RF Test Report

For

Applicant Name:	**Shenzhen Chuangmengying Trading Co., Ltd.**
Address:	1811 Guangyuan Building, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen
EUT Name:	Bluetooth Watch
Brand Name:	Lovouse
Model Number:	R68
Series model number:	G89, G86

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Report Number:	BTF240826R00601
Test Standards:	47 CFR Part 15.247
Test Conclusion:	Pass
FCC ID:	2BKO7-R68
Test Date:	2024-08-26 to 2024-08-29
Date of Issue:	2024-08-30
Test By:	Ssxx.guo/ Tester
Prepared By:	Aria Zhang / Project Engineer
Date:	2024-08-30
Approved By:	Ryan.CJ / EMC Manager
Date:	2024-08-30

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2024-08-30	Original
Note: Once the revision has been made, then previous versions reports are invalid.		

BTF Testing Lab (Shenzhen) Co., Ltd.
F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

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1 Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130
FCC Registration Number:	518915
Designation Number:	CN1330

1.3 Announcement

(1) The test report reference to the report template version v0.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
(4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.
(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 Product Information

2.1 Application Information

Company Name:	Shenzhen Chuangmengying Trading Co., Ltd.
Address:	1811 Guangyuan Building, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen

2.2 Manufacturer Information

Company Name:	HanYuan Technology(Shenzhen)Co.Ltd
Address:	Room601,buildinge,No.8,North District,shangxue SciencePark,Bantian street,Longgang District,Shenzhen,Guangdong,China

2.3 Factory Information

Company Name:	HanYuan Technology(Shenzhen)Co.Ltd
Address:	Room601,buildinge,No.8,North District,shangxue SciencePark,Bantian street,Longgang District,Shenzhen,Guangdong,China

2.4 General Description of Equipment under Test (EUT)

EUT Name:	Bluetooth Watch
Test Model Number:	R68
Series model name:	G89, G86
Description of model name differentiation:	Only the appearance and color are different, the others are the same.

2.5 Technical Information

Power Supply:	DC 3.8V from battery
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	79
Modulation Type:	GFSK, π/4 DQPSK, 8DPSK
Antenna Type:	Internal Antenna
Antenna Gain#:	0.17dBi
Note: #: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.	

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3 Summary of Test Results

3.1 Test Standards

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

3.2 Uncertainty of Test

Item	Measurement Uncertainty
Conducted Emission (150 kHz-30 MHz)	±2.64dB
Occupied Bandwidth	±69kHz
Transmitter Power, Conducted	±0.87dB
Conducted Spurious Emissions	±0.95dB
Radiated Spurious Emissions (above 1GHz)	1-6GHz: ±3.94dB 6-18GHz: ±4.16dB
Radiated Spurious Emissions (30M - 1GHz)	±4.12dB
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.	

3.3 Summary of Test Result

Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.215(c)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(1)	Pass
Channel Separation	47 CFR Part 15.247	47 CFR 15.247(a)(1)	Pass
Number of Hopping Frequencies	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Dwell Time	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass

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4 Test Configuration

4.1 Test Equipment List

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	00953	2023-11-13	2024-11-12
Coaxial Switcher	SCHWARZBECK	CX210	CX210	2023-11-13	2024-11-12
V-LISN	SCHWARZBECK	NSLK 8127	01073	2023-11-16	2024-11-15
LISN	AFJ	LS16/110VAC	16010020076	2023-11-16	2024-11-15
EMI Receiver	ROHDE&SCHWARZ	ESCI3	101422	2023-11-15	2024-11-14

Occupied Bandwidth Maximum Conducted Output Power Channel Separation Number of Hopping Frequencies Dwell Time Emissions in non-restricted frequency bands					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-13	2024-11-12
RF Sensor Unit	Techy	TR1029-2	/	2023-11-13	2024-11-12
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2023-11-16	2024-11-15
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2023-11-13	2024-11-12
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2023-11-16	2024-11-15
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2023-11-16	2024-11-15

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Band edge emissions (Radiated) Emissions in frequency bands (below 1GHz) Emissions in frequency bands (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-11-13	2024-11-12
Preamplifier	SCHWARZBECK	BBV9744	00246	2023-11-13	2024-11-12
RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	2023-11-13	2024-11-12
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2023-11-13	2024-11-12
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	2023-11-13	2024-11-12
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2023-11-13	2024-11-12
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2023-11-13	2024-11-12
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	2023-11-13	2024-11-12
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2023-11-13	2024-11-12
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI7	101032	2023-11-16	2024-11-15
SIGNAL ANALYZER	ROHDE&SCHWARZ	FSQ40	100010	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	2023-11-13	2024-11-12
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	00008	2023-11-16	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2023-11-16	2024-11-15
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	2023-11-13	2024-11-12
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2023-11-13	2024-11-12

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4.2 Test Auxiliary Equipment

Title	Manufacturer	Model No.	Serial No.
Adapter	Huawei	HW-059200CHQ	/

4.3 Test Modes

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

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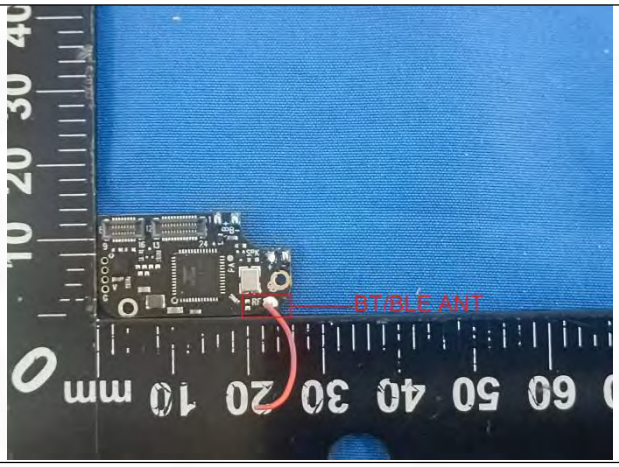
5 Evaluation Results (Evaluation)

5.1 Antenna requirement

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.

5.1.1 Conclusion:



6 Radio Spectrum Matter Test Results (RF)

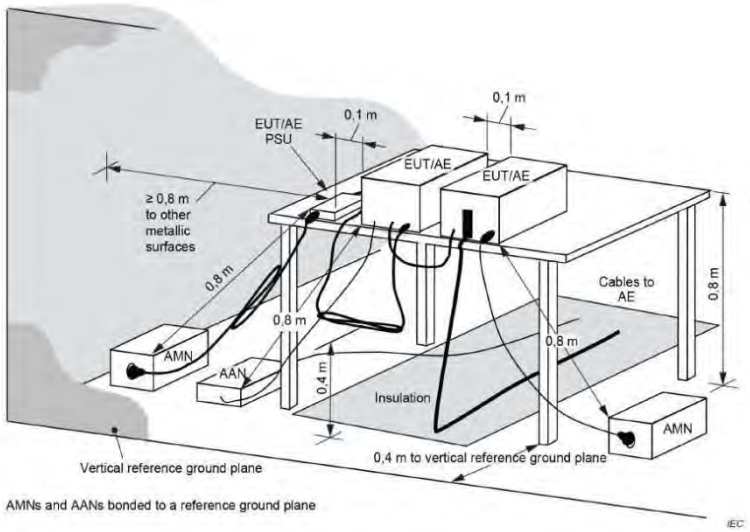
6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Method:	ANSI C63.10-2020 section 6.2
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 *Decreases with the logarithm of the frequency.
Procedure:	Refer to ANSI C63.10-2020 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

6.1.1 E.U.T. Operation:

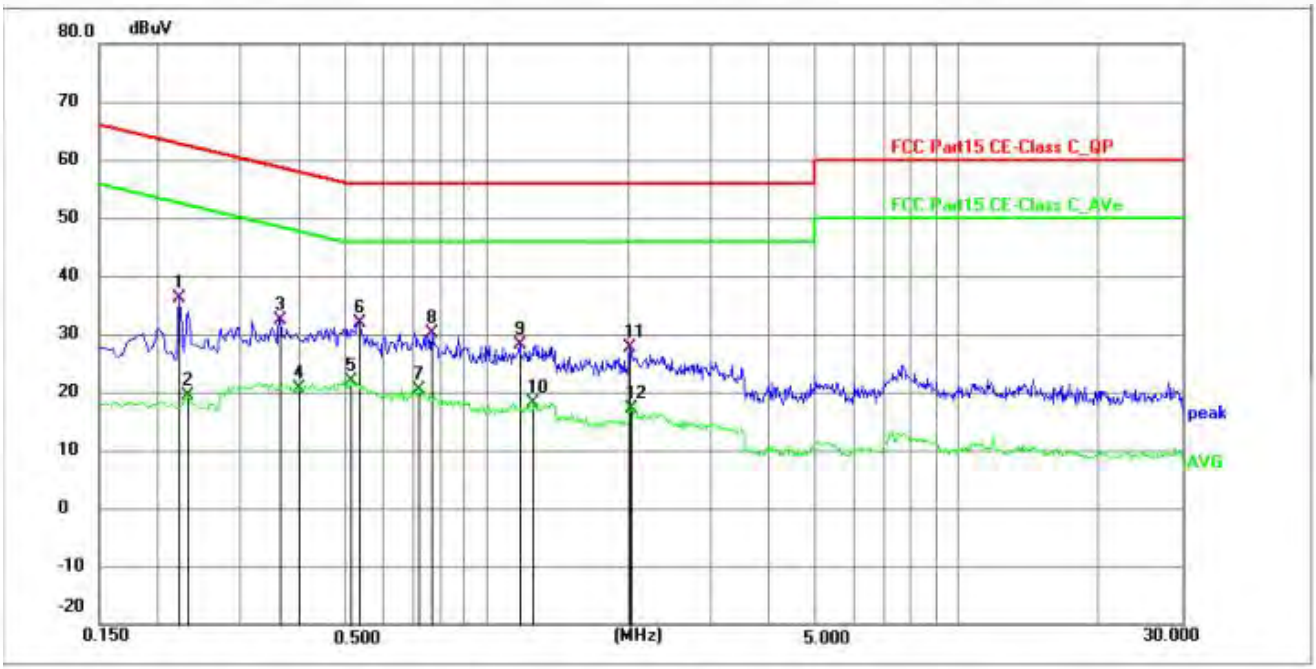
Operating Environment:	
Temperature:	24.6 °C
Humidity:	52 %
Atmospheric Pressure:	1010 mbar

6.1.2 Test Setup Diagram:



6.1.3 Test Data:

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



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2220	25.60	10.56	36.16	62.74	-26.58	QP	P	
2	0.2310	8.73	10.56	19.29	52.41	-33.12	AVG	P	
3	0.3614	21.82	10.57	32.39	58.70	-26.31	QP	P	
4	0.3975	10.09	10.57	20.66	47.91	-27.25	AVG	P	
5	0.5144	11.17	10.59	21.76	46.00	-24.24	AVG	P	
6 *	0.5370	21.37	10.60	31.97	56.00	-24.03	QP	P	
7	0.7170	9.58	10.69	20.27	46.00	-25.73	AVG	P	
8	0.7664	19.39	10.69	30.08	56.00	-25.92	QP	P	
9	1.1760	17.59	10.66	28.25	56.00	-27.75	QP	P	
10	1.2615	7.49	10.66	18.15	46.00	-27.85	AVG	P	
11	2.0130	16.87	10.68	27.55	56.00	-28.45	QP	P	
12	2.0310	6.42	10.68	17.10	46.00	-28.90	AVG	P	

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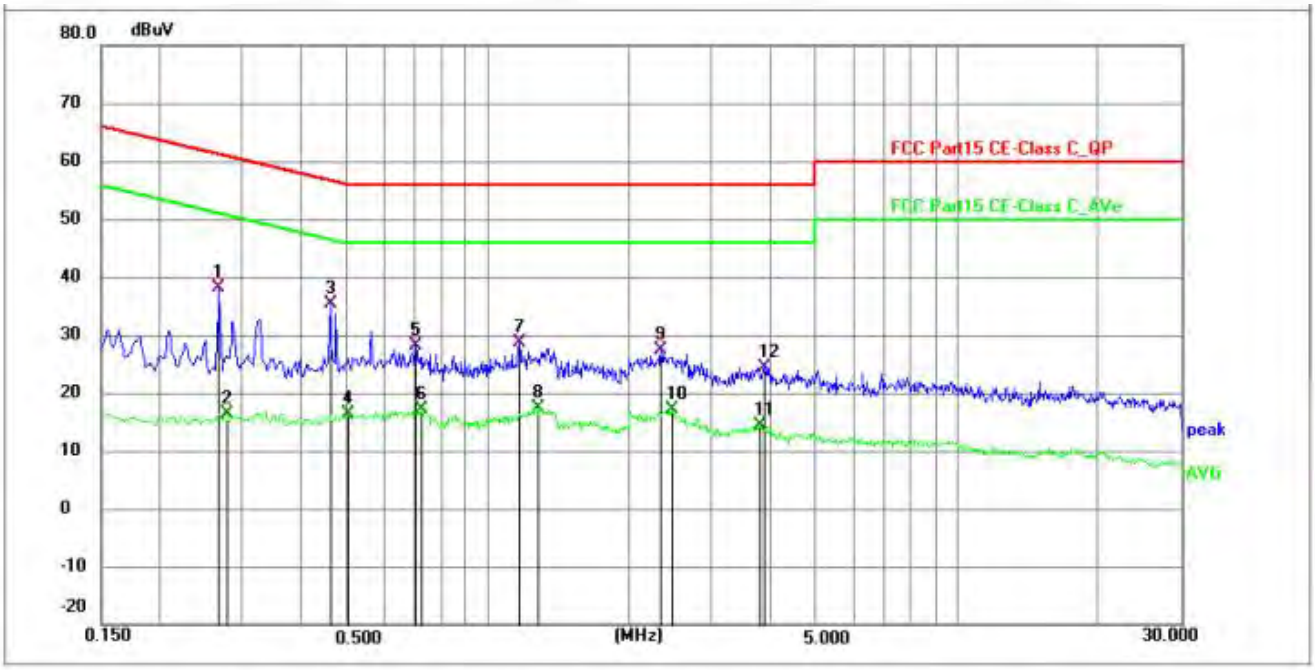
TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2670	27.63	10.56	38.19	61.21	-23.02	QP	P	
2	0.2760	5.81	10.56	16.37	50.94	-34.57	AVG	P	
3 *	0.4605	24.72	10.57	35.29	56.68	-21.39	QP	P	
4	0.5054	5.87	10.58	16.45	46.00	-29.55	AVG	P	
5	0.7035	17.50	10.69	28.19	56.00	-27.81	QP	P	
6	0.7260	6.55	10.69	17.24	46.00	-28.76	AVG	P	
7	1.1713	17.97	10.66	28.63	56.00	-27.37	QP	P	
8	1.2839	6.75	10.66	17.41	46.00	-28.59	AVG	P	
9	2.3370	16.68	10.67	27.35	56.00	-28.65	QP	P	
10	2.4720	6.36	10.67	17.03	46.00	-28.97	AVG	P	
11	3.8130	3.60	10.66	14.26	46.00	-31.74	AVG	P	
12	3.8894	13.82	10.67	24.49	56.00	-31.51	QP	P	

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6.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.215(c)
Test Method:	ANSI C63.10-2020, 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
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.
Procedure:	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).

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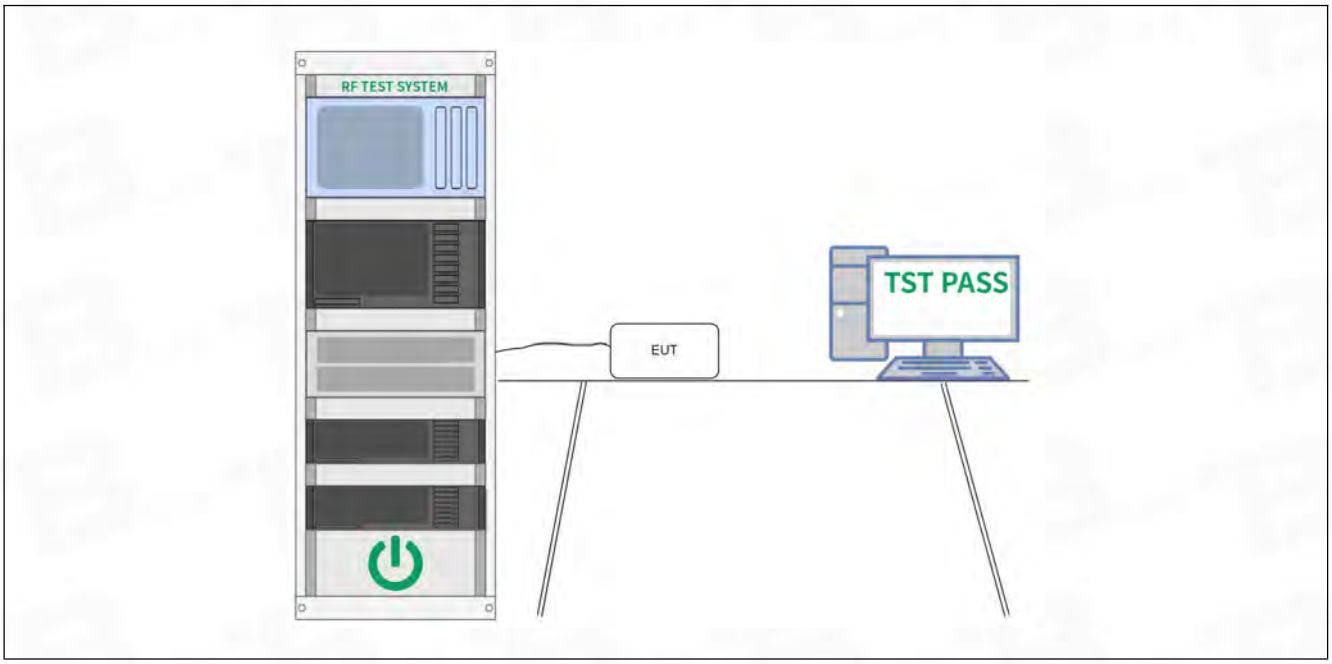
6.2.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	49.6 %
Atmospheric Pressure:	1010 mbar

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

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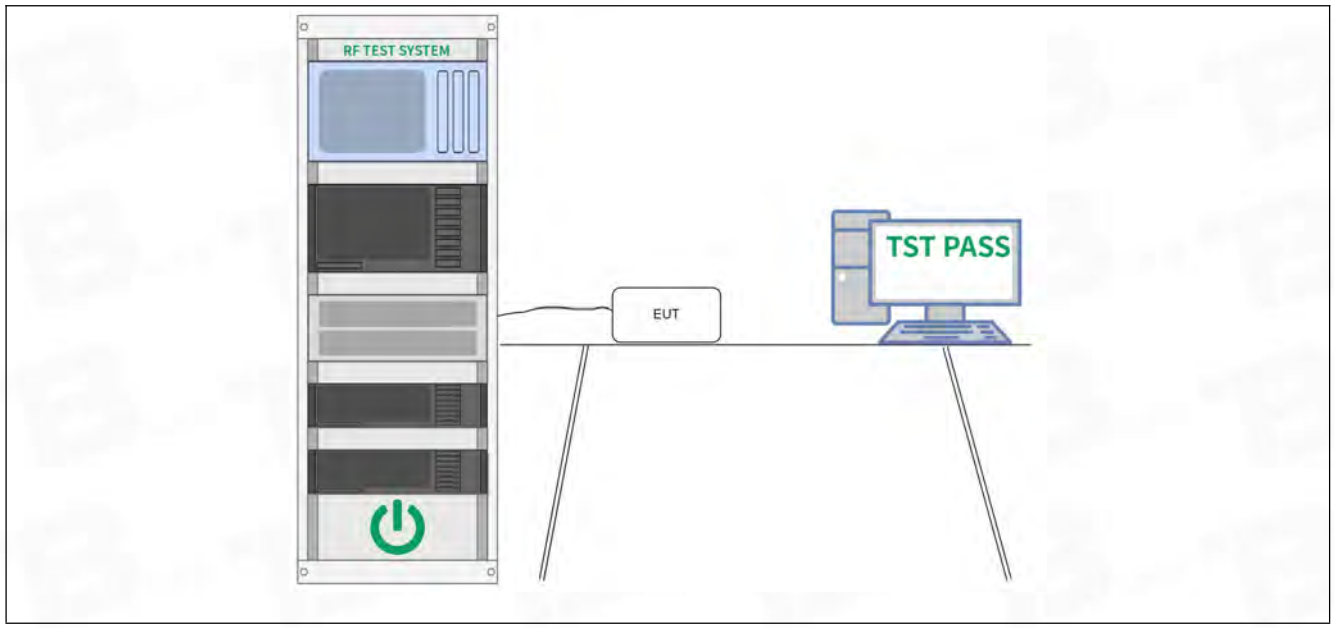
6.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(1)
Test Method:	ANSI C63.10-2020, section 7.8.5 KDB 558074 D01 15.247 Meas Guidance v05r02
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.
Procedure:	This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test: a) Use the following spectrum analyzer settings: 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel. 2) RBW > 20 dB bandwidth of the emission being measured. 3) VBW >= RBW. 4) Sweep: Auto. 5) Detector function: Peak. 6) Trace: Max hold. b) Allow trace to stabilize. c) Use the marker-to-peak function to set the marker to the peak of the emission. d) The indicated level is the peak output power, after any corrections for external attenuators and cables. e) A plot of the test results and setup description shall be included in the test report. NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

6.3.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	49.6 %
Atmospheric Pressure:	1010 mbar

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

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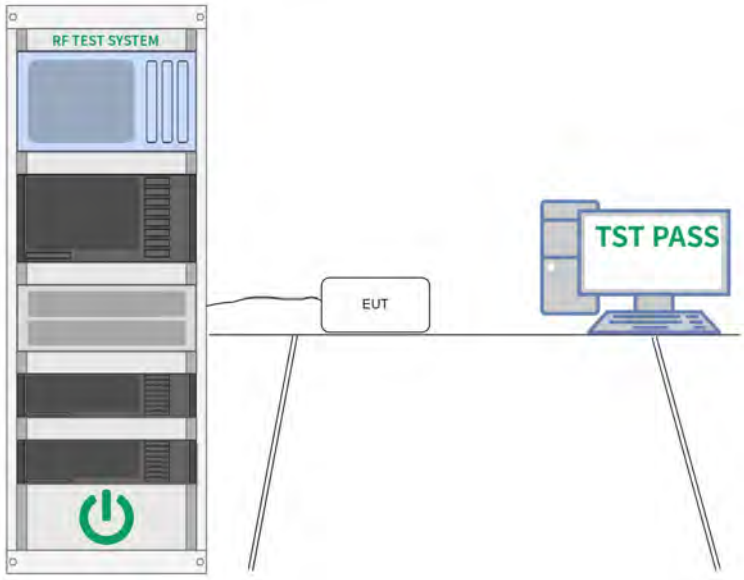
6.4 Channel Separation

Test Requirement:	47 CFR 15.247(a)(1)
Test Method:	ANSI C63.10-2020, section 7.8.2 KDB 558074 D01 15.247 Meas Guidance v05r02
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.
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) ≥ RBW. d) Sweep: Auto. 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 plot of the data shall be included in the test report.

6.4.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	49.6 %
Atmospheric Pressure:	1010 mbar

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Please Refer to Appendix for Details.

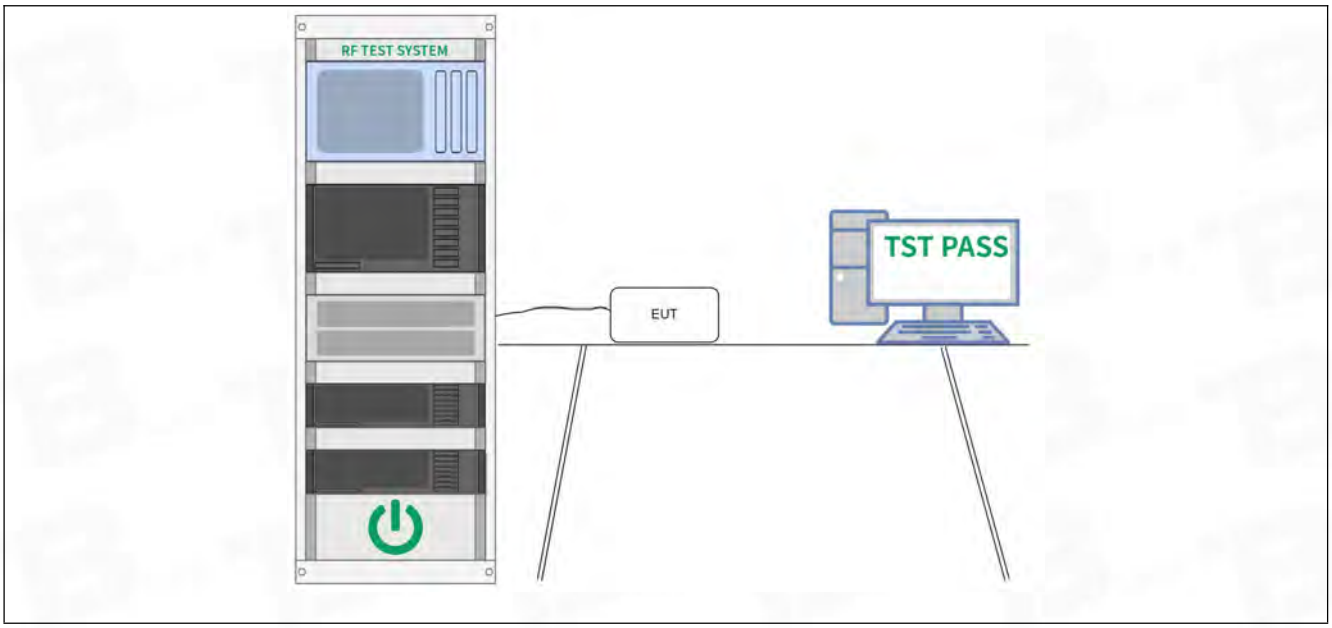
6.5 Number of Hopping Frequencies

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Method:	ANSI C63.10-2020, section 7.8.3 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Fequency 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.
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen. b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. c) VBW ≥ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

6.5.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	49.6 %
Atmospheric Pressure:	1010 mbar

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Please Refer to Appendix for Details.

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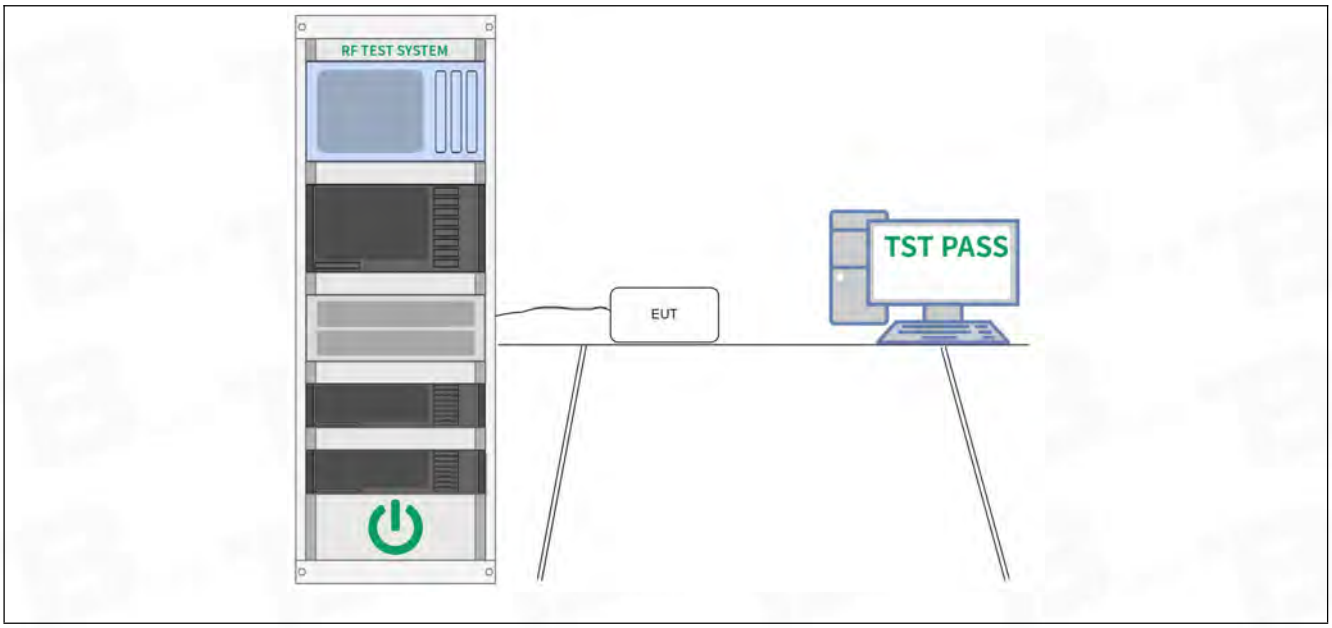
6.6 Dwell Time

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Method:	ANSI C63.10-2020, section 7.8.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Fequency 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.
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Zero span, centered on a hopping channel. b) RBW shall be <= channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel. c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel. d) Detector function: Peak. e) Trace: Max hold. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation: (Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time) The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation. The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

6.6.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	49.6 %
Atmospheric Pressure:	1010 mbar

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Please Refer to Appendix for Details.

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6.7 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Method:	ANSI C63.10-2020 section 7.8.7 KDB 558074 D01 15.247 Meas Guidance v05r02
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.
Procedure:	To demonstrate compliance with the relative out-of-band emissions requirements conducted spurious emissions shall be measured for the transmit frequencies, per 5.5 and 5.6, and at the maximum transmit powers. Frequency hopping shall be disabled for this test with the exception of measurements at the allocated band-edges which shall be repeated with hopping enabled. Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The frequency range of testing shall span 30 MHz to 10 times the operating frequency and this may be done in a single sweep or, to aid resolution, across a number of sweeps. The resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector. The limit is based on the highest in-band level across all channels measured using the same instrument settings (resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector). To help clearly demonstrate compliance a display line may be set at the required offset (typically 20 dB) below the highest in-band level. Where the highest in-band level is not clearly identified in the out-of-band measurements a separate spectral plot showing the in-band level shall be provided. When conducted measurements cannot be made (for example a device with integrated, non-removable antenna) radiated measurements shall be used. The reference level for determining the limit shall be established by maximizing the field strength from the highest power channel and measuring using the resolution and video bandwidth settings and peak detector as described above. The field strength limit for spurious emissions outside of restricted-bands shall then be set at the required offset (typically 20 dB) below the highest in-band level. Radiated measurements will follow the standards measurement procedures described in Clause 6 with the exception that the resolution bandwidth shall be 100 kHz, video bandwidth

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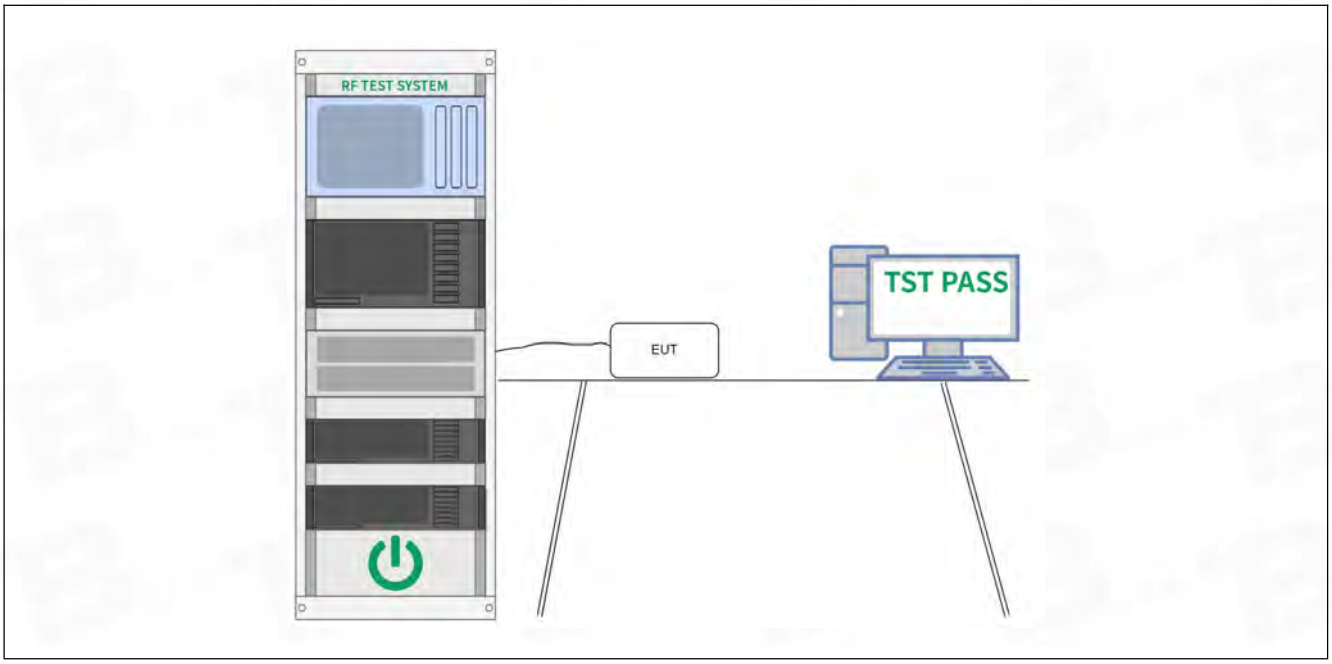
	300 kHz, and a coupled sweep time with a peak detector. Note that use of wider measurement bandwidths are acceptable for measuring the spurious emissions provided that the peak detector is used and that the measured value of spurious emissions are compared to the highest in-band level measured with the 100 kHz / 300 kHz bandwidth settings to determine compliance.

6.7.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	49.6 %
Atmospheric Pressure:	1010 mbar

6.7.2 Test Setup Diagram:



6.7.3 Test Data:

Please Refer to Appendix for Details.

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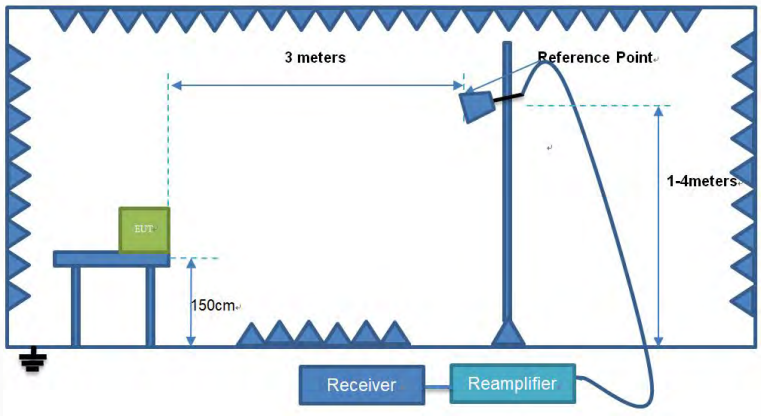
6.8 Band edge emissions (Radiated)

<table>
<tr><td>Test Requirement:</td><td>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)).`</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.10
KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** 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.
</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2020 section 6.10.5.2</td></tr>
</table>

6.8.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.1 °C
Humidity:	52.4 %
Atmospheric Pressure:	1010 mbar

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Note: All the mode have been tested, and only the worst case of mode are in the report

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

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.00	57.97	3.39	61.36	74.00	-12.64	peak
2	2310.00	41.63	3.39	45.02	54.00	-8.98	AV
3	2390.00	57.78	3.45	61.23	74.00	-12.77	peak
4	2390.00	40.93	3.45	44.38	54.00	-9.62	AV

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

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2310.00	57.57	3.39	60.96	74.00	-13.04	peak
2	2310.00	41.25	3.39	44.64	54.00	-9.36	AV
3	2390.00	57.85	3.45	61.30	74.00	-12.70	peak
4	2390.00	41.39	3.45	44.84	54.00	-9.16	AV

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

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.50	58.50	3.52	62.02	74.00	-11.98	peak
2	2483.50	38.75	3.52	42.27	54.00	-11.73	AV
3	2500.00	56.79	3.53	60.32	74.00	-13.68	peak
4	2500.00	37.15	3.53	40.68	54.00	-13.32	AV

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

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.50	57.61	3.52	61.13	74.00	-12.87	peak
2	2483.50	37.25	3.52	40.77	54.00	-13.23	AV
3	2500.00	59.28	3.53	62.81	74.00	-11.19	peak
4	2500.00	39.10	3.53	42.63	54.00	-11.37	AV

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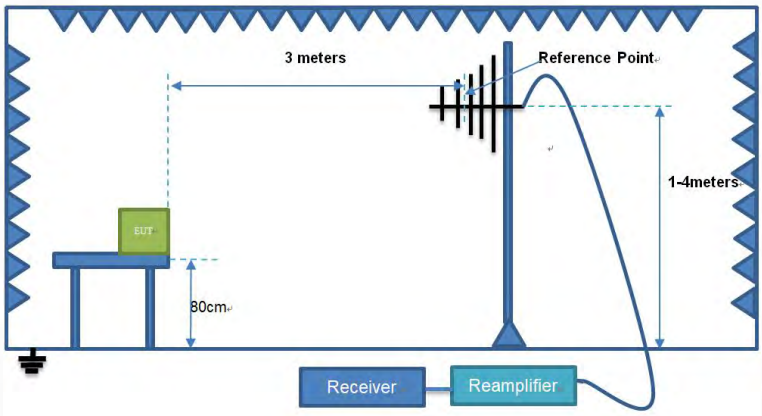
6.9 Emissions in frequency bands (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>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)).`</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 section 6.6.4
KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** 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.
</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
</table>

6.9.1 E.U.T. Operation:

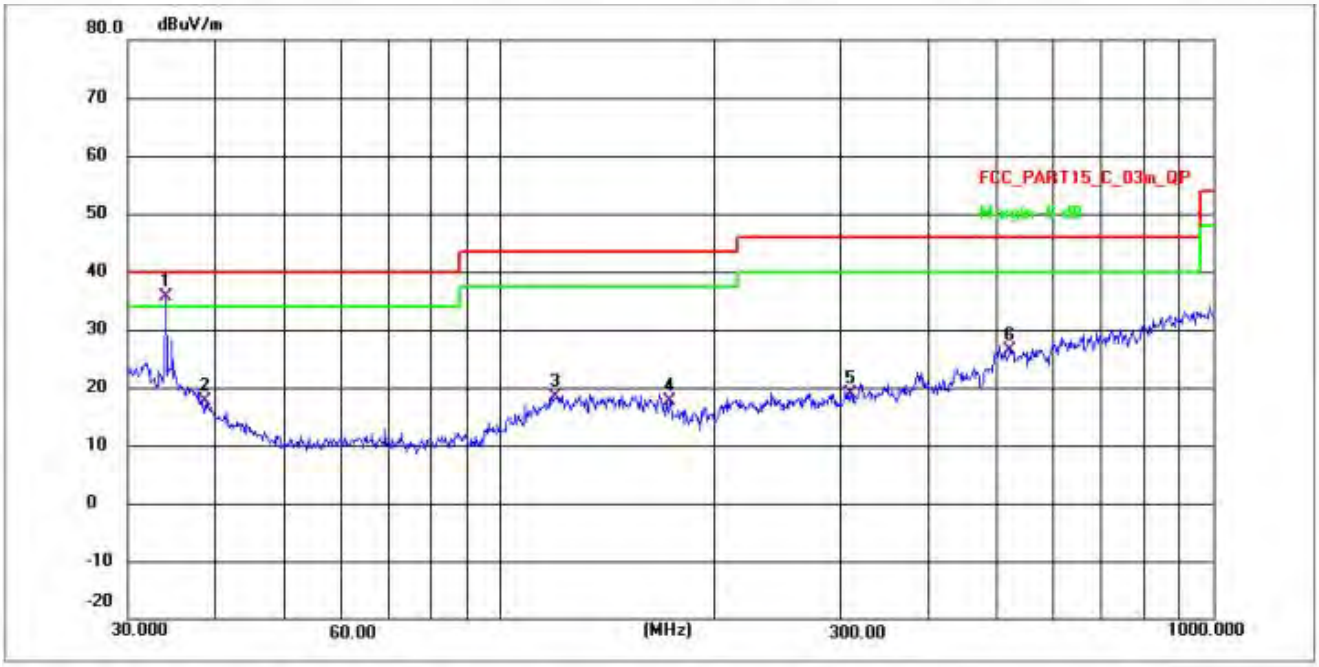
Operating Environment:	
Temperature:	24.6 °C
Humidity:	52 %
Atmospheric Pressure:	1010 mbar

6.9.2 Test Setup Diagram:



6.9.3 Test Data:

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



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	33.9174	40.03	-4.30	35.73	40.00	-4.27	QP	P
2	38.6160	22.02	-4.30	17.72	40.00	-22.28	QP	P
3	120.0659	40.65	-22.29	18.36	43.50	-25.14	QP	P
4	172.5988	39.34	-21.79	17.55	43.50	-25.95	QP	P
5	310.5416	39.49	-20.54	18.95	46.00	-27.05	QP	P
6	519.0649	45.24	-18.86	26.38	46.00	-19.62	QP	P

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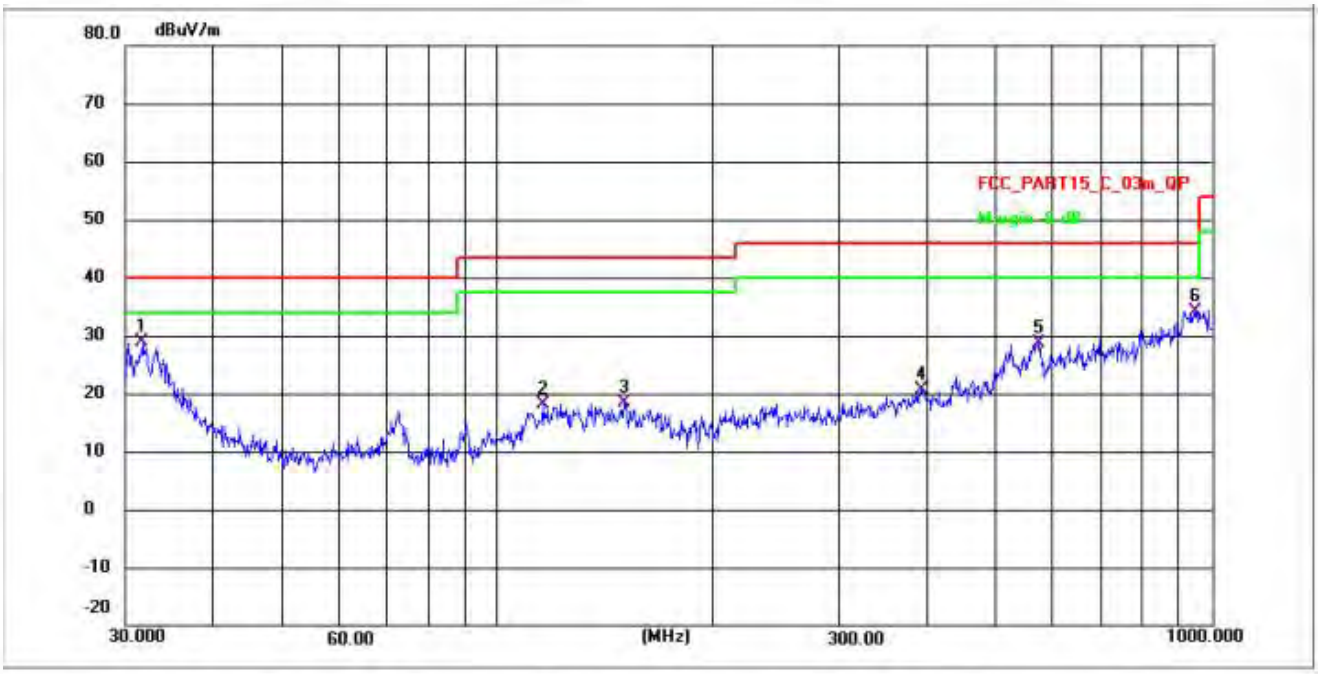
TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	31.7869	33.25	-4.31	28.94	40.00	-11.06	QP	P
2	115.3205	40.47	-22.33	18.14	43.50	-25.36	QP	P
3	150.0108	40.39	-22.01	18.38	43.50	-25.12	QP	P
4	392.7831	40.58	-19.89	20.69	46.00	-25.31	QP	P
5	571.6113	47.10	-18.53	28.57	46.00	-17.43	QP	P
6	947.0990	50.10	-15.93	34.17	46.00	-11.83	QP	P

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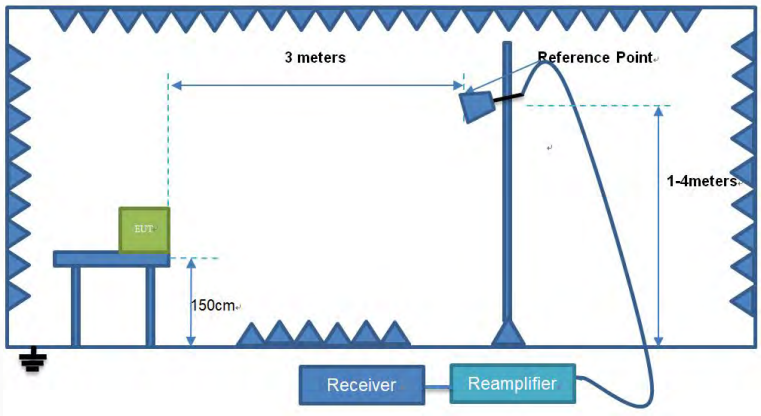
6.10 Emissions in frequency bands (above 1GHz)

Test Requirement:	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 Method:	ANSI C63.10-2020 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
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.
Procedure:	ANSI C63.10-2020 section 6.6.4

6.10.1 E.U.T. Operation:

Operating Environment:	
Temperature:	24.4 °C
Humidity:	54 %
Atmospheric Pressure:	1010 mbar

6.10.2 Test Setup Diagram:



6.10.3 Test Data:

Note: All the mode have been tested, and only the worst case of mode are in the report
TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4804.000	77.05	-49.34	27.71	74.00	-46.29	peak	P
2	7206.000	81.40	-47.51	33.89	74.00	-40.11	peak	P
3	9608.000	79.49	-45.91	33.58	74.00	-40.42	peak	P

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4804.000	77.44	-49.34	28.10	74.00	-45.90	peak	P
2	7206.000	83.40	-47.51	35.89	74.00	-38.11	peak	P
3	9608.000	82.31	-45.91	36.40	74.00	-37.60	peak	P

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4882.000	78.17	-49.34	28.83	74.00	-45.17	peak	P
2	7323.000	82.52	-47.51	35.01	74.00	-38.99	peak	P
3	9764.000	80.61	-45.91	34.70	74.00	-39.30	peak	P

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4882.000	76.45	-49.34	27.11	74.00	-46.89	peak	P
2	7323.000	82.41	-47.51	34.90	74.00	-39.10	peak	P
3	9764.000	81.32	-45.91	35.41	74.00	-38.59	peak	P

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4960.000	76.55	-49.22	27.33	74.00	-46.67	peak	P
2	7440.000	80.90	-47.39	33.51	74.00	-40.49	peak	P
3	9920.000	78.99	-45.79	33.20	74.00	-40.80	peak	P

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4960.000	76.71	-49.22	27.49	74.00	-46.51	peak	P
2	7440.000	82.67	-47.39	35.28	74.00	-38.72	peak	P
3	9920.000	81.58	-45.79	35.79	74.00	-38.21	peak	P

Note:Because the peak value is less than the AV limit 54dBuV/m, the AV value is not evaluated

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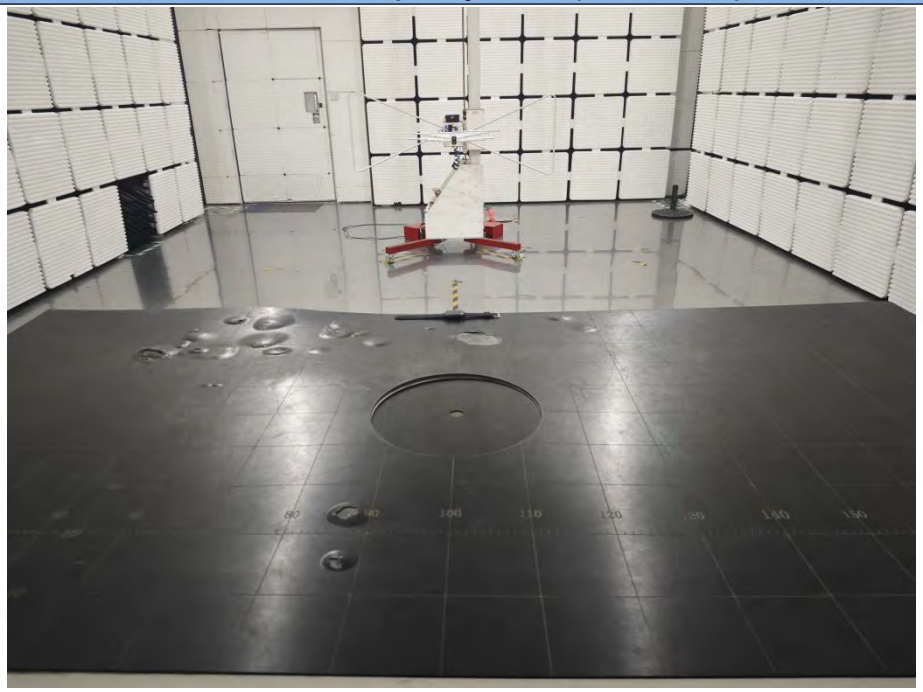
7 Test Setup Photos

Conducted Emission at AC power line


Band edge emissions (Radiated) Emissions in frequency bands (above 1GHz)


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Emissions in frequency bands (below 1GHz)


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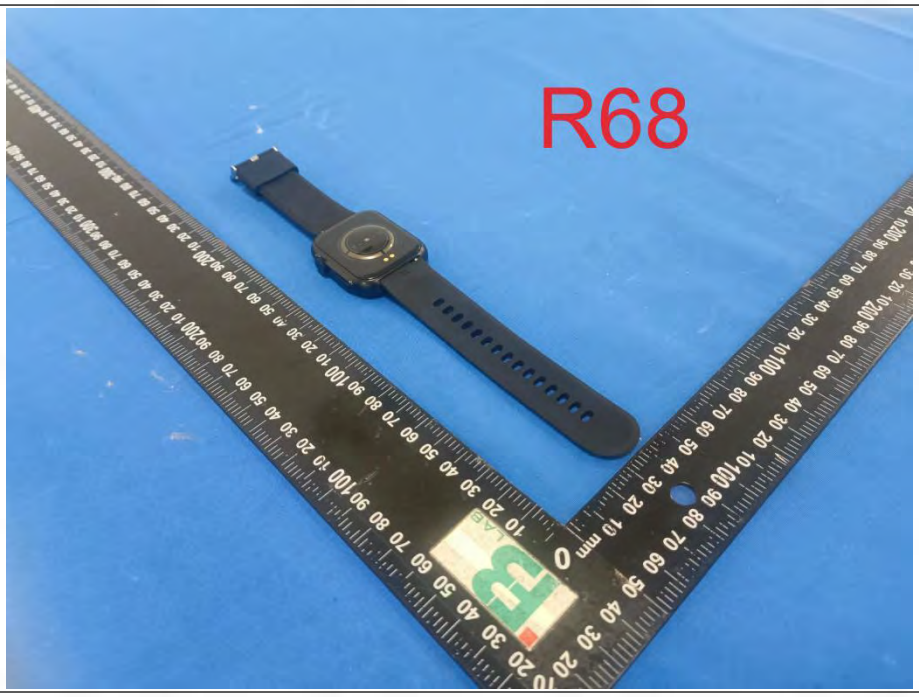
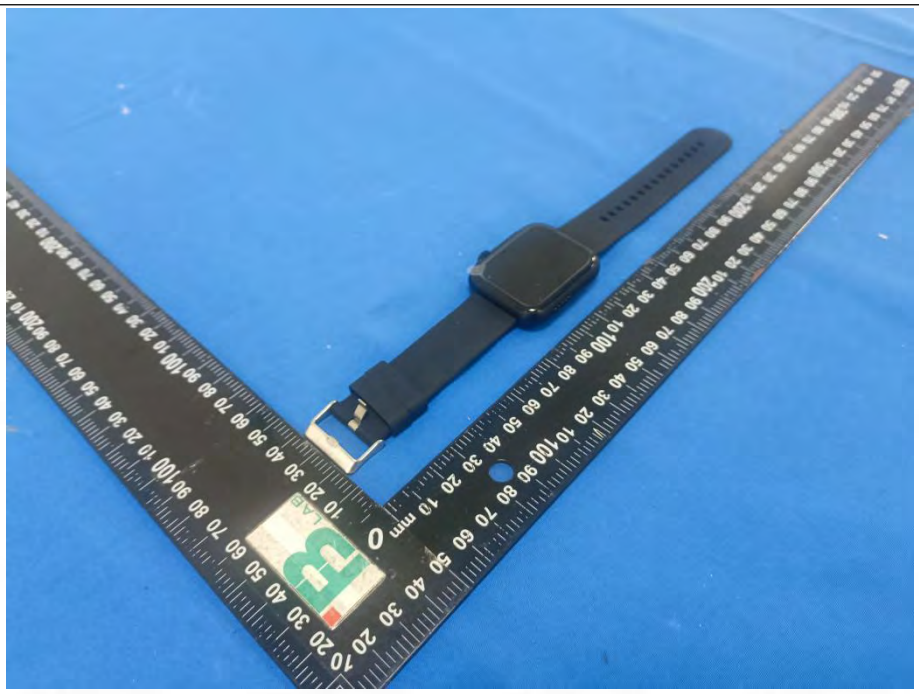
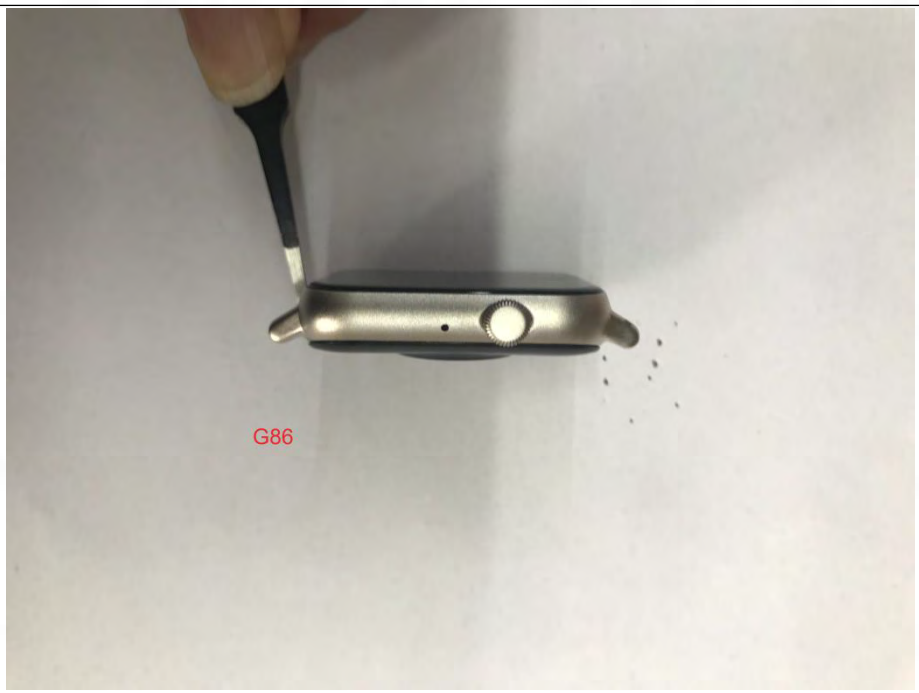
8 EUT Constructional Details (EUT Photos)

External





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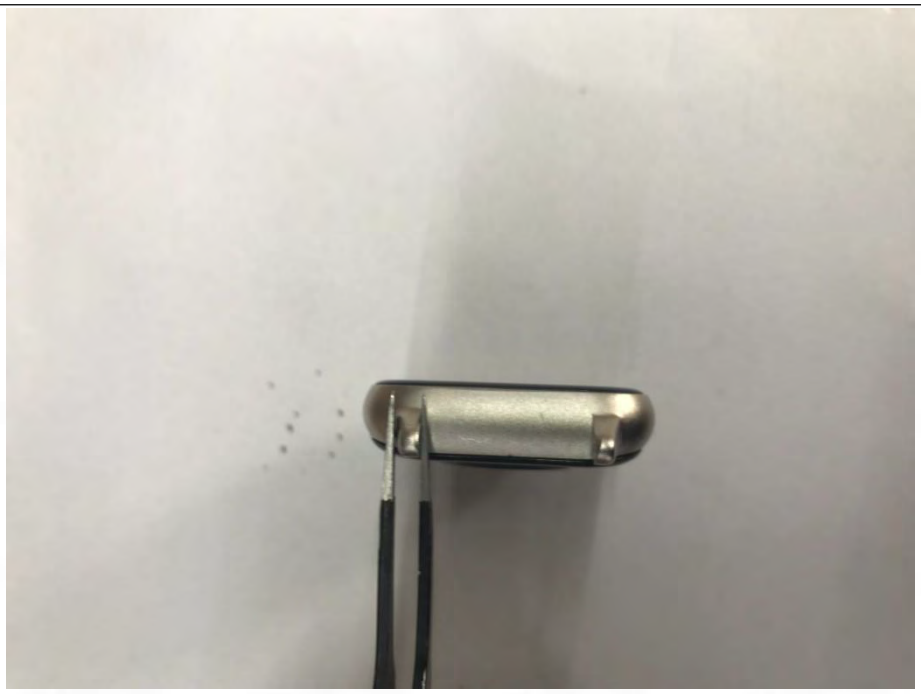

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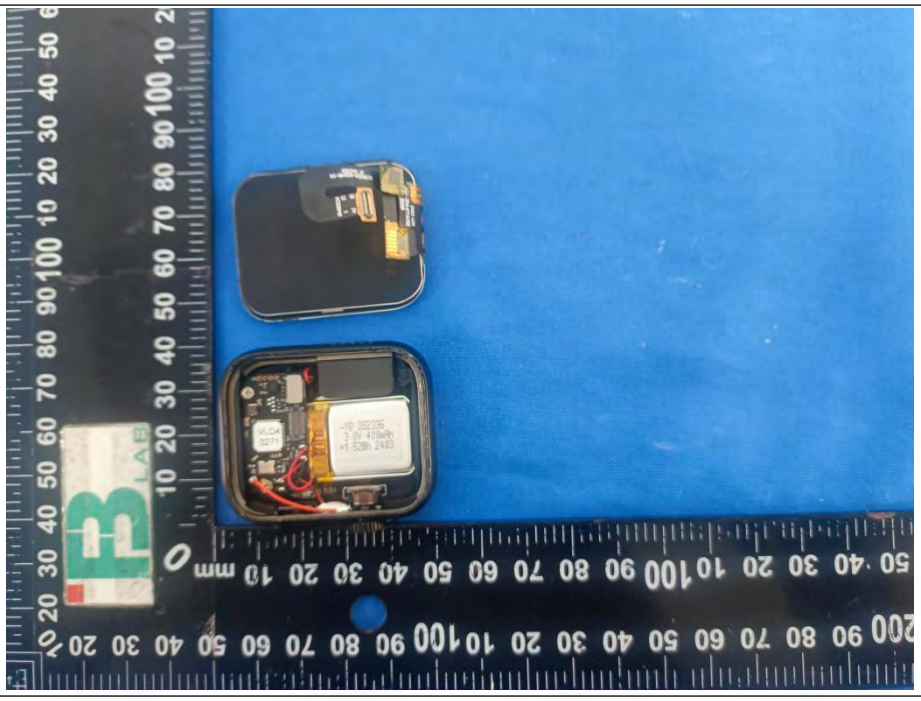
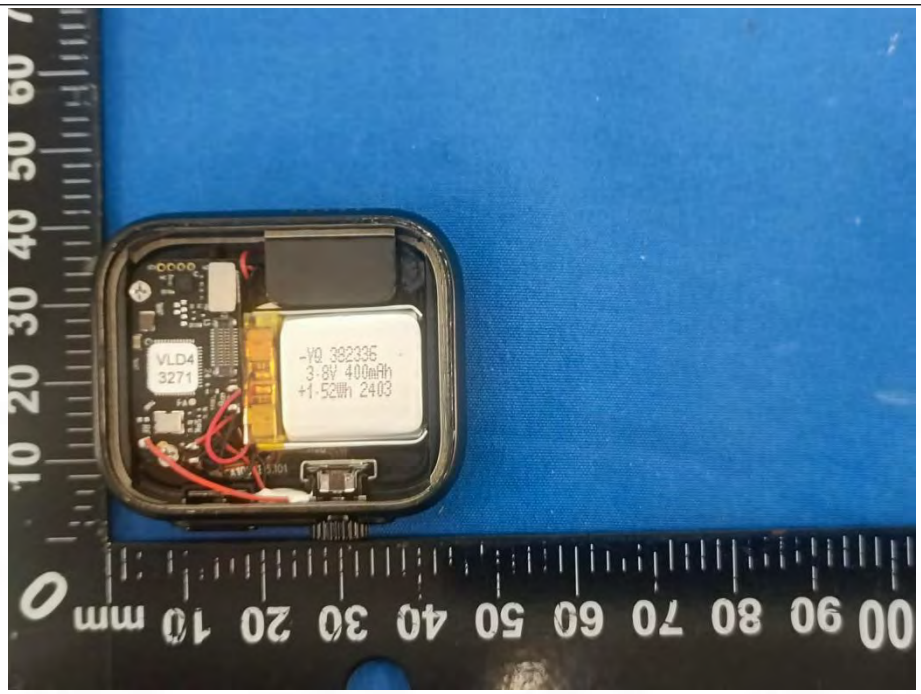
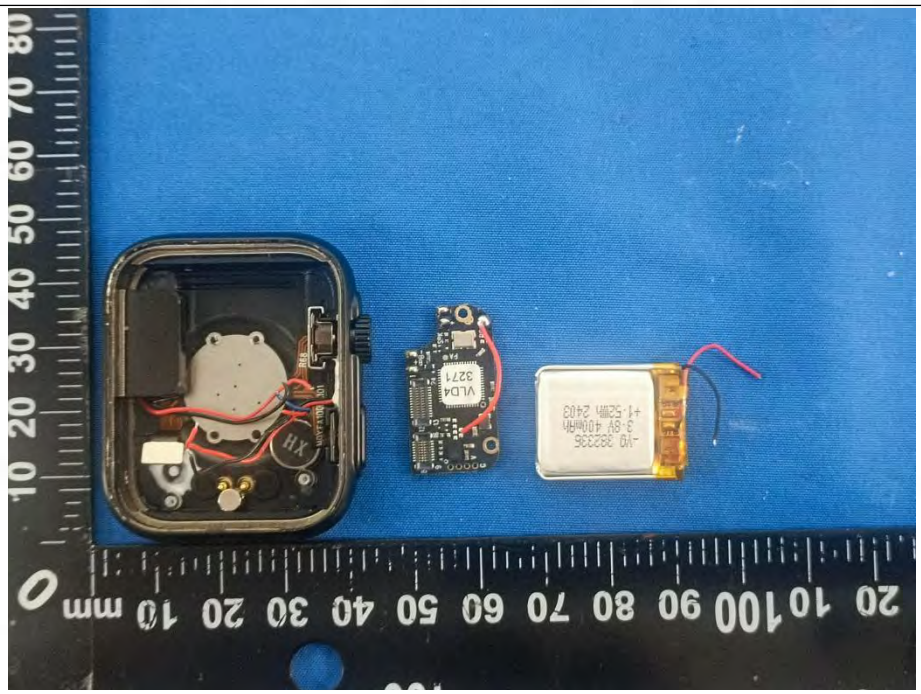
Internal







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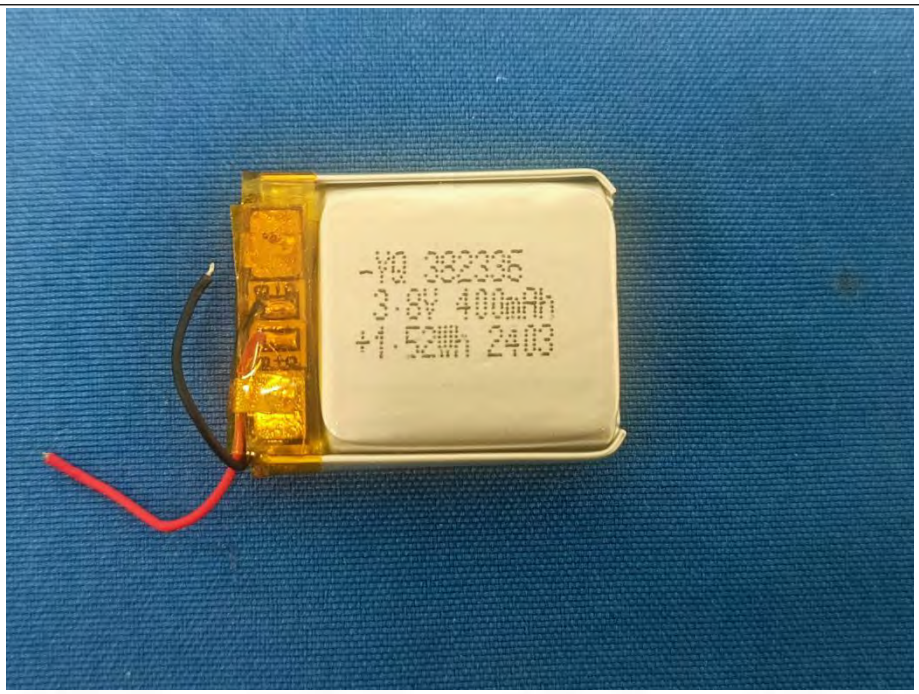
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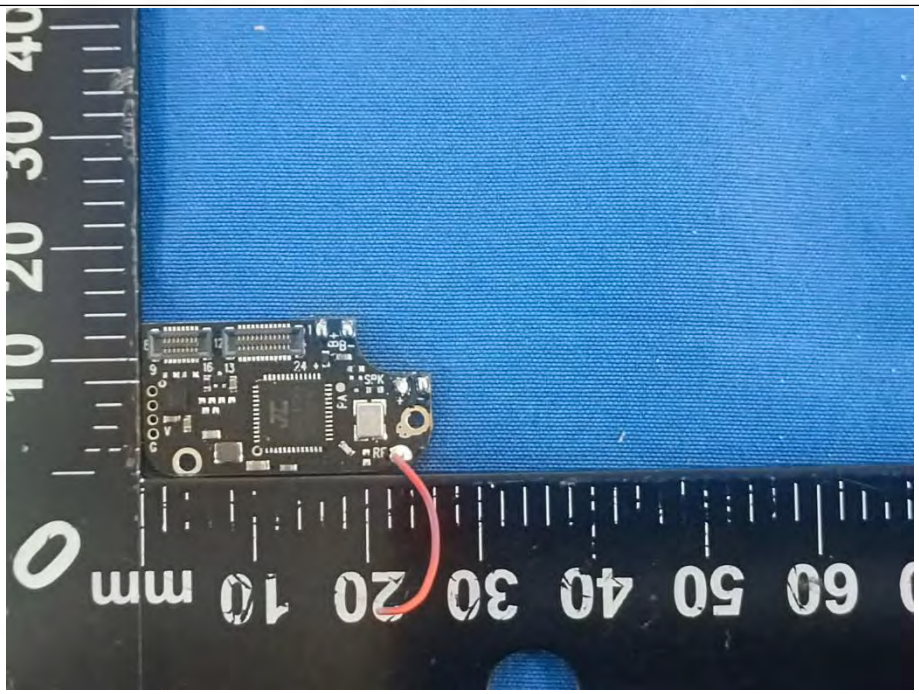
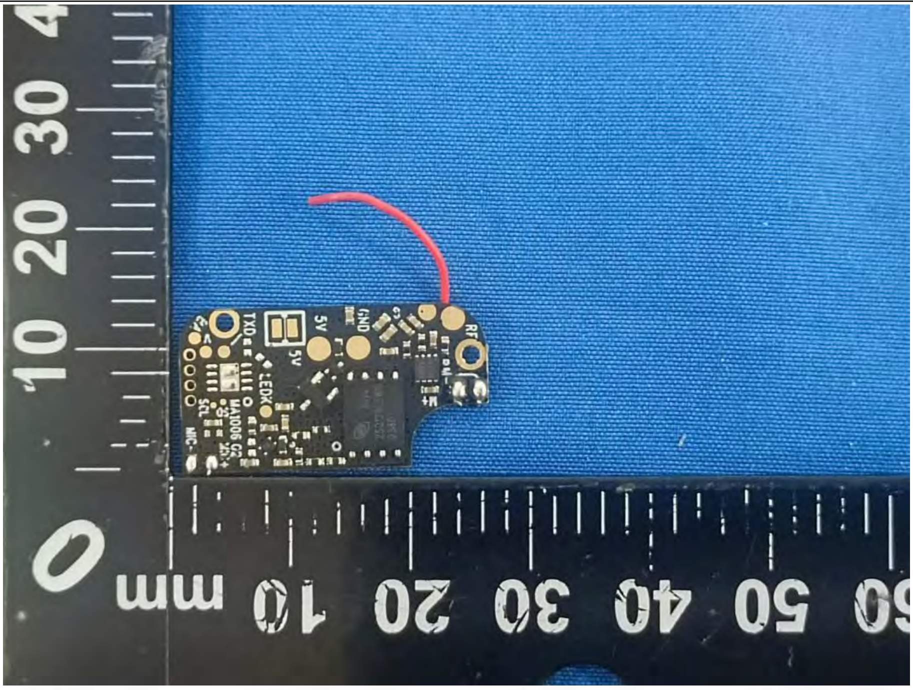
3.8V 400mAh
+1.52Wh 2403





Appendix

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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	0.881	/	Pass
		2441	DH5	1	0.885	/	Pass
		2480	DH5	1	0.888	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.201	/	Pass
		2441	2DH5	1	1.218	/	Pass
		2480	2DH5	1	1.242	/	Pass
8DPSK	SISO	2402	3DH5	1	1.212	/	Pass
		2441	3DH5	1	1.225	/	Pass
		2480	3DH5	1	1.253	/	Pass

1.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.954	/	Pass
		2441	DH5	1	0.954	/	Pass
		2480	DH5	1	0.967	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.319	/	Pass
		2441	2DH5	1	1.335	/	Pass
		2480	2DH5	1	1.328	/	Pass
8DPSK	SISO	2402	3DH5	1	1.303	/	Pass
		2441	3DH5	1	1.315	/	Pass
		2480	3DH5	1	1.342	/	Pass

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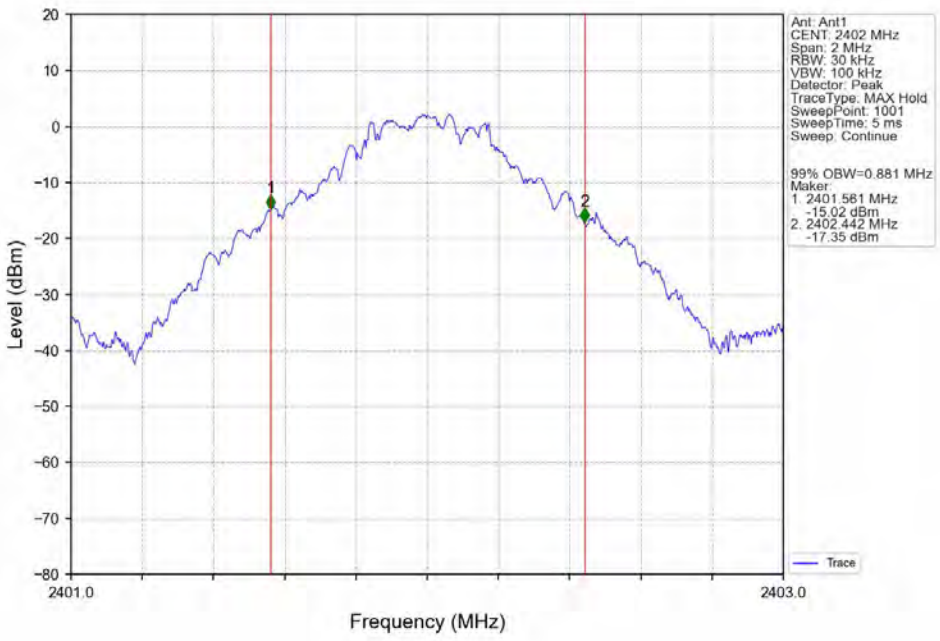
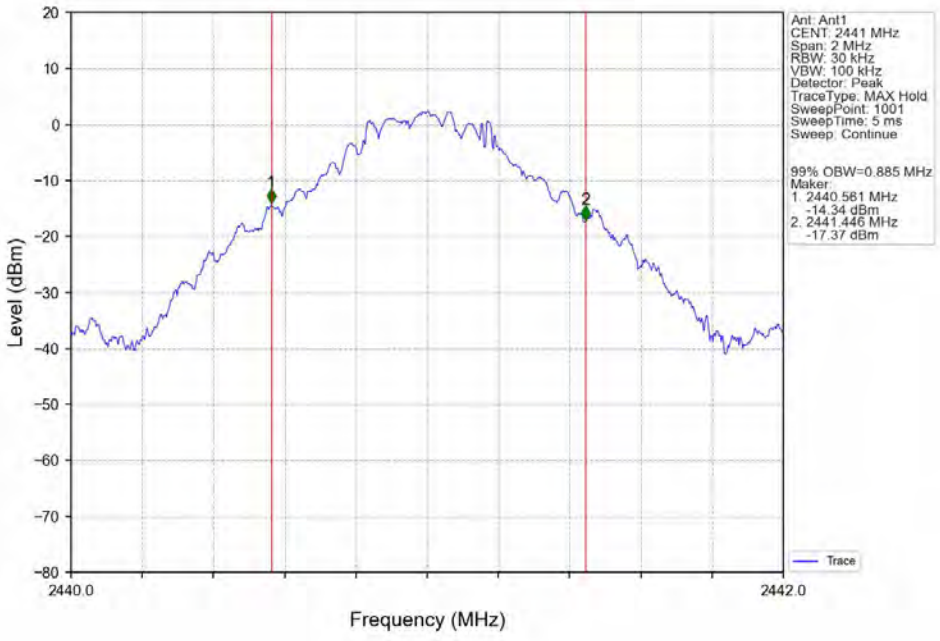
1.2 Test Graph

1.2.1 OBW

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_MCH_2441MHz_Ant1_NTNV



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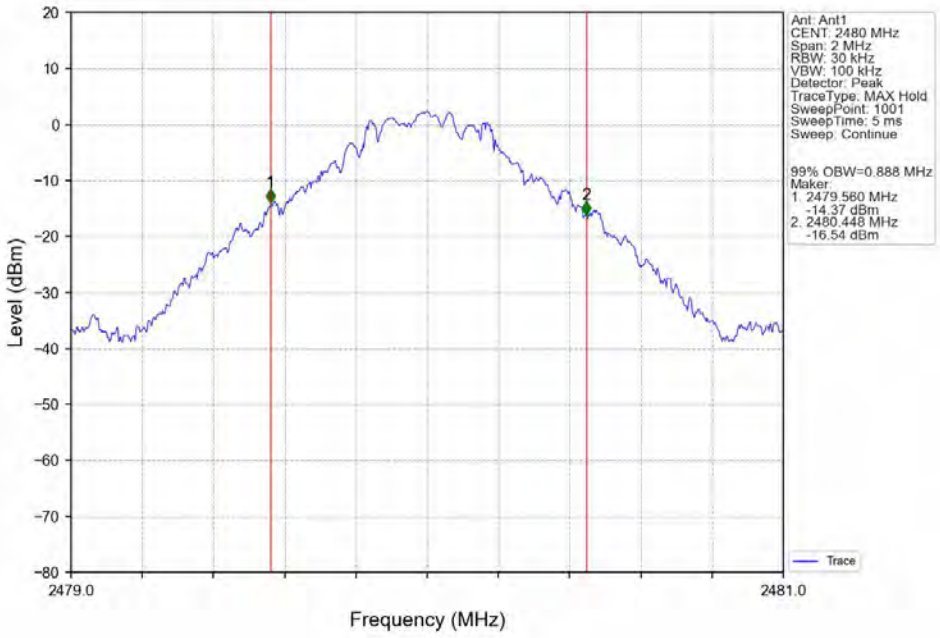
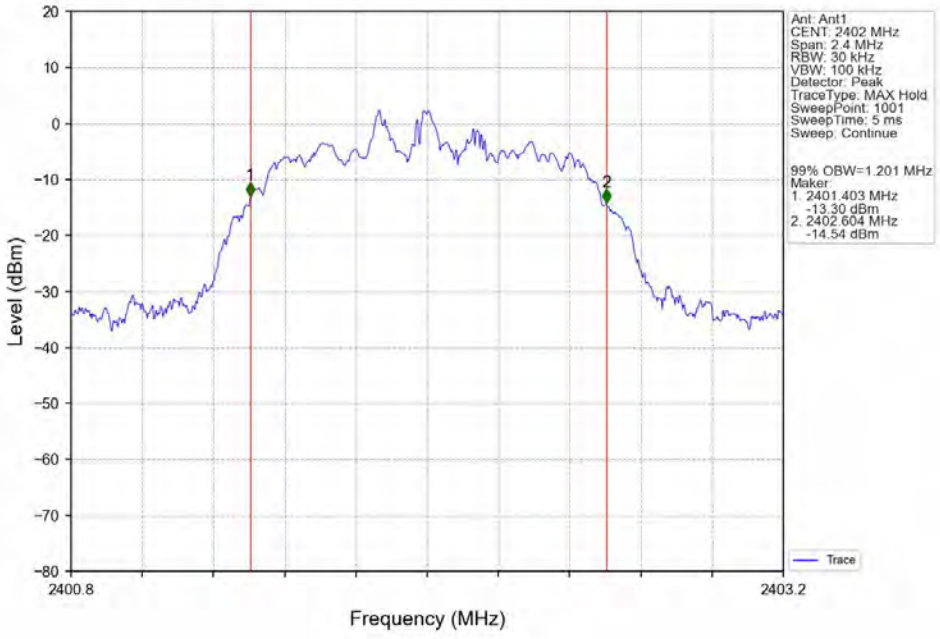
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



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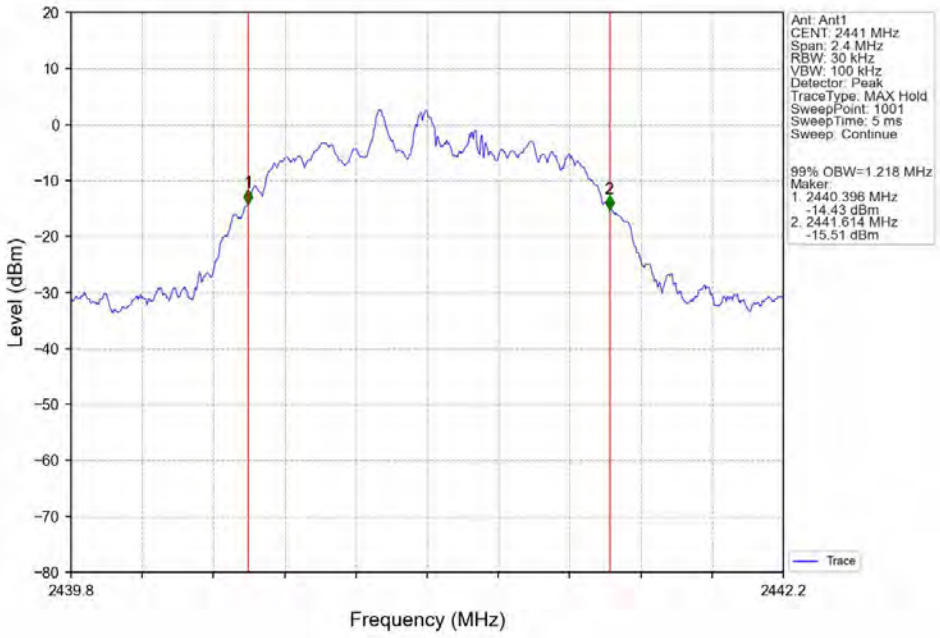
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

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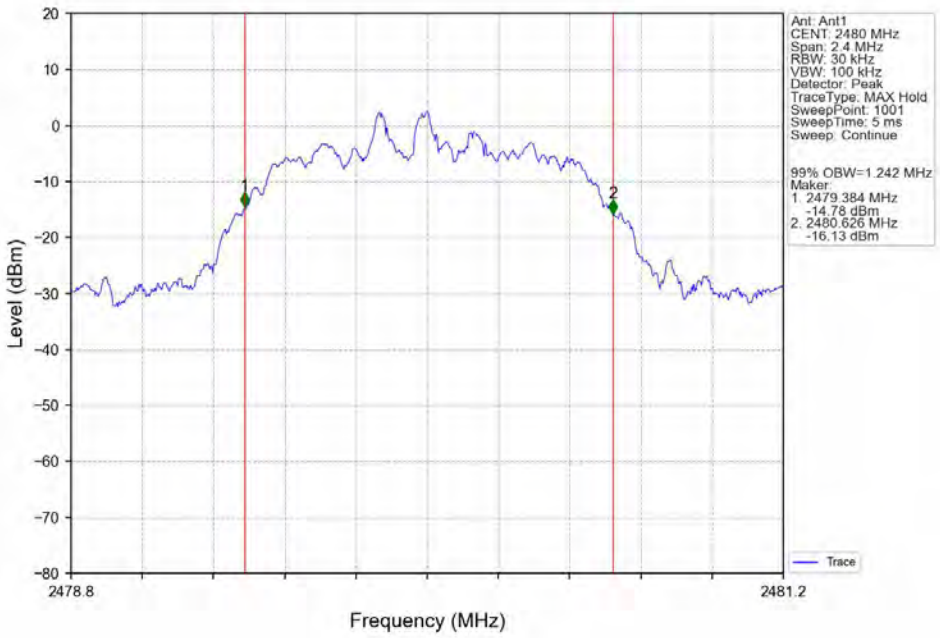

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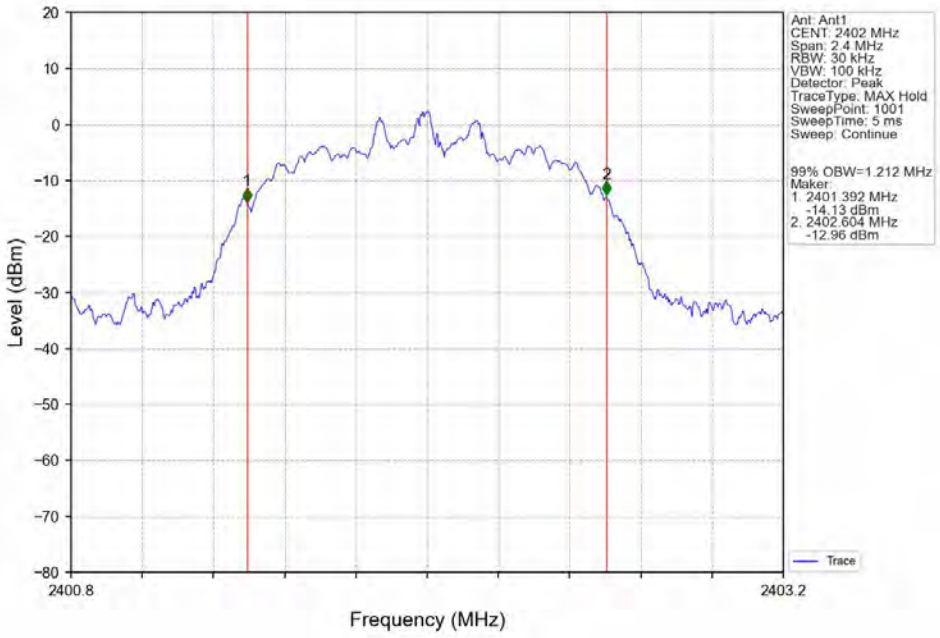
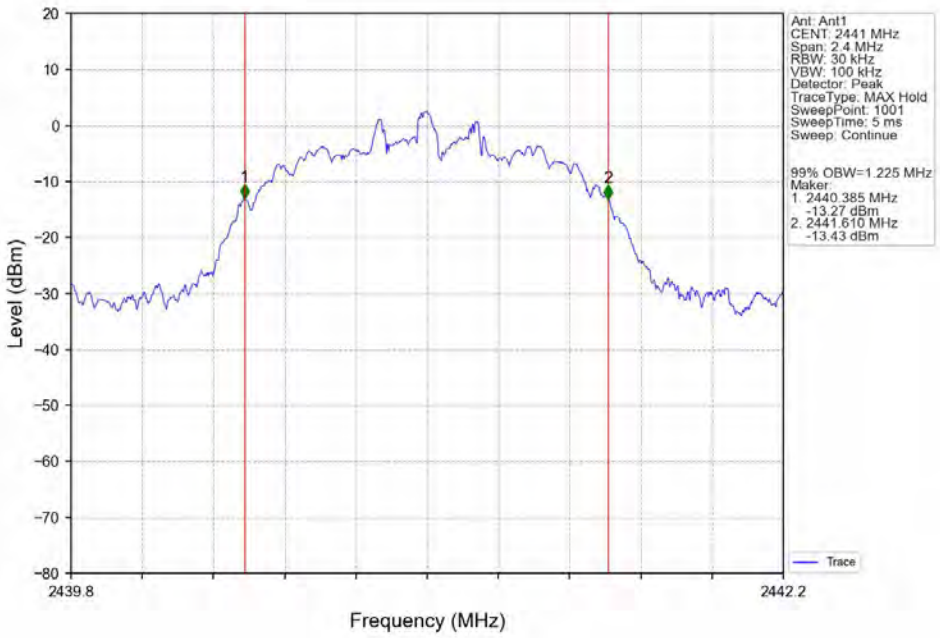
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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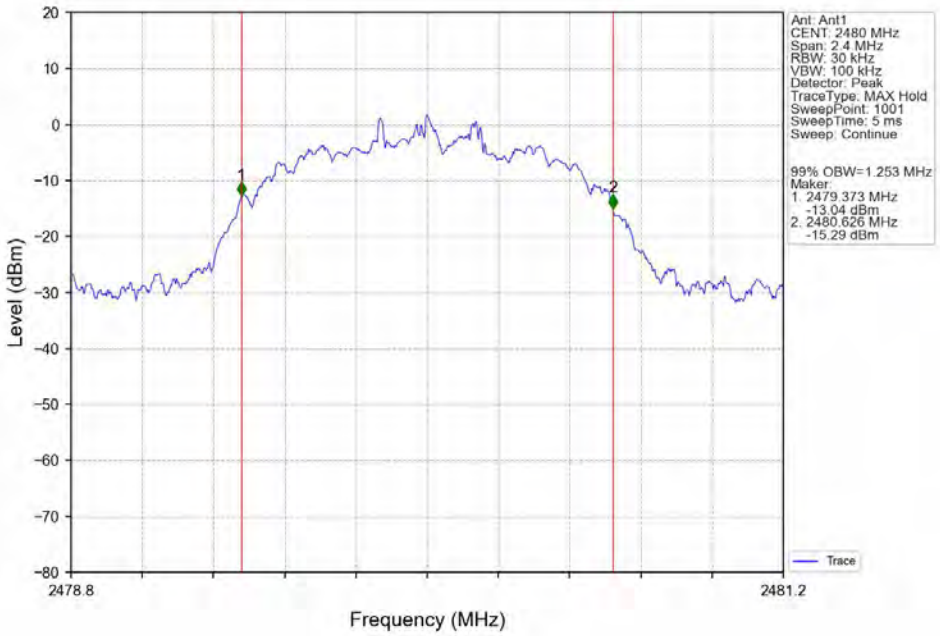
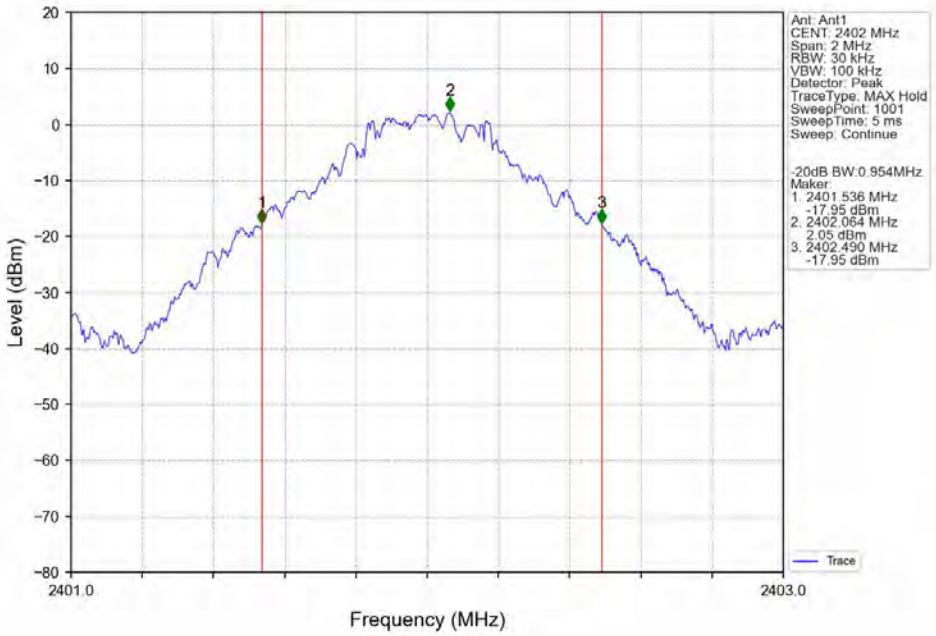
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

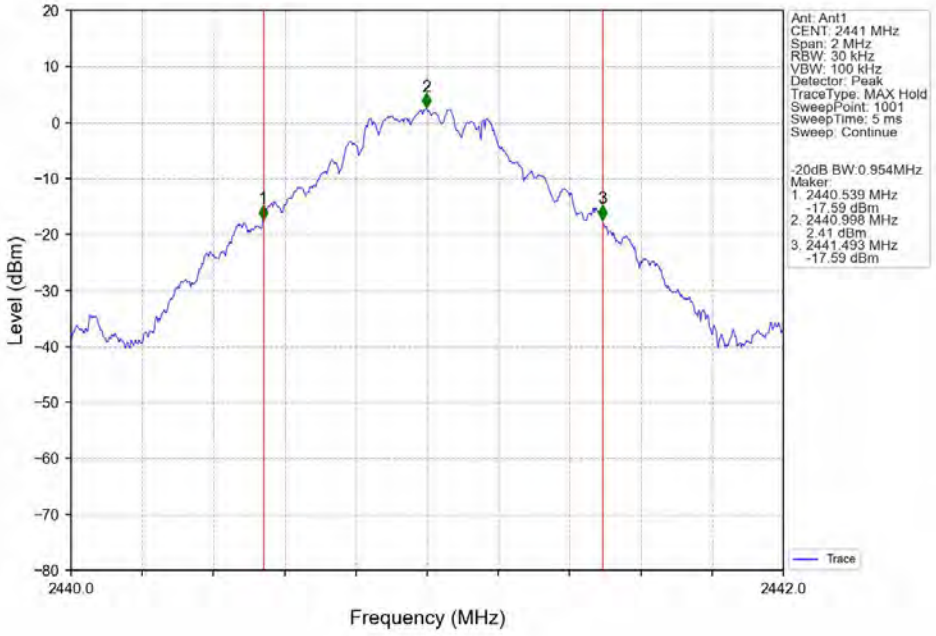


1.2.2 20dB BW

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_MCH_2441MHz_Ant1_NTNV



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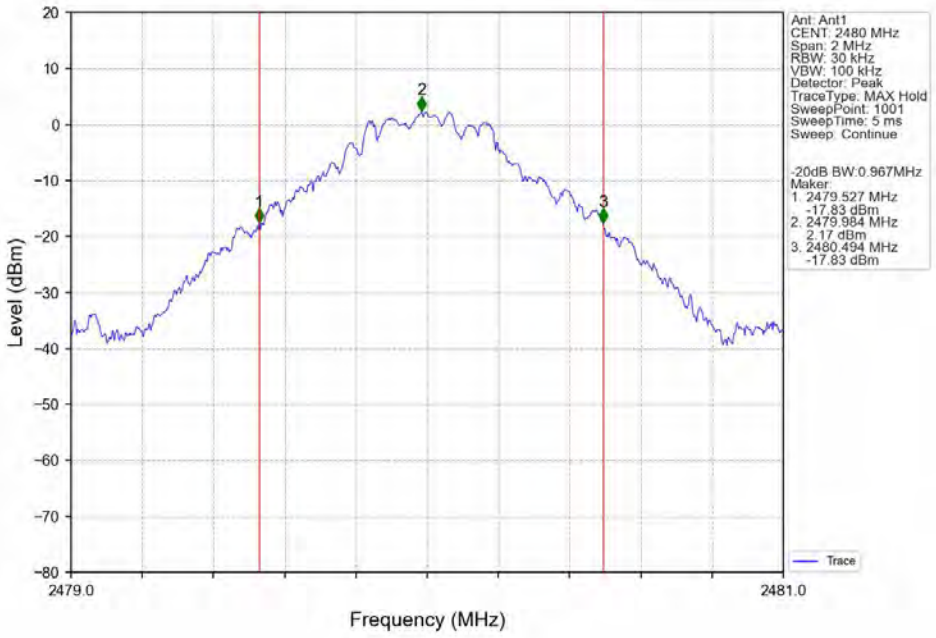
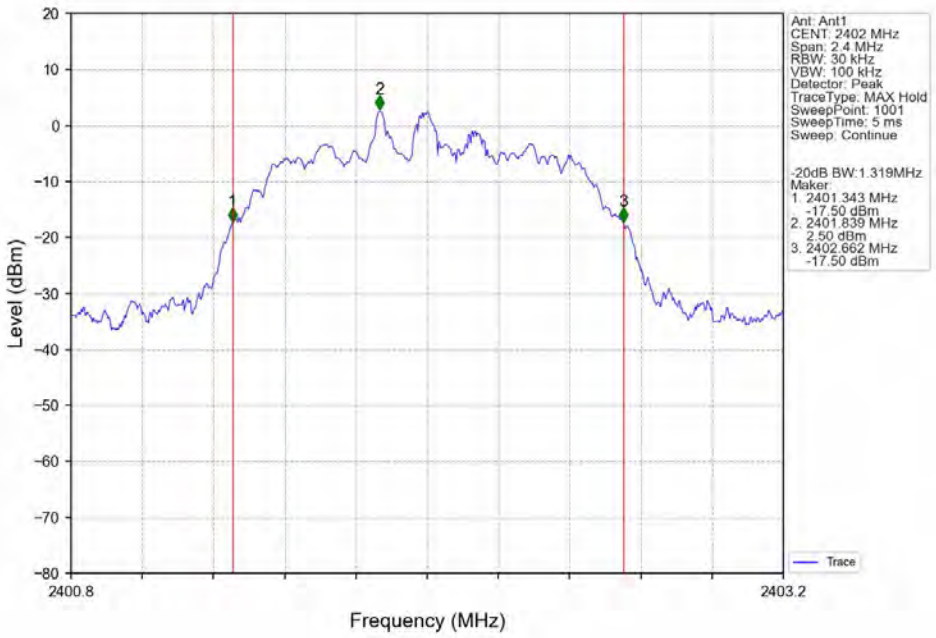
GFSK_DH5_HCH_2480MHz_Ant1_NTNV

Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV


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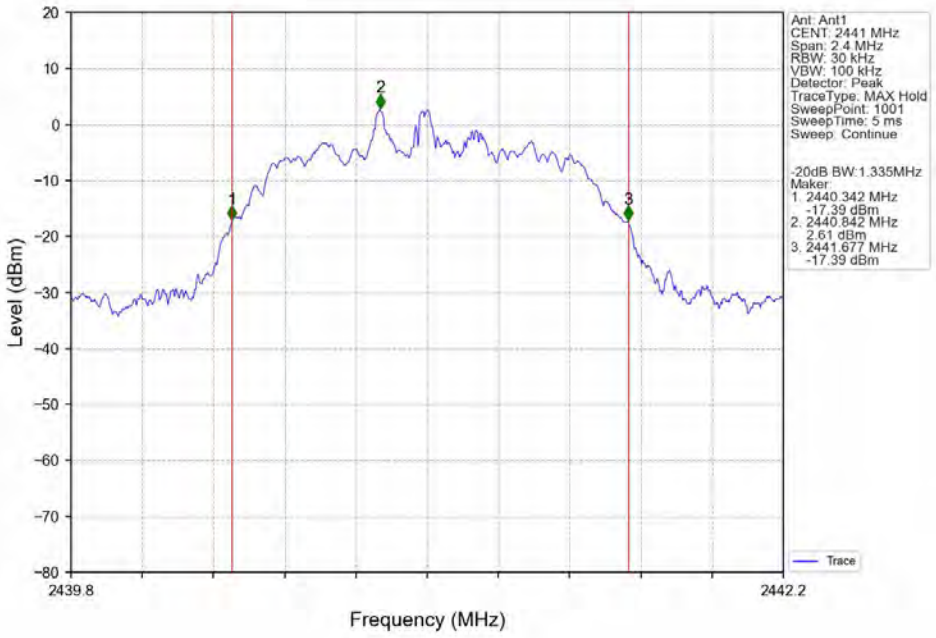
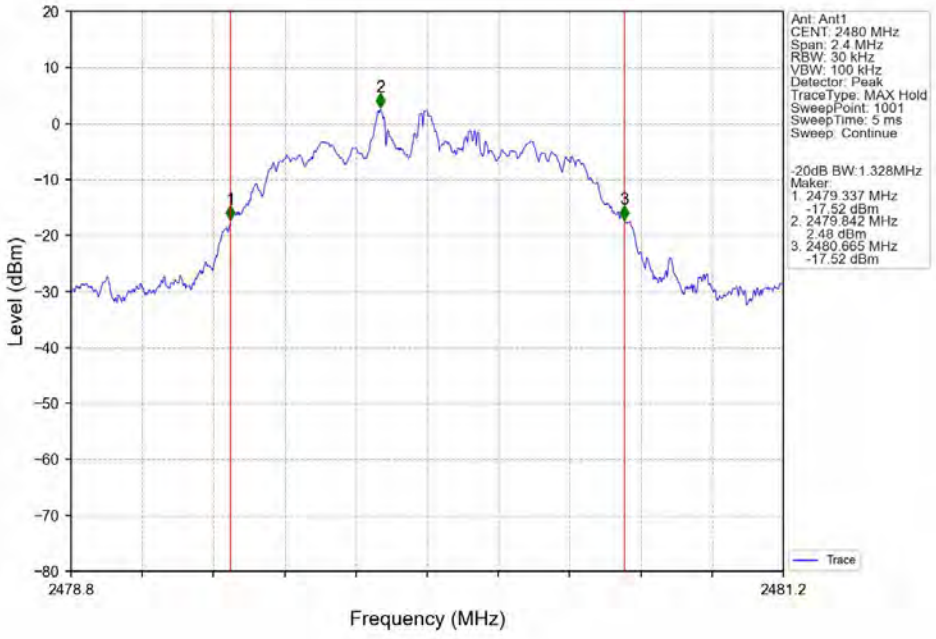
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



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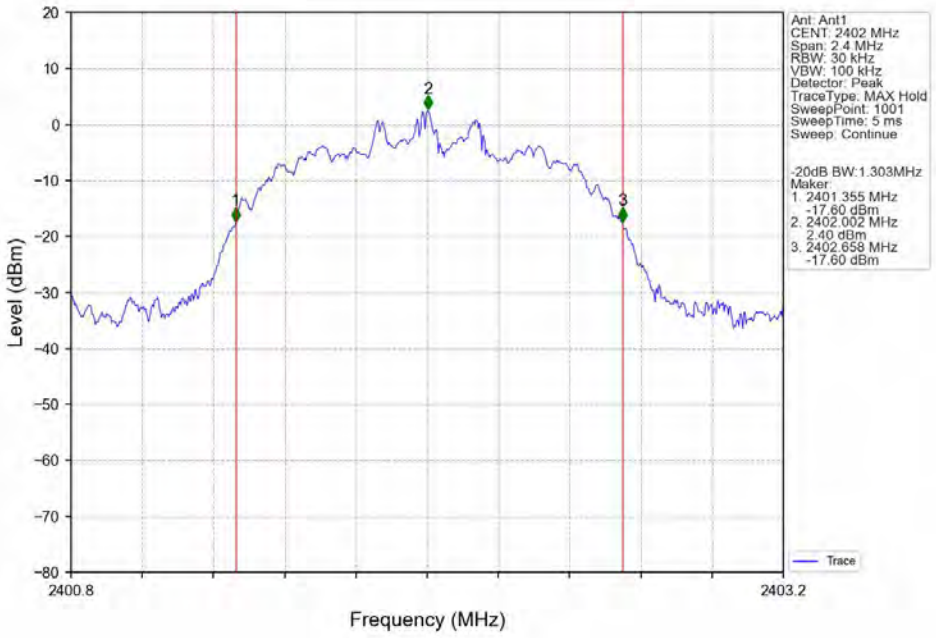
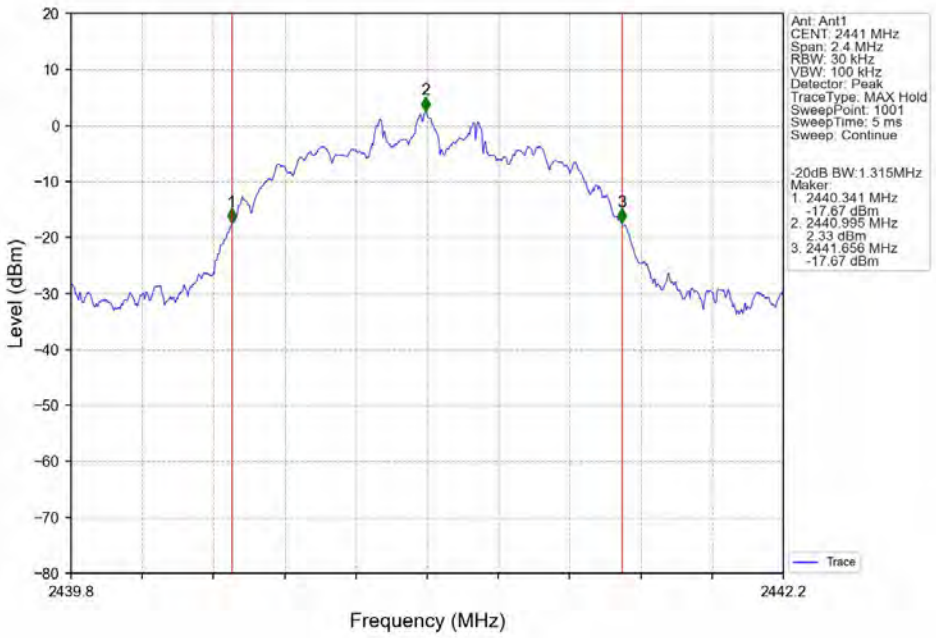
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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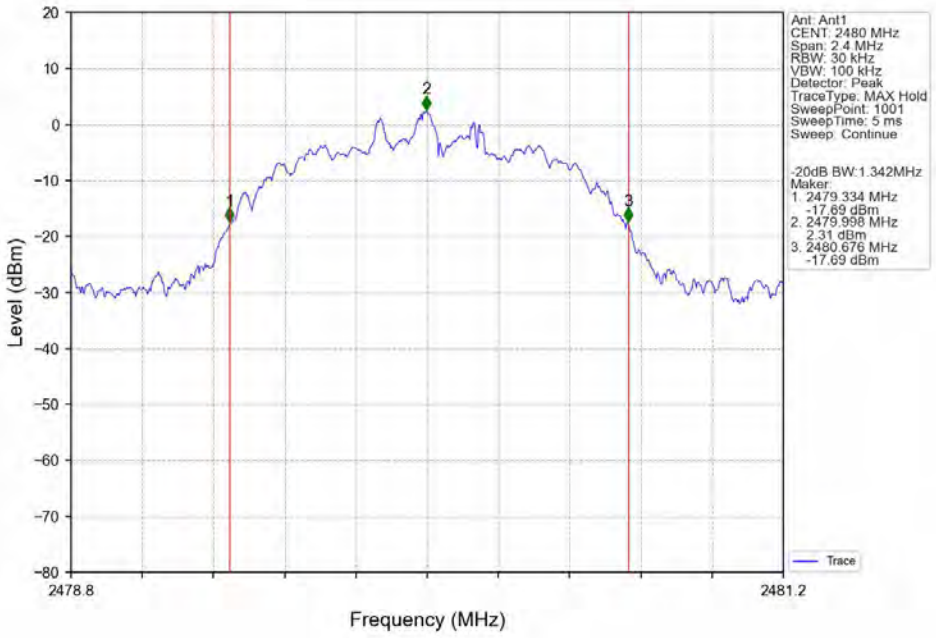
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV


2. Maximum Conducted Output Power

2.1 Test Result

2.1.1 Power

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	4.50	<=30	Pass
		2441	DH5	4.61	<=30	Pass
		2480	DH5	4.49	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	5.09	<=20.97	Pass
		2441	2DH5	4.97	<=20.97	Pass
		2480	2DH5	4.82	<=20.97	Pass
8DPSK	SISO	2402	3DH5	5.26	<=20.97	Pass
		2441	3DH5	5.14	<=20.97	Pass
		2480	3DH5	4.94	<=20.97	Pass
Note1: Antenna Gain: Ant1: 0.17dBi;						

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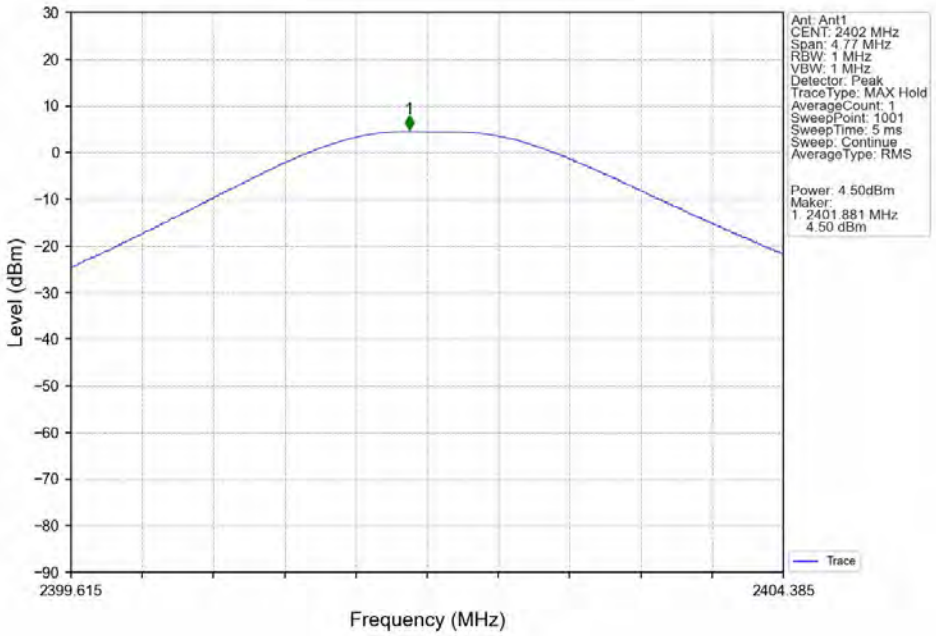
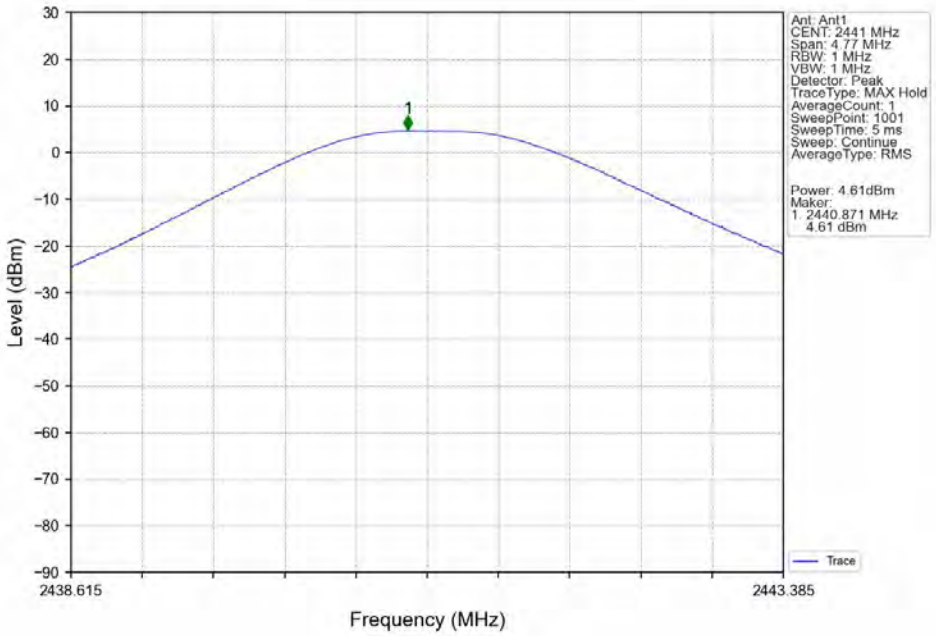
2.2 Test Graph

2.2.1 Power

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_MCH_2441MHz_Ant1_NTNV



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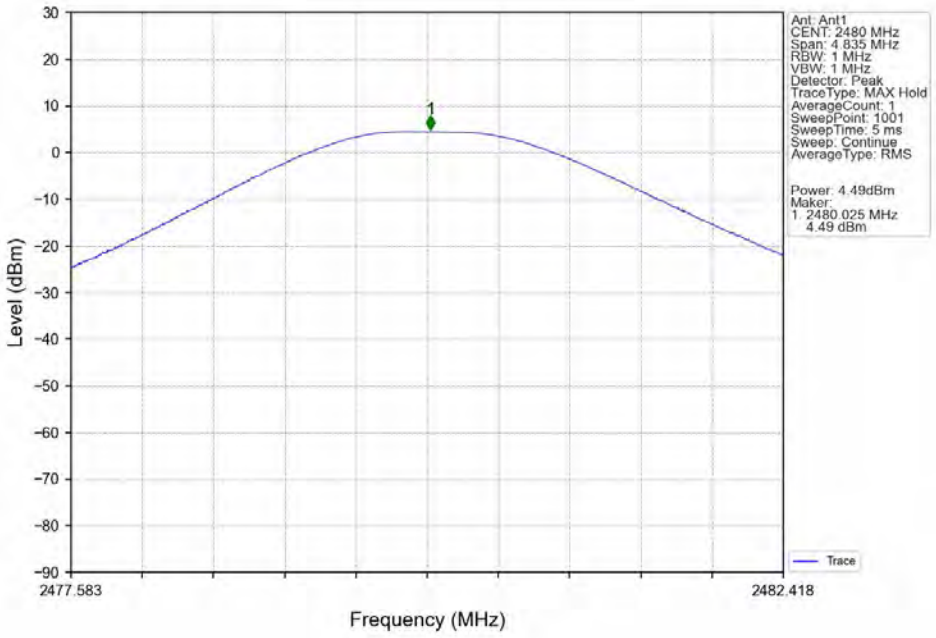
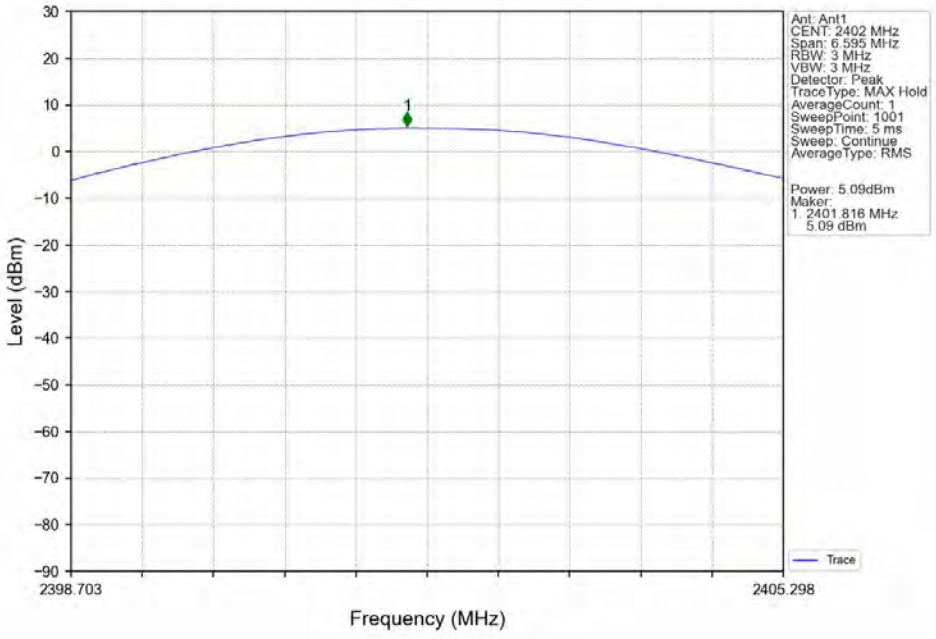
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



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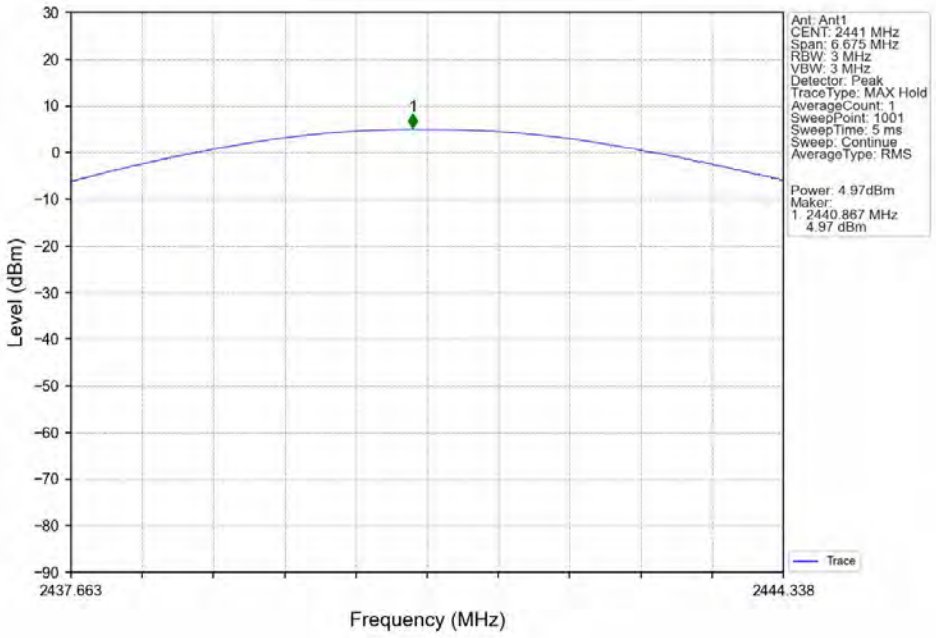
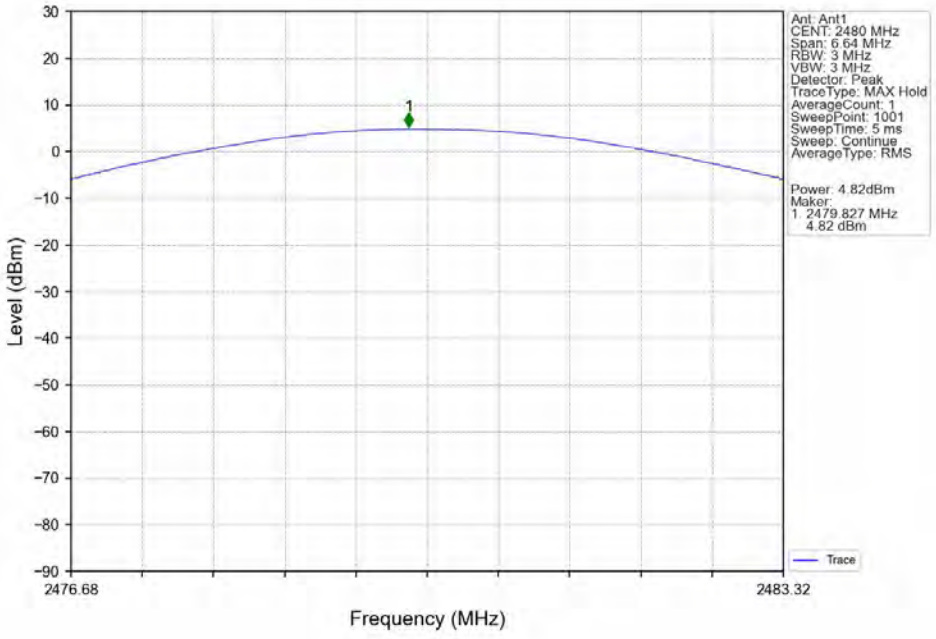
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV


Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV


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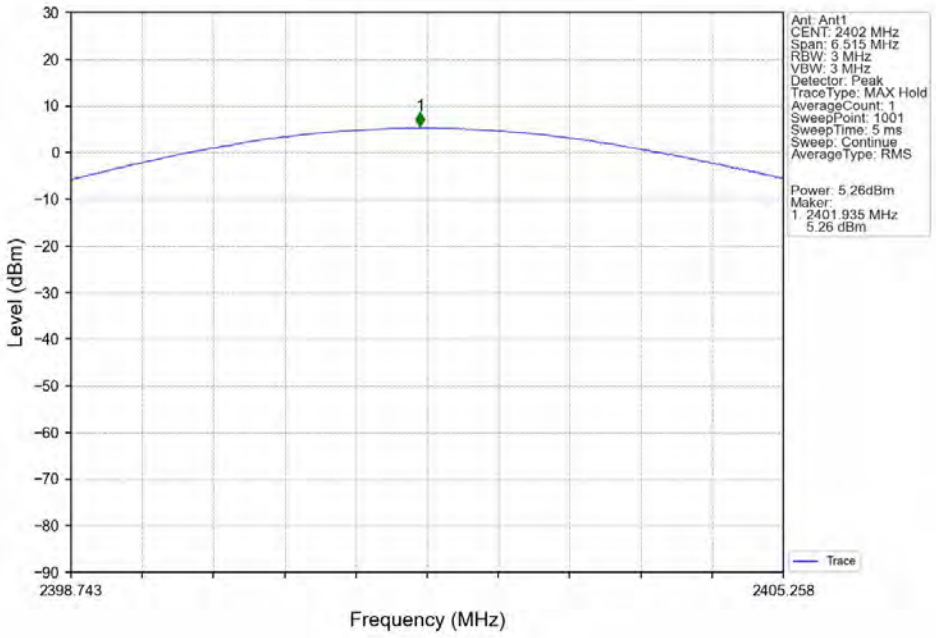
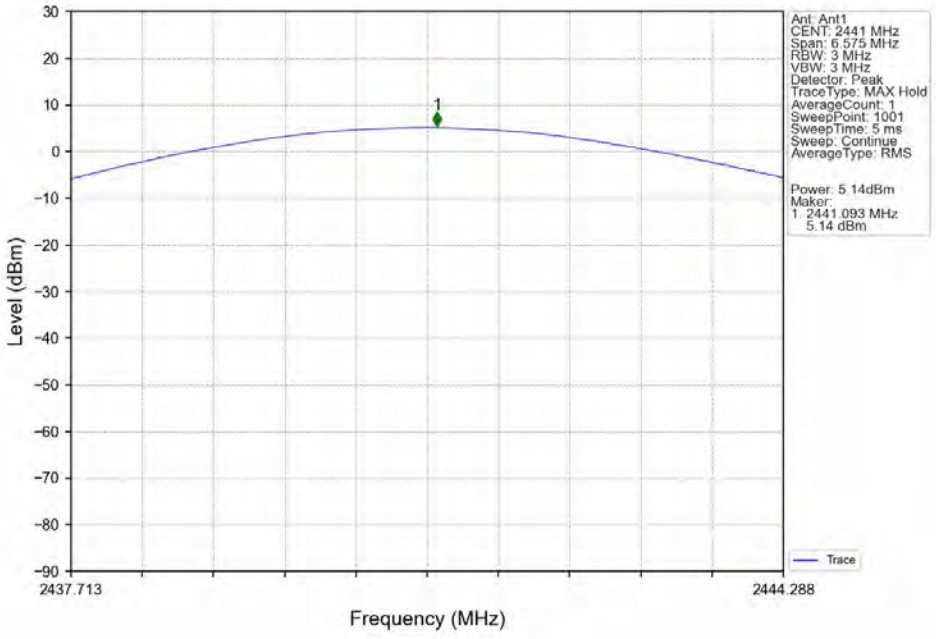
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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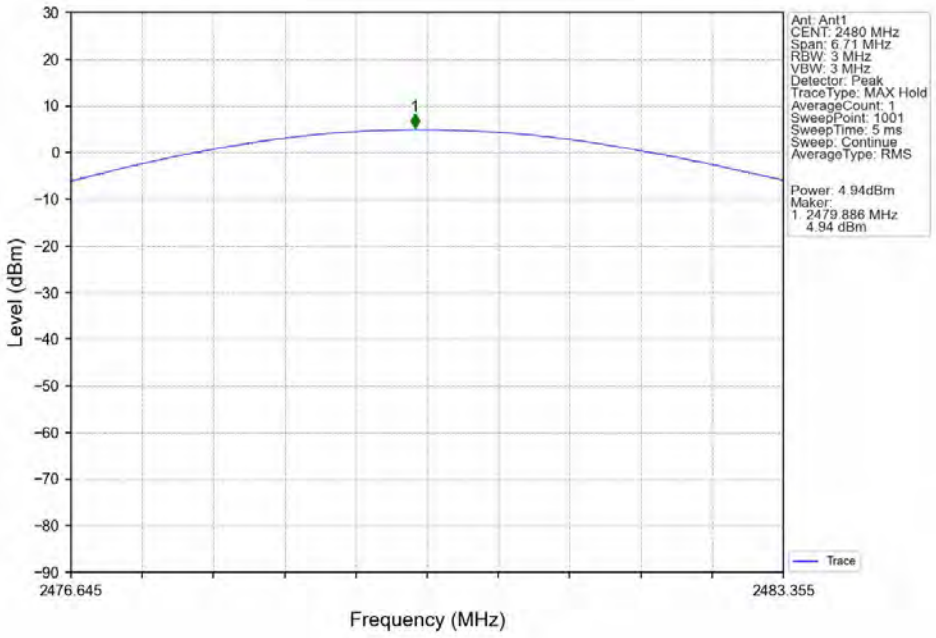
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



3. Carrier Frequency Separation

3.1 Test Result

3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.000	0.967	>=0.967	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.001	1.335	>=0.89	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.342	>=0.895	Pass

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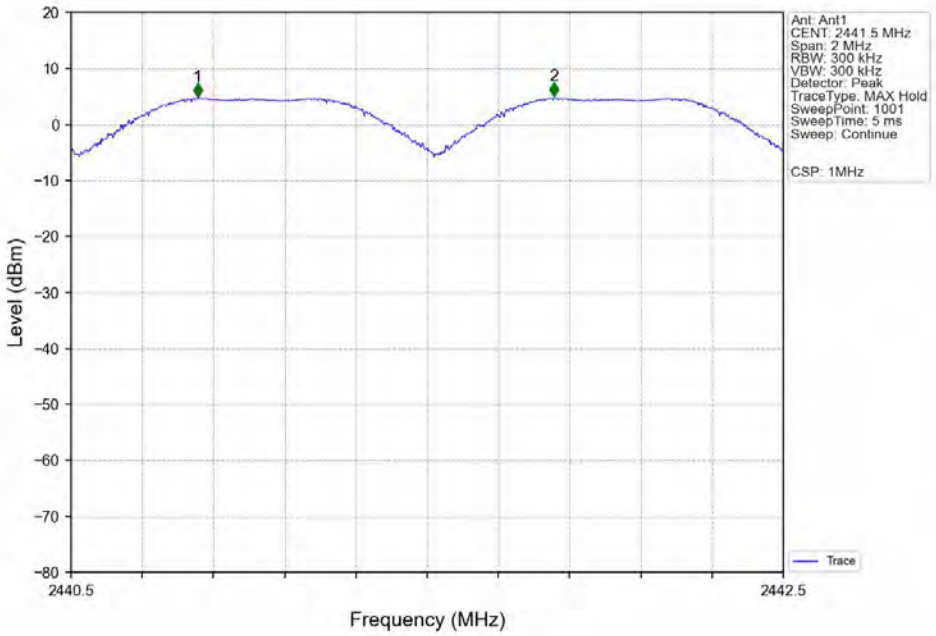
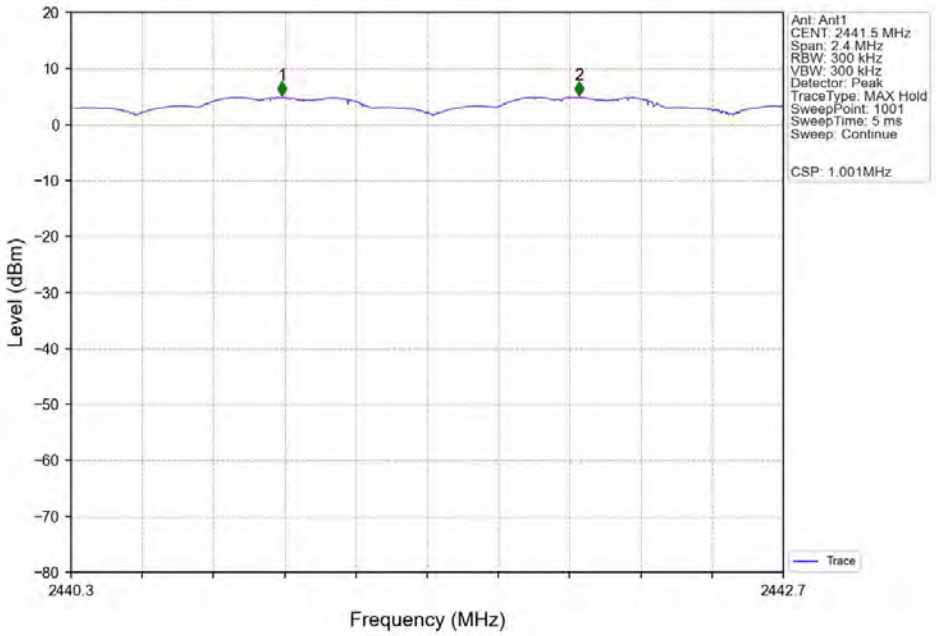
3.2 Test Graph

3.2.1 Ant1

GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



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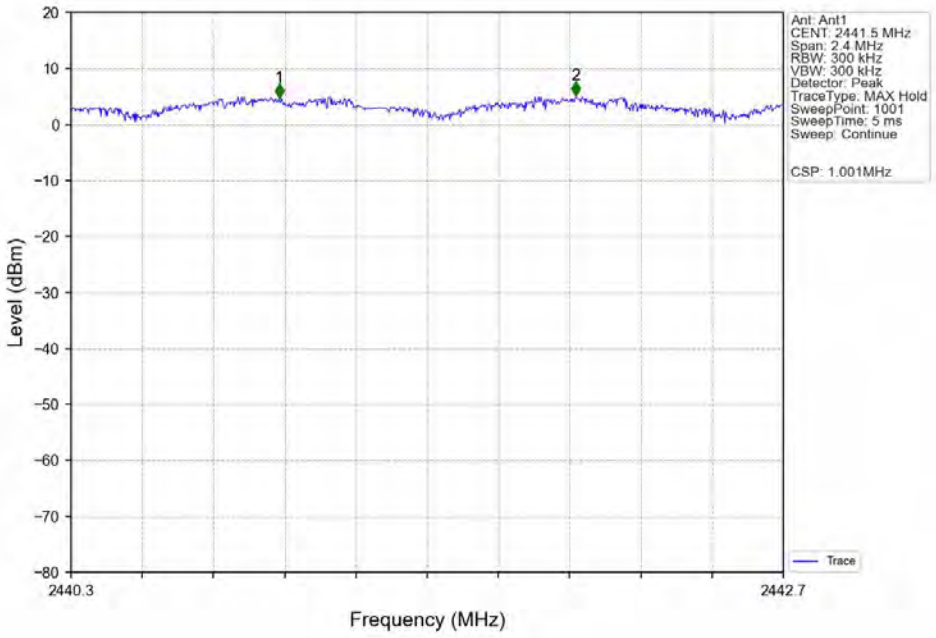
8DPSK_3DH5_HOPP_Ant1_NTNV



4. Number of Hopping Frequencies

4.1 Test Result

4.1.1 HoppNum

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

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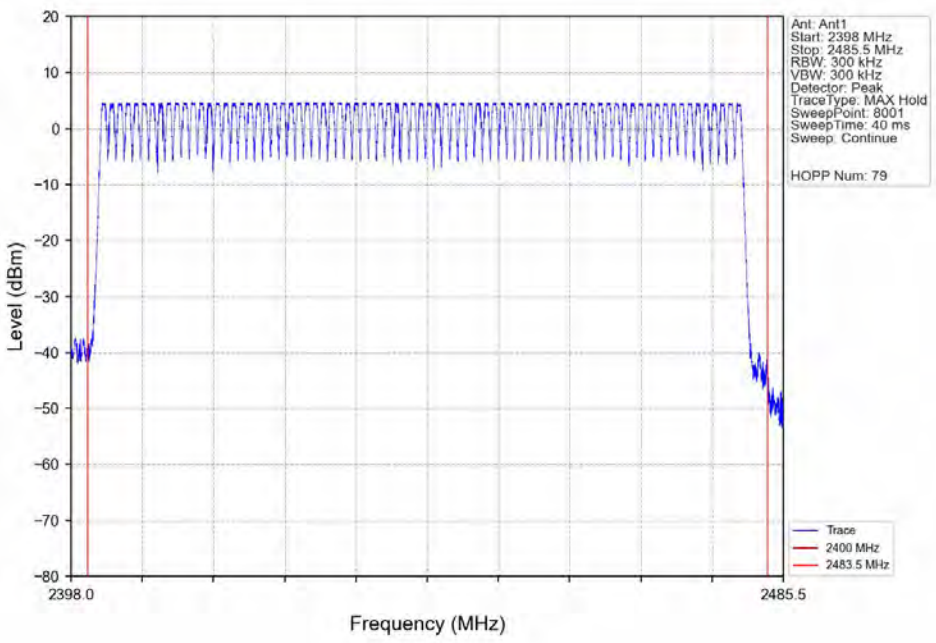
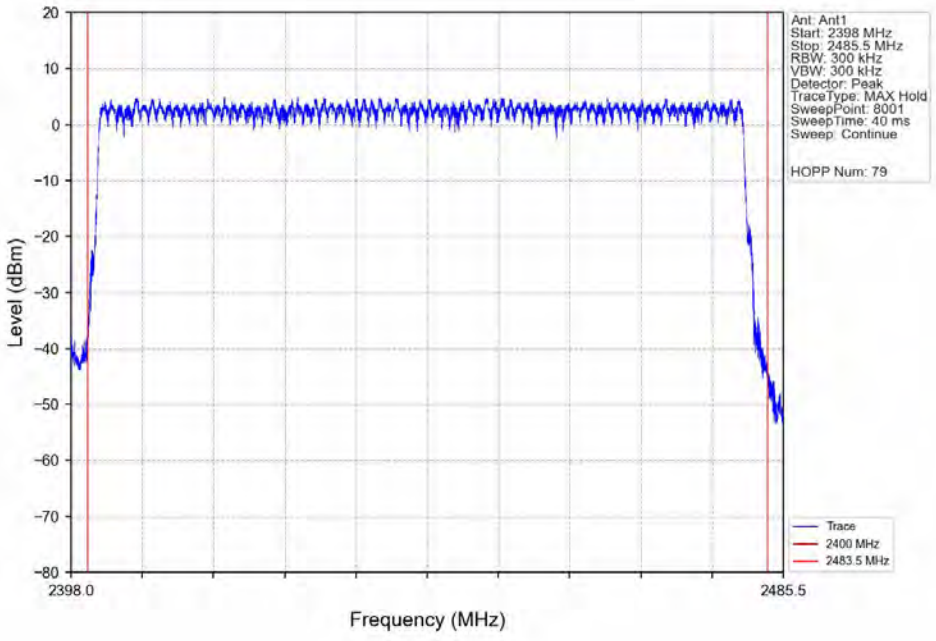
4.2 Test Graph

4.2.1 HoppNum

GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



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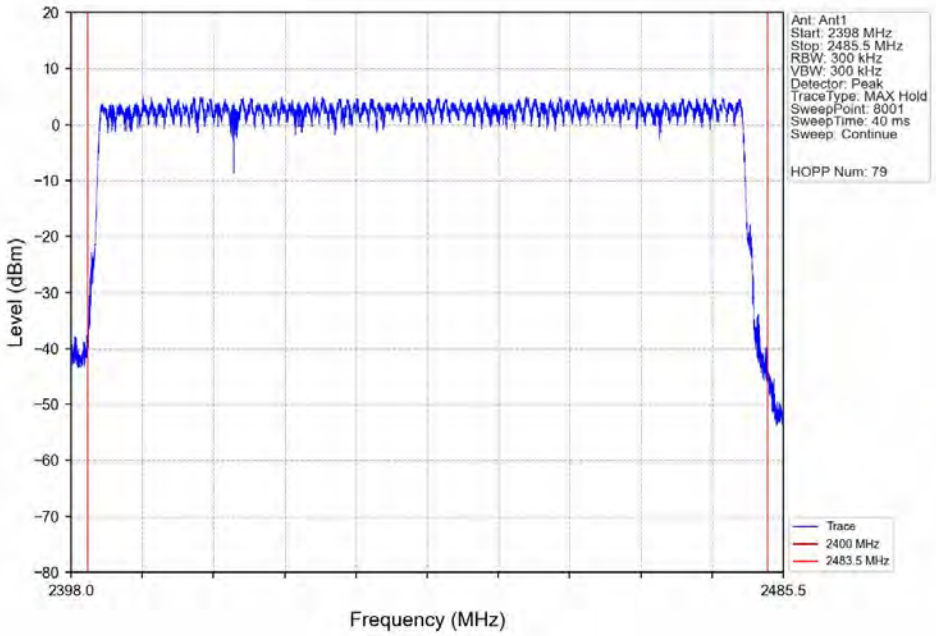
8DPSK_3DH5_HOPP_Ant1_NTNV



5. Time of Occupancy (Dwell Time)

5.1 Test Result

5.1.1 Ant1

Ant1									
Mode	TX Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	SISO	HOPP	DH1	0.393	31.600	316	124.188	<=400	Pass
			DH3	1.645	31.600	155	254.975	<=400	Pass
			DH5	2.898	31.600	105	304.290	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.395	31.600	317	125.215	<=400	Pass
			2DH3	1.648	31.600	156	257.088	<=400	Pass
			2DH5	2.895	31.600	107	309.765	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.395	31.600	316	124.820	<=400	Pass
			3DH3	1.645	31.600	164	269.780	<=400	Pass
			3DH5	2.900	31.600	97	281.300	<=400	Pass

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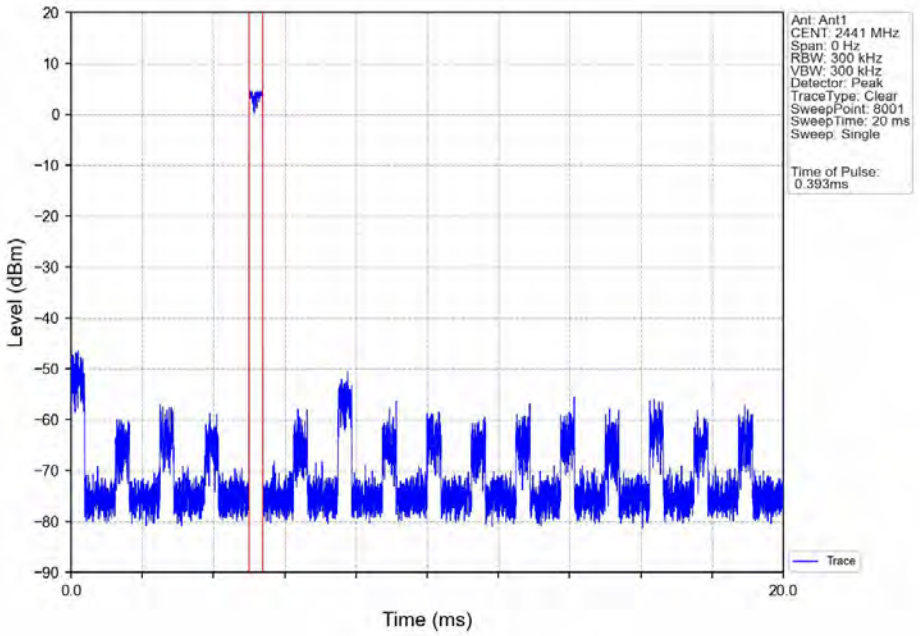
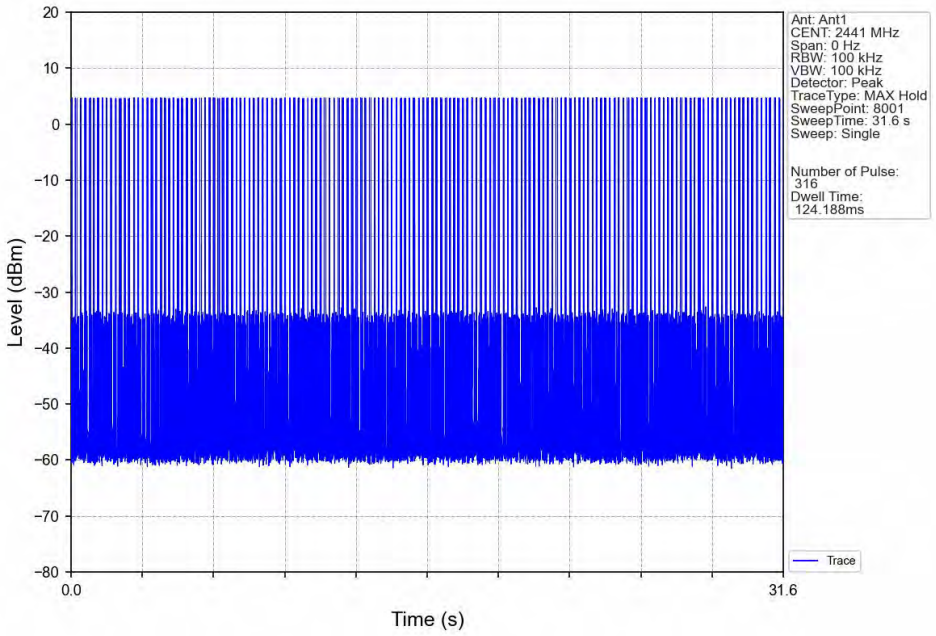
5.2 Test Graph

5.2.1 Ant1

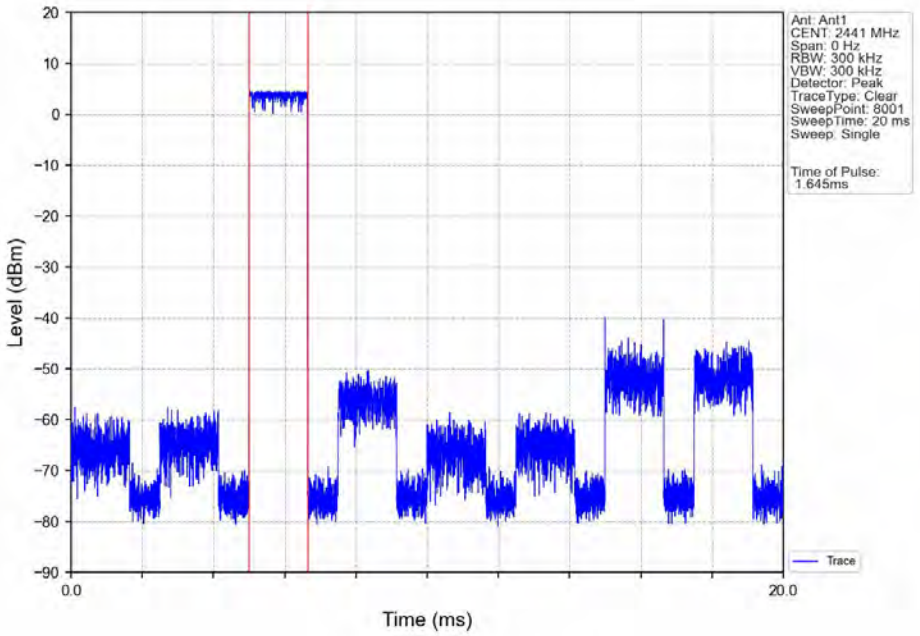
GFSK_DH1_HOPP_Ant1_NTNV



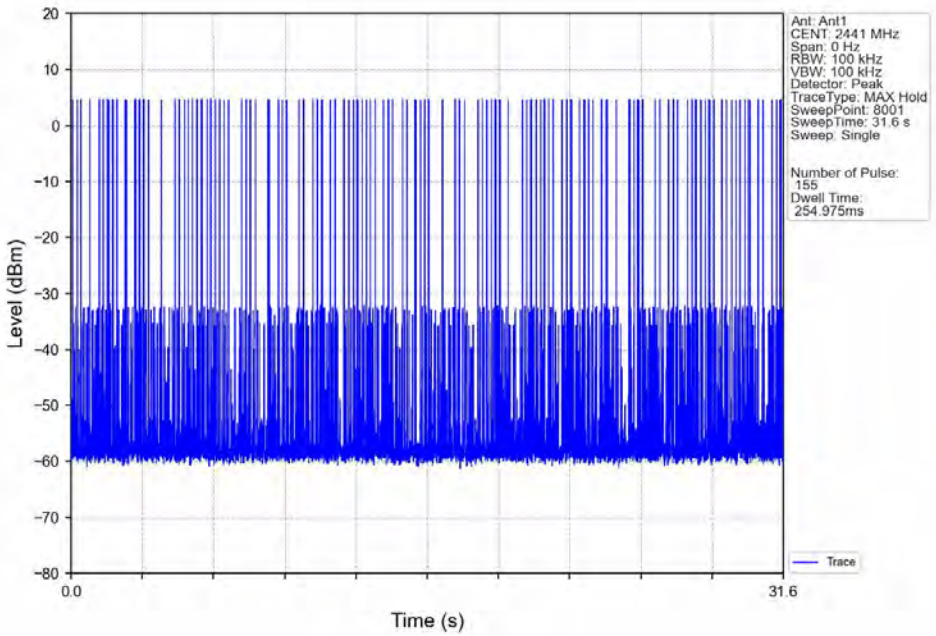
GFSK_DH1_HOPP_Ant1_NTNV



GFSK_DH3_HOPP_Ant1_NTNV



GFSK_DH3_HOPP_Ant1_NTNV



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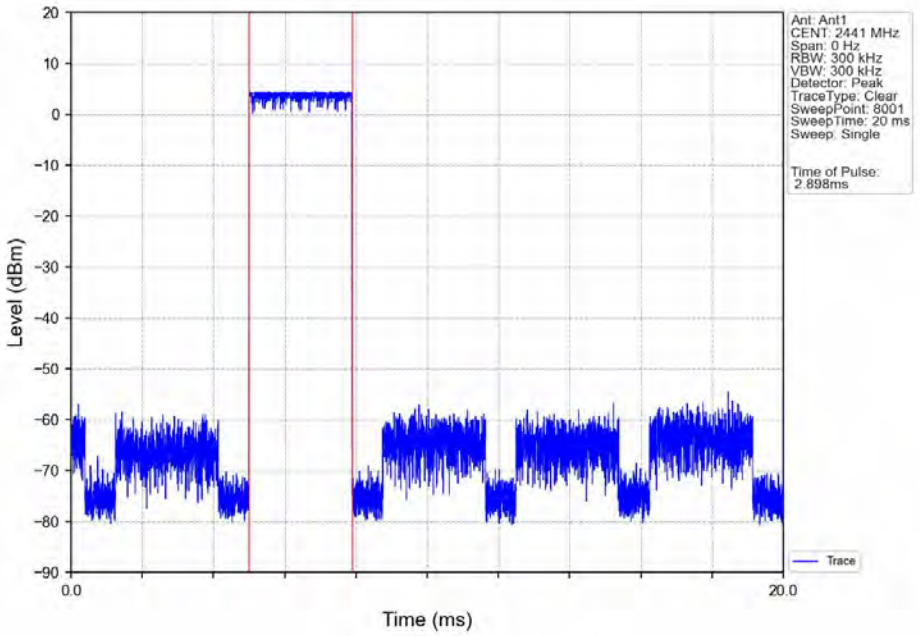
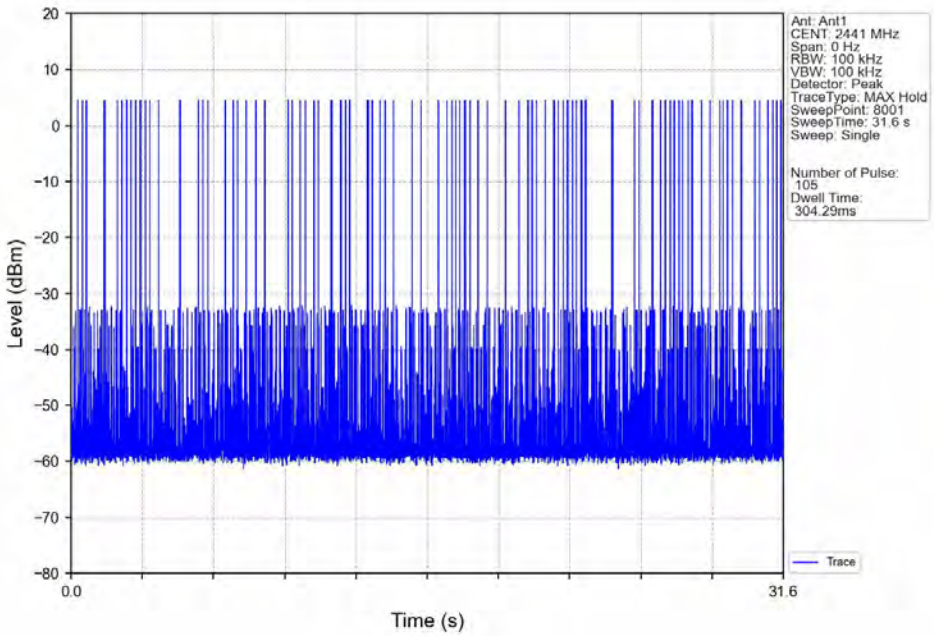
GFSK_DH5_HOPP_Ant1_NTNV



GFSK_DH5_HOPP_Ant1_NTNV



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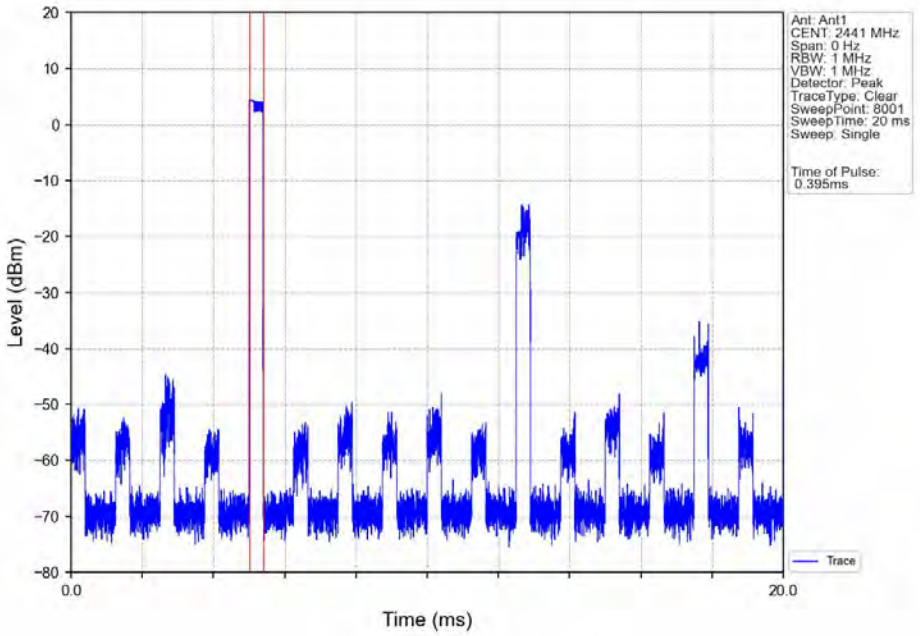
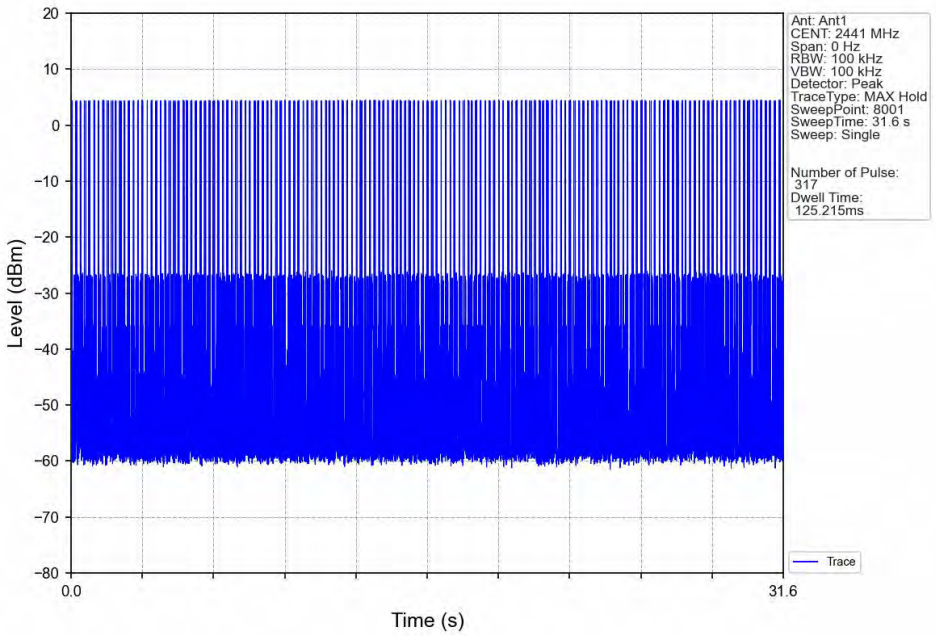
Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV


Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV


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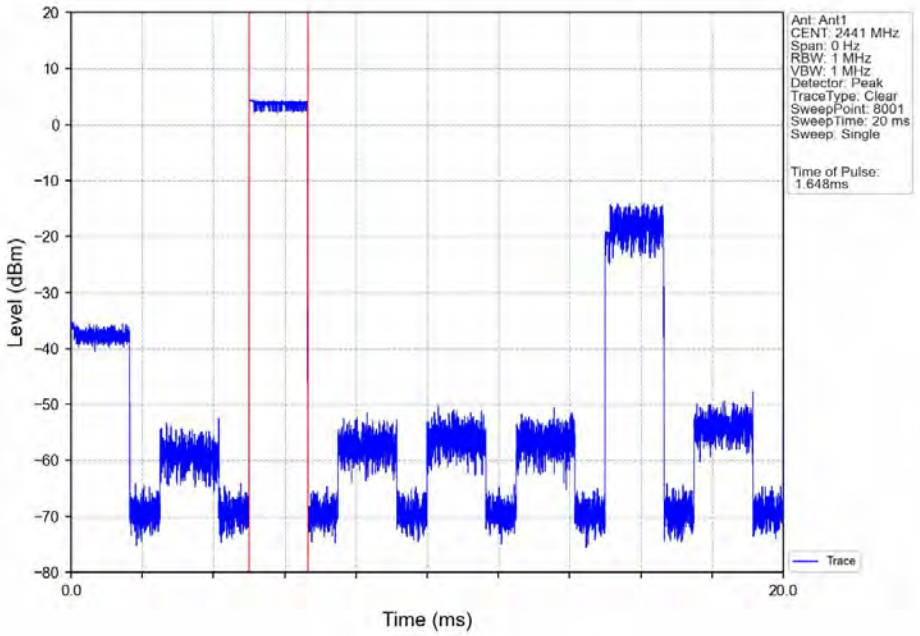
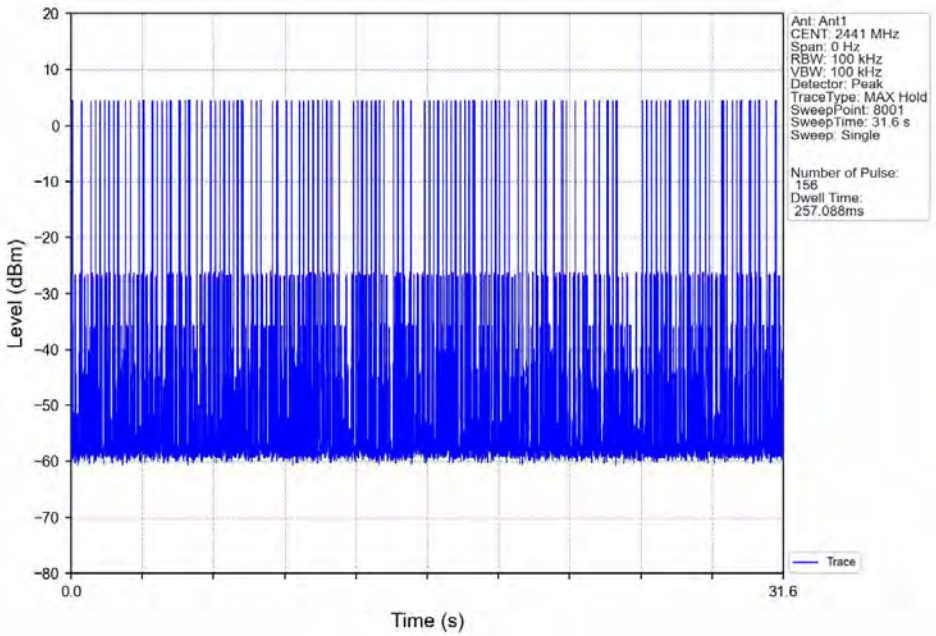
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV


Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV


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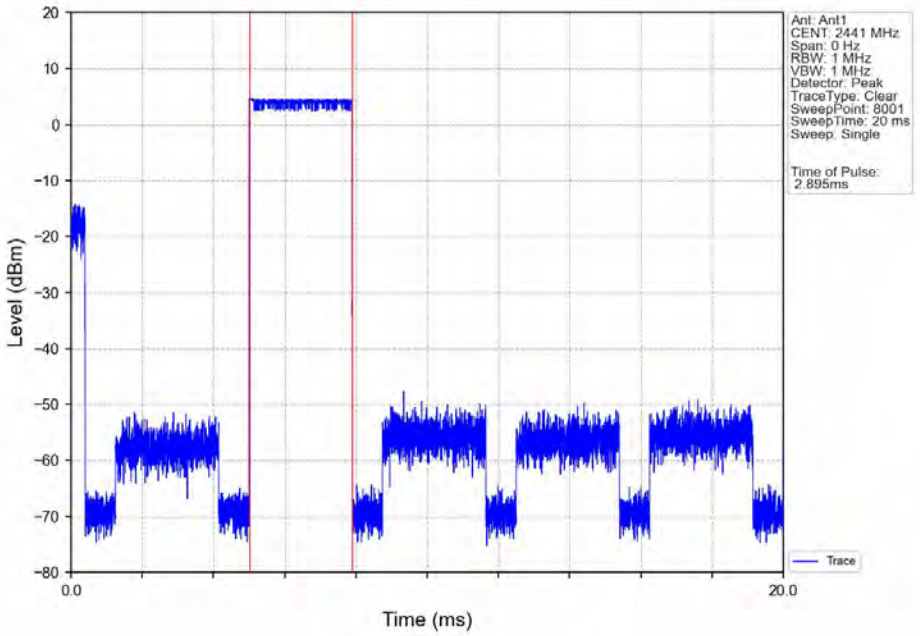
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV


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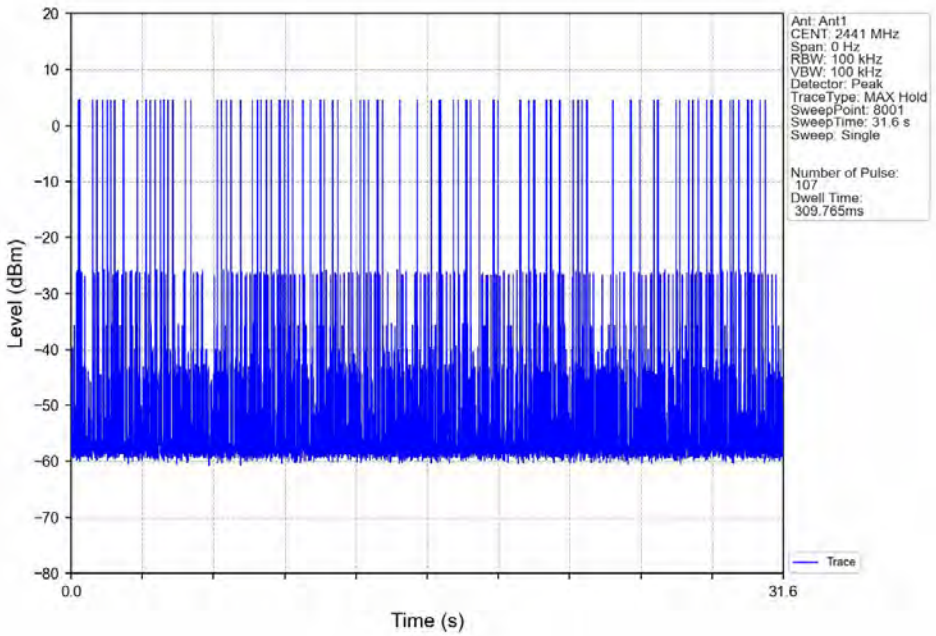

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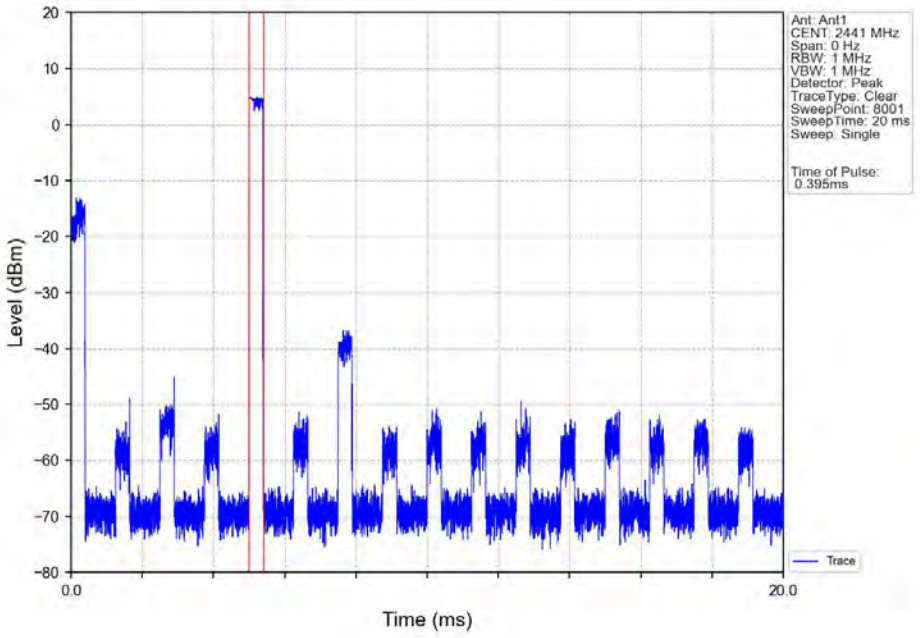

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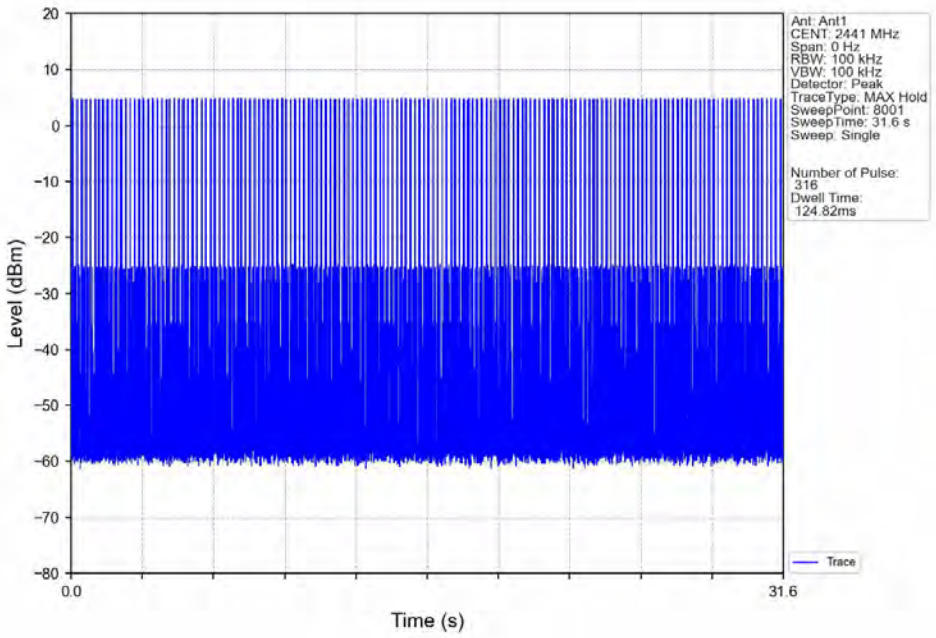

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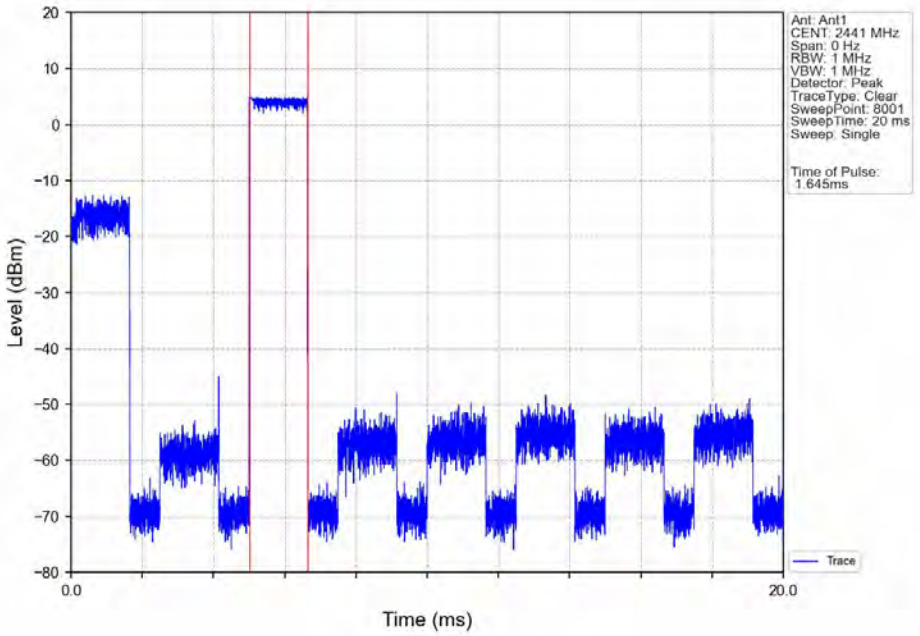
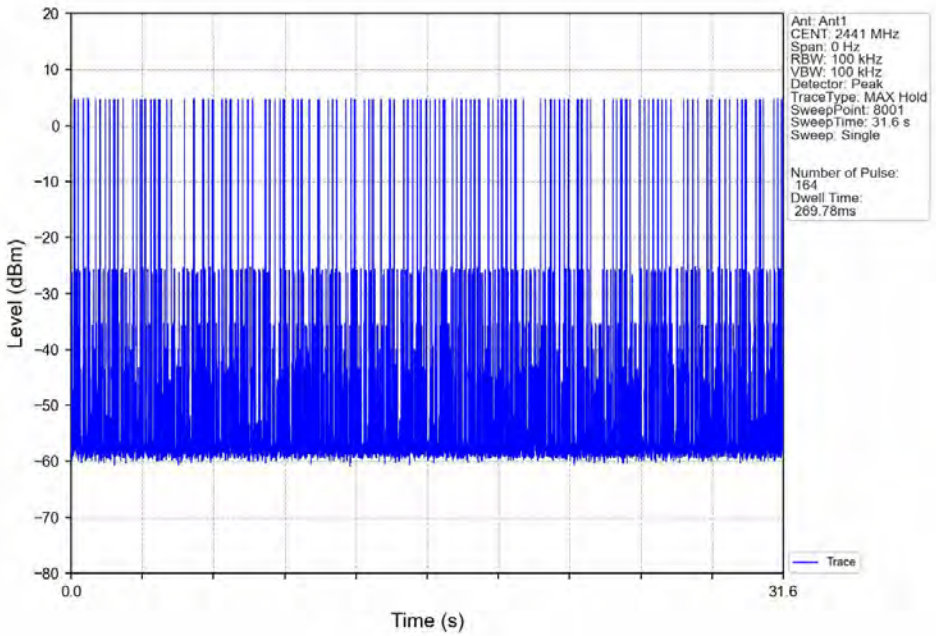
8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH3_HOPP_Ant1_NTNV



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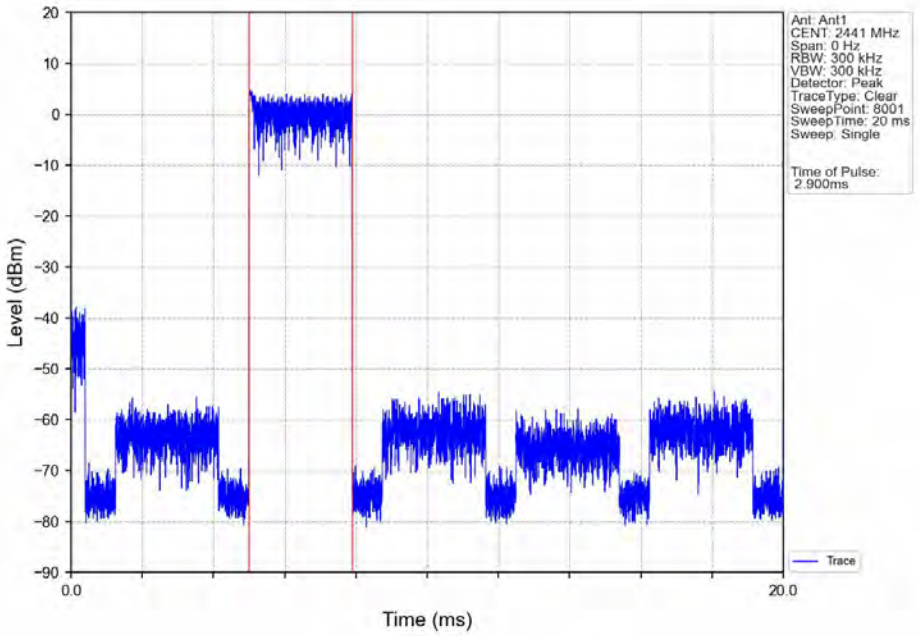
8DPSK_3DH5_HOPP_Ant1_NTNV


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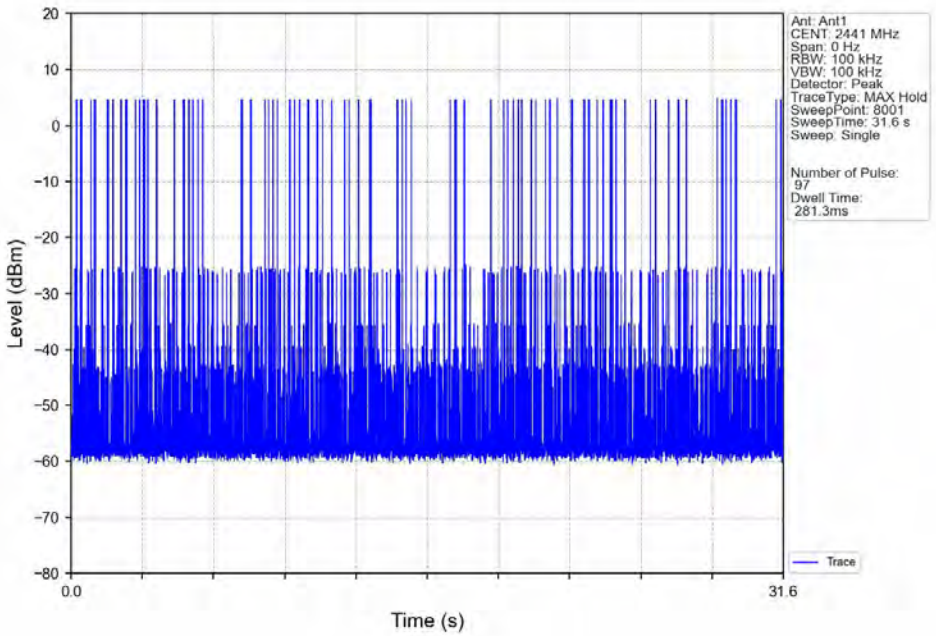

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6. Unwanted Emissions In Non-restricted Frequency Bands

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	4.67
		2441	DH5	1	4.78
		2480	DH5	1	4.71
Pi/4DQPSK	SISO	2402	2DH5	1	4.92
		2441	2DH5	1	4.92
		2480	2DH5	1	4.83
8DPSK	SISO	2402	3DH5	1	4.84
		2441	3DH5	1	4.92
		2480	3DH5	1	4.91
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.					

6.1.2 CSE

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	4.78	-15.22	Pass
		2441	DH5	1	4.78	-15.22	Pass
		2480	DH5	1	4.78	-15.22	Pass
		HOPP	DH5	1	4.78	-15.22	Pass
					4.78	-15.22	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	4.92	-15.08	Pass
		2441	2DH5	1	4.92	-15.08	Pass
		2480	2DH5	1	4.92	-15.08	Pass
		HOPP	2DH5	1	4.92	-15.08	Pass
					4.92	-15.08	Pass
8DPSK	SISO	2402	3DH5	1	4.92	-15.08	Pass
		2441	3DH5	1	4.92	-15.08	Pass
		2480	3DH5	1	4.92	-15.08	Pass
		HOPP	3DH5	1	4.92	-15.08	Pass
					4.92	-15.08	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.							

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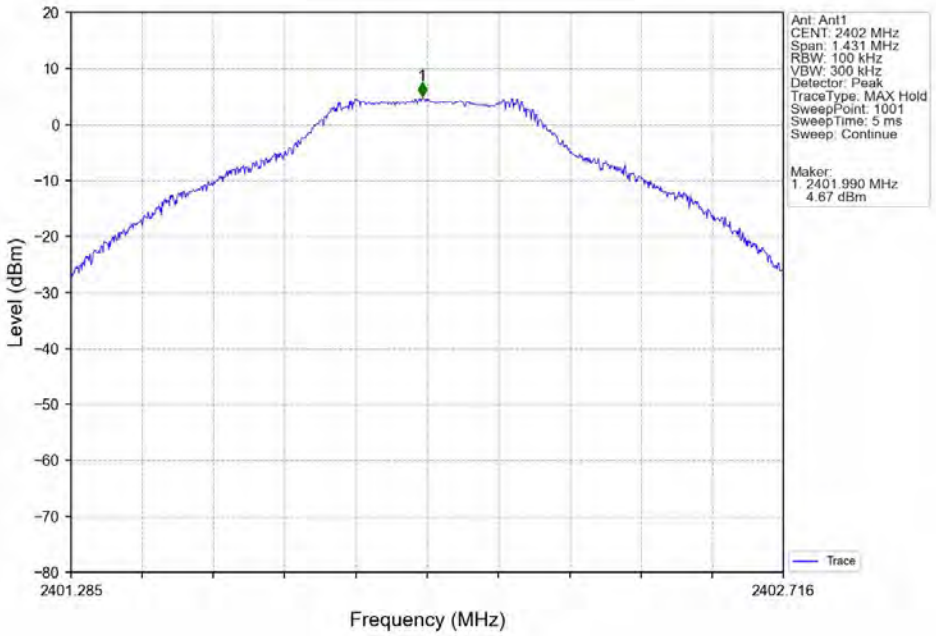
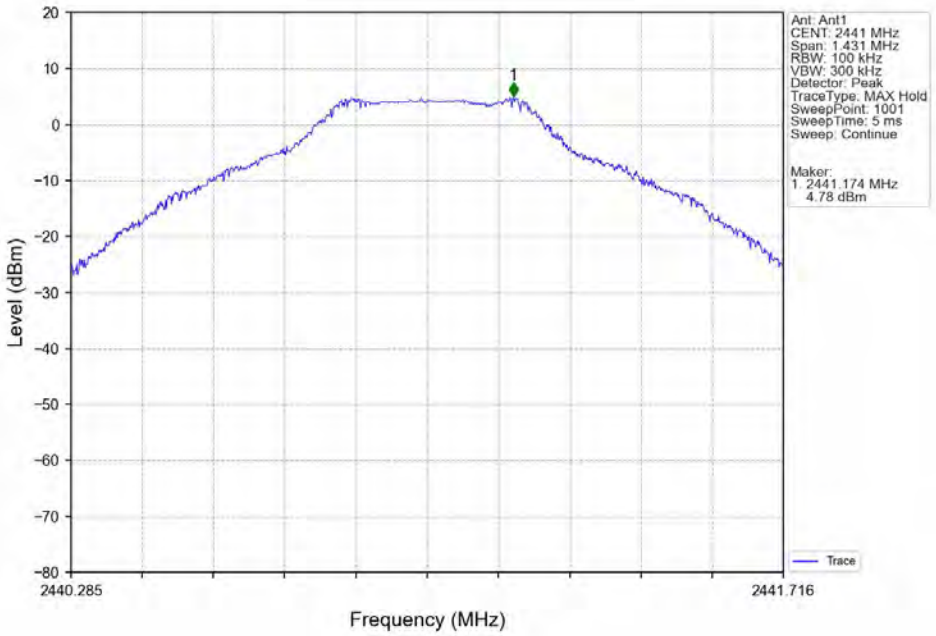
6.2 Test Graph

6.2.1 Ref

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_MCH_2441MHz_Ant1_NTNV



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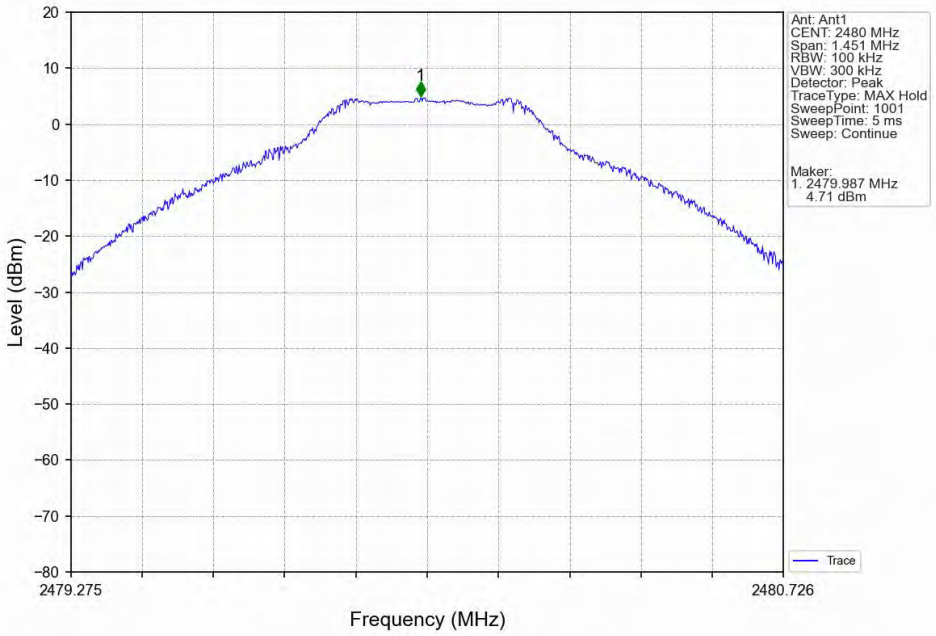
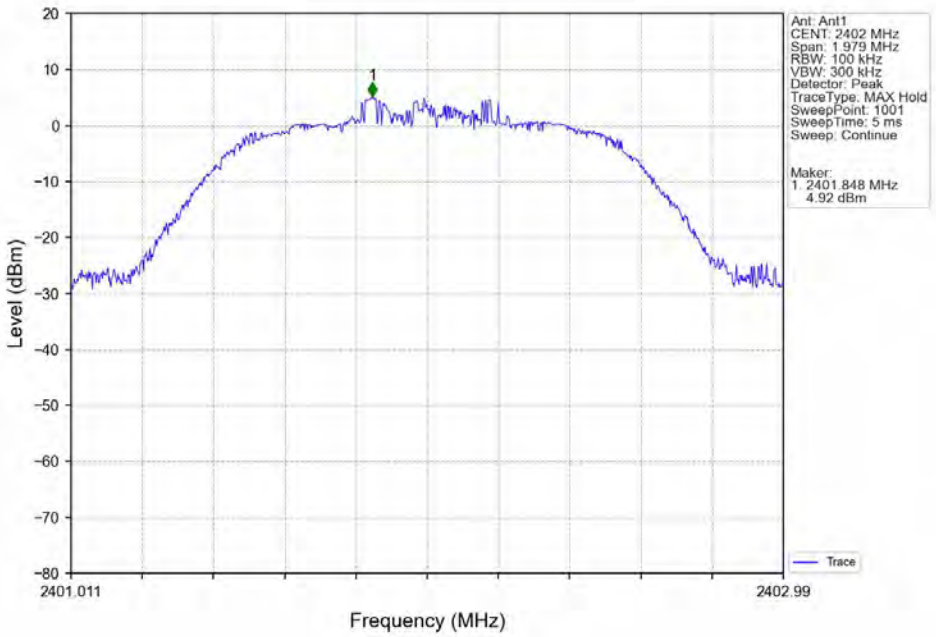
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



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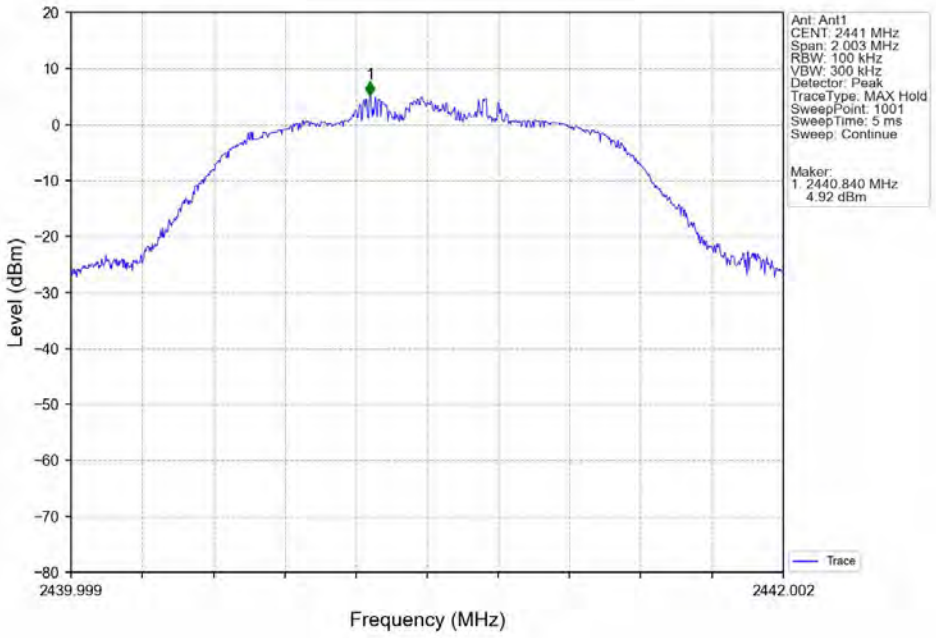
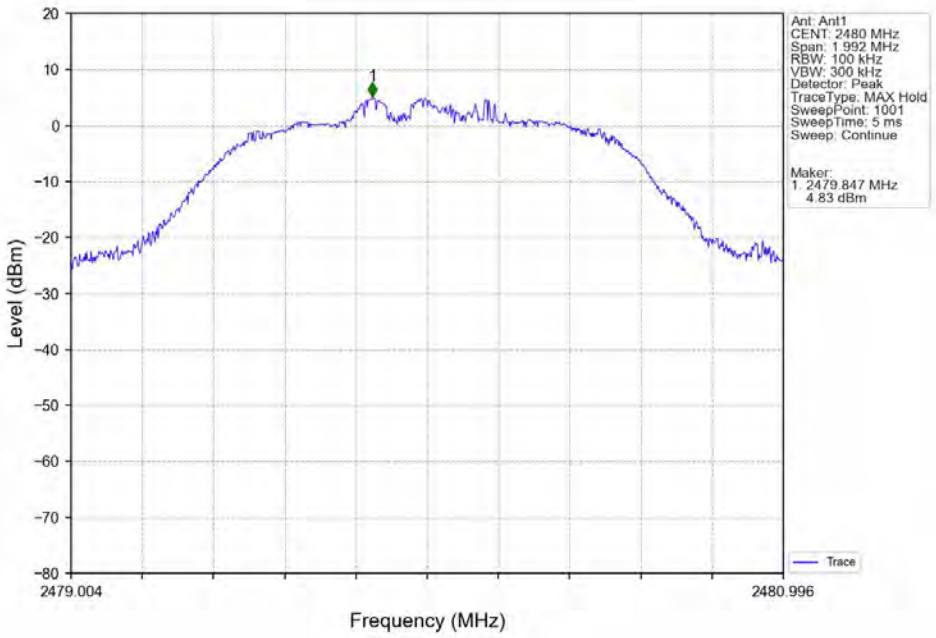
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



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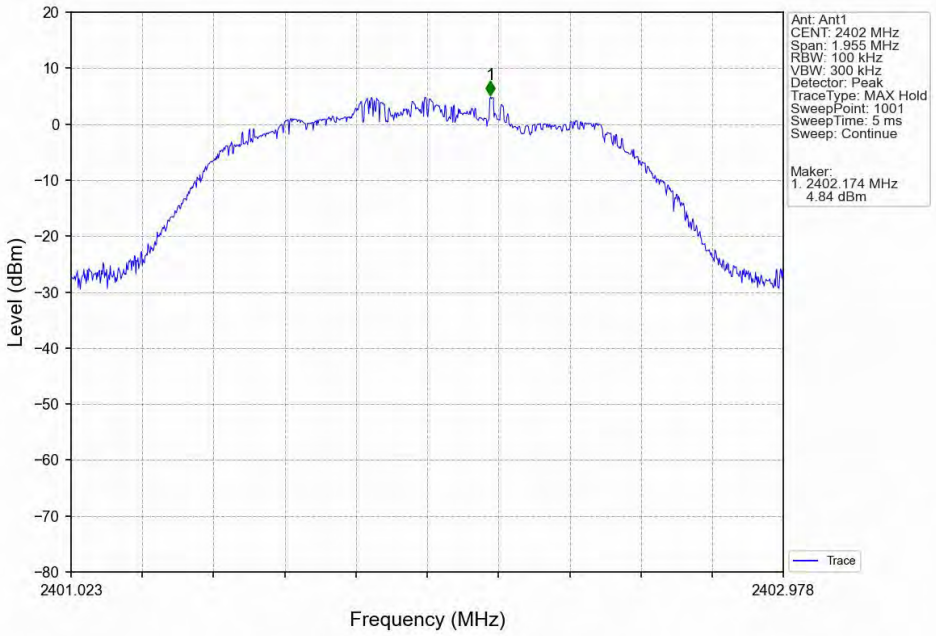
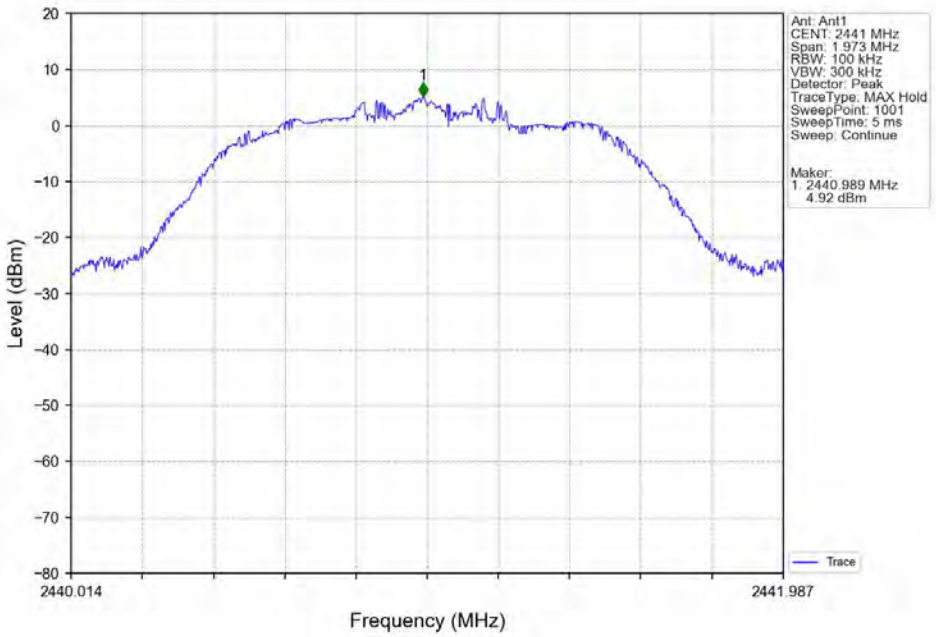
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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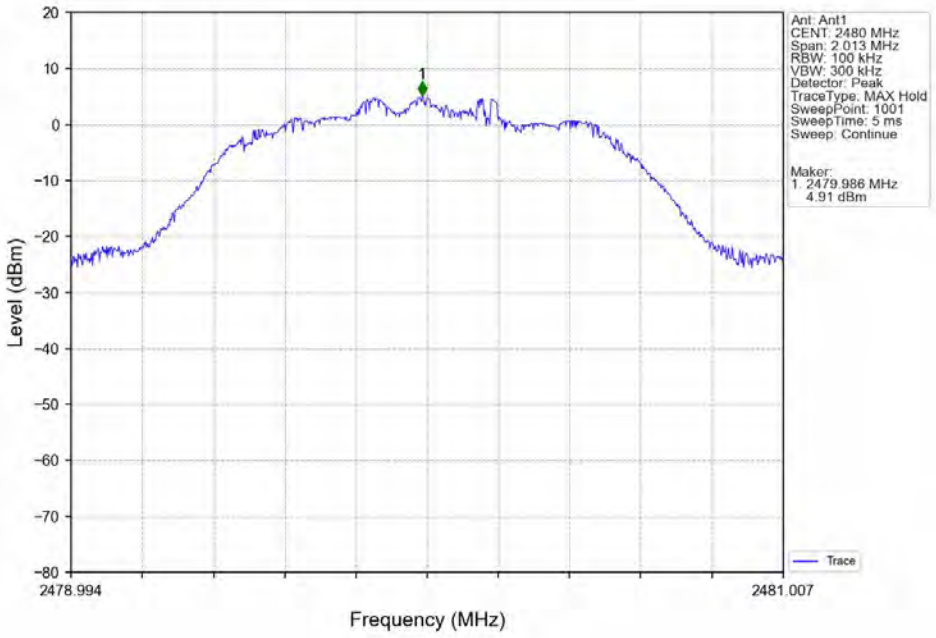
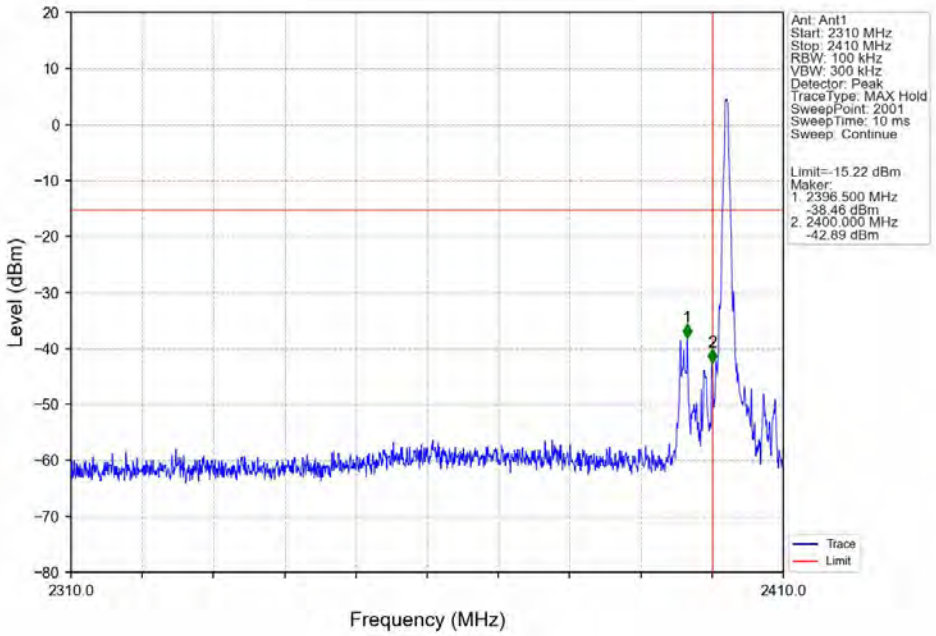
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



6.2.2 CSE

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



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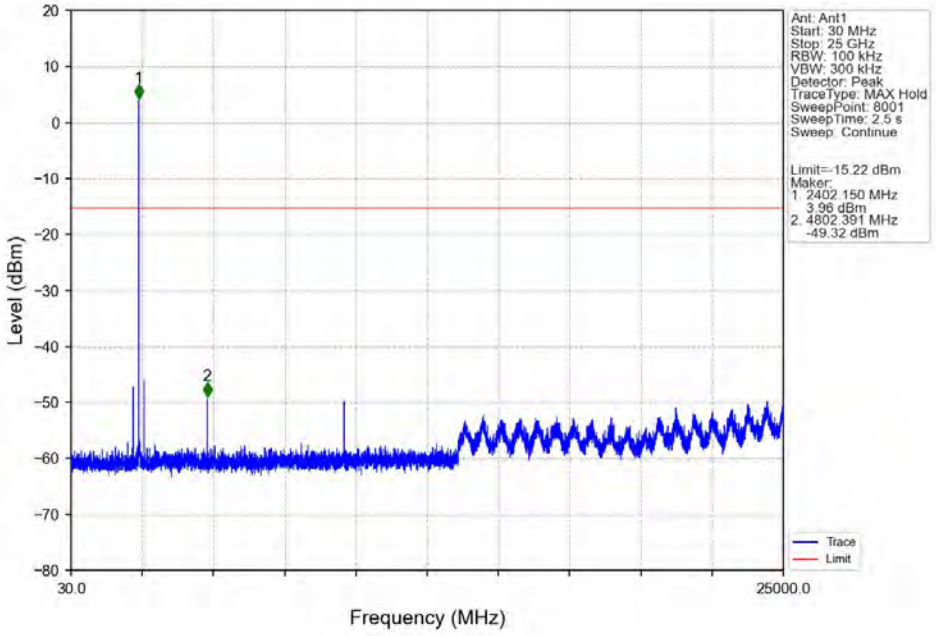

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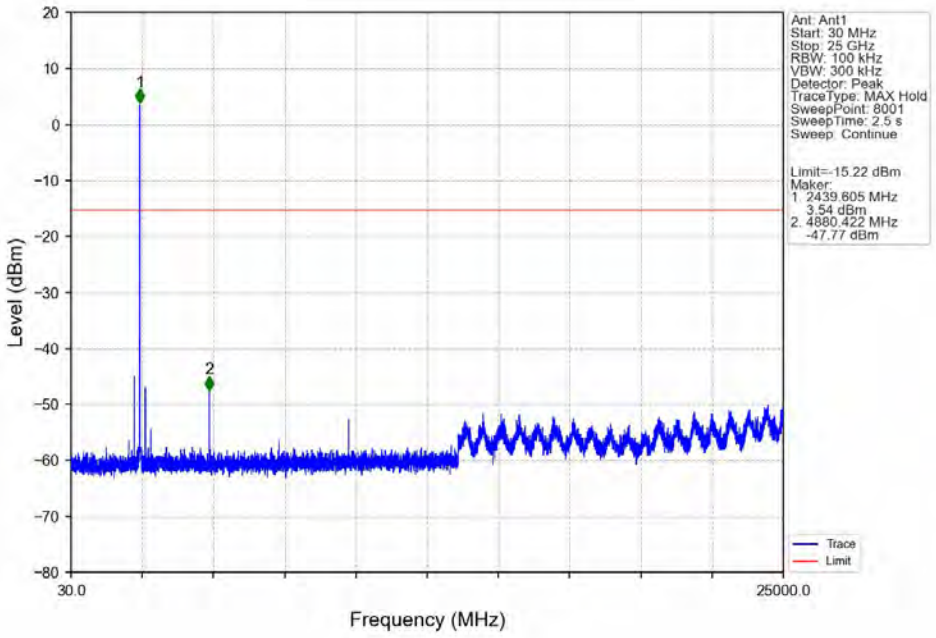
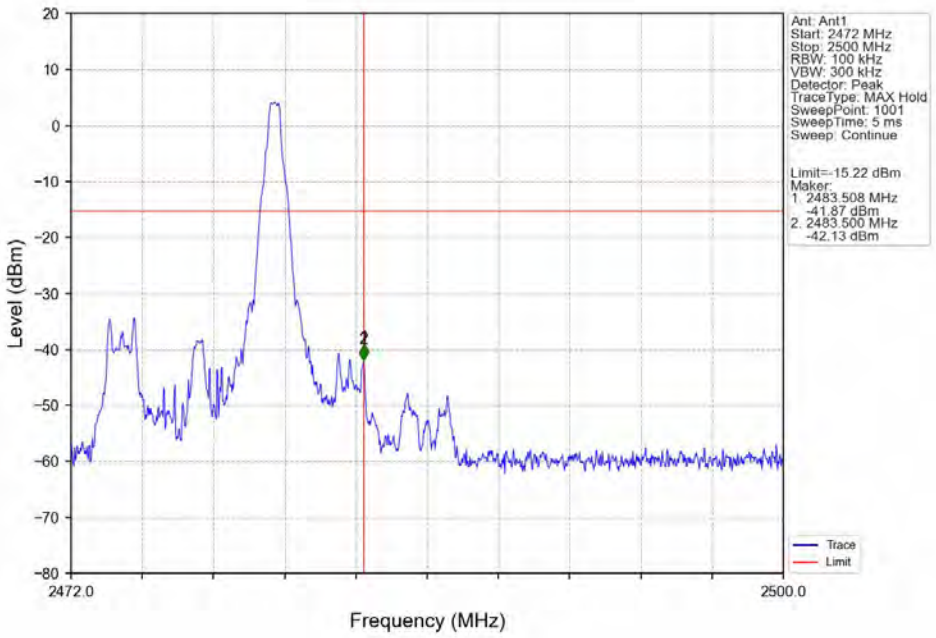
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



GFSK_DH5_HCH_2480MHz_Ant1_NTNV



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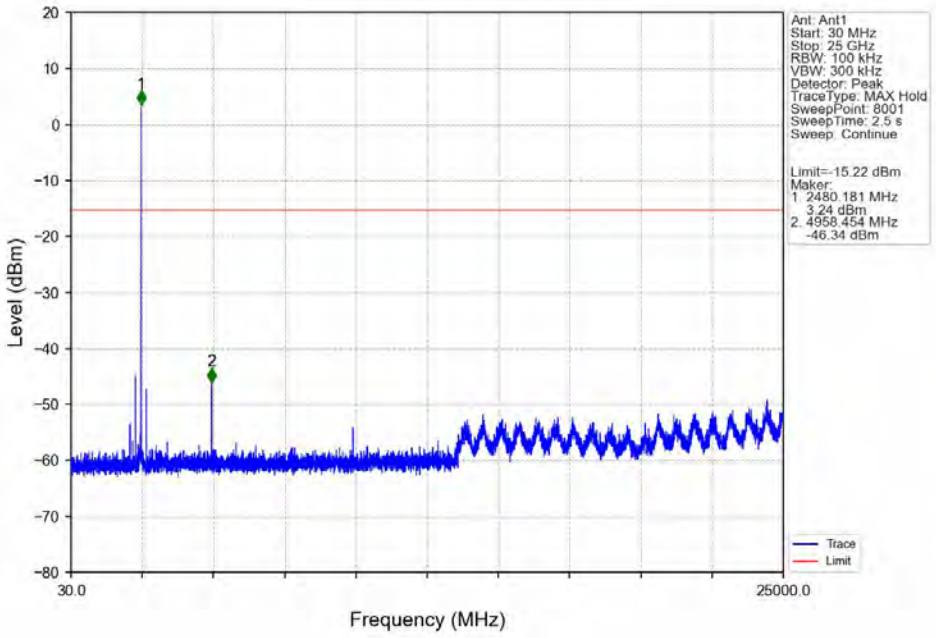
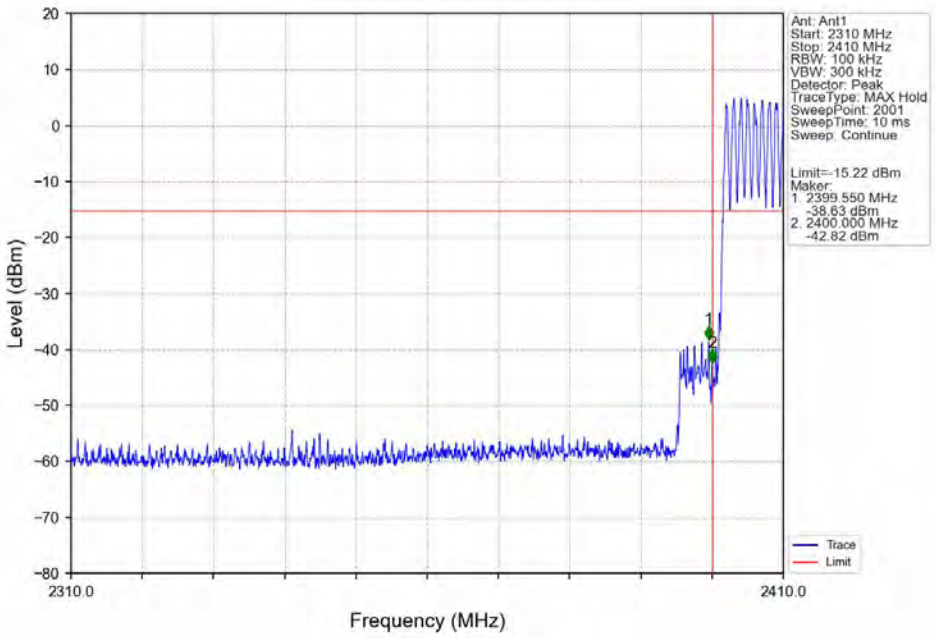
GFSK_DH5_HCH_2480MHz_Ant1_NTNV



GFSK_DH5_HOPP_Ant1_NTNV



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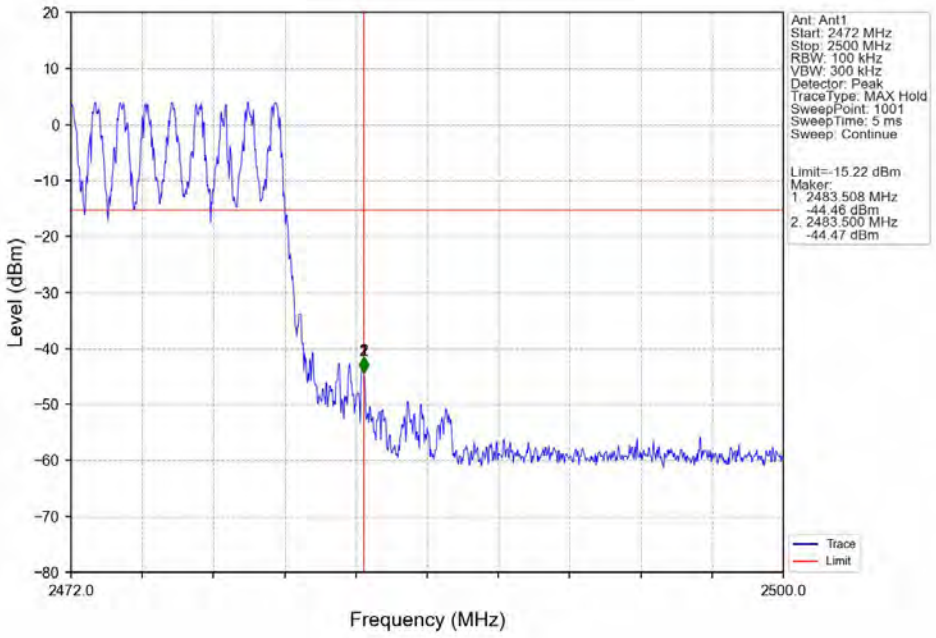
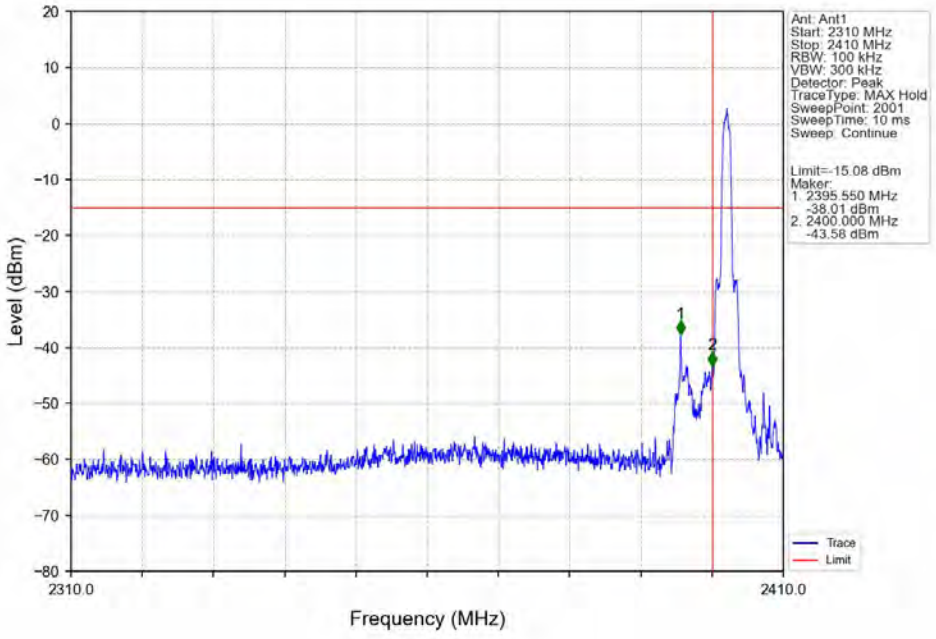
GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



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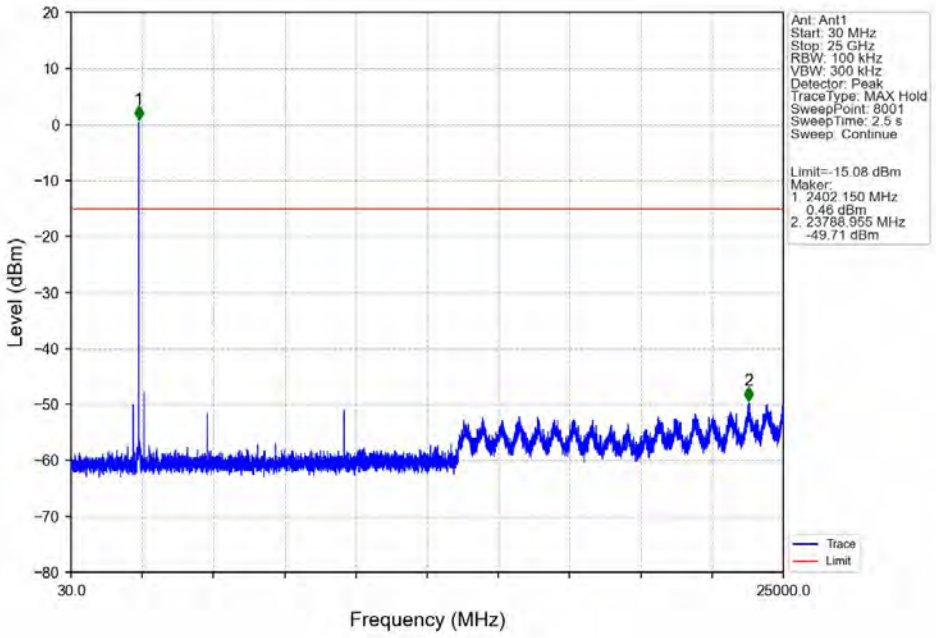
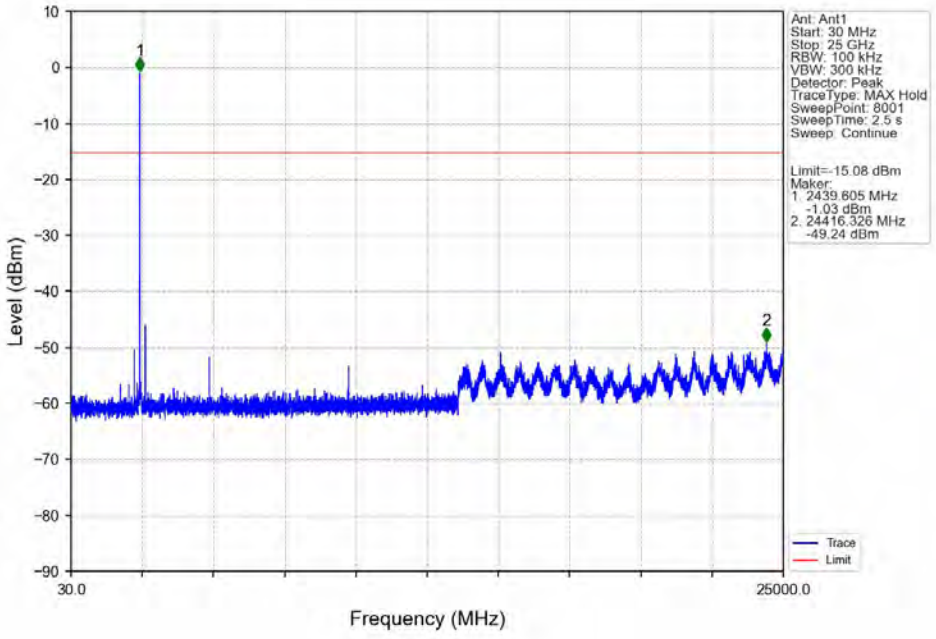
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



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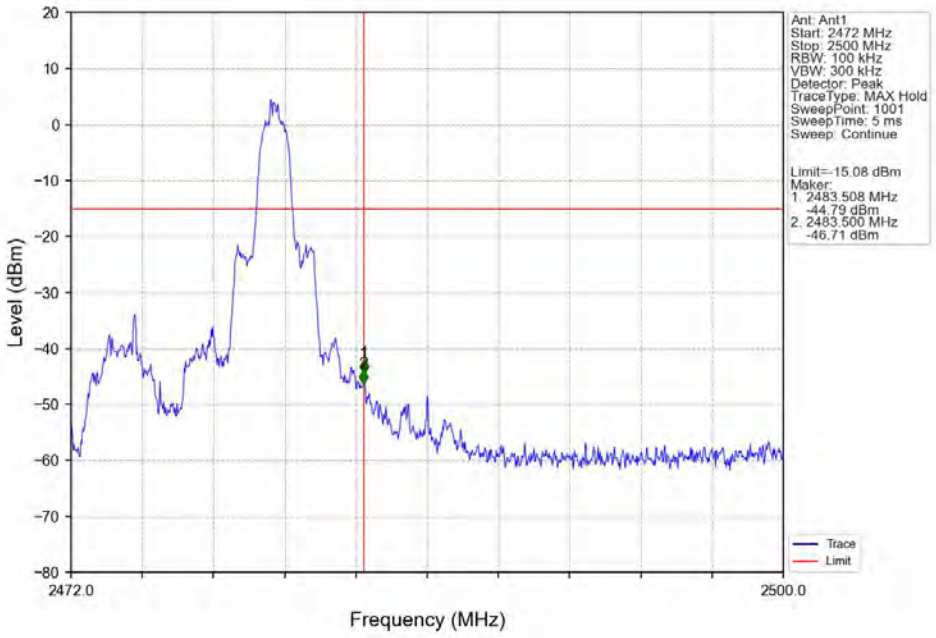
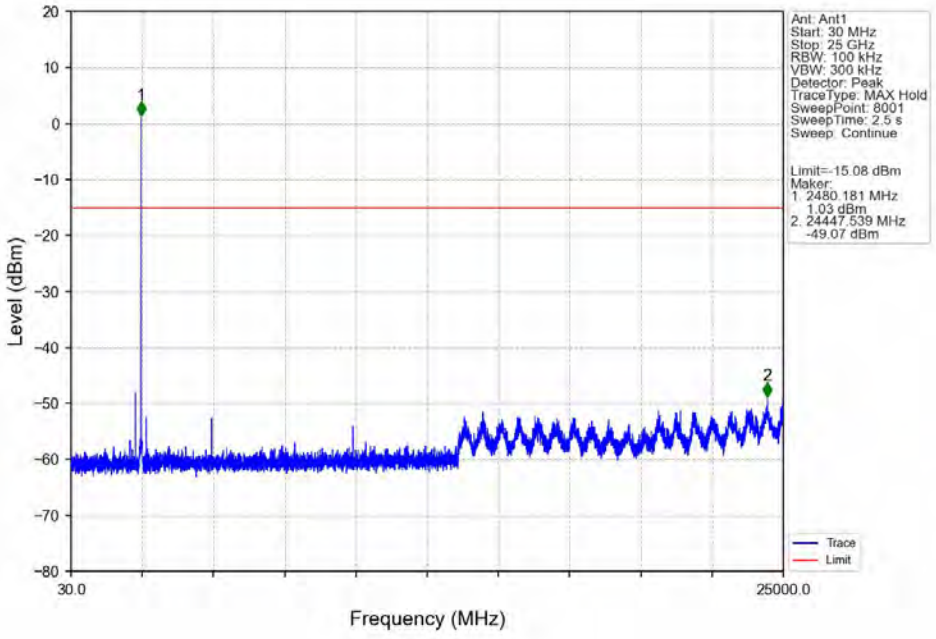
Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



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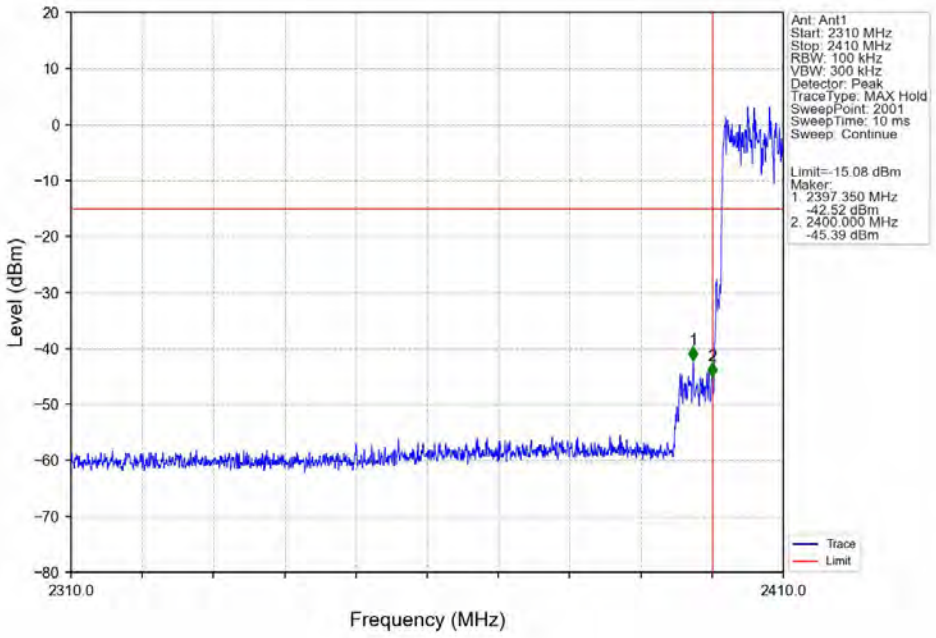
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV


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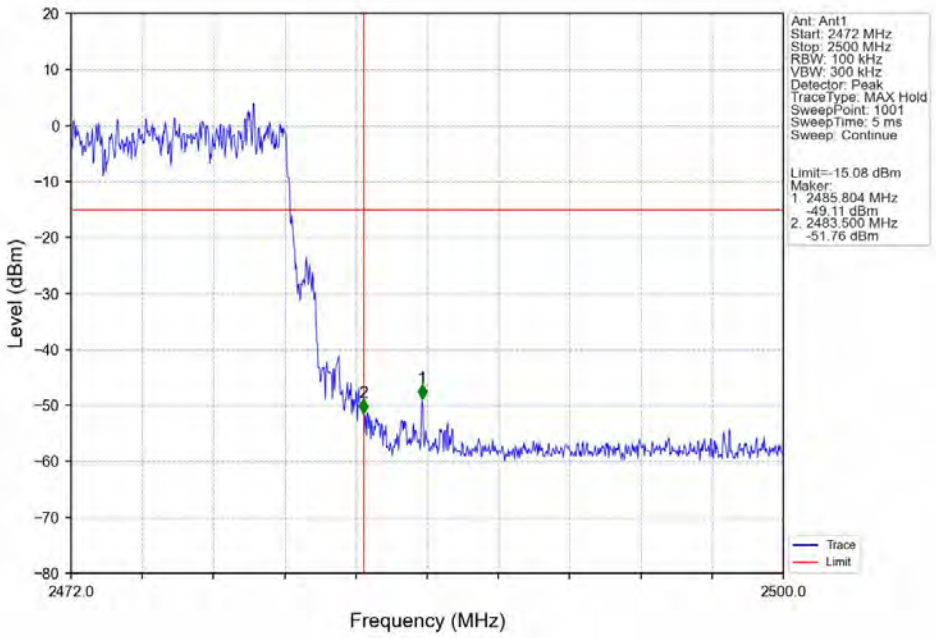

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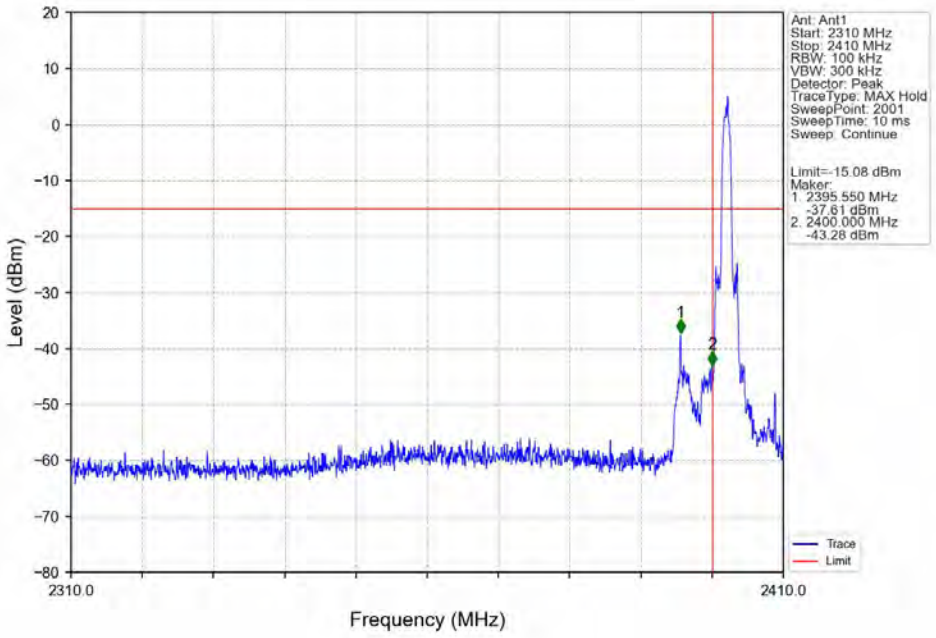
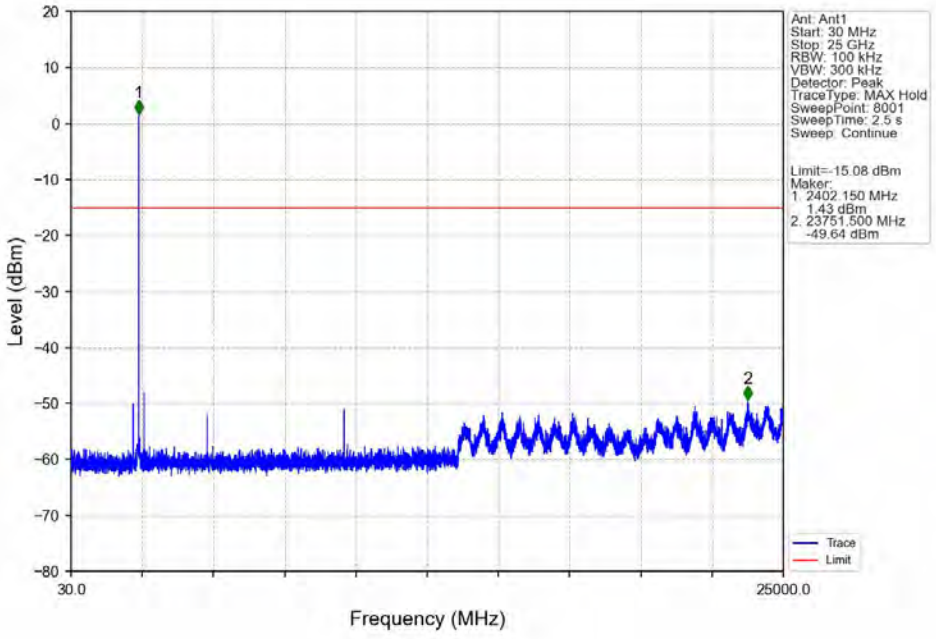
8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



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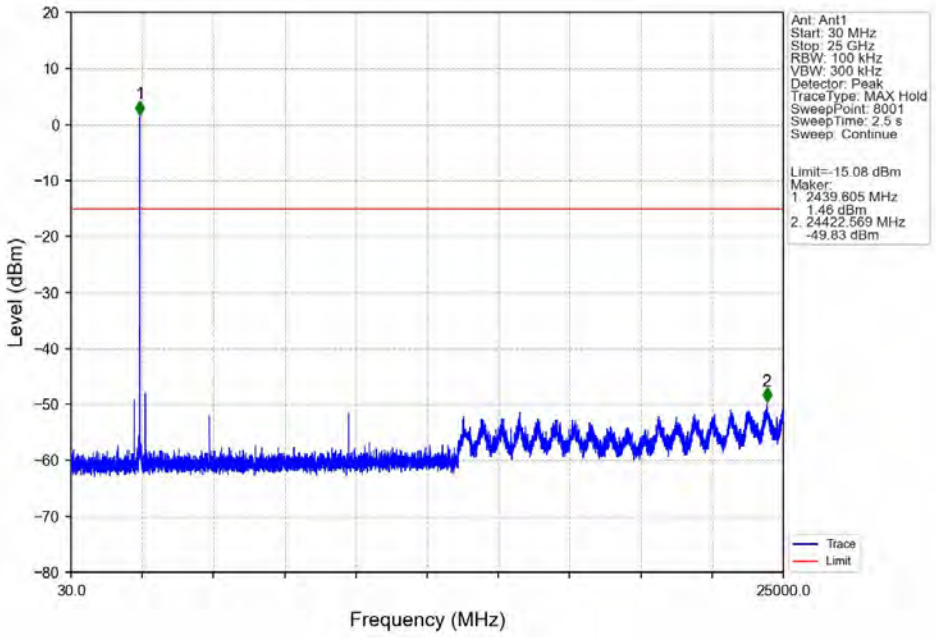
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV

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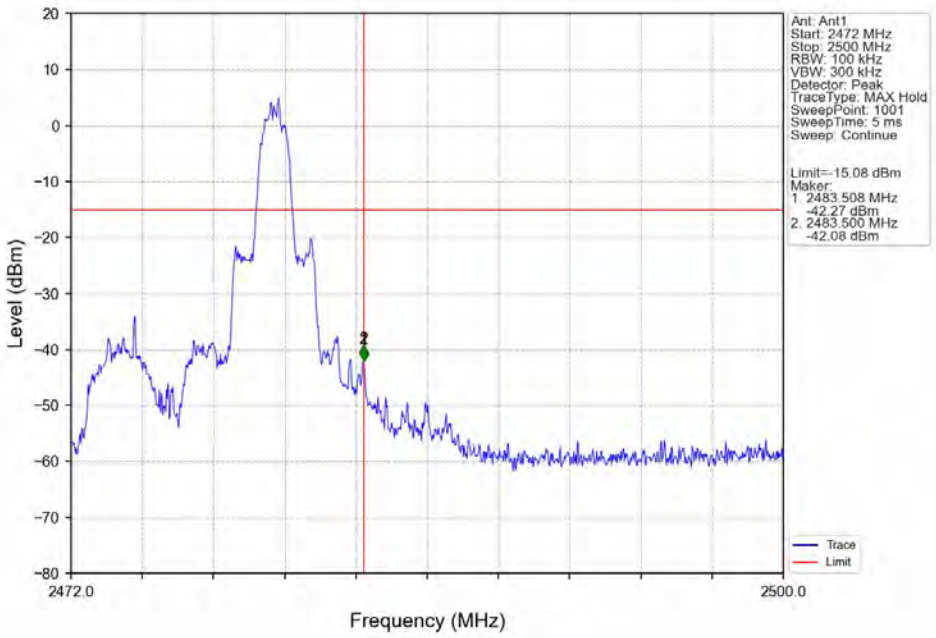

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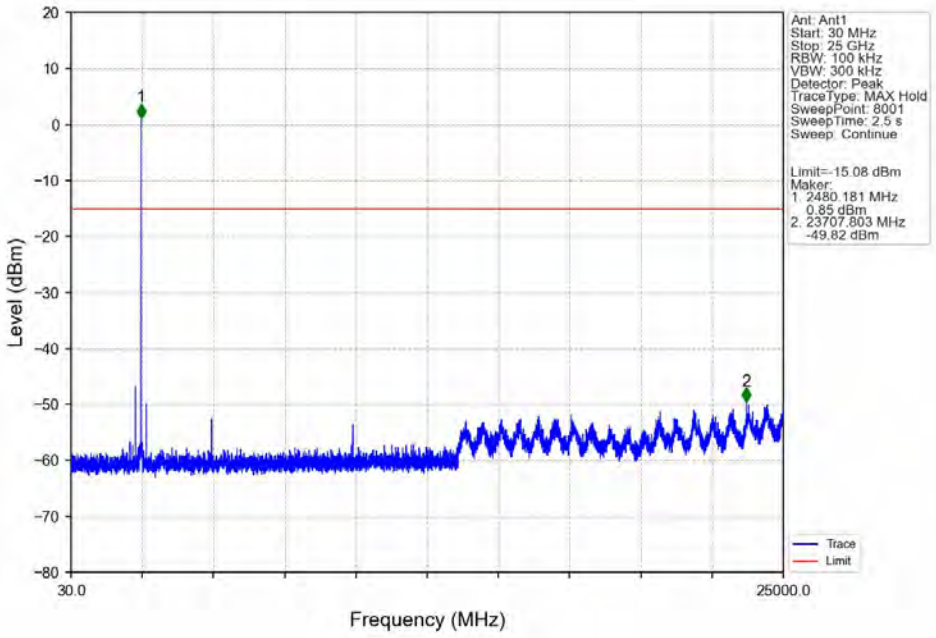
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV

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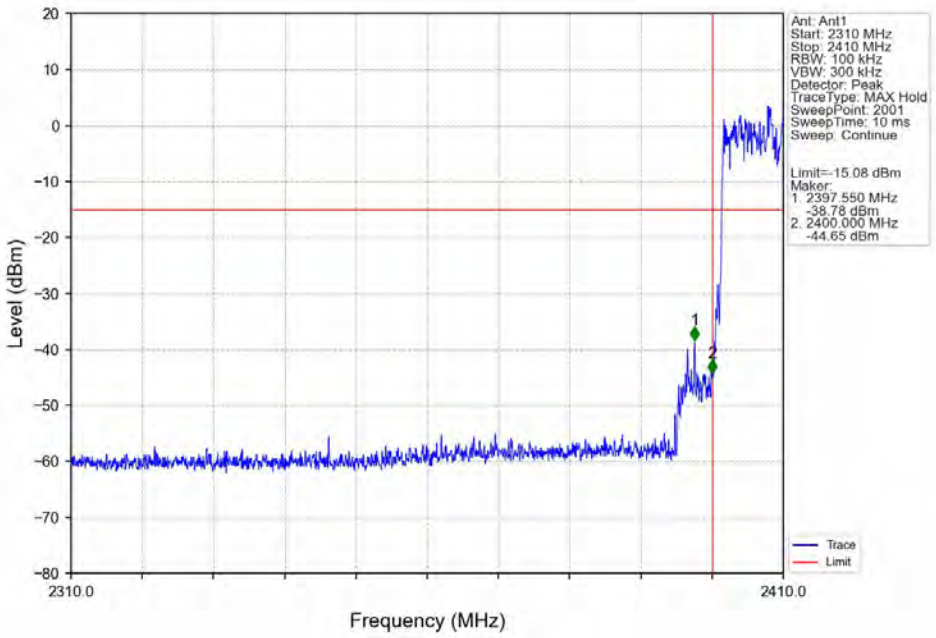

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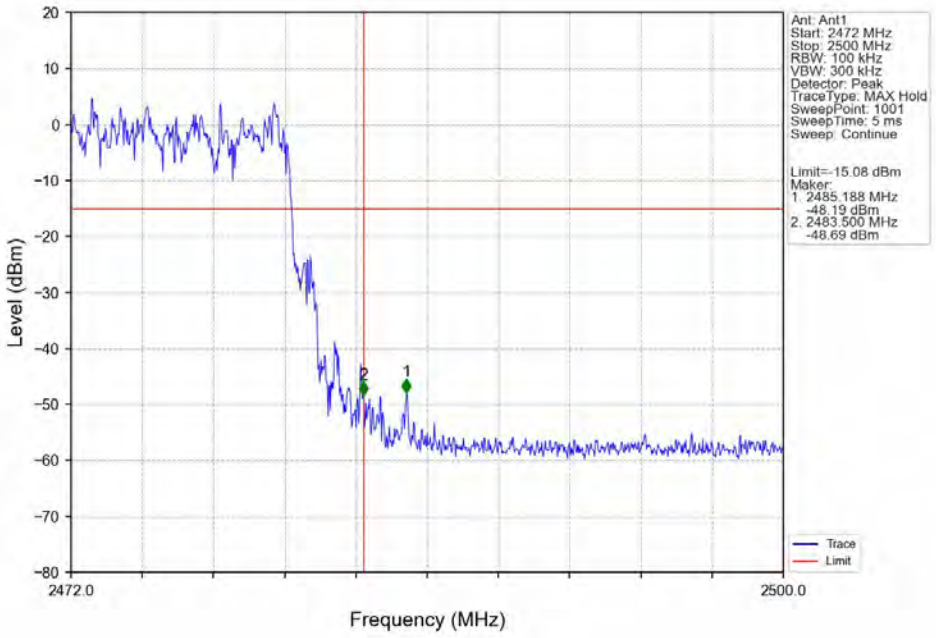
8DPSK_3DH5_HOPP_Ant1_NTNV



7. Form731

7.1 Test Result

7.1.1 Form731

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2402	2480	0.0034	5.26

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