

TEST REPORT

Report No.:	BCTC2410930951-1E					
Applicant:	Shenzhen Qichang Intelligent Technology Co., Ltd					
Product Name:	Smart phone					
Test Model:	S3					
Tested Date:	2024-10-14 to 2024-11-06					
Issued Date:	2024-11-07					
She	enzhen BCTC Testing Co., Ltd.					
No.: BCTC/RF-EMC-005	Page: 1 of 83	Edition: B.2				



FCC ID: 2BAK2-S3

Product Name:	Smart phone
Trademark:	T OSSIBOT
Model/Type Reference:	S3 S3 Pro, S3 Plus, S3 P, S3 +
Prepared For:	Shenzhen Qichang Intelligent Technology Co., Ltd
Address:	Room 510, Building 7, Yunli Intelligent Park, No. 7, Bantian Street, Longgang , Shenzhen
Manufacturer:	Shenzhen Qichang Intelligent Technology Co., Ltd
Address:	Room 510, Building 7, Yunli Intelligent Park, No. 7, Bantian Street, Longgang , Shenzhen
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2024-10-14
Sample tested Date:	2024-10-14 to 2024-11-06
Issue Date:	2024-11-07
Report No.:	BCTC2410930951-1E
Test Standards	FCC Part15.247 ANSI C63.10-2013
Test Results	PASS \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Remark:	This is Bluetooth Classic radio test report.

Tested by:

Vare

Brave Zeng/ Project Handler

Approved by:

Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.



Table Of Content

Test	Report Declaration P	age
1.	Version	5
2.	Test Summary	6
3.	Measurement Uncertainty	7
4.	Product Information And Test Setup	
4.1	Product Information	
4.2	Test Setup Configuration	
4.3	Support Equipment	
4.4	Channel List	
4.5	Test Mode	-
4.6	Table Of Parameters Of Text Software Setting	
5.	Test Facility And Test Instrument Used	
5.1	Test Facility	
5.2	Test Instrument Used	
6.	Conducted Emissions.	
6.1	Block Diagram Of Test Setup	
6.2 6.3	Limit	
6.3 6.4	Test procedure	
6.4 6.5	EUT operating Conditions	
0.5 7.	Radiated emissions	
7.1	Block Diagram Of Test Setup	
7.1	Limit	
7.3	Test procedure	
7.4	EUT operating Conditions	
7.5	Test Result.	19
8.	Radiated Band Emission Measurement And Restricted Bands Of Operation	on23
8.1	Block Diagram Of Test Setup	
8.2	Limit	
8.3	Test procedure	24
8.4	EUT operating Conditions	24
8.5	Test Result	25
9.	Spurious RF Conducted Emissions	26
9.1	Block Diagram Of Test Setup	26
9.2	Limit Test procedure Test Result	26
9.3	Test procedure	26
9.4	Test Result	27
10.		48
10.1	Block Diagram Of Test Setup	48
10.2	Limit	48
10.3		48
10.4		
11.	Maximum Peak Output Power	
11.1	5	
11.2	: Limit	54

Page: 3 of 83



11.3 Test procedure	54
11.4 Test Result	
12. Hopping Channel Separation	60
12.1 Block Diagram Of Test Setup	60
12.2 Limit	60
12.3 Test procedure	60
12.4 Test Result	60
13. Number Of Hopping Frequency	66
13.1 Block Diagram Of Test Setup	66
13.2 Limit	
13.3 Test procedure	66
13.4 Test Result	66
14. Dwell Time	69
14.1 Block Diagram Of Test Setup	69
14.2 Limit	69
14.3 Test procedure	69
14.4 Test Result	69
15. Antenna Requirement	79
15.1 Limit	79
15.2 Test Result	79
16. EUT Photographs	80
17. EUT Test Setup Photographs	81

(Note: N/A Means Not Applicable)

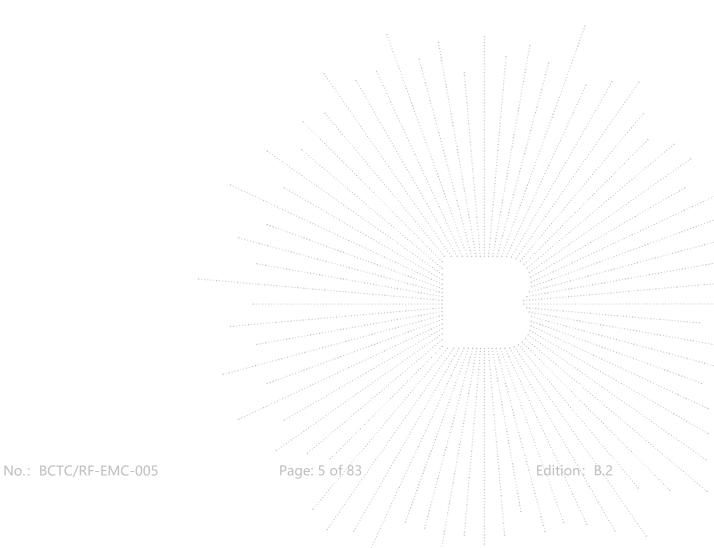
Page: 4 of 83

Edition: B.2



1. Version

Report No.	Issue Date	Description	Approved
BCTC2410930951-1E	2024-11-07	Original	Valid





2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No.	Results
1	Conducted emission AC power port	§15.207	PASS
2	Conducted peak output power for FHSS	§15.247(b)(1)	PASS
3	20dB Occupied bandwidth	§15.247(a)(1)	PASS
4	Hopping channel separation	§15.247(a)(1)	PASS
5	Number of hopping frequencies	§15.247(a)(1)(iii)	PASS
6	Dwell Time	§15.247(a)(1)(iii)	PASS
7	Spurious RF conducted emissions	§15.247(d)	PASS
8	Band edge	§15.247(d)	PASS
9	Spurious radiated emissions for transmitter	§15.247(d) & §15.209 & §15.205	PASS
10	Antenna Requirement	15.203	PASS

No.: BCTC/RF-EMC-005

Page: 6 of 83

Edition: B.2



3. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59°C



4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	S3 S3 Pro, S3 Plus, S3 P, S3 +
Model differences:	All the model are the same circuit and RF module, except model names.
Bluetooth Version:	5.0
Hardware Version:	E1A_01
Software Version:	FOSSiBOT_S3_E
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK, π/ 4 DQPSK, 8DPSK
Number Of Channel	79CH
Antenna installation:	Internal antenna
	-1.9 dBi
Antenna Gain:	Remark: The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.
Ratings:	DC 9V from adapter/DC 3.87V from battery
Adapter Information:	Model: TPD-203A120167UF01 Input: 100-240V~ 50/60Hz 0.6A USB-C Output: 5.0V 3A or 9.0V 2.22A or 12.0V 1.67A

4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	Smart phone	O SSIBOT	S3	N/A	EUT
E-2	Adapter	N/A	TPD-203A12 0167UF01	N/A	Auxiliary

ltem	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	1M	DC cable unshielded

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

СН	Frequency (MHz)	СН	Frequency (MHz)	СН	Frequency (MHz)	СН	Frequency (MHz)
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	79	



4.5 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Test mode	Low channel	Middle channel	High channel
1	Transmitting(GFSK)	2402MHz	2441MHz	2480MHz
2	Transmitting(π/ 4 DQPSK)	2402MHz	2441MHz	2480MHz
3	Transmitting(8DPSK)	2402MHz	2441MHz	2480MHz
4		Link		

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) Fully-charged battery is used during the test

4.6 Table Of Parameters Of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Test software Version	CMD				
Frequency	2402 MHz	2441 MHz	2480 MHz		
Parameters	DEF	DEF	DEF		



5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards. FCC Test Firm Registration Number: 712850 A2LA certificate registration number is: CN1212 ISED Registered No.: 23583

ISED CAB identifier: CN0017

Conducted Emissions Test								
Equipment	Equipment Manufacturer Model# Serial# Last Cal. Next Cal.							
Receiver	R&S	ESR3	102075	May 16, 2024	May 15, 2025			
LISN	R&S	ENV216	101375	May 16, 2024	May 15, 2025			
Software	Frad	EZ-EMC	EMC-CON 3A1	\	١			
Pulse limiter	Schwarzbeck	VTSD9561-F	01323	May 16, 2024	May 15, 2025			

5.2 Test Instrument Used

RF Conducted Test							
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.		
Power meter	Keysight	E4419	1	May 16, 2024	May 15, 2025		
Power Sensor (AV)	Keysight	E9300A		May 16, 2024	May 15, 2025		
Signal Analyzer20kH z-26.5GHz	Keysight	N9020A	MY49100060	May 16, 2024	May 15, 2025		
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40	100363	May 16, 2024	May 15, 2025		
Communication test set	R&S	CMW500	126173	Nov. 13. 2023	Nov. 12, 2024		
Radio frequency control box	MAIWEI	MW200-RFC B					
Software	MAIWEI	MTS 8200	·····		L.		



Radiated Emissions Test (966 Chamber01)								
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.			
966 chamber	ChengYu	Yu 966 Room 966		May 15, 2023	May 14, 2026			
Receiver	R&S	ESR3	102075	May 16, 2024	May 15, 2025			
Receiver	R&S	ESRP	101154	May 16, 2024	May 15, 2025			
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 16, 2024	May 15, 2025			
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 21, 2024	May 20, 2025			
Loop Antenna(9KHz -30MHz)	tenna ⁽ 9KHz Schwarzbeck		FMZB1519B 00014		May 20, 2025			
Amplifier	olifier SKET LAP		SK202104090 1	May 16, 2024	May 15, 2025			
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 21, 2024	May 20, 2025			
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35- HG	2034381	May 16, 2024	May 15, 2025			
Horn Antenna(18G Hz-40GHz)	Schwarzbeck	BBHA9170	00822	May 21, 2024	May 20, 2025			
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40	100363	May 16, 2024	May 15, 2025			
Communication test set	R&S	CMW500	126173	May 16, 2024	May 15, 2025			
Software	Frad	EZ-EMC	FA-03A2 RE	\	\			

No.: BCTC/RF-EMC-005

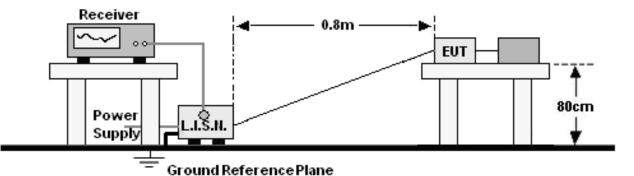
Page: 12 of 83

Edition: B.2



6. Conducted Emissions

6.1 Block Diagram Of Test Setup



6.2 Limit

	Limit (dBuV)				
Frequency (MHz)	Quas-peak	Average			
0.15 -0.5	66 - 56 *	56 - 46 *			
0.50 -5.0	56.00	46.00			
5.0 -30.0	60.00	50.00			

Notes:

1. *Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

6.3 Test procedure

Setting
10 dB
0.15 MHz
30 MHz
9 kHz

a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).

b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.

c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

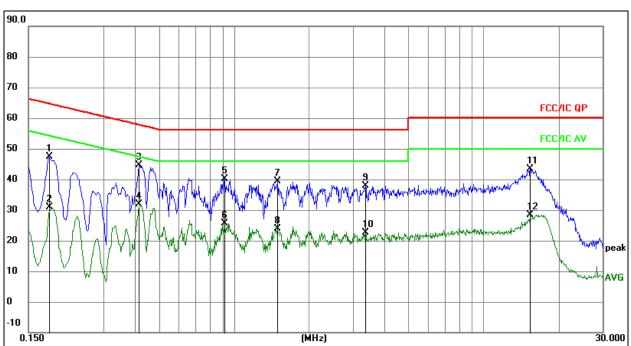
6.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



6.5 Test Result

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 4	Test Voltage :	AC120V/60Hz



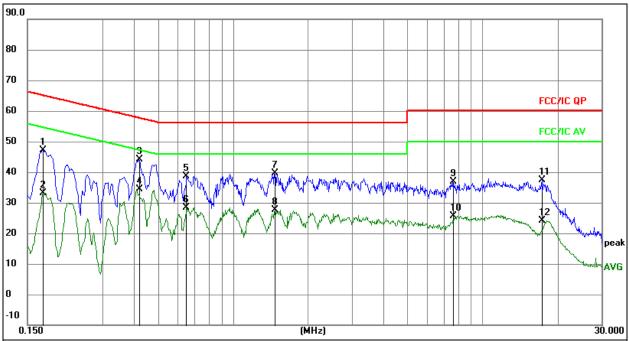
Remark:

All readings are Quasi-Peak and Average values.
 Factor = Insertion Loss + Cable Loss.
 Measurement = Reading Level + Correct Factor
 Over = Measurement - Limit

-			-					
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.1806	27.22	20.07	47.29	64.46	-17.17	QP
2		0.1806	10.78	20.07	30.85	54.46	-23.61	AVG
3	*	0.4148	24.61	20.08	44.69	57.55	-12.86	QP
4		0.4148	11.84	20.08	31.92	47.55	-15.63	AVG
5		0.9136	20.14	20.09	40.23	56.00	-15.77	QP
6		0.9136	5.53	20.09	25.62	46.00	-20.38	AVG
7		1.4953	19.21	20.09	39.30	56.00	-16.70	QP
8		1.4953	3.68	20.09	23.77	46.00	-22.23	AVG
9		3.3635	17.69	20.13	37.82	56.00	-18.18	QP
10		3.3635	2.52	20.13	22.65	46.00	-23.35	AVG
11		15.3883	23.04	20.31	43.35	60.00	-16.65	QP
12		15.3883	8.19	20.31	28.50	50.00	-21.50	AVG



Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Ν
Test Mode:	Mode 4	Test Voltage :	AC120V/60Hz



Remark:

All readings are Quasi-Peak and Average values.
 Factor = Insertion Loss + Cable Loss.

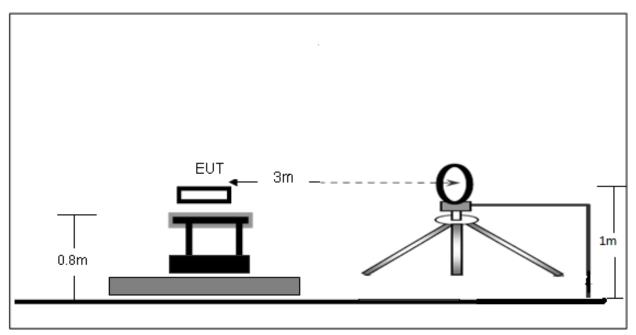
Facto	r = Inser	tion Loss + (Cable Loss.					1
3. Meas	urement	= Reading L	_evel + Correc	t Factor				1
4. Over	= Measu	irement - Lin	nit					
			Reading	Correct	Measure-			
No.	Mk.	Freq.	Level	Factor	ment	Limit	Over	
		MHz		dB	dBu∨	dBuV	dB	Detector
1		0.1722	26.99	20.07	47.06	64.85	-17.79	QP
2		0.1722	13.18	20.07	33.25	54.85	-21.60	AVG
3		0.4193	24.04	20.08	44.12	57.46	-13.34	QP
4	*	0.4193	14.18	20.08	34.26	47.46	-13.20	AVG
5		0.6508	18.61	20.09	38.70	56.00	-17.30	QP
6		0.6508	8.29	20.09	28.38	46.00	-17.62	AVG
7		1.4640	19.44	20.09	39.53	56.00	-16.47	QP
8		1.4640	7.55	20.09	27.64	46.00	-18.36	AVG
9		7.6060	16.84	20.16	37.00	60.00	-23.00	QP
10		7.6060	5.47	20.16	25.63	50.00	-24.37	AVG
11		17.2908	17.18	20.32	37.50	60.00	-22.50	QP
12		17.2908	3.88	20.32	24.20	50.00	-25.80	AVG



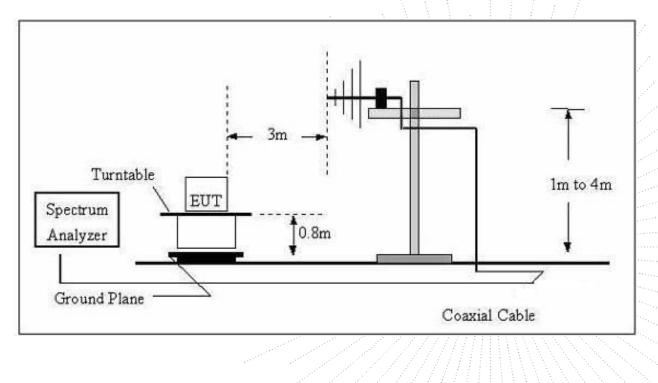
7. Radiated emissions

7.1 Block Diagram Of Test Setup

(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





Turntable EUT 1.5m Im to 4m Ground Plane Ground Plane

(C) Radiated Emission Test-Up Frequency Above 1GHz

7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency	Field Strength	Distance	Field Strength Limit at 3m Distance		
(MHz)	uV/m	(m)	uV/m	dBuV/m	
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log ^{(2400/F(kHz))} + 80	
0.490 ~ 1.705	24000/F(kHz)	30 .	100 * 24000/F(kHz)	20log ^{(24000/F(kHz))} + 40	
1.705 ~ 30	30	30	100 * 30	20log ⁽³⁰⁾ + 40	
30 ~ 88	100	3	100	20log ⁽¹⁰⁰⁾	
88 ~ 216	150	3	150	20log ⁽¹⁵⁰⁾	
216 ~ 960	200	3	200	20log ⁽²⁰⁰⁾	
Above 960	500	3	500	20log ⁽⁵⁰⁰⁾	

Limits Of Radiated Emission Measurement (Above 1000MHz)

	Limit (dBuV/m) (at 3M)	
Frequency (MHz)	Peak	Average
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).



Frequency Range Of Radiated Measurement

(a) For an intentional radiator the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.

(4) If the intentional radiator operates at or above 95 GHz: To the third harmonic of the highest fundamental frequency or to 750 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
(5) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up

to the range specified in paragraphs (a) (1)through (4) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

7.3 Test procedure

Receiver Parameter	Setting		
Attenuation	Auto		
9kHz~150kHz	RBW 200Hz for QP		
150kHz~30MHz	RBW 9kHz for QP		
30MHz~1000MHz	RBW 120kHz for QP		

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.



Above 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middlest channel, the Highest channel. Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

7.5 Test Result

Below 30MHz

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC120V/60Hz
Test Mode:	Mode 4	Polarization :	

Freq.	Reading	Limit Margin	State
(MHz)	(dBuV/m)	(dBuV/m) (dB)	P/F
			PASS
			PASS

Note:

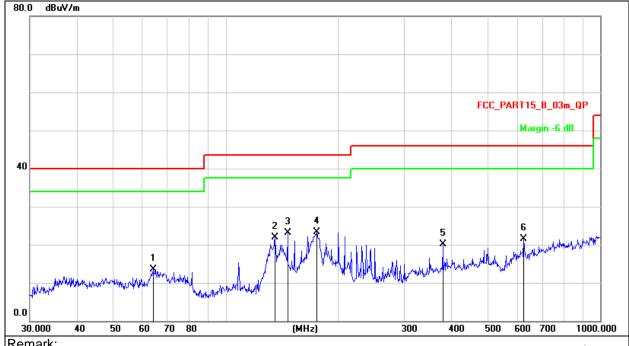
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB); Limit line = specific limits(dBuv) + distance extrapolation factor.



Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 4	Test Voltage:	AC120V/60Hz





Remark:

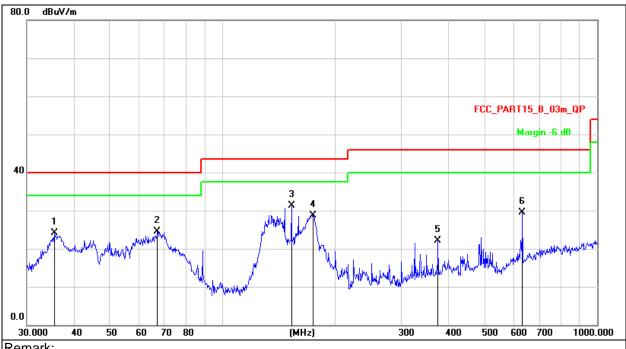
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Measurement = Reading Level + Correct Factor
 Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		63.9828	29.84	-16.35	13.49	40.00	-26.51	QP
2		135.5062	40.38	-18.42	21.96	43.50	-21.54	QP
3		146.3735	42.35	-19.18	23.17	43.50	-20.33	QP
4	*	175.0368	40.92	-17.57	23.35	43.50	-20.15	QP
5	;	379.9141	31.13	-11.10	20.03	46.00	-25.97	QP
6		625.0780	28.19	-6.59	21.60	46.00	-24.40	QP



Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 4	Test Voltage:	AC120V/60Hz



Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Measurement = Reading Level + Correct Factor
 Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		35.4993	39.63	-15.59	24.04	40.00	-15.96	QP
2		66.9669	41.63	-17.17	24.46	40.00	-15.54	QP
3	* ,	152.6641	50.53	-19.23	31.30	43.50	-12.20	QP
4		174.4241	46.34	-17.62	28.72	43.50	-14.78	QP
5	3	375.9385	33.34	-11.15	22.19	46.00	-23.81	QP
6	(631.6884	36.01	-6.47	29.54	46.00	-16.46	QP



Polar	Fre- quency	Reading Level	Correct Factor	Measure- ment	Limits	Over	Detector
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Туре
	GFSK Low channel						
V	4804.00	74.72	-19.99	54.73	74.00	-19.27	PK
V	4804.00	66.07	-19.99	46.08	54.00	-7.92	AV
V	7206.00	67.06	-14.22	52.84	74.00	-21.16	PK
V	7206.00	56.20	-14.22	41.98	54.00	-12.02	AV
Н	4804.00	70.99	-19.99	51.00	74.00	-23.00	PK
Н	4804.00	60.29	-19.99	40.30	54.00	-13.70	AV
Н	7206.00	65.58	-14.22	51.36	74.00	-22.64	PK
Н	7206.00	56.66	-14.22	42.44	54.00	-11.56	AV
			GFSK Mide	dle channel			
V	4882.00	72.77	-19.84	52.93	74.00	-21.07	PK
V	4882.00	64.04	-19.84	44.20	54.00	-9.80	AV
V	7323.00	61.96	-13.90	48.06	74.00	-25.94	PK
V	7323.00	53.13	-13.90	39.23	54.00	-14.77	AV
Н	4882.00	70.22	-19.84	50.38	74.00	-23.62	PK
Н	4882.00	59.23	-19.84	39.39	54.00	-14.61	AV
Н	7323.00	60.75	-13.90	46.85	74.00	-27.15	PK
Н	7323.00	52.78	-13.90	38.88	54.00	-15.12	AV
			GFSK Hig	h channel			1
V	4960.00	73.99	-19.68	54.31	74.00	-19.69	PK
V	4960.00	63.32	-19.68	43.64	54.00	-10.36	AV
V	7440.00	65.55	-13.57	51.98	74.00	-22.02	PK
V	7440.00	55.02	-13.57	41.45	54.00	-12.55	AV
Н	4960.00	71.52	-19.68	51.84	74.00	-22.16	PK
Н	4960.00	61.08	-19.68	41.40	54.00	-12.60	AV
Н	7440.00	64.29	-13.57	50.72	74.00	-23.28	PK
Н	7440.00	55.68	-13.57	42.11	54.00	-11.89	AV

Between 1GHz - 25GHz

Remark:

1.Measurement = Reading Level + Correct Factor,

Correct Factor = Antenna Factor + Cable Loss - Pre-amplifier,

Over= Measurement - Limit

2.If peak below the average limit, the average emission was no test.

3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB

4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

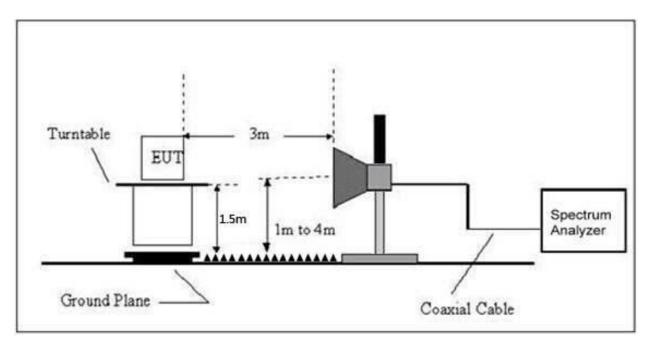
5.All the Modulation are test, the worst mode is GFSK, the data recording in the report.



8. Radiated Band Emission Measurement And Restricted Bands Of Operation

8.1 Block Diagram Of Test Setup

Radiated Emission Test-Up Frequency Above 1GHz



8.2 Limit

FCC Part15 C Section 15.209 and 15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			



Limits Of Radiated Emission Measurement (Above 1000MHz)

	Limit (dBuV/m) (at 3M)			
Frequency (MHz)	Peak	Average		
Above 1000	74	54		

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

8.3 Test procedure

Receiver Parameter	Setting			
Attenuation	Auto			
Start Frequency	2300MHz			
Stop Frequency	2520			
RB / VB (Emission In Restricted Band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average			

Above 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middlest channel, the Highest channel.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

8.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



8.5 Test Result

Test mode	Polar (H/V)	Fre- quency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure- ment (dBuV/m) PK	Limits (dBuV/m)		Result	
						PK	AV		
	Low Channel 2402MHz								
GFSK	Н	2390.00	71.51	-25.43	46.08	74.00	54.00	PASS	
	Н	2400.00	74.98	-25.40	49.58	74.00	54.00	PASS	
	V	2390.00	72.07	-25.43	46.64	74.00	54.00	PASS	
	V	2400.00	76.11	-25.40	50.71	74.00	54.00	PASS	
	High Channel 2480MHz								
	Н	2483.50	74.19	-25.15	49.04	74.00	54.00	PASS	
	Н	2500.00	69.45	-25.10	44.35	74.00	54.00	PASS	
	V	2483.50	75.24	-25.15	50.09	74.00	54.00	PASS	
	V	2500.00	71.02	-25.10	45.92	74.00	54.00	PASS	
	Low Channel 2402MHz								
π/4DQPSK	Н	2390.00	71.31	-25.43	45.88	74.00	54.00	PASS	
	Н	2400.00	74.43	-25.40	49.03	74.00	54.00	PASS	
	V	2390.00	71.61	-25.43	46.18	74.00	54.00	PASS	
	V	2400.00	75.37	-25.40	49.97	74.00	54.00	PASS	
	High Channel 2480MHz								
	Н	2483.50	73.69	-25.15	48.54	74.00	54.00	PASS	
	Н	2500.00	69.42	-25.10	44.32	74.00	54.00	PASS	
	V	2483.50	75.62	-25.15	50.47	74.00	54.00	PASS	
	V	2500.00	70.74	-25.10	45.64	74.00	54.00	PASS	
	Low Channel 2402MHz								
8DPSK	Н	2390.00	71.60	-25.43	46.17	74.00	54.00	PASS	
	Н	2400.00	75.54	-25.40	50.14	74.00	54.00	PASS	
	V	2390.00	72.54	-25.43	47.11	74.00	54.00	PASS	
	V	2400.00	76.65	-25.40	51.25	74.00	54.00	PASS	
	High Channel 2480MHz								
	Н	2483.50	76.07	-25.15	50.92	74.00	54.00	PASS	
	Н	2500.00	70.19	-25.10	45.09	74.00	54.00	PASS	
	V	2483.50	76.78	-25.15	51.63	74.00	54.00	PASS	
	V	2500.00	73.04	-25.10	47.94	74.00	54.00	PASS	

Over= Measurement - Limit

2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB 4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



9. Spurious RF Conducted Emissions

9.1 Block Diagram Of Test Setup



9.2 Limit

Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.205(c))

9.3 Test procedure

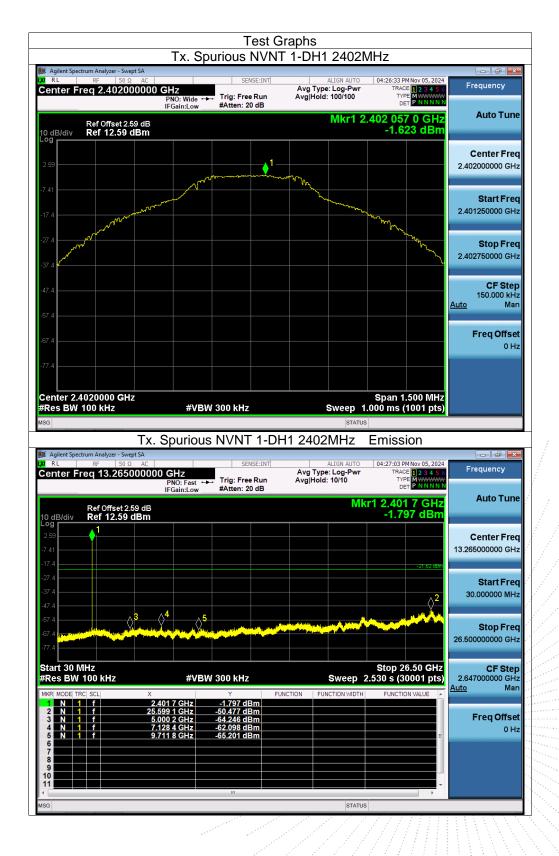
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto Detector function = peak, Trace = max hold

Page: 26 of 83



9.4 Test Result

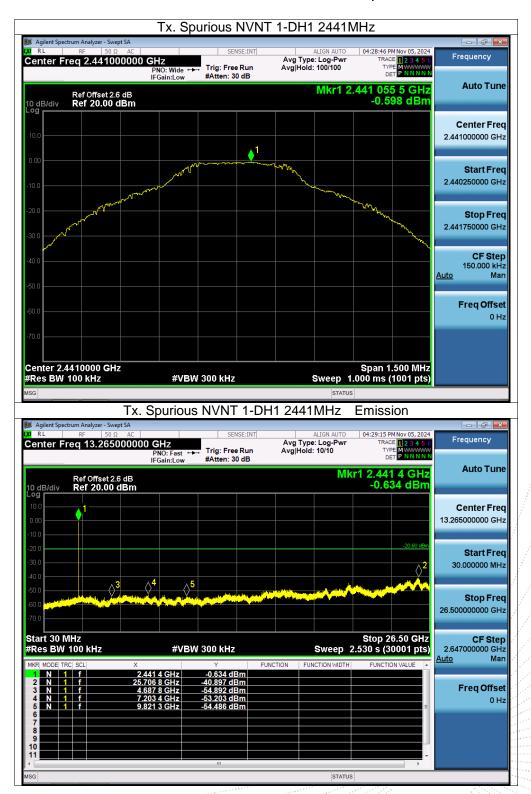


No.: BCTC/RF-EMC-005

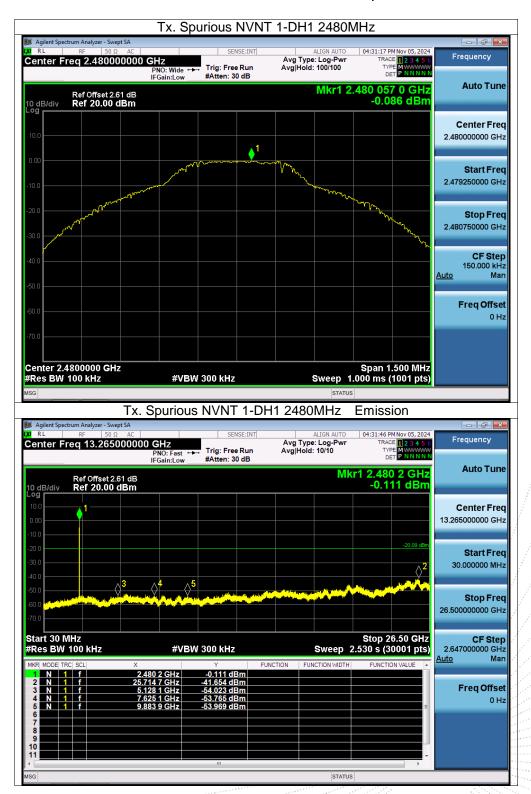
Page: 27 of 83

Edition: B.2

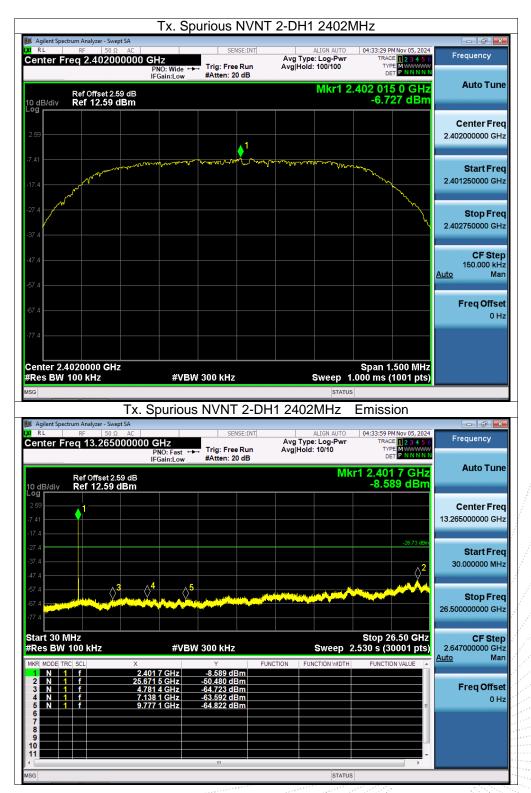






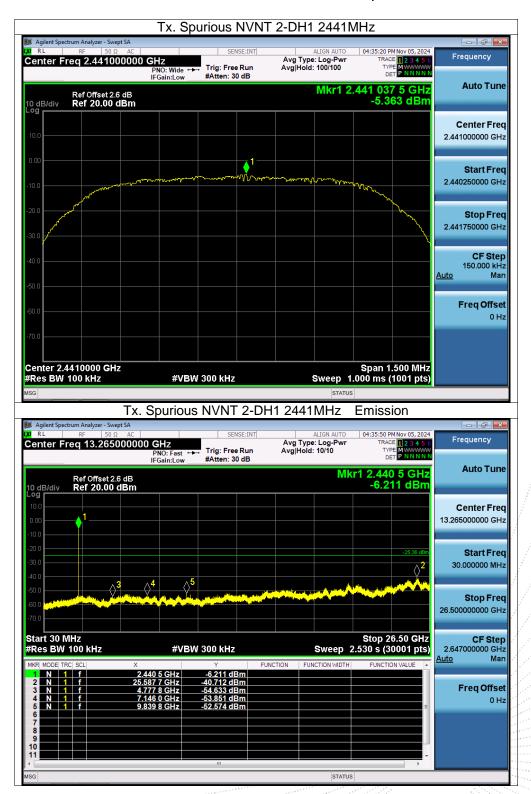






Edition: B.2





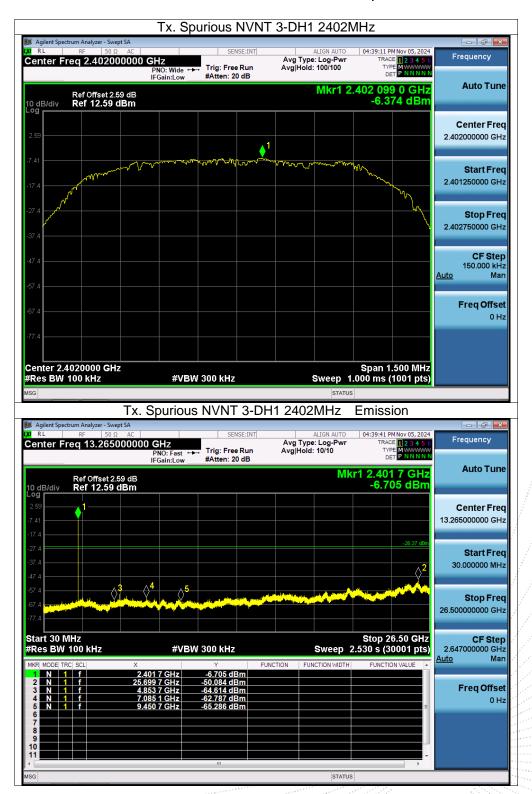
Edition: B.2



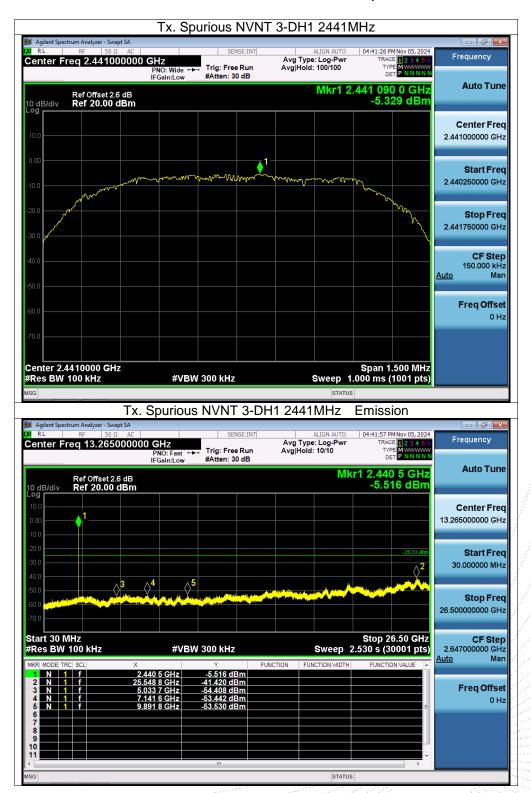


Edition: B.2



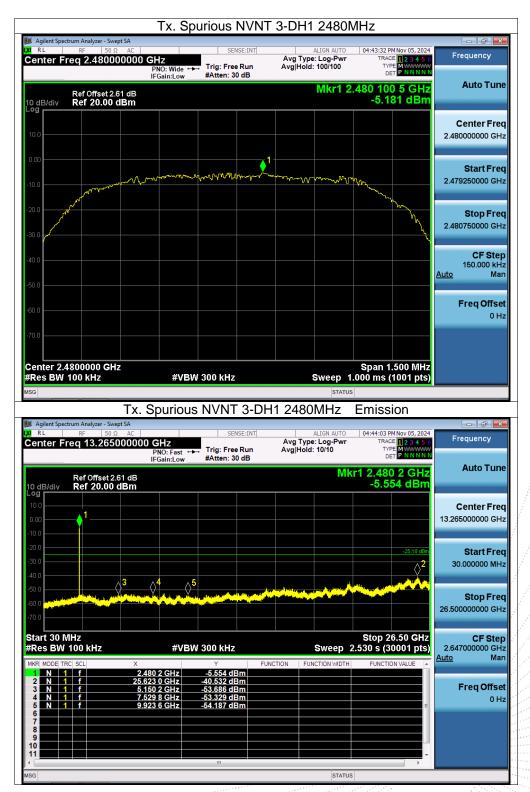




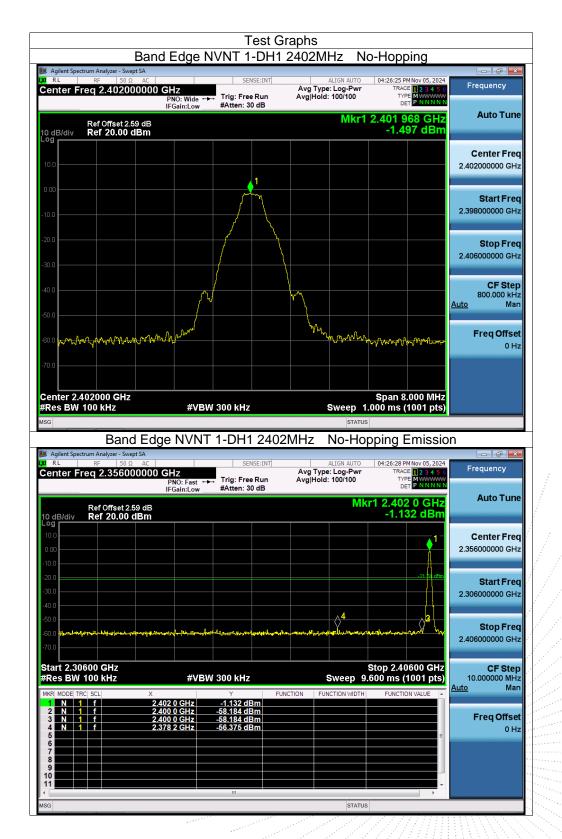


Edition: B.2

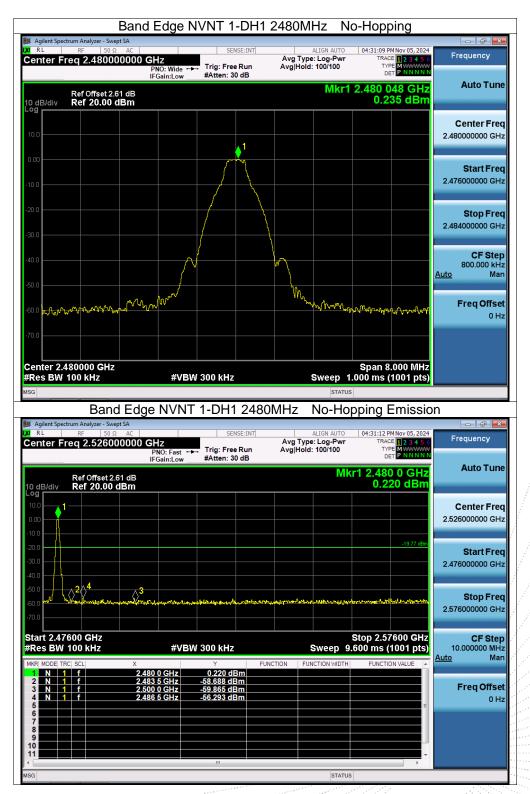




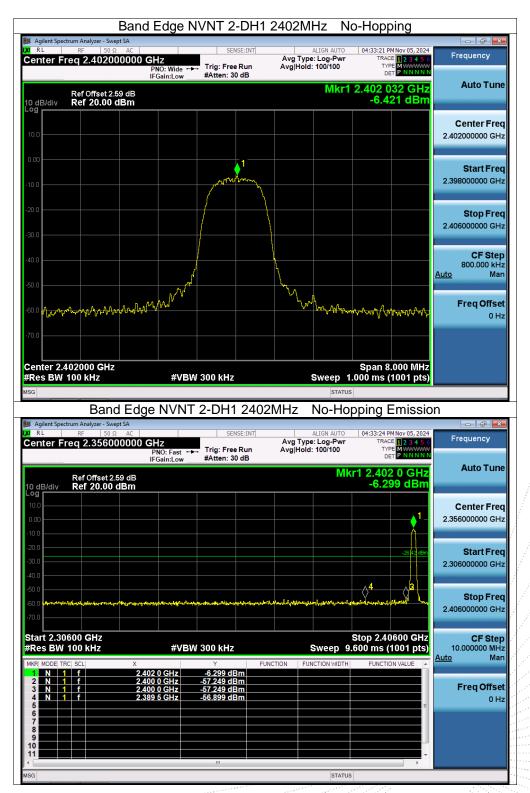






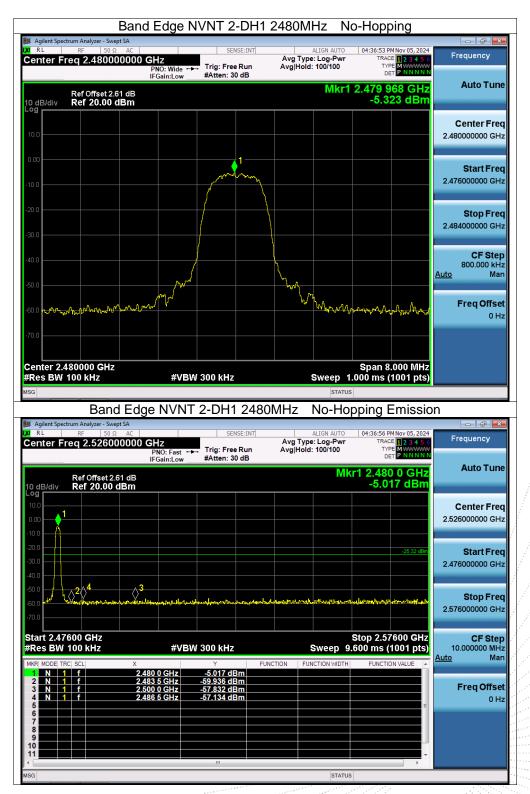




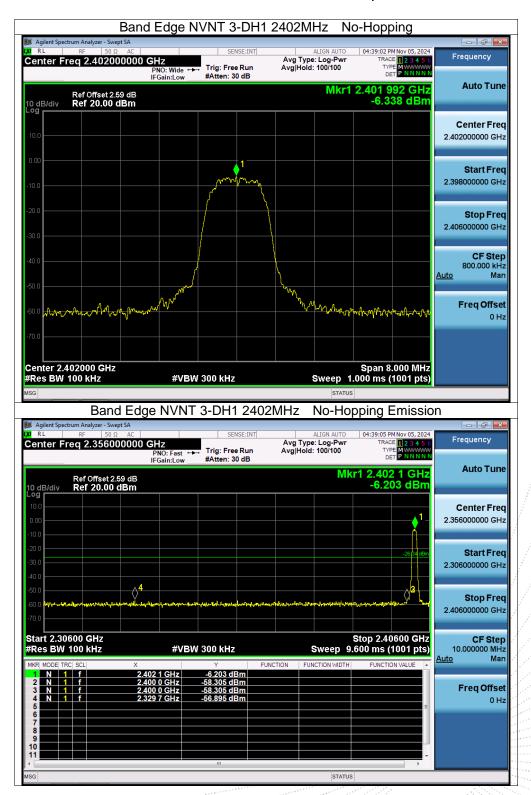


Edition: B.2



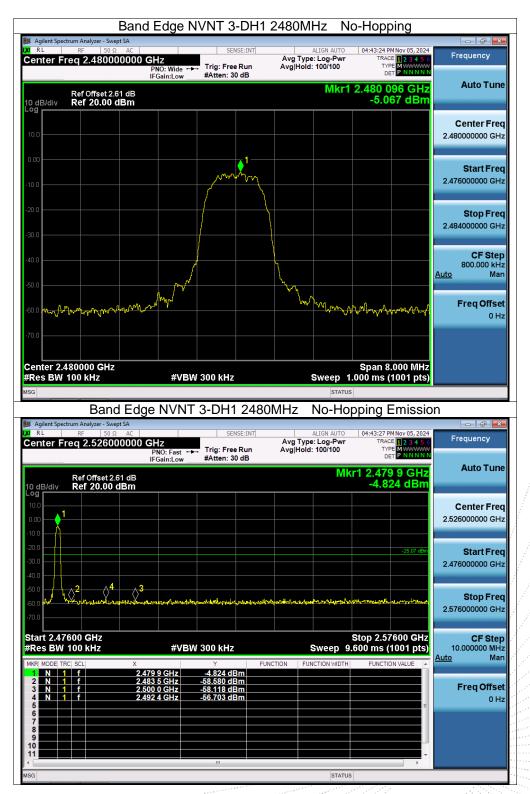






Edition: B.2





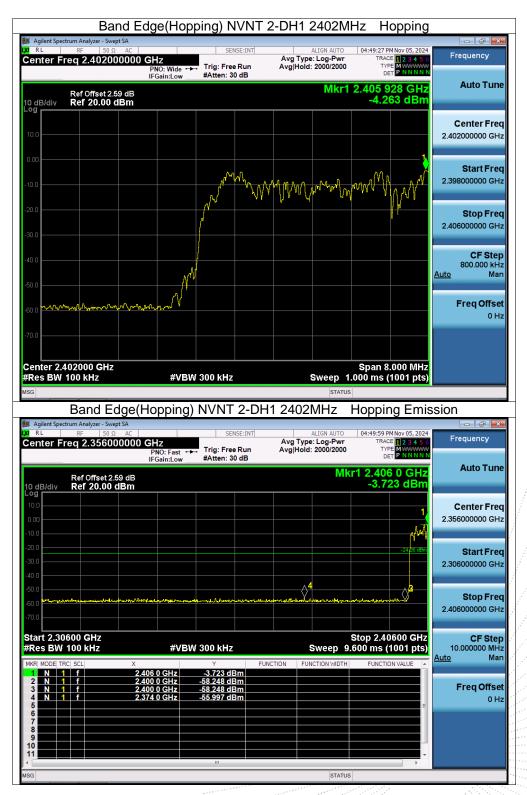








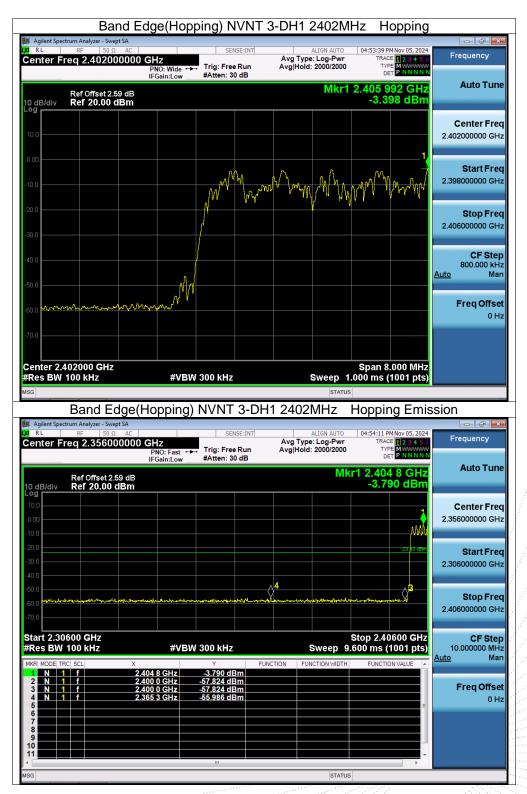


















10. 20 dB Bandwidth

10.1 Block Diagram Of Test Setup



10.2 Limit

N/A

10.3 Test procedure

1. Set RBW = 30kHz.

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.

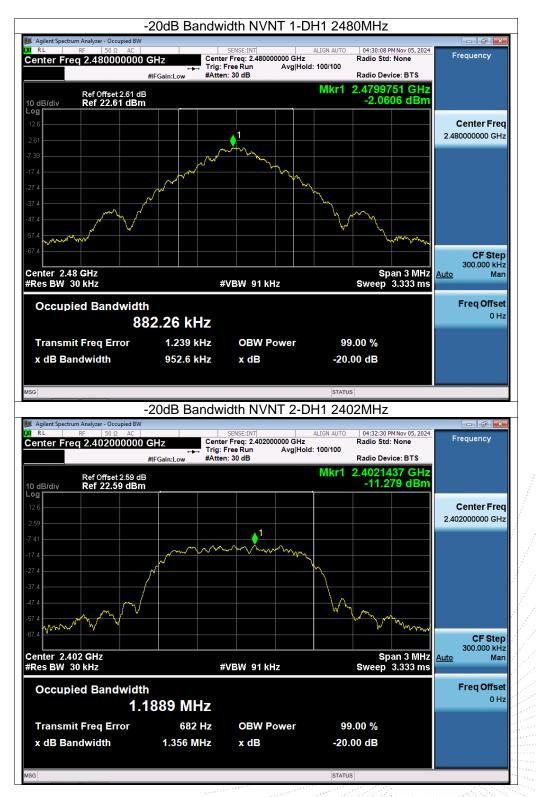
10.4 Test Result

Condition	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.959	Pass
NVNT	1-DH1	2441	0.952	Pass
NVNT	1-DH1	2480	0.953	Pass
NVNT	2-DH1	2402	1.356	Pass
NVNT	2-DH1	2441	1.361	Pass
NVNT	2-DH1	2480	1.359	Pass
NVNT	3-DH1	2402	1.343	Pass
NVNT	3-DH1	2441	1.346	Pass
NVNT	3-DH1	2480	1.345	Pass

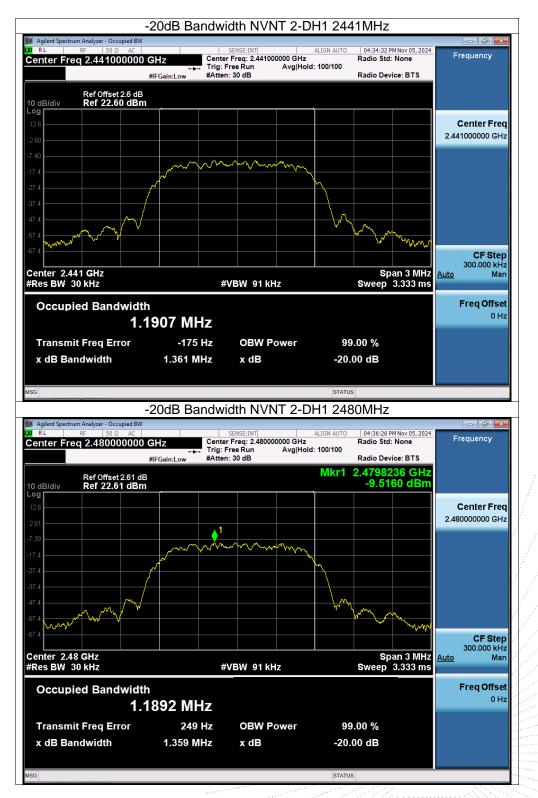




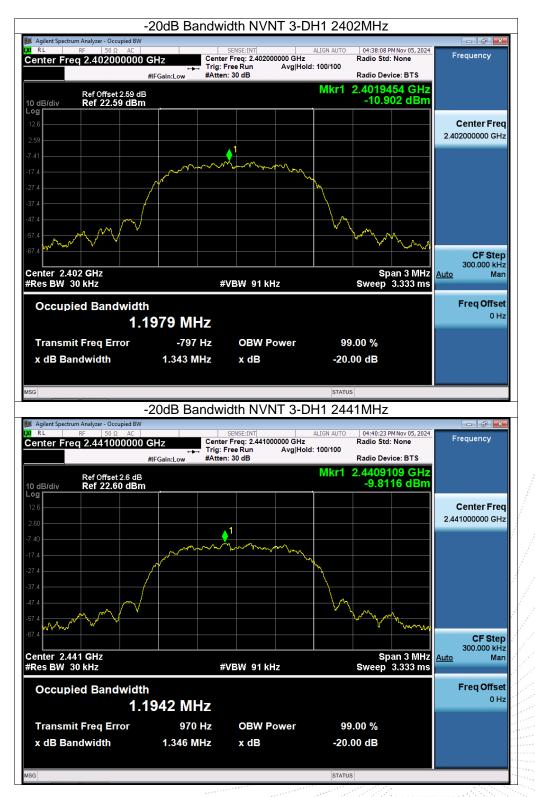




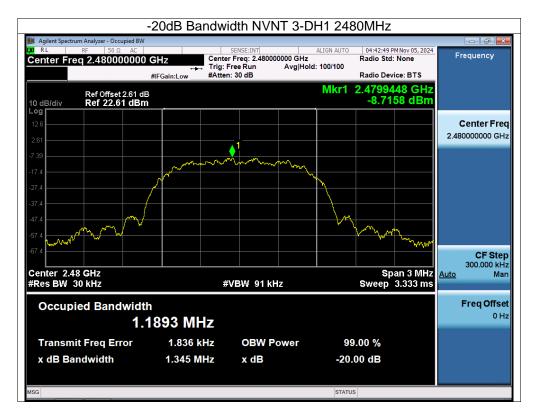












No.: BCTC/RF-EMC-005

Page: 53 of 83



11. Maximum Peak Output Power

11.1 Block Diagram Of Test Setup



11.2 Limit

	FCC Part15 (15.247) , Subpart C								
Section	Test Item Limit Frequency Range (MHz) Resul								
15.247(b)(1)	Peak Output Power	0.125 watt or 21dBm	2400-2483.5	PASS					

11.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

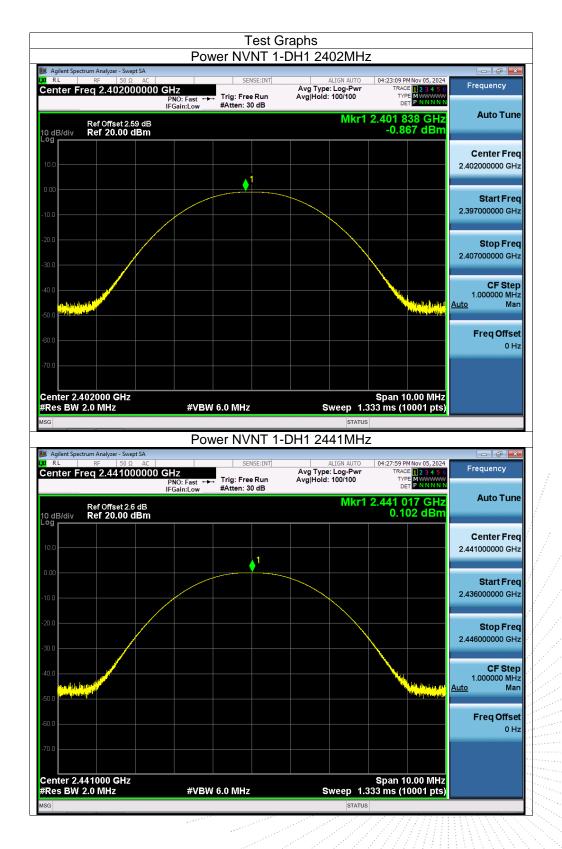
2. Set the spectrum analyzer: RBW = 2MHz. VBW = 6MHz. Sweep = auto; Detector Function = Peak.

3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

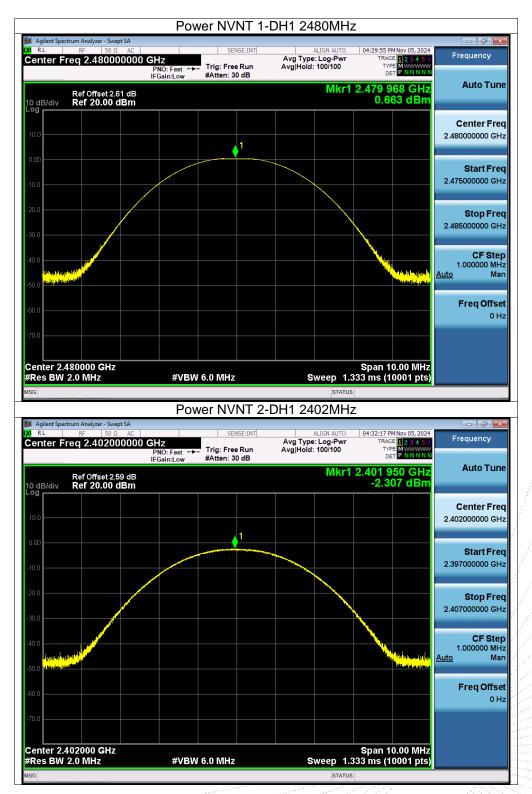
11.4 Test Result

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	-0.87	21	Pass
NVNT	1-DH1	2441	0.1	21	Pass
NVNT	1-DH1	2480	0.66	21	Pass
NVNT	2-DH1	2402	-2.31	21	Pass
NVNT	2-DH1	2441	-1.21	21	Pass
NVNT	2-DH1	2480	-0.52	21	Pass
NVNT	3-DH1	2402	-2	21	Pass
NVNT	3-DH1	2441	-0.93	21	Pass
NVNT	3-DH1	2480	0.09	21	Pass



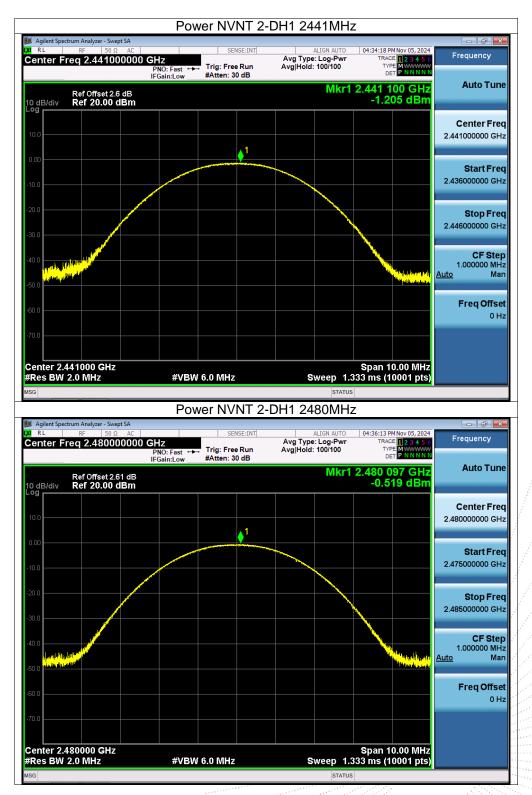




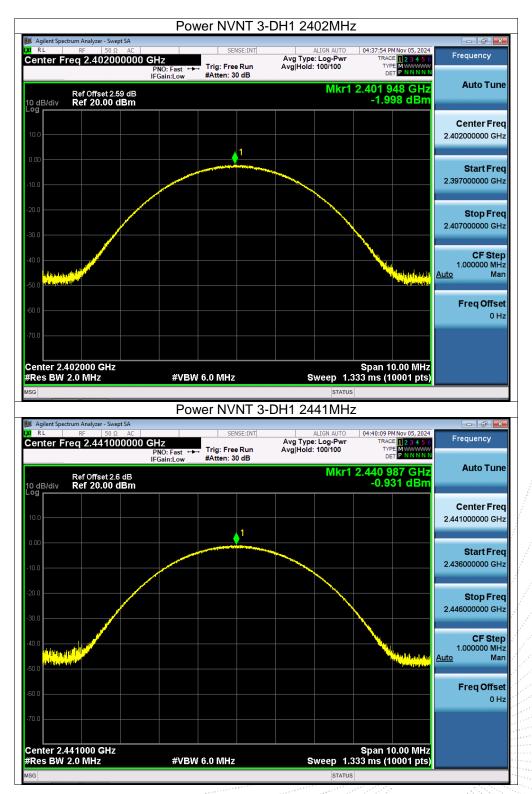


Edition: B.2



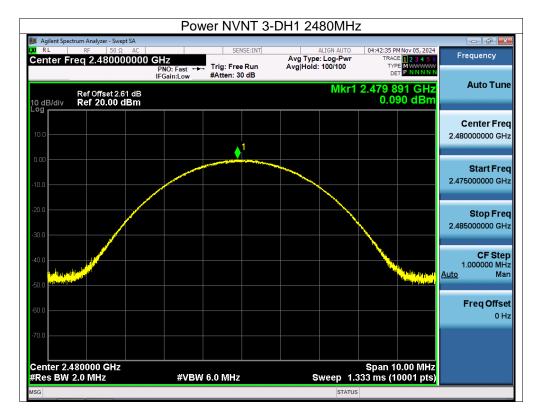






Edition: B.2





No.: BCTC/RF-EMC-005

Page: 59 of 83



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.

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2401.974	2402.972	0.998	0.639	Pass
NVNT	1-DH1	2440.972	2441.974	1.002	0.635	Pass
NVNT	1-DH1	2478.974	2479.972	0.998	0.635	Pass
NVNT	2-DH1	2401.98	2403.146	1.166	0.904	Pass
NVNT	2-DH1	2440.984	2442.142	1.158	0.907	Pass
NVNT	2-DH1	2479.144	2480.14	0.996	0.906	Pass
NVNT	3-DH1	2401.914	2402.948	1.034	0.895	Pass
NVNT	3-DH1	2440.914	2441.914	1	0.897	Pass
NVNT	3-DH1	2478.916	2479.91	0.994	0.897	Pass

12.4 Test Result



	CI		Braphs DH1 2402MHz		
Agilent Spectrum Analyzer - Sw RL RF 50 Center Freq 2.4025	Ω AC	SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	04:26:19 PM Nov 05, 2024 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET PNNNNN	Frequency
Ref Offset 2 10 dB/div Ref 20.00			Mkr1	2.401 974 GHz -3.528 dBm	Auto Tun
10.0	1		2 2	~	Center Fre 2.402500000 GH
-20.0					Start Fre 2.401500000 GH
-60.0					Stop Fre 2.403500000 GH
Center 2.402500 GH #Res BW 30 kHz	#VBV	V 100 kHz		Span 2.000 MHz 133 ms (1001 pts)	CF Ste 200.000 kH <u>Auto</u> Ma
MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 1 f 4 - - 5 - - 6 - - 7 - - 8 - - 9 - -	X 2.401 974 GHz 2.402 972 GHz	Y FI -3.528 dBm -3.527 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 H
11 MSG Aglient Spectrum Analyzer - Sw XI RF SO Center Freq 2.4415	vept SA Ω AC	SENSE:INT	STATUS DH1 2441MHz ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	04:28:38 PM Nov 05, 2024 TRACE 12 2 3 4 5 0 TYPE PMWWW DET PMNNNN	ा छि 💌
Ref Offset 2 10 dB/div Ref 20.00	2.6 dB	#Atten: 00 dB	Mkr1	2.440 972 GHz -2.586 dBm	Auto Tun
10.0 .10.0			2		Center Fre 2.441500000 GH
-20.0					Start Fre 2.440500000 GH
-50.0					Stop Fre 2.442500000 GH
Center 2.441500 GH #Res BW 30 kHz	#VBV	V 100 kHz		Span 2.000 MHz 133 ms (1001 pts)	CF Ste 200.000 kH <u>Auto</u> Ma
MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 - - 4 - - 5 - - 6 - -	× 2.440 972 GHz 2.441 974 GHz	Y FI -2.586 dBm -2.574 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 H



	C	FS NVNT 1-E	JIII 2400101112		
📕 Agilent Spectrum Analyzer - Sw					
enter Freq 2.4795		SENSE:INT → Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	04:30:40 PM Nov 05, 2024 TRACE 2 3 4 5 6 TYPE MWWWW DET P NNNN	Frequency
Ref Offset 2 0 dB/div Ref 20.00	.61 dB		Mkr1	2.478 974 GHz -2.007 dBm	Auto Tu
.og 10.0 0.00			2		Center Fr 2.479500000 G
30.0					Start Fr 2.478500000 G
50.0					Stop Fr 2.480500000 G
enter 2.479500 GHz Res BW 30 kHz		W 100 kHz	Sweep 2	Span 2.000 MHz .133 ms (1001 pts)	CF Sto 200.000 k
IKR MODE TRC SCL 1 N 1 F 2 N 1 F 3 4	× 2.478 974 GHz 2.479 972 GHz	Y FU -2.007 dBm -2.030 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto M Freq Offs 0
5 6 7 8 9 9				E	
11					
G			STATUS		
	C	ES NVNT 2-	DH1 2402MHz		
Agilent Spectrum Analyzer - Sw					
RL RF 509 enter Freq 2.4025		SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	04:33:15 PM Nov 05, 2024 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
Ref Offset 2 0 dB/div Ref 20.00	.59 dB		Mkr1	2.401 980 GHz -8.502 dBm	Auto Tu
	1			 ⊘²	Center Fr 2.402500000 G
20.0				\sim	Start Fr
40.0 50.0 50.0					2.401500000 G Stop Fr
40.0 50.0 70.0 Senter 2.402500 GHz		W 100 kHz	Sweep 2	Span 2.000 MHz .133 ms (1001 pts)	2.401500000 G Stop Fr 2.403500000 G CF Str 200.000 k
40.0 50.0	#VB	Y FU	Sweep 2		2.401500000 G Stop Fr 2.403500000 G CF Ste 200.000 k <u>Auto</u> M
40.0 50.0 50.0 Center 2.402500 GHz Res BW 30 kHz KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4	#VB			.133 ms (1001 pts)	2.401500000 G Stop Fr 2.403500000 G CF St 200.000 k Auto Freq Offs
40.0 50.0 Center 2.402500 GHz Res BW 30 kHz IKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 5 5 5 6 7 8 8	#VB × 2.401 980 GHz	Y FU -8.502 dBm		.133 ms (1001 pts)	2.401500000 G Stop Fr 2.403500000 G CF Sto 200.000 k <u>Auto</u> Freq Offs
40.0 50.0 50.0 Center 2.402500 GHz Res BW 30 kHz KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 5 5 6 7 7	#VB × 2.401 980 GHz	Y FU -8.502 dBm		.133 ms (1001 pts)	2.401500000 G Stop Fra 2.403500000 G CF Sta 200.000 k



	С	FS NVNT 2	-DH1 2441MHz	2	
Agilent Spectrum Analyzer - Swe RL RF 50 Ω		SENSE:INT	ALIGN AUTO	04:35:13 PM Nov 05, 2024	- 6
center Freq 2.44150			Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P NNNNN	Frequency
Ref Offset 2.0 0 dB/div Ref 20.00	6 dB		Mkr1	2.440 984 GHz -9.981 dBm	Auto Tur
og					Querte -
0.00					Center Fre 2.441500000 GH
10.0				\diamond^2	
20.0					Start Fre
30.0					2.440500000 GI
40.0					
50.0					Stop Fre
70.0					2.442500000 G
enter 2.441500 GHz Res BW 30 kHz		W 100 kHz	Sweep 2	Span 2.000 MHz 2.133 ms (1001 pts)	CF Ste 200.000 k
KR MODE TRC SCL	Х	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
1 N 1 f 2 N 1 f	2.440 984 GHz 2.442 142 GHz	-9.981 dBm -10.053 dBm			Freq Offs
3 4					01
5 6				E	
7 8					
9					
SG			STATU	IS	
	С	FS NVNT 2	-DH1 2480MHz	<u> </u>	
Agilent Spectrum Analyzer - Swe		SENSE:INT	ALIGN AUTO	04:36:45 PM Nov 05, 2024	
enter Freq 2.47950	00000 GHz	THE FOR	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 123456 TYPE MWWWW DET P NNNNN	Frequency
	PNO: Wide O IFGain:Low	#Atten: 30 dB			Auto Tui
Ref Offset 2.			Mkr1	2.479 144 GHz -9.395 dBm	Auto Tu
0 dB/div Ref 20.00 (dBm			-9.393 uBm	
10.0					Center Fre
).00 	↓ ↓ ↓ ↓ ↓			∂ ²	2.479500000 G
20.0		······	\sim	\sim	
30.0					Start Fre 2.478500000 G
40.0					2.478500000 Gi
50.0					
60.0					Stop Fr 2.480500000 G
70.0					
				Span 2.000 MHz	CF Ste
			O	2.133 ms (1001 pts)	200.000 kł
Res BW 30 kHz		W 100 kHz	-		Auto M
Res BW 30 kHz	#VB X 2.479 144 GHz	Y -9.395 dBm	FUNCTION FUNCTION WIDTH		Auto Ma
Res BW 30 KHz	#VB	Y	-		
2 N 1 f	#VB X 2.479 144 GHz	Y -9.395 dBm	-		Auto Ma Freq Offs 0 H
Res BW 30 kHz KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 4 4	#VB X 2.479 144 GHz	Y -9.395 dBm	-		Freq Offs
Res BW 30 kHz Image: Non-Example of the state of the stateo	#VB X 2.479 144 GHz	Y -9.395 dBm	-		Freq Offs
Res BW 30 kHz IKR MODELTRC SCL IN 1 IN <td>#VB X 2.479 144 GHz</td> <td>Y -9.395 dBm</td> <td>-</td> <td></td> <td>Freq Offs</td>	#VB X 2.479 144 GHz	Y -9.395 dBm	-		Freq Offs
Res BW 30 kHz kR MODE TRC SCL 1 N 1 f 2 N 1 f 3 - - - 4 - - - 5 - - - 6 - - - 7 - - - 8 - - - 9 - - -	#VB X 2.479 144 GHz	Y -9.395 dBm	-		Freq Offs



Agilent Spectrum Analyzer - Swe		FS NVNT 3-D			
	2 AC 00000 GHz PNO: Wide C	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	04:38:55 PM Nov 05, 2024 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
Ref Offset 2. dB/div Ref 20.00		#Atten: 30 dB	Mkr1	2.401 914 GHz -10.302 dBm	Auto Tur
					Center Fro
0.0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Start Fro
0.0					2.401500000 G
D.0 D.0 D.0					Stop Fr 2.403500000 G
enter 2.402500 GHz Res BW 30 kHz		W 100 kHz	Sweep 2.	Span 2.000 MHz 133 ms (1001 pts)	CF St 200.000 k
MODE TRC SCL 1 N 1 f 2 N 1 f 3	X 2.401 914 GHz 2.402 948 GHz	Y FU -10.302 dBm -10.272 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	Auto M Freq Offs 0
6 7 8 9 0					
g			STATUS		
3	С	FS NVNT 3-[DH1 2441MHz		
Agilent Spectrum Analyzer - Swe	ept SA	SENSE:INT	ALIGN AUTO	04:41:19 PM Nov 05, 2024	
enter Freq 2.4415			Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN	Frequency
Ref Offset 2. dB/div Ref 20.00			Mkr1	2.440 914 GHz -9.200 dBm	Auto Tu
0.0					Contor Er
			2		
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		2.441500000 G Start Fr
			~~~~~ ² ~~~		2.441500000 G Start Fr 2.440500000 G Stop Fr
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		W 100 kHz		Span 2.000 MHz 133 ms (1001 pts)	2.441500000 G Start Fr 2.440500000 G Stop Fr 2.442500000 G CF St 200.000 k
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					2.441500000 G Start Fr 2.440500000 G Stop Fr 2.442500000 G CF Str 200.000 k Auto M
2 N 1 f 3 4 5 6	#VB × 2.440 914 GHz	Y FU -9.200 dBm	Sweep 2.	133 ms (1001 pts)	Center Fr 2.441500000 G Start Fr 2.440500000 G Stop Fr 2.442500000 G CF Sto 200.000 k Auto M Freq Offs 01
0.0	#VB × 2.440 914 GHz	Y FU -9.200 dBm	Sweep 2.	133 ms (1001 pts)	2.441500000 G Start Fr 2.440500000 G Stop Fr 2.442500000 G CF Sta 200.000 k Auto M



	(CFS NVNT	3-DH1	2480MHz			
Agilent Spectrum Analyzer - Swept SA		05105	X & LTY				- P X
Center Freq 2.4795000	000 GHz PNO: Wide IEGain:Low	Trig: Free Ru #Atten: 30 dB	Avg un Avg	ALIGN AUTO Type: Log-Pwr Hold:>100/100	TRAC	M Nov 05, 2024 E 1 2 3 4 5 6 PE M WWWWWW T P N N N N N	Frequency
Ref Offset 2.61	iB			Mkr1	2.478 9 -9.1	16 GHz 13 dBm	Auto Tune
Log 10.0 .00	1			¢ ²			Center Fred 2.479500000 GHz
-20.0 -30.0 -40.0							Start Fred 2.478500000 GHz
-50.0							Stop Fred 2.480500000 GHz
Center 2.479500 GHz #Res BW 30 kHz	#VI	BW 100 kHz		Sweep 2	Span 2. .133 ms (.000 MHz 1001 pts)	CF Step 200.000 kHz Auto Mar
MKR MODE TRC SCL	× 2.478 916 GHz	۲ -9.113 dBm	FUNCTION	FUNCTION WIDTH	FUNCTIO	ON VALUE	<u>Auto</u> Mar
2 N 1 f 3 4 5	2.479 910 GHz	-8.653 dBm					Freq Offset 0 Hz
6 7 8 9							
11		III					
MSG				STATU	S		

No.: BCTC/RF-EMC-005

Page: 65 of 83



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.

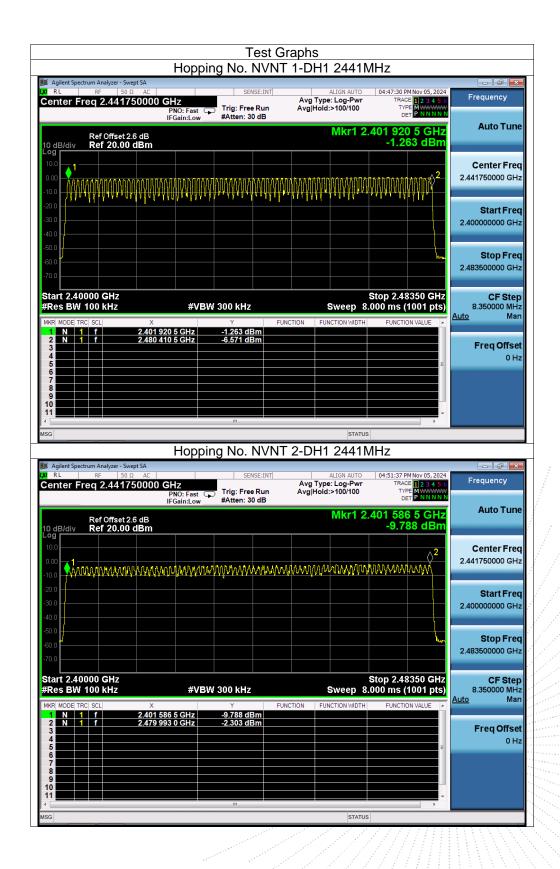
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

13.4 Test Result

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









Нор	ping No. NVNT	3-DH1 2441	ЛНz	
Agilent Spectrum Analyzer - Swept SA X RL RF 50 Ω AC	SENSE:INT	ALIGN AUTO	04:56:05 PM Nov 05, 2024	
Center Freq 2.441750000 GHz		Avg Type: Log-Pwr AvglHold:>100/100	TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
IFGain:Lov			DET PNNNN	Auto Tune
Ref Offset 2.6 dB 10 dB/div Ref 20.00 dBm		Mkr1 2	402 004 0 GHz -3.489 dBm	Auto Funo
10.0				Center Freg
0.00 1 -10.0 1	10.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5	հնորիներիններին	80000A0000A000	2.441750000 GHz
	<u>₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩</u>	<u>NAMANAAAAAAAAAAAAAA</u>	480044644444444	
-20.0				Start Freq
-40.0				2.400000000 GHz
-50.0				Ctop Frog
-60.0			ц <u>ь</u>	Stop Freq 2.483500000 GHz
-70.0				
Start 2.40000 GHz #Res BW 100 kHz #V	/BW 300 kHz		Stop 2.48350 GHz .000 ms (1001 pts)	CF Step 8.350000 MHz
MKR MODE TRC SCL X 1 N 1 f 2.402 004 0 GHz	Y FUN -3.489 dBm	ICTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 2.479 993 0 GHz	-1.835 dBm			Freg Offset
4 5			=	0 Hz
6				
8 9 9				
10			-	
MSG	m	STATUS	•	

No.: BCTC/RF-EMC-005

Page: 68 of 83



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).

			·. ·.				2 1 2 2 2	
Condition	Mode	Fre- quency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	0.383	121.028	316	31600	400	Pass
NVNT	1-DH3	2441	1.639	247.489	151	31600	400	Pass
NVNT	1-DH5	2441	2.887	323.344	112	31600	400	Pass
NVNT	2-DH1	2441	0.392	123.48	315	31600	400	Pass
NVNT	2-DH3	2441	1.643	266.166	162	31600	400	Pass
NVNT	2-DH5	2441	2.892	326.796	113	31600	400	Pass
NVNT	3-DH1	2441	0.392	124.264	317	31600	400	Pass
NVNT	3-DH3	2441	1.643	243.164	148	31600	400	Pass
NVNT	3-DH5	2441	2.894	321.234	111	31600	400	Pass

14.4 Test Result

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



				est Gr					
		ell NV/	NT 1-D	H1 24	41MH	z One	e Burst		
Agilent Spectrum Analyzer	- Swept SA 50 Ω AC		SEN	ISE:INT		ALIGN AUTO	04:47:35 PM Nov	05,2024	- 6 -
Center Freq 2.44	1000000 GH	IZ NO: Fast ↔ Gain:Low	Trig Delay	γ-500.0 μs o		: Log-Pwr		23456	Frequency
Ref Offs 10 dB/div Ref 20.	et 2.6 dB 00 dBm					L	Mkr1 383 3.0	.0 μs 5 dB	Auto Tune
10.0									Center Fred
0.00 1 <u>A</u> 2 -					į				2.441000000 GHz
-10.0]			TRIG LVL	
-20.0					i				Start Free
-30.0									2.441000000 GH:
		and the local state of the stat	and the second states of the	म् त्यात् । सम्ब में । ^{भू} स्य भ्		in the state in the state in the	and this are provided a low of the	त्। कार्यप्रकार	
	and the type of the								Stop Fred 2.441000000 GHz
-70.0									
Center 2.4410000 Res BW 1.0 MHz	00 GHz	#\/B\4	/ 3.0 MHz		6	woop 10	Spar 00 ms (1000.	1 0 Hz	CF Step 1.000000 MH
	X	#909	7 3.0 WIHZ	FUNC		истіом міртні	FUNCTION VA		uto Mar
1 Δ2 1 t (Δ) 2 F 1 t	38	3.0 μs (Δ) 2.0 μs	3.05 c	dB					
3 4									Freq Offse 0 Hi
5 6								=	0 11
7 8									
9 10									
11								• •	
ISG						STATUS			
	Dwe	II NVN	T 1-DH	11 244	1MHz	Accu	mulated		
Agilent Spectrum Analyzer	- Swept SA 50 Ω AC		SEN	ISE:INT		ALIGN AUTO	04:48:09 PM Nov	05,2024	
Center Freq 2.44		IZ NO:Fast ↔	Trig: Free	Run		e: Log-Pwr	TRACE 1	2 3 4 5 6	Frequency
		Gain:Low	#Atten: 30) dB			DET	NNNNN	Auto Tune
Ref Offse	t 2.6 dB								
In dBidiy Ref 20	00 dBm								1
10 dB/div Ref 20.	00 dBm				1				Contor Fro
In dBidiy Ref 20	00 dBm								
10 dB/div Ref 20.	00 dBm								Center Fred 2.441000000 GHz
og Ref 20.									2.441000000 GH;
10 dB/div Ref 20.									2.441000000 GH: Start Free
10 dB/div Ref 20.									2.441000000 GH: Start Frec 2.441000000 GH:
10 dB/div Ref 20.									2.441000000 GH: Start Frec 2.441000000 GH: Stop Frec
10 dB/div Ref 20.									2.441000000 GH: Start Frec 2.441000000 GH: Stop Frec
10 dB/div Ref 20.									2.441000000 GH; Start Free 2.441000000 GH; Stop Free 2.441000000 GH; CF Step
10 dB/div Ref 20.									2.441000000 GH; Start Free 2.441000000 GH; Stop Free 2.441000000 GH; CF Step 1.000000 MH;
10 dB/div Ref 20.									
10.0 BJ/div Ref 20.									2.44100000 GH2 Start Free 2.44100000 GH2 Stop Free 2.441000000 GH2 CF Step 1.000000 MH2 uto Mar Freq Offset
10 dB/div Ref 20.									2.441000000 GH; Start Free 2.441000000 GH; Stop Free 2.441000000 GH; CF Step 1.000000 MH; uto Mar
10.0 BJ/div Ref 20.									2.44100000 GH; Start Free 2.44100000 GH; Stop Free 2.441000000 GH; CF Step 1.000000 MH; uto Mar Freq Offse
10.0 BJ/div Ref 20.									2.44100000 GH: Start Free 2.44100000 GH: Stop Free 2.441000000 GH: CF Step 1.00000 MH: uto Mar Freq Offse
0 dB/div Ref 20.		#\//BIA	(3.0 MHz			Sween_1	Span 31.60 s (1000	n o Hz	2.44100000 GH: Start Free 2.44100000 GH: Stop Free 2.441000000 GH: CF Step 1.00000 MH: uto Mar Freq Offse