

Appendix RF Test Data for BT

Company: : Dongguan Shanneng Electronic Technology Co., Ltd..

EUT : Q103 wireless controller

FCC ID: : 2BO2P-Q103

Model Number : Q103

Report No. : HTT2025081090F02

Reviewed By : Heber He

1. Duty Cycle

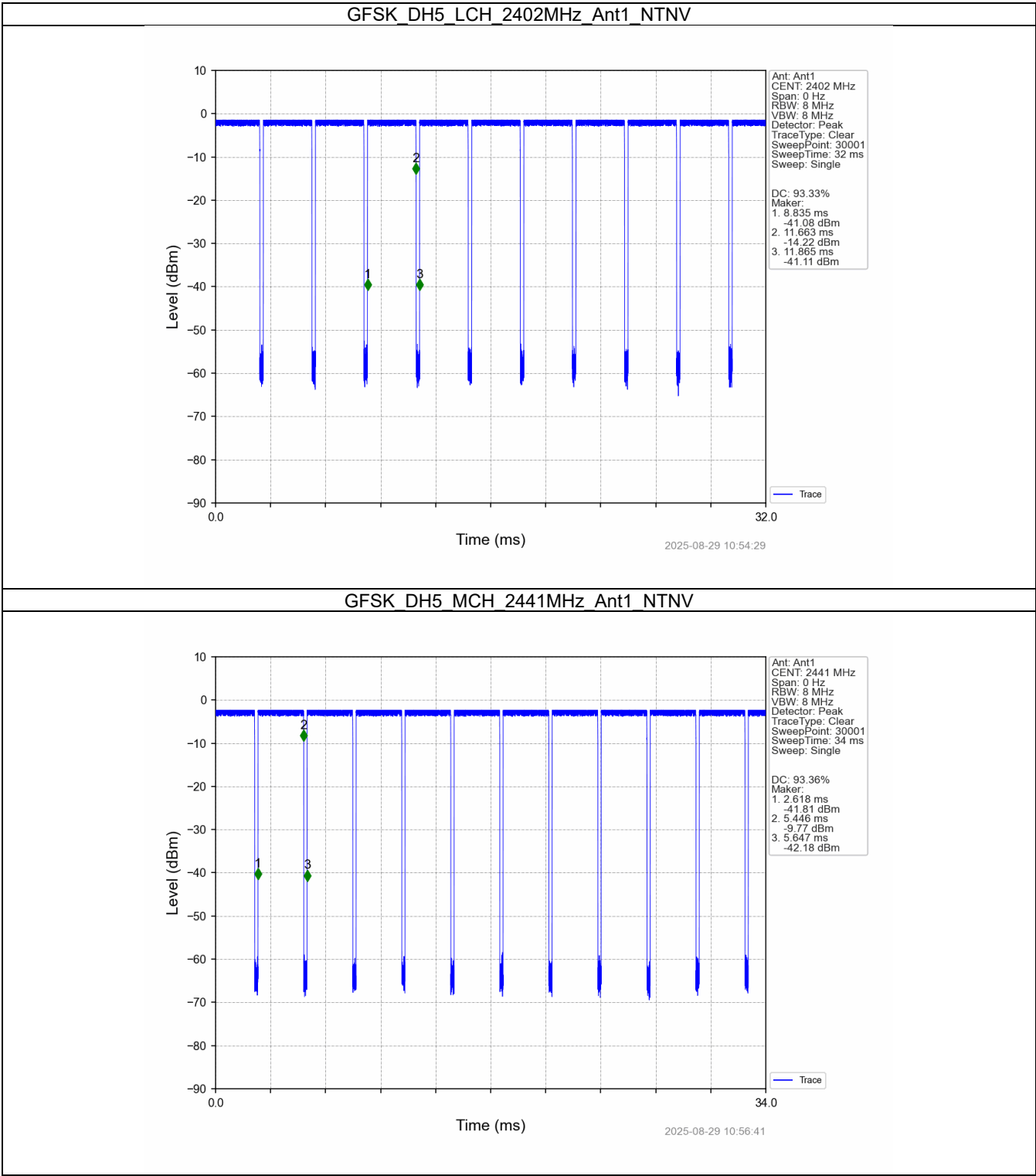
1.1 Test Result

1.1.1 Ant1

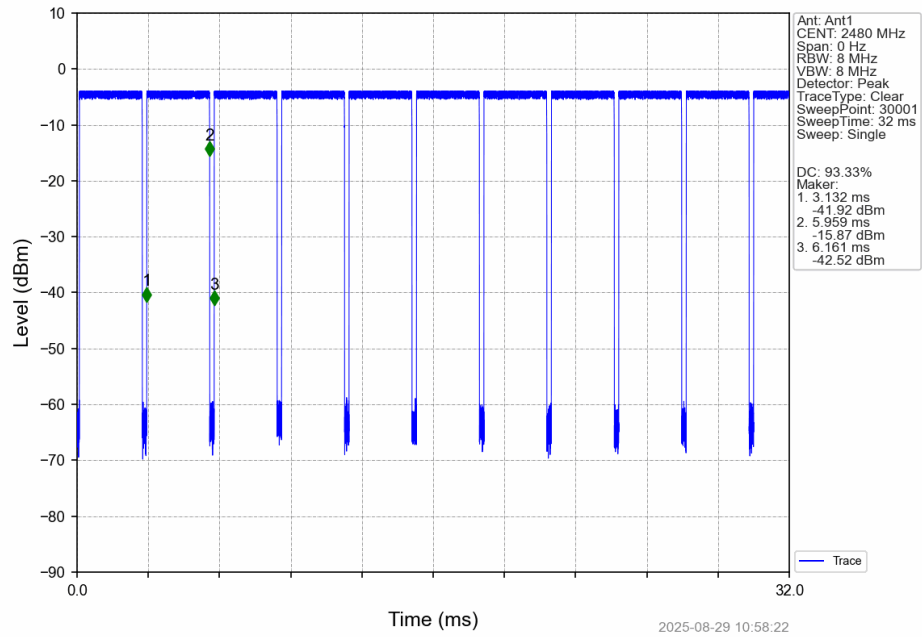
Ant1								
Mode	Tx Type	Frequency (MHz)	Packet Type	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
GFSK	SISO	2402	DH5	2.828	3.030	93.33	0.30	0.04
		2441	DH5	2.828	3.029	93.36	0.30	0.04
		2480	DH5	2.827	3.029	93.33	0.30	0.04
Pi/4DQPSK	SISO	2402	2DH5	2.819	3.021	93.31	0.30	0.04
		2441	2DH5	2.819	3.021	93.31	0.30	0.04
		2480	2DH5	2.819	3.020	93.34	0.30	3.32
8DPSK	SISO	2402	3DH5	2.827	3.028	93.36	0.30	0.04
		2441	3DH5	2.827	3.029	93.33	0.30	0.04
		2480	3DH5	2.826	3.028	93.33	0.30	0.04

1.2 Test Graph

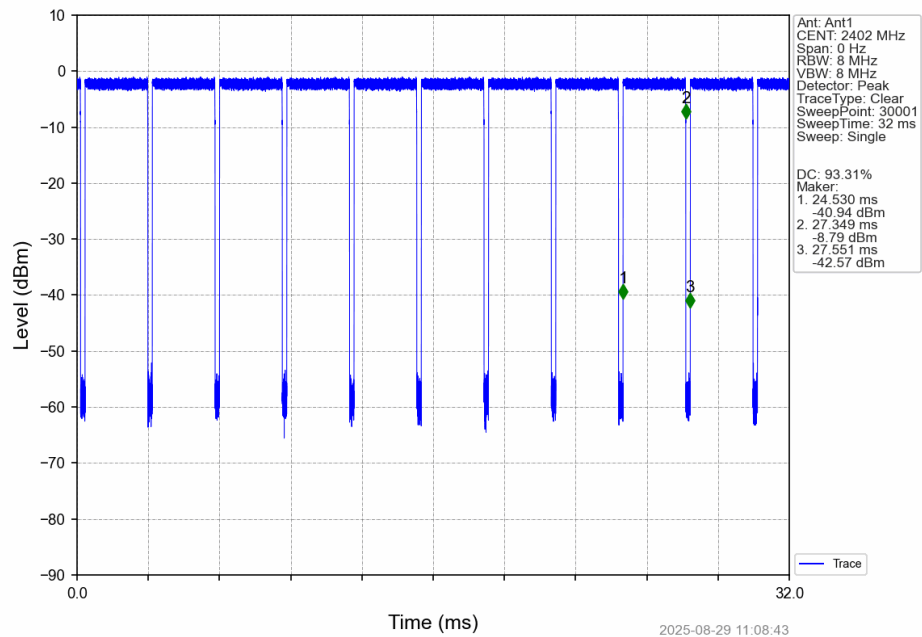
1.2.1 Ant1



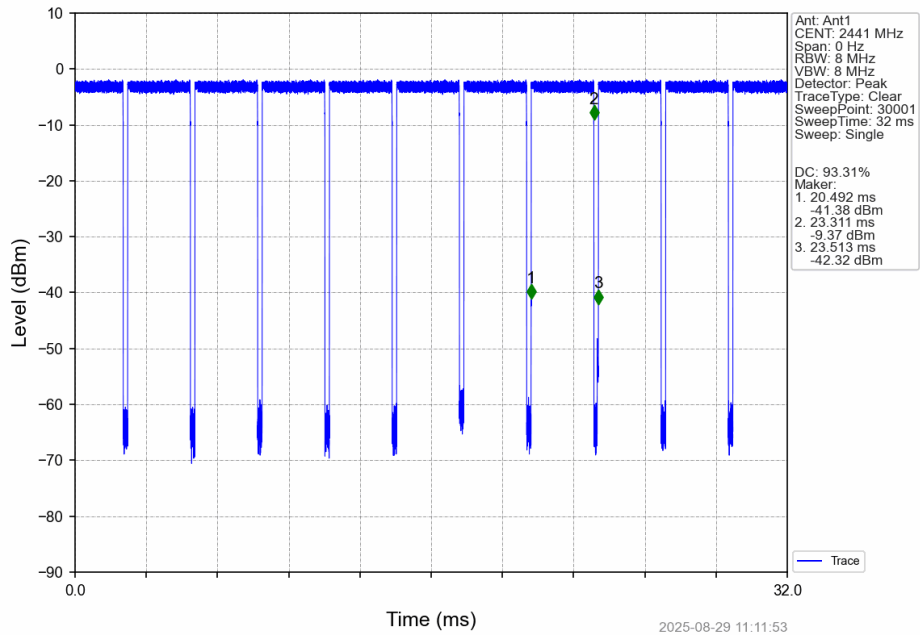
GFSK DH5_HCH_2480MHz_Ant1_NTNV



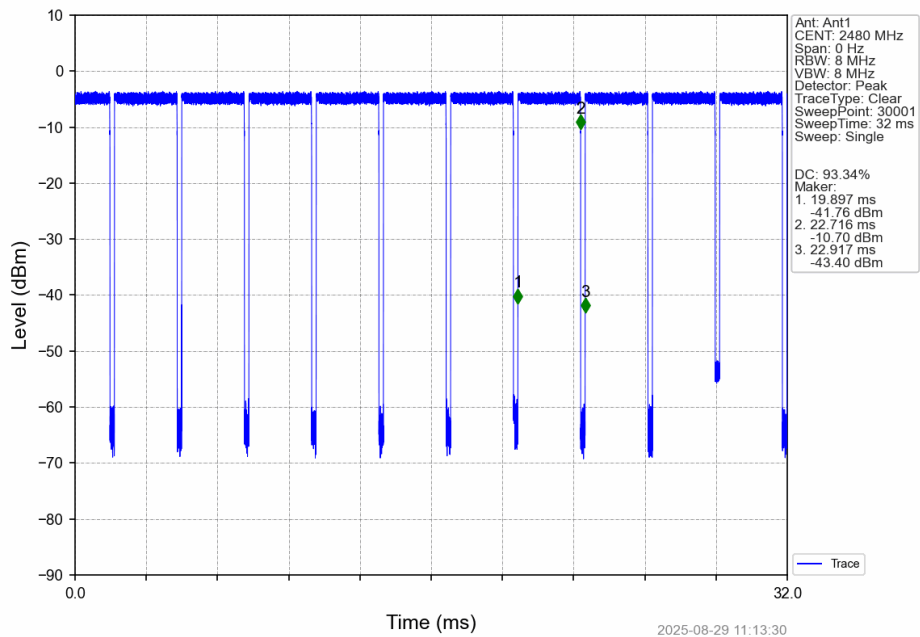
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



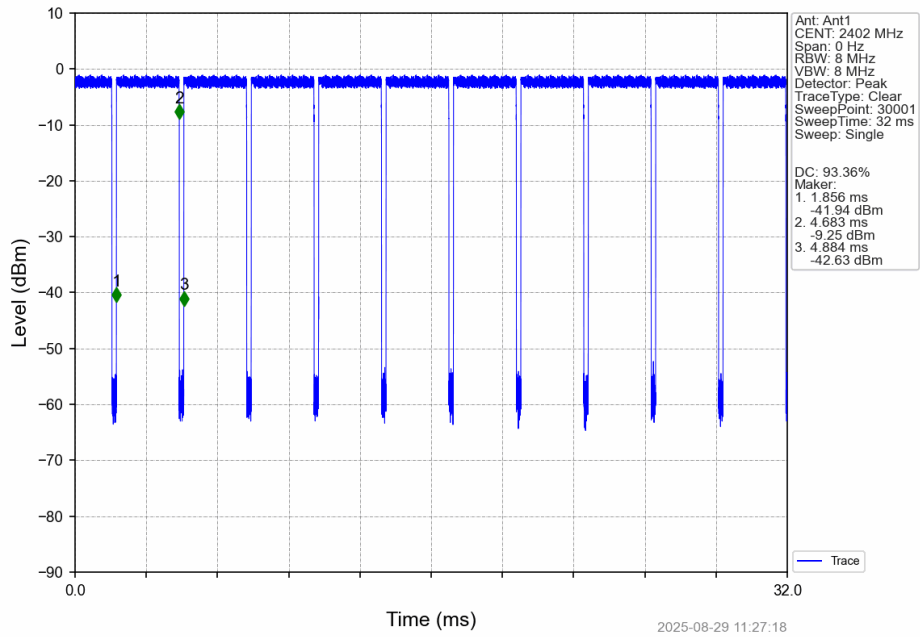
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



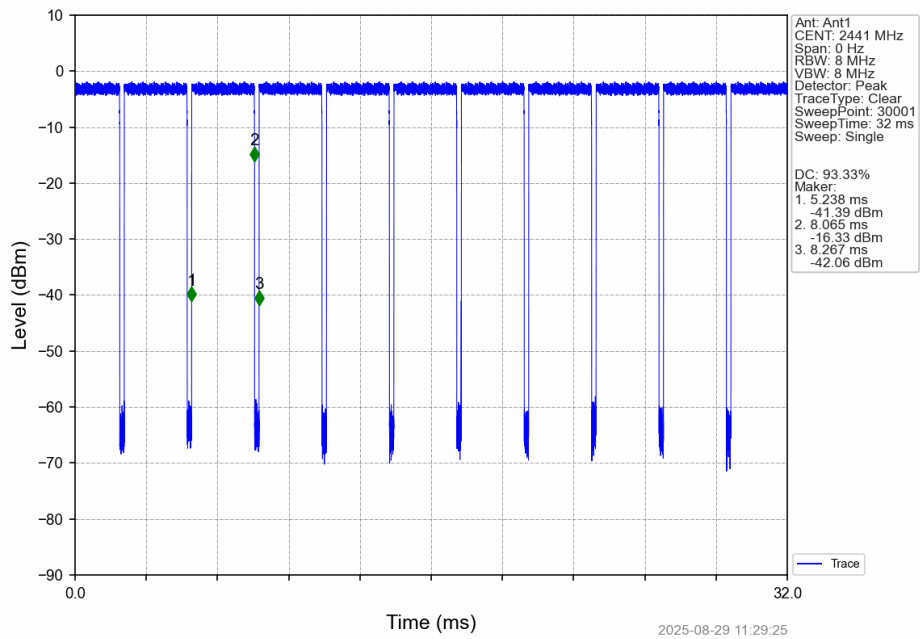
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



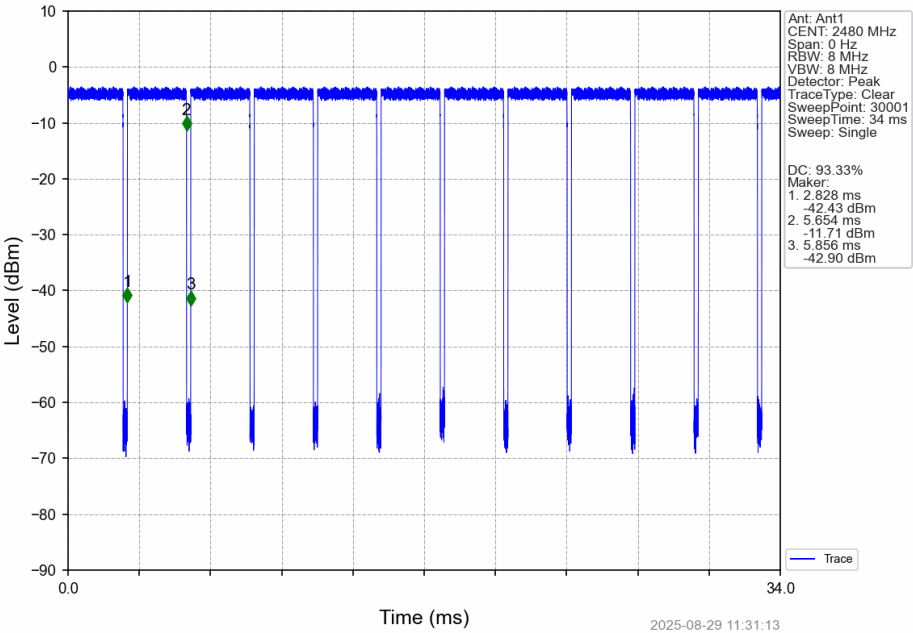
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



2. Bandwidth

2.1 Test Result

2.1.1 OBW

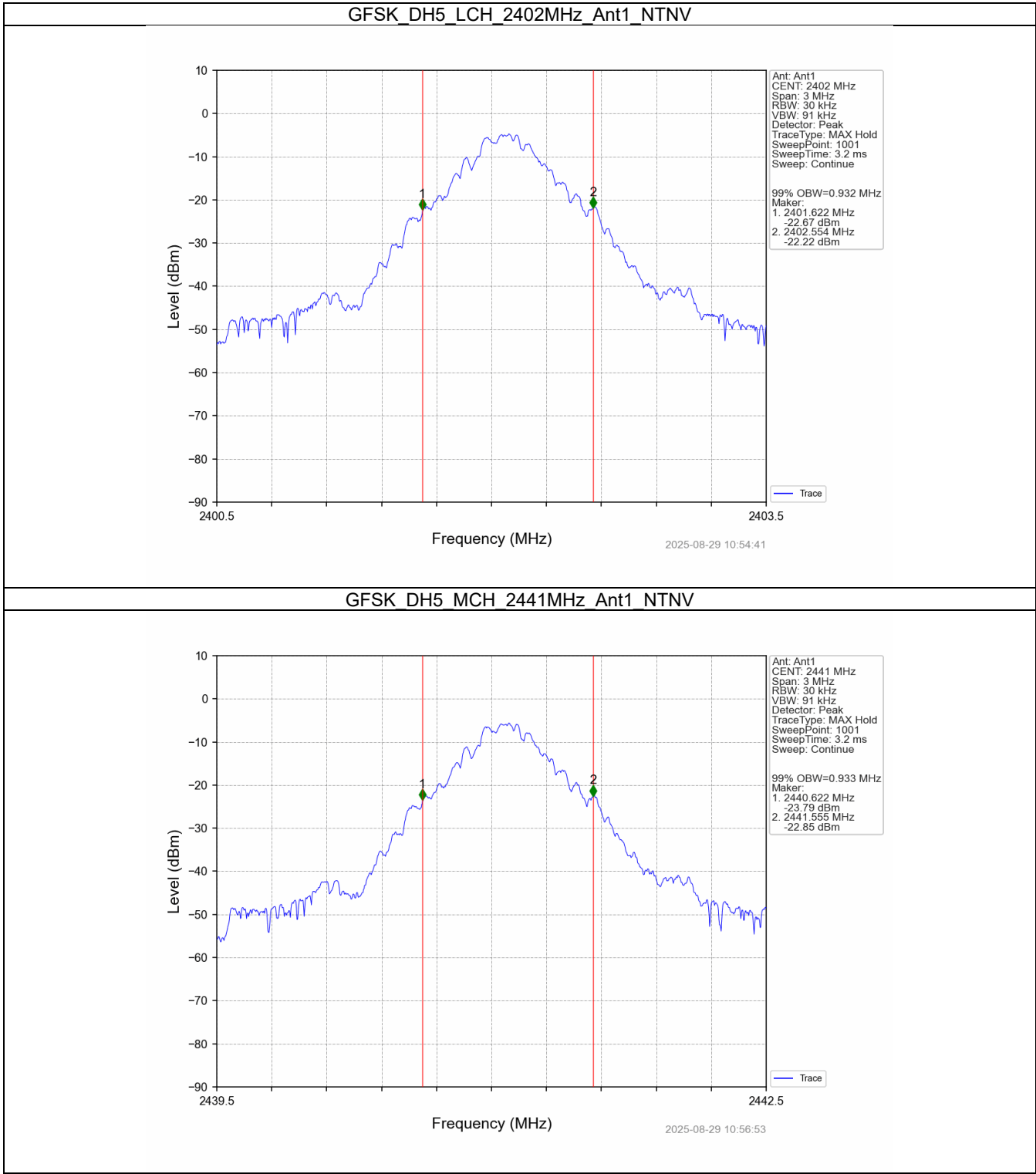
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.932	/	Pass
		2441	DH5	1	0.933	/	Pass
		2480	DH5	1	0.936	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.208	/	Pass
		2441	2DH5	1	1.214	/	Pass
		2480	2DH5	1	1.209	/	Pass
8DPSK	SISO	2402	3DH5	1	1.229	/	Pass
		2441	3DH5	1	1.233	/	Pass
		2480	3DH5	1	1.228	/	Pass

2.1.2 20dB BW

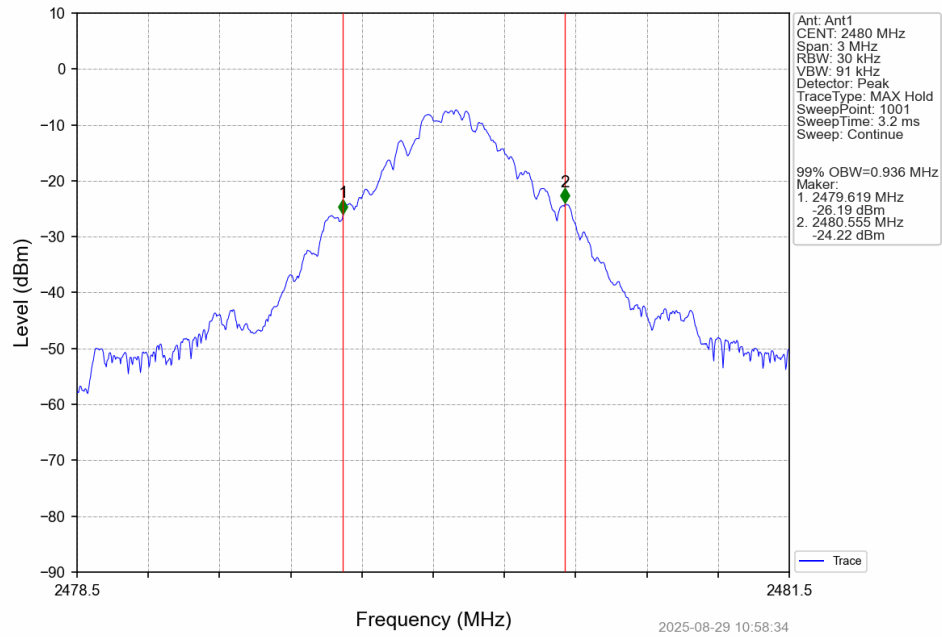
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					Result	Limit	
GFSK	SISO	2402	DH5	1	1.048	/	Pass
		2441	DH5	1	1.050	/	Pass
		2480	DH5	1	1.049	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.335	/	Pass
		2441	2DH5	1	1.334	/	Pass
		2480	2DH5	1	1.337	/	Pass
8DPSK	SISO	2402	3DH5	1	1.329	/	Pass
		2441	3DH5	1	1.333	/	Pass
		2480	3DH5	1	1.327	/	Pass

2.2 Test Graph

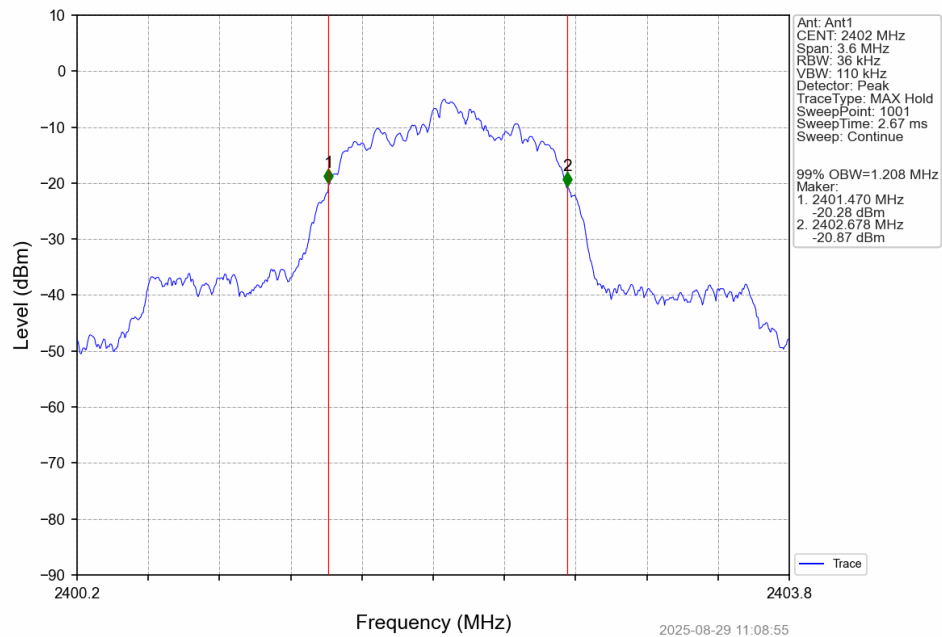
2.2.1 OBW



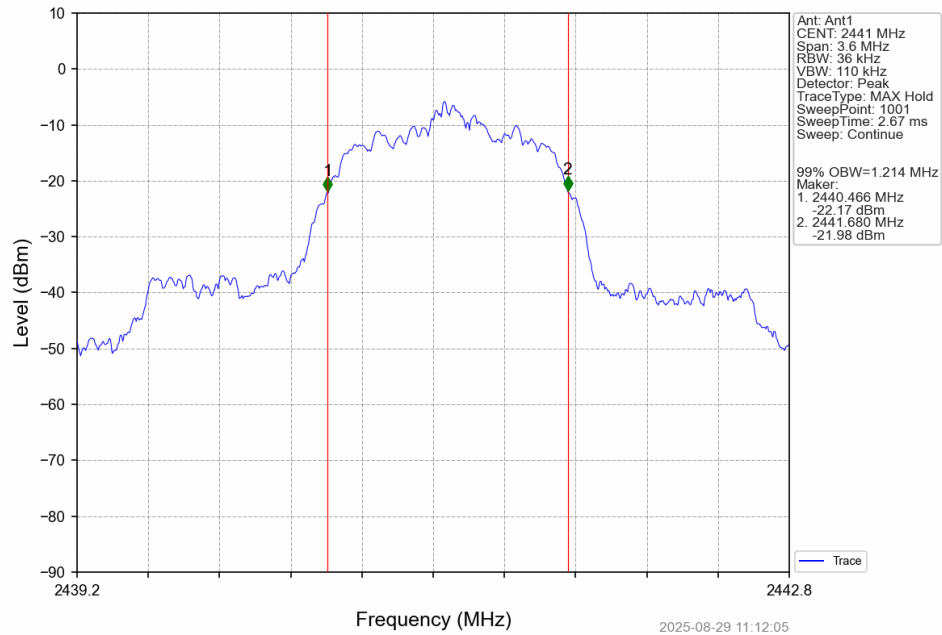
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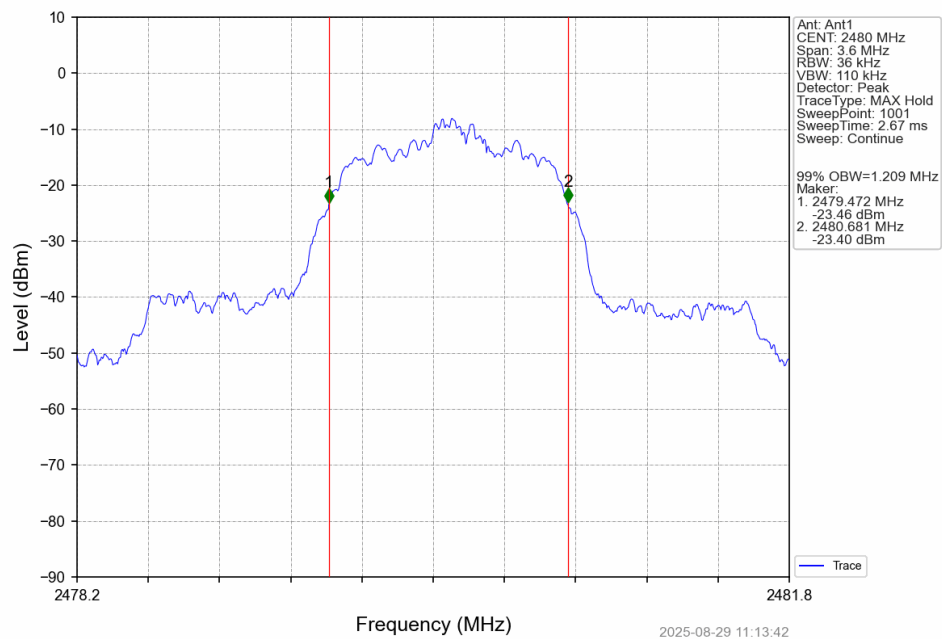
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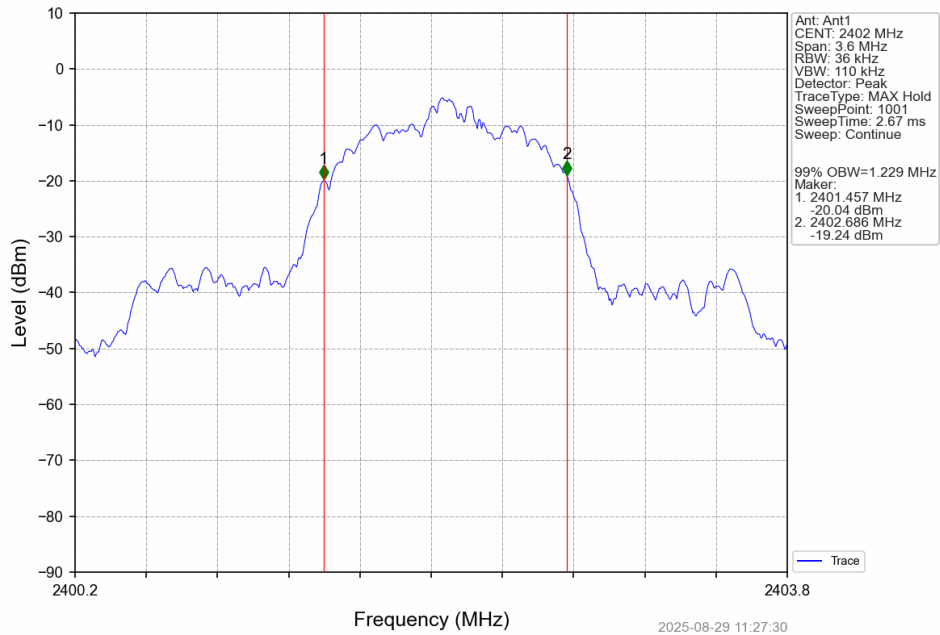
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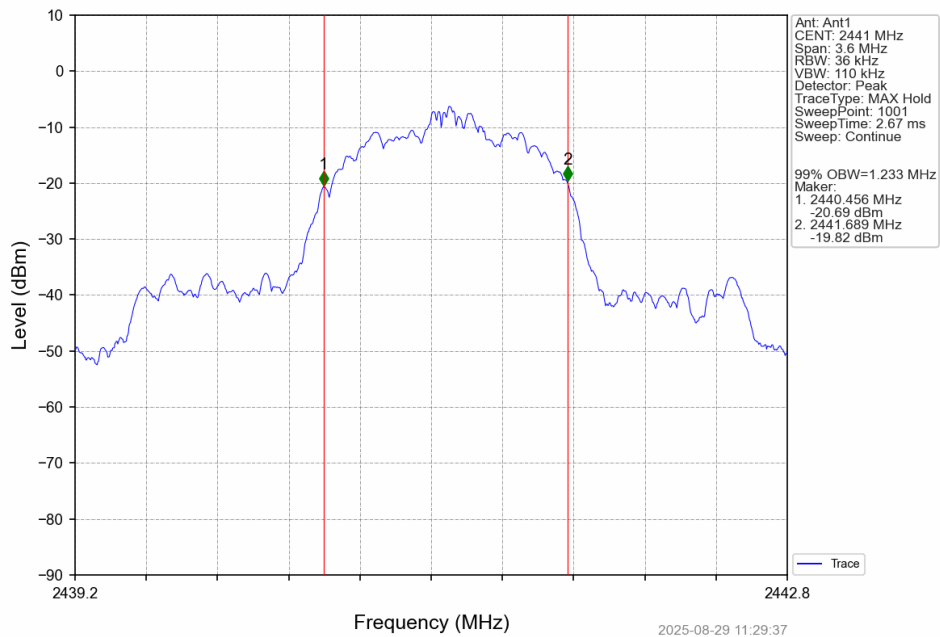
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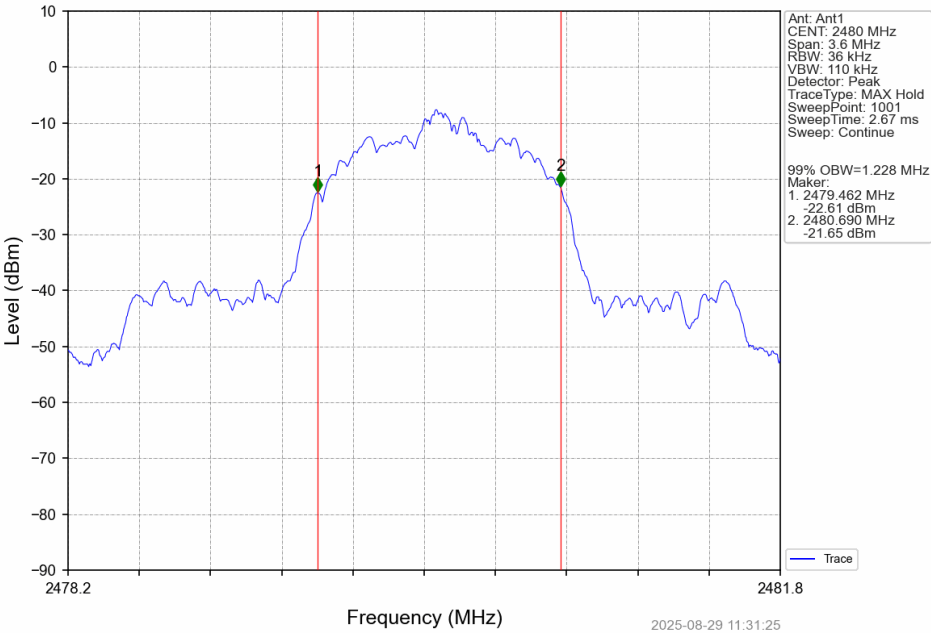
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



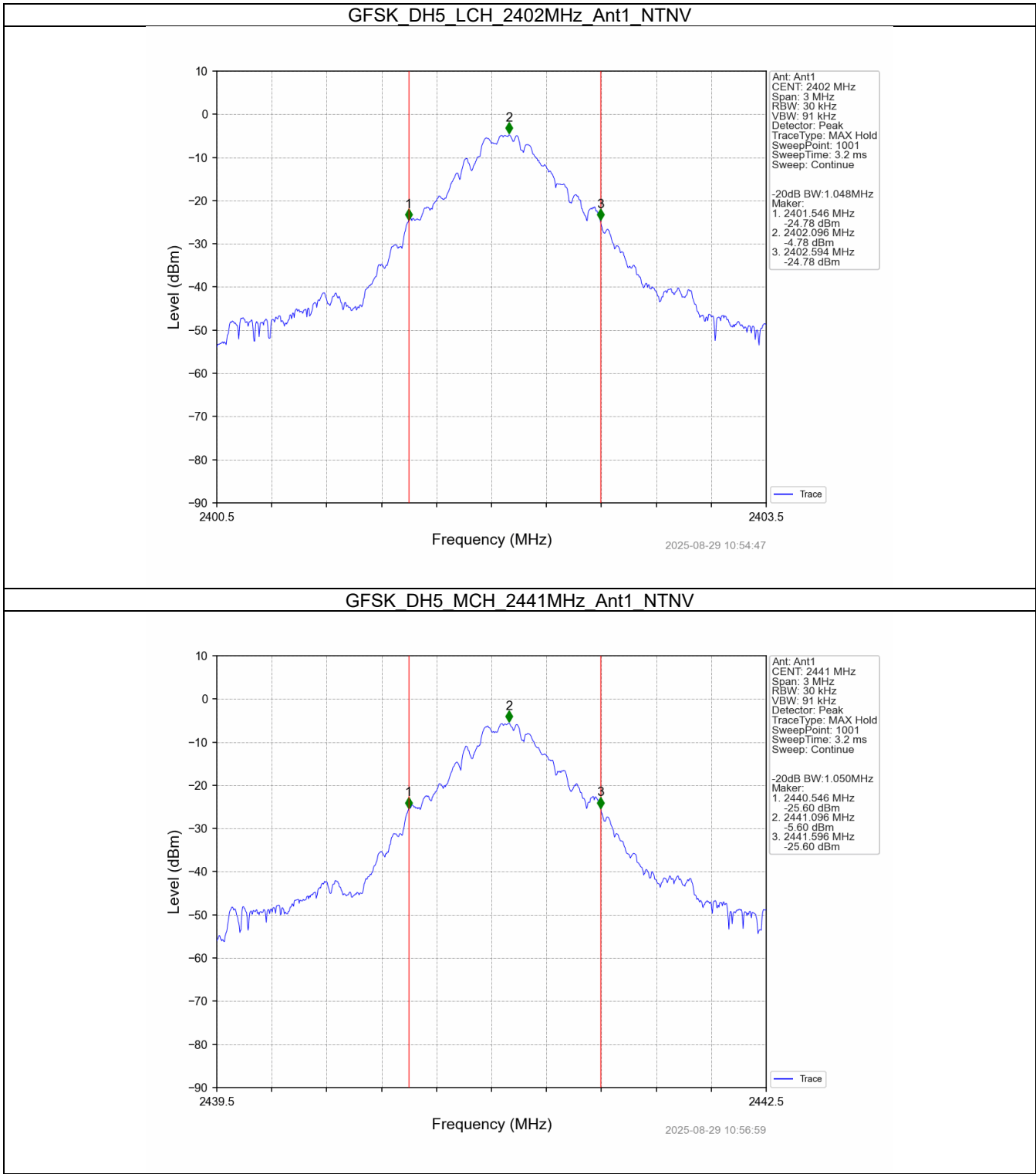
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



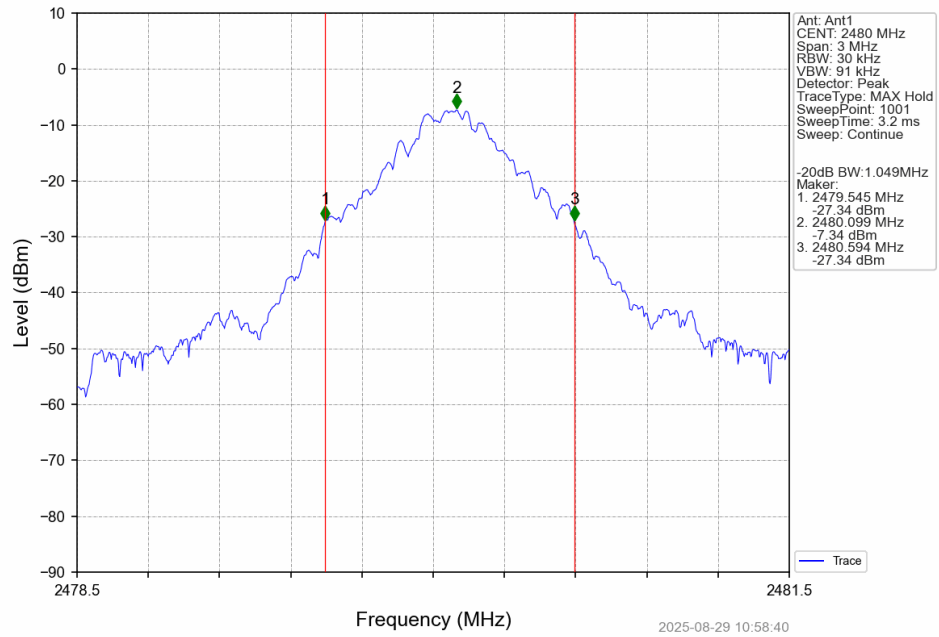
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



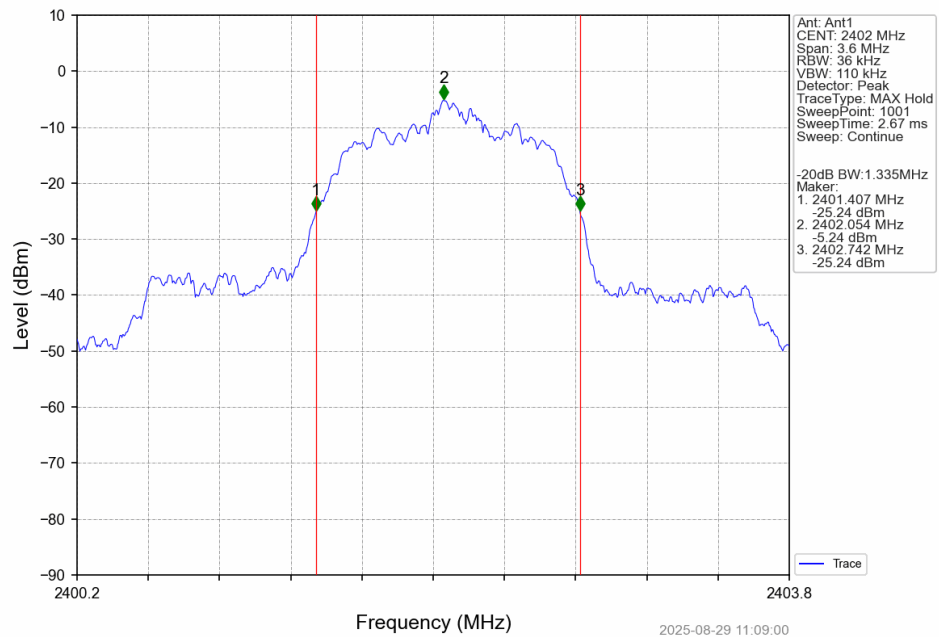
2.2.2 20dB BW



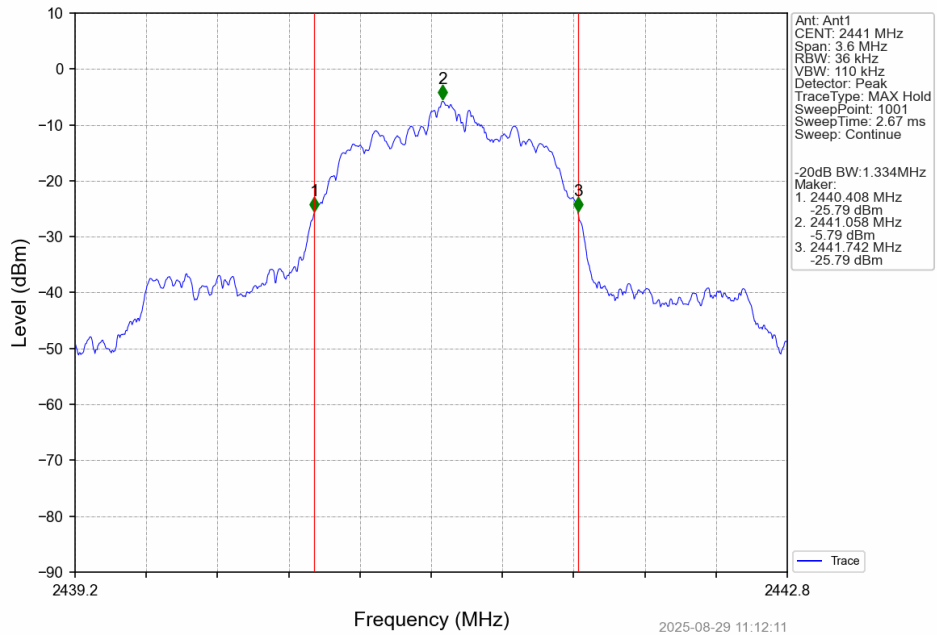
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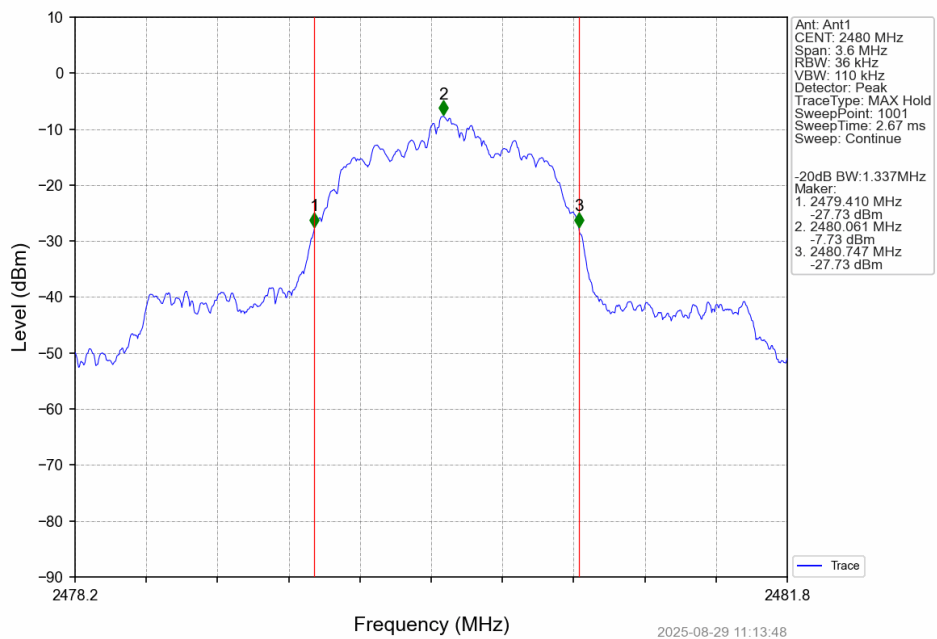
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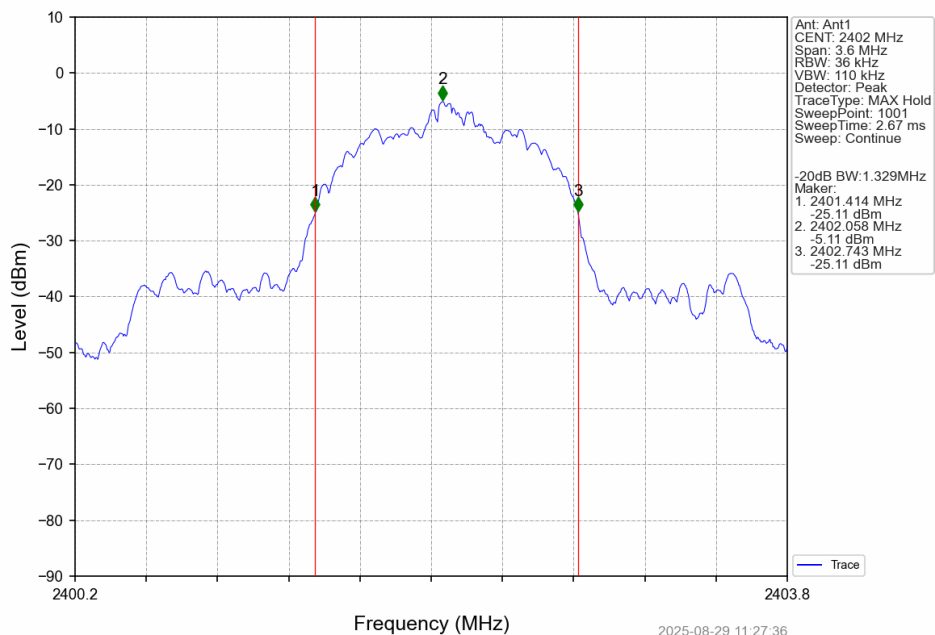
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



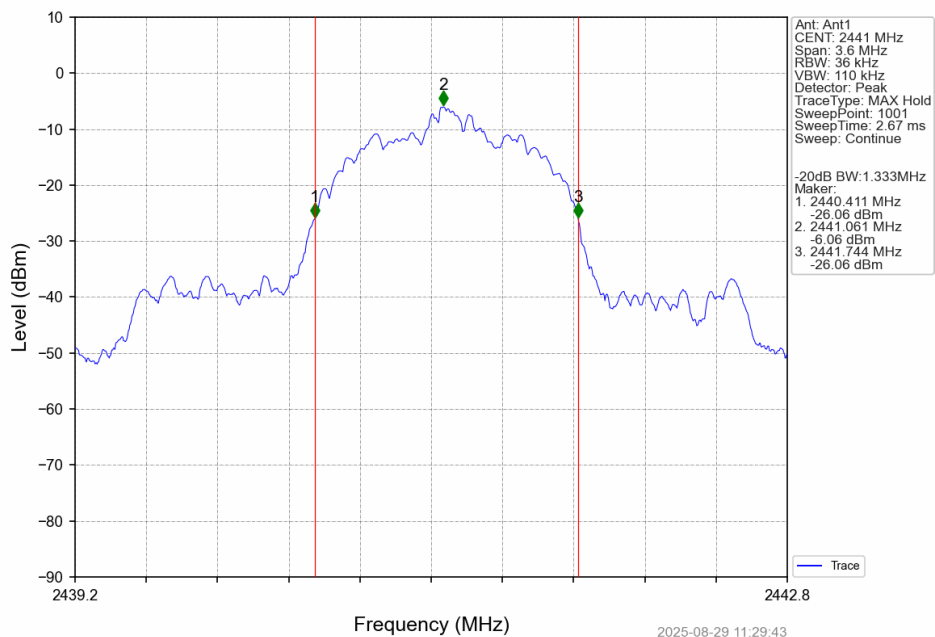
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



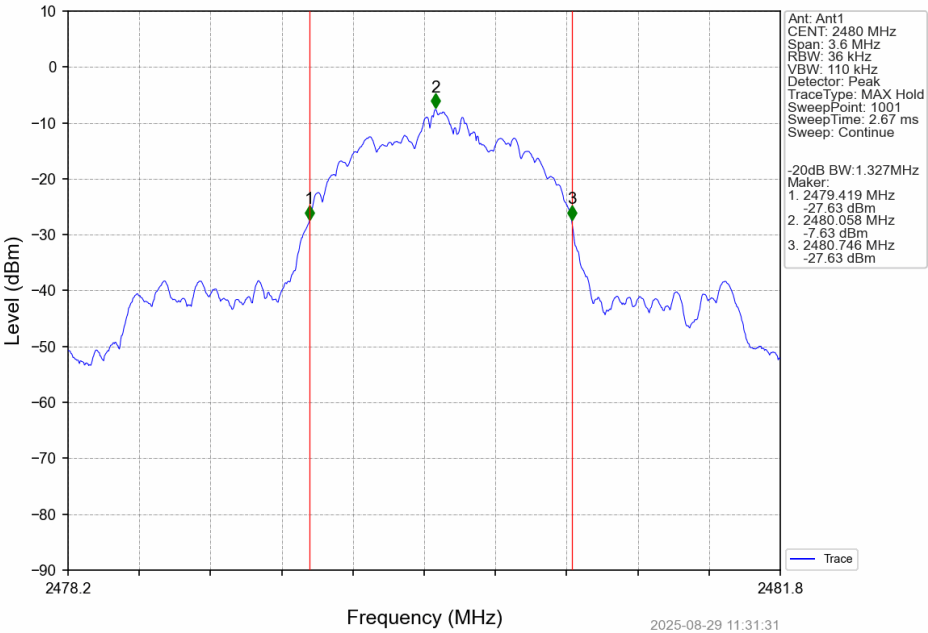
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 Power

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	-1.54	≤ 20.97	Pass
		2441	DH5	-2.21	≤ 20.97	Pass
		2480	DH5	-4.08	≤ 20.97	Pass
Pi/4DQPSK	SISO	2402	2DH5	-1.33	≤ 20.97	Pass
		2441	2DH5	-2.18	≤ 20.97	Pass
		2480	2DH5	-3.89	≤ 20.97	Pass
8DPSK	SISO	2402	3DH5	-1.37	≤ 20.97	Pass
		2441	3DH5	-2.19	≤ 20.97	Pass
		2480	3DH5	-3.85	≤ 20.97	Pass

4. Carrier Frequency Separation

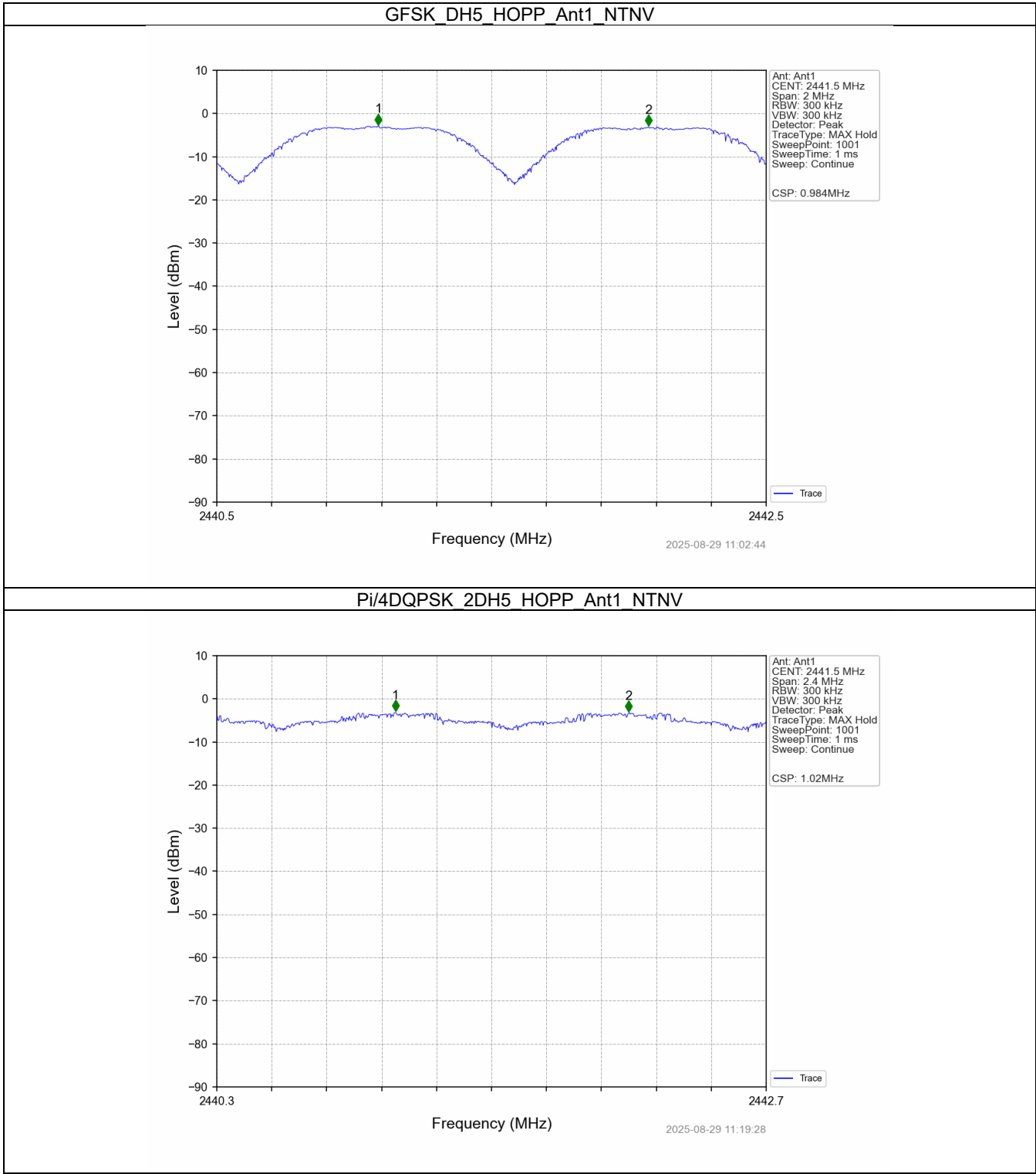
4.1 Test Result

4.1.1 Ant1

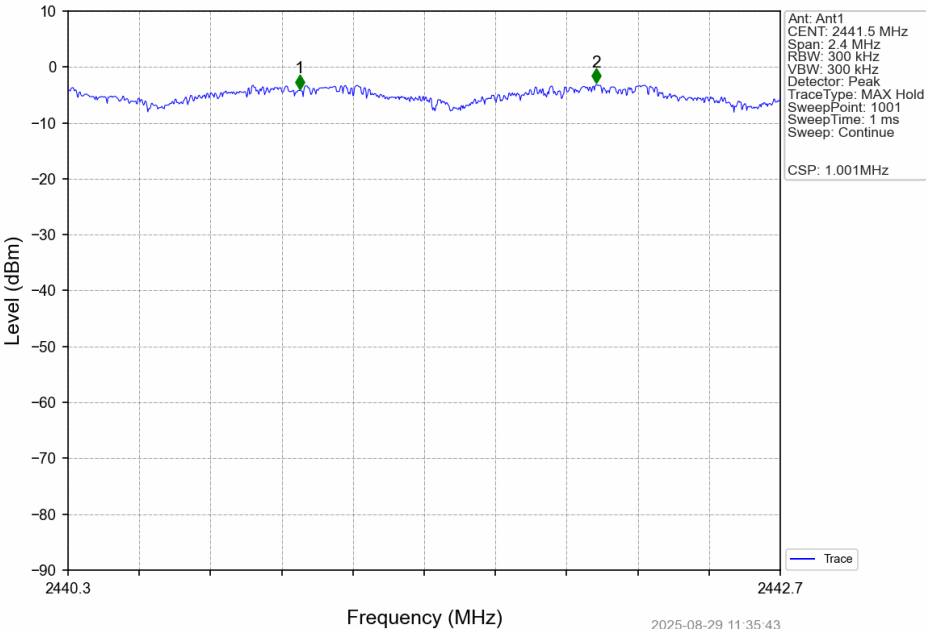
Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	0.984	1.050	≥ 0.7	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.020	1.337	≥ 0.891	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.333	≥ 0.889	Pass

4.2 Test Graph

4.2.1 Ant1



8DPSK_3DH5_HOPP_Ant1_NTNV



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5. Number of Hopping Frequencies

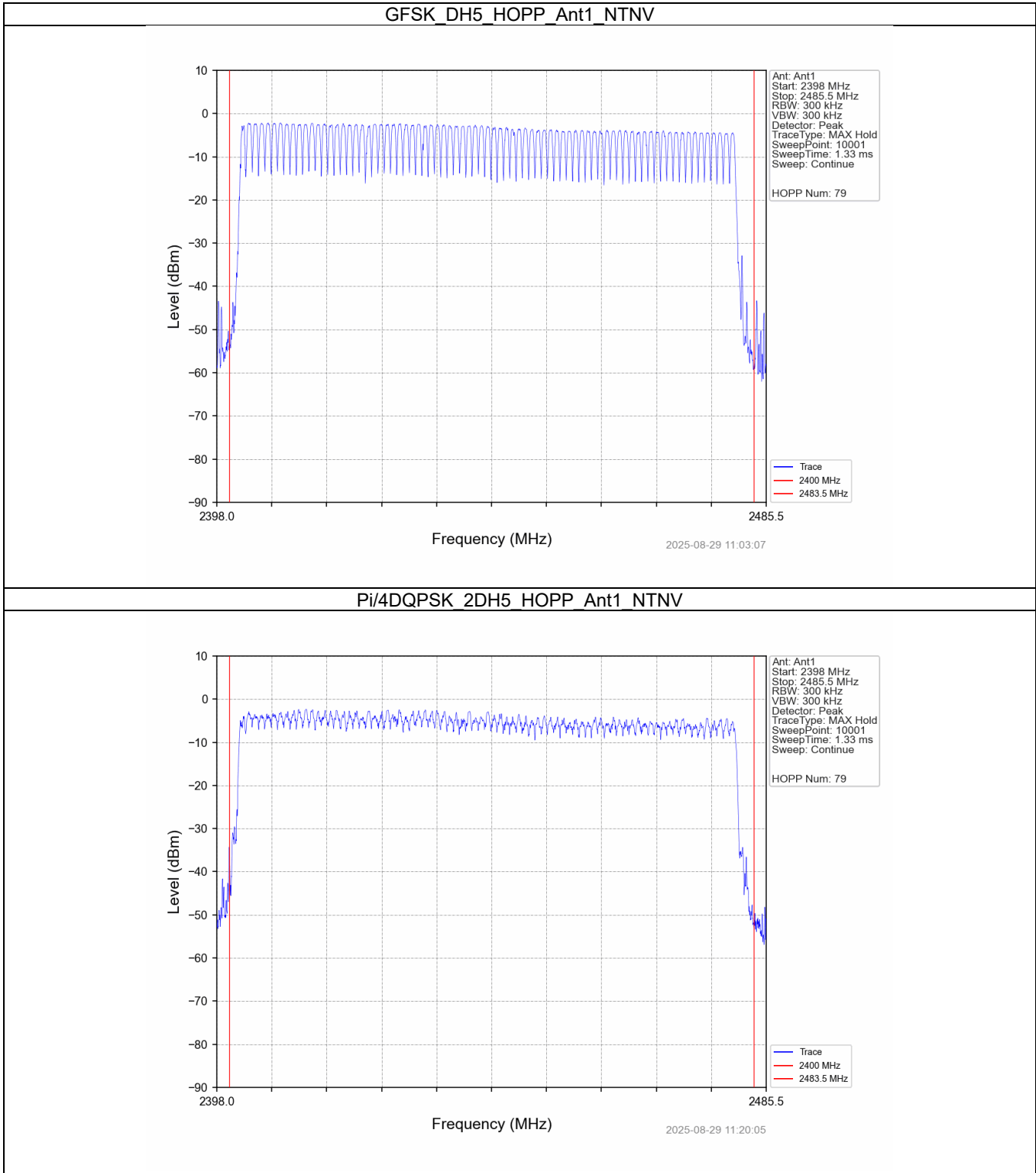
5.1 Test Result

5.1.1 HoppNum

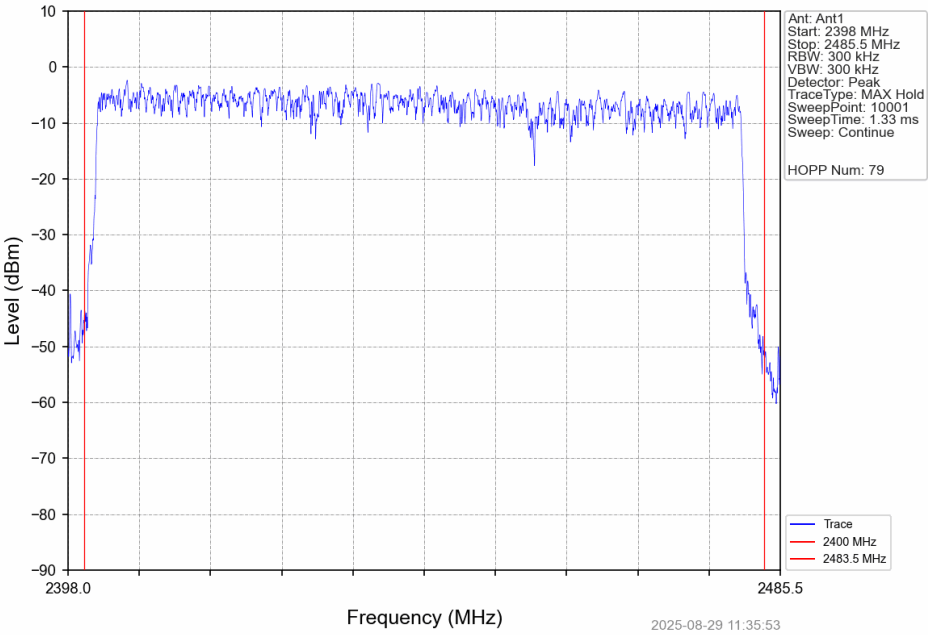
Mode	TX Type	Frequency (MHz)	Packet Type	Num of Hopping Frequencies		Verdict
				ANT1	Limit	
GFSK	SISO	HOPP	DH5	79	>=15	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	79	>=15	Pass
8DPSK	SISO	HOPP	3DH5	79	>=15	Pass

5.2 Test Graph

5.2.1 HoppNum



8DPSK_3DH5_HOPP_Ant1_NTNV



6. Time of Occupancy (Dwell Time)

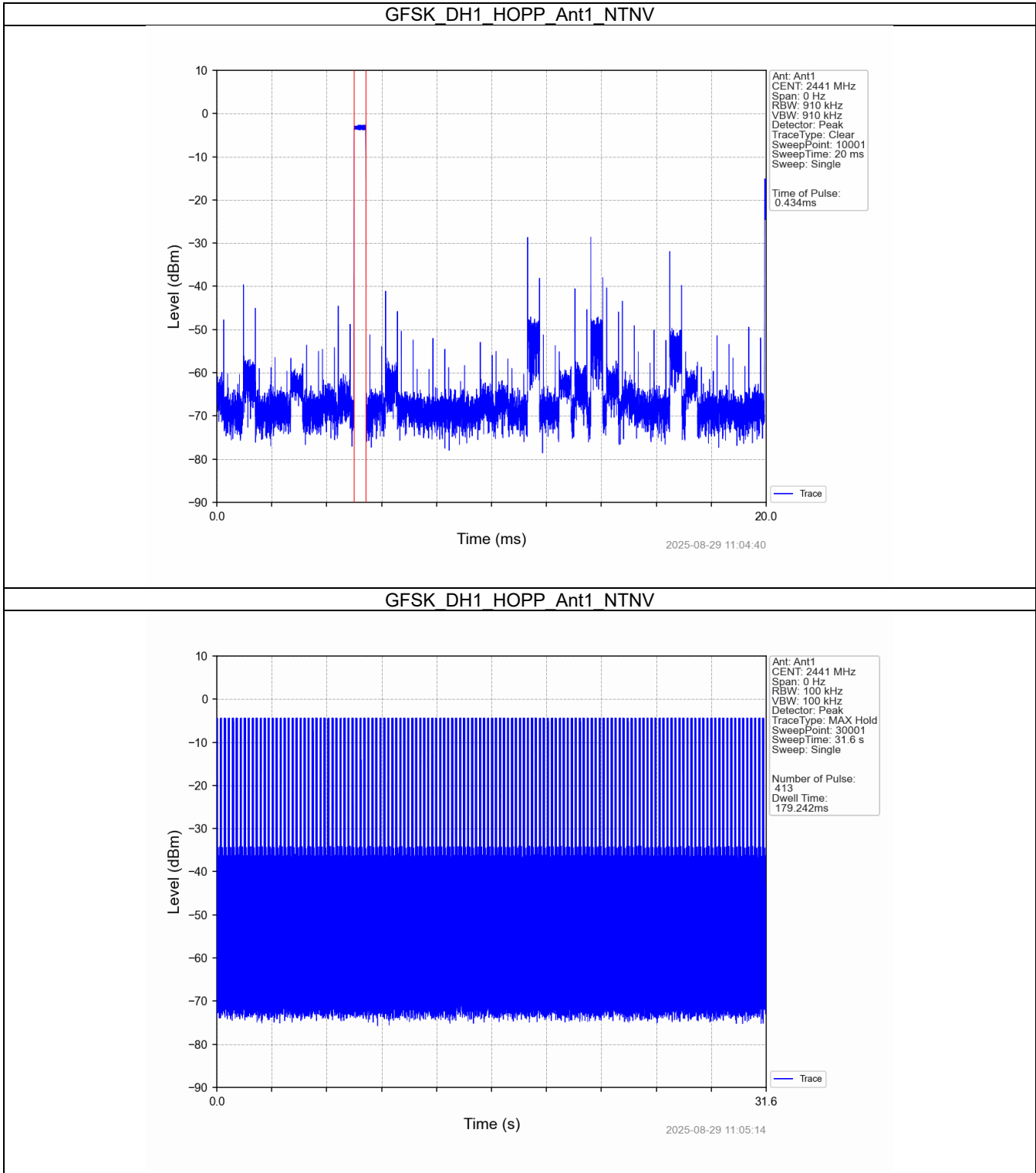
6.1 Test Result

6.1.1 Ant1

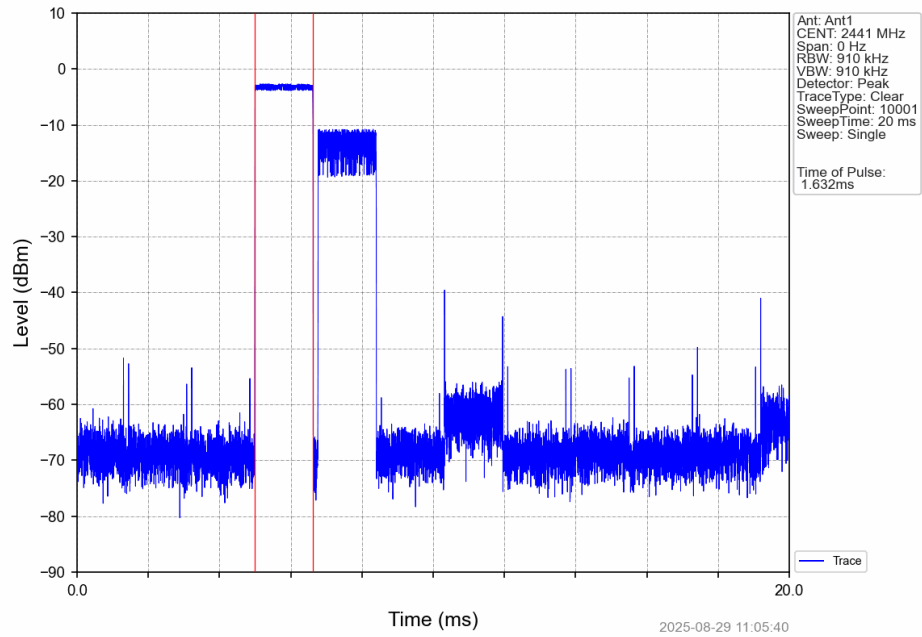
Ant1									
Mode	Tx Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	SISO	HOPP	DH1	0.434	31.600	413	179.242	<=400	Pass
			DH3	1.632	31.600	168	274.176	<=400	Pass
			DH5	2.834	31.600	114	323.076	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.486	31.600	241	117.126	<=400	Pass
			2DH3	1.694	31.600	102	172.788	<=400	Pass
			2DH5	2.898	31.600	138	399.924	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.412	31.600	168	69.216	<=400	Pass
			3DH3	1.674	31.600	124	207.576	<=400	Pass
			3DH5	2.768	31.600	115	318.320	<=400	Pass

6.2 Test Graph

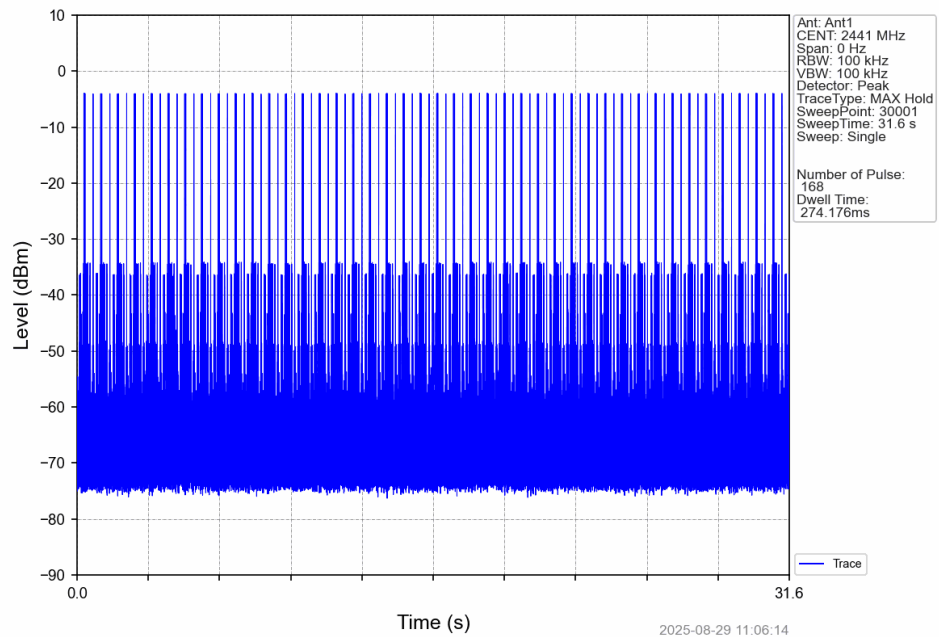
6.2.1 Ant1



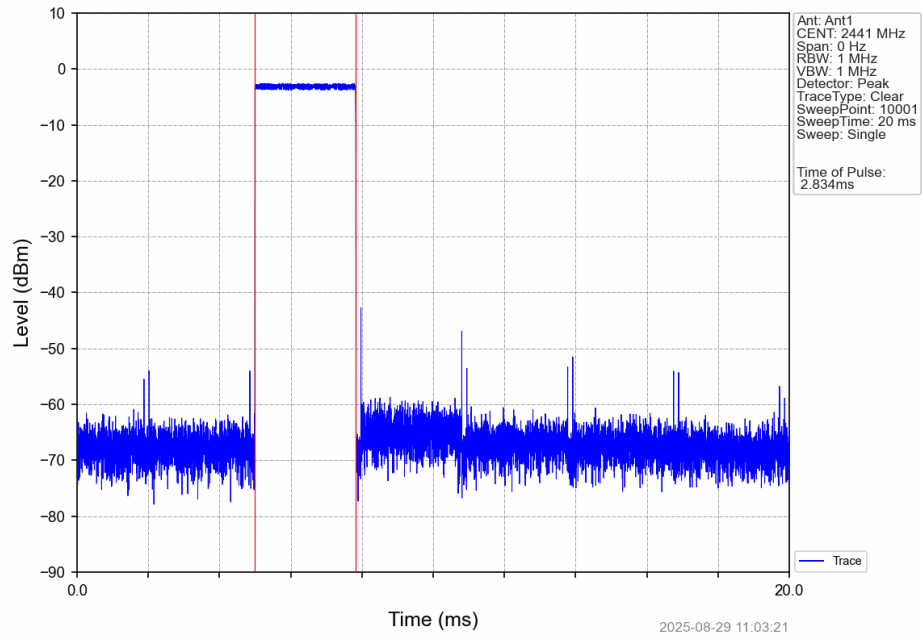
GFSK_DH3_HOPP_Ant1_NTNV



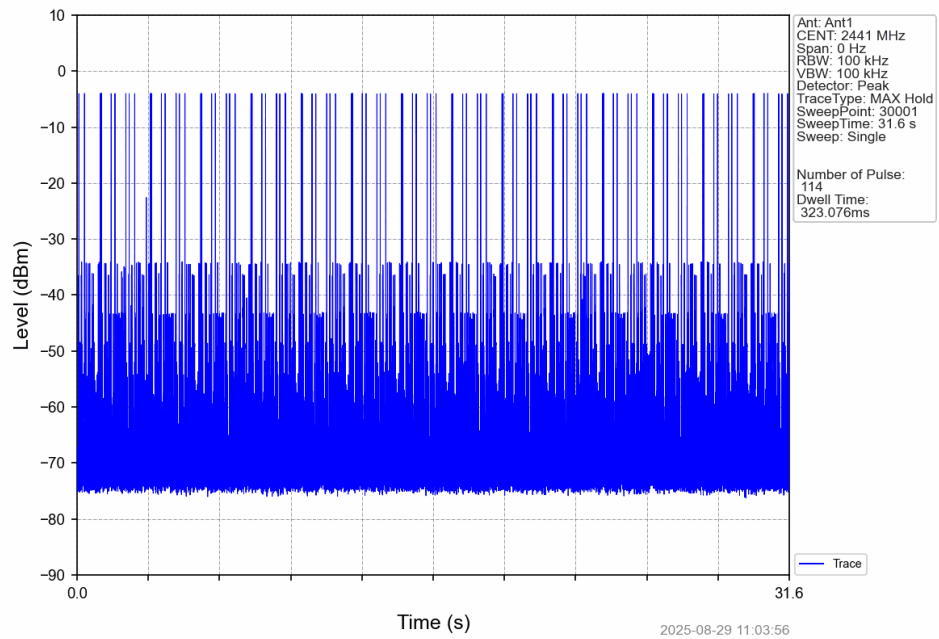
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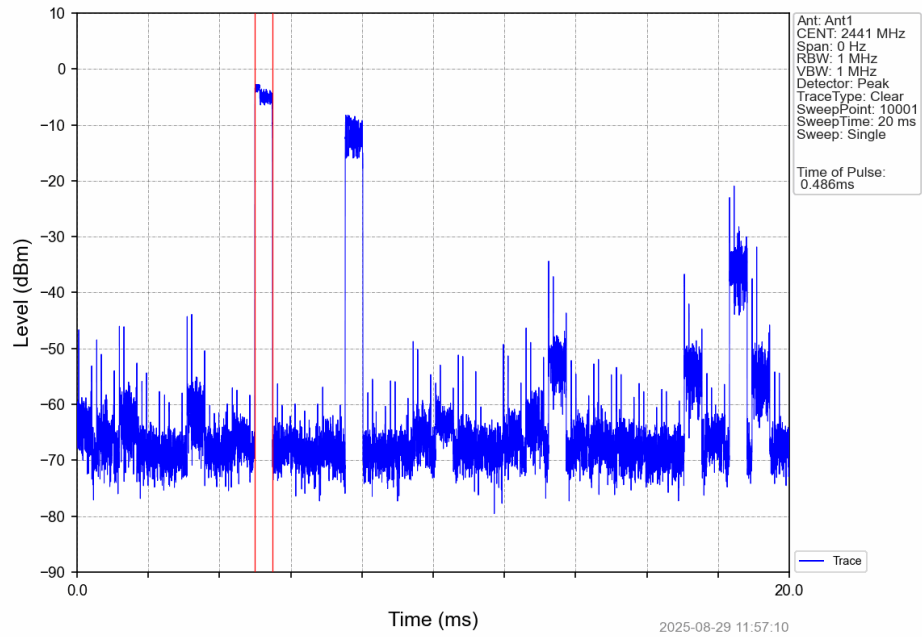
GFSK_DH5_HOPP_Ant1_NTNV



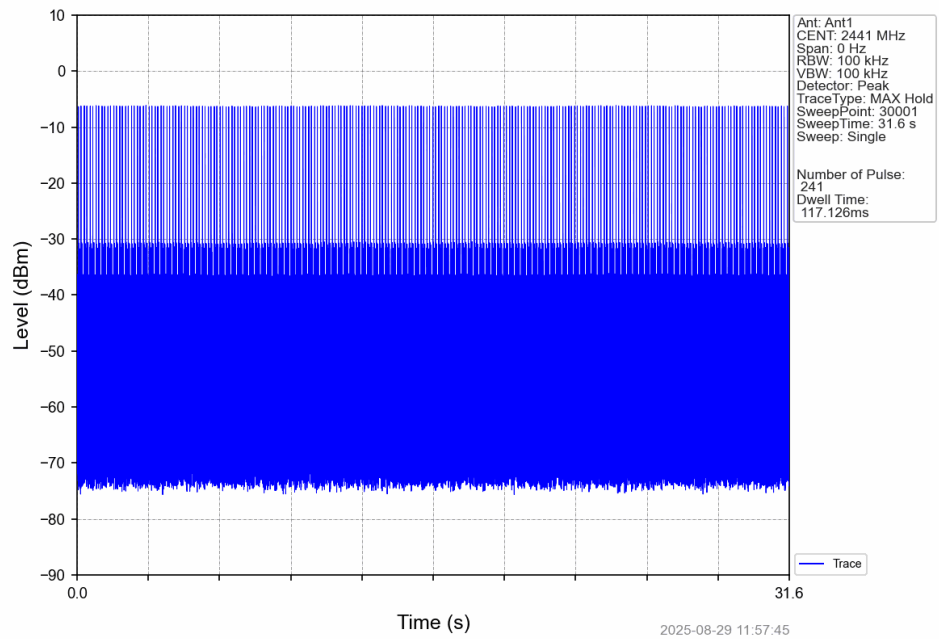
GFSK_DH5_HOPP_Ant1_NTNV



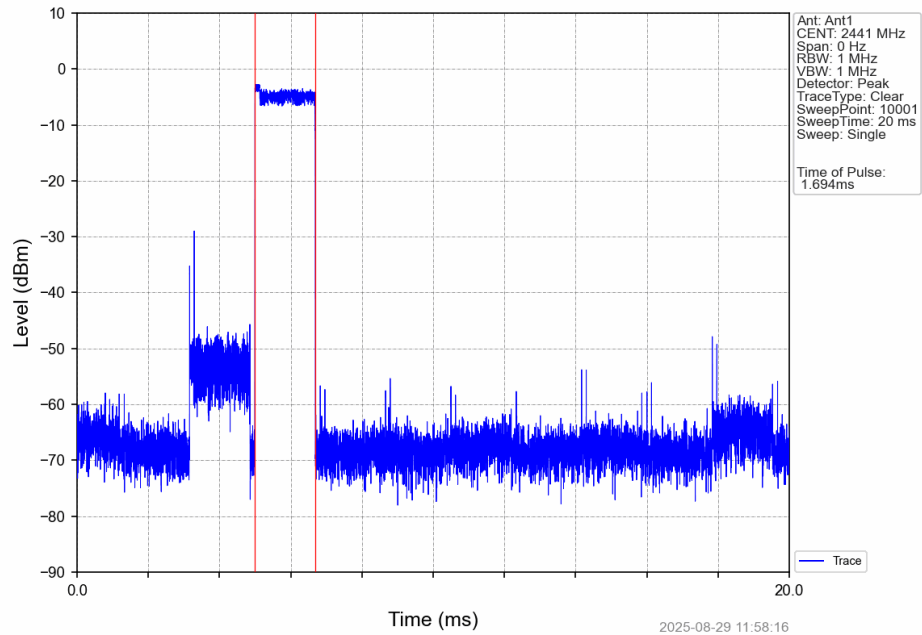
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



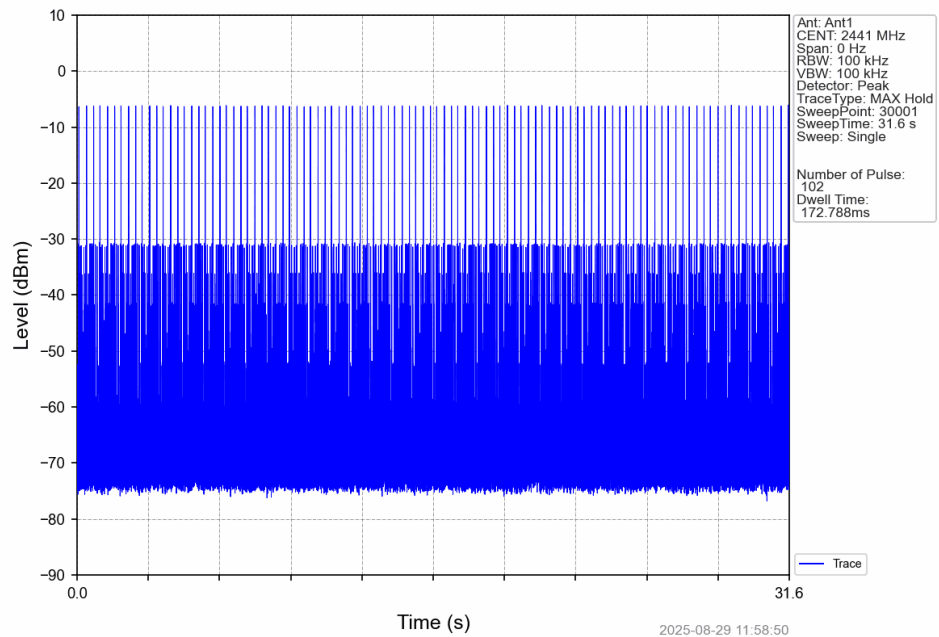
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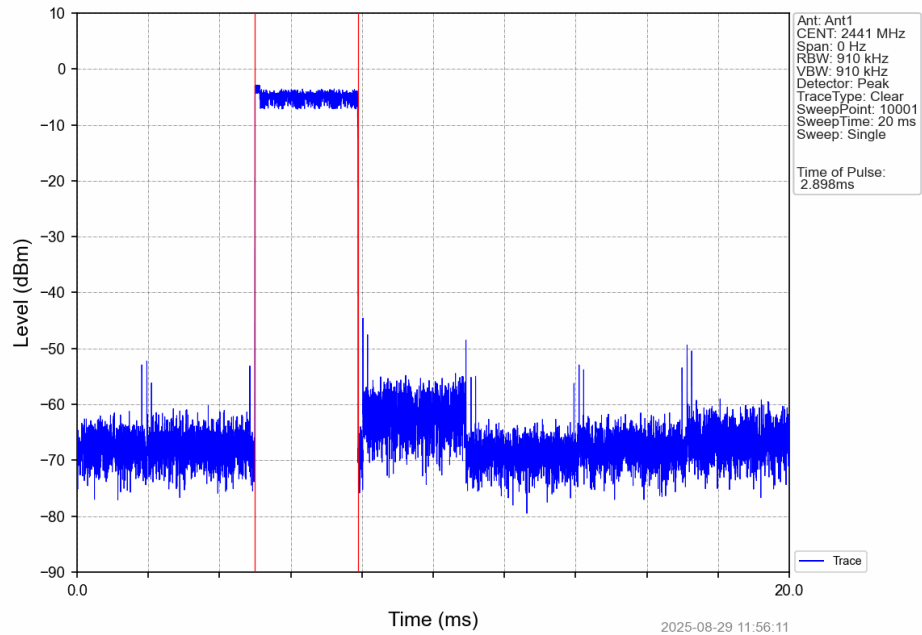
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



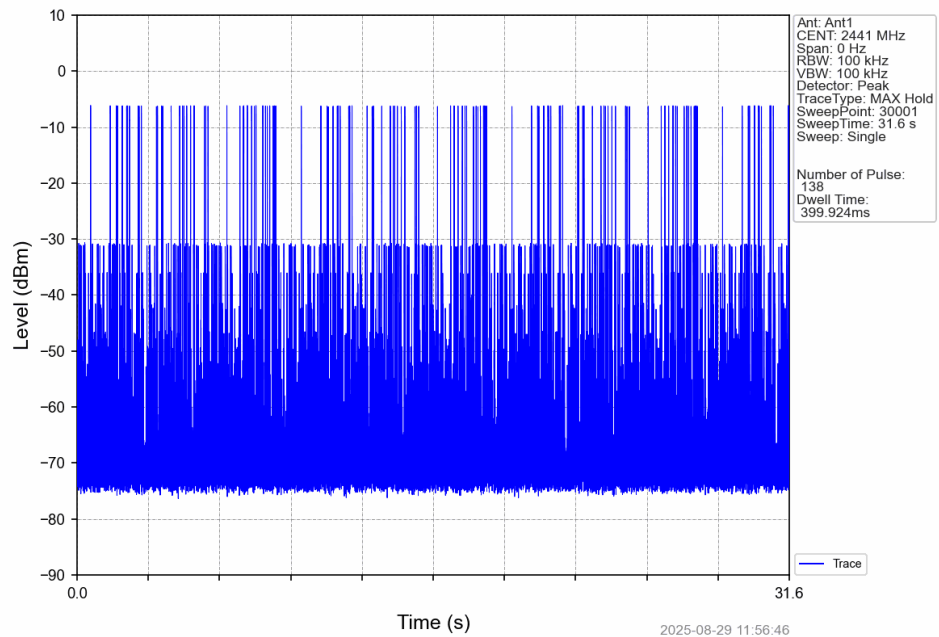
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



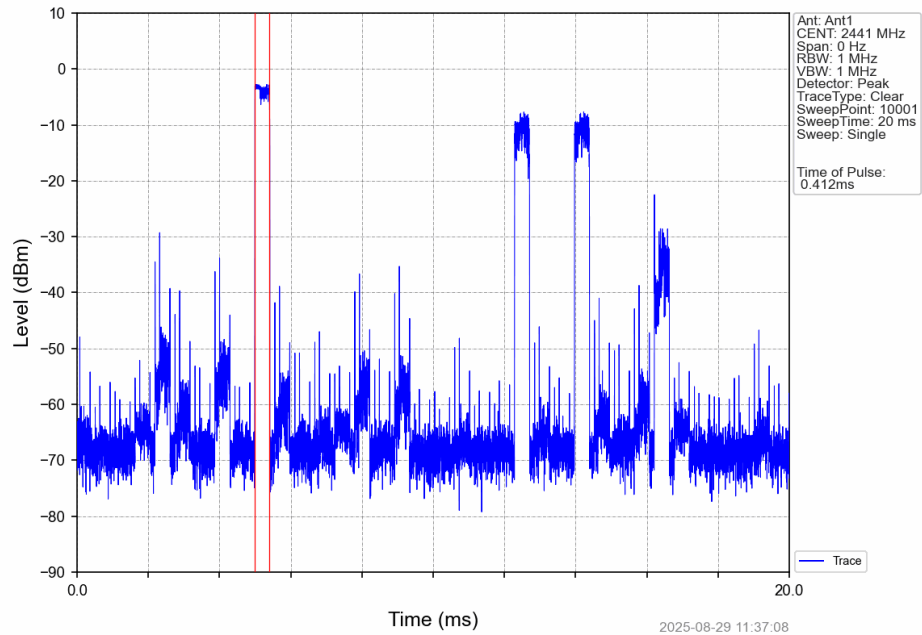
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



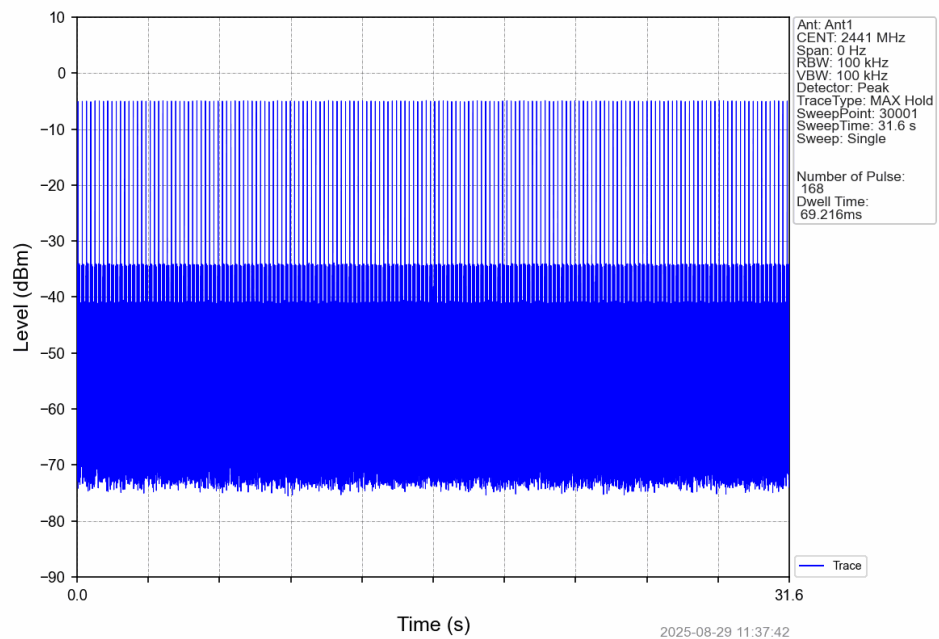
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



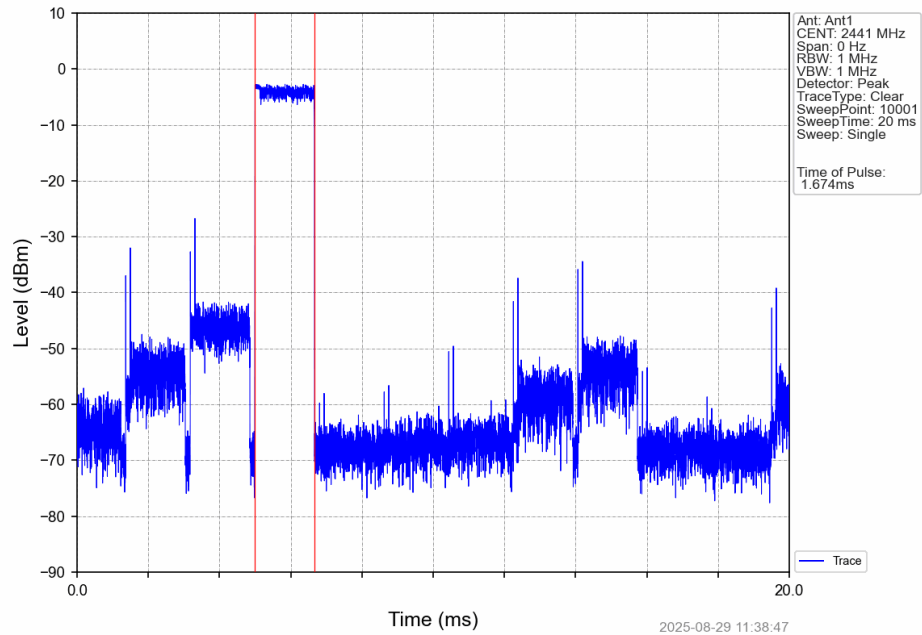
8DPSK_3DH1_HOPP_Ant1_NTNV



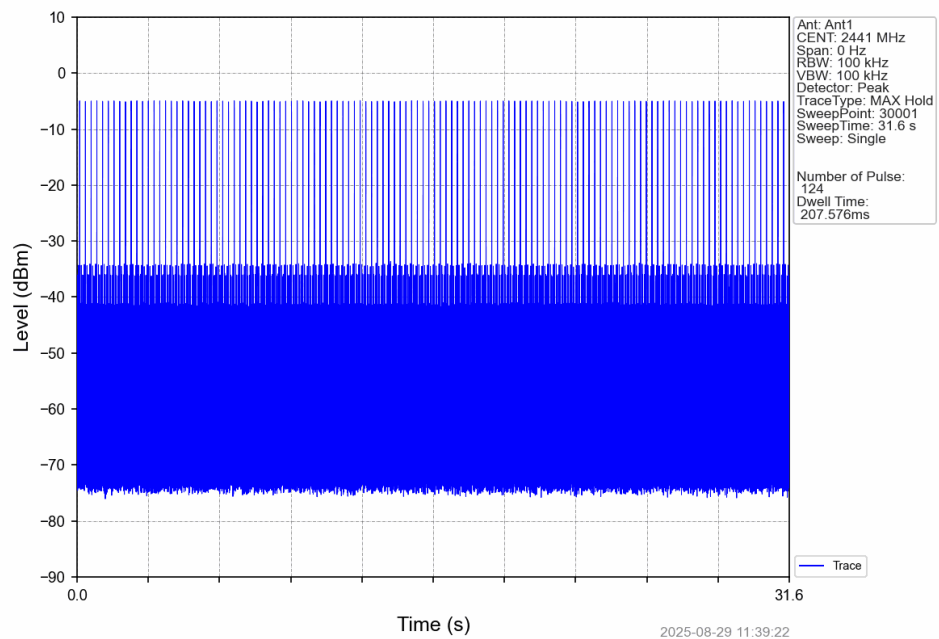
8DPSK_3DH1_HOPP_Ant1_NTNV



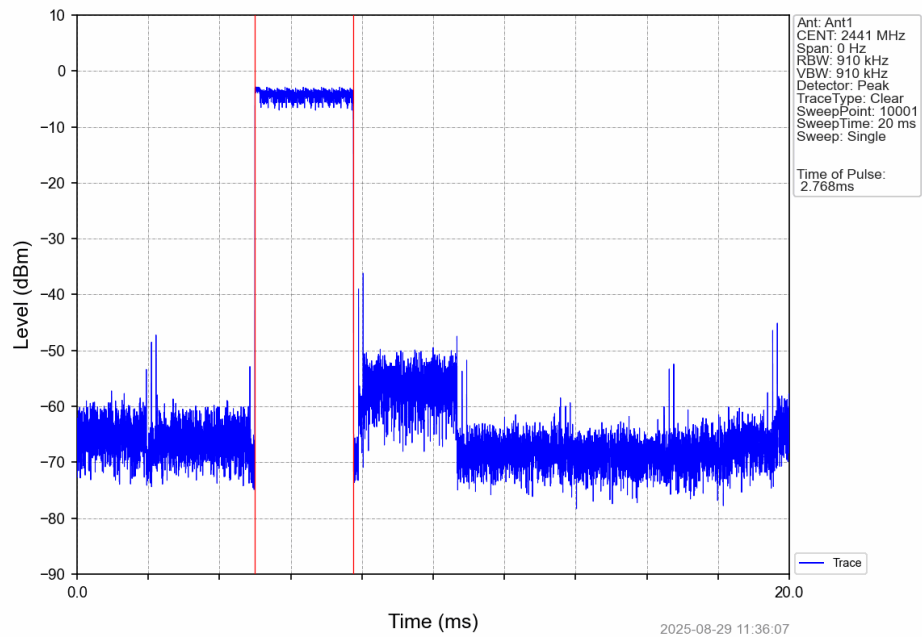
8DPSK_3DH3_HOPP_Ant1_NTNV



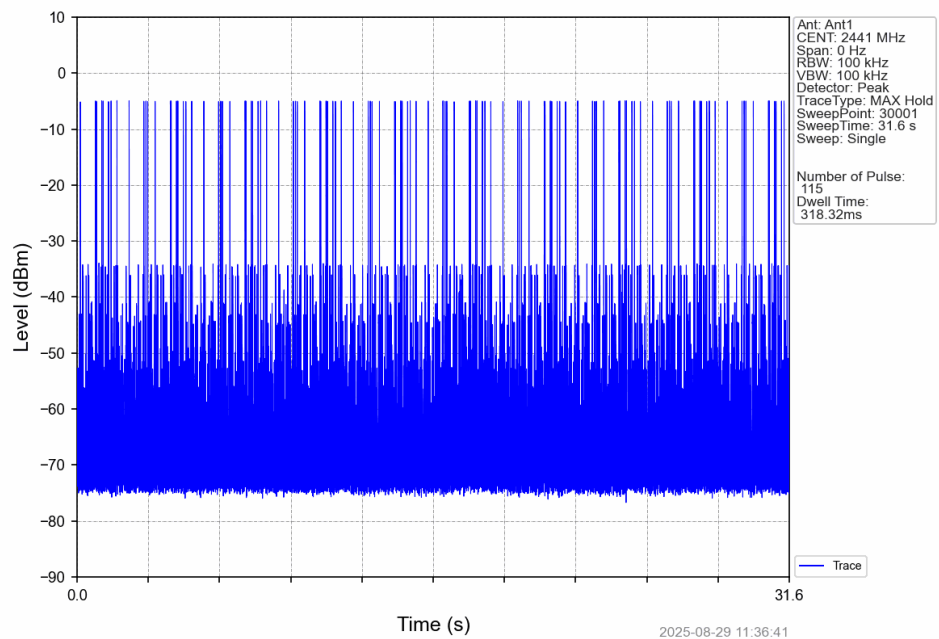
8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



7. Unwanted Emissions In Non-restricted Frequency Bands

7.1 Test Result

7.1.1 Ref

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	-2.55
		2441	DH5	1	-3.41
		2480	DH5	1	-5.09
Pi/4DQPSK	SISO	2402	2DH5	1	-3.00
		2441	2DH5	1	-3.89
		2480	2DH5	1	-5.63
8DPSK	SISO	2402	3DH5	1	-42.02
		2441	3DH5	1	-3.89
		2480	3DH5	1	-5.57

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.

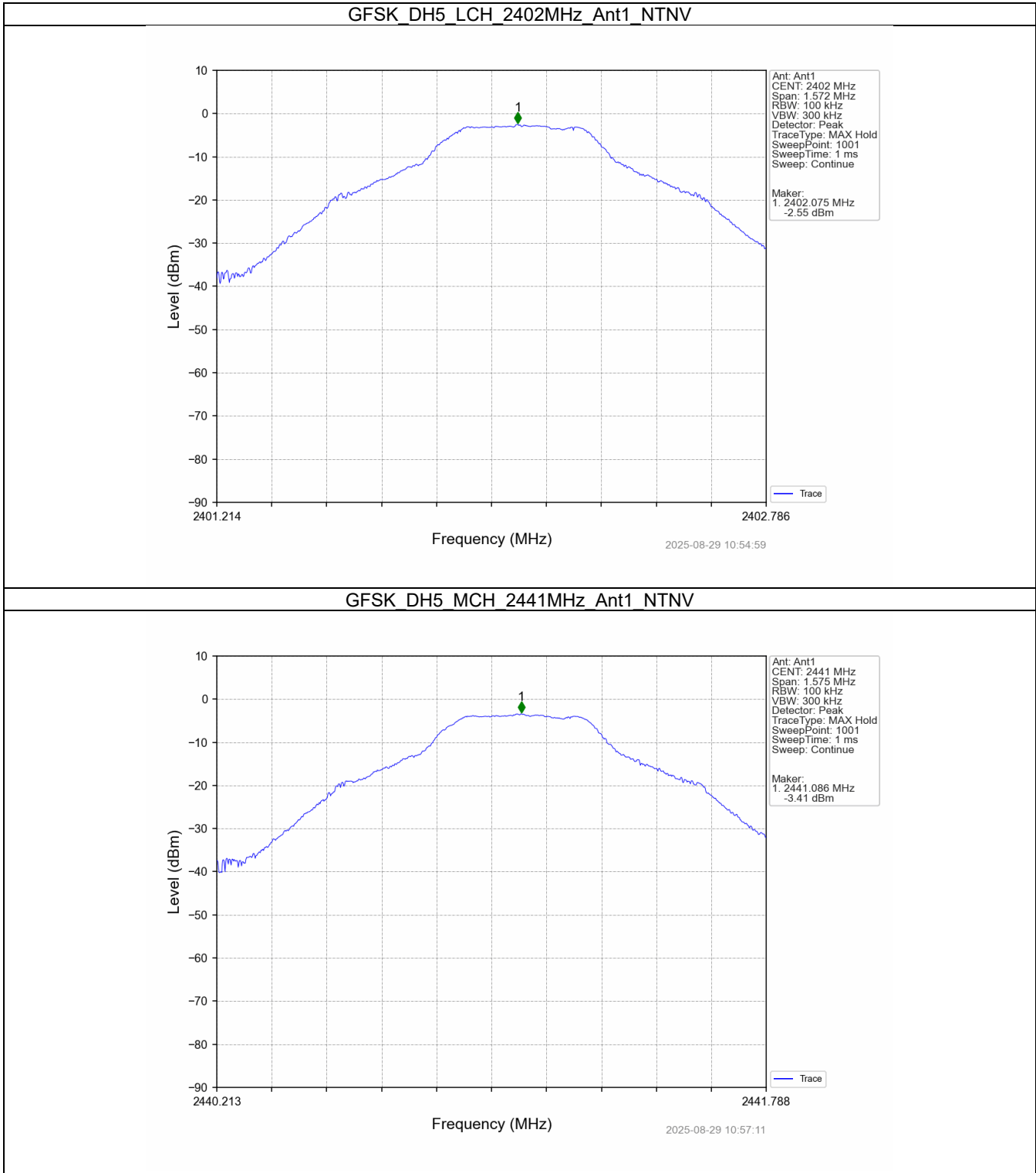
7.1.2 CSE

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	-2.55	-22.55	Pass
		2441	DH5	1	-2.55	-22.55	Pass
		2480	DH5	1	-2.55	-22.55	Pass
	HOPP	DH5	1		-2.55	-22.55	Pass
					-2.55	-22.55	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	-3.00	-23.00	Pass
		2441	2DH5	1	-3.00	-23.00	Pass
		2480	2DH5	1	-3.00	-23.00	Pass
	HOPP	2DH5	1		-3.00	-23.00	Pass
					-3.00	-23.00	Pass
8DPSK	SISO	2402	3DH5	1	-3.89	-23.89	Pass
		2441	3DH5	1	-3.89	-23.89	Pass
		2480	3DH5	1	-3.89	-23.89	Pass
	HOPP	3DH5	1		-3.89	-23.89	Pass
					-3.89	-23.89	Pass

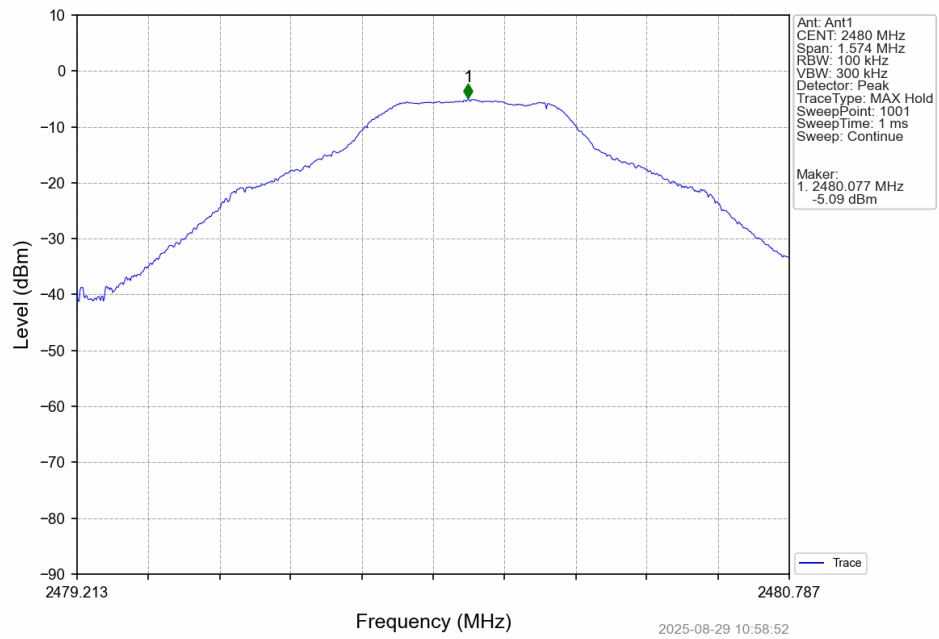
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

7.2 Test Graph

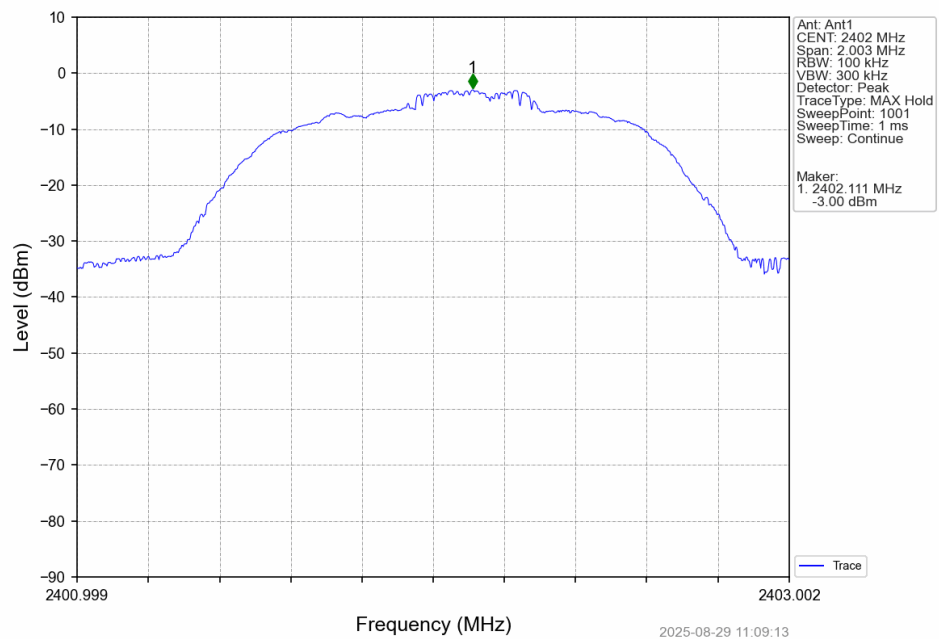
7.2.1 Ref



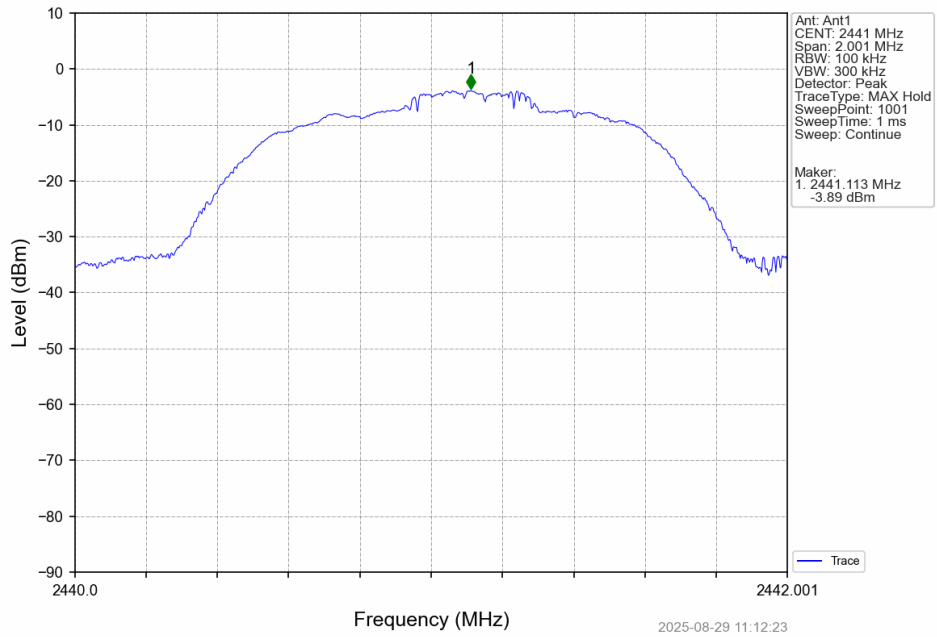
GFSK DH5_HCH_2480MHz_Ant1_NTNV



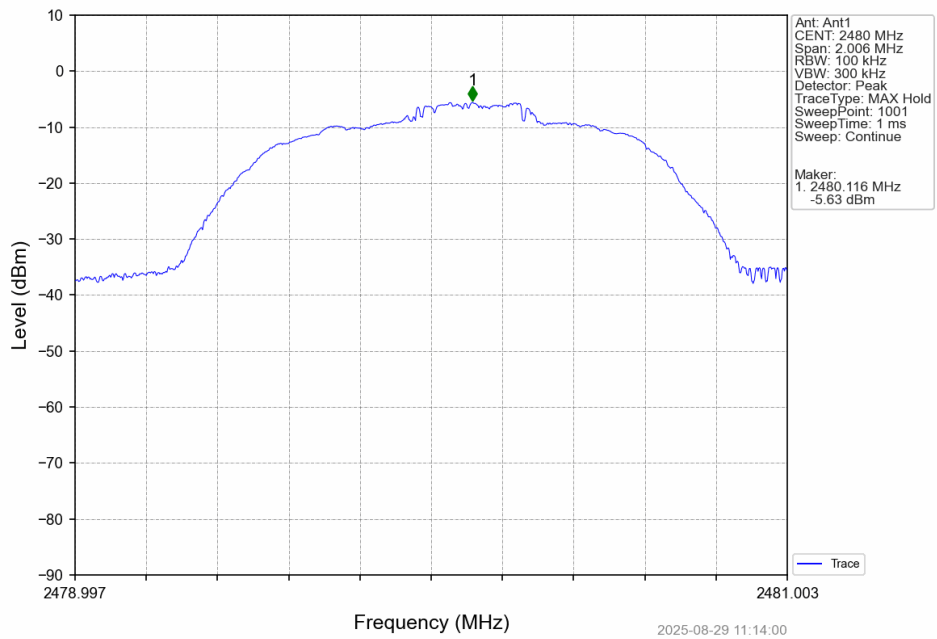
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



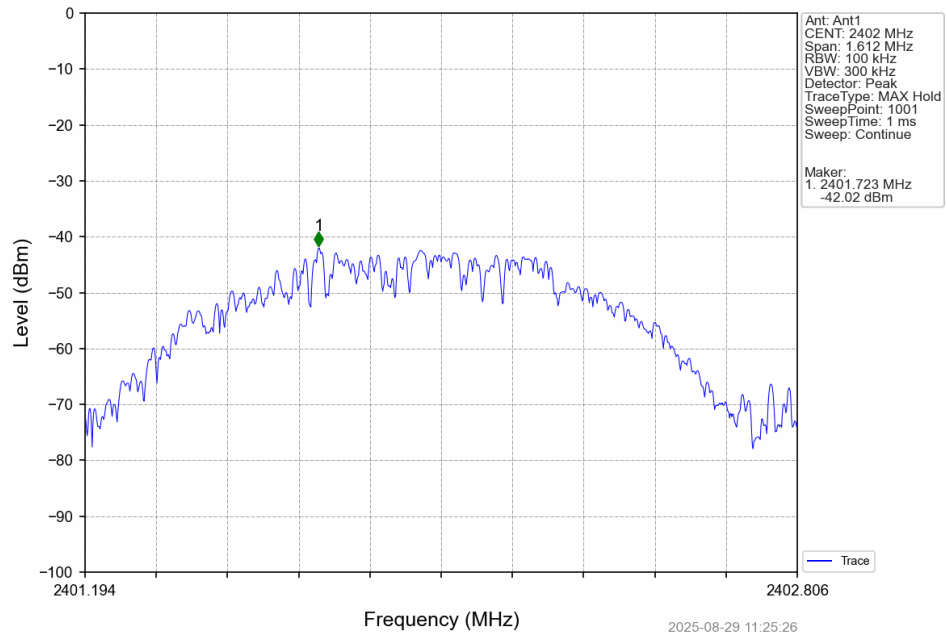
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



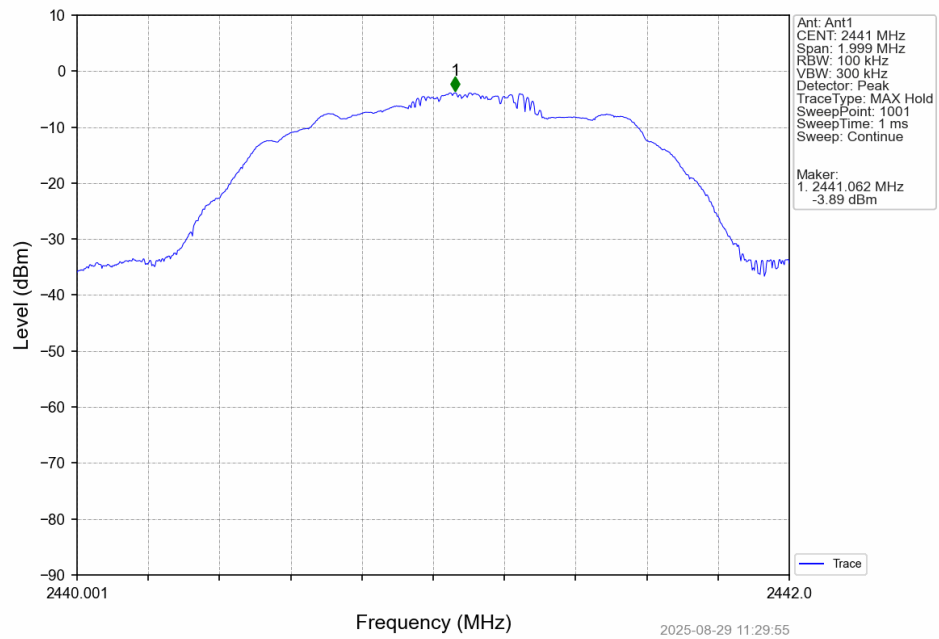
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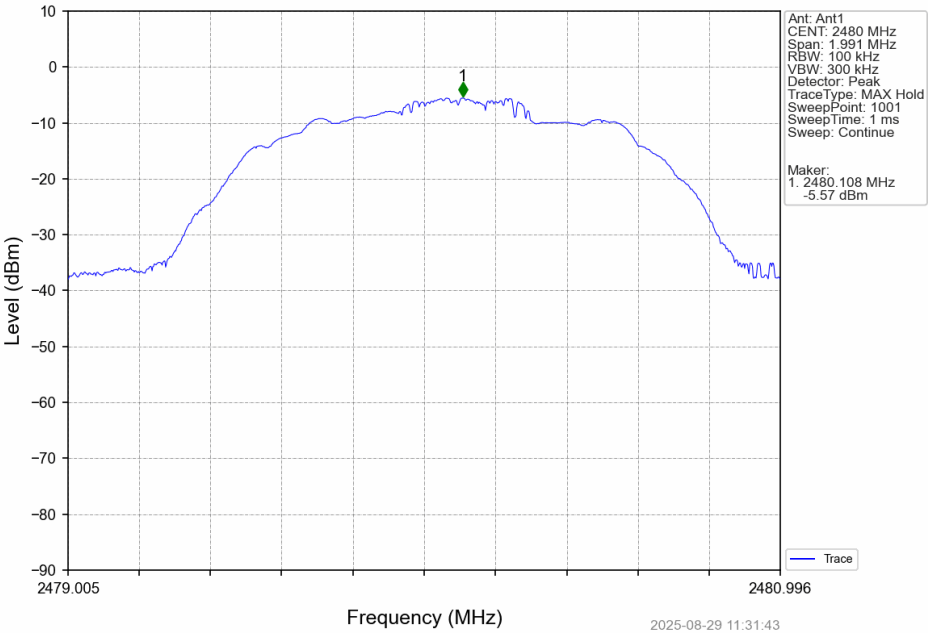
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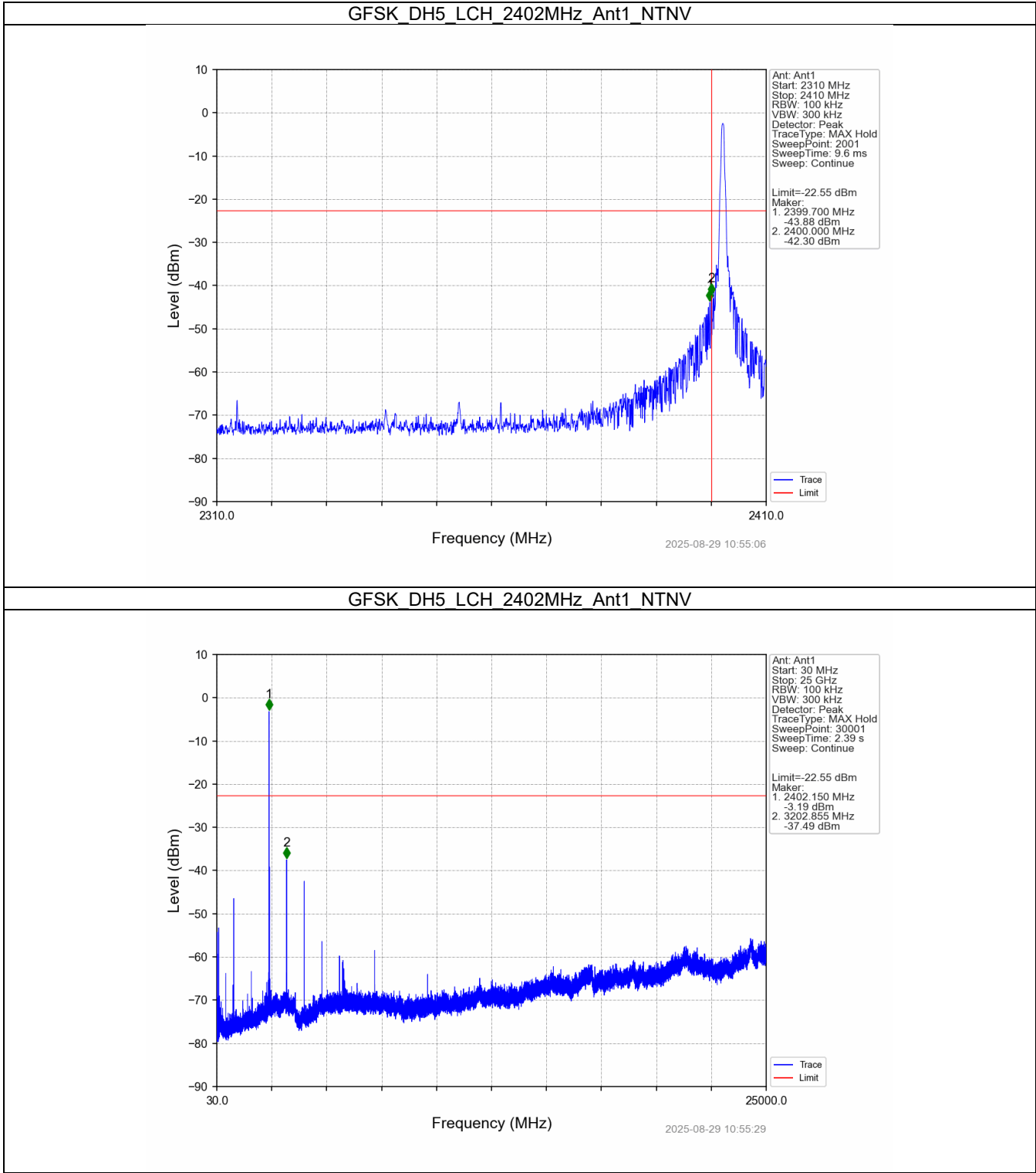
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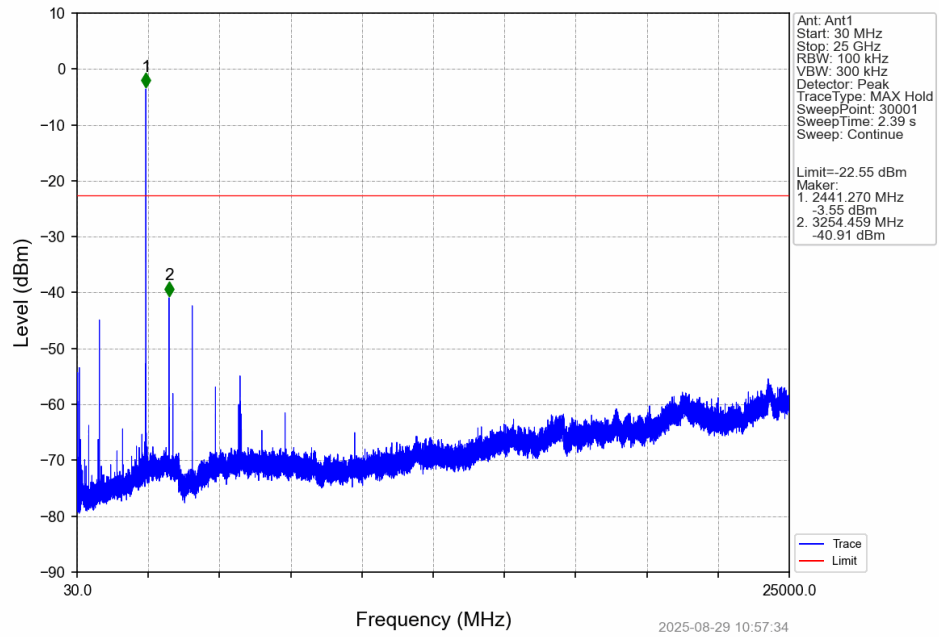
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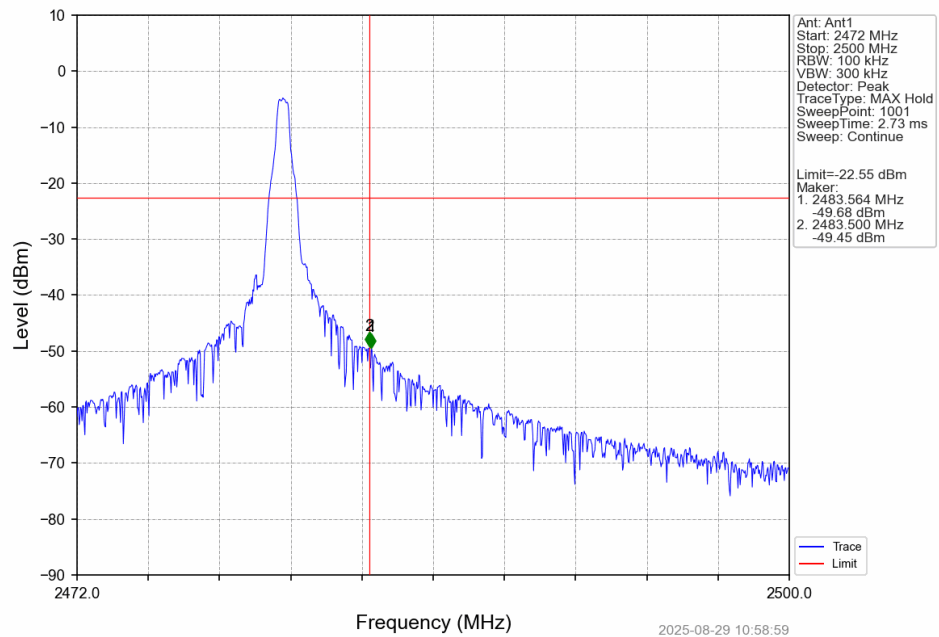
7.2.2 CSE



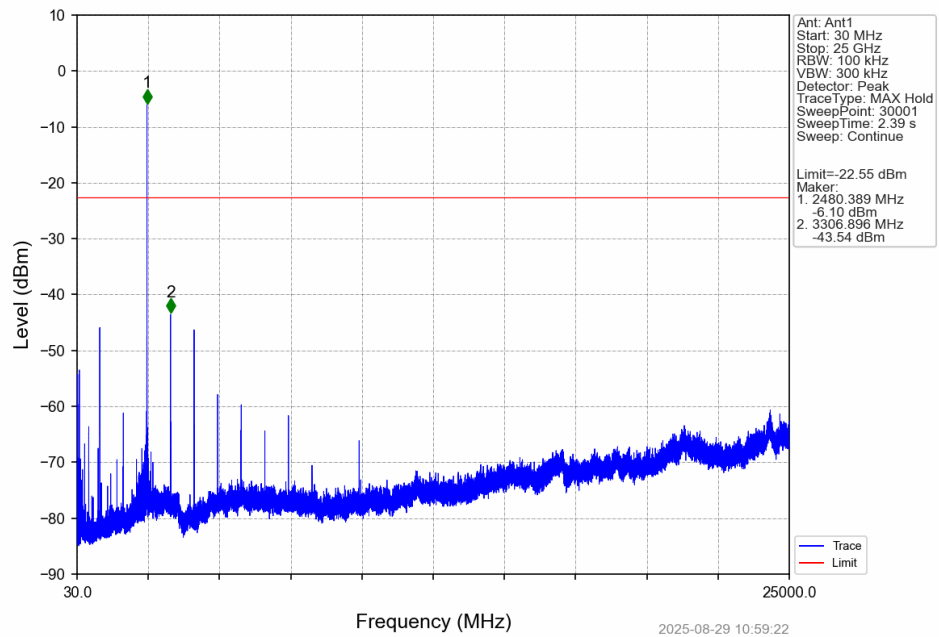
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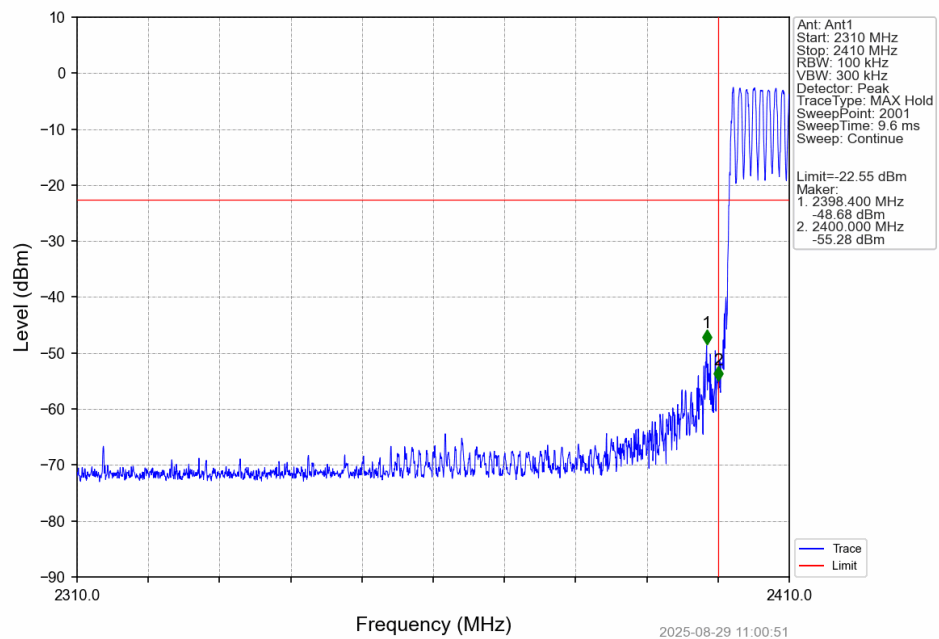
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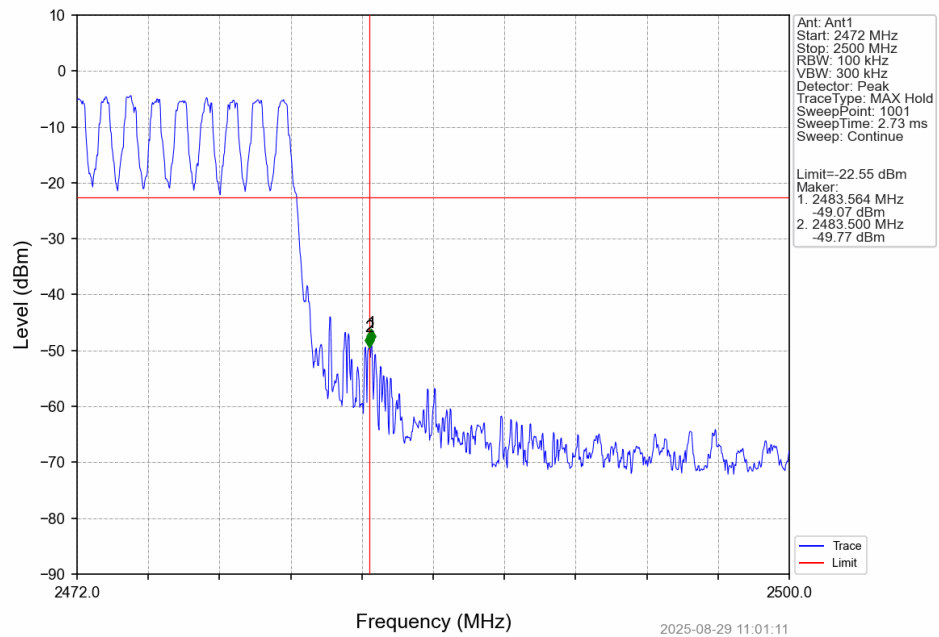
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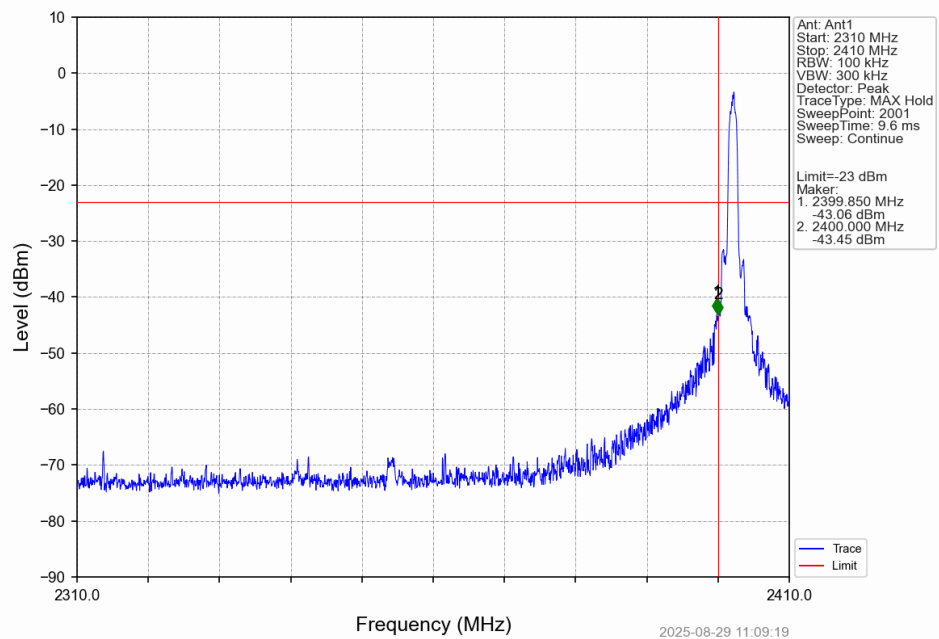
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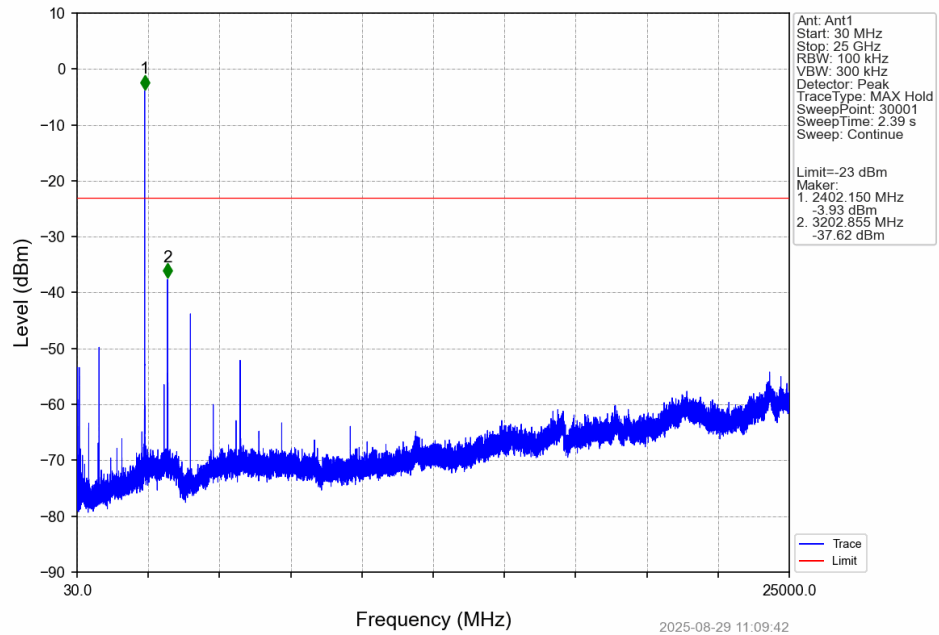
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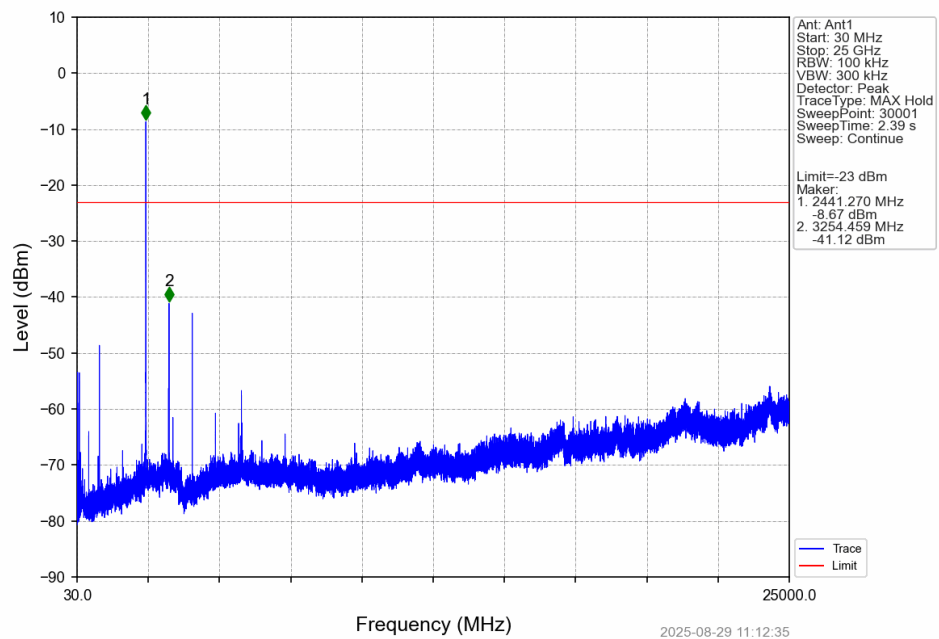
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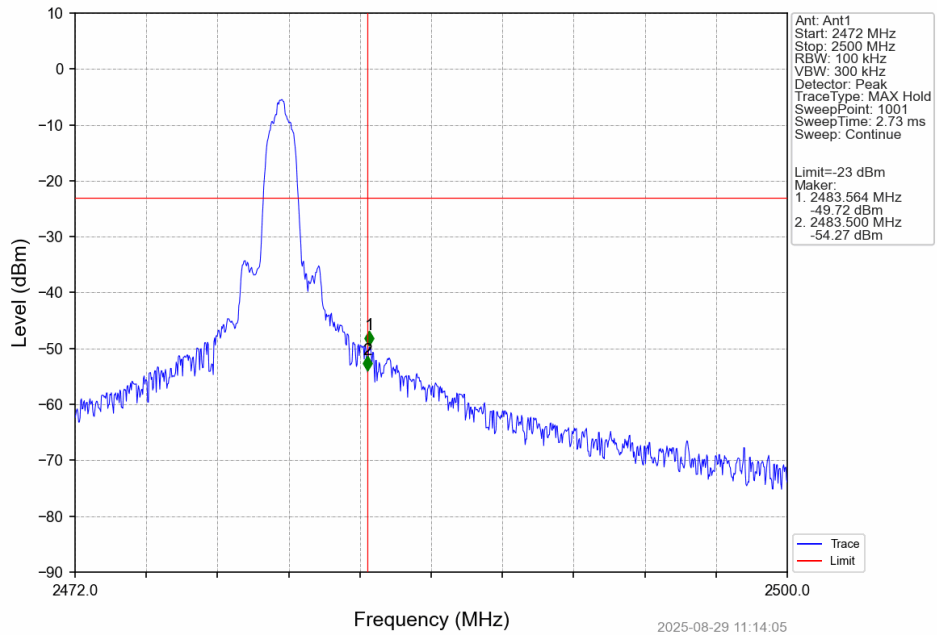
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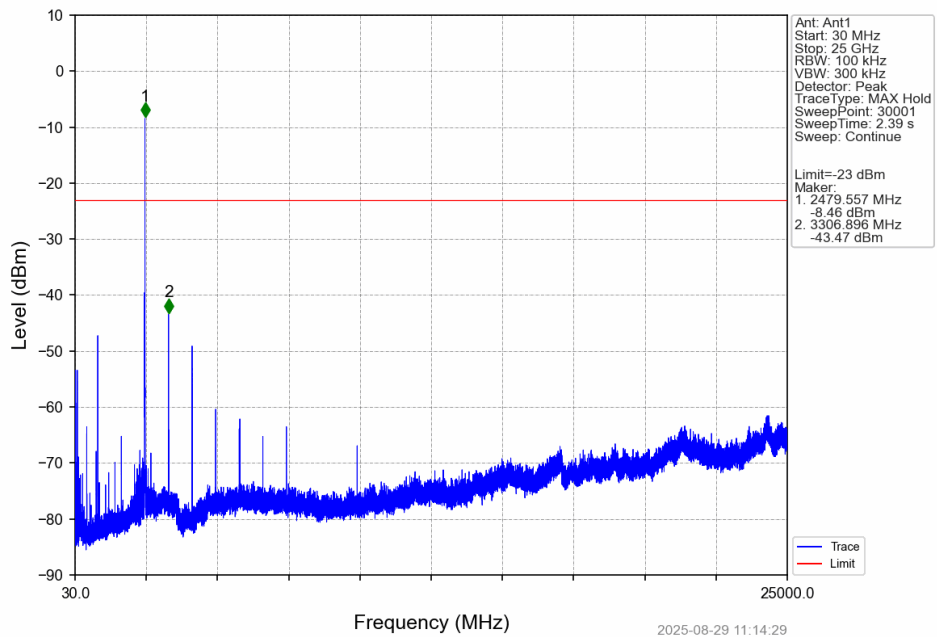
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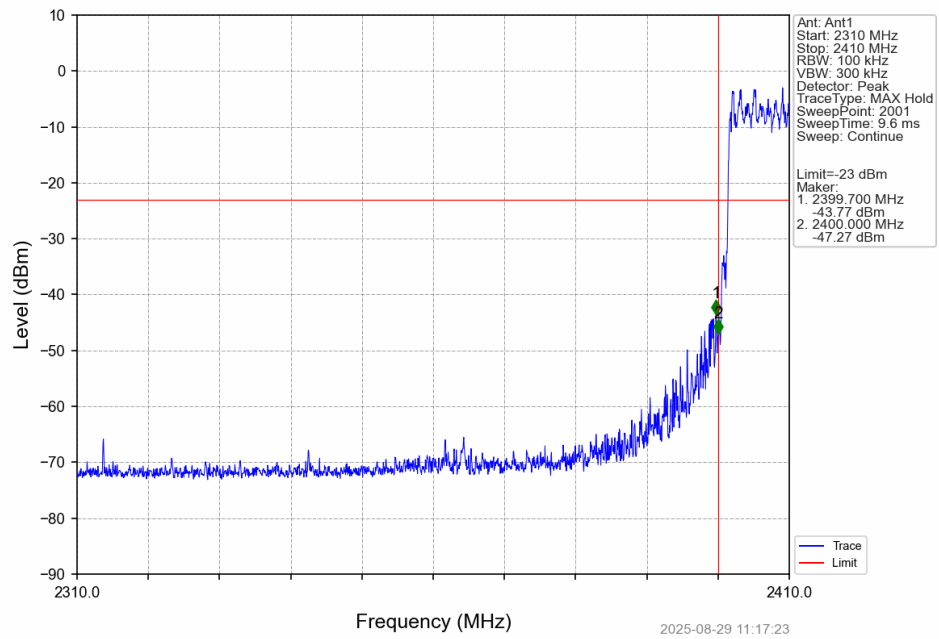
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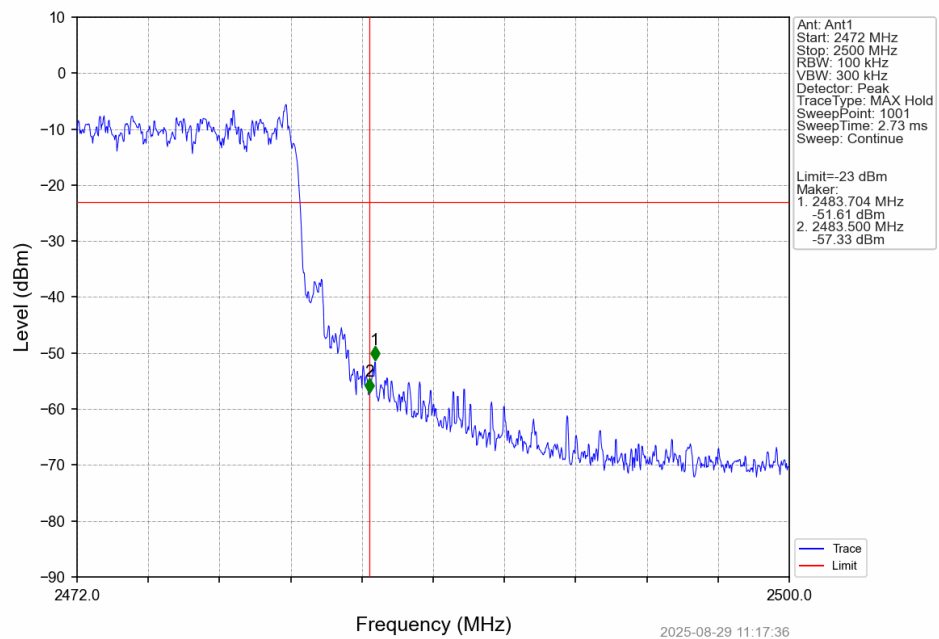
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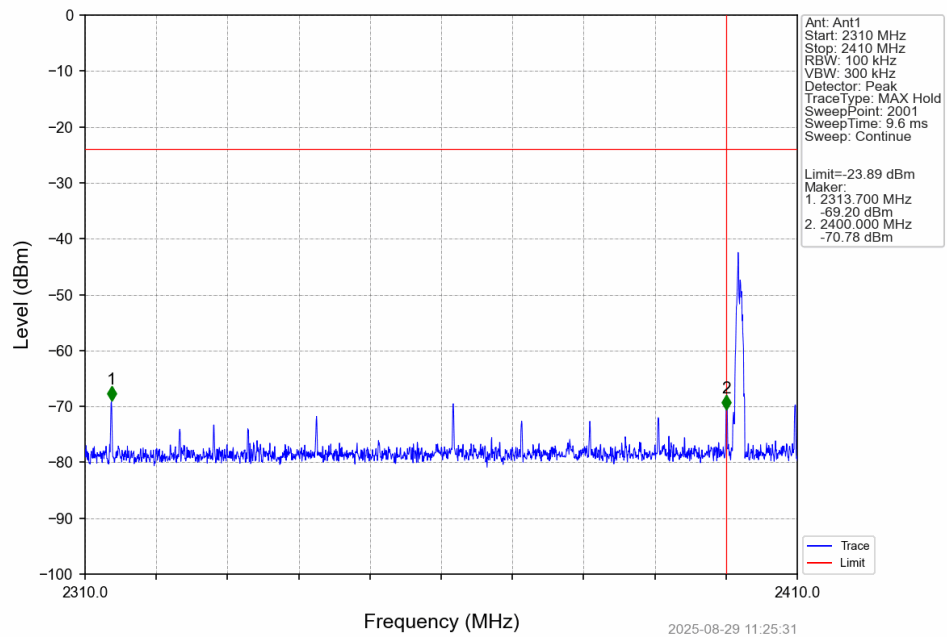
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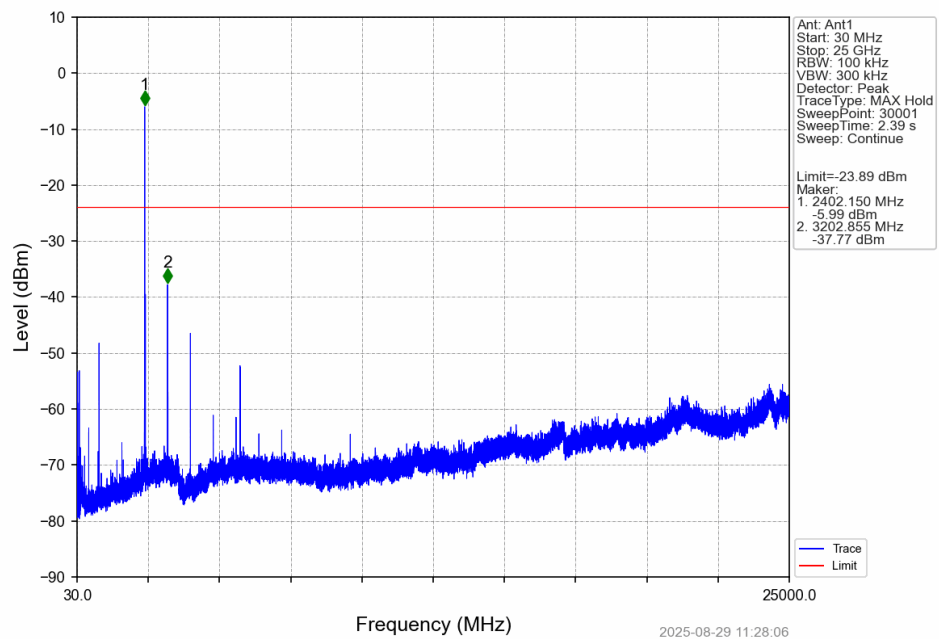
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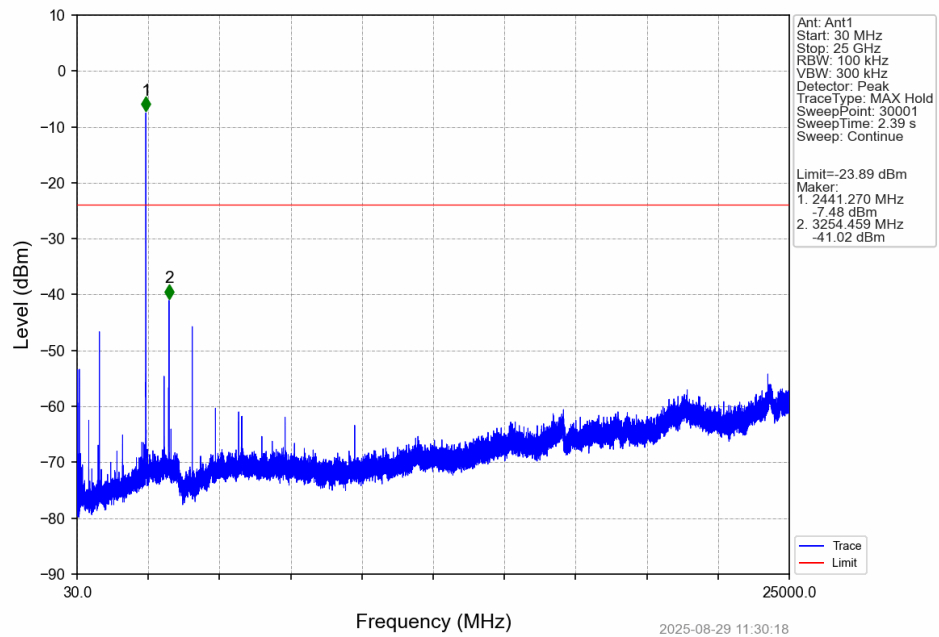
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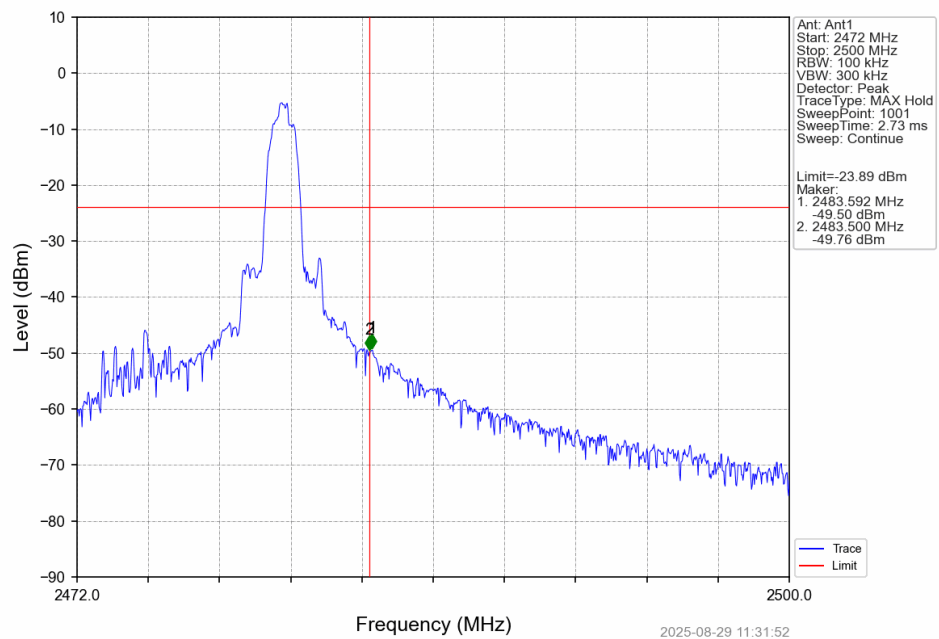
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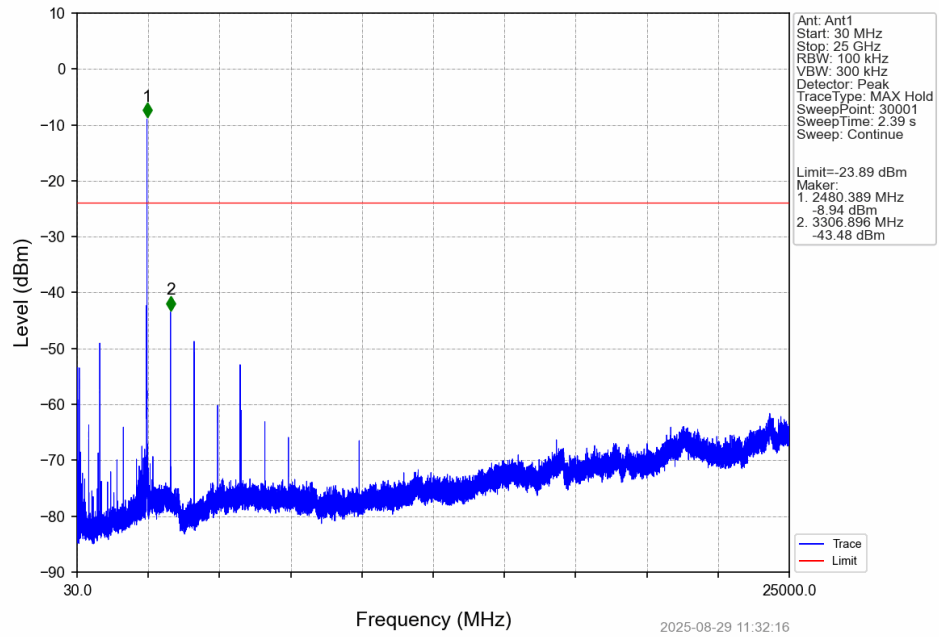
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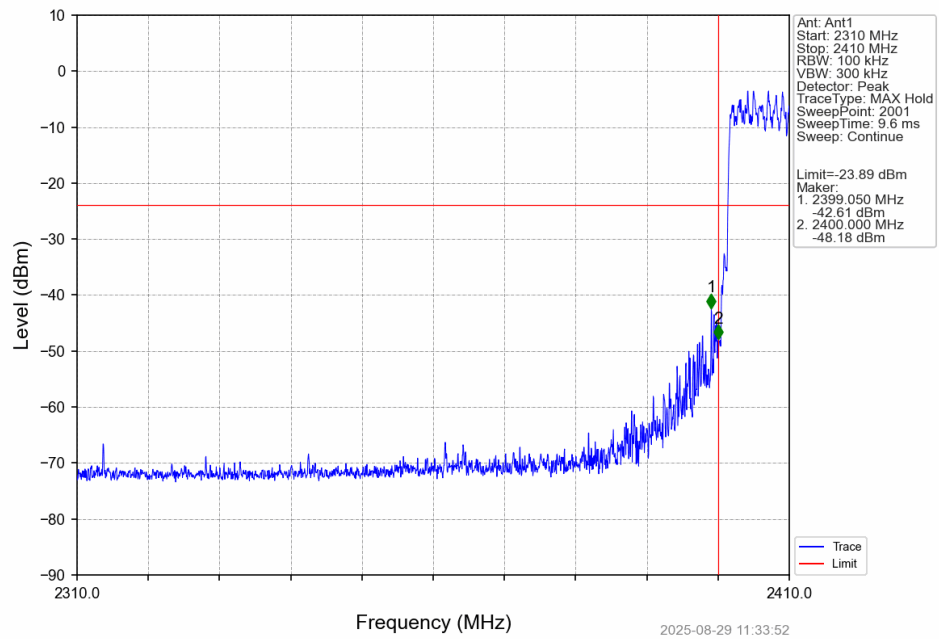
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV

