



RF Test Report

For

Project No.:	ZKT-240913L11618E-1
Client:	Shenzhen Huiran Technology Co., Ltd
Manufacturer:	Shenzhen Huiran Technology Co., Ltd
Product Description:	MP4 Player
Test Model	YMP-A1
Test Engineer:	Franco
Test Date:	2024-09-19

Test Summary

Item	Result
Bandwidth	Pass
Maximum Conducted Output Power	Pass
Carrier Frequency Separation	Pass
Number of Hopping Frequencies	Pass
Time of Occupancy (Dwell Time)	Pass
Unwanted Emissions In Non-restricted Frequency Bands	Pass
Frequency Error	Pass
Form731	Pass



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	0.880	/	Pass
		2441	DH5	1	0.881	/	Pass
		2480	DH5	1	0.881	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.167	/	Pass
		2441	2DH5	1	1.168	/	Pass
		2480	2DH5	1	1.166	/	Pass
8DPSK	SISO	2402	3DH5	1	1.161	/	Pass
		2441	3DH5	1	1.162	/	Pass
		2480	3DH5	1	1.161	/	Pass

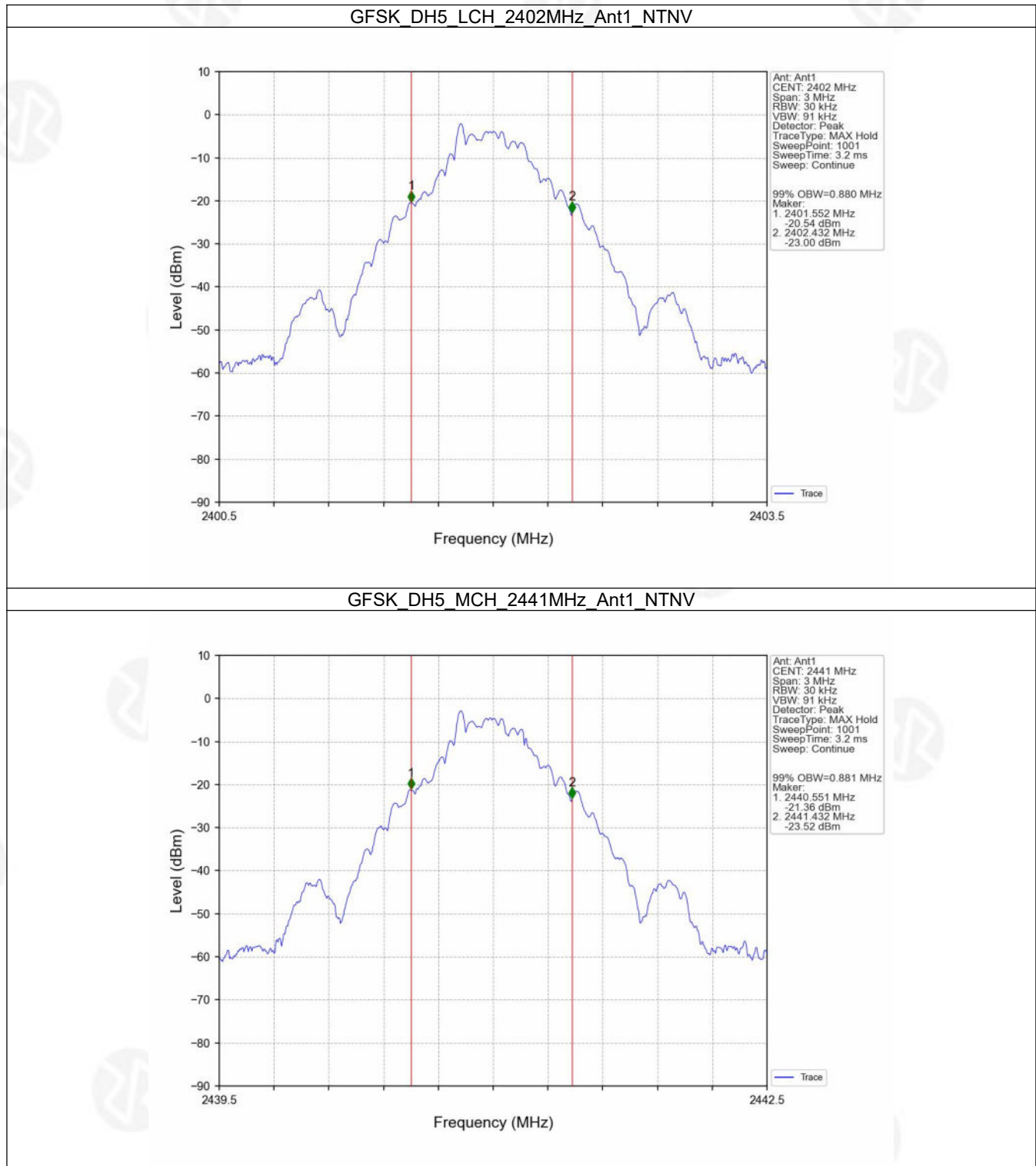
1.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.947	/	Pass
		2441	DH5	1	0.950	/	Pass
		2480	DH5	1	0.948	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.285	/	Pass
		2441	2DH5	1	1.284	/	Pass
		2480	2DH5	1	1.284	/	Pass
8DPSK	SISO	2402	3DH5	1	1.275	/	Pass
		2441	3DH5	1	1.277	/	Pass
		2480	3DH5	1	1.276	/	Pass



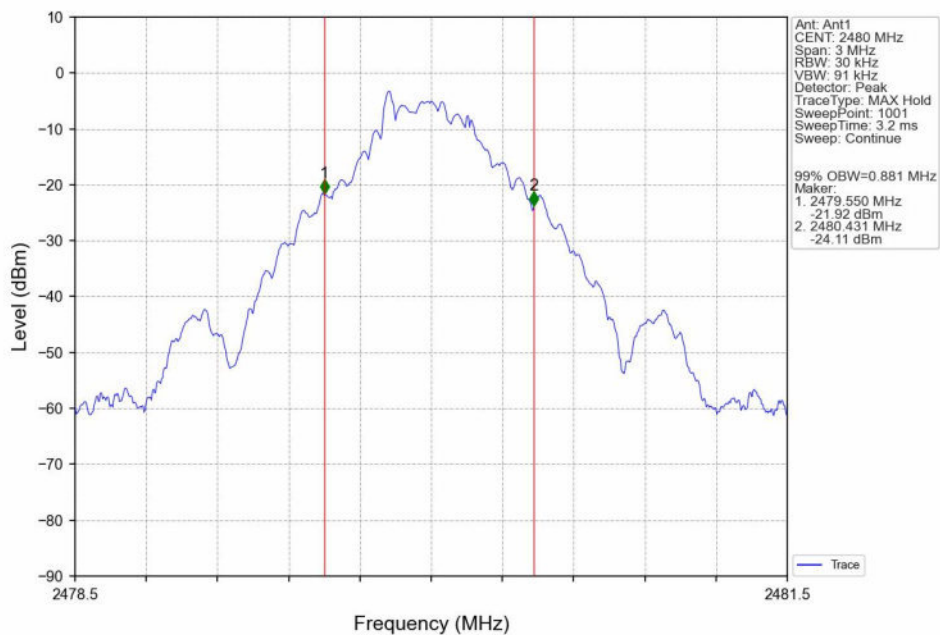
1.2 Test Graph

1.2.1 OBW

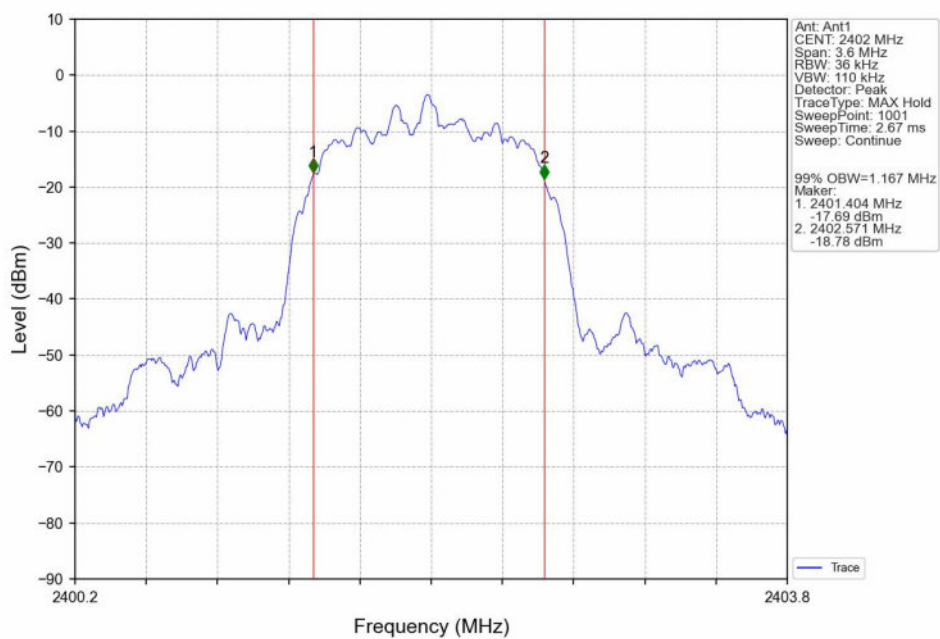




GFSK DH5_HCH_2480MHz_Ant1_NTNV

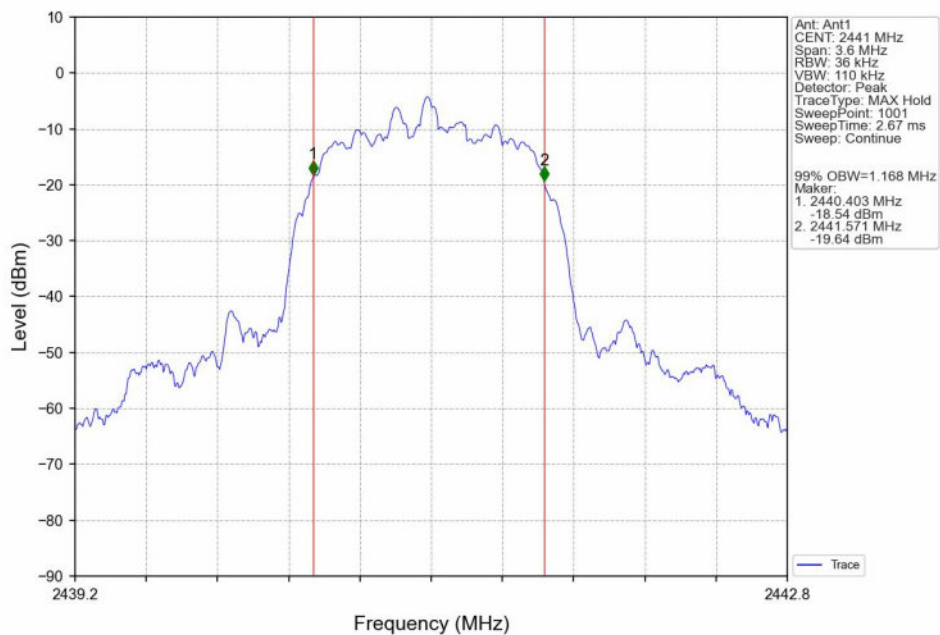


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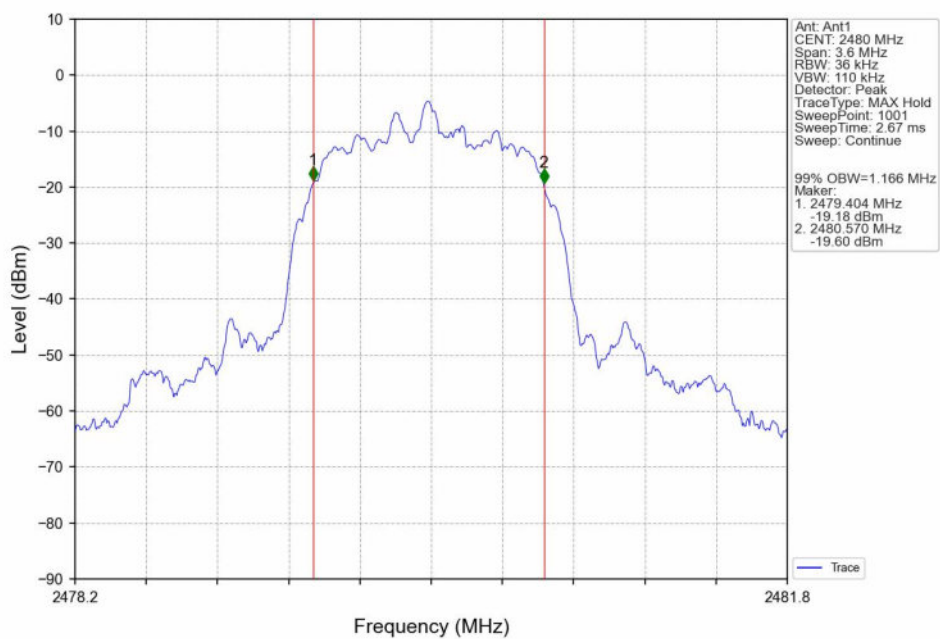




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

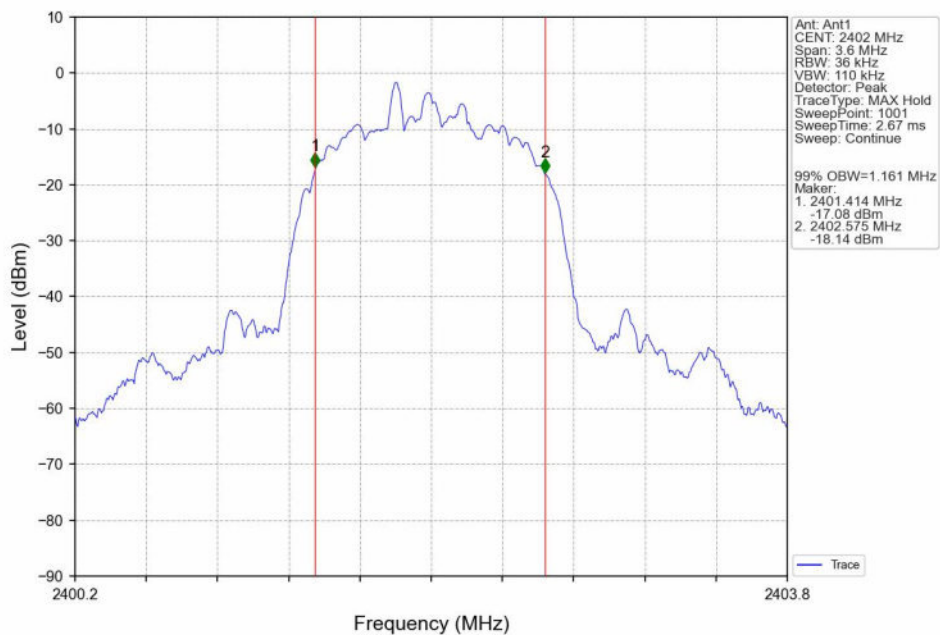


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

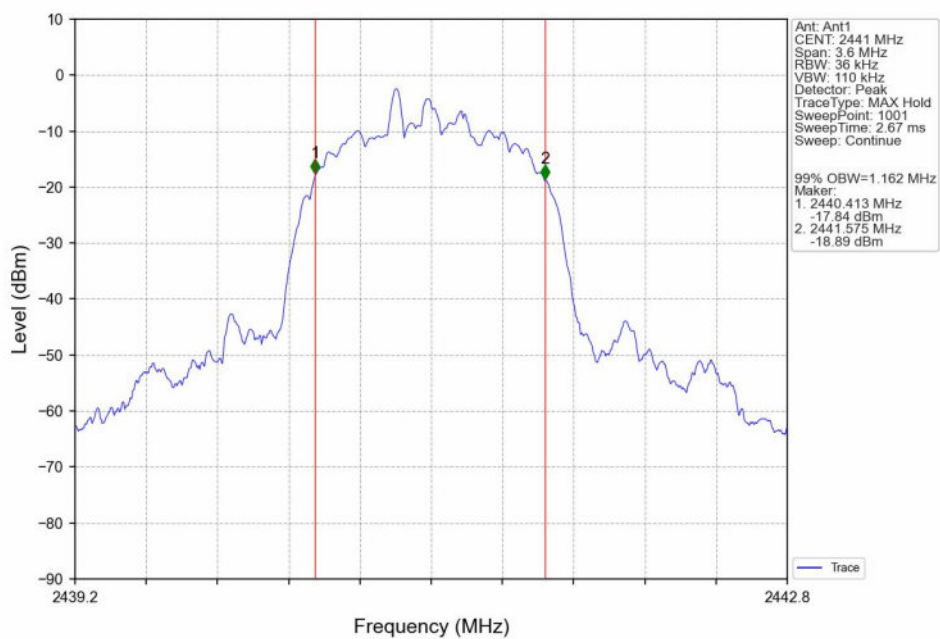


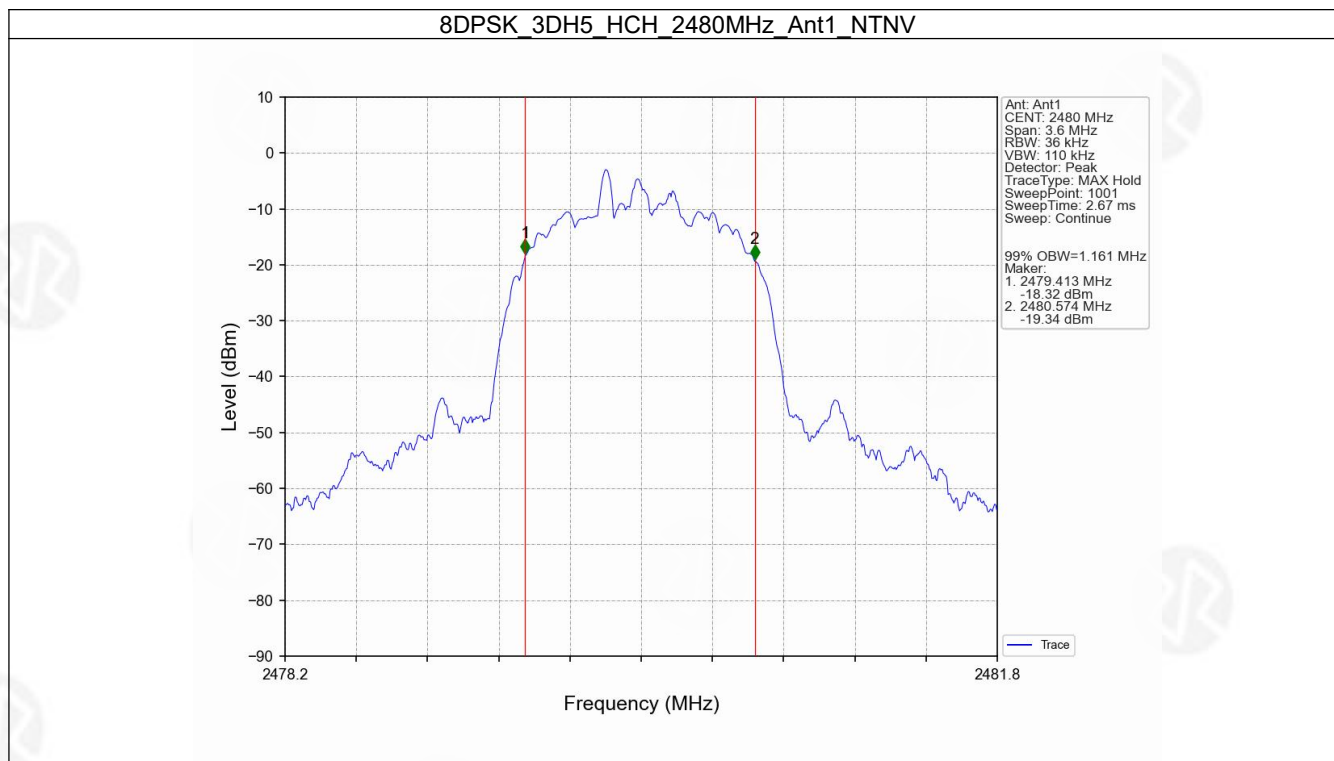


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



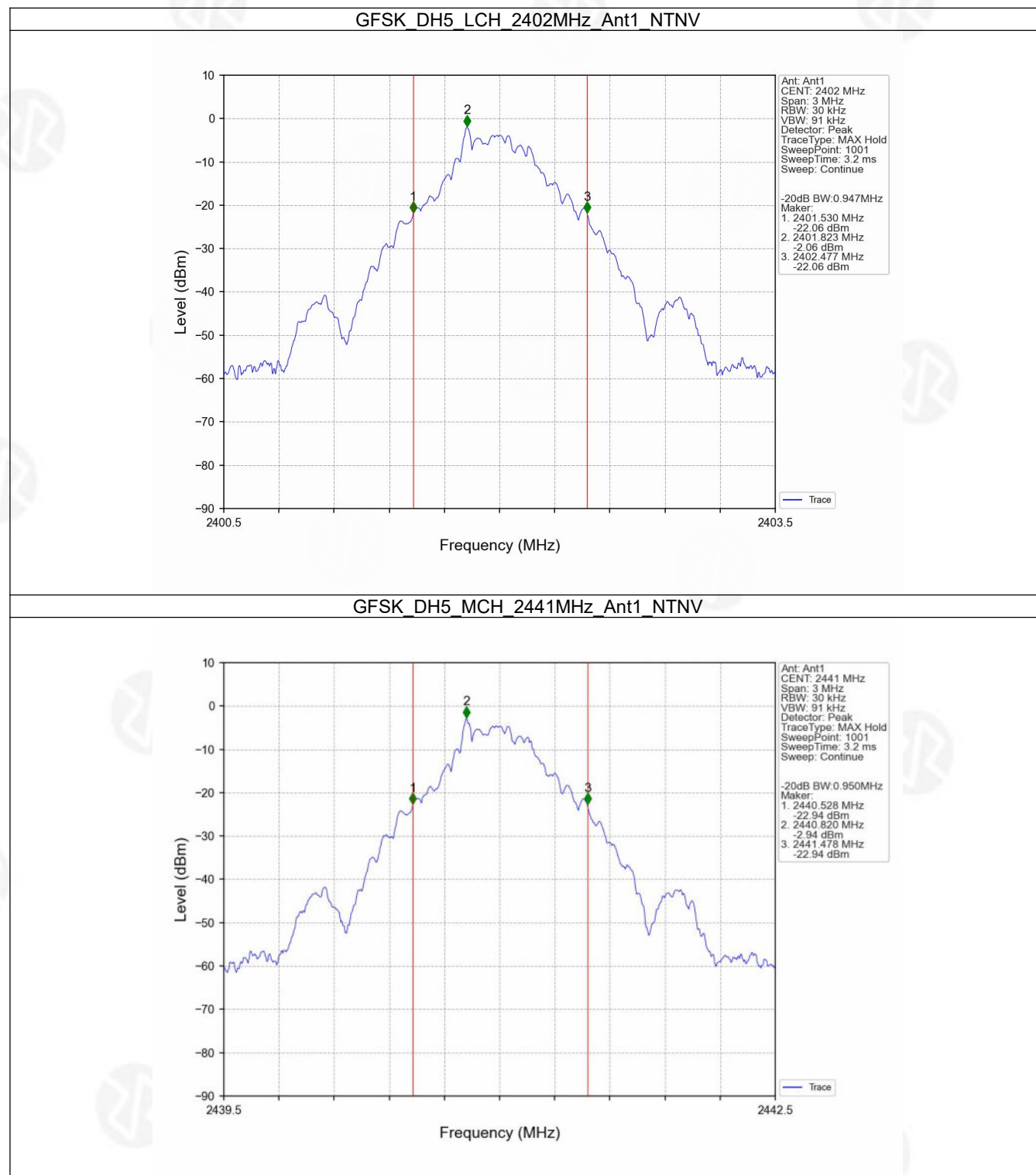
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





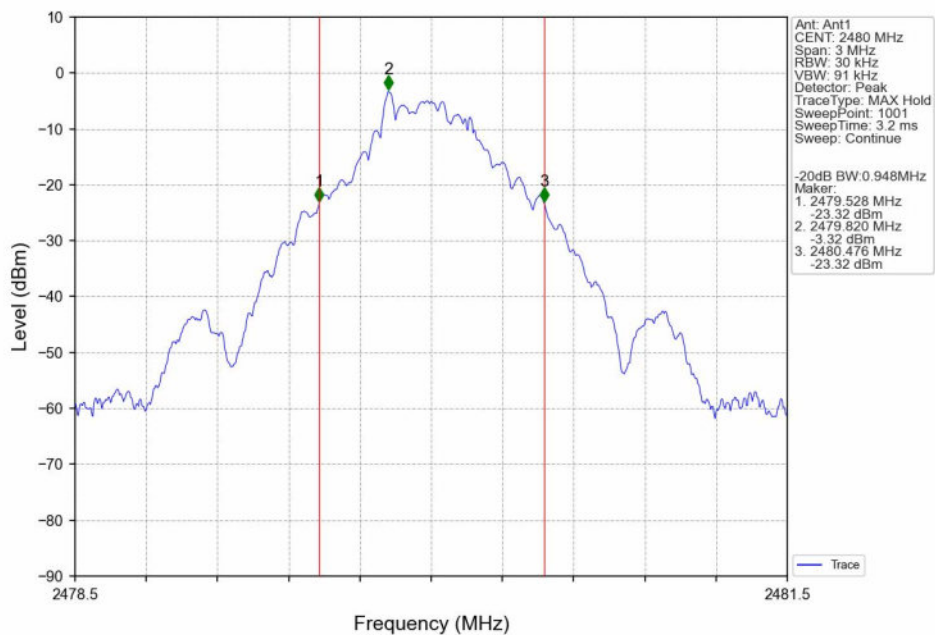


1.2.2 20dB BW

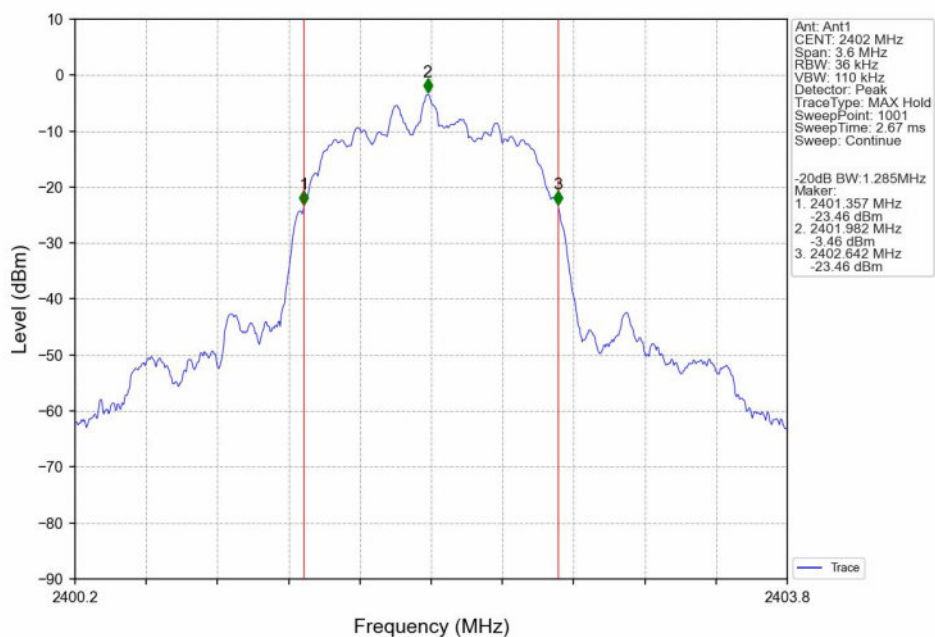




GFSK DH5_HCH_2480MHz_Ant1_NTNV

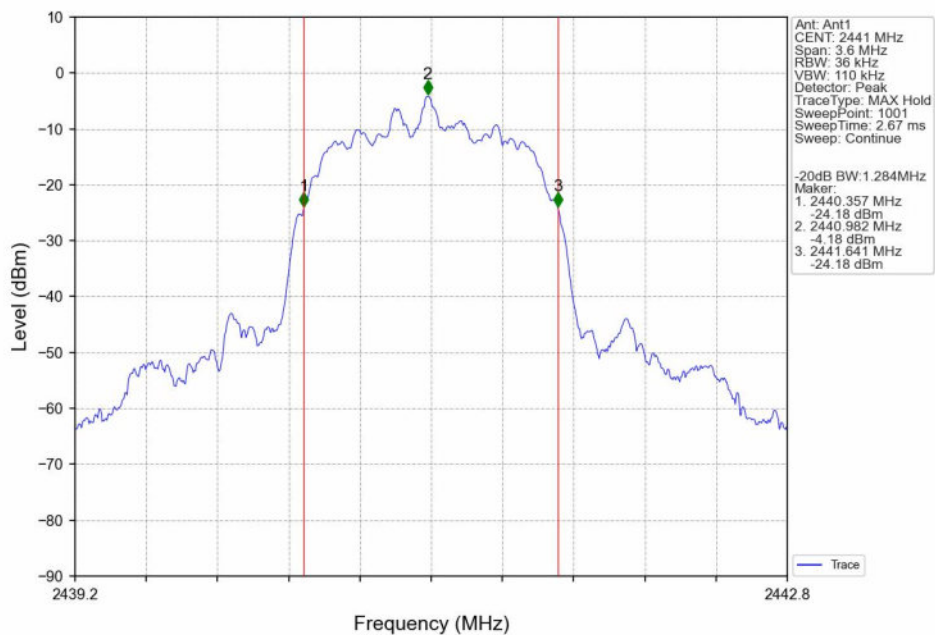


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

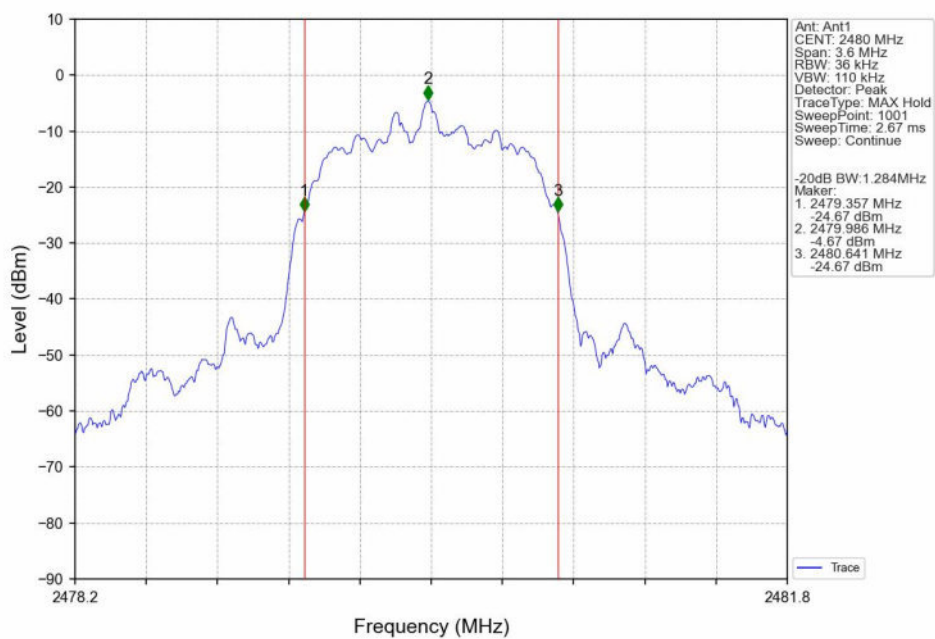




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

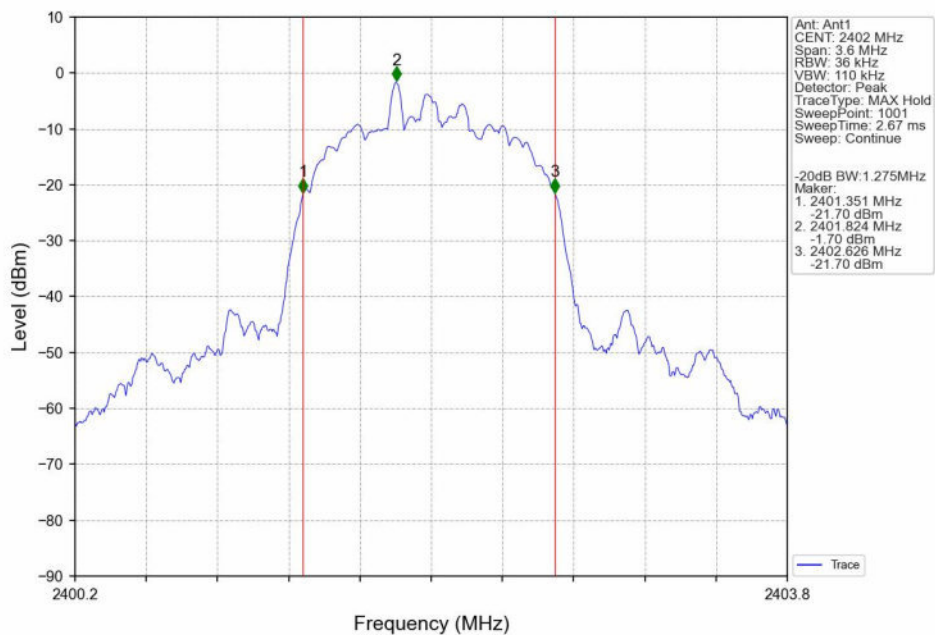


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

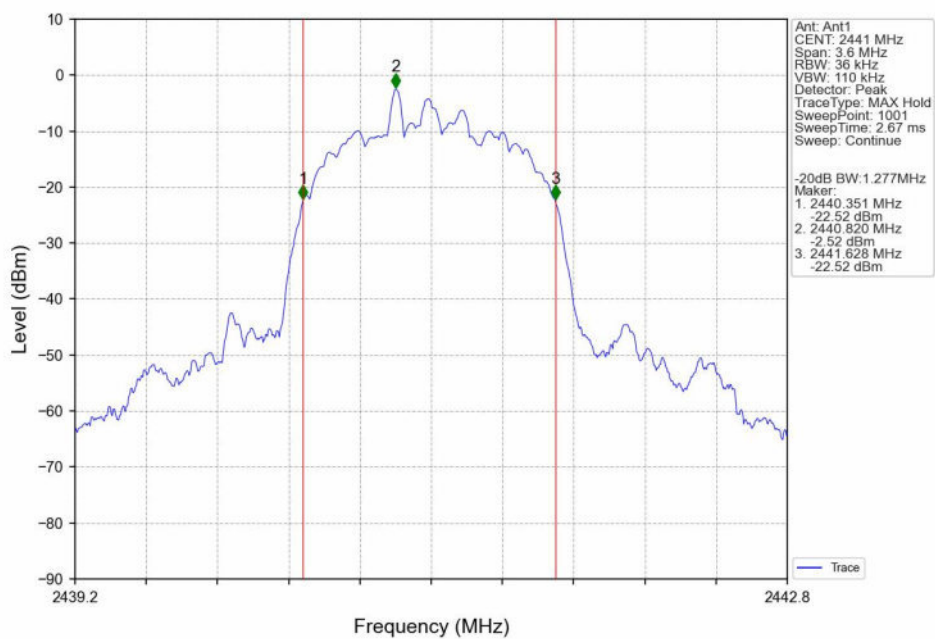




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

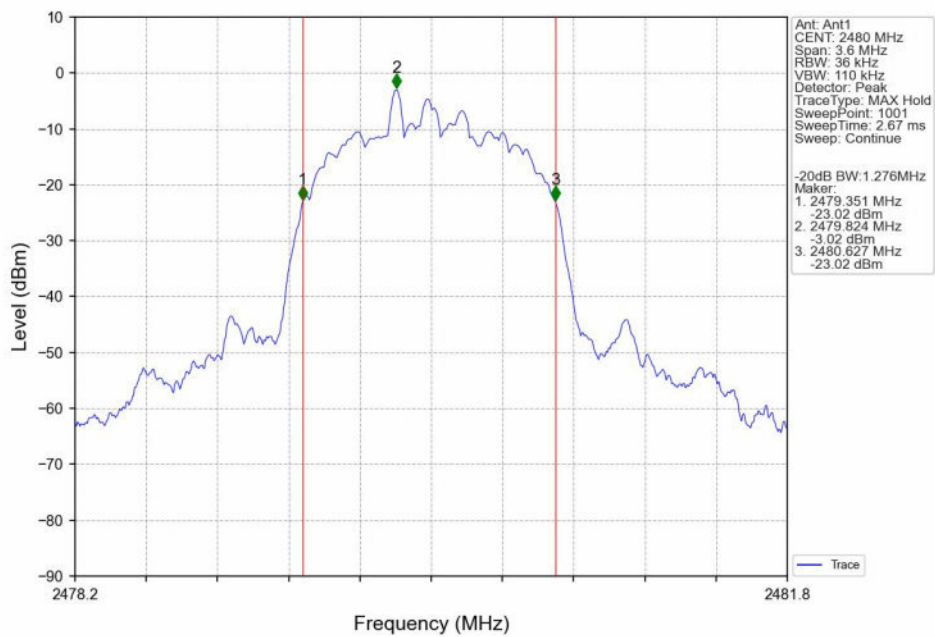


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV





2. Maximum Conducted Output Power

2.1 Test Result

2.1.1 Power

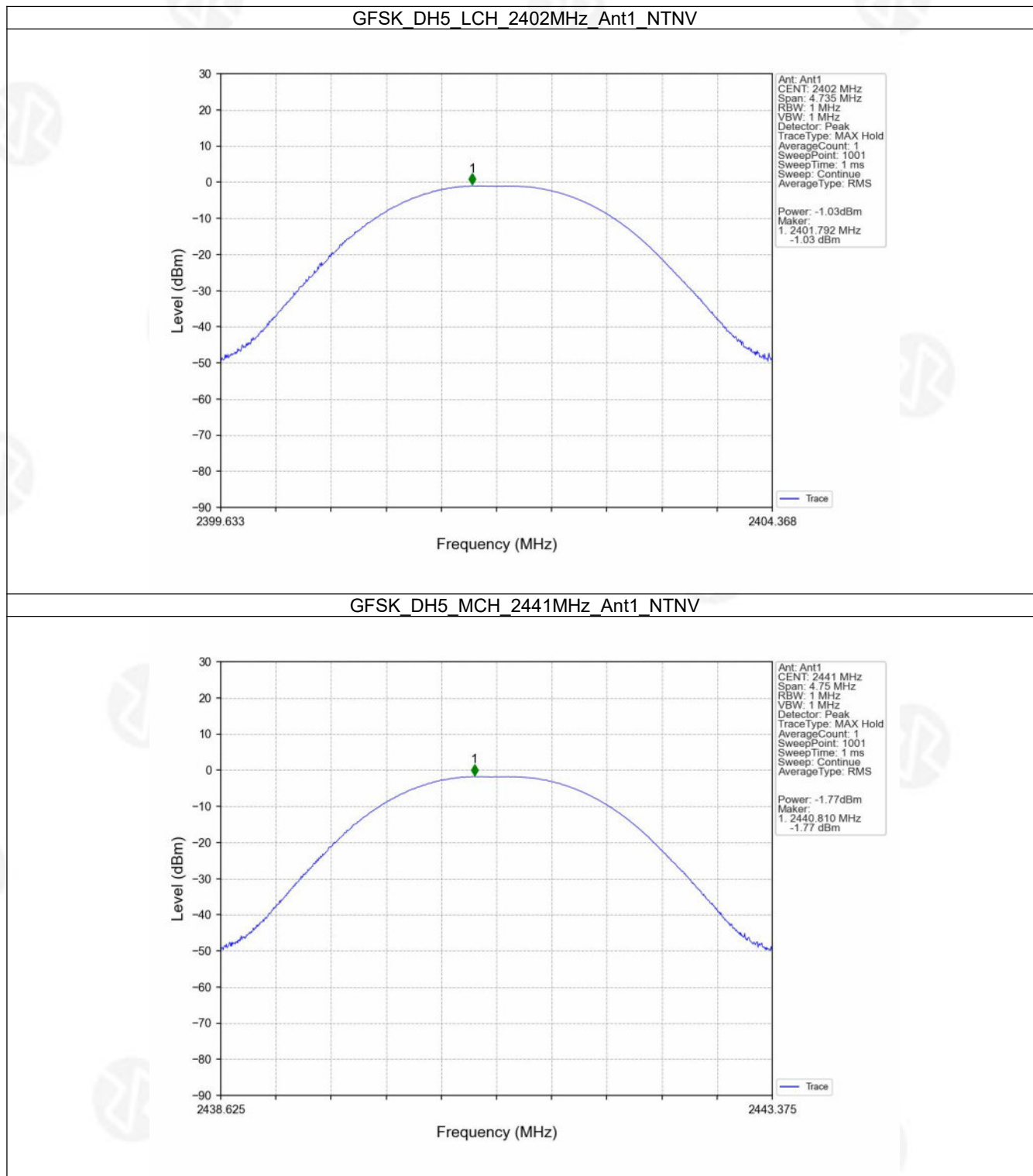
Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	-1.03	≤ 30	Pass
		2441	DH5	-1.77	≤ 30	Pass
		2480	DH5	-2.23	≤ 30	Pass
Pi/4DQPSK	SISO	2402	2DH5	-0.41	≤ 20.97	Pass
		2441	2DH5	-1.13	≤ 20.97	Pass
		2480	2DH5	-1.68	≤ 20.97	Pass
8DPSK	SISO	2402	3DH5	0.10	≤ 20.97	Pass
		2441	3DH5	-0.61	≤ 20.97	Pass
		2480	3DH5	-1.15	≤ 20.97	Pass

Note1: Antenna Gain: Ant1: 0.25 dBi;



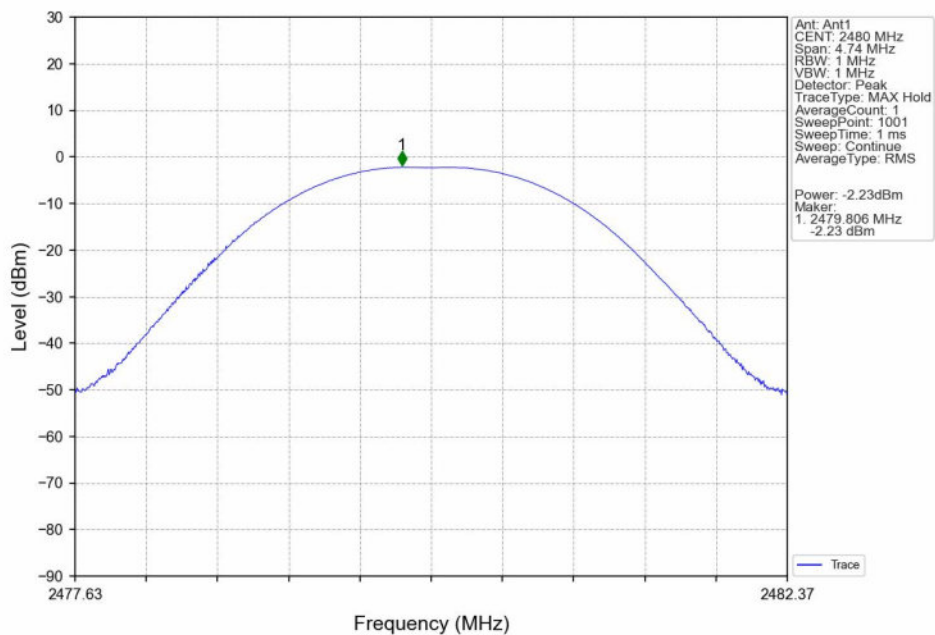
2.2 Test Graph

2.2.1 Power

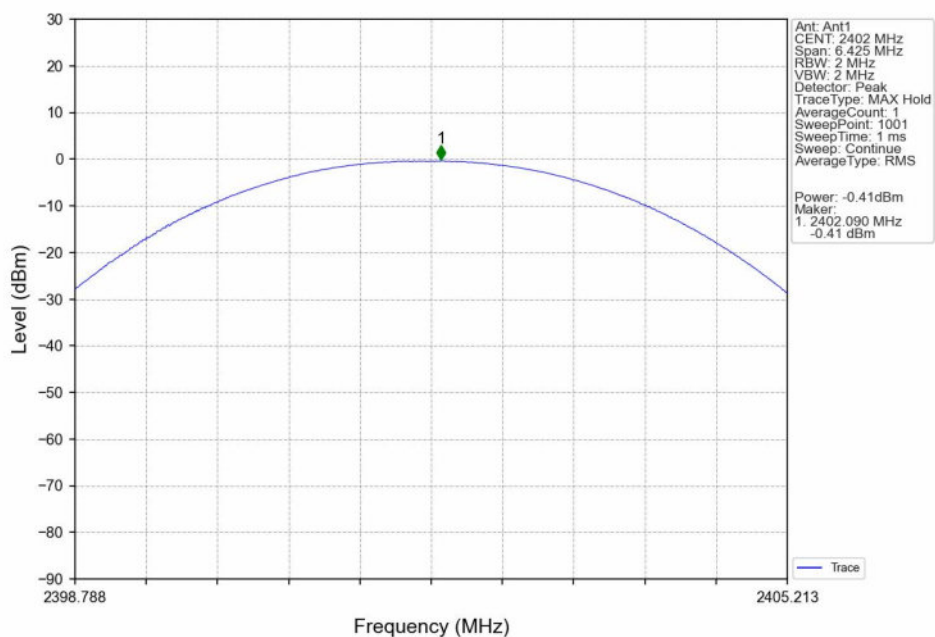




GFSK DH5_HCH_2480MHz_Ant1_NTNV

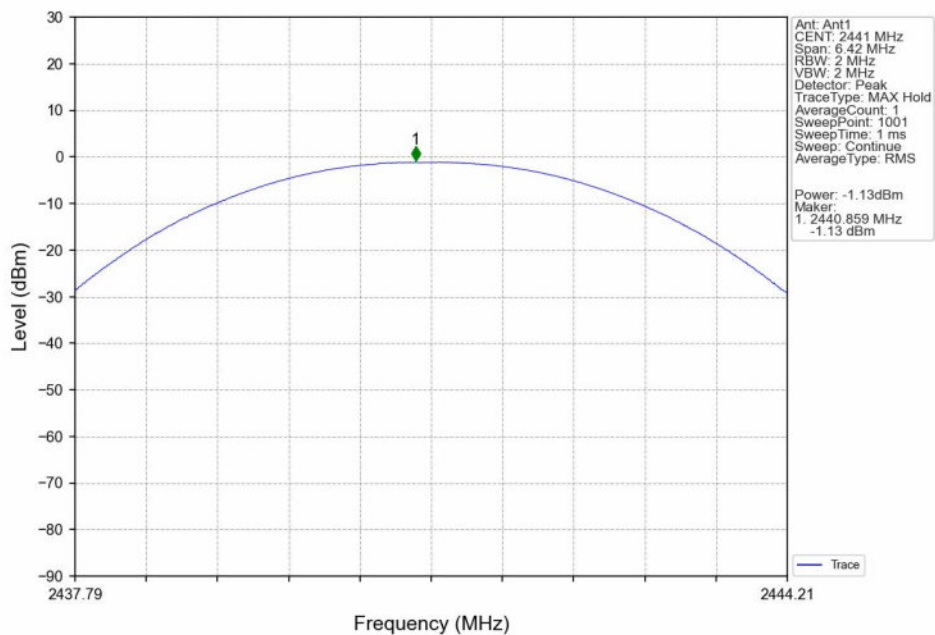


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

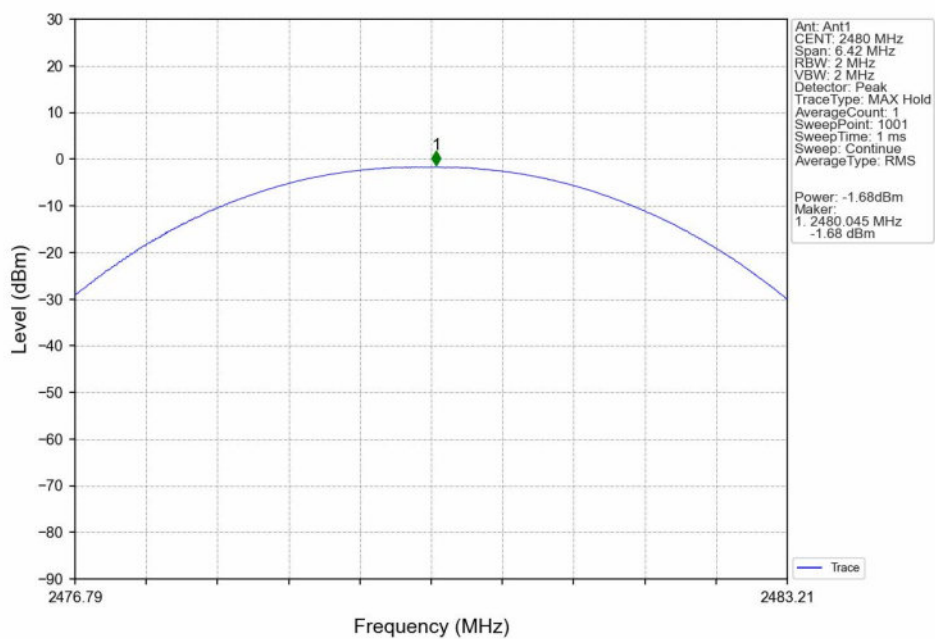




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

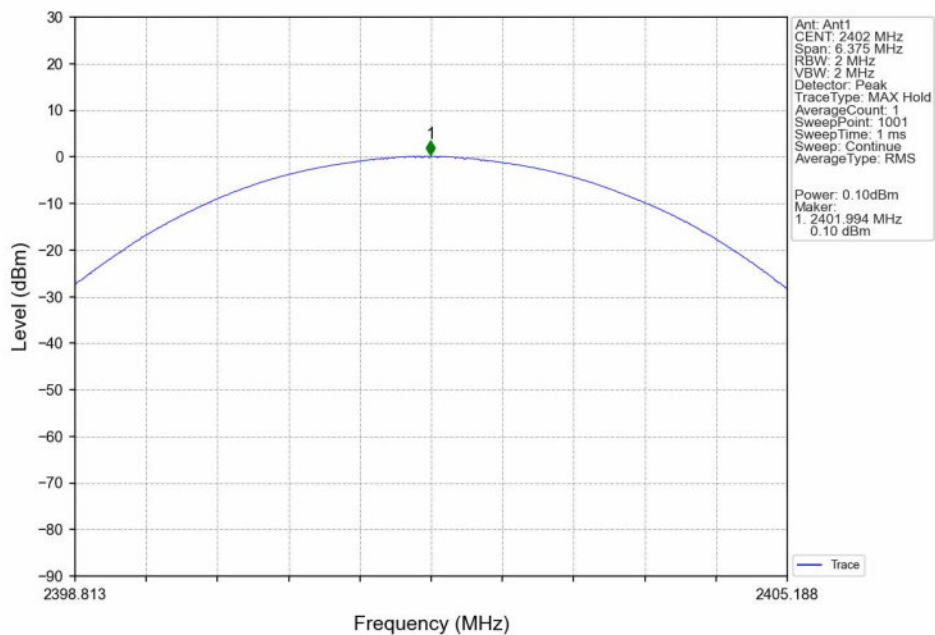


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

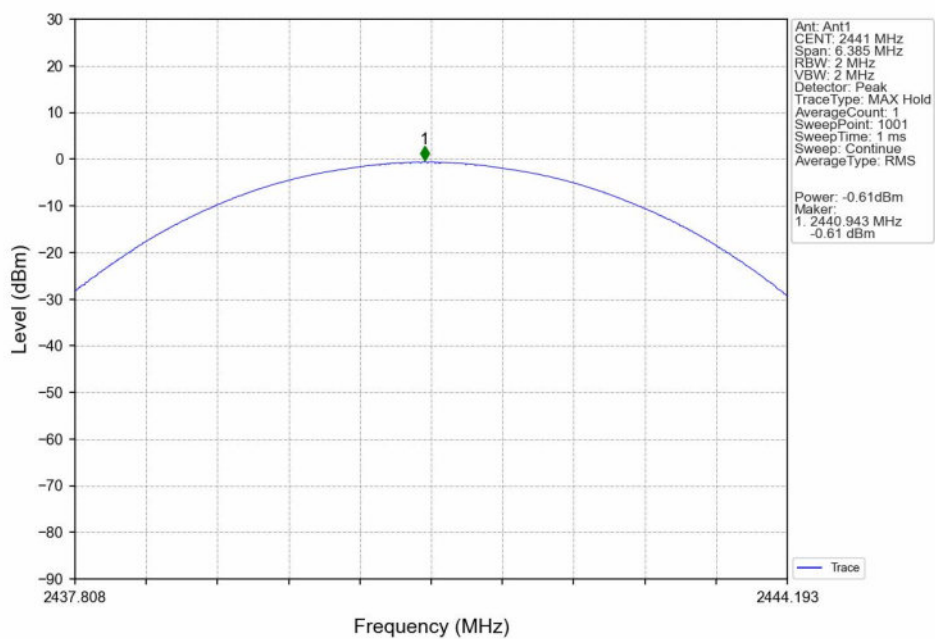




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

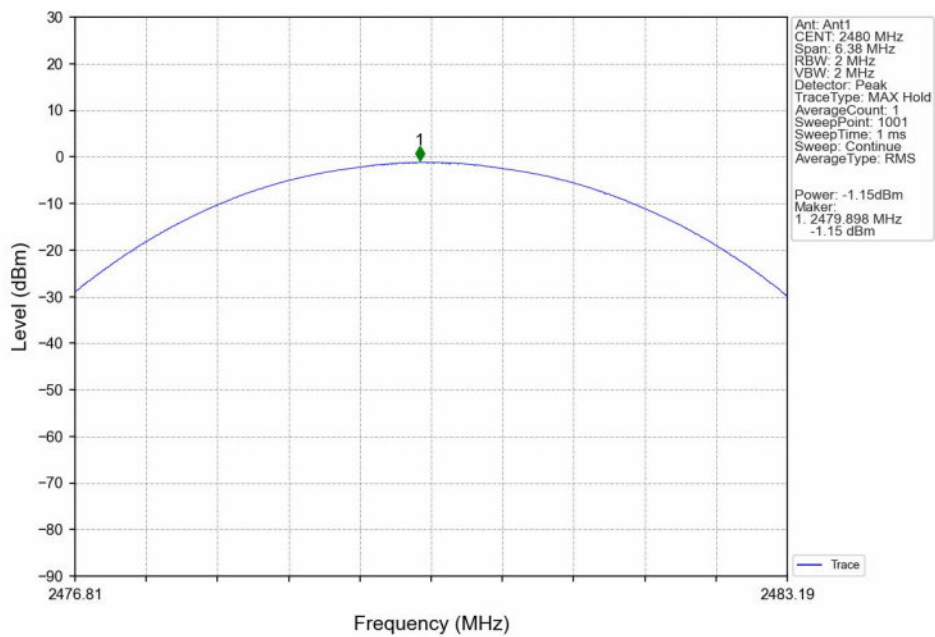


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV





3. Carrier Frequency Separation

3.1 Test Result

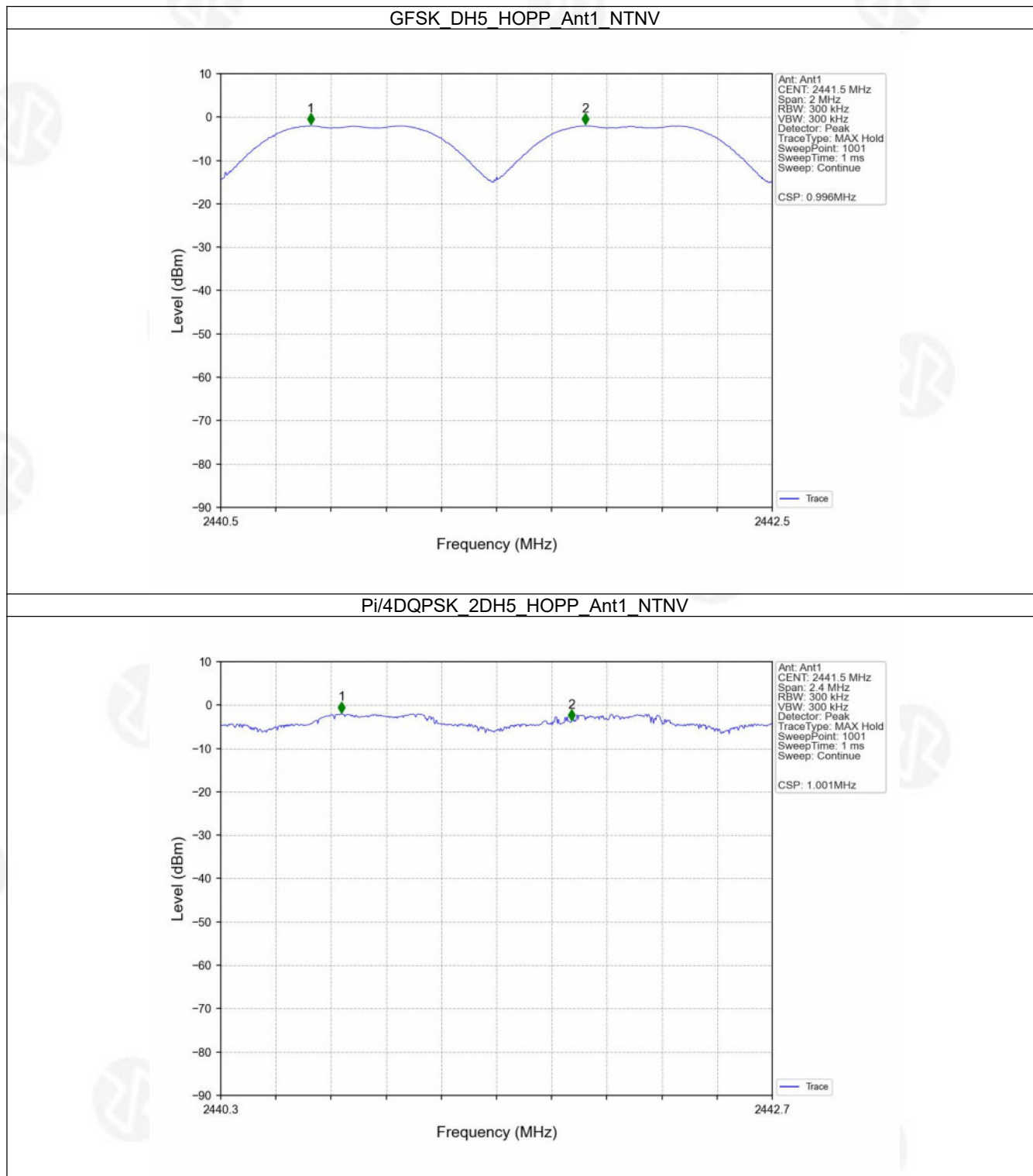
3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	0.996	0.950	≥ 0.95	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.001	1.285	≥ 0.857	Pass
8DPSK	SISO	HOPP	3DH5	1.006	1.277	≥ 0.851	Pass



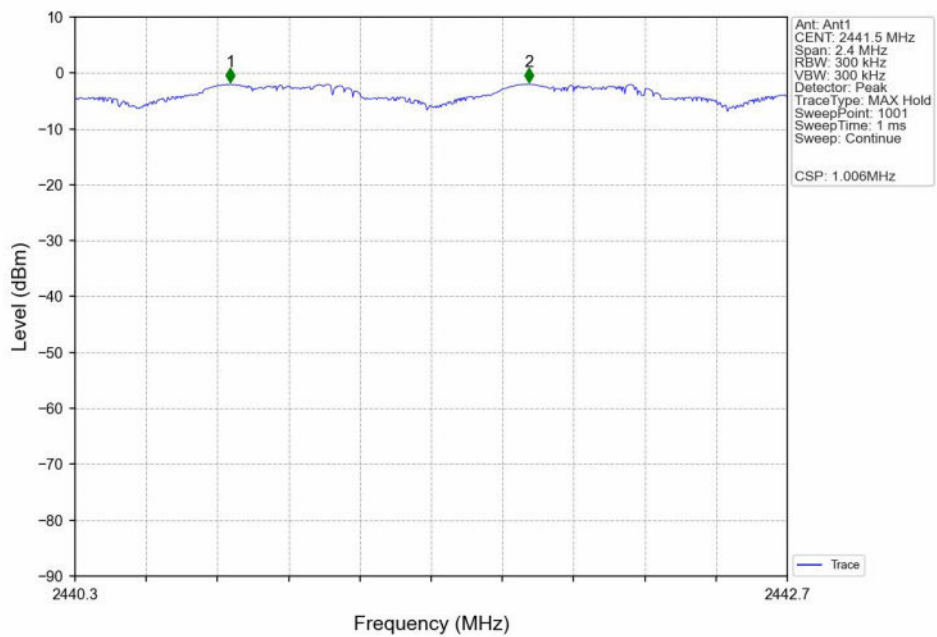
3.2 Test Graph

3.2.1 Ant1





8DPSK_3DH5_HOPP_Ant1_NTNV





4. Number of Hopping Frequencies

4.1 Test Result

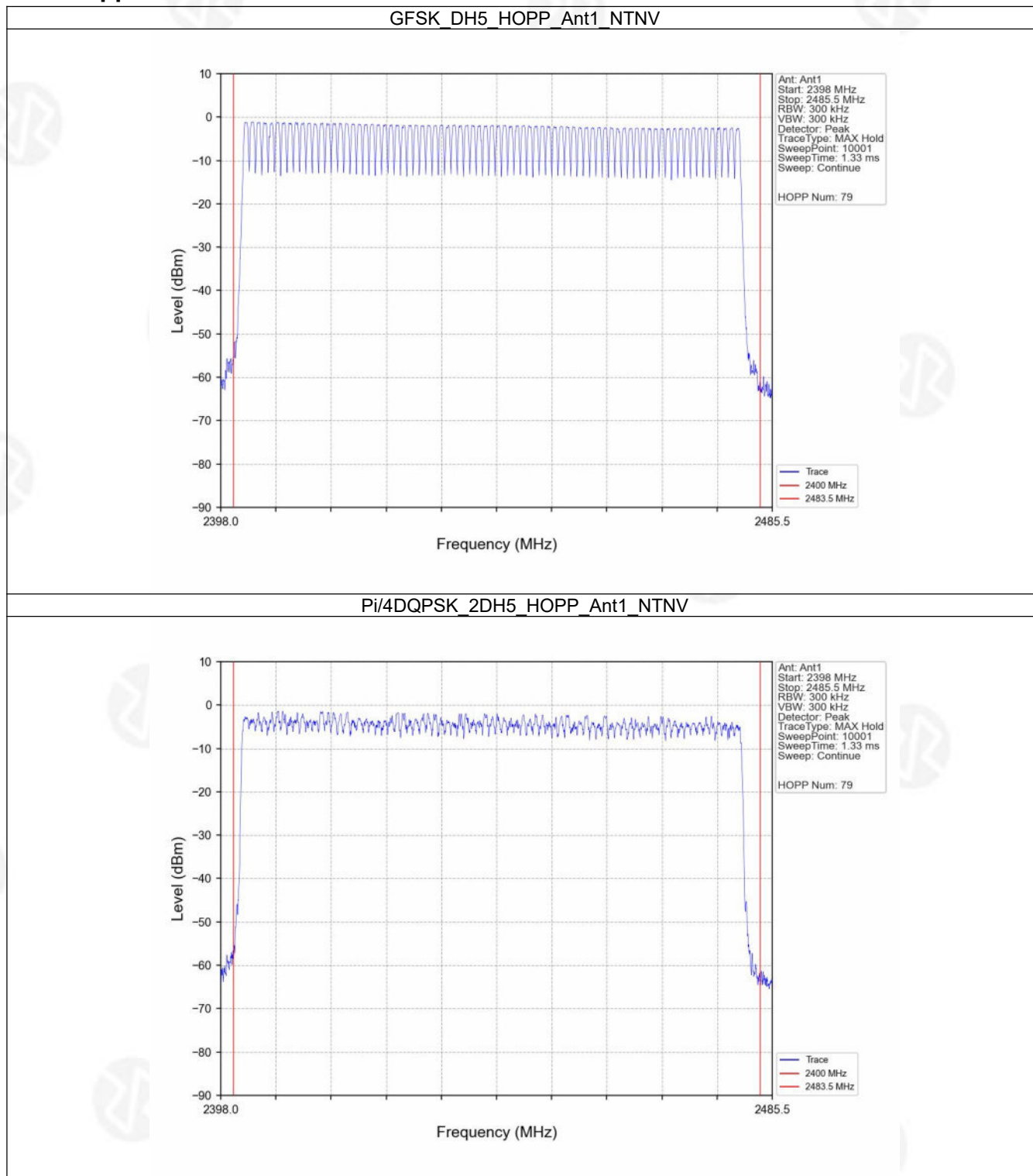
4.1.1 HoppNum

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



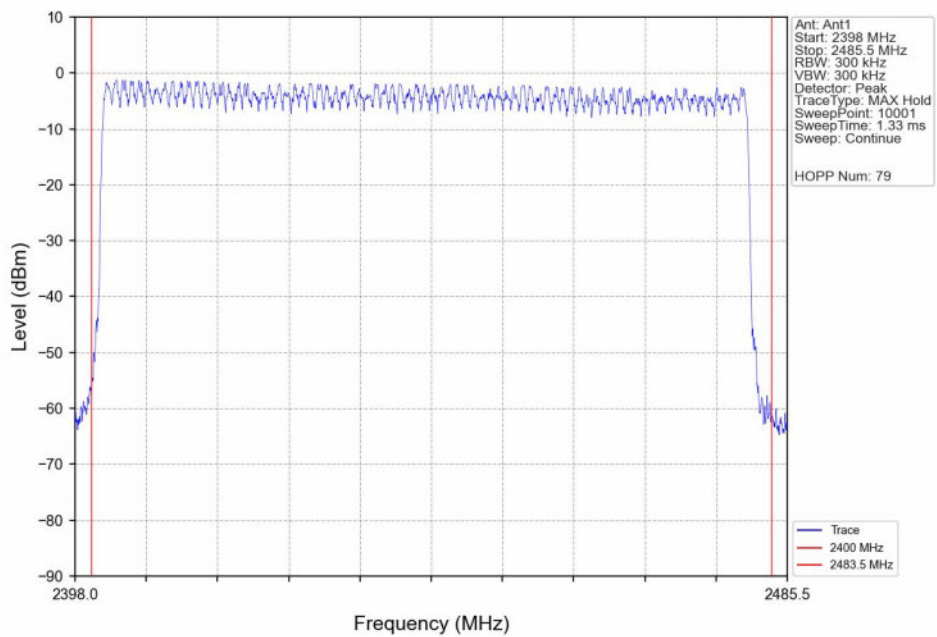
4.2 Test Graph

4.2.1 HoppNum





8DPSK_3DH5_HOPP_Ant1_NTNV





5. Time of Occupancy (Dwell Time)

5.1 Test Result

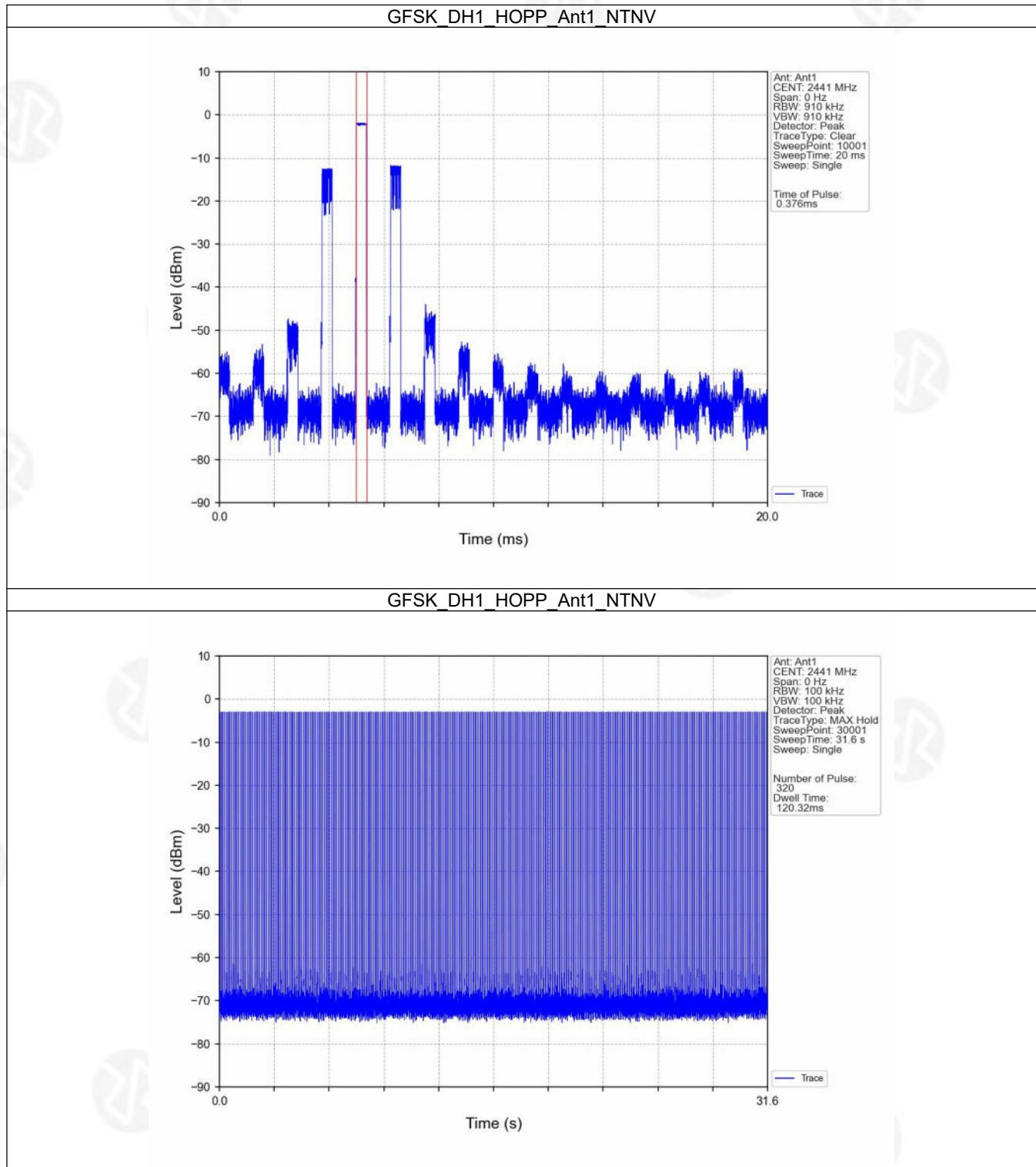
5.1.1 Ant1

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	0.376	31.600	320	120.320	<=400	Pass
			DH3	1.650	31.600	160	264.000	<=400	Pass
			DH5	2.900	31.600	107	310.300	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.382	31.600	320	122.240	<=400	Pass
			2DH3	1.662	31.600	160	265.920	<=400	Pass
			2DH5	2.912	31.600	106	308.672	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.382	31.600	320	122.240	<=400	Pass
			3DH3	1.660	31.600	160	265.600	<=400	Pass
			3DH5	2.912	31.600	106	308.672	<=400	Pass



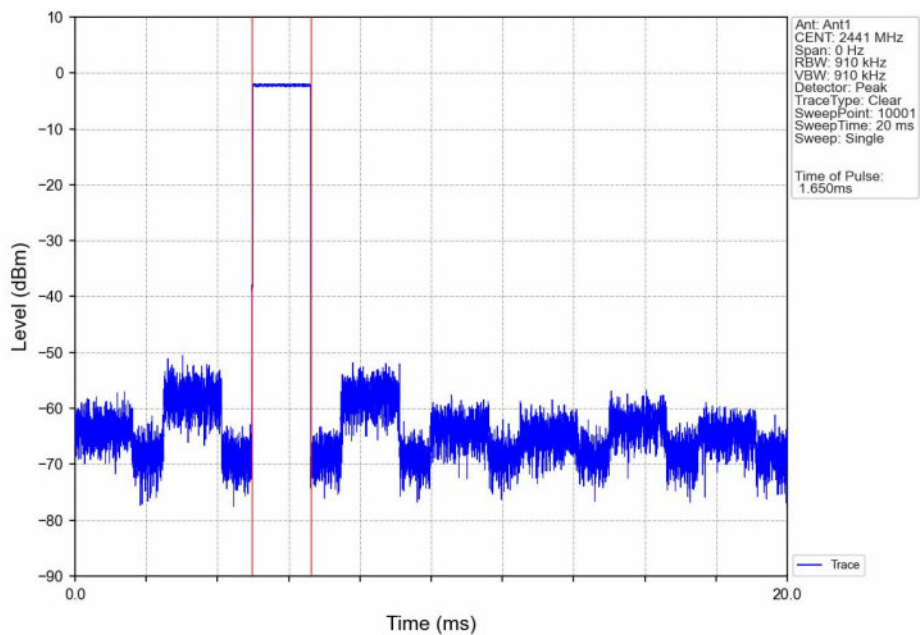
5.2 Test Graph

5.2.1 Ant1

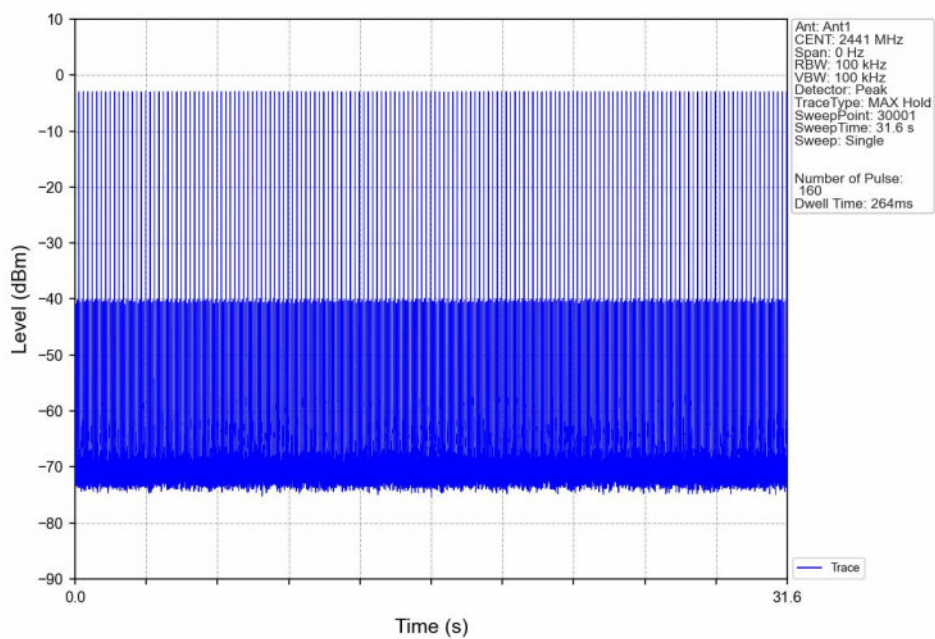




GFSK_DH3_HOPP_Ant1_NTNV

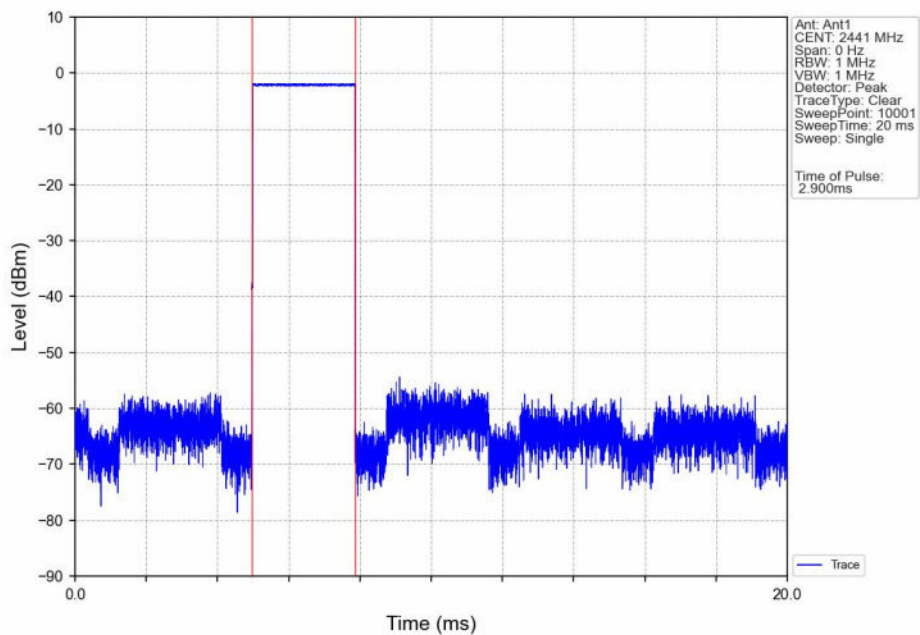


GFSK_DH3_HOPP_Ant1_NTNV

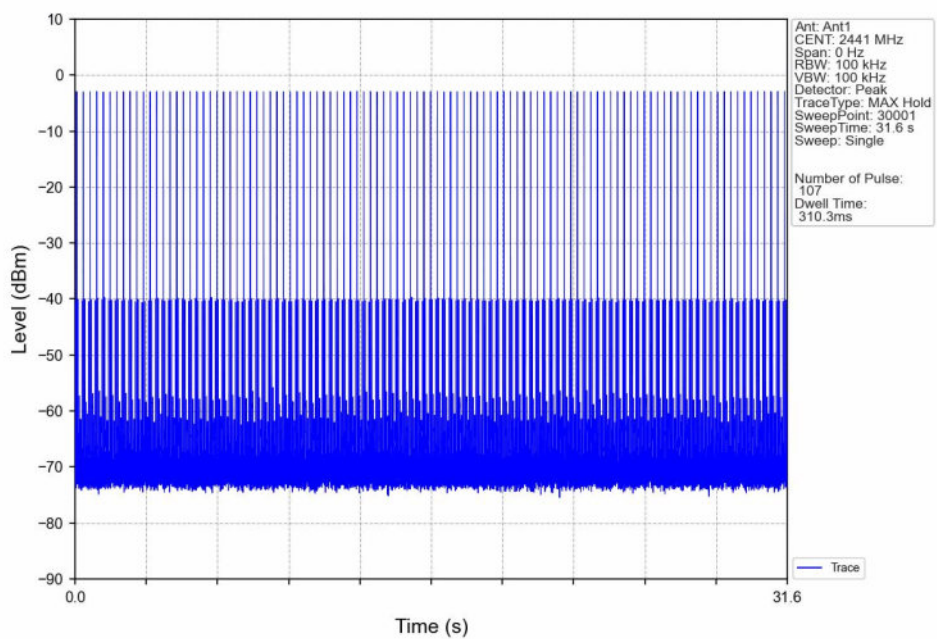




GFSK_DH5_HOPP_Ant1_NTNV

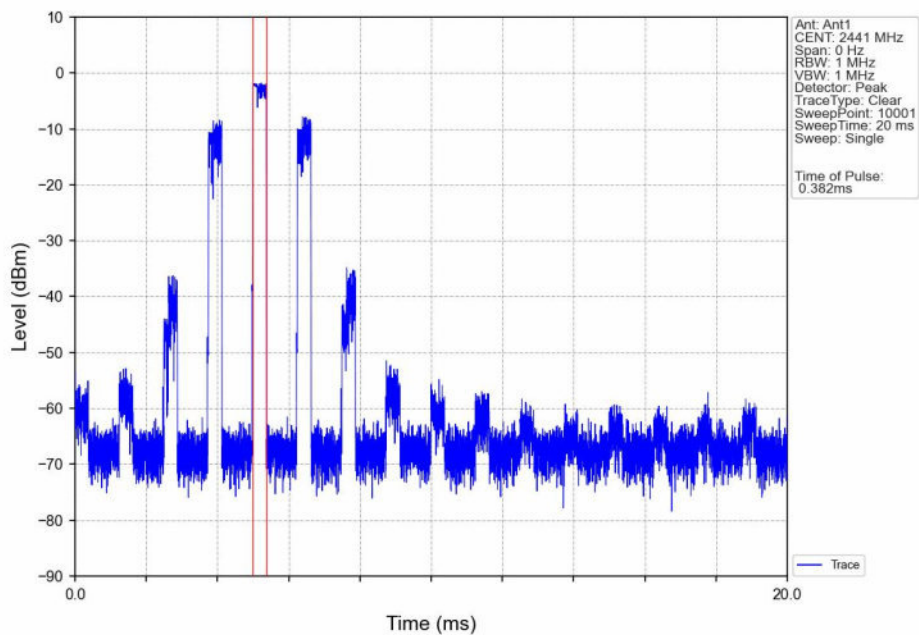


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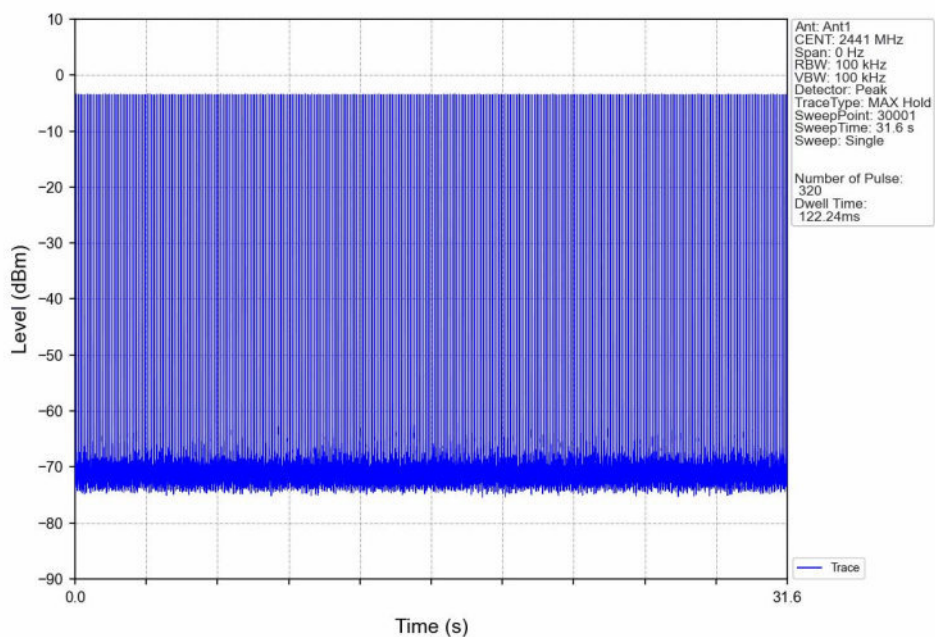




Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV

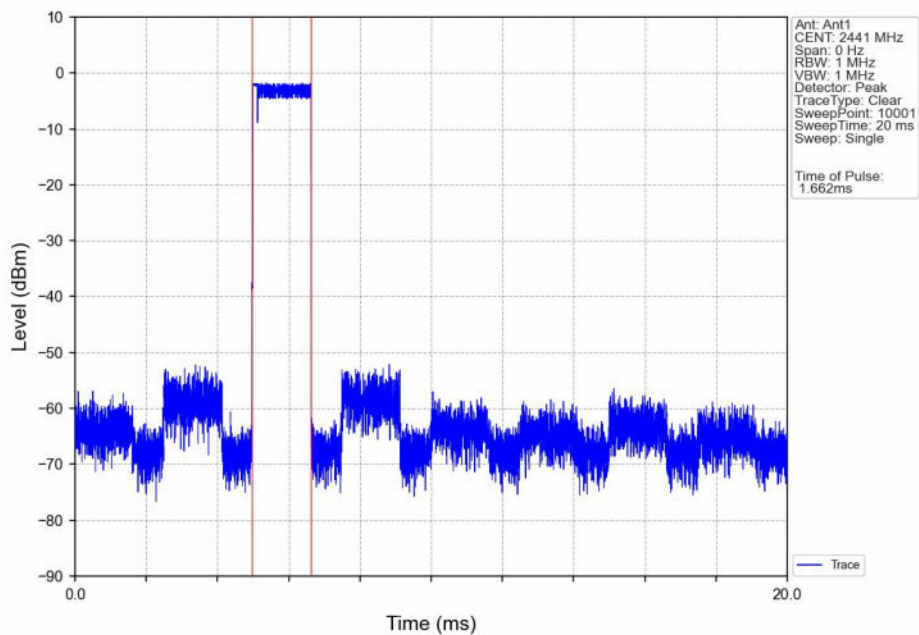


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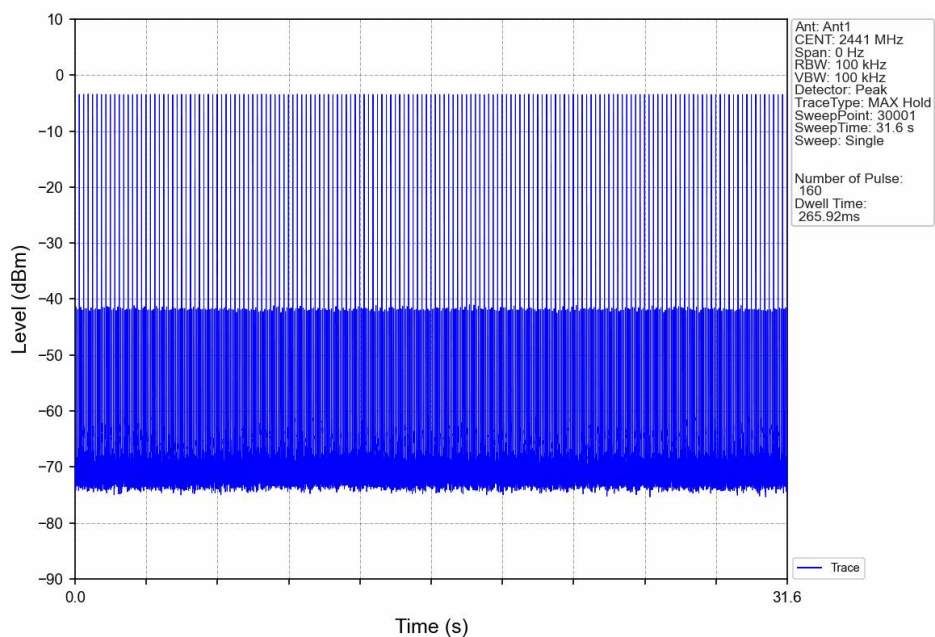




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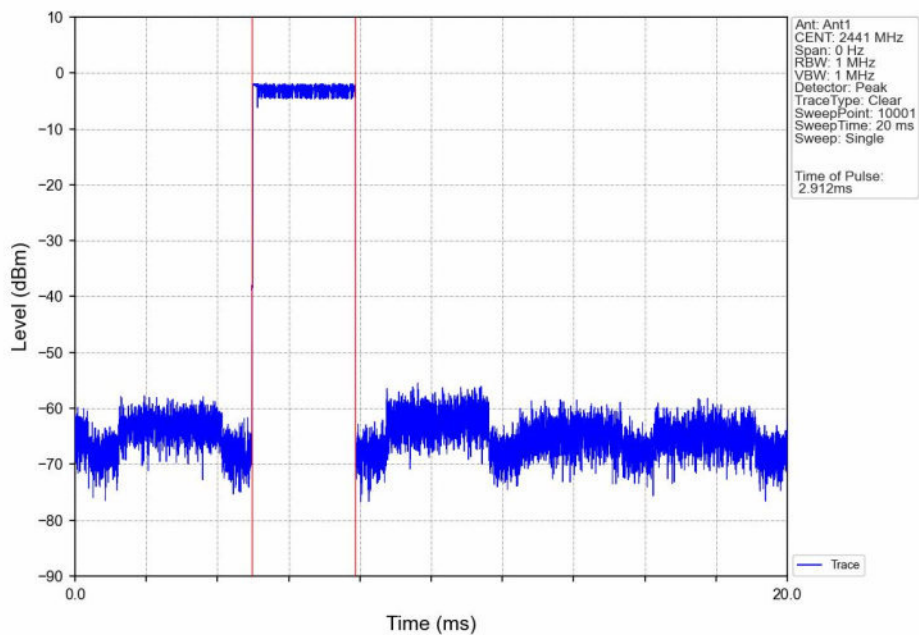


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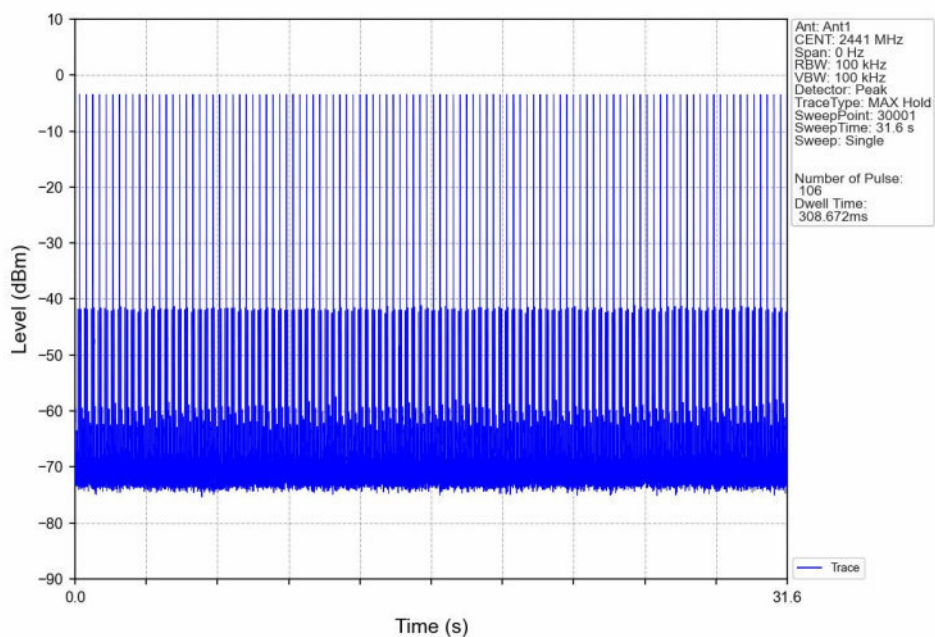




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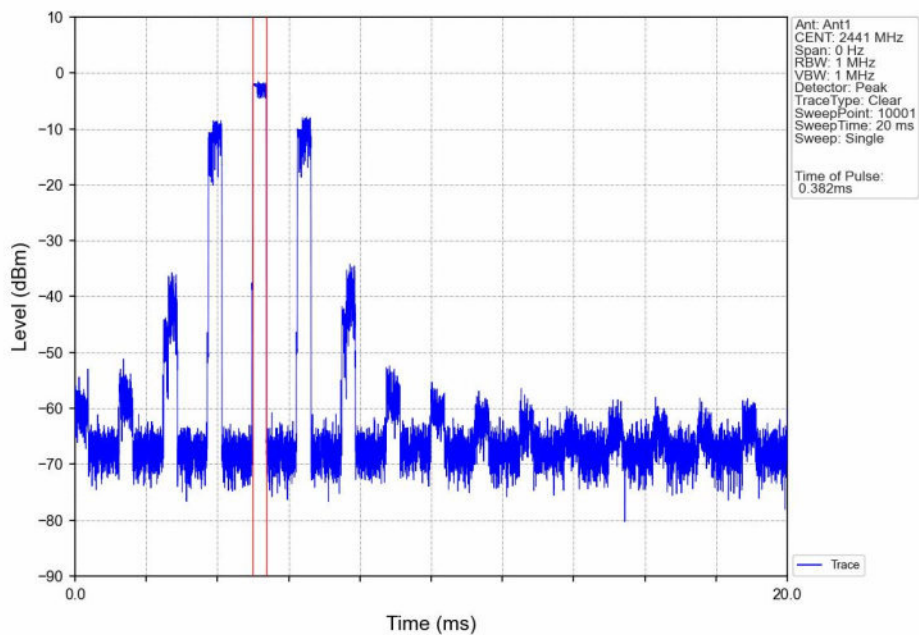


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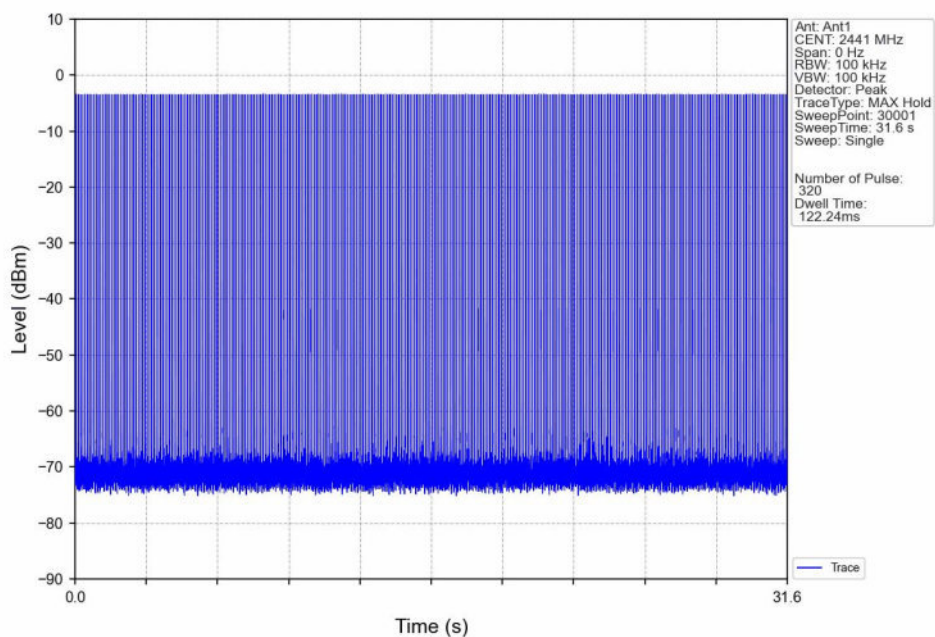




8DPSK_3DH1_HOPP_Ant1_NTNV

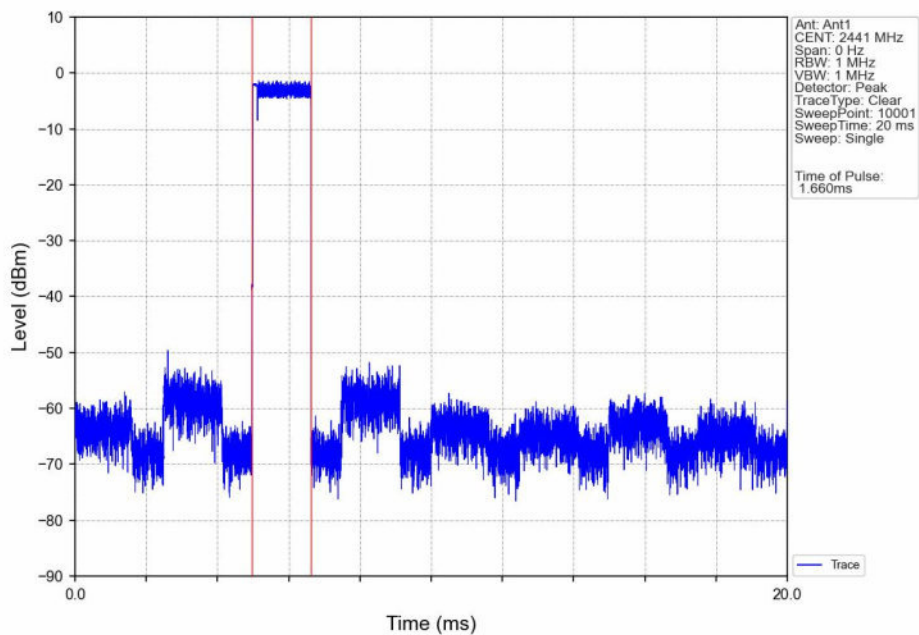


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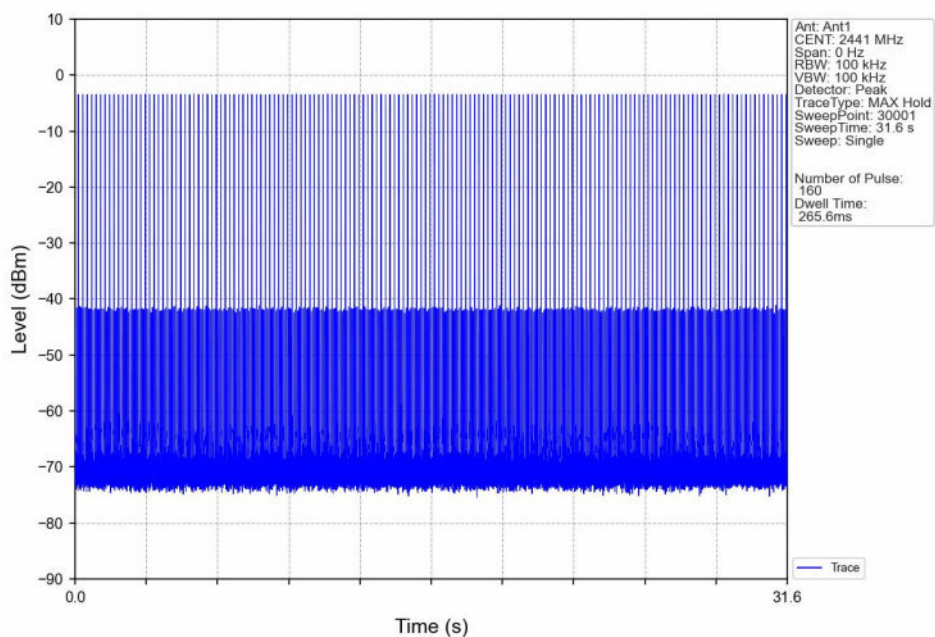




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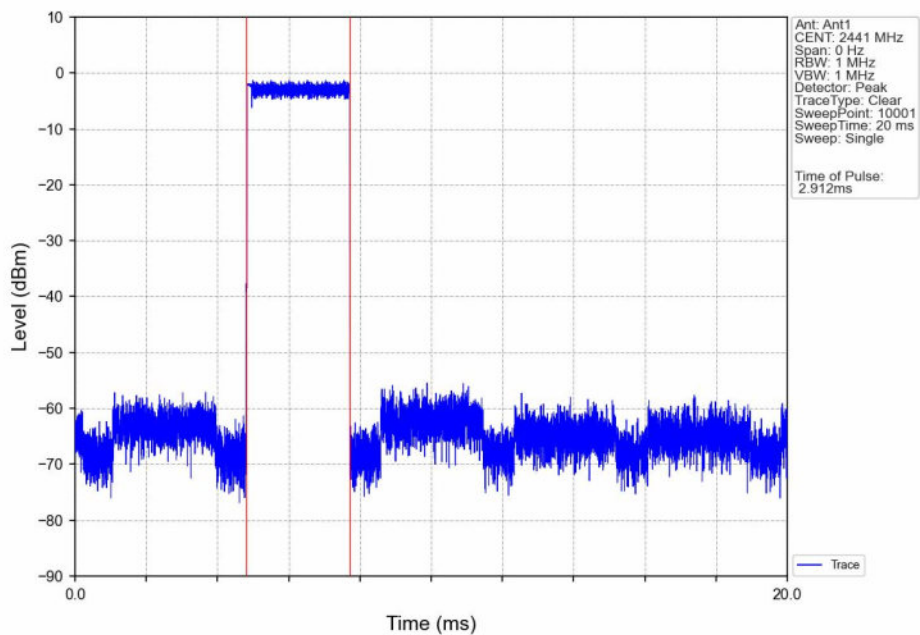


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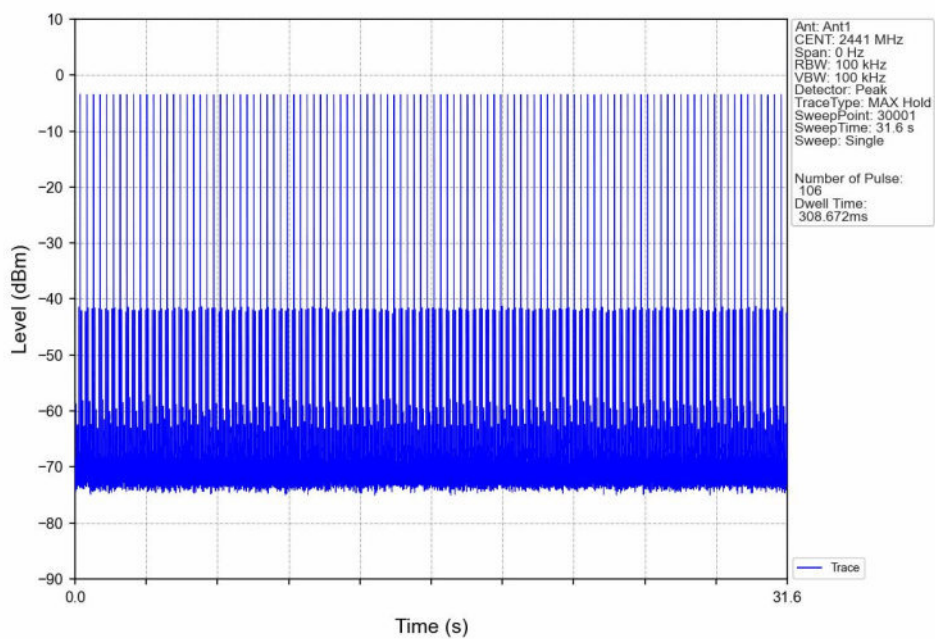




8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV





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	-1.31
		2441	DH5	1	-2.05
		2480	DH5	1	-2.50
		HOPP	DH5	1	-1.42
					-1.42
Pi/4DQPSK	SISO	2402	2DH5	1	-1.52
		2441	2DH5	1	-2.26
		2480	2DH5	1	-2.80
		HOPP	2DH5	1	-1.86
					-1.86
8DPSK	SISO	2402	3DH5	1	-1.33
		2441	3DH5	1	-2.08
		2480	3DH5	1	-2.60
		HOPP	3DH5	1	-1.43
					-1.43

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

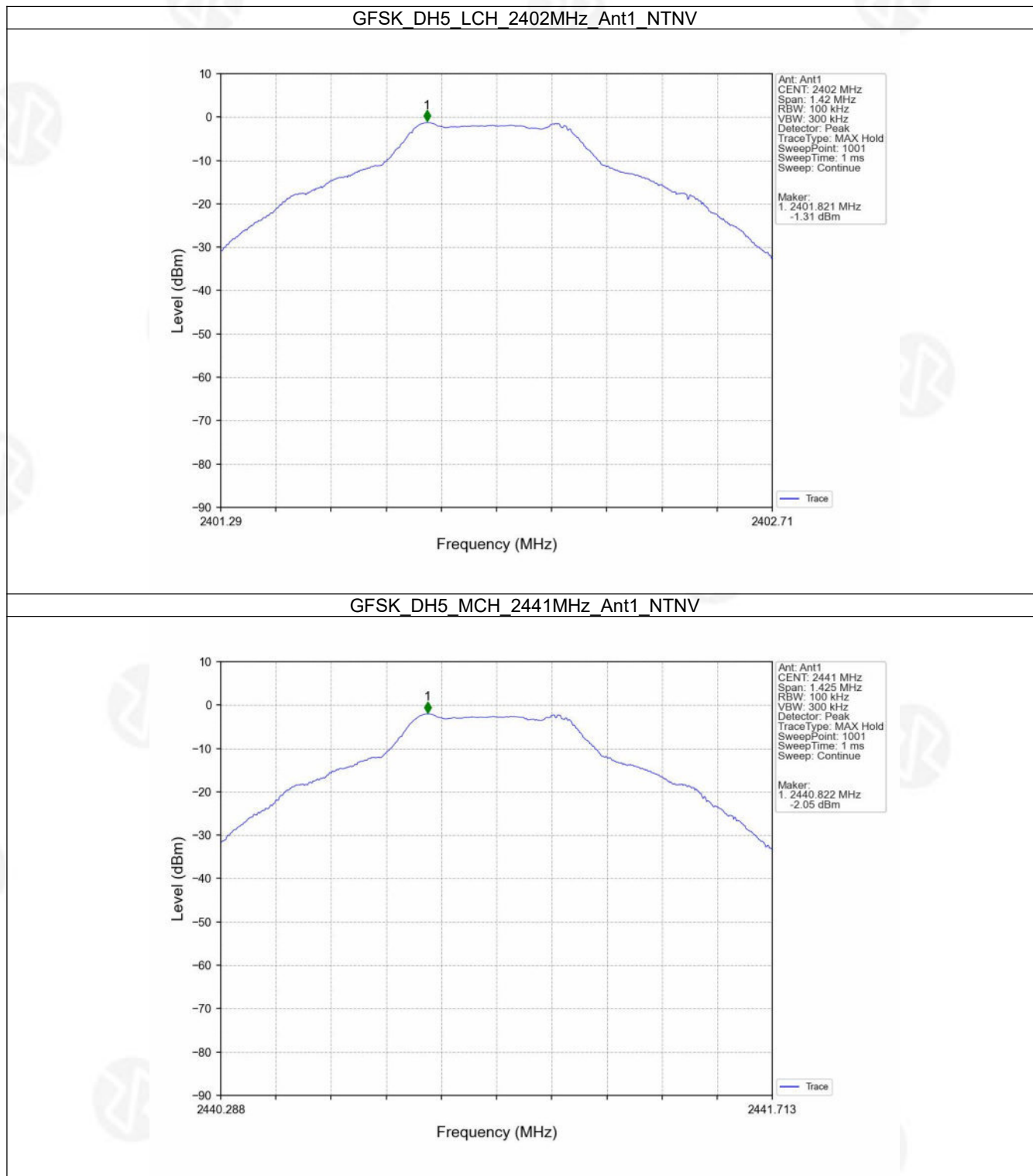
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	-1.31	-21.31	Pass
		2441	DH5	1	-2.05	-22.05	Pass
		2480	DH5	1	-2.50	-22.50	Pass
		HOPP	DH5	1	-1.42	-21.42	Pass
					-1.42	-21.42	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	-1.52	-21.52	Pass
		2441	2DH5	1	-2.26	-22.26	Pass
		2480	2DH5	1	-2.80	-22.80	Pass
		HOPP	2DH5	1	-1.86	-21.86	Pass
					-1.86	-21.86	Pass
8DPSK	SISO	2402	3DH5	1	-1.33	-21.33	Pass
		2441	3DH5	1	-2.08	-22.08	Pass
		2480	3DH5	1	-2.60	-22.60	Pass
		HOPP	3DH5	1	-1.43	-21.43	Pass
					-1.43	-21.43	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.



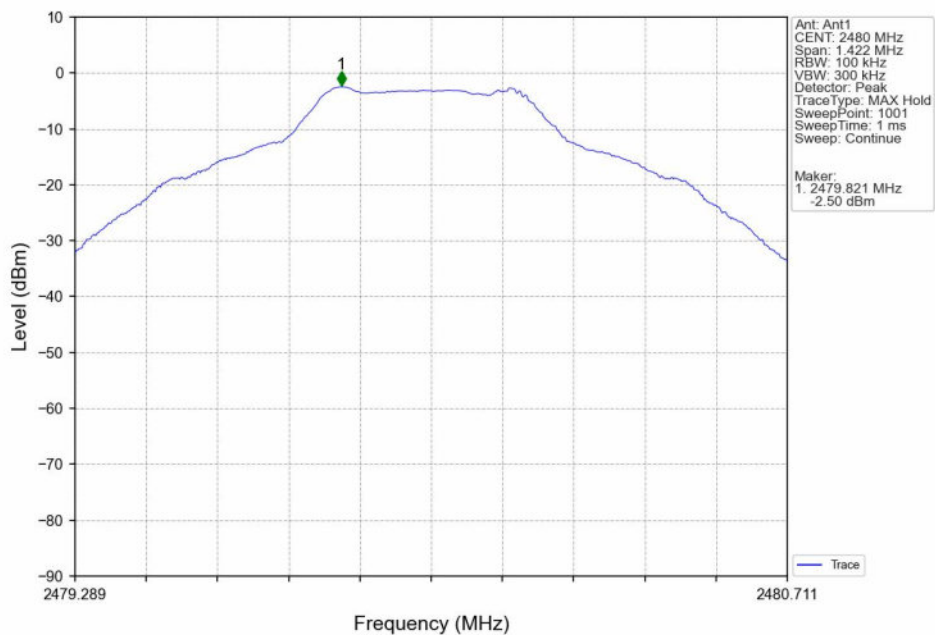
6.2 Test Graph

6.2.1 Ref

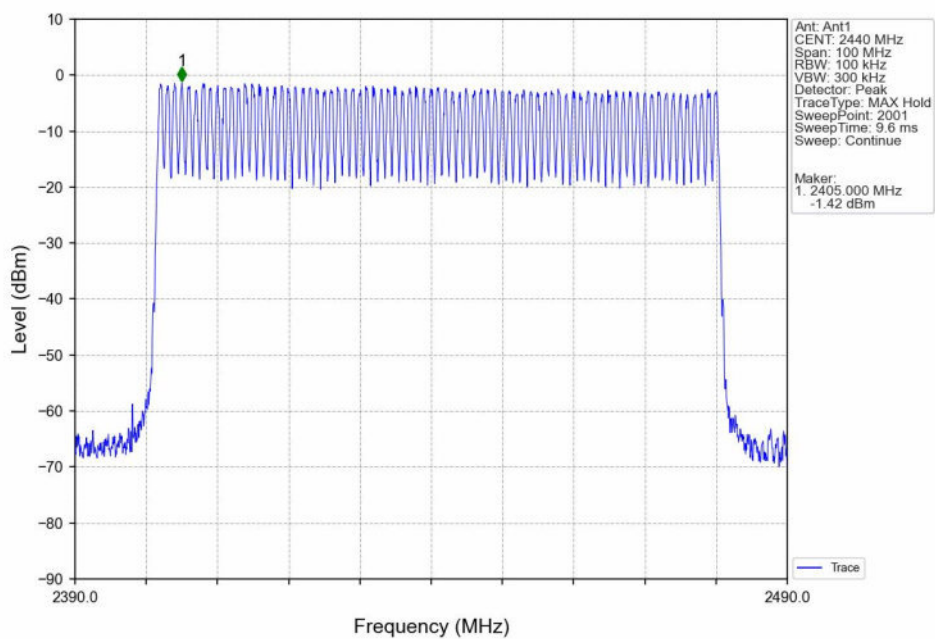




GFSK_DH5_HCH_2480MHz_Ant1_NTNV

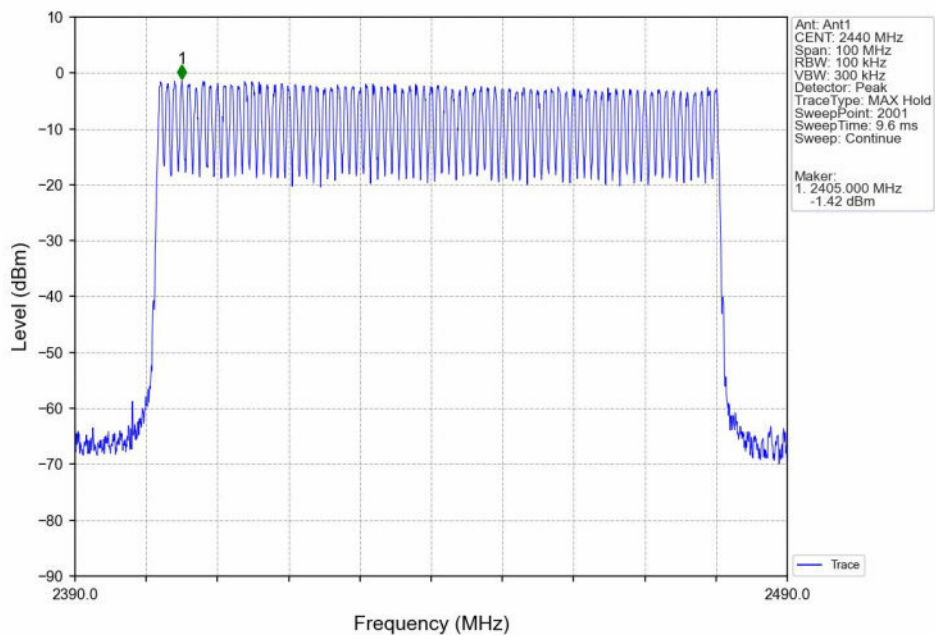


GFSK_DH5_HOPP_Ant1_NTNV

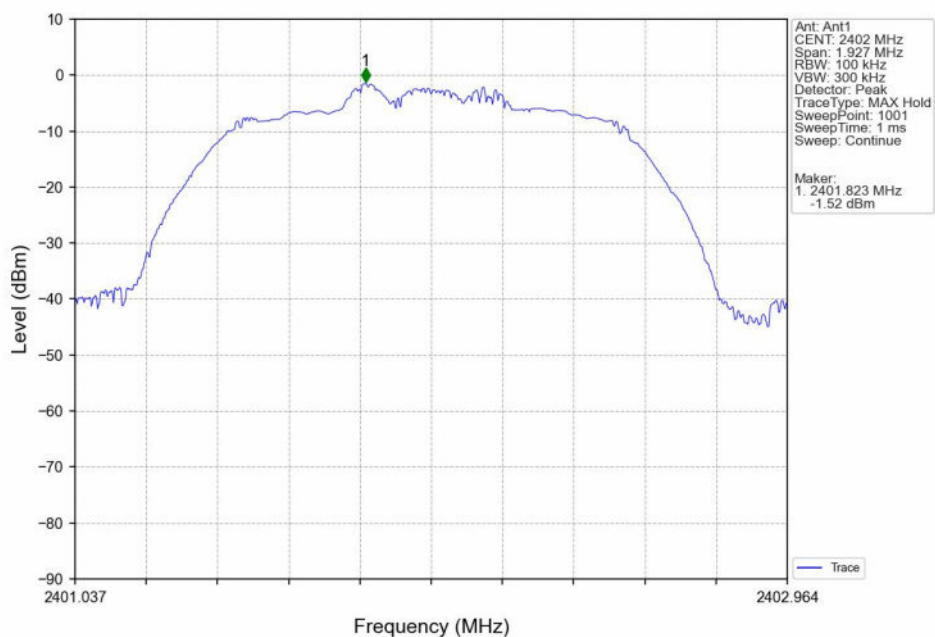




GFSK_DH5_HOPP_Ant1_NTNV

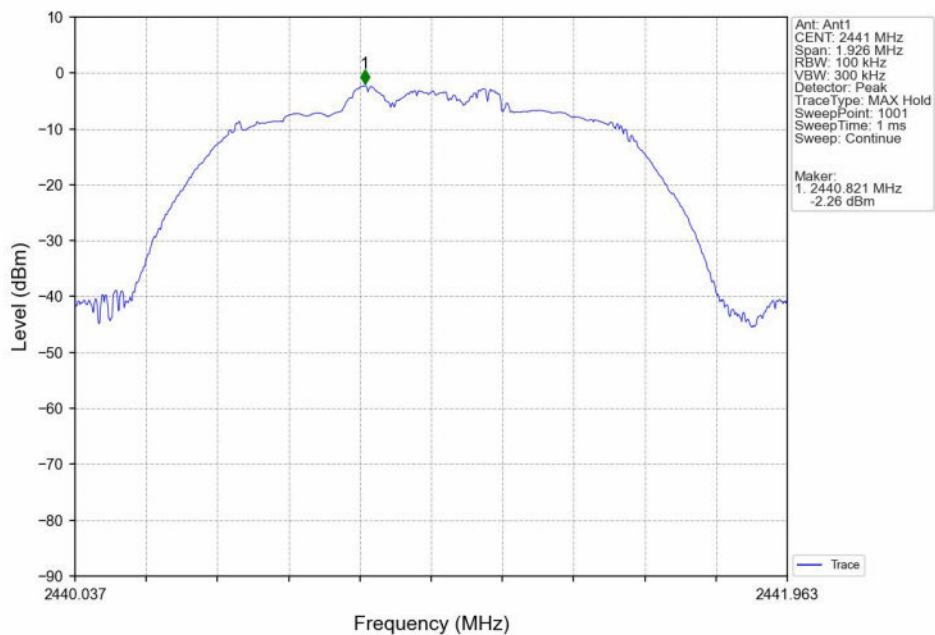


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

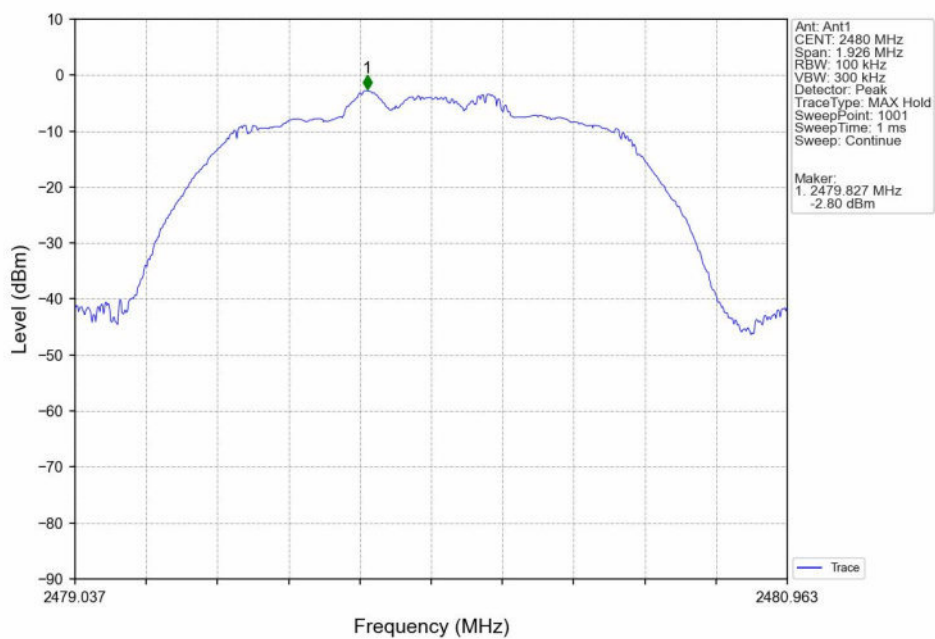




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

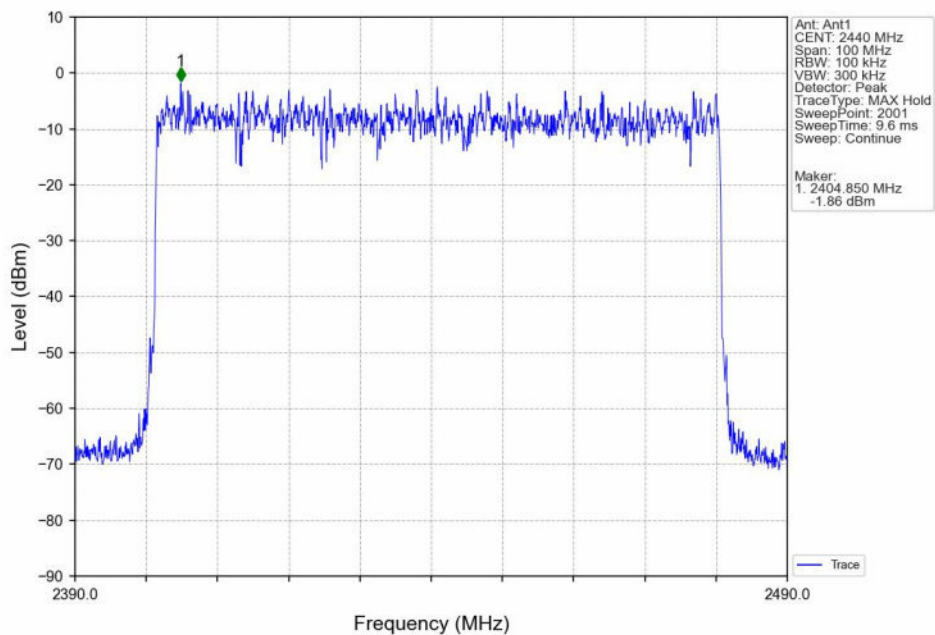


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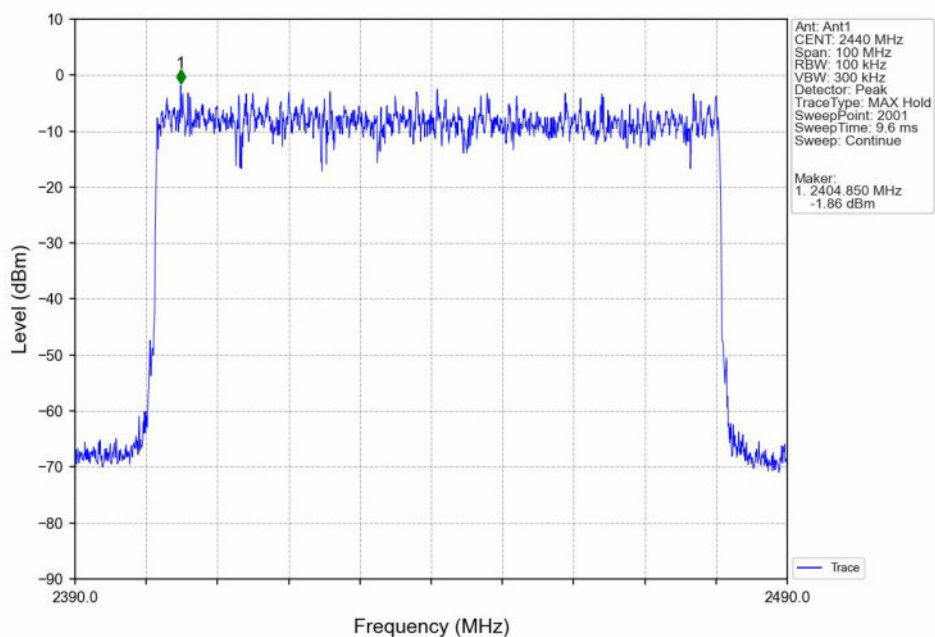




Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

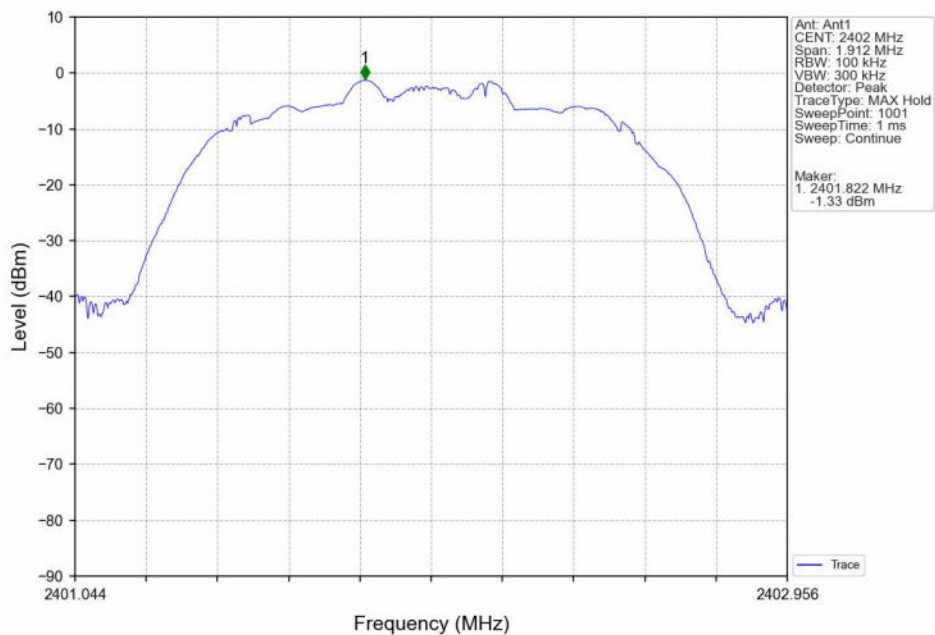


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

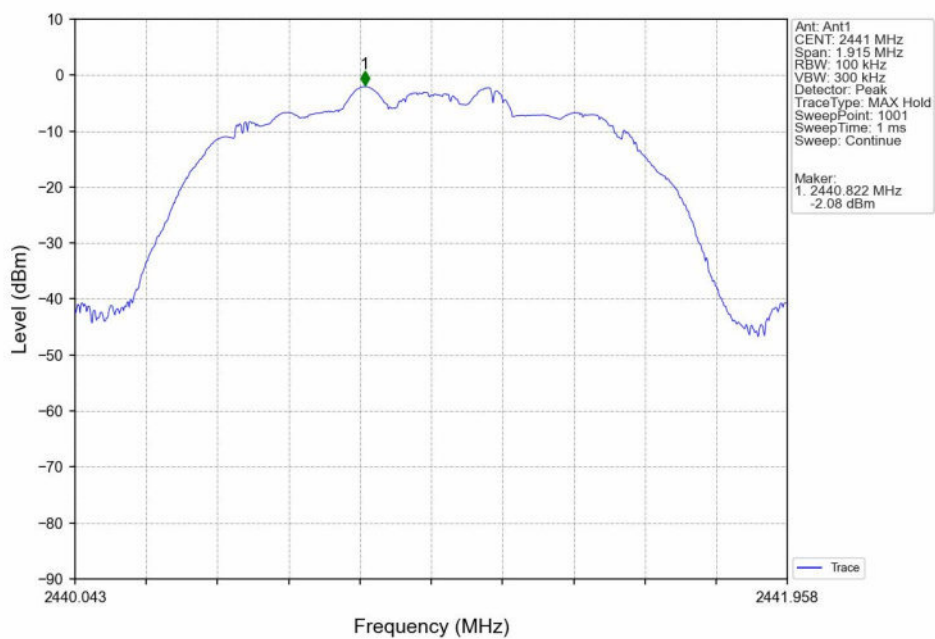




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

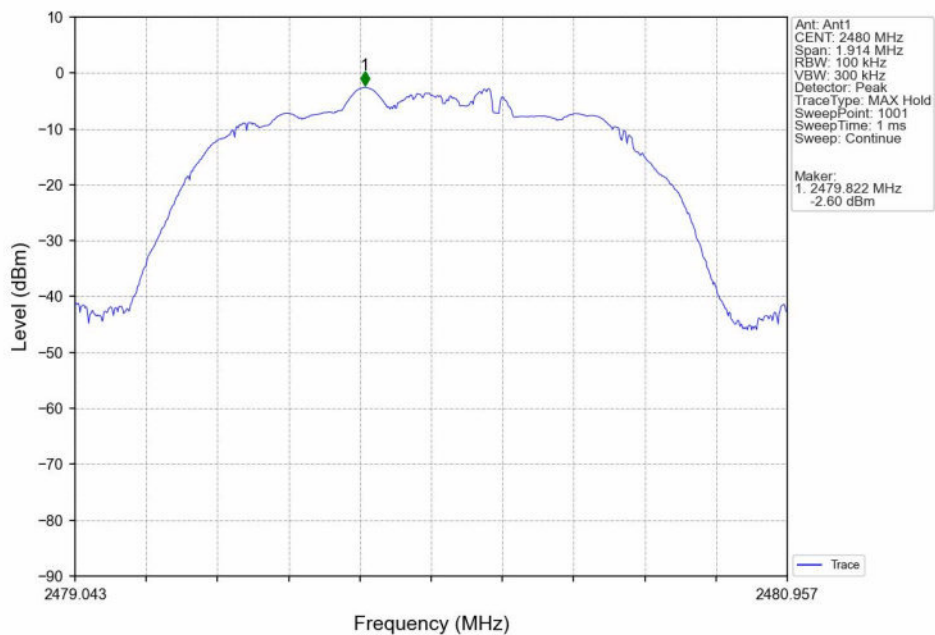


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

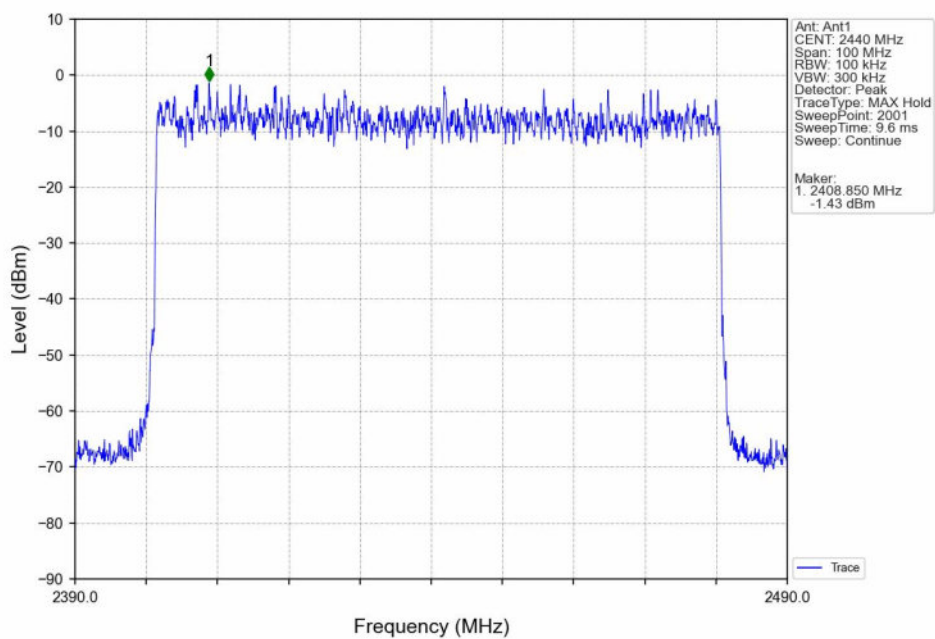




8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

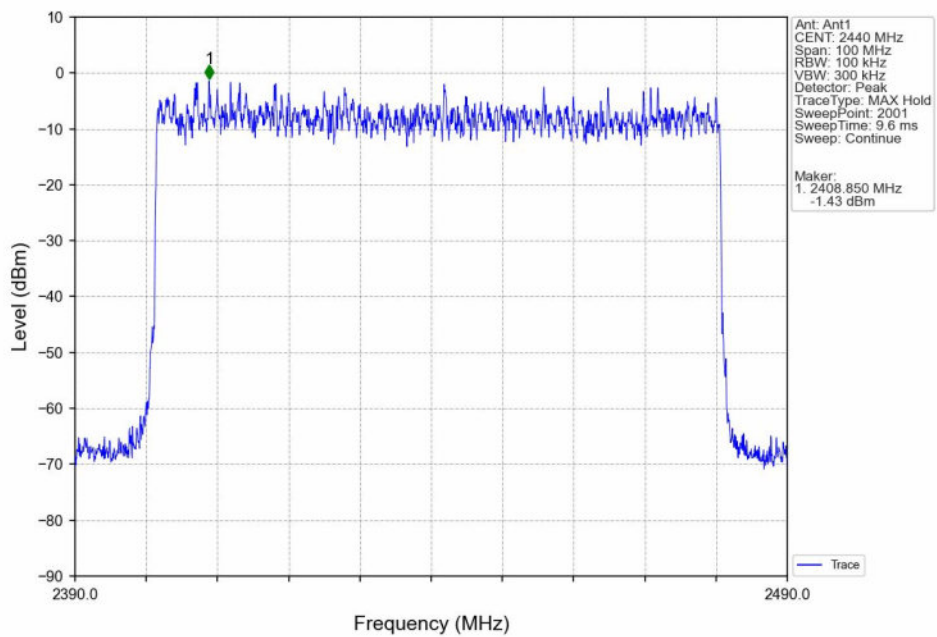


8DPSK_3DH5_HOPP_Ant1_NTNV





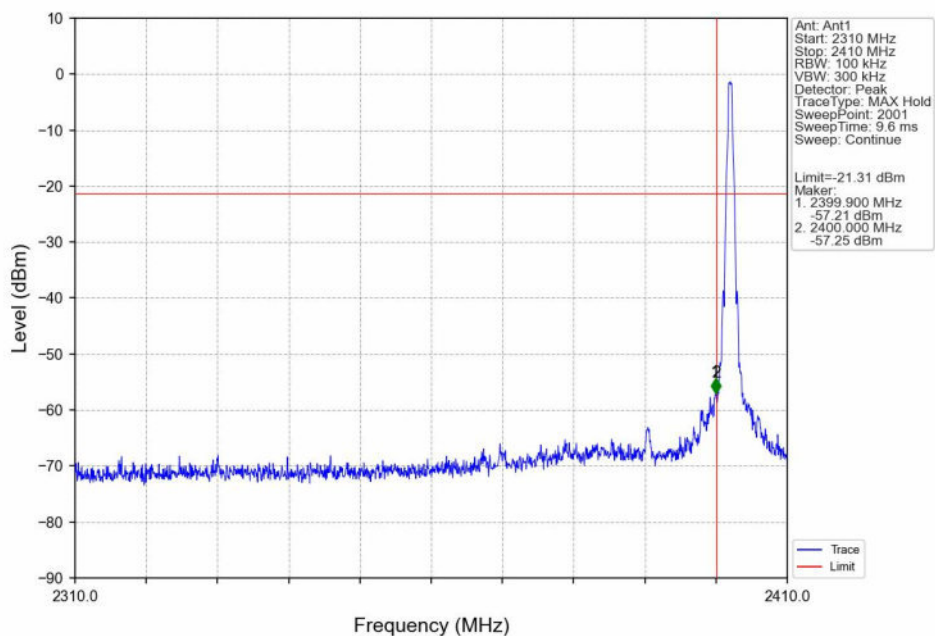
8DPSK_3DH5_HOPP_Ant1_NTNV



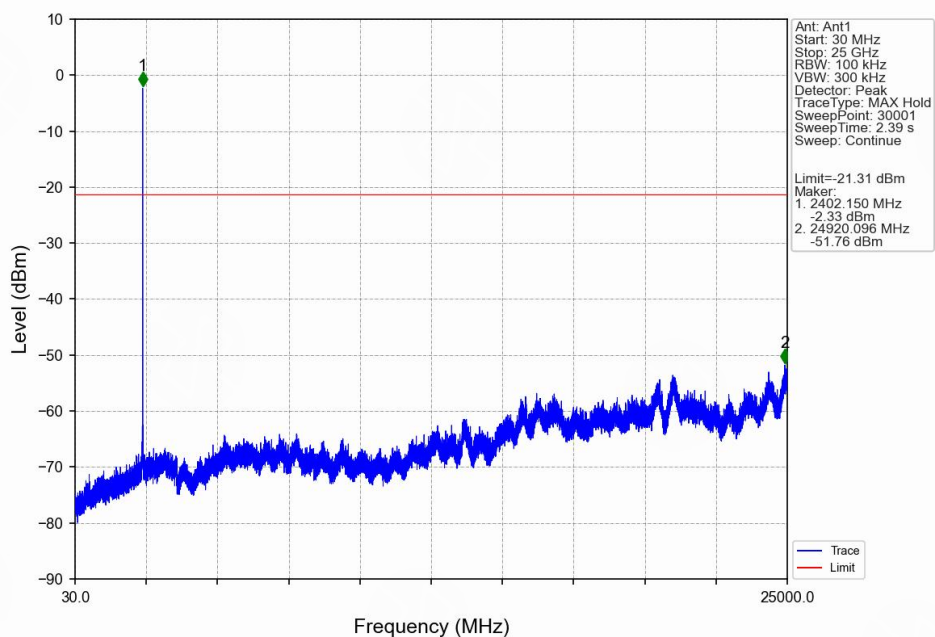


6.2.2 CSE

GFSK_DH5_LCH_2402MHz_Ant1_NTNV

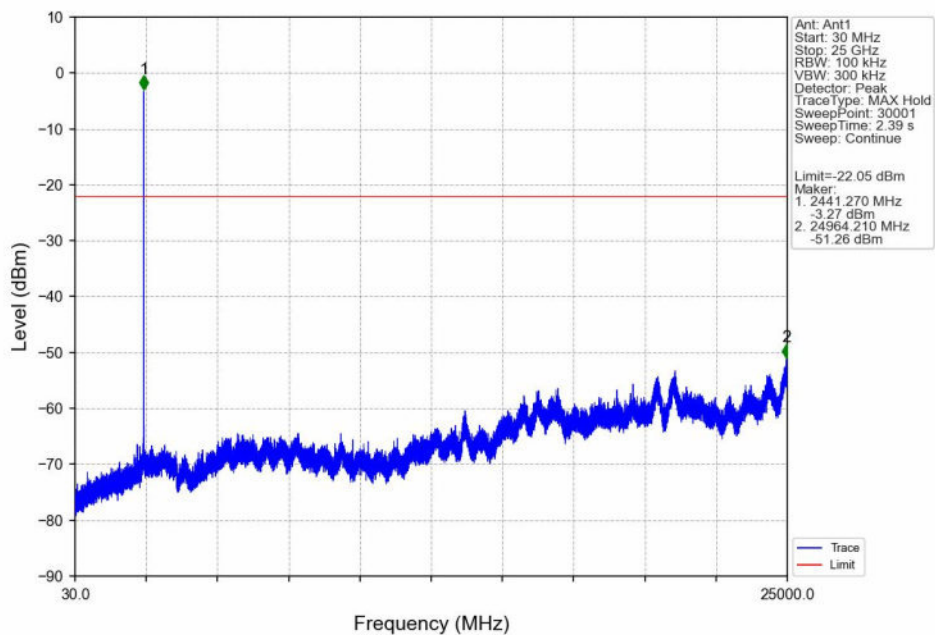


GFSK_DH5_LCH_2402MHz_Ant1_NTNV

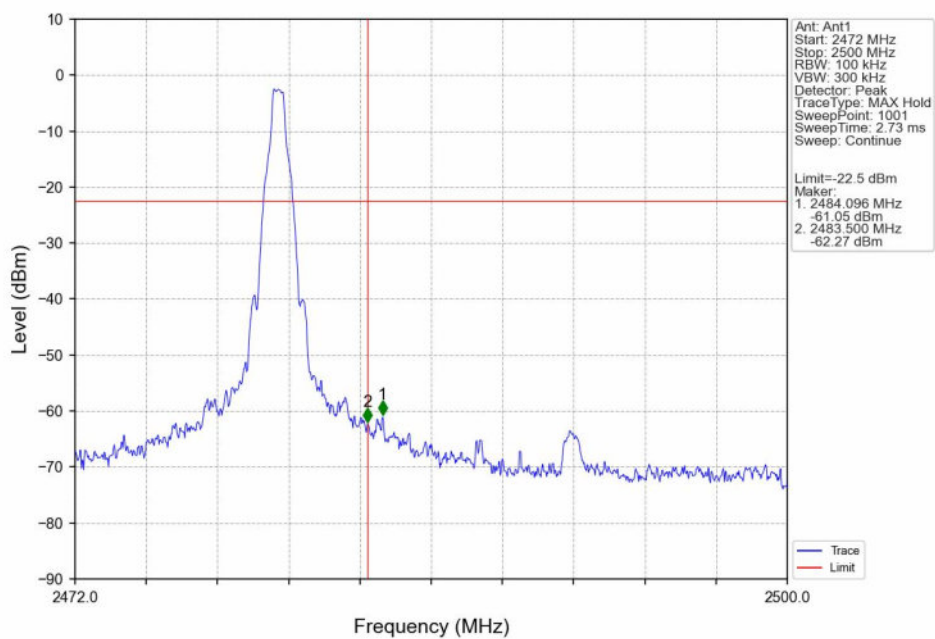




GFSK_DH5_MCH_2441MHz_Ant1_NTNV

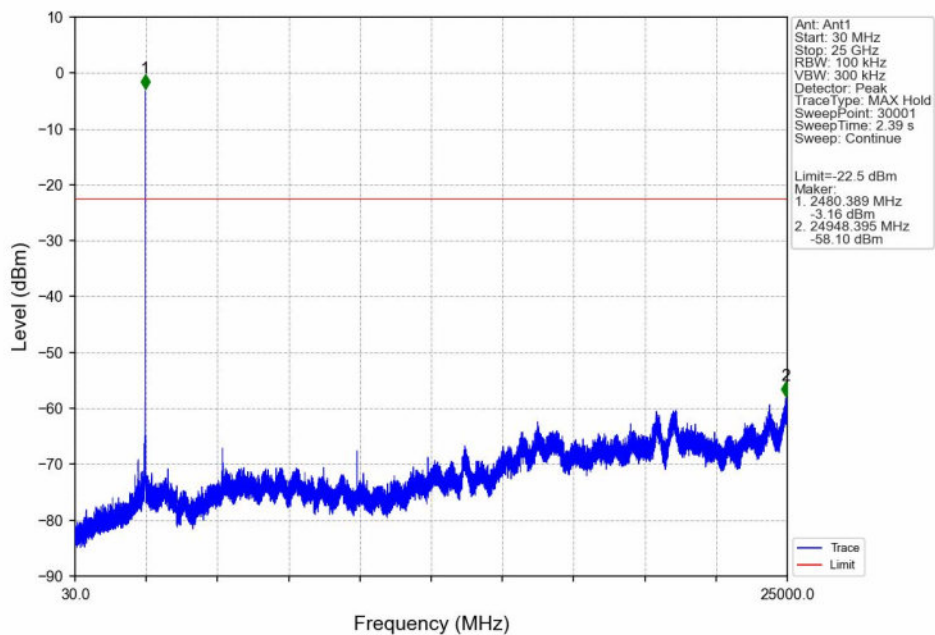


GFSK_DH5_HCH_2480MHz_Ant1_NTNV

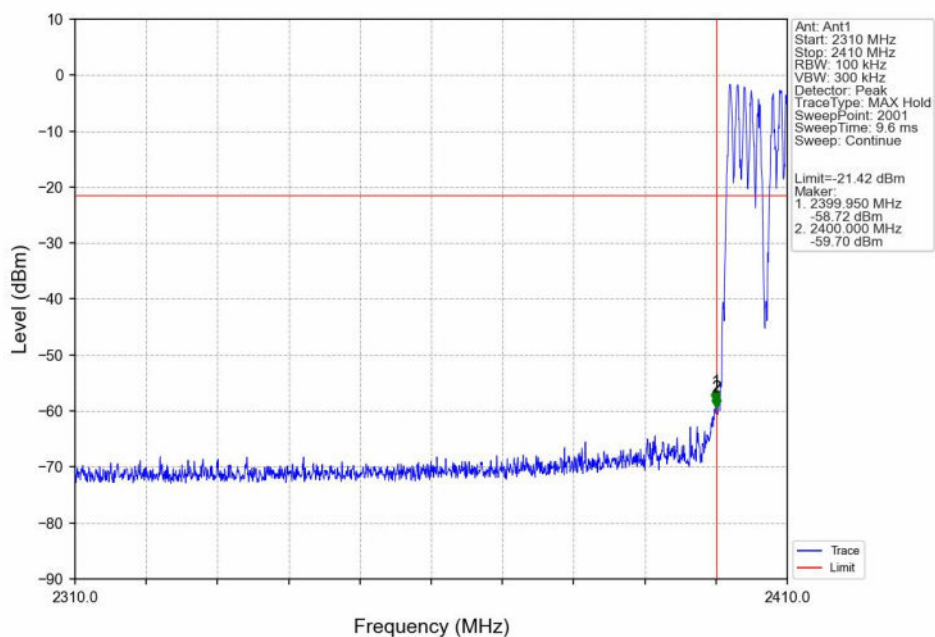




GFSK_DH5_HCH_2480MHz_Ant1_NTNV

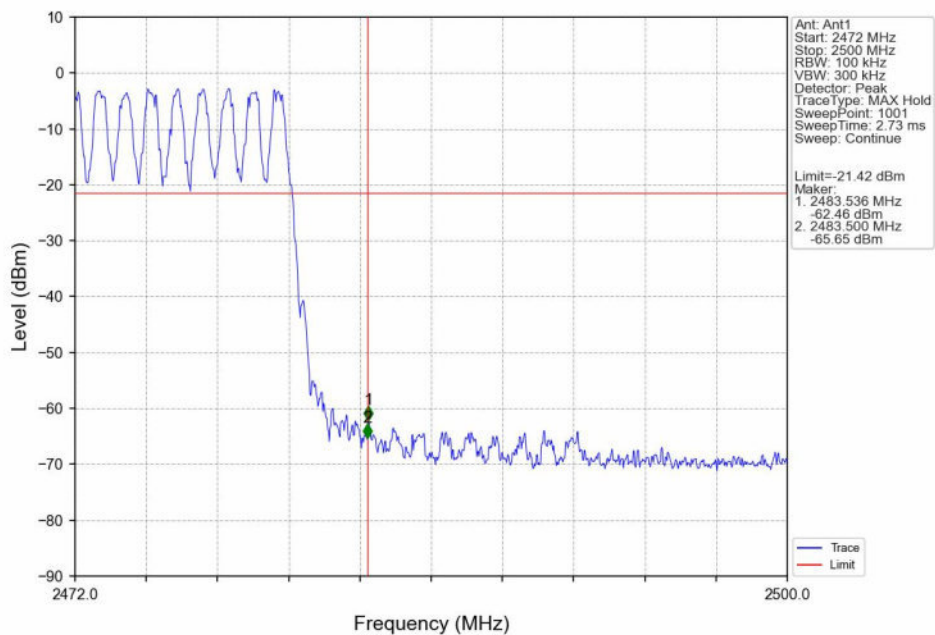


GFSK_DH5_HOPP_2410MHz_Ant1_NTNV

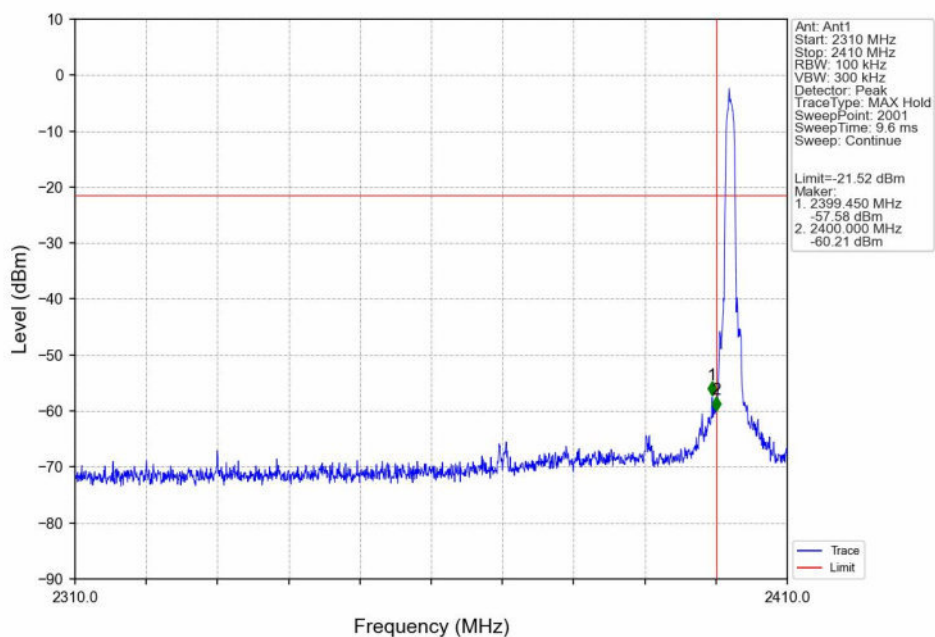




GFSK_DH5_HOPP_Ant1_NTNV

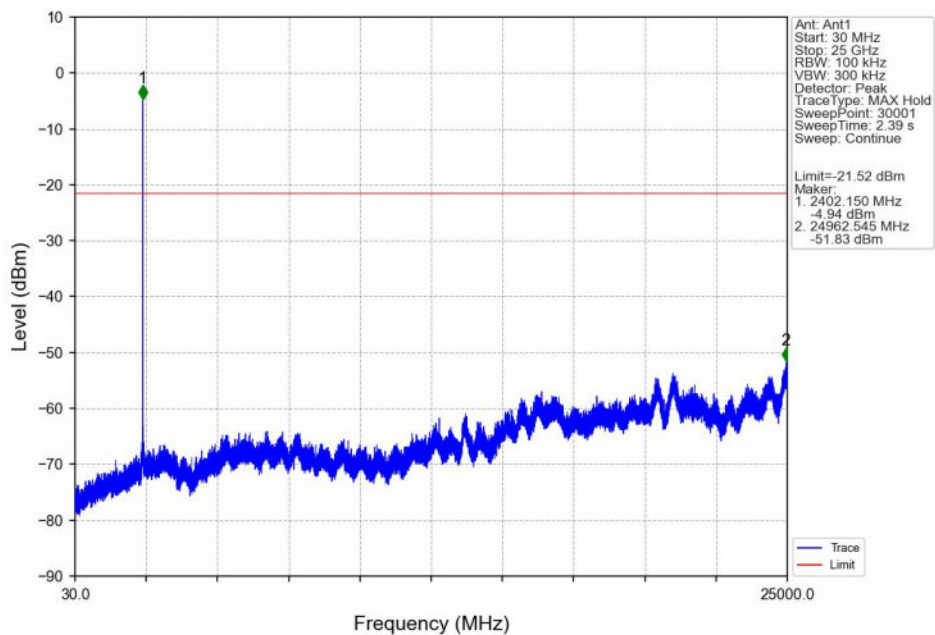


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

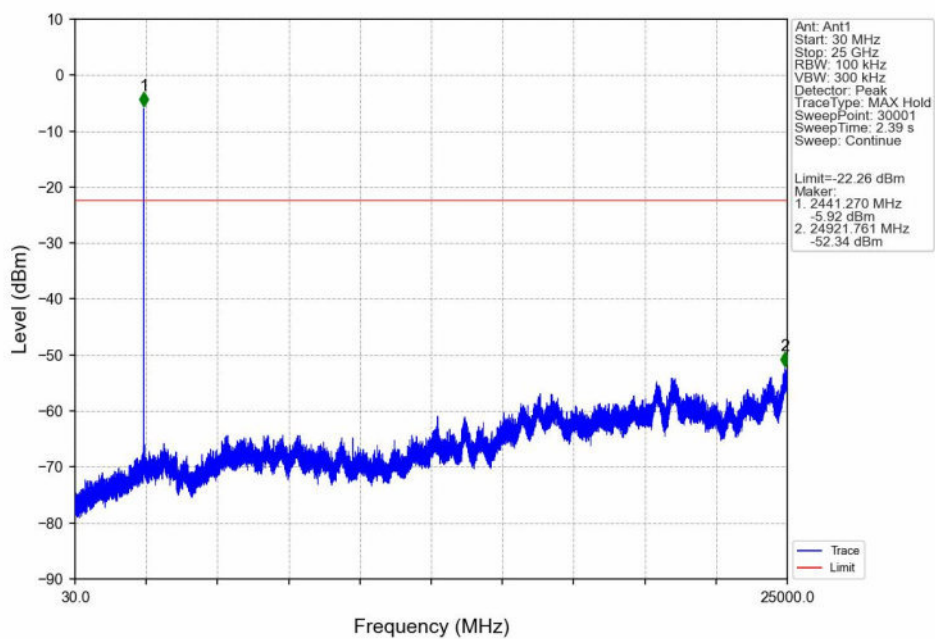




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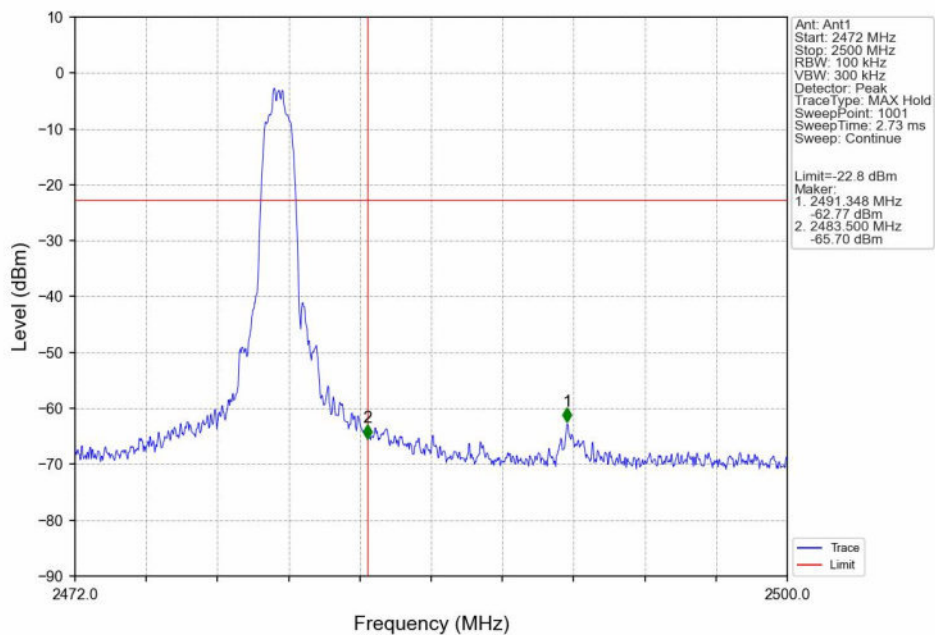


Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

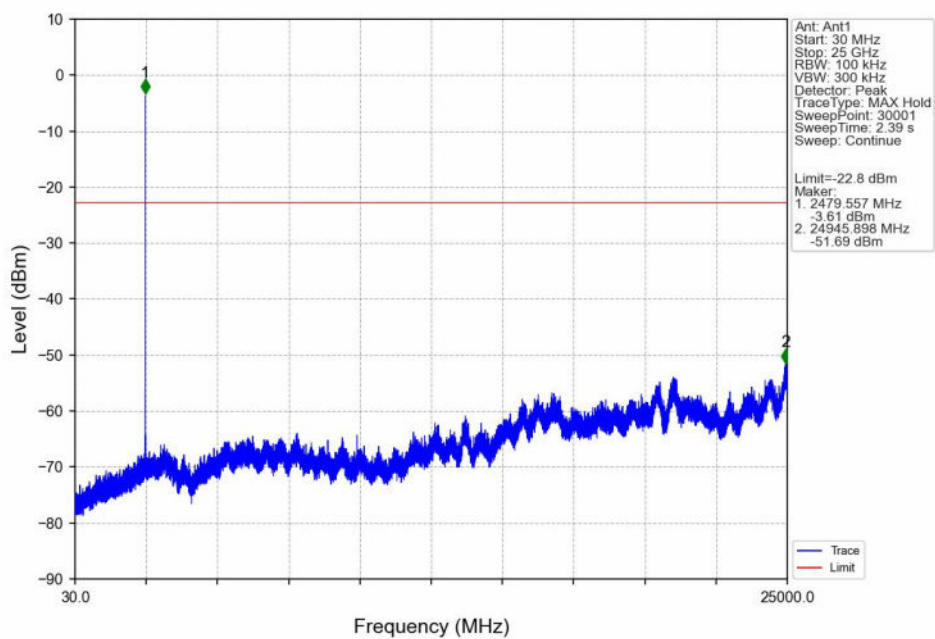




Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

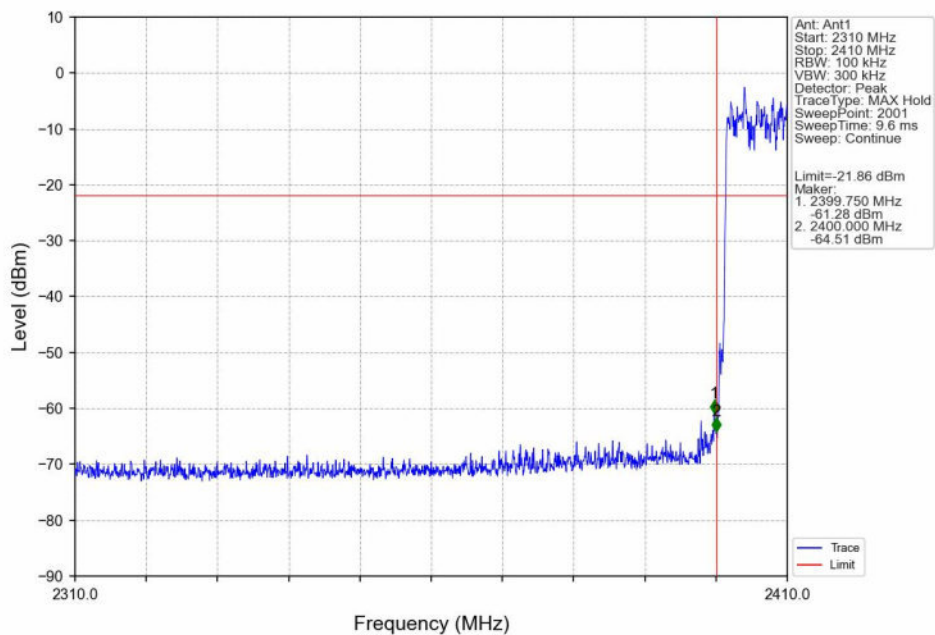


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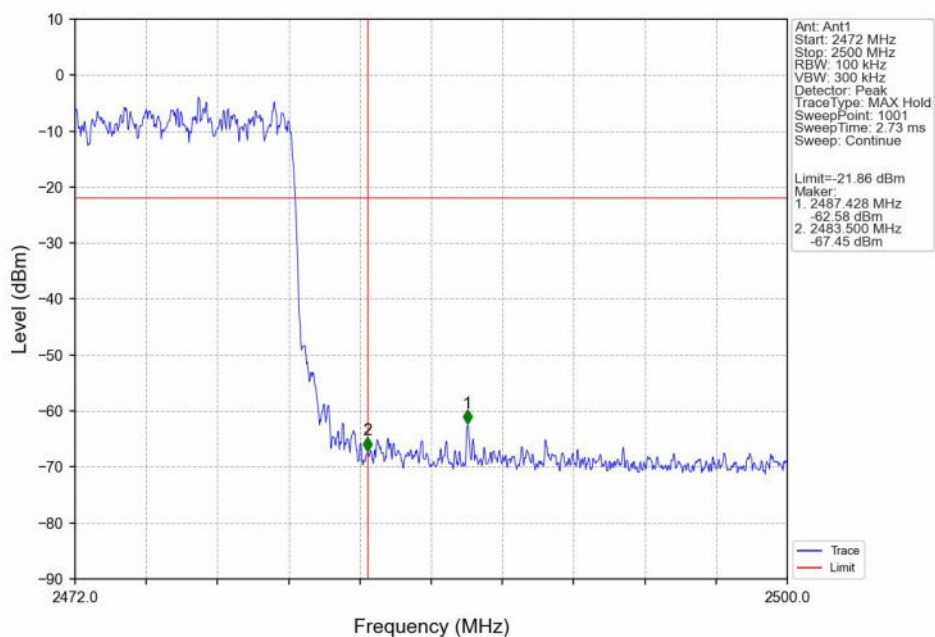




Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

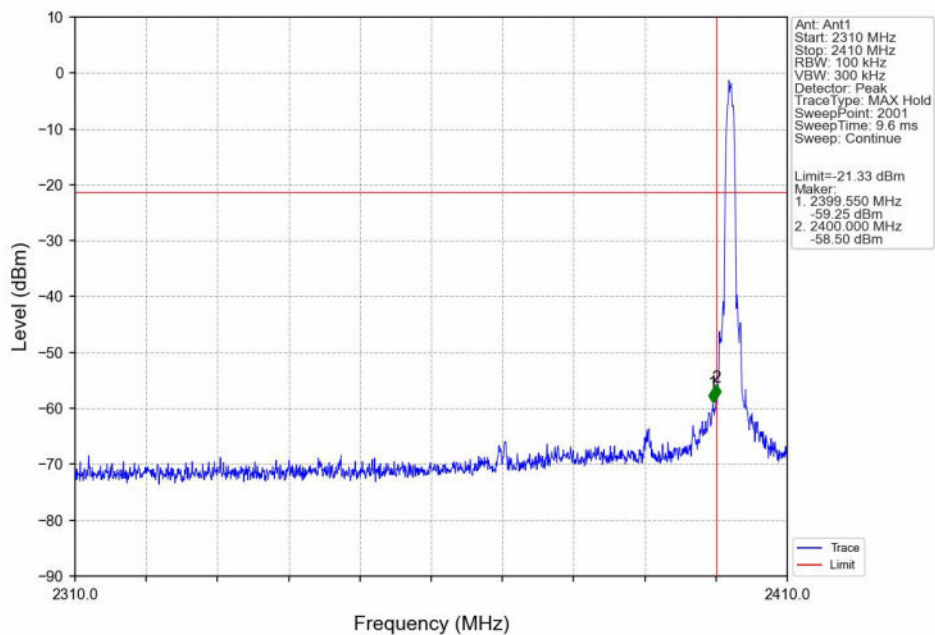


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

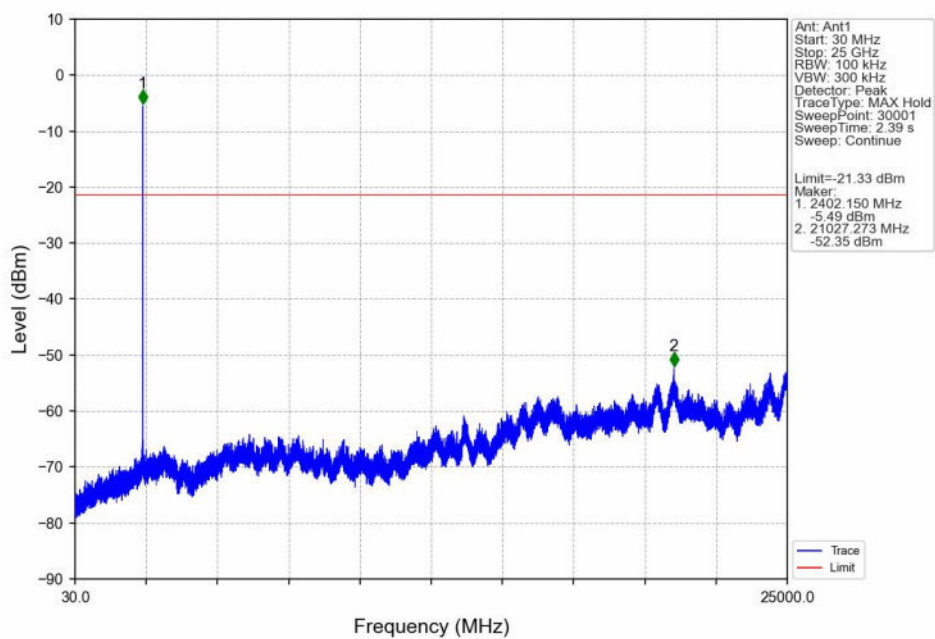




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

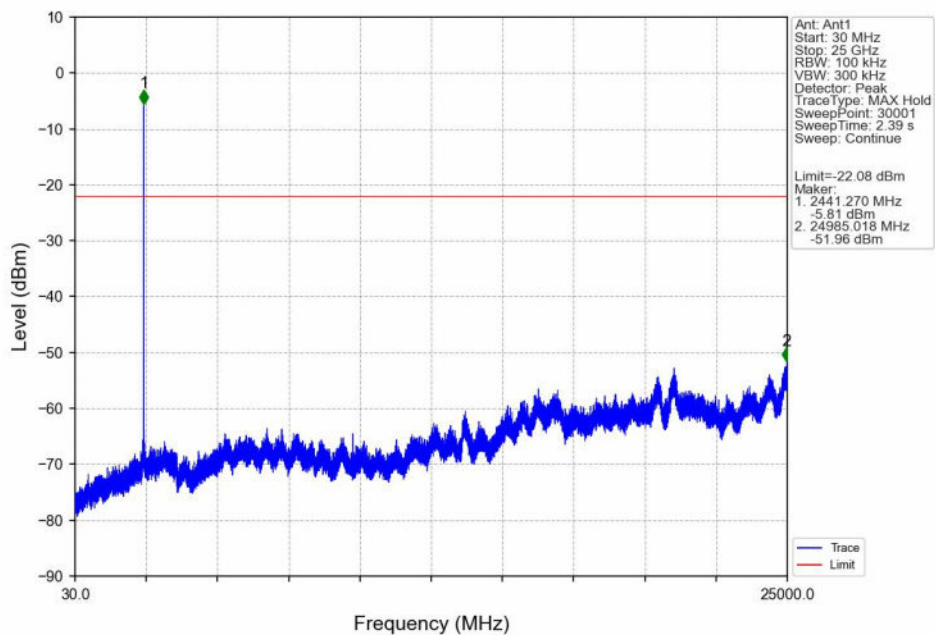


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

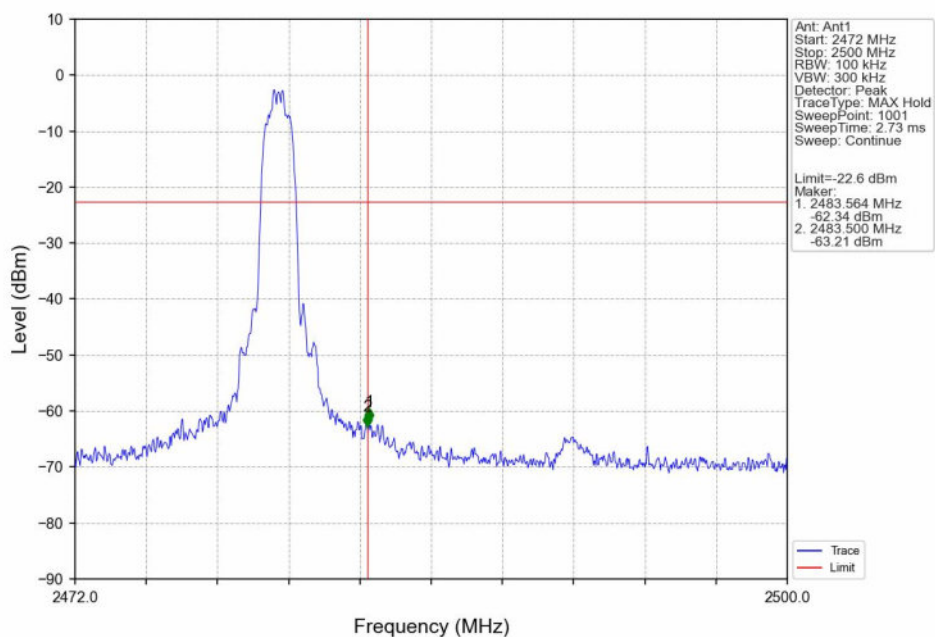




8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

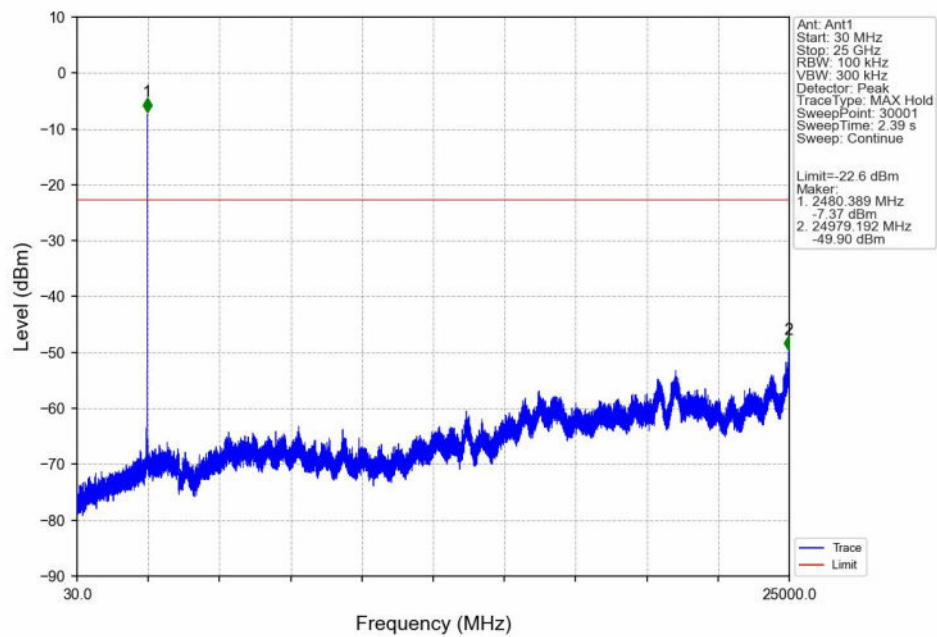


8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

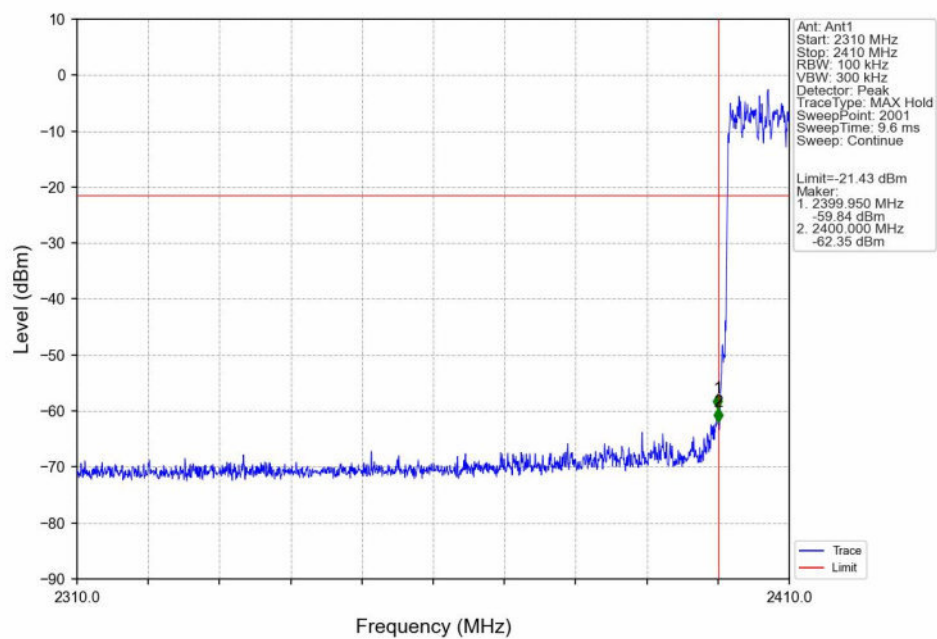




8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

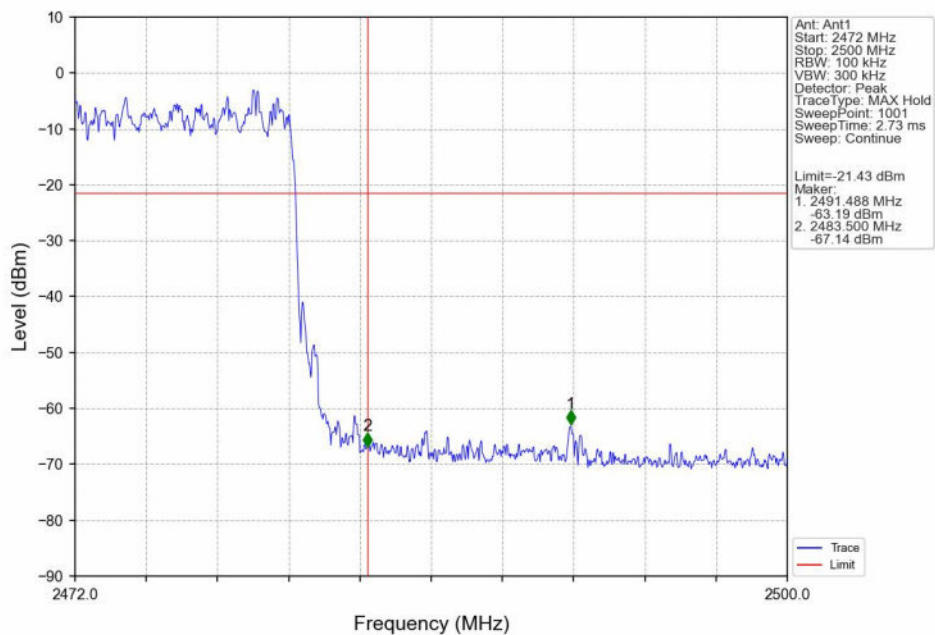


8DPSK_3DH5_HOPP_Ant1_NTNV





8DPSK_3DH5_HOPP_Ant1_NTNV





7. Form731

7.1 Test Result

7.1.1 Form731

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2402	2480	0.0010	0.10