



Appendix A

RF Test Data for BT(BDR/EDR) (Conducted Measurement)

Product Name: Bluetooth Earphone

Trade Mark: Spark-Air

Test Model: DIVOOM

Environmental Conditions

Temperature:	25.2℃
Relative Humidity:	51.2%
ATM Pressure:	101Kpa
Test Engineer:	Simba Huang
Supervised by:	Seal Chen



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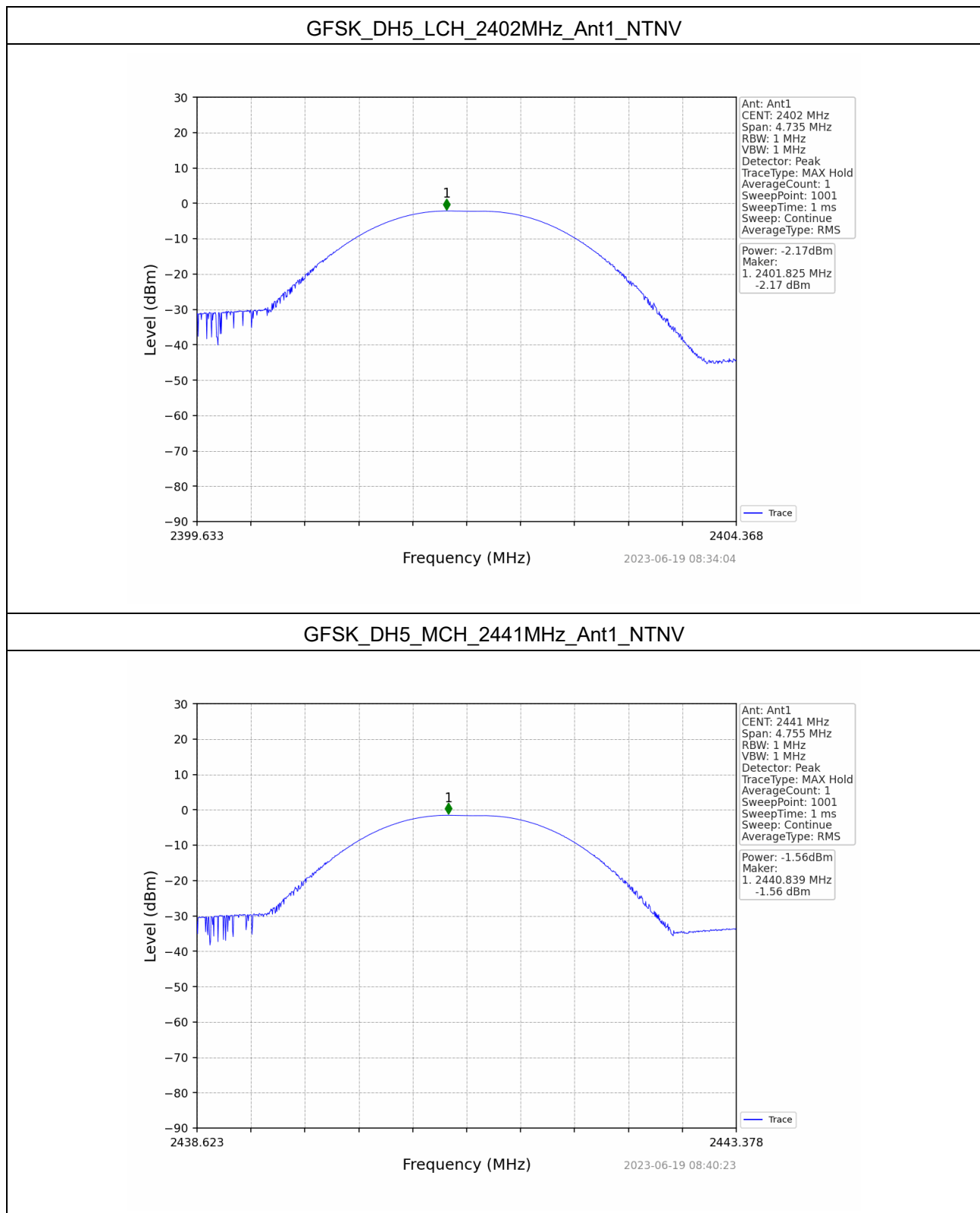
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1 Maximum Conducted Peak Output Power

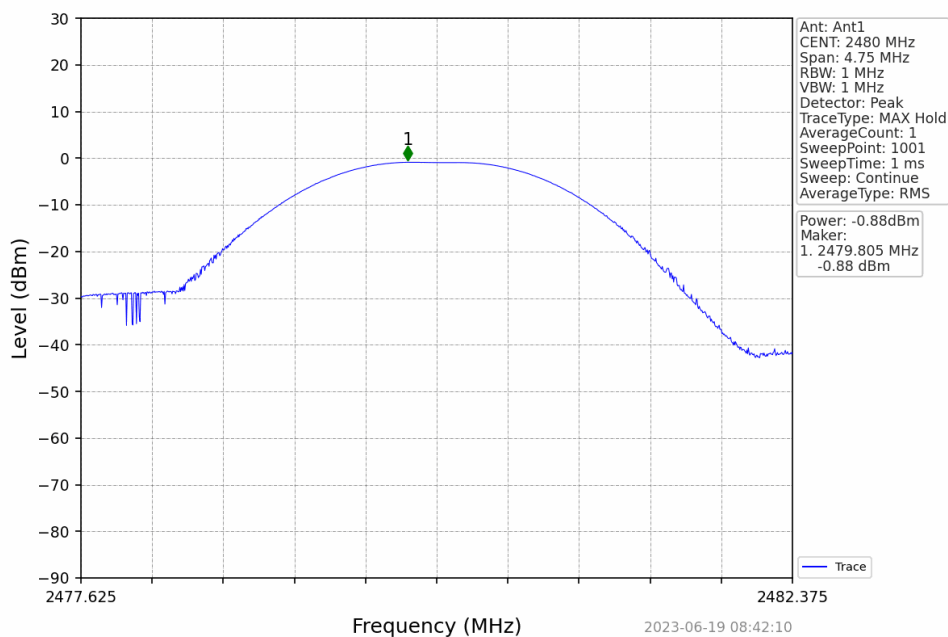
1.1 Test Result

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.17	21	Pass
	MCH	-1.56	21	Pass
	HCH	-0.88	21	Pass
$\pi/4$ -DQPSK	LCH	-1.33	21	Pass
	MCH	-0.83	21	Pass
	HCH	-0.20	21	Pass
8-DPSK	LCH	-1.17	21	Pass
	MCH	-0.58	21	Pass
	HCH	0.02	21	Pass

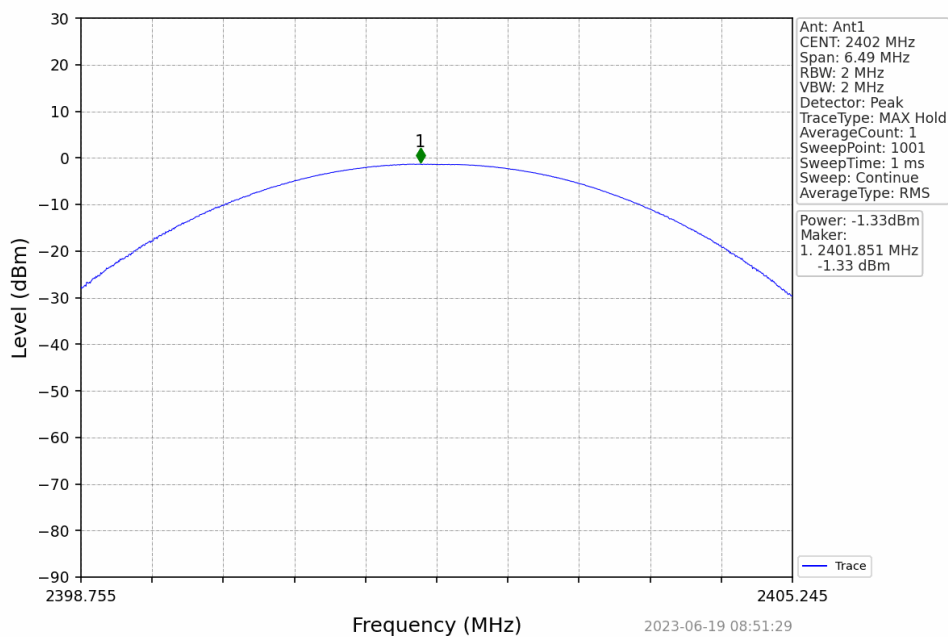
1.2 Test Graphs



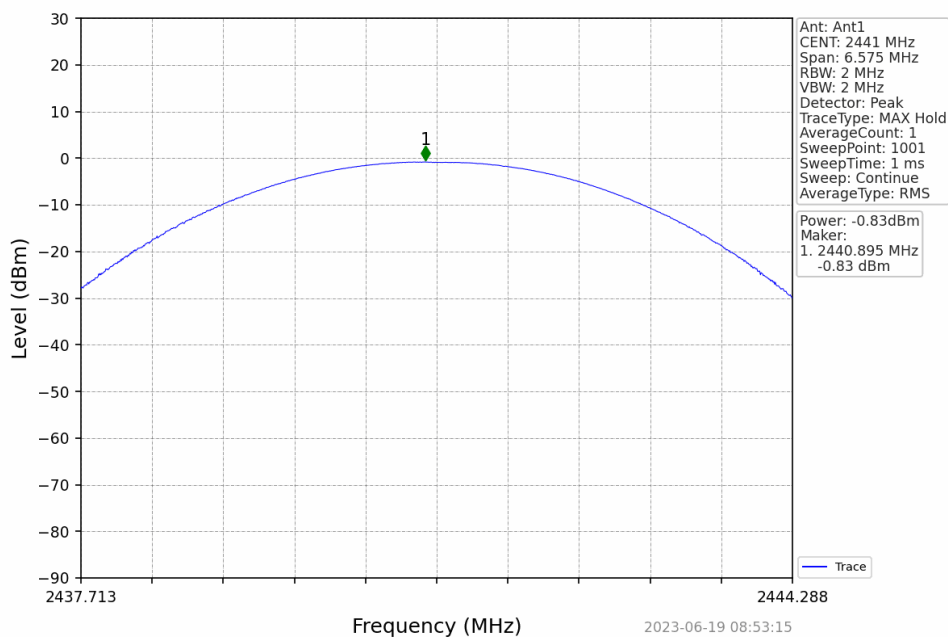
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



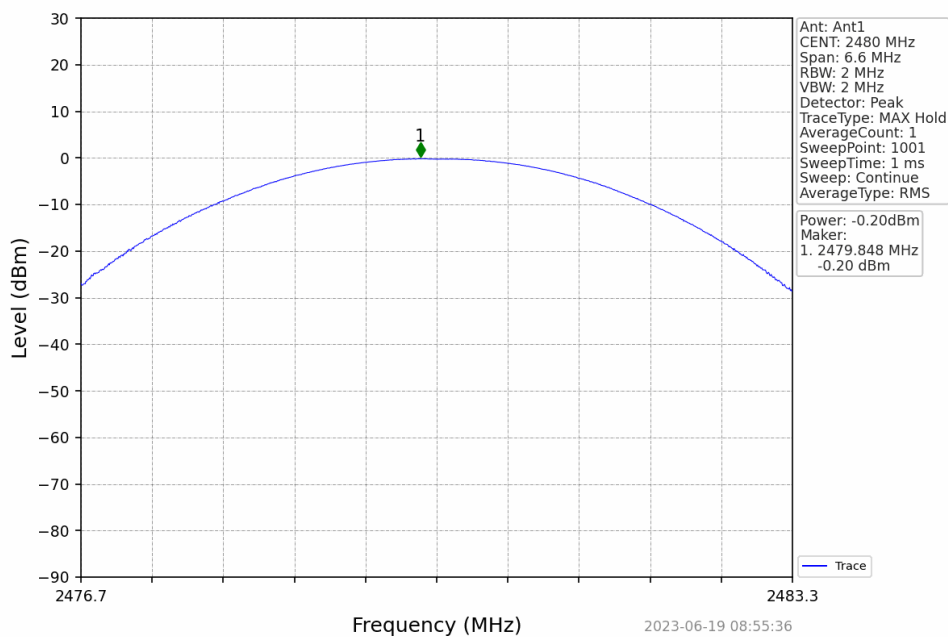
$\pi/4$ -DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



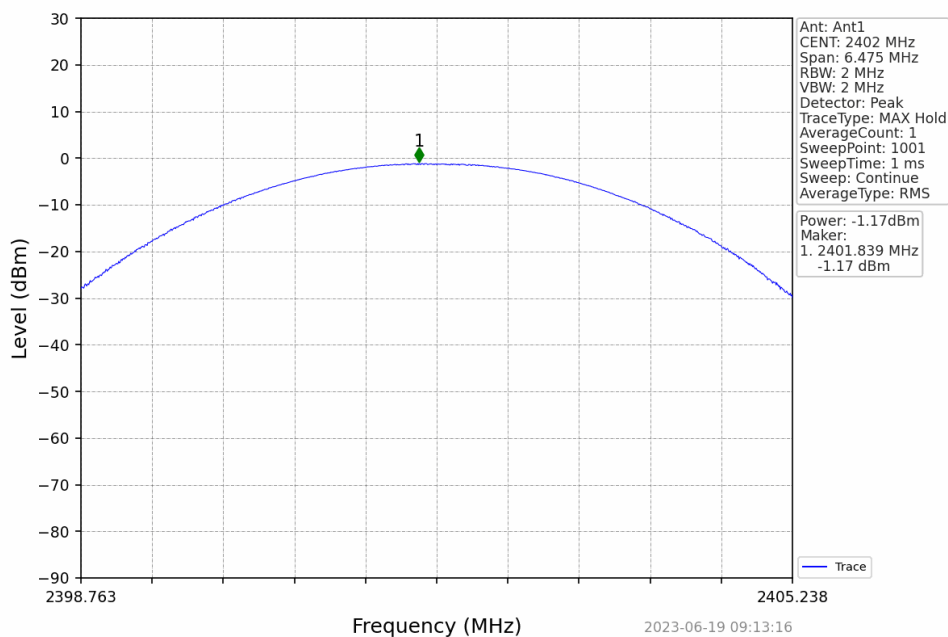
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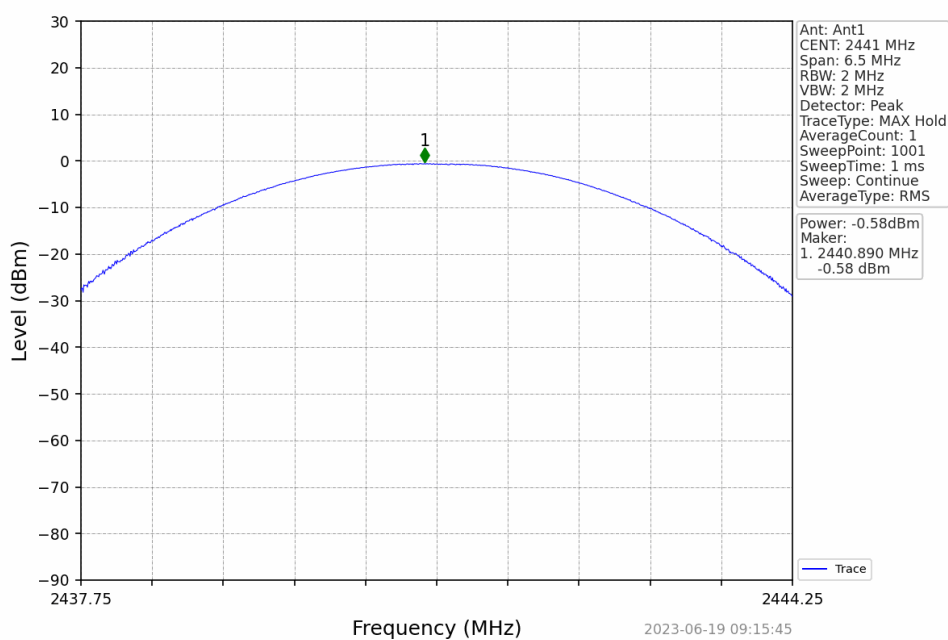
$\pi/4$ -DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



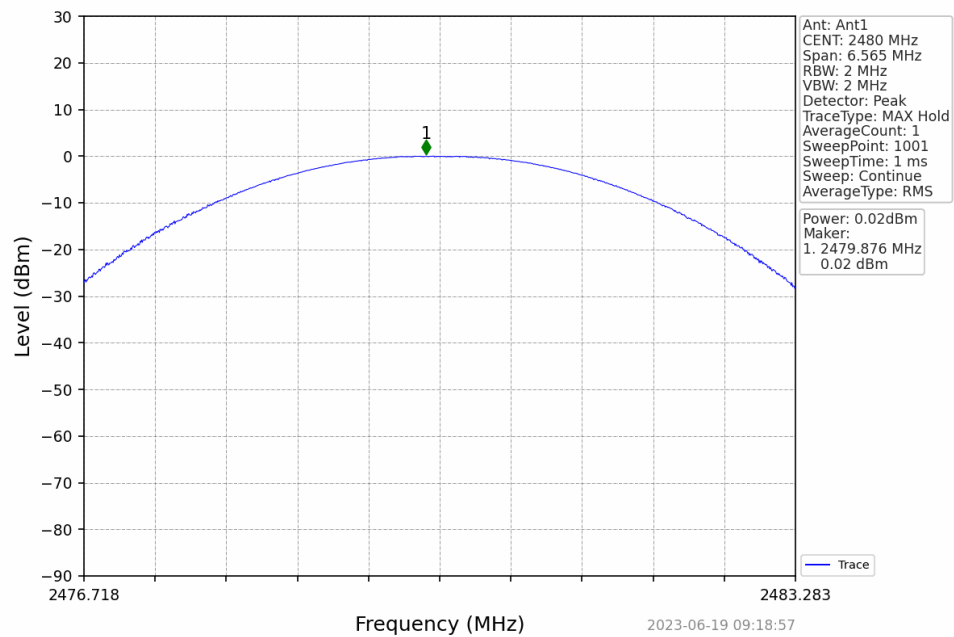
8-DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8-DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8-DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

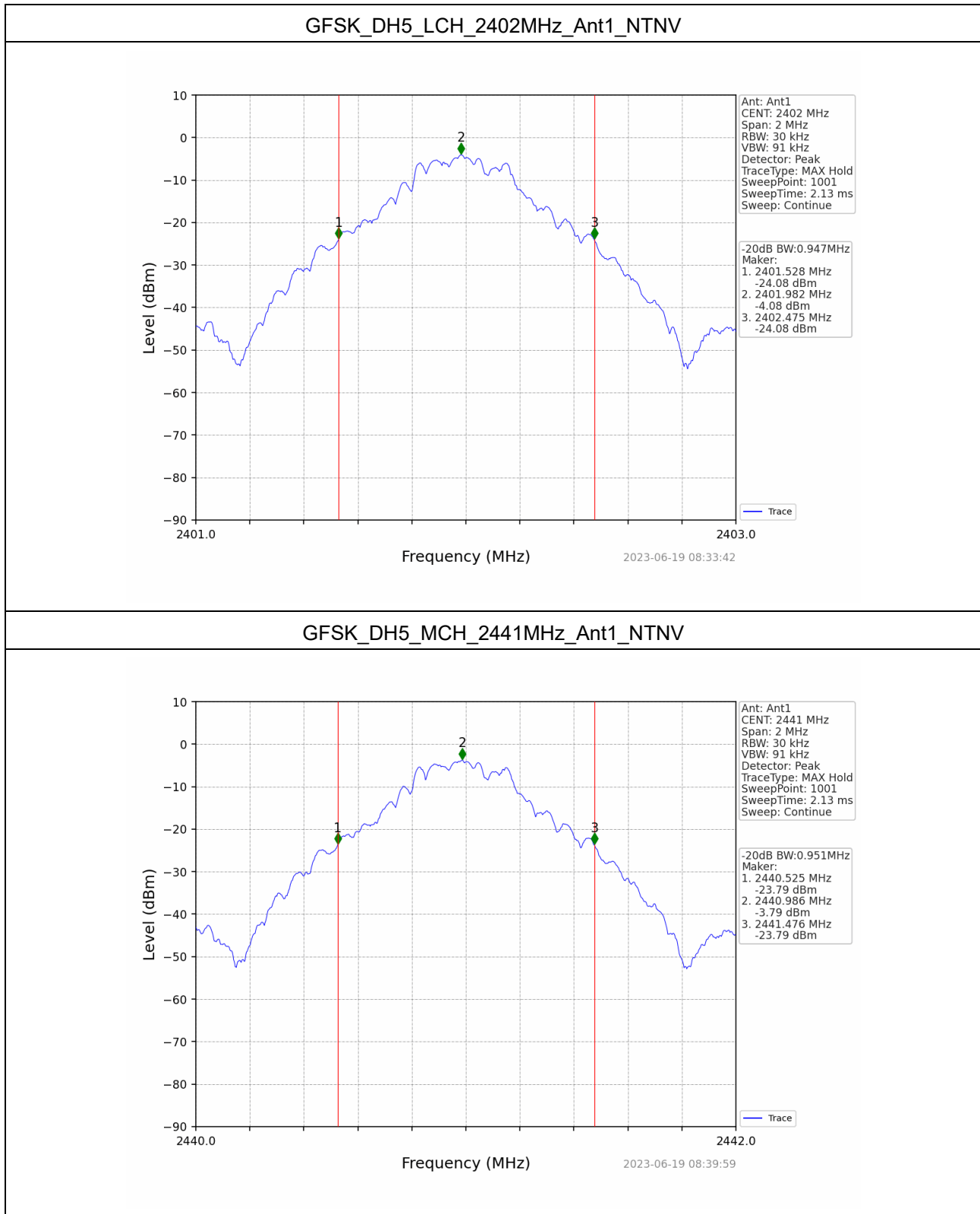


2 20dB Bandwidth

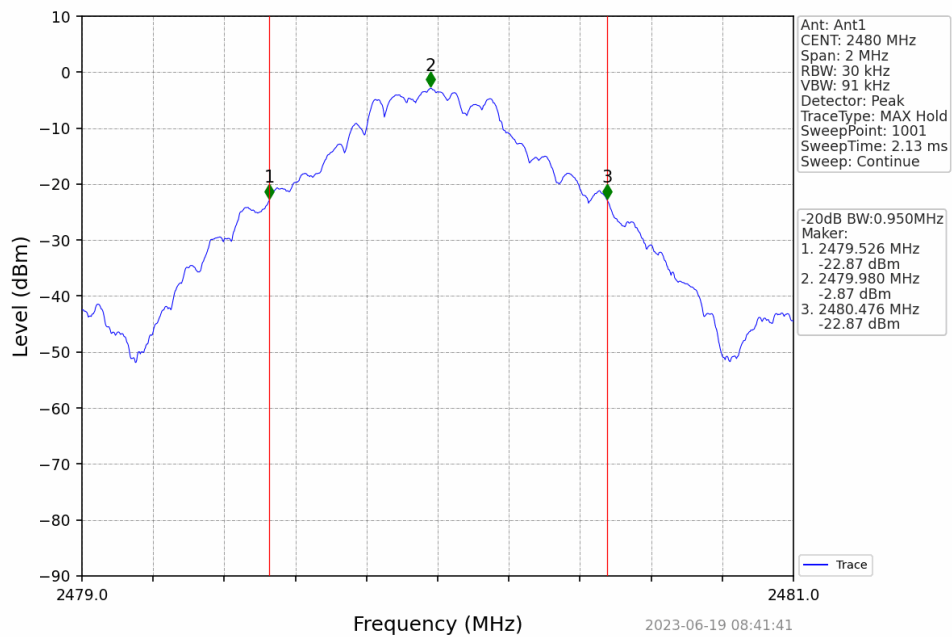
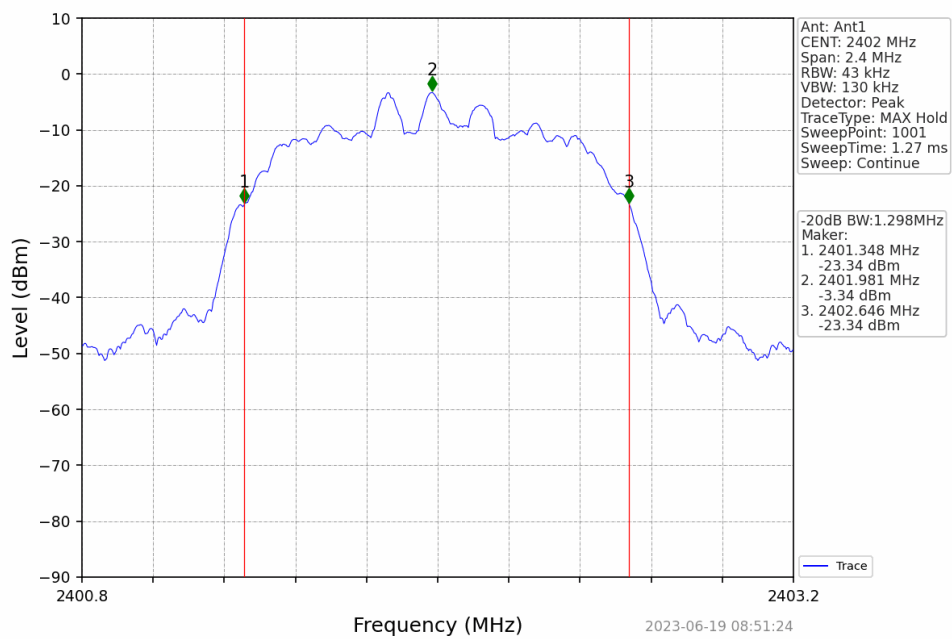
2.1 Test Result

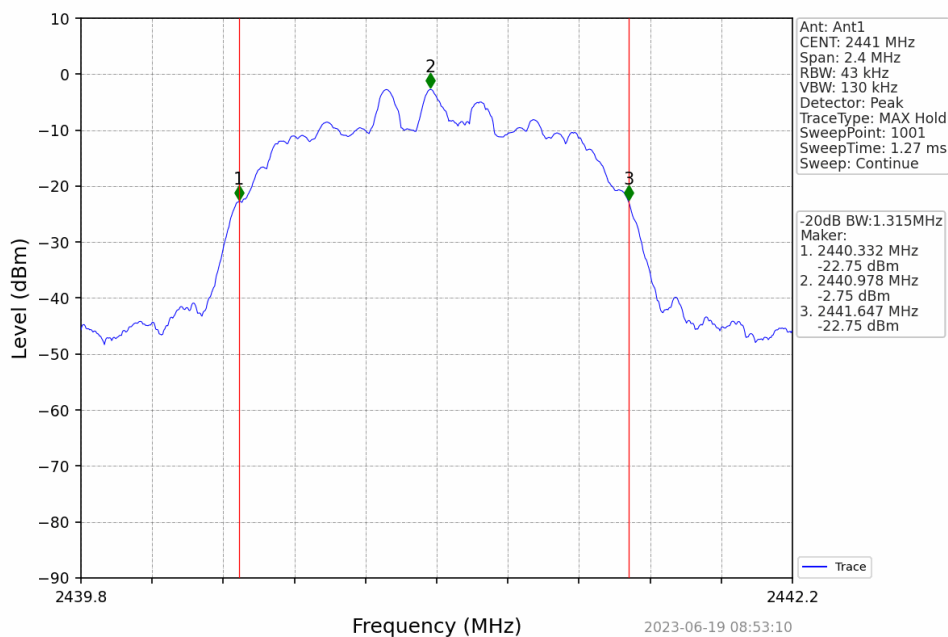
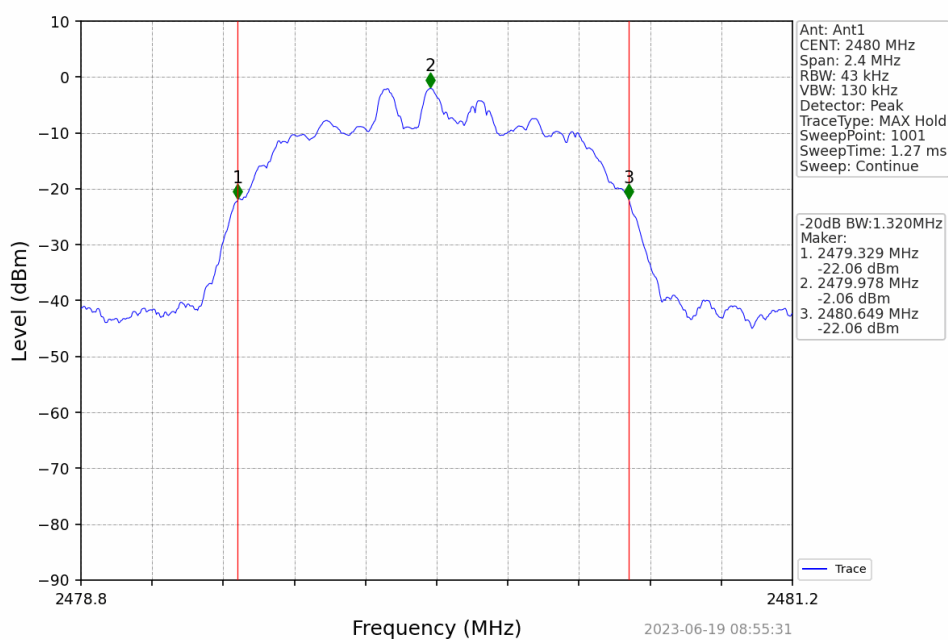
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.947	Not Specified	Pass
	MCH	0.951	Not Specified	Pass
	HCH	0.950	Not Specified	Pass
$\pi/4$ -DQPSK	LCH	1.298	Not Specified	Pass
	MCH	1.315	Not Specified	Pass
	HCH	1.320	Not Specified	Pass
8-DPSK	LCH	1.295	Not Specified	Pass
	MCH	1.300	Not Specified	Pass
	HCH	1.313	Not Specified	Pass

2.2 Test Graphs

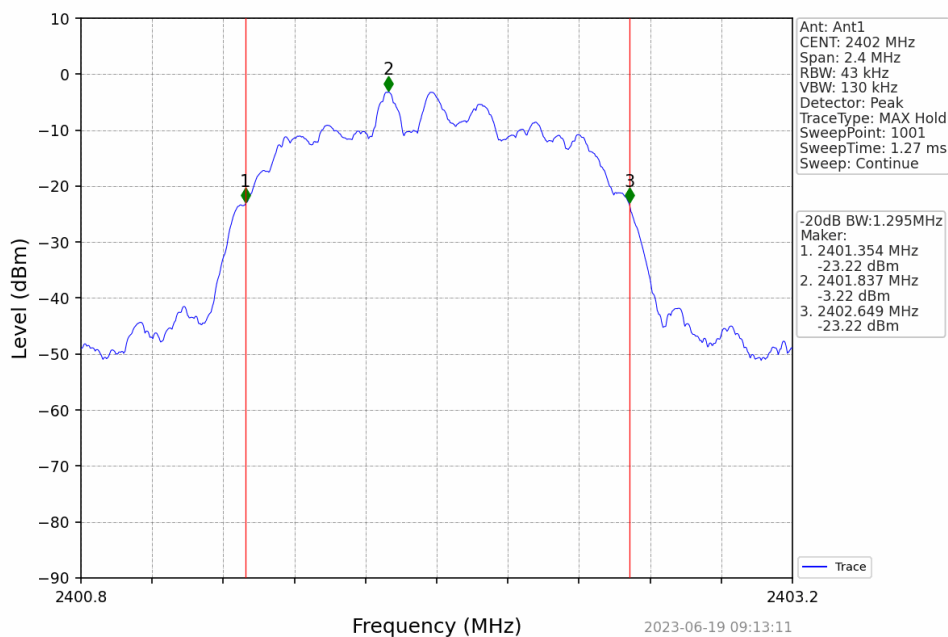


GFSK_DH5_HCH_2480MHz_Ant1_NTNV

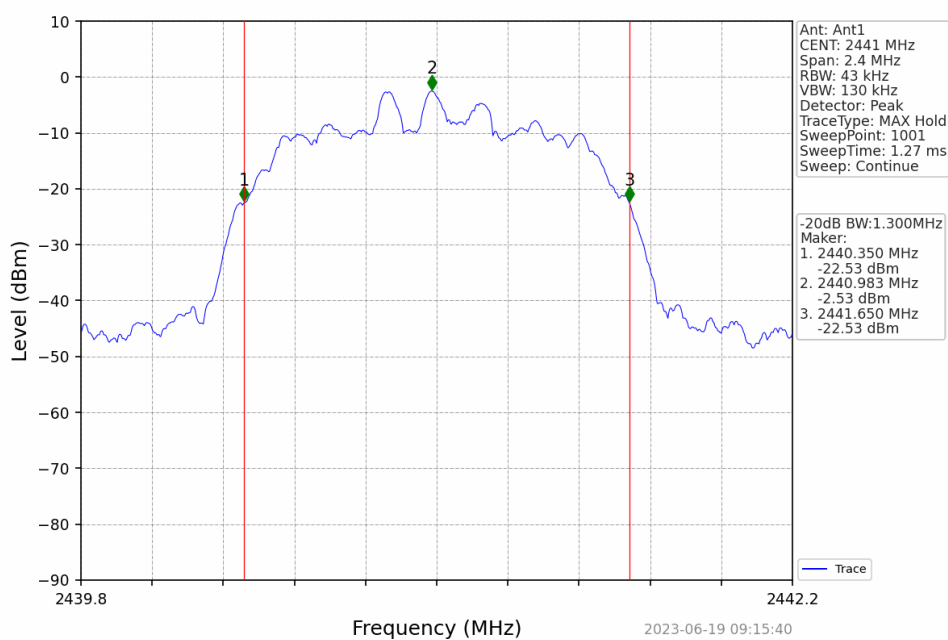

 $\pi/4$ -DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV


$\pi/4$ -DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

 $\pi/4$ -DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV


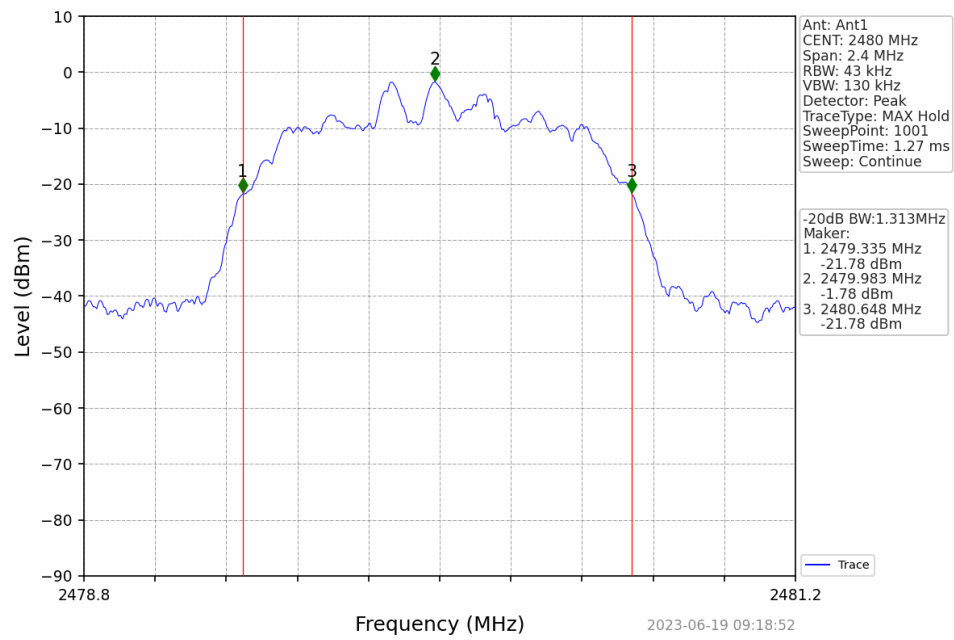
8-DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8-DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8-DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



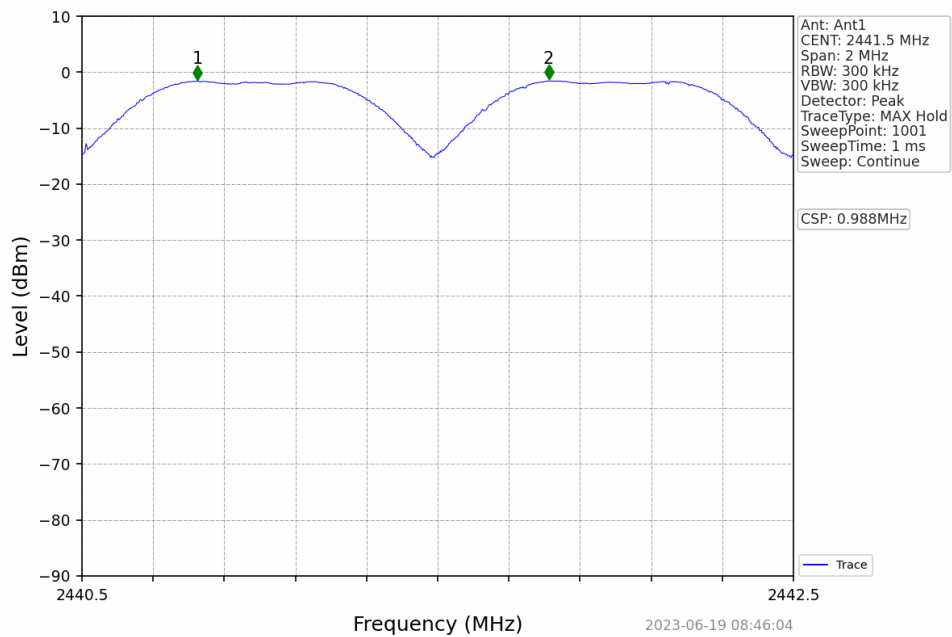
3 Carrier Frequency Separation

3.1 Test Result

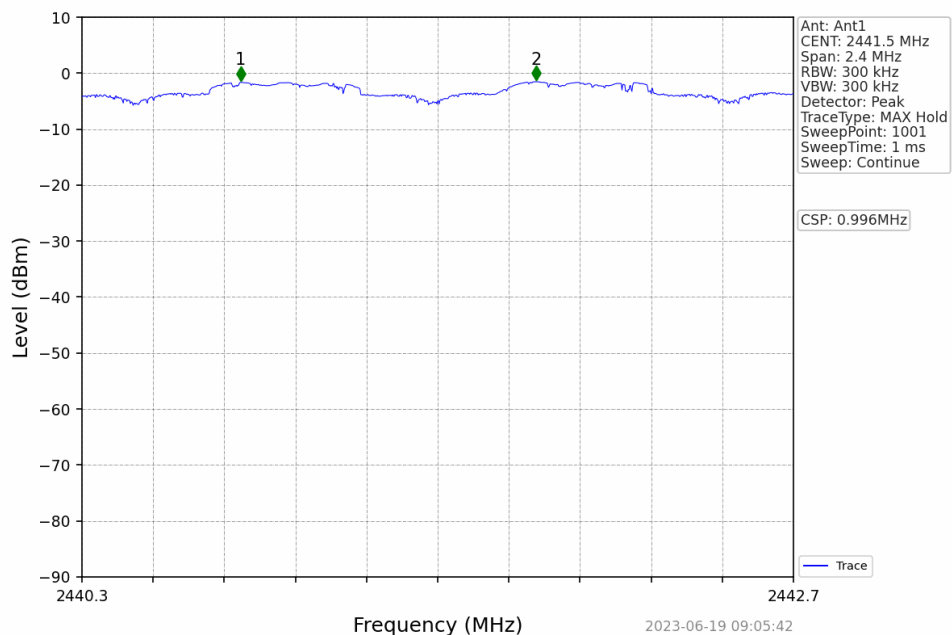
Mode	Channel.	Carrier Frequency Separation [MHz]	20dB Bandwidth (MHz)	Limit [MHz]	Verdict
GFSK	MCH	0.988	0.951	≥ 0.634	Pass
$\pi/4$ -DQPSK	MCH	0.996	1.320	≥ 0.880	Pass
8-DPSK	MCH	0.994	1.313	≥ 0.875	Pass

3.2 Test Graphs

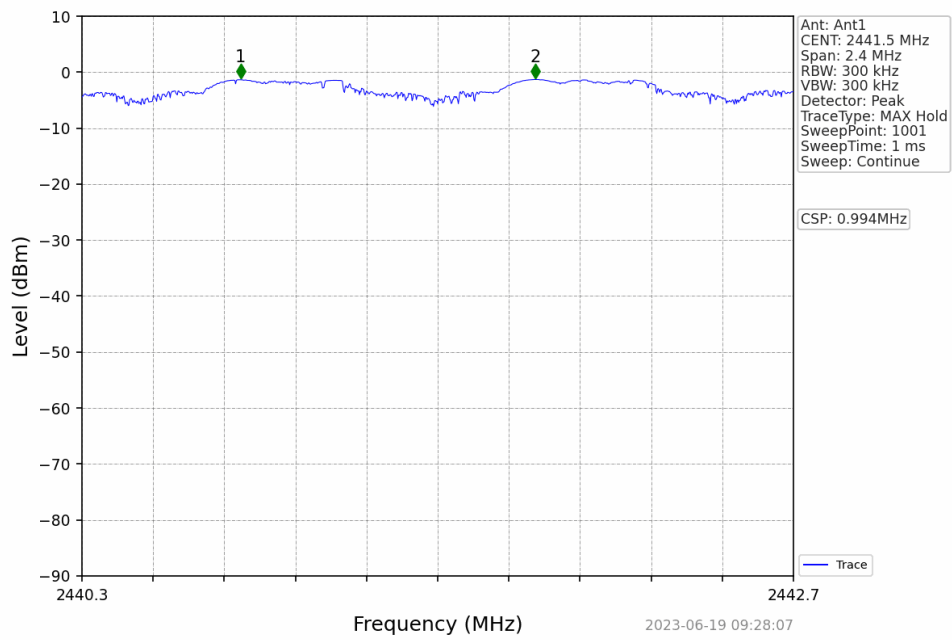
GFSK_DH5_HOPP_Ant1_NTNV



$\pi/4$ -DQPSK_2DH5_HOPP_Ant1_NTNV



8-DPSK_3DH5_HOPP_Ant1_NTNV



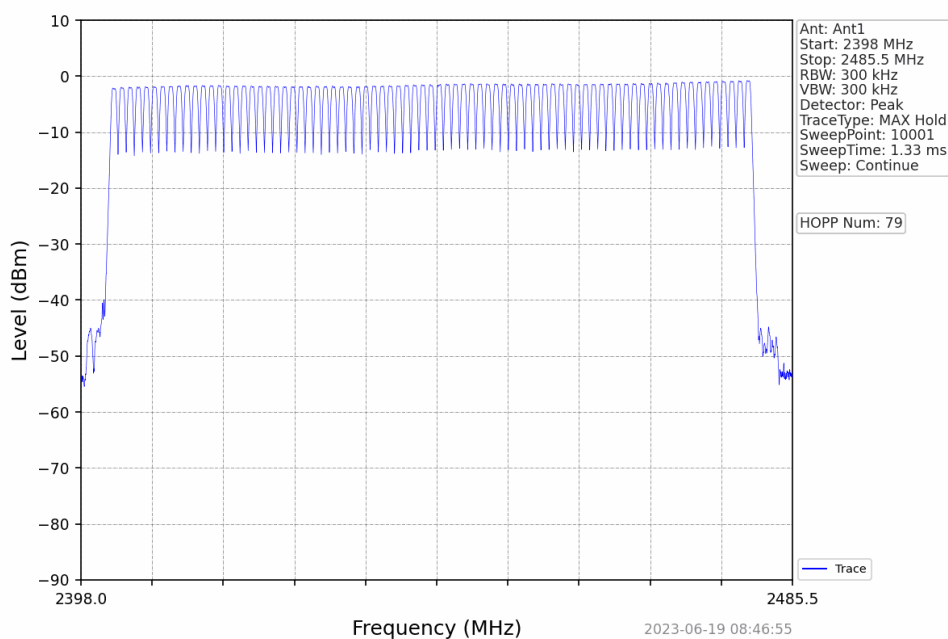
4 Hopping Channel Number

4.1 Test Result

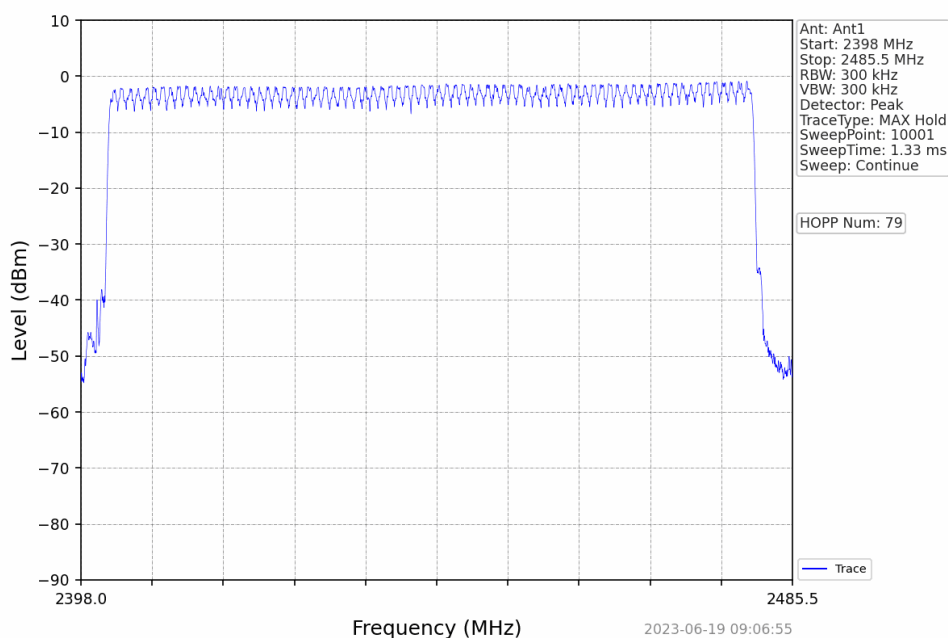
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ -DQPSK	Hop	79	≥ 15	PASS
8-DPSK	Hop	79	≥ 15	PASS

4.2 Test Graphs

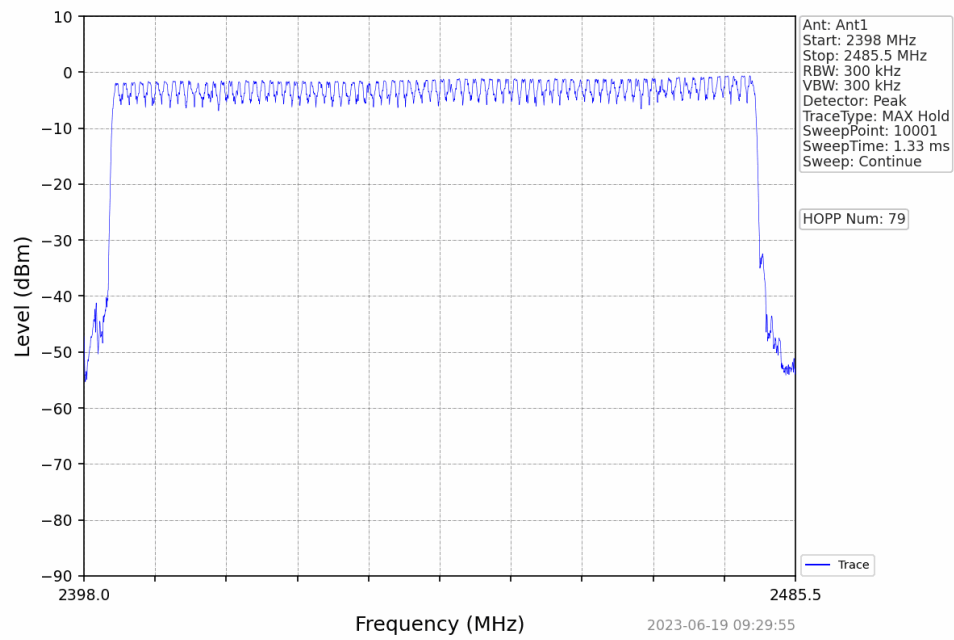
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$\pi/4$ -DQPSK_2DH5_HOPP_Ant1_NTNV



8-DPSK_3DH5_HOPP_Ant1_NTNV

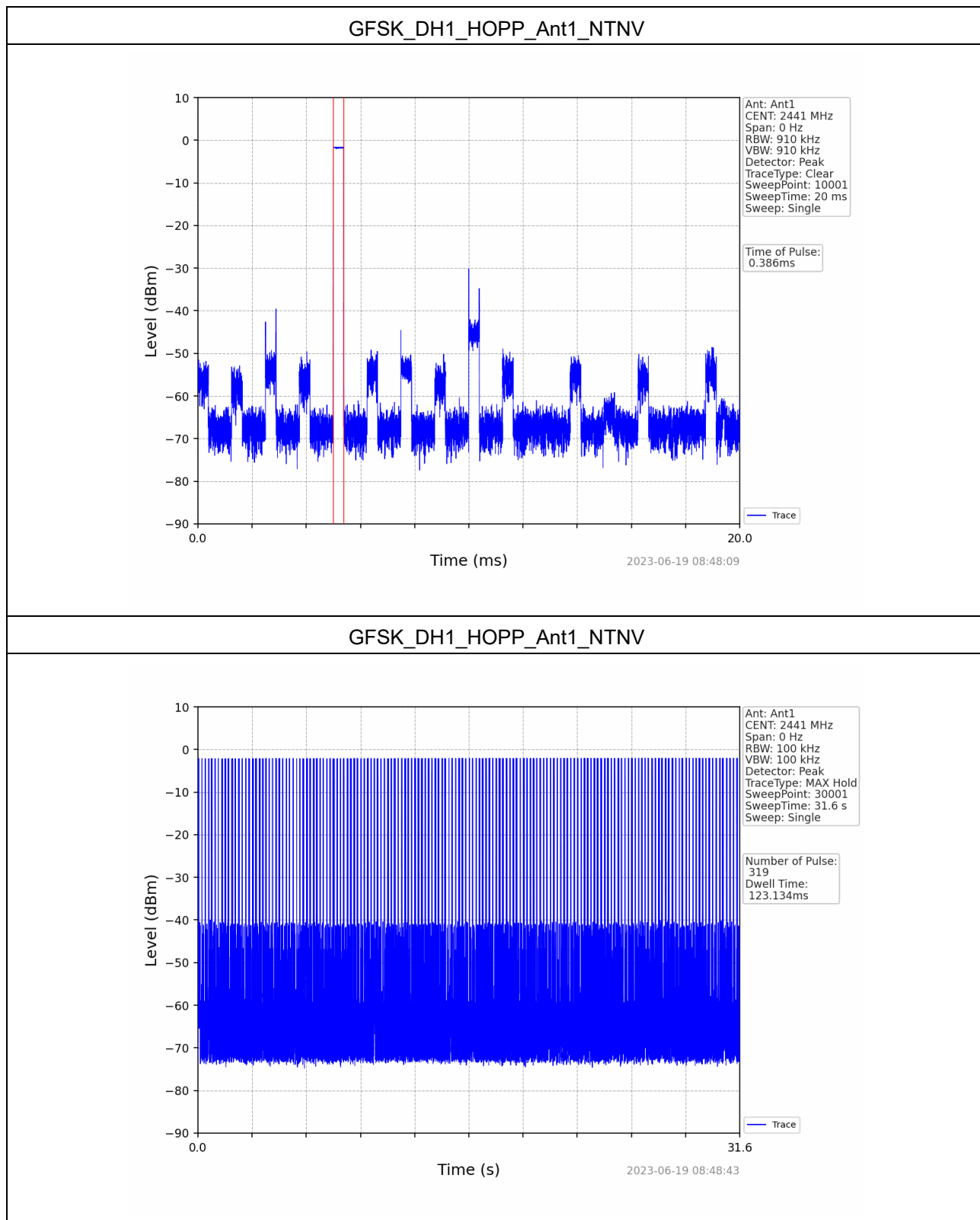


5 Dwell Time

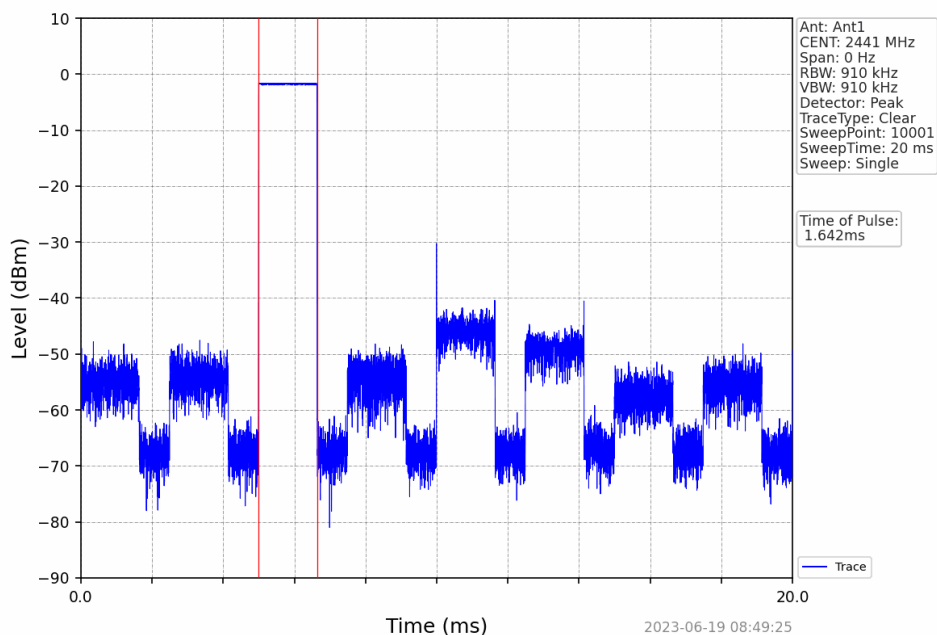
5.1 Test Result

Mode	Packet	Frequency (MHz)	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	DH1	HOPP	0.386	31.600	319	123.134	<=400	Pass
	DH3		1.642	31.600	155	254.510	<=400	Pass
	DH5		2.892	31.600	116	335.472	<=400	Pass
$\pi/4$ -DQPSK	2DH1	HOPP	0.398	31.600	320	127.360	<=400	Pass
	2DH3		1.648	31.600	166	273.568	<=400	Pass
	2DH5		2.898	31.600	91	263.718	<=400	Pass
8-DPSK	3DH1	HOPP	0.390	31.600	315	122.850	<=400	Pass
	3DH3		1.640	31.600	173	283.720	<=400	Pass
	3DH5		2.954	31.600	109	321.986	<=400	Pass

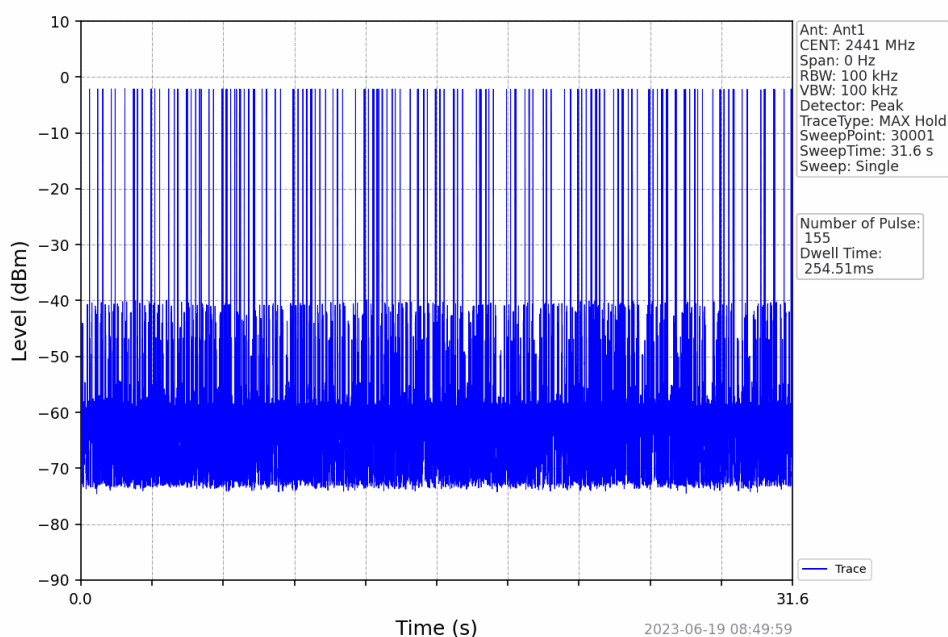
5.2 Test Graphs



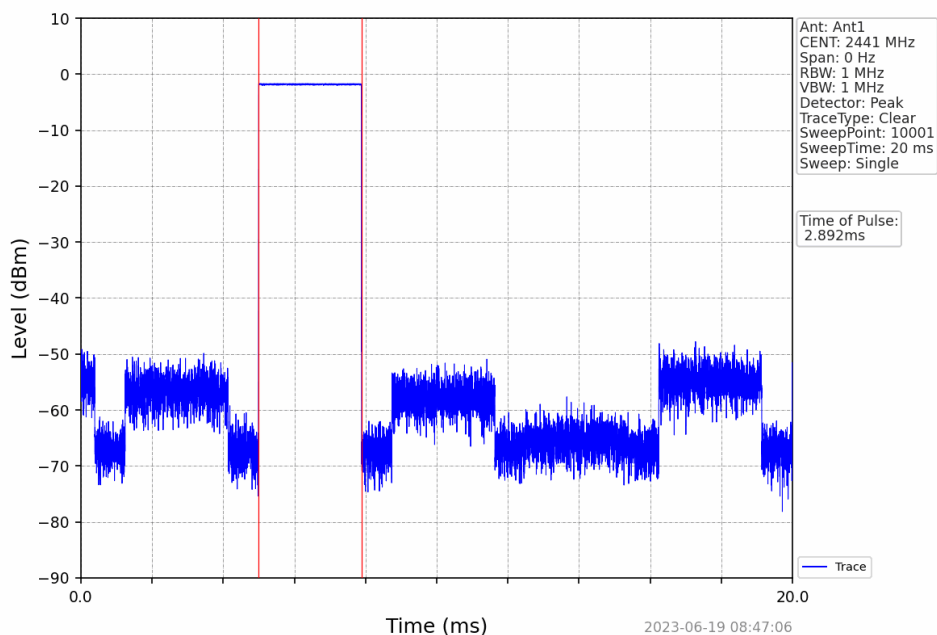
GFSK_DH3_HOPP_Ant1_NTNV



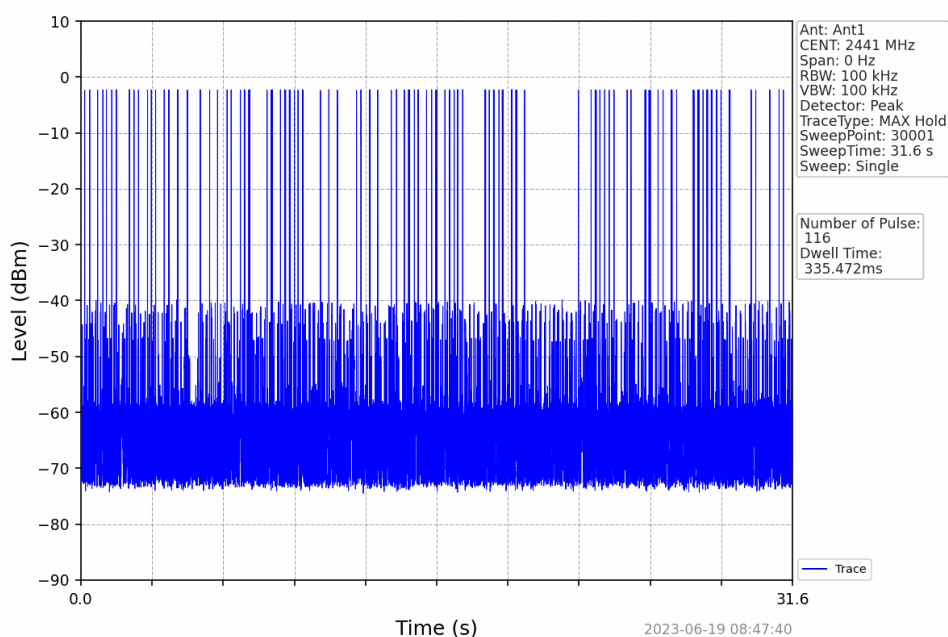
GFSK_DH3_HOPP_Ant1_NTNV



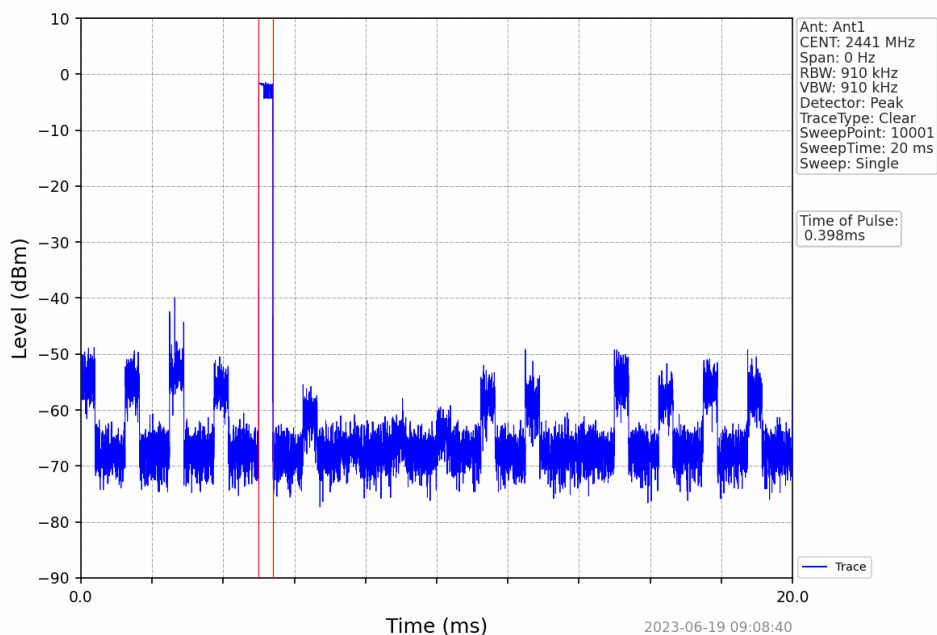
GFSK_DH5_HOPP_Ant1_NTNV



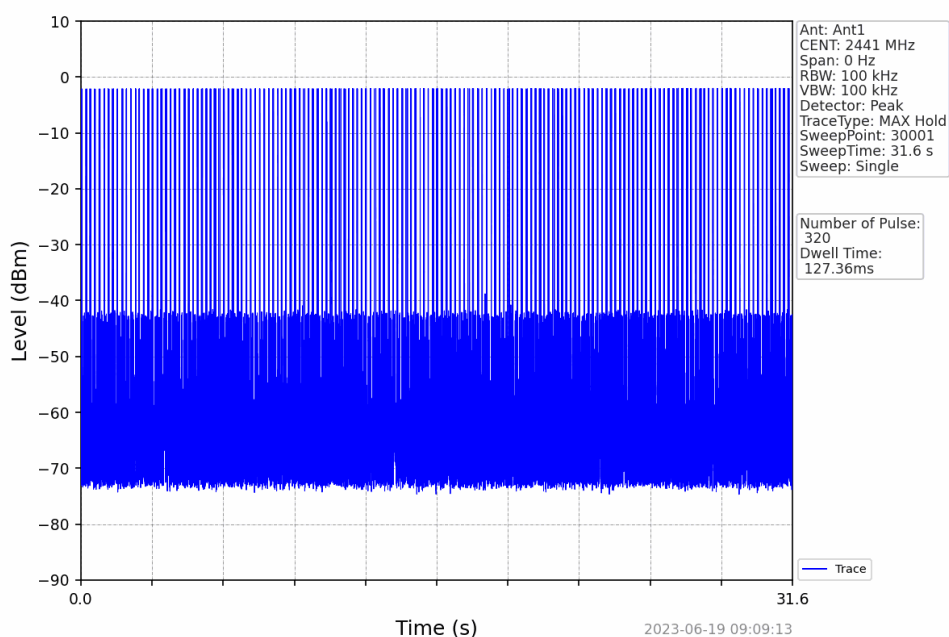
GFSK_DH5_HOPP_Ant1_NTNV



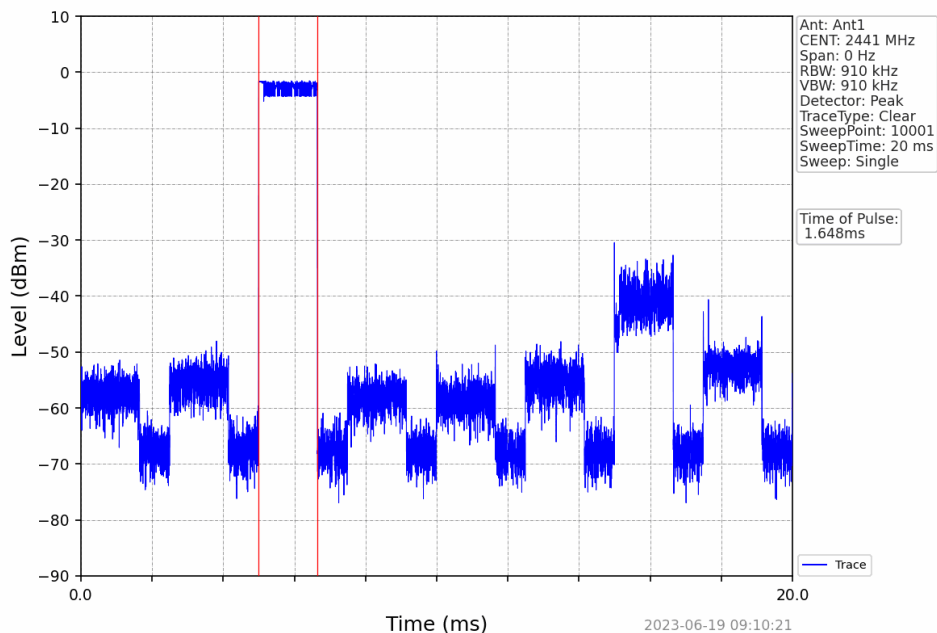
$\pi/4$ -DQPSK_2DH1_HOPP_Ant1_NTNV



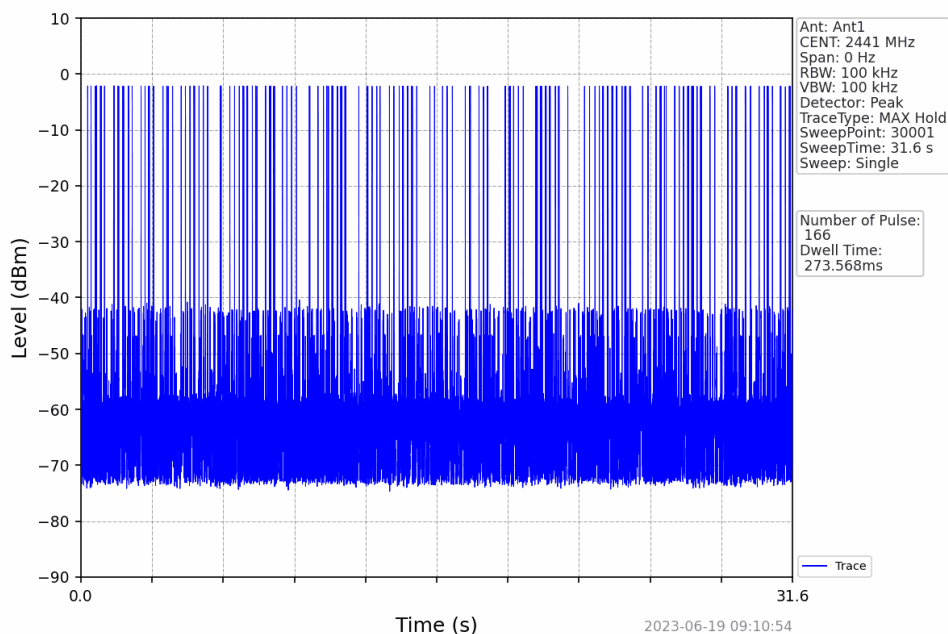
$\pi/4$ -DQPSK_2DH1_HOPP_Ant1_NTNV



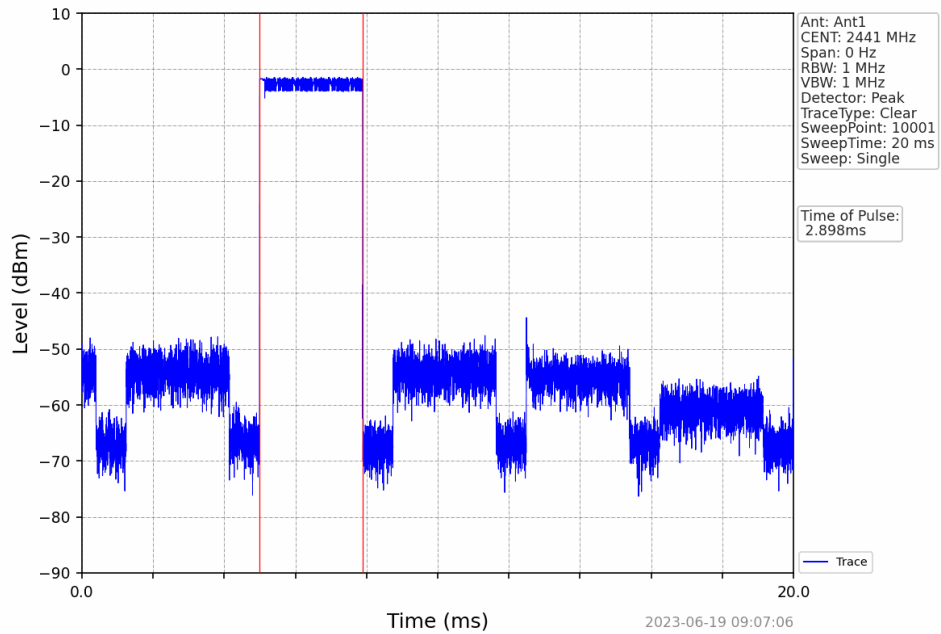
$\pi/4$ -DQPSK_2DH3_HOPP_Ant1_NTNV



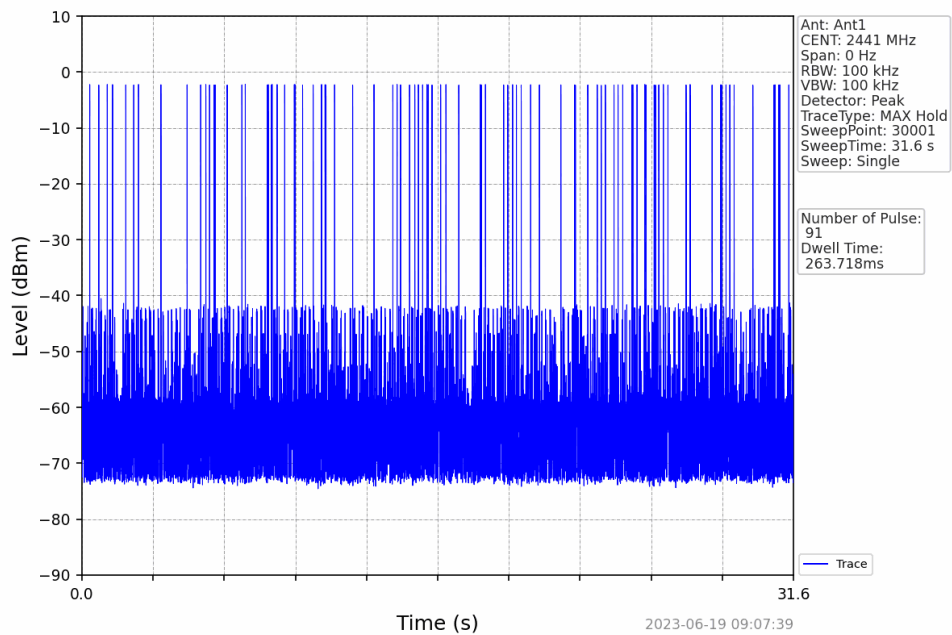
$\pi/4$ -DQPSK_2DH3_HOPP_Ant1_NTNV



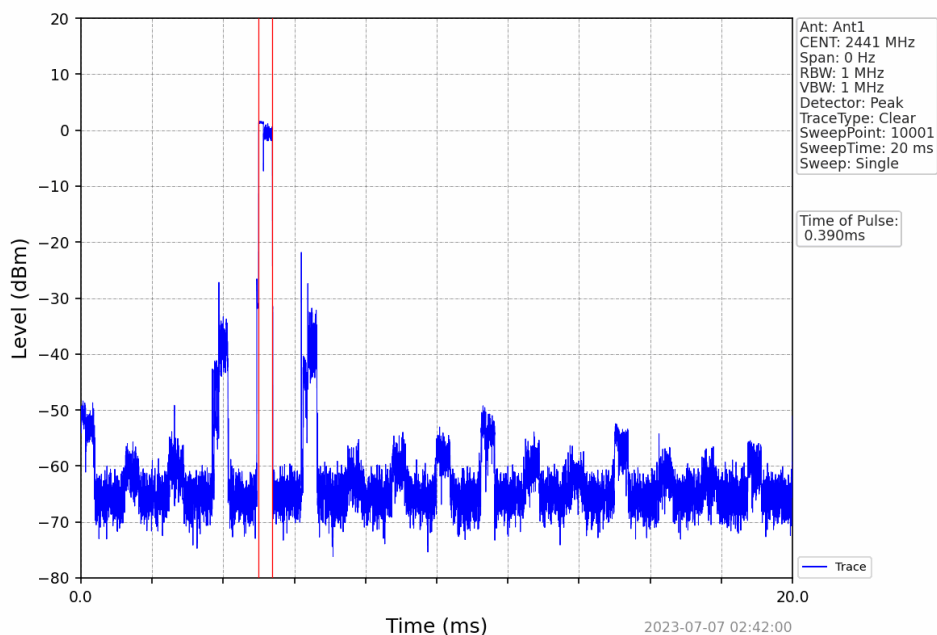
$\pi/4$ -DQPSK_2DH5_HOPP_Ant1_NTNV



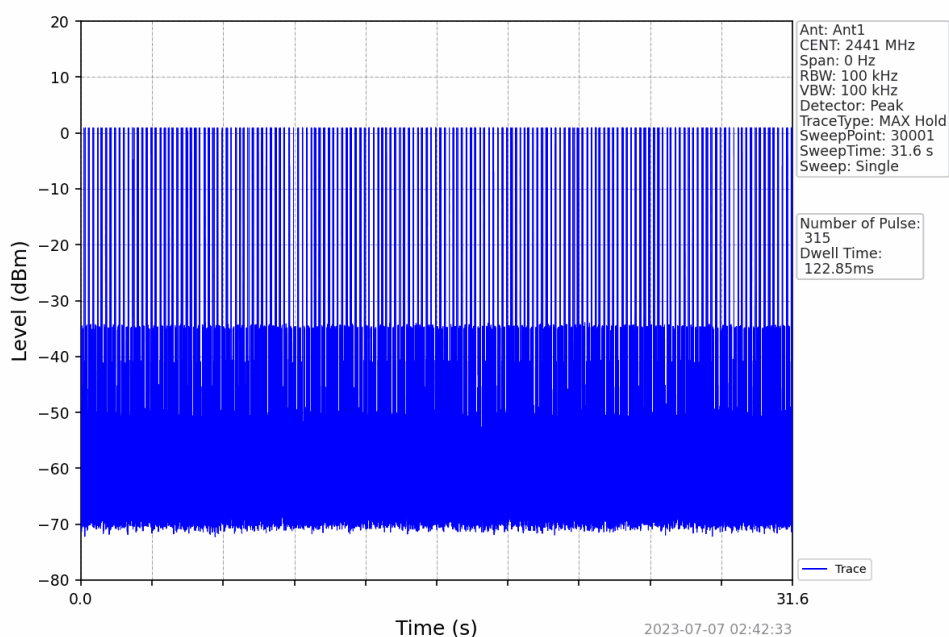
$\pi/4$ -DQPSK_2DH5_HOPP_Ant1_NTNV



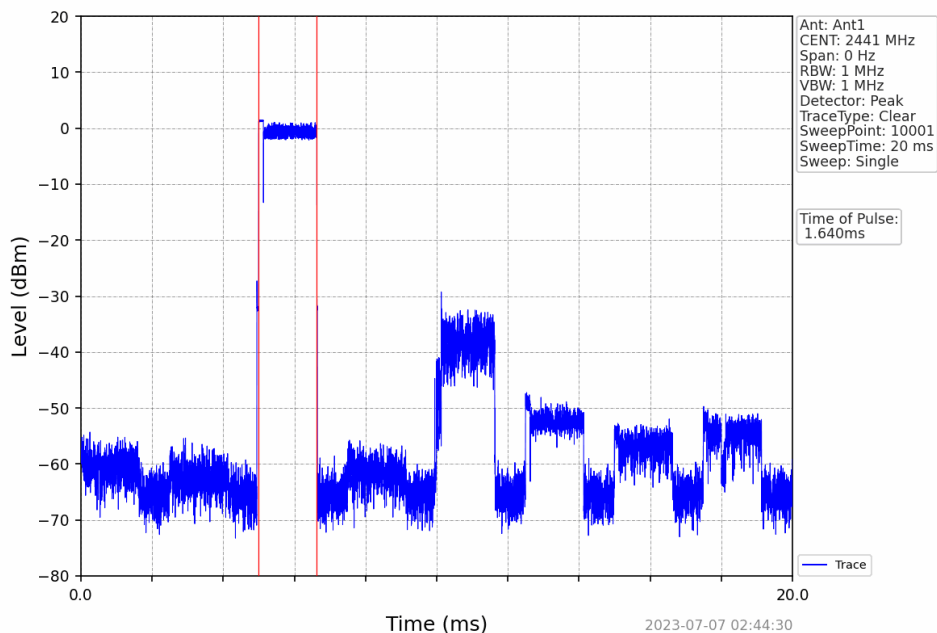
8-DPSK_3DH1_HOPP_Ant1_NTNV



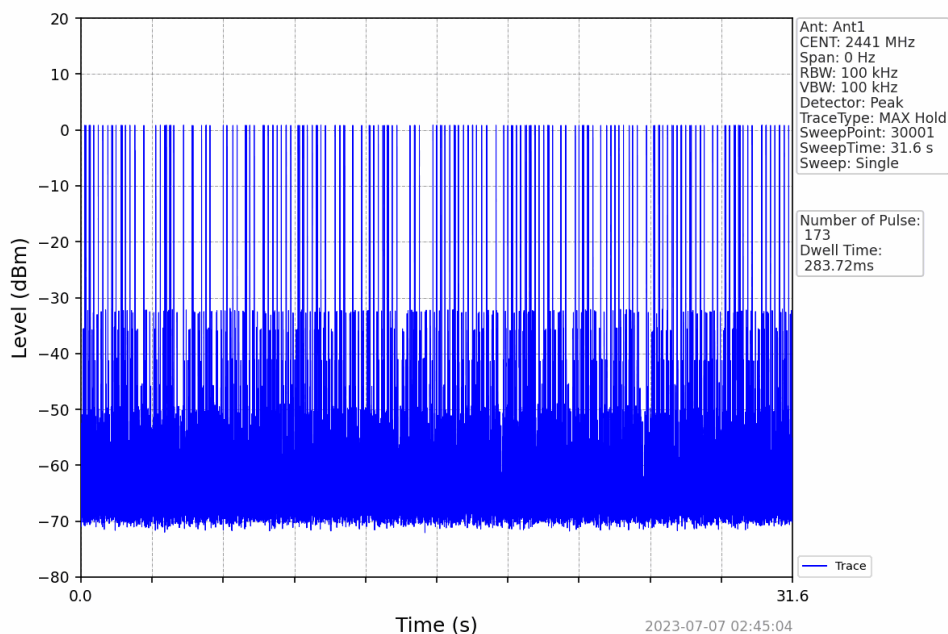
8-DPSK_3DH1_HOPP_Ant1_NTNV



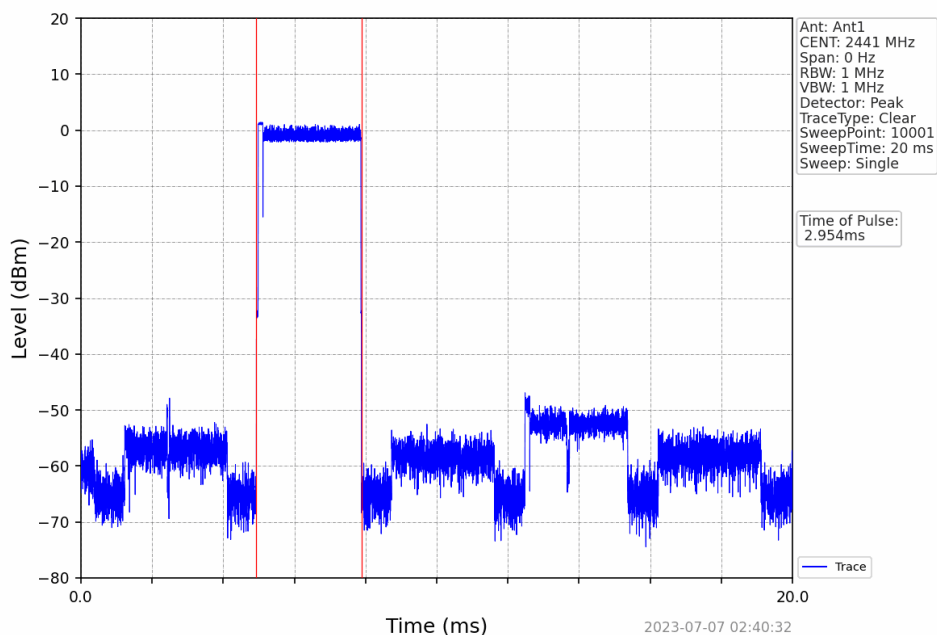
8-DPSK_3DH3_HOPP_Ant1_NTNV



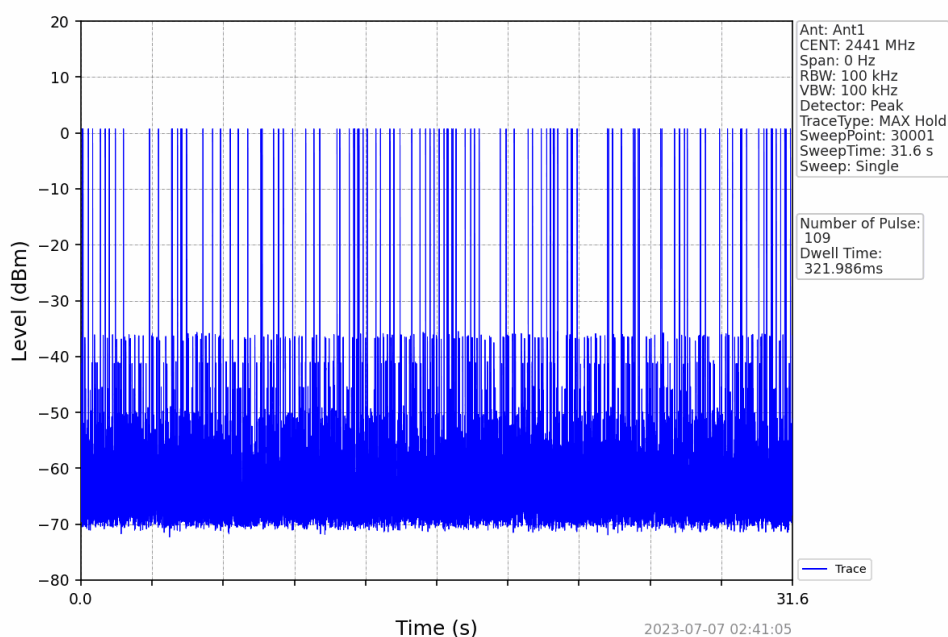
8-DPSK_3DH3_HOPP_Ant1_NTNV



8-DPSK_3DH5_HOPP_Ant1_NTNV



8-DPSK_3DH5_HOPP_Ant1_NTNV



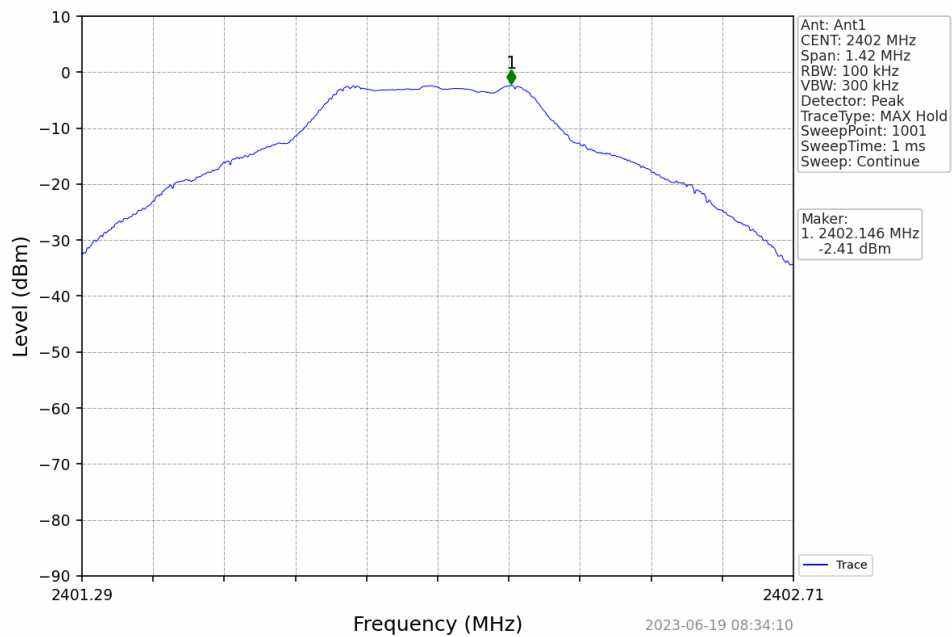
6 Conducted Spurious Emissions and Band Edges Test

6.1 Test Result

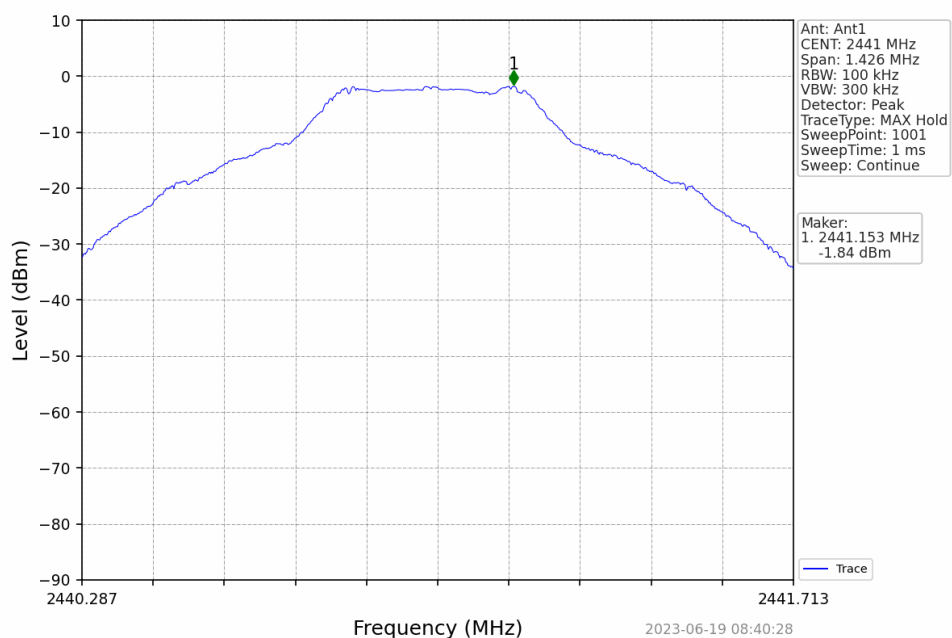
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	-2.41
		2441	DH5	1	-1.84
		2480	DH5	1	-1.10
$\pi/4$ -DQPSK	SISO	2402	2DH5	1	-2.32
		2441	2DH5	1	-1.71
		2480	2DH5	1	-0.97
8DPSK	SISO	2402	3DH5	1	-2.15
		2441	3DH5	1	-1.46
		2480	3DH5	1	-0.76
Note1: Refer to RSS-247 Issue 2 section 5.5 and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.					

6.1.1 Test Graphs

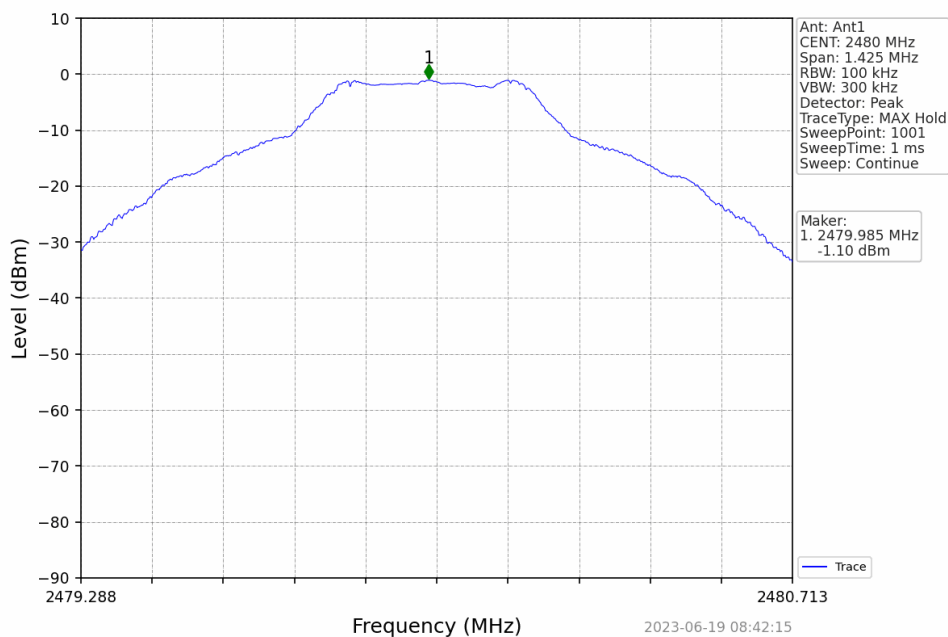
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



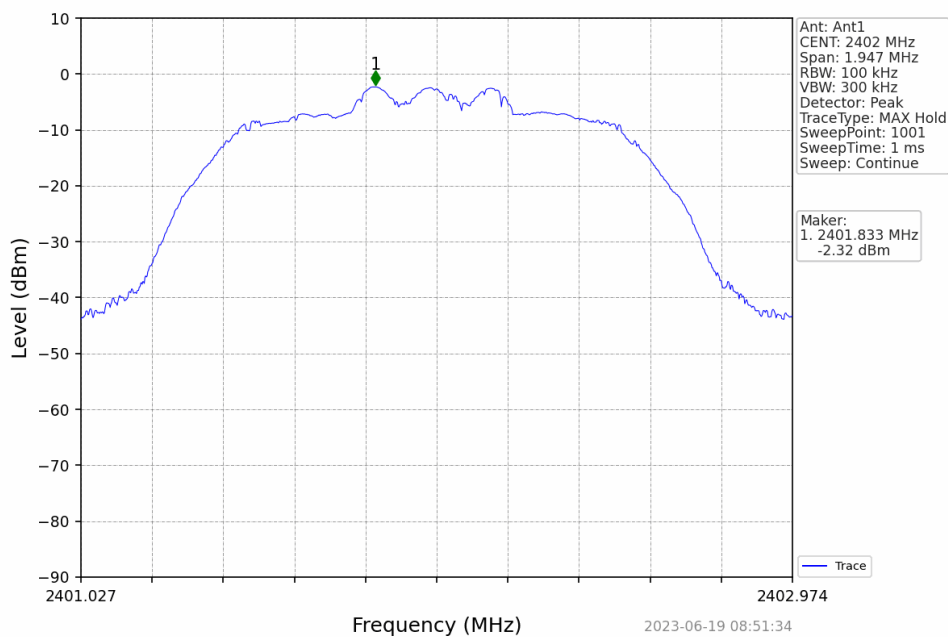
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



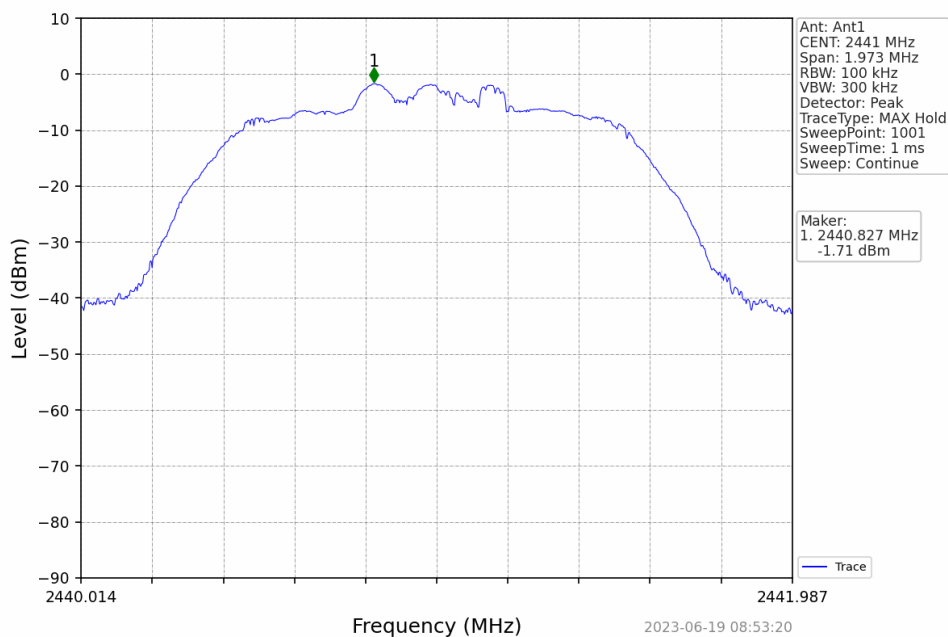
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



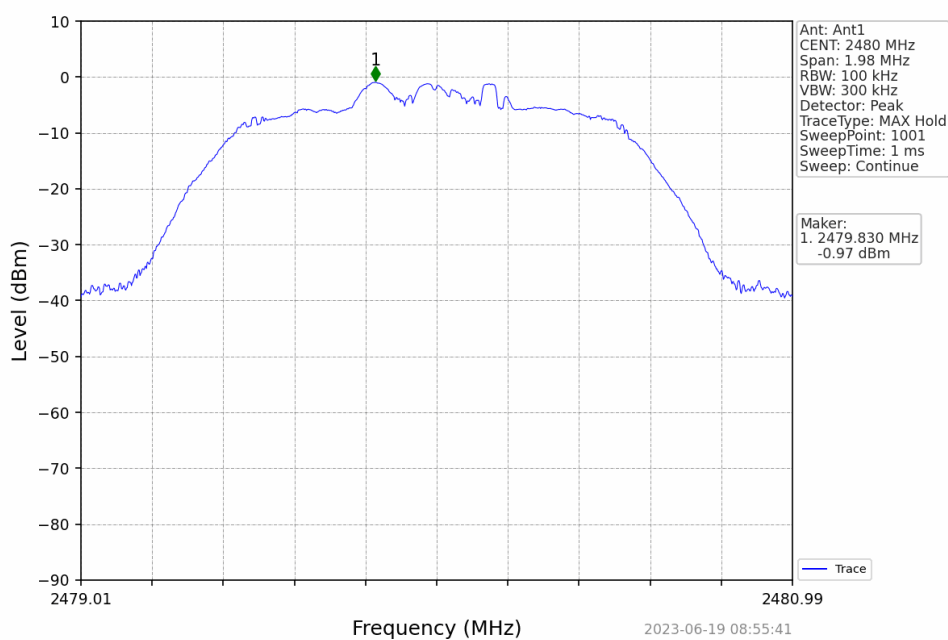
$\pi/4$ -DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



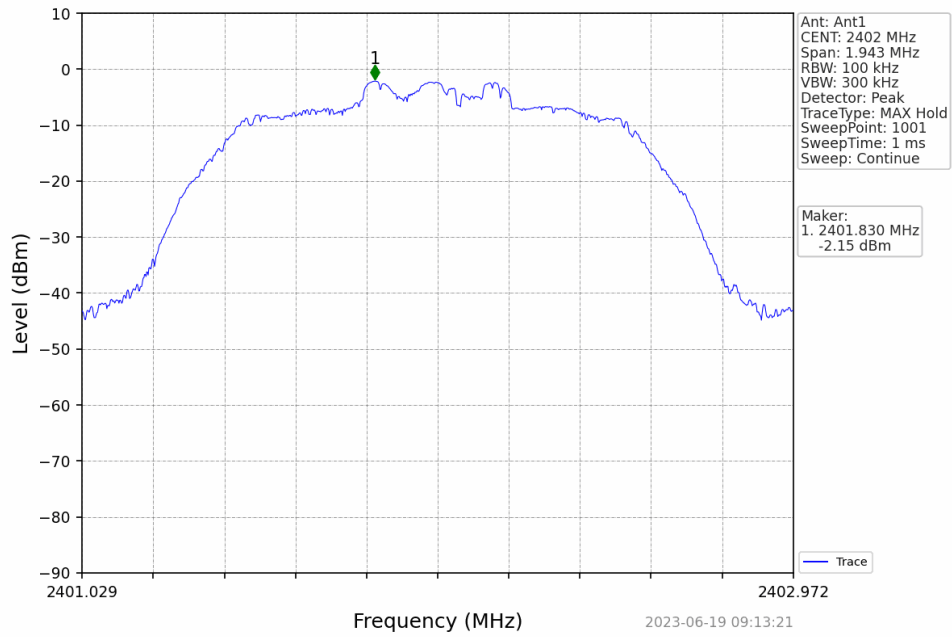
$\pi/4$ -DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



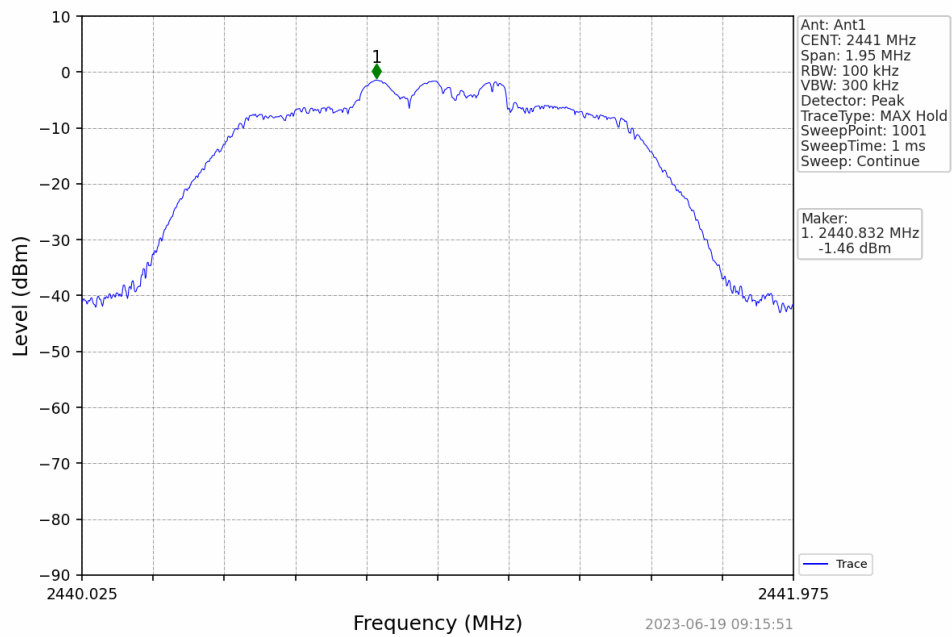
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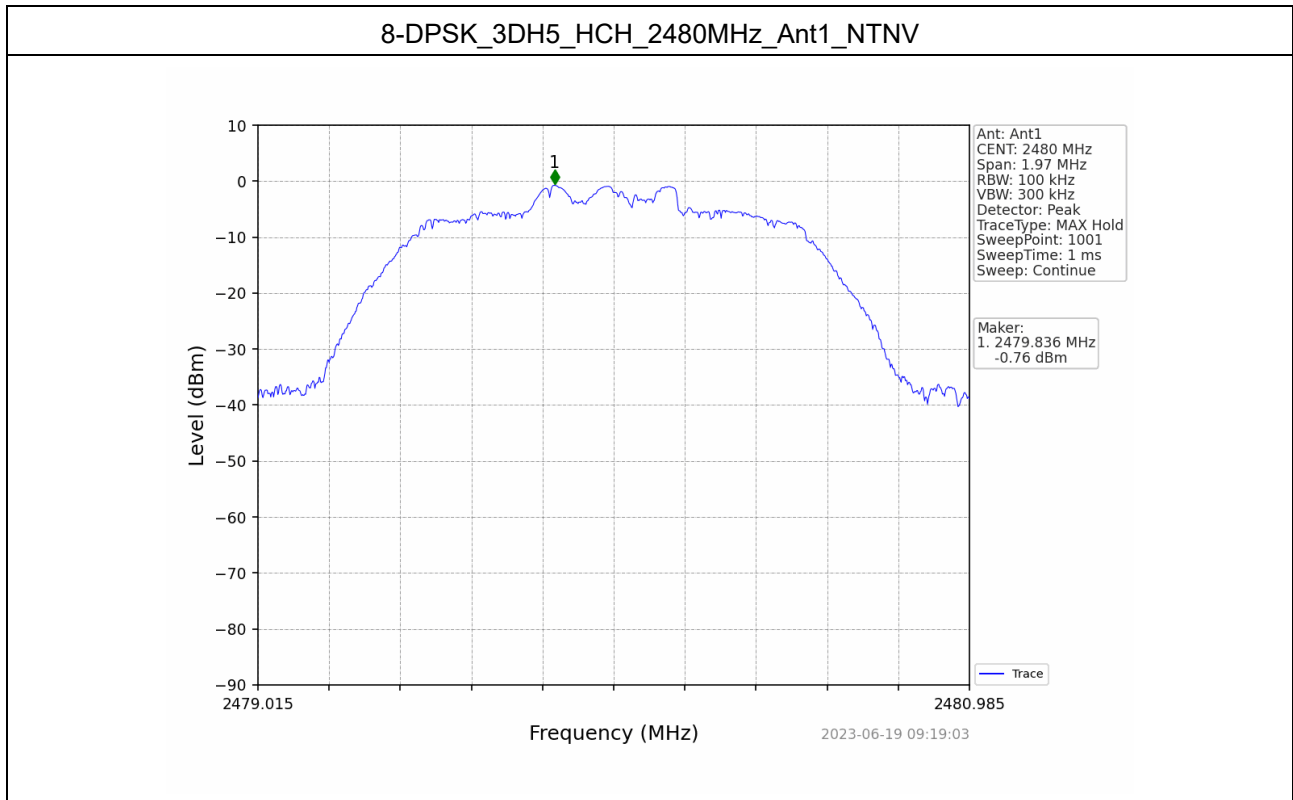


8-DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8-DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





CSE

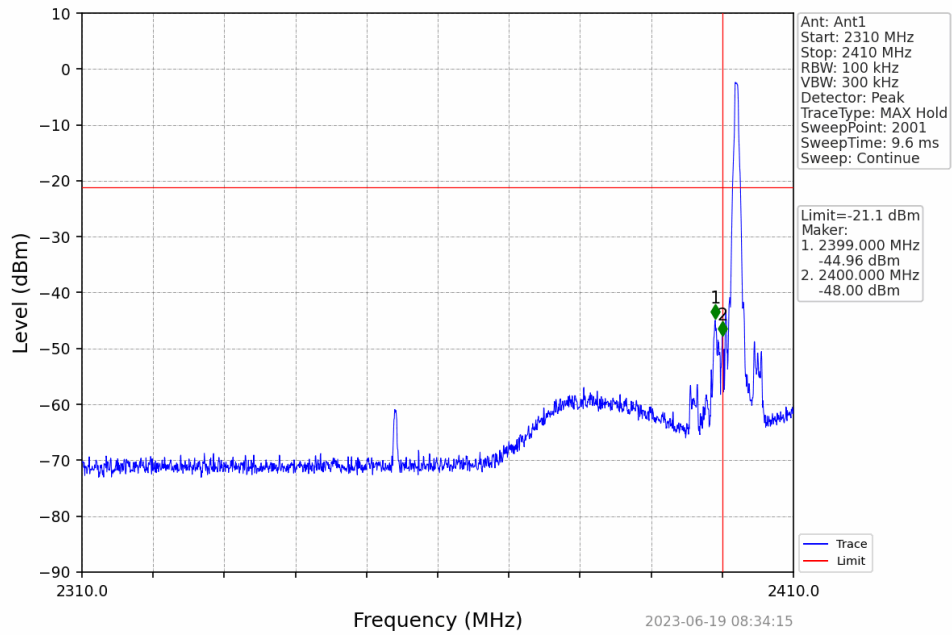
6.2 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	-1.10	-21.10	Pass
		2441	DH5	1	-1.10	-21.10	Pass
		2480	DH5	1	-1.10	-21.10	Pass
		HOPP	DH5	1	-1.10	-21.10	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	-0.97	-20.97	Pass
		2441	2DH5	1	-0.97	-20.97	Pass
		2480	2DH5	1	-0.97	-20.97	Pass
		HOPP	2DH5	1	-0.97	-20.97	Pass
8DPSK	SISO	2402	3DH5	1	-0.76	-20.76	Pass
		2441	3DH5	1	-0.76	-20.76	Pass
		2480	3DH5	1	-0.76	-20.76	Pass
		HOPP	3DH5	1	-0.76	-20.76	Pass

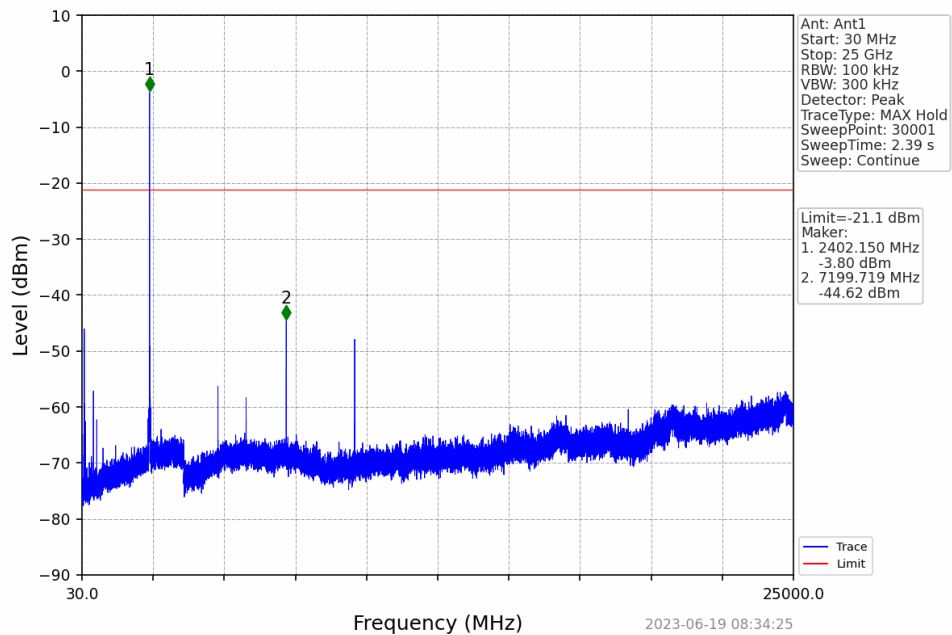
Note1: Refer to RSS-247 Issue 2 section 5.5 and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

6.2.1 Test Graphs

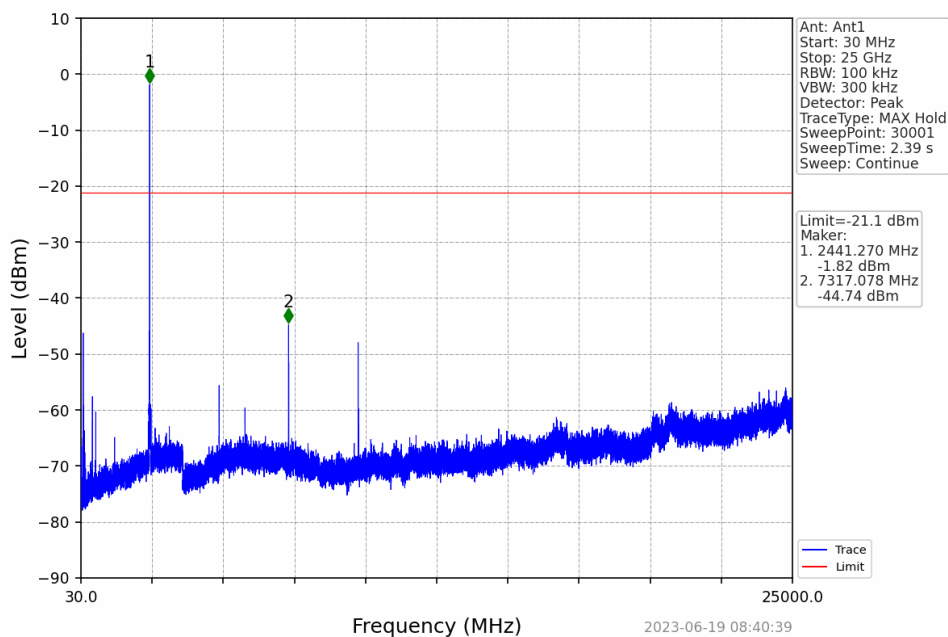
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



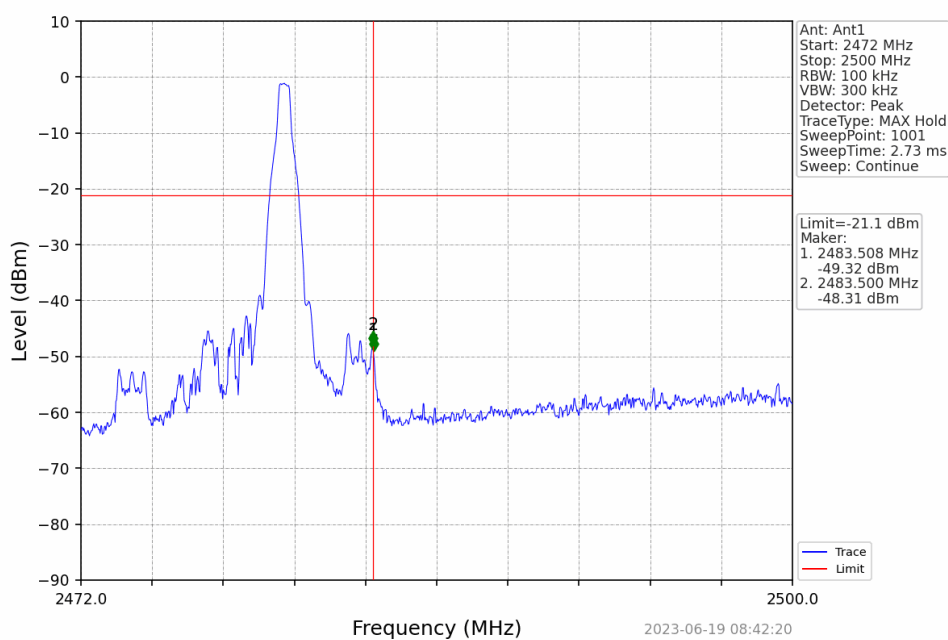
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



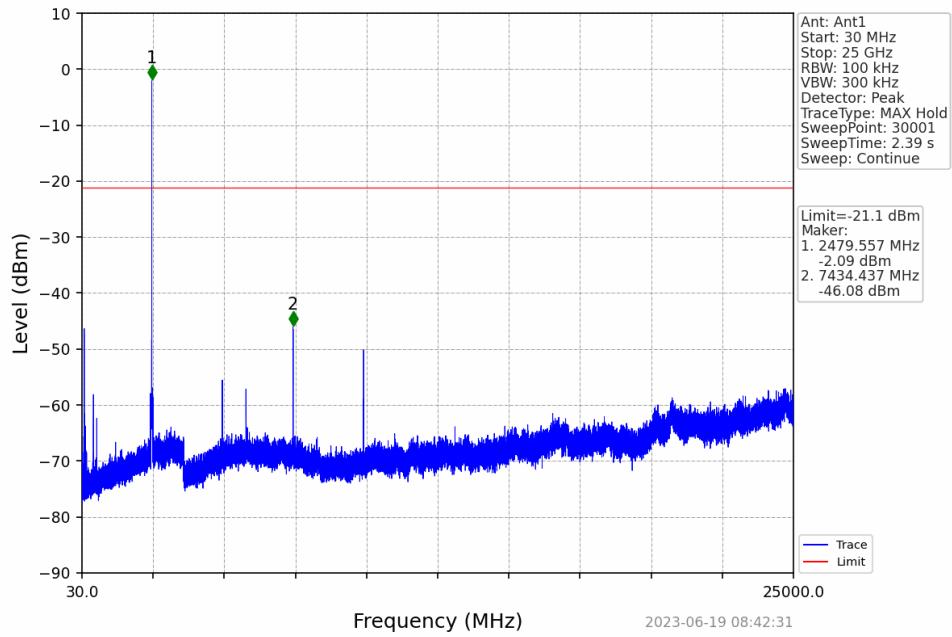
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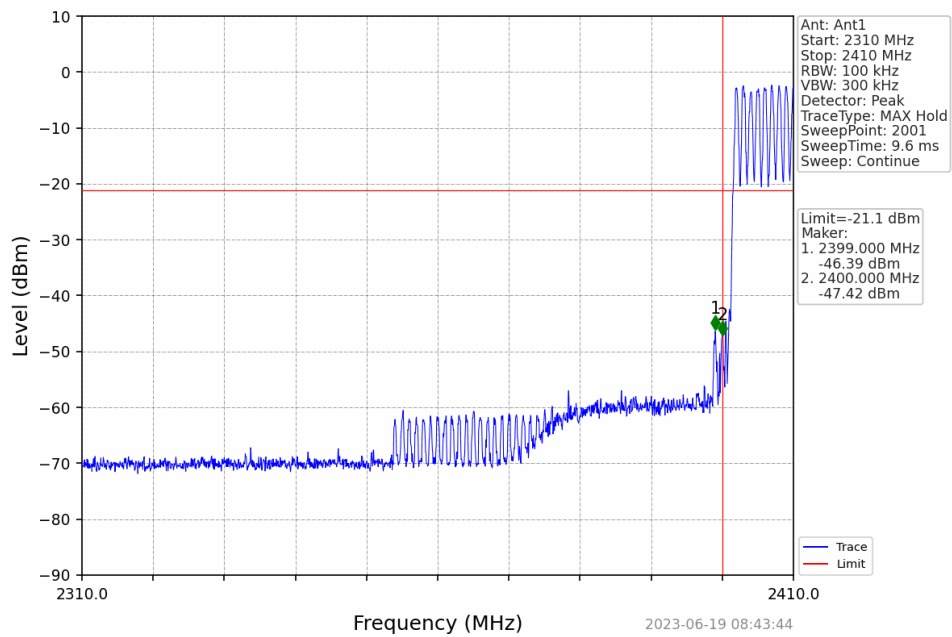
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



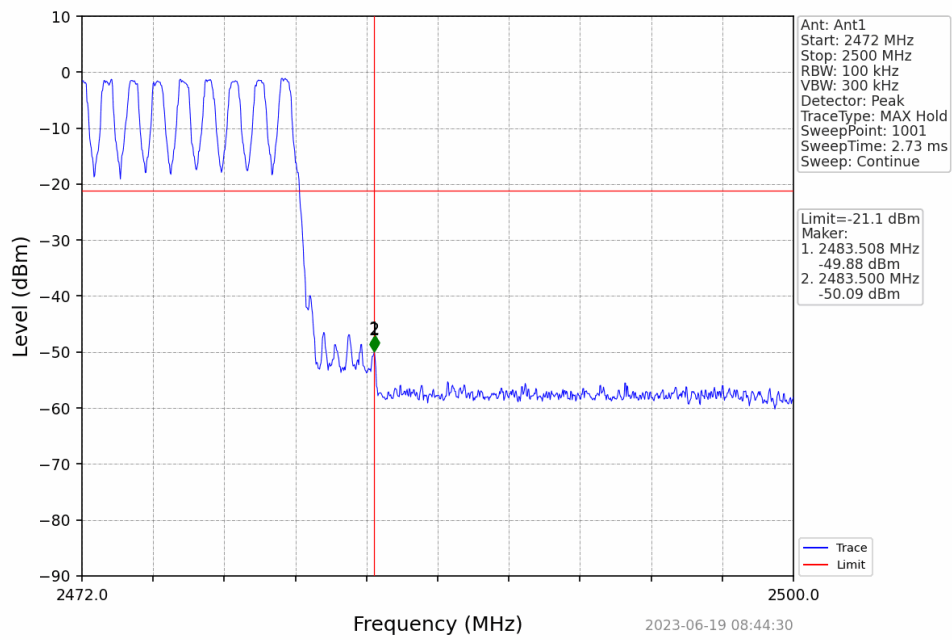
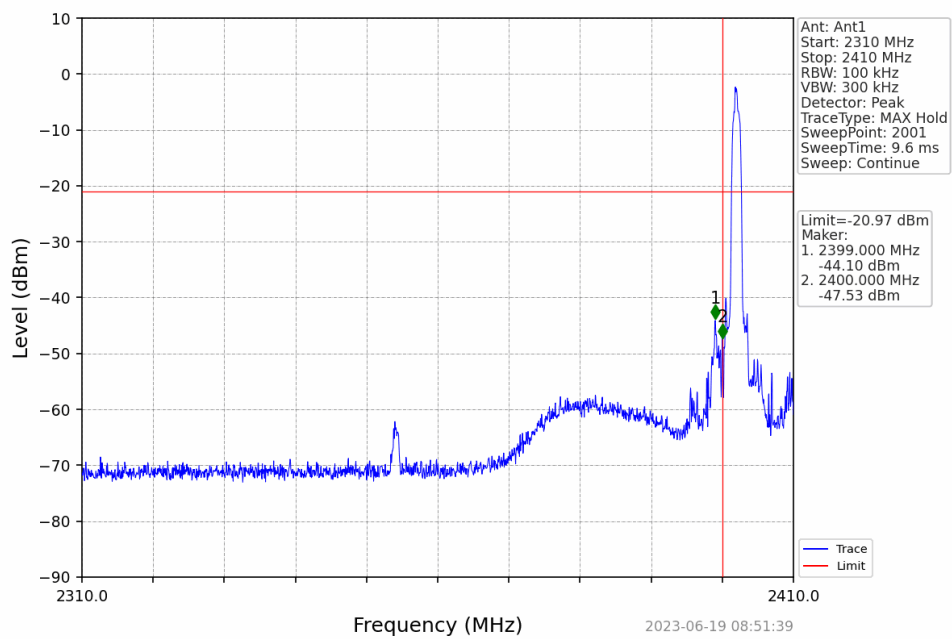
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



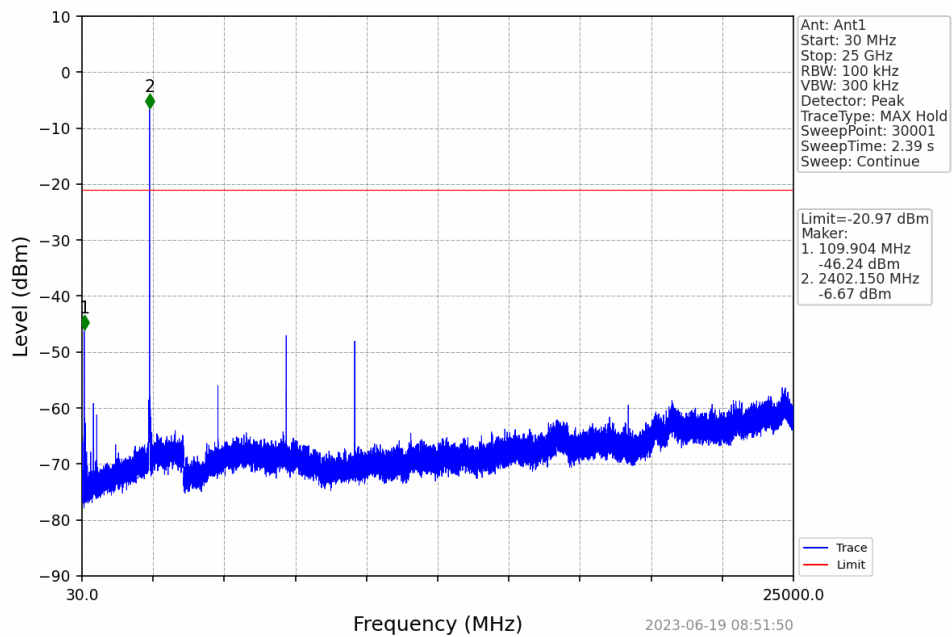
GFSK_DH5_HOPP_Ant1_NTNV



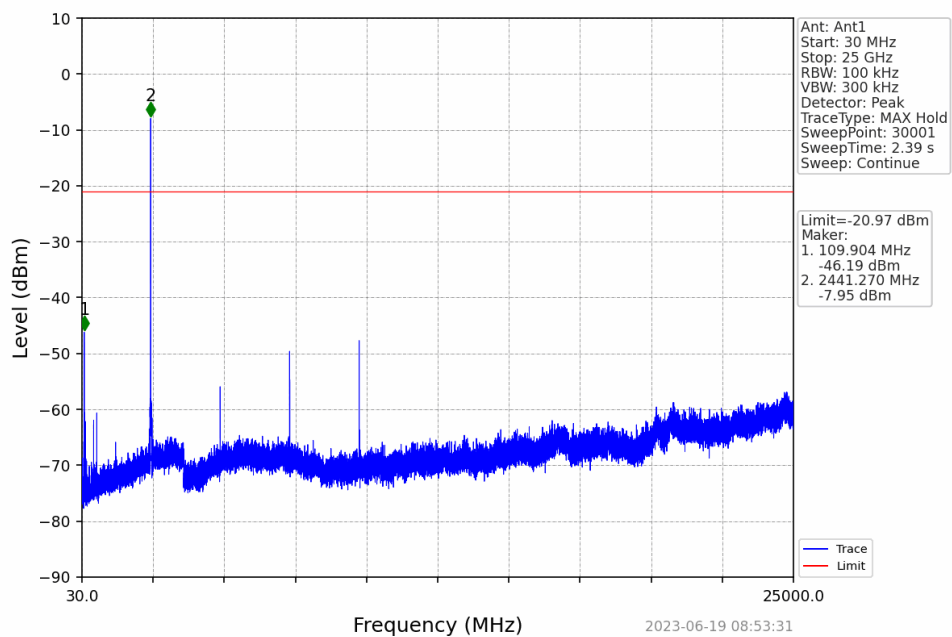
GFSK_DH5_HOPP_Ant1_NTNV


 $\pi/4$ -DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV


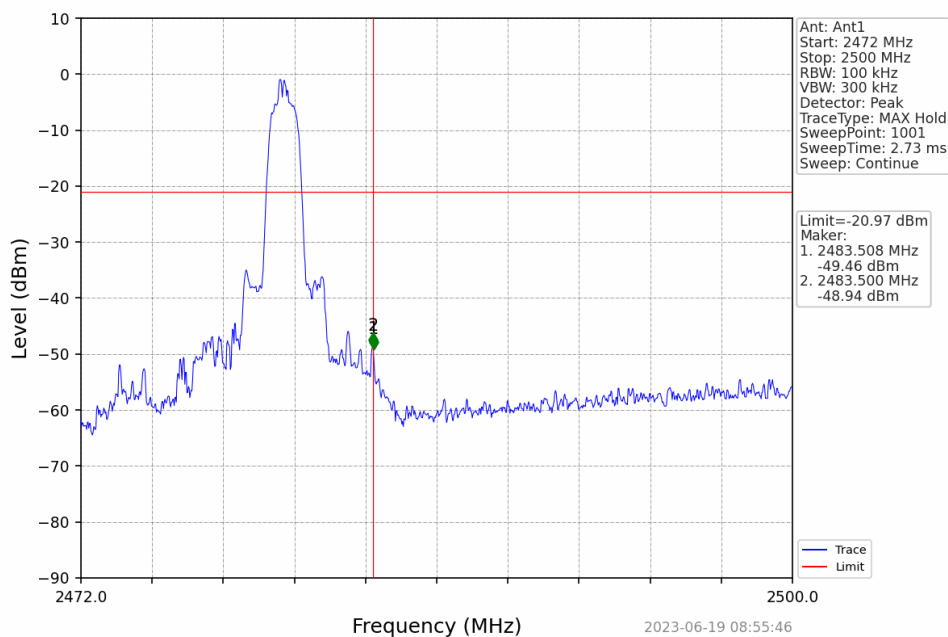
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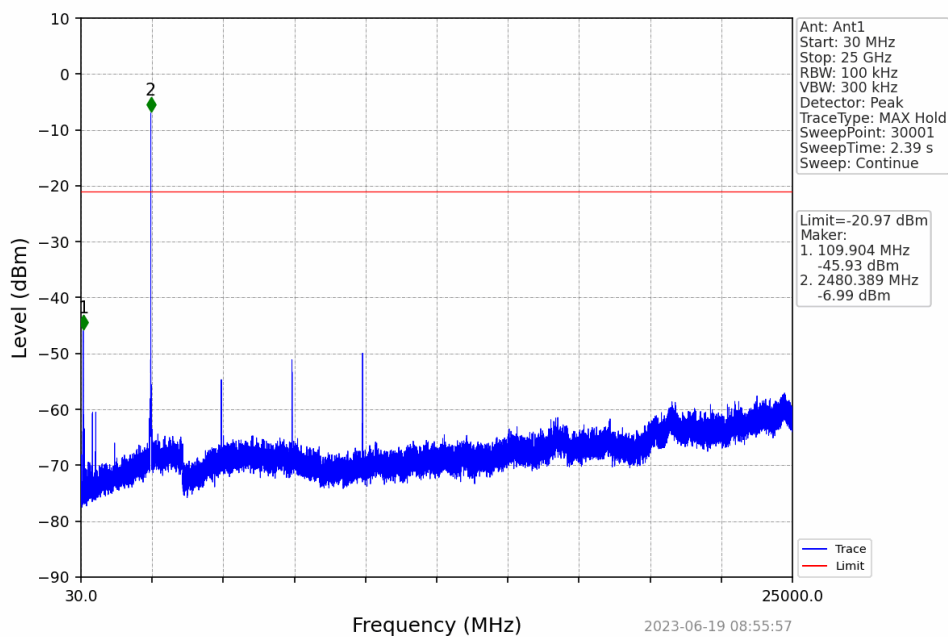
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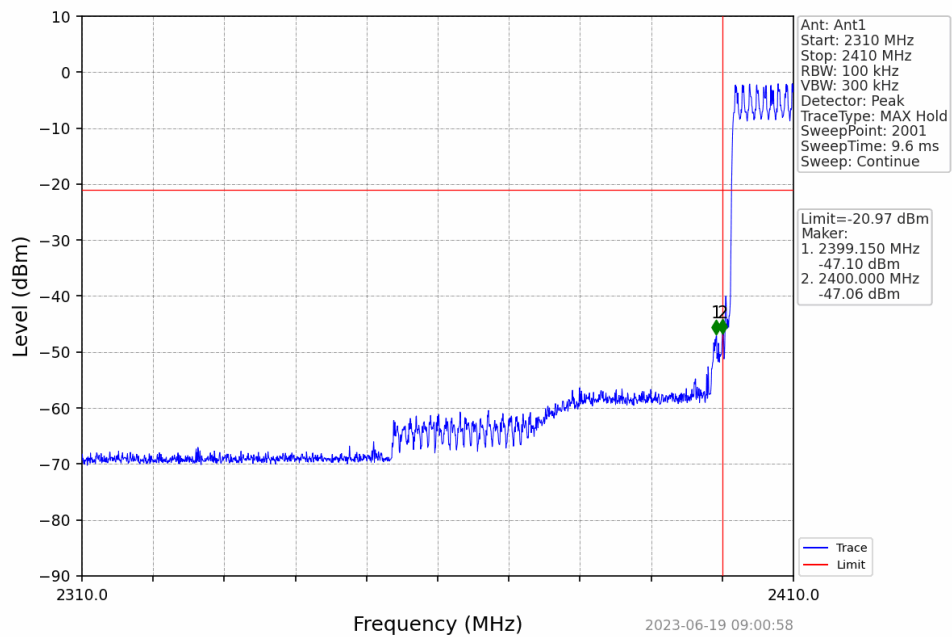
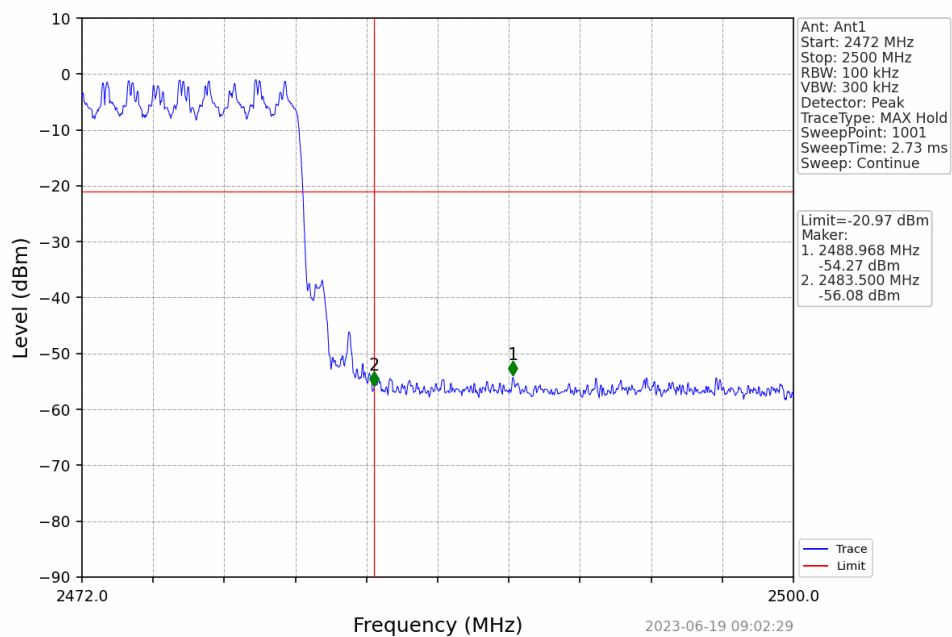


$\pi/4$ -DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

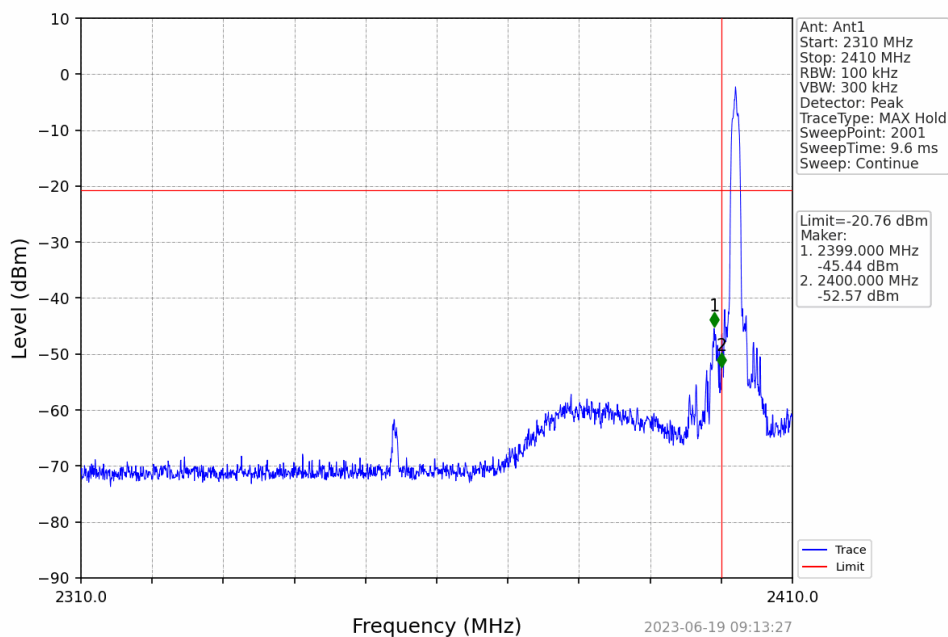


$\pi/4$ -DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

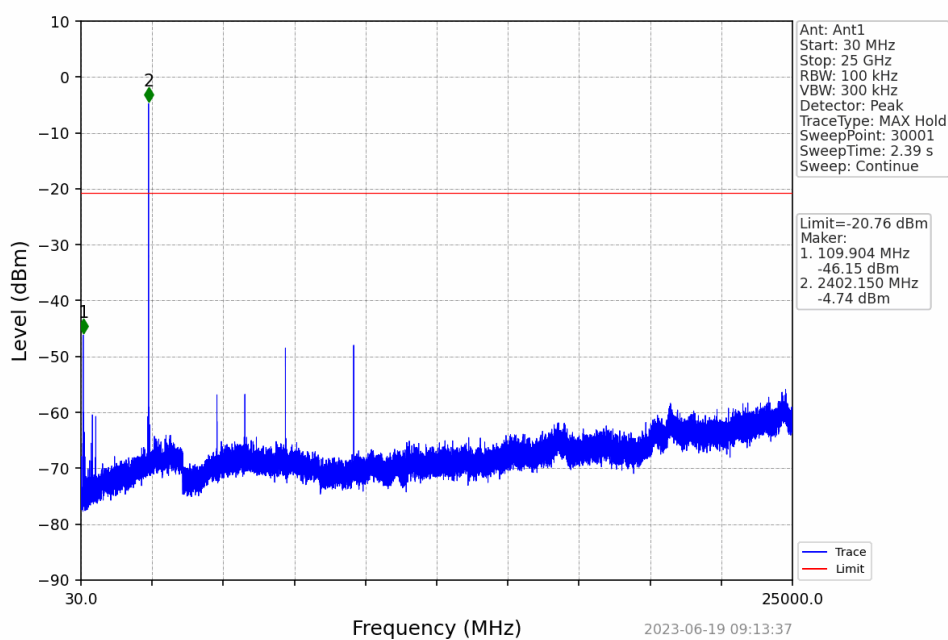


$\pi/4$ -DQPSK_2DH5_HOPP_Ant1_NTNV

 $\pi/4$ -DQPSK_2DH5_HOPP_Ant1_NTNV


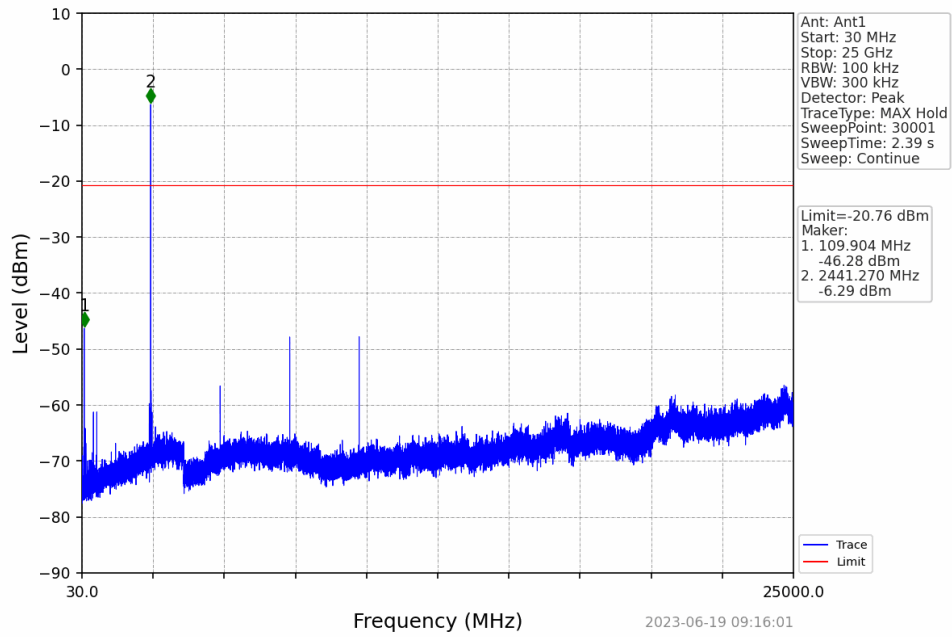
8-DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



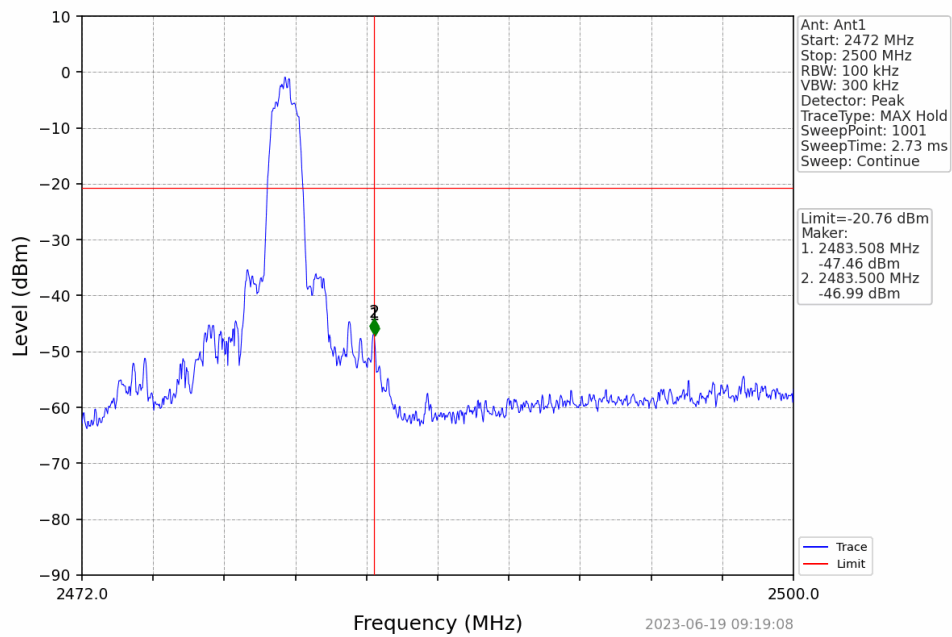
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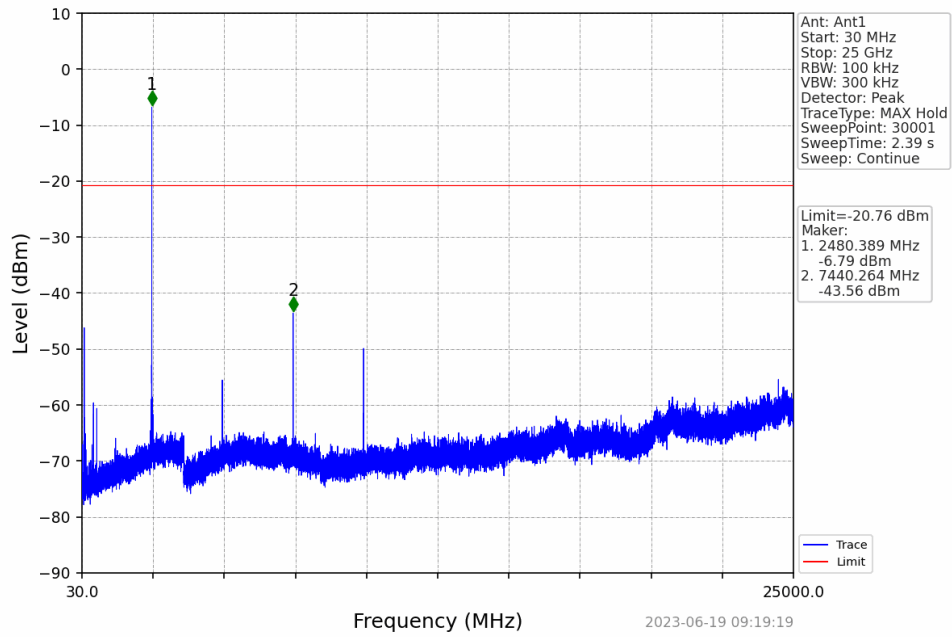
8-DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



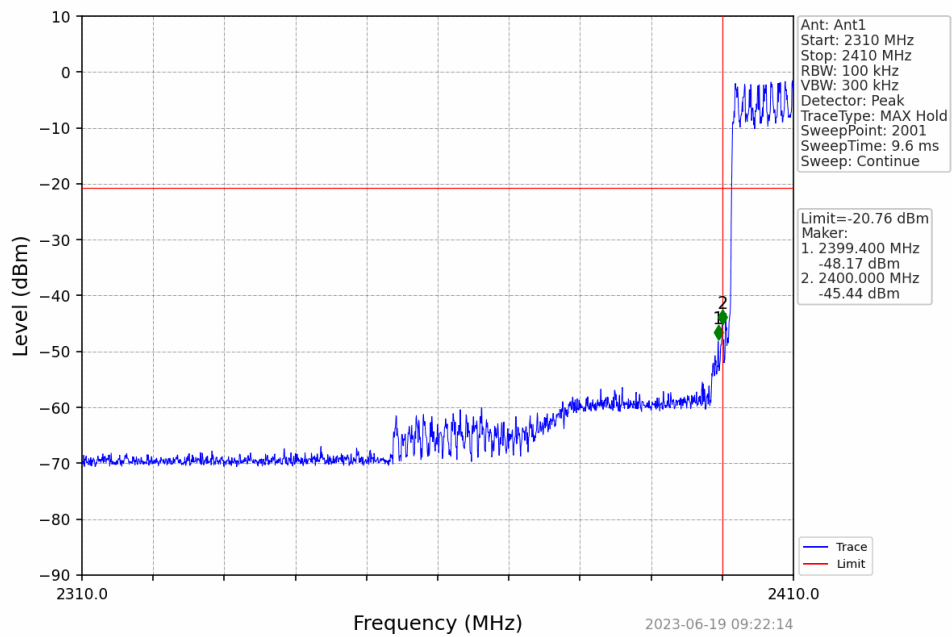
8-DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



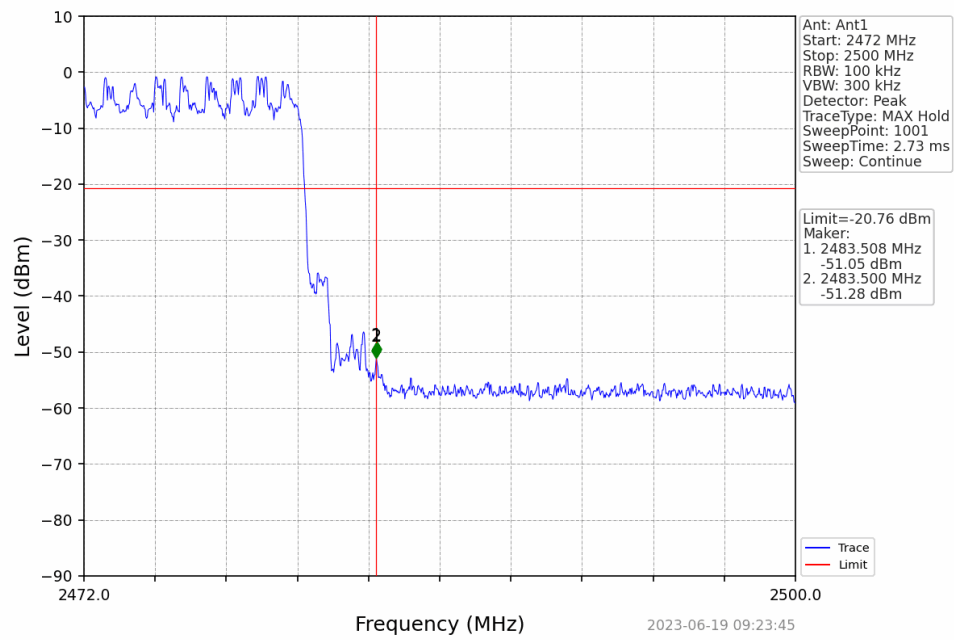
8-DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8-DPSK_3DH5_HOPP_Ant1_NTNV



8-DPSK_3DH5_HOPP_Ant1_NTNV



7 Band-edge for RF Conducted Emissions

7.1 Test Result

Test Mode: GFKS										
Pol.	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detect or Type	Result
Low Channel: 2402MHz										
H	2390.00	47.12	29.15	3.41	34.01	45.67	74.00	-28.33	PK	PASS
H	2400.00	64.51	29.16	3.43	34.01	63.09	74.00	-10.91	PK	PASS
V	2390.00	48.07	29.15	3.41	34.01	46.62	74.00	-27.38	PK	PASS
V	2400.00	67.00	29.16	3.43	34.01	65.58	74.00	-8.42	PK	PASS
H	2390.00	36.71	29.15	3.41	34.01	35.26	54.00	-18.74	AV	PASS
H	2400.00	48.20	29.16	3.43	34.01	46.78	54.00	-7.22	AV	PASS
V	2390.00	36.95	29.15	3.41	34.01	35.50	54.00	-18.50	AV	PASS
V	2400.00	50.25	29.16	3.43	34.01	48.83	54.00	-5.17	AV	PASS
High Channel: 2480MHz										
H	2483.50	49.72	29.28	3.53	34.03	48.50	74.00	-25.50	PK	PASS
H	2500.00	48.09	29.30	3.56	34.03	46.92	74.00	-27.08	PK	PASS
V	2483.50	51.27	29.28	3.53	34.03	50.05	74.00	-23.95	PK	PASS
V	2500.00	49.49	29.30	3.56	34.03	48.32	74.00	-25.68	PK	PASS
H	2483.50	39.58	29.28	3.53	34.03	38.36	54.00	-15.64	AV	PASS
H	2500.00	36.98	29.30	3.56	34.03	35.81	54.00	-18.19	AV	PASS
V	2483.50	41.15	29.28	3.53	34.03	39.93	54.00	-14.07	AV	PASS
V	2500.00	37.26	29.30	3.56	34.03	36.09	54.00	-17.91	AV	PASS



Test Mode: $\pi/4$ -DQPSK										
Pol.	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detect or Type	Result
Low Channel: 2402MHz										
H	2390.00	47.40	29.15	3.41	34.01	45.95	74.00	-28.05	PK	PASS
H	2400.00	64.84	29.16	3.43	34.01	63.42	74.00	-10.58	PK	PASS
V	2390.00	48.38	29.15	3.41	34.01	46.93	74.00	-27.07	PK	PASS
V	2400.00	67.36	29.16	3.43	34.01	65.94	74.00	-8.06	PK	PASS
H	2390.00	36.93	29.15	3.41	34.01	35.48	54.00	-18.52	AV	PASS
H	2400.00	48.43	29.16	3.43	34.01	47.01	54.00	-6.99	AV	PASS
V	2390.00	37.20	29.15	3.41	34.01	35.75	54.00	-18.25	AV	PASS
V	2400.00	50.51	29.16	3.43	34.01	49.09	54.00	-4.91	AV	PASS
High Channel: 2480MHz										
H	2483.50	50.04	29.28	3.53	34.03	48.82	74.00	-25.18	PK	PASS
H	2500.00	48.35	29.30	3.56	34.03	47.18	74.00	-26.82	PK	PASS
V	2483.50	51.64	29.28	3.53	34.03	50.42	74.00	-23.58	PK	PASS
V	2500.00	49.78	29.30	3.56	34.03	48.61	74.00	-25.39	PK	PASS
H	2483.50	39.81	29.28	3.53	34.03	38.59	54.00	-15.41	AV	PASS
H	2500.00	37.16	29.30	3.56	34.03	35.99	54.00	-18.01	AV	PASS
V	2483.50	41.40	29.28	3.53	34.03	40.18	54.00	-13.82	AV	PASS
V	2500.00	37.46	29.30	3.56	34.03	36.29	54.00	-17.71	AV	PASS



Test Mode: 8-DPSK										
Pol.	Frequen cy (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/ m)	Margin (dB)	Detect or Type	Result
Low Channel: 2402MHz										
H	2390.00	47.48	29.15	3.41	34.01	46.03	74.00	-27.97	PK	PASS
H	2400.00	64.92	29.16	3.43	34.01	63.50	74.00	-10.50	PK	PASS
V	2390.00	48.46	29.15	3.41	34.01	47.01	74.00	-26.99	PK	PASS
V	2400.00	67.45	29.16	3.43	34.01	66.03	74.00	-7.97	PK	PASS
H	2390.00	36.99	29.15	3.41	34.01	35.54	54.00	-18.46	AV	PASS
H	2400.00	48.50	29.16	3.43	34.01	47.08	54.00	-6.92	AV	PASS
V	2390.00	37.26	29.15	3.41	34.01	35.81	54.00	-18.19	AV	PASS
V	2400.00	50.58	29.16	3.43	34.01	49.16	54.00	-4.84	AV	PASS
High Channel: 2480MHz										
H	2483.50	50.13	29.28	3.53	34.03	48.91	74.00	-25.09	PK	PASS
H	2500.00	48.42	29.30	3.56	34.03	47.25	74.00	-26.75	PK	PASS
V	2483.50	51.74	29.28	3.53	34.03	50.52	74.00	-23.48	PK	PASS
V	2500.00	49.86	29.30	3.56	34.03	48.69	74.00	-25.31	PK	PASS
H	2483.50	39.87	29.28	3.53	34.03	38.65	54.00	-15.35	AV	PASS
H	2500.00	37.21	29.30	3.56	34.03	36.04	54.00	-17.96	AV	PASS
V	2483.50	41.46	29.28	3.53	34.03	40.24	54.00	-13.76	AV	PASS
V	2500.00	37.52	29.30	3.56	34.03	36.35	54.00	-17.65	AV	PASS

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

-----End-----