

Appendix for 15.247

Product Name: Bluetooth Speaker

Test Model: Sound Cube

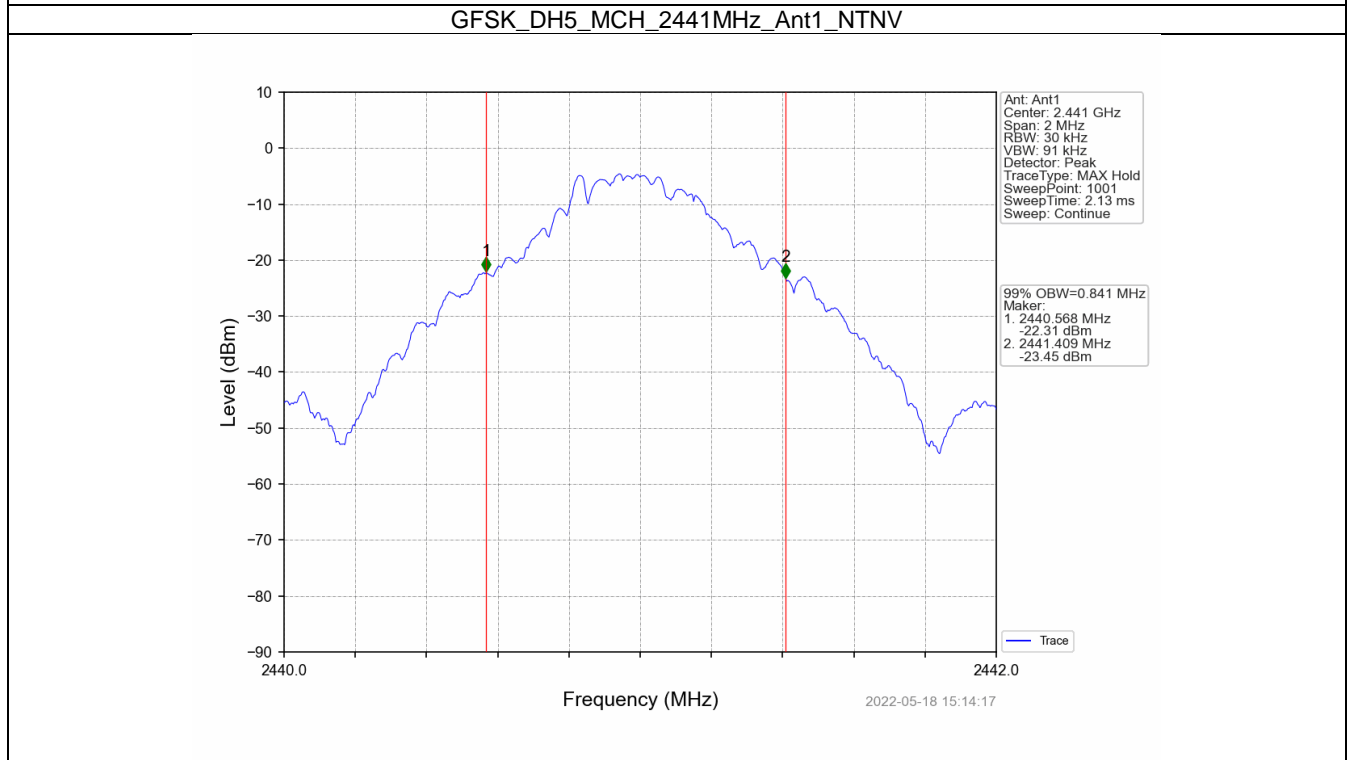
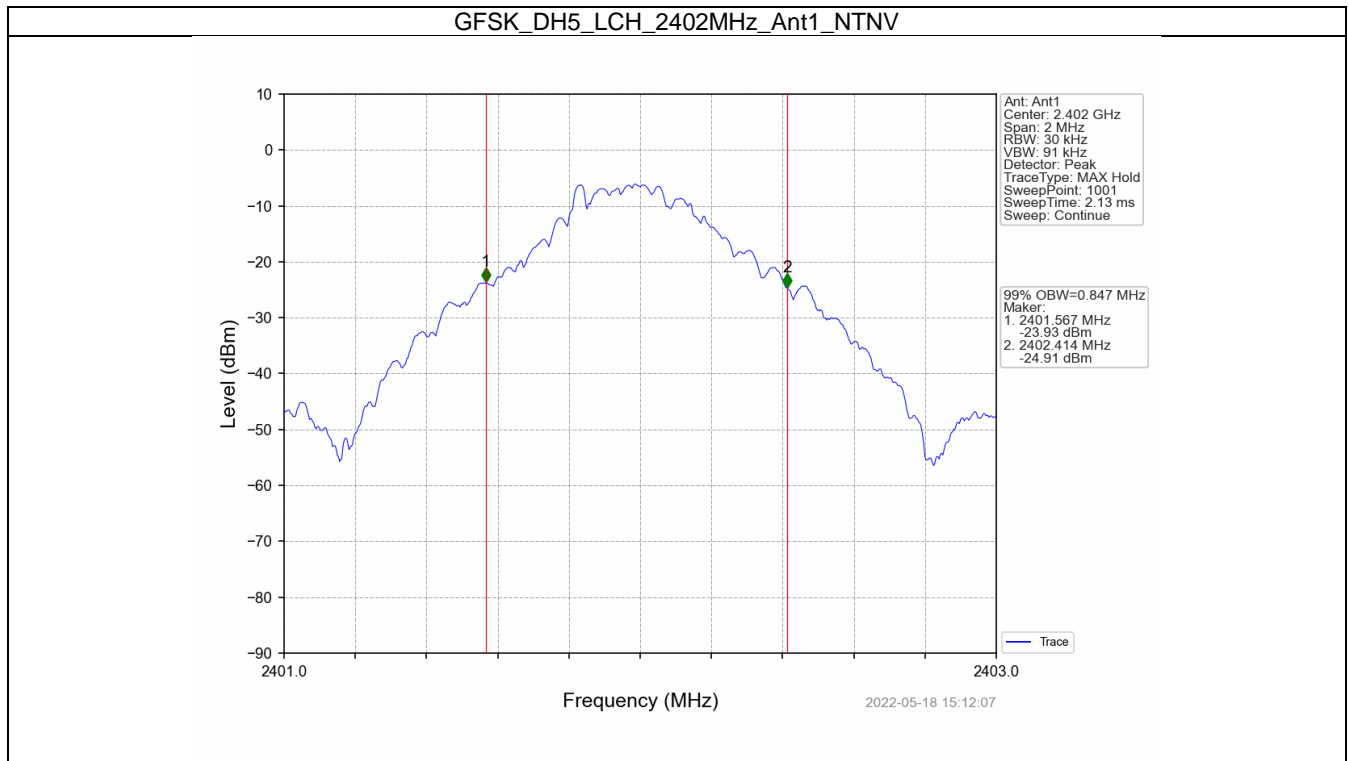
1. Bandwidth

1.1 OBW

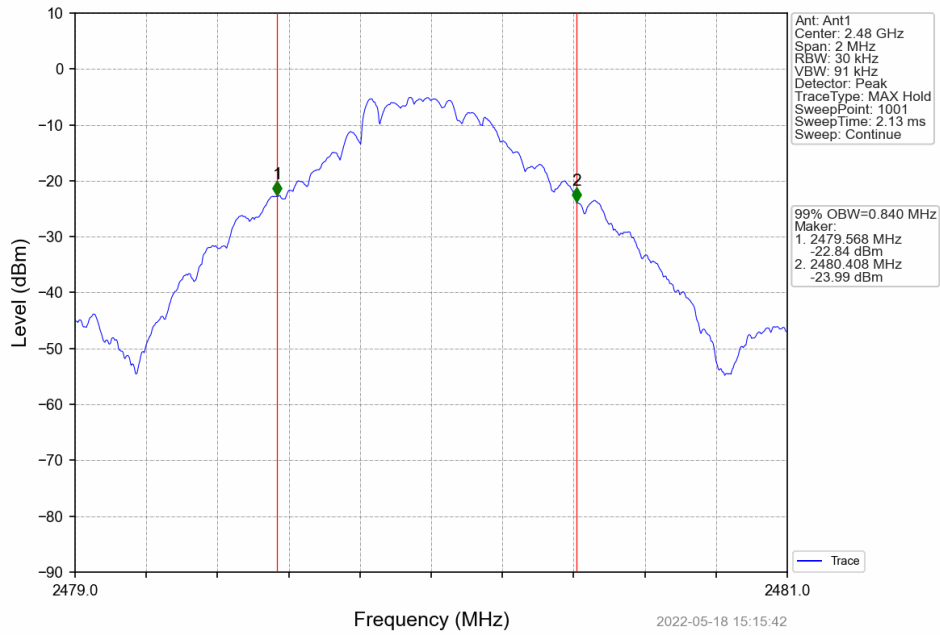
1.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	99% Occupied Bandwidth (MHz)	Verdict
					Result	
GFSK	SISO	2402	DH5	1	0.847	Pass
		2441	DH5	1	0.841	Pass
		2480	DH5	1	0.840	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.170	Pass
		2441	2DH5	1	1.172	Pass
		2480	2DH5	1	1.173	Pass
8DPSK	SISO	2402	3DH5	1	1.172	Pass
		2441	3DH5	1	1.174	Pass
		2480	3DH5	1	1.171	Pass

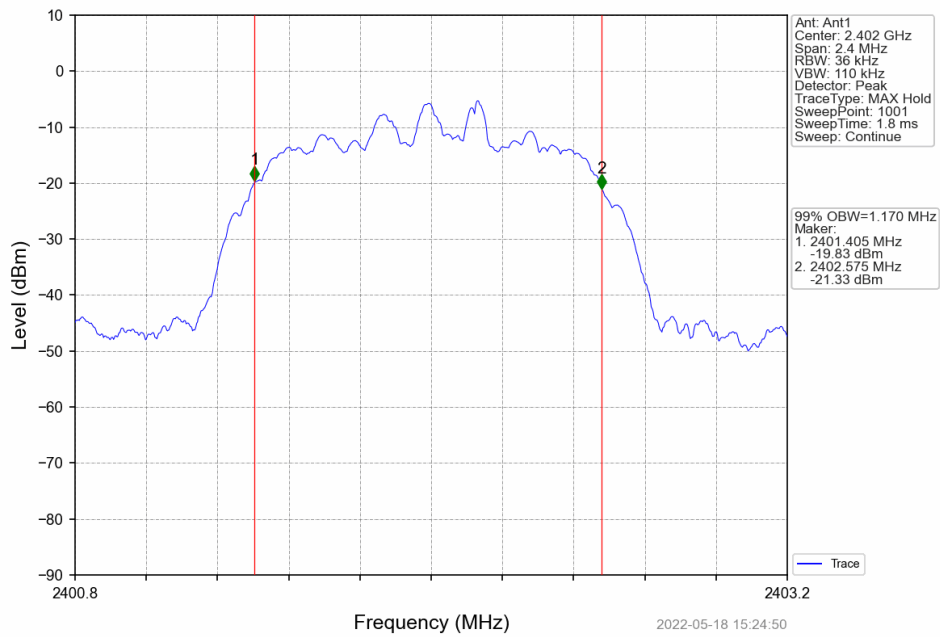
1.1.2 Test Graph



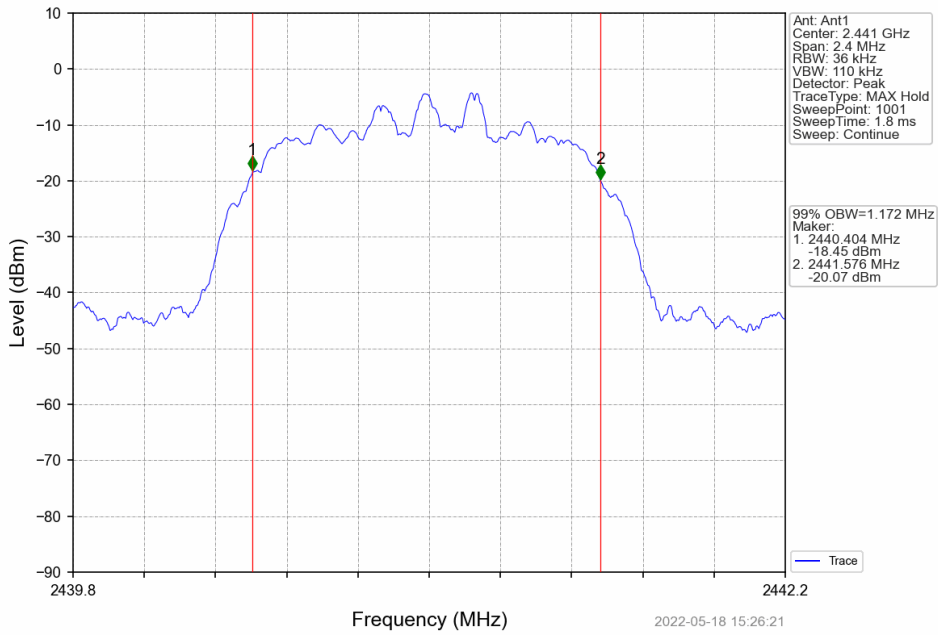
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



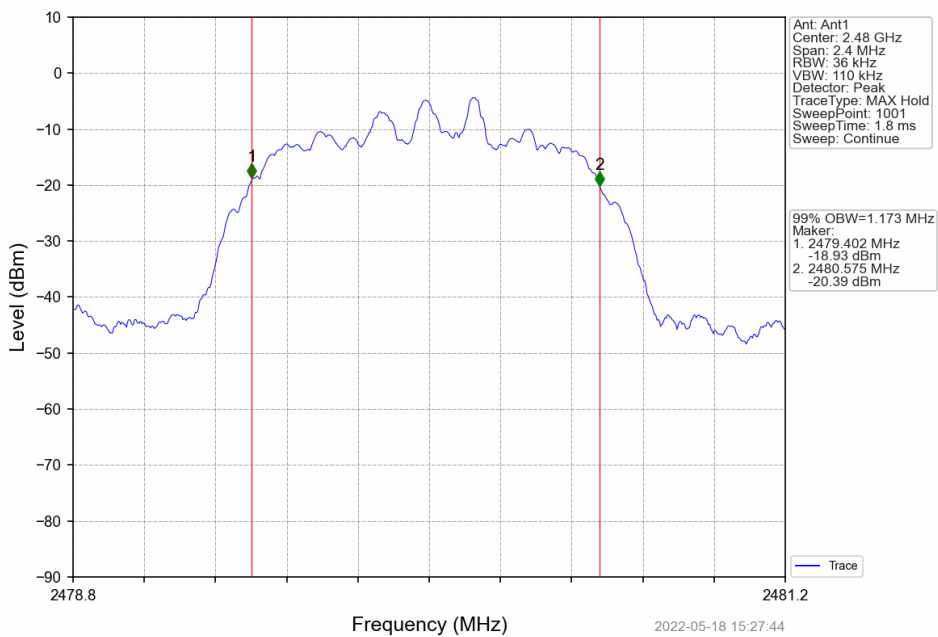
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



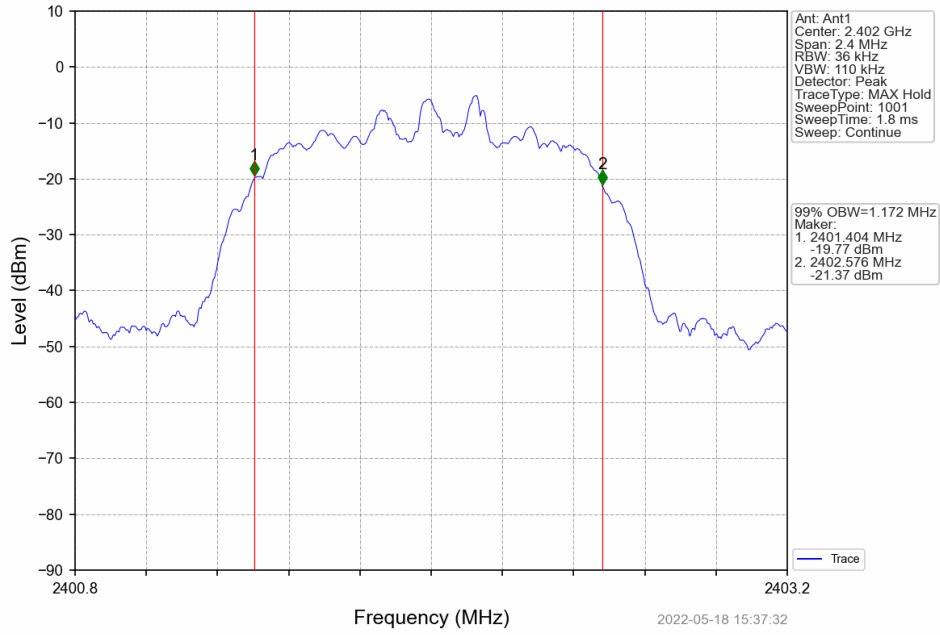
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



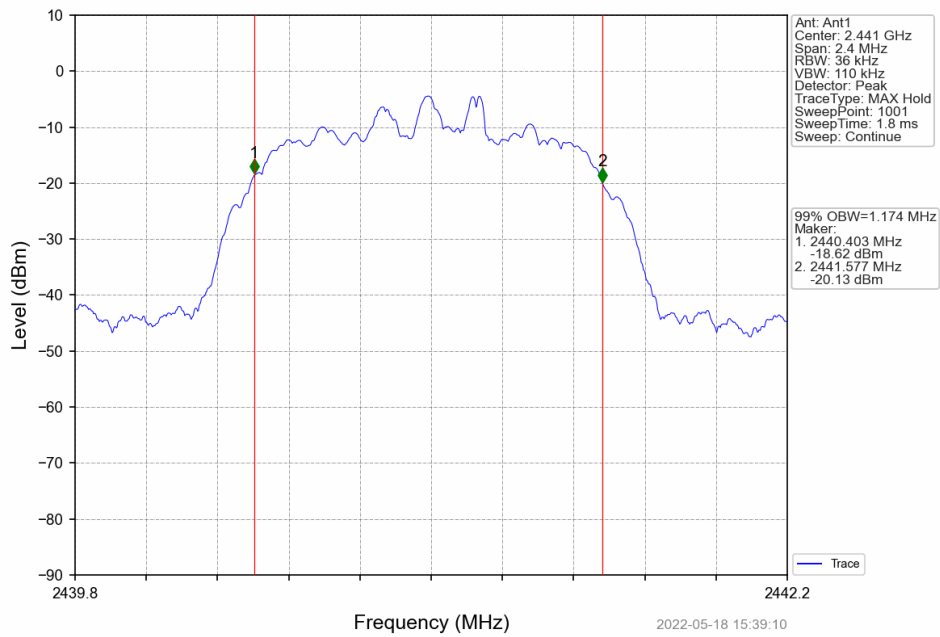
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

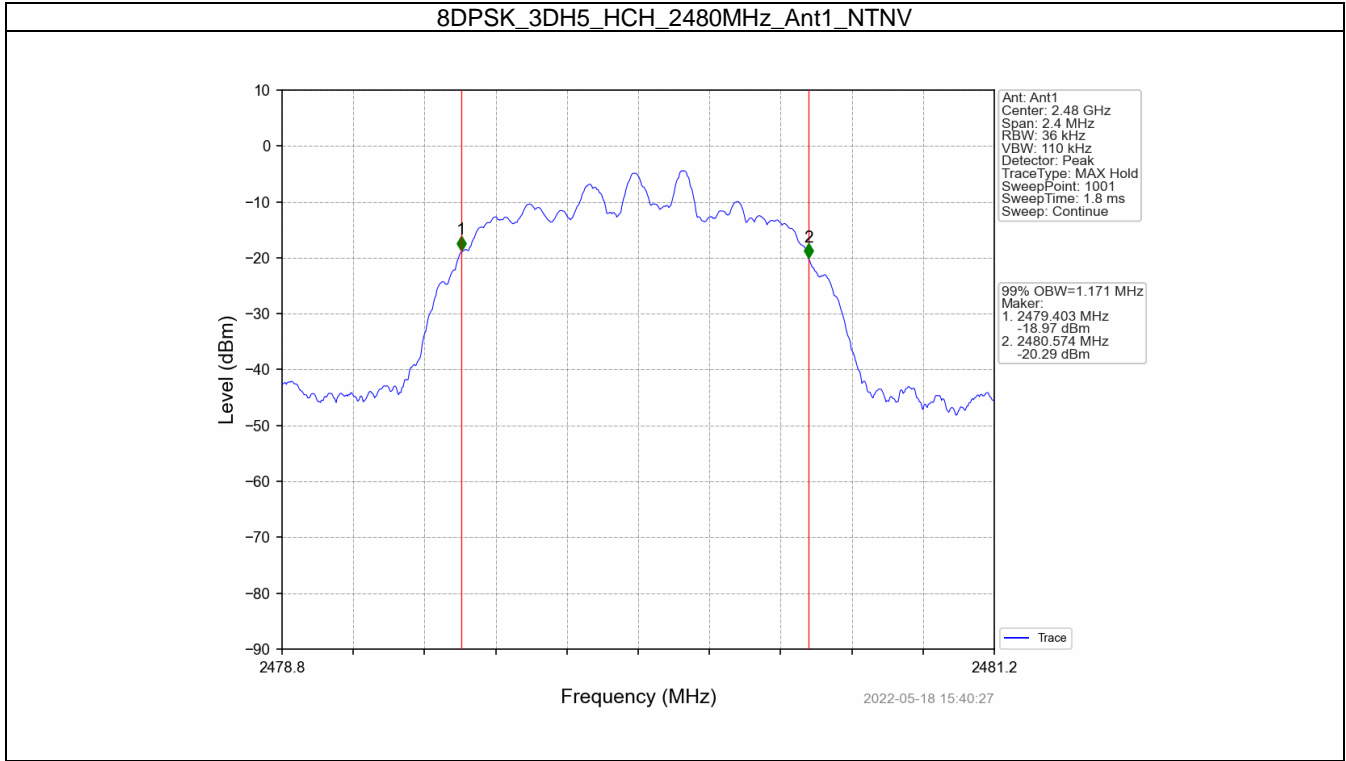


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



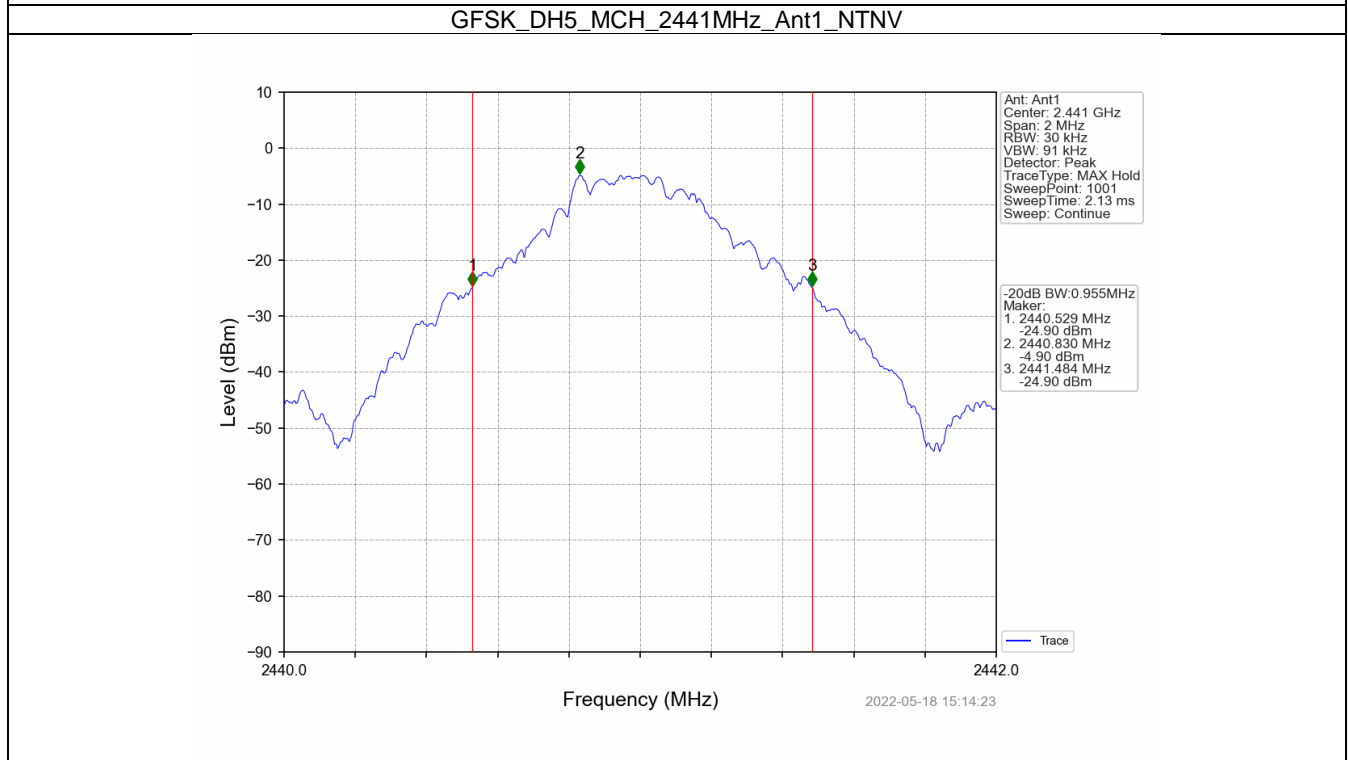
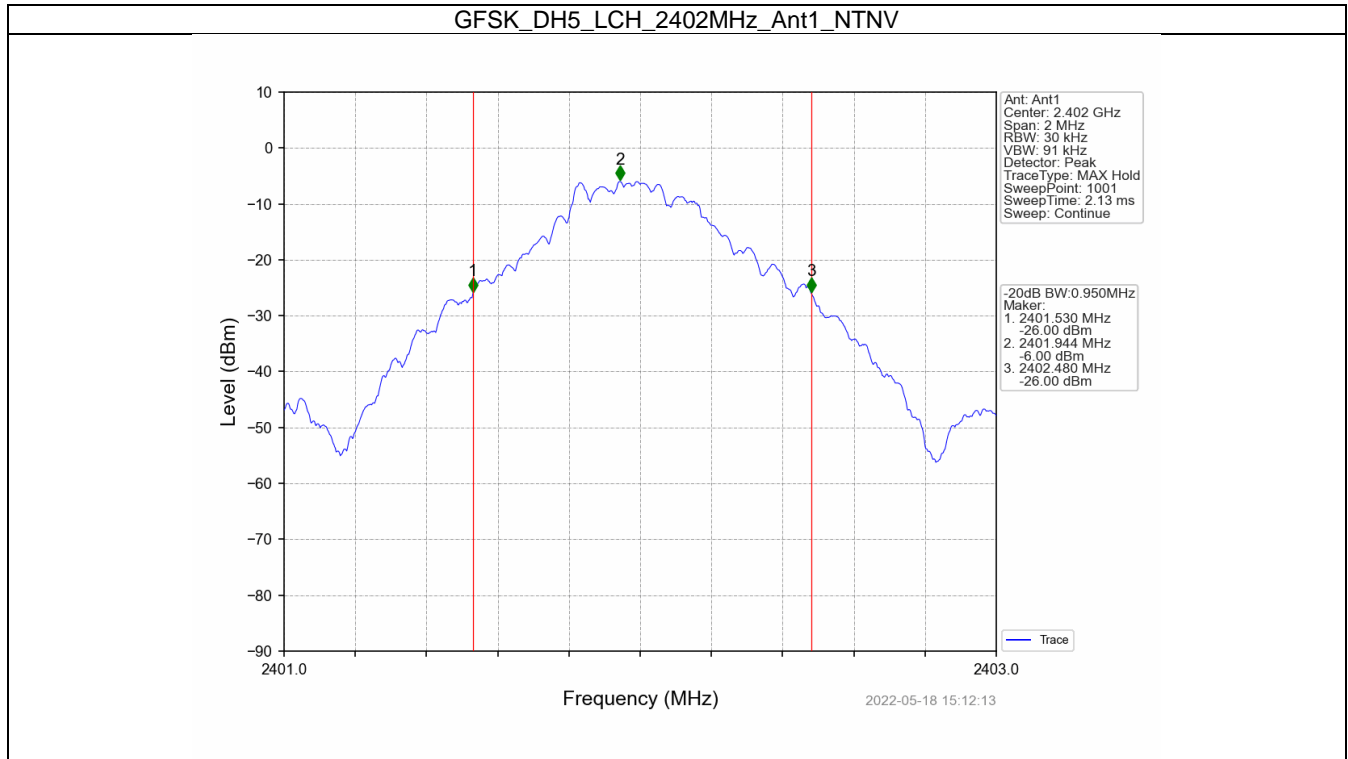


1.2 20dB BW

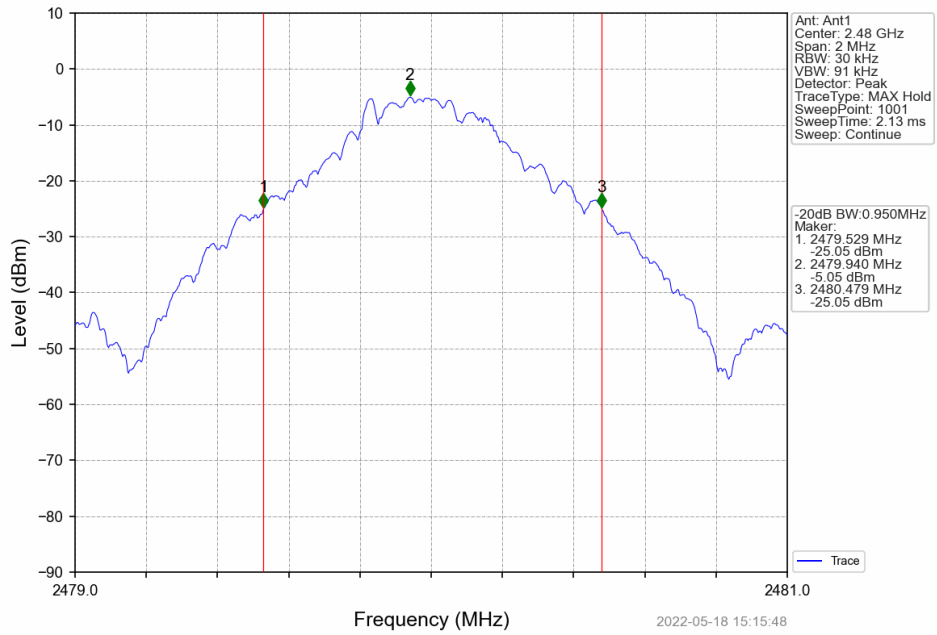
1.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)	Verdict
					Result	
GFSK	SISO	2402	DH5	1	0.950	Pass
		2441	DH5	1	0.955	Pass
		2480	DH5	1	0.950	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.285	Pass
		2441	2DH5	1	1.286	Pass
		2480	2DH5	1	1.307	Pass
8DPSK	SISO	2402	3DH5	1	1.284	Pass
		2441	3DH5	1	1.314	Pass
		2480	3DH5	1	1.314	Pass

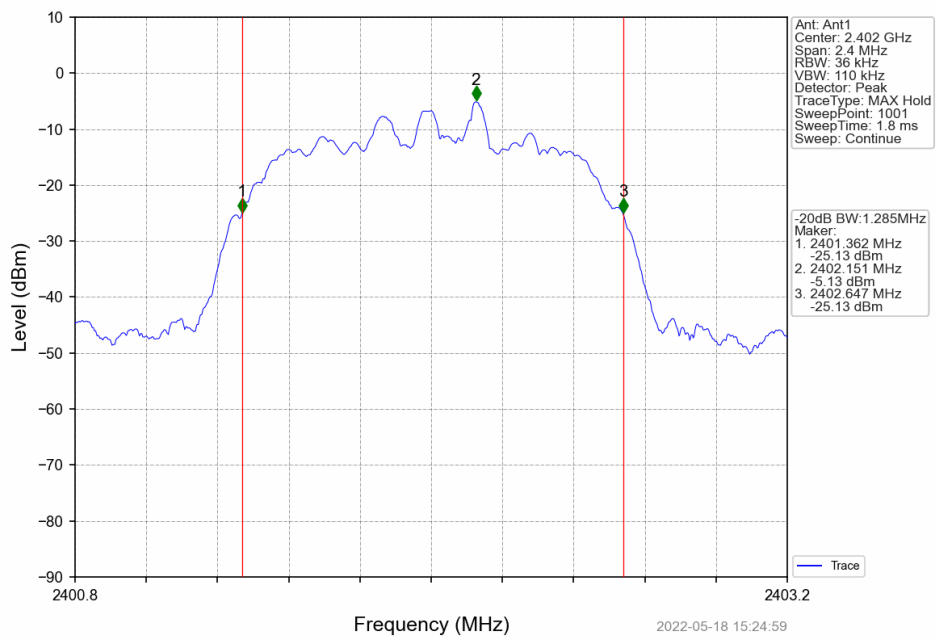
1.2.2 Test Graph



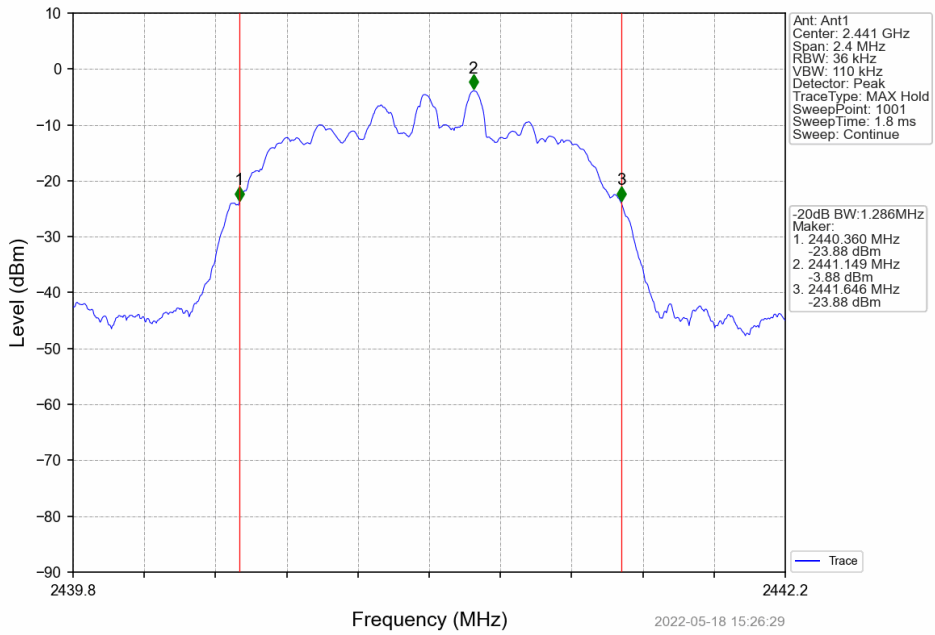
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



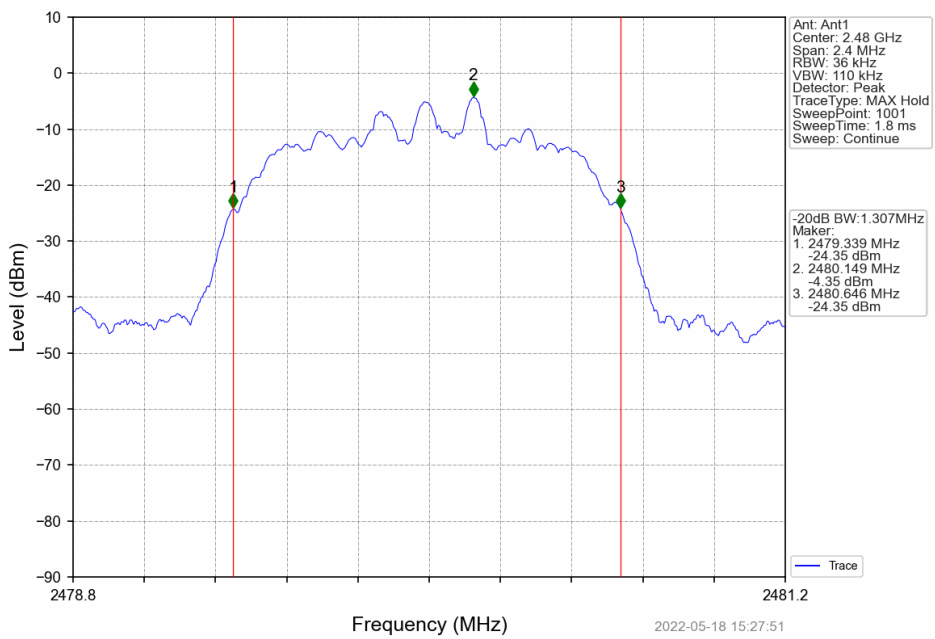
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



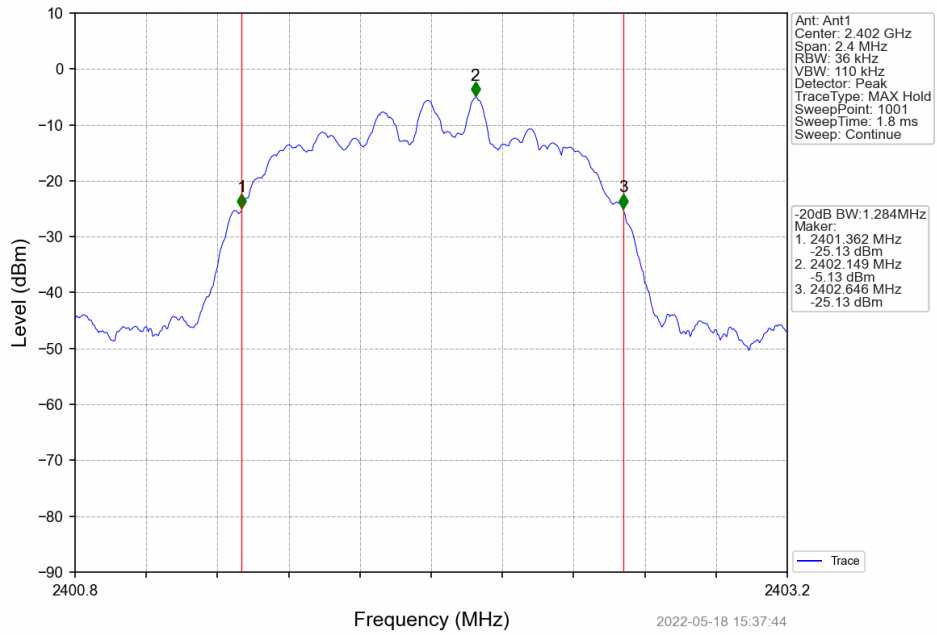
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



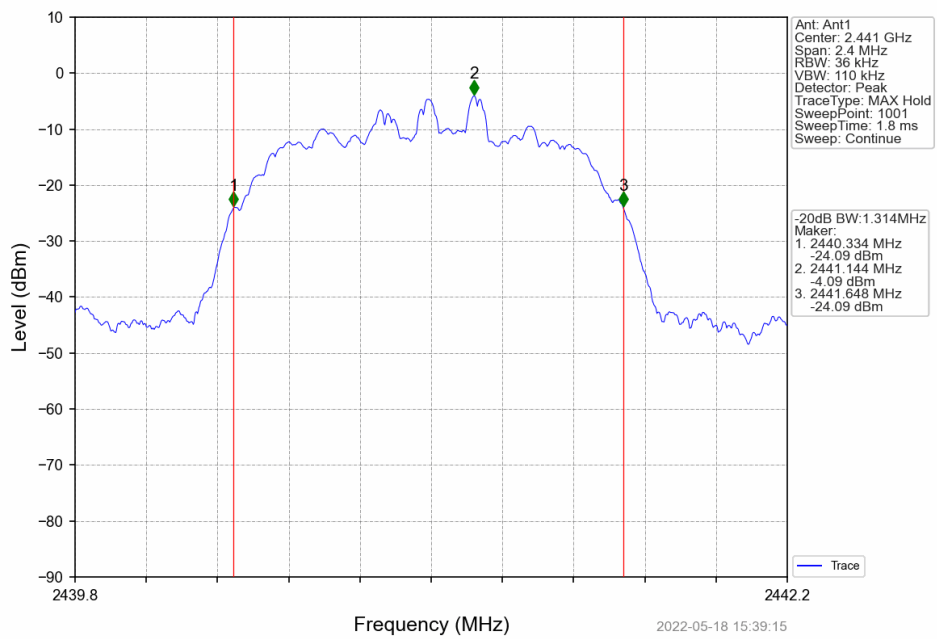
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

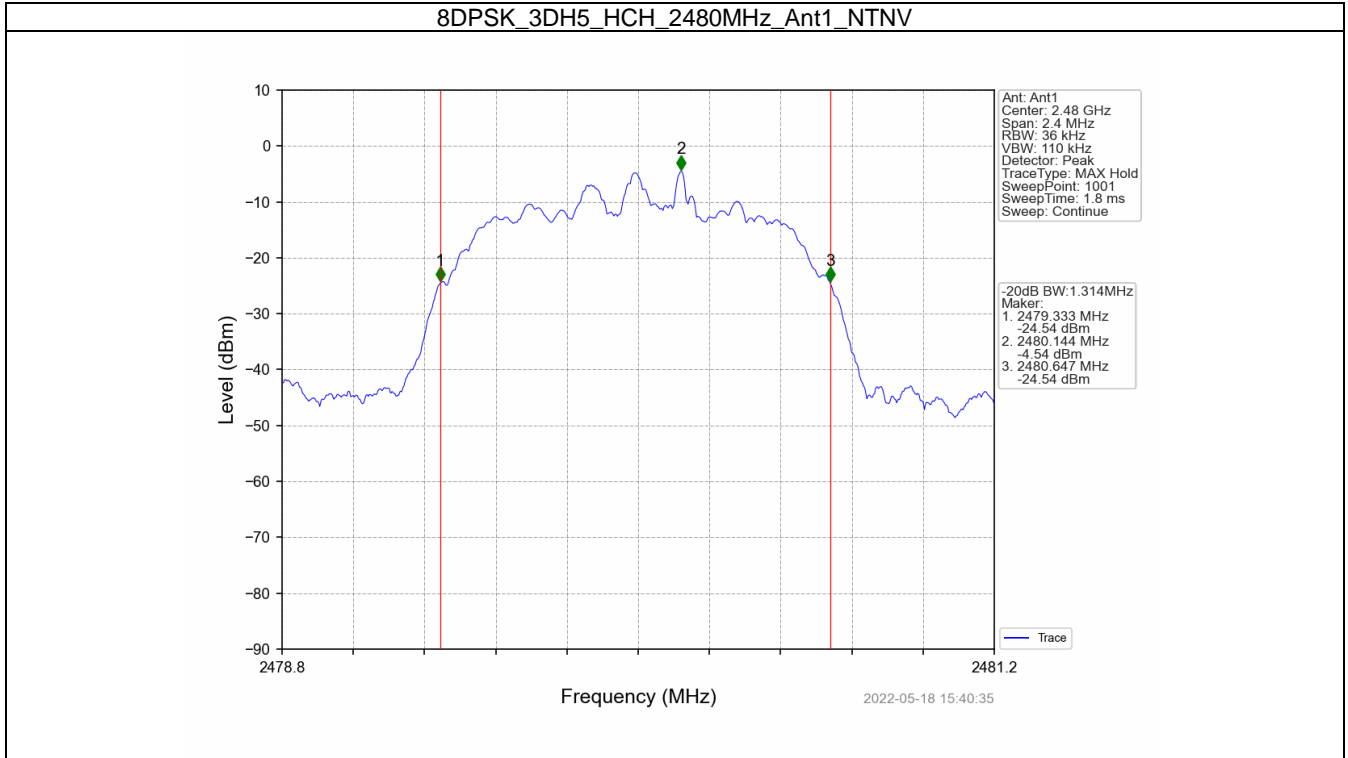


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





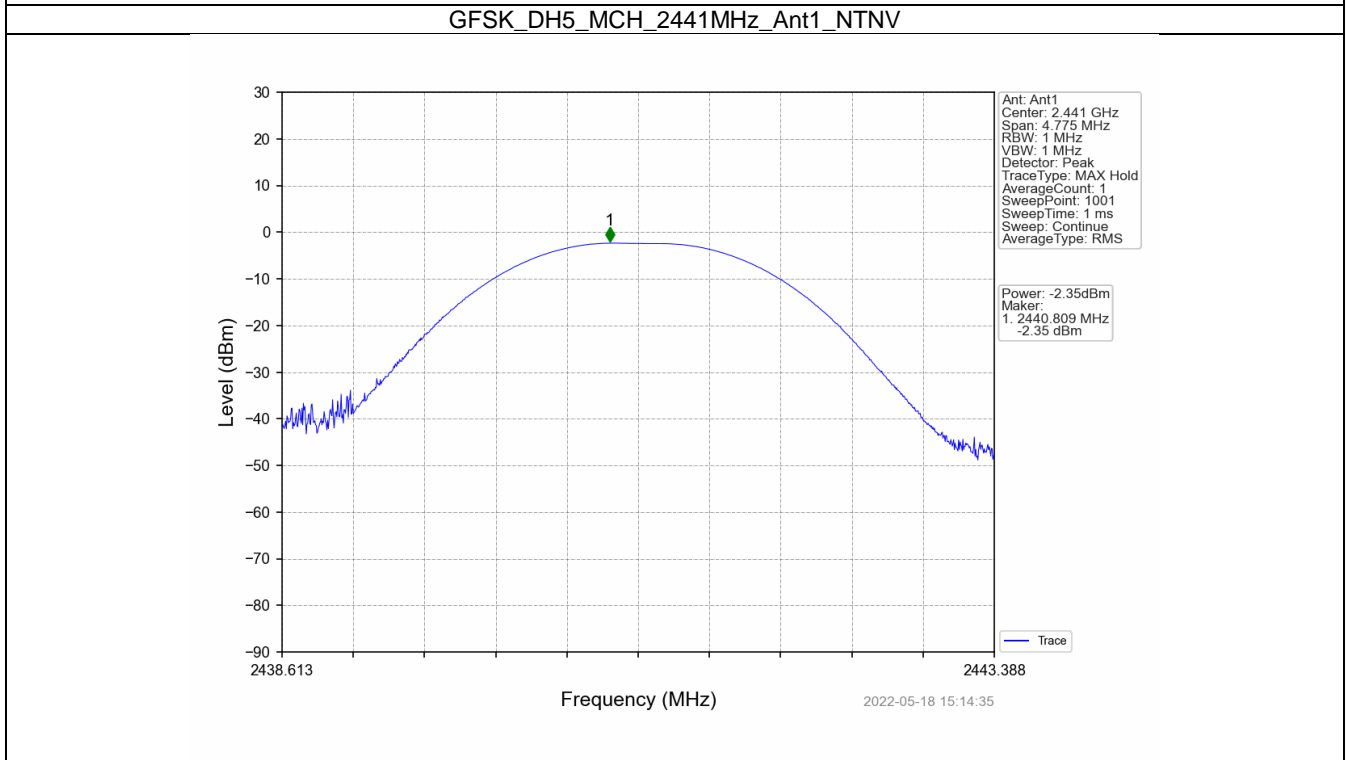
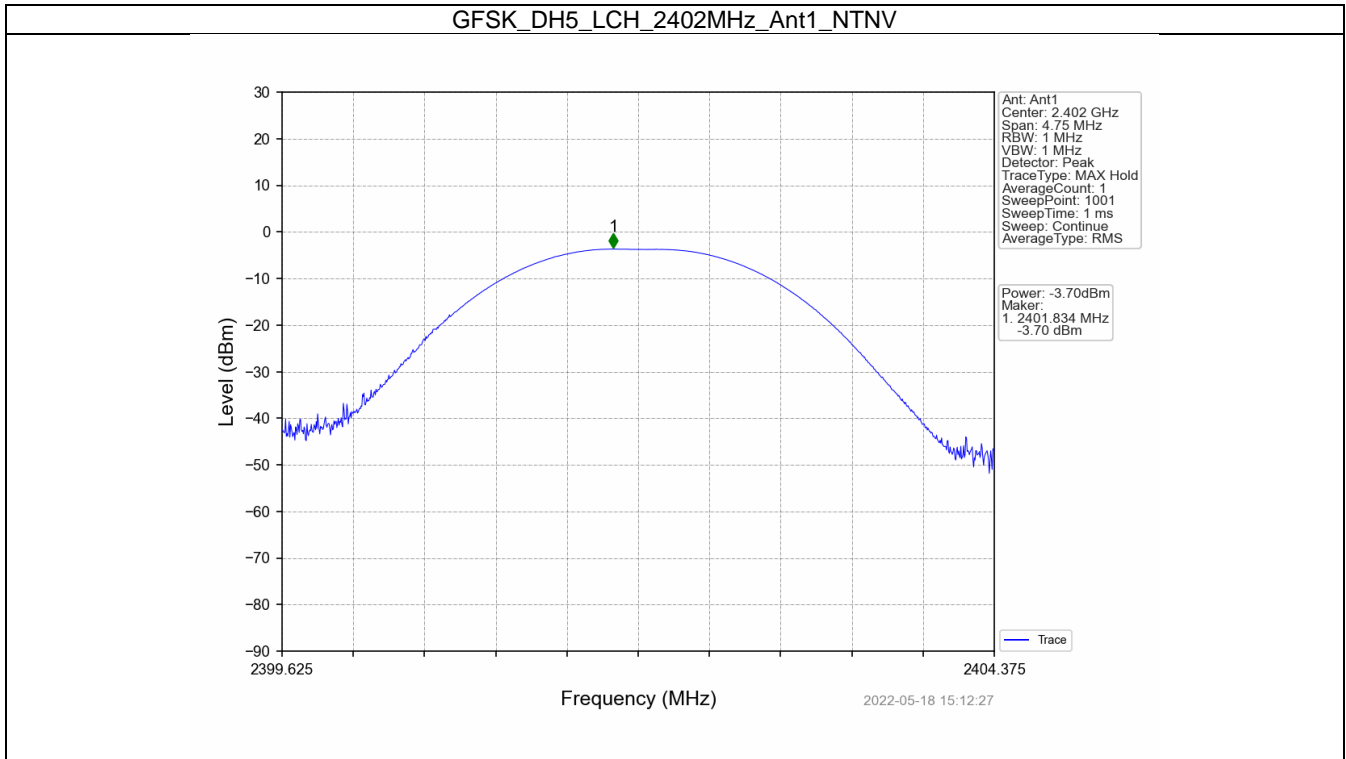
2. Maximum Conducted Output Power

2.1 Power

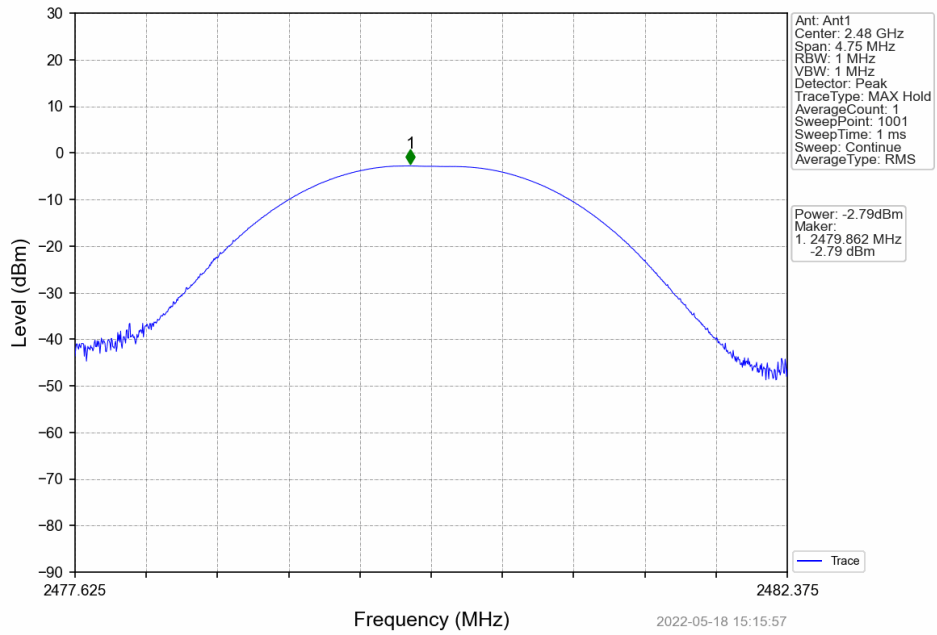
2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	-3.70	<=30	Pass
		2441	DH5	-2.35	<=30	Pass
		2480	DH5	-2.79	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	-2.82	<=20.97	Pass
		2441	2DH5	-1.60	<=20.97	Pass
		2480	2DH5	-2.04	<=20.97	Pass
8DPSK	SISO	2402	3DH5	-2.82	<=20.97	Pass
		2441	3DH5	-1.59	<=20.97	Pass
		2480	3DH5	-2.03	<=20.97	Pass

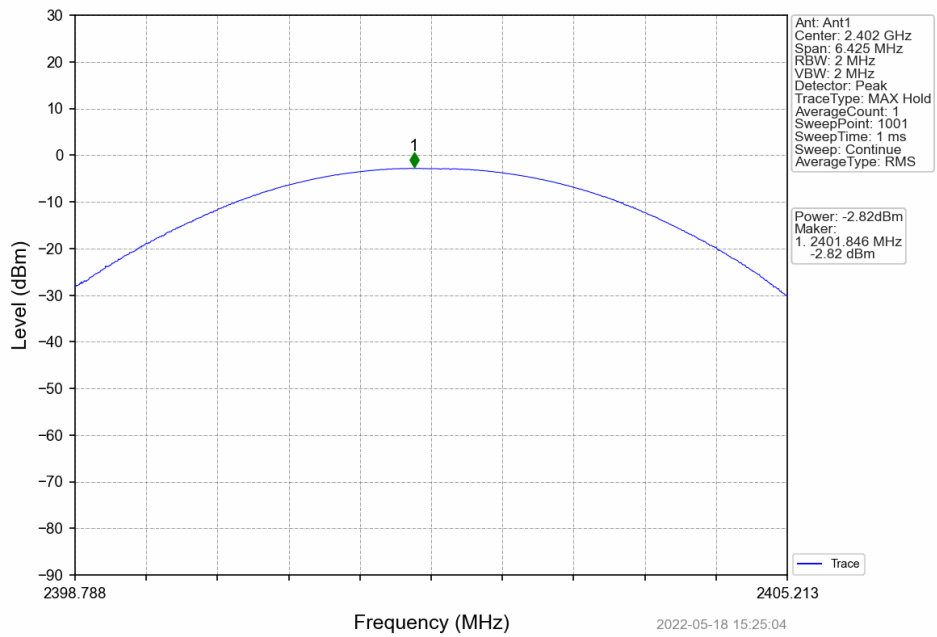
2.1.2 Test Graph



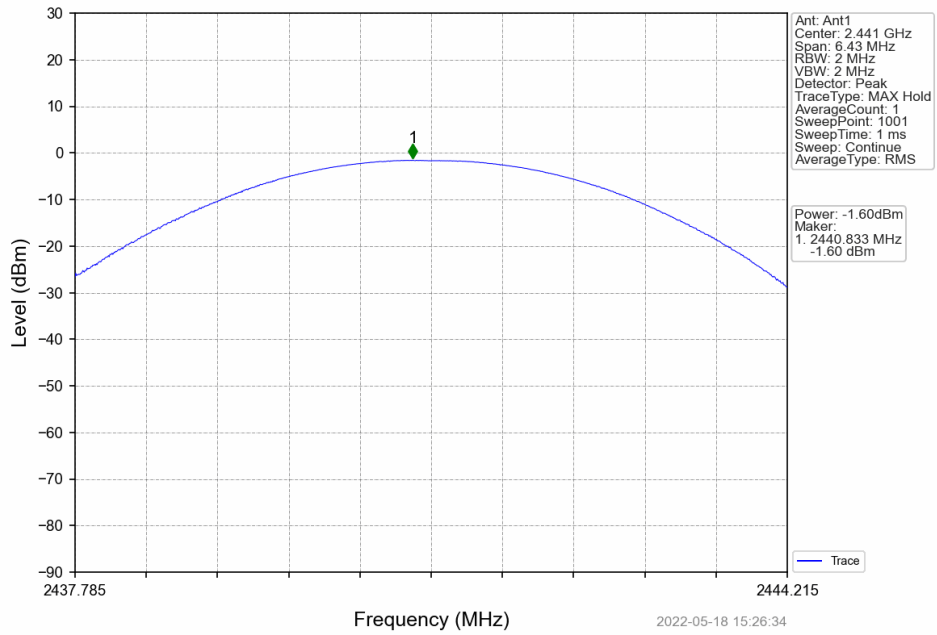
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



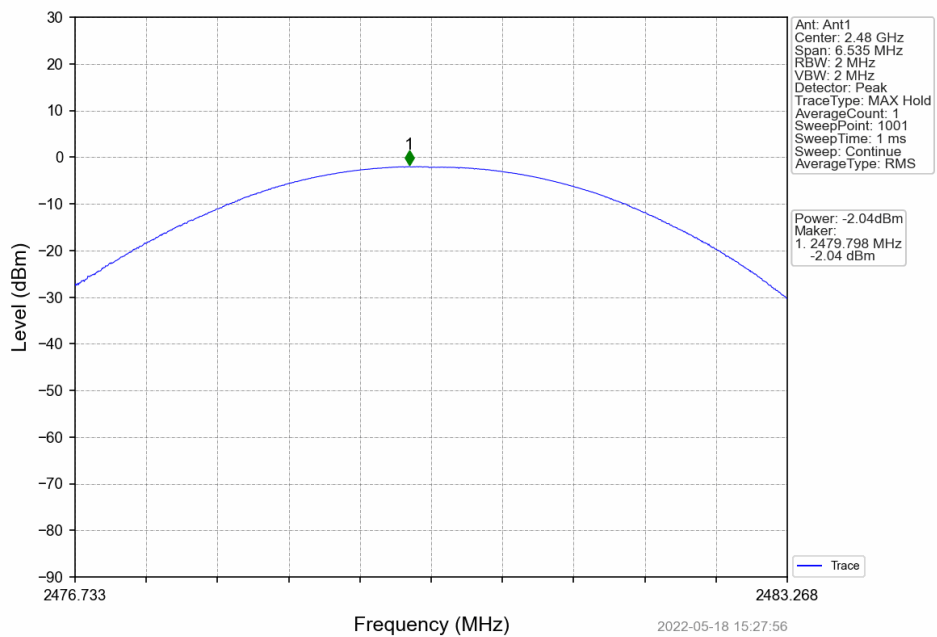
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



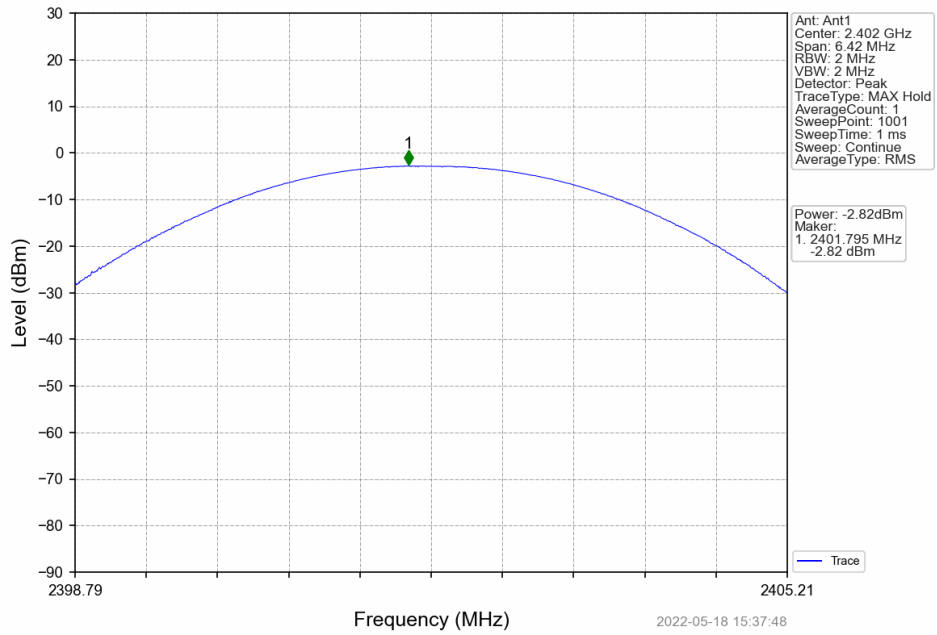
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



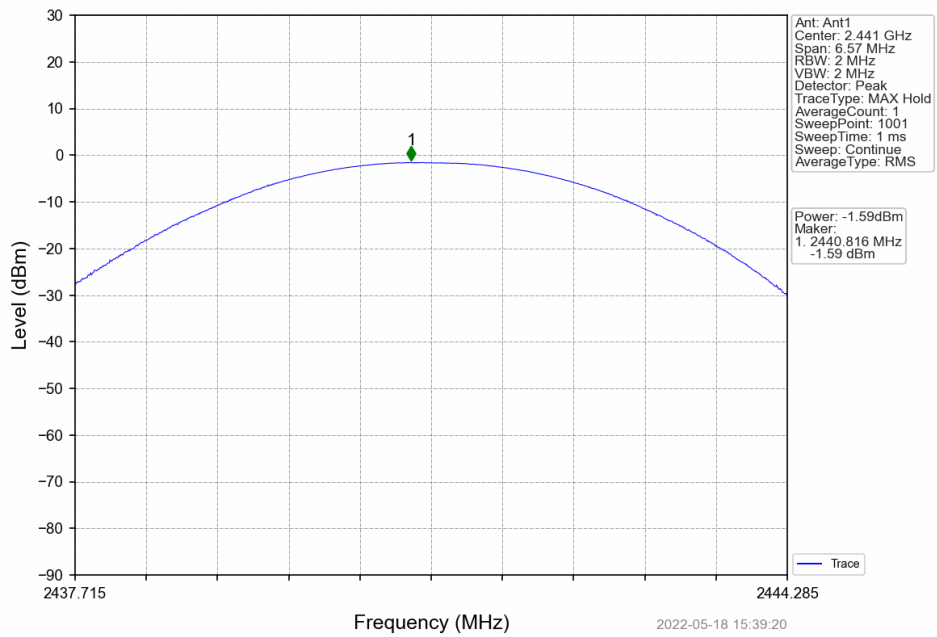
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

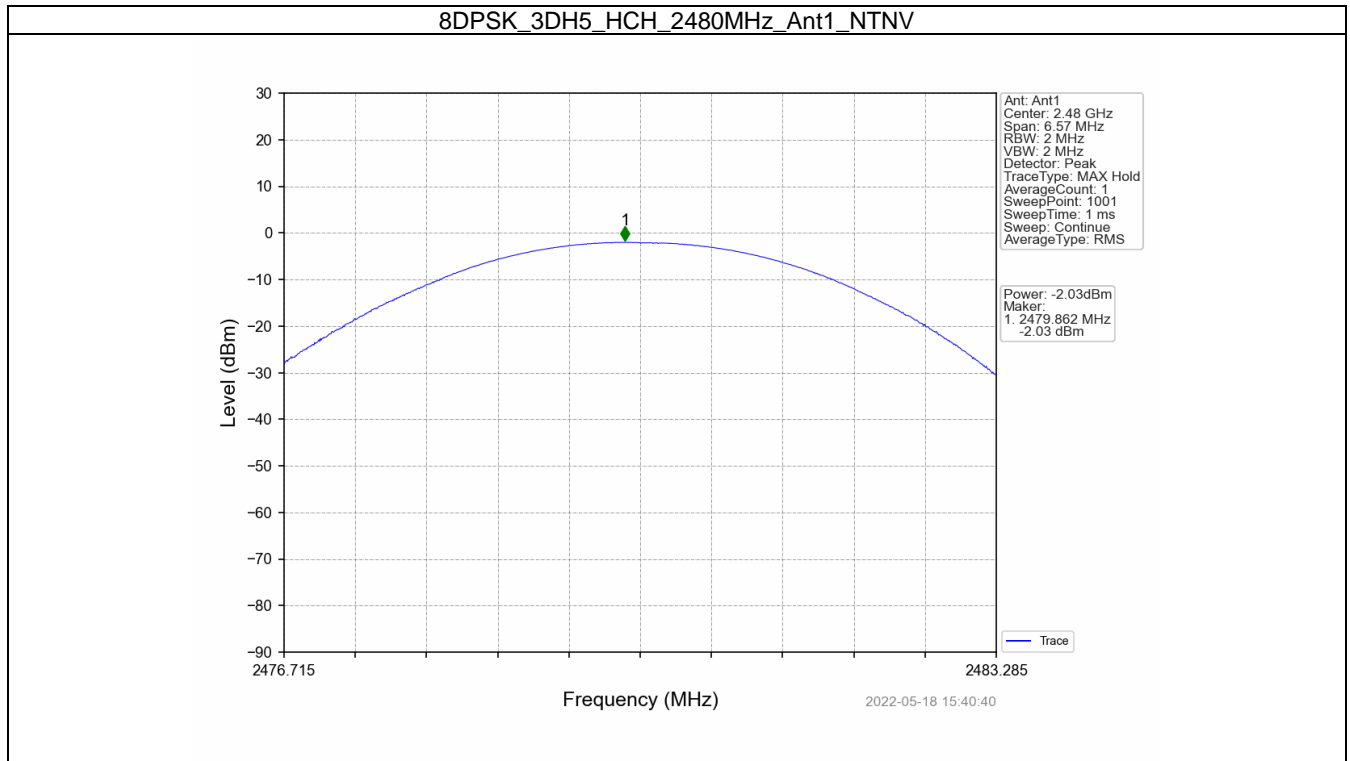


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





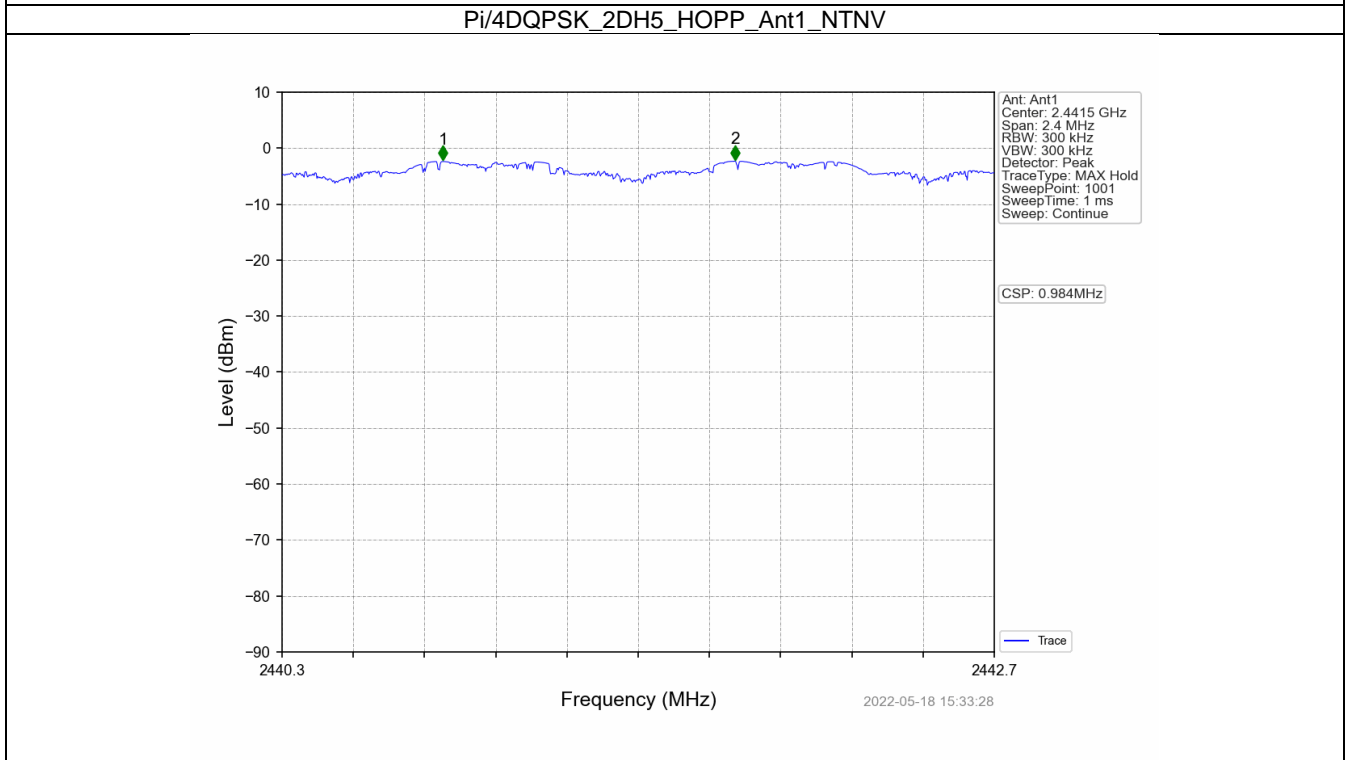
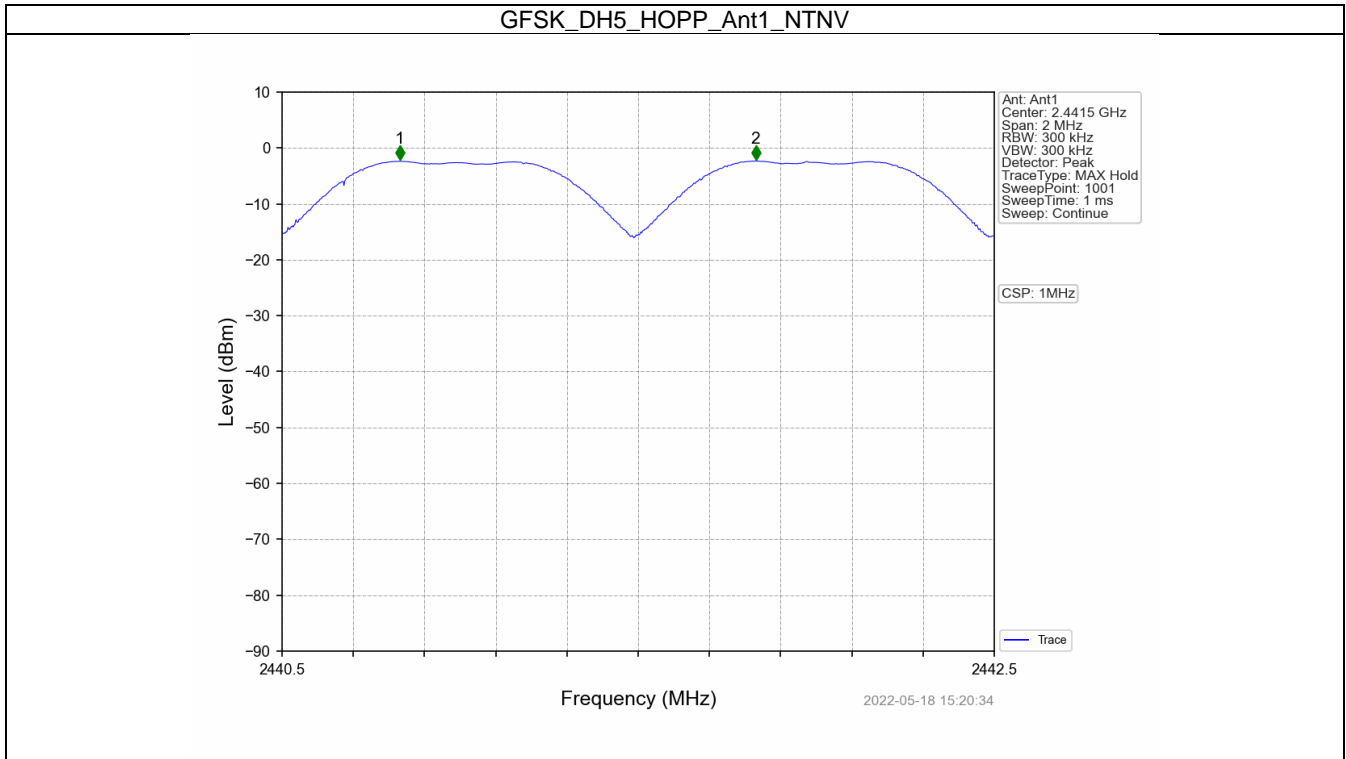
3. Carrier Frequency Separation

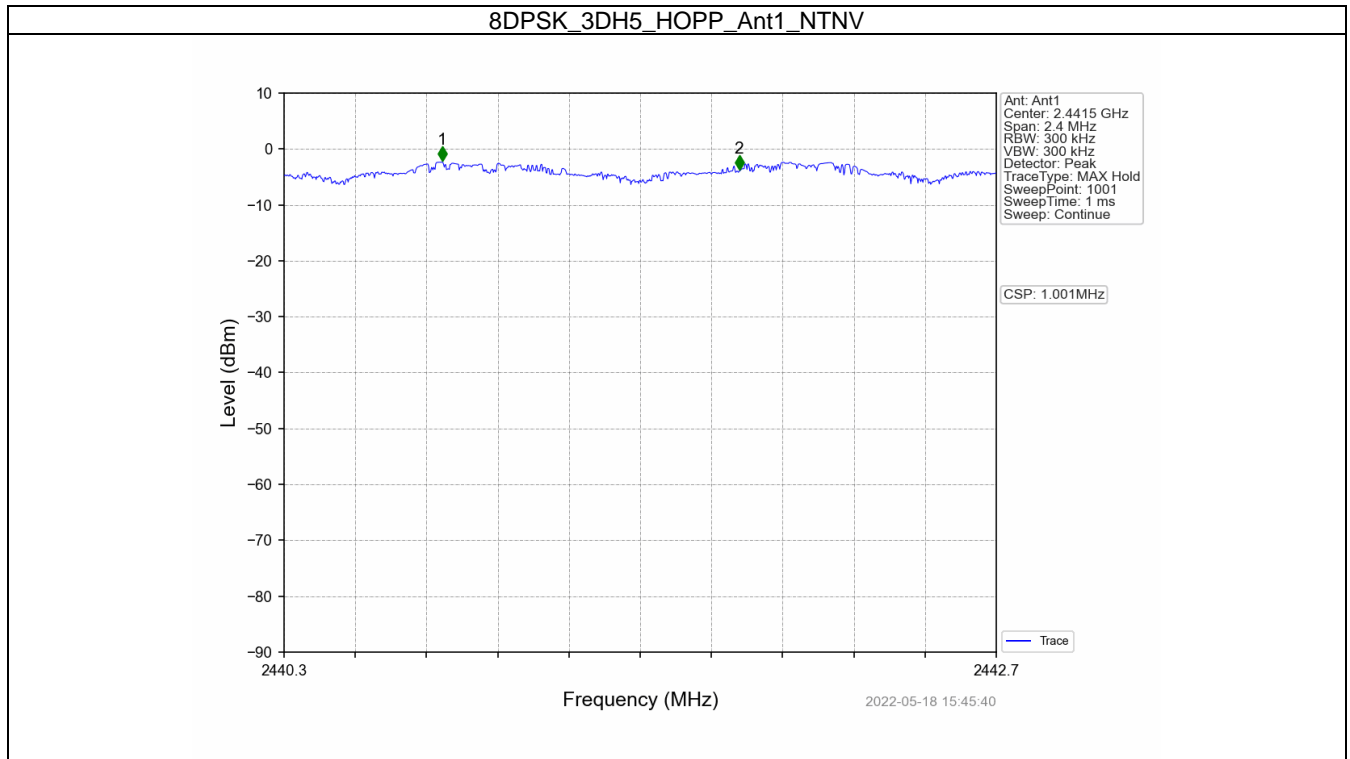
3.1 Ant1

3.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.000	0.955	≥ 0.955	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	0.984	1.307	≥ 0.871	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.314	≥ 0.876	Pass

3.1.2 Test Graph





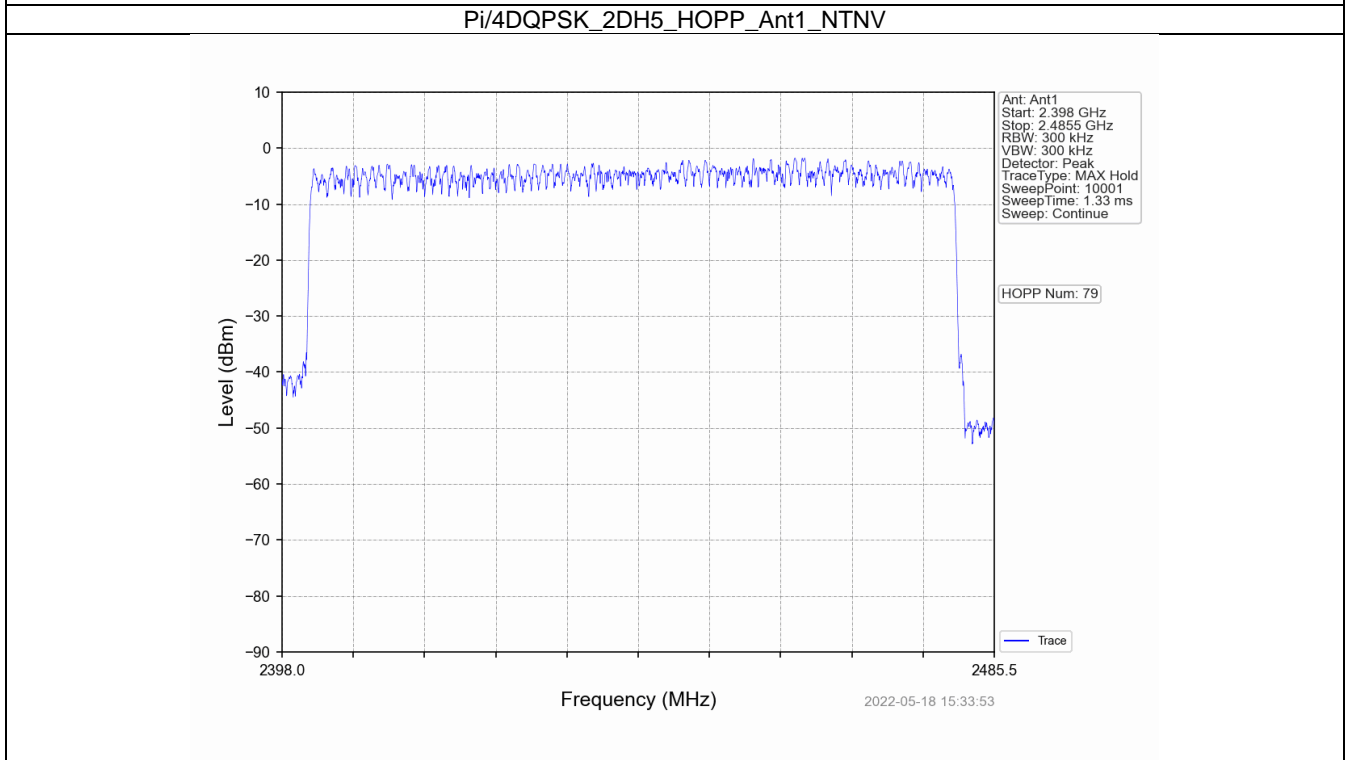
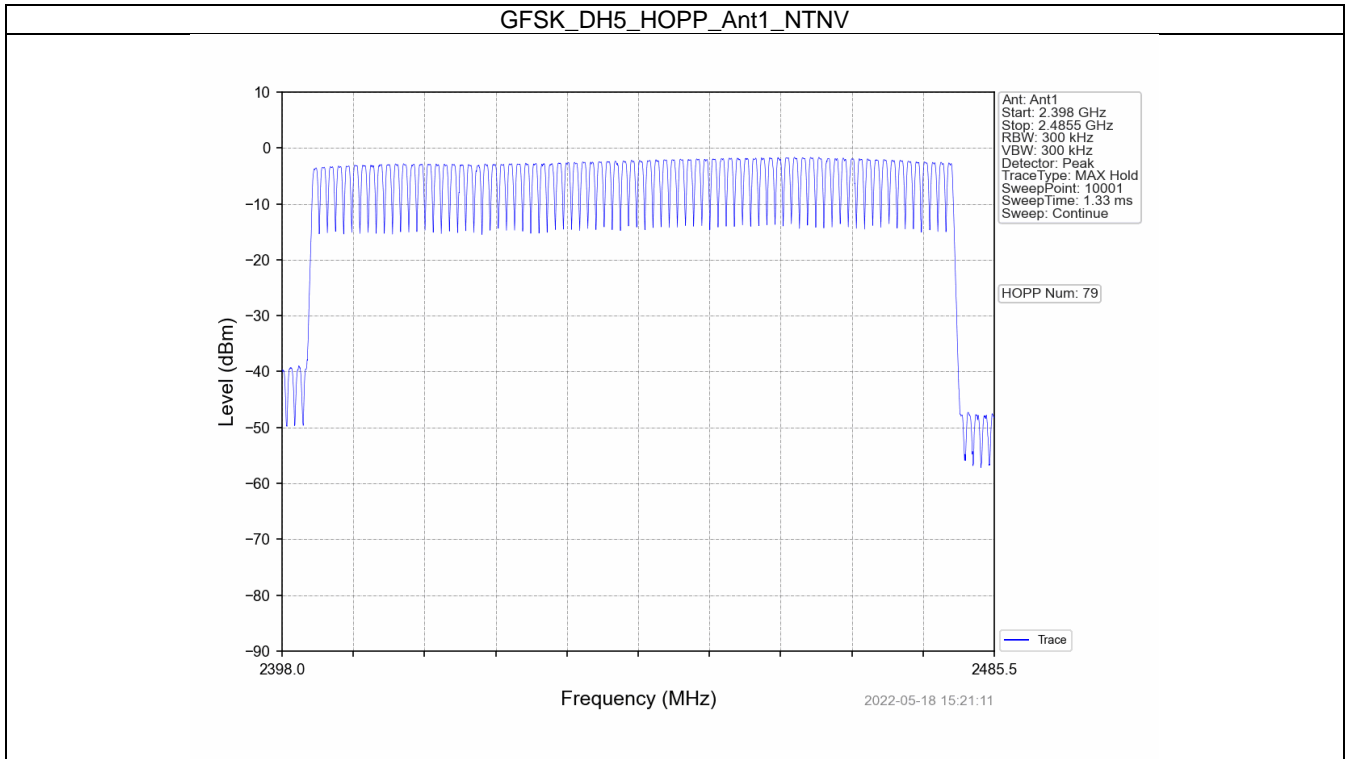
4. Number of Hopping Frequencies

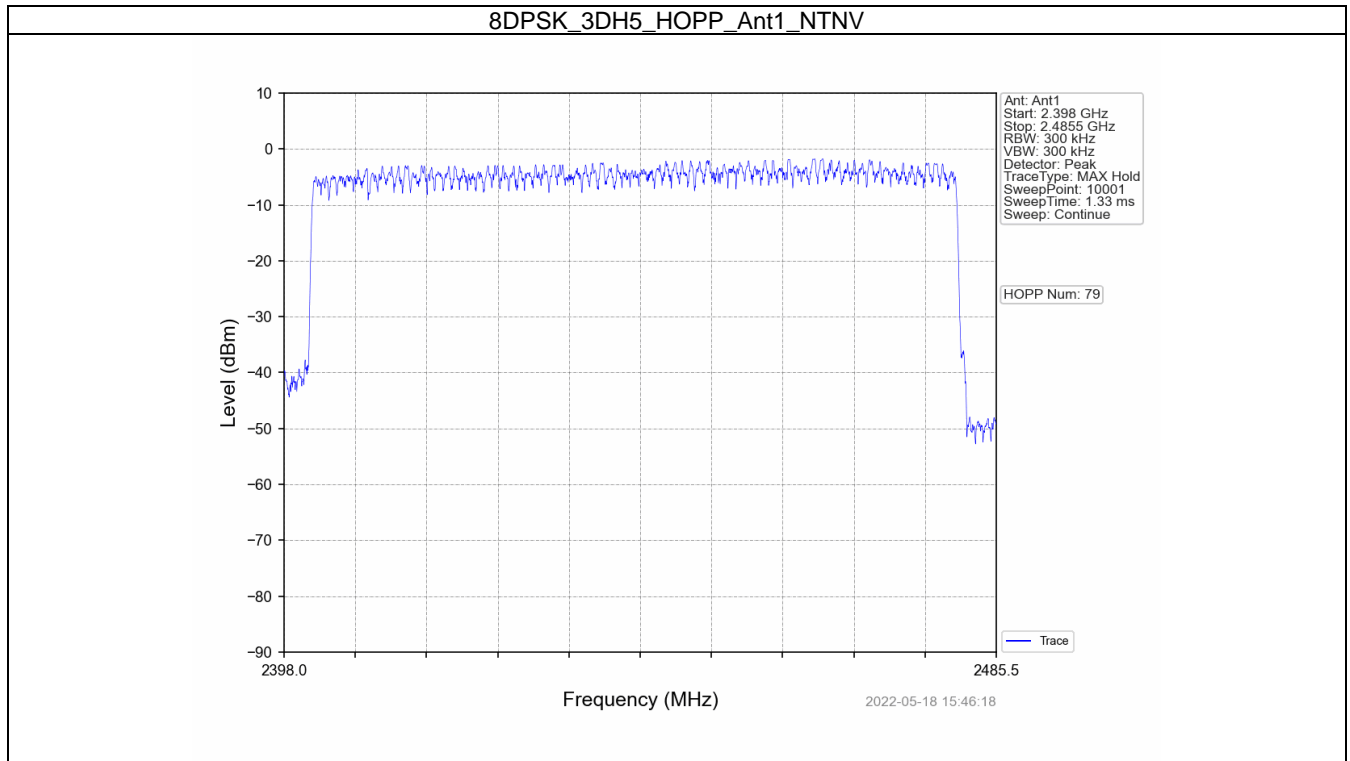
4.1 HoppNum

4.1.1 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

4.1.2 Test Graph





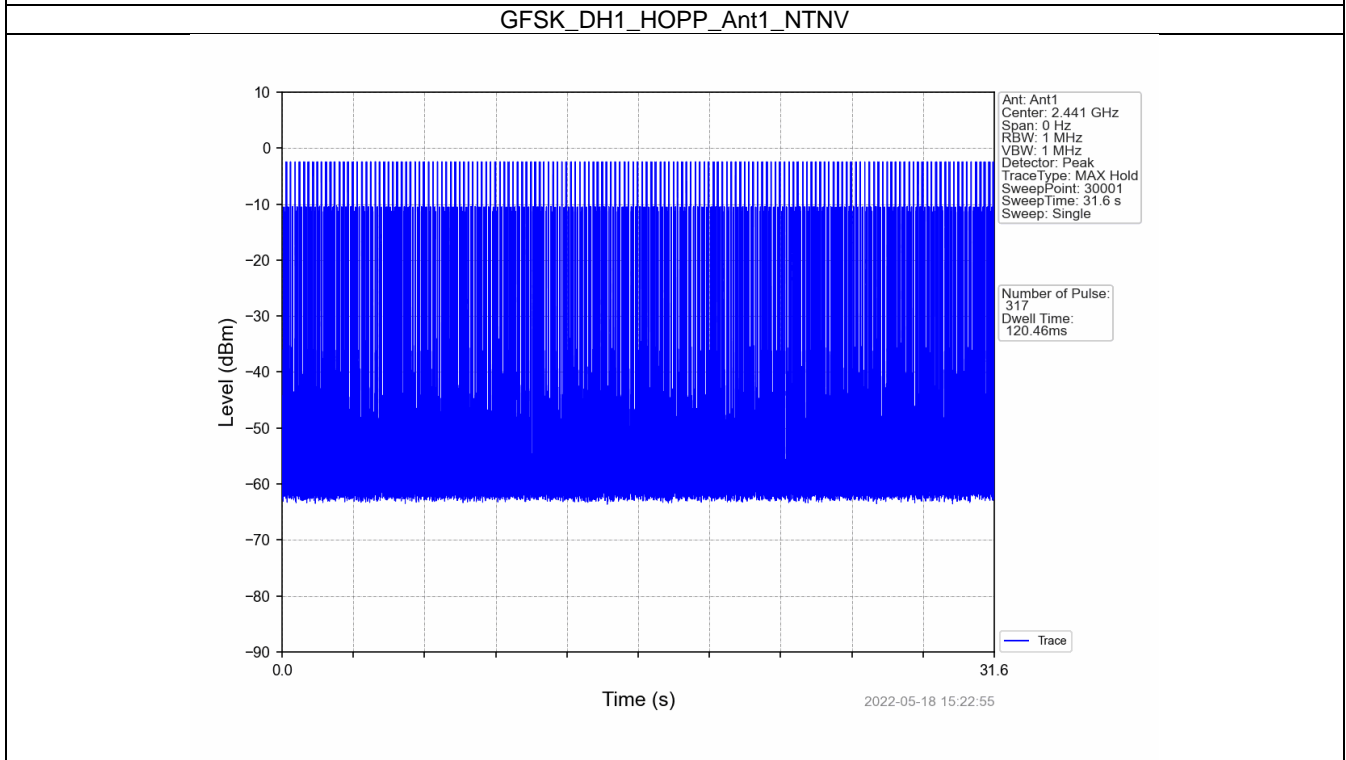
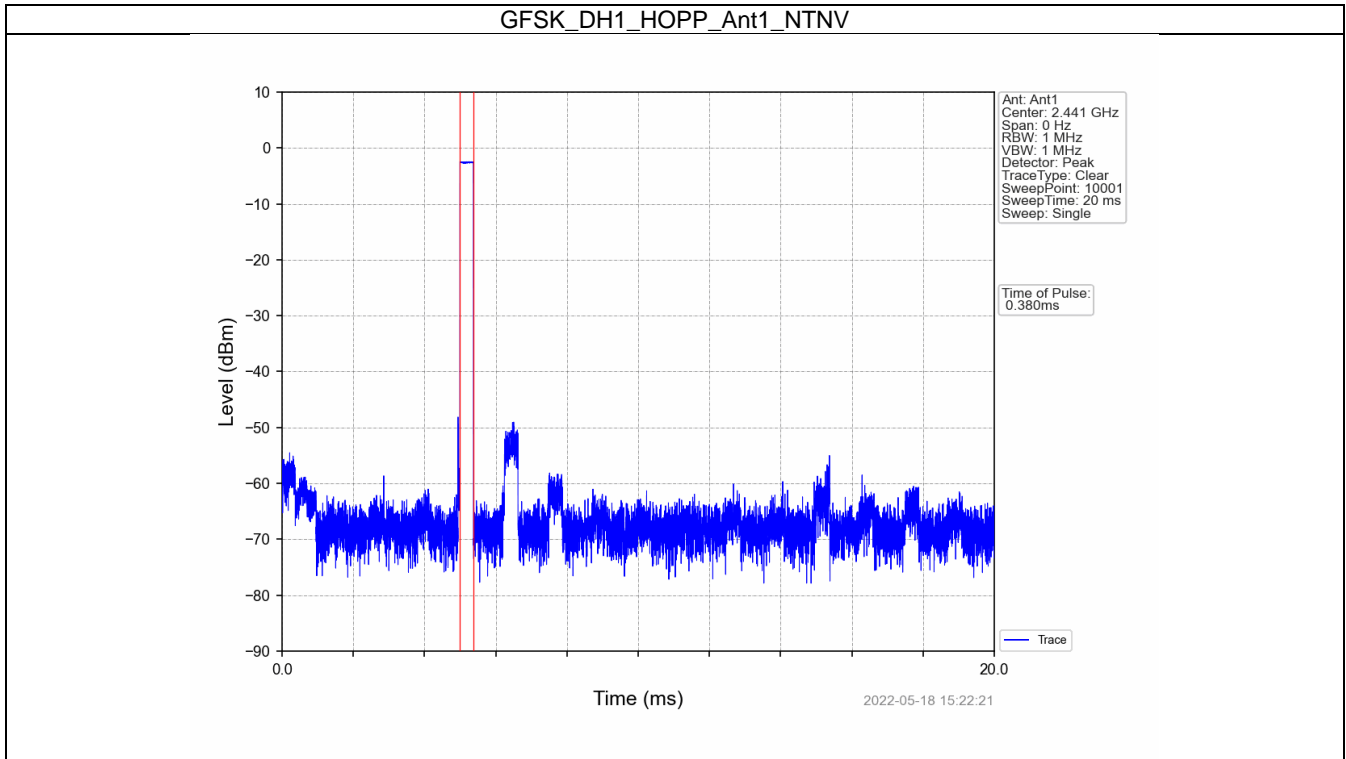
5. Time of Occupancy (Dwell Time)

5.1 Ant1

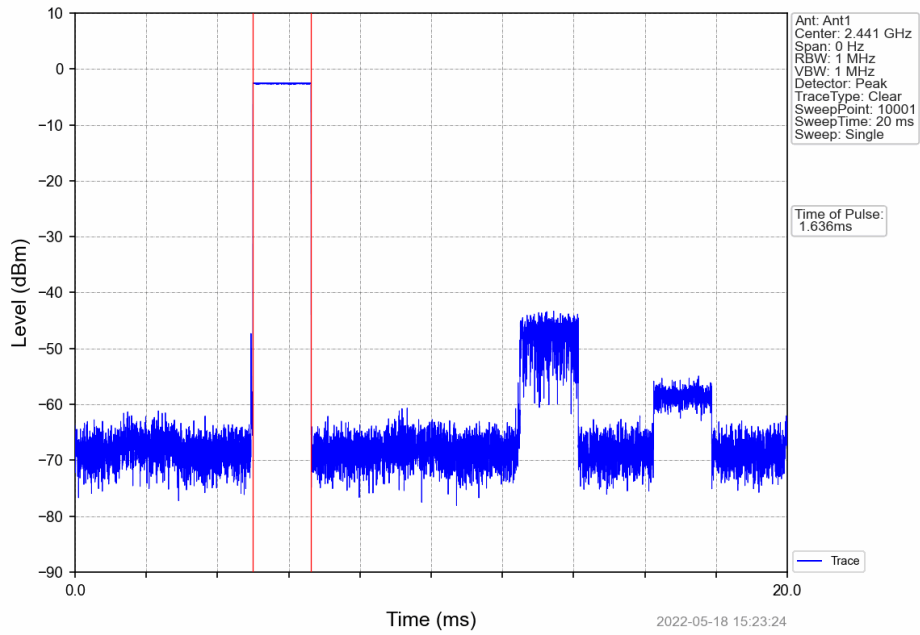
5.1.1 Test Result

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	0.380	31.600	317	120.460	<=400	Pass
			DH3	1.636	31.600	92	150.512	<=400	Pass
			DH5	2.884	31.600	68	196.112	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.390	31.600	319	124.410	<=400	Pass
			2DH3	1.644	31.600	110	180.840	<=400	Pass
			2DH5	2.890	31.600	67	193.630	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.390	31.600	320	124.800	<=400	Pass
			3DH3	1.642	31.600	109	178.978	<=400	Pass
			3DH5	2.890	31.600	58	167.620	<=400	Pass

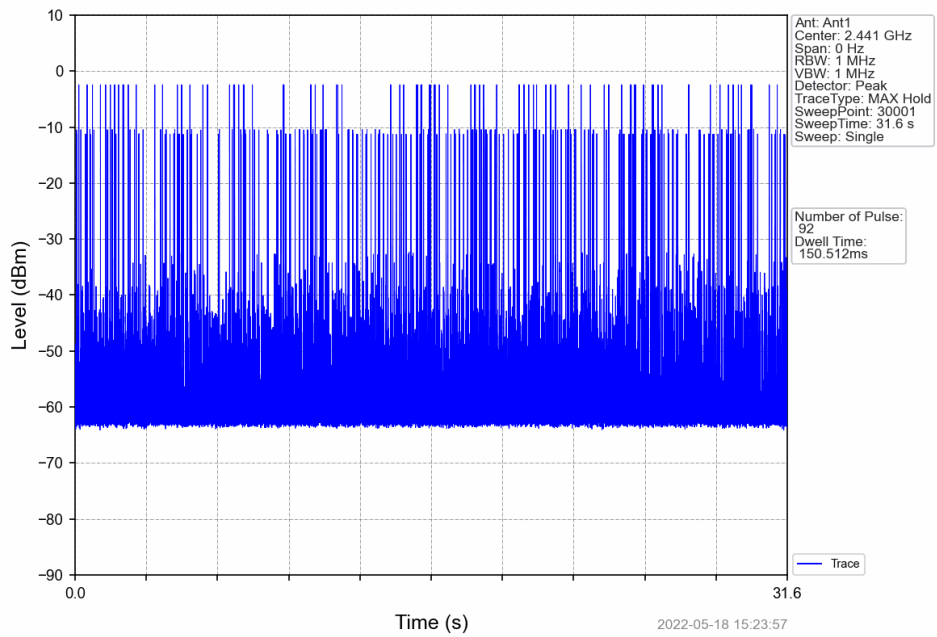
5.1.2 Test Graph



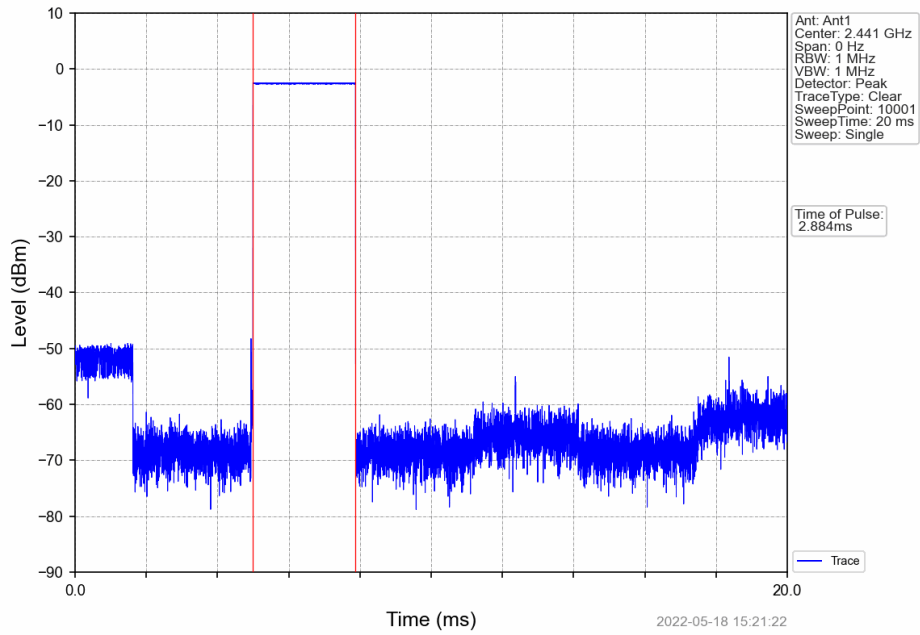
GFSK_DH3_HOPP_Ant1_NTNV



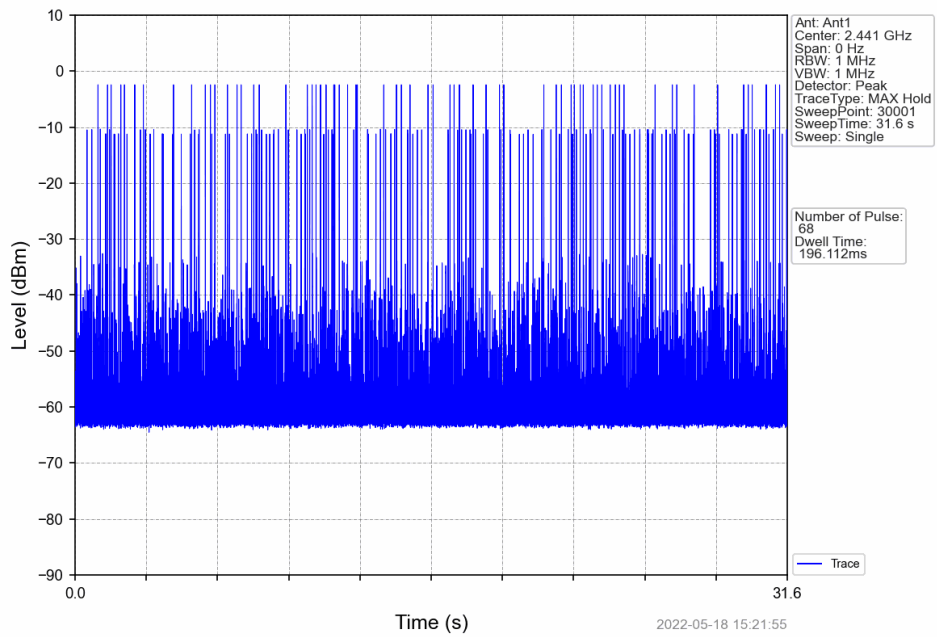
GFSK_DH3_HOPP_Ant1_NTNV



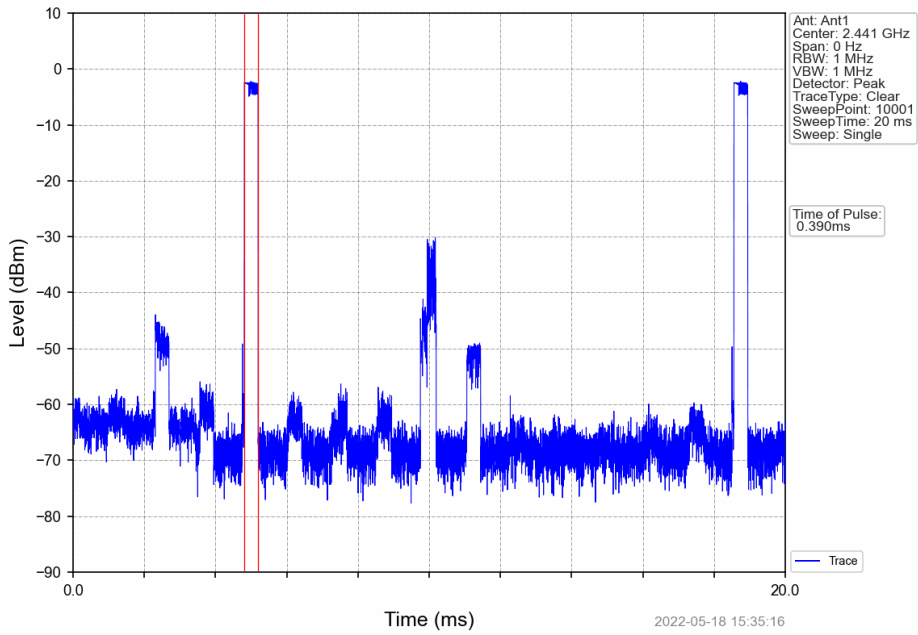
GFSK_DH5_HOPP_Ant1_NTNV



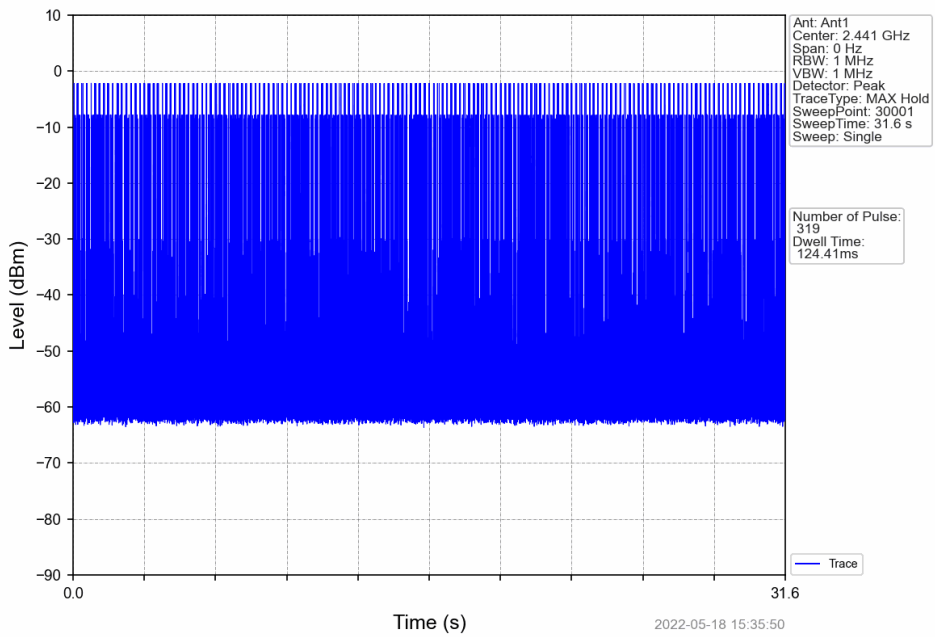
GFSK_DH5_HOPP_Ant1_NTNV



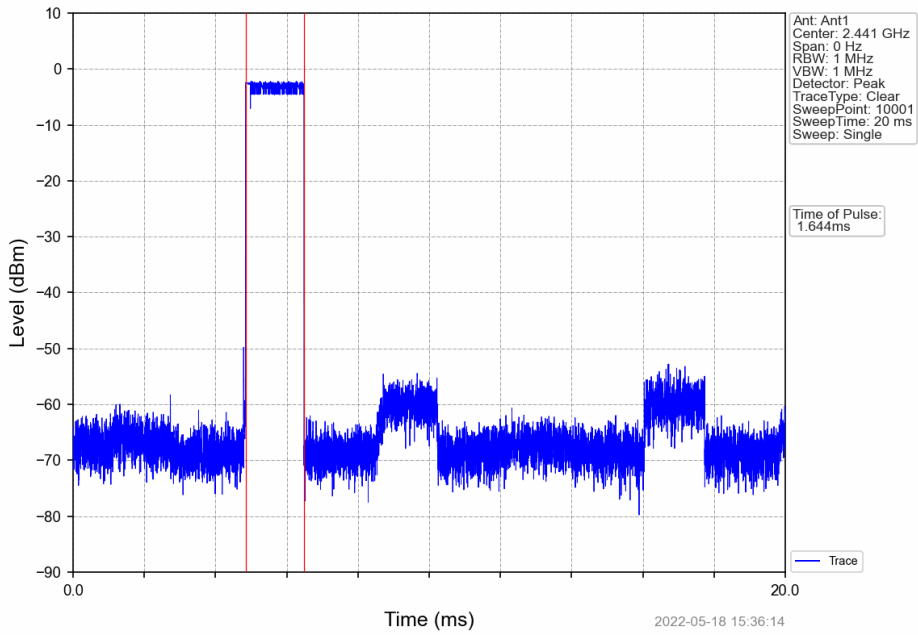
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



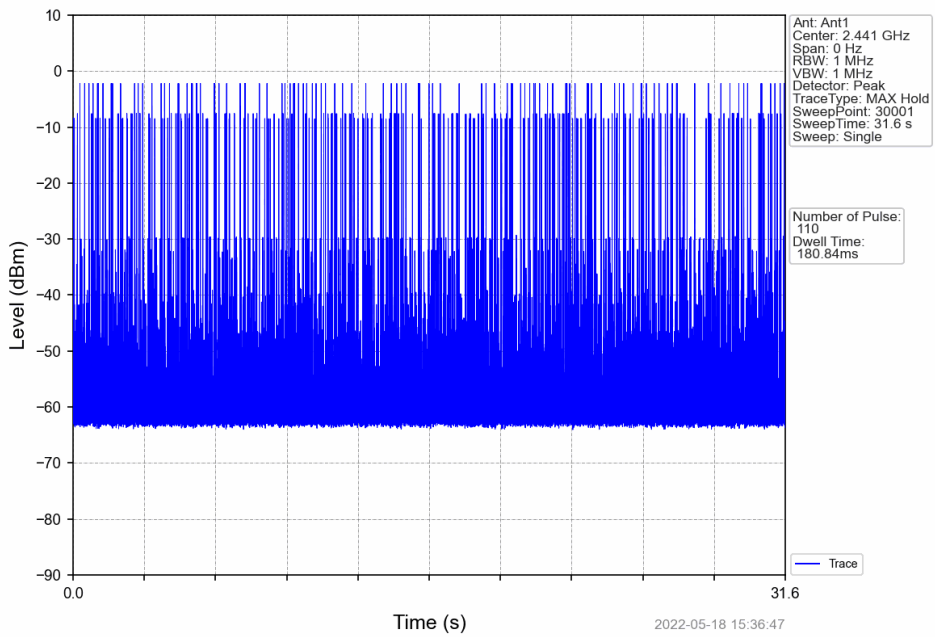
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



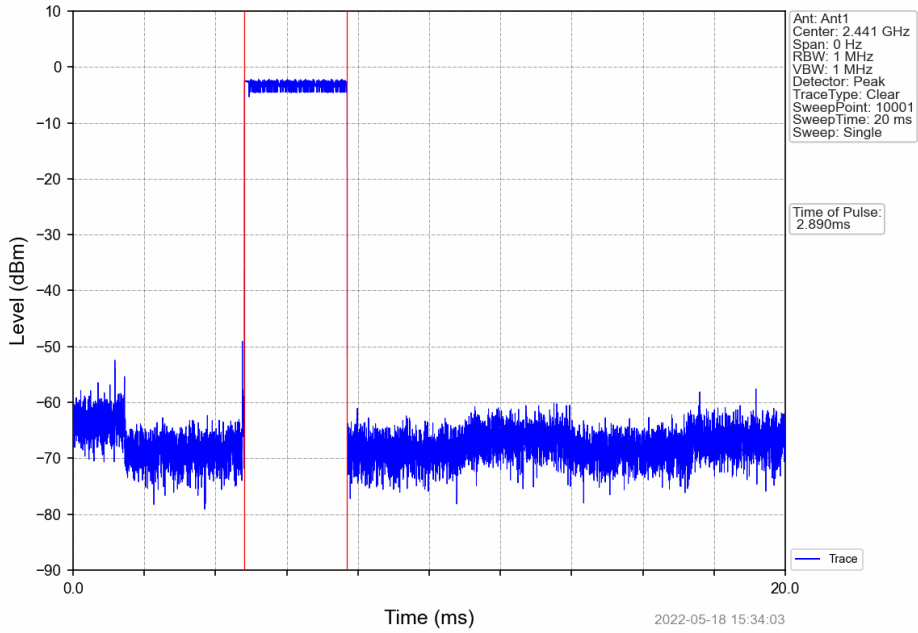
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



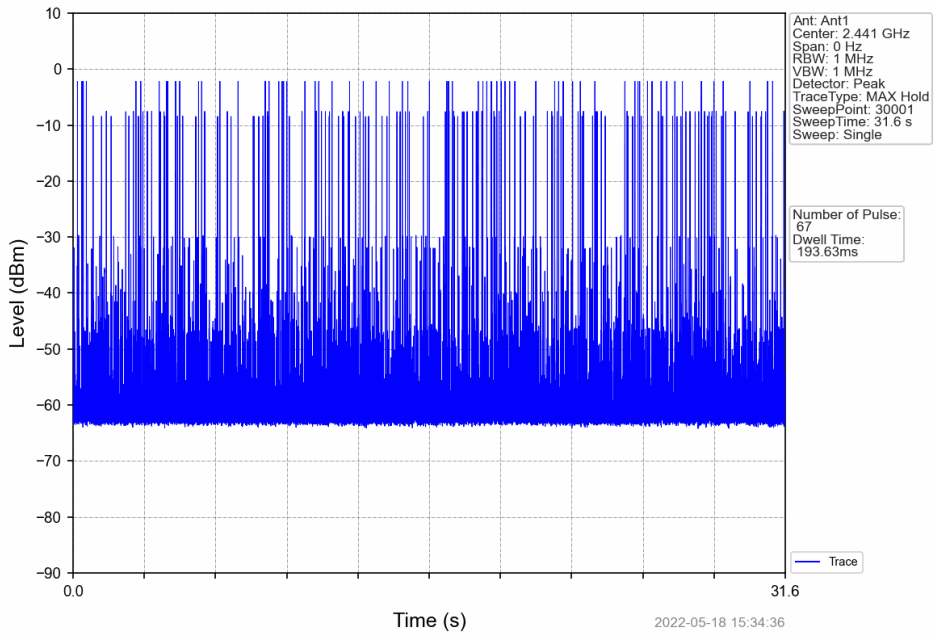
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



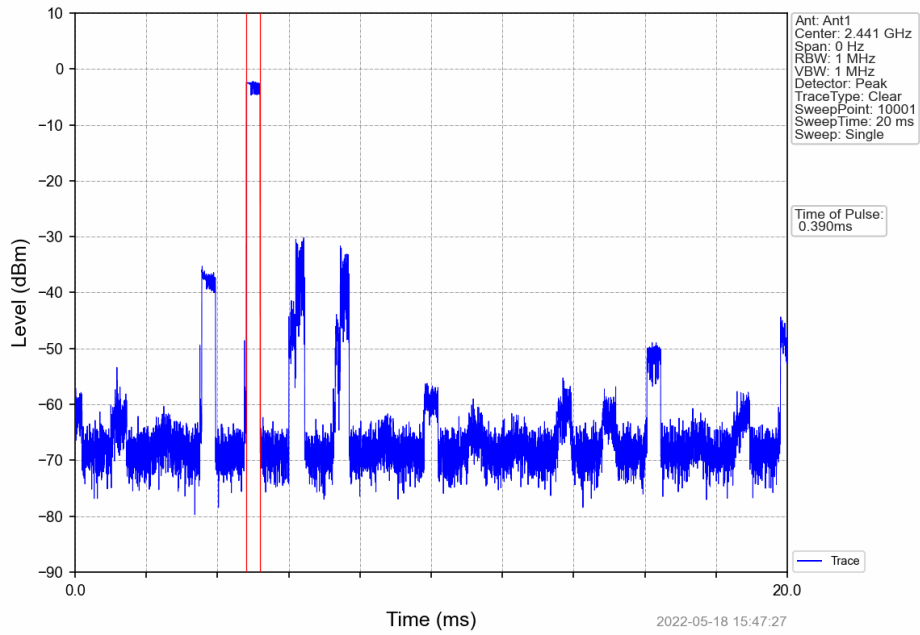
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



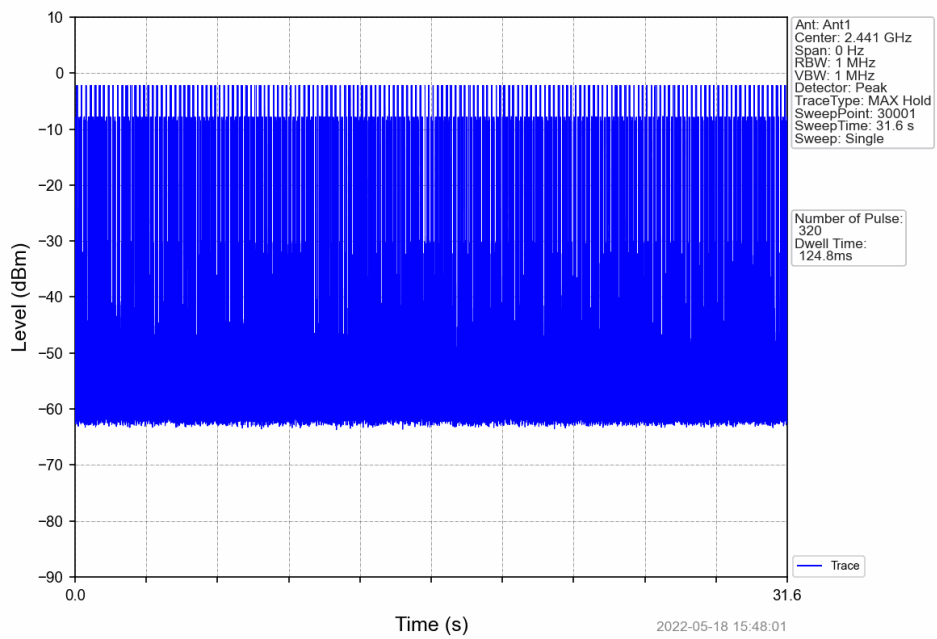
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



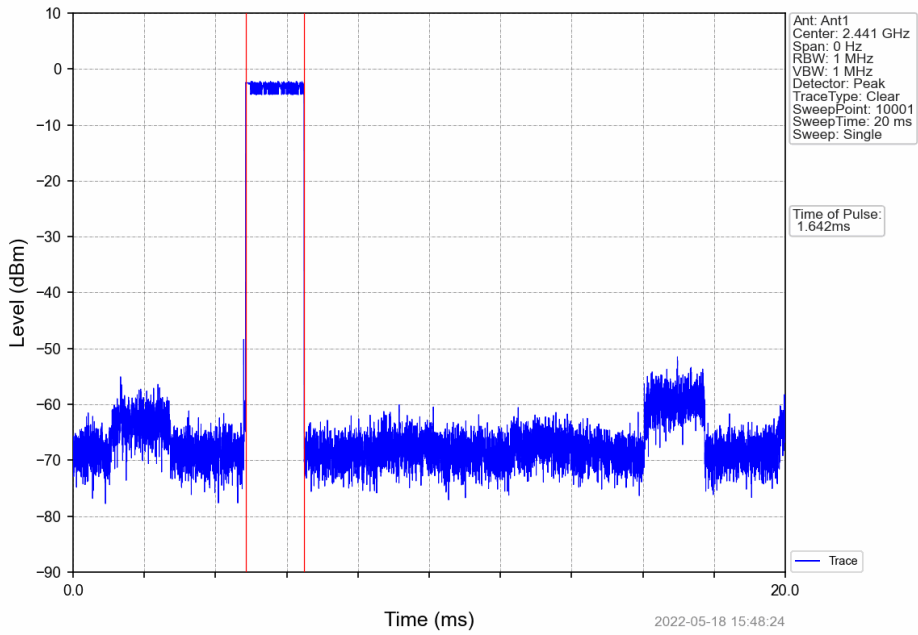
8DPSK_3DH1_HOPP_Ant1_NTNV



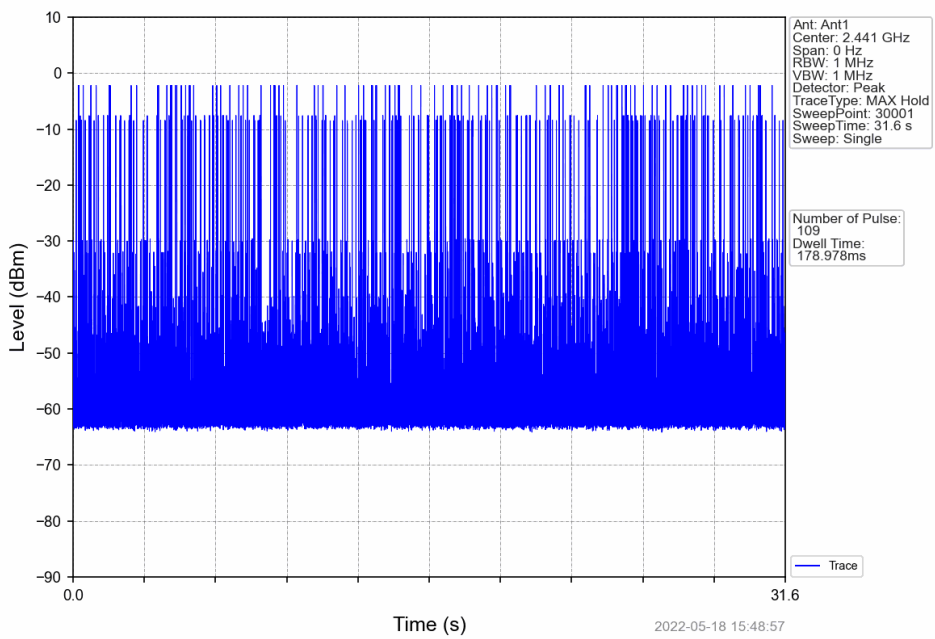
8DPSK_3DH1_HOPP_Ant1_NTNV

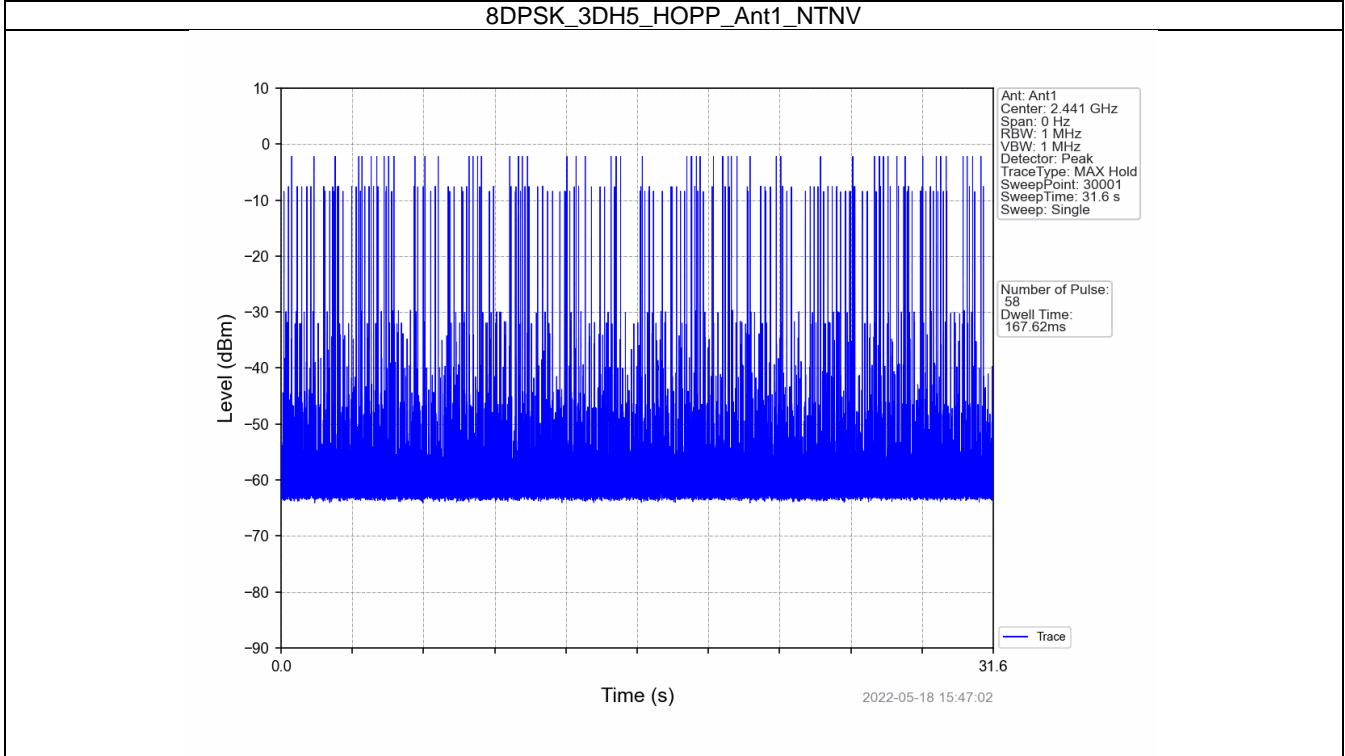
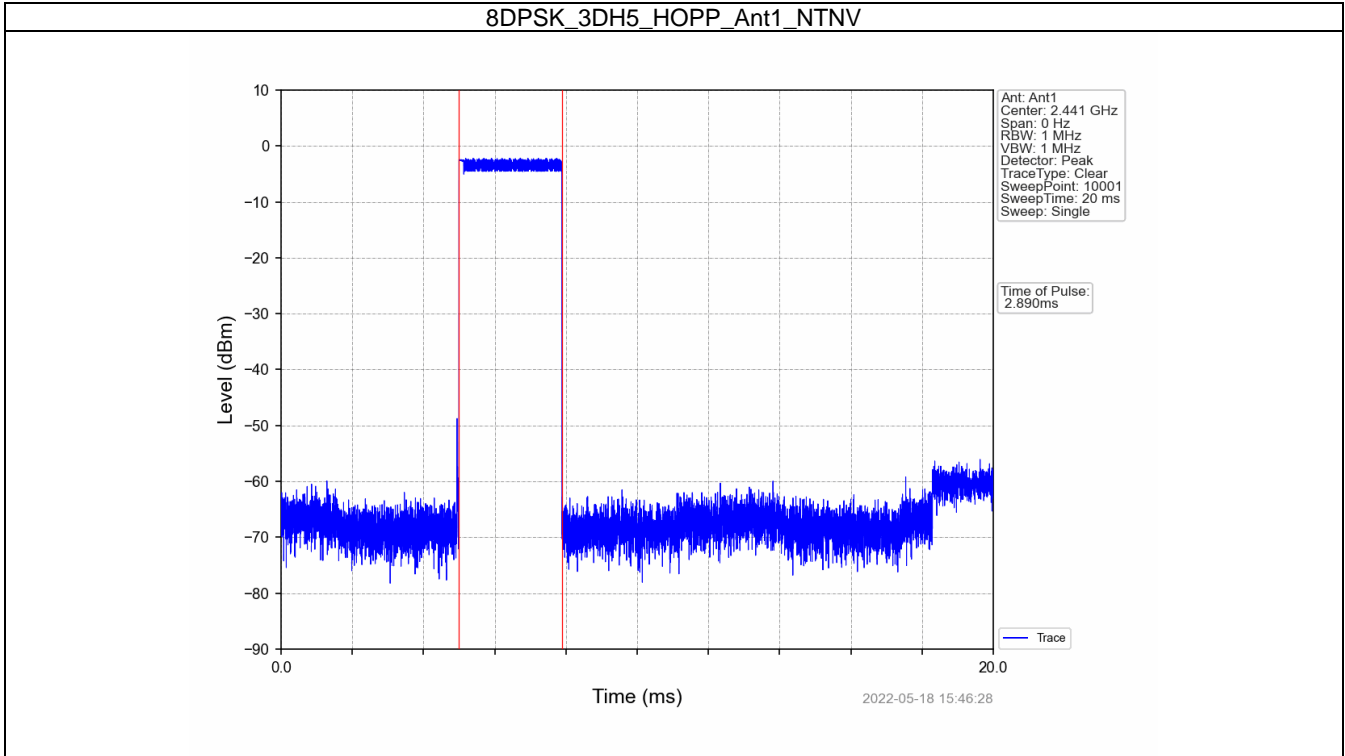


8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH3_HOPP_Ant1_NTNV





6. Unwanted Emissions In Non-restricted Frequency Bands

6.1 Ref

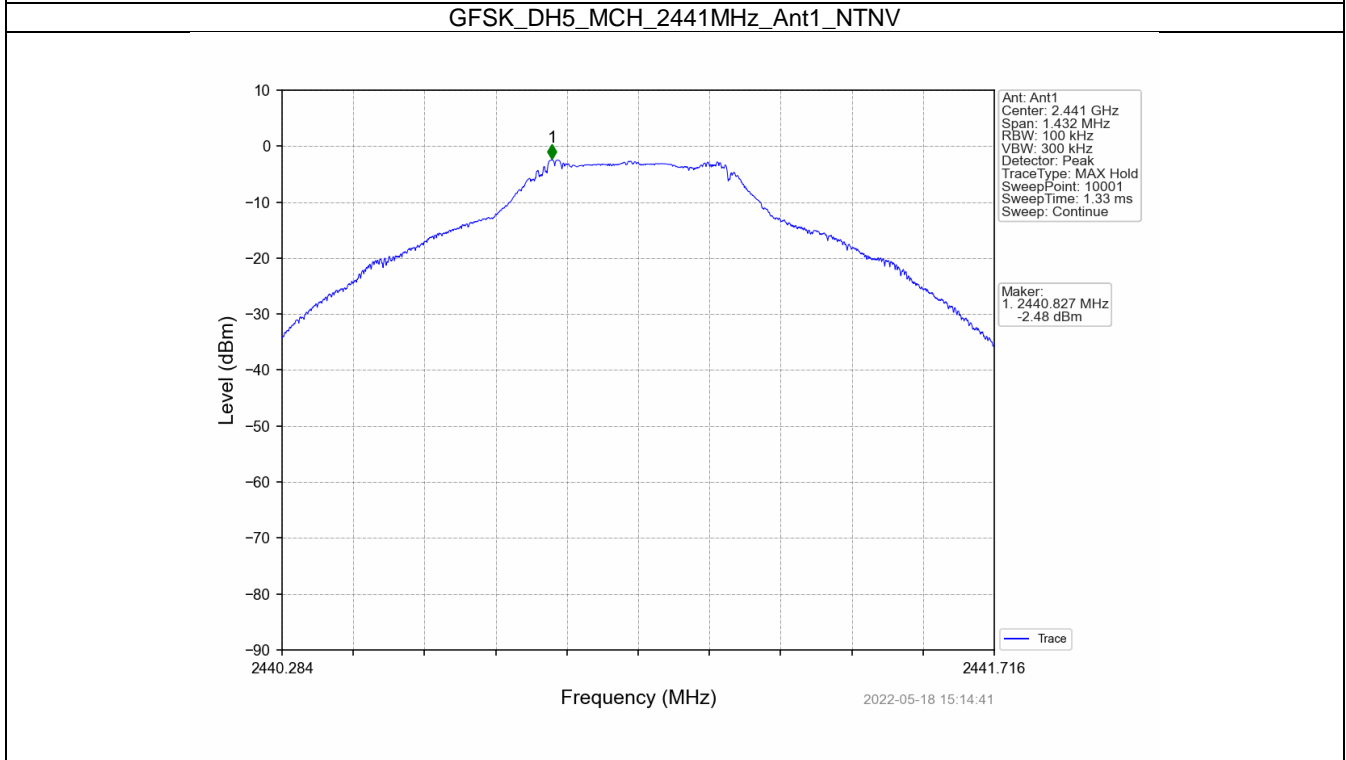
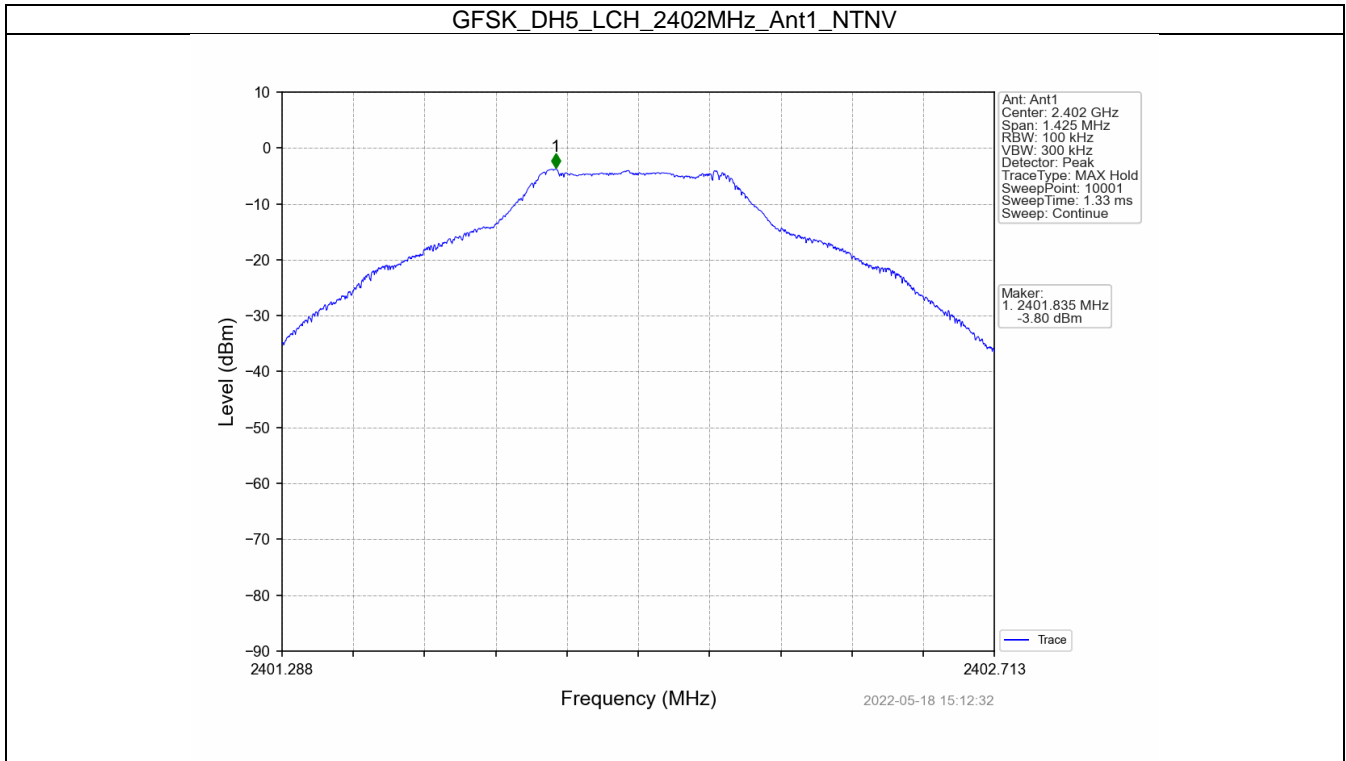
6.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	-3.80
		2441	DH5	1	-2.48
		2480	DH5	1	-2.93
Pi/4DQPSK	SISO	2402	2DH5	1	-3.82
		2441	2DH5	1	-2.54
		2480	2DH5	1	-2.98
8DPSK	SISO	2402	3DH5	1	-3.79
		2441	3DH5	1	-2.54
		2480	3DH5	1	-2.95

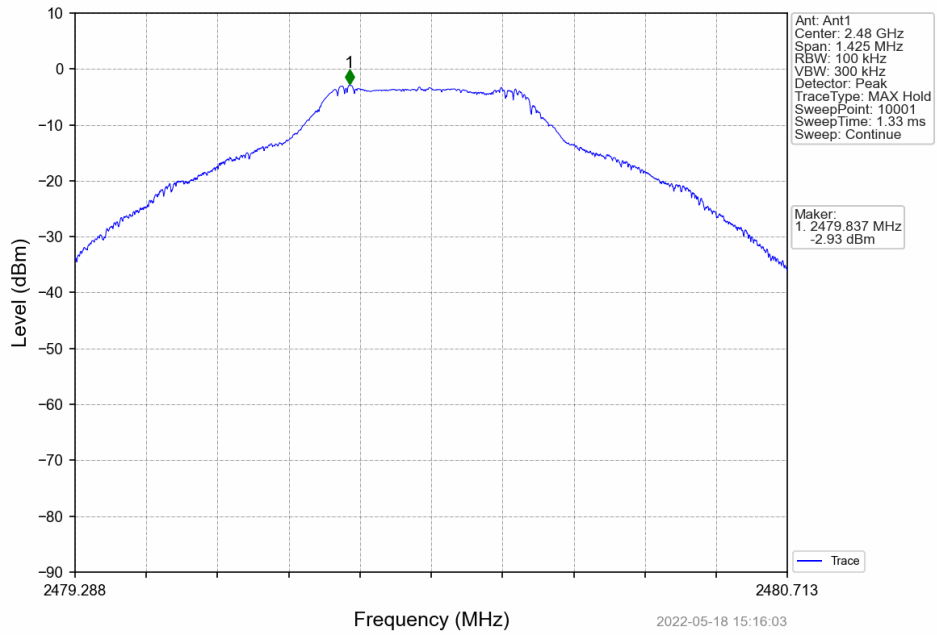
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.

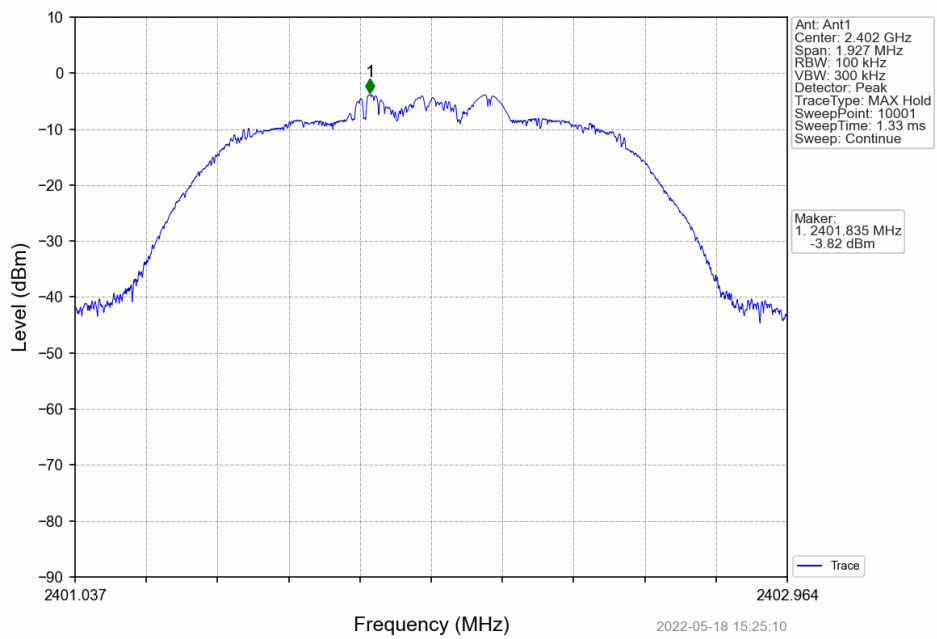
6.1.2 Test Graph



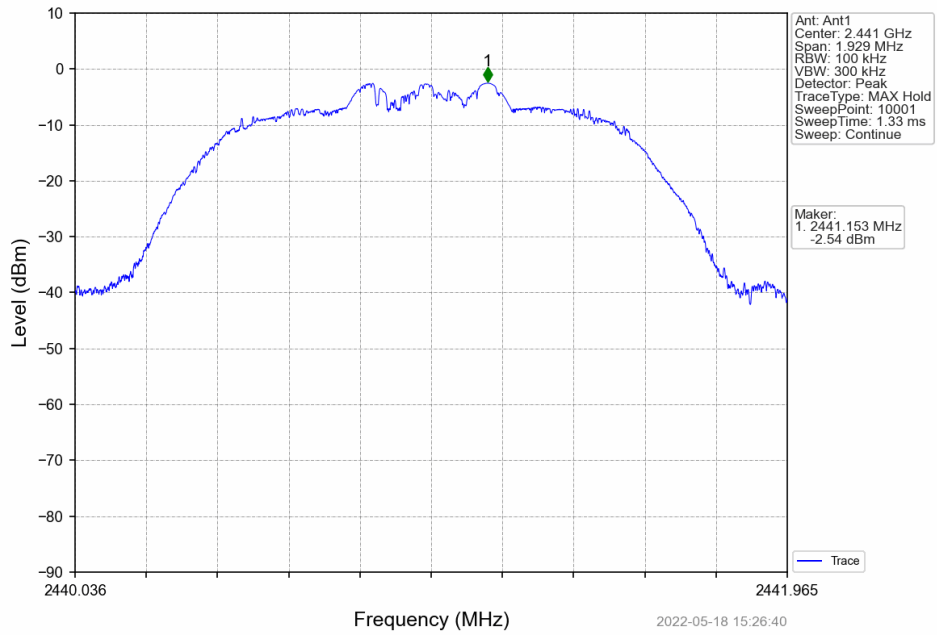
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



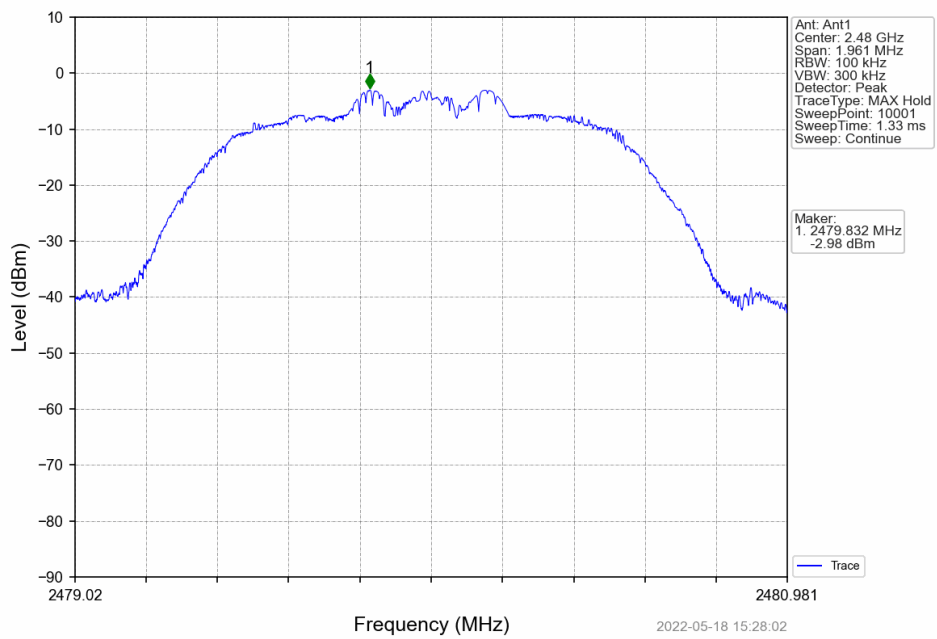
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



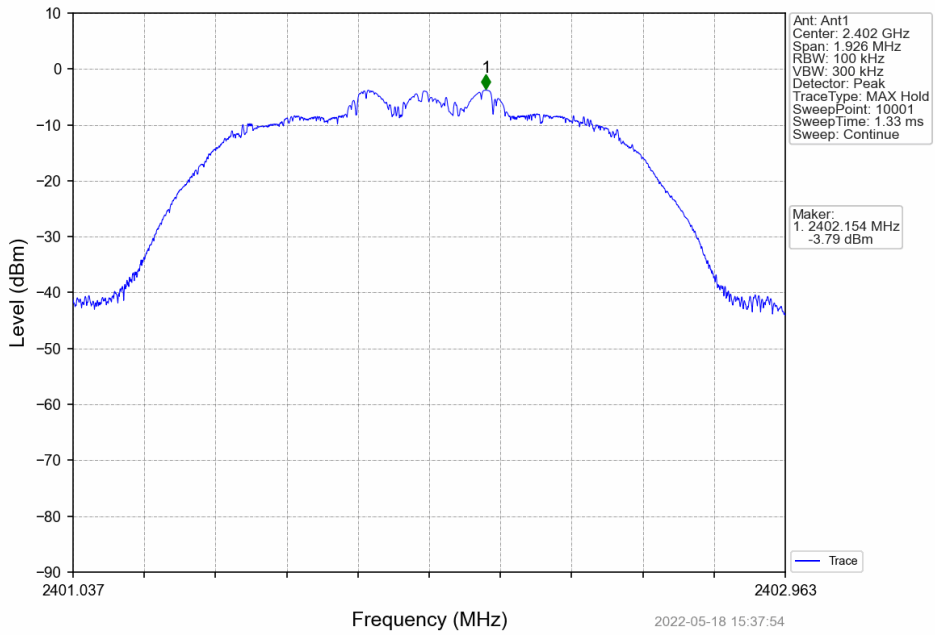
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



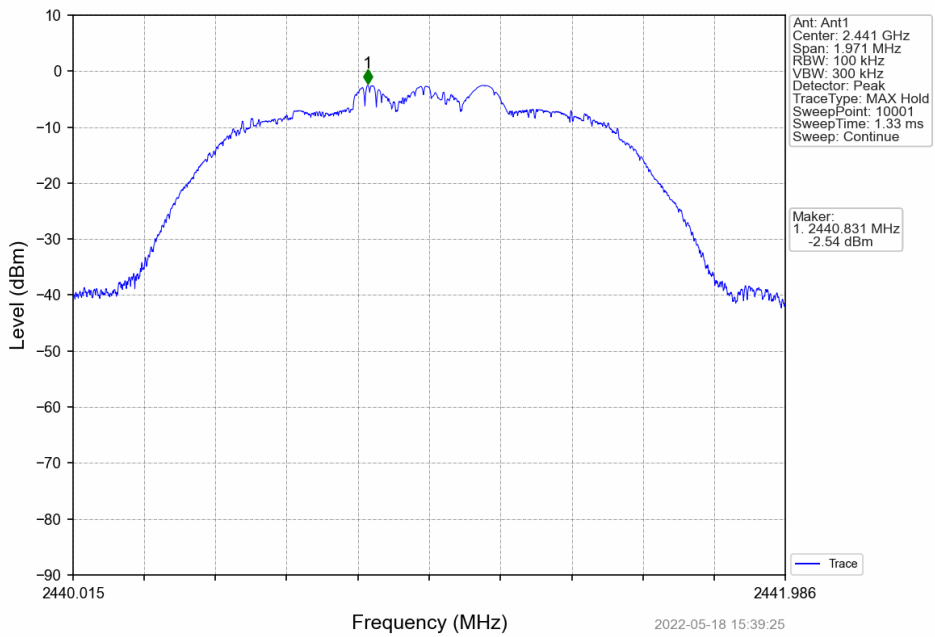
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



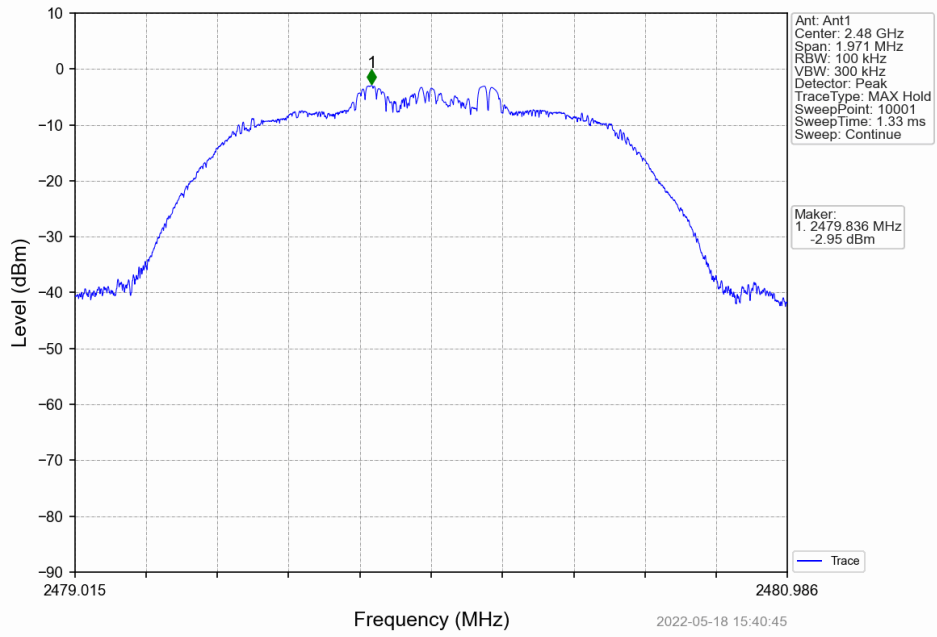
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



6.2 CSE

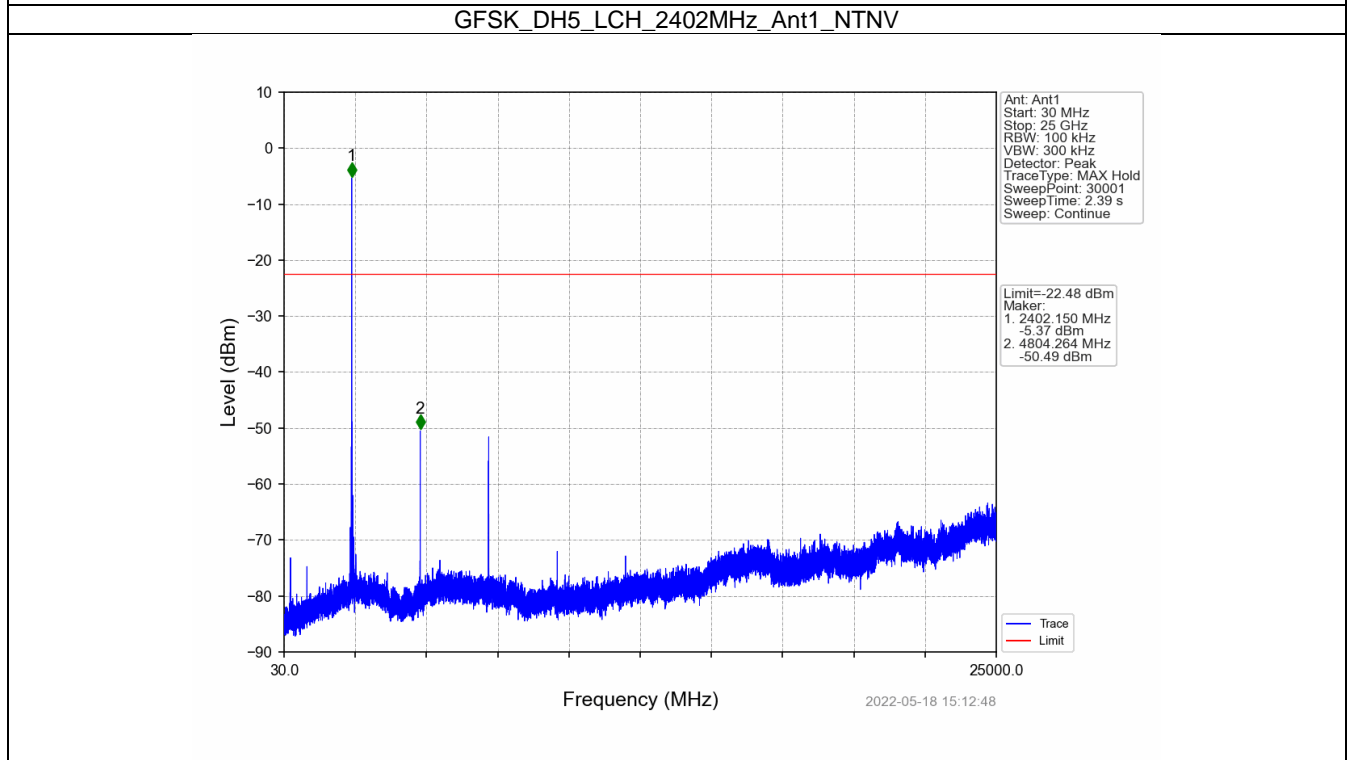
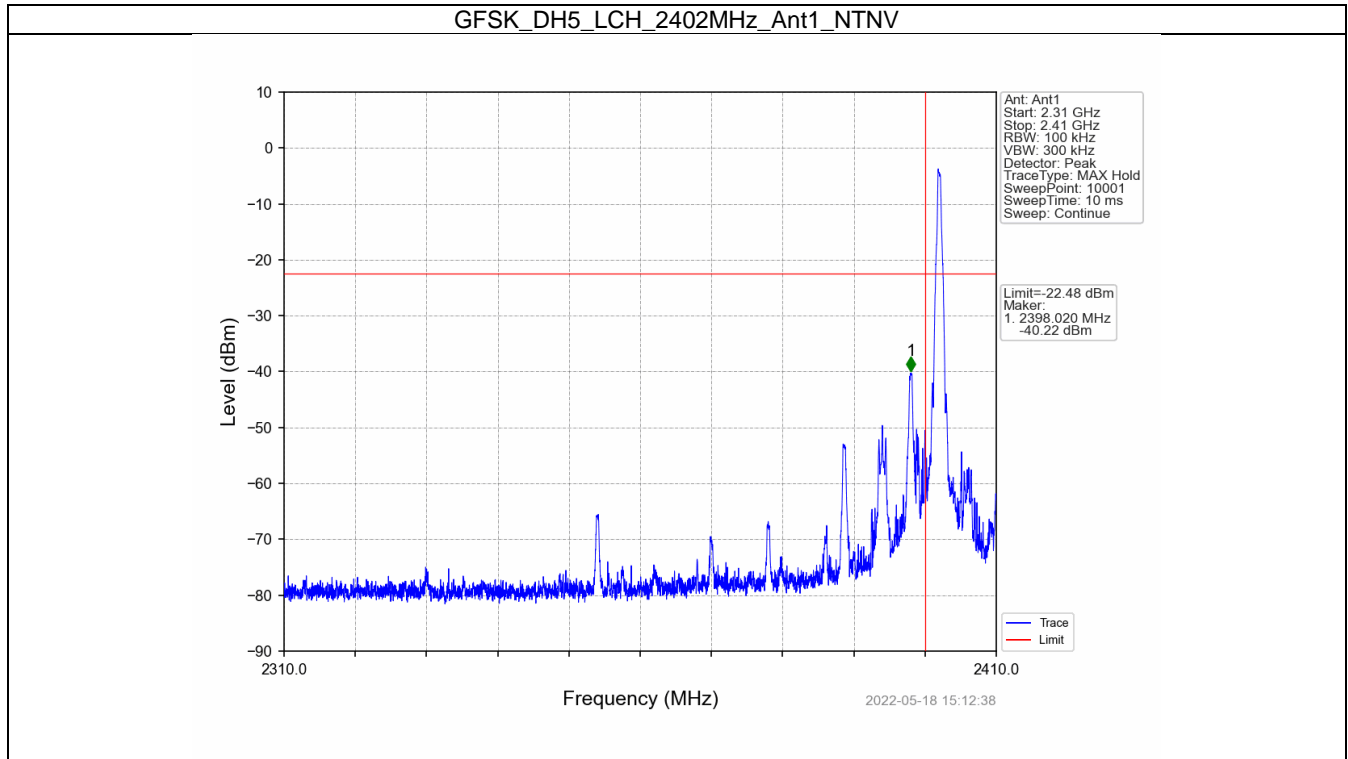
6.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	-2.48	-22.48	Pass
		2441	DH5	1	-2.48	-22.48	Pass
		2480	DH5	1	-2.48	-22.48	Pass
		HOPP	DH5	1	-2.48	-22.48	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	-2.54	-22.54	Pass
		2441	2DH5	1	-2.54	-22.54	Pass
		2480	2DH5	1	-2.54	-22.54	Pass
		HOPP	2DH5	1	-2.54	-22.54	Pass
8DPSK	SISO	2402	3DH5	1	-2.54	-22.54	Pass
		2441	3DH5	1	-2.54	-22.54	Pass
		2480	3DH5	1	-2.54	-22.54	Pass
		HOPP	3DH5	1	-2.54	-22.54	Pass

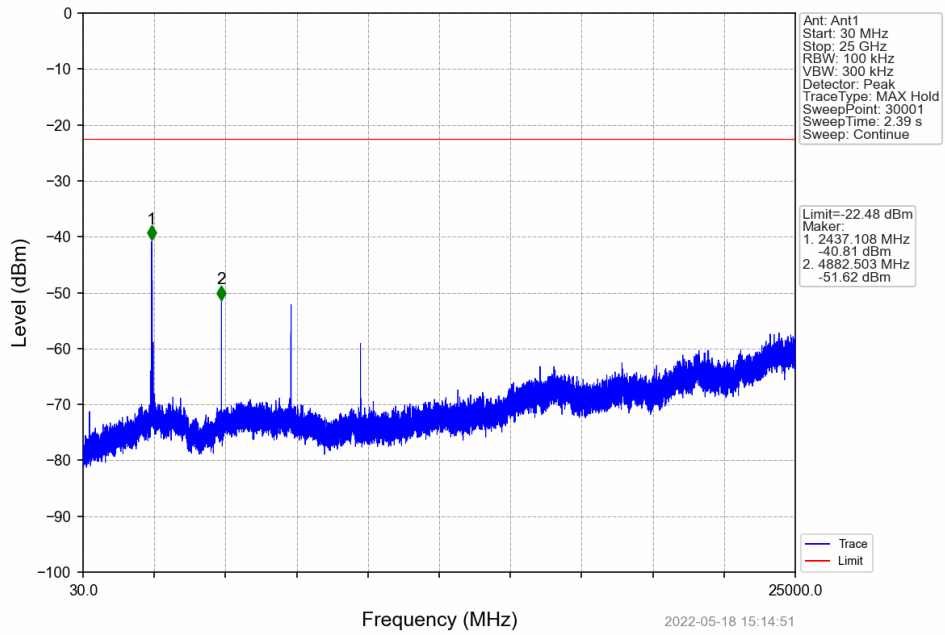
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.

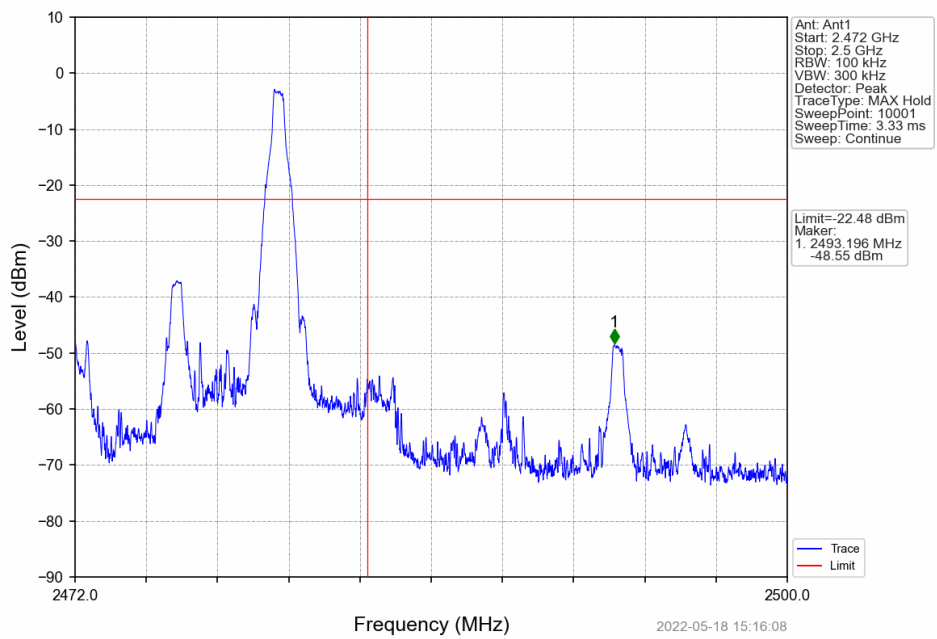
6.2.2 Test Graph



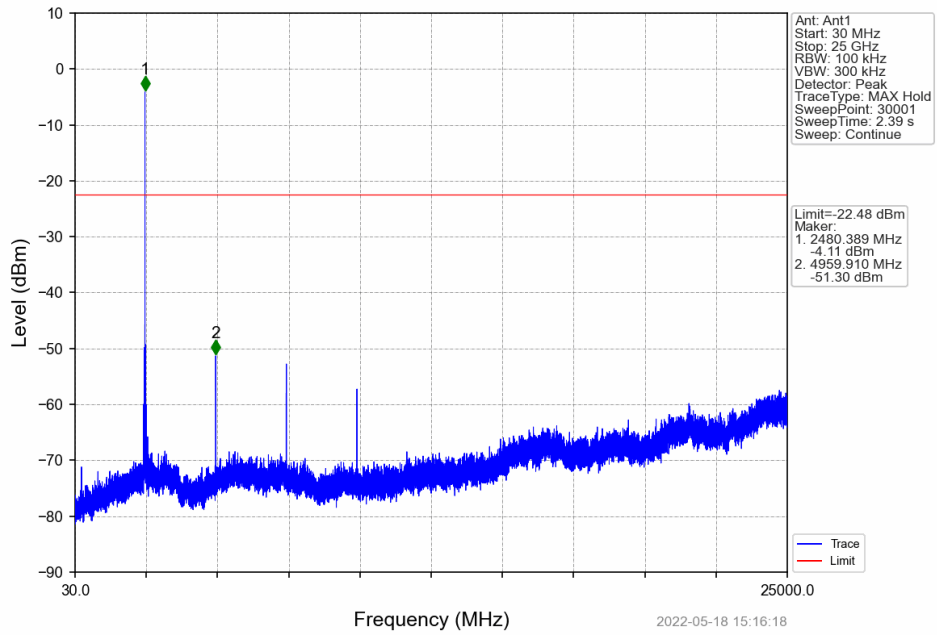
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



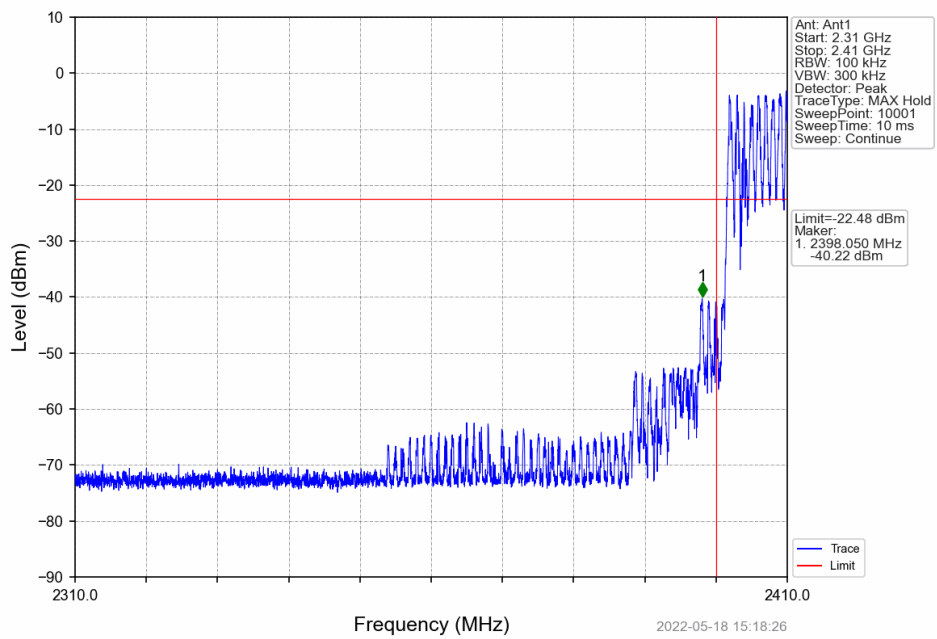
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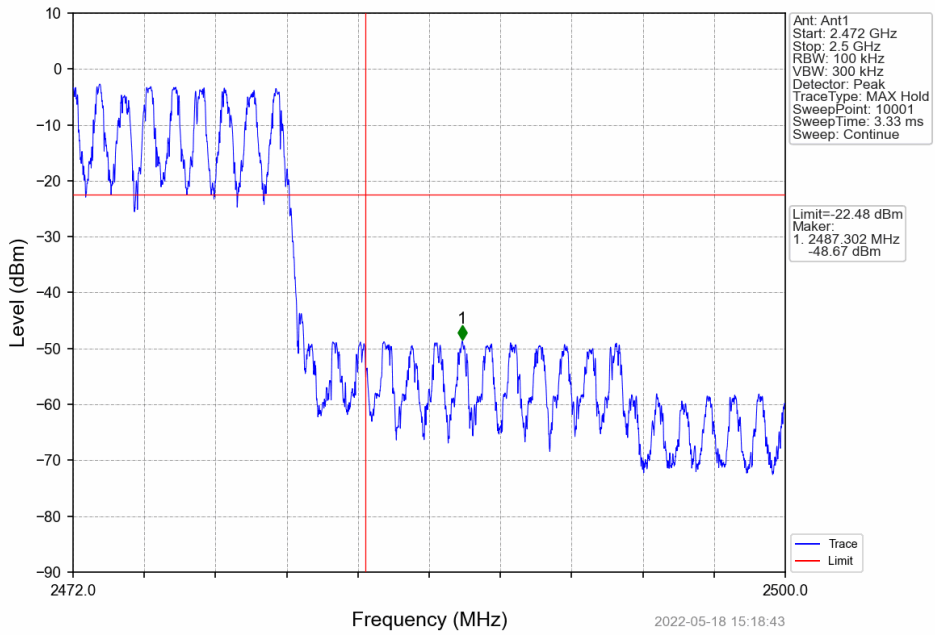
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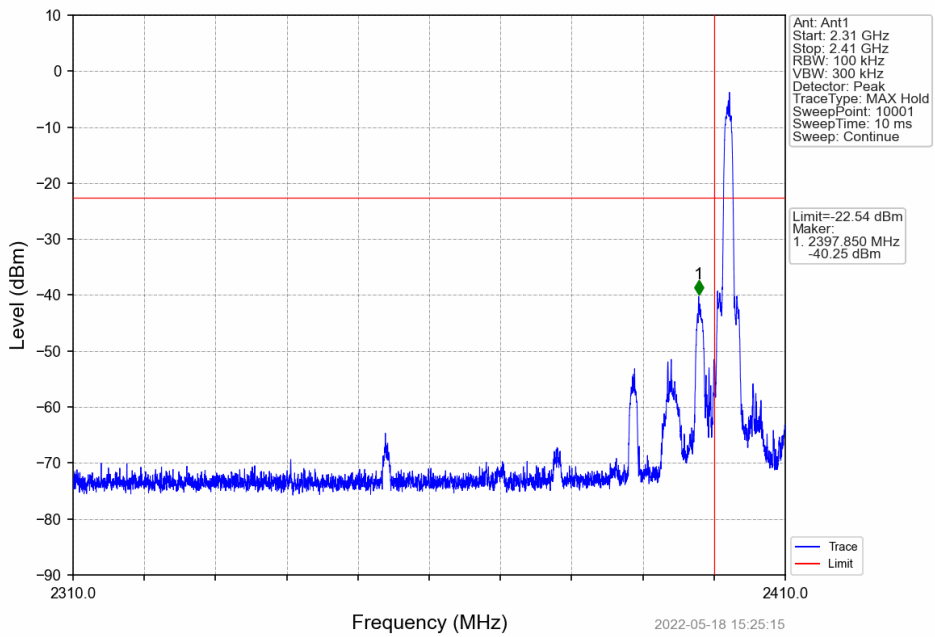
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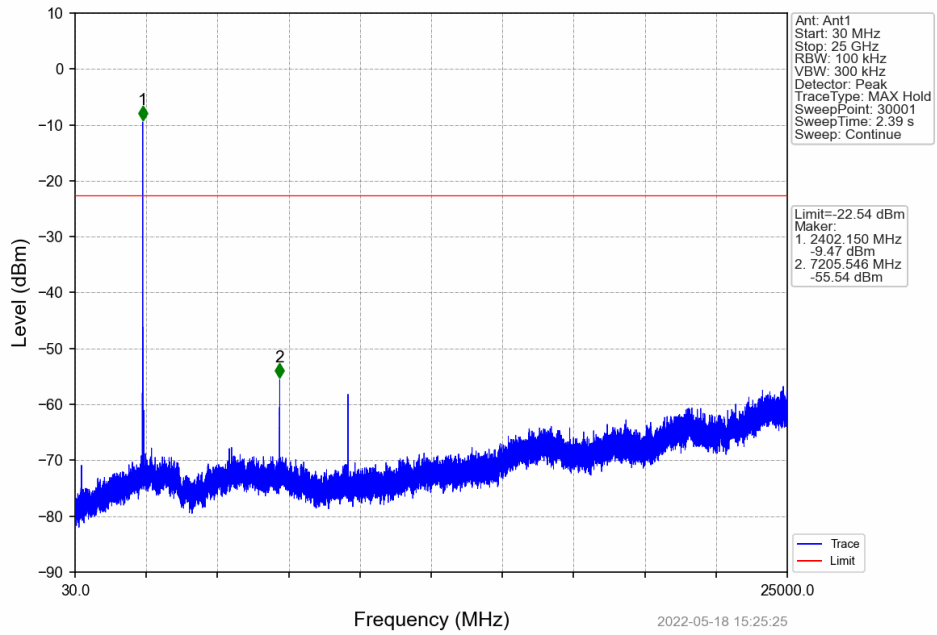
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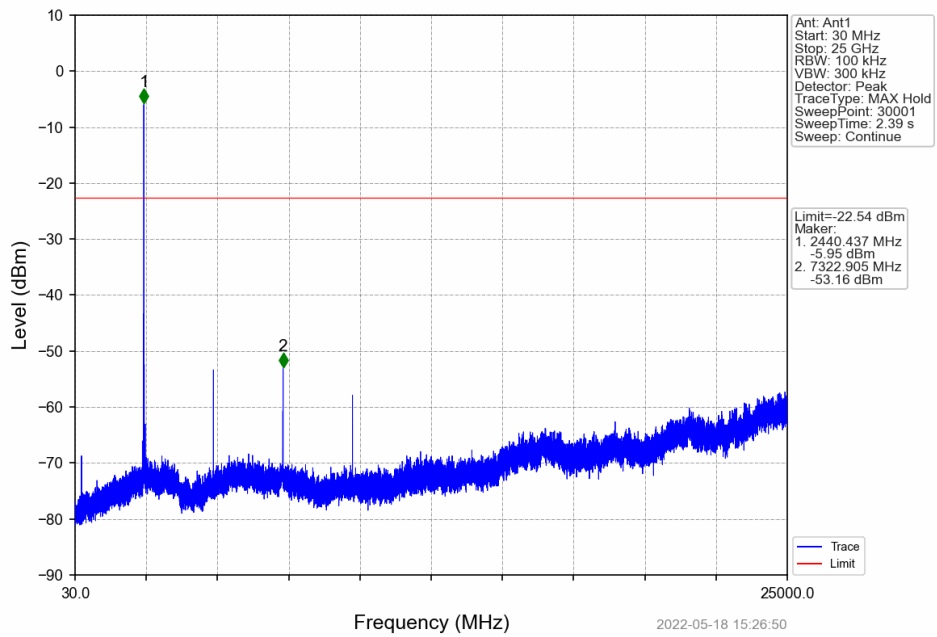
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



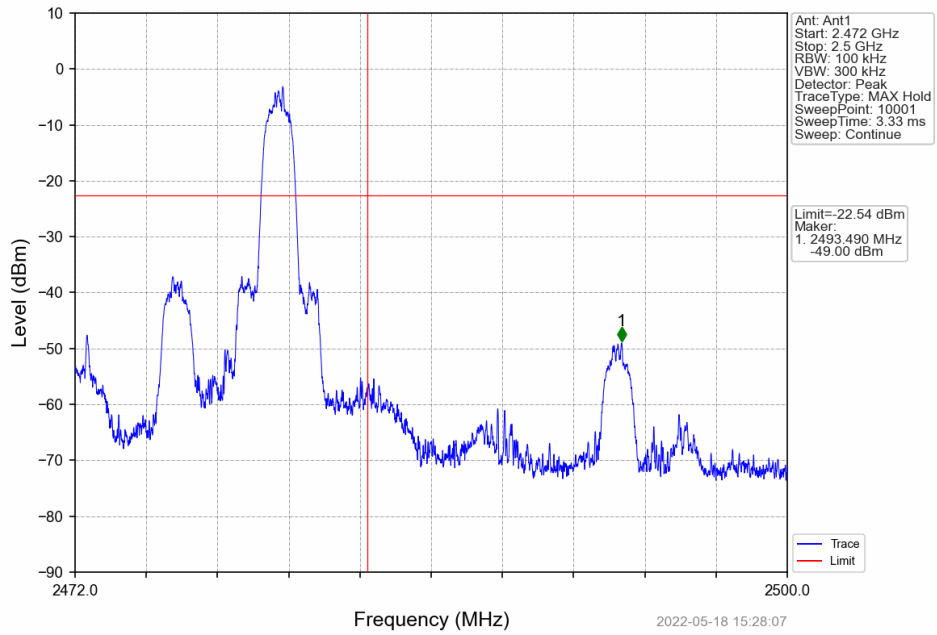
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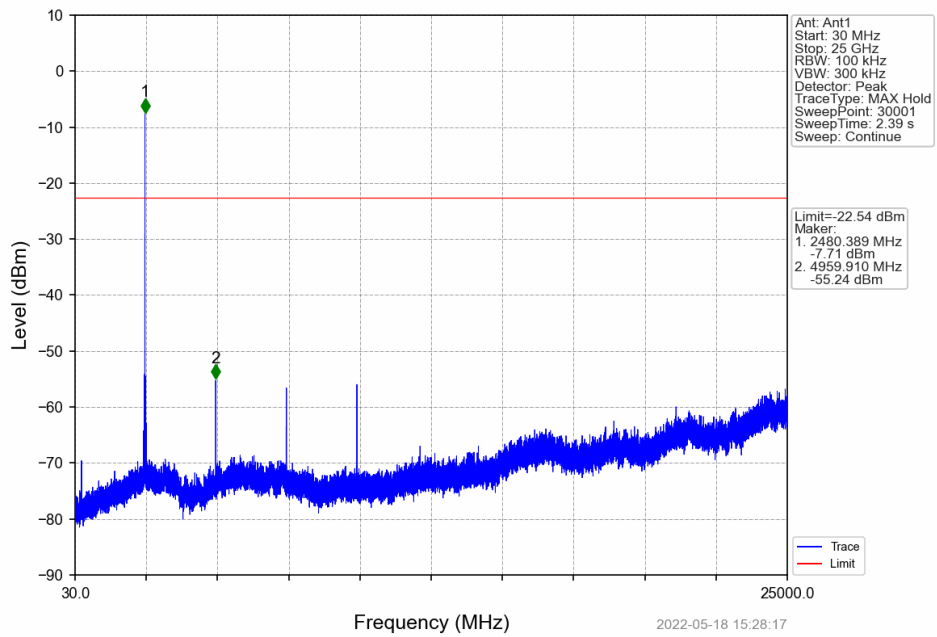
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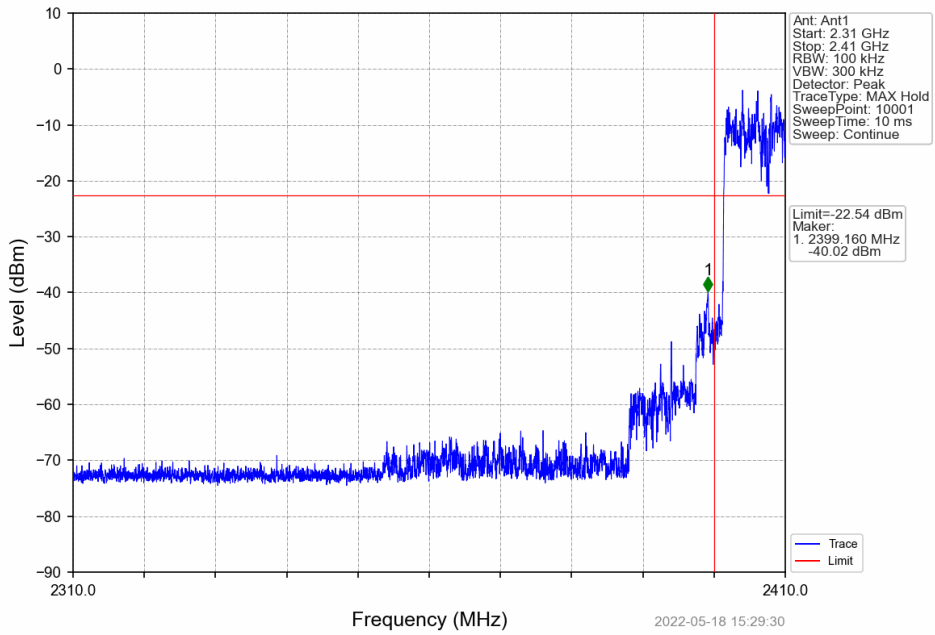
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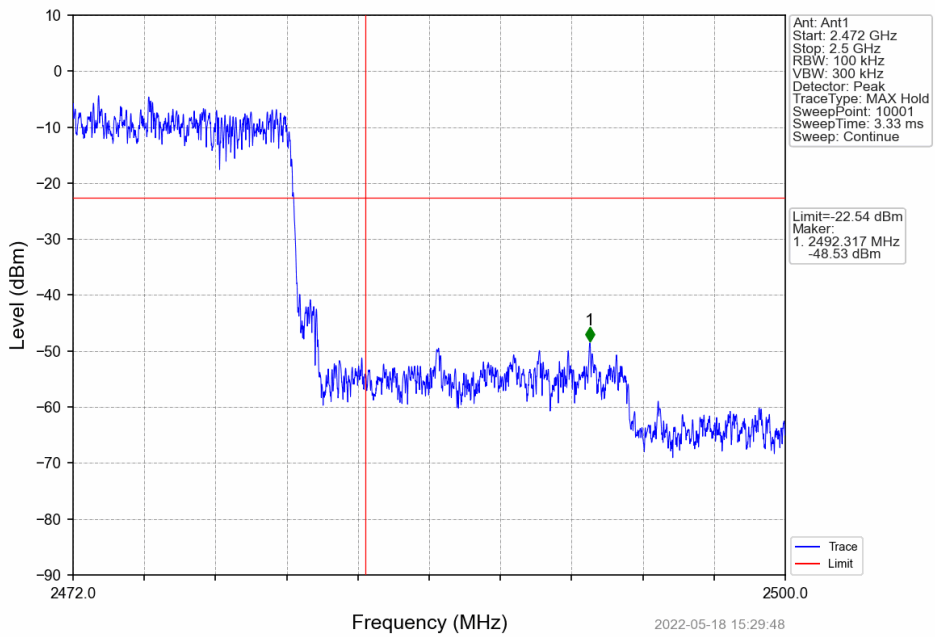
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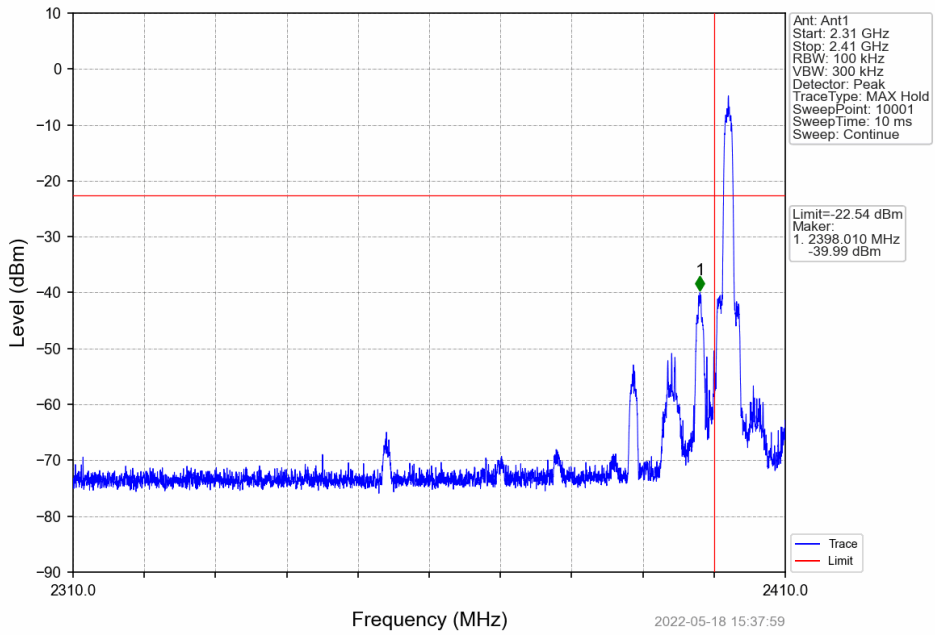
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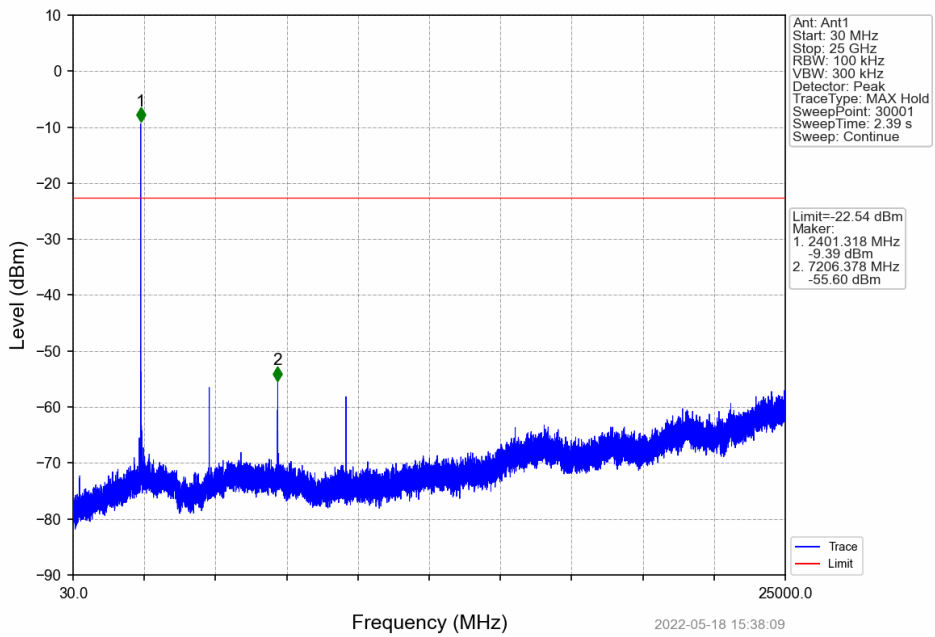
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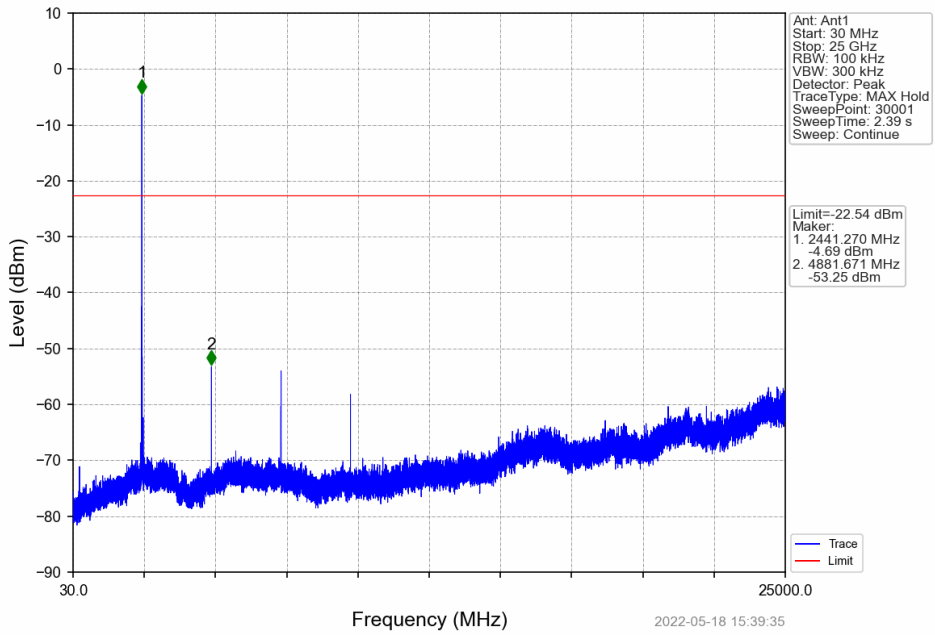
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



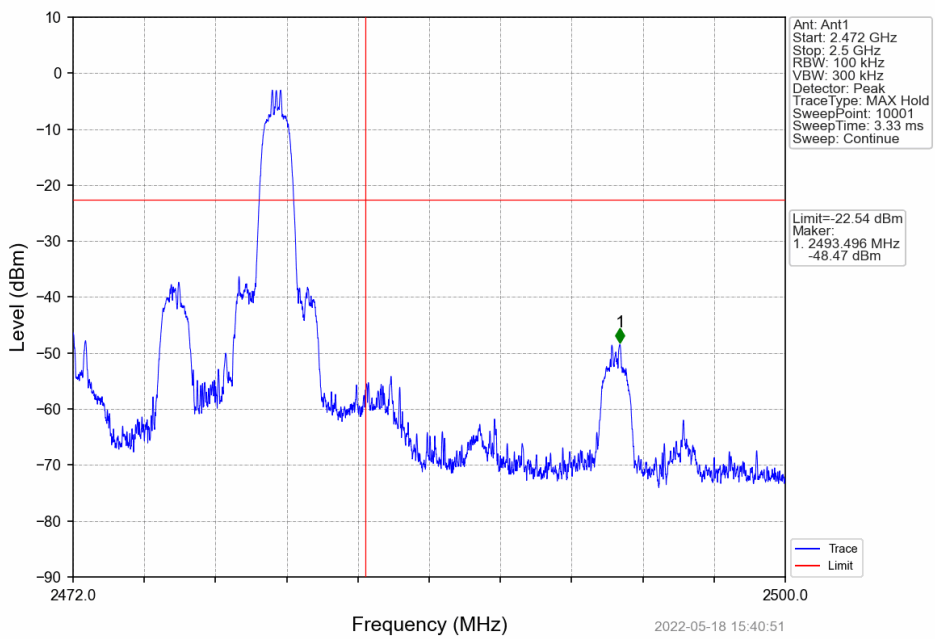
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



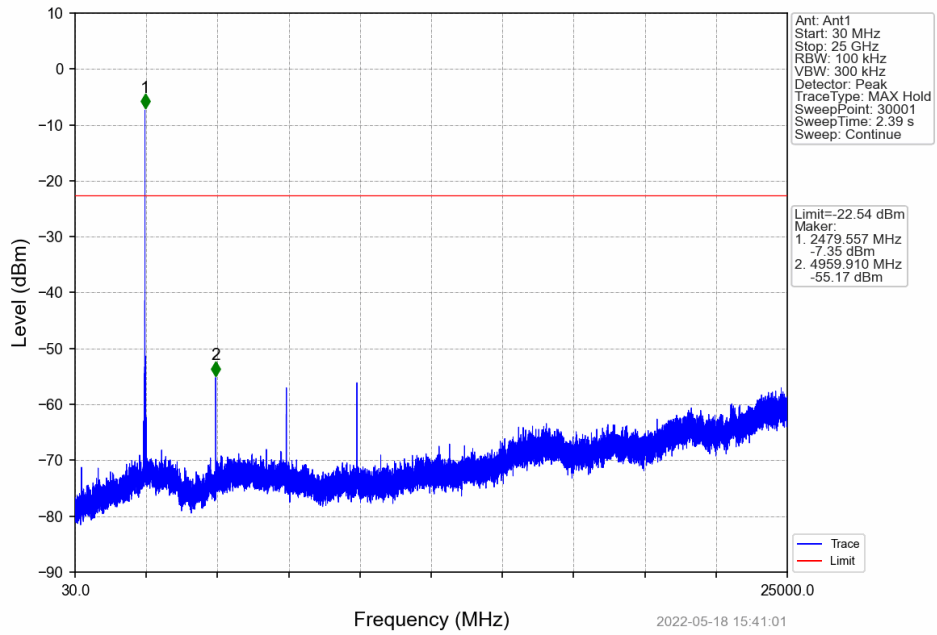
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV

