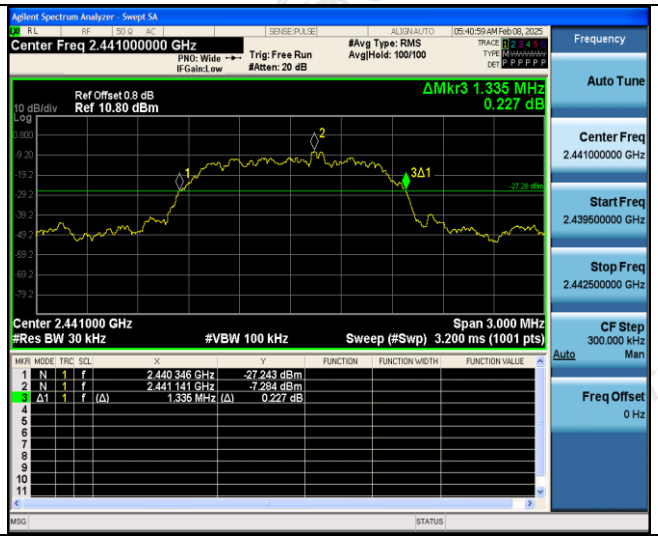
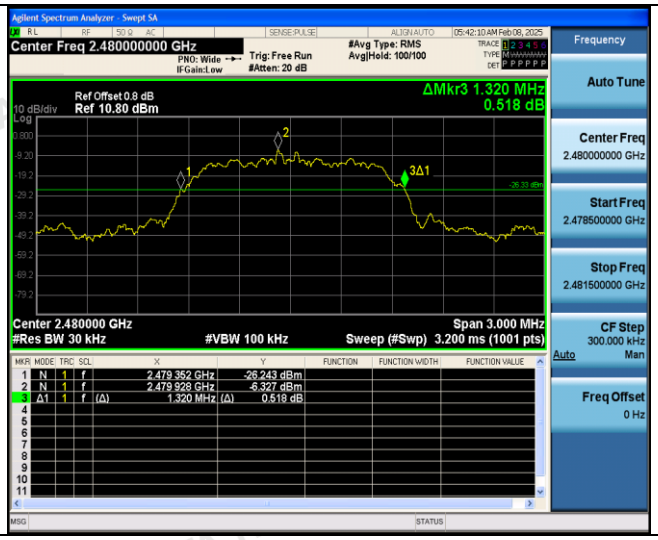
GFSK Modulation

CH00

CH39

CH78

π/4DQPSK Modulation

CH00

CH39

CH78

4.5 Frequency Separation

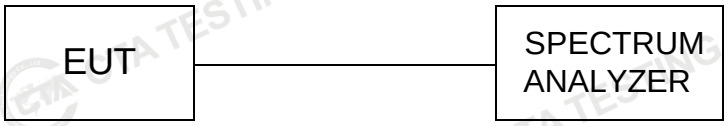
LIMIT

According to 15.247(a)(1),frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with100 KHz RBW and 300 KHz VBW.

TEST CONFIGURATION

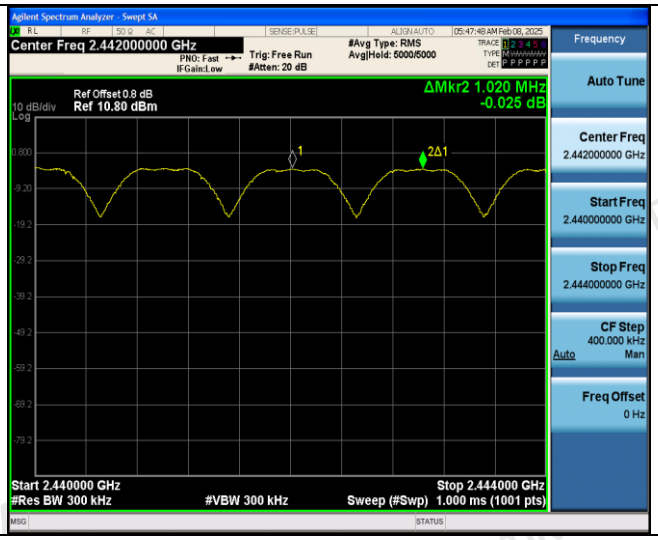


TEST RESULTS

Modulation	Channel	Channel Separation (MHz)	Limit(MHz)	Result
GFSK	CH38	1.020	25KHz or 2/3*20dB bandwidth	Pass
	CH39			
π/4DQPSK	CH38	1.040	25KHz or 2/3*20dB bandwidth	Pass
	CH39			

Note:
We have tested all mode at high, middle and low channel, and recorded worst case at middle

Test plot as follows:



GFSK

π/4DQPSK

4.6 Number of hopping frequency

Limit

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

Test Procedure

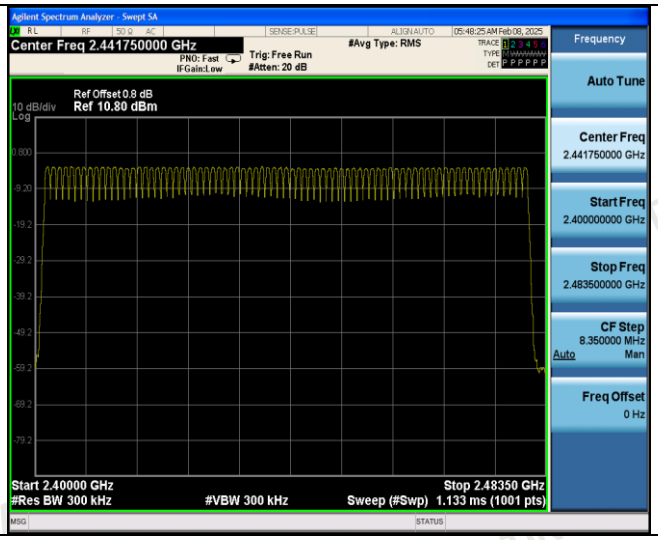
The transmitter output was connected to the spectrum analyzer through an attenuator. Set spectrum analyzer start 2400MHz to 2483.5MHz with 100 KHz RBW and 300 KHz VBW.

Test Configuration

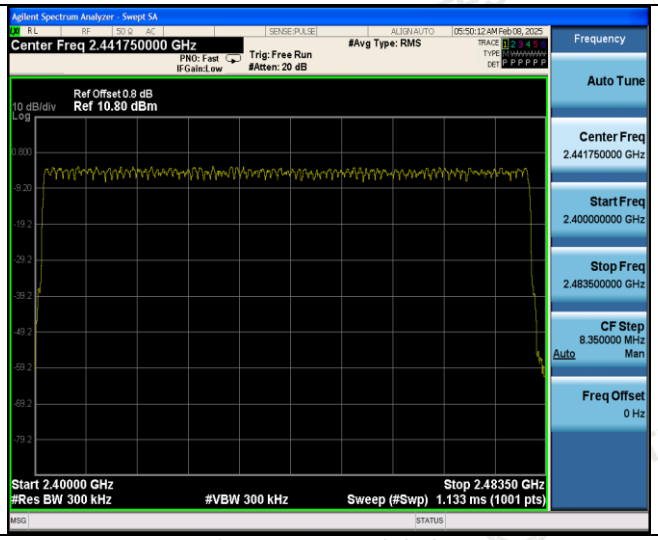
Test Results

Modulation	Number of Hopping Channel	Limit	Result
GFSK	79	≥15	Pass
π/4DQPSK	79		

Test plot as follows:



GFSK Modulation



π/4DQPSK Modulation

4.7 Time of Occupancy (Dwell Time)

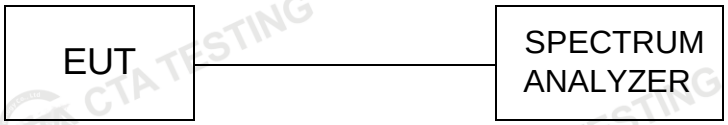
Limit

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.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 1MHz VBW, Span 0Hz.

Test Configuration



Test Results

Modulation	Packet	Burst time (ms)	Dwell time (s)	Limit (s)	Result
GFSK	DH1	0.390	0.125	0.40	Pass
	DH3	1.650	0.264		
	DH5	2.900	0.309		
π/4DQPSK	2-DH1	0.390	0.125	0.40	Pass
	2-DH3	1.650	0.264		
	2-DH5	2.900	0.309		

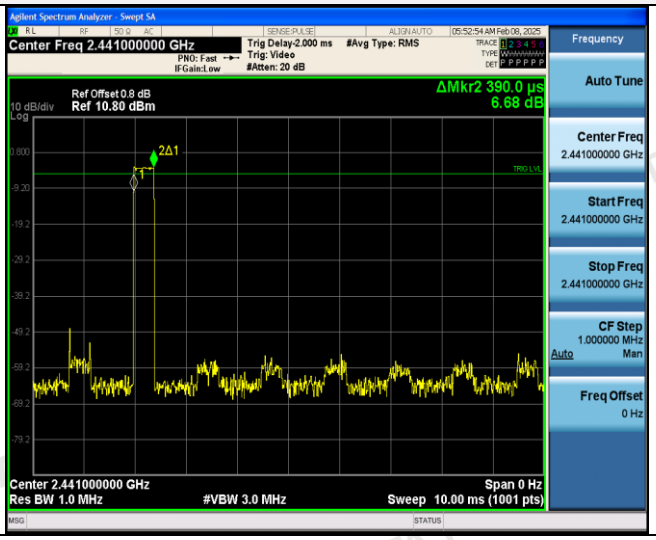
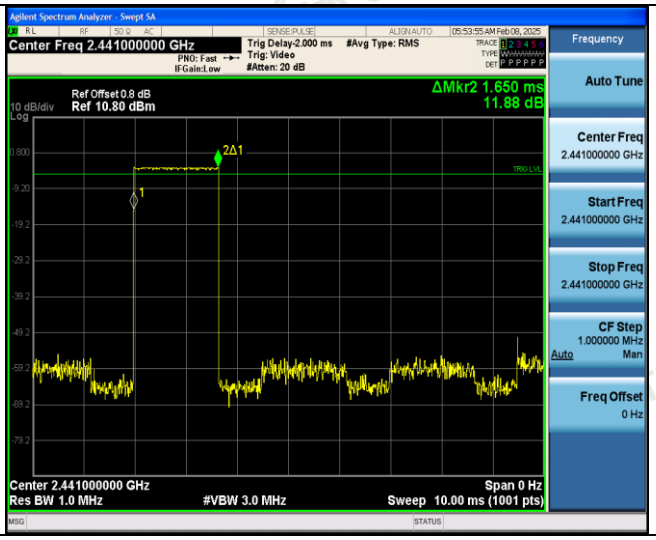
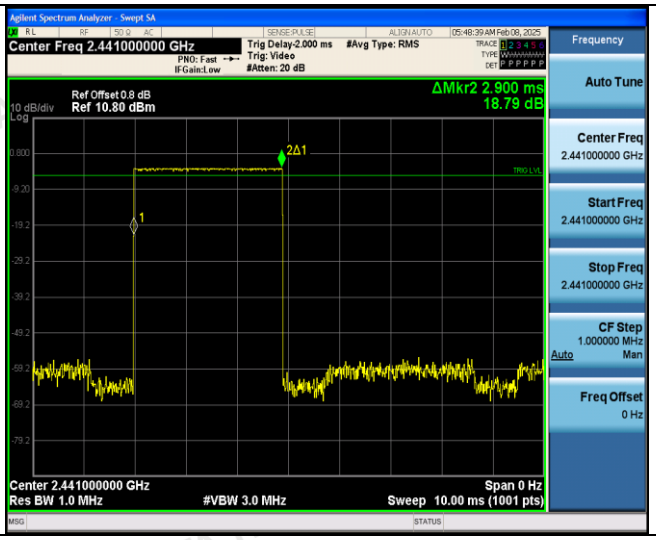
Note:We have tested all mode at high,middle and low channel,and recoreded worst case at middle channel.

Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second for DH1, 2-DH1

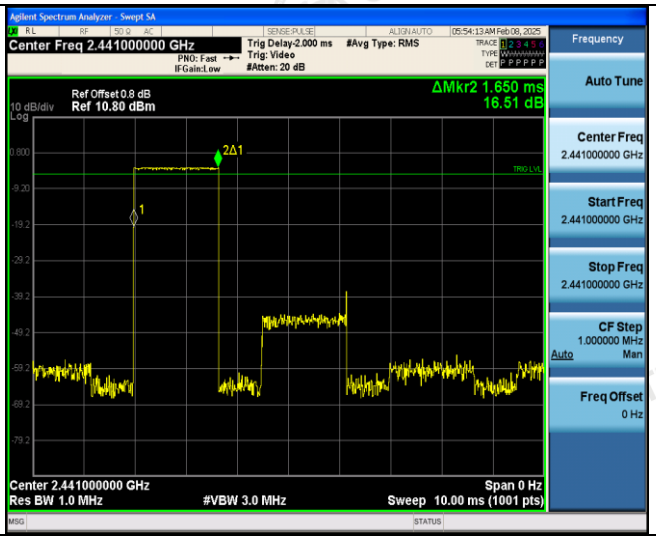
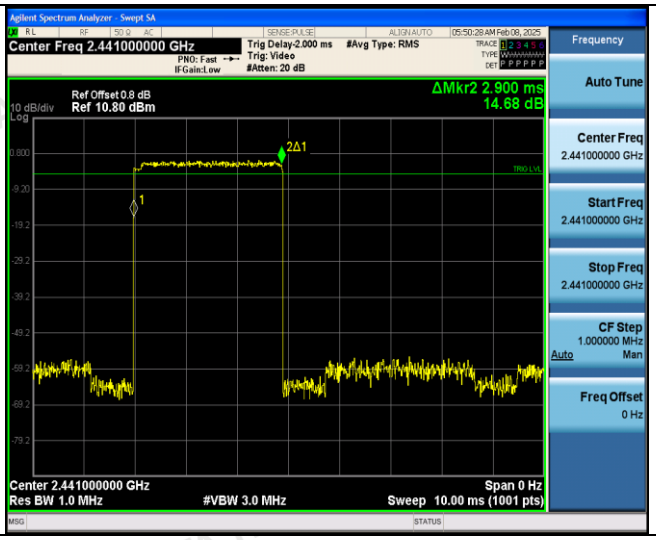
Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second for DH3, 2-DH3

Dwell time=Pulse time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second for DH5, 2-DH5

Test plot as follows:

GFSK Modulation

DH1 burst time

DH3 burst time

DH5 burst time

π/4DQPSK Modulation

2-DH1 burst time

2-DH3 burst time

2-DH5 burst time

4.8 Out-of-band Emissions

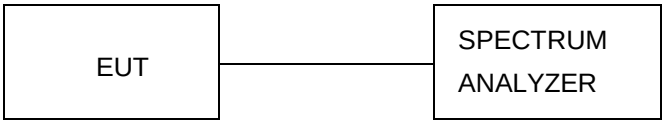
Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

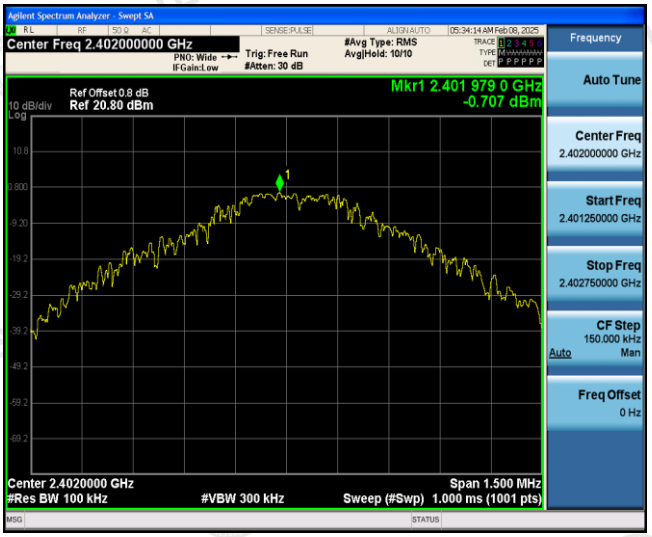
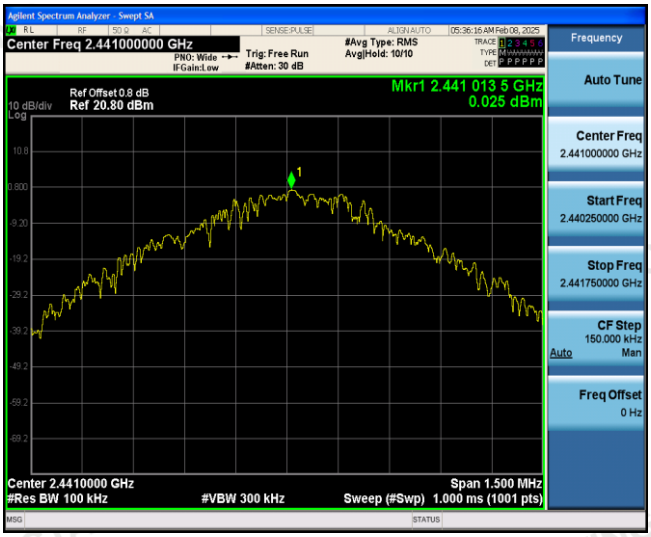
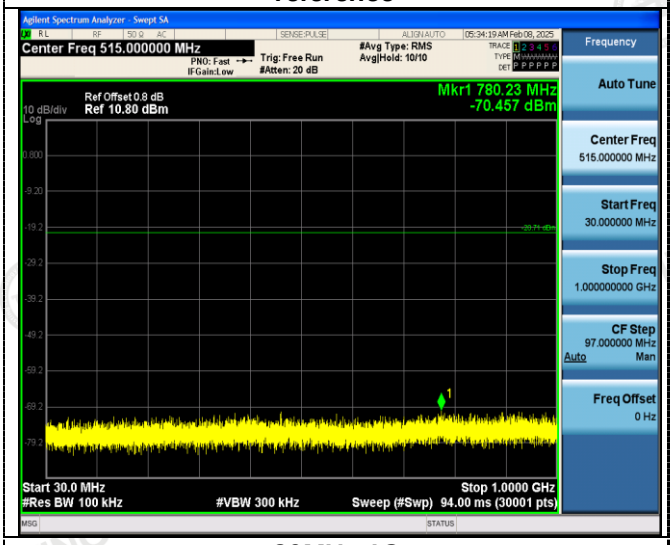
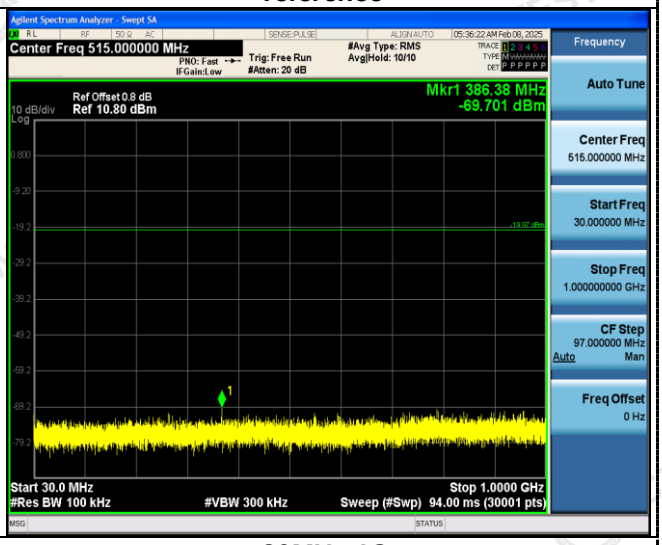
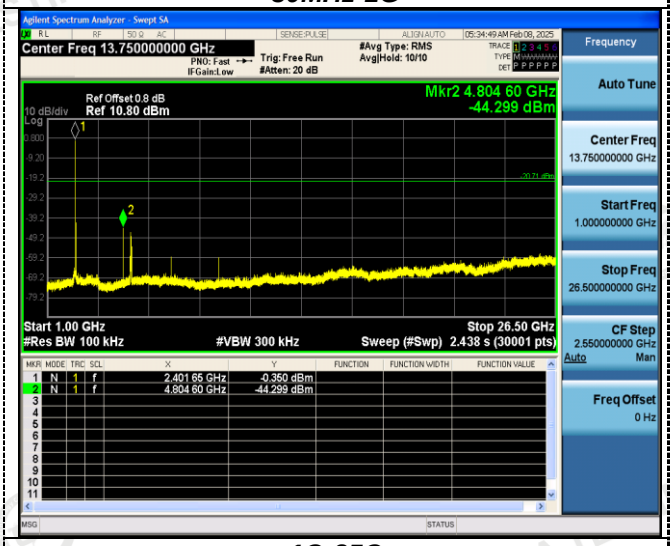
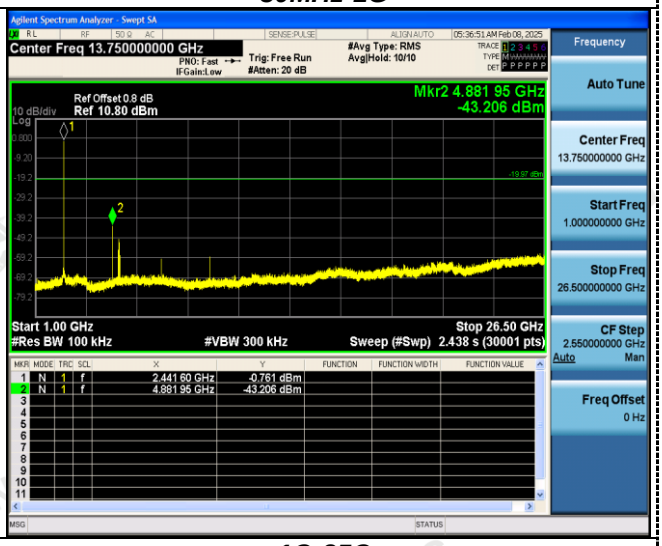
Test Configuration

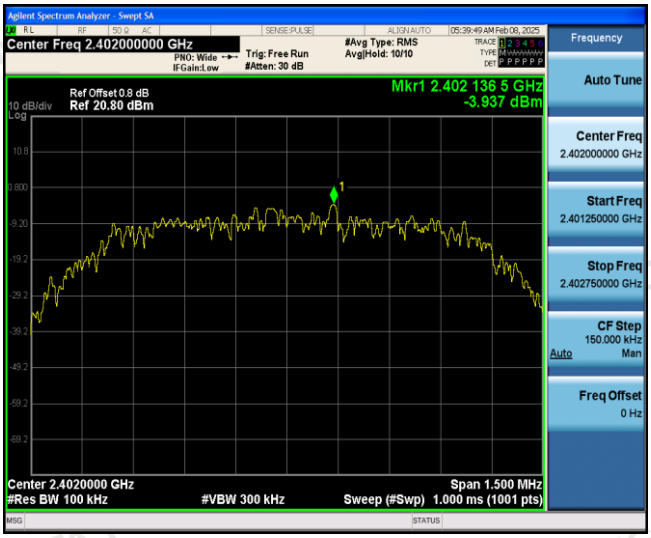
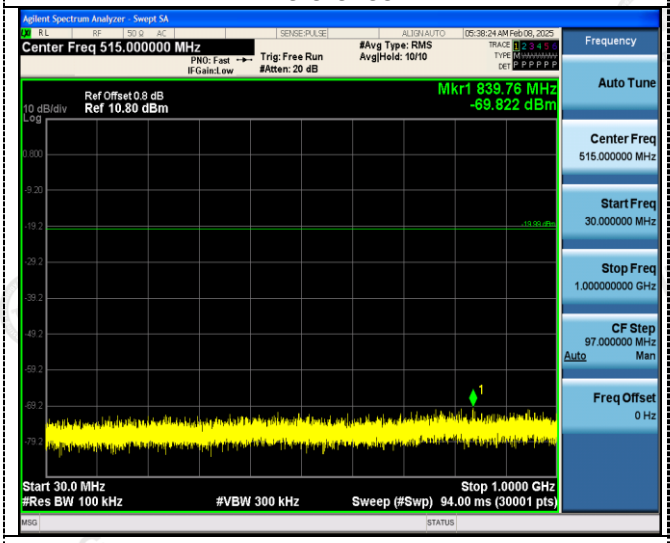
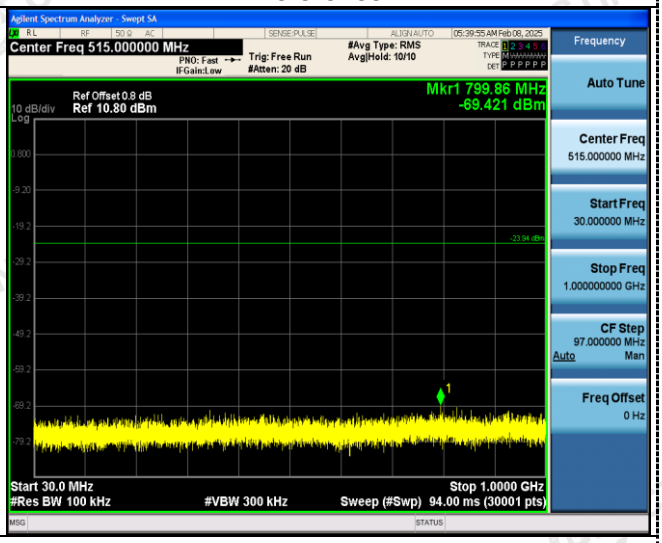
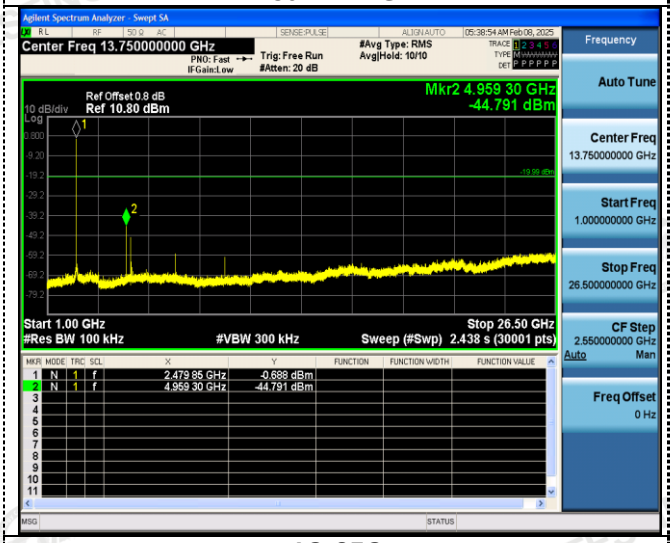
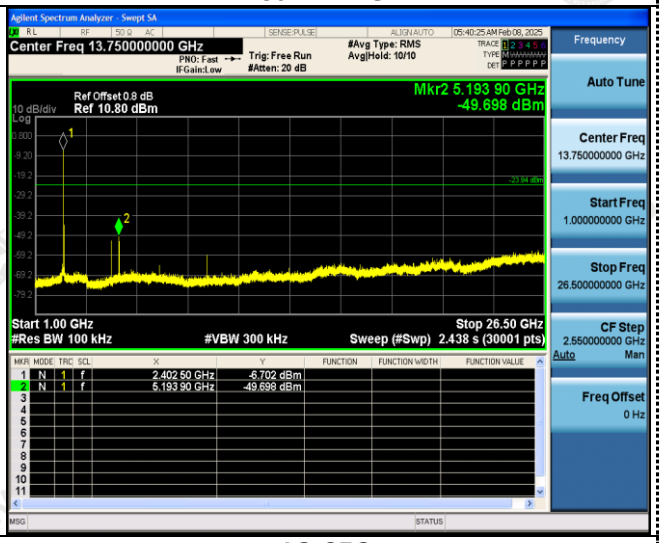


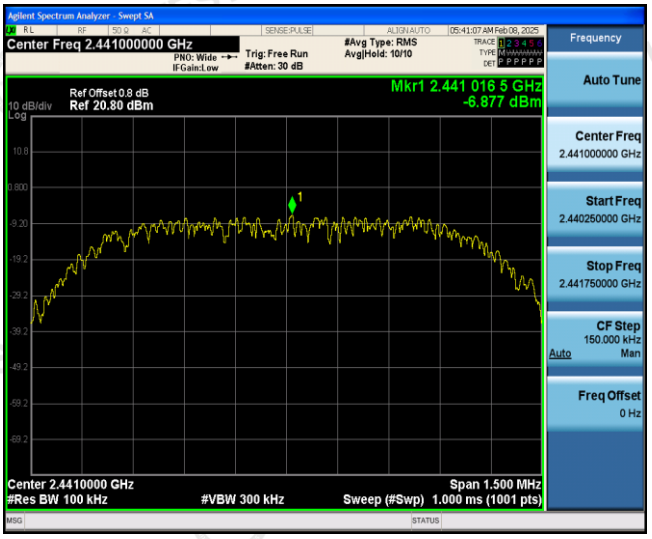
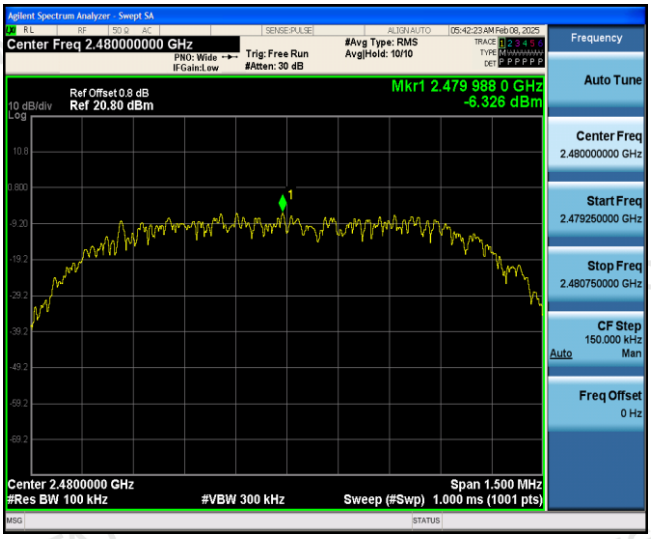
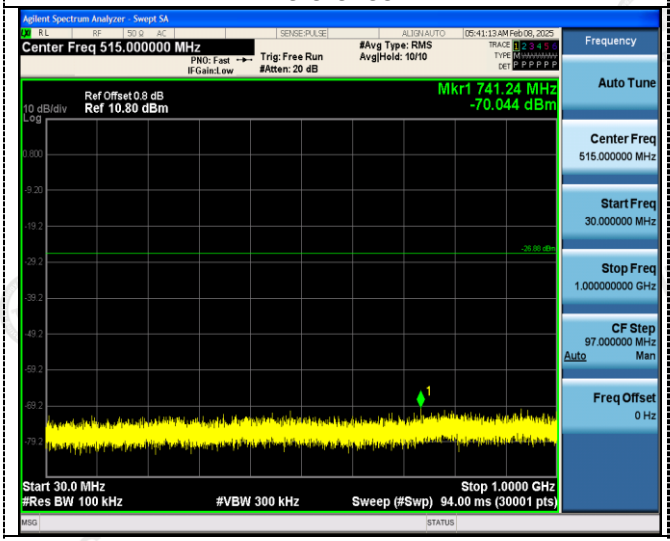
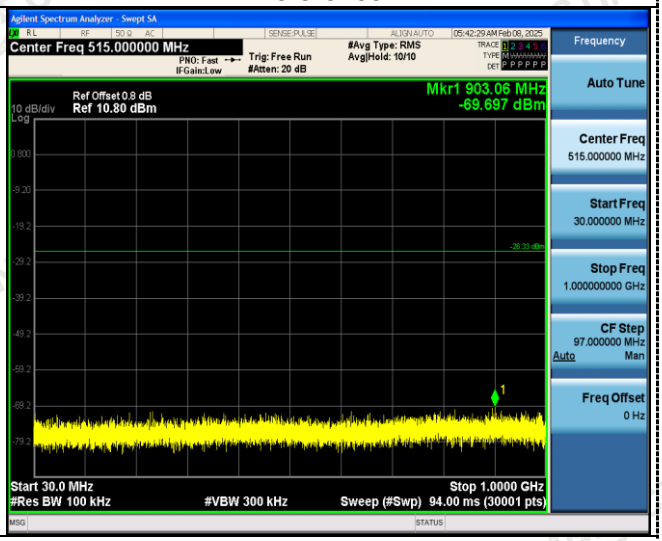
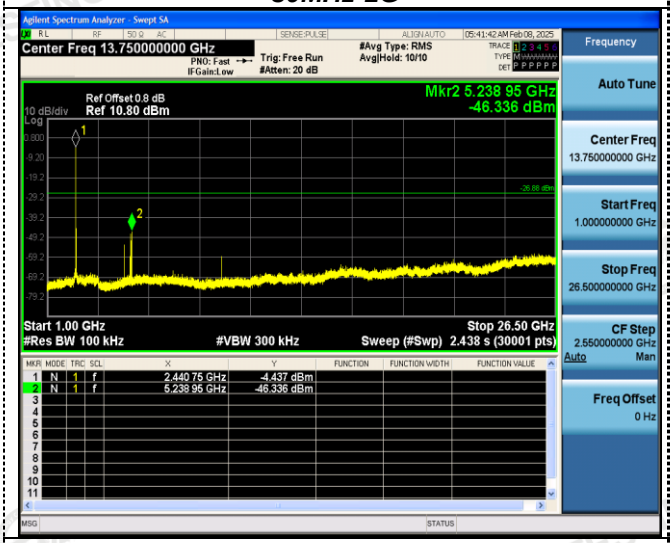
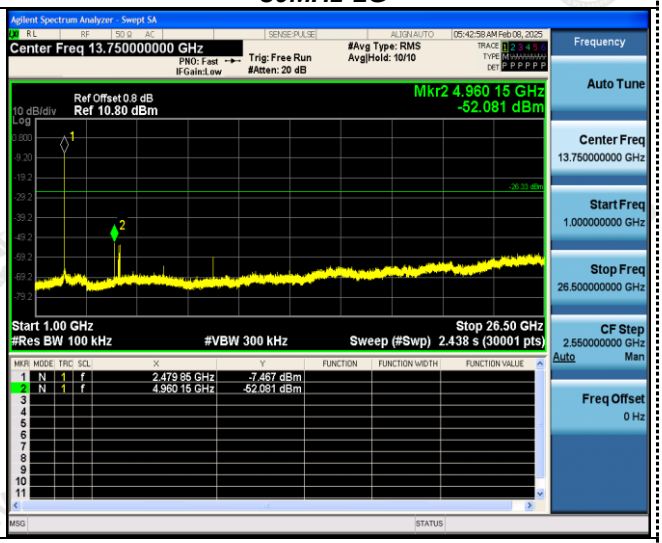
Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.
We measured all conditions (DH1, DH3, DH5) and recorded worst case at DH5

Test plot as follows:

GFSK(CH00)	GFSK(CH39)
	
reference	reference
	
30MHz-1G	30MHz-1G
	
1G-25G	1G-25G

GFSK(CH78)	π/4DQPSK (CH00)
	
reference	reference
	
30MHz-1G	30MHz-1G
	
1G-25G	1G-25G

π/4DQPSK (CH39)	π/4DQPSK (CH78)
	
reference	reference
	
30MHz-1G	30MHz-1G
	
1G-25G	1G-25G