

CTC Laboratories, Inc.

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1	EST REPORT			
Report No. ·····:	CTC20210836E02			
FCC ID:	2ASWHNC7			
Applicant:	Shenzhen Worgo Technology Limit	ed		
Address	26th Floor, Building 1, COFCO Innovation R&D Center, 69 District, Xingdong Community, Xin'an Street, Bao'an District, Shenzhen, China			
Manufacturer ······:	Shenzhen Wintop Technology Co., Ltd	t		
Address	101, No.46 XinHe Road, ShangMuGu Community, PingHu Street, LongGangDistrict, ShenZhen City, GuangDong Province, China			
Product Name······:	Wireless Earbuds			
Trade Mark······:	ТОΖО			
Model/Type reference······:	NC7			
Listed Model(s) ·····:	/			
Standard:	FCC CFR Title 47 Part 15 Subpart C Section 15.247			
Date of receipt of test sample:	May 14, 2021			
Date of testing	May 14, 2021 to May 31, 2021			
Date of issue	Jun. 03, 2021			
Result:	PASS			
Compiled by:		Jim Jiang		
(Printed name+signature)	Jim Jiang	Jim - J		
Supervised by:		Miller Ma		
(Printed name+signature)	Miller Ma	////////		
Approved by:				
(Printed name+signature)	Walter Chen	water chis		
Testing Laboratory Name:	CTC Laboratories, Inc.			
Address	 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China 			
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correspond to the test sample.



Table of Contents

Page

1. TI	rest summary	3
1.1.	Test Standards	3
1.2.	REPORT VERSION	
1.3.	TEST DESCRIPTION	
1.4.	. Test Facility	4
1.5.	. Measurement Uncertainty	4
1.6.	. Environmental Conditions	5
2. G	GENERAL INFORMATION	6
2.1.	CLIENT INFORMATION	6
2.2.	GENERAL DESCRIPTION OF EUT	6
2.3.	OPERATION STATE	7
2.4.	. Measurement Instruments List	8
3. ті	rest item and results	10
3.1.	CONDUCTED EMISSION	
3.2.	. RADIATED EMISSION	
3.3.	. Band Edge Emissions (Radiated)	
3.4.	. BAND EDGE AND SPURIOUS EMISSIONS (CONDUCTED)	49
3.5.	20dB Bandwidth	64
3.6.		
3.7.	NUMBER OF HOPPING CHANNEL	75
3.8.		
3.9.		
3.10	0. Antenna Requirement	82



1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

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

<u>RSS 247 Issue 2:</u> Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.

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

1.2. Report Version

Revised No.	Date of issue	Description
01 ⁽¹⁾	Jun. 03, 2021	Original

1.3. Test Description

FCC Part 15 Subpart C (15.247)/ RSS 247 Issue 2					
Test Item	Standard	Section	Result		
lest item	FCC	FCC IC		Test Engineer	
Antenna Requirement	15.203	/	Pass	Lucy Lan	
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Lucy Lan	
Restricted Bands	15.205	RSS-Gen 8.10	Pass	Jim Jiang	
Hopping Channel Separation	15.247(a)(1)	RSS 247 5.1 (b)	Pass	Lucy Lan	
Dwell Time	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Lucy Lan	
Peak Output Power	15.247(b)(1)	RSS 247 5.4 (b)	Pass	Lucy Lan	
Number of Hopping Frequency	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Lucy Lan	
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS 247 5.5	Pass	Lucy Lan	
Radiated Band Edge and Spurious Emissions	15.247(d)&15.209	RSS 247 5.5& RSS-Gen 8.9	Pass	Jim Jiang	
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)	RSS 247 5.1 (b)	Pass	Lucy Lan	

Note: The measurement uncertainty is not included in the test result.



Address of the report laboratory

CTC Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Laboratory accreditation

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

CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

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 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.

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



Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth		(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.6. Environmental Conditions

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

Temperature:	20~24°C
Relative Humidity:	53~57%RH
Air Pressure:	101kPa



EN

2. GENERAL INFORMATION

2.1.Client Information

Applicant:	Shenzhen Worgo Technology Limited
Address:	26th Floor, Building 1, COFCO Innovation R&D Center, 69 District, Xingdong Community, Xin'an Street, Bao'an District, Shenzhen, China
Manufacturer:	Shenzhen Wintop Technology Co., Ltd
Address:	101, No.46 XinHe Road, ShangMuGu Community, PingHu Street, LongGangDistrict, ShenZhen City, GuangDong Province, China
Factory:	Shenzhen Wintop Technology Co., Ltd
Address:	101, No.46 XinHe Road, ShangMuGu Community, PingHu Street, LongGangDistrict, ShenZhen City, GuangDong Province, China

2.2. General Description of EUT

Product Name:	Wireless Earbuds
Trade Mark:	тоzo
Model/Type reference:	NC7
Listed Model(s):	/
Model Difference:	/
Power supply:	Wireless Case: 5Vdc/0.5A from External adapter 3.8Vdc/500mAh from Battery Wireless Earbuds: 5Vdc/0.2A from Wireless Case 3.7Vdc/70mAh from Battery
Hardware version:	1V4
Software version:	V1.3.0.6
Bluetooth 5.2 + BR/EDR	
Modulation:	GFSK, π/4-DQPSK, 8-DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	FPC Antenna
Antenna gain:	-1.25dBi



2.3. 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 was set to connect with the Bluetooth instrument under large package sizes transmission.

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.



Measurement Instruments List 2.4.

Tonscer	Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021	
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2022	
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 25, 2021	
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 25, 2021	
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 25, 2021	
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 25, 2021	
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 25, 2021	
8	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 25, 2021	
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 25, 2021	
10	Climate Chamber	ESPEC	MT3065	/	Dec. 25, 2021	
11	300328 v2.1.1 test system	TONSCEND	v2.6	/	/	

Radiate	Radiated Emission and Transmitter spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 25, 2021	
2	High pass filter	micro-tranics	HPM50111	142	Dec. 25, 2021	
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 25, 2021	
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 25, 2021	
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 25, 2021	
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 25, 2021	
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 25, 2021	
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 25, 2021	
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 25, 2021	
10	Antenna Mast	UC	UC3000	N/A	N/A	
11	Turn Table	UC	UC3000	N/A	N/A	
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 25, 2021	
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX1 02	DA1580	Dec. 25, 2021	
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 25, 2021	
15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 25, 2021	
16	RF Connection Cable	Chengdu E-Microwave			Dec. 25, 2021	
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 25, 2021	

CTC Laboratories, Inc.

中国国家认证认可监督管理委员会 EN

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn 证认可监督管理委员会 For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



18	Attenuator	Chengdu E-Microwave	EMCAXX-10 RNZ-3		Dec. 25, 2021
19	High and low temperature box	ESPEC	MT3065	12114019	Dec. 25, 2021

Conduc	Conducted Emission											
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until							
1	LISN	R&S	ENV216	101112	Dec. 25, 2021							
2	LISN	R&S	ENV216	101113	Dec. 25, 2021							
3	EMI Test Receiver	R&S	ESCI	100658	Dec. 25, 2021							

Note:1. The Cal. Interval was one year. 2. The cable loss has calculated in test result which connection between each test instruments.



3. TEST ITEM AND RESULTS

3.1. Conducted Emission

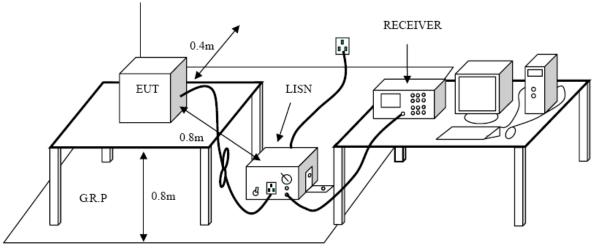
<u>Limit</u>

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

	Limit (dBuV)					
Frequency range (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



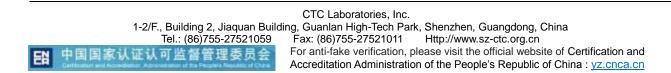
Test Procedure

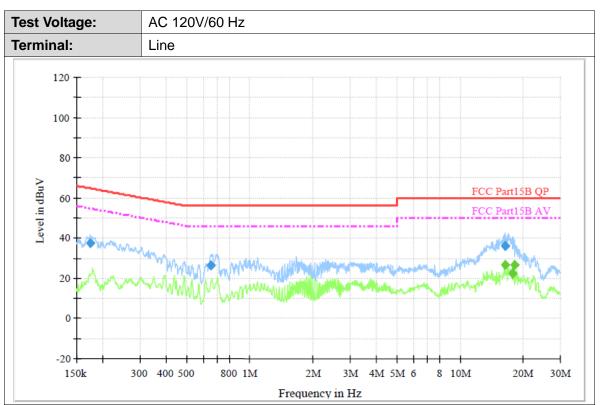
- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. 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)
- Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was 4. individually connected through a LISN to the input power source.
- The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth 5. at the center of the lead to form a bundle not exceeding 40 cm in length.
- 6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 7. During the above scans, the emissions were maximized by cable manipulation.

Test Mode:

Please refer to the clause 2.3.

Test Result





Final Measurement Detector 1

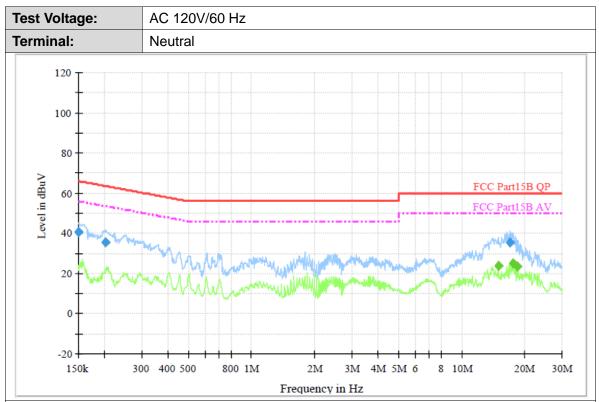
Frequency (MHz)	QuasiPeak (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
0.173880	37.6	1000.00	9.000	On	L1	10.4	27.2	64.8	
0.649180	26.4	1000.00	9.000	On	L1	10.4	29.6	56.0	
16.338200	36.0	1000.00	9.000	On	L1	10.7	24.0	60.0	

Final Measurement Detector 2

	Frequency (MHz)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
	16.338200	26.5	1000.00	9.000	On	L1	10.7	23.5	50.0	
Ī	17.766920	22.0	1000.00	9.000	On	L1	10.8	28.0	50.0	
	18.197610	26.6	1000.00	9.000	On	L1	10.8	23.4	50.0	

Emission Level= Read Level+ Correct Factor





Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
0.150000	40.5	1000.00	9.000	On	N	10.7	25.5	66.0	
0.202360	34.9	1000.00	9.000	On	N	10.7	28.6	63.5	
17.003610	35.5	1000.00	9.000	On	N	10.9	24.5	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Comment
14.904890	23.6	1000.00	9.000	On	N	10.8	26.4	50.0	
17.625630	24.9	1000.00	9.000	On	N	10.9	25.1	50.0	
18.343480	23.7	1000.00	9.000	On	Ν	10.9	26.3	50.0	

Emission Level= Read Level+ Correct Factor



3.2. Radiated Emission

<u>Limit</u>

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

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (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

	dB(uV/m) (a	at 3 meters)
Frequency (MHz)	Peak	Average
Above 1000	74	54

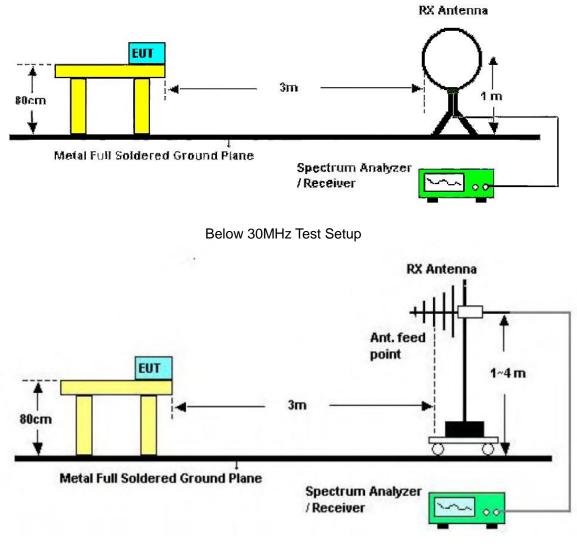
Note:

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

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

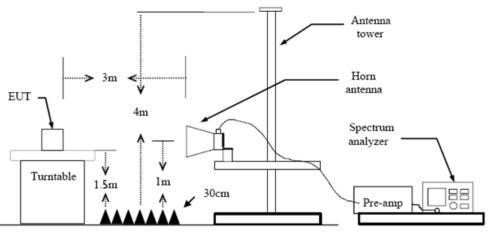
Test Configuration





30-1000MHz Test Setup





Above 1GHz Test Setup

Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for 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.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna 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.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
 - Span shall wide enough to fully capture the emission being measured; (1)
 - Below 1 GHz: (2)

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

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 quasi-peak detector and reported.

(3) From 1 GHz to 10th harmonic:

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

RBW=1MHz, VBW \geq 1/T Peak detector for Average value.

Note 1: For the 1/T& Duty Cycle please refer to clause 3.10 Duty Cycle.

Test Mode

Please refer to the clause 2.3.

Test Result

9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

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



Ant. Pol	-	Ho	orizontal					
Test Mo	de:	ТΧ	GFSK Mod	le 2402MHz				
Remark:		Or	nly worse ca	se is reported	1			
90.0 dBu	JV/m							
40						CC Part15 RE-Clas	Margin -	6 dB
www.	- to a to	∿µÅ _W	blandagen ag na shekara	www.		hele where the second	Winter and the second	
-10 30.000		3 ****		Mar	300			
-10		i0 70						
-10 30.000	40 50 6	50 70 CY	Factor	(мнг) Reading	300 Level	0 400 50 Limit	0 600 700 Margin	1000.00
10 30.000 No.	40 50 6 Frequence (MHz)	60 70 CY 6	Factor (dB/m)	(MH₂) Reading (dBuV)	Level (dBuV/m)	0 400 50 Limit (dBuV/m)	0 600 700 Margin (dB)	1000.00 Detector
10 30.000 No.	40 50 6 Frequence (MHz) 39.3766	60 70 Cy 6 3	Factor (dB/m) -14.42	(MH₂) Reading (dBuV) 30.83	Level (dBuV/m) 16.41	0 400 50 Limit (dBuV/m) 40.00	0 600 700 Margin (dB) -23.59	Detector QP
¹⁰ 30.000 No. 1 2	40 50 6 Frequence (MHz) 39.3760 55.5433	60 70 Cy 6 3 0	Factor (dB/m) -14.42 -15.10	(MHz) Reading (dBuV) 30.83 32.17	Level (dBuV/m) 16.41 17.07	2 400 50 Limit (dBuV/m) 40.00 40.00	0 600 700 Margin (dB) -23.59 -22.93	Detector QP QP
-10 30.000 No. 1 2 3	40 50 6 Frequence (MHz) 39.3766 55.5433 67.8300	60 70 cy 63 00	Factor (dB/m) -14.42 -15.10 -16.59	(MHz) Reading (dBuV) 30.83 32.17 32.44	Level (dBuV/m) 16.41 17.07 15.85	Limit (dBuV/m) 40.00 40.00 40.00	Margin (dB) -23.59 -22.93 -24.15	Detector QP QP QP

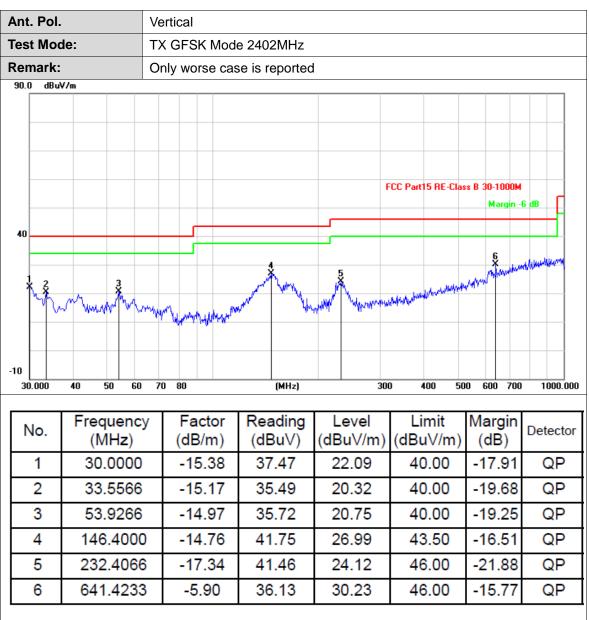
Remarks:

ΕN

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

2.Margin value = Level -Limit value





Remarks:

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

2.Margin value = Level -Limit value



			FCC P	art15 Class B 3M 4		
		e emission v	FCC P			
				art 15 Class B 3M A	above-16 Pea	k
+ + *				art15 Class B 3M A	above-1G Pea	k
				art15 Class B 3M A	bove-16 Pea	k
1 * 				art15 Class B 3M A	Above-1G Pea	k
****			FC			
• ×			FC			
			FC			
*				2 Part15 Class B 3	M Above-16 A	×
2						
6000.00	8500.00 110	00.00 13500.0	0 16000.00	18500.00 2100	0.00	26000.00 MI
quency /Hz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
						peak
04.288	-2.82	40.22	37.40	54.00		AVG
	quency /IHz) 04.256	quency Factor (dB/m) 04.256 -2.82	quency Factor Reading (dB/m) (dBuV) 04.256 -2.82 53.76	quency Factor Reading Level (Hz) (dB/m) (dBuV) (dBuV/m) 04.256 -2.82 53.76 50.94	quency (Hz)Factor (dB/m)Reading (dBuV)Level (dBuV/m)Limit (dBuV/m)04.256-2.8253.7650.9474.00	quency (Hz)Factor (dB/m)Reading (dBuV)Level (dBuV/m)Limit (dBuV/m)Margin (dB)04.256-2.8253.7650.9474.00-23.06

2.Margin value = Level -Limit value



Ant.	Pol.		Ve	rtical					
Test	t Mode	:	ТХ	GFSK Mo	de 2402MHz				
Ren	nark:		No lim		the emission	which more t	han 10 dB b	elow the p	orescribed
100.0) dBuV/	m							
						FCC P	art15 Class B 3M 4	Above-1G Pea	k
						FCC	: Part15 Class B 3	M Above-16 A	v
50		2×							
0.0	00.000 3	500.00	6000.00	8500.00	11000.00 13500.	00 16000.00	18500.00 2100	0.00	26000.00 MHz
	No.	Frequ (MF	-	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	4804	.202	-2.82	39.78	36.96	54.00	-17.04	AVG
	2	4804	.451	-2.82	53.97	51.15	74.00	-22.85	peak
	narks:								
		B/m) = A			3/m)+Cable F	actor (dB)-Pr	e-amplifier F	actor	

Page 19 of 82

2.Margin value = Level -Limit value

ΕN



Ant	. Pol.			Но	rizonta									
Tes	t Mod	e:		ТΧ	GFSK	Mod	e 244	1MHz						
Ren	nark:			No report for the emission which more than 10 dB below the prescri limit.									prescribed	
100.0) dBuV	/m								1				
									FCC P	art15 Class	: B 3M /	Above-1G Pea	k	
										FCC	Part15 Cl	ass B 3	M Above-16 A	v
50														
0.0	00.000	2500.00	6000.	00	8500.00	11	000.00	13500.0	0 100	00.00	18500.00	21.0	0.00	26000.00 MHz
	No.	1	quen //Hz)	су	Fac (dB/			ading BuV)	Lev (dBu		Lin (dBu)		Margin (dB)	Detector
	1	488	82.01	2	-2.	60	52	.89	50.	29	74.	00	-23.71	peak
	2	488	82.30)3	-2.	60	40	.00	37.	40	54.	00	-16.60	AVG
Ron	narks:													
1.Fa	actor (dB/m) =				•	m)+Ca	able Fa	ictor (c	lB)-Pr	e-ampl	ifier F	actor	

Page 20 of 82

2.Margin value = Level -Limit value



nt. F	Pol.			Ver	tical									
est I	Mode	e:		ТΧ	GFSK	Mode	e 244	1MHz						
ema	ark:			No limi		for th	e emi	ssion v	which r	nore t	han 10) dB b	elow the	prescribed
00.0	dBuV∕	/m												
										FCC P	art15 Cla	ss B 3M /	Above-1G Pea	ĸ
										FCC	Part15 (M Above-1G A	M
50			2 X								. Faiti 5 (.1433 0 3	M ADOVE-TO A	
			*											
0.0														
1000).000 (3500.00	6000.	.00	8500.00	11(00.00	13500.0	1600	00.00	18500.0	0 210	00.00	26000.00 MI
N	l o.		uen (Hz)	-	Fac			ading BuV)	Lev (dBu)		1	nit V/m)	Margin (dB)	Detector
	1	488	31.92	20	-2.6		39	.68	37.		-	.00	-16.92	AVG
				0	-2.6	0	53	.36	50.	76	74	.00	-23.24	peak
	2	488	32.11	0										

Page 21 of 82

2.Margin value = Level -Limit value



nt.	Pol.			Ho	rizon	tal											
est	t Mode	:		ТХ	GFS	SK N	lode	e 2480	OMHz	-							
en	nark:			No lim		ort fo	or th	e emi	ssion	wh	ich r	nore t	han	10 c	IB b	elow the	prescribed
00. O	dBu∀∕i	m															
												FCC P	art15	Class E	3M /	vbove-16 Pe	ak
50			2									FCC	Part	15 Clas	s B 3	M Above-1G	AV
30			Î														
			×														
) 0.0 10	00.000 3	500.00	6000). 00	8500.	.00	110	00.00	13500	.00	160	DD.00	1850	0.00	210	0.00	26000.00 MI
													1				
	No.		quer //Hz		1	acto B/m			ading BuV)		Le Bu	vei V/m)		Limi 3uV		Margin (dB)	Detector
	1	49	59.9	23	-	2.38	3	38	3.98		36.	60		54.0	0	-17.40	AVG
	2	49	60.1	20	-	2.38	3	53	3.00		50	.62		74.0	0	-23.38	peak
en	narks:																

Page 22 of 82

2.Margin value = Level -Limit value



Ant.	Pol.		Ve	ertical					
Test	Mod	e:			de 2480MHz				
Rem	nark:			o report for t hit.	he emission	which more t	han 10 dB b	elow the	prescribed
100.0	dBuV.	/m	1		1 1			1	
						FCC P	art15 Class B 3M /	Above-16 Pea	ak
						FCC	2 Part15 Class B 3	M Above-1G A	av .
50			Ś.						
			1						
			1						
0.0 10	00.000	3500.00	6000.00	8500.00 1	1000.00 13500	.00 16000.00	18500.00 210	00.00	26000.00 MHz
Γ	No.		uency	Factor	Reading		Limit	Margin	Detector
\vdash	1	,	1Hz) 59.885	(dB/m) -2.38	(dBuV) 39.01	(dBuV/m) 36.63	(dBuV/m) 54.00	(dB) -17.37	AVG
┢	2		0.162	-2.30	53.22	50.84	74.00	-17.57	
	2	490	0.102	-2.38	03.ZZ	50.84	74.00	-23.10	peak
	narks:								

Page 23 of 82

2.Margin value = Level -Limit value



\nt.	Pol.		Но	rizontal					
est	t Mode	:	ТХ	π /4-DQF	SK Mode 24)2MHz			
Rem	nark:		No lim		the emission	which more t	han 10 dB b	elow the	prescribed
00.0 Г	dBuV∕i	m	i i						
						FCC Pa	art15 Class B 3M A	Above-16 Pea	k
						FCC	Part15 Class B 3	M Above-1G A	N
50		2	*						
		3	*						
0.0 10	00.000 3	500.00	6000.00	8500.00 1	1000.00 13500.	0 16000.00	18500.00 2100	0.00	26000.00 MH
	No.		quency (Hz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	480	03.898	-2.82	53.71	50.89	74.00	-23.11	peak
Γ	2	480	04.014	-2.82	39.87	37.05	54.00	-16.95	AVG
	narks:								

Page 24 of 82

2.Margin value = Level -Limit value

ΕN



nt. Pol.		Ve	ertical					
est Mod	e:	ТΣ	(π/4-DQP	SK Mode 240	2MHz			
emark:			o report for th	he emission v	which more t	han 10 dB b	elow the p	prescribed
0.0 dBuV	//m							
					FCC P	art15 Class B 3M /	Above-16 Pea	k
	;	, X			FCC	Part15 Class B 3	M Above-1G A	v
50		\$						
0.0	0500.00					10500.00		
1000.000	3500.00	6000.00	8500.00 11	000.00 13500.0)0 16000.00	18500.00 210	00.00	26000.00 MI
	Free	uency	Factor	Reading	Level	Limit	Margin	Detector
No.				-		1	(dD)	Delector
	(N	IHz)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)		
No.	(N 480			-		1	(dB) -17.69 -23.12	AVG

Page 25 of 82

2.Margin value = Level -Limit value



nt.	Pol.		Horizo	ntal						
est	t Mode	:	ΤΧ π	/4-DQPS	SK Mode 2	441MHz				
en	nark:		No rep limit.	ort for th	ne emissio	n which n	nore t	han 10 dB b	elow the	prescribed
00.0	dBu∀/	n						Ì	1	
					_		FCC P	art15 Class B 3M /	Above-1G Pea	ak
50		2					FCC	Part15 Class B 3	M Above-1G A	w III
30		Î								
		*								
10 10	00.000 3	500.00 6000	.00 850	0.00 11	000.00 1350	0.00 1600	0.00	18500.00 210	00.00	26000.00 M
	No.	Frequen	-	Factor	Reading			Limit	Margin	Detector
		(MHz)) ((dB/m)	(dBuV)) (dBu	V/m)	(dBuV/m)	(dB)	
	No.) ((07) (dBu	V/m) 13		-	Detector AVG peak

Page 26 of 82

2.Margin value = Level -Limit value



est Mo emark:	nt. Pol.			I								
omark	de:		TX π/	4-DQPS	K Mode	244	1MHz					
			No repolimit.	ort for th	e emissi	on v	vhich n	nore tl	han 10 d	Bb	elow the p	prescribed
)0.0 dBu	V/m				1							
								FCC Pa	art 15 Class B	3M A	bove-16 Pea	k
								FCC	Part15 Clas	s B 3I	Above-1G A	v
50		¥				_						
		*										
).0												
1000.000	3500.00	6000.0	00 8500	0.00 110)00.00 13	500.0	0 1600	0.00	18500.00	2100	0.00	26000.00 MH
No.		quenc	-	actor	Readi		Lev		Limi		Margin	Detector
4		MHz)		IB/m)	(dBu\		(dBu		(dBuV/		(dB)	a selu
1		81.78		-2.60	52.79		50.		74.0		-23.81	peak
2	48	82.11	2	-2.60	39.2	5	36.	65	54.0	0	-17.35	AVG

Page 27 of 82

2.Margin value = Level -Limit value



nt. Pol.		Но	orizontal					
est Mod	le:	ТХ	(π/4-DQP	SK Mode 248	0MHz			
emark:		No lim		he emission v	which more t	han 10 dB b	elow the	prescribed
10.0 dBuV	//m							
					FCC P	art15 Class B 3M /	Above-1G Pea	ık
50		z			FU	2 Part15 Class B 3	M Above-1Li A	NV III
		*						
1000.000	3500.00	6000.00	8500.00 11	1000.00 13500.0	0 16000.00	19500.00 2100	DO.00	26000.00 MI
No.		quency	Factor	Reading	Level	Limit	Margin	Detector
		/Hz)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
4	498	59.988	-2.38	39.28	36.90	54.00	-17.10	AVG
1		60.103	-2.38	52.85	50.47	74.00	-23.53	peak

Page 28 of 82

2.Margin value = Level -Limit value



lode: 'k: IBu¥7m			π /4-DQ eport fo									
			eport fo	r the e	emissic	n v						
lBuV/m						/1 V	vhich n	nore t	han 10 d	Bb	elow the p	orescribed
								FCC Pa	art15 Class B	3м А	vbove-1G Pea	Ik
								FCC	Part15 Clas	B 31	Above-16 A	w l
	z											
	×											
00 3500.00) 6000	.00 8	500.00	11000.	00 135	00.0	0 1600	0.00	18500.00	2100	00.00	26000.00 N
		-				-					Margin (dB)	Detector
					•	*	-		-			AVG
												peak
'			2.00		-2.00					_	20.00	pour
1). Fr 4 4	Frequen (MHz) 4959.95 4960.31	Frequency (MHz) 4959.950 4960.315	Frequency (MHz) Facto (dB/m) 4959.950 -2.38 4960.315 -2.38	Frequency (MHz) Factor (dB/m) F 4959.950 -2.38 4960.315 -2.38 4960.315 -2.38 4960.315 -2.38	Frequency (MHz) Factor (dB/m) Readin (dBuV 4959.950 -2.38 38.80 4960.315 -2.38 52.85	Frequency (MHz) Factor (dB/m) Reading (dBuV) 4959.950 -2.38 38.80 4960.315 -2.38 52.85	Frequency (MHz) Factor (dB/m) Reading (dBuV) Lev (dBuV) 4959.950 -2.38 38.80 36.4 4960.315 -2.38 52.85 50.4	Image: Second system Image: Se	Frequency Factor Reading Level Limit 00 3500.00 6000.00 8500.00 1000.00 13500.00 16000.00 18500.00 0. Frequency Factor Reading Level Limit 0. (MHz) (dB/m) (dBuV) (dBuV/m) (dBuV/m) 4959.950 -2.38 38.80 36.42 54.00 4960.315 -2.38 52.85 50.47 74.00	Image: Second	Frequency (MHz) Factor (dB/m) Reading (dBuV) Level (dBuV/m) Limit (dBuV/m) Margin (dB) 4959.950 -2.38 38.80 36.42 54.00 -17.58 4960.315 -2.38 52.85 50.47 74.00 -23.53

Page 29 of 82

2.Margin value = Level -Limit value



Test Mo Remarl	ode:	nt. Pol.																
Remarl	emark:			ТХ	8-DP	SKN	/lod	le 24	02MH	Ηz								
	k:			No lim		t for	the	emi	ssion	whi	ch n	nore t	han	10 d	Вb	elow the p	prescribe	d
00.0 de	BuV/m																	1
												FCC Pa	art15	Class B	3M A	bove-16 Pea	k	
												FCC	Part	15 Class	B 31	Above-16 A	N	
50		2	ξ															
		7	5															
0.0	00 350	0.00	6000.	.00	8500.0	D 1	1100	D.00	13500	.00	1600	0.00	1850	0.00	2100	0.00	26000.00 k	мн
No).	Freq (N	luen 1Hz)			ctor 3/m)			ding uV)		Lev Bu	/el √/m)		Limit 3uV/		Margin (dB)	Detector	
1		480	4.05	55	-2	.82		39	.81		36.	99	;	54.0	0	-17.01	AVG	Ť
2	2	480	4.23	32	-2	.82		53	.23		50.	41		74.0	0	-23.59	peak	1
Remark	ks:																	

Page 30 of 82

2.Margin value = Level -Limit value



Ant	. Pol.		Ve	rtical							
Tes	t Mode	:	ТХ	8-DPSK	Mode 2	2402MH	z				
Ren	nark:		No lim		r the en	nission v	vhich n	nore t	han 10 dB b	elow the p	prescribed
100.0) dBuV/r	n	1								
								FCC Pa	nt15 Class B 3M A	Above-1G Pea	ĸ
								FCC	Part15 Class B 3	M Above-1G A	v
50		2×									
		×									
0.0	00.000 3		6000.00	8500.00	11000.00	13500.0	0 1600	0.00	18500.00 2100	D.00	26000.00 MH
	00.000 3	300.00	6000.00	8500.00	11000.00	13900.0	0 1600	0.00	18900.00 2100	0.00	26000.00 MH
_		_									
	No.	Freq	uency	Facto		eading IBuV)	Lev (dBu)		Limit (dBuV/m)	Margin (dB)	Detector
	NO.	(M	Hz)	(dB/m	/ (9		(222		· /		
-	1		Hz) 4.333	-2.82	· ·	9.73	36.	-	54.00	-17.09	AVG
		480	· · ·		3	9.73	-	91	-	-17.09 -23.15	AVG peak
	1	480	4.333	-2.82	3		36.	91	54.00		
	1	480	4.333	-2.82	3		36.	91	54.00		
	1	480	4.333	-2.82	3		36.	91	54.00		
	1 2 narks:	480	4.333 4.412	-2.82	5	3.67	36.9 50.0	91 85	54.00	-23.15	

Page 31 of 82

2.Margin value = Level -Limit value



nt. Pol.		H	orizontal							
est Mod	e:	Т	K 8-DPSK	Mode 2	441MH	z				
Remark:			o report fo nit.	r the err	nission v	which r	nore tl	han 10 dB b	pelow the p	prescribed
00.0 dBuV/	/m		1					1		
							FCC Pa	nt15 Class B 3M	Above-16 Pea	k
							FCC	Part15 Class B 3	M Above-16 A	v
50	ŝ									
	X	k								
0.0										
1000.000	3500.00	6000.00	8500.00	11000.00	13500.0	0 1600	00.00	18500.00 210	00.00	26000.00 MH
No.		juency 1Hz)	Facto (dB/m		ading BuV)	Lev (dBu)		Limit (dBuV/m)	Margin (dB)	Detector
1		2.045	-2.60		9.73	37.		54.00	-16.87	AVG
2		2.321	-2.60		3.41	50.		74.00	-23.19	peak
L	1		1			1				

Page 32 of 82

2.Margin value = Level -Limit value



Ant. Pol.			Vertical									
Test Mode:			TX 8-DPSK Mode 2441MHz									
Remark	:		No report for the emission which more than 10 dB below the prescribed limit.									
100.0 dBu	ıV/m						1					
					FCC P	art15 Class B 3M /	Above-1G Pea	ık				
					FCC	: Part15 Class B 3	M Above-1G /	v				
50		¥										
		*										
0.0												
		6000.00	8500.00 11	000.00 13500.0	0 16000.00	18500.00 210	00.00	26000.00 MH				
No	Free	quency	Factor	Reading	Level	Limit	Margin	Datastas				
No.	(MHz)		(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	Detector				
1	4881.850		-2.60	52.90	50.30	74.00	-23.70	peak				
2	4882.005 -2.60		38.27	35.67	54.00	-18.33	AVG					
			•		•		•					

Page 33 of 82

2.Margin value = Level -Limit value



Ant. Pol. Test Mode: Remark:			Ho	Horizontal TX 8-DPSK Mode 2480MHz No report for the emission which more than 10 dB below the prescribed limit.									
			ТХ										
100.0) dBuV,	/m											
								FCC Pa	art15 Class B 3M	Above-16 Pea	k		
								FCC	: Part15 Class B :	M Above-1G A	.v		
50			1 X										
			*										
						_							
0.0													
10	00.000 3	3500.00	6000.00	8500.00 11	1000.00 13	500.0	0 1600	00.00	18500.00 210	00.00	26000.00 MHz		
Γ	No.			Factor	Readii (dBu\	_	Lev		Limit (dBuV/m)	Margin (dB)	Detector		
┢	1	1 4959.808 -2.38		-2.38	53.12		(dBu V/III) 50.74		74.00	-23.26	peak		
\vdash	2			39.2				54.00	-23.20	AVG			
L	2	490	0.030	-2.38	39.21		30.	09	04.00	-17.11	AVG		
	narks:												

Page 34 of 82

2.Margin value = Level -Limit value

ΕŇ



Ant. Pol.			Vertical											
Test Mode:			TX 8-DPSK Mode 2480MHz											
Remark:				No r	No report for the emission which more than 10 dB below the prescribed limit.									
00.	0 dBuV/	m												
					FCC Part15 Class B 3M Above-16 P							Above-16 Pea	ik	
					FCC Part15 Class B 3M Above-1G A							v		
50			1 X											
			Å											
0.0														
10	000.000 3	500.00	6000.	.00 8	3500.00	11(00.00	13500.0	0 1600	00.00	18500.00	2100	00.00	26000.00
Γ	No.		uen 1Hz)	-	Facto (dB/n			ding	Lev		Limi (dBuV/		Margin (dB)	Detector
$\left \right $	1	,	59.95		-2.3		(dBuV) 53.39		(dBuV/m) 51.01		74.0		-22.99	peak
$\left \right $	2		60.309 -2.38 39.6			37.30				-16.70	AVG			
L	2			~	2.0	~			07.		01.0	~	10.70	
	narks:										e-amplifi			

Page 35 of 82

2.Margin value = Level -Limit value



3.3. Band Edge Emissions (Radiated)

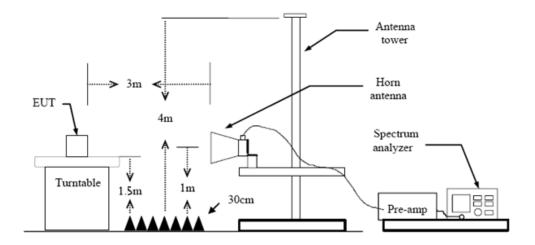
<u>Limit</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

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

Conducted Band Edge and Conducted Spurious Emissions limit: The highest point of the operating frequency waveform down 20dB

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.
- The receiver set as follow: RBW=1MHz, VBW=3MHz PEAK detector for Peak value. RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value. The conducted spurious emissions set as follow:
- 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 2.3.



	Pol.		H	orizontal								
est		: :	G	FSK Mo	de 24	02MHz						
0.0		'n										_
-	96.400 230									C - Above 16 C - Above 16		
50 .	96.400 230	**************************************		gene 10-96 - 10-00	ىلىدىنامىيە ب ارلىر	· · · · · · · · · · · · · · · · · · ·				*		
.0	96 400 39	207.40	2318.40	2329.40	224	10.40 235	1.40 236	2.40	2373.40 238	4.40	2406.4	
	No.		juency 1Hz)	Fac (dB/		Readin (dBuV			Limit (dBuV/m)	Margin (dB)	Detect	tor
		(N		1	m)) (dBu	V/m)	1		Delect	

Remarks:

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



nt.	Pol.		Ver	rtical					
est	Mode	:	GF	SK Mode 24	402MHz				
00.0	dBuV∕n	n							
Γ									
-									0
┝							FCC Part15	C · Above 1G	РК
							ECC Partits	C · Above 1G	AV
50							recratio	l Andre In	AV
								Î	
							a	\$	
Ĩ									
).0									
229	5.850 23	306.95 231	7.85	2328.85 23	39.85 2350.8	5 2361.85	2372.95 2383	3.85	2405.85 M
I	No.	Freque (MHz		Factor (dB/m)	Reading (dBuV)	Level	Limit (dBuV/m)	Margin (dB)	Detector
	4		-						maala
1	1	2390.0		30.84 30.84	18.47	49.31	74.00	-24.69	peak
	2				5.35	36.19	54.00	-17.81	AVG

Remarks:

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



ht	. Pol	I.			Ho	orizoi	ntal												
es	t Mo	de:			GI	-SK	Mode	e 24	80 MI	Ηz									
0.0	D dB	uV/m			_				1										_
																			1
		┼												FCC	Part1 5	C · Above	e 1G	РК	-
														FCC	Part15	C - Above	e 16	AV	
50		1																	
		Î	'																
	wind	3		unum	mm		an a	mante		and the second	mmunh	and the second	an a	Markanna M	en deve	- during the	5.046.0 9	non-statestates	~
																			_
0.0																			
24	474.50	0 24	85.50	249	6.50	250	7.50	251	8.50	2529.	i0 2	540.50	255	51.50	2562	2.50		2584.50	М
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$\left \right $	1	+		83.5			31.24	*		.49		7.73	.,	74.0		-26.2	*	peak	
$\left \right $	2	+		83.5			31.24			79		6.03	+	54.0		-17.9		AVG	-
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2.Margin value = Level -Limit value





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2	474.500	2485	.50	2496	6.50	250	7.50	251	8.50	2529	9.50	254	0.50	2551	.50	2562	2.50	2584.50 ⊮
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ľ	1	1	248				31.2			7.98		49		· ·	74.0		-24.78	peak
ľ	2		248	3.5	00	:	31.2	4	5	.29	\top	36	53		54.0	00	-17.47	AVG
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2296.40	0 2307.40 231	9.40 232	9.40 234	0.40 2351.40	2362.40	2373.40 2384	l. 40	2406.40
No.	Frequer (MHz	-	Factor dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.0	00	30.84	17.27	48.11	74.00	-25.89	peak
	0000.0	00	30.84	4.69	35.53	54.00	-18.47	AVG
2	2390.0	00	30.04	4.03	33.33	04.00	-10.47	1110

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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BuV/m			51 / 7	-DQ	PSKI	Noc	de 24	02MF	Ιz							
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	239	0.00	0	30	.84		18.7	74	49	.58	7	4.00	-24	.42	pe	eak
2	239	0.00	0	30	.84		4.8	3	35	.67	5	4.00	-18	.33	A	VG
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lode:	π	/4-DQPSK	Mode 2480MI	Ηz			
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050 2486.05	2497.05	2508.05 2	519.05 2530.05	2541.05	2552.05 2563	3.05	2585.05
Erc	equency		Reading	Level	Limit	Margin	Detector
. (MHz)	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	Delector
1 24	183.500	31.24	17.76	49.00	74.00	-25.00	peak
_		31.24	4.73	35.97	54.00	-18.03	AVG
0. (MHz)	(dB/m) 31.24	(dBuV) 17.76	(dBuV/m) 49.00	(dBuV/m) 74.00	(dB) -25.00	D

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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est Mo	de:	π/	4-DQPSK N	lode 2480MH	Ηz			
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2474.300	2485.50 2	496.50	2507.50 25	18.50 2529.50) 2540.50	2551.50 2562	2.00	2584.50 ⊮
	Freque	ency	Factor	Reading	Level	Limit	Margin	
No.	Freque (MH	-	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
No.		lz)	1	-			-	Detector peak
	(MH	lz) .500	(dB/m)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	(MH 2483	lz) .500	(dB/m) 31.24	(dBuV) 17.29	(dBuV/m) 48.53	(dBuV/m) 74.00	(dB) -25.47	peak
1	(MH 2483	lz) .500	(dB/m) 31.24	(dBuV) 17.29	(dBuV/m) 48.53	(dBuV/m) 74.00	(dB) -25.47	peak
1	(MH 2483	lz) .500	(dB/m) 31.24	(dBuV) 17.29	(dBuV/m) 48.53	(dBuV/m) 74.00	(dB) -25.47	peak
1 2 emarks	(MH 2483 2483	lz) .500 .500	(dB/m) 31.24 31.24	(dBuV) 17.29	(dBuV/m) 48.53 36.78	(dBuV/m) 74.00 54.00	(dB) -25.47 -17.22	peak



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	2306.85	231	7.85	2328.	85	233	9.85 235	0.85	2361	.85	2372	.85 23	983.	.85	24	05.8	5 1
No.		equen MHz)			actor B/m)	I	Readin (dBuV	~ 1	Lev (dBu)		1	Limit BuV/m		Margin (dB)	Det	ecto	or
1		390.0		-	0.84	-+	18.24	,	49.		-	74.00	-	-24.92	pe	eal	(
2	23	390.0	00	3	0.84		4.74		35.	58	ł	54.00	\dagger	-18.42		VG	_
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1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value



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07 500	2308.50	2319.50	2330.50	224	1.50 23	52.50	2363	1 60	2374.50	238	E E0		407.50
.57.500	2300.00	2010.00	2330.30	234	1.30 23	JZ. JU	2.30		2314.30	230	5.50	2	407.JO
No.	Free	quency	Fact	or	Readir	ng	Lev	/el	Lim	it	Margir		tector
INO.	()	MHz)	(dB/n	n)	(dBuV	()	(dBu)	V/m)	(dBu∖	//m)	(dB)	De	elector
1	23	90.000	30.8	4	19.92	2	50.	76	74.0	00	-23.24	1 p	eak
2	23	90.000	30.8	4	5.07		35.	91	54.0	00	-18.09) /	٩VG
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narks													

2.Margin value = Level -Limit value



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.0 24	75.050 2	486.05 2497	.05 25	08.05 251	9.05 2530.05	2541.05	2552.05 2563	.05	2585.05
	No.	Frequen (MHz)	-	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	2483.5	00	31.24	17.59	48.83	74.00	-25.17	peak
F	2	2483.5	00	31.24	4.54	35.78	54.00	-18.22	AVG

Remarks:

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



nt.	Pol.			Ve	rtical													
est	Mode	:		8-0	DPSK	Mod	le 2	2480	ИНz									
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		Fre	quen	cv	F	actor	.	Rea	ding		Lev	el		Lim	it	Margin		
	No.		MHz)		1	3/m)			3uV)			//m)					Detector	٢
	1	24	83.50	00	3	1.24		18	.06	4	19.3	30		74.0	00	-24.70	peak	
	2	24	83.50	00	3	1.24		4.	25	:	35.4	19		54.0)0	-18.51	AVG	

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

2.Margin value = Level -Limit value

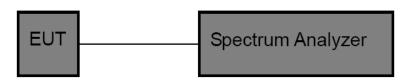


3.4. Band edge and Spurious Emissions (Conducted)

<u>Limit</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):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.

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 10th harmonic.
 - Sweep = auto, Detector function = peak, Trace = max hold
- Sweep = auto, Detector function = peak, Trace = max
 Measure and record the results in the test report.

Test Mode

Please refer to the clause 2.3.

Test Result

(1) Band edge Conducted Test

Test Mode	Antenna	ChName	Frequency (MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
		Low	2402	0.26	-59.33	<=-19.74	PASS
DH5	Ant1	High	2480	1.51	-58.54	<=-18.49	PASS
DHIJ	AIIU	Low	Hop_2402	-0.65	-59.17	-20.65	PASS
		High	Hop_2480	0.81	-58.60	-19.19	PASS
		Low	2402	0.39	-59.08	<=-19.61	PASS
2DH5	Ant1	High	2480	1.50	-59.56	<=-18.50	PASS
2005	Anti	Low	Hop_2402	-7.06	-59.32	-27.06	Bm] Verdict 19.74 PASS 18.49 PASS 0.65 PASS 9.19 PASS 19.61 PASS 18.50 PASS 7.06 PASS 19.88 PASS 18.67 PASS 1.11 PASS
		High	Hop_2480	-1.55	-58.90	-21.55	
		Low	2402	0.12	-58.36	<=-19.88	PASS
3DH5	Ant1	High	2480	1.33	-59.12	<=-18.67	PASS
	AIIT	Low	Hop_2402	-1.11	-59.53	-21.11	Bmj 19.74 PASS 18.49 PASS 0.65 PASS 0.19 PASS 19.61 PASS 18.50 PASS 1.55 PASS 19.88 PASS 18.67 PASS 1.11 PASS
		High	Hop_2480	1.32	-59.23	-18.68	PASS





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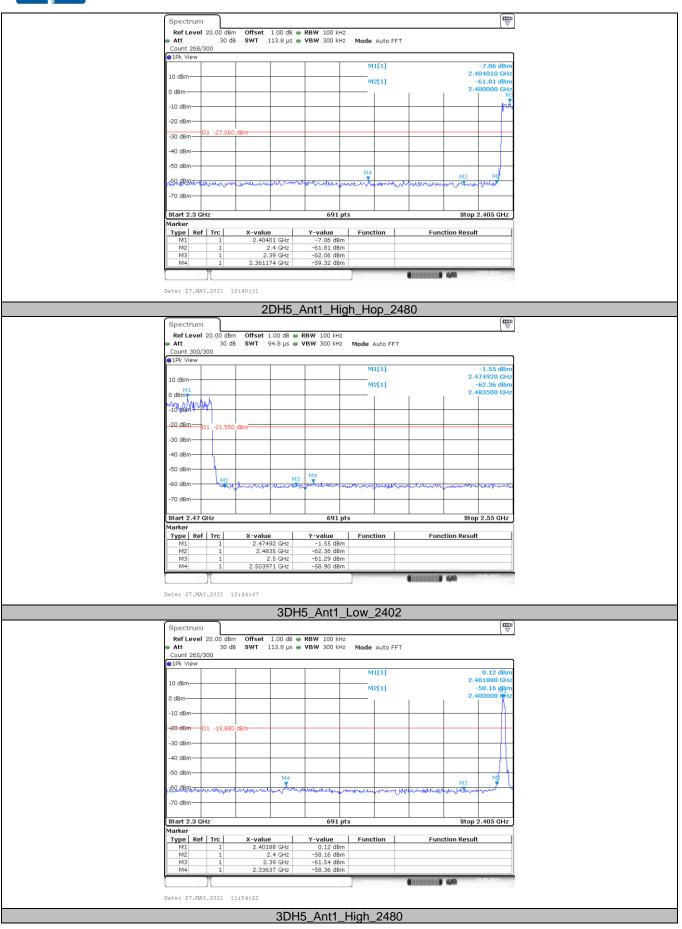


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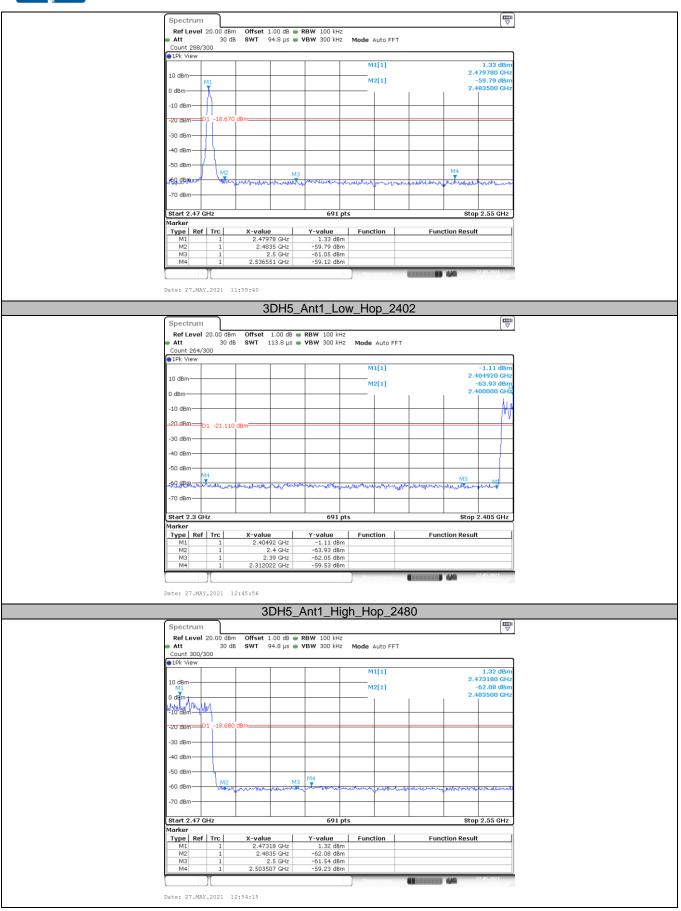
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Accreditation Administration of the People's Republic of China : yz.cnca.cn





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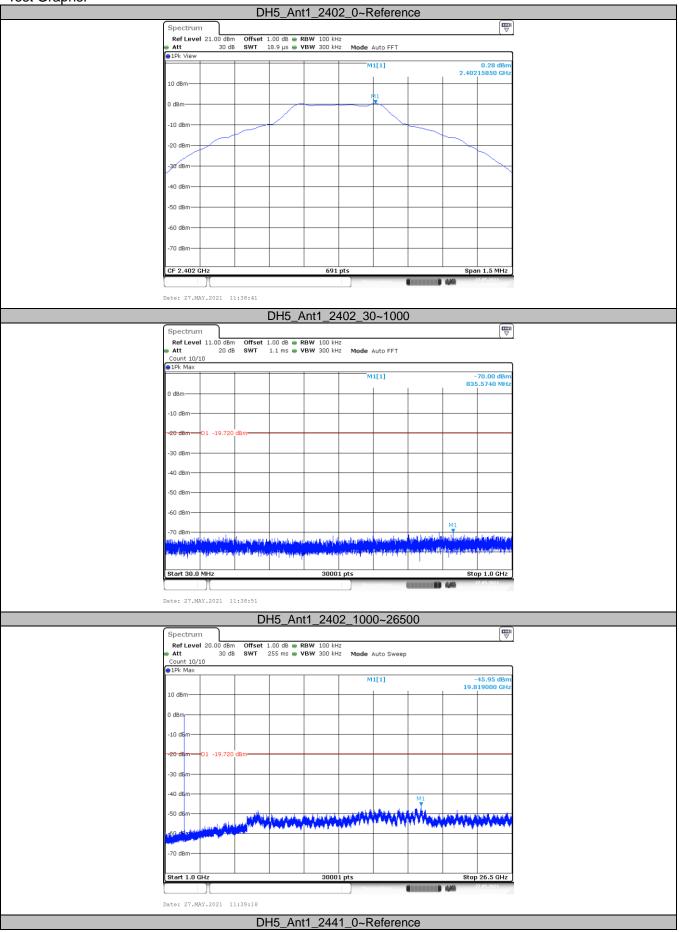


(2) Conducted Spurious Emissions Test

Test Mode	Antenna	Channel	Freq Range [MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
			Reference	0.28	0.28		PASS
		2402	30~1000	30~1000	-70.00	<=-19.72	PASS
			1000~26500	1000~26500	-45.95	<=-19.72	PASS
			Reference	1.21	1.21		PASS
DH5	Ant1	2441	30~1000	30~1000	-70.70	<=-18.79	PASS
			1000~26500	1000~26500	-47.05	<=-18.79	PASS
			Reference	1.54	1.54		PASS
		2480	30~1000	30~1000	-71.12	<=-18.46	PASS
			1000~26500	1000~26500	-46.92	<=-18.46	PASS
			Reference	0.19	0.19		PASS
		2402	30~1000	30~1000	-70.26	<=-19.81	PASS
			1000~26500	1000~26500	-46.56	<=-19.81	PASS
			Reference	1.13	1.13		[dBm] Verdict PASS <=-19.72
2DH5	Ant1	2441	30~1000	30~1000	-70.26	<=-18.87	
			1000~26500	1000~26500	-45.72	<=-18.87	PASS
			Reference	1.29	1.29		PASS
		2480	30~1000	30~1000	-70.17	<=-18.71	PASS
			1000~26500	1000~26500	-46.32	<=-18.71	PASS
			Reference	0.23	0.23		PASS
		2402	30~1000	30~1000	-71.02	<=-19.77	PASS
			1000~26500	1000~26500	-46.10	<=-19.77	PASS
			Reference	1.17	1.17		PASS
3DH5	Ant1	2441	30~1000	30~1000	-70.60	<=-18.83	PASS
			1000~26500	1000~26500	-46.31	<=-18.83	[dBm] Verdict PASS =-19.72 PASS =-19.72 PASS =-19.72 PASS =-19.72 PASS =-18.79 PASS =-18.79 PASS =-18.79 PASS =-18.79 PASS =-18.46 PASS =-18.46 PASS =-19.81 PASS =-18.87 PASS =-18.87 PASS =-18.71 PASS =-18.71 PASS =-18.71 PASS =-19.77 PASS =-19.77 PASS =-19.77 PASS =-19.77 PASS =-18.83 PASS =-18.83 PASS =-18.83 PASS
			Reference	1.49	1.49		PASS
		2480	30~1000	30~1000	-70.94	<=-18.51	PASS
			1000~26500	1000~26500	-46.03	<=-18.51	PASS



Test Graphs:

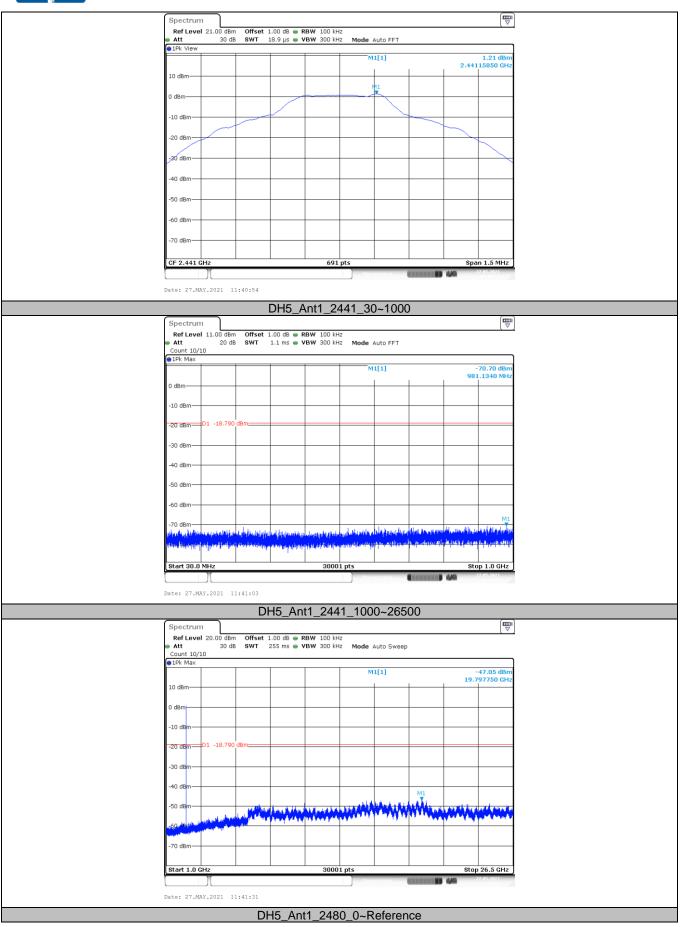


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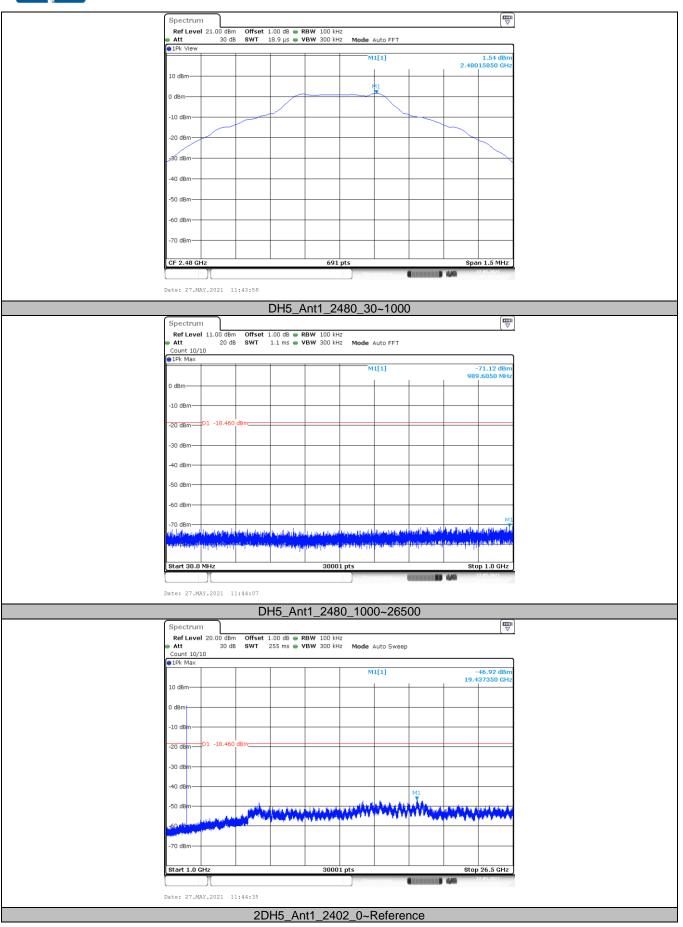
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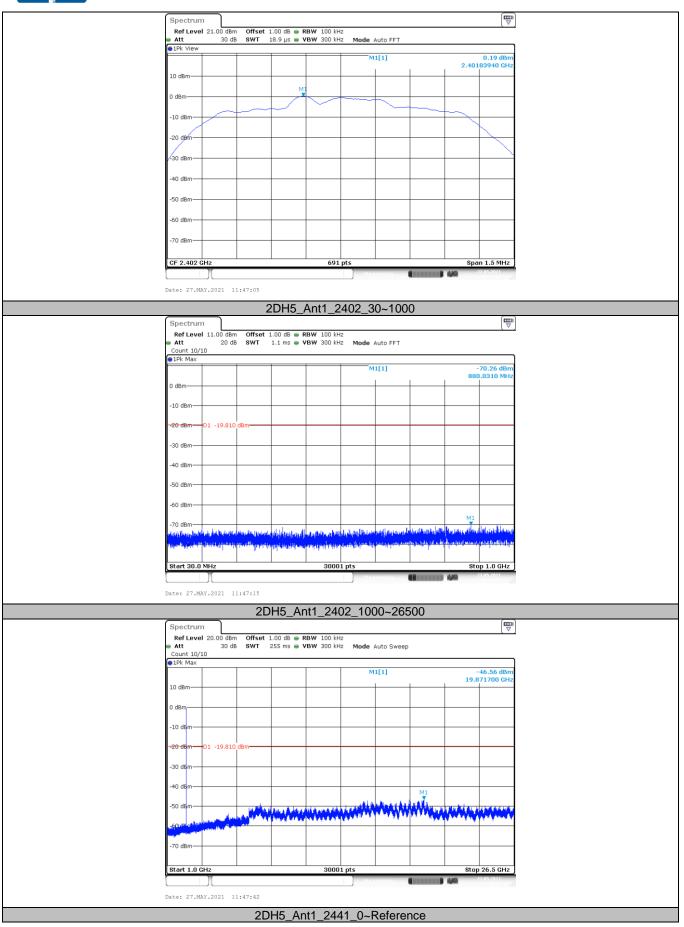




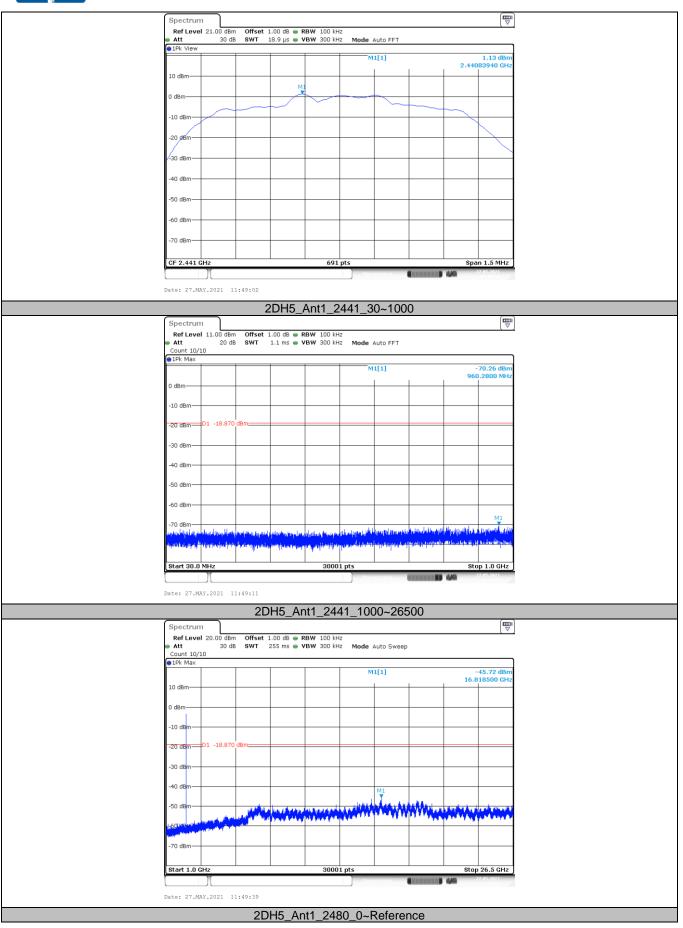




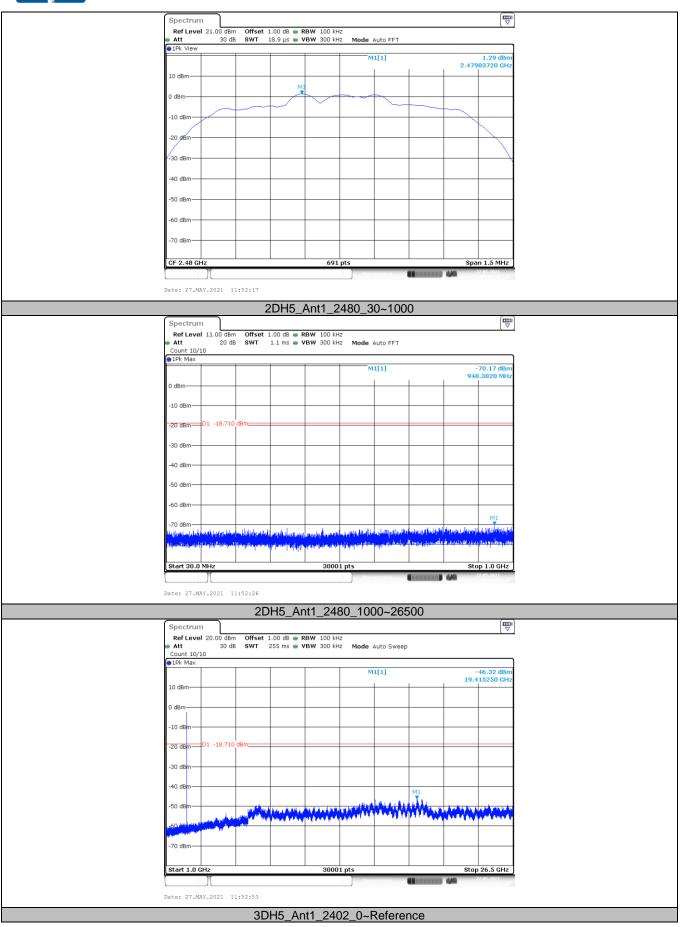




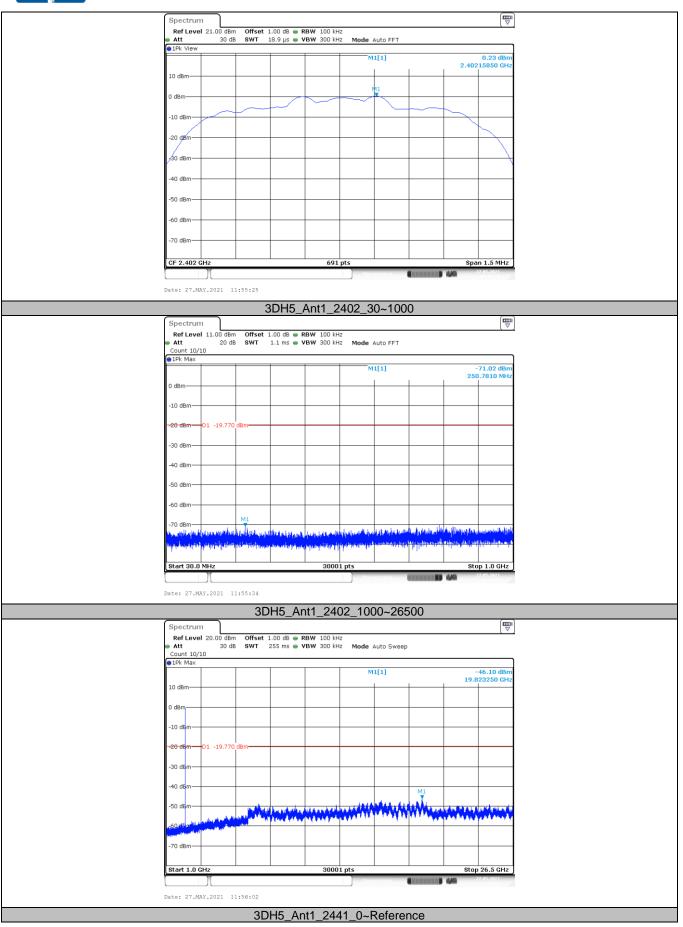




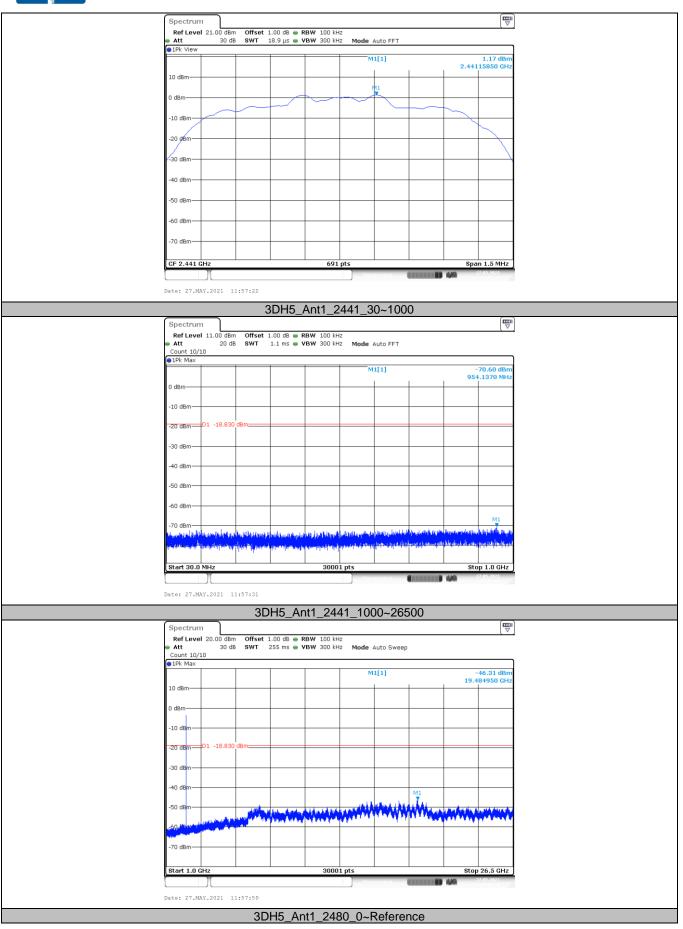






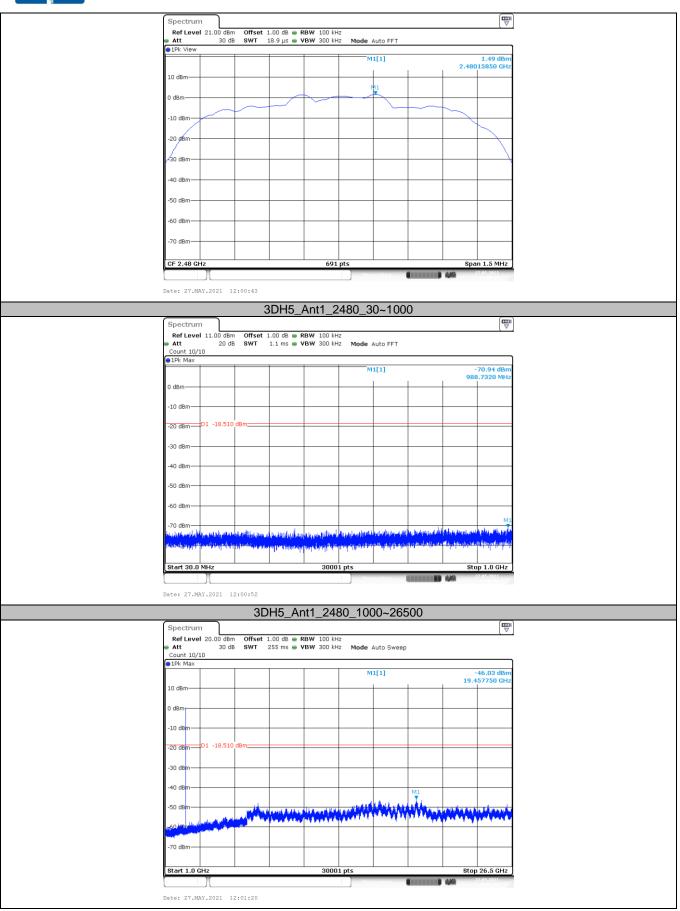








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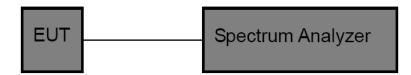


3.5. 20dB Bandwidth

<u>Limit</u>

N/A

Test Configuration



Test Procedure

- 5. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 6. Spectrum Setting:
 - (1) Set RBW = 30 kHz.
 - (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

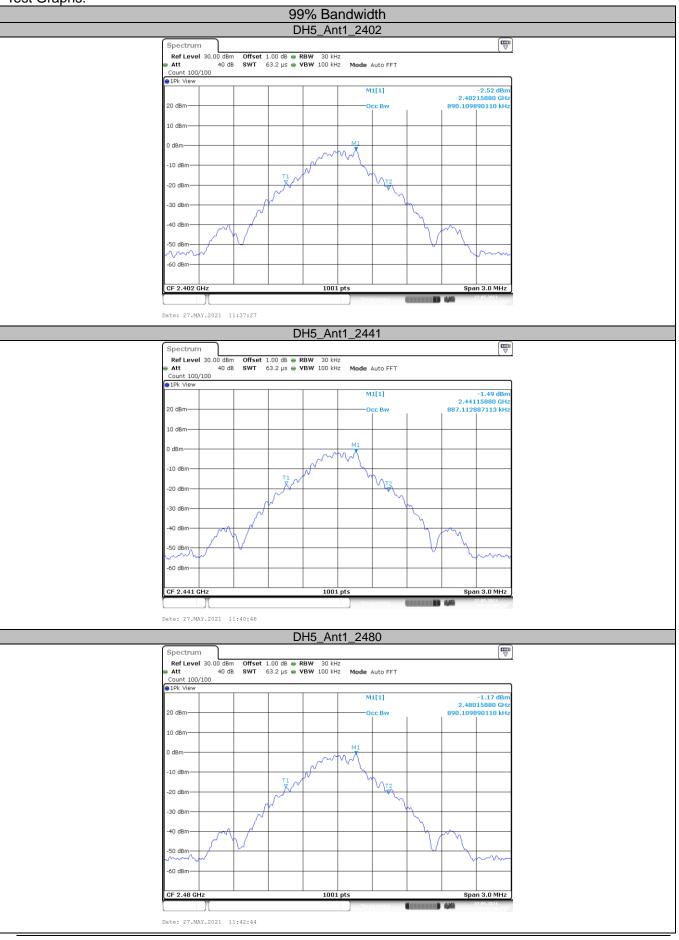
Please refer to the clause 2.3.

Test Result

Modulation type	Channel	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (kHz)
	00	0.890	0.963	642.00
GFSK	39	0.887	0.957	638.00
	78	0.890	0.963	642.00
	00	1.151	1.239	826.00
π /4-DQPSK	39	1.154	1.242	828.00
	78	1.151	1.239	826.00
	00	1.151	1.266	844.00
8-DPSK	39	1.157	1.269	846.00
	78	1.151	1.266	844.00



Test Graphs:



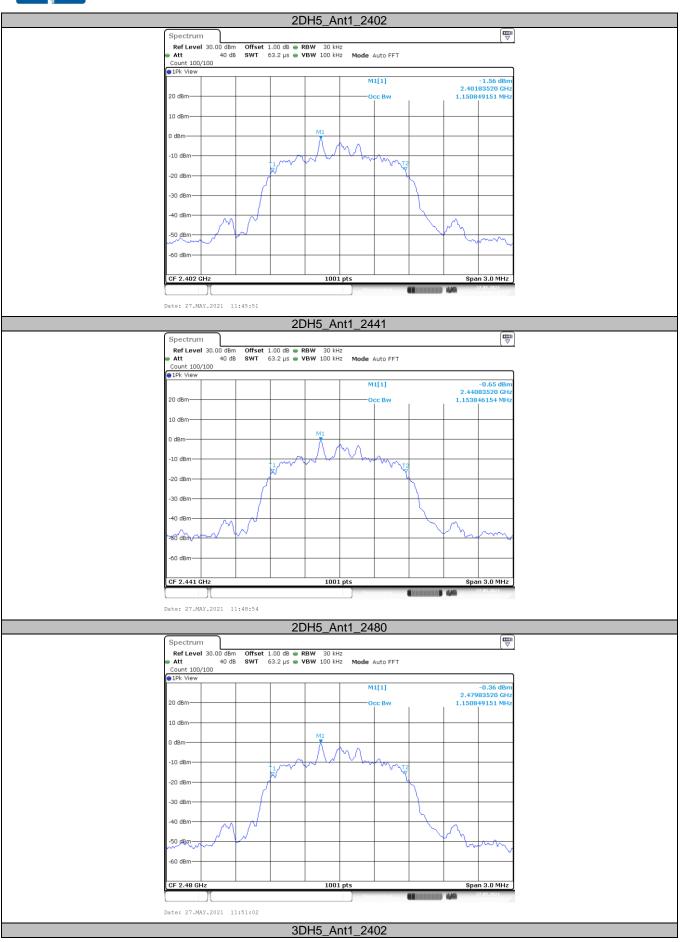
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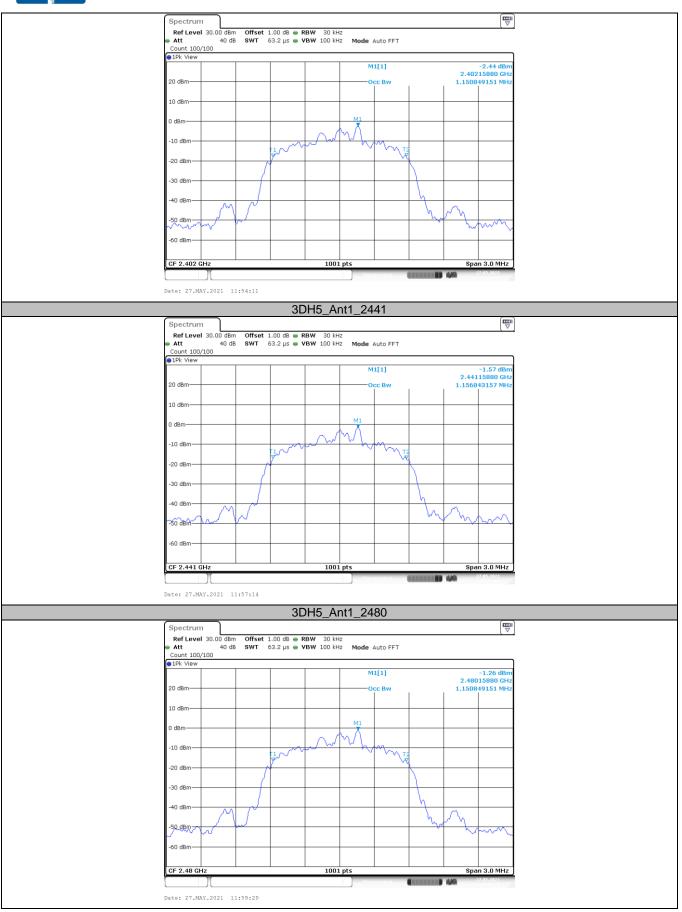


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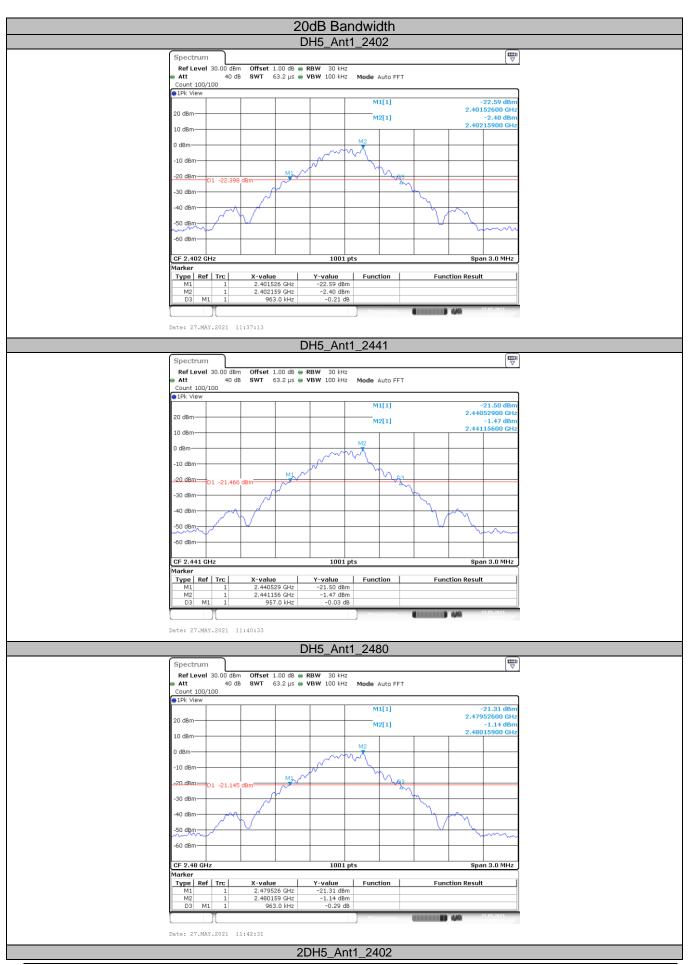
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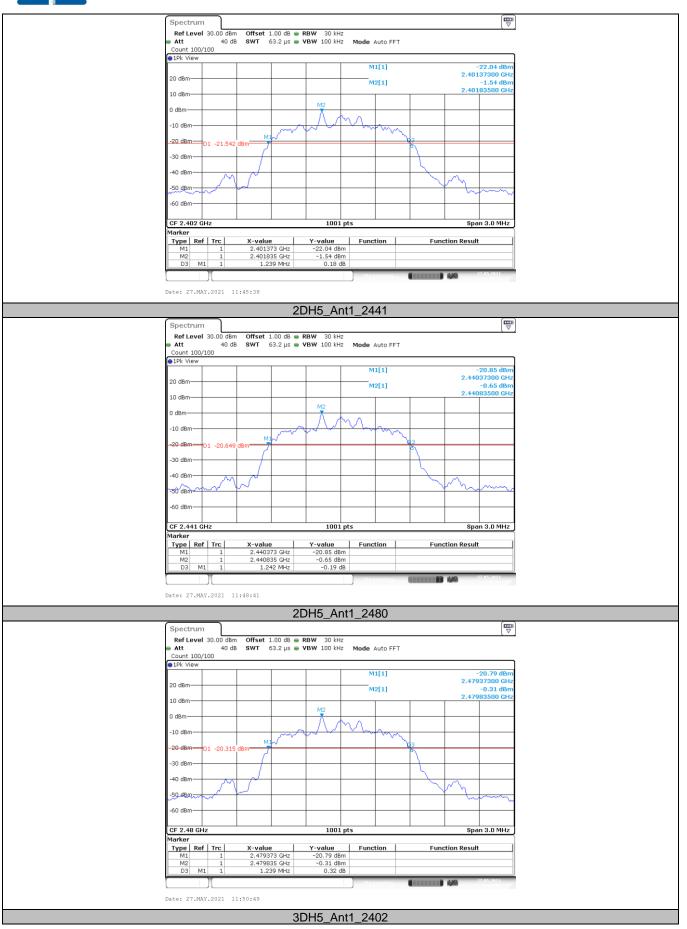
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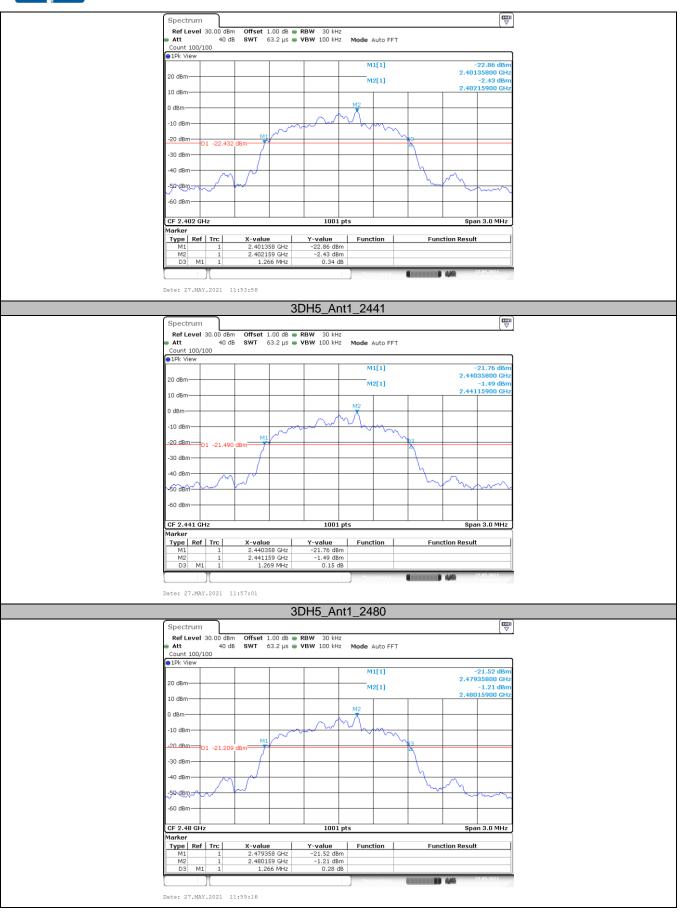




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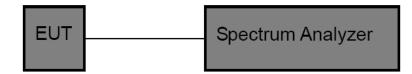
3.6. Channel Separation

<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 is greater	2400~2483.5

Test Configuration



Test Procedure

- 7. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- 8. Spectrum Setting:
 - (1) Set RBW = 100 kHz.
 - (2) Set the video bandwidth (VBW) \ge 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

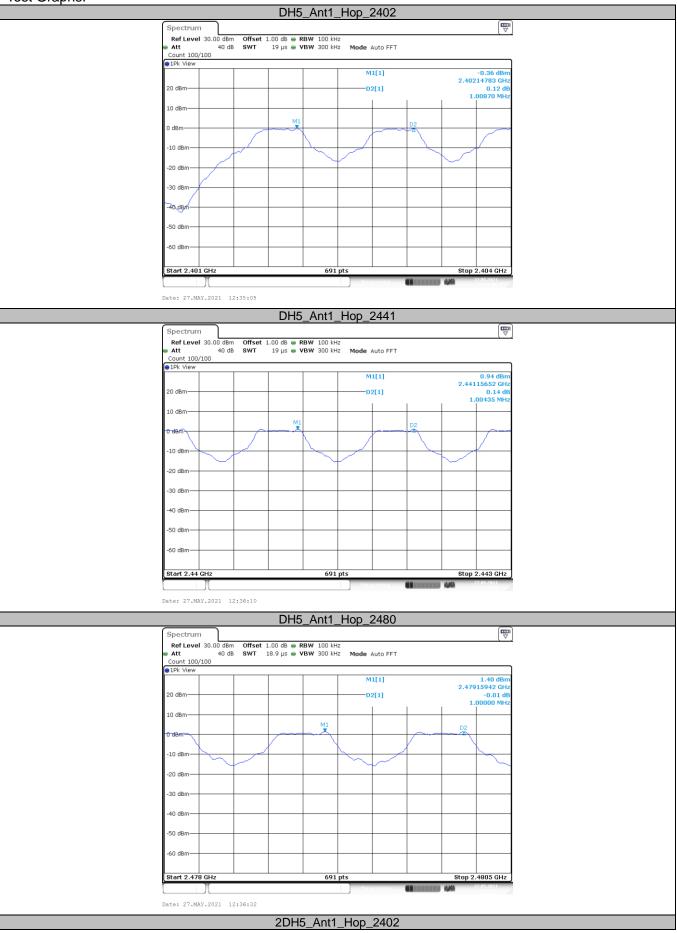
Please refer to the clause 2.3.

Test Result

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz)	Result
	00	1.009	>=0.963	
GFSK	39	1.004	>=0.963	Pass
	78	1.000	>=0.963	
	00	1.000	>=0.828	
π /4-DQPSK	39	0.991	>=0.828	Pass
	78	1.051	>=0.828	
	00	1.004	>=0.846	
8-DPSK	39	1.004	>=0.846	Pass
	78	0.996	>=0.846	



Test Graphs:



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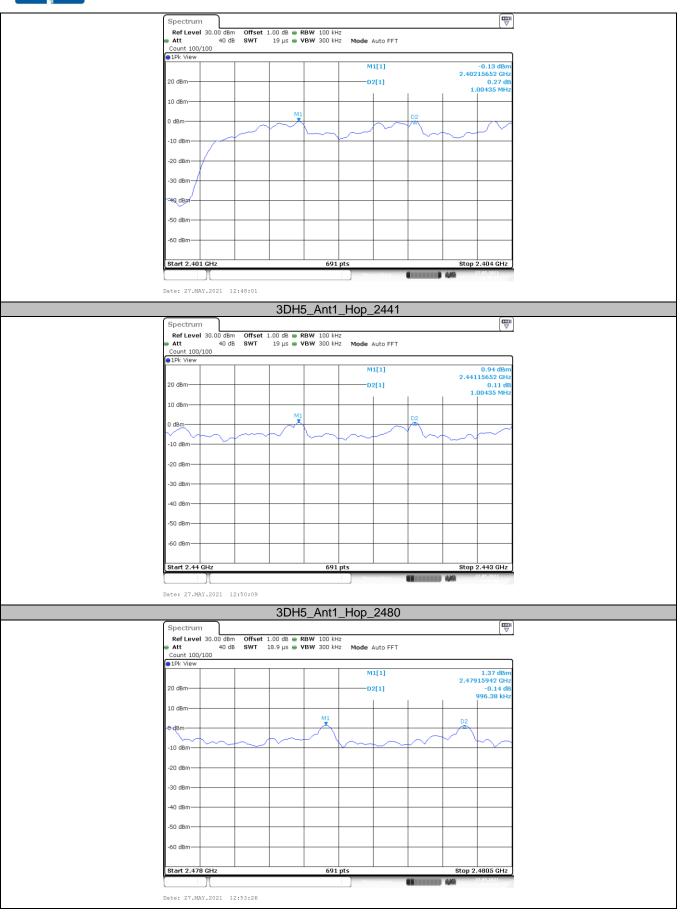
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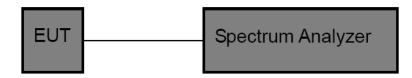
3.7. Number of Hopping Channel

<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

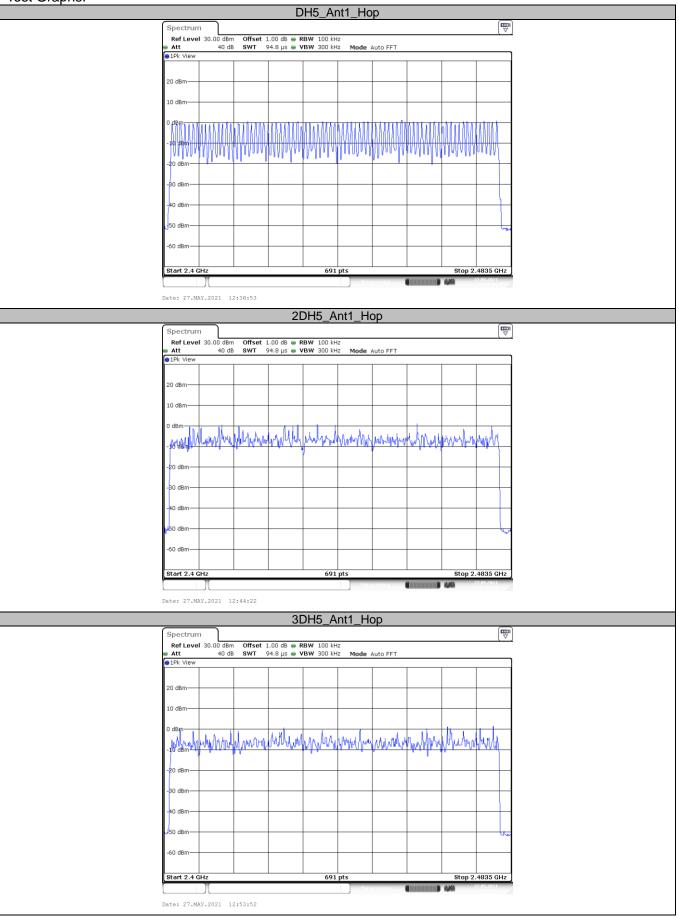
Please refer to the clause 2.3.

Test Result

Modulation type	Channel number	Limit	Result
GFSK	79		
π /4-DQPSK	79	≥15.00	Pass
8DPSK	79		



Test Graphs:



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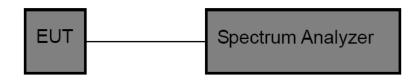


3.8. Dwell Time

Limit

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 2.3.

Test Result

Modulation type	Channel	Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
	DH1	2441	0.37	118.40	31.60		
GFSK	DH3	2441	1.62	259.20	31.60	≤ 0.40	Pass
	DH5	2441	2.87	306.13	31.60		
	2DH1	2441	0.38	121.60	31.60		
π /4-DQPSK	2DH3	2441	1.63	260.80	31.60	≤ 0.40	Pass
	2DH5	2441	2.87	306.13	31.60		
	3DH1	2441	0.38	121.60	31.60		
8-DPSK	3DH3	2441	1.62	259.20	31.60	≤ 0.40	Pass
	3DH5	2441	2.87	306.13	31.60		

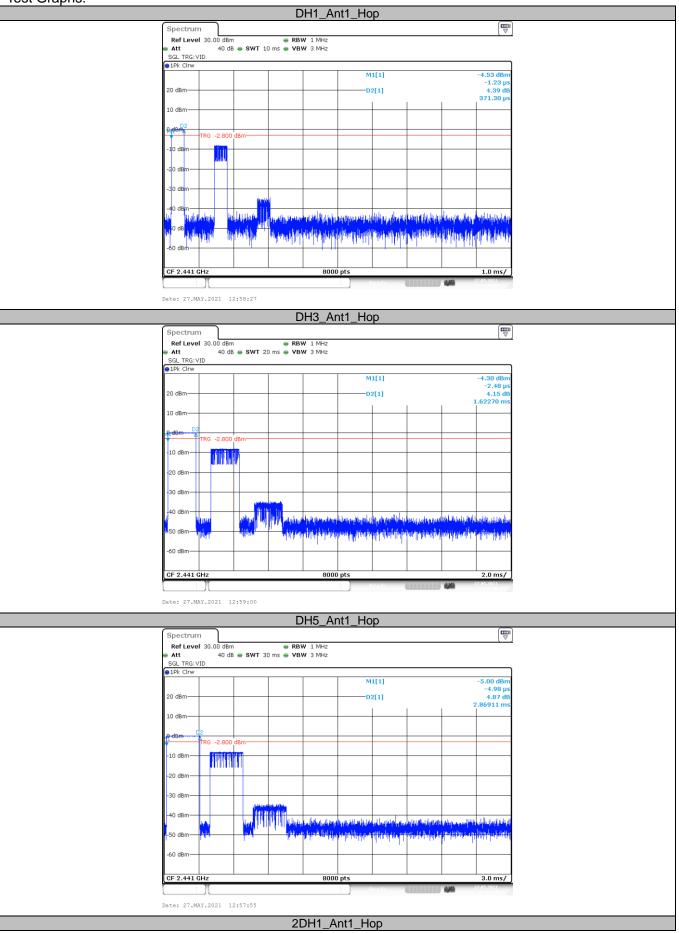
Note: 1DH1/2DH1/3DH1Total of Dwell= Pulse Time*(1600/2)*31.6/79 1DH3/2DH3/3DH3 Total of Dwell= Pulse Time*(1600/4)*31.6/79 1DH5/2DH5/3DH5 Total of Dwell= Pulse Time*(1600/6)*31.6/79

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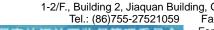




Test Graphs:



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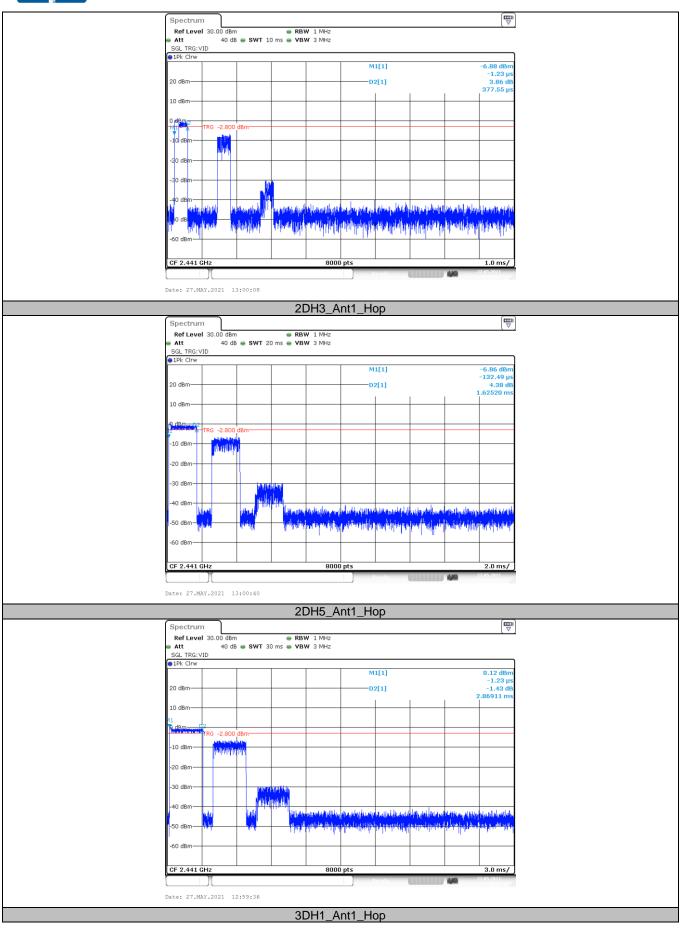


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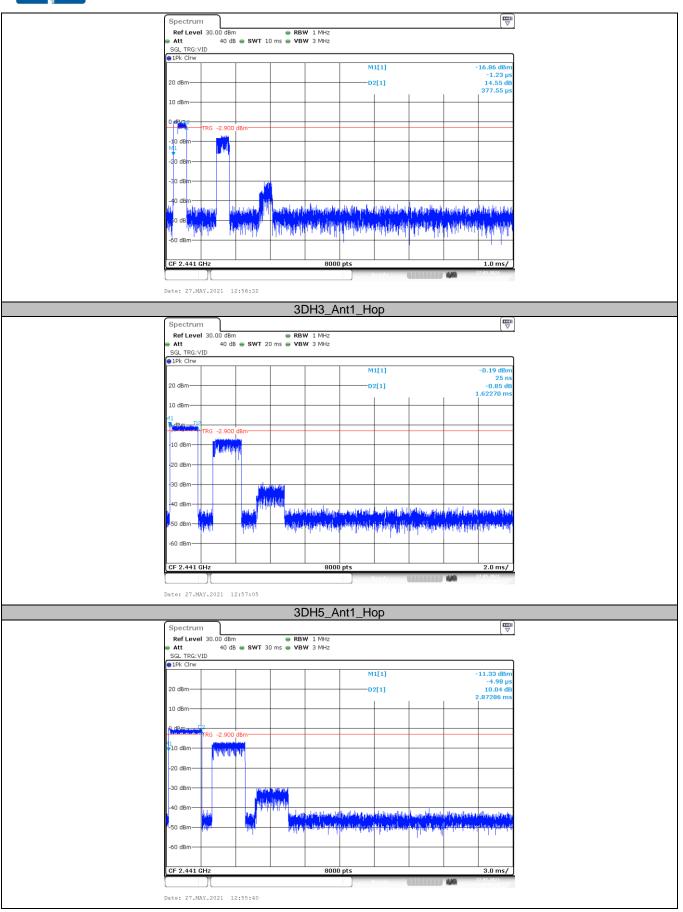
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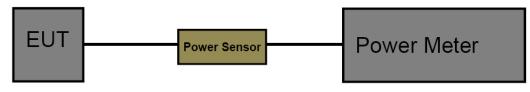
3.9. Peak Output Power

<u>Limit</u>

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

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	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 2.3.

Test Result

Modulation type	Channel	Output power (dBm)	Limit (dBm)	Result
	00	0.27		
GFSK	39	1.18	≤ 21.00 Pa	Pass
	78	1.51		
	00	0.25		
π /4-DQPSK	39	1.16	≤ 21.00	Pass
	78	1.51		
	00	0.32		
8-DPSK	39	1.11	≤ 21.00	Pass
	78	1.51		





3.10. 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 less than 6dBi, please refer to the EUT internal photographs antenna photo.