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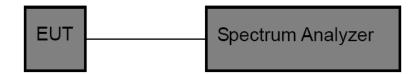
# 3.6. Channel Separation

<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.

#### Test Mode

Please refer to the clause 2.4.

#### Test Results

Test Mode	Frequency(MHz)	Result[MHz]	Limit[MHz]	Verdict
GFSK	Hop_2441	1.000	>=0.632	PASS
π /4-DQPSK	Hop_2441	1.014	>=0.870	PASS
8-DPSK	Hop_2441	1.000	>=0.880	PASS







# 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  $\geq$  RBW, Sweep time= Auto.

#### Test Mode

Please refer to the clause 2.4.

#### Test Result

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

Agilent Spectrum Analyzer - Swept SA			
PNO: East +++ Trig: Free Run	ALIGN AUTO 09:57:57 PM Aug 11, 2021 #Avg Type: RMS TRACE 2345 G Avg[Hold: 1000/1000 TYPE MWWWAAA	Frequency	
Ref Offset 0.5 dB		Auto Tune	
10 dB/div Ref 30.00 dBm		Center Freq	
20.0		2.441750000 GHz	
10.0	10000110001100011000410.000-	Start Freq	
0.00 - <u>AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA</u>		2.40000000 GHz	
-100 <u>- A CARD CE A A CARDA A A CARDA DA A A CARDA DA A A A CARDA DA CARDA DA A CARDA DA A</u>	XAMALI VALANA KANATSKI ANKANA KANA	<b>Stop Freq</b> 2.483500000 GHz	
-200			
-30.0		CF Step 8.350000 MHz Auto Man	
-40.0		Freq Offset	
-50.0		0 Hz	
80.0			
Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.48350 GHz Sweep 8.000 ms (1001 pts)		
MSG	STATUS		
2DH5_ Agilent Spectrum Analyzer - Swept SA	Нор		
UN RLT RF 50.0 AC SENSE:INT	ALIGN AUTO 10:04:58 PM Aug 11, 2021 #Avg Type: RMS TRACE 2 3 4 5 6 Avg Hold: 1000/1000 Type M	Frequency	
IFGain:Low #Atten: 40 dB	DET PPPPPP	Auto Tune	
10 dB/div Ref 30.00 dBm			
20.0		Center Freq 2.441750000 GHz	
10.0		Start Freq	
an partitional management apartition of the second	Unashellertsanshort Warmelling	2.40000000 GHz	
	the second second second	Stop Freq	
-200		2.483500000 GHz	
-30.0		CF Step 8.350000 MHz <u>Auto</u> Man	
-40.0			
-50.0		Freq Offset 0 Hz	
-60.0			
Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.48350 GHz Sweep 8.000 ms (1001 pts)		
MSG	STATUS		
3DH5_ Agilent Spectrum Analyzer - Swept SA	Нор		
Center Freq 2.441750000 GHz	ALIGN AUTO 10:15:10PM Aug 11, 2021 #Avg Type: RMS TRACE 2 3 4 5 6 Avg Hold:/1000 TYPE MUNICIPAL DET P P P P P	Frequency	
IFGain:Low #Atten: 40 dB	DETPPPP	Auto Tune	
Ref Offset 0.5 dB 10 dB/div Ref 30.00 dBm	*		
20.0		Center Freq 2.441750000 GHz	
10.0		Start Freq	
	ar and a hall the state of the	2.40000000 GHz	
		Stop Freq	
-20.0		2.483500000 GHz	
.30.0		CF Step 8.350000 MHz Auto Man	
-40.0		<u>Auto</u> Man	
-60.0		Freq Offset 0 Hz	
-60.0			
Start 2.40000 GHz	Stop 2.48350 GHz Sweep 8.000 ms (1001 pts)		
#Res BW 100 kHz #VBW 300 kHz	Sweep 8.000 ms (1001 pts)		



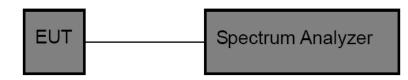


# 3.8. Dwell Time

<u>Limit</u>

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

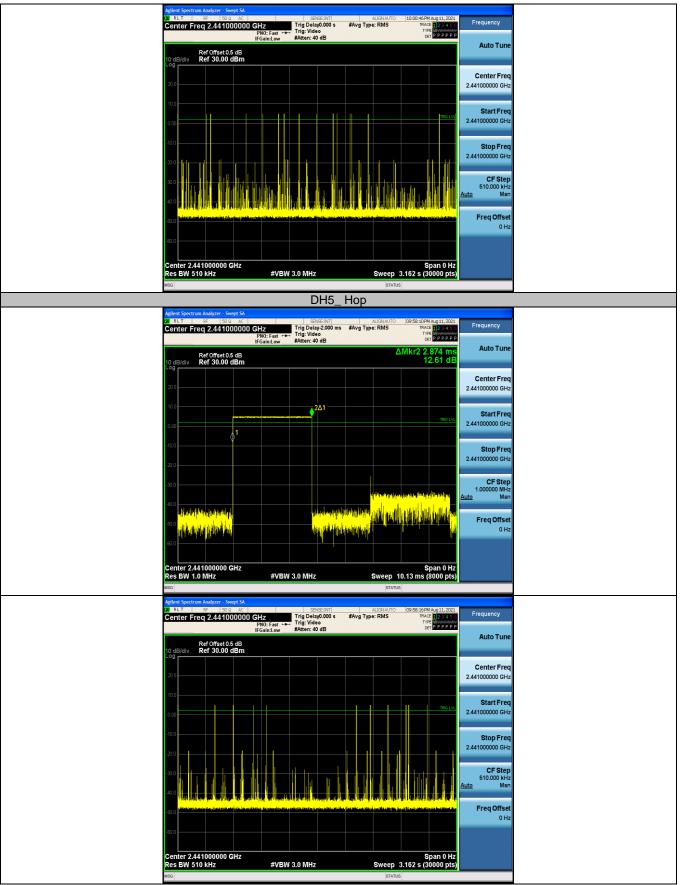
Modulation type	Channel	Frequency (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (ms)	Limit (Second)	Result
	DH1	2441	0.37	118.40	31.60		
GFSK	DH3	2441	1.63	260.80	31.60	≤ 0.40	Pass
	DH5	2441	2.87	306.13	31.60		
	2DH1	2441	0.38	121.60	31.60		
π /4-DQPSK	2DH3	2441	1.63	260.80	31.60	≤ 0.40	Pass
	2DH5	2441	2.88	307.20	31.60		
	3DH1	2441	0.38	121.60	31.60		
8-DPSK	3DH3	2441	1.63	260.80	31.60	≤ 0.40	Pass
	3DH5	2441	2.88	307.20	31.60		

Note: 1DH1/2DH1/3DH1 Total 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



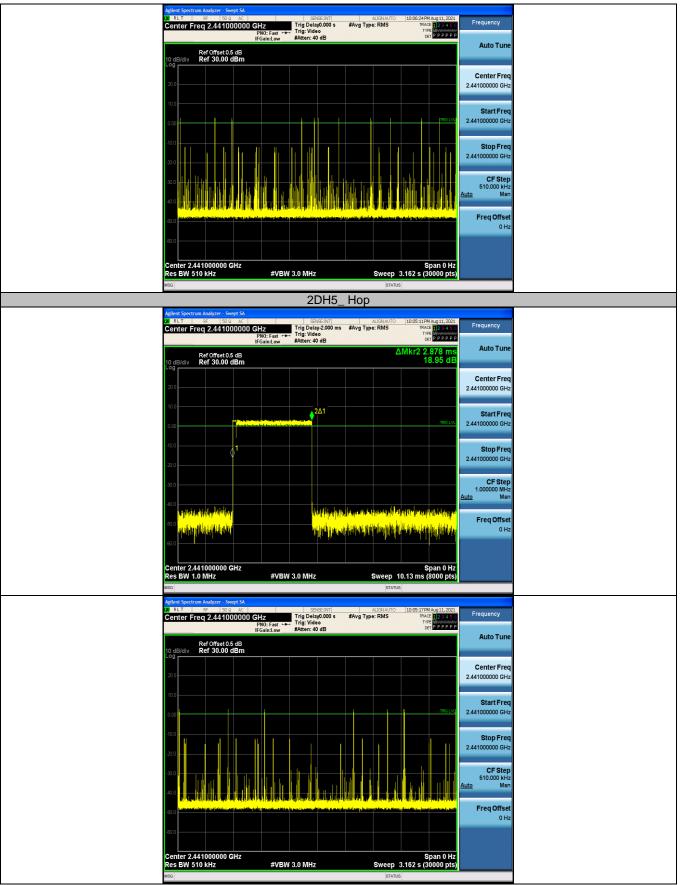
	DH1_	Нор		
LXC RLT	ctrum Analyzer - Swept SA RF 50 Ω AC SENSE:INT	ALIGN AUTO 09:59:41 PM Aug 11, 2021	Frequency	
Center	Freq 2.441000000 GHz PN0: Fast +++ IFGain:Low #Atten: 40 dB	S #Avg Type: RMS TRACE 23456 TYPE DET P P P P P P		
10 dB/di	Ref Offset 0.5 dB	ΔMkr2 369.9 μs 20.81 dB	Auto Tune	
Log			Center Freq	
20.0			2.441000000 GHz	
10.0	2Δ1-	TRIG LVL	Start Freq 2.441000000 GHz	
0.00			2.441000000 0112	
-10.0	¢ <sup>1</sup>		Stop Freq 2.441000000 GHz	
-20.0			CE Stan	
-30.0			CF Step 1.000000 MHz Auto Man	
-40.0 * <mark>3/1</mark>	<mark>n'n pladariad failet</mark> - <mark>Tribupan diatat da ar takarlad. Majadapan</mark>	Alan hand Alah Malay Kalen Ing Panapatén Kalén yan	Freq Offset	
-50.0	Aldan perdeander – stande beste die selandet biede sinder	in dia ang di mang di kang di kang di kang	0 Hz	
-60.0				
Center Res BV	2.441000000 GHz / 1.0 MHz #VBW 3.0 MHz	Span 0 Hz Sweep 10.13 ms (8000 pts)		
MSG		STATUS		
(xu RLT	RF S0 Ω AC SENSE:INT   Freq 2.441000000 GHz Trig Delay0.000 s	ALIGN AUTO 09:59:47 PM Aug 11, 2021 #Avg Type: RMS TRACE	Frequency	
Center	PNO: Fast ++ Trig: Video IFGain:Low #Atten: 40 dB	WRYG TYPE, RWS TWO 23456 TYPE PPPP	Auto Tune	
10 dB/di	Ref Offset 0.5 dB Ref 30.00 dBm		Autorune	
			Center Freq	
20.0			2.441000000 GHz	
100			Start Freq 2.441000000 GHz	
000				
-100			Stop Freq 2.441000000 GHz	
-200			CF Step	
-300			510.000 kHz Auto Man	
		n an	FreqOffset	
500			0 Hz	
-60.0				
	2.441000000 GHz / 510 kHz #VBW 3.0 MHz	Span 0 Hz Sweep  3.162 s (30000 pts)		
MSG	DH3_	STATUS		
	ctrum Analyzer - Swept SA RF 50.0 AC SENSE:INT	ALIGN AUTO 10:00:40 PM Aug 11, 2021		
		#Avg Type: RMS TRACE 23456 TYPE DET PPPPP	Frequency	
	Ref Offset 0.5 dB	∆Mkr2 1.625 ms 4.86 dB	Auto Tune	
			Center Freq	
20.0			2.441000000 GHz	
10.0	<u>4</u>	TRIG LVL	Start Freq	
0.00			2.441000000 GHz	
-10.0			Stop Freq 2.441000000 GHz	
-20.0				
-30.0	e filme e en este antenen e en este an	vijdire.	CF Step 1.000000 MHz Auto Man	
-40.0 <mark>// 1</mark> 7	and a state of the	<mark>Nan Katan Batha Albah Aban Indonesia kata</mark>		
-50.0	Handara and the Annales and	and the second second	Freq Offset 0 Hz	
-60.0				
Center	2.441000000 GHz	Span 0 Hz		
Res BV	1.0 MHz #VBW 3.0 MHz	Sweep 10.13 ms (8000 pts) STATUS		





2DH1_ Hop Agilent Spectrum Analyzer - Swept SA	
02 RLT RF 100 AC SPEE3771 AL39/AUTO 100551 PM AQ1 Center Freq 2.441000000 CHz Trig Delay2.000 ns #Avg Type: RMS TRACE 123 FR0: Fast Trig: Video creptor Foint.cw #Atter: 40 dB creptor	eeo Frequency
Ref Offset 0.5 dB ΔMkr2 377.5   10 dB/div Ref 30.00 dBm 21.66	HS Auto Tune dB
200	Center Freq 2.441000000 GHz
	Start Freq 2.441000000 GHz
	Stop Freq
	2.441000000 GHz
	CF Step 1.00000 MHz <u>Auto</u> Man
1000 <mark>an in the second statement of the second stateme</mark>	Hiy FreqOffset 0 Hz
Center 2.441000000 GHz Span 0   Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8000   Msg status	Hz pts)
Agilent Spectrum Analyzer - Swept SA DI RLT 8F 90.0 AC SPISE/INIT ALISHAUTO 10:05/57/6M.Aug 11, Center Freq 2:441000000 CHz Trig Delay0.000 s #Avg Type: RMS TRACE 123 PND: East →→ Trig: Video Trife	456 Frequency
Piller Pred 2.44 1000000 G1/2 Fast → Piller Fast → IFGainLow Ref Offset 0.5 dB 10 dBldiv Ref 30.00 dBm	Auto Tune
	Center Freq 2.44100000 GHz
	Start Freq 2.44100000 GHz
	Stop Freq   2.44100000 GHz   CF Step
	510.000 kHz Auto Freq Offset
	0Hz
Center 2.441000000 GHz Span 0 Res BW 510 kHz #VBW 3.0 MHz Sweep 3.162 s (30000	Hz pts)
2DH3_Hop	
Agilent Spectrum Analyzer - Swept SA UI RLT RF 150.9 AC ISSNEIDT ALIGNAUTO 1006/38 PM Aug 11. Center Freq 2.4410000000 GHz Trig Delay-2.000 ms #Avg Type: RMS TRACE 0.00 PN0: Fast → Trig: Video	456 Frequency
PN0: Fast → Ing: Video Ing: Video   If Gelinit.ow #Atten: 40 dB ΔMkr2 1.629   10 dB/div Ref 30.00 dBm 4.95	
	Center Freq 2.441000000 GHz
	Start Freq 2.441000000 GHz
	Stop Freq 2.44100000 GHz
	CF Step 1.00000 MHz
-000 antice of the state of the	Auto Man
and the second sec	0 Hz
Center 2.441000000 GHz Span 0 Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8000	Hz pts)
MSG STATUS	



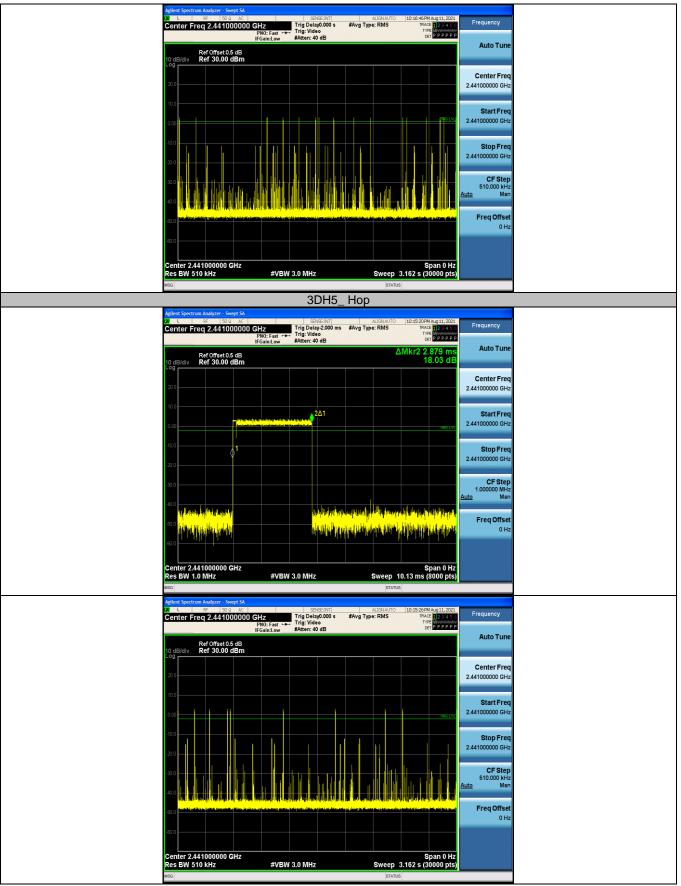


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	3DH1_	Hon		
	gilent Spectrum Analyzer - Swept SA	·		
	L 8F 500 AC SPREENT enter Freq 2.441000000 GHz PN0:Fast	ALIGN AUTO 10:16:04 PM Aug 11, 2021 #Avg Type: RMS TRACE 2 3 4 5 6 TYPE DET P P.P.P.P.	Frequency	
10	Ref Offset 0.5 dB 0 dB/div Ref 30.00 dBm	ΔMkr2 377.5 μs 6.30 dB	Auto Tune	
2	20.0	*	Center Freq 2.441000000 GHz	
c c		TRIG LVL	Start Freq 2.441000000 GHz	
			Stop Freq 2.441000000 GHz	
4	30.0		CF Step 1.000000 MHz	
4 8 8	<sup>000</sup> o <mark>n de la participation de la participat</mark>		<u>Auto</u> Man <b>Freq Offset</b> 0 Hz	
R	Center 2.441000000 GHz Les BW 1.0 MHz #VBW 3.0 MHz	Span 0 Hz Sweep 10.13 ms (8000 pts)		
	gilent Spectrum Analyzer - Swept SA			
G	L 8F 50.0. AC SENEE.N/T Center Freq 2.441000000 GHz PN0:Fast →→ IFGain:Low #Atten: 40 dB	ALIGNAUTO 10:16:11 PM Aug 11, 2021 #Avg Type: RMS TRACE 22345 G TYPE WHATTAN DET P P P P P	Frequency Auto Tune	
1 L	Ref Offset 0.5 dB 0 dB/div Ref 30.00 dBm		Center Freq	
	20.0		2.441000000 GHz	
¢		I RIG LVL	Start Freq 2.441000000 GHz	
3 3 4			Stop Freq 2.441000000 GHz CF Step 510.000 kHz Auto Man	
2 4		n yan yan Andrich yan da yan yan yan yan yan yan yan yan yan ya	Freq Offset 0 Hz	
C	Center 2.441000000 GHz Les BW 510 kHz #VBW 3.0 MHz	Span 0 Hz Sweep 3.162 s (30000 pts)		
MS		STATUS		
A	gilent Spectrum Analyzer - Swept SA			
G	enter Freq 2.441000000 GHz PN0:Fast - IFGain:Low #Atten: 40 dB	TYPE	Frequency	
10 L	o dB/div Ref 30.00 dBm	∆Mkr2 1.629 ms 21.97 dB	Auto Tune	
	20.0		Center Freq 2.441000000 GHz	
d		TROLVL	Start Freq 2.441000000 GHz	
			<b>Stop Freq</b> 2.441000000 GHz	
đ	90.0		CF Step 1.000000 MHz <u>Auto</u> Man	
4 8 8		ol konsense kan for en providente solenne Na na spol a district a providente providente Na na spol a district a providente providente providente providente providente providente providente providente	Freq Offset 0 Hz	
R	Center 2.441000000 GHz Les BW 1.0 MHz #VBW 3.0 MHz	Span 0 Hz Sweep 10.13 ms (8000 pts)		







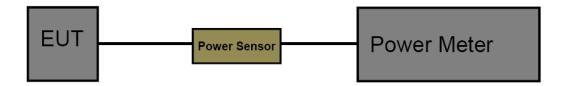
# 3.9. Peak Output Power

## <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 Pow- er<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

### **Test Configuration**



#### Test Procedure

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

2. Read the power value in the test software and record it.

### Test Mode

Please refer to the clause 2.4.

#### Test Result

Test Mode	Frequency (MHz)	Result[dBm]	Limit[dBm]	Verdict
	2402	4.83	<=21	PASS
GFSK	2441	5.15	<=21	PASS
	2480	4.99	<=21	PASS
	2402	3.64	<=21	PASS
π /4-DQPSK	2441	4.22	<=21	PASS
	2480	3.96	<=21	PASS
	2402	4.14	<=21	PASS
8-DPSK	2441	4.42	<=21	PASS
	2480	4.31	<=21	PASS

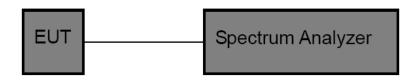


# 3.10. Duty Cycle

### Limit

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.

Spectrum Setting: 3.

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)
GFSK	2402	2.875	5.003	0.57	0.20	1
	2441	2.879	5.006	0.58	0.20	1
	2480	2.880	5.005	0.58	0.20	1
π /4-DQPSK	2402	2.884	5.005	0.58	0.20	1
	2441	2.883	5.002	0.58	0.20	1
	2480	2.884	5.005	0.58	0.20	1
8-DPSK	2402	2.885	5.005	0.58	0.20	1
	2441	2.887	5.001	0.58	0.20	1
	2480	2.878	4.993	0.58	0.20	1









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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

Complies

Directional gain =  $G_{ANT}$  = 5dBi Note: Bluetooth mode only supports SISO mode and does not support MIMO transmission.