



8. Test of Conducted Spurious Emission

8.1 Test Limit

According to the methods defined in ANSI C63.10-2013 Section 7.8.8

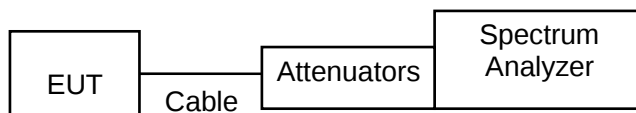
Below –30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

8.2 Test Procedure

According to the methods defined in ANSI C63.10-2013

- 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.

8.3 Test Setup Layout

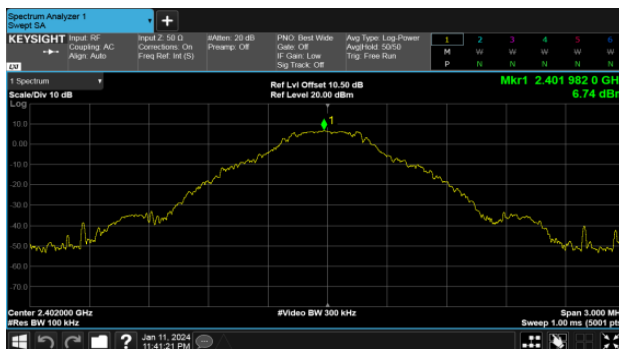


8.4 Test Result and Data

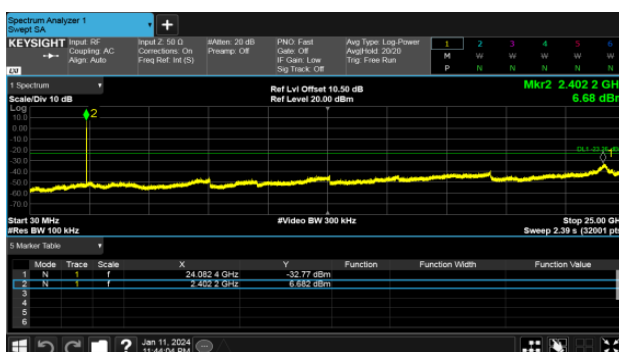
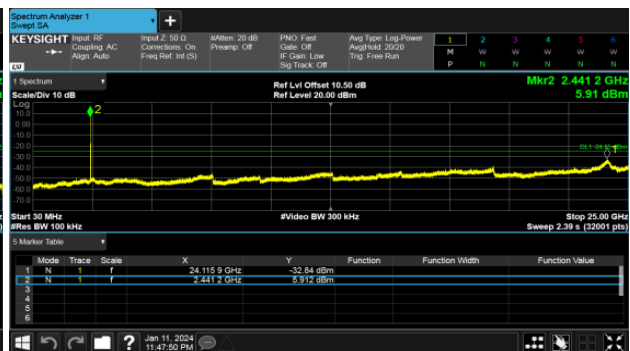
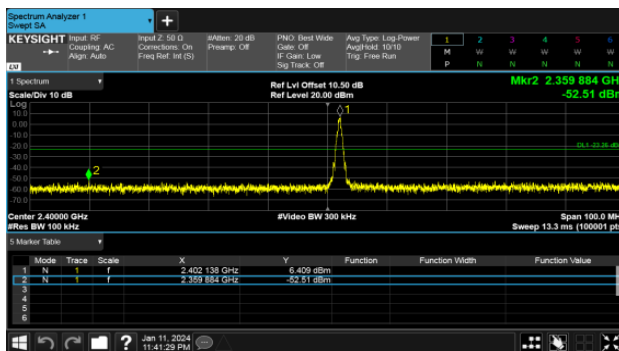
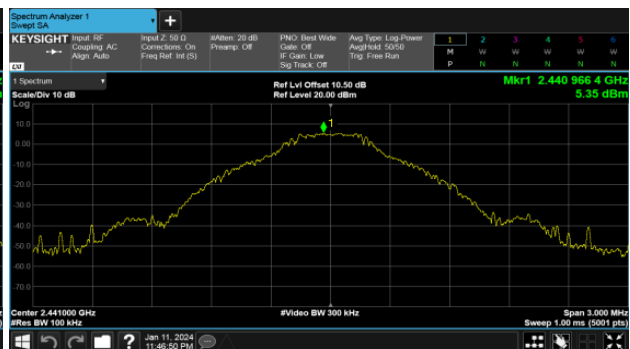
Note: Test plots refer to the following pages.



Modulation Type: GFSK (1Mbps)
Channel: 00

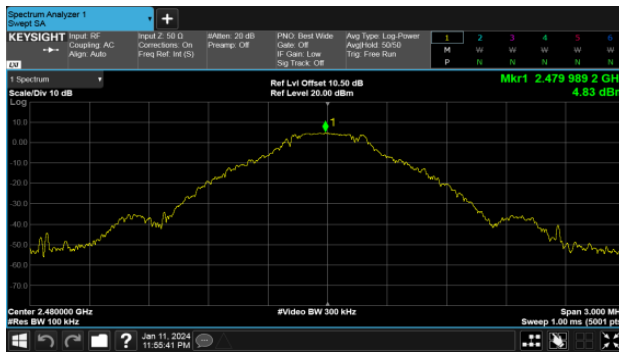


Modulation Type: GFSK (1Mbps)
Channel: 39

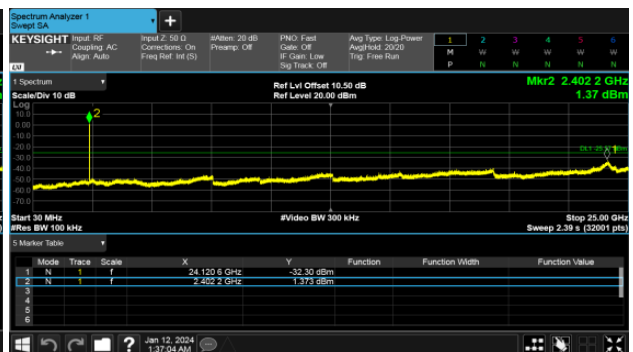
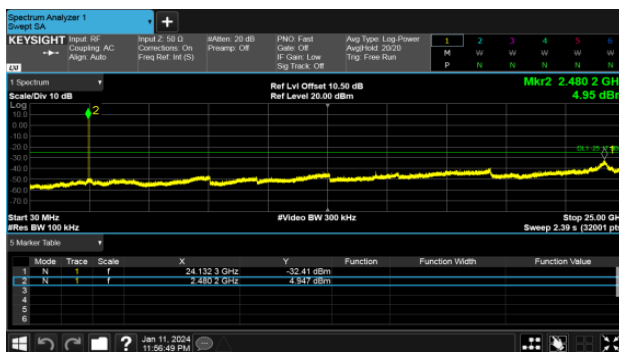
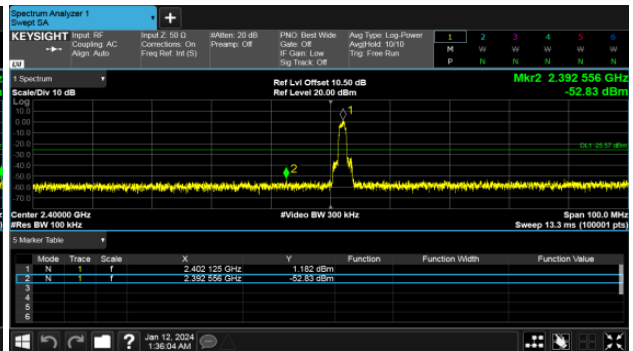
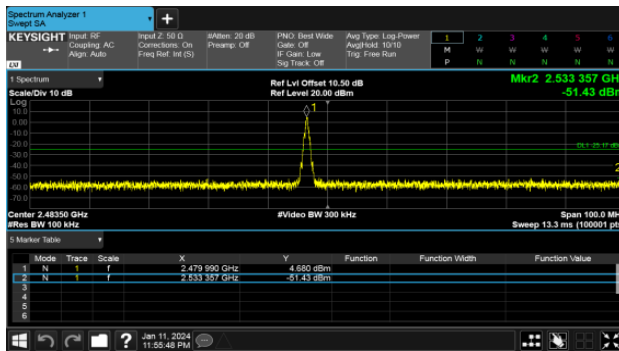
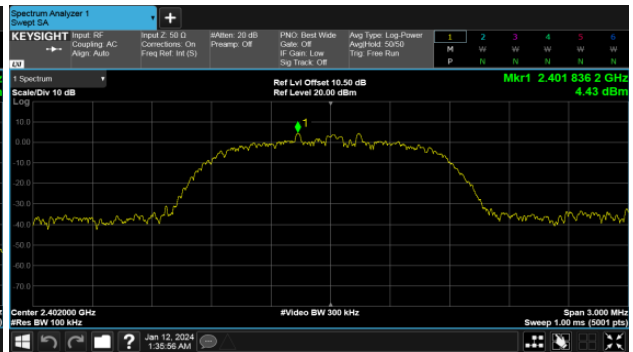




Modulation Type: GFSK (1Mbps)
Channel: 78



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

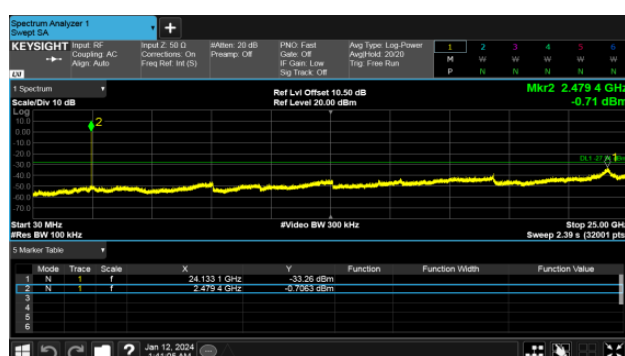
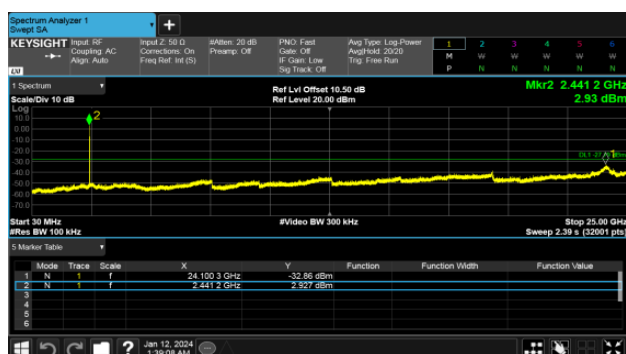
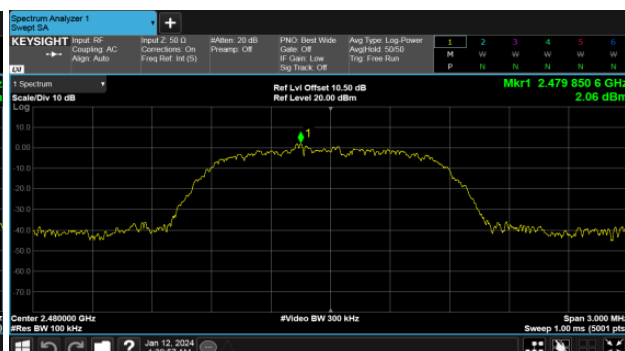




Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 39

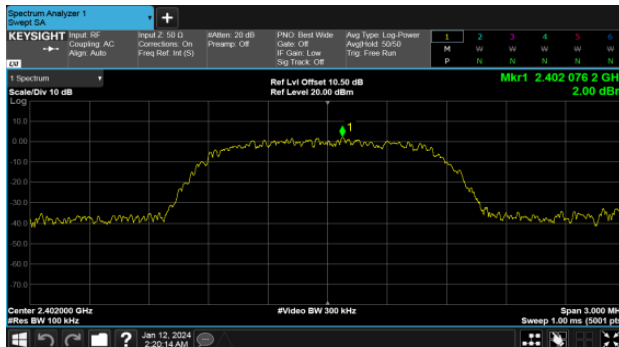


Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 78

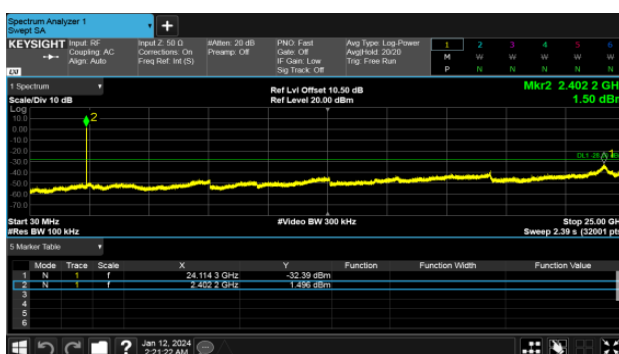
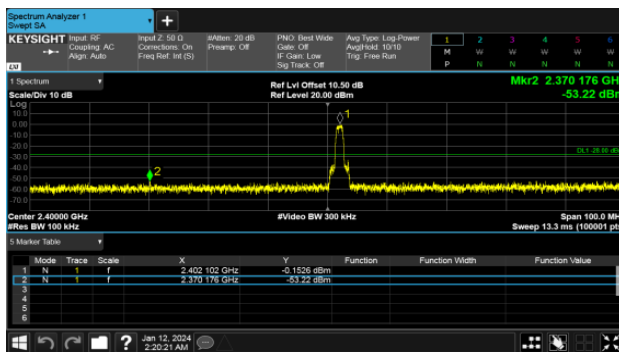
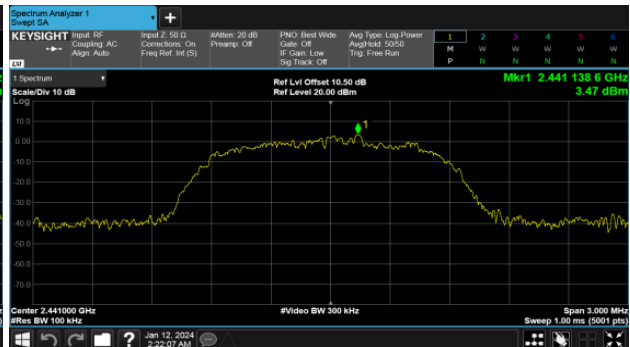




Modulation Type: 8DPSK (3Mbps)
Channel: 00

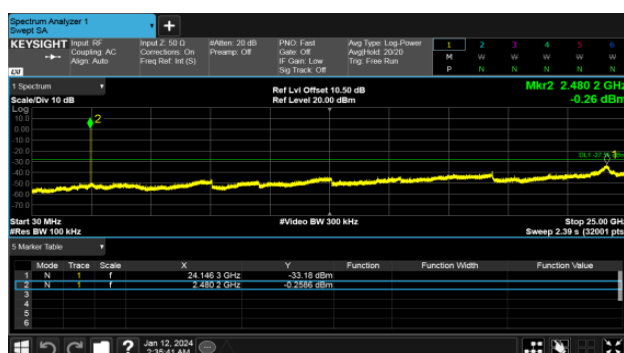
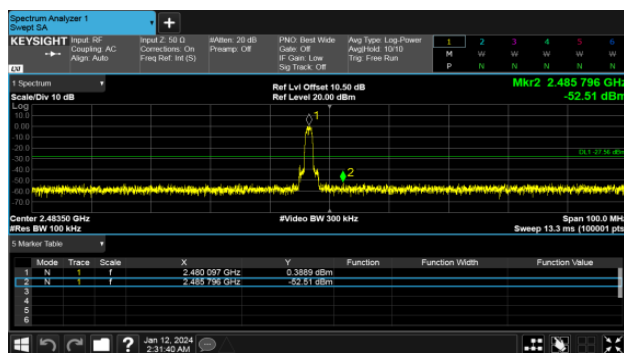
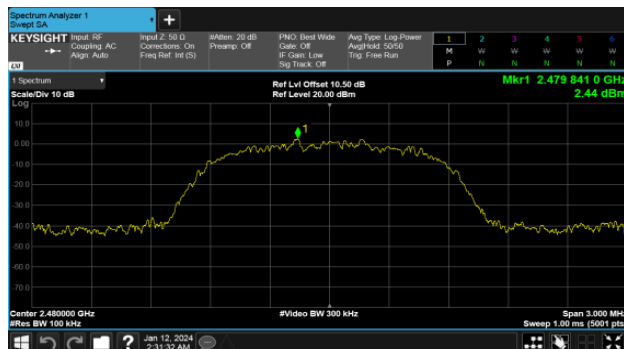


Modulation Type: 8DPSK (3Mbps)
Channel: 39





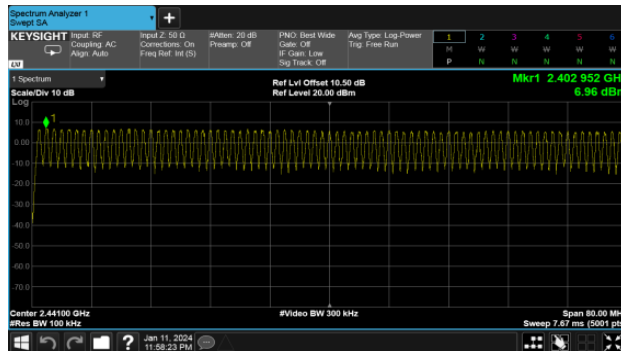
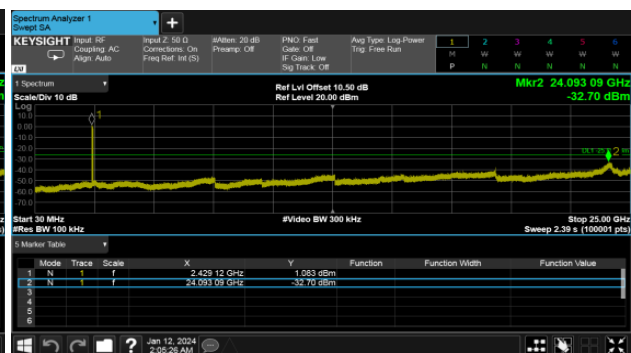
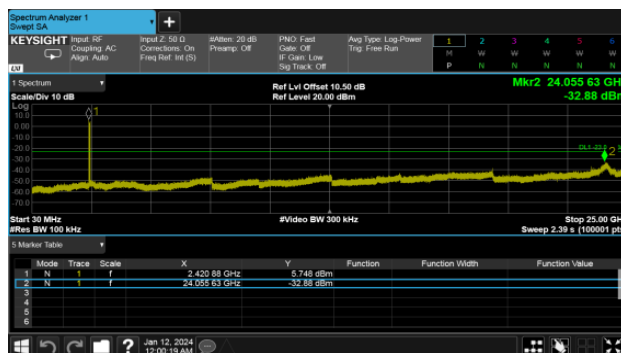
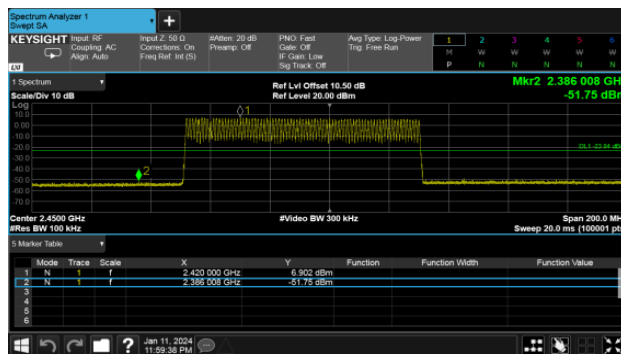
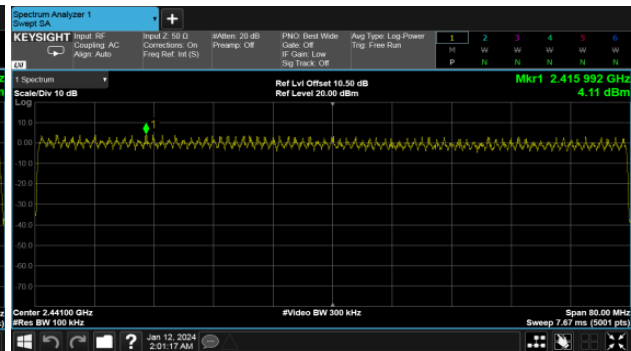
Modulation Type: 8DPSK (3Mbps)
Channel: 78





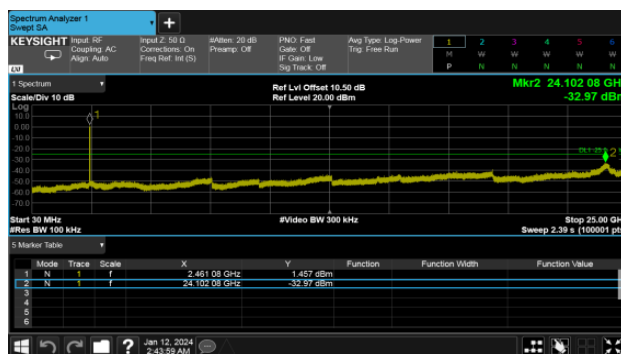
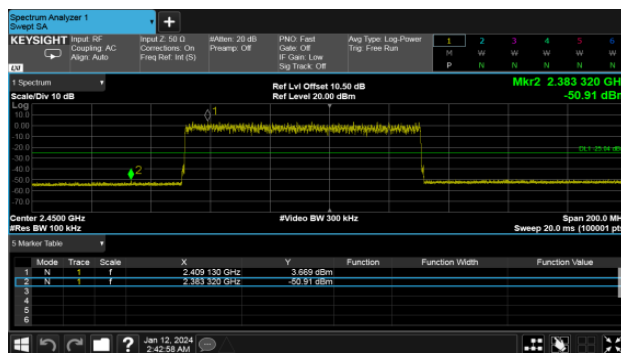
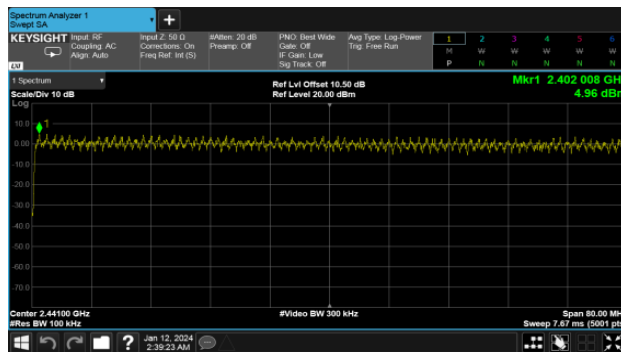
Hopping Mode

Modulation Type: GFSK

Modulation Type: $\pi/4$ -DQPSK



Modulation Type: 8DPSK





9. 20dB Bandwidth Measurement Data

9.1 Test Limit

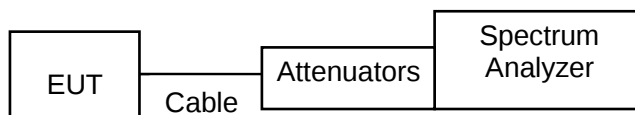
For reference data.

9.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 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.

9.3 Test Setup Layout

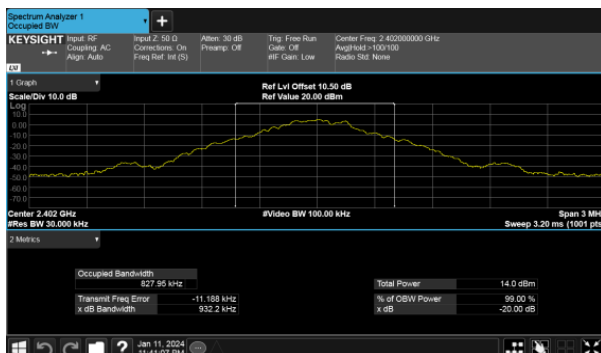


9.4 Test Result and Data

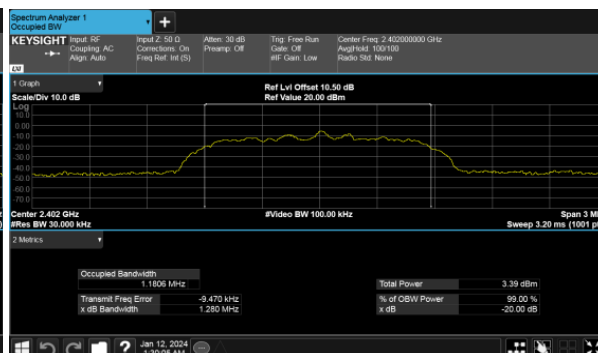
Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (MHz)	2/3 20dB Bandwidth (MHz)
GFSK	0	2402	0.932	0.621
	39	2441	0.934	0.622
	78	2480	0.928	0.618
$\pi/4$ -DQPSK	0	2402	1.280	0.853
	39	2441	1.280	0.853
	78	2480	1.280	0.853
8DPSK	0	2402	1.292	0.861
	39	2441	1.288	0.859
	78	2480	1.291	0.861



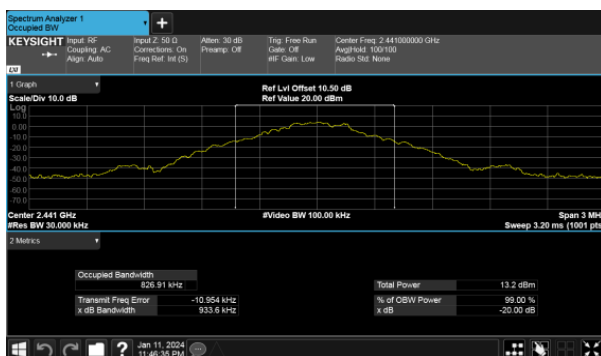
Modulation Type: GFSK (1Mbps)
Channel: 00



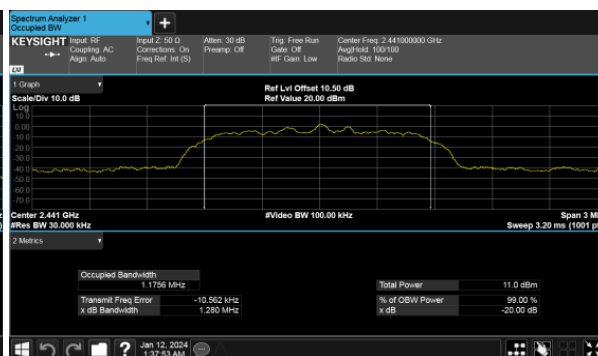
Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 00



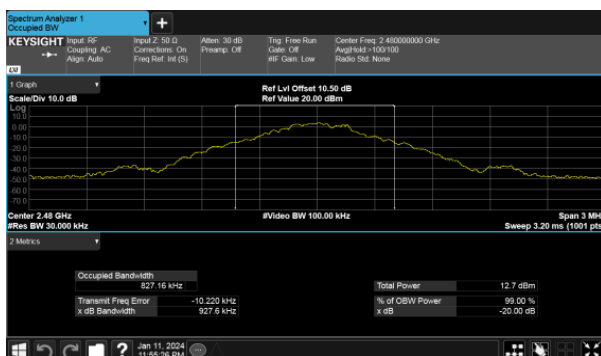
CH39



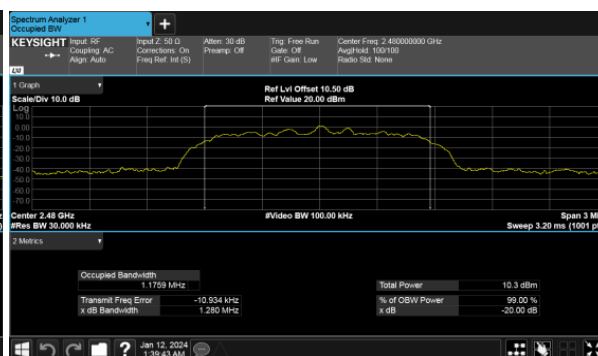
CH39



CH78

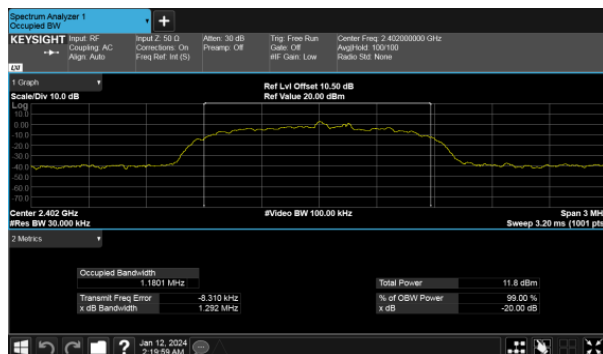


CH78





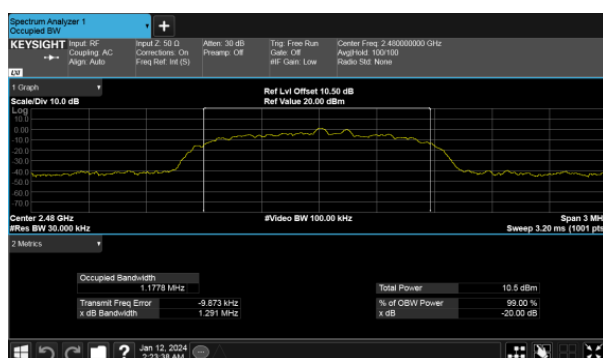
Modulation Type: 8DPSK (3Mbps)
Channel: 00



CH39



CH78





10. Carrier Frequency Separation

10.1 Test Limit

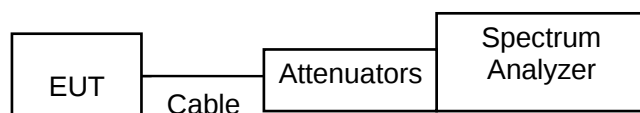
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that 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.

10.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 Section 7.8.2

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 300 KHz and VBW to 1000 KHz.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels.

10.3 Test Setup Layout

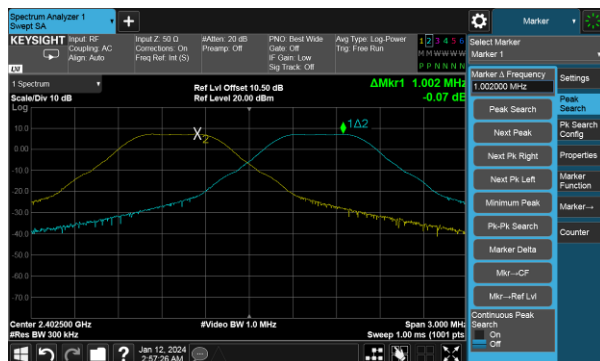


10.4 Test Result and Data

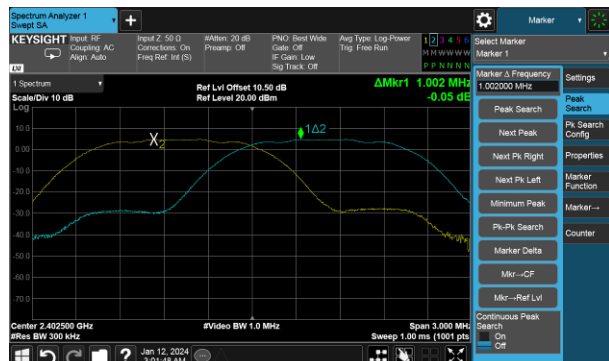
Modulation Type	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	0	2402	1.002	0.621
	39	2441	1.002	0.622
	78	2480	1.002	0.618
$\pi/4$ -DQPSK	0	2402	1.002	0.853
	39	2441	1.002	0.853
	78	2480	1.002	0.853
8DPSK	0	2402	1.002	0.861
	39	2441	1.002	0.859
	78	2480	1.002	0.861



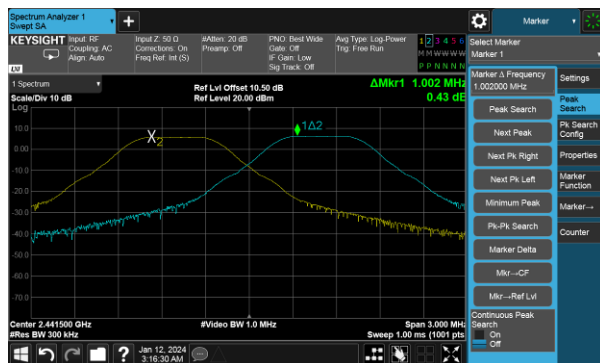
Modulation Type: GFSK (1Mbps)
Channel: 00



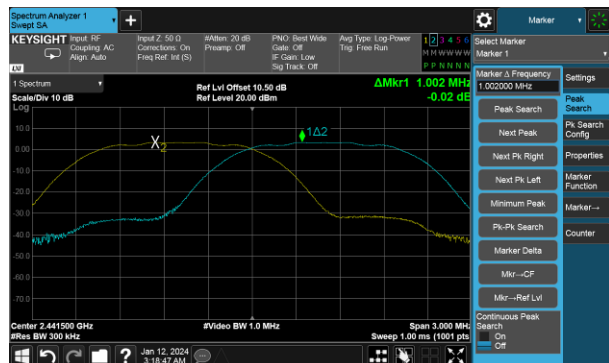
Modulation Type: $\pi/4$ -DQPSK (2Mbps)
Channel: 00



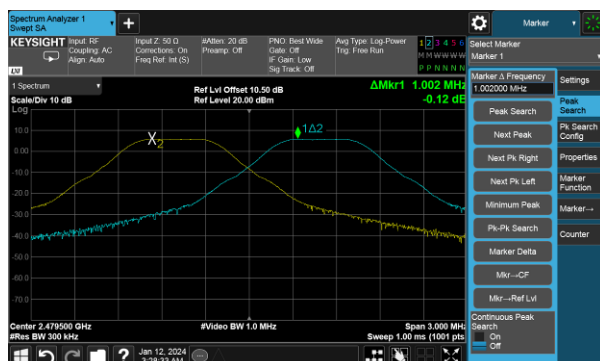
CH39



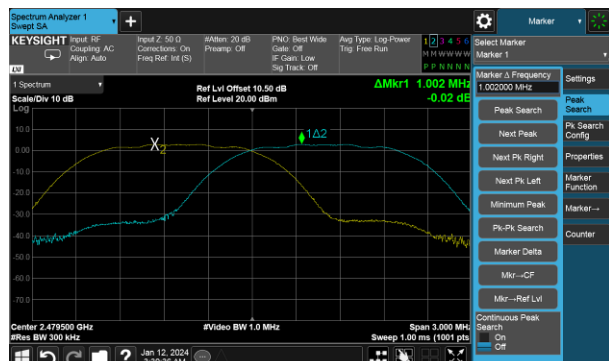
CH39



CH78

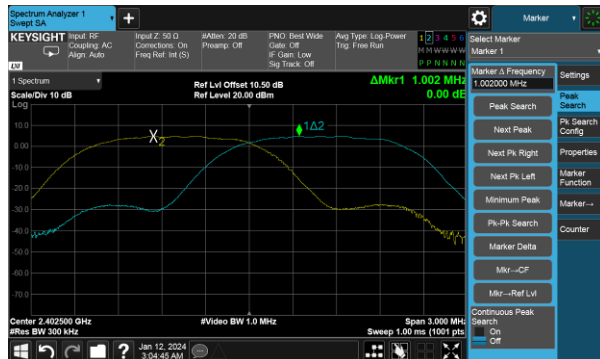


CH78

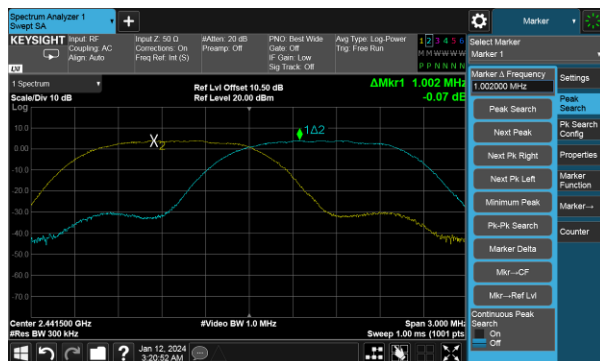




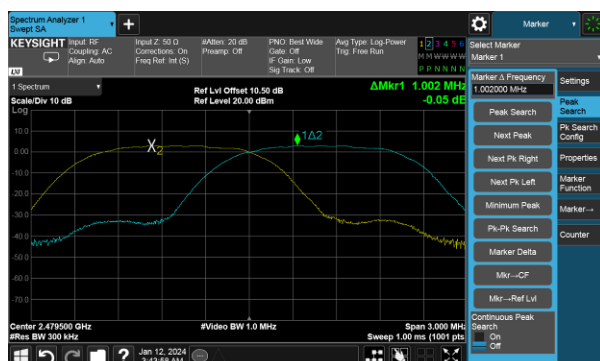
Modulation Type: 8DPSK (3Mbps)
Channel: 00



CH39



CH78





11. Dwell Time on each channel

11.1 Test Limit

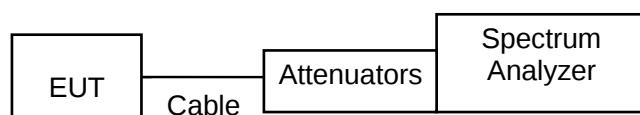
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

11.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 Section 7.8.4

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
3. Set RBW of spectrum analyzer to 300KHz and VBW to 1MHz.
4. Measure the time duration of one transmission on the measured frequency.

11.3 Test Setup Layout



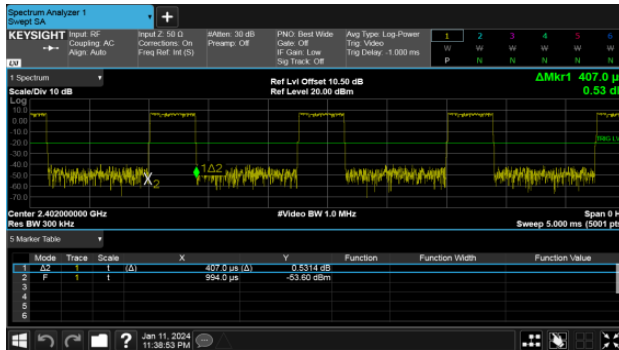
11.4 Test Result and Data

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	0.407	320.00	130.24	400
GFSK-DH3	2402	1.666	160.00	266.56	400
GFSK-DH5	2402	2.913	106.67	310.72	400
$\pi/4$ -DQPSK-DH1	2402	0.413	320.00	132.16	400
$\pi/4$ -DQPSK-DH3	2402	1.664	160.00	266.24	400
$\pi/4$ -DQPSK-DH5	2402	2.922	106.67	311.68	400
8DPSK-DH1	2402	0.413	320.00	132.16	400
8DPSK-DH3	2402	1.668	160.00	266.88	400
8DPSK-DH5	2402	2.922	106.67	311.68	400

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	0.407	160.00	65.12	400
AFH-DH3	2402-2421	1.664	80.00	133.12	400
AFH-DH5	2402-2421	2.919	53.33	155.67	400



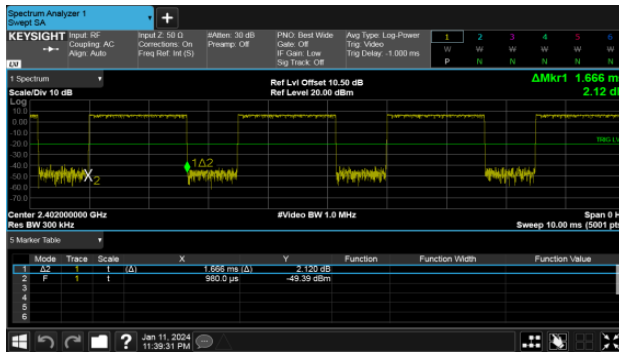
Modulation Type: GFSK (DH1)
Channel: 00



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



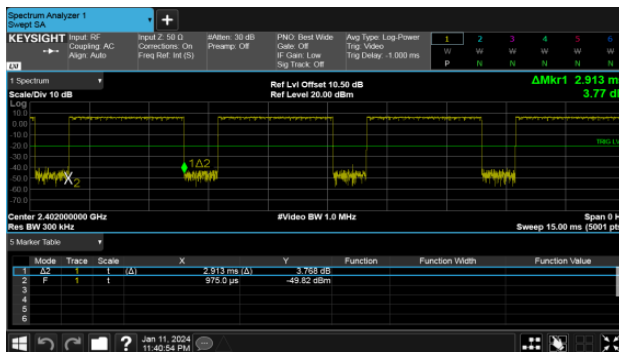
Modulation Type: GFSK (DH3)
Channel: 00



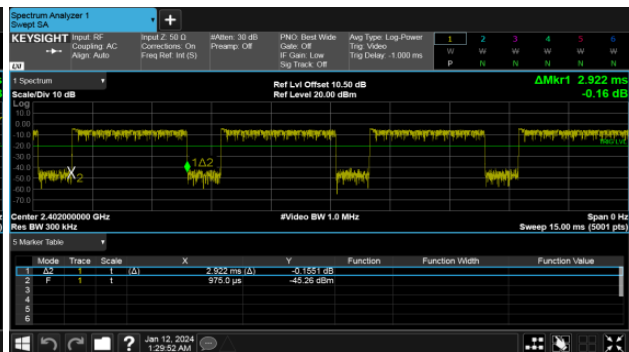
Modulation Type: $\pi/4$ -DQPSK (DH3)
Channel: 00



Modulation Type: GFSK (DH5)
Channel: 00

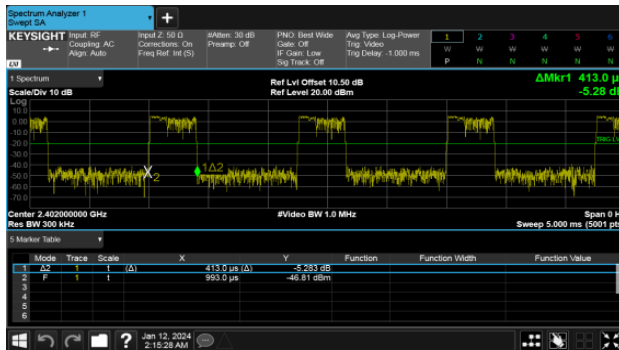


Modulation Type: $\pi/4$ -DQPSK (DH5)
Channel: 00

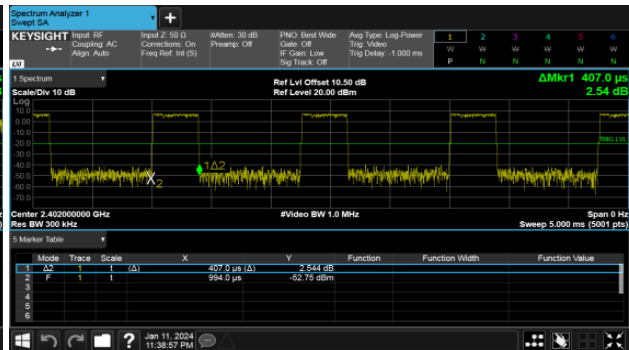




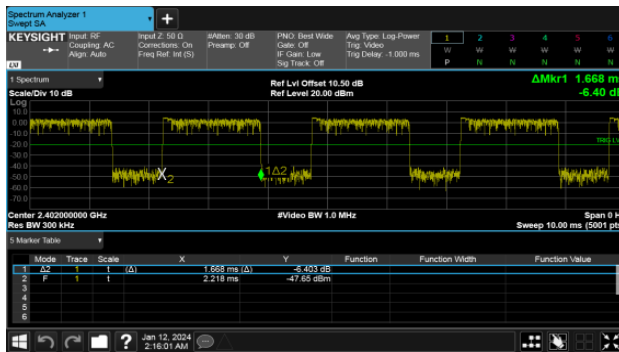
Modulation Type: 8DPSK (DH3)
Channel: 00



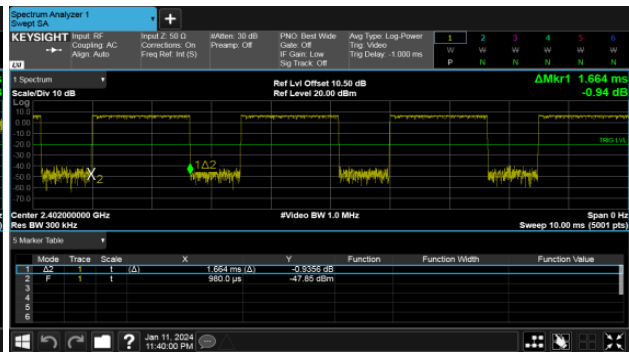
Modulation Type: AFH (DH1)



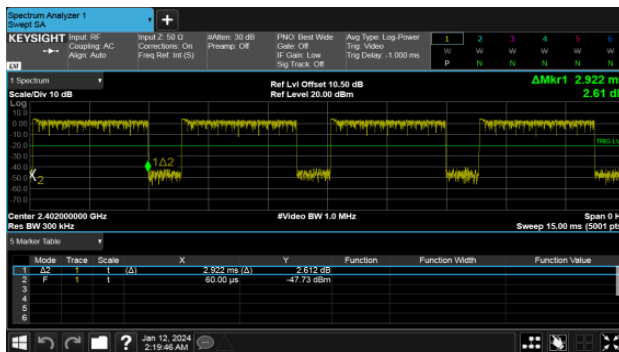
Modulation Type: GFSK (DH3)
Channel: 00



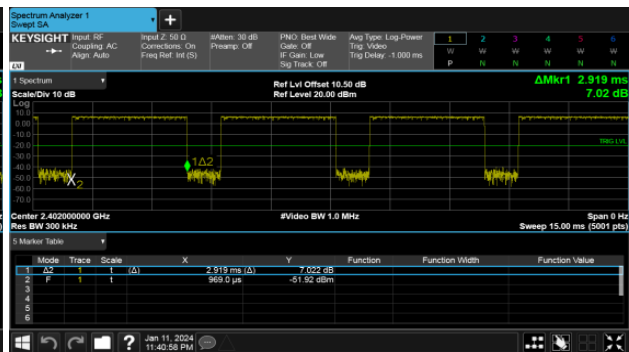
Modulation Type: AFH (DH3)



Modulation Type: GFSK (DH5)
Channel: 00



Modulation Type: AFH (DH5)





12. Number of Hopping Channels

12.1 Test Limit

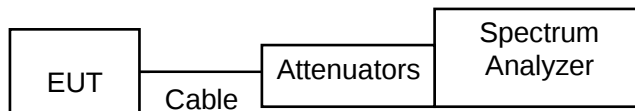
Frequency hopping systems in the 2400 ~ 2483.5 MHz band shall use at least 15 channels.

12.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 Section 7.8.3

- a. The transmitter output was connected to the spectrum analyzer.
- b. 2. Set RBW of spectrum analyzer to 100 KHz and VBW to 300 KHz.
- c. 3. Set the MaxHold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

12.3 Test Setup Layout

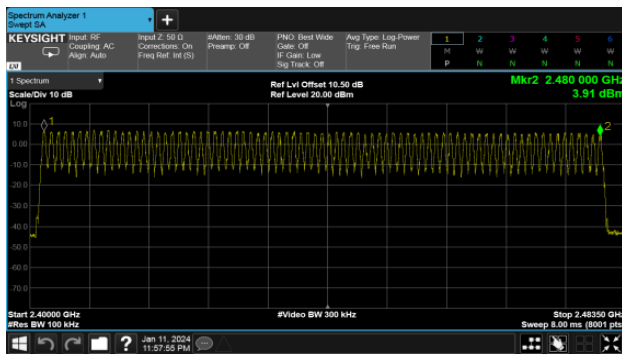


12.4 Test Result and Data

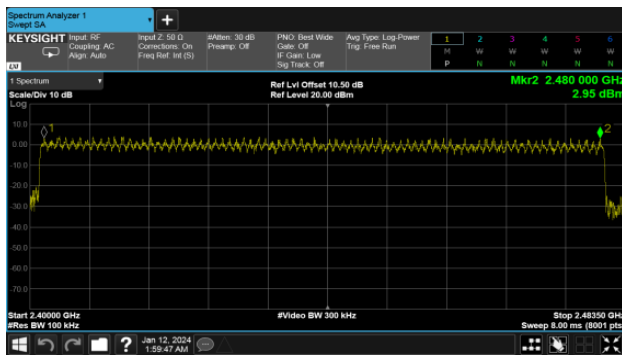
Modulation Type	Hopping Channels
GFSK	79
$\pi/4$ -DQPSK	79
8DPSK	79



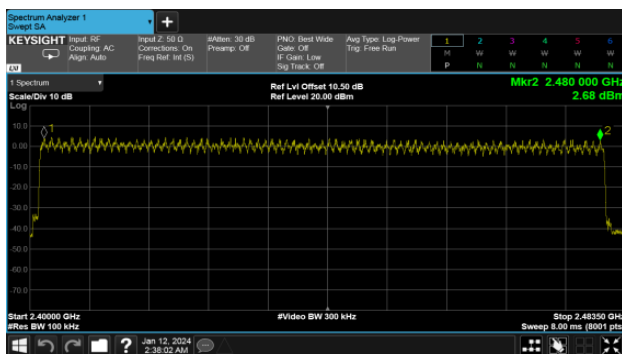
Modulation Type: GFSK (1Mbps)



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



Modulation Type: 8DPSK (3Mbps)





13. Maximum Average Output Power

13.1 Test Limit

The Maximum Average Output Power Measurement is 30dBm.

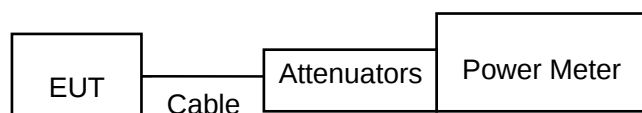
13.2 Test Procedures

According to the methods defined in ANSI C63.10-2013 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.

13.3 Test Setup Layout



13.4 Test Result and Data

Setting	Modulation Type	Channel	Frequency (MHz)	AV Output Power (dBm)	AV Output Power (mW)
10	GFSK	0	2402	16.33	42.954
10		39	2441	15.70	37.154
10		78	2480	14.77	29.992
10	$\pi/4$ -DQPSK	0	2402	13.41	21.928
10		39	2441	12.72	18.707
10		78	2480	11.85	15.311
10	8DPSK	0	2402	13.52	22.491
10		39	2441	12.76	18.880
10		78	2480	11.80	15.136

AFH Mode					
Setting	Modulation Type	Channel	Frequency (MHz)	AV Output Power (dBm)	AV Output Power (mW)
10	GFSK	0-19	2402-2421	16.26	42.267
10	$\pi/4$ -DQPSK	0-19	2402-2421	13.38	21.777
10	8DPSK	0-19	2402-2421	13.47	22.233