



RF Test Report

For

Project No.:	ZKT-240828L10670E-1
Client:	Shenzhen Innosystem Technology Co.,Ltd
Manufacturer:	Shenzhen Innosystem Technology Co.,Ltd
Product Description:	Wearable Mini Speaker
Model No.:	MZ-628
Test Engineer:	Franco
Test Date:	2024-08-19

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

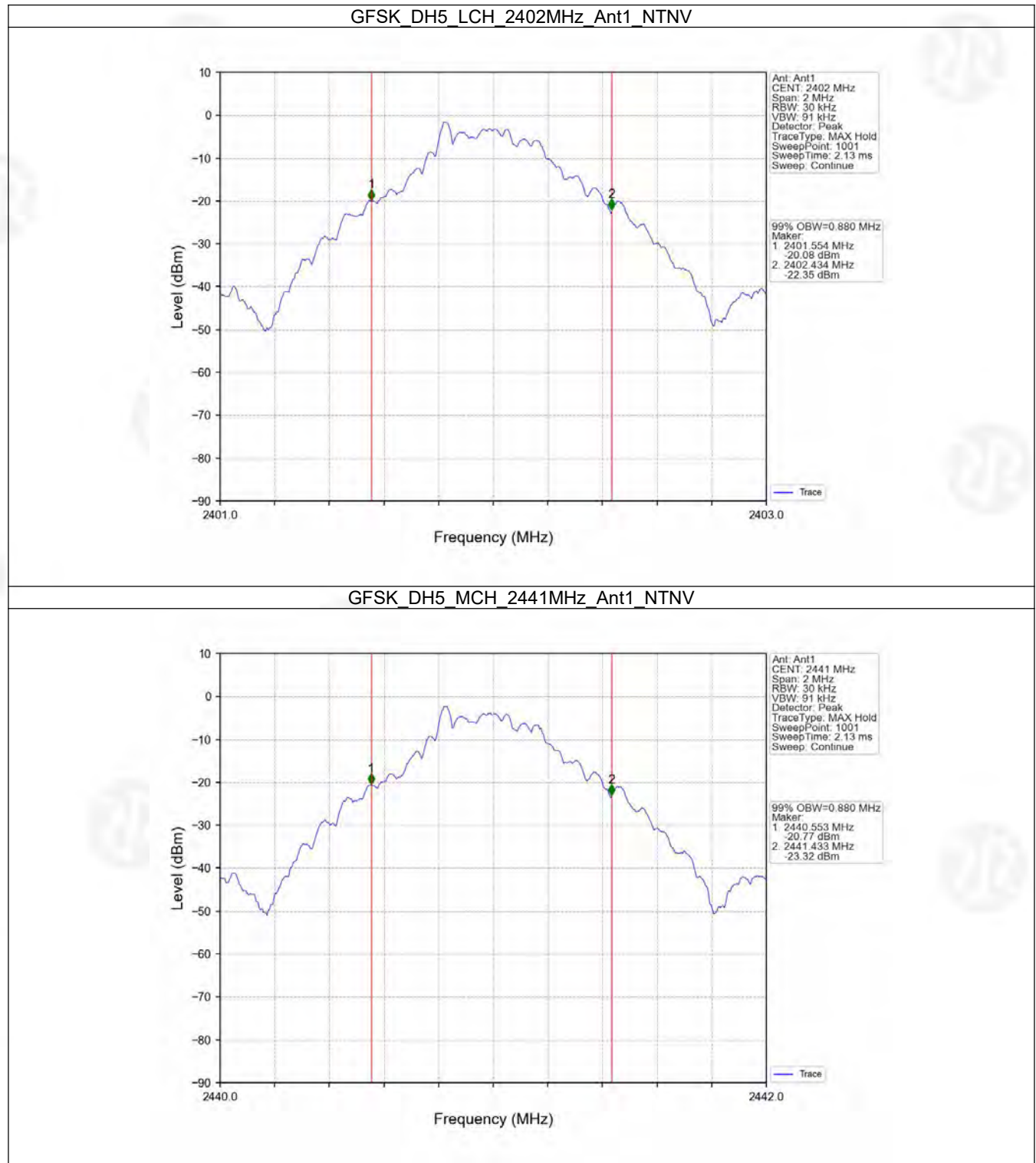
1.1 OBW

1.1.1 Test Result

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	0.880	/	Pass
		2480	DH5	1	0.885	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.172	/	Pass
		2441	2DH5	1	1.167	/	Pass
		2480	2DH5	1	1.169	/	Pass
8DPSK	SISO	2402	3DH5	1	1.163	/	Pass
		2441	3DH5	1	1.164	/	Pass
		2480	3DH5	1	1.165	/	Pass

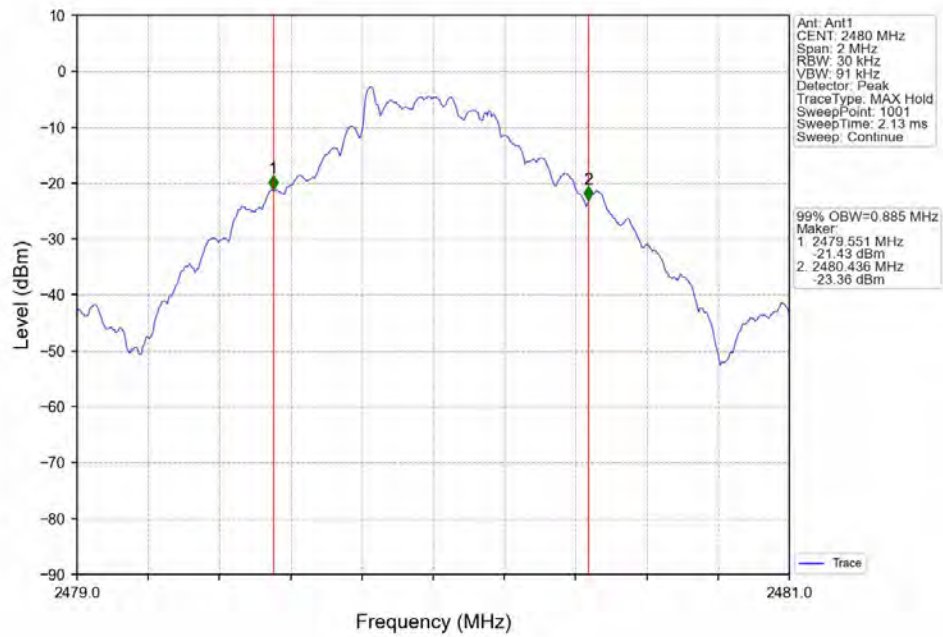


1.1.2 Test Graph

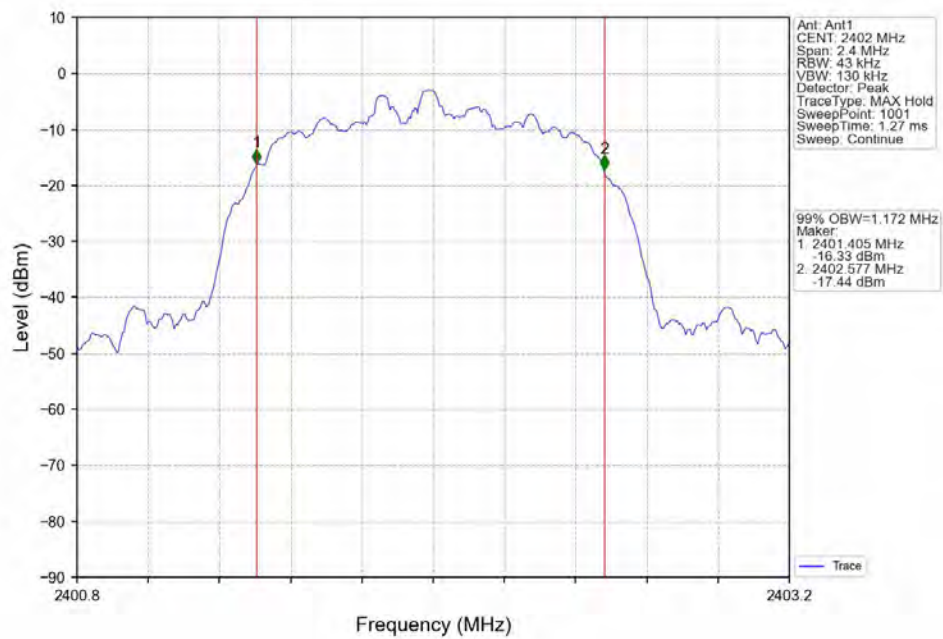




GFSK DH5_HCH_2480MHz_Ant1_NTNV

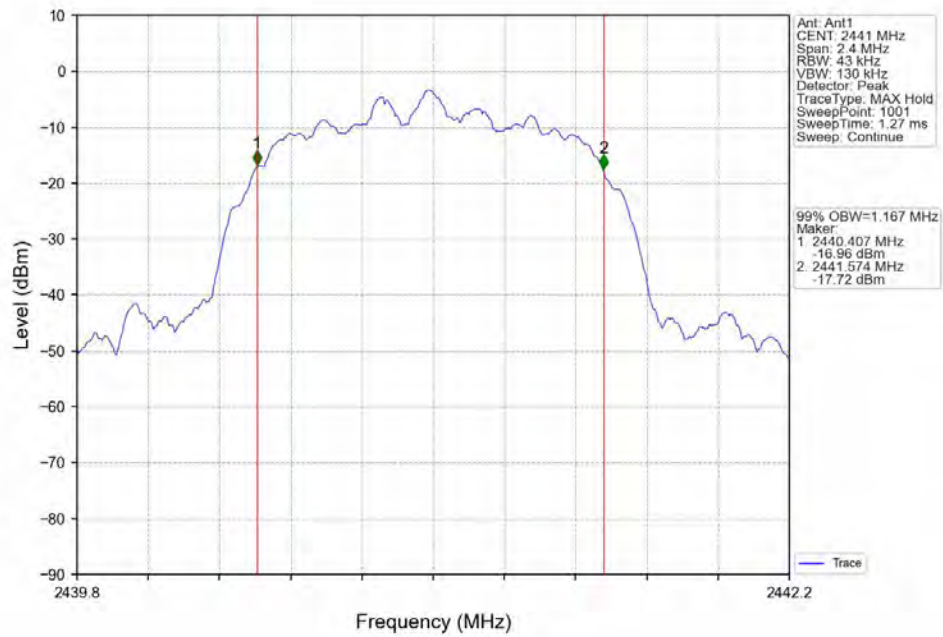


PI/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

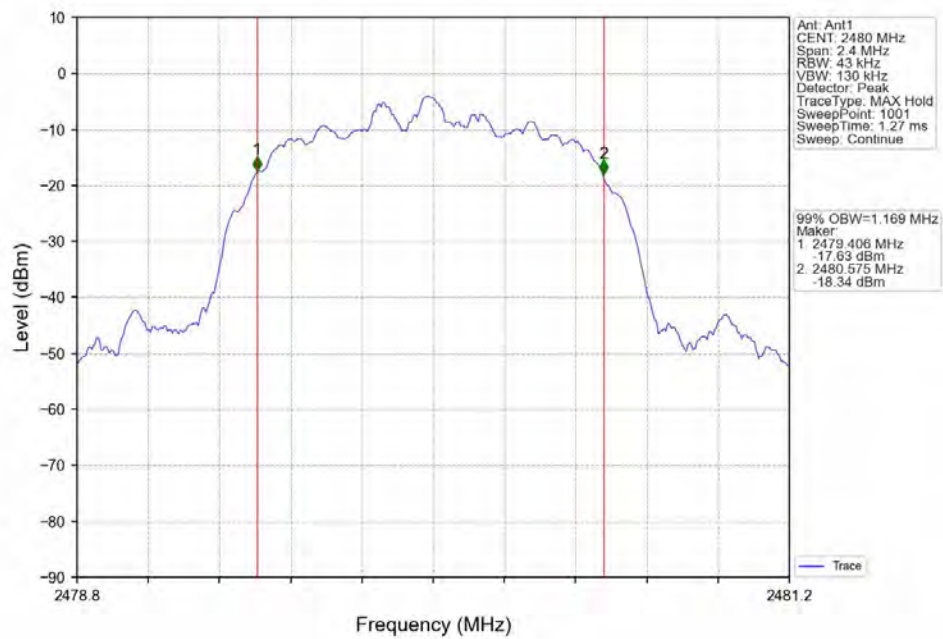




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

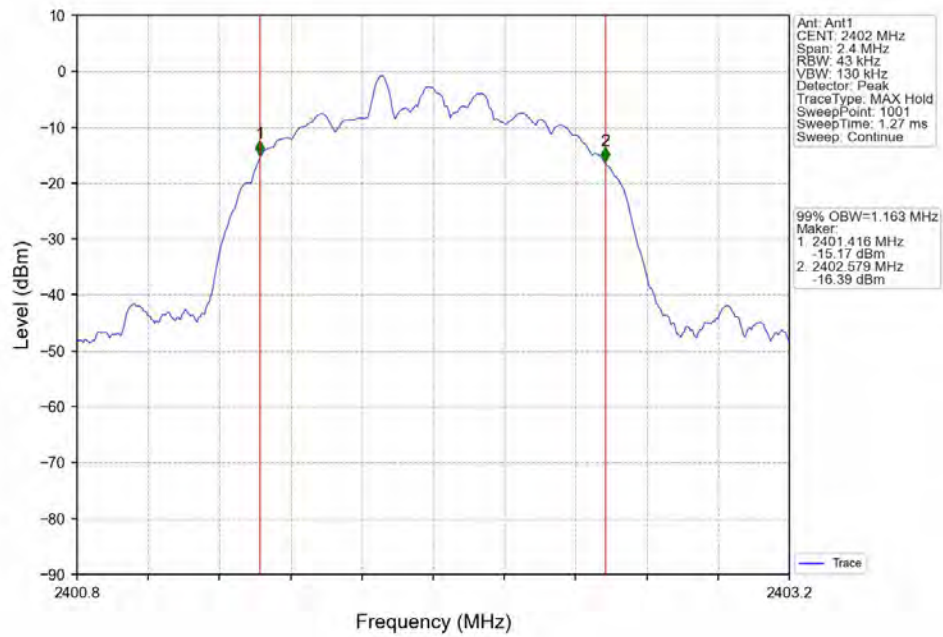


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

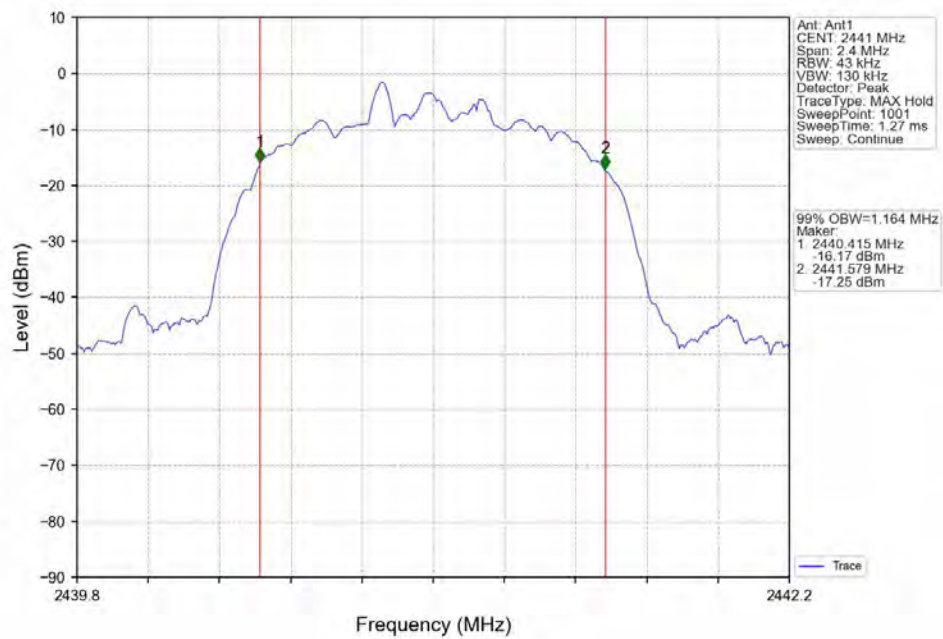




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

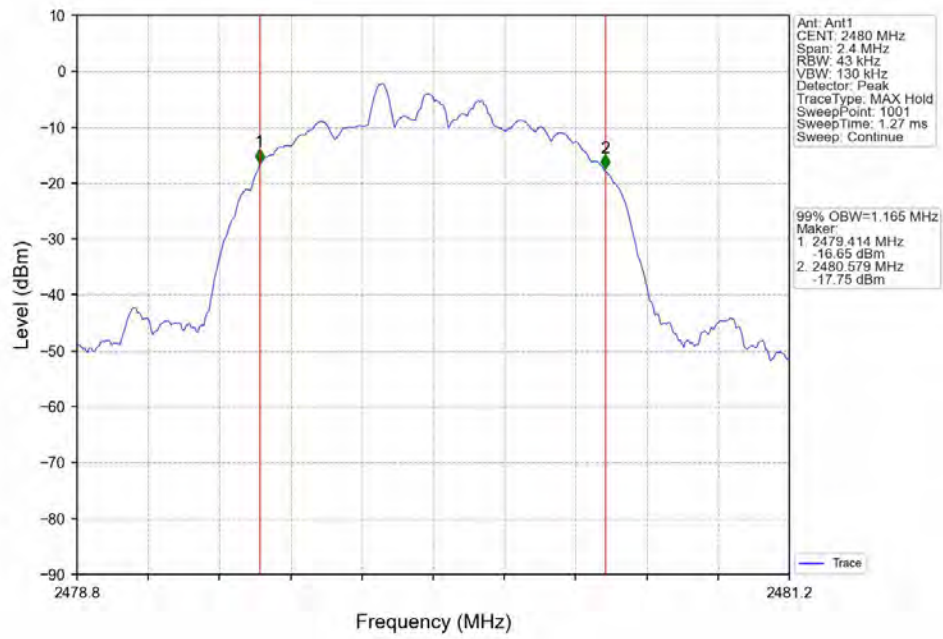


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV





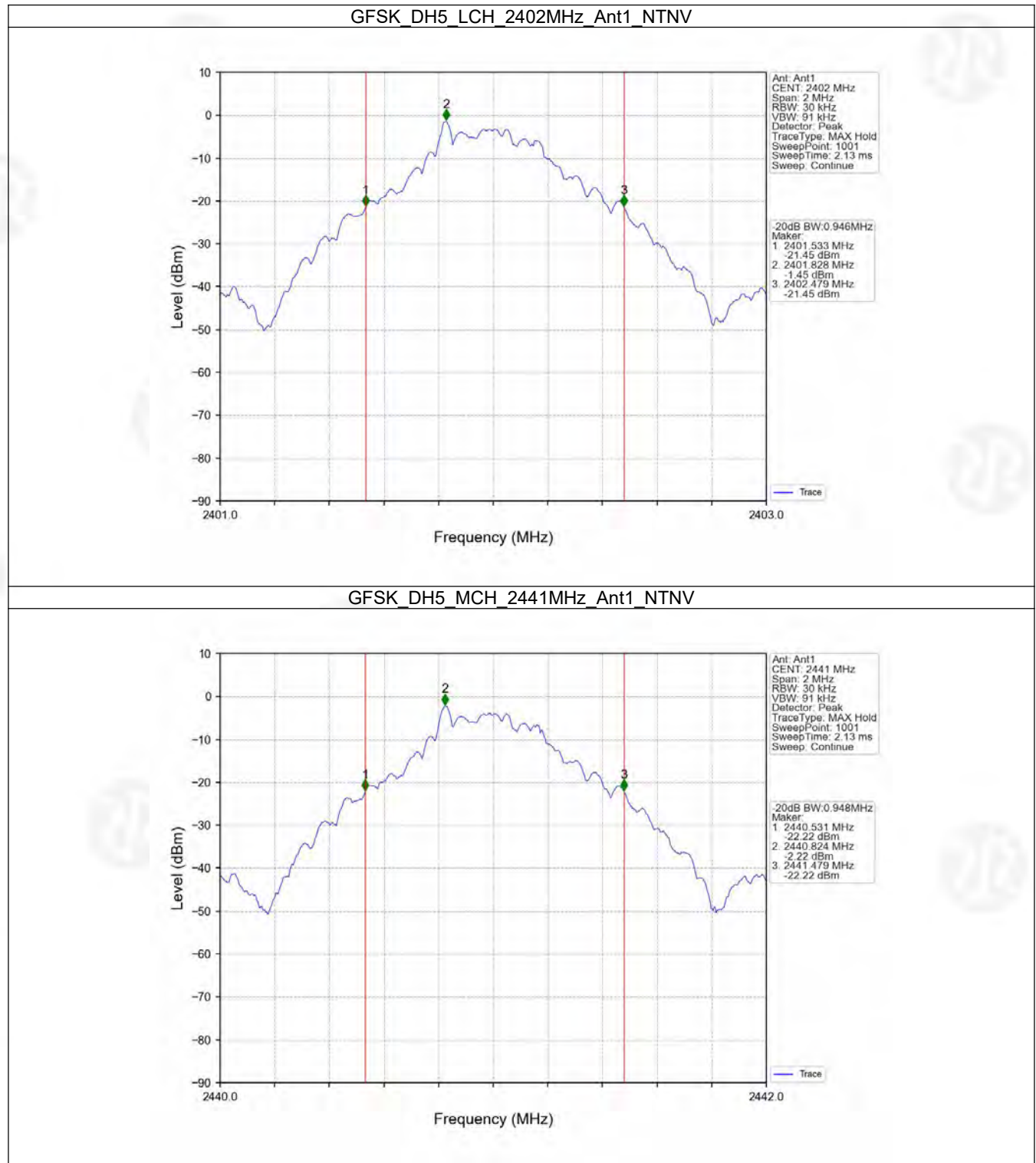
1.2 20dB BW

1.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.946	/	Pass
		2441	DH5	1	0.948	/	Pass
		2480	DH5	1	0.948	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.299	/	Pass
		2441	2DH5	1	1.299	/	Pass
		2480	2DH5	1	1.297	/	Pass
8DPSK	SISO	2402	3DH5	1	1.286	/	Pass
		2441	3DH5	1	1.286	/	Pass
		2480	3DH5	1	1.284	/	Pass

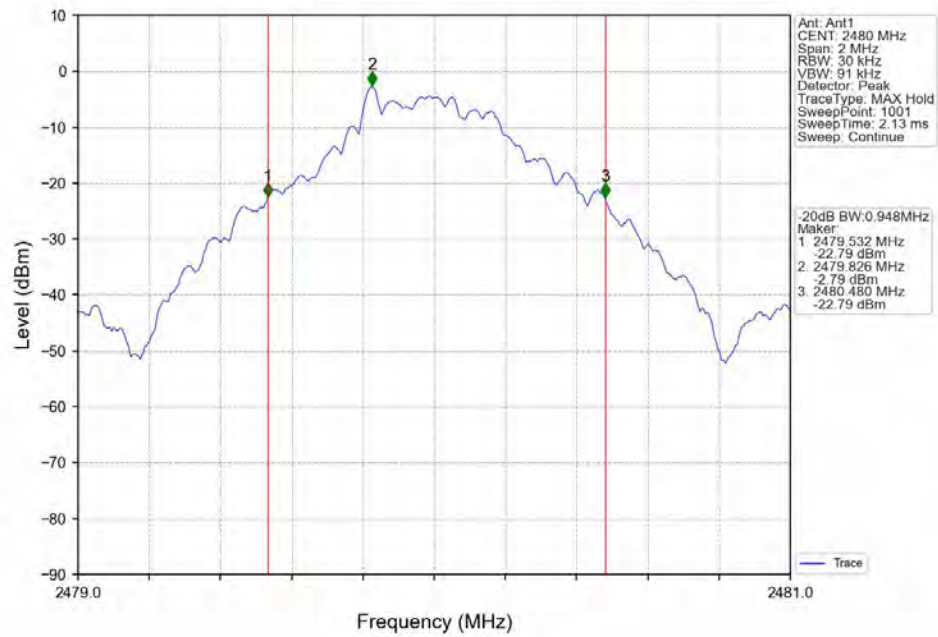


1.2.2 Test Graph

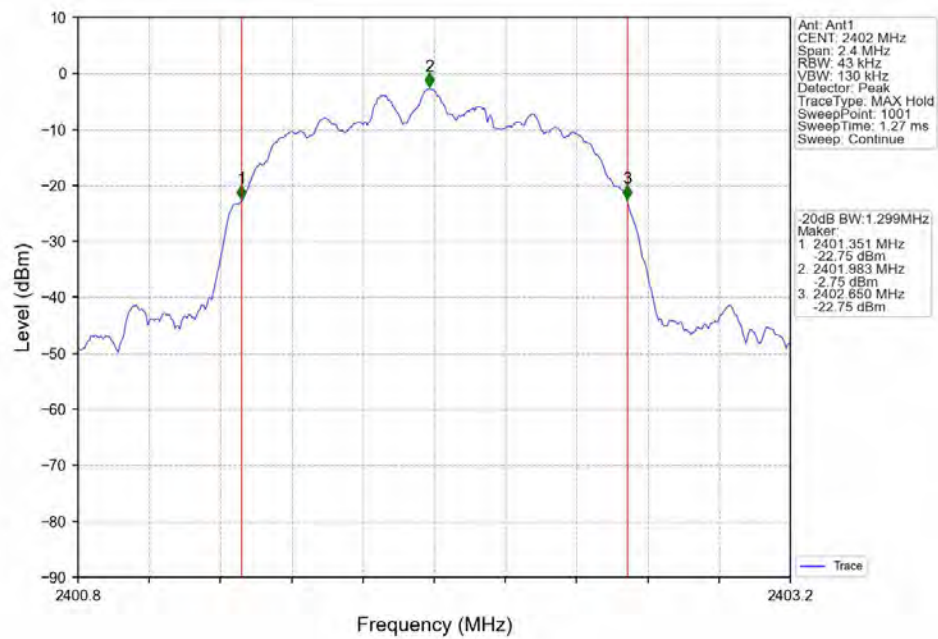




GFSK DH5_HCH_2480MHz_Ant1_NTNV

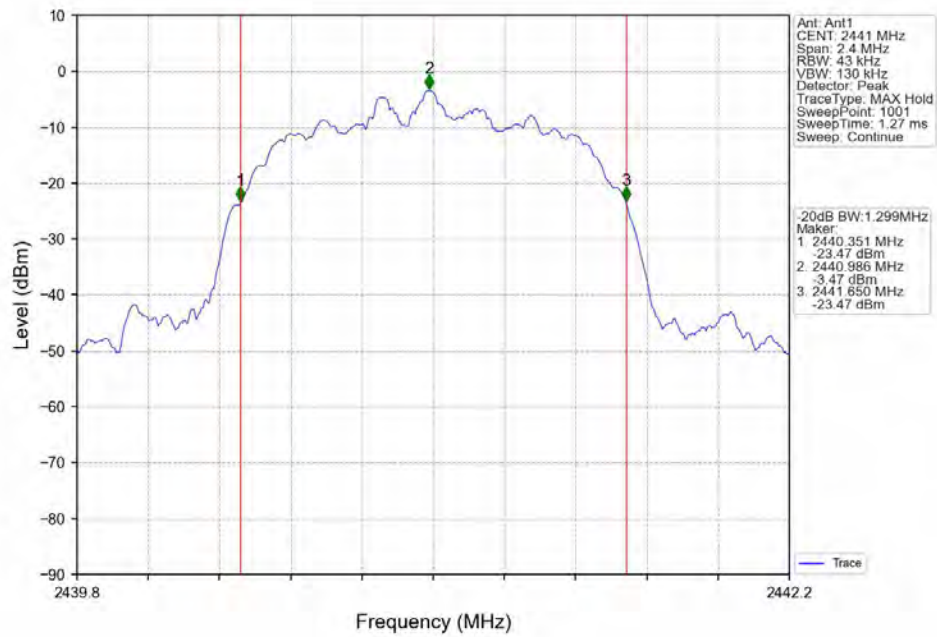


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

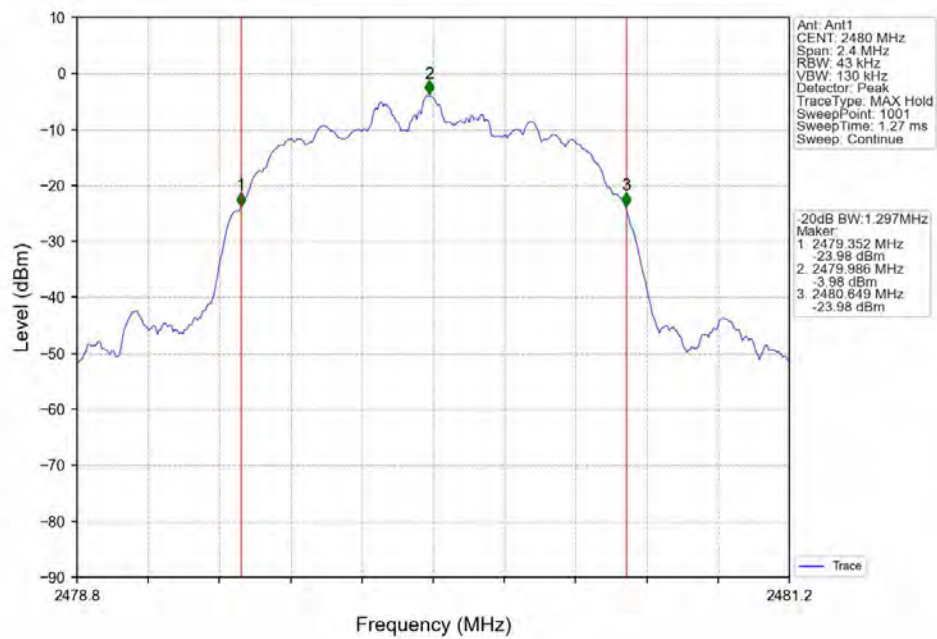




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

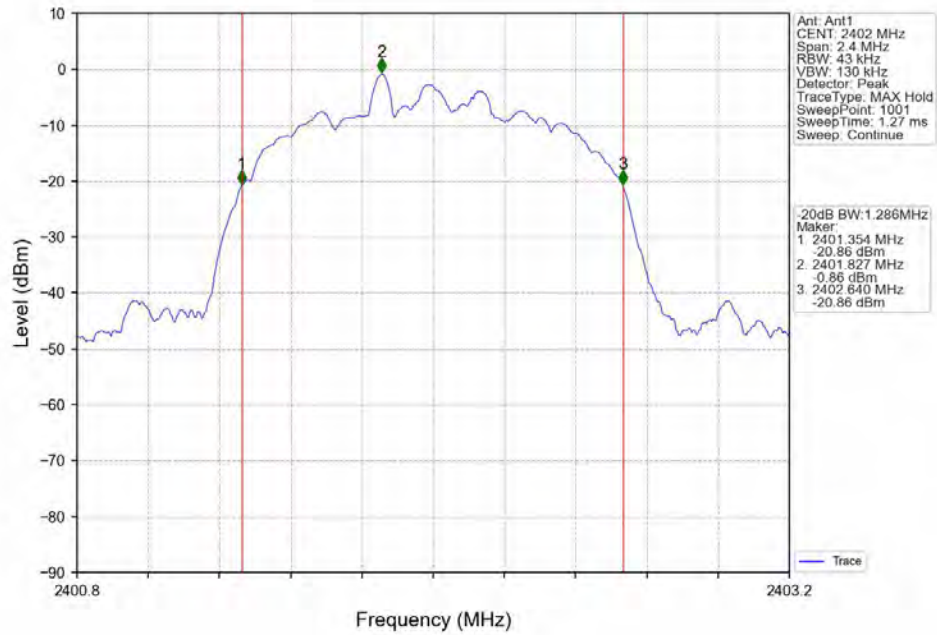


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

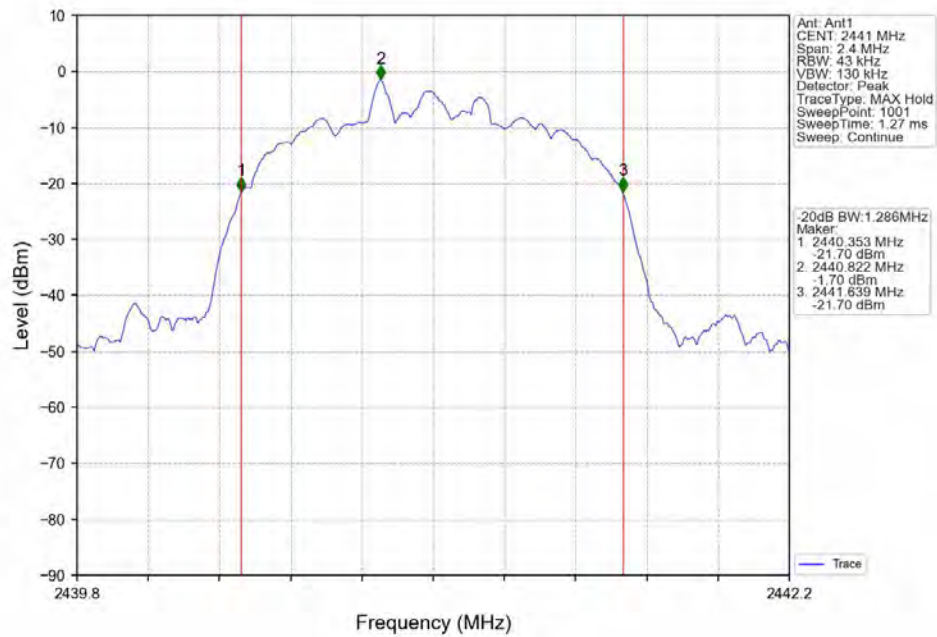




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

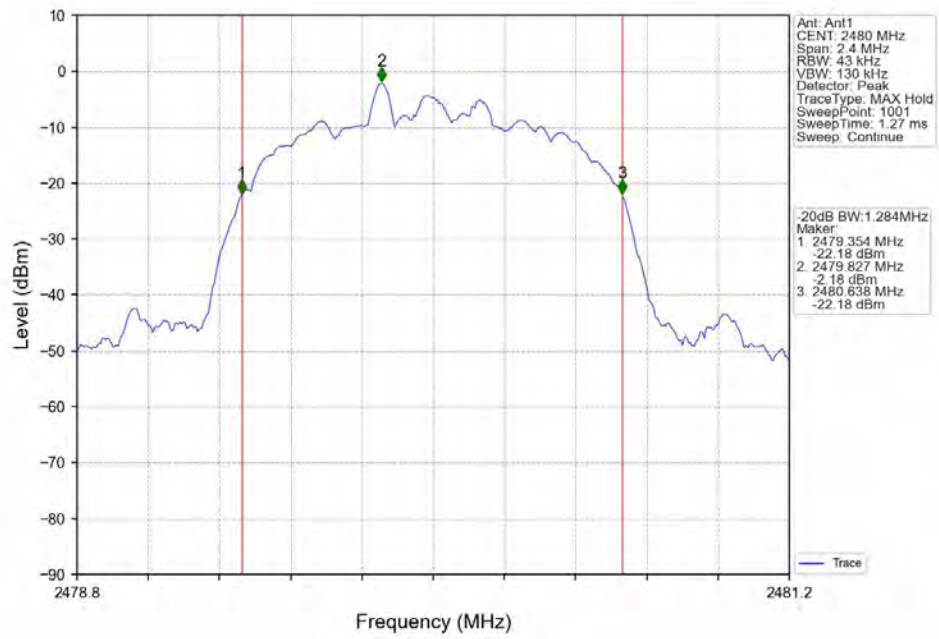


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV





2. Maximum Conducted Output Power

2.1 Power

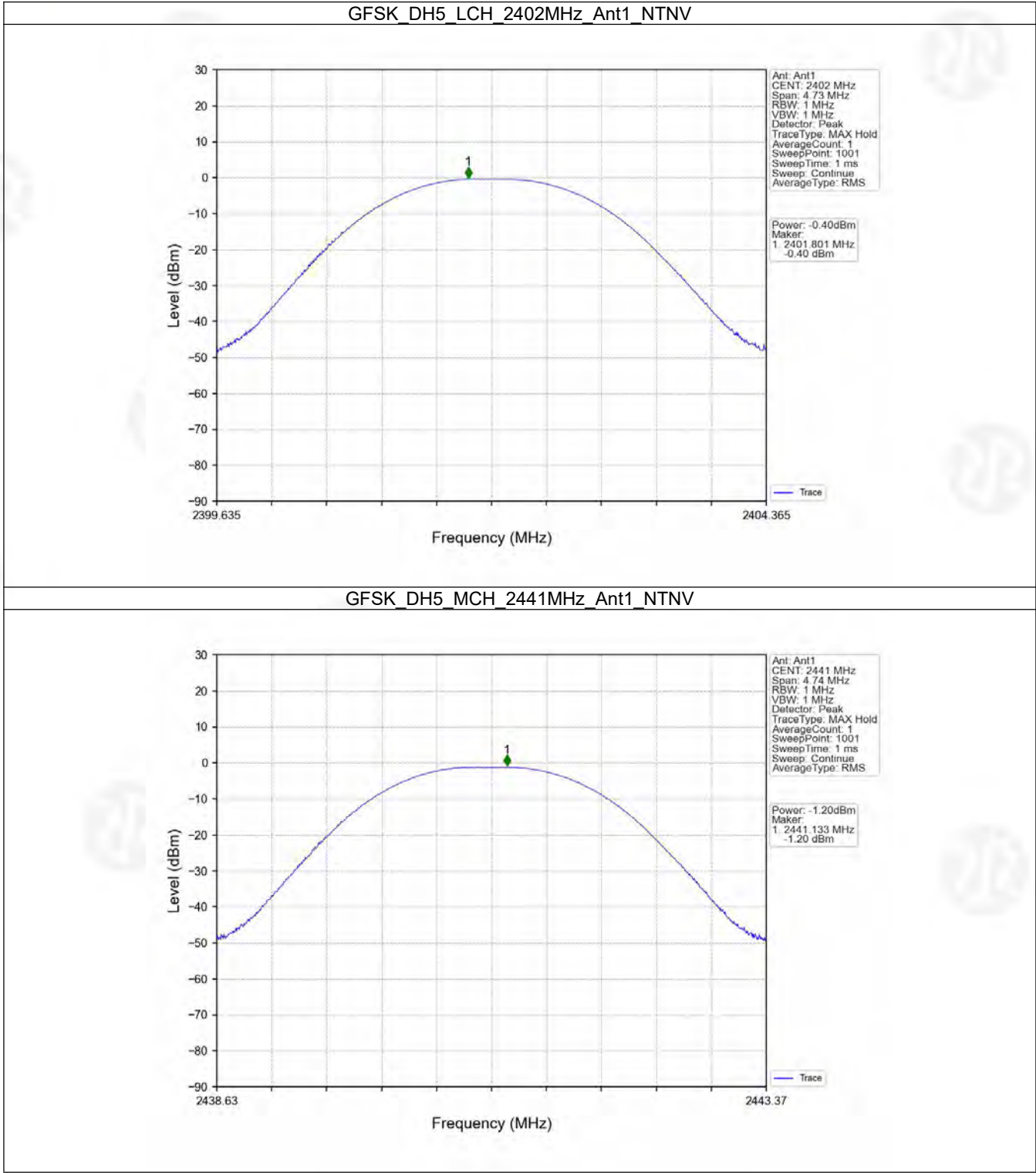
2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	-0.40	<=30	Pass
		2441	DH5	-1.20	<=30	Pass
		2480	DH5	-1.72	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	0.19	<=20.97	Pass
		2441	2DH5	-0.54	<=20.97	Pass
		2480	2DH5	-1.08	<=20.97	Pass
8DPSK	SISO	2402	3DH5	0.70	<=20.97	Pass
		2441	3DH5	-0.02	<=20.97	Pass
		2480	3DH5	-0.59	<=20.97	Pass

Note1: Antenna Gain: Ant1: 1.70dBi;

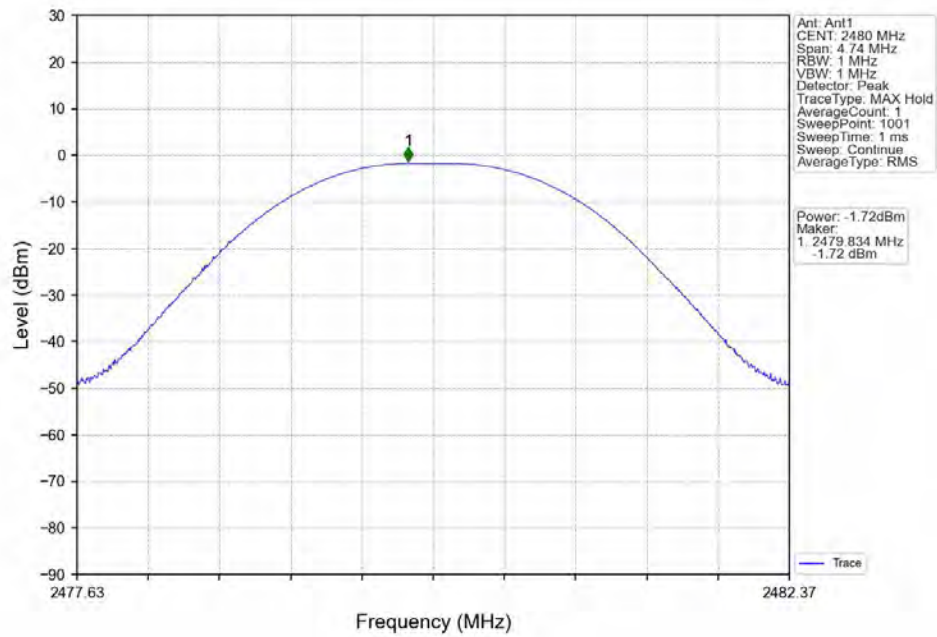


2.1.2 Test Graph

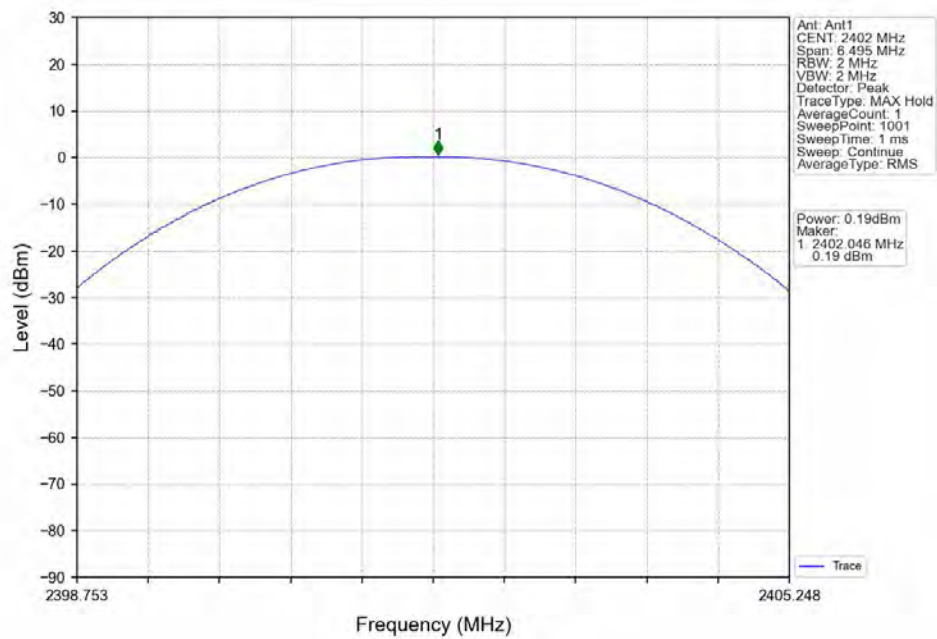




GFSK DH5 HCH 2480MHz_Ant1_NTNV

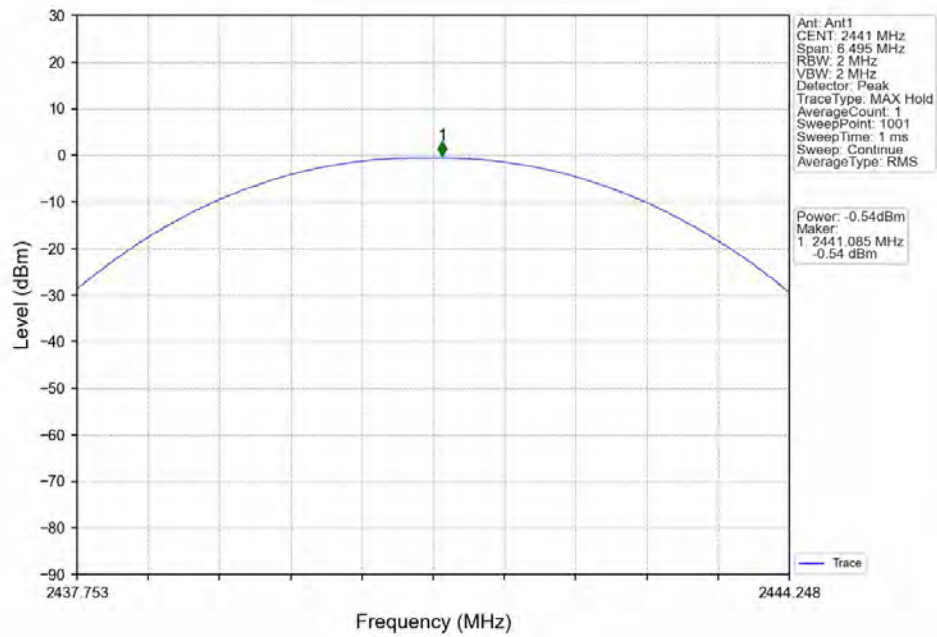


Pi/4DQPSK 2DH5_LCH 2402MHz_Ant1_NTNV

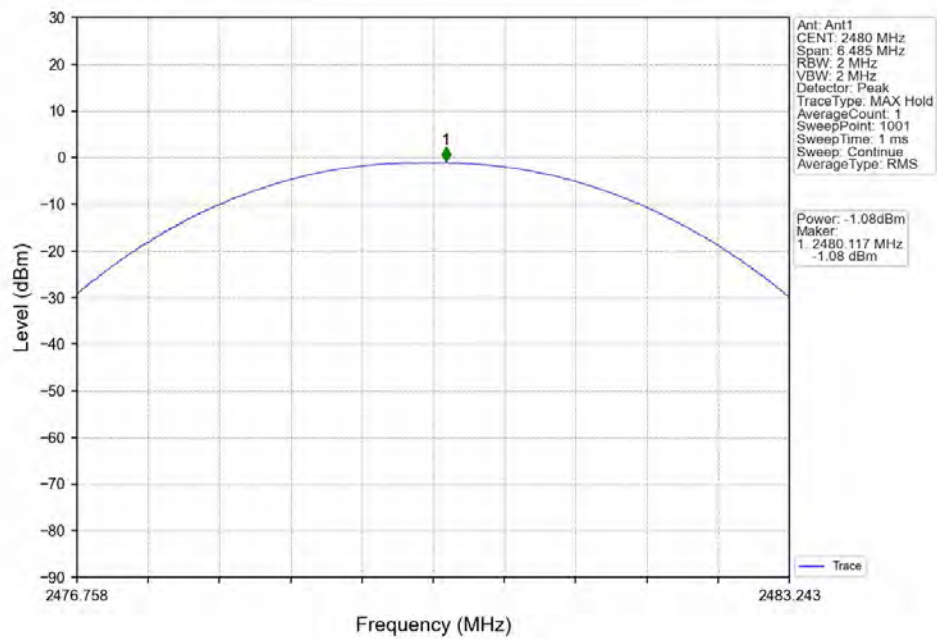




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

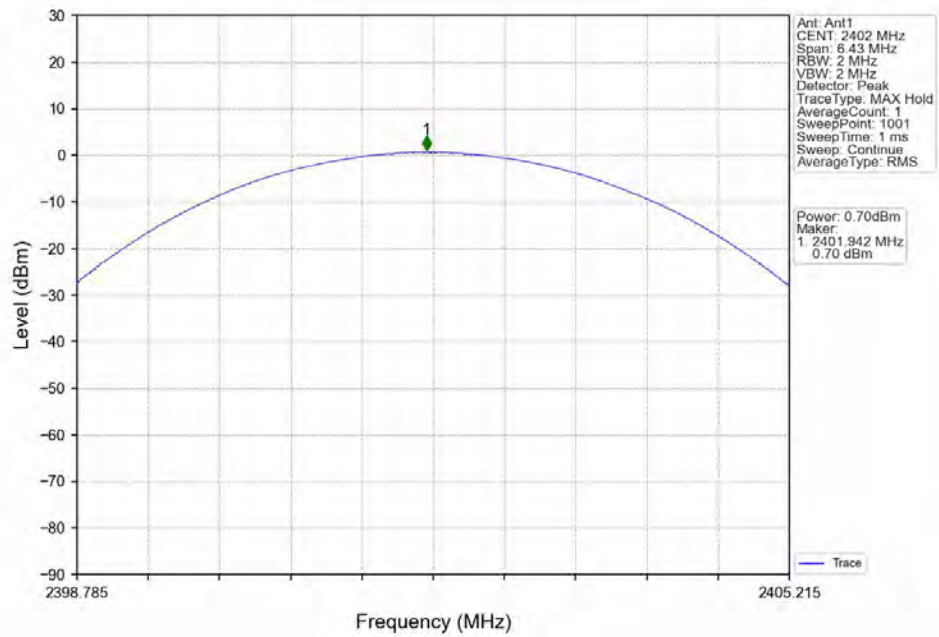


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

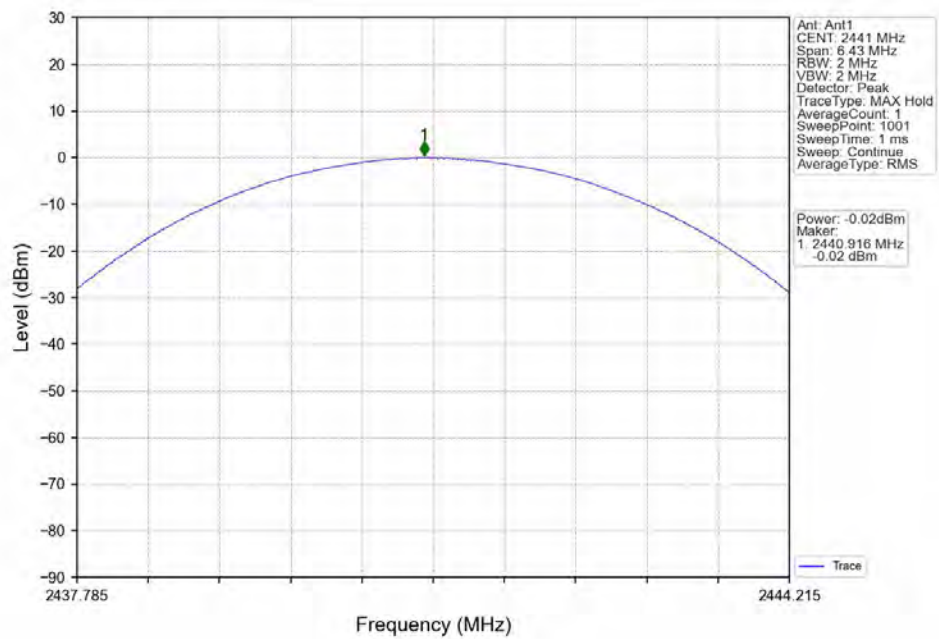




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

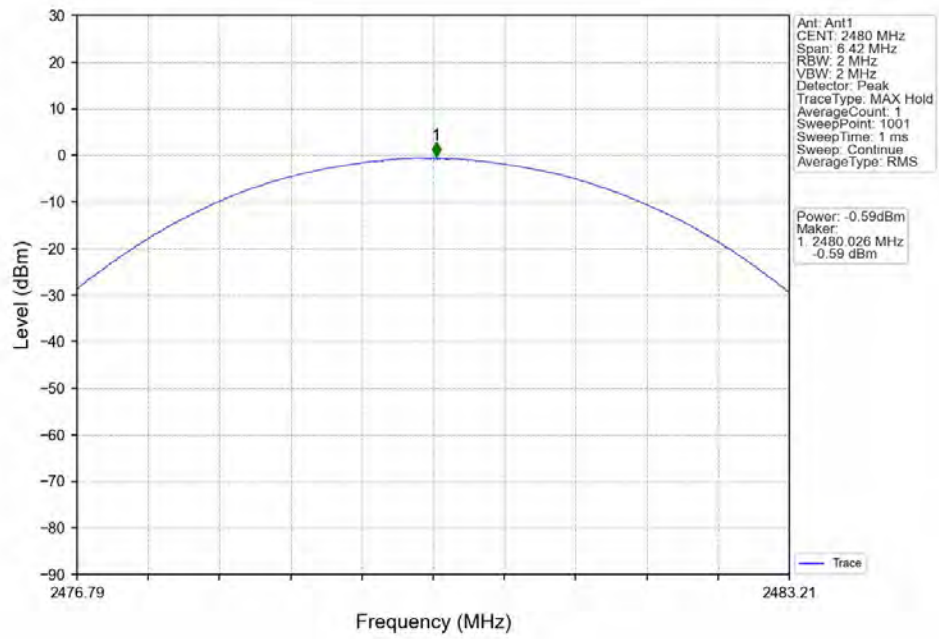


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV





3. Carrier Frequency Separation

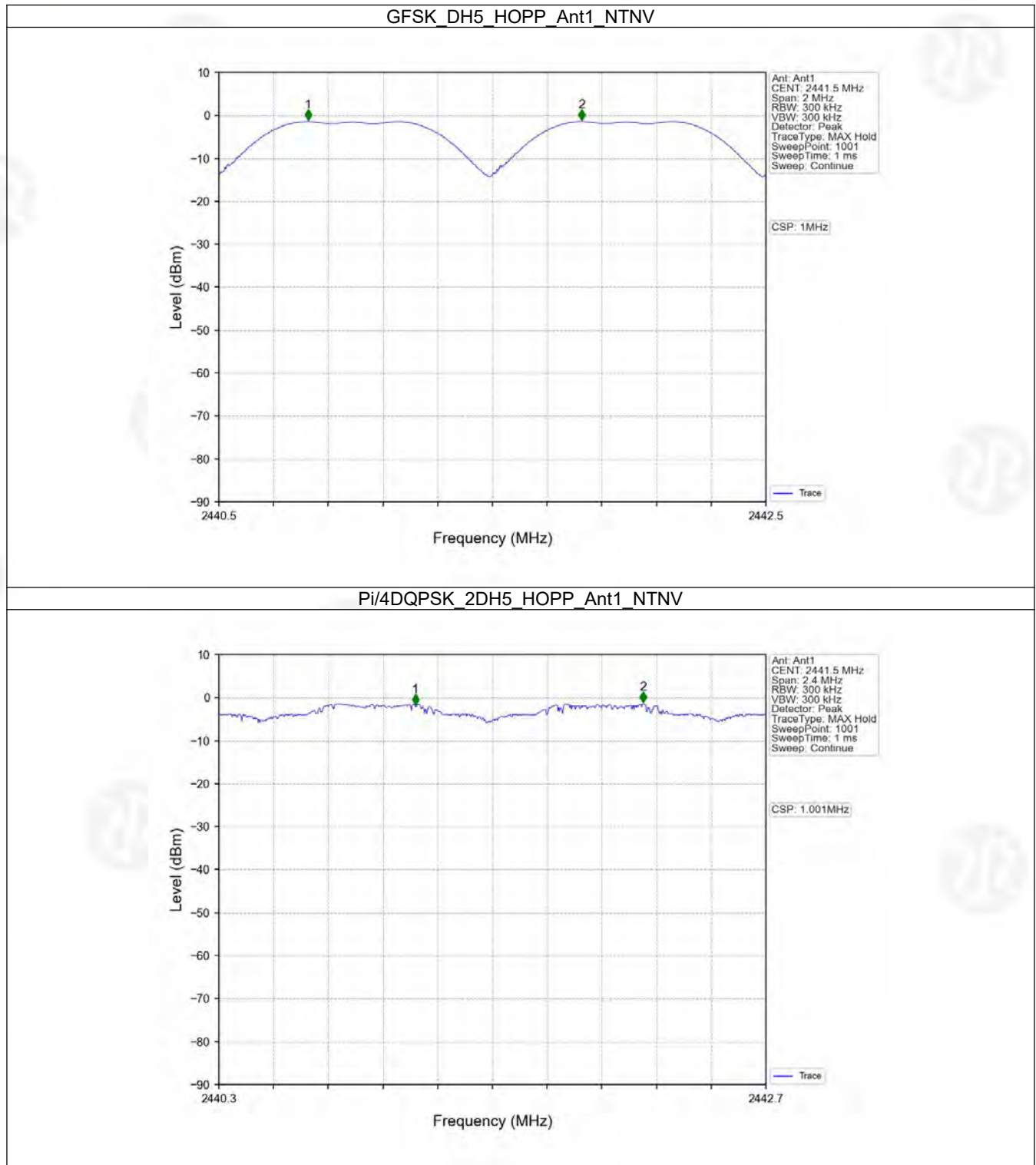
3.1 Ant1

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	1.000	0.948	≥ 0.948	Pass
PI/4DQPSK	SISO	HOPP	2DH5	1.001	1.299	≥ 0.866	Pass
8DPSK	SISO	HOPP	3DH5	1.006	1.286	≥ 0.857	Pass

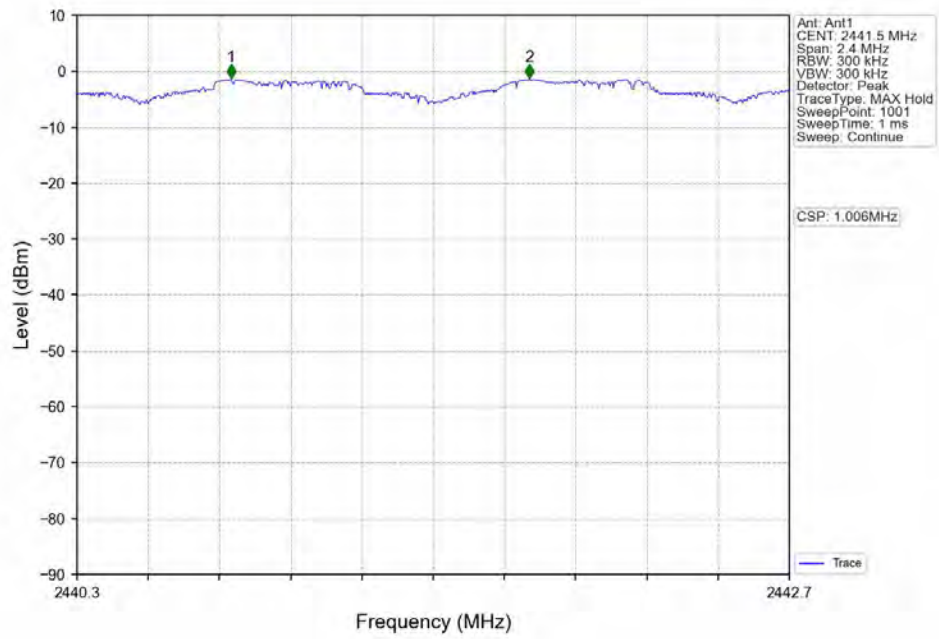


3.1.2 Test Graph





8DPSK_3DH5_HOPP_Ant1_NTNV





4. Number of Hopping Frequencies

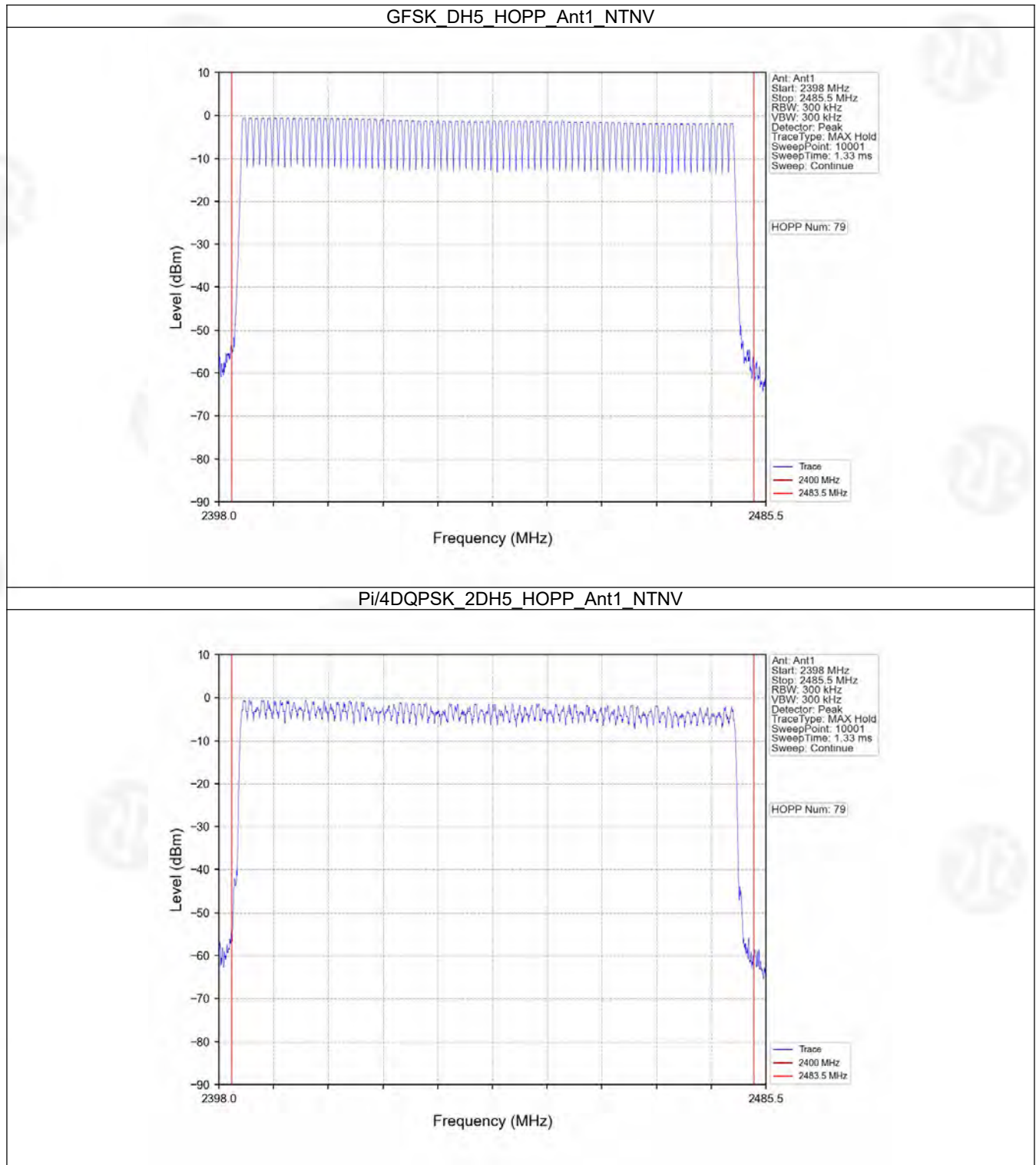
4.1 HoppNum

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

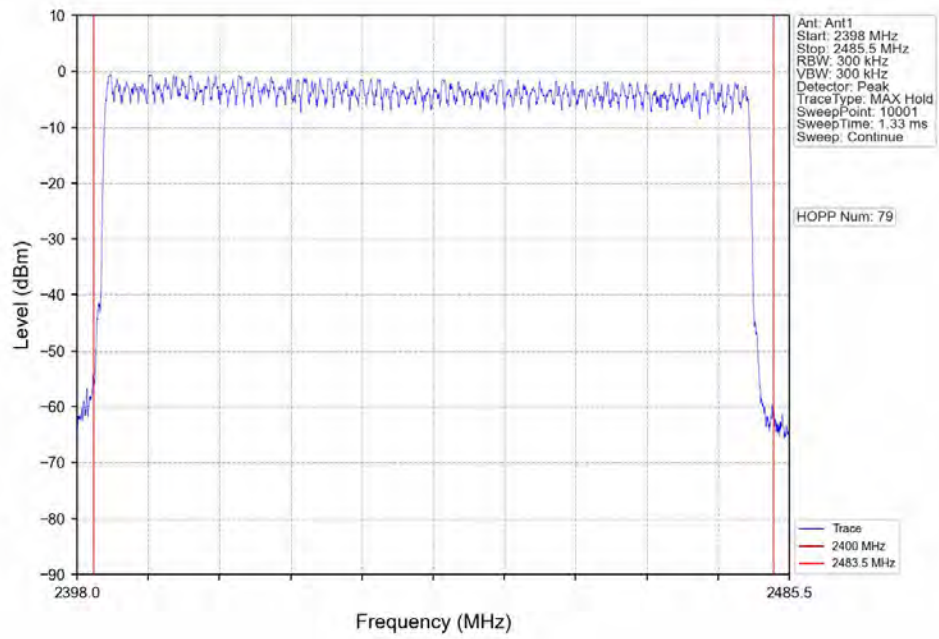


4.1.2 Test Graph





8DPSK_3DH5_HOPP_Ant1_NTNV





5. Time of Occupancy (Dwell Time)

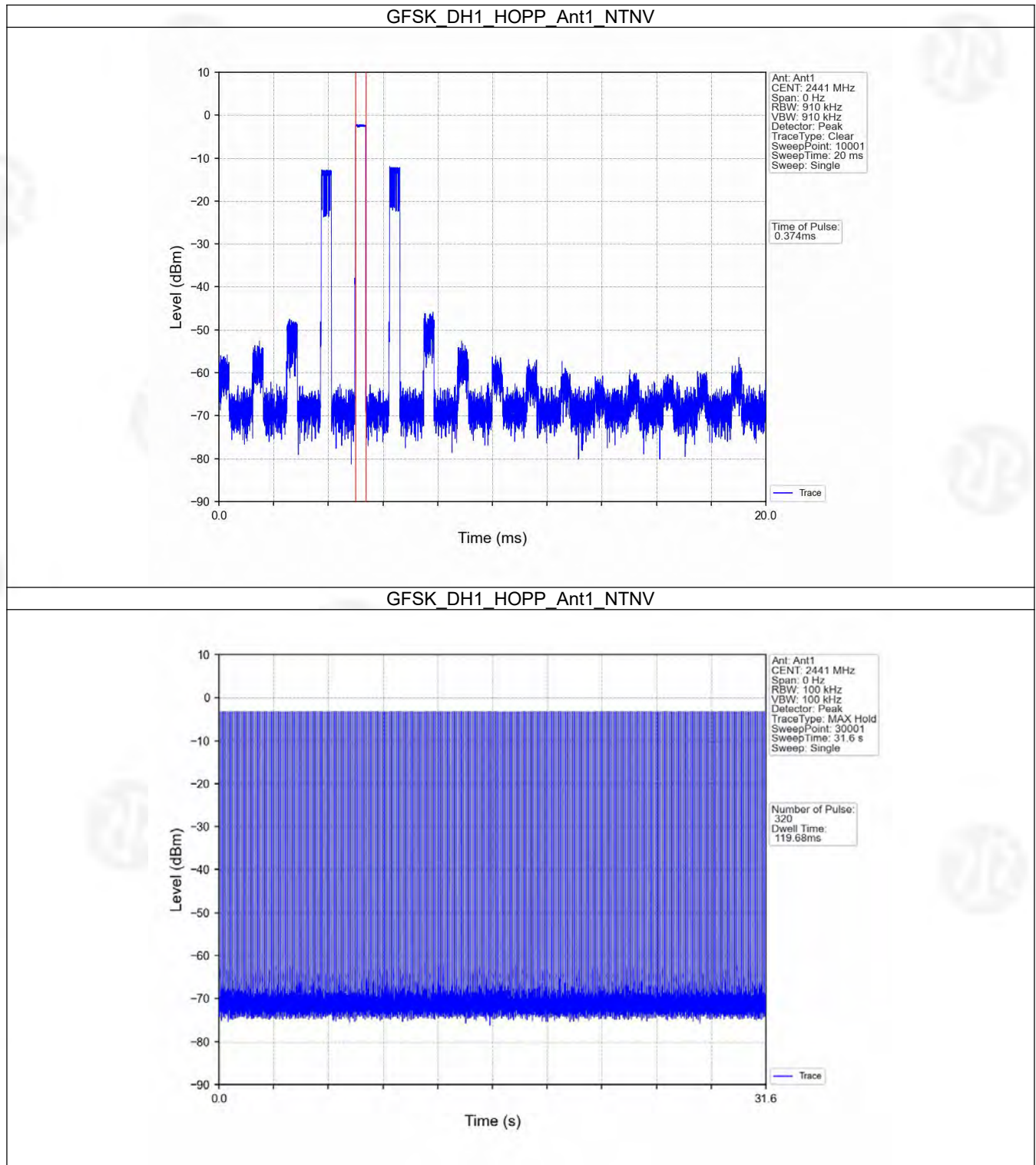
5.1 Ant1

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	0.374	31.600	320	119.680	<=400	Pass
			DH3	1.650	31.600	160	264.000	<=400	Pass
			DH5	2.898	31.600	106	307.188	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.380	31.600	320	121.600	<=400	Pass
			2DH3	1.662	31.600	160	265.920	<=400	Pass
			2DH5	2.912	31.600	107	311.584	<=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	107	311.584	<=400	Pass

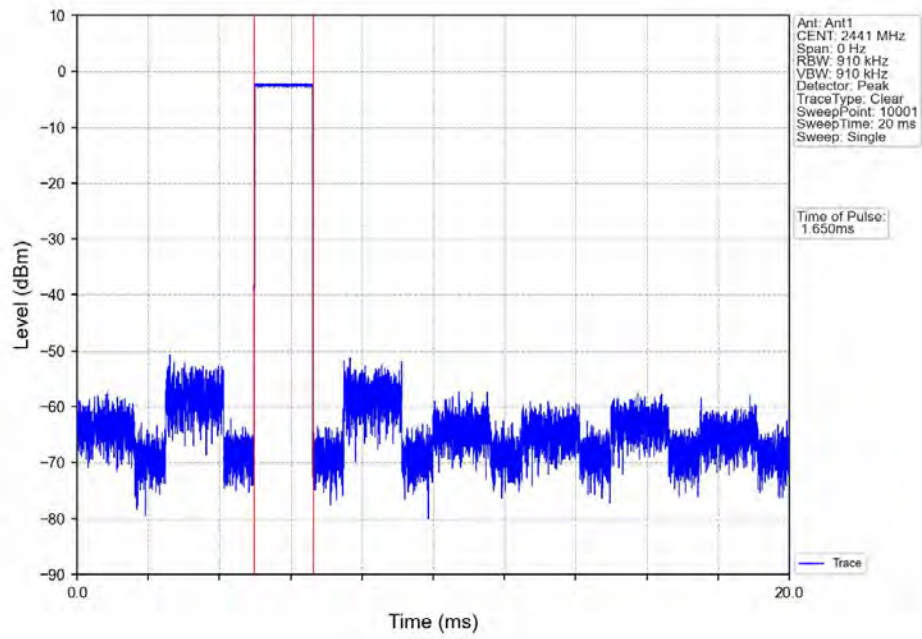


5.1.2 Test Graph

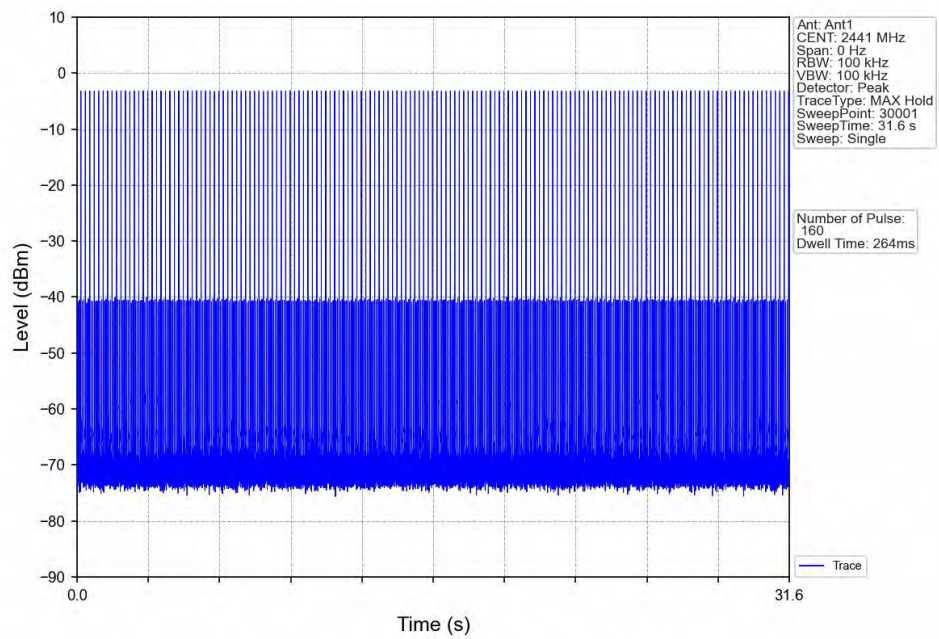




GFSK_DH3_HOPP_Ant1_NTNV

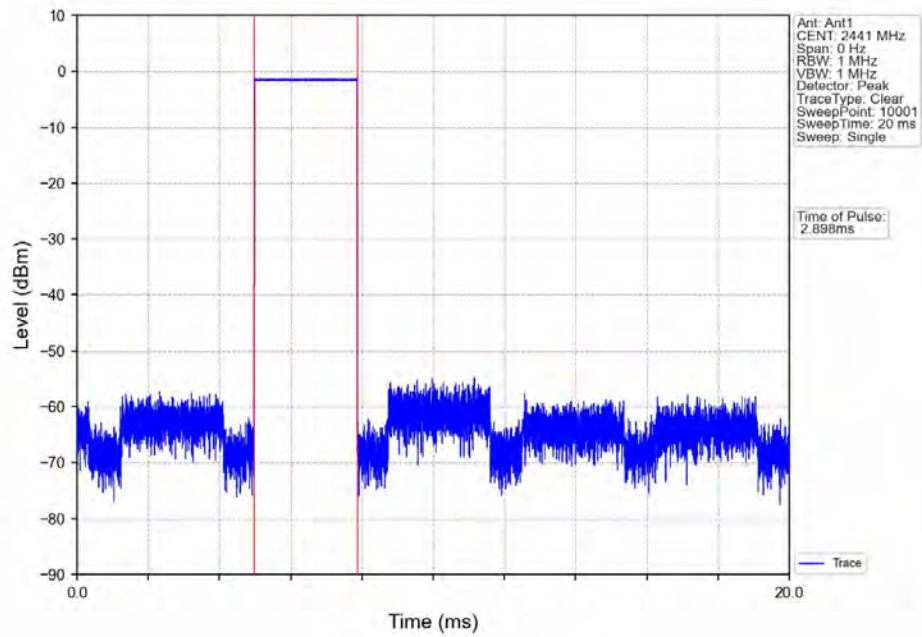


GFSK_DH3_HOPP_Ant1_NTNV

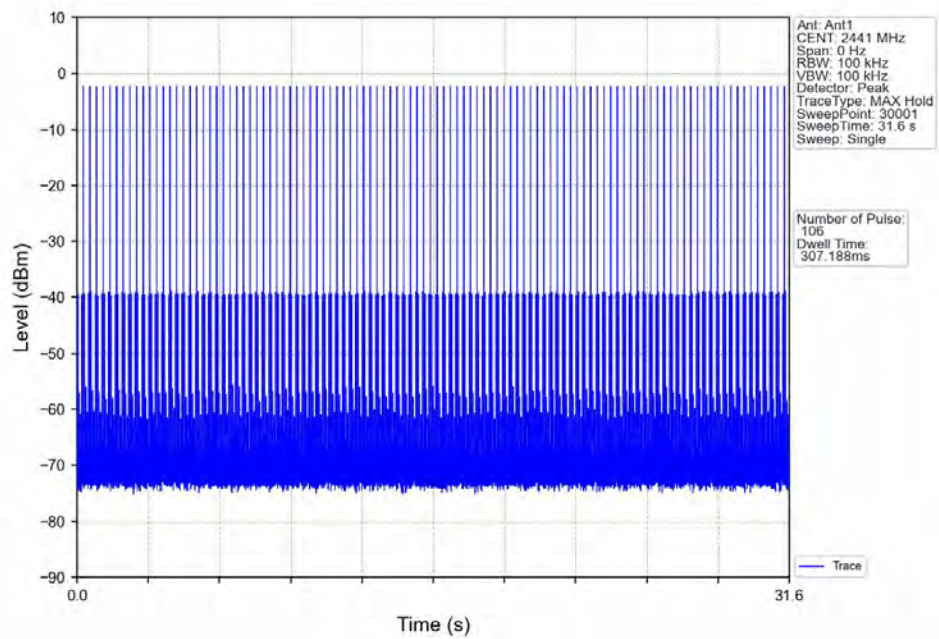




GFSK_DH5_HOPP_Ant1_NTNV

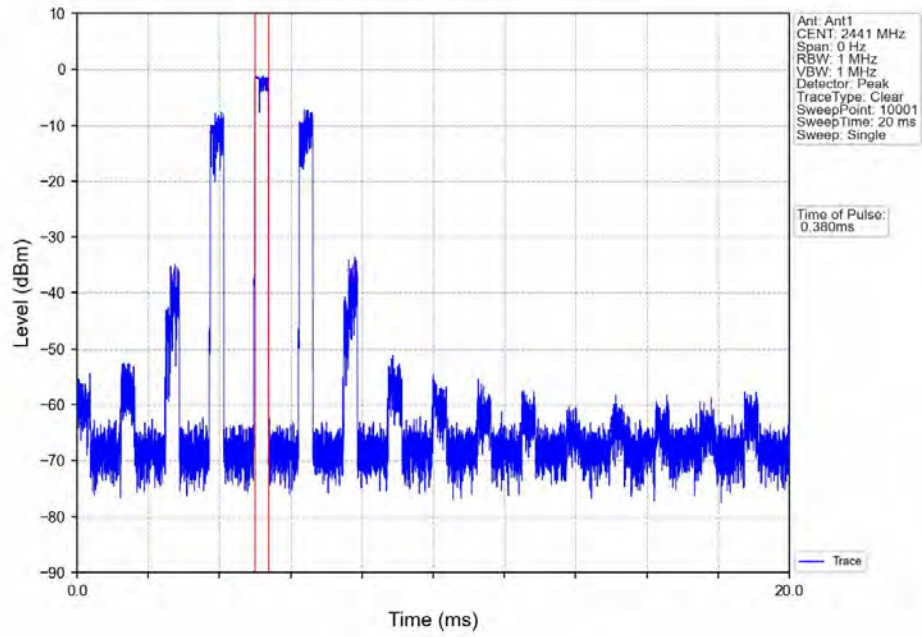


GFSK_DH5_HOPP_Ant1_NTNV

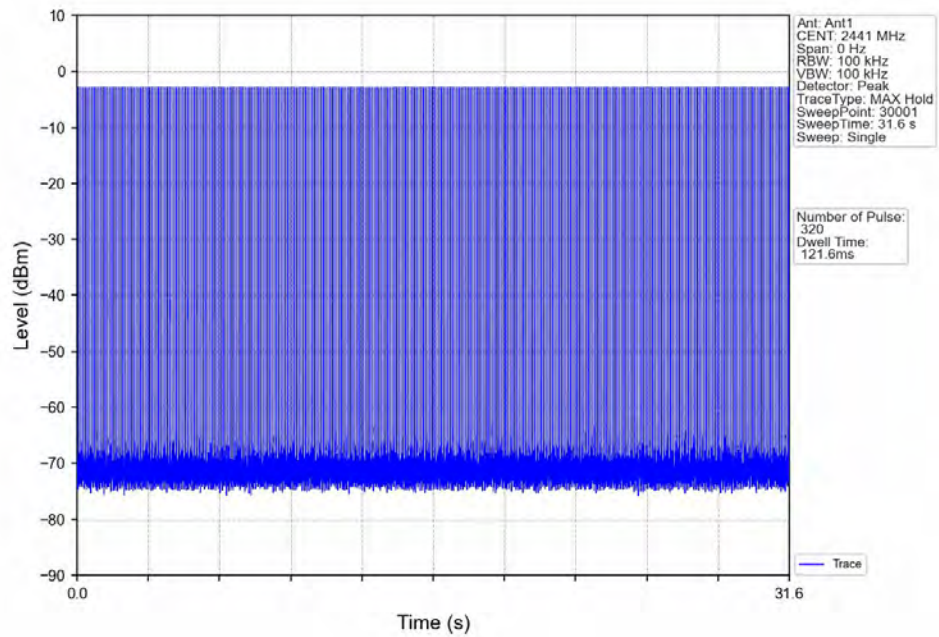




Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV

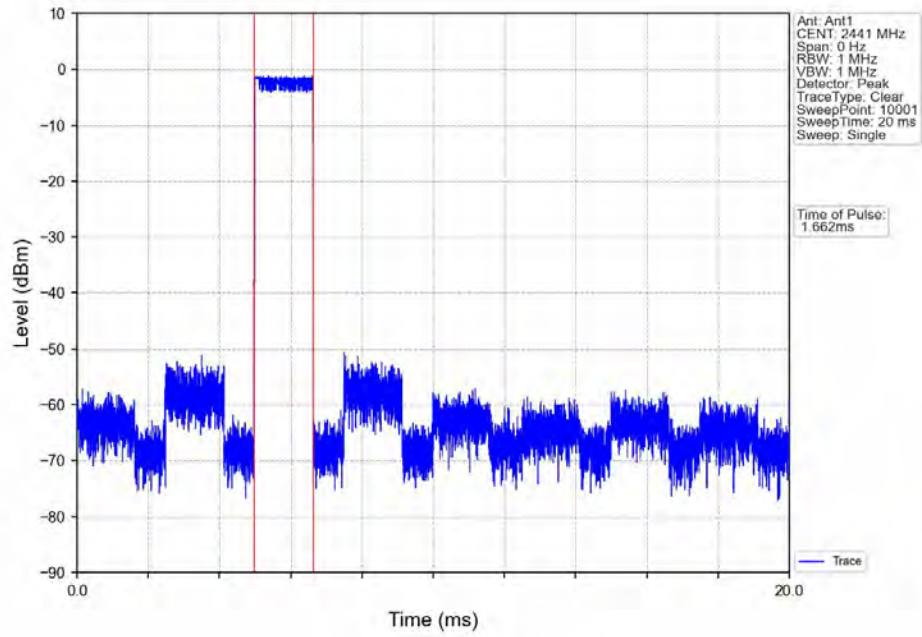


Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV

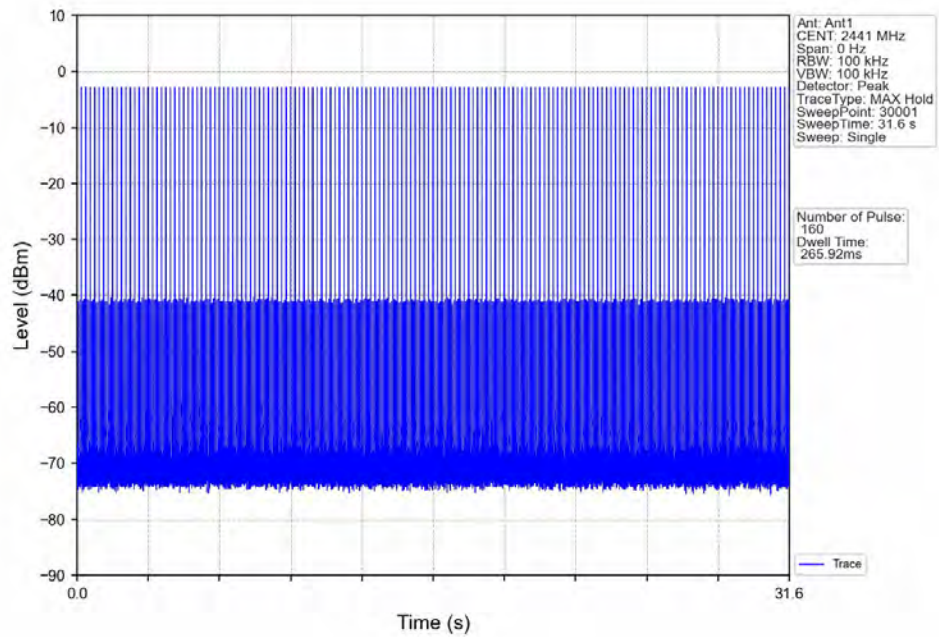




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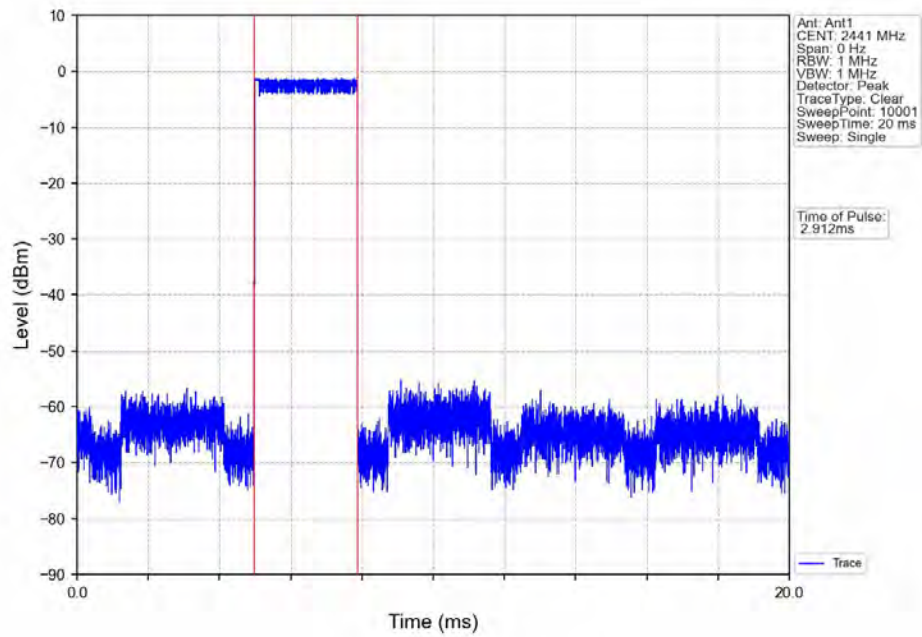


Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV

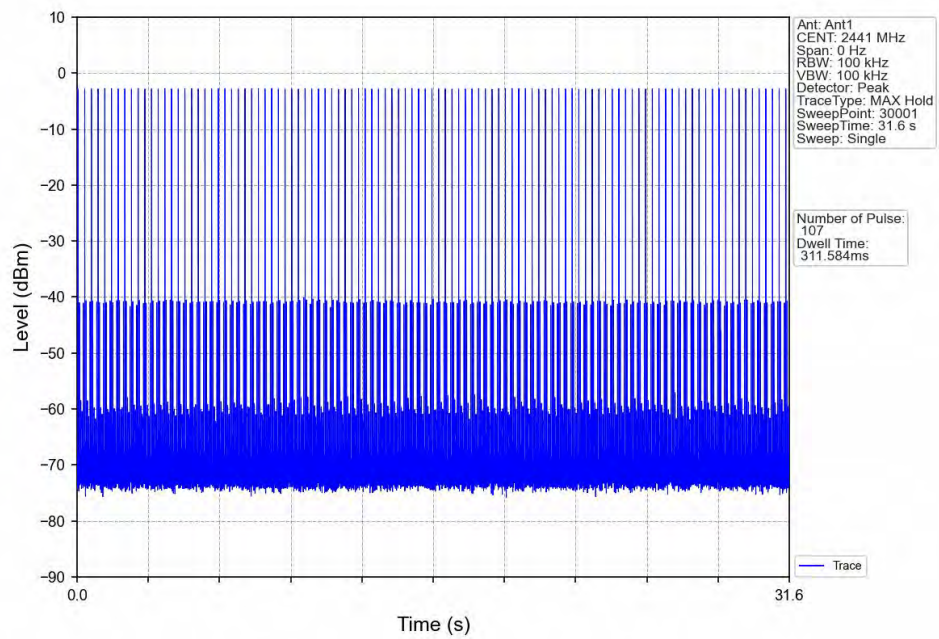




Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

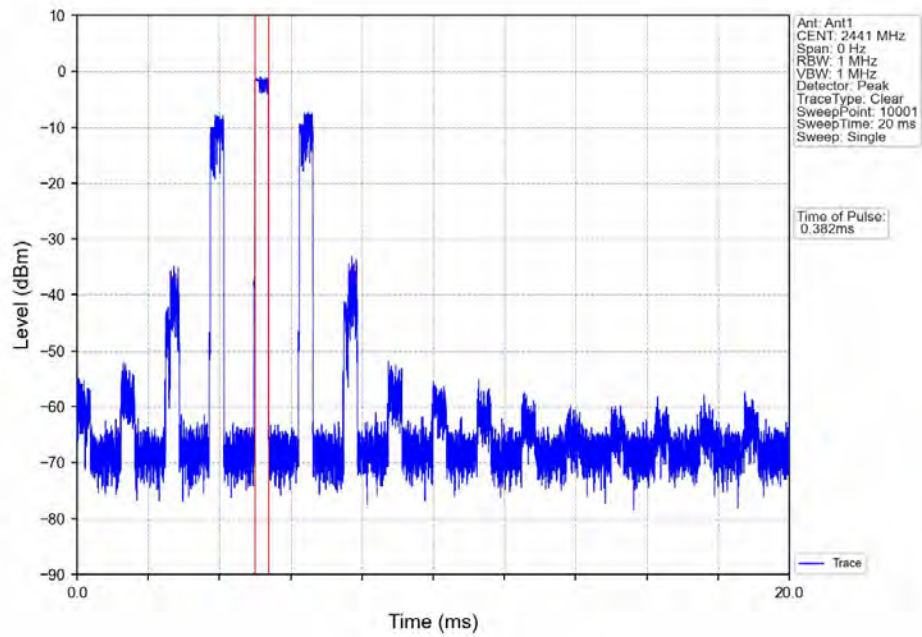


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

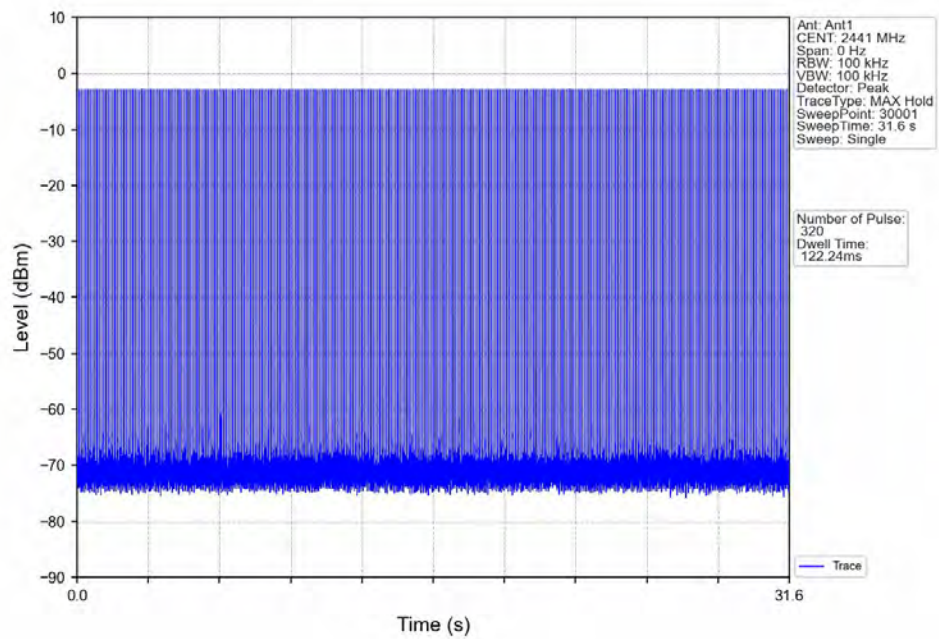




8DPSK_3DH1_HOPP_Ant1_NTNV

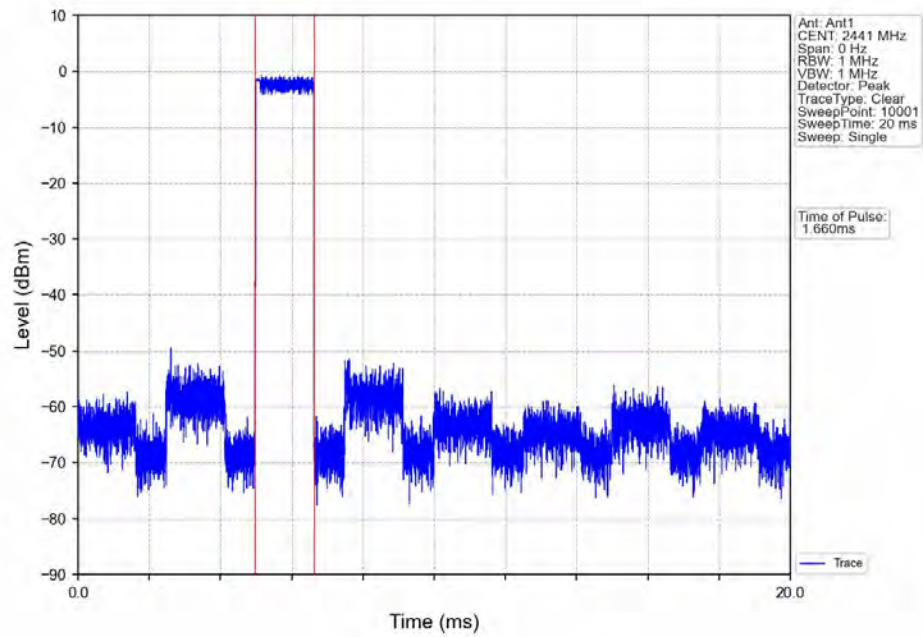


8DPSK_3DH1_HOPP_Ant1_NTNV

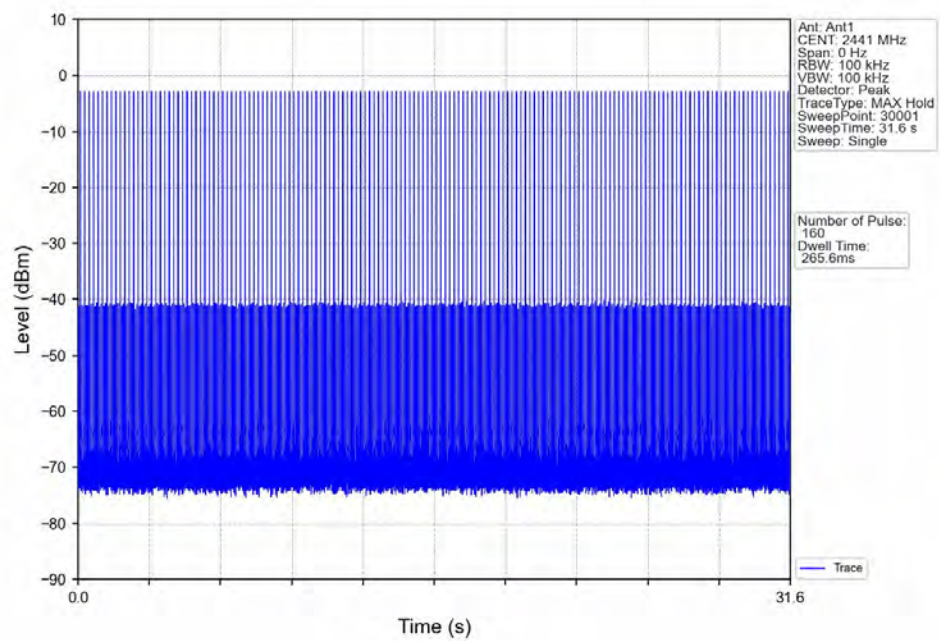




8DPSK_3DH3_HOPP_Ant1_NTNV

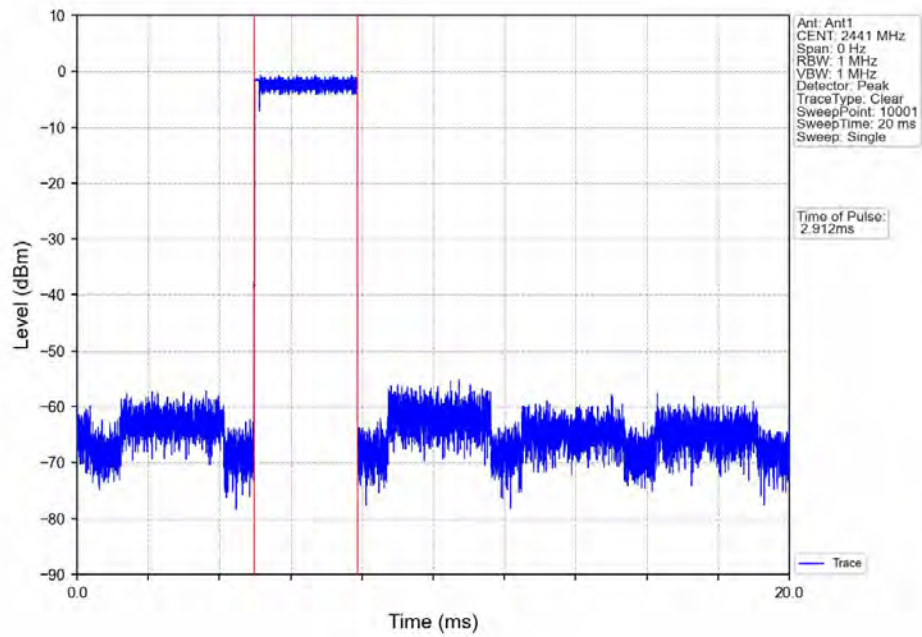


8DPSK_3DH3_HOPP_Ant1_NTNV

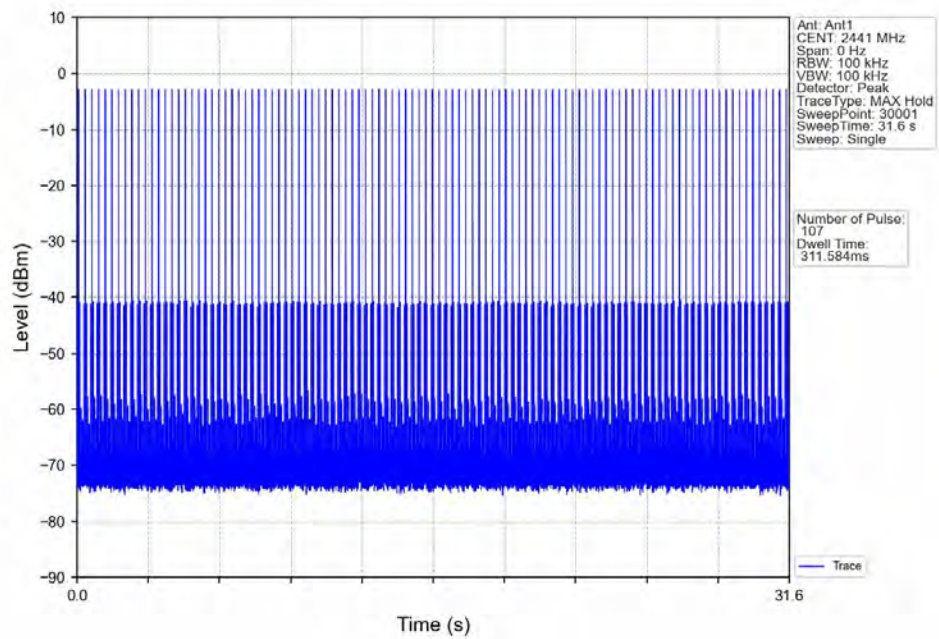




8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV





6. Unwanted Emissions In Non-restricted Frequency Bands

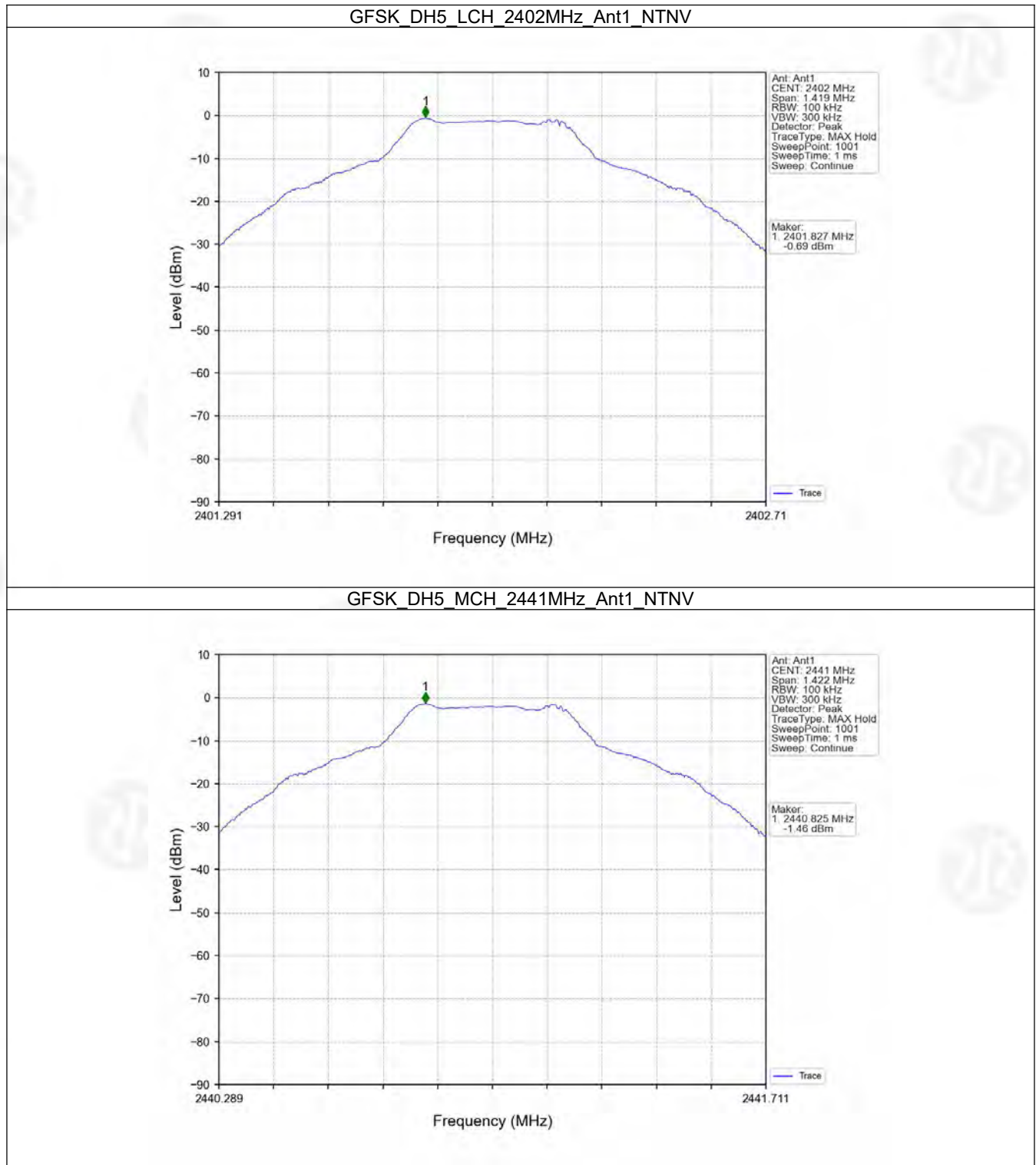
6.1 Ref

6.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	-0.69
		2441	DH5	1	-1.46
		2480	DH5	1	-2.00
		HOPP	DH5	1	-0.69
					-0.69
Pi/4DQPSK	SISO	2402	2DH5	1	-0.96
		2441	2DH5	1	-1.64
		2480	2DH5	1	-2.19
		HOPP	2DH5	1	-0.77
					-0.77
8DPSK	SISO	2402	3DH5	1	-0.72
		2441	3DH5	1	-1.50
		2480	3DH5	1	-2.06
		HOPP	3DH5	1	-1.05
					-1.05
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.					

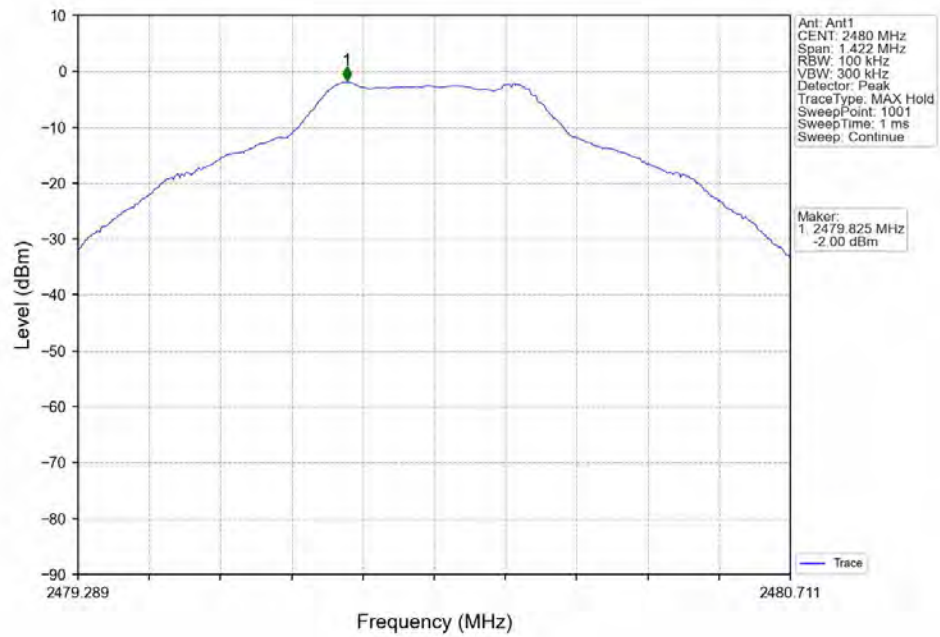


6.1.2 Test Graph

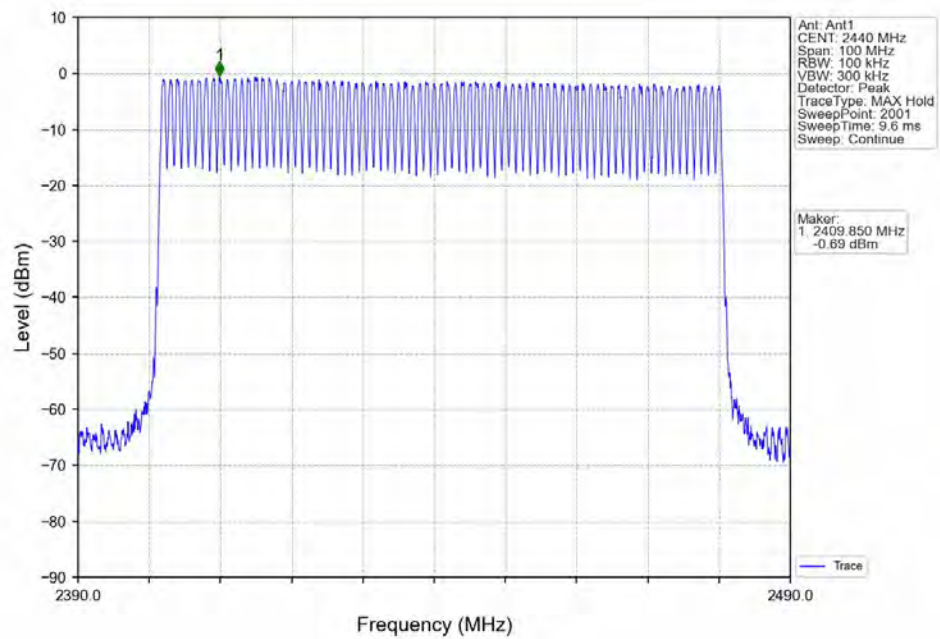




GFSK_DH5_HCH_2480MHz_Ant1_NTNV

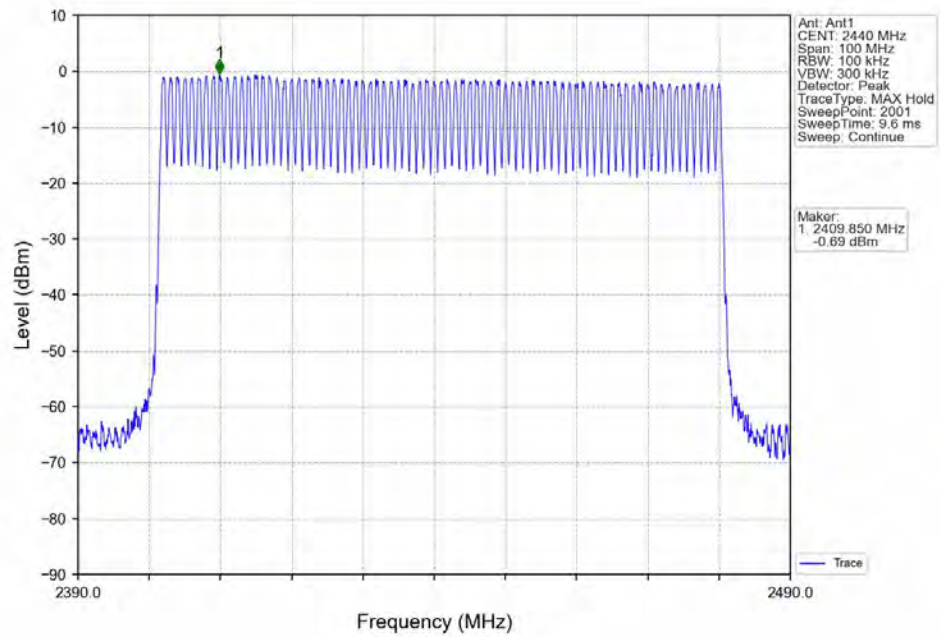


GFSK_DH5_HOPP_Ant1_NTNV

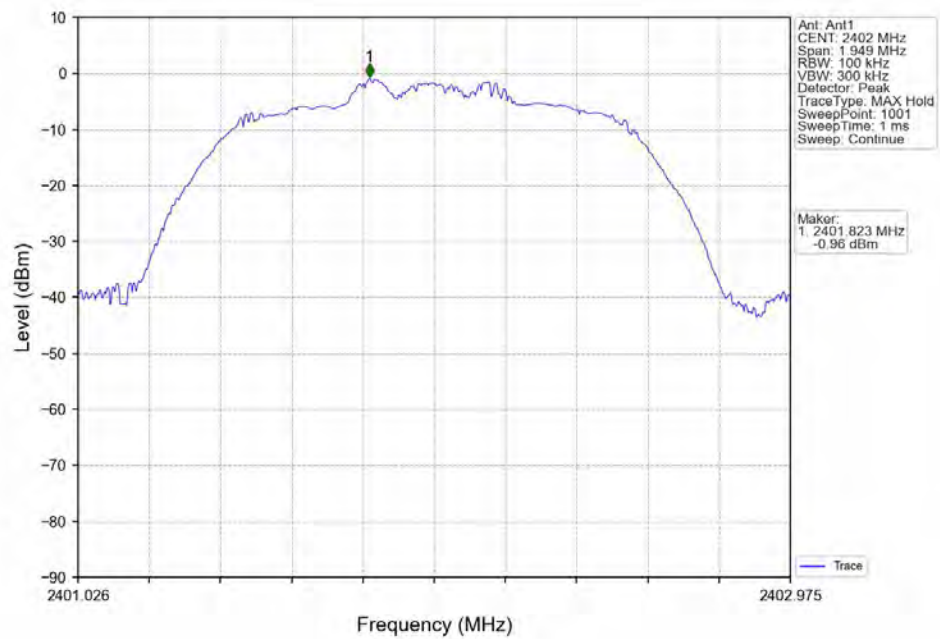




GFSK_DH5_HOPP_Ant1_NTNV

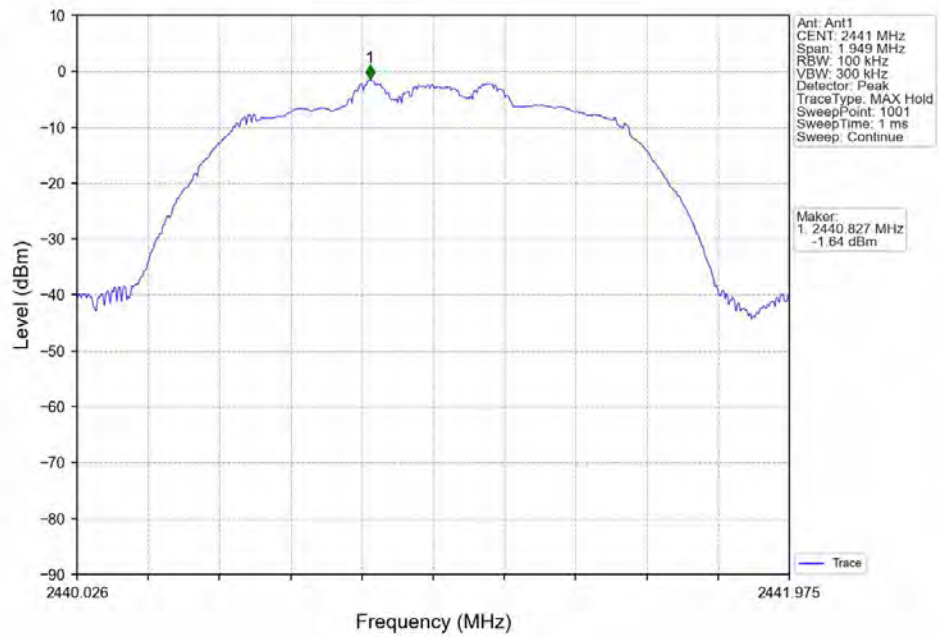


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

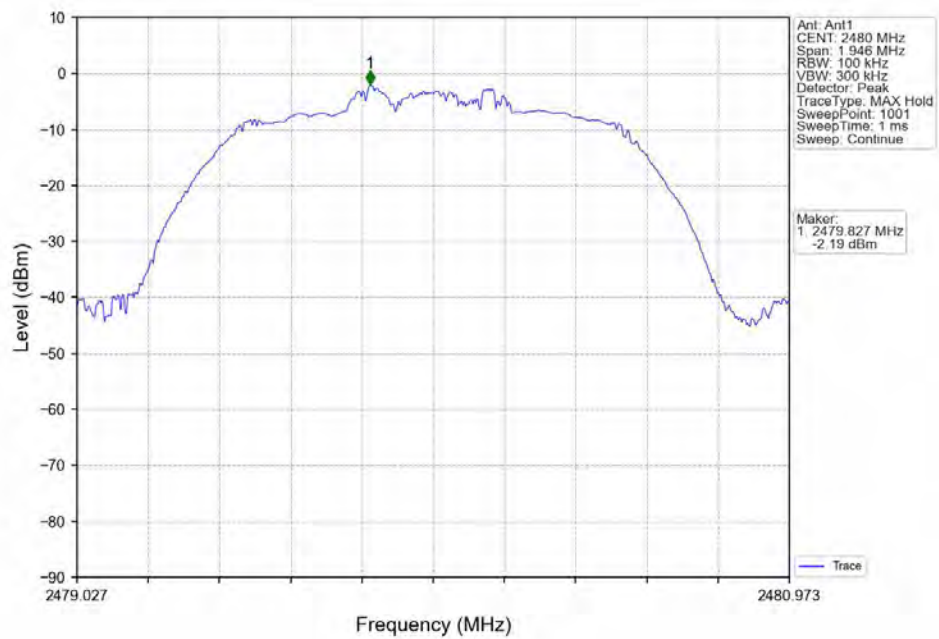




Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

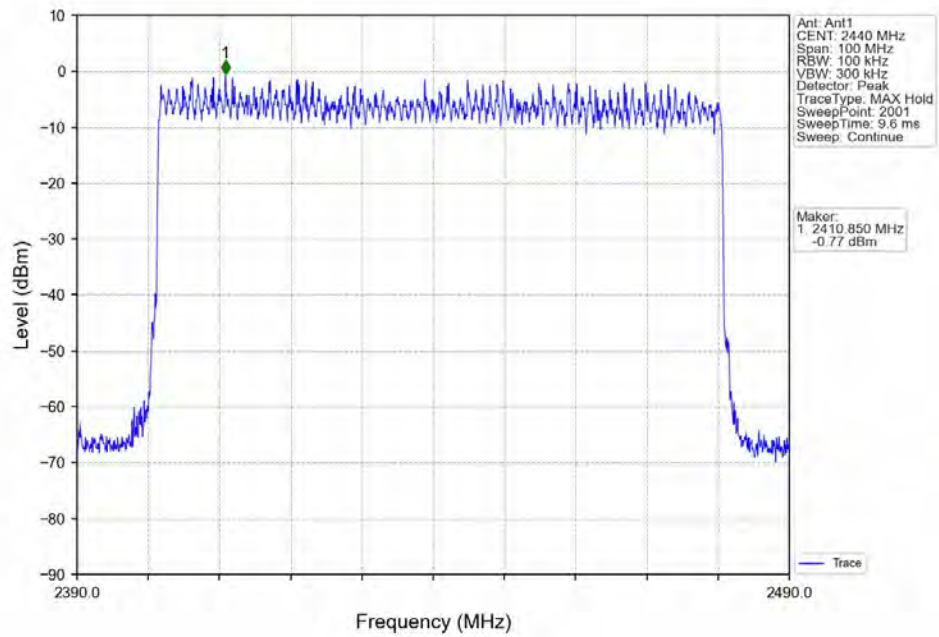


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

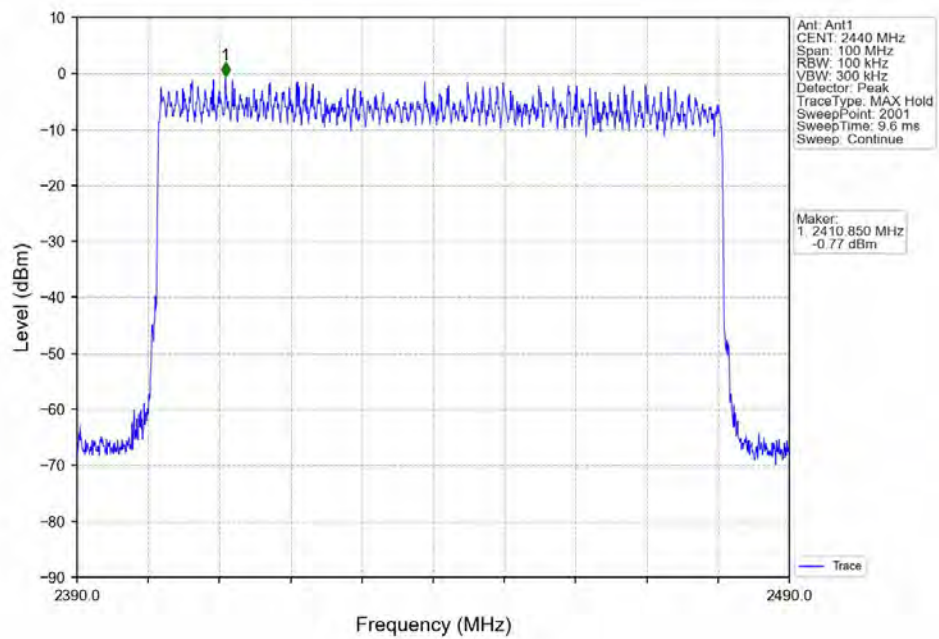




Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

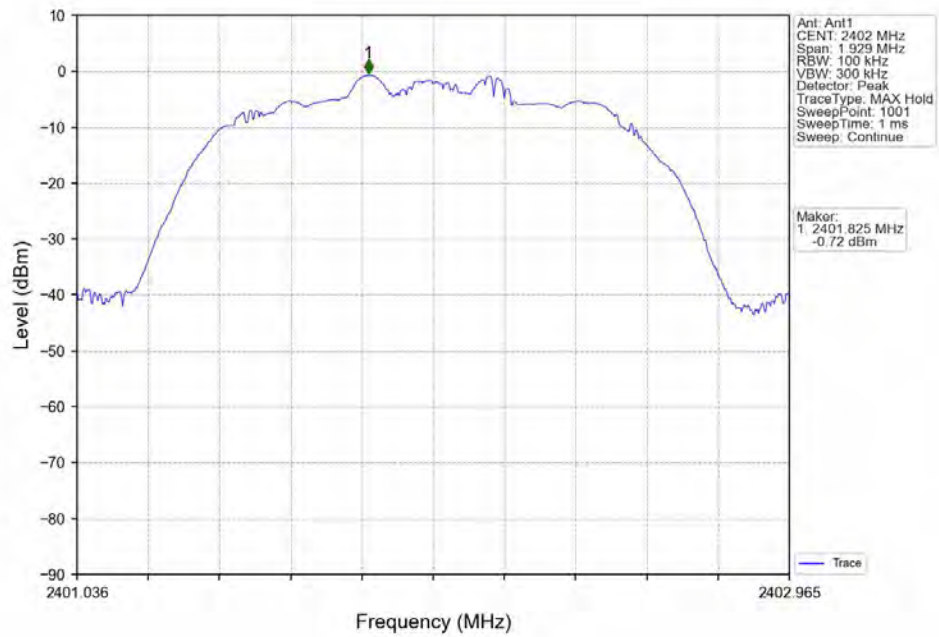


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

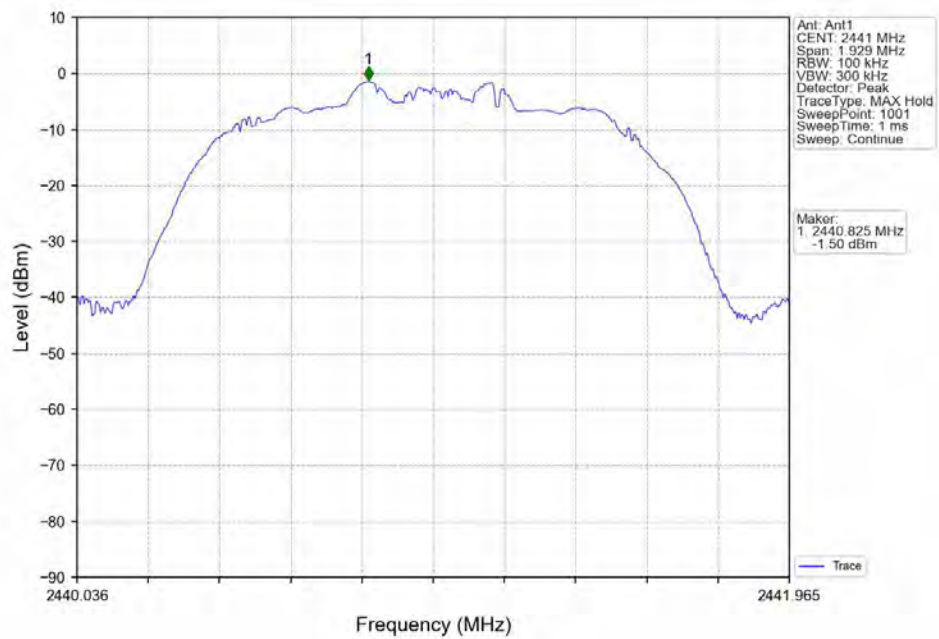




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

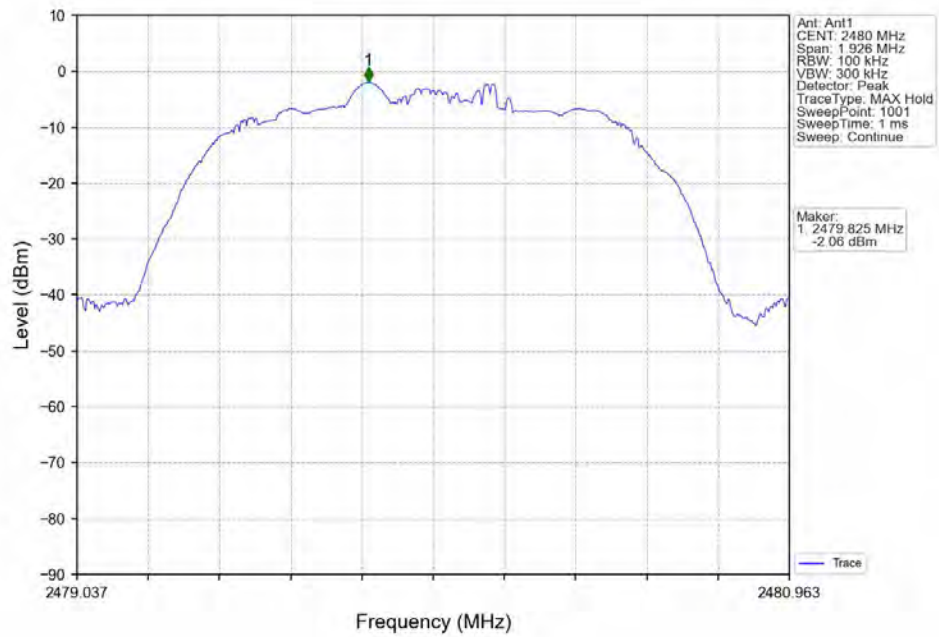


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

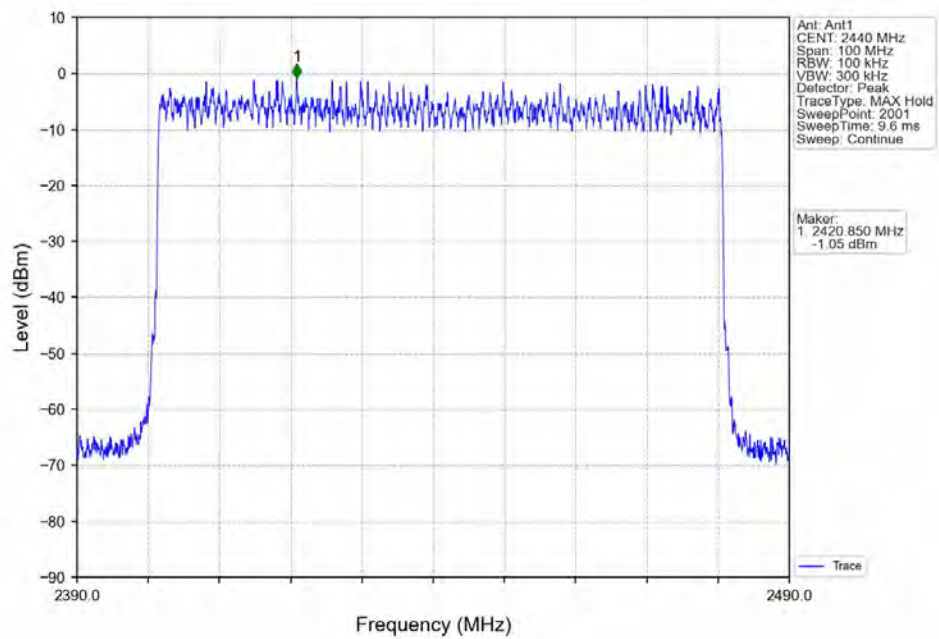




8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

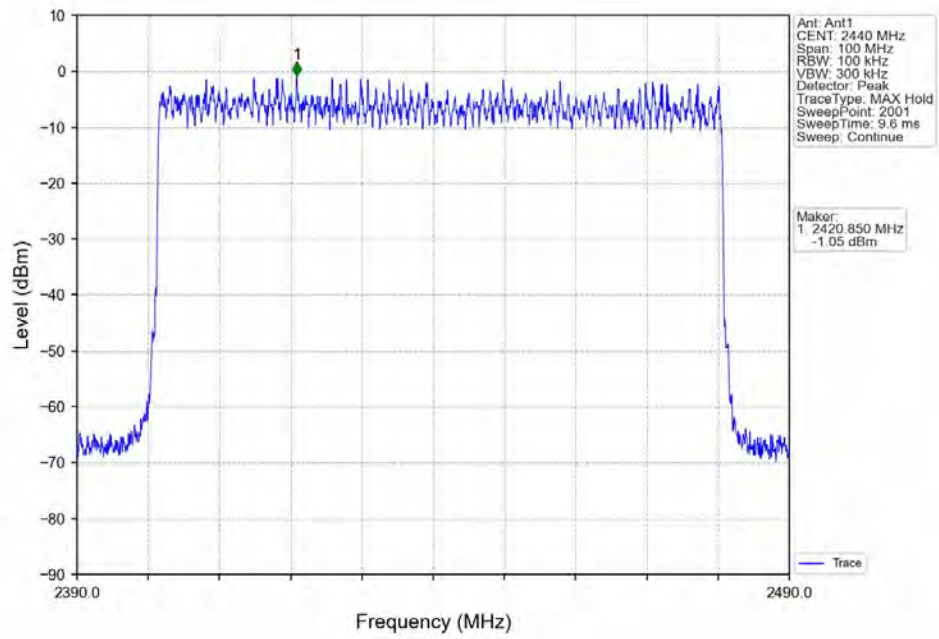


8DPSK_3DH5_HOPP_Ant1_NTNV





8DPSK_3DH5_HOPP_Ant1_NTNV





6.2 CSE

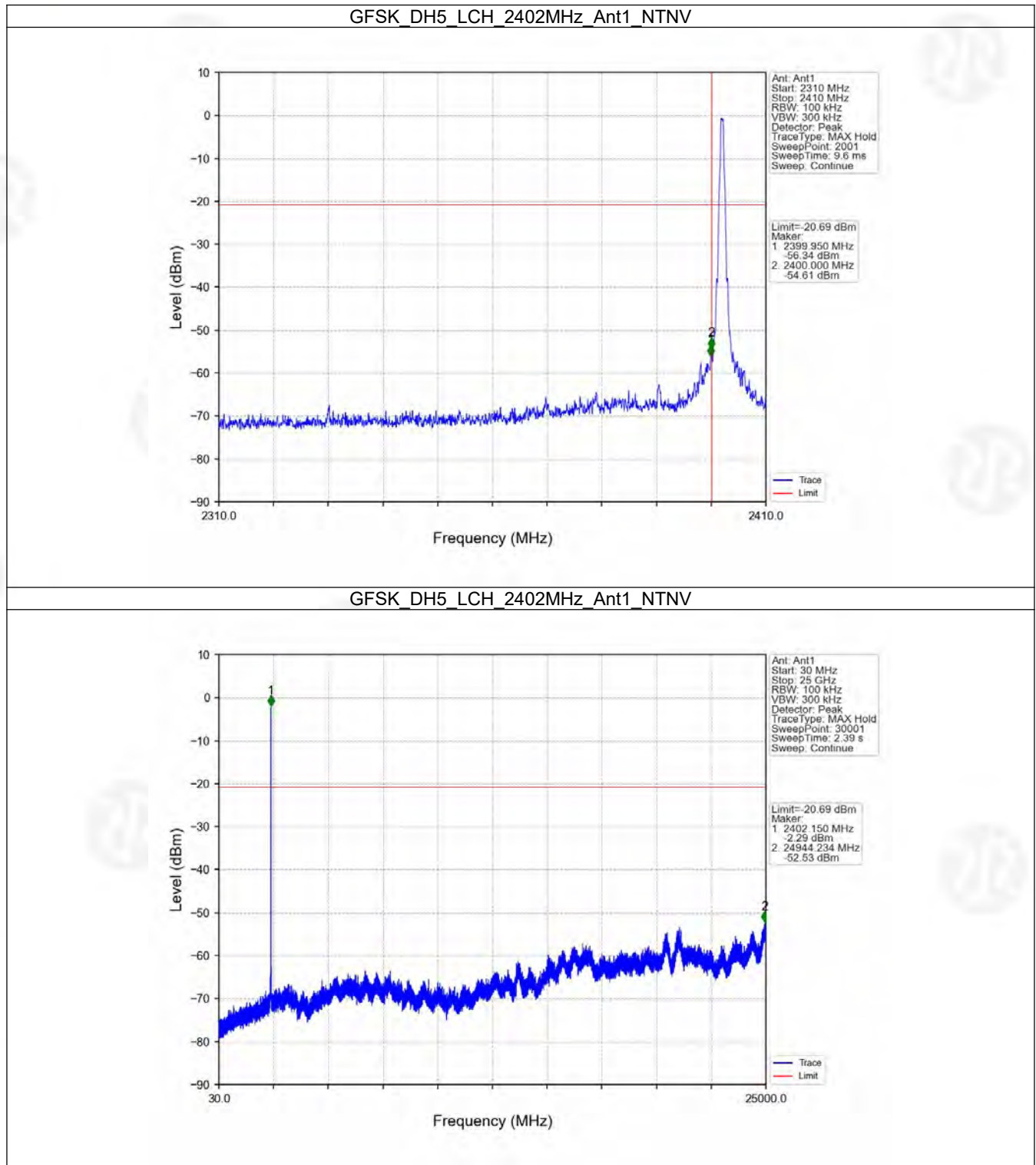
6.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	-0.69	-20.69	Pass
		2441	DH5	1	-1.46	-21.46	Pass
		2480	DH5	1	-2.00	-22.00	Pass
		HOPP	DH5	1	-0.69	-20.69	Pass
					-0.69	-20.69	Pass
PI/4DQPSK	SISO	2402	2DH5	1	-0.96	-20.96	Pass
		2441	2DH5	1	-1.64	-21.64	Pass
		2480	2DH5	1	-2.19	-22.19	Pass
		HOPP	2DH5	1	-0.77	-20.77	Pass
					-0.77	-20.77	Pass
8DPSK	SISO	2402	3DH5	1	-0.72	-20.72	Pass
		2441	3DH5	1	-1.50	-21.50	Pass
		2480	3DH5	1	-2.06	-22.06	Pass
		HOPP	3DH5	1	-1.05	-21.05	Pass
					-1.05	-21.05	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.

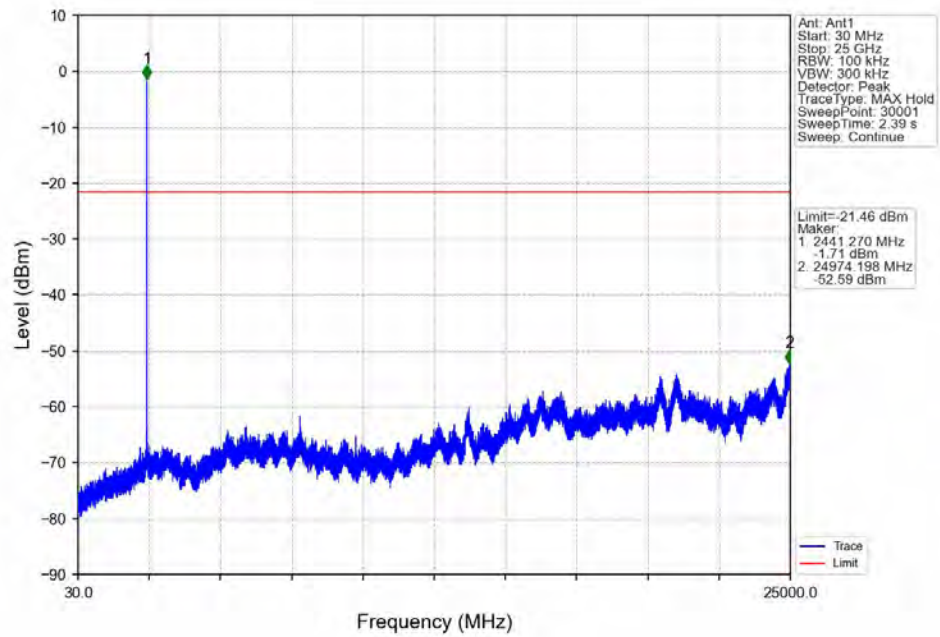


6.2.2 Test Graph

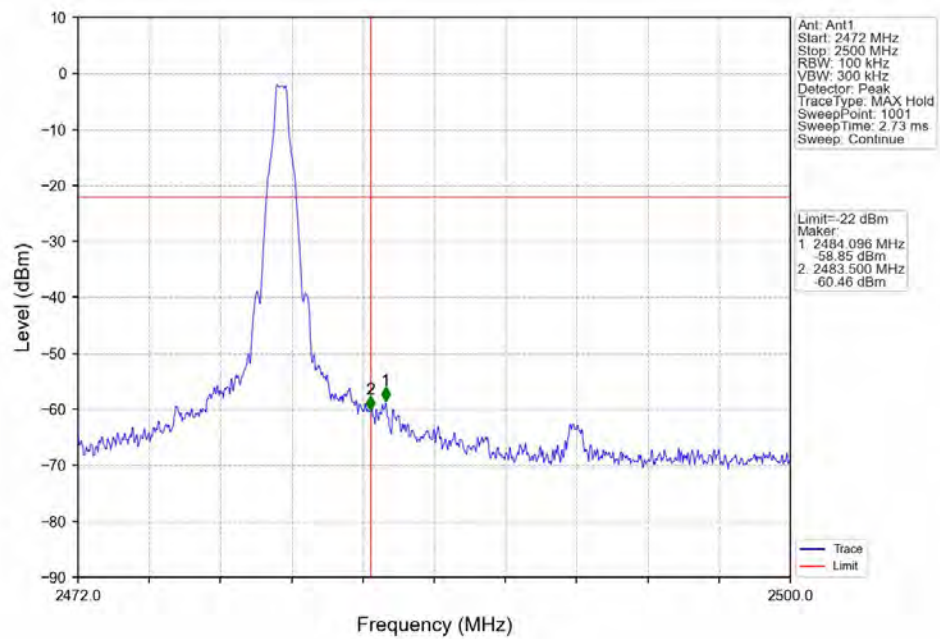




GFSK_DH5_MCH_2441MHz_Ant1_NTNV

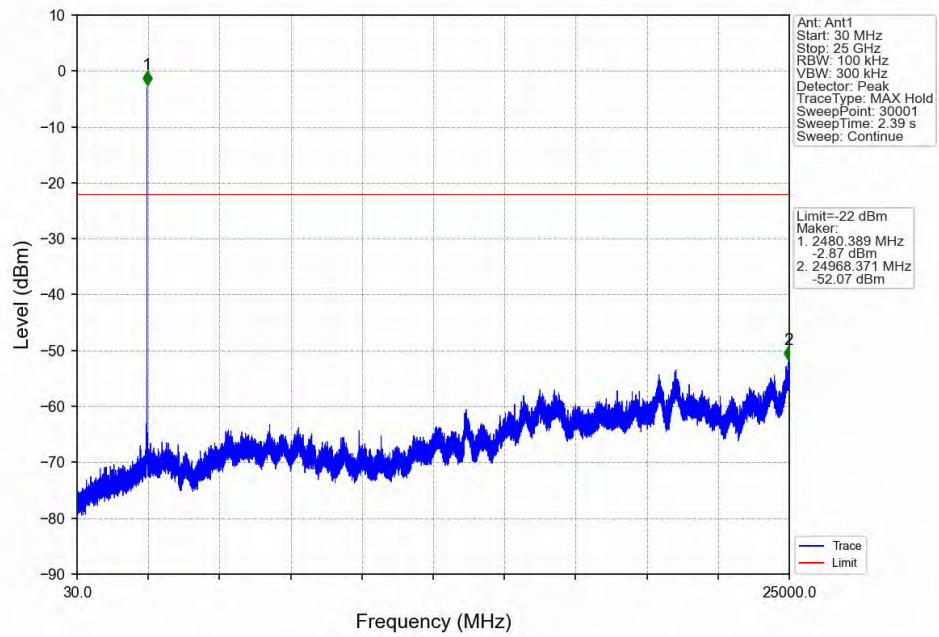


GFSK_DH5_HCH_2480MHz_Ant1_NTNV

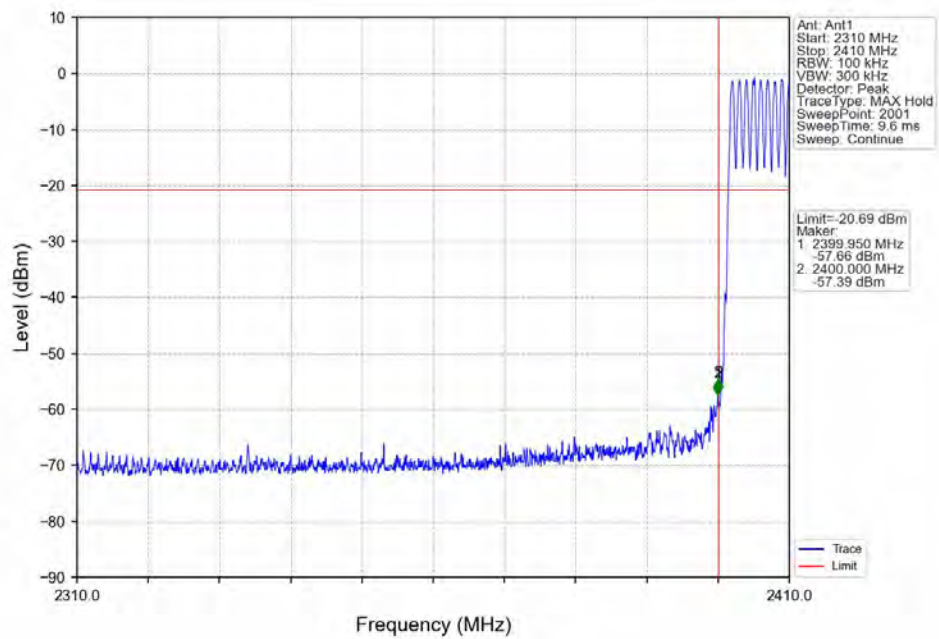




GFSK_DH5_HCH_2480MHz_Ant1_NTNV

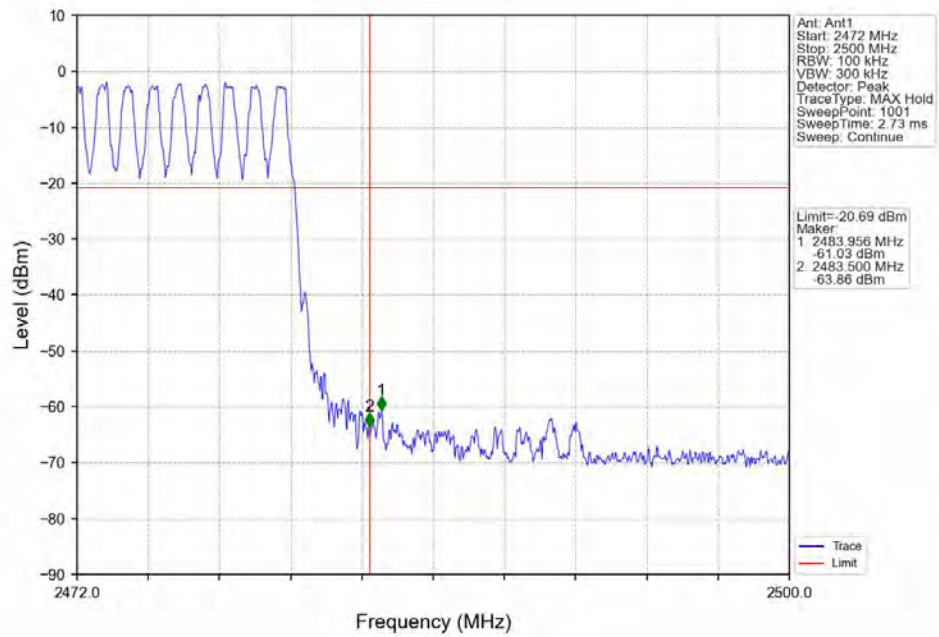


GFSK_DH5_HOPP_2410MHz_Ant1_NTNV

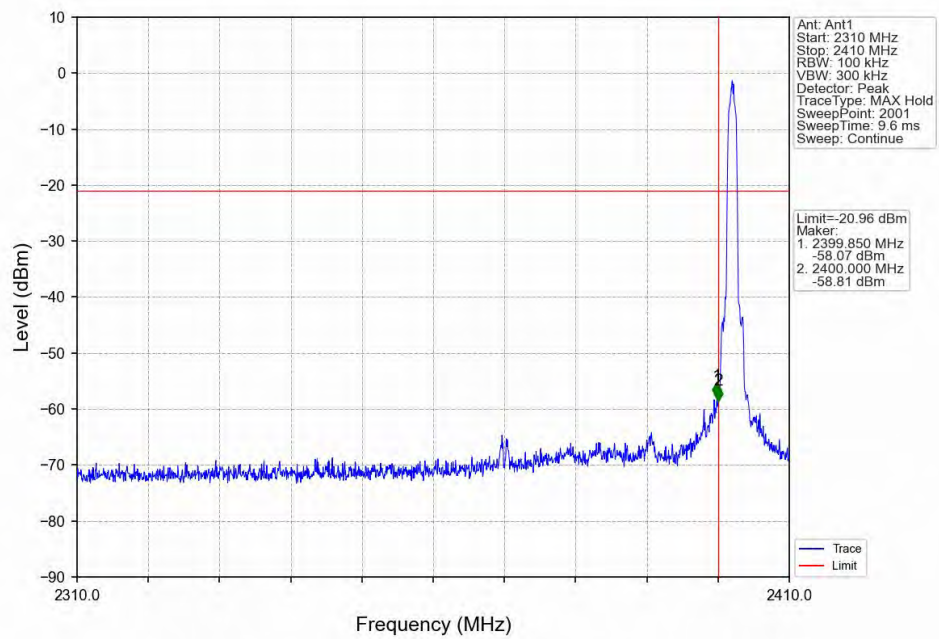




GFSK_DH5_HOPP_Ant1_NTNV

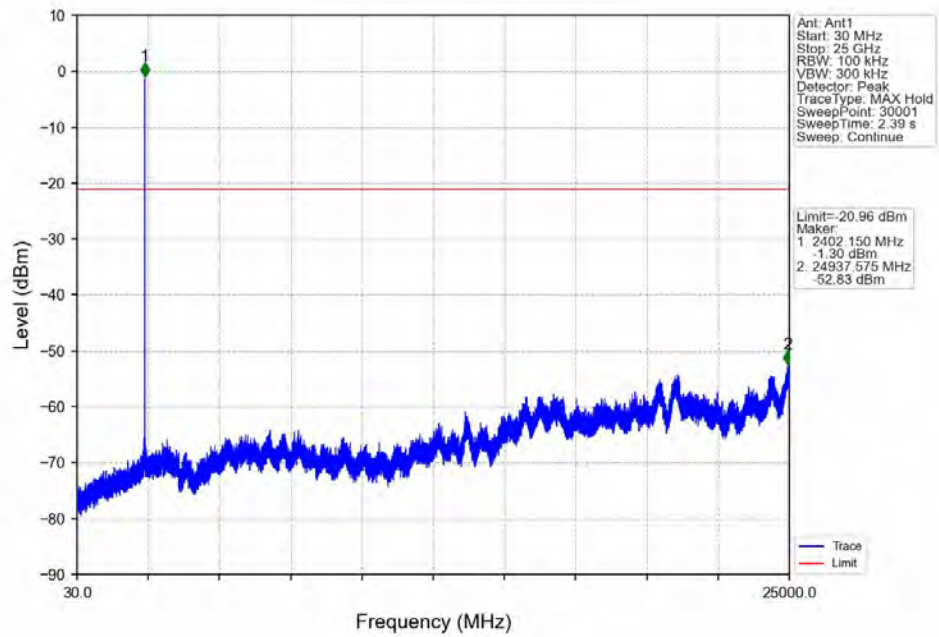


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

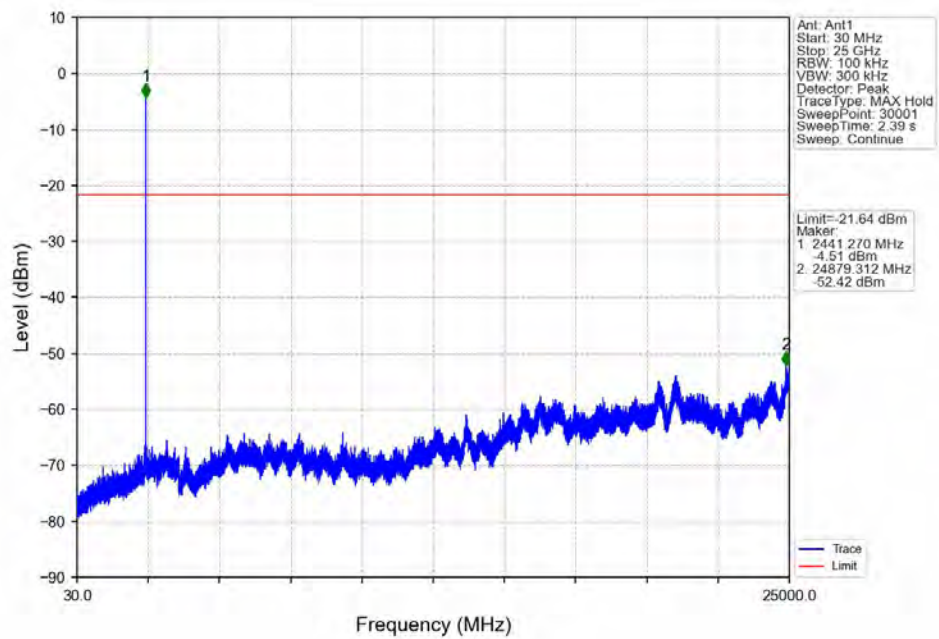




Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

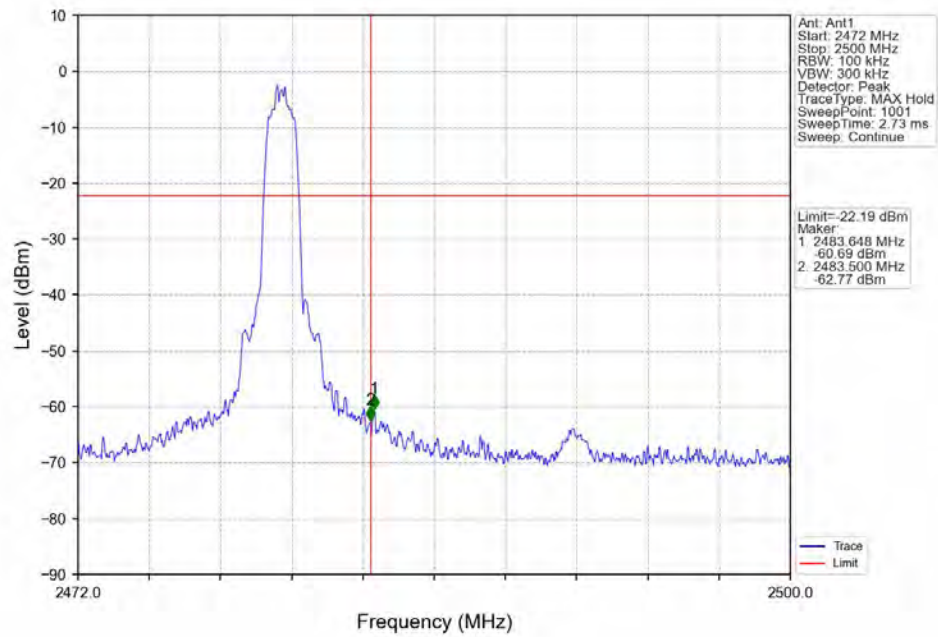


Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

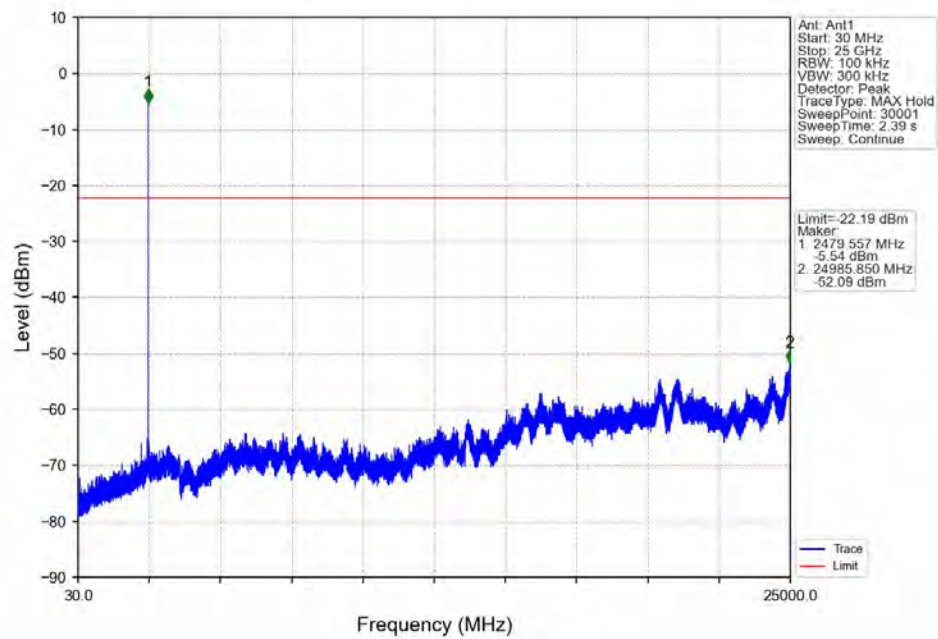




Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

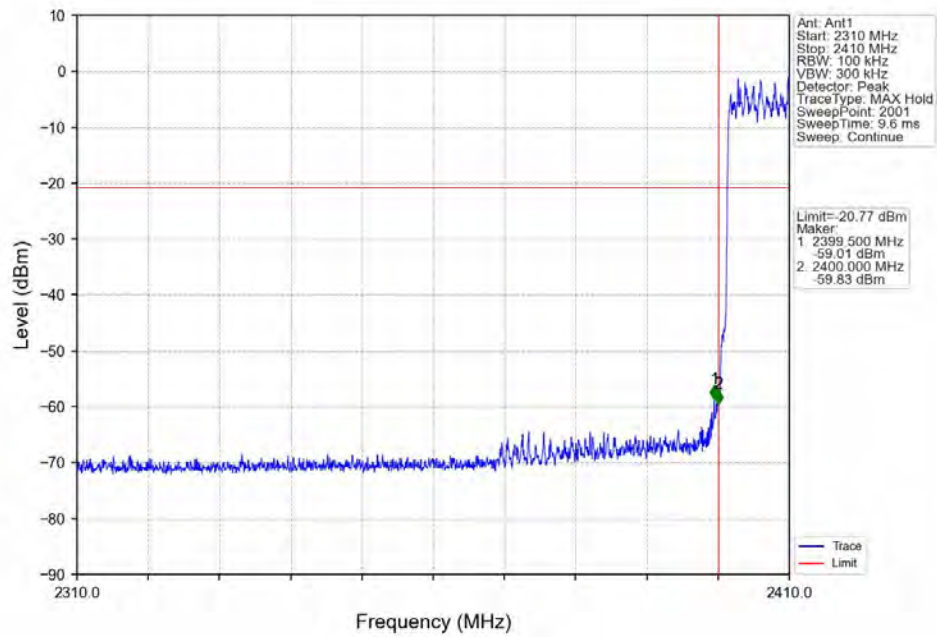


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

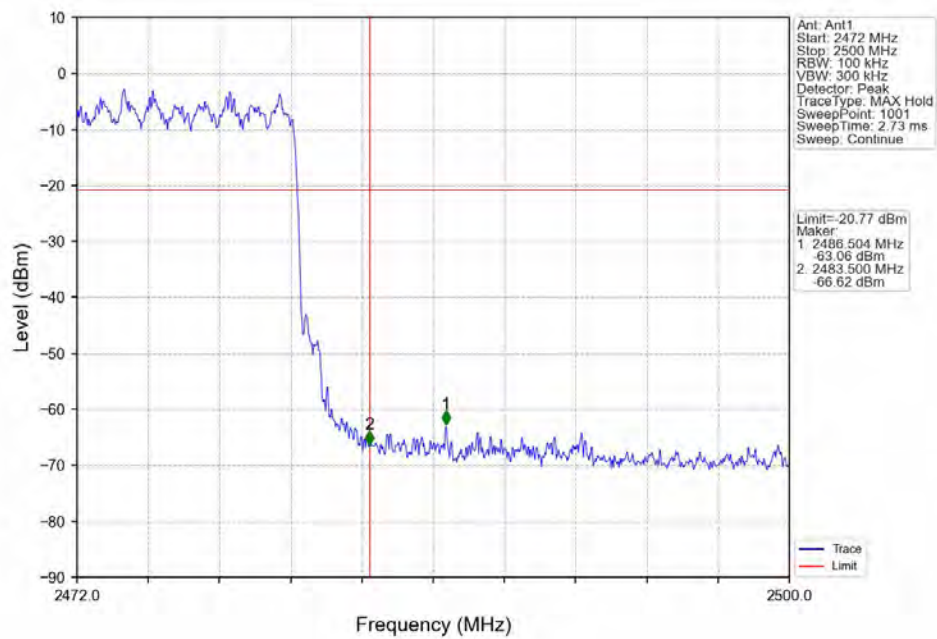




Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

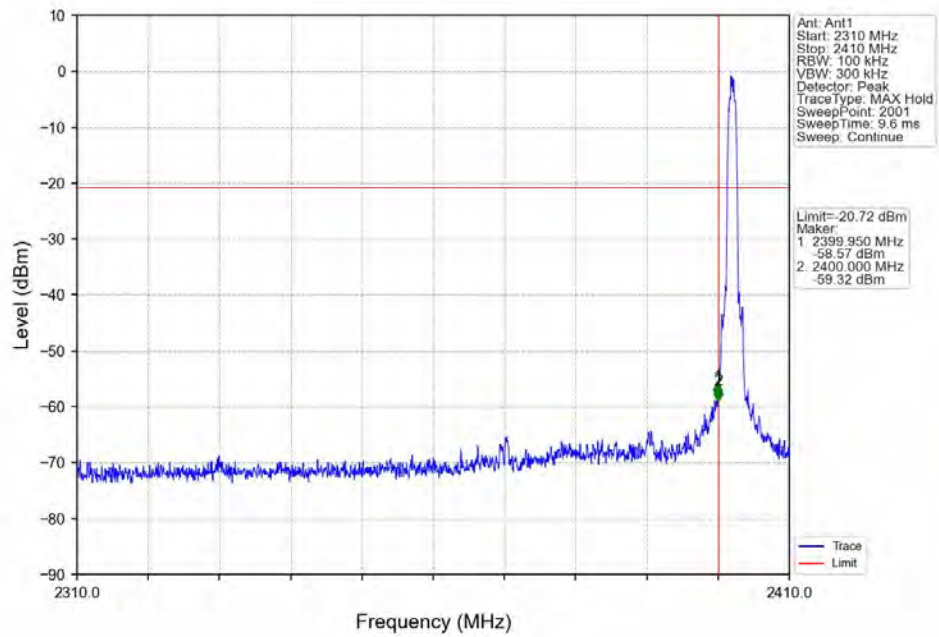


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV

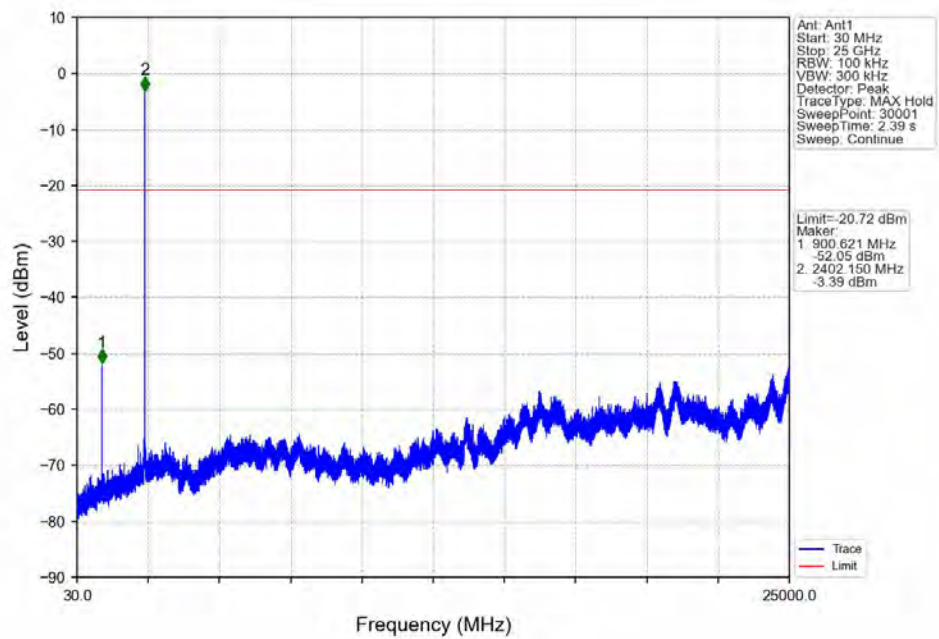




8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

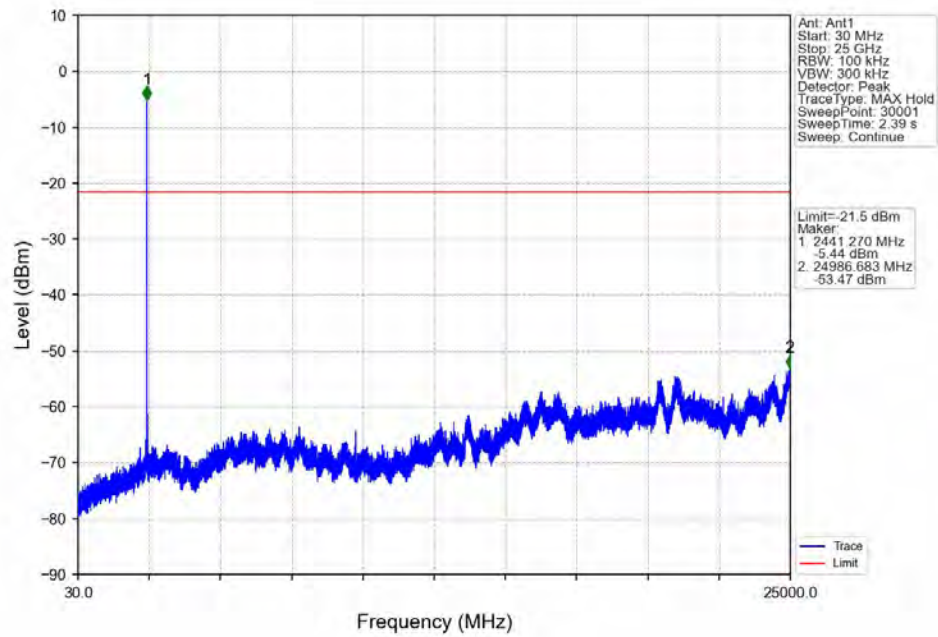


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

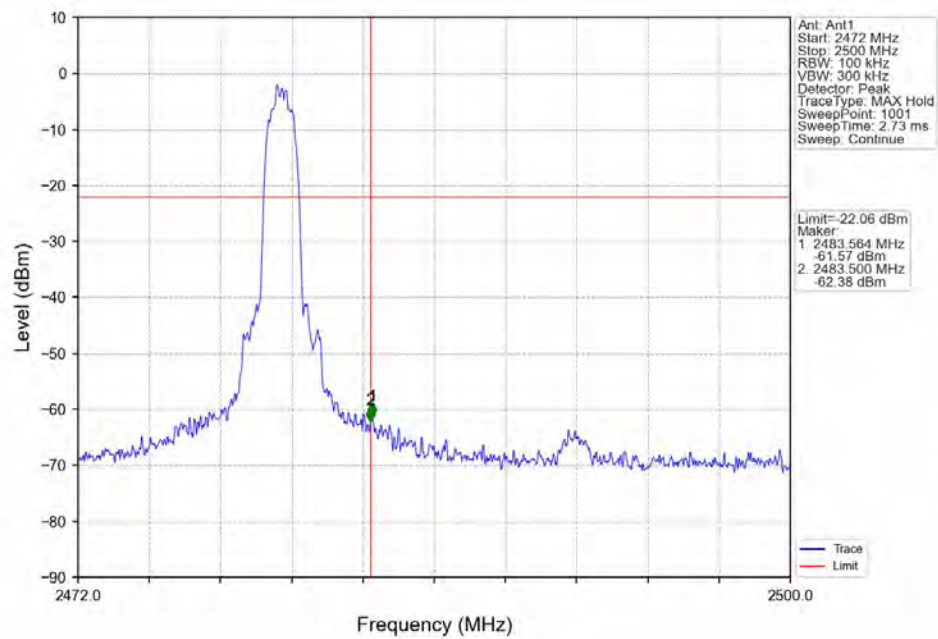


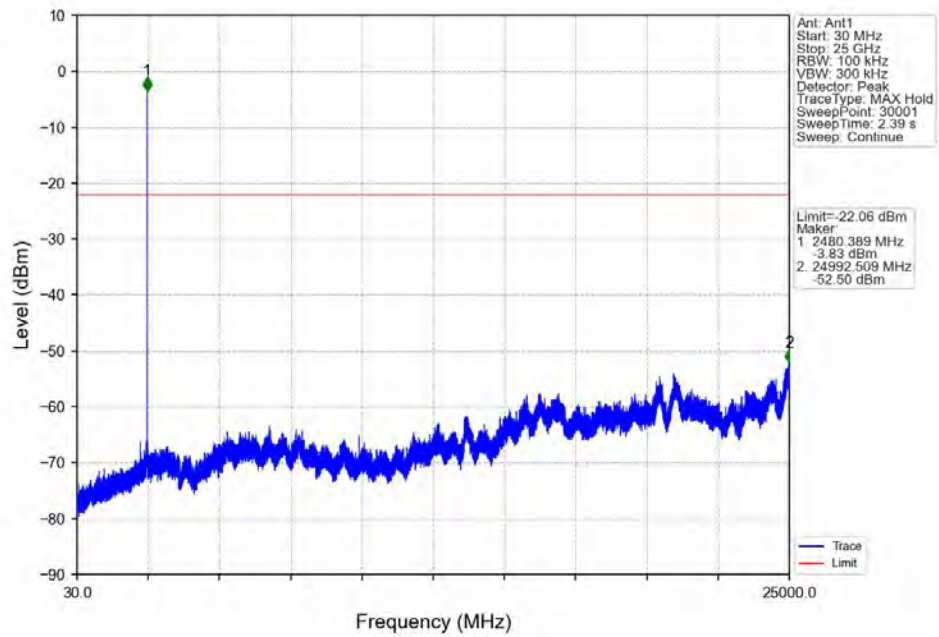


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

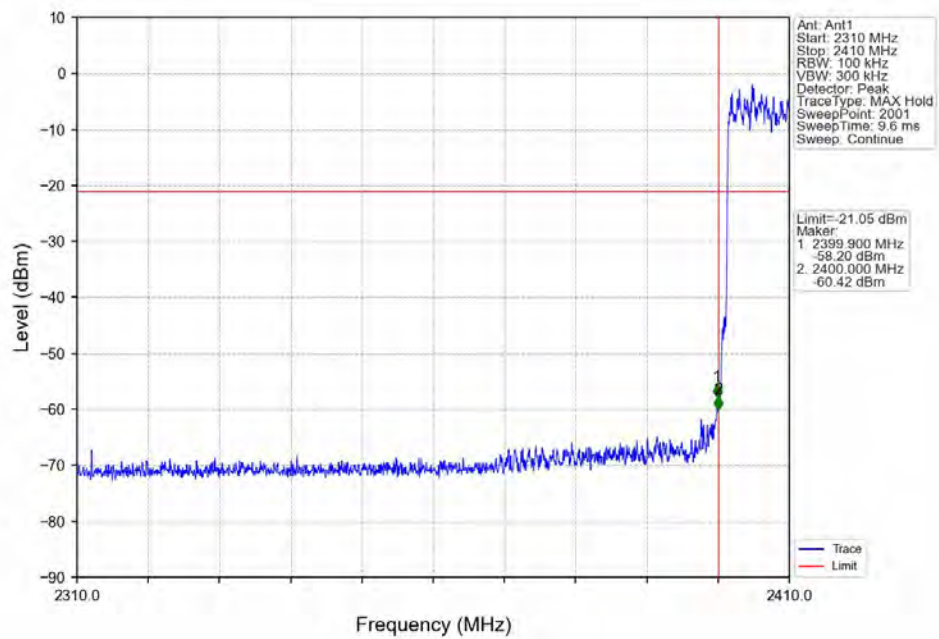


8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



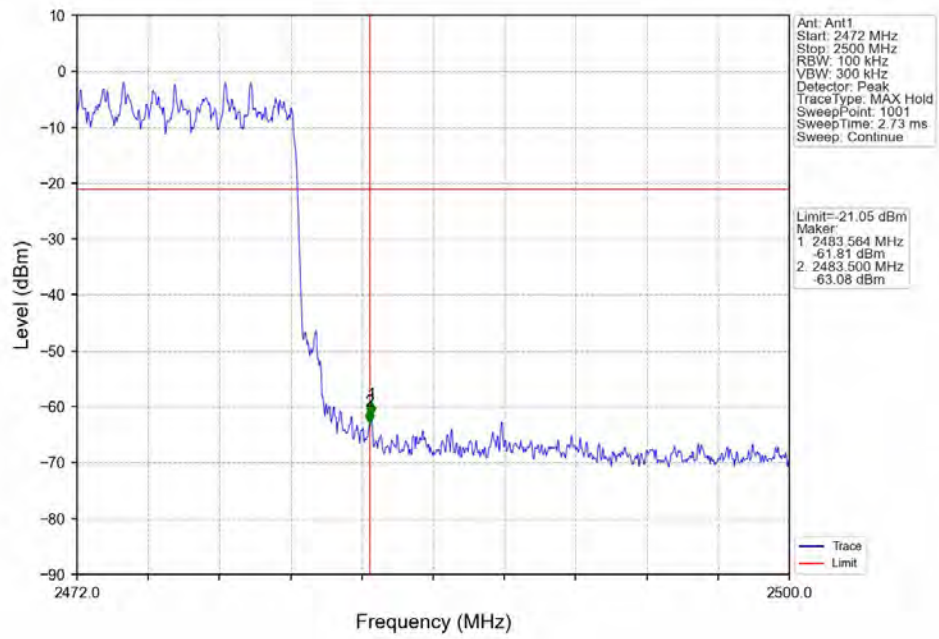


8DPSK_3DH5_HOPP_Ant1_NTNV





8DPSK_3DH5_HOPP_Ant1_NTNV





7. Form731

7.1 Form731

7.1.1 Test Result

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2402	2480	0.0012	0.70