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Annex for Bluetooth

Test Report No.: CTL2608172081-WF

TABLE OF CONTENTS

1. Bandwidth.....	2
2. Maximum Conducted Output Power.....	13
3. Carrier Frequency Separation.....	19
4. Number of Hopping Frequencies.....	22
5. Time of Occupancy (Dwell Time).....	25
6. Unwanted Emissions In Non-restricted Frequency Bands.....	35

FCC ID: 2BBNB-WS22

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	0.979	/	Pass
		2441	DH5	1	0.990	/	Pass
		2480	DH5	1	0.993	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.237	/	Pass
		2441	2DH5	1	1.250	/	Pass
		2480	2DH5	1	1.256	/	Pass
8DPSK	SISO	2402	3DH5	1	1.227	/	Pass
		2441	3DH5	1	1.235	/	Pass
		2480	3DH5	1	1.226	/	Pass

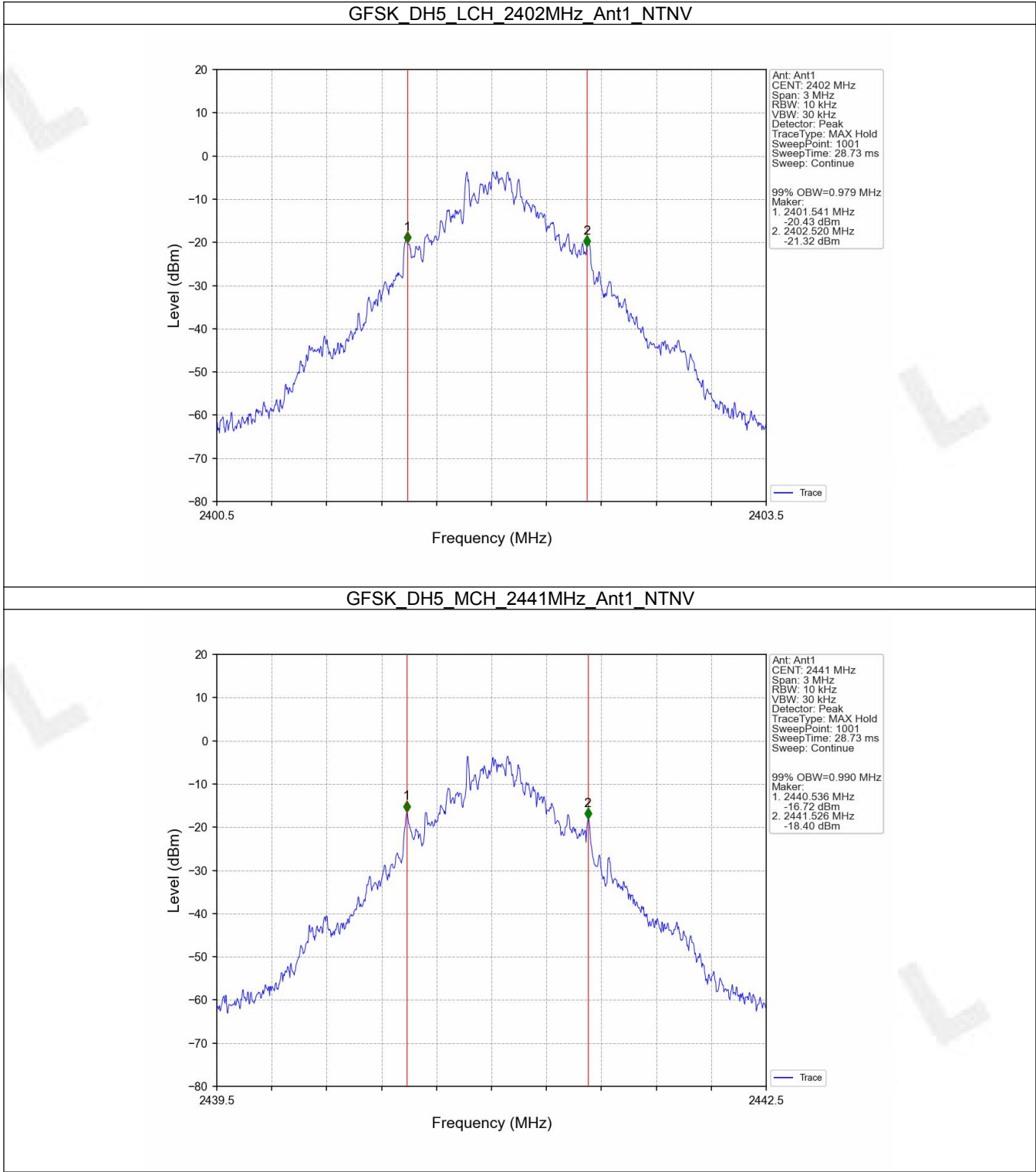
1.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	1.029	/	Pass
		2441	DH5	1	1.030	/	Pass
		2480	DH5	1	1.065	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.340	/	Pass
		2441	2DH5	1	1.345	/	Pass
		2480	2DH5	1	1.353	/	Pass
8DPSK	SISO	2402	3DH5	1	1.290	/	Pass
		2441	3DH5	1	1.266	/	Pass
		2480	3DH5	1	1.268	/	Pass

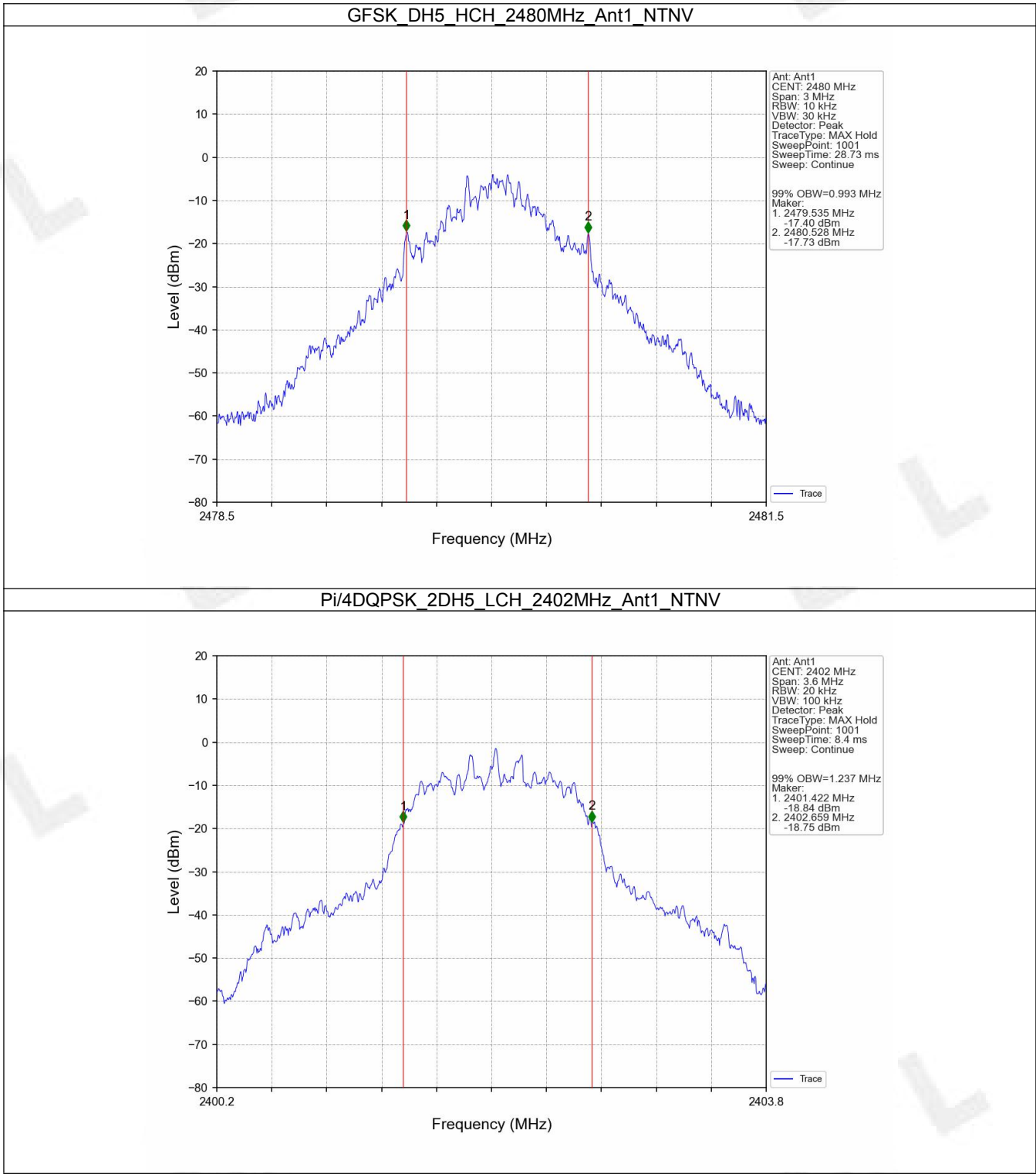
FCC ID: 2BBNB-WS22

1.2 Test Graph

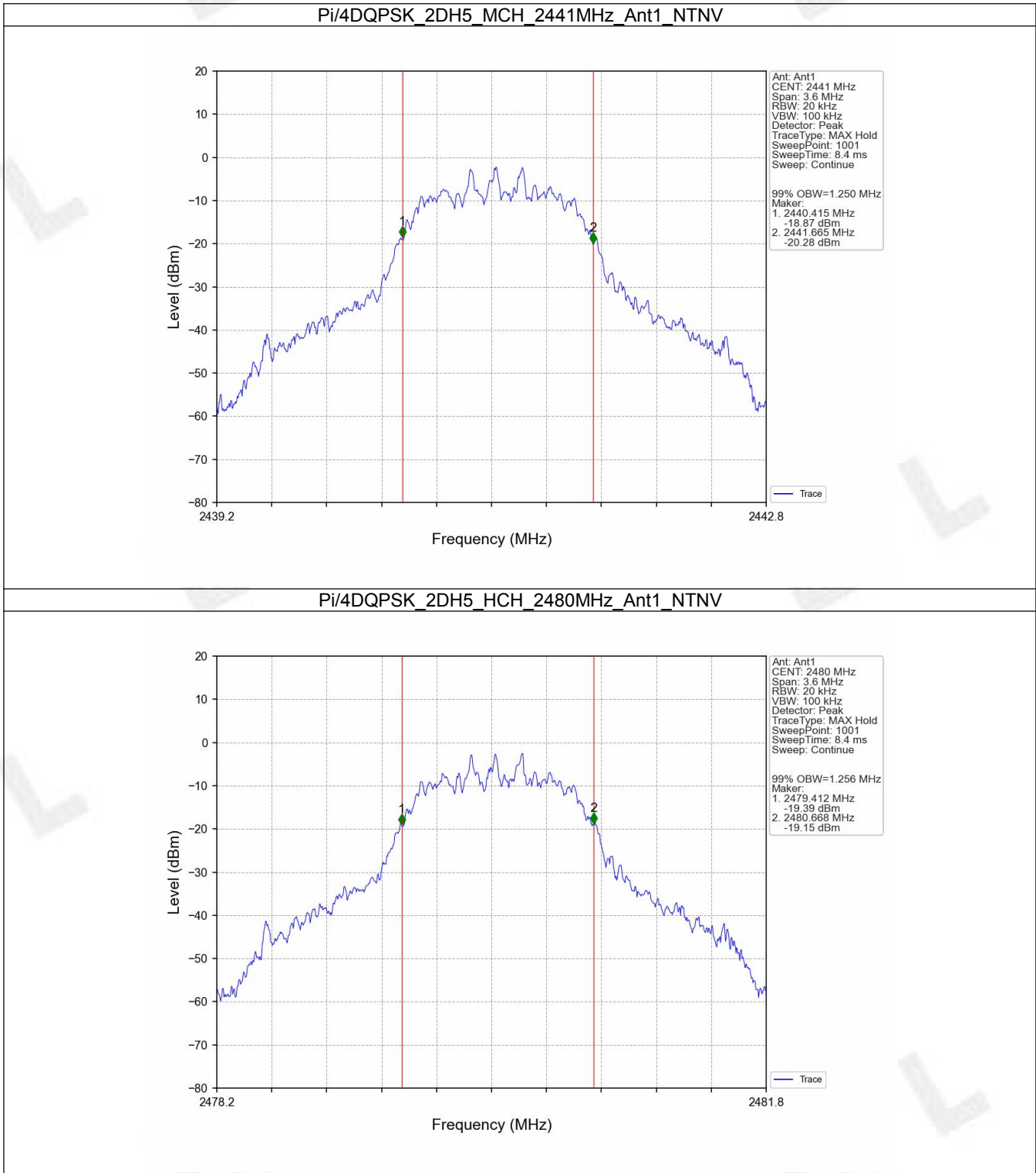
1.2.1 OBW



FCC ID: 2BBNB-WS22

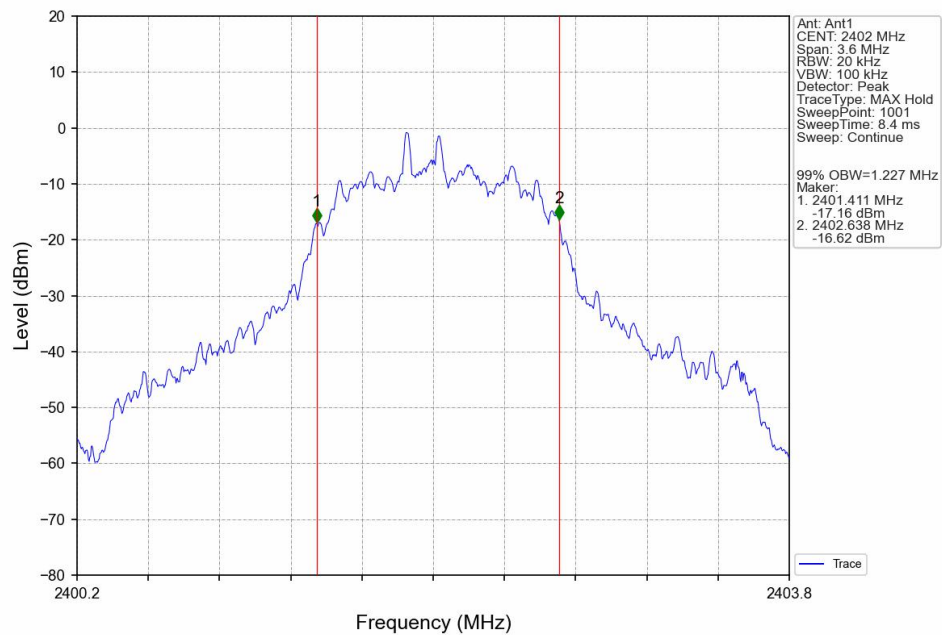


FCC ID: 2BBNB-WS22

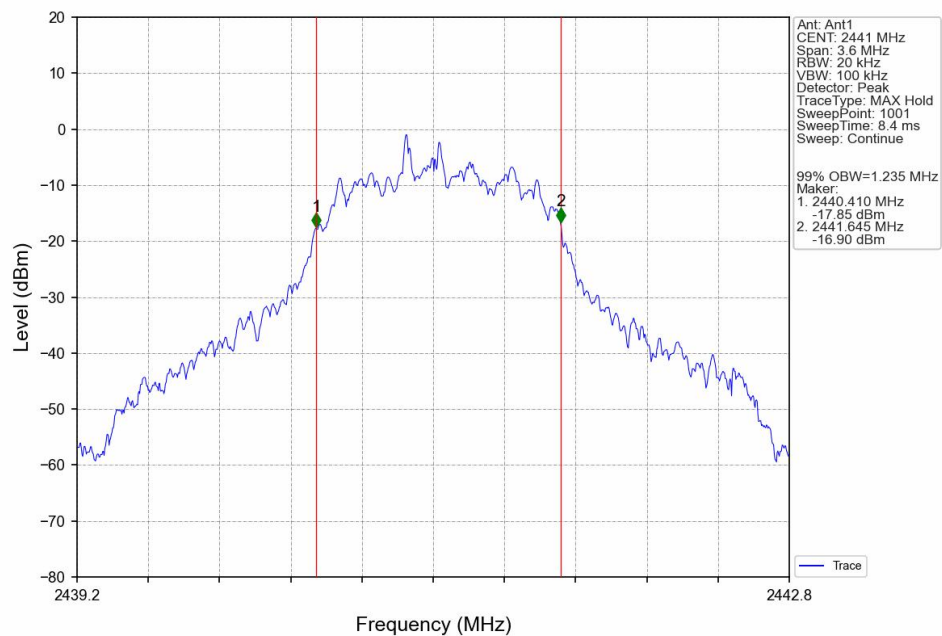


FCC ID: 2BBNB-WS22

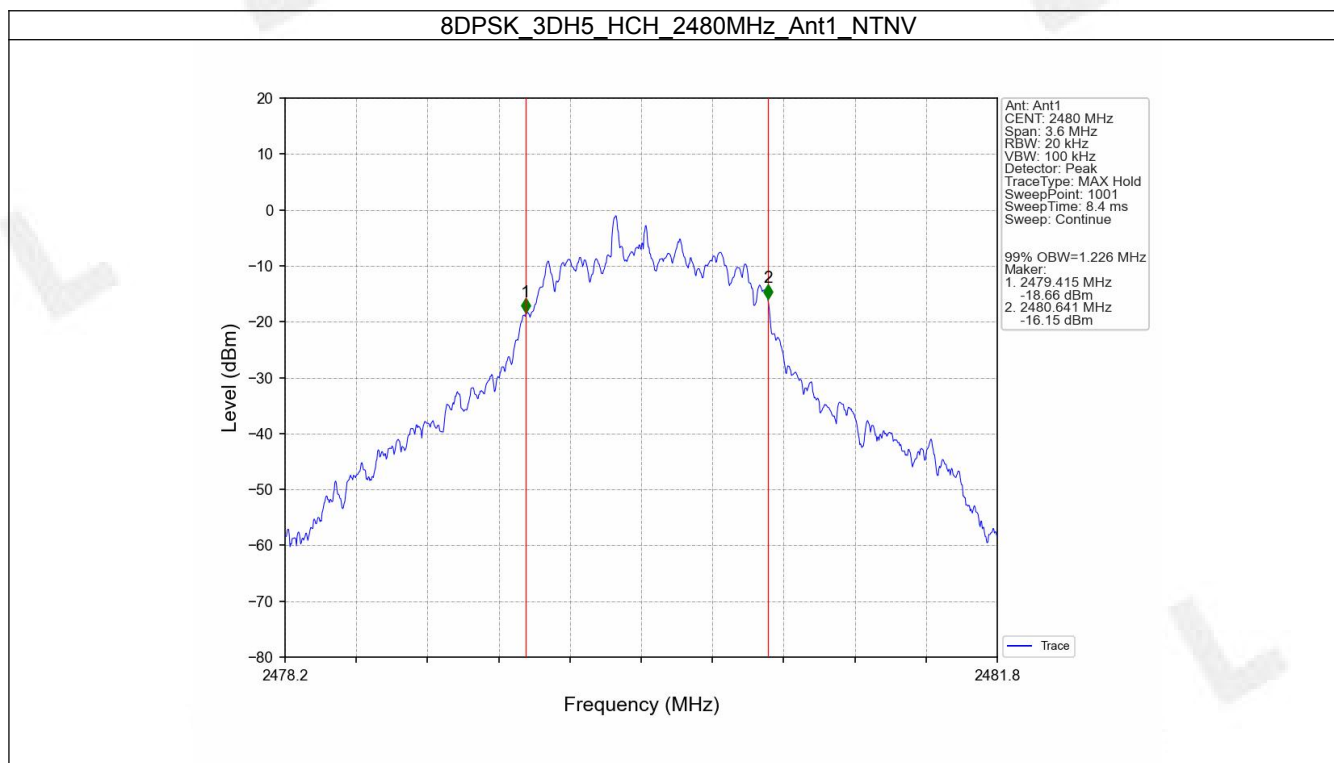
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

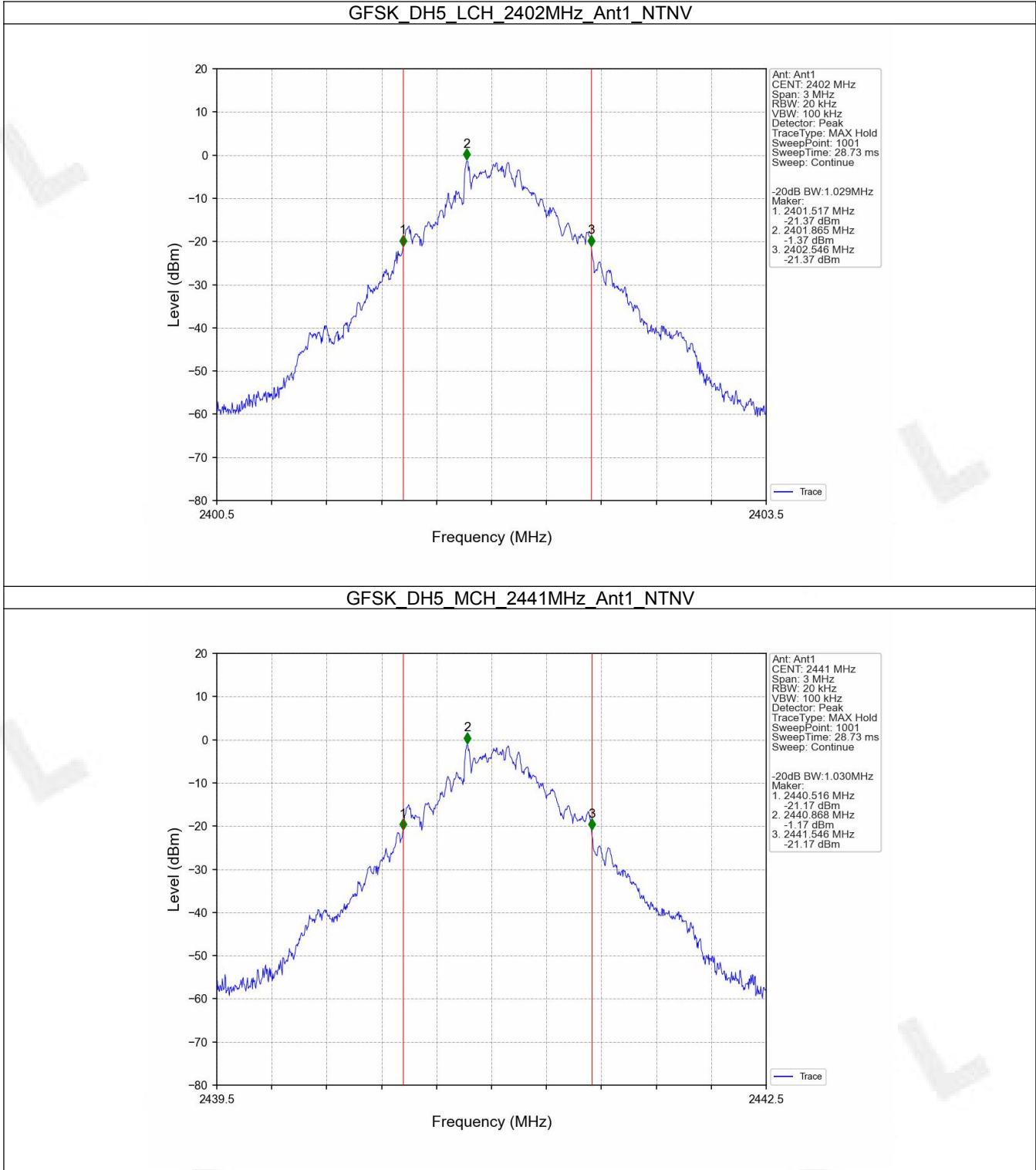


FCC ID: 2BBNB-WS22

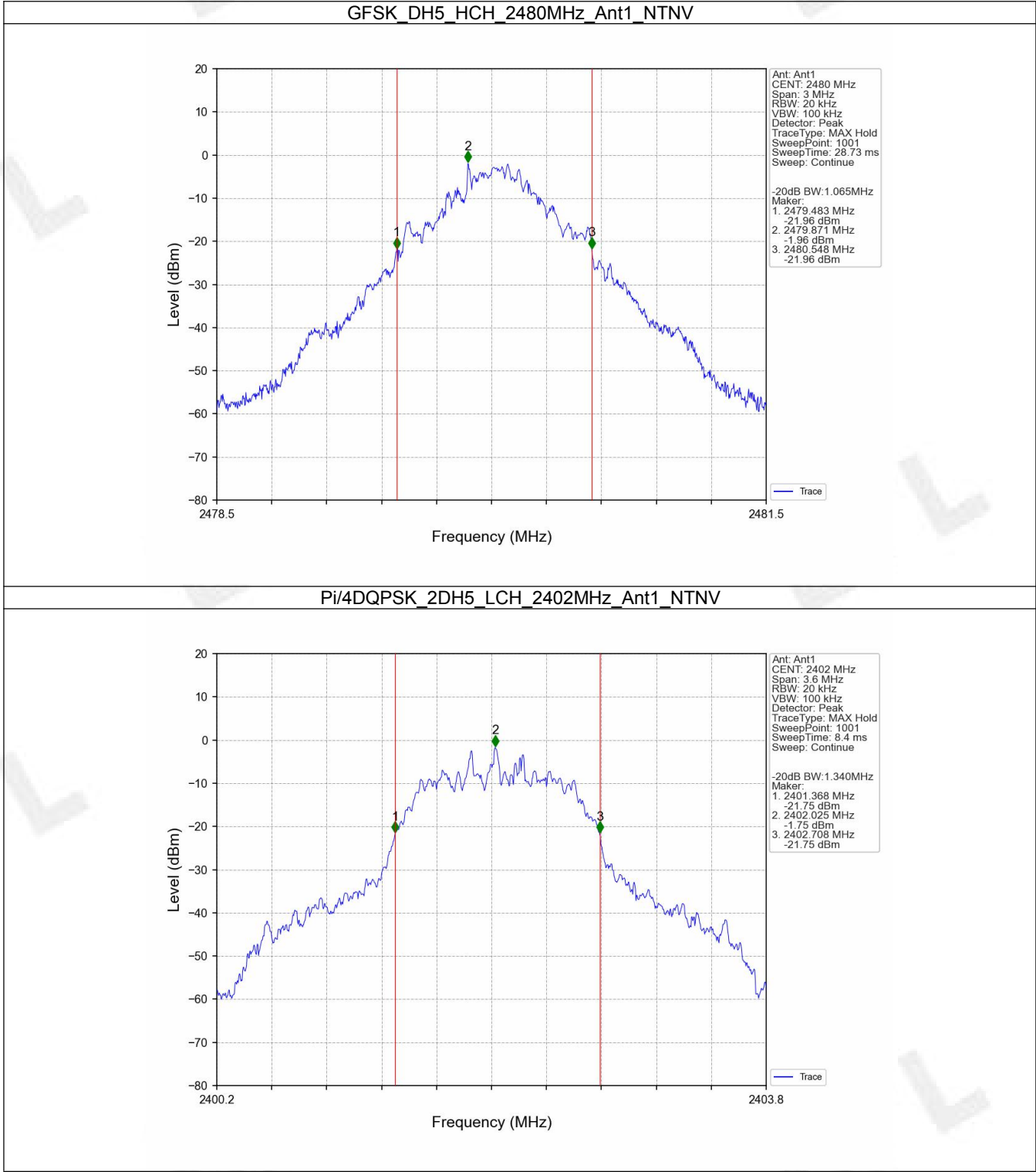


FCC ID: 2BBNB-WS22

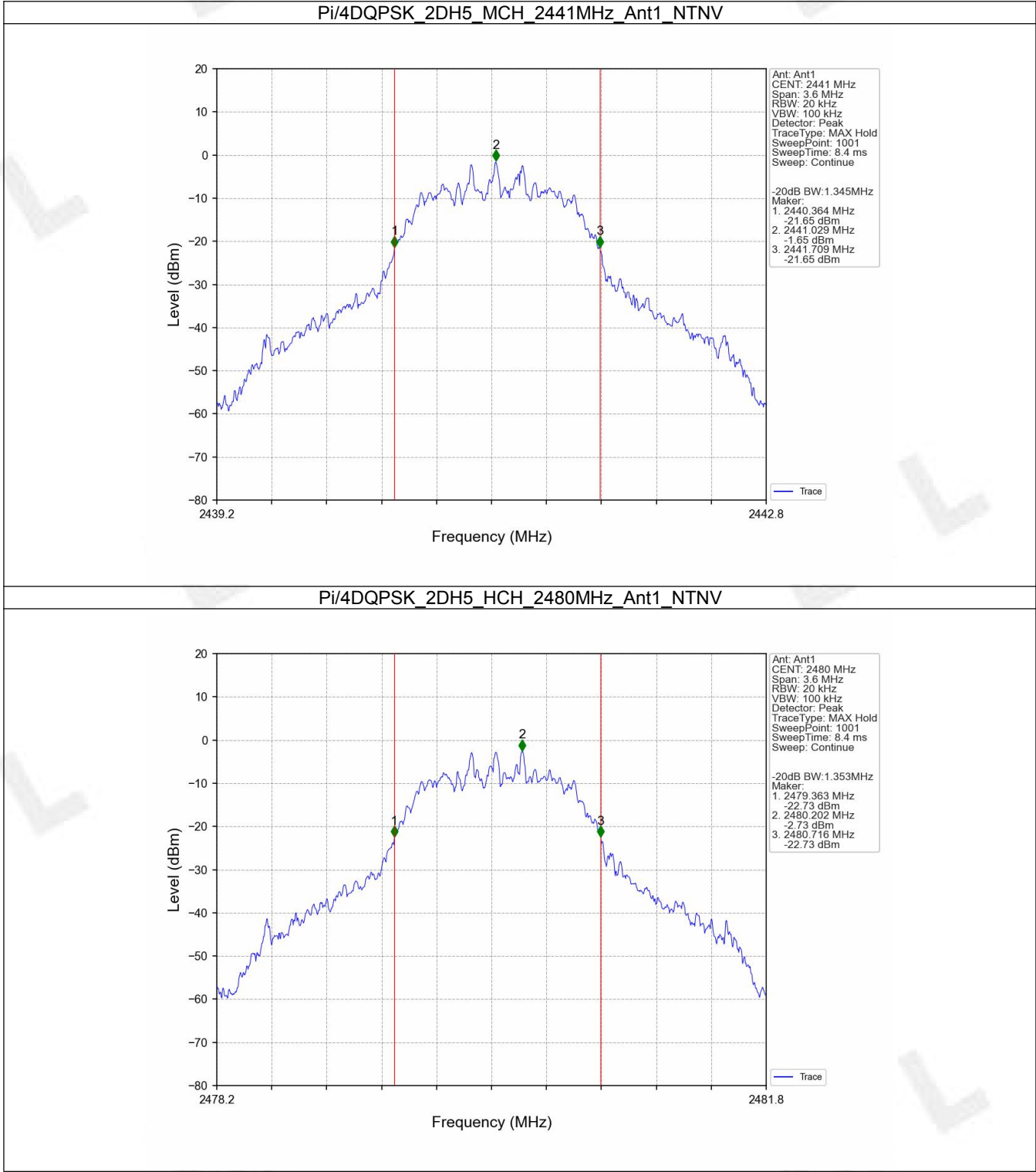
1.2.2 20dB BW



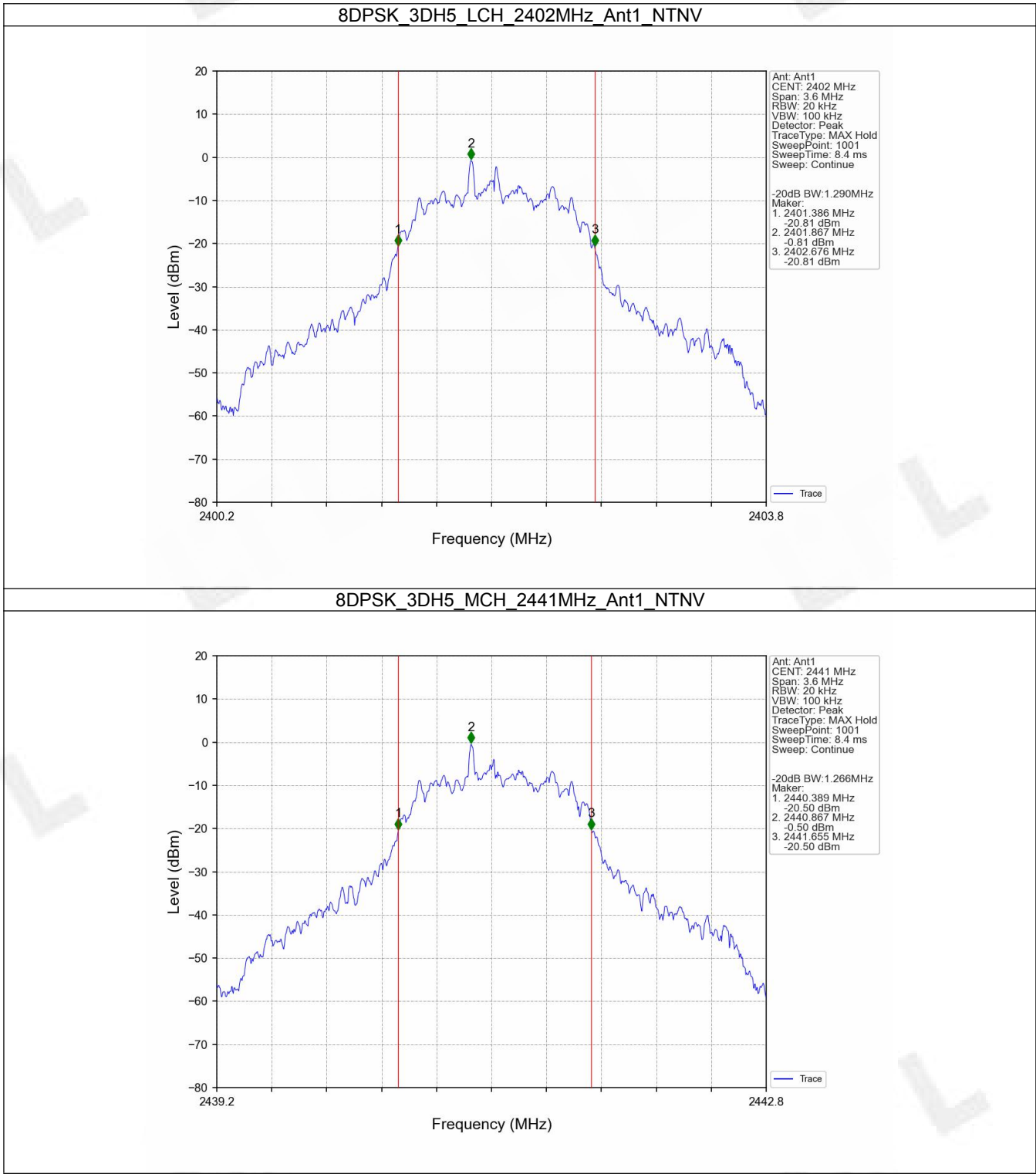
FCC ID: 2BBNB-WS22



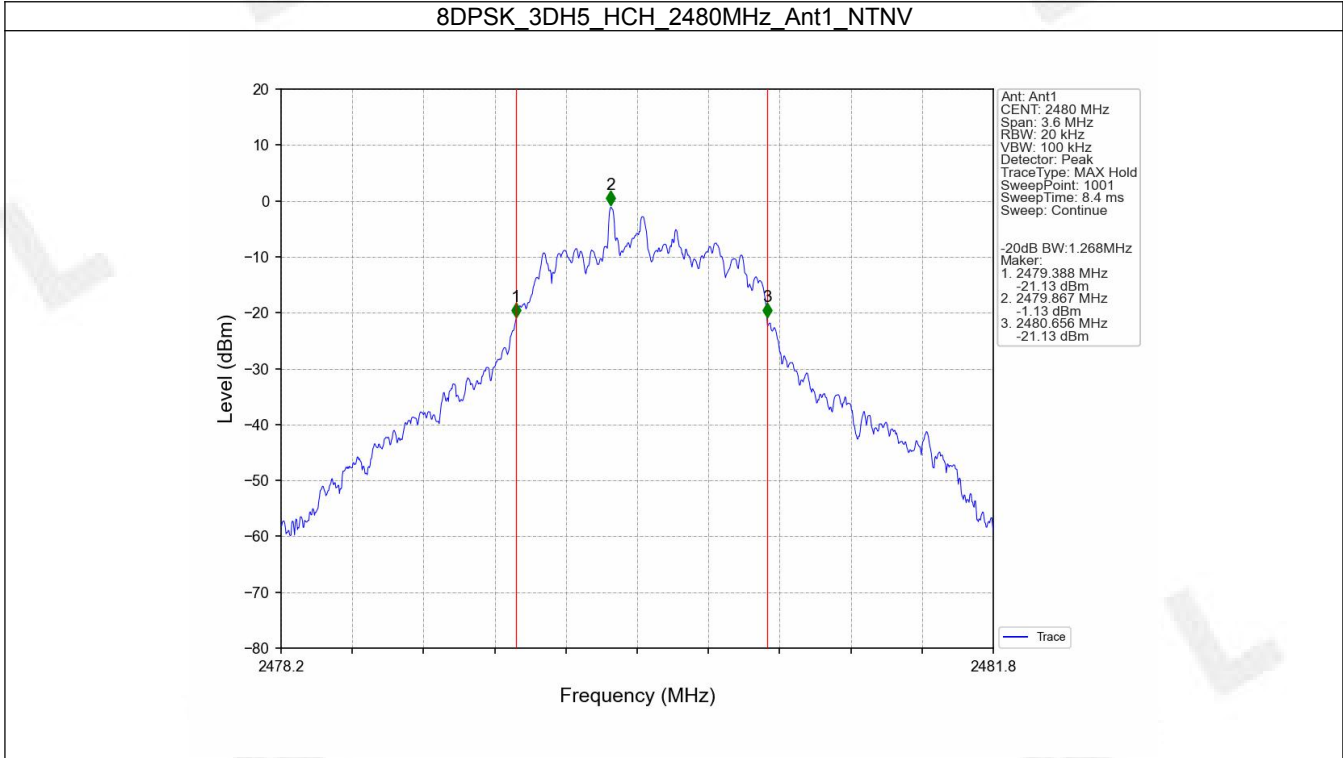
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2. Maximum Conducted Output Power

2.1 Test Result

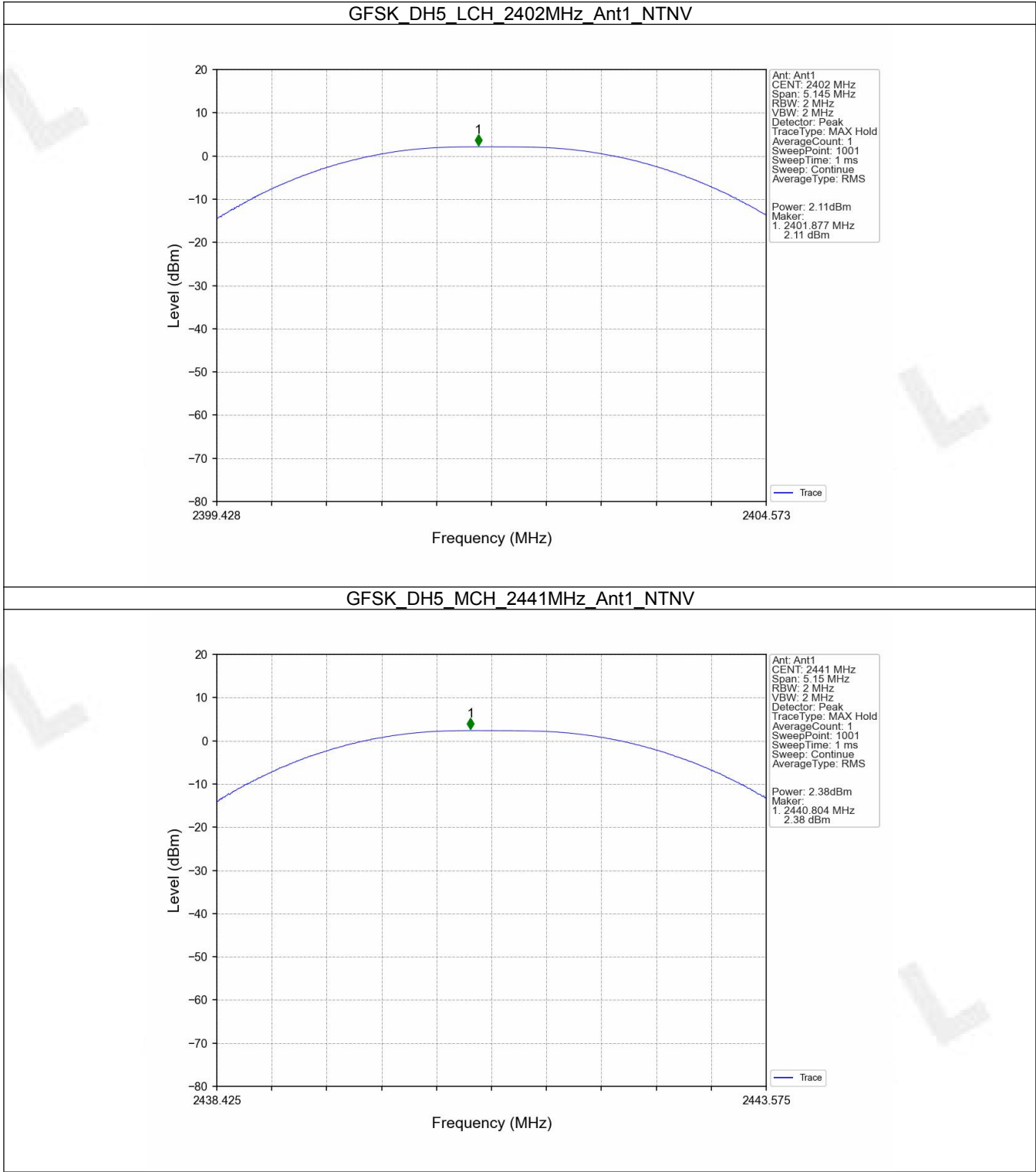
2.1.1 Power

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	2.11	<=20.97	Pass
		2441	DH5	2.38	<=20.97	Pass
		2480	DH5	1.95	<=20.97	Pass
Pi/4DQPSK	SISO	2402	2DH5	2.99	<=20.97	Pass
		2441	2DH5	3.31	<=20.97	Pass
		2480	2DH5	2.99	<=20.97	Pass
8DPSK	SISO	2402	3DH5	3.35	<=20.97	Pass
		2441	3DH5	3.68	<=20.97	Pass
		2480	3DH5	3.36	<=20.97	Pass
Note1: Antenna Gain: Ant1: -0.30dBi;						

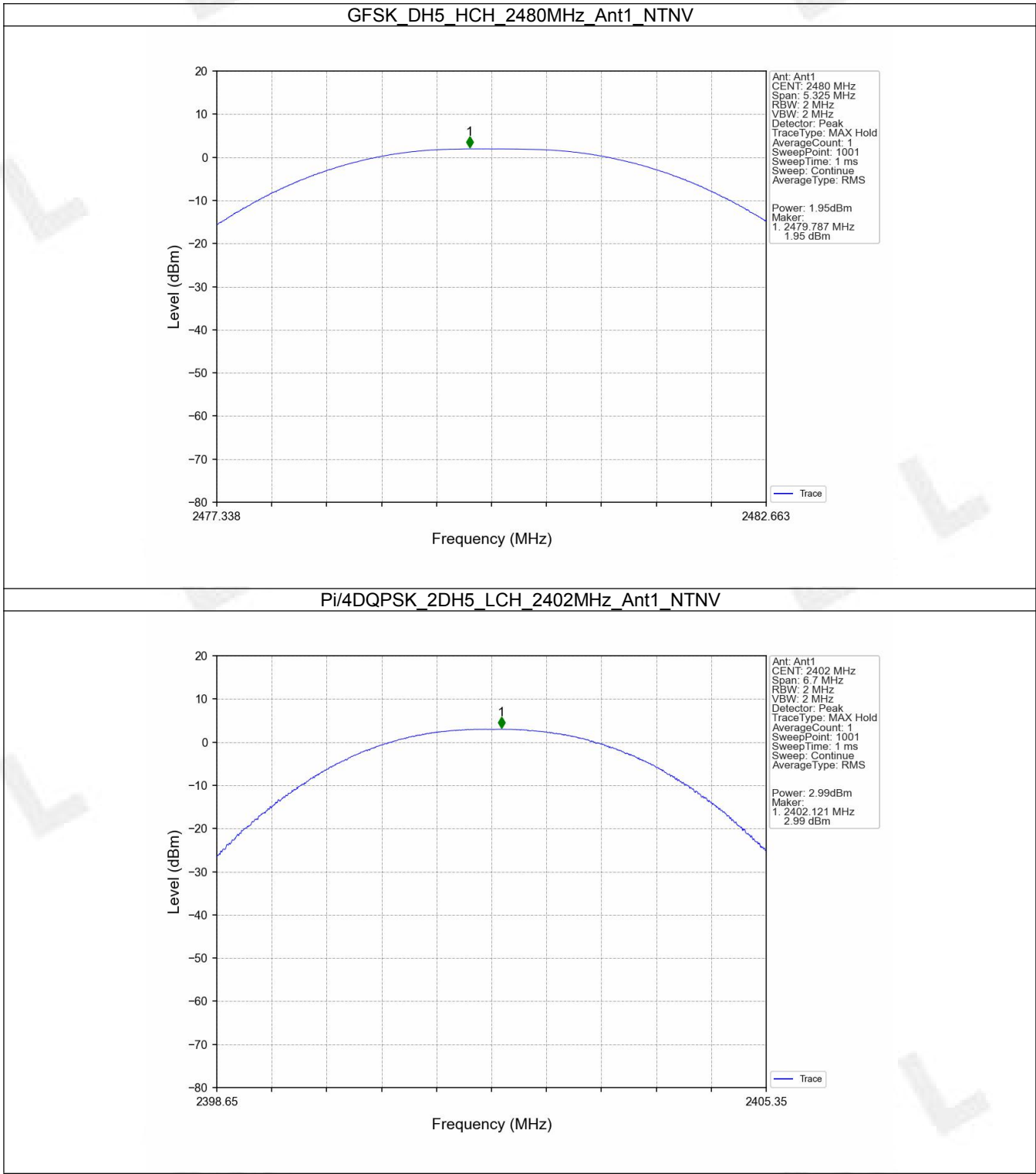
FCC ID: 2BBNB-WS22

2.2 Test Graph

2.2.1 Power

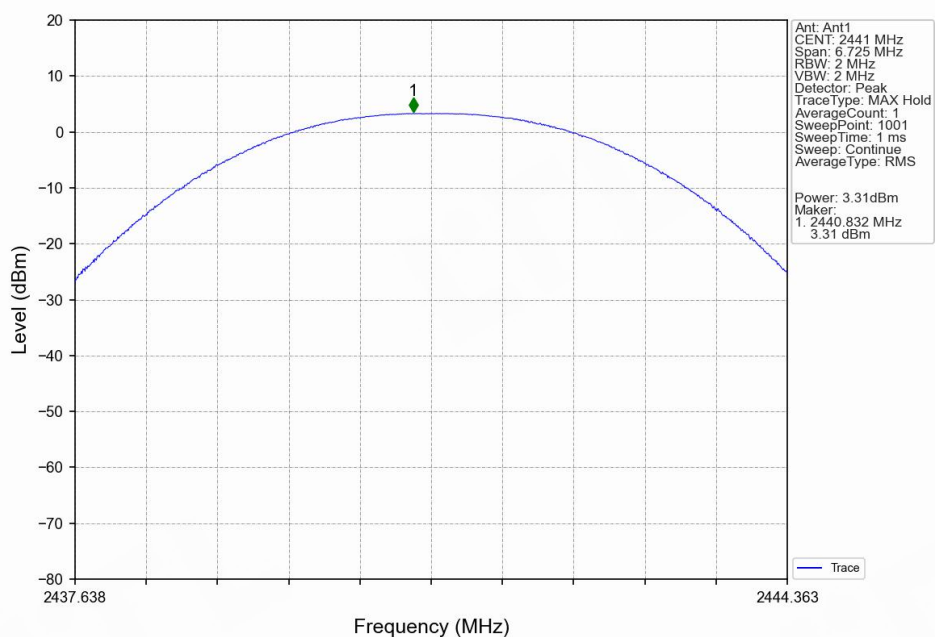


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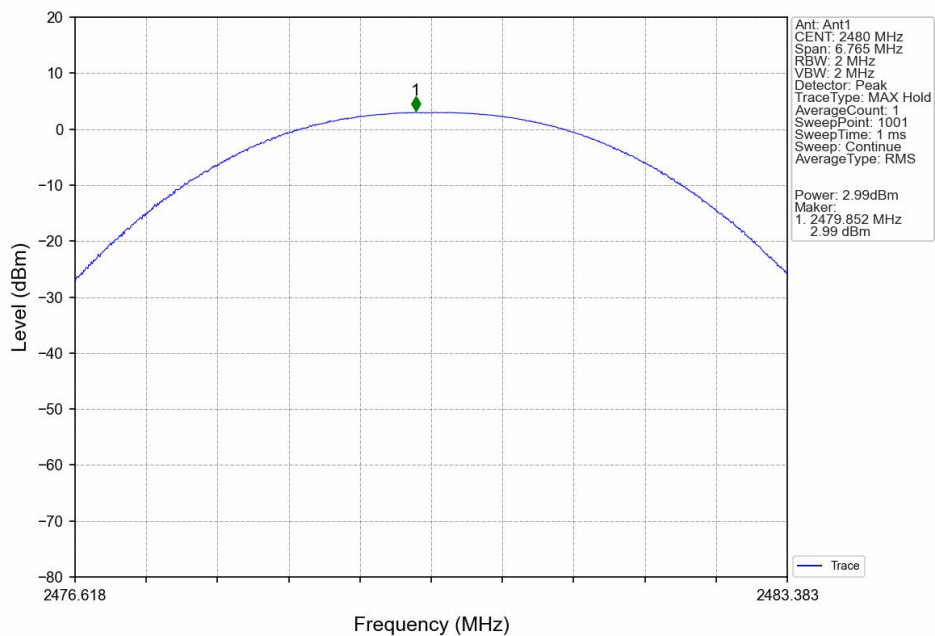


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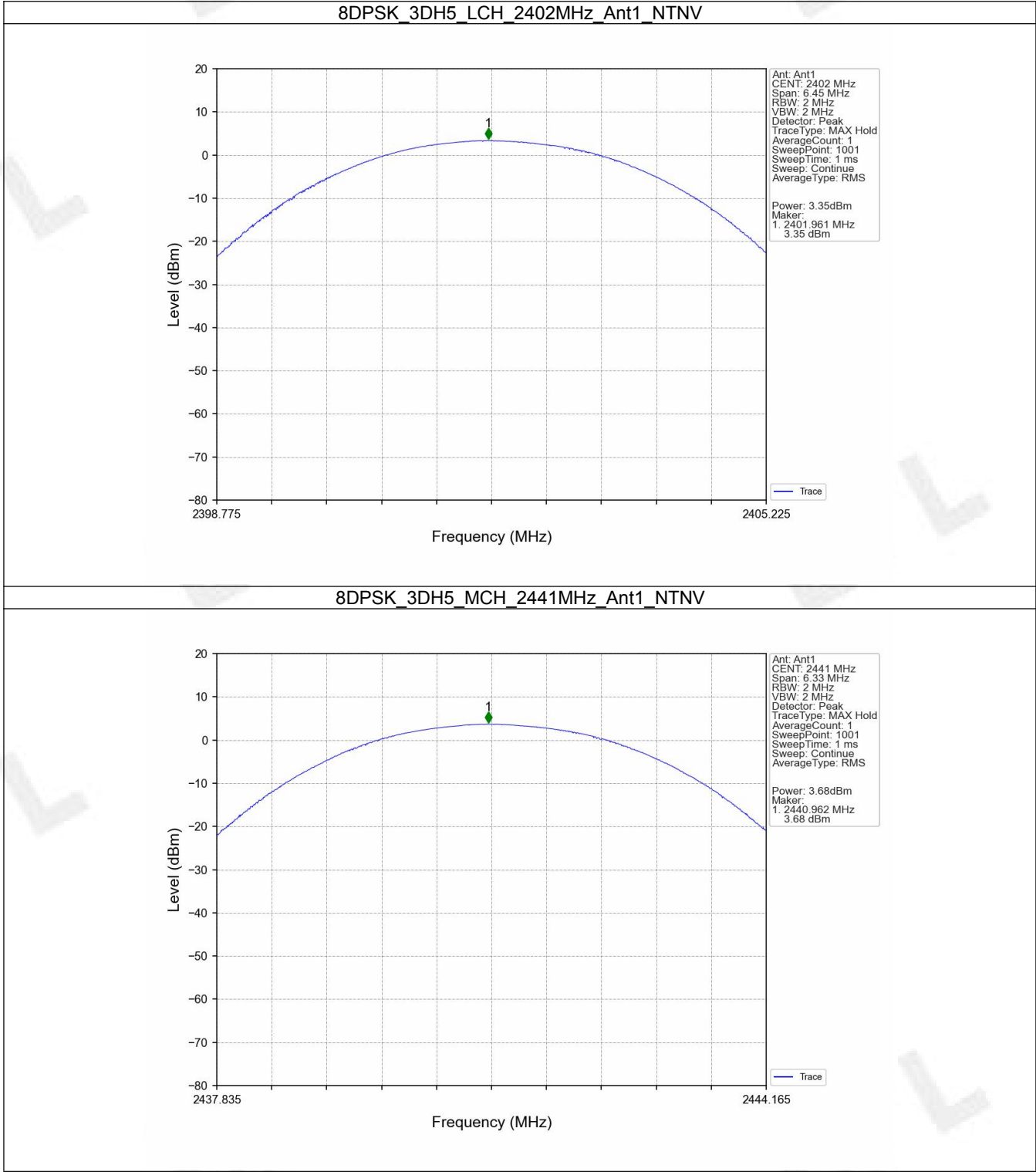
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



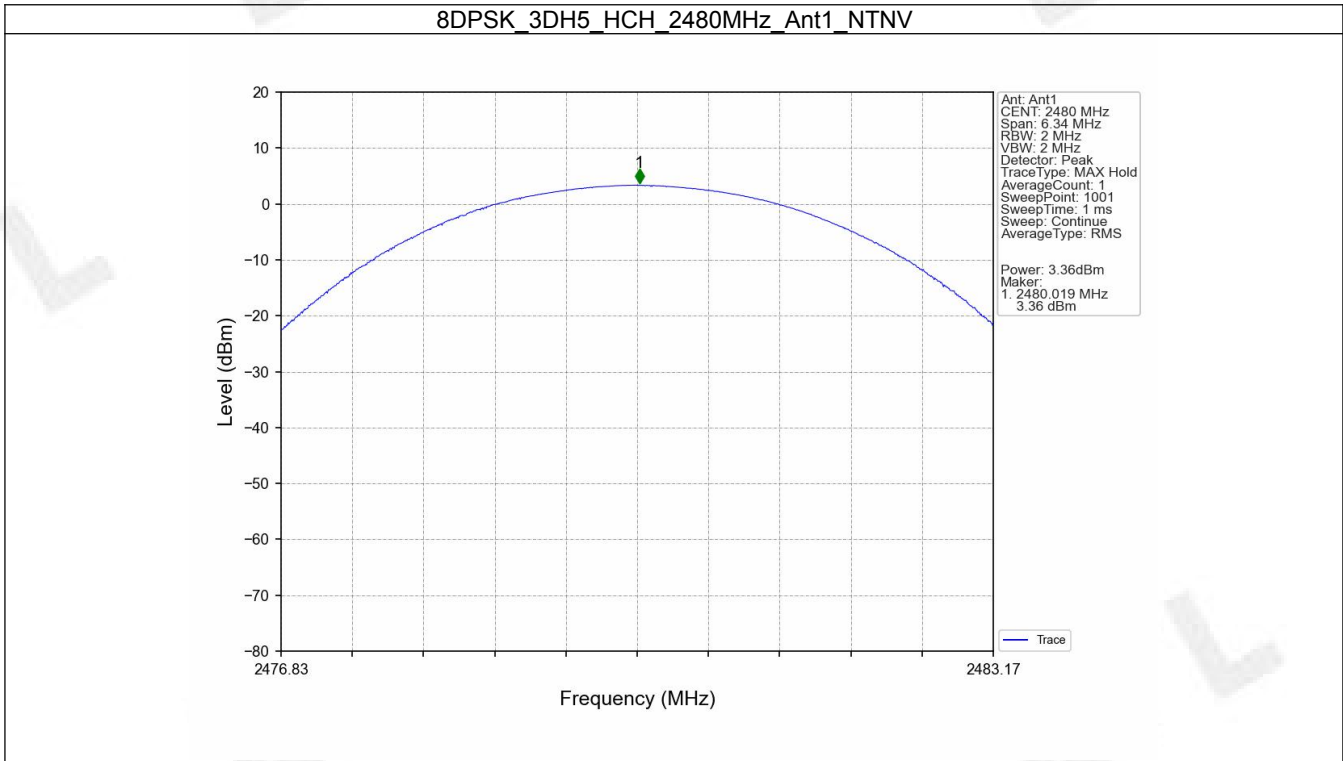
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



FCC ID: 2BBNB-WS22



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FCC ID: 2BBNB-WS22

3. Carrier Frequency Separation

3.1 Test Result

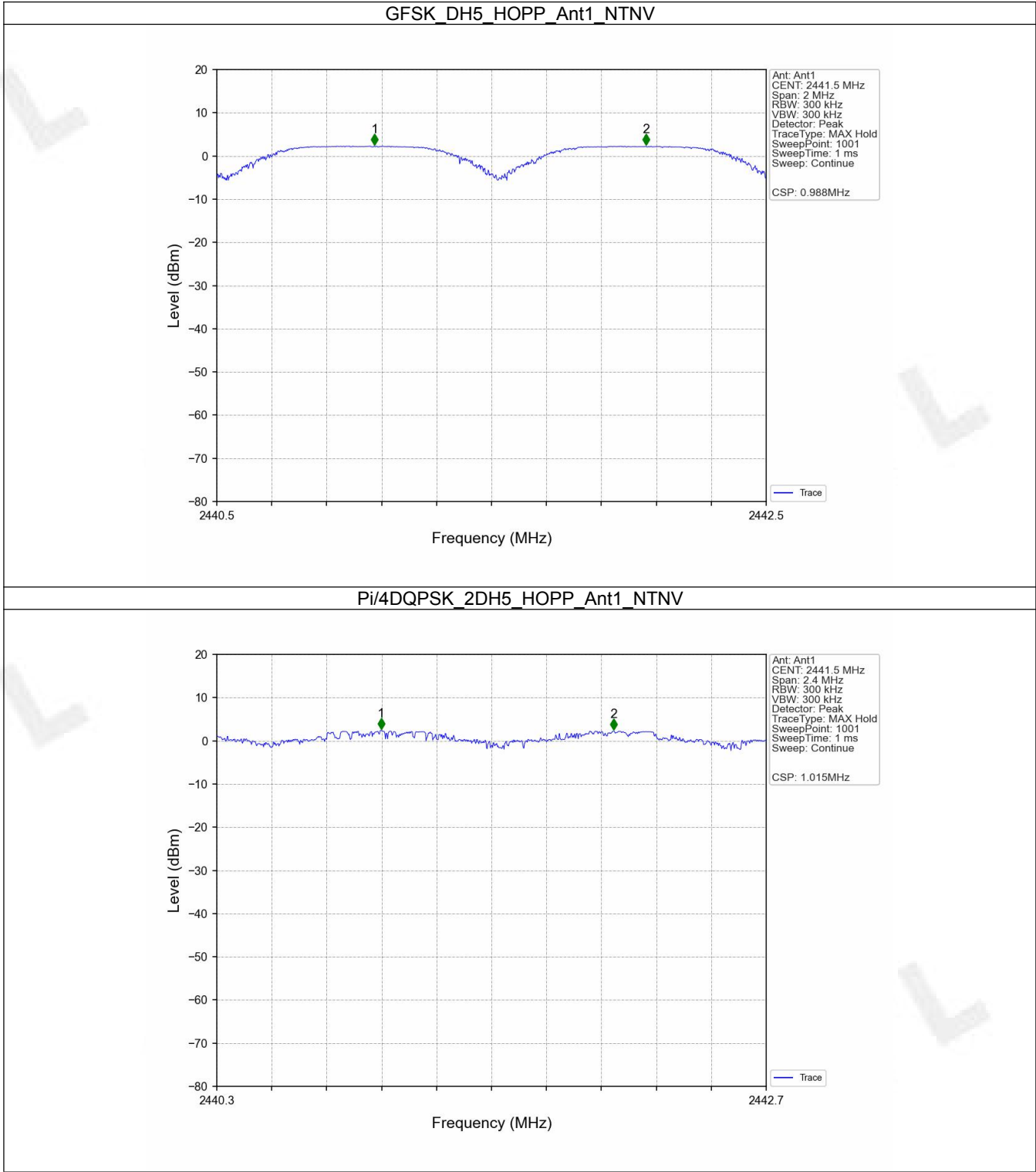
3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	0.988	1.065	≥ 0.71	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.015	1.353	≥ 0.902	Pass
8DPSK	SISO	HOPP	3DH5	1.037	1.290	≥ 0.86	Pass

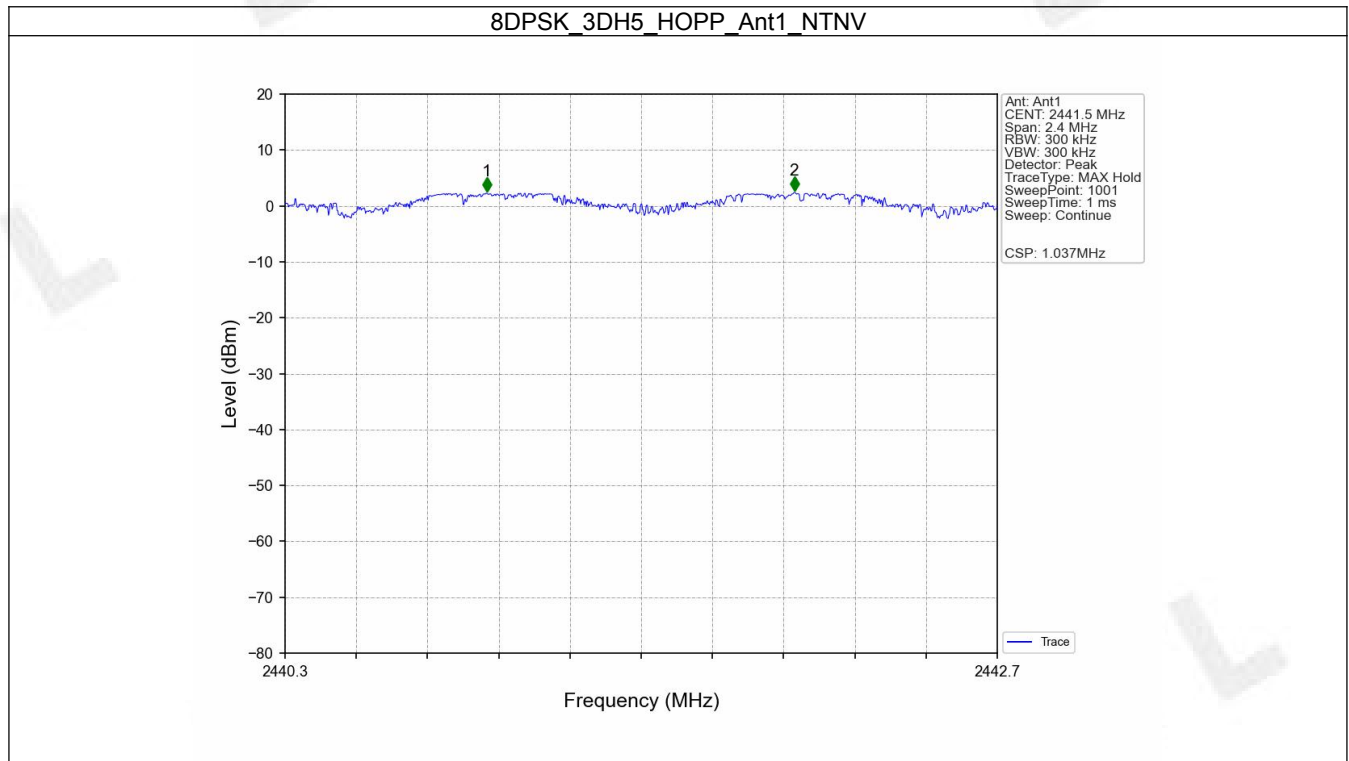
FCC ID: 2BBNB-WS22

3.2 Test Graph

3.2.1 Ant1



FCC ID: 2BBNB-WS22



4. Number of Hopping Frequencies

4.1 Test Result

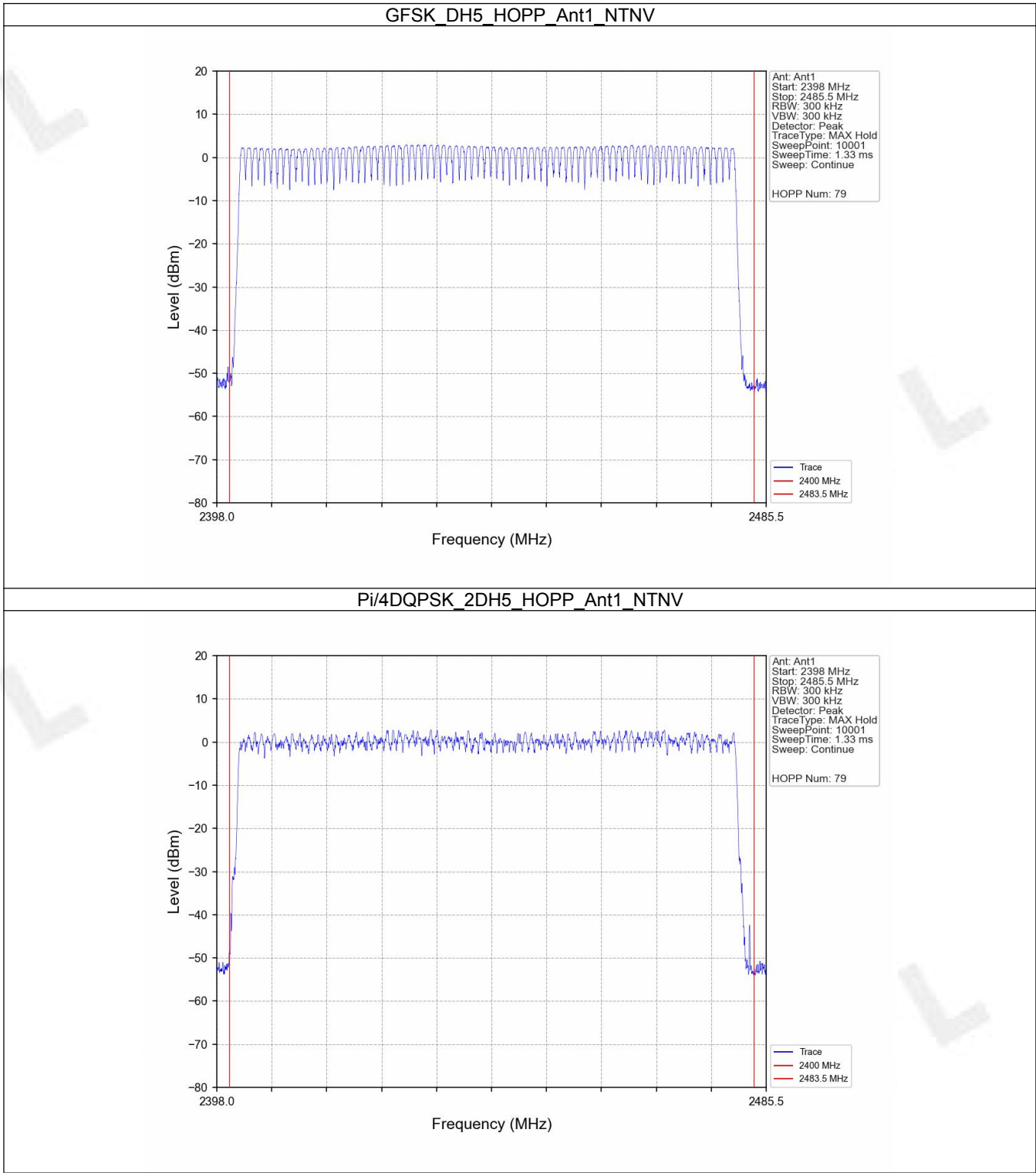
4.1.1 HoppNum

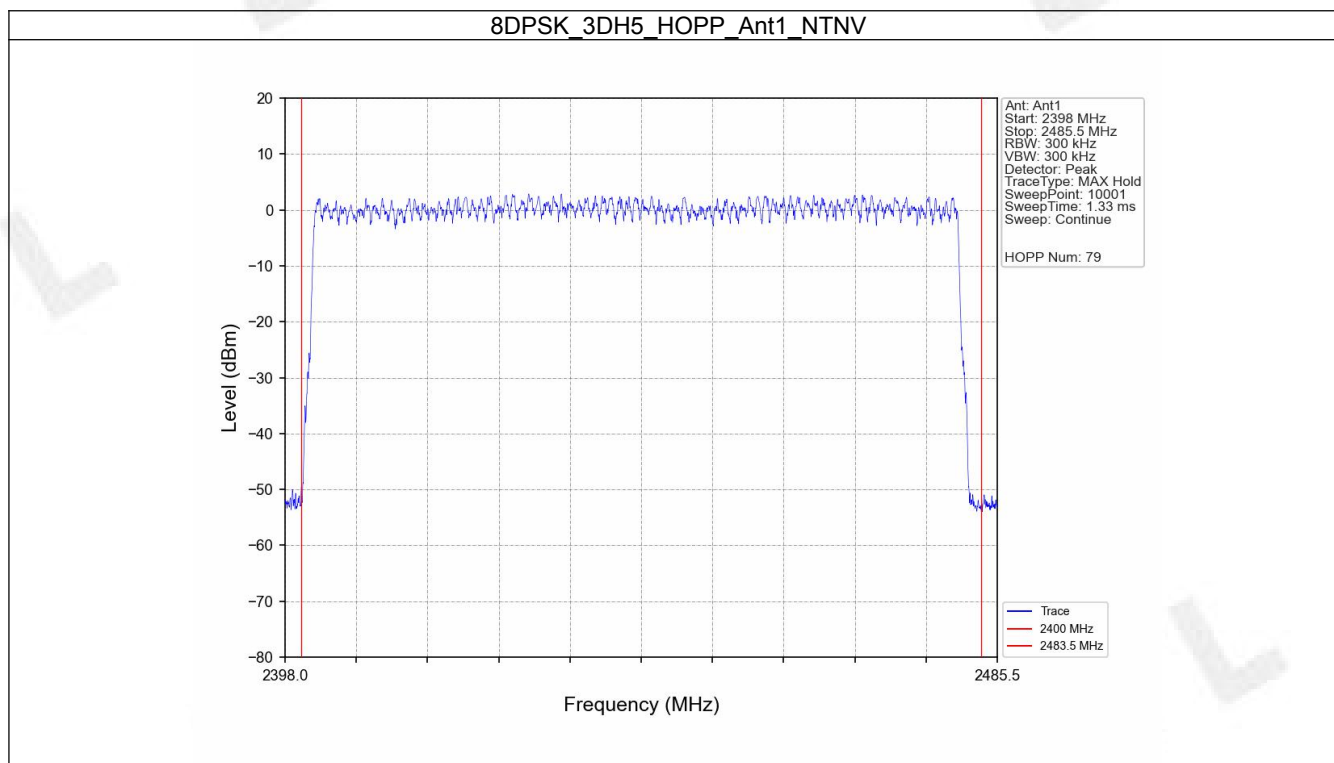
Mode	TX Type	Frequency (MHz)	Packet Type	Num of Hopping Frequencies		Verdict
				ANT1	Limit	
GFSK	SISO	HOPP	DH5	79	≥ 15	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	79	≥ 15	Pass
8DPSK	SISO	HOPP	3DH5	79	≥ 15	Pass

FCC ID: 2BBNB-WS22

4.2 Test Graph

4.2.1 HoppNum





FCC ID: 2BBNB-WS22

5. Time of Occupancy (Dwell Time)

5.1 Test Result

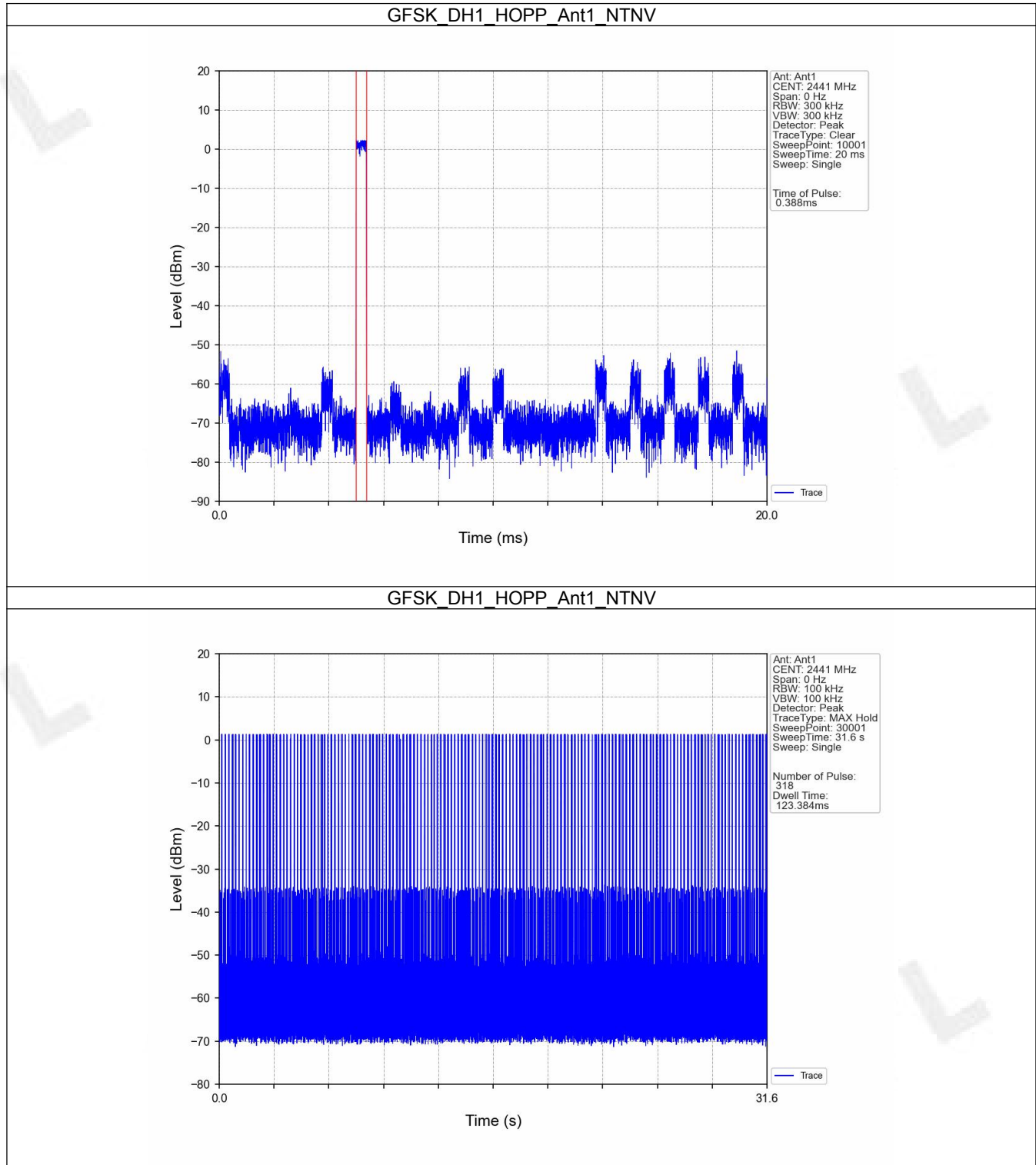
5.1.1 Ant1

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	0.388	31.600	318	123.384	<=400	Pass
			DH3	1.642	31.600	171	280.782	<=400	Pass
			DH5	2.890	31.600	98	283.220	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.390	31.600	320	124.800	<=400	Pass
			2DH3	1.646	31.600	162	266.652	<=400	Pass
			2DH5	2.896	31.600	107	309.872	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.388	31.600	319	123.772	<=400	Pass
			3DH3	1.646	31.600	176	289.696	<=400	Pass
			3DH5	2.894	31.600	118	341.492	<=400	Pass

FCC ID: 2BBNB-WS22

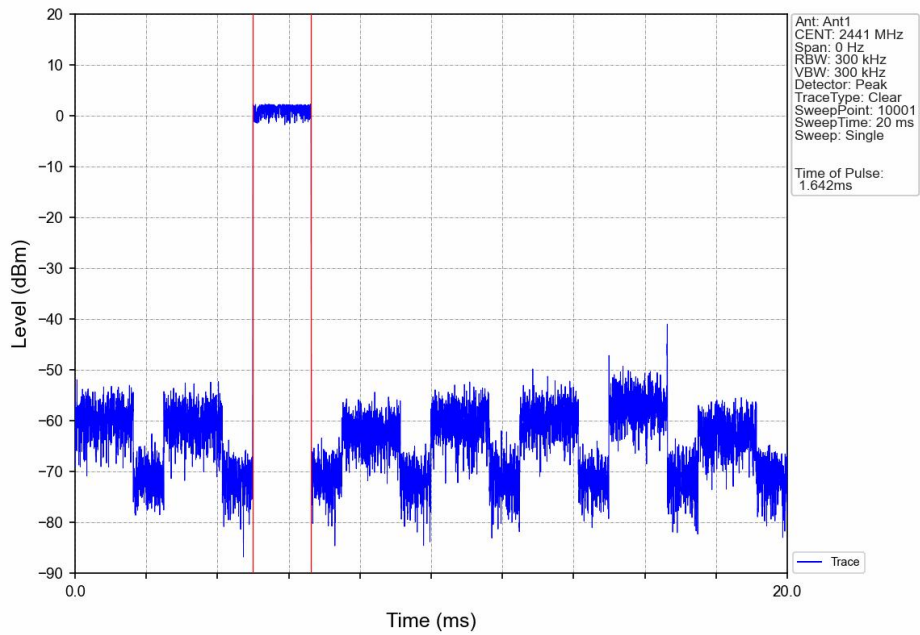
5.2 Test Graph

5.2.1 Ant1

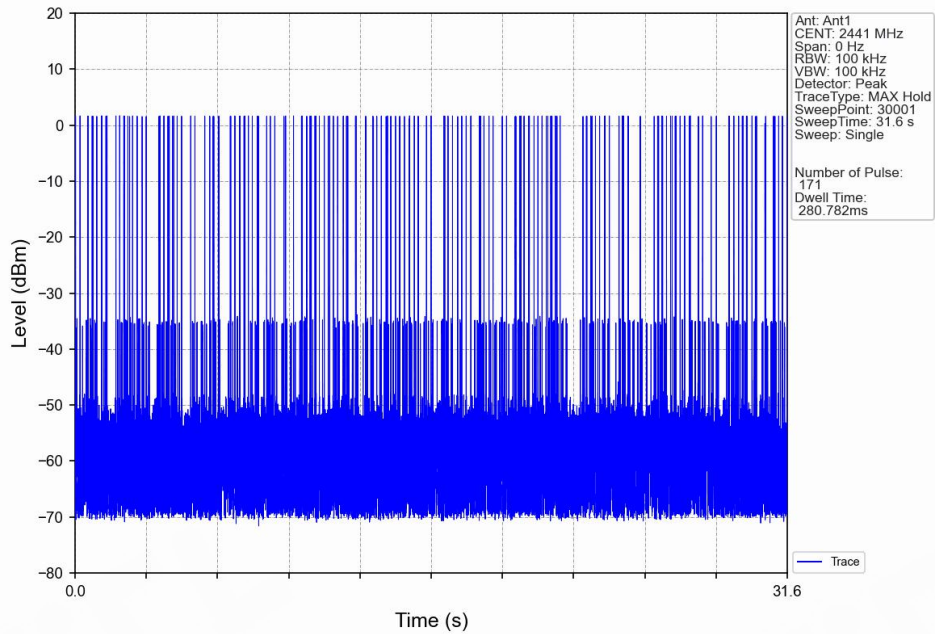


FCC ID: 2BBNB-WS22

GFSK_DH3_HOPP_Ant1_NTNV

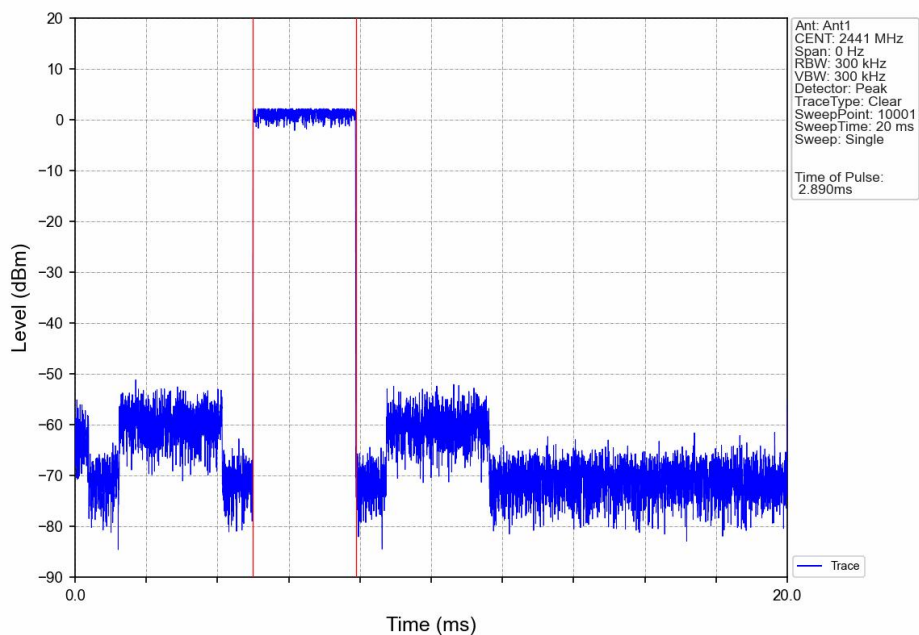


GFSK_DH3_HOPP_Ant1_NTNV

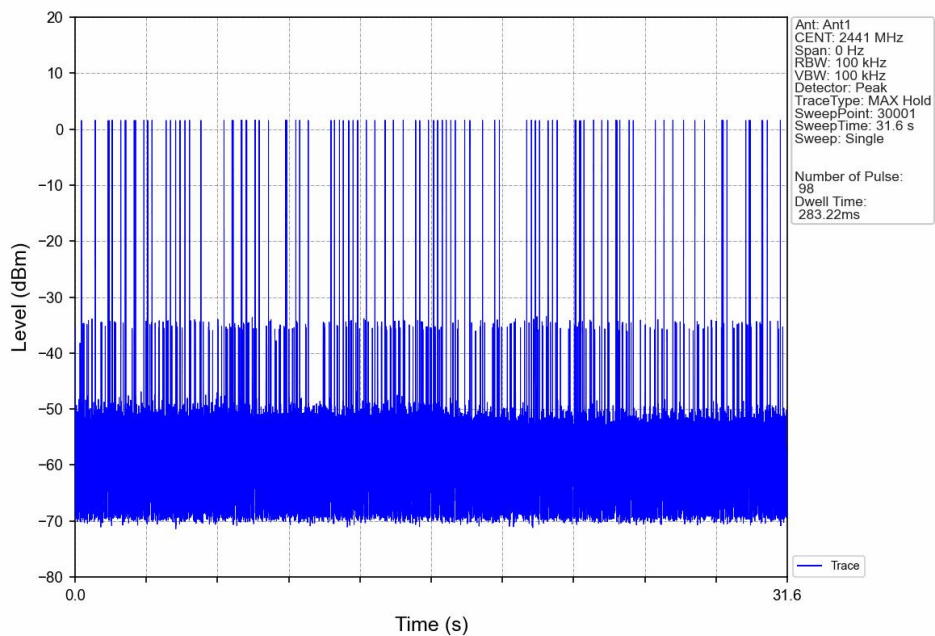


FCC ID: 2BBNB-WS22

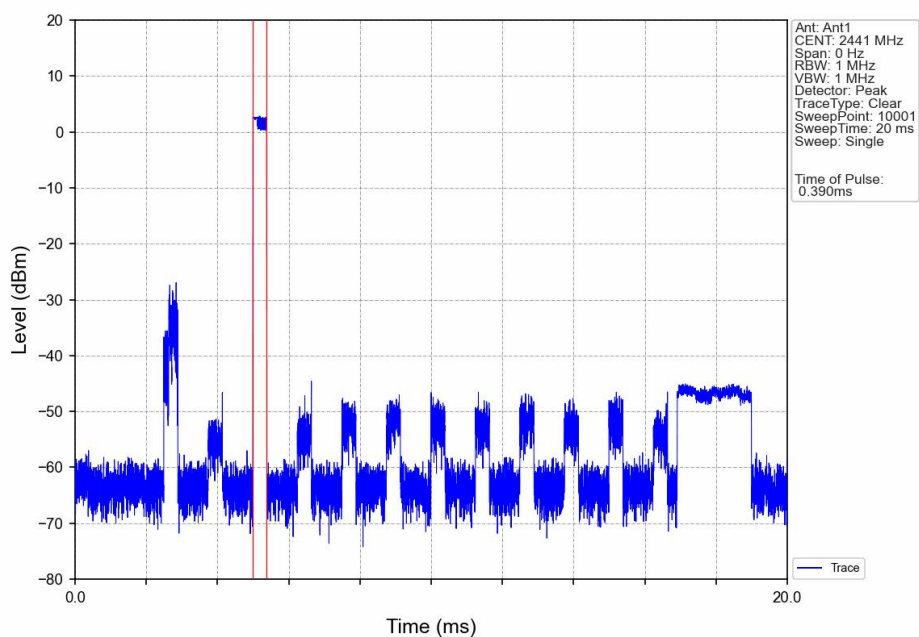
GFSK_DH5_HOPP_Ant1_NTNV



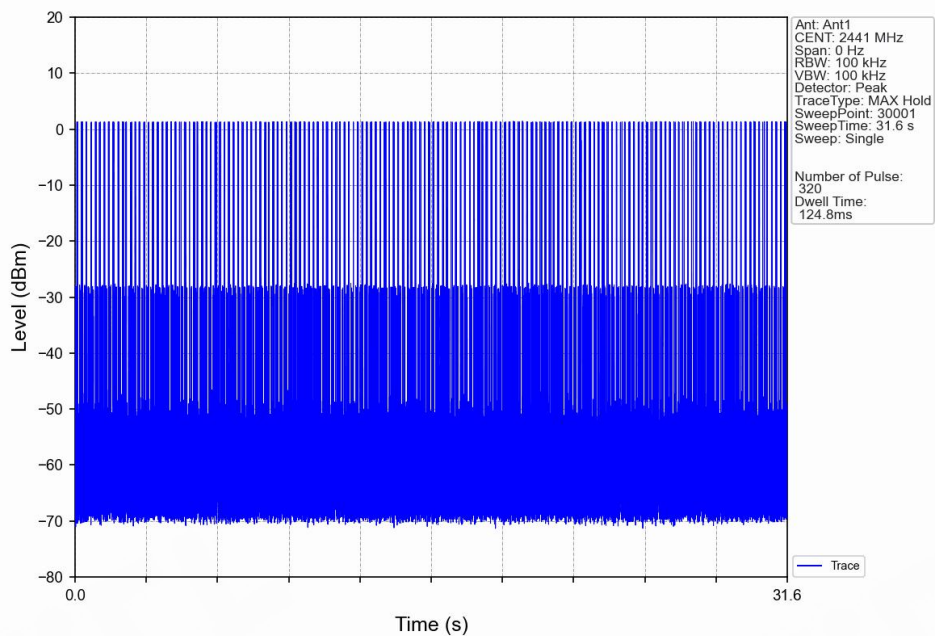
GFSK_DH5_HOPP_Ant1_NTNV



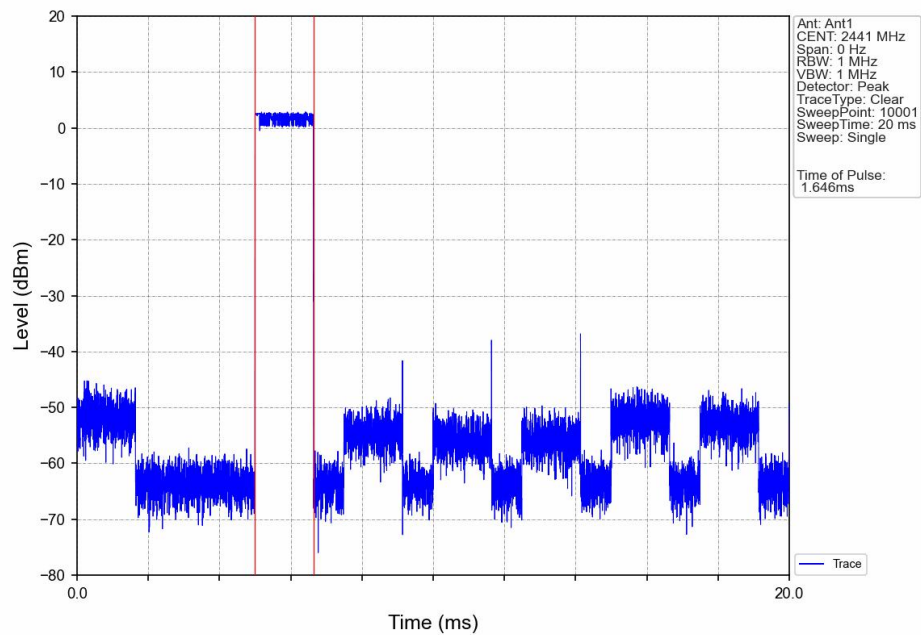
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



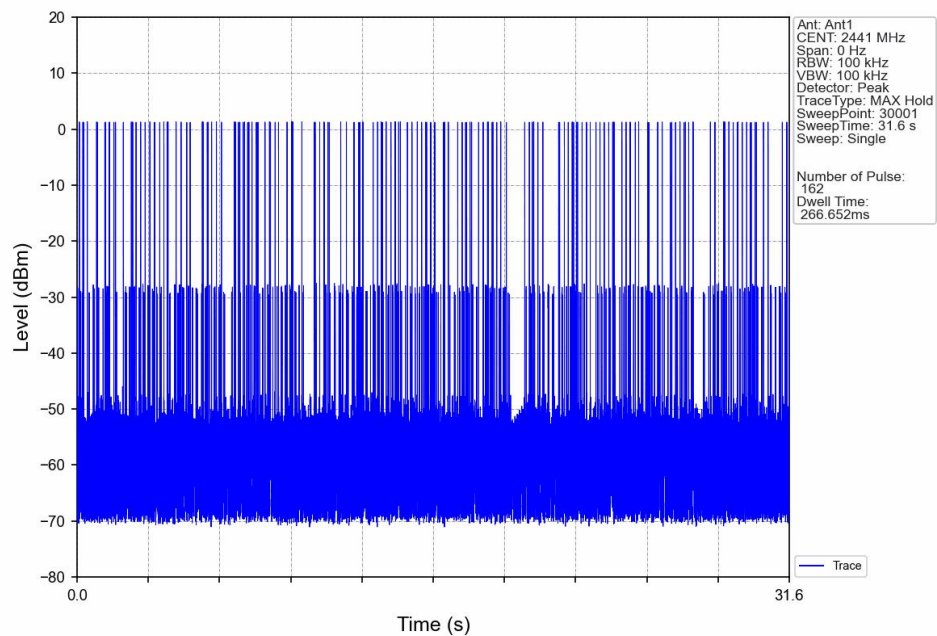
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV



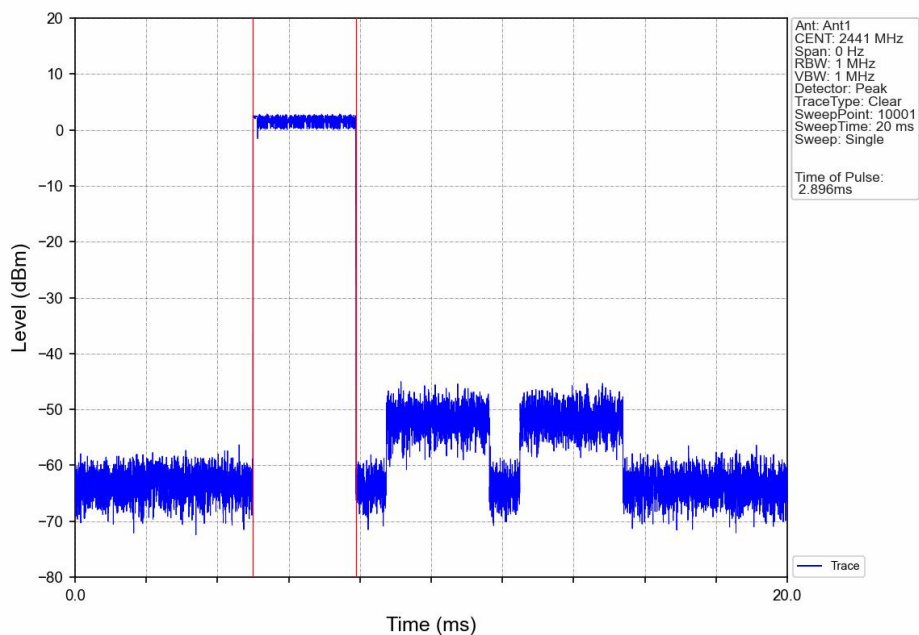
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



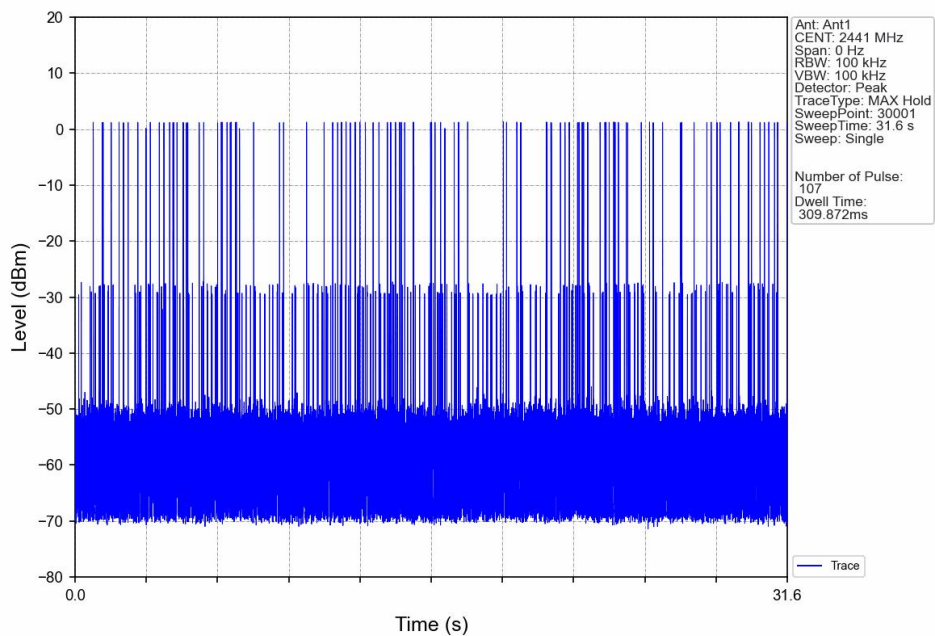
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV



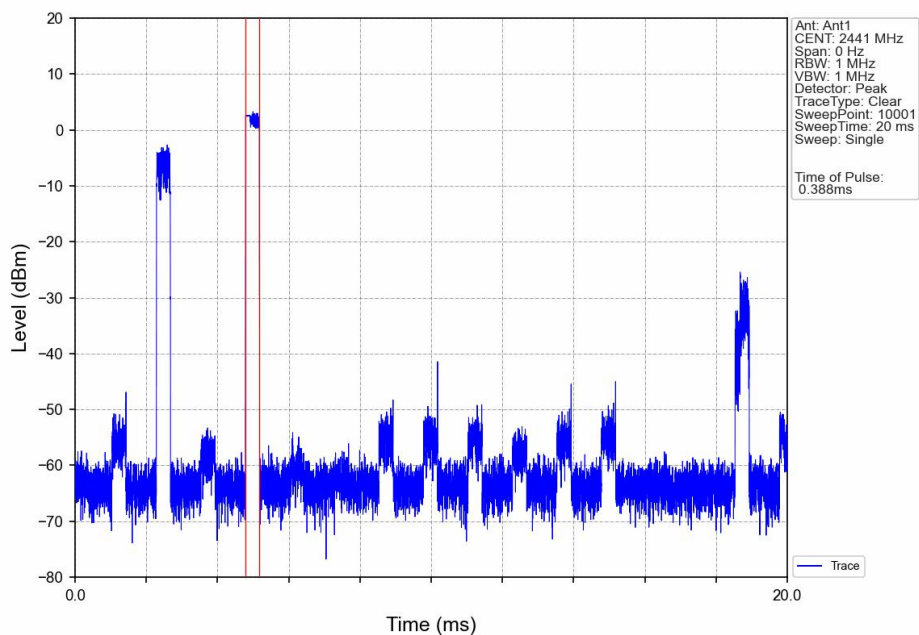
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



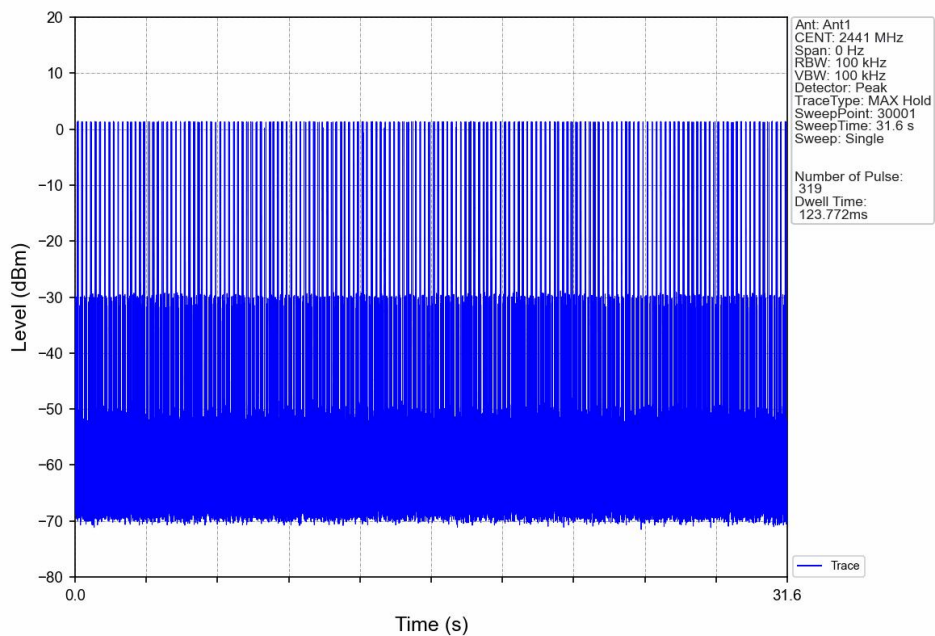
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



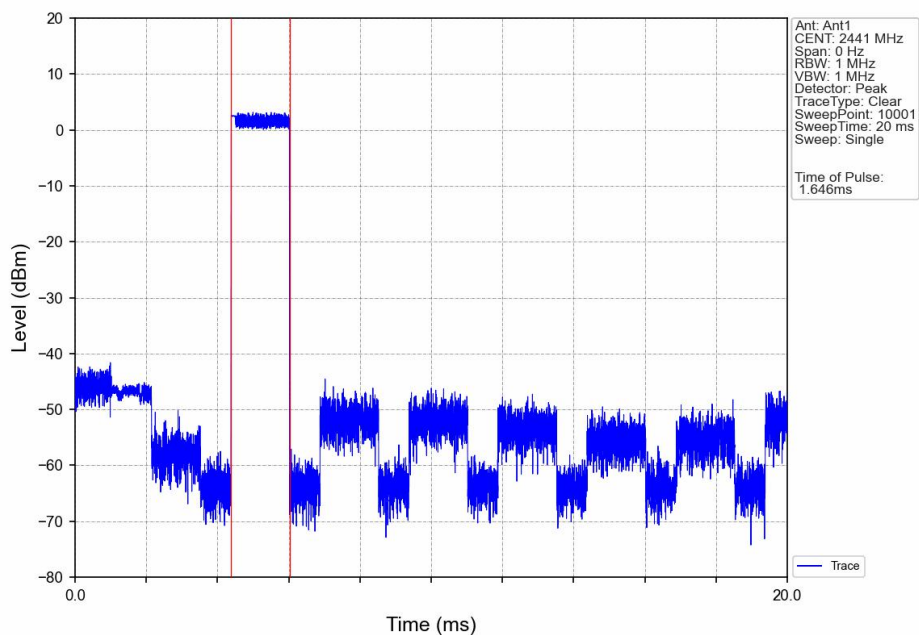
8DPSK_3DH1_HOPP_Ant1_NTNV



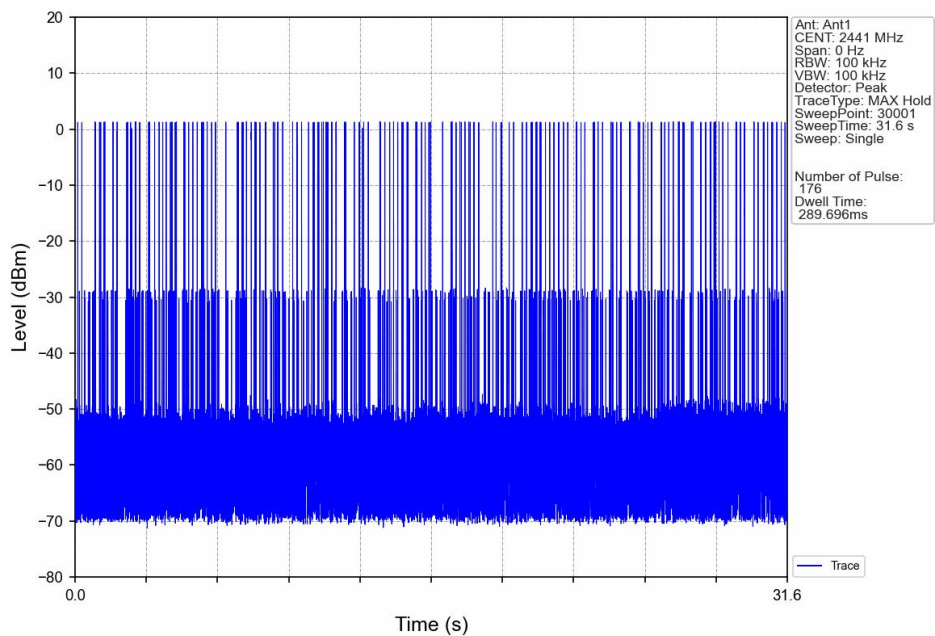
8DPSK_3DH1_HOPP_Ant1_NTNV



8DPSK_3DH3_HOPP_Ant1_NTNV

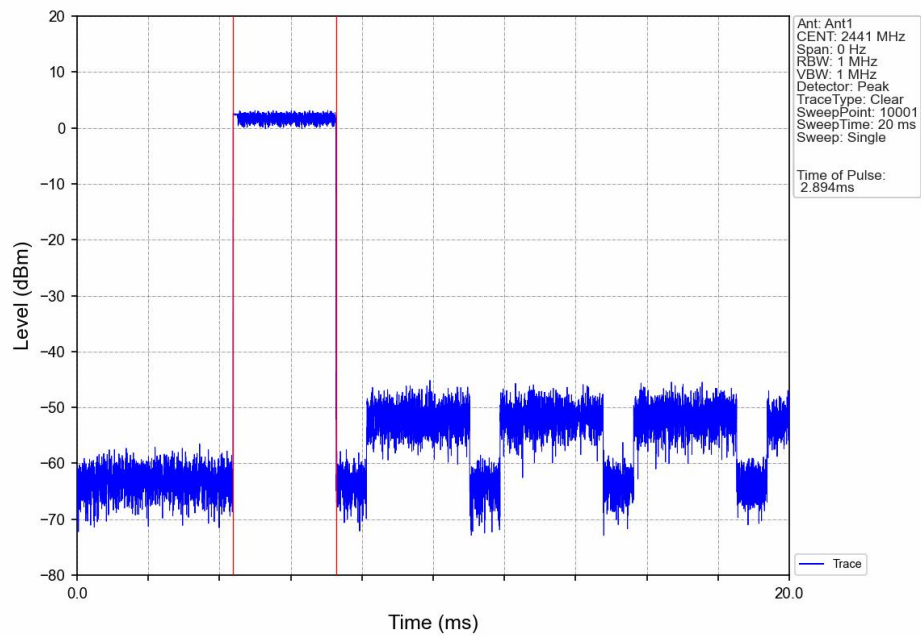


8DPSK_3DH3_HOPP_Ant1_NTNV

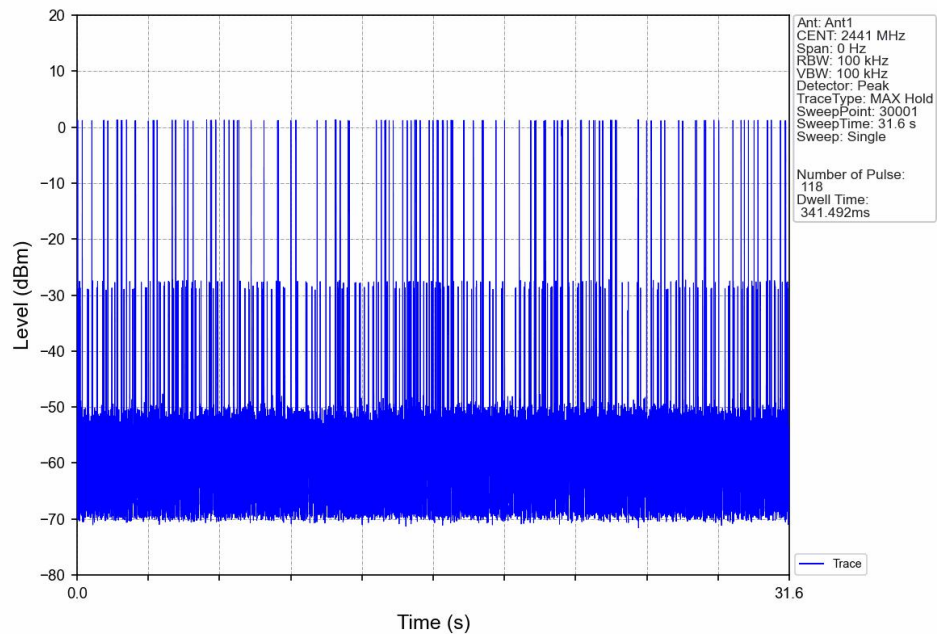


FCC ID: 2BBNB-WS22

8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



FCC ID: 2BBNB-WS22

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	1.68
		2441	DH5	1	1.86
		2480	DH5	1	1.38
		HOPP	DH5	1	2.51
					2.51
Pi/4DQPSK	SISO	2402	2DH5	1	1.90
		2441	2DH5	1	2.09
		2480	2DH5	1	1.68
		HOPP	2DH5	1	2.49
					2.49
8DPSK	SISO	2402	3DH5	1	1.94
		2441	3DH5	1	2.11
		2480	3DH5	1	1.63
		HOPP	3DH5	1	2.48
					2.48

6.1.2 CSE

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	1.68	-18.32	Pass
		2441	DH5	1	1.86	-18.14	Pass
		2480	DH5	1	1.38	-18.62	Pass
		HOPP	DH5	1	2.51	-17.49	Pass
					2.51	-17.49	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.90	-18.10	Pass
		2441	2DH5	1	2.09	-17.91	Pass
		2480	2DH5	1	1.68	-18.32	Pass
		HOPP	2DH5	1	2.49	-17.51	Pass
					2.49	-17.51	Pass
8DPSK	SISO	2402	3DH5	1	1.94	-18.06	Pass
		2441	3DH5	1	2.11	-17.89	Pass
		2480	3DH5	1	1.63	-18.37	Pass
		HOPP	3DH5	1	2.48	-17.52	Pass
					2.48	-17.52	Pass

FCC ID: 2BBNB-WS22

6.2 Test Graph

6.2.1 Ref

