

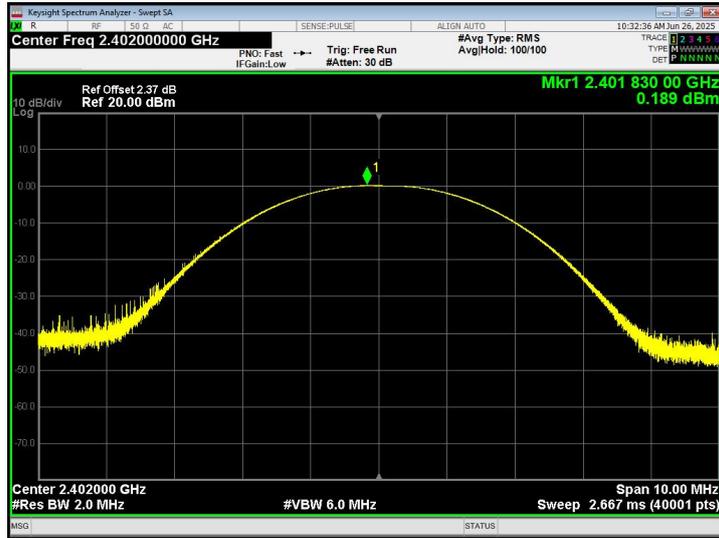


8.5 TEST RESULT

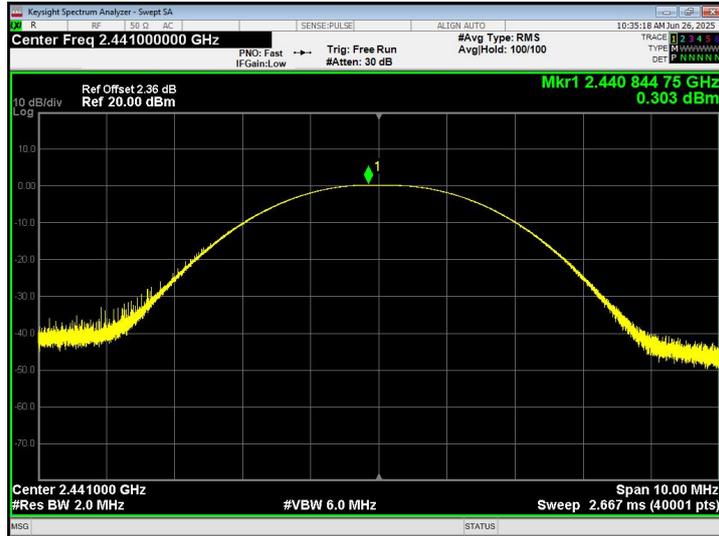
Modulation	Packet	Test Channel	Peak Output Power (dBm)	Limit (dBm)	Result
GFSK	1-DH1	Lowest	0.189	30.00	Pass
		Middle	0.303		
		Highest	-0.269		
$\pi/4$ -DQPSK	2-DH1	Lowest	0.906	21.00	Pass
		Middle	1.016		
		Highest	0.265		
8-DPSK	3-DH1	Lowest	1.422	21.00	Pass
		Middle	1.466		
		Highest	0.789		



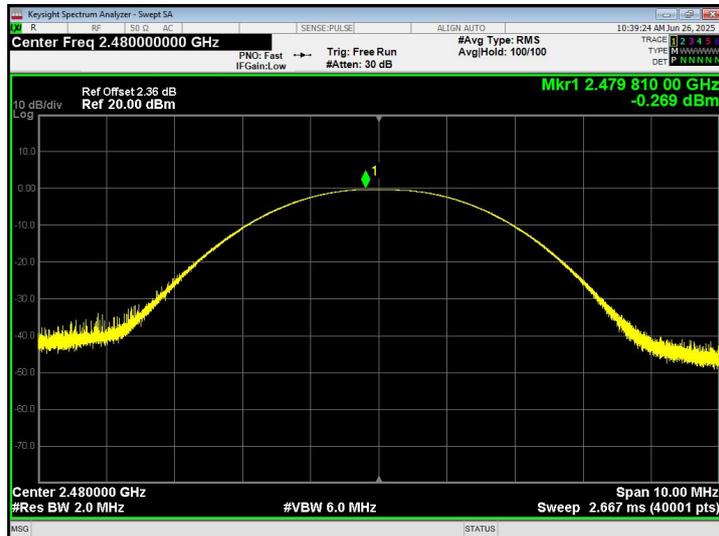
GFSK - 1-DH1 Test plots Low Channel



Middle Channel

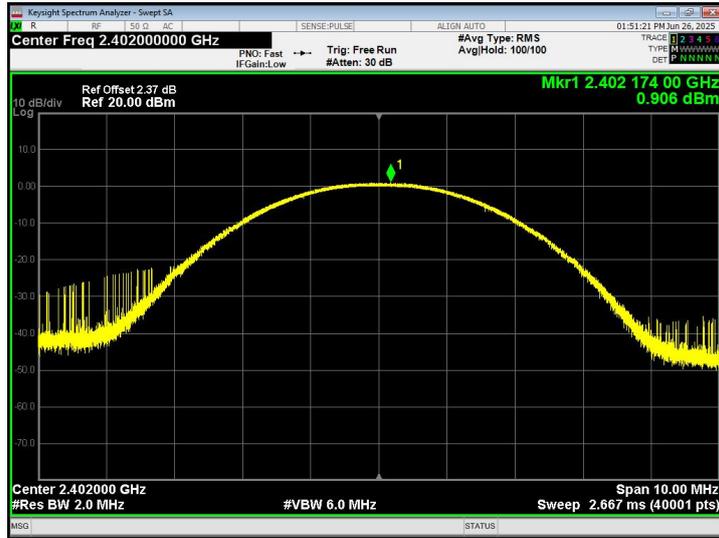


High Channel

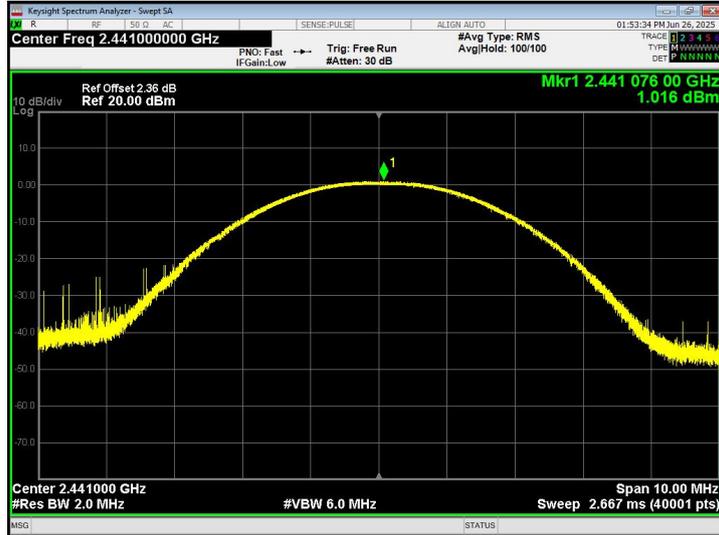




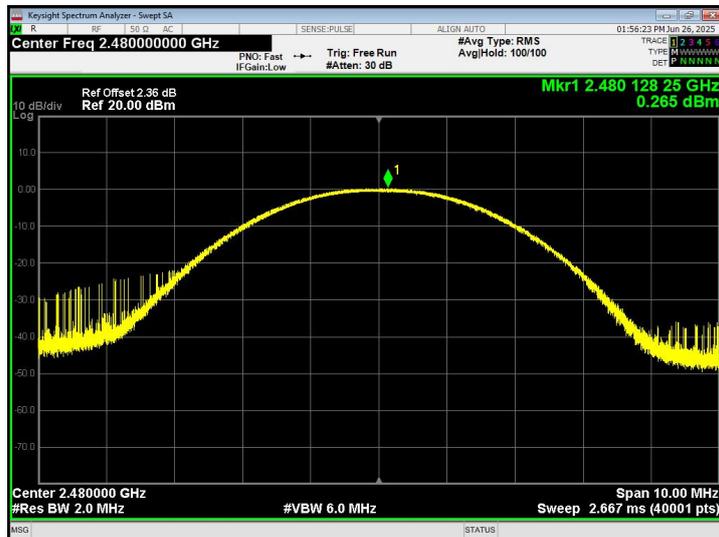
$\pi/4$ -DQPSK - 2-DH1 Test plots Low Channel



Middle Channel



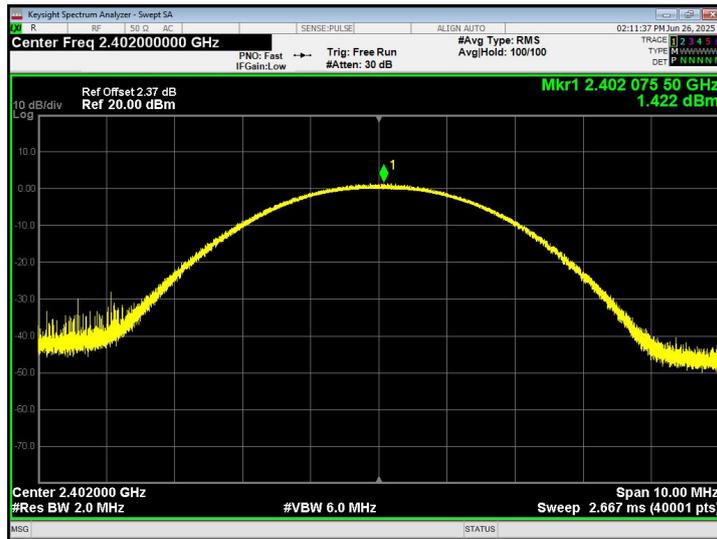
High Channel



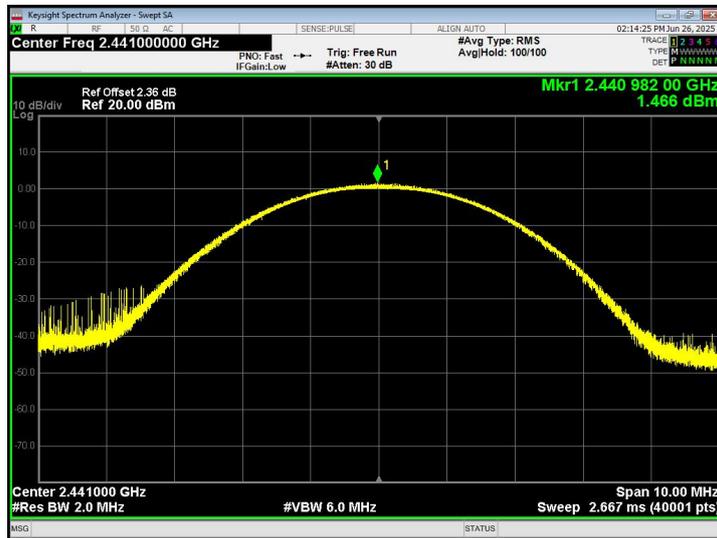


8-DPSK - 3-DH1 Test plots

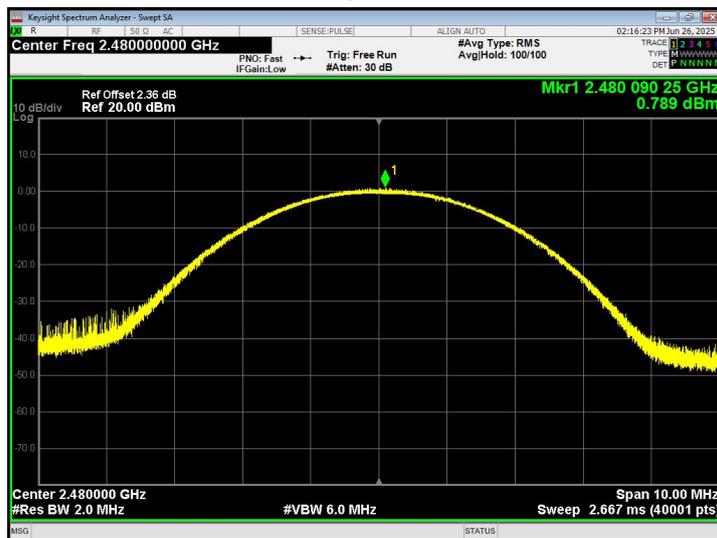
Low Channel



Middle Channel



High Channel

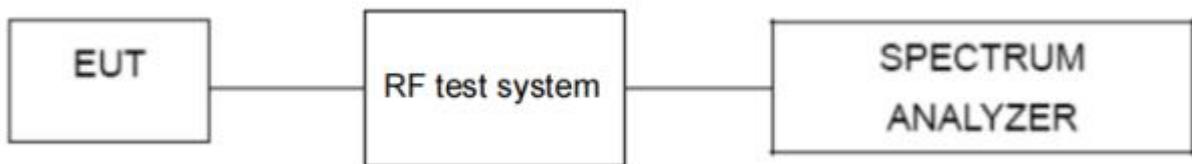




9. HOPPING CHANNEL SEPARATION

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 $\pi/4$ -DQPSK & 8DSK: 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	1.005	0.877	PASS
		Middle	1.008	0.874	PASS
		High	1.005	0.876	PASS
$\pi/4$ -DQPSK	2-DH1	Low	1.155	0.835	PASS
		Middle	1.146	0.835	PASS
		High	1.002	0.831	PASS
8-DPSK	3-DH1	Low	1.008	0.833	PASS
		Middle	1.005	0.814	PASS
		High	1.005	0.827	PASS



GFSK - 1-DH1 Test plots

Low Channel



Middle Channel



High Channel

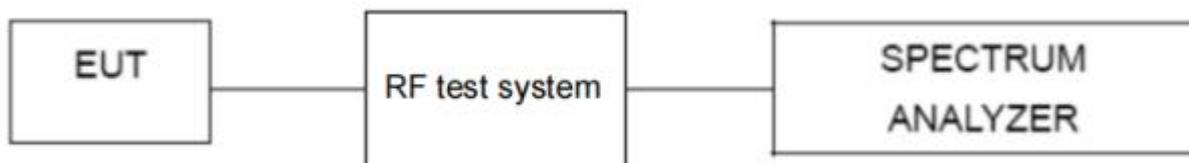




10. NUMBER OF HOPPING FREQUENCY

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:	$P_{\max\text{-pk}} \leq 1\text{W}$, $N_{\text{ch}} \geq 75$ Channels $P_{\max\text{-pk}} \leq 0.125\text{W}$, $N_{\text{ch}} \geq 15$ 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

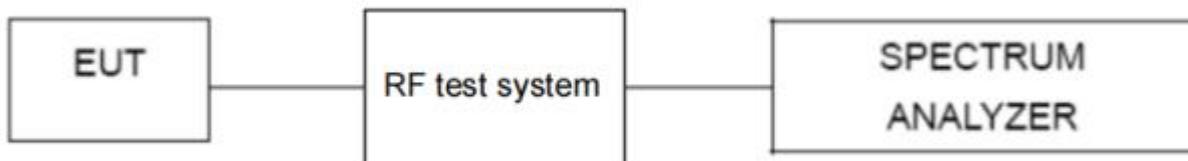
No deviation.



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	0.383	122.560	400	Pass
2441MHz	1-DH3	1.639	262.240	400	Pass
2441MHz	1-DH5	2.887	307.947	400	Pass

Remarks:

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

Test channel: as blow

CH:2441MHz time slot= $0.383(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 122.560(\text{ms})$

CH:2441MHz time slot= $1.639(\text{ms}) \times (1600 / (4 \times 79)) \times 31.6 = 262.240(\text{ms})$

CH:2441MHz time slot= $2.887(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 307.947(\text{ms})$

$\pi/4$ -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	1.644	263.04	400	Pass
2441MHz	2-DH5	2.892	308.48	400	Pass

Remarks:

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

Test channel: as blow

CH:2441MHz time slot= $0.392(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 125.44(\text{ms})$

CH:2441MHz time slot= $1.644(\text{ms}) \times (1600 / (4 \times 79)) \times 31.6 = 263.04(\text{ms})$

CH:2441MHz time slot= $2.892(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 308.48(\text{ms})$

8-DPSK mode:

Frequency	Packet	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Result
2441MHz	3-DH1	0.392	125.440	400	Pass
2441MHz	3-DH3	1.642	262.720	400	Pass
2441MHz	3-DH5	2.893	308.587	400	Pass

Remarks:

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

Test channel: as blow

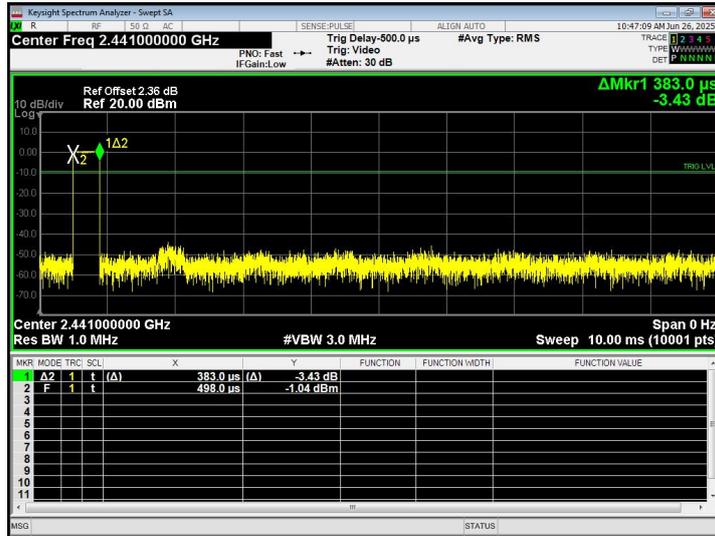
CH:2441MHz time slot= $0.392(\text{ms}) \times (1600 / (2 \times 79)) \times 31.6 = 125.440\text{ms}$

CH:2441MHz time slot= $1.642(\text{ms}) \times (1600 / (4 \times 79)) \times 31.6 = 262.720\text{ms}$

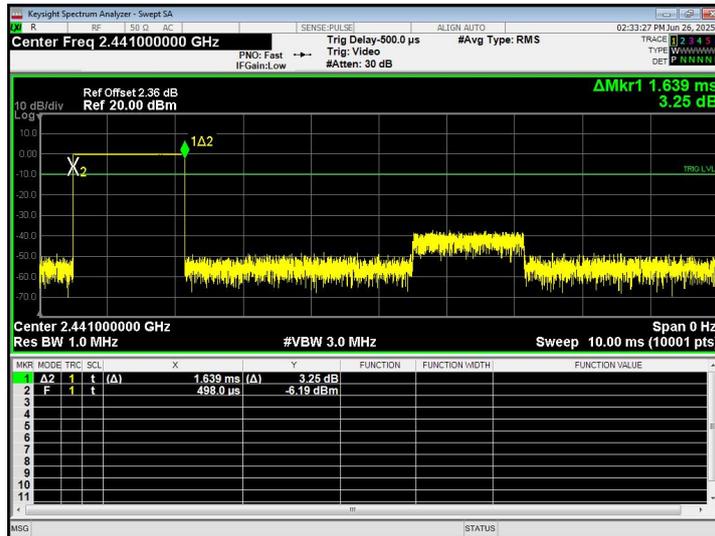
CH:2441MHz time slot= $2.893(\text{ms}) \times (1600 / (6 \times 79)) \times 31.6 = 308.587\text{ms}$



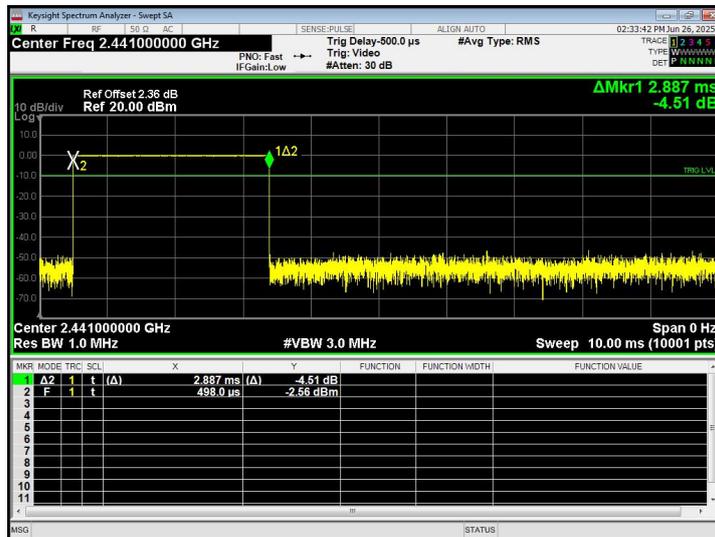
GFSK Test Plots 1-DH1 Middle Channel



1-DH3 Middle Channel

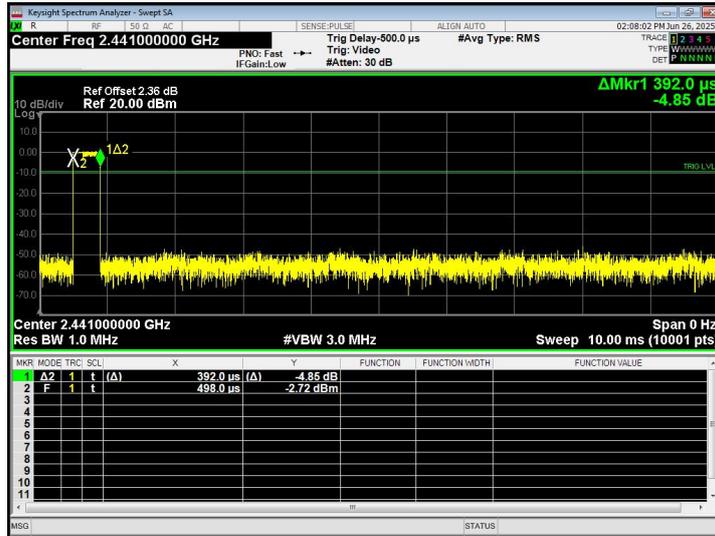


1-DH5 Middle Channel

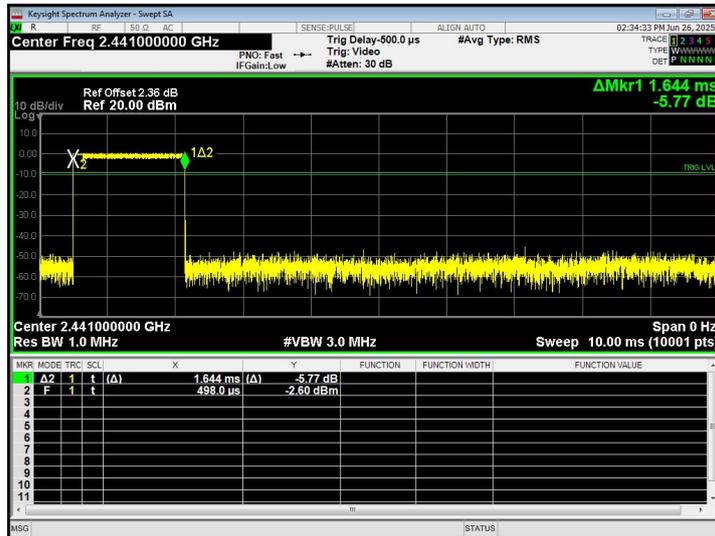




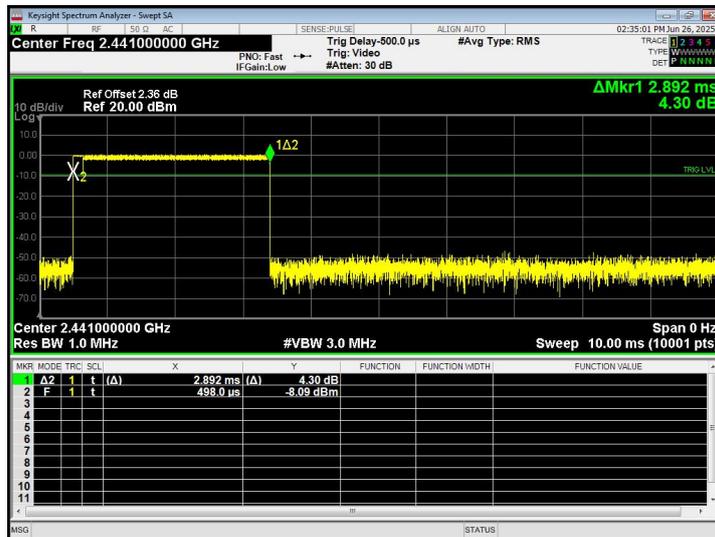
$\pi/4$ -DQPSK Test Plots
2-DH1 Middle Channel



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 PCB Antenna, the best case gain of the antennas is 1.59dBi, 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 *******