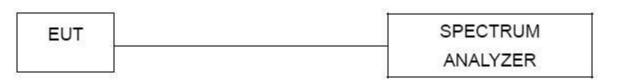




7. 20DB&99% BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.247 (a)(1), RSS 247 5.1, RSS-Gen 6.7	1
Test Method:	ANSI C63.10:2013	6

7.1 Test Setup



7.2 Limit

According to RSS-247§5.1(a)& §5.1(b), 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

- 7.3 Test procedure
- 1. Set RBW = 30 kHz.
- 2. Set the video bandwidth (VBW) \ge 3 x RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

8. The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30KHz RBW and 100 KHz VBW record the 99% bandwidth.

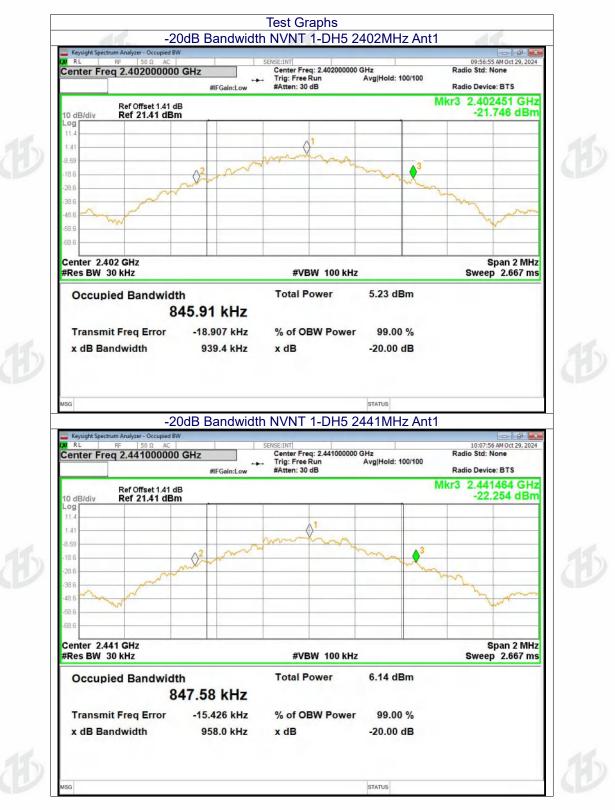
7.4 DEVIATION FROM STANDARD



7.5 Test Result

Mode	Test channel	20dB Emission Bandwidth (MHz)	99%Bandwidth (MHz)	Result
15	Lowest	0.939	0.851	15
GFSK	Middle	0.958	0.862	Pass
	Highest	0.95	0.85	
	Lowest	1.287	1.183	
π/4DQPSK	Middle	1.312	1.175	Pass
	Highest	1.338	1.18	
	Lowest	1.3	1.18	
8DPSK	Middle	1.302	1.175	Pass
	Highest	1.305	1.186	





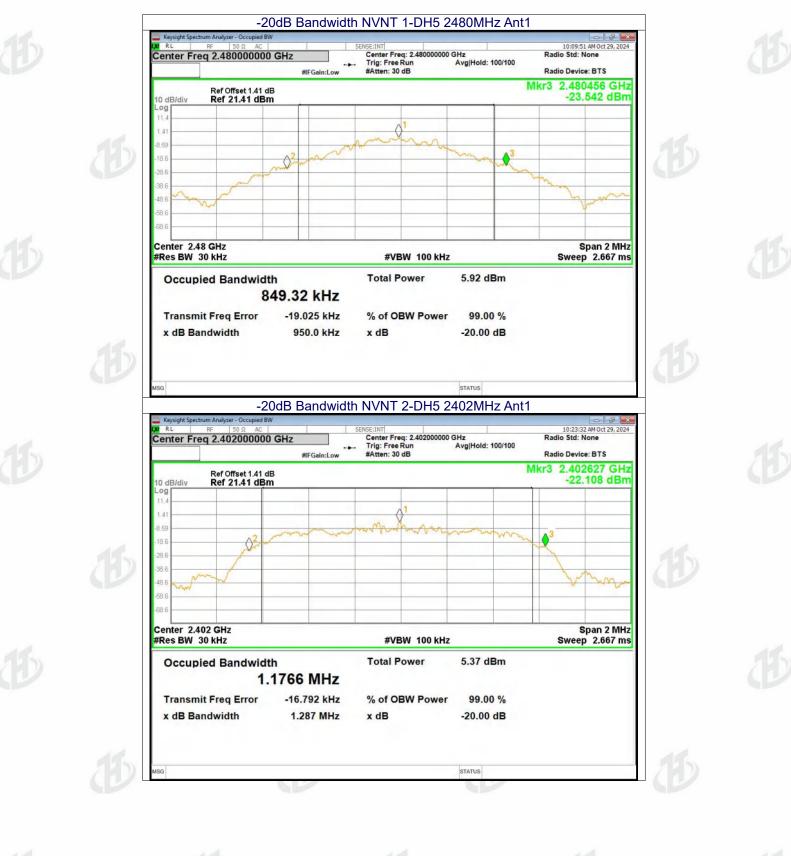
Project No.: ZHT-241025107W01-1

Page 68 of 109

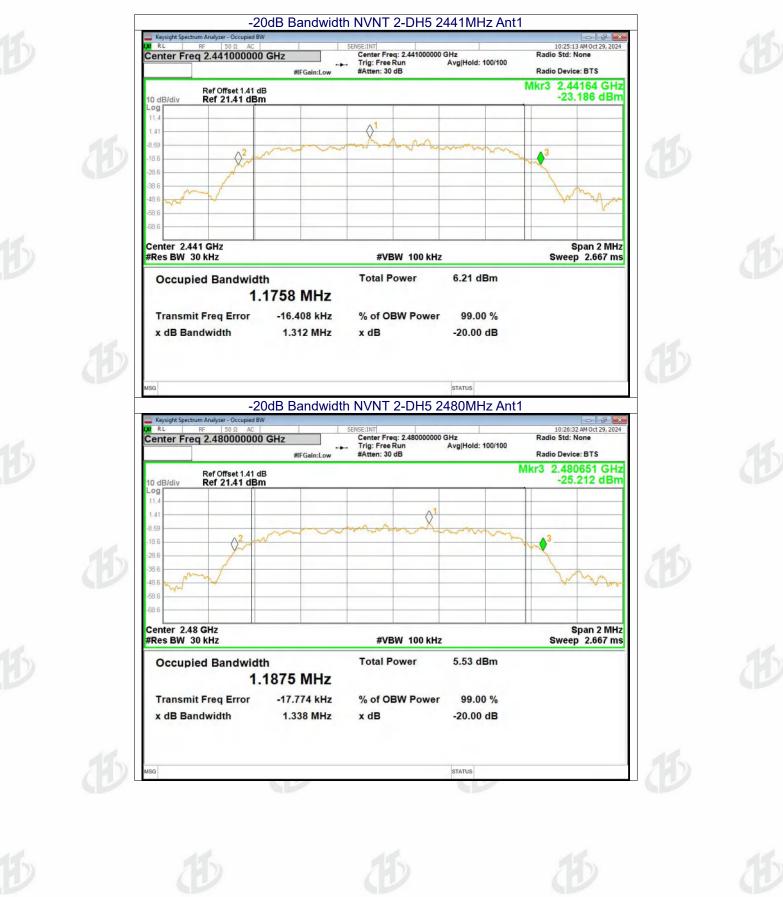
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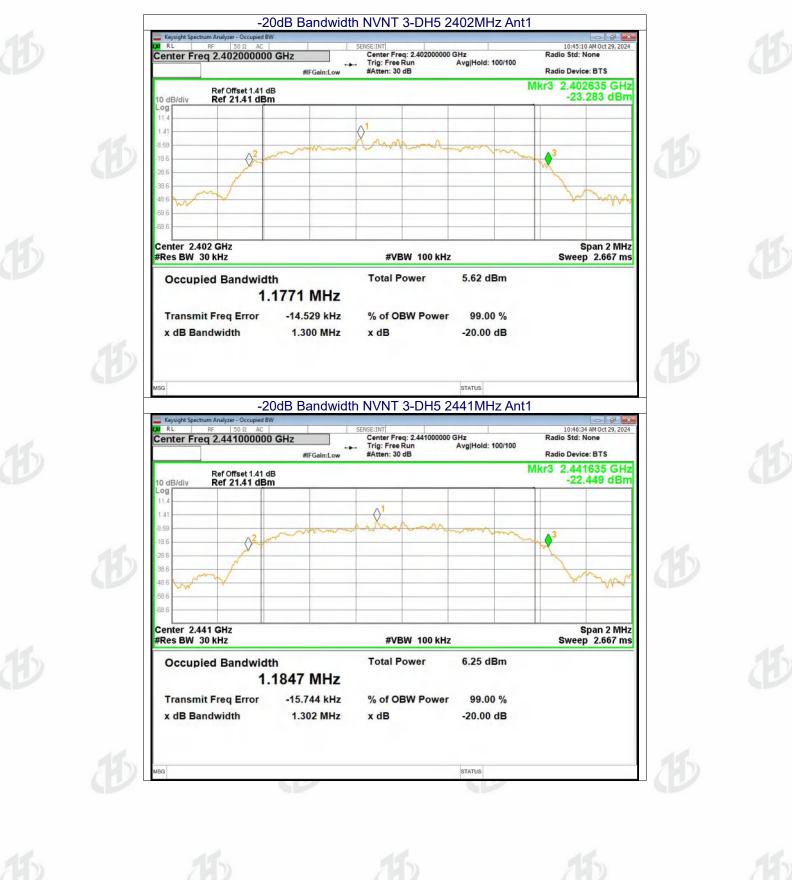














Project No.: ZHT-241025107W01-1 Page 72 of 109

Center	Freq 2.480000000 G	Hz #IFGain:Low	Center Freq: 2.480000000 Trig: Free Run #Atten: 30 dB	Avg Hold: 100/100	Radio Std: None Radio Device: BTS Mkr3 2.480643 GHz	
10 dB/di Log	Ref Offset 1.41 dB Ref 21.41 dBm				-23.648 dBm	
1.41 -8.59 -18.6	0 ² mm	- Marchand	man	more and and me	3	15
-28.6	m				my home	C
-48.6					m Ahm	
Center	2.48 GHz W 30 kHz		#VBW 100 kHz		Span 2 MHz Sweep 2.667 ms	
Occ	upied Bandwidth	000 MUL-	Total Power	6.49 dBm		
Trar	1.10 smit Freq Error	692 MHz -9.622 kHz	% of OBW Power	99.00 %		
x dE	Bandwidth	1.305 MHz	x dB	-20.00 dB		15
44						
(B)				STATUS		
MSG				STATUS		

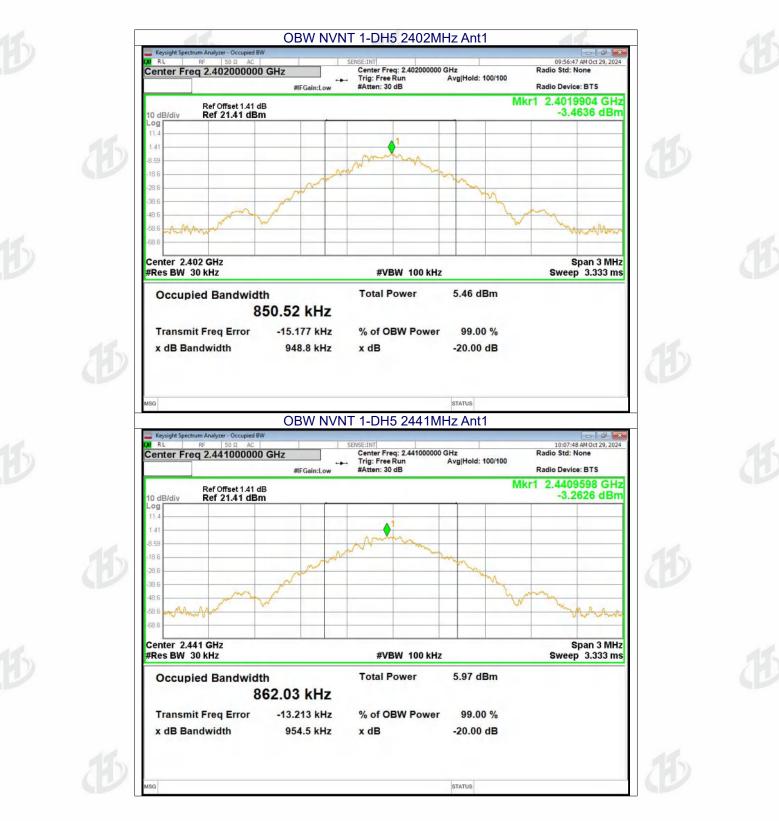






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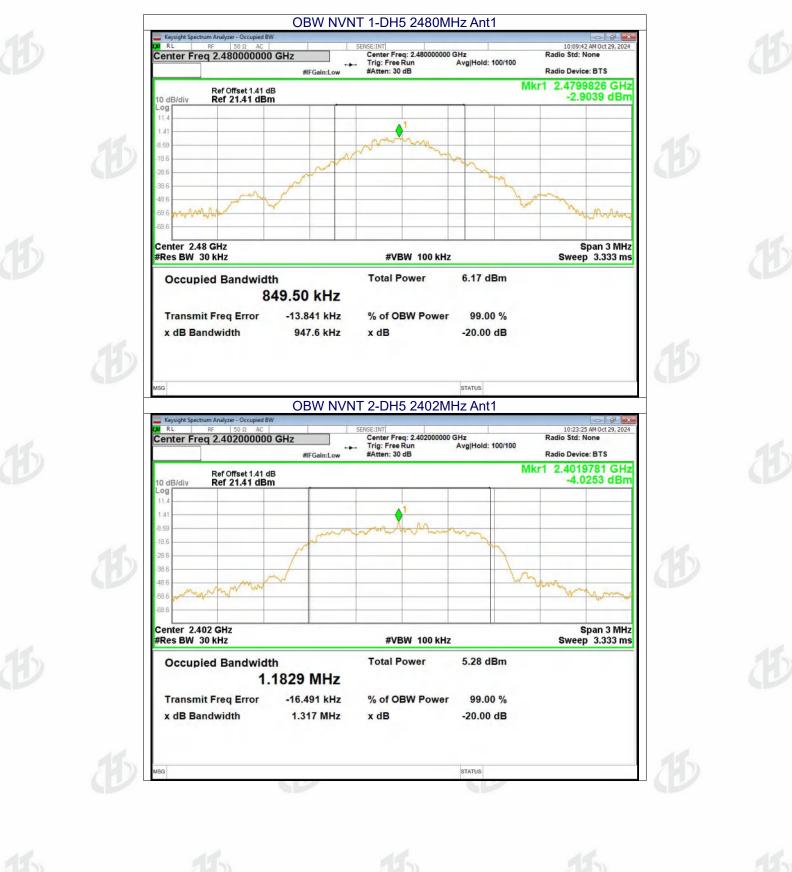


Project No.: ZHT-241025107W01-1

Page 73 of 109

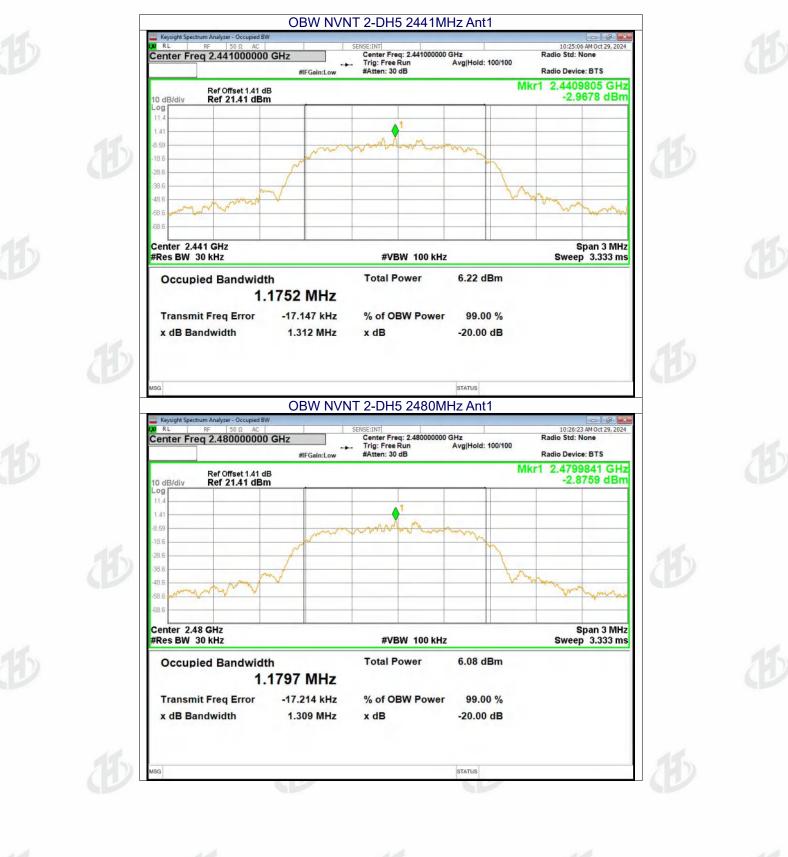






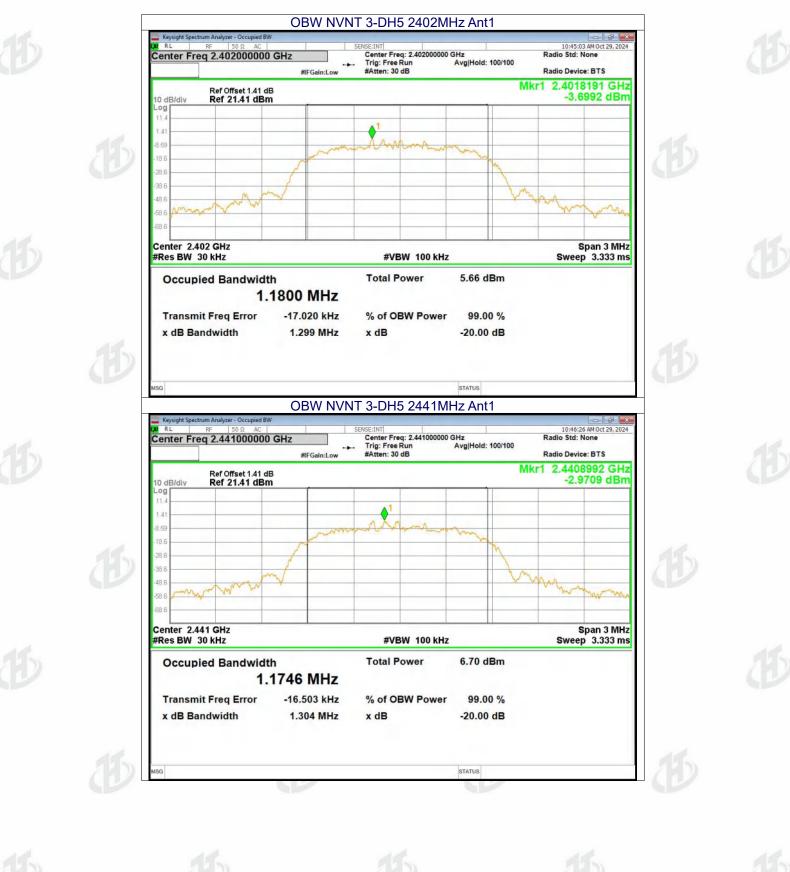






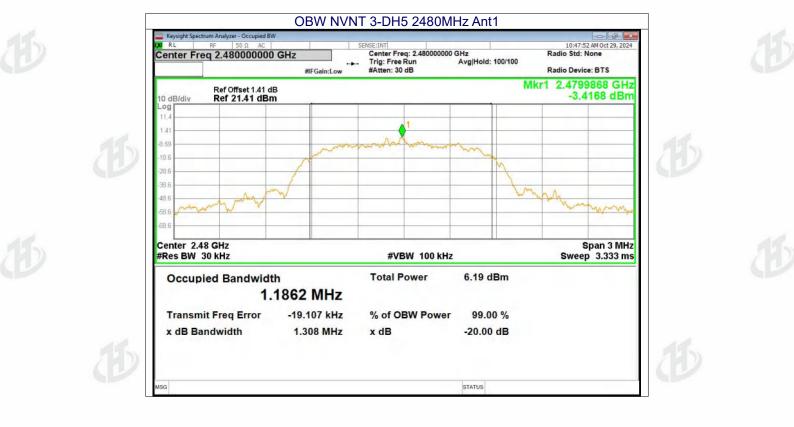
















8. Maximum Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1), RSS 247 5.4 (b)
Test Method:	ANSI C63.10:2013

8.1 Block Diagram Of Test Setup



8.2 Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W.

8.3 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 = 2MHz. VBW =6MHz. Sweep = auto; Detector Function = Peak.
- 3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

8.4 DEVIATION FROM STANDARD

No deviation.

8.5 Test Result	220	220		1:0	
Mode	Test channel	Peak Output Power (dBm)-Earphone Left	Peak Output Power (dBm)-Earphone Right	Peak Output Power Limit (dBm)	Result
10	Lowest	-1.12	-0.77		10
GFSK	Middle	-0.29	-0.13	30.00	Pass
	Highest	-0.48	-0.38		
	Lowest	0.86	0.95		
π/4DQPSK	Middle	1.65	1.70	21.00	Pass
	Highest	1.54	1.55	155	
	Lowest	1.53	1.40		
8DPSK	Middle	2.37	2.2	21.00	Pass
	Highest	2.28	2.12		





Project No.: ZHT-241025107W01-1

Page 79 of 109



Project No.: ZHT-241025107W01-1 Page 80 of 109





Project No.: ZHT-241025107W01-1 Page 81 of 109





Project No.: ZHT-241025107W01-1 Page 82 of 109





Project No.: ZHT-241025107W01-1 Page 83 of 109





Project No.: ZHT-241025107W01-1 Page 84 of 109





Project No.: ZHT-241025107W01-1 Page 85 of 109





Project No.: ZHT-241025107W01-1 Page 86 of 109





Project No.: ZHT-241025107W01-1 Page 87 of 109





9. HOPPING CHANNEL SEPARATION

Test Requirement:	FCC Part15 C Section 15.247 (a)(1), RSS 247 5.1
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak
Limit:	GFSK, π /4-DQPSK & 8DSK: 0.025MHz or 2/3 of the 20dB bandwidth
	(whichever is greater)

9.1 Test Setup

EUT	SPECTRUM
1999-970-99	ANALYZER

9.2 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.

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 Test Result

10 million 1	10		18 m
Modulation	Separation (MHz)	Limit(MHz)	Result
GFSK	1.092	0.950	PASS
π/4DQPSK	0.986	0.858	PASS
8DPSK	1.086	0.867	PASS





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	RF 50 Ω AC Freq 2.402500000 GH2	PNO: Wide Tri	g: Free Run tten: 30 dB	Avg Type: Log-Pv Avg Hold:>100/10	10:52 Wr 0	:46 AM Oct 29, 2024 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N
10 dB/div	Ref Offset 1.41 dB Ref 20.00 dBm					1 898 GHz 3.814 dBm
0.00	1			2	2	
-10.0						and
-40.0						
-60.0						
Center 2 #Res BW	.402500 GHz / 30 kHz	#VBW 10	0 kHz		Spa Sweep 2.133 n	n 2.000 MHz ns (1001 pts)
MKR MODE 1 N 2 N 3	IRC SCL X 1 f 2.401 898 1 f 2.402 984		FUNCTION F	UNCTION WIDTH	FUNCTION VALUE	
4 5 6 7						=
8 9 10						
11			ш	STATUS		•

Project No.: ZHT-241025107W01-1

Page 90 of 109





10.NUMBER OF HOPPING FREQUENCY

and the back	EPH CHINA DAVID	in the second
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii), RSS-247 5	.1
Test Method:	ANSI C63.10:2013	
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=24 Detector=Peak	100MHz-2483.5MHz,
Limit:	15 channels	

10.1 Test Setup



10.2 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.

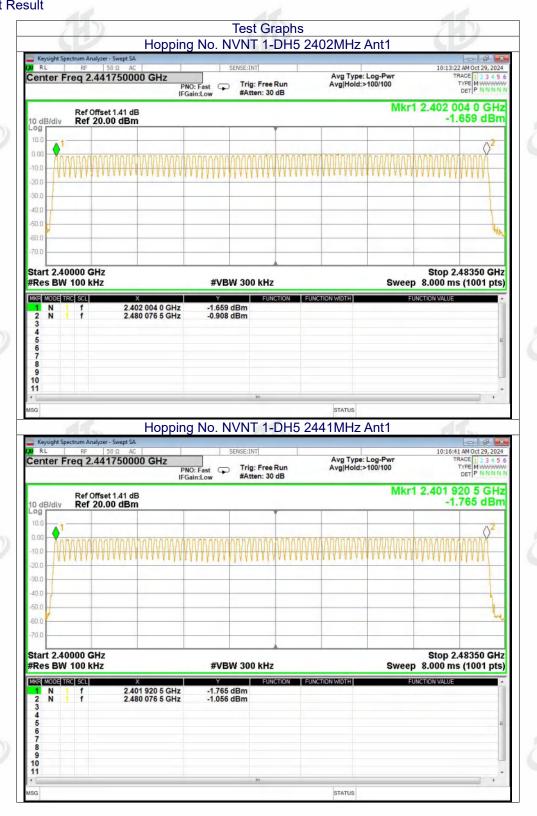
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

10.3 DEVIATION FROM STANDARD No deviation.

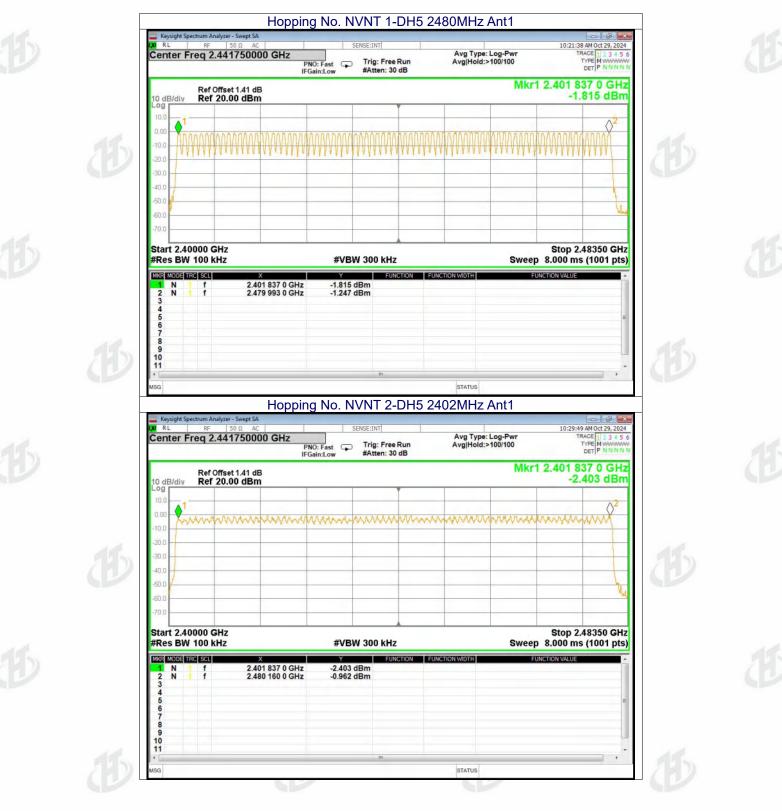


10.4 Test Result

B









Ref Offset 1.41 di	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100 TrAcE 12.3 TYPE MWW DET P NN Mkr1 2.401 920 5 G	Hz
10 dB/div Ref 20.00 dBm		-2.227 dE	Bm
	mmmmmmmmmm	mmunicanon	2
-20.0			
-40.0			
-60.0			N.
Start 2.40000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop 2.48350 G Sweep 8.000 ms (1001 p	GHZ
	X Y FUNCTION FUN 1 920 5 GHz -2.227 dBm	CTION WDTH FUNCTION VALUE	
2 N 1 f 2.44 3 4	30 327 0 GHz -4.171 dBm		
6 6 7 8			
9 10 11			. 70
MSG	m	STATUS	
wy Keysight Spectrum Analyzer - Swept SA			
Center Freq 2.44175000	DO GHZ PNO: Fast 🕞 Trig: Free Run	10:37:24 AMOct 29, 2 Avg Type: Log-Pwr TRACE [1 2 3 Avg Hold:>100/100 TYPE M MAA DET [P NN] DET [P NN]	4 5 6
Ref Offset 1.41 db	3	Mkr1 2.401 920 5 G -2.107 dE	Hz
-10.0	www.www.www.www.www.www.www.www.www.ww	V	
-20.0			
-40.0			
-60.0			
Start 2.40000 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop 2.48350 G Sweep 8.000 ms (1001 p	
	-2.107 dBm	CTION WIDTH FUNCTION VALUE	^
3 4	-0.979 dBm		
6 6 7			
8			



Center Freq 2.441750000 G	SENSE:INT HZ PNO: Fast IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100	10:56:11 AM Oct 29, 2024 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N N
Ref Offset 1.41 dB 10 dB/div Ref 20.00 dBm		Mkr1 2.	401 586 5 GHz -4.314 dBm
10.0			
0.00	nununununun	www.www.	mmm
-20.0			
-40.0			
-60.0			
Start 2.40000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sween 9	Stop 2.48350 GHz 200 ms (1001 pts)
MIXE MODE TRC SCL X	Y FUNCTION FUN		
2 N 1 f 2.480 410 3 4	0 5 GHz -3.612 dBm		
6 6 7 8			E
9 10 11			
, ← L	т	STATUS	
Keysight Spectrum Analyzer - Swept SA	opping No. NVNT 3-DH5 24	41MHz Ant1	
Center Freq 2.441750000 G	PNO: Fast Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	11:03:48 AM Oct 29, 2024 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N N
Ref Offset 1.41 dB	IFGain:Low #Atten: 30 dB	Mkr1 2.	401 837 0 GHz
10 dB/div Dof 20 00 dBm			
10 dB/div Ref 20.00 dBm			-1.436 dBm
10.0 • 1		www.www.www	
Log 10.0 0.00 -10.0 -20.0	www.www.www.www.www.www.www.www.www.ww	wwwwwww	
Log 10.0 0.00 -10.0 -20.0 -30.0 -40.0		wwwwwww	
Log 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -60.0		wwwwwww	
Log 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -50.0 -70.0 Start 2.40000 GHz			3top 2.48350 GHz
Log 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -30.0 -40.0 -50.0 -50.0 -70.0 Start 2.40000 GHz #Res BW 100 kHz [MICE INC. SCI.] ×	#VBW 300 kHz		Stop 2.48350 GHz 100 ms (1001 pts)
Log 1 0.00 -1 -10.0 -1 -20.0 -30.0 -30.0 -40.0 -40.0 -40.0 -50.0 -40.0 -50.0 -40.0 -60.0 -70.0 Start 2.40000 GHz #Res BW 100 KHz MXE MODE FIRE SGL X 1 N 1 2 N 1 2 N 1	#VBW 300 kHz	Sweep 8.	Stop 2.48350 GHz 100 ms (1001 pts)
Log 10.0 -10.0 -20.0 -30.0 -40.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -50.0 -70.0	#VBW 300 kHz	Sweep 8.	Stop 2.48350 GHz 100 ms (1001 pts)
Log 10.0 0.00 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0 Start 2.40000 GHz #Res BW 100 kHz Kart 2.40000 GHz #Res BW 100 kHz X 1 2 N 1 2 N 1 2 2 1 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2	#VBW 300 kHz	Sweep 8.	Stop 2.48350 GHz 100 ms (1001 pts)



Project No.: ZHT-2410 Pa	25107W01-1 age 96 of 109

Center Freq 2.441	0 Ω AC 750000 GHz		ree Run	Avg Type: Log-Pwr Avg Hold:>100/100	1	RACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N
	IFG	O: Fast Trig: F ain:Low #Atten		dering and the stand start		
10 dB/div Ref 20.0				N	lkr1 2.401 9 -2	20 5 GHz .247 dBm
10.0 1						-
0.00	www.www	mmmmm	mm	mann	mmm	mm
-10.0						
-20.0						
-40.0						
-50.0						
-60.0			_			246
-70.0						
Start 2.40000 GHz #Res BW 100 kHz		#VBW 300 k	Hz	Sv	Stop 2 /eep 8.000 m	.48350 GHz s (1001 pts)
MKR MODE TRC SCL	Х		FUNCTION FUN	CTION WDTH	FUNCTION VALUE	
1 N 1 f 2 N 1 f	2.401 920 5 GHz 2.480 410 5 GHz	-2.247 dBm -3.916 dBm				
3 4						
6						E
7 8						
9 10						
11		ш				- F
MSG				STATUS		





11. DWELL TIME

The second se	A STATE OF
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii), RSS-247 5.1
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
and a second	14 14 14

11.1 Test Setup



11.2 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 = 0Hz;

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).

11.3 DEVIATIOI No deviation.	N FROM STAN	DARD			



11.4 Test Result

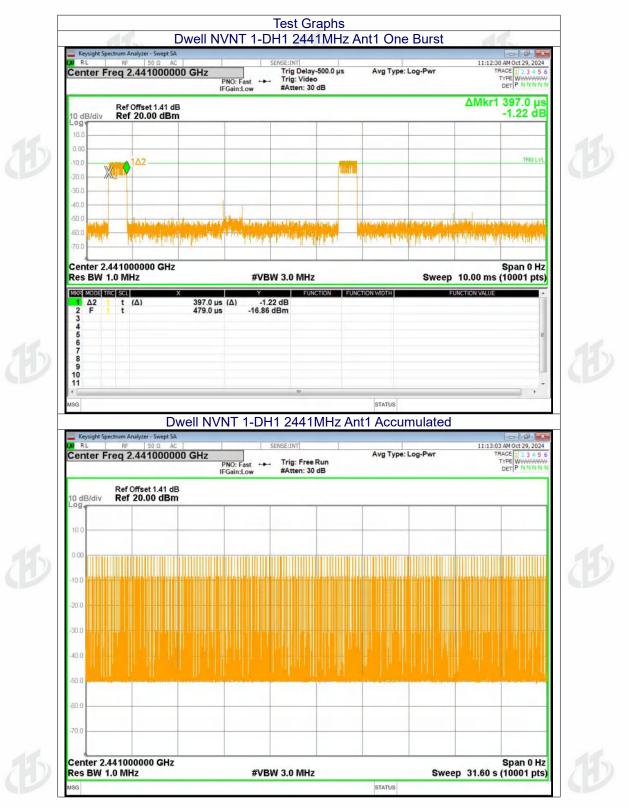
Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2441	0.397	126.246	318	31600	400	Pass
1-DH3	2441	1.653	259.521	157	31600	400	Pass
1-DH5	2441	2.904	307.824	106	31600	400	Pass
2-DH1	2441	0.41	130.79	319	31600	400	Pass
2-DH3	2441	1.662	265.92	160	31600	400	Pass
2-DH5	2441	2.891	294.882	102	31600	400	Pass
3-DH1	2441	0.41	130.38	318	31600	400	Pass
3-DH3	2441	1.659	278.712	168	31600	400	Pass
3-DH5	2441	2.911	264.901	91	31600	400	Pass

Remarks:

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s (1 / 2 / 3)-DH1: Dwell time (ms) = Pulse Time (ms) * [1600 / (2 * 79)] * 31.6s(1 / 2 / 3)-DH3: Dwell time (ms) = Pulse Time (ms) * [1600 / (4 * 79)] * 31.6s(1 / 2 / 3)-DH5: Dwell time (ms) = Pulse Time (ms) * [1600 / (6 * 79)] * 31.6s

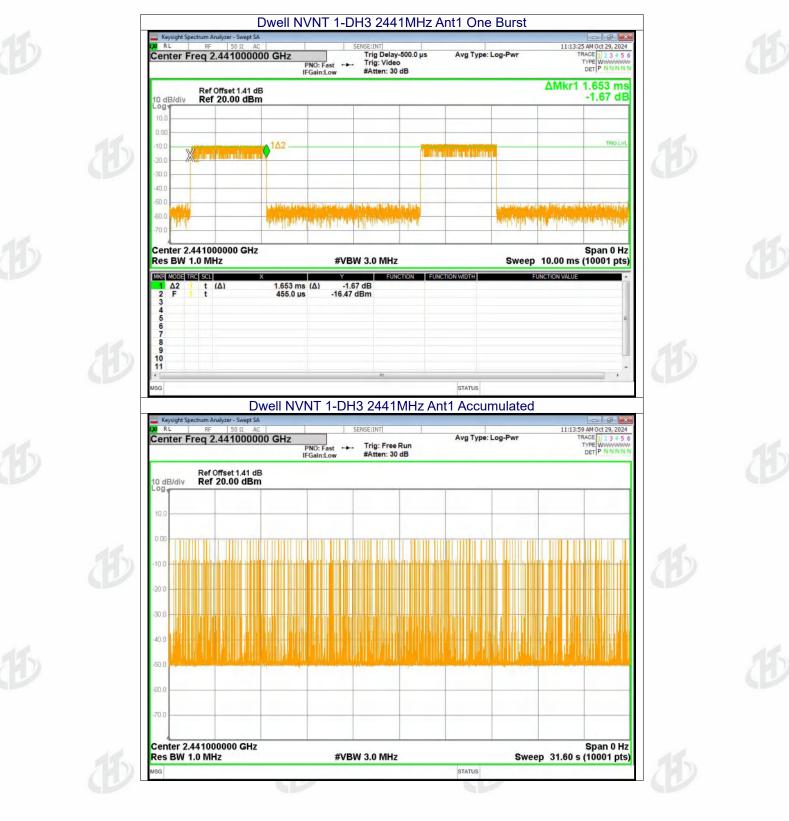






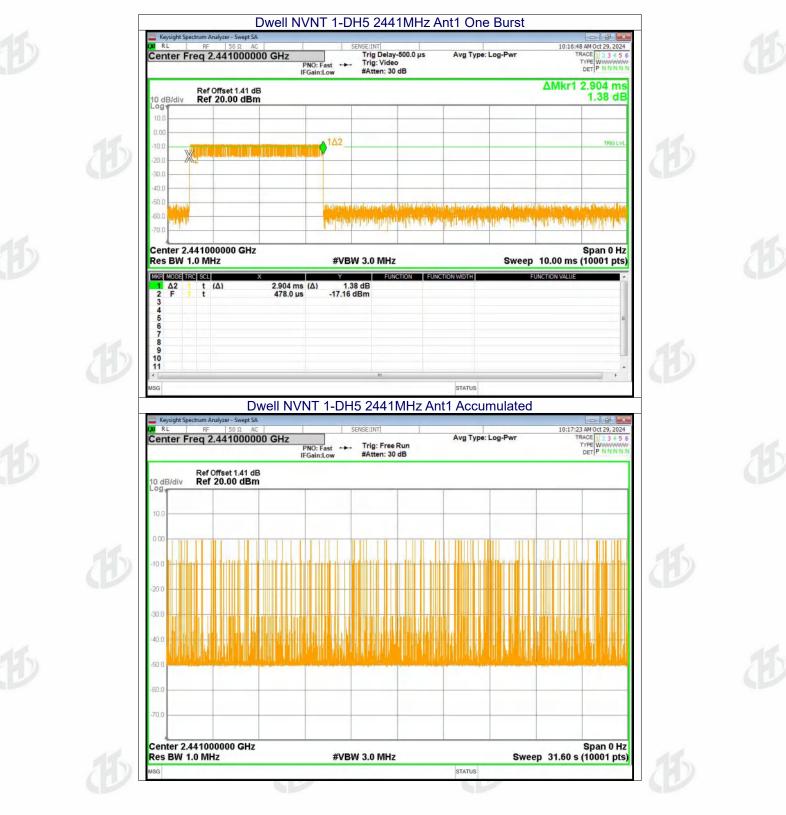


Project No.: ZHT-241025107W01-1 Page 100 of 109



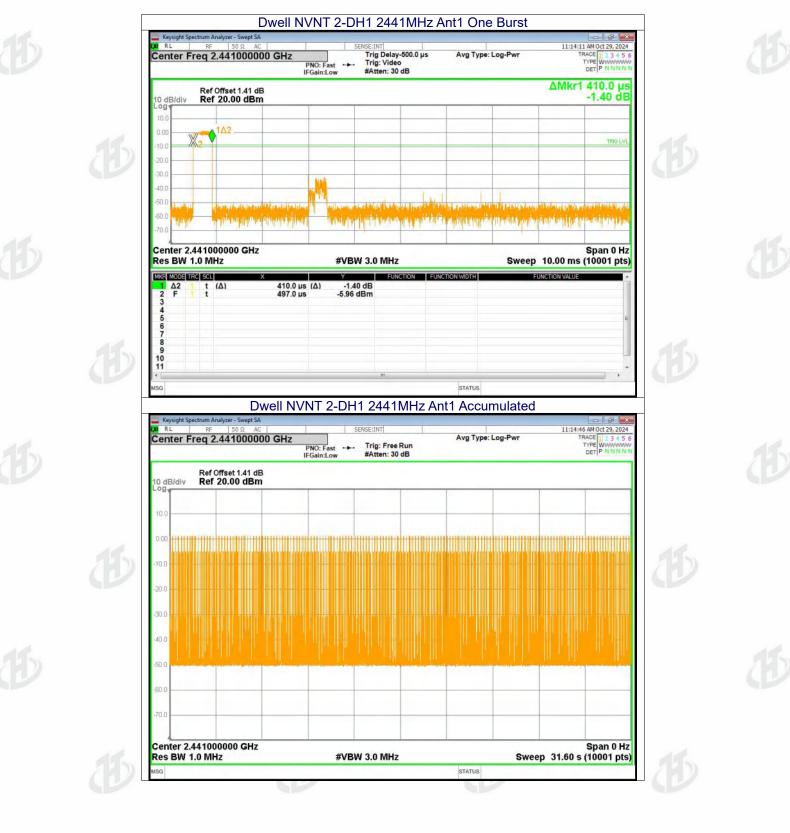


Project No.: ZHT-241025107W01-1 Page 101 of 109



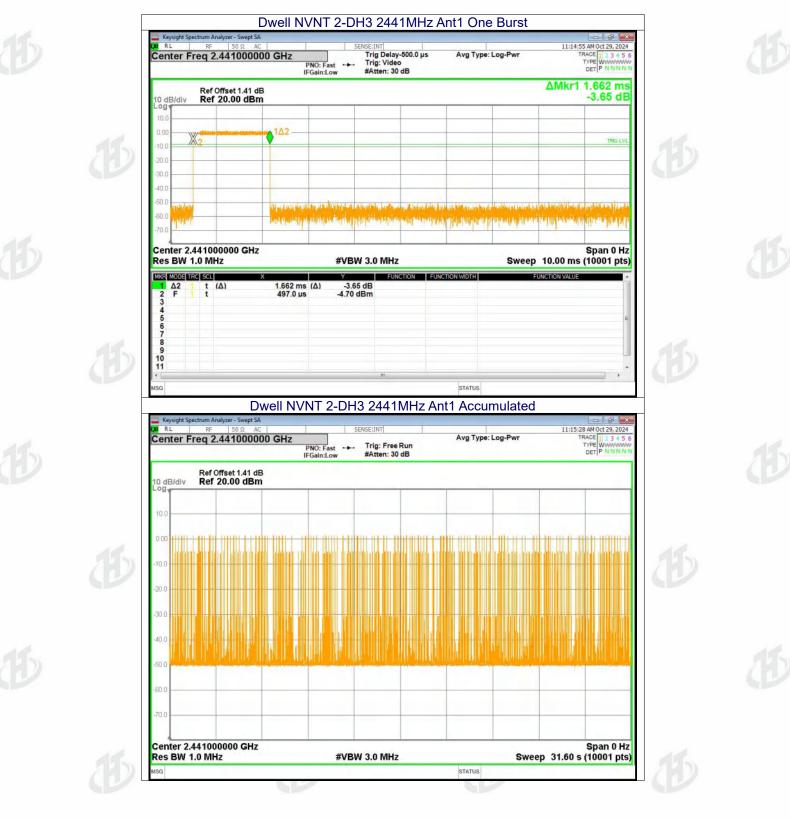


Project No.: ZHT-241025107W01-1 Page 102 of 109



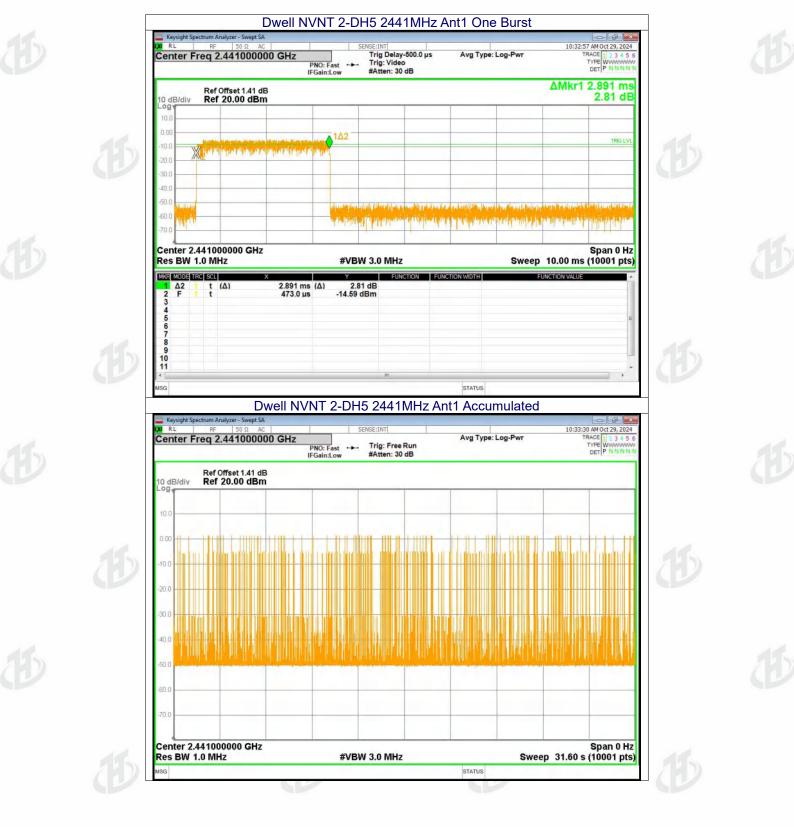


Project No.: ZHT-241025107W01-1 Page 103 of 109



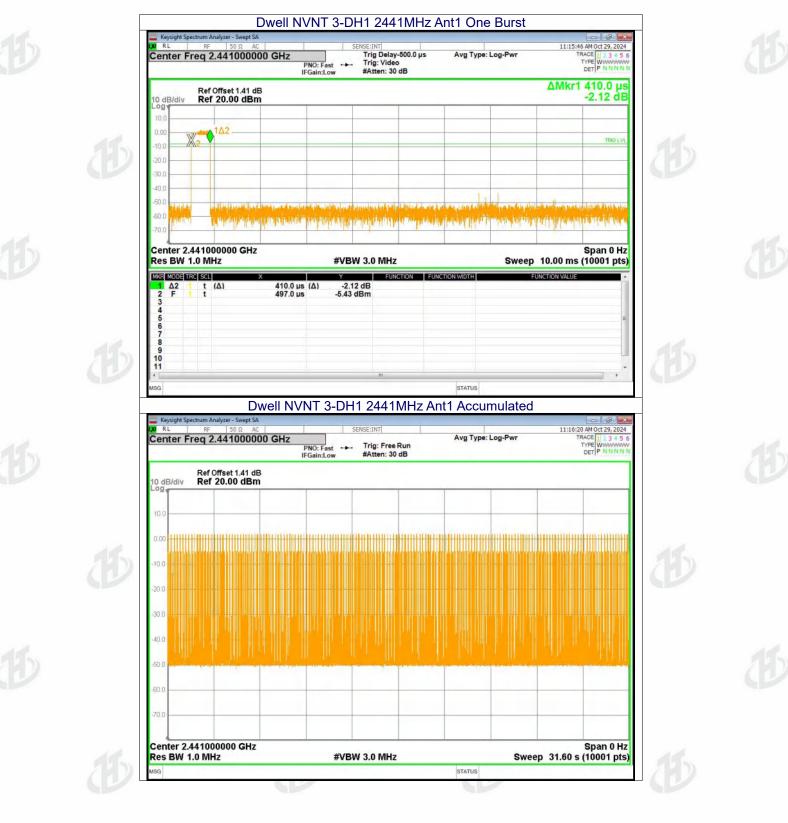


Project No.: ZHT-241025107W01-1 Page 104 of 109



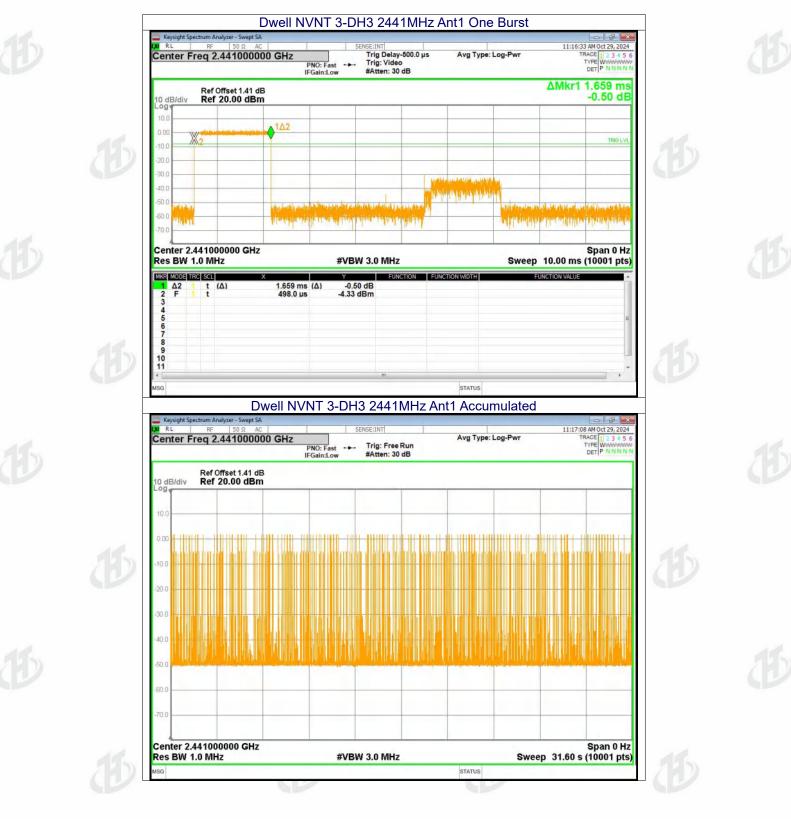


Project No.: ZHT-241025107W01-1 Page 105 of 109



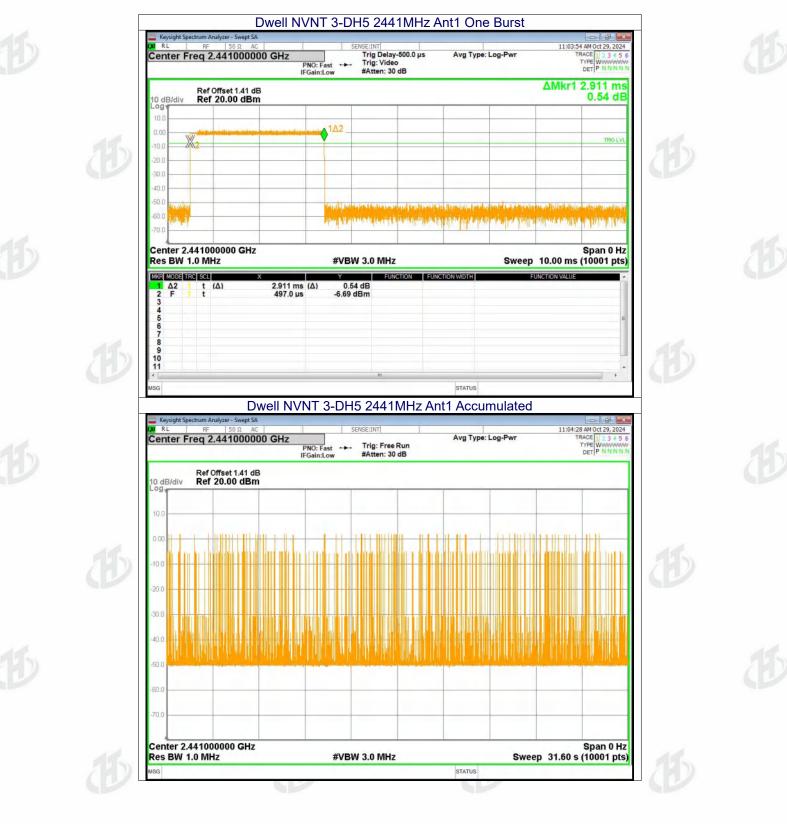


Project No.: ZHT-241025107W01-1 Page 106 of 109





Project No.: ZHT-241025107W01-1 Page 107 of 109





Standard requi	rement:	FCC Part1	5 C Section 15.	203 /247(b)(4), F	RSS-Gen 6.8	
5.203 requirer in intentional esponsible pa ntenna that us roken antenna rohibited. 5.247(b) (4) re he conducted vith directional ntennas of dir adiator shall b ppropriate, by he applicant fi sed with the l equired imped	ment: radiator shall l rty shall be use ses a unique cou a can be replace equirement: output power li gains that do no rectional gain g be reduced below the amount in c or equipment ce icence-exempt t ance for each at	be designed to ad with the dev upling to the inte- ed by the user, to mit specified in ot exceed 6 dBi. reater than 6 d w the stated va IB that the direct rtification, as per ransmitter, indi- ntenna. Licence pes of antenna	p ensure that r vice. The use entional radiator, but the use of a paragraph (b) o Except as show Bi are used, the lues in paragrap tional gain of the er RSP-100, musicating the maxir e-exempt transm as. However, it	no antenna oth of a permaner the manufactur standard antenn of this section is in in paragraph e conducted out ohs (b)(1), (b)(2 e antenna excee st provide a list of num permissible itters that have r is not permiss	er than that fu titly attached ar er may design ti a jack or electri based on the u (c) of this section put power from), and (b)(3) of eds 6 dBi. of all antenna type e antenna gain received equipm sible to exceed	atenna or of an he unit so that a cal connector is use of antennas n, if transmitting n the intentional this section, as bes that may be (in dBi) and the nent certification I the maximum
cence-exempt cence-exempt Vhen a measu ne device's an UT Antenna: The antenna is	ropically radiate apparatus. Tes transmitter and irement at the a tenna shall be s	ting shall be pe I antenna type, intenna connect tated, based on	P) limits specifi orformed using th with the transm tor is used to de a measuremen ain of the antenr	ne highest gain a nitter output pow etermine RF out t or on data fron	antenna of each ver set at the m put power, the o n the antenna m	a combination of naximum level.9 effective gain of nanufacturer.
cence-exempt cence-exempt Vhen a measu ne device's an UT Antenna: 'he antenna is	ropically radiate apparatus. Tes transmitter and irement at the a tenna shall be s	ting shall be pe I antenna type, intenna connect tated, based on	orformed using the with the transm tor is used to de a measuremen	ne highest gain a nitter output pow etermine RF out t or on data fron	antenna of each ver set at the m put power, the o n the antenna m	a combination of naximum level.9 effective gain of nanufacturer.
cence-exempt cence-exempt Vhen a measu ne device's an UT Antenna:	ropically radiate apparatus. Tes transmitter and irement at the a tenna shall be s	ting shall be pe I antenna type, intenna connect tated, based on	orformed using the with the transm tor is used to de a measuremen	ne highest gain a nitter output pow etermine RF out t or on data fron	antenna of each ver set at the m put power, the o n the antenna m	a combination of naximum level.9 effective gain of nanufacturer.
cence-exempt cence-exempt Vhen a measu ne device's an UT Antenna: 'he antenna is	ropically radiate apparatus. Tes transmitter and irement at the a tenna shall be s	ting shall be pe I antenna type, intenna connect tated, based on	orformed using the with the transm tor is used to de a measuremen	ne highest gain a nitter output pow etermine RF out t or on data fron	antenna of each ver set at the m put power, the o n the antenna m	a combination of naximum level.9 effective gain of nanufacturer.

