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Annex for Bluetooth

Test Report No.: CTL2508212021-WF01

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1. Bandwidth**1.1 Test Result****1.1.1 OBW**

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.747	/	Pass
		2441	DH5	1	0.746	/	Pass
		2480	DH5	1	0.743	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.146	/	Pass
		2441	2DH5	1	1.147	/	Pass
		2480	2DH5	1	1.145	/	Pass
8DPSK	SISO	2402	3DH5	1	1.162	/	Pass
		2441	3DH5	1	1.158	/	Pass
		2480	3DH5	1	1.152	/	Pass

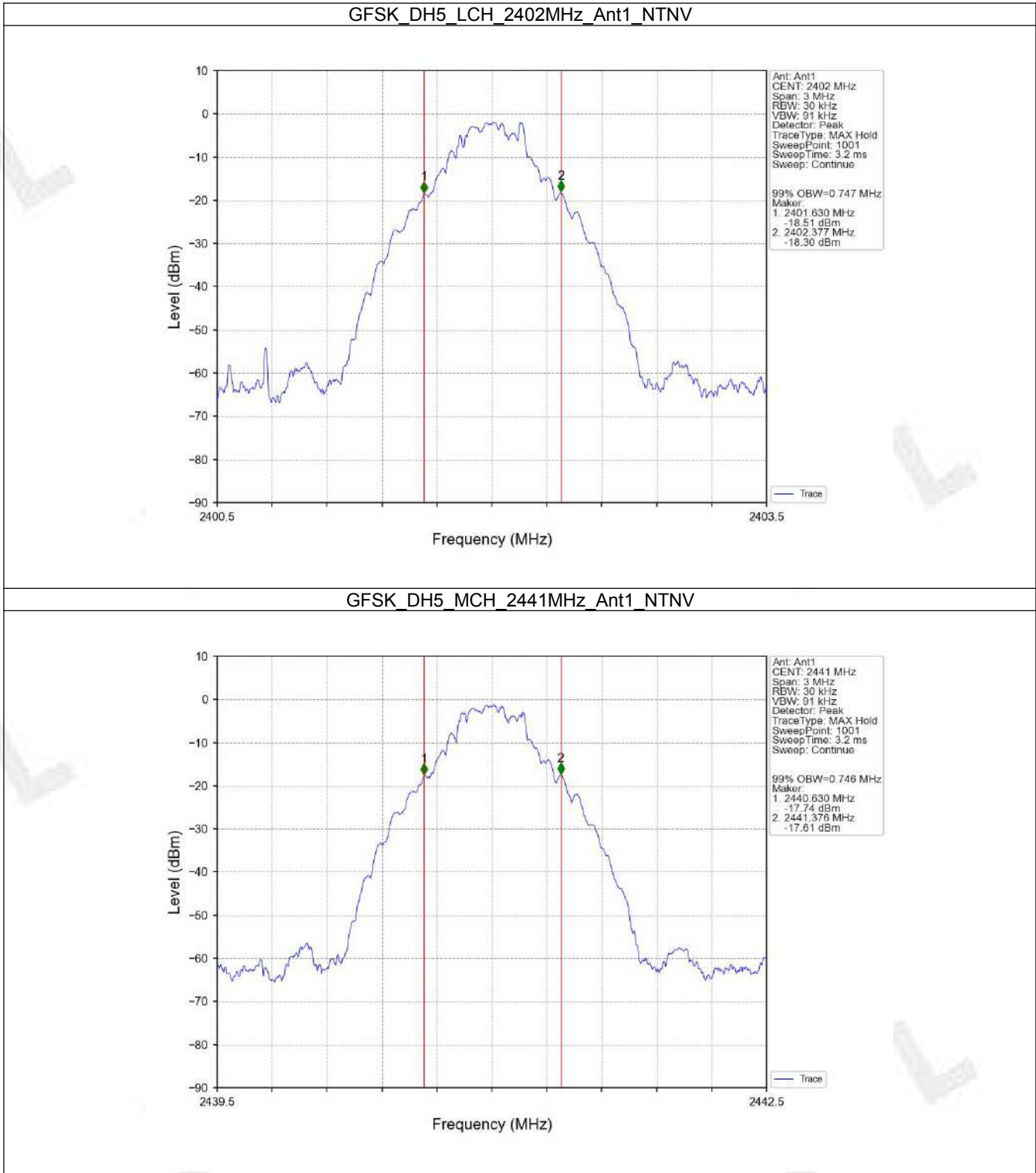
1.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.846	/	Pass
		2441	DH5	1	0.846	/	Pass
		2480	DH5	1	0.850	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.275	/	Pass
		2441	2DH5	1	1.280	/	Pass
		2480	2DH5	1	1.280	/	Pass
8DPSK	SISO	2402	3DH5	1	1.283	/	Pass
		2441	3DH5	1	1.286	/	Pass
		2480	3DH5	1	1.281	/	Pass

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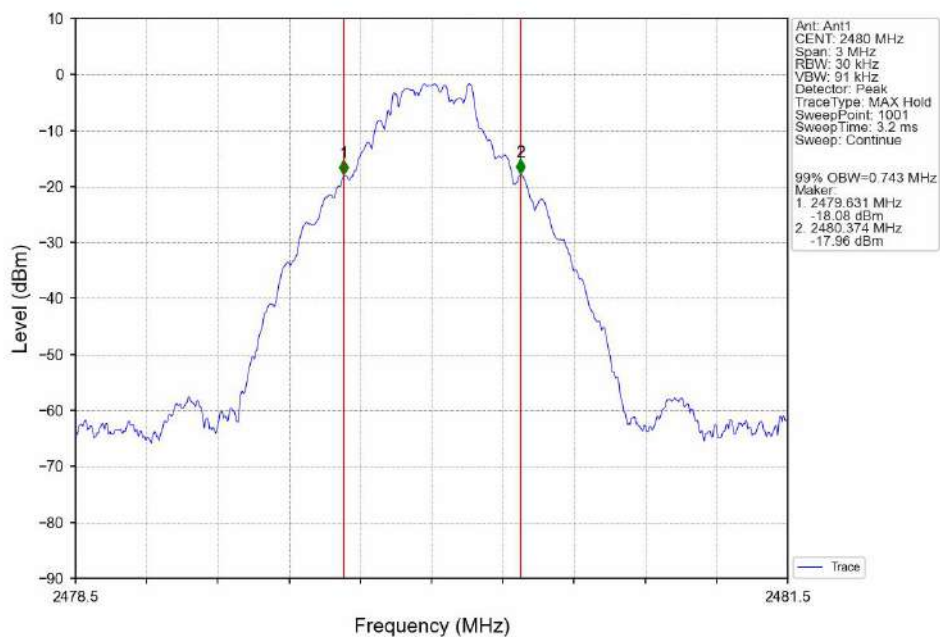
1.2 Test Graph

1.2.1 OBW

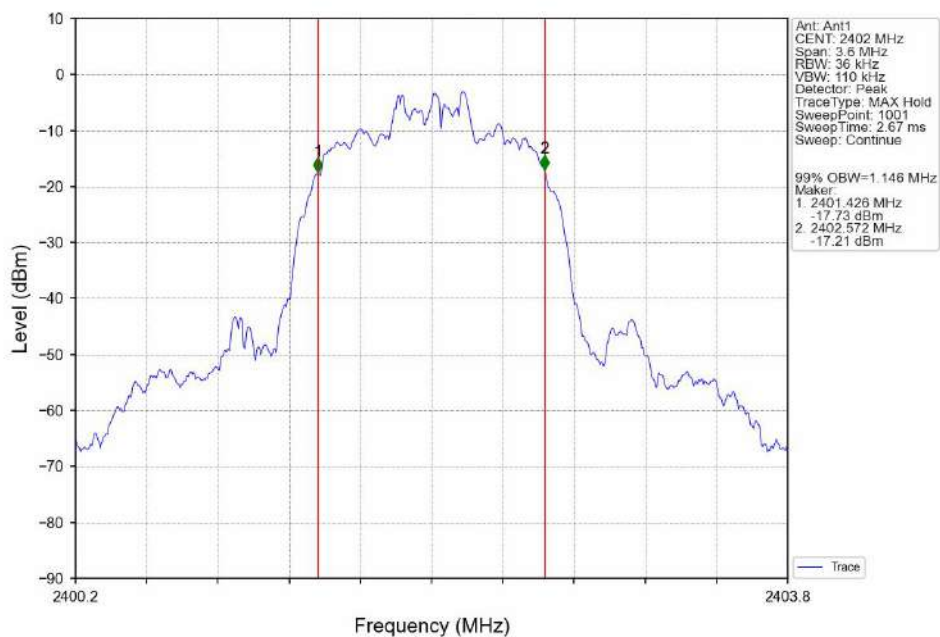


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GFSK DH5_HCH_2480MHz_Ant1_NTNV

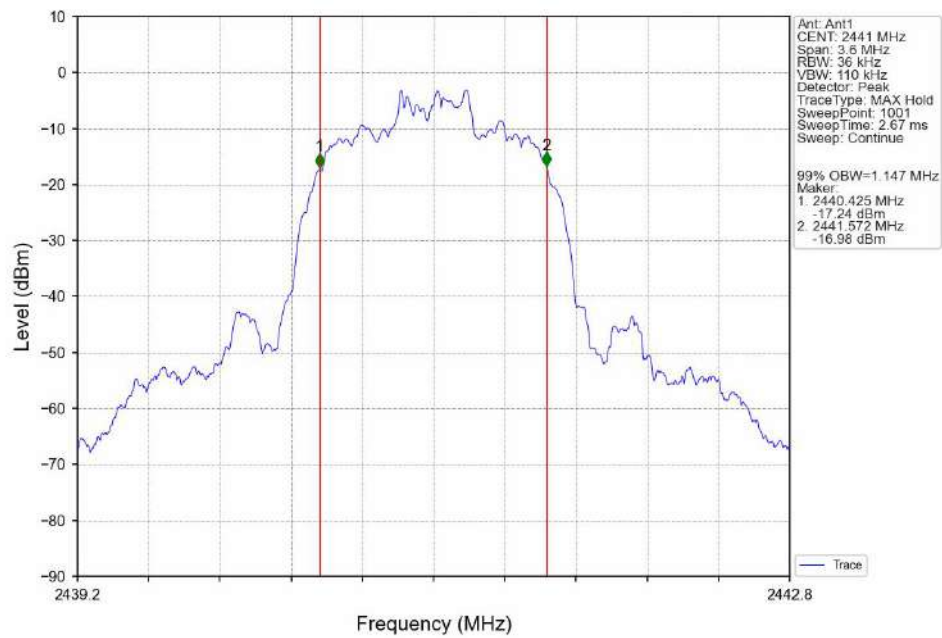


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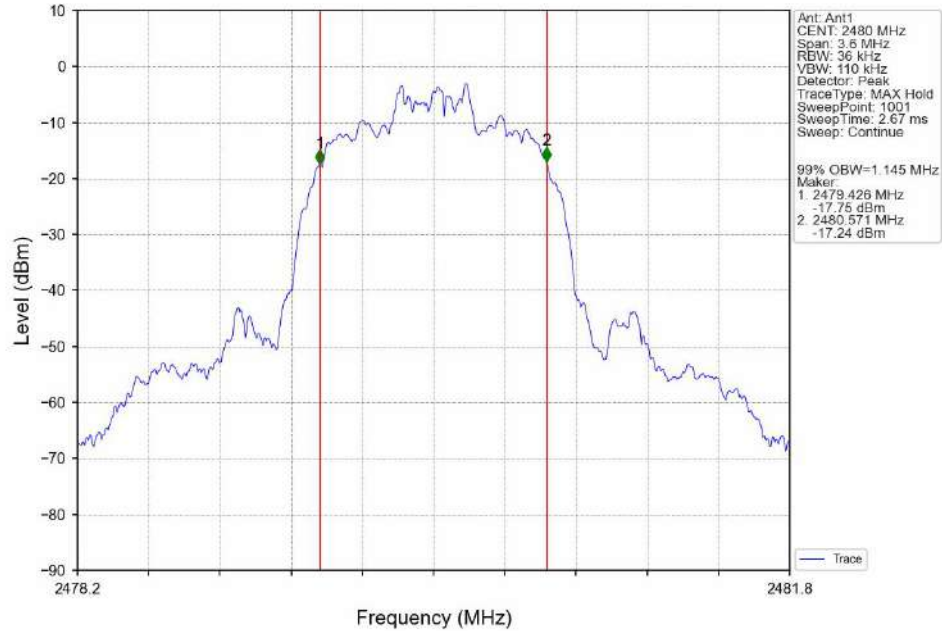


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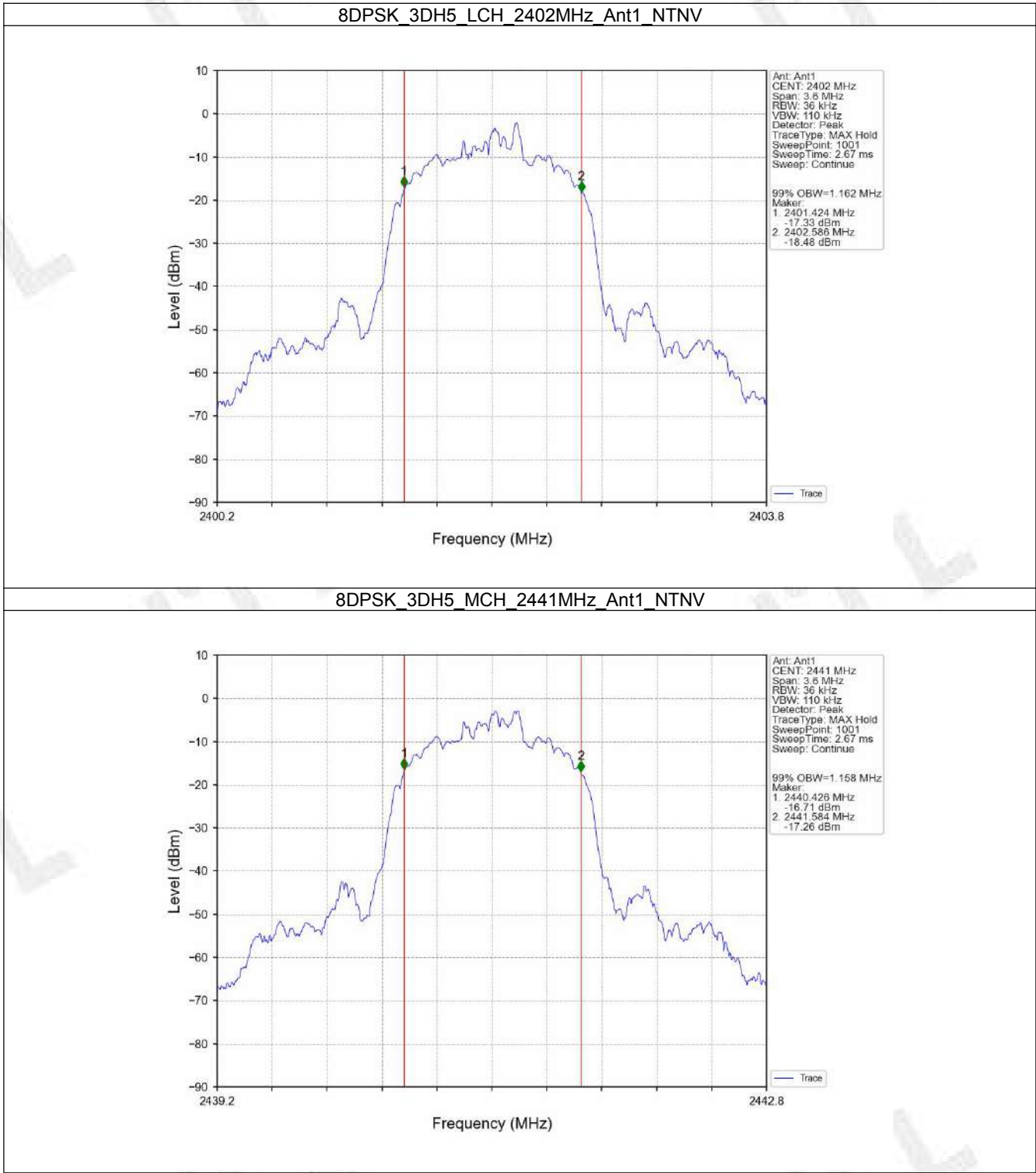
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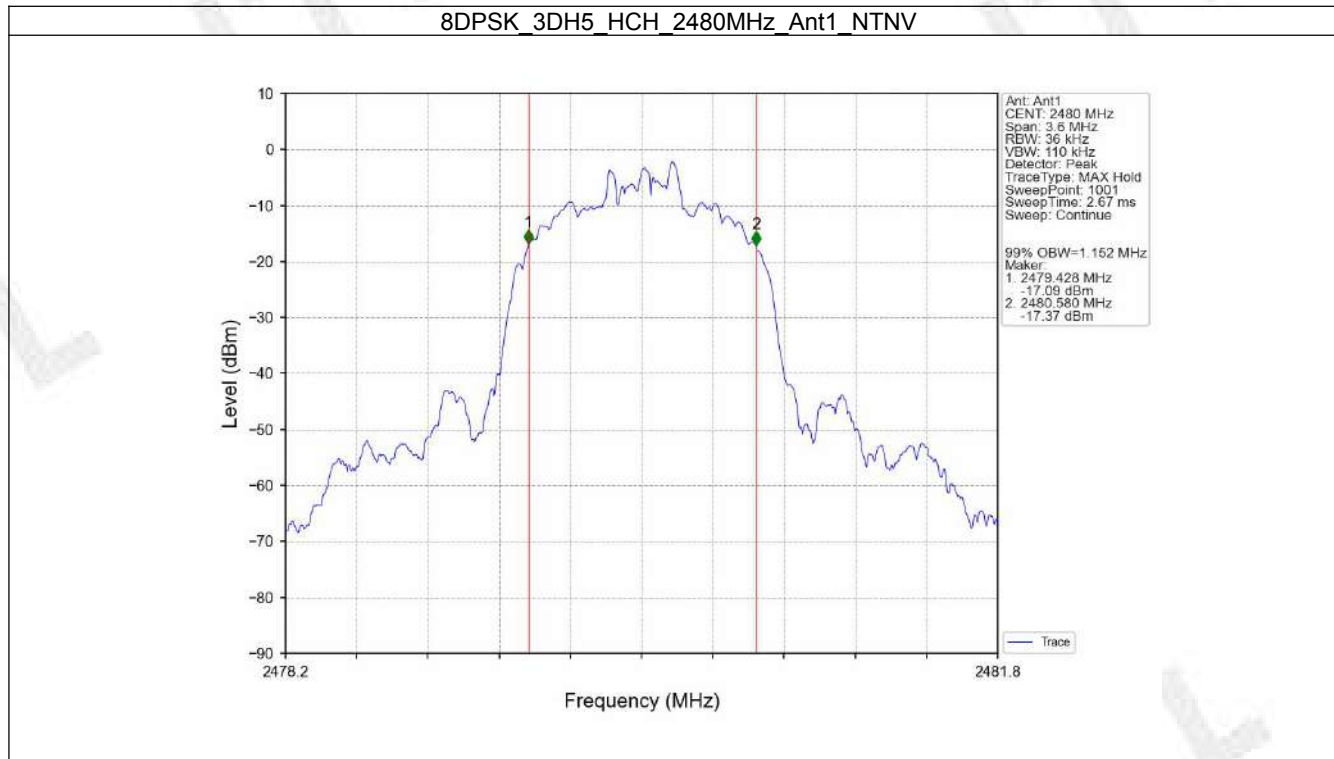
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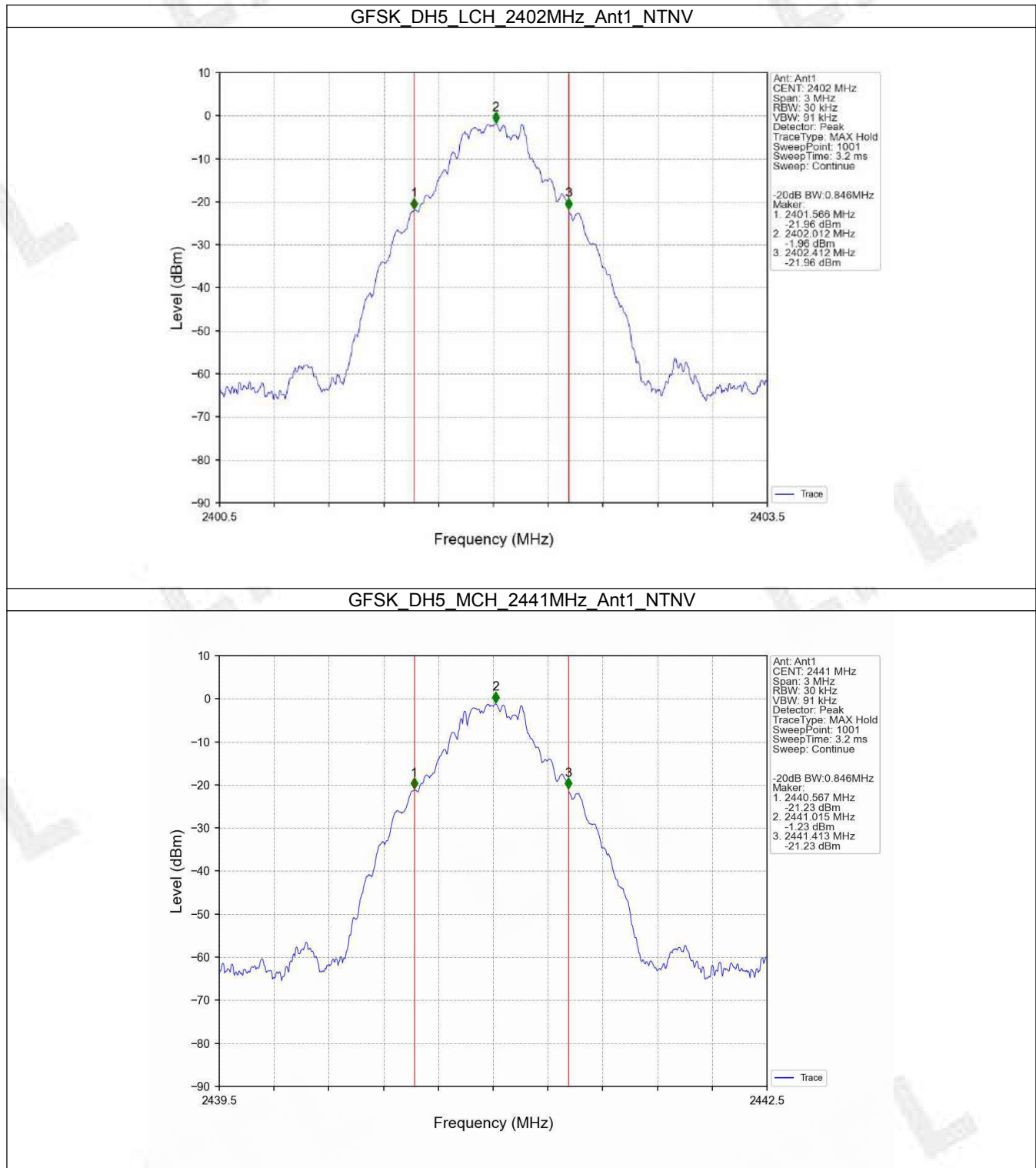
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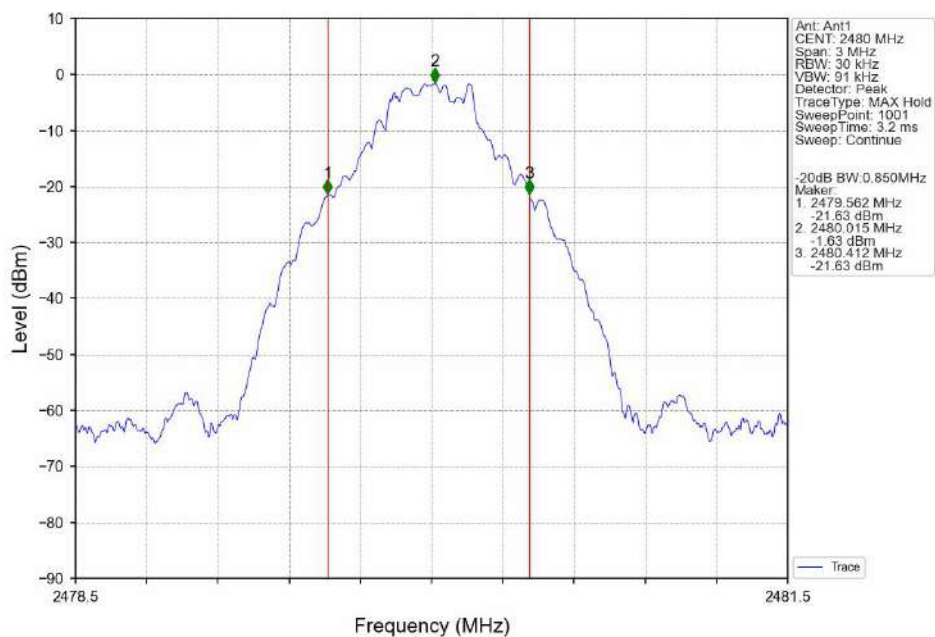


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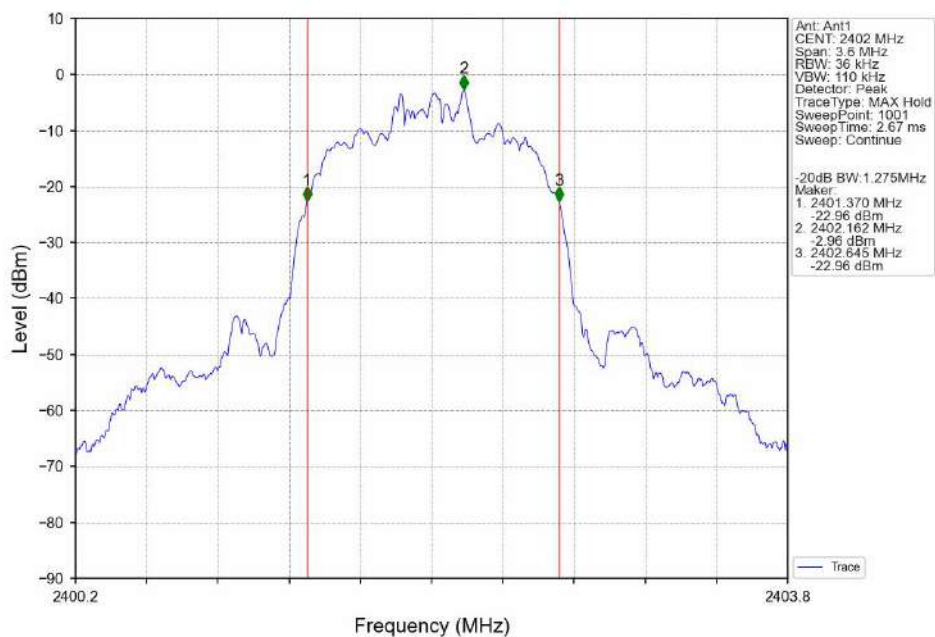
1.2.2 20dB BW

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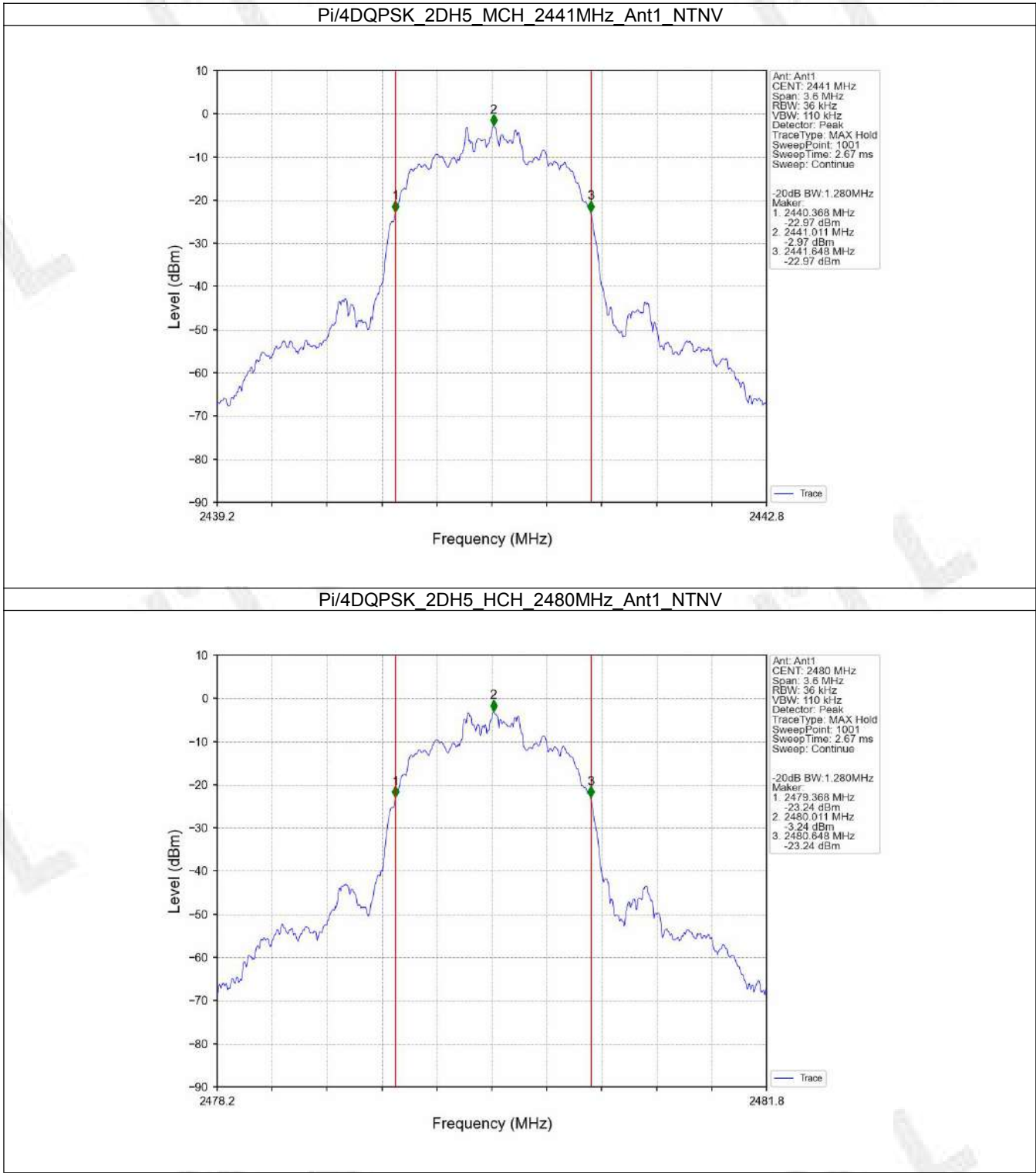
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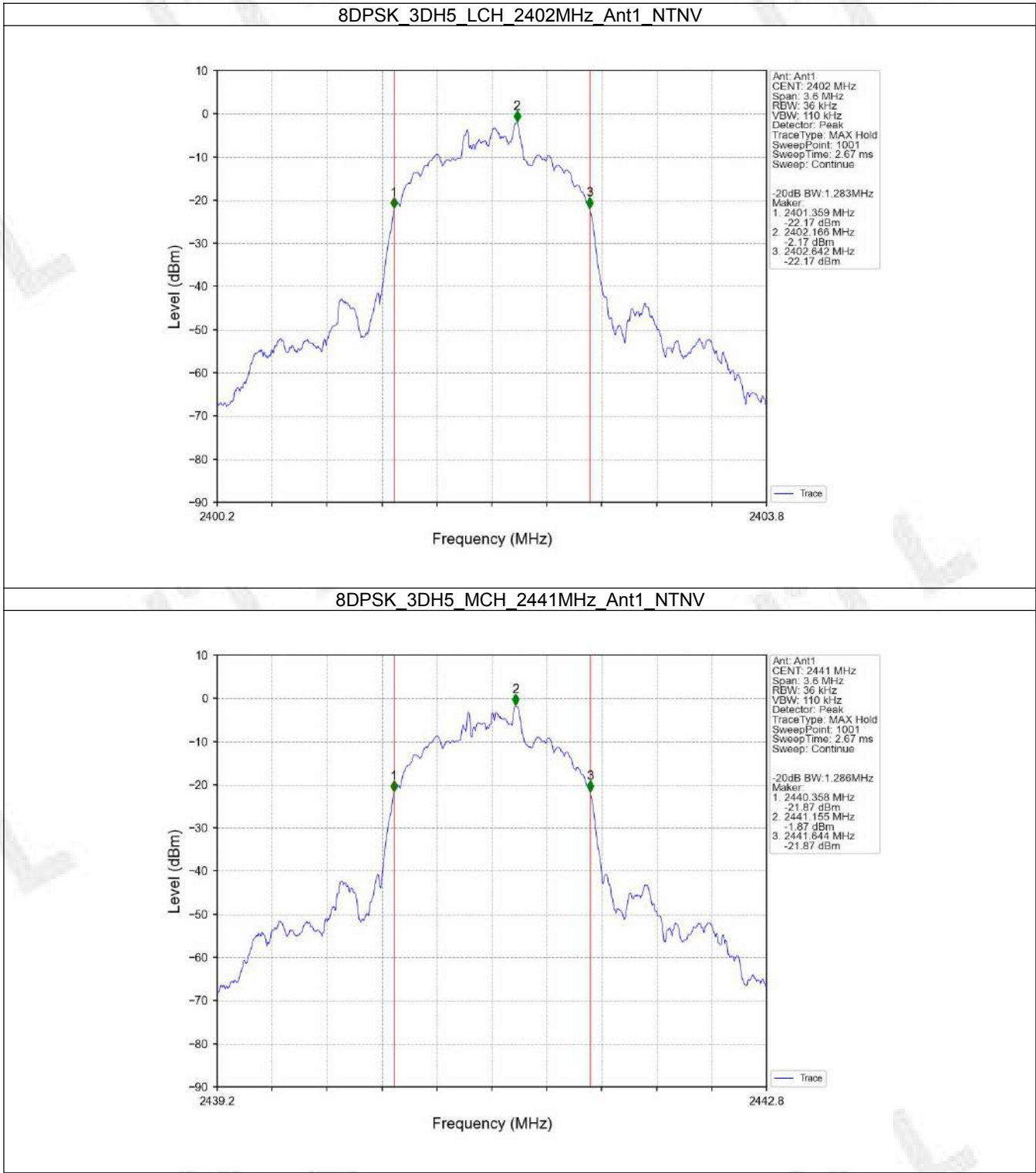
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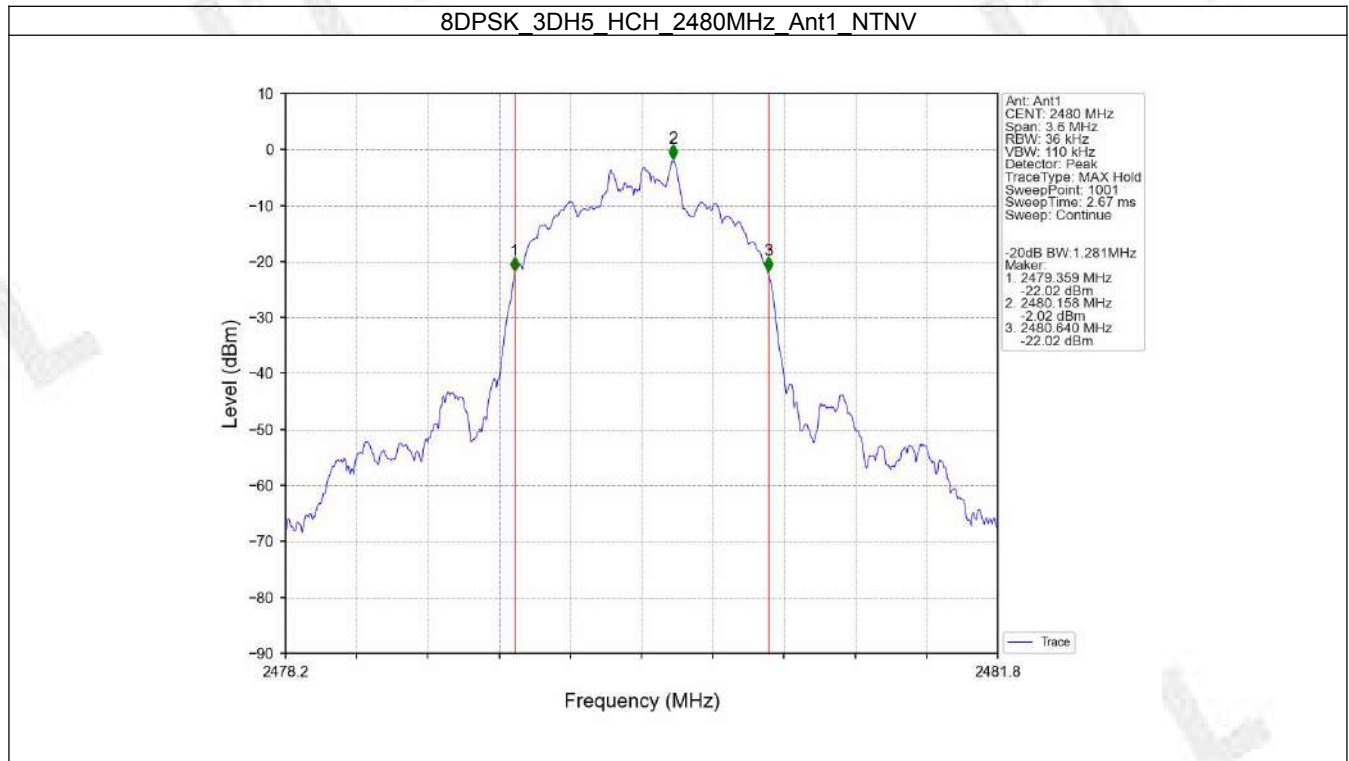
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FCC ID: 2BDI3-RUGGEDULTRA



FCC ID: 2BDI3-RUGGEDULTRA



FCC ID: 2BDI3-RUGGEDULTRA

2. Maximum Conducted Output Power**2.1 Test Result****2.1.1 Power**

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	0.48	<=30	Pass
		2441	DH5	1.24	<=30	Pass
		2480	DH5	0.88	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	-0.09	<=20.97	Pass
		2441	2DH5	0.34	<=20.97	Pass
		2480	2DH5	0.05	<=20.97	Pass
8DPSK	SISO	2402	3DH5	-0.14	<=20.97	Pass
		2441	3DH5	0.43	<=20.97	Pass
		2480	3DH5	-0.06	<=20.97	Pass

Note1: Antenna Gain: Ant1: 0.54dBi;

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3. Carrier Frequency Separation

3.1 Test Result

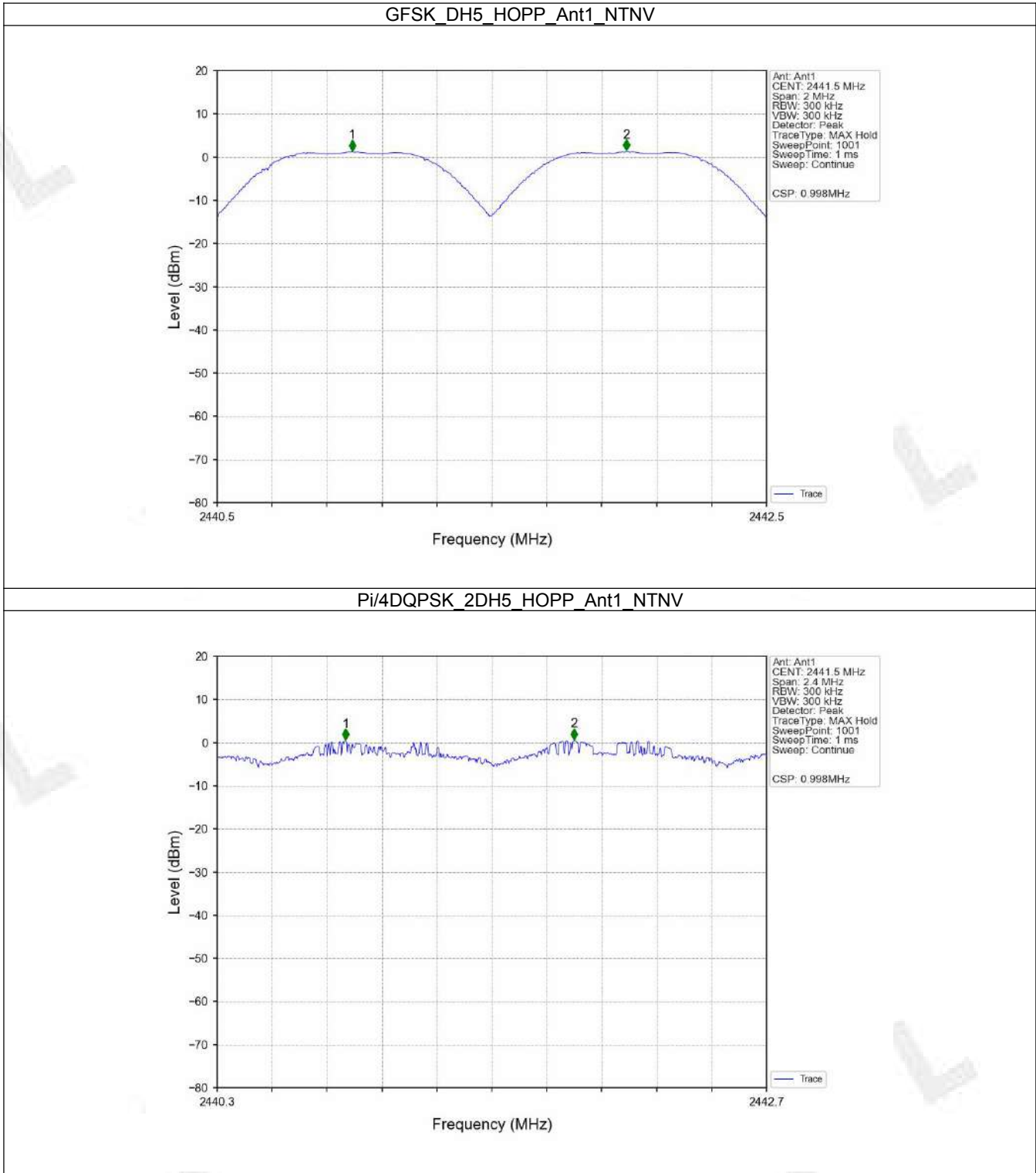
3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	0.998	0.850	≥ 0.85	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	0.998	1.280	≥ 0.853	Pass
8DPSK	SISO	HOPP	3DH5	1.003	1.286	≥ 0.857	Pass

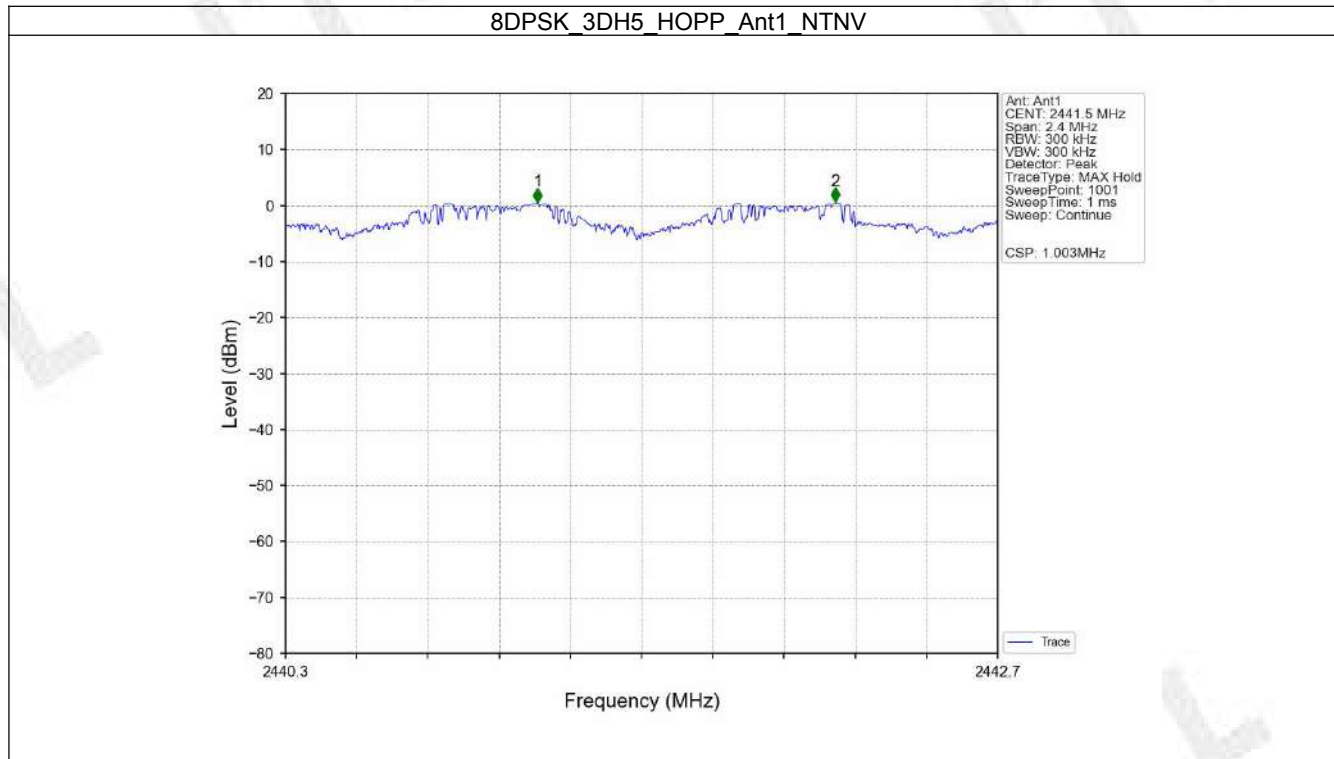
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3.2 Test Graph

3.2.1 Ant1



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4. Number of Hopping Frequencies

4.1 Test Result

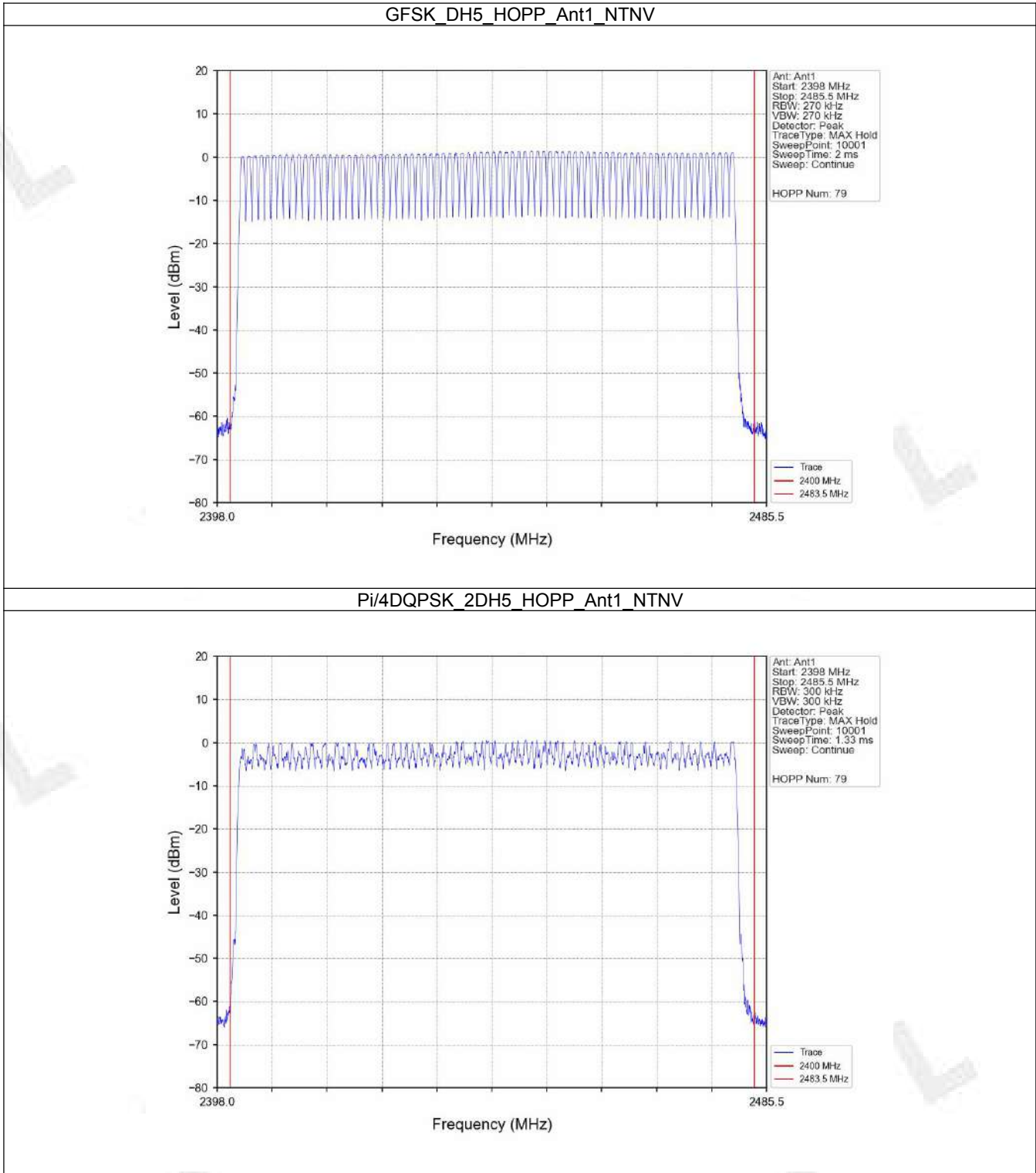
4.1.1 HoppNum

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

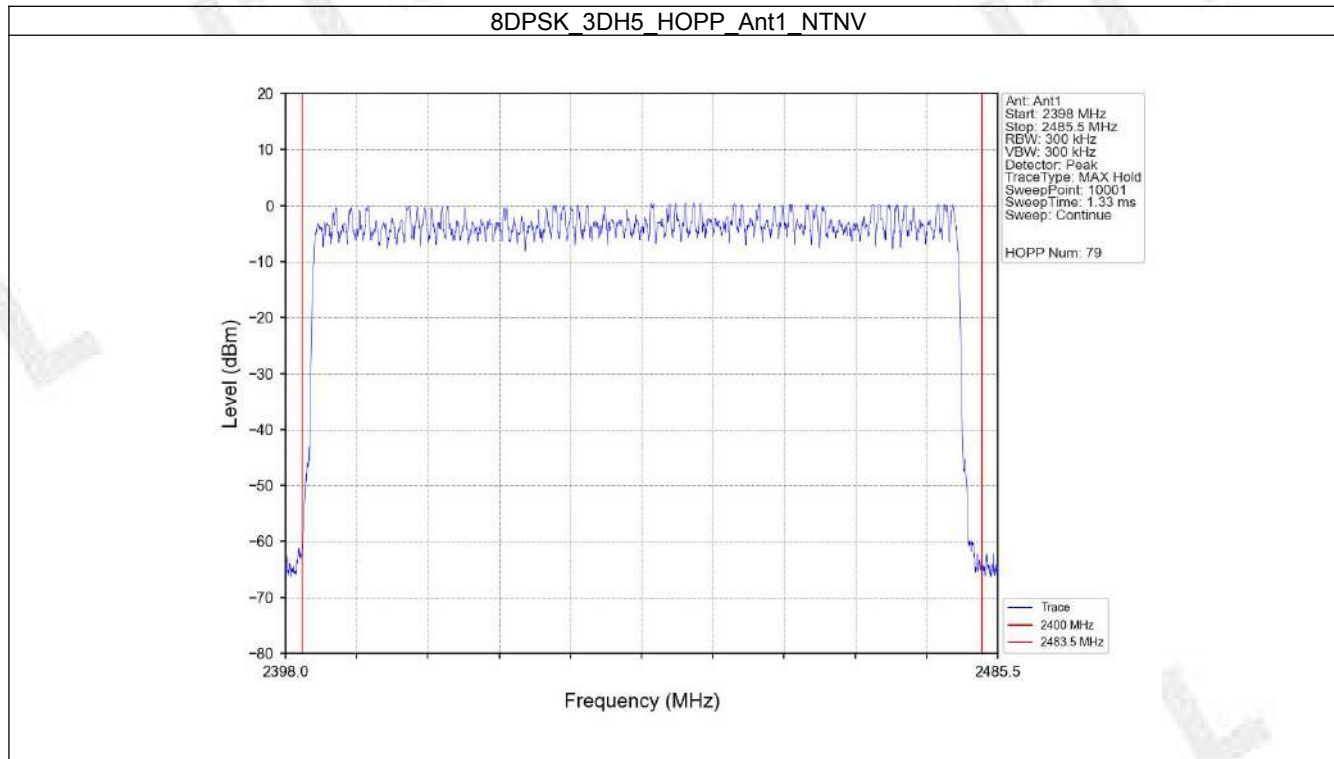
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4.2 Test Graph

4.2.1 HoppNum



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FCC ID: 2BDI3-RUGGEDULTRA

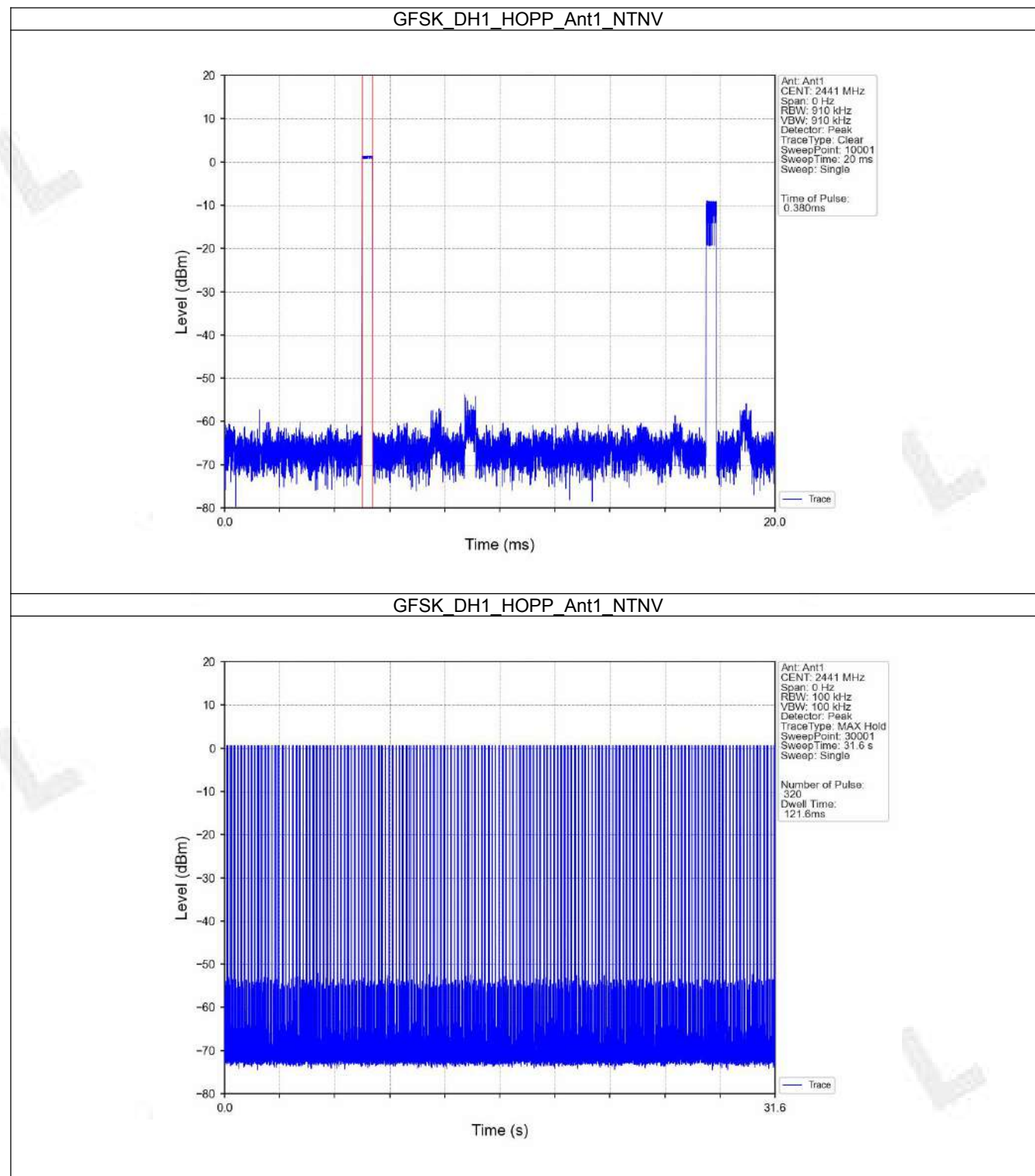
5. Time of Occupancy (Dwell Time)**5.1 Test Result****5.1.1 Ant1**

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	0.380	31.600	320	121.600	<=400	Pass
			DH3	1.648	31.600	161	265.328	<=400	Pass
			DH5	2.894	31.600	99	286.506	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.396	31.600	319	126.324	<=400	Pass
			2DH3	1.650	31.600	159	262.350	<=400	Pass
			2DH5	2.898	31.600	107	310.086	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.390	31.600	319	124.410	<=400	Pass
			3DH3	1.648	31.600	161	265.328	<=400	Pass
			3DH5	2.900	31.600	117	339.300	<=400	Pass

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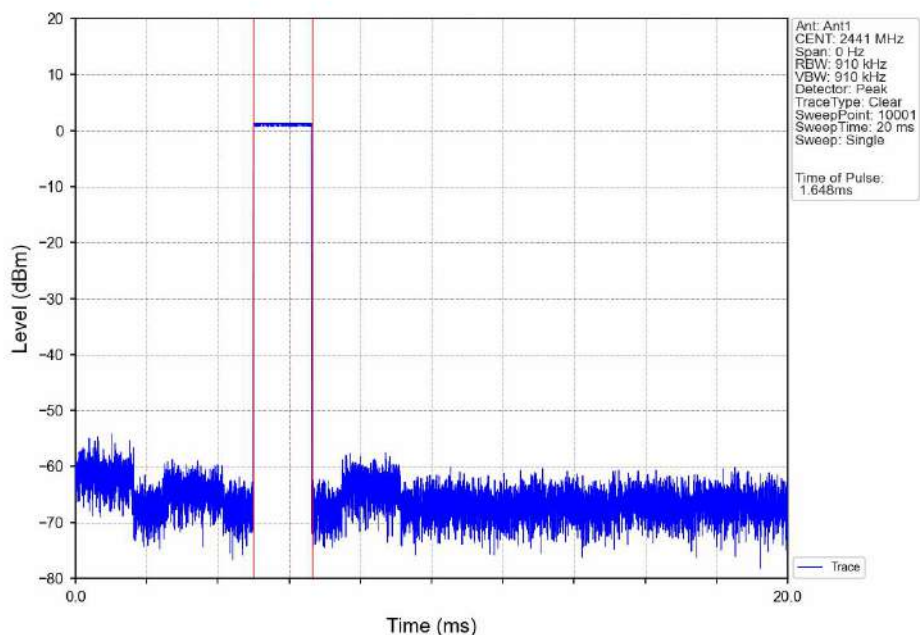
5.2 Test Graph

5.2.1 Ant1

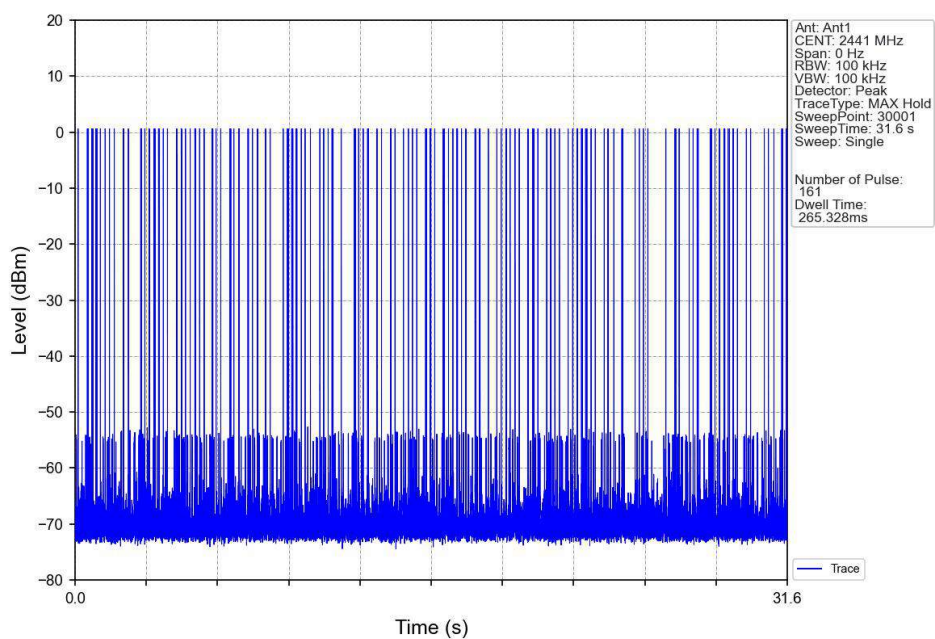


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GFSK_DH3_HOPP_Ant1_NTNV

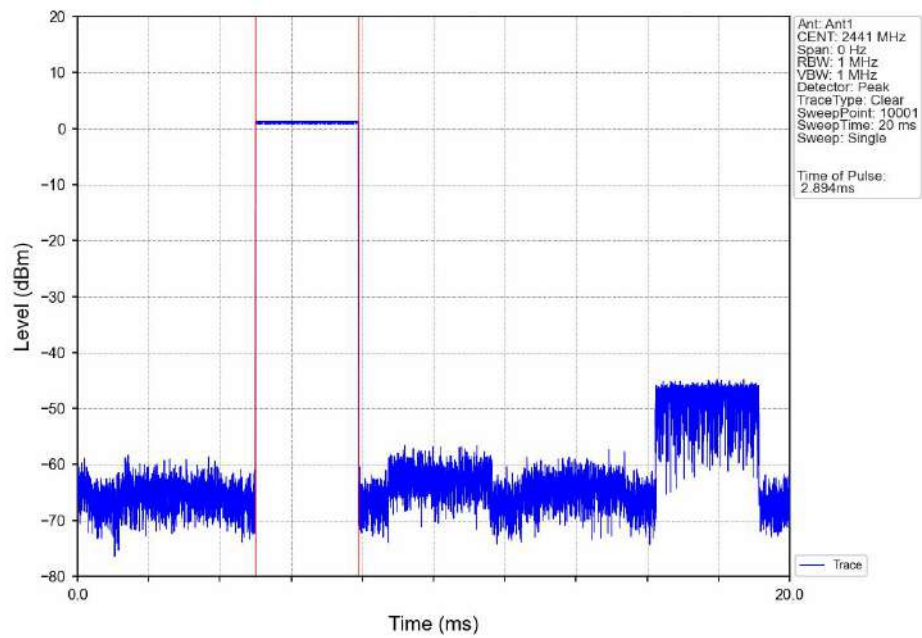


GFSK_DH3_HOPP_Ant1_NTNV

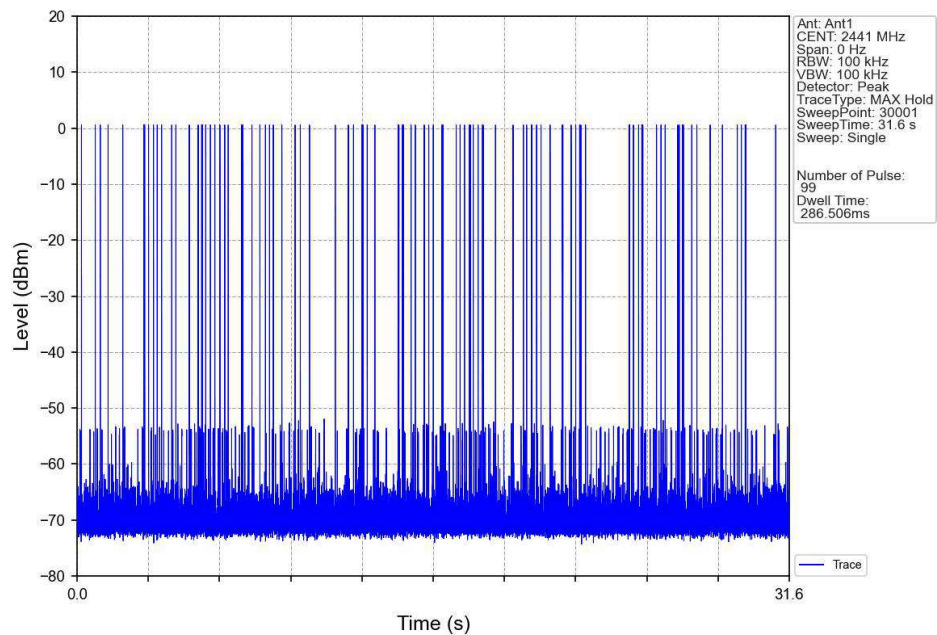


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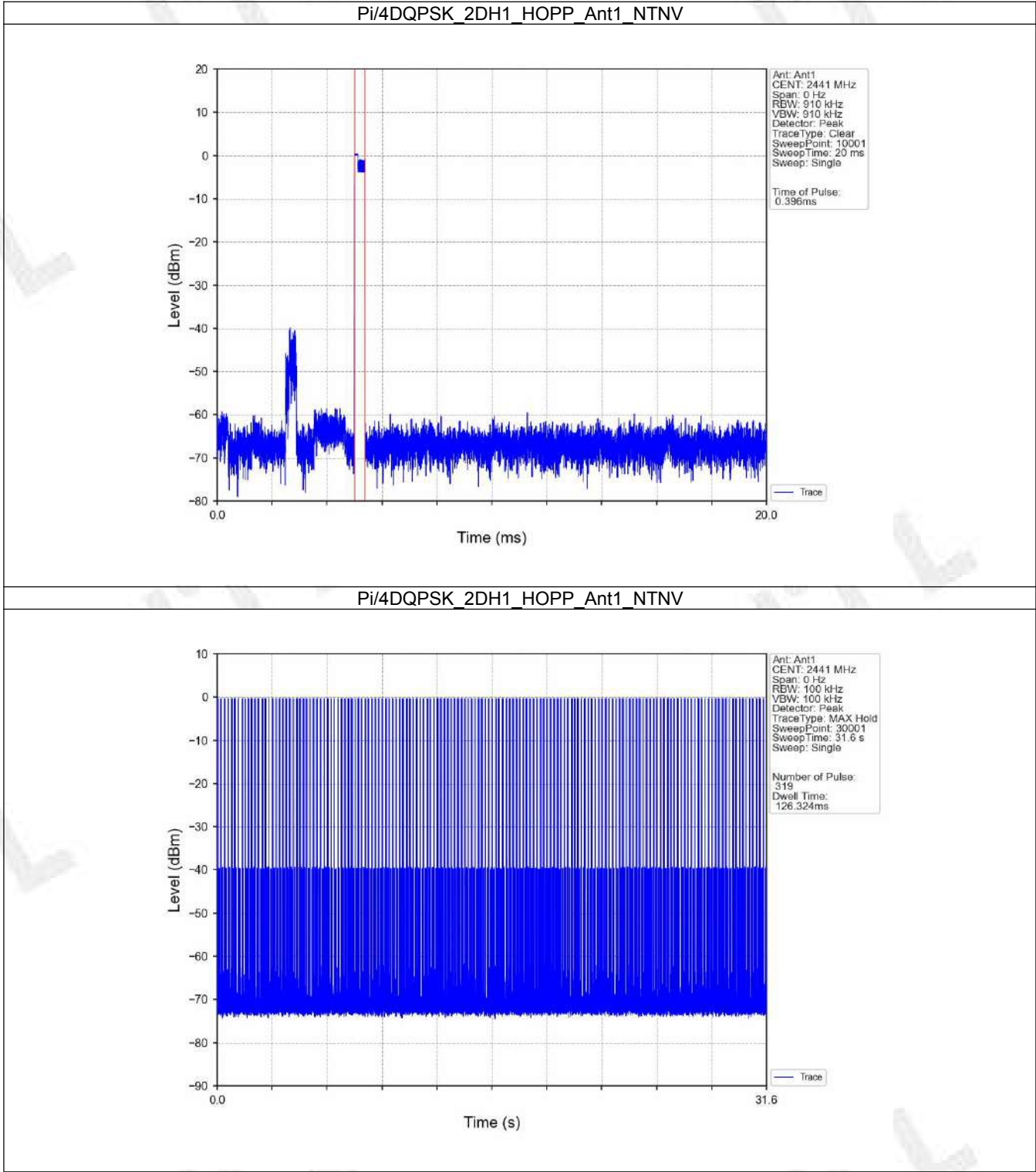
GFSK_DH5_HOPP_Ant1_NTNV



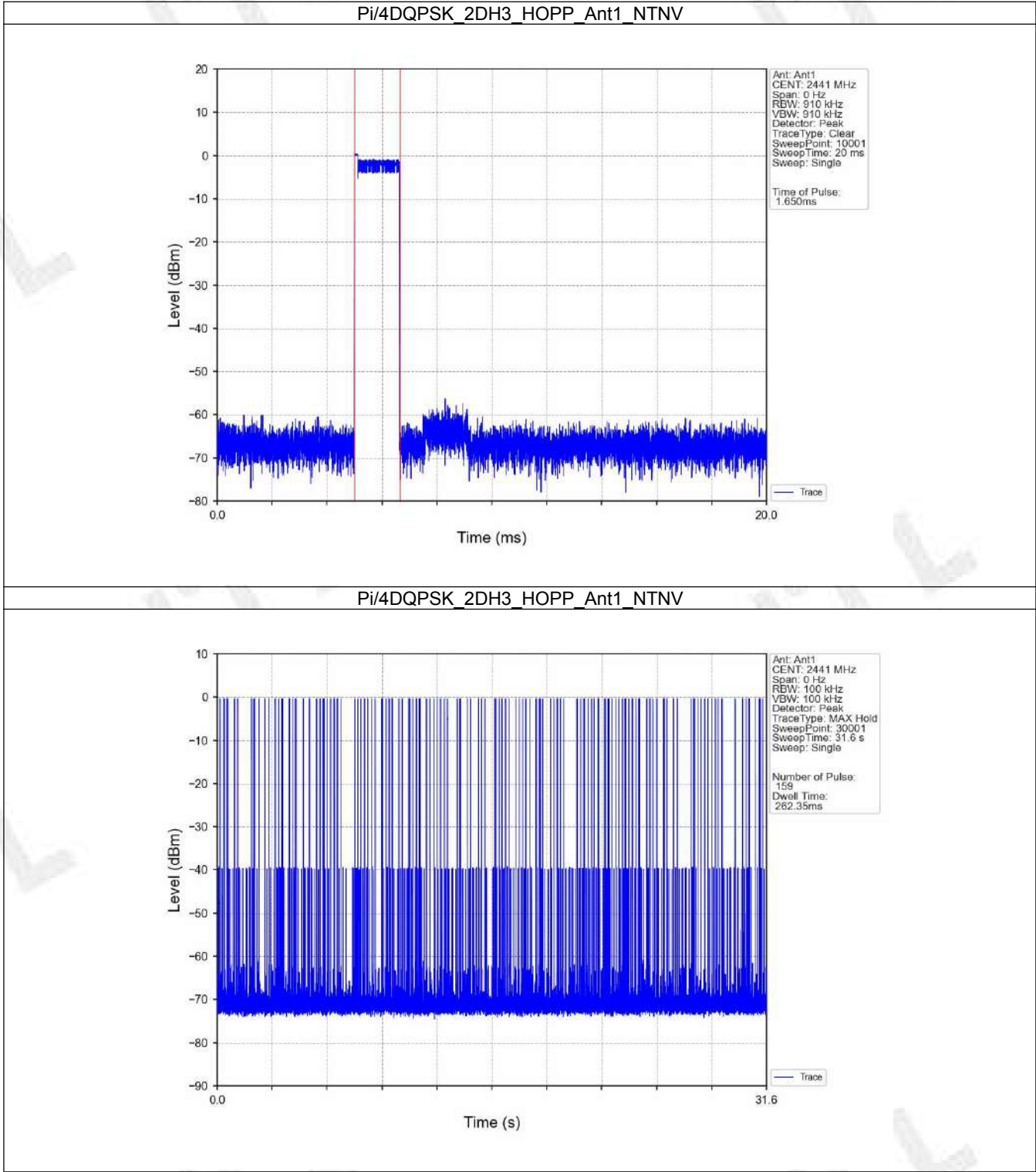
GFSK_DH5_HOPP_Ant1_NTNV



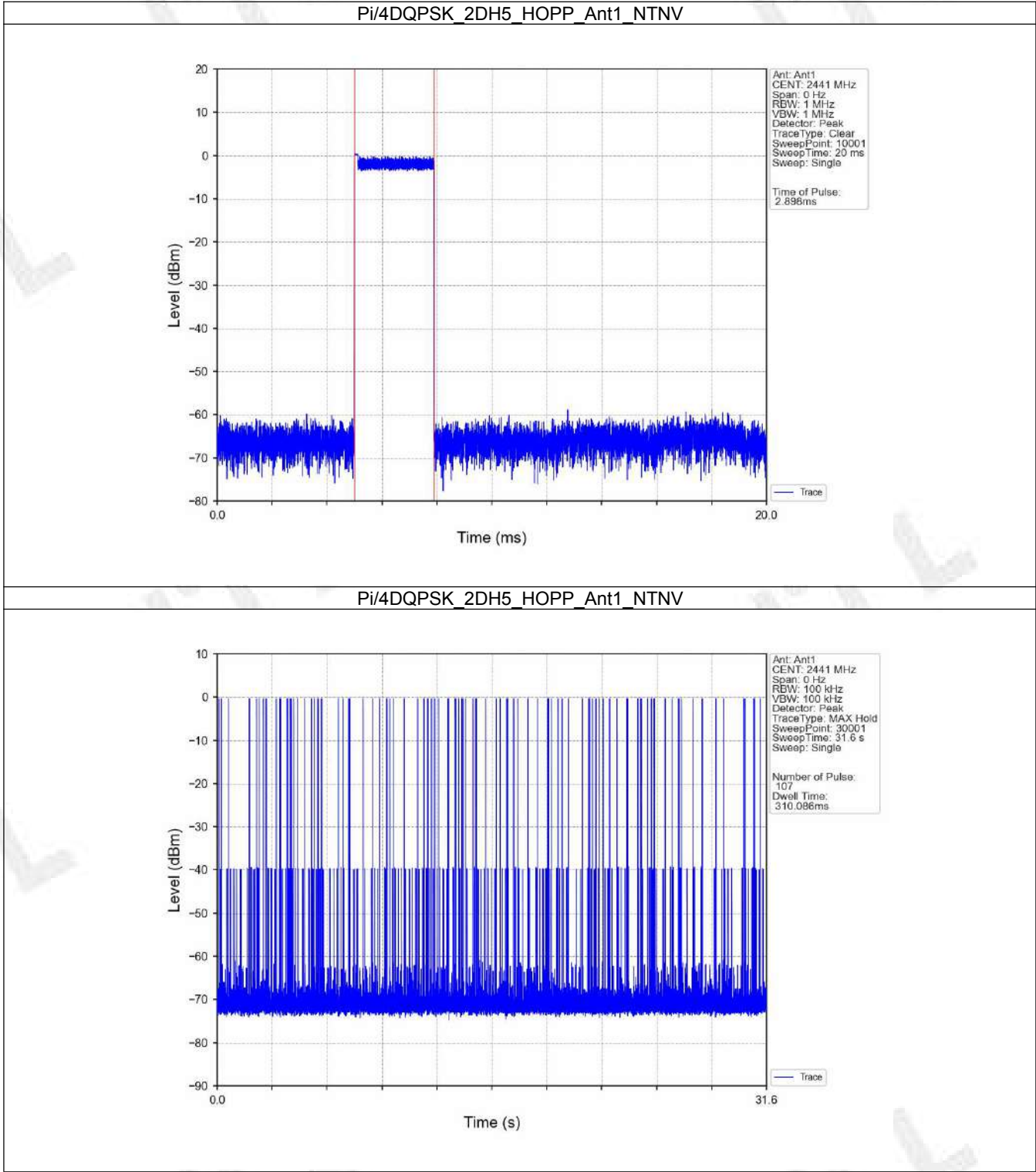
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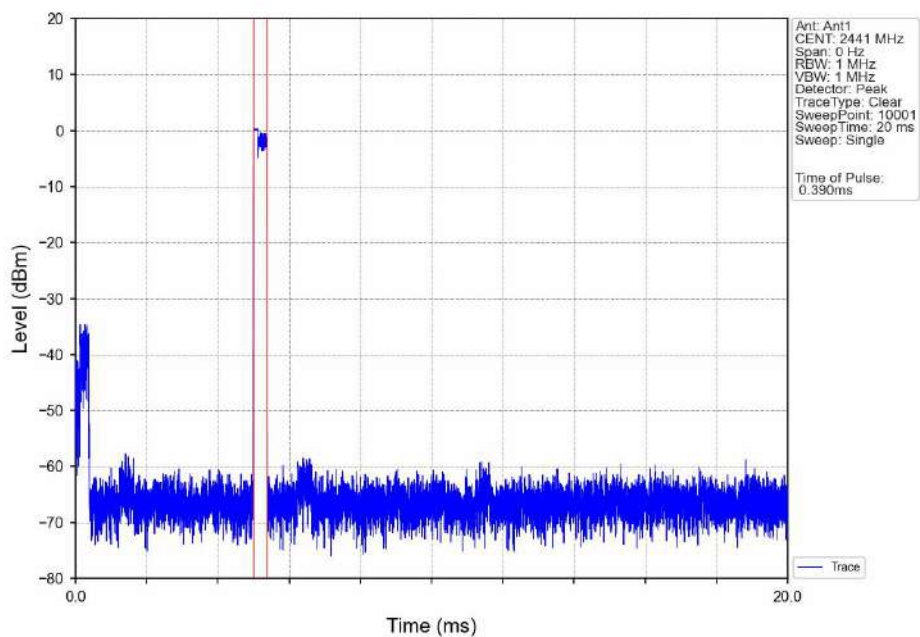


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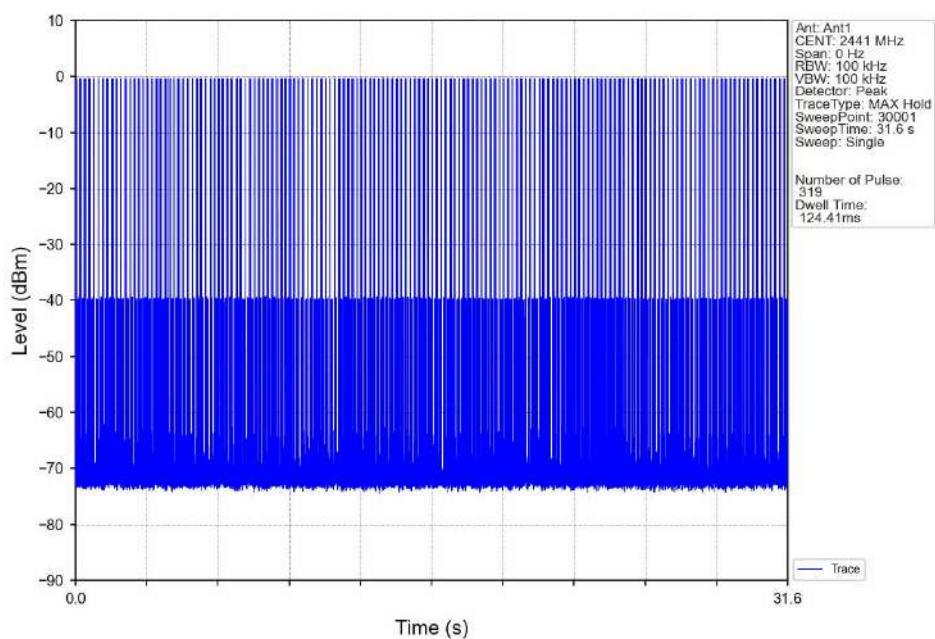


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8DPSK_3DH1_HOPP_Ant1_NTNV

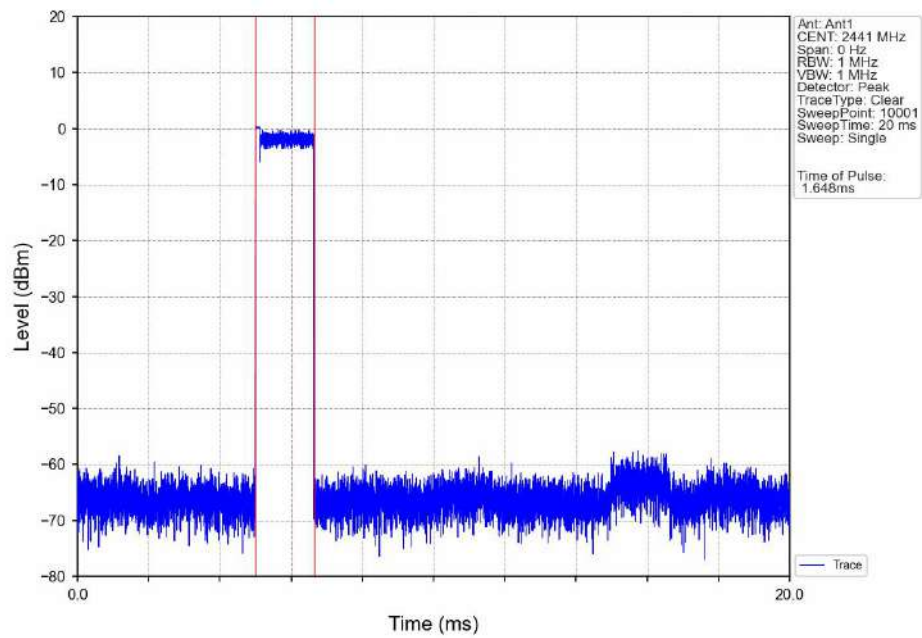


8DPSK_3DH1_HOPP_Ant1_NTNV

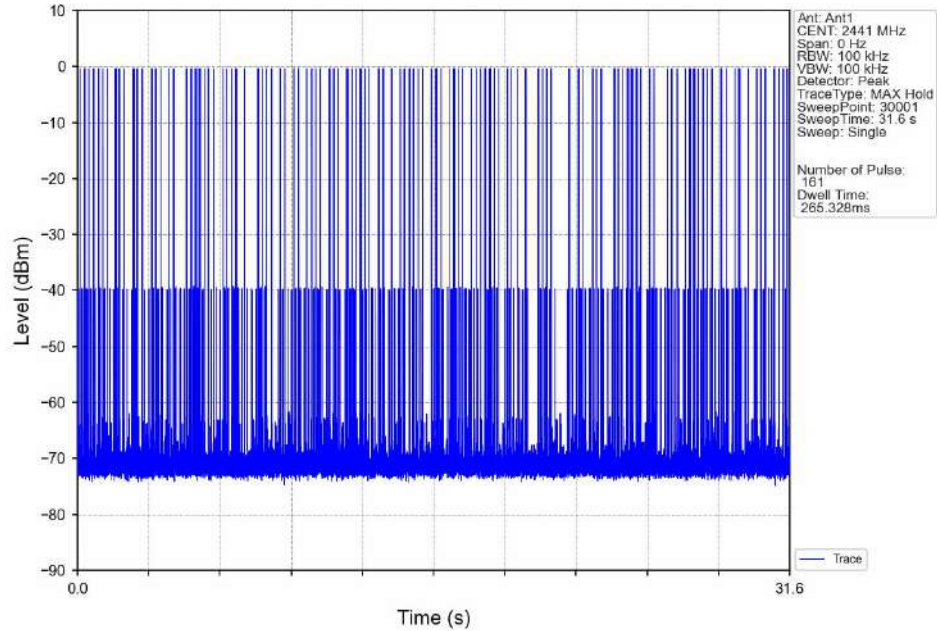


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8DPSK_3DH3_HOPP_Ant1_NTNV

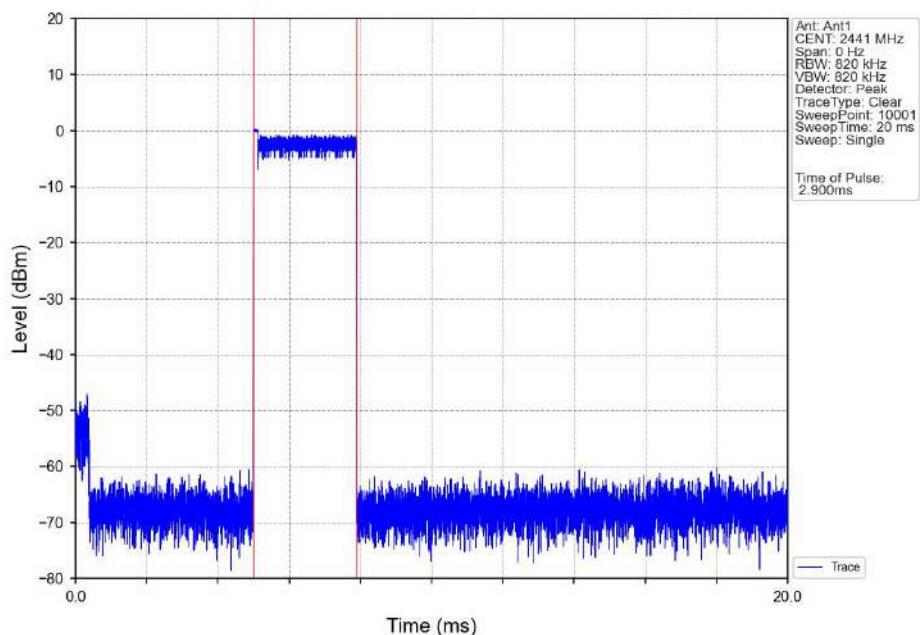


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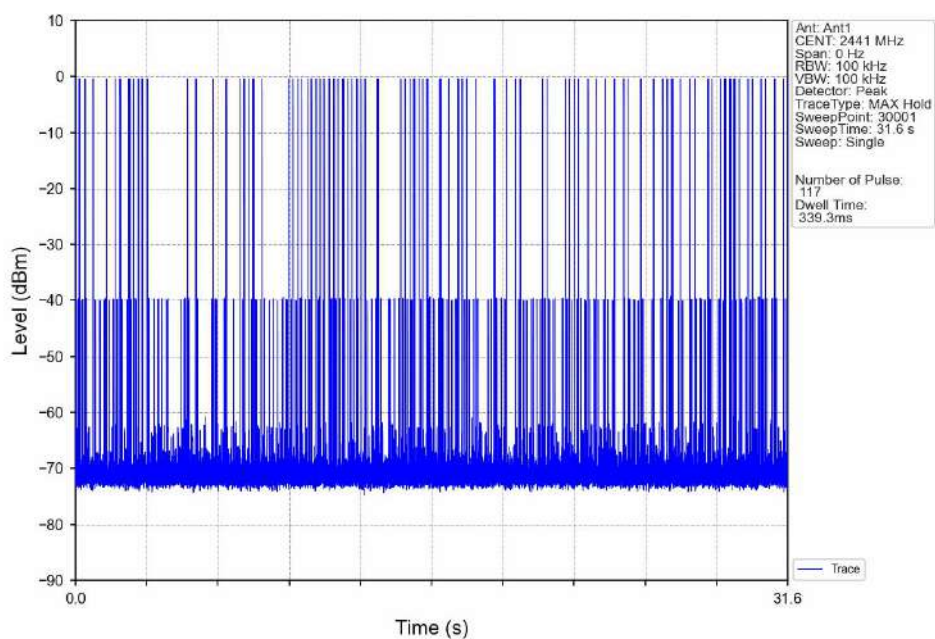


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8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



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6. Unwanted Emissions In Non-restricted Frequency Bands**6.1 Test Result****6.1.1 Ref**

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	0.12
		2441	DH5	1	0.88
		2480	DH5	1	0.51
Pi/4DQPSK	SISO	2402	2DH5	1	-0.41
		2441	2DH5	1	0.05
		2480	2DH5	1	-0.23
8DPSK	SISO	2402	3DH5	1	-0.32
		2441	3DH5	1	0.26
		2480	3DH5	1	-0.26

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.

6.1.2 CSE

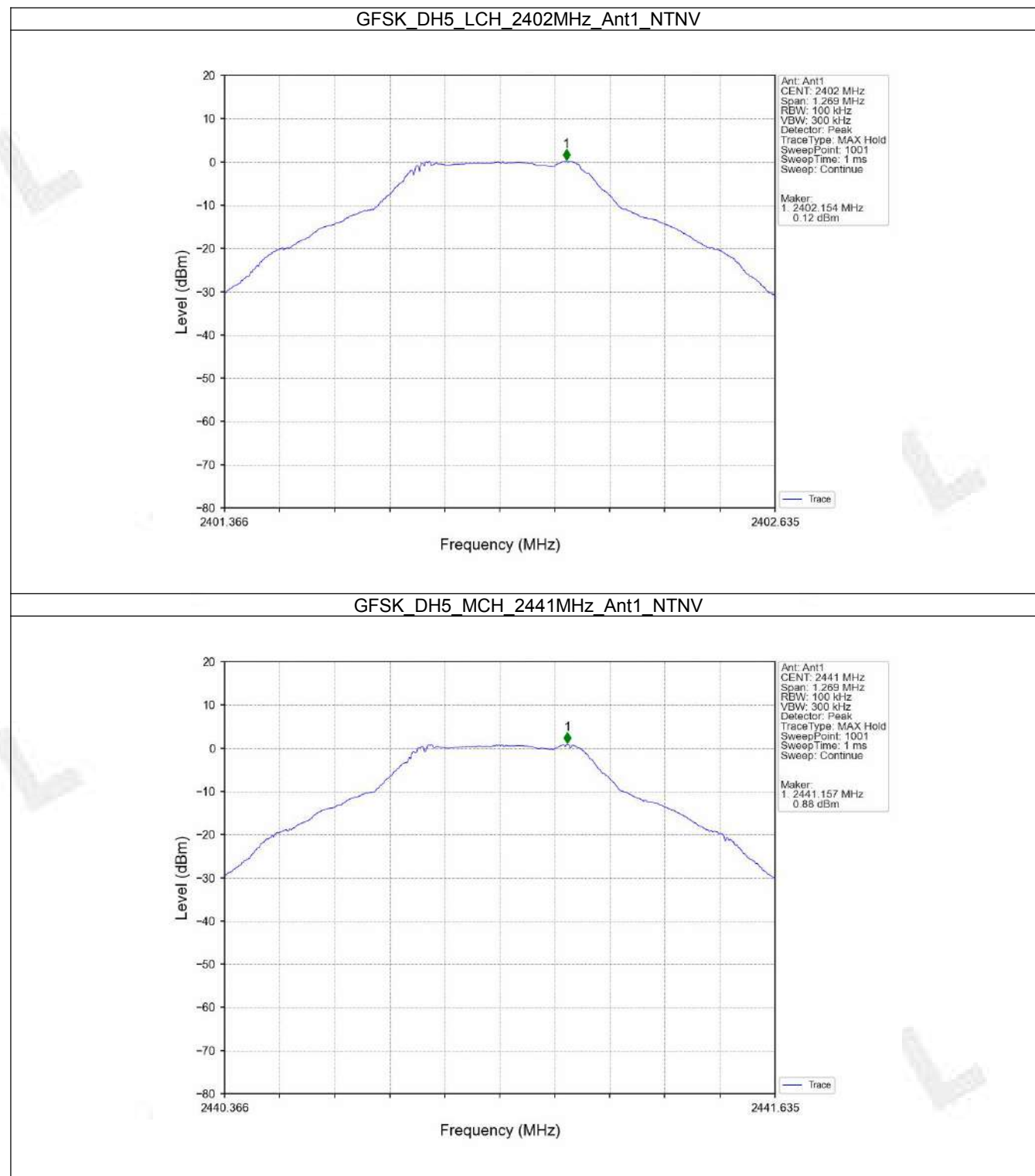
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	0.88	-19.12	Pass
		2441	DH5	1	0.88	-19.12	Pass
		2480	DH5	1	0.88	-19.12	Pass
		HOPP	DH5	1	0.88	-19.12	Pass
					0.88	-19.12	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	0.05	-19.95	Pass
		2441	2DH5	1	0.05	-19.95	Pass
		2480	2DH5	1	0.05	-19.95	Pass
		HOPP	2DH5	1	0.05	-19.95	Pass
					0.05	-19.95	Pass
8DPSK	SISO	2402	3DH5	1	0.26	-19.74	Pass
		2441	3DH5	1	0.26	-19.74	Pass
		2480	3DH5	1	0.26	-19.74	Pass
		HOPP	3DH5	1	0.26	-19.74	Pass
					0.26	-19.74	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.

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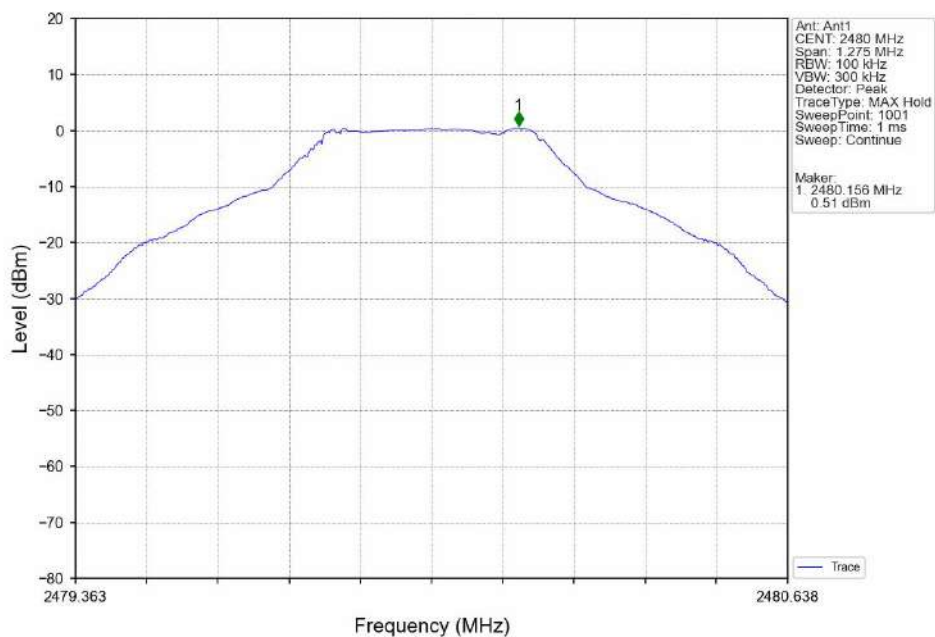
6.2 Test Graph

6.2.1 Ref

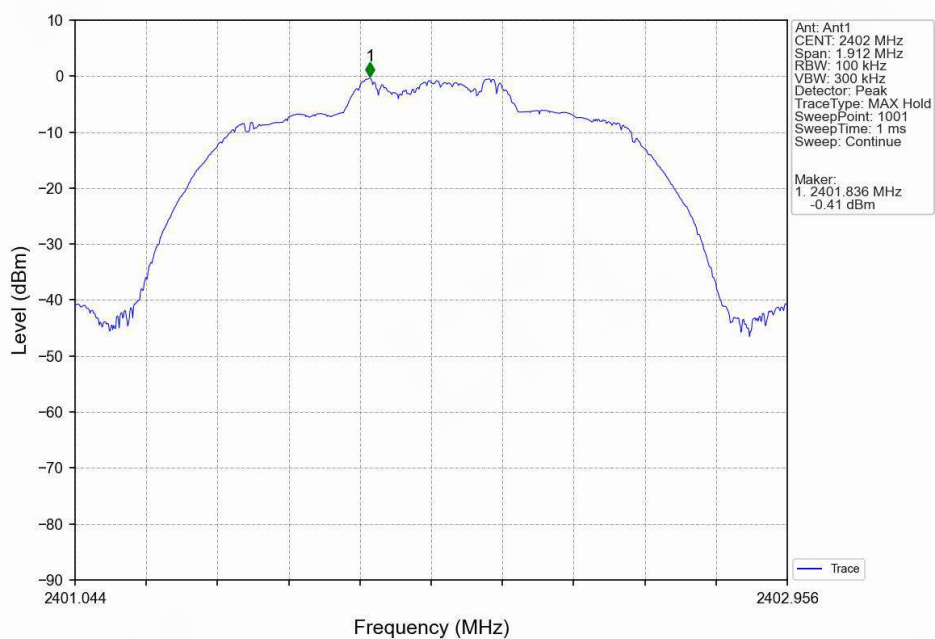


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GFSK DH5_HCH_2480MHz_Ant1_NTNV

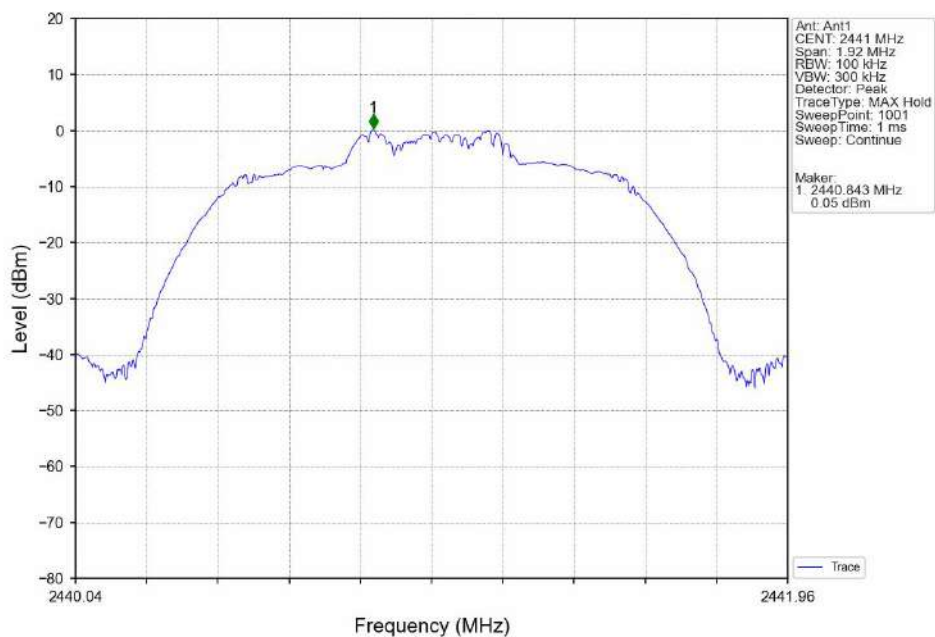


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

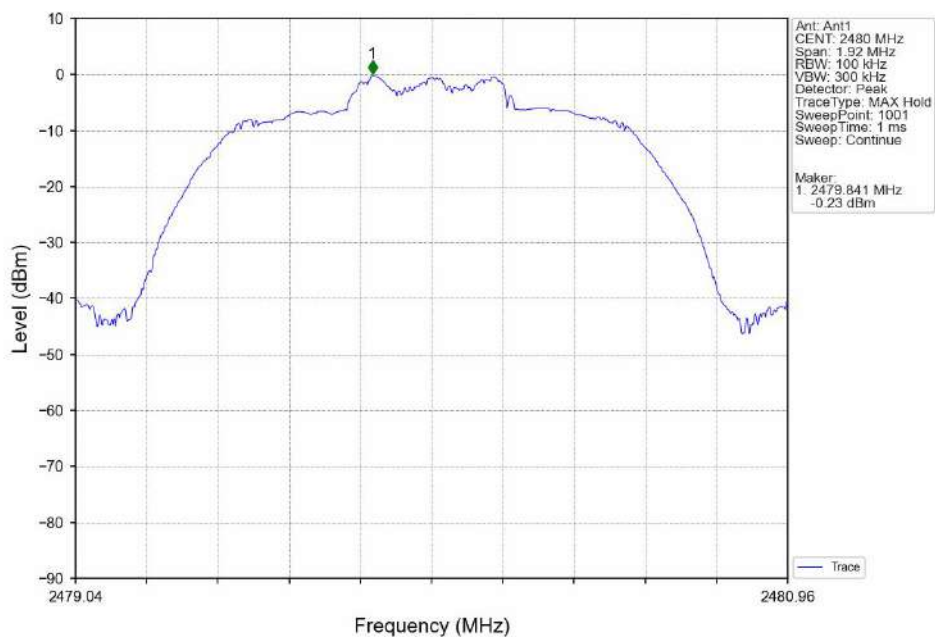


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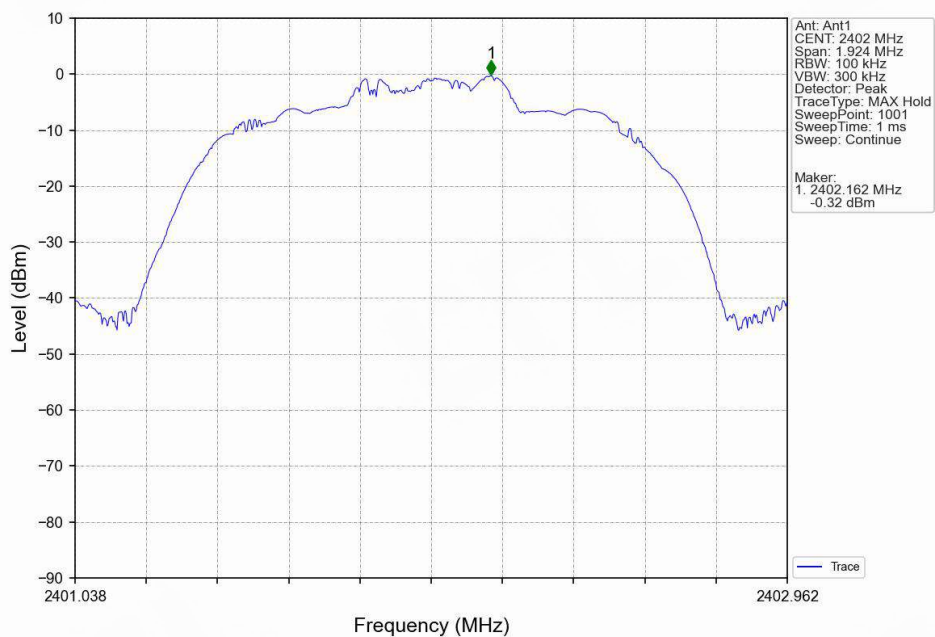


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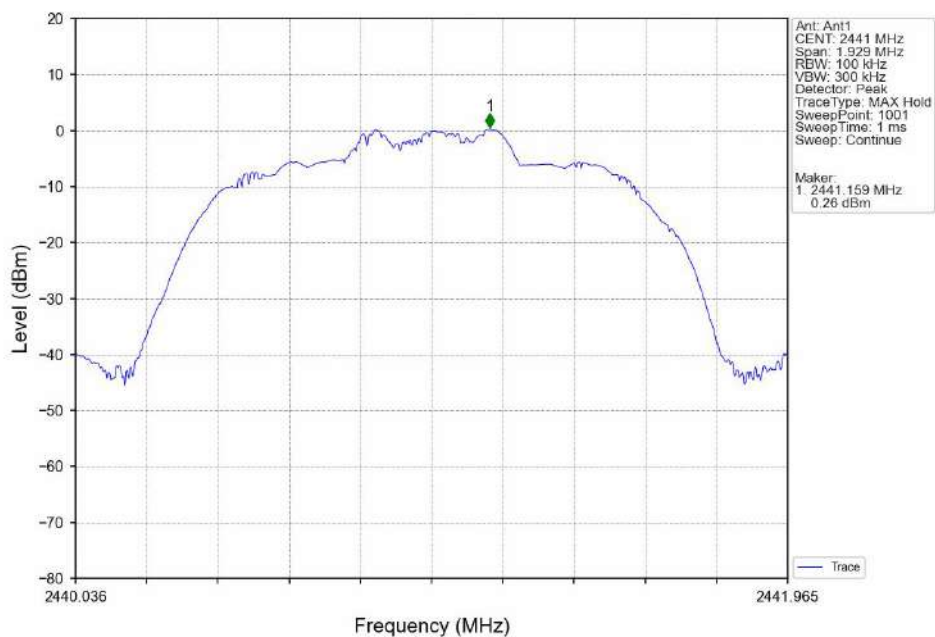


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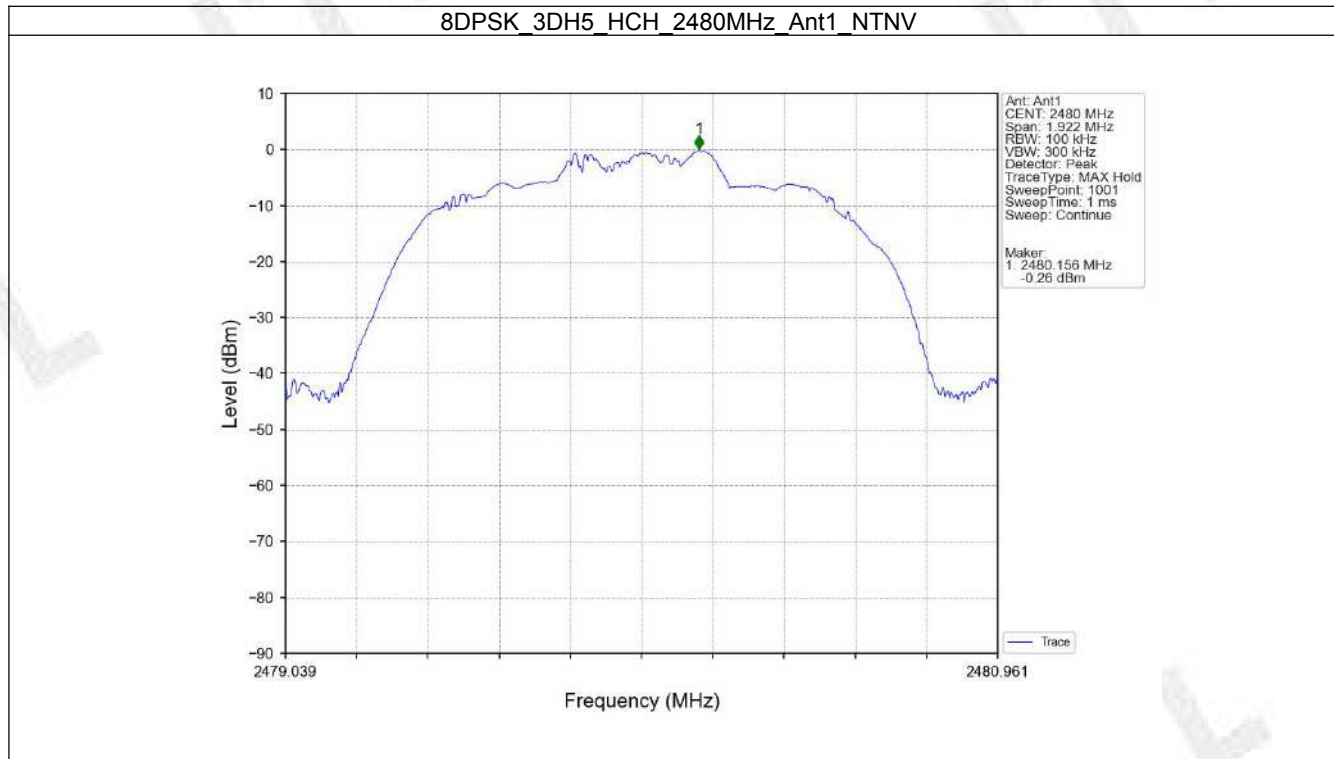
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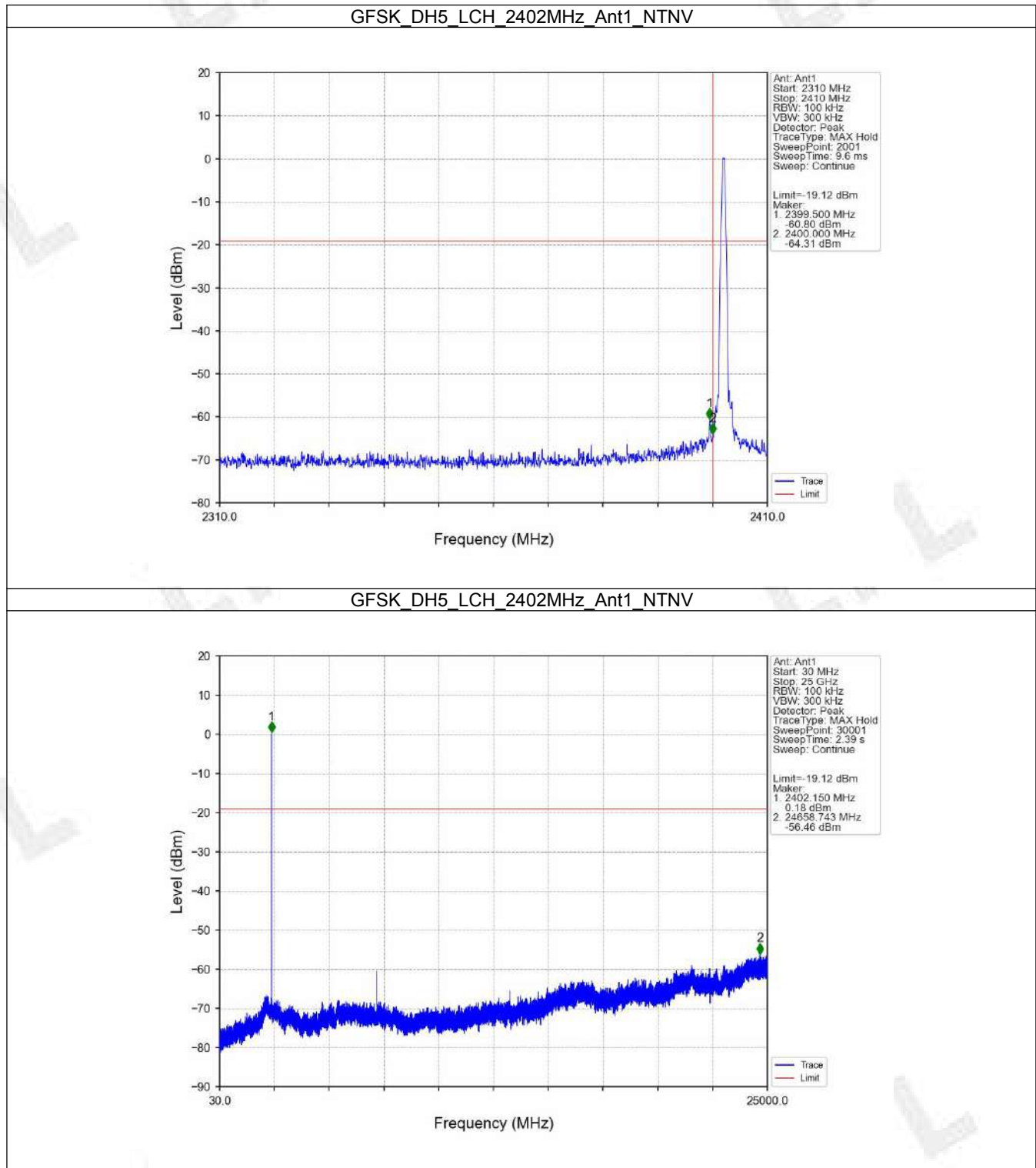
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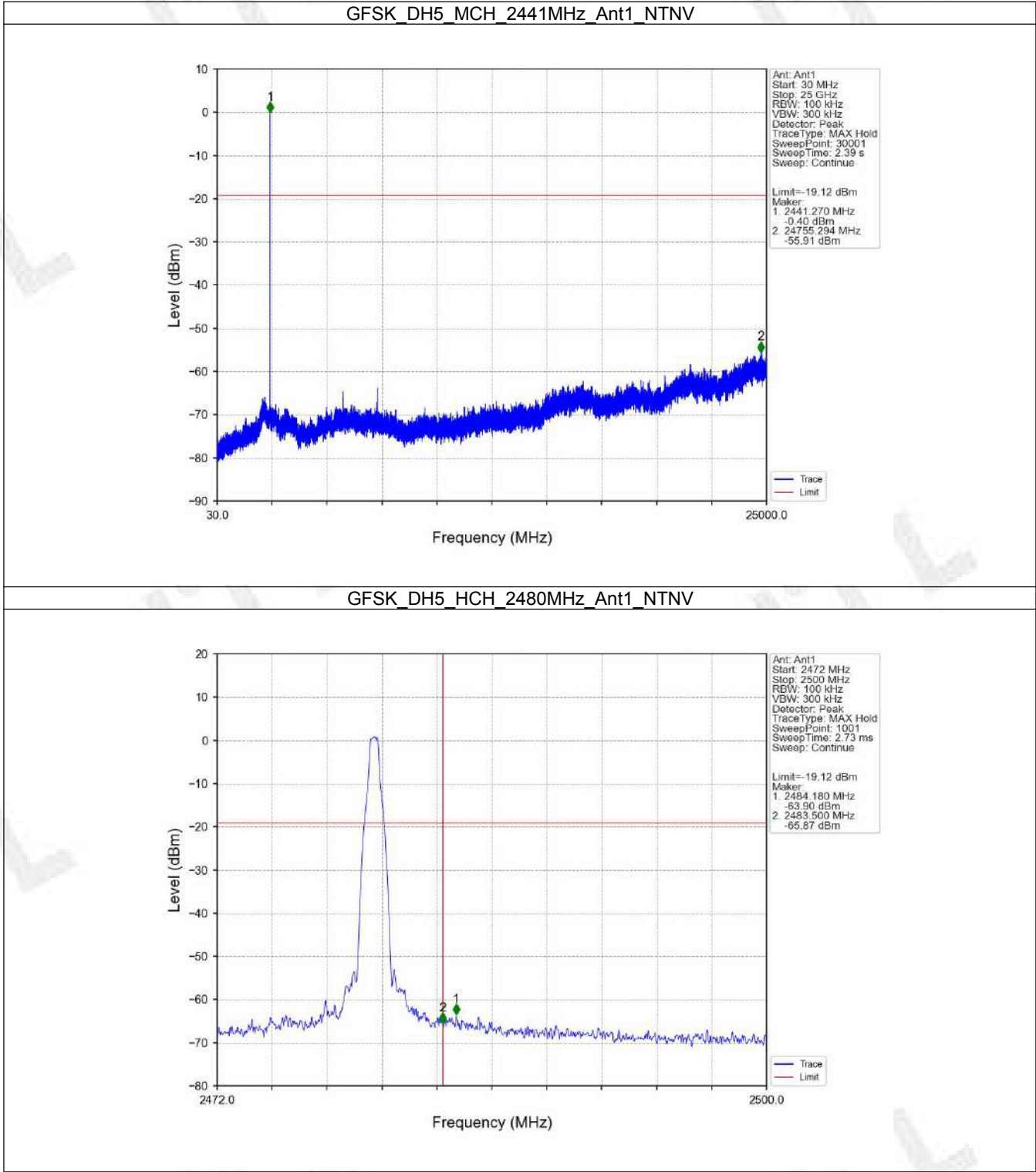
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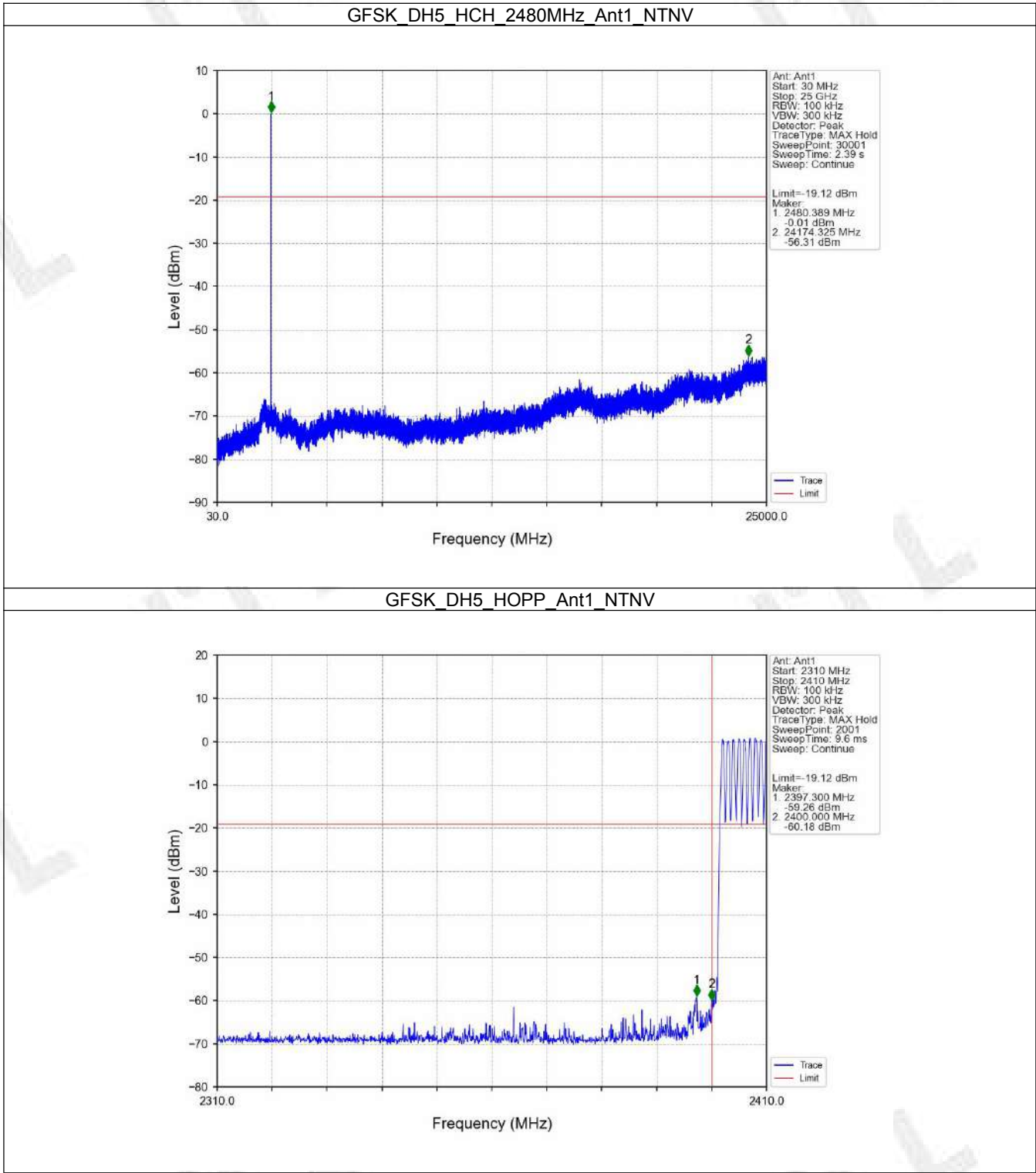
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6.2.2 CSE

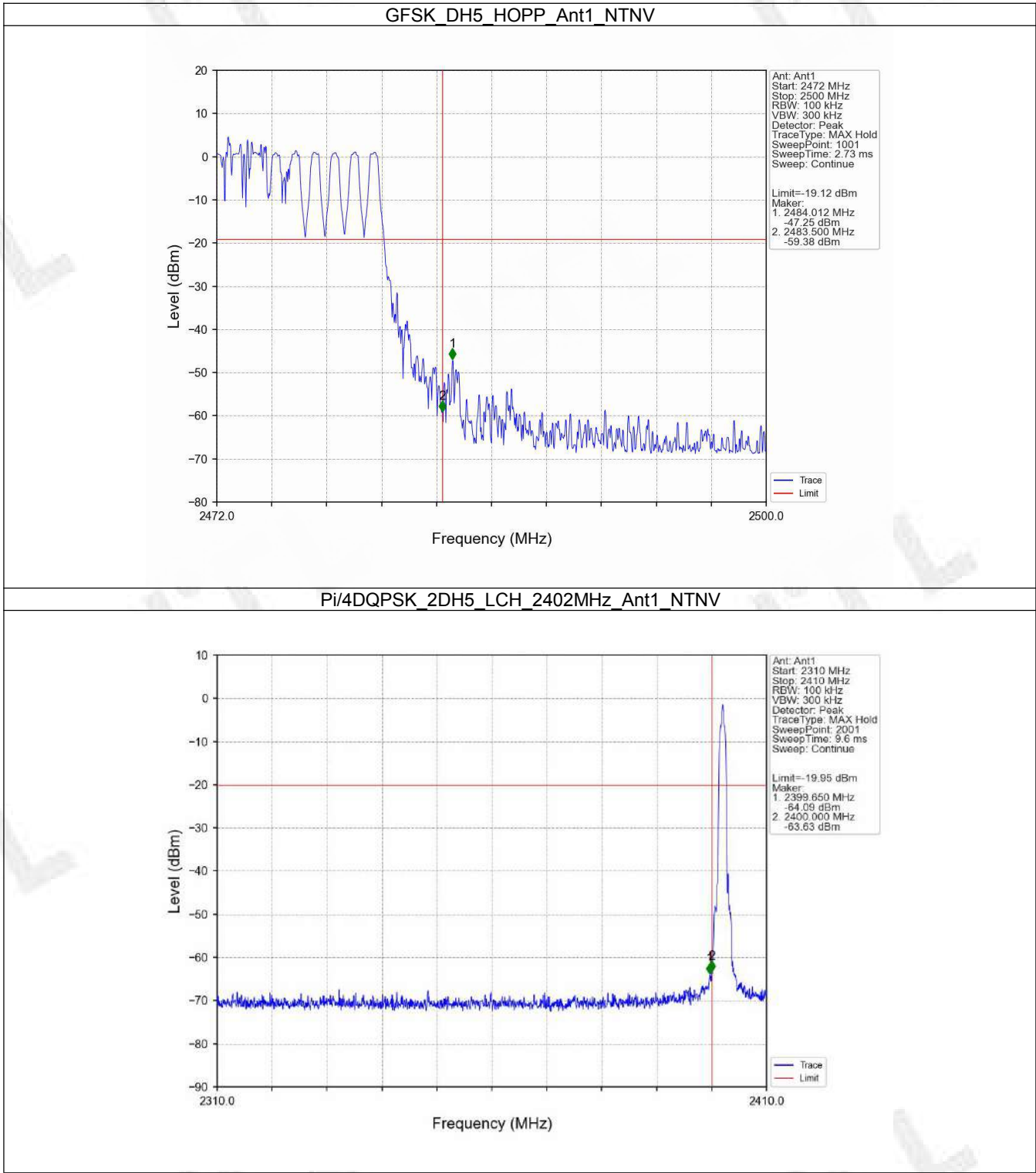
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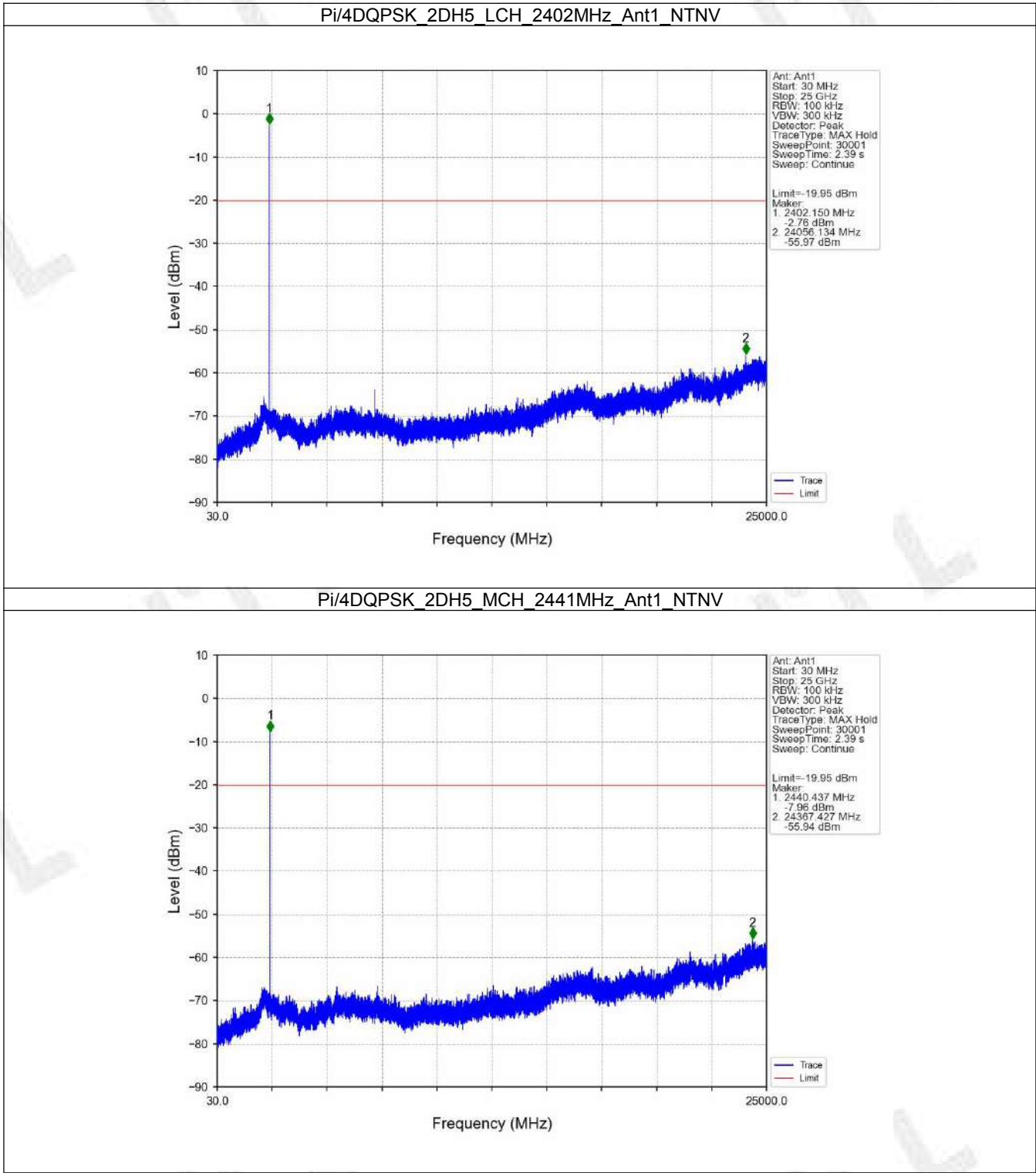
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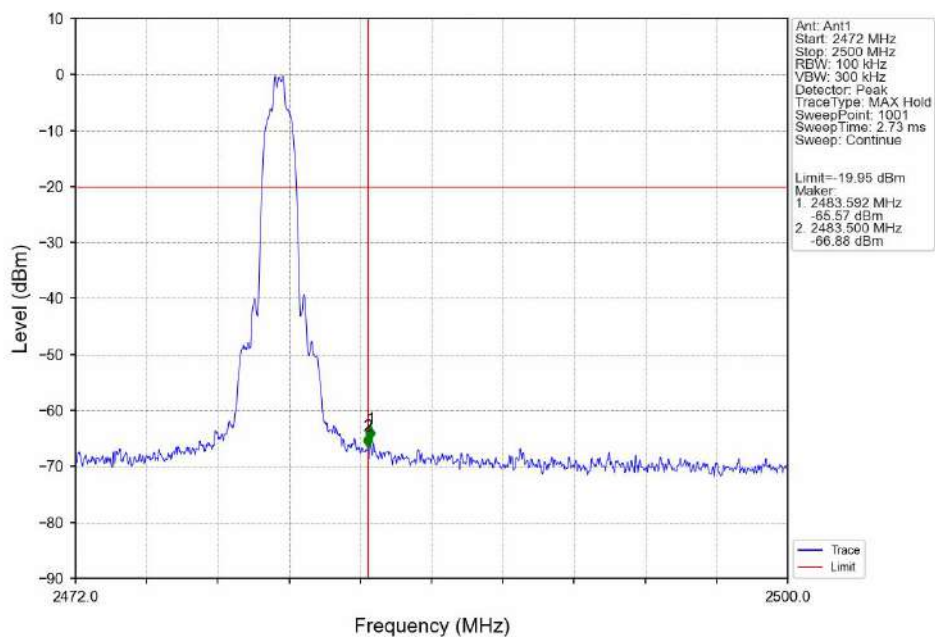


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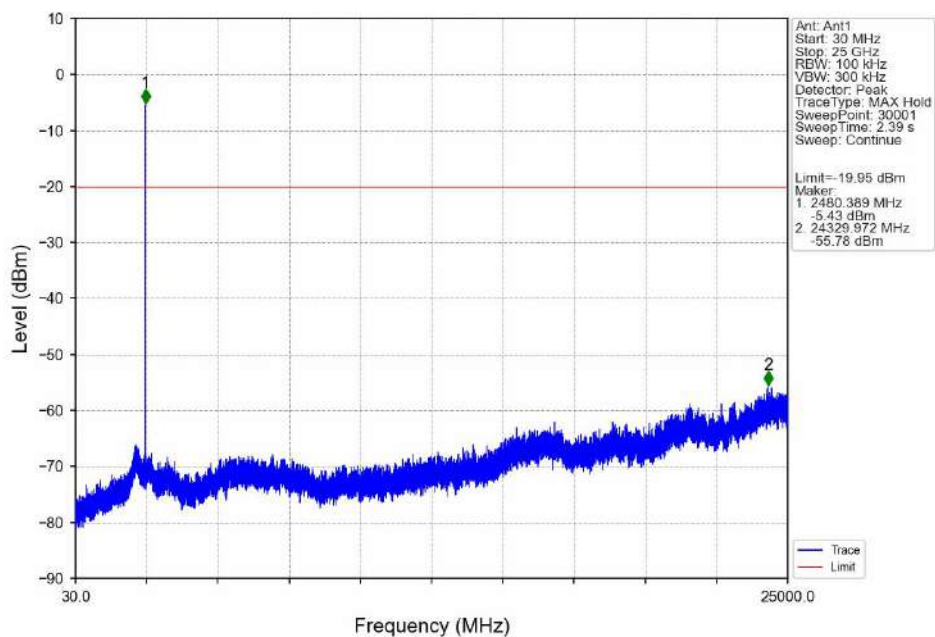


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Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

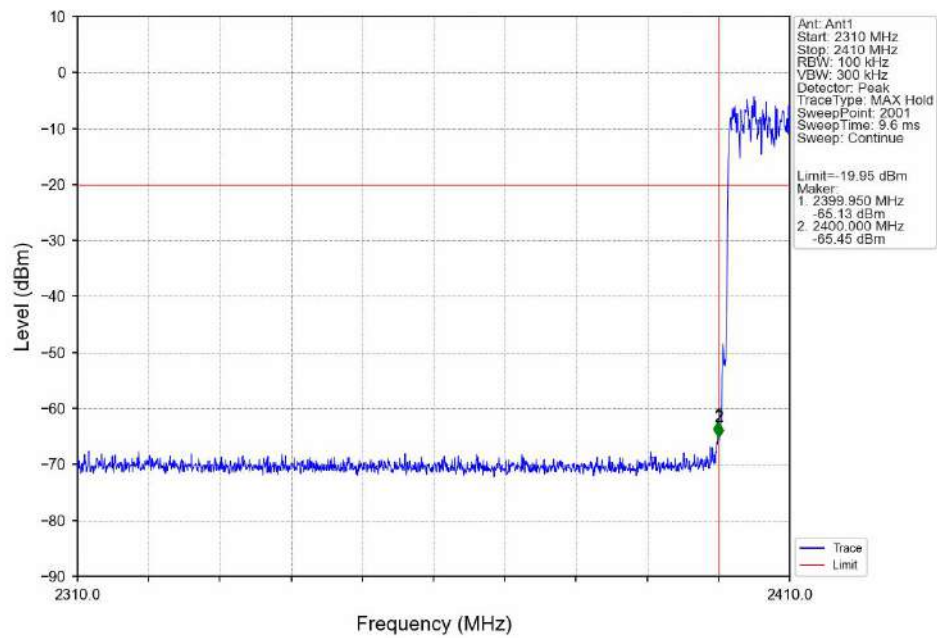


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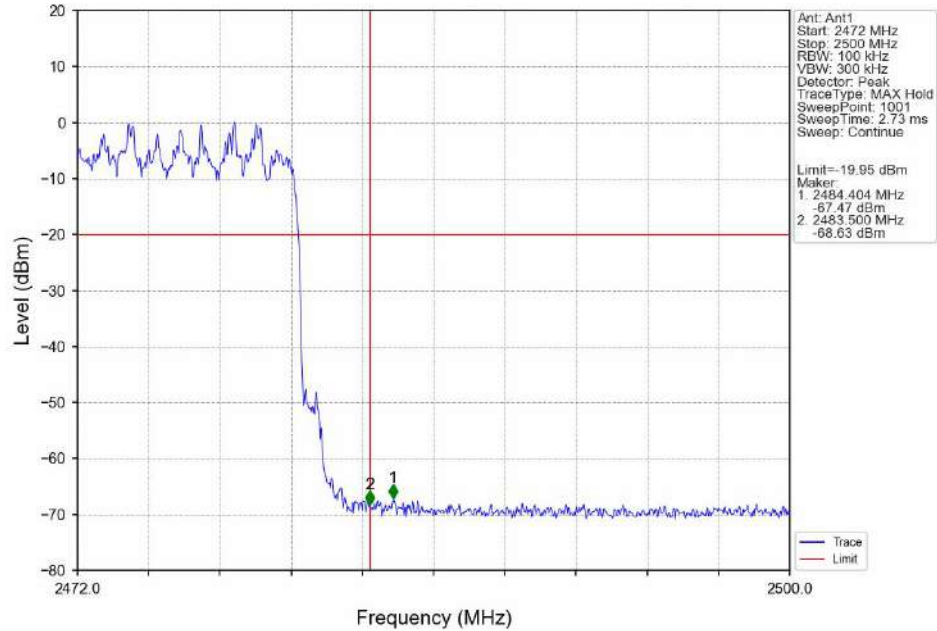


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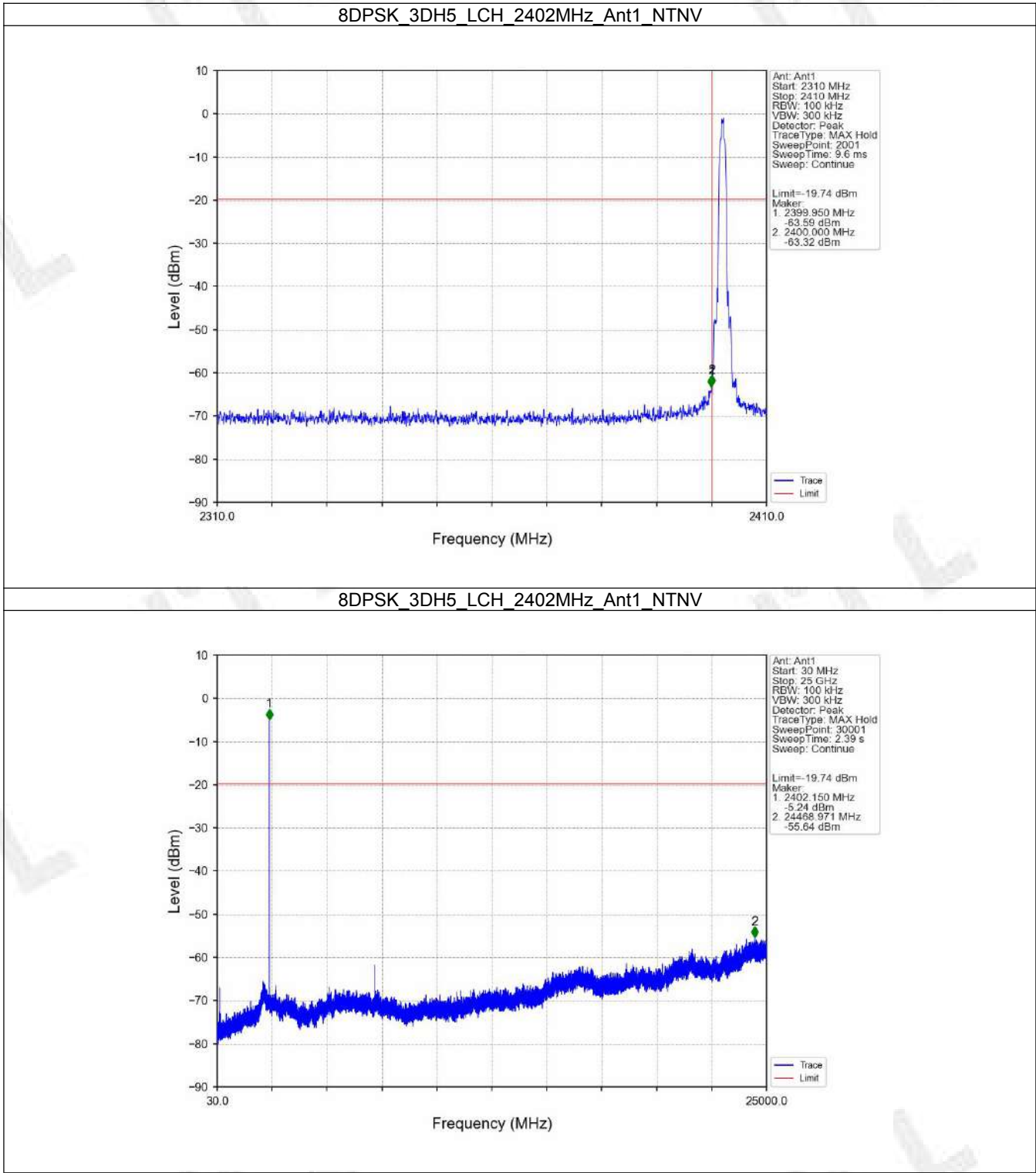
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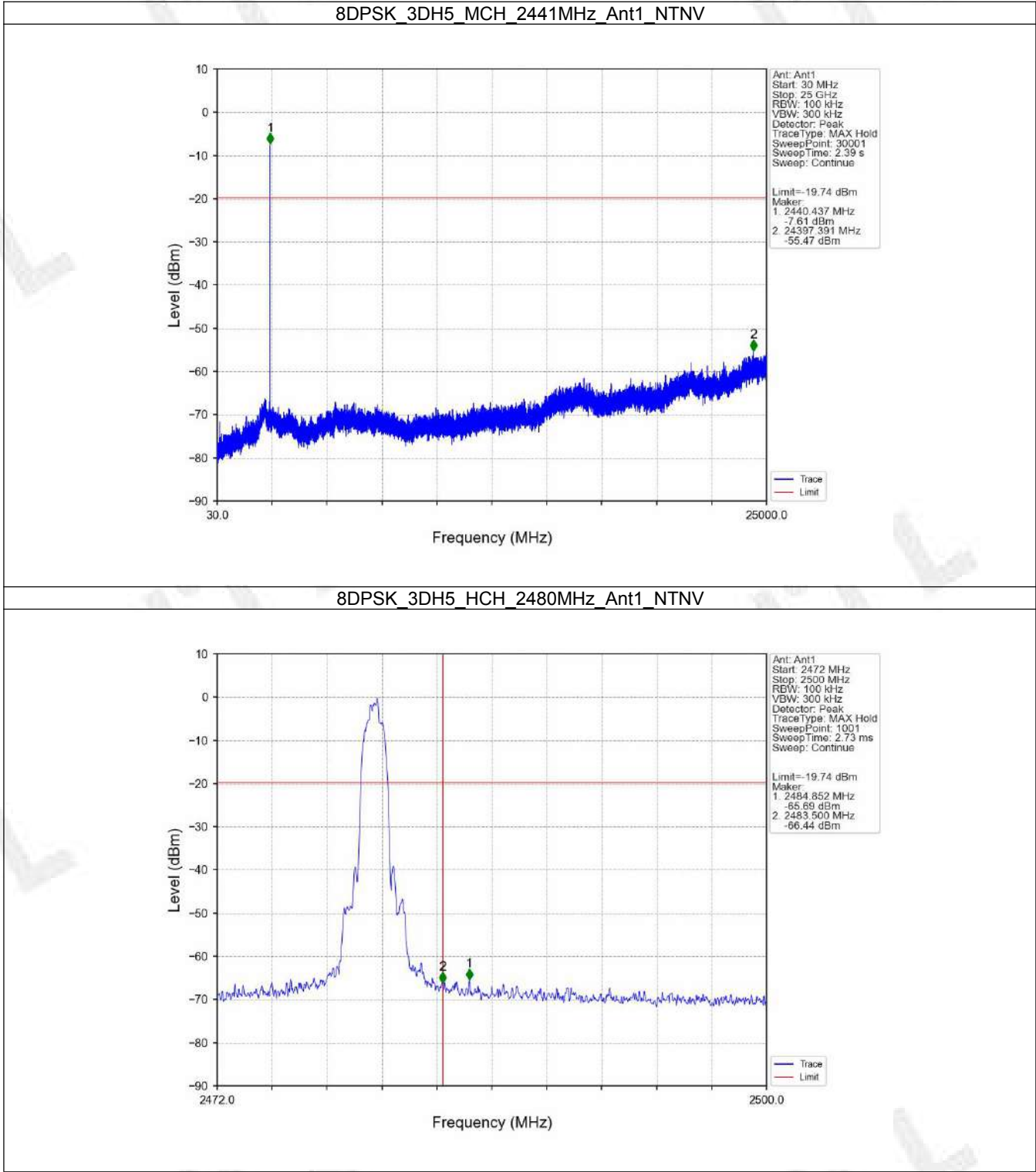
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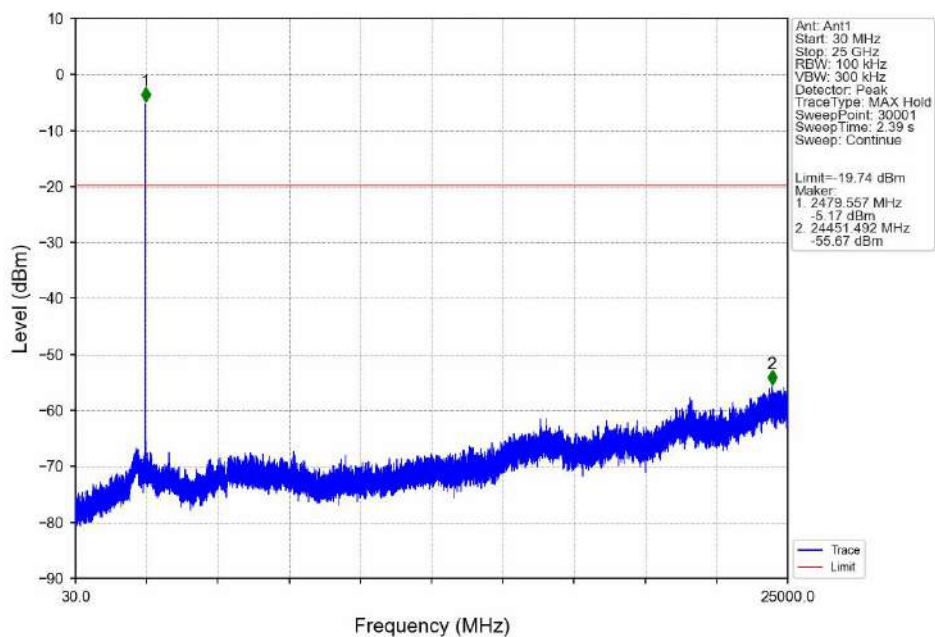


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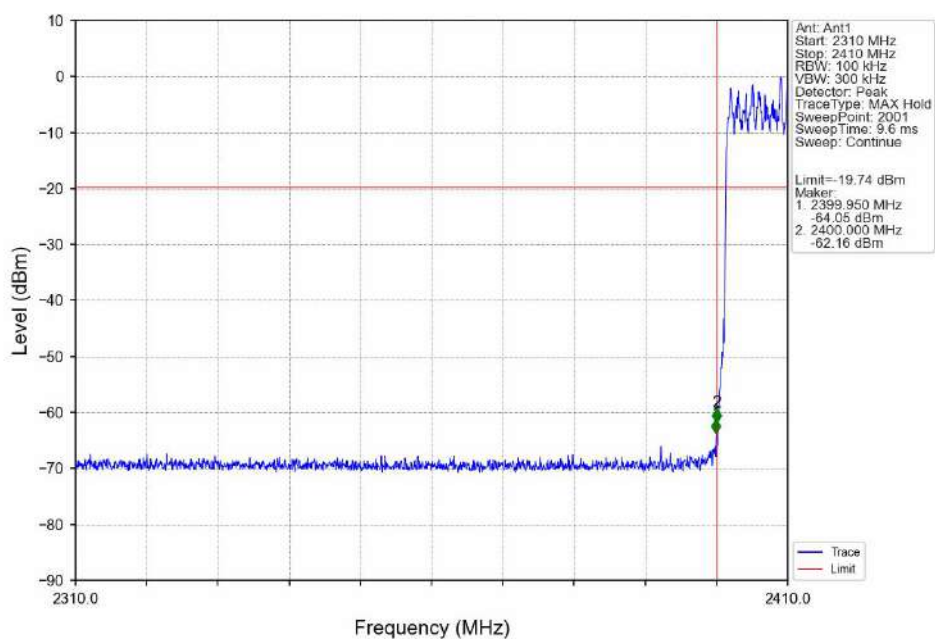


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8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



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