

TEST REPORT

Report No.: 8429EU012318W1

Applicant: GuangZhouWanTuoXinXiKeJiYouXianGongSi

Address: BaiYunQuTongDeJie XiChalu31HaoZhiSiEDong201-9,
Guangzhou City, Guangdong Province, China

Product Name: Thermal Label Printer

Model No.: ST423 (refer to clause 2.4)

Trademark: SVANTTO

FCC ID: 2BVDX-ST423

Test Standard(s): 47 CFR Part 15.247

Test Result: Pass

Date of Receipt: Mar. 23, 2026

Test Date: Mar. 24, 2026 - May 08, 2026

Date of Issue: May 12, 2026

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED



Prepared by:



Landon Qiu/ Engineer

Reviewed and Approved by:



Sally Zhang/ Manager

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2 General Information

2.1 Applicant Information

Applicant	GuangZhouWanTuoXinXiKeJiYouXianGongSi
Address	BaiYunQuTongDeJie XiChalu31HaoZhiSiEDong201-9, Guangzhou City, Guangdong Province, China

2.2 Manufacturer Information

Manufacturer	GuangZhouWanTuoXinXiKeJiYouXianGongSi
Address	BaiYunQuTongDeJie XiChalu31HaoZhiSiEDong201-9, Guangzhou City, Guangdong Province, China

2.3 Factory Information

Factory	GuangZhouWanTuoXinXiKeJiYouXianGongSi
Address	BaiYunQuTongDeJie XiChalu31HaoZhiSiEDong201-9, Guangzhou City, Guangdong Province, China

2.4 General Description of E.U.T.

Product Name	Thermal Label Printer
Model No. Under Test	ST423
List Model No.	ST423s, ST423c, ST424, ST42, ST43, ST423 Pro, ST423 Max
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in appearance color and model name. (this information provided by the customer)
Rating(s)	Input: 24.0V === 2.5A(Adapter Input: 100-240V~, 50/60Hz, 1.5A Max; Output: 24.0V === 2.5A)
Adapter 1	Model No.: XY65S-240250VQ-UW Input: 100-240V~, 50/60Hz, 1.5A Max Output: 24.0V === 2.5A Manufacturer: XING YUAN ELECTRONICS CO., LID
Adapter 2	Model No.: 20202M-240250U Input: 100-240V~, 50/60Hz, 1.5A Max Output: 24.0V === 2.5A Manufacturer: Hunan Dajing Power Technology Co.,Ltd.
Product Type	☒ Mobile ☐ Portable ☐ Fix Location
Test Sample No.	8429EU012318W-1/2(Normal), 8429EU012318W-2/2(Engineering)
Hardware Version	N/A
Software Version	N/A
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR+BLE)
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The requirement for the following technical information of the EUT was tested in this report:

Technology	Bluetooth
Operation Mode	BDR+EDR
Operating Frequency	2402MHz to 2480MHz
Modulation Type	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79
Antenna Type	PCB Antenna
Antenna Gain(Peak)	2.07 dBi
Remark	The above information are declared by the applicant, EU-LAB is not responsible for the information accuracy provided by the applicant.

All channels were listed on the following table:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	-	-

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

Remark:

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Verdict

Test Items	Standard	Method	Requirement	Results
Antenna requirement	47 CFR Part 15.247	---	47 CFR 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	ANSI C63.10-2020+Cor.1-2023 section 6.2	47 CFR 15.207(a)	Pass
20dB Bandwidth	47 CFR Part 15.247	ANSI C63.10-2020+Cor.1-2023, section 7.8.6 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(a)(1)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023, section 7.8.5 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(b)(1)	Pass
Channel Separation	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023, section 7.8.2 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(a)(1)	Pass
Number of Hopping Frequencies	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023, section 7.8.3 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(a)(1)(iii)	Pass
Dwell Time	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023, section 7.8.4 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(a)(1)(iii)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023 section 7.8.7 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d)	Pass

Band edge emissions (Radiated)	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023 section 6.5.4 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	ANSI C63.10-2020+Cor 1-2023 section 6.5.4 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass
Note: (1) "N/A" denotes test is not applicable in this Test Report.				

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China
Designation Number	CN1368
Test Firm Registration Number	952583

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15°C to +35°C
Working Voltage of the EUT	NV (Normal Voltage)	120VAC, 60Hz for adapter

4.2 Test Equipment

Conducted Emission at AC power line					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
Test Software	Farad	EZ-EMC	EE-014	/	/
EMI Test Receiver	Rohde & Schwarz	ESCI	EE-005	2026-01-07	2027-01-06
L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	EE-004	2026-01-07	2027-01-06

20dB Bandwidth Maximum Conducted Output Power Channel Separation Number of Hopping Frequencies Dwell Time Emissions in non-restricted frequency bands					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
MXA Signal Analyzer	Agilent	N9020A	EE-011	2026-01-07	2027-01-06
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2026-01-07	2027-01-06
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2026-01-07	2027-01-06
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2026-02-13	2027-02-12
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2026-02-13	2027-02-12
Power Meter	Anritsu	ML2495A	EE-416	2026-02-13	2027-02-12
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2025-07-29	2026-07-28
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	/	/

Emissions in frequency bands (above 1GHz)					
Band edge emissions (Radiated)					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2026-01-07	2027-01-06
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2026-01-11	2029-01-10
Pre-amplifier	Agilent	8449B	EE-010	2026-01-07	2027-01-06
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2026-01-07	2027-01-06
DRG Horn Antenna	SCHWARZBECK	BBHA 9170	EE-410	2026-02-13	2027-02-12
Pre-amplifier	SKET	LNPA-1840-50	EE-411	2026-02-13	2027-02-12
Test Software	Farad	EZ-EMC	EE-015	/	/

Emissions in frequency bands (below 1GHz)					
Equipment	Manufacturer	Model No	Serial No	Cal Date	Cal Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2026-01-07	2027-01-06
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2026-01-13	2029-01-12
Pre-amplifier	Agilent	8447D	EE-009	2026-01-07	2027-01-06
MXA Signal Analyzer	Agilent	N9020A	EE-011	2026-01-07	2027-01-06
Loop Antenna	TESEQ	HLA6121	EE-403	2026-02-13	2027-02-12
Test Software	Farad	EZ-EMC	EE-015	/	/

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

4.4 Test Mode

No.	Test Modes	Description
TM1	TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation at lowest, middle and highest channel.
TM2	TX- π /4DQPSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with π /4DQPSK modulation at lowest, middle and highest channel.
TM3	TX-8DPSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation at lowest, middle and highest channel.
TM4	TX-GFSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation.
TM5	TX- π /4DQPSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with π /4DQPSK modulation.
TM6	TX-8DPSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with 8DPSK modulation.

4.5 Description of Calculation

4.5.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS \text{ (dBuV/m)} = RA \text{ (dBuV)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

4.5.2 Disturbance Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$CD \text{ (dBuV)} = RA \text{ (dBuV)} + PL \text{ (dB)} + CL \text{ (dB)}$$

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4.6 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Test Item	Measurement Uncertainty
Conducted Emission	2.64 dB
Occupied Channel Bandwidth	70 kHz
RF output power, conducted	1.04 dB
Time of Occupancy (Dwell Time)	1.8 %
Unwanted Emissions, conducted	2.72 dB
Radiated Emission (1GHz- 18GHz)	Ur = 3.50 dB (Horizontal) Ur = 3.50 dB (Vertical)
Radiated Emission (9kHz- 30MHz)	Ur = 2.50 dB
Radiated Emission (30MHz- 1GHz)	Ur = 2.70 dB (Horizontal) Ur = 2.70 dB (Vertical)
Radiated Emission (18GHz- 40GHz)	Ur = 5.15 dB (Horizontal) Ur = 5.24 dB (Vertical)

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Condition

None

5 Evaluation Results (Evaluation)

5.1 Antenna requirement

5.1.1 Test Specification

Test Requirement:	Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
Test Method:	---

5.1.2 Test Data

PASS.

The Antenna Anti-Replacement as following method:

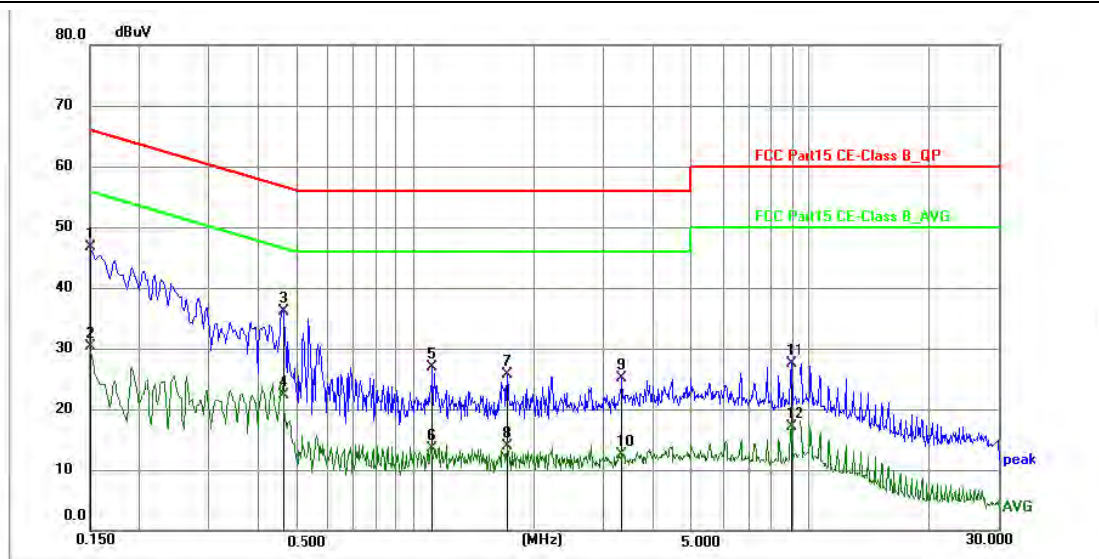
Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna-design is used.

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

Conducted Emission at AC power line Test Data

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: XY65S-240250VQ-UW

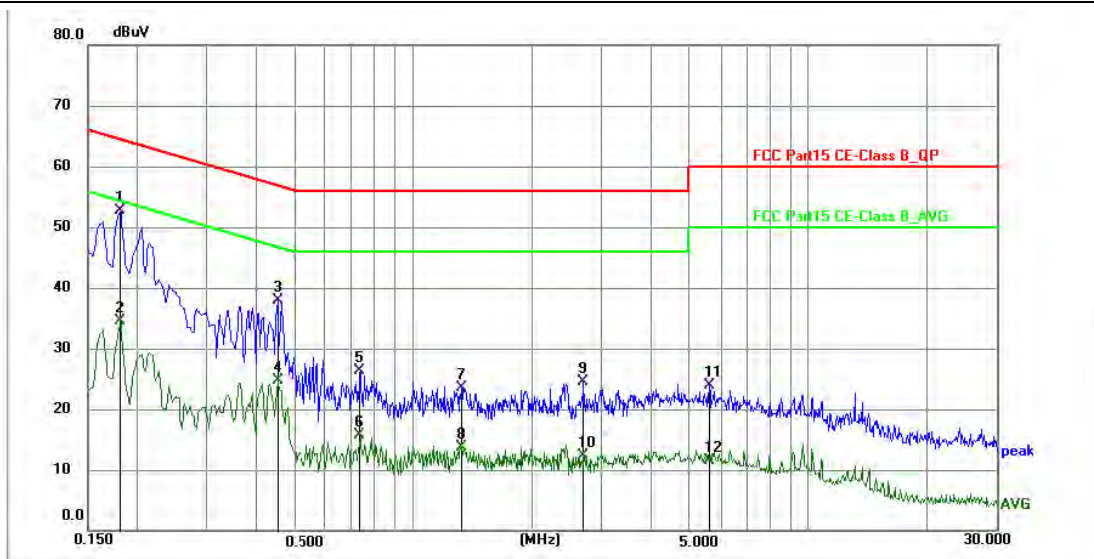


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	36.76	9.95	46.71	66.00	-19.29	QP	P	
2	0.1500	20.33	9.95	30.28	56.00	-25.72	AVG	P	
3	0.4605	26.00	10.03	36.03	56.68	-20.65	QP	P	
4	0.4605	12.24	10.03	22.27	46.68	-24.41	AVG	P	
5	1.1085	16.91	10.04	26.95	56.00	-29.05	QP	P	
6	1.1085	3.43	10.04	13.47	46.00	-32.53	AVG	P	
7	1.7115	15.67	10.03	25.70	56.00	-30.30	QP	P	
8	1.7115	3.88	10.03	13.91	46.00	-32.09	AVG	P	
9	3.3450	15.04	10.05	25.09	56.00	-30.91	QP	P	
10	3.3450	2.46	10.05	12.51	46.00	-33.49	AVG	P	
11	8.9295	17.62	9.97	27.59	60.00	-32.41	QP	P	
12	8.9295	7.05	9.97	17.02	50.00	-32.98	AVG	P	

Conducted Emission at AC power line Test Data

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: XY65S-240250VQ-UW

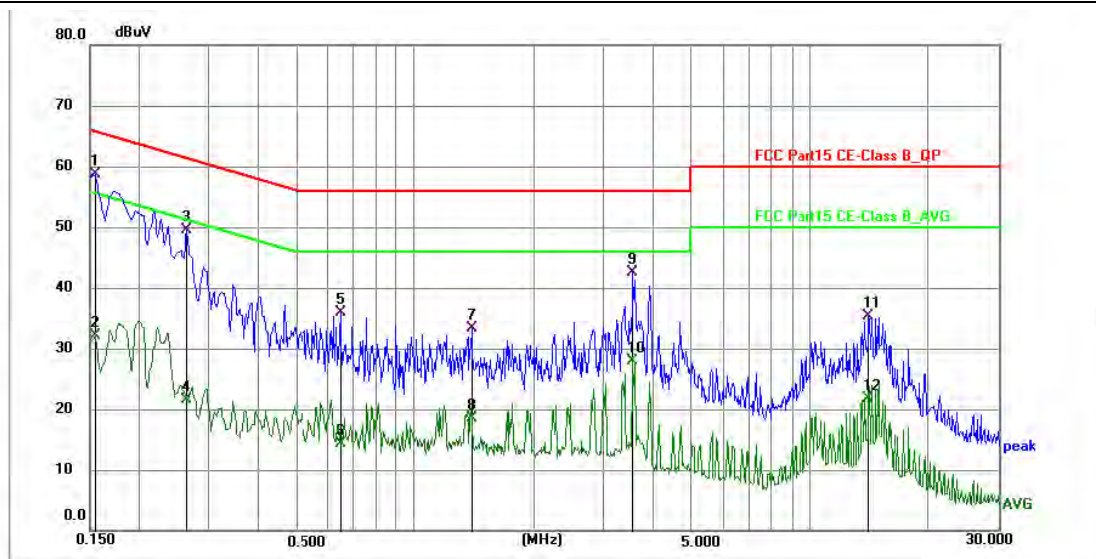


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1814	42.74	9.99	52.73	64.42	-11.69	QP	P	
2	0.1814	24.50	9.99	34.49	54.42	-19.93	AVG	P	
3	0.4515	27.82	10.06	37.88	56.85	-18.97	QP	P	
4	0.4515	14.72	10.06	24.78	46.85	-22.07	AVG	P	
5	0.7350	16.28	10.06	26.34	56.00	-29.66	QP	P	
6	0.7350	5.62	10.06	15.68	46.00	-30.32	AVG	P	
7	1.3290	13.49	10.06	23.55	56.00	-32.45	QP	P	
8	1.3290	3.63	10.06	13.69	46.00	-32.31	AVG	P	
9	2.6924	14.49	10.06	24.55	56.00	-31.45	QP	P	
10	2.6924	2.15	10.06	12.21	46.00	-33.79	AVG	P	
11	5.6040	13.96	10.04	24.00	60.00	-36.00	QP	P	
12	5.6040	1.51	10.04	11.55	50.00	-38.45	AVG	P	

Conducted Emission at AC power line Test Data

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: 20202M-240250U

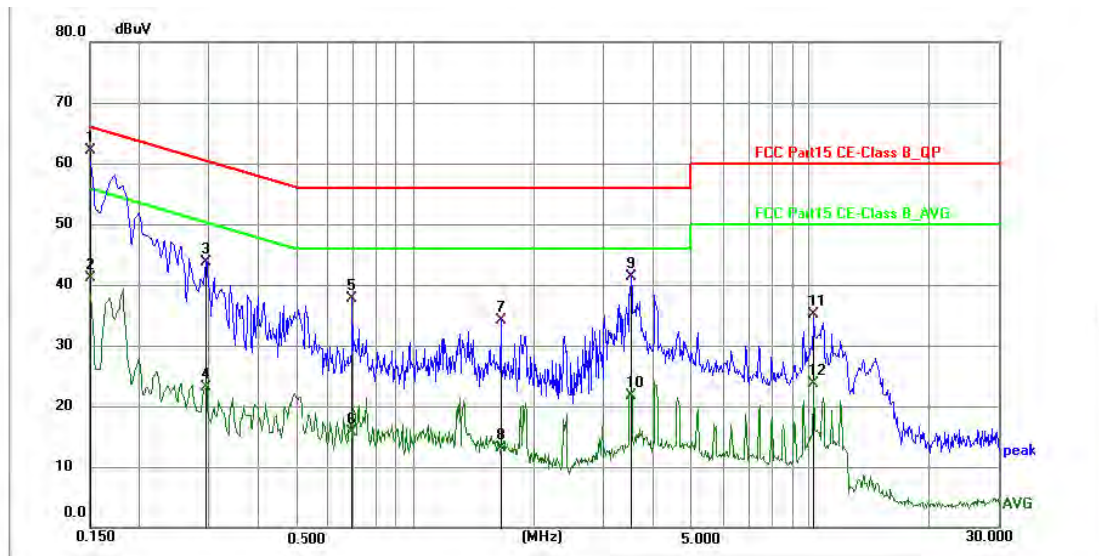


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1545	48.64	9.98	58.62	65.75	-7.13	QP	P	
2	0.1545	22.05	9.98	32.03	55.75	-23.72	AVG	P	
3	0.2625	39.41	10.01	49.42	61.35	-11.93	QP	P	
4	0.2625	11.59	10.01	21.60	51.35	-29.75	AVG	P	
5	0.6495	25.86	10.06	35.92	56.00	-20.08	QP	P	
6	0.6495	4.30	10.06	14.36	46.00	-31.64	AVG	P	
7	1.3920	23.28	10.06	33.34	56.00	-22.66	QP	P	
8	1.3920	8.46	10.06	18.52	46.00	-27.48	AVG	P	
9	3.5565	32.48	10.04	42.52	56.00	-13.48	QP	P	
10	3.5565	17.88	10.04	27.92	46.00	-18.08	AVG	P	
11	14.1360	25.29	9.99	35.28	60.00	-24.72	QP	P	
12	14.1360	11.80	9.99	21.79	50.00	-28.21	AVG	P	

Conducted Emission at AC power line Test Data

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: 20202M-240250U



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	52.13	9.97	62.10	66.00	-3.90	QP	P	
2	0.1500	31.20	9.97	41.17	56.00	-14.83	AVG	P	
3	0.2940	33.60	10.01	43.61	60.41	-16.80	QP	P	
4	0.2940	13.01	10.01	23.02	50.41	-27.39	AVG	P	
5	0.6945	27.62	10.06	37.68	56.00	-18.32	QP	P	
6	0.6945	5.64	10.06	15.70	46.00	-30.30	AVG	P	
7	1.6530	24.05	10.07	34.12	56.00	-21.88	QP	P	
8	1.6530	3.09	10.07	13.16	46.00	-32.84	AVG	P	
9	3.5205	31.17	10.04	41.21	56.00	-14.79	QP	P	
10	3.5205	11.76	10.04	21.80	46.00	-24.20	AVG	P	
11	10.2705	25.04	10.01	35.05	60.00	-24.95	QP	P	
12	10.2705	13.60	10.01	23.61	50.00	-26.39	AVG	P	

6.2 20dB Bandwidth

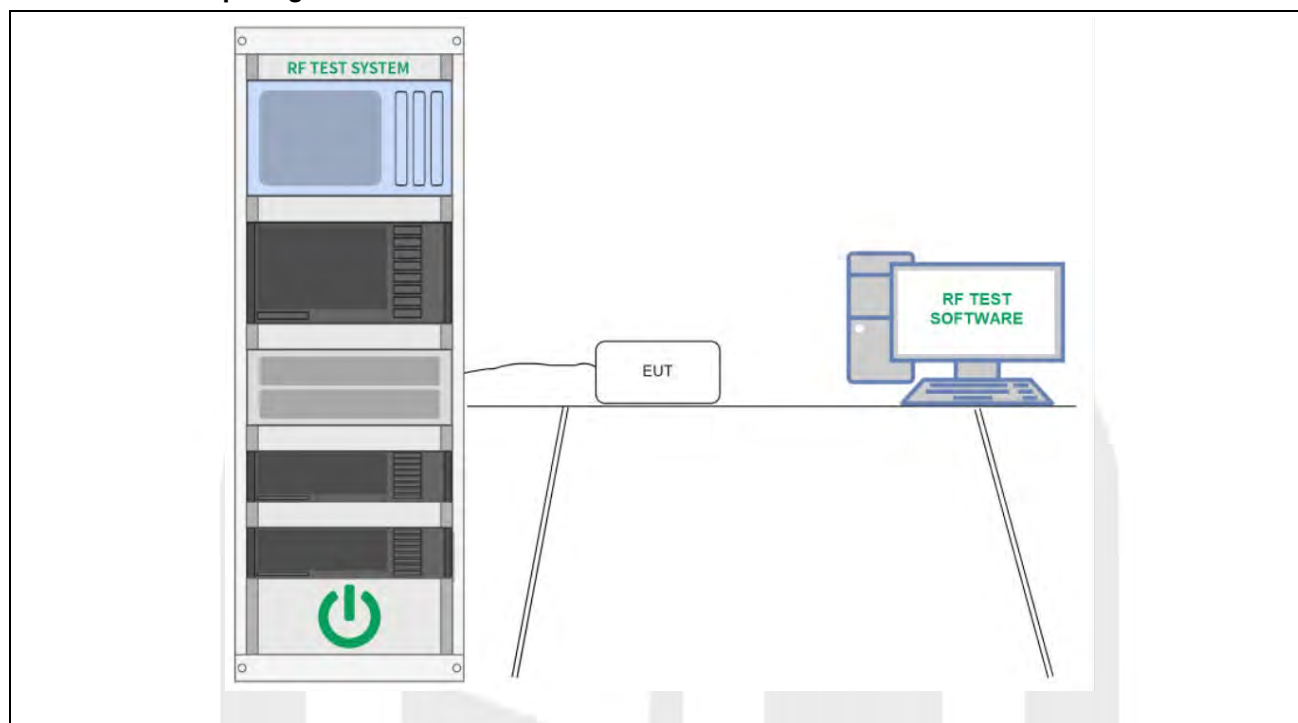
6.2.1 Test Specification

Test Requirement:	47 CFR 15.247(a)(1)
Test Limit:	Refer to 47 CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	ANSI C63.10-2020+Cor.1-2023, section 7.8.6, For occupied bandwidth measurements, use the procedure in 6.9.3. Frequency hopping shall be disabled for this test. KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.6.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max-hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth. g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies. h) The occupied bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.2.2 E.U.T. Operation

Pre test mode:	TM1, TM2, TM3
Final test mode:	TM1, TM2, TM3

6.2.3 Test Setup Diagram



6.2.4 Test Data

PASS.

Please refer to Annex D for details.

6.3 Maximum Conducted Output Power

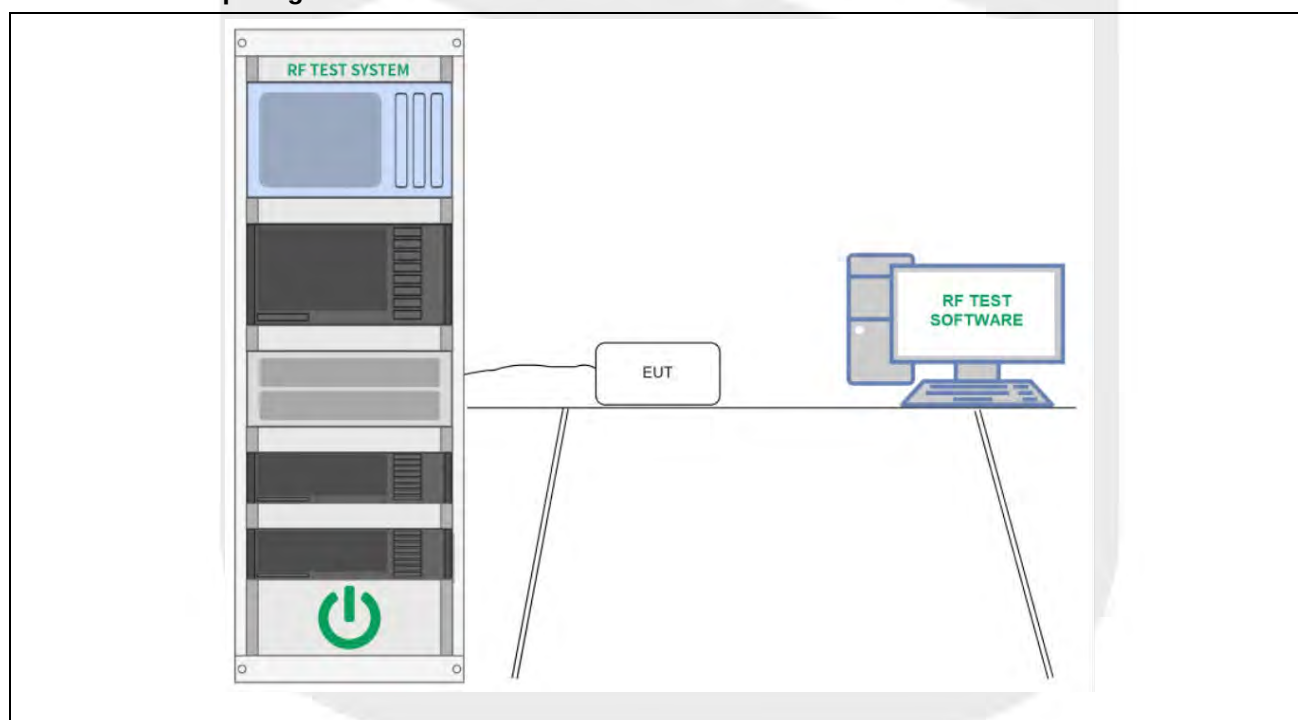
6.3.1 Test Specification

Test Requirement:	47 CFR 15.247(b)(1)
Test Limit:	Refer to 47 CFR 15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Method:	ANSI C63.10-2020+Cor 1-2023, section 7.8.5 KDB 558074 D01 15.247 Meas Guidance v05r02

6.3.2 E.U.T. Operation

Pre test mode:	TM1, TM2, TM3
Final test mode:	TM1, TM2, TM3

6.3.3 Test Setup Diagram



6.3.4 Test Data

PASS.

Please refer to Annex D for details.

6.4 Channel Separation

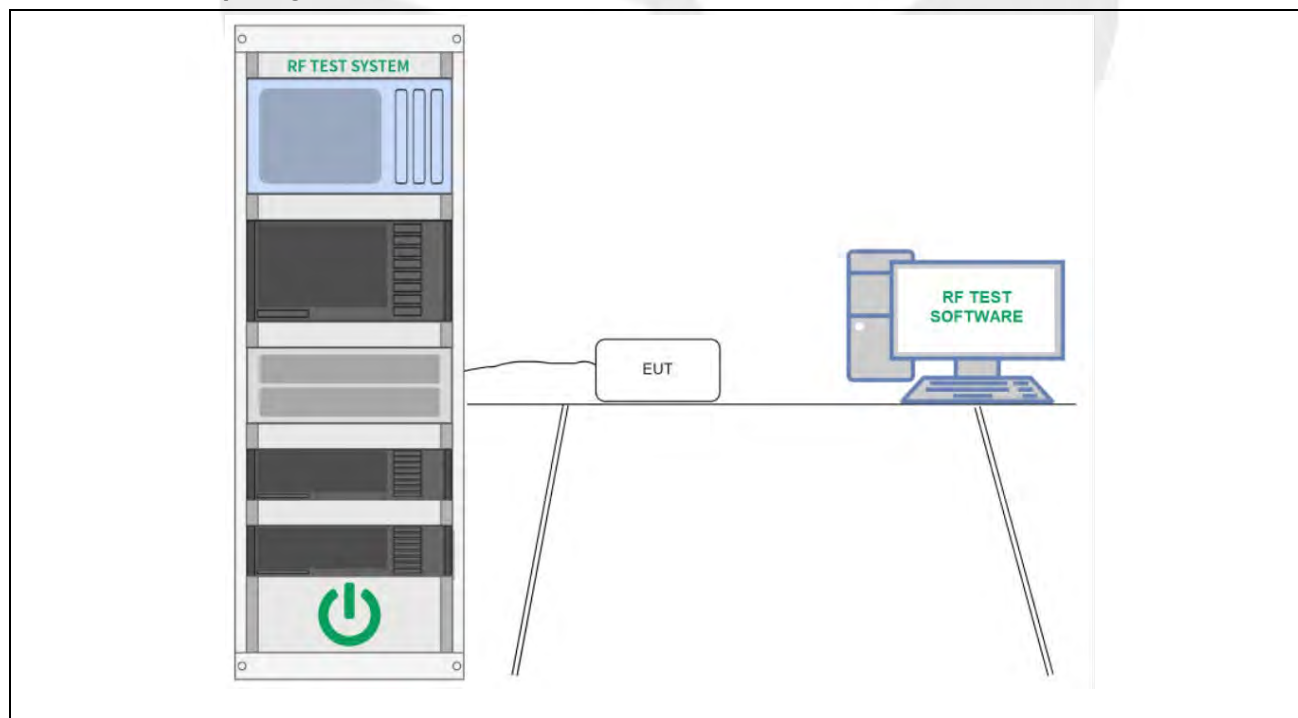
6.4.1 Test Specification

Test Requirement:	47 CFR 15.247(a)(1)
Test Limit:	Refer to 47 CFR 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Test Method:	ANSI C63.10-2020+Cor 1-2023, section 7.8.2 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Wide enough to capture the peaks of two adjacent channels. b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. c) Video (or average) bandwidth (VBW) $\geq$ RBW. d) Sweep: No faster than coupled (auto) time. e) Detector function: Peak. f) Trace: Max-hold. g) Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A spectral plot of the data shall be included in the test report.

6.4.2 E.U.T. Operation

Pre test mode:	TM4, TM5, TM6
Final test mode:	TM4, TM5, TM6

6.4.3 Test Setup Diagram



6.4.4 Test Data

PASS.

Please refer to Annex D for details.



6.5 Number of Hopping Frequencies

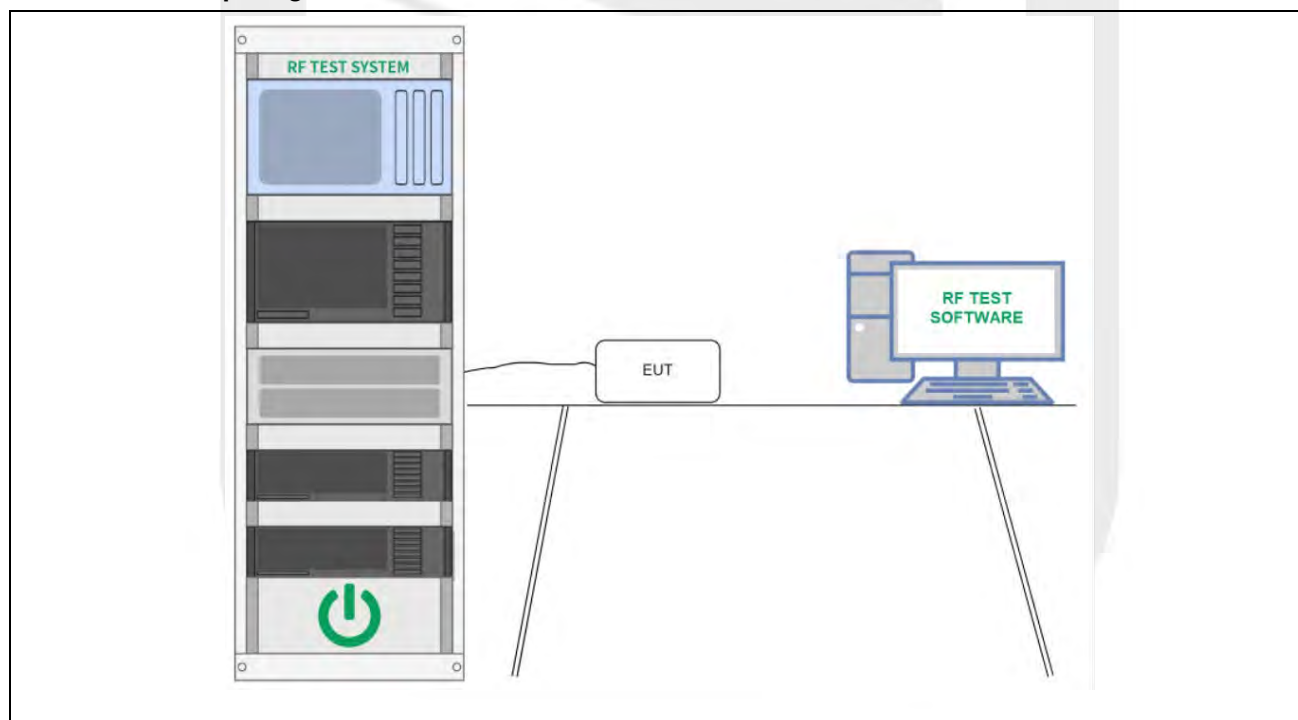
6.5.1 Test Specification

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	ANSI C63.10-2020+Cor 1-2023, section 7.8.3 KDB 558074 D01 15.247 Meas Guidance v05r02

6.5.2 E.U.T. Operation

Pre test mode:	TM4, TM5, TM6
Final test mode:	TM4, TM5, TM6

6.5.3 Test Setup Diagram



6.5.4 Test Data

PASS.

Please refer to Annex D for details.

6.6 Dwell Time

6.6.1 Test Specification

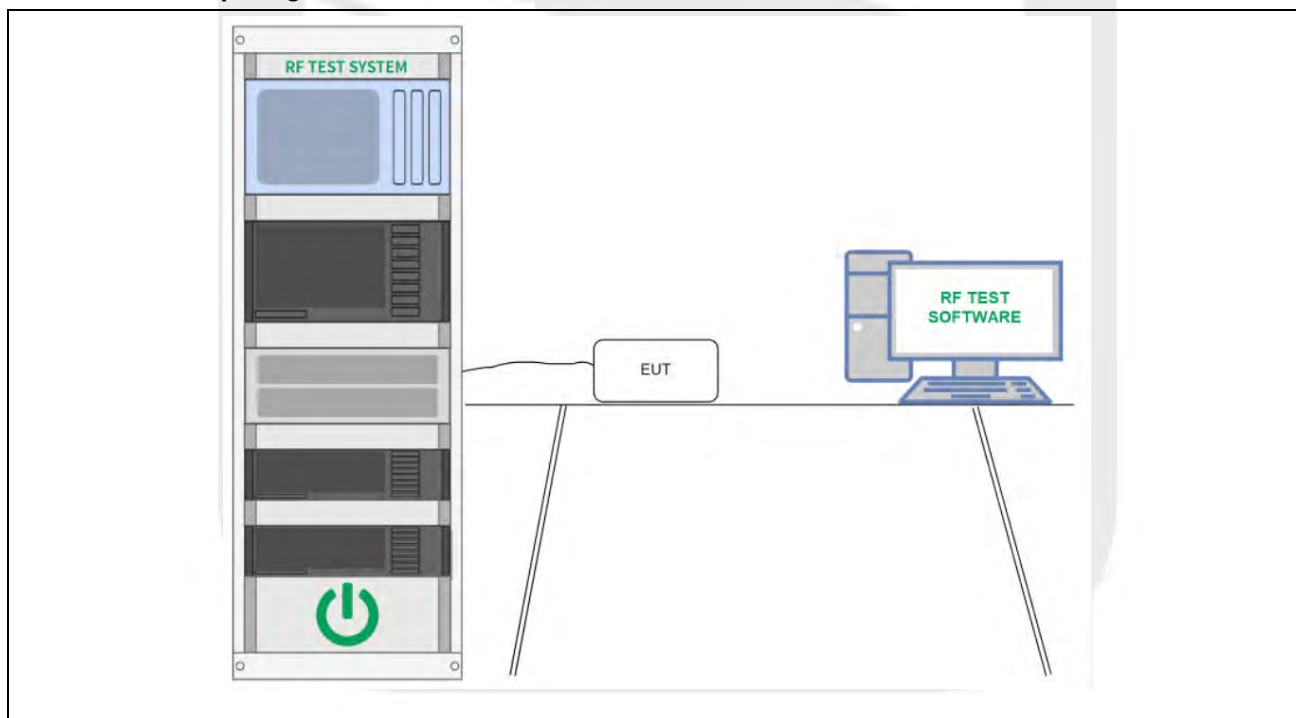
Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	ANSI C63.10-2020+Cor 1-2023, section 7.8.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	The dwell time per hop on a channel is the time from the start of the first transmission to the end of the last transmission for that hop. If the device has a single transmission per hop then the dwell time is the duration of that transmission. If the device has a multiple transmissions per hop then the dwell time is measured from the start of the first transmission to the end of the last transmission. The time of occupancy is the total time that the device dwells on a channel over an observation period specified in the regulatory requirement. To determine the time of occupancy the spectrum analyzer will be configured to measure both the dwell time per hop and the number of times the device transmits on a specific channel in a given period. The EUT shall have its hopping function enabled. Compliance with the requirements shall be made with the minimum and with the maximum number of channels enabled. If the dwell time per channel does not vary with the number of channels then compliance with the requirements may be based on the minimum number of channels. If the device supports different dwell times per channel (example Bluetooth devices can dwell on a channel for 1, 3 or 5 time slots) then measurements can be limited to the longest dwell time with the minimum number of channels. Use the following spectrum analyzer settings to determine the dwell time per hop: a) Span: Zero span, centered on a hopping channel. b) RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected transmission time per hop. c) Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = $1/\text{hopping rate}$) should achieve this. d) Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel. e) Detector function: Peak. f) Trace: Clear-write, single sweep. g) Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers. To determine the number of hops on a channel in the regulatory observation period repeat the measurement using a longer sweep time. When the device uses a single hopping sequence the period of measurement should be sufficient to capture at least 2 hops. When the device uses a dynamic hopping sequence, or the sequence varies, the period of measurement may need to capture multiple

	hops to better determine the average time of occupancy. Count the number of hops on the channel across the sweep time. The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with an analyzer sweep time of 500 ms and the regulatory observation period is 10 s, then the number of hops in that ten seconds is $3 / 0.5 \times 10$, or 60 hops. The average time of occupancy is calculated by multiplying the dwell time per hop by the number of hops in the observation period.
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6.6.2 E.U.T. Operation

Pre test mode:	TM4, TM5, TM6
Final test mode:	TM4, TM5, TM6

6.6.3 Test Setup Diagram



6.6.4 Test Data

PASS.

Please refer to Annex D for details.

6.7 Emissions in non-restricted frequency bands

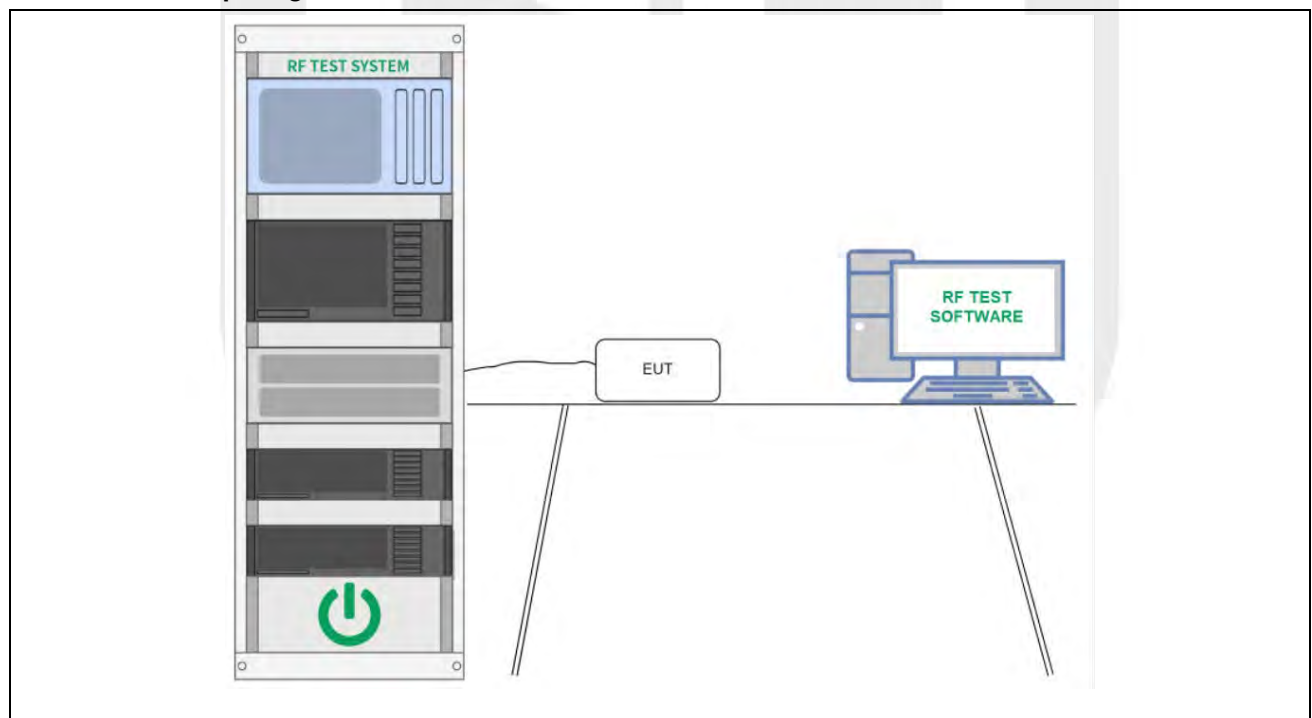
6.7.1 Test Specification

Test Requirement:	47 CFR 15.247(d)
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2020+Cor 1-2023 section 7.8.7 KDB 558074 D01 15.247 Meas Guidance v05r02

6.7.2 E.U.T. Operation

Pre test mode:	TM1, TM2, TM3, TM4, TM5, TM6
Final test mode:	TM1, TM2, TM3, TM4, TM5, TM6

6.7.3 Test Setup Diagram



6.7.4 Test Data

PASS.

Please refer to Annex D for details.

6.8 Band edge emissions (Radiated)

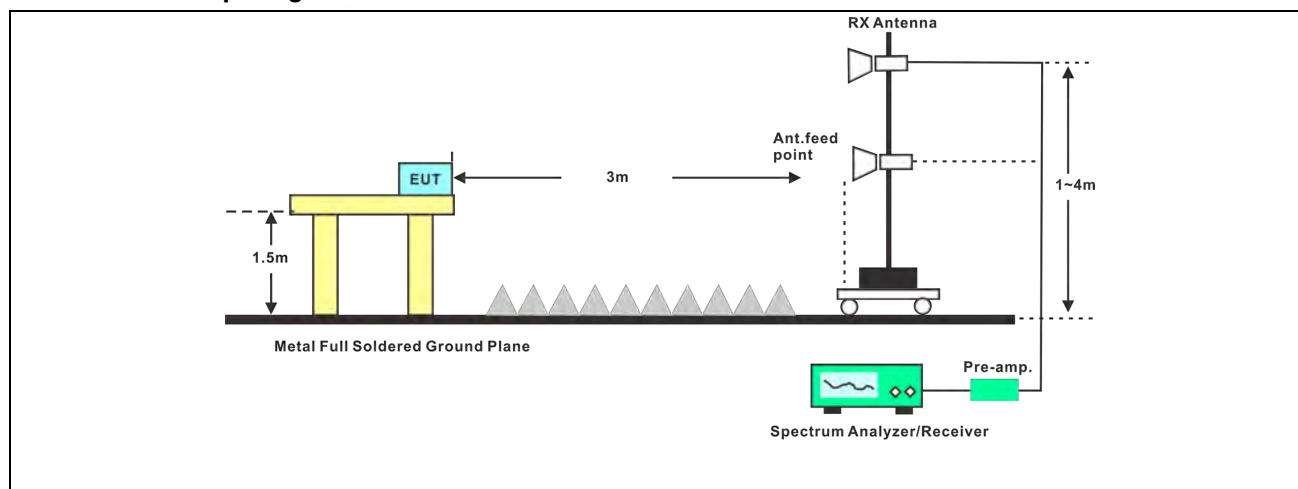
6.8.1 Test Specification

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.			
Test Method:	ANSI C63.10-2020+Cor 1-2023 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02		
Procedure:	ANSI C63.10-2020+Cor 1-2023 section 6.10.5.2		

6.8.2 E.U.T. Operation

Pre test mode:	TM1, TM2, TM3
Final test mode:	TM1, TM2, TM3

6.8.3 Test Setup Diagram



6.8.4 Test Data

PASS.

Please refer to the following pages.



Band Edge Emissions (Restricted frequency bands):

Test Mode: GFSK					CH Low: 2402 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	2310.00	42.14	-2.81	39.33	74.00	-34.67	PK	PASS
H	2390.00	47.88	-2.69	45.19	74.00	-28.81	PK	PASS
H	**2400.00	62.49	-2.68	59.81	74.00	-14.19	PK	PASS
V	2310.00	42.23	-2.81	39.42	74.00	-34.58	PK	PASS
V	2390.00	48.97	-2.69	46.28	74.00	-27.72	PK	PASS
V	**2400.00	60.90	-2.68	58.22	74.00	-15.78	PK	PASS
H	2310.00	34.29	-2.81	31.48	54.00	-22.52	AV	PASS
H	2390.00	34.12	-2.69	31.43	54.00	-22.57	AV	PASS
H	**2400.00	46.03	-2.68	43.35	54.00	-10.65	AV	PASS
V	2310.00	31.65	-2.81	28.84	54.00	-25.16	AV	PASS
V	2390.00	35.31	-2.69	32.62	54.00	-21.38	AV	PASS
V	**2400.00	47.72	-2.68	45.04	54.00	-8.96	AV	PASS

Test Mode: GFSK					CH High: 2480 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	**2483.50	48.99	-2.56	46.43	74.00	-27.57	PK	PASS
H	2500.00	49.50	-2.54	46.96	74.00	-27.04	PK	PASS
V	**2483.50	48.39	-2.56	45.83	74.00	-28.17	PK	PASS
V	2500.00	49.85	-2.54	47.31	74.00	-26.69	PK	PASS
H	**2483.50	37.17	-2.56	34.61	54.00	-19.39	AV	PASS
H	2500.00	39.80	-2.54	37.26	54.00	-16.74	AV	PASS
V	**2483.50	35.29	-2.56	32.73	54.00	-21.27	AV	PASS
V	2500.00	40.04	-2.54	37.50	54.00	-16.50	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

Band Edge Emissions (Restricted frequency bands):

Test Mode: $\pi/4$ DQPSK					CH Low: 2402 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	2310.00	43.69	-2.81	40.88	74.00	-33.12	PK	PASS
H	2390.00	47.52	-2.69	44.83	74.00	-29.17	PK	PASS
H	**2400.00	61.66	-2.68	58.98	74.00	-15.02	PK	PASS
V	2310.00	44.08	-2.81	41.27	74.00	-32.73	PK	PASS
V	2390.00	48.56	-2.69	45.87	74.00	-28.13	PK	PASS
V	**2400.00	61.07	-2.68	58.39	74.00	-15.61	PK	PASS
H	2310.00	34.23	-2.81	31.42	54.00	-22.58	AV	PASS
H	2390.00	34.05	-2.69	31.36	54.00	-22.64	AV	PASS
H	**2400.00	45.47	-2.68	42.79	54.00	-11.21	AV	PASS
V	2310.00	33.89	-2.81	31.08	54.00	-22.92	AV	PASS
V	2390.00	34.50	-2.69	31.81	54.00	-22.19	AV	PASS
V	**2400.00	46.02	-2.68	43.34	54.00	-10.66	AV	PASS

Test Mode: $\pi/4$ DQPSK					CH High: 2480 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	**2483.50	46.08	-2.56	43.52	74.00	-30.48	PK	PASS
H	2500.00	51.40	-2.54	48.86	74.00	-25.14	PK	PASS
V	**2483.50	47.39	-2.56	44.83	74.00	-29.17	PK	PASS
V	2500.00	50.62	-2.54	48.08	74.00	-25.92	PK	PASS
H	**2483.50	38.89	-2.56	36.33	54.00	-17.67	AV	PASS
H	2500.00	39.00	-2.54	36.46	54.00	-17.54	AV	PASS
V	**2483.50	35.29	-2.56	32.73	54.00	-21.27	AV	PASS
V	2500.00	40.62	-2.54	38.08	54.00	-15.92	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

Band Edge Emissions (Restricted frequency bands):

Test Mode: 8DPSK					CH Low: 2402 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	2310.00	42.25	-2.81	39.44	74.00	-34.56	PK	PASS
H	2390.00	47.51	-2.69	44.82	74.00	-29.18	PK	PASS
H	**2400.00	60.92	-2.68	58.24	74.00	-15.76	PK	PASS
V	2310.00	42.78	-2.81	39.97	74.00	-34.03	PK	PASS
V	2390.00	48.11	-2.69	45.42	74.00	-28.58	PK	PASS
V	**2400.00	60.35	-2.68	57.67	74.00	-16.33	PK	PASS
H	2310.00	31.96	-2.81	29.15	54.00	-24.85	AV	PASS
H	2390.00	36.19	-2.69	33.50	54.00	-20.50	AV	PASS
H	**2400.00	46.25	-2.68	43.57	54.00	-10.43	AV	PASS
V	2310.00	33.63	-2.81	30.82	54.00	-23.18	AV	PASS
V	2390.00	34.58	-2.69	31.89	54.00	-22.11	AV	PASS
V	**2400.00	46.64	-2.68	43.96	54.00	-10.04	AV	PASS

Test Mode: 8DPSK					CH High: 2480 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	**2483.50	45.65	-2.56	43.09	74.00	-30.91	PK	PASS
H	2500.00	49.63	-2.54	47.09	74.00	-26.91	PK	PASS
V	**2483.50	47.73	-2.56	45.17	74.00	-28.83	PK	PASS
V	2500.00	47.91	-2.54	45.37	74.00	-28.63	PK	PASS
H	**2483.50	38.32	-2.56	35.76	54.00	-18.24	AV	PASS
H	2500.00	37.96	-2.54	35.42	54.00	-18.58	AV	PASS
V	**2483.50	37.39	-2.56	34.83	54.00	-19.17	AV	PASS
V	2500.00	38.95	-2.54	36.41	54.00	-17.59	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

6.9 Emissions in frequency bands (below 1GHz)

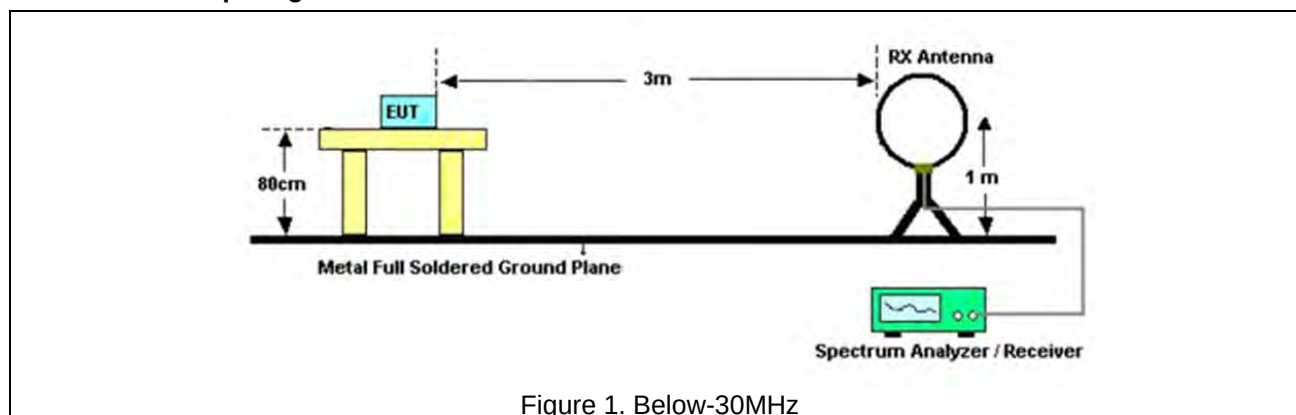
6.9.1 Test Specification

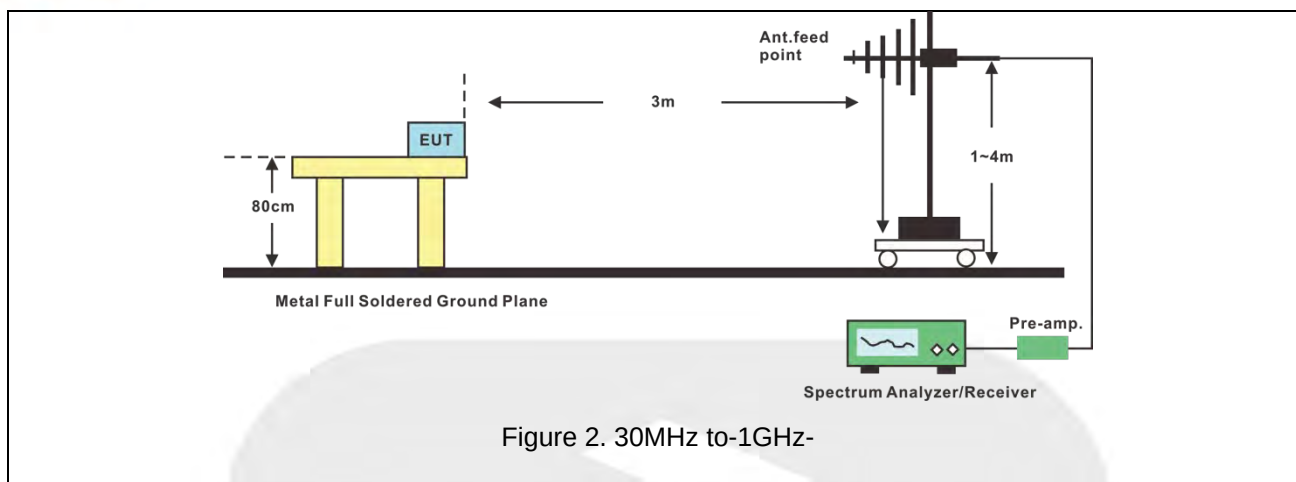
Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.			
Test Method:	ANSI C63.10-2020+Cor 1-2023 section 6.5.4 KDB 558074 D01 15.247 Meas Guidance v05r02		
Procedure:	ANSI C63.10-2020+Cor 1-2023 section 6.5.4		

6.9.2 E.U.T. Operation

Pre test mode:	TM1, TM2, TM3, TM4, TM5, TM6
Final test mode:	TM1, TM2, TM3, TM4, TM5, TM6

6.9.3 Test Setup Diagram





6.9.4 Test Data

PASS.

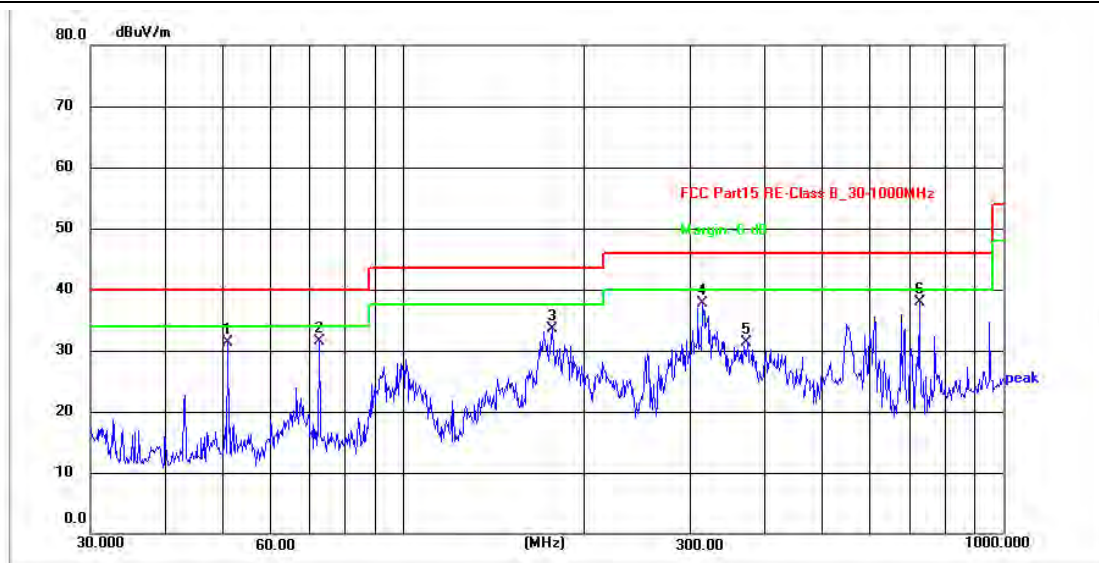
The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, for 30MHz to 1000MHz, pre-scan all modulations, and found the GFSK modulation Low channel which is the worst case, only the worst case is recorded in the report.

Emissions in frequency bands (below 1GHz) Test Data

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: XY65S-240250VQ-UW

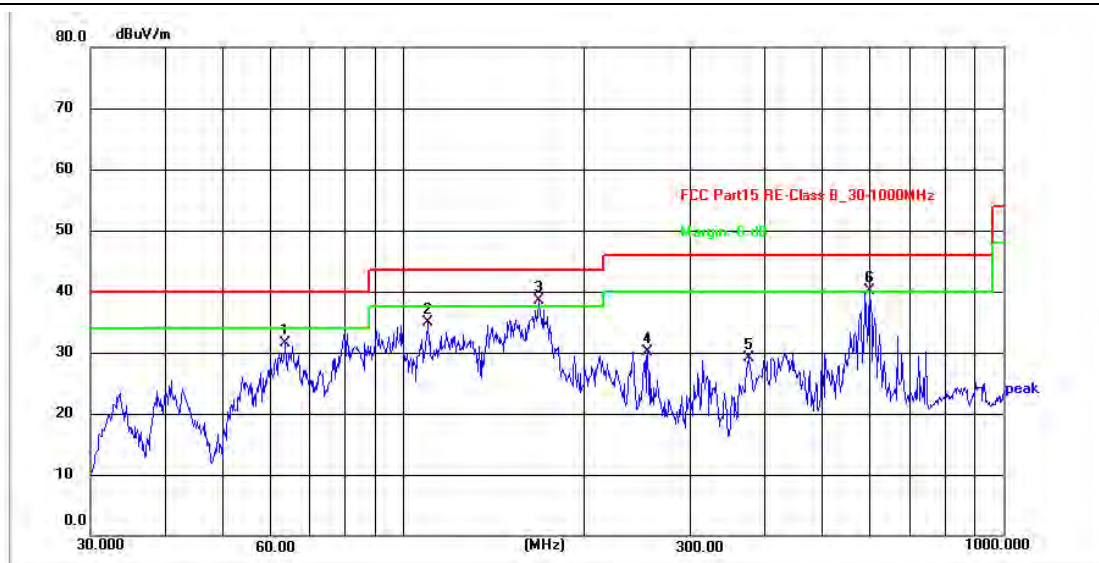


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	50.7635	48.74	-17.39	31.35	40.00	-8.65	QP	P	
2	72.3375	53.23	-21.66	31.57	40.00	-8.43	QP	P	
3	176.8874	53.39	-19.89	33.50	43.50	-10.00	QP	P	
4	314.3763	52.92	-15.20	37.72	46.00	-8.28	QP	P	
5	373.3110	44.89	-13.54	31.35	46.00	-14.65	QP	P	
6 *	724.2610	44.73	-6.74	37.99	46.00	-8.01	QP	P	

Emissions in frequency bands (below 1GHz) Test Data

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: XY65S-240250VQ-UW

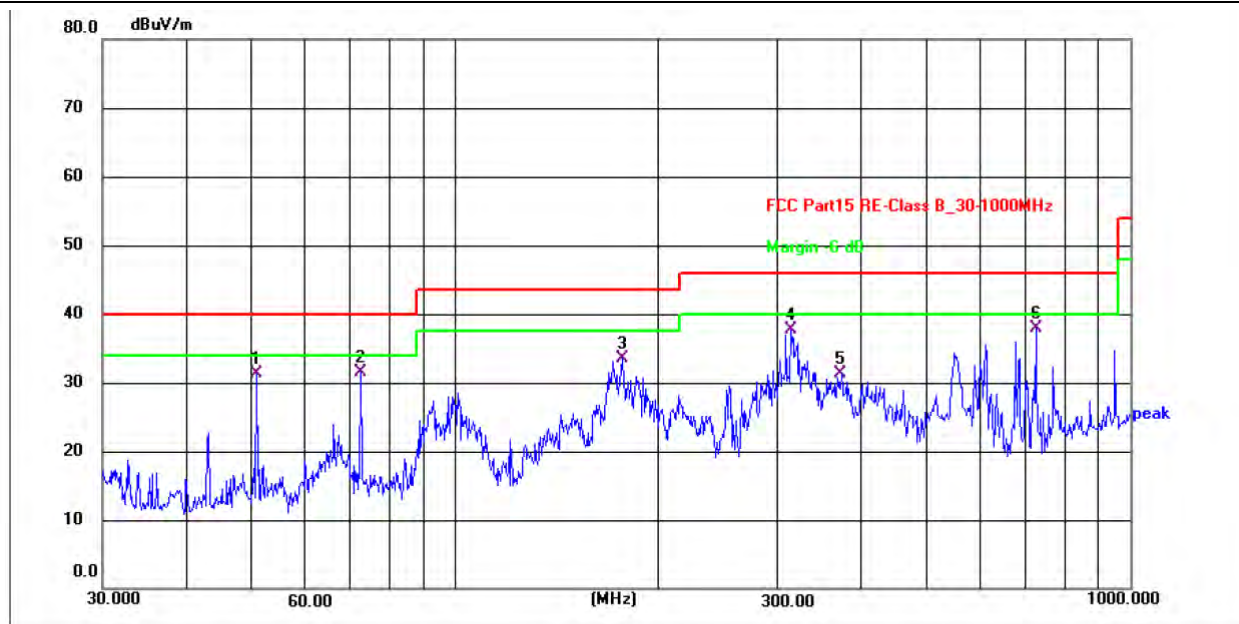


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	63.3132	50.55	-19.07	31.48	40.00	-8.52	QP	P	
2	109.7960	54.11	-19.21	34.90	43.50	-8.60	QP	P	
3 *	167.8240	58.97	-20.52	38.45	43.50	-5.05	QP	P	
4	254.7281	46.84	-16.80	30.04	46.00	-15.96	QP	P	
5	374.6225	42.70	-13.52	29.18	46.00	-16.82	QP	P	
6 †	599.3211	48.13	-8.11	40.02	46.00	-5.98	QP	P	

Emissions in frequency bands (below 1GHz) Test Data

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: 20202M-240250U

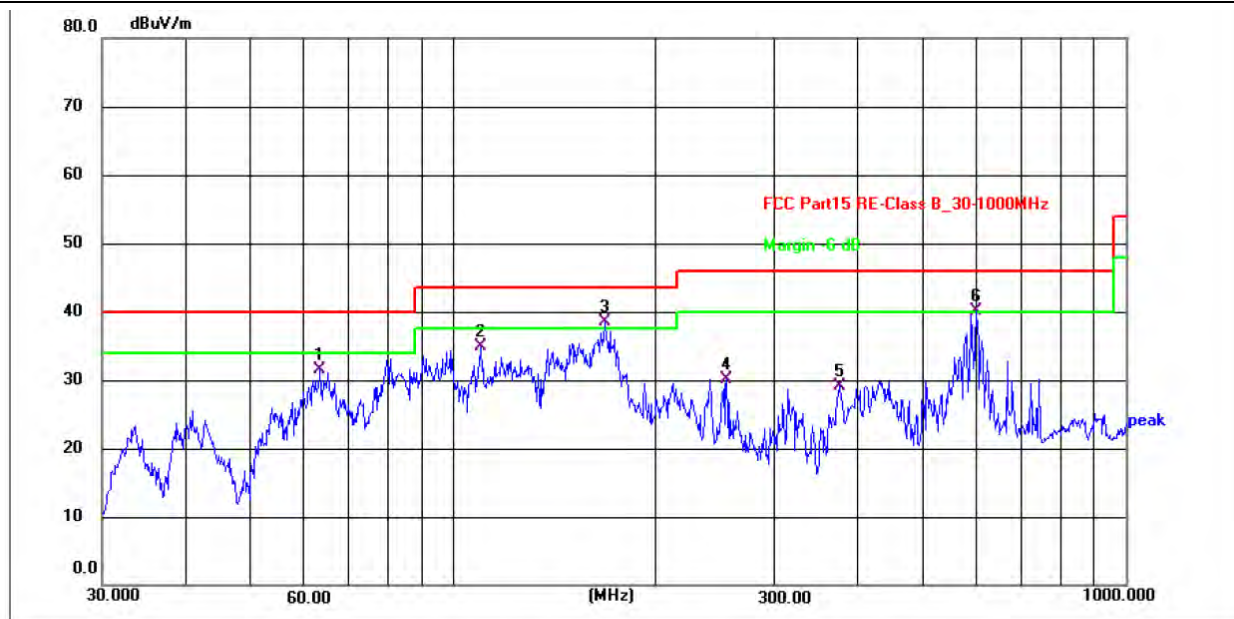


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	50.7635	48.74	-17.39	31.35	40.00	-8.65	QP	P	
2	72.3375	53.23	-21.66	31.57	40.00	-8.43	QP	P	
3	176.8874	53.39	-19.89	33.50	43.50	-10.00	QP	P	
4	314.3763	52.92	-15.20	37.72	46.00	-8.28	QP	P	
5	373.3110	44.89	-13.54	31.35	46.00	-14.65	QP	P	
6 *	724.2610	44.73	-6.74	37.99	46.00	-8.01	QP	P	

Emissions in frequency bands (below 1GHz) Test Data

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L

Adapter: 20202M-240250U



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	63.3132	50.55	-19.07	31.48	40.00	-8.52	QP	P	
2	109.7960	54.11	-19.21	34.90	43.50	-8.60	QP	P	
3 *	167.8240	58.97	-20.52	38.45	43.50	-5.05	QP	P	
4	254.7281	46.84	-16.80	30.04	46.00	-15.96	QP	P	
5	374.6225	42.70	-13.52	29.18	46.00	-16.82	QP	P	
6 !	599.3211	48.13	-8.11	40.02	46.00	-5.98	QP	P	

6.10 Emissions in frequency bands (above 1GHz)

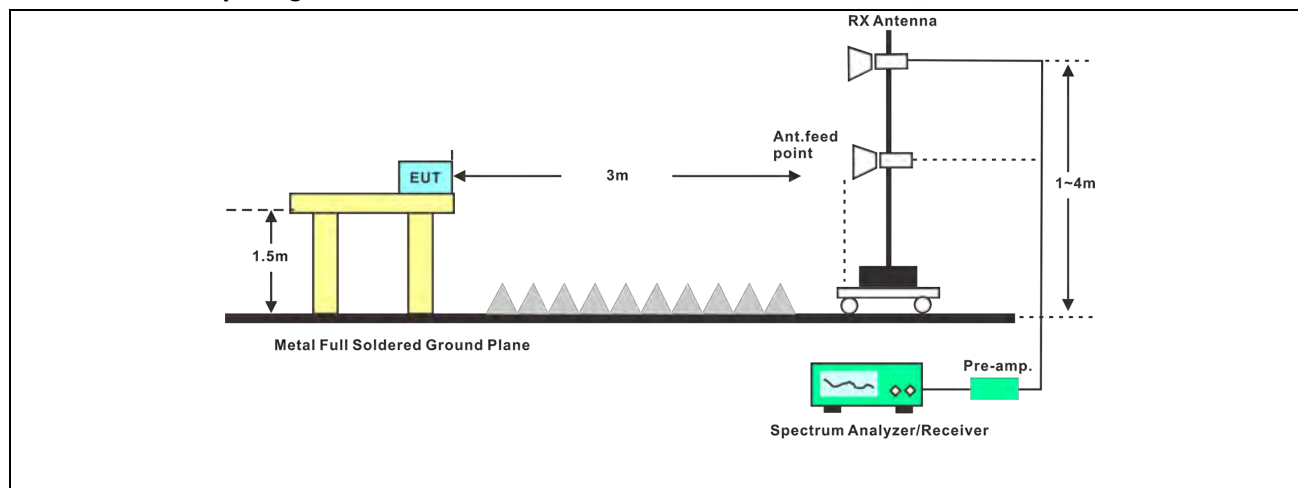
6.10.1 Test Specification

Test Requirement:	Refer to 47 CFR 15.247(d), in addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).		
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.			
Test Method:	ANSI C63.10-2020+Cor 1-2023 section 6.5.4 KDB 558074 D01 15.247 Meas Guidance v05r02		
Procedure:	ANSI C63.10-2020+Cor 1-2023 section 6.5.4		

6.10.2 E.U.T. Operation

Pre test mode:	TM1, TM2, TM3
Final test mode:	TM1, TM2, TM3

6.10.3 Test Setup Diagram



6.10.4 Test Data**PASS.**

During the test, for 1GHz- 25GHz, pre-scan all modulations, and found the GFSK modulation which is the worst case, only the worst case is recorded in the report.



Radiated Spurious Emission (1GHz-25GHz)

Test Mode: GFSK					CH Low: 2402 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	4804.01	41.13	4.68	45.81	74.00	-28.20	PK	PASS
V	7206.63	33.58	9.84	43.42	74.00	-30.58	PK	PASS
V	9608.79	29.94	13.17	43.11	74.00	-30.89	PK	PASS
V	12010.10	*	*	*	74.00	*	PK	PASS
V	14412.93	*	*	*	74.00	*	PK	PASS
V	16814.96	*	*	*	74.00	*	PK	PASS
H	4804.61	40.40	4.68	45.08	74.00	-28.93	PK	PASS
H	7206.73	34.77	9.84	44.61	74.00	-29.39	PK	PASS
H	9608.38	28.53	13.17	41.70	74.00	-32.30	PK	PASS
H	12010.82	*	*	*	74.00	*	PK	PASS
H	14412.75	*	*	*	74.00	*	PK	PASS
H	16814.47	*	*	*	74.00	*	PK	PASS
V	4804.30	30.81	4.68	35.49	54.00	-18.52	AV	PASS
V	7206.16	23.68	9.84	33.52	54.00	-20.48	AV	PASS
V	9608.42	19.38	13.17	32.55	54.00	-21.45	AV	PASS
V	12010.74	*	*	*	54.00	*	AV	PASS
V	14412.15	*	*	*	54.00	*	AV	PASS
V	16814.59	*	*	*	54.00	*	AV	PASS
H	4804.41	32.56	4.68	37.24	54.00	-16.77	AV	PASS
H	7206.73	24.72	9.84	34.56	54.00	-19.45	AV	PASS
H	9608.38	18.55	13.17	31.72	54.00	-22.29	AV	PASS
H	12010.82	*	*	*	54.00	*	AV	PASS
H	14412.75	*	*	*	54.00	*	AV	PASS
H	16814.47	*	*	*	54.00	*	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Radiated Spurious Emission (1GHz-25GHz)

Test Mode: GFSK					CH Middle: 2441 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	4882.67	40.05	4.92	44.97	74.00	-29.03	PK	PASS
V	7323.71	35.78	9.83	45.61	74.00	-28.39	PK	PASS
V	9764.43	30.47	13.22	43.69	74.00	-30.32	PK	PASS
V	12205.76	*	*	*	74.00	*	PK	PASS
V	14646.99	*	*	*	74.00	*	PK	PASS
V	17087.17	*	*	*	74.00	*	PK	PASS
H	4882.64	42.28	4.92	47.20	74.00	-26.80	PK	PASS
H	7323.76	33.93	9.83	43.76	74.00	-30.25	PK	PASS
H	9764.37	30.90	13.22	44.12	74.00	-29.89	PK	PASS
H	12205.47	*	*	*	74.00	*	PK	PASS
H	14646.32	*	*	*	74.00	*	PK	PASS
H	17087.79	*	*	*	74.00	*	PK	PASS
V	4882.09	31.13	4.92	36.05	54.00	-17.95	AV	PASS
V	7323.44	23.45	9.83	33.28	54.00	-20.72	AV	PASS
V	9764.10	17.27	13.22	30.49	54.00	-23.51	AV	PASS
V	12205.34	*	*	*	54.00	*	AV	PASS
V	14646.43	*	*	*	54.00	*	AV	PASS
V	17087.33	*	*	*	54.00	*	AV	PASS
H	4882.64	30.85	4.92	35.77	54.00	-18.24	AV	PASS
H	7323.76	23.92	9.83	33.75	54.00	-20.25	AV	PASS
H	9764.37	18.28	13.22	31.50	54.00	-22.51	AV	PASS
H	12205.47	*	*	*	54.00	*	AV	PASS
H	14646.32	*	*	*	54.00	*	AV	PASS
H	17087.79	*	*	*	54.00	*	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Radiated Spurious Emission (1GHz-25GHz)

Test Mode: GFSK					CH High: 2480 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	4960.28	40.36	5.17	45.53	74.00	-28.48	PK	PASS
V	7440.57	35.68	9.83	45.51	74.00	-28.50	PK	PASS
V	9920.97	28.31	13.27	41.58	74.00	-32.43	PK	PASS
V	12400.08	*	*	*	74.00	*	PK	PASS
V	14880.56	*	*	*	74.00	*	PK	PASS
V	17360.39	*	*	*	74.00	*	PK	PASS
H	4960.91	42.71	5.17	47.88	74.00	-26.12	PK	PASS
H	7440.34	34.91	9.83	44.74	74.00	-29.27	PK	PASS
H	9920.88	29.01	13.27	42.28	74.00	-31.73	PK	PASS
H	12400.30	*	*	*	74.00	*	PK	PASS
H	14880.50	*	*	*	74.00	*	PK	PASS
H	17360.15	*	*	*	74.00	*	PK	PASS
V	4960.55	30.69	5.17	35.86	54.00	-18.15	AV	PASS
V	7440.57	22.58	9.83	32.41	54.00	-21.60	AV	PASS
V	9920.98	18.44	13.27	31.71	54.00	-22.29	AV	PASS
V	12400.53	*	*	*	54.00	*	AV	PASS
V	14880.05	*	*	*	54.00	*	AV	PASS
V	17360.90	*	*	*	54.00	*	AV	PASS
H	4960.91	31.89	5.17	37.06	54.00	-16.94	AV	PASS
H	7440.34	24.35	9.83	34.18	54.00	-19.82	AV	PASS
H	9920.88	17.09	13.27	30.36	54.00	-23.64	AV	PASS
H	12400.30	*	*	*	54.00	*	AV	PASS
H	14880.50	*	*	*	54.00	*	AV	PASS
H	17360.15	*	*	*	54.00	*	AV	PASS

Remark:

1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

ANNEX A TEST SETUP PHOTOS

Please refer to the document "8429EU012318W1-ANNEX A.PDF"

ANNEX B EXTERNAL PHOTOS

Please refer to the document "8429EU012318W1-ANNEX B.PDF"

ANNEX C INTERNAL PHOTOS

Please refer to the document "8429EU012318W1-ANNEX C.PDF"



ANNEX D TEST DATA

1. Duty Cycle

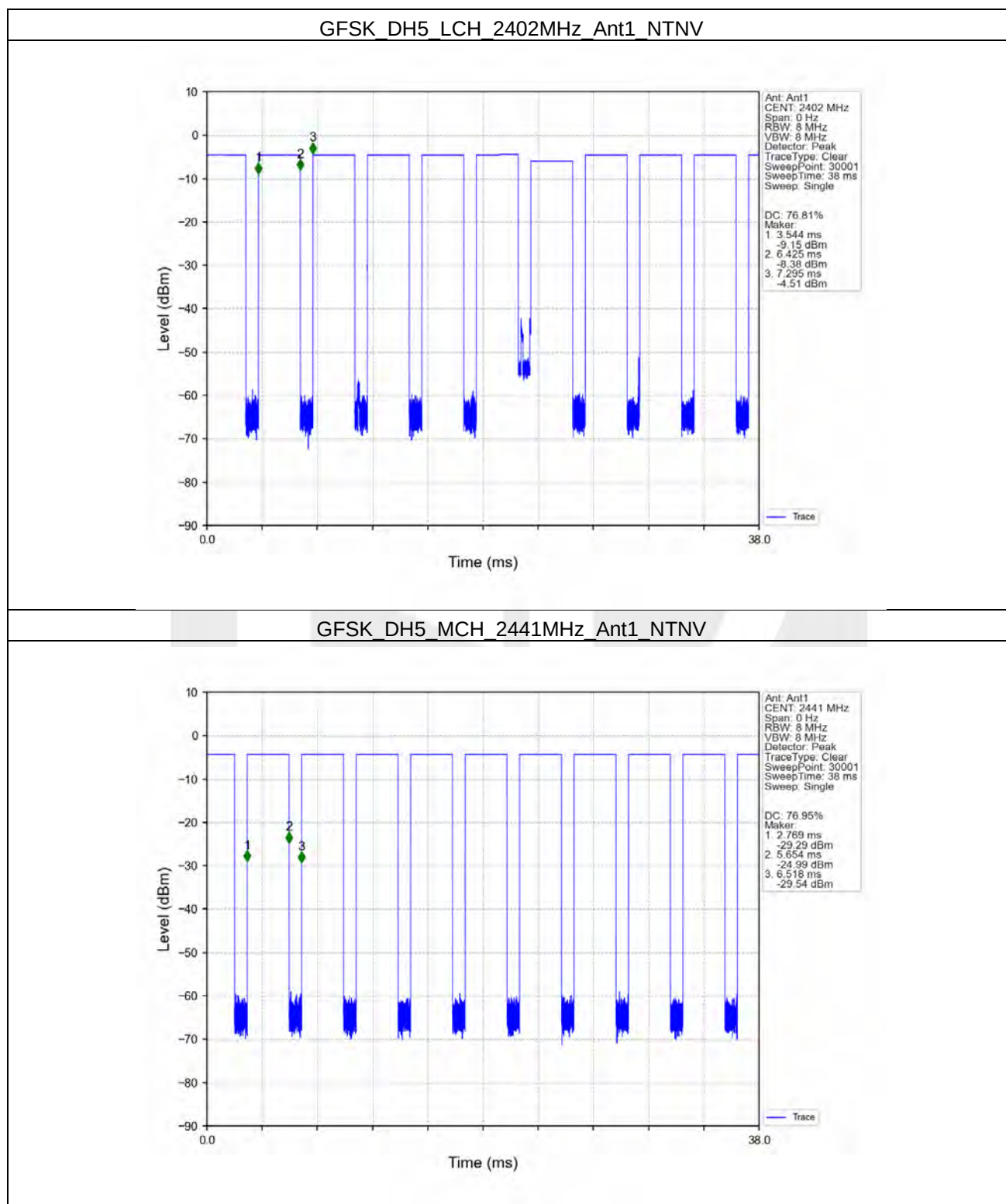
1.1 Test Result

1.1.1 Ant1

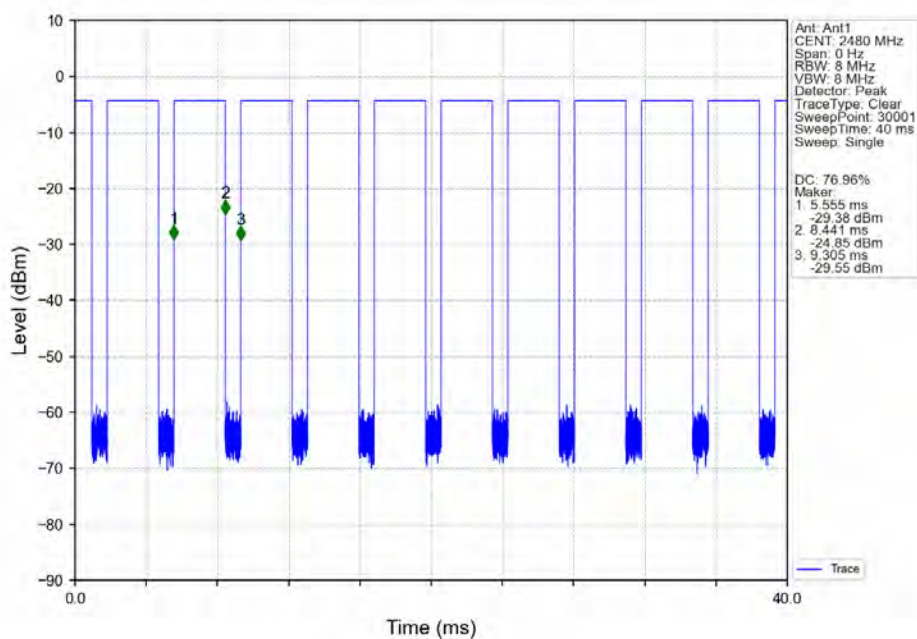
Ant1								
Mode	TX Type	Frequency (MHz)	Packet Type	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
GFSK	SISO	2402	DH5	2.881	3.751	76.81	1.15	0.03
		2441	DH5	2.885	3.749	76.95	1.14	0.03
		2480	DH5	2.886	3.750	76.96	1.14	0.03
$\pi/4$ DQPSK	SISO	2402	2DH5	2.891	3.749	77.11	1.13	0.01
		2441	2DH5	2.892	3.750	77.12	1.13	0.01
		2480	2DH5	2.892	3.750	77.12	1.13	0.01
8DPSK	SISO	2402	3DH5	2.895	3.750	77.20	1.12	0.04
		2441	3DH5	2.895	3.750	77.20	1.12	0.04
		2480	3DH5	2.895	3.750	77.20	1.12	0.03

1.2 Test Graph

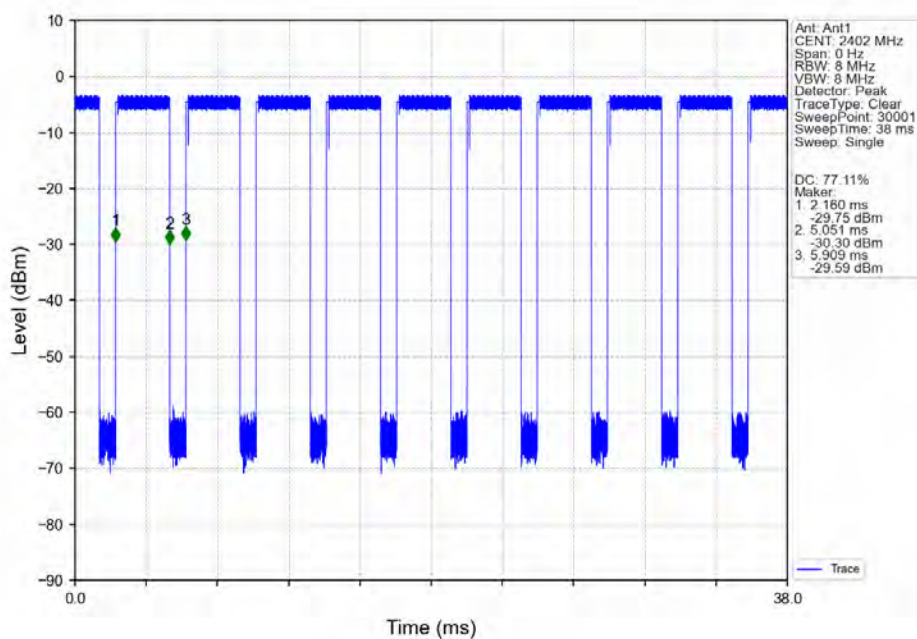
1.2.1 Ant1



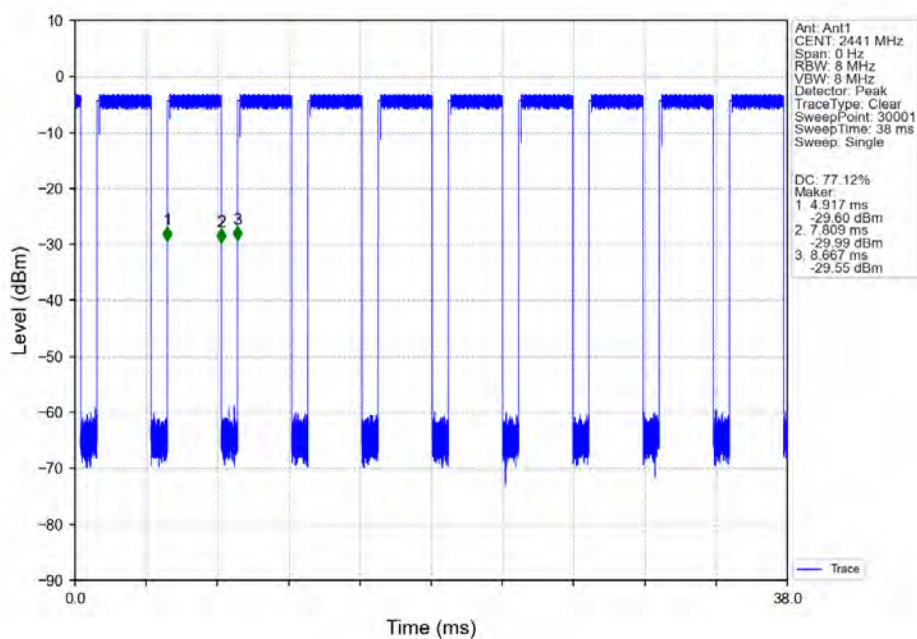
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



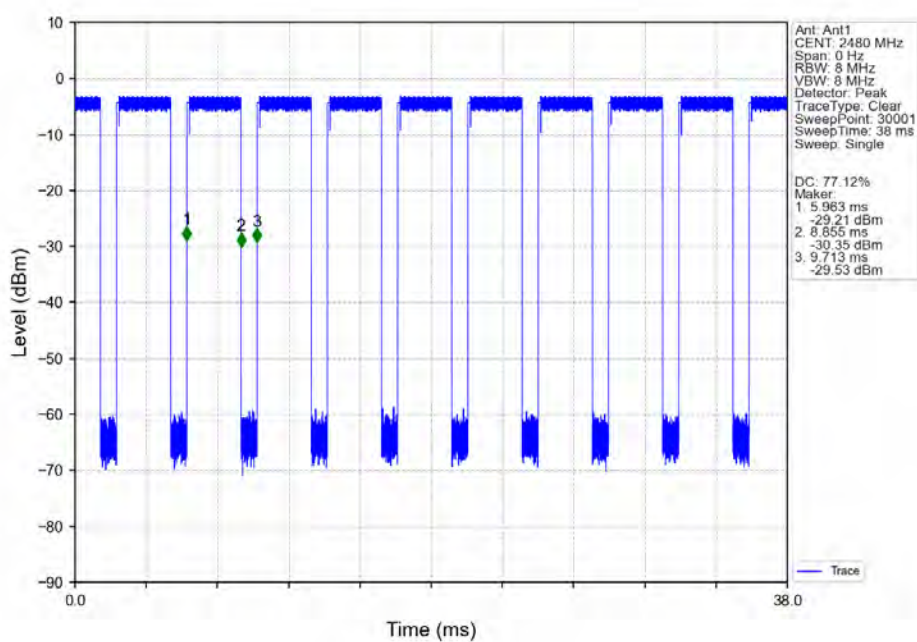
$\pi/4$ DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



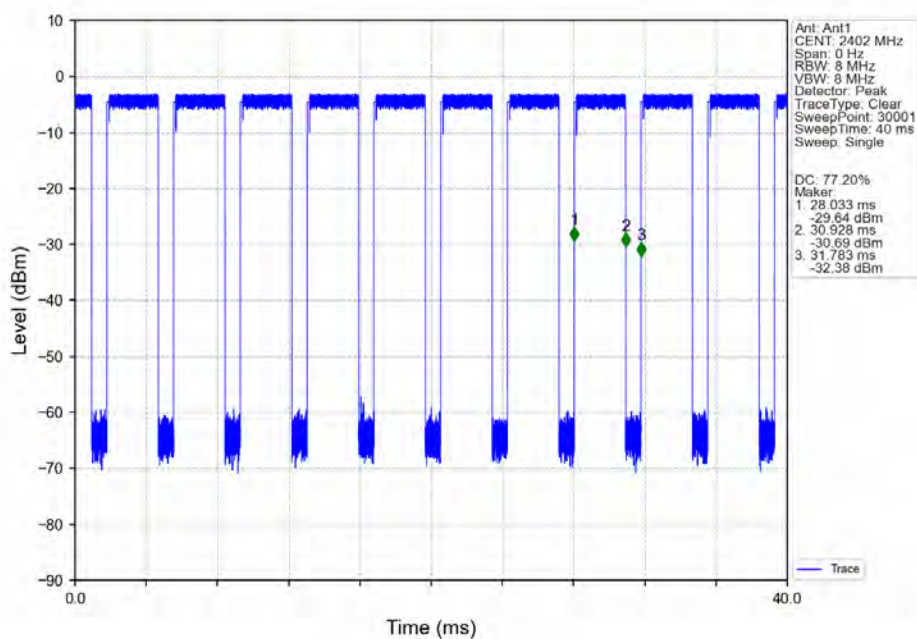
π /4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



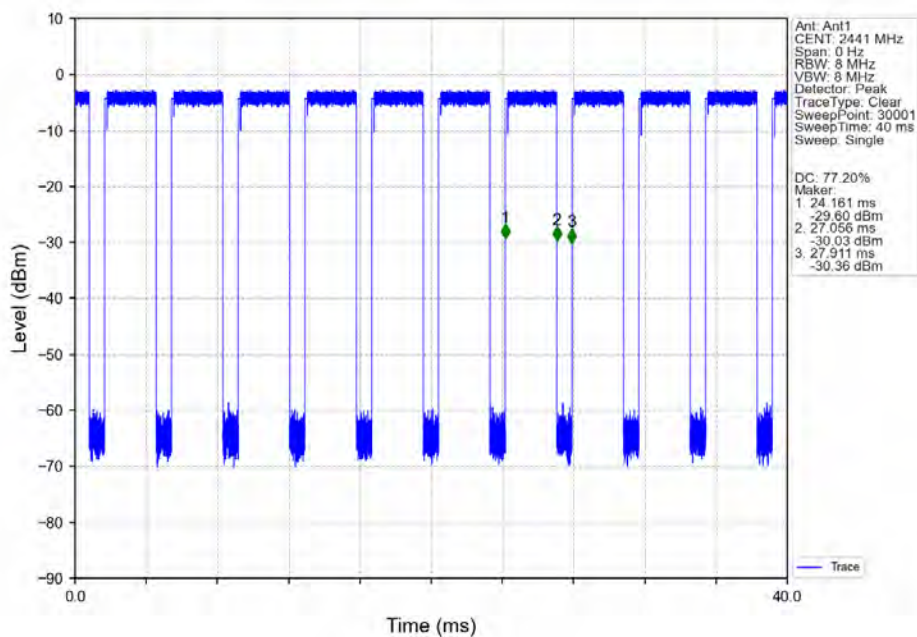
π /4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

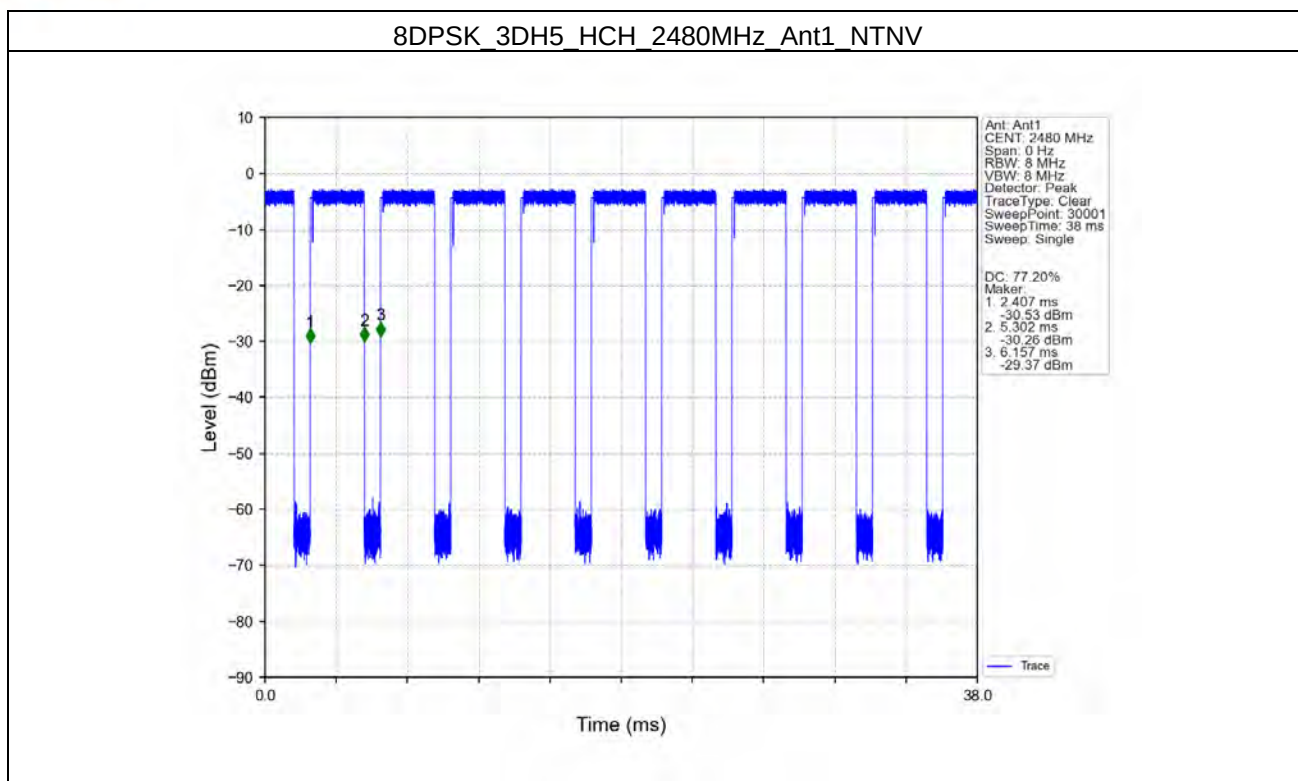


8DPSK 3DH5 LCH 2402MHz Ant1 NTN



8DPSK 3DH5 MCH 2441MHz Ant1 NTN





2. Bandwidth

2.1 Test Result

2.1.1 OBW

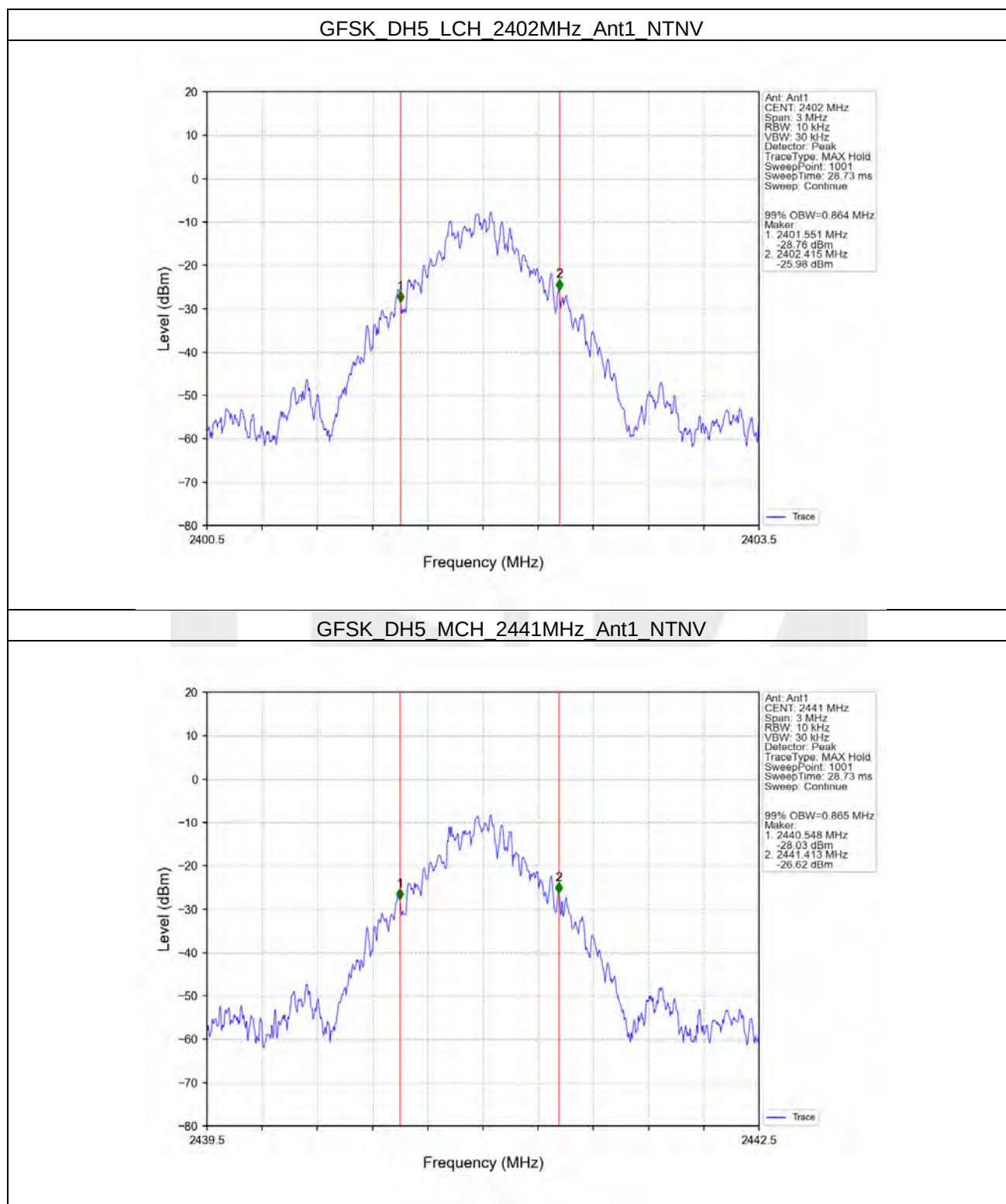
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.864	/	Pass
		2441	DH5	1	0.865	/	Pass
		2480	DH5	1	0.869	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.158	/	Pass
		2441	2DH5	1	1.158	/	Pass
		2480	2DH5	1	1.161	/	Pass
8DPSK	SISO	2402	3DH5	1	1.173	/	Pass
		2441	3DH5	1	1.176	/	Pass
		2480	3DH5	1	1.176	/	Pass

2.1.2 20dB BW

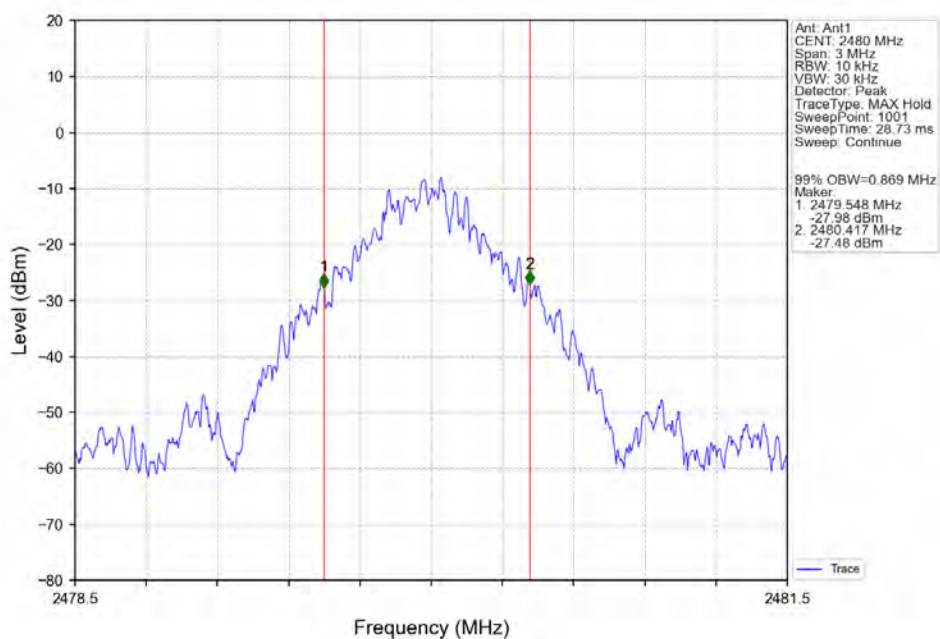
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.923	/	Pass
		2441	DH5	1	0.925	/	Pass
		2480	DH5	1	0.929	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.250	/	Pass
		2441	2DH5	1	1.255	/	Pass
		2480	2DH5	1	1.252	/	Pass
8DPSK	SISO	2402	3DH5	1	1.267	/	Pass
		2441	3DH5	1	1.269	/	Pass
		2480	3DH5	1	1.267	/	Pass

2.2 Test Graph

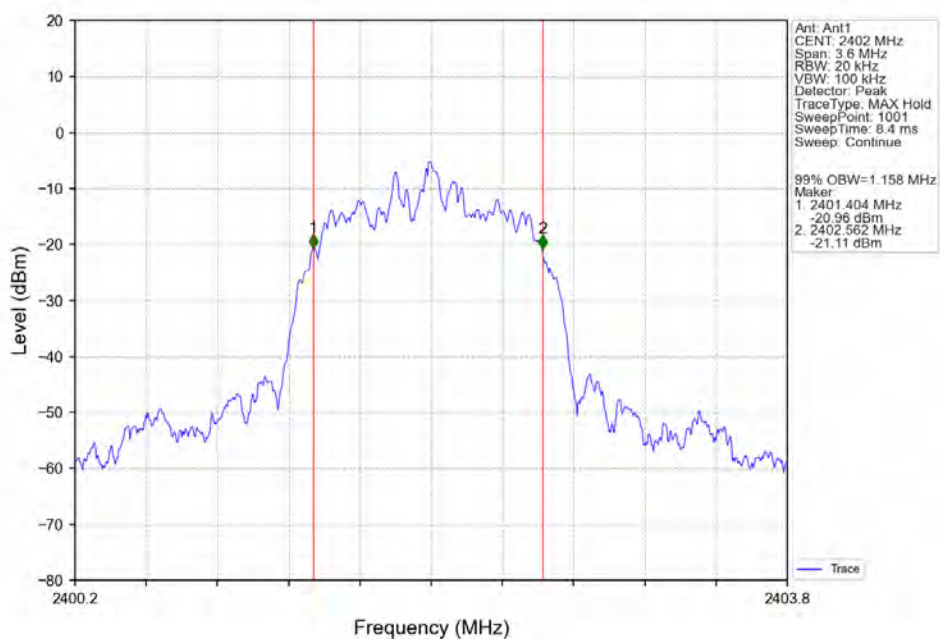
2.2.1 OBW



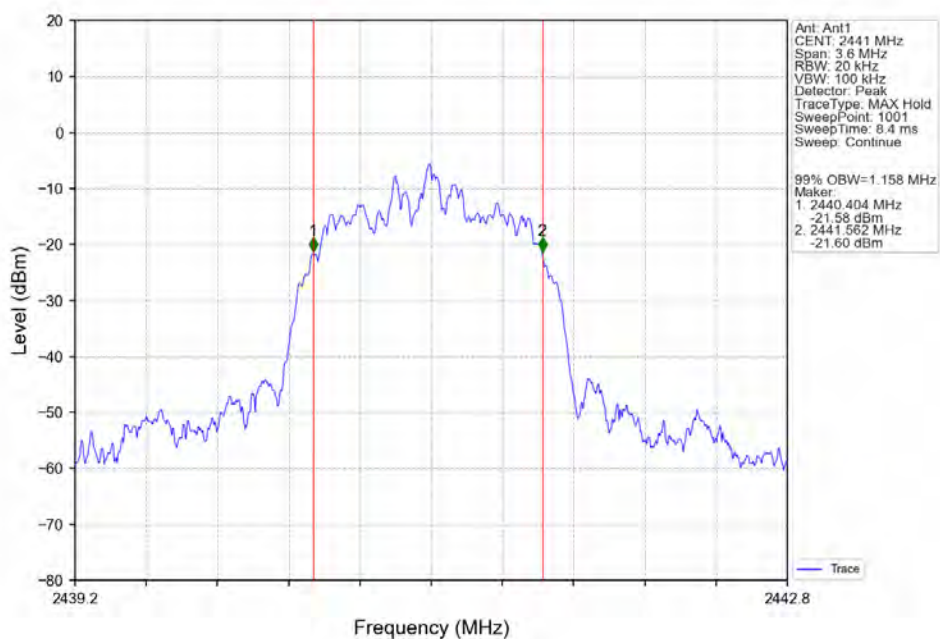
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



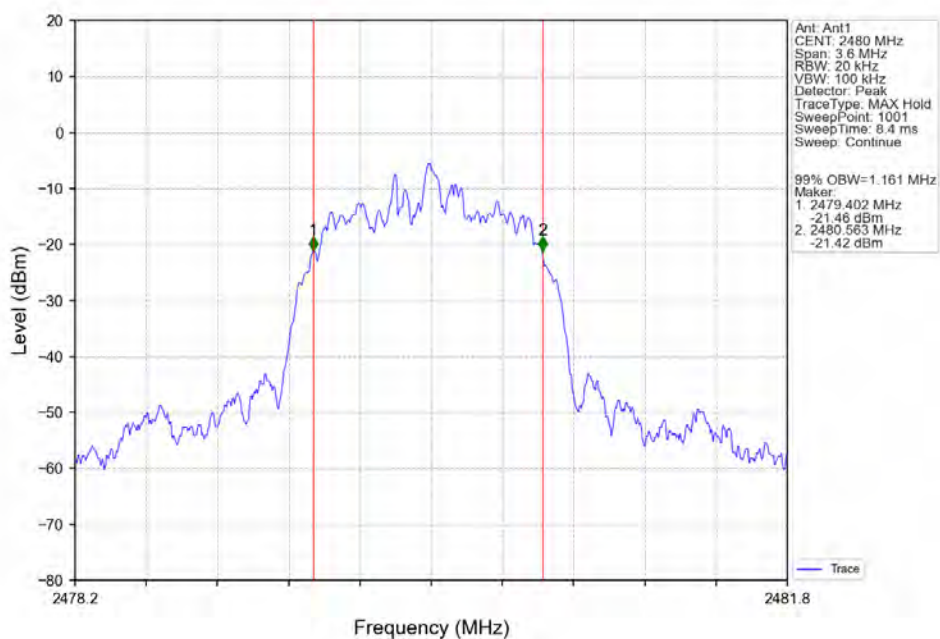
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



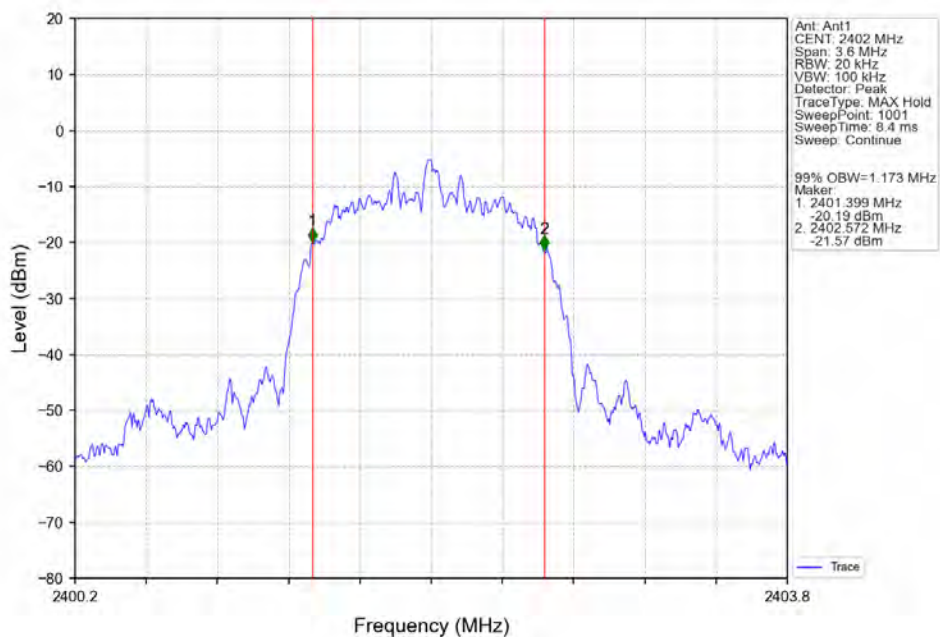
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



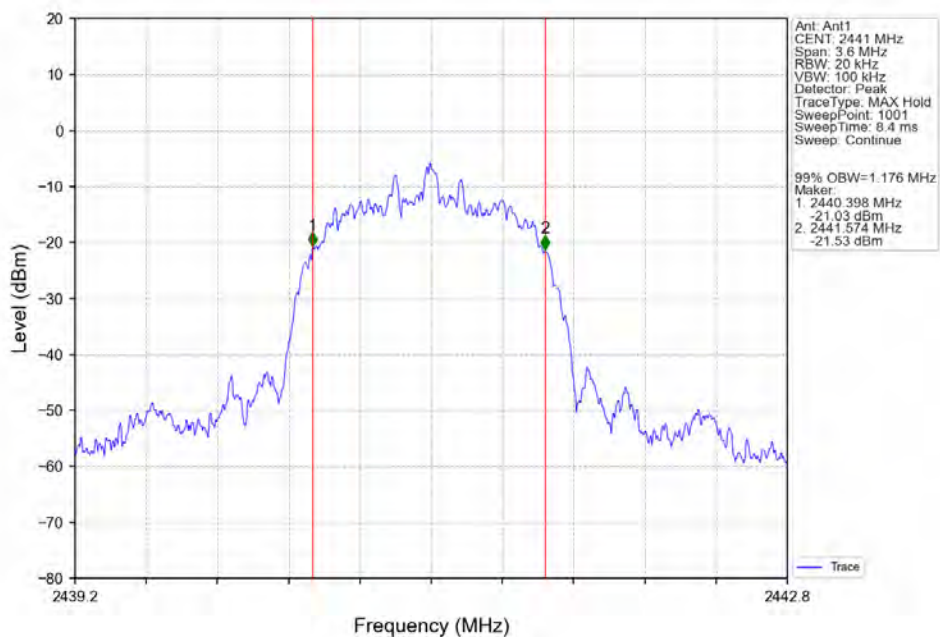
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

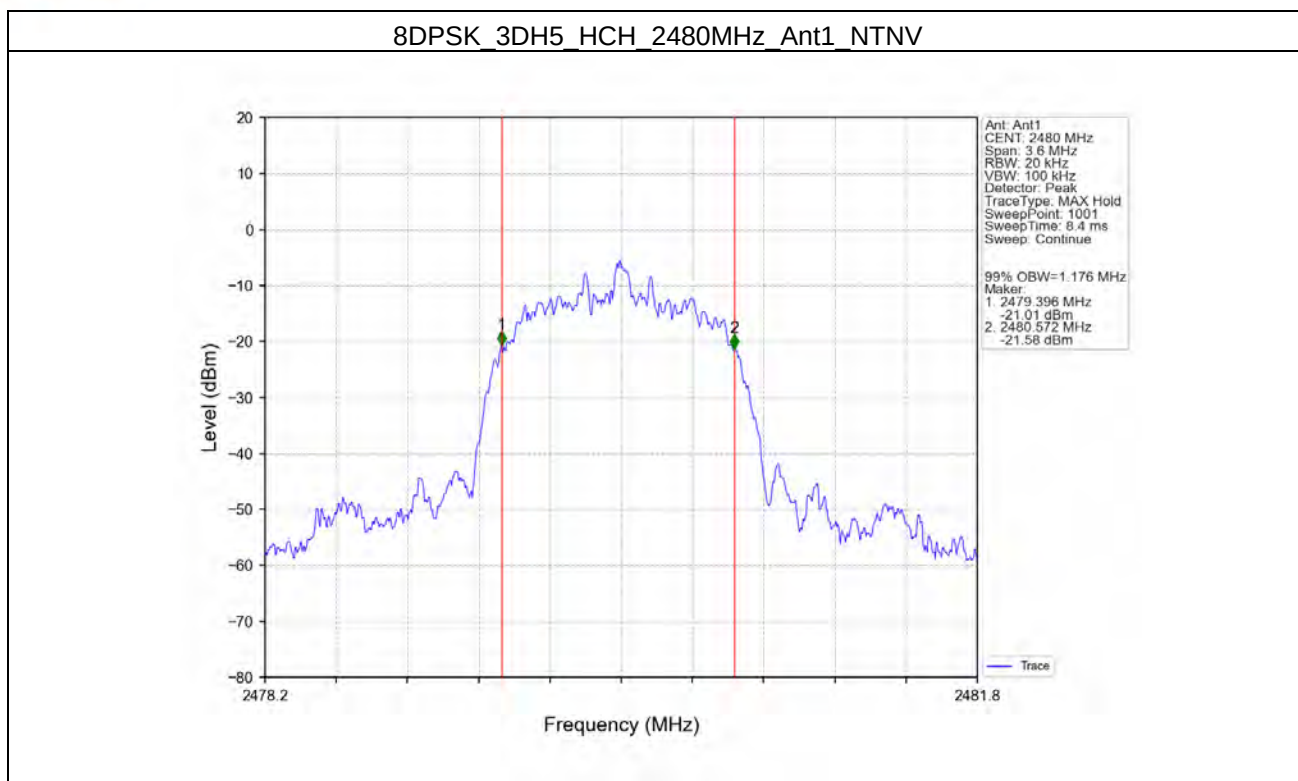


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

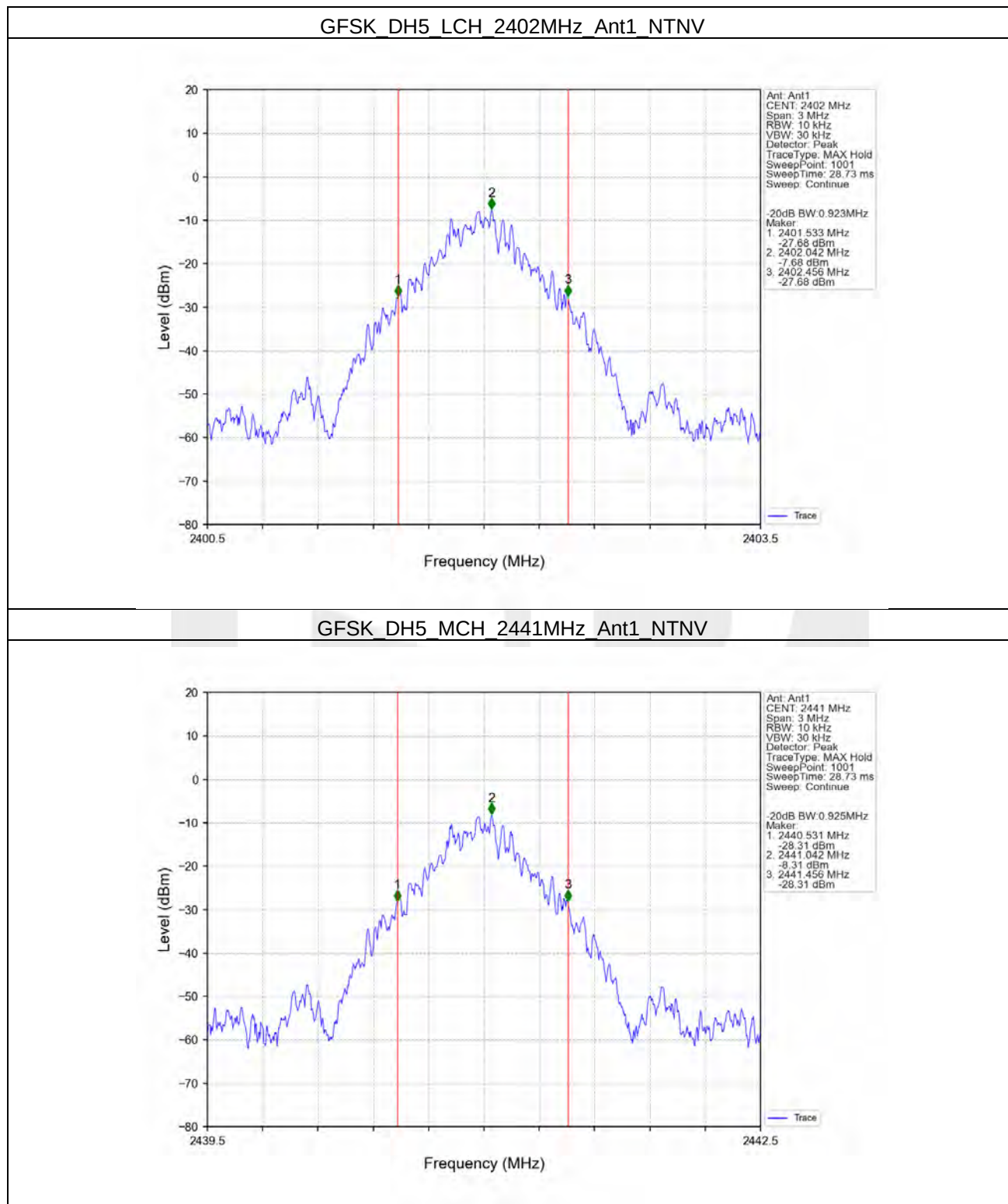


8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

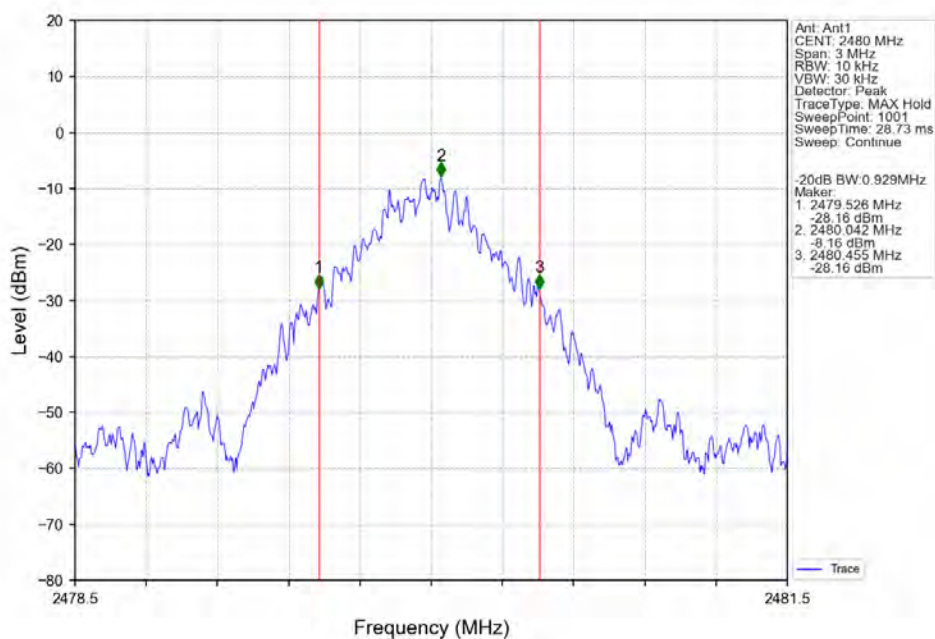




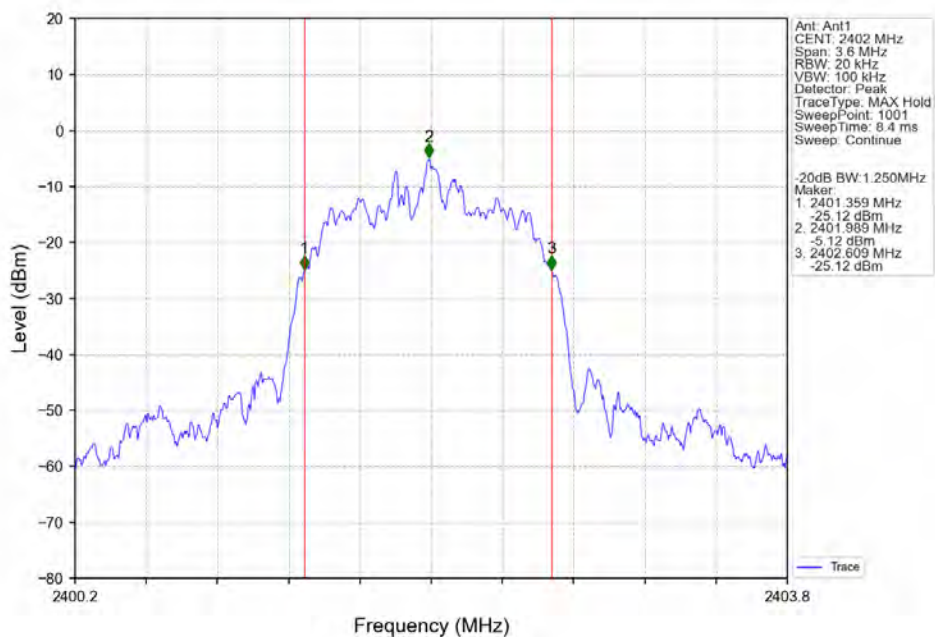
2.2.2 20dB BW



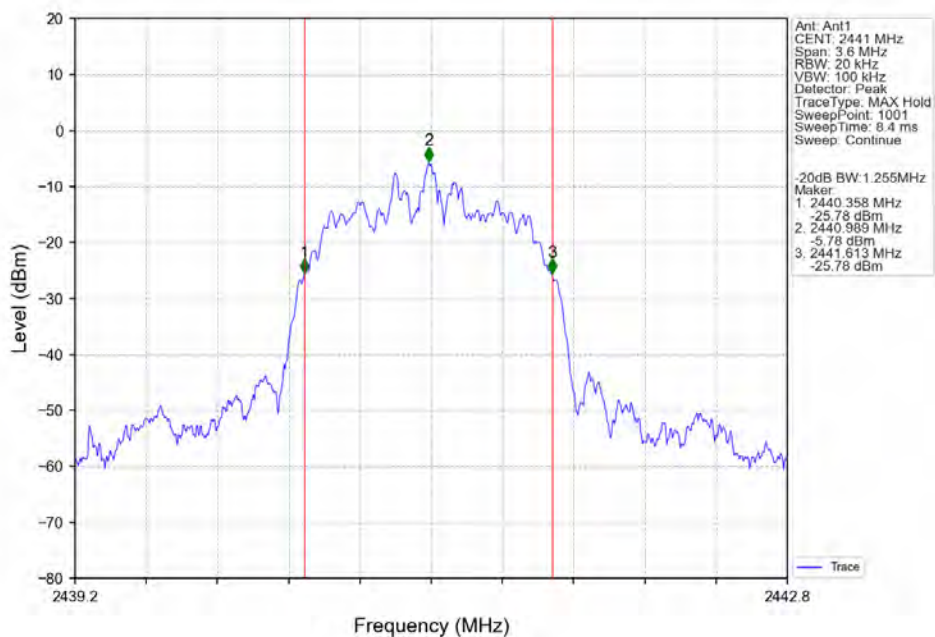
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



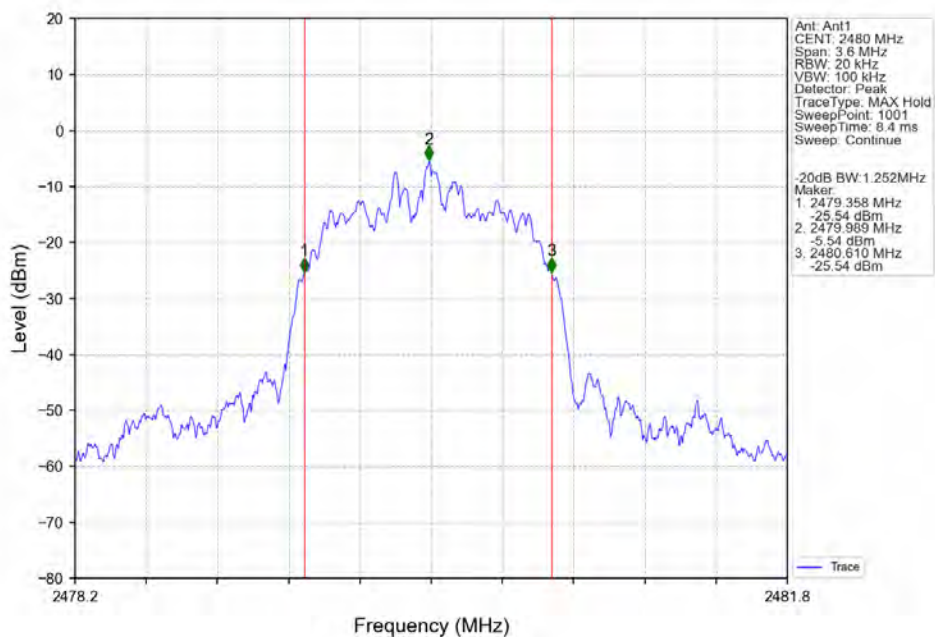
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



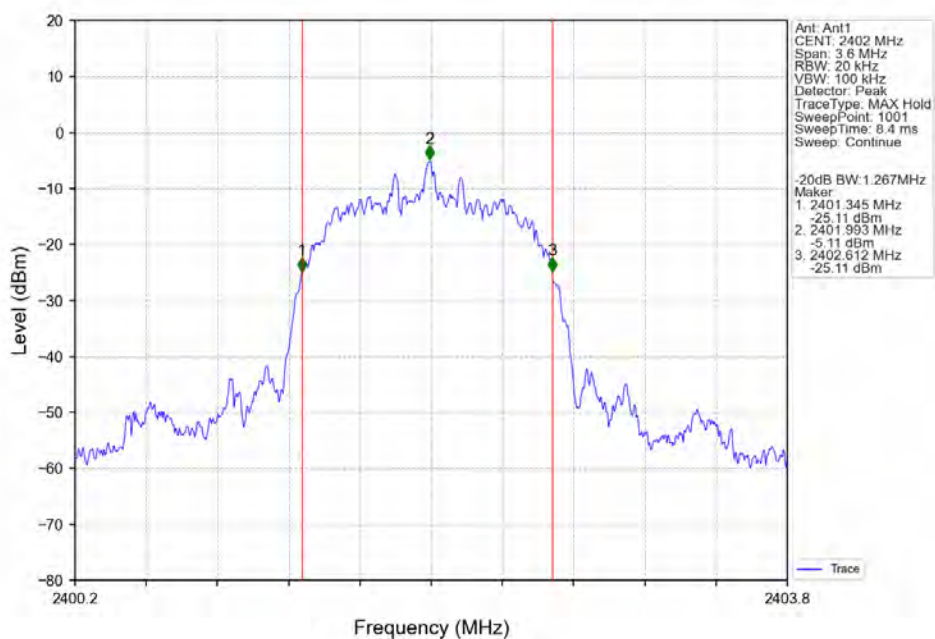
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



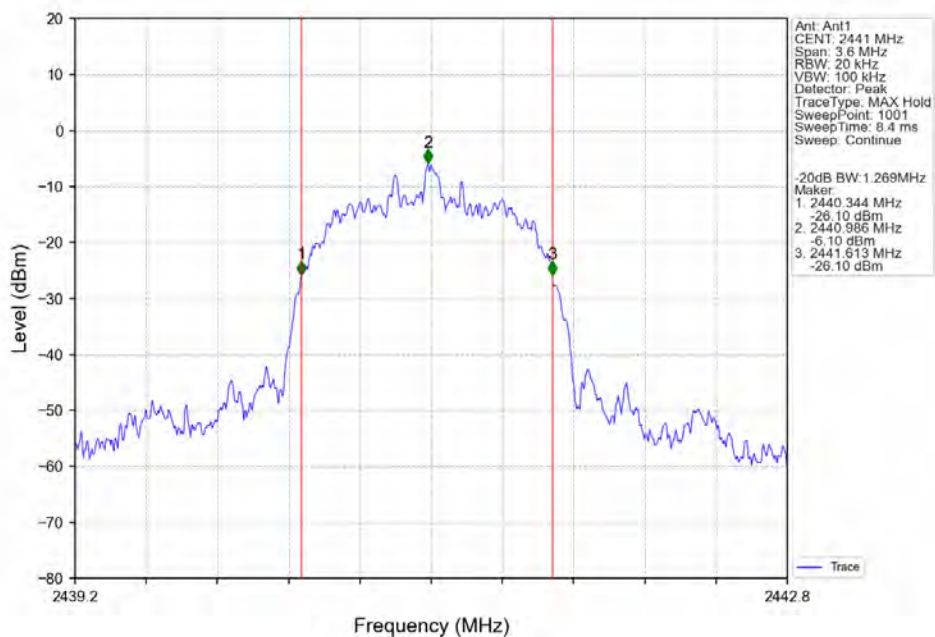
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



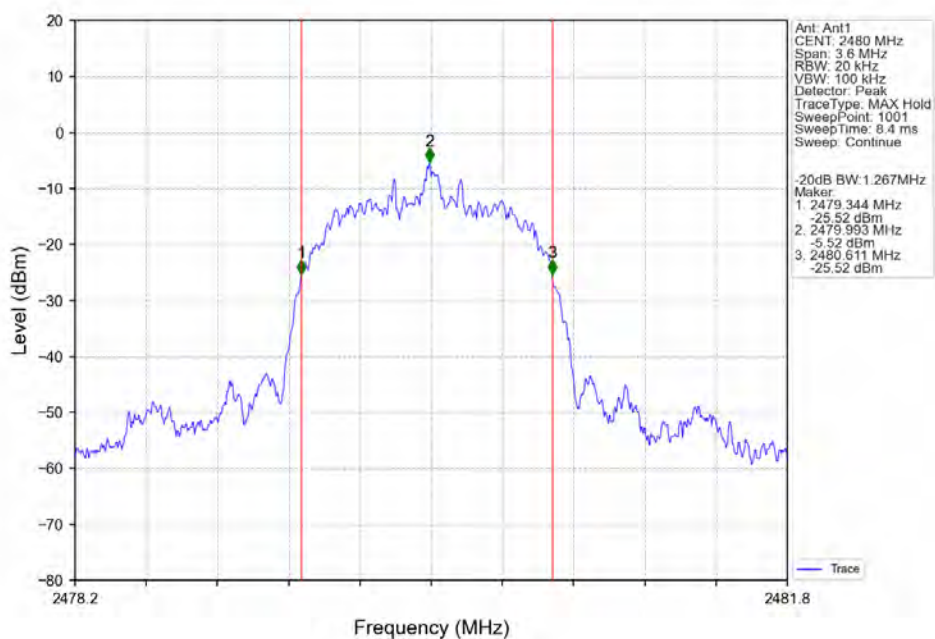
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



3. Maximum Conducted Output Power

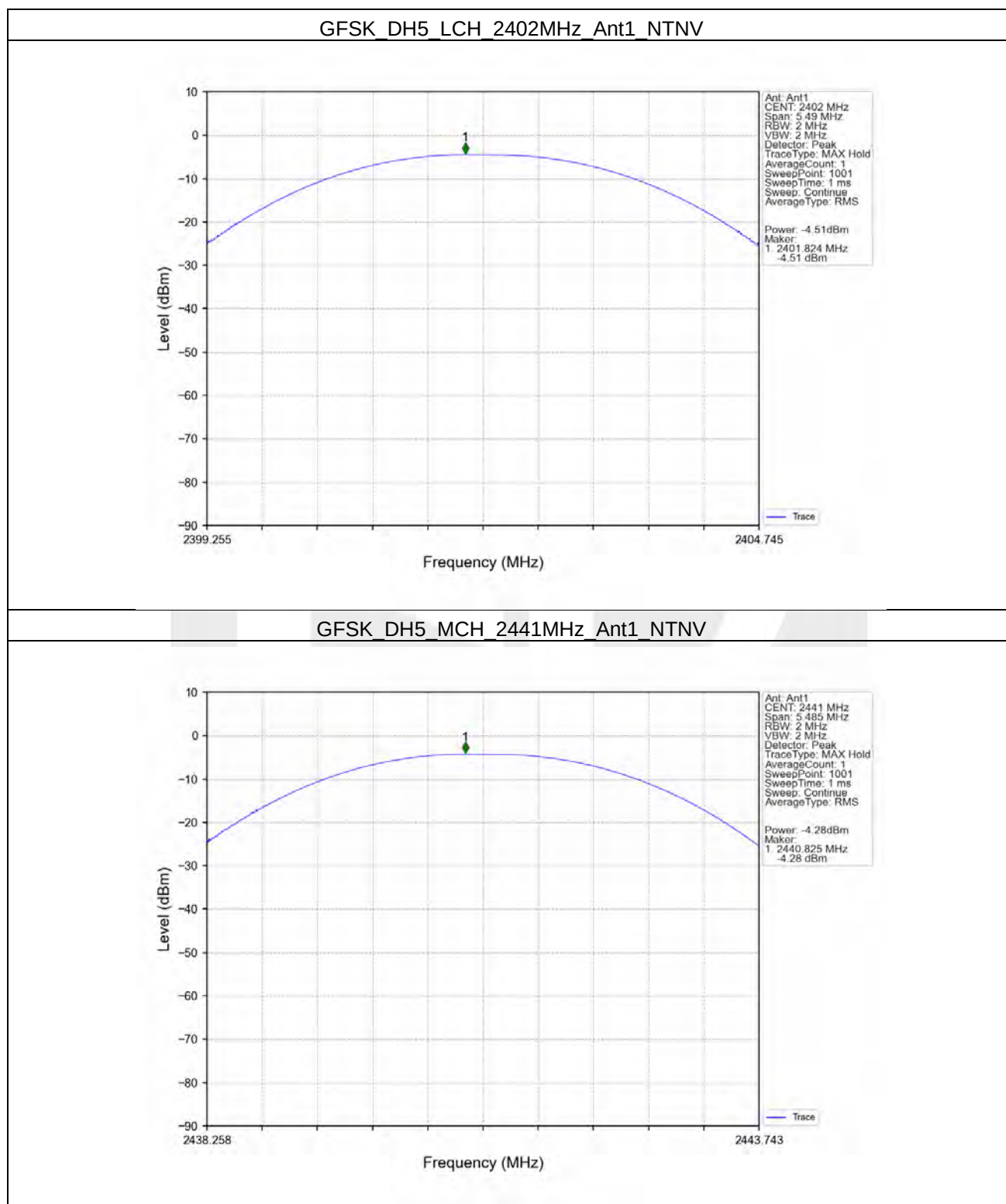
3.1 Test Result

3.1.1 Power

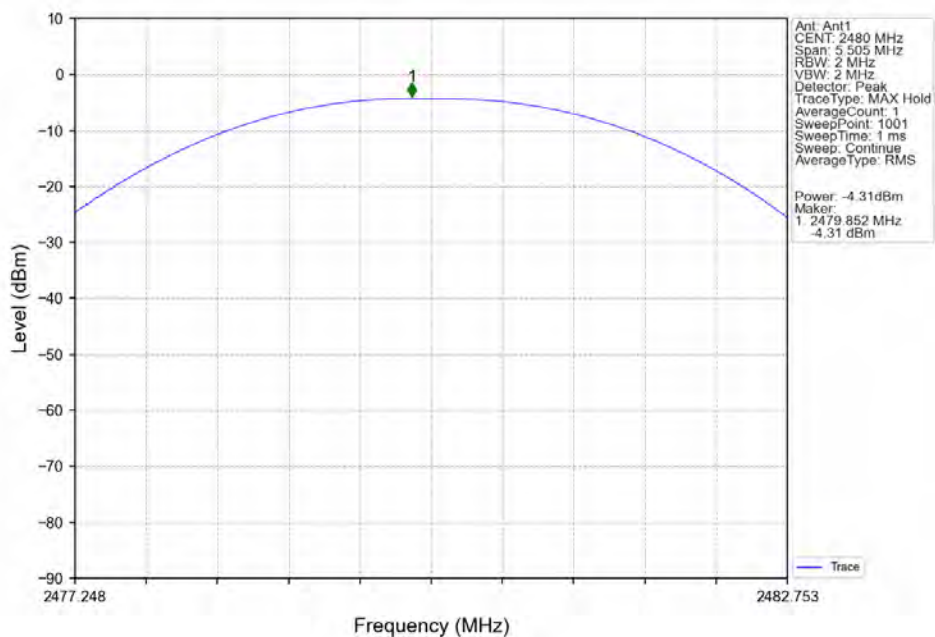
Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	-4.51	≤ 20.97	Pass
		2441	DH5	-4.28	≤ 20.97	Pass
		2480	DH5	-4.31	≤ 20.97	Pass
$\pi/4$ DQPSK	SISO	2402	2DH5	-3.60	≤ 20.97	Pass
		2441	2DH5	-3.36	≤ 20.97	Pass
		2480	2DH5	-3.41	≤ 20.97	Pass
8DPSK	SISO	2402	3DH5	-3.17	≤ 20.97	Pass
		2441	3DH5	-2.93	≤ 20.97	Pass
		2480	3DH5	-2.98	≤ 20.97	Pass

3.2 Test Graph

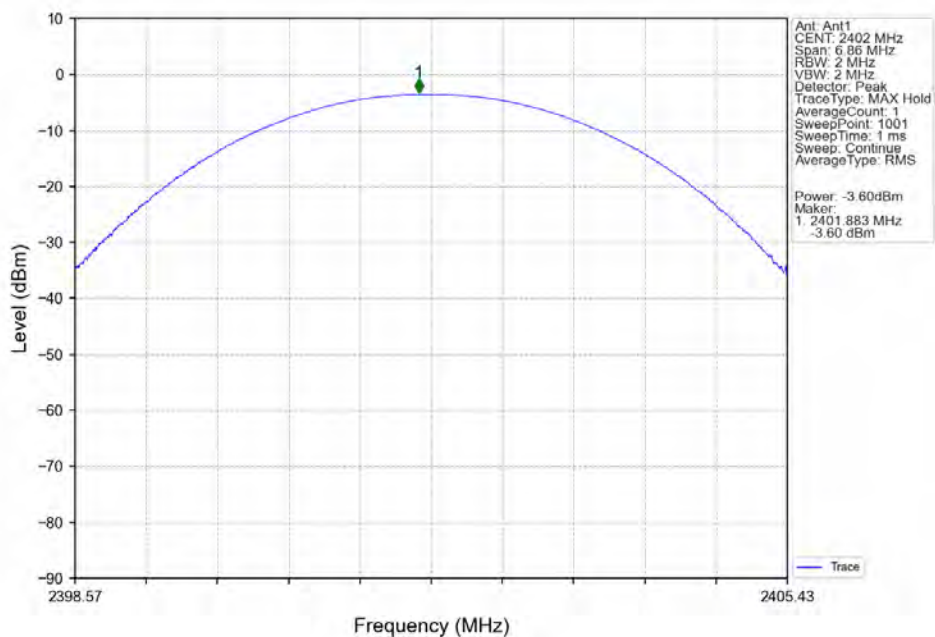
3.2.1 Power



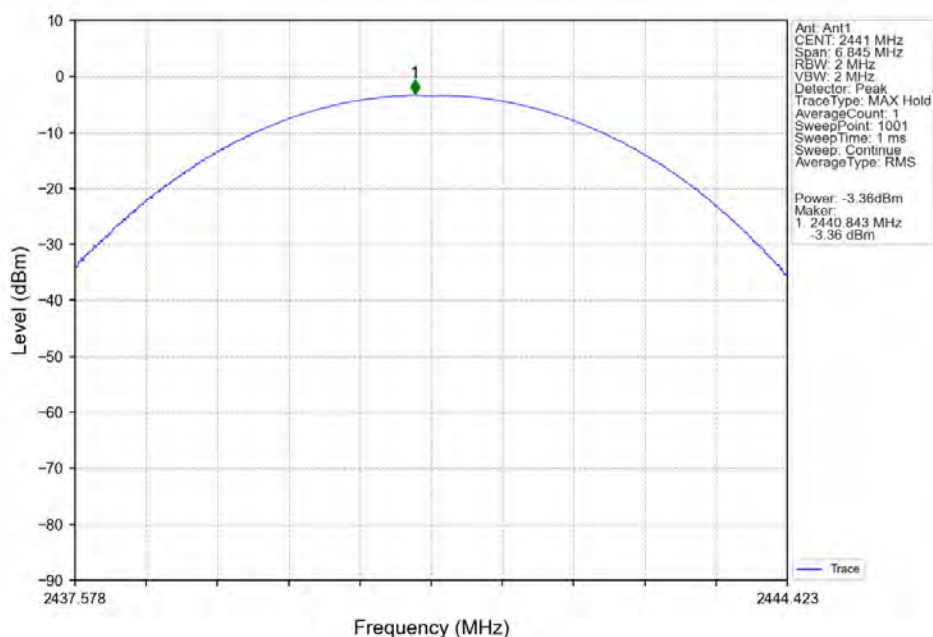
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



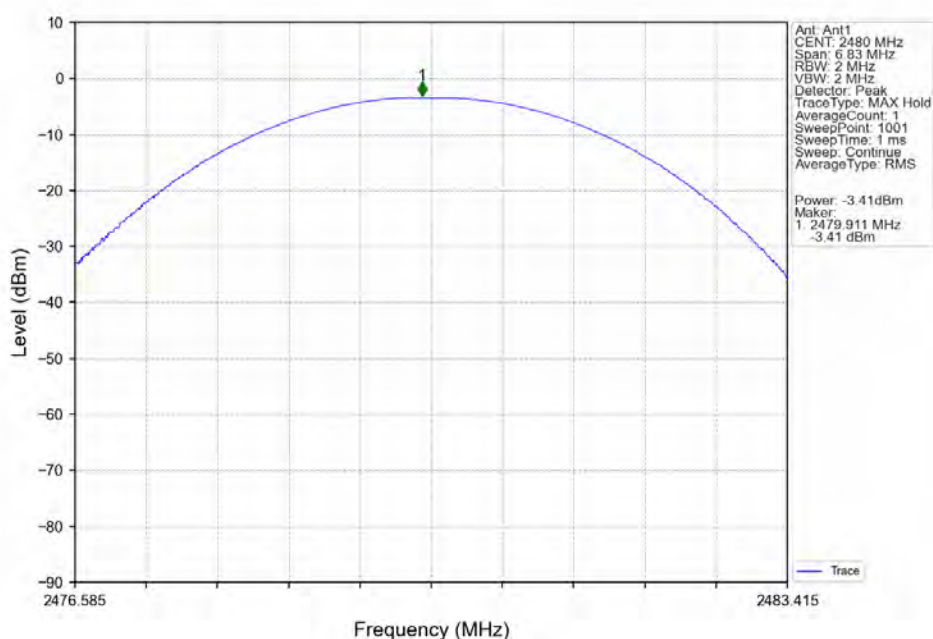
π /4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



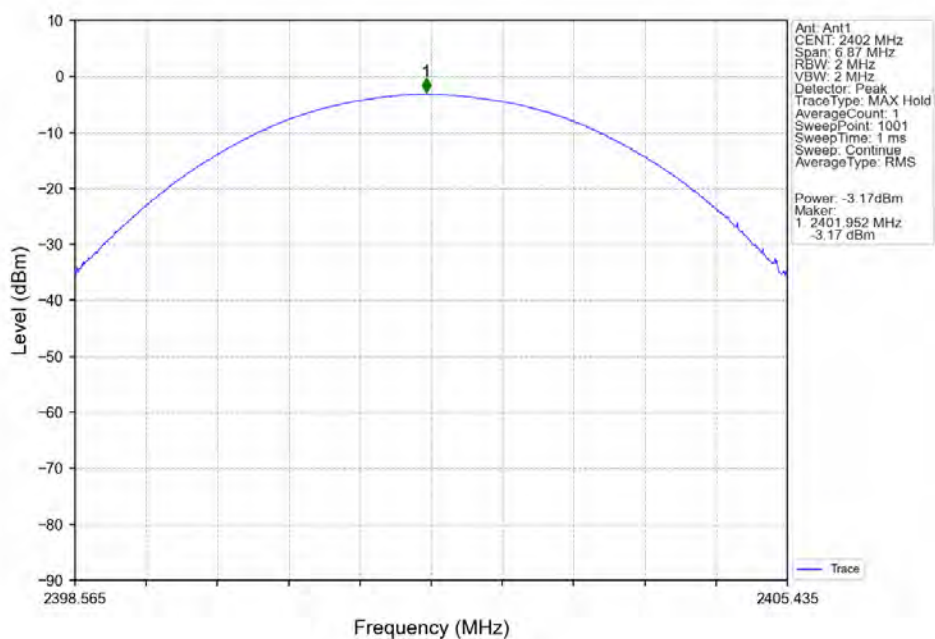
π /4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



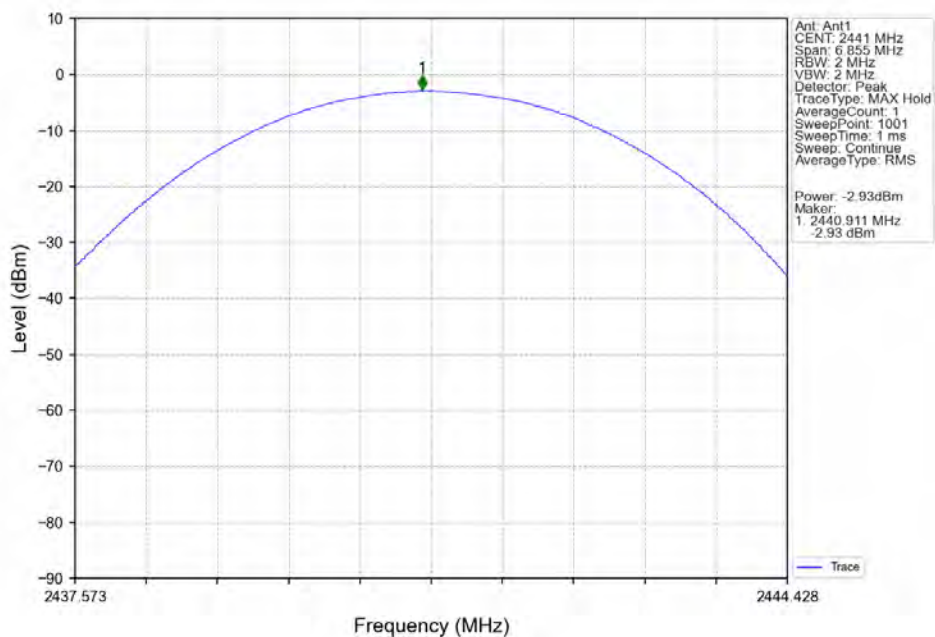
π /4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV

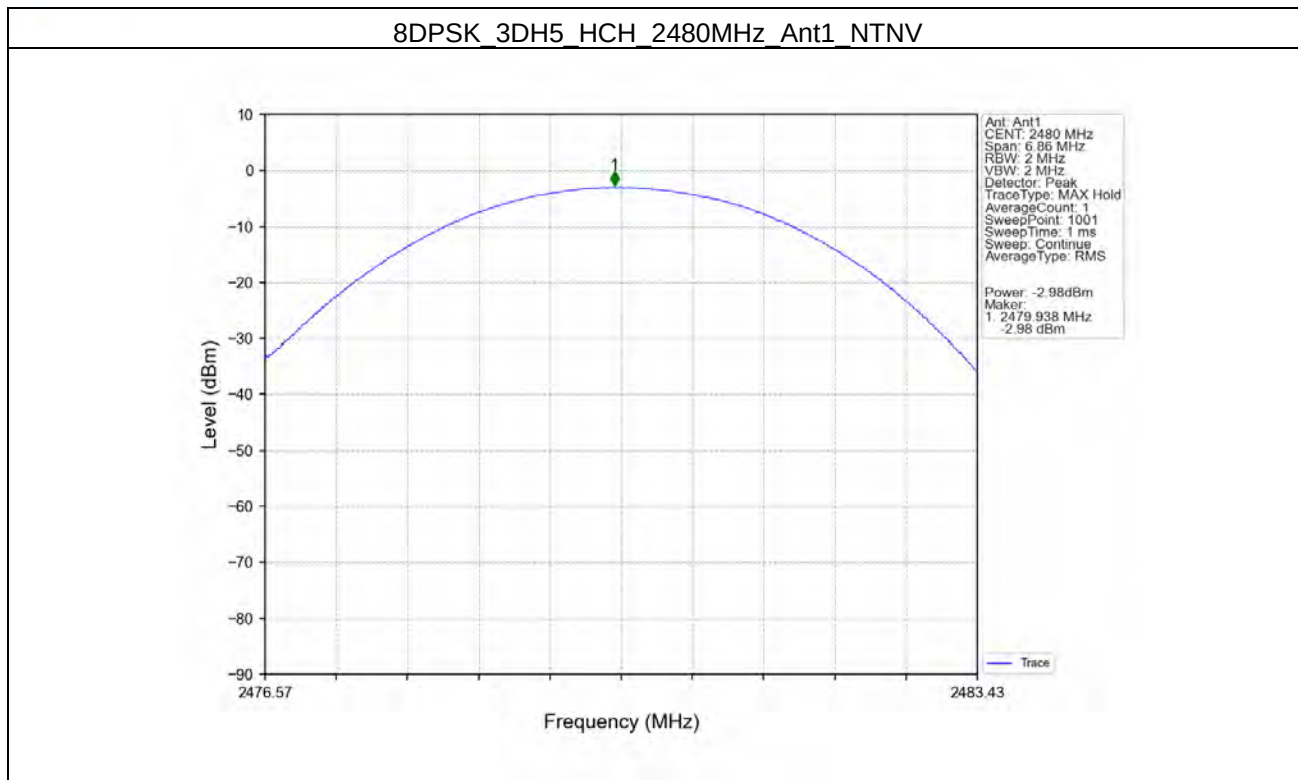


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV





4. Carrier Frequency Separation

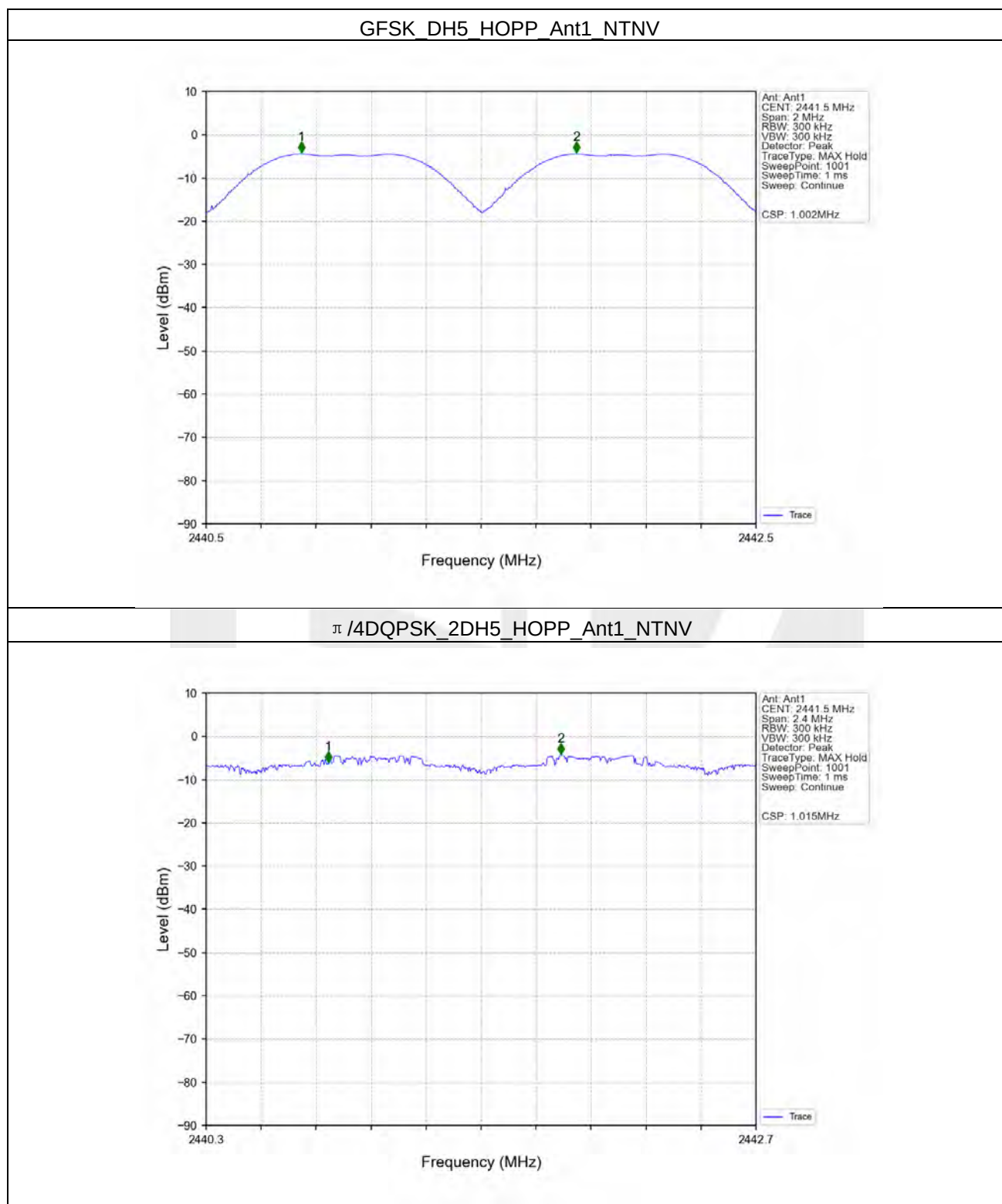
4.1 Test Result

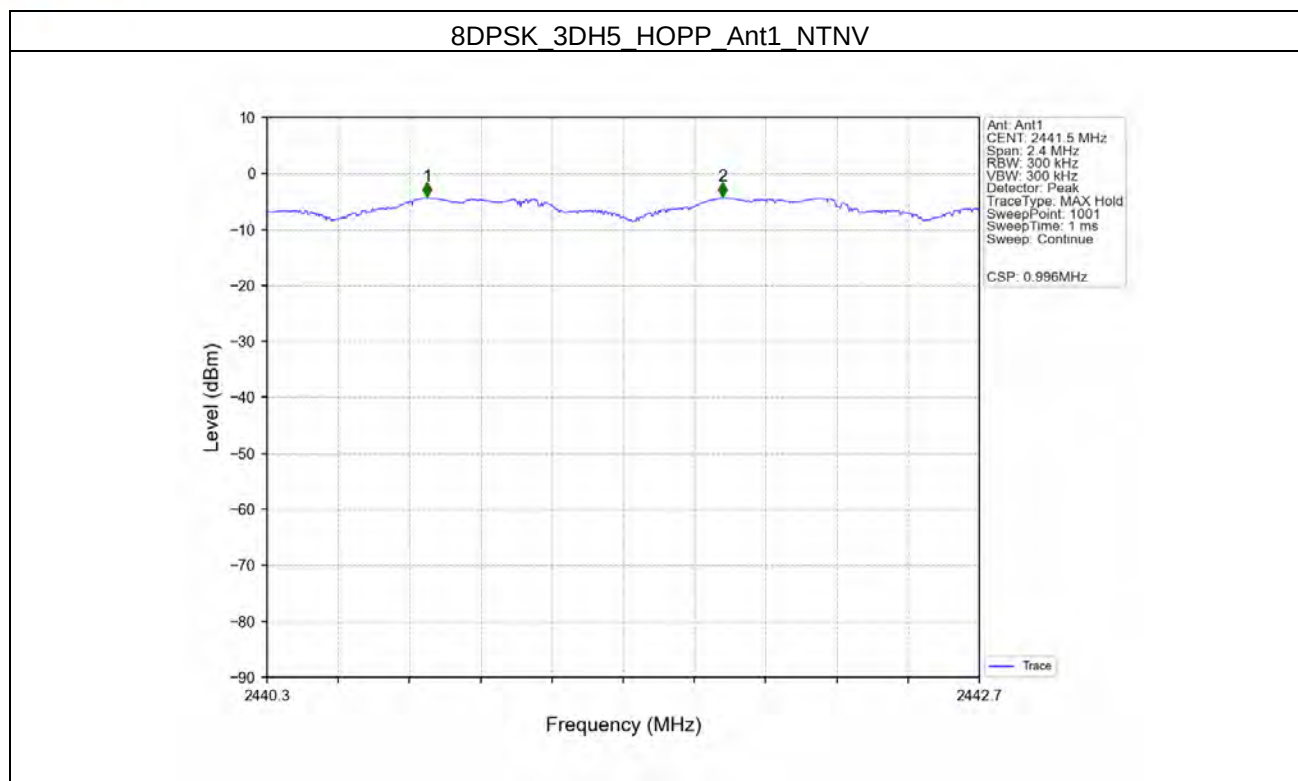
4.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.002	1.101	≥ 0.734	Pass
$\pi/4$ DQPSK	SISO	HOPP	2DH5	1.015	1.372	≥ 0.915	Pass
8DPSK	SISO	HOPP	3DH5	0.996	1.374	≥ 0.916	Pass

4.2 Test Graph

4.2.1 Ant1





5. Number of Hopping Frequencies

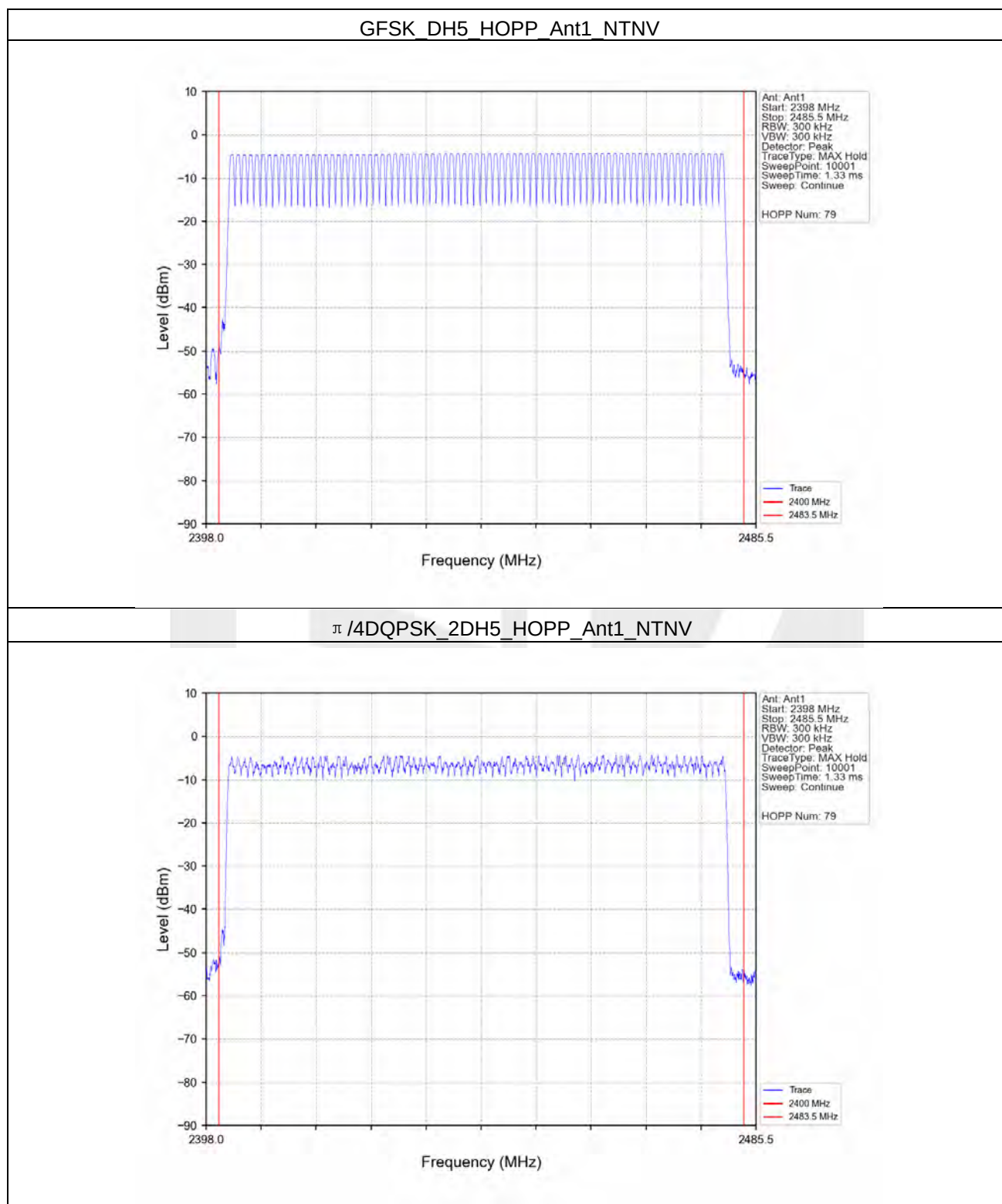
5.1 Test Result

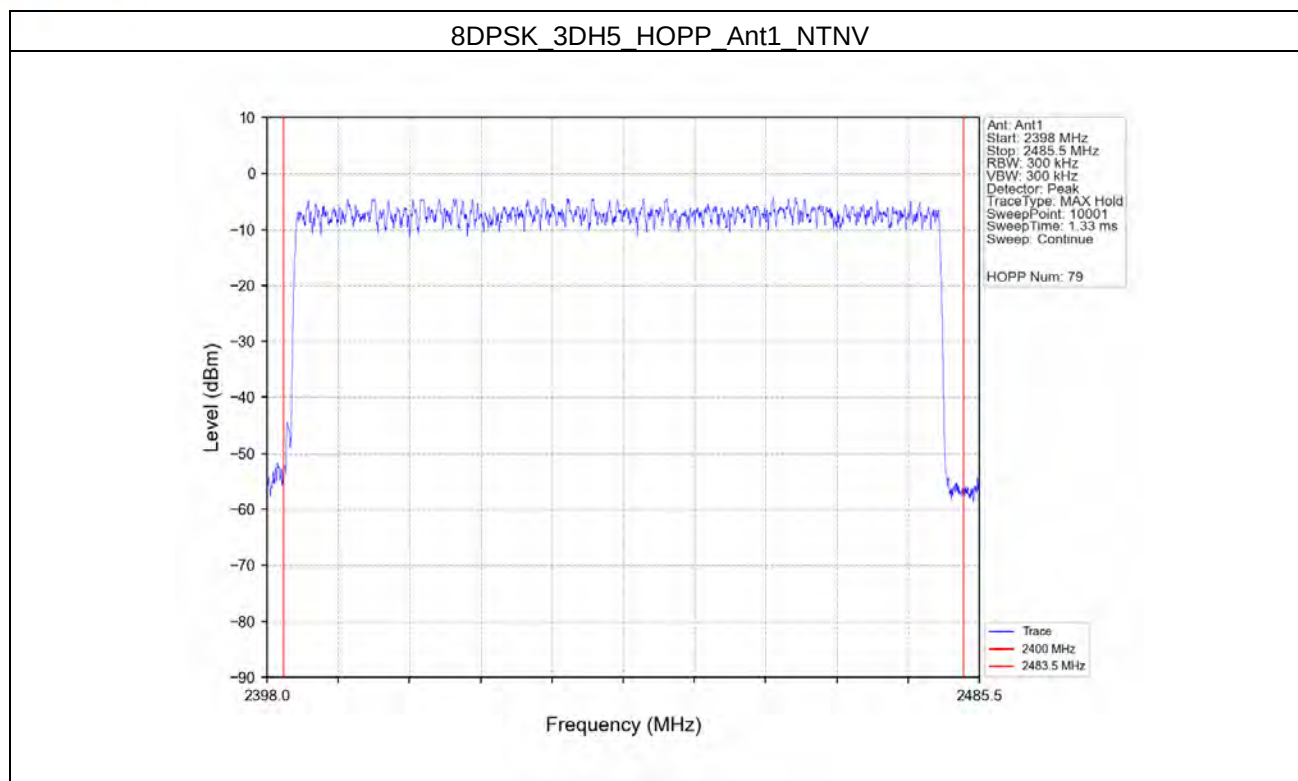
5.1.1 HoppNum

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

5.2 Test Graph

5.2.1 HoppNum





6. Time of Occupancy (Dwell Time)

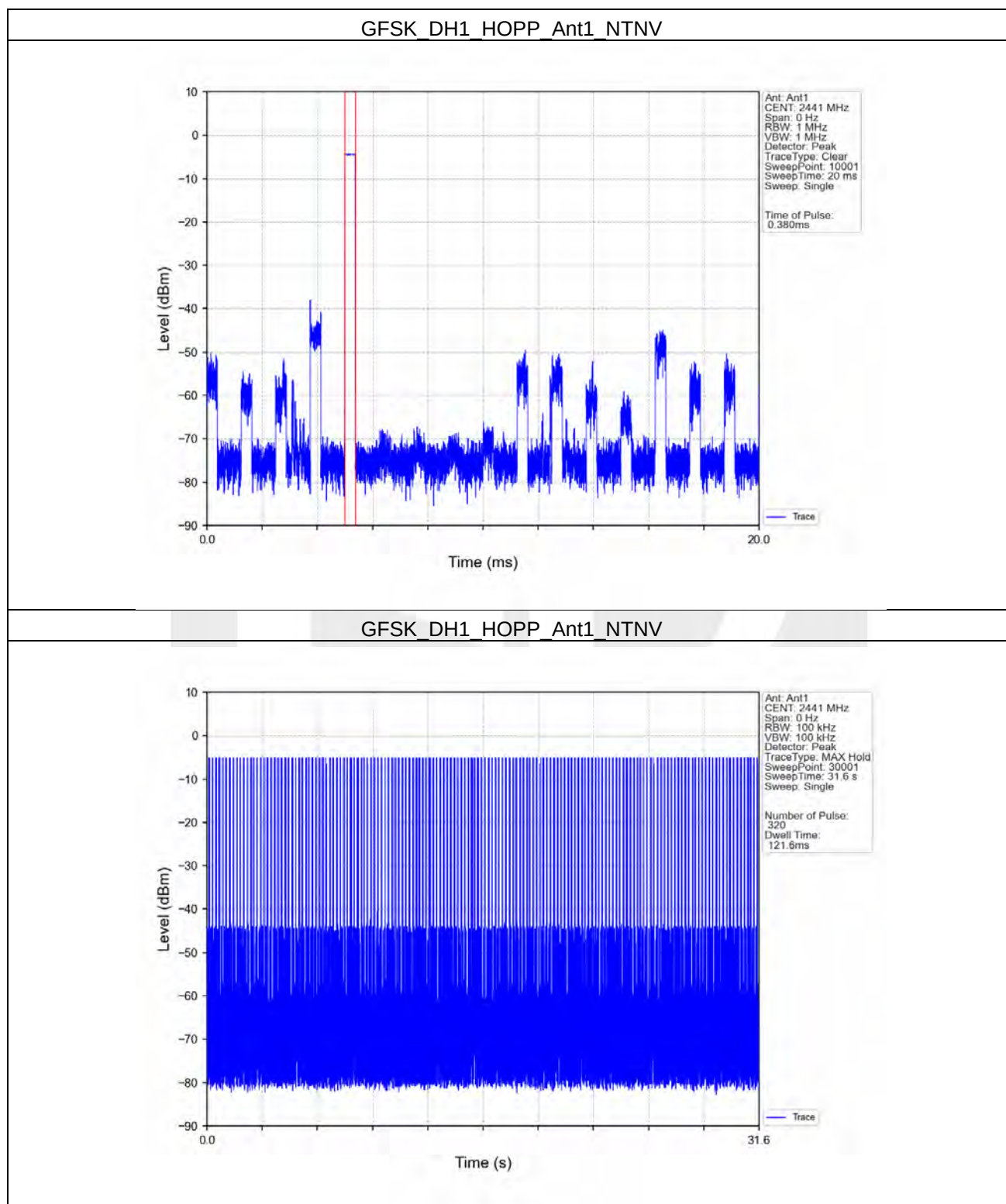
6.1 Test Result

6.1.1 Ant1

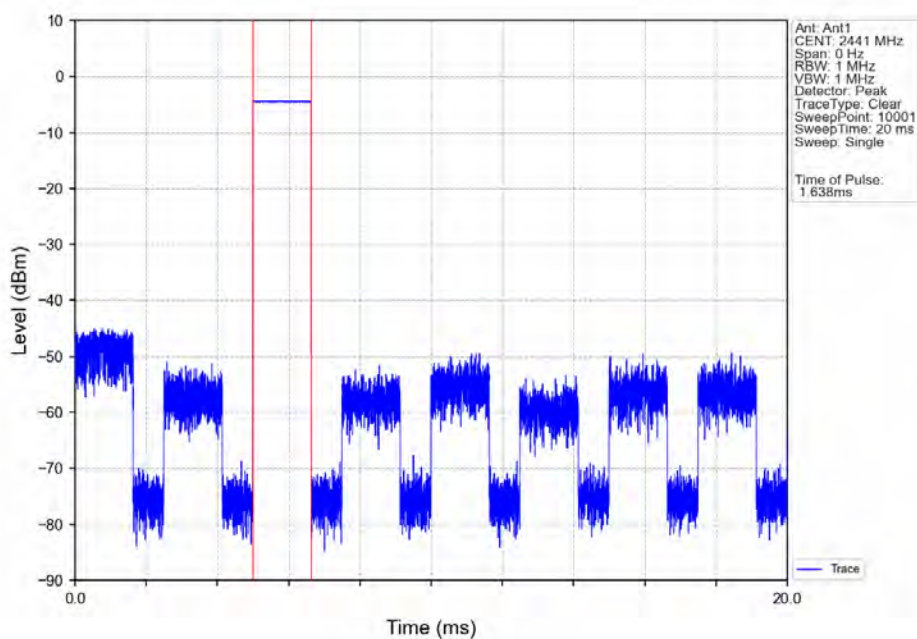
Ant1									
Mode	TX Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	SISO	HOPP	DH1	0.380	31.600	320	121.600	<=400	Pass
			DH3	1.638	31.600	158	258.804	<=400	Pass
			DH5	2.890	31.600	106	306.340	<=400	Pass
π /4DQPSK	SISO	HOPP	2DH1	0.390	31.600	320	124.800	<=400	Pass
			2DH3	1.644	31.600	171	281.124	<=400	Pass
			2DH5	2.896	31.600	105	304.080	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.396	31.600	320	126.720	<=400	Pass
			3DH3	1.648	31.600	165	271.920	<=400	Pass
			3DH5	2.896	31.600	113	327.248	<=400	Pass

6.2 Test Graph

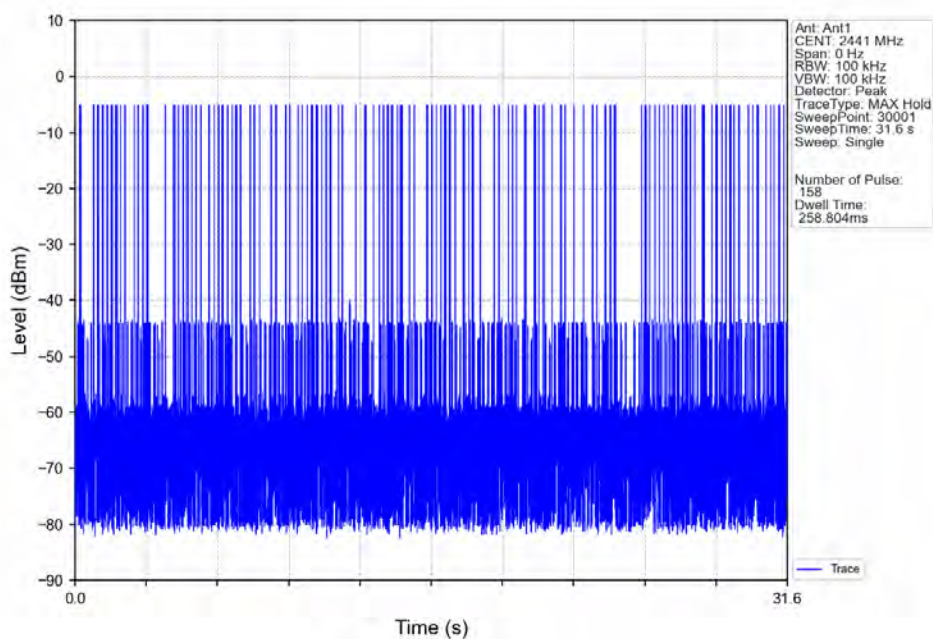
6.2.1 Ant1



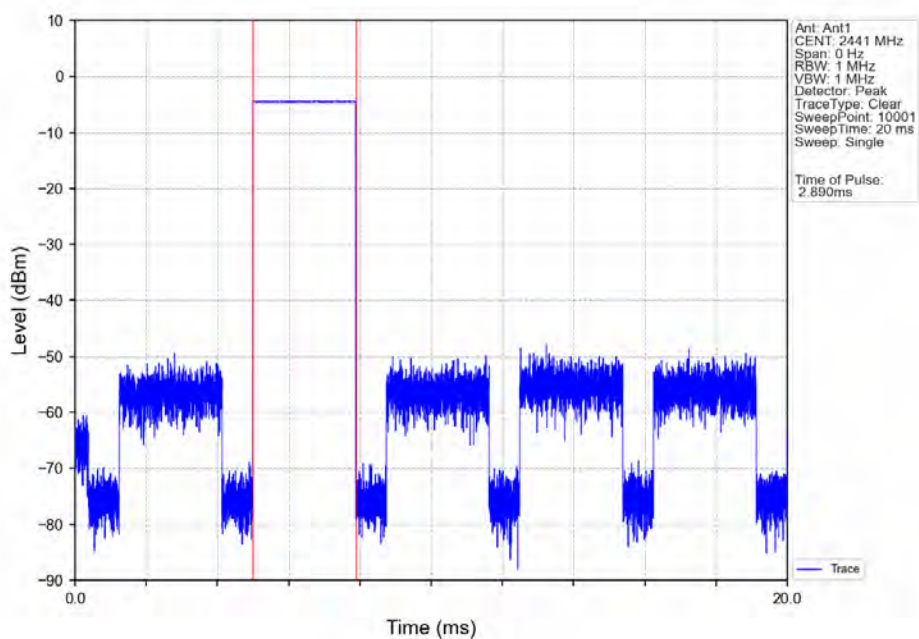
GFSK_DH3_HOPP_Ant1_NTNV



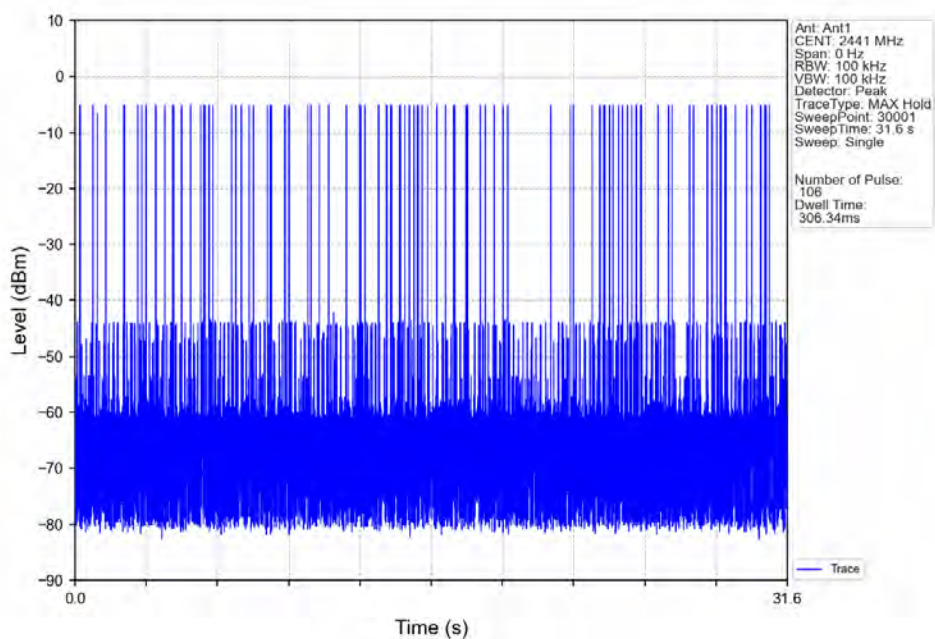
GFSK_DH3_HOPP_Ant1_NTNV



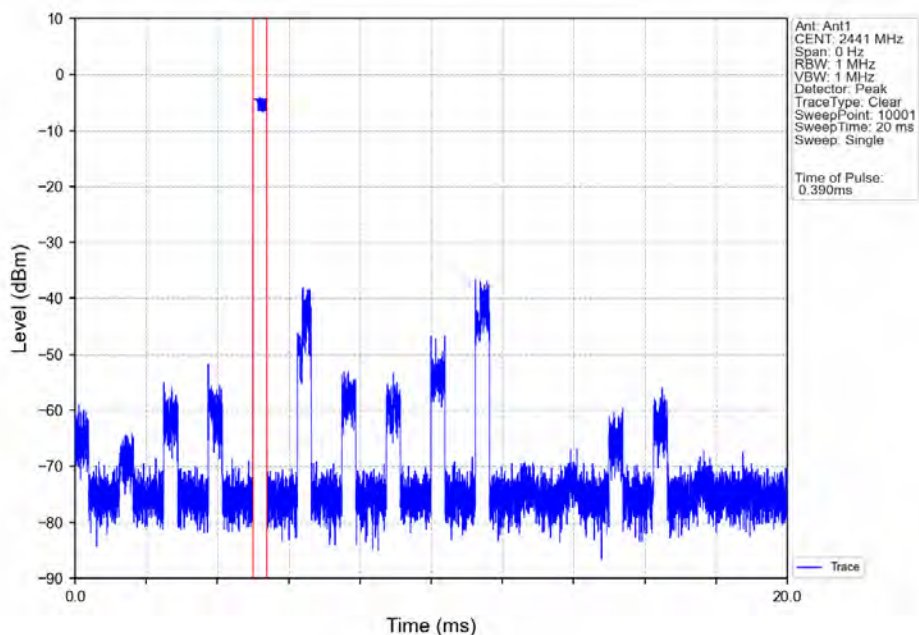
GFSK_DH5_HOPP_Ant1_NTNV



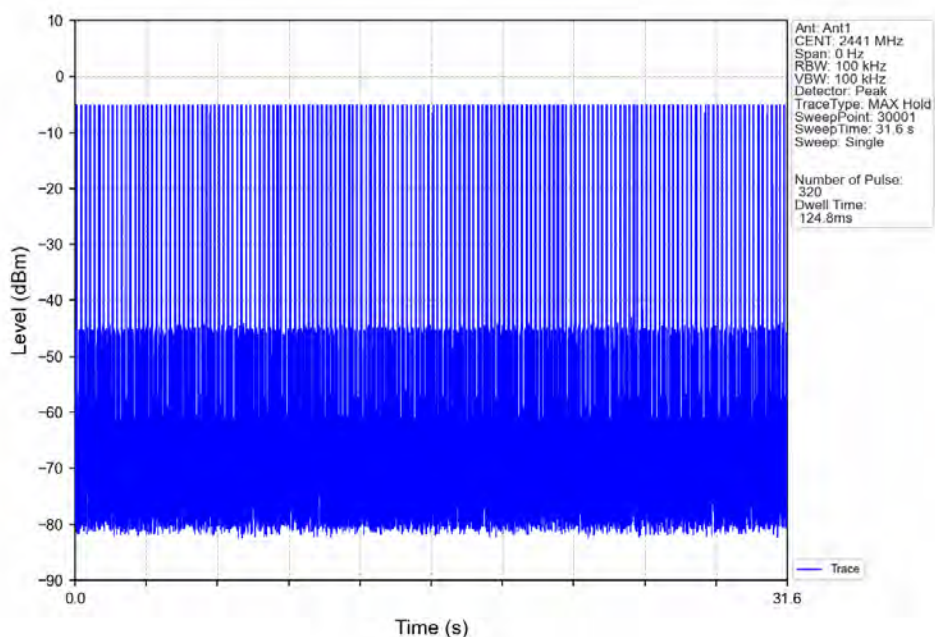
GFSK_DH5_HOPP_Ant1_NTNV



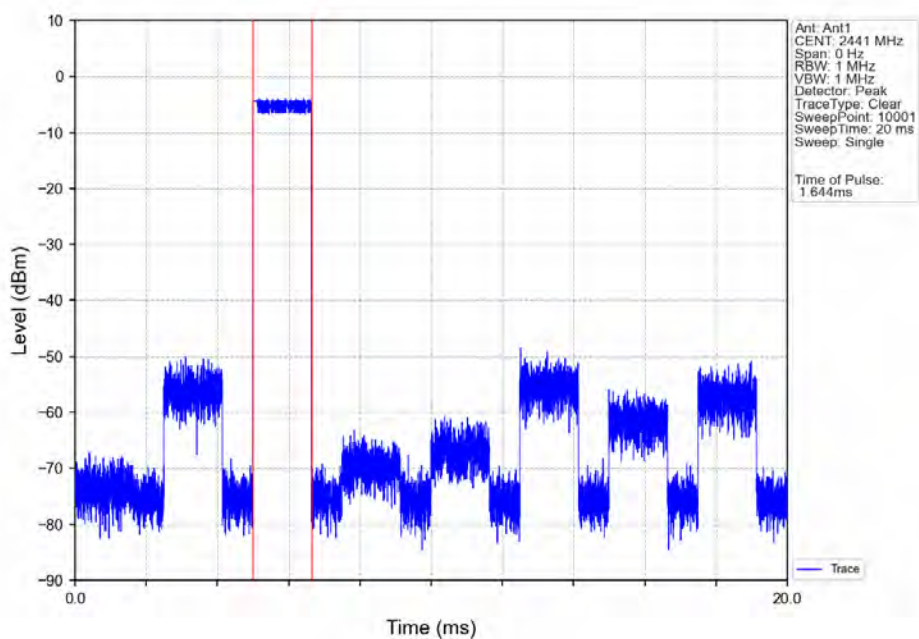
π /4DQPSK_2DH1_HOPP_Ant1_NTNV



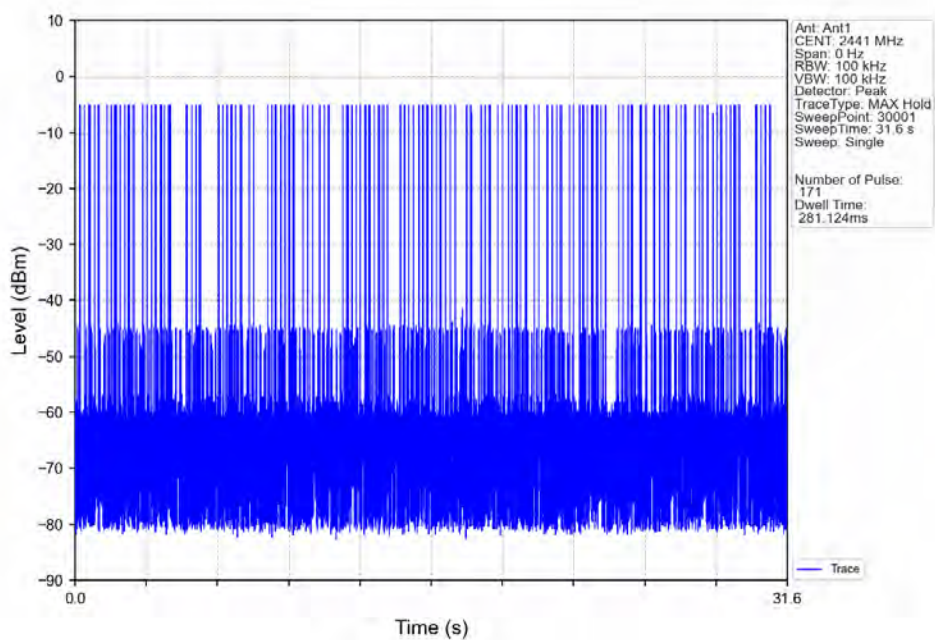
π /4DQPSK_2DH1_HOPP_Ant1_NTNV



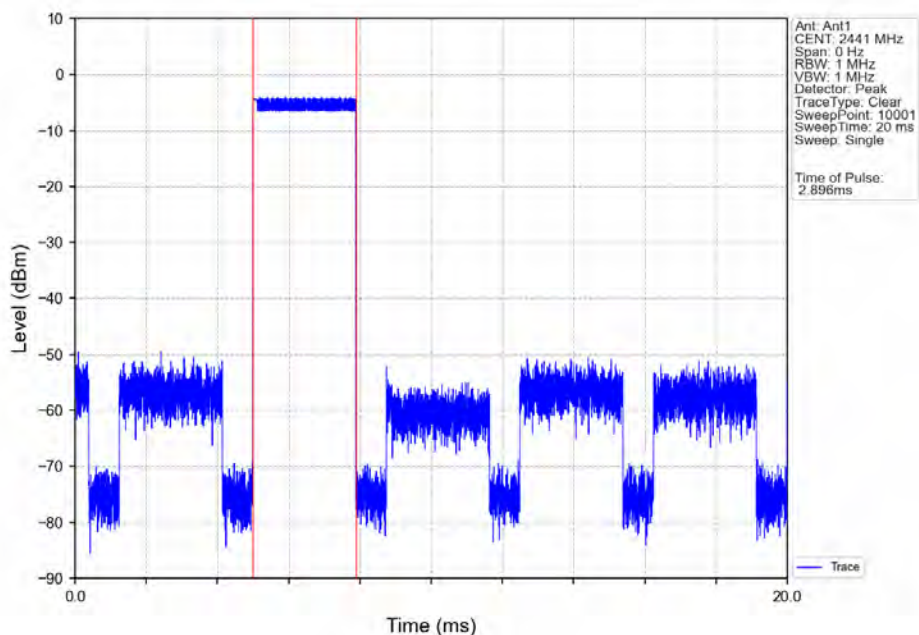
π /4DQPSK_2DH3_HOPP_Ant1_NTNV



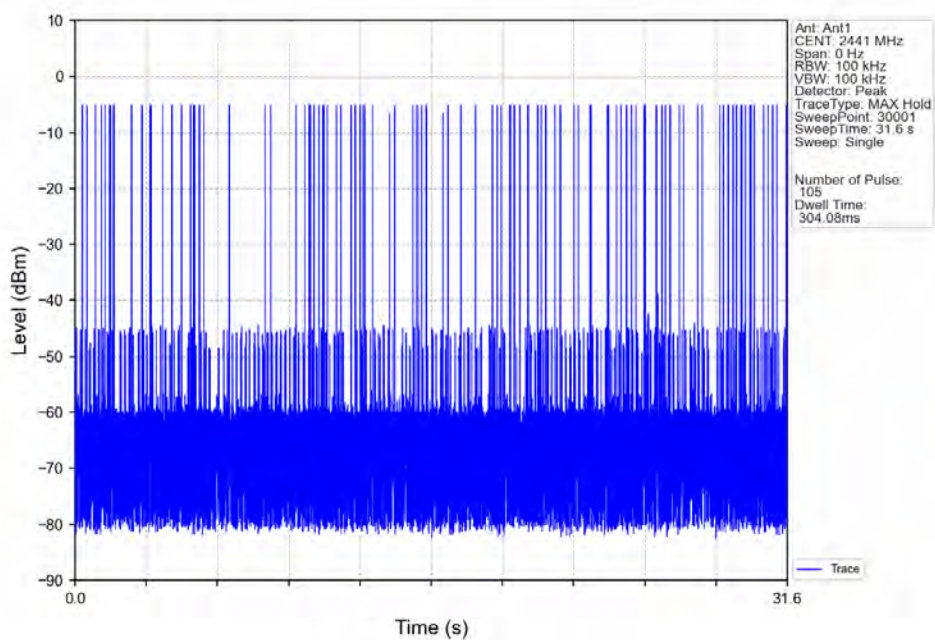
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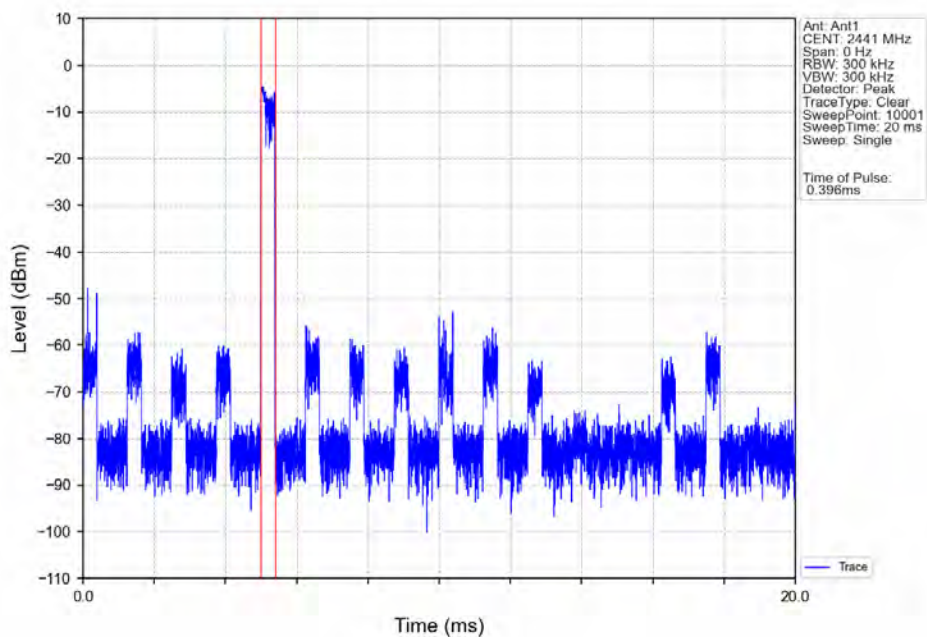
π /4DQPSK_2DH5_HOPP_Ant1_NTNV



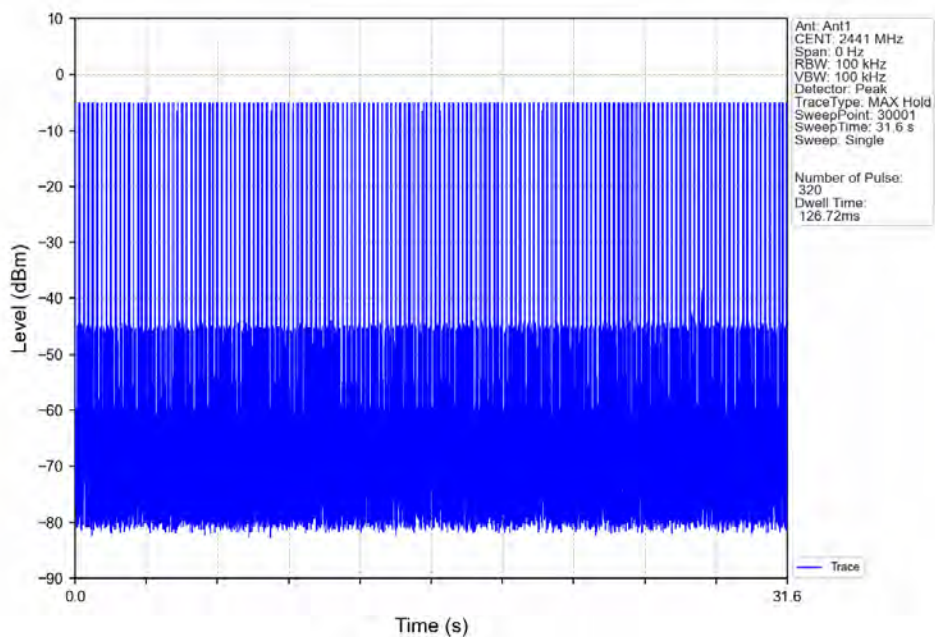
π /4DQPSK_2DH5_HOPP_Ant1_NTNV



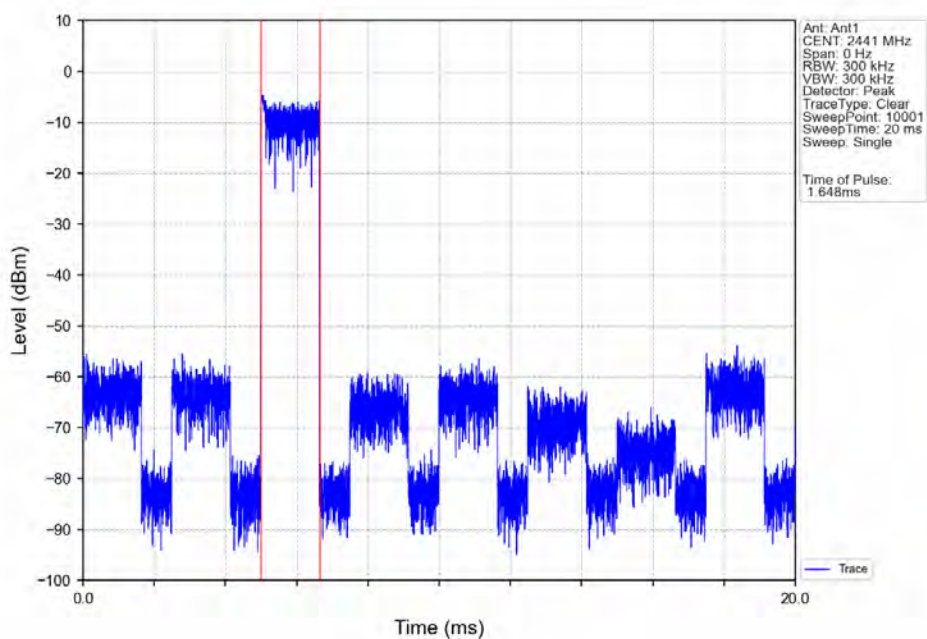
8DPSK_3DH1_HOPP_Ant1_NTNV



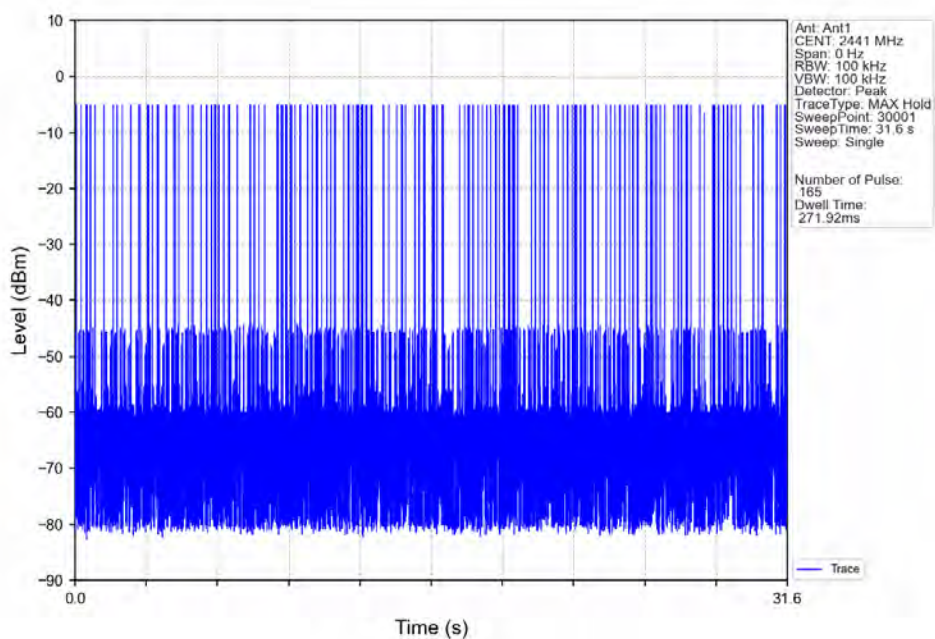
8DPSK_3DH1_HOPP_Ant1_NTNV



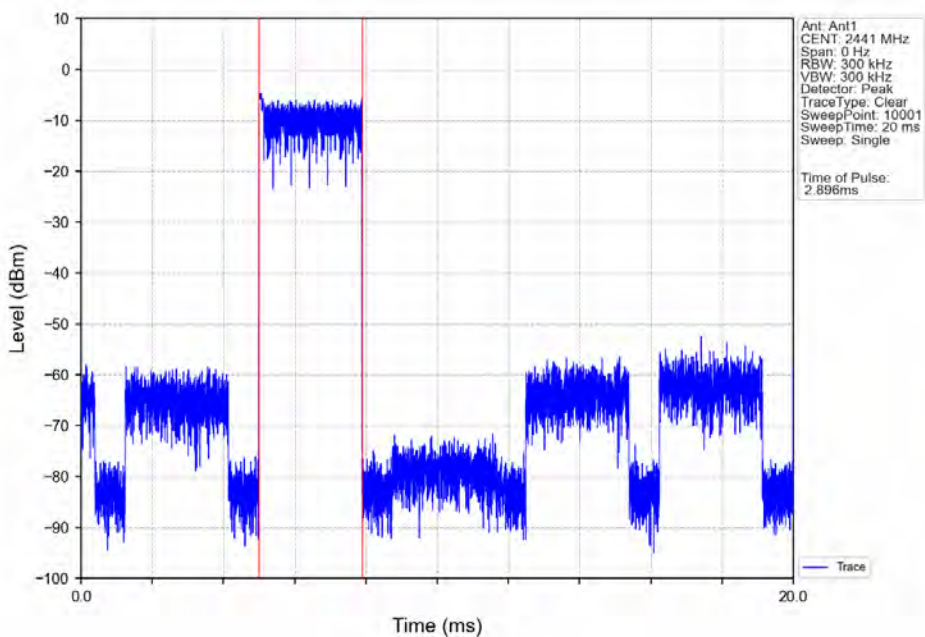
8DPSK_3DH3_HOPP_Ant1_NTNV



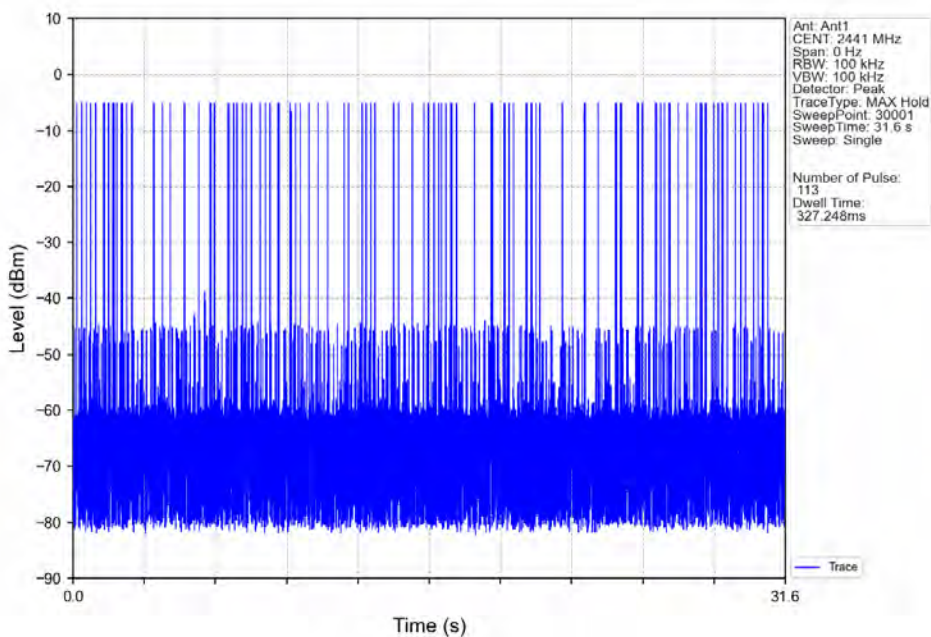
8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



7. Unwanted Emissions In Non-restricted Frequency Bands

7.1 Test Result

7.1.1 Ref

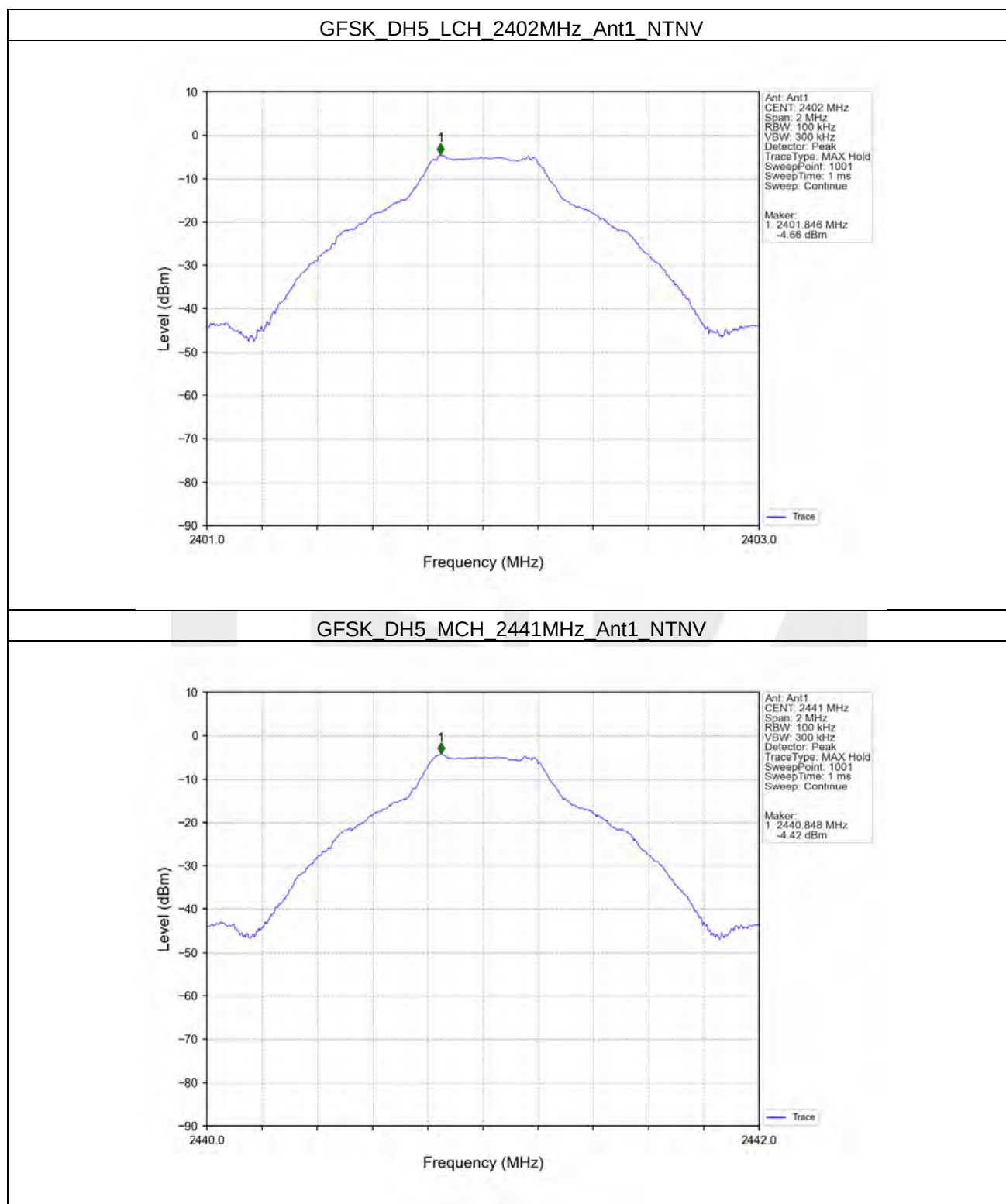
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	-4.66
		2441	DH5	1	-4.42
		2480	DH5	1	-4.46
		HOPP	DH5	1	-4.33
					-4.33
$\pi/4$ DQPSK	SISO	2402	2DH5	1	-4.72
		2441	2DH5	1	-4.46
		2480	2DH5	1	-4.51
		HOPP	2DH5	1	-4.38
					-4.38
8DPSK	SISO	2402	3DH5	1	-4.64
		2441	3DH5	1	-4.60
		2480	3DH5	1	-4.46
		HOPP	3DH5	1	-4.28
					-4.28

7.1.2 CSE

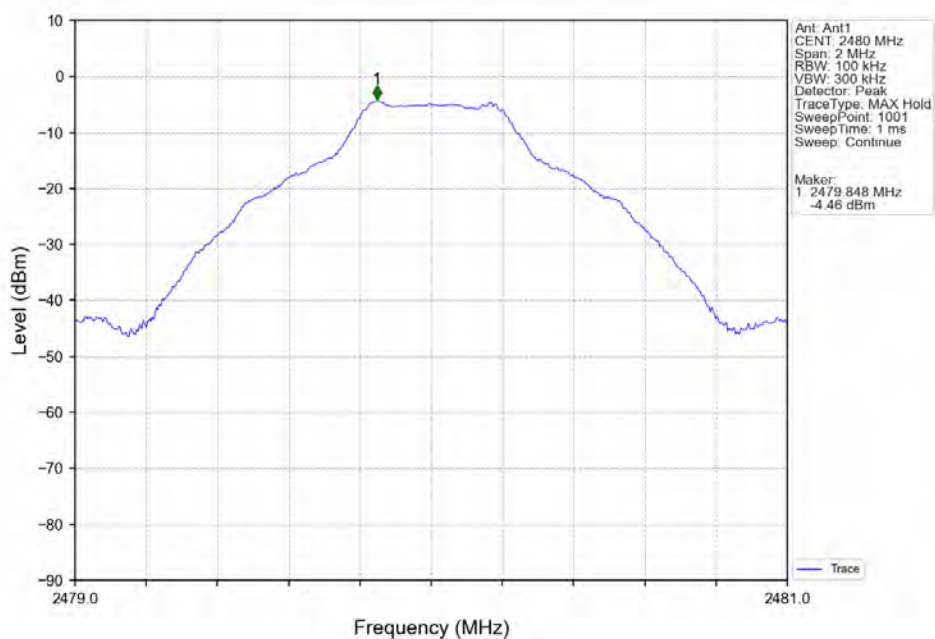
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	-4.66	-24.66	Pass
		2441	DH5	1	-4.42	-24.42	Pass
		2480	DH5	1	-4.46	-24.46	Pass
		HOPP	DH5	1	-4.33	-24.33	Pass
					-4.33	-24.33	Pass
$\pi/4$ DQPSK	SISO	2402	2DH5	1	-4.72	-24.72	Pass
		2441	2DH5	1	-4.46	-24.46	Pass
		2480	2DH5	1	-4.51	-24.51	Pass
		HOPP	2DH5	1	-4.38	-24.38	Pass
					-4.38	-24.38	Pass
8DPSK	SISO	2402	3DH5	1	-4.64	-24.64	Pass
		2441	3DH5	1	-4.60	-24.60	Pass
		2480	3DH5	1	-4.46	-24.46	Pass
		HOPP	3DH5	1	-4.28	-24.28	Pass
					-4.28	-24.28	Pass

7.2 Test Graph

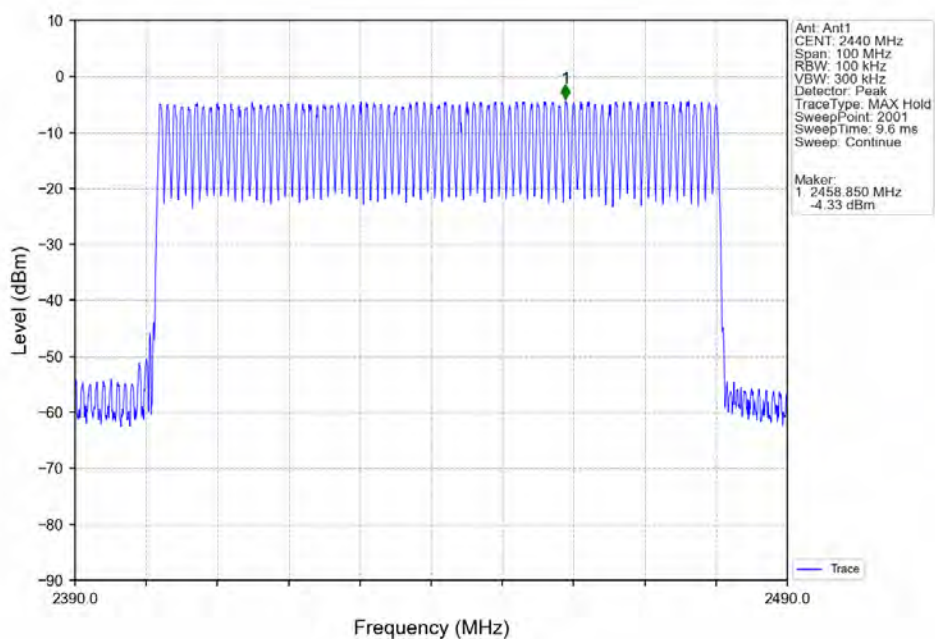
7.2.1 Ref



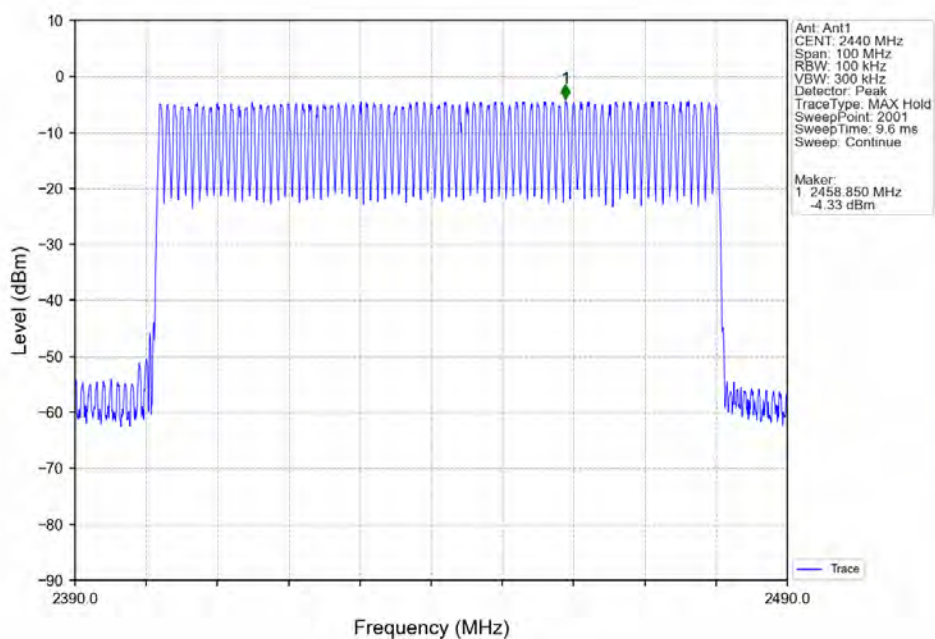
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



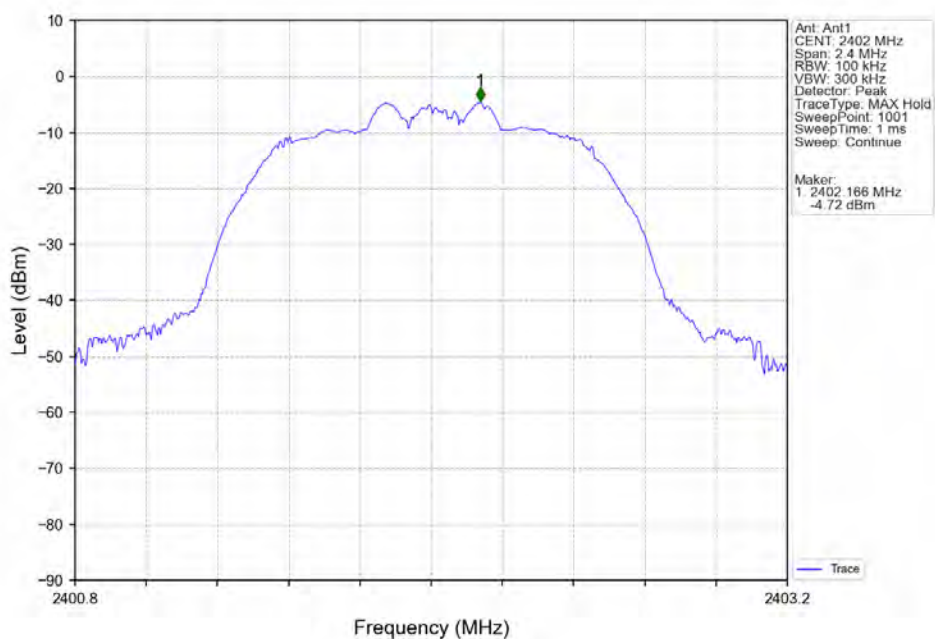
GFSK_DH5_HOPP_Ant1_NTNV



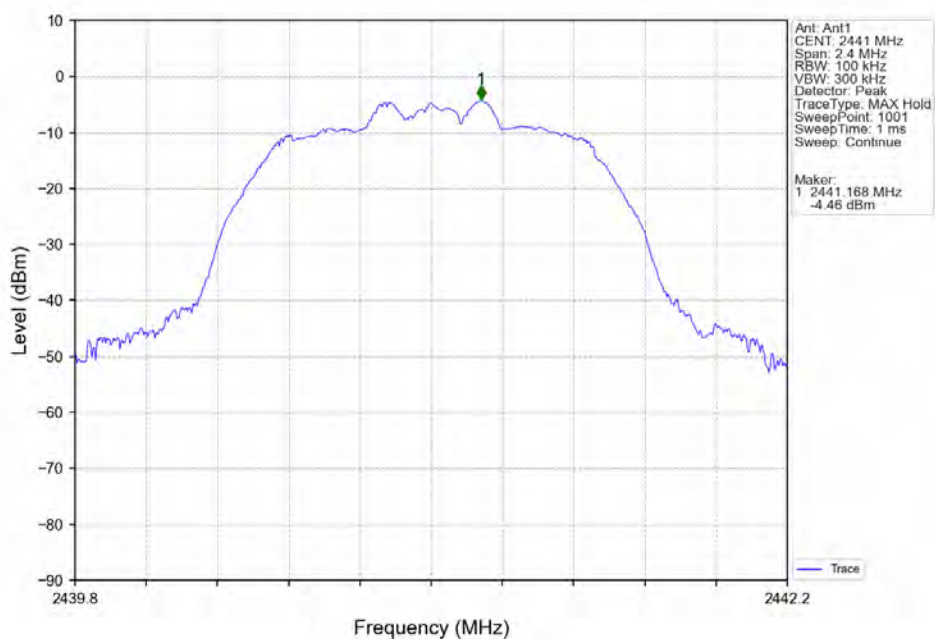
GFSK_DH5_HOPP_Ant1_NTNV



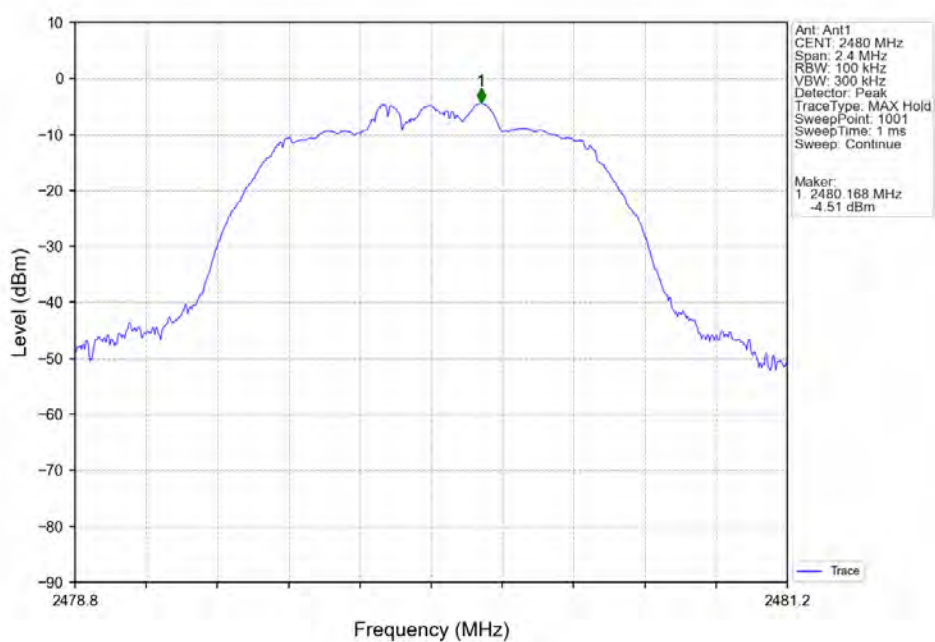
π /4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



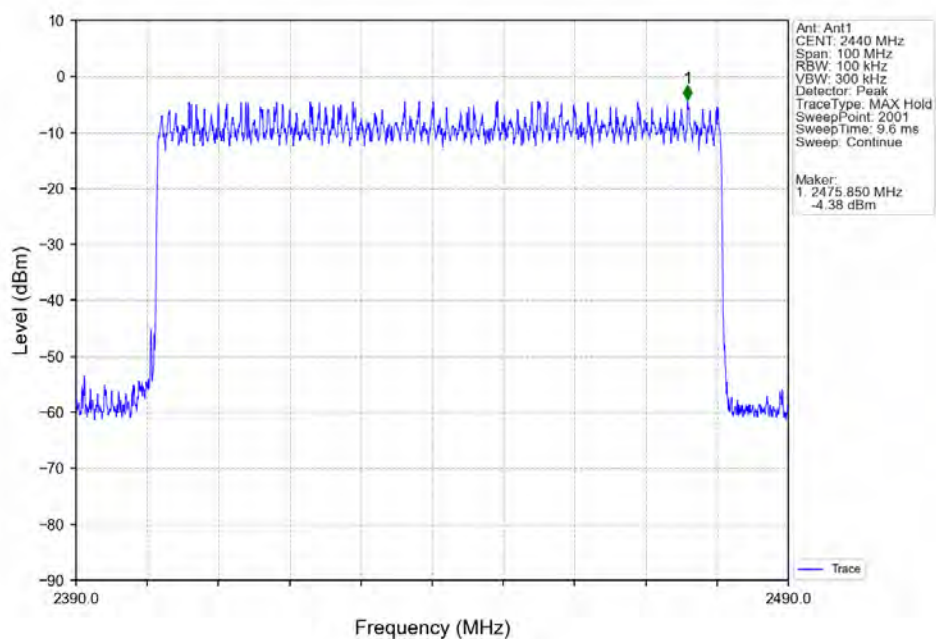
π /4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



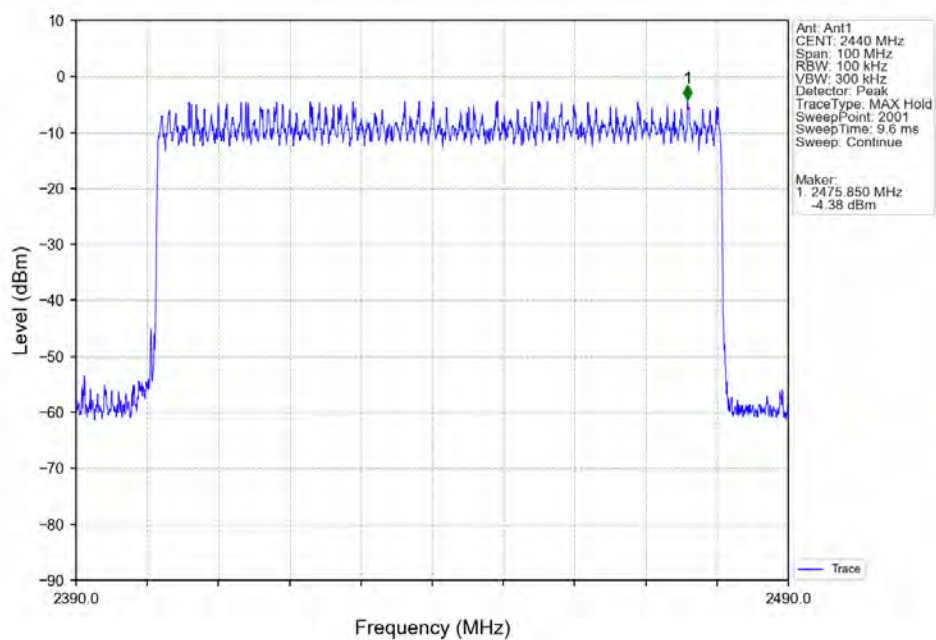
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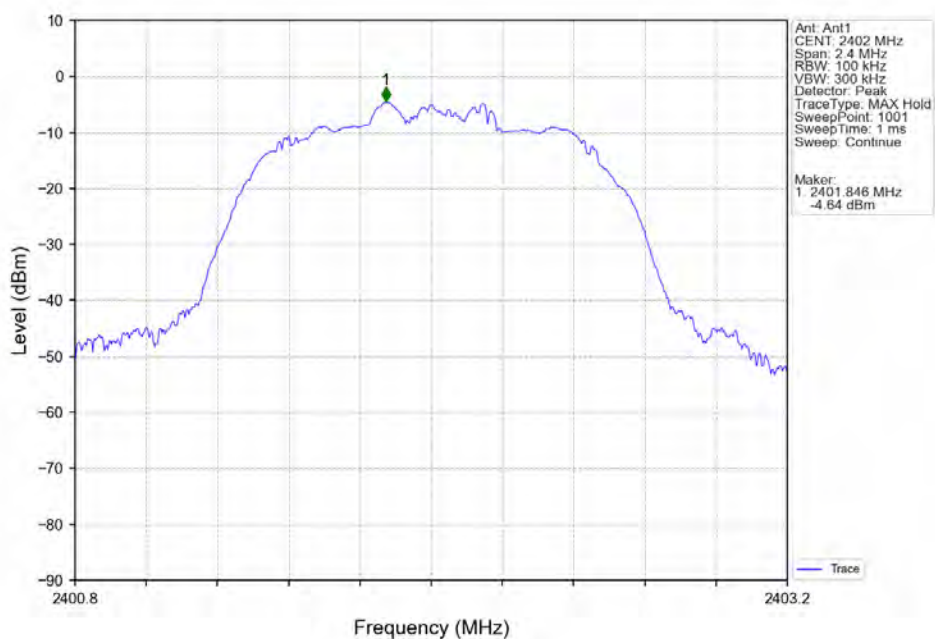
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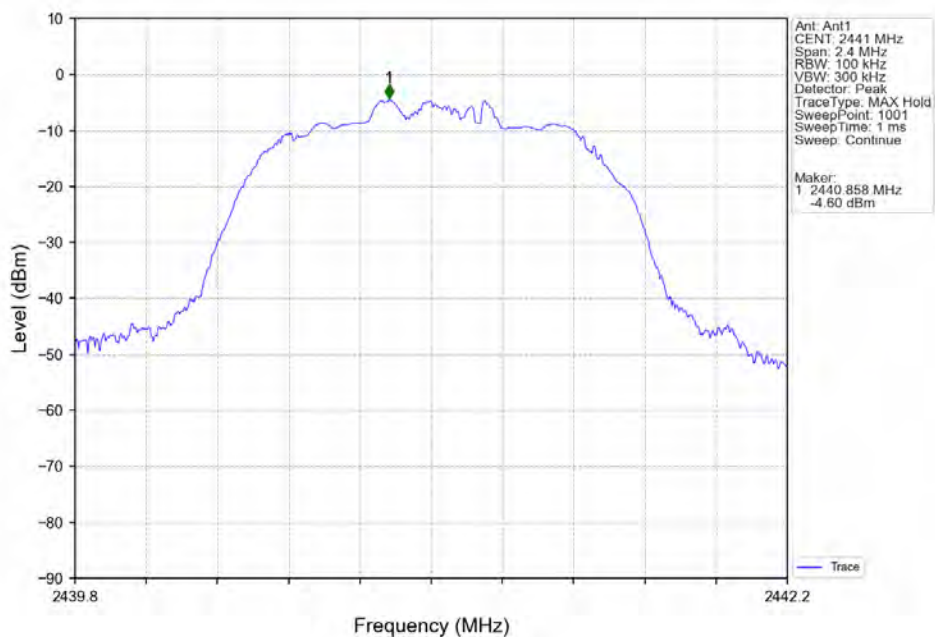
π /4DQPSK_2DH5_HOPP_Ant1_NTNV



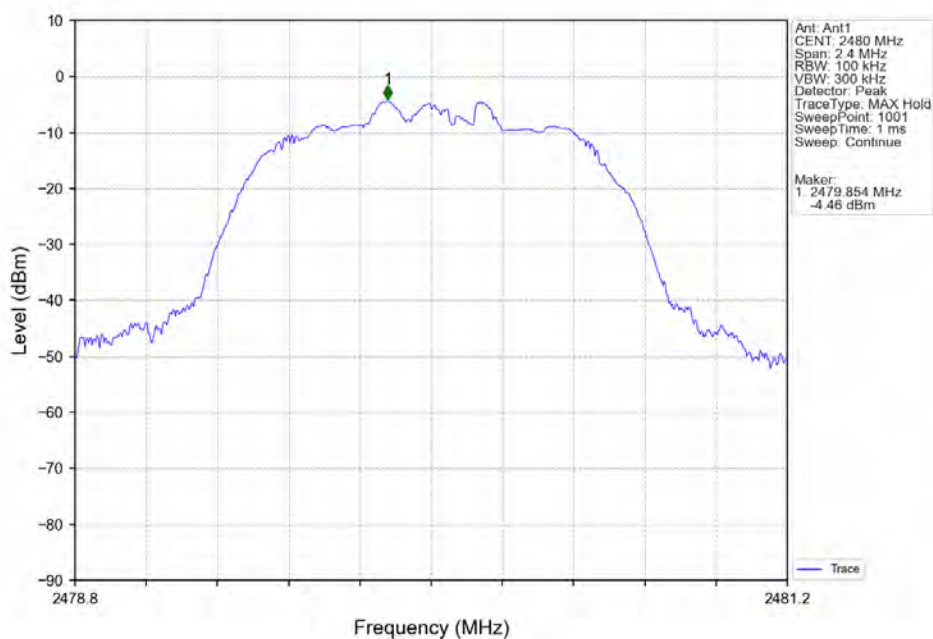
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



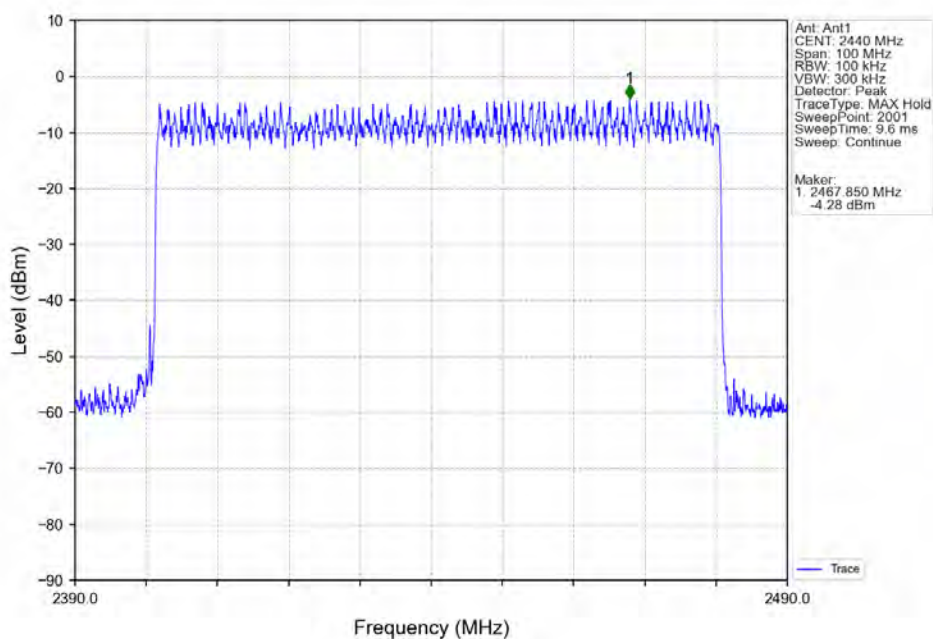
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

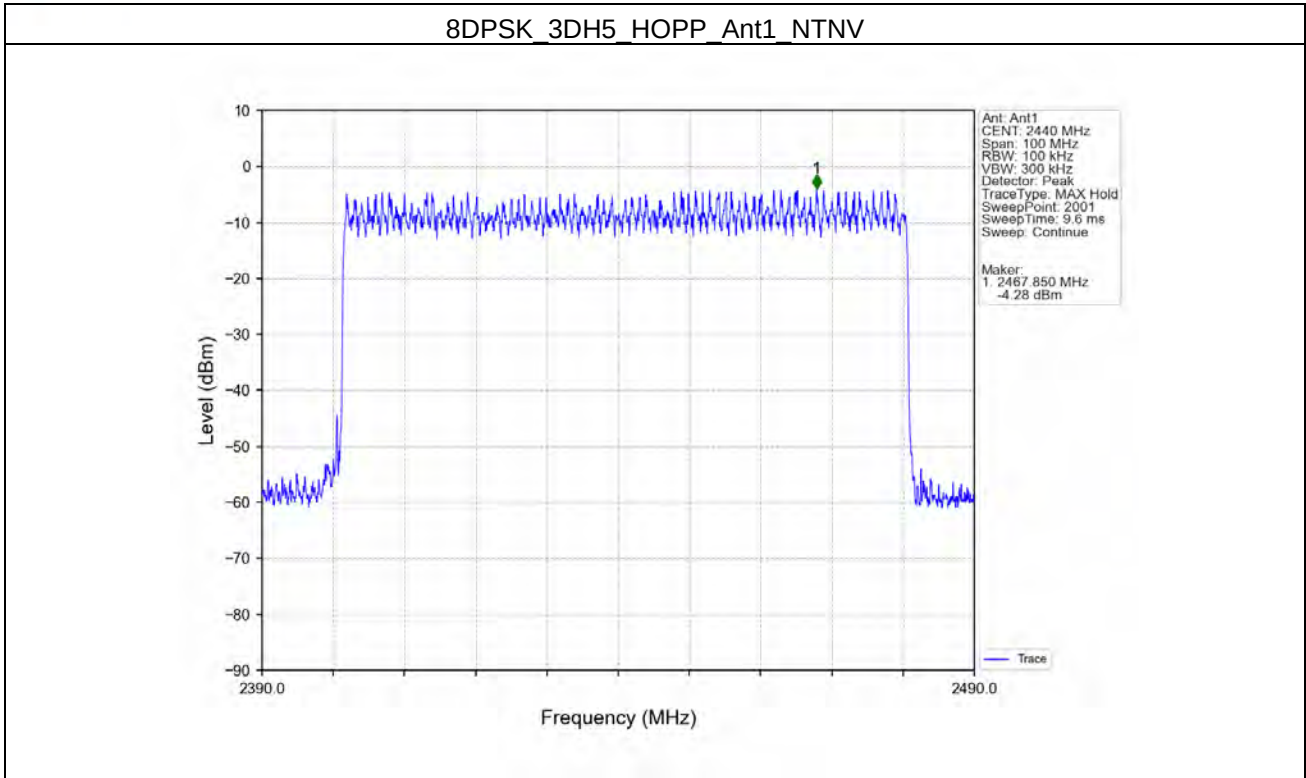


8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

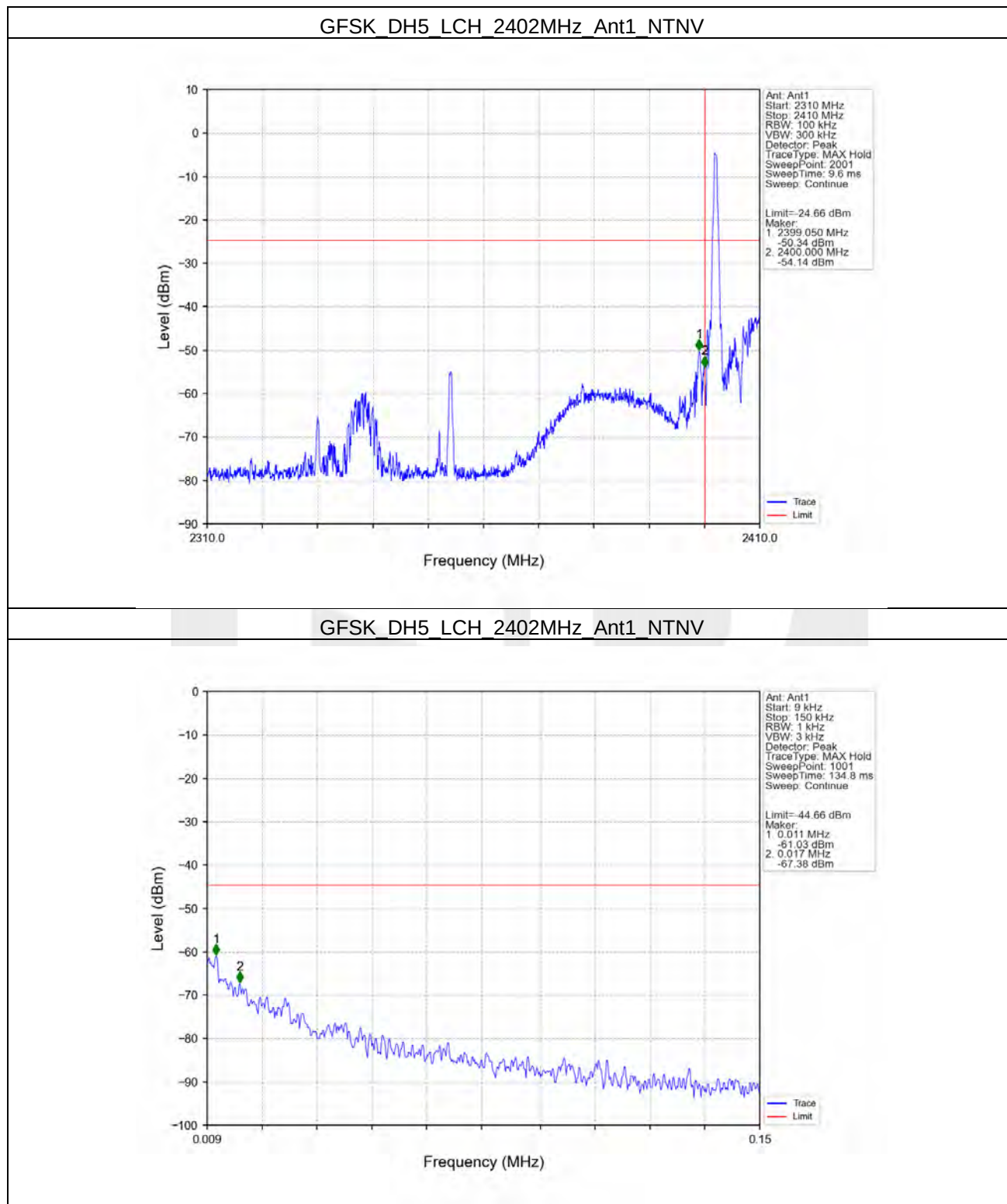


8DPSK_3DH5_HOPP_Ant1_NTNV

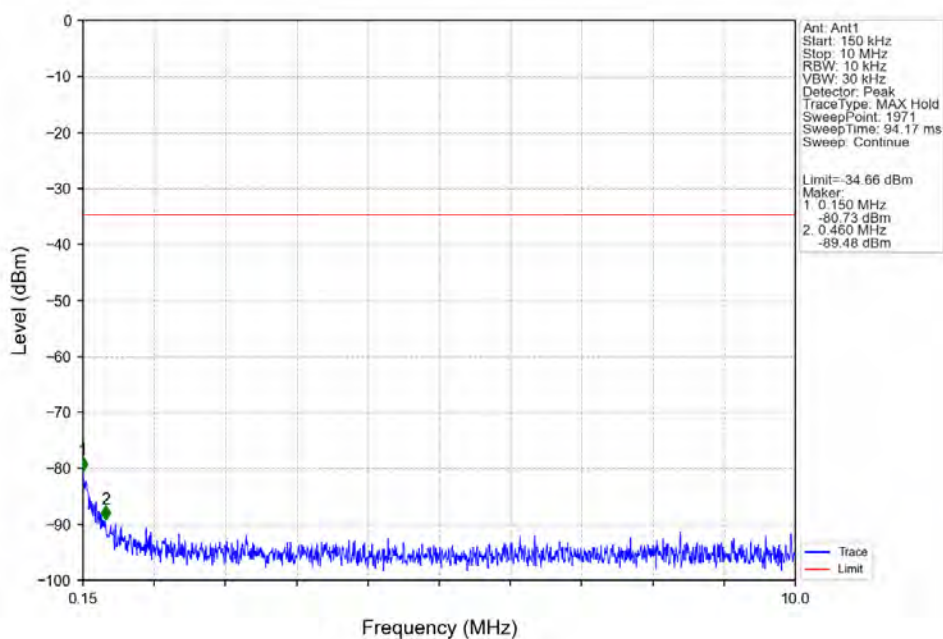




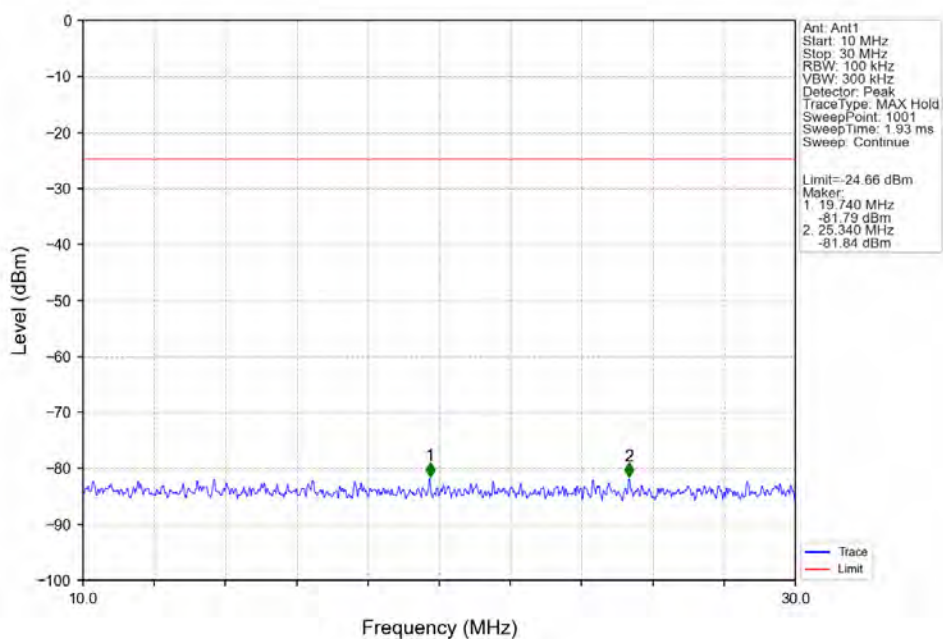
7.2.2 CSE



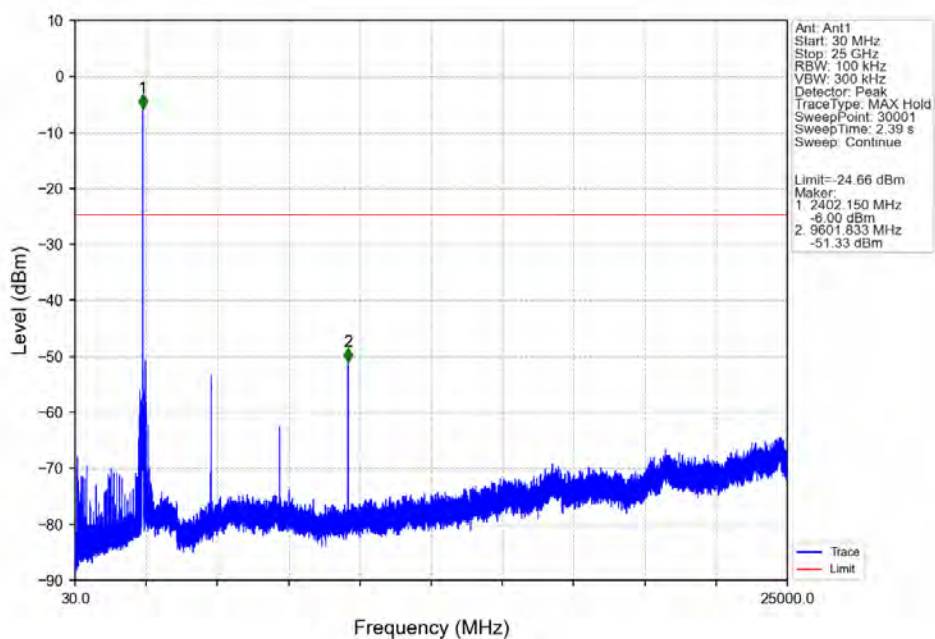
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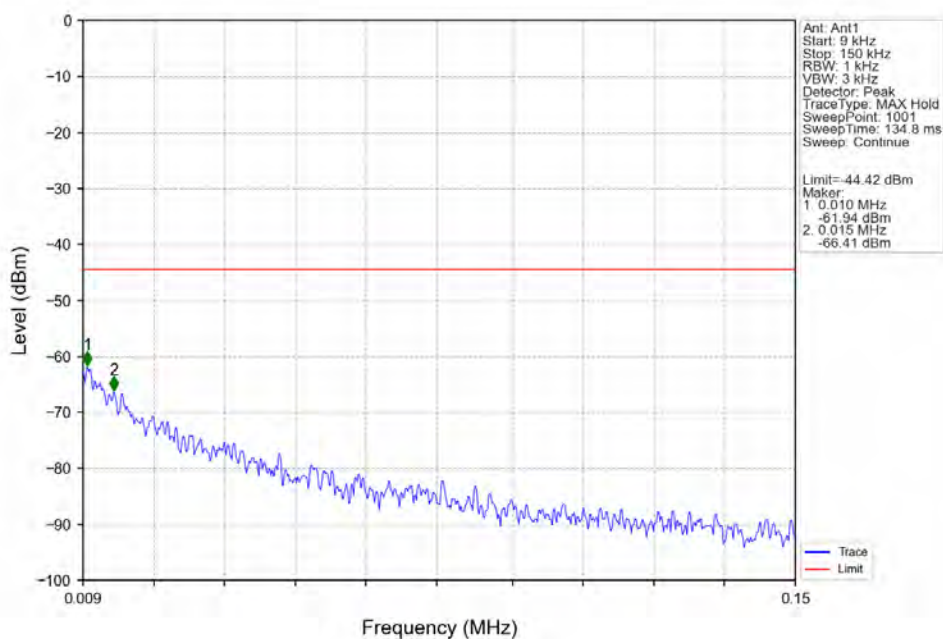
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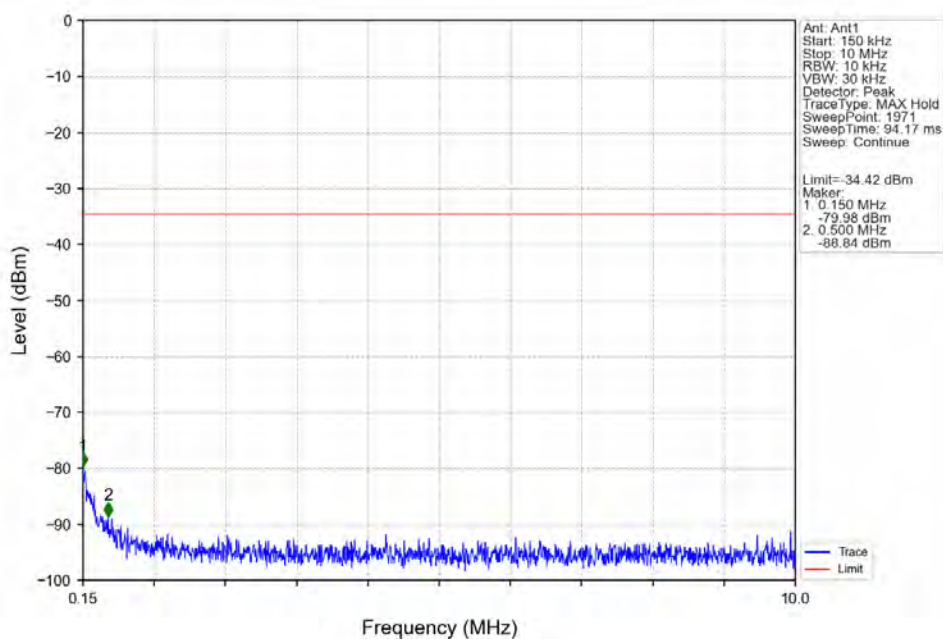
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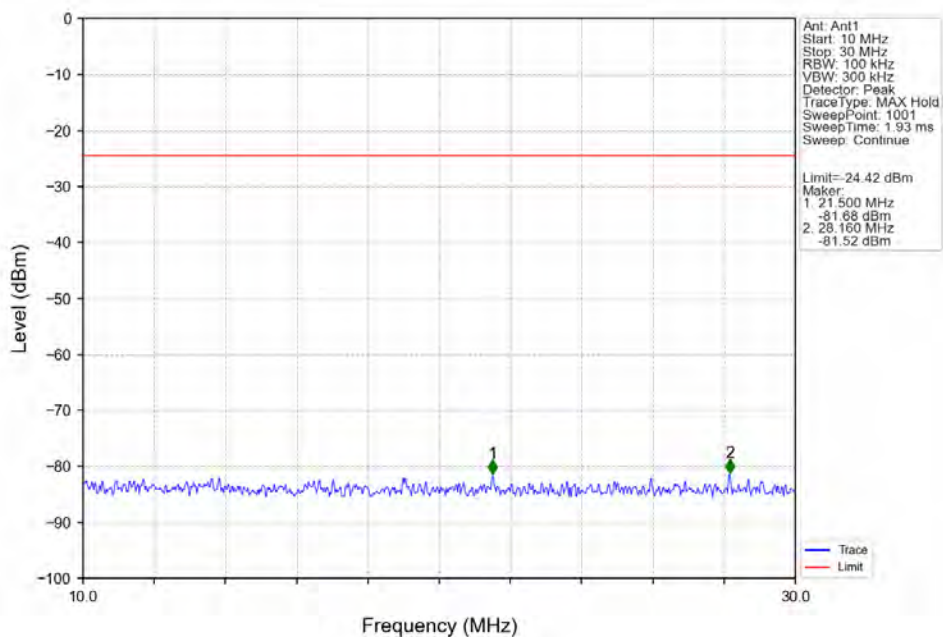
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



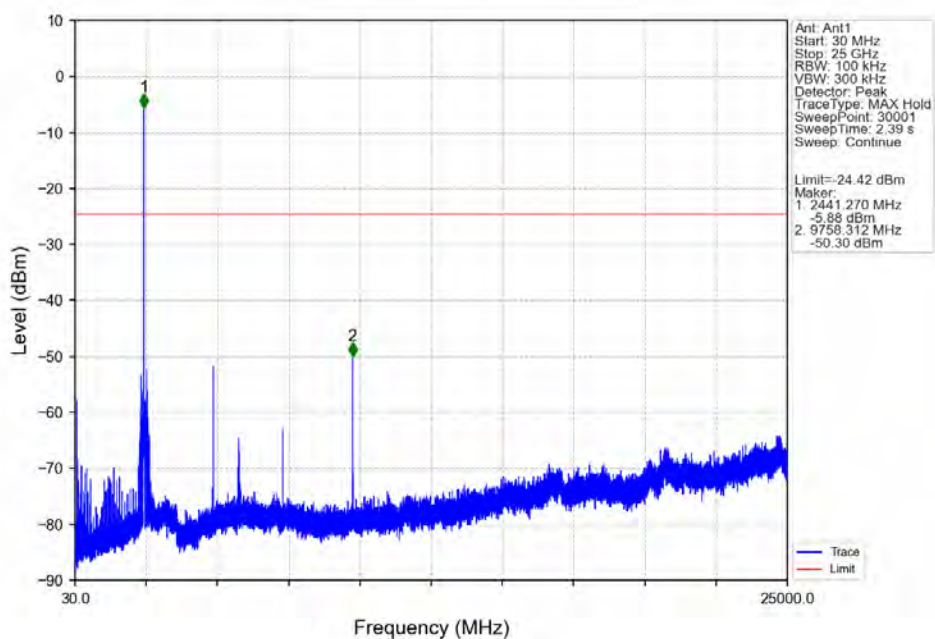
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



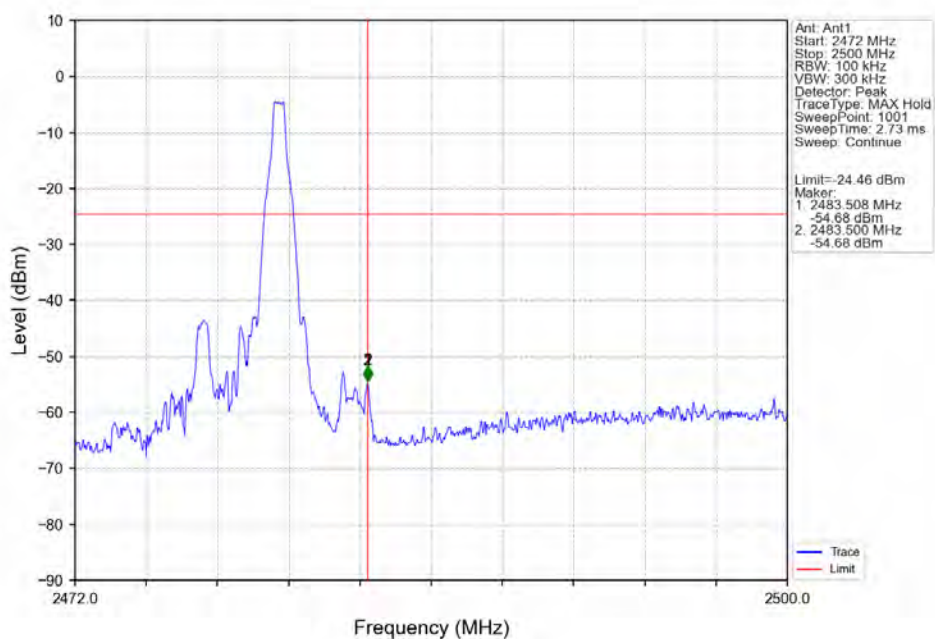
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



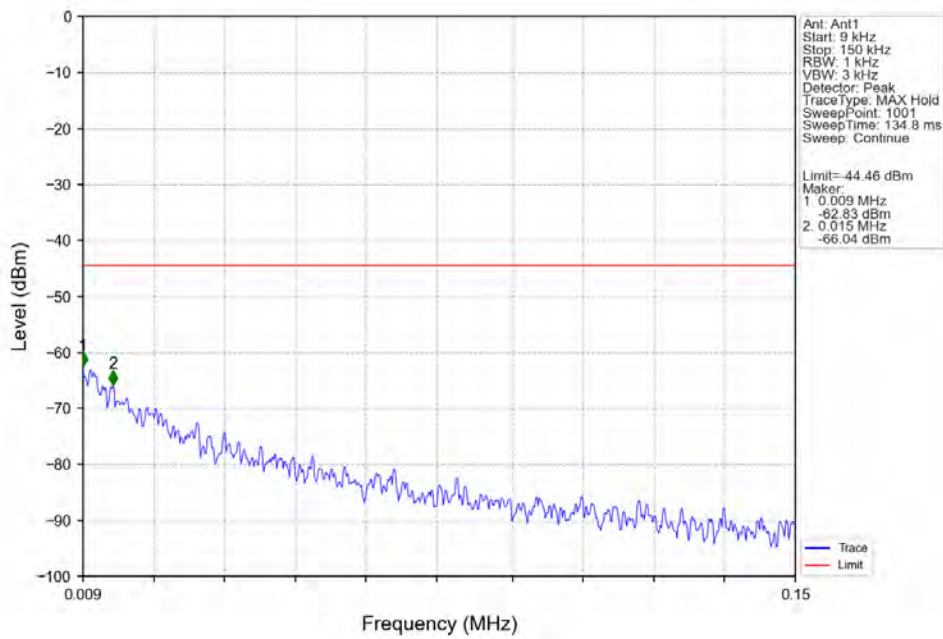
GFSK DH5 MCH 2441MHz Ant1 NTN



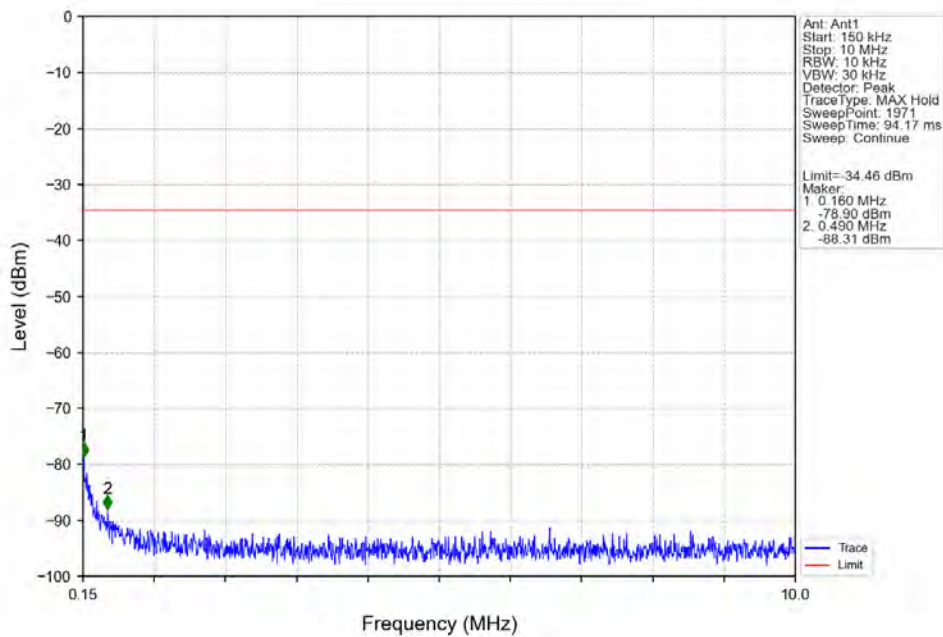
GFSK DH5 HCH 2480MHz Ant1 NTN



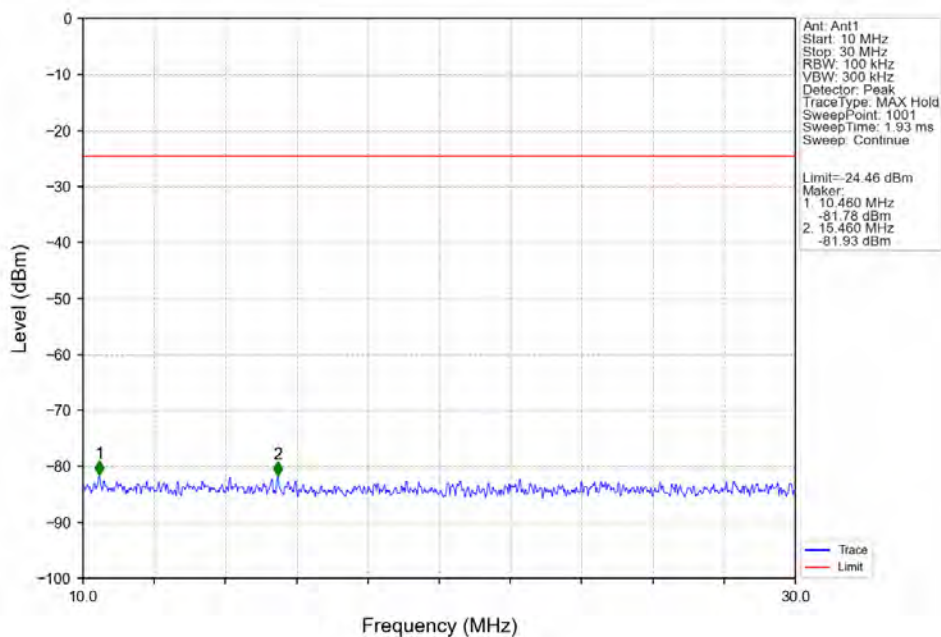
GFSK DH5 HCH 2480MHz Ant1 NTN



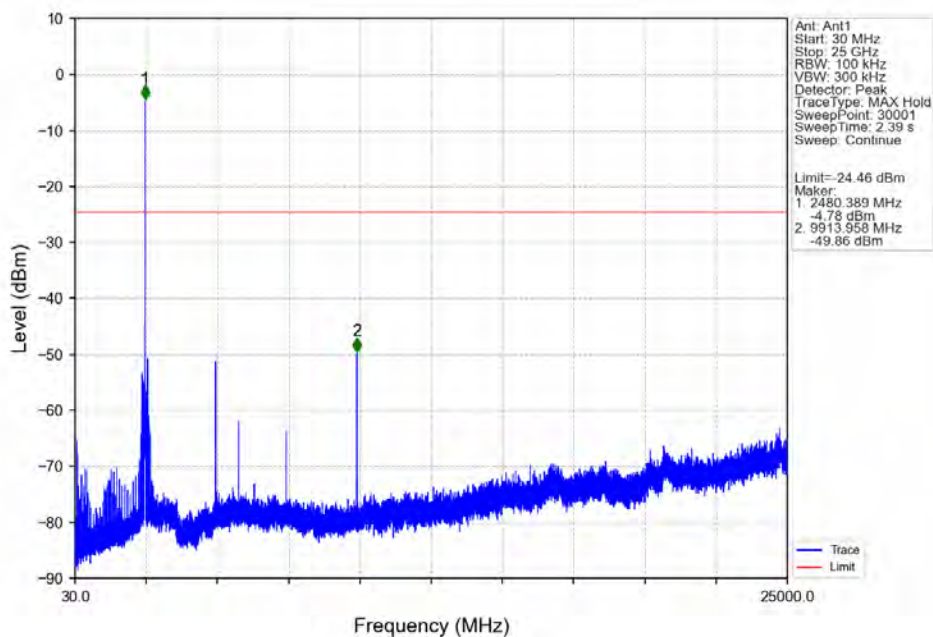
GFSK DH5 HCH 2480MHz Ant1 NTN



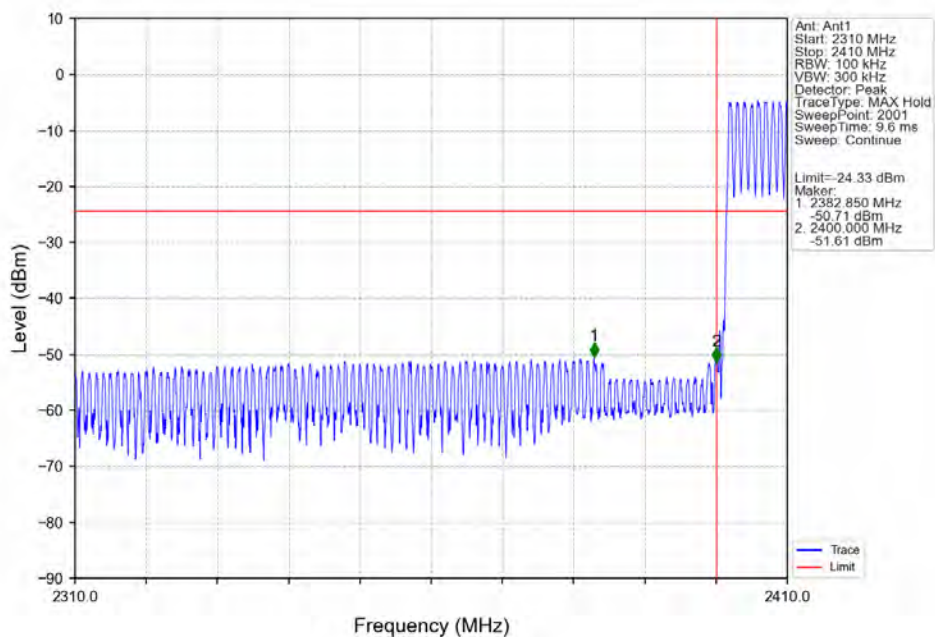
GFSK DH5 HCH 2480MHz Ant1 NTN



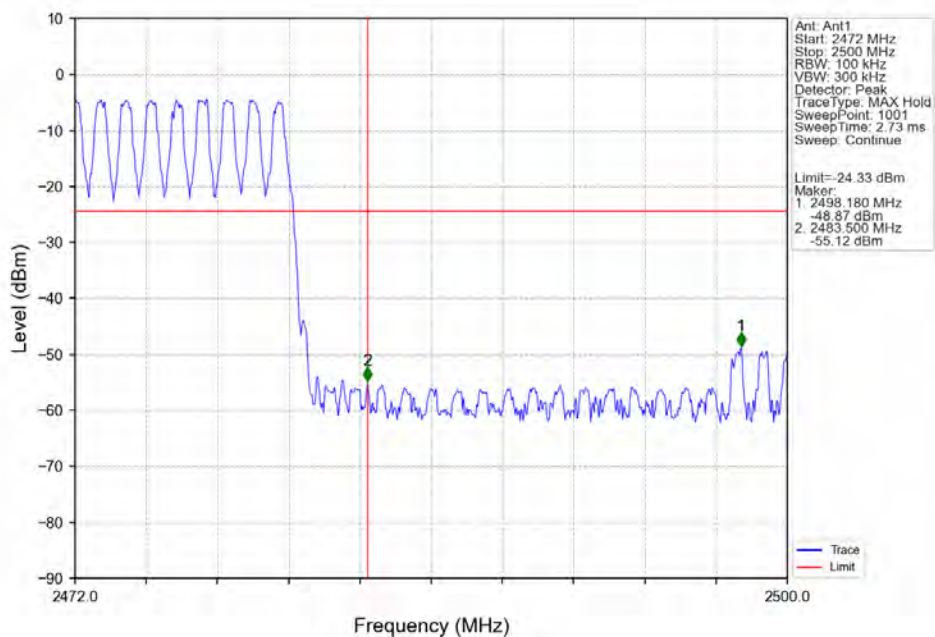
GFSK DH5 HCH 2480MHz Ant1 NTN



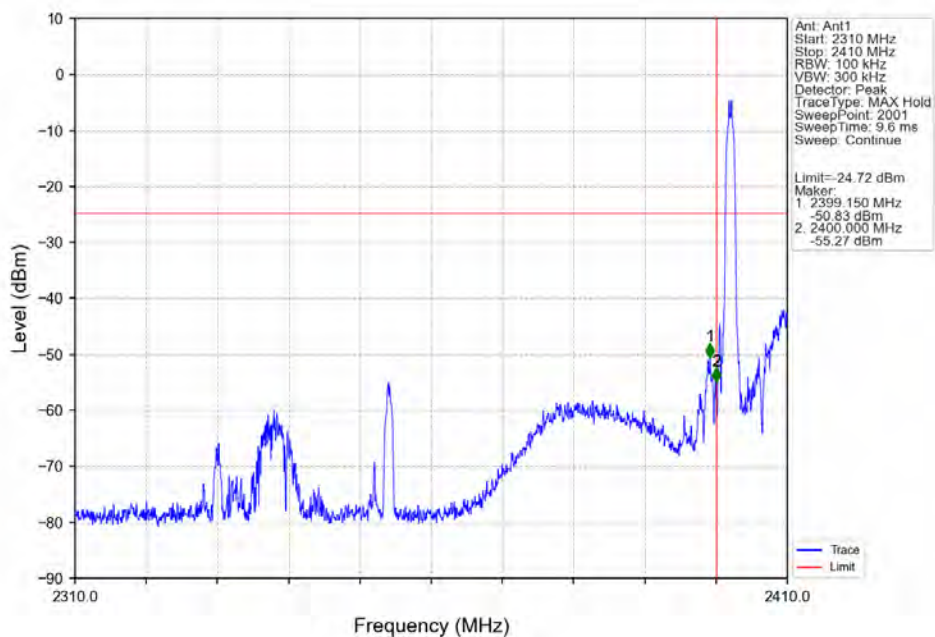
GFSK_DH5_HOPP_Ant1_NTNV



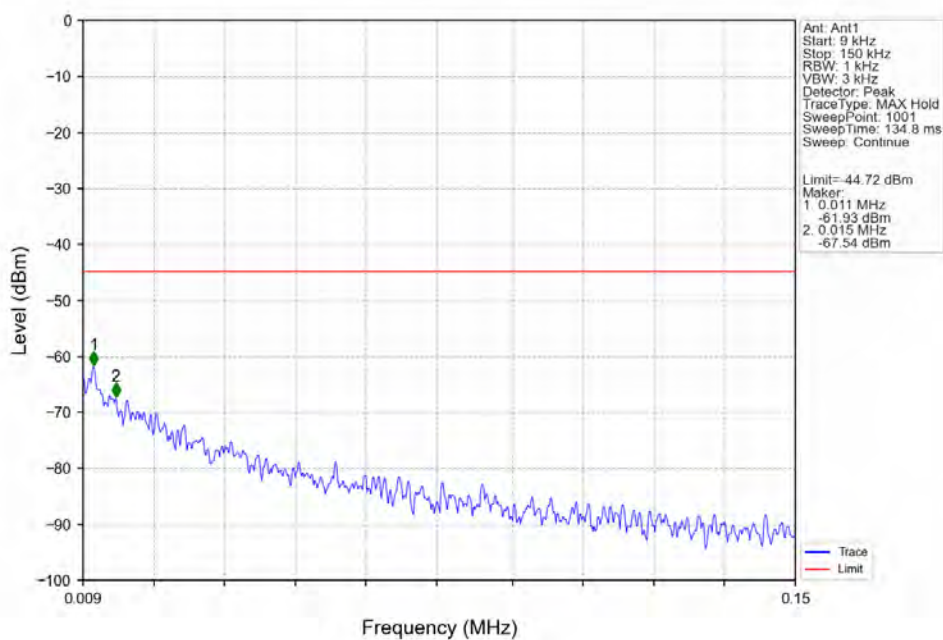
GFSK_DH5_HOPP_Ant1_NTNV



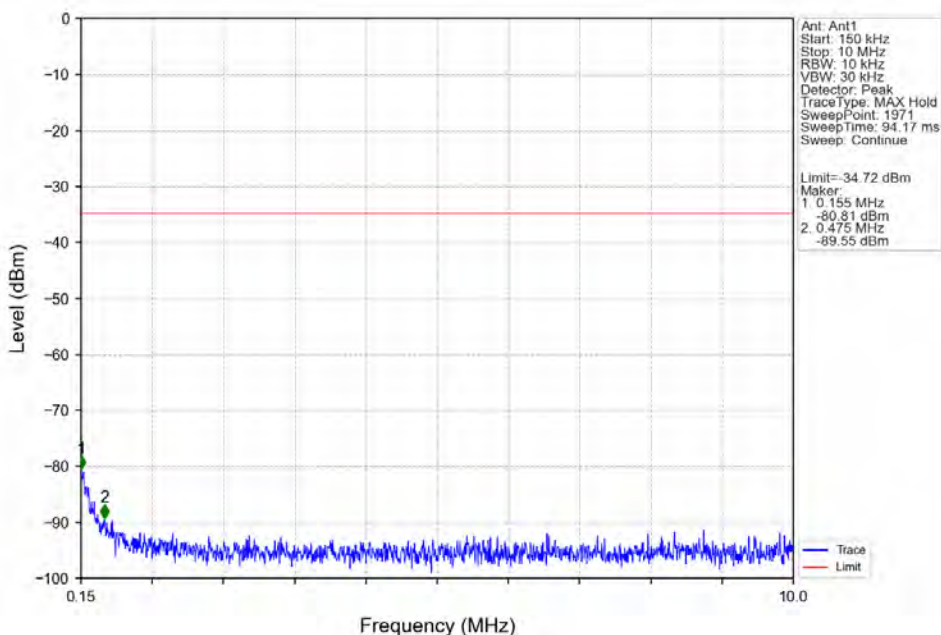
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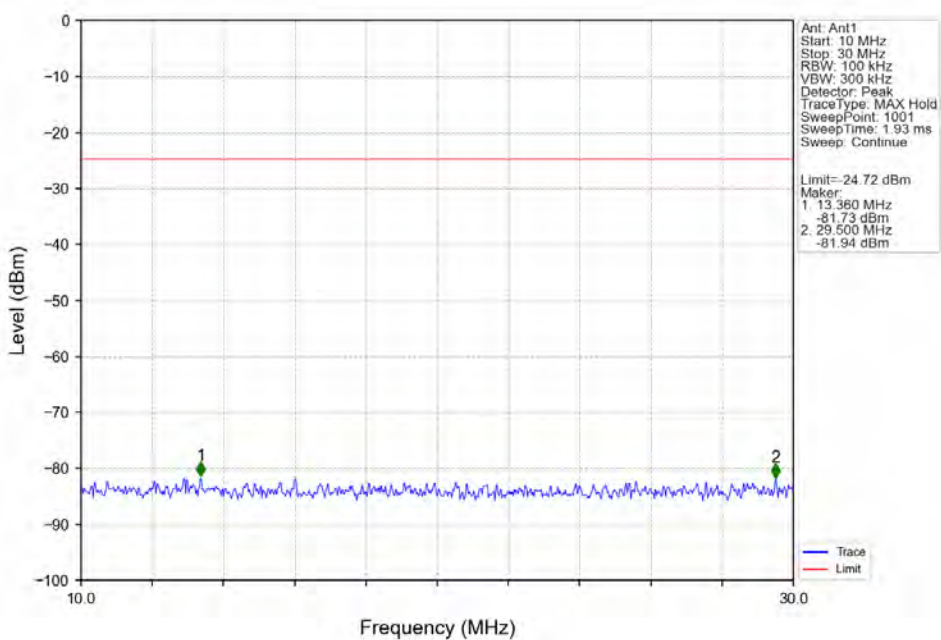
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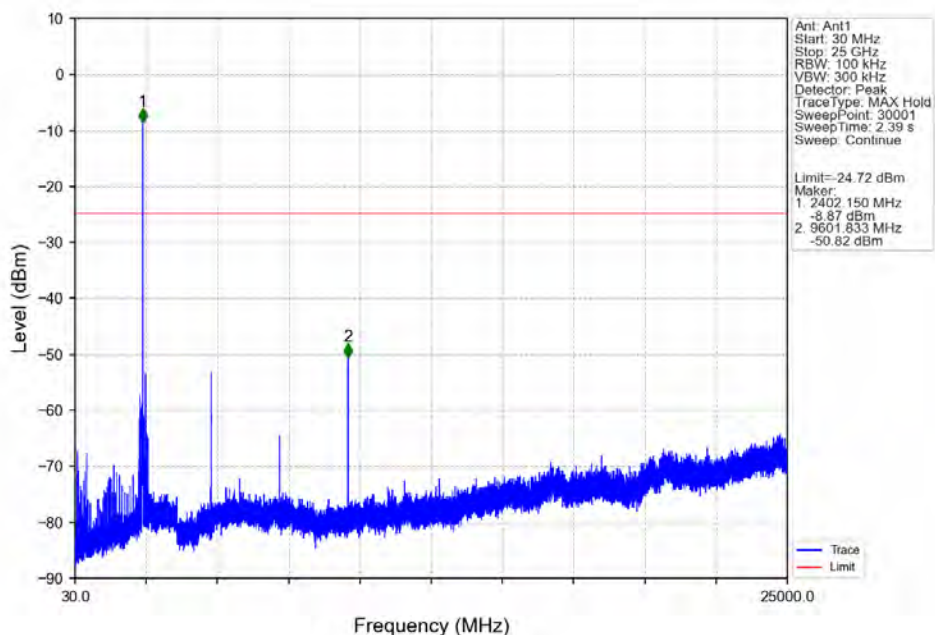
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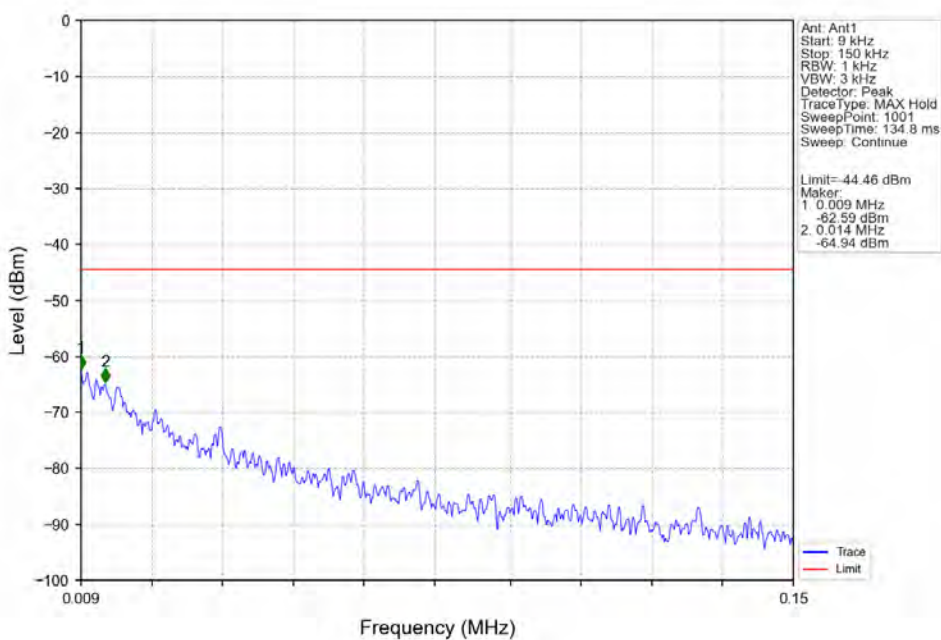
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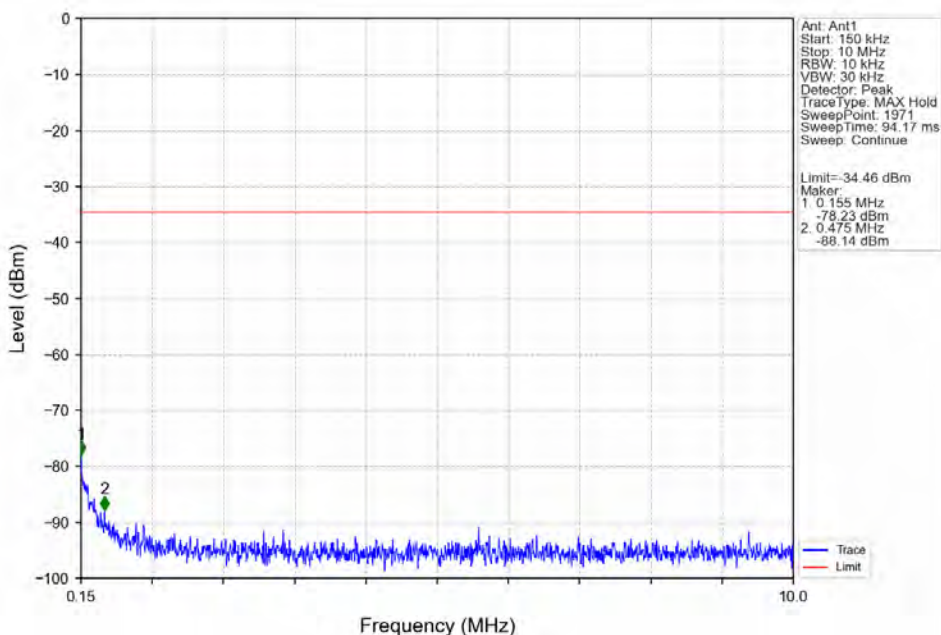
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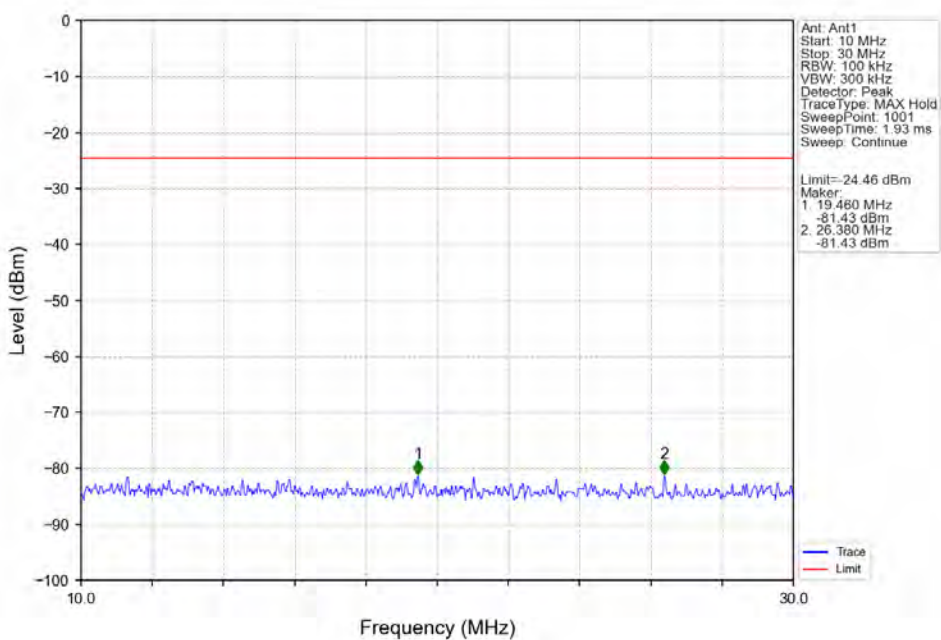
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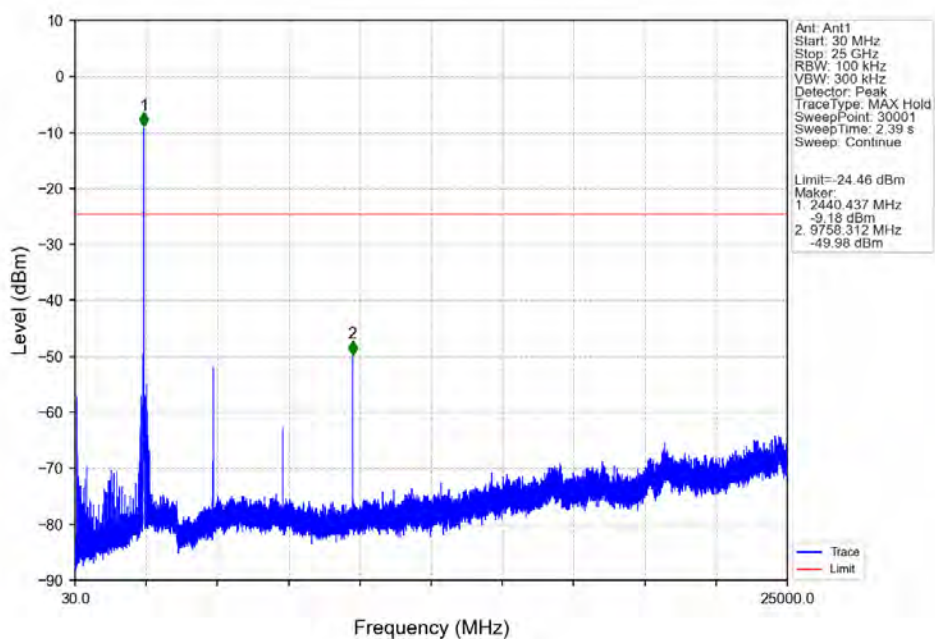
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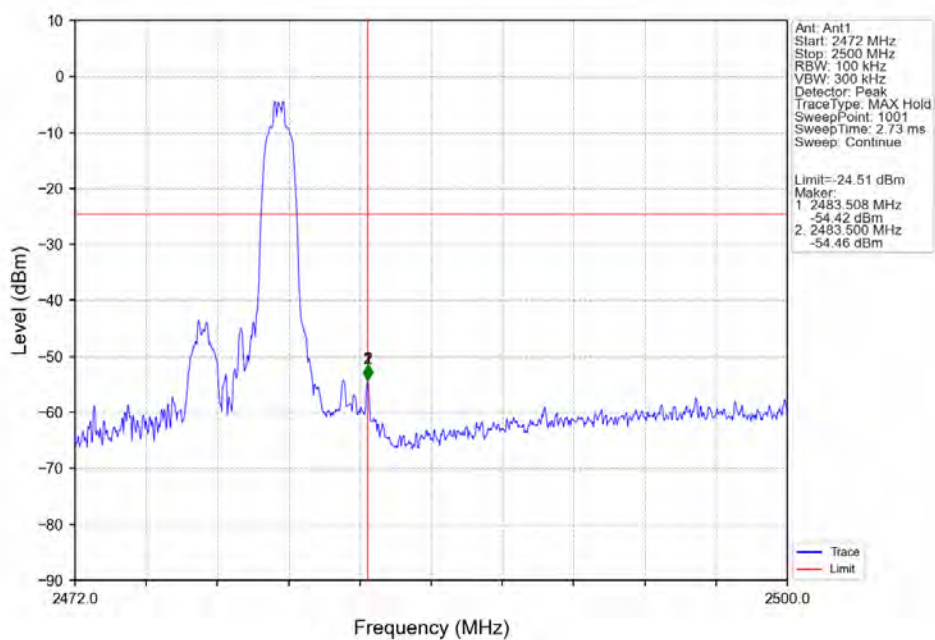
π /4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



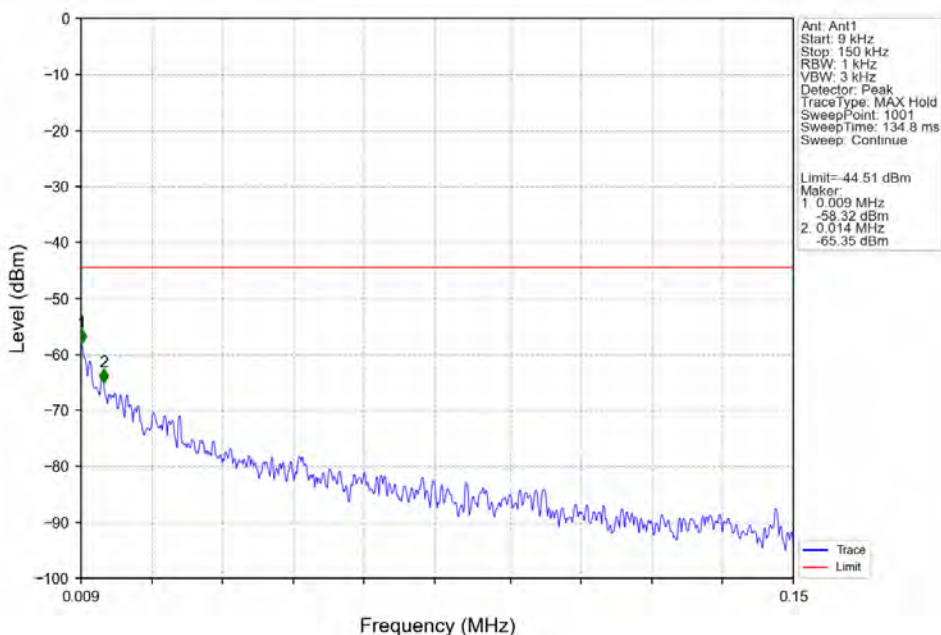
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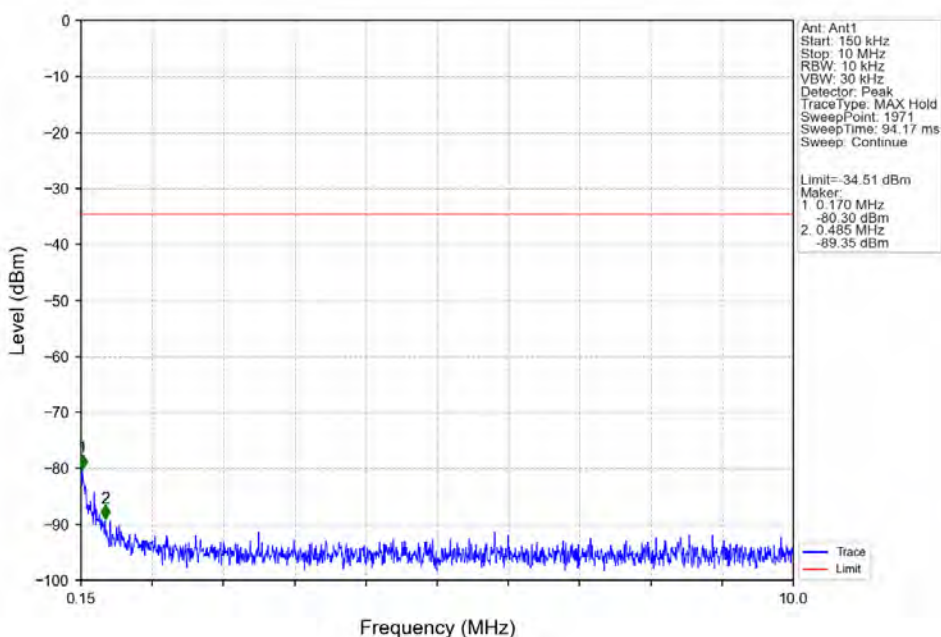
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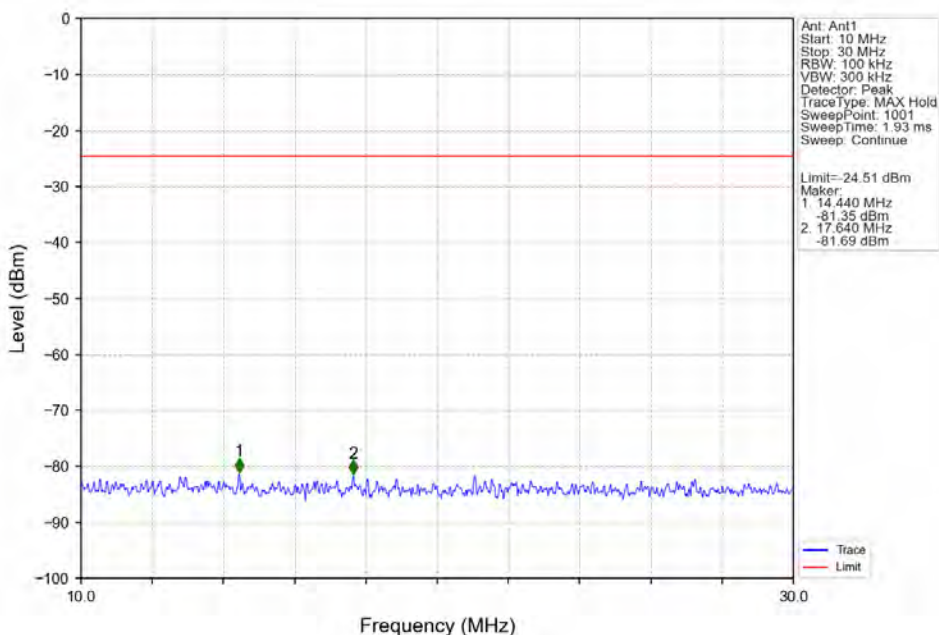
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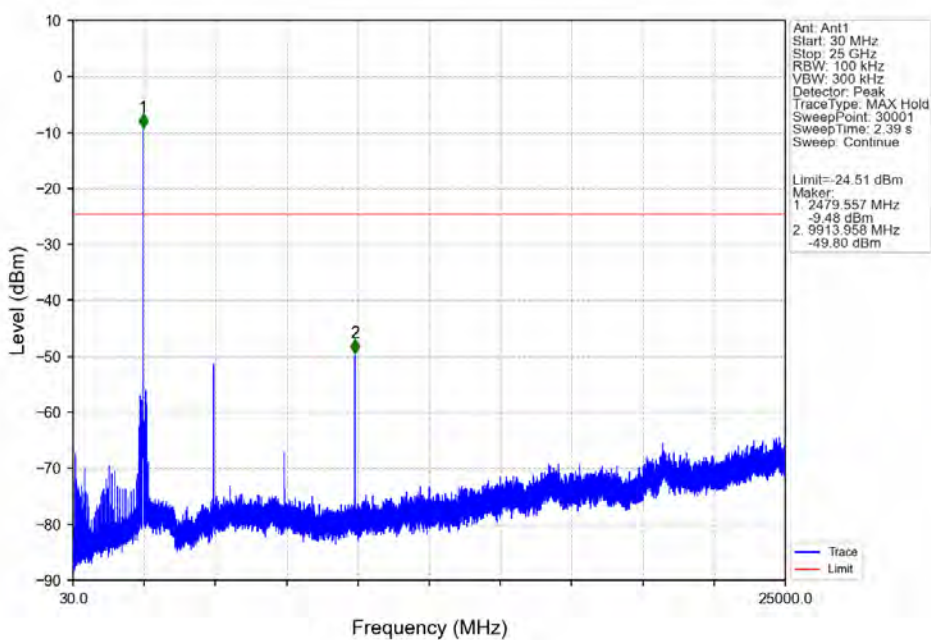
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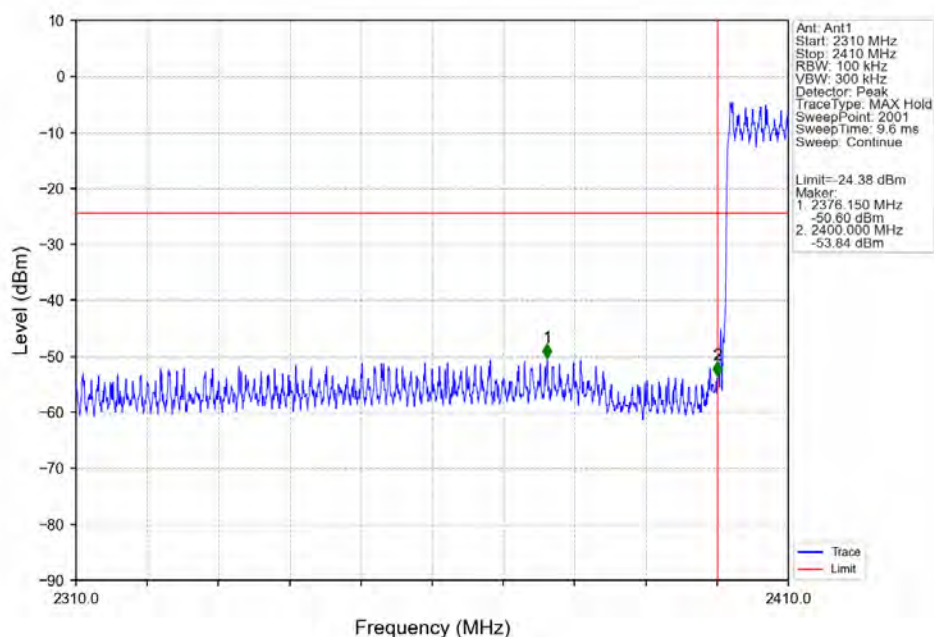
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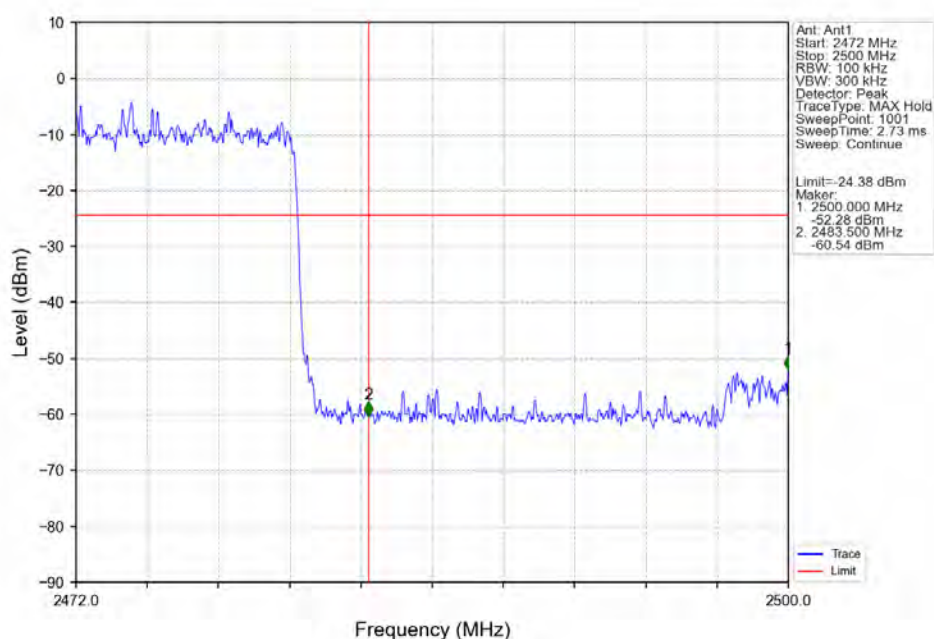
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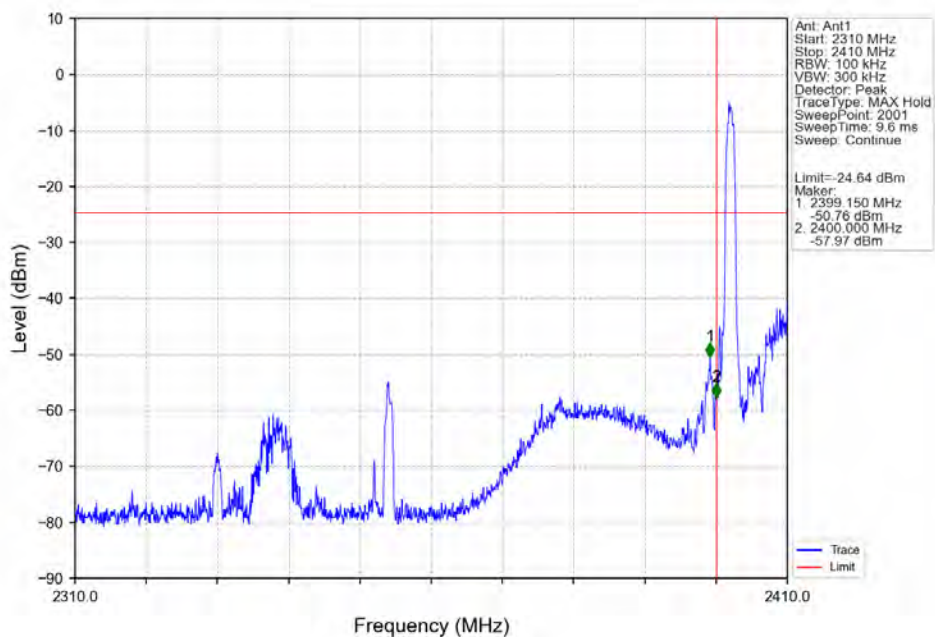
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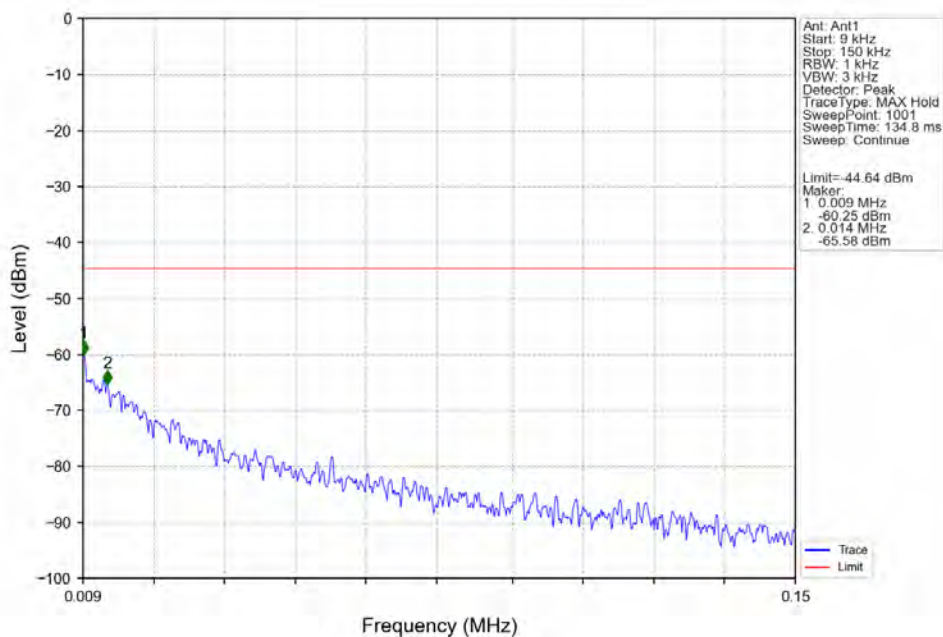
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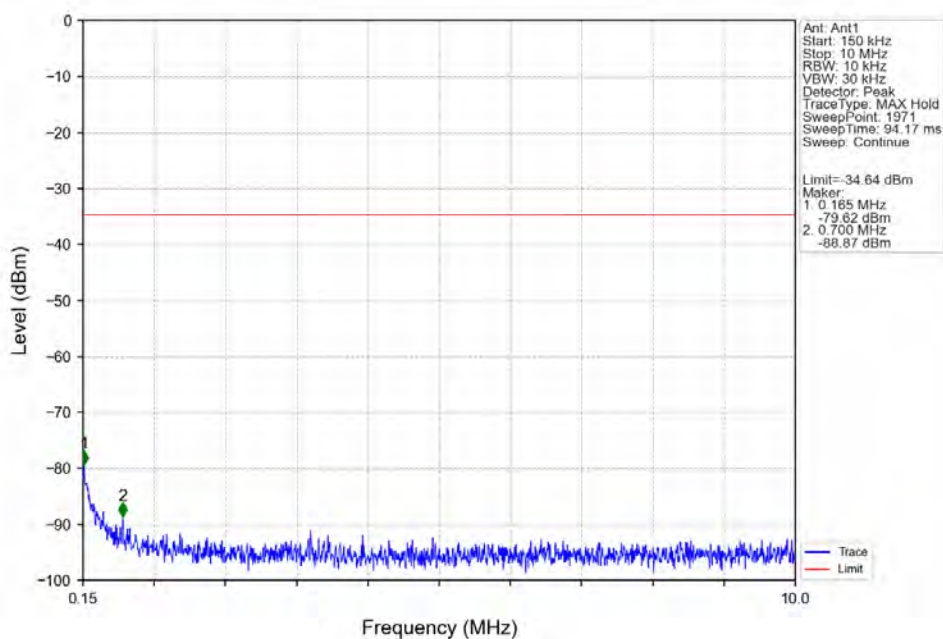
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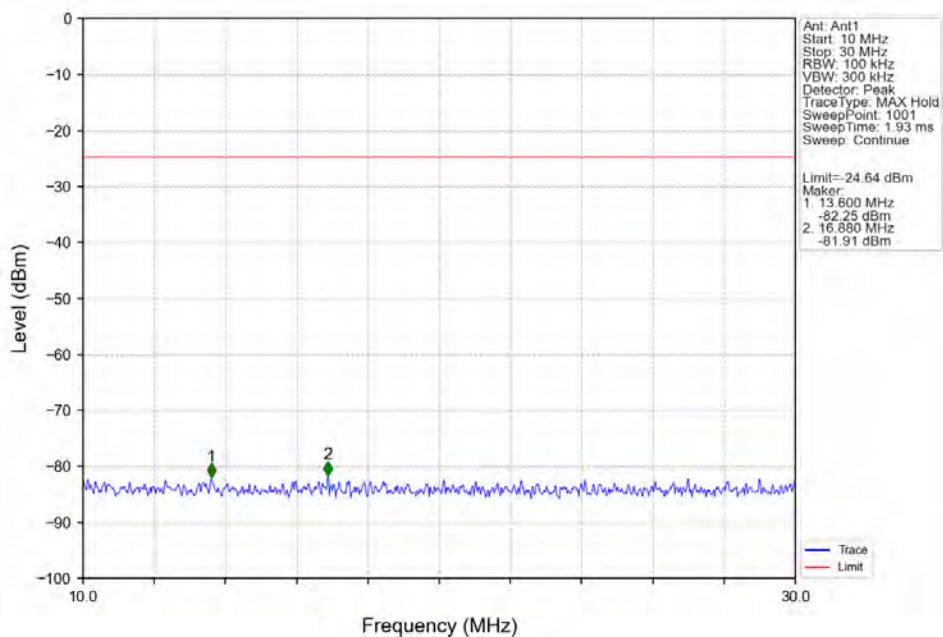
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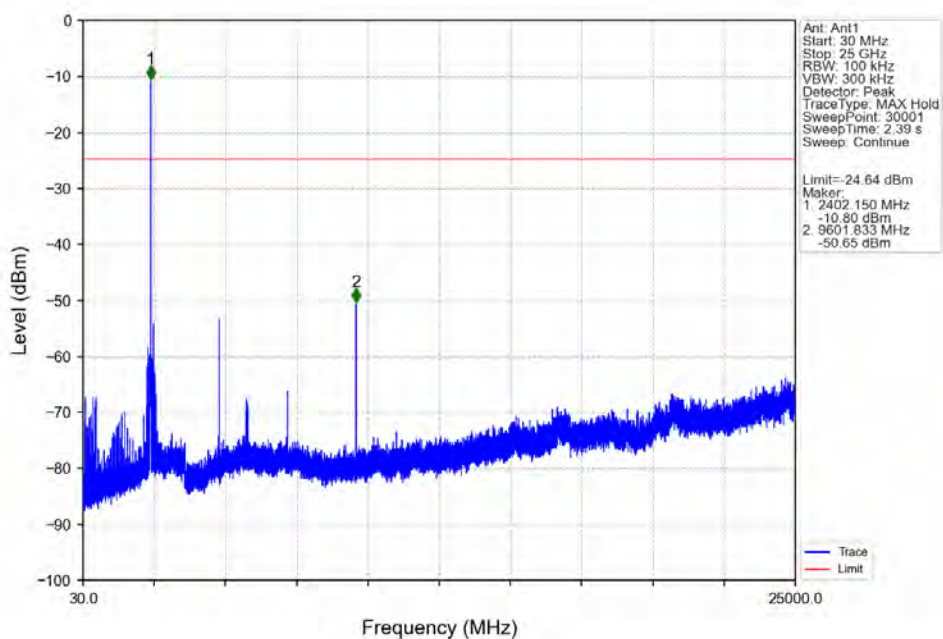
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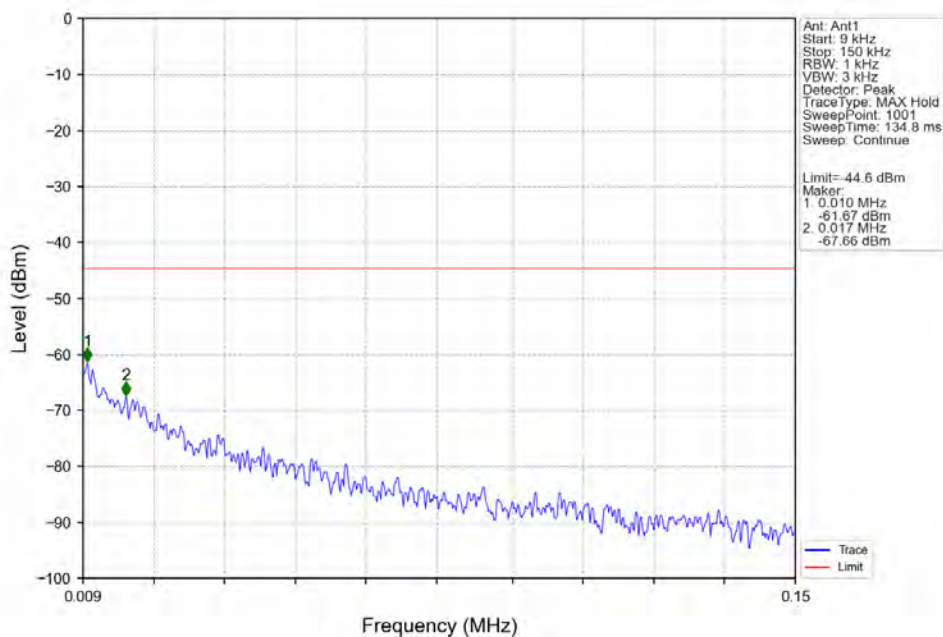
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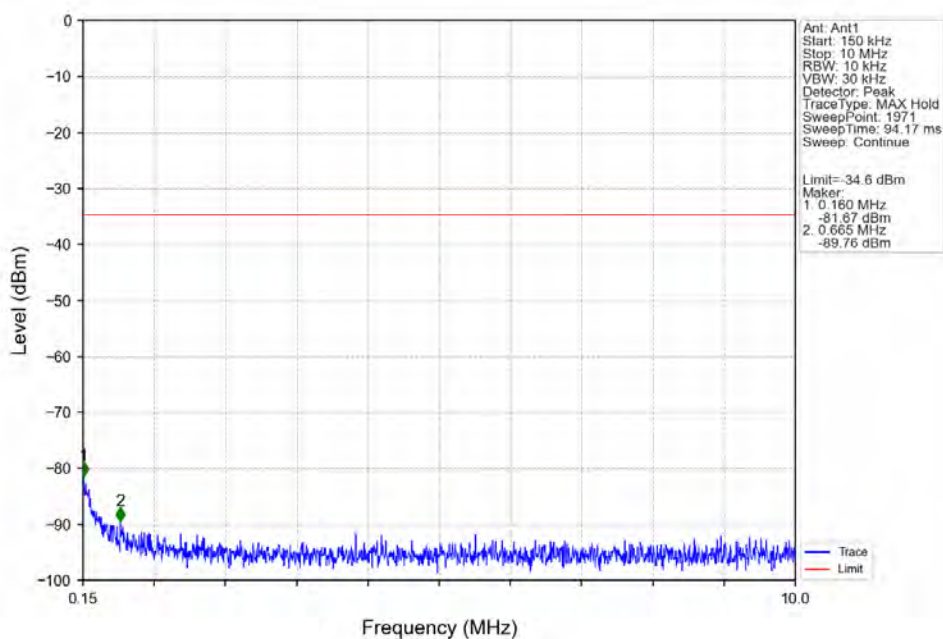
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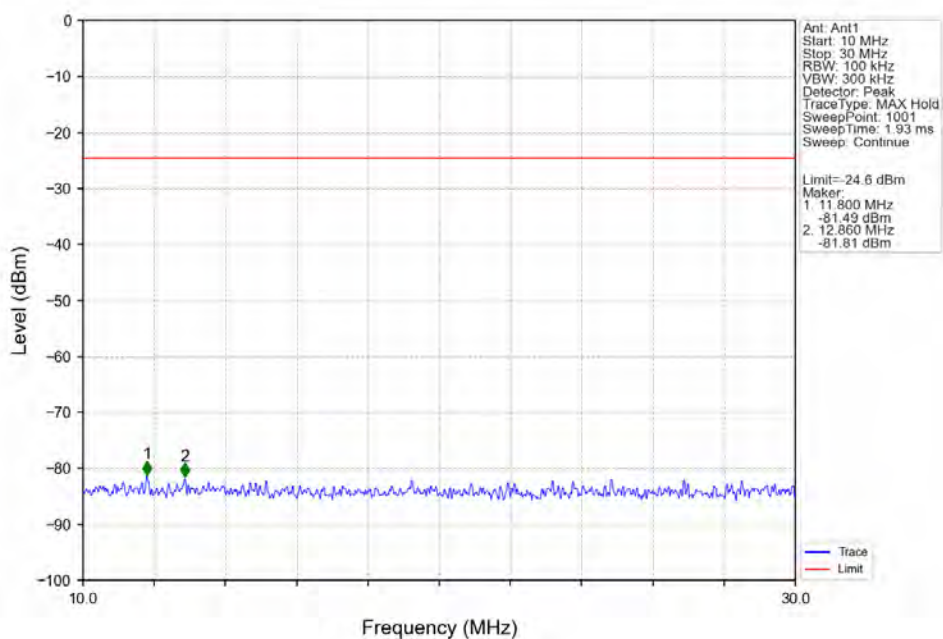
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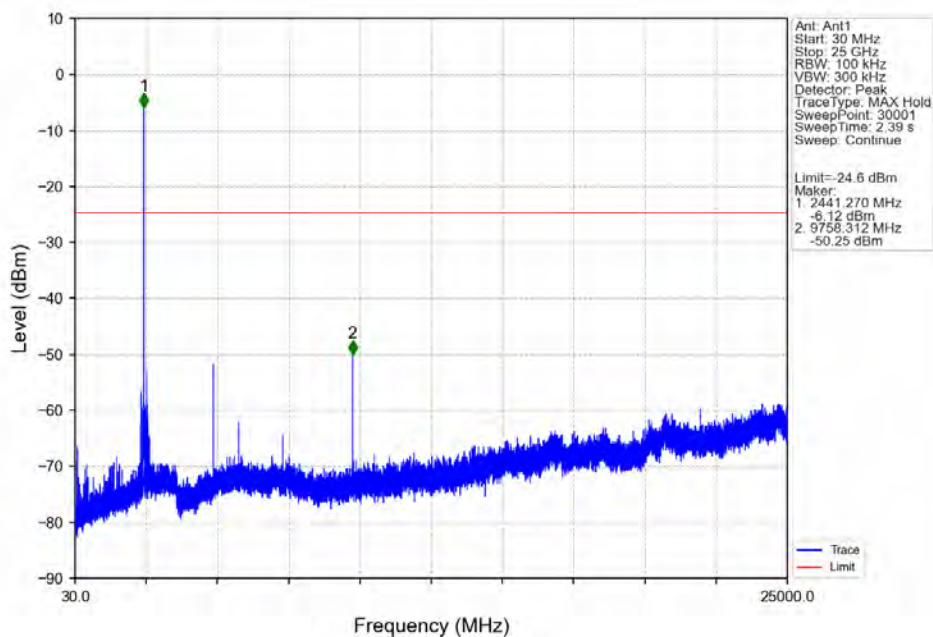
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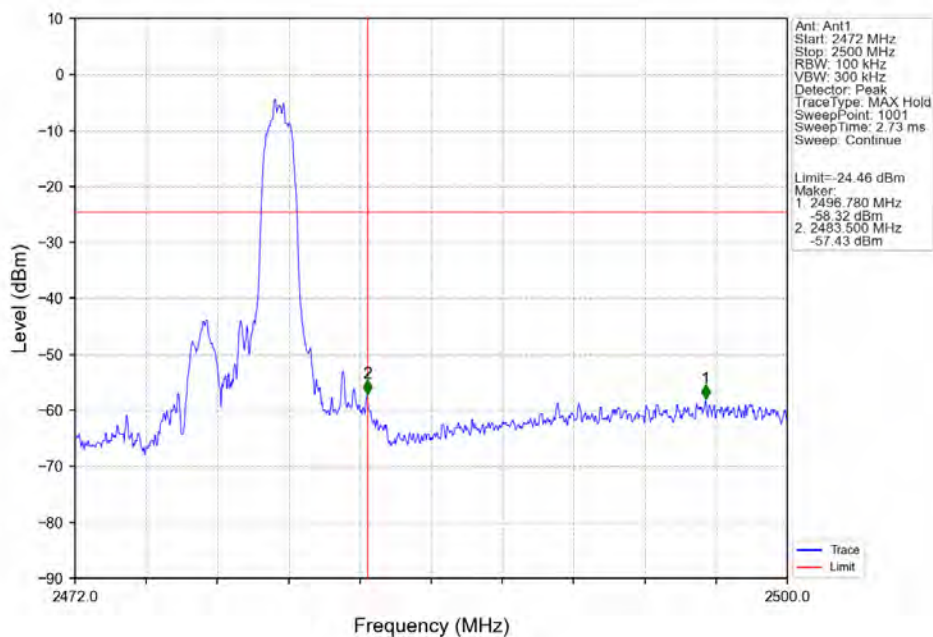
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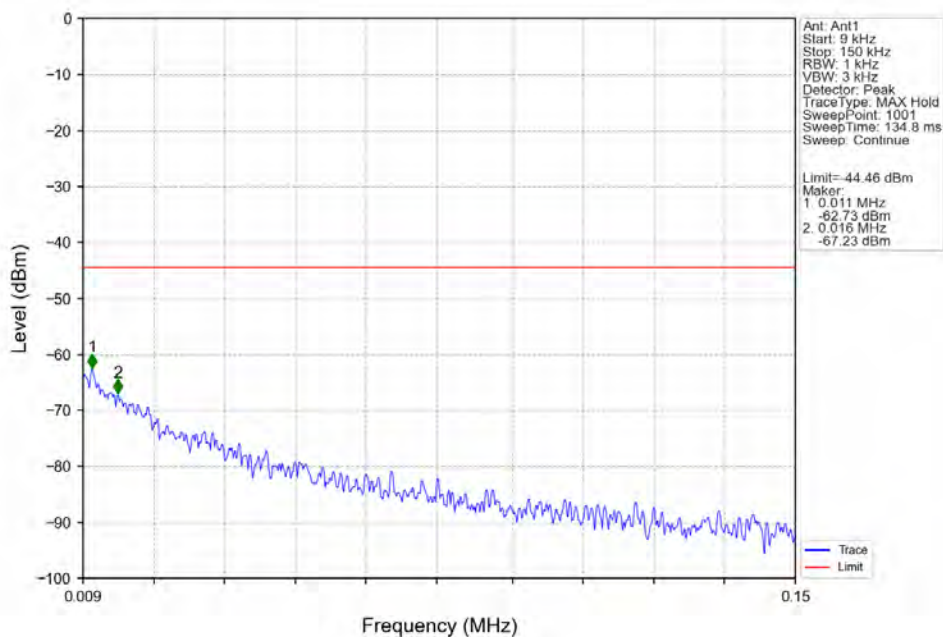
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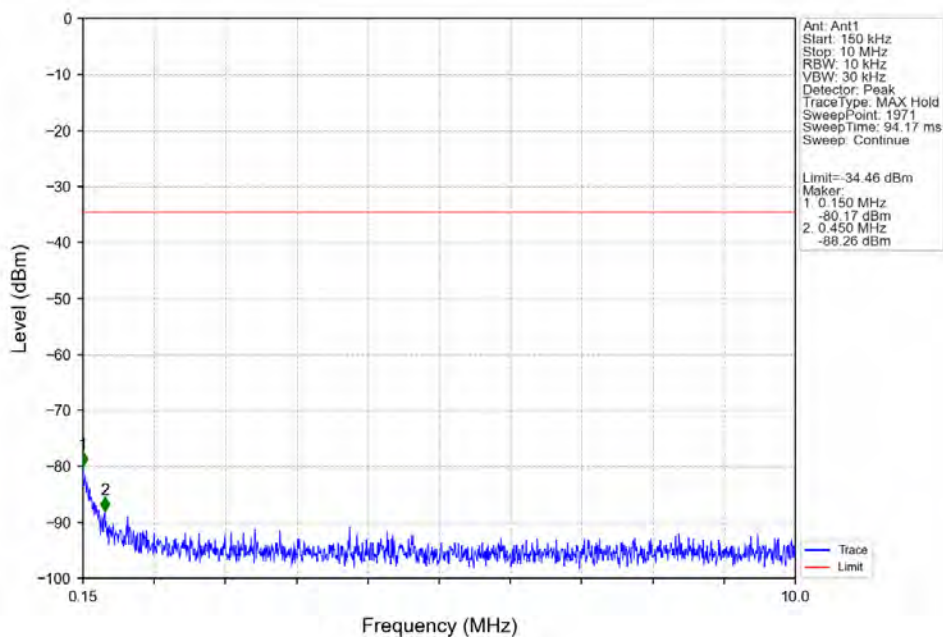
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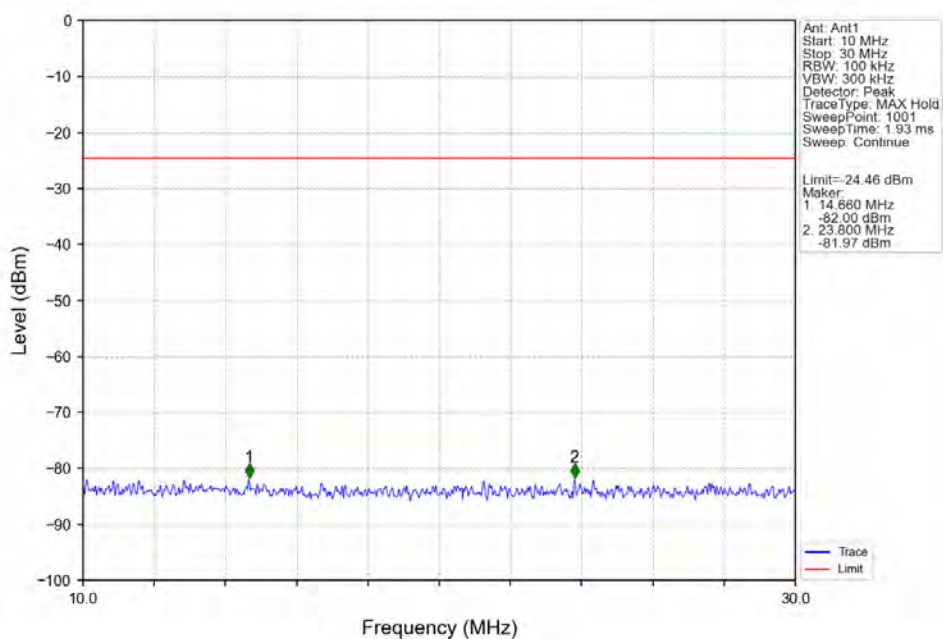
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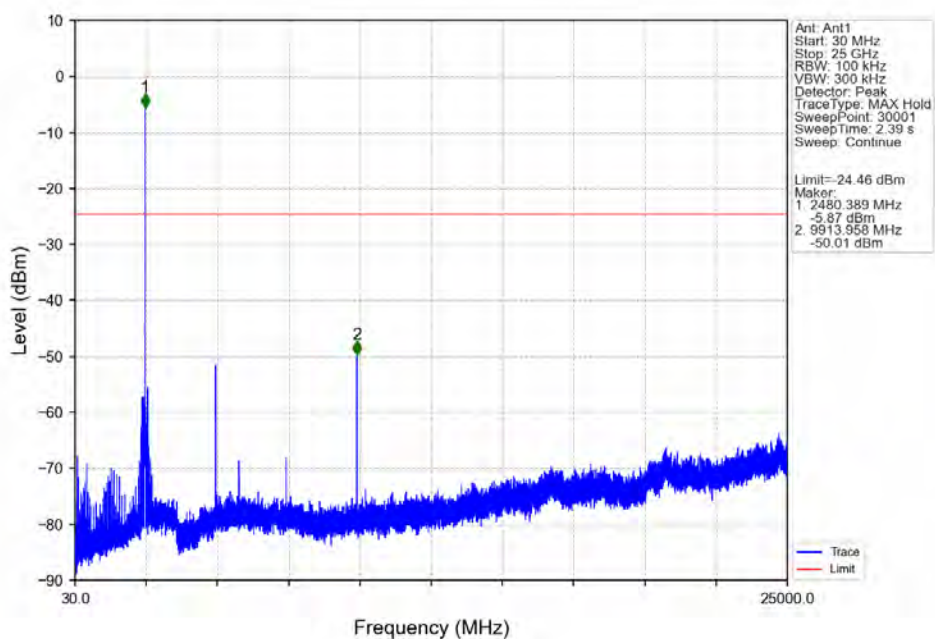
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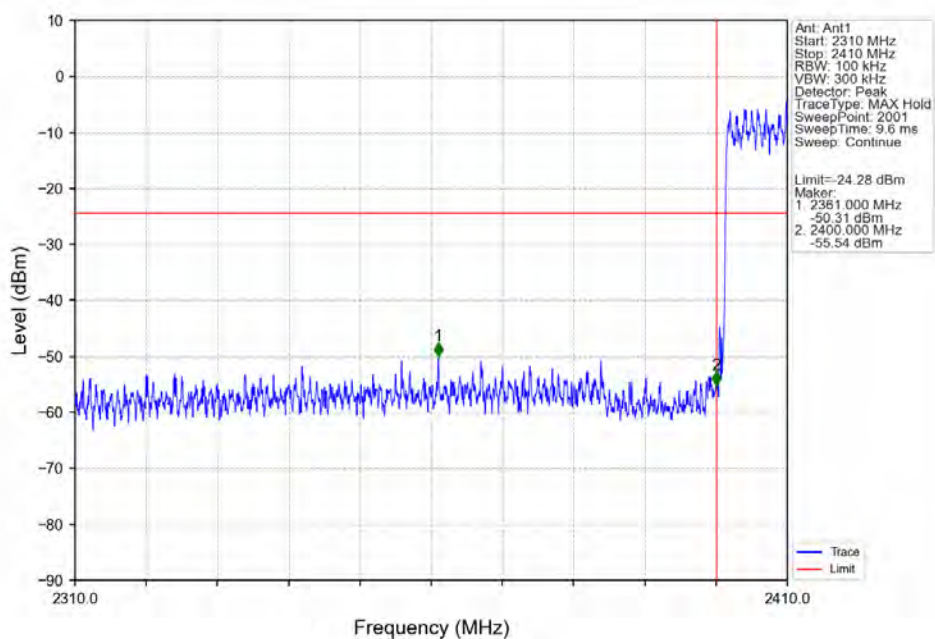
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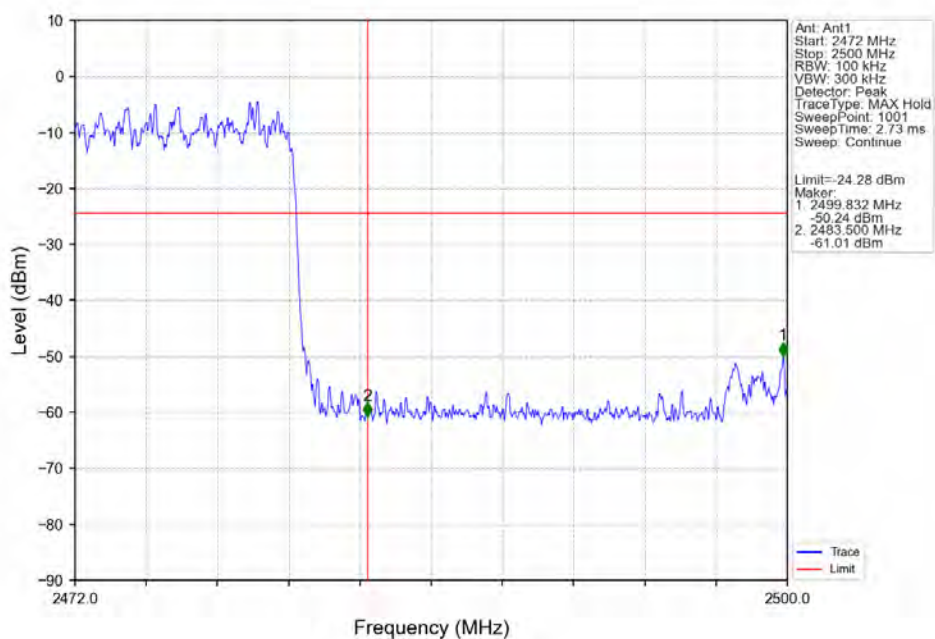
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



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