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Annex for Bluetooth

Test Report No.: CTL2504014016-WF

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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	0.850	/	Pass
		2441	DH5	1	0.852	/	Pass
		2480	DH5	1	0.853	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.168	/	Pass
		2441	2DH5	1	1.169	/	Pass
		2480	2DH5	1	1.169	/	Pass
8DPSK	SISO	2402	3DH5	1	1.179	/	Pass
		2441	3DH5	1	1.180	/	Pass
		2480	3DH5	1	1.179	/	Pass

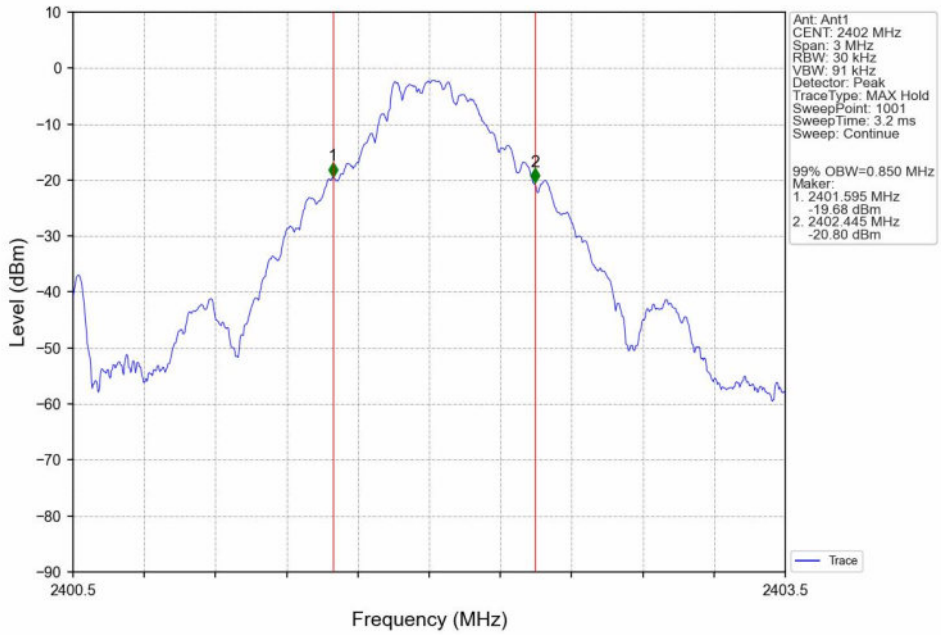
1.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.956	/	Pass
		2441	DH5	1	0.956	/	Pass
		2480	DH5	1	0.950	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.288	/	Pass
		2441	2DH5	1	1.287	/	Pass
		2480	2DH5	1	1.284	/	Pass
8DPSK	SISO	2402	3DH5	1	1.310	/	Pass
		2441	3DH5	1	1.309	/	Pass
		2480	3DH5	1	1.306	/	Pass

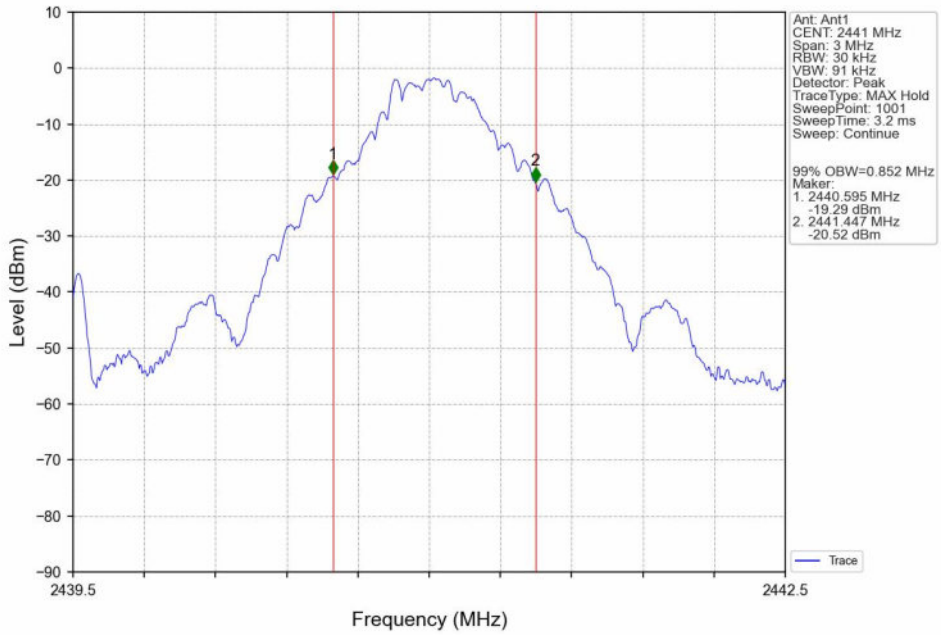
1.2 Test Graph

1.2.1 OBW

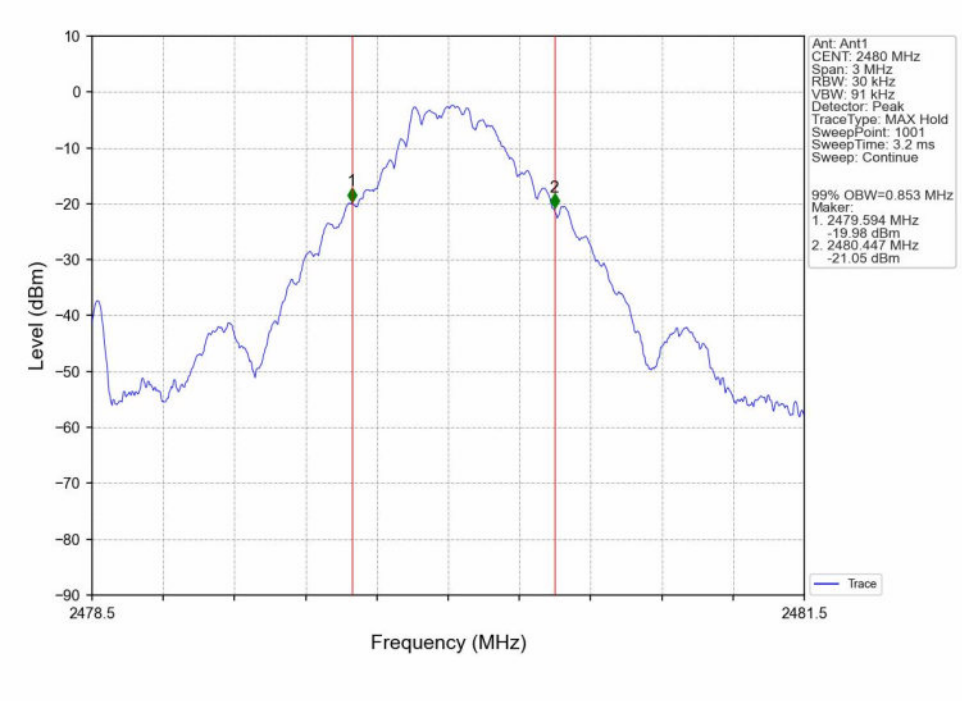
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



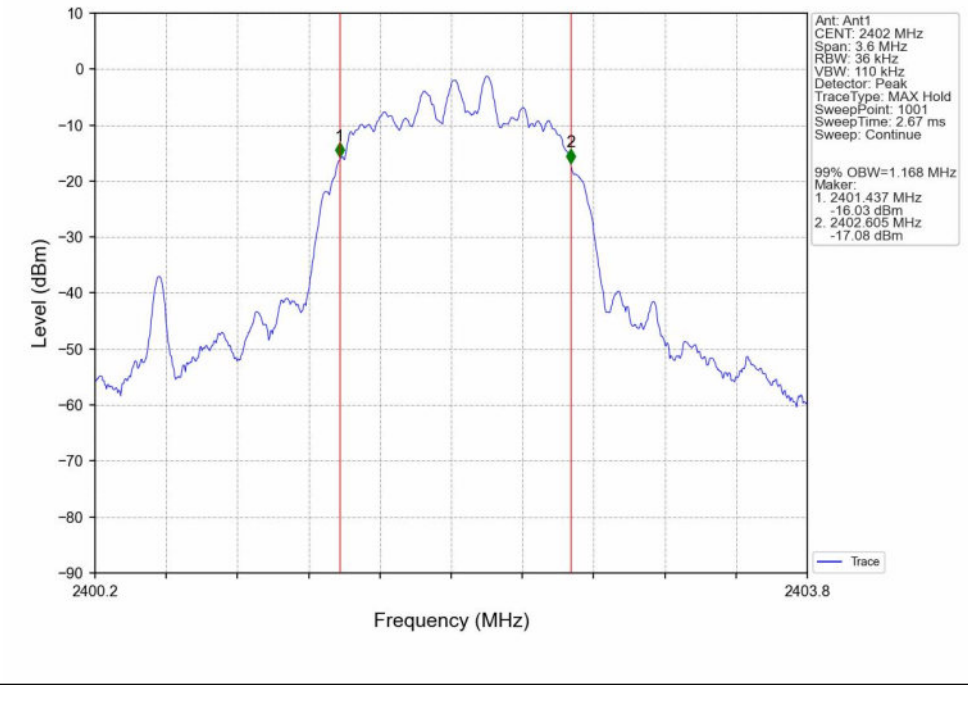
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



GFSK_DH5_HCH_2480MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



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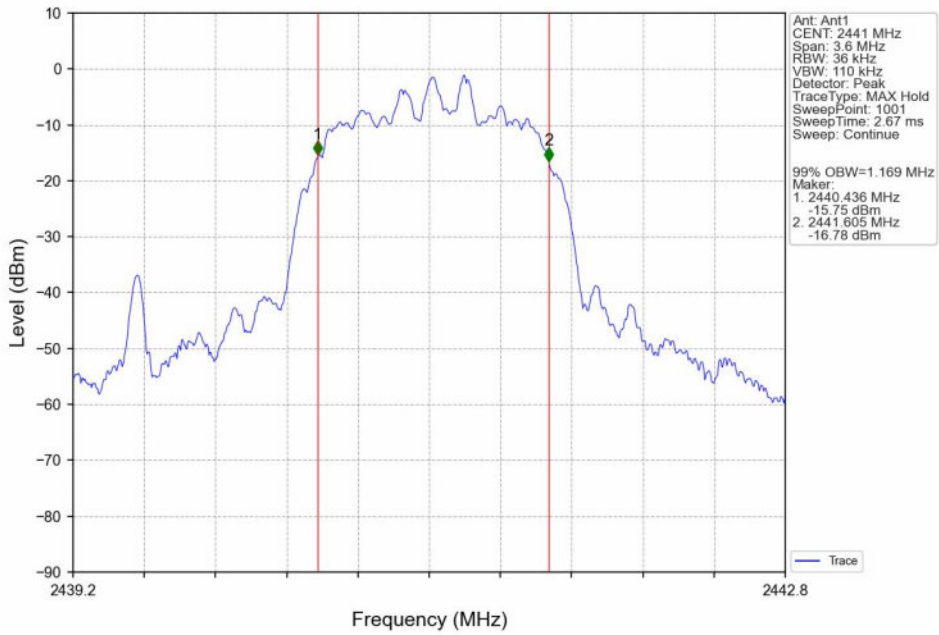
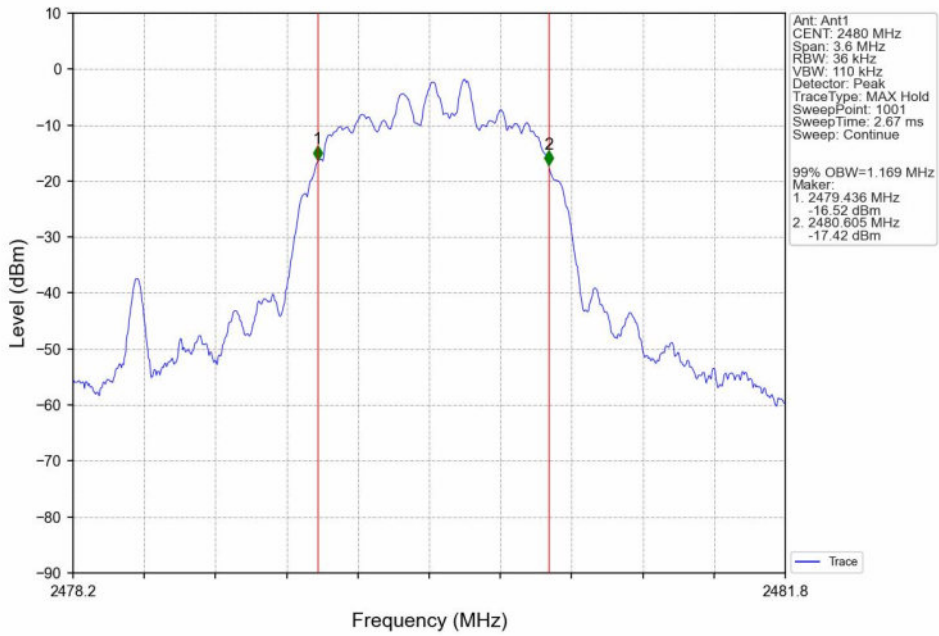
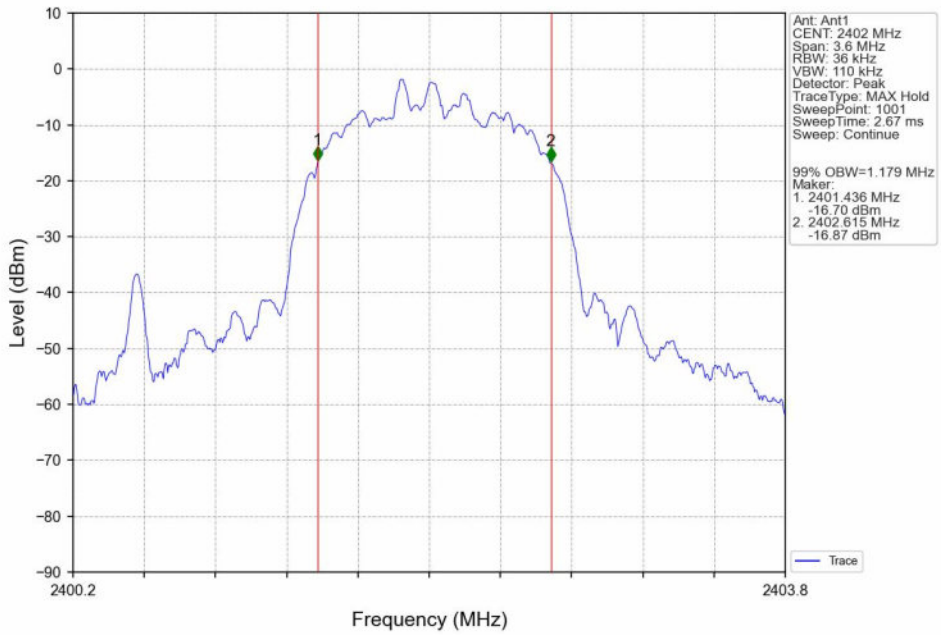


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



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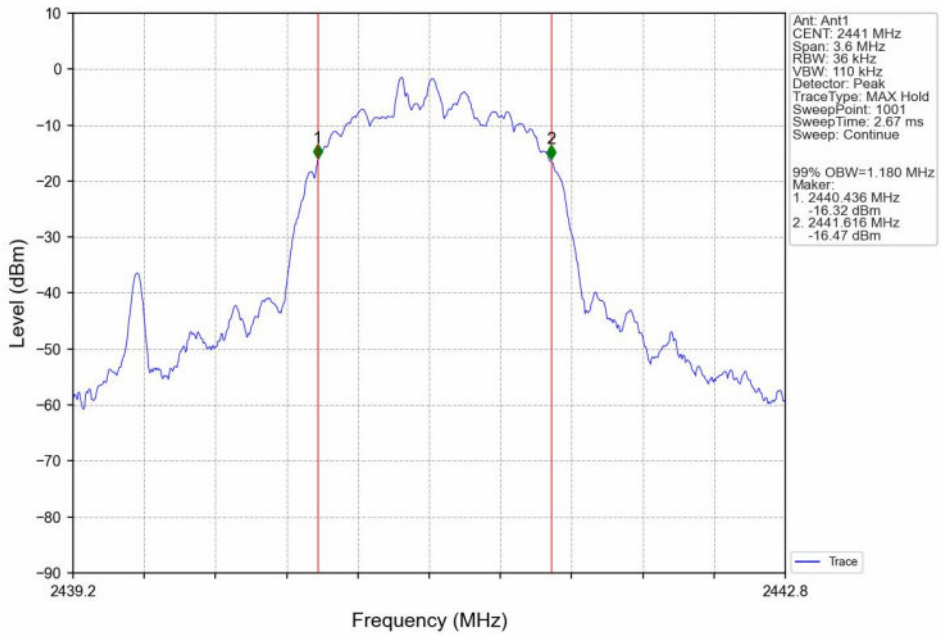
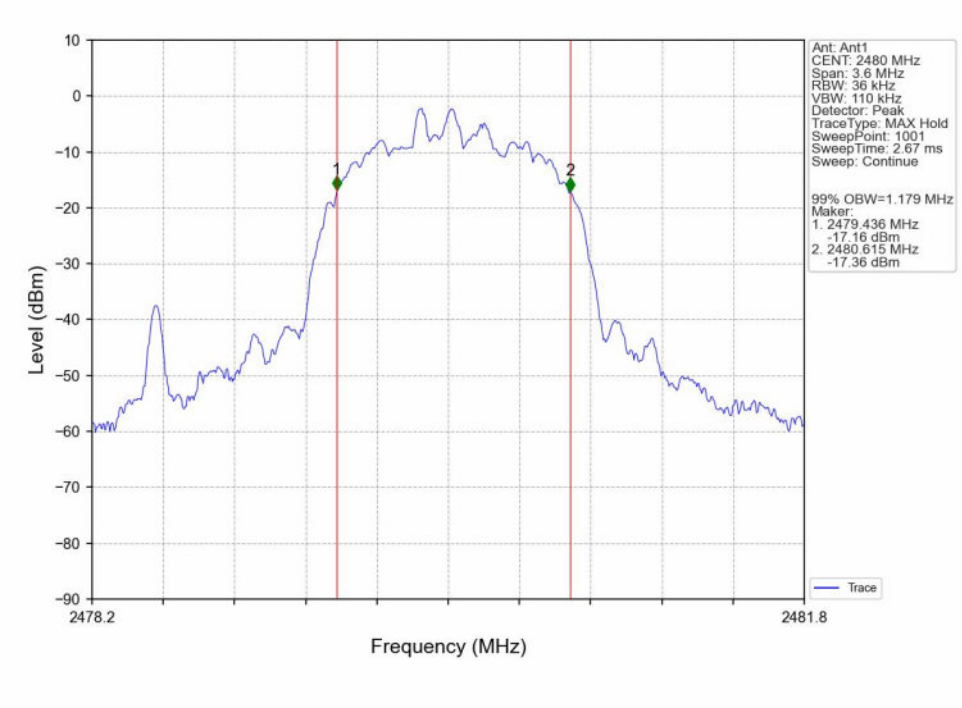
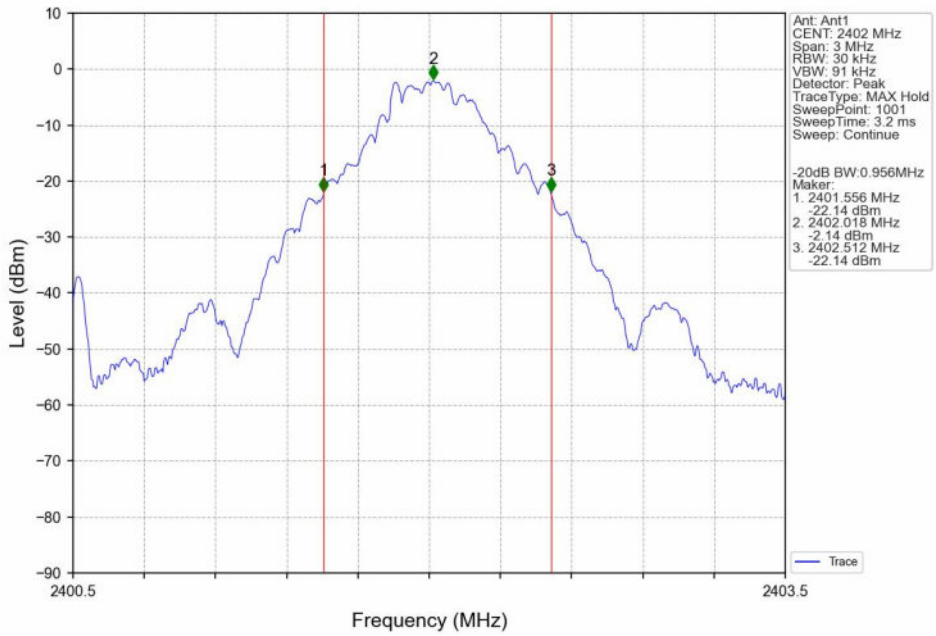


8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

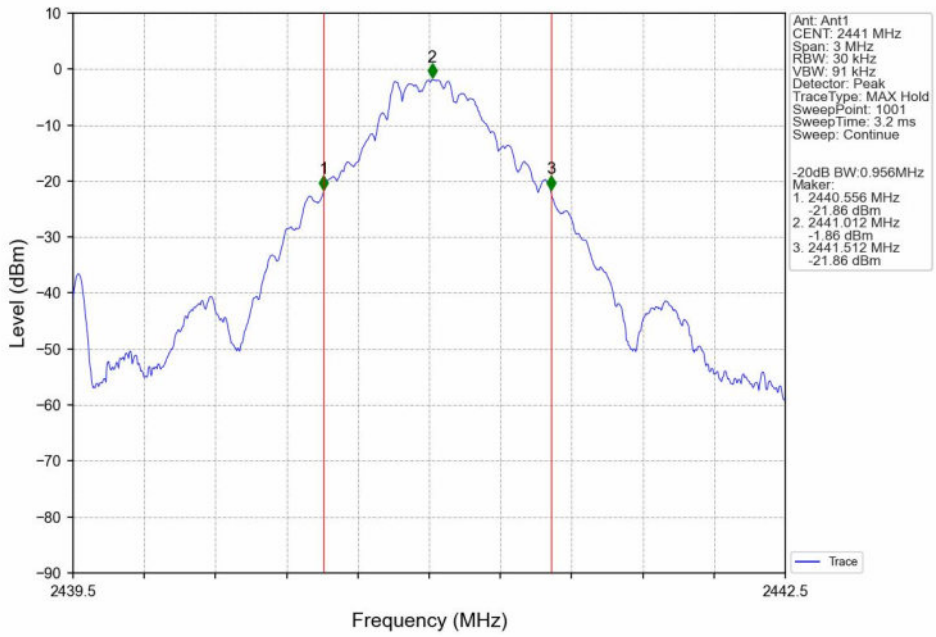


1.2.2 20dB BW

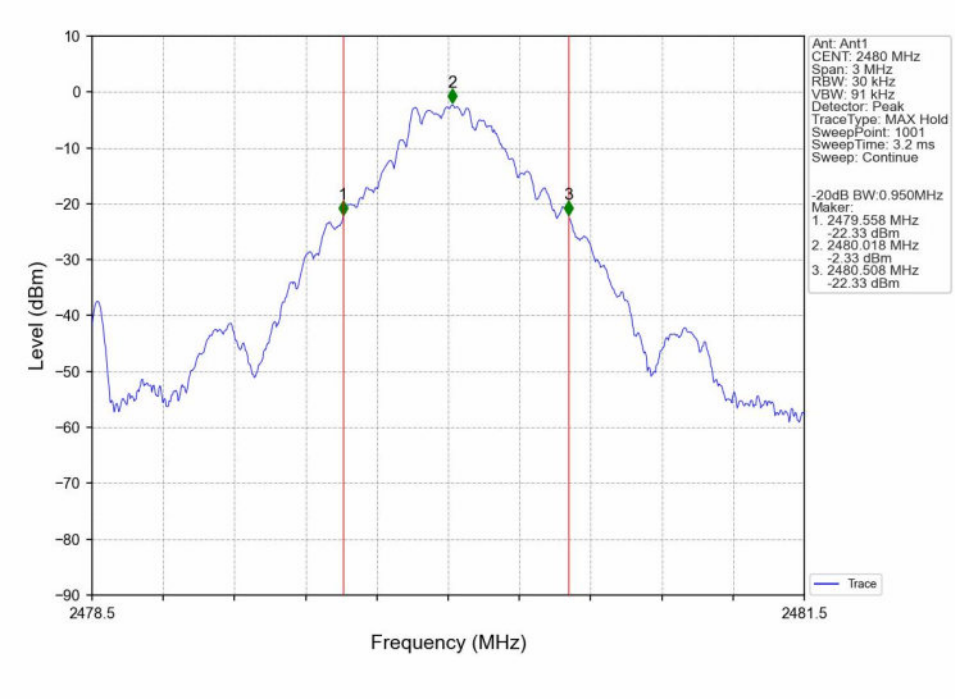
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



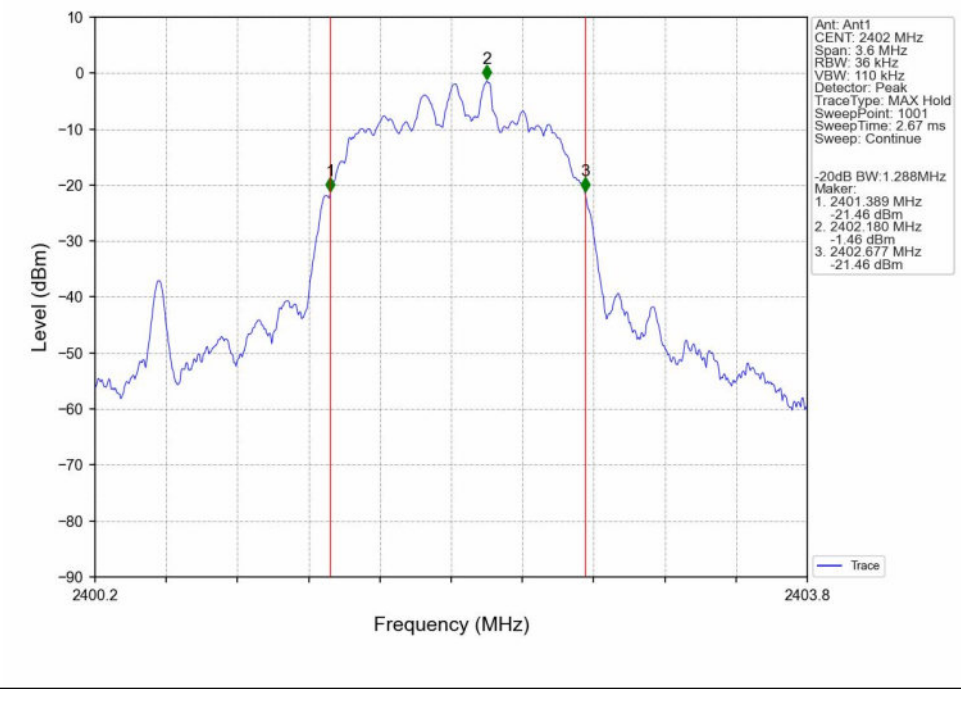
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



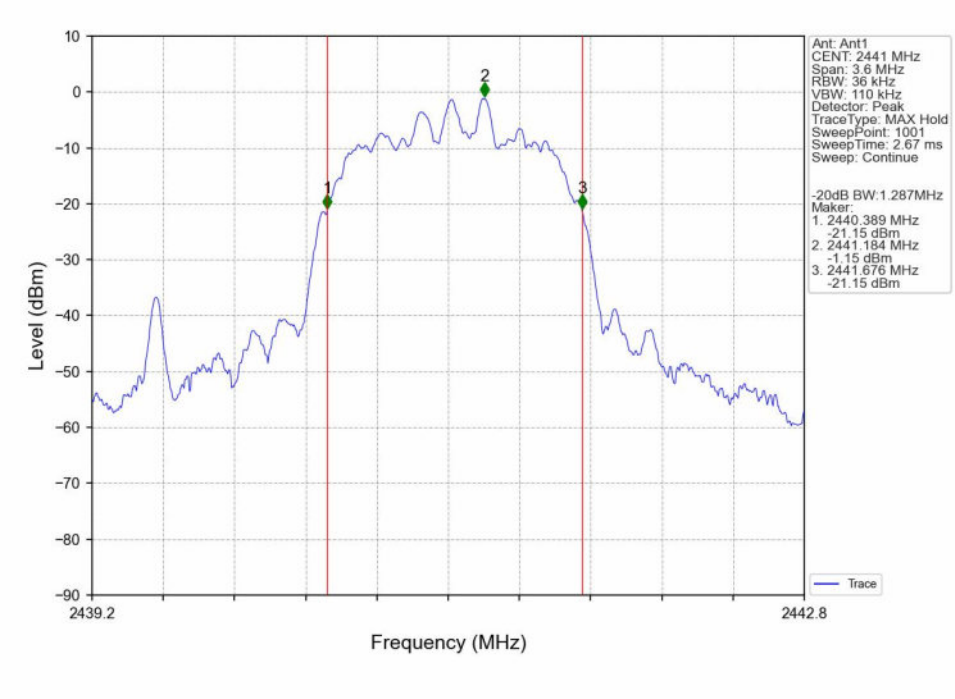
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



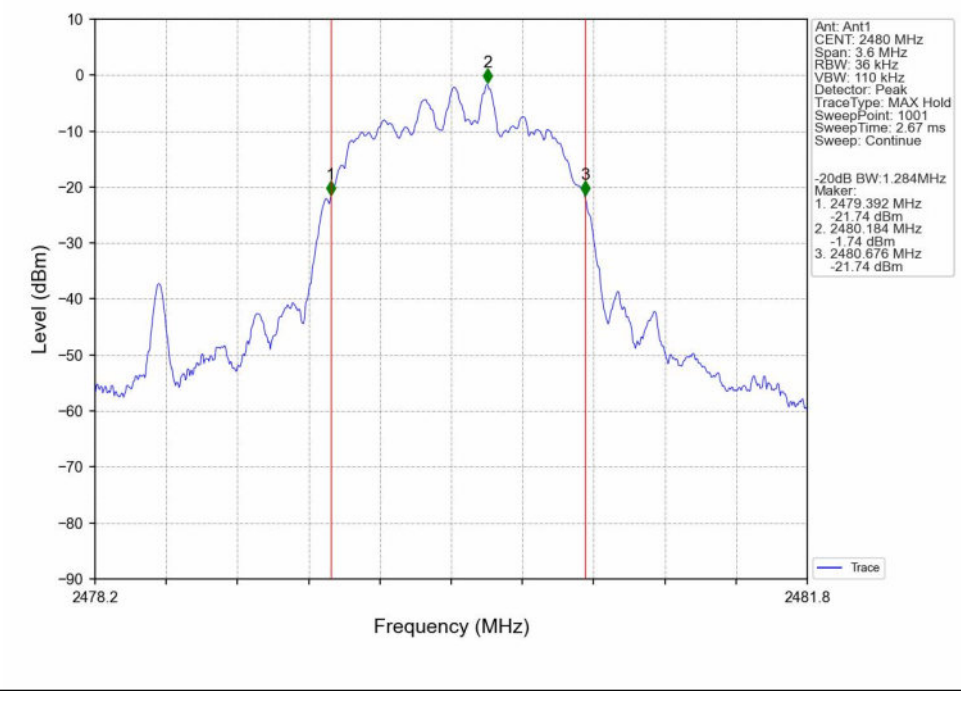
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



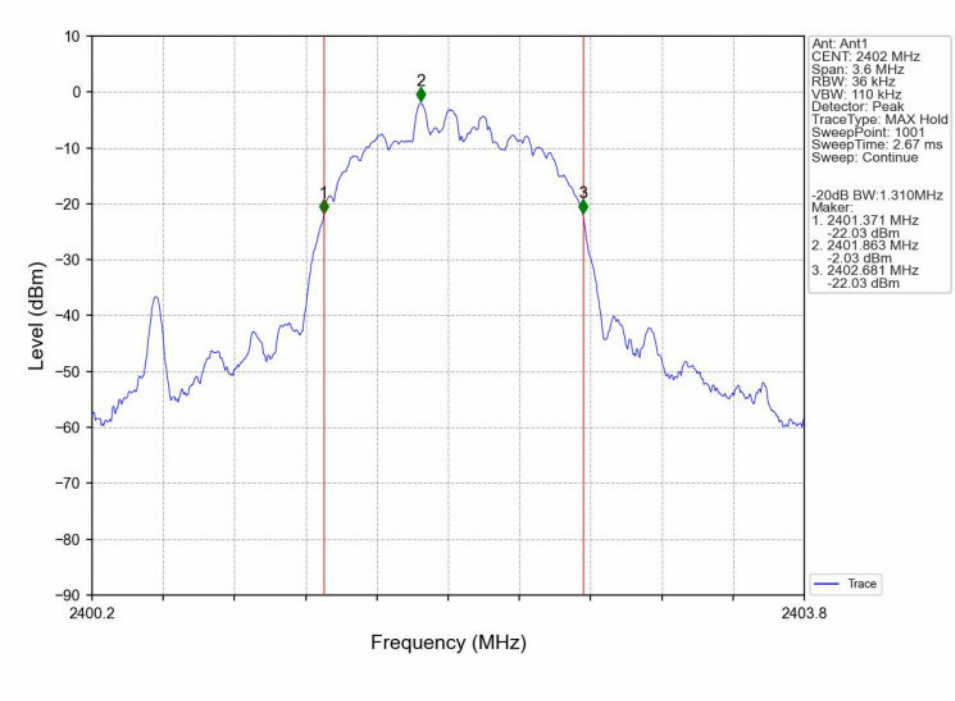
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



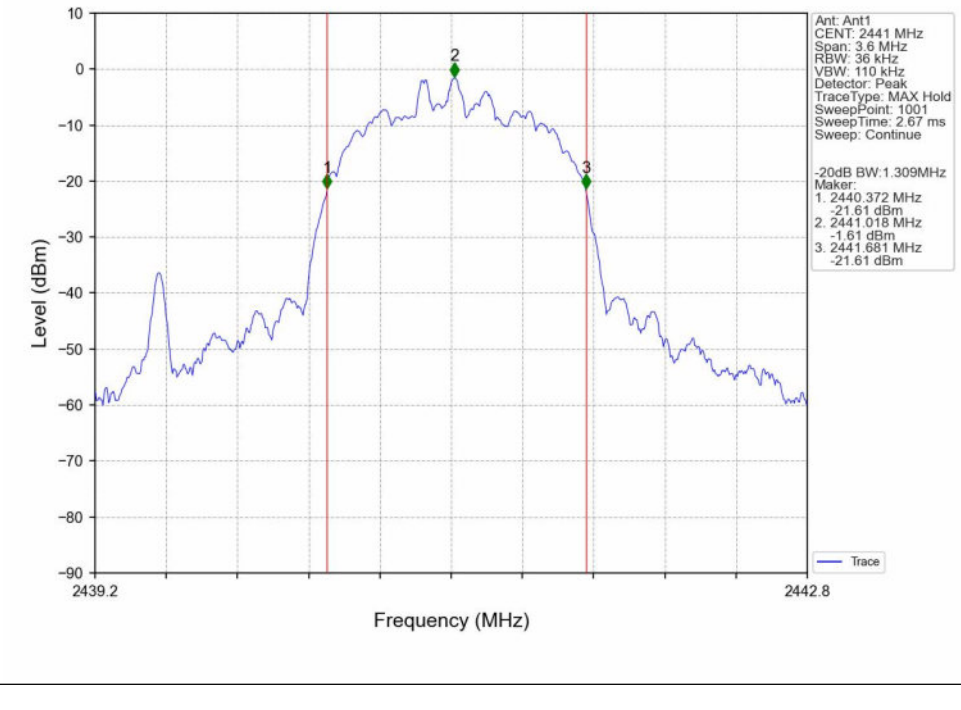
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



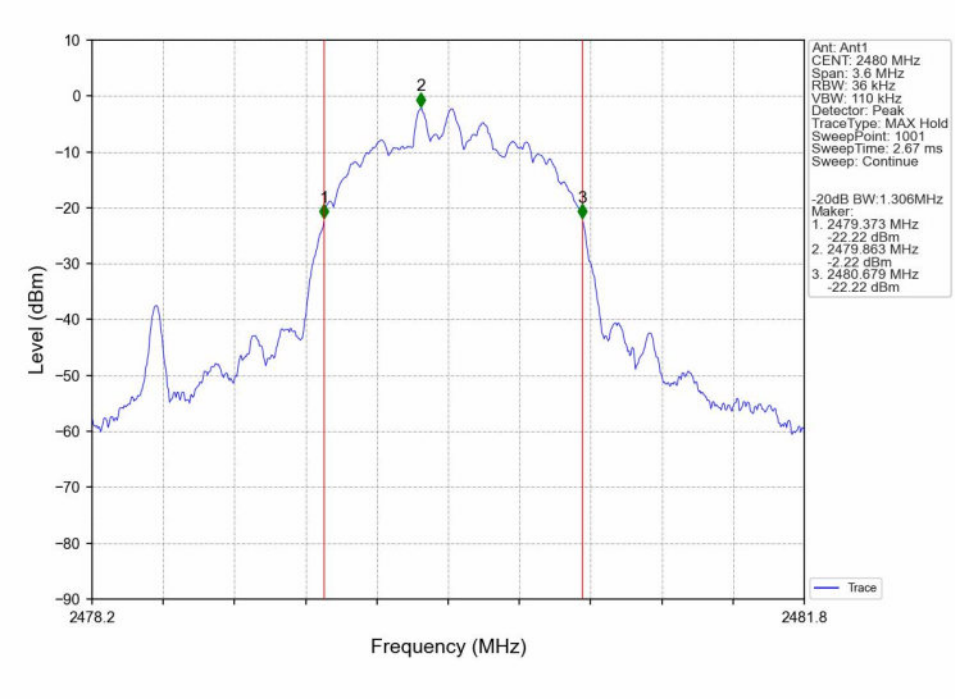
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



2. Maximum Conducted Output Power

2.1 Test Result

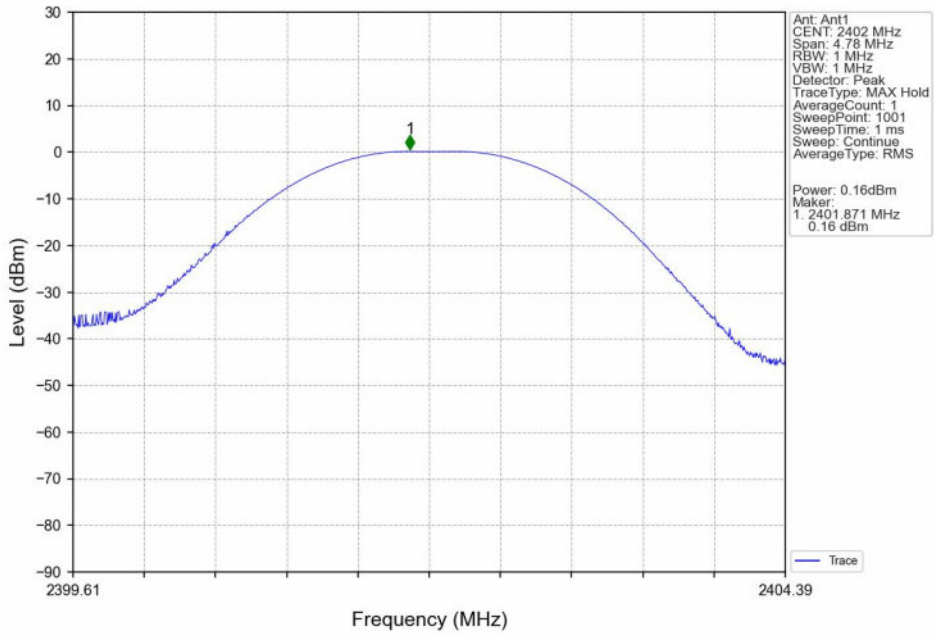
2.1.1 Power

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	0.16	<=30	Pass
		2441	DH5	0.50	<=30	Pass
		2480	DH5	-0.23	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	1.05	<=20.97	Pass
		2441	2DH5	1.38	<=20.97	Pass
		2480	2DH5	0.64	<=20.97	Pass
8DPSK	SISO	2402	3DH5	1.39	<=20.97	Pass
		2441	3DH5	1.70	<=20.97	Pass
		2480	3DH5	0.98	<=20.97	Pass
Note1: Antenna Gain: Ant1: -0.68dBi;						

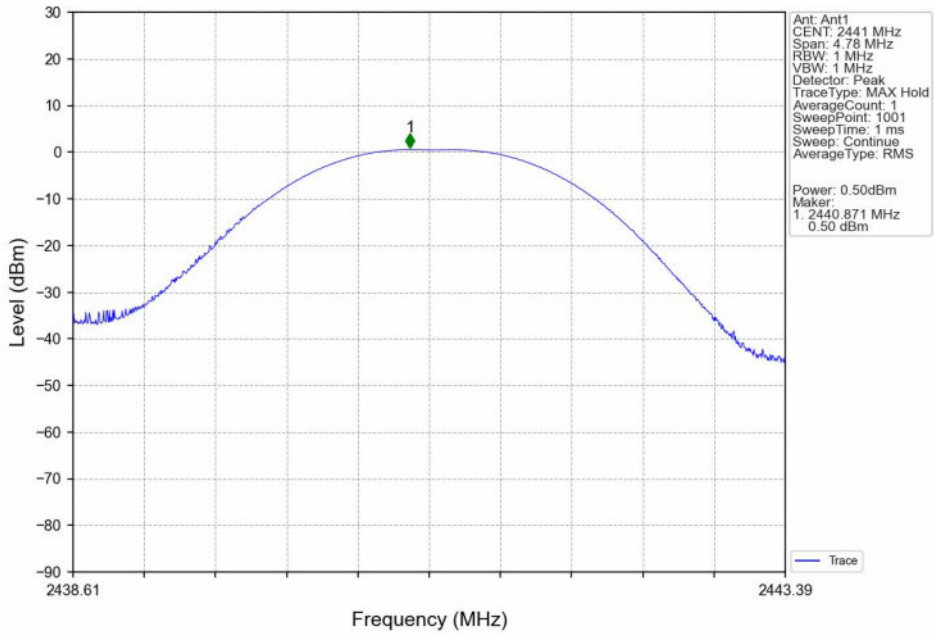
2.2 Test Graph

2.2.1 Power

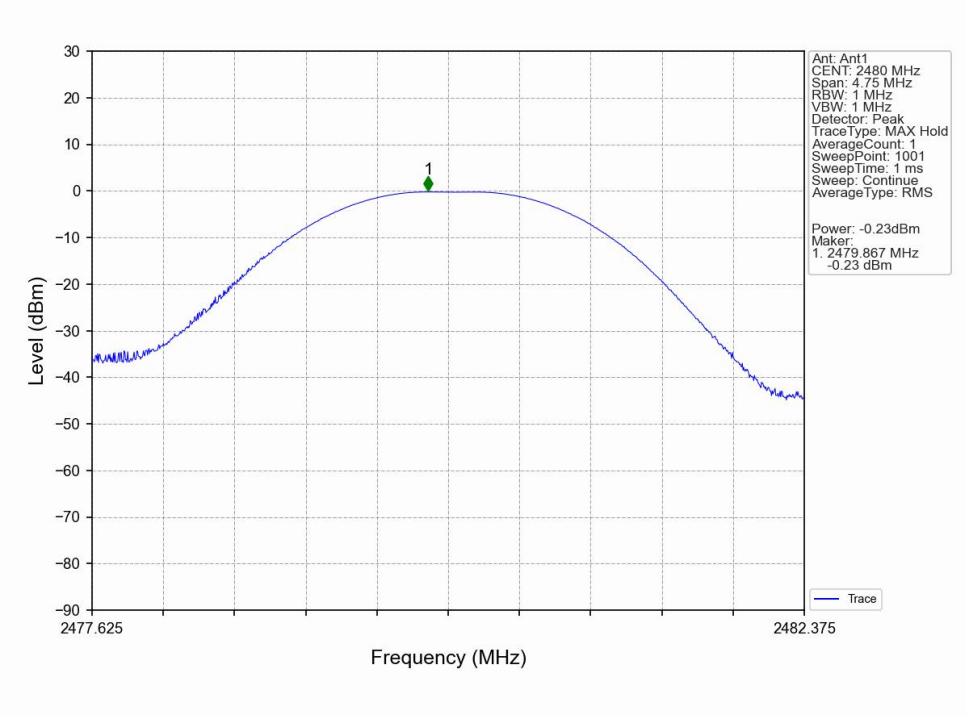
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



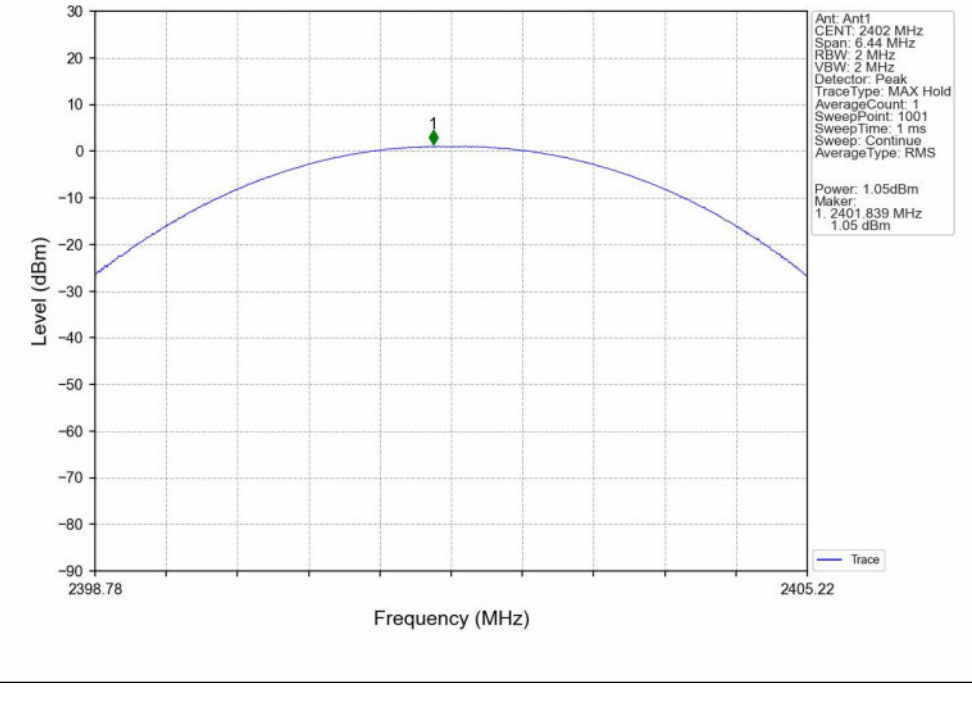
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



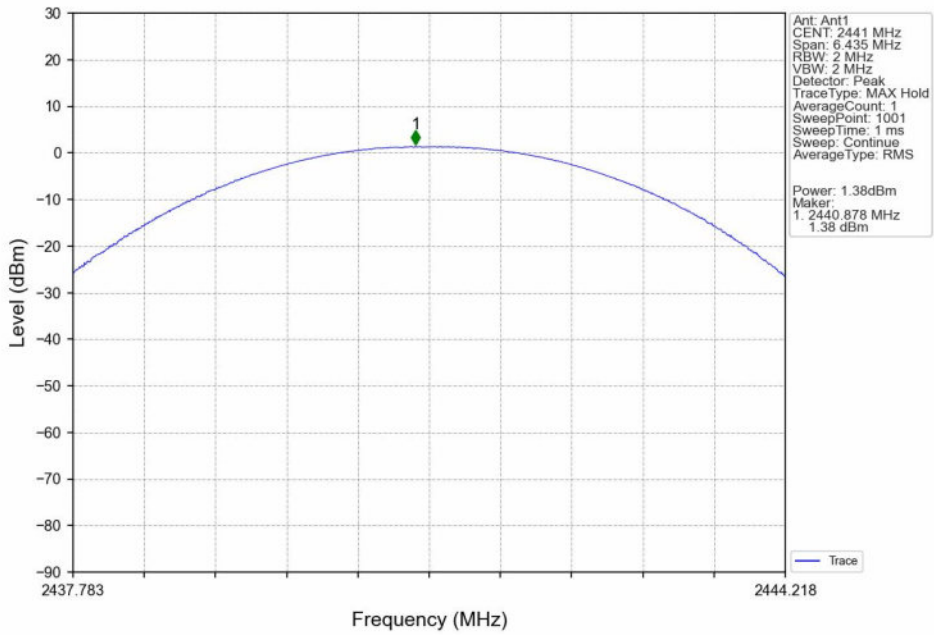
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



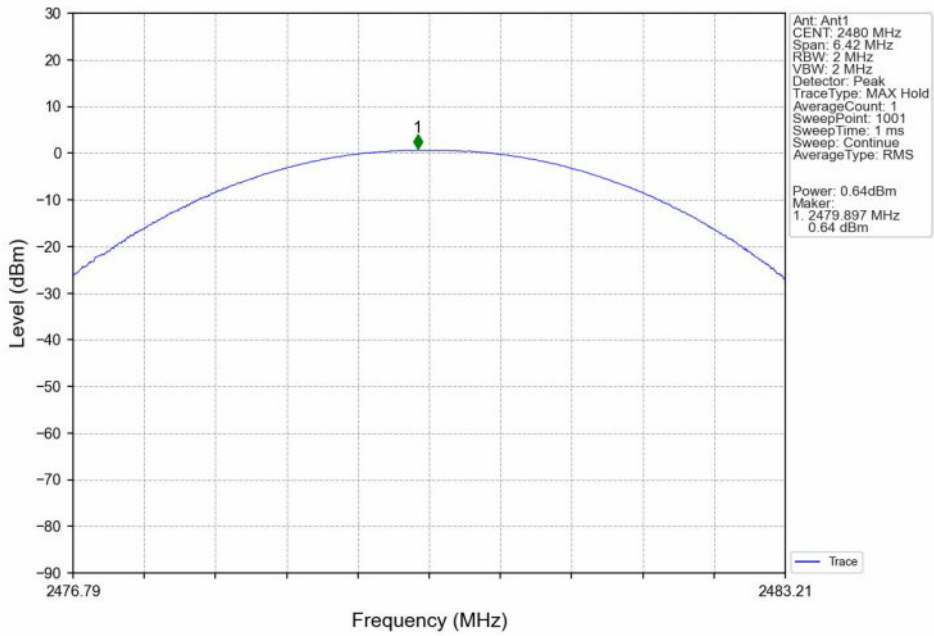
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



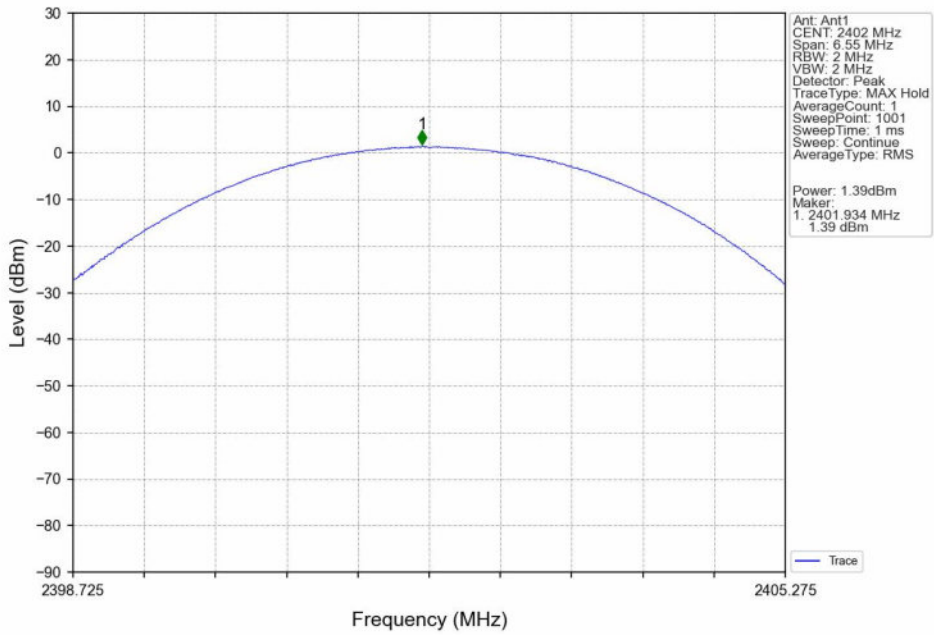
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



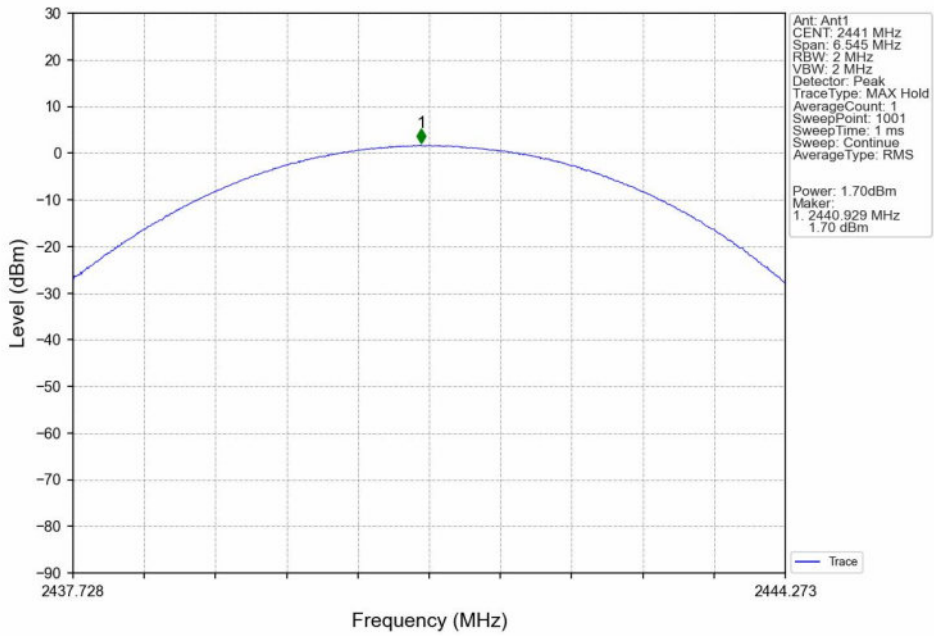
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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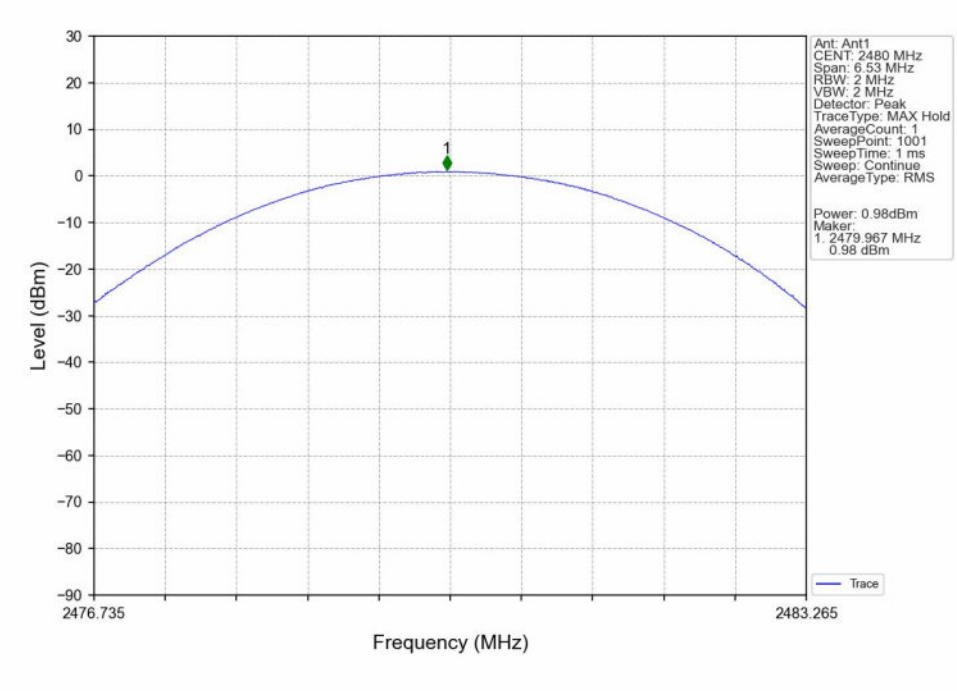


3. Carrier Frequency Separation

3.1 Test Result

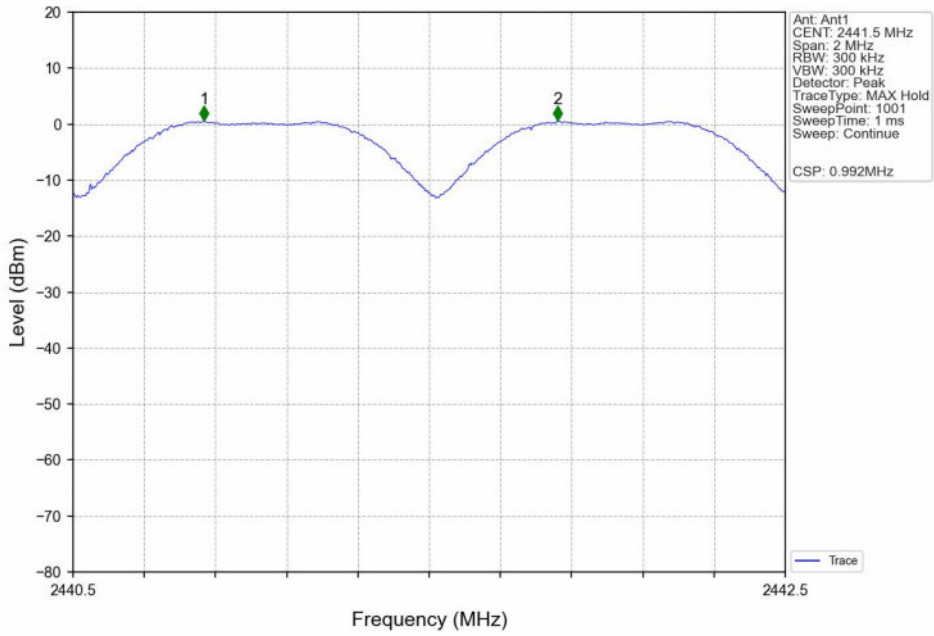
3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	0.992	0.956	>=0.956	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.001	1.288	>=0.859	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.310	>=0.873	Pass

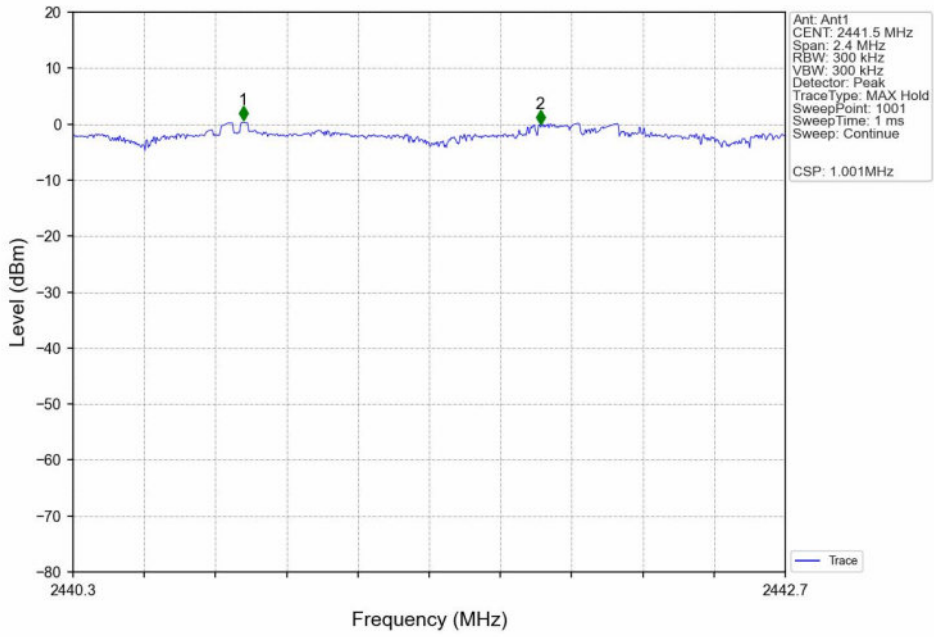
3.2 Test Graph

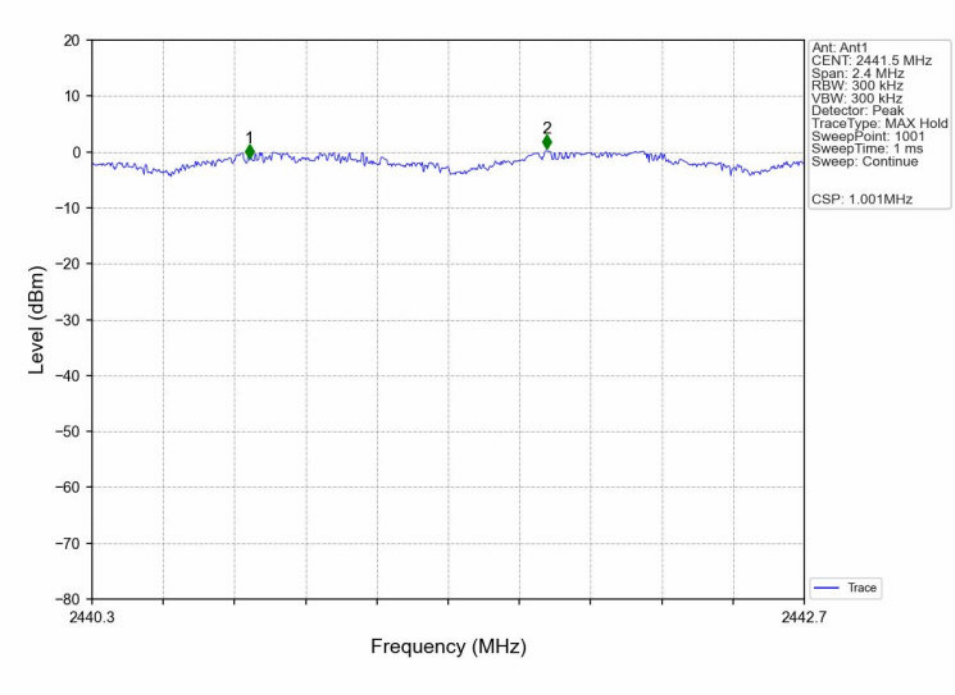
3.2.1 Ant1

GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV


4. Number of Hopping Frequencies

4.1 Test Result

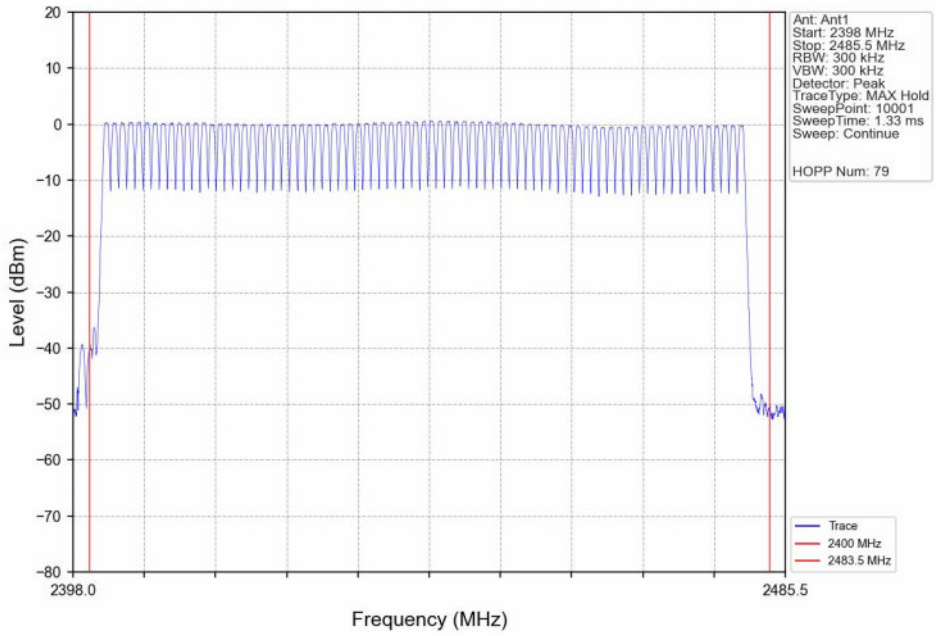
4.1.1 HoppNum

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

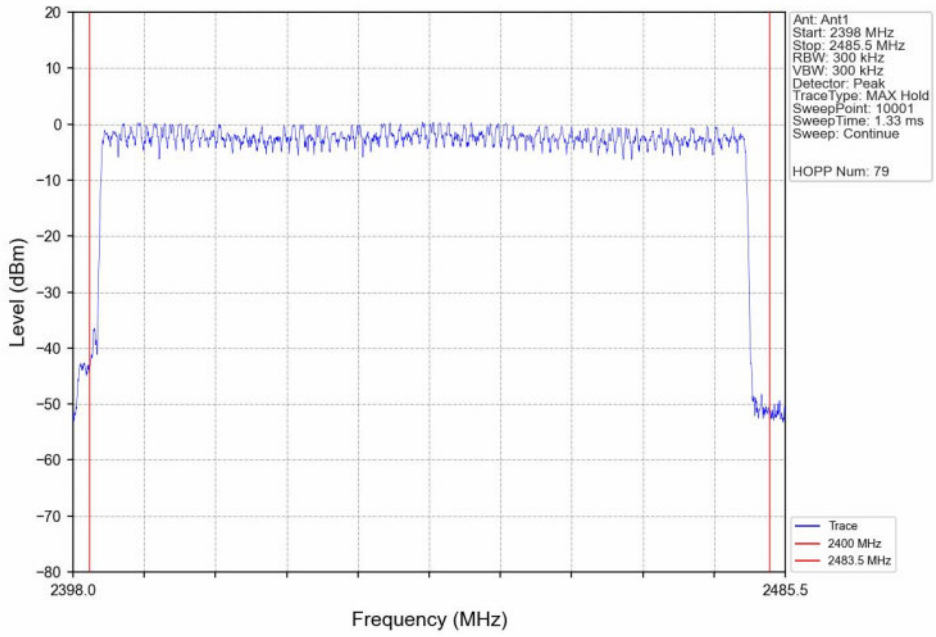
4.2 Test Graph

4.2.1 HoppNum

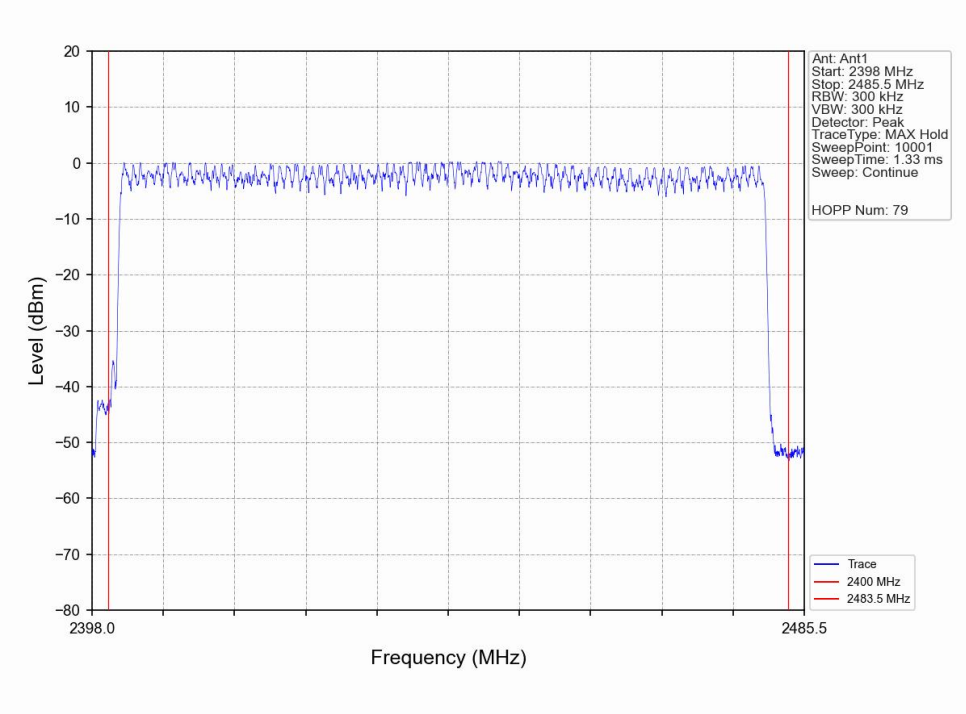
GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



5. Time of Occupancy (Dwell Time)

5.1 Test Result

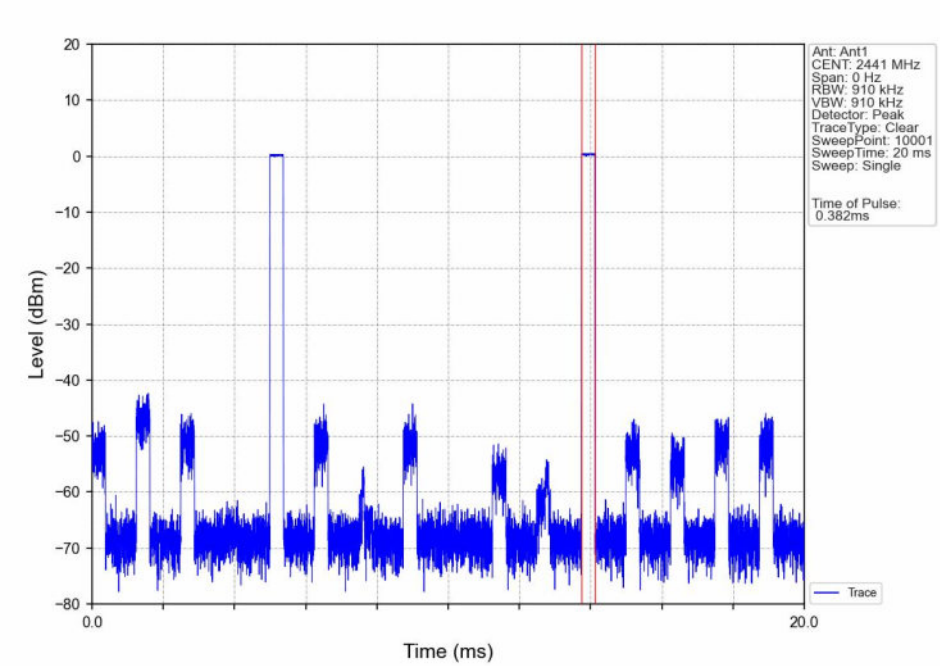
5.1.1 Ant1

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	0.382	31.600	315	120.330	<=400	Pass
			DH3	1.640	31.600	157	257.480	<=400	Pass
			DH5	2.886	31.600	108	311.688	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.390	31.600	320	124.800	<=400	Pass
			2DH3	1.642	31.600	161	264.362	<=400	Pass
			2DH5	2.890	31.600	123	355.470	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.392	31.600	319	125.048	<=400	Pass
			3DH3	1.642	31.600	153	251.226	<=400	Pass
			3DH5	2.892	31.600	103	297.876	<=400	Pass

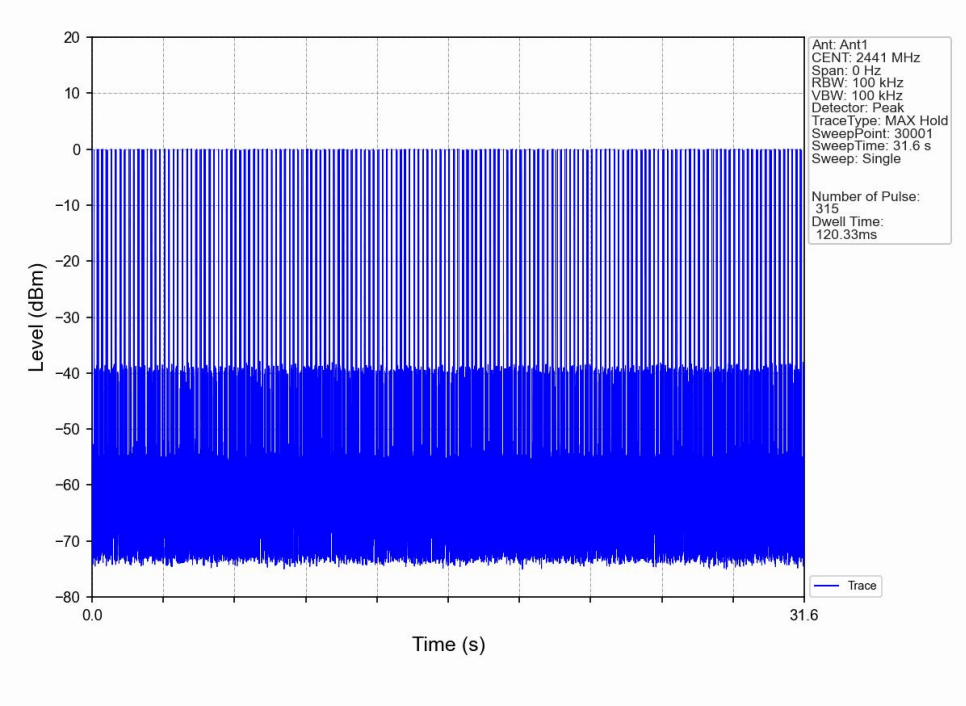
5.2 Test Graph

5.2.1 Ant1

GFSK_DH1_HOPP_Ant1_NTNV



GFSK_DH1_HOPP_Ant1_NTNV



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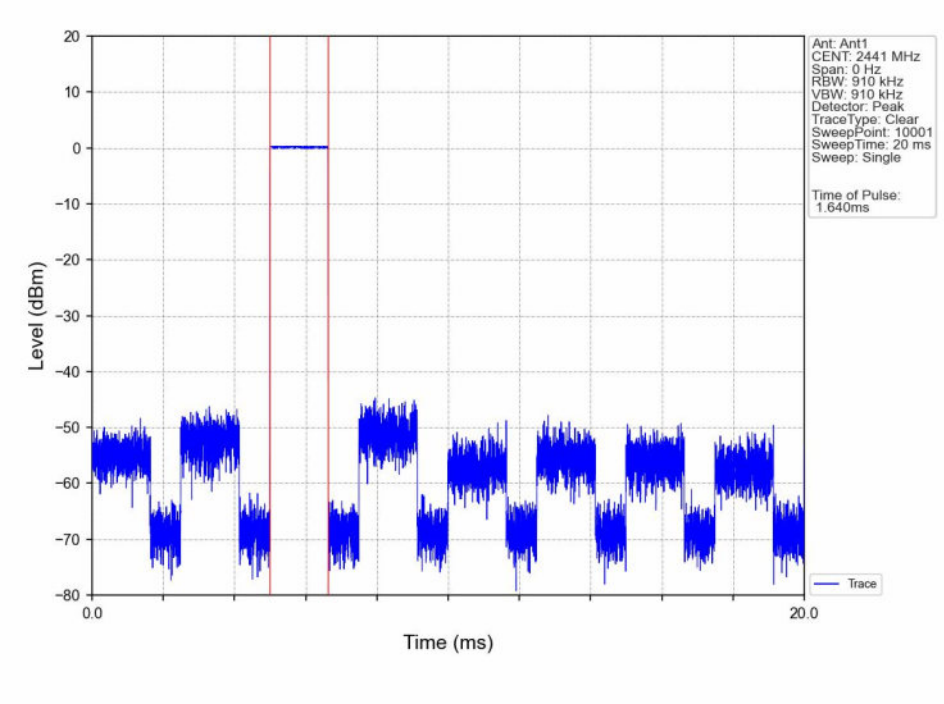

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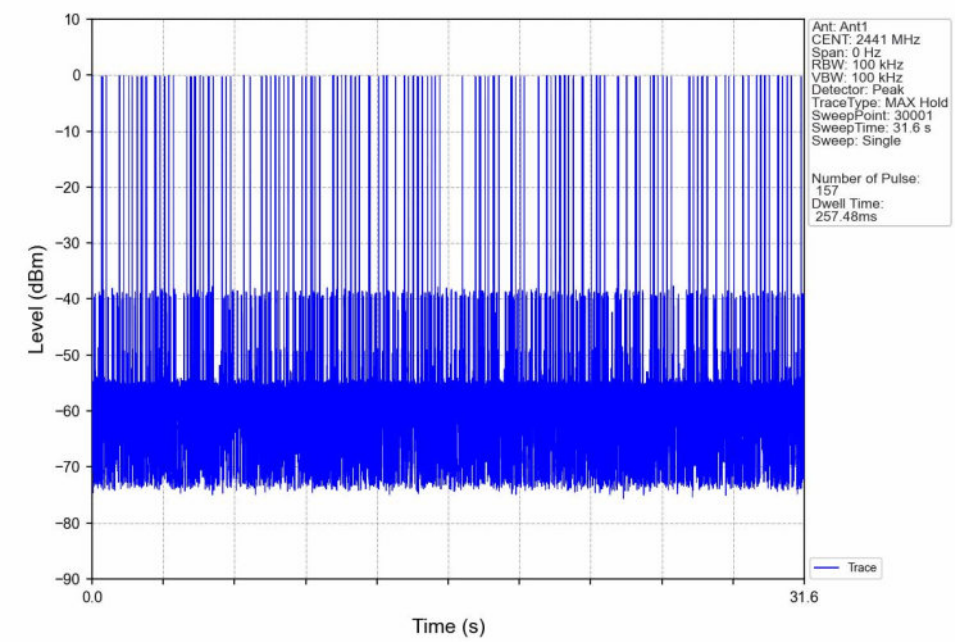
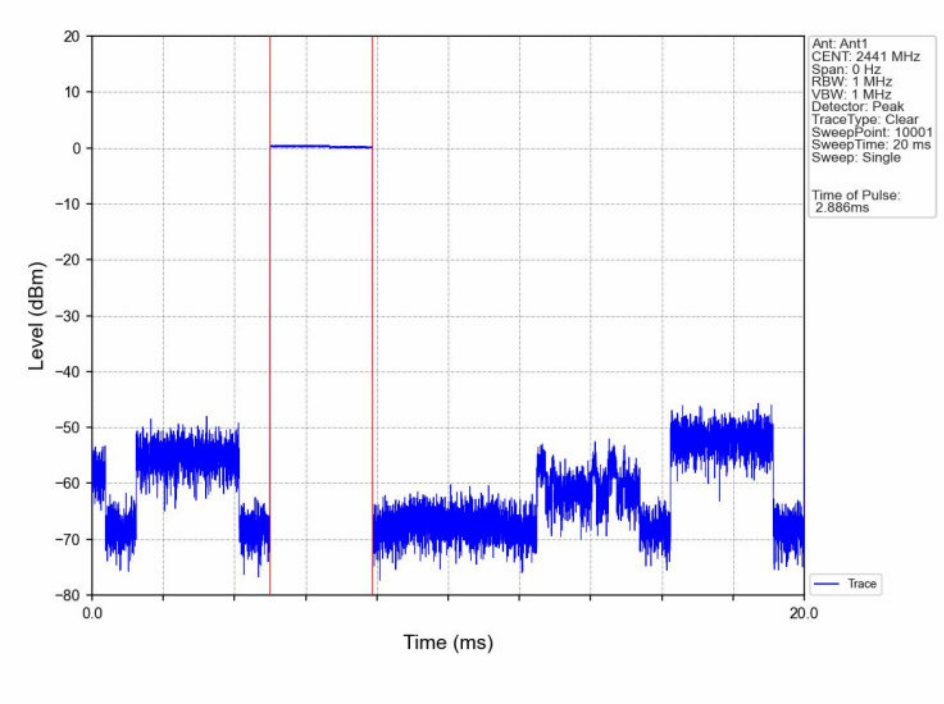


GFSK_DH5_HOPP_Ant1_NTNV



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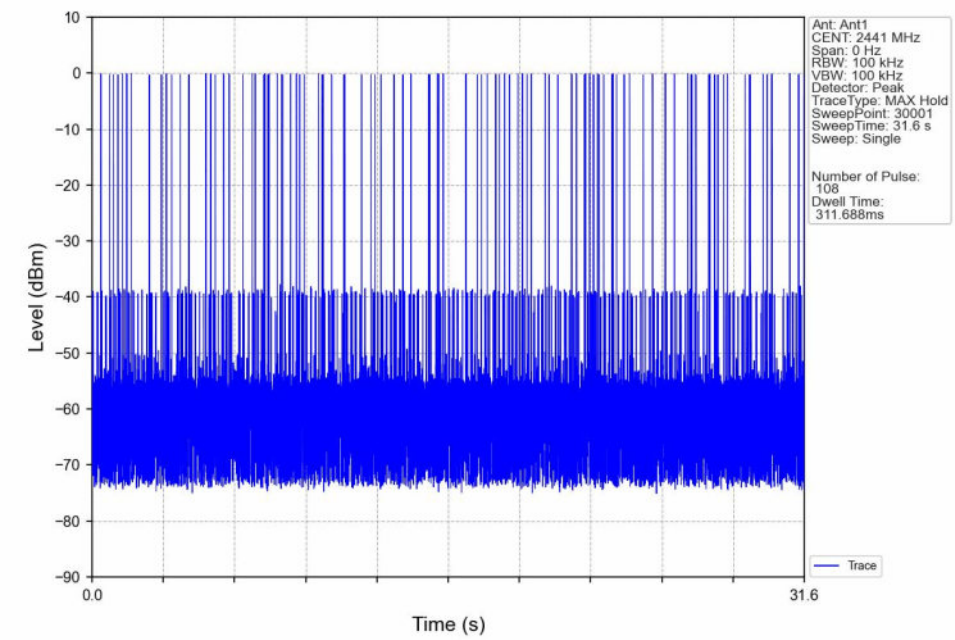
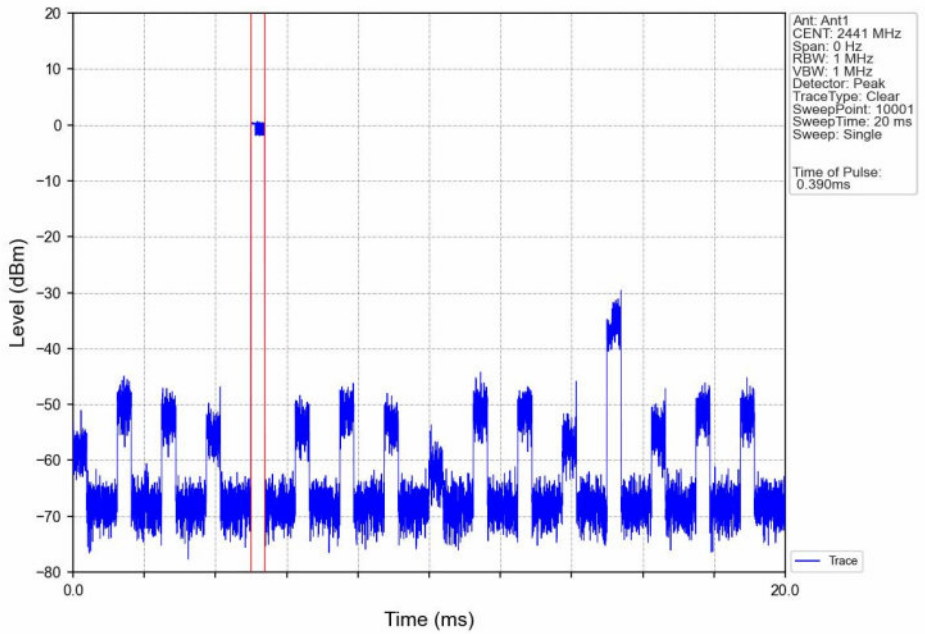
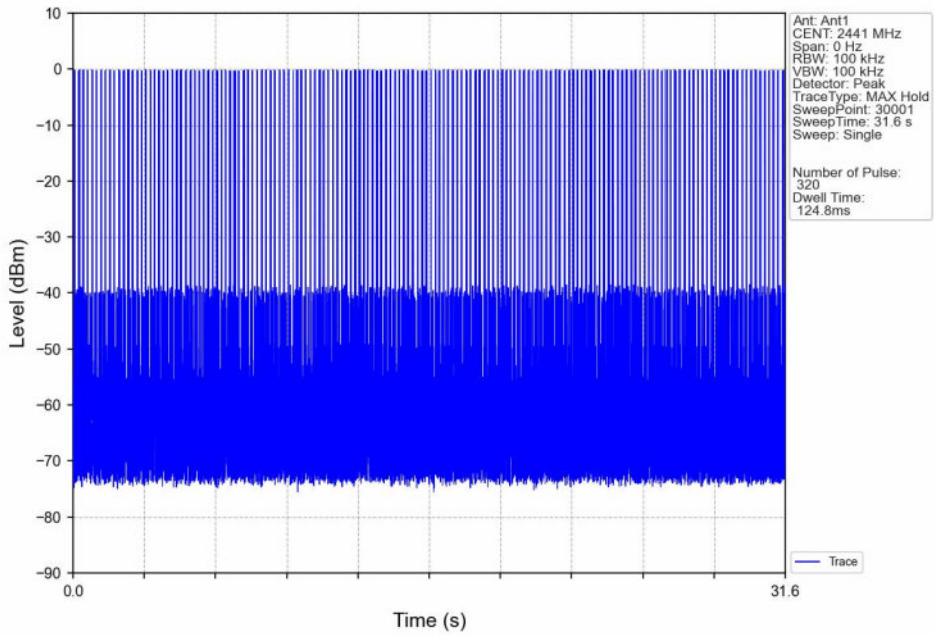


Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



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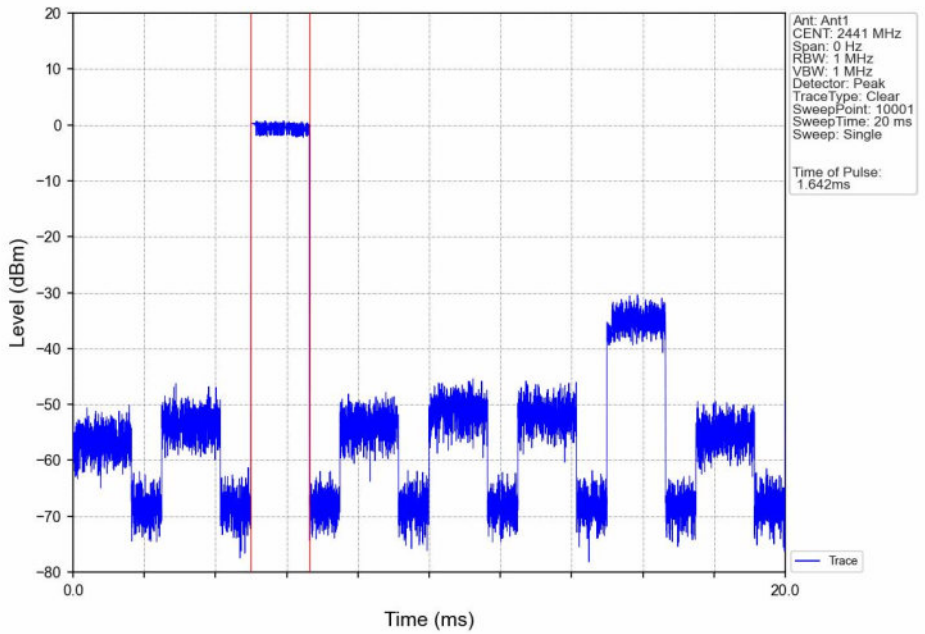

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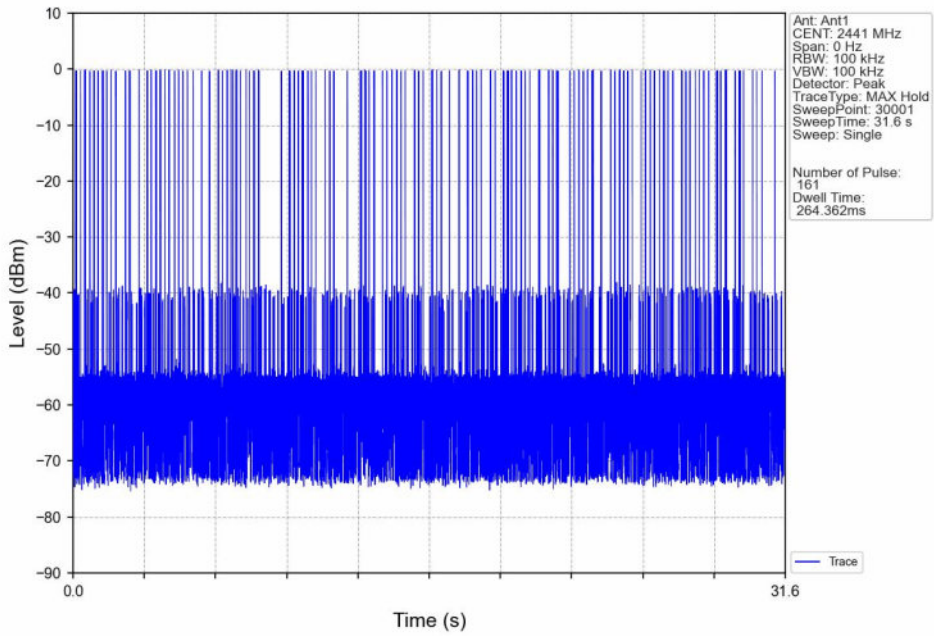

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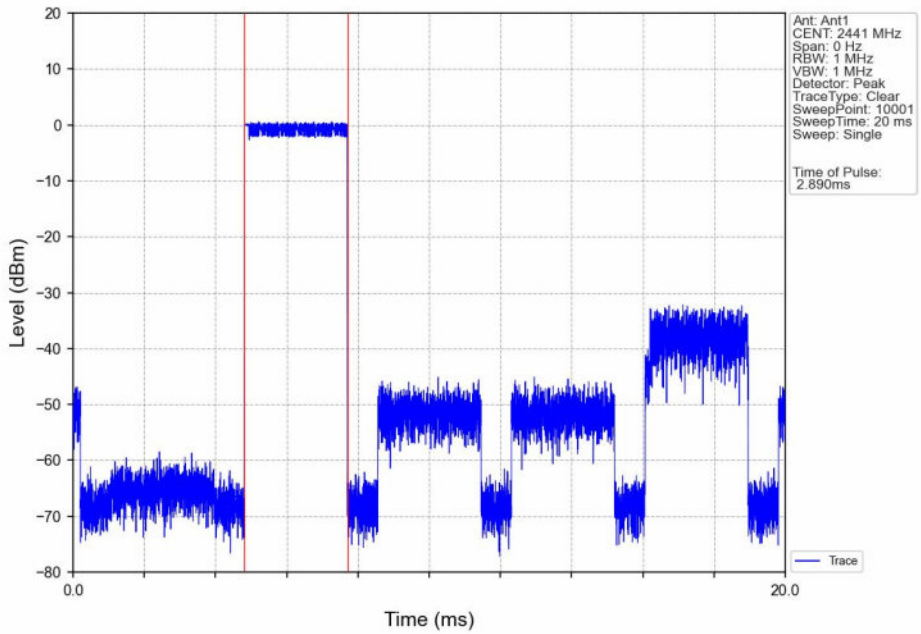

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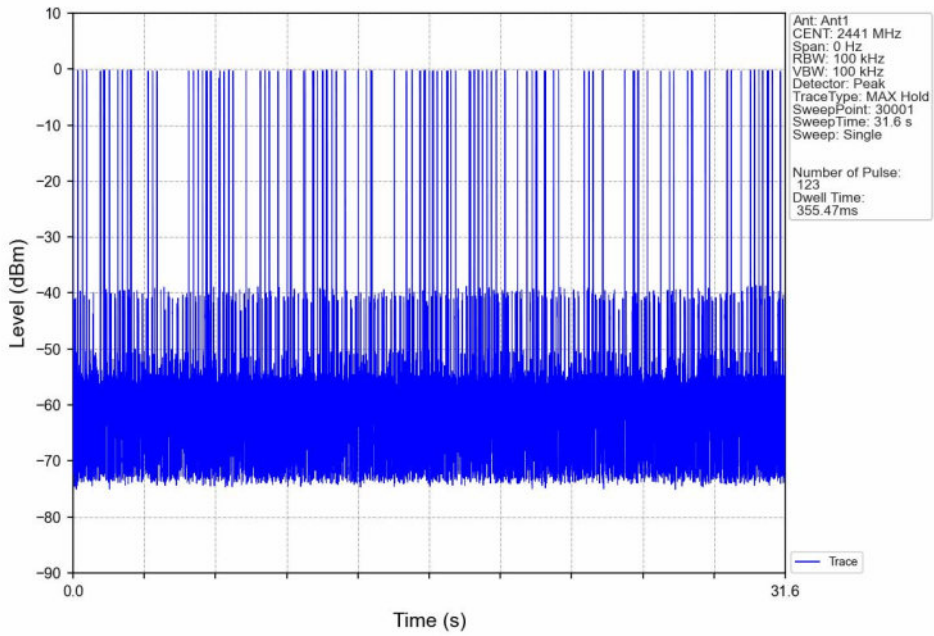

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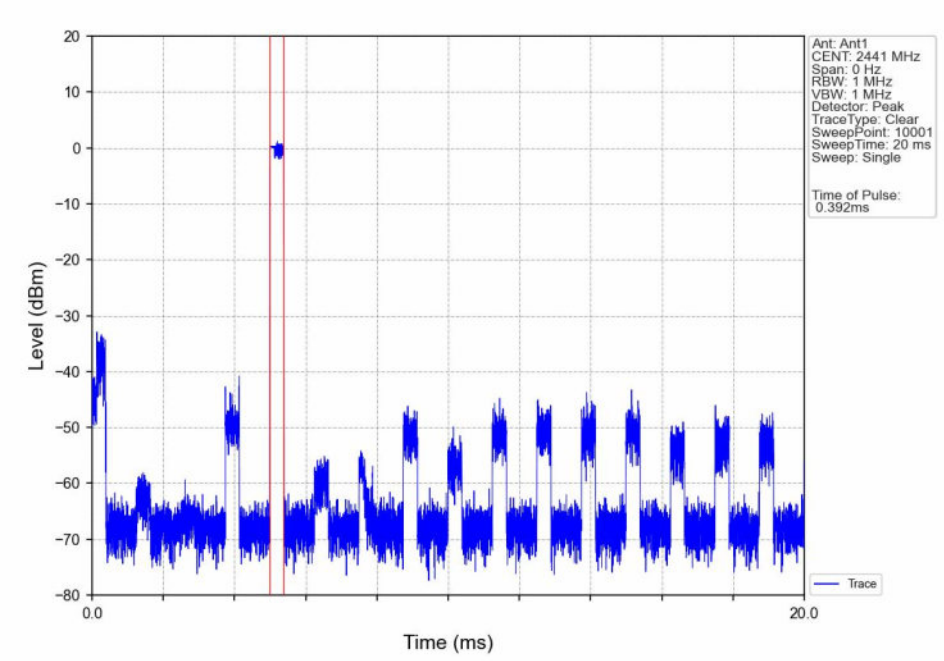

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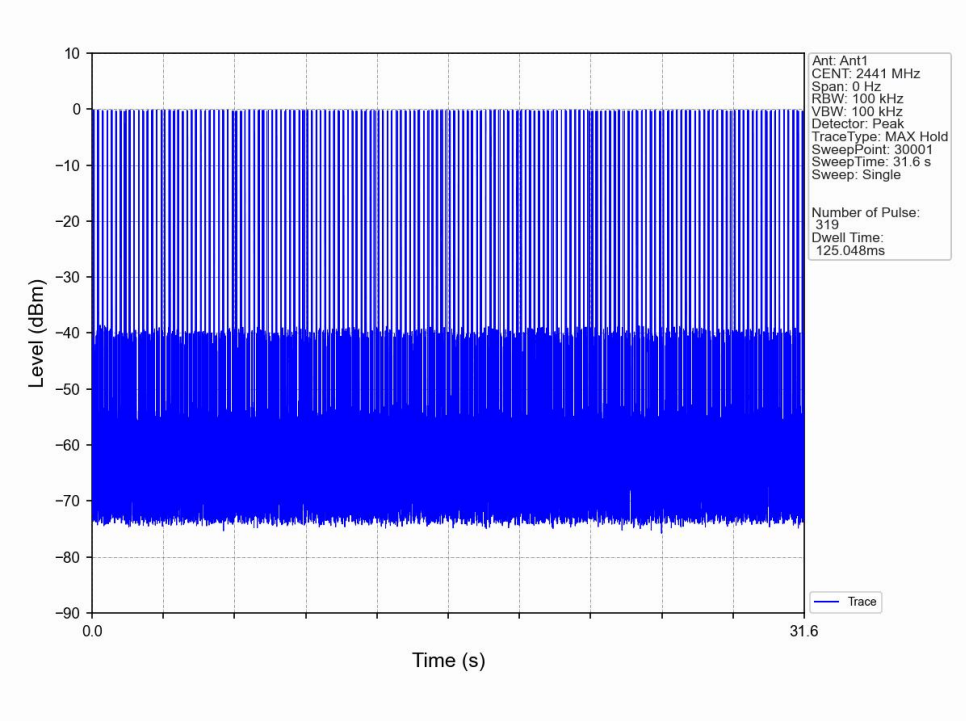

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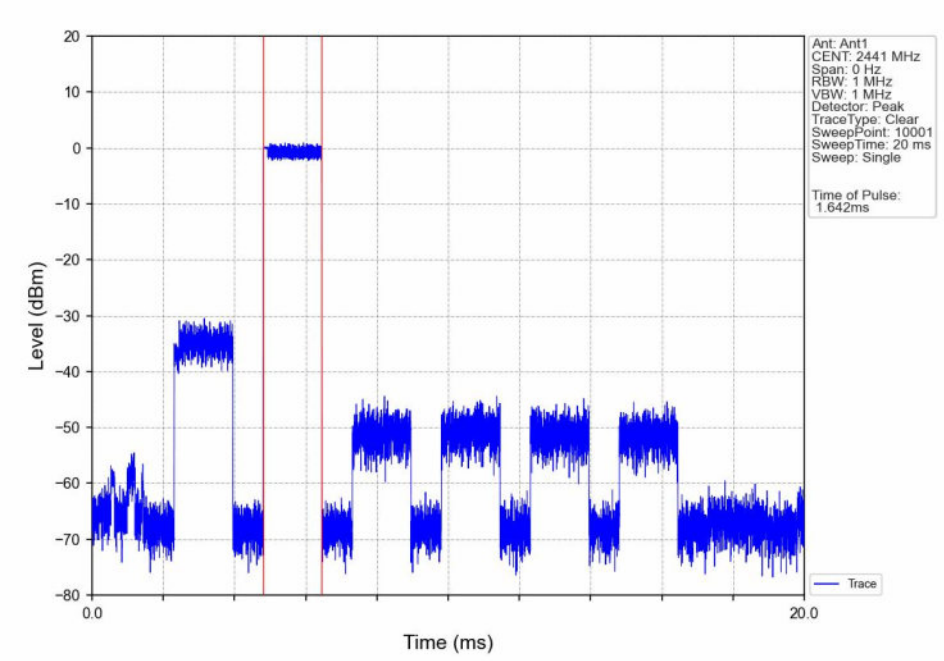

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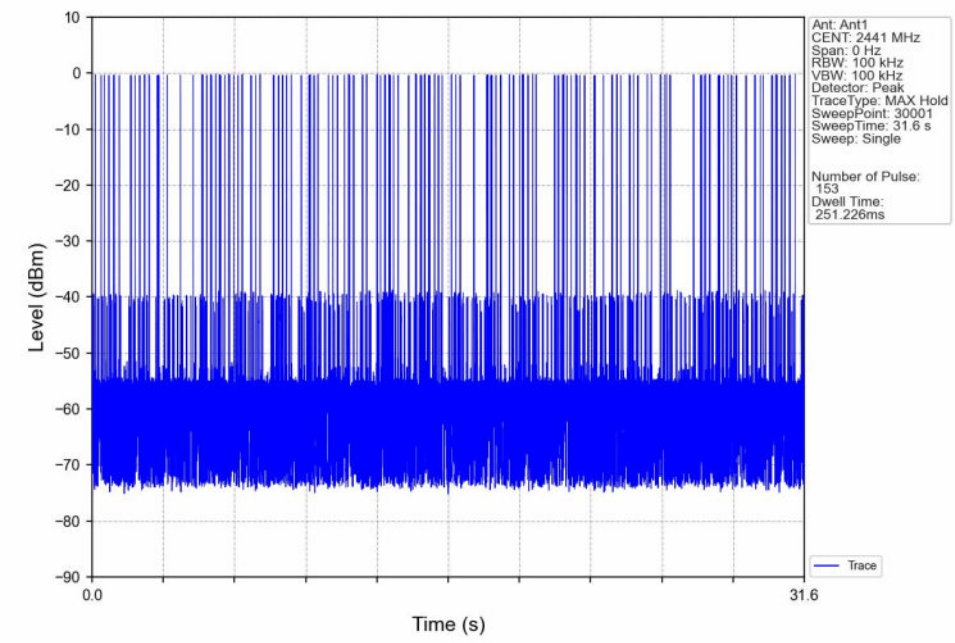

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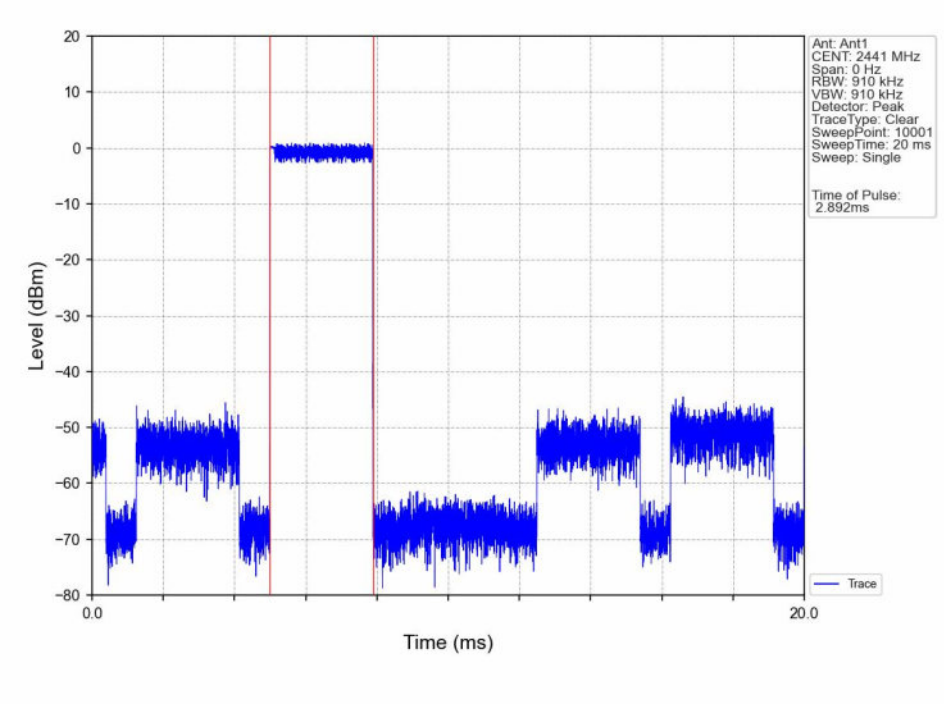

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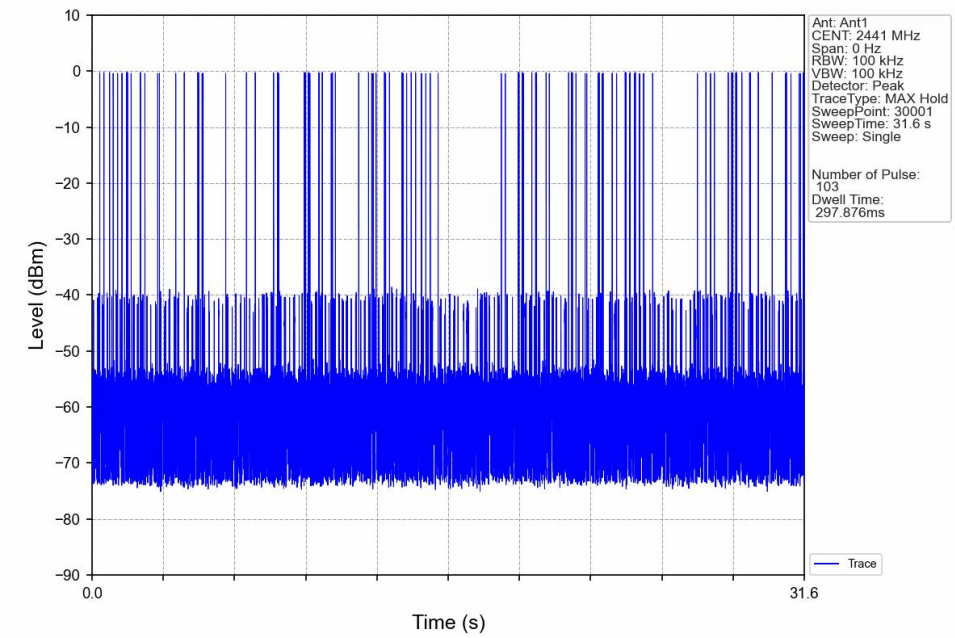


6. Unwanted Emissions In Non-restricted Frequency Bands

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	0.13
		2441	DH5	1	0.47
		2480	DH5	1	-0.30
Pi/4DQPSK	SISO	2402	2DH5	1	0.05
		2441	2DH5	1	0.41
		2480	2DH5	1	-0.34
8DPSK	SISO	2402	3DH5	1	0.01
		2441	3DH5	1	0.30
		2480	3DH5	1	-0.39
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.					

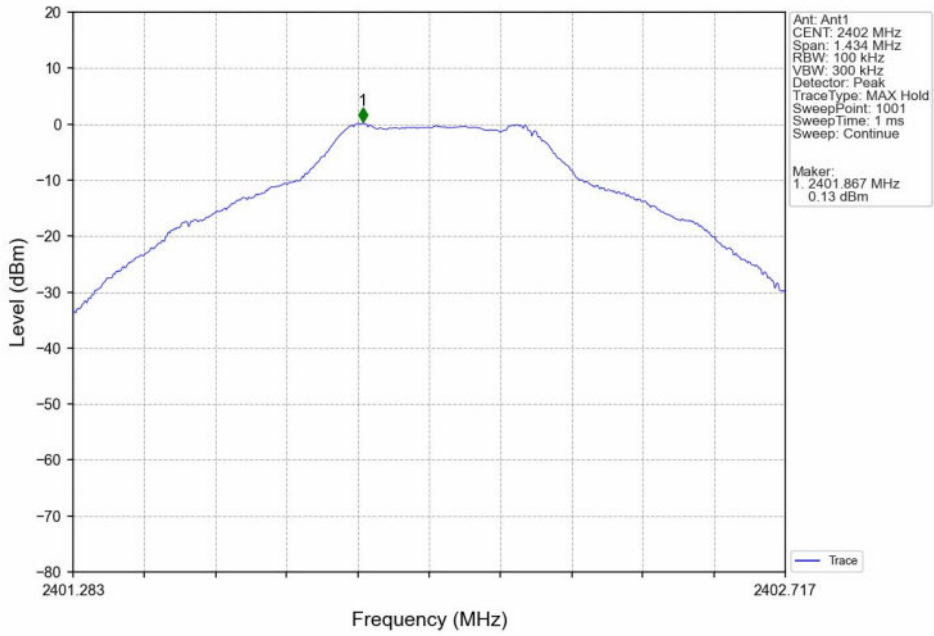
6.1.2 CSE

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	0.47	-19.53	Pass
		2441	DH5	1	0.47	-19.53	Pass
		2480	DH5	1	0.47	-19.53	Pass
		HOPP	DH5	1	0.47	-19.53	Pass
					0.47	-19.53	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	0.41	-19.59	Pass
		2441	2DH5	1	0.41	-19.59	Pass
		2480	2DH5	1	0.41	-19.59	Pass
		HOPP	2DH5	1	0.41	-19.59	Pass
					0.41	-19.59	Pass
8DPSK	SISO	2402	3DH5	1	0.30	-19.70	Pass
		2441	3DH5	1	0.30	-19.70	Pass
		2480	3DH5	1	0.30	-19.70	Pass
		HOPP	3DH5	1	0.30	-19.70	Pass
					0.30	-19.70	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.							

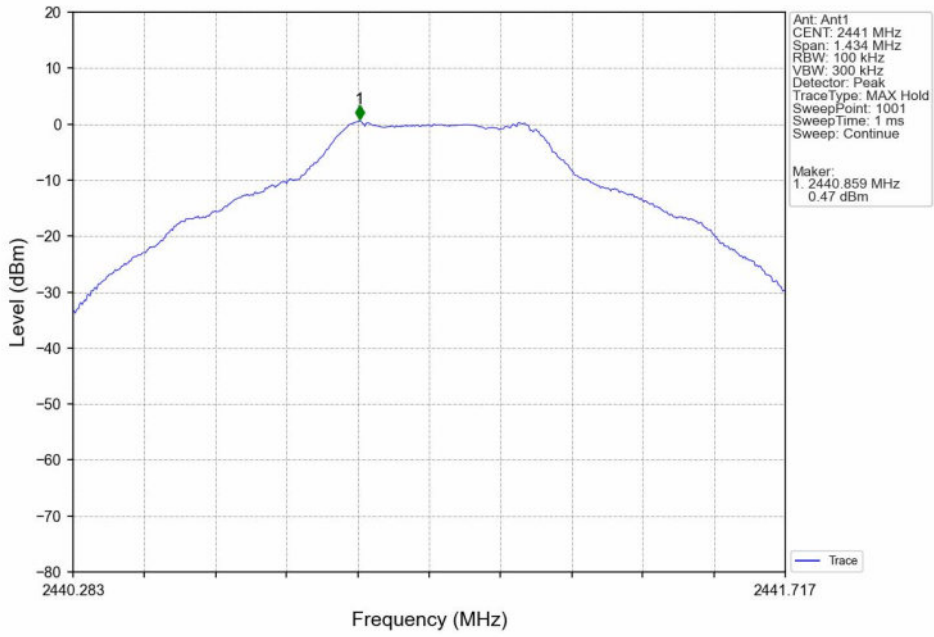
6.2 Test Graph

6.2.1 Ref

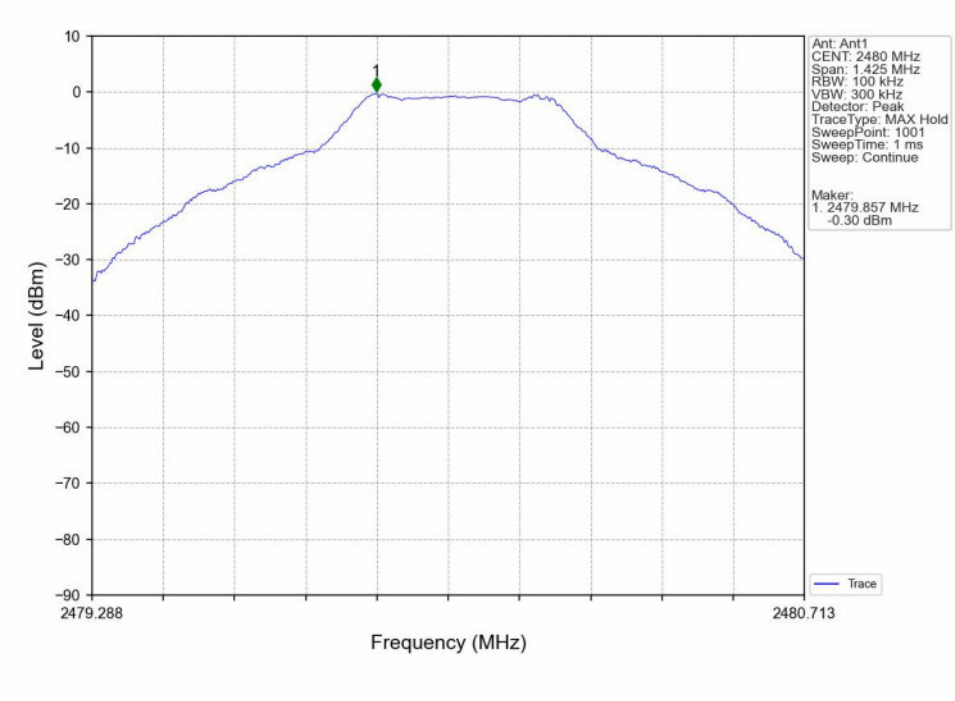
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



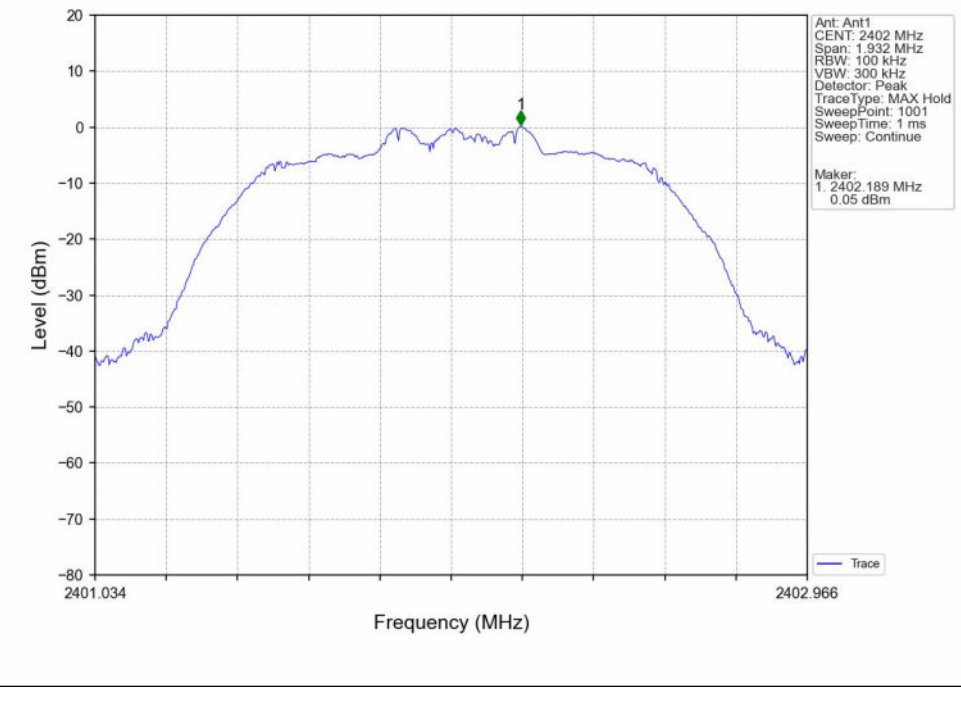
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



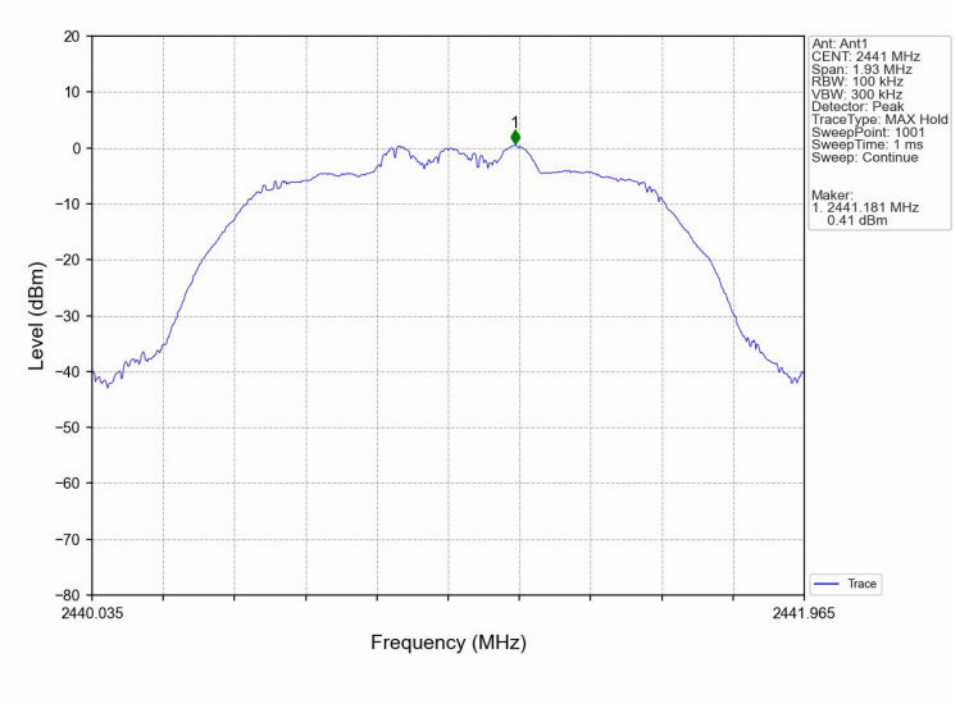
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



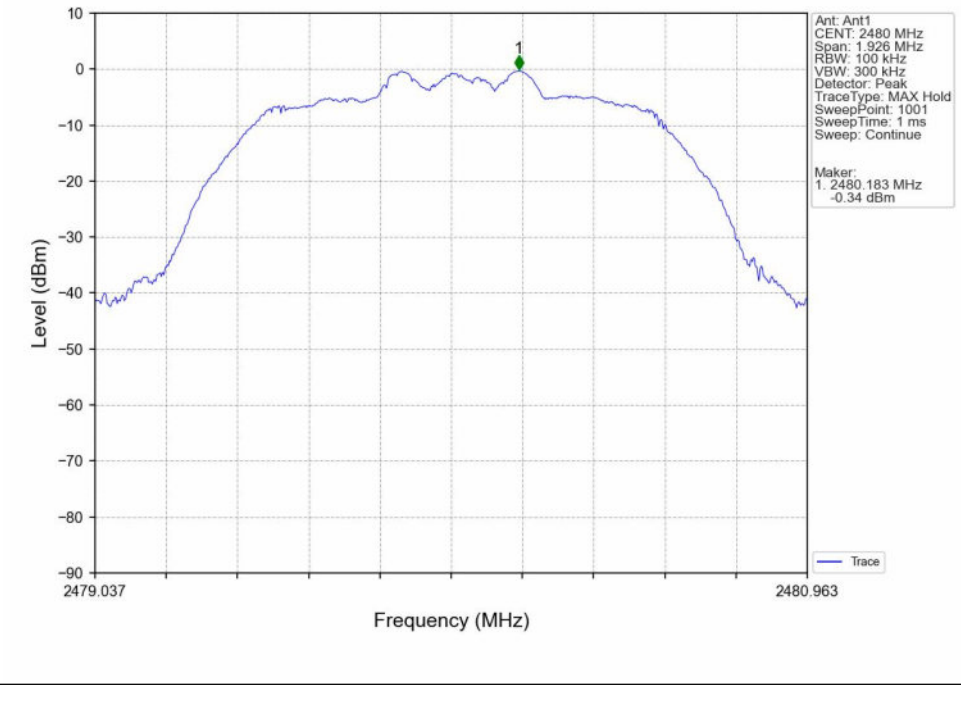
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



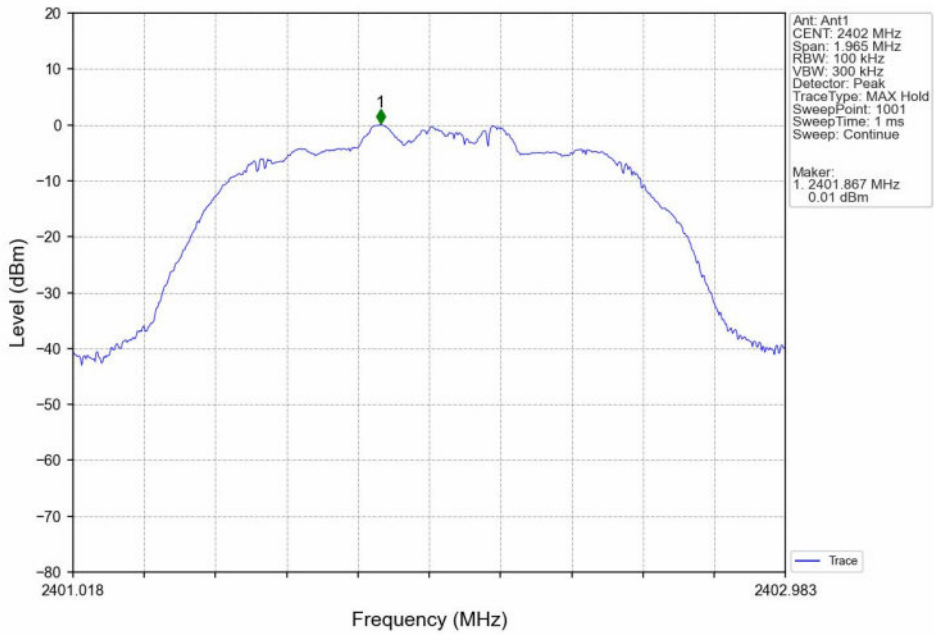
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



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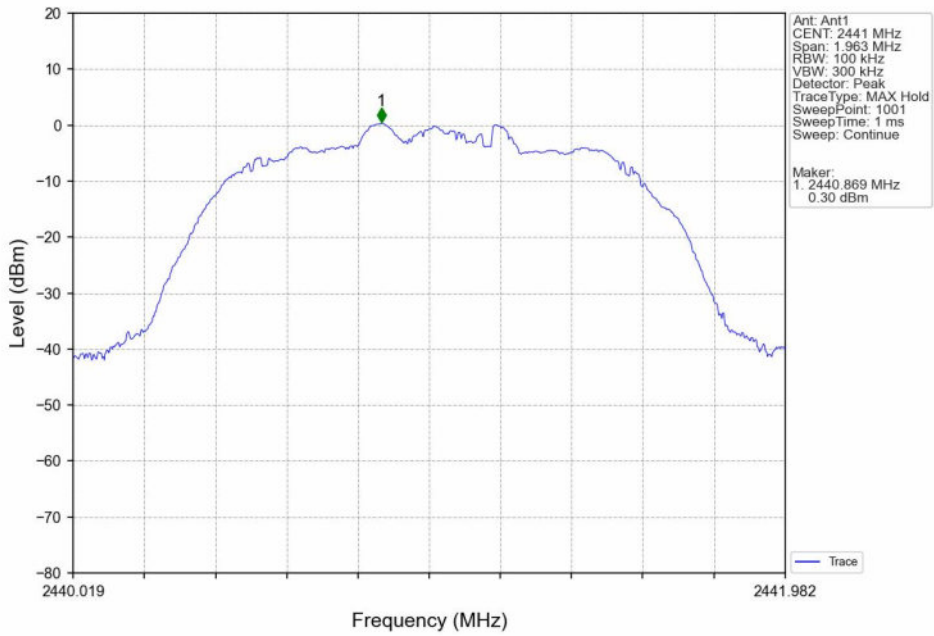

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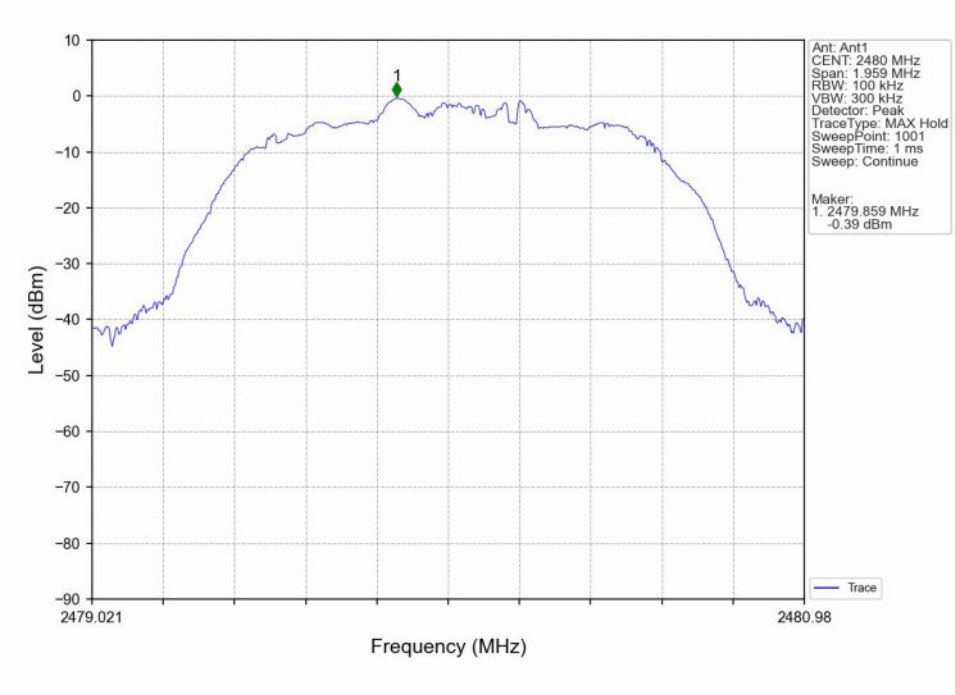
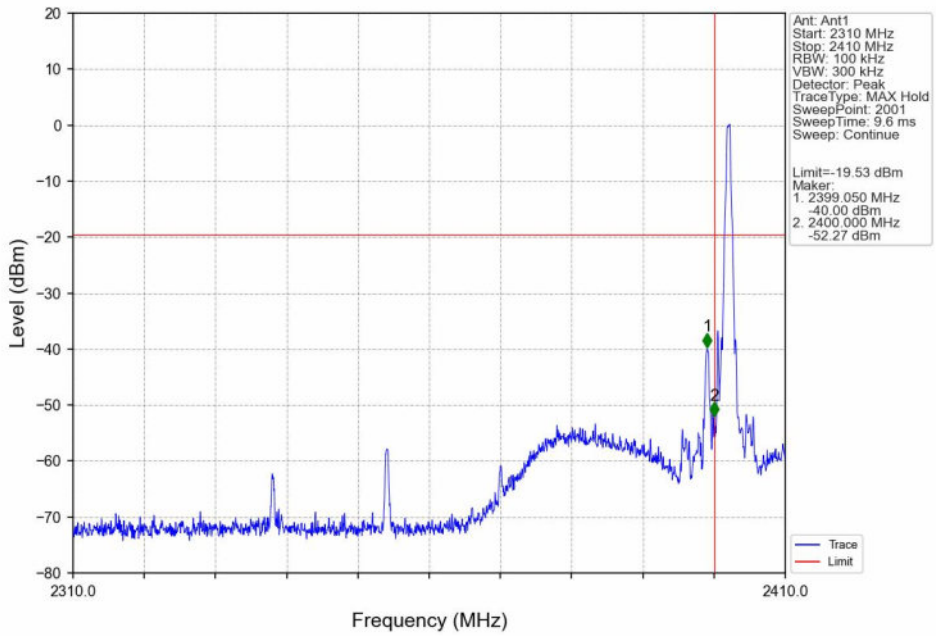
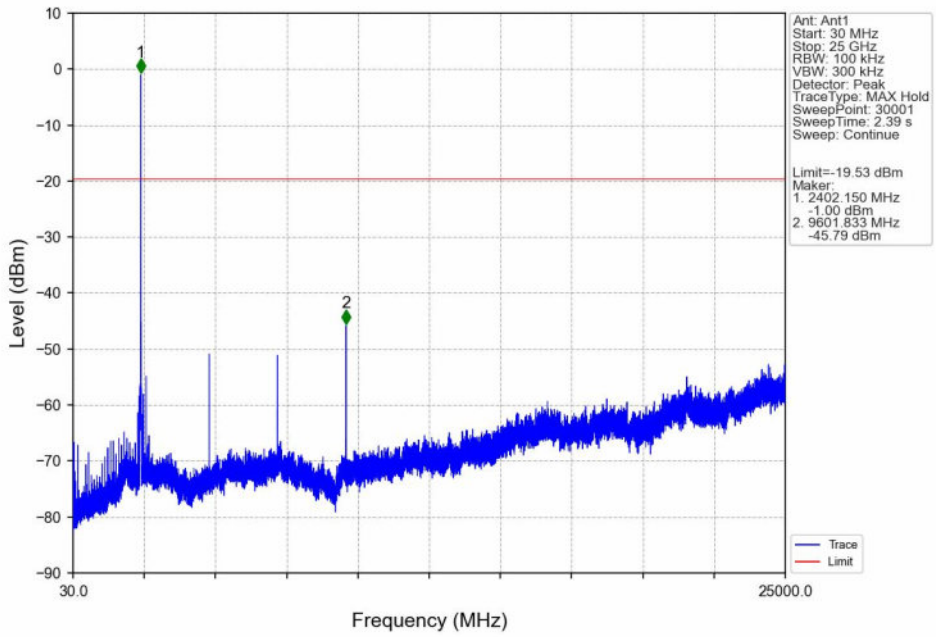


6.2.2 CSE

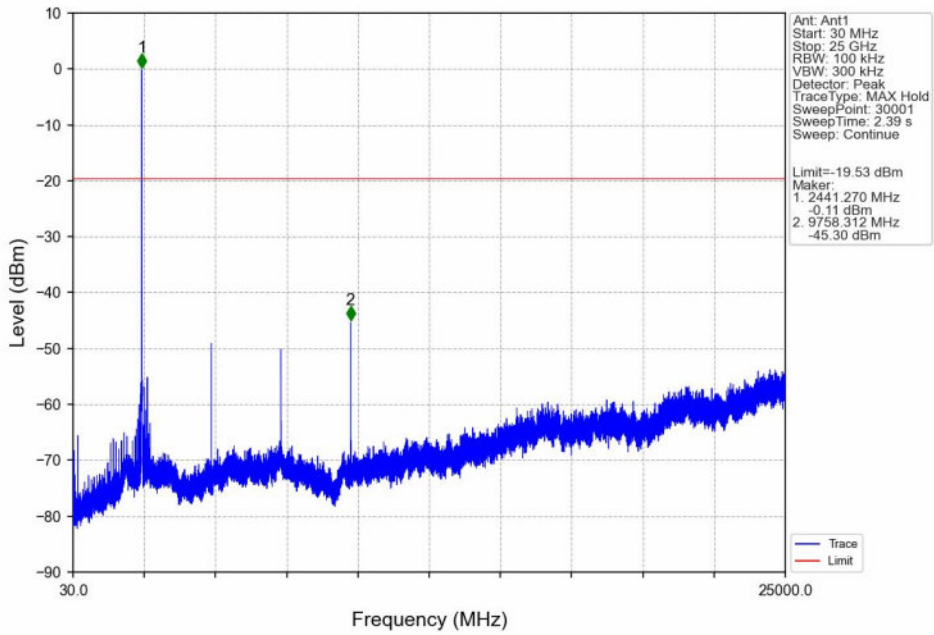
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



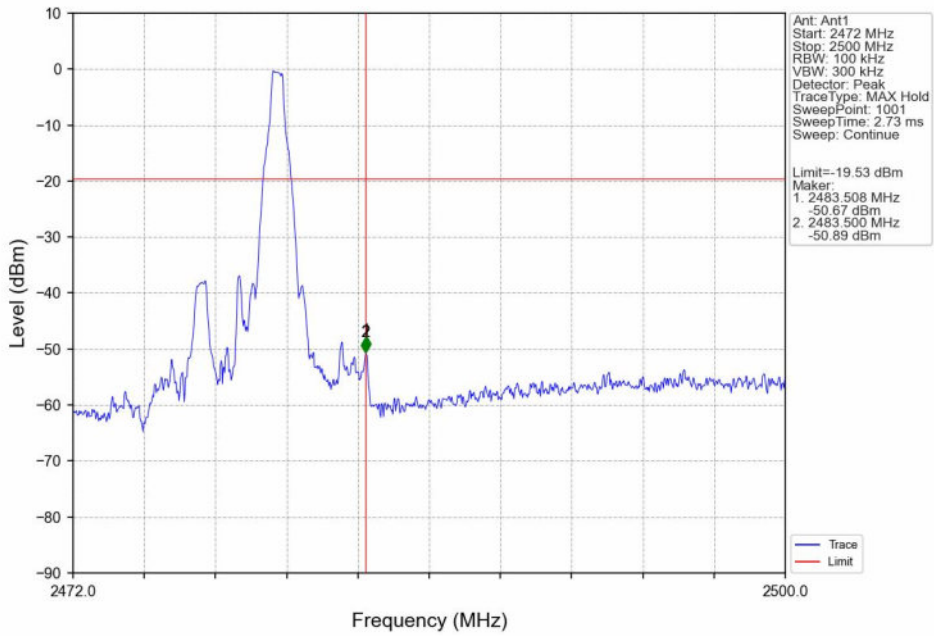
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



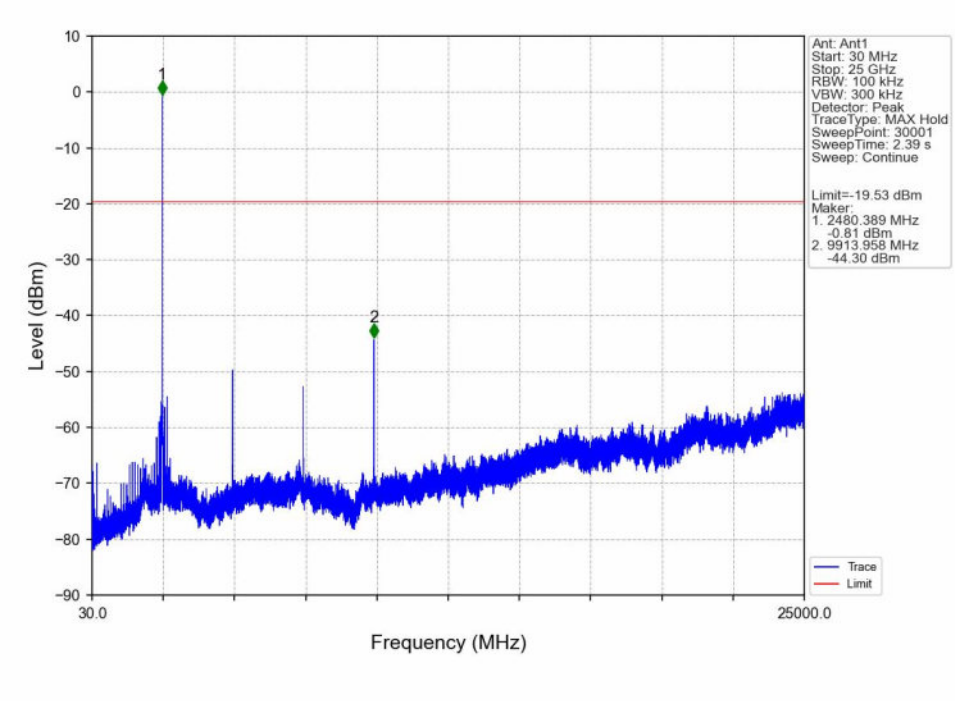
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



GFSK_DH5_HCH_2480MHz_Ant1_NTNV



GFSK_DH5_HCH_2480MHz_Ant1_NTNV



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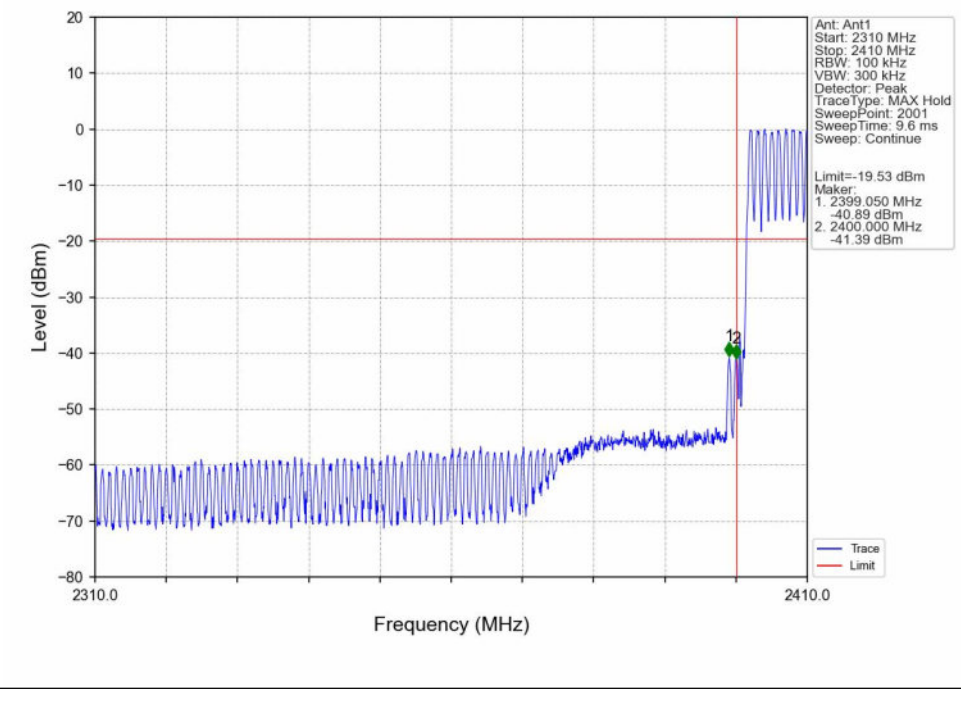

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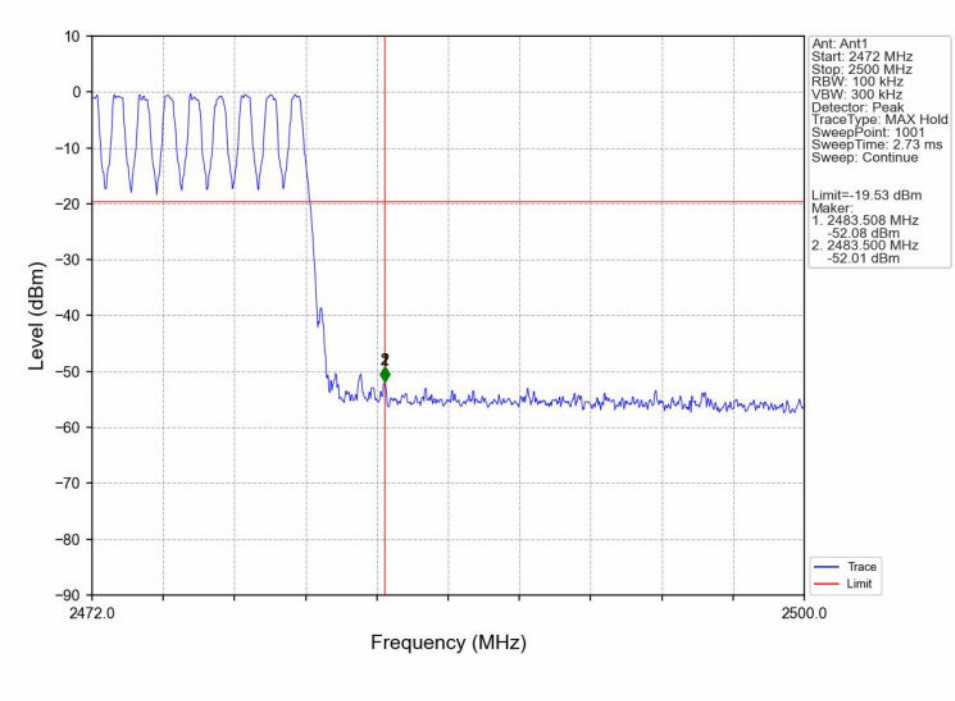
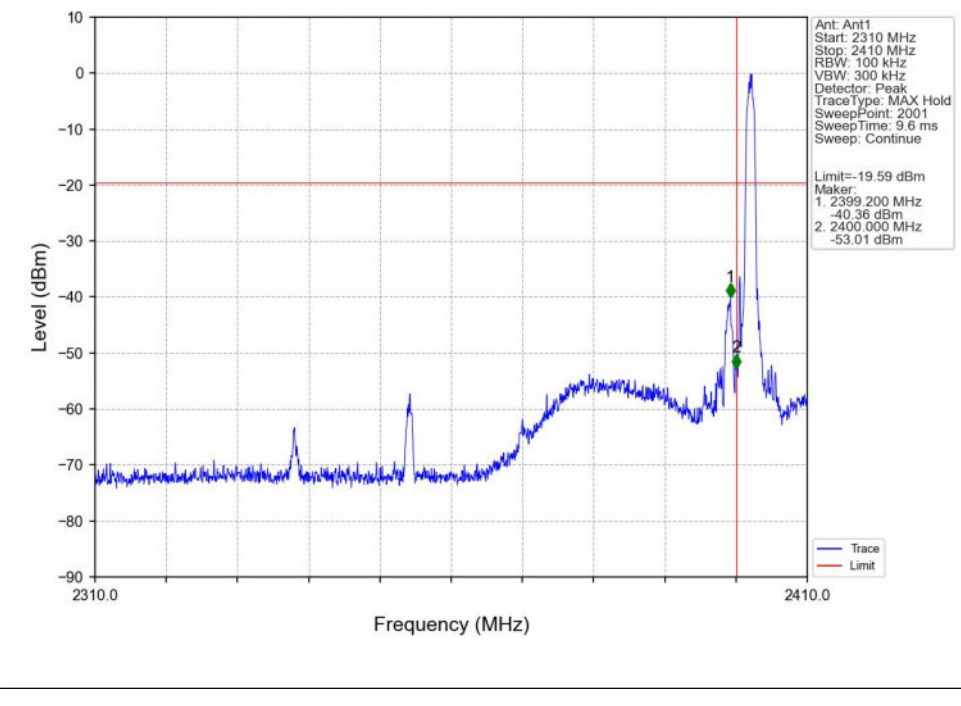
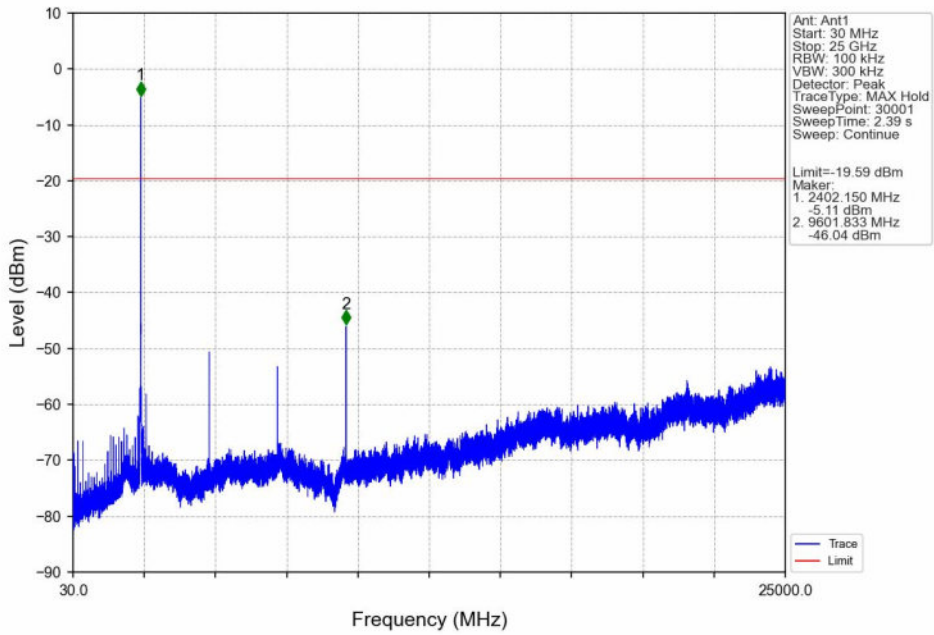


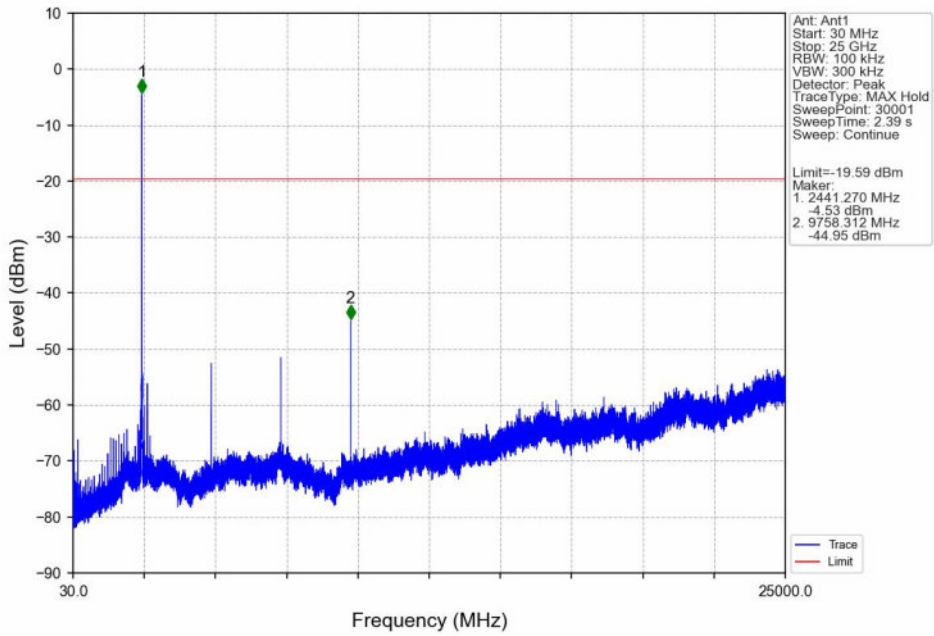
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



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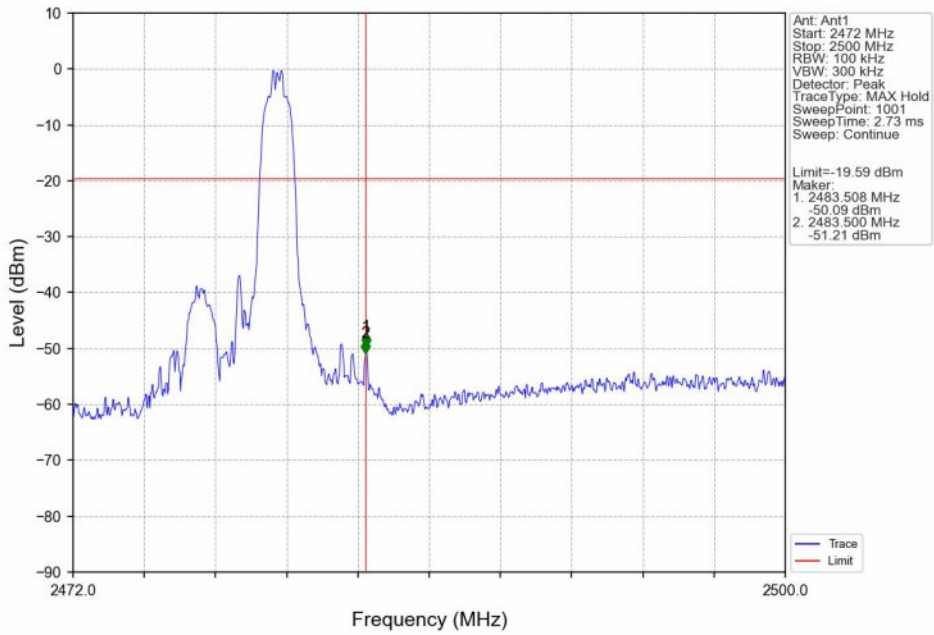

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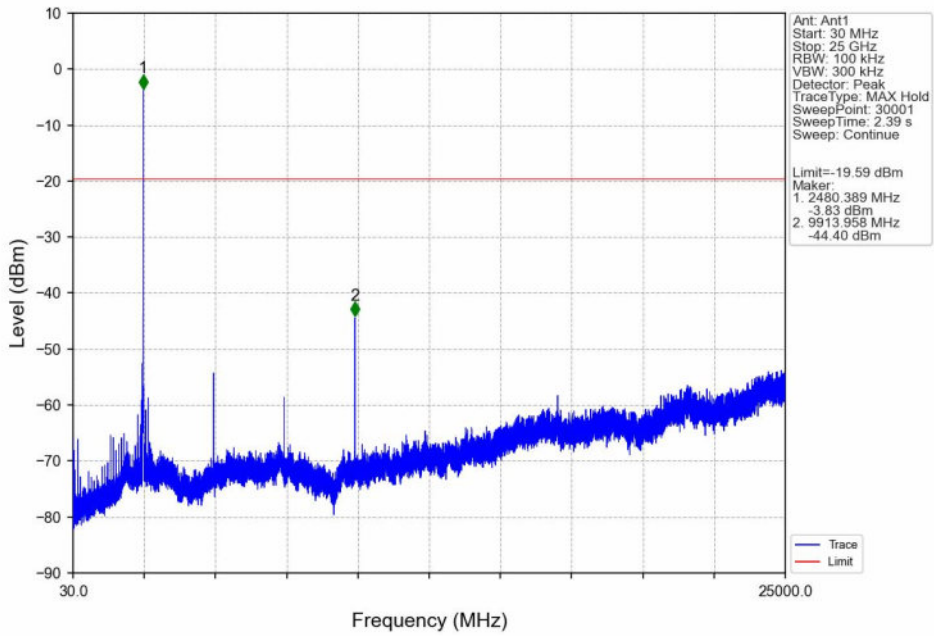

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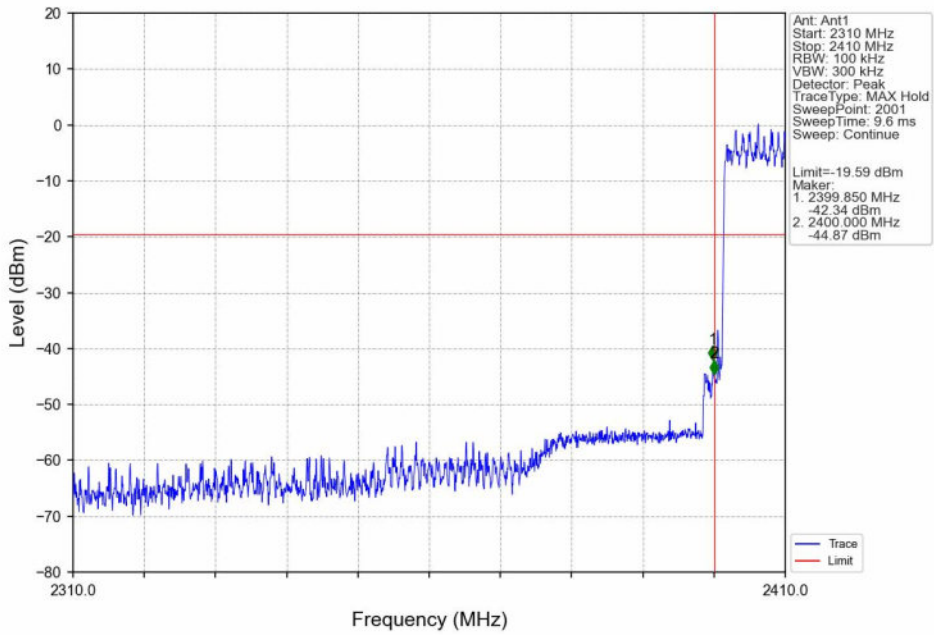

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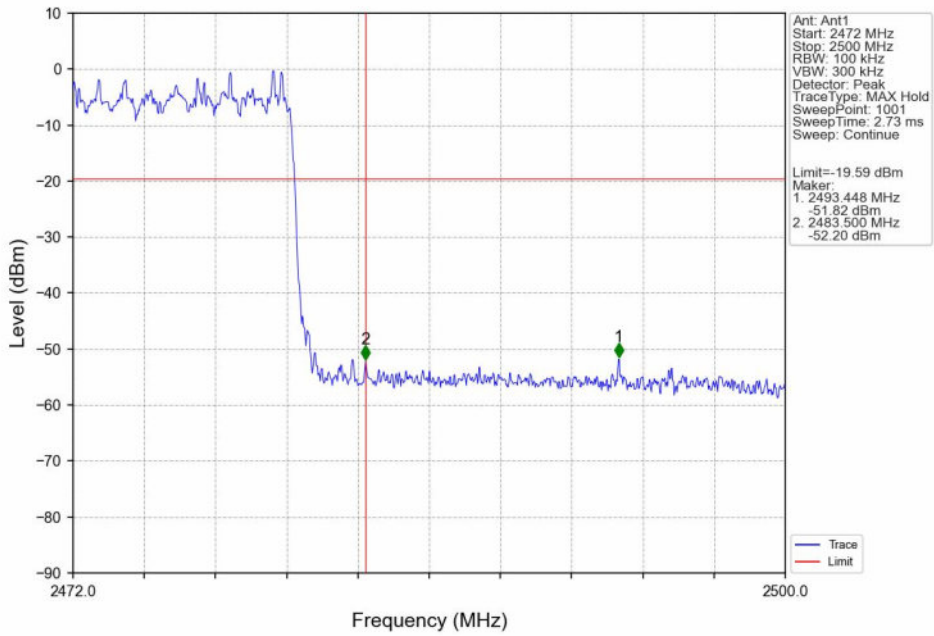
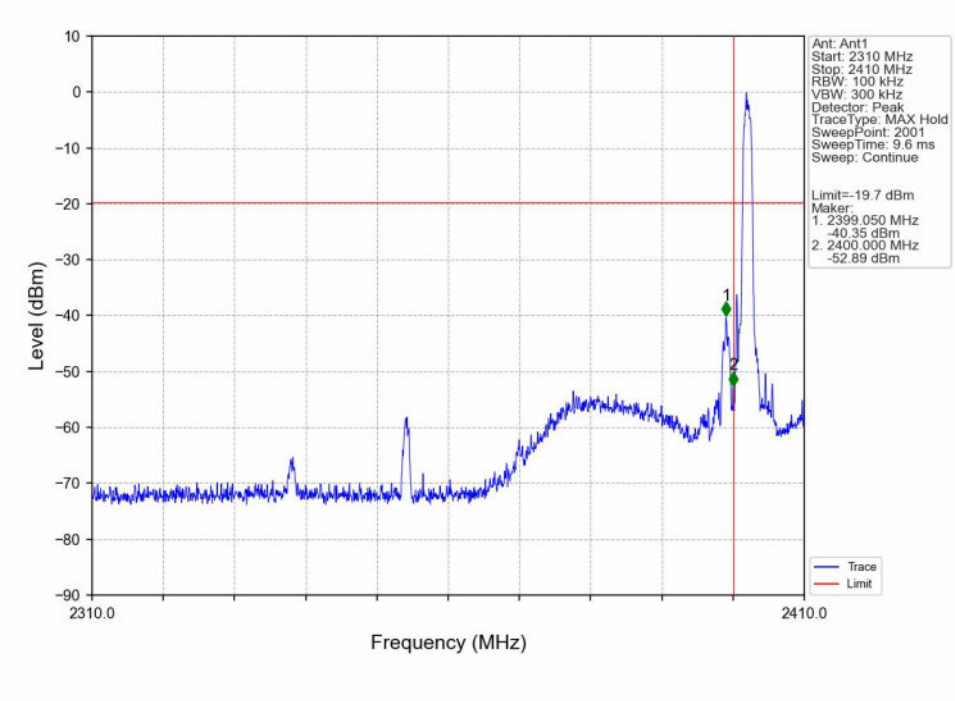


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



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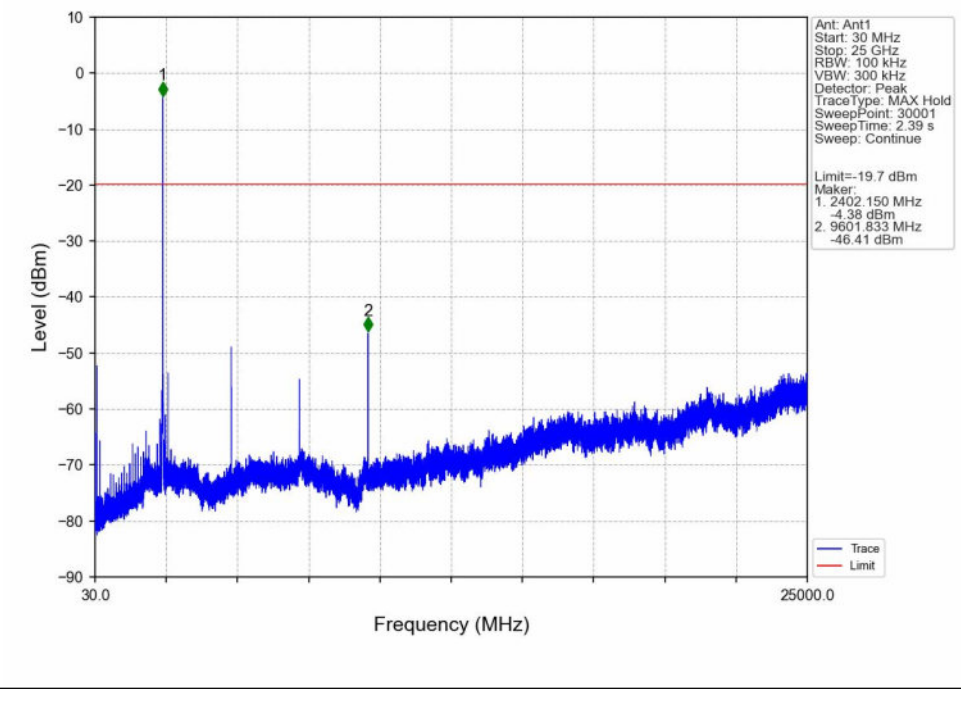

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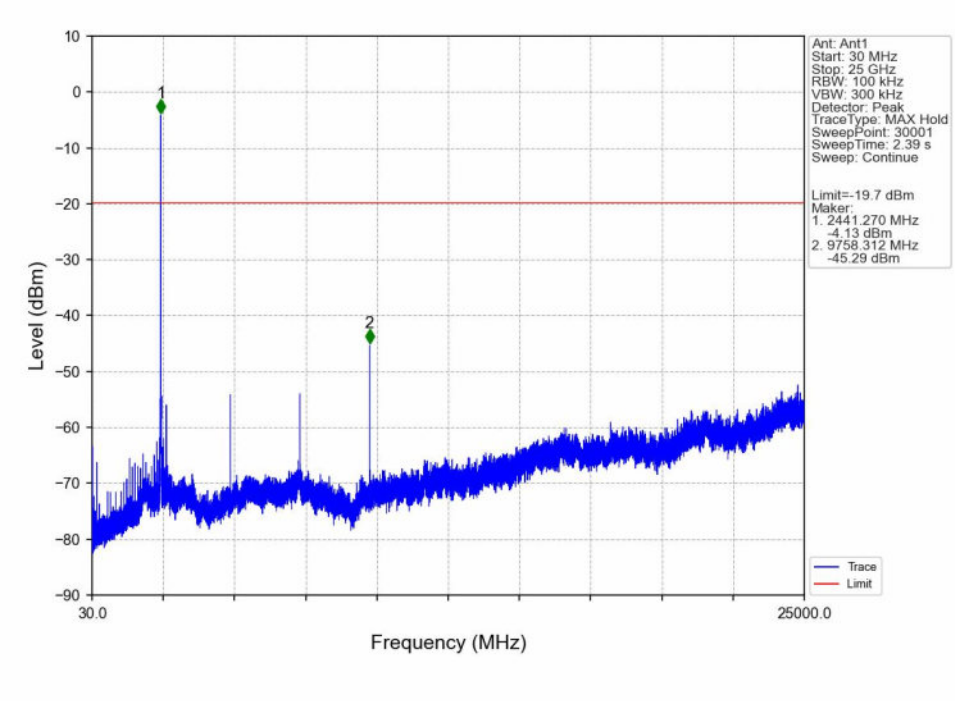

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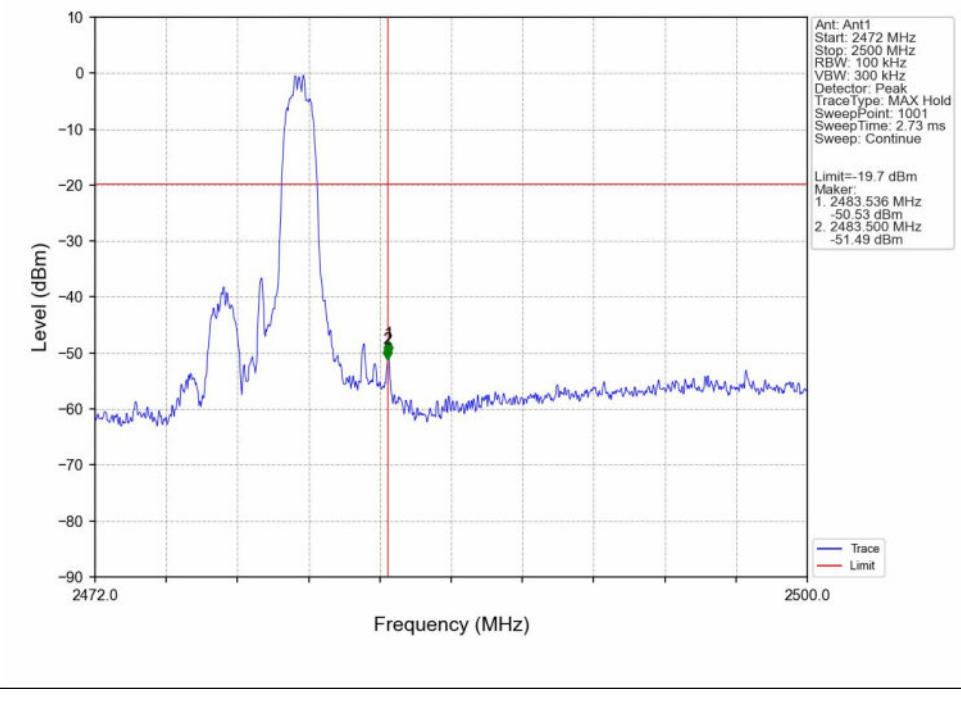

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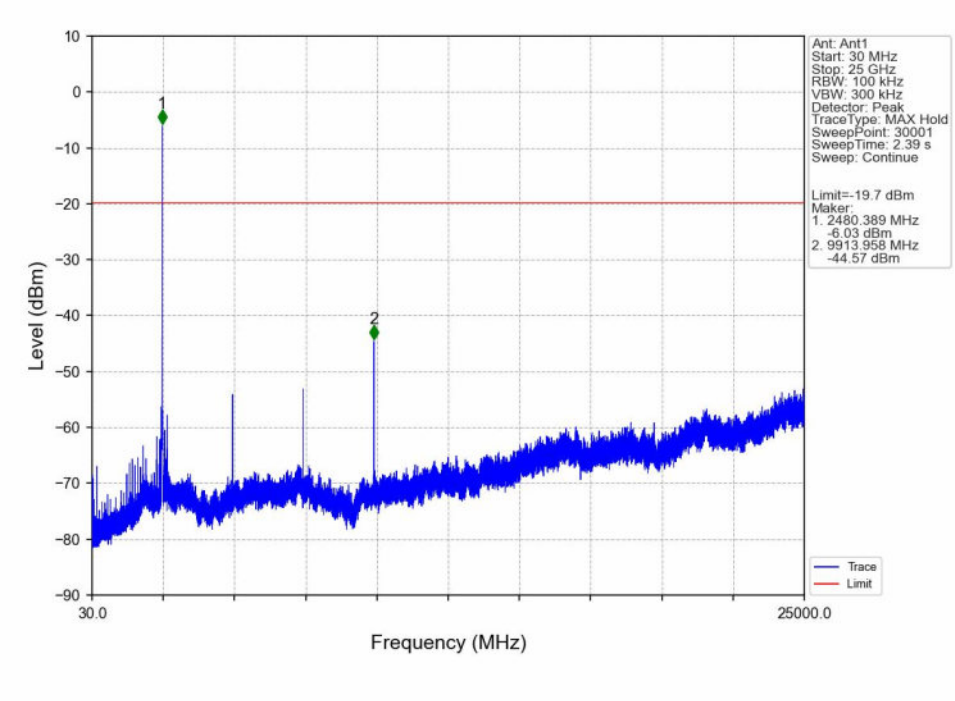

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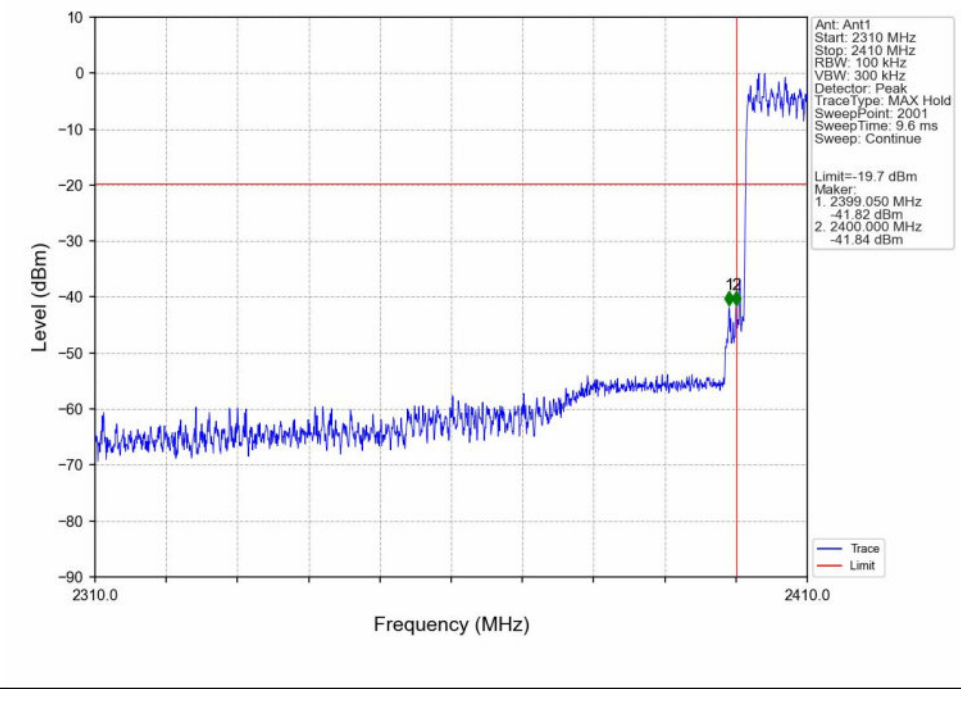
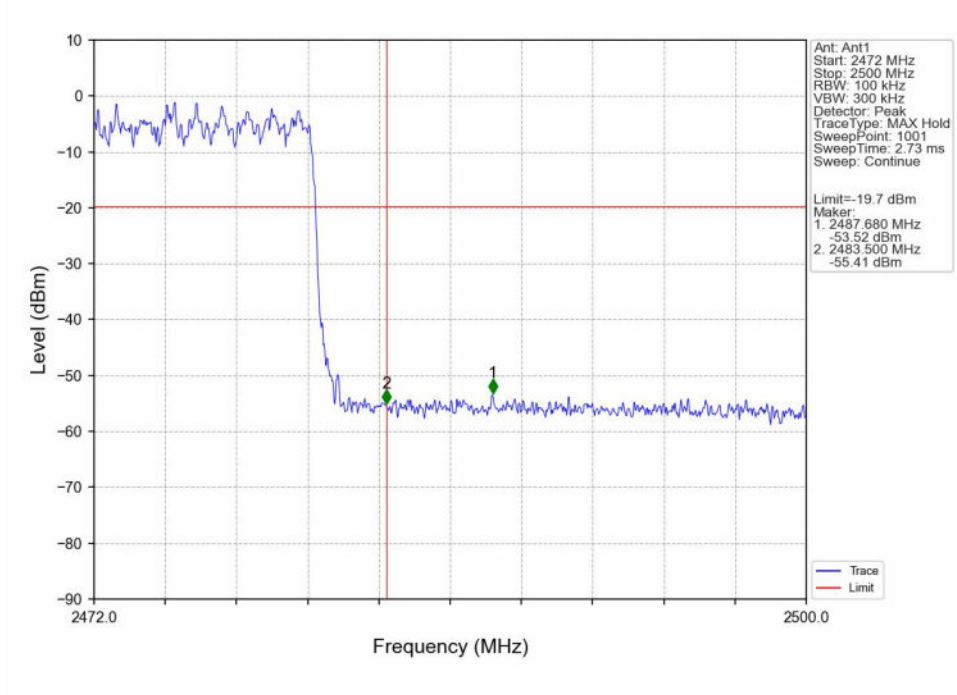
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