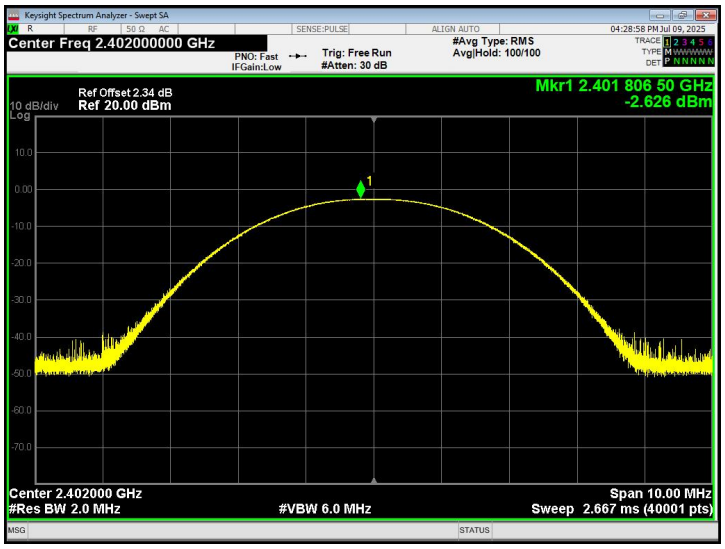
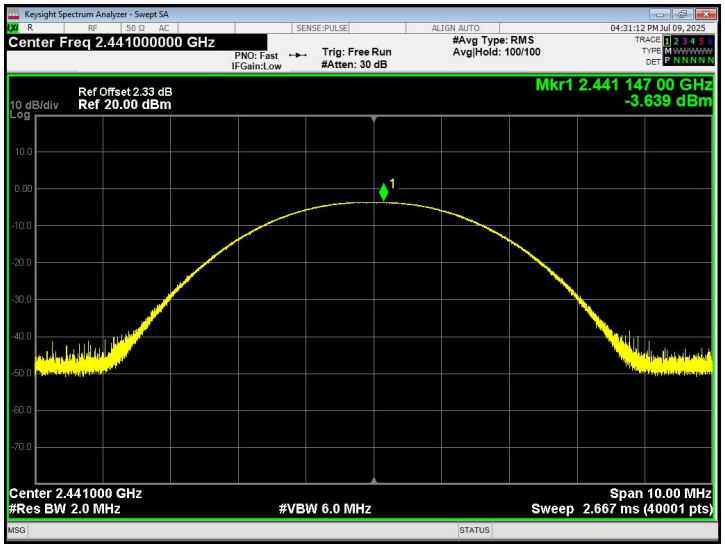
GFSK - 1-DH1 Test plots

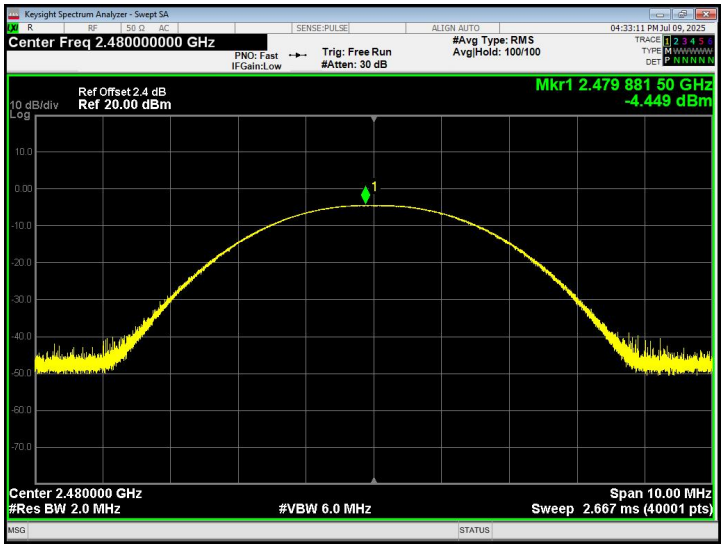
Low Channel



Middle Channel

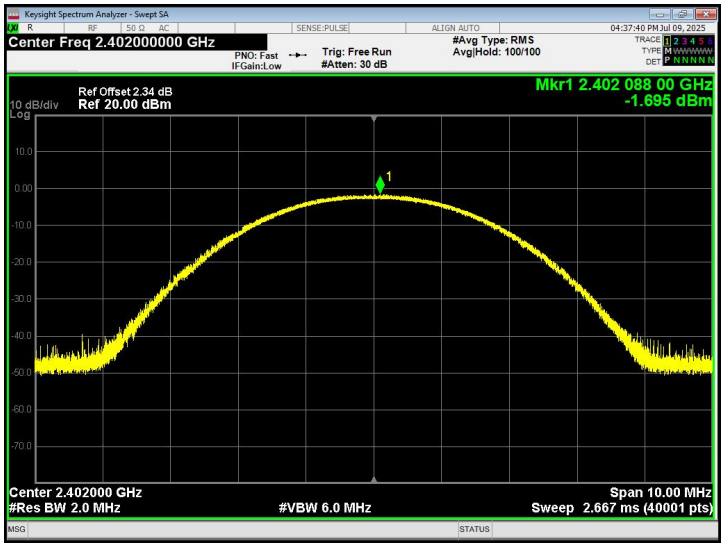


High Channel

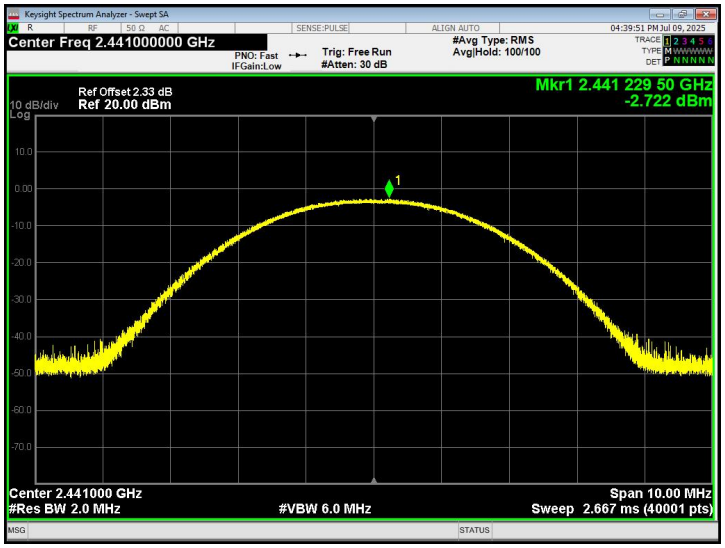


π/4-DQPSK - 2-DH1 Test plots

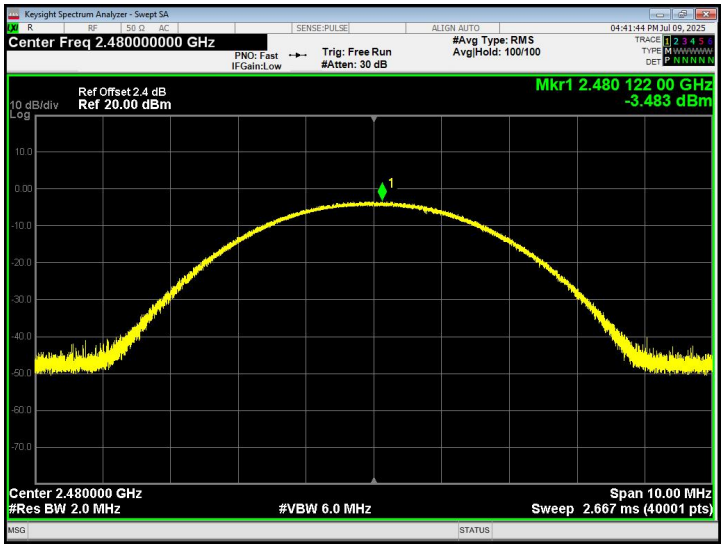
Low Channel



Middle Channel



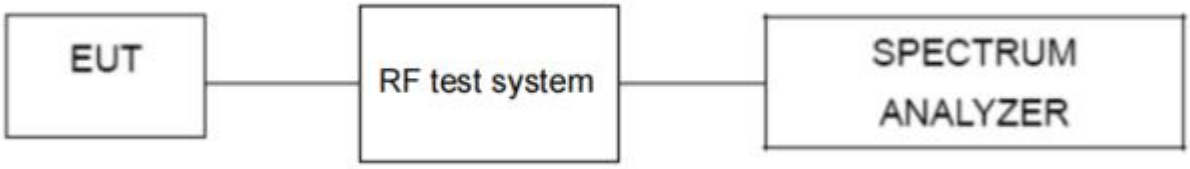
High Channel



9. HOPPING CHANNEL SEPARATION

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak
Limit:	GFSK: 20dB Bandwidth π/4-DQPSK : 0.025MHz or 2/3 of the 20dB Bandwidth (whichever is greater)

9.1 TEST SETUP



9.2 TEST PROCEDURE

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port

to the spectrum.

2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 3.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

9.3 DEVIATION FROM STANDARD

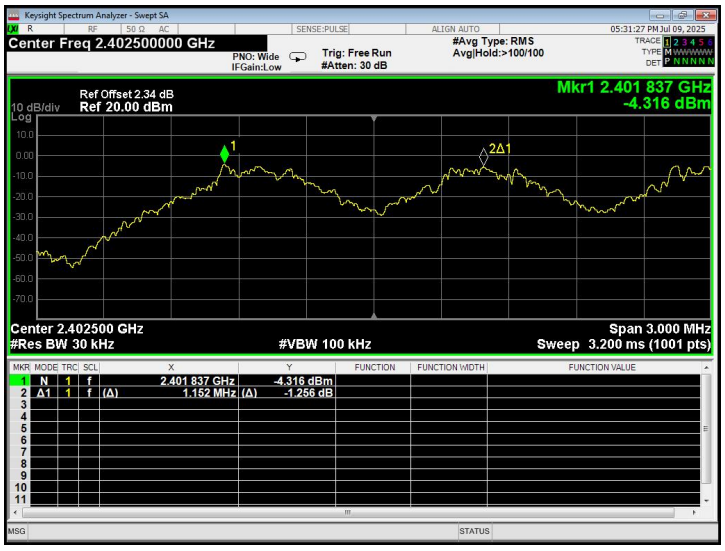
No deviation.

9.4 TEST RESULT

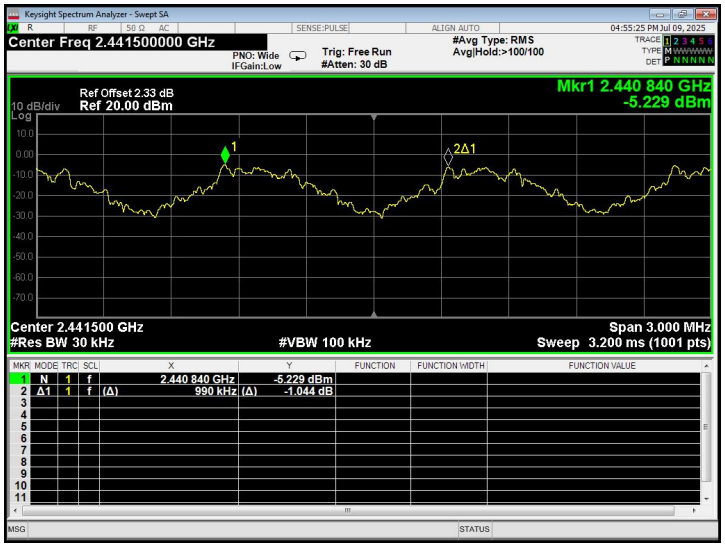
Modulation	Packet	Test Channel	Separation (MHz)	Limit (MHz)	Result
GFSK	1-DH1	Low	1.152	0.870	PASS
		Middle	0.990	0.878	PASS
		High	1.005	0.882	PASS
π/4-DQPSK	2-DH1	Low	1.005	0.828	PASS
		Middle	1.017	0.829	PASS
		High	0.996	0.830	PASS

GFSK - 1-DH1 Test plots

Low Channel



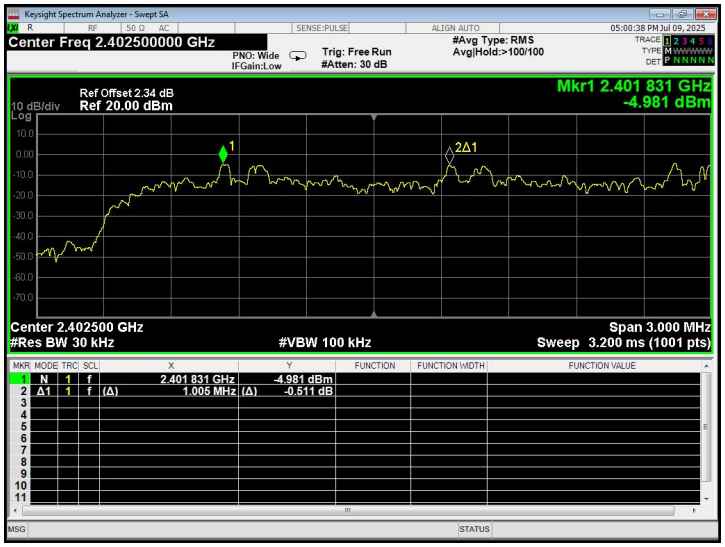
Middle Channel



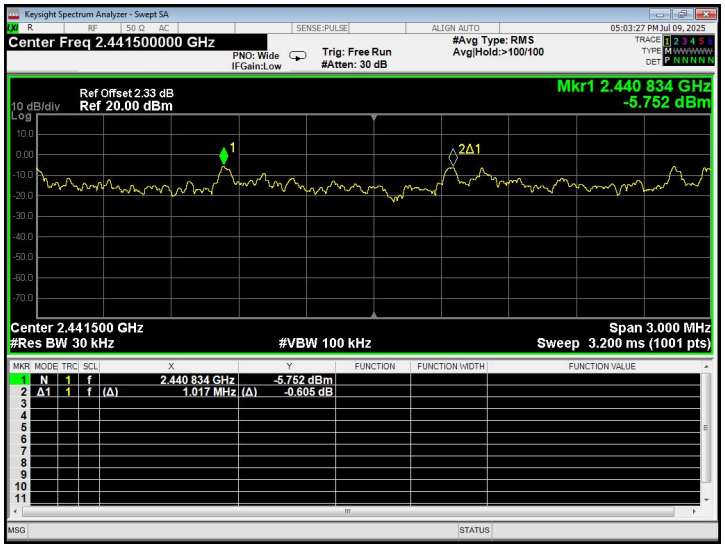
High Channel

π/4-DQPSK - 2-DH1 Test plots

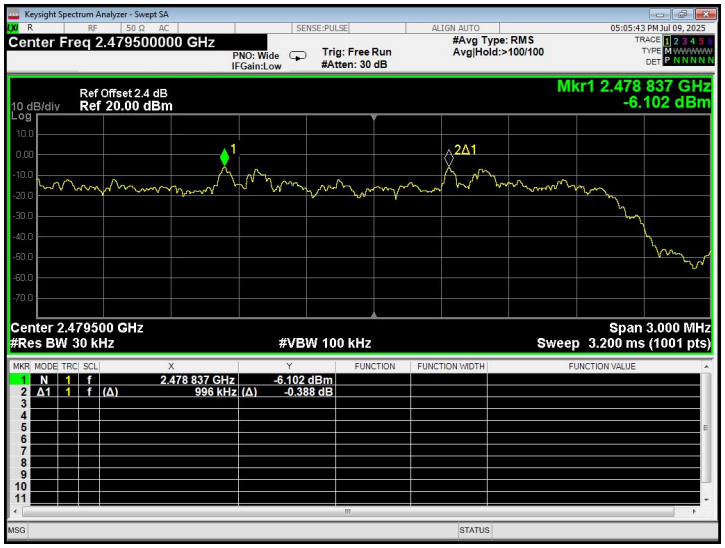
Low Channel



Middle Channel



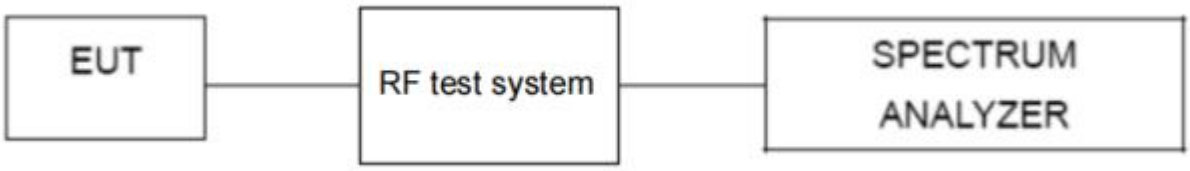
High Channel



10.NUMBER OF HOPPING FREQUENCY

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz Frequency Range=2400MHz-2483.5MHz Detector=Peak
Limit:	P_{max-pk} ≤ 1W, N_{ch} ≥ 75 Channels P_{max-pk} ≤ 0.125W, N_{ch} ≥ 15 Channels

10.1 TEST SETUP



10.2 TEST PROCEDURE

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

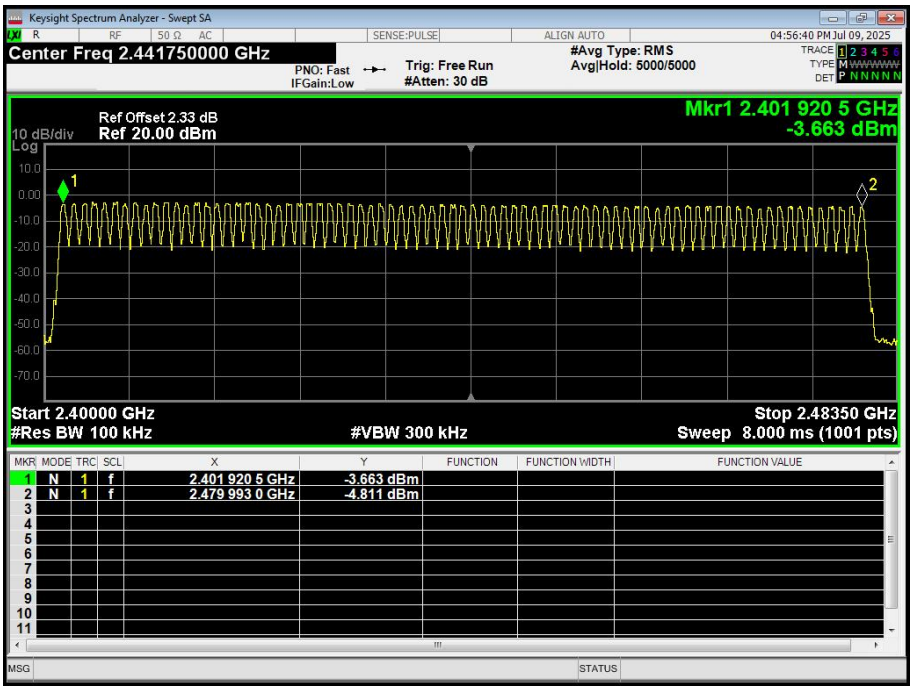
10.3 DEVIATION FROM STANDARD

No deviation.

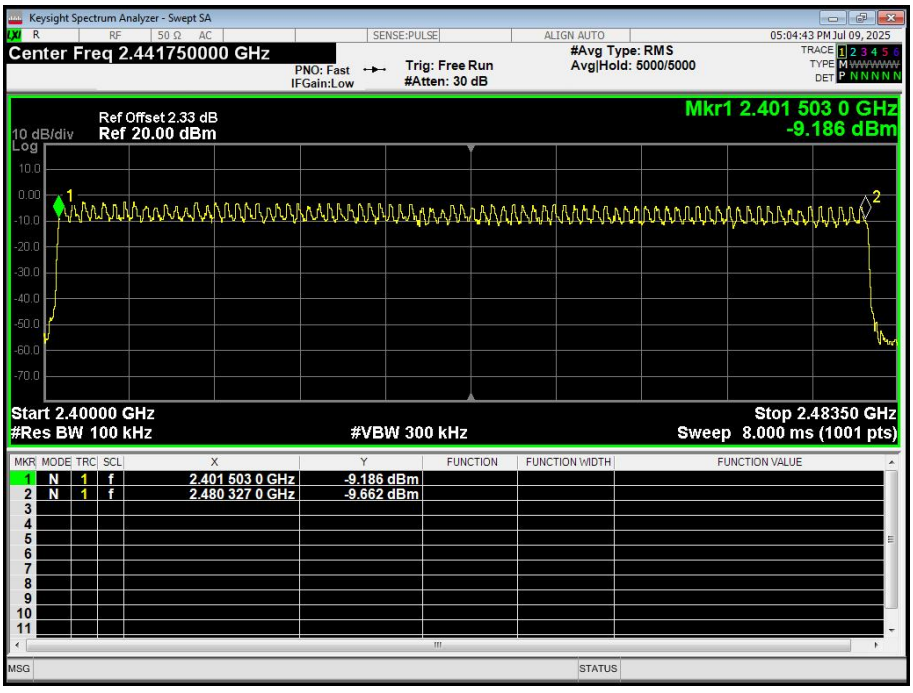
10.4 TEST RESULT

Modulation	Packet	Hopping Number	Limit	Result
GFSK	1-DH1	79	≥75	Pass
π/4-DQPSK	2-DH1	79	≥15	Pass

GFSK - 1-DH1 Test Plots



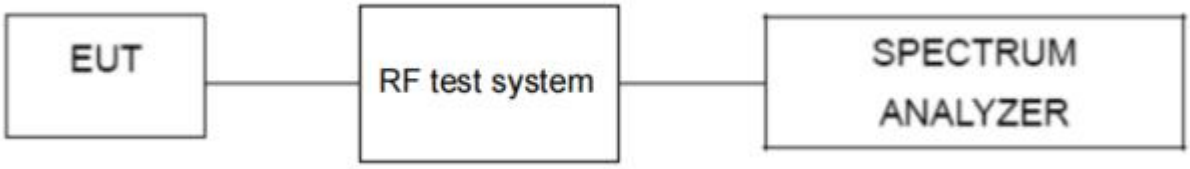
π/4-DQPSK - 2-DH1 Test Plots



11. DWELL TIME

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second

11.1 TEST SETUP



11.2 TEST PROCEDURE

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set spectrum analyzer span = 0Hz;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

11.3 DEVIATION FROM STANDARD

No deviation.

11.4 TEST RESULT

GFSK mode:

Frequency	Packet	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Result
2441MHz	1-DH1	0.382	122.240	400	Pass
2441MHz	1-DH3	1.638	262.080	400	Pass
2441MHz	1-DH5	2.887	307.947	400	Pass

Remarks:

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s
Test channel: as blow
CH:2441MHz time slot=0.382(ms)*(1600/ (2*79))*31.6=122.240(ms)
CH:2441MHz time slot=1.638(ms)*(1600/ (4*79))*31.6=262.080(ms)
CH:2441MHz time slot=2.887(ms)*(1600/ (6*79))*31.6=307.947(ms)

π/4-DQPSK mode:

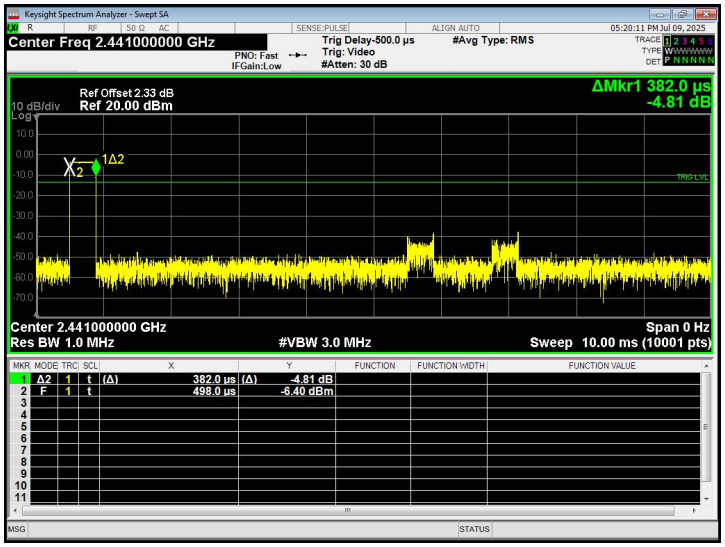
Frequency	Packet	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Result
2441MHz	2-DH1	0.392	125.44	400	Pass
2441MHz	2-DH3	1.643	262.88	400	Pass
2441MHz	2-DH5	2.892	308.48	400	Pass

Remarks:

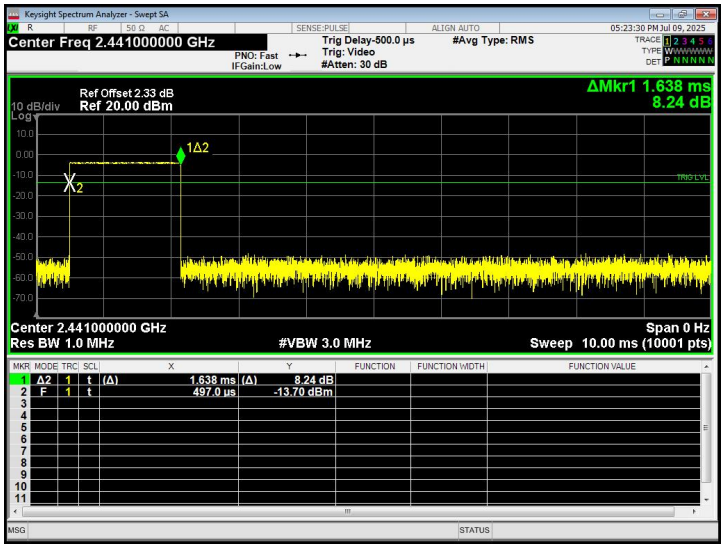
The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s
Test channel: as blow
CH:2441MHz time slot=0.392(ms)*(1600/ (2*79))*31.6=125.44(ms)
CH:2441MHz time slot=1.643(ms)*(1600/ (4*79))*31.6=262.88(ms)
CH:2441MHz time slot=2.892(ms)*(1600/ (6*79))*31.6=308.48(ms)

GFSK Test Plots

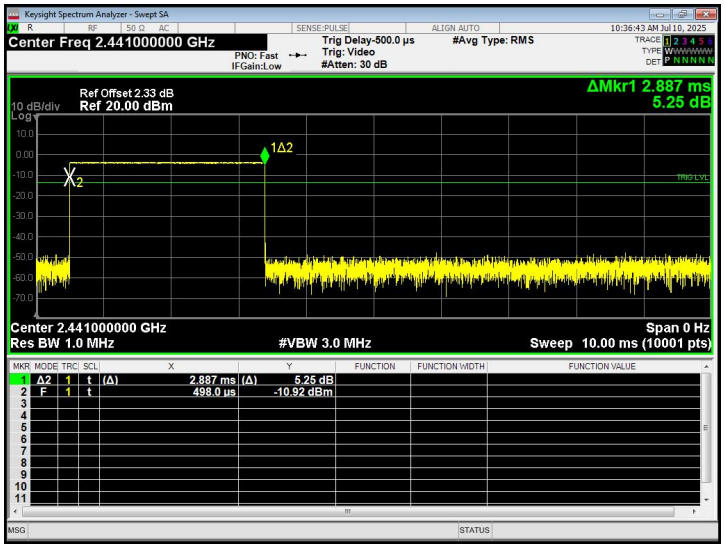
1-DH1 Middle Channel



1-DH3 Middle Channel

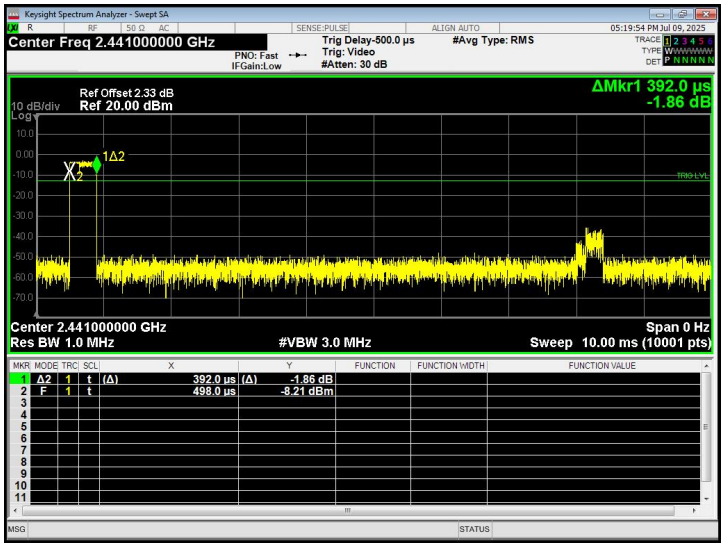


1-DH5 Middle Channel

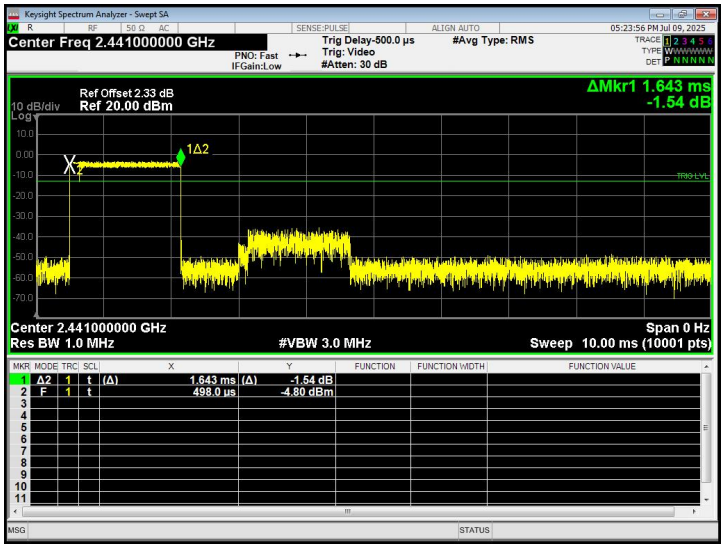


π/4-DQPSK Test Plots

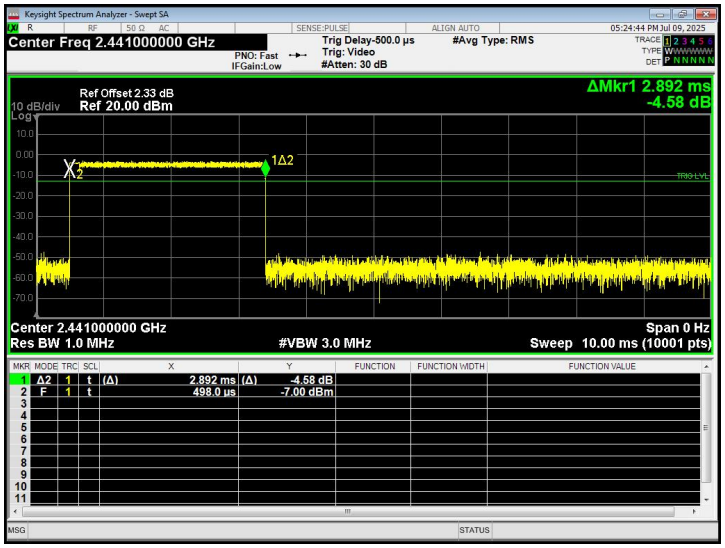
2-DH1 Middle Channel



2-DH3 Middle Channel



2-DH5 Middle Channel



12. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: 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 an 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. 15.247(c) (1)(i) requirement: (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.	
EUT Antenna:	
The antenna is Chip Antenna, the best case gain of the antennas is 1.7dBi, reference to the appendix II for details.	

13. Test Setup Photo

Reference to the appendix I for details.

14. EUT Constructional Details

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※