Appendix Test Data

Report No.:	18220WC10109301	Test Date:	2021.7.7
Test Engineer:	Tony.He	Auditor:	Edward.Pan
Temperature:	24.3℃	Relative Humidity:	56.3%
Pressure:	1012 hPa		

1. Bandwidth

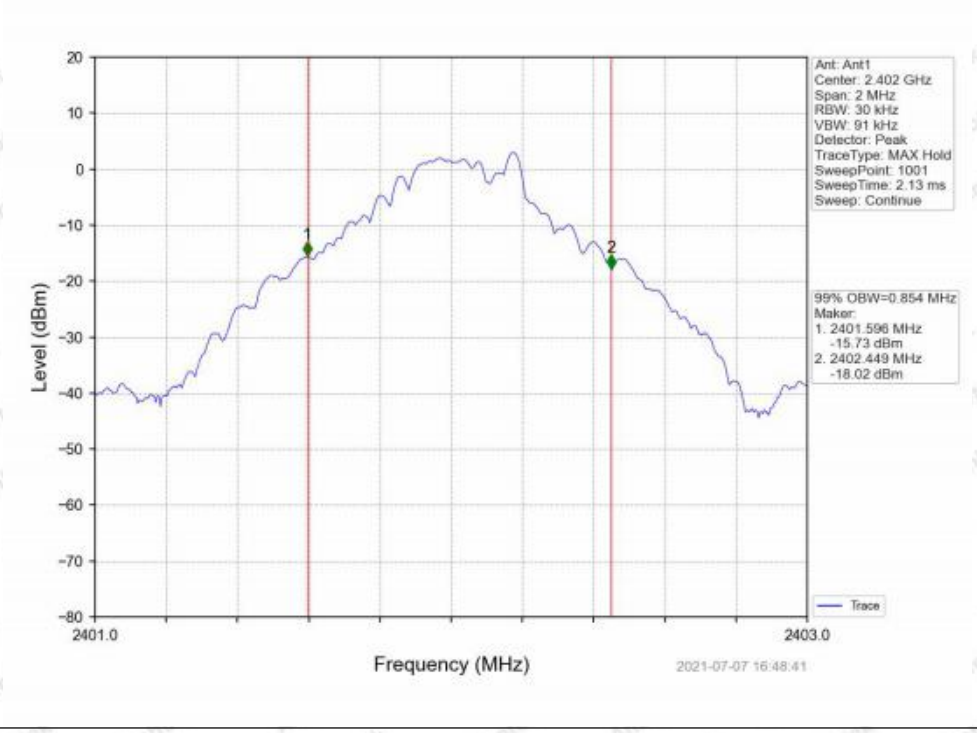
1.1 OBW

1.1.1 Test Result

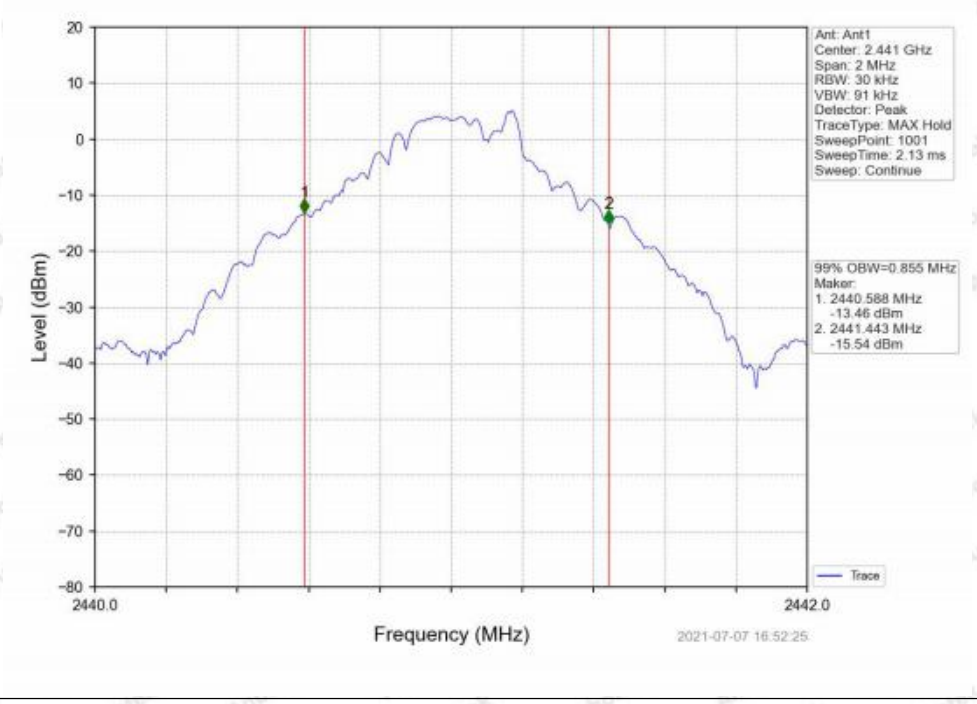
Mode	TX Type	Frequency (MHz)	Packet Type	Ant	99% Occupied Bandwidth (MHz)	Limit	Verdict
GFSK	SISO	2402	DH5	1	0.85	/	Pass
		2441	DH5	1	0.85	/	Pass
		2480	DH5	1	0.85	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.19	/	Pass
		2441	2DH5	1	1.19	/	Pass
		2480	2DH5	1	1.20	/	Pass
8DPSK	SISO	2402	3DH5	1	1.19	/	Pass
		2441	3DH5	1	1.19	/	Pass
		2480	3DH5	1	1.19	/	Pass

1.1.2 Test Graph

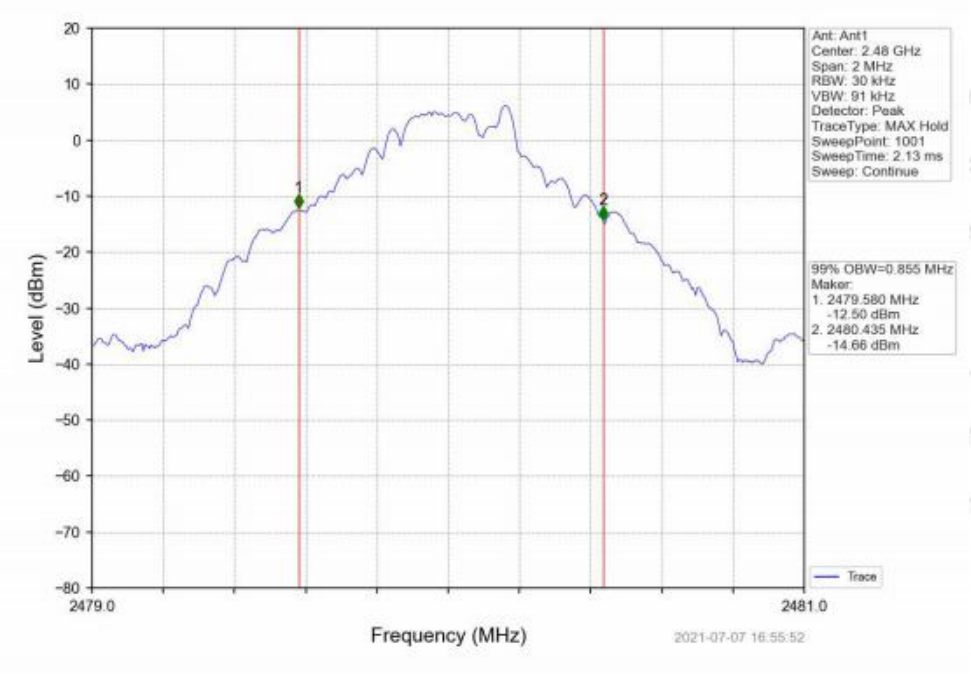
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



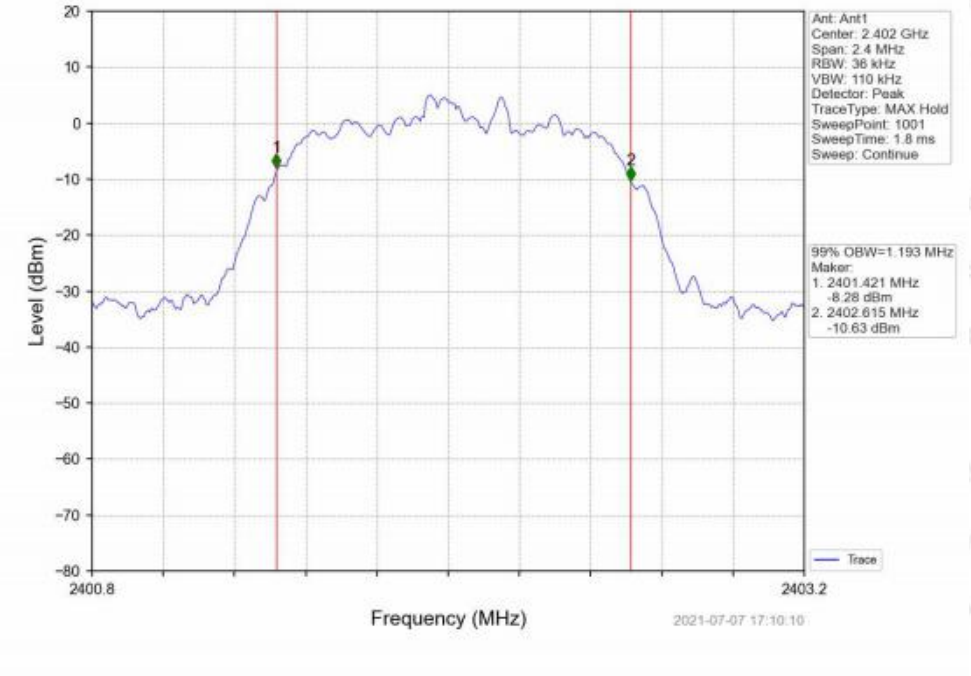
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



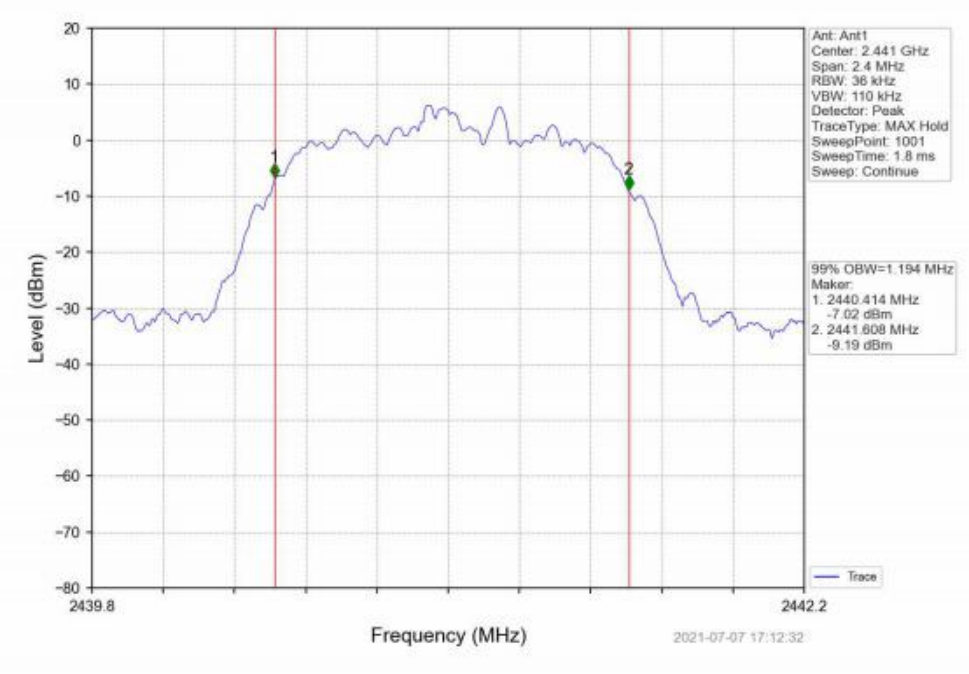
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



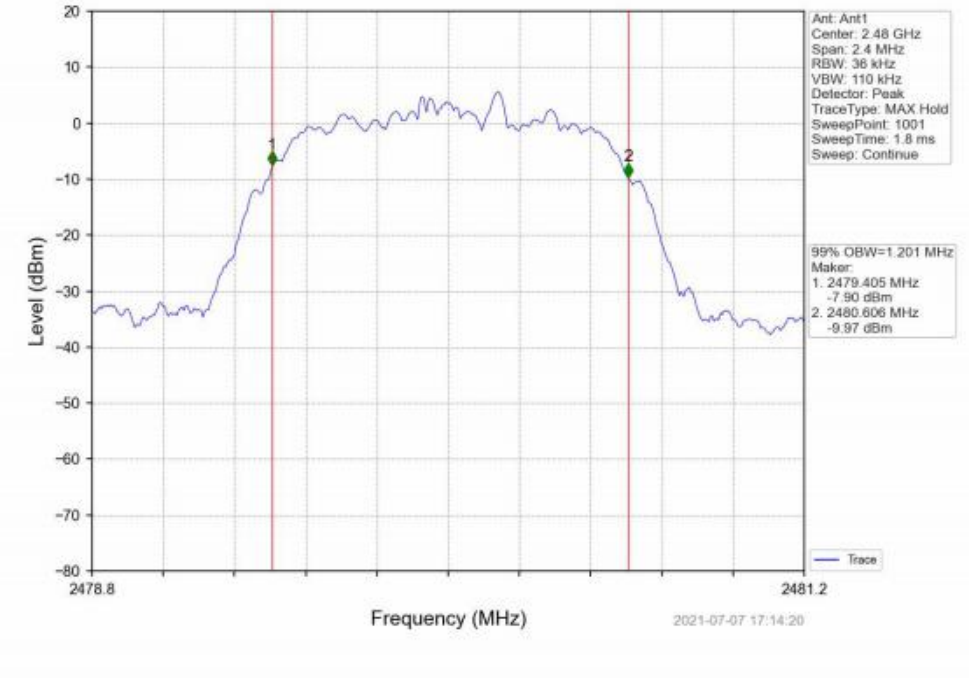
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



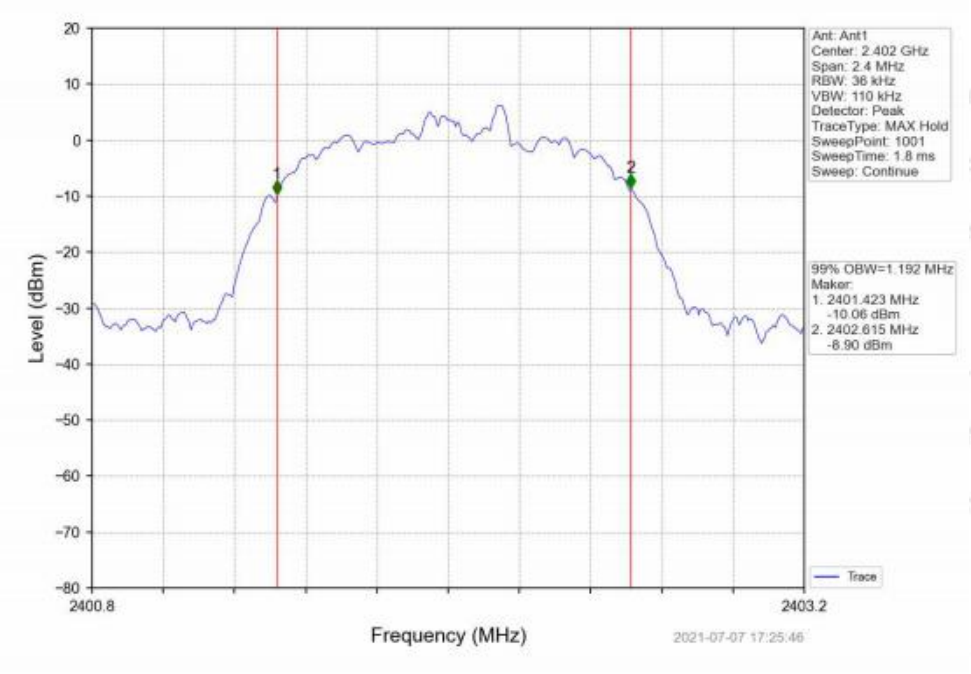
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



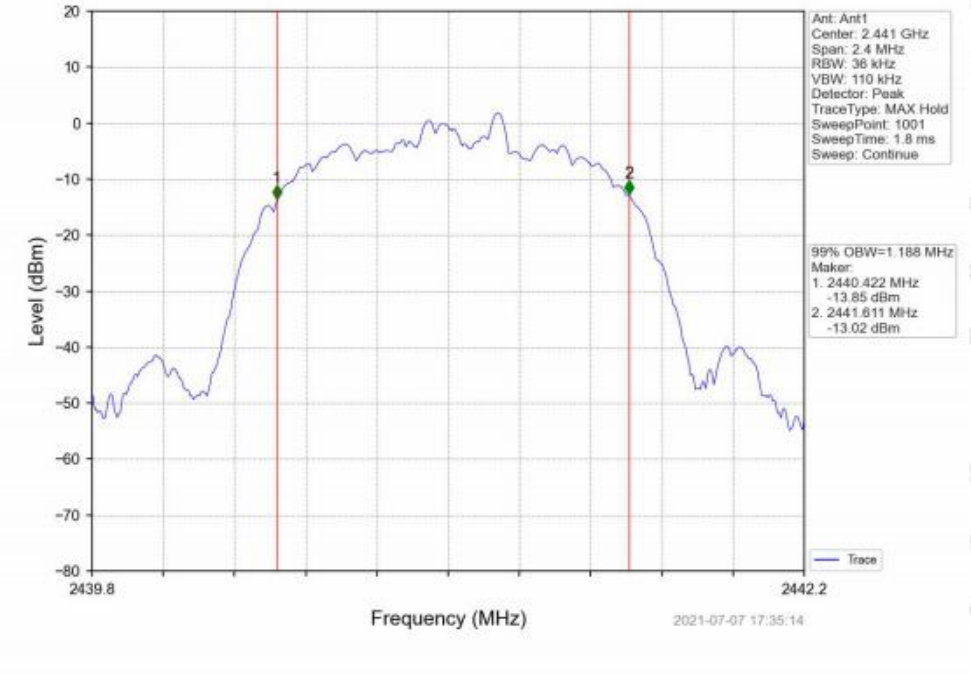
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



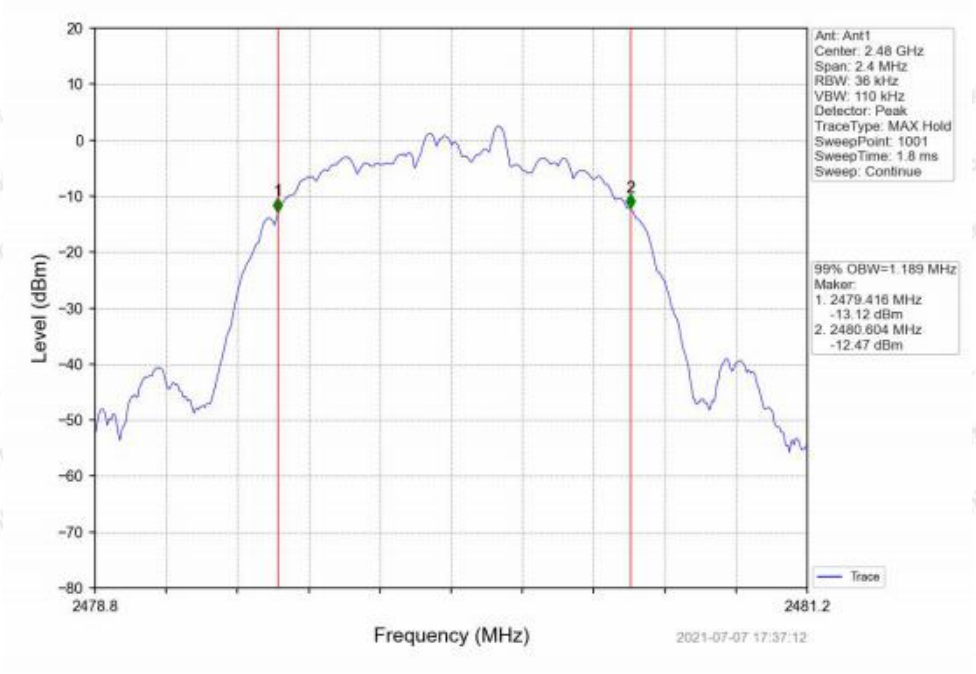
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



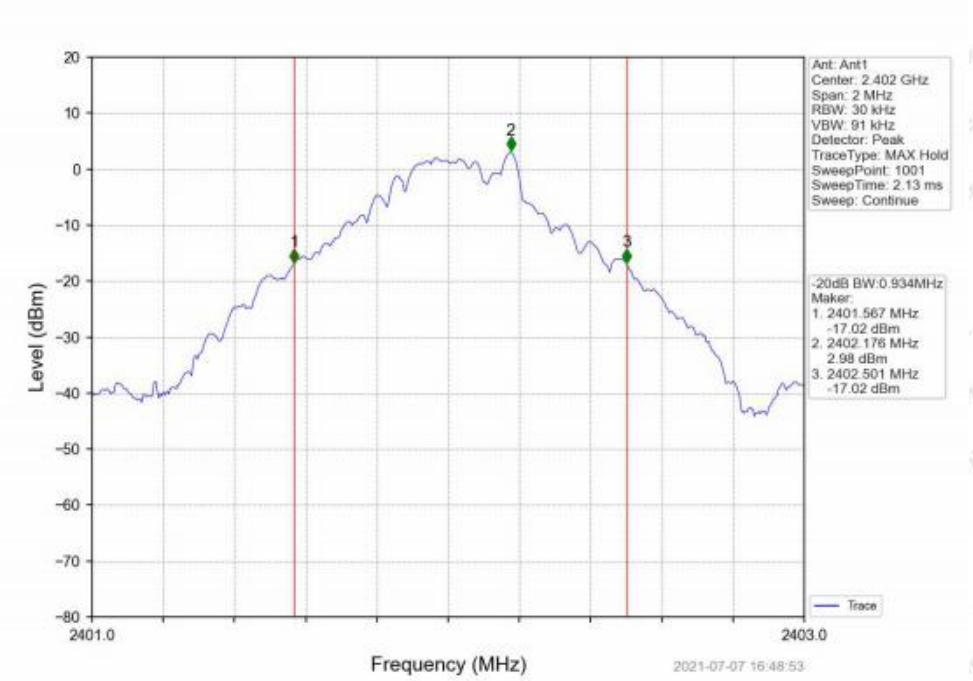
1.2 20dB BW

1.2.1 Test Result

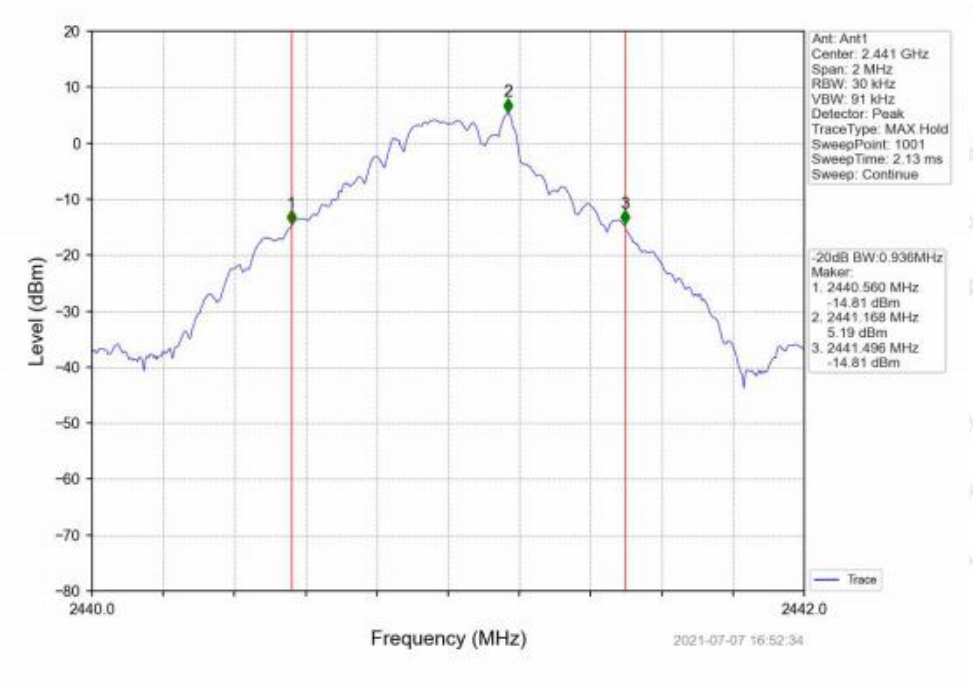
Mode	TX Type	Frequency (MHz)	Packet Type	Ant	20dB Bandwidth (MHz)	Limit	Verdict
GFSK	SISO	2402	DH5	1	0.93	/	Pass
		2441	DH5	1	0.94	/	Pass
		2480	DH5	1	0.93	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.34	/	Pass
		2441	2DH5	1	1.35	/	Pass
		2480	2DH5	1	1.35	/	Pass
8DPSK	SISO	2402	3DH5	1	1.31	/	Pass
		2441	3DH5	1	1.31	/	Pass
		2480	3DH5	1	1.31	/	Pass

1.2.2 Test Graph

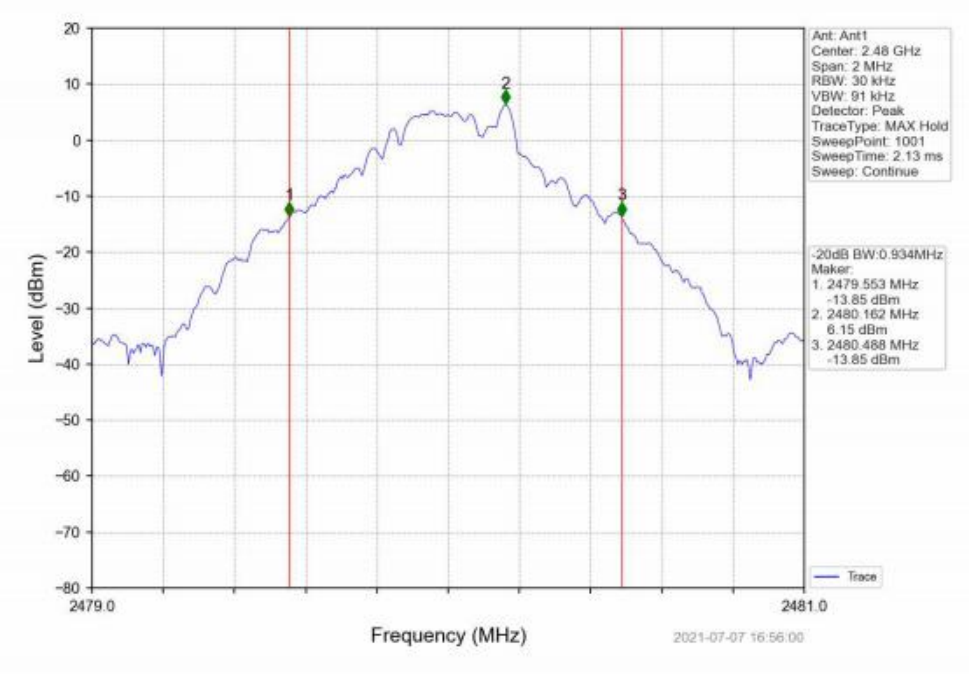
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



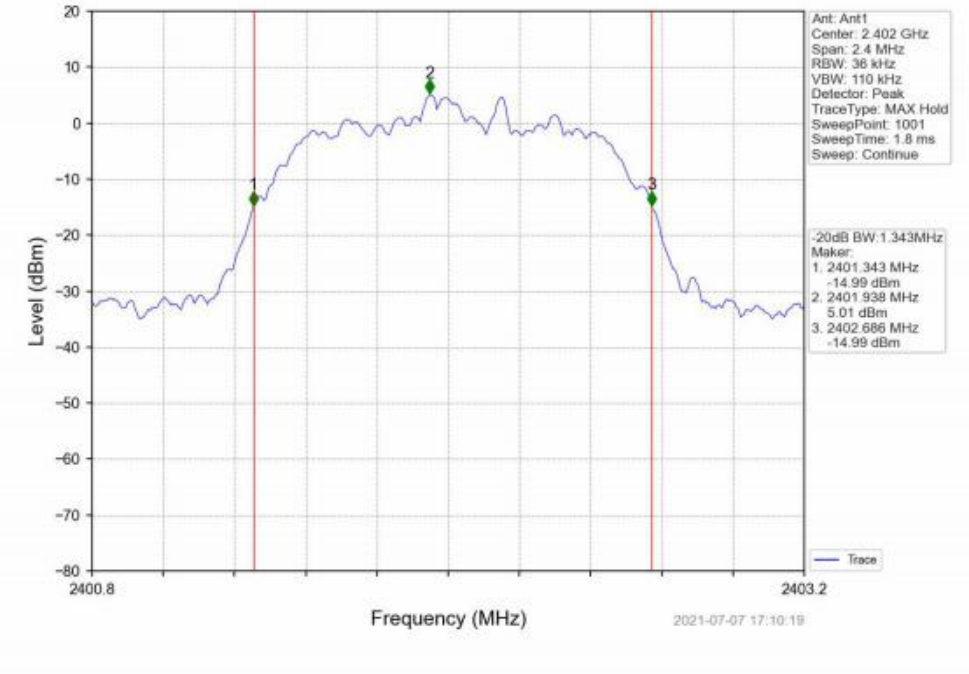
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



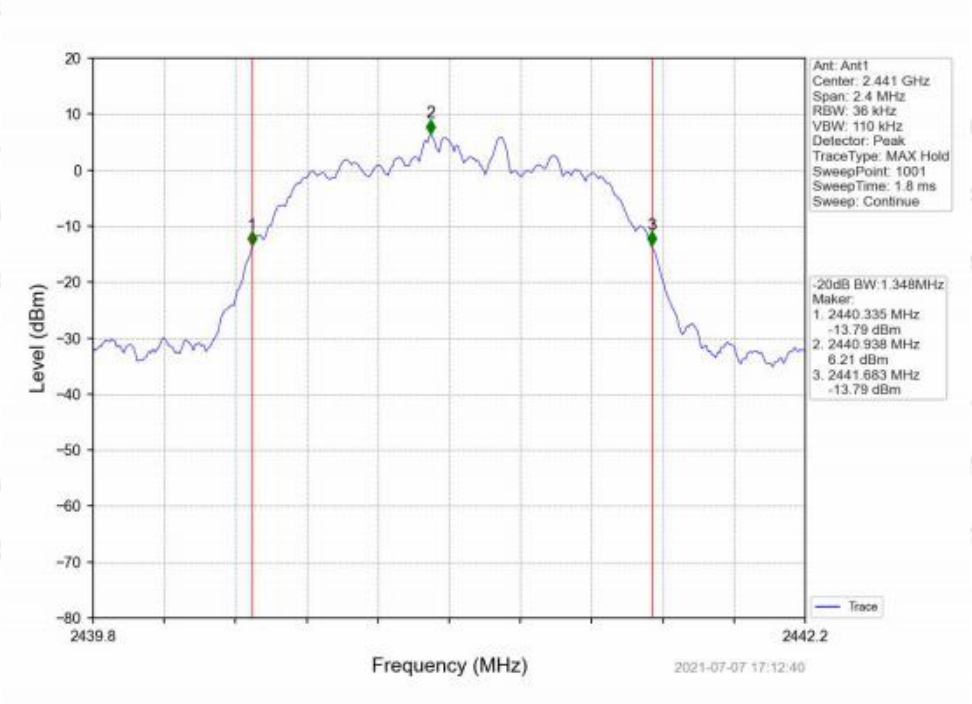
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



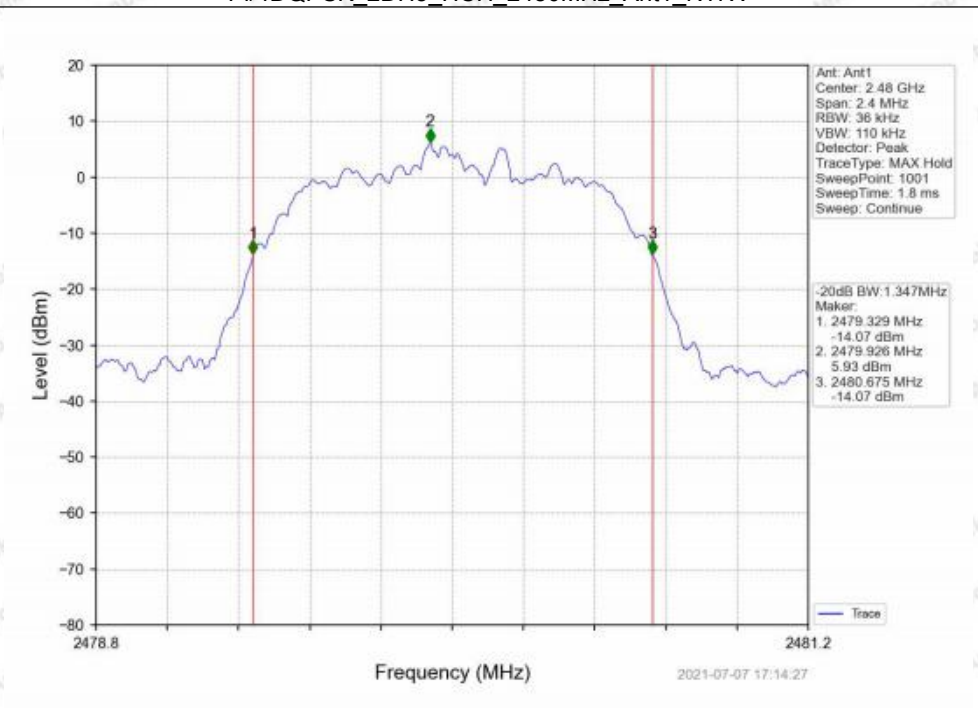
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



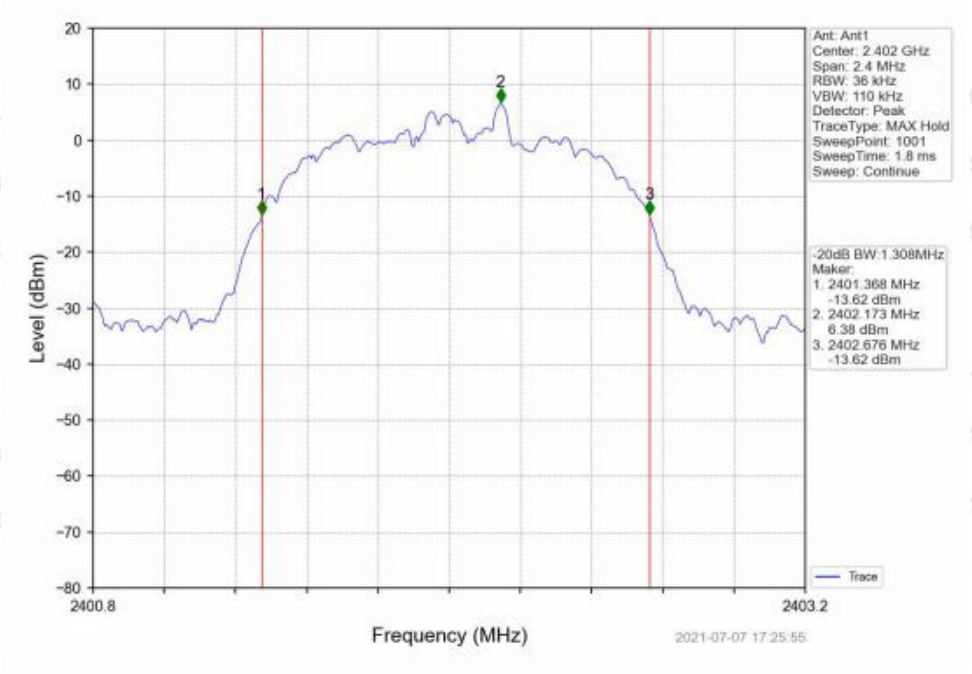
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



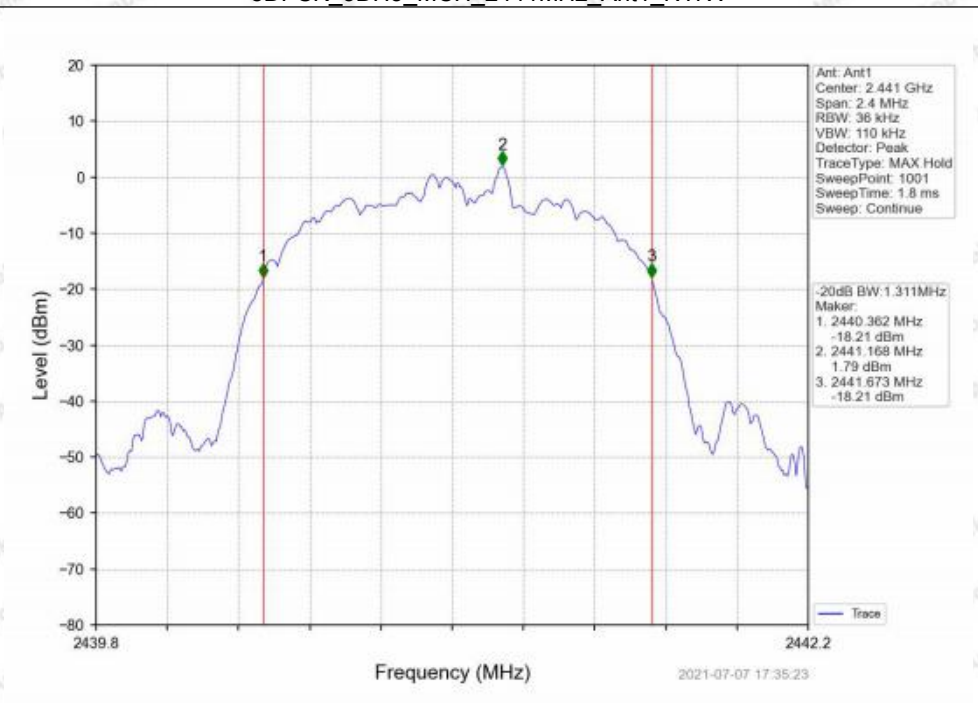
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



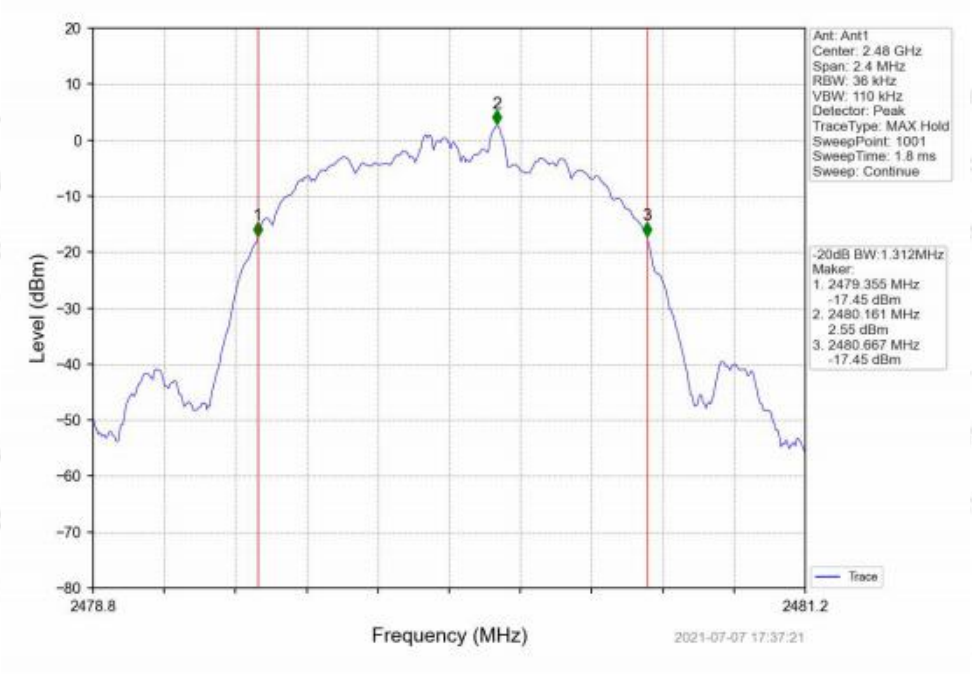
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



2. Maximum Conducted Output Power

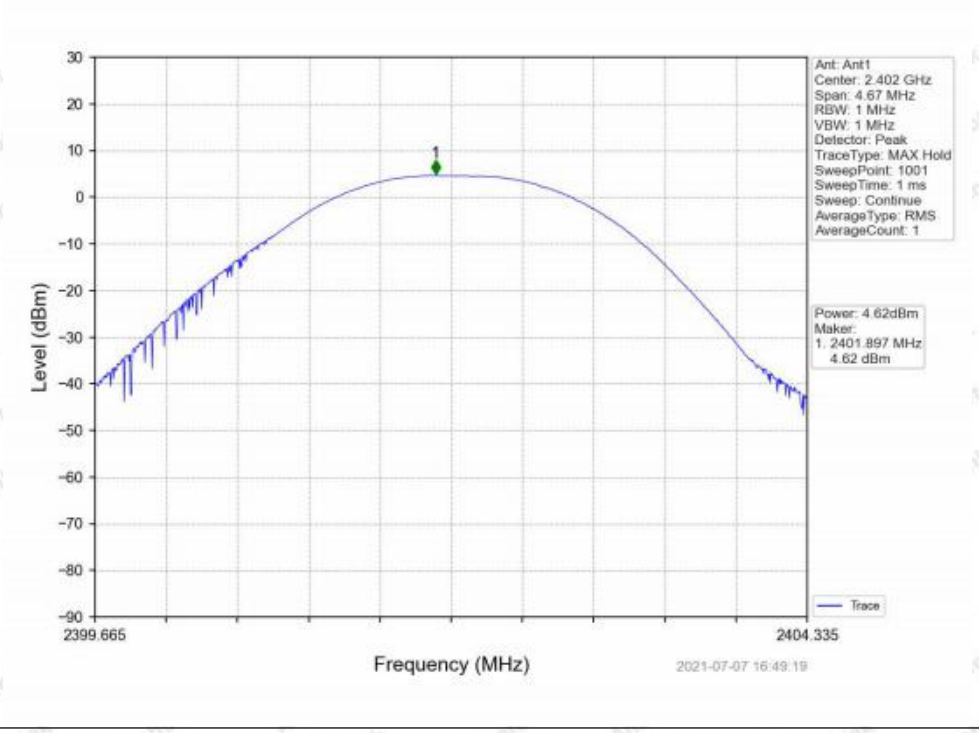
2.1 Power

2.1.1 Test Result

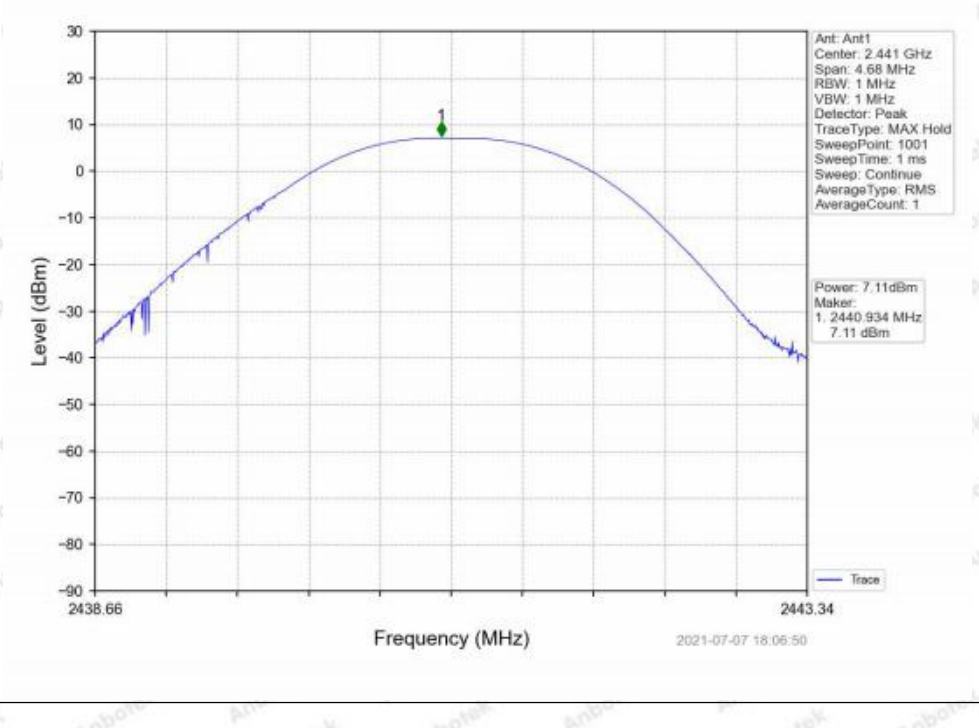
Mode	TX Type	Frequency (MHz)	Packet Type	Measured Peak Output Power (dBm)		Verdict
				Ant1	Limit	
GFSK	SISO	2402	DH5	4.62	<=30	Pass
		2441	DH5	7.11	<=30	Pass
		2480	DH5	7.73	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	4.70	<=20.97	Pass
		2441	2DH5	6.91	<=20.97	Pass
		2480	2DH5	7.62	<=20.97	Pass
8DPSK	SISO	2402	3DH5	5.06	<=20.97	Pass
		2441	3DH5	5.68	<=20.97	Pass
		2480	3DH5	6.20	<=20.97	Pass
Note1: Antenna Gain: Ant1: 1.59dBi;						

2.1.2 Test Graph

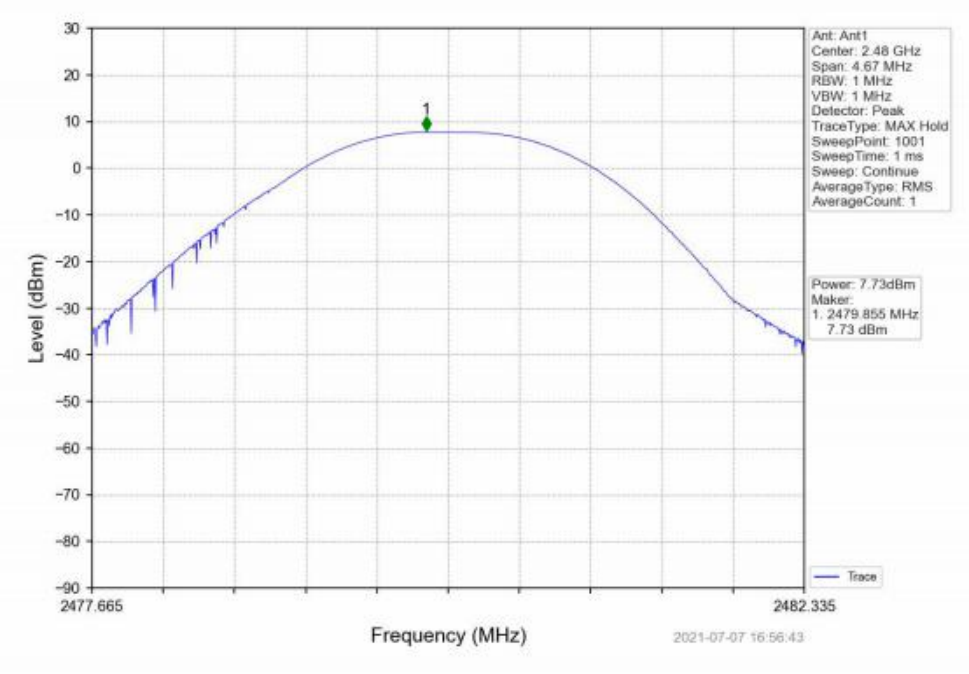
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



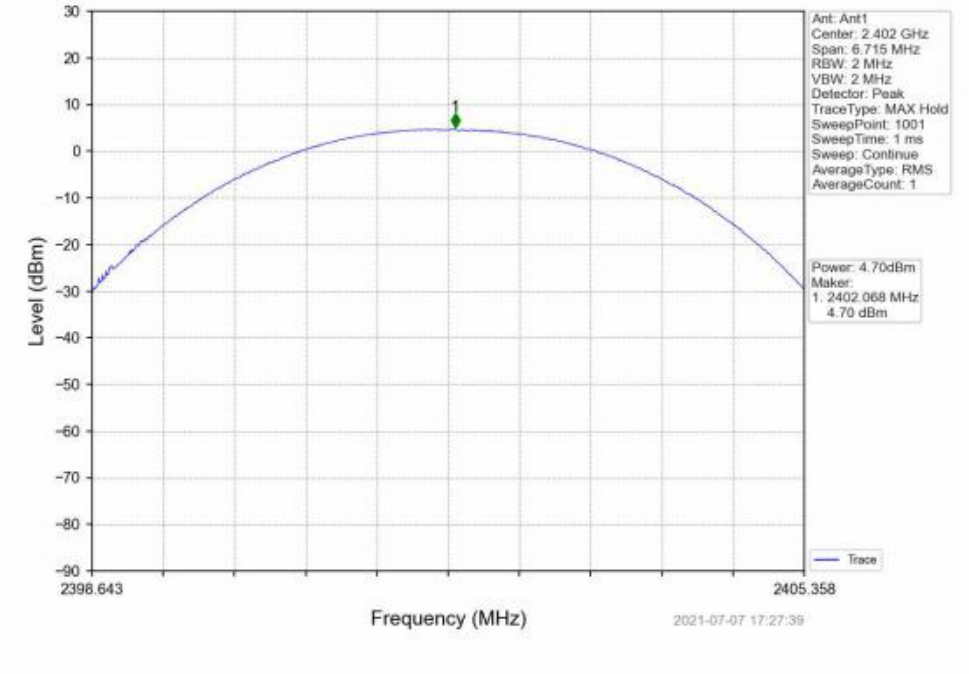
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



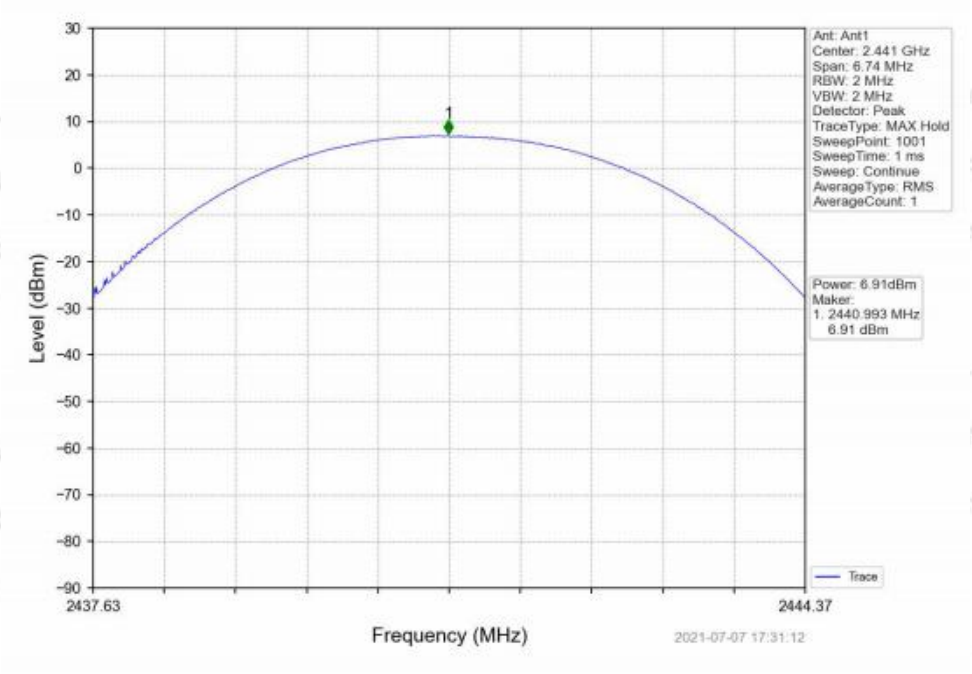
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



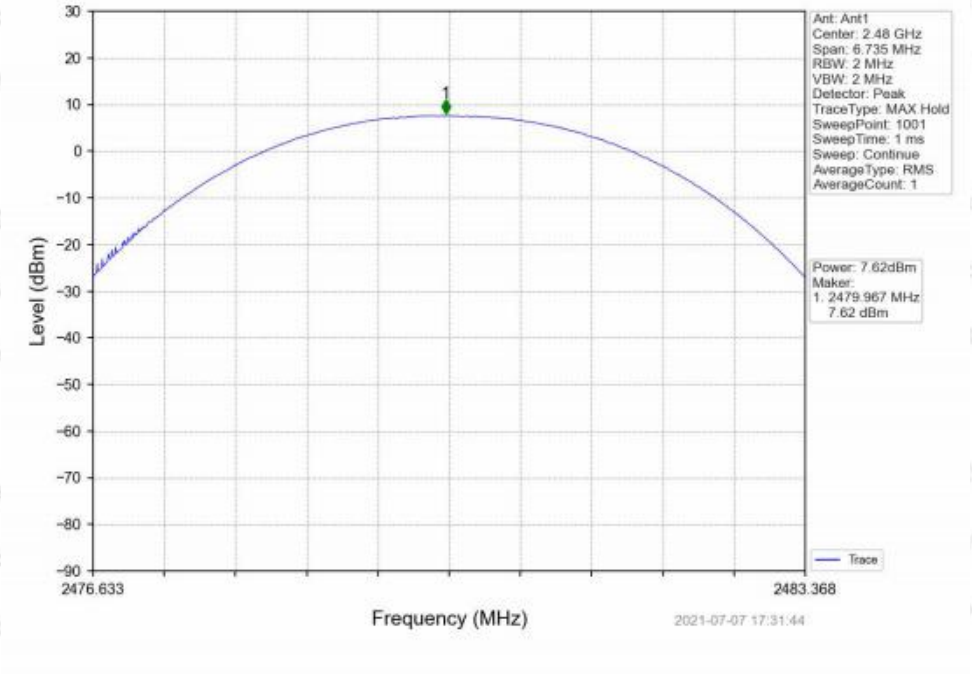
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



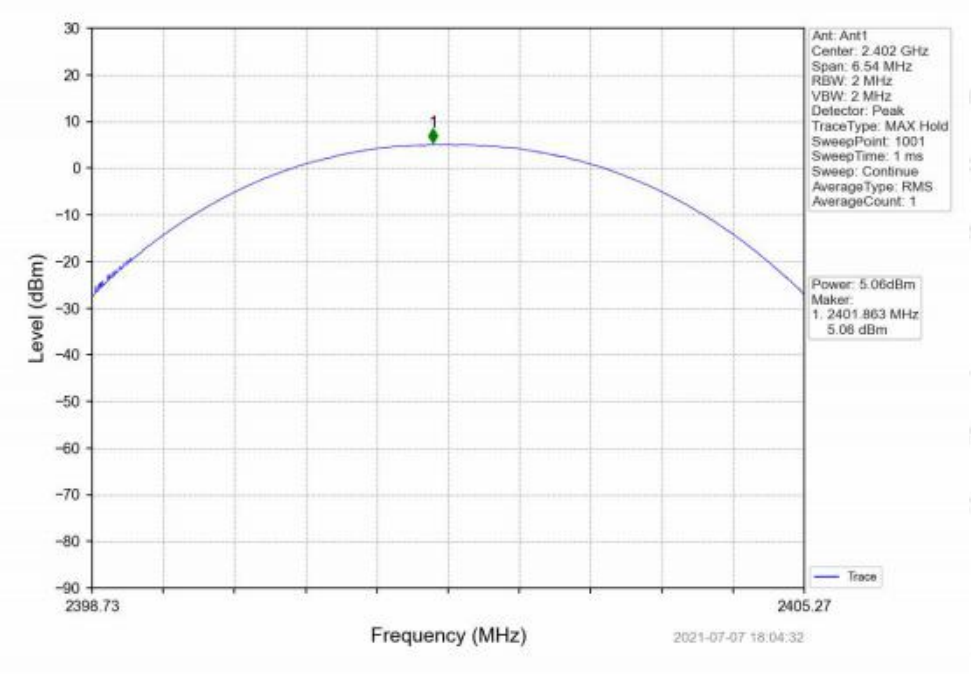
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



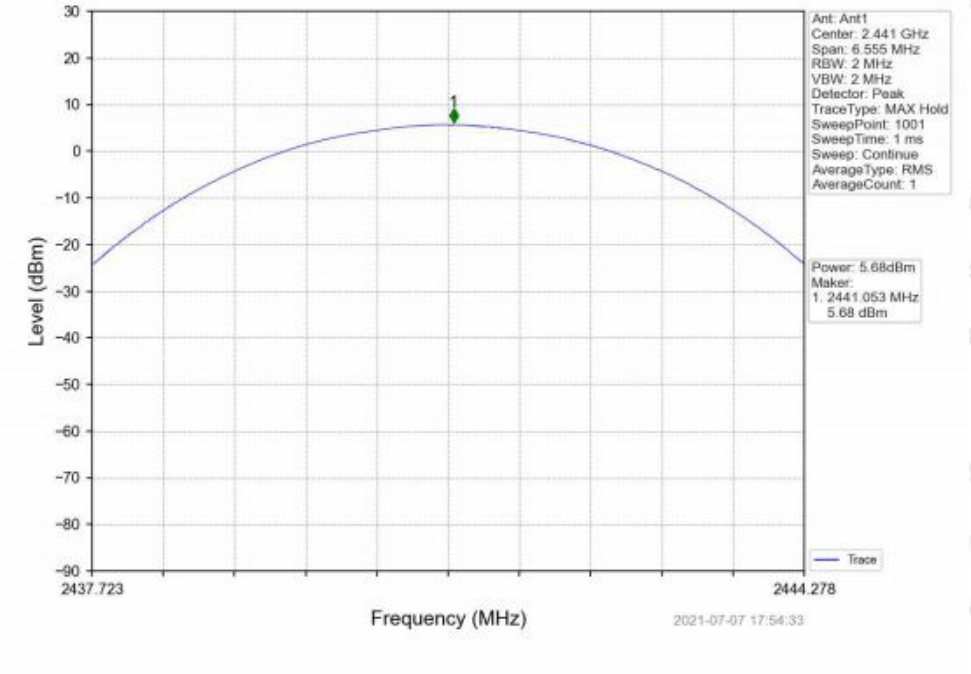
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



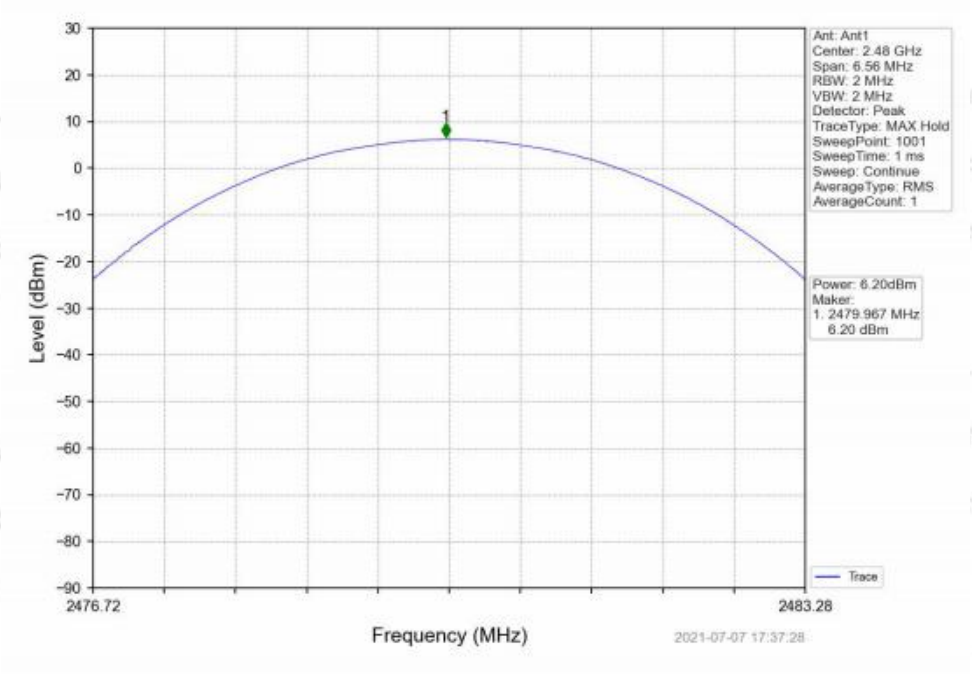
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



3. Unwanted Emissions In Non-restricted Frequency Bands

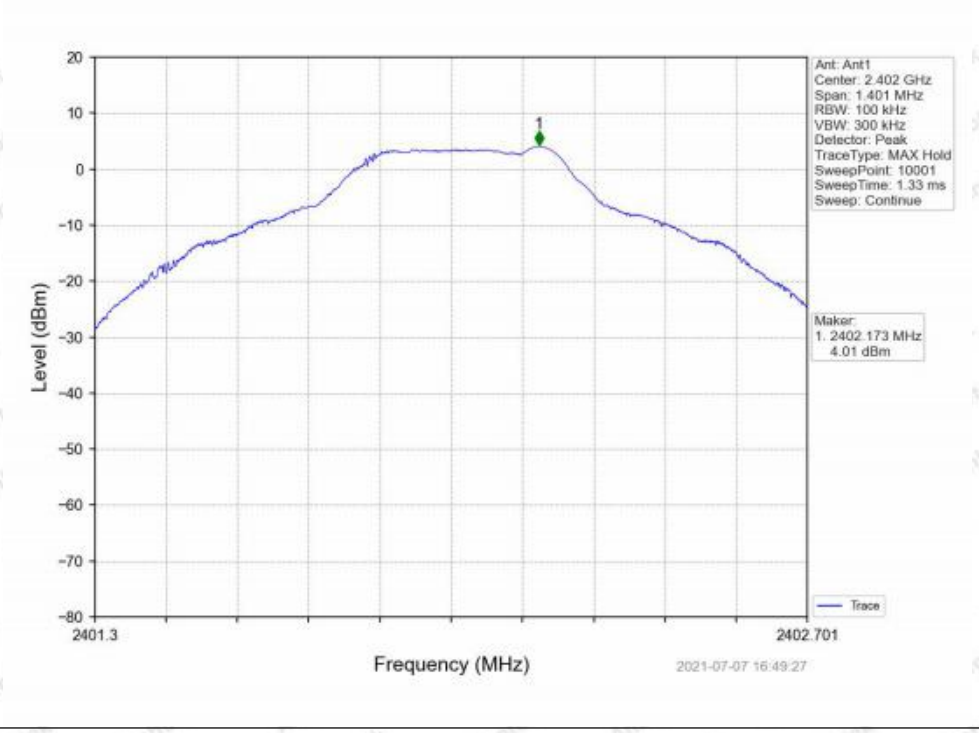
3.1 Ref

3.1.1 Test Result

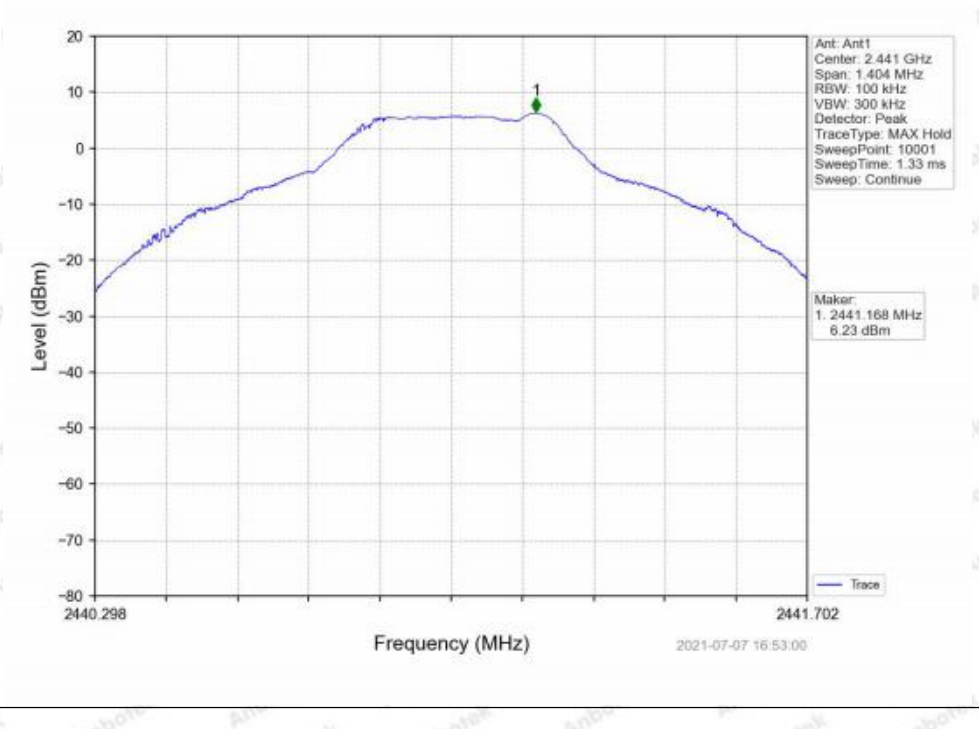
Mode	TX Type	Frequency (MHz)	Packet Type	Ant	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	4.01
		2441	DH5	1	6.23
		2480	DH5	1	7.20
Pi/4DQPSK	SISO	2402	2DH5	1	6.72
		2441	2DH5	1	7.99
		2480	2DH5	1	7.75
8DPSK	SISO	2402	3DH5	1	6.90
		2441	3DH5	1	2.31
		2480	3DH5	1	3.03
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.					

3.1.2 Test Graph

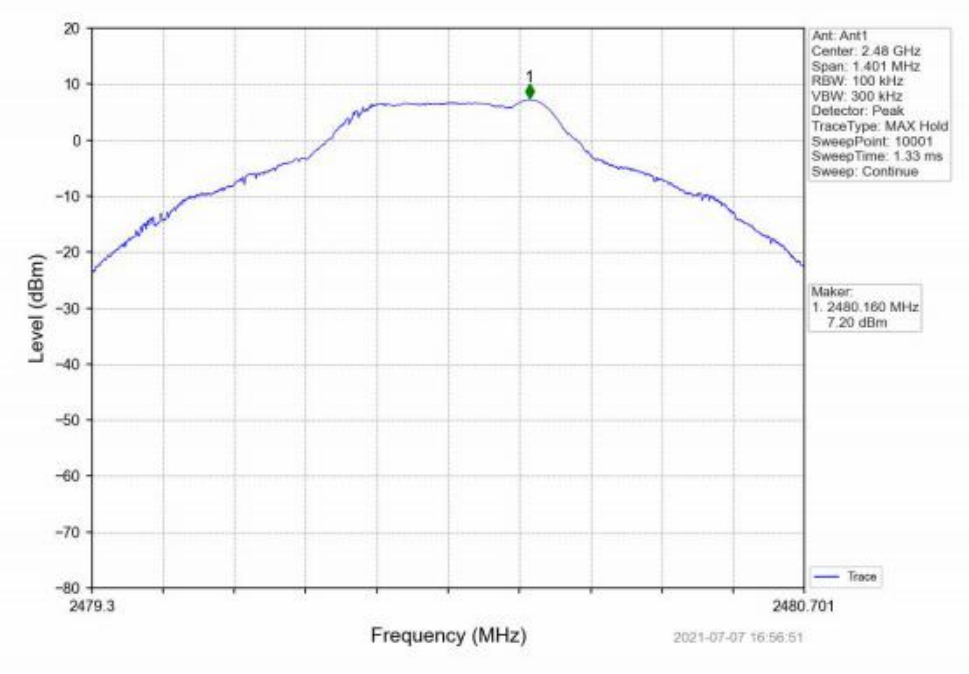
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



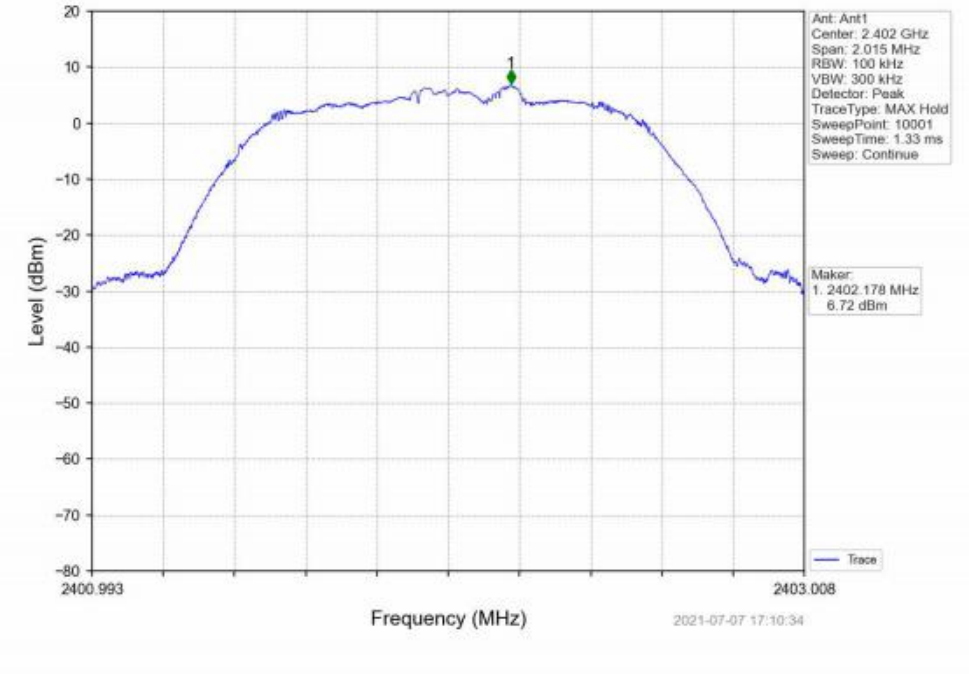
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



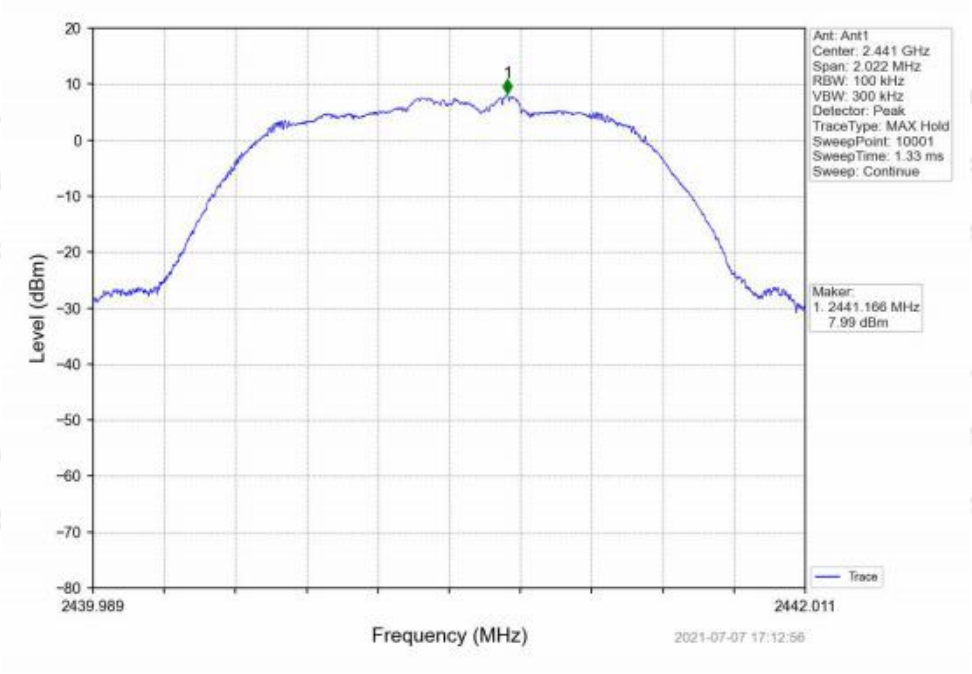
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



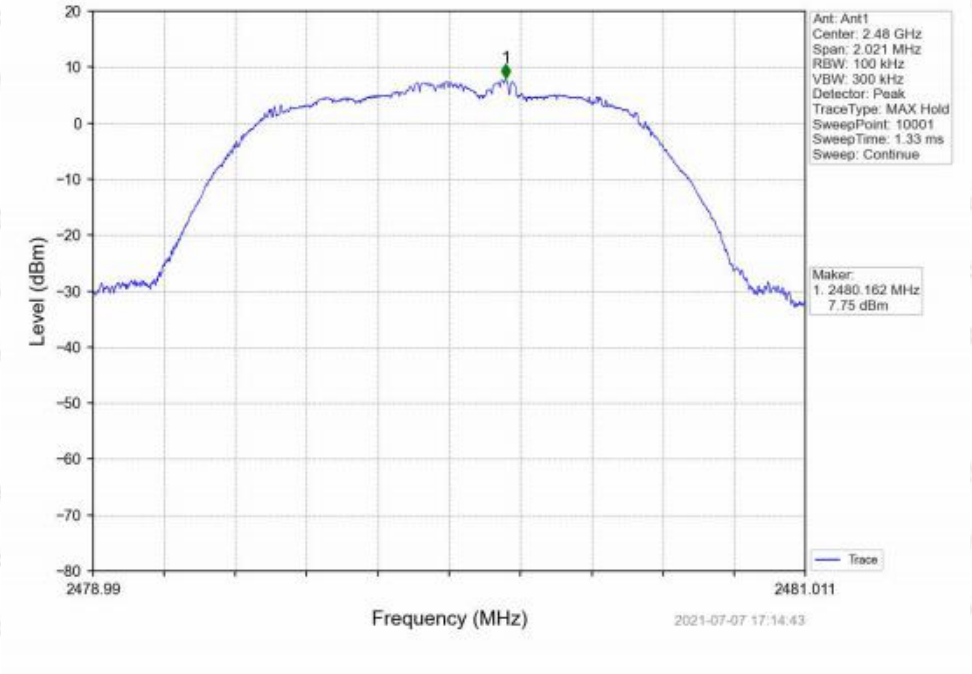
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



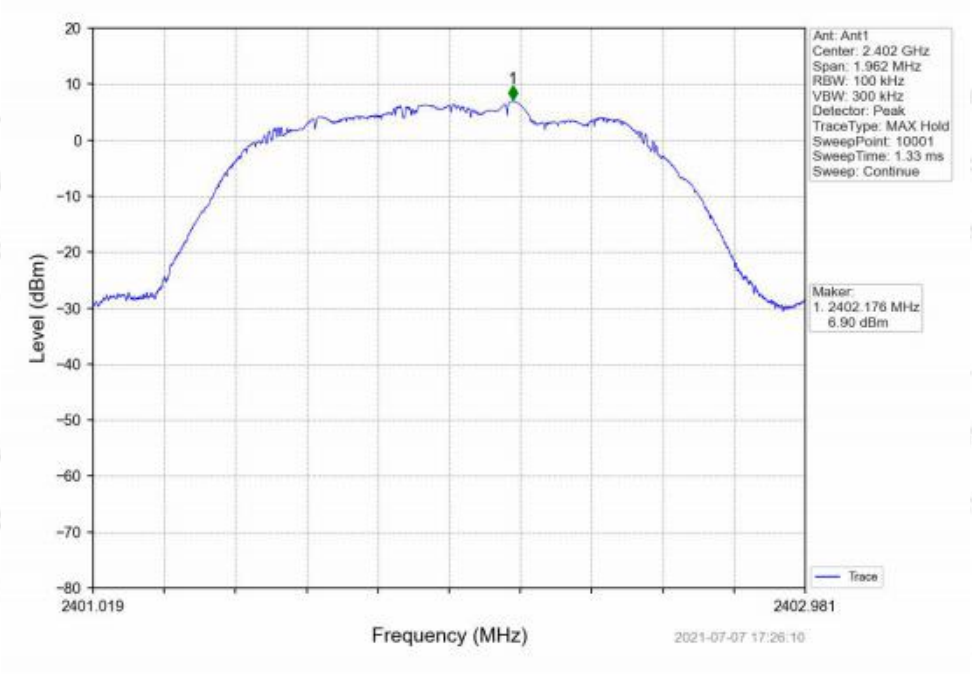
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



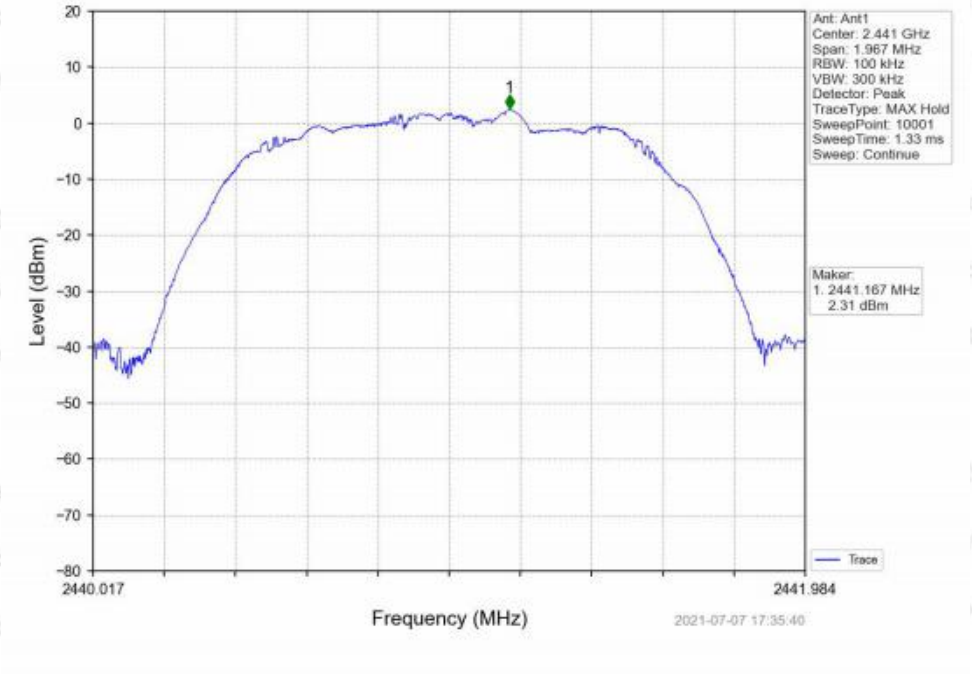
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



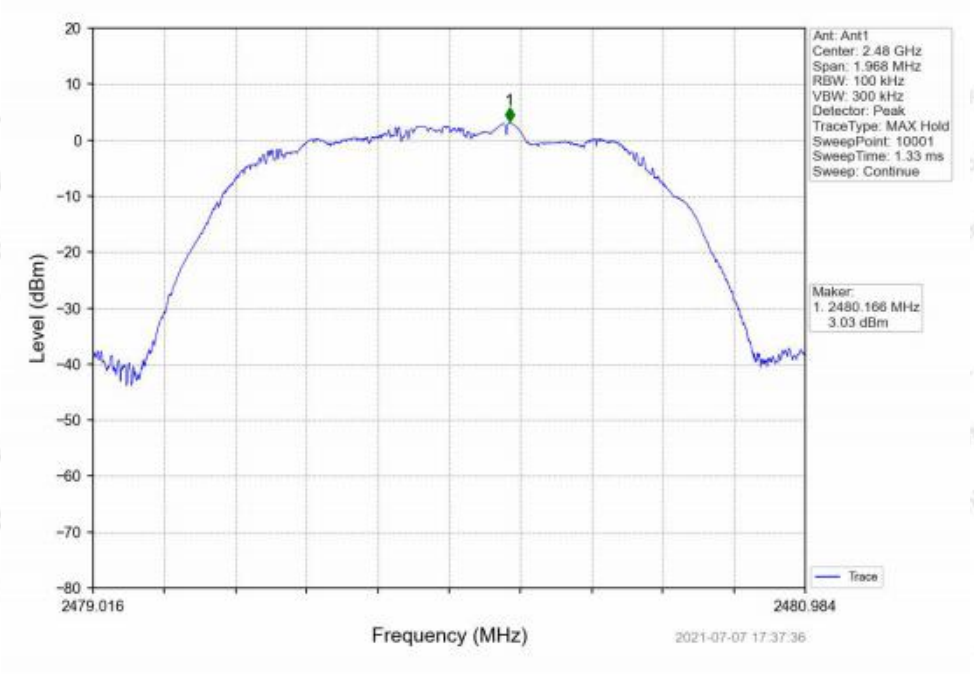
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



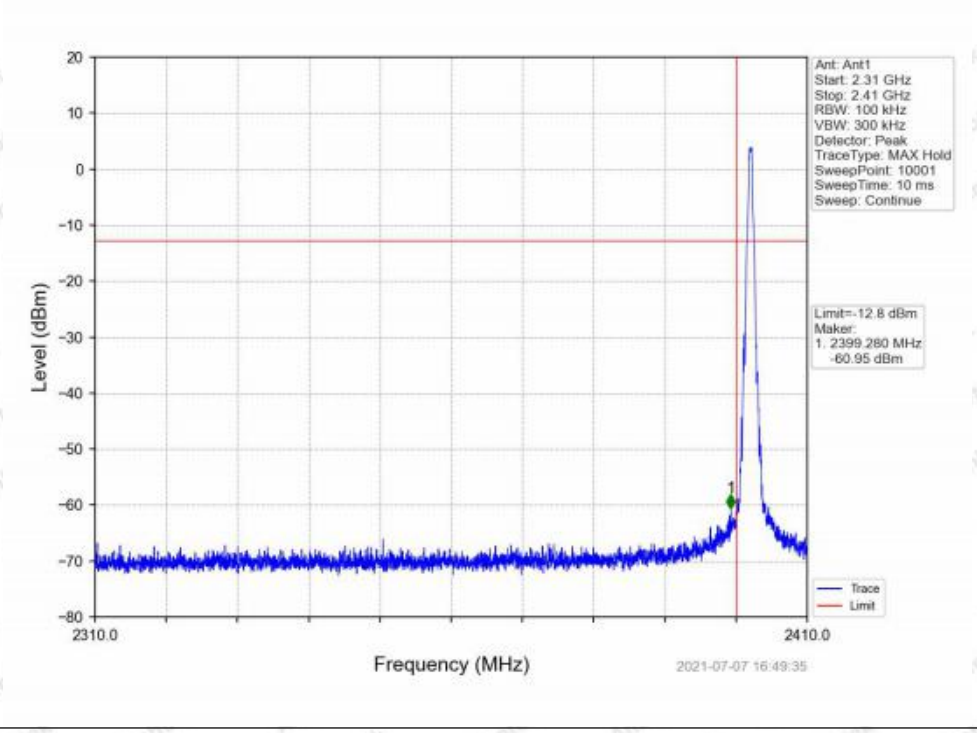
4.2 CSE

4.2.1 Test Result

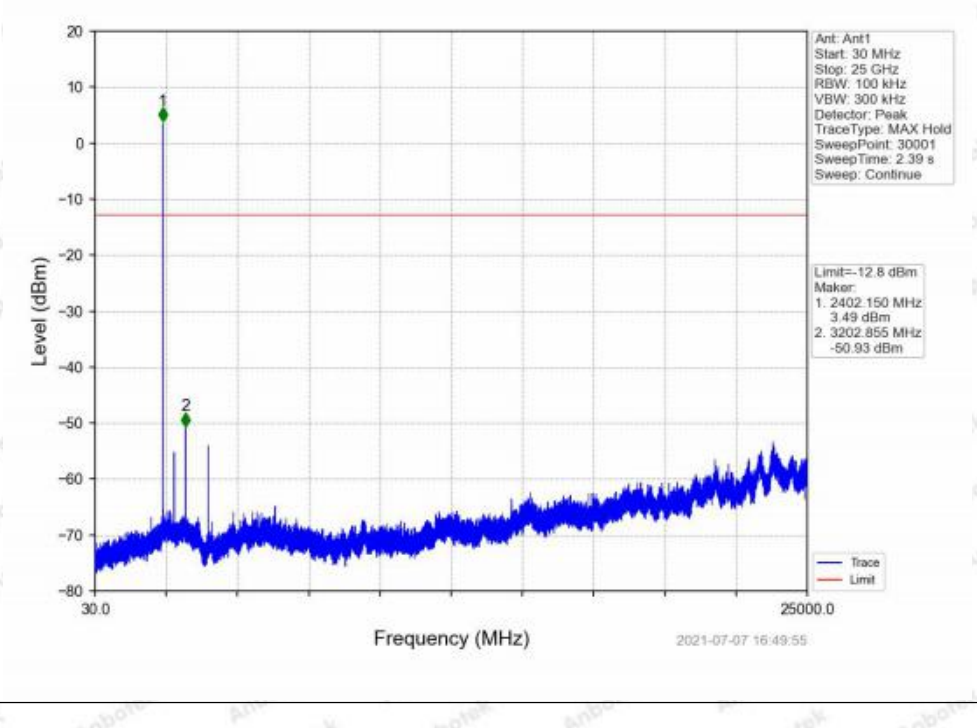
Mode	TX Type	Frequency (MHz)	Packet Type	Ant	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	7.20	-12.80	Pass
		2441	DH5	1	7.20	-12.80	Pass
		2480	DH5	1	7.20	-12.80	Pass
		HOPP	DH5	1	7.20	-12.80	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	7.99	-12.01	Pass
		2441	2DH5	1	7.99	-12.01	Pass
		2480	2DH5	1	7.99	-12.01	Pass
		HOPP	2DH5	1	7.99	-12.01	Pass
8DPSK	SISO	2402	3DH5	1	6.90	-13.10	Pass
		2441	3DH5	1	6.90	-13.10	Pass
		2480	3DH5	1	6.90	-13.10	Pass
		HOPP	3DH5	1	6.90	-13.10	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.							

4.2.2 Test Graph

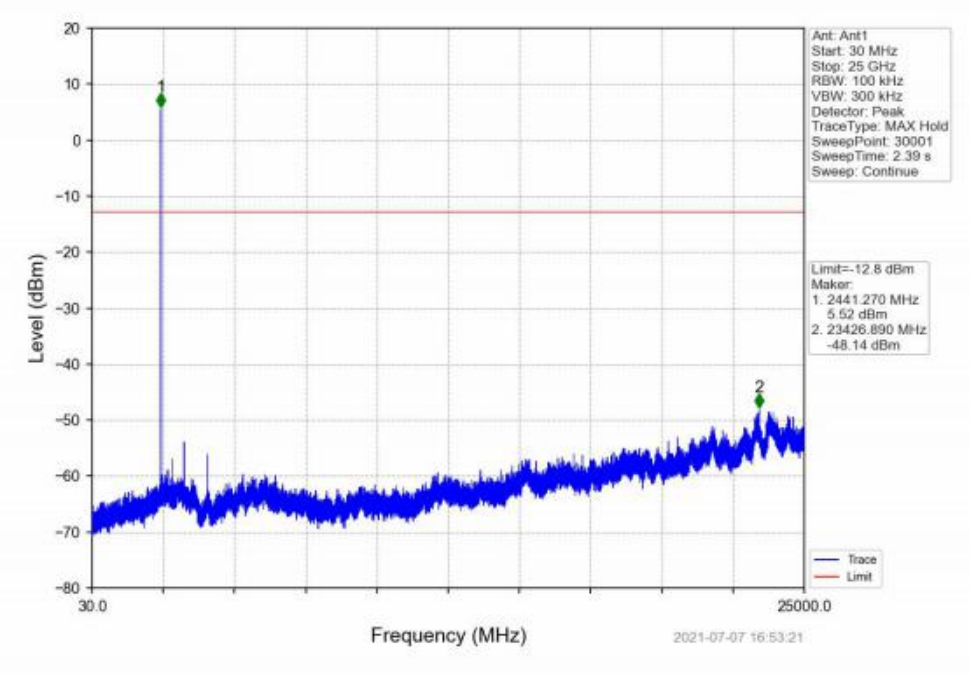
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



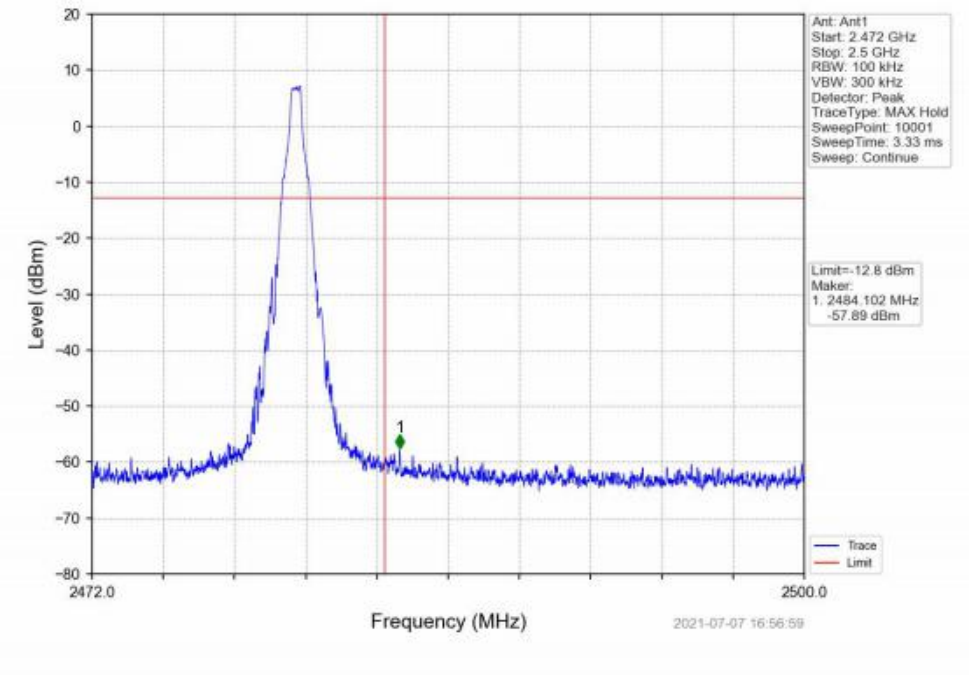
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



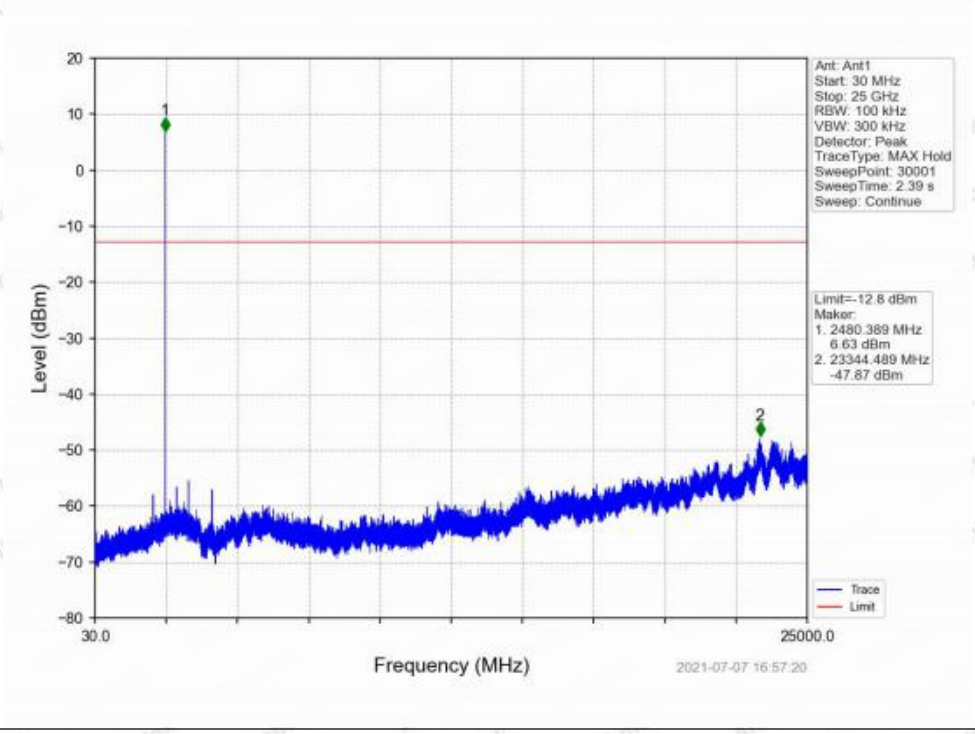
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



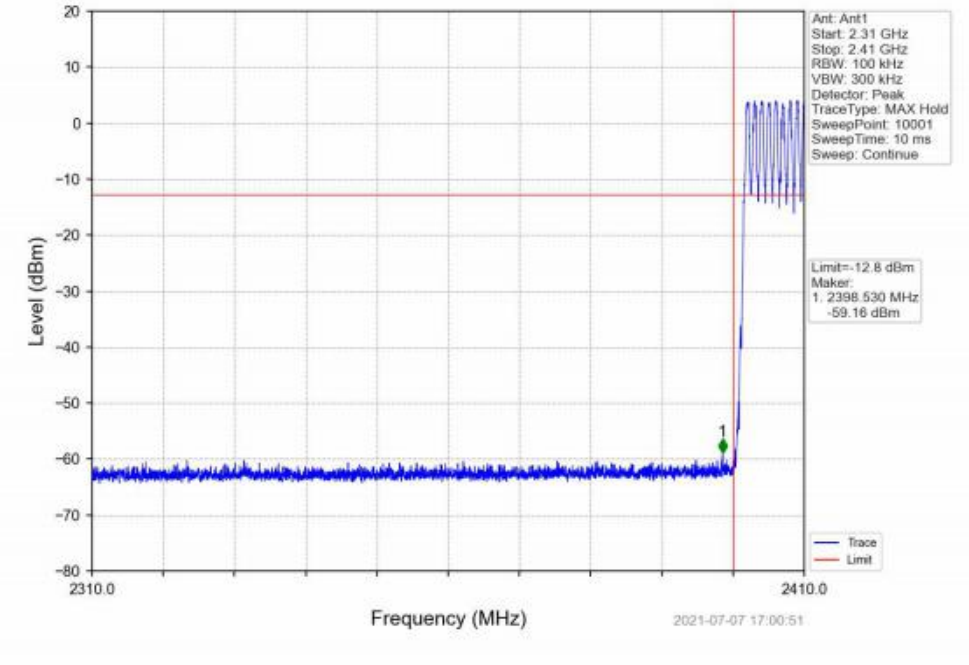
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



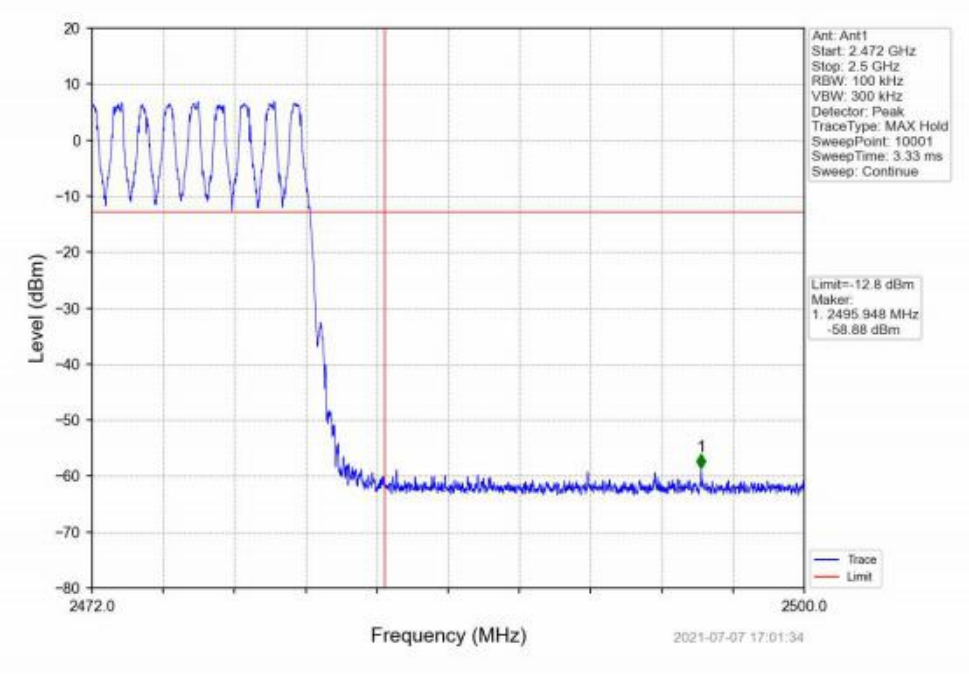
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



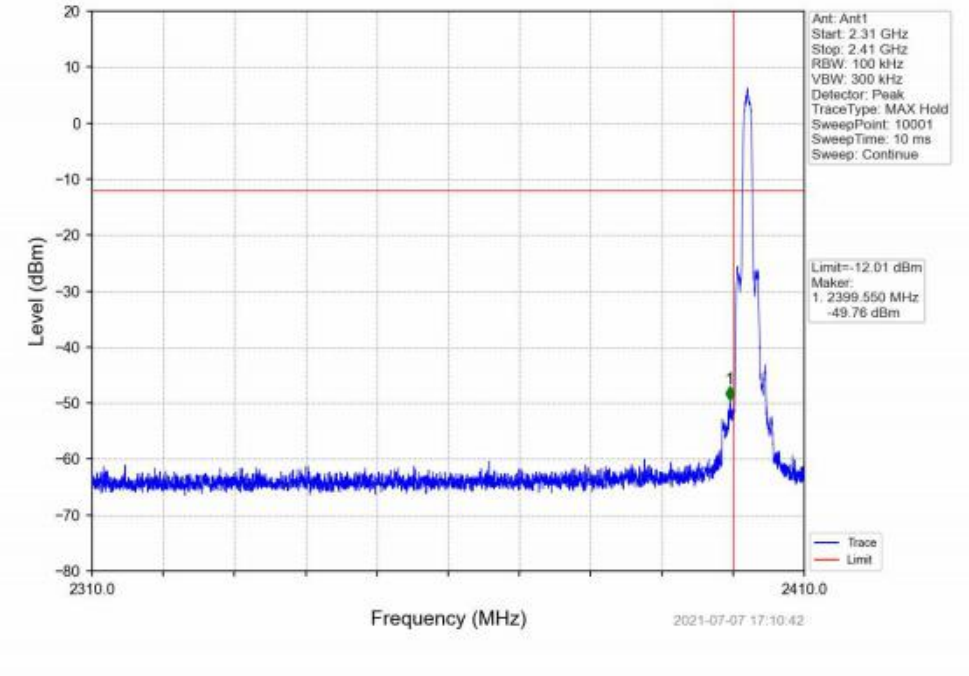
GFSK_DH5_HOPP_Ant1_NTNV



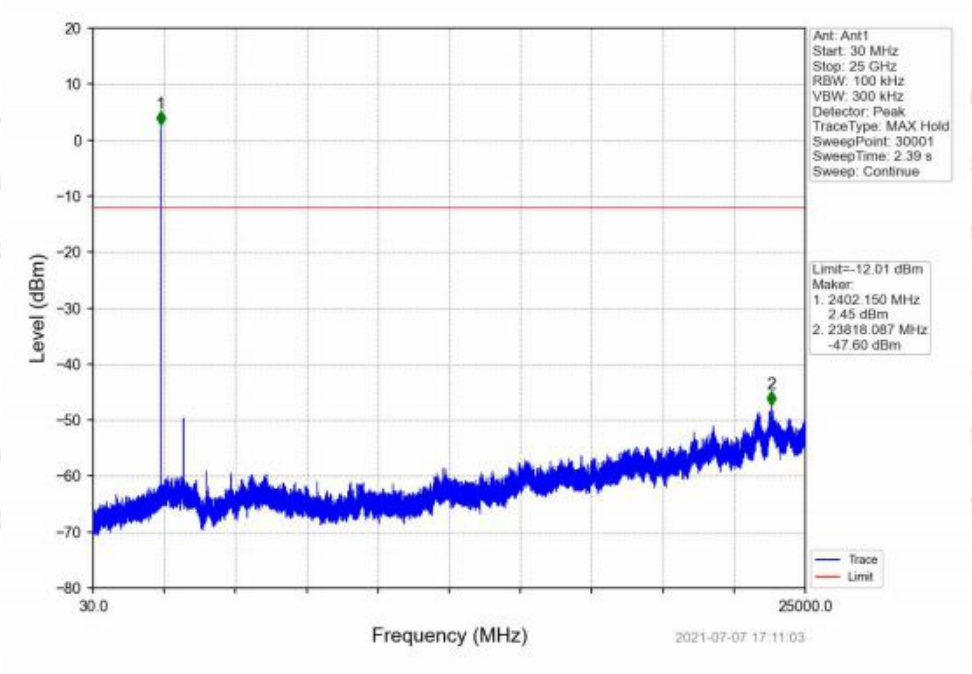
GFSK_DH5_HOPP_Ant1_NTNV



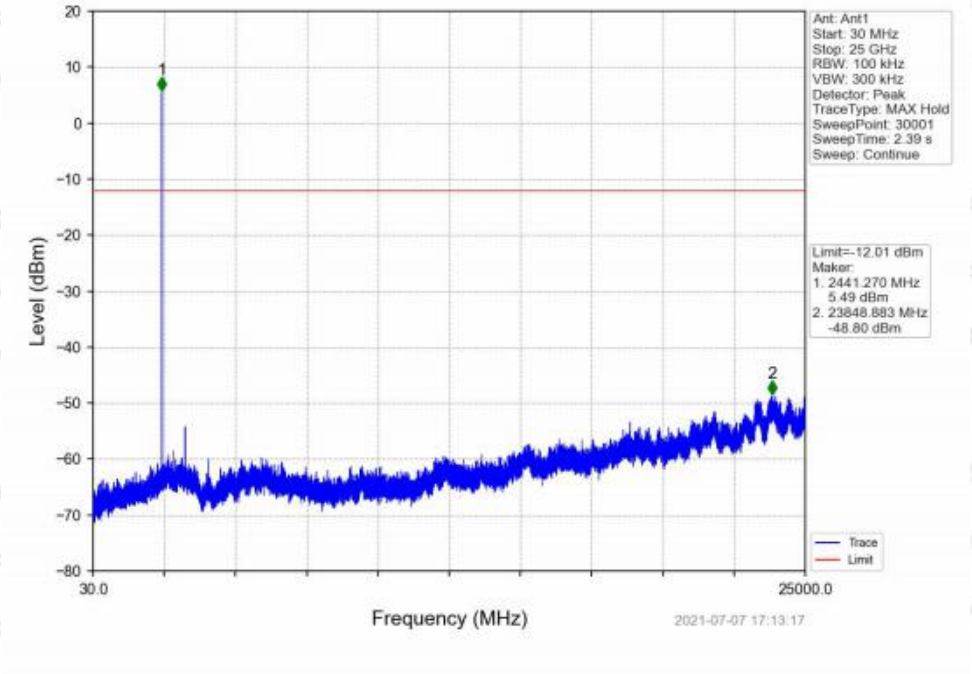
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



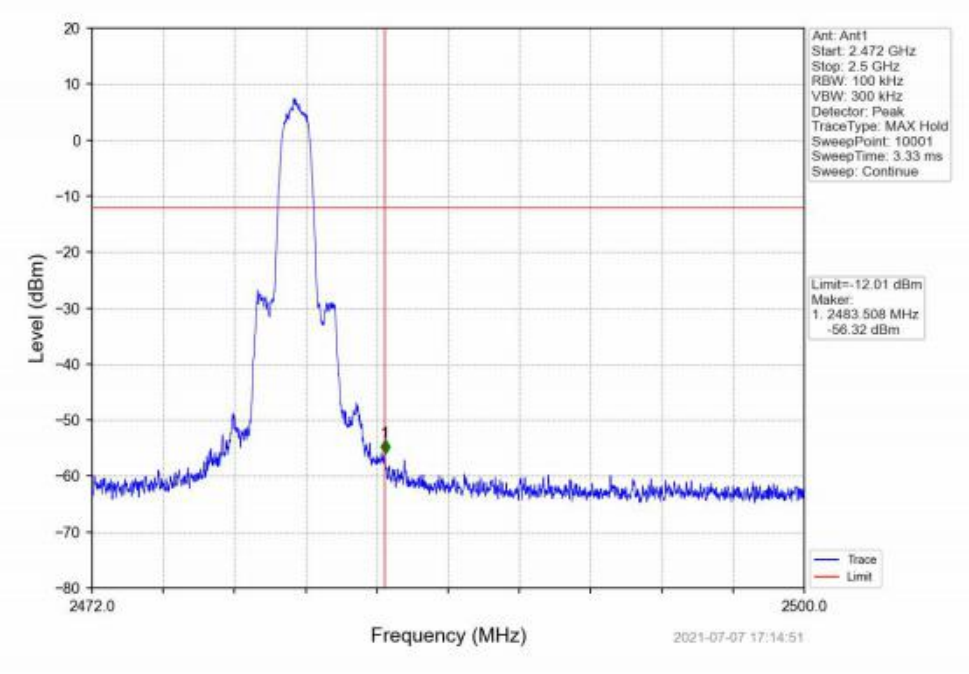
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



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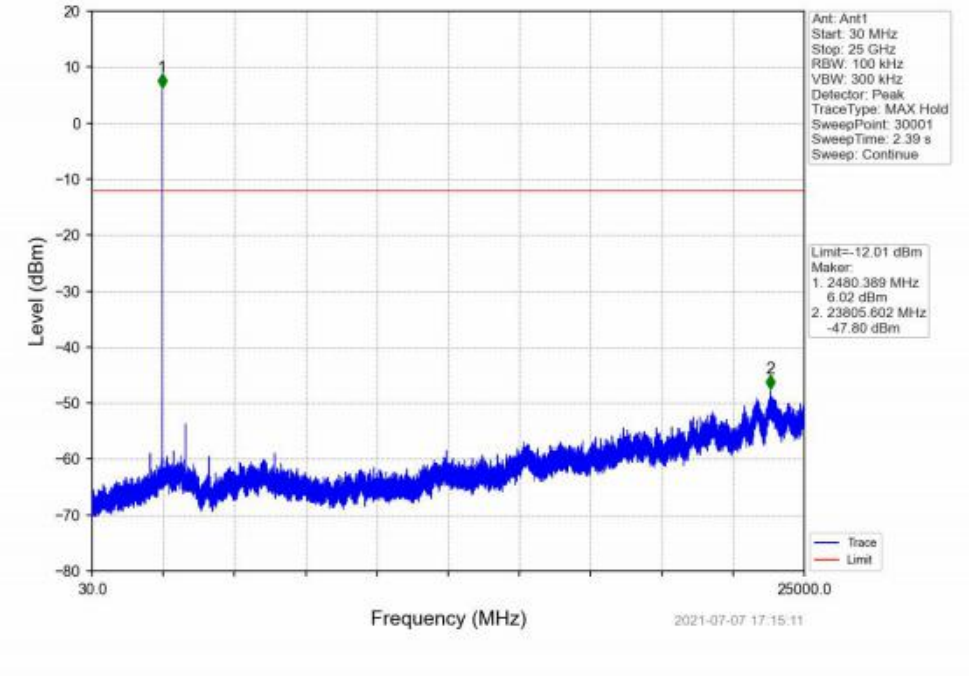

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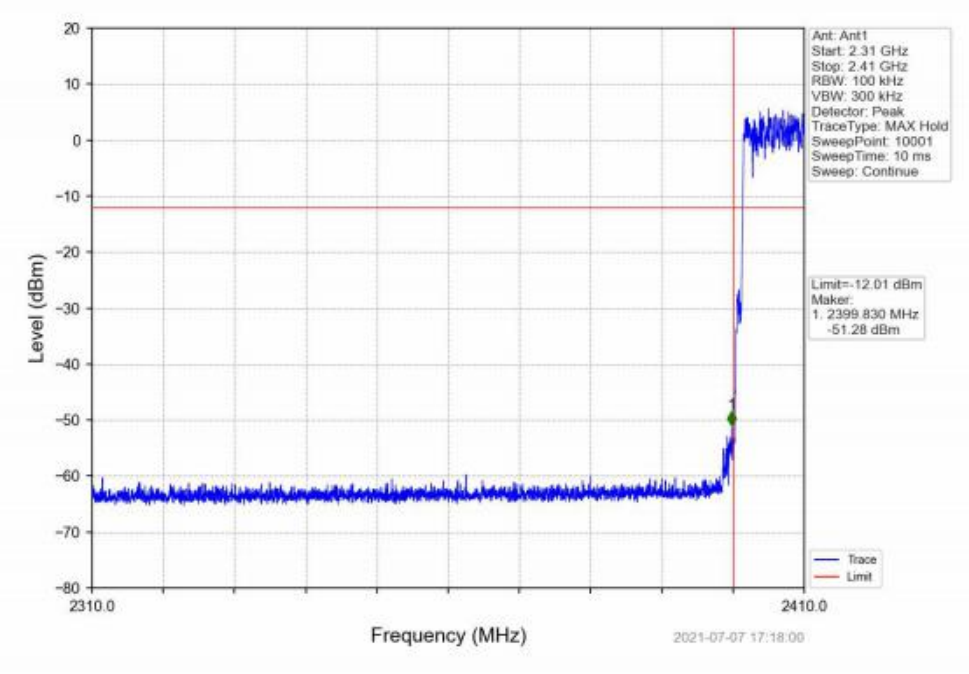

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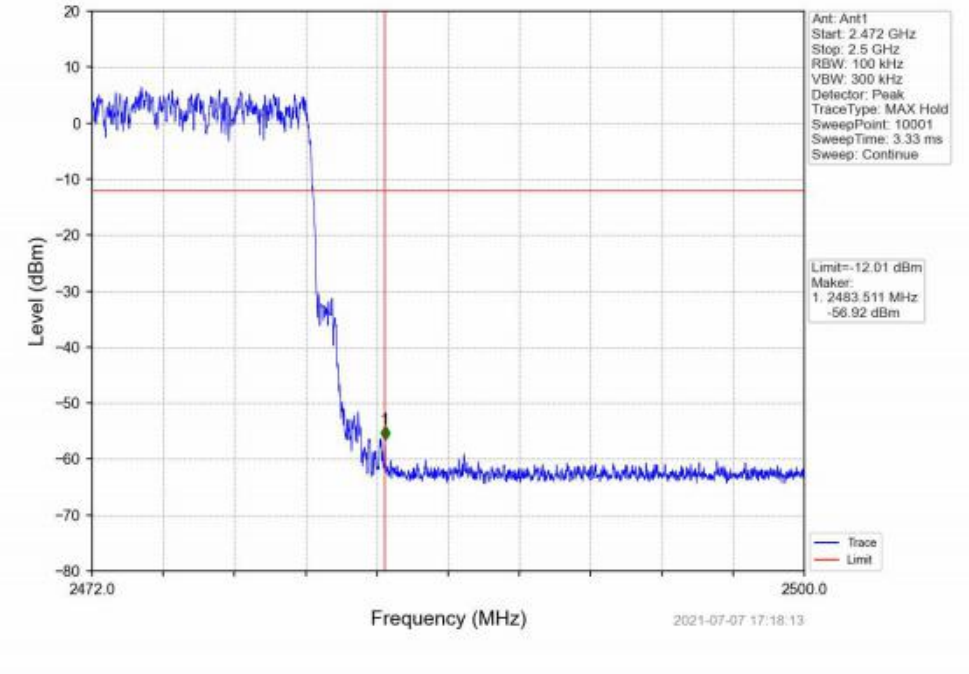
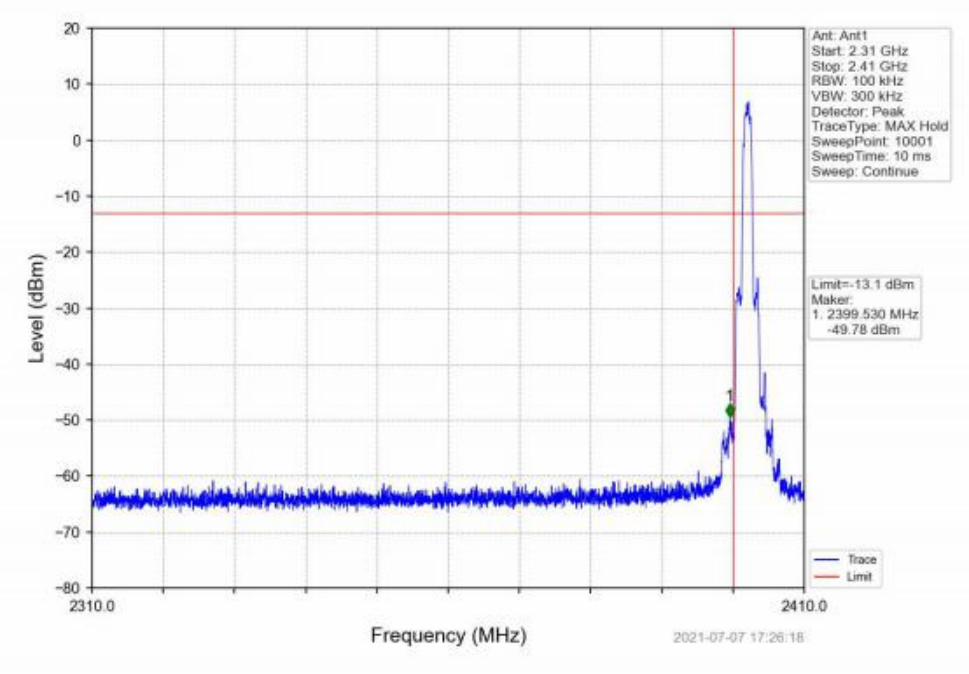
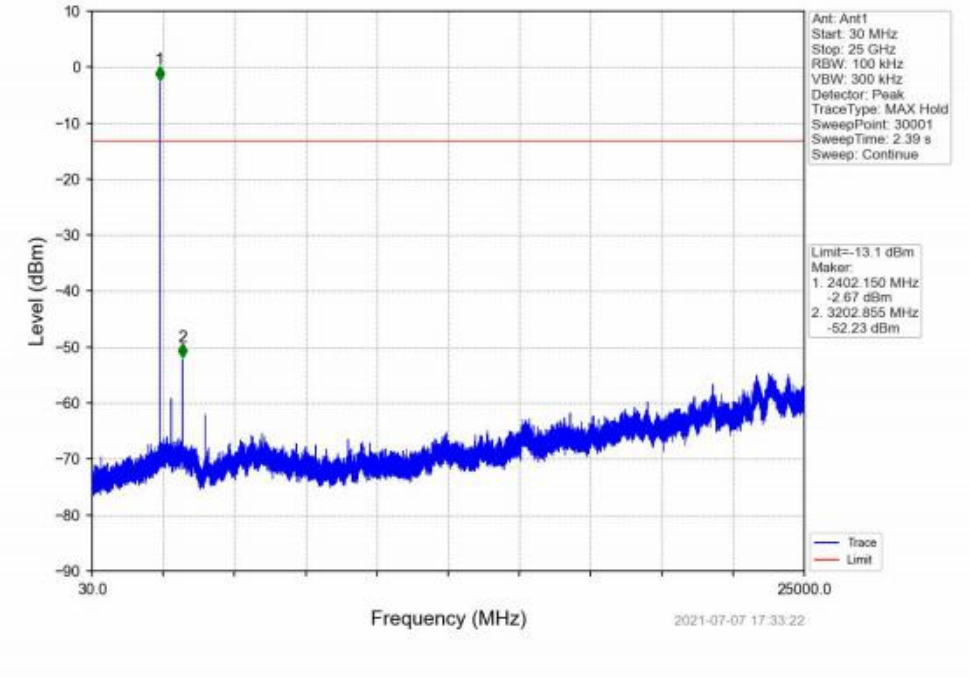


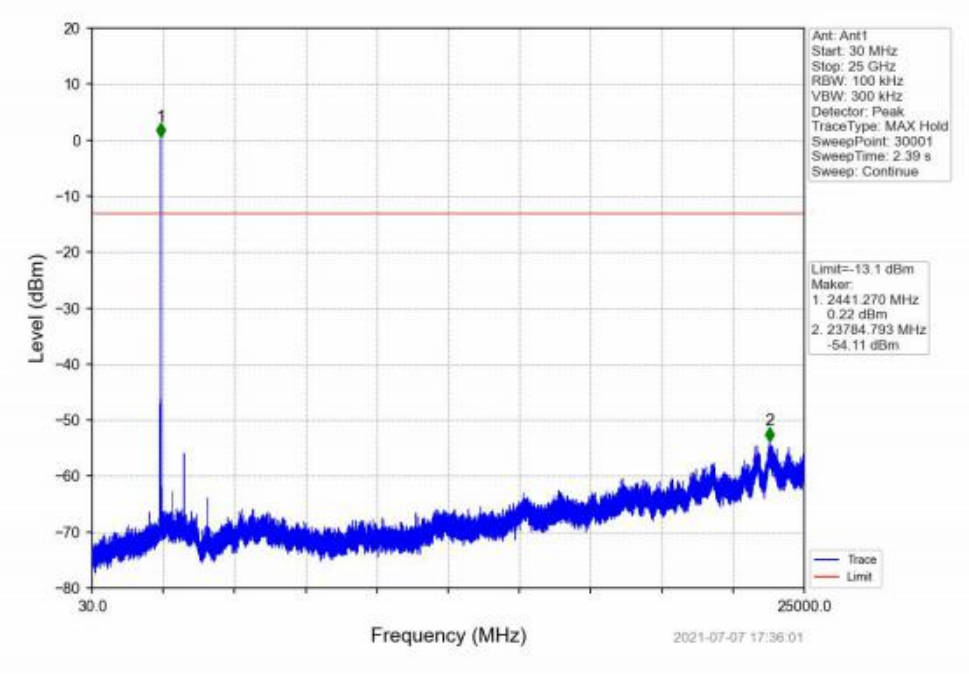
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



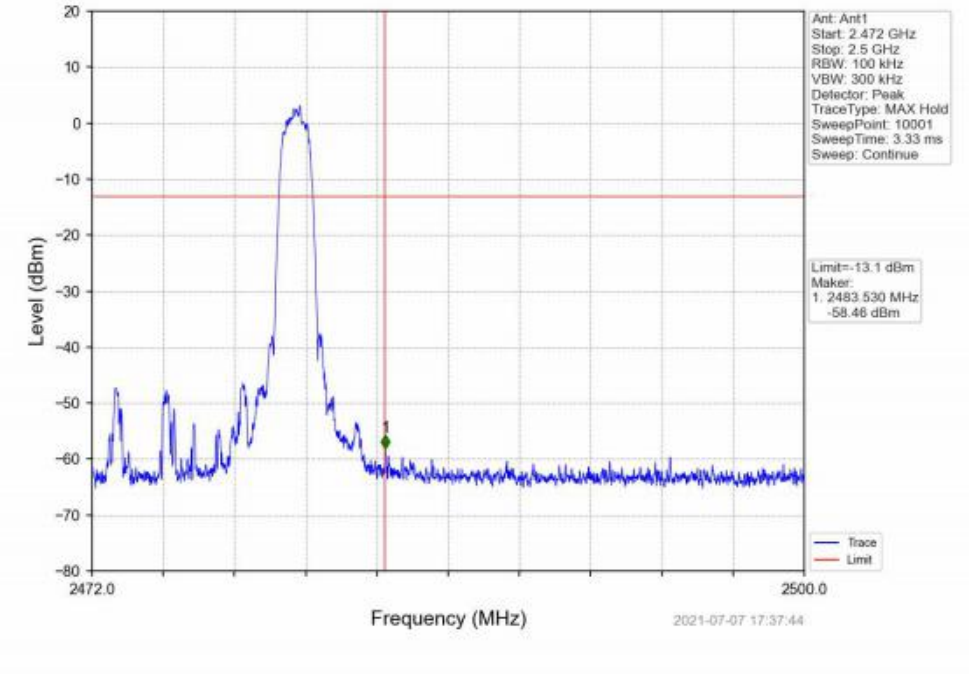
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



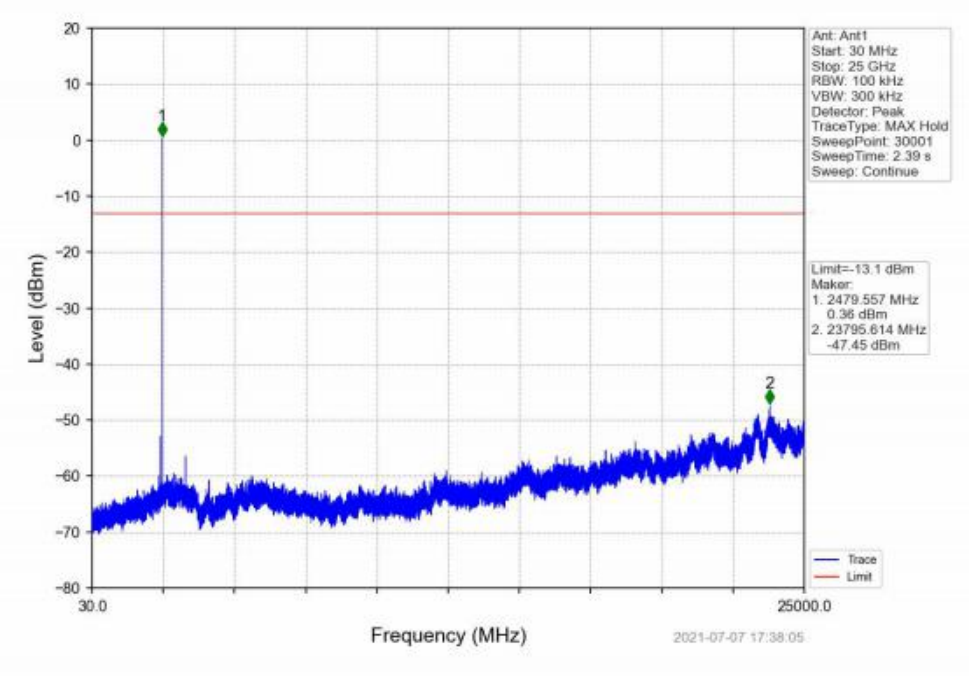
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



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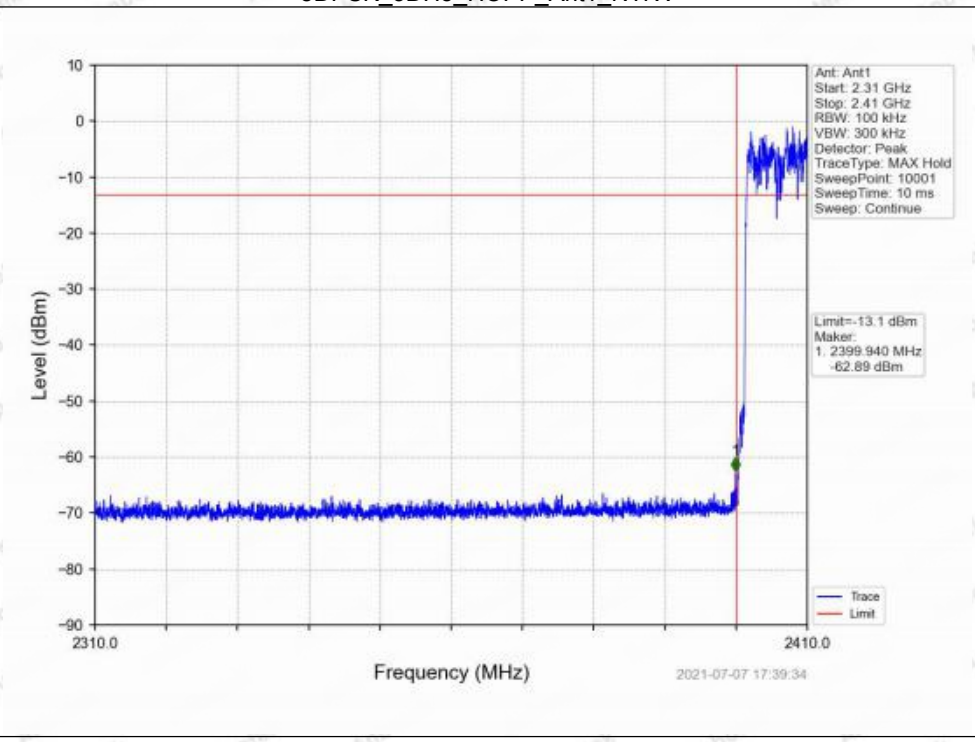
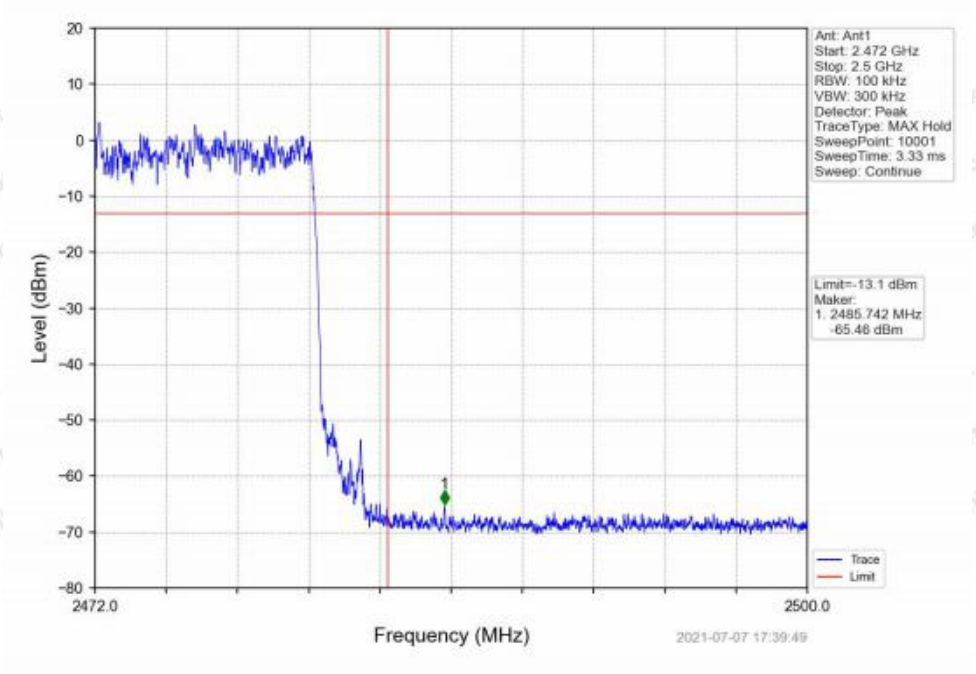


8DPSK_3DH5_HOPP_Ant1_NTNV



6. Frequency Error

5.1 Ant1

5.1.1 Test Result

Ant1								
Mode	TX Type	Frequency (MHz)	Packet Type	Temperature (°C)	Voltage (VAC)	Measured Frequency (MHz)	Limit	Verdict
GFSK	SISO	2402	DH5	20	102	2402.018	2401.6 to 2402.4	Pass
					120	2402.019	2401.6 to 2402.4	Pass
					138	2402.020	2401.6 to 2402.4	Pass
				-20	120	2402.019	2401.6 to 2402.4	Pass
				50	120	2402.017	2401.6 to 2402.4	Pass
		2441	DH5	20	102	2441.011	2440.6 to 2441.4	Pass
					120	2441.012	2440.6 to 2441.4	Pass
					138	2441.012	2440.6 to 2441.4	Pass
				-20	120	2441.011	2440.6 to 2441.4	Pass
				50	120	2441.013	2440.6 to 2441.4	Pass
		2480	DH5	20	102	2480.006	2479.6 to 2480.4	Pass
					120	2480.006	2479.6 to 2480.4	Pass
					138	2480.018	2479.6 to 2480.4	Pass
				-20	120	2480.004	2479.6 to 2480.4	Pass
				50	120	2480.007	2479.6 to 2480.4	Pass
Pi/4DQPSK	SISO	2402	2DH5	20	102	2402.019	2401.52 to 2402.48	Pass
					120	2402.015	2401.52 to 2402.48	Pass
					138	2402.018	2401.52 to 2402.48	Pass
				-20	120	2402.018	2401.52 to 2402.48	Pass
				50	120	2402.017	2401.52 to 2402.48	Pass
		2441	2DH5	20	102	2441.010	2440.52 to 2441.48	Pass
					120	2441.010	2440.52 to 2441.48	Pass
					138	2441.008	2440.52 to 2441.48	Pass
				-20	120	2441.012	2440.52 to 2441.48	Pass
				50	120	2441.010	2440.52 to 2441.48	Pass
		2480	2DH5	20	102	2480.003	2479.52 to 2480.48	Pass
					120	2480.001	2479.52 to 2480.48	Pass
					138	2480.003	2479.52 to 2480.48	Pass
				-20	120	2480.003	2479.52 to 2480.48	Pass
				50	120	2480.006	2479.52 to 2480.48	Pass
8DPSK	SISO	2402	3DH5	20	102	2402.017	2401.52 to 2402.48	Pass
					120	2402.015	2401.52 to 2402.48	Pass
					138	2402.016	2401.52 to 2402.48	Pass
				-20	120	2402.016	2401.52 to 2402.48	Pass
				50	120	2402.017	2401.52 to 2402.48	Pass
		2441	3DH5	20	102	2441.008	2440.52 to 2441.48	Pass
					120	2441.008	2440.52 to 2441.48	Pass
					138	2441.008	2440.52 to 2441.48	Pass
				-20	120	2441.008	2440.52 to 2441.48	Pass
				50	120	2441.006	2440.52 to 2441.48	Pass
		2480	3DH5	20	102	2480.002	2479.52 to 2480.48	Pass
					120	2480.003	2479.52 to 2480.48	Pass
					138	2480.003	2479.52 to 2480.48	Pass
				-20	120	2480.005	2479.52 to 2480.48	Pass
				50	120	2480.003	2479.52 to 2480.48	Pass

7. Carrier Frequency Separation

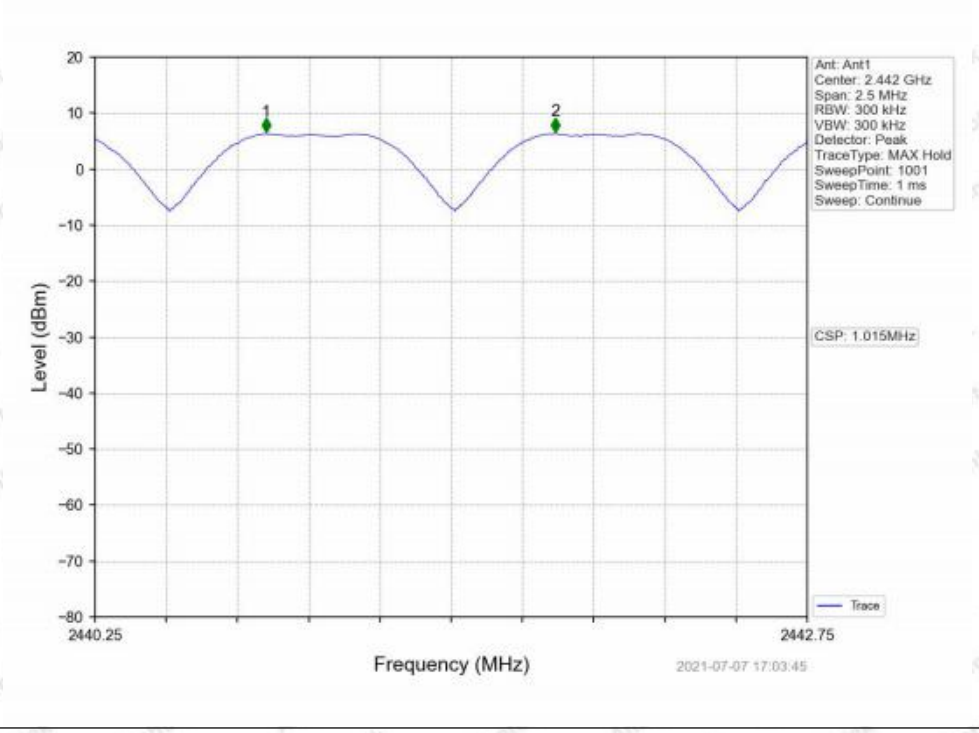
6.1 Ant1

6.1.1 Test Result

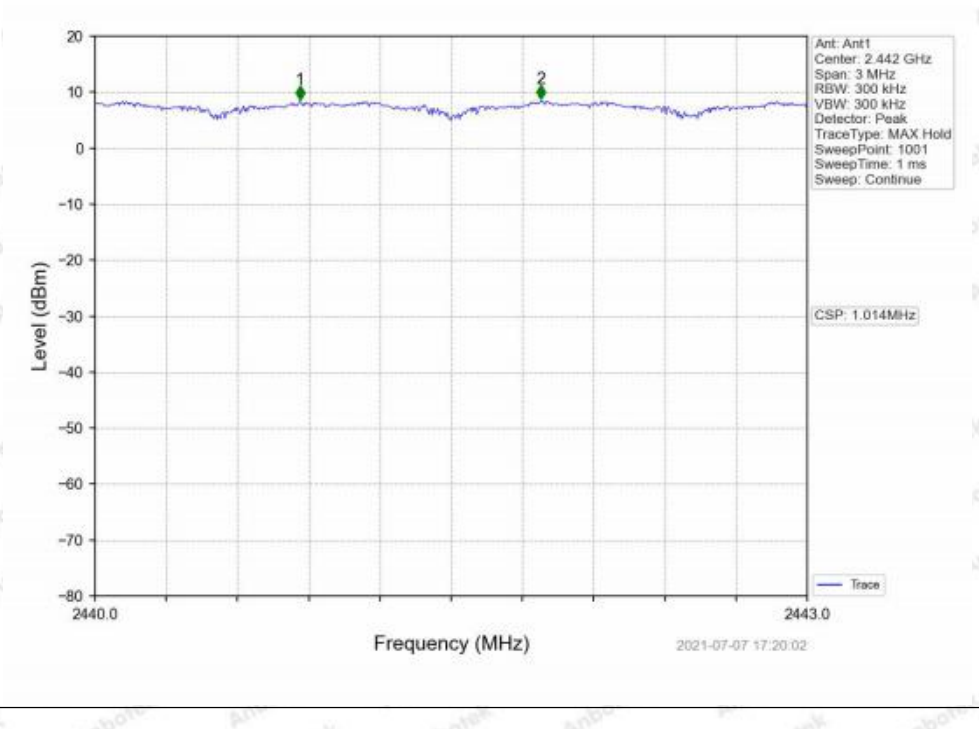
Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.01	0.93	>=0.934	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.01	1.34	>=0.895	Pass
8DPSK	SISO	HOPP	3DH5	1.00	1.31	>=0.872	Pass

6.1.2 Test Graph

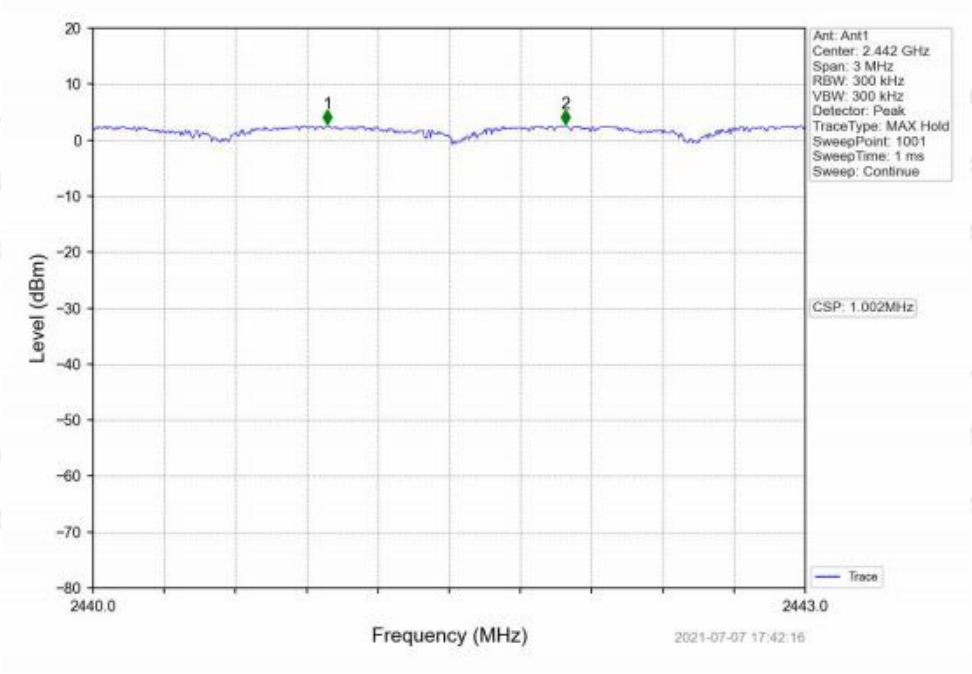
GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8. Number of Hopping Frequencies

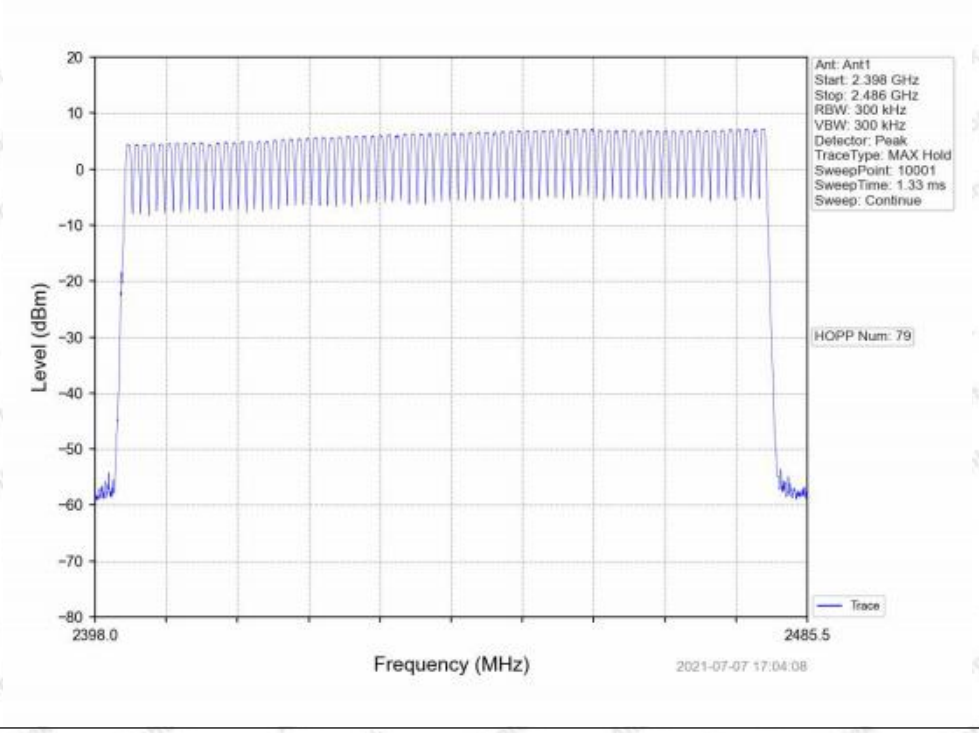
7.1 HoppNum

7.1.1 Test Result

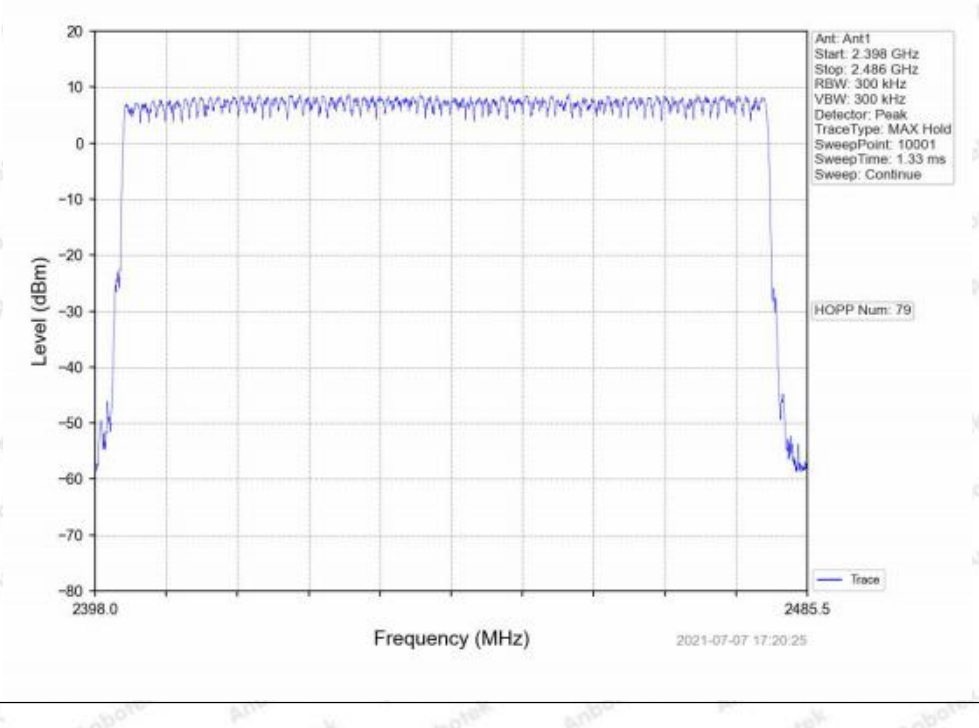
Mode	TX Type	Frequency (MHz)	Packet Type	Num of Hopping Frequencies		Verdict
				Ant1	Limit	
GFSK	SISO	HOPP	DH5	79	>=15	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	79	>=15	Pass
8DPSK	SISO	HOPP	3DH5	79	>=15	Pass

7.1.2 Test Graph

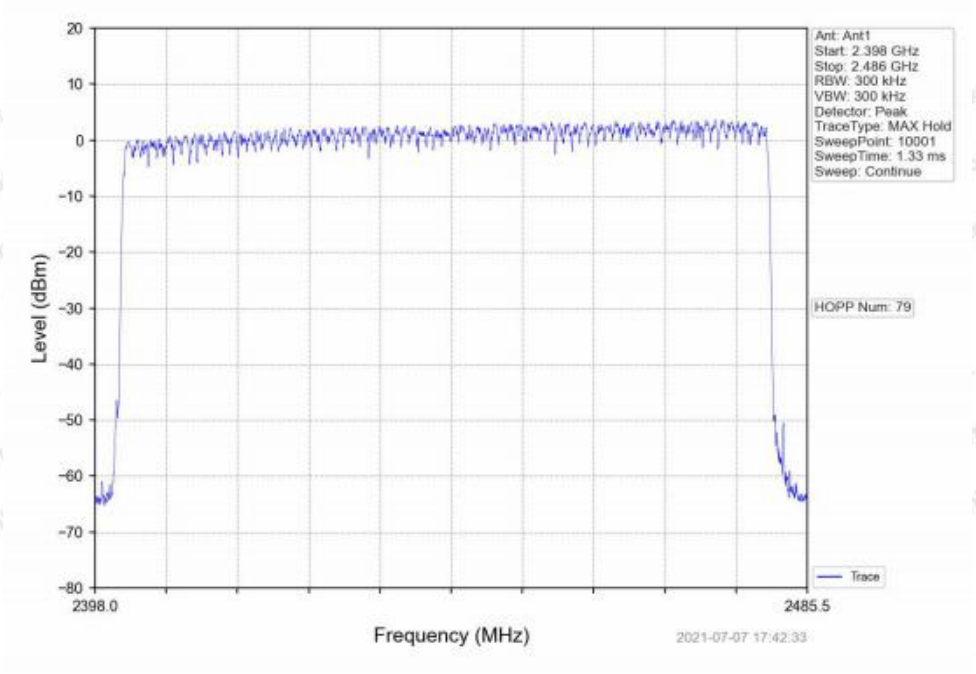
GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



9. Time of Occupancy (Dwell Time)

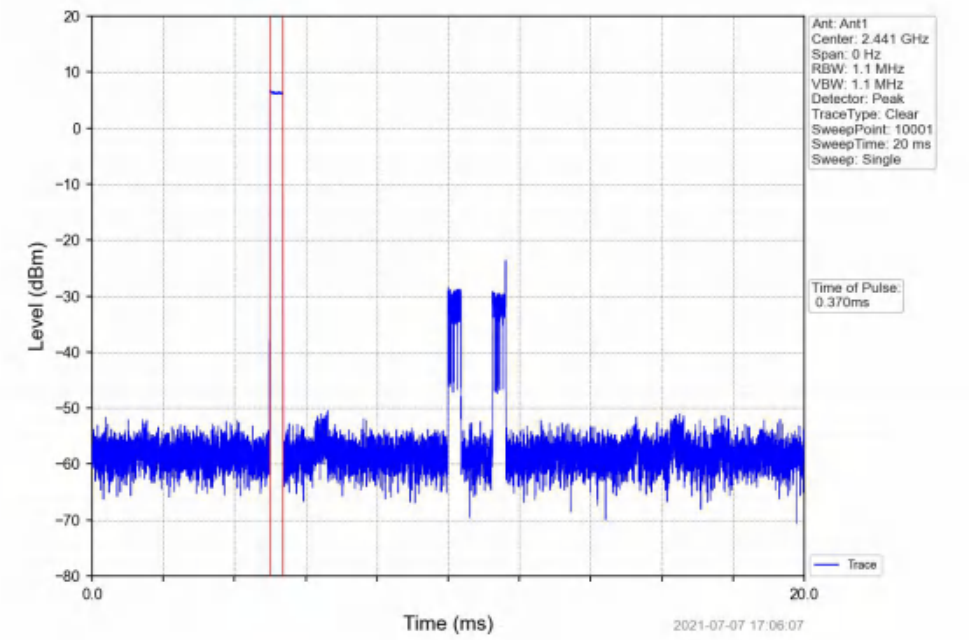
8.1 Ant1

8.1.1 Test Result

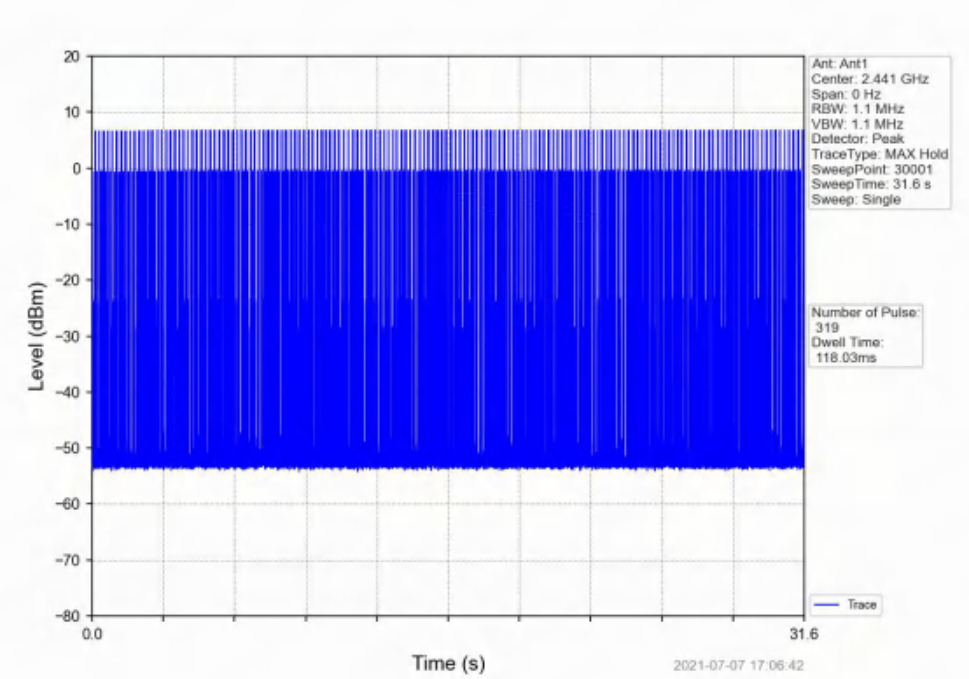
Ant1									
Mode	TX Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	SISO	HOPP	DH1	0.37	31.60	319	118.03	<=400	Pass
			DH3	1.63	31.60	167	271.54	<=400	Pass
			DH5	2.87	31.60	113	324.76	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.38	31.60	318	119.57	<=400	Pass
			2DH3	1.63	31.60	155	252.34	<=400	Pass
			2DH5	2.88	31.60	99	284.72	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.38	31.60	319	119.94	<=400	Pass
			3DH3	1.63	31.60	162	263.41	<=400	Pass
			3DH5	2.88	31.60	111	319.24	<=400	Pass

8.1.2 Test Graph

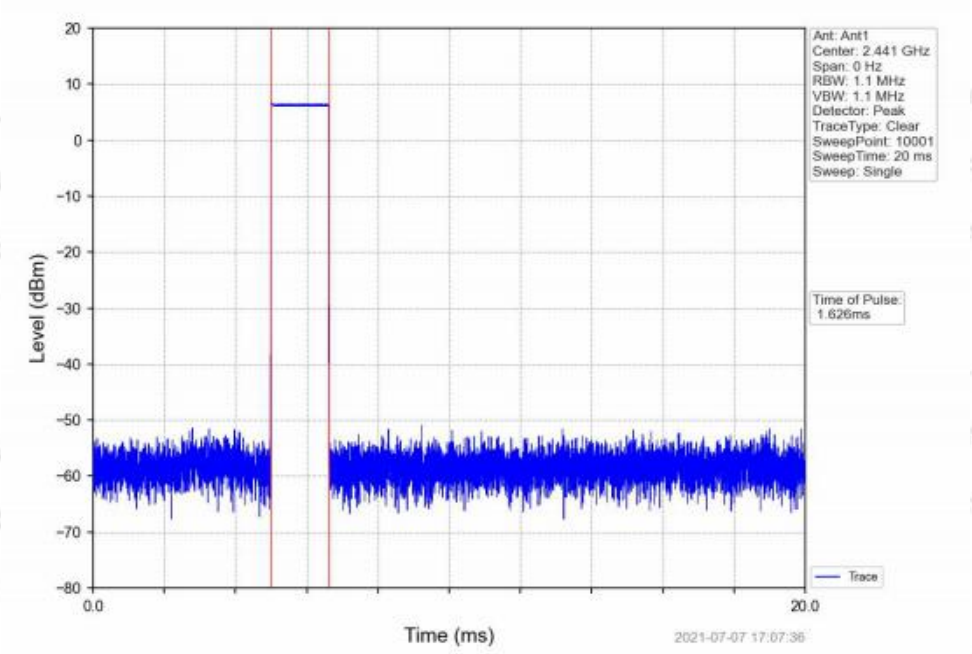
GFSK_DH1_HOPP_Ant1_NTNV



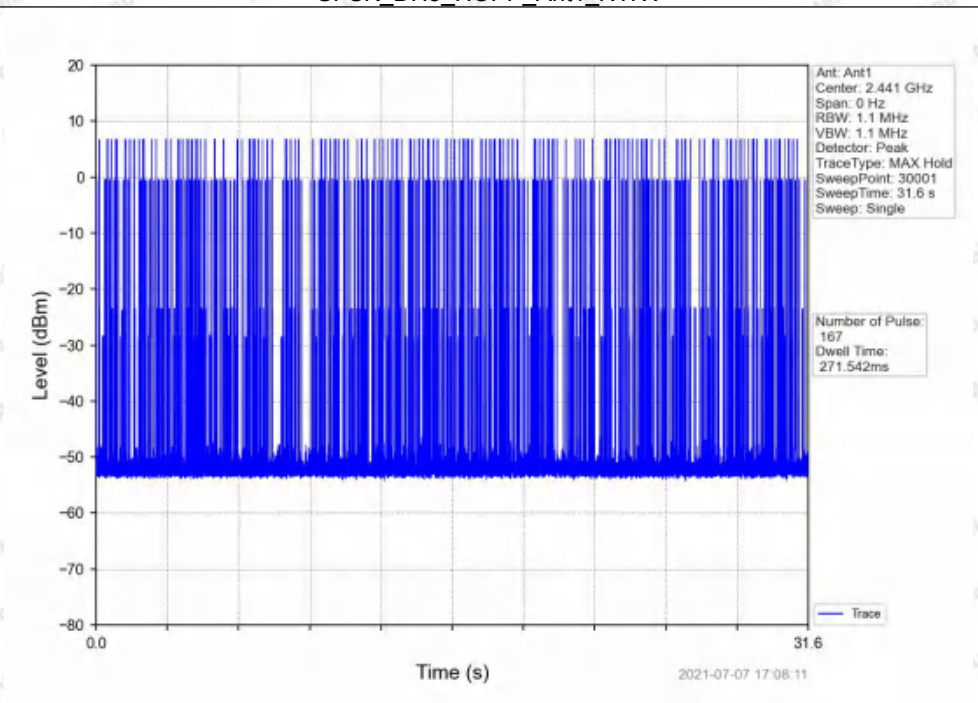
GFSK_DH1_HOPP_Ant1_NTNV



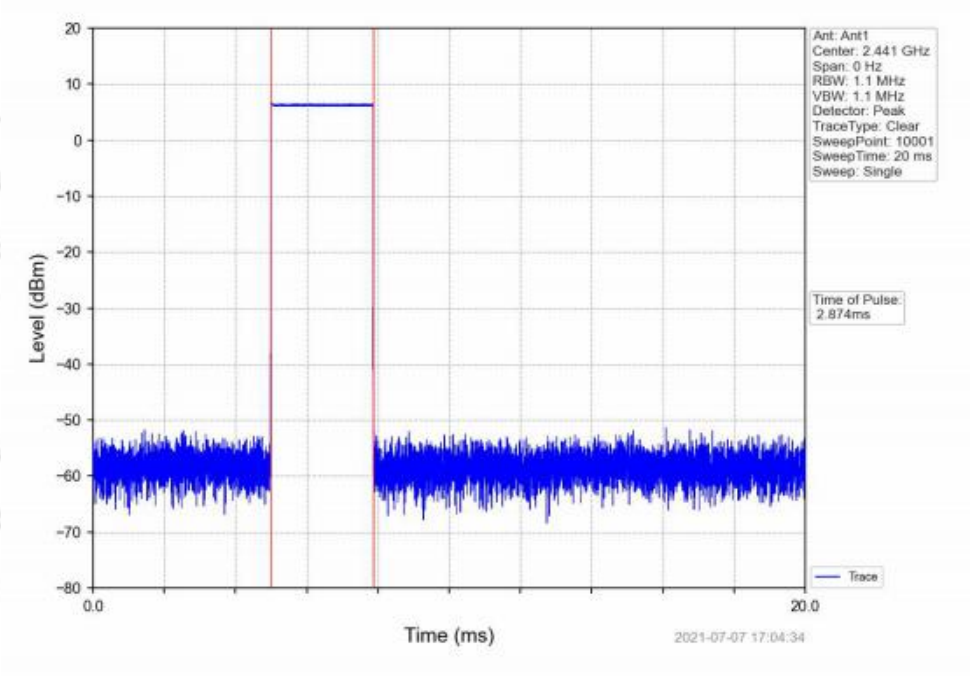
GFSK_DH3_HOPP_Ant1_NTNV



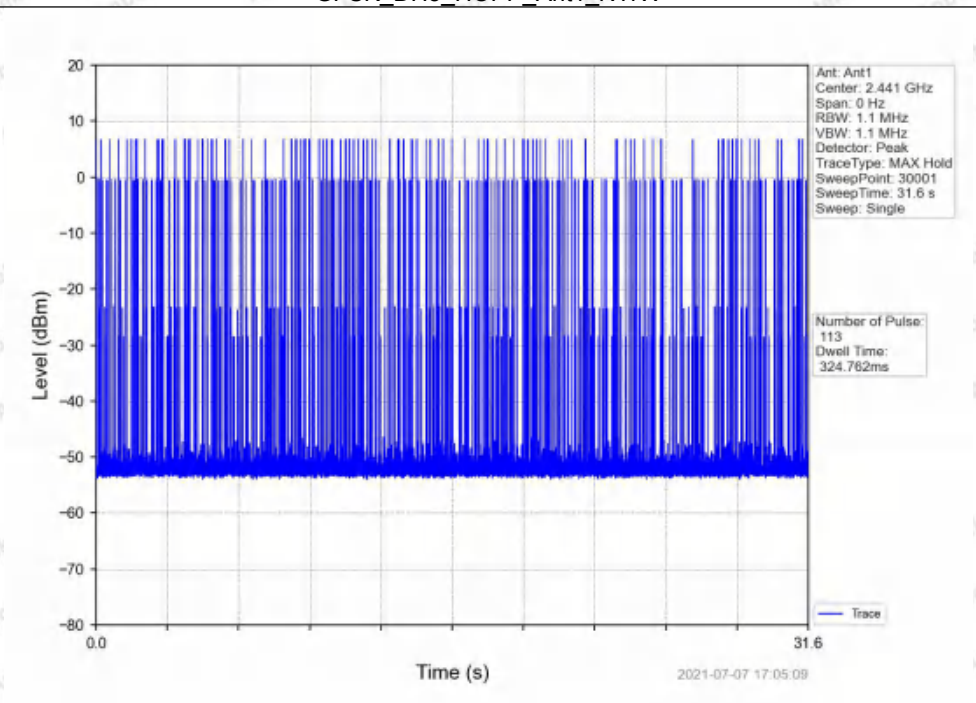
GFSK_DH3_HOPP_Ant1_NTNV



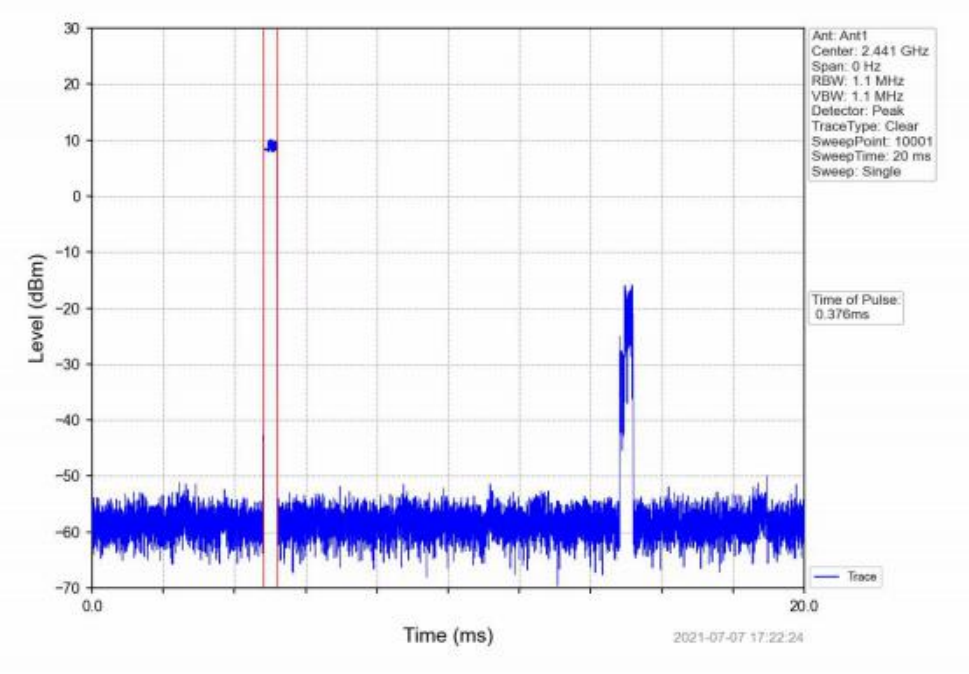
GFSK_DH5_HOPP_Ant1_NTNV



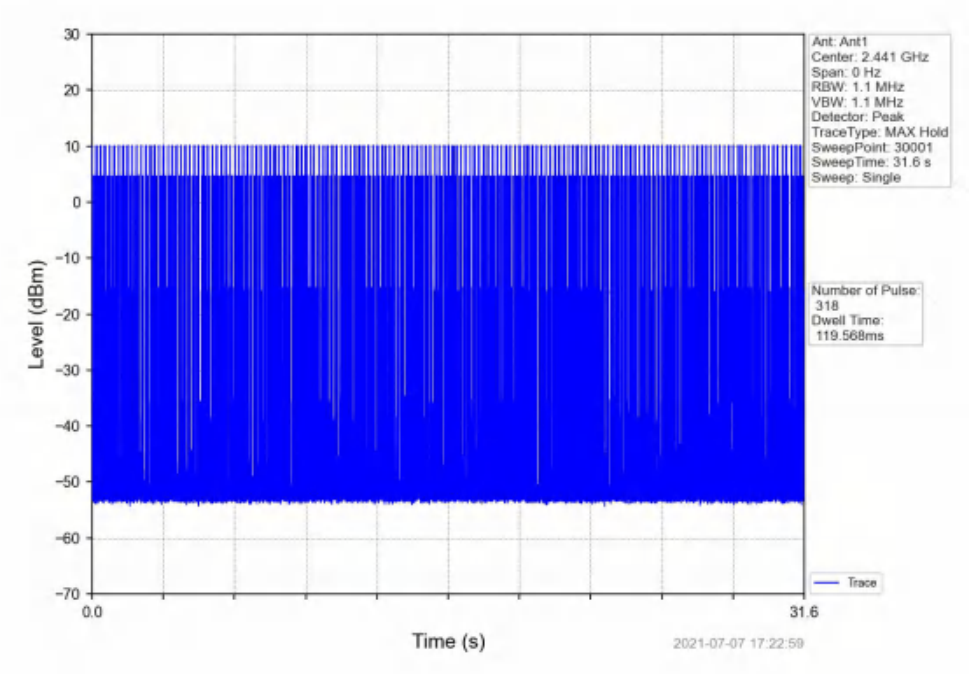
GFSK_DH5_HOPP_Ant1_NTNV



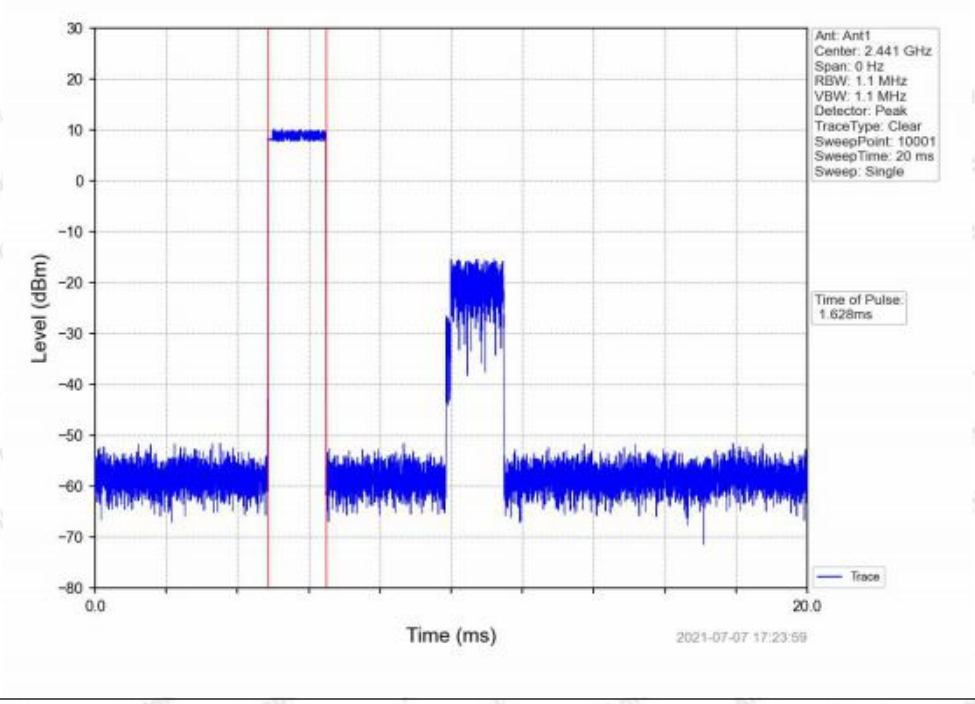
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



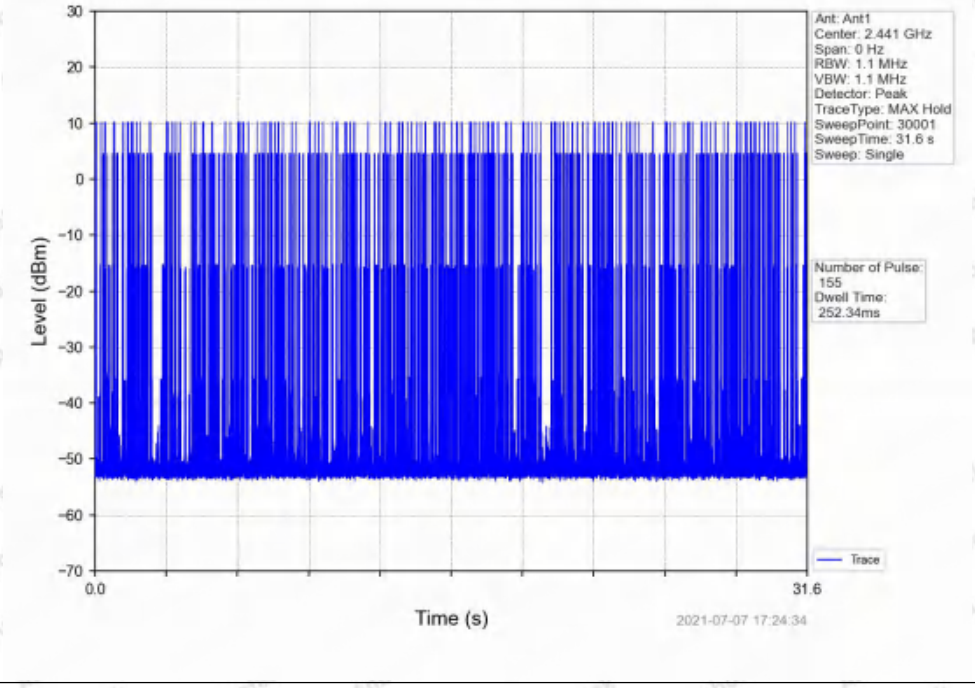
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



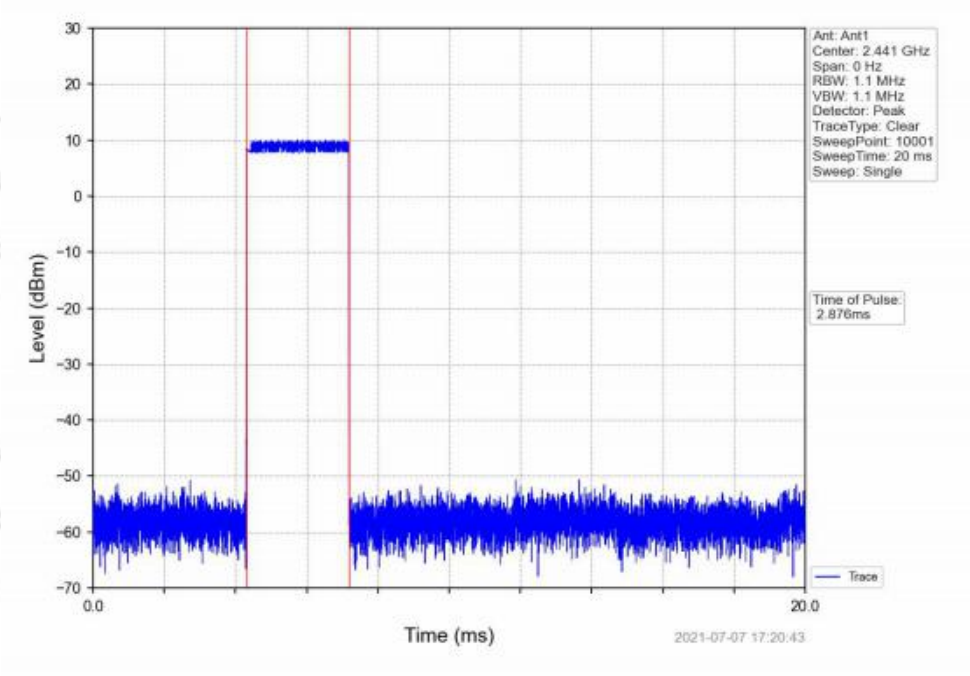
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



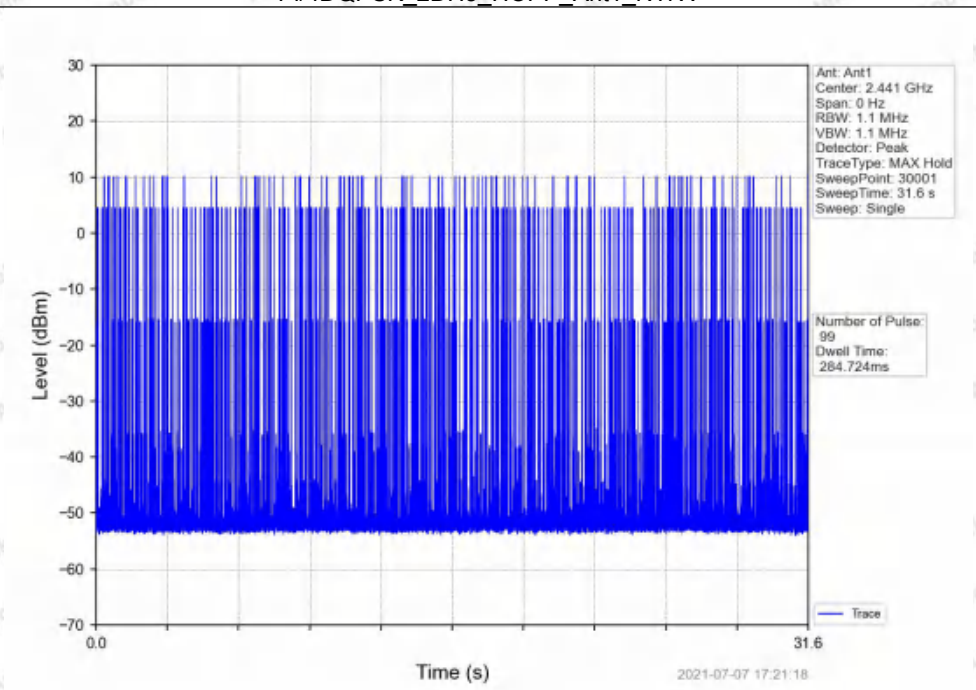
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



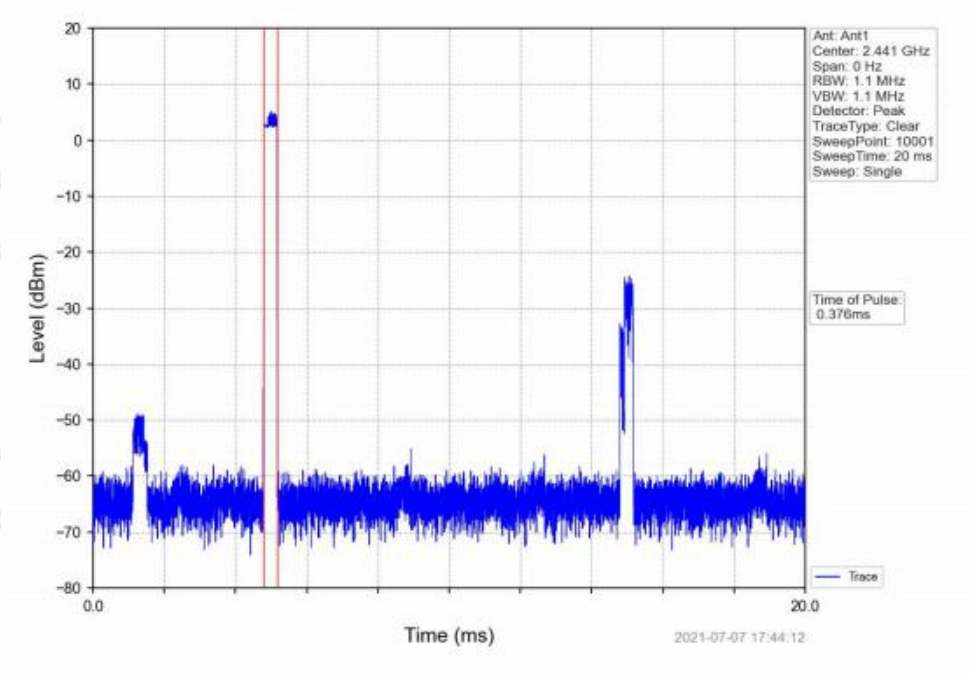
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH1_HOPP_Ant1_NTNV



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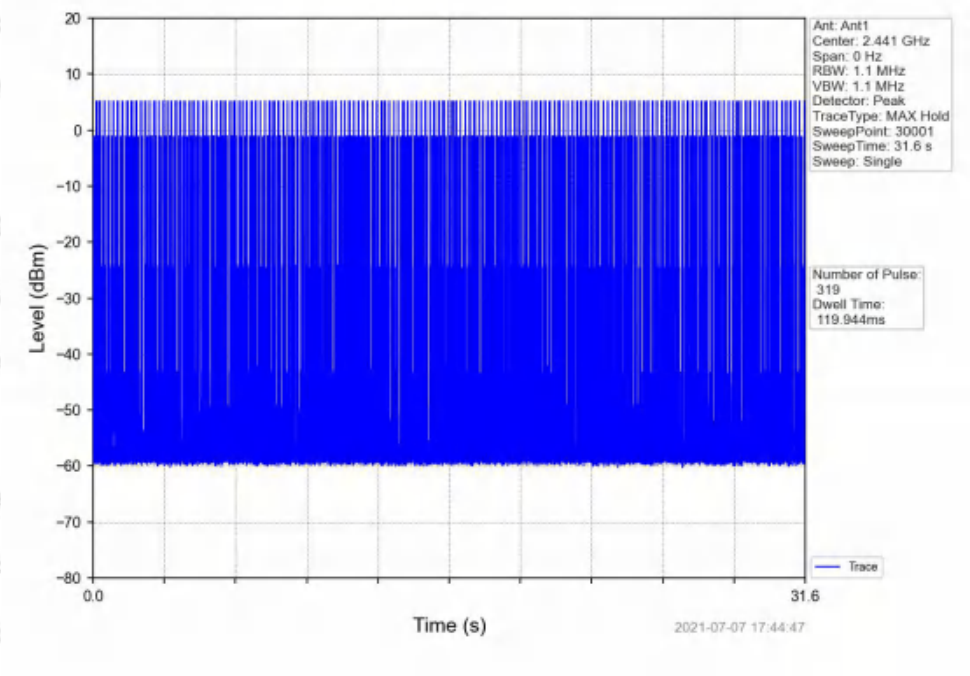

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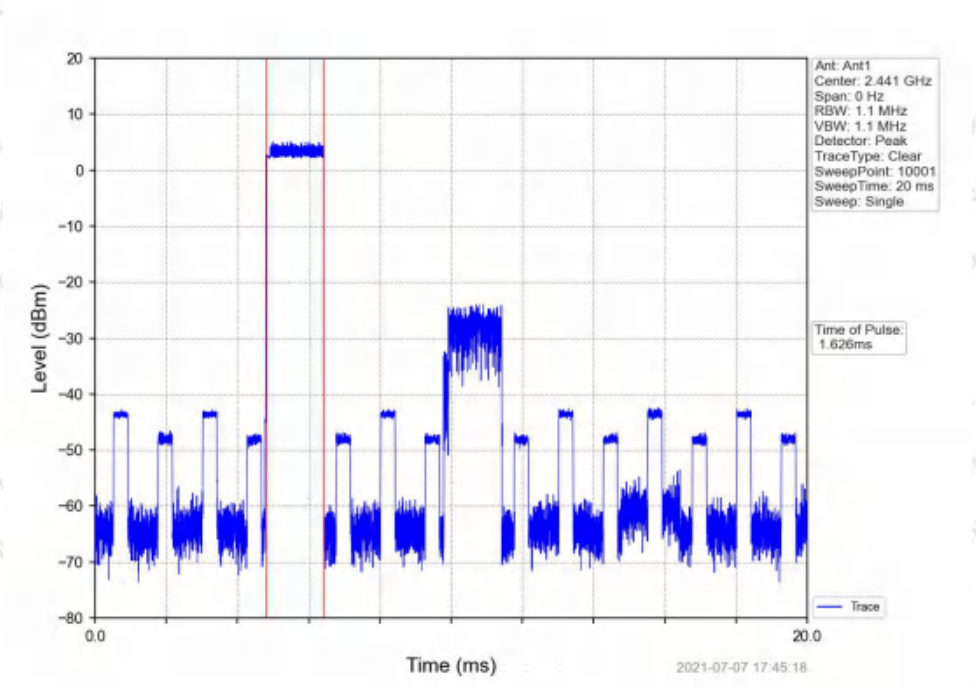
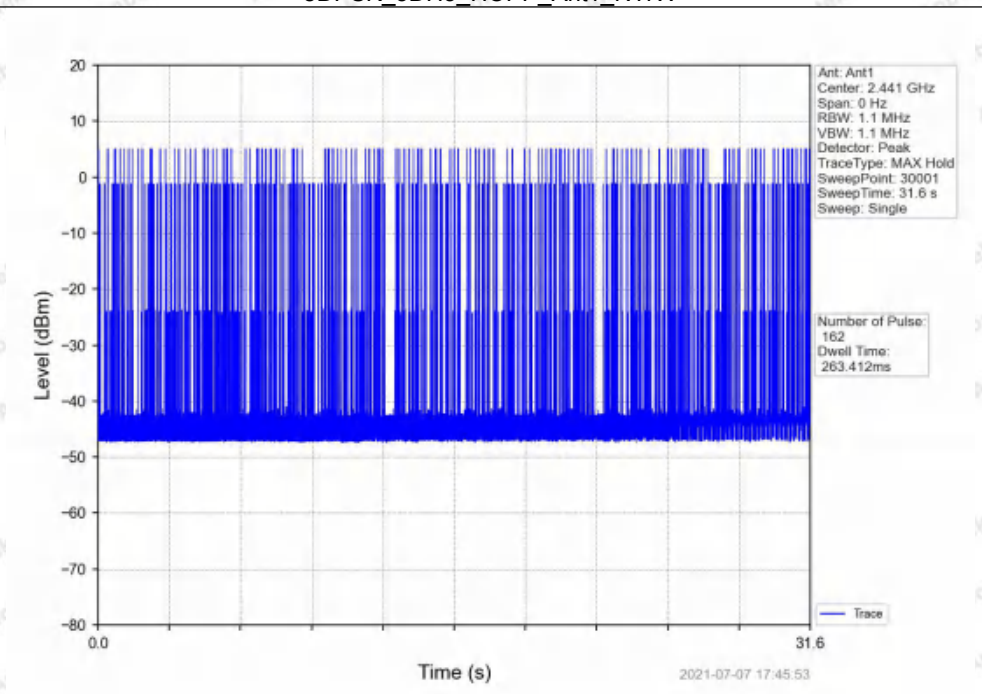


8DPSK_3DH3_HOPP_Ant1_NTNV



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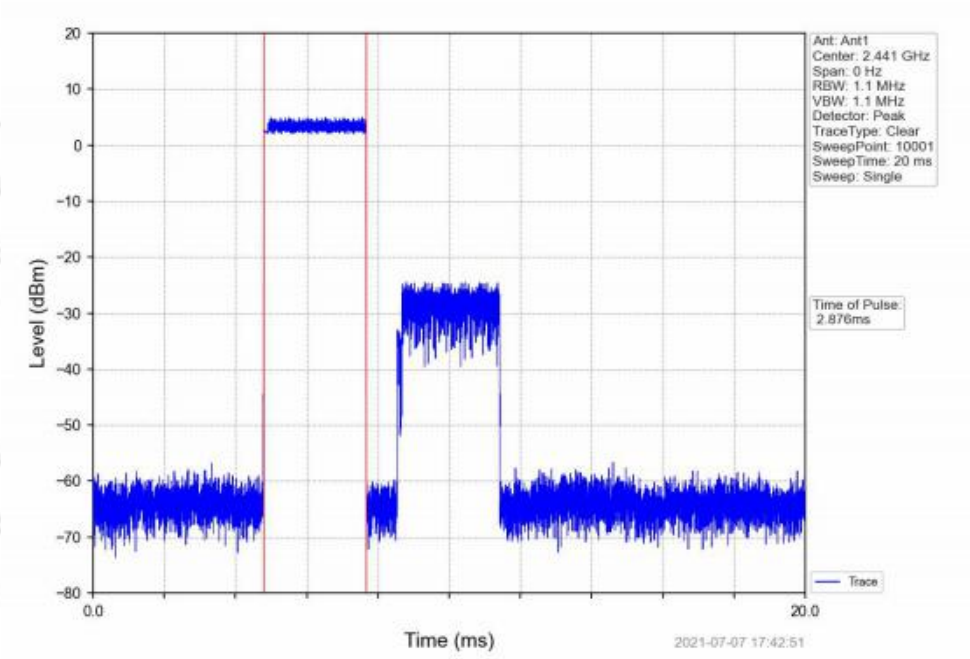

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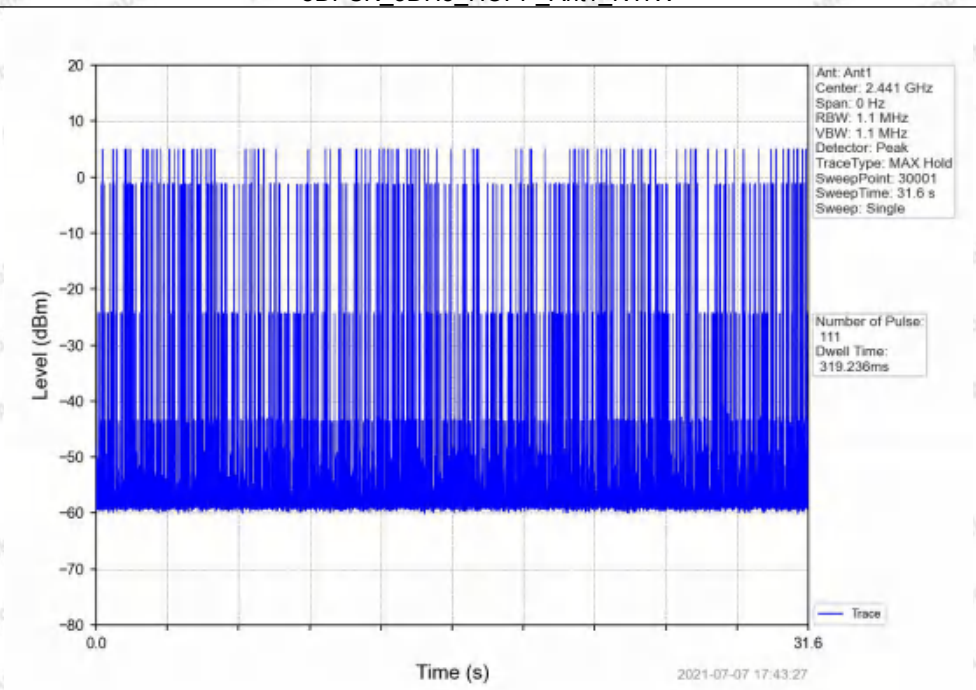

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