

# **TEST REPORT**

Report No.:	BCTC2401807783-1E				
Applicant:	SHENZHEN NST INDUSTRY AND TRADE CO.,LTD				
Product Name:	15.6 inch laptop				
Test Model:	M15-N				
Tested Date:	2024-01-16 to 2024-02-01				
Issued Date:	2024-02-02				
She	nzhen BCTC Testing Co., Ltd.				
No.: BCTC/RF-EMC-005	Page: 1 of 79				



# FCC ID: 2AAMS-M15NPRO

Product Name:	15.6 inch laptop
Trademark:	N/A
Model/Type Reference:	M15-N M15PRO-N, M156FH
Prepared For:	SHENZHEN NST INDUSTRY AND TRADE CO.,LTD
Address:	3-4/F, Bldg 1, Hongbang Intelligent Technology Park, No.30 Cuibao Road, Baolong Street, Longgang District, Shenzhen
Manufacturer:	SHENZHEN NST INDUSTRY AND TRADE CO.,LTD
Address:	3-4/F, Bldg 1, Hongbang Intelligent Technology Park, No.30 Cuibao Road, Baolong Street, Longgang District, 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:	2024-01-16
Sample tested Date:	2024-01-16 to 2024-02-01
Issue Date:	2024-02-02
Report No.:	BCTC2401807783-1E
Test Standards	FCC Part15.247 ANSI C63.10-2013
Test Results	PASS
Remark:	This is Bluetooth Classic radio test report.

Tested by:

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.

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(Note: N/A Means Not Applicable)

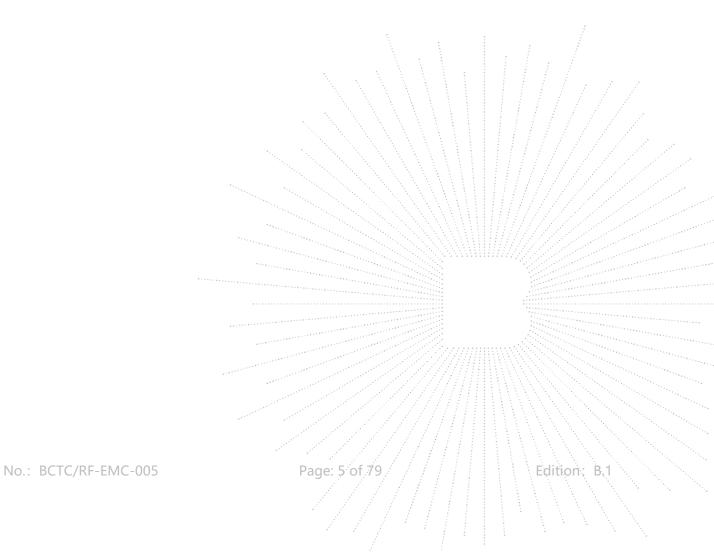
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# 1. Version

Report No.	Issue Date	Description	Approved
BCTC2401807783-1E	2024-02-02	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

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# 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

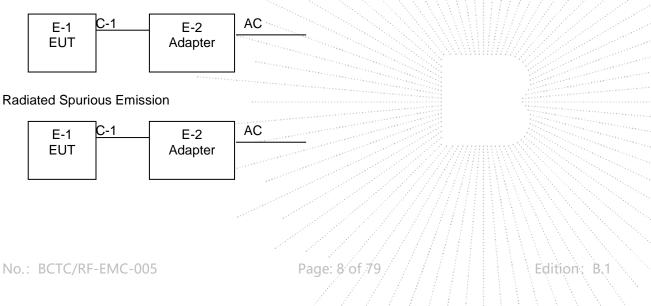
#### 4.1 Product Information

Model/Type reference:	M15-N M15PRO-N, M156FH
Model differences:	All the model are the same circuit and RF module, except model names and appearance of the color.
Bluetooth Version:	5.0
Hardware Version:	X133GRX100
Software Version:	windows11 HOME
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK, π/ 4 DQPSK, 8DPSK
Number Of Channel	79CH
Antenna installation:	Internal antenna
Antenna Gain:	<ul> <li>2.26 dBi</li> <li>Remark:</li> <li>☑ 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.</li> <li>☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.</li> </ul>
Ratings:	DC 12V from adapter/DC 7.6V from battery
Adapter Information:	MODEL: JZB024-1202000UX INPUT: 100-240V~50/60Hz 1.0A OUTPUT: DC 12.0V 2.0A 24.0W

# 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:





# 4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	15.6 inch laptop	N/A	M15-N	N/A	EUT
E-2	Adapter	N/A	JZB024-120200 0UX	N/A	Auxiliary

ltem	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	3M	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

		_	
5.2	Test	Instrument	Used

Conducted Emissions Test						
Equipment	quipment Manufacturer Model# Serial# Last Cal. Next C					
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024	
LISN	R&S	ENV216	101375	May 15, 2023	May 14, 2024	
Software	Frad	EZ-EMC	EMC-CON 3A1	١	\	
Pulse limiter	Schwarzbeck	VTSD9561-F	01323	Sept. 22, 2023	Sept. 21, 2024	

RF Conducted Test						
Equipment	Last Cal.	Next Cal.				
Power meter	Keysight	E4419	۱. I	May 15, 2023	May 14, 2024	
Power Sensor (AV)	Keysight	E9300A		May 15, 2023	May 14, 2024	
Signal Analyzer20kH z-26.5GHz	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024	
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024	
Radio frequency control box	MAIWEI	MW100-RFC B			X	
Software	MAIWEI	MTS 8310		l l		



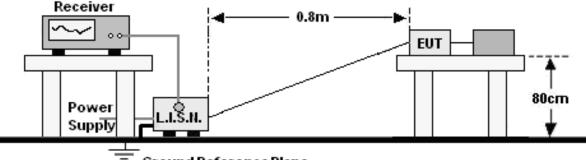
Radiated Emissions Test (966 Chamber01)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 29, 2023	May 28, 2024
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 31, 2023	May 30, 2024
Amplifier	SKET	LAPA_01G18 G-45dB	SK202104090 1	May 15, 2023	May 14, 2024
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 31, 2023	May 30, 2024
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35- HG	2034381	May 15, 2023	May 14, 2024
Horn Antenna(18G Hz-40GHz)	Schwarzbeck	BBHA9170	00822	May 31, 2023	May 30, 2024
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	FA-03A2 RE	١	١

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#### 6. Conducted Emissions

#### 6.1 Block Diagram Of Test Setup



Ground Reference Plane

#### 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

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.

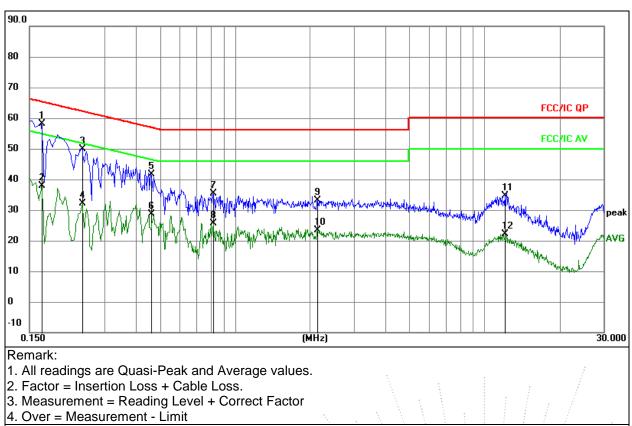
#### 6.4 EUT operating Conditions

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

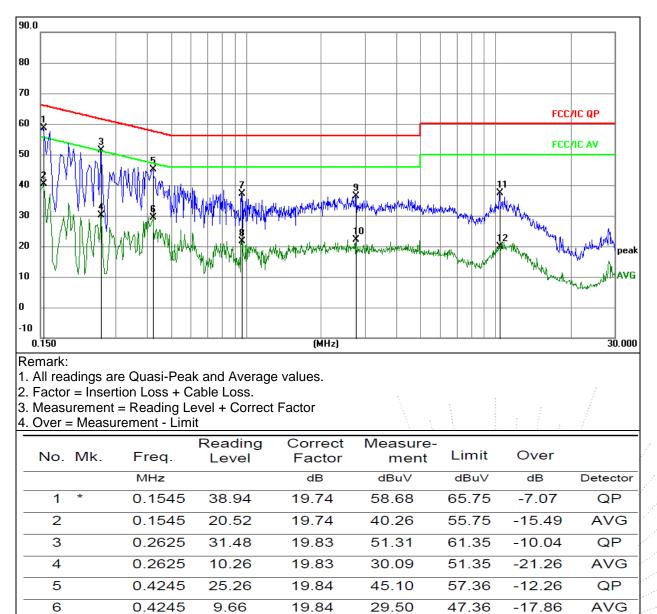
Temperature:	<b>26</b> ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 1	Test Voltage :	AC120V/60Hz



4. 0001		ement - Lin	IIL	5		1 1 1		
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1	*	0.1677	38.48	19.77	58.25	65.07	-6.82	QP
2		0.1677	18.07	19.77	37.84	55.07	-17.23	AVG
3		0.2442	30.09	19.83	49.92	61.95	-12.03	QP
4		0.2442	12.23	19.83	32.06	51.95	-19.89	AVG
5		0.4588	21.83	19.84	41.67	56.71	-15.04	QP
6		0.4588	8.86	19.84	28.70	46.71	-18.01	AVG
7		0.8174	15.57	19.88	35.45	56.00	-20.55	QP
8		0.8174	5.74	19.88	25.62	46.00	-20.38	AVG
9		2.1439	13.09	20.00	33.09	56.00	-22.91	QP
10		2.1439	3.40	20.00	23.40	46.00	-22.60	AVG
11		12.0599	14.80	19.88	34.68	60.00	-25.32	QP
12		12.0599	2.18	19.88	22.06	50.00	-27.94	AVG



Temperature:	<b>26</b> ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Ν
Test Mode:	Mode 1	Test Voltage :	AC120V/60Hz



7

8

9

10

11

12

0.9600

0.9600

2.7645

2.7645

10.3965

10.3965

17.29

1.65

16.09

1.89

17.62

0.07

19.94

19.94

20.22

20.22

19.88

19.88

37.23

21.59

36.31

22.11

37.50

19.95

56.00

46.00

56.00

46.00

60.00

50.00

-18.77

-24.41

-19.69

-23.89

-22.50

-30.05

Edition: B.1

QP

AVG

QP

AVG

QP

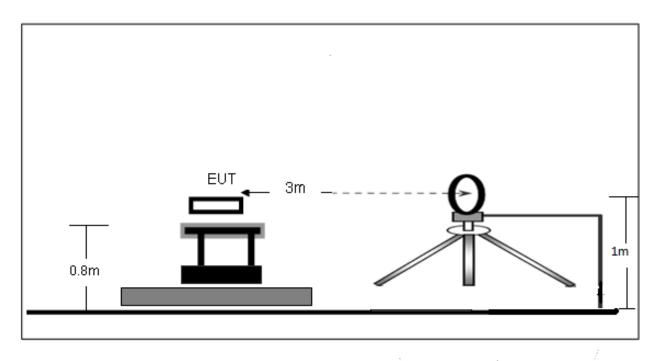
AVG



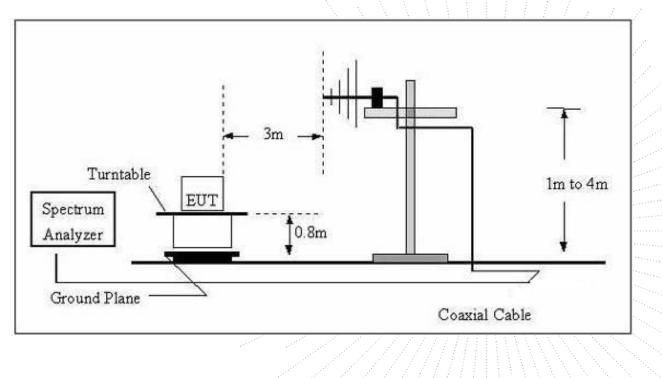
#### 7. Radiated emissions

# 7.1 Block Diagram Of Test Setup

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

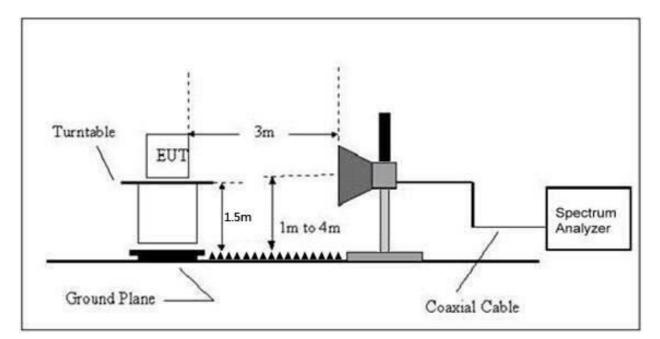


#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz





#### (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 <sup>(2400/F(kHz))</sup> + 80	
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40	
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40	
30 ~ 88	100	3	100	20log <sup>(100)</sup>	
88 ~ 216	150	3	150	20log <sup>(150)</sup>	
216 ~ 960	200	3	200	20log <sup>(200)</sup>	
Above 960	500	3	500	20log <sup>(500)</sup>	

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, 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:	<b>26</b> ℃	· · · · · ·	Relative Humidity:	54%
Pressure:	101KPa		Test Voltage :	AC120V/60Hz
Test Mode:	Mode 2		Polarization :	NH 1777772
				NA 111777777777

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

Note:

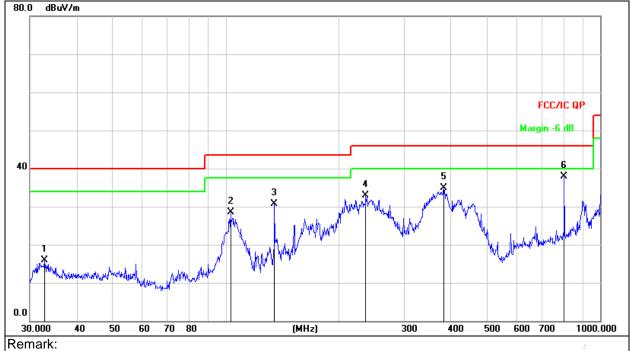
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

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



Temperature:	<b>26</b> ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 1	Test Voltage :	AC120V/60Hz

Between	30MHz -	1GHz
DOLWOOT		

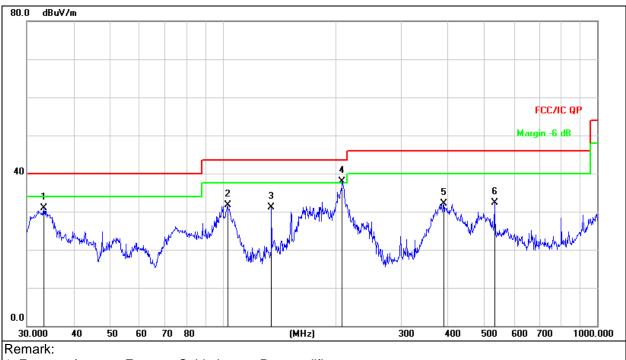


Factor = Antenna Factor + Cable Loss – Pre-amplifier.
 Measurement = Reading Level + Correct Factor
 Over = Measurement - Limit

No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		32.8637	31.97	-16.10	15.87	40.00	-24.13	QP
2		103.0800	44.70	-16.15	28.55	43.50	-14.95	QP
3		135.0319	49.07	-18.38	30.69	43.50	-12.81	QP
4		236.6447	47.56	-14.67	32.89	46.00	-13.11	QP
5		382.5879	46.02	-11.06	34.96	46.00	-11.04	QP
6	*	801.7863	42.22	-4.38	37.84	46.00	-8.16	QP



Temperature:	<b>26</b> ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 1	Test Voltage :	AC120V/60Hz



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

2. Measurement = Reading Level + Correct Factor

3.	Over	= M	leasurement -	- Li	imit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		33.3279	46.82	-16.01	30.81	40.00	-9.19	QP
2	1	03.0800	47.80	-16.15	31.65	43.50	-11.85	QP
3	1	35.0319	49.52	-18.38	31.14	43.50	-12.36	QP
4	* 2	08.5803	53.40	-15.47	37.93	43.50	-5.57	QP
5	3	89.3549	43.01	-10.98	32.03	46.00	-13.97	QP
6	5	31.9635	42.08	-9.74	32.34	46.00	-13.66	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	73.36	-19.99	53.37	74.00	-20.63	PK	
V	4804.00	63.44	-19.99	43.45	54.00	-10.55	AV	
V	7206.00	63.70	-14.22	49.48	74.00	-24.52	PK	
V	7206.00	53.87	-14.22	39.65	54.00	-14.35	AV	
Н	4804.00	70.22	-19.99	50.23	74.00	-23.77	PK	
Н	4804.00	60.60	-19.99	40.61	54.00	-13.39	AV	
Н	7206.00	62.53	-14.22	48.31	74.00	-25.69	PK	
Н	7206.00	55.22	-14.22	41.00	54.00	-13.00	AV	
			GFSK Mid	dle channel				
V	4882.00	69.59	-19.84	49.75	74.00	-24.25	PK	
V	4882.00	62.99	-19.84	43.15	54.00	-10.85	AV	
V	7323.00	59.52	-13.90	45.62	74.00	-28.38	PK	
V	7323.00	49.74	-13.90	35.84	54.00	-18.16	AV	
Н	4882.00	67.07	-19.84	47.23	74.00	-26.77	PK	
Н	4882.00	56.75	-19.84	36.91	54.00	-17.09	AV	
Н	7323.00	57.45	-13.90	43.55	74.00	-30.45	PK	
Н	7323.00	49.29	-13.90	35.39	54.00	-18.61	AV	
			GFSK Hig	h channel				
V	4960.00	70.64	-19.68	50.96	74.00	-23.04	PK	
V	4960.00	60.78	-19.68	41.10	54.00	-12.90	AV	
V	7440.00	61.67	-13.57	48.10	74.00	-25.90	PK	
V	7440.00	51.01	-13.57	37.44	54.00	-16.56	AV	
Н	4960.00	69.60	-19.68	49.92	74.00	-24.08	PK	
Н	4960.00	59.76	-19.68	40.08	54.00	-13.92	AV	
Н	7440.00	60.34	-13.57	46.77	74.00	-27.23	PK	
Н	7440.00	52.76	-13.57	39.19	54.00	-14.81	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.

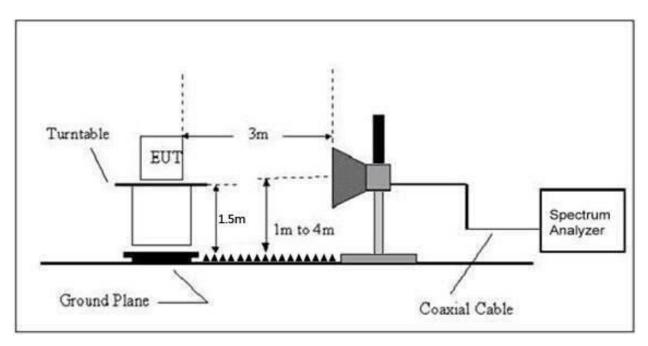
5.All the Modulation are test, the worst mode is GFSK, the data recording in the report.



#### 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
<sup>1</sup> 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	( <sup>2</sup> )
13.36-13.41			



#### Limits Of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit (dBu\	//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

	Polar (H/V)	Fre- quency	Reading Level	Correct Factor	Measure- ment (dBuV/m)	Lin (dBu		Result
	(,.)	(MHz)	(dBuV/m)	(dB)	PK	PK	AV	
		•	l	ow Channe	el 2402MHz			
	Н	2390.00	71.33	-25.43	45.90	74.00	54.00	PASS
	Н	2400.00	75.53	-25.40	50.13	74.00	54.00	PASS
	V	2390.00	70.81	-25.43	45.38	74.00	54.00	PASS
GFSK	V	2400.00	75.10	-25.40	49.70	74.00	54.00	PASS
GF3N			ŀ	ligh Channe	el 2480MHz			
	Н	2483.50	74.81	-25.15	49.66	74.00	54.00	PASS
	Н	2500.00	69.04	-25.10	43.94	74.00	54.00	PASS
	V	2483.50	75.31	-25.15	50.16	74.00	54.00	PASS
	V	2500.00	70.63	-25.10	45.53	74.00	54.00	PASS
			l	_ow Channe	el 2402MHz			
	Н	2390.00	71.72	-25.43	46.29	74.00	54.00	PASS
	Н	2400.00	76.54	-25.40	51.14	74.00	54.00	PASS
	V	2390.00	71.72	-25.43	46.29	74.00	54.00	PASS
π	V	2400.00	76.33	-25.40	50.93	74.00	54.00	PASS
/4DQPSK			ŀ	ligh Channe	el 2480MHz			
	Н	2483.50	74.65	-25.15	49.50	74.00	54.00	PASS
	Н	2500.00	68.99	-25.10	43.89	74.00	54.00	PASS
	V	2483.50	75.44	-25.15	50.29	74.00	54.00	PASS
	V	2500.00	72.42	-25.10	47,32	74.00	54.00	PASS
		•	l	_ow Channe	el 2402MHz			
	Н	2390.00	71.68	-25.43	46.25	74.00	54.00	PASS
	Н	2400.00	74.97	-25.40	49.57	74.00	54.00	PASS
	V	2390.00	71.21	-25.43	45.78	74.00	54.00	PASS
8DPSK	V	2400.00	75.37	-25.40	49.97	74.00	54.00	PASS
ODPSK				ligh Channe	el 2480MHz			
	Н	2483.50	74.71	-25.15	49.56	74.00	54.00	PASS
	Н	2500.00	71.02	-25.10	45.92	74.00	54.00	PASS
	V	2483.50	74.36	-25.15	49.21	74.00	54.00	PASS
	V	2500.00	69.42	-25.10	44.32	74.00	54.00	PASS

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

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



#### 9.4 Test Result



No.: BCTC/RF-EMC-005











lent Spectrum Analyzer - Swe RL RF 50 Ω	ept SA	Spurious N'		ALIGNAUTO		12:36:14 PM Jan 31, 20
enter Freq 2.40200	10000 GHz	NO:Wide 🛶 Tri	ig: Free Run tten: 20 dB	#Avg Type Avg Hold:		12:36:14 PM Jan 31, 20 TRACE 12:3:4 TYPE MWWW DET P.N.N.N
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lent Spectrum Analyzer - Swe	ept SA	ous NVNT 2	2-DH1 24	02MHz E	mission	12:36:45 PM Jan 31, 20
l <mark>ent Spectrum Analyzer - Swe</mark> RL RF 50 Ω	ept SA AC       1000000 GHz	DUS NVNT 2	2-DH1 24			12:36:45 PM Jan 31, 20 TRACE 11 2 3 4
lent Spectrum Analyzer - Swe RL RF 50 Ω enter Freq 13.2650 Ref Offset 2.1 dB/div Ref 12.14 c	ept SA AC 1000000 GHz IF 14 dB	DUS NVNT 2 SENSE: PNO: Fast + Tri	2-DH1 24	02MHz E	mission RMS 10/10	12:36:45 PM Jan 31, 22 TRACE 22 3 4 TYPE MWWW DET P NNN AKr1 2.401 7 GH
Ient Spectrum Analyzer - Swe RL RF 50 2 enter Freq 13.2650 Ref Offset 2.1 dB/div Ref 12.14 c 9	ept SA AC 1000000 GHz IF 14 dB	DUS NVNT 2 SENSE: PNO: Fast + Tri	2-DH1 24	02MHz E	mission RMS 10/10	12:36:45 PM Jan 31, 22 TRACE 22 3 4 TYPE MWWW DET P NNN AKr1 2.401 7 GH
Ient Spectrum Analyzer - Swe RL RF 50 Ω enter Freq 13.2650 Ref Offset 2.1 dB/div Ref 12.14 c	ept SA AC 1000000 GHz IF 14 dB	DUS NVNT 2 SENSE: PNO: Fast + Tri	2-DH1 24	02MHz E	mission RMS 10/10	12:36:45 PM Jan 31, 20 TRACE 2 3 4 TYPE MWWW DET PNIN Akr1 2.401 7 GH -0.774 dB
lent Spectrum Analyzer - Swe RL RF 50 Ω enter Freq 13.2650 Ref Offset 2.1 dB/div Ref 12.14 c 9 9 9	ept SA AC 1000000 GHz IF 14 dB	DUS NVNT 2 SENSE: PNO: Fast + Tri	2-DH1 24	02MHz E	mission RMS 10/10	12:36:45 PM Jan 31, 20 TRACE 2 3 4 TYPE DET PNINA Akr1 2.401 7 GH -0.774 dB
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lent Spectrum Analyzer - Swe RL RF 50 Ω enter Freq 13.2650 Ref Offset 2.1 dB/div Ref 12.14 c 9 9 9 9 9 9 9	ept SA AC 1000000 GHz IF 14 dB	DUS NVNT 2 SENSE: PNO: Fast → Tri Gain:Low	2-DH1 24	02MHz E	mission RMS 10/10	12:36:45 PM Jan 31, 20 TRACE 2 3 4 TYPE MWWW DET PNIN Akr1 2.401 7 GH -0.774 dB
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Ient Spectrum Analyzer - Swe         Ref Offset 2.1         Ref Offset 2.1         Ref Offset 2.1	AC	PNO: Fast +- Tr Gain:Low TA	2-DH1 24	02MHz E	ERMS 10/10	12:36:45 PM Jan 31, 20 TRACE 12 3 - 4 TYPE 12 3 - 4 TYPE 12 - 401 7 GH -0.774 dB 
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Edition: B.1



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Ient Spectrum An RL Ref aB/div Ref dB/div Ref 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7	alyzer - Swept SA 50 Q. AC 13.265000000 GHz TOffset 2.14 dB f 12.14 dBm 1 4 4 4 4 4 4 4 4 4 4 4 4 4	SENSE:INT PNO: Fast → Trig: Fi FGain:Low #Atten:	DH1 2480N	MHZ Emissi	001 12:41:02 PM Jan 31, 20 TRACE 2 3 4 TYPE WWWW DET PNNN Mkr1 2.480 2 GH -0.571 dB
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Edition: B.1







ilent Spectrum Analyzer - Swe	ept SA	Spurious N					
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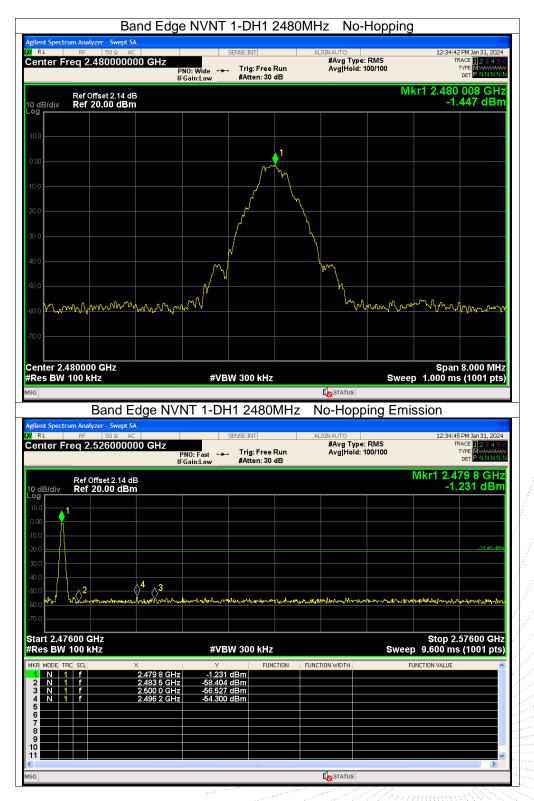
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l <mark>ent Spectrum Analyzer - Swep</mark> RL RF 50 Ω	pt SA AC 000000 GHz PI	SENSE:I	-DH1 24	ALIGNAUTO	Emission 	12:46:00 PM Jan 31, TRACE 1 2 3 TYPE MWN DET P NN
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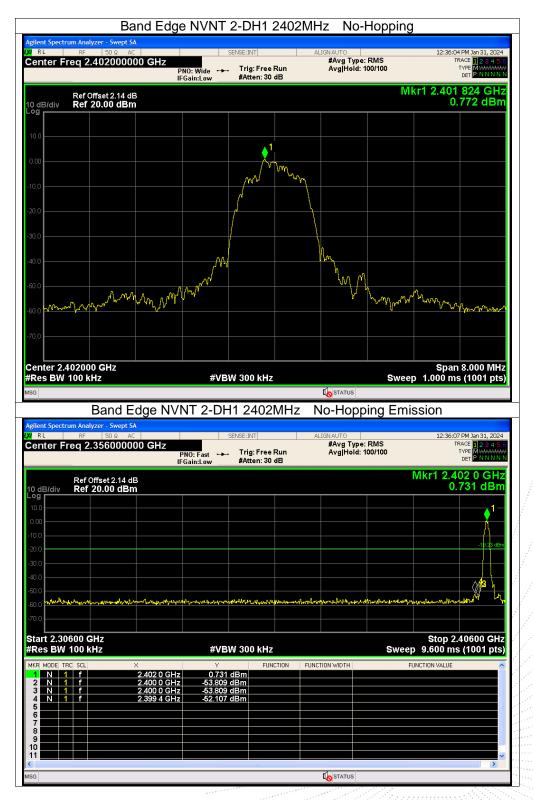
<mark>ilent Spectrum Analyzer - Swe</mark> RL RF 50 Ω	AC	NVNT 1-DH1	ALIGNAU	то	12:28:2	3 PM Jan 31, 202
enter Freq 2.40200	PNO:	Wide 🛶 Trig: Fre in:Low #Atten: 3	e Run Avg	/g Type: RMS g Hold: 100/100		RACE 12345 TYPE MWAAAA DET PNNNN
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Res BW 100 kHz           Banc           Banc           Itent Spectrum Analyzer - Sweet           Rt         RF           Sometric Freq 2.35600           BB/div         Ref Offset 2.1           Ref 20.00 c           Ref 20.00 c           Ref 20.00 c	AC OUT OF CONTRACT	T 1-DH1 240. SENSE:INT : Fast → Trig: Fre	2MHz No-H	ATUS Hopping En TO 'g Type: RMS g Hold: 100/100	nission 12:28:2 Mkr1 2.4 -1.	6 PM Jan 31, 202 RACE   2 3 4 5 DET P NNNN 02 0 GH 025 dBr
Res BW 100 kHz Banc Banc Ient Spectrum Analyzer - Swa Ref Offset 2.1 GB/div Ref 20.00 c Ref 0ffset 2.1 GB/div Ref 20.00 c C C C C C C C C C C C C C	AC   PNO AC   PNO IFGai	T 1-DH1 240: SENSE:INT : Fast → Trig: Fre #Atten: S	2MHz No-F	ATUS Hopping En TO TO TO TO TO TO TO TO TO TO TO TO TO	eep 1.000 m nission الالاتا 2:28:2 Mkr1 2.4 -1.	6 PM Jan 31, 202 RACE   2 3 4 5 DET   2 3 4 5 DE
Res BW 100 kHz           Banc           Banc           Itent Spectrum Analyzer - Swick           RL         RF           Some           Banc           Ref Offset 2.1           Ref 20.00 c	AC   PNO BOOOD GHz PNO IFGai A dB IBm IBm	T1-DH1 240	e Run o dB	ATUS Hopping En rg Type: RMS ghteid: 100/100	nission 12:28:2 Mkr1 2.4 -1. Stop 2. stop 2. ep 9.600 ms	6 PM Jan 31, 202 RACE   2 3 4 5 DET   2 3 4 5 DE
Res BW 100 kHz           Banc           Banc           Ient Spectrum Analyzer - Swa           Ref Offset 2.1           Ref Offset 2.1           Ref 20.00 c	AC OUDOO GHZ PNO IFGai	T 1-DH1 240	e Run o dB	ATUS Hopping En rg Type: RMS ghteid: 100/100	eep 1.000 m nission الالاتا 2:28:2 Mkr1 2.4 -1.	6 PM Jan 31, 202 RACE   2 3 4 5 DET   2 3 4 5 DE
Res BW 100 kHz           Banc           Banc           Itent Spectrum Analyzer - Swe           RL         RF           Some           Enter Freq 2.35600           Bl/div           Ref Offset 2.1           Ref Offset 2.1           Bl/div           Ref Offset 2.1           Ref Offset 2.1           Bl/div           Ref Offset 2.1           Ref Offset	AC   PNO BOOOD GHz PNO IFGai A dB IBm IBm	T 1-DH1 240: SENSE:INT : Fast → Trig: Fre #Atten: 3	e Run o dB	ATUS Hopping En rg Type: RMS ghteid: 100/100	nission 12:28:2 Mkr1 2.4 -1. Stop 2. stop 2. ep 9.600 ms	6 PM Jan 31, 202 RACE   2 3 4 5 DET   2 3 4 5 DE
Res BW 100 kHz         Banc         Banc         Ilent Spectrum Analyzer - Swe         RE       RF         Some         Conter Freq 2.35600         Ref Offset2.1	AC OUDOO GHZ PNO IFGai	T 1-DH1 240: SENSE:INT : Fast → Trig: Fre #Atten: 3 #VBW 300 kH Y Fl -1.025 dBm -57.969 dBm	e Run o dB	ATUS Hopping En rg Type: RMS ghteid: 100/100	nission 12:28:2 Mkr1 2.4 -1. Stop 2. stop 2. ep 9.600 ms	6 PM Jan 31, 202 RACE   2 3 4 5 DET   2 3 4 5 DE

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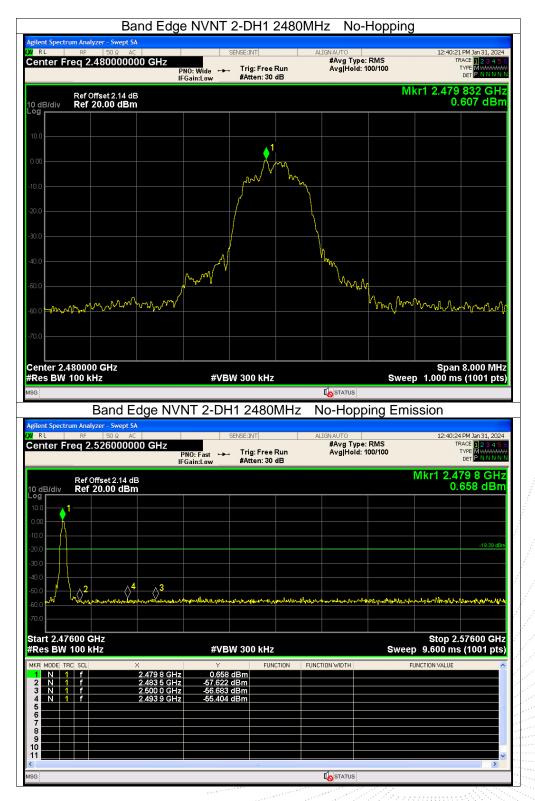




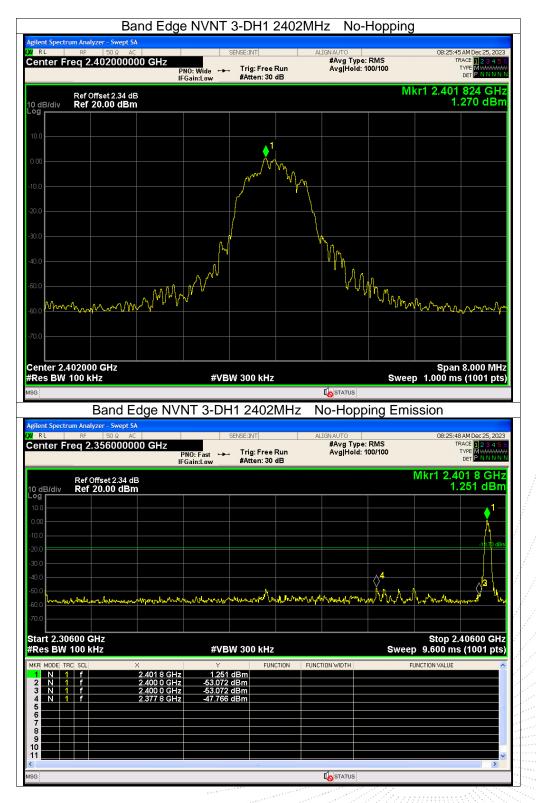








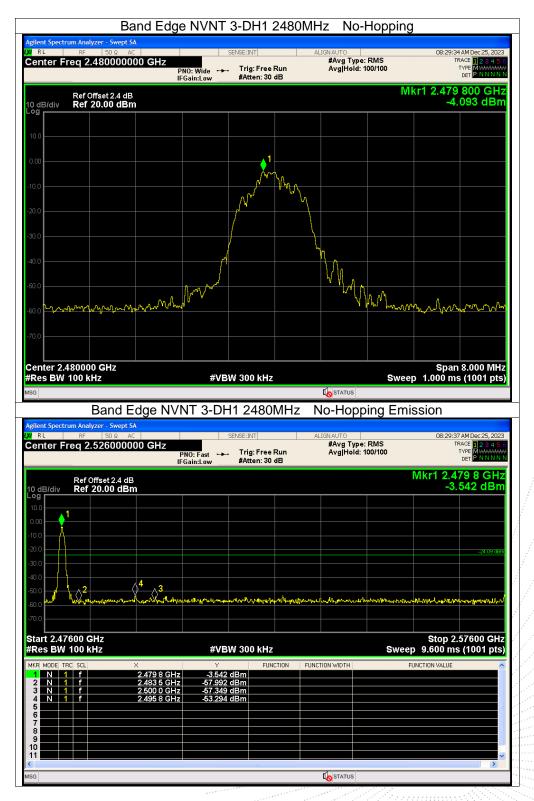




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Bar	nd Edge(Ho	Te N (paina)	st Graphs	2402MH	7 Hoppi	na	
ilent Spectrum Analyzer - Swe							
RL RF 50 Ω	AC	SENSI	E:INT	ALIGNAUTO		12:52:50 PM Jan 31, 202	
enter Freq 2.40200		0:Wide ↔ T	rig: Free Run	#Avg Type: Avg Hold: 2	RMS 000/2000	TRACE 12345 TYPE MWWWW DET PNNNN	
			Atten: 30 dB				
Ref Offset 2.1	4 dB				Mk	r1 2.403 832 GH	
dB/div Ref 20.00 d	Bm					-0.696 dBr	
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enter 2.402000 GHz						Span 8.000 MH	
Res BW 100 kHz		#VBW 3	00 kHz		Sween	1.000 ms (1001 pts	
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Band Ec ilent Spectrum Analyzer - Swe RL RF 50 Ω	pt SA AC OOOO GHz Ph	SENSI	1-DH1 240	2MHz Ho Alignauto #Avg Type:	Dpping El	Tission 12:53:23 PM Jan 31, 202 TRACE 2 3 4 S TYPE M TYPE M Cet P N1111	
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Band Ec           RL         RF         50 20           RL         RF         50 20           enter Freq 2.35600         Ref Offset 2.1           0 dB/div         Ref 20.00 d           0 dB/div         Ref 20.00 d           0 0		VO: Fast → T Sain:Low / #	1-DH1 240	2MHz Ho ALIGNAUTO #AvgType: AvgHold: 2	Sweep	mission 12:53:23PM Jan 31, 202 TRACE    2:3 4:5 Type Pure Pure Pure Pure Pure Pure Pure Pure	
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Band Ec           Ref Offset 2.1           Colspan="2">Ref Offset 2.1           Colspan="2">Ref Offset 2.1           Colspan="2">Colspan="2">Colspan="2">Ref Offset 2.1           Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"Colspa="2"Colspa="2"Colspan="2"Colspan="2"Colspan="2"Colspan="2"Colsp	pt SA AC AC AC AC AC AC AC AC AC A	10: Fast → T ain:Low # #VBW 3 #VBW 3 	1-DH1 240	2MHz Ho ALIGNAUTO #AvgType: AvgHold: 2	Sweep	mission 12:53:23PM Jan 31, 202 TRACE    2:3 4:5 Type Pure Pure Pure Pure Pure Pure Pure Pure	
Band Ec           RL         RF         SQ           RL         RF         SQ           enter Freq 2.35600         SQ           odB/div         Ref Offset 2.1           odB/div         Ref 20.00 d           od         SQ           odB/div         Ref 20.00 d           od         SQ           odB/div         Ref 20.00 d           od         SQ           odB/div         SQ           odB/div         SQ           odB/div         Ref 20.00 d           odB/div         SQ	pt SA AC AC AC AC AC AC AC AC AC A	10: Fast → T ain:Low # #VBW 3 #VBW 3 	1-DH1 240	2MHz Ho ALIGNAUTO #AvgType: AvgHold: 2	Sweep	mission 12:53:23PM Jan 31, 202 TRACE    2:3 4:5 Type Pure Pure Pure Pure Pure Pure Pure Pure	
Band Ec           RL         See           Ref Offset 2.1           Colspan="2">Colspan="2"	AC         Philoson           AC         Philoson           AC         Philoson           AC         Philoson           4 dB         Bm           Bm         Philoson           AC         Philoson	10: Fast → T ain:Low # #VBW 3 #VBW 3 	1-DH1 240	2MHz Ho ALIGNAUTO #AvgType: AvgHold: 2	Sweep	mission 12:53:23PM Jan 31, 202 TRACE    2:3 4:5 Type Pure Pure Pure Pure Pure Pure Pure Pure	









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

## 10.4 Test Result

Temperature:	<b>26</b> ℃	Relative Humidity:	5	4%				1		67	1	2	, i
Test Voltage:	DC 12V	Remark:	Ν	I/A		1	/.	Ĺ,	έ.,	ĺ.,			
						1.		1	1	1	1		Ξ.

Condition	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.931	Pass
NVNT	1-DH1	2441	0.919	Pass
NVNT	1-DH1	2480	0.928	Pass
NVNT	2-DH1	2402	1.214	Pass
NVNT	2-DH1	2441	1.233	Pass
NVNT	2-DH1	2480	1.188	Pass
NVNT	3-DH1	2402	1.199	Pass
NVNT	3-DH1	2441	1.197	Pass
NVNT	3-DH1	2480	1.209	Pass





















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### 11. Maximum Peak Output Power

### 11.1 Block Diagram Of Test Setup

EUT	SPECTRUM
	ANALYZER

#### 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.

#### 11.4 Test Result

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	-0.61	21	Pass
NVNT	1-DH1	2441	-0.63	21	Pass
NVNT	1-DH1	2480	-0.94	21	Pass
NVNT	2-DH1	2402	0.93	21	Pass
NVNT	2-DH1	2441	0.97	21	Pass
NVNT	2-DH1	2480	0.8	21	Pass
NVNT	3-DH1	2402	2.18	21	Pass
NVNT	3-DH1	2441	2.26	21	Pass
NVNT	3-DH1		2.19	21	Pass

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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.

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2401.818	2402.818	1	0.621	Pass
NVNT	1-DH1	2440.816	2441.816	1	0.613	Pass
NVNT	1-DH1	2478.814	2479.814	1	0.619	Pass
NVNT	2-DH1	2401.818	2402.816	0.998	0.809	Pass
NVNT	2-DH1	2440.816	2441.816	1	0.822	Pass
NVNT	2-DH1	2478.816	2479.816	1	0.792	Pass
NVNT	3-DH1	2401.816	2402.814	0.998	0.799	Pass
NVNT	3-DH1	2440.814	2441.814	1	0.798	Pass
NVNT	3-DH1	2478.814	2479.818	1.004	0.806	Pass

#### 12.4 Test Result



ilent Spectrum Analyzer - RL RF 5 enter Freq 2.402	ο Ω AC 2500000 GHz PNO:	SENSE:INT		: RMS	12:28:18 PM Jan 31, 2024 TRACE 123456 TYPE MWWWW DET PNNNNN
Ref Offset	t 2.14 dB	in:Low #Atten: 30	dB	Mkr1 2.	401 818 GHz
0 dB/div Ref 20.0					-2.433 dBm
.00	1				
			$\sim$		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
0.0					
0.0					
					No 0.000 BALL-
enter 2.402500 GI Res BW 30 kHz	HZ	#VBW 100 kHz		Sweep 2.13	Span 2.000 MHz 3 ms (1001 pts)
(R MODE TRC SCL 1 N 1 f 2 N 1 f	× 2.401 818 GHz 2.402 818 GHz	Y FUNC -2.433 dBm -2.406 dBm	CTION FUNCTION WIDTH	FUNCTION	ALUE
	2.402 010 0112	-2.400 0.511			
6					
8					
1					×
1		ES NVNT 1-D	<b>Б</b> ататия Н1 2441MHz		
3 ilent Spectrum Analyzer -	Swept SA	FS NVNT 1-D	H1 2441MHz		
1 ilent Spectrum Analyzer - RL RF 5	Swept SA 50 Ω AC     I 500000 GHz PNO:	SENSE:INT	H1 2441MHz ALIGNAUTO #Avg Type Run Avg Hold:	: RMS	
1 ilent Spectrum Analyzer - RL RF 5 enter Freq 2.441 Ref Offset	Swept SA 30 Ω AC   I5000000 GHz PNO: IFGai t2.14 dB	SENSE: INT	H1 2441MHz ALIGNAUTO #Avg Type Run Avg Hold:	:: RMS • 100/100	2:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MAXAMMAN DET P N N N N N 440 816 GHZ
I RL RF IS enter Freq 2.441 Ref Offset dB/div Ref 20.0 P9	Swept 5A 50 Q AC   PNO: 500000 GHz FGai t 2.14 dB 00 dBm	SENSE:INT	H1 2441MHz ALIGNAUTO Run Avg Hold:>	:: RMS • 100/100	12:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET PMMMMM
I RL RF IS RL RF IS enter Freq 2.441 Ref Offset dB/div Ref 20.0 0 0 0 0 0 0 0 0 0 0 0 0 0	Swept SA 30 Ω AC   I5000000 GHz PNO: IFGai t2.14 dB	SENSE:INT	H1 2441MHz ALIGNAUTO #Avg Type Run Avg Hold:	:: RMS • 100/100	2:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MAXAMMAN DET P N N N N N 440 816 GHZ
enter Freq 2.441 Ref Offset	Swept 5A 50 Q AC   PNO: 500000 GHz FGai t 2.14 dB 00 dBm	SENSE:INT	H1 2441MHz ALIGNAUTO Run Avg Hold:>	:: RMS • 100/100	2:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MAXAMMAN DET P N N N N N 440 816 GHZ
I I RL RF IS enter Freq 2.441 Ref Offset dB/div Ref 20.00 00 00 00 00 00 00 00 00 00	Swept 5A 50 Q AC   PNO: 500000 GHz FGai t 2.14 dB 00 dBm	SENSE:INT	H1 2441MHz ALIGNAUTO Run Avg Hold:>	:: RMS • 100/100	2:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MAXAMMAN DET P N N N N N 440 816 GHZ
1       RL       RL       RE       RE       Ref Offset       dB/div       Ref 20.0       0       0       0       0       0       0       0       0       0	Swept 5A 50 Q AC   PNO: 500000 GHz FGai t 2.14 dB 00 dBm	SENSE:INT	H1 2441MHz ALIGNAUTO Run Avg Hold:>	:: RMS • 100/100	2:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MAXAMMAN DET P N N N N N 440 816 GHZ
1         1           RL         RF           RE         RF           Senter Freq 2.441           Ref Offset           dB/div           Ref 20.00           0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0	Swept 5A 50 Q AC   PNO: 500000 GHz FGai t 2.14 dB 00 dBm	SENSE:INT	H1 2441MHz ALIGNAUTO Run Avg Hold:>	:: RMS • 100/100	2:30:16 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE MAXAMMAN DET P N N N N N 440 816 GHZ
1         3           RL         RF           Senter Freq 2.441           Ref Offset           0 dB/div           Ref 20.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0	Swept SA 50 Q AC   PN0: FGat t2.14 dB 00 dBm	SENSE:INT	H1 2441MHz ALIGNAUTO Run Avg Hold:>	: RMS +100/100 Mkr1 2.	2:30:16 PM Jan 31, 2024 TRACE 12 2 3 4 5 6 TYPE VIEW VIEW VIEW VIEW VIEW VIEW VIEW VIE
Int Spectrum Analyzer - RL RF Spectrum Analyzer - Senter Freq 2.441	Swept SA S0 Q AC   PNO: ISO0000 GHz PNO: IFGat t2.14 dB 00 dBm 1 1 Hz	SENSE:INT Wide Trig: Free I #Atten: 30 d	H1 2441MHz	Mkr1 2.	2:30:16 PM Jan 31, 2024 TRACE 12 23 45 56 TYPE NINNN 0ET P NINNN 440 816 GHz -2.450 dBm 5pan 2.000 MHz 3 ms (1001 pts)
1       RL       RF       IS         RL       RF       IS         enter Freq 2.441       Ref Offset         dB/div       Ref 20.00         00       Ref 20.00	Swept SA 50 Q AC   PN0: FGat t2.14 dB 00 dBm	SENSE:INT Wide Trig: Free I #Atten: 30 d	H1 2441MHz ALIGNAUTO Run Avg Hold:>	: RMS +100/100 Mkr1 2.	2:30:16 PM Jan 31, 2024 TRACE 12 23 45 56 TYPE NINNN 0ET P NINNN 440 816 GHz -2.450 dBm 5pan 2.000 MHz 3 ms (1001 pts)
1       Ref       RF       S         RL       RF       S         enter Freq 2.441       Ref Offset         0 dB/div       Ref 20.0         0 0	Swept SA 50.0. AC   PN0: 1500000 GHz PN0: IFGal t2.14 dB 00 dBm 1 1 4 1 4 4 4 8 1 4 4 8 1 4 4 8 1 4 4 4 4 4 4 4 4 4 4 4 4 4	SENSE:INT Wide Trig: Free I #Atten: 30 o	H1 2441MHz	: RMS -100/100 Mkr1 2.	2:30:16 PM Jan 31, 2024 TRACE 12 23 45 56 TYPE NINNN 0ET P NINNN 440 816 GHz -2.450 dBm 5pan 2.000 MHz 3 ms (1001 pts)
1	Swept SA 50.0. AC   PN0: 1500000 GHz PN0: IFGal t2.14 dB 00 dBm 1 1 4 1 4 4 4 8 1 4 4 8 1 4 4 8 1 4 4 4 4 4 4 4 4 4 4 4 4 4	SENSE:INT Wide Trig: Free I #Atten: 30 o	H1 2441MHz	: RMS -100/100 Mkr1 2.	2:30:16 PM Jan 31, 2024 TRACE 12 23 45 56 TYPE NINNN 0ET P NINNN 440 816 GHz -2.450 dBm 5pan 2.000 MHz 3 ms (1001 pts)



ilent Spectrum Analyzer - RL RF 5	50 Ω AC	SENSE:INT	T	ALIGN AUTO			4 Jan 31, 2024
enter Freq 2.479	PNC	): Wide 🖵 Trig: ain:Low #Atte	Free Run en: 30 dB	#Avg Type: Avg Hold:>*	100/100	DE	E 12345 E M <del>WAAAA</del> T P N N N N
Ref Offset dB/div Ref 20.0					Mkı	1 2.478 8 -2.68	14 GH: 38 dBm
0.0	1						
		· · · · · · · · · · · · · · · · · · ·		~~~~~		~~~~	
0.0							
0.0							
enter 2.479500 GI Res BW 30 kHz	Hz	#VBW 100	kHz		Sweep	Span 2. 2.133 ms (*	.000 MH: 1001 pts
(R MODE TRC SCL) 1 N 1 f 2 N 1 f	× 2.478 814 GHz 2.479 814 GHz	ץ -2.688 dBm -2.653 dBm	FUNCTION	FUNCTION WIDTH	FUN	CTION VALUE	
3 4	2.473 014 012	-2.000 dBm					
6 7 8							
9 0 1							_
3				<b>I</b> STATUS			
_	C	FS NVNT 2	2-DH1 2				
i <mark>lent Spectrum Analyzer</mark> - RL RF 5		SENSE:INT	Г	ALIGNAUTO			4 Jan 31, 2024
enter Freq 2.402	PNC		Free Run en: 30 dB	#Avg Type: Avg Hold:>*		TRAC TYP DE	E 1 2 3 4 5 E M WAAAAA T P N N N N
							18 GH
Ref Offset	2.14 dB				Mki	1 2.401 8	51 dBn
dB/div Ref 20.0	t 2.14 dB 10 dBm			^ <b>2</b>	Mki	1 2.401 8 -0.8	51 dBn
0 dB/div Ref 20.0	t 2.14 dB 0 dBm					-0.8	51 dBm
0 dB/div Ref 20.0 99 .00 .00	12.14 dB 0 dBm	·····	~~~~	2 		1 2.401 8	51 dBm
0 dB/div Ref 20.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 dBm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1 2.401 8 -0.8(	51 dBm
0 dB/div Ref 20.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	12.14 dB 10 dBm	·····		2 		-0.8	51 dBm
dB/div         Ref 20.0           00	12.14 dB 10 dBm						51 dBn
enter 2.402500 G	10 dBm					-0.85	51 dBm
dB/div         Ref 20.0           9	10 dBm	#VBW 100			Sweep	-0.85 	51 dBm
dB/div       Ref 20.0         29	10 dBm	#VBW 100 -0.851 dBm -0.765 dBm	KHZ FUNCTION	FUNCTION W/DTH	Sweep	-0.85	51 dBm
dB/div         Ref 20.0           29	10 dBm	۲ -0.851 dBm			Sweep	-0.85 	51 dBm
dB/div         Ref 20.0           29	10 dBm	۲ -0.851 dBm			Sweep	-0.85 	51 dBm
dB/div         Ref 20.0           Q         A	10 dBm	۲ -0.851 dBm			Sweep	-0.85 	51 dBm



	SENSE:INT	ALIGNAUTO	12:37:34 PM Jan 31, 2024
) GHz PNO: Wide IFGain:Low	Trig: Free Run #Atten: 30 dB	#Avg Type: RMS Avg Hold:>100/100	TRACE 12345 TYPE MWWWW DET P N N N N
			Mkr1 2.440 816 GH: -0.827 dBn
	~~~~~		here and the second sec
#\	/BW/ 100 kHz	Swi	Span 2.000 MH eep 2.133 ms (1001 pts
Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
10 816 GHz -0.8 11 816 GHz -0.8	27 dBm 117 dBm		
			>
		STATUS	
CFSN	NVNT 2-DH1 2	2480MHz	
	SENSE:INT		12:40:16 PM Jan 31, 202
	Trig: Free Run #Atten: 30 dB	Avg Hold:>100/100	TRACE 12345 TYPE MWWWW DET PNNN
			Mkr1 2.478 816 GH -0.952 dBn
		2	
$\sim$		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	where we have a second
			Span 2.000 MH
			eep 2.133 ms (1001 pts
78 816 GHz -0.9	52 dBm		
	GHz FGain:Low #1 0 816 GHz 0 916 GHZ 0	GHZ       PNO: Wide IFGain:Low       Trig: Free Run #Atten: 30 dB         Trig: Free Run #VBW 100 kHz         #VBW 100 kHz         9 PINO: Wide 0 216 GHz       Y         Y UNCTION         9 PINO: Wide 0 216 GHz       Y         9 PINO: Wide 0 216 GHz       Y         9 PINO: Wide 0 216 GHz       Y         PINO: Wide 0 216 GHz       Y         O 826 SENSE: INT         10 SENSE: INT         GHz       SENSE: INT         PINO: Wide 0 200       Trig: Free Run #Atten: 30 dB         GHz       SENSE: INT         PINO: Wide 0 200       Trig: Free Run #Atten: 30 dB         FGain: Low       Trig: Free Run #Atten: 30 dB         #VBW 1000 kHz         #VBW 1000 kHz	GH2       PNO: Wide       Trig: Free Run       #Avg Type: RMS         MygHold>-100/100       #Atten: 30 dB       #Avg Type: RMS         # VEW 100 KHz       Sw         # VEW 100 KHz       Sw         0 316 GHz       -0.817 dBm         -0.817 dBm       FUNCTION         # VEW 100 KHz       Sw         CFS NVNT 2-DH1 2480MHz         CFS NVNT 2-DH1 2480MHz         PNO: Wide       Trig: Free Run         # AvgHold>- 100/100         # Atten: 30 dB         # UPO: Wide       Trig: Free Run         # Avg Type: RMS



enter Freq 2.40		SENSE:INT	eRun Avg H	Type: RMS Iold:>100/100	12:42:09 PM Jan 31, 2024 TRACE 1 2 3 4 5 TYPE November 1
Ref Offse	IFG	ain:Low #Atten: 3	i0 dB	Mkr1	2.401 816 GH
<sup>pg</sup>	00 dBm				-0.977 dBm
.00				2	
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
1.0					
).0 ).0					
0.0					
					On on 2,000 MU
enter 2.402500 G Res BW 30 kHz	HZ	#VBW 100 kH	z	Sweep 2	Span 2.000 MH: 133 ms (1001 pts.
R MODE TRC SCL	× 2.401 816 GHz	-0.977 dBm	JNCTION FUNCTION WIDTH	H FUNCT	ION VALUE
2 N 1 f 3	2.402 814 GHz	-0.824 dBm			
5 5 6 7					
B B					
1					
3			<b>K</b> ostati	us	
	(				
		FS NVNT 3-L	DH1 2441MH	2	
RL RF	- Swept SA 50 Ω AC	SENSE:INT	ALIGNAUTO		
RL RF	- Swept SA 50 Ω AC     1500000 GHz PN		ALIGNAUTO #Avg e Run Avg H		TRACE 12345
RL RF enter Freq 2.44 Ref Offse	- Swept SA 50 g AC 1500000 GHz PN IFG et 2.14 dB	SENSE:INT	ALIGNAUTO #Avg e Run Avg H	Type: RMS loid:>100/100	TRACE 12345 TYPE MWWWW DET P N N N N 2.440 814 GH
RL RF enter Freq 2.44 Ref Offse dB/div Ref 20.0	- Swept SA 50 Ω AC 15000000 GHz PNi IFG	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid>100/100 Mkr1	TRACE 12345 TYPE MWWWW DET P N N N N 2.440 814 GH
RL RF enter Freq 2.44 Ref Offse dB/div Ref 20.1	- Swept SA 50 g AC 1500000 GHz PN IFG et 2.14 dB	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid:>100/100	TRACE 12345 TYPE MWWWW DET P N N N N 2.440 814 GH
RL RF enter Freq 2.44 BRef Offse dB/div Ref 20.1	- Swept SA 50 g AC 1500000 GHz PN IFG et 2.14 dB	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid>100/100 Mkr1	TRACE 12345 TYPE MWWWW DET P N N N N 2.440 814 GH
RL RF enter Freq 2.44 Ref Offse dB/div Ref 20.0	- Swept SA 50 g AC 1500000 GHz PN IFG et 2.14 dB	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid>100/100 Mkr1	TRACE 12345 TYPE MWWWW DET P N N N N 2.440 814 GH
RL RF enter Freq 2.44 Ref Offse dB/div Ref 20.1	- Swept SA 50 g AC 1500000 GHz PN IFG et 2.14 dB	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid>100/100 Mkr1	TRACE 12345 TYPE MWWWW DET PNNNN 2.440 814 GH2
RL RF enter Freq 2.44 Ref Offse dB/div Ref 20.1	- Swept SA 50 g AC 1500000 GHz PN IFG et 2.14 dB	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid>100/100 Mkr1	TRACE 12345 TYPE MWWWW DET PNNNN 2.440 814 GH2
RL         RF           enter Freq 2.44         Ref Offse           dB/div         Ref 20.1           00	- Swept SA 50 Q AC 1500000 GHz PN IFG et 2.14 dB 00 dBm	SENSE:INT	ALIGNAUTO #Avg e Run Avg H 0 dB	Type: RMS loid>100/100 Mkr1	TRACE II 23 4 5 TYPE MANNAN DET ENNINN 2.440 814 GH: -0.918 dBn
RL         RF           enter Freq 2.44         Ref Offse           dB/div         Ref 20.1           30	- Swept SA 50 Q AC 1500000 GHz PN IFG et 2.14 dB 00 dBm	SENSE:INT	ALIGNAUTO #Avg te Run Avg H 0 dB	Type: RMS lold>100/100 Mkr1	TRACE 12 3 4 5 TYPE 12 3 4 5 TYPE 1 14 GH: -0.918 dBn
RL RF enter Freq 2.44 Ref Offse dB/div Ref 20.1 Ref 20.1	- Swept SA 50 Q AC 1500000 GHz PNG st 2:14 dB 00 dBm	SENSE:INT O: Wide ain:Low #Atten: 3	ALIGNAUTO #Avg te Run Avg H 0 dB	Type: RMS lold>100/100 Mkr1	12:43:49 PM Jan 31, 2024 TRACE 12 23 4 5 TYPE MYNNWN 2.440 814 GH7 -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm -0.918 dBm
RL         RF           enter Freq 2.44           Ref Offse           dB/div         Ref 20.1           00	- Swept SA 50 Q AC 1500000 GHz PN IFG et 2.14 dB 00 dBm	SENSE:INT O: Wide ain:Low Trig: Fre #Atten: 3	ALIGNAUTO #Avg be Run Avg H	Type: RMS lold>100/100 Mkr1	Span 2.000 MH: .133 ms (1001 pts
RL         RF           enter Freq 2.44           Ref Offse           dB/div         Ref 20.1           0	- Swept SA 50 Q AC 1500000 GHz PN IFG st 2.14 dB 00 dBm 1 1 	SENSE:INT O: Wide ain:Low Trig: Fre #Atten: 3 #Atten: 3 #VBW 100 kH Y Fl -0.918 dBm	ALIGNAUTO #Avg be Run Avg H	Type: RMS lold>100/100 Mkr1	Span 2.000 MH: .133 ms (1001 pts
Ref Offse Ref 20.0 Ref 2	- Swept SA 50 Q AC 1500000 GHz PN IFG st 2.14 dB 00 dBm 1 1 	SENSE:INT O: Wide ain:Low Trig: Fre #Atten: 3 #Atten: 3 #VBW 100 kH Y Fl -0.918 dBm	ALIGNAUTO #Avg be Run Avg H	Type: RMS lold>100/100 Mkr1	Span 2.000 MH: .133 ms (1001 pts



	CFS NVNT	3-DH1 2	2480MHz		
Agilent Spectrum Analyzer - Swept SA					
	SENSE:II	NT	ALIGNAUTO #Avg Type:		5:14 PM Jan 31, 2024 TRACE <b>1 2 3 4 5 6</b>
Center Freq 2.479500000 GHz		g: Free Run ten: 30 dB	Avg Hold:>*		
Ref Offset 2.14 dB 10 dB/div Ref 20.00 dBm				Mkr1 2.47	78 814 GHz 0.946 dBm
Log					
-10.0	~~			~~ <u>~</u>	
-20.0			~~~~~	· ~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-30.0					
-40.0					
-50.0					
-60.0					
-70.0					
Center 2.479500 GHz #Res BW 30 kHz	#VBW 10	0 kHz		Sweep 2.133	an 2.000 MHz ms (1001 pts)
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALU	IE 🔼
1 N 1 f 2.478 814 G 2 N 1 f 2.479 818 G	Hz -0.946 dBm Hz -1.589 dBm				
5					=
6 7					
8					
10					~
<					>
MSG			<b>I</b> o STATUS		

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### 13. Number Of Hopping Frequency

### 13.1 Block Diagram Of Test Setup



#### 13.2 Limit

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

#### 13.3 Test procedure

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

2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

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

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

### 13.4 Test Result





Ient Spectrum Analyzer - Swept SA RL RF 50 & AC enter Freq 2.441750000 GHz		ALIGNAUTO #Avg Type: RMS	12:55:17 PM Jan 31, 2024 TRACE 1 2 3 4 5 TYPE MMAAAAAA
	PNO: Fast 🍙 Trig: Free Ri IFGain:Low #Atten: 30 di	3	
Ref Offset 2.14 dB dB/div Ref 20.00 dBm g		WIKT	2.401 837 0 GHz -1.471 dBm
			^2
	ANAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		AMAMMANAA
1.0 <b></b>			
.0			
art 2.40000 GHz Res BW 100 kHz	#VBW 300 kHz	Sweep	Stop 2.48350 GHz 8.000 ms (1001 pts
R MODE TRC SCL X N 1 f 2.401 837 0 G	Y FUNCT		INCTION VALUE
N 1 f 2.479 993 0 G	Hz -3.170 dBm		
7 3 9			
			×
3	1111	STATUS	
H lent Spectrum Analyzer - Swept SA	opping No. NVNT 2	2-DH1 2441MHz	
RL RF 50 Ω AC enter Freq 2.441750000 GHz	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:00:34 PM Jan 31, 2024 TRACE 1 2 3 4 5
	PNO: Fast 😱 Trig: Free Ru IFGain:Low #Atten: 30 df	3	TRACE 12345 TYPE MWWWW DET PNNNN
Ref Offset 2.14 dB dB/div Ref 20.00 dBm		Mkr′	2.401 837 0 GHz 0.805 dBm
·g			
	աստումումունում	ՠՠՠՠՠՠՠՠՠՠՠՠ	$\mathcal{W}$
0.0			
1.0			
			¥
.0			
art 2.40000 GHz			Stop 2.48350 GHz
art 2.40000 GHz tes BW 100 kHz	#VBW 300 kHz		8.000 ms (1001 pts
00 art 2.40000 GHz tes BW 100 kHz R MODE TRC SCL × N 1 f 2.401 837 0 G N 1 f 2.490 410 5 G	Y FUNCT		Stop 2.48350 GHz 8.000 ms (1001 pts
IO Ant 2,40000 GHz Res BW 100 kHz R MODE TRC SCL × N 1 f 2,401837 0 G N 1 f 2,401837 0 G N 1 f 2,480 410 5 G	Y FUNCT		8.000 ms (1001 pts
00         art 2.40000 GHz           Res BW 100 kHz         X           R MODE TRC SCL         X           N         1         f         2.401837.0 G           N         1         f         2.401837.0 G           N         1         f         2.400405.0 G	Y FUNCT		8.000 ms (1001 pts



Нор	ping No. NVN	IT 3-DH1 2441	MHz	
Agilent Spectrum Analyzer - Swept SA				
Image: Ward RL         RF         50 Ω         AC           Center Freq 2.441750000 GHz	SENSE:INT		Type: RMS	01:05:37 PM Jan 31, 2024 TRACE 1 2 3 4 5 6
	PNO: Fast 😱 Trig: F -Gain:Low #Atten		Hold:>100/100	DET P N N N N
	Sameow		Mkr1	2.401 837 0 GHz
Ref Offset 2.14 dB 10 dB/div Ref 20.00 dBm				1.136 dBm
		1 41 M N N 13 40 41 4 40 4 10 10 10	1 m h m	$\sim$
	<u> MAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA</u>	<u> </u>	144044044644444	INA AMIN'NA AN
-20.0				
-30.0				
-40.0				
-50.0				V
-60.0				
-70.0				
Start 2.40000 GHz				Stop 2.48350 GHz
#Res BW 100 kHz	#VBW 300 k	Hz	Sweep	8.000 ms (1001 pts)
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WID1	H FUNC	TION VALUE
1 N 1 f 2.401 837 0 GHz 2 N 1 f 2.480 327 0 GHz	1.136 dBm -3.297 dBm			
3				
5				
7				
9				
10				×
	111			<u>&gt;</u>
MSG		To STAT	US	

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### 14. Dwell Time

#### 14.1 Block Diagram Of Test Setup



#### 14.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

#### 14.3 Test procedure

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

2. Set spectrum analyzer span = 0. Centred on a hopping channel;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

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

#### 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:

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Condition	Mode	Frequency	Pulse Time	Total Dwell Time	Burst	Period Time	Limit	Verdict
		(MHz)	(ms)	(ms)	Count	(ms)	(ms)	
NVNT	1-DH1	2441	0.383	122.177	319	31600	400	Pass
NVNT	1-DH3	2441	1.639	265.518	162	31600	400	Pass
NVNT	1-DH5	2441	2.887	311.796	108	31600	400	Pass
NVNT	2-DH1	2441	0.392	125.048	319	31600	400	Pass
NVNT	2-DH3	2441	1.643	257.951	157	31600	400	Pass
NVNT	2-DH5	2441	2.892	329.688	114	31600	400	Pass
NVNT	3-DH1	2441	0.391	124.338	318	31600	400	Pass
NVNT	3-DH3	2441	1.642	262.72	160	31600	400	Pass
NVNT	3-DH5	2441	2.893	303.765	105	31600	400	Pass

Note: Total Dwell Time =Pulse Time \*Burst Count

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	 	well NVNT	Test Gr 1-DH1 244		1 One Bu	rst		
gilent Spectrum Analyze	er - Swept SA					51		
RL RF Center Freq 2.4	50 Ω AC 41000000 GHz	PNO: Fast ← IFGain:Low	SENSE:INT Trig Delay Trig: Video #Atten: 30	-500.0 µs	LIGN AUTO #Avg Type	RMS		23 PM Jan 31, 2024 TRACE 1 2 3 4 5 6 TYPE WWWWWWW DET P N N N N
0 dB/div Ref 20	set 2.14 dB 0.00 dBm						∆Mkr1	l 383.0 μs 4.86 dB
- <b>°g</b> 10.0 0.00	2							
10.0 X2								TRIG LVL
20.0								
40.0	ter se til som der en forkallet i för In faller av lingen profiler i Die forg	hin the shaked of bolines.	den stredigt verbinden bei imper die	ta da		e at a de optidate to	<mark>din kataba</mark> dala	
60.0 % <mark>,(114<mark>,</mark>14 — 149,41 70.0</mark>		l bed lot bed and a straight and a straight a	au na haina na mana na Na mana na mana n					
Center 2.441000 Res BW 1.0 MHz		#V	BW 3.0 MHz			Sweep	) 10.00 ms	Span 0 Hz (10001 pts)
1 A2 1 t (A			4.86 dB	CTION FUNC	TION WIDTH		FUNCTION VALUE	^
2 F 1 t 3 4	498.0	) µs -6.0	05 dBm					
5 6 7								
8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9								
sg								<u>&gt;</u>
	Dw	ell NVNT 1	DH1 2441	MHz Ant1		ated		
gilent Spectrum Analyze RL RF Center Freg 2.4	50 Ω AC		SENSE:INT	A	LIGN AUTO #Avg Type	RMS		57 PM Jan 31, 2024 TRACE <b>1 2 3 4 5 6</b> TYPE WWWWWW
		PNO: Fast ↔ IFGain:Low	► Trig: Free #Atten: 30					DET PNNNN
	set 2.14 dB ).00 dBm				1	1		
10.0								
0.00								
10.0 <b>(***************</b> *********								
20.0								
30.0								
40.0								
50.0								
60.0								
70.0								
enter 2.441000	000 GHz					0		Span 0 Hz
tes BW 1.0 MHz		#V	BW 3.0 MHz		STATUS	Swe	ep 31.60 s	; (10001 pts)



	um Analyzer - Swept S	SA	I NVNT 1-	DH3 2441	i wifiz Ant	1 One Bur	St		
	RF 50 Ω A0 Teq 2.4410000	00 GHz	PNO: Fast 🔸	SENSE:INT Trig Delay- Trig: Video #Atten: 30	-500.0 µs	LIGN AUTO #Avg Type:	RMS	Т	2 PM Jan 31, 2024 RACE <b>1 2 3 4 5</b> 6 TYPE WWWWWW DET P N N N N
0 dB/div	Ref Offset 2.14 d Ref 20.00 dBr							∆Mkr1	1.639 ms 7.25 dB
10.0		1Δ2							
0.00	( <sub>2</sub>								TRIG LVL
10.0 <b>- X</b> 20.0 <b>- X</b>	× <del>2</del>								
30.0									
40.0		ulista i klasta, kode	Little of a state of the state	andara da da disilaria	ast in the second still it when	al beaters and all	Harthernest	And the state of the	a differen tiler de servici de
60.0 <mark>4144</mark>		and the second	llaka <sub>n b</sub> ahan peraku di	and the second secon	er an a stad bird	han a data an particular of			undind fronter op si
70.0					·				
Center 2.4 Res BW 1	I41000000 GHz .0 MHz		#VB	W 3.0 MHz			Sweep	10.00 ms	Span 0 Hz (10001 pts)
KR MODE TR		X	Y		CTION FUNC	TION WIDTH		JNCTION VALUE	<u> </u>
1 Δ2 1 2 F 1 3		1.639 ms 498.0 µs	( <u>4)</u> -8.32	25 dB dBm					
4 5									
6 7 8									
9									
11									<u> </u>
SG		Dwall		112 2444			tod		
gilent Spectru	um Analyzer - Swept S			7H3 244 H		Accumula	lieu		
	RF 50 Ω A0 Teq 2.4410000	00 GHz		SENSE:INT		LIGN AUTO #Avg Type:	RMS	Т	6 PM Jan 31, 2024 RACE <b>1 2 3 4 5 6</b>
			NO: Fast ↔↔ Gain:Low	#Atten: 30	dB				
0 dB/div og	Ref Offset 2.14 dl Ref 20.00 dBn								
og									
10.0									
10.0 0.00									
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10.0 0.00 10.0 20.0 30.0									
	141000000 GHz			W 3.0 MHz			Swee	D 31.60 S	Span 0 Hz (10001 pts)



enter Freq 2.44100	I	PNO: Fast ↔ FGain:Low	SENSE:INT Trig Delay-5( Trig: Video #Atten: 30 dE	00.0 µs #	AUTO Avg Type: F	RMS	Т	3 PM Jan 31, 2024 RACE <b>1 2 3 4 5</b> 6 TYPE WWWWWW DET P N N N N
Ref Offset 2.1		-Gain:Low	Matten: 00 di					2.887 ms
0 dB/div Ref 20.00 d	dBm							-2.58 dB
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0.00 X2								TRIG LVL
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		an di Anglish Marina	teri per per selat a terrari. La tribuca da la terraria	hard over the first of the first of the second s	a an an an Alberta an Alberta. In the second and a futures	en tri til settis mata ta mala m	a populați a produți a dina.	naderat Mileslip for anta farada atanta
60.0 <b>4 14 14 14 14 14 14 14 14 14 14 14 14 14</b>			in state in the second state of the second sta					
Center 2.441000000 G Res BW 1.0 MHz	∍HZ	#VB	W 3.0 MHz			Sweep	10.00 ms	Span 0 Hz (10001 pts)
MKR MODE TRC SCL	х	Y	FUNCT	ION FUNCTION	WIDTH	FL	JNCTION VALUE	~
1 Δ2 1 t (Δ) 2 F 1 t	2.887 ms 498.0 µs	(Δ) -2.5 -1.93	58 dB dBm					
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7 8 9								
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SG				4	STATUS			
		NVNT 1-D	DH5 2441M	Hz Ant1 Ac	cumulat	ed		
gilent Spectrum Analyzer - Swe RL RF 50 Ω	AC		SENSE:INT		AUTO		01:16:4	7 PM Jan 31, 2024
RL RF 50Ω	AC 00000 GHz	PNO: Fast 🔸	. Trig: Free Ru	un t	AUTO <b>/Avg Type: F</b>	RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL RF 50Ω Center Freq 2.44100	AC DOOOO GHz IF			un t		RMS	01:16:4 T	7 PM Jan 31, 2024 RACE 1 2 3 4 5 6 TYPE WWWWWWW DET P NNNN
RL RF 50 Q Center Freq 2.44100 Ref Offset 2.1	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL RF 50 Q Center Freq 2.44100 Ref Offset 2.1	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL RF 50 Q Center Freq 2.44100 Ref Offset 2.1	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL         RF         50.0           Center Freq 2.44100         Ref Offset 2.1           0 dB/div         Ref Offset 2.1           10 0         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL         RF         50 Q           center Freq 2.44100         Ref Offset 2.1           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL         RF         50.0           Center Freq 2.44100         Ref Offset 2.1           0 dB/div         Ref Offset 2.1           10 0         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4 T	RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset 2.1           0 dB/div         Ref 20.00 c           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t		RMS	01:16:4	RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t			01:16:4	RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c           99	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         50 Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c           99	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         SQ Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c           0 dB/	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         SQ Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c           0 dB/	AC 00000 GHz IF	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6
RL         RF         SQ Q           Center Freq 2.44100         Ref Offset2.1           0 dB/div         Ref 20.00 c           0 g	AC	PNO: Fast 🔸	. Trig: Free Ru	un t				RACE 1 2 3 4 5 6



gilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC			SENSE:INT		ALIGN AUTO		.01-00-4	0 PM Jan 31, 2024
Center Freq 2.441000000 C	Р	NO: Fast 🔸 Gain:Low	Trig Delay Trig: Vide #Atten: 30	y-500.0 μs o	#Avg Type	: RMS	01:00:4 T	RACE 1 2 3 4 5 6 TYPE WANNAN DET PNNNN
Ref Offset 2.14 dB							∆Mkr1	392.0 μs -0.63 dB
0 dB/div Ref 20.00 dBm								-0.03 uB
0.00								
		ilia Ilia						TRIG LVL
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	al n d to	. է նարդ	i an titha	a lak rear	de dala sur la co	and the second second	ander kele fat see	
Center 2.441000000 GHz							40.00	Span 0 Hz
Res BW 1.0 MHz		#VE	W 3.0 MHz		CTION WIDTH		UNCTION VALUE	(10001 pts)
1 Δ2 1 t (Δ) 2 F 1 t	392.0 µs 347.0 µs	( <u>∆)</u> -0.0 -12.82	63 dB					
3 4 4								
5 6 7								
8								
10								~
sg					STATUS			>
	Dwell N	NVNT 2-D	DH1 2441	MHz Ant1	Accumula	ated		
gilent Spectrum Analyzer - Swept SA								
RL RF 50 Q AC			SENSE:INT		ALIGN AUTO		01:01:1	4 PM Jan 31, 2024
RL RF 50 Q AC	Р	NO: Fast 🔸 Gain:Low		Run	ALIGN AUTO #Avg Type	: RMS		RACE 12345 C
RL RF 50Ω AC Center Freq 2.441000000 C Ref Offset 2.14 dB	Р		. Trig: Free	Run		: RMS		RACE 12345 C
RL RF 50Ω AC Center Freq 2.441000000 C Ref Offset 2.14 dB	Р		. Trig: Free	Run		: RMS		4 PM Jan 31, 2024 (RACE 1) 2 3 4 5 6 TYPE WWWWWW DET P N N N N N
RL RF 50Ω AC Center Freq 2.441000000 C Ref Offset 2.14 dB	Р		. Trig: Free	Run		: RMS		RACE 123456 TYPE WMMMM
RL         RF         50 Ω         AC           Center Freq 2.441000000 C         Ref Offset 2.14 dB         Ref Offset 2.14 dB           0 dB/div         Ref 20.00 dBm         Ref 20.00 dBm	Р		. Trig: Free	Run		: RMS		RACE 123456 TYPE WMMMM
RE         50 Ω AC           Center Freq 2.441000000 C           0 dB/div           Ref Offset 2.14 dB           0 dB/div           0 dB/div           0 dB/div           0 dB/div	Р		. Trig: Free	Run		: RMS		RACE 123456 TYPE WMMMM
RE         50 Ω AC           Center Freq 2.441000000 C           0 dB/div           Ref Offset 2.14 dB           0 dB/div           Ref 20.00 dBm           0 dB/div	Р		. Trig: Free	Run		: RMS		RACE 123456 TYPE WMMMM
RE         50 Ω AC           Center Freq 2.441000000 C           0 dB/div           Ref Offset 2.14 dB           0 dB/div           0 dB/div           0 dB/div           0 dB/div	Р		. Trig: Free	Run		: RMS		RACE 123456 TYPE WMMMM
RE         50 Ω AC           Center Freq 2.441000000 C           0 dB/div           Ref Offset 2.14 dB           0 dB/div           Ref 20.00 dBm           0 dB/div	Р		. Trig: Free	Run		: RMS		RACE 123456 TYPE WMMMM
RL         RF         50 Ω         AC           Center Freq 2.441000000 (         0         <	Р		. Trig: Free	Run		RMS		RACE 123456 TYPE WMMMM
Ref         50 Ω         AC           Senter Freq 2.441000000 (         0           0 dB/div         Ref Offset 2.14 dB           0 g         0           10 0         0	Р		. Trig: Free	Run		RMS		RACE 123456 TYPE WMMMM
RL         RF         50 Ω         AC           Center Freq 2.441000000 (         0         <	Р		. Trig: Free	Run		RMS		RACE 123456 TYPE WMMMM
Ref         50 Ω         AC           Senter Freq 2.441000000 (         0           0 dB/div         Ref Offset 2.14 dB           0 g         0           10 0         0	Р		. Trig: Free	Run				RACE 123456 TYPE WMMMM
RE         50 Ω         AC           Center Freq 2.441000000 C         Ref Offset 2.14 dB         Ref Offset 2.14 dB           0 dB/div         Ref 20.00 dBm         0           0.00         0         0         0           10.0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0           0.00         0         0         0         0         0           0.00         0         0         0         0         0         0           0.00         0         0         0         0         0         0           0.00	Р		. Trig: Free	Run				RACE 123456 TYPE WMMMM
Rt         Rf         50 Ω         AC           Senter Freq 2.441000000 (         Ref Offset 2.14 dB         Ref Offset 2.00 dBm         Ref Offset 2.00 dBm           0 dB/div         Ref Offset 2.00 dBm         0	Р		. Trig: Free	Run		RMS		RACE 123456 TYPE WMMMM
RE         50 Ω AC           Center Freq 2.441000000 C           Q dB/div         Ref Offset 2.14 dB           Ref 20.00 dBm           0 g           10 0           10	Р	Gain:Low	. Trig: Free					RACE 123456 TYPE WMMMM



gilent Spectrum Analyzer - 1 R L RF 50	Swept SA	I NVNT 2-DH	E:INT	ALIGN AUTO		01:15:04	+ PM Jan 31, 2024
enter Freq 2.441	000000 GHz	NO: Fast ↔ 1	Frig Delay-500.0 μs Frig: Video /Atten: 30 dΒ	#Avg Type:	RMS	Tf	RACE 12345 TYPE WWWWWW DET PNNNN
Ref Offset 0 dB/div Ref 20.0	2.14 dB 0 dBm					∆Mkr1	1.643 ms -1.31 dB
	1Δ2						
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	and de de services and the services of the ser	na sena que contra de l'Angle <mark>num di al la ciuta da la ciuta d</mark>	a la sur pringer a construe Nilaren de la conjulatera	i fan de de la posteria. Nave de la posteria	rine bist operations in the second	an a the and the second se	
70.0							
enter 2.441000000 es BW 1.0 MHz	) GHz	#VBW 3	3 0 MHz		Sween	10.00 ms	Span 0 Hz
IKR MODE TRC SCL	X	Y	FUNCTION FU	JNCTION WIDTH	· · · ·	JNCTION VALUE	(10001 pts,
1 Δ2 1 t (Δ) 2 F 1 t 3	1.643 ms 498.0 μs	(∆) -1.31 d 0.15 dBi	B m				
4							
6							
8							
1 <b>— —</b> — —							×
ŝG				STATUS			
gilent Spectrum Analyzer - :		NVNT 2-DH3	3 2441MHz Ani	t1 Accumula	ited		
RL RF 50 enter Freg 2.441	DQ AC	SENS	EINT	ALIGN AUTO #Avg Type:	RMS	Tf	3 PM Jan 31, 2024 RACE <mark>1 2 3 4 5</mark> (
	F	PNO:Fast ↔→ 1 Gain:Low #	Frig: Free Run #Atten: 30 dB				
Ref Offset	2.14 dB 0 dBm						
	, abiii						
odB/div Ref 20.00							
og							
0 dB/div Ref 20.00							
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•g							
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og 10.0 10							
og 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.							
og 10.0 10							
	GHz	#VBW 3				p 31.60 s	Span 0 Hz



Agilent Spectrum Analyzer - Swept SA	Dweirittitt	2-DH5 244		One Bur	st		
RL RF 500 AC Center Freq 2.441000000 (	GHz PNO: Fast IFGain:Low		-500.0 μs o dB	GNAUTO #Avg Type:	RMS	TF	8 PM Jan 31, 2024 RACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N
Ref Offset 2.14 dB 10 dB/div Ref 20.00 dBm						∆Mkr1	2.892 ms -1.15 dB
0.00	1 <u>02</u>						TRIG LVL
10.0 X2 and a start of the star	line to a li						
30.0							
40.0 50.0 <mark>1710 17</mark>		- jine jobile e dani berma plat	an a	ini in inter de la contact de la contact	ulaa walaa <sup>b</sup> irdaa wale	und radiation palaced	an <mark>t for statestalle</mark>
60.0 <mark>/////</mark>		<mark>the part of the part of the</mark>	<mark>ha an dar ang dar</mark>	ng kana palahaha			init alian () al juni
Center 2.441000000 GHz							Span 0 Hz
Res BW 1.0 MHz	#	VBW 3.0 MHz				10.00 ms	(10001 pts)
MKR MODE TRC SCL X	2.892 ms (Δ)	-1.15 dB	CTION FUNCT	ION WIDTH	F	JNCTION VALUE	^
2 F 1 t 3 4	349.0 μs -12	2.73 dBm					
5							=
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9							
10 11							~
sg				STATUS			
	Dwell NVNT 2	2-DH5 2441	MHz Ant1 /	Accumula	ted		
gilent Spectrum Analyzer - Swept SA G RL RF 50 Ω AC		SENSE:INT	ALI	GN AUTO		01:14:32	2 PM Jan 31, 2024
Center Freq 2.441000000	GHz PNO: Fast IFGain:Low	⊶→ Trig: Free #Atten: 30		#Avg Type:	RMS	TF	RACE 123456 TYPE WWWWWW DET PNNNN
Ref Offset 2.14 dB 0 dB/div Ref 20.00 dBm							
.09							
10.0							
0.00 <b>1 11 11 11 11 11 11 11 11 11 11 11 11</b>							
100 0.00 1.00 200 300 4.00 4.00 500 4.00 5.00							
							Span 0 Hz



gilent Spectrum Analyzer - <mark>0</mark> R L RF 50		SEN:	H1 2441MHz Ar	ALIGNAUTO	01:05:4	43 PM Jan 31, 2024
Center Freq 2.441	000000 GHz	PNO: East ↔	Trig Delay-500.0 μs Trig: Video #Atten: 30 dB	#Avg Type: RMS	1	TRACE 123456 TYPE WWWWWW DET PNNNNN
Ref Offset I0 dB/div Ref 20.0	2.14 dB 0 dBm				∆Mkr1	391.0 µs -2.12 dB
. <b>og</b> 10.0						
						TRIG LVL
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40.0			a second and a second all t	a di tata da a	1. 11 f (	
50.0 <mark>4.140 - <sup>t</sup>avilayilari</mark> 60.0 <mark>4.140 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.149 - 1.1</mark>	and standade perform <mark>, l. tagette palleple</mark> ,	<mark>a tenta a anti anti anti anti anti anti anti</mark>		<mark>a standar (</mark> and <mark>a standar ( a standar ).</mark> An an	<mark>n a ser a da ang ang ang ang ang ang ang ang ang an</mark>	<mark>, and the state of t</mark>
70.0						0
Center 2.441000000 Res BW 1.0 MHz	Г GHZ	#VBW	3.0 MHz		weep 10.00 ms	Span 0 Hz (10001 pts)
4KR MODE TRC SCL 1 Δ2 1 t (Δ) 2 F 1 t	× 391.0 µ 345.0 µ	s (Δ) -2.12 c s -10.37 dB	3B	NCTION WIDTH	FUNCTION VALUE	^
3 4	040.0 µ	s -10.37 dB				
5 6 7						3
8 9 10						
						>
SG	Dwal		1 2441MHz Ant			
gilent Spectrum Analyzer -	Swept SA					
RL RF 50 Center Freq 2.441		PNO: Fast ↔	SE:INT Trig: Free Run #Atten: 30 dB	ALIGNAUTO #Avg Type: RMS	01:06:1 1	L7 PM Jan 31, 2024 IRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N
Def Offeet	2.14 dB	IFGain:Low	#Atten: 30 dB			
Rer Unset	оавті					
0 dB/div Ref 20.00						
0 dB/div Ref 20.00						
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O dB/div         Ref 20.01           og						
0 dB/div Ref 20.01						
0 dB/div Ref 20.01						
0 dB/div Ref 20.00						
0 dB/div Ref 20.00 9 10 0 10 0 10 0 10 0 10 0 10 0 10 0						Span 0 Hz



RL RF Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sec RL RF Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sec RL RF Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sectrum Analyzer Sec	50 Ω AC		ENSE:INT	500.0 µs	LIGN AUTO #Avg Type:	RMS	TI	5 PM Jan 31, 2024 RACE 12 3 4 5 6 TYPE WWWWWW
		NO: Fast 🔸	Trig: Video #Atten: 30 (					
Ref Offse	t 2.14 dB						ΔMkr1	1.642 ms 0.24 dB
0 dB/div Ref 20.0	00 dBm							0.24 GB
	∆2							
).00 X2								TRIG LVL
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30.0								
10.0								
50.0 <mark>alterin</mark>	line in the second s	ine splin her die Hot	der stel Heldling	<mark>And provident of the l</mark>		<mark>i kandin ka</mark> ta kan	en die breek kij	ini dipeter di Mata
60.0 <mark>V(ht), (())</mark>	in the second			in the second				
70.0								
enter 2.44100000	0 GHz	#\/B\	N 3.0 MHz			Buroon	10.00 mo	Span 0 Hz
KR MODE TRC SCL	×	#VDV		TION FUNC	TION WIDTH			(10001 pts)
$1 \Delta 2 1 t (\Delta)$ 2 F 1 t	1.642 ms 498.0 µs		4 dB				SHETION VALUE	
	498.0 µs	-0.05						
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6								
8								
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								~
G			Ш		STATUS			>
	Dwall	NVNT 3-D	112 24444	ALL= Apt1		tod		
gilent Spectrum Analyzer -			115 244 11		Accumula	lieu		
RL RF 5	50 Ω AC	S	ENSE:INT	Al	LIGN AUTO #Avg Type:	DMS	01:13:39	9 PM Jan 31, 2024 RACE <mark>1 2 3 4 5</mark> 6
enter Freq 2.44'	Р	NO: Fast 🔸	Trig: Free F #Atten: 30 (	Run	HONG TYPE.	Nano.		TYPE WWWWWWWW
			MALLEII. 00 0					
Ref Offse dB/div Ref 20.0	t 2.14 dB							
	t 2.14 dB							
Ref Offse 0 dB/div Ref 20.0	t 2.14 dB							
0 dB/div Ref 20.0	t 2.14 dB							
odB/div Ref 20.0	t 2.14 dB							
0 dB/div Ref 20.0	t 2.14 dB							
0 dB/div Ref 20.0	t 2.14 dB					,		
0 dB/div Ref 20.0	t 2.14 dB							
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0 dB/div Ref 20.0 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0	t 2.14 dB							
0 dB/div Ref 20.0 9 dB/div Ref	t 2.14 dB							
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0 dB/div Ref 20.0 0 d 0 d 0 d 0 d 0 d 0 d 0 d 0	t2.14 dB 0 dBm		N 3.0 MHz				n 31.60 <b>c</b>	Span 0 Hz (10001 pts



gilent Spectrum Analyzer - Sw RL RF 50 Ջ Center Freq 2.44100	AC		BE:INT Trig Delay-500		IGNAUTO #Avg Type:	RMS	01:12:05 TR	PM Jan 31, 2024 ACE <b>1 2 3 4 5</b> (
enter Treq 2.44 Tot	PNO:	Fast ↔	Trig: Video #Atten: 30 dB				١	ACE 12345 ( YPE WAAAAAAA DET P N N N N
Ref Offset 2.								2.893 ms
0 dB/div Ref 20.00 (								-0.74 dB
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		1Δ2						TRIG LVL
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40.0		i i i i i i i i i i i i i i i i i i i					t ant an air sh	
50.0 <mark>(10) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1</mark>		and the specific state of a state of the state	land ferd to plan we also Des tool is too in basing for		i pie pie pie pie pie de suis 14 <mark>july 10 july 10 july 11 july 11 july 11 july</mark>	ladari in terreta de la secto. Alexandre de la secto de la	in an shire that the	dah tapat bertenan Ingkan pertuka basis
70.0			And An Obs.	ալը հայիլ է		ere ti dan ha		lan a <b>n</b> a ang lang lang lang lang lang lang lang
enter 2.441000000 C	Hz							Span 0 Hz
tes BW 1.0 MHz		#VBW :	3.0 MHz			Sweep	10.00 ms (	
IKR MODE TRC SCL	× 2.893 ms (Δ)	۲ -0.74 d	FUNCTIO	IN FUNCT	TION WIDTH	FL	JNCTION VALUE	^
2 F 1 t	349.0 µs	-10.35 dB						
4 5								
6 6 7								
8								
10 11								~
					STATUS			>
SG	Durall NIV			I- A 10 4 4		te el		
gilent Spectrum Analyzer - Swe		/NT 3-DH	5 Z44 HVIF	12 Anti 1	Accumula	lea		
RL RF 50 Ω Senter Freq 2.44100		SENS	BE:INT	AL	IGNAUTO AVTO	RMS	TR	PM Jan 31, 2024 ACE <mark>1 2 3 4 5</mark> (
enter Treq 2.44 lot	PNO:		Trig: Free Rur #Atten: 30 dB	n			1	DET P N N N N
Ref Offset 2.1								
0 dB/div Ref 20.00 d								
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9.00 <b>- 111 - 111 - 111 - 111</b>								
and the last district of								
20.0								
20.0 20.0 								
20.0 20.0 								
	HZ		3.0 MHz				p 31.60 s (	Span 0 Hz

# 15. Antenna Requirement

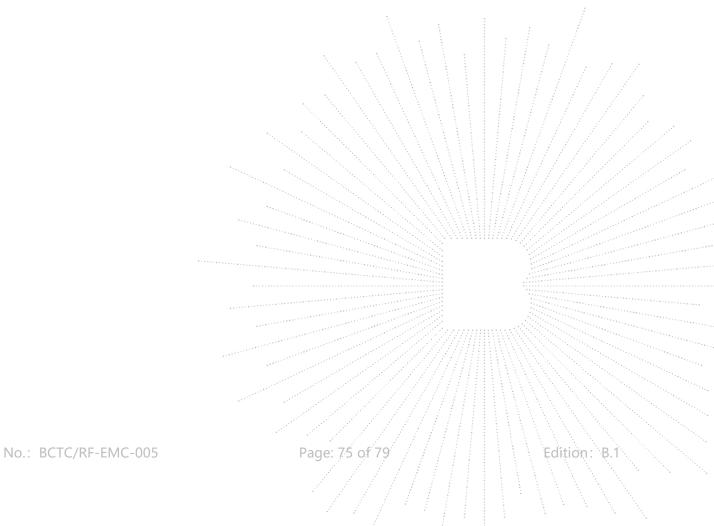


### 15.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

#### 15.2 Test Result

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





## 16. EUT Photographs

#### EUT Photo 1



EUT Photo 2



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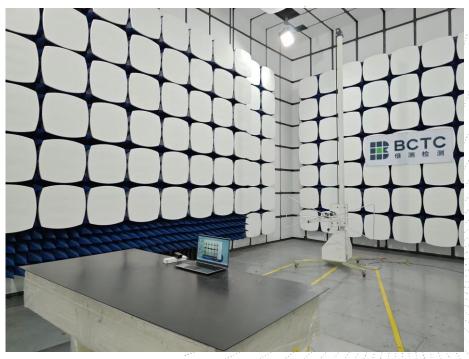


## 17. EUT Test Setup Photographs

### **Conducted Emissions Photo**



#### **Radiated Measurement Photos**



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### STATEMENT

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

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

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

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

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

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

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

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

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\*\*\*\*\* END \*\*\*\*\*

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