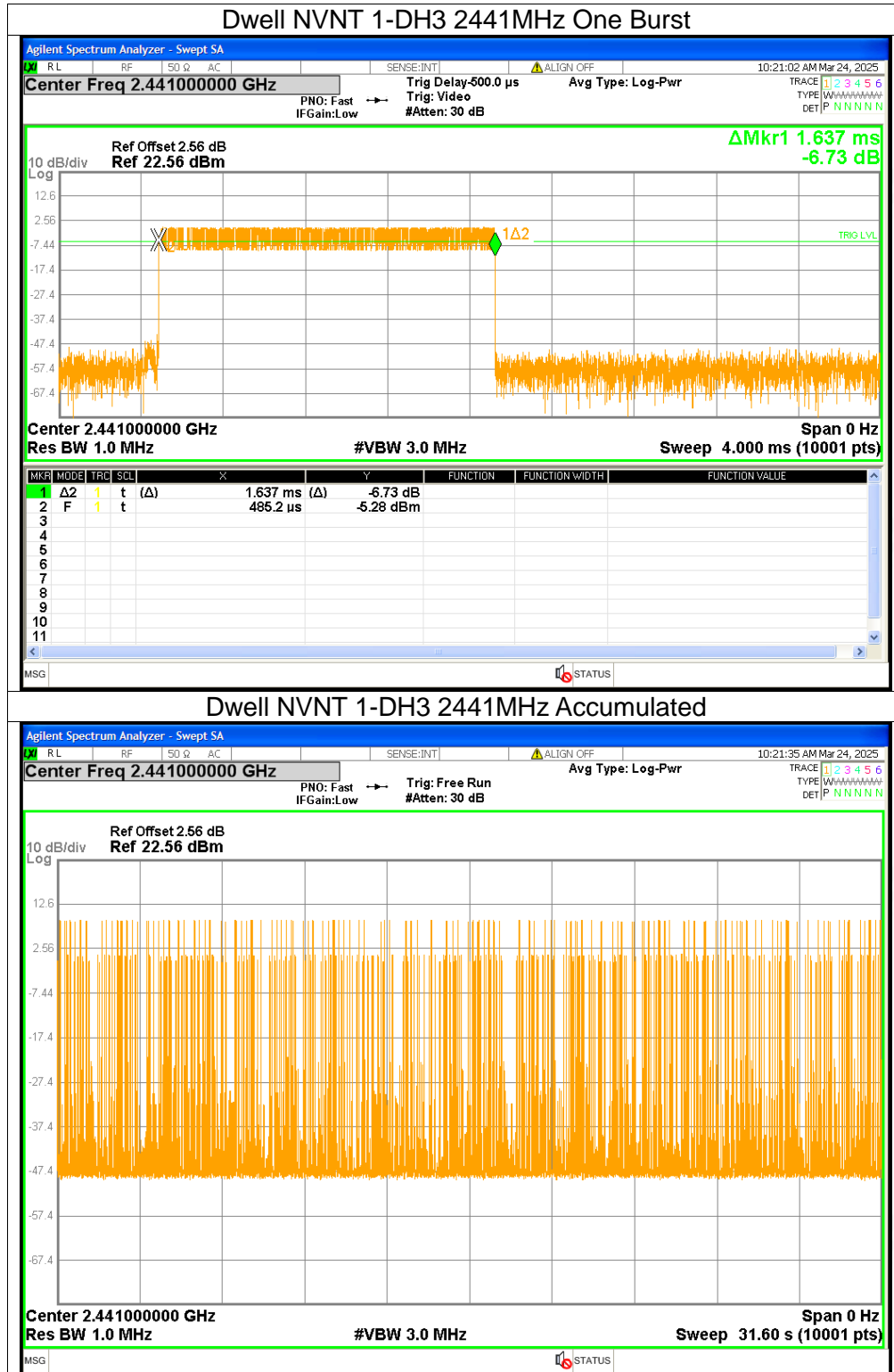| Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	0.381	120.777	317	31600	<=400	Pass
NVNT	1-DH3	2441	1.637	258.646	158	31600	<=400	Pass
NVNT	1-DH5	2441	2.885	279.845	97	31600	<=400	Pass
NVNT	2-DH1	2441	0.389	124.48	320	31600	<=400	Pass
NVNT	2-DH3	2441	1.642	264.362	161	31600	<=400	Pass
NVNT	2-DH5	2441	2.889	335.124	116	31600	<=400	Pass
NVNT	3-DH1	2441	0.389	124.091	319	31600	<=400	Pass
NVNT	3-DH3	2441	1.64	257.48	157	31600	<=400	Pass
NVNT	3-DH5	2441	2.891	312.228	108	31600	<=400	Pass

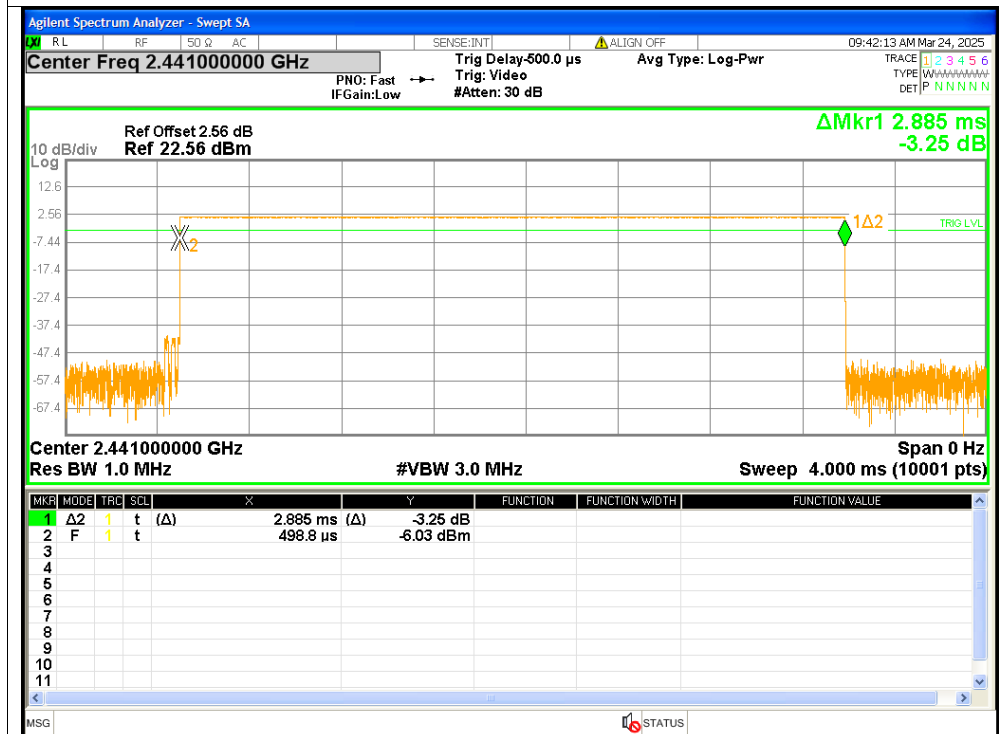## Test Graphs

Dwell NVNT 1-DH1 2441MHz One Burst
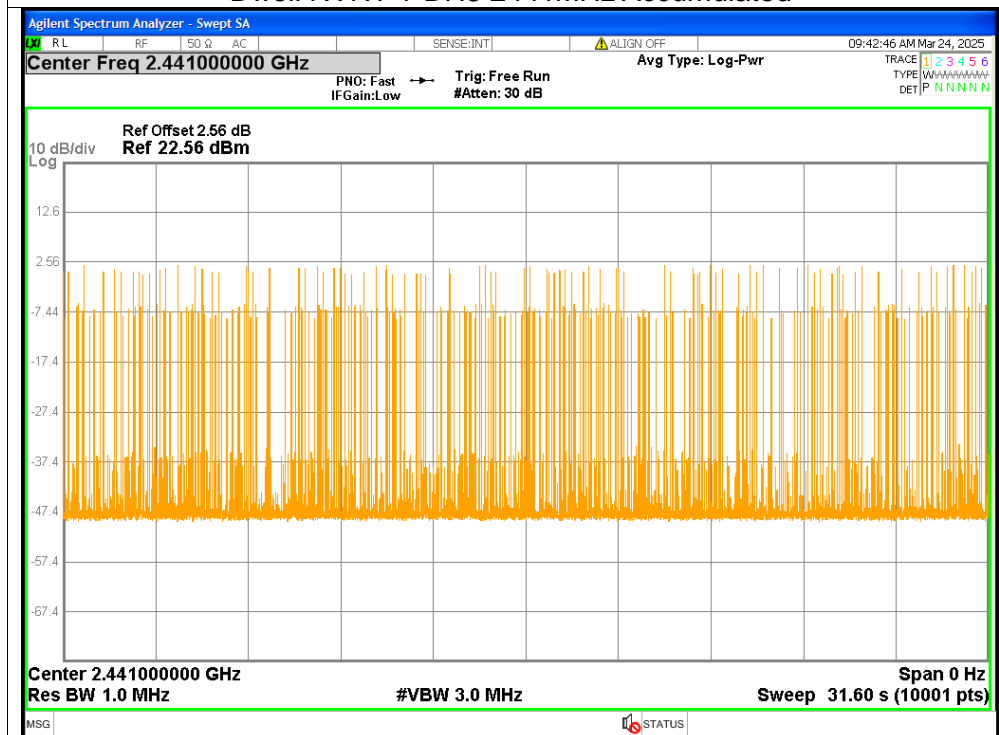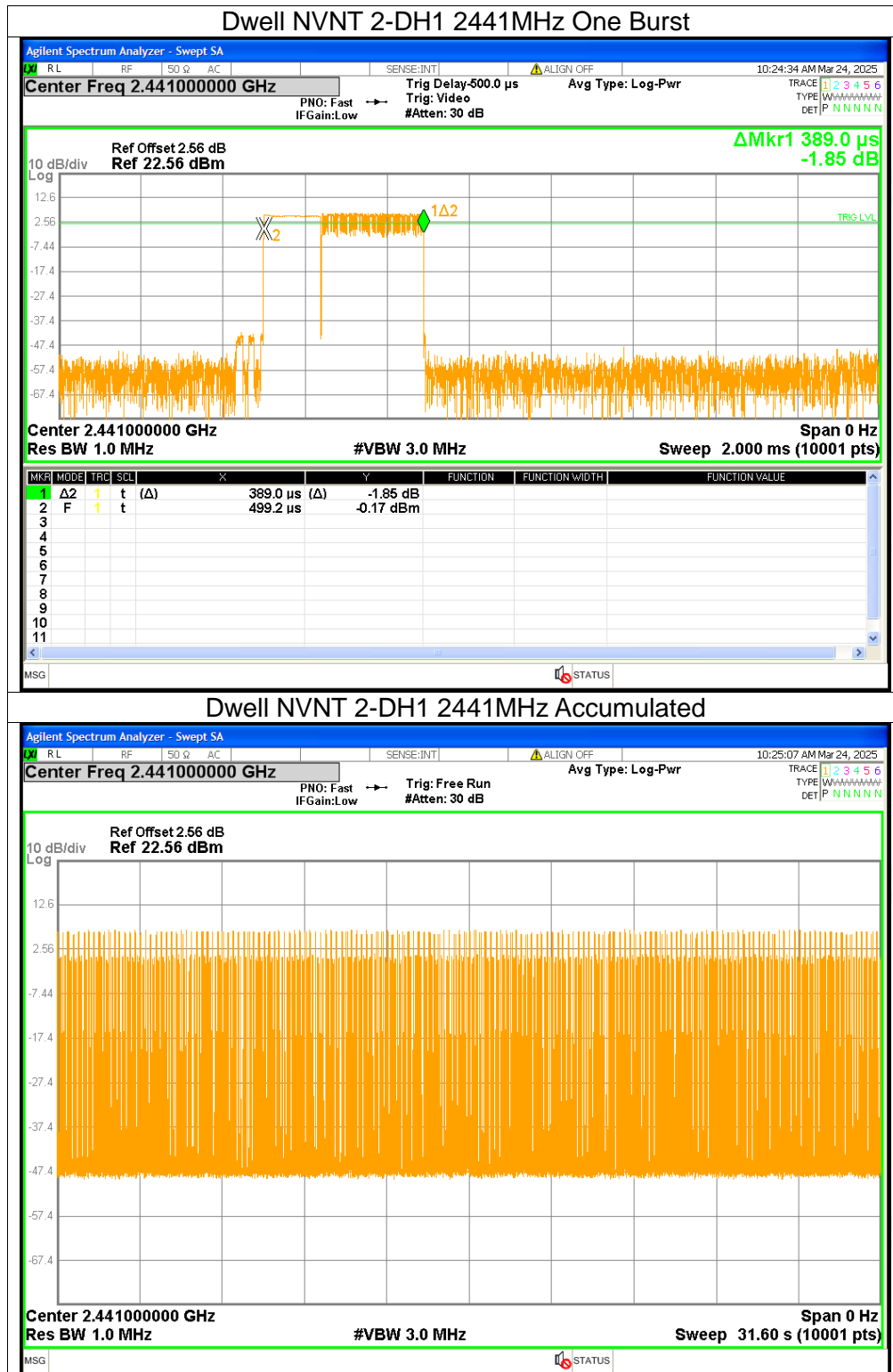

Dwell NVNT 1-DH1 2441MHz Accumulated

Dwell NVNT 1-DH3 2441MHz One Burst

Dwell NVNT 1-DH3 2441MHz Accumulated

Dwell NVNT 1-DH5 2441MHz One Burst

Agilent Spectrum Analyzer - Swept SA

| | | RF | 50 Ω | AC | | SENSE:INT | ⚠ ALIGN OFF | 09:42:13 AM Mar 24, 2025 |

R L

Center Freq 2.441000000 GHz

PNO: Fast →
IFGain:Low

Trig Delay-500.0 µs
Trig: Video
#Atten: 30 dB

Avg Type: Log-Pwr

TRACE 1 2 3 4 5 6
TYPE WWWWWW
DET P N N N N N

Ref Offset 2.56 dB
Ref 22.56 dBm

10 dB/div
Log

ΔMkr1 2.885 ms
-3.25 dB

12.6
2.56
-7.44
-17.4
-27.4
-37.4
-47.4
-57.4
-67.4

1Δ2
TRIG LVL

Center 2.441000000 GHz
Res BW 1.0 MHz   **#VBW 3.0 MHz**   **Span 0 Hz**
Sweep 4.000 ms (10001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	1	t (Δ)	2.885 ms (Δ)	-3.25 dB			
2	F	1	t	498.8 µs	-6.03 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG   STATUS

Dwell NVNT 1-DH5 2441MHz Accumulated

Agilent Spectrum Analyzer - Swept SA

| | | RF | 50 Ω | AC | | SENSE:INT | ⚠ ALIGN OFF | 09:42:46 AM Mar 24, 2025 |

R L

Center Freq 2.441000000 GHz

PNO: Fast →
IFGain:Low

Trig: Free Run
#Atten: 30 dB

Avg Type: Log-Pwr

TRACE 1 2 3 4 5 6
TYPE WWWWWW
DET P N N N N N

Ref Offset 2.56 dB
Ref 22.56 dBm

10 dB/div
Log

12.6
2.56
-7.44
-17.4
-27.4
-37.4
-47.4
-57.4
-67.4

Center 2.441000000 GHz
Res BW 1.0 MHz   **#VBW 3.0 MHz**   **Span 0 Hz**
Sweep 31.60 s (10001 pts)

MSG   STATUS

Dwell NVNT 2-DH1 2441MHz One Burst

Dwell NVNT 2-DH1 2441MHz Accumulated
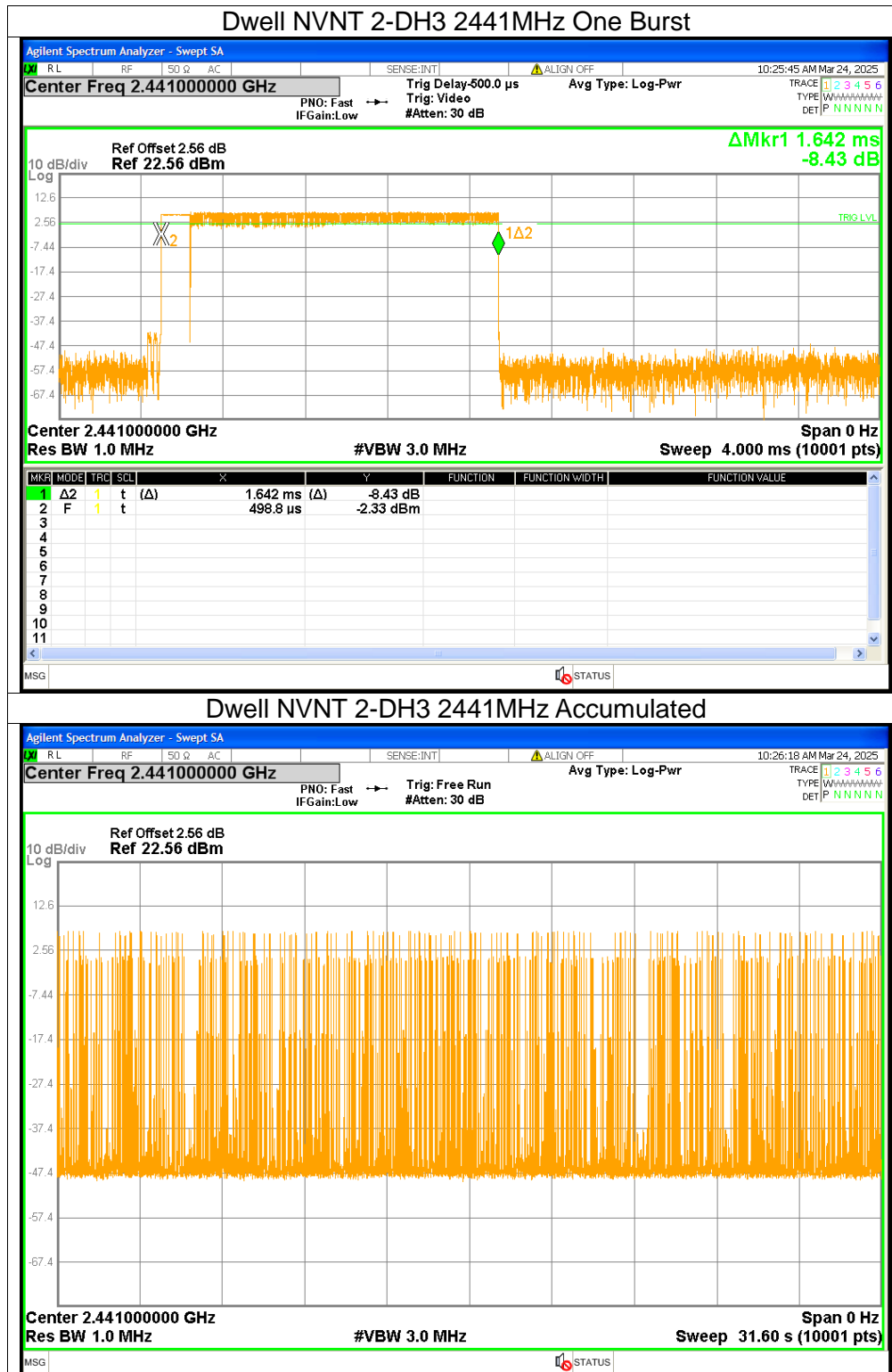
Dwell NVNT 2-DH3 2441MHz One Burst

Dwell NVNT 2-DH3 2441MHz Accumulated

Dwell NVNT 2-DH5 2441MHz One Burst

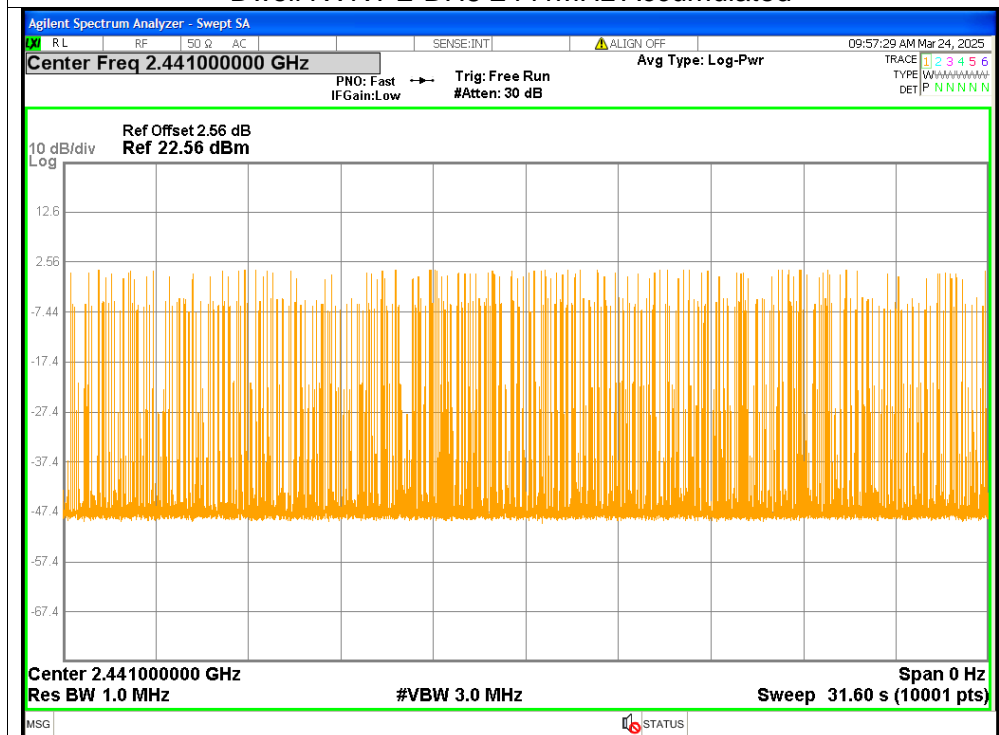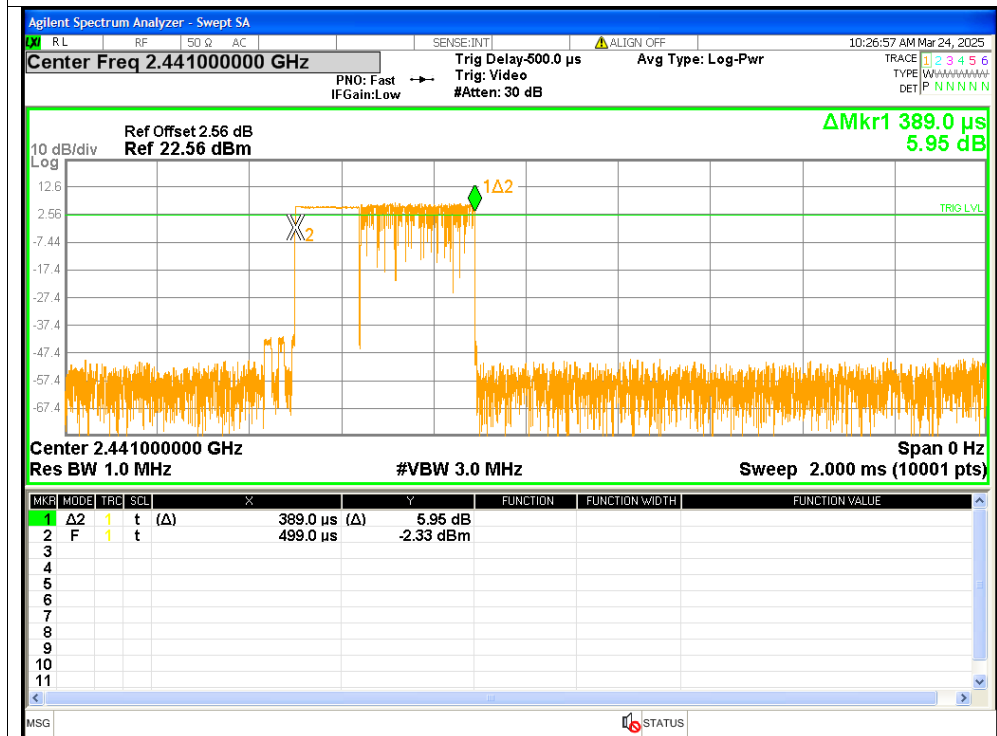## Dwell NVNT 2-DH5 2441MHz Accumulated

Dwell NVNT 3-DH1 2441MHz One Burst

Dwell NVNT 3-DH1 2441MHz Accumulated