



7. Test of Conducted Spurious Emission

7.1 Test Limit

According to the methods defined in ANSI C63.10-2020 Section 7.8.7

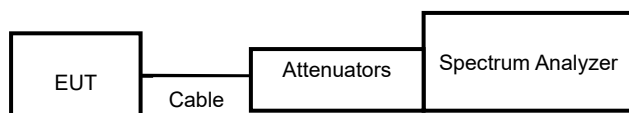
Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

7.2 Test Procedure

According to the methods defined in ANSI C63.10-2020

- The transmitter output was connected to the spectrum analyzer via a low loss cable.
- Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.
- The band edges was measured and recorded.

7.3 Test Setup Layout



7.4 Test Result and Data

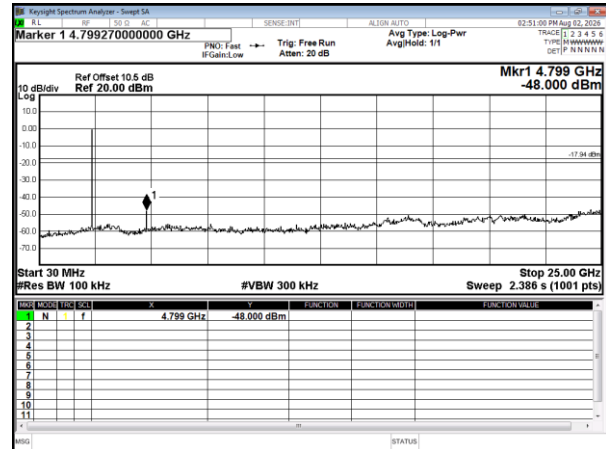
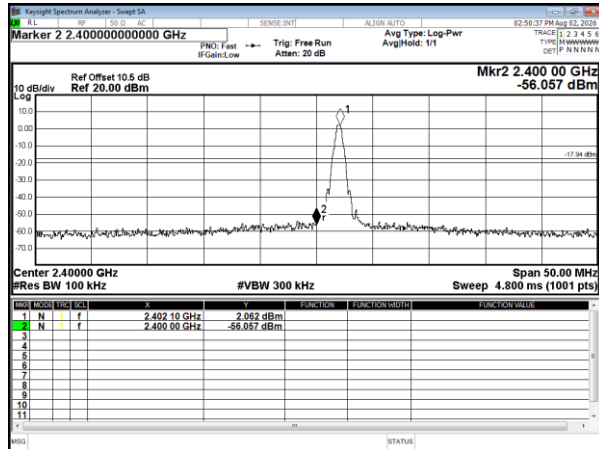
Note: Test plots refer to the following pages.



Single test

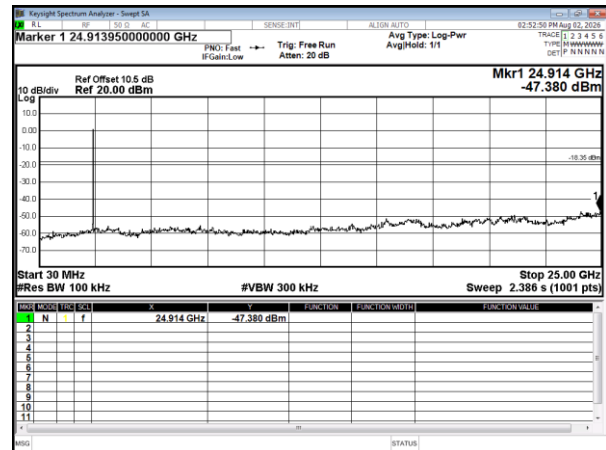
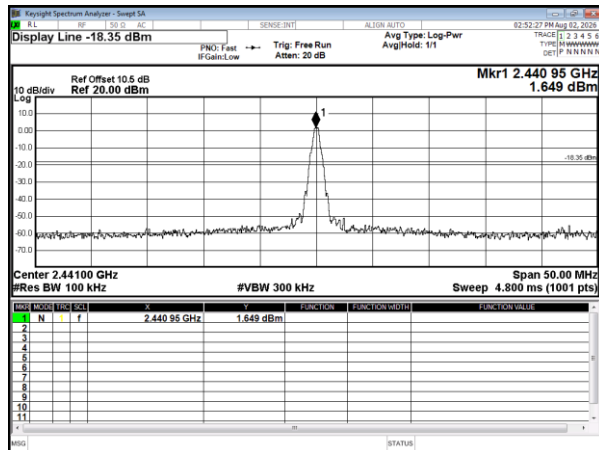
Modulation Type: GFSK (1Mbps)

Channel: 00



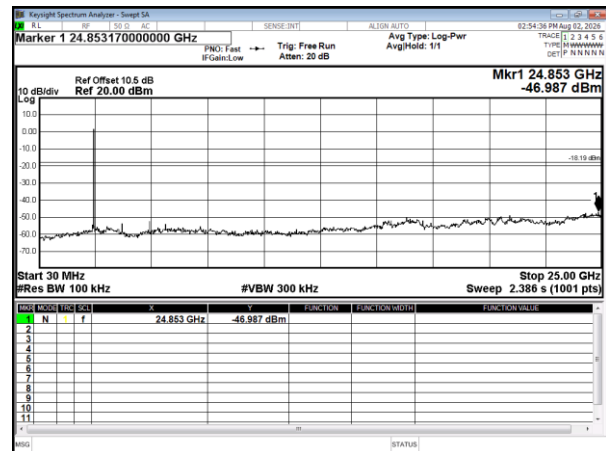
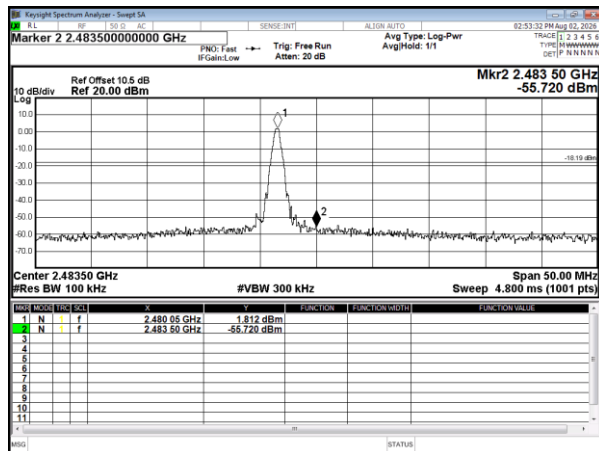
Modulation Type: GFSK (1Mbps)

Channel: 39



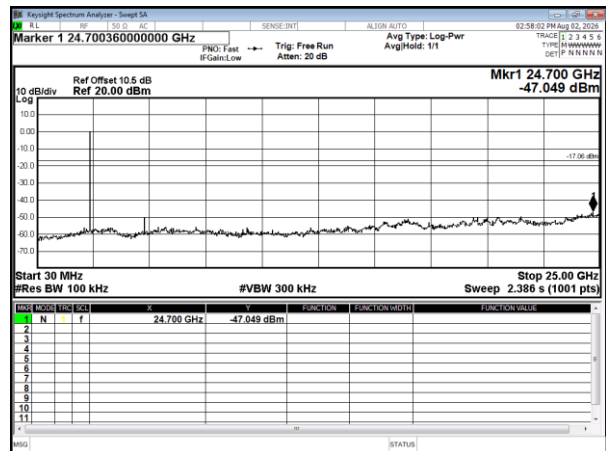
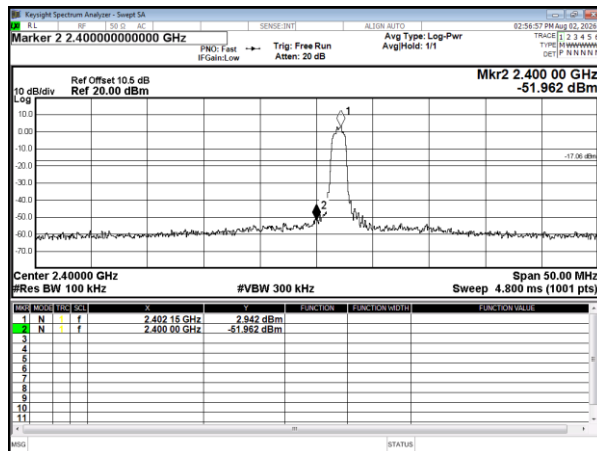
Modulation Type: GFSK (1Mbps)

Channel: 78

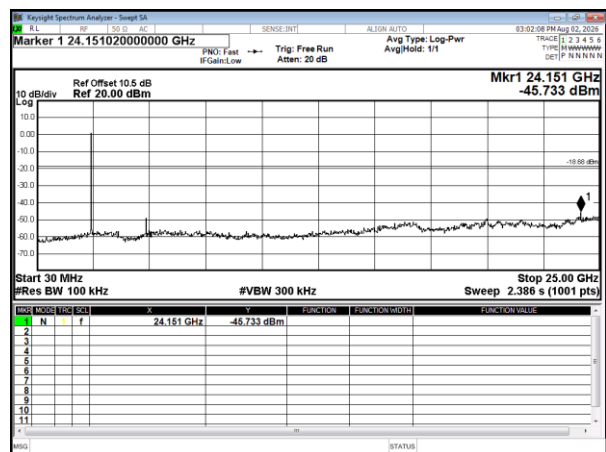
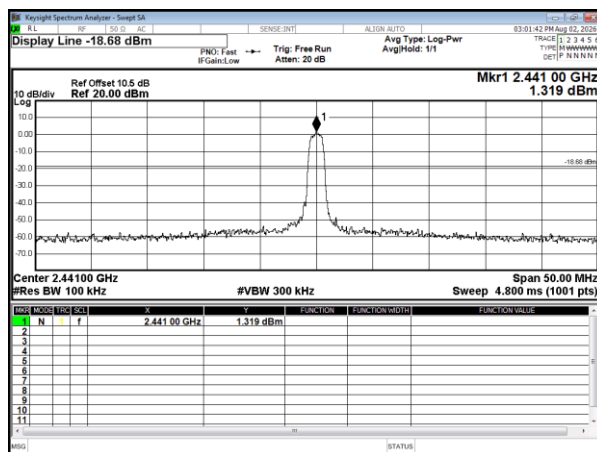




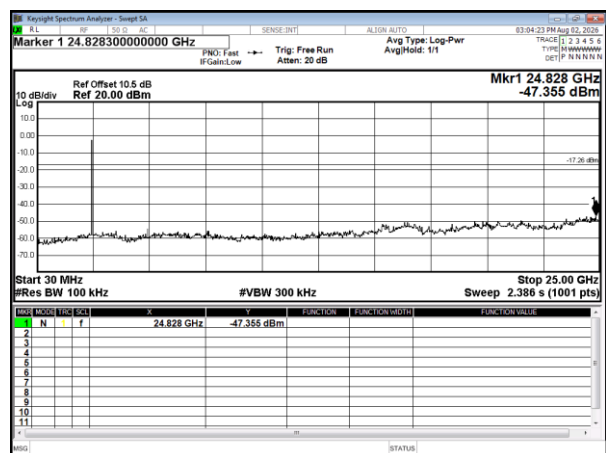
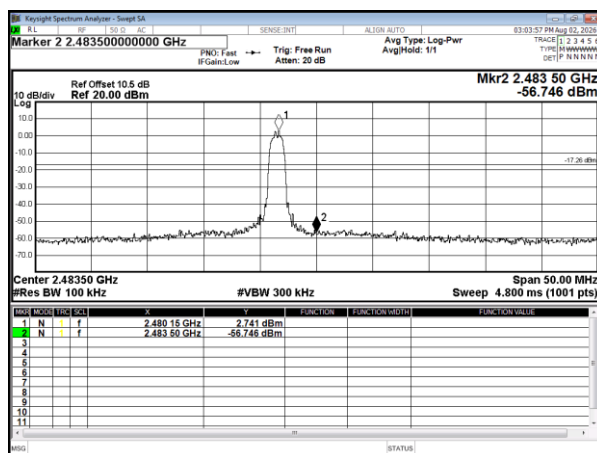
Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 00



Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 39

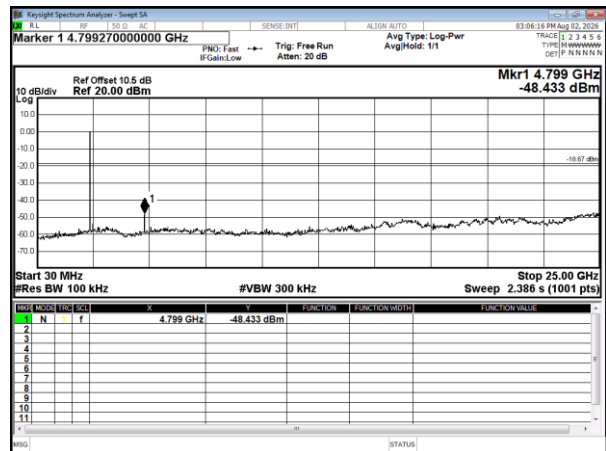
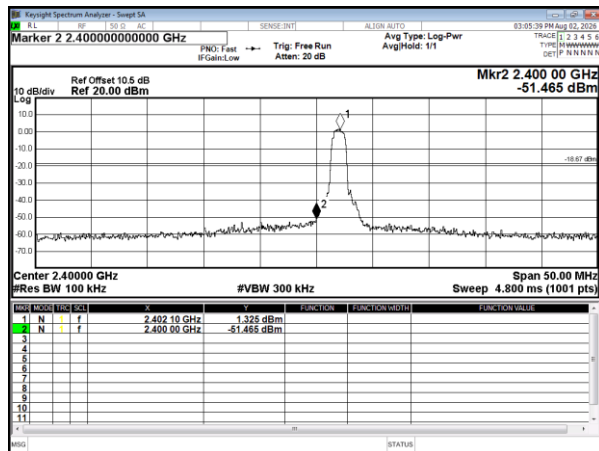


Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 78

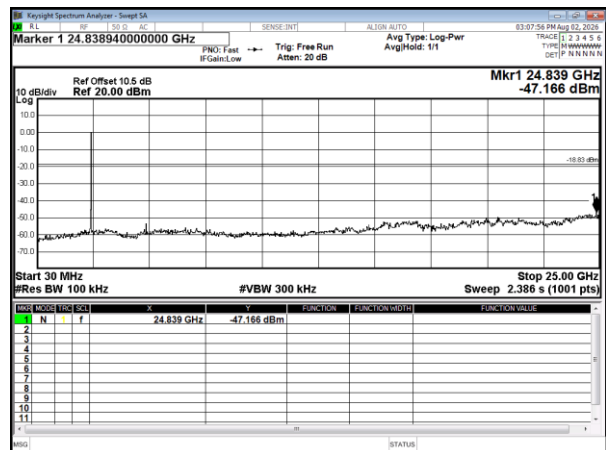
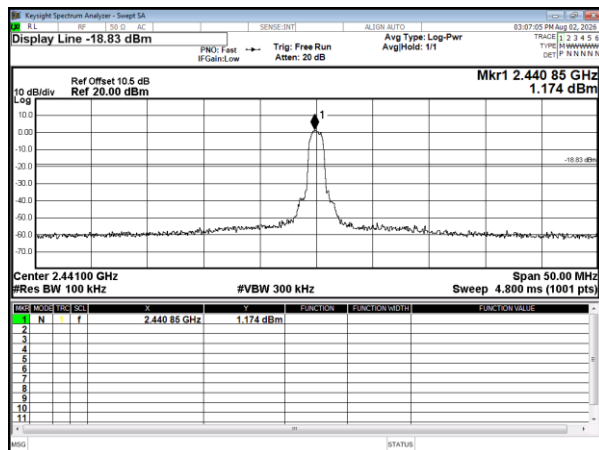




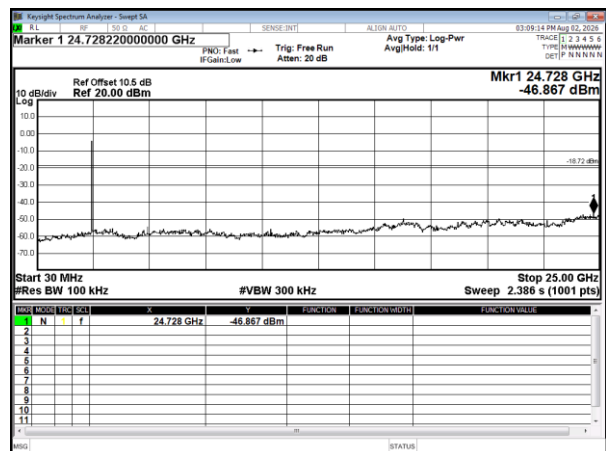
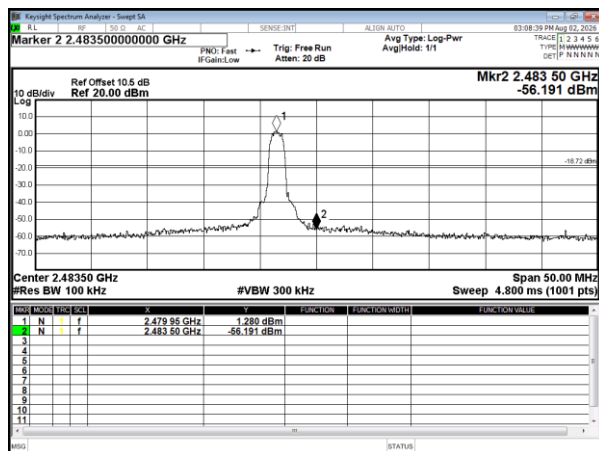
Modulation Type: 8DPSK (3Mbps)
Channel: 00



Modulation Type: 8DPSK (3Mbps)
Channel: 39



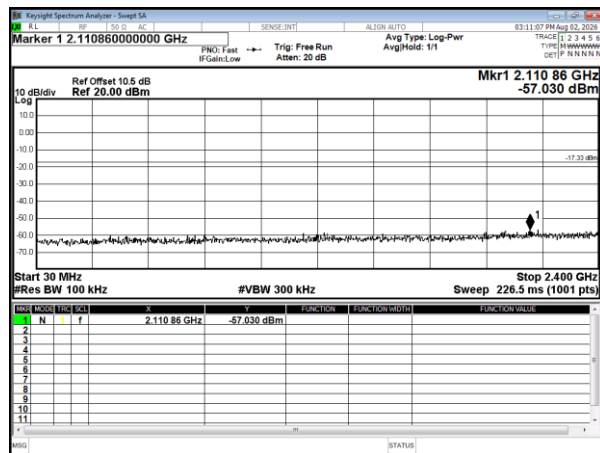
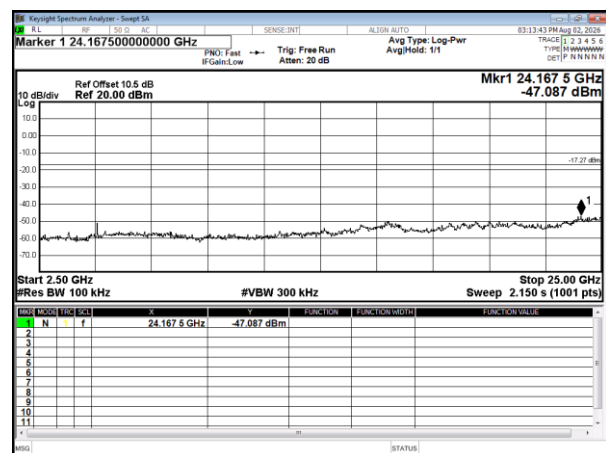
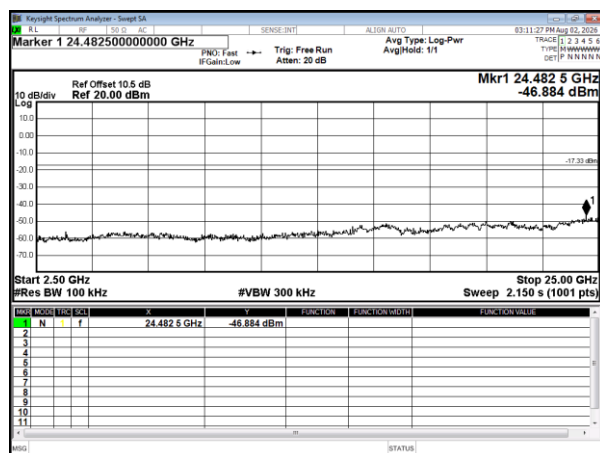
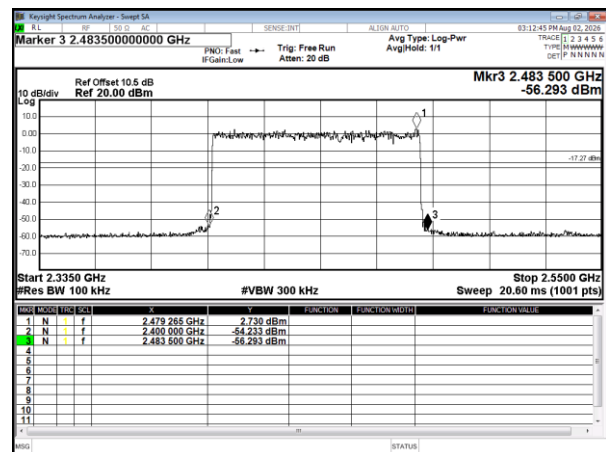
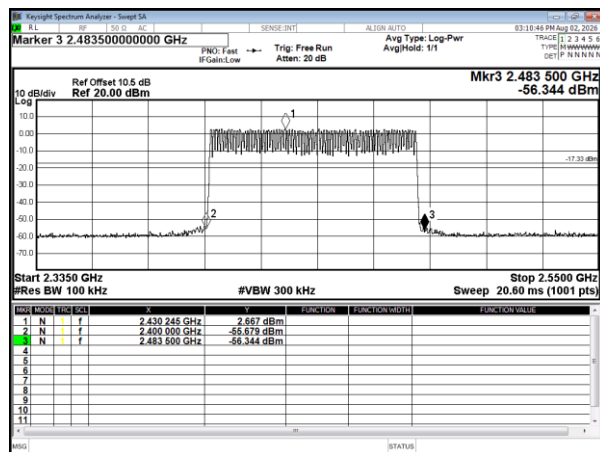
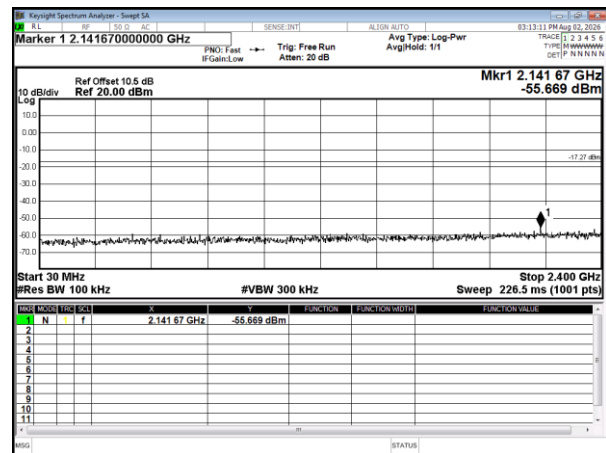
Modulation Type: 8DPSK (3Mbps)
Channel: 78





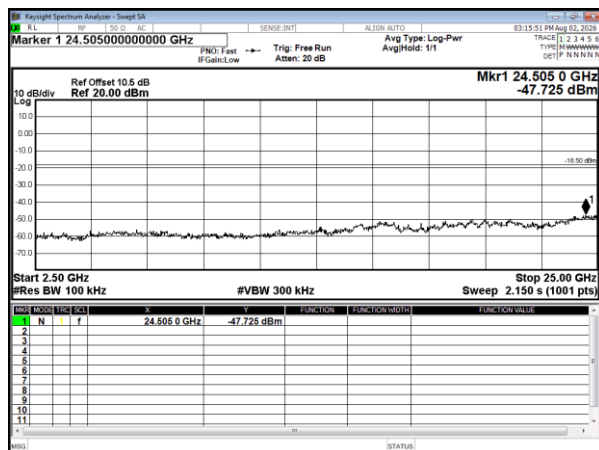
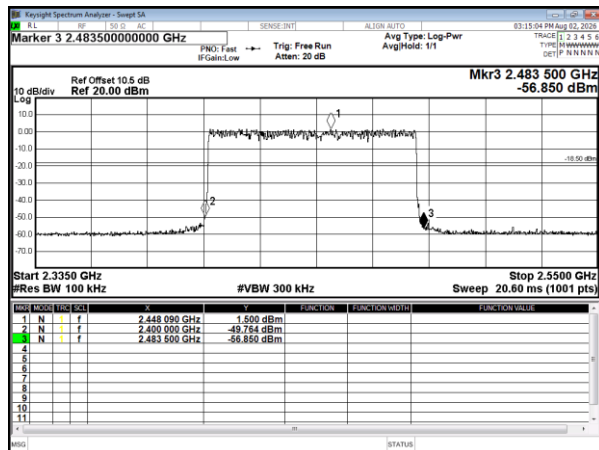
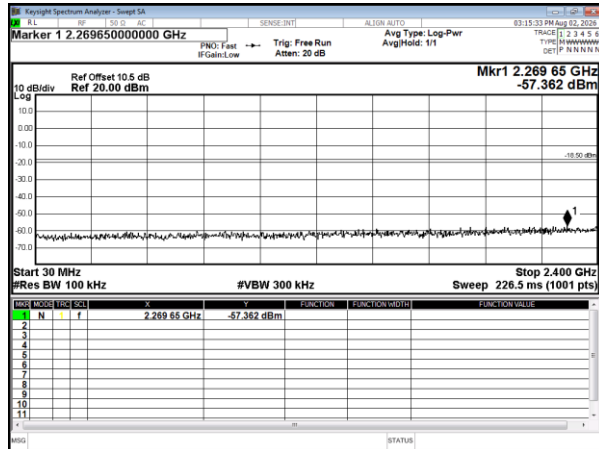
Hopping test

Modulation Type: GFSK

Modulation Type: $\pi/4$ -DQPSK



Modulation Type: 8DPSK





8. 20dB Bandwidth Measurement Data

8.1 Test Limit

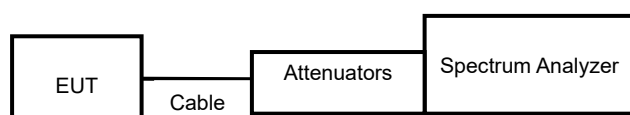
For reference data.

8.2 Test Procedures

According to the methods defined in ANSI C63.10-2020 Section 6.9

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 1% to 5% of the 20dB Bandwidth and VBW to approximately three times RBW.
- The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

8.3 Test Setup Layout

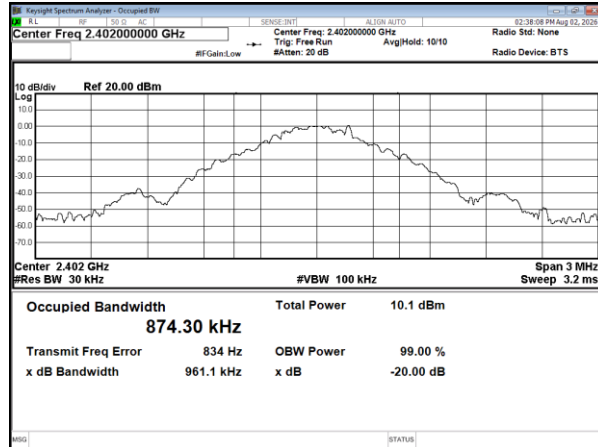


8.4 Test Result and Data

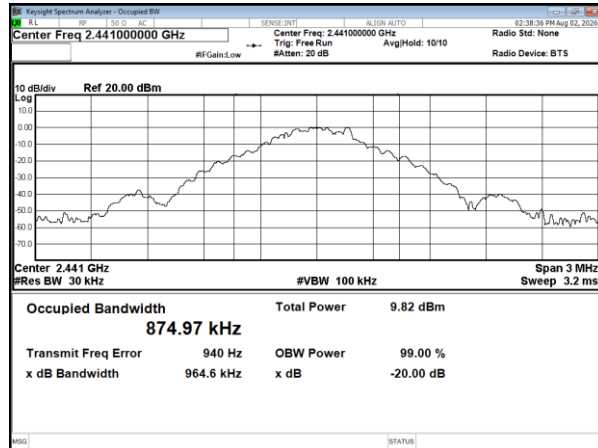
Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (MHz)	2/3 20dB Bandwidth(MHz)
GFSK (1Mbps)	00	2402	0.961	0.641
	39	2441	0.965	0.643
	78	2480	0.965	0.643
$\pi/4$ -DQPSK (2Mbps)	00	2402	1.331	0.887
	39	2441	1.326	0.884
	78	2480	1.367	0.911
8DPSK (3Mbps)	00	2402	1.353	0.902
	39	2441	1.312	0.875
	78	2480	1.315	0.877
Note	2/3*20dB Bandwidth=20dB Bandwidth x 2/3			



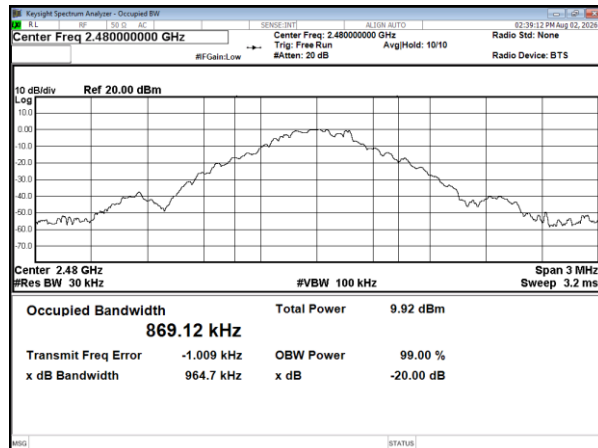
Modulation Type: GFSK (1Mbps)
Channel: 00



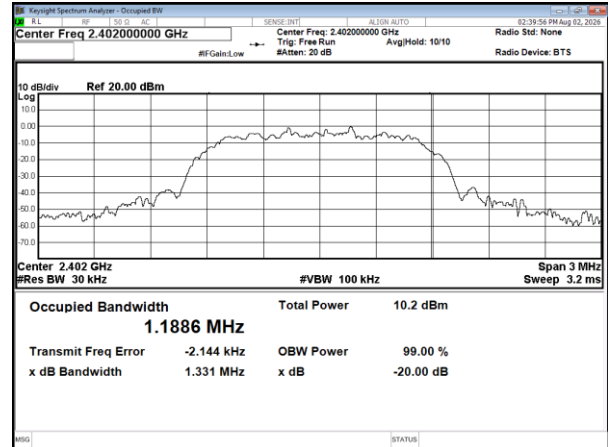
CH39



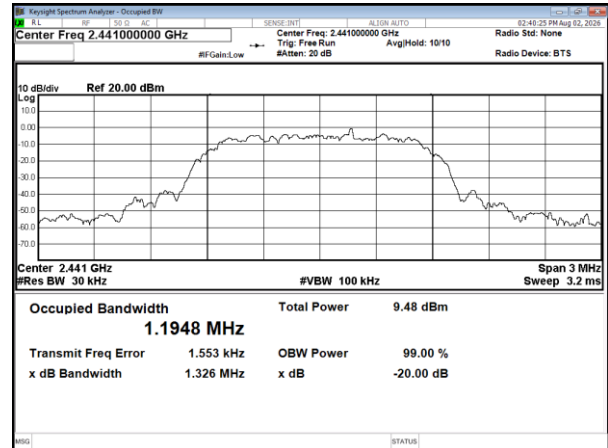
CH78



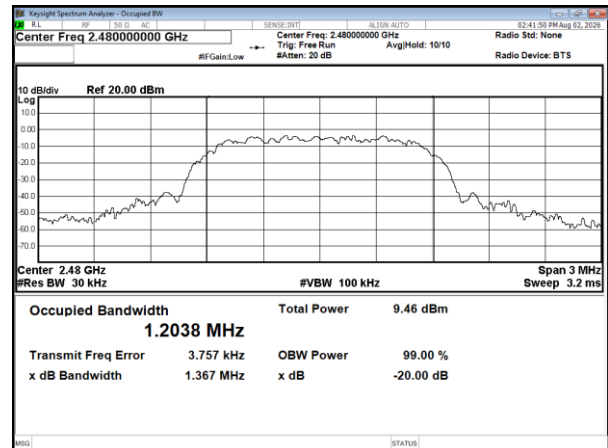
Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 00



CH39

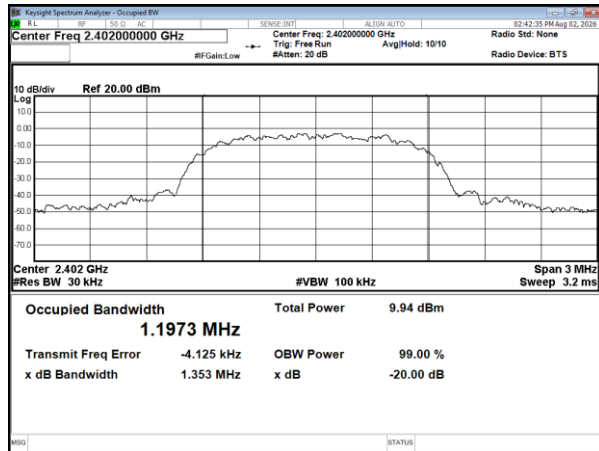


CH78

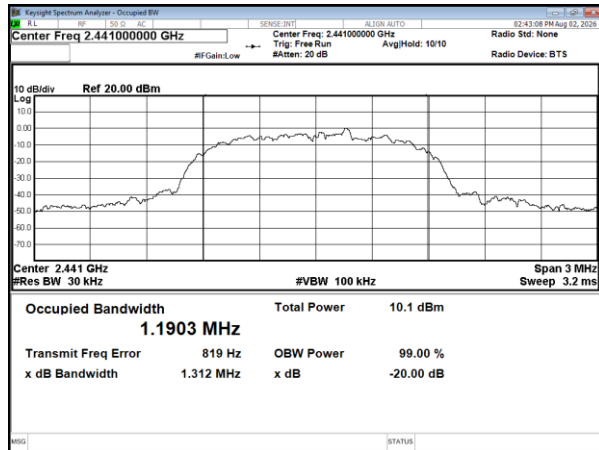




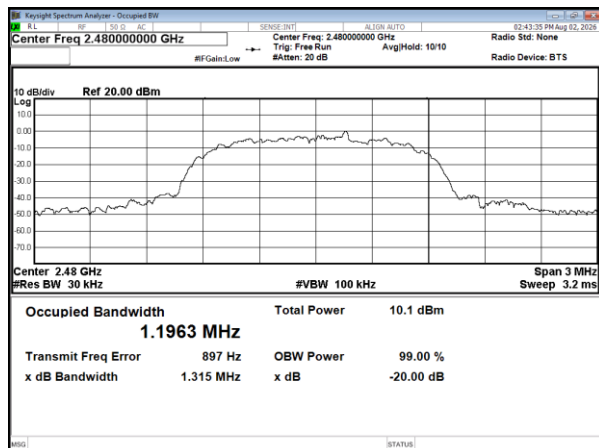
Modulation Type: 8DPSK (3Mbps)
Channel: 00



CH39



CH78





9. Carrier Frequency Separation

9.1 Test Limit

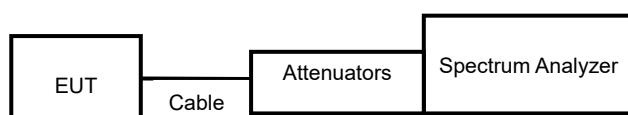
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

9.2 Test Procedures

According to the methods defined in ANSI C63.10-2020+Cor.1-2023 and ANSI C63.10a-2024 Section 7.8.2

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.
- By using the Max Hold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels.

9.3 Test Setup Layout

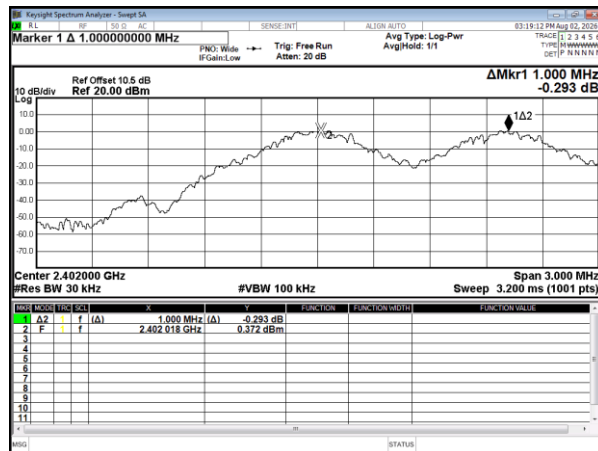


9.4 Test Result and Data

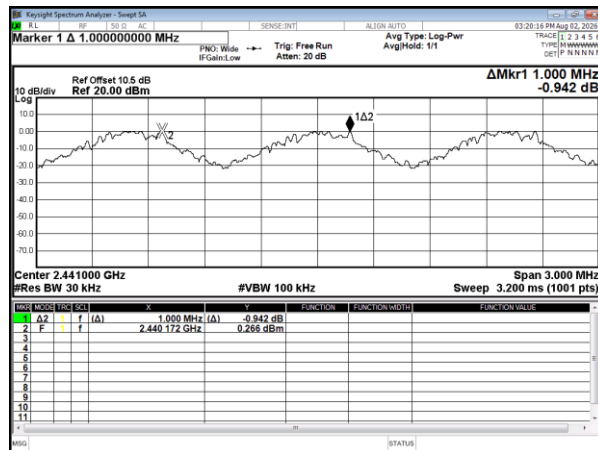
Modulation Type	Channel	Channel Separation (MHz)	Limit (MHz)
GFSK	00	1.000	0.641
	39	1.000	0.643
	78	1.000	0.643
$\pi/4$ -DQPSK	00	1.000	0.887
	39	1.000	0.884
	78	1.000	0.911
8DPSK	00	1.000	0.902
	39	1.000	0.875
	78	1.000	0.877



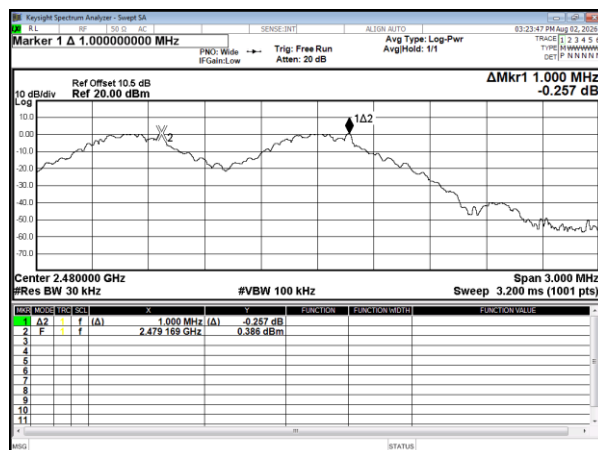
Modulation Type: GFSK (1Mbps)
Channel: 00



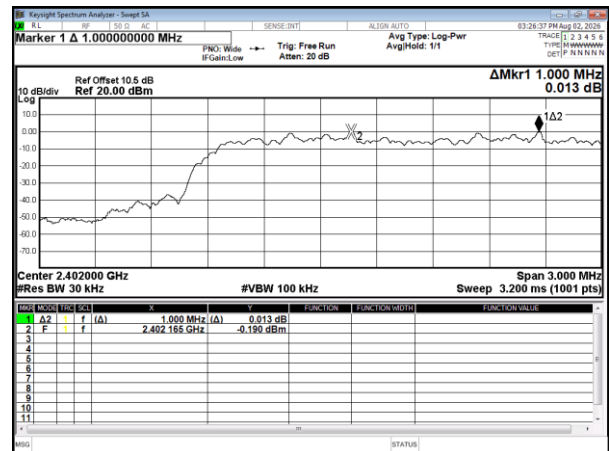
CH39



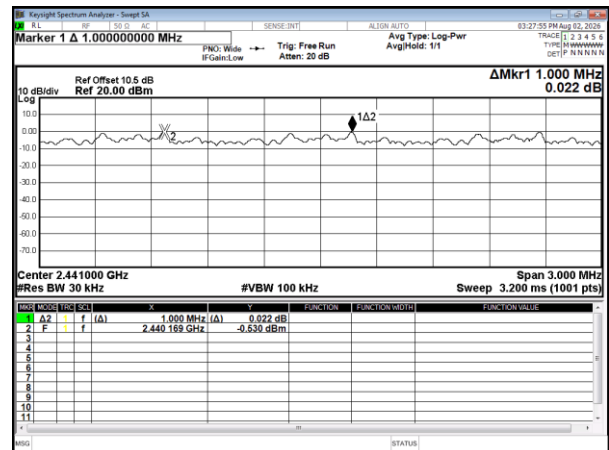
CH78



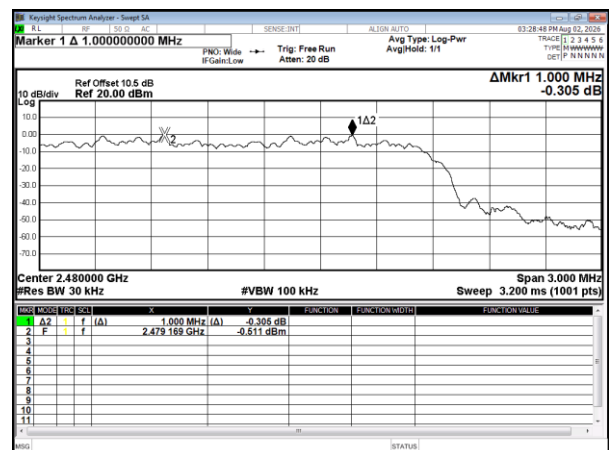
Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 00



CH39

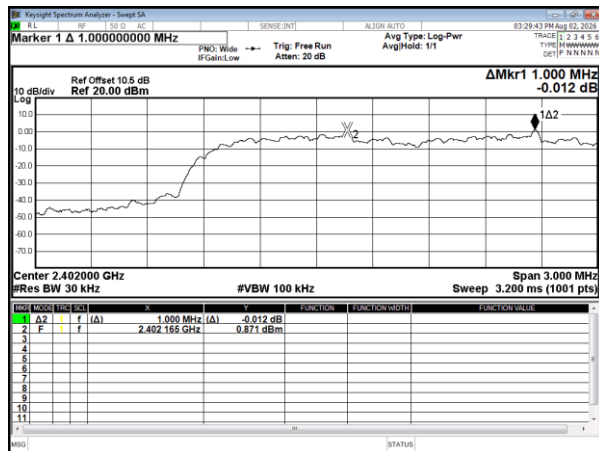


CH78

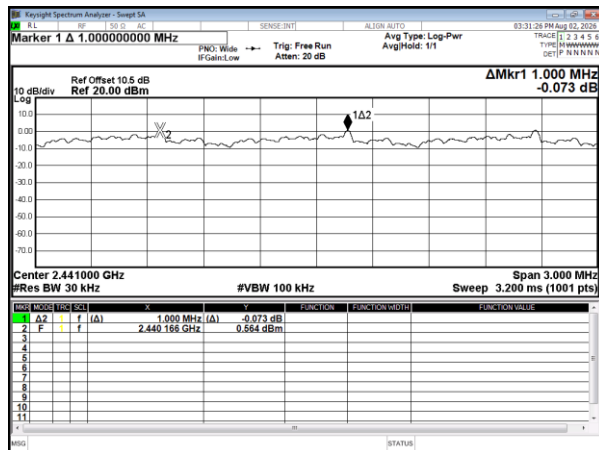




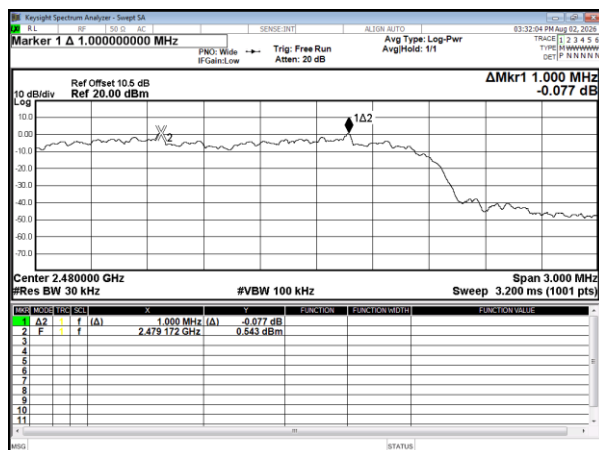
Modulation Type: 8DPSK (3Mbps)
Channel: 00



CH39



CH78





10. Dwell Time on each channel

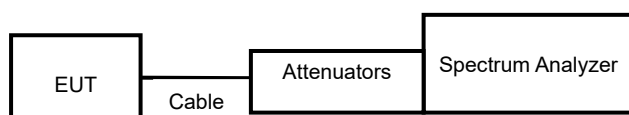
10.1 Test Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

10.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
2. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
4. Measure the time duration of one transmission on the measured frequency.

10.3 Test Setup Layout



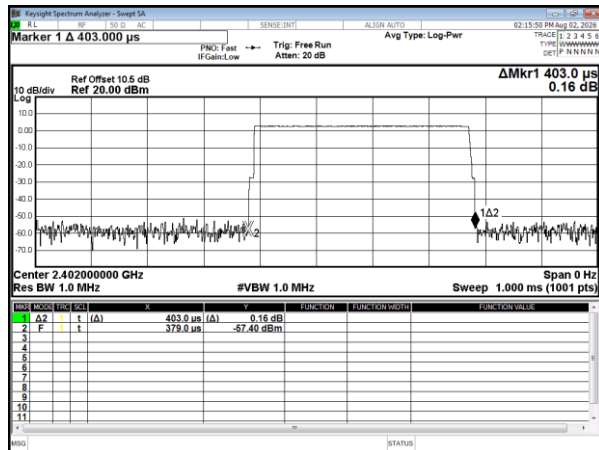
10.4 Test Result and Data

Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec

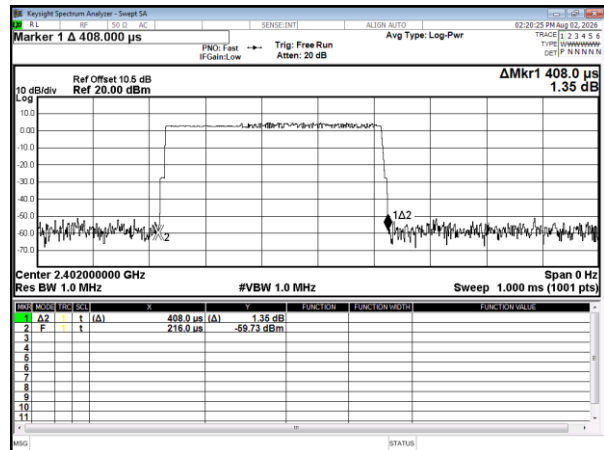
Modulation Type	Frequency (MHz)	Length of transmission time (ms)	Number of transmission in a 31.6 (79 Hopping*0.4)	Dwell Time (ms)	Limit (ms)
GFSK (DH1)	2402	0.403	320.00	128.96	400
GFSK (DH3)	2402	1.674	160.00	267.84	400
GFSK (DH5)	2402	2.915	106.67	310.93	400
$\pi/4$ -DQPSK (DH1)	2402	0.408	320.00	130.56	400
$\pi/4$ -DQPSK (DH3)	2402	1.659	160.00	265.44	400
$\pi/4$ -DQPSK (DH5)	2402	2.915	106.67	310.93	400
8DPSK (DH1)	2402	0.412	320.00	131.84	400
8DPSK (DH3)	2402	1.662	160.00	265.92	400
8DPSK (DH5)	2402	2.930	106.67	312.53	400



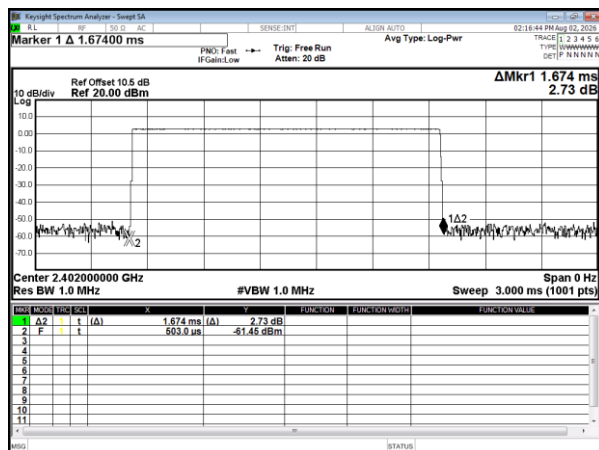
Modulation Type: GFSK-DH1
Channel: 00



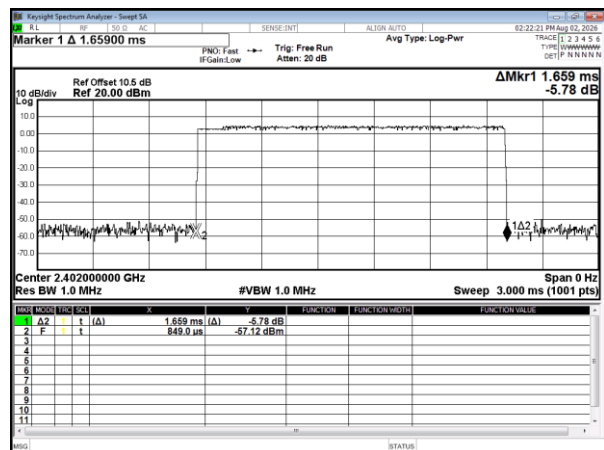
Modulation Type: $\pi/4$ -DQPSK-DH1
Channel: 00



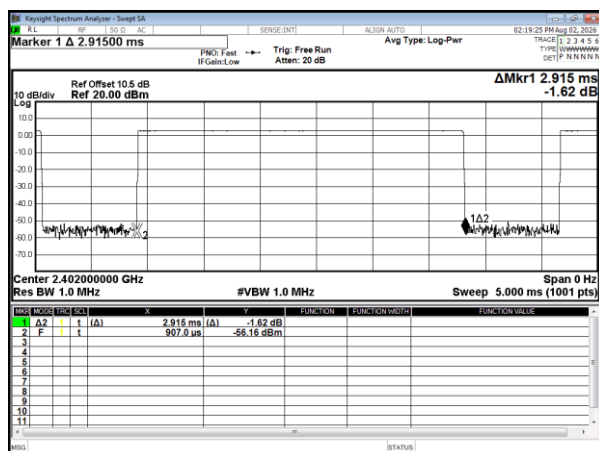
Modulation Type: GFSK-DH3
Channel: 00



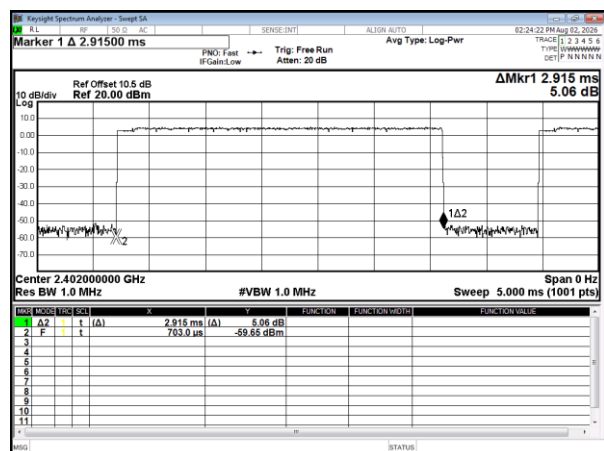
Modulation Type: $\pi/4$ -DQPSK-DH3
Channel: 00



Modulation Type: GFSK-DH5
Channel: 00



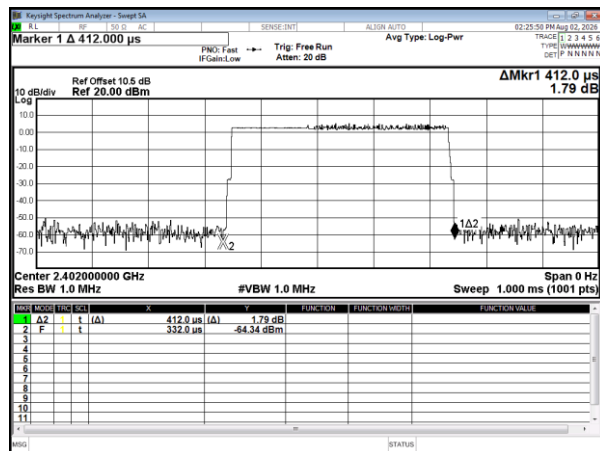
Modulation Type: $\pi/4$ -DQPSK-DH5
Channel: 00





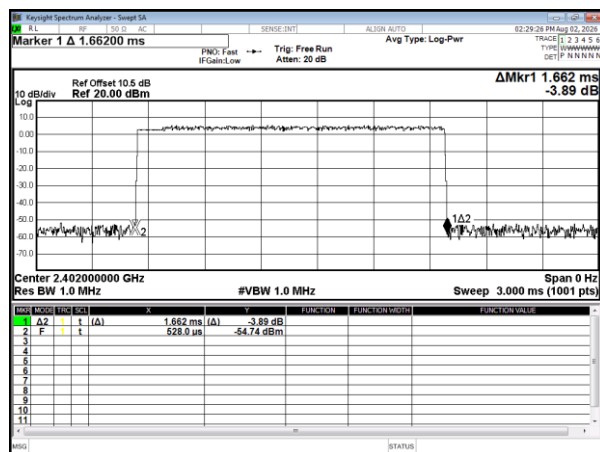
Modulation Type: 8DPSK-DH1

Channel: 00



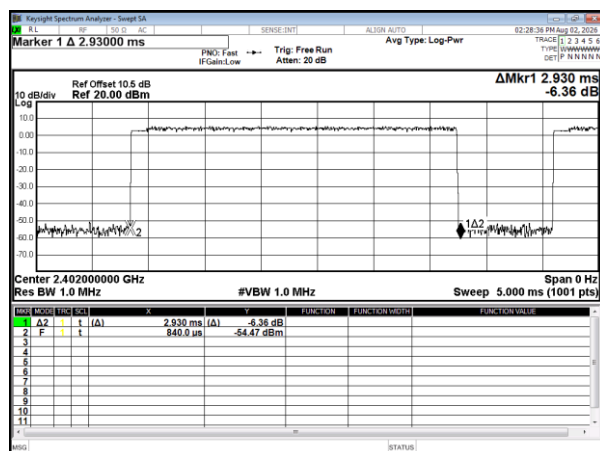
Modulation Type: 8DPSK-DH3

Channel: 00



Modulation Type: 8DPSK-DH5

Channel: 00

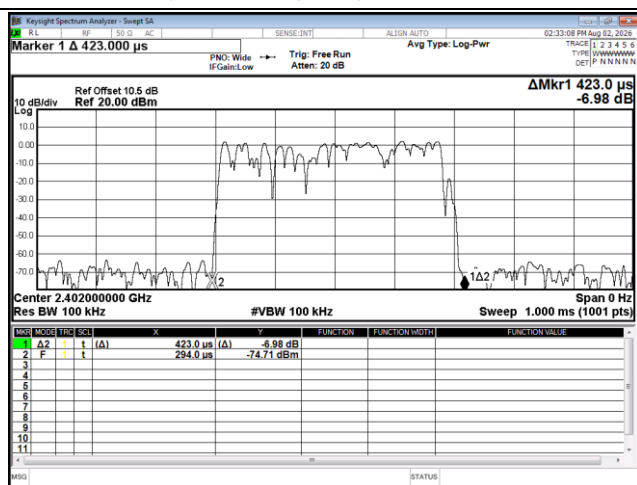




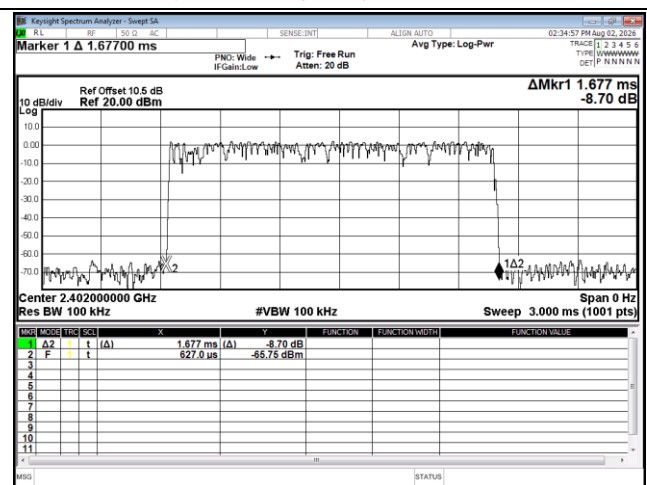
Test Period = 0.4 (second/ channel) x 20 Channel = 8 sec

Modulation Type	Frequency (MHz)	Length of transmission time (ms)	Number of transmission in a 8 (20 Hopping*0.4)	Dwell Time (ms)	Limit (ms)
AFH (DH1)	2402-2421	0.423	160.00	67.68	400
AFH (DH3)	2402-2421	1.677	80.00	134.16	400
AFH (DH5)	2402-2421	2.935	53.33	156.52	400

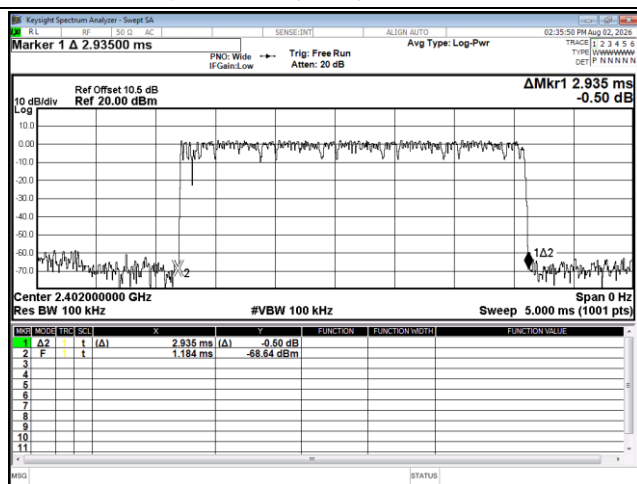
Modulation Type: AFH (DH1)



Modulation Type: AFH (DH3)



Modulation Type: AFH (DH5)





11. Number of Hopping Channels

11.1 Test Limit

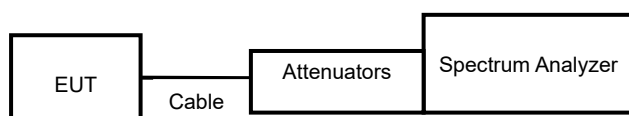
Frequency hopping systems in the 2400 ~ 2483.5 MHz band shall use at least 15 channels.

11.2 Test Procedures

According to the methods defined in ANSI C63.10-2020+Cor.1-2023 and ANSI C63.10a-2024 Section 7.8.3

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 300 kHz and VBW to 300 kHz.
- Set the Max Hold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

11.3 Test Setup Layout

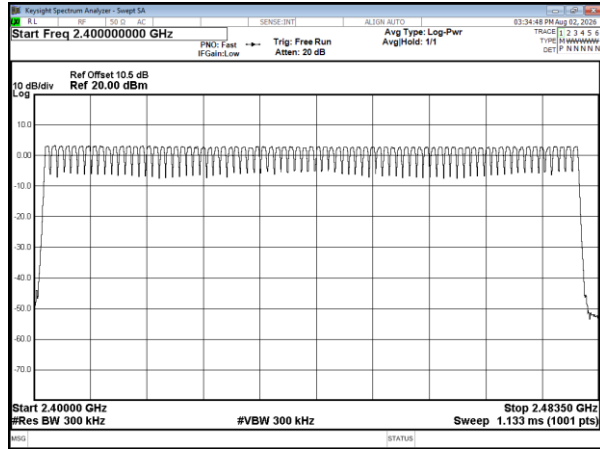


11.4 Test Result and Data

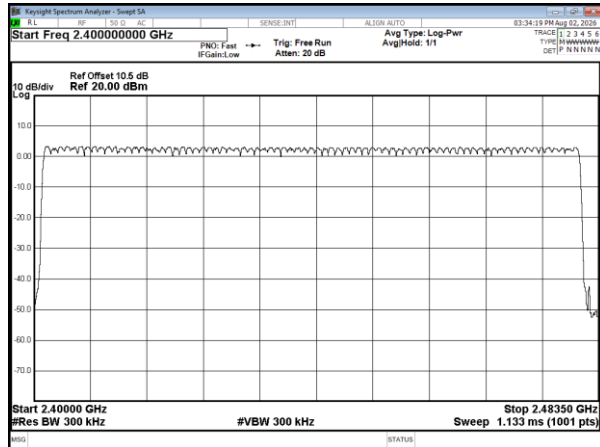
Modulation Type	Number of hopping channels
GFSK	79
$\pi/4$ -DQPSK	79
8DPSK	79



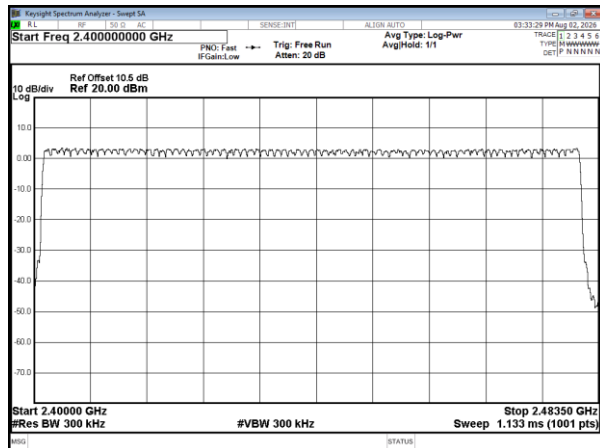
Modulation Type: GFSK (1Mbps)



Modulation Type: $\pi/4$ -DQPSK (2Mbps)



Modulation Type: 8DPSK (3Mbps)





12. Maximum Peak Output Power

12.1 Test Limit

The Maximum Peak Output Power Measurement is 21dBm.

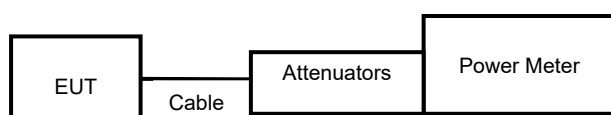
12.2 Test Procedures

According to the methods defined in ANSI C63.10-2020 Section 7.8.5

The antenna port(RF output)of the EUT was connected to the input(RF input)of a power meter.

Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

12.3 Test Setup Layout



12.4 Test Result and Data

Modulation Type	Setting	Channel	Frequency (MHz)	PK Output Power (dBm)	PK Output Power (mW)
GFSK	5	0	2402	2.856	1.930
	5	39	2441	2.496	1.777
	5	78	2480	2.604	1.821
$\pi/4$ -DQPSK	5	0	2402	5.402	3.469
	5	39	2441	5.041	3.192
	5	78	2480	5.155	3.277
8DPSK	5	0	2402	5.998	3.979
	5	39	2441	5.628	3.654
	5	78	2480	5.720	3.733

-----THE END OF REPORT-----