

TEST REPORT

Application No.: FYCR2203000045AT
Applicant: Shenzhen Jimi IoT Co., Ltd.
Address of Applicant: 3-4/F, Block A, Building #7, Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China
Manufacturer: Shenzhen Jimi IoT Co., Ltd.
Address of Manufacturer: 3-4/F, Block A, Building #7, Shenzhen International Innovation Valley, Dashi 1st Road, Nanshan District, Shenzhen, Guangdong, China
Factory: Huizhou Xinsiwei Electronics Co., Ltd.
Address of Factory: Factory Buildings 1 and 2, Jimi Industrial Park, 101 Jinfu Road, Xiaojinkou Subdistrict, Huicheng District, Huizhou, Guangdong, China
Equipment Under Test (EUT):
EUT Name: 4G AI DashCam
Model No.: JC450, JC450 AFX, JC450 PRO, JC450 PRO AFX ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark: JIMI
FCC ID: 2AMLF-JC450AFX
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2022-03-31
Date of Test: 2022-04-03 to 2022-06-21
Date of Issue: 2022-06-23

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Winkey Wang
EMC Technical Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-06-23		Original

Authorized for issue by:				
		Tree Zhan		
		Tree Zhan/Project Engineer		
		Winkey Wang		
		Winkey Wang/Reviewer		



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence		N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth		ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation		ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number		ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time		ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass



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Declaration of EUT Family Grouping:

Model No.: JC450, JC450 AFX, JC450 PRO, JC450 PRO AFX

Only the model JC450 PRO AFX was final tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on following:

1. JC450 PRO and JC450 PRO AFX added one N5 RX chip in order to support 5cameras, the rest of the circuit is exactly the same as the JC450 and JC450 AFX.

2. Products to ship will depend on the inventory in either of the following ways:

A. JC450 and JC450 AFX to ship will have no N5 AHD receivers on their main boards and JC450 Pro and JC450 Pro AFX to ship will have N5 AHD receivers on their main boards

B. JC450, JC450 Pro, JC450 AFX, and JC450 Pro AFX to ship will all have N5 AHD receivers on their main boards, but the N5 AHD receiver function on JC450 and JC450 AFX will be shielded via software.

Remark:

Pre-scanning were performed at both JC450 AFX and JC450 PRO AFX, test data of JC450 PRO AFX is worse case, so in this report, only show the test data of JC450 PRO AFX.



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4 General Information

4.1 Details of E.U.T.

Power supply:	Input: DC 9V-33V Output: DC 5.4V
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V4.0 Classic
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Antenna Type:	PIFA Antenna
Antenna Gain:	2.23dBi declared by applicant

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
DC power supply	XANTREX	XFR 100-12	REF. No.SEA27A00

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	$\pm 0.8\text{dB}$
20dB Bandwidth	$\pm 0.3\%$
Carrier Frequencies Separation	$\pm 0.3\%$
Hopping Channel Number	$\pm 0.3\%$
Dwell Time	$\pm 0.3\%$
Conducted Band Edges Measurement	$\pm 2.7\text{dB}$
Conducted Spurious Emissions	$\pm 2.7\text{dB}$
Radiated Emissions which fall in the restricted bands	$\pm 4.4\text{dB}$ (Above 1GHz)
Radiated Spurious Emissions Below 1GHz	$\pm 3.1\text{dB}$ (Below 1GHz)
Radiated Spurious Emissions Above 1GHz	$\pm 4.4\text{dB}$ (Above 1GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results
 – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
 – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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4.4 Test Location

All tests were performed at:

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No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 6606.01)**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 6606.01.

- **FCC –Designation Number: CN1322**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

- **Innovation, Science and Economic Development Canada**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.

IC#: 28189.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A



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Carrier Frequencies Separation					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

Hopping Channel Number					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A



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Dwell Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A



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Conducted Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2021/7/13	2022/7/12
MXA Signal Analyzer	Agilent	N9020A	SEM004-20	2021/7/13	2022/7/12
Signal Generator	Agilent	N5173B	SEM006-05	2021/7/13	2022/7/12
ESG Vector Signal Generator	Agilent	E4438C	SEM006-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-15	2021/7/13	2022/7/12
Power Sensor	Erika Fiedler	U2021XA	SEM009-16	2021/7/13	2022/7/12
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	SEM010-08	2021/7/13	2022/7/12
Programmable DC Source	Chroma	62024P-80-60	SEM011-09	2021/7/13	2022/7/12
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2021/7/13	2022/7/12
Measurement software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Trilog-Broadband Antenna(25MHz-2GHz)	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna(150MHz-1GHz)	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna(9kHz-30MHz)	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver(20Hz-8.4GHz)	Agilent	N9038A	SEM004-05	2021/7/13	2022/7/12
Pre-amplifier (0.1-1.3GHz)	HP	8447D	SEM005-02	2021/7/13	2022/7/12
Broad-Band Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna (1-18GHz)	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer(20Hz-43GHz)	Rohde & Schwarz	101288	SEM004-08	2021/7/13	2022/7/12
Low Noise Amplifier(100MHz-	CLAVIIO	BDLNA-0118-352810	SEM005-05	2021/7/13	2022/7/12



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Compliance Certification Services (Kunshan) Inc.
Shenzhen Branch

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18GHz)					
Pre-amplifier(26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2021/7/13	2022/7/12
Pre-amplifier(18GHz-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2021/7/13	2022/7/12
Measurement software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

Radiated Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Trilog-Broadband Antenna(25MHz-2GHz)	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna(150MHz-1GHz)	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna(9kHz-30MHz)	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver(20Hz-8.4GHz)	Agilent	N9038A	SEM004-05	2021/7/13	2022/7/12
Pre-amplifier (0.1-1.3GHz)	HP	8447D	SEM005-02	2021/7/13	2022/7/12
Broad-Band Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna (1-18GHz)	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer(20Hz-43GHz)	Rohde & Schwarz	101288	SEM004-08	2021/7/13	2022/7/12
Low Noise Amplifier(100MHz-18GHz)	CLAVIO	BDLNA-0118-352810	SEM005-05	2021/7/13	2022/7/12
Pre-amplifier(26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2021/7/13	2022/7/12
Pre-amplifier(18GHz-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2021/7/13	2022/7/12
Measurement software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A



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Radiated Spurious Emissions Above 1GHz					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Trilog-Broadband Antenna(25MHz-2GHz)	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna(150MHz-1GHz)	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna(9kHz-30MHz)	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver(20Hz-8.4GHz)	Agilent	N9038A	SEM004-05	2021/7/13	2022/7/12
Pre-amplifier (0.1-1.3GHz)	HP	8447D	SEM005-02	2021/7/13	2022/7/12
Broad-Band Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna (1-18GHz)	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer(20Hz-43GHz)	Rohde & Schwarz	101288	SEM004-08	2021/7/13	2022/7/12
Low Noise Amplifier(100MHz-18GHz)	CLAVIO	BDLNA-0118-352810	SEM005-05	2021/7/13	2022/7/12
Pre-amplifier(26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2021/7/13	2022/7/12
Pre-amplifier(18GHz-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2021/7/13	2022/7/12
Measurement software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-22	2021-07-13	2022-07-12
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-23	2021-07-13	2022-07-12
Barometer	DUMAI	DYM3	SEM002-24	2021-07-13	2022-07-12



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.23dBi

Antenna location: Refer to Internal photos.



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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: $2^9 - 1 = 511$ bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.



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Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C Humidity: 58.5 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

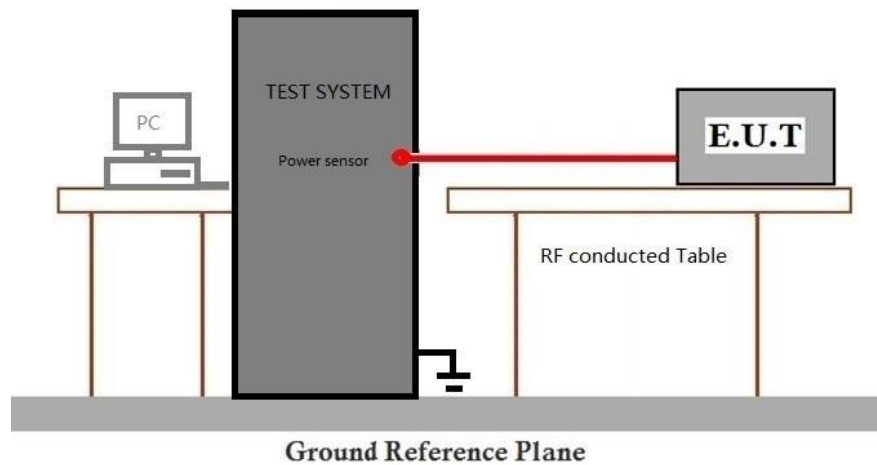


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7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details



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7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.7

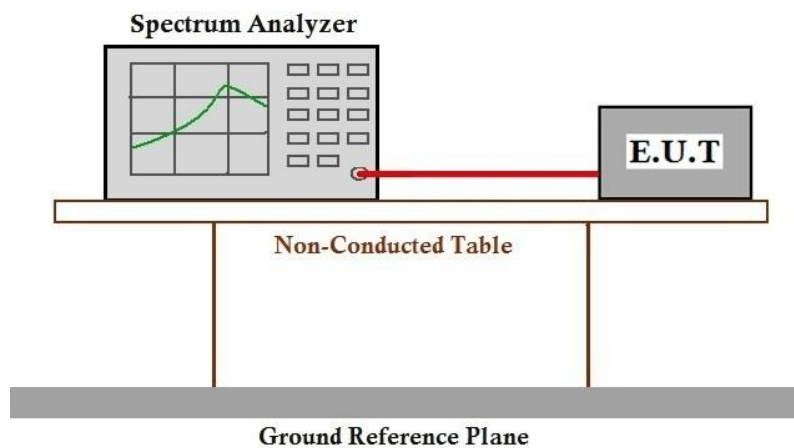
7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 25.5 °C Humidity: 58.5 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.3 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)

Test Method: ANSI C63.10 (2013) Section 7.8.2

Limit:

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.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

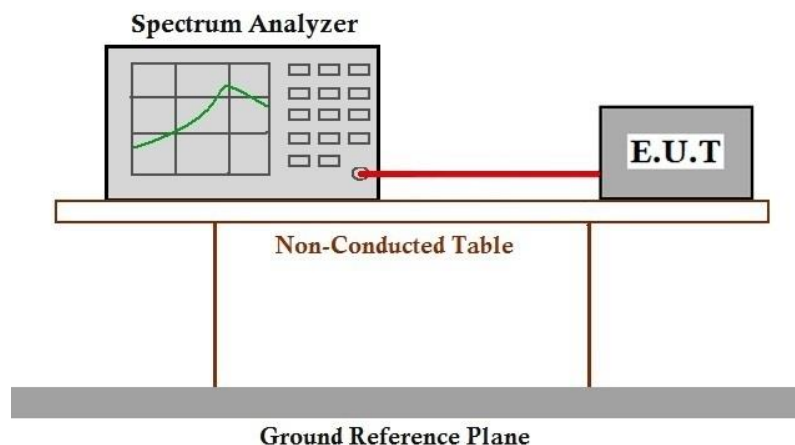
Humidity: 58.5 % RH

Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.4 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.3

Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

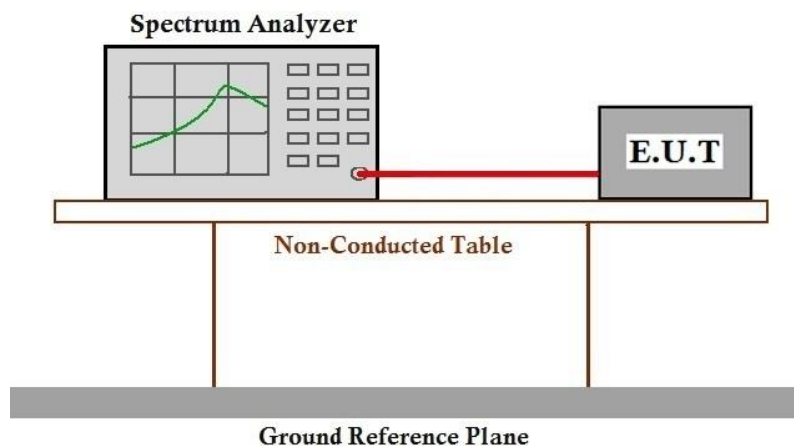
Humidity: 58.5 % RH

Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.4.3 Test Setup Diagram



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7.4.4 Measurement Procedure and Data

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7.5 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)

Test Method: ANSI C63.10 (2013) Section 7.8.4

Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 58.5 % RH

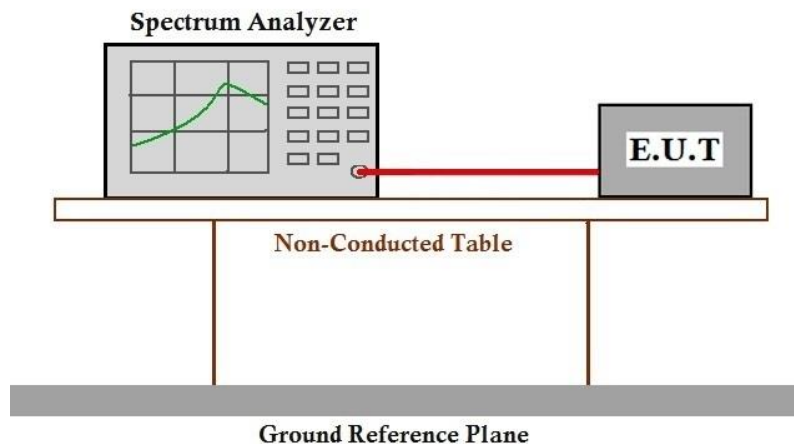
Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	

Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
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7.5.3 Test Setup Diagram



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7.5.4 Measurement Procedure and Data

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7.6 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 7.8.6

Limit:

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. 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)).

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C Humidity: 58.5 % RH Atmospheric Pressure: 1020 mbar

7.6.2 Test Mode Description

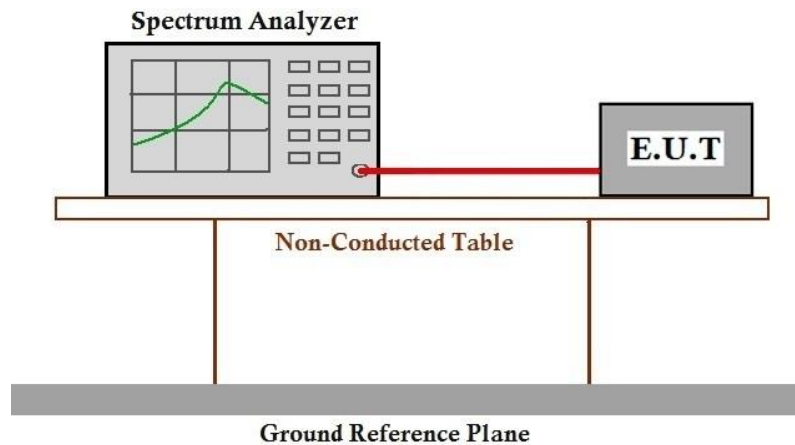
Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	01	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.



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7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.7 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 7.8.8

Limit:

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. 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)).

7.7.1 E.U.T. Operation

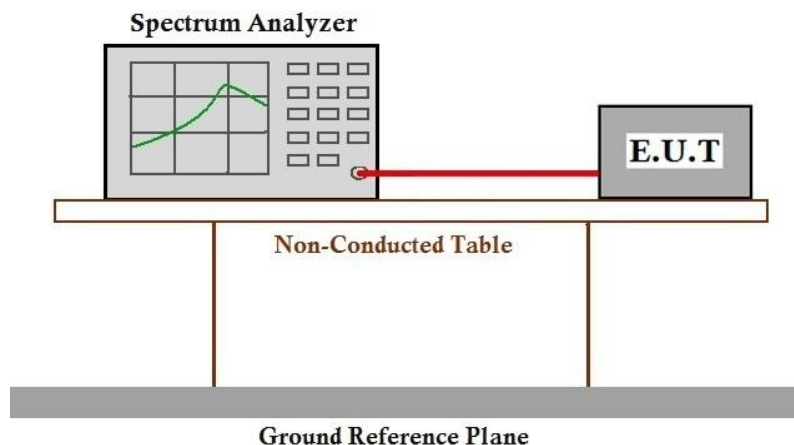
Operating Environment:

Temperature: 25.5 °C Humidity: 58.5 % RH Atmospheric Pressure: 1020 mbar

7.7.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.7.3 Test Setup Diagram



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7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.8 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 58.5 % RH

Atmospheric Pressure: 1020 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

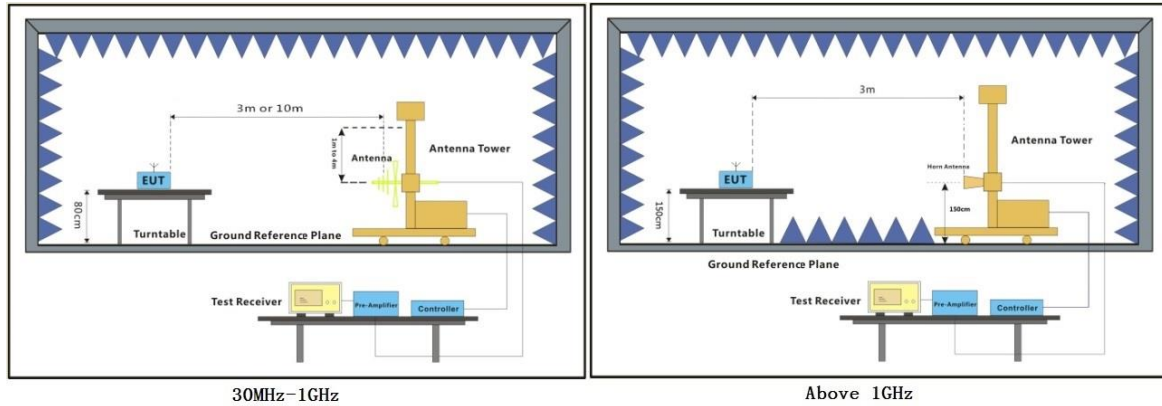


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7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

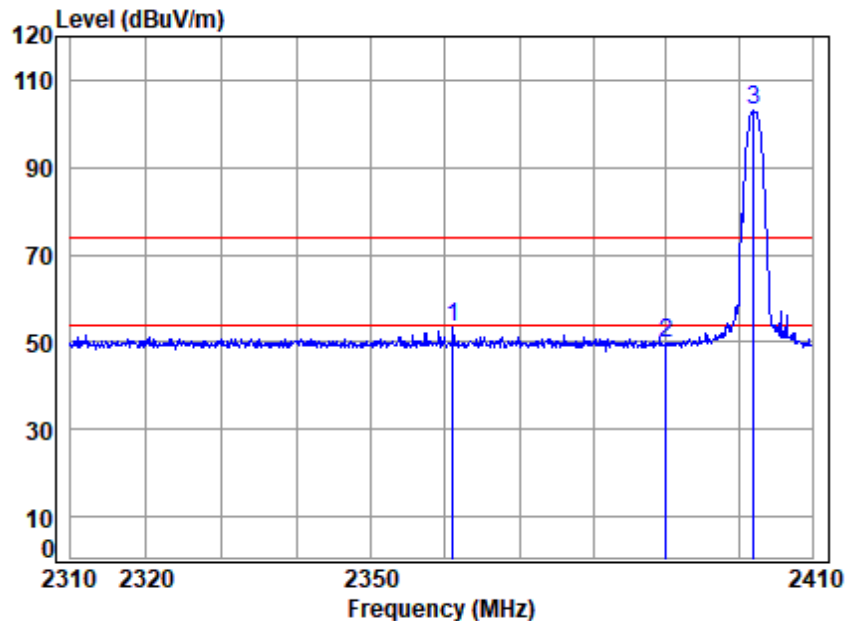
Remark3: For WLAN radiated test, according to the conducted power and verify test the SISO & MIMO mode, the worst-case is SISO mode for 802.11b/g, MIMO mode for 802.11n, therefore, all final test are performed in SISO & MIMO mode and reported.



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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00045AT
Mode : 2402 Band edge
Note : BT

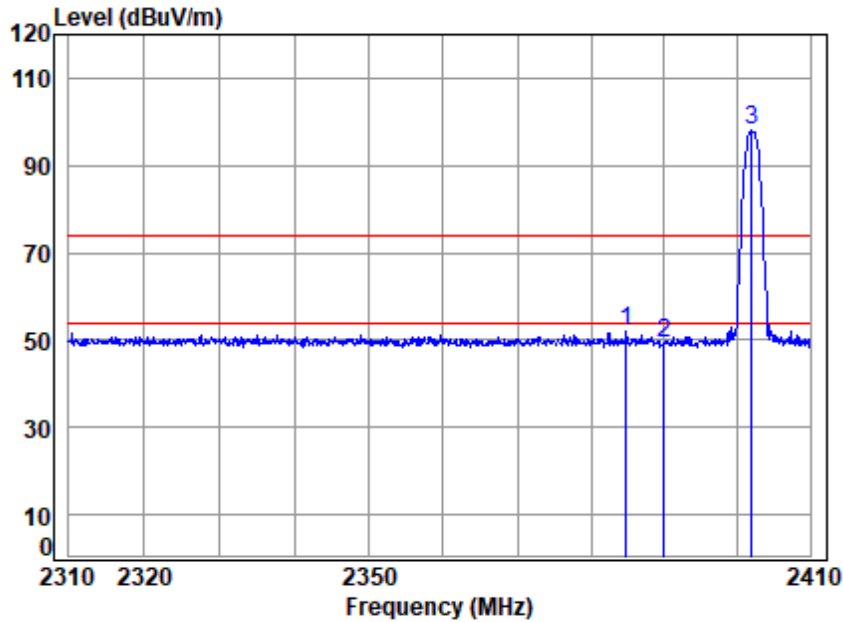
		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2361.0710	5.03	27.09	46.50	67.64	53.26	74.00	-20.74	Peak
2	2390.0000	5.05	27.16	46.52	63.89	49.58	74.00	-24.42	peak
3	2402.0000	5.06	27.18	46.53	117.26	102.97	74.00	28.97	peak



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00045AT
Mode : 2402 Band edge
Note : BT

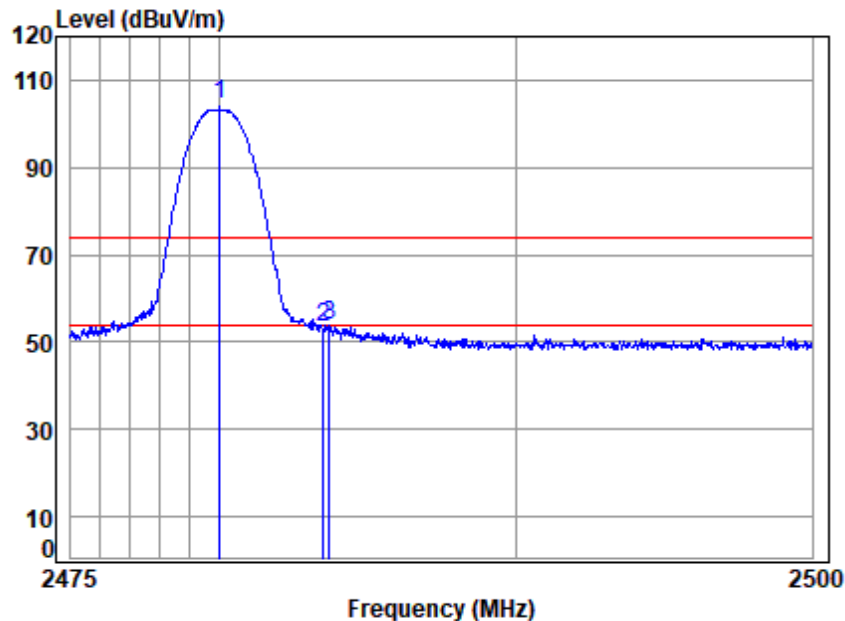
		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2384.8030	5.05	27.15	46.52	66.47	52.15	74.00	-21.85	peak
2	2390.0000	5.05	27.16	46.52	63.60	49.29	74.00	-24.71	peak
3	2402.0000	5.06	27.18	46.53	112.17	97.88	74.00	23.88	peak



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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00045AT
Mode : 2480 Band edge
Note : BT

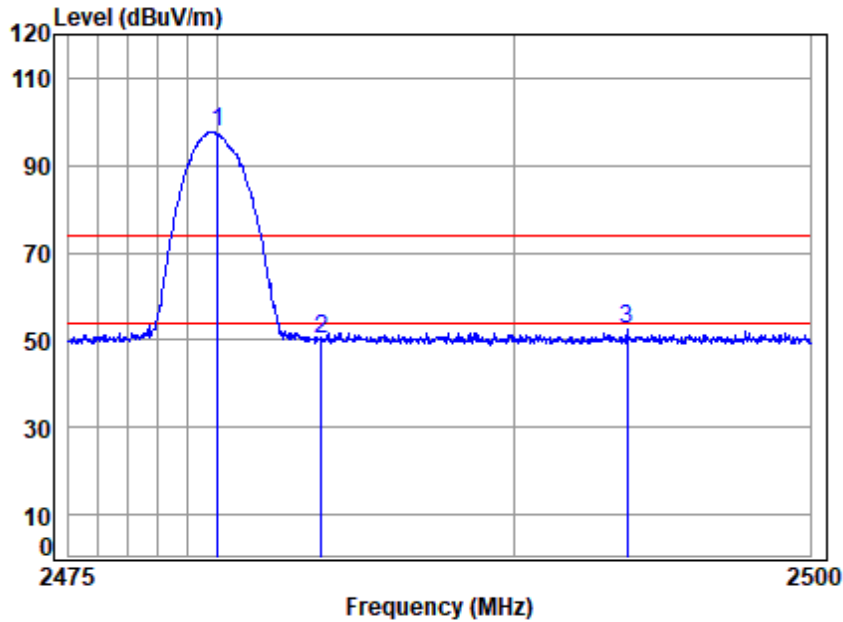
		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.0000	5.12	27.36	46.57	118.40	104.31	74.00	30.31	peak
2	2483.5000	5.12	27.36	46.57	67.53	53.44	74.00	-20.56	peak
3	2483.6970	5.12	27.36	46.57	67.90	53.81	74.00	-20.19	Peak



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: High



Site : chamber
Condition: 3m VERTICAL
Job No : 00045AT
Mode : 2480 Band edge
Note : BT

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.0000	5.12	27.36	46.57	111.81	97.72	74.00	23.72	peak
2	2483.5000	5.12	27.36	46.57	64.40	50.31	74.00	-23.69	peak
3	2493.8020	5.13	27.39	46.57	66.68	52.63	74.00	-21.37	peak



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7.9 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Measurement Distance: 3m

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
960-1000	500	3

7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 21.6 °C

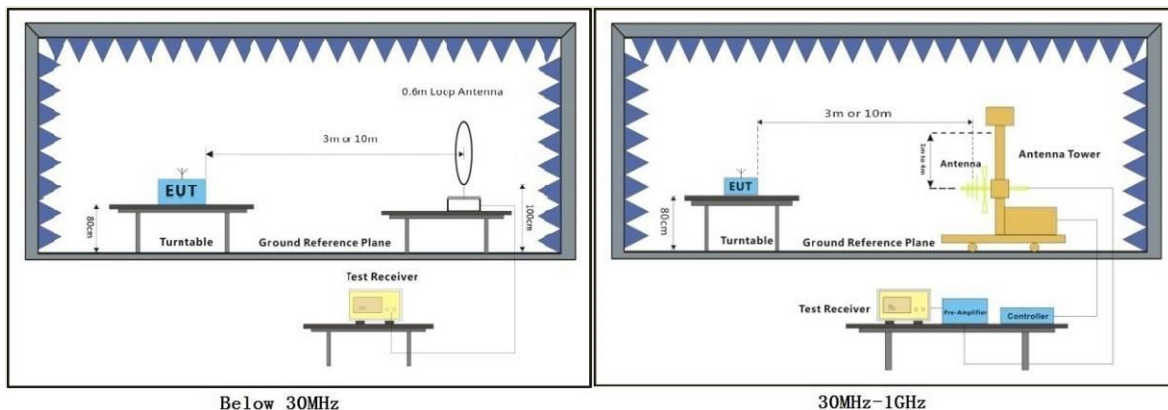
Humidity: 52.3 % RH

Atmospheric Pressure: 1020 mbar

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.9.3 Test Setup Diagram



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7.9.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

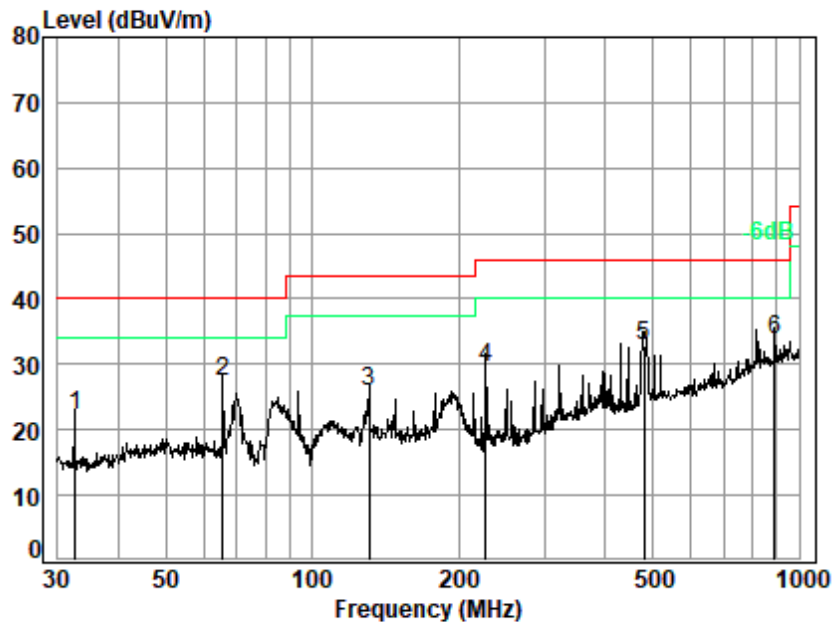
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00045AT
Mode : 00

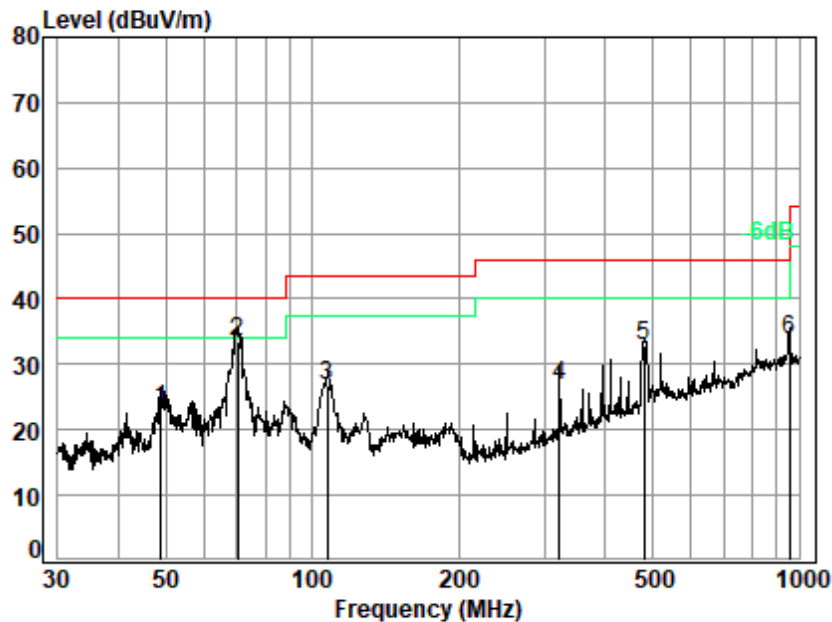
	Freq	Cable	Ant	Preamp	Read	Limit	Over	
		Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	32.520	0.19	15.21	25.90	32.61	22.11	40.00	-17.89 QP
2	65.573	0.25	16.51	25.84	36.42	27.34	40.00	-12.66 QP
3	130.837	0.92	16.69	25.63	33.74	25.72	43.50	-17.78 QP
4	226.894	0.77	15.98	25.28	38.09	29.56	46.00	-16.44 QP
5	480.528	1.42	22.16	26.26	35.62	32.94	46.00	-13.06 QP
6 p	890.728	2.40	28.07	26.41	29.59	33.65	46.00	-12.35 QP



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00045AT
Mode : 00

	Freq	Cable	Ant	Preamp	Read	Limit	Over	
		Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	48.843	0.22	17.32	25.86	31.34	23.02	40.00	-16.98 QP
2	70.337	0.30	15.83	25.83	43.19	33.49	40.00	-6.51 QP
3	107.510	0.88	15.21	25.75	36.42	26.76	43.50	-16.74 QP
4	322.189	1.24	19.32	25.28	31.64	26.92	46.00	-19.08 QP
5	480.528	1.42	22.16	26.26	35.50	32.82	46.00	-13.18 QP
6	955.438	2.13	29.30	26.28	28.55	33.70	46.00	-12.30 QP



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7.10 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

7.10.1 E.U.T. Operation

Operating Environment:

Temperature: 21.6 °C

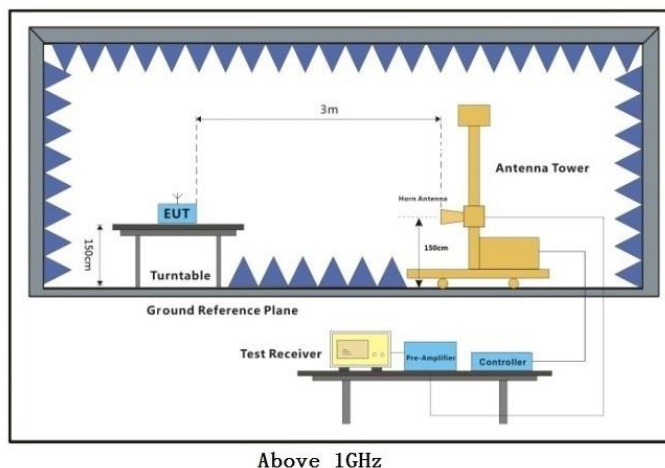
Humidity: 52.3 % RH

Atmospheric Pressure: 1020 mbar

7.10.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX_non-Hop mode Keep the EUT in continuously transmitting mode with GFSK modulation, Pi/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.10.3 Test Setup Diagram



Above 1GHz



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Shenzhen Branch

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7.10.4 Measurement Procedure and Data

- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- Repeat above procedures until all frequencies measured was complete.

Remark:

- Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- For WLAN radiated test, according to the conducted power and verify test the SISO & MIMO mode, the worst-case is SISO mode for 802.11b/g, MIMO mode for 802.11n, therefore, all final test are performed in SISO & MIMO mode and reported.

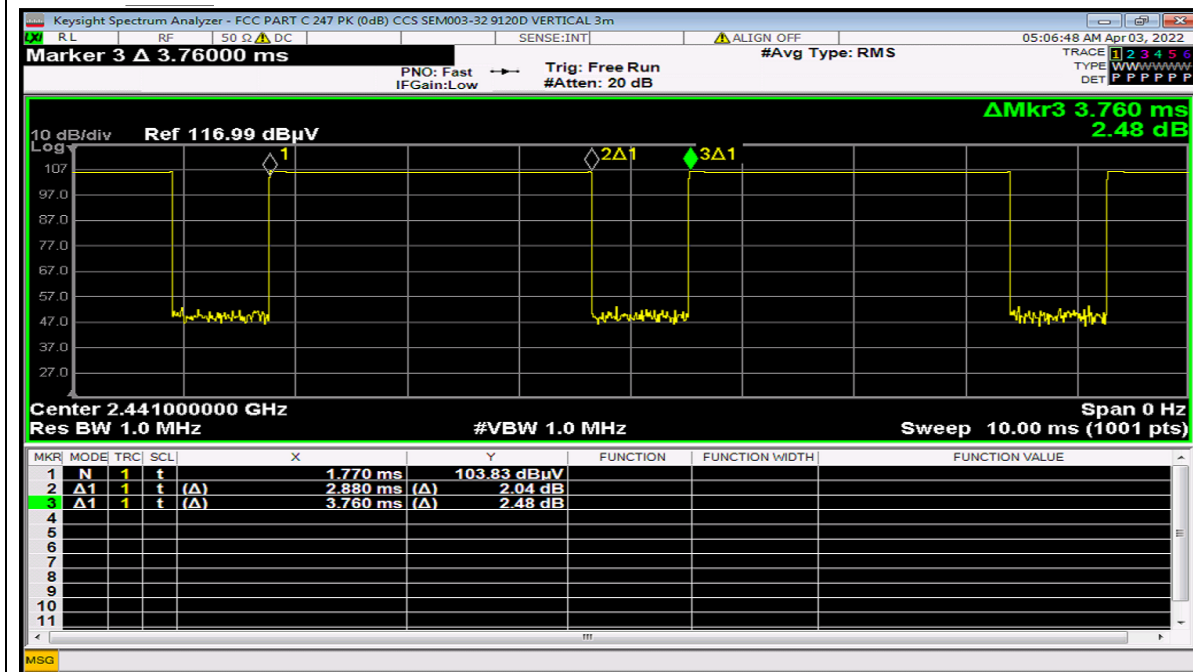
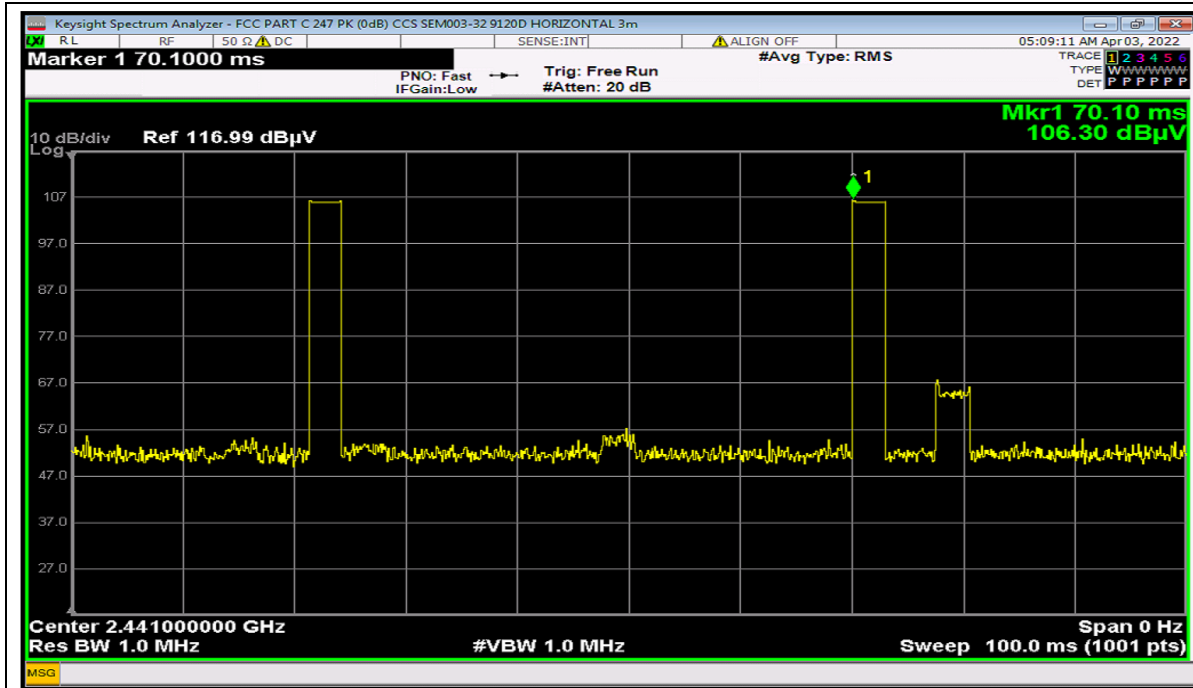
Average value:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =5.76ms
	T period =100ms
	PCDF value= -24.79dB

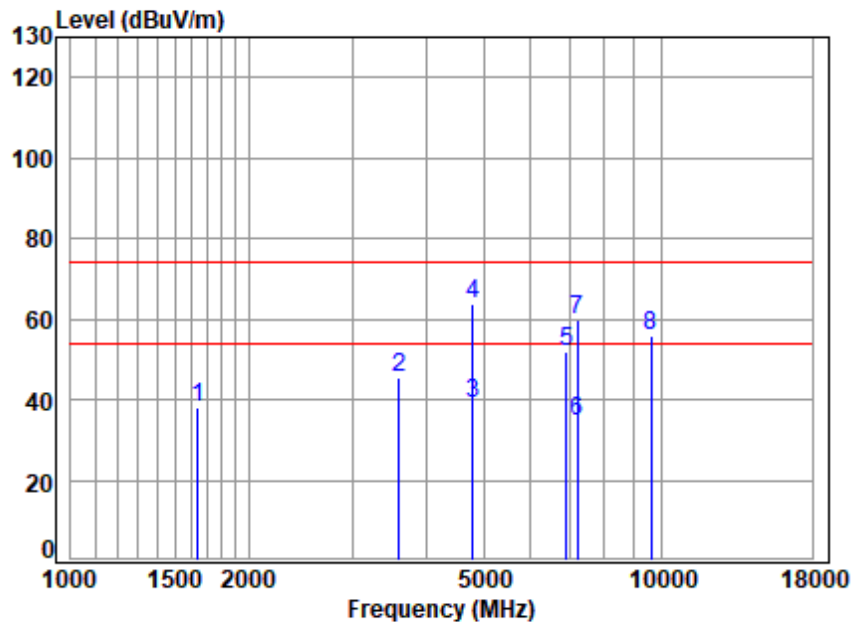


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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00045AT
Mode : 2402 TX RSE
Note : BT

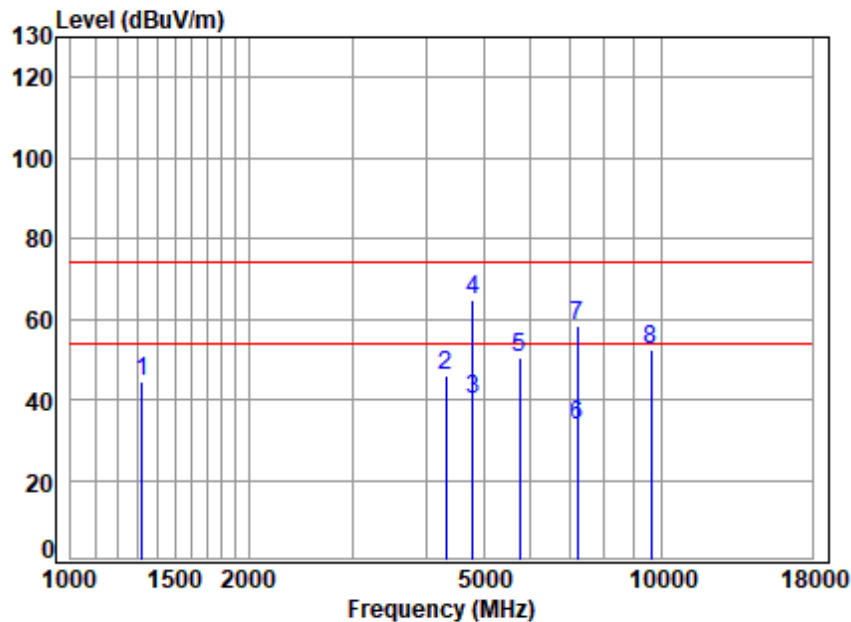
	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1644.019	4.08	24.89	46.38	55.37	37.96	74.00	-36.04	peak
2	3598.203	7.09	28.87	46.17	55.74	45.53	74.00	-28.47	peak
3 a	4804.000	7.98	30.94	46.78	46.67	38.81	54.00	-15.19	Average
4 p	4804.000	7.98	30.94	46.78	71.46	63.60	74.00	-10.40	peak
5	6894.806	8.09	35.55	46.68	54.97	51.93	74.00	-22.07	peak
6	7206.000	8.29	36.05	46.50	36.96	34.80	54.00	-19.20	Average
7	7206.000	8.29	36.05	46.50	61.75	59.59	74.00	-14.41	peak
8	9608.000	11.41	37.53	47.13	53.80	55.61	74.00	-18.39	peak



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00045AT
Mode : 2402 TX RSE
Note : BT

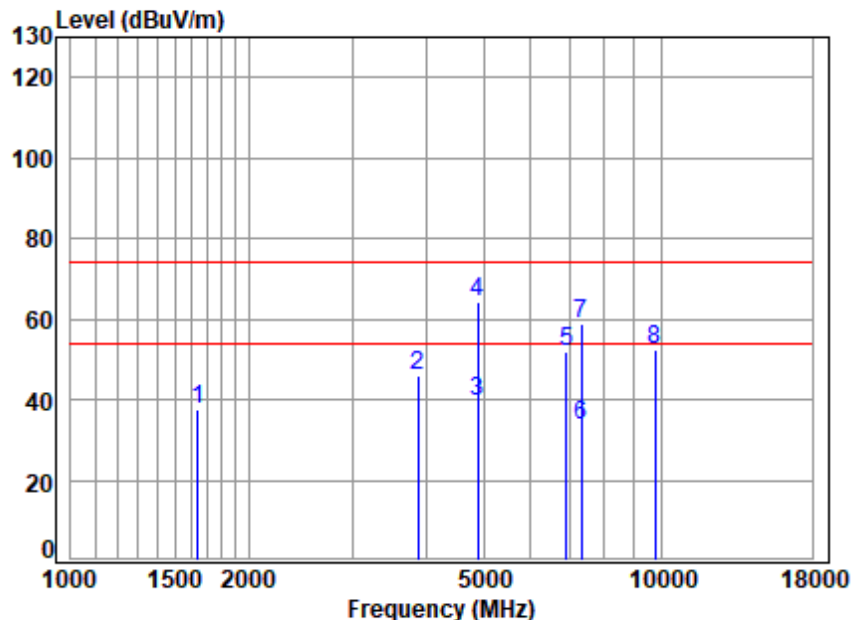
	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1319.794	3.41	24.24	46.48	63.35	44.52	74.00	-29.48	peak
2	4316.859	7.48	29.95	46.21	54.51	45.73	74.00	-28.27	peak
3	a 4804.000	7.98	30.94	46.78	48.06	40.20	54.00	-13.80	Average
4	p 4804.000	7.98	30.94	46.78	72.85	64.99	74.00	-9.01	peak
5	5763.617	7.93	32.49	46.61	56.50	50.31	74.00	-23.69	peak
6	7206.000	8.29	36.05	46.50	35.74	33.58	54.00	-20.42	Average
7	7206.000	8.29	36.05	46.50	60.53	58.37	74.00	-15.63	peak
8	9608.000	11.41	37.53	47.13	50.45	52.26	74.00	-21.74	peak



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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00045AT
Mode : 2441 TX RSE
Note : BT

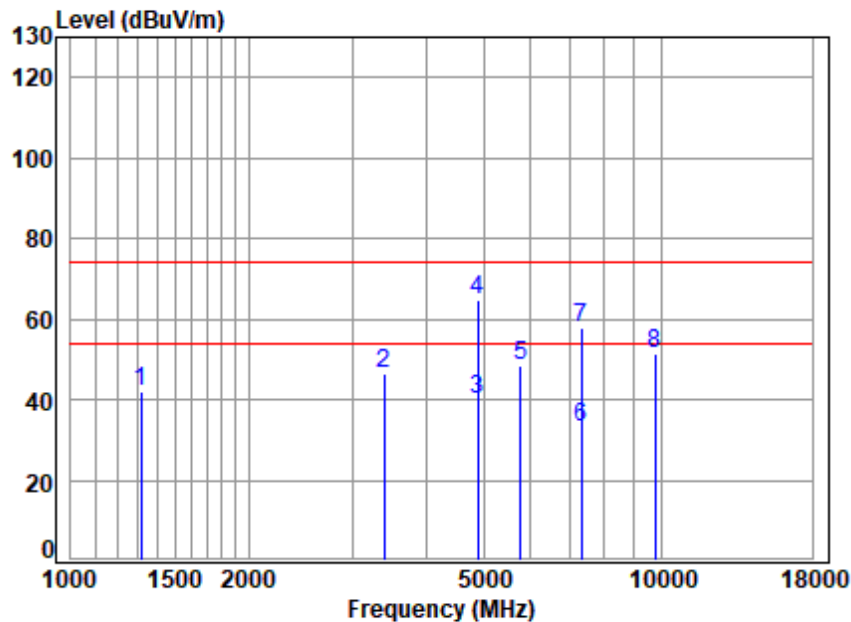
	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1639.274	4.07	24.88	46.39	55.16	37.72	74.00	-36.28	peak
2	3879.027	7.38	29.32	45.91	55.01	45.80	74.00	-28.20	peak
3 a	4882.000	8.11	31.13	46.87	47.17	39.54	54.00	-14.46	Average
4 p	4882.000	8.11	31.13	46.87	71.96	64.33	74.00	-9.67	peak
5	6894.806	8.09	35.55	46.68	54.99	51.95	74.00	-22.05	peak
6	7323.000	8.35	36.19	46.40	35.69	33.83	54.00	-20.17	Average
7	7323.000	8.35	36.19	46.40	60.48	58.62	74.00	-15.38	peak
8	9764.000	11.29	37.88	47.24	50.27	52.20	74.00	-21.80	peak



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: middle



Site : chamber
Condition: 3m VERTICAL
Job No : 00045AT
Mode : 2441 TX RSE
Note : BT

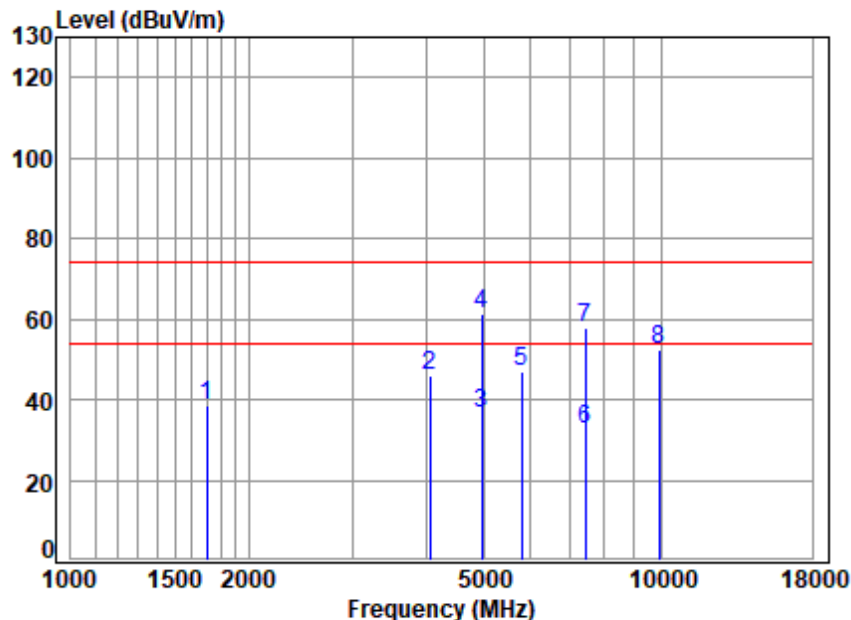
	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1315.985	3.41	24.24	46.48	60.79	41.96	74.00	-32.04	peak
2	3396.098	6.74	28.68	46.37	57.21	46.26	74.00	-27.74	peak
3 a	4882.000	8.11	31.13	46.87	47.83	40.20	54.00	-13.80	Average
4 p	4882.000	8.11	31.13	46.87	72.62	64.99	74.00	-9.01	peak
5	5780.300	7.91	32.49	46.60	54.82	48.62	74.00	-25.38	peak
6	7323.000	8.35	36.19	46.40	34.73	32.87	54.00	-21.13	Average
7	7323.000	8.35	36.19	46.40	59.52	57.66	74.00	-16.34	peak
8	9764.000	11.29	37.88	47.24	49.65	51.58	74.00	-22.42	peak



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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00045AT
Mode : 2480 TX RSE
Note : BT

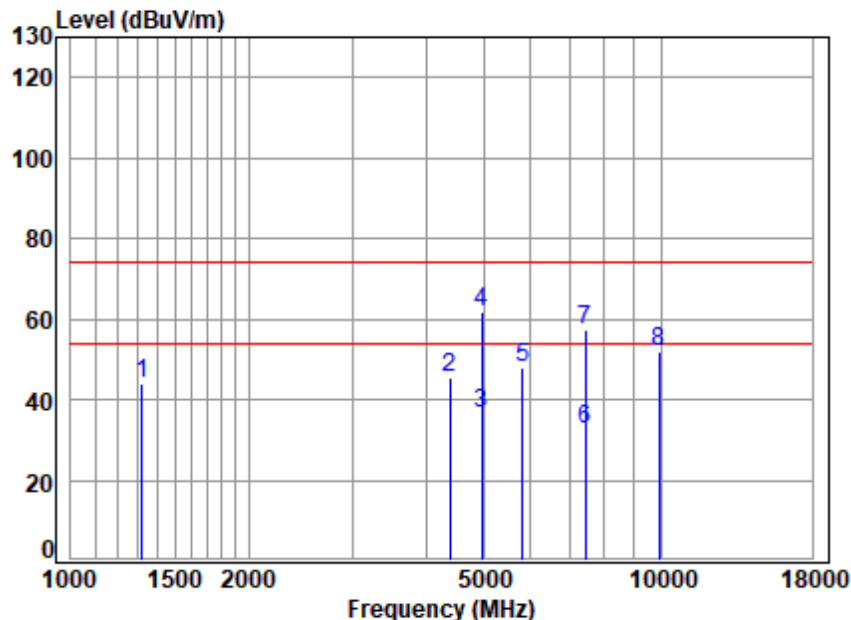
	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1697.129	4.19	25.00	46.37	55.69	38.51	74.00	-35.49	peak
2	4050.904	7.49	29.58	45.87	54.99	46.19	74.00	-27.81	peak
3 a	4960.000	8.24	31.31	46.96	44.14	36.73	54.00	-17.27	Average
4 p	4960.000	8.24	31.31	46.96	68.93	61.52	74.00	-12.48	peak
5	5797.032	7.89	32.48	46.59	53.11	46.89	74.00	-27.11	peak
6	7440.000	8.40	36.33	46.29	34.40	32.84	54.00	-21.16	Average
7	7440.000	8.40	36.33	46.29	59.39	57.83	74.00	-16.17	peak
8	9920.000	11.18	38.22	47.35	50.14	52.19	74.00	-21.81	peak



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: High



Site : chamber
Condition: 3m VERTICAL
Job No : 00045AT
Mode : 2480 TX RSE
Note : BT

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1319.794	3.41	24.24	46.48	62.79	43.96	74.00	-30.04	peak
2	4379.699	7.47	30.04	46.29	54.35	45.57	74.00	-28.43	peak
3 a	4960.000	8.24	31.31	46.96	44.17	36.76	54.00	-17.24	Average
4 p	4960.000	8.24	31.31	46.96	68.96	61.55	74.00	-12.45	peak
5	5813.812	7.87	32.47	46.59	54.29	48.04	74.00	-25.96	peak
6	7440.000	8.40	36.33	46.29	34.34	32.78	54.00	-21.22	Average
7	7440.000	8.40	36.33	46.29	59.13	57.57	74.00	-16.43	peak
8	9920.000	11.18	38.22	47.35	50.04	52.09	74.00	-21.91	peak



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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for FYCR2203000045AT

9 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for FYCR2203000045AT



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10 Appendix

1. Bandwidth

1.1 OBW

1.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	99% Occupied Bandwidth (MHz)	Verdict
					Result	
GFSK	SISO	2402	DH5	1	0.819	Pass
		2441	DH5	1	0.822	Pass
		2480	DH5	1	0.827	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.090	Pass
		2441	2DH5	1	1.094	Pass
		2480	2DH5	1	1.090	Pass
8DPSK	SISO	2402	3DH5	1	1.097	Pass
		2441	3DH5	1	1.091	Pass
		2480	3DH5	1	1.100	Pass

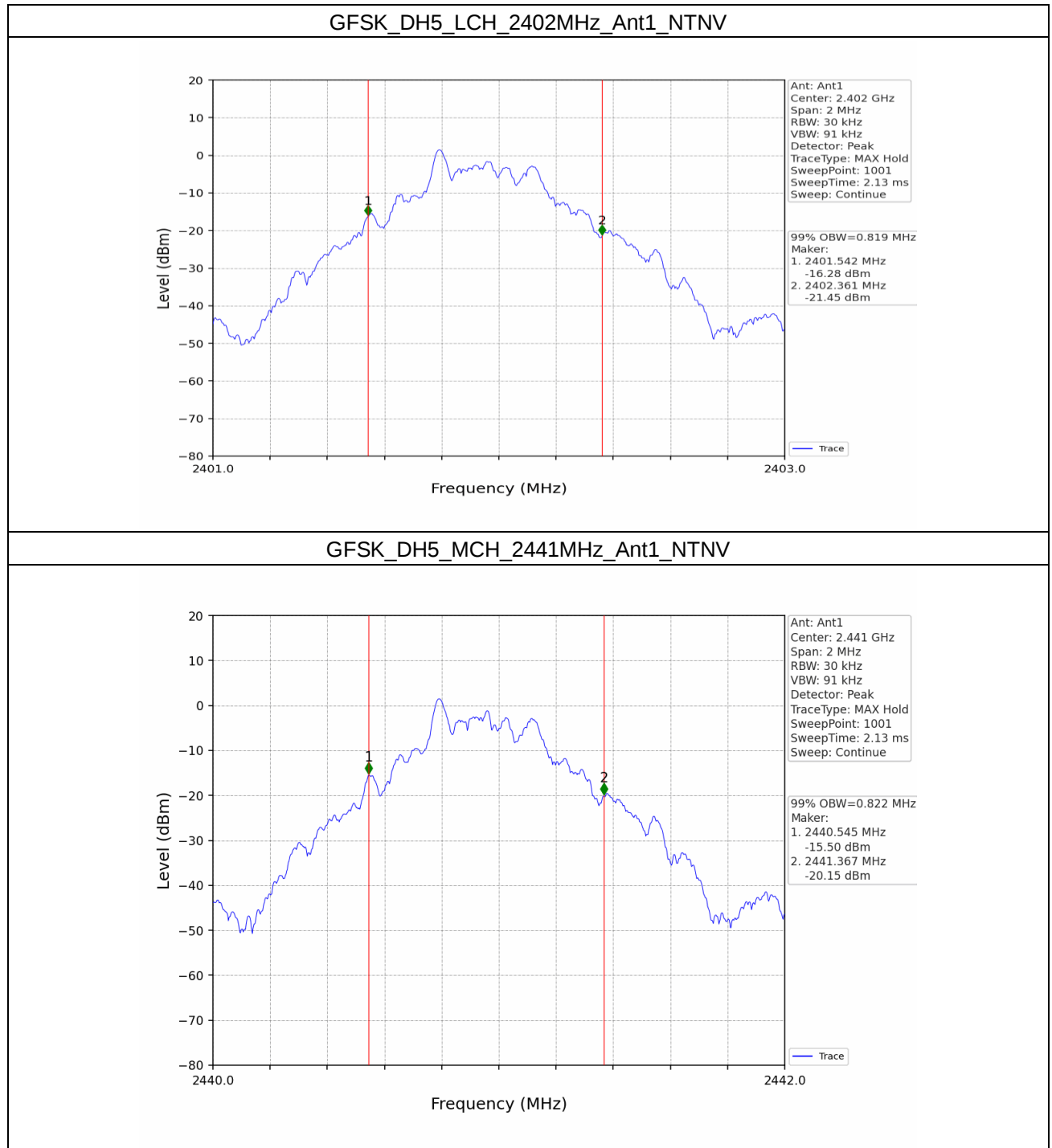


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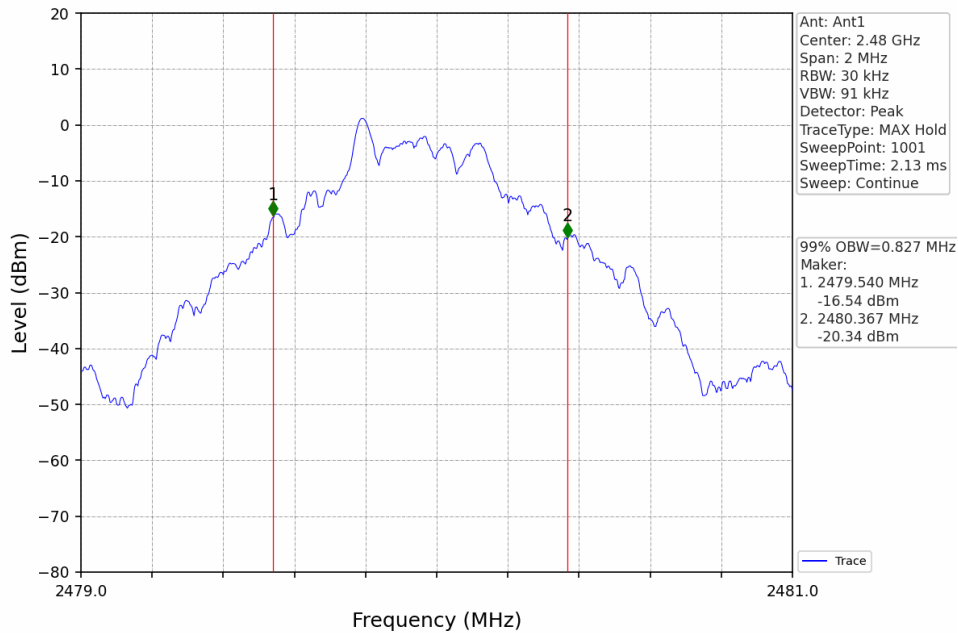
1.1.2 Test Graph



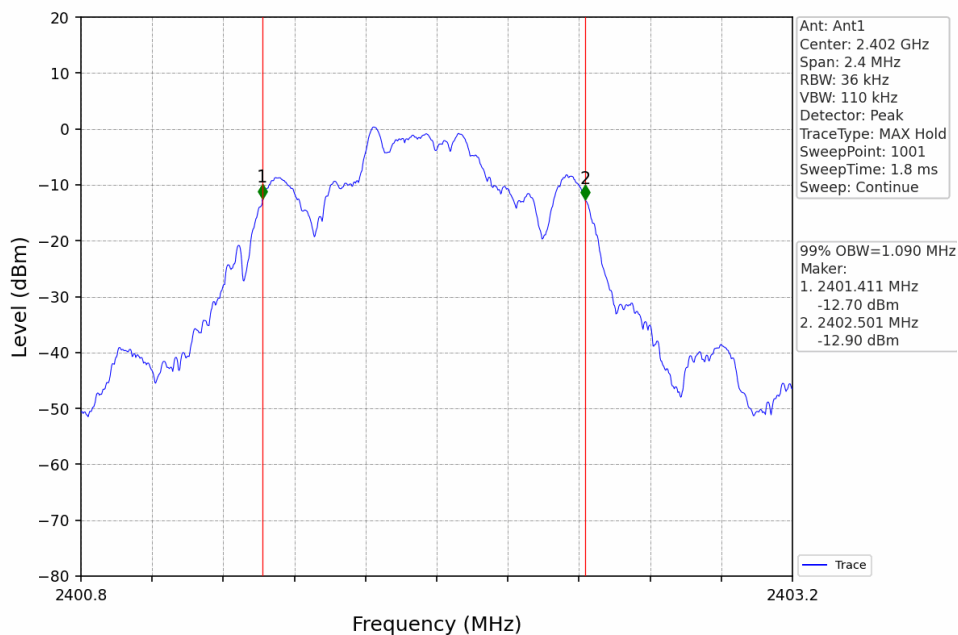
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GFSK_DH5_HCH_2480MHz_Ant1_NTNV



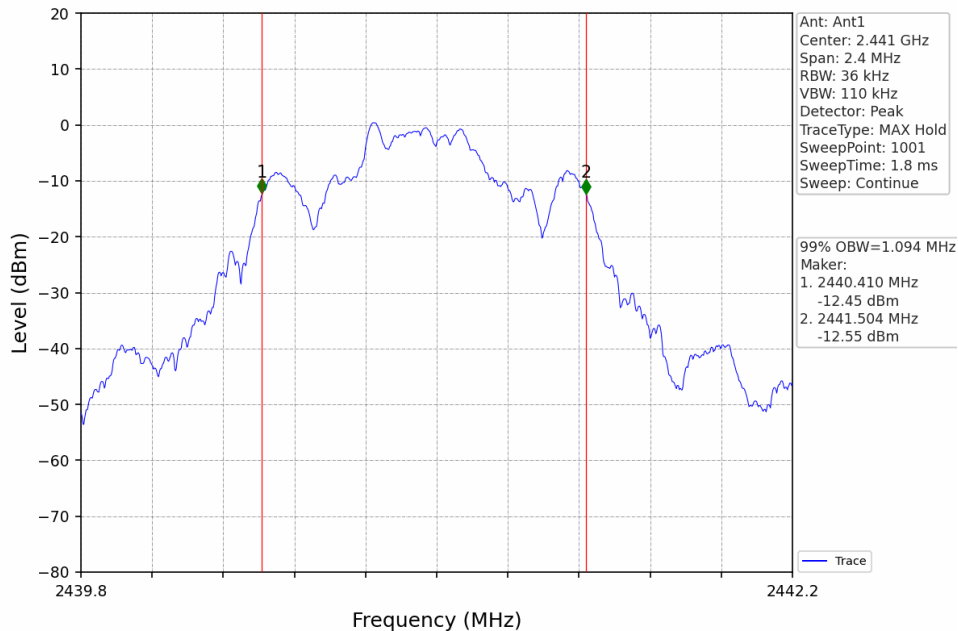
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



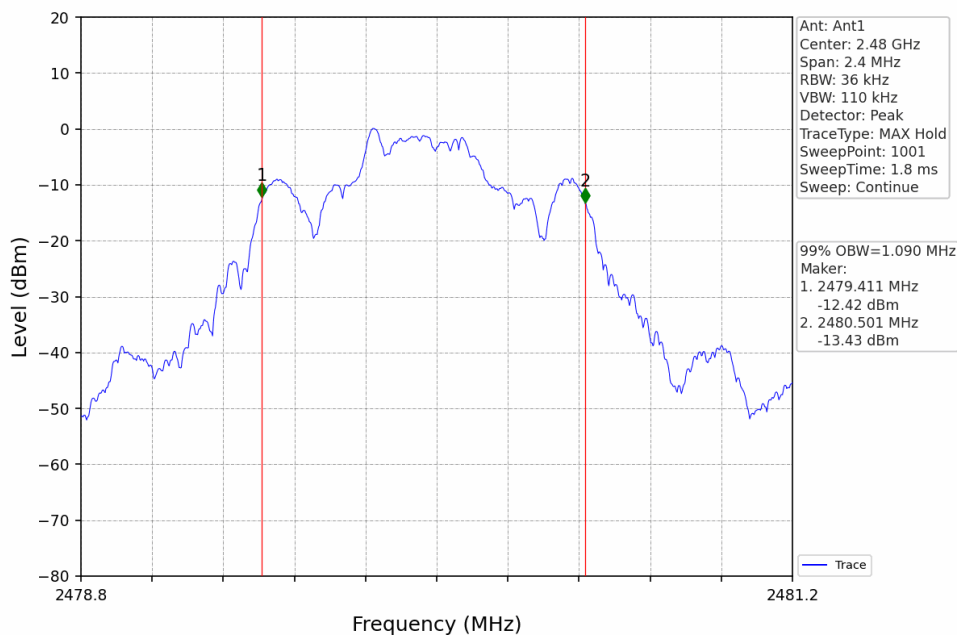
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Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



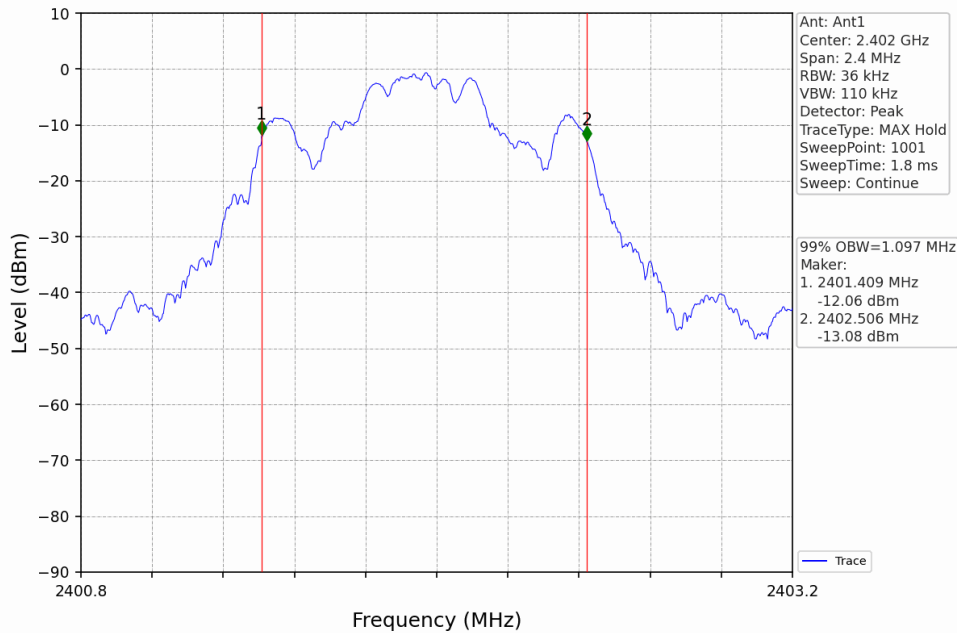
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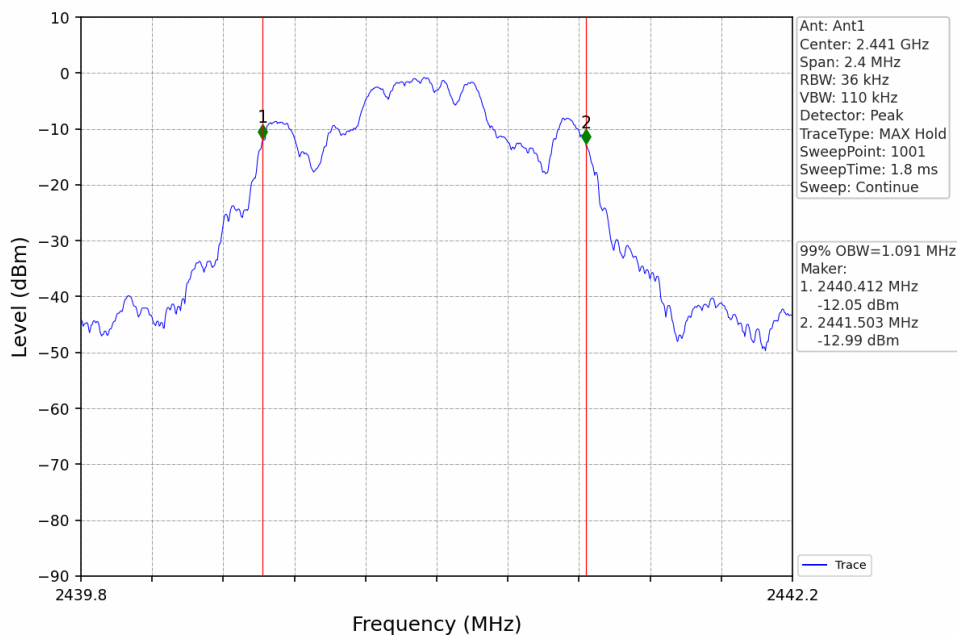
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8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



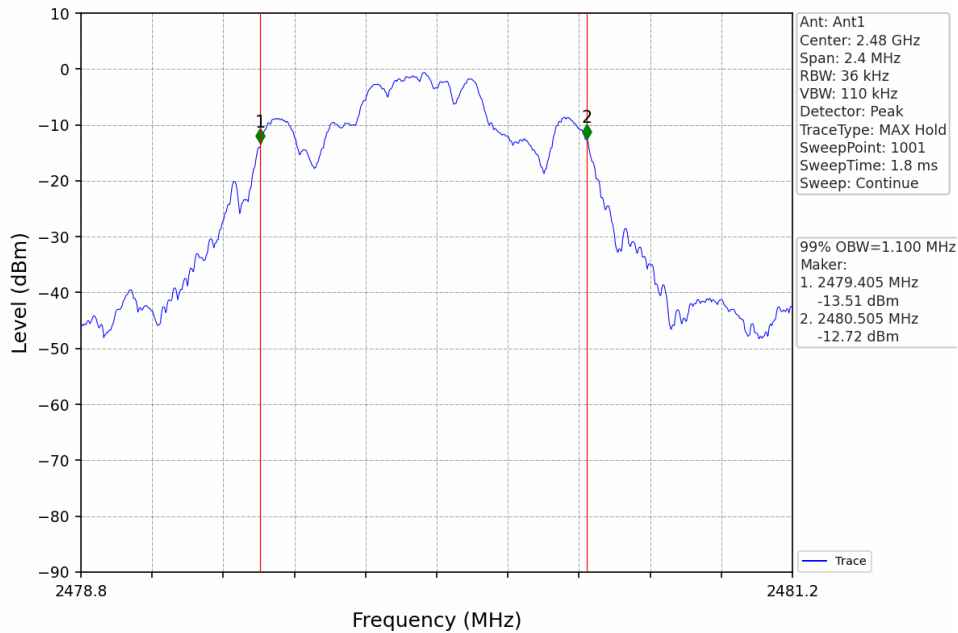
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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1.2 20dB BW

1.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	20dB Bandwidth (MHz)	Verdict
					Result	
GFSK	SISO	2402	DH5	1	0.798	Pass
		2441	DH5	1	0.799	Pass
		2480	DH5	1	0.800	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.169	Pass
		2441	2DH5	1	1.167	Pass
		2480	2DH5	1	1.179	Pass
8DPSK	SISO	2402	3DH5	1	1.176	Pass
		2441	3DH5	1	1.169	Pass
		2480	3DH5	1	1.167	Pass

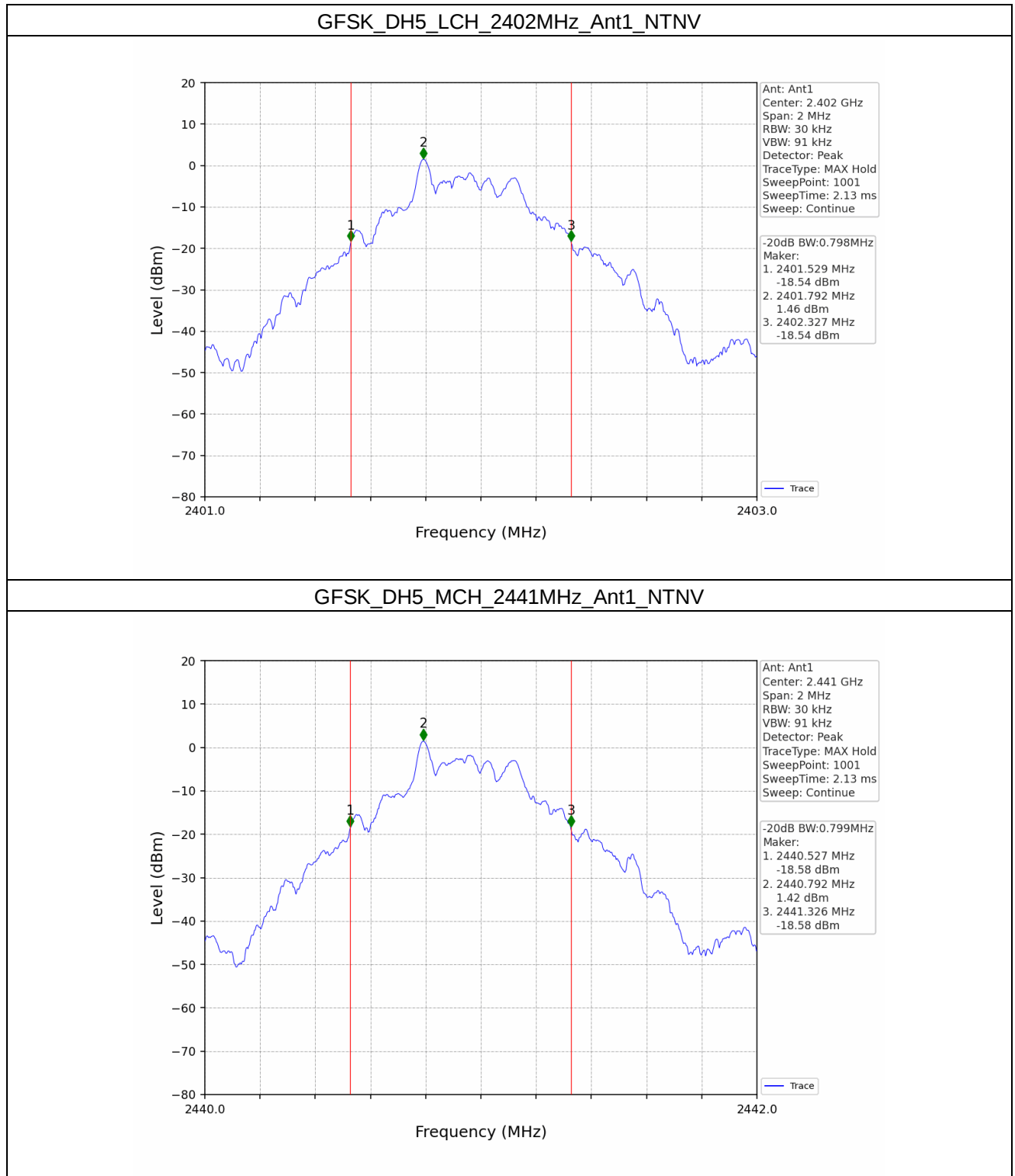


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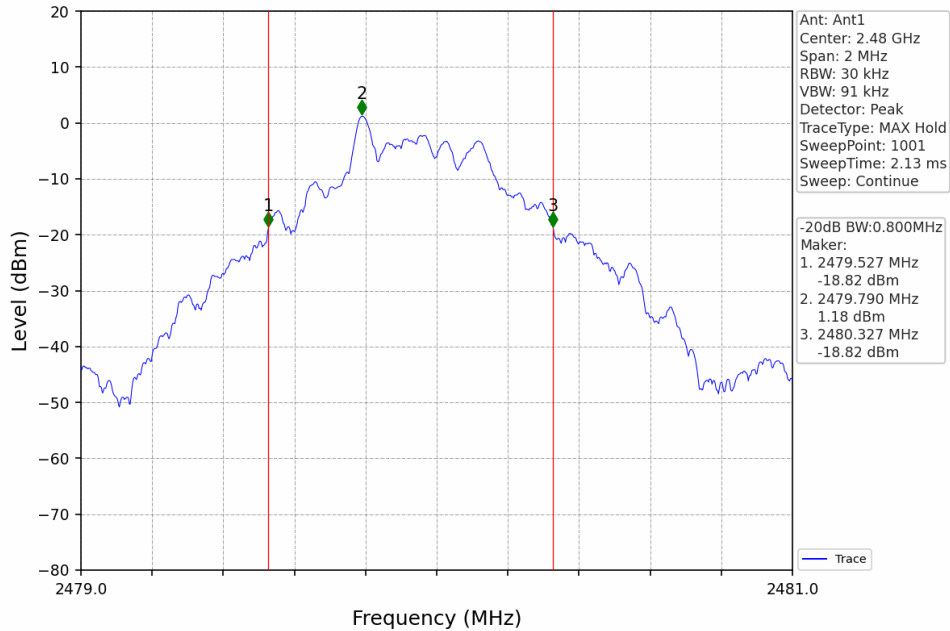
1.2.2 Test Graph



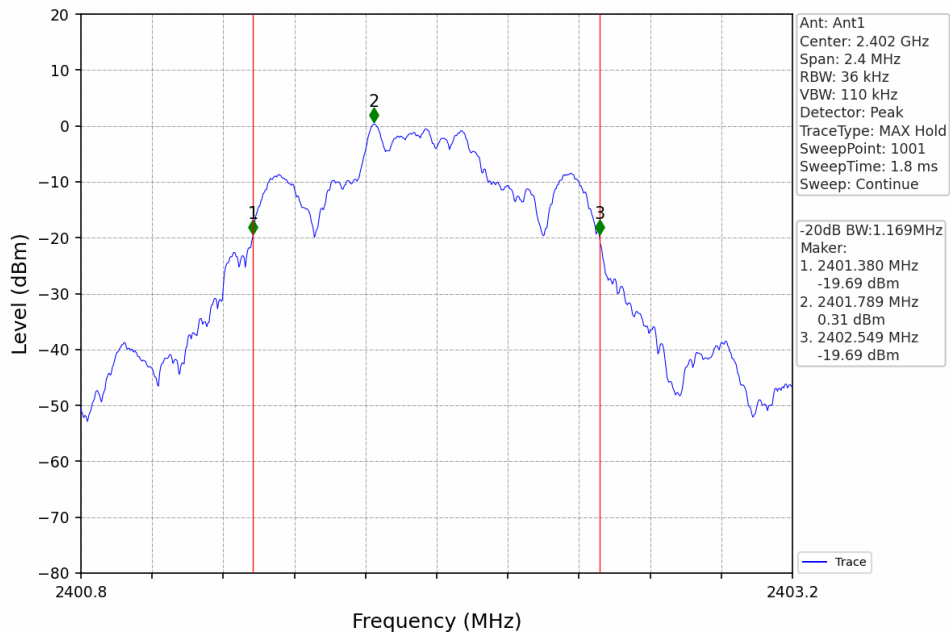
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GFSK_DH5_HCH_2480MHz_Ant1_NTNV



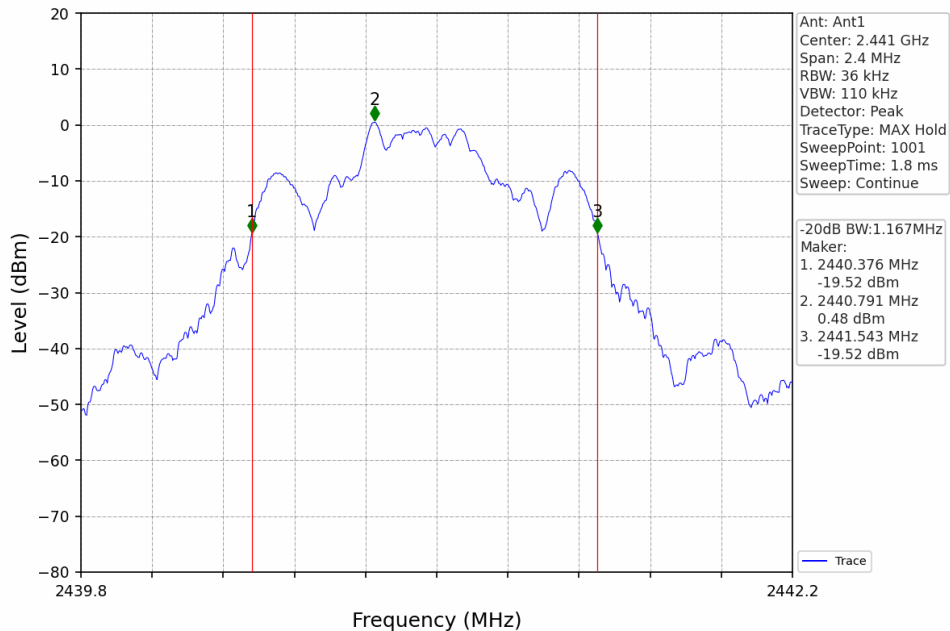
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



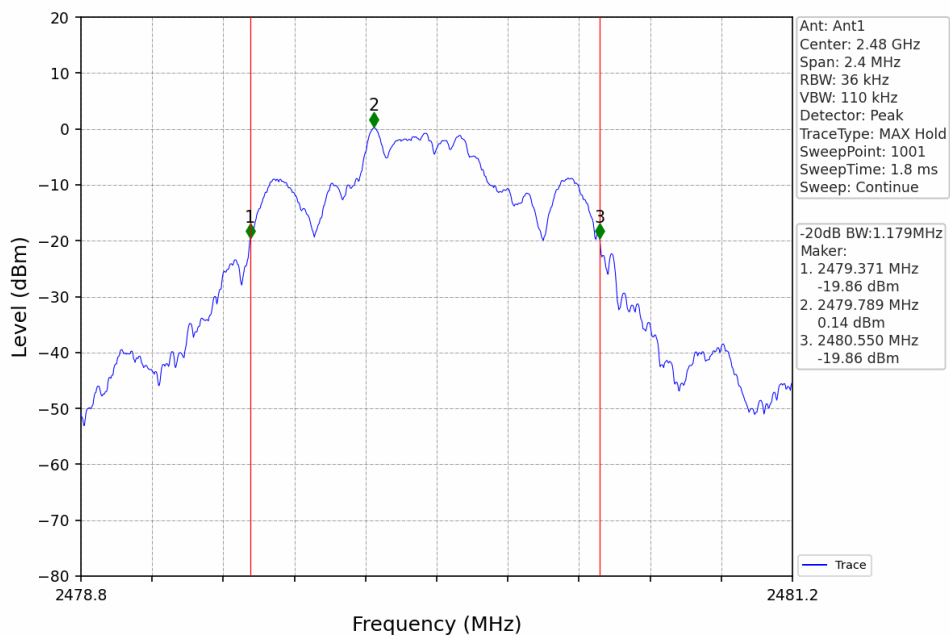
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Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



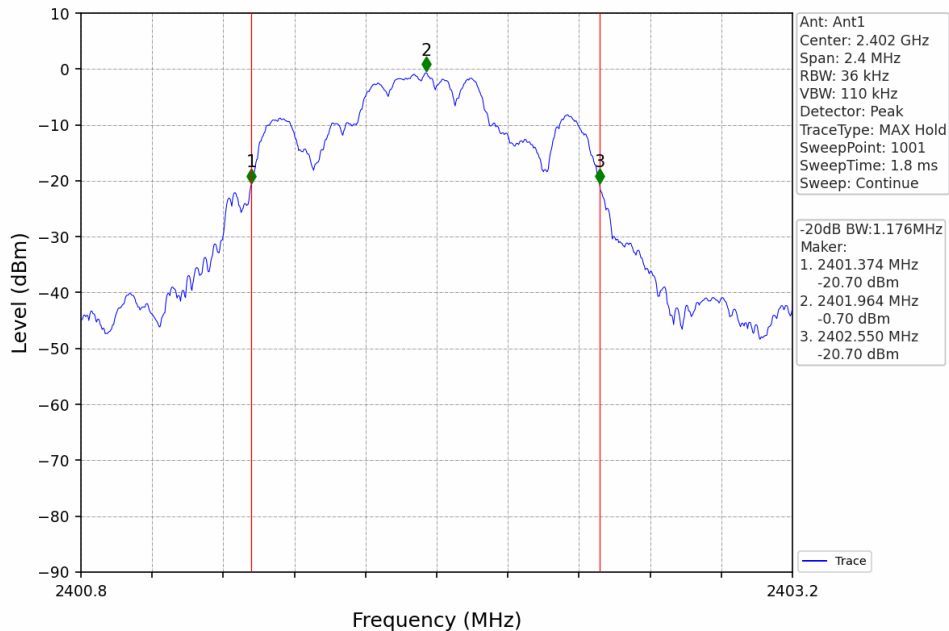
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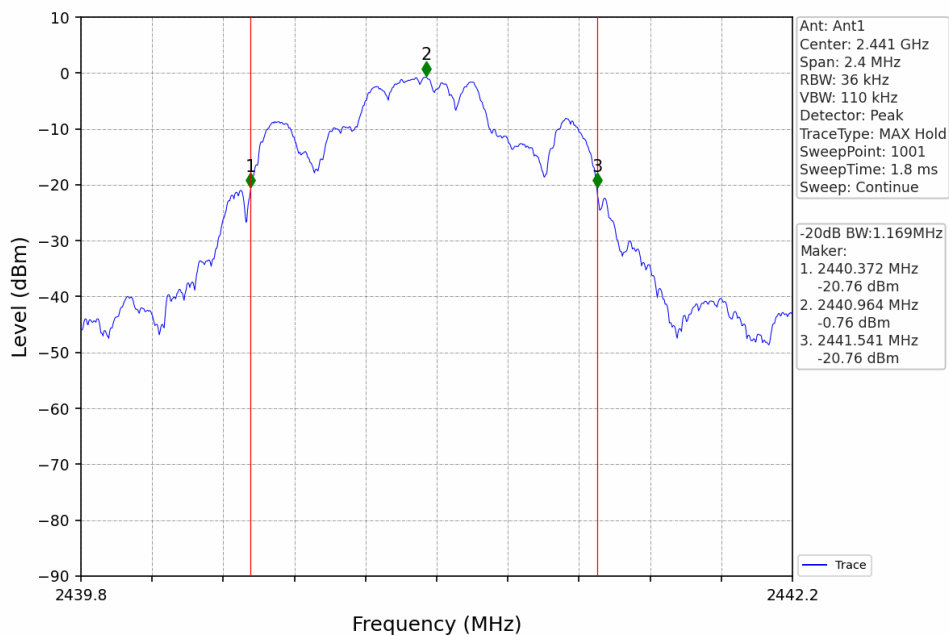
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8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



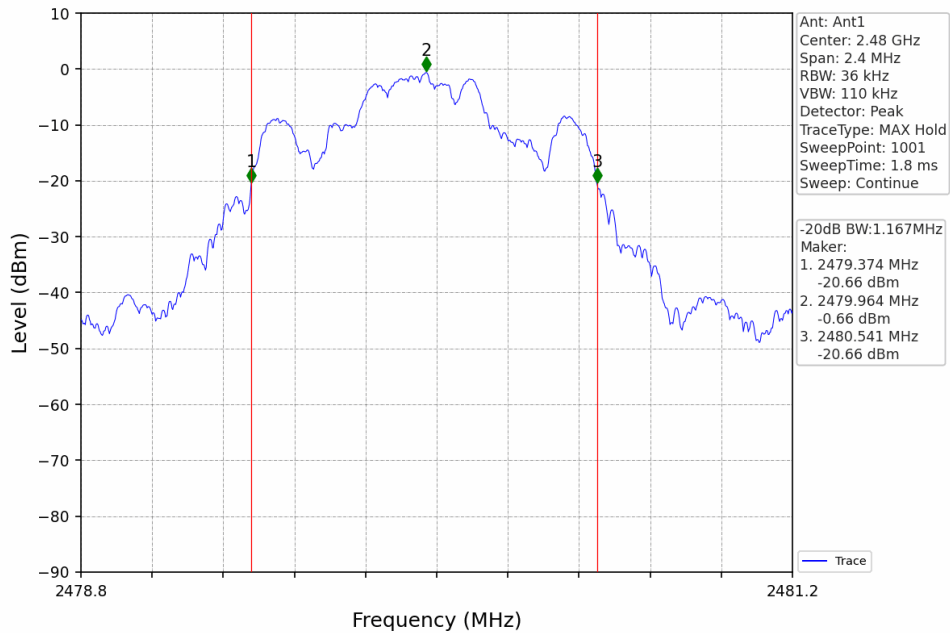
8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



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2. Maximum Conducted Output Power

2.1 Power

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				Ant1	Limit	
GFSK	SISO	2402	DH5	1.67	<=30	Pass
		2441	DH5	1.61	<=30	Pass
		2480	DH5	1.39	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	3.28	<=20.97	Pass
		2441	2DH5	3.43	<=20.97	Pass
		2480	2DH5	3.10	<=20.97	Pass
8DPSK	SISO	2402	3DH5	3.51	<=20.97	Pass
		2441	3DH5	3.57	<=20.97	Pass
		2480	3DH5	3.34	<=20.97	Pass
Antenna Gain: 2.23dBi						

3. Carrier Frequency Separation

3.1 Ant1

3.1.1 Test Result

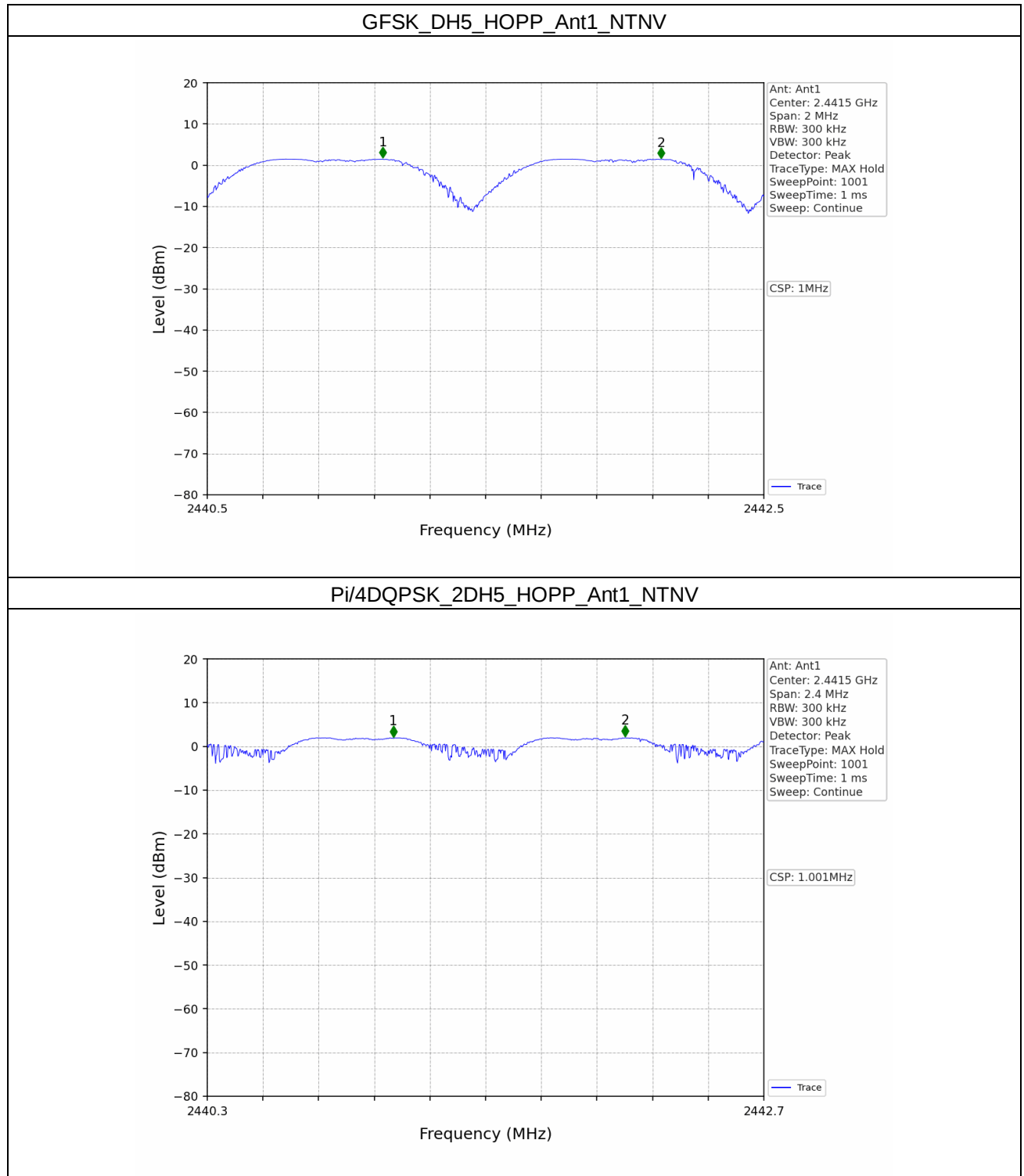
Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.000	0.800	>=0.8	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.001	1.179	>=0.786	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.176	>=0.784	Pass



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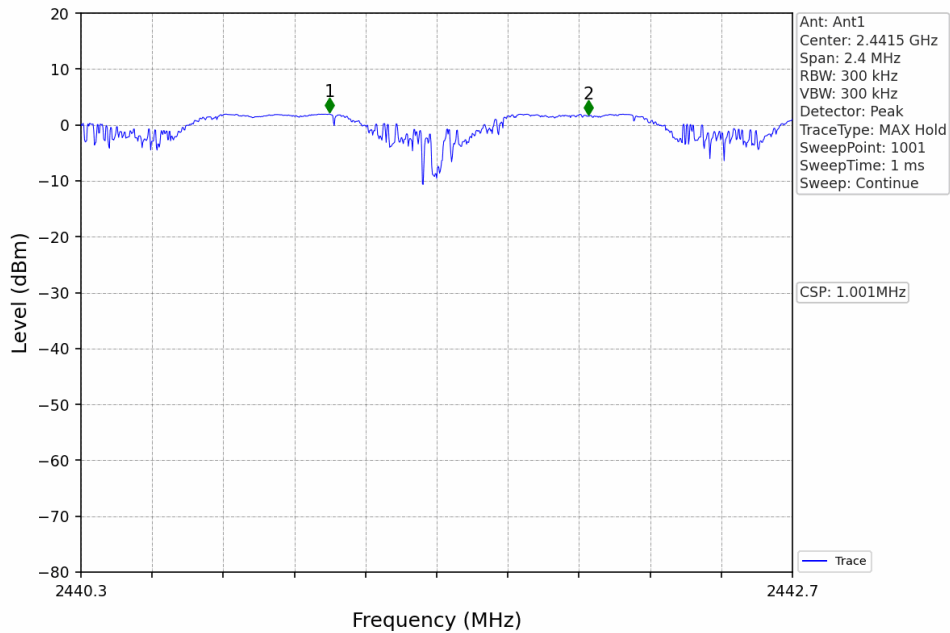
3.1.2 Test Graph



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8DPSK_3DH5_HOPP_Ant1_NTNV



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4. Number of Hopping Frequencies

4.1 HoppNum

4.1.1 Test Result

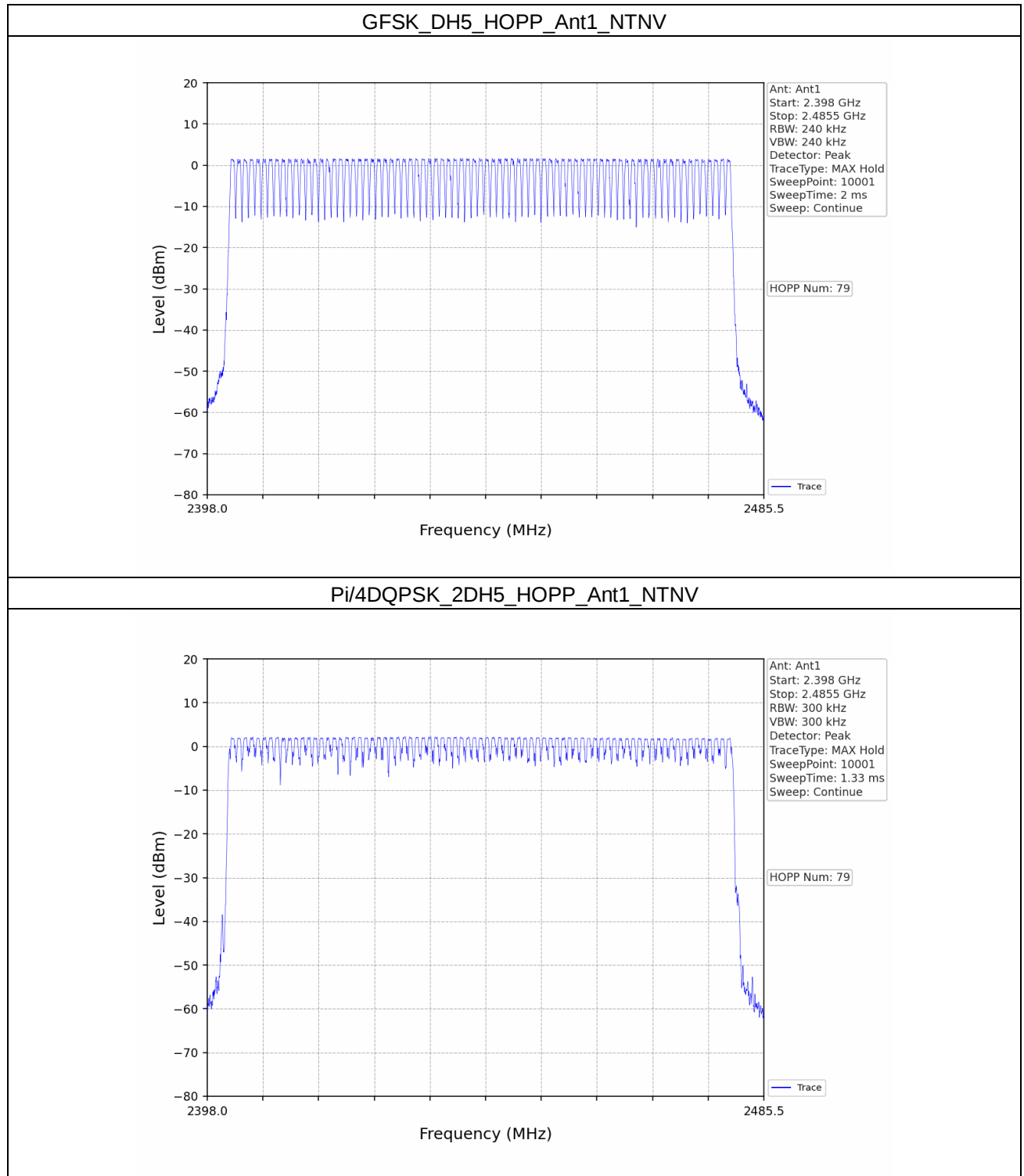
Mode	TX Type	Frequency (MHz)	Packet Type	Num of Hopping Frequencies		Verdict
				Ant1	Limit	
GFSK	SISO	HOPP	DH5	79	>=15	Pass
PI/4DQPSK	SISO	HOPP	2DH5	79	>=15	Pass
8DPSK	SISO	HOPP	3DH5	79	>=15	Pass



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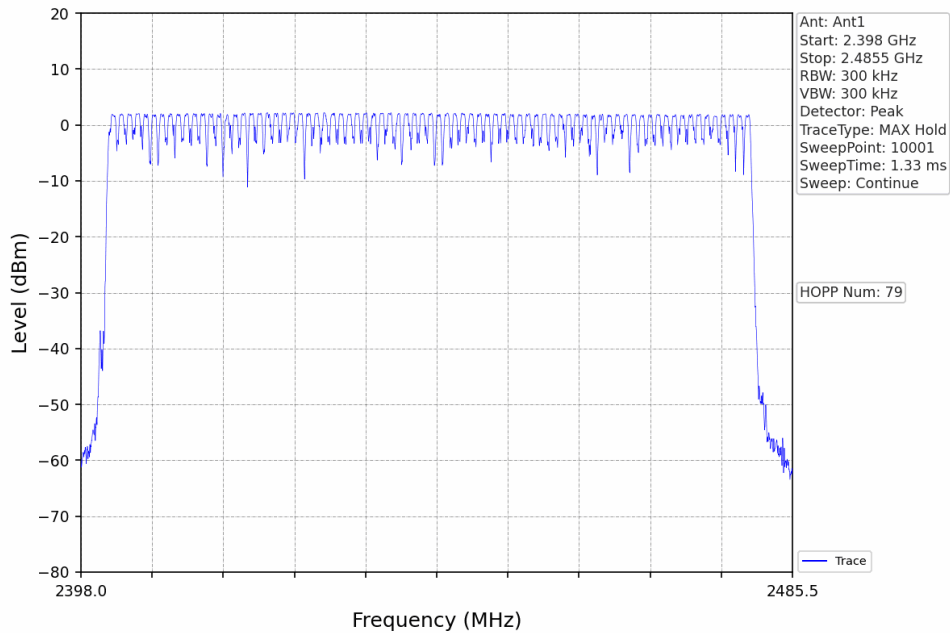
4.1.2 Test Graph



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8DPSK_3DH5_HOPP_Ant1_NTNV



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5. Time of Occupancy (Dwell Time)

5.1 Ant1

5.1.1 Test Result

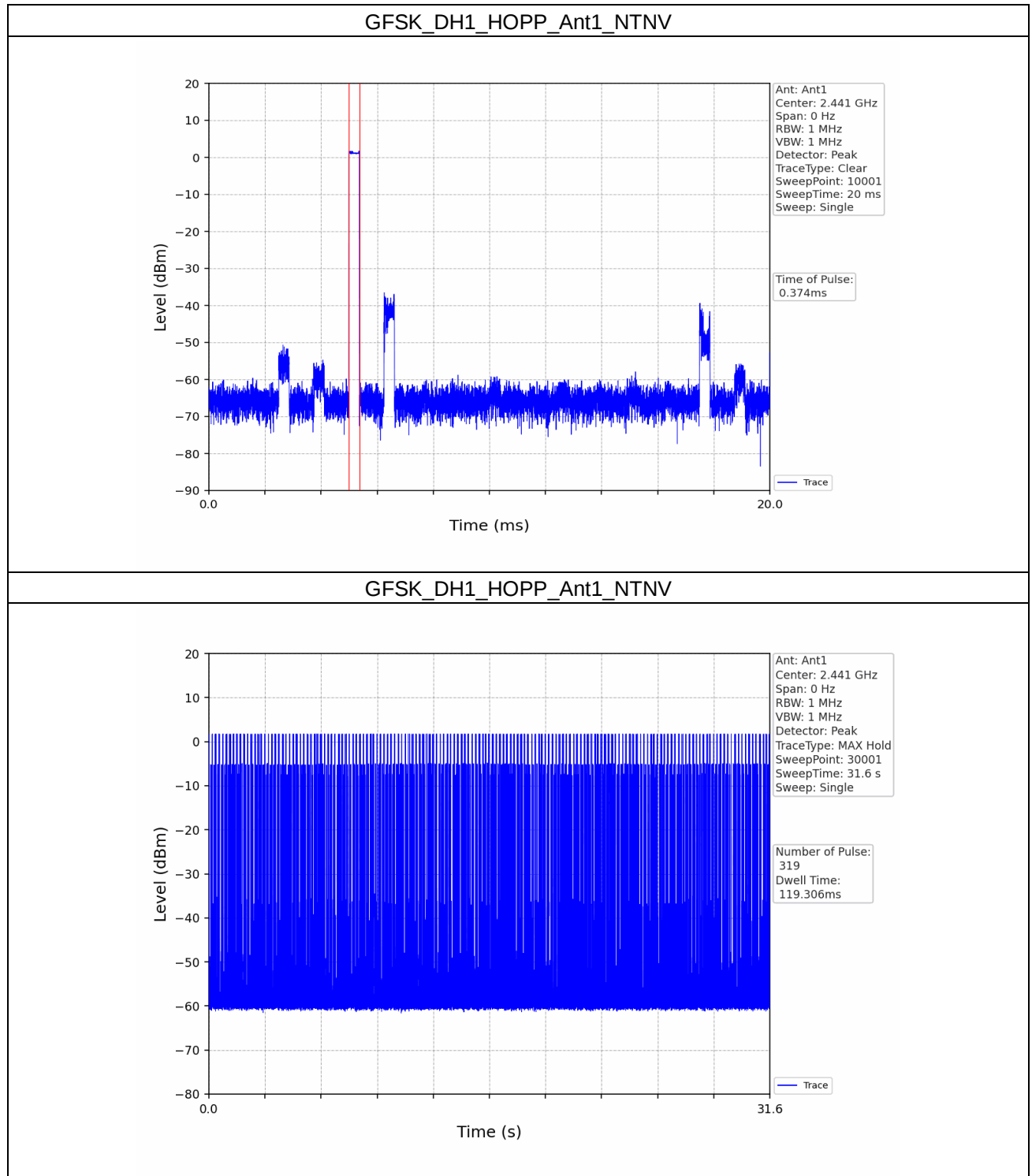
Ant1									
Mode	Tx Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	SISO	HOPP	DH1	0.374	31.600	319	119.306	<=400	Pass
			DH3	1.628	31.600	164	266.992	<=400	Pass
			DH5	2.882	31.600	102	293.964	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.168	31.600	320	53.760	<=400	Pass
			2DH3	0.168	31.600	160	26.880	<=400	Pass
			2DH5	0.170	31.600	98	16.660	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.164	31.600	320	52.480	<=400	Pass
			3DH3	0.162	31.600	168	27.216	<=400	Pass
			3DH5	0.164	31.600	113	18.532	<=400	Pass



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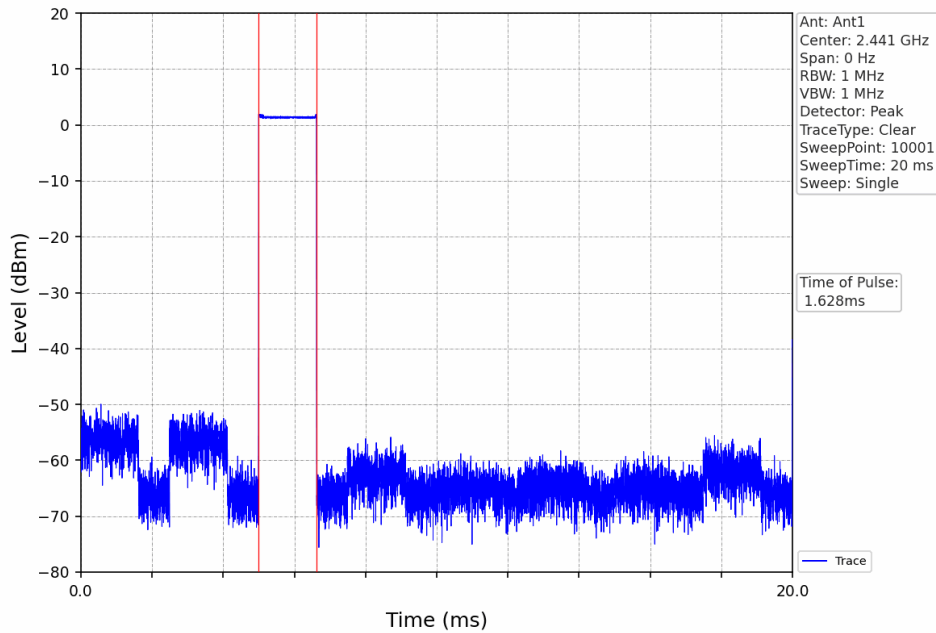
5.1.2 Test Graph



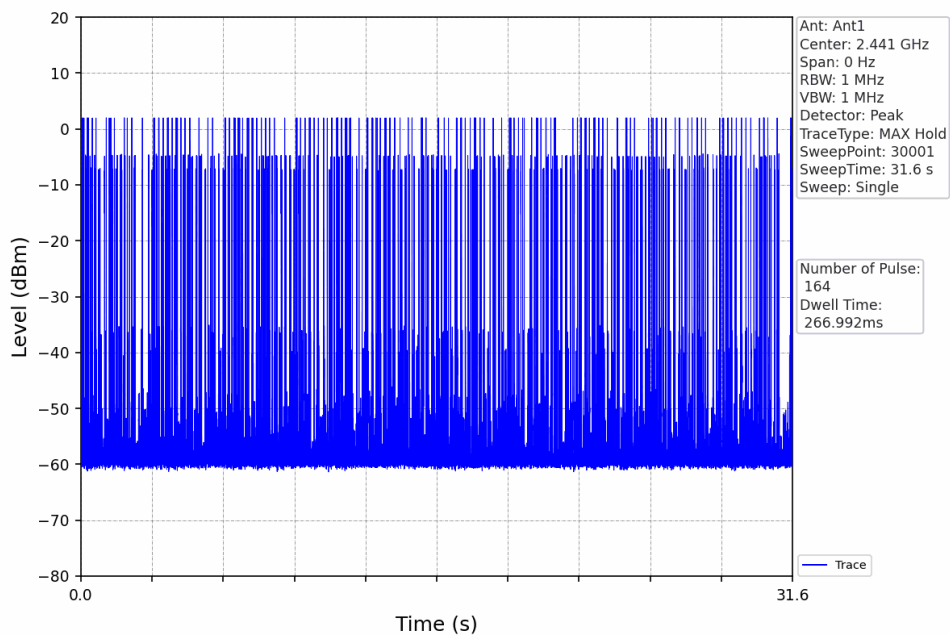
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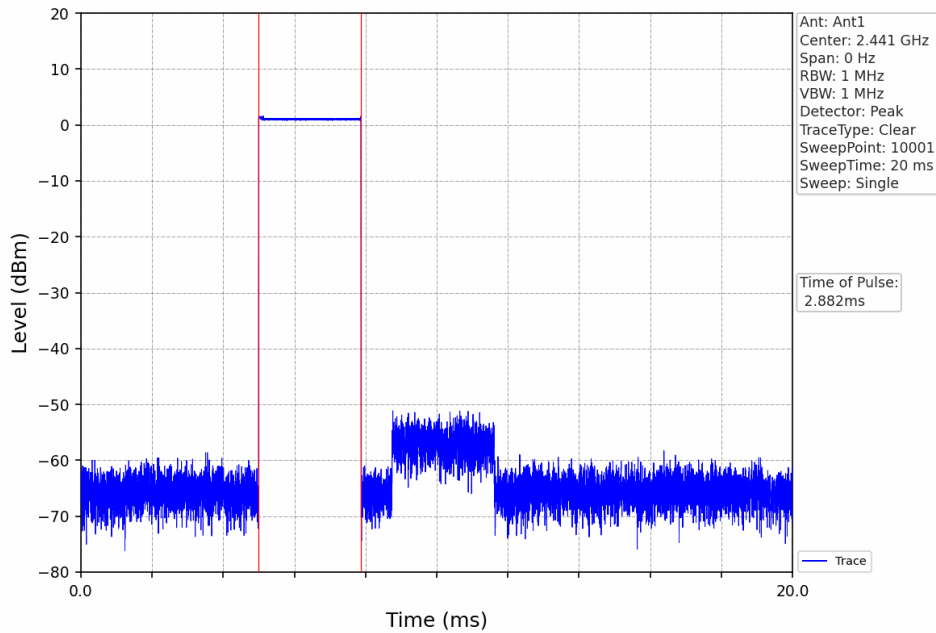
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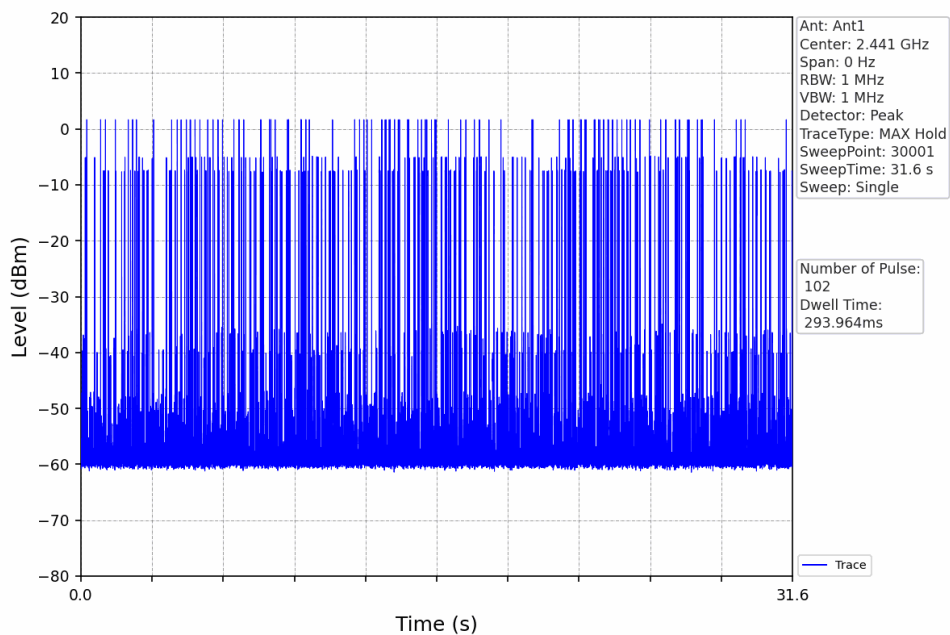
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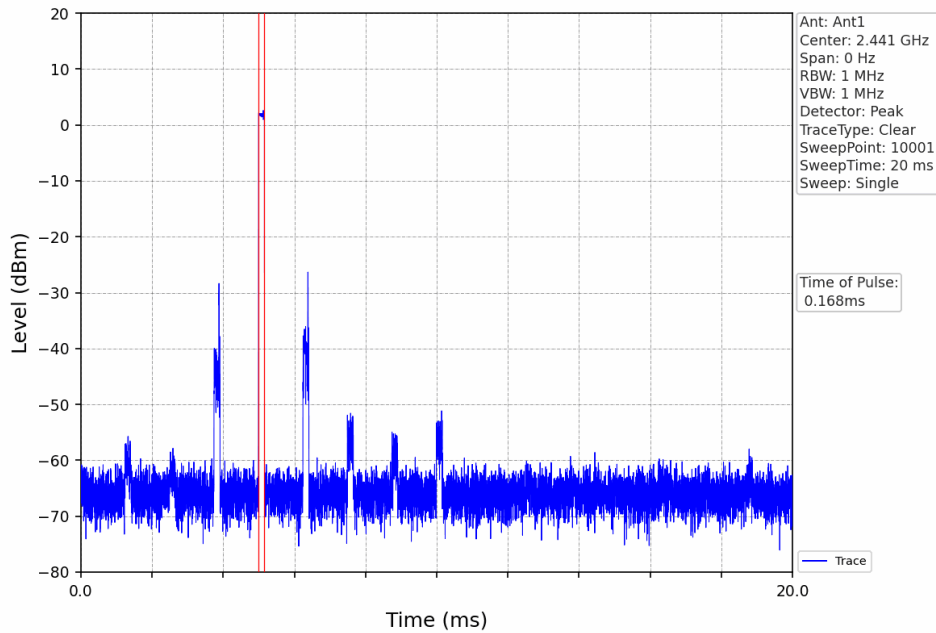
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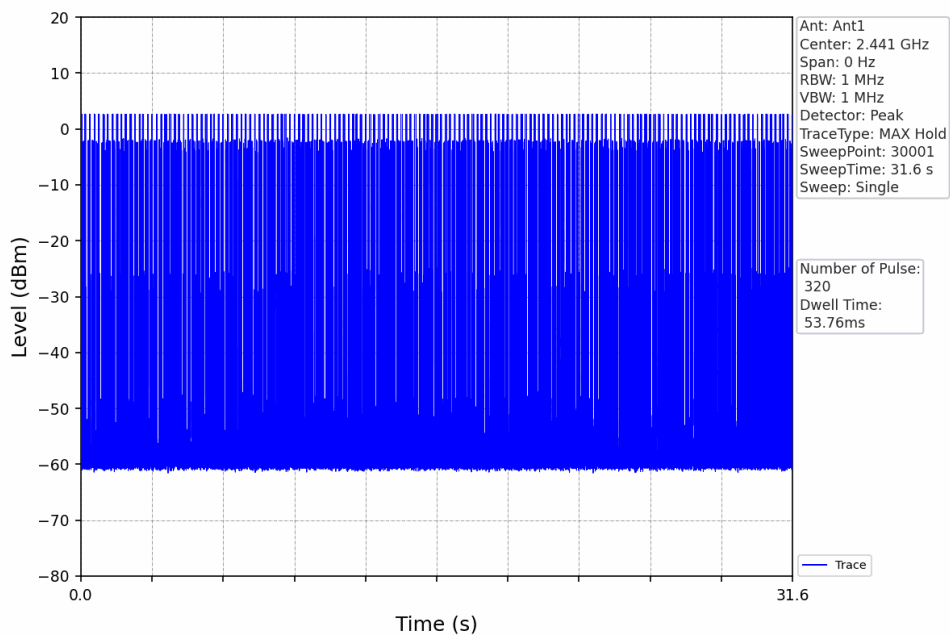
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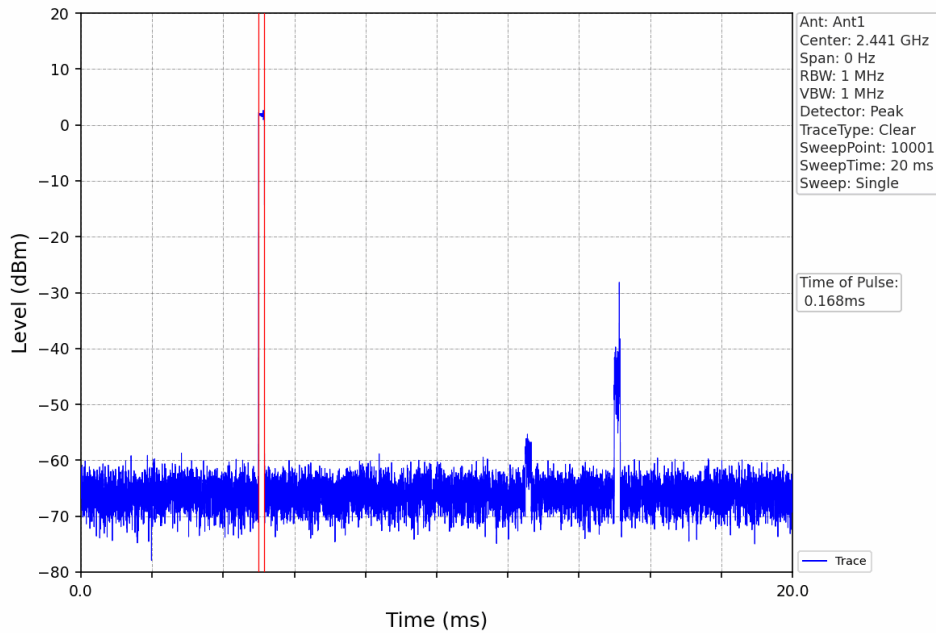
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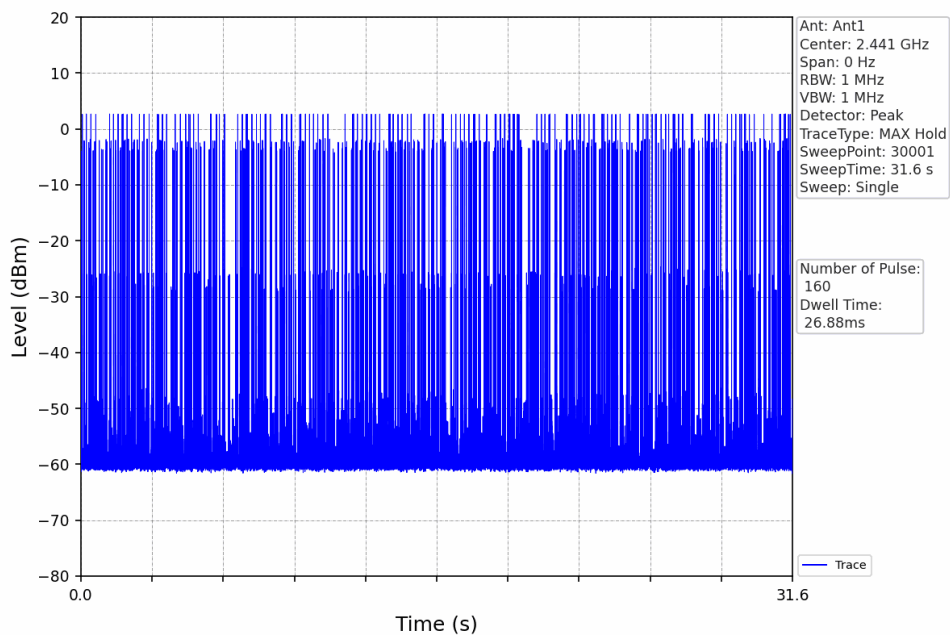
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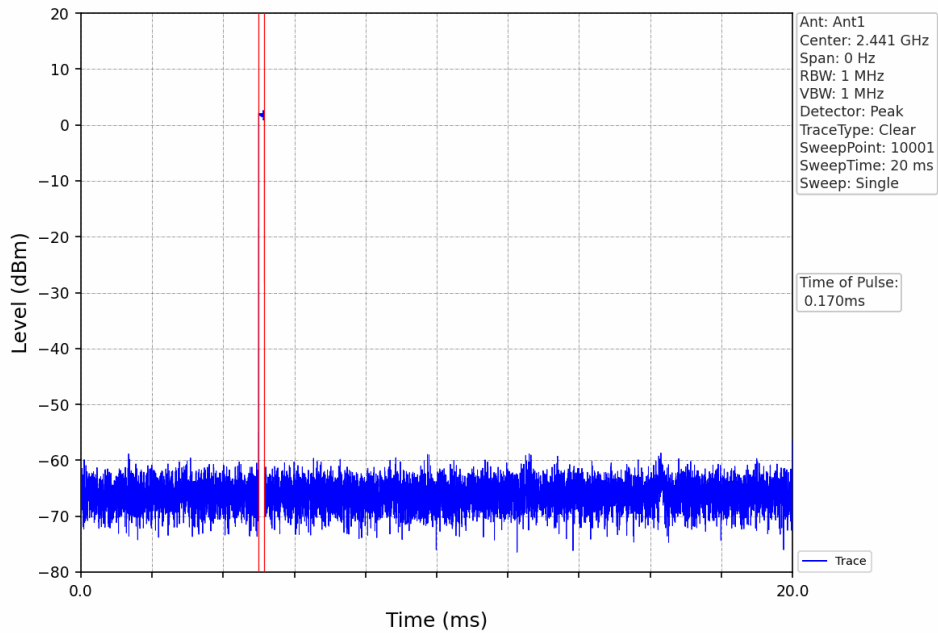
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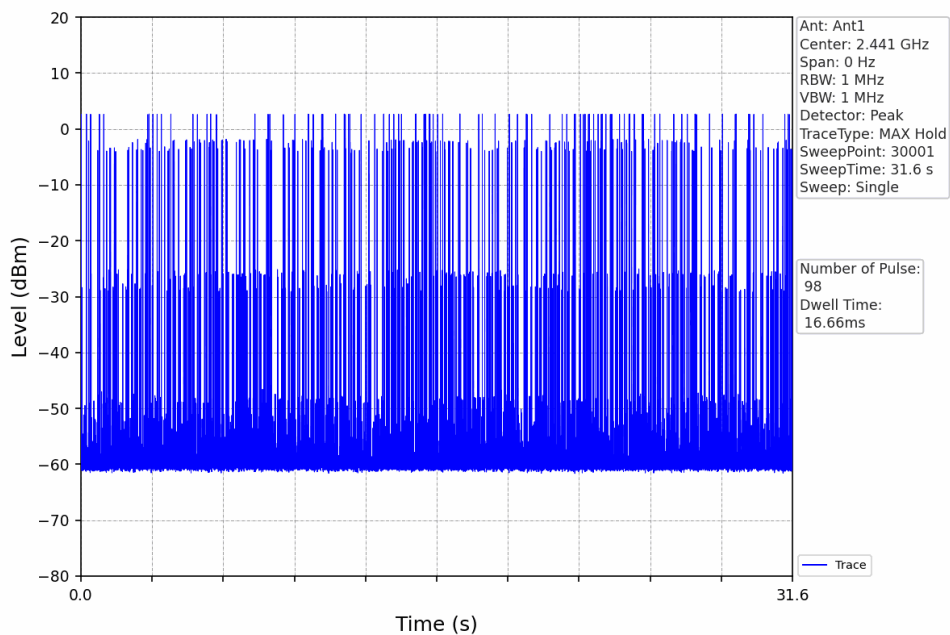
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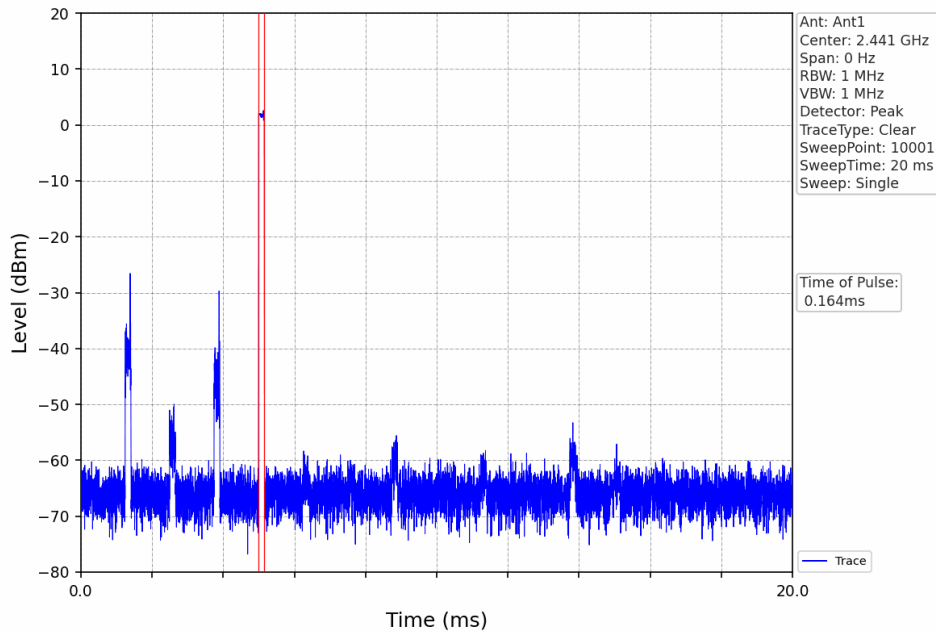
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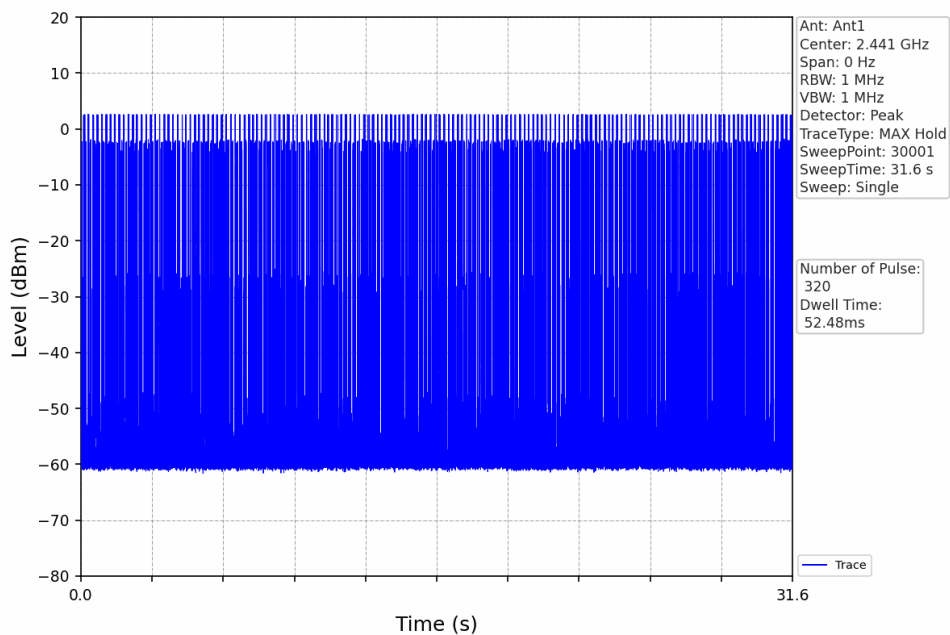
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8DPSK_3DH1_HOPP_Ant1_NTNV



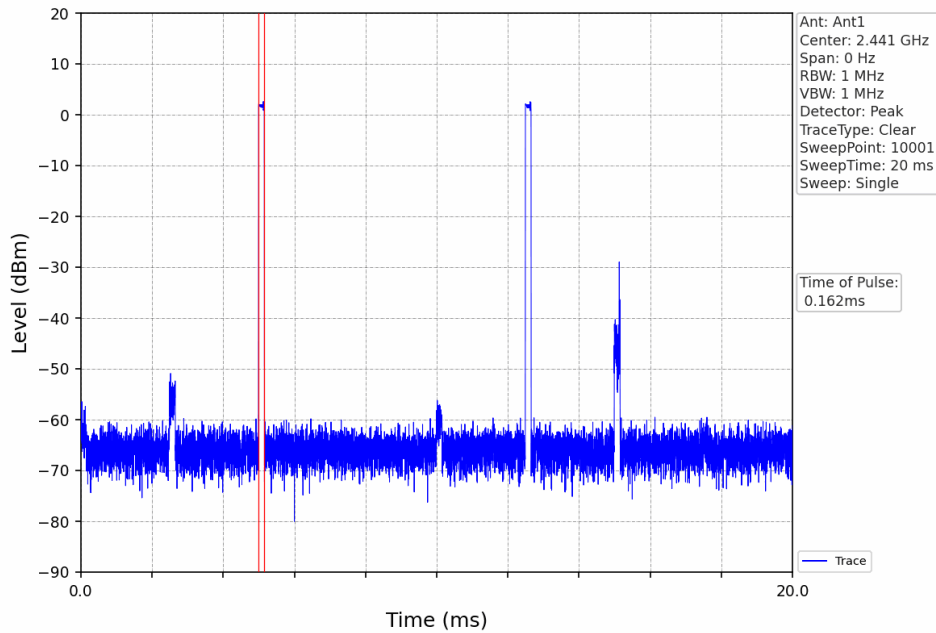
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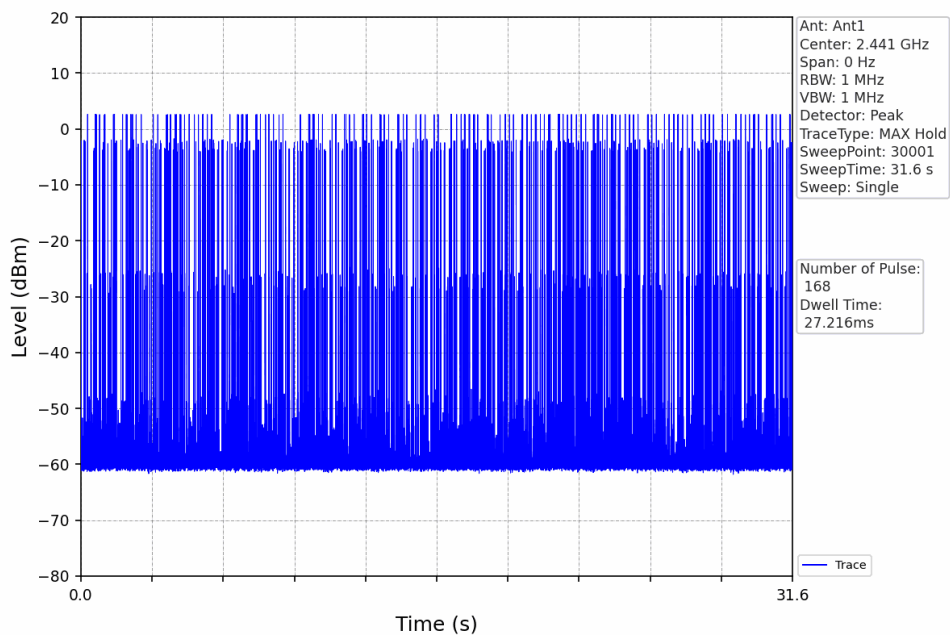
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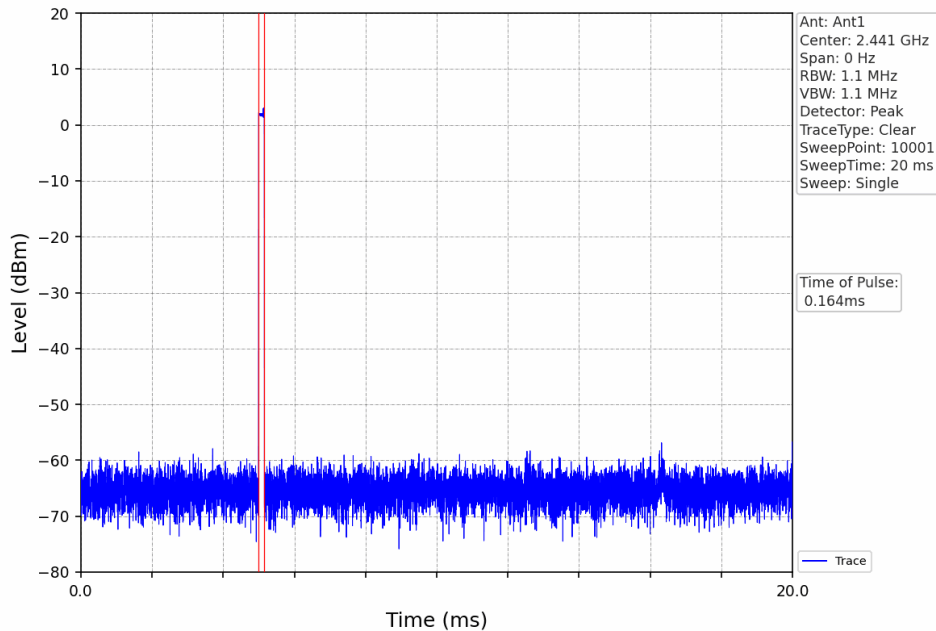
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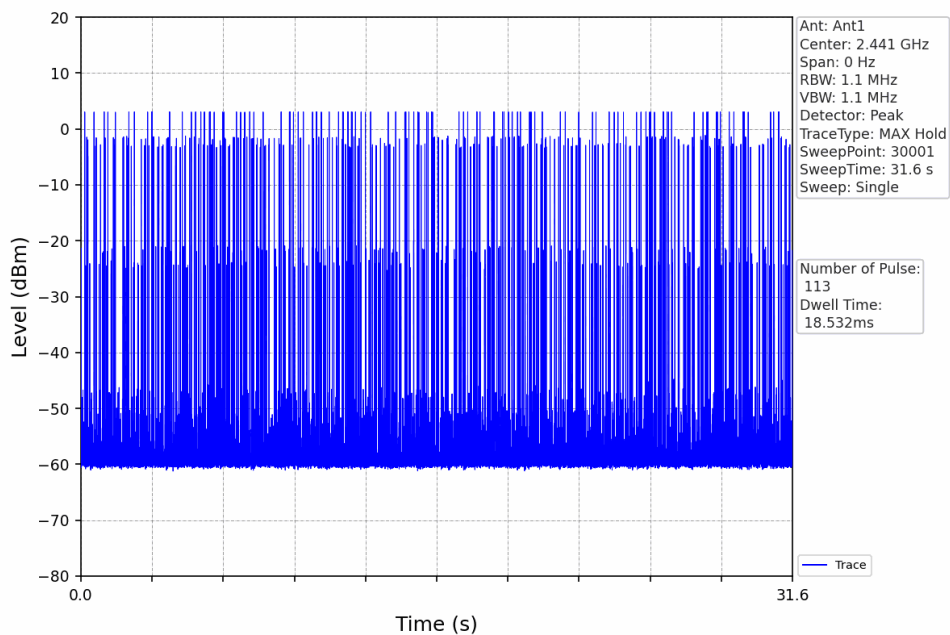
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8DPSK_3DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV



6. Unwanted Emissions In Non-restricted Frequency Bands

6.1 Ref

6.1.1 Test Result

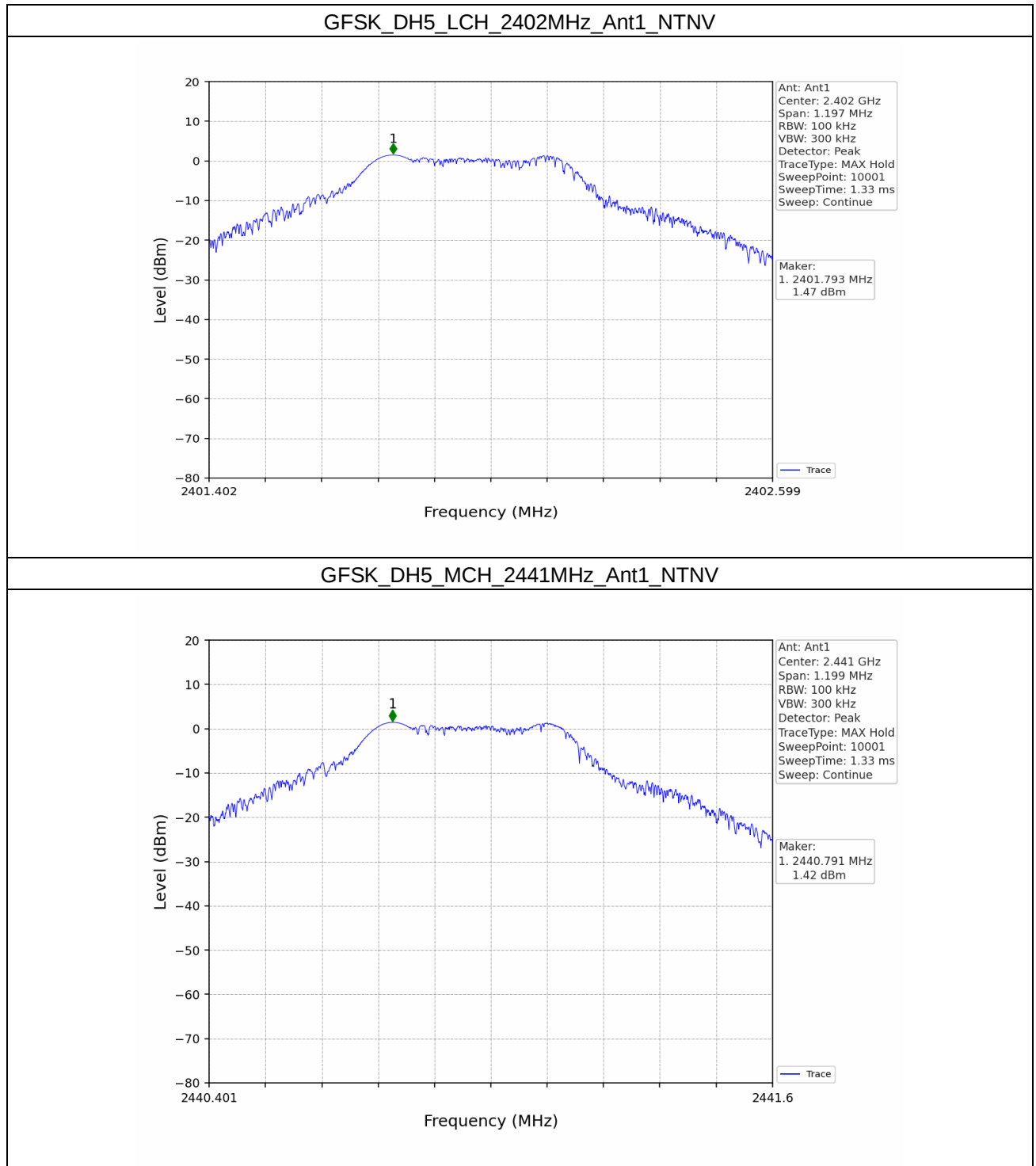
Mode	TX Type	Frequency (MHz)	Packet Type	Ant	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	1.47
		2441	DH5	1	1.42
		2480	DH5	1	1.19
Pi/4DQPSK	SISO	2402	2DH5	1	1.73
		2441	2DH5	1	1.92
		2480	2DH5	1	1.55
8DPSK	SISO	2402	3DH5	1	1.70
		2441	3DH5	1	1.76
		2480	3DH5	1	1.52



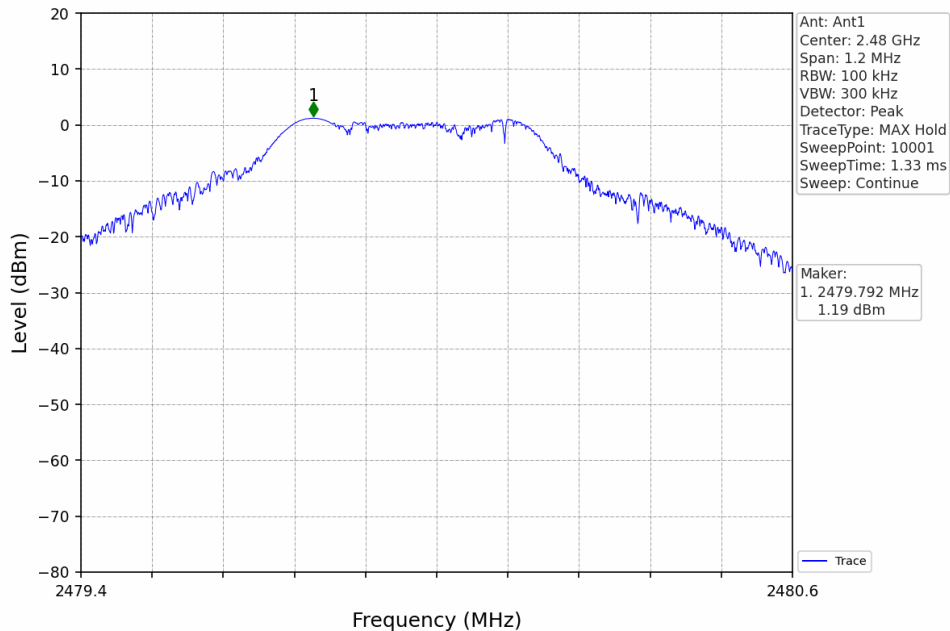
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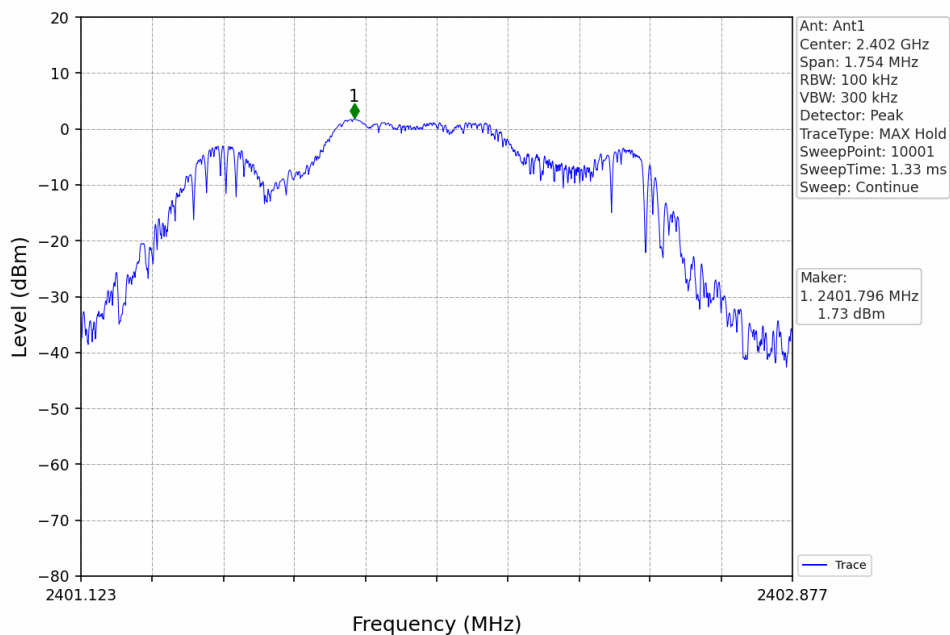
6.1.2 Test Graph



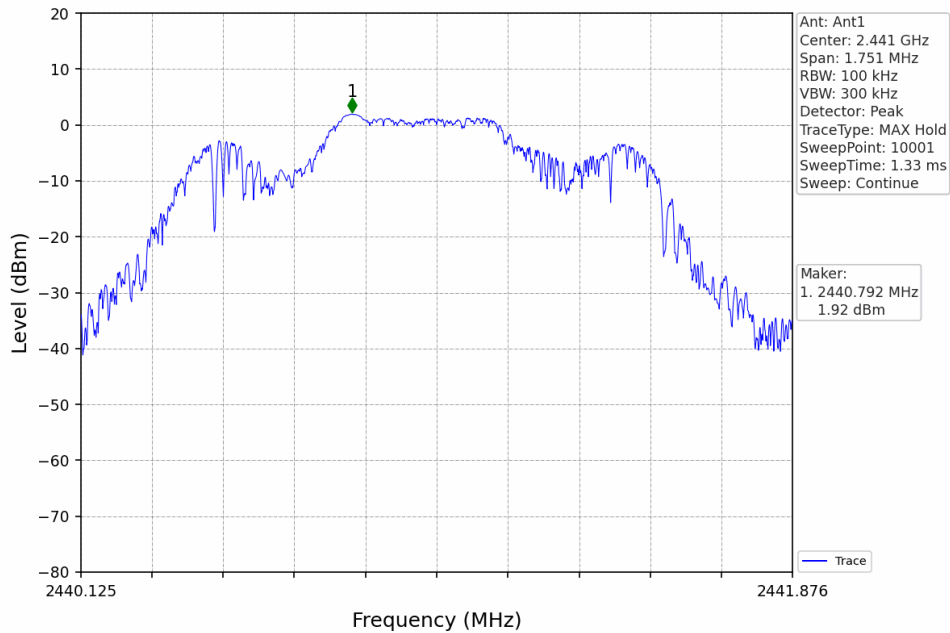
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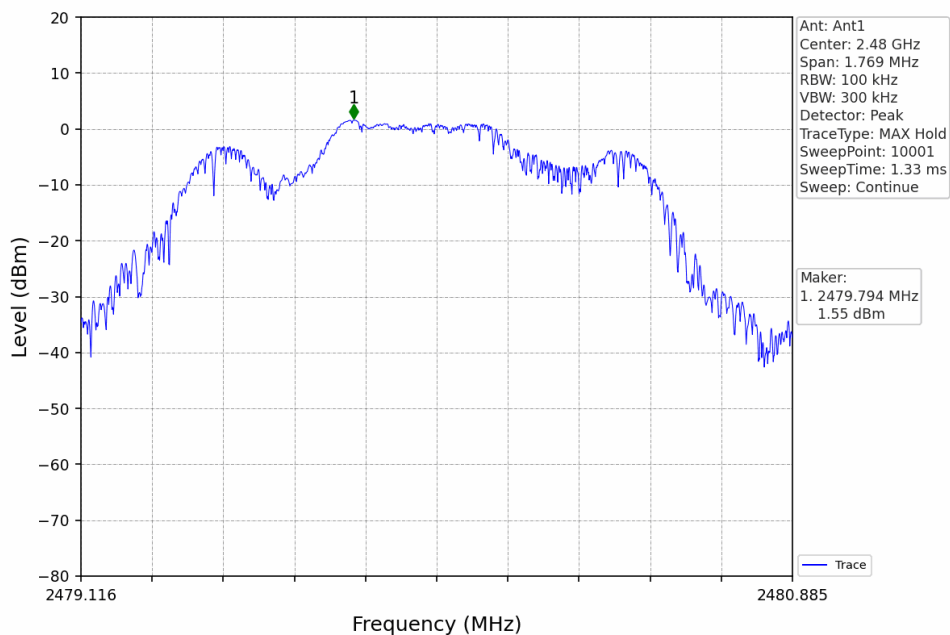
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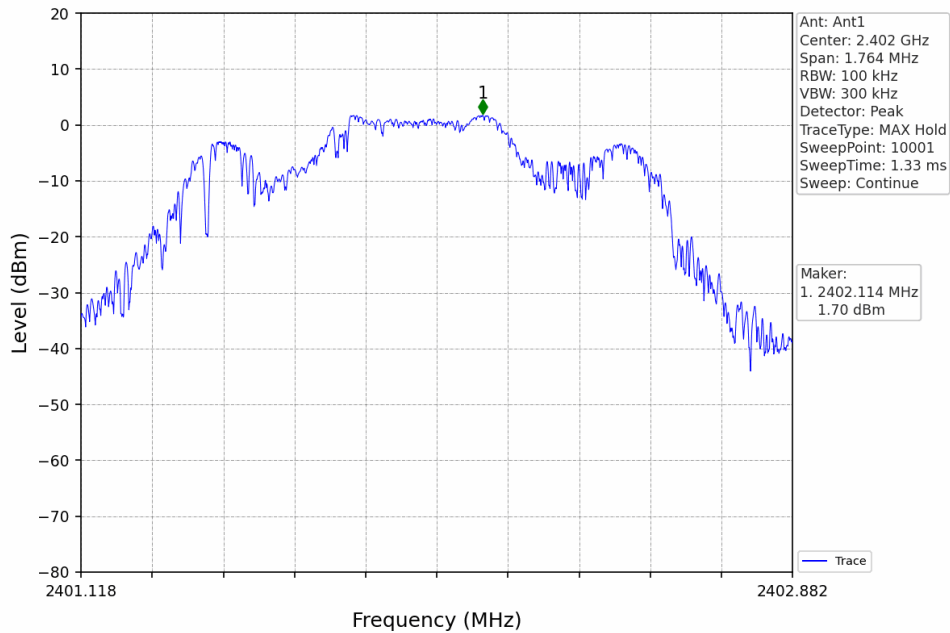
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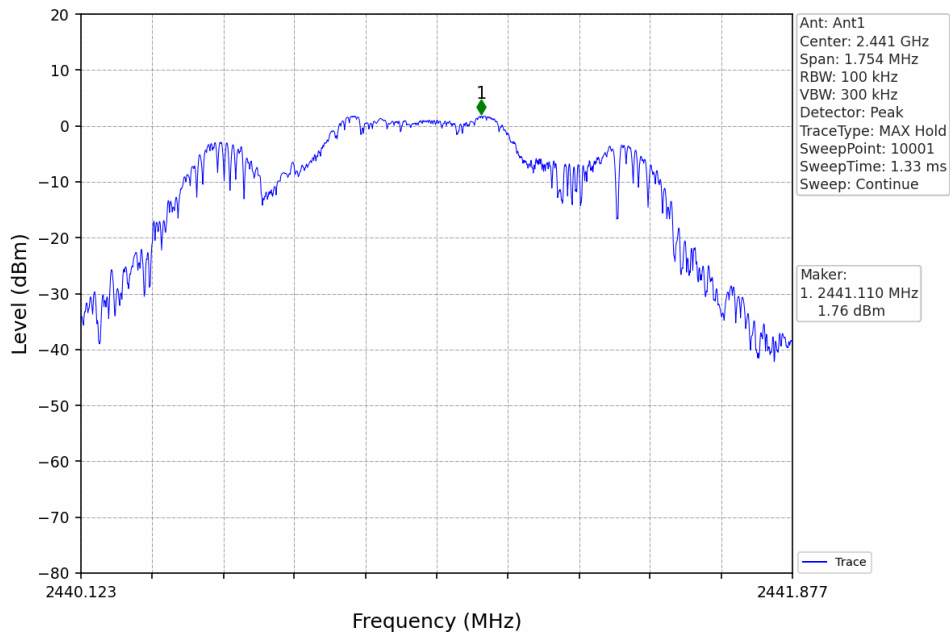
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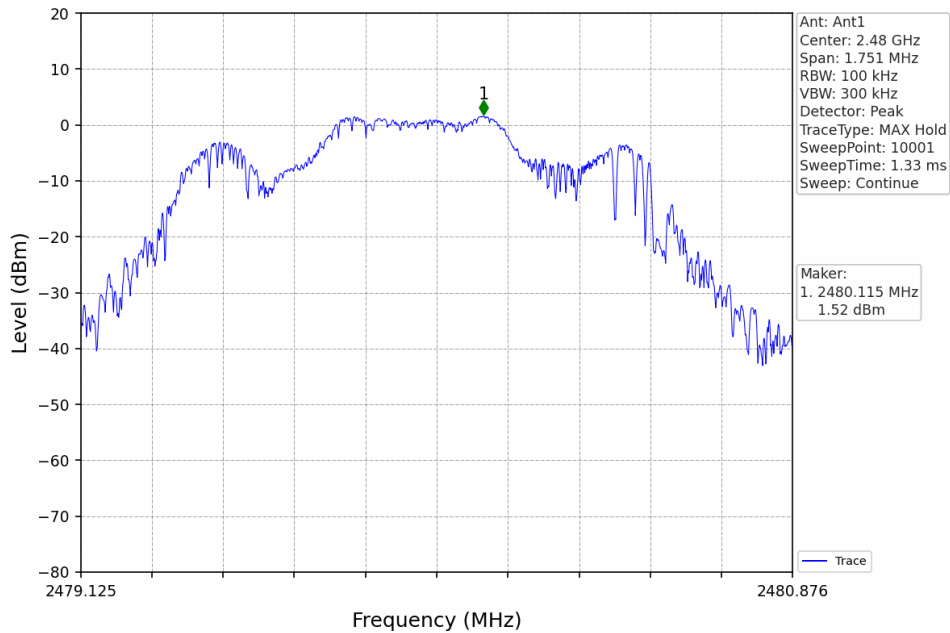
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8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV



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6.2 CSE

6.2.1 Test Result

Mode	TX Type	Frequency (MHz)	Packet Type	Ant	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	1.47	-18.53	Pass
		2441	DH5	1	1.47	-18.53	Pass
		2480	DH5	1	1.47	-18.53	Pass
		HOPP	DH5	1	1.47	-18.53	Pass
PI/4DQPSK	SISO	2402	2DH5	1	1.92	-18.08	Pass
		2441	2DH5	1	1.92	-18.08	Pass
		2480	2DH5	1	1.92	-18.08	Pass
		HOPP	2DH5	1	1.92	-18.08	Pass
8DPSK	SISO	2402	3DH5	1	1.76	-18.24	Pass
		2441	3DH5	1	1.76	-18.24	Pass
		2480	3DH5	1	1.76	-18.24	Pass
		HOPP	3DH5	1	1.76	-18.24	Pass

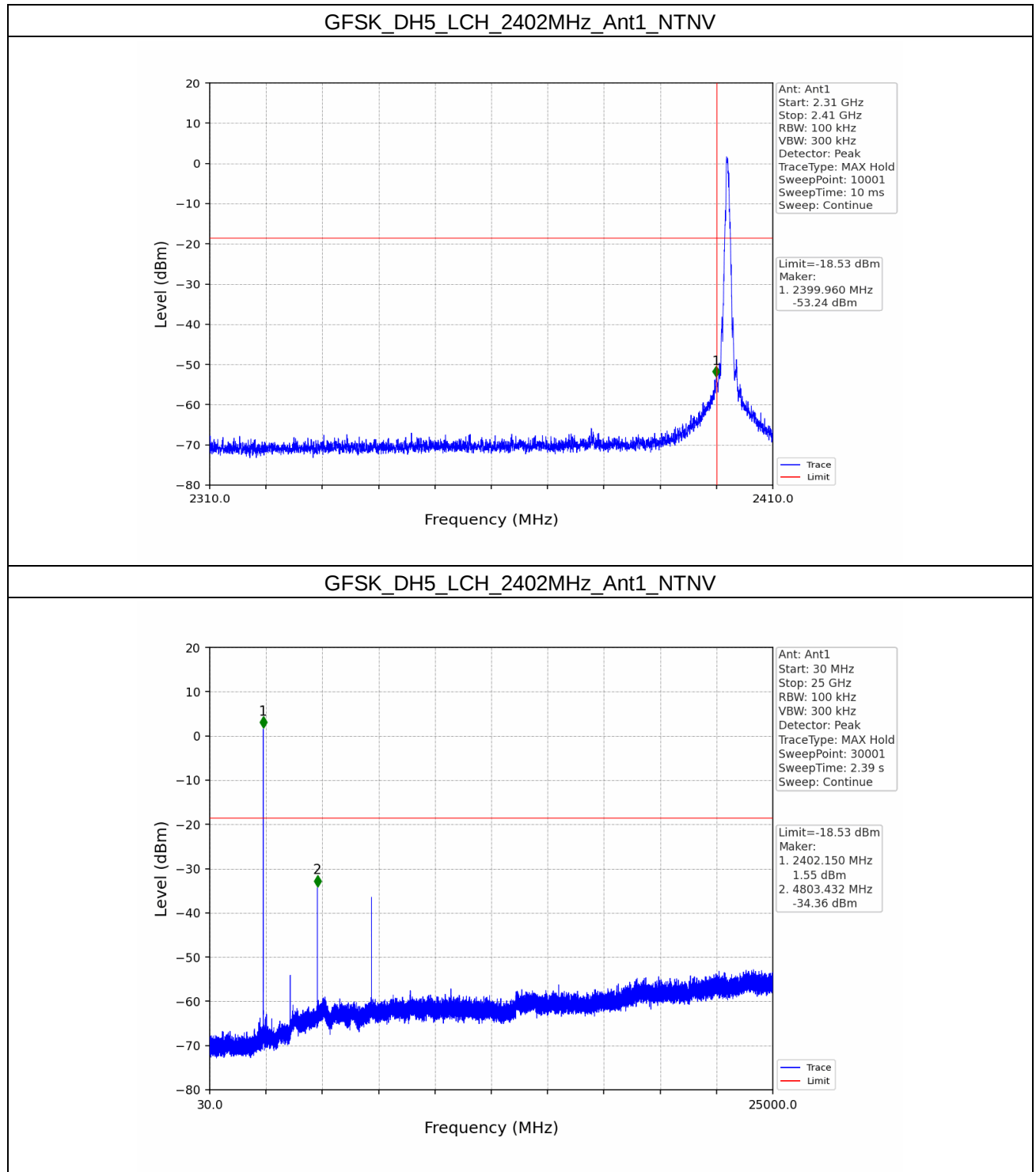


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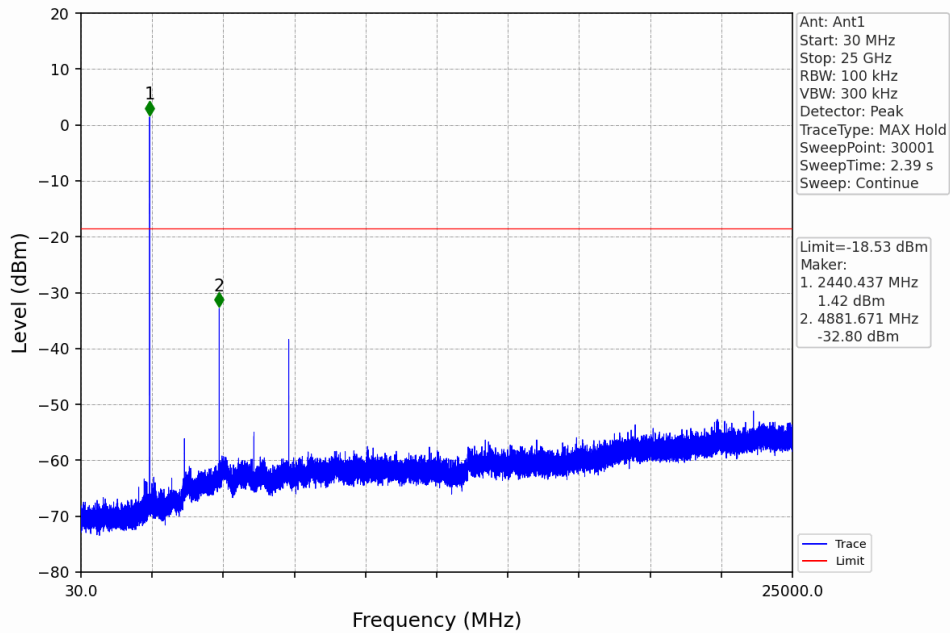
6.2.2 Test Graph



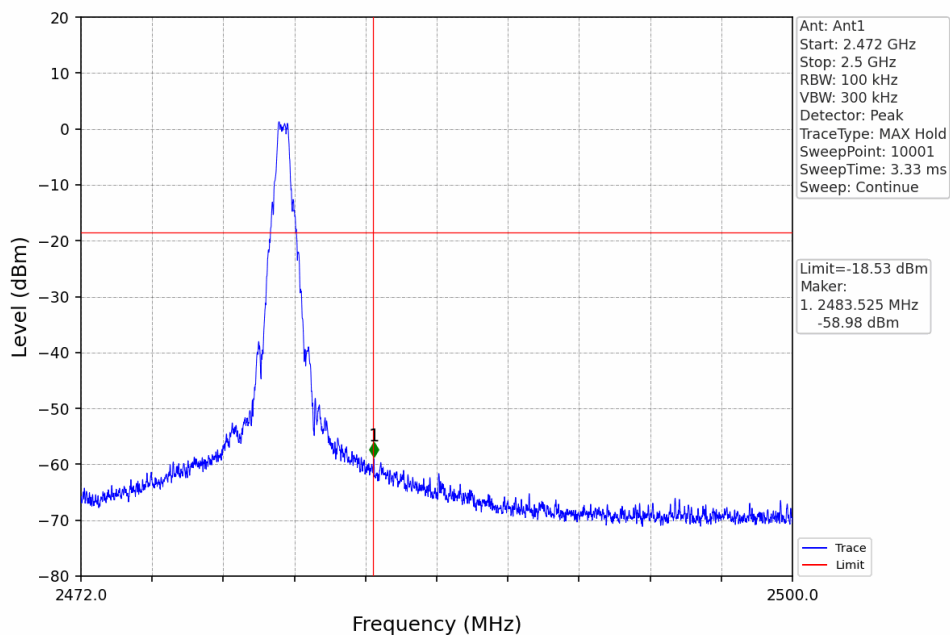
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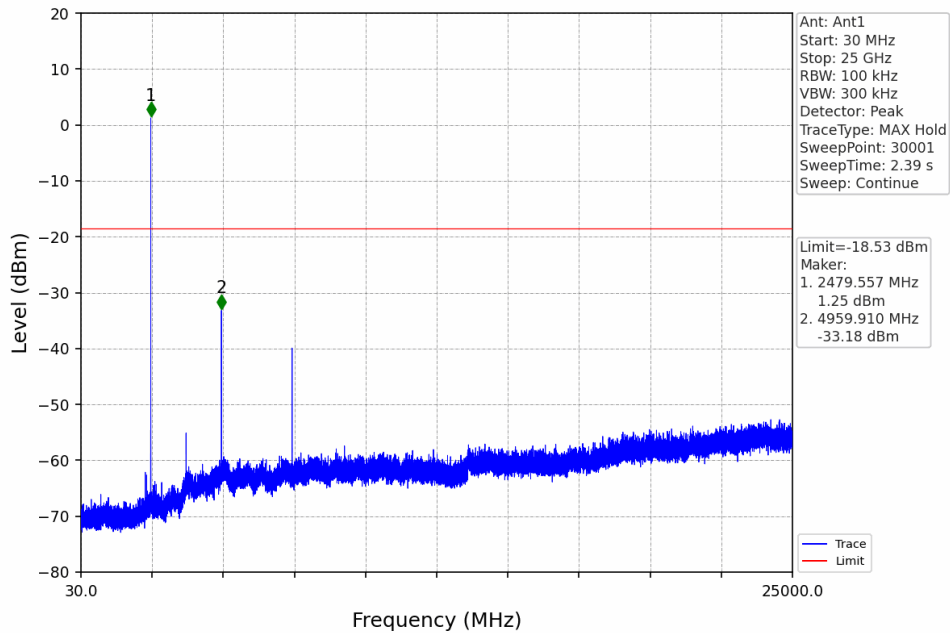
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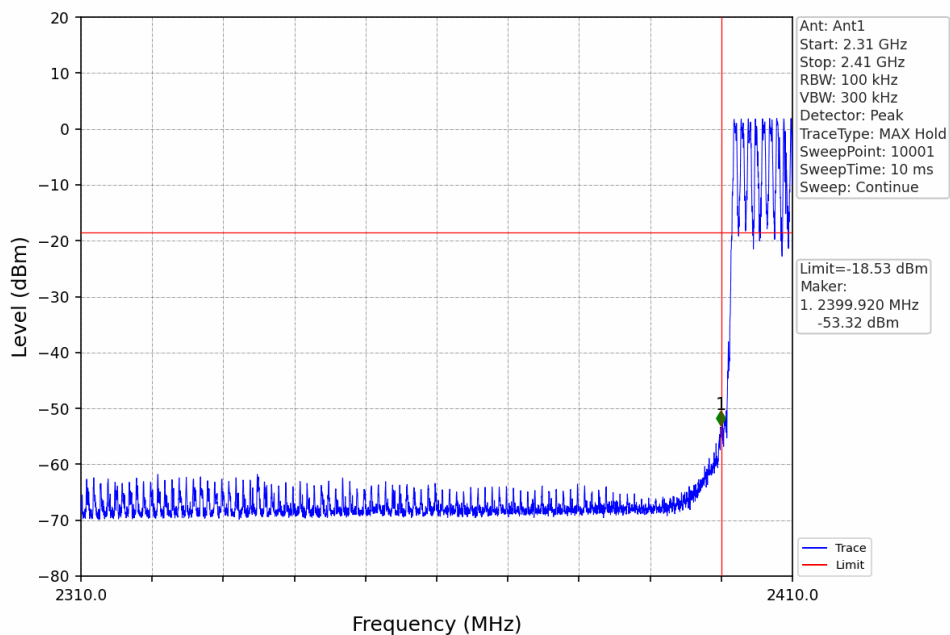
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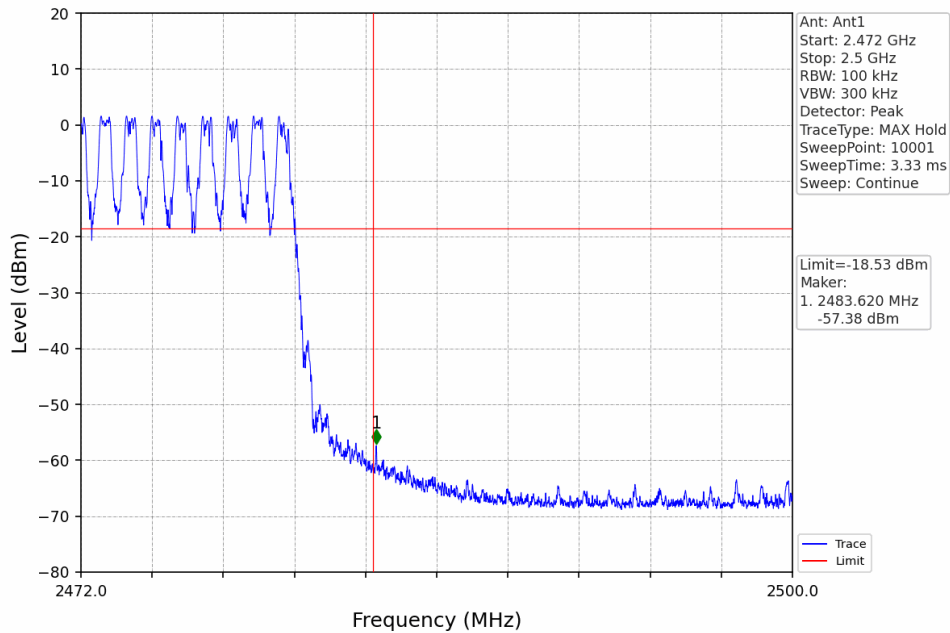
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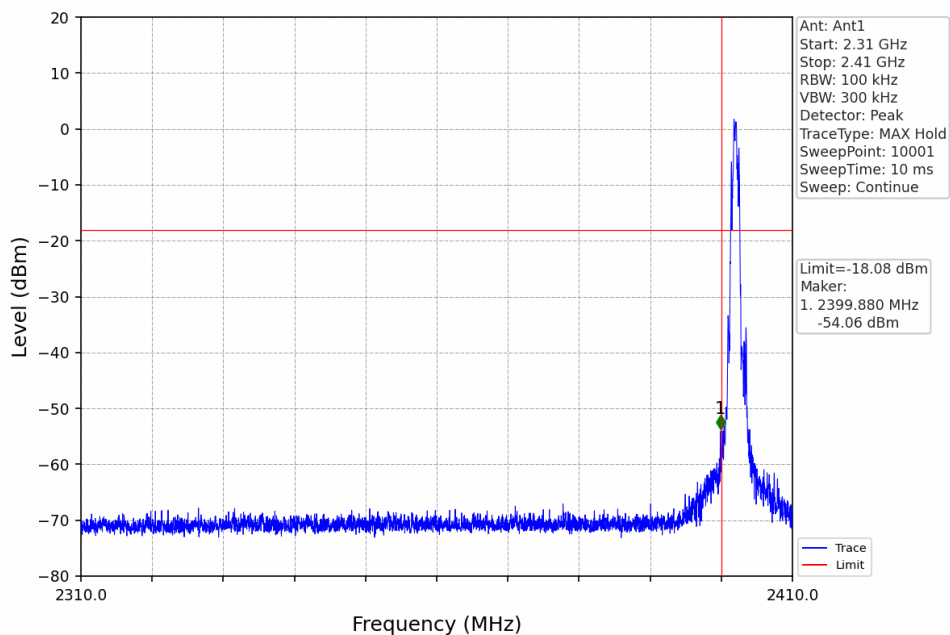
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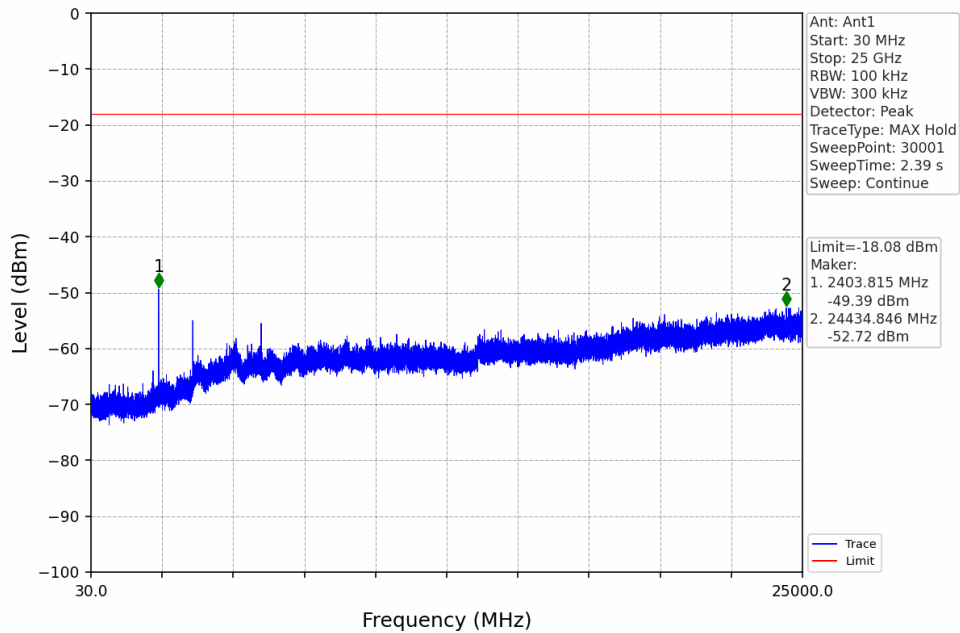
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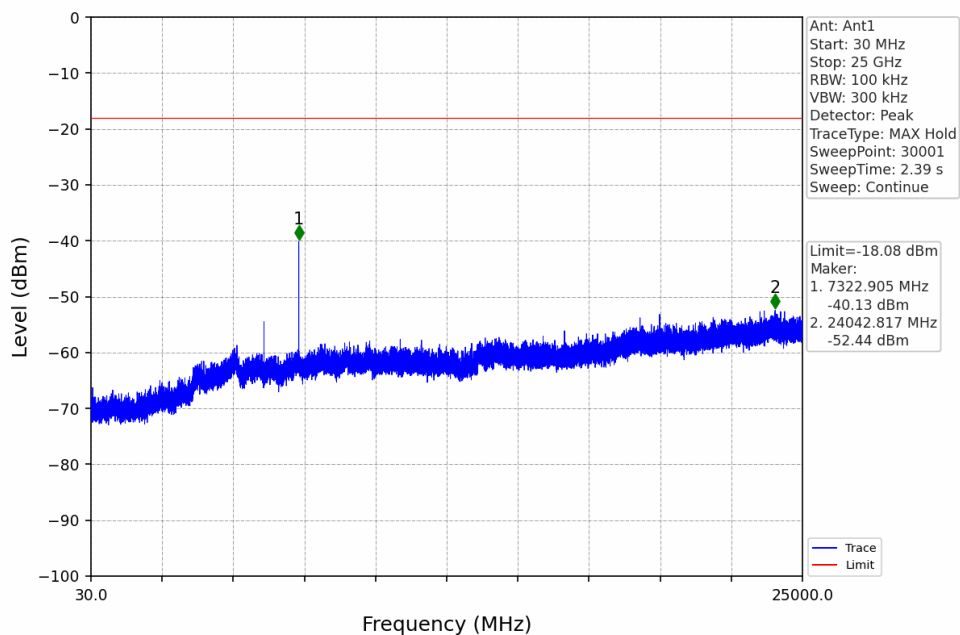
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Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



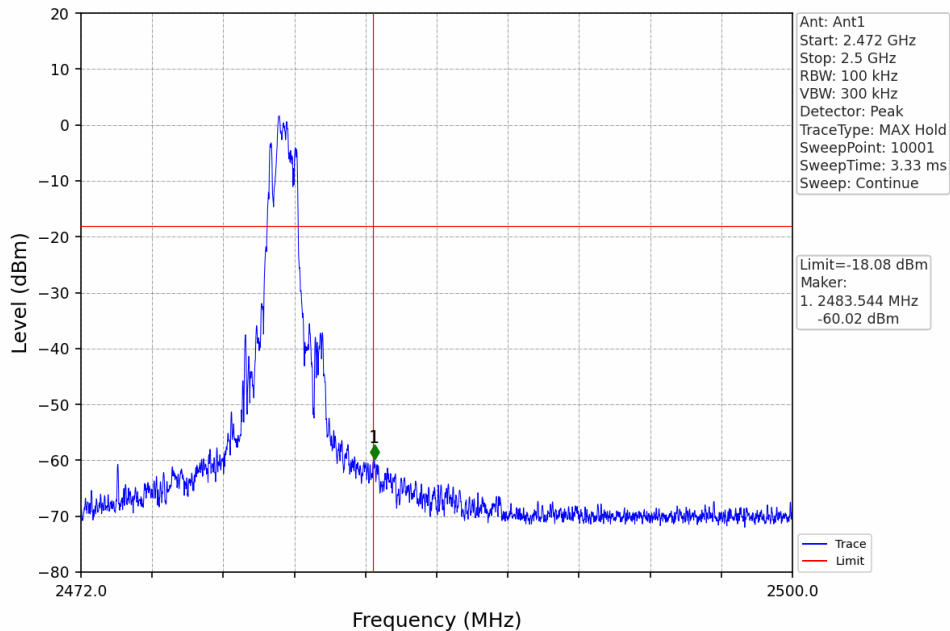
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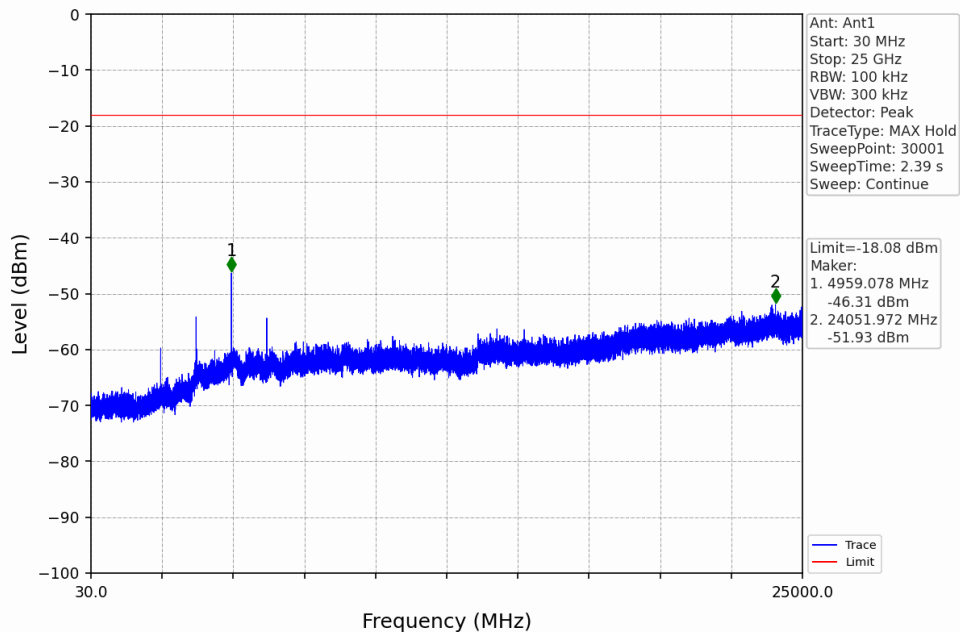
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Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



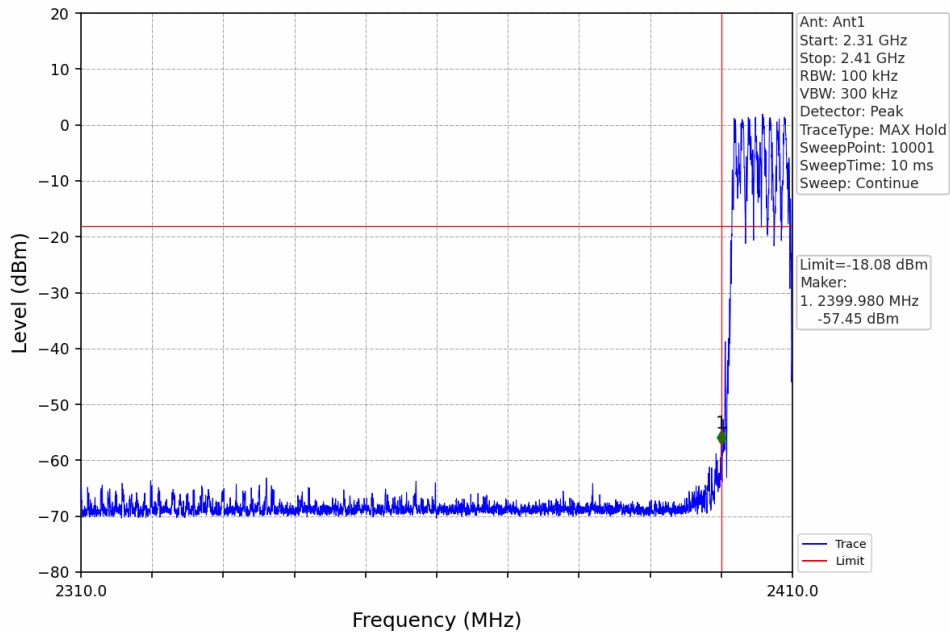
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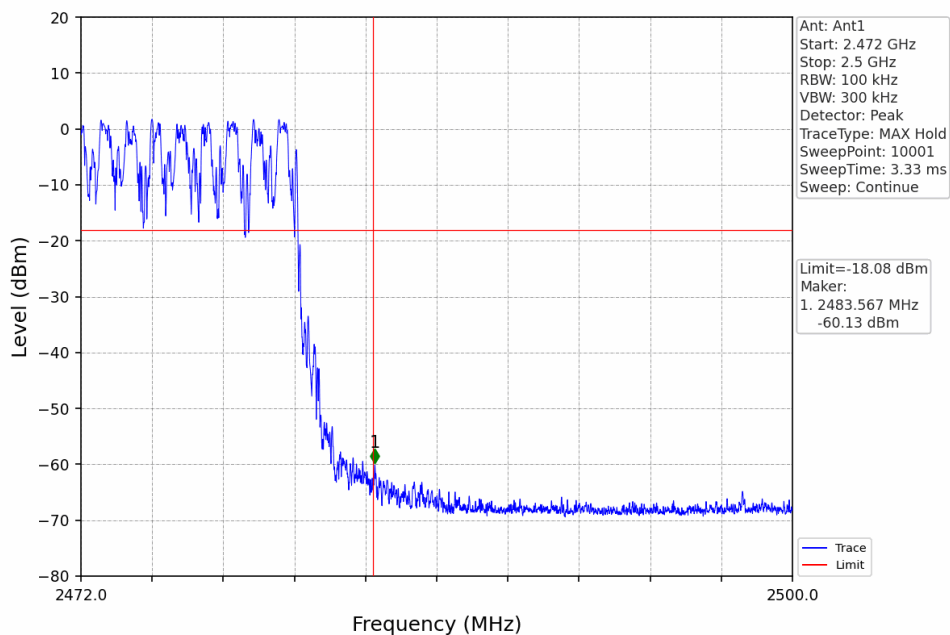
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Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



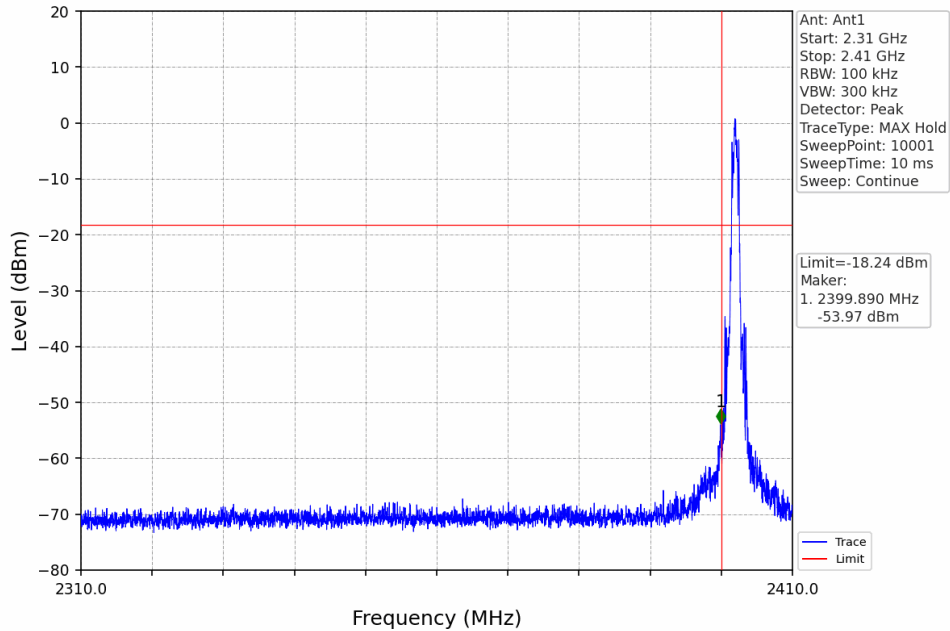
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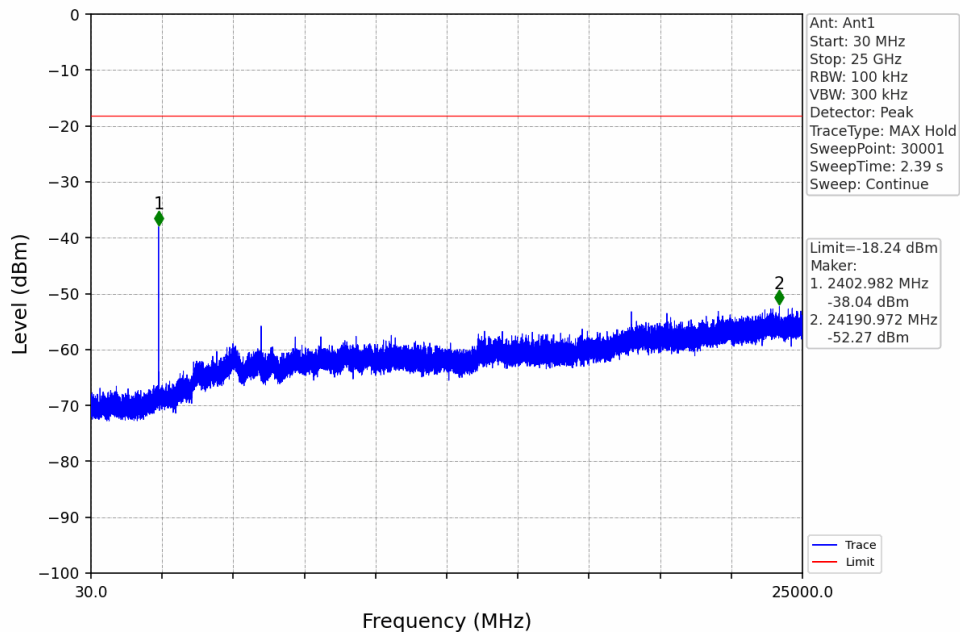
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8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



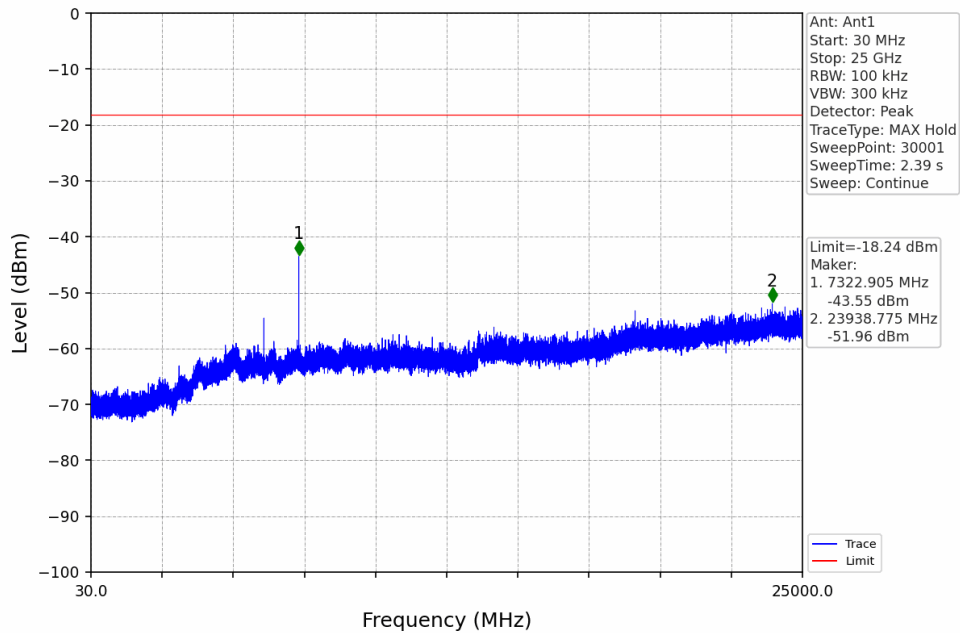
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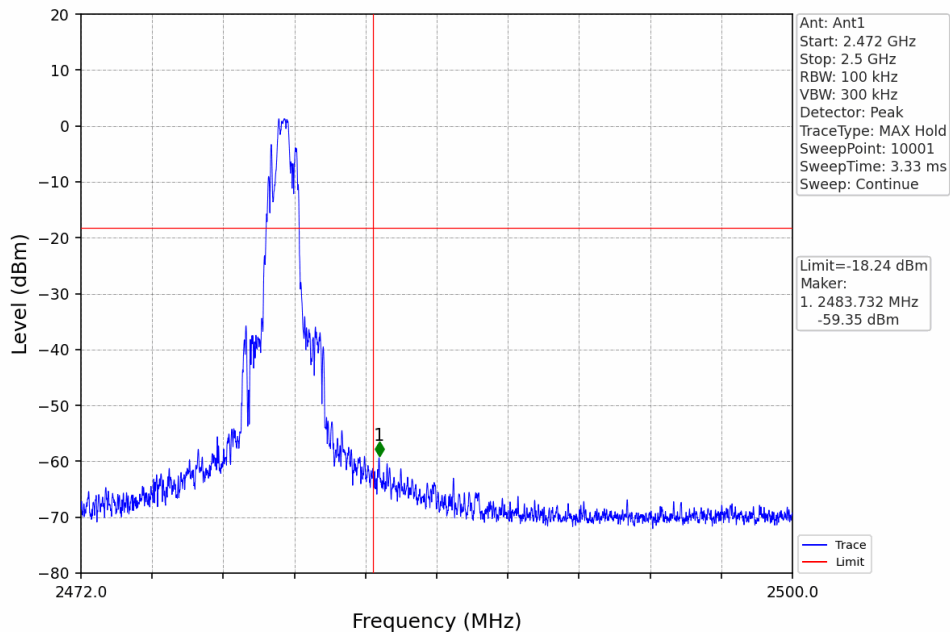
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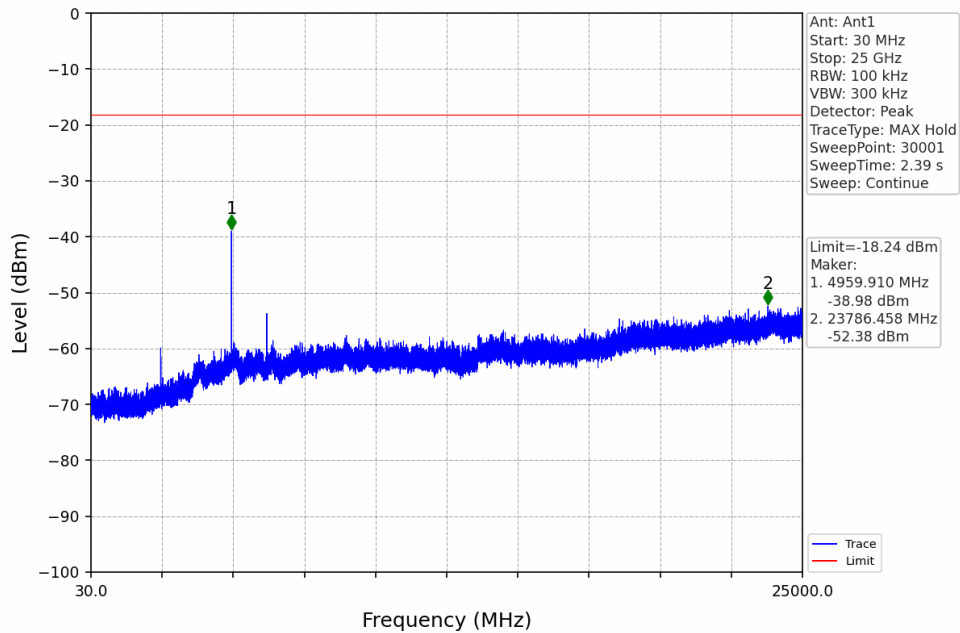
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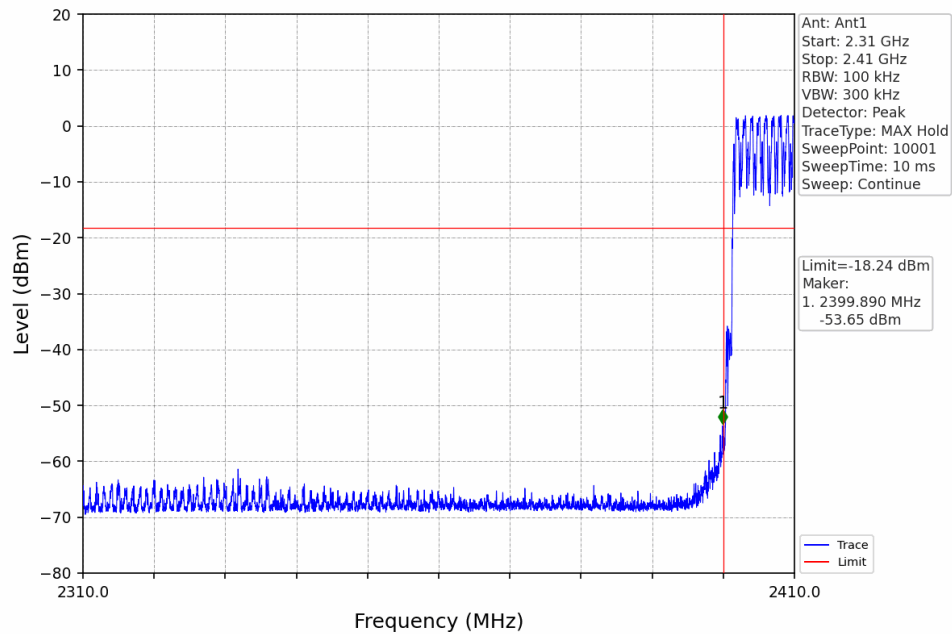
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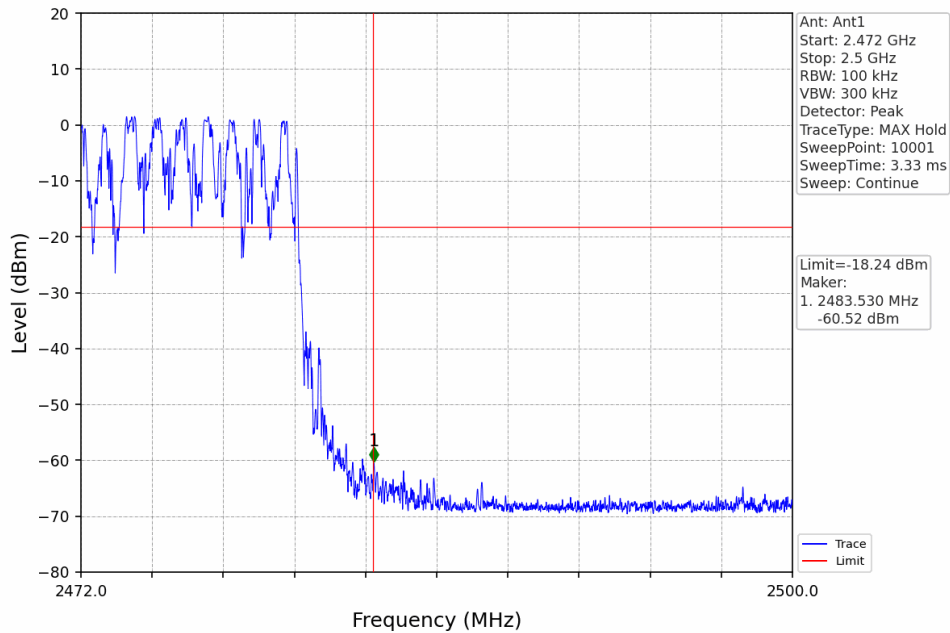
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8DPSK_3DH5_HOPP_Ant1_NTNV



- End of the Report -



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