



Shenzhen CTL Testing Technology Co., Ltd.

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FCC PART 15.247

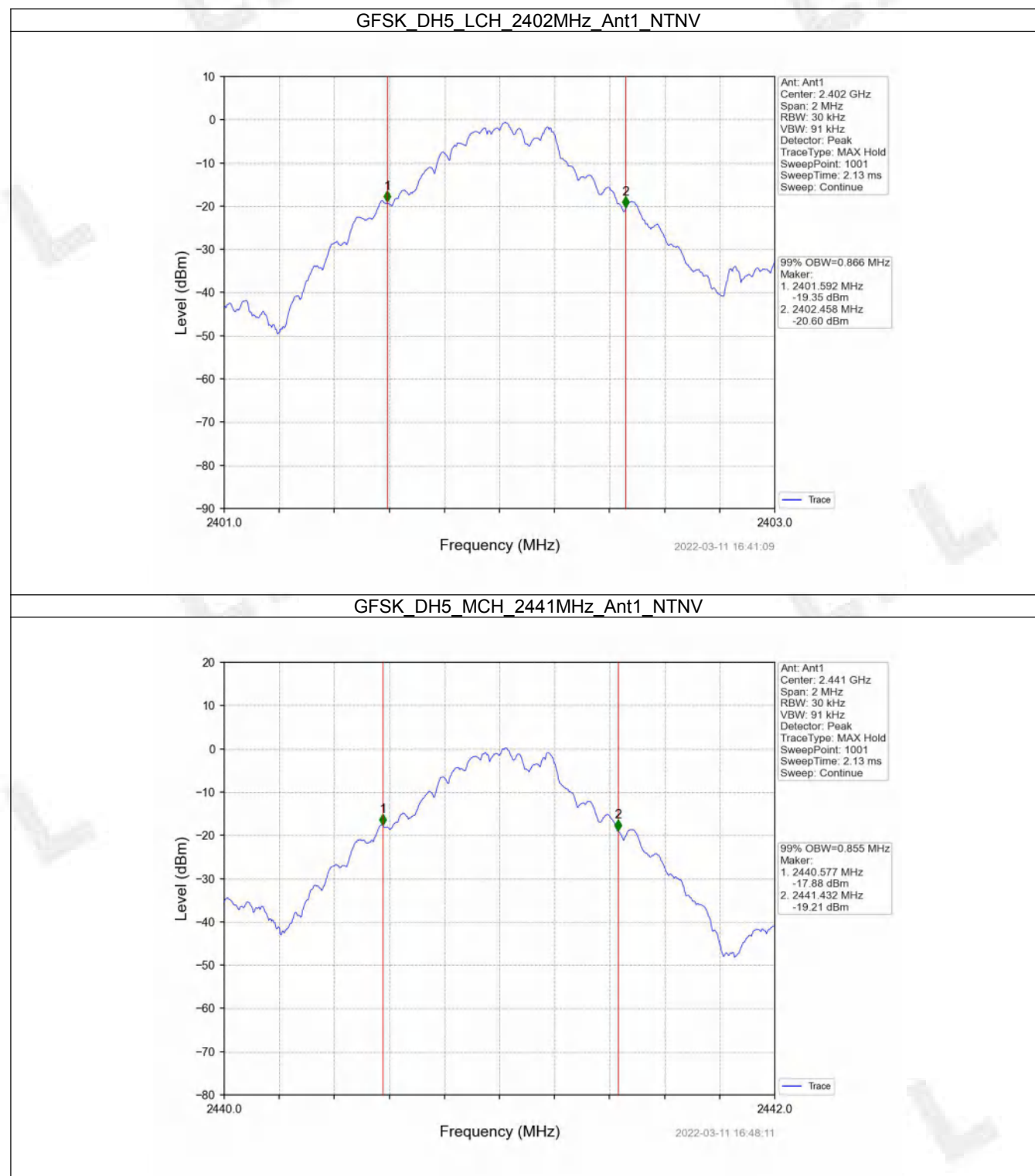
1. Bandwidth

1.1 OBW

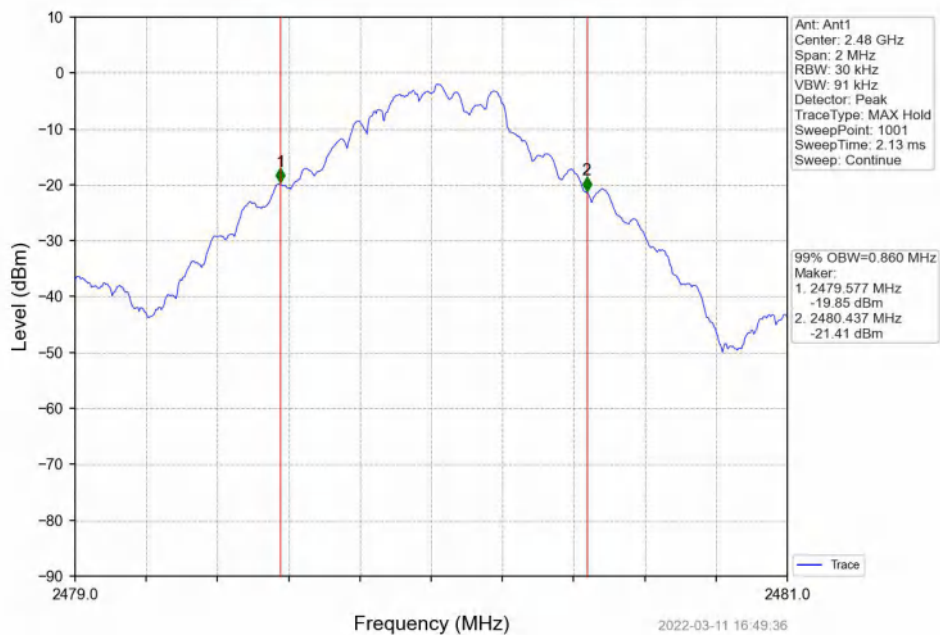
1.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	99% Occupied Bandwidth (MHz)	Verdict
					Result	
GFSK	SISO	2402	DH5	1	0.866	Pass
		2441	DH5	1	0.855	Pass
		2480	DH5	1	0.860	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	0.871	Pass
		2441	2DH5	1	0.858	Pass
		2480	2DH5	1	0.866	Pass
8DPSK	SISO	2402	3DH5	1	1.163	Pass
		2441	3DH5	1	1.156	Pass
		2480	3DH5	1	1.160	Pass

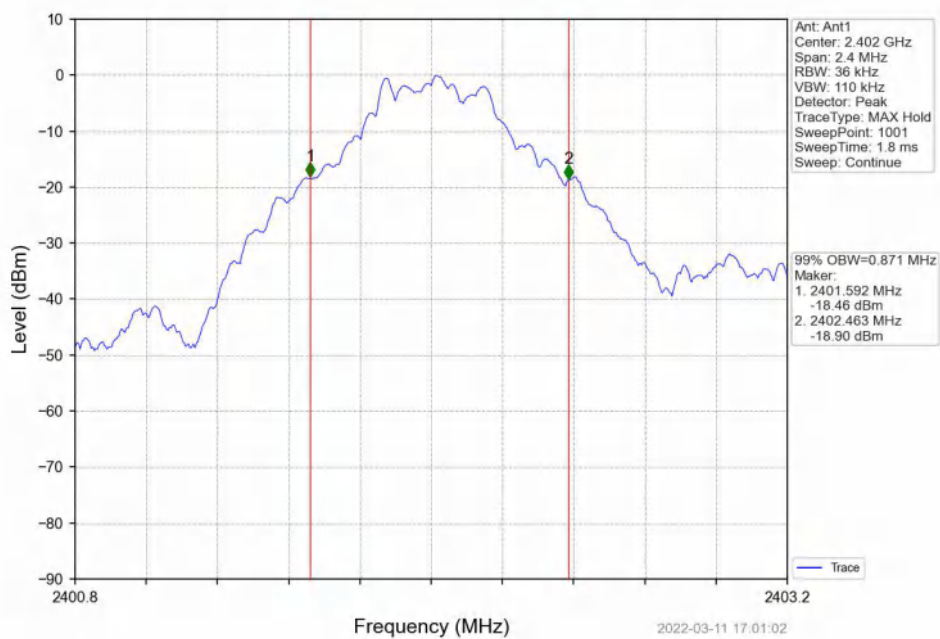
1.1.2 Test Graph



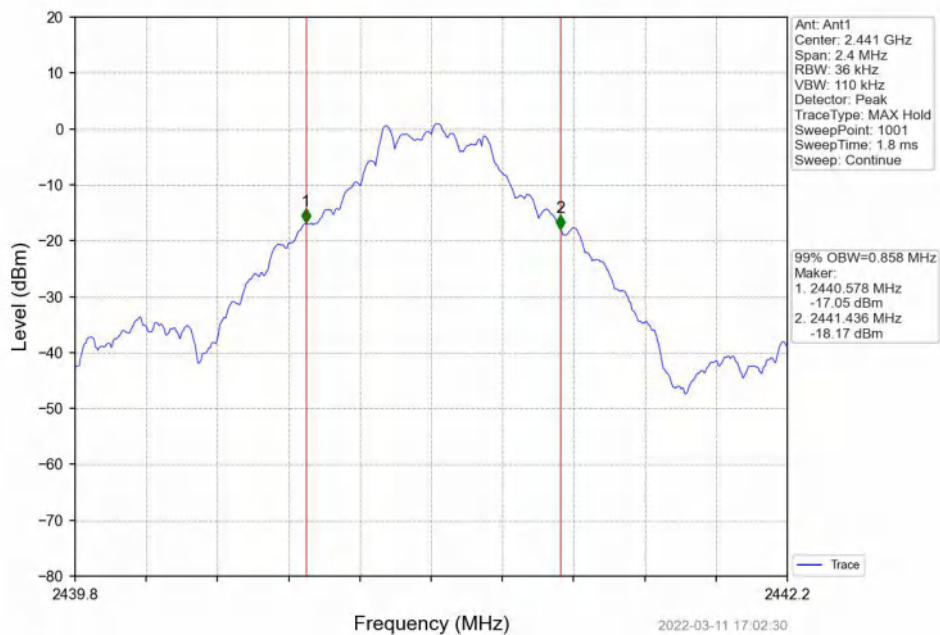
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



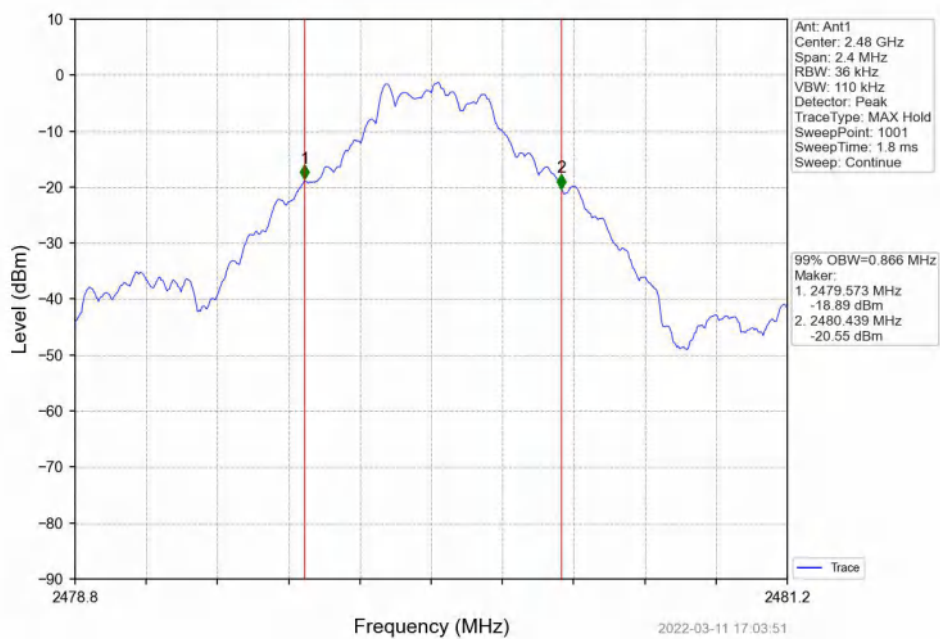
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



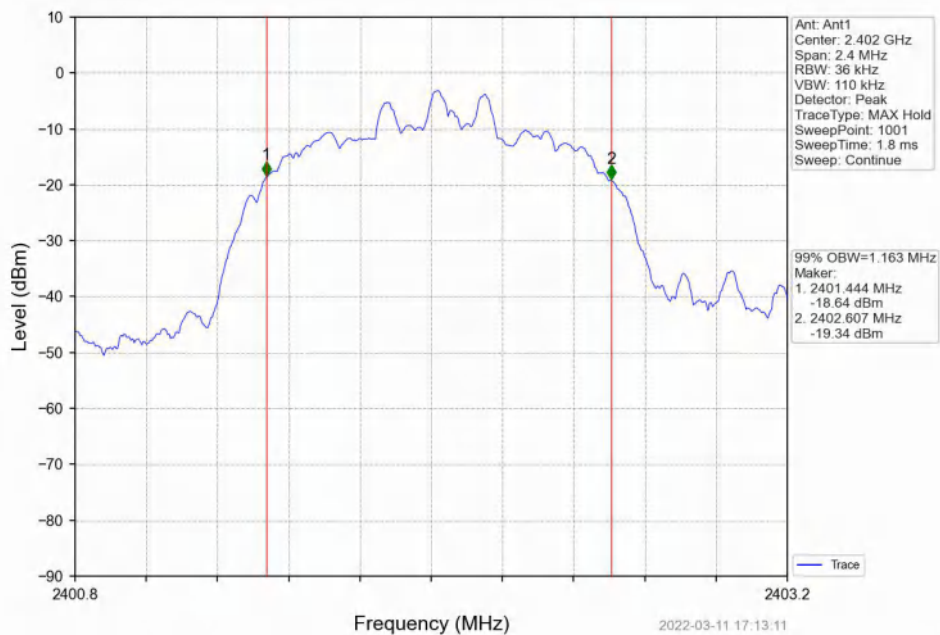
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



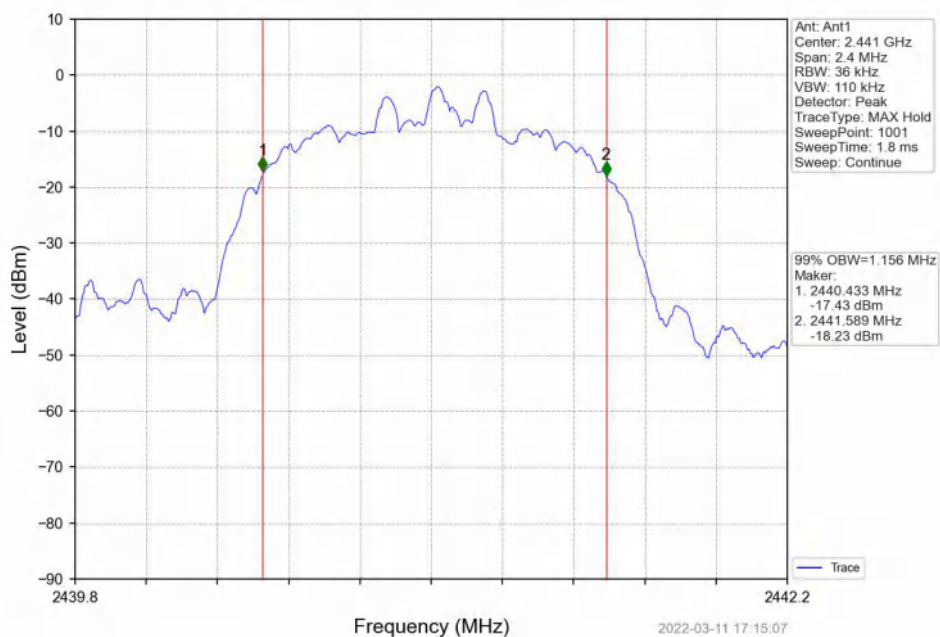
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

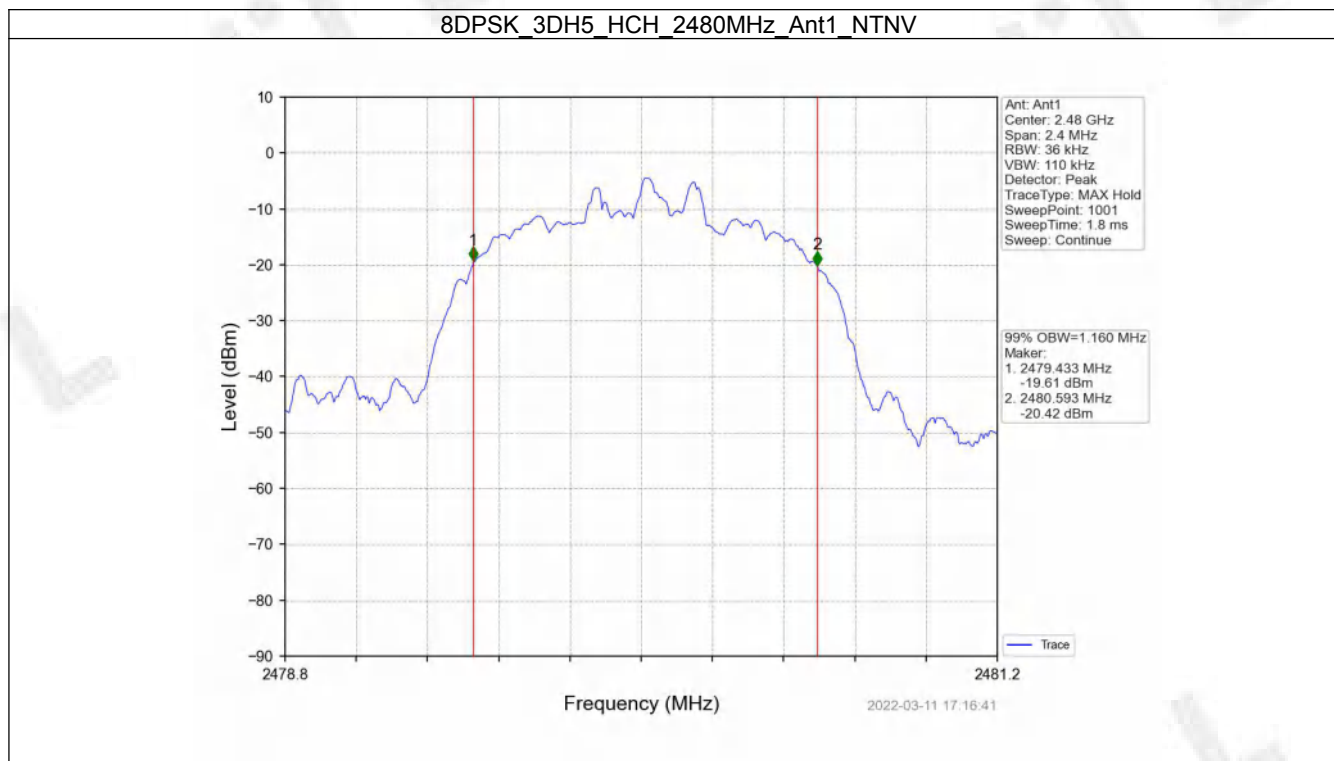


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



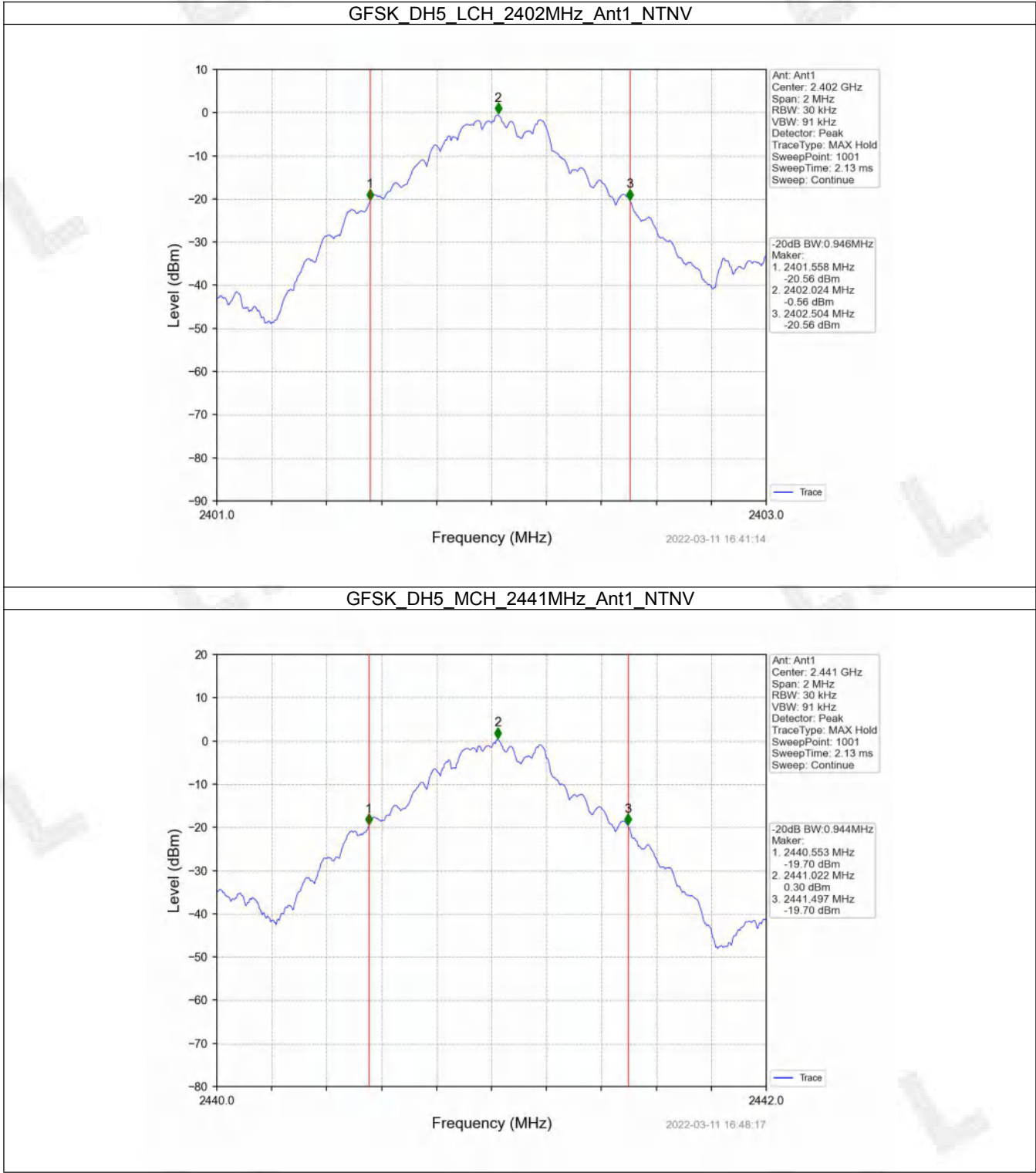


1.2 20dB BW

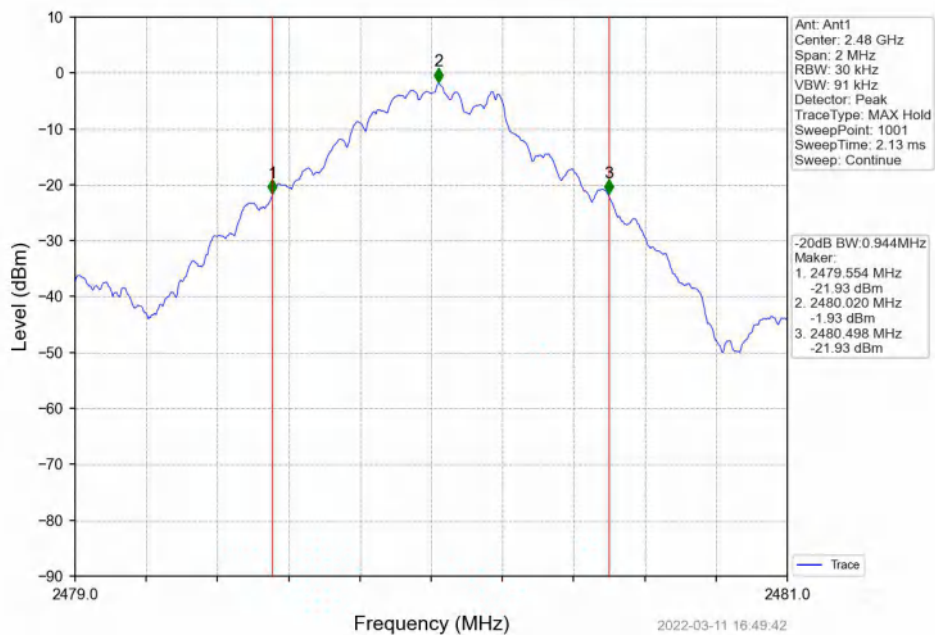
1.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	20dB Bandwidth (MHz)	Verdict
					Result	
GFSK	SISO	2402	DH5	1	0.946	Pass
		2441	DH5	1	0.944	Pass
		2480	DH5	1	0.944	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	0.956	Pass
		2441	2DH5	1	0.957	Pass
		2480	2DH5	1	0.957	Pass
8DPSK	SISO	2402	3DH5	1	1.290	Pass
		2441	3DH5	1	1.280	Pass
		2480	3DH5	1	1.283	Pass

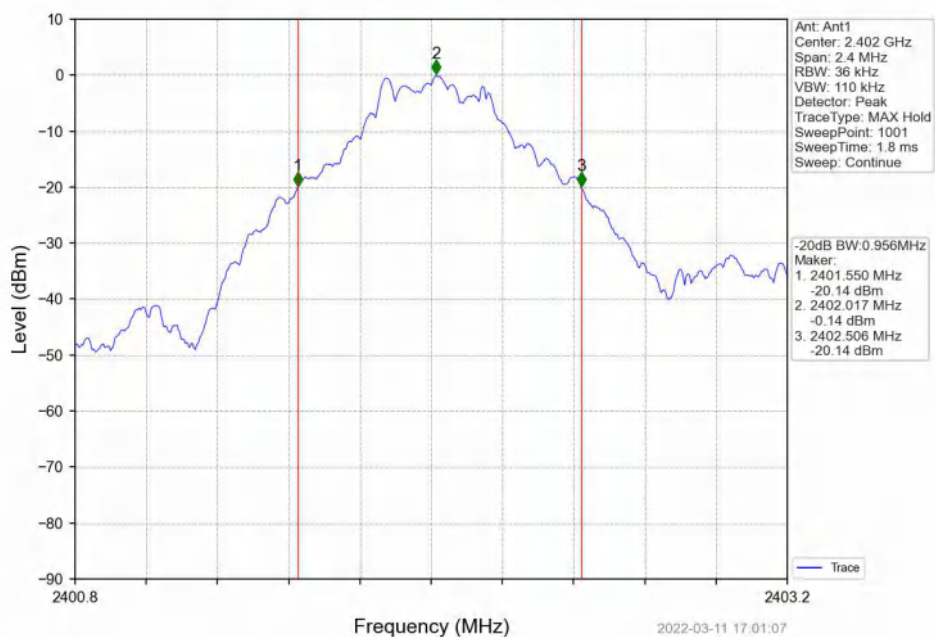
1.2.2 Test Graph



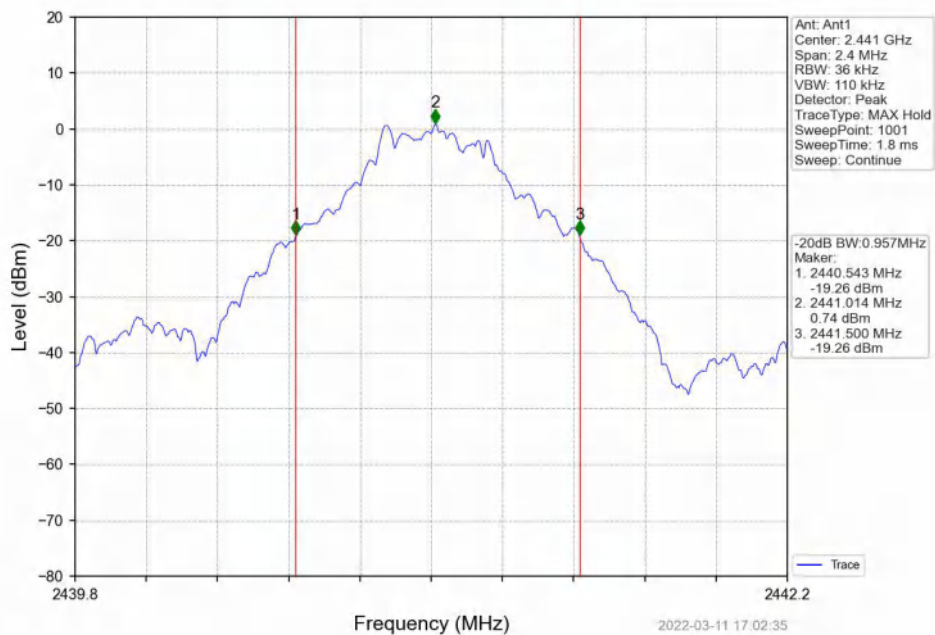
GFSK DH5_HCH_2480MHz_Ant1_NTNV



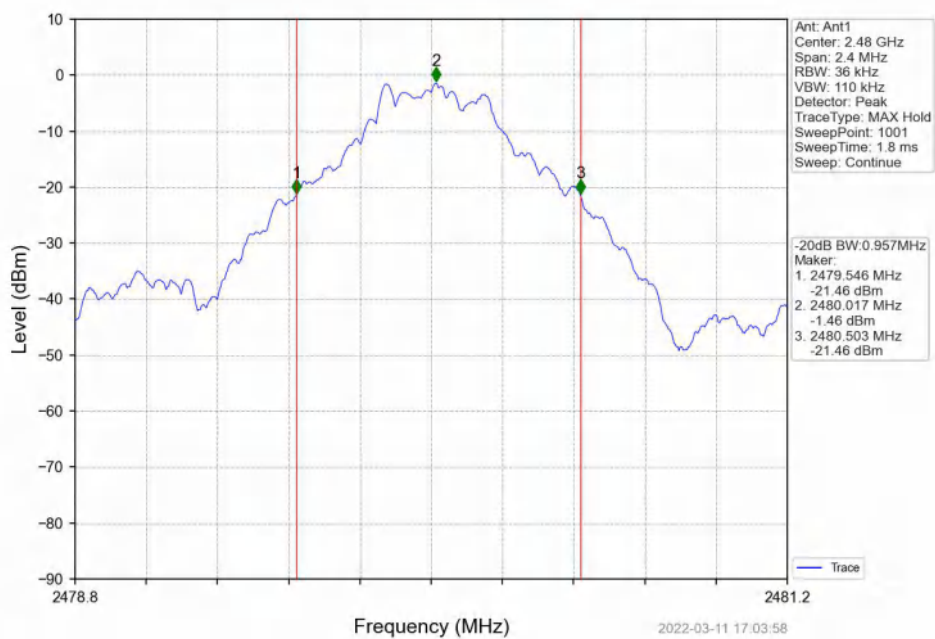
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



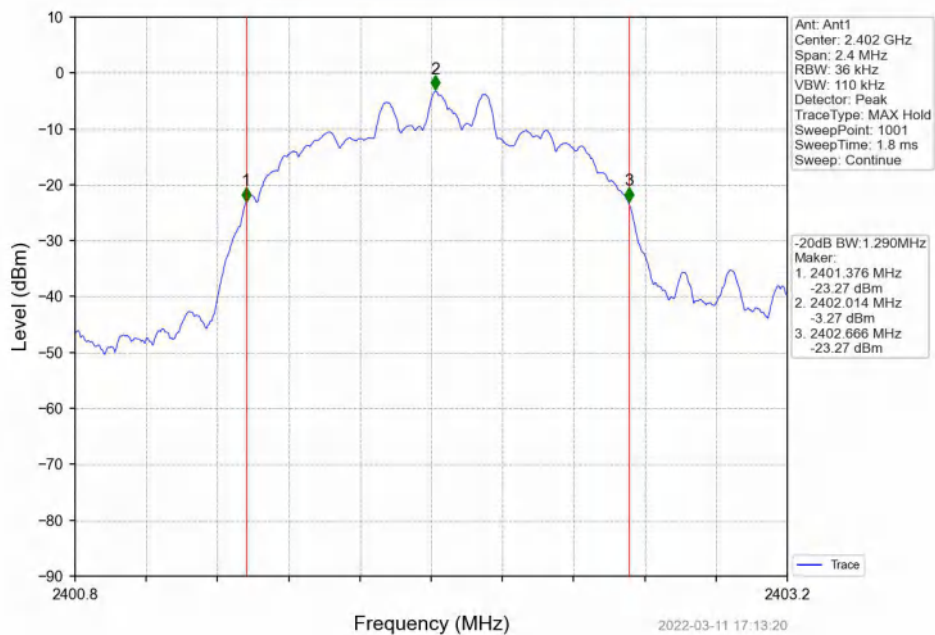
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



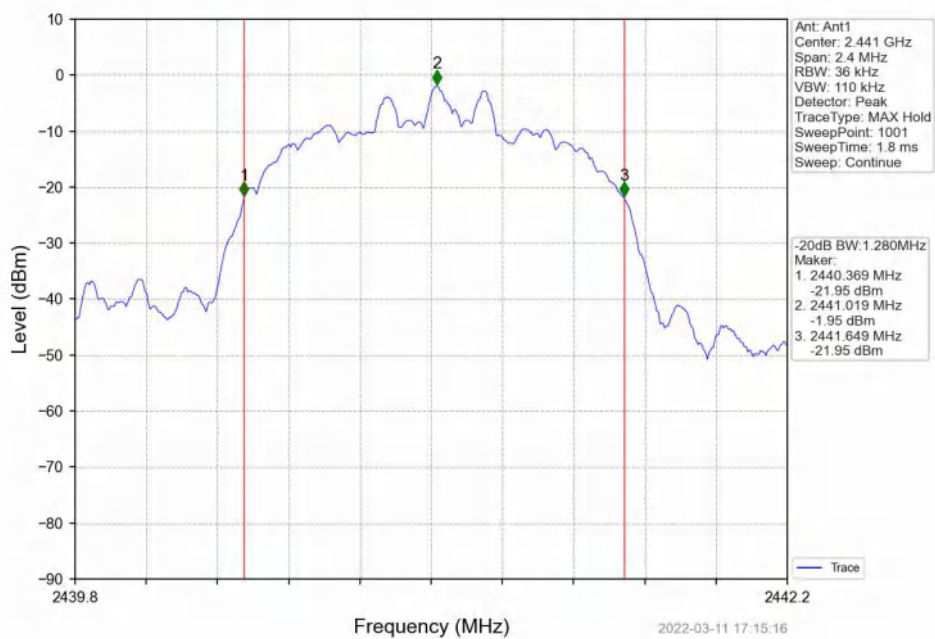
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

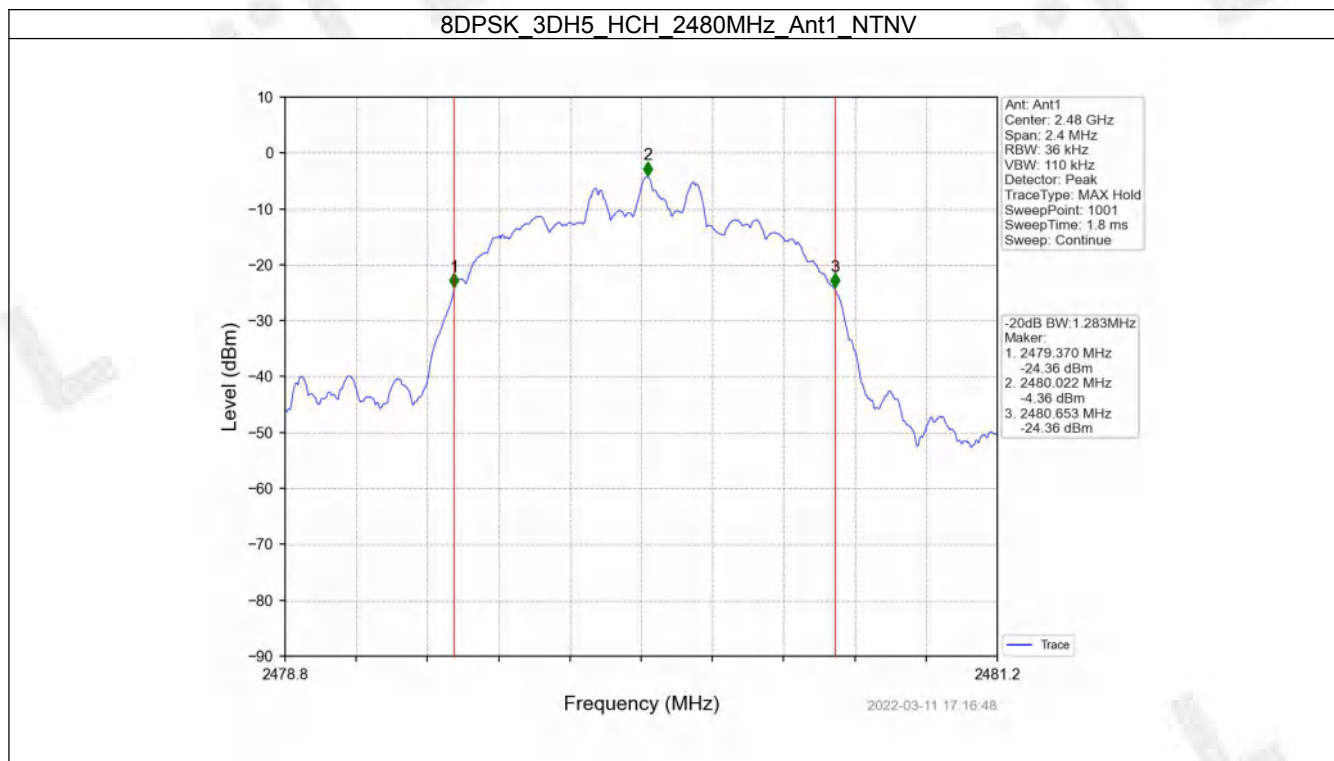


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





2. Maximum Conducted Output Power

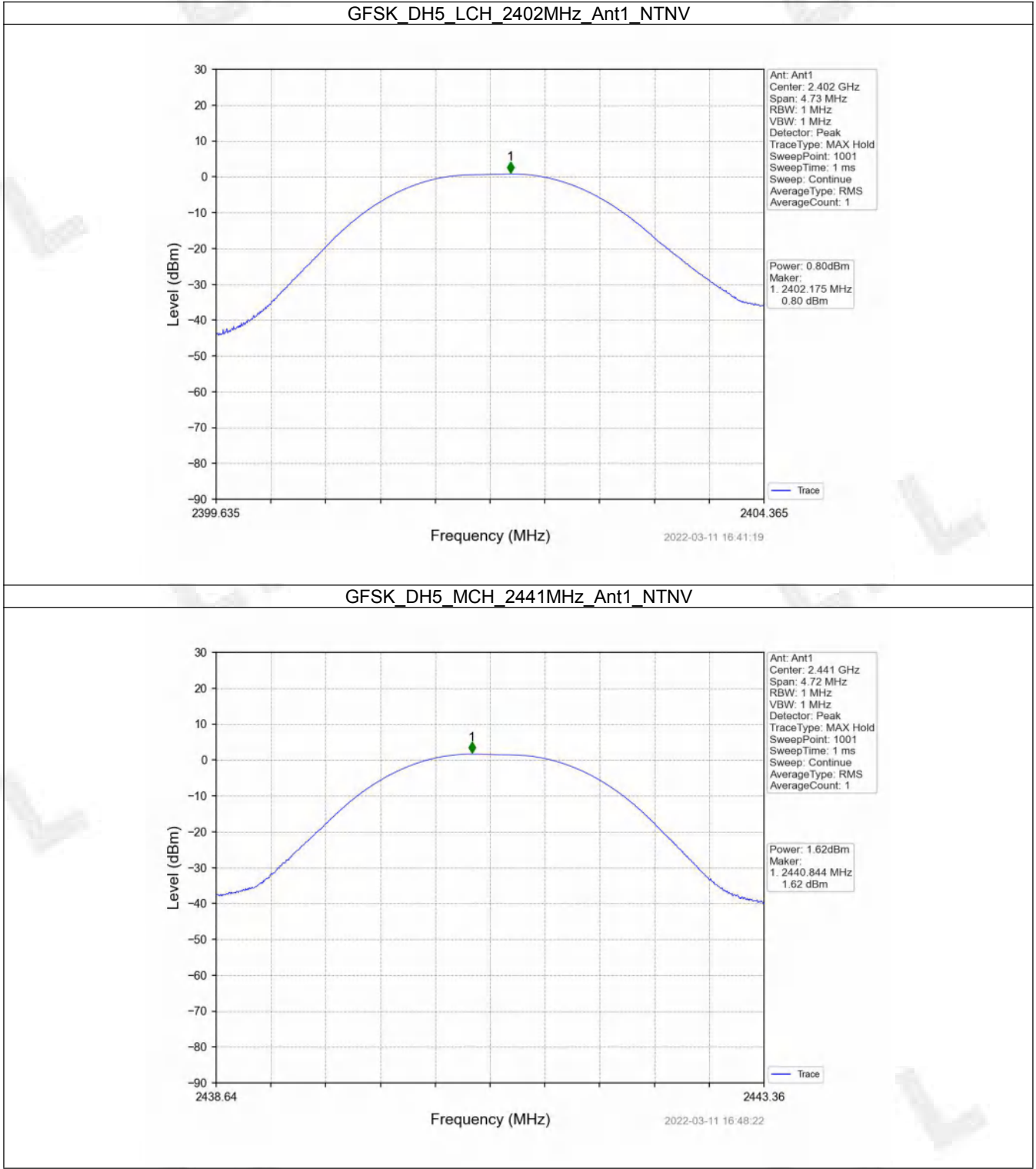
2.1 Power

2.1.1 Test Result

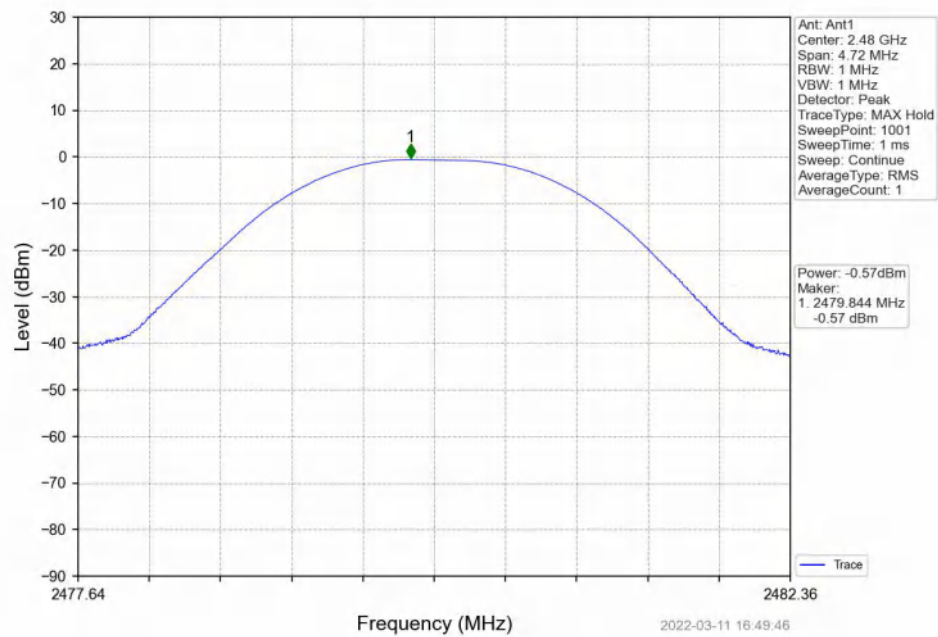
Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				Ant1	Limit	
GFSK	SISO	2402	DH5	0.80	<=30	Pass
		2441	DH5	1.62	<=30	Pass
		2480	DH5	-0.57	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	0.74	<=30	Pass
		2441	2DH5	1.79	<=30	Pass
		2480	2DH5	-0.52	<=30	Pass
8DPSK	SISO	2402	3DH5	-1.19	<=20.97	Pass
		2441	3DH5	-0.04	<=20.97	Pass
		2480	3DH5	-2.32	<=20.97	Pass

Note1: Antenna Gain: Ant1: 0.50dBi;

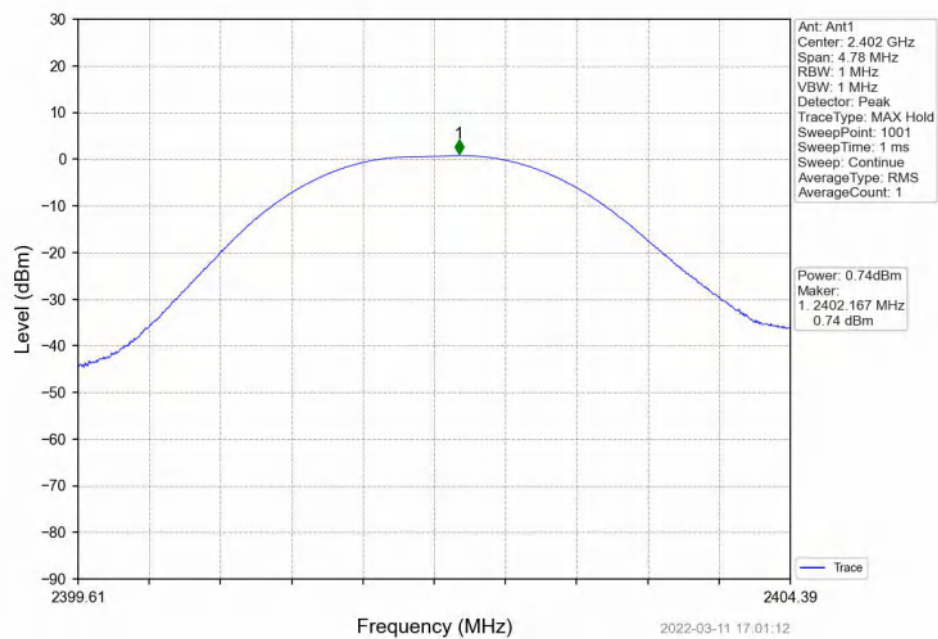
2.1.2 Test Graph



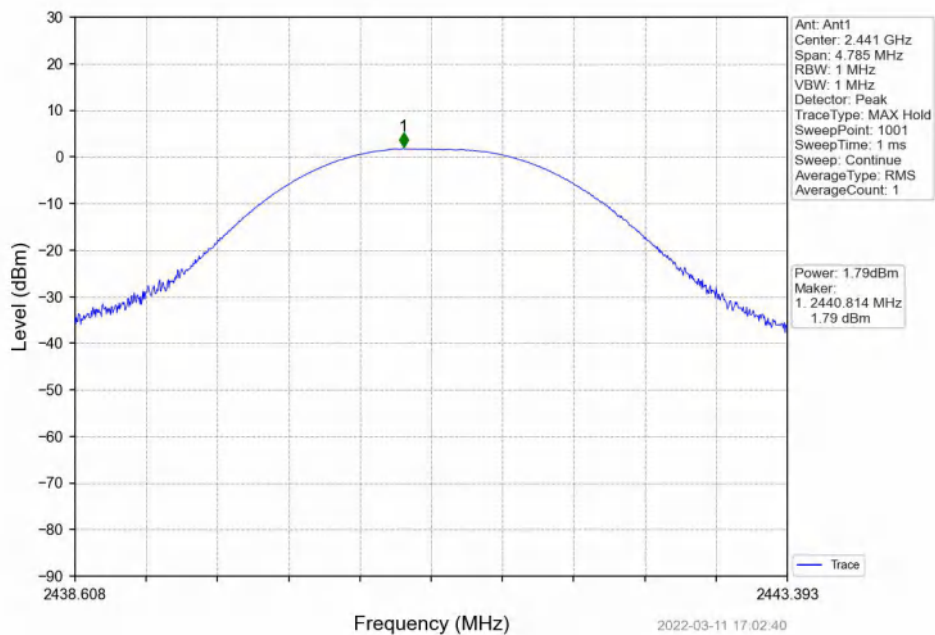
GFSK DH5_HCH_2480MHz_Ant1_NTNV



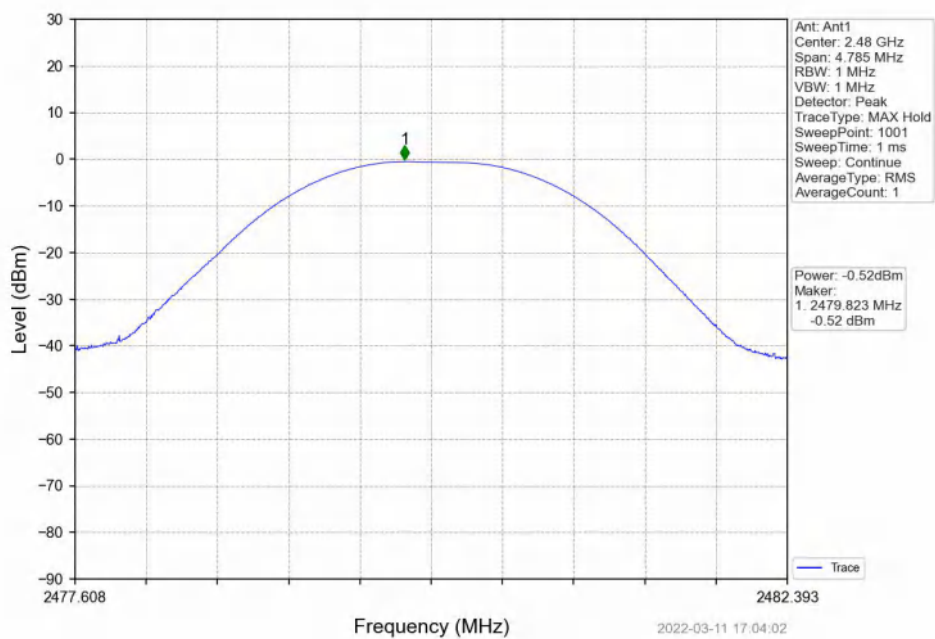
PI/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



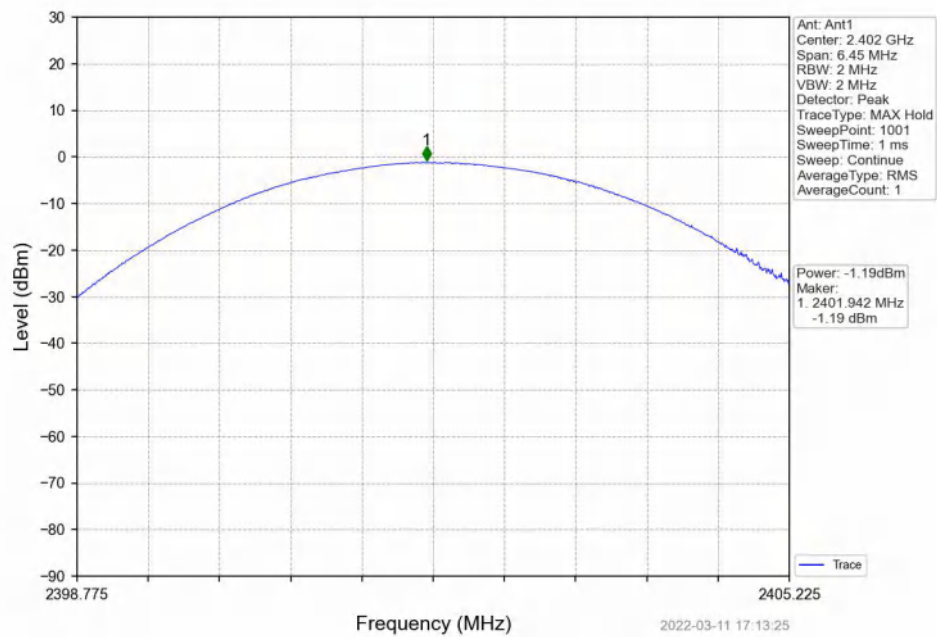
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



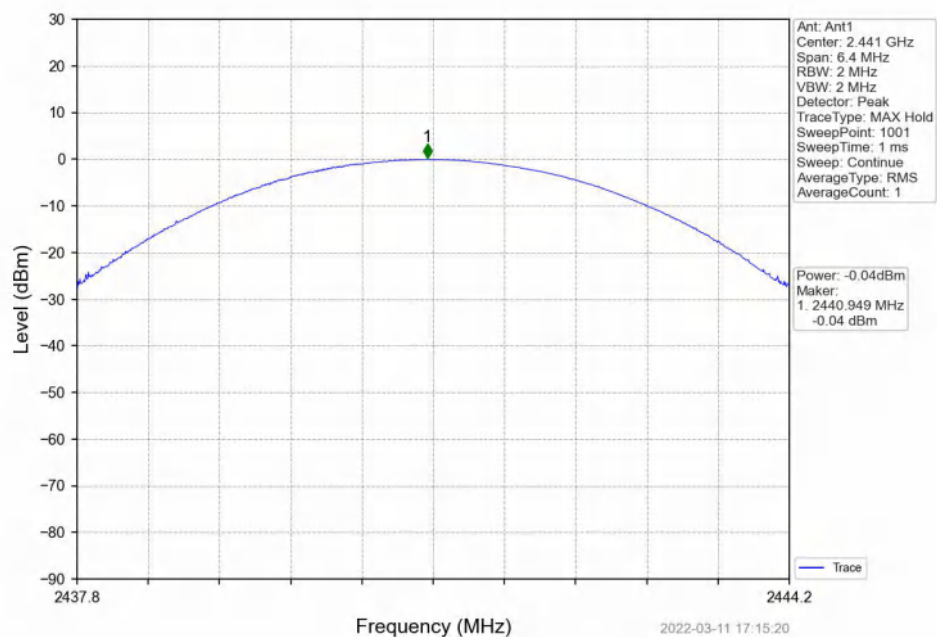
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



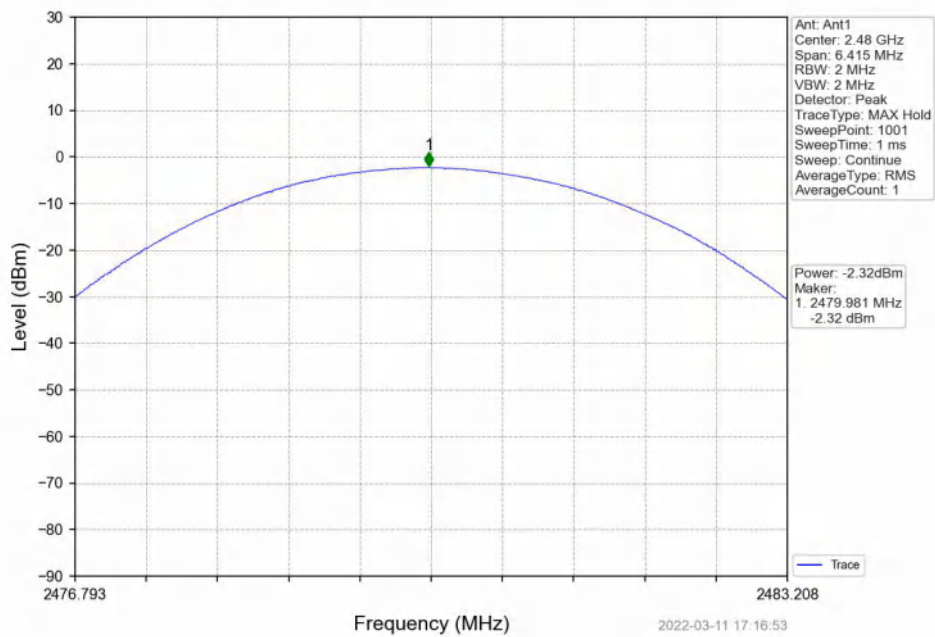
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



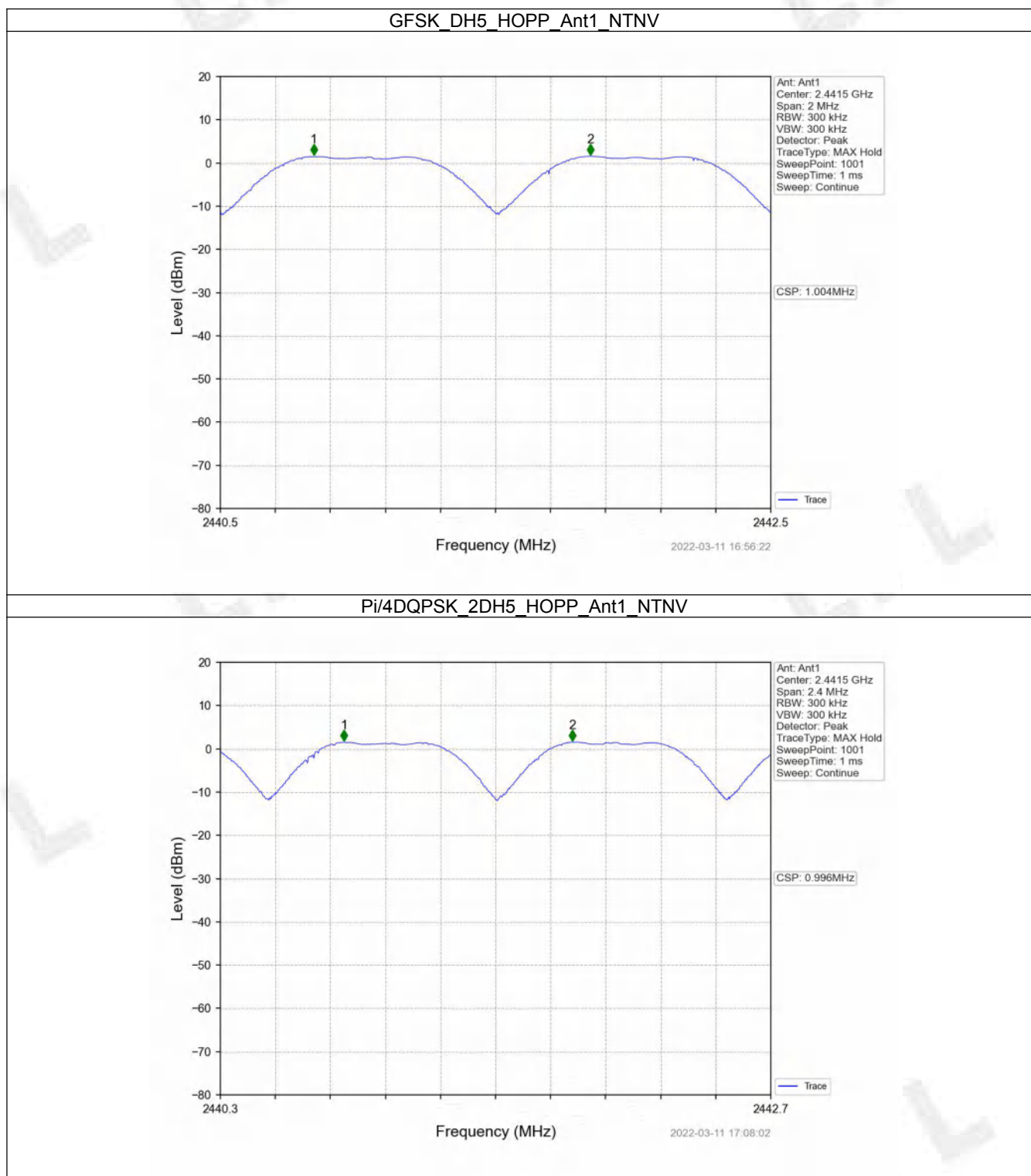
3. Carrier Frequency Separation

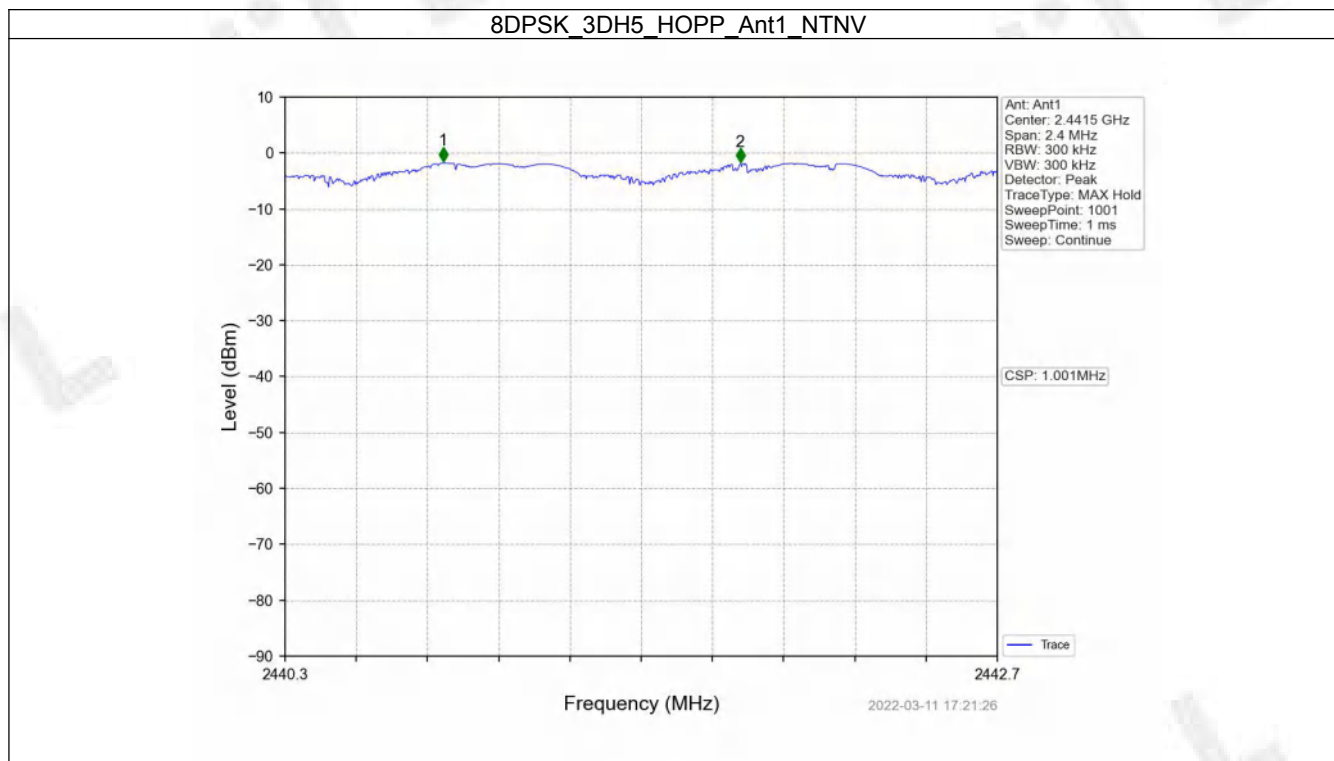
3.1 Ant1

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	1.004	0.946	≥ 0.946	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	0.996	0.957	≥ 0.957	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.290	≥ 0.86	Pass

3.1.2 Test Graph





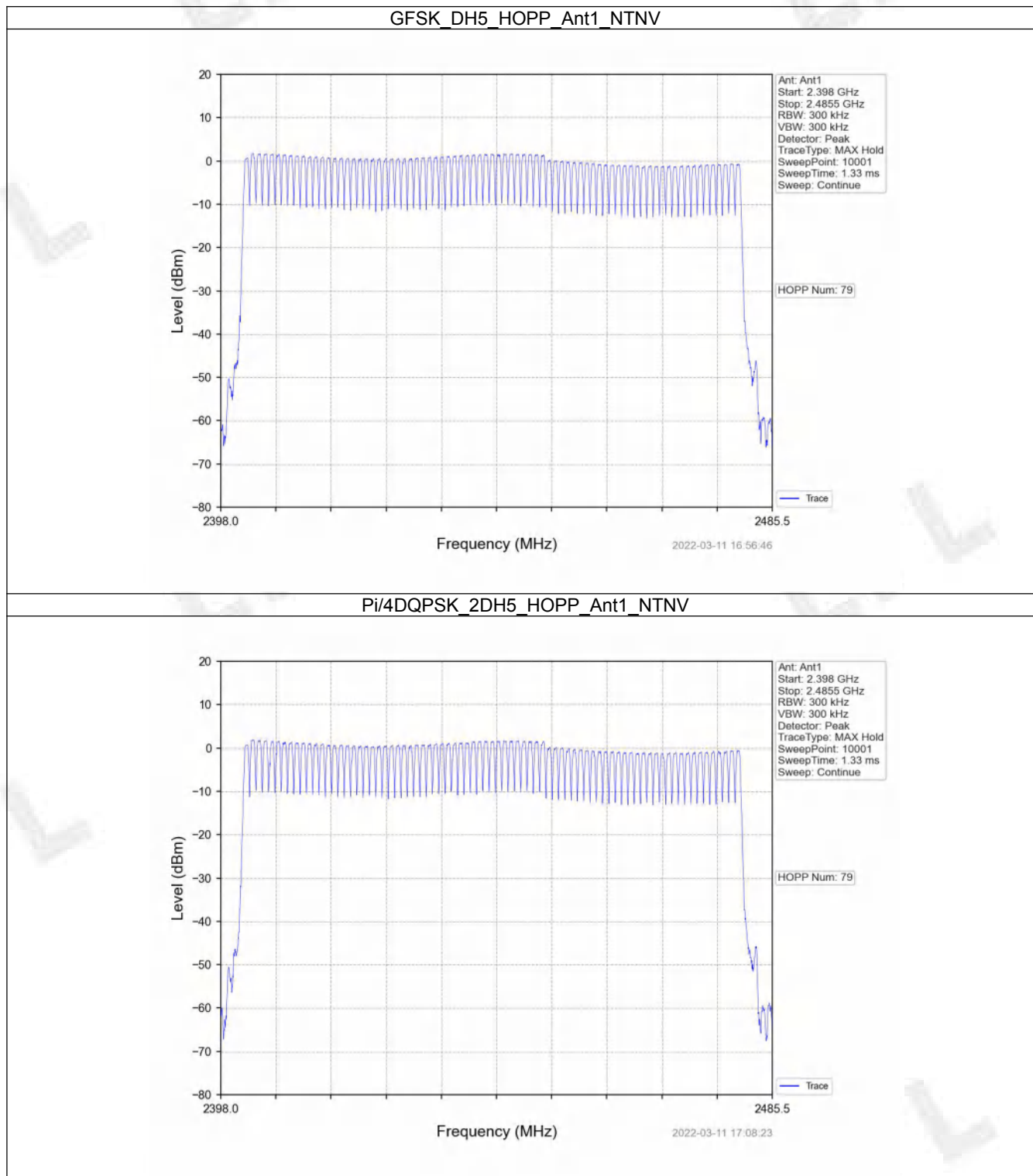
4. Number of Hopping Frequencies

4.1 HoppNum

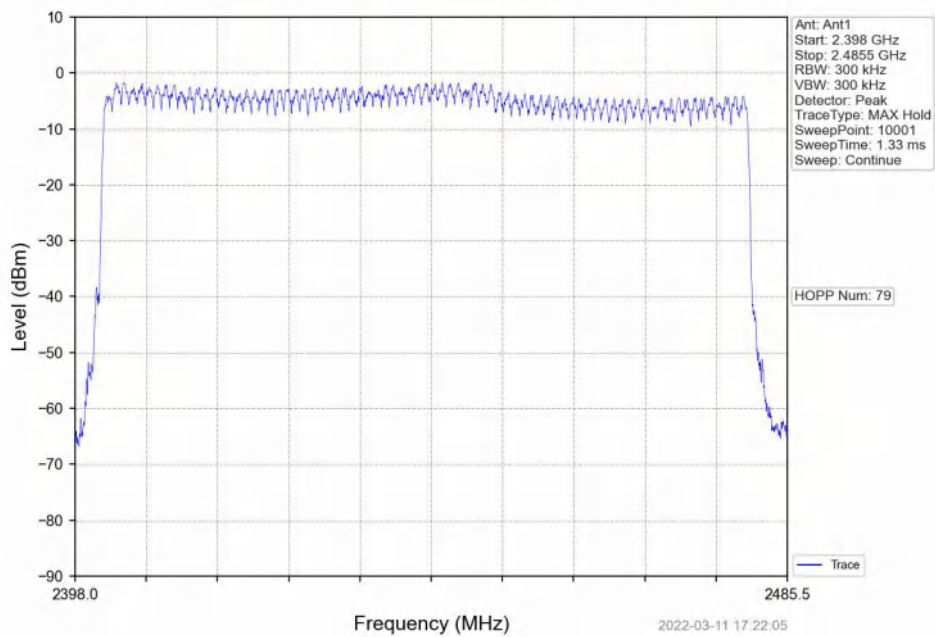
4.1.1 Test Result

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



8DPSK_3DH5_HOPP_Ant1_NTNV



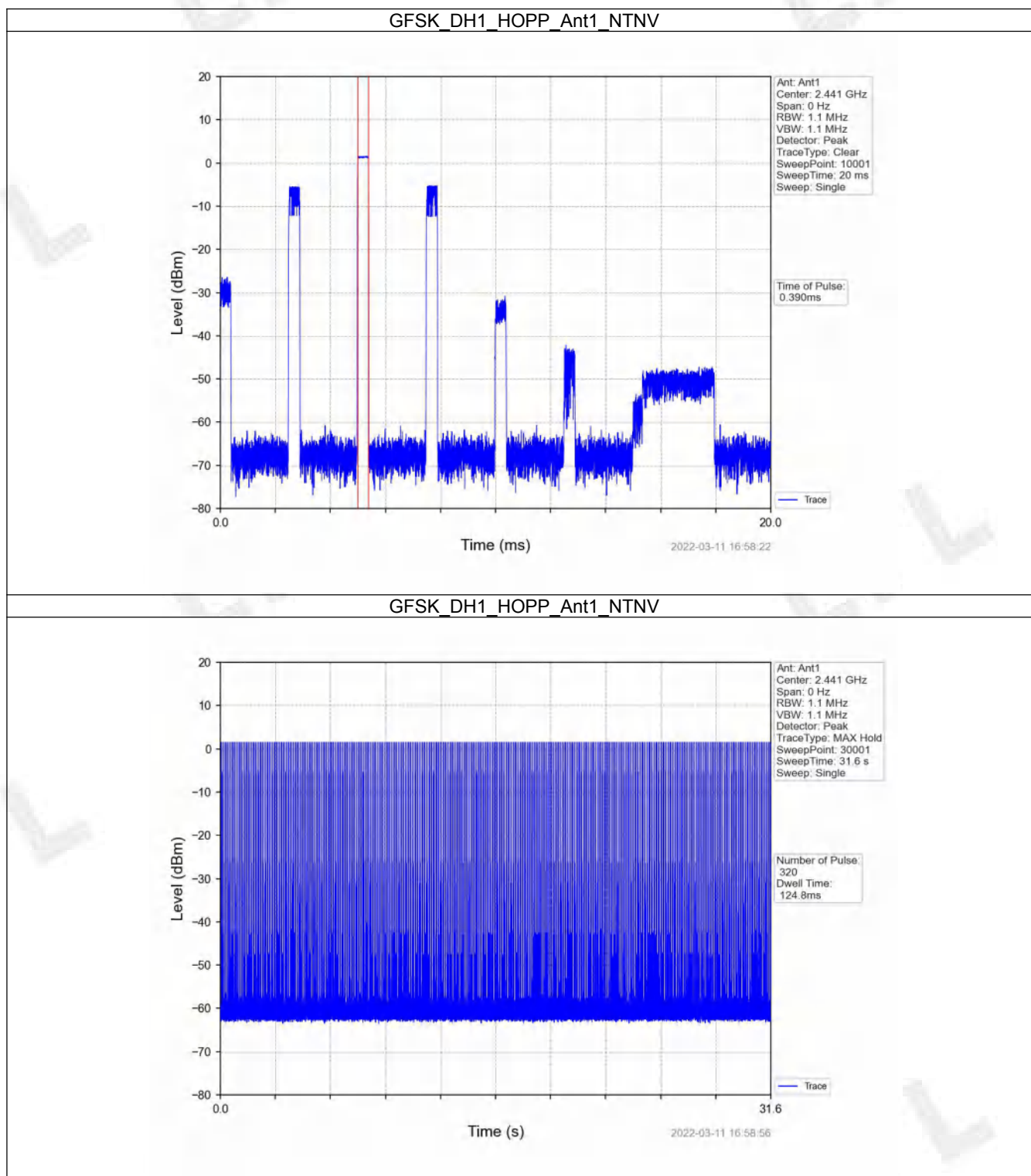
5. Time of Occupancy (Dwell Time)

5.1 Ant1

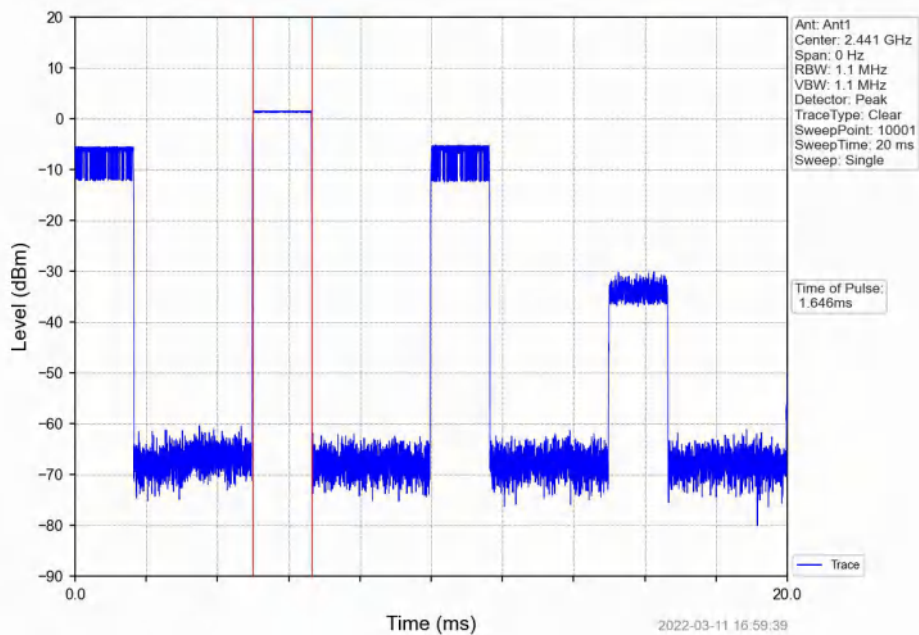
5.1.1 Test Result

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	0.390	31.600	320	124.800	<=400	Pass
			DH3	1.646	31.600	160	263.360	<=400	Pass
			DH5	2.894	31.600	107	309.658	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.410	31.600	320	131.200	<=400	Pass
			2DH3	1.664	31.600	159	264.576	<=400	Pass
			2DH5	1.646	31.600	160	263.360	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.410	31.600	320	131.200	<=400	Pass
			3DH3	1.660	31.600	160	265.600	<=400	Pass
			3DH5	2.910	31.600	106	308.460	<=400	Pass

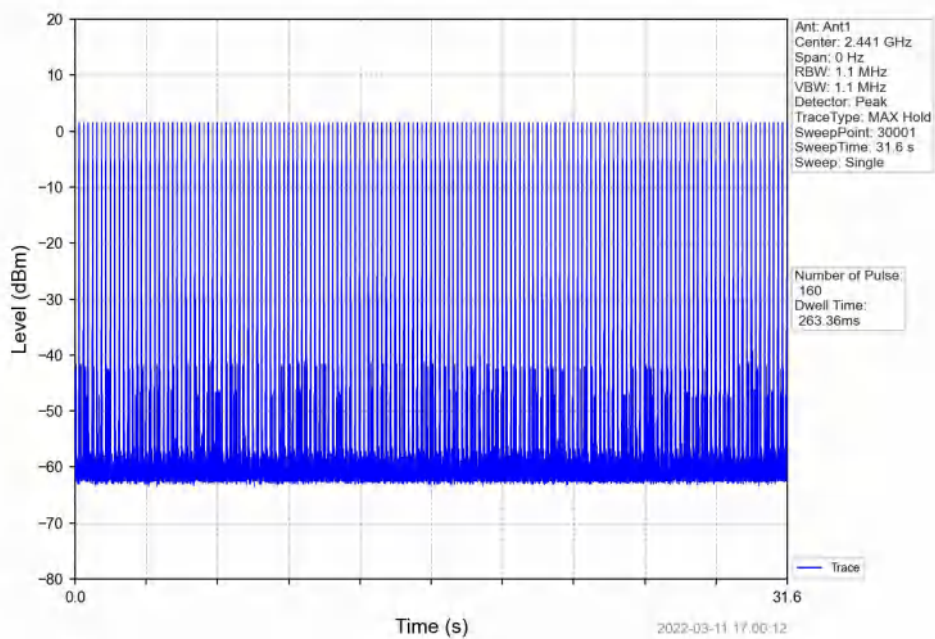
5.1.2 Test Graph



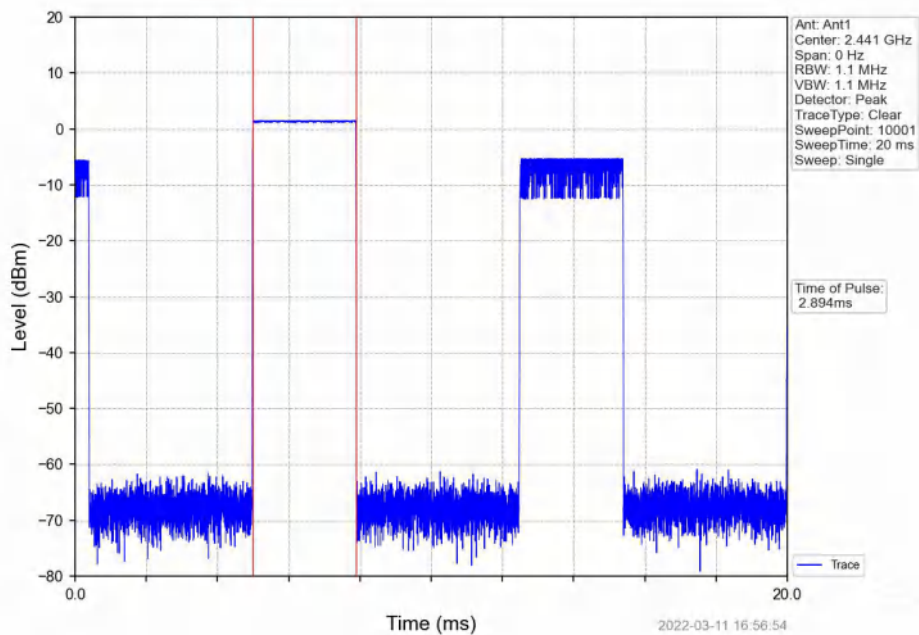
GFSK_DH3_HOPP_Ant1_NTNV



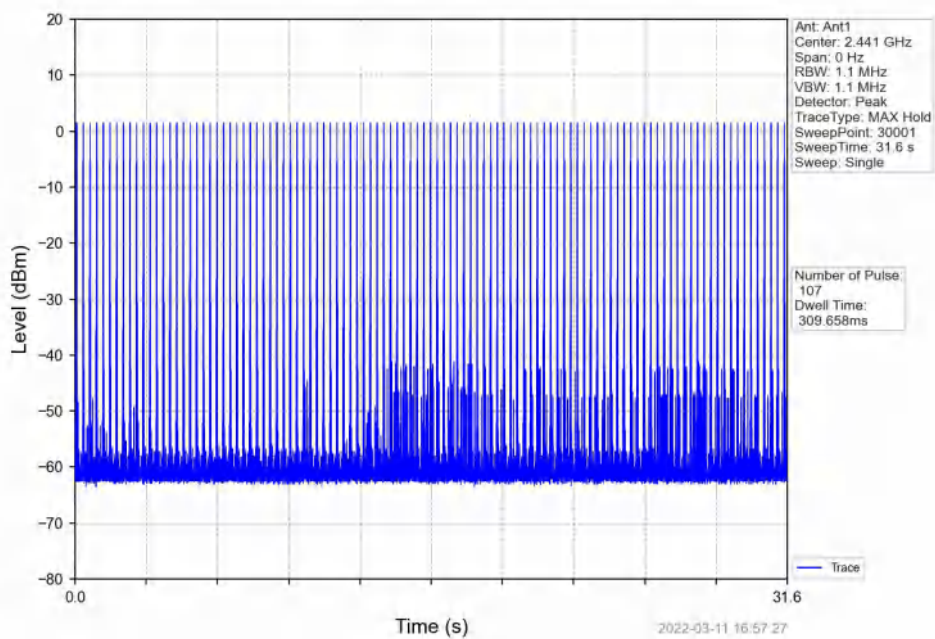
GFSK_DH3_HOPP_Ant1_NTNV



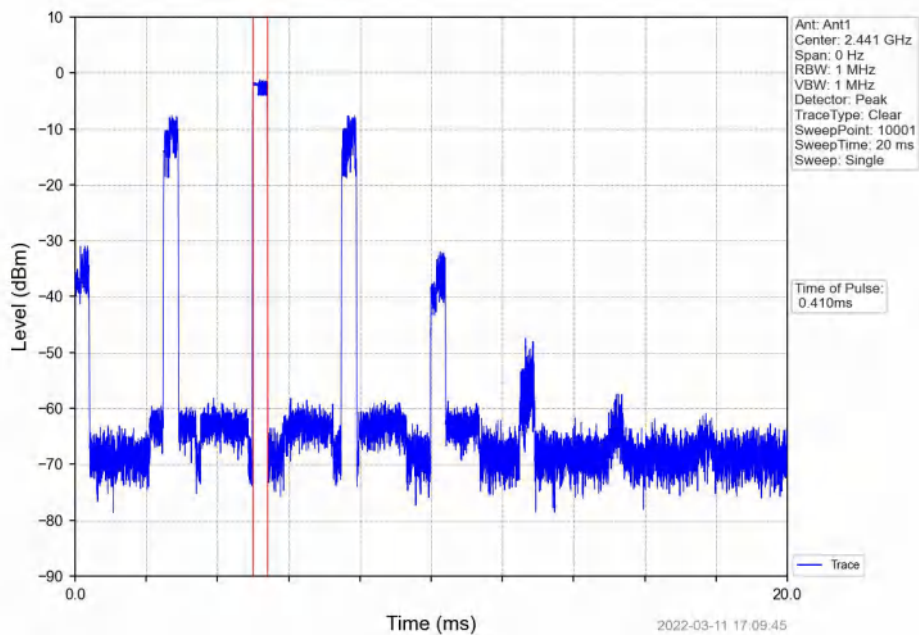
GFSK_DH5_HOPP_Ant1_NTNV



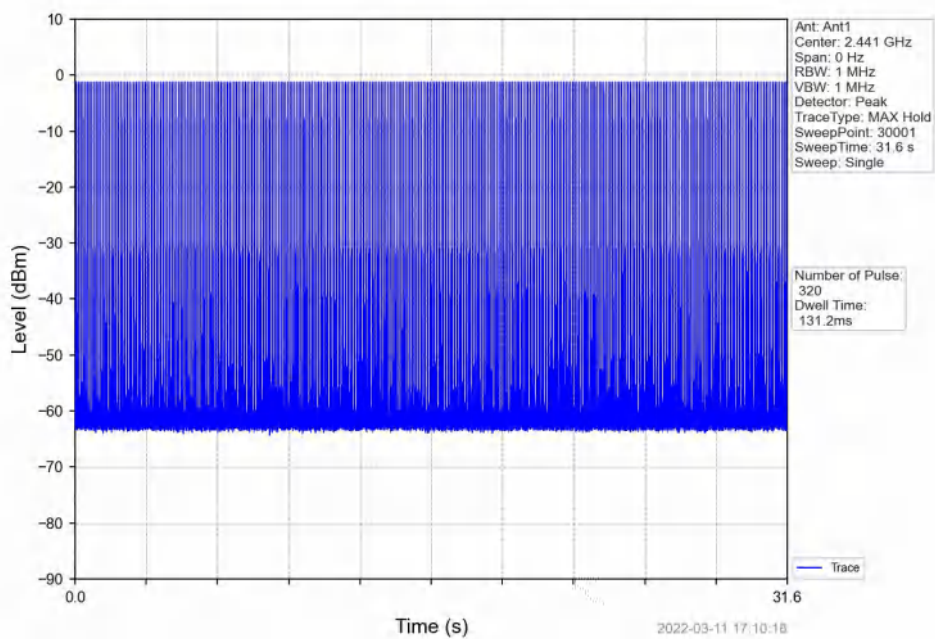
GFSK_DH5_HOPP_Ant1_NTNV



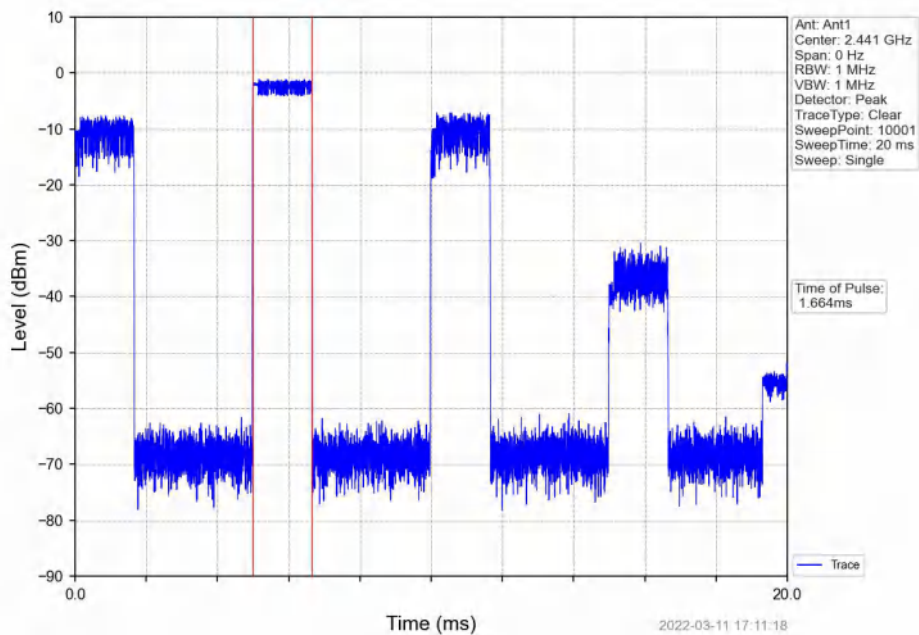
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



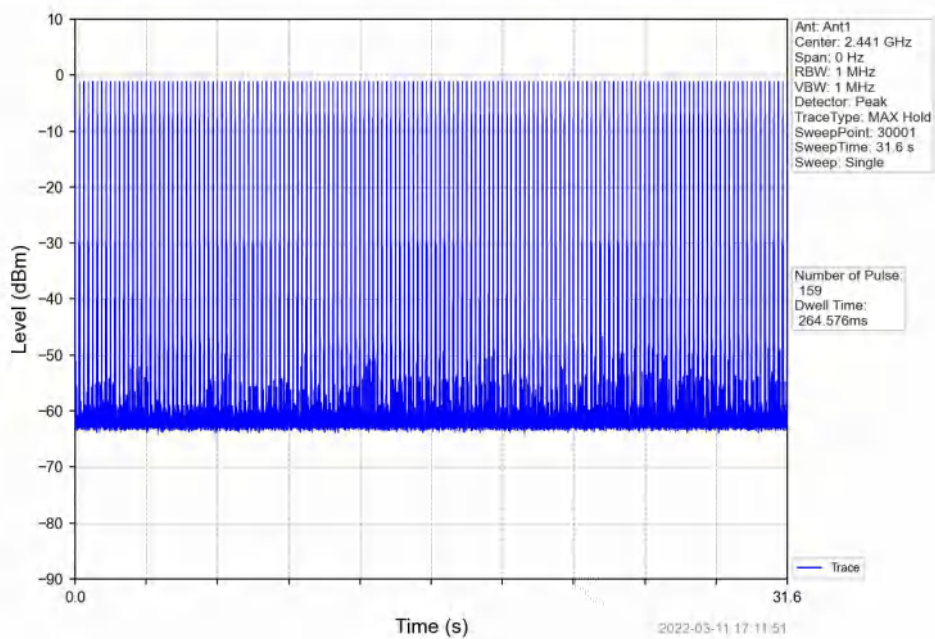
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



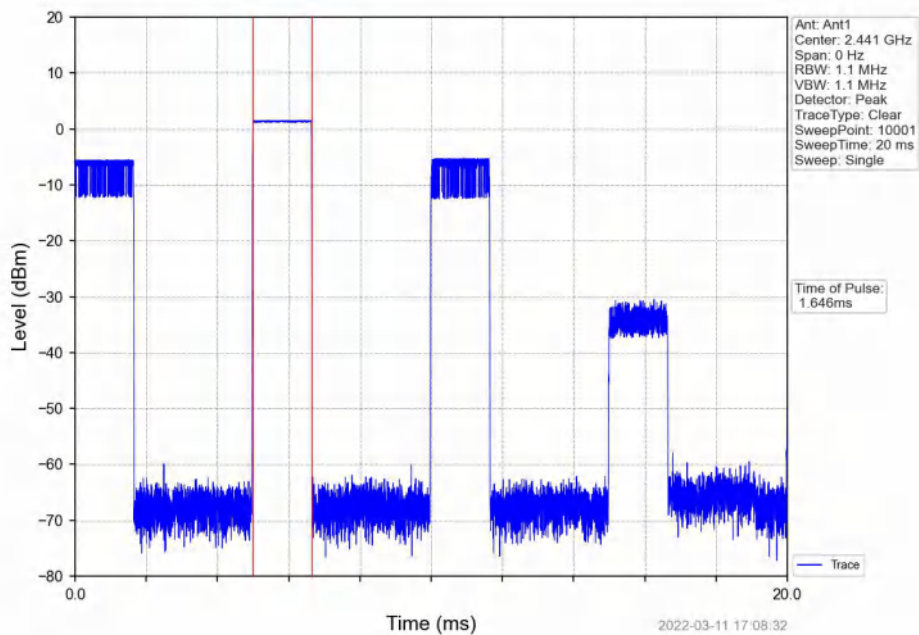
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



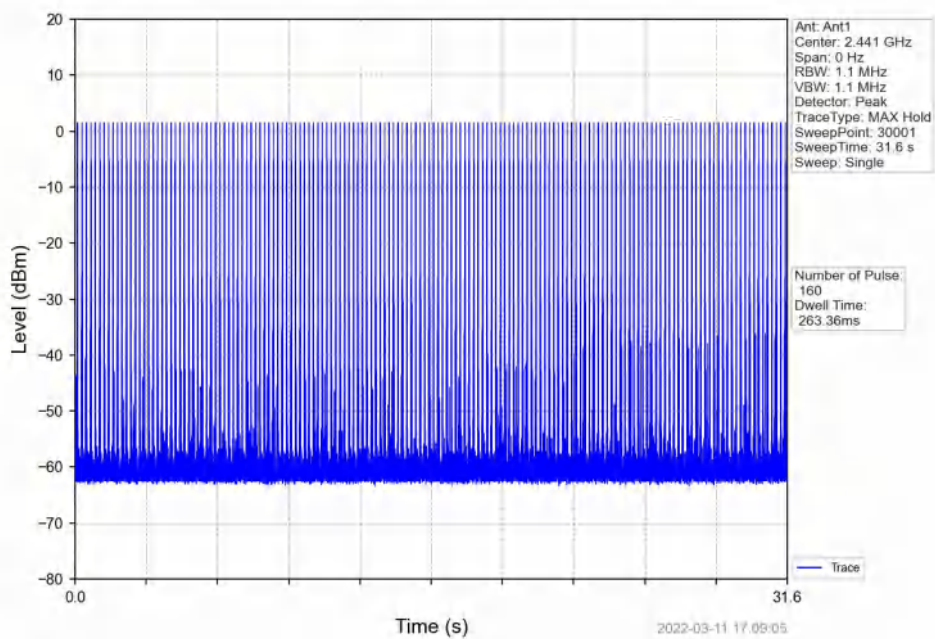
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



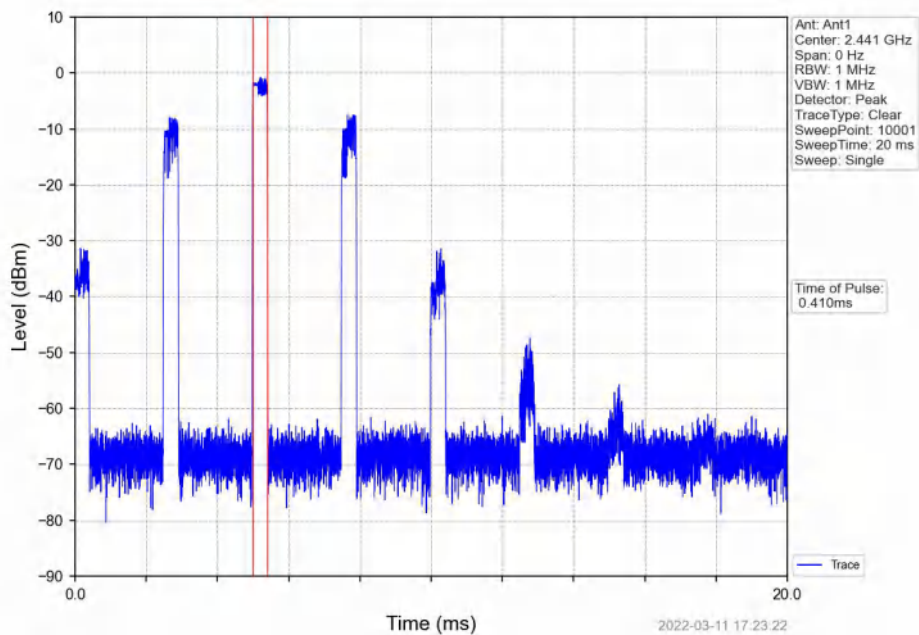
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



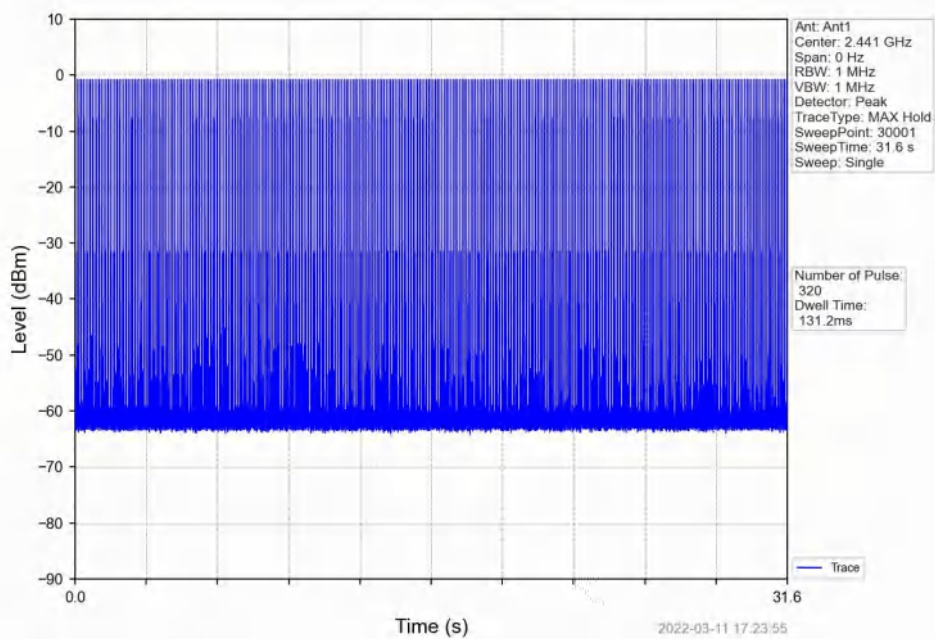
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



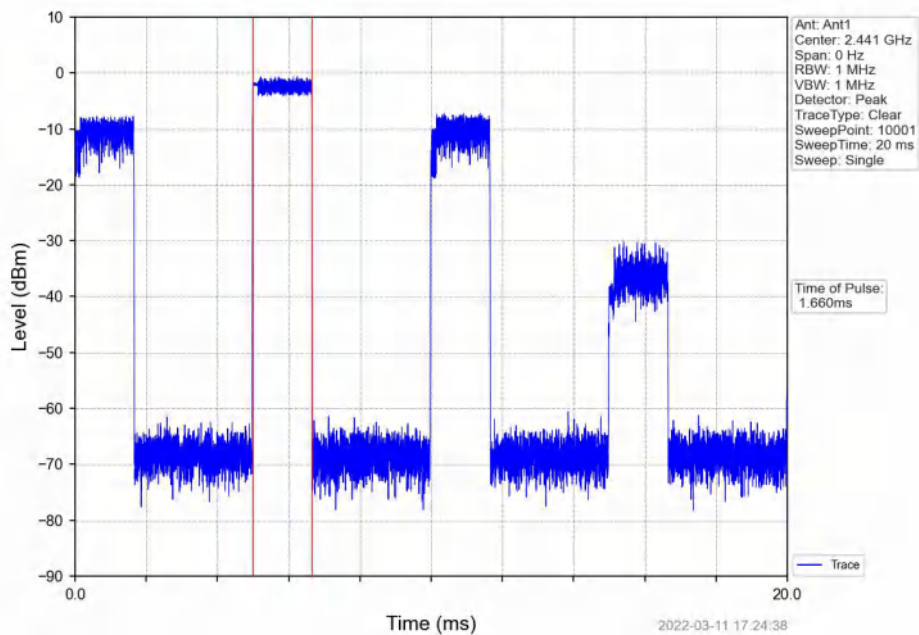
8DPSK_3DH1_HOPP_Ant1_NTNV



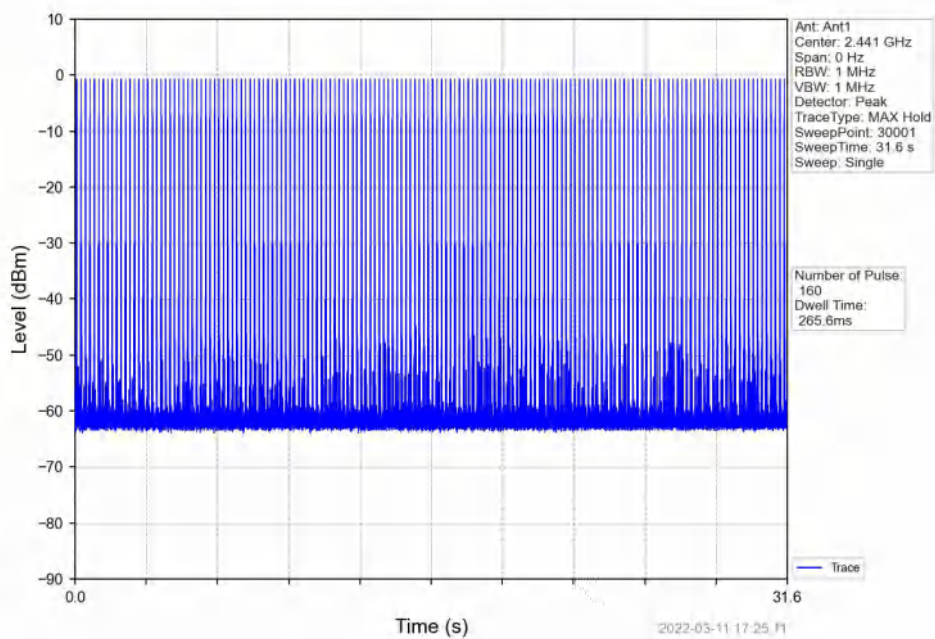
8DPSK_3DH1_HOPP_Ant1_NTNV



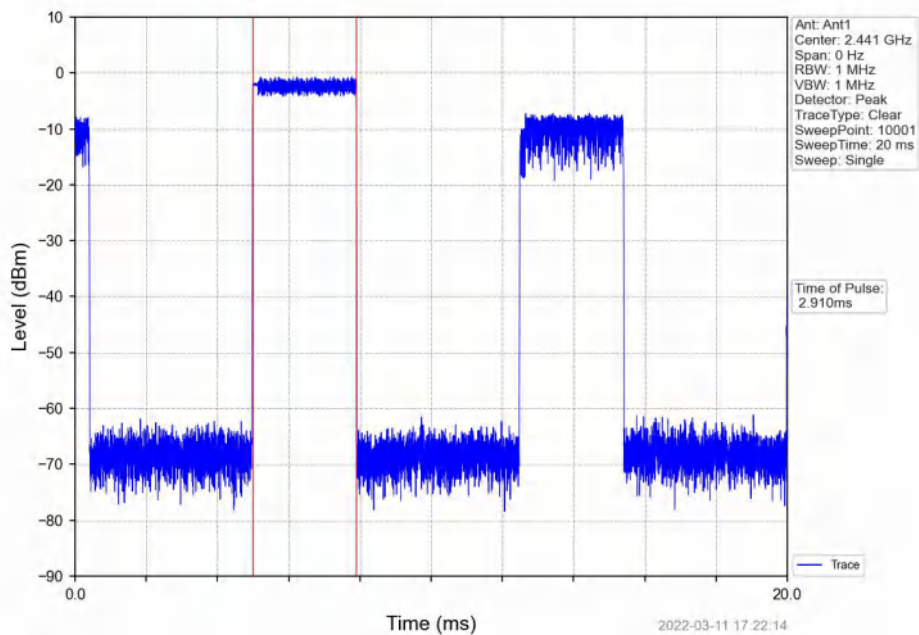
8DPSK_3DH3_HOPP_Ant1_NTNV



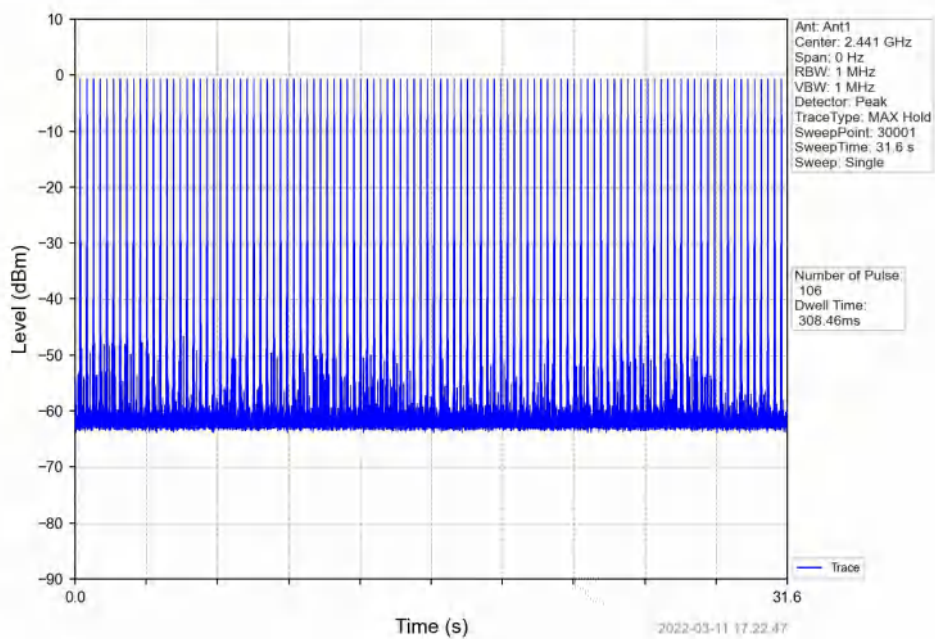
8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



6. Unwanted Emissions In Non-restricted Frequency Bands

6.1 Ref

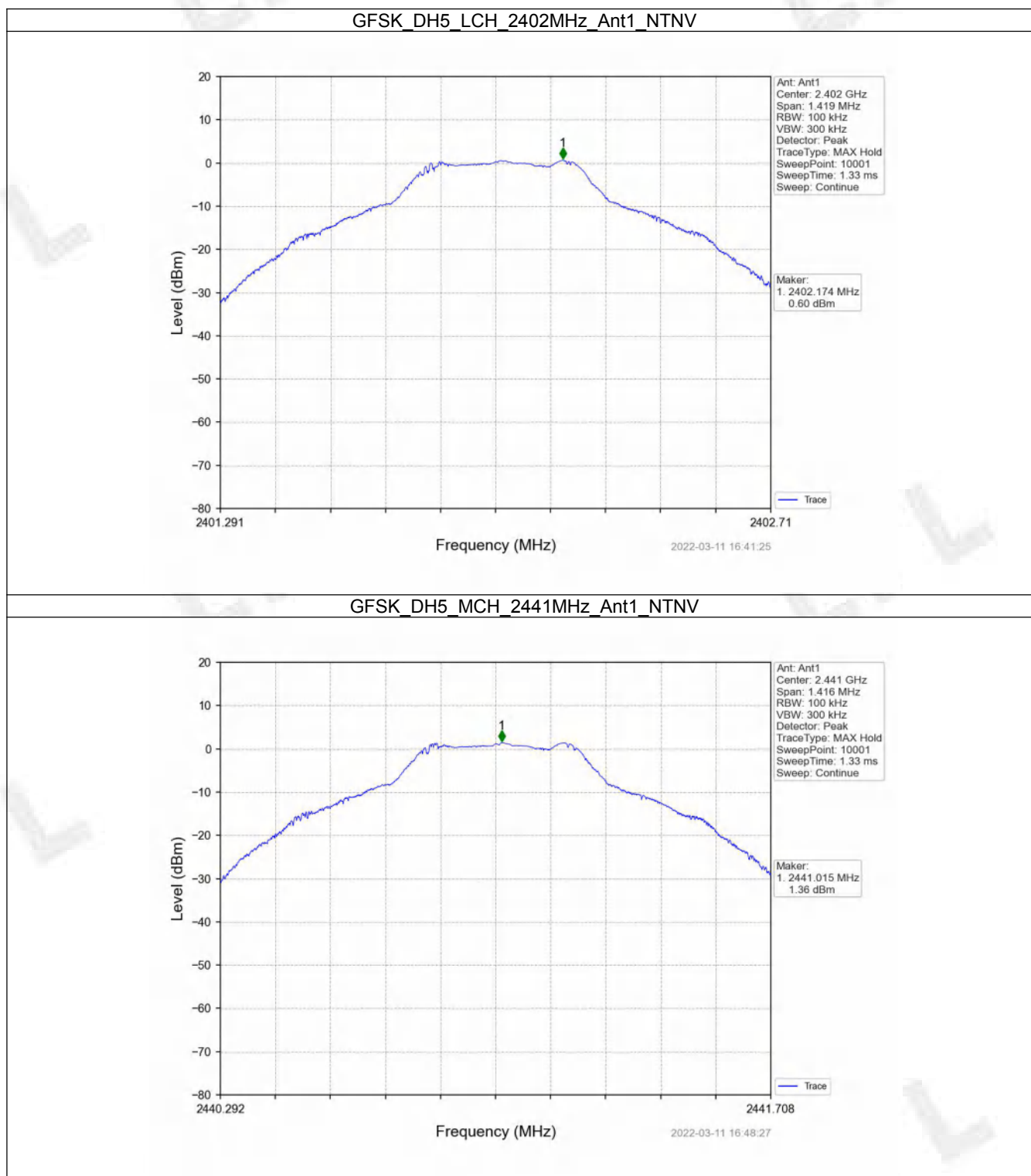
6.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	0.60
		2441	DH5	1	1.36
		2480	DH5	1	-0.83
Pi/4DQPSK	SISO	2402	2DH5	1	0.54
		2441	2DH5	1	1.50
		2480	2DH5	1	-0.68
8DPSK	SISO	2402	3DH5	1	-2.99
		2441	3DH5	1	-1.93
		2480	3DH5	1	-4.22

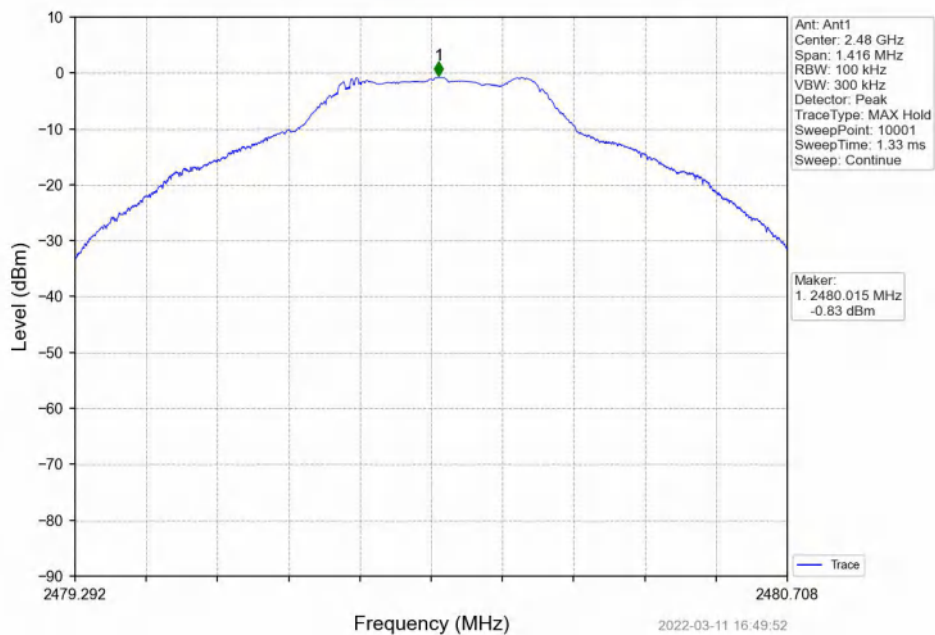
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

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.

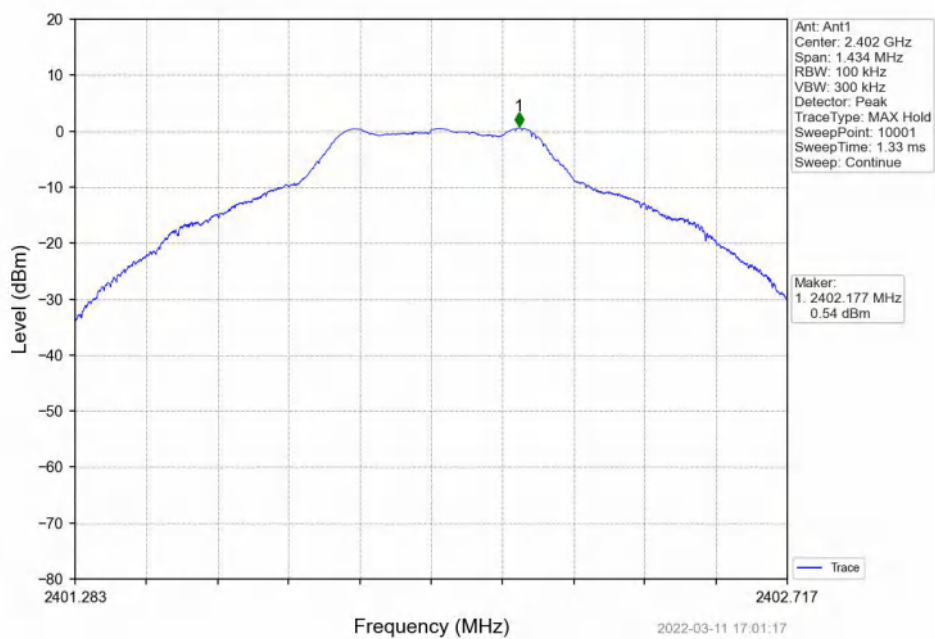
6.1.2 Test Graph



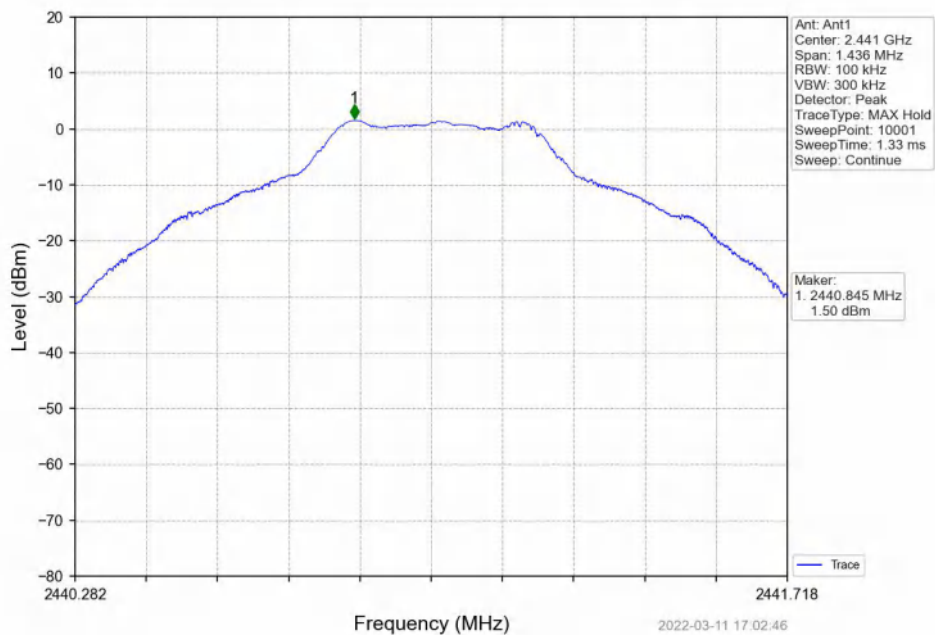
GFSK DH5_HCH_2480MHz_Ant1_NTNV



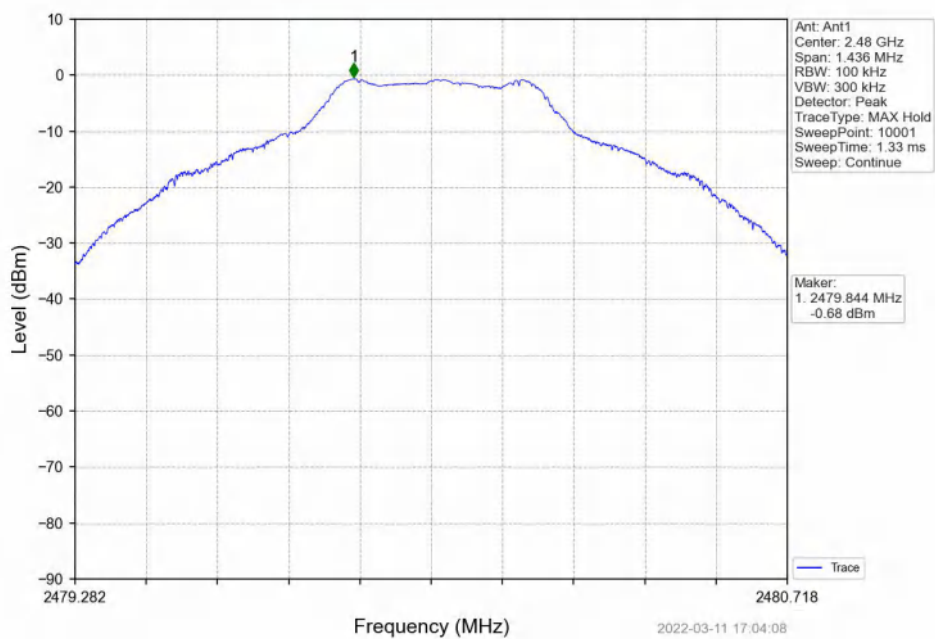
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



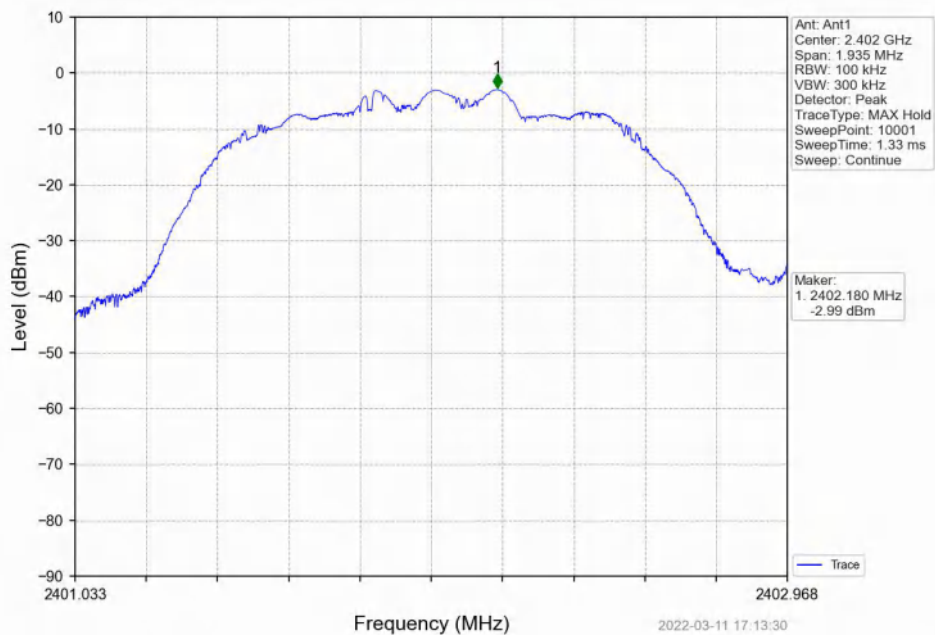
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



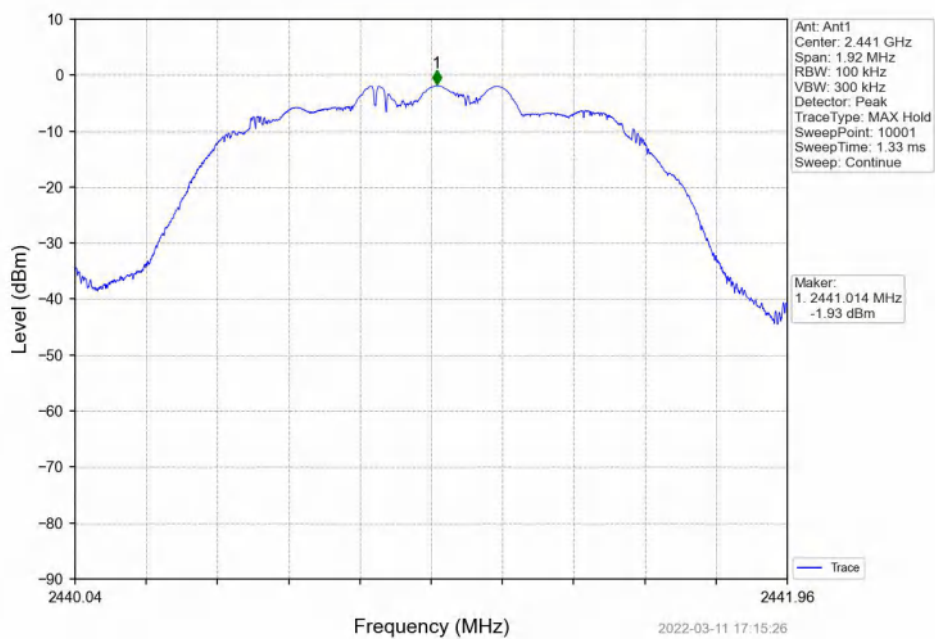
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

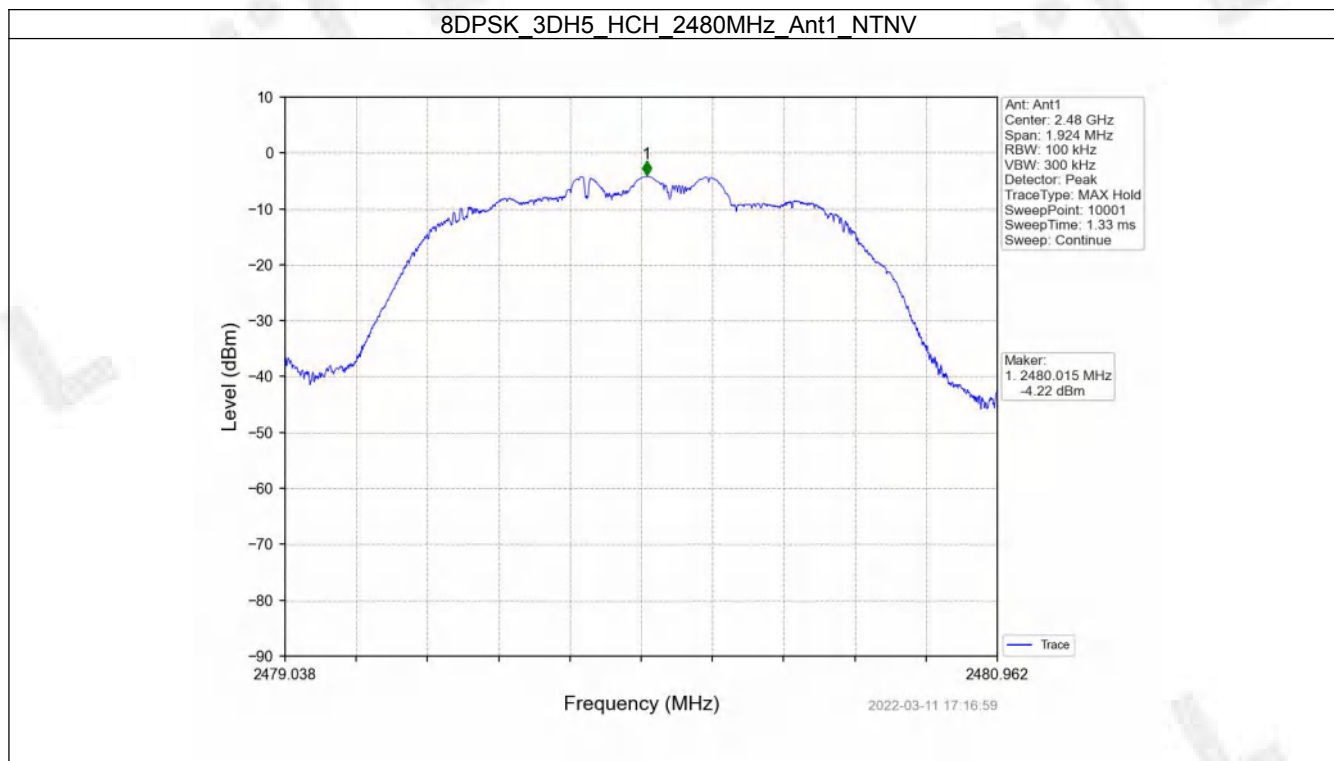


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





6.2 CSE

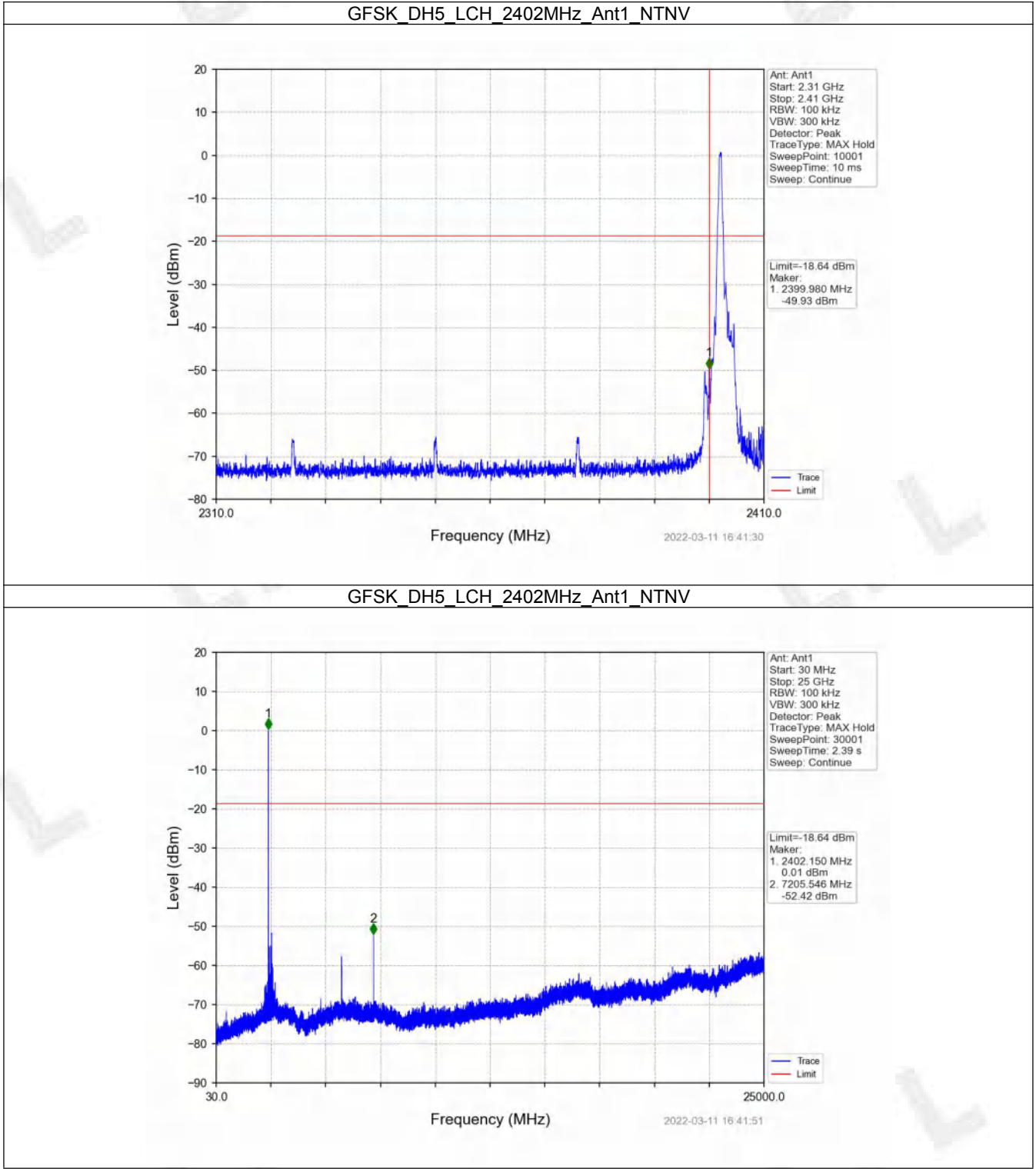
6.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	1.36	-18.64	Pass
		2441	DH5	1	1.36	-18.64	Pass
		2480	DH5	1	1.36	-18.64	Pass
		HOPP	DH5	1	1.36	-18.64	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.50	-18.50	Pass
		2441	2DH5	1	1.50	-18.50	Pass
		2480	2DH5	1	1.50	-18.50	Pass
		HOPP	2DH5	1	1.50	-18.50	Pass
8DPSK	SISO	2402	3DH5	1	-1.93	-21.93	Pass
		2441	3DH5	1	-1.93	-21.93	Pass
		2480	3DH5	1	-1.93	-21.93	Pass
		HOPP	3DH5	1	-1.93	-21.93	Pass

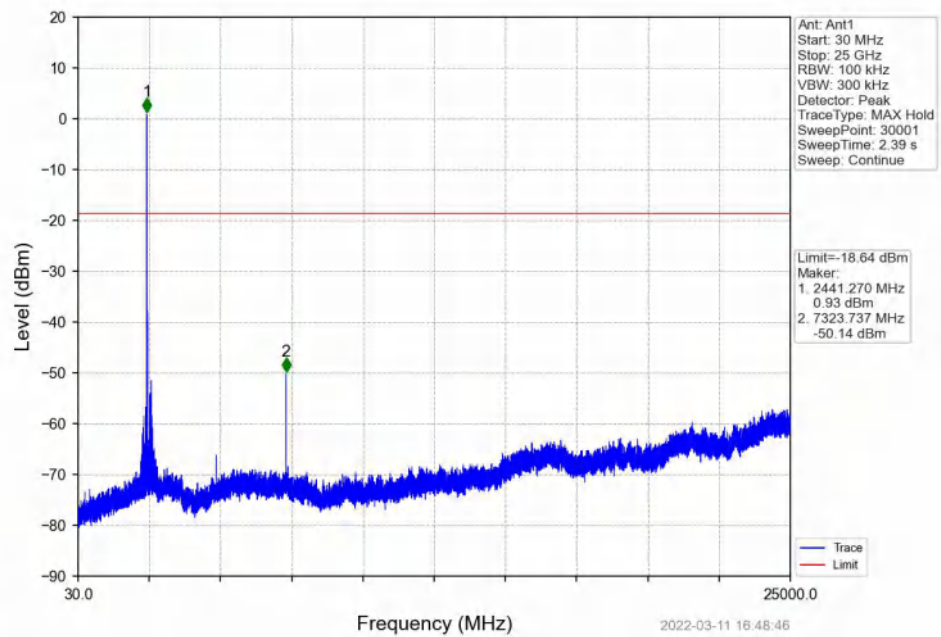
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

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.

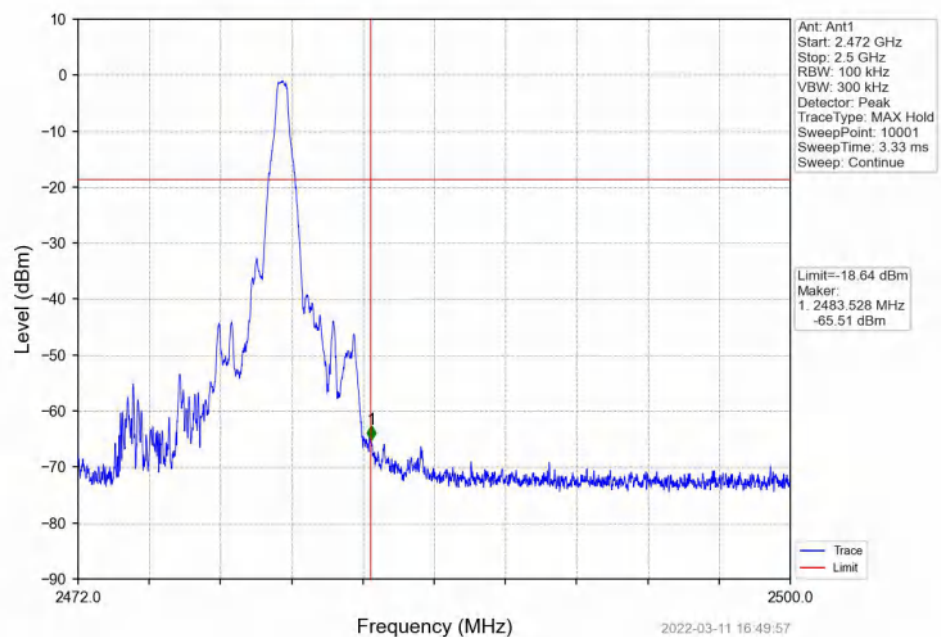
6.2.2 Test Graph



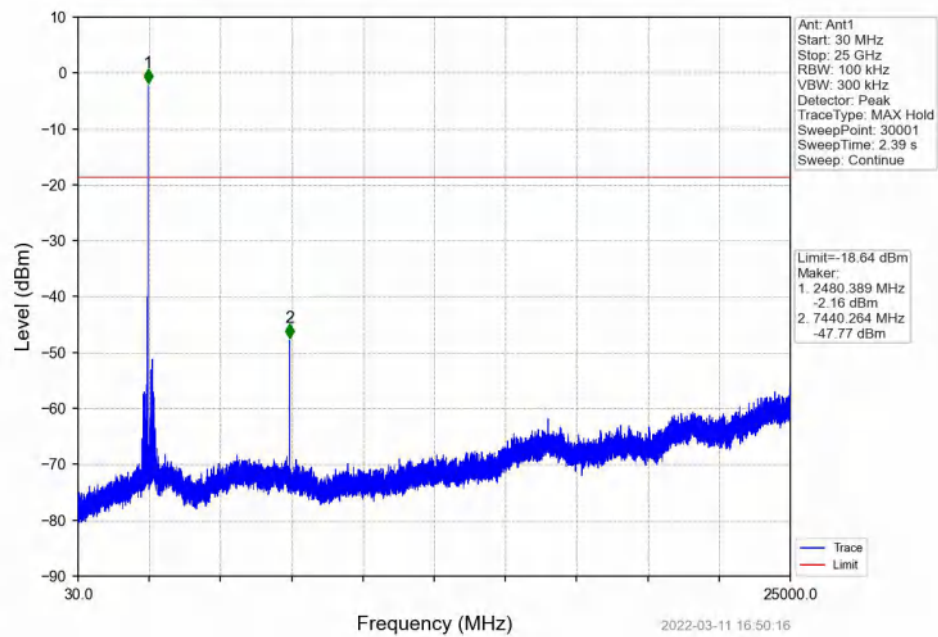
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



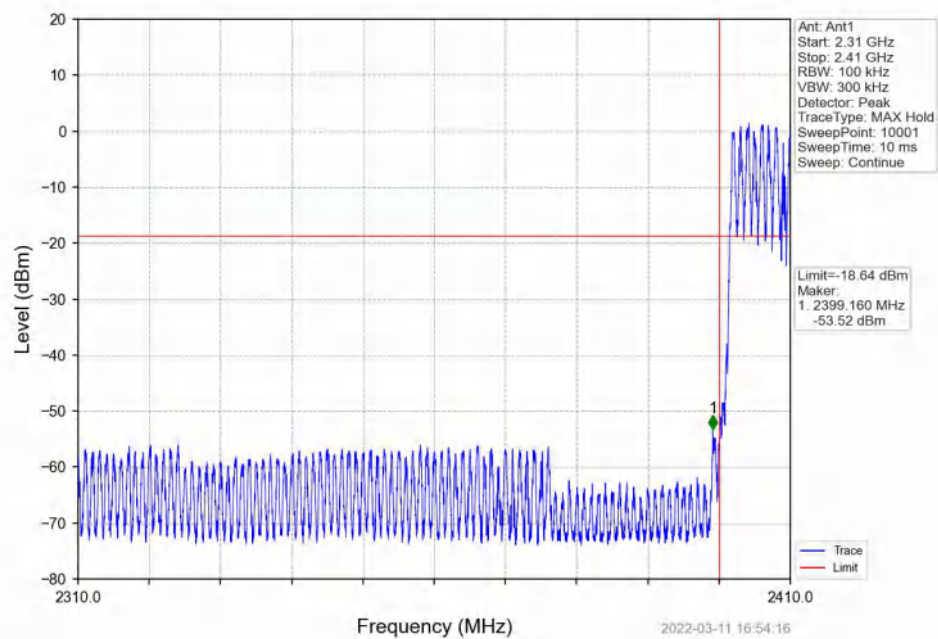
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



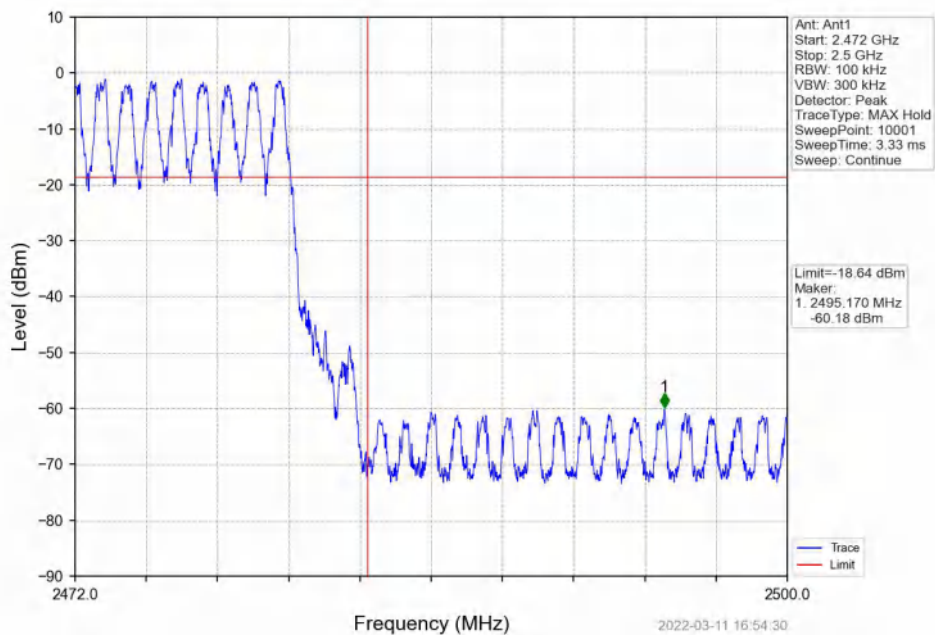
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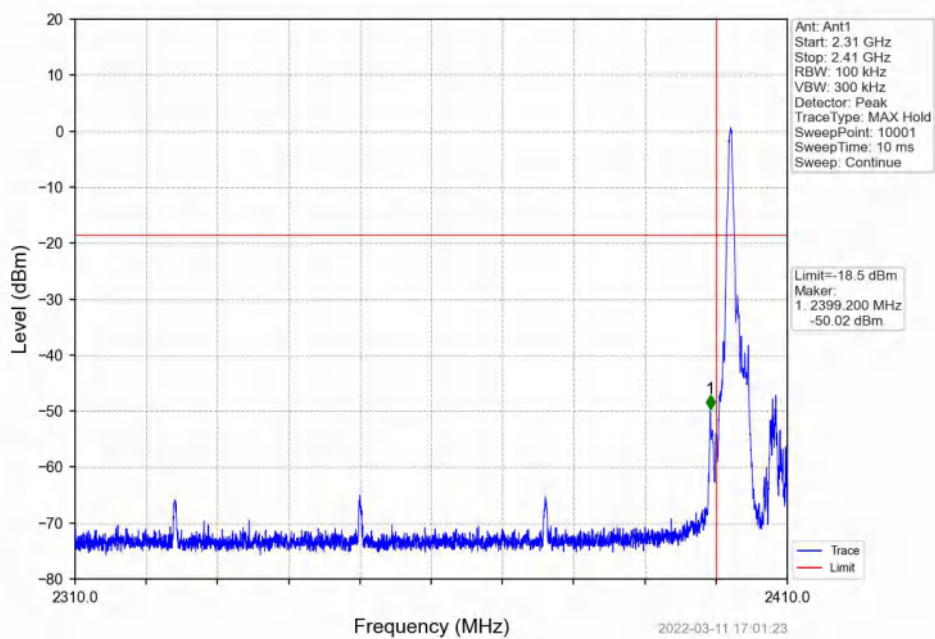
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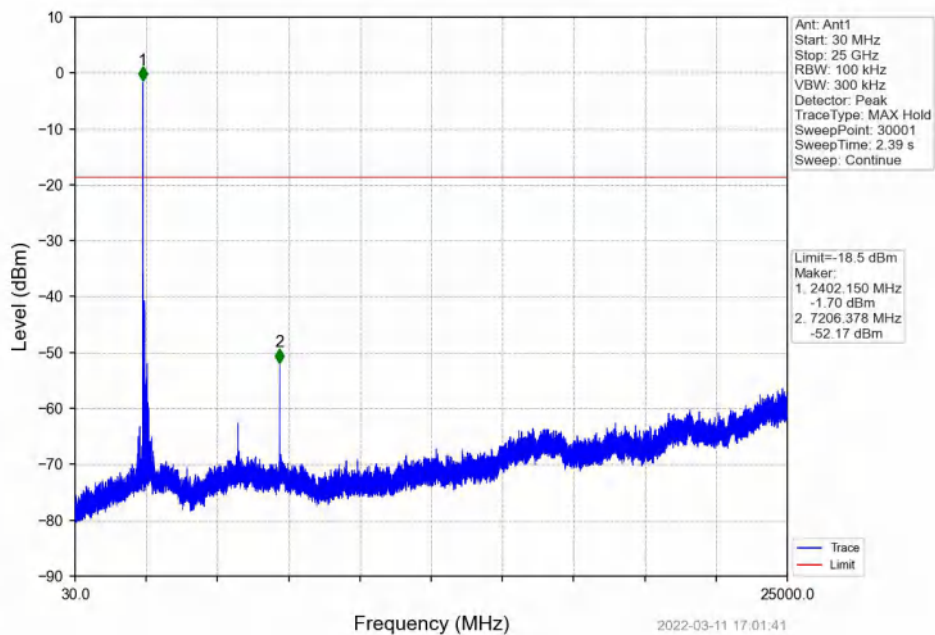
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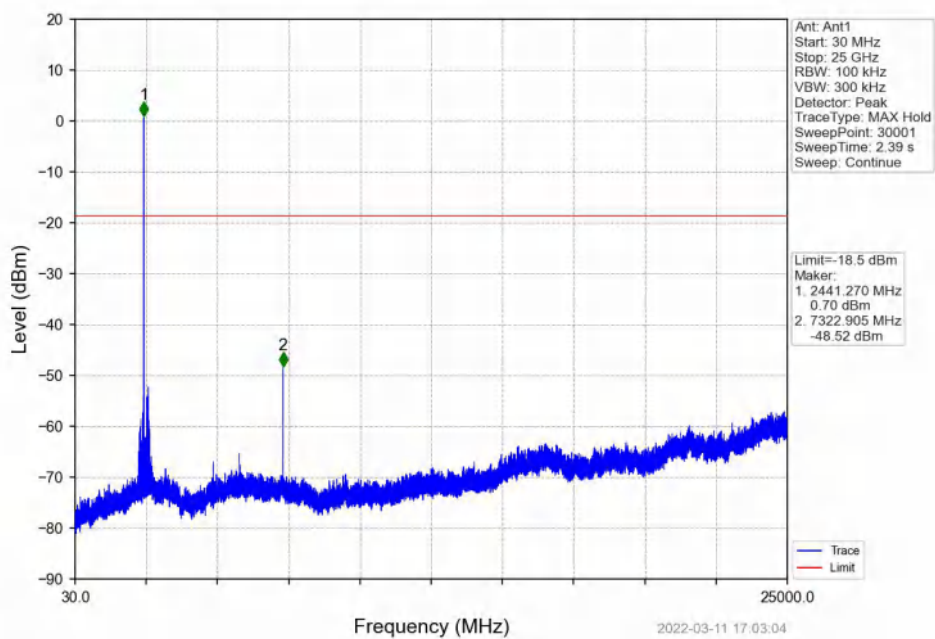
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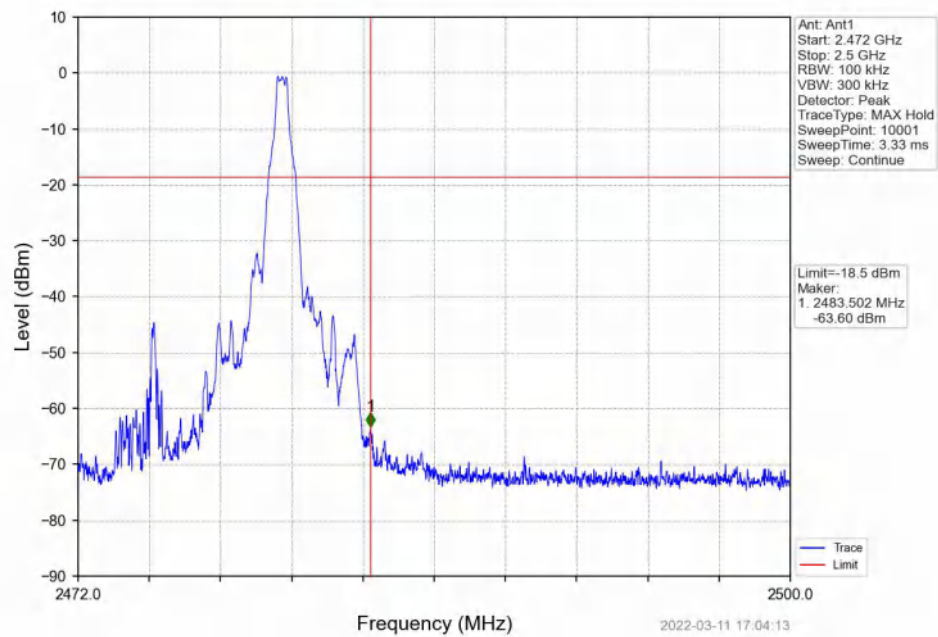
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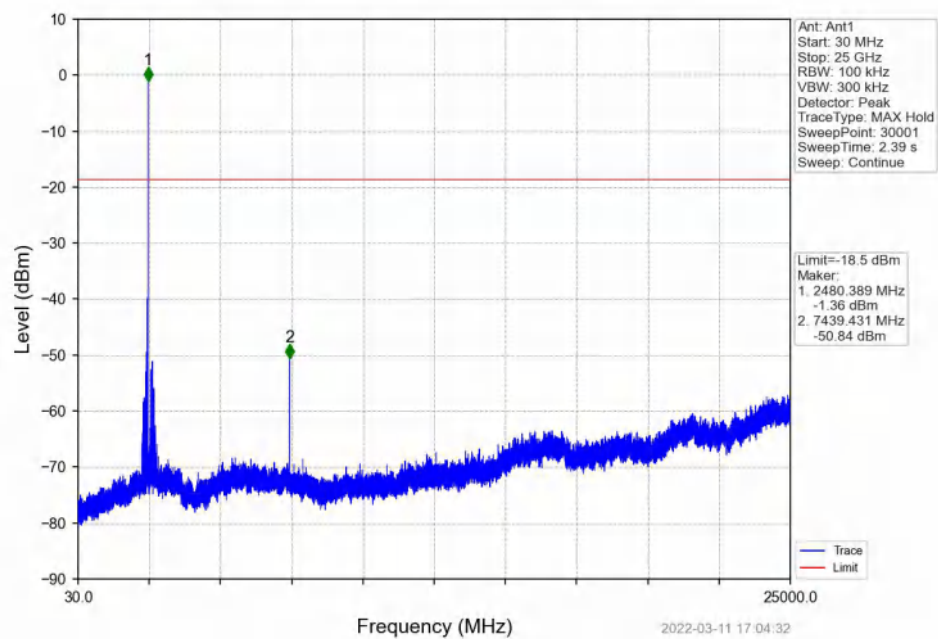
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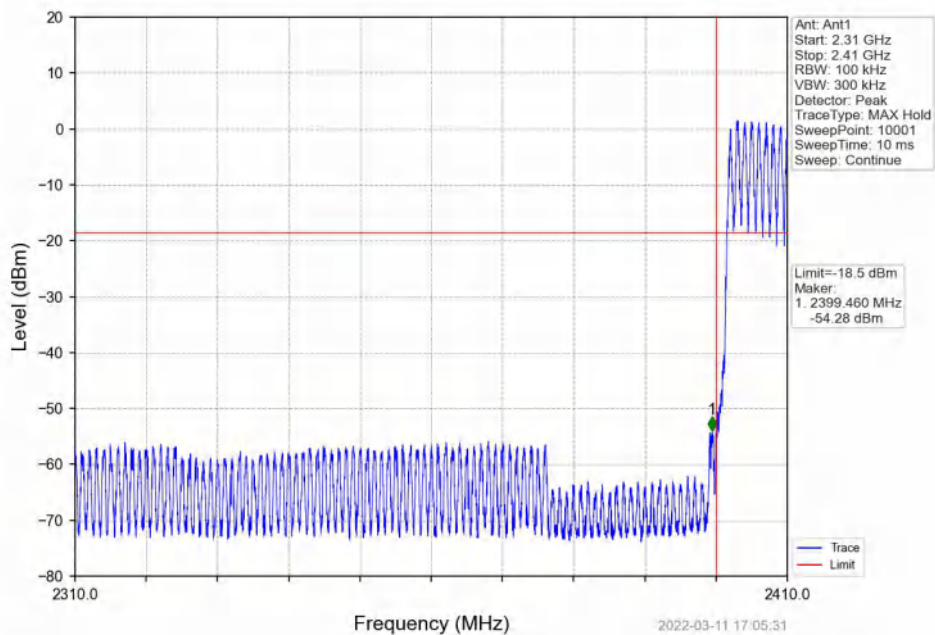
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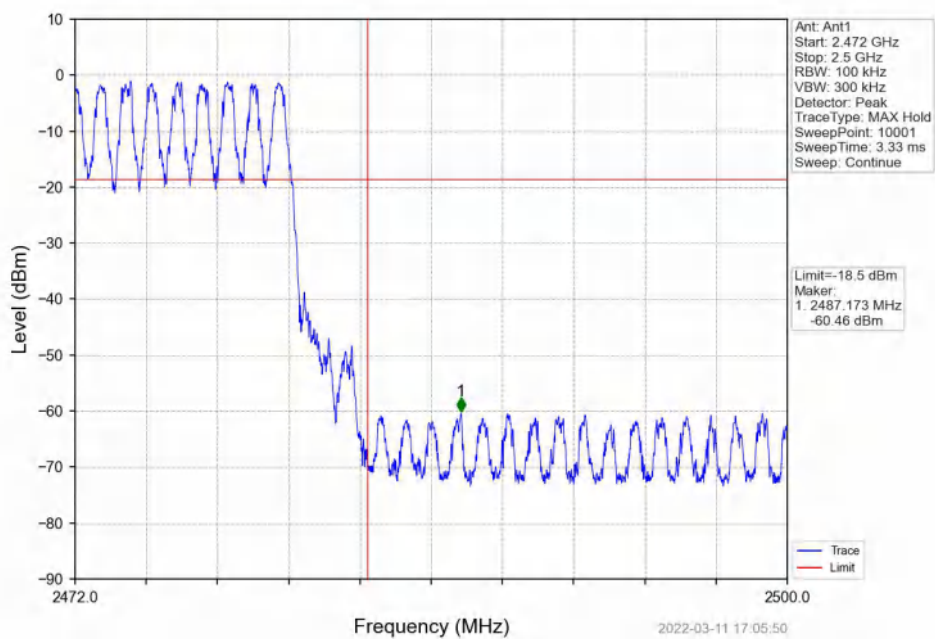
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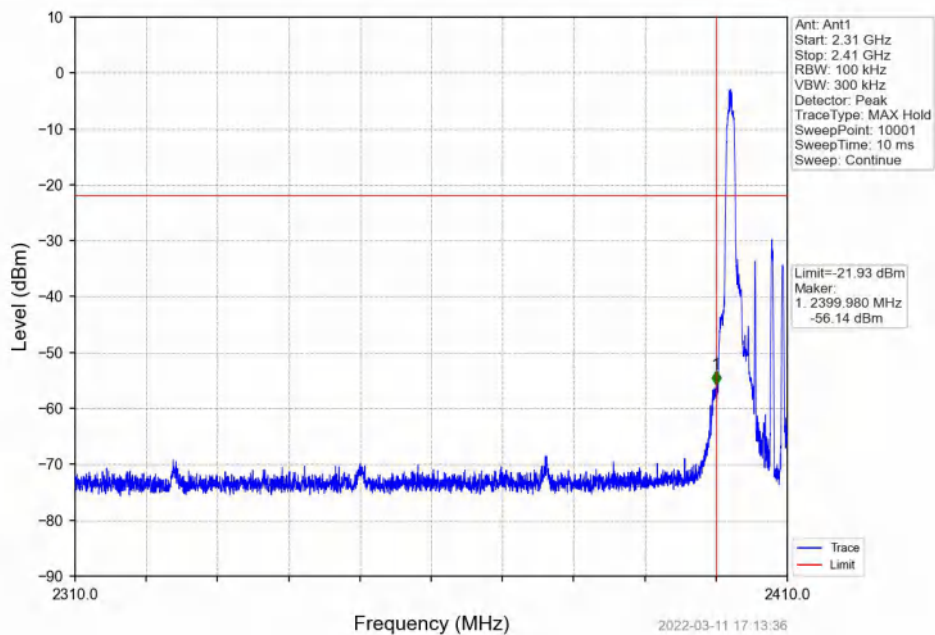
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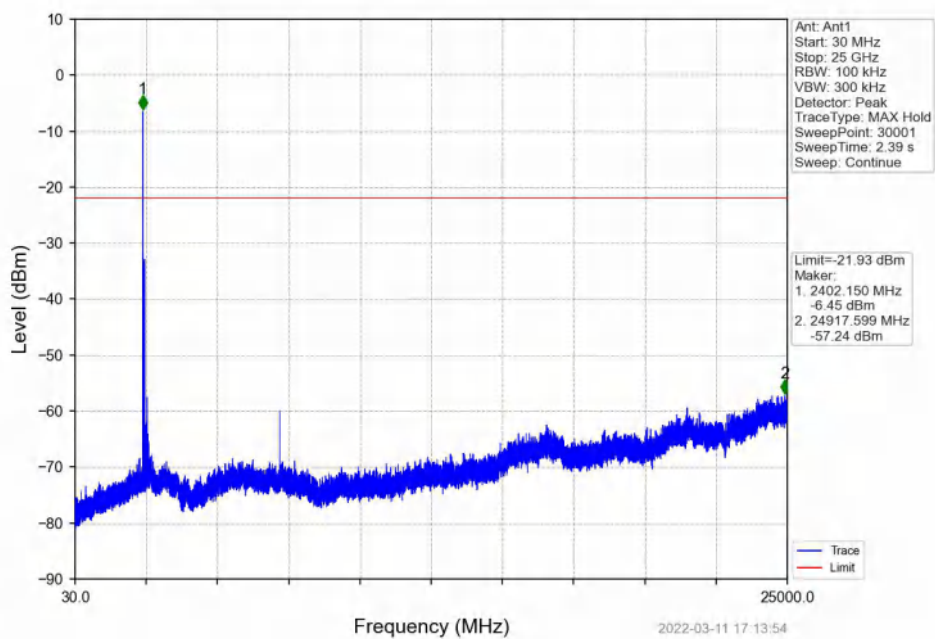
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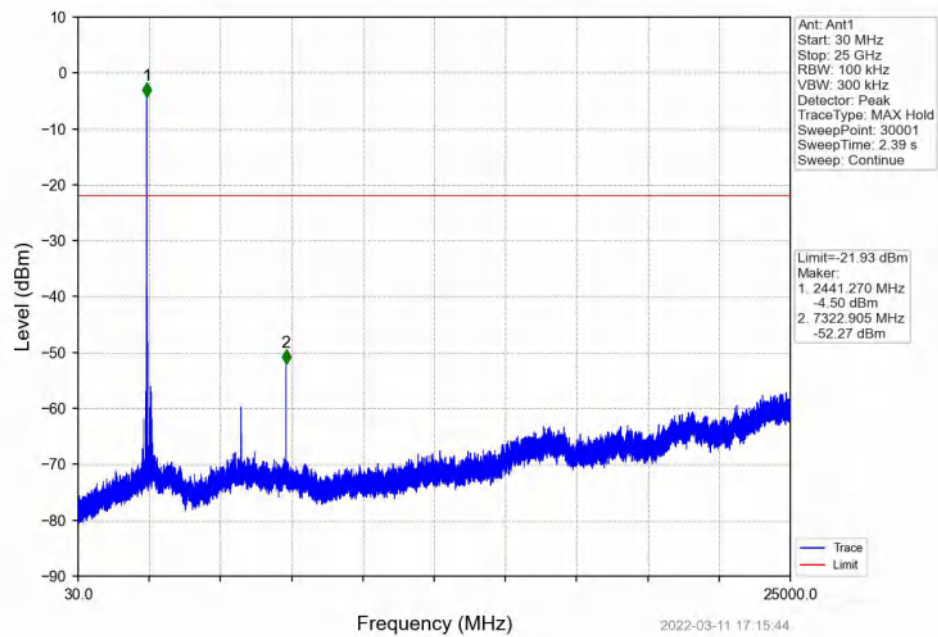
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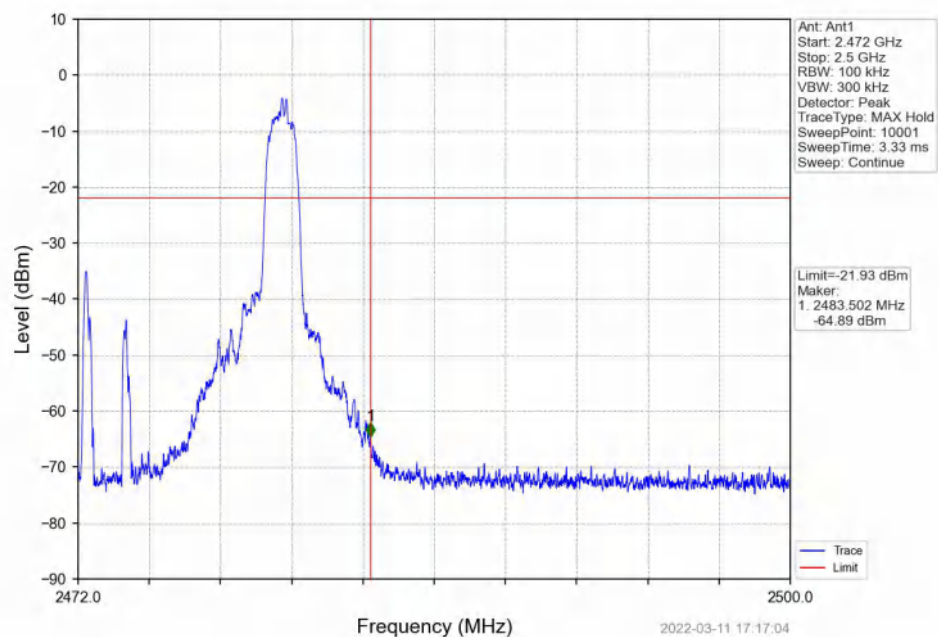
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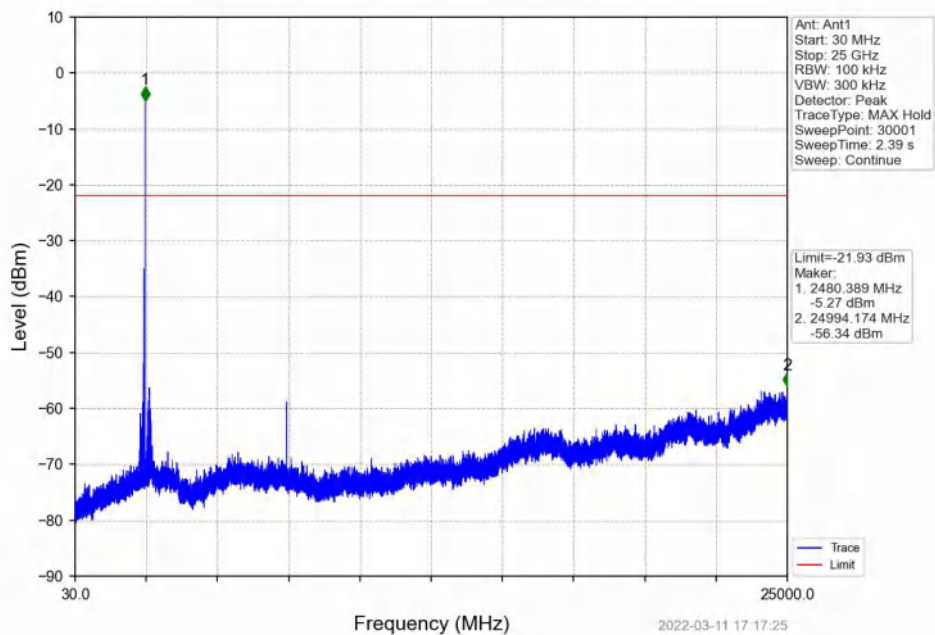
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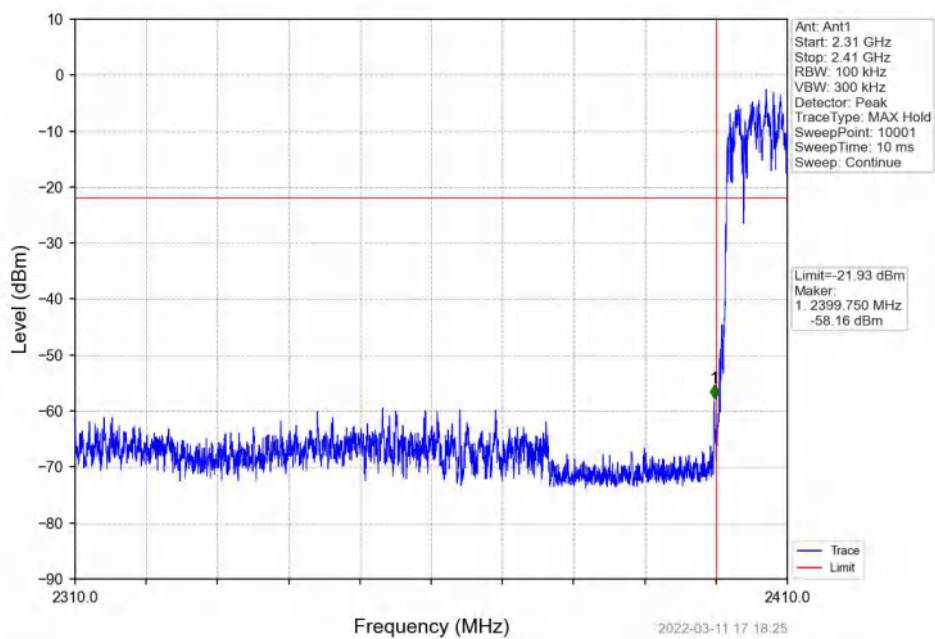
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV

