

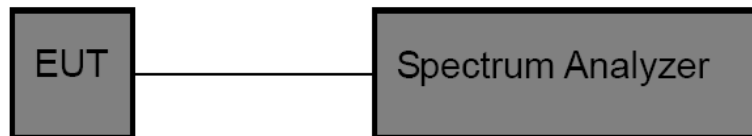


## 4.5. 20dB Bandwidth

### Limit

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% ~ 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

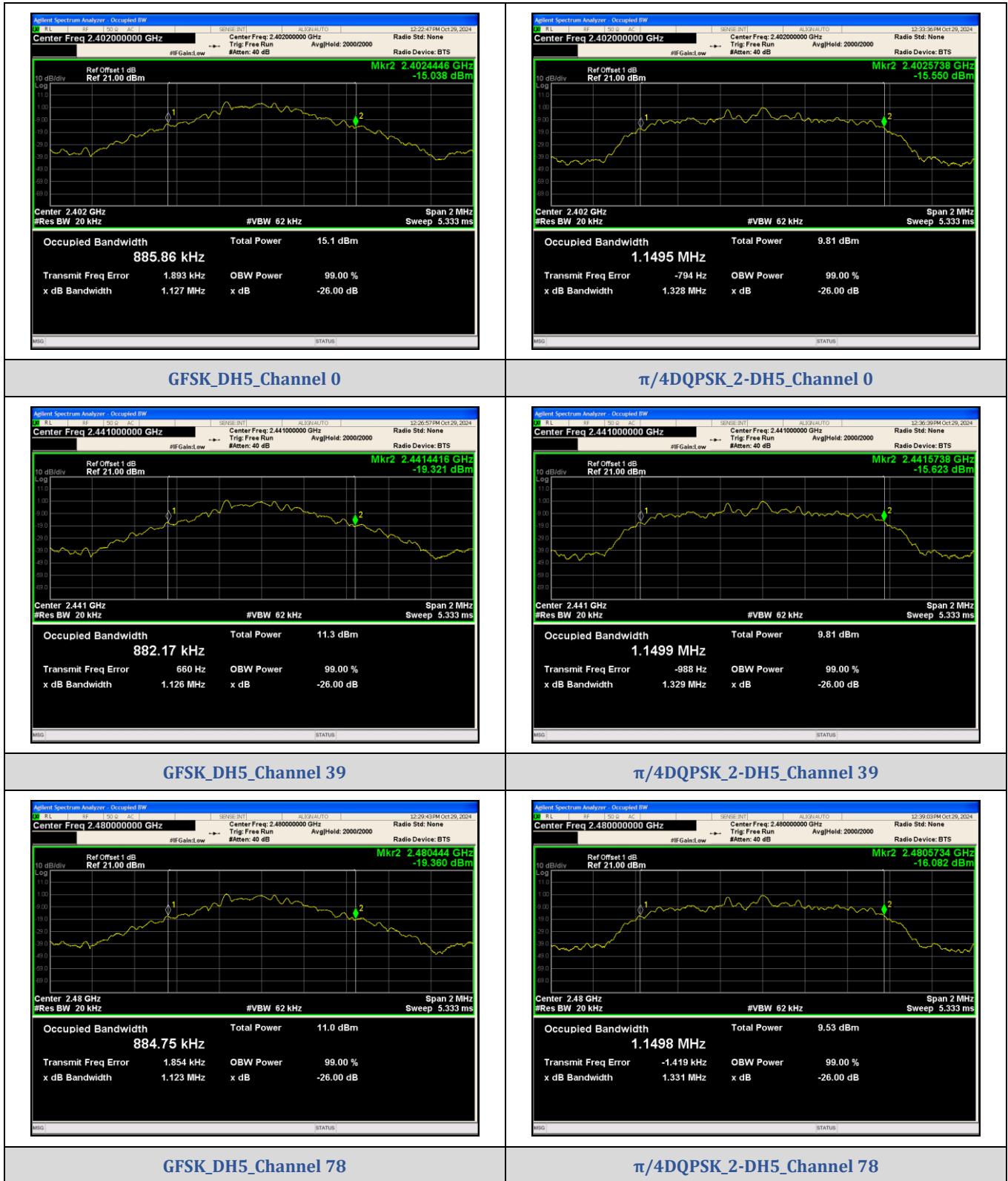
Please refer to the clause 2.4.

### Test Result

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
GFSK	2402	0.88586	0.9623	0.642
	2441	0.88217	0.9468	0.631
	2480	0.88475	0.9533	0.636
$\pi/4$ -DQPSK	2402	1.1495	1.280	0.853
	2441	1.1499	1.223	0.815
	2480	1.1498	1.223	0.815
8-DPSK	2402	1.1350	1.200	0.800
	2441	1.1357	1.196	0.797
	2480	1.1371	1.201	0.801



99% Bandwidth:

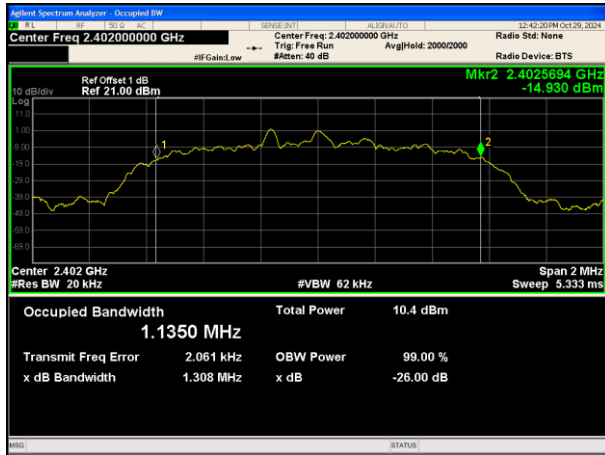


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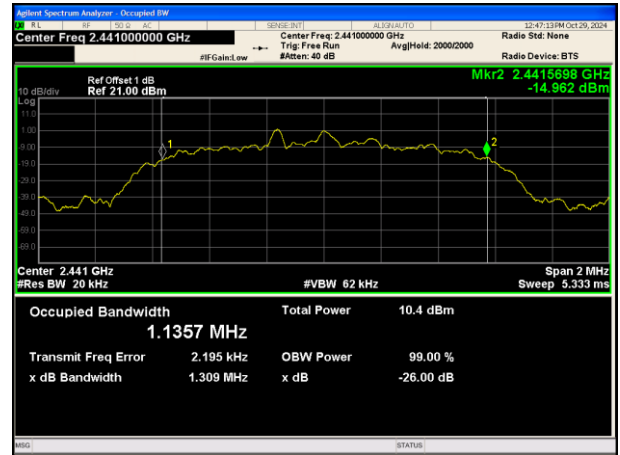
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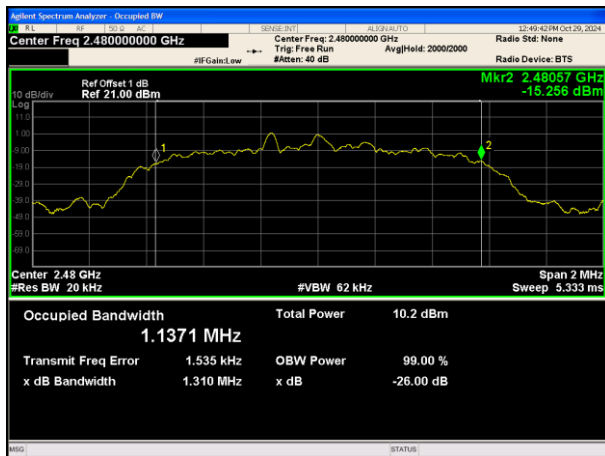
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8DPSK\_3-DH5\_Channel 0



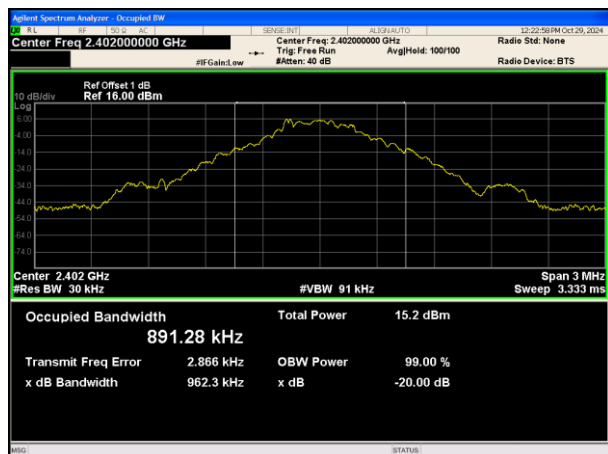
8DPSK\_3-DH5\_Channel 39



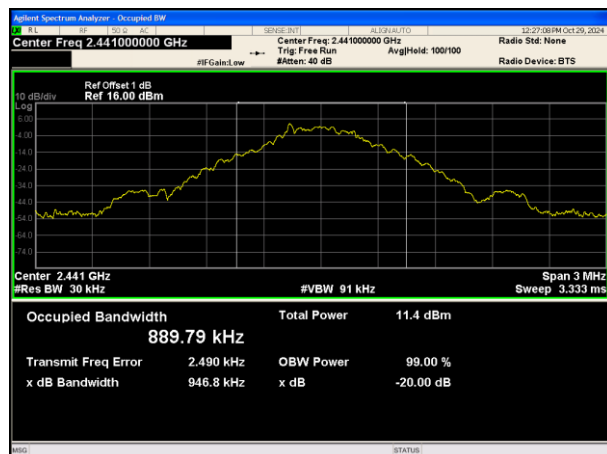
8DPSK\_3-DH5\_Channel 78



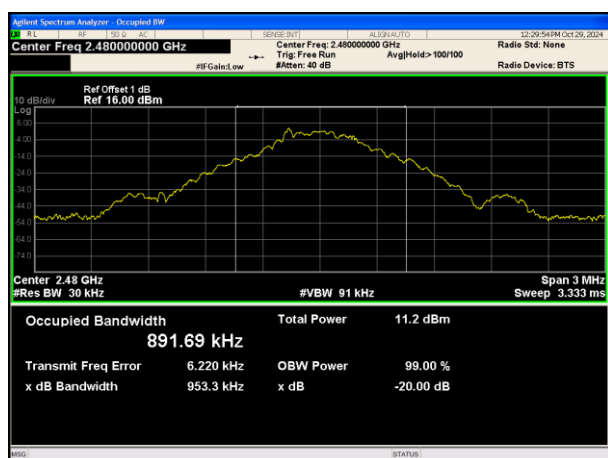
20dB Bandwidth:



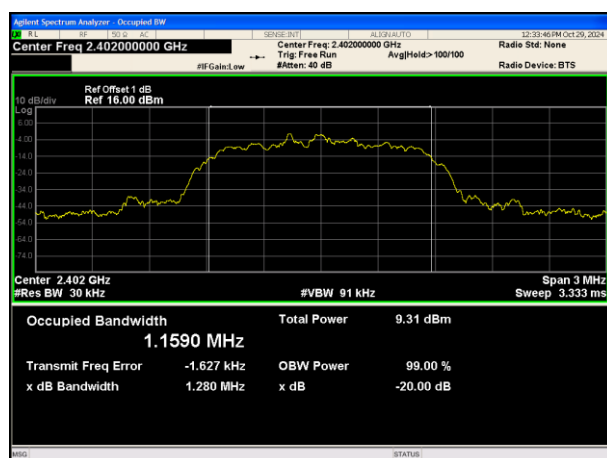
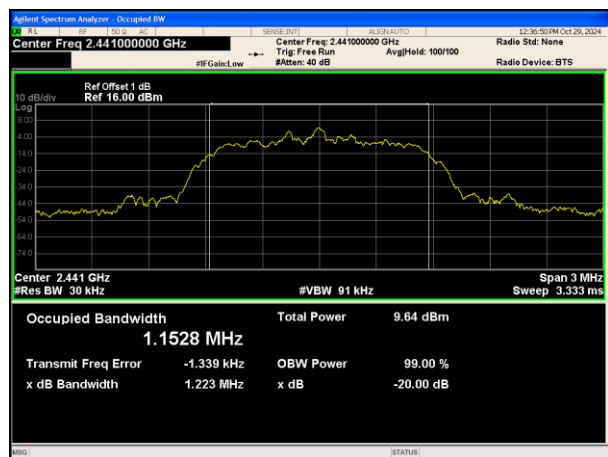
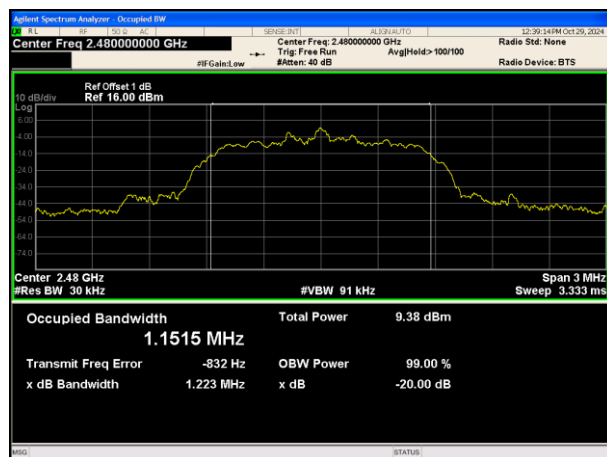
GFSK\_DH5\_Channel 0

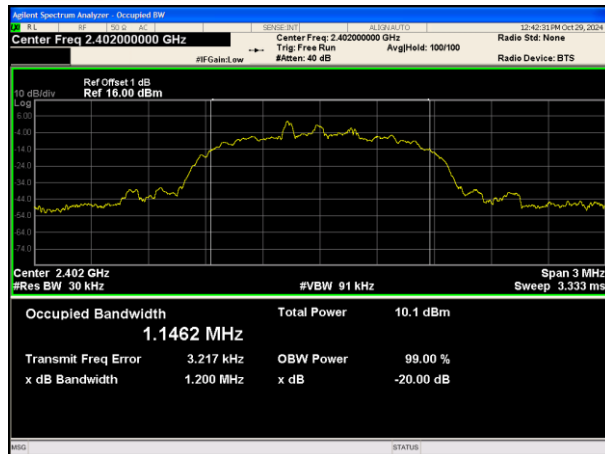


GFSK\_DH5\_Channel 39

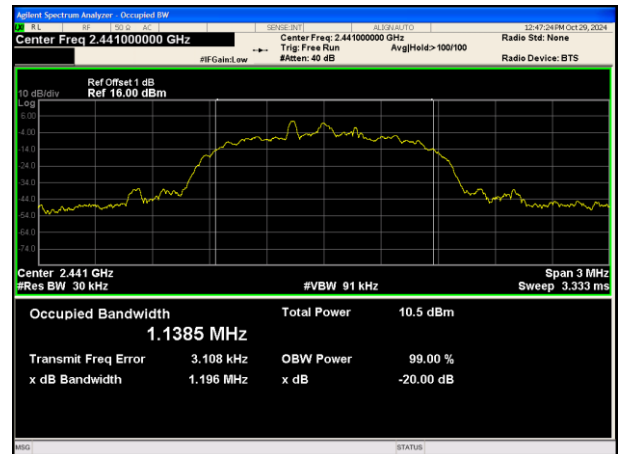


GFSK\_DH5\_Channel 78

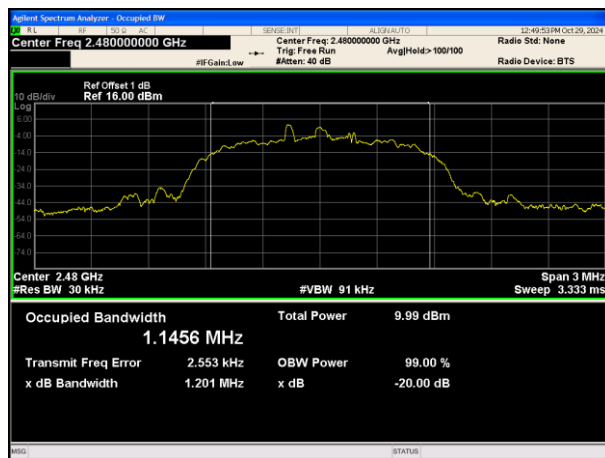
 $\pi/4$ DQPSK\_2-DH5\_Channel 0 $\pi/4$ DQPSK\_2-DH5\_Channel 39 $\pi/4$ DQPSK\_2-DH5\_Channel 78



8DPSK\_3-DH5\_Channel 0



8DPSK\_3-DH5\_Channel 39



8DPSK\_3-DH5\_Channel 78



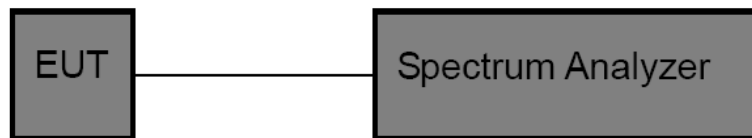
## 4.6. Channel Separation

### Limit

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

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

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

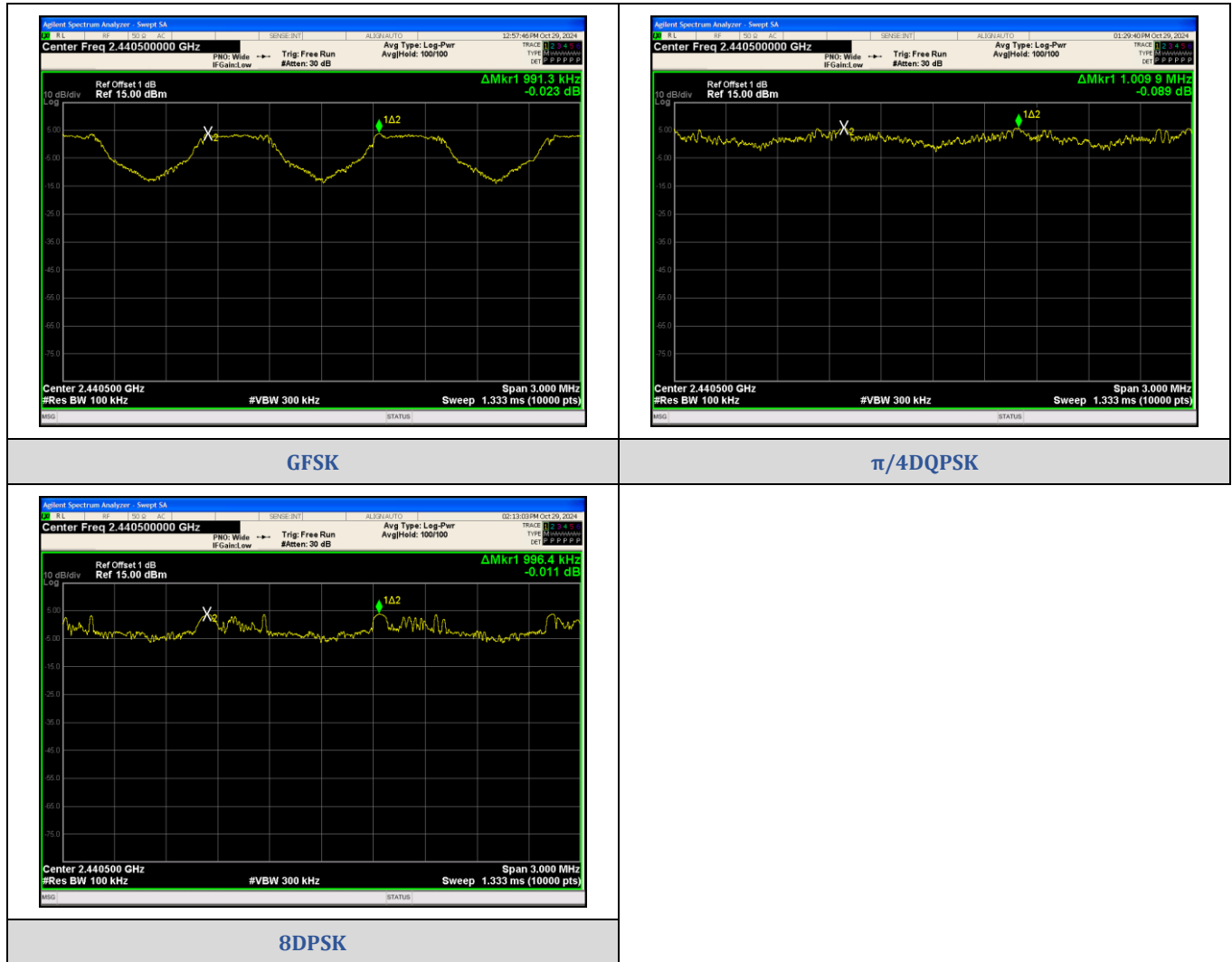
Please refer to the clause 2.4.

### Test Result

Test Mode	Frequency (MHz)	Carrier Frequencies Separation (MHz)	Limit (MHz)	Verdict
GFSK	Hop_2441	0.9913	>0.631	Pass
$\pi/4$ -DQPSK	Hop_2441	1.0099	>0.815	Pass
8-DPSK	Hop_2441	0.9964	>0.797	Pass



Test plot as follows:



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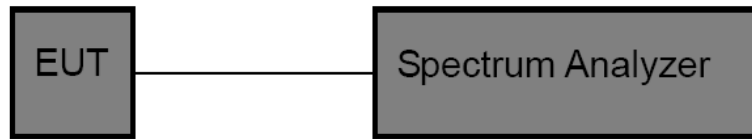
## 4.7. Number of Hopping Channel

### Limit

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)

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

### 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.

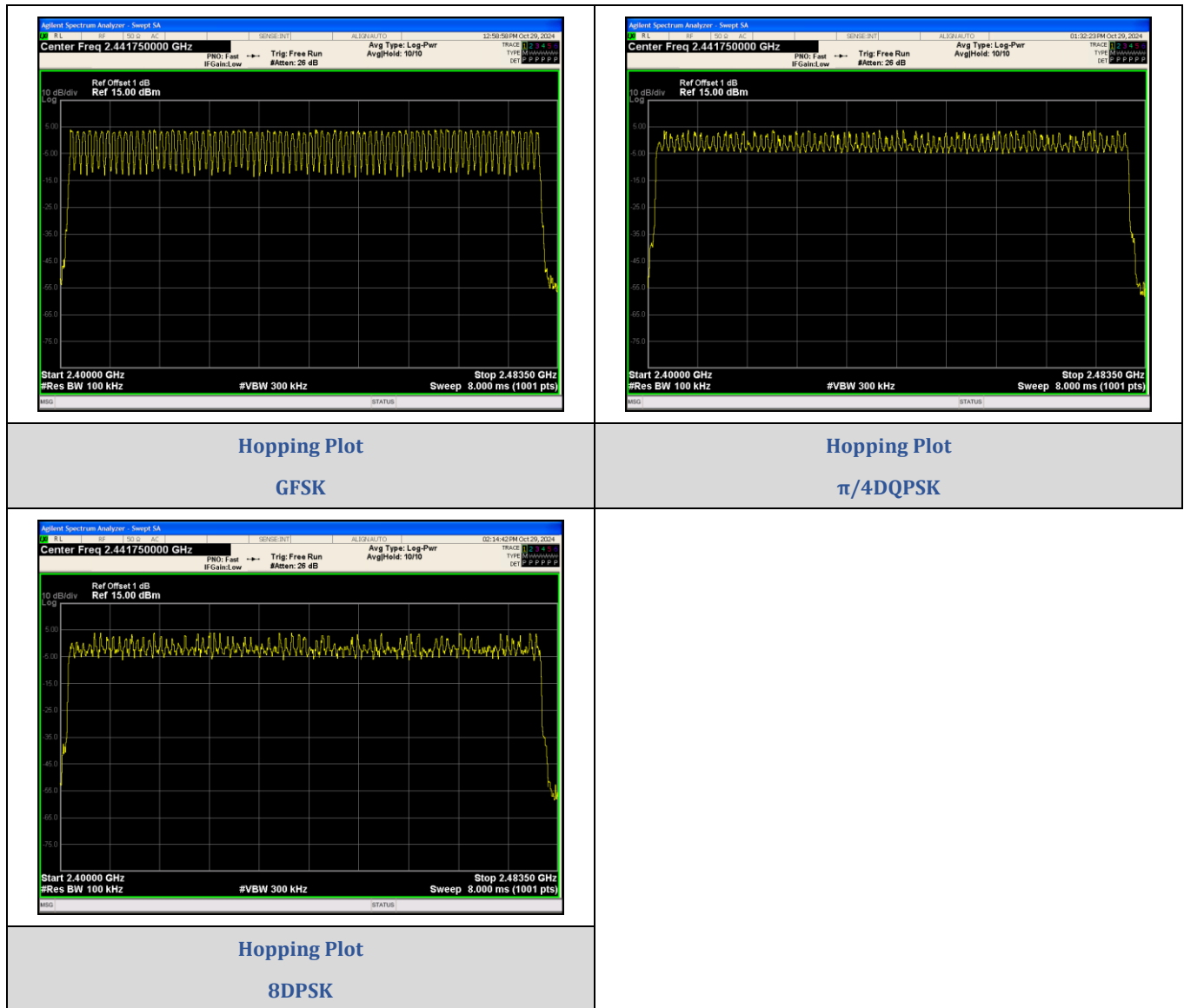
### Test Result

Test Mode	Channel Number	Limit	Verdict
GFSK	79	$\geq 15$	Pass
$\pi/4$ -DQPSK	79	$\geq 15$	Pass
8-DPSK	79	$\geq 15$	Pass





Test plot as follows:



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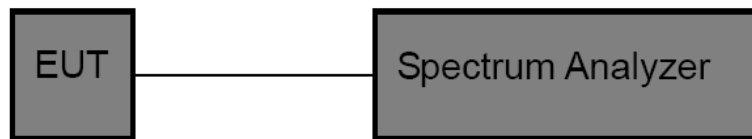
## 4.8. Dwell Time

### Limit

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)

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 $\geq$ 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		Frequency (MHz)	Pulse Width (ms)	Number of Pulses in 31.6 seconds	Dwell Time (ms)	Period Time (ms)	Limit (second)	Verdict
GFSK	DH1	2441	0.368	100	36.80	31.60	≤0.40	Pass
	DH3	2441	1.616	51	82.42	31.60		
	DH5	2441	2.864	34	97.38	31.60		
$\pi$ /4-DQPSK	2DH1	2441	0.376	101	37.98	31.60	≤0.40	Pass
	2DH3	2441	1.632	51	83.23	31.60		
	2DH5	2441	2.880	34	97.92	31.60		
8-DPSK	3DH1	2441	0.384	101	38.78	31.60	≤0.40	Pass
	3DH3	2441	1.632	51	83.23	31.60		
	3DH5	2441	2.880	34	97.92	31.60		

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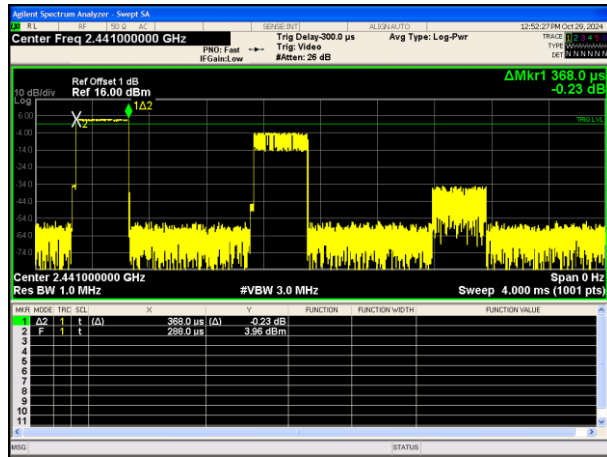
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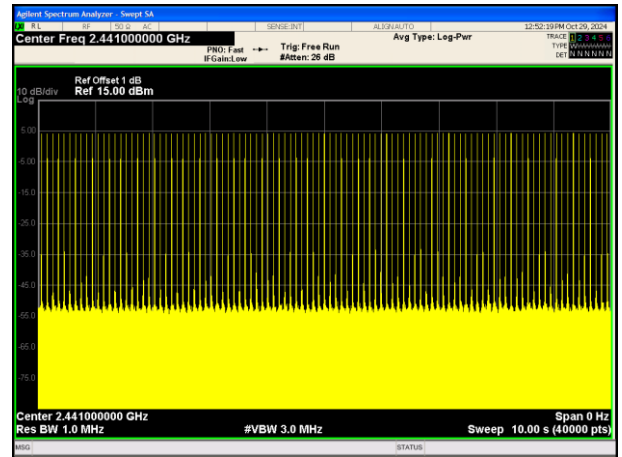


Test plot as follows:



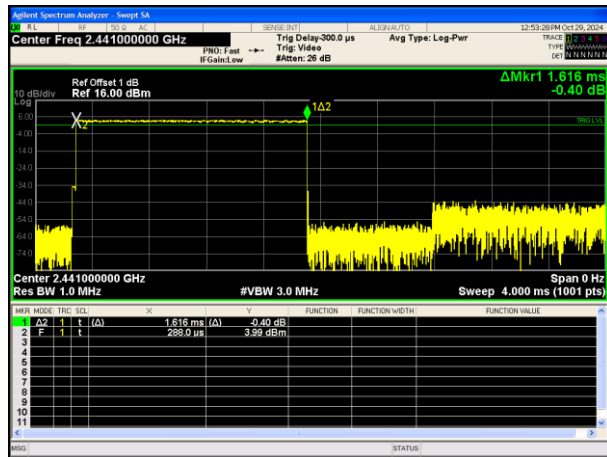
Pulse Width

GFSK\_DH1



Number of Pulses in 31.6 seconds

GFSK\_DH1



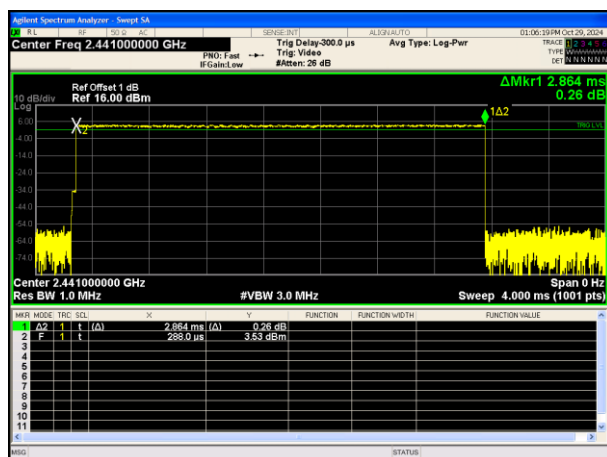
Pulse Width

GFSK\_DH3



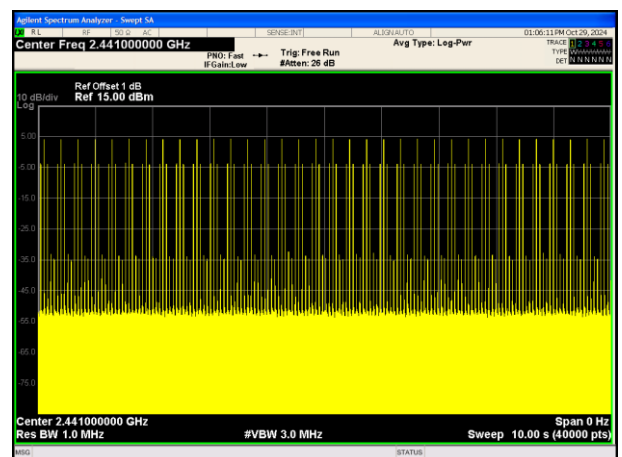
Number of Pulses in 31.6 seconds

GFSK\_DH3



Pulse Width

GFSK\_DH5



Number of Pulses in 31.6 seconds

GFSK\_DH5

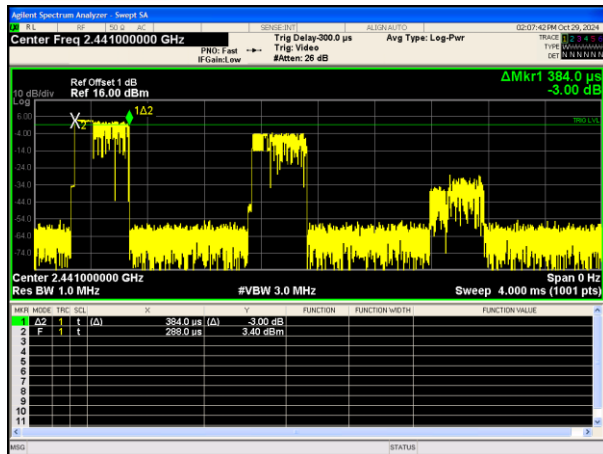
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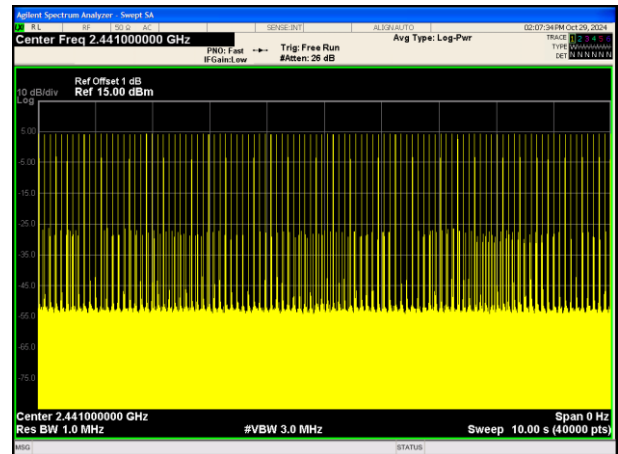
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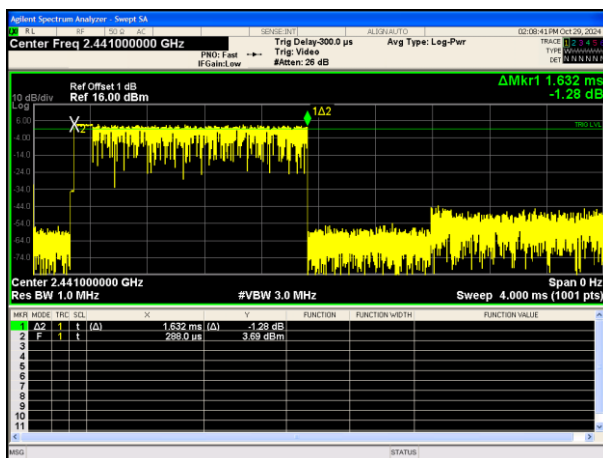
Pulse Width

8DPSK\_3-DH1



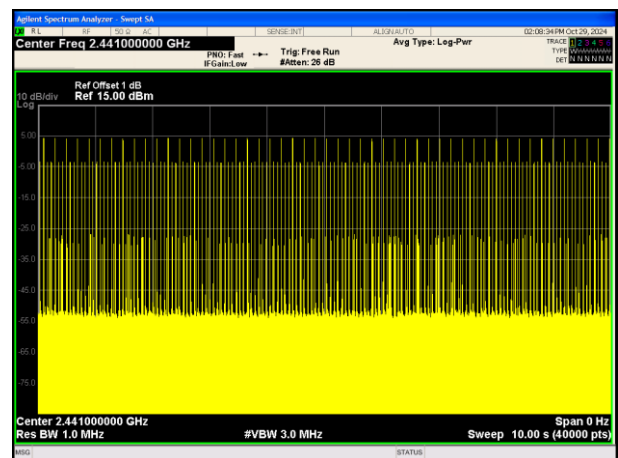
Number of Pulses in 31.6 seconds

8DPSK\_3-DH1



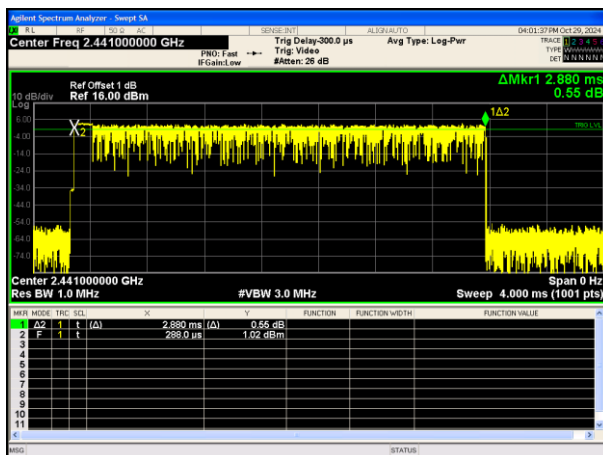
Pulse Width

8DPSK\_3-DH3



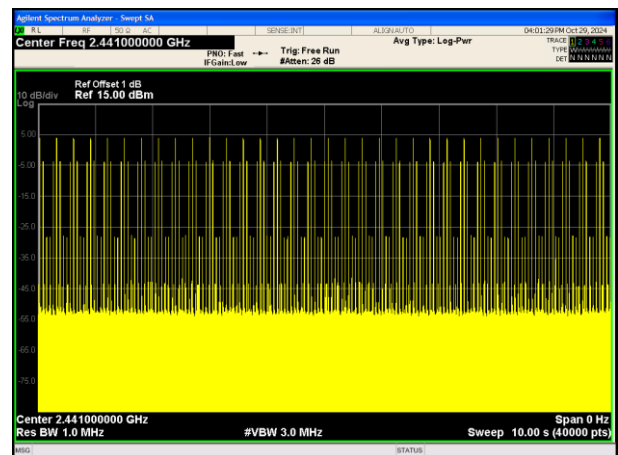
Number of Pulses in 31.6 seconds

8DPSK\_3-DH3



Pulse Width

8DPSK\_3-DH5



Number of Pulses in 31.6 seconds

8DPSK\_3-DH5



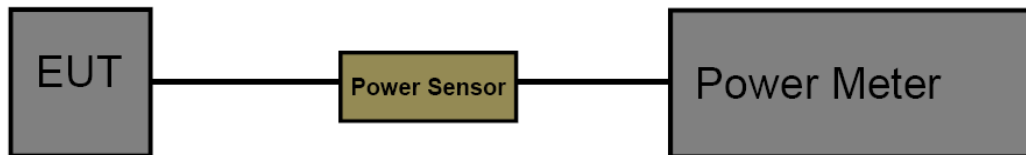
## 4.9. Peak Output Power

### Limit

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

Section	Test Item	Limit	Frequency Range (MHz)
FCC CFR 47 Part15.247 (b)(1)	Maximum Conducted Output Power	Hopping Channels $\geq$ 75, Power <1W(30dBm); Others <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.  
Record the measurement data.

### Test Mode

Please refer to the clause 2.4.

### Test Result

Test Mode	Frequency (MHz)	Conducted Output Power (dBm)	FCC Limit (dBm)	Verdict
GFSK	2402	4.763	$\leq$ 30	Pass
	2441	4.609	$\leq$ 30	Pass
	2480	4.581	$\leq$ 30	Pass
$\pi$ /4-DQPSK	2402	4.582	$\leq$ 30	Pass
	2441	4.386	$\leq$ 30	Pass
	2480	4.348	$\leq$ 30	Pass
8-DPSK	2402	4.673	$\leq$ 30	Pass
	2441	4.434	$\leq$ 30	Pass
	2480	4.533	$\leq$ 30	Pass

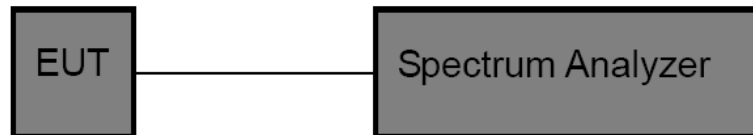


## 4.10. Duty Cycle

### 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.
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.

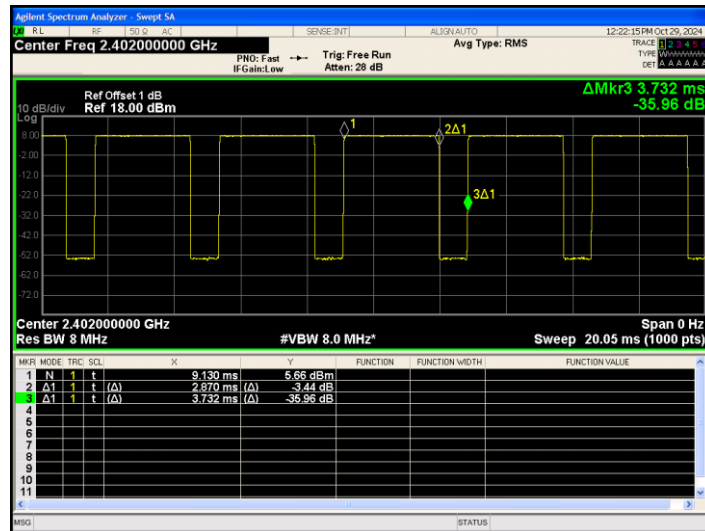
### Test Result

Test Mode	Frequency (MHz)	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)	1/T Minimum VBW (kHz)	Final Setting for VBW (kHz)
GFSK	2402	2.870	3.732	76.88	0.35	1
	2441	2.849	3.712	76.76	0.35	1
	2480	2.870	3.732	76.88	0.35	1
$\pi/4$ -DQPSK	2402	2.870	3.732	76.88	0.35	1
	2441	2.870	3.732	76.88	0.35	1
	2480	2.870	3.732	76.88	0.35	1
8-DPSK	2402	2.870	3.732	76.88	0.35	1
	2441	2.870	3.732	76.88	0.35	1
	2480	2.870	3.732	76.88	0.35	1

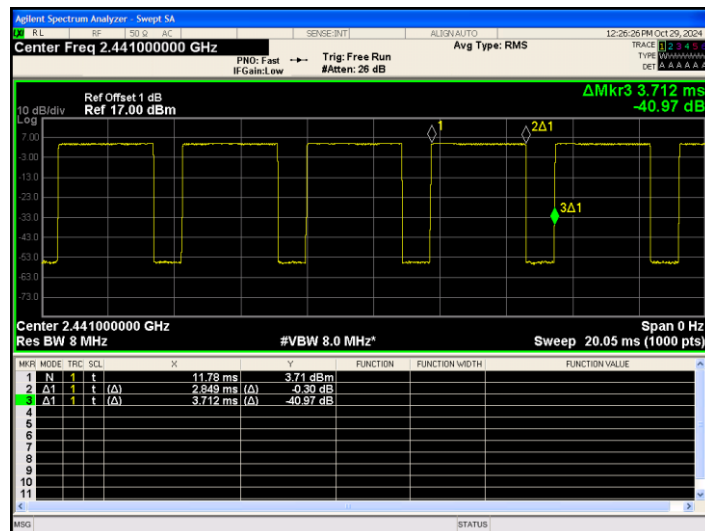




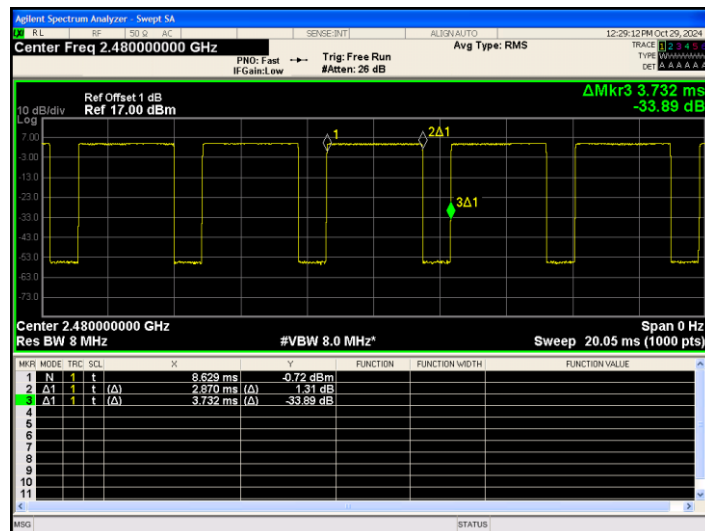
Test plot as follows:



GFSK(DH5)\_Channel 0



GFSK(DH5)\_Channel 39



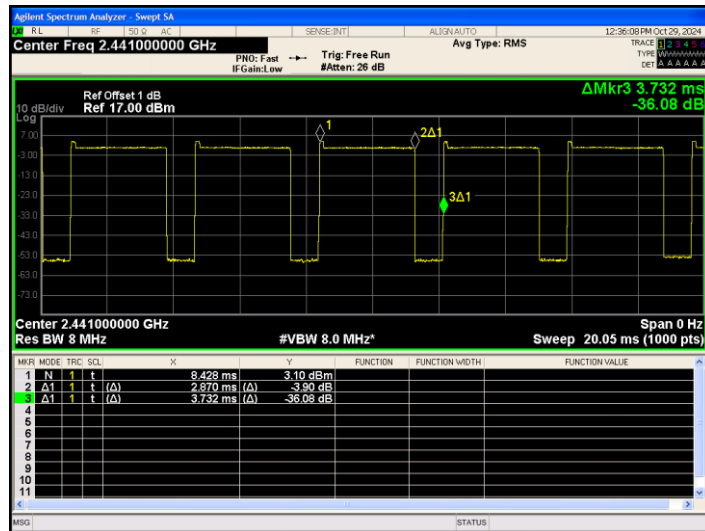
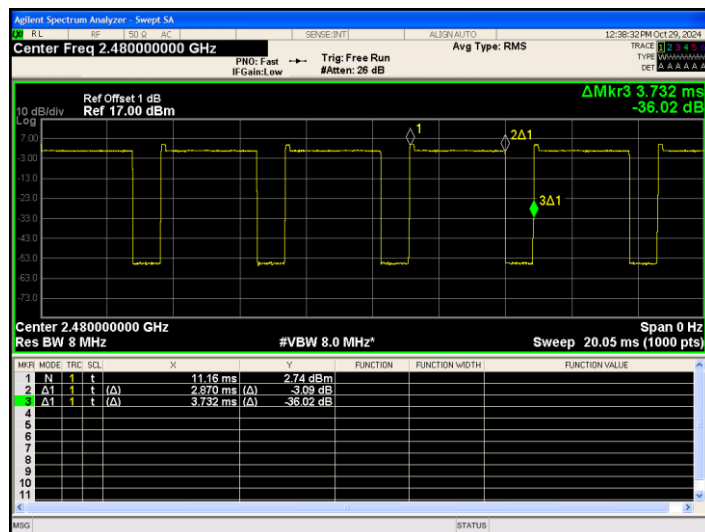
GFSK(DH5)\_Channel 78

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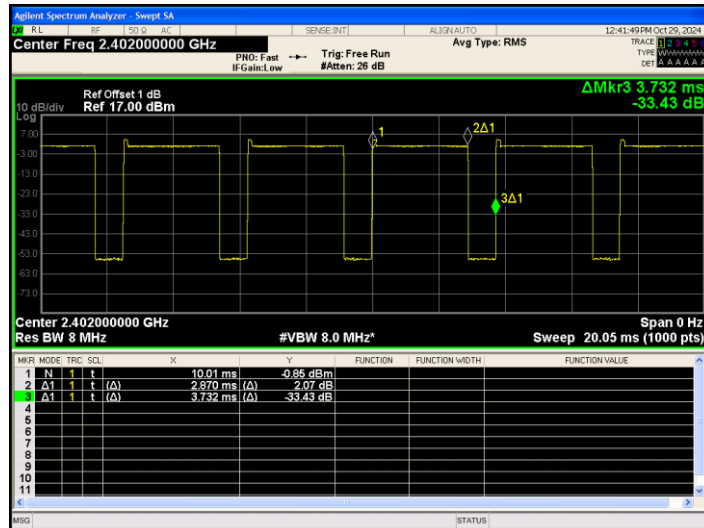
 $\pi/4$ DQPSK(2-DH5)\_Channel 0 $\pi/4$ DQPSK(2-DH5)\_Channel 39 $\pi/4$ DQPSK(2-DH5)\_Channel 78

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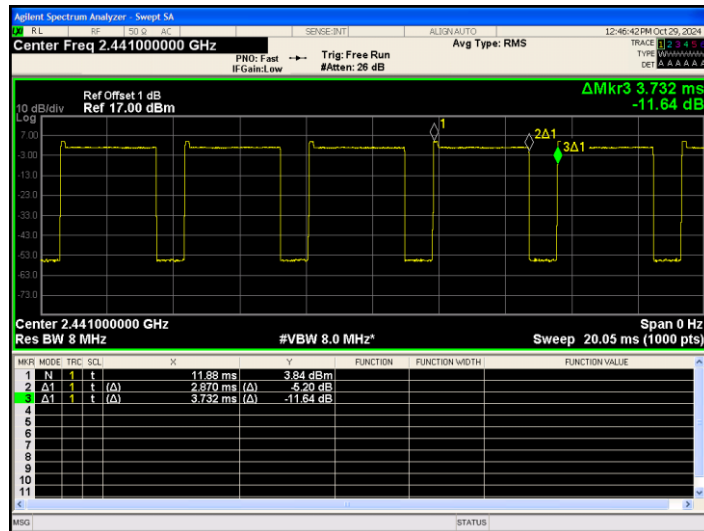
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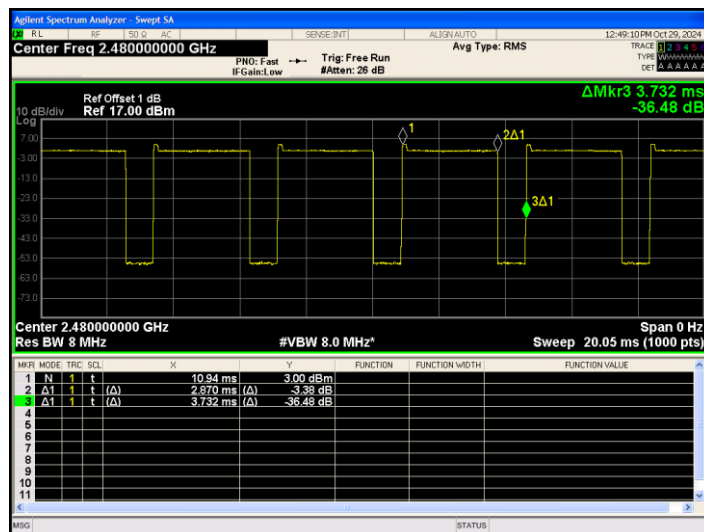
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## 8DPSK(3-DH5)\_Channel 0



## 8DPSK(3-DH5)\_Channel 39



## 8DPSK(3-DH5)\_Channel 78

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## 4.11. 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.

### Result

PASS.

The EUT has 1 antenna: a Multilayer Ceramic Antenna for BT.

Note: ☒ 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.

\*\*\*\*\*THE END OF REPORT\*\*\*\*\*