BCTC

Power NVNT 3-DH1 2480MHz

Agilent Spectrum Analyzer - Swept SA

R L   RF   50 Ω   AC   SENSE:INT   ALIGN AUTO   11:47:15 PM May 30, 2024

Center Freq 2.480000000 GHz

PNO: Fast →   Trig: Free Run   Avg Type: Log-Pwr   TRACE 1 2 3 4 5 6
IFGain:Low   #Atten: 30 dB   Avg|Hold: 100/100   TYPE M W W W W W
                                                                          DET P N N N N N

Ref Offset 2.61 dB   **Mkr1 2.479 992 GHz**
10 dB/div   **Ref 20.00 dBm**   **1.161 dBm**
Log

Center 2.480000 GHz   Span 10.00 MHz
#Res BW 2.0 MHz   #VBW 6.0 MHz   Sweep   1.333 ms (10001 pts)

MSG   STATUS

Frequency

Auto Tune

Center Freq
2.480000000 GHz

Start Freq
2.475000000 GHz

Stop Freq
2.485000000 GHz

CF Step
1.000000 MHz
Auto   Man

Freq Offset
0 Hz

12. Hopping Channel Separation

12.1 Block Diagram Of Test Setup

12.2 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 0.125W.

12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.
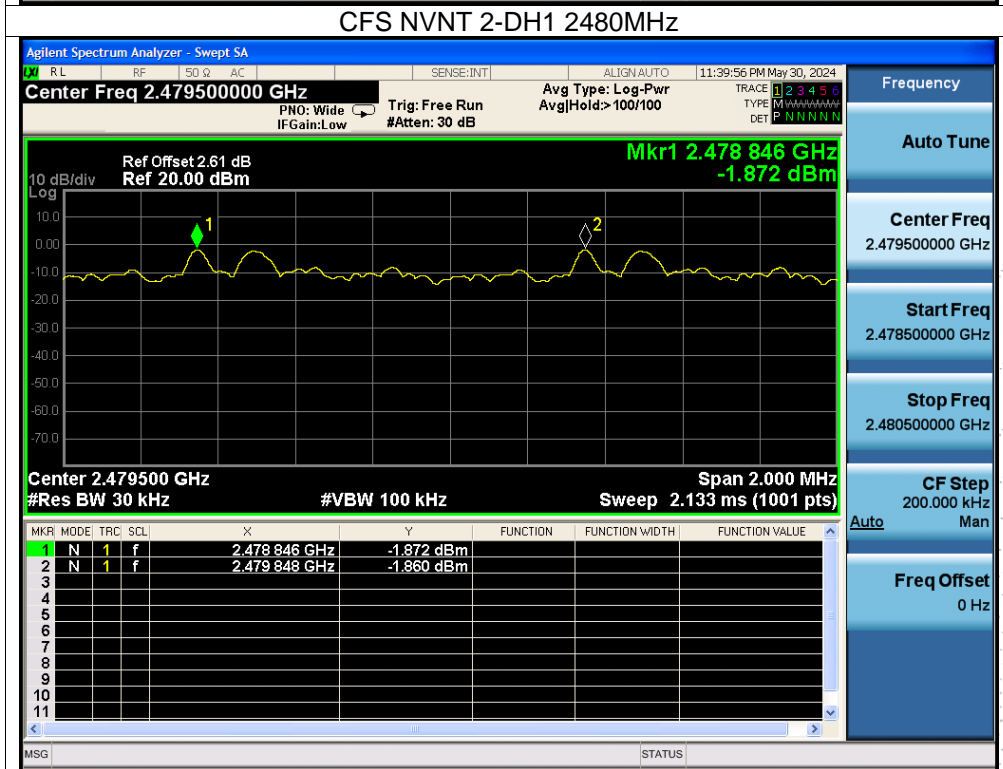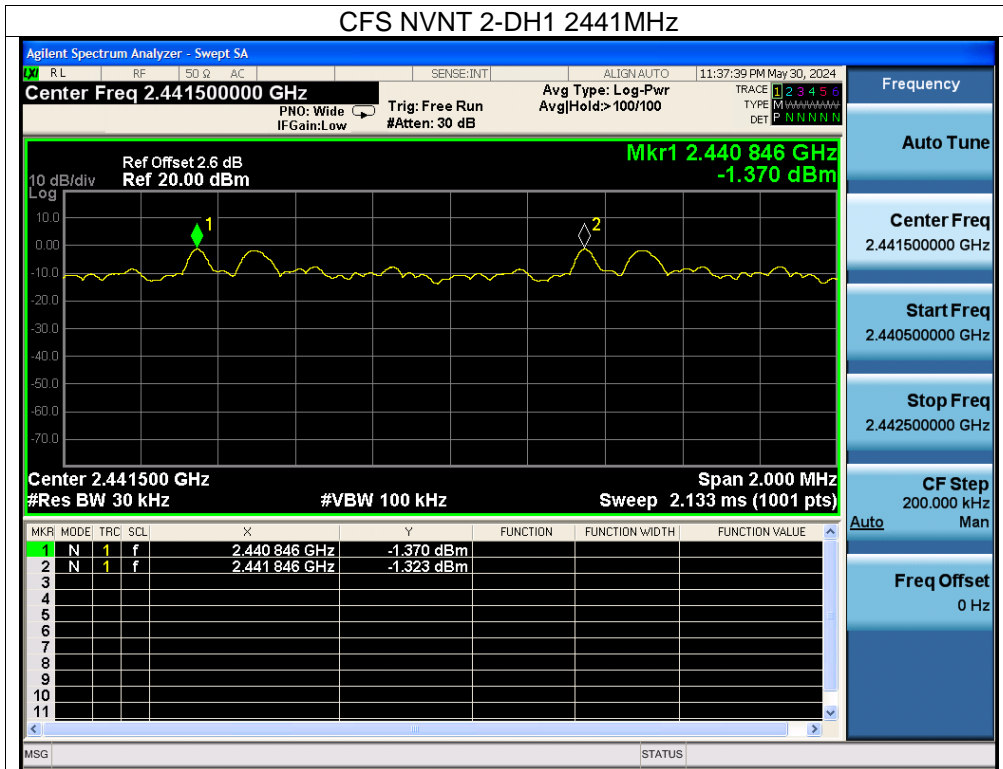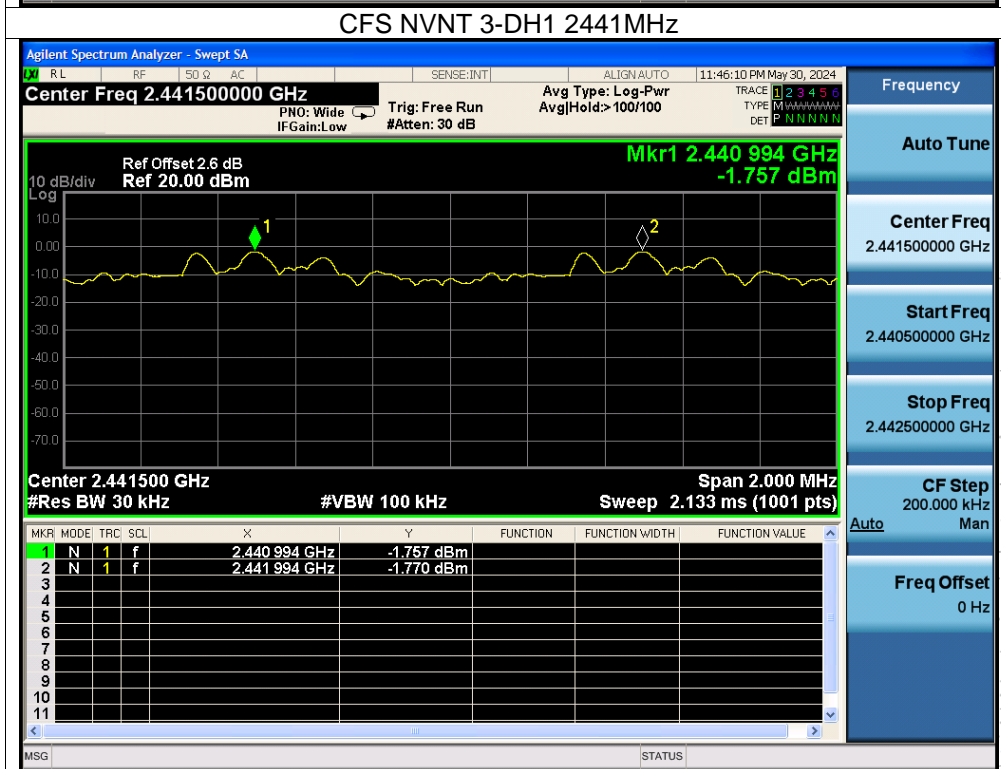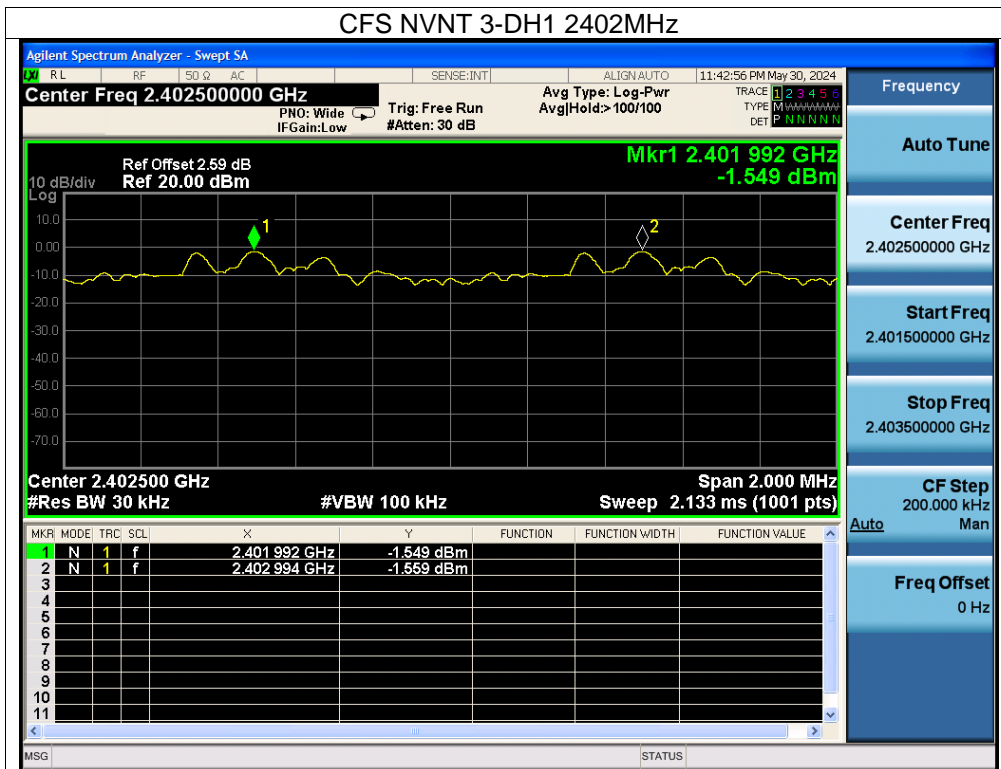
12.4 Test Result

Temperature:	26℃		Relative Humidity:	54%
Test Voltage:	DC 3.7V		Remark:	N/A

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2401.846	2402.846	1	0.577	Pass
NVNT	1-DH1	2440.848	2441.846	0.998	0.625	Pass
NVNT	1-DH1	2478.846	2479.846	1	0.567	Pass
NVNT	2-DH1	2401.846	2402.846	1	0.833	Pass
NVNT	2-DH1	2440.846	2441.846	1	0.816	Pass
NVNT	2-DH1	2478.846	2479.848	1.002	0.833	Pass
NVNT	3-DH1	2401.992	2402.994	1.002	0.803	Pass
NVNT	3-DH1	2440.994	2441.994	1	0.825	Pass
NVNT	3-DH1	2478.99	2479.99	1	0.807	Pass

Test Graphs

CFS NVNT 1-DH1 2402MHz

CFS NVNT 1-DH1 2441MHz

BCTC

CFS NVNT 1-DH1 2480MHz

Agilent Spectrum Analyzer - Swept SA

| X | R L | RF | 50 Ω | AC | | SENSE:INT | | ALIGN AUTO | 11:31:01 PM May 30, 2024 |

Center Freq 2.479500000 GHz

PNO: Wide
IFGain:Low

Trig: Free Run
#Atten: 30 dB

Avg Type: Log-Pwr
Avg|Hold:> 100/100

TRACE 1 2 3 4 5 6
TYPE M W W W W W
DET P N N N N N

Frequency

Auto Tune

Center Freq
2.479500000 GHz

Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Auto   Man

Freq Offset
0 Hz

Ref Offset 2.61 dB
Ref 20.00 dBm
10 dB/div
Log

Mkr1 2.478 846 GHz
-1.833 dBm

Center 2.479500 GHz
#Res BW 30 kHz   #VBW 100 kHz

Span 2.000 MHz
Sweep 2.133 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.478 846 GHz	-1.833 dBm			
2	N	1	f	2.479 846 GHz	-1.828 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG   STATUS

CFS NVNT 2-DH1 2402MHz

Agilent Spectrum Analyzer - Swept SA

| X | R L | RF | 50 Ω | AC | | SENSE:INT | | ALIGN AUTO | 11:34:51 PM May 30, 2024 |

Center Freq 2.402500000 GHz

PNO: Wide
IFGain:Low

Trig: Free Run
#Atten: 30 dB

Avg Type: Log-Pwr
Avg|Hold:> 100/100

TRACE 1 2 3 4 5 6
TYPE M W W W W W
DET P N N N N N

Frequency

Auto Tune

Center Freq
2.402500000 GHz

Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Auto   Man

Freq Offset
0 Hz

Ref Offset 2.59 dB
Ref 20.00 dBm
10 dB/div
Log

Mkr1 2.401 846 GHz
-1.129 dBm

Center 2.402500 GHz
#Res BW 30 kHz   #VBW 100 kHz

Span 2.000 MHz
Sweep 2.133 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401 846 GHz	-1.129 dBm			
2	N	1	f	2.402 846 GHz	-1.076 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG   STATUS

CFS NVNT 2-DH1 2441MHz

CFS NVNT 2-DH1 2480MHz

CFS NVNT 3-DH1 2402MHz

CFS NVNT 3-DH1 2441MHz

CFS NVNT 3-DH1 2480MHz

Agilent Spectrum Analyzer - Swept SA

L×I R L	RF	50 Ω AC	SENSE:INT	ALIGN AUTO	12:40:50 AM May 31, 2024

Center Freq 2.479500000 GHz

PNO: Wide
IFGain:Low

Trig: Free Run
#Atten: 30 dB

Avg Type: Log-Pwr
Avg|Hold:> 100/100

TRACE 1 2 3 4 5 6
TYPE M W W W W W
DET P N N N N N

Ref Offset 2.61 dB
Ref 20.00 dBm
10 dB/div
Log

Mkr1 2.478 990 GHz
-2.310 dBm

10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0

Center 2.479500 GHz
#Res BW 30 kHz

#VBW 100 kHz

Span 2.000 MHz
Sweep 2.133 ms (1001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.478 990 GHz	-2.310 dBm			
2	N	1	f	2.479 990 GHz	-2.336 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG

STATUS

Frequency

Auto Tune

Center Freq
2.479500000 GHz

Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Auto   Man

Freq Offset
0 Hz

13.   Number Of Hopping Frequency

13.1   Block Diagram Of Test Setup

13.2   Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

13.3   Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of   this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

13.4   Test Result

Temperature:	26℃	Relative Humidity:	54%
Test Voltage:	DC 3.7V	Remark:	N/A

Condition	Mode	Hopping Number	Limit	Verdict
NVNT	1-DH1	79	15	Pass
NVNT	2-DH1	79	15	Pass
NVNT	3-DH1	79	15	Pass

Test Graphs

Hopping No. NVNT 1-DH1 2441MHz

Hopping No. NVNT 2-DH1 2441MHz

Hopping No. NVNT 3-DH1 2441MHz
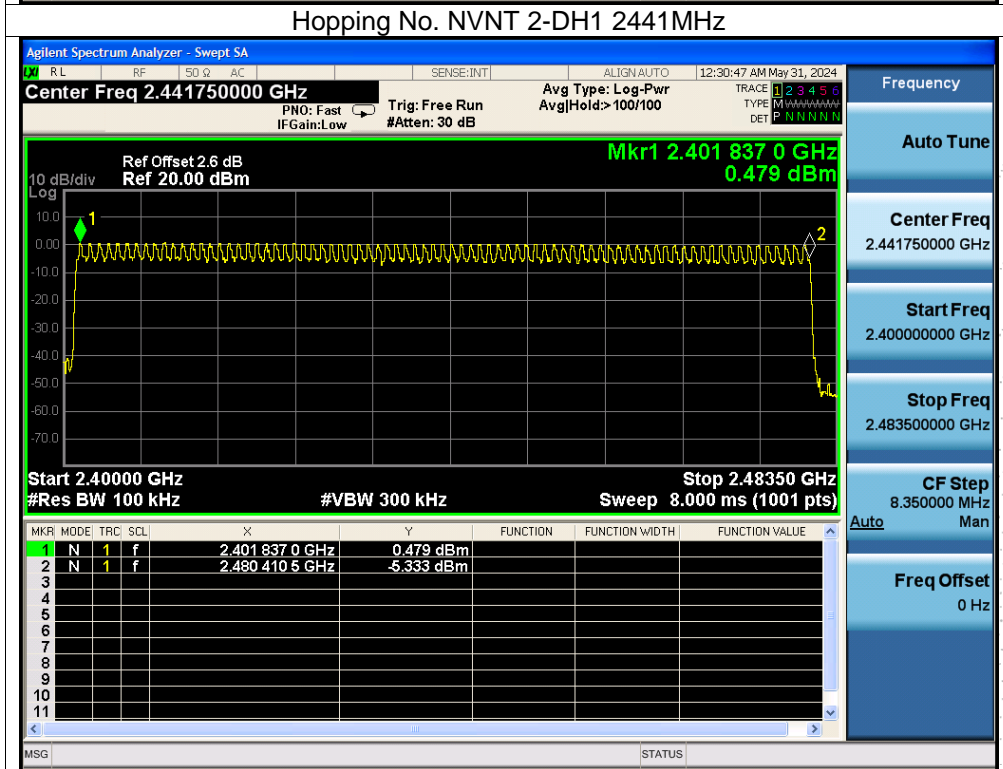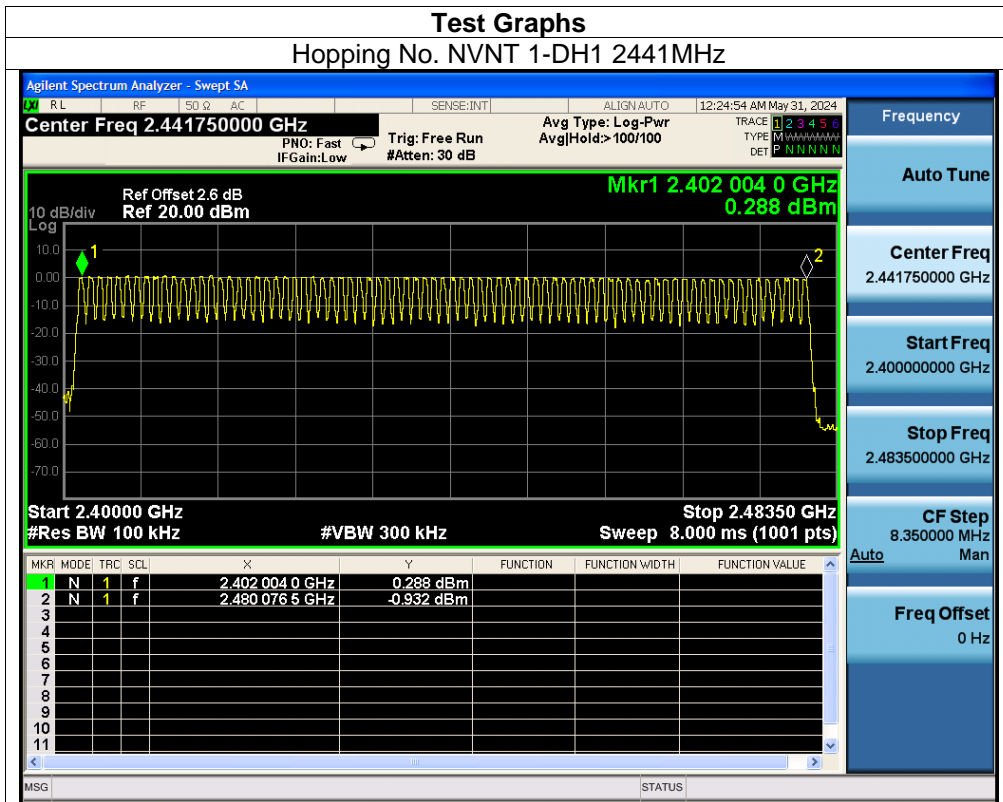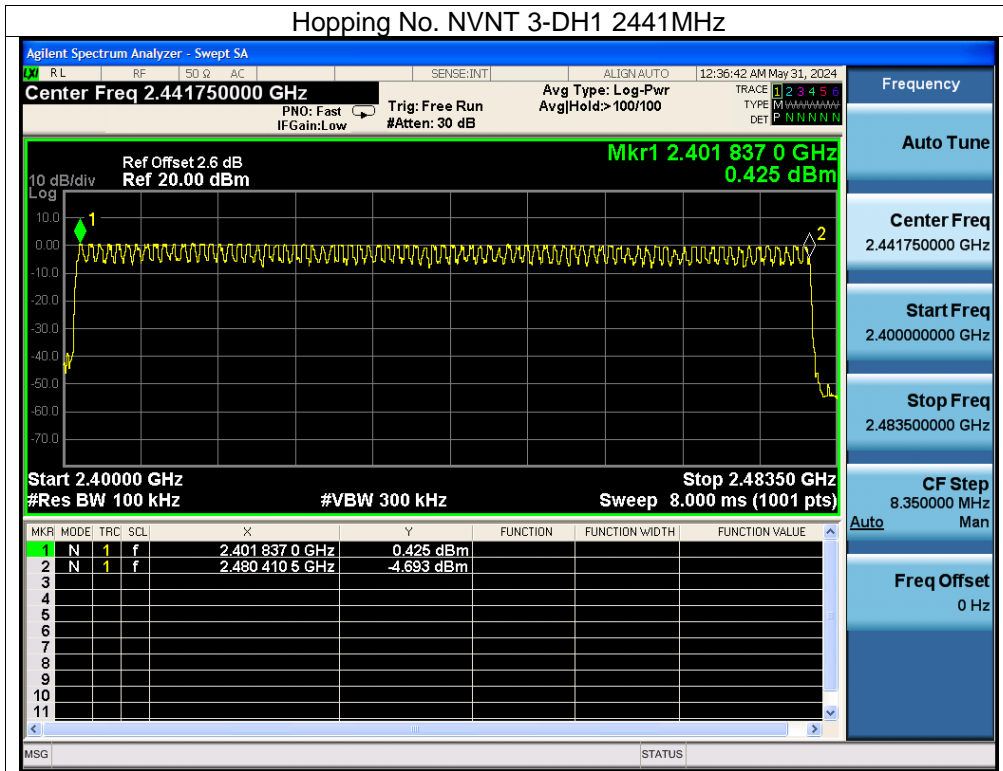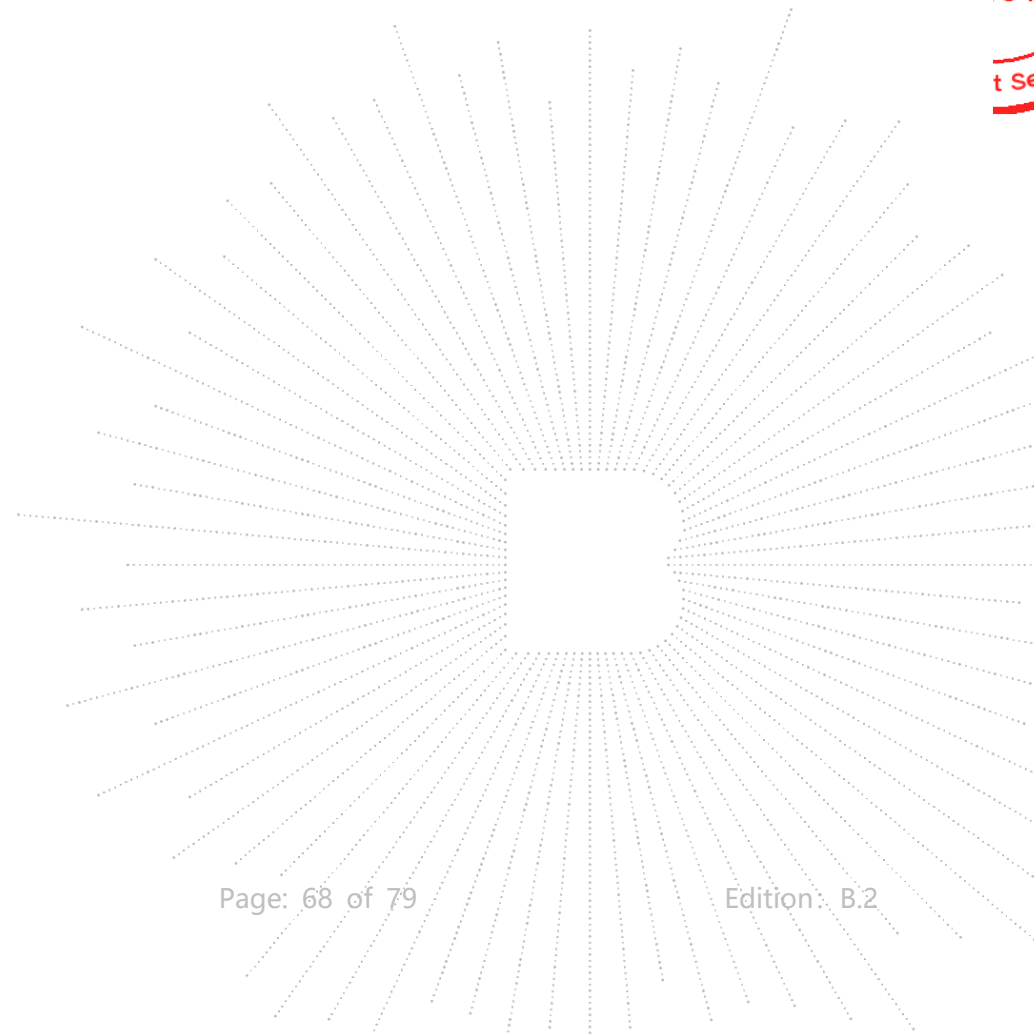
14. Dwell Time

14.1 Block Diagram Of Test Setup

14.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

14.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0.   Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

14.4 Test Result

DH5 Packet permit maximum 1600 / 79 / 6   hops per second in each channel
(5 time slots RX, 1 time slot TX).
DH3 Packet permit maximum 1600 / 79 / 4   hops per second in each channel
(3 time slots RX, 1 time slot TX).
DH1 Packet permit maximum 1600 / 79 /2   hops per second in each channel
(1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

DH5:1600/79/6*0.4*79*(MkrDelta)/1000
DH3:1600/79/4*0.4*79*(MkrDelta)/1000
DH1:1600/79/2*0.4*79*(MkrDelta)/1000
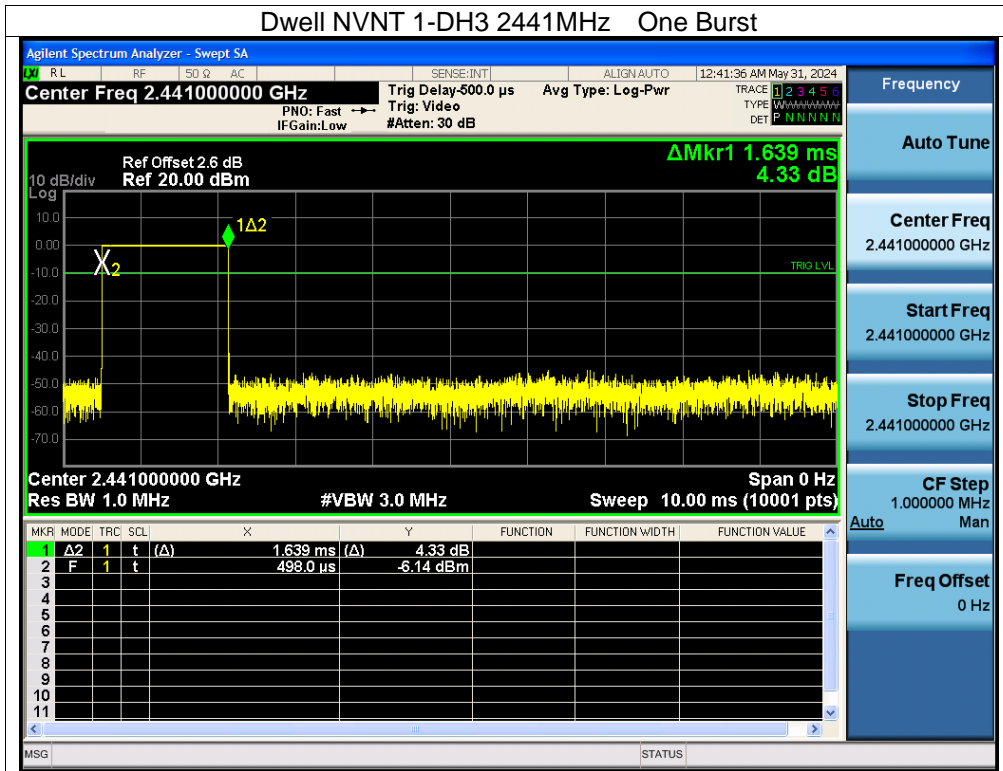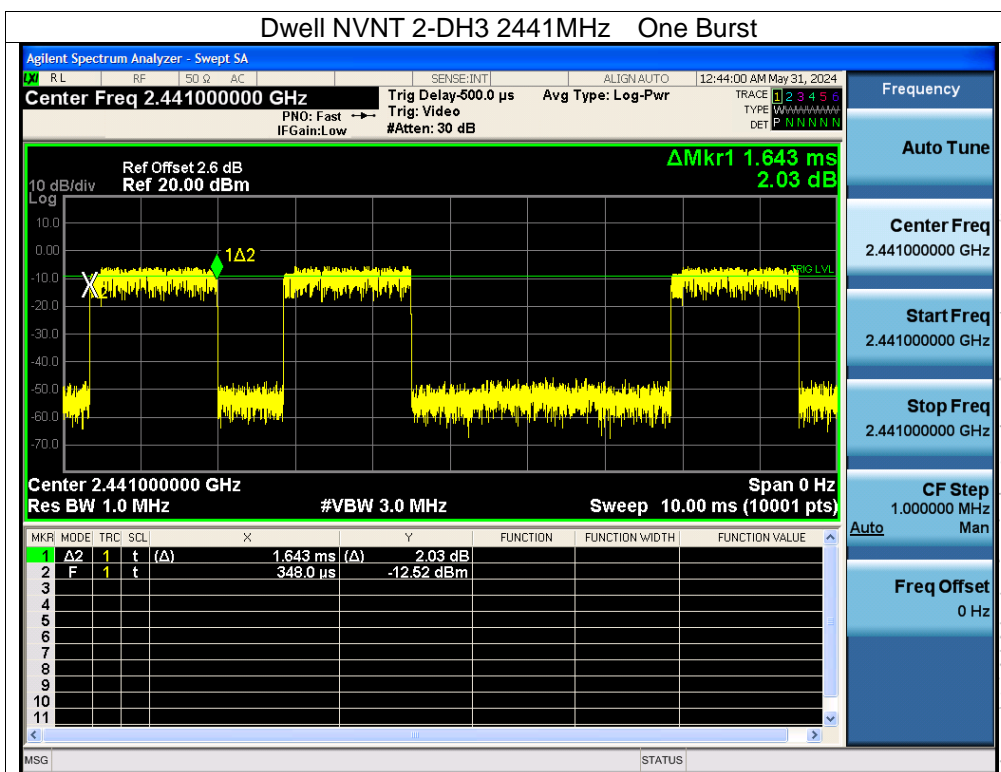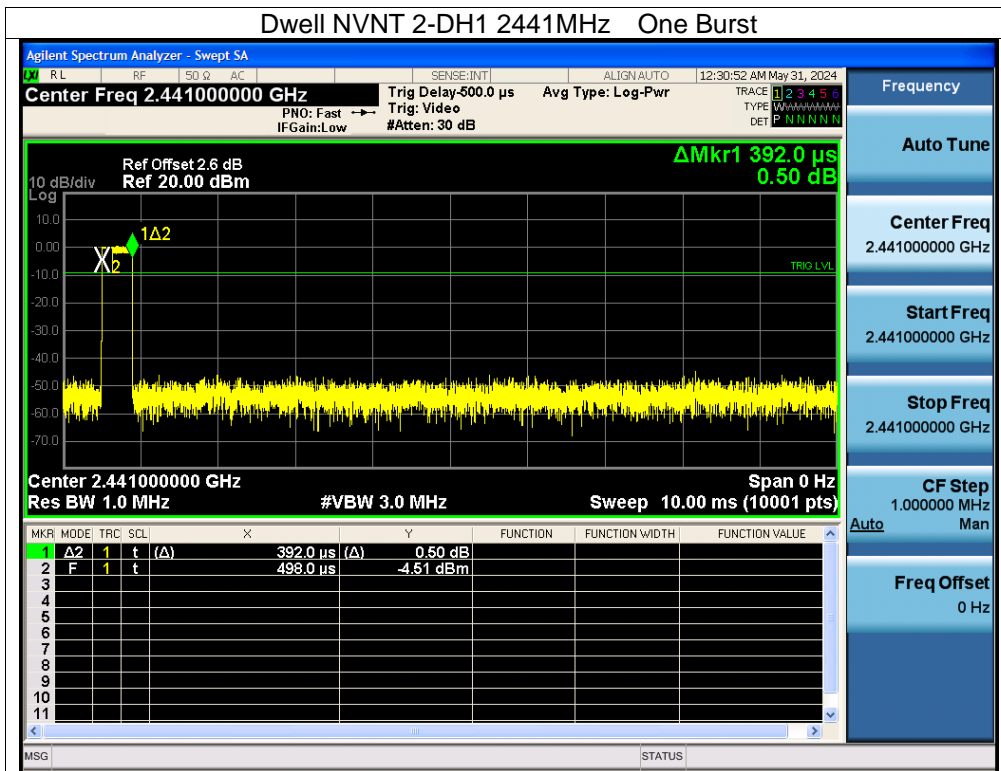Remark: Mkr Delta is once pulse time.

Temperature:	26℃	Relative Humidity:	54%
Test Voltage:	DC 3.7V	Remark:	N/A

Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (s)	Limit (s)	Verdict
NVNT	1-DH1	2441	0.383	0.123	0.4	Pass
NVNT	1-DH3	2441	1.639	0.262	0.4	Pass
NVNT	1-DH5	2441	2.886	0.308	0.4	Pass
NVNT	2-DH1	2441	0.392	0.125	0.4	Pass
NVNT	2-DH3	2441	1.643	0.263	0.4	Pass
NVNT	2-DH5	2441	2.891	0.308	0.4	Pass
NVNT	3-DH1	2441	0.391	0.125	0.4	Pass
NVNT	3-DH3	2441	1.643	0.263	0.4	Pass
NVNT	3-DH5	2441	2.893	0.309	0.4	Pass

Test Graphs
Dwell NVNT 1-DH1 2441MHz　One Burst

Dwell NVNT 1-DH3 2441MHz   One Burst

Dwell NVNT 1-DH5 2441MHz   One Burst

Dwell NVNT 2-DH1 2441MHz　One Burst

Dwell NVNT 2-DH3 2441MHz　One Burst

Dwell NVNT 2-DH5 2441MHz   One Burst

Dwell NVNT 3-DH1 2441MHz   One Burst

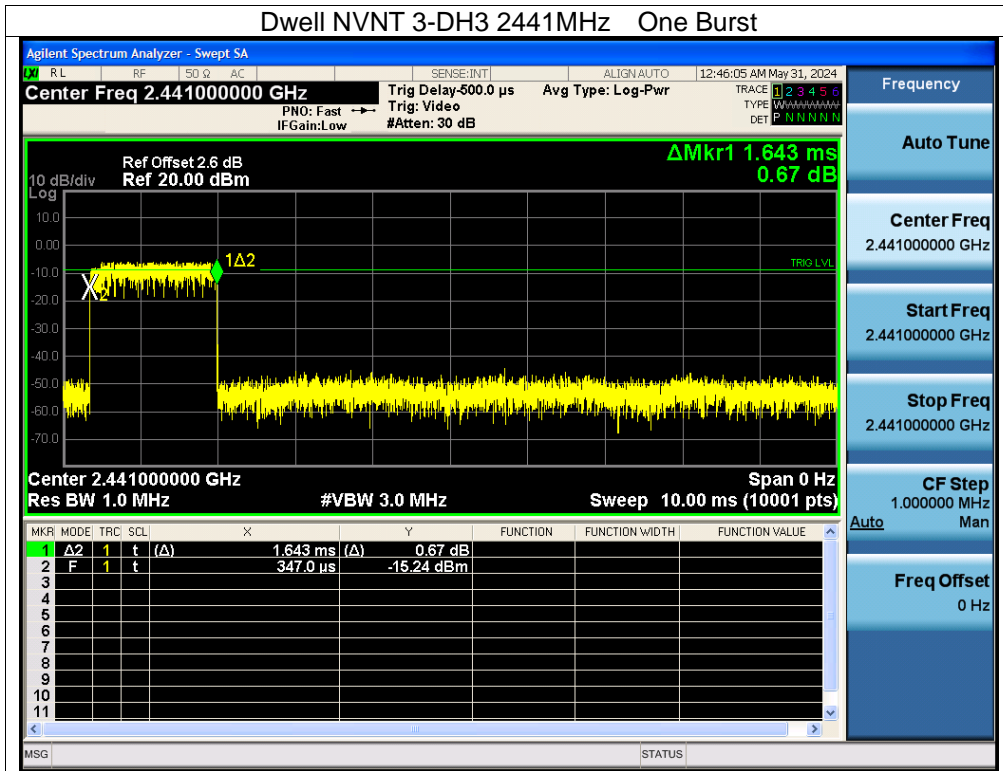### Dwell NVNT 3-DH3 2441MHz   One Burst

Dwell NVNT 3-DH5 2441MHz   One Burst
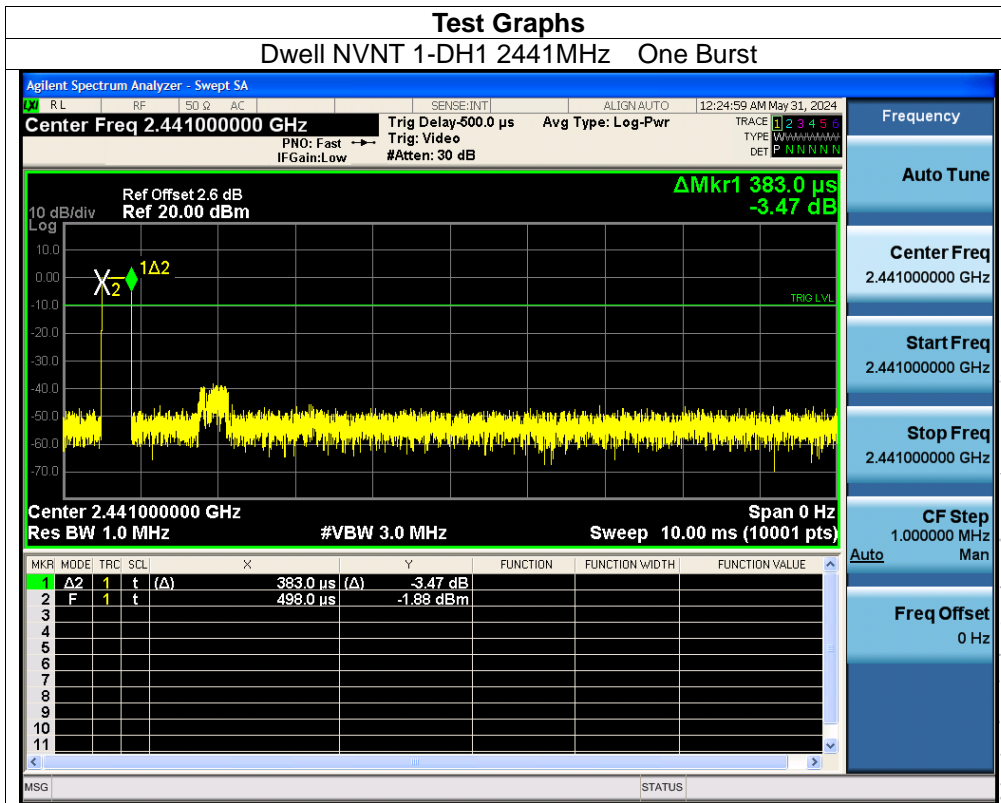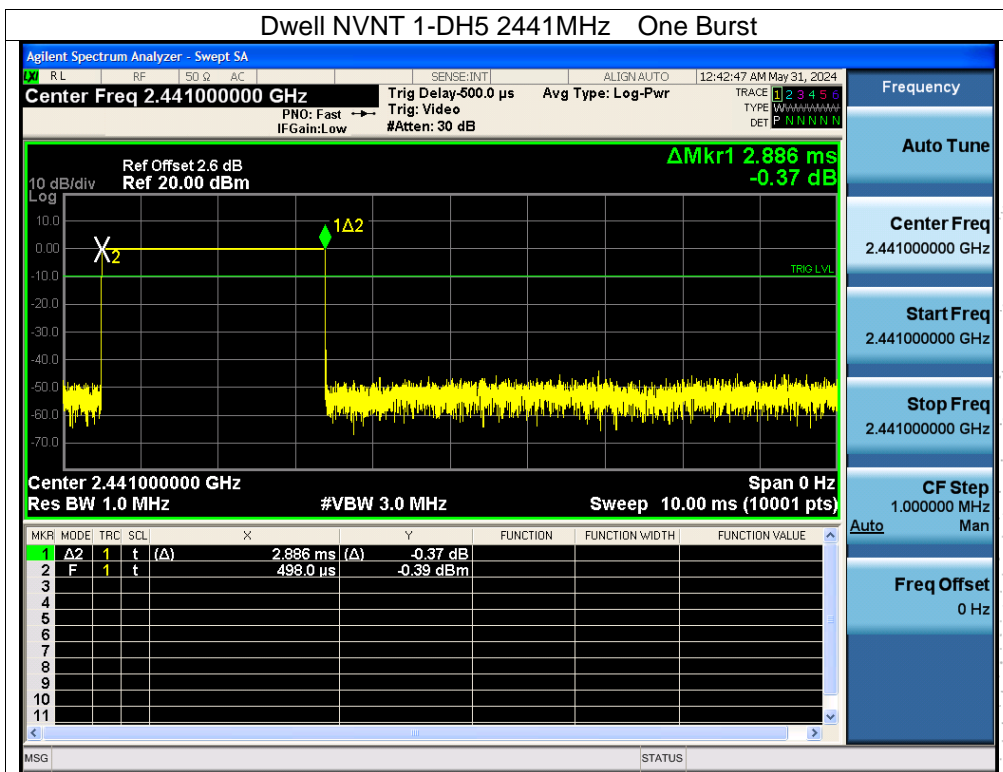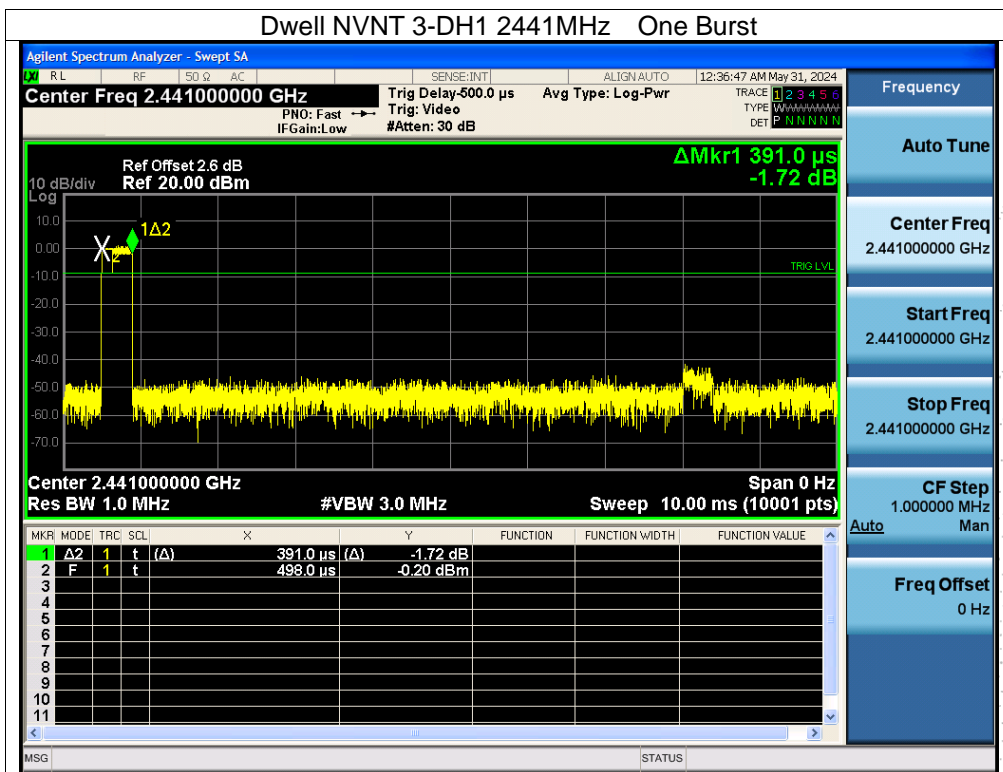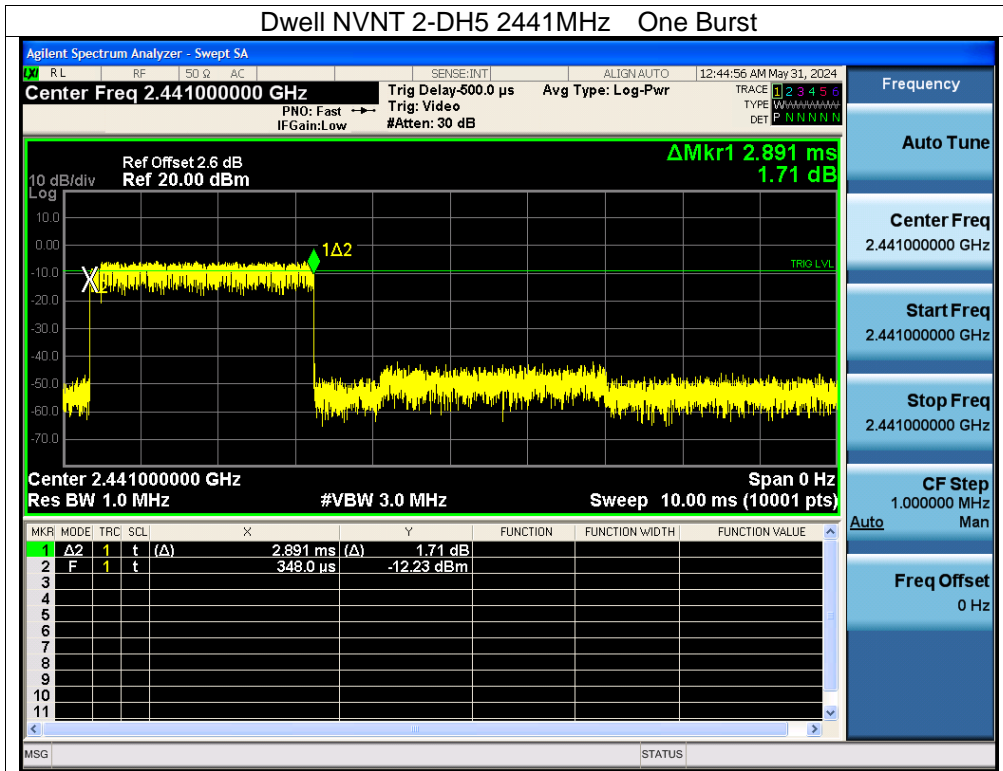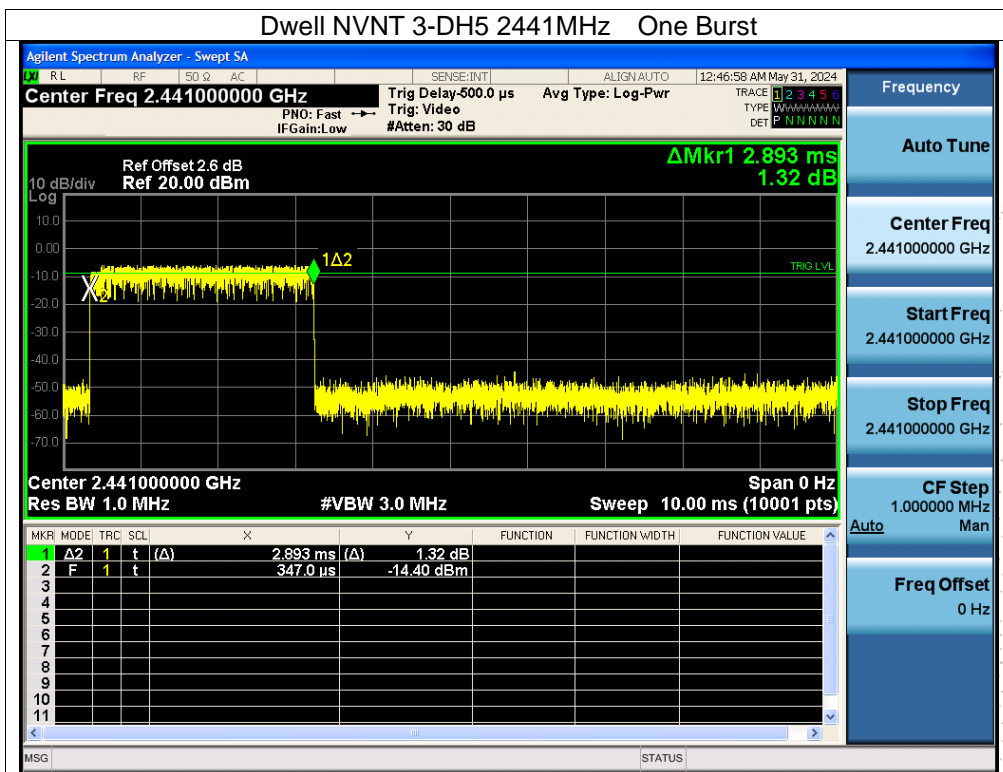
15. Antenna Requirement

15.1 Limit

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.

15.2 Test Result

The EUT antenna is Internal antenna, fulfill the requirement of this section.
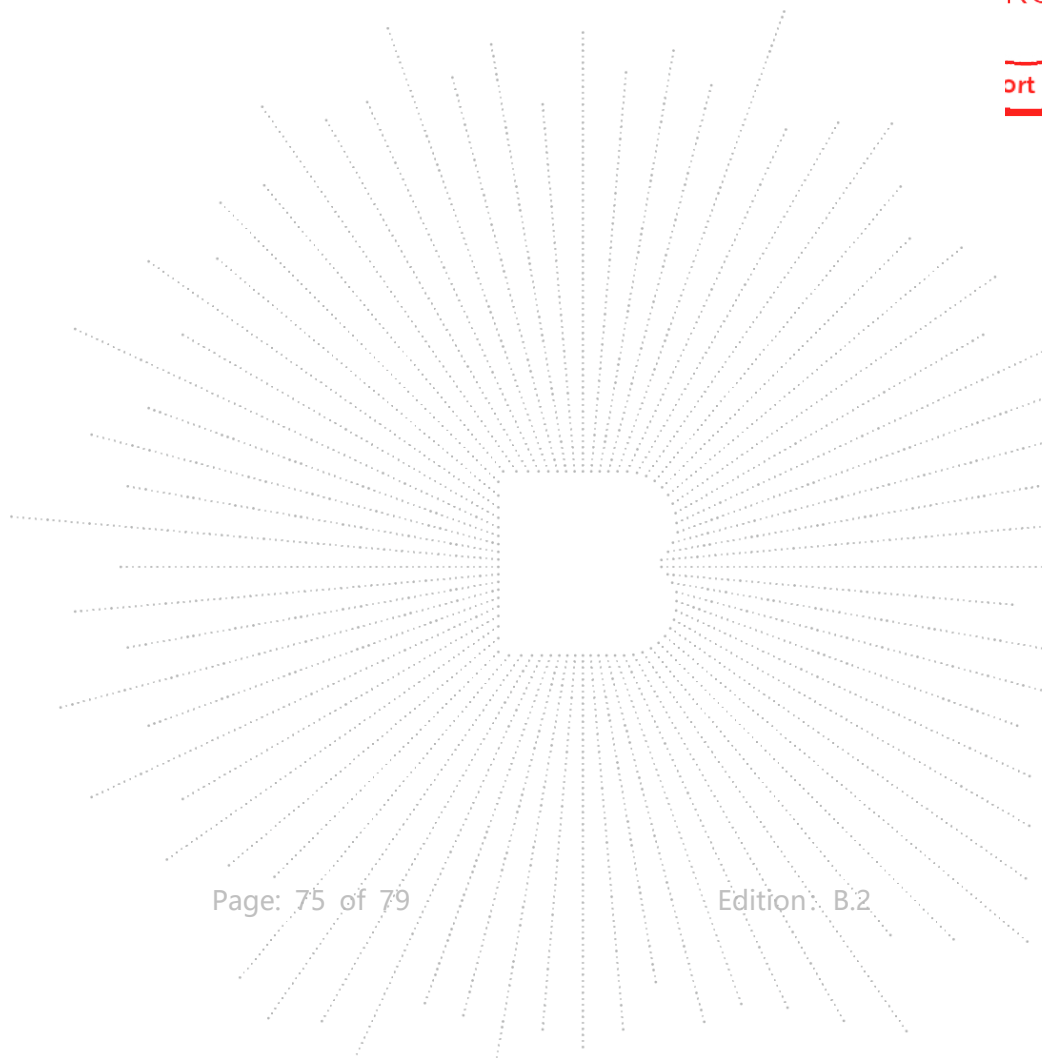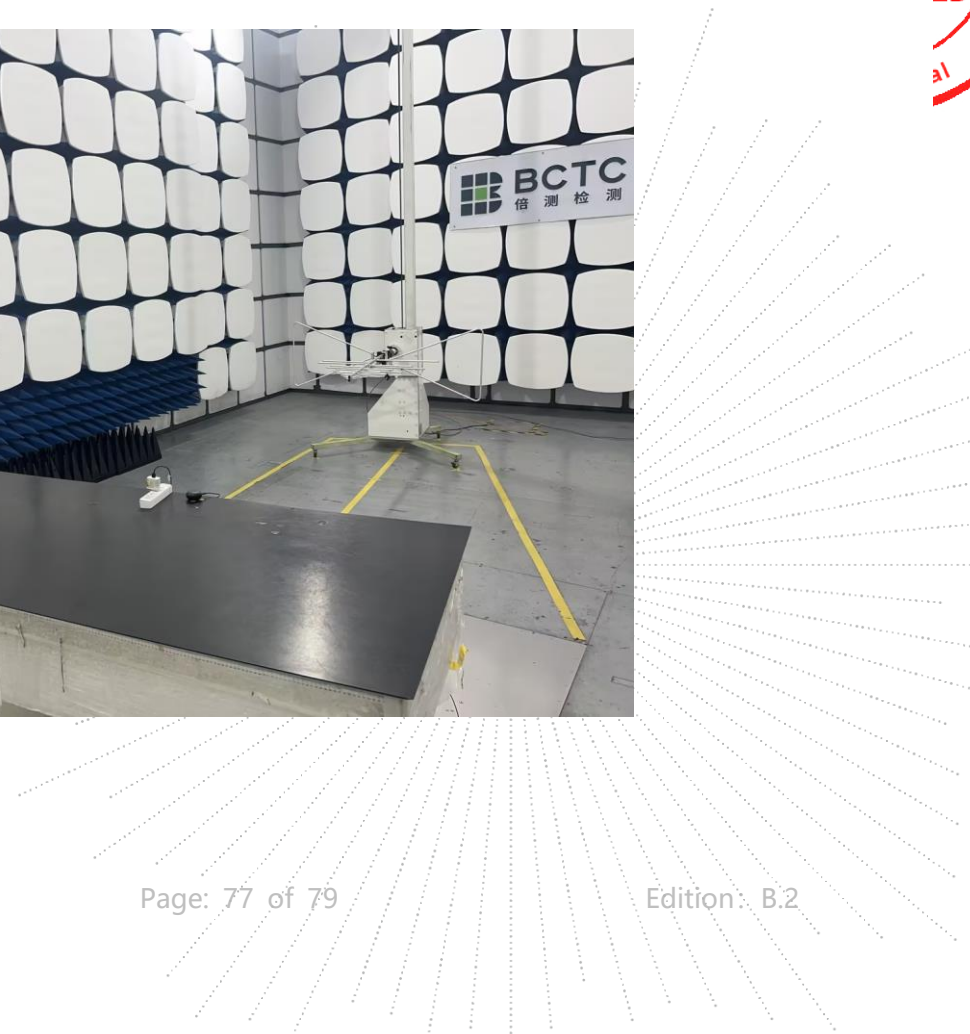
16. EUT Photographs

EUT Photo 1

EUT Photo 2

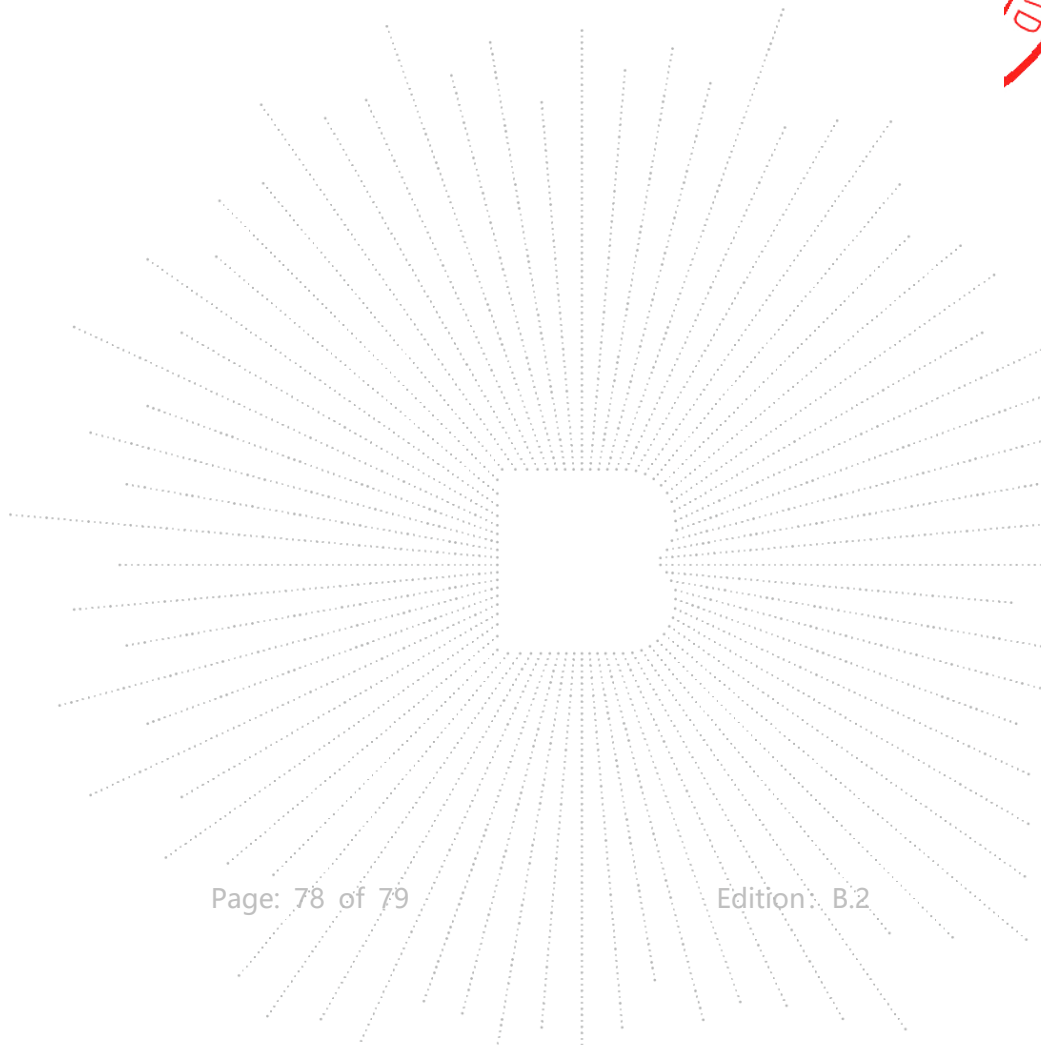NOTE: Appendix-Photographs Of EUT Constructional Details.

17. EUT Test Setup Photographs

Conducted Emissions Photo

Radiated Measurement Photos

STATEMENT

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without the "special seal for inspection and testing".

4. The test report is invalid without the signature of the approver.

5. The test process and test result is only related to the Unit Under Test.

6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.

7. The quality system of our laboratory is in accordance with ISO/IEC17025.

8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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Complaint/Advice E-mail: advice@bctc-lab.com.cn

※※※※※ END ※※※※※