

TEST REPORT

uangzhou Havit Technology Co., Ltd
MART HEADBAND HEADPHONES
022-10-09 to 2022-10-20
022-10-21
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FCC ID:2AI6I-HAKIIMIX

Product Name:	SMART HEADBAND HEADPHONES
Trademark:	HAKII, HAVIT
Model/Type Ref.:	HAKII MIX S5023
Prepared For:	Guangzhou Havit Technology Co., Ltd
Address:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE CENTER, NO.1000,XINGANG EAST ROAD,HAIZHU GUANGDONG CITY, CHINA.510000
Manufacturer:	Guangzhou Havit Technology Co., Ltd
Address:	ROOM 1307,13F,PHASE 2 B,C BUILDING OF POLY WORLD TRADE CENTER, NO.1000,XINGANG EAST ROAD,HAIZHU GUANGDONG CITY, CHINA.510000
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:	2022-10-09
Sample tested Date:	2022-10-09 to 2022-10-20
Issue Date:	2022-10-21
Report No.:	BCTC2210927605E
Test Standards:	FCC Part15.247 ANSI C63.10-2013
Test Results:	PASS
Remark:	This is Bluetooth Classic radio test report.
Tested	by: Approved by:

el ty

Jeff.Fu/Project Handler

Zero Zhou/Reviewer

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(Note: N/A Means Not Applicable)

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1. Version

Report No.	Issue Date	Description	Approved
BCTC2210927605E	2022-10-21	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



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(9kHz-30MHz)	U=3.7dB
2	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
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

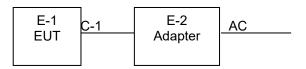
4.1 Product Information

Model/Type Ref.:	HAKII MIX S5023
Model differences:	All the model are the same circuit and RF module, except model names.
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK, π/4DQPSK, 8DPSK
Number Of Channel	79CH
Antenna installation:	Chip antenna
Antenna Gain:	1.98 dBi
Ratings:	DC 5V From Adapter, DC3.7V From Battery

4.2 Test Setup Configuration

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

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	SMART HEADBAND HEADPHONES	HAKII, HAVIT		N/A	EUT
E-2	Adapter	N/A	BCTC001	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length Note	
C-1	NO	NO	0.5M DC cable unshielded	Ł

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	1

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.

configuration mode(c) monached abore nab erandated respectively.							
Test Mode	Test mode	Low channel	Middle channel	High channel			
1	Transmitting(GFSK)	2402MHz	2441MHz	2480MHz			
2	Transmitting(π/4DQPSK)	2402MHz	2441MHz	2480MHz			
3	Transmitting(8DPSK)	2402MHz	2441MHz	2480MHz			
4	Charging(Conducted emission)						
5	Transmitting (Radiated emission)						

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	FCC_assist 1.0.2.2			
Frequency	2402 MHz	2441 MHz 2480 MHz		
Parameters	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 IC Registered No.: 23583

5.2 Test Instrument Used

Conducted emissions Test							
Equipment	Manufacturer	Model#	Last Cal.	Next Cal.			
Receiver	R&S	ESR3	102075	May 24, 2022	May 23, 2023		
LISN	R&S	ENV216	101375	May 24, 2022	May 23, 2023		
Software	Frad	EZ-EMC	EMC-CON 3A1	/	/		
Attenuator	١	10dB DC-6GHz	1650	May 24, 2022	May 23, 2023		

RF Conducted Test						
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.	
Power Metter	Keysight	E4419	١	May 24, 2022	May 23, 2023	
Power Sensor (AV)	Keysight	E9300A	V Star	May 24, 2022	May 23, 2023	
Signal Analyzer20kH z-26.5GHz	Keysight	N9020A	MY49100060	May 24, 2022	May 23, 2023	
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40		May 24, 2022	May 23, 2023	

No.: BCTC/RF-EMC-005



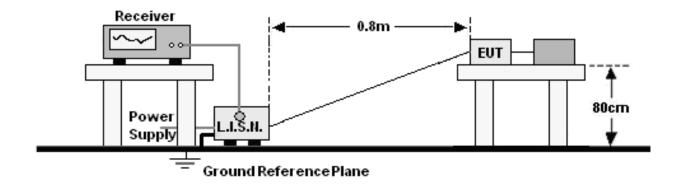
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Radiated Emissions Test (966 Chamber01)						
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.	
966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023	
Receiver	R&S	ESR3	102075	May 24, 2022	May 23, 2023	
Receiver	R&S	ESRP	101154	May 24, 2022	May 23, 2023	
Amplifier	SKET	LAPA_01G18 G-45dB	1	May 24, 2022	May 23, 2023	
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 24, 2022	May 23, 2023	
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 26, 2022	May 25, 2023	
Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 06, 2022	Jun. 05, 2023	
Horn Antenna(18G Hz-40GHz)	Schwarzbeck	BBHA9170	00822	Jun. 06, 2022	Jun. 05, 2023	
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35- HG	2034381	May 26, 2022	May 25, 2023	
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 26, 2022	May 25, 2023	
Power Metter	Keysight	E4419	١	May 26, 2022	May 25, 2023	
Power Sensor (AV)	Keysight	E9300A	\	May 26, 2022	May 25, 2023	
Signal Analyzer20kH z-26.5GHz	Keysight	N9020A	MY49100060	May 26, 2022	May 25, 2023	
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40	١	May 26, 2022	May 25, 2023	
Software	Frad	EZ-EMC	FA-03A2 RE	and the second sec		



6. Conducted Emissions

6.1 Block Diagram Of Test Setup



6.2 Limit

FREQUENCY (MHz)	Limit (Limit (dBuV)		
FREQUENCE (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		

Notes:

1. *Decreasing linearly with logarithm of frequency.

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

6.3 Test Procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	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.

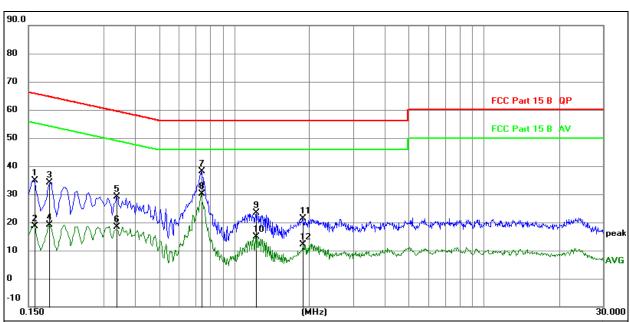
6.4 EUT Operating Conditions

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 :	Line
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

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

3. Measurement=Reading Level+ Correct Factor

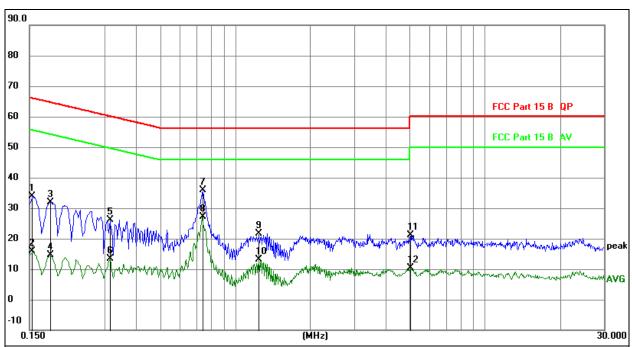
4. Over= Measurement-Limit

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz		dB	dBuV	dBuV	dB	Detector
1	0.1590	15.17	19.69	34.86	65.52	-30.66	QP
2	0.1590	-1.02	19.69	18.67	55.52	-36.85	AVG
3	0.1815	14.38	19.75	34.13	64.42	-30.29	QP
4	0.1815	-0.54	19.75	19.21	54.42	-35.21	AVG
5	0.3390	9.29	19.76	29.05	59.23	-30.18	QP
6	0.3390	-1.26	19.76	18.50	49.23	-30.73	AVG
7	0.7395	18.45	19.74	38.19	56.00	-17.81	QP
8 *	0.7395	10.38	19.74	30.12	46.00	-15.88	AVG
9	1.2164	3.64	19.79	23.43	56.00	-32.57	QP
10	1.2164	-4.95	19.79	14.84	46.00	-31.16	AVG
11	1.8780	1.40	19.87	21.27	56.00	-34.73	QP
12	1.8780	-7.71	19.87	12.16	46.00	-33.84	AVG

No.: BCTC/RF-EMC-005



Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Neutral
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

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

4. Over= Measurement-Limit

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz		dB	dBuV	dBuV	dB	Detector
1	0.1539	14.21	19.68	33.89	65.79	-31.90	QP
2	0.1539	-3.86	19.68	15.82	55.79	-39.97	AVG
3	0.1806	12.09	19.75	31.84	64.46	-32.62	QP
4	0.1806	-5.11	19.75	14.64	54.46	-39.82	AVG
5	0.3149	6.30	19.77	26.07	59.84	-33.77	QP
6	0.3149	-6.40	19.77	13.37	49.84	-36.47	AVG
7	0.7391	16.26	19.74	36.00	56.00	-20.00	QP
8 *	0.7391	7.39	19.74	27.13	46.00	-18.87	AVG
9	1.2422	1.84	19.79	21.63	56.00	-34.37	QP
10	1.2422	-6.76	19.79	13.03	46.00	-32.97	AVG
11	5.0312	0.90	20.13	21.03	60.00	-38.97	QP
12	5.0312	-9.69	20.13	10.44	50.00	-39.56	AVG

No.: BCTC/RF-EMC-005

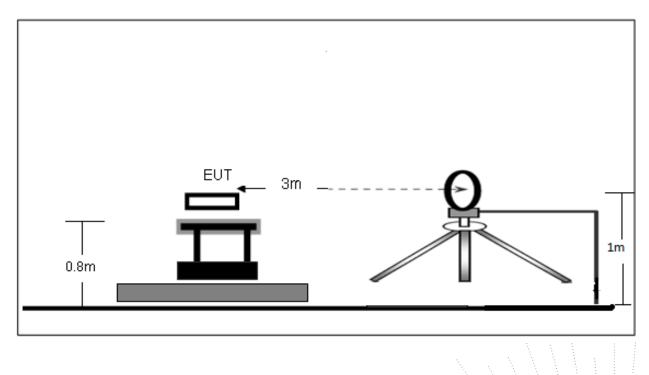
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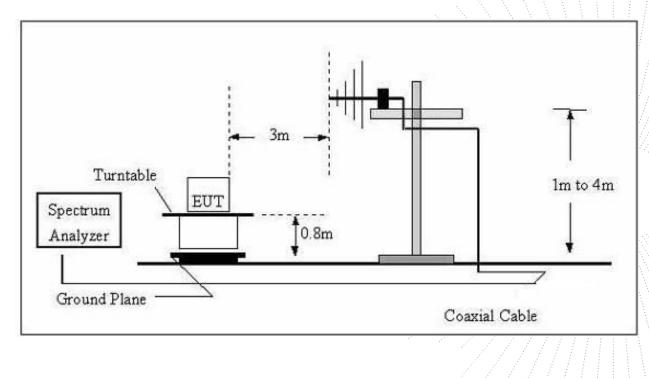
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

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

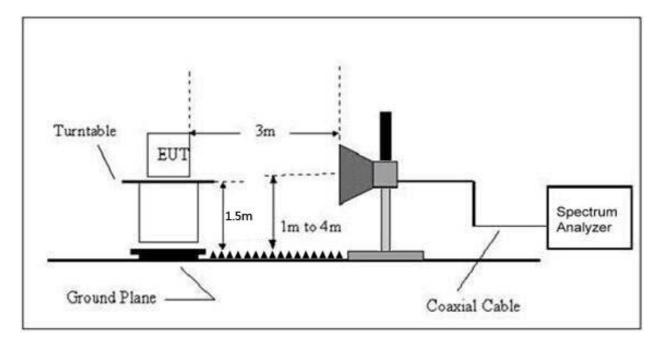


(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





(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⁾	

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LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY	Limit (dBuV/	m) (at 3M)
(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).

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 chamber. 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:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

h. Test the EUT in the lowest channel, the middle 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.



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 chamber. 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 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: 24%
Pressure:	101 kPa	Test Voltage : DC 3.7V
Test Mode :	Mode 5	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.

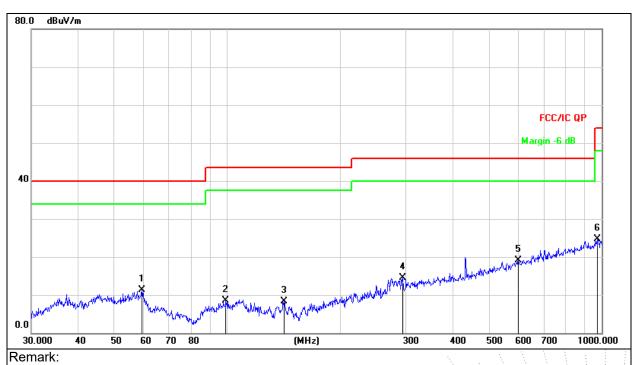
Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



Between 30MHz – 1GHz

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 5	Remark:	N/A



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

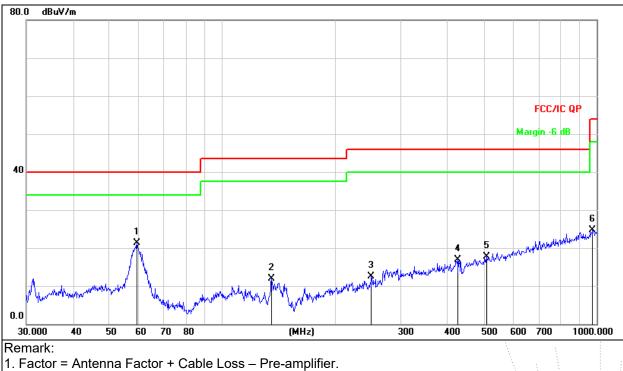
2. Measurement=Reading Level+ Correct Factor

3. Over= Measurement-Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		59.2325	28.00	-16.60	11.40	40.00	-28.60	QP
2		99.1797	25.30	-16.86	8.44	43.50	-35.06	QP
3		141.8262	27.60	-19.35	8.25	43.50	-35.25	QP
4	2	294.1137	26.63	-12.22	14.41	46.00	-31.59	QP
5	* (599.3212	24.71	-5.54	19.17	46.00	-26.83	QP
6	ç	975.7529	24.78	-0.13	24.65	54.00	-29.35	QP



Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 5	Remark:	N/A



2. Measurement=Reading Level+ Correct Factor

3. Over= Measurement-Limit

				• •				
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	59.2325	37.98	-16.60	21.38	40.00	-18.62	QP
2	1	35.5062	30.84	-18.95	11.89	43.50	-31.61	QP
3	2	50.3011	26.61	-14.18	12.43	46.00	-33.57	QP
4	4	25.0280	26.56	-9.66	16.90	46.00	-29.10	QP
5	5	08.2581	25.32	-7.66	17.66	46.00	-28.34	QP
6	9	75.7528	24.78	-0.13	24.65	54.00	-29.35	QP



Polar	Frequency	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	53.66	-0.43	53.23	74.00	-20.77	PK
V	4804.00	43.53	-0.43	43.10	54.00	-10.90	AV
V	7206.00	45.67	8.31	53.98	74.00	-20.02	PK
V	7206.00	35.77	8.31	44.08	54.00	-9.92	AV
Н	4804.00	51.01	-0.43	50.58	74.00	-23.42	PK
Н	4804.00	40.03	-0.43	39.60	54.00	-14.40	AV
Н	7206.00	42.85	8.31	51.16	74.00	-22.84	PK
Н	7206.00	35.79	8.31	44.10	54.00	-9.90	AV
		G	FSK Middle o	hannel			
V	4882.00	50.43	-0.38	50.05	74.00	-23.95	PK
V	4882.00	42.02	-0.38	41.64	54.00	-12.36	AV
V	7323.00	42.45	8.83	51.28	74.00	-22.72	PK
V	7323.00	33.10	8.83	41.93	54.00	-12.07	AV
Н	4882.00	45.72	-0.38	45.34	74.00	-28.66	PK
Н	4882.00	36.50	-0.38	36.12	54.00	-17.88	AV
Н	7323.00	39.67	8.83	48.50	74.00	-25.50	PK
Н	7323.00	30.96	8.83	39.79	54.00	-14.21	AV
			GFSK High ch	nannel			
V	4960.00	52.85	-0.32	52.53	74.00	-21.47	PK
V	4960.00	44.31	-0.32	43.99	54.00	-10.01	AV
V	7440.00	45.09	9.35	54.44	74.00	-19.56	PK
V	7440.00	35.80	9.35	45.15	54.00	-8.85	AV
Н	4960.00	51.16	-0.32	50.84	74.00	-23.16	PK
Н	4960.00	41.10	-0.32	40.78	54.00	-13.22	AV
Н	7440.00	43.94	9.35	53.29	74.00	-20.71	PK
Н	7440.00	35.36	9.35	44.71	54.00	-9.29	AV

Between 1GHz – 25GHz

Remark:

1.Emission Level = Meter Reading + Factor,

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

Over= Emission Level - Limit

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

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

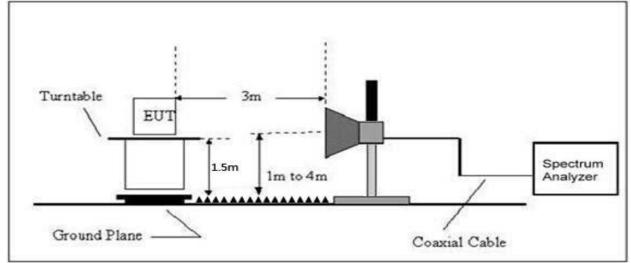
5.All the Modulation are test, the worst mode is GFSK, the data recording in the report.



8. Radiated Band Emission Measurement And Restricted Bands Of Operation

Block Diagram Of Test Setup 8.1

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			

Edition:



LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY	Limit (dBuV/	m) (at 3M)
(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 / 1/T Hz 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 chamber. 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 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

	Polar (H/V)	Frequency (MHz)	Reading Level	Correct Factor	Measure- ment (dBuV/m)	Limits (dBuV/m)		Result	
	(111 •)	(11112)	(dBuV/m)	(dB)	РК	□PK	AV		
	Low Channel 2402MHz								
GFSK	Н	2390.00	53.53	-6.70	46.83	74.00	54.00	PASS	
	Н	2400.00	58.27	-6.71	51.56	74.00	54.00	PASS	
	V	2390.00	53.69	-6.70	46.99	74.00	54.00	PASS	
	V	2400.00	58.40	-6.71	51.69	74.00	54.00	PASS	
	High Channel 2480MHz								
	Н	2483.50	55.56	-6.79	48.77	74.00	54.00	PASS	
	Н	2500.00	50.68	-6.81	43.87	74.00	54.00	PASS	
	V	2483.50	56.28	-6.79	49.49	74.00	54.00	PASS	
	V	2500.00	53.44	-6.81	46.63	74.00	54.00	PASS	
π/4DQPSK	Low Channel 2402MHz								
	Н	2390.00	54.57	-6.70	47.87	74.00	54.00	PASS	
	Н	2400.00	58.32	-6.71	51.61	74.00	54.00	PASS	
	V	2390.00	55.20	-6.70	48.50	74.00	54.00	PASS	
	V	2400.00	59.04	-6.71	52.33	74.00	54.00	PASS	
	High Channel 2480MHz								
	Н	2483.50	58.83	-6.79	52.04	74.00	54.00	PASS	
	Н	2500.00	52.61	-6.81	45.80	74.00	54.00	PASS	
	V	2483.50	59.70	-6.79	52.91	74.00	54.00	PASS	
	V	2500.00	56.56	-6.81	49.75	74.00	54.00	PASS	
8DPSK	Low Channel 2402MHz								
	Н	2390.00	54.14	-6.70	47.44	74.00	54.00	PASS	
	Н	2400.00	58.60	-6.71	51.89	74.00	54.00	PASS	
	V	2390.00	54.40	-6.70	47.70	74.00	54.00	PASS	
	V	2400.00	58.25	-6.71	51.54	74.00	54.00	PASS	
	High Channel 2480MHz								
	Н	2483.50	57.15	-6.79	50.36	74.00	54.00	PASS	
	Н	2500.00	52.70	-6.81	45.89	74.00	54.00	PASS	
	V	2483.50	58.66	-6.79	51.87	74.00	54.00	PASS	
	V	2500.00	54.60	-6.81	47.79	74.00	54.00	PASS	

1. Emission Level = Meter Reading + Factor,

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

Over= Emission Level – 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. Conducted Emission

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;

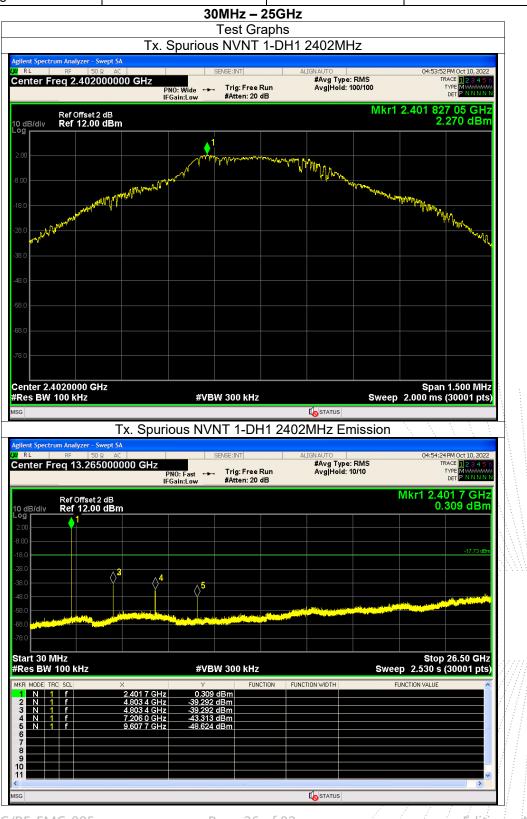
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto Detector function = peak, Trace = max hold

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9.4 Test Result

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



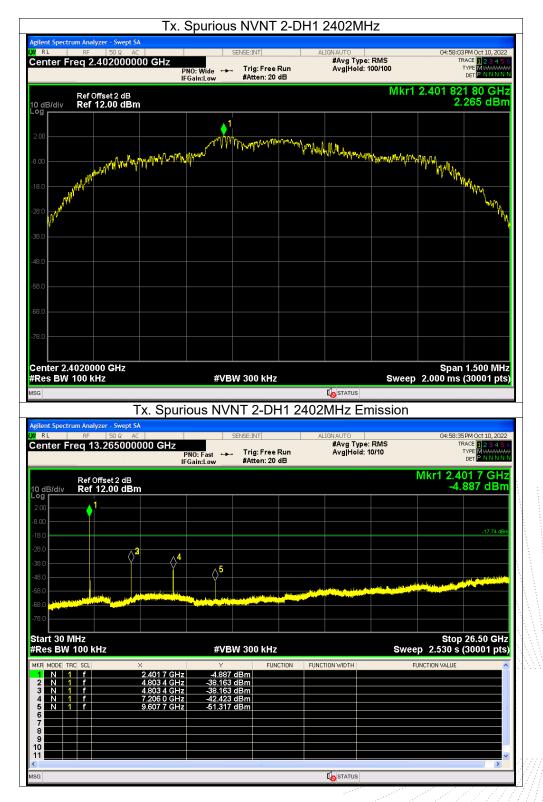




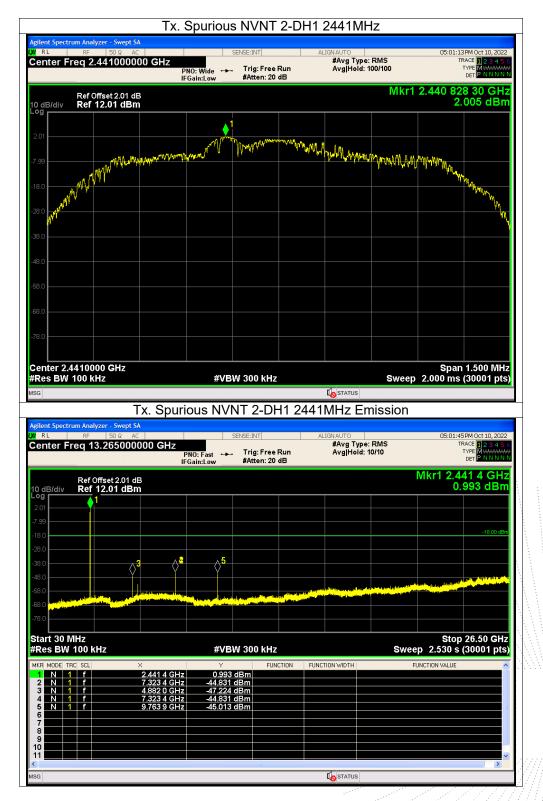




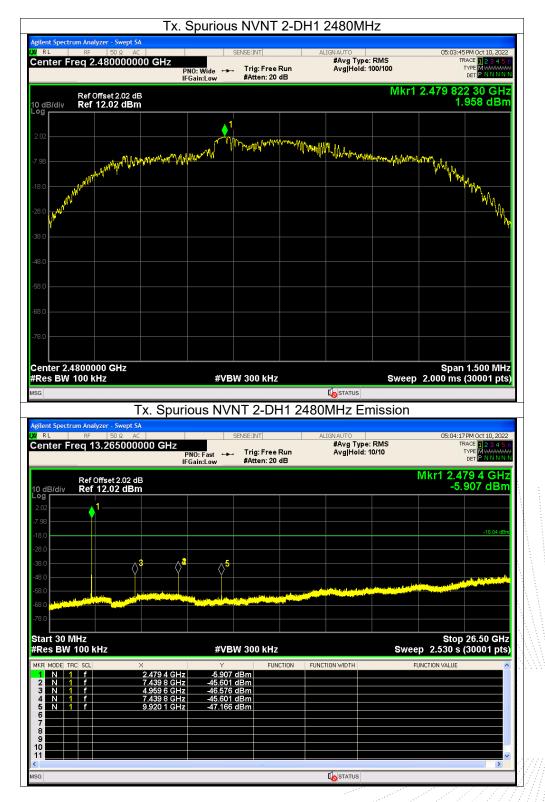
















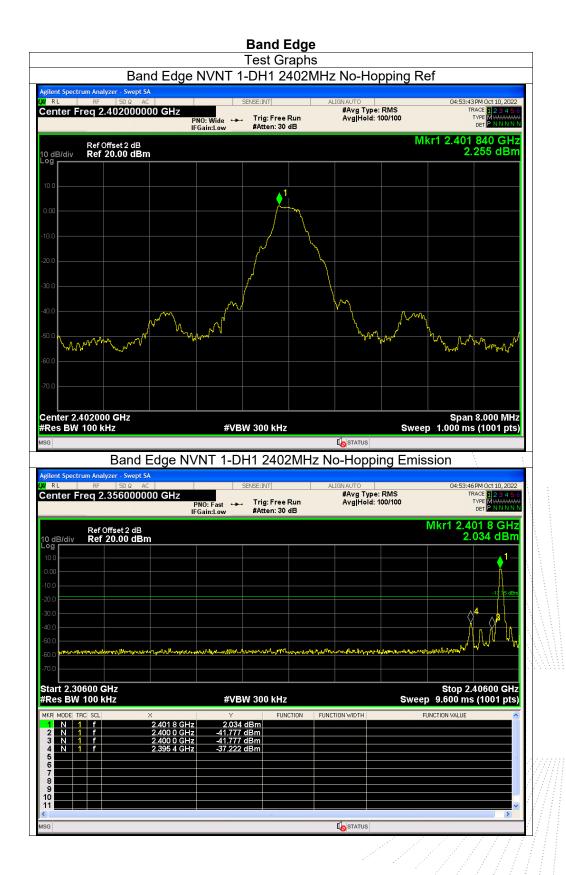




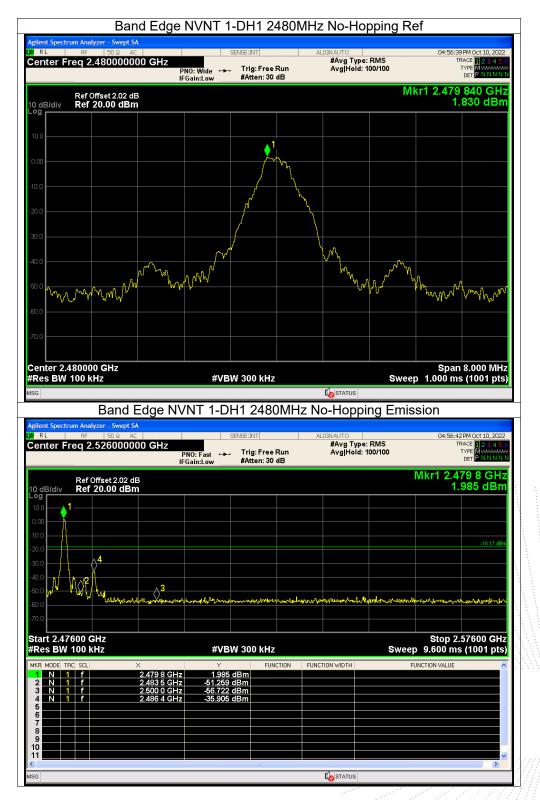








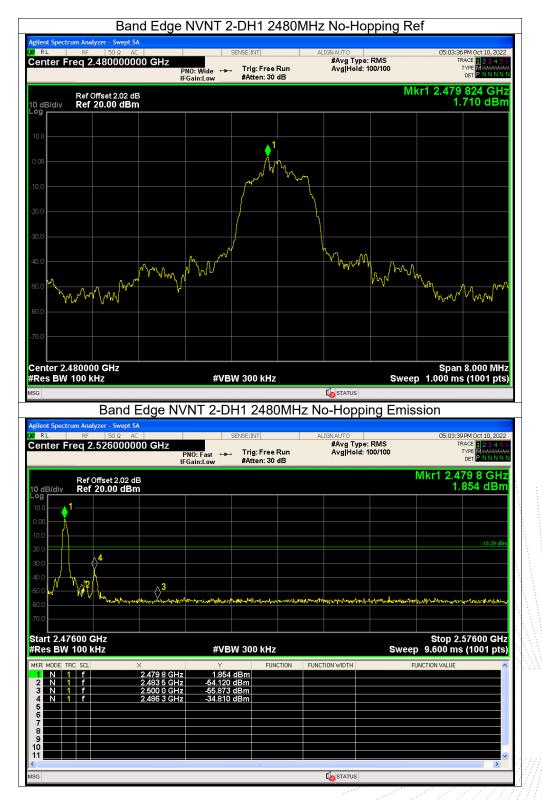




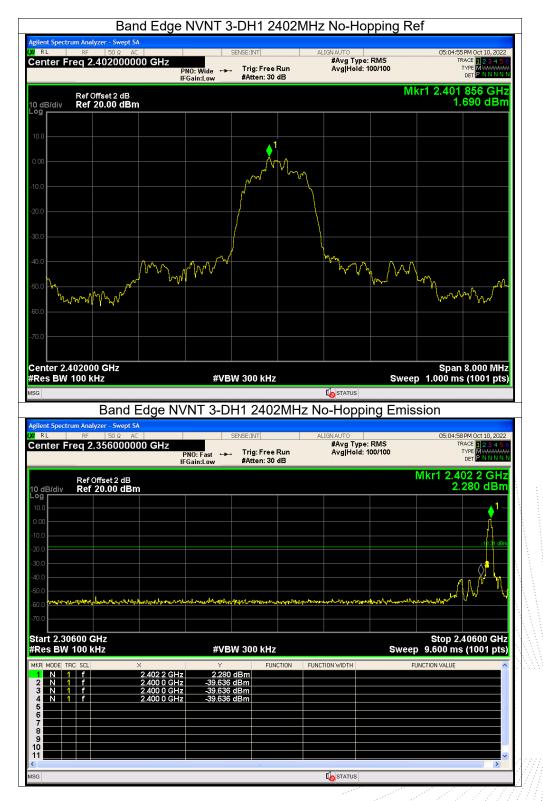




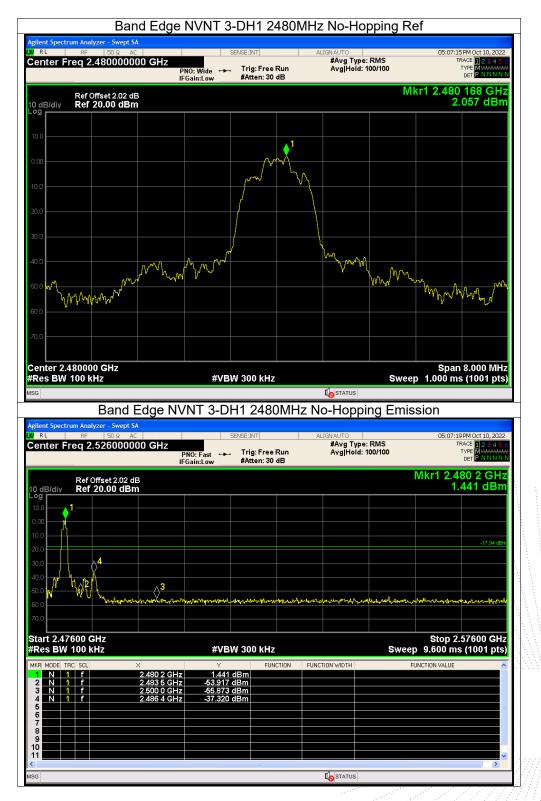




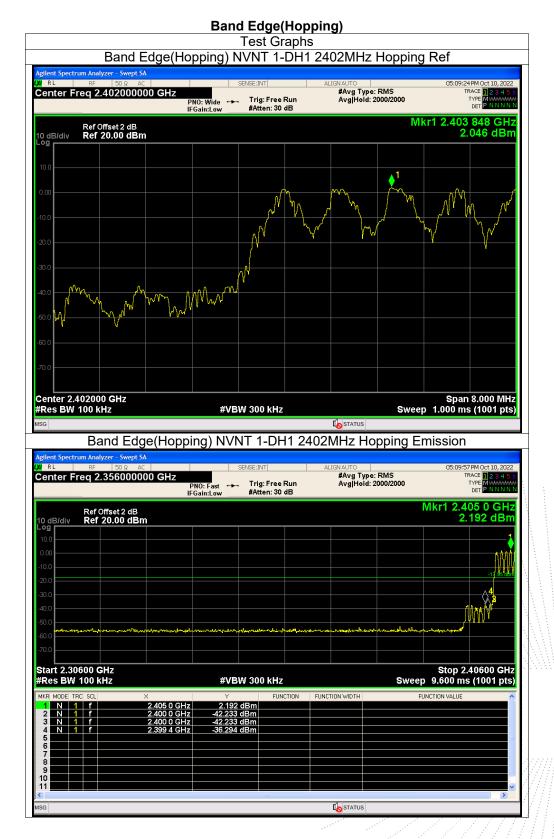










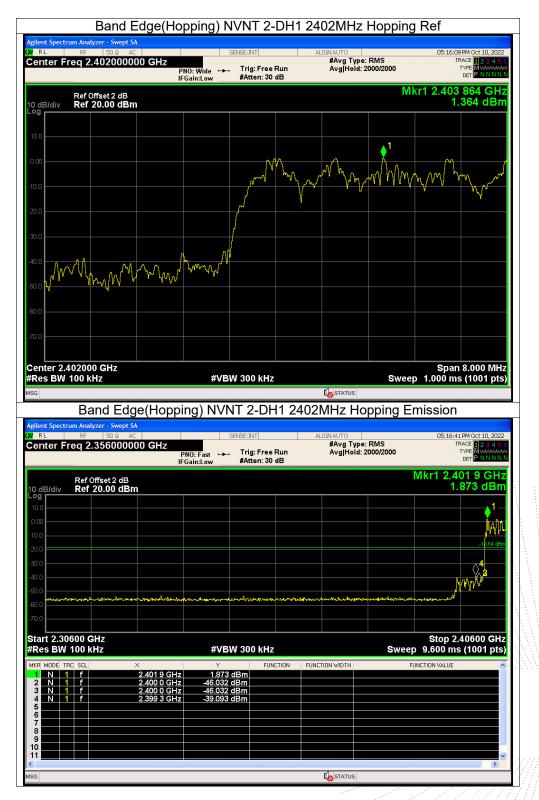


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10. 20 DB Bandwidth

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 20 dB relative to the maximum level measured in the fundamental emission.

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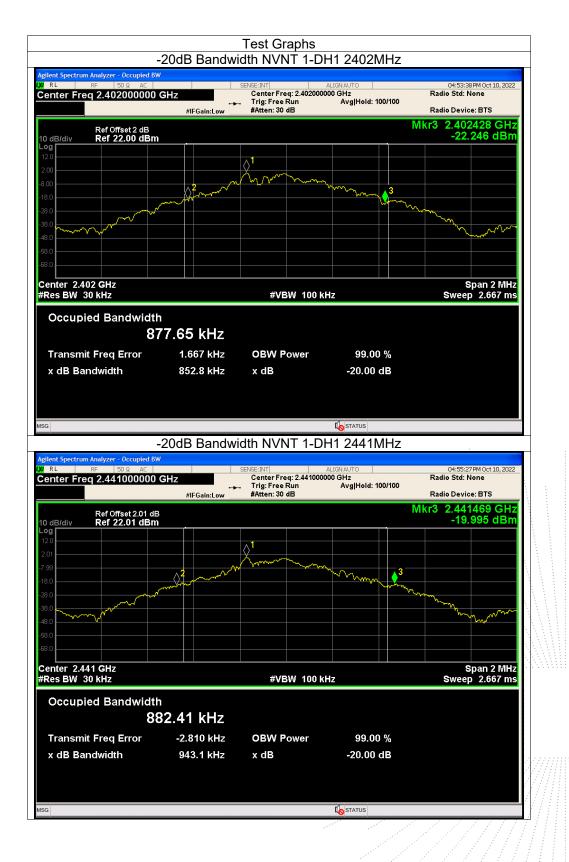
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10.4 Test Result

Temperature :	26 ℃	Relative H	Humidity :	54%
Test Voltage :	DC 3.7V	Remark		N/A
Modulatio	on	Test Channel		Bandwidth(MHz)
GFSK		Low		0.853
GFSK		Middle		0.943
GFSK		High		0.962
π/4DQPS	SK	Low		1.171
π/4DQPS	SK	Middle		1.204
π/4DQPS	SK	High		1.2
8DPSK		Low		1.2
8DPSK		Middle		1.21
8DPSK		High		1.177

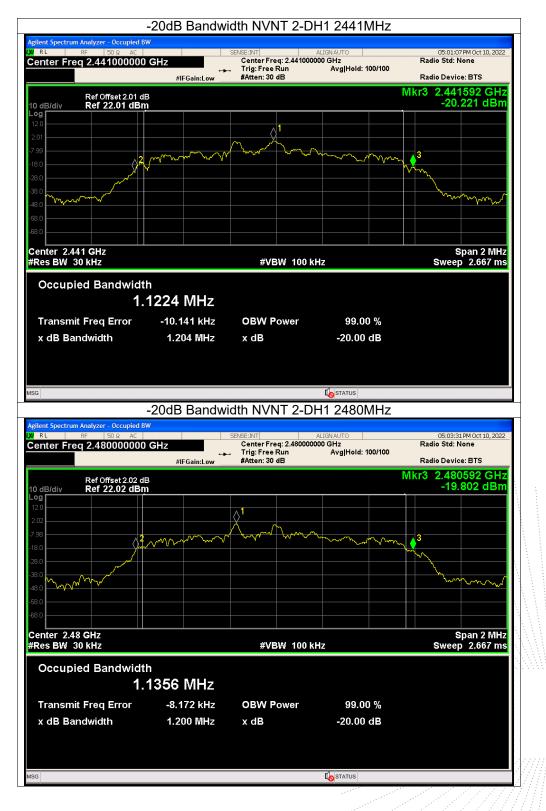








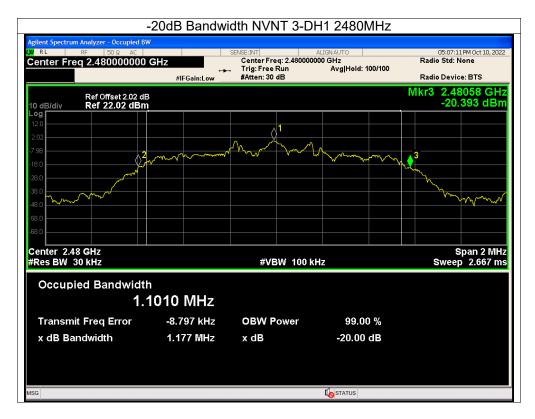














11. Maximum Peak Output Power

11.1 Block Diagram Of Test Setup



11.2 Limit

		FCC Part15 (15.247),	Subpart C	
Section	Test Item	Limit	Frequency Range (MHz)	Result
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.

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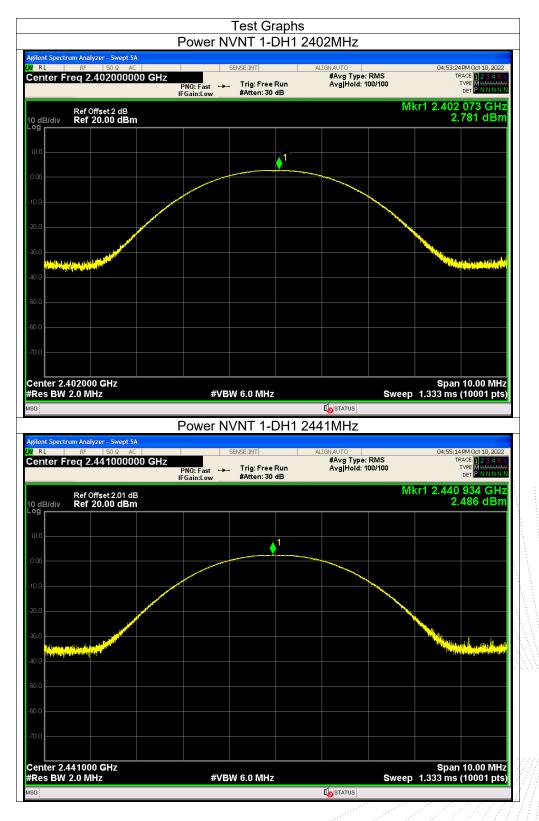
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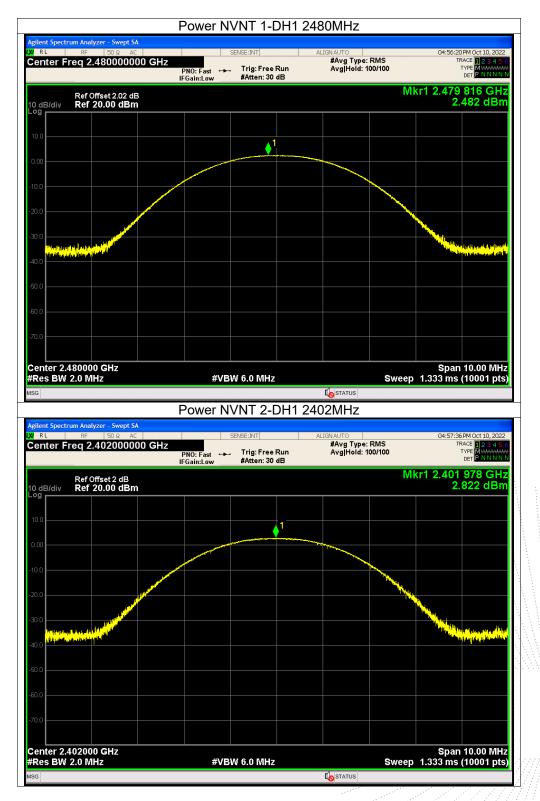
11.4 Test Result

Temperature :	26 ℃	Relative Humidity :	54%	
Test Voltage :	DC 3.7V	Remark:	N/A	
	1 1			
Modulation	Test Channel	Output Power (dBm)		Limit (dBm)
GFSK	Low	2.78		21
GFSK	Middle	2.49		21
GFSK	High	2.48		21
π/4DQPSK	Low	2.82		21
π/4DQPSK	Middle	2.49		21
π/4DQPSK	High	2.49		21
8DPSK	Low	2.81		21
8DPSK	Middle	2.47		21
8DPSK	High	2.50		21

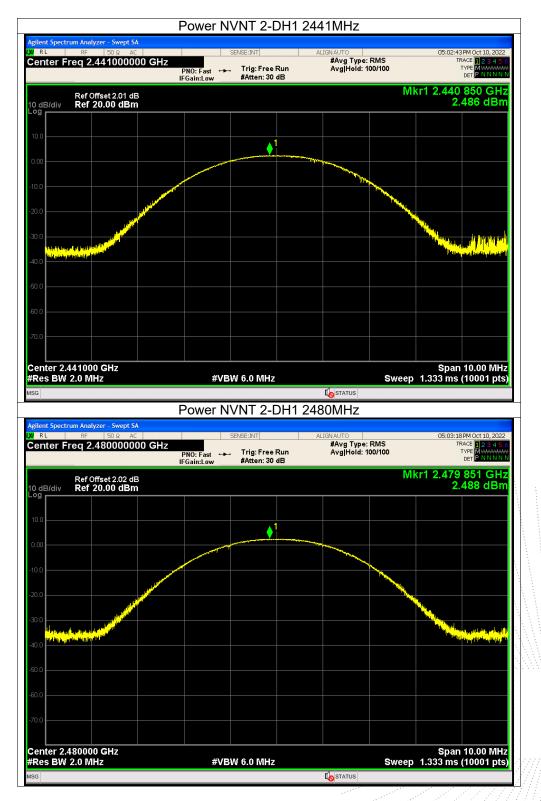




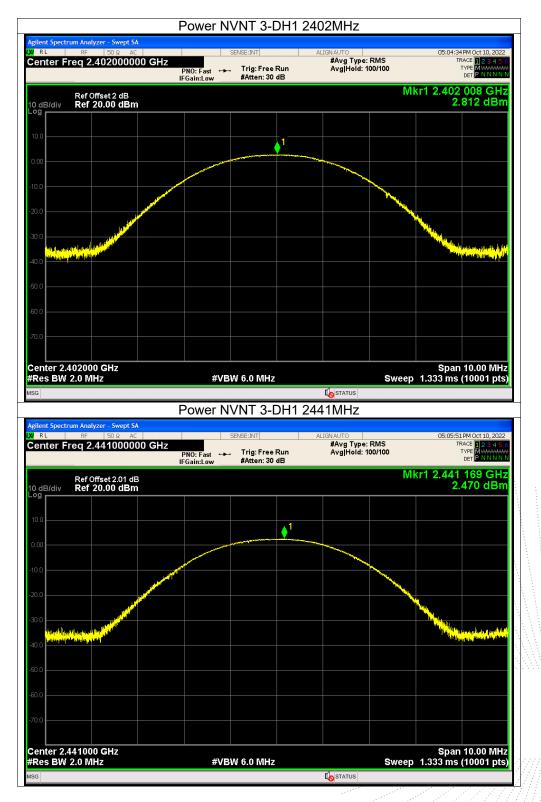




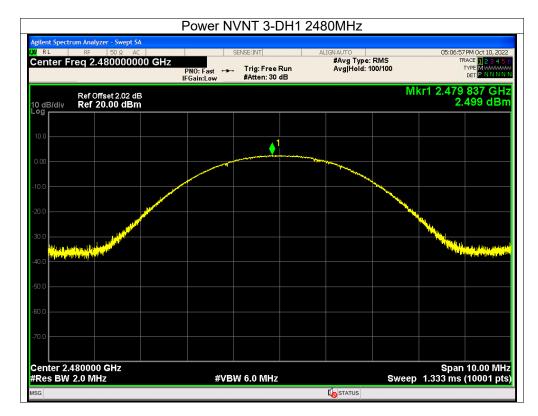












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12. Hopping Channel Separation

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.

No.: BCTC/RF-EMC-005

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12.4 Test Result

Modulation	Test Channel	Separation (MHz)	Limit(MHz)	Result
GFSK	Low	1.002	0.853	PASS
GFSK	Middle	1.002	0.943	PASS
GFSK	High	0.996	0.962	PASS
π/4DQPSK	Low	1.002	0.781	PASS
π/4DQPSK	Middle	1.002	0.803	PASS
π/4DQPSK	High	0.998	0.800	PASS
8DPSK	Low	1.002	0.800	PASS
8DPSK	Middle	1.164	0.807	PASS
8DPSK	High	1.158	0.785	PASS



ilent Spectrum Analyzer - S		JFS NVI	NI 1-DH1	2402MHz		
RL RF 50 enter Freq 2.402	DΩ AC	SE	INSE:INT	ALIGN AUTO #Avg Typ	e: RMS	05:09:08 PM Oct 10, 2022 TRACE 1 2 3 4 5 6
	PN	O: Wide 🖵 Sain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold	:>100/100	TYPE MWWWWW DET PNNNN
Ref Offset dB/div Ref 20.00	2 dB 0 dBm				Mkr1	2.401 828 GHz 0.450 dBm
	1			^ 2		
.00	×	~		\rightarrow		
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~		
0.0						
0.0						
0.0						
0.0						
enter 2.402500 GH Res BW 30 kHz	Iz	#VBW	/ 100 kHz		Sweep 2	Span 2.000 MHz 133 ms (1001 pts)
KR MODE TRC SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTIO	,
1 N 1 f 2 N 1 f	2.401 828 GHz 2.402 830 GHz	0.450 d 0.421 d	IBm IBm			
3						
5 6						=
8						
9						
						~
				I STATUS		<u>&gt;</u>
G						
		CFS NVI	NT 1-DH1	status 2441MHz		
i <mark>lent Spectrum Analyzer - 1</mark> R L RF 50	Swept SA DΩ AC		NT 1-DH1	2441MHz		05:10:35PM Oct 10, 2022
i <mark>lent Spectrum Analyzer - 1</mark> R L RF 50	Swept SA วฏ AC 500000 GHz PN	O: Wide 😱	INSE:INT	2441MHz	e: RMS >100/100	05:10:35 PM Oct 10, 2022 TRACE 12 84 55 TYPE
ilent Spectrum Analyzer - 3 RL RF 50 enter Freq 2.441	Swept SA DQ AC 500000 GHz PN IFG	SE	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 112 3 4 5 6 TYPE M WWWWW DET P WWWW
Ilent Spectrum Analyzer - 3 RL RS Sc enter Freq 2.441: Ref Offset D dB/div Ref 20.00	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NINNN
RL RF 2.441 RL RF SC enter Freq 2.441 Ref Offset dB/div Ref 20.00	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 3 4 5 6 TYPE MANNAWA DET P.N.N.N. 2, 440 830 GHz
RL REF Spectrum Analyzer - 3 RL RF Sc enter Freq 2.441 Ref Offset dB/div Ref 20.00	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MAXMANN DET P.NNNN 2. 440 830 GHz
Ilent Spectrum Analyzer - 2 RL RF Sc enter Freq 2.441: Ref Offset 0 GB/div Ref 20.00 0 0 0 0	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MAXMANN DET P.NNNN 2. 440 830 GHz
Ilent Spectrum Analyzer - 2 RL RF Sc enter Freq 2.441 Ref Offset od B/div Ref 20.00 od 00 00 00 00	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MAXMANN DET P.NNNN 2. 440 830 GHz
ilent Spectrum Analyzer - ' RL RF SC enter Freq 2.441: Ref Offset	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MMWMWM DET P.NNNNN 2.440 830 GHz
Ilent Spectrum Analyzer - 3 RL RF Sc enter Freq 2.441: Ref Offset 0 dB/div Ref 20.00 00 00 00 00 00 00 00 00 00	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MMWMWM DET P.NNNNN 2.440 830 GHz
RL         RF         S0           enter Freq 2.441:         Ref Offset         S0           dB/div         Ref 20.00         S0           00         0         0         0           00         0         0         0         0           00         0         0         0         0	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MMWMWM DET P.NNNNN 2.440 830 GHz
Ilent Spectrum Analyzer - 3 RL RF Sc enter Freq 2.441: Ref Offset 0 dB/div Ref 20.00 00 00 00 00 00 00 00 00 00	Swept SA 30 AC 5000000 GHz PN IFG 2.01 dB	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 4 5 6 TYPE MMWMWM DET P.NNNNN 2.440 830 GHz
ilent Spectrum Analyzer - 3 RL RF 50 enter Freq 2.441: Ref Offset 0 dB/div Ref 20.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Swept 5A 500000 GHz PN IFC 2.01 dB 0 dBm	O: Wide 😱	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	:>100/100	05:10:35PM oct 10, 2022 TRACE 10 2 3 4 5 G TYPE MANNUM Der MANNUM 2.440 830 GHz 0.133 dBm
Ilent Spectrum Analyzer -3 RL RF 50 enter Freq 2.441: Ref Offset 0 dB/div Ref 20.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Swept 5A 500000 GHz PN IFC 2.01 dB 0 dBm	0: Wide Sain:Low	INSE:INT	2441MHz ALIGNAUTO #Avg Typ	>100/100	05:10:35PM oct 10, 2022 TRACE 10 2 3 4 5 G TYPE MANNUM Der MANNUM 2.440 830 GHz 0.133 dBm
Ilent Spectrum Analyzer -3 RL RF Scenter Freq 2.441: Ref Offiset dB/div Ref 20.01 00 00 00 00 00 00 00 00 00	Swept SA DR AC PN 500000 GHz PN FG 2.01 dB 0 dBm 1 1 1 1 1 1 1 1 1 1 1 1 1	0: Wide Sain:Low #VBW	Trig: Free Run #Atten: 30 dB	2441MHz ALIGNAUTO #Avg Typ	>100/100	05:10:35PM Oct 10, 2022 TRACE 12 2 3 5 G TYPE MANNANA DET MANNANA 2.440 830 GHz 0.133 dBm
Ref         Ref         S0           enter         Freq         2.441:           Ref Offset         S0         S0           dB/div         Ref Offset         S0           0         S0         S0           1         F </td <td>Swept SA 500000 GHz PN PC 2.01 dB 0 dBm 1 1 1 1 1 1 1 1 1</td> <td>0: Wide Sain:Low</td> <td>INSE:INT</td> <td>2441MHz</td> <td>&gt;100/100 Mkr1</td> <td>05:10:35PM Oct 10, 2022 TRACE 12:34 5 G TYPE MONITOR DET MONITOR 2.440 830 GHz 0.133 dBm</td>	Swept SA 500000 GHz PN PC 2.01 dB 0 dBm 1 1 1 1 1 1 1 1 1	0: Wide Sain:Low	INSE:INT	2441MHz	>100/100 Mkr1	05:10:35PM Oct 10, 2022 TRACE 12:34 5 G TYPE MONITOR DET MONITOR 2.440 830 GHz 0.133 dBm
ilent Spectrum Analyzer - 3         RL       RE       S0         enter Freq 2.441:         Ref Offset         0 dE/div       Ref 20.00         0 dE/div       Ref 20.01         0 dE/div	Swept SA 500000 GHz PN FC 2.01 dB 0 dBm 1 1 1 2.440 830 GHz	0: Wide Sain:Low #VBW Y 0.133 d	INSE:INT	2441MHz	>100/100 Mkr1	05:10:35PM Oct 10, 2022 TRACE 12 2 3 5 G TYPE MANNANA DET MANNANA 2.440 830 GHz 0.133 dBm
Ilent Spectrum Analyzer -1       RE       SC         enter Freq 2.441:       Ref Offset       SC         dB/div       Ref 20.01       SC         0       Ref 20.01       SC	Swept SA 500000 GHz PN FC 2.01 dB 0 dBm 1 1 1 2.440 830 GHz	0: Wide Sain:Low #VBW Y 0.133 d	INSE:INT	2441MHz	>100/100 Mkr1	05:10:35PM Oct 10, 2022 TRACE 12 2 3 5 G TYPE MANNANA DET MANNANA 2.440 830 GHz 0.133 dBm
Ilent Spectrum Analyzer -1         RE         SC           enter Freq 2.441:         Ref Offset         SC           dB/div         Ref 2.441:         Ref 2.441:           0 dB/div         Ref 20.01         SC           0 dB/div         Ref 2.441:         SC           0 dB/div         Ref 20.01         SC	Swept SA 500000 GHz PN FC 2.01 dB 0 dBm 1 1 1 2.440 830 GHz	0: Wide Sain:Low #VBW Y 0.133 d	INSE:INT	2441MHz	>100/100 Mkr1	05:10:35PM Oct 10, 2022 TRACE 12 2 3 5 G TYPE MANNANA DET MANNANA 2.440 830 GHz 0.133 dBm
Ilent Spectrum Analyzer         S           RL         RB         SC           enter Freq 2.441:         Ref Offset           0 dB/div         Ref 20.00           0 dB/div         Ref 20.01           0 dB/div         Ref 20.01           0 dB/div         Ref 20.01           0 d	Swept SA 500000 GHz PN FC 2.01 dB 0 dBm 1 1 1 2.440 830 GHz	0: Wide Sain:Low #VBW Y 0.133 d	INSE:INT	2441MHz	>100/100 Mkr1	D5:10:35 PM Oct 10, 2022 TRACE 12 23 4 5 G TYPE MWWWW Det P WWWW 2.440 830 GHz 0.133 dBm
RL         RF         SC           RL         RF         SC           enter Freq 2.441:         SC         SC           dB/div         Ref Offset         SC           dB/div         Ref 20.00         SC           00         SC         SC           01         SC         SC           02         SC         SC           03         SC         SC           04         SC         SC           05         SC         SC           06         SC         SC           07         SC         SC           08         SC         SC	Swept SA 500000 GHz PN FC 2.01 dB 0 dBm 1 1 1 2.440 830 GHz	0: Wide Sain:Low #VBW Y 0.133 d	INSE:INT	2441MHz	>100/100 Mkr1	05:10:35PM Oct 10, 2022 TRACE 12 2 3 5 G TYPE MANNANA DET MANNANA 2.440 830 GHz 0.133 dBm



gilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC Center Freq 2.479500000 GHz	SENSE:INT PNO: Wide _ Trig: Free Run FGain:Low #Atten: 30 dB	ALIGNAUTO #Avg Type: RMS Avg Hold:>100/100	05:13:48 PM Oct 10, 2022 TRACE 12 3 4 5 6 TYPE MWWWWW DET P NN NN N
Ref Offset 2.02 dB	FGain:Low #Atten: 30 dB	Mk	r1 2.478 832 GHz 0.235 dBm
0 dB/div Ref 20.00 dBm			0.200 dBm
		2	
0.0		~~~	
0.0			
0.0			
50.0			
enter 2.479500 GHz Res BW 30 kHz	#VBW 100 kHz	Sweep	Span 2.000 MHz 2.133 ms (1001 pts)
KR MODE TRC SCL X 1 N 1 f 2.478 832 GHz	Y FUNCTION 0.235 dBm	FUNCTION WIDTH FU	NCTION VALUE
2 N 1 f 2.479 828 GHz 3 4	0.196 dBm		
5 6 7			
8			
0			~
G			
	CFS NVNT 2-DH1 2	2402MHz	
RL         RF         50 Ω         AC         AC           enter Freq 2.402500000 GHz         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C         C	SENSE:INT	ALIGNAUTO #Avg Type: RMS	05:15:52 PM Oct 10, 2022
F	PNO: Wide Trig: Free Run FGain:Low #Atten: 30 dB	Avg Hold:>100/100	TRACE 123456 TYPE MWAAAAA DET PNNNNN
Ref Offset 2 dB ) dB/div Ref 20.00 dBm		Mk	r1 2.401 828 GHz 0.461 dBm
		2	
0.0			
0.0			
0.0			
0.0			
			Span 2.000 MHz
	#VBW 100 kHz	Sweep	2.133 ms (1001 pts)
	Y FUNCTION		
Res BW 30 kHz           KR MODE TRC SCL         X           1         N         1         f         2.401 828 GHz           2         N         1         f         2.401 828 GHz           3         -         -         -         -	Y FUNCTION		2.133 ms (1001 pts)
Res BW 30 kHz           KR, MODE TRC SCL         X           1         N         1         f         2.401 828 GHz           2         N         1         f         2.401 828 GHz           3	Y FUNCTION		2.133 ms (1001 pts)
×         ×           Image: Second Condition of the second conditio	Y FUNCTION		2.133 ms (1001 pts)



ilent Spectrum Analyzer - Swept SA		2-DH1 2441MHz		
RL RF 50 Ω AC enter Freq 2.441500000	GHz PNO: Wide	#Avg Ty	05: npe:RMS d:>100/100	17:39 PM Oct 10, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N
		n: 30 dB		
Ref Offset 2.01 dB dB/div Ref 20.00 dBm			WIKT1 2.4	40 828 GHz 0.183 dBm
			2	
	- man		4 mm	~~~~~
0.0				
0.0				
0.0				
0.0				
enter 2.441500 GHz Res BW 30 kHz	#VBW 100	kHz	Sp Sweep 2.133	an 2.000 MHz ms (1001 pts)
KR MODE TRC SCL X	Y 0.000 CH 10 0 402 4D m	FUNCTION FUNCTION WIDTH	FUNCTION VAL	JE 🔺
1 N 1 f 2.440 2 N 1 f 2.441 3	0 828 GHz 0.183 dBm 830 GHz 0.104 dBm			
4 5				
6 7				
8				
0 1				~
G		<b>I</b> o status		
	CFS NVNT 2	2-DH1 2480MHz		
ilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC	SENSE:INT	ALIGNAUTO	05:	22:24 PM Oct 10, 2022
enter Freq 2.479500000	GHz	#Avg Ty	pe: RMS d:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N
		n: 30 dB		
			WIKF1 2.4	78 832 GHz
Ref Offset 2.02 dB				0.151 dBm
O dB/div Ref 20.00 dBm				0.151 0.611
0 dB/div Ref 20.00 dBm				0.151 GBM
0 dB/div Ref 20.00 dBm 0 dB/div Ref 20.00 dBm 1 1 1 000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~		
0 dB/div Ref 20.00 dBm	^	~~~~~		
0 dB/div Ref 20.00 dBm 9 d 0.0 0 0.0 0 0		~~~~~		
0 dB/div Ref 20.00 dBm 9 d 0.0 0 0.0 0 0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
b dB/div Ref 20.00 dBm og 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.				
0 dB/div Ref 20.00 dBm 0 dB/div Ref 20.00 dBm 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0			2	
enter 2,479500 GHz	#VBW 100		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	an 2.000 MHz
OddB/div         Ref 20.00 dBm           Og         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1           0.00         1	Y		2	an 2.000 MHz ms (1001 pts)
OddB/div         Ref 20.00 dBm           Og         1		KHz	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5	an 2.000 MHz ms (1001 pts)
dB/div         Ref 20.00 dBm           og         1           og         2           og         1           og         1           og         1           og         2	Y 8 832 GHz 0.151 dBm	KHz	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5	an 2.000 MHz ms (1001 pts)
dB/div         Ref 20.00 dBm           og	Y 8 832 GHz 0.151 dBm	KHz	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5	an 2.000 MHz ms (1001 pts)
o dB/div         Ref 20.00 dBm           og	Y 8 832 GHz 0.151 dBm	KHz	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5	an 2.000 MHz ms (1001 pts)
dB/div         Ref 20.00 dBm           odd         1	Y 8 832 GHz 0.151 dBm	KHz	2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 5 5 5 5 5	an 2.000 MHz ms (1001 pts)



RL RF 50 Ω AC enter Freq 2.402500000 GHz	PNO: Wide	ALIGNAUTO #Avg Type: RMS µn Avg Hold:>100/100	05:23:55 PM Oct 10, 2022 TRACE 12 3 4 5 6 TYPE MWWWWW
	IFGain:Low #Atten: 30 dE	3	
Ref Offset 2 dB 0 dB/div Ref 20.00 dBm		IVIN	r1 2.401 828 GHz 0.083 dBm
og 10.0		^ <b>2</b>	
		2	
	×		
30.0			
40.0			
50.0			
70.0			
enter 2.402500 GHz			Span 2.000 MHz
Res BW 30 kHz	#VBW 100 kHz	-	2.133 ms (1001 pts)
KR         MODE         TRC         SCL         X           1         N         1         f         2.401 828 G           2         N         1         f         2.402 830 G	Y         FUNCTI           Hz         0.083 dBm           Hz         0.109 dBm	ION FUNCTION WIDTH FU	
2 IN I I 2.402 000 G	0.109 0.511		
5 6			
7 8 9			
G			
	CFS NVNT 3-DF		
gilent Spectrum Analyzer - Swept SA			
RL RF 50 Ω AC enter Freg 2.441500000 GHz	SENSE:INT	ALIGNAUTO #Avg Type: RMS	05:25:26 PM Oct 10, 2022 TRACE 12 3 4 5 6
	PNO: Wide Trig: Free Ru IFGain:Low #Atten: 30 dB	ın Avg Hold:≻100/100 3	TYPE M WWWWWWW DET P N N N N N
Ref Offset 2.01 dB		Mł	r1 2.440 828 GHz
0 dB/div Ref 20.00 dBm			
0 dB/div Ref 20.00 dBm			r1 2.440 828 GHz
0 dB/div Ref 20.00 dBm og 0.00 0.00 0.00			r1 2.440 828 GHz
0 dB/div Ref 20.00 dBm og 100 100 200 200			r1 2.440 828 GHz
			r1 2.440 828 GHz
0 dB/div Ref 20.00 dBm 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0 d			r1 2.440 828 GHz
0 dB/div Ref 20.00 dBm 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0 d			r1 2.440 828 GHz
o dB/div Ref 20.00 dBm 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			r1 2.440 828 GHz -0.228 dBm
o dB/div Ref 20.00 dBm og 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0 d	#VBW 100 kHz		r1 2.440 828 GHz
0 dB/div Ref 20.00 dBm 9 9 9 9 9 9 9 9 9 9	#VBW 100 kHz	Sweep	r1 2.440 828 GHz -0.228 dBm
o dB/div Ref 20.00 dBm 9 9 9 10 10 10 10 10 10 10 10 10 10	#VBW 100 kHz	Sweep	r1 2.440 828 GHz -0.228 dBm
0 dB/div Ref 20.00 dBm 9 dB/div Ref 20.00 dBm 9 d 9 d 9 d 9 d 9 d 9 d 9 d 9 d	#VBW 100 kHz 9.228 dBm	Sweep	r1 2.440 828 GHz -0.228 dBm
0 dB/div Ref 20.00 dBm 9 9 9 9 9 9 9 9 9 9	#VBW 100 kHz 9.228 dBm	Sweep	r1 2.440 828 GHz -0.228 dBm
0 dB/div Ref 20.00 dBm 9 db/div Ref 20.00 dBm 9 db/div Ref 20.00 dBm 9 db/div Ref 20.00 dBm 1 db/d	#VBW 100 kHz 9.228 dBm	Sweep	r1 2.440 828 GHz -0.228 dBm



	CFS NVNT	3-DH1 2480MHz	·
Agilent Spectrum Analyzer - Swept SA RL RF 50 Q AC Center Freq 2.479500000	PNO: Wide 😱 Trig	#Avg T	05:27:56 PM Oct 10, 20 Sype: RMS TRACE 12.34 old:>100/100 TVPE
Ref Offset 2.02 dB 10 dB/div Ref 20.00 dBm			Mkr1 2.478 832 GF -0.151 dB
	^	~~~~	
-30.0			
-70.0			
Center 2.479500 GHz #Res BW 30 kHz	#VBW 10	0 kHz	Span 2.000 MI Sweep   2.133 ms (1001 pt
	9 832 GHz -0.151 dBm 9 990 GHz -0.156 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE
5 6 7 8 9 9			
10 11 MSG		statu	



### 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.

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

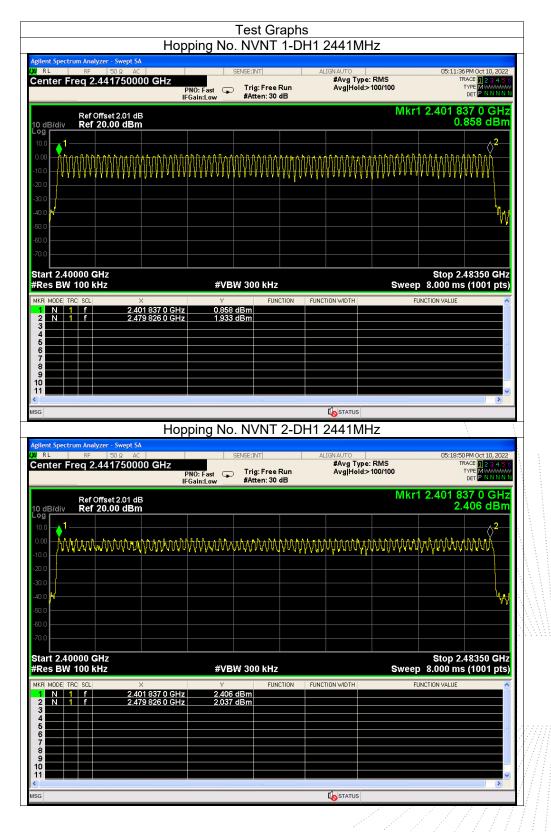
No.: BCTC/RF-EMC-005

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Edition: A.5



# 13.4 Test Result







	trum Analyze																	
enter F	_R ⊧ req 2.44	50 Ω ΑΟ 417500			IO: Fast ain:Low	Ģ		g: Free ten: 30		A	LIGN AUTO #Avg T Avg Ho			)		05:26	TRAC TYP	Oct 10, 202 E 12345 E MWWWW T P N N N N
) dB/div		set 2.01 di 1 <b>.00 dB</b> n		IFO	am.cow		HT I							Mk	12	.401	503 6.41	0 GH
		.00 001																. ?
		NNNN	WIWI	ſŲIJ		πψι	MUV	WW	WW	iμų		ι, î, î, î,	W	ΛŴ	VUV	MM	ΛŴ	VM
0.0													_					
0.0																		v
0.0																		
	0000 GH: / 100 kHz				ţ	¥VΒ۱	W 30	0 kHz	<u> </u>		<u> </u>			Swee	р 8.	Stop .000 r	2.48 ns (1	350 GH 1001 pts
R MODE T			× 01 503 0 G			Y		FUN	ICTION	FUNC	TION WIDTH				FUNCTI	ON VALU	E	
	1 f		80 076 5 G			.914	dBm dBm											
2 N 7 3 4 5 1																		
2 N 7 3 4 5 5 7 7																		
2 N .																		



# 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).

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# 14.4 Test Result

DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

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

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

Modulation	Channel Data	Packet	pulse time(ms)	Dwell Time(s)	Limits(s)
		DH1	0.372	0.119	0.4
GFSK	Middle	DH3	1.621	0.259	0.4
		DH5	2.869	0.306	0.4
		2DH1	0.372	0.119	0.4
π/4DQPSK	Middle	2DH3	1.633	0.261	0.4
		2DH5	2.876	0.307	0.4
		3DH1	0.37	0.118	0.4
8DPSK	Middle	3DH3	1.63	0.261	0.4
		3DH5	2.879	0.307	0.4



	rept SA		- 16 IT	01 700 - 01 00 0			
RL RF 50 Ω enter Freq 2.44100	PNO	):East ⊶ Tt	rig Delay-500.0 μ rig: Video Atten: 30 dB	ALIGN AUTO s #Avg Ty	/pe: RMS	Tf	PPM Oct 10, 2022 RACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N
Ref Offset 2. dB/div Ref 20.00	01 dB dBm					∆Mkr1	372.0 μs 1.40 dB
							TRIG LVL
10.0		<b>                                     </b>			u la	n (shu) Jana ay	
0.0 <mark>dingu ahayadada</mark> 0.0 <mark>dingu ahayadada</mark> 0.0	en ale a service de la company de la comp La company de la company de La company de la company de	1999, 1999, 1999, 1999, 1999 	עריין איז	n san san san san san san san san san sa			
enter 2.441000000 ( es BW 1.0 MHz	GHz	#VBW 3.	.0 MHz		Sweep	10.00 ms	Span 0 Hz (10001 pts)
KR MODE TRC SCL 1 Δ2 1 t (Δ) 2 F 1 t	× 372.0 µs (/ 498.0 µs	۲ () 1.40 dE -2.29 dBm	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	^
2 3 4 5	430.0 µs	-2.29 UBII					
6 7 8							
9 0 1							
G			Ш	<b>I</b> STATUS			
	Dwell N	IVNT 1-D	H3 2441	HTZ Ono	Durot		
ilent Spectrum Analyzer - Sw	rept SA				Buist		
RL RF 50 Ω	AC 00000 GHz PNC	):East ⊶ Tt		ALIGNAUTO	JUISI /pe: RMS	TF	2PM Oct 10, 2022 RACE 1 2 3 4 5 6 WWWWWWW DET P N N N N N
RL RF 50 2 enter Freq 2.44100 Ref Offset 2. 0 dB/div Ref 20.00	AC	D: Fast ↔ Tr	::ɪντ rig Delay-500.0 μ rig: Video	ALIGNAUTO		TF	RACE 123456 TYPE WAAAAAAA
RL	AC	D: Fast ↔ Tr	::ɪντ rig Delay-500.0 μ rig: Video	ALIGNAUTO		TF	RACE 123456 TYPE WAAAAAAA DET PNNNNN 1.621 ms
enter Freq 2.44100 Ref Offset 2. 0 dB/div Ref 20.00 0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	AC DODOO GHZ PNC IFG2 01 dB dBm	D: Fast ↔ Tr	::ɪντ rig Delay-500.0 μ rig: Video	ALIGNAUTO		TF	RACE 123456 TYPE WAAAAAAA DET PNNNNN 1.621 ms
RLRF   50 Ω enter Freq 2.4410( Ref Offset 2. 0 dB/div Ref 20.00 29 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	AC DODOO GHZ PNC IFG2 01 dB dBm	D: Fast ↔ Tr	::ɪντ rig Delay-500.0 μ rig: Video	ALIGNAUTO		TF	RACE 123456 TYPE WWWWWWWW DET PNNNN 1.621 ms -2.59 dB
RL         RF         50 Ω           enter Freq 2.4410(         Ref Offset2.           D dB/div         Ref 20.00           90	AC 00000 GHz PNO IFG2 01 dB dBm 1Δ2	D: Fast ↔ Tr	rig Delay-500.0 µ rig Delay-500.0 µ Atten: 30 dB		/pe: RMS		ACE 112 34 5 6 DET ENNINN 1.621 ms -2.59 dB TRIO LVL
RL         RF         50 Ω           enter Freq 2.44100         Ref Offset 2.           0 dB/div         Ref 20.00           0 d0         Q           Q         Q	AC 00000 GHz PN IFG2 01 dB dBm 1Δ2 1Δ2	T D: Fast Tr in:Low #A	enri Ing Delay-500.0 µ Ing: Video Atten: 30 dB		/pe: RMS	TI AMkr1	ACE DI 23 45 6 THE WINNIN N DET PINININ 1.621 ms -2.59 dB
RL         RF         50 Q           enter Freq 2.4410(         Ref Offset 2.           0 dB/div         Ref 20.00           0 g	AC 000000 GHz PN IFG2 01 dB dBm 1Δ2 1Δ2 GHz	Transformer Transforme	eint rig Delay-500.0 µ fig Delay-500.0 µ Atten: 30 dB		ype: RMS	TT AMkr1	ACE 02 34 5 6 THE WINNING AND A SECOND A SECOND AND A SECOND A S
RL         RF         S0 Ω           enter Freq 2.4410(         Ref Offset 2.           0 dB/div         Ref 20.00	AC 00000 GHz PN IFG2 01 dB dBm 1Δ2 1Δ2	The set of	enri rig Delay-500.0 µ rig Video 4 Atten: 30 dB		ype: RMS		ACE 02 34 5 6 THE WINNING AND A SECOND A SECONDA
RL         RF         S0 Ω           enter Freq 2.4410(         Ref Offset 2.           0 dB/div         Ref 20.00	AC DO0000 GHz PN IFGa 01 dB dBm 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2	The set of	enri rig Delay-500.0 µ rig Video 4 Atten: 30 dB		ype: RMS	TT AMkr1	ACE 02 34 5 6 THE WINNING AND A SECOND A SECONDA
RL         RF         50 Q           enter Freq 2.44100         Ref Offset 2.           0 dB/div         Ref 20.00           0 d         X2           0 d         MODE TRC SCL           1 d         X1	AC DO0000 GHz PN IFGa 01 dB dBm 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2 1Δ2	The set of	enri rig Delay-500.0 µ rig Video 4 Atten: 30 dB		ype: RMS	TT AMkr1	ACE 02 34 5 6 THE WINNING AND A SECOND A SECONDA



gilent Spectrum Analyzer - Swept RL RF 50 Ω		SENSE:	INT	ALIGN AUTO		(15:29:51	IPM Oct 10, 2022
enter Freq 2.441000	000 GHz	0:Fast ↔ Tri	ig Delay-500.0 μs ig: Video tten: 30 dB	#Avg Type	e: RMS	00.29.00	RACE 123456 TYPE WWWWWWWW DET PNNNNN
Ref Offset 2.01 0 dB/div Ref 20.00 dB	dB					ΔMkr1	2.869 ms -3.44 dB
X2							TRIG LVL
0.0							
30.0							
40.0 50.0 <mark>41 august 14.</mark>		ante A la constante da	ana alia kana dina palinga. Kan pana kana kana pali	ni aliana ing Kabula palawa 1 mpi 🔍 pala sa bilin 111 m	uralının. <mark>Helenen</mark> yanı yaşında başında karanan	i dan persentalak bili pake	dual In Dalemaine
		<mark>iterite exteriter</mark>			and the low of the second s	<mark>nalin katan na</mark>	angang palantan
enter 2.441000000 GH							Span 0 Hz
es BW 1.0 MHz	2	#VBW 3.	0 MHz		Sweep	10.00 ms	(10001 pts)
KR MODE TRC SCL 1 Δ2 1 t (Δ)	× 2.869 ms (/	γ Δ) -3.44 dB	FUNCTION	FUNCTION WIDTH	FU	NCTION VALUE	<u> </u>
2 F 1 t	498.0 µs	-3.69 dBm					
4							=
7							
9 0							
							×
G				STATUS			
	Dwell N	VNT 2-DI	H1 2441N	IHz One E	Burst		
		051105	Y6 (77)			05.00.50	
RL RF 50Ω	AC 000 GHz		ig Delay-500.0 μs	ALIGNAUTO #Avg Type		05:20:59 TF	PPM Oct 10, 2022
RL RF 50Ω	AC 000 GHz PN	0:Fast ↔ Tri				TF	RACE 123456 TYPE WWWWWWW DET PNNNNN
RL RF 50 Ω enter Freq 2.441000/ 	AC 000 GHz PN IFG dB	0: Fast ↔ Tri	ig Delay-500.0 μs ig: Video			TF	армост 10, 2022 RACE 12 3 4 5 6 ТҮРЕ WWWWWW DET P. N.N.N.N.N. 372.0 µs -0.48 dB
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 2.01           Ω dB/div         Ref 20.00 dB           9	AC 000 GHz PN IFG dB	0: Fast ↔ Tri	ig Delay-500.0 μs ig: Video			TF	ACE 123456 TYPE WWWWWWWW DET PNNNNN 372.0 μs
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           og         100	AC 000 GHz PN IFG dB	0: Fast ↔ Tri	ig Delay-500.0 μs ig: Video			TF	ACCE 123456 TYPE PNNNNN 372.0 μs -0.48 dB
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           99         142           0.00         142	AC 000 GHz PN IFG dB	0: Fast ↔ Tri	ig Delay-500.0 μs ig: Video			TF	ACE 123456 TYPE WWWWWWWW DET PNNNNN 372.0 μs
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           99         10.0           100         10.2           100         10.2           100         10.2	AC 000 GHz PN IFG dB	0: Fast ↔ Tri	ig Delay-500.0 μs ig: Video			TF	ACCE 123456 TYPE PNNNNN 372.0 μs -0.48 dB
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 2.01           D dB/div         Ref 20.00 dB           0 0         1Δ2           100         141           0 0         142           141         141	AC 000 GHz PN IFG dB	0: Fast ↔ Tri	ig Delay-500.0 μs ig: Video tten: 30 dB			TF	ACCE 123456 TYPE PNNNNN 372.0 μs -0.48 dB
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 2.01         Ref 0ffset 2.01           D dB/div         Ref 20.00 dB         Ref 20.00 dB           0 0         1Δ2         1           0 0         1         1         1           0 0         1         1         1           0 0         1         1         1           0 0         1         1         1           0 0         1         1         1           0 0         1         1         1           0 0         1         1         1	AC 000 GHz PN IFG dB	Tri 0: Fast → Tri ain:Low #A	ig Delay-500.0 μs ig: Video tten: 30 dB			TF	ACCE 123456 TYPE PNNNNN 372.0 μs -0.48 dB
RL         RF         50.0           enter Freq 2.441000         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <td>AC 000 GHz PN IFG dB</td> <td>Tri 0: Fast → Tri ain:Low #A</td> <td>ig Delay-500.0 μs ig: Video tten: 30 dB</td> <td></td> <td>e: RMS</td> <td>TF</td> <td>асе 12 3 4 5 б рег 2 N N N N N -0.48 dB</td>	AC 000 GHz PN IFG dB	Tri 0: Fast → Tri ain:Low #A	ig Delay-500.0 μs ig: Video tten: 30 dB		e: RMS	TF	асе 12 3 4 5 б рег 2 N N N N N -0.48 dB
RL         RF         50.0           enter Freq 2.441000         30.0         30.0           0 dB/div         Ref Offset 2.01         30.0           0 dB/div         Ref 20.00 dB         30.0	AC PN PN IFG	Seast →→ Tri O:Fast →→ Tri ain:Low #A	ig Delay-500.0 µs ig: Video tten: 30 dB			TF	ACCE 123456 TYPE PNNNNN 372.0 μs -0.48 dB
RL         RF         50.0           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           0 dB/div         Ref 20.00 dB           0 0         100           0 0         100           0 0         100           0 0         100           0 0         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100		Seast →→ Tri O:Fast →→ Tri ain:Low #A	ig Delay-500.0 µs ig: Video tten: 30 dB		e: RMS	TF	асе Ц 2 3 4 5 6 рет 2 11 11 2 3 4 5 6 рет 2 11 11 11 11 11 11 11 11 11 11 11 11 1
RL         RF         50.0           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           0 dB/div         Ref 20.00 dB <td></td> <td>Seast →→ Tri O:Fast →→ Tri ain:Low #A</td> <td>ig Delay-500.0 µs ig: Video tten: 30 dB</td> <td></td> <td>e: RMS</td> <td></td> <td>асе 12 3 4 5 б рег 2 N N N N N -0.48 dB</td>		Seast →→ Tri O:Fast →→ Tri ain:Low #A	ig Delay-500.0 µs ig: Video tten: 30 dB		e: RMS		асе 12 3 4 5 б рег 2 N N N N N -0.48 dB
RL         RF         50.0           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           Ref 20.00 dB         Ref 20.00 dB           Ref 20.00 dB <t< td=""><td>AC ON CH2</td><td>U: Fast → Tri ain:Low #A</td><td>ig Delay-500.0 µs ig: Video ttten: 30 dB</td><td></td><td>e: RMS</td><td></td><td>ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL </td></t<>	AC ON CH2	U: Fast → Tri ain:Low #A	ig Delay-500.0 µs ig: Video ttten: 30 dB		e: RMS		ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL 
enter Freq 2.4410000 Ref Offset 2.01 0 dB/div Ref 2.00 dB 9 9 9 9 9 9 9 9 9		U: Fast → Tri ain:Low #A	ig Delay-500.0 µs ig: Video tten: 30 dB	#Avg Type	e: RMS	AMkr1	ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL 
RL         RF         50.0           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           1 d2         1 t           1 d2         1 t           2 F         1 t           3 d         4	ACC PN 000 GHz PN IFG dB dB dB dB dB dB dB dB dB dB	0: Fast       →→       Tr #A         0: Fast       →→       #A         in:Low       #A<	ig Delay-500.0 µs ig: Video tten: 30 dB	#Avg Type	e: RMS	AMkr1	ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL 
RL         RF         50.0           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           1 dA         1 cL           1 A2         1 cL           2 F         1 cL           3 A         -           4 -         -           5 6         -	ACC PN 000 GHz PN IFG dB dB dB dB dB dB dB dB dB dB	0: Fast       →→       Tr #A         0: Fast       →→       #A         in:Low       #A<	ig Delay-500.0 µs ig: Video tten: 30 dB	#Avg Type	e: RMS	AMkr1	ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL 
RL         RF         50.2           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0           0 0         10.0	ACC PN 000 GHz PN IFG dB dB dB dB dB dB dB dB dB dB	0: Fast       →→       Tr #A         0: Fast       →→       #A         in:Low       #A<	ig Delay-500.0 µs ig: Video tten: 30 dB	#Avg Type	e: RMS	AMkr1	ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL 
RL         RF         50.0           enter Freq 2.441000         Ref Offset 2.01           0 dB/div         Ref 20.00 dB           0 dD         Ref 20.00 dB           0 dD         Ref 20.00 dB           0 dD         Ref 20.00 dB           1 d2         Ref 20.00 dB           1 d2         I           2 F         I           2 F         I           3 d         A           4 d         A           5         A           6         A	ACC PN 000 GHz PN IFG dB dB dB dB dB dB dB dB dB dB	0: Fast       →→       Tr #A         0: Fast       →→       #A         in:Low       #A<	ig Delay-500.0 µs ig: Video tten: 30 dB	#Avg Type	e: RMS	AMkr1	ACCE 12 3 4 5 6 DET P. N.N.N.N. 372.0 µS -0.48 dB TRO LVL TRO LVL 



Agilent Spectrum Analyzer - Sw	Dwell NVNT 2-DH3 2441MHz One	Burst
RL RF 50 G Center Freq 2.4410	AC SENSE:INT ALIGN AUTO	
Ref Offset 2.		ΔMkr1 1.633 ms 0.97 dB
10 dB/div Ref 20.00		
	142	TRIG LVL
-10.0 <b>X2</b>		
-20.0		
-40.0	the property of the second	n de la generation de la company de
-50.0 <mark>  .4 </mark> -60.0   .4	Contraction of the second s	i i i i i i i i i i i i i i i i i i i
70.0		
Center 2.441000000 Res BW 1.0 MHz	GHz #VBW 3.0 MHz	Span 0 Hz Sweep 10.00 ms (10001 pts)
MKR MODE TRC SCL	X Y FUNCTION FUNCTION WIDTH	FUNCTION VALUE
1 Δ2 1 t (Δ) 2 F 1 t 3	1.633 ms (Δ) 0.97 dB 497.0 μs -7.51 dBm	
4 5		
6 7 8		
9 10		
		×
SG		<b>-</b> .
Agilent Spectrum Analyzer - Sw	Dwell NVNT 2-DH5 2441MHz One	Burst
	AC SENSE:INT ALIGN AUTO	05:31:23PM Oct 10, 2022
	PNO: Fast +++ Trig: Video IFGain:Low #Atten: 30 dB	TYPE WWWWWW DET P N N N N N
Ref Offset 2		ΔMkr1 2.876 ms 1.09 dB-
10 dB/div Ref 20.00		
0.00	162	TRIG LVL
	na fina se a constante de la co	
30.0		
-40.0	- Alter a light of the state of	
-50.0 <mark></mark>	ter de se	n yan da a ka ka ku ya ku y Ma ku ya k
-70.0		attern and the same street
Center 2.441000000		Span 0 Hz
Res BW 1.0 MHz	#VBW 3.0 MHz X Y FUNCTION FUNCTION WIDTH	Sweep 10.00 ms (10001 pts)
1 Δ2 1 t (Δ) 2 F 1 t	2.876 ms (Δ) -1.09 dB 359.0 μs -8.87 dBm	
3 4 5		
6 7		
8		
8 9 10 11		× >



RL RF 5 Center Freq 2.441		Telev Mid		Гуре: RMS	05:26:50 PM Oct TRACE TYPE W	23456
	F	NO: Fast Trig: Vid Gain:Low #Atten: 3			DET P	NNNN
Ref Offset					ΔMkr1 370	.0 μs 0 dB
0 dB/div Ref 20.0	l0 dBm				0.0	<u>о u в</u>
10.0 ].00 <b>1∆2</b>						
10.0 <b>- X</b>						TRIG LVL
20.0						
10.0				يدر الله		
50.0 <mark>Adapta yang dan kalendar</mark>	ultistic datast	atest fingentilles about out	house the state of	Turing and the second	alan Alan ang kang bana sa pang kang bana sa pang b	Hitterson o
so.o <mark>nativr – hader and hader a</mark>	and the second	and the second	<mark>n har an </mark>	<mark>, physical physical sectors and the sector sectors and the sector sectors and the sector sectors and the sector</mark>		<mark>akiaji sa</mark> i
70.0						
enter 2.44100000 es BW 1.0 MHz	0 GHz	#VBW 3.0 MH	7	Sween	Spar 10.00 ms (1000	n 0 Hz )1 nts)
IKR MODE TRC SCL	×		NCTION FUNCTION WIDTH		NCTION VALUE	A [3.57
1 Δ2 1 t (Δ) 2 F 1 t	370.0 µs 360.0 µs	(Δ) 0.60 dB -7.13 dBm				
3						
5 6 7						
8						
0						
I.						
G	Durall					
gilent Spectrum Analyzer -		NVNT 3-DH3 2		Bursi		
RL RF S enter Freg 2.441	50Ω AC	SENSE:INT	ALIGN AUTO	Гуре: RMS	05:32:10 PM Oct TRACE	10,2022
enter Freq 2.44	F	NO: Fast Trig: Vid Gain:Low #Atten: 3	≥0		TYPE W	NNNN
Ref Offset					ΔMkr1 1.63	
0 dB/div Ref 20.0					1.6	4 dB
10.0						
	<u>u-period</u> 1∆2					TRIG LVL
10.0 <b>X2¹¹4/m¹ 1⁴4/m</b>	h handar an					
30.0						
40.0		प्राथमार्थ्य प्रायम् १ मार्ग्स् व मार्ग्स् व मार्ग्स् व	- Mindal Protection (and	<mark>ilþ.</mark> er		
+0.0	t as the statistical as	and a set of a set o			n ha shi ku s Ku ji mu shi ku shi k	n fatin kaja Kaja na se
50.0		Li la				
50.0 (1773) 50.0 <mark>(1773)</mark>						
50.0 (mm) 60.0 (h el)					0	
50.0 (771) 50.0 (171) 70.0 (171) Senter 2.44100000	0 GHz	#VBW 3.0 MH	z	Sweep	Spar 10.00 ms (1000	n 0 Hz )1 pts)
80.0 1770 80.0 1411 Senter 2.44100000 Ses BW 1.0 MHz KRI MODE   TRC  SCL	X	Y FL	Z		Spar 10.00 ms (1000 NCTION VALUE	n 0 Hz )1 pts) ^
300         1770           300         141           301         141           302         141           303         141           304         141           305         141           306         141           307         141           308         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141           309         141		Y FL			10.00 ms (1000	n 0 Hz )1 pts)
300         190           300         141           300         141           300         141           300         141           300         141           300         141           300         141           4         141	× 1.630 ms	Y FL			10.00 ms (1000	n 0 Hz )1 pts)
00         111           00         111           00         111           00         111           00         111           00         111           01         111           02         111           02         1           02         1           03         1           04         1           05         1	× 1.630 ms	Y FL			10.00 ms (1000	n 0 Hz )1 pts)
5000         1720           5000         141           5000         141           5000         141           5000         141           5000         141           5000         141           141         141           1500         141           1600         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700         1500           1700	× 1.630 ms	Y FL			10.00 ms (1000	n 0 Hz 01 pts)
0.0     171       0.0     1.1       1.1     1.1       1.1     1.0       1.2     1.1       1.2     1.1       1.3     1.1       3.4     1.4       4     1.4       5     1.4       6     1.4	× 1.630 ms	Y FL			10.00 ms (1000	n 0 Hz )1 pts)



Dwe	II NVNT 3-DH	15 2441MI	Hz One Bu	urst	
Agilent Spectrum Analyzer - Swept SA	PNO: Fast +++ Trig	л j Delay-500.0 µs j: Video en: 30 dB	ALIGNAUTO #Avg Type:	RMS	05:32:58PM Oct 10, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P.N.N.N.N
Ref Offset 2.01 dB           10 dB/div         Ref 20.00 dBm           10 0					ΔMkr1 2.879 ms 0.38 dB
-10.0 -20.0 -30.0 -40.0 -60.0		silyan ing saya saying ing ing ing ing ing ing ing ing ing		ne el terre den se de per jus de la del Les es casa den de a de check	THEO LVL
700 Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0			Sweep	Span 0 Hz 10.00 ms (10001 pts)
MKR         MODE         TRC         SCL         X           1         Δ2         1         t         (Δ)         2.879 m           2         F         1         t         358.0 μ           3         -         -         358.0 μ           4         -         -         -           5         -         -         -           6         -         -         -           7         -         -         -           8         -         -         -           9         -         -         -           10         -         -         -           11         -         -         -		FUNCTION FL		FU	CTION VALUE
MSG			<b>I</b> STATUS		<b>&gt;</b>



### 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

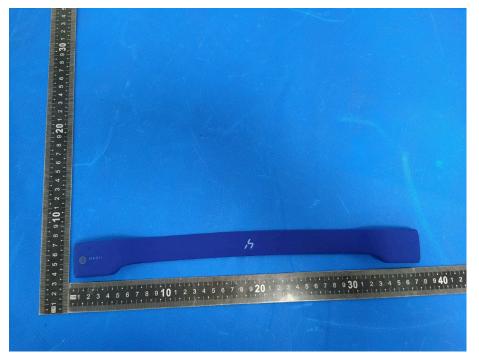
The EUT antenna is Chip antenna, The antenna gain is 1.98 dBi, fulfill the requirement of this section.

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# 16. EUT Photographs

# EUT Photo 1



EUT Photo 2



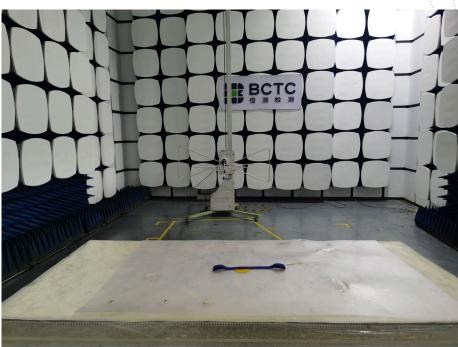


# 17. EUT Test Setup Photographs

# **Conducted Measurement Photo**



**Radiated Measurement Photos** 



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f 82

No.: BCTC/RF-EMC-005



# 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 test report without CMA mark is only used for scientific research, teaching, enterprise product development and internal quality control purposes.

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

9. 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

E-Mail: bctc@bctc-lab.com.cn

### ******** END *******