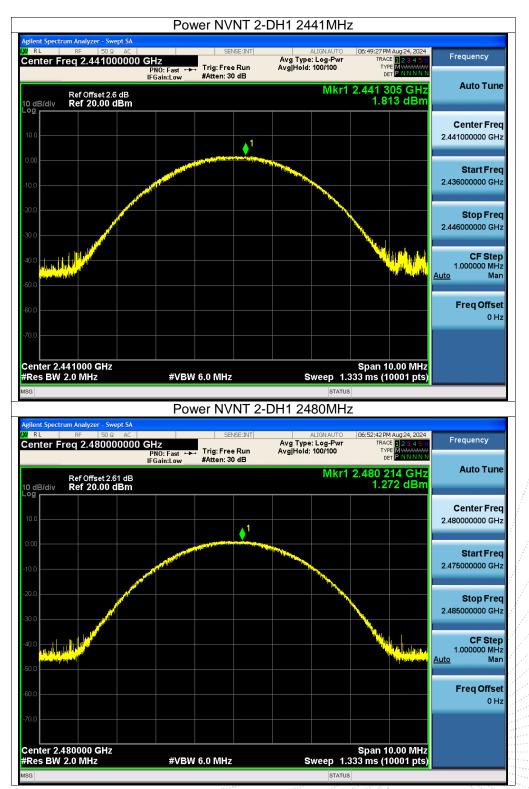


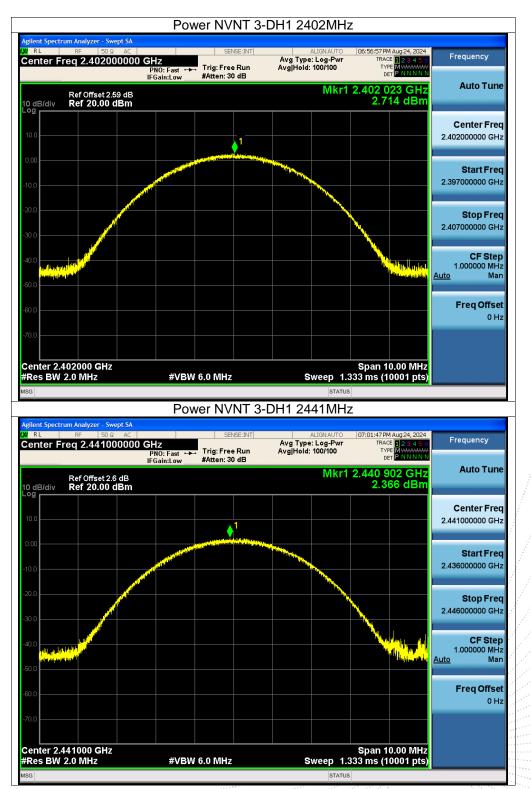


No.: BCTC/RF-EMC-005





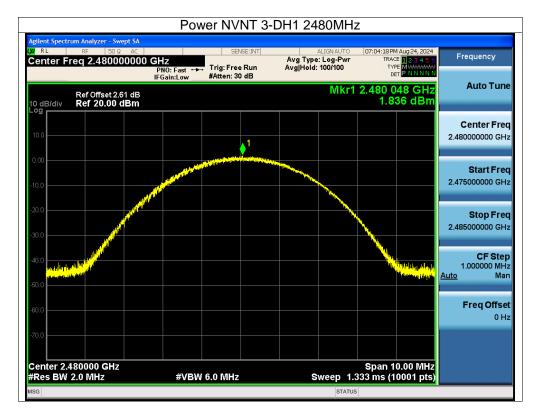




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12. Hopping Channel Separation

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.

Mode	Test Channel	Separation (MHz)	Limit(MHz)	Result
1-DH1	Low Manager	1.000	0.577	PASS
1-DH1	Middle	1.004	0.581	PASS
1-DH1	High Migh	1.000	0.552	PASS
2-DH1	Low	1.000	0.832	PASS
2-DH1	Middle	1.000	0.821	PASS
2-DH1	High	1.002	0.834	PASS
3-DH1	Low	1.000	0.810	PASS
3-DH1	Middle	1.000	0.829	PASS
3-DH1	High	1.002	0.814	PASS

12.4 Test Result





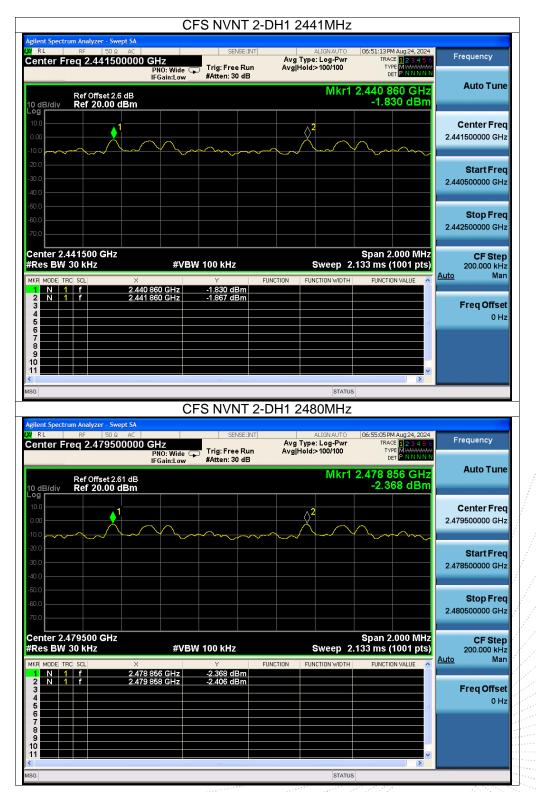
n 00.,LT



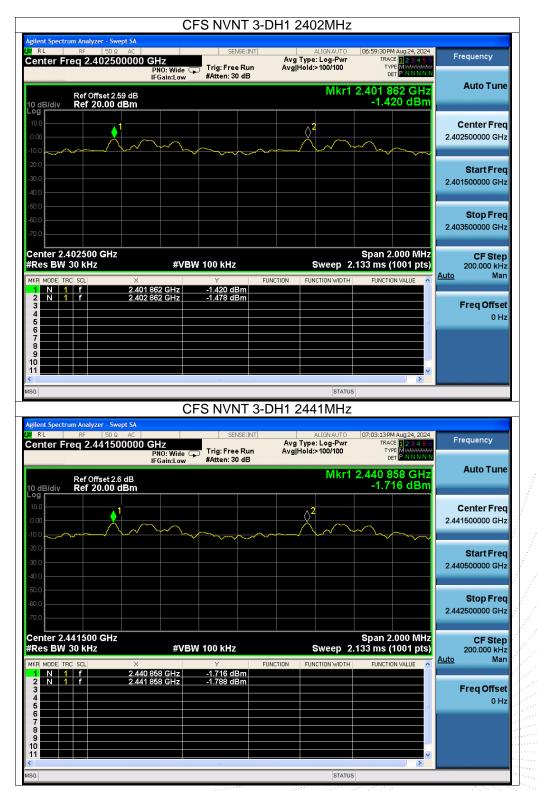


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	CFS NVNT 3	3-DH1 2480MHz		
Agilent Spectrum Analyzer - Swept SA V/ RL RF 50 Ω AC Center Freq 2.479500000 0	GHz PNO: Wide Trig: Free Run JE Gain: Jaw #Atten: 30 dB	ALIGNAUTO Avg Type: Log-Pwr Avg Hold:>100/100	07:07:38 PM Aug 24, 2024 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
Ref Offset 2.61 dB 10 dB/div Ref 20.00 dBm		Mkr1	2.478 856 GHz -2.308 dBm	Auto Tune
Log 10.0 0.00 -10.0	······································	2 ~~~~^2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Center Freq 2.479500000 GHz
-20.0				Start Freq 2.478500000 GHz
-50.0 -60.0 -70.0				Stop Freq 2.480500000 GHz
Center 2.479500 GHz #Res BW 30 kHz	#VBW 100 kHz	Sweep 2	Span 2.000 MHz .133 ms (1001 pts)	CF Step 200.000 kHz
	Y 856 GHz 868 GHz -2.208 dBm -2.228 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man Freq Offset 0 Hz
MSG	100	STATUS		



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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.

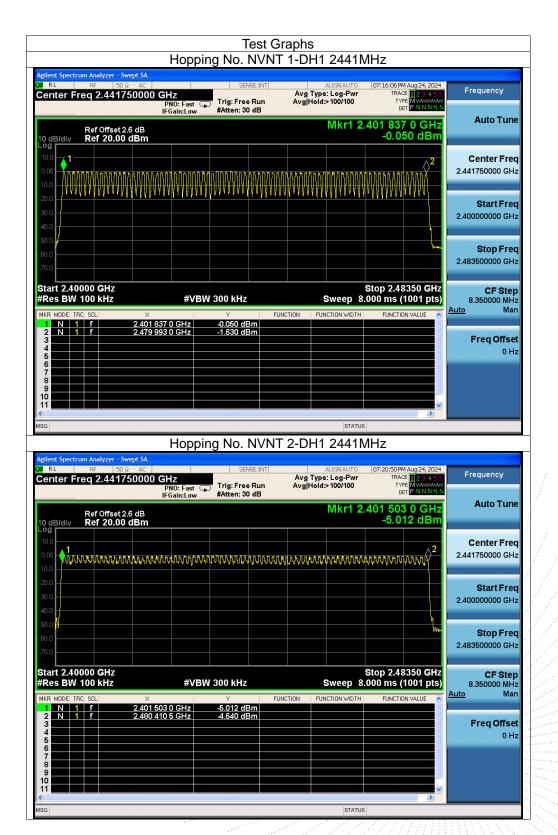
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

13.4 Test Result

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

Edition:





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Hoppir	ng No. NVNT	3-DH1 2441M	/Hz	
Agilent Spectrum Analyzer - Swept SA				
	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	07:24:49 PM Aug 24, 2024 TRACE 1 2 3 4 5 6	Frequency
Center Freq 2.441750000 GHz	Trig: Free Run	Avg Hold:>100/100	TYPE MWWWWWW DET P N N N N N	
IFGain:Low	#Atten: 30 dB			Auto Tune
Ref Offset 2.6 dB		Mkr1 2.	401 837 0 GHz -0.072 dBm	Auto Tune
10 dB/div Ref 20.00 dBm			-0.072 dBm	
10.0				Center Freq
	800880000000000000000000000000000000000			2.441750000 GHz
-1010	adduaddorlwyddo	ด้งคนิ้อกนั้นที่มีกิติกษิทั้งภ	ռողուհուսվողջել	
-20.0				Otort From
-30.0				Start Freq 2.40000000 GHz
-40.0				2.40000000 GH2
-50.0 🖌			k	
-60.0			"lor.	Stop Freq
-70.0				2.483500000 GHz
Start 2.40000 GHz			Stop 2.48350 GHz	CF Step
#Res BW 100 kHz #VBW	/ 300 kHz	Sweep 8.	000 ms (1001 pts)	8.350000 MHz Auto Man
MKR MODE TRC SCL X 1 N 1 f 2.401 837 0 GHz	Y FUNI -0.072 dBm	CTION FUNCTION WIDTH	FUNCTION VALUE	Adto
2 N 1 f 2.480 410 5 GHz	-4.080 dBm			
3				Freq Offset 0 Hz
5				0 H2
7				
8				
10				
<			×	
MSG		STATUS		



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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.

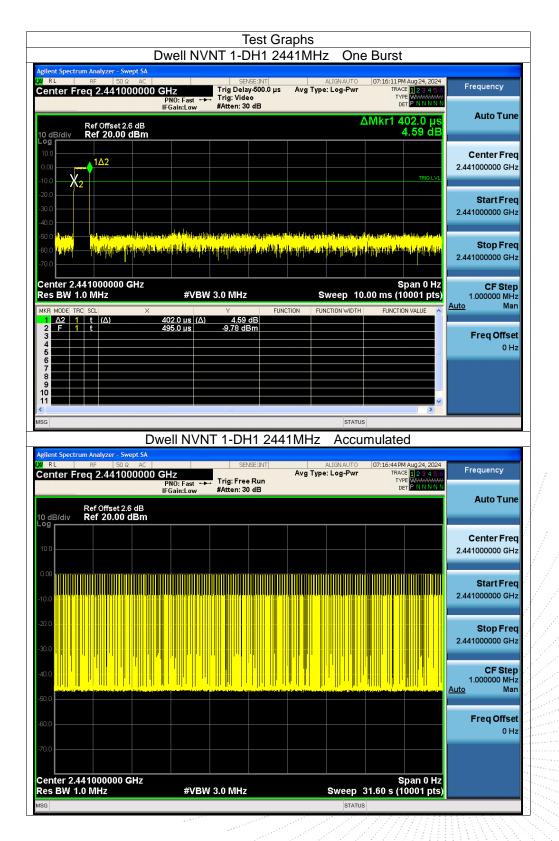
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2441	0.402	128.64	320	31600	400	Pass
1-DH3	2441	1.658	256.99	155	31600	400	Pass
1-DH5	2441	2.906	308.036	106	31600	400	Pass
2-DH1	2441	0.410	130.38	318	31600	400	Pass
2-DH3	2441	1.654	246.446	149	31600	400	Pass
2-DH5	2441	2.900	292.9	101	31600	400	Pass
3-DH1	2441	0.410	130.79	319	31600	400	Pass
3-DH3	2441	1.660	249	150	31600	400	Pass
3-DH5	2441	2.903	301.912	104	31600	400	Pass

14.4 Test Result

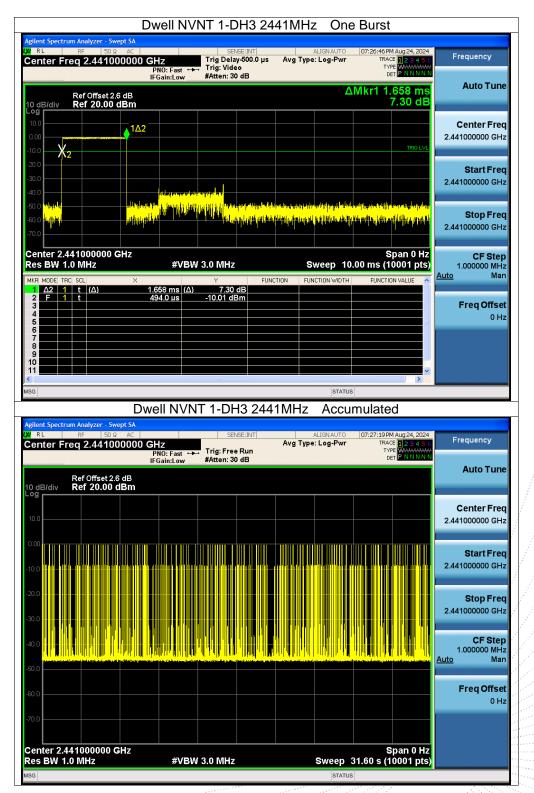
Note: Total Dwell Time (ms) = Pulse Time (ms)*Burst Count





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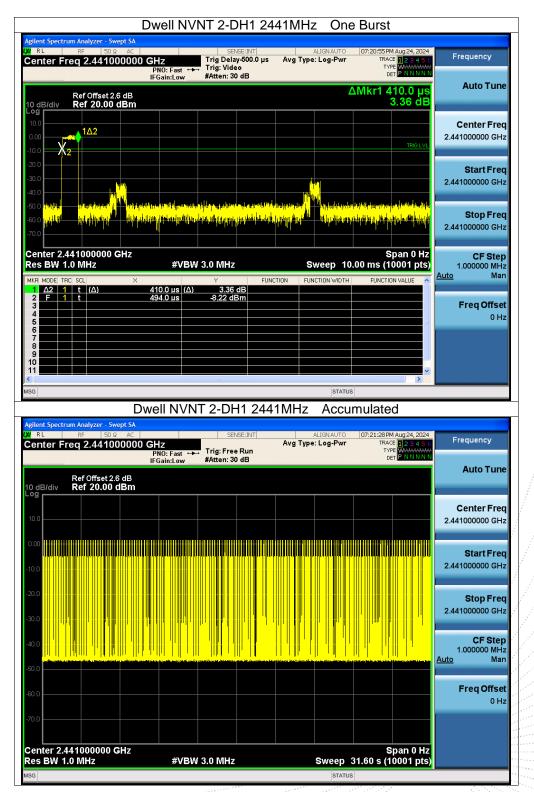




Dwell NVNT 1-DH5 2441MHz One Burst	
gilent Spectrum Analyzer - Swept SA { RL RF 50 Ω AC SENSE.INT ALIGNAUTO 07:36:49PM Aug24,2024 Center Freq 2.441000000 GHz Trig Delay-500.0 μs Avg Type: Log-Pwr TRACE 1 2 3:4 5 6 PNO: Fast → Trig: Video Trig: Video Trig: Video Physical Aug24,2024 IFGaint.low #Atten: 30 dB	Frequency
Ref Offset 2.6 dB ΔMkr1 2.906 ms 10 dB/div Ref 20.00 dBm 8.67 dB	Auto Tune
ο g 100 0.00 10.0 X ₂ Ττου LVL	Center Freq 2.441000000 GHz
	Start Fred 2.441000000 GHz
500 ber versen en e	Stop Fred 2.441000000 GHz
Center 2.441000000 GHz Span 0 Hz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.00 ms (10001 pts)	CF Step 1.000000 MHz
MKR MODE TRC SCL X Y FUNCTION FUNCTION width FUNCTION VALUE 1 Δ2 1 t (Δ) 2,906 ms (Δ) 8.67 dB 2 F 1 t 494.0 μs -10.25 dBm -10.25 dBm 3 - - - - - -	Auto Man Freq Offset 0 Hz
5 3 3 3 3 3 3 6 3 3 3 3 3 3 7 3 3 3 3 3 3 8 3 3 3 3 3 3	
Dwell NVNT 1-DH5 2441MHz Accumulated	
gilent Spectrum Analyzer - Swept SA α RL RF 50 Ω AC SENSE:INT ALIGNAUTO 07:37:22 PM Aug 24, 2024	
Center Freq 2.441000000 GHz PN0: Fast +>- IFG faint.low #Atten: 30 dB PN0: Fast +>-	Frequency
Ref Offset 2.6 dB 0 dB/div Ref 20.00 dBm	Auto Tune
	Center Freq 2.441000000 GHz
	Start Fred 2.441000000 GHz
200	
	2.441000000 GHz CF Step 1.000000 MHz
	Stop Freq 2.44100000 GHz CF Step 1.000000 MHz <u>Auto</u> Man Freq Offset 0 Hz
	2.44100000 GHz CF Step 1.000000 MHz <u>Auto</u> Mar Freq Offset

) ED







	ell NVNT 2-E	DH3 2441N	1Hz One	Burst	
50 Ω AC 441000000 GH Pt	Z Trig Del: 10: Fast ↔ Trig: Vid	ay-500.0 µs Avg eo	ALIGNAUTO Type: Log-Pwr	07:39:22 PM Aug 24, 2024 TRACE 1 2 3 4 5 6 TYPE WWWWW DET P N N N N N	Frequency
fset 2.6 dB	ain:Low Pricen. o		Δ		Auto Tune
1Δ2 —				TRIG LVL	Center Fred 2.441000000 GH;
in in in in it.					Start Free 2.441000000 GH;
areadout areada hardeled half a	han air de ann an Antainn an Antainn an Anna an Anna an Anna an Anna an Anna an Anna Anna Anna Anna Anna Anna A Anna an Anna an Anna an Anna Anna	nderstand för den som den som den Angelen förstande som den som d Angelen som den	n a filla higi gan a kanalar ba Rahin di san galakin da kapalaa	a <mark>ha sheriya ya sa ya karara sa sa</mark>	Stop Fred 2.441000000 GH:
	#VBW 3.0 MHz		Sweep 10.0	Span 0 Hz 00 ms (10001 pts)	CF Step 1.000000 MH
			FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mar Freq Offse
					0 H
			STATUS	>	
	II NVNT 2-DI	H3 2441M⊦	Iz Accur	nulated	
50 Ω AC 441000000 GH Pt	Z 10: Fast ↔→→ Trig: Fre	Avg e Run	ALIGNAUTO Type: Log-Pwr	07:39:55 PM Aug 24, 2024 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Frequency
fset 2.6 dB 0.00 dBm					Auto Tun
					Center Fre 2.441000000 GH
					Start Fre 2.441000000 GH
	.				Stop Fre 2.441000000 GH
					CF Ste 1.000000 MH <u>Auto</u> Ma
					Freq Offse 0 H
	zer - Swept SA 50 Ω AC 441000000 GH P F F F F F F F F F F F F F	zer - Swept SA S0 Ω AC SE 141000000 GHz PN0: Fast Fiset 2.6 dB Trig Del Watten: 3 fset 2.6 dB 1Δ2 1Δ2 1Δ2 14100000 GHz 40000 GHz 10000 GHz 40000 GHz 100000 GHz 40000 GHz 10000 GHz 10000 GHz 10000 GHz 716.54 ms (Δ) 10000 GHz 714.90 d 10000 GHz 716.54 ms (Δ) 10000 GHz 717.57 ms (Δ) 10000 GHz 716.54 ms (Δ)<	zer - Swept SA SENSE:INT 50.02 AC Trig Delay-\$00.0 µs PNO: Fast Fig: Video IFGain:Low #Atten: 30 dB	Zer - Swept SA SENSE:INT ALIGNAUTO 141000000 GHz PND: Fast	zer - Swept SA Serve: INT ALIGNAUTO (07.99:22 PM Aug24, 2024) 1411000000 GHz IFGain.Low Trig Delay-500.0 µs Trig: Video #Atten: 30 dB Avg Type: Log-Pwr Trace December 2000 56 t 2.6 dB CMKr1 1.654 ms 5.29 dB CMKr1 1.654 ms 5.29 dB 102 102 Troot Video #Atten: 30 dB Troot Video #Atten: 30 dB 102 102 Troot Video #Atten: 30 dB Troot Video #Atten: 30 dB 102 102 Troot Video #Atten: 30 dB Troot Video #Atten: 30 dB 103 1654 ms (A) 5.29 dB Span 0 Hz Sweep 10.00 ms (10001 pts) 103 1.654 ms (A) 5.29 dB Sweep 10.00 ms (10001 pts) 103 1.654 ms (A) 5.29 dB Sweep 10.00 ms (10001 pts) 103 1.654 ms (A) 5.29 dB Sweep 10.00 ms (10001 pts) 103 1.654 ms (A) 5.29 dB Sweep 10.00 ms (10001 pts) 104 1.654 ms (A) 5.29 dB Sweep 10.00 ms (10001 pts) 105 Troot Video #Atton: 30 dB Avg Type: Log-Pwr Troot Video Troot Pwr 1000000 GHz FN0: Fast





	ell NVNT 2-DH5 24	41MHz One	Burst	
Agilent Spectrum Analyzer - Swept SA XM RL RF 50 Ω AC AC Center Freq 2.441000000 GH PN	0: Fast 🛶 Trig: Video	ALIGNAUTO Avg Type: Log-Pwr	07:41:07 PM Aug 24, 2024 TRACE 123456 TYPE WANN N N DET PNNNNN	Frequency
Ref Offset 2.6 dB 10 dB/div Ref 20.00 dBm	ain:Low #Atten: 30 dB	Δ	Mkr1 2.900 ms -0.62 dB	Auto Tune
Log 10.0 0.00 -10.0 -10.0	ag 1Δ2		TRIG LVL	Center Freq 2.441000000 GHz
-100 X211 autori Minute II patricipation -200				Start Freq 2.441000000 GHz
-50.0 %/1 -60.0 %/1 -70.0	na haran aya din ki ya aya dina tina ta dana ayan Mana ya aya na aya dina di ya ta aya dina aya ya aya	<mark>i ba lualipita dina katana da basana da b Mana da basana da basa</mark>		Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	-	Span 0 Hz 00 ms (10001 pts)	CF Step 1.000000 MHz <u>Auto</u> Man
2 F 1 t 354 3 4 9	00 ms (Δ) -0.62 dB 1.0 μs -14.26 dBm	CTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
5 6 7 8 9				
10 11 < MSG		STATUS		
Dwe Agilent Spectrum Analyzer - Swept SA	II NVNT 2-DH5 244	1MHz Accu	mulated	
X RL RF 50Ω AC Center Freq 2.441000000 GH	Z 0: Fast ++ Trig: Free Run ain:Low #Atten: 30 dB	ALIGNAUTO Avg Type: Log-Pwr	07:41:40 PM Aug 24, 2024 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Frequency
Ref Offset 2.6 dB 10 dB/div Ref 20.00 dBm Log				Auto Tune
10.0				Center Freq 2.441000000 GHz
0.00				Start Freq 2.441000000 GHz
-20.0				Stop Freq 2.441000000 GHz
-40.0				CF Step 1.000000 MHz <u>Auto</u> Man
-60.0				Freq Offset 0 Hz
-70.0				
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 3	Span 0 Hz 31.60 s (10001 pts)	

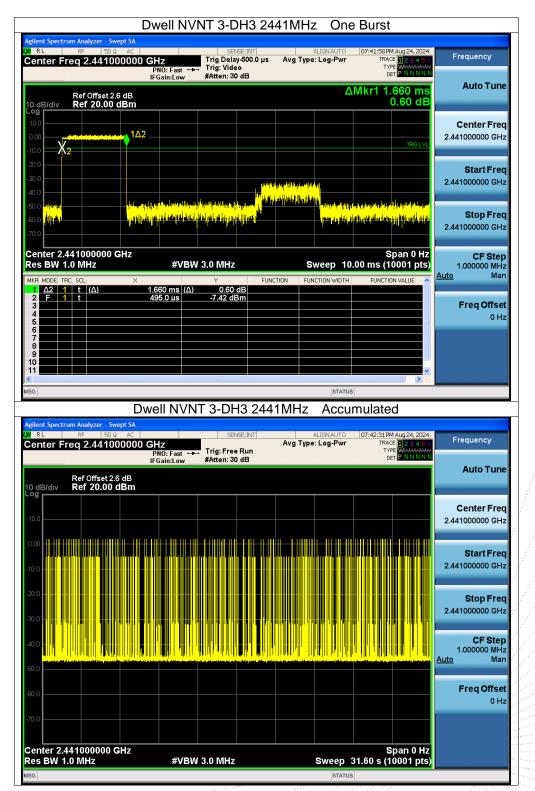


	Dwell NVNT 3-I	DH1 2441MHz O	ne Burst	
gilent Spectrum Analyzer - So RL RF 50: Center Freq 2.4410	2 AC SI 000000 GHz Trig Del PN0: Fast ↔ Trig: Vic			Frequency
Ref Offset 2 IO dB/div Ref 20.00	IFGain:Low #Atten: : .6 dB	30 dB	ΔMkr1 410.0 μs 5.83 dB	Auto Tune
			TRIG LVL	Center Freq 2.441000000 GHz
				Start Fred 2.441000000 GHz
0.0 <mark>14 (1990) - 4 (1994) - 4 (1994)</mark> 0.0 14 <mark>14 (1994) - 17 4 (1994) - 1994)</mark> 0.0	¹⁴ ¹⁴ <mark>Angelong ang sa kari kang sa kari kang Sa kang sa kari kari kari kari kari kari kari k Sa kari kari kari kari kari kari kari kar</mark>	ta ben den ben ben sen fra den staten in det den sen de sen sen de La senda de sen fra de la sen fra de sen de sen La senda de sen de s	alata antoinin a sina ana ang magana di an Aggina antoinin pani katang mananing patang pina Aggina antoining pani katang pina sina sina sina sina sina sina	Stop Fred 2.441000000 GH
enter 2.441000000 tes BW 1.0 MHz	GHz #VBW 3.0 MH	z Sweep	Span 0 Hz 10.00 ms (10001 pts)	CF Step 1.000000 MHz
KR MODE TRC SCL 1 Δ2 1 t (Δ) 2 F 1 t (Δ) 3 - - - - 4 - - - - 5 - - - - 6 - - - -	× Υ 410.0 μs (Δ) 5.83 494.0 μs -7.84 c	FUNCTION FUNCTION WID	TH FUNCTION VALUE	Auto Mar Freq Offset 0 Hz
7 8 9 0 1			×	
G			TUS	
gilent Spectrum Analyzer - Sv	Dwell NVNT 3-D		cumulated	
enter Freq 2.4410				Frequency
Ref Offset 2 dB/div Ref 20.00	6 dB			Auto Tune
0.0				Center Free 2.441000000 GH
00				Start Free 2.441000000 GH
				Stop Free 2.441000000 GH
				CF Step 1.000000 MH: <u>Auto</u> Mar
0.0				Freq Offse
0.0				
enter 2.441000000 es BW 1.0 MHz	GHz #VBW 3.0 MH:	z Swee	Span 0 Hz 5 31.60 s (10001 pts)	
G		STA	TUS	

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Dv	vell NVNT 3-DH5 24	41MHz On	e Burst	
Agilent Spectrum Analyzer - Swept SA W RL RF 50 Ω AC Center Freq 2.441000000 GH	NO:Fast 🛶 Trig:Video	ALIGN AUTO Avg Type: Log-Pwr	07:43:08 PM Aug 24, 2024 TRACE 12 3 4 5 6 TYPE WANNANN DET P N N N N N	Frequency
Ref Offset 2.6 dB 10 dB/div Ref 20.00 dBm	Gain:Low #Atten: 30 dB	Ĺ	Mkr1 2.903 ms 2.11 dB	Auto Tune
	142		TRIG LVL	Center Freq 2.441000000 GHz
-100 X24001M0101M, 014000000				Start Freq 2.441000000 GHz
-50.0 <mark>ve</mark>	dan Kasim (), kisala kasim kangan kasim kasim kasim kasim Manan kasim kasi Manan kasim kasi		n ferskille og forste forste strikte blever i nøger u ferska som forste strikte operationer i strikte operationer u	Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz		Sweep 10	Span 0 Hz 0.00 ms (10001 pts)	CF Step 1.000000 MHz <u>Auto</u> Man
2 F 1 t 15 3 4 5 5	003 ms (Δ) 2.11 dB 55.0 μs -14.49 dBm			Freq Offset 0 Hz
6 7 8 9 10				
MSG		STATU	s	
	ell NVNT 3-DH5 244	1MHz Accu	imulated	
	IZ NO: Fast →→ Trig: Free Run Gain:Low #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr	07:43:41 PM Aug 24, 2024 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Frequency
Ref Offset 2.6 dB 10 dB/div Ref 20.00 dBm Log				Auto Tune
10.0				Center Freq 2.441000000 GHz
0.00				Start Freq 2.441000000 GHz
-20.0				Stop Freq 2.441000000 GHz
-40.0				CF Step 1.000000 MHz <u>Auto</u> Man
-60.0				Freq Offset 0 Hz
.70.0 Center 2.441000000 GHz			Span 0 Hz	
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep statu	31.60 s (10001 pts)	



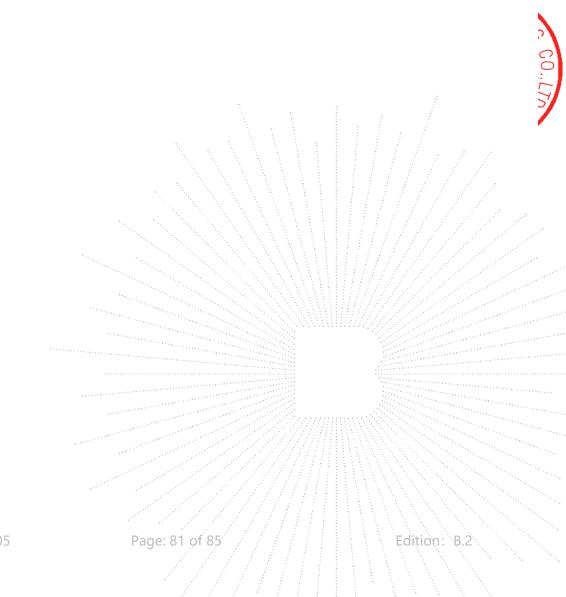
15. Antenna Requirement

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 PCB antenna, fulfill the requirement of this section.

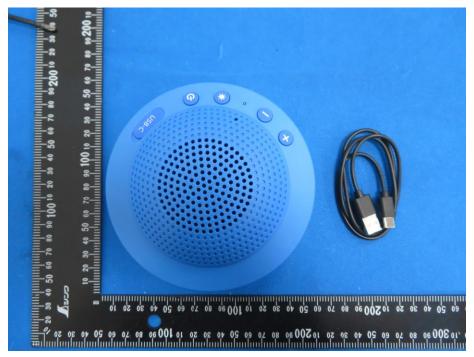


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16. EUT Photographs

EUT Photo



NOTE: Appendix-Photographs Of EUT Constructional Details

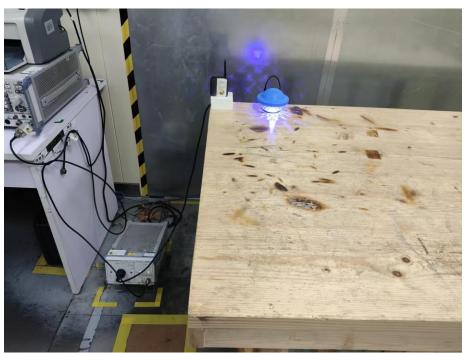
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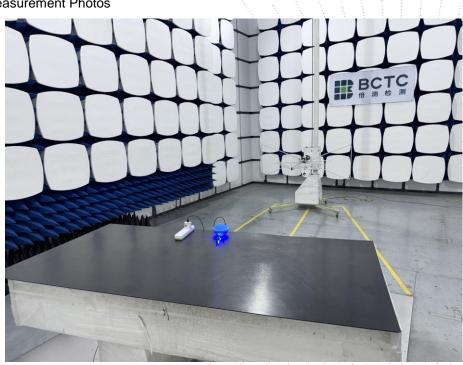
17. EUT Test Setup Photographs

Conducted emissions





Radiated Measurement Photos

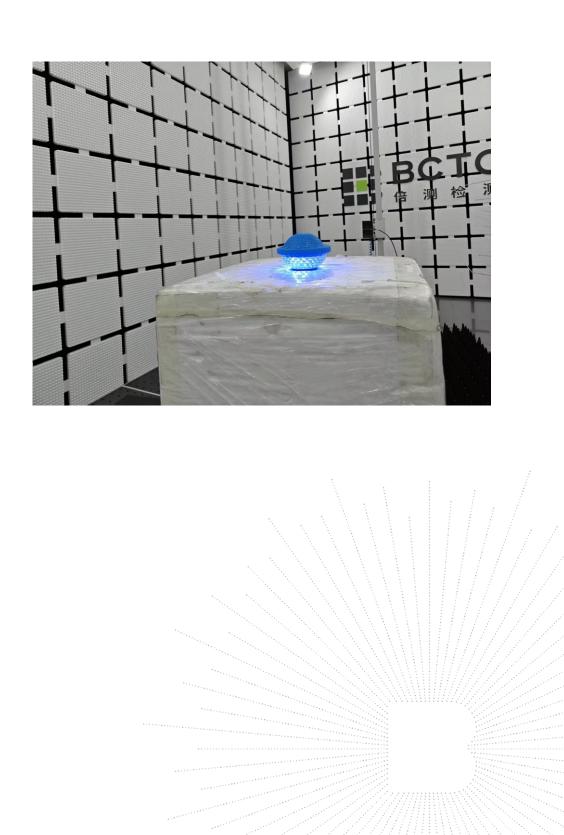


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TEST

t Seal



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.

Address:

1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: 400-788-9558

P.C.: 518103

FAX: 0755-33229357

Website: http://www.chnbctc.com

Consultation E-mail: bctc@bctc-lab.com.cn

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

***** END *****

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