

# TEST REPORT

Report No:	CTC2024240710		
FCC ID:	XUJCRT511SV2		
IC:	29886-CRT511SV2		
Applicant / Manufacturer:	Launch Tech Co., Ltd.		
FCC Address:	Launch Industrial Park, North of W Longgang Shenzhen 518129 Chin		
ISED Address:	Launch Industrial Park, North of W Longgang District, Shenzhen Guar	uhe Road, Bantian Street,	
Product Name:	SMART TPMS DIAGNOSTIC SYS	STEM	
Trade Mark:	LAUNCH		
Model/Type reference:	Creader TPMS 511S V2		
Listed Model(s):	Creader TPMS 5011 V2		
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 RSS-247 Issue 3		
Test Report Form No	CTC-TR-059_A1		
Master TRF:	Dated 2024-09-20		
Date of receipt of test sample:	Oct. 14, 2024		
Date of testing	Oct. 14, 2024 ~ Nov. 18, 2024		
Date of issue	Dec. 20, 2024		
Result:	PASS		
Compiled by:		Tim Jiang	
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		đ	

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Society : <u>yz.cnca.cn</u>



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# 1. TEST SUMMARY

# 1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands 902–928MHz, 2400–2483.5MHz, and 5725–5850MHz.

<u>RSS-247 Issue 3</u>: Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus.

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

# 1.2. Report Version

Revised No.	Report No.	Date of issue	Description
01	CTC2024240710	Dec. 20, 2024	Original

# 1.3. Test Description

FCC Part 15 Subpart C (15.247)/ RSS-247 Issue 3					
Test Item	Standard	I Section	Decult		
Test Item	FCC ISED		Result	Test Engineer	
Antenna Requirement	15.203	RSS-Gen 6.8	Pass	Jim Jiang	
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Jim Jiang	
Restricted Bands	15.205	RSS-Gen 8.10	Pass	Jim Jiang	
Hopping Channel Separation	15.247(a)(1)	RSS-247 5.1 (b)	Pass	Jim Jiang	
Dwell Time	15.247(a)(iii)	RSS-247 5.1 (d)	Pass	Jim Jiang	
Peak Output Power	15.247(b)(1)	RSS-247 5.4 (b)	Pass	Jim Jiang	
Number of Hopping Frequency	15.247(a)(iii)	RSS-247 5.1 (d)	Pass	Jim Jiang	
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS-247 5.5	Pass	Jim Jiang	
Radiated Band Edge and Spurious Emissions	15.205&15.209& 15.247(d)	RSS-247 5.5	Pass	Jim Jiang	
Radiated Spurious Emission	15.247(d)&15.20 9	RSS-247 5.5& RSS-Gen 8.9	Pass	Jim Jiang	
20dB Bandwidth	15.247(a)	RSS-247 5.1 (b)	Pass	Jim Jiang	
Occupied Bandwidth	/	RSS-GEN 6.7	Pass	Jim Jiang	

Note:

1. The measurement uncertainty is not included in the test result.

2. N/A: means this test item is not applicable for this device according to the technology characteristic of device.

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# 1.4. Test Facility

# Address of the report laboratory

# CTC Laboratories, Inc.

Add: Room 101 of Building B, Room 107, 108, 207, 208 of Building A, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

## Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

## A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

## Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

## FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 951311, Aug 26, 2017.



# **1.5. Measurement Uncertainty**

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties radio equipment characteristics; Part 2" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Test Items	Measurement Uncertainty	Notes
20dB Emission Bandwidth	±0.0196%	(1)
Carrier Frequency Separation	±1.9%	(1)
Number of Hopping Channel	±1.9%	(1)
Time of Occupancy	±0.028%	(1)
Max Peak Conducted Output Power	±0.743 dB	(1)
Band-edge Spurious Emission	±1.328 dB	(1)
Conducted RF Spurious Emission	9kHz-1GHz: ±0.746dB 1GHz-26GHz: ±1.328dB	(1)
Conducted Emissions 9kHz~30MHz	±3.08 dB	(1)
Radiated Emissions 30~1000MHz	±4.51 dB	(1)
Radiated Emissions 1~18GHz	±5.84 dB	(1)
Radiated Emissions 18~40GHz	±6.12 dB	(1)

Below is the best measurement capability for CTC Laboratories, Inc.

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

# **1.6. Environmental Conditions**

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15 °C to 35 °C
Relative Humidity:	20 % to 75 %
Air Pressure:	101 kPa

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# 2. GENERAL INFORMATION

# 2.1. Client Information

Applicant / Manufacturer:	Launch Tech Co., Ltd.
FCC Address:	Launch Industrial Park, North of Wuhe Rd., Banxuegang, Longgang Shenzhen 518129 China
ISED Address:	Launch Industrial Park, North of Wuhe Road, Bantian Street, Longgang District, Shenzhen Guangdong 518129 China

# 2.2. General Description of EUT

ct Name: SMART TPMS DIAGNOSTIC SYSTEM		
LAUNCH		
Creader TPMS 511S V2		
Creader TPMS 5011 V2		
All these models are identical in the same PCB, layout, electrical circuit and enclosure. The difference is the color of the plastic sleeve.		
CTC240919-001-S002, CTC240919-001-S003		
Vehicle Input: DC12V 1A, USB Input: DC5V 2A		
3.7V 6000mAh from lithium battery		
V2		
CRT501S_V2_V100		
GFSK, π/4-DQPSK		
2402MHz~2480MHz		
79		
1MHz		
FPC Antenna		
2.4dBi		

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# 2.3. Accessory Equipment Information

Equipment Information						
Name	Manufacturer					
Notebook	ThinkBook 14 G3 ACL MP246QDR Lenovo		Lenovo			
Adapter	A2167	1	Apple			
Cable Information	Cable Information					
Name	Shielded Type	Ferrite Core	Length			
USB Cable	Unshielded	NO	100cm			
Test Software Information						
Name Version / /						
adb	/	/	/			

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# 2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	2402
01	2403
:	:
38	2440
39	2441
40	2442
:	÷
77	2479
78	2480

Note: The display in grey were the channel selected for testing.

## Test Mode:

For RF test items:		

The engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions:

The EUT charges through the adapter.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Power Setting: Use the default power level.

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# 2.5. Measurement Instruments List

	RF Test System - SRD					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until	
1	MXA Signal Analyzer	Keysight	N9020A	MY52091402	Aug. 21, 2025	
2	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 12, 2024	
3	PSG Analog Signal Generator	Agilent	E8257D	MY46521908	Dec. 12, 2024	
4	USB Wideband Power Sensor	Keysight	U2021XA	MY55130004	Mar. 21, 2025	
5	USB Wideband Power Sensor	Keysight	U2021XA	MY55130006	Mar. 21, 2025	
6	Wideband Radio Communication Tester	R&S	CMW500	102414	Dec. 12, 2024	
7	RF Control Unit	Tonscend	JS0806-2	/	Aug. 21, 2025	
8	Test Software	Tonscend	JS1120-3	V3.3.38	/	
9	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 21, 2025	

		Radiated I	Emission		
Item	Test Equipment	Manufacturer	Serial No.	Calibrated Until	
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9163	01026	Dec. 18, 2024
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Sep. 25, 2025
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 12, 2024
4	Broadband Amplifier	SCHWARZBECK	BBV9743B	259	Dec. 12, 2024
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 12, 2024
6	3m chamber 3	YIHENG	EE106	/	Aug. 28, 2026
7	Test Software	FARA	EZ-EMC	FA-03A2	/

	Conducted Emission												
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until								
1	LISN	R&S	ENV216	101112	Dec. 12, 2024								
2	LISN	R&S	ENV216	101113	Dec. 12, 2024								
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 12, 2024								
4	ISN CAT6	Schwarzbeck	NTFM 8158	CAT6-8158-0046	Dec. 12, 2024								
5	ISN CAT5	Schwarzbeck	NTFM 8158	CAT5-8158-0046	Dec. 12, 2024								
6	Test Software	R&S	EMC32	6.10.10	/								

Note: 1. The Cal. Interval was one year.

- 2. The Cal. Interval was three years of the antenna.
- 3. The cable loss has been calculated in test result which connection between each test instruments.

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# 3. TEST ITEM AND RESULTS

# 3.1. Conducted Emission

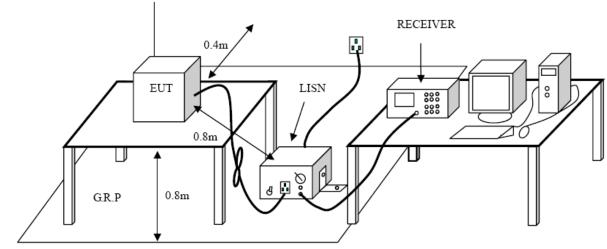
# <u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.207 / RSS-Gen 8.8

	Conducted Limit (dBµV)							
Frequency (MHz)	Quasi-peak	Average						
0.15 - 0.5	66 to 56 *	56 to 46 *						
0.5 - 5	56	46						
5 - 30	60	50						

\* Decreases with the logarithm of the frequency.

## Test Configuration



## Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.

2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.

3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm / 50  $\mu$ H coupling impedance for the measuring equipment. 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

8. During the above scans, the emissions were maximized by cable manipulation.

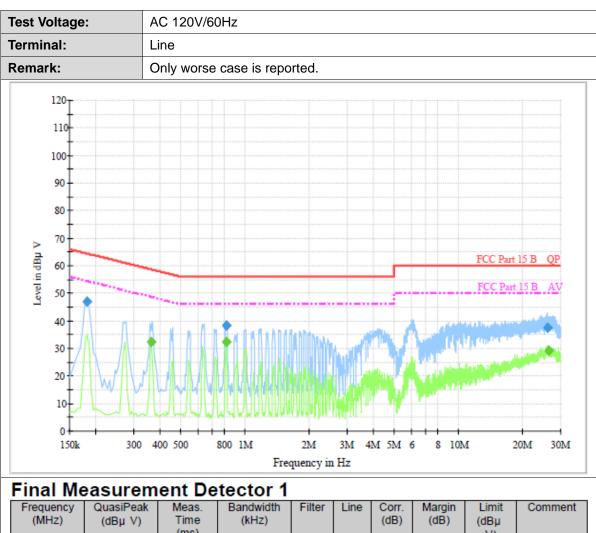
## Test Mode

Please refer to the clause 2.4.

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	(MHz)	(dBµ V)	Time (ms)	(kHz)	Filler	Line	(dB)	(dB)	(dBµ V)	Comment
Γ	0.181500	47.0	1000.00	9.000	On	L1	9.5	17.4	64.4	
Γ	0.811500	38.1	1000.00	9.000	On	L1	9.5	17.9	56.0	
	26.133000	37.6	1000.00	9.000	On	L1	9.7	22.4	60.0	

# Final Measurement Detector 2

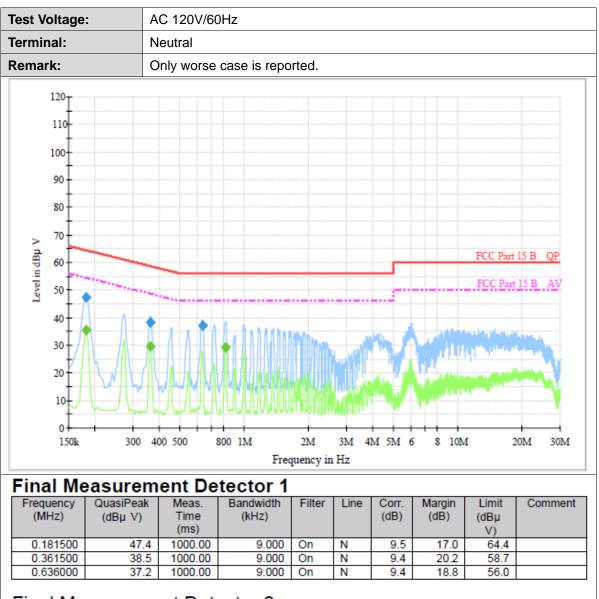
Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.361500	32.5	1000.00	9.000	On	L1	9.5	16.2	48.7	
0.811500	32.2	1000.00	9.000	On	L1	9.5	13.8	46.0	
26.241000	29.3	1000.00	9.000	On	L1	9.7	20.7	50.0	
Emission Lev	/el = Read	Level + C	orrect Facto	r					

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# Final Measurement Detector 2

	Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
ſ	0.181500	35.7	1000.00	9.000	On	N	9.5	18.7	54.4	
	0.361500	29.6	1000.00	9.000	On	N	9.4	19.1	48.7	
	0.811500	29.1	1000.00	9.000	On	N	9.4	16.9	46.0	

Emission Level = Read Level + Correct Factor

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# 3.2. Radiated Emission

# <u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.209 / RSS-Gen 8.9

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

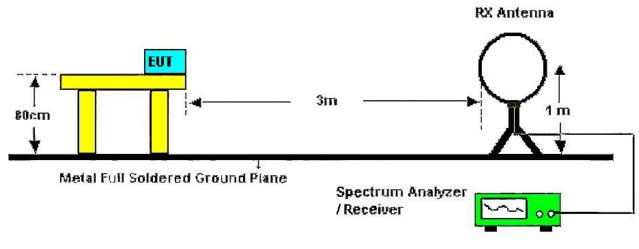
Frequency Pango (MHz)	dBµV/m (at 3 meters)						
Frequency Range (MHz)	Peak	Average					
Above 1000	74	54					

#### Note:

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

(2) Emission Level ( $dB\mu V/m$ )=20log Emission Level ( $\mu V/m$ ).

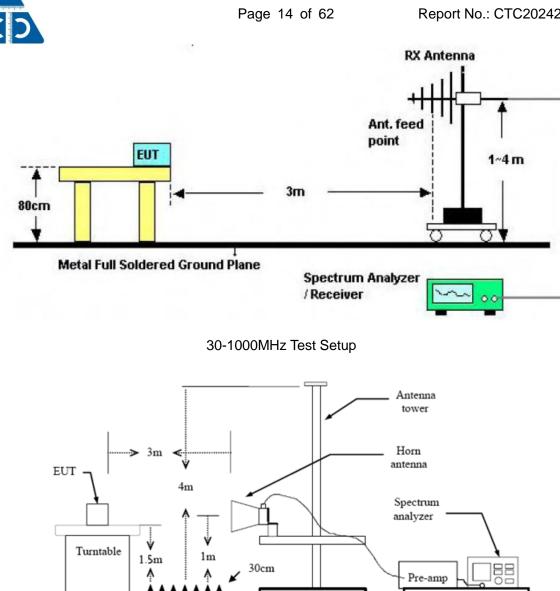
## **Test Configuration**



Below 30MHz Test Setup

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Above 1GHz Test Setup

## **Test Procedure**

1. The EUT was setup and tested according to ANSI C63.10:2013.

The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for 2. above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.

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

For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna 4. tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

Set to the maximum power setting and enable the EUT transmit continuously. 5.

Use the following spectrum analyzer settings 6.

Span shall wide enough to fully capture the emission being measured; (1)

(2) 9k – 150kHz:

RBW=300 Hz, VBW=1 kHz, Sweep=auto, Detector function=peak, Trace=max hold (3) 0.15M – 30MHz:

RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold (4) 30M - 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold

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If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the guasi-peak detector and reported.

(5) From 1 GHz to 10<sup>th</sup> harmonic:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.10 Duty Cycle.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

#### 9 kHz~30 MHz

From 9 kHz to 30 MHz: The conclusion is PASS.

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

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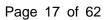


nt.	Pol.	Horizontal																	
ſest	Mode:			ТΣ	X GFSK Mode 2402MHz														
Rem	ark:		Only worse case is reported.																
90.0	dB uV/m	n																_	
80																			
70										_							$\downarrow$	_	
60										+		FCC Part	15 RE-CI	as: B 3	0-100	OM	_	_	
50										_		Margin -					-+	┨	
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0																			
-10 31	D.000		60	0.00					[MHz]		30	0.00						000	. OI
	No.	Free (N	que MHz	-				ing V)	Factor (dB/m)	-	.evel 3uV/m)	1	nit V/m)	Mar (d		De	tect	tor	
	1	210	0.78	60		4	9.3	37	-18.99	3	0.38	43	.50	-13	.12	(	٦P		t
	2 *	233	3.34	86		5	5.9	95	-18.19	3	37.76	46	.00	-8.	24	(	٦P		t
	3	299	9.31	58		5	2.8	37	-15.69	3	37.18	46	.00	-8.	82	(	٦P		ľ
	4	747	7.48	24		4	0.4	13	-4.83	3	35.60	46	.00	-10	.40	(	٦P		İ
	5	848	3.05	62		4	0.5	58	-3.28	3	37.30	46	.00	-8.	70	(	٦P		t
	6	948	3.76	08	+	3	7.4	11	-1.71	2	5.70	46	.00	-10	30	(	٦P		t

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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t. Pol.			tical										
st Mod	e:	ТХ	GFSI	K Mod	e 2402MHz								
mark:		Onl	Only worse case is reported.										
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լ այսներ	Latala Med	M. WWW.W		th	<u></u>	Mark Marker	When Artener M	Maria C	We will				
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No	Freque		1	ading BuV)	Factor (dB/m)	Level (dBuV/m)		nit V/m)	Mar (dl		De	etec	tor
		<u> </u>	· ·							<u> </u>		~ ~ ~	
1				7.49	-16.79	30.70	40		-9.			QP	
2	233.34			9.90	-18.19	31.71	46	.00	-14			QP	
3	299.31	58	4	7.35	-15.69	31.66	46	.00	-14	.34		QP	<u> </u>
4	649.65	596	4	0.22	-6.70	33.52	46	00	-12	.48		QP	)
4	747.40	325	3	8.61	-4.83	33.78	46	.00	-12	22		QP	,
4	747.48					1							

2.Margin value = Level -Limit value

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Ant.	Pol.		Ho	orizontal								
Test	Mode:		ТΧ	TX GFSK Mode 2402MHz								
Rem	nark:		No lim		he emission	which more	than 20 dB	below th	e prescrib			
	No.	Frequenc (MHz)	y	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector			
	1	2296.417	7	42.74	-3.48	39.26	74.00	-34.74	peak			
	2	3984.500	)	42.57	0.47	43.04	74.00	-30.96	peak			
	3	6538.167	7	36.85	7.44	44.29	74.00	-29.71	peak			
	4	8006.917	7	38.40	10.85	49.25	74.00	-24.75	peak			
	5	9624.500	)	38.97	12.66	51.63	74.00	-22.37	peak			
	6 *	11199.00	0	38.42	14.88	53.30	74.00	-20.70	peak			

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	46.86	-7.61	39.25	74.00	-34.75	peak
2	4807.000	41.40	2.08	43.48	74.00	-30.52	peak
3	7411.583	37.67	10.22	47.89	74.00	-26.11	peak
4	9181.917	38.16	12.24	50.40	74.00	-23.60	peak
5	10768.167	37.03	14.49	51.52	74.00	-22.48	peak
6 *	12123.333	37.06	15.80	52.86	74.00	-21.14	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1438.667	45.59	-6.85	38.74	74.00	-35.26	peak
2	5320.083	38.70	3.19	41.89	74.00	-32.11	peak
3	8003.000	38.85	10.86	49.71	74.00	-24.29	peak
4	9738.083	37.50	12.89	50.39	74.00	-23.61	peak
5	11128.500	38.02	14.85	52.87	74.00	-21.13	peak
6 *	12436.667	37.28	15.71	52.99	74.00	-21.01	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2441MHz					
Remark:	No report for the emission which more than 20 dB below the prescribed limit.					

	No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	1199.750	50.44	-7.59	42.85	74.00	-31.15	peak
	2	5692.167	39.21	4.38	43.59	74.00	-30.41	peak
	3	7983.417	37.62	10.84	48.46	74.00	-25.54	peak
Γ	4	9440.417	37.22	12.55	49.77	74.00	-24.23	peak
	5 *	11140.250	38.57	14.84	53.41	74.00	-20.59	peak
	6	12460.167	36.99	15.77	52.76	74.00	-21.24	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2480MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1493.500	46.31	-6.88	39.43	74.00	-34.57	peak
2	4391.833	40.13	1.14	41.27	74.00	-32.73	peak
3	6432.417	39.42	7.11	46.53	74.00	-27.47	peak
4	9142.750	37.97	12.11	50.08	74.00	-23.92	peak
5	10787.750	37.76	14.53	52.29	74.00	-21.71	peak
6 *	12338.750	37.05	15.70	52.75	74.00	-21.25	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2480MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	48.70	-7.61	41.09	74.00	-32.91	peak
2	4807.000	40.15	2.08	42.23	74.00	-31.77	peak
3	6444.167	38.72	7.16	45.88	74.00	-28.12	peak
4	8014.750	38.31	10.83	49.14	74.00	-24.86	peak
5	10873.917	37.61	14.63	52.24	74.00	-21.76	peak
6 *	12722.583	36.10	16.43	52.53	74.00	-21.47	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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Ant. Pol. Horizontal									
Test	st Mode: TX π/4-DQPSK Mode 2402MHz								
Remark: No report for the emission which more than 20 dB below the presc limit.						e prescrib			
	No.	Frequence (MHz)	y	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	3945.33	3	41.34	0.32	41.66	74.00	-32.34	peak
	2	6397.16	7	39.07	7.01	46.08	74.00	-27.92	peak
	3	8077.41	7	38.22	10.67	48.89	74.00	-25.11	peak
	4	9209.33	3	38.60	12.31	50.91	74.00	-23.09	peak
	L								<u> </u>

14.67

15.64

52.47

52.55

74.00

74.00

-21.53

-21.45

peak

peak

## Remarks:

5

6 \*

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

37.80

36.91

2.Margin value = Level -Limit value

10909.167

12385.750

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2402MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1199.750	48.49	-7.59	40.90	74.00	-33.10	peak
2	4807.000	39.99	2.08	42.07	74.00	-31.93	peak
3	7341.083	40.00	10.20	50.20	74.00	-23.80	peak
4	9671.500	37.91	12.75	50.66	74.00	-23.34	peak
5 *	10772.083	38.48	14.50	52.98	74.00	-21.02	peak
6	12197.750	37.02	15.88	52.90	74.00	-21.10	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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Ant. Pol. Horizontal								
Test Mode:	٦	TX π/4-DQPSK Mode 2441MHz						
Remark:		lo report for th mit.	ne emission	which more	than 20 dl	B below the prescribed		
	Frequency	uency Reading Eactor Level Limit Margin						

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1438.667	45.99	-6.85	39.14	74.00	-34.86	peak
2	3937.500	40.09	0.29	40.38	74.00	-33.62	peak
3	6600.833	38.03	7.62	45.65	74.00	-28.35	peak
4	8809.833	38.25	11.33	49.58	74.00	-24.42	peak
5	10509.667	38.44	14.04	52.48	74.00	-21.52	peak
6 *	12045.000	37.08	15.70	52.78	74.00	-21.22	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol. Test Mode: Remark:		Vertical	Vertical							
Test Mode:		TX π/4-DQPS	K Mode 244	1MHz						
Remark:		No report for t limit.	No report for the emission which more than 20 dB below the prescribed limit.							
	No.	Frequenc (MHz)	y Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector		
	4	4400 754	40.40	7.50	40.00	74.00	00.44		ſ	

		(ubuv)	(ub/iii)	(ubu v/m)	(ubuv/iii)	(ub)	
1	1199.750	48.48	-7.59	40.89	74.00	-33.11	peak
2	4807.000	40.00	2.08	42.08	74.00	-31.92	peak
3	6514.667	38.09	7.37	45.46	74.00	-28.54	peak
4	8030.417	39.63	10.78	50.41	74.00	-23.59	peak
5	9789.000	37.03	12.98	50.01	74.00	-23.99	peak
6 *	11704.250	37.50	15.28	52.78	74.00	-21.22	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2480MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4752.167	40.15	1.97	42.12	74.00	-31.88	peak
2	6455.917	37.67	7.19	44.86	74.00	-29.14	peak
3	7889.417	37.98	10.64	48.62	74.00	-25.38	peak
4	10024.000	37.13	13.33	50.46	74.00	-23.54	peak
5 *	11159.833	38.05	14.86	52.91	74.00	-21.09	peak
6	12710.833	36.20	16.40	52.60	74.00	-21.40	peak

#### Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2480MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	47.44	-7.61	39.83	74.00	-34.17	peak
2	4807.000	41.71	2.08	43.79	74.00	-30.21	peak
3	7012.083	37.70	9.21	46.91	74.00	-27.09	peak
4	9189.750	38.95	12.27	51.22	74.00	-22.78	peak
5 *	10548.833	38.42	14.09	52.51	74.00	-21.49	peak
6	12346.583	36.54	15.68	52.22	74.00	-21.78	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

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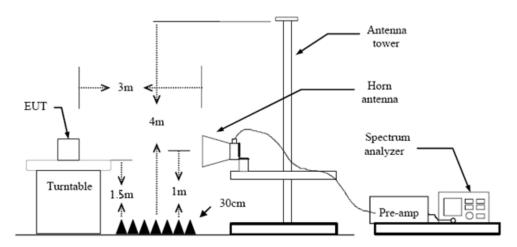
# 3.3. Band Edge Emissions (Radiated)

<u>Limit</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d) / RSS-247 5.5

Restricted Frequency Band	(dBµV/m	ı) (at 3m)
(MHz)	Peak	Average
2310 ~ 2390	74	54
2483.5 ~ 2500	74	54

## Test Configuration



## Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.

2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.

3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.10 Duty Cycle.

## Test Mode

Please refer to the clause 2.4.

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	GFSK	M. I. O	Horizontal									
		Wode 24	402MHz									
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						FCC Part15	C - Above 10	a PK 🛛				
						FCC Part15		AV				
							×					
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								<u> </u>				
0.00 2212.0	1 7774		C 00 (MU)		0.00	2272 00 2755	4 00 33	95.00	240			
Frequenc (MHz)			Factor (dB/m)				Margin (dB)	Deteo	tor			
2390.000	) 1	6.39	31.31	47.	70	74.00	-26.30	pea	ık			
2390.000	) .	4.55	31.31	35.	86	54.00	-18.14	AV	G			
	Frequenc (MHz) 2390.000	Frequency (MHz) (d 2390.000 1	Frequency (MHz) Reading (dBuV) 2390.000 16.39	Frequency (MHz)         Reading (dBuV)         Factor (dB/m)           2390.000         16.39         31.31	Frequency (MHz)         Reading (dBuV)         Factor (dB/m)         Lev (dBuV)           2390.000         16.39         31.31         47.	Frequency (MHz)         Reading (dBuV)         Factor (dB/m)         Level (dBuV/m)           2390.000         16.39         31.31         47.70	Frequency (MHz)         Reading (dBuV)         Factor (dB/m)         Level (dBuV/m)         Limit (dBuV/m)           2390.000         16.39         31.31         47.70         74.00	Frequency (MHz)       Reading (dBuV)       Factor (dBnm)       Level (dBuV/m)       Limit (dBuV/m)       Margin (dB)         2390.000       16.39       31.31       47.70       74.00       -26.30	Frequency (MHz)       Reading (dBuV)       Factor (dB/m)       Level (dBuV/m)       Limit (dBuV/m)       Margin (dBuV/m)       Detection         2390.000       16.39       31.31       47.70       74.00       -26.30       pea			

2.Margin value = Level -Limit value

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Ant.	Pol.		Ve	ertical						
ſest	Mode:		G	FSK Mode 2	402MHz					
120.	0 dBuV/m									_
110										_
100									8	_
90									+	$\neg$
80							FCC Part15	C - Above 10	арк ()	$\neg$
70									+	=
60							FCC Part15	C - Above 10		$\neg$
50								1 X		-
40								Z		ana
30										_
20										-
10										-
0.0		299.40 2	311.40	2323.40 23	35.40 (MHz)	2359.40	2371.40 23	83.40 23	95.40	2407
	No.	Frequ (MF	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecto	or
	1	2390.	000	15.79	31.31	47.10	74.00	-26.90	peak	:
	2 *	2390.	000	4.76	31.31	36.07	54.00	-17.93	AVG	

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Ant.	Pol.		Horiz	ontal						
Test	Mode:		GFSł	K Mode 2	480MHz					
120.0	D dBuV/m				1				1	
110										<u> </u>
100										
90	L_A									<u> </u>
80	$\square$							ECC Part15	C - Above 10	C PK
70								Teerura		
60	$\square$							FCC Part15	C - Above 10	GAN
50	1 X									
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30										<u>+</u>
20										<u> </u>
10 0.0										
	474.500 Z	486.60 2498.	60 251	0.60 252	22.60 (MH	z] 254	6.60	2558.60 25	70.60 25	82.60 2594.60
	No.	Frequen (MHz)		eading dBuV)	Factor (dB/m)			Limit (dBuV/m)	Margin (dB)	Detector
	1	2483.50	0	16.30	31.48	47.	78	74.00	-26.22	peak
	2 *	2483.50	0	4.98	31.48	36.	46	54.00	-17.54	AVG

Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value

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t. Pol.		Ve	rtical					
st Mode:		GF	SK Mode 2	480MHz				
20.0 dBuV/	/m							
10								
ĵ								
						FCC Part15	C - Above 10	РК
						FCC Part15	C - Above 10	AV
	X							
durin	-				man and an and the matches and		-	-
·								
.0 2472.200	2484.20 24	96.20	2508.20 25	20.20 (MHz)	2544.20	2556.20 25	68.20 25	80.20 253
No.	Freque (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.5		4.70	31.48	36.18	74.00	-37.82	peak
2 *	2483.5		16.32	31.48	47.80	74.00	-26.20	peak
2	2403.0	00	10.52	31.40	47.00	74.00	-20.20	реак

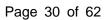
2.Margin value = Level -Limit value

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		н	Horizontal										
est Mode:		π	π /4-DQPSK Mode 2402MHz										
120.0 dBuV/n	n 												
110													
100													
90													
80													
70						FCC Part15	C - Above 1	<mark>Б РК</mark>					
50													
50						FCC Part15	C - Above 1	GAV					
40							X						
30							÷.	m hallower					
20													
10				1 1									
0.0 2291.600 2	303.60 231	5.60	2327.50 23	39.60 (MHz)	2363.60	2375.60 23	87.60 23	99.60 24					
	303.60 231	5.60	2327.50 23	39.60 (MHz)	2363.60	2375.60 23	87.60 23	99.60 24					
	303.60 231 Frequer (MHz	ncy	2327.50 233 Reading (dBuV)	Factor (dB/m)	Level	2375.60 23 Limit (dBuV/m)	87.60 23 Margin (dB)	99.60 24 Detector					
2291.500 2	Frequer	ncy )	Reading	Factor	Level	Limit	Margin						

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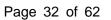
nt.	Pol.		Ve	Vertical											
est	Mode:		π	π /4-DQPSK Mode 2402MHz											
120.	) dBuV/m														
110															
100															
90										Λ					
80										ТЦ					
70								FCC Part19	i C - Above 1	G PK					
_															
60								FCC Part1	i C - Above 1	G AV					
50									X						
40						ana	· ***	moderne southeasthe		and the					
30															
20															
10 0.0															
	288.500 Z	300.60 23	12.60	2324.60 23	36.60 (MHz) 2360.60			2372.60 23	396.60 24						
	No.	Freque (MH2		Reading (dBuV)	Factor (dB/m)	Lev (dBu)		Limit (dBuV/m)	Margin (dB)	Detector					
	1	2390.0	000	15.93	31.31	47.	24	74.00	-26.76	peak					
		2390.0	000	4.53	31.31	35.	84	54.00	-18.16	AVG					
	2 *		<b>N N I</b>	4.53	01.31	30.	04	54.00	-10.10	AVG					

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est Mode:		Horizontal									
		π /4-DQPSK Mode 2480MHz									
120.0 dBuV/m							1				
110											
100											
90											
80											
						FCC Part15	C - Above 10	а РК			
70											
60						FCC Part15	C - Above 10	AV			
- 1 - 1 - 1	X										
40 minut		mandradora				and a state of the		-			
30											
20											
10											
0.0 2471.500 24	483.60 2495.	. <u>60 Z</u>	507.60 25	19.60 (MHz)	2543.60	2555.60 250	67.60 251	79.60 25			
No.	Frequence (MHz)	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector			
1	2483.50	0	4.67	31.48	36.15	74.00	-37.85	peak			
2 *	2483.50	0	16.48	31.48	47.96	74.00	-26.04	peak			

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Ant. Pol.					Vertical											
Test Mode: π /						π /4-DQPSK Mode 2480MHz										
120.0	) dBuV/n	n														
110																
100																
90	A															
80													FCC Part15	C . About	10 04	
70													FCC Fatts	C - ADOVC		
60												FCC Part18	C - Above	1G AV		
50		×														
40	mina				custored and a series and the second series the										hin and the	-
30																
20																
10 0.0																
	72.200 Z	484.20	2496	5.20	2508.	20 2	520.20	[MH	z)	254	4.20	255	6.20 25	68.20	2580.20	259
	No.		quer MHz			ading BuV)		actor B/m)		Lev dBu			Limit 3uV/m)	Margi (dB)	n <sub>Det</sub>	ector
	1	24	83.50	00	4	.62	3	1.48		36.	10	74.00		-37.90	) pe	ak
	2 *	24	83.50	00	1	6.23	3	1.48		47.	71	7	4.00	-26.29	) pe	ak
lema	arks:															

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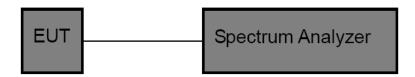
# 3.4. Band Edge and Spurious Emissions (Conducted)

## <u>Limit</u>

## FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d) / RSS-247 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

## Test Configuration



## **Test Procedure**

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously.
- Use the following spectrum analyzer settings: RBW = 100 kHz, VBW ≥ RBW, scan up through 10<sup>th</sup> harmonic. Sweep = auto, Detector function = peak, Trace = max hold.
- 4. Measure and record the results in the test report.

## Test Mode

Please refer to the clause 2.4.

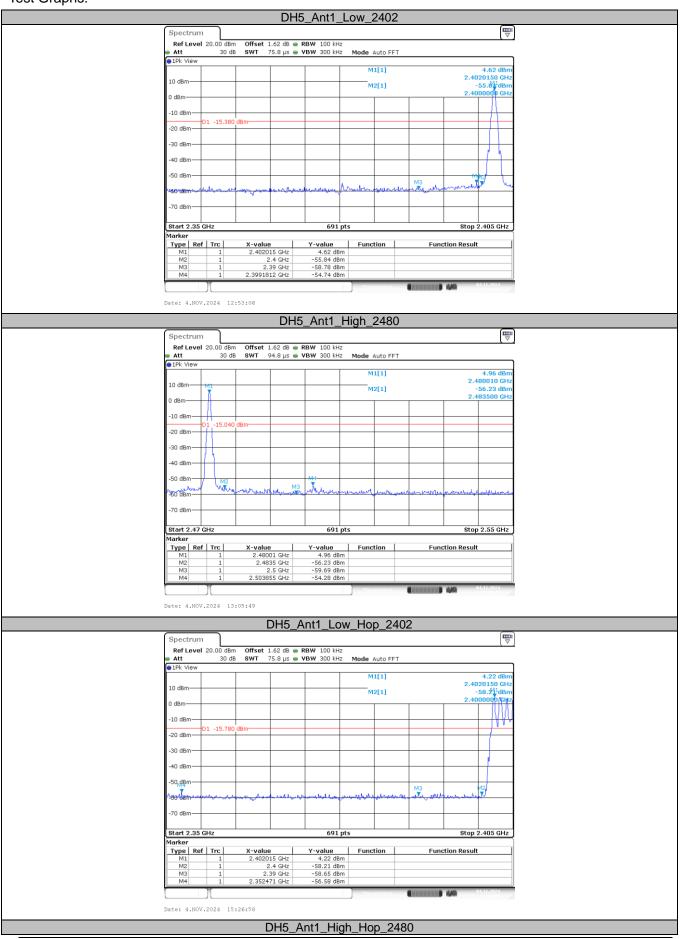
## Test Result

#### Band edge measurement

Test Mode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
		Low	2402	4.62	-54.74	≤-15.38	PASS
DH5	Ant1 Ant1	High	2480	4.96	-54.28	≤-15.04	PASS
DHD		Low	Hop_2402	4.22	-56.58	≤-15.78	PASS
		High	Hop_2480	4.30	-56.32	≤-15.70	PASS
		Low	2402	1.80	-52.62	≤-18.20	PASS
2DH5		High	2480	2.53	-55.43	≤-17.47	PASS
2000		Low	Hop_2402	2.39	-56.04	≤-17.61	PASS
		High	Hop_2480	4.55	-55.94	≤-15.45	PASS

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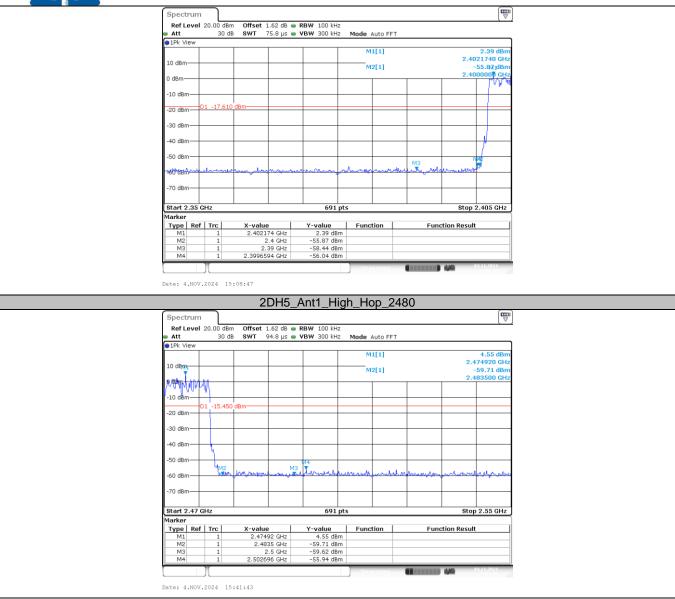
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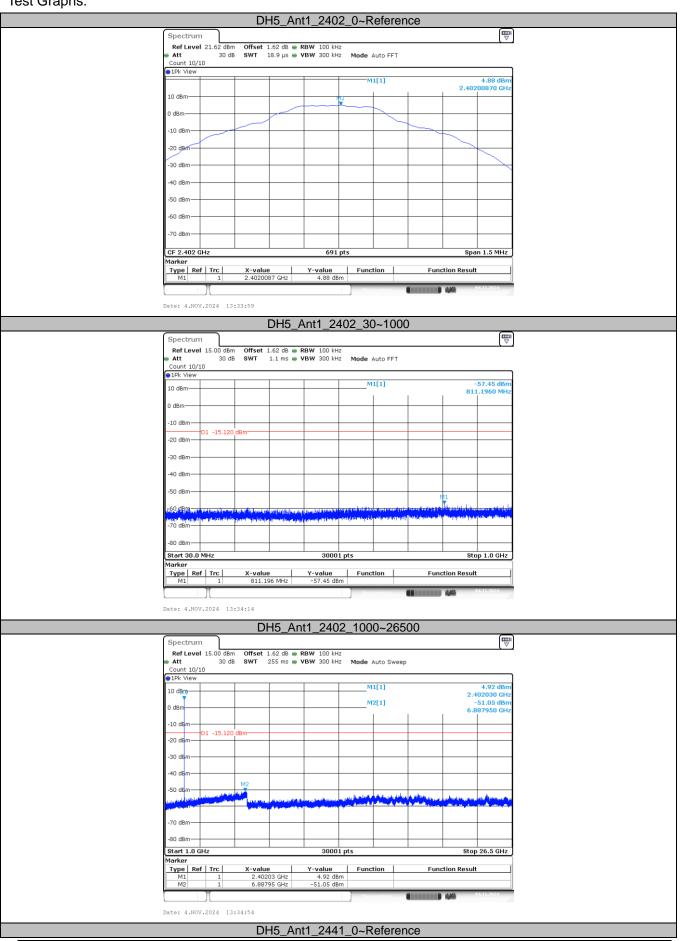


#### **Conducted Spurious Emission**

Test Mode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
			Reference	4.88	4.88		PASS
		2402	30~1000	4.88	-57.45	≤-15.12	PASS
			1000~26500	4.88	-51.05	≤-15.12	PASS
			Reference	5.26	5.26		PASS
DH5	Ant1	2441	30~1000	5.26	-58.28	≤-14.74	PASS
		2480	1000~26500	5.26	-50.95	≤-14.74	PASS
			Reference	5.35	5.35		PASS
			30~1000	5.35	-57.45	≤-14.65	PASS
			1000~26500	5.35	-50.00	≤-14.65	PASS
			Reference	2.38	2.38		PASS
		2402	30~1000	2.38	-58.09	≤-17.62	PASS
			1000~26500	2.38	-50.87	≤-17.62	PASS
			Reference	2.75	2.75		PASS
2DH5	Ant1	2441	30~1000	2.75	-57.66	≤-17.25	PASS
			1000~26500	2.75	-50.88	≤-17.25	PASS
			Reference	2.85	2.85		PASS
		2480	30~1000	2.85	-57.07	≤-17.15	PASS
			1000~26500	2.85	-49.73	≤-17.15	PASS

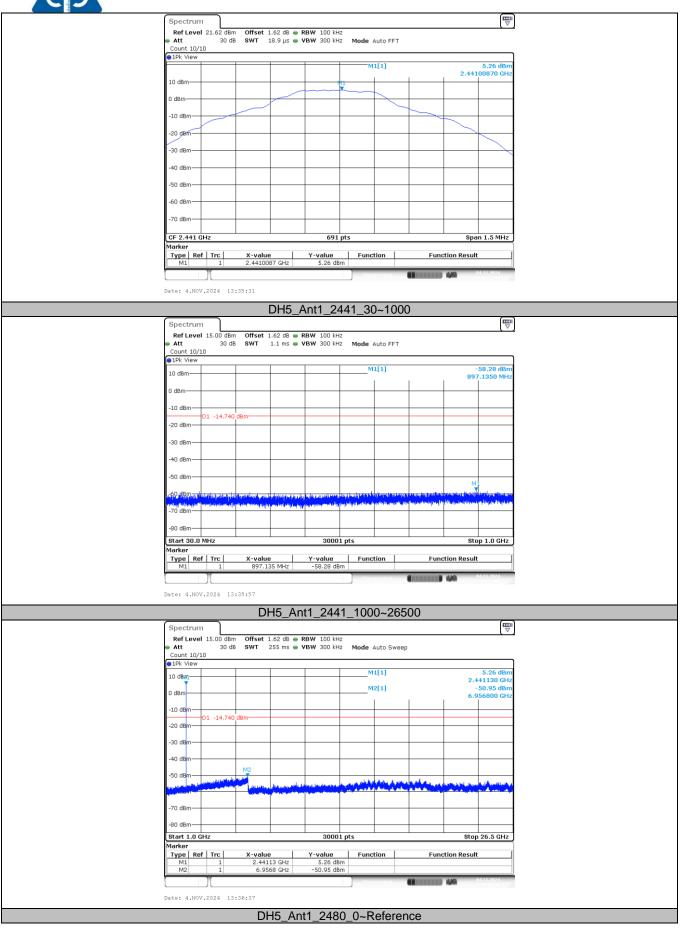
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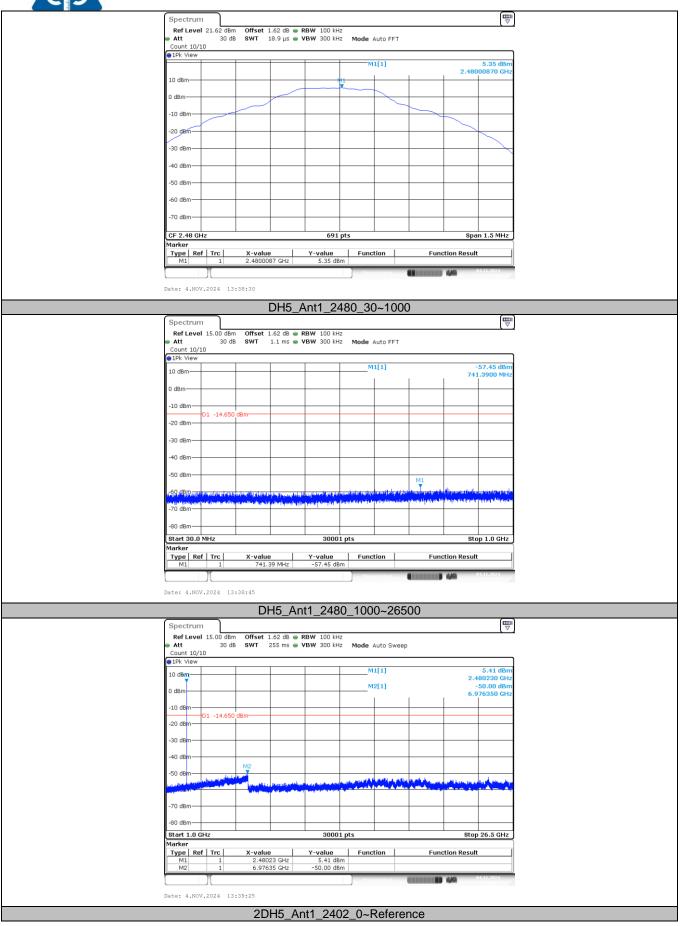
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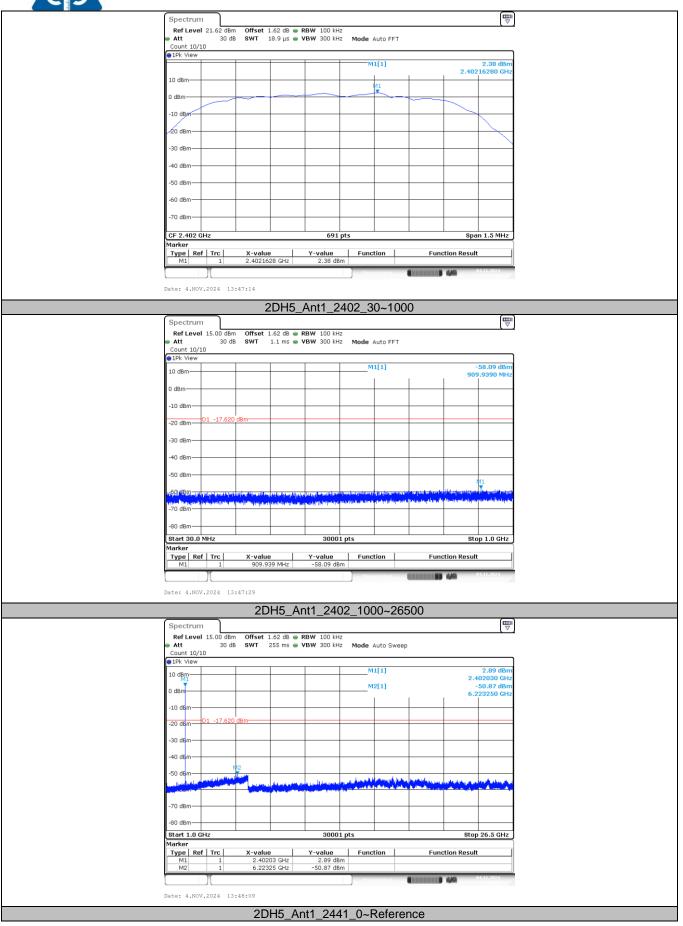
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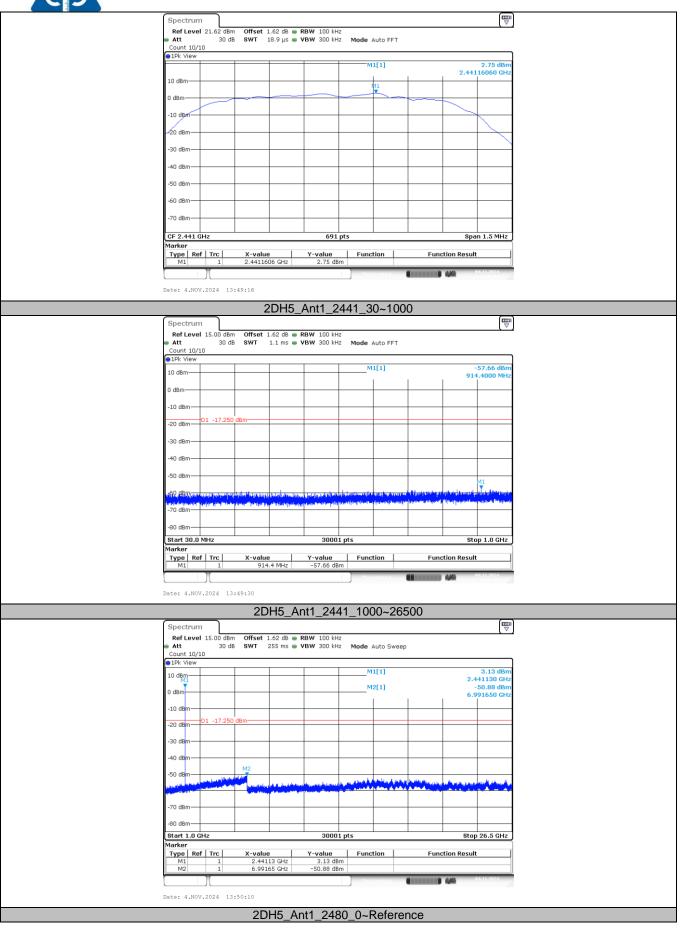
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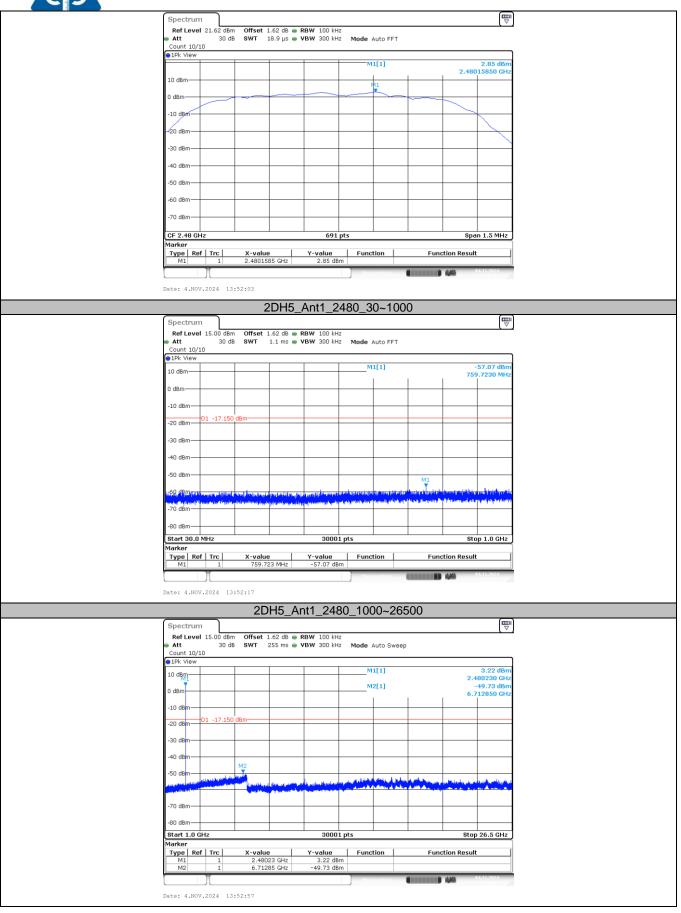
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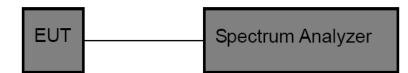


# 3.5. 20dB Bandwidth

<u>Limit</u>

N/A

# **Test Configuration**



# Test Procedure

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. OCB and 20dB Spectrum Setting:
  - (1) Set RBW =  $1\% \sim 5\%$  occupied bandwidth.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

Note: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

# Test Mode

Please refer to the clause 2.4.

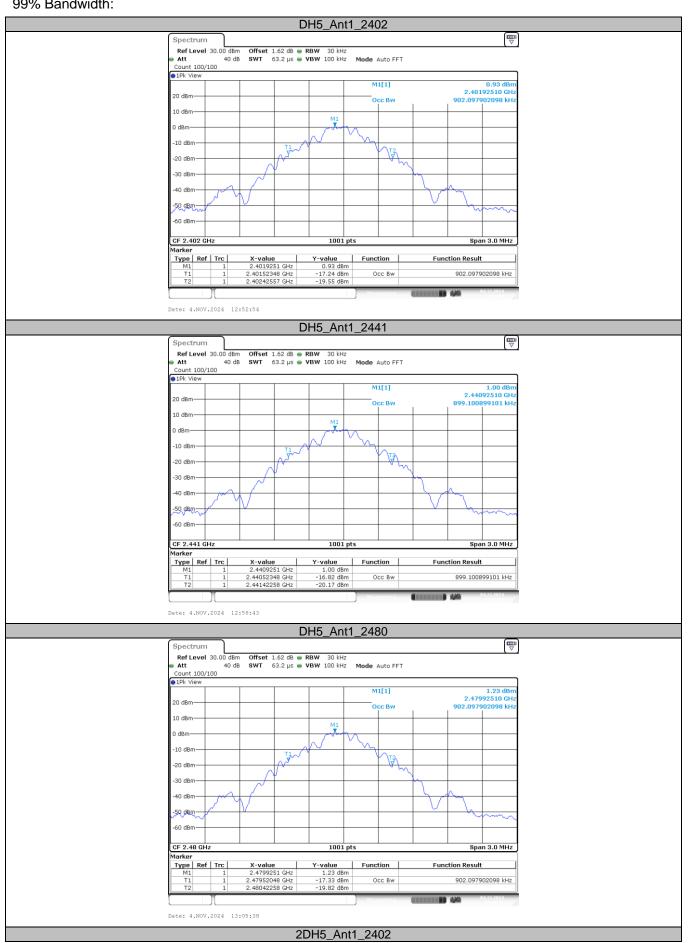
# Test Result

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
	2402	0.902	1.038	0.692
GFSK	2441	0.899	1.035	0.690
	2480	0.902	1.035	0.690
	2402	1.181	1.332	0.888
π/4-DQPSK	2441	1.184	1.329	0.886
	2480	1.184	1.332	0.888

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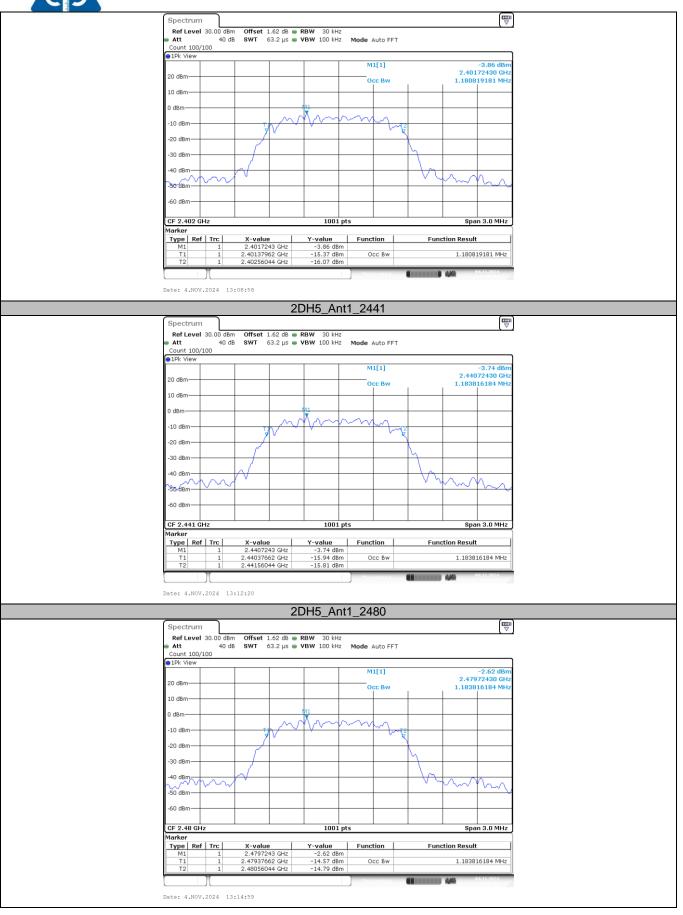
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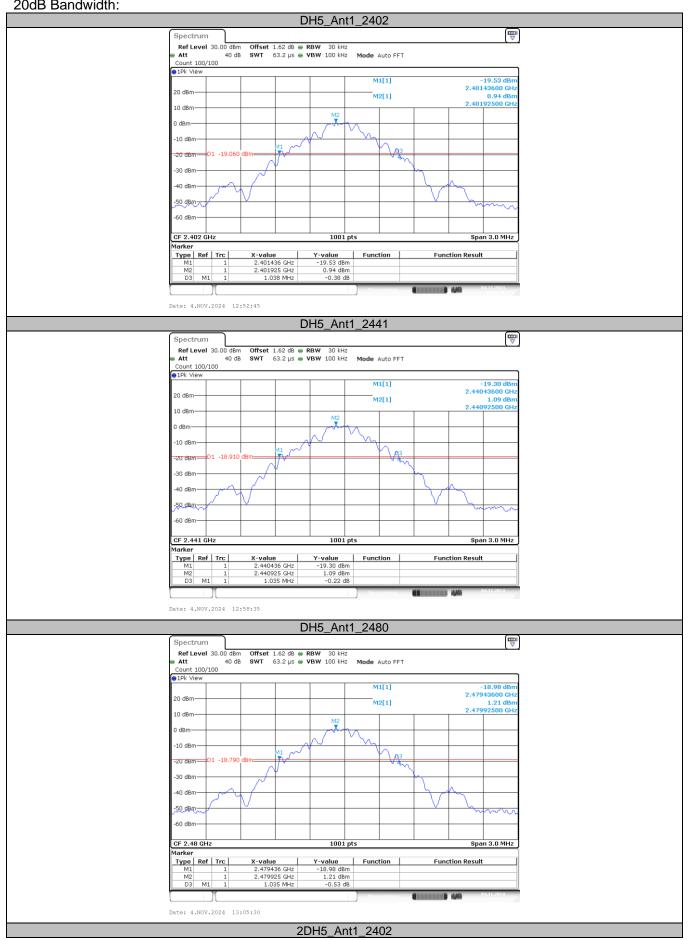
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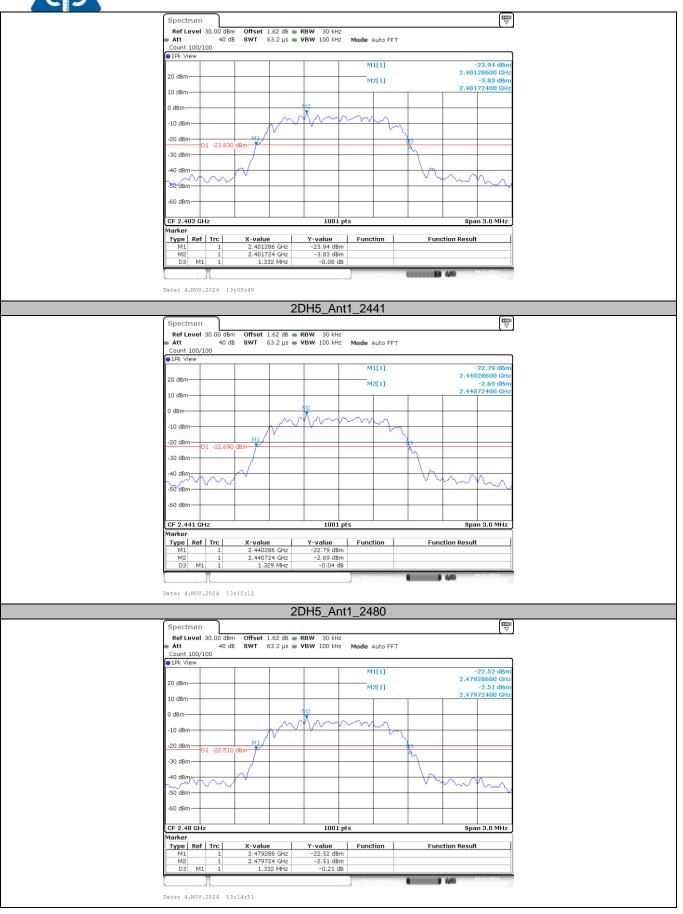
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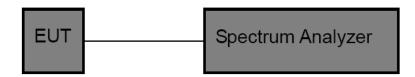
# 3.6. Channel Separation

<u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1) / RSS-247 5.1 b

Test Item	Limit	Frequency Range (MHz)
Channel Separation	>25kHz or >two-thirds of the 20 dB bandwidth Which	2400~2483.5
	is greater	

# **Test Configuration**



# Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

- 2. Spectrum Setting:
  - (1) Set RBW = 100 kHz.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.
  - (4) Trace mode = Max hold.
  - (5) Sweep = Auto couple.

# Test Mode

Please refer to the clause 2.4.

# Test Result

Test Mode	Frequency (MHz)	Carrier Frequencies Separation (MHz)	Limit (MHz)	Verdict
GFSK	Hop_2441	1.000	>0.690	Pass
π /4-DQPSK	Hop_2441	1.003	>0.886	Pass

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	_			
		DH5_Ant1_Hop		
Spectrum				
Ref Level 30.00 dB	3m Offset 1.62 dB 👄 I	RBW 100 kHz		
<ul> <li>Att 40 ( Count 100/100</li> </ul>	dB SWT 18.9 µs 👄 '	VBW 300 kHz Mode Auto	FFT	
●1Pk View				
		M1[1]	4.3 2.4410101	0 dBm 5 CHz
20 dBm		D2[1]	0	.07 dB
10 dBm	MI		1.0000	0 MHz
	MI			
0 dBm				
-10 dBm	+			~
-20 dBm				
-30 dBm				
-40 dBm				
E0 dBm				
-50 dBm				
-60 dBm				
Start 2.4405 GHz Marker		691 pts	Stop 2.4425	o GHZ
Type Ref Trc	X-value	Y-value Function	Function Result	
M1 1 D2 M1 1	2.44101014 GHz 1.0 MHz	4.30 dBm 0.07 dB		
	1.0 MHZ	Nacend	NG	J D24
		1 Catsure		
Date: 4.NOV.2024 1	5:37:20			
	2	DH5 Ant1 Hop		
Spectrum	21	DH5_Ant1_Hop		(m)
Spectrum Ref Level 30.00 dB				
Ref Level 30.00 dB Att 40	3m Offset 1.62 dB 👄 I		FFT	
Ref Level 30.00 dB Att 40 of Count 100/100	3m Offset 1.62 dB 👄 I	RBW 100 kHz	FFT	
Ref Level 30.00 dB Att 40	3m Offset 1.62 dB 👄 I	RBW 100 kHz	5.9	4 dBm
Ref Level 30.00 dB Att 40 of Count 100/100	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014	4 dBm IS GHz
Ref Level 30.00 dB           Att         40 f           Count 100/100           PIPk View           20 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto	5.9 2.4408014	4 dBm 15 GHz .03 dB
Ref Level 30.00 dB Att 40 Count 100/100 100/100	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0	4 dBm 15 GHz .03 dB
Ref Level 30.00 dB           Att         40 f           Count 100/100           PIPk View           20 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 120/200           1Pk View           20 dBm           10 dBm           0.dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dB           Att         40 i           Count 100/100           1Pk View           20 dBm           10 dBm           -10 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 120/200           1Pk View           20 dBm           10 dBm           0.dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dB           Att         40 i           Count 100/100           1Pk View           20 dBm           10 dBm           -10 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 100/100           Pik View           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dB           Att         40 d           Count 100/100           Plk View           20 dBm           10 dBm           -10 dBm           -20 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 100/100           Pik View           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 120/100           1Pk View           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 100/100           1Pk View           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz .03 dB
Ref Level 30.00 dE           Att         40           Count 120/100           IPk View           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm           Start 2.4405 GHz	3m Offset 1.62 dB 👄 I	RBW 100 kHz VBW 300 kHz Mode Auto M1[1]	5.9 2.4408014 -0 1.0029 D2	4 dBm 15 GHz 03 dB 0 MHz
Ref Level 30.00 dE           Att         40           Count 100/100           PIP View           20 dBm           10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           Start 2.4405 GHz           Marker	am Offset 1.62 dB ● 1 db SWT 18.9 µs ● 1	RBW 100 kHz VBW 300 kHz Mode Auto M1[1] D2[1] D2[1] 691 pts	5.9 2.4408014 -0 1.0029 	4 dBm 15 GHz 03 dB 0 MHz
Ref Level 30.00 dB           Att         40           Count 100/100           Plk View           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -50 dBm           -60 dBm           -50 dBm           -50 dBm           -50 dBm           -50 dBm           -50 dBm	am Offset 1.62 dB ● I dB SWT 18.9 μs ● '	RBW 100 kHz VBW 300 kHz Mode Auto M1[1] D2[1] D2[1] 691 pts Y-value Function	5.9 2.4408014 -0 1.0029 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	4 dBm 15 GHz 03 dB 0 MHz
Ref Level 30.00 dE           Att         40           Count 100/100           PIP View           20 dBm           10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           Start 2.4405 GHz           Marker	am Offset 1.62 dB ● 1 db SWT 18.9 µs ● 1	RBW 100 kHz VBW 300 kHz Mode Auto M1[1] D2[1] D2[1] 691 pts	5.9 2.4408014 -0 1.0029 	4 dBm 15 GHz 03 dB 0 MHz
Ref Level 30.00 dE           Att         40           Count 100/100           10 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           Start 2.4405 GHz           Marker           Type           Ref Trc           Marker	3m Offset 1.62 dB ● I ds SWT 18.9 μs ● 1	RBW 100 kHz         Mode Auto           VBW 300 kHz         Mode Auto           M1[1]         D2[1]           D2[1]         D2[1]           691 pts         Function           5,94 dBm         Function	5.9 2.4408014 -0 1.0029 	4 dBm 15 GHz 03 dB 0 MHz
Ref Level 30.00 dE           Att         40           Count 100/100           10 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           Start 2.4405 GHz           Marker           Type           Ref Trc           Marker	Bm         Offset 1.62 dB ● I           db         SWT         18.9 μs ● '           Image: SWT         18.9 μs ● '	RBW 100 kHz         Mode Auto           VBW 300 kHz         Mode Auto           M1[1]         D2[1]           D2[1]         D2[1]           691 pts         Function           5,94 dBm         Function	5.9 2.4408014 -0 1.0029 2 2 2 3 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5	4 dBm 15 GHz 03 dB 0 MHz

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# 3.7. Number of Hopping Channel

<u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii) / RSS-247 5.1 d

Section	Test Item	Limit
15.247 (a)(iii) RSS-247 5.1 d	Number of Hopping Channel	≥15

# Test Configuration



### **Test Procedure**

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

2. Spectrum Setting:

(1) Peak Detector: RBW=100 kHz, VBW≥RBW, Sweep time= Auto.

# Test Mode

Please refer to the clause 2.4.

#### Test Result

Test Mode	Channel Number	Limit	Verdict
GFSK	79	≥15	Pass
π/4-DQPSK	79	≥15	Pass

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DH5_Ant1_Hop	
Spectrum	
Ref Level 30.00 dBm Offset 1.62 dB  RBW 300 kHz	
Att 40 dB SWT 31.7 μs  VBW 300 kHz Mode Auto FFT	
1Pk View	
20 dBm-	
10 d8m-	
<ul> <li>Bendatababababababababababababababababababa</li></ul>	
-10 dBm	
-20 dBm-	
-30 dBm	
-40 dBm	
-50 dBm-	
-60 dBm	
Start 2.4 GHz 691 pts Stop 2.4835 GHz Marker	
Measuring 🗰 🖬 🗰 04.11.2024	
Date: 4.NOV.2024 14:10:03	
2DH5_Ant1_Hop	
Spectrum (77) Reflevel 30.00 dBm Offset 1.62 dB @ RBW 300 kHz	
Ref Level         30.00 dBm         Offset         1.62 dB         ● RBW         300 kHz           ● Att         40 dB         SWT         31.7 μs         ● VBW         300 kHz         Mode         Auto FFT	
Ref Level 30.00 dBm Offset 1.62 dB 👄 RBW 300 kHz	
Ref Level 30.00 dBm         Offset 1.62 dB         ■ RBW         300 kHz           ● Att         40 dB         SWT         31.7 μs         ● VBW         300 kHz         Mode         Auto FFT           ● 1Pk View         ■         <	
Ref Level         30.00 dBm         Offset         1.62 dB         ● RBW         300 kHz           ● Att         40 dB         SWT         31.7 μs         ● VBW         300 kHz         Mode         Auto FFT	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz           Image: Pick View         Image: Pick View         Image: Pick View         Image: Pick View           20 dBm         10 dBm         Image: Pick View         I	
Ref Level 30.00 dBm         Offset 1.62 dB ● RBW 300 kHz           → Att         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ∞         ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz           Image: Pick View         Image: Pick View <th< td=""><td></td></th<>	
Ref Level 30.00 dBm         Offset 1.62 dB ● RBW 300 kHz           → Att         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ⊗WT         31.7 µs         ¥ WBW 300 kHz           ▲ Ith         40 dB ∞         ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz           Image: Pick View         Image: Pick View <th< td=""><td></td></th<>	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz           Image: Subscript and the set of the set o	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz         Mode Auto FFT           IPR View         Image: state	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz           Image: Subscript and the set of the set o	
Ref Level 30.00 dBm       Offset 1.62 dB         RBW 300 kHz       Made Auto FFT            • Att         40 dB         SWT         31.7 µs         • VBW 300 kHz        Made Auto FFT             • IPk View           10 dBm           10 dBm             10 dBm           10 dBm           10 dBm             -10 dBm           -10 dBm           -10 dBm             -10 dBm           -10 dBm           -10 dBm	
Ref Level 30.00 dBm         Offset 1.62 dB         RBW 300 kHz           Att         40 dB         SWT         31.7 µs         VBW 300 kHz         Mode Auto FFT           IPk View         Image: state	
Ref Level 30.00 dBm       Offset 1.62 dB         RBW 300 kHz       Made Auto FFT            • Att         40 dB         SWT         31.7 µs         • VBW 300 kHz        Made Auto FFT             • IPk View           10 dBm           10 dBm             10 dBm           10 dBm           10 dBm             -10 dBm           -10 dBm           -10 dBm             -10 dBm           -10 dBm           -10 dBm	
Ref Level 30.00 dBm       Offset 1.62 dB         RBW 300 kHz       Made Auto FFT         IPR View       IPR View       IPR View       IPR View         10 dBm       IPR View       IPR View       IPR View         IPR View       IPR View       IPR View       IPR View         10 dBm       IPR View       IPR View       IPR View         IPR View       IPR View	
Ref Level 30.00 dBm       Offset 1.62 dB @ RBW 300 kHz       Mode Auto FFT         ID       40 dB SWT 31.7 µs       VBW 300 kHz       Mode Auto FFT         ID       ID       ID       ID       ID         10 dBm       ID       ID       ID       ID       ID         10 dBm       ID       ID       ID       ID       ID       ID         10 dBm       ID       ID       ID       ID       ID       ID       ID         10 dBm       ID	
Ref Level 30.00 dBm       Offset 1.62 dB         RBW 300 kHz       Made Auto FFT         IPR View       IPR View       IPR View       IPR View         10 dBm       IPR View       IPR View       IPR View         IPR View       IPR View       IPR View       IPR View         10 dBm       IPR View       IPR View       IPR View         IPR View       IPR View	
Ref Level 30.00 dBm       Offset 1.62 dB @ RBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT         Image: Att 40 dB SWT 31.7 µs @ VBW 300 kHz       Mode Auto FFT	

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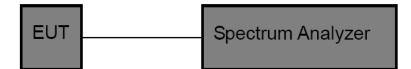
# 3.8. Dwell Time

<u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii) / RSS-247 5.1 d

Section	Test Item	Limit
15.247 (a)(iii) RSS-247 5.1 d	Average Time of Occupancy	0.4 sec

# Test Configuration



### **Test Procedure**

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. Spectrum Setting:
  - (1) Spectrum Setting: RBW=1MHz, VBW≥RBW.
  - (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
  - (3) Sweep Time is more than once pulse time.
  - (4) Set the center frequency on any frequency would be measure and set the frequency span to

zero.

- (5) Measure the maximum time duration of one single pulse.
- (6) Set the EUT for packet transmitting.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

Test Mode	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Нор	0.381	320	0.122	≤0.4	PASS
DH3	Нор	1.636	160	0.262	≤0.4	PASS
DH5	Нор	2.887	100	0.289	≤0.4	PASS
2DH1	Нор	0.390	330	0.129	≤0.4	PASS
2DH3	Нор	1.643	190	0.312	≤0.4	PASS
2DH5	Нор	2.892	130	0.376	≤0.4	PASS

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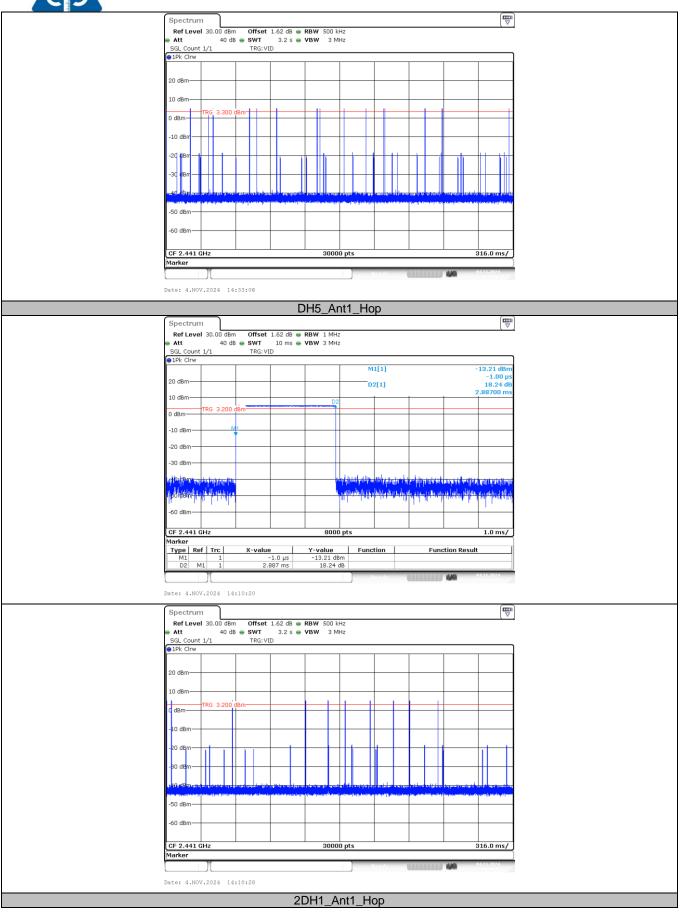
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3 10110 W3.			
	DH1_Ant	1_Hop	
Spectrum			
	set 1.62 dB 👄 RBW 1 MHz T 10 ms 👄 VBW 3 MHz		
SGL Count 1/1 TR	G: VID		
IPk Clrw		M1[1]	-18.48 dBm
20 dBm		D2[1]	-1.00 μs 23.67 dB
10 dBm			381.00 µs
0 dBm TRG 3.400 dBm			
-10 dBm			
M1			
-20 dBm			
-30 dBm			
ATTRACTOR AND A CONTRACT AND A CONTRACT OF A	n i se di a constitui e se della seco della poste dan Periopia dese pittal per teste per administrato del tra pittal en f	and the second state of the linear	na sanan dala dala dapan's
a filia faith a the state of the	la in the phillip is in product of the factor of the phillip is th	والمقابلة والمتعاقلية والتألك فتقتر	hild light in a line with the party of the second
-60 dBm			· · · ·
CF 2.441 GHz	8000 p		1.0 ms/
Marker			
Type         Ref         Trc         X-v           M1         1         1         1         1	alue Y-value -1.0 μs -18.48 dBm	Function Fu	Inction Result
D2 M1 1	381.0 µs 23.67 dB		0.1.11.202.1
		Ready	
Date: 4.NOV.2024 14:12:05			
Spectrum			
Ref Level 30.00 dBm Off	set 1.62 dB 👄 RBW 500 kHz T 3.2 s 👄 VBW 3 MHz		
SGL Count 1/1 TR	G: VID		
1Pk Clrw			
20 dBm			
10 40 m			
10 dBm			
0 dBm			
-10 dBm			
-20, d3m			
-20 0011			
-30 dBm			
ur40.dBto_rear-rear-rear-rear-	and the particular state of the		
-50 dBm			
-60 dBm			
CF 2.441 GHz	30000 p	ts	316.0 ms/
Marker		\	)
		Ready	04.11.2024
Date: 4.NOV.2024 14:12:13			
	DH3_Ant	1_Hop	
Spectrum			
RefLevel 30.00 dBm Off ● Att 40 dB ● SW	set 1.62 dB		`````````````````````````````````
SGL Count 1/1 TR	1 10 ms 🖶 VBW 3 MHz 5:VID		
●1Pk Clrw		M1[1]	4.27 dBm
20 dBm		D2[1]	250 ns 0.41 dB
10 dBm		02[1]	0.41 dB 1.63600 ms
TRG 3.300 dBm	D2		
0 dBm			
-10 dBm			
-20 dBm			
-30 dBm		ويتعاد والمراجع والمراجع	and the descent of the
149 demark attenuited	da salah ji manjal muruh salah s		al Lord Concernational
a that a start of the second start of the seco	namus diadaadaa	chandraschauff eine Beithe affit	eri te telet i en bisset als spalt hi
a del superior trace	and the second sec	· III · · · · · · · · · · · · · · · · ·	The best of the second s
-60 dBm			
CF 2.441 GHz	8000 pt	s	1.0 ms/
Marker Type   Ref   Trc   X-v	alue Y-value	Function Fu	Inction Result
M1 1 D2 M1 1	250.0 ns 4.27 dBm 1.636 ms 0.41 dB		
	0.1100	Ready	440 04.11.2024
Date: 4.NOV.2024 14:32:58			
THVT12024 14.32:30			

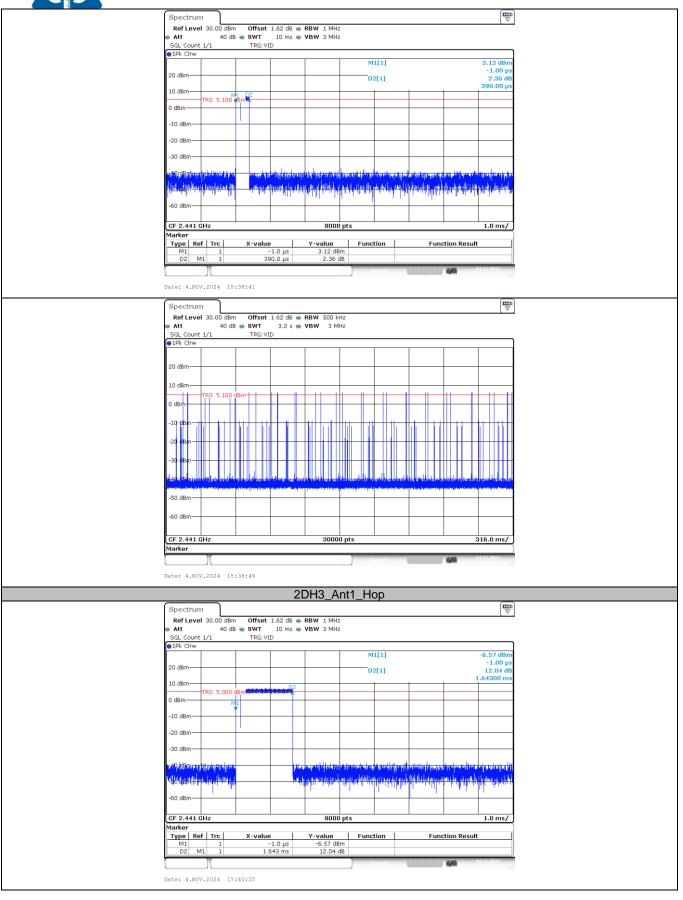
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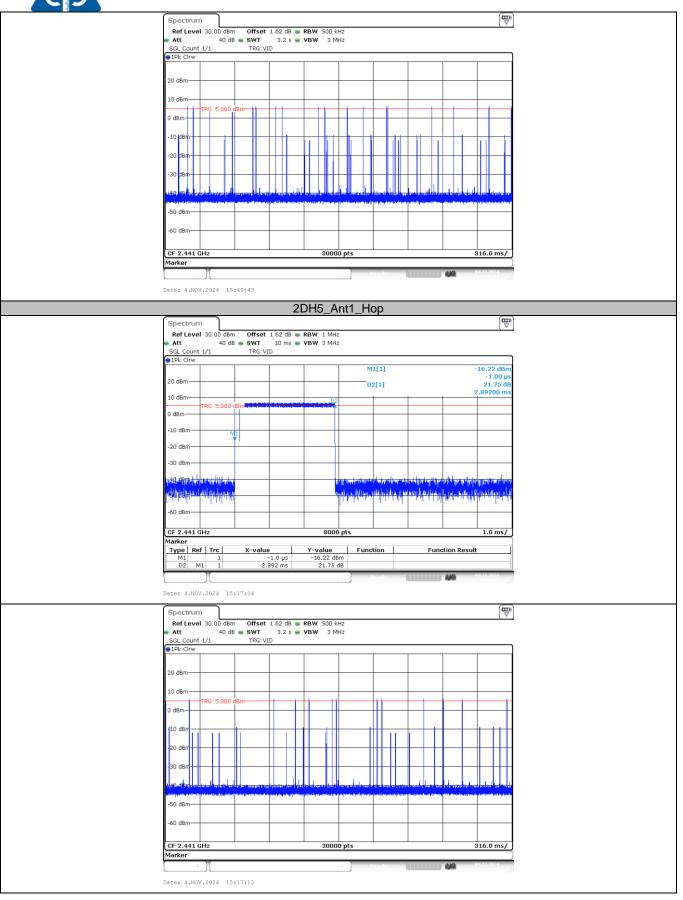
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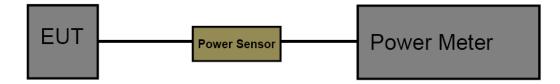
# 3.9. Peak Output Power

<u>Limit</u>

# FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1) / RSS-247 5.4 b

Section	Test Item	Limit	Frequency Range (MHz)
FCC CFR 47 Part15.247 (b)(1)	Maximum Conducted Output Power	Hopping Channels≥75, Power <1W(30dBm); Others <125mW(21dBm)	2400~2483.5
ISED RSS-247 5.4 b	Maximum Conducted Output Power	1 Watt or 30dBm	2400~2483.5
	EIRP	4 Watt or 36dBm	2400~2483.5

# Test Configuration



### Test Procedure

- 1. The maximum conducted output power may be measured using a broadband Peak RF power meter.
- 2. Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor.
- 3. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.
- 4. Record the measurement data.

# Test Mode

Please refer to the clause 2.4.

#### Test Result

Test Mode	Freq(MHz)	Peak Output Power[dBm]	Peak Output Power Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
	2402	6.162	≤30	8.562	≤36	PASS
GFSK	2441	6.360	≤30	8.760	≤36	PASS
	2480	6.382	≤30	8.782	≤36	PASS
	2402	7.570	≤30	9.970	≤36	PASS
π/4-DQPSK	2441	7.668	≤30	10.068	≤36	PASS
	2480	7.527	≤30	9.927	≤36	PASS

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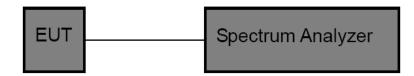
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# <u>Limit</u>

None, for report purposes only.

# Test Configuration



# **Test Procedure**

- 1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.

3. Spectrum Setting:
Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz.
Set the RBW to 10MHz.
Set the VBW to 10MHz.
Detector: Peak.
Sweep time: Auto.
Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

# Test Mode

Please refer to the clause 2.4.

# Test Result

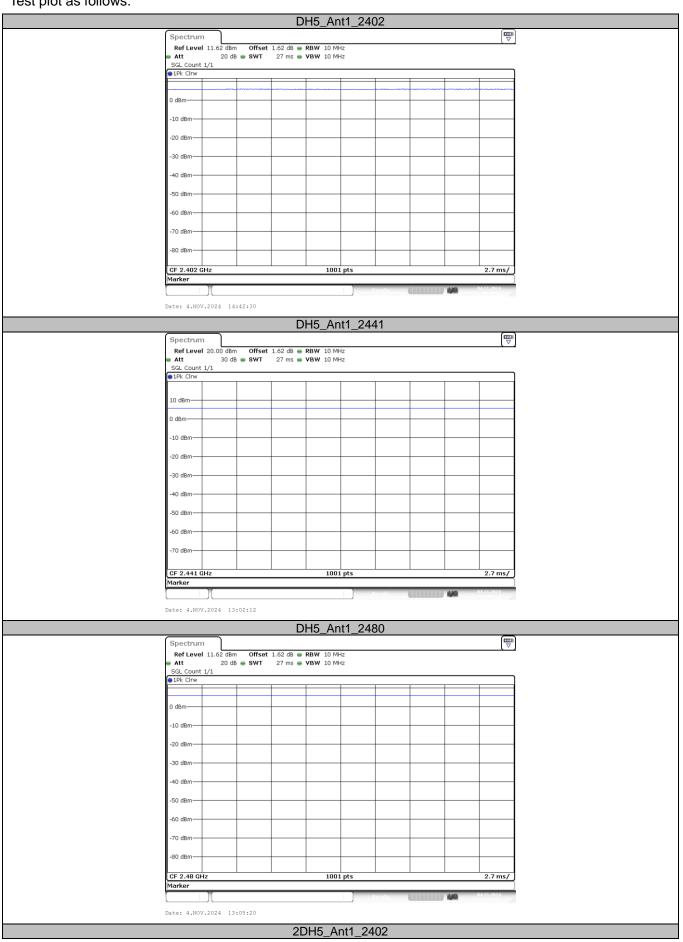
Test Mode	Frequency (MHz)	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)	1/T Minimum VBW (kHz)	Final Setting for VBW (kHz)
	2402	0	0	100	/	0.01
GFSK	2441	0	0	100	/	0.01
	2480	0	0	100	/	0.01
	2402	0	0	100	/	0.01
π/4-DQPSK	2441	0	0	100	/	0.01
	2480	0	0	100	/	0.01

Note: Duty Cycle > 98%, Final Setting for VBW is 10Hz.

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Spectrum 🕎	
Ref Level         11.62         dBm         Offset         1.62         dB         RBW         10         MHz           Att         20         dB         SWT         27         ms         VBW         10         MHz	
SGL Count 1/1 TRG:VID	
IPk Clrw	
0 dBm TRG 1.120 dBm	
-10 dBm	
-10 doin-	
-20 dBm	
-30 dBm	
-30 0601	
-40 dBm	
-50 dBm	
-60 dBm	
-70 dBm-	
-80 dBm	
CF 2.402 GHz 1001 pts 2.7 ms/	
Marker	
Peady 04.11.2024	
Date: 4.NOV.2024 14:43:38	
2DH5_Ant1_2441	
Spectrum (	
Ref Level         11.62         dBm         Offset         1.62         dB         RBW         10         MHz           Att         20         dB         SWT         27         ms         VBW         10         MHz	
SGL Count 1/1 TRG: VID	
PIPk Clrw	
TRG 1.520 dBm	
0 dBm	
-10 dBm	
-20 dBm	
-30 dBm	
-40 dBm	
-40 UBII	
-50 dBm	
-60 dBm-	
-70 dBm	
-80 dBm	
CF 2.441 GHz 1001 pts 2.7 ms/	
Marker	
Marker	
Marker Prendy Pr	
Marker Prendy Pr	
Marker Date: 4.NOV.2024 14:44:43 2DH5_Ant1_2480	
 Marker Date: 4.NOV.2024 14:44:43  2DH5_Ant1_2480  Spectrum Ref Level 11.62 dB Offset 1.62 dB RBW 10 MHz	
 Merker Date: 4.NOV.2024 14:44:43  2DH5_Ant1_2480  Spectrum Ref Level 11.62 dB Offset 1.62 dB RBW 10 MHz Att 20 db SWT 27 ms VBW 10 MHz	
 Marker Date: 4.NOV.2024 14:44:43  2DH5_Ant1_2480  Spectrum Ref Level 11.62 dB Offset 1.62 dB RBW 10 MHz	
Marker         Provide         #11202           Date: 4.NOV.2024         14:44:43         #11202           DBH5_Ant1_2480           Ref Level 11.62 dBm Offset 1.62 dB ■ RBW 10 MHz           Att         20 dB ● SWT         27 ms ● VBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID           ■ IPP: Clrw         ■         ■	
Marker         Product         #11/221           Date: 4.NOV.2024         14:44:43         #11/224           DBUDDE_Ant1_2480           Spectrum           Ref Level 11.62 dB         BW 10 MHz           Att         20 dB         SWT 27 ms         YBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID	
 Merker         Provide         P111200           Date: 4,NOV.2024         14:44:43         P11200           CDH5_Ant1_2480           Spectrum           Ref Level 11.62 dB         RBW 10 MHz           att         20 dB         SWT         27 ms         VBW 10 MHz           SGL Count 1/1         TRG: VID         VBW 10 MHz         TRG: VID           0 dBm         TRG         1.20 dBm         TRG: VID	
 Marker         Provide         #11202           Date: 4.NOV.2024         14:44:43         #11202           DBH5_Ant1_2480           Ref Level 11.62 dBm Offset 1.62 dB ■ RBW 10 MHz           Att         20 dB ● SWT         27 ms ● VBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID           ■ IPP: Clrw         ■         ■	
 Merker         Provide         P111200           Date: 4,NOV.2024         14:44:43         P11200           CDH5_Ant1_2480           Spectrum           Ref Level 11.62 dB         RBW 10 MHz           att         20 dB         SWT         27 ms         VBW 10 MHz           SGL Count 1/1         TRG: VID         VBW 10 MHz         TRG: VID           0 dBm         TRG         1.20 dBm         TRG: VID	
 Merker         Perder         Perder         Perder           Date: 4.NOV.2024         14:44:43           2DH5_Ant1_2480           Spectrum           Ref Level 11.62 dB e RBW 10 MHz           Att         20 dB e SWT         27 ms e VBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID           IPk Chrw         IPk Chrw         IPk Chrw           -10 dBm         IPk 0         IPk 0	
Marker         Product         Million           Date: 4.100V.2024         14:44:43         20H5_Ant1_2480           Composition offset 1.62 dB • RBW 10 MHz           Ref Level 11.62 dB • RBW 10 MHz           Att         20 dB • SWT         27 ms • YBW 10 MHz           SGL Count 1/1         TRG: VID           • IPF CInv         • IPF CInv           • 0 dBm         TRG 1.220 dBm         • Index	
Merker         Perder         Perder         Perder           Date: 4.NOV.2024         14:44:43           2DH5_Ant1_2480           Spectrum           Ref Level 11.62 dB e RBW 10 MHz           Att         20 dB e SWT         27 ms e VBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID           IPk Chrw         IPk Chrw         IPk Chrw           -10 dBm         IPk 0         IPk 0	
Marker         Product         Million           Date: 4,NOV.2024         14:44:43         2DH5_Ant1_2480           COUNT OFfset 1.62 dB RBW 10 MHz           Att         20 dB SWT         27 ms         YBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID         TRG: VID           0 dBm         TRG 1.220 dBm         TRG 1.220 dBm         TRG 1.220 dBm         TRG 1.220 dBm           -10 dBm         -30 dBm         -40 dBm         -40 dBm         -40 dBm         -40 dBm	
Merker         Provide         Million           Date: 4.NOV.2024         14:44:43         2DH5_Ant1_2480           CEDH5_Ant1_2480           Ref Level 11.62 dB         RBW 10 MHz           Att         20 dB         SWT         27 ms         YBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID         TRG: VID         TRG: VID           IPR Clrw         Image: TRG         I.220 dBm         Image: TRG         Image: TRG         Image: TRG           -10 dBm         -30 dBm         Image: TRG         Image: TRG         Image: TRG         Image: TRG	
Marker         Product         Million           Date: 4,NOV.2024         14:44:43         2DH5_Ant1_2480           COUNT OFfset 1.62 dB RBW 10 MHz           Att         20 dB SWT         27 ms         YBW 10 MHz           SGL Count 1/1         TRG: VID         TRG: VID         TRG: VID           0 dBm         TRG 1.220 dBm         TRG 1.220 dBm         TRG 1.220 dBm         TRG 1.220 dBm           -10 dBm         -30 dBm         -40 dBm         -40 dBm         -40 dBm         -40 dBm	
Marker         Product         Million           Date: 4.NOV.2024         14:44:43         20DH5_Ant1_2480         Image: Control of Section (Control of	
Merker         Prode         Million           Date: 4,NOV.2024         14:44:43         20DH5_Ant1_2480           COUNT OFfset 1.62 dB RBW 10 MHz           Ref Level 11.62 dB RBW 10 MHz           SGL Count 1/1         TRG: VID           IPR Clrw         TRG: VID           0 dBm         TRG: 1.20 dBm           -10 dBm         -10 dBm           -30 dBm         -30 dBm	
Marker         Product         Million           Date: 4.NOV.2024         14:44:43         20DH5_Ant1_2480         Image: Control of Section (Control of	
Merker         Provide         Million           Date: 4.NOV.2024         14:44:43         20DH5_Ant1_2480         Image: 1.62 dB         RBW 10 MHz           Ref Level 11.62 dB         Offset 1.62 dB         RBW 10 MHz         Image: 1.62 dB         Image: 1.62 dB <t< td=""><td></td></t<>	
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Merker         Provide         Million           Date: 4.NOV.2024         14:44:43         20DH5_Ant1_2480         Image: 1.62 dB         RBW 10 MHz           Ref Level 11.62 dB         Offset 1.62 dB         RBW 10 MHz         Image: 1.62 dB         Image: 1.62 dB <t< td=""><td></td></t<>	

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# 3.11. Antenna Requirement

# **Requirement**

# FCC CFR Title 47 Part 15 Subpart C Section 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. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

# FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i)

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

# Test Result

The directional gain of the antenna is less than 6dBi, please refer to the EUT internal photographs antenna photo.

# **RSS-Gen Issue 5 Section 6.8**

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power(e.i.r.p.) limits specified in the applicable standard (RSS) for licence-exempt apparatus.

# <u>Result</u>

PASS.

The EUT has 1 antenna: a FPC Antenna for BT.

Note:  $\square$ Antenna use a permanently attached antenna which is not replaceable.

Not using a standard antenna jack or electrical connector for antenna replacement.

The antenna has to be professionally installed (please provide method of installation).

Which in accordance to RSS-Gen 6.8, please refer to the internal photos.

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