RF Test Report

For

Applicant name:	**Nomenta Industries International BV**
Address:	Kenaupark 33-2,2011 MR, Haarlem, Netherlands
EUT name:	Portable Speaker
Brand name:	KOODUU
Model number:	Sensa Play
Series model number:	N/A
FCC ID:	2ASCWSPSPL

Issued By

Company name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Report number:	BTF250807R01101
Test standards:	FCC CFR Title 47 Part 15 Subpart C (§15.247)
Test conclusion:	Pass
Date of sample receipt:	2025-08-07
Test date:	2025-08-08 to 2025-09-01
Date of issue:	2025-09-01

Prepared by: Chris Liu /Project engineer

Approved by: Ryan.CJ /EMC manager

BTF Testing Lab (Shenzhen) Co., Ltd.

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Revision History		
Version	Issue date	Revisions content
R_V0	2025-09-01	Original

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BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/ 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 Laboratory Location

Test location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Description:	All measurement facilities used to collect the measurement data are located at 101/201/301, Building 1, Block 2, Tantou Industrial Park,Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Phone number:	+86-0755-23146130
Fax number:	+86-0755-23146130

1.2 Laboratory Facility

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

- **FCC - Designation No.: CN1409**
  BTF Testing Lab (Shenzhen) Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The test firm Registration No. is 695374.
- **CNAS - Registration No.: CNAS L17568**
  BTF Testing Lab (Shenzhen) Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L17568.
- **A2LA - Registration No.: 6660.01**
  BTF Testing Lab (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.

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.
(7) All entrusted information in this report is provided by the client and has been confirmed through consultation with the client; The testing items for this report have been discussed and confirmed with the client, and our company is only responsible for the content reflected in the report.

2 Product Information

2.1 Application Information

Company name:	Nomenta Industries International BV
Address:	Kenaupark 33-2,2011 MR, Haarlem, Netherlands

2.2 Manufacturer Information

Company name:	AZREE SERVICE & TRADING SDN BHD
Address:	NO, 20A, TKT 1, JALAN CENGKEH OFF JALAN KIM CHUAN, PANDAMARAN, 42000 PELABUHAN KLANG, SELANGOR

2.3 Factory Information

Company name:	AZREE SERVICE & TRADING SDN BHD
Address:	NO, 20A, TKT 1, JALAN CENGKEH OFF JALAN KIM CHUAN, PANDAMARAN, 42000 PELABUHAN KLANG, SELANGOR

2.4 General Description of Equipment under Test (EUT)

EUT name	Portable Speaker
Under test model name	Sensa Play
Series model name	N/A
Description of model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Rating:	Input: DC 5V 2A Battery:7.4 V 19.24Wh

2.5 Technical Information

Operation frequency:	2402MHz ~ 2480MHz
Channel number:	79
Channel separation:	1MHz
Modulation technology:	GFSK, π/4 DQPSK, 8DPSK
Data rate:	1/2/3 Mbits/s
Max. Conducted Power:	5.46 dBm
Antenna type:	Internal Antenna
Antenna gain:	3.13dBi (declare by Applicant)
Antenna transmit mode:	SISO (1TX, 1RX)

2.6 Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
…	…	…	…	…	…	…	…
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
…	…	…	…	…	…	…	…
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz	-	
Remark: Channel 0, 39 & 78 have been tested for GFSK, π/4-DQPSK, 8DPSK modulation mode.							

3 Test Information

3.1 Test Standards

Identity	Document Title
FCC CFR Title 47 Part 15 Subpart C (§15.247)	Intentional Radiators - Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
ANSI C63.10-2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of The FCC Rules

3.2 Summary of Test

Clauses	Test Items	Result
Part 15.203	Antenna requirement	PASS
47 CFR 15.207(a)	Conducted Emission at AC power line	PASS
47 CFR 15.215(c)	Occupied Bandwidth	PASS
47 CFR 15.247(b)(1)	Maximum Conducted Output Power	PASS
47 CFR 15.247(a)(1)	Channel Separation	PASS
47 CFR 15.247(a)(1)(iii)	Number of Hopping Frequencies	PASS
47 CFR 15.247(a)(1)(iii)	Dwell Time	PASS
47 CFR 15.247(d)	Emissions in non-restricted frequency bands	PASS
47 CFR 15.247(d)	Band edge emissions (Radiated)	PASS
47 CFR 15.247(d)	Emissions in restricted frequency bands (below 1GHz)	PASS
Remark: *1. Pass: met the requirements.* *2. N/A: not applicable.*		

3.3 Uncertainty of Test

Measurement	Value
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Supply voltages	±3 %
Time	±5 %
Conducted Emission for LISN (9kHz ~ 150kHz)	±2.97 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.45 dB
Radiated Emission (30MHz ~ 1000MHz)	±4.80 dB
Radiated Emission (1GHz ~ 18GHz)	±4.82 dB
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.

3.4 Additions to, deviations, or exclusions from the method

None

3.5 Test Auxiliary Equipment

No.	Description	Manufacturer	Model	Serial Number	Certification
1	Power Adapter	Apple Inc.	A2166	N/A	N/A

3.6 Test Equipment List

Radiated test method					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	Rohde &Schwarz	ESCI7	101032	2024/10/25	2025/10/24
Signal Analyzer	Rohde & Schwarz	FSQ40	100010	2024/10/25	2025/10/24
Log periodic antenna	Schwarzbeck	VULB 9168	01328	2024/10/28	2025/10/27
Preamplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9744	00246	2024/09/24	2025/09/23
Horn Antenna (1GHz ~18GHz)	Schwarzbeck	BBHA9120D	2597	2024/10/30	2025/10/29
Horn Antenna (15GHz ~ 40GHz)	SCHWARZBECK	BBHA9170	1157	2024/10/24	2025/10/23
Preamplifier (1GHz ~ 40GHz)	TST Pass	LNA10180G45	246	2024/09/24	2025/09/23
Test Software	Frad	EZ_EMC	Version: FA-03A2 RE+		

Conducted Emission Test					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	Rohde & Schwarz	ESCI3	101422	2024/10/25	2025/10/24
V-LISN	Schwarzbeck	NSLK 8127	01073	2024/10/25	2025/10/24
Coaxial Switcher	Schwarzbeck	CX210	CX210	2024/10/25	2025/10/24
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00953	2024/10/25	2025/10/24
Test Software	Frad	EZ_EMC	Version: EMC-CON 3A1.1+		

Conducted test method					
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020A	MY50410020	2024/10/25	2025/10/24
ESG Vector Signal Generator	Agilent	E4438C	MY45094854	2024/10/25	2025/10/24
MXG Vector Signal Generator	Agilent	N5182A	MY46240163	2024/10/25	2025/10/24
Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	161997	2024/10/25	2025/10/24
Temperature Humidity Chamber	ZZCKONG	ZZ-K02A	20210928007	2024/10/25	2025/10/24

DC Power Supply	Tongmen	etm-6050c	20211026123	2024/10/25	2025/10/24
RF Control Unit	Techy	TR1029-1	/	2024/10/25	2025/10/24
RF Sensor Unit	Techy	TR1029-2	/	2024/10/25	2025/10/24
Test Software	TST Pass	/	Version: 2.0		

4 Test Configuration

4.1 Environment Condition

Selected Values During Tests		
Temperature	Relative Humidity	Ambient Pressure
Normal: +15°C to +35°C Extreme: -30°C to +50°C	20% to 75%	86 kPa to 106 kPa

4.2 Test mode

(TM1)Transmitting mode:	Keep the EUT in continuously transmitting mode with modulation

We have verified the construction and function in typical operation. All the test items were carried out with the EUT in above test modes.

Clauses	Test Items	Test mode
Part 15.203	Antenna requirement	TM1
47 CFR 15.207(a)	Conducted Emission at AC power line	TM1
47 CFR 15.247(b)(3)	Duty Cycle	TM1
47 CFR 15.247(a)(2)	Occupied Bandwidth	TM1
47 CFR 15.247(b)(3)	Maximum Conducted Output Power	TM1
47 CFR 15.247(e)	Power Spectral Density	TM1
47 CFR 15.247(d)	Emissions in non-restricted frequency bands	TM1
47 CFR 15.247(d)	Band edge emissions (Radiated)	TM1
47 CFR 15.247(d)	Emissions in restricted frequency bands (below 1GHz)	TM1

4.3 Test Channel of EUT

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	39	2441	78	2480

4.4 Test software

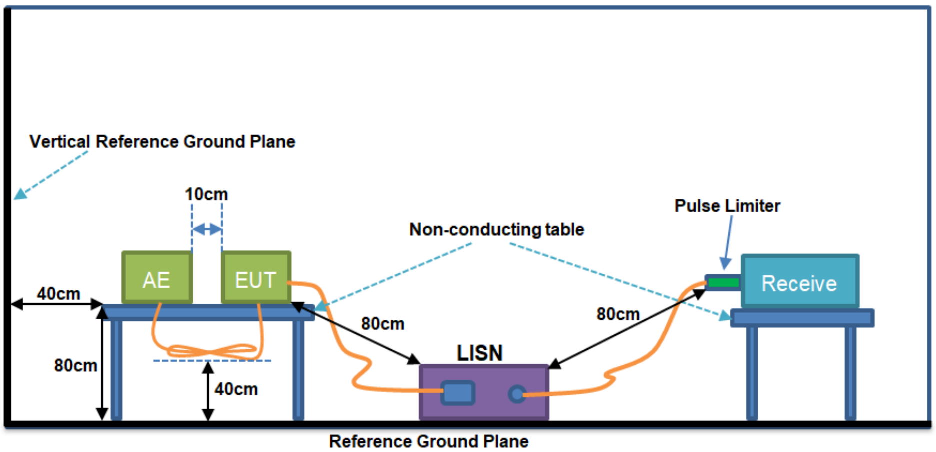
Test software:	Version:	Power Class:
FrequencyTool	v0.3.2	5

4.5 Test procedure

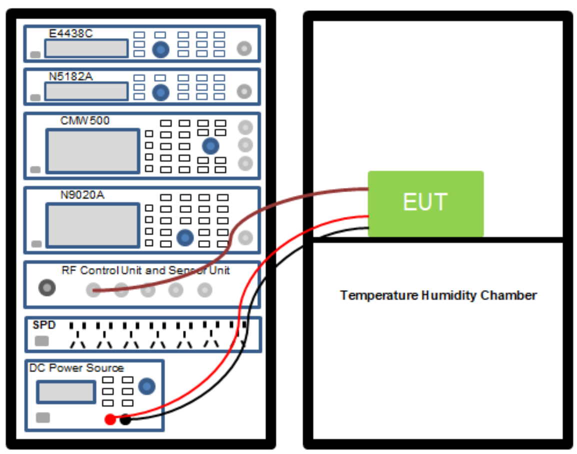
AC Power Line Conducted Emission
The EUT is connected to the power mains through a LISN which provides 50 Ω/50 μH of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.
1. Level= Read Level+ Cable Loss+ LISN Factor 2. Margin=Level-Limit=Reading+factor-Limit
Radiated test method
1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, recorded the test results. 4. The substitution antenna shall be used to replace the equipment under test. 5. The reference point of the substitution antenna shall coincide with the volume centre of the UUT when its antenna is internal. 6. Set the required test frequency for the signal generator, adjust the emission level, until the spectrum analyzer reading on the receiving link is consistent with the recorded value in step 3, and the recorded signal generator emission level. 7. Final results = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB). This report only reflects the final results.
1. Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor 2. Margin=Level-Limit=Reading+factor-Limit
Conducted test method
1. The Bluetooth LE antenna port of EUT was connected to the test port of the test system through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. Open the test software, prepare a test plan, and control the system through the software. After the test is completed, the test report is exported through the test software.

4.6 Test Setup Block

1) **Conducted emission measurement:**

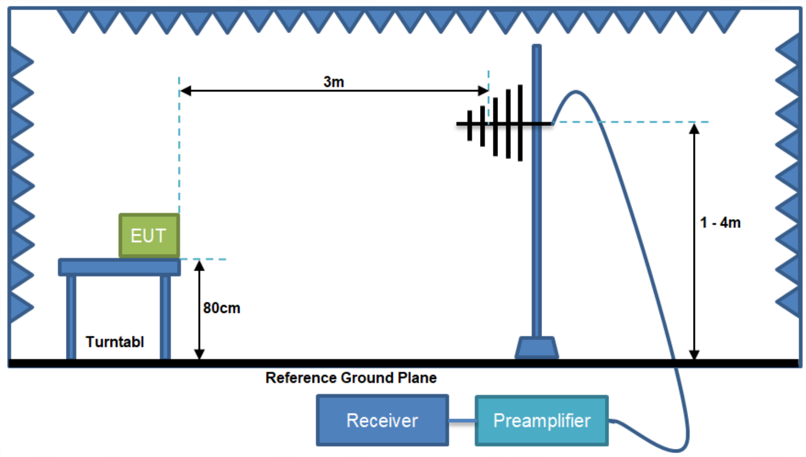


2) **Conducted test method:**

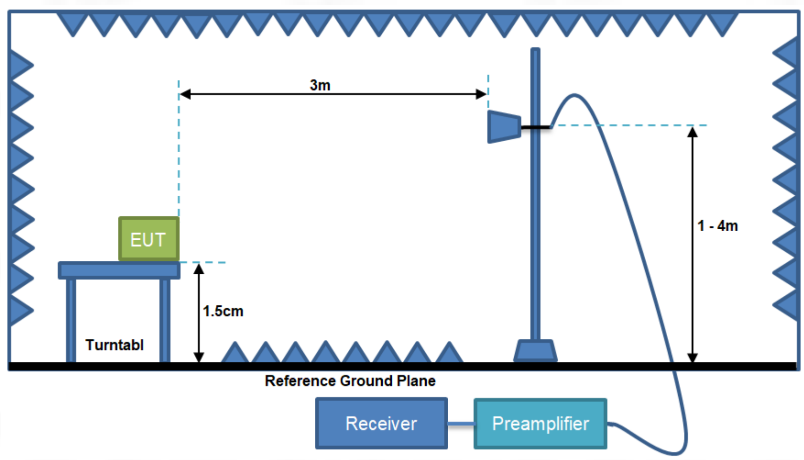


3) Radiated test method:

Below 1GHz



Above 1GHz



5 Technical requirements specification

5.1 Antenna Requirement

§15.203 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:

(4) 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.

E.U.T Antenna:	The Bluetooth antenna is an Internal antenna which permanently attached, and the best case gain of the antenna is -0.68 dBi. See product internal photos for details.

5.2 AC Power Line Conducted Emission

Test Requirement:	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:	Refer to ANSI C63.10-2020 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices
Test Limit:	see table below
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	AC 120V 60Hz

Test Limit:

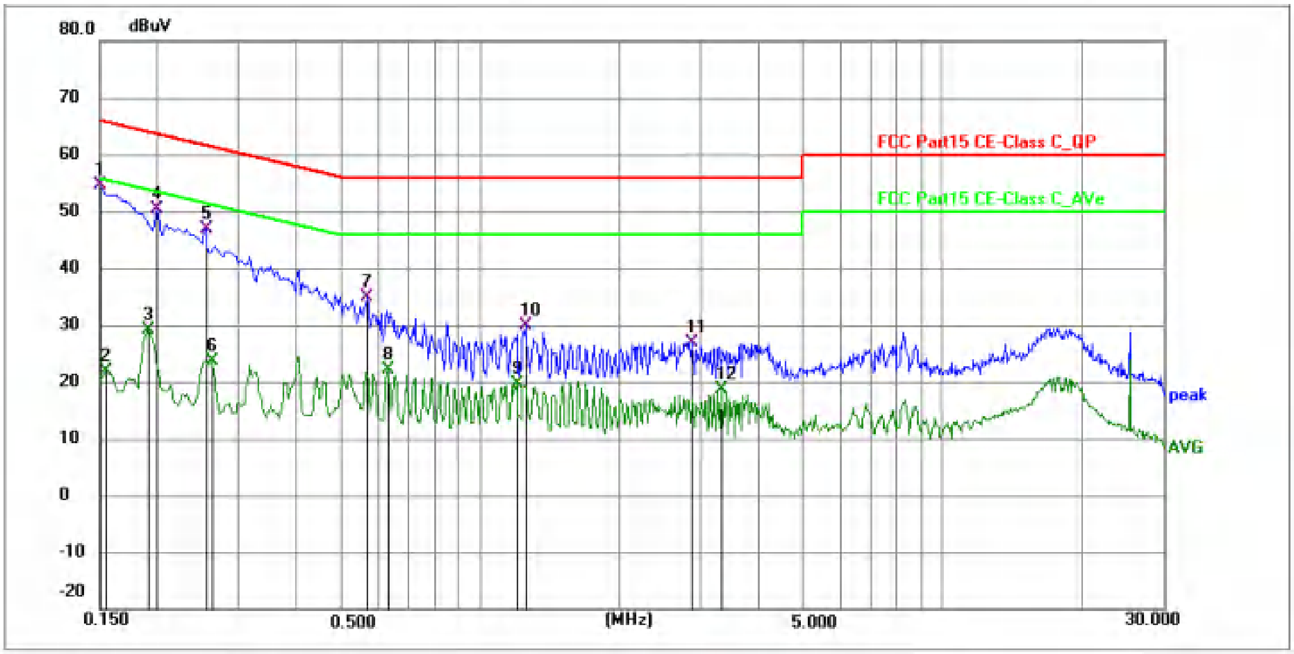
Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

5.2.1 Test Data:

Remark: The report only reflects the test data of worst mode.

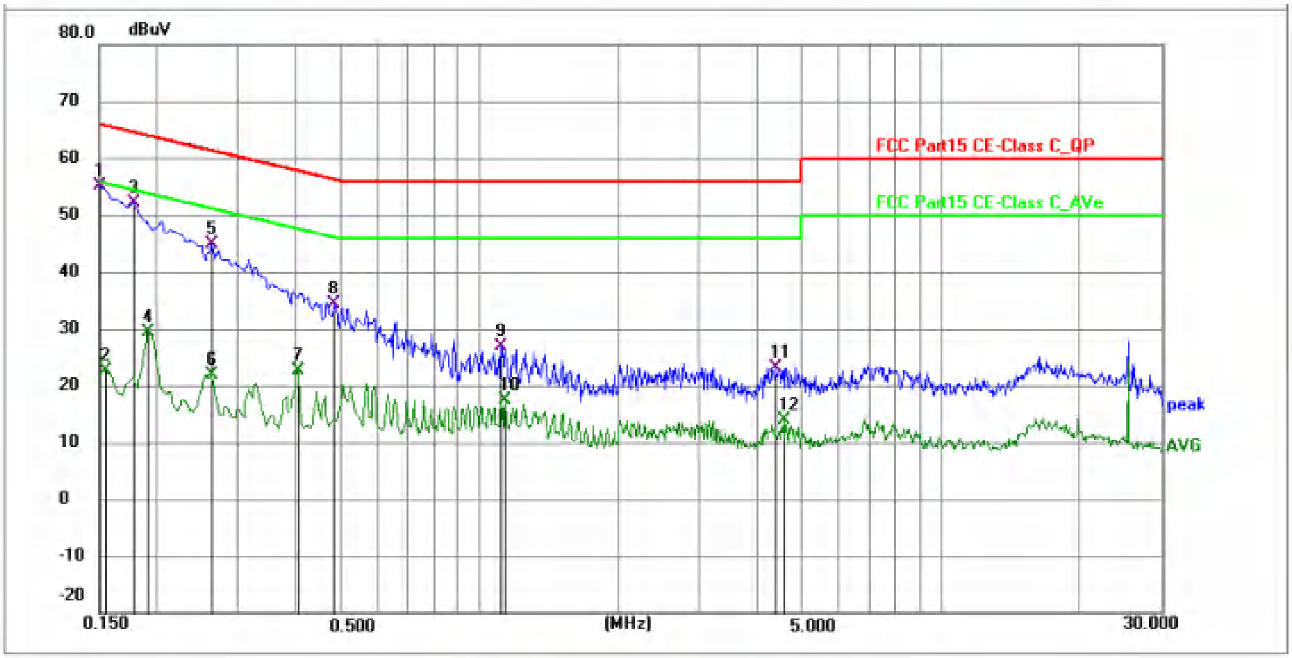
Test phase: L phase



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	44.18	10.55	54.73	66.00	-11.27	QP	P	
2	0.1544	11.33	10.56	21.89	55.76	-33.87	AVG	P	
3	0.1905	18.46	10.64	29.10	54.01	-24.91	AVG	P	
4	0.1995	39.79	10.66	50.45	63.63	-13.18	QP	P	
5	0.2535	36.22	10.66	46.88	61.64	-14.76	QP	P	
6	0.2625	12.89	10.66	23.55	51.35	-27.80	AVG	P	
7	0.5685	24.29	10.65	34.94	56.00	-21.06	QP	P	
8	0.6310	11.48	10.61	22.09	46.00	-23.91	AVG	P	
9	1.1980	8.92	10.82	19.74	46.00	-26.26	AVG	P	
10	1.2520	19.07	10.81	29.88	56.00	-26.12	QP	P	
11	2.8635	16.26	10.72	26.98	56.00	-29.02	QP	P	
12	3.3224	7.91	10.72	18.63	46.00	-27.37	AVG	P	

Note:Margin=Level-Limit=Reading+factor-Limit

Test phase: N phase



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	44.63	10.55	55.18	66.00	-10.82	QP	P	
2	0.1544	12.13	10.55	22.68	55.76	-33.08	AVG	P	
3	0.1770	41.63	10.56	52.19	64.63	-12.44	QP	P	
4	0.1905	18.90	10.56	29.46	54.01	-24.55	AVG	P	
5	0.2625	34.40	10.60	45.00	61.35	-16.35	QP	P	
6	0.2625	11.24	10.60	21.84	51.35	-29.51	AVG	P	
7	0.4020	11.93	10.70	22.63	47.81	-25.18	AVG	P	
8	0.4830	23.67	10.76	34.43	56.29	-21.86	QP	P	
9	1.1130	15.94	10.87	26.81	56.00	-29.19	QP	P	
10	1.1350	6.60	10.87	17.47	46.00	-28.53	AVG	P	
11	4.3935	12.26	10.97	23.23	56.00	-32.77	QP	P	
12	4.5960	2.79	11.01	13.80	46.00	-32.20	AVG	P	

Note:Margin=Level-Limit=Reading+factor-Limit

5.3 Emissions in Restricted Frequency Bands

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:	Radiated emissions tests
Test Limit:	see table below
Procedure:	ANSI C63.10-2020 section 6.10.5.2
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 7.4V From Battery

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.

5.3.1 Test Data:

Remark: The report only reflects the test data of worst mode.

Test Channel: Lowest channel, Test Polarization: Vertical

Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
2310.00	51.57	3.85	55.42	74.00	-18.58	Peak	Pass
2310.00	40.63	3.85	44.48	54.00	-9.52	AVG	Pass
2390.00	52.86	3.91	56.78	74.00	-17.22	Peak	Pass
2390.00	42.91	3.91	46.82	54.00	-7.18	AVG	Pass

Test Channel: Lowest channel, Test Polarization: Horizontal

Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
2310.00	50.71	3.85	54.56	74.00	-19.44	Peak	Pass
2310.00	40.12	3.85	43.97	54.00	-10.03	AVG	Pass
2390.00	52.64	3.91	56.55	74.00	-17.45	Peak	Pass
2390.00	41.97	3.91	45.89	54.00	-8.11	AVG	Pass

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Email: info@btf-lab.com Tel: +86-755-23146130 http://www.btf-lab.com

Test Channel: Highest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
2483.50	51.33	3.99	55.31	74.00	-18.69	Peak	Pass
2483.50	41.82	3.99	45.80	54.00	-8.20	AVG	Pass
2500.00	52.69	4.00	56.69	74.00	-17.31	Peak	Pass
2500.00	41.93	4.00	45.93	54.00	-8.07	AVG	Pass
Test Channel: Highest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
2483.50	52.35	3.99	56.34	74.00	-17.66	Peak	Pass
2483.50	42.26	3.99	46.25	54.00	-7.75	AVG	Pass
2500.00	52.96	4.00	56.96	74.00	-17.04	Peak	Pass
2500.00	43.17	4.00	47.17	54.00	-6.83	AVG	Pass

Note:Margin=Level-Limit=Reading+factor-Limit

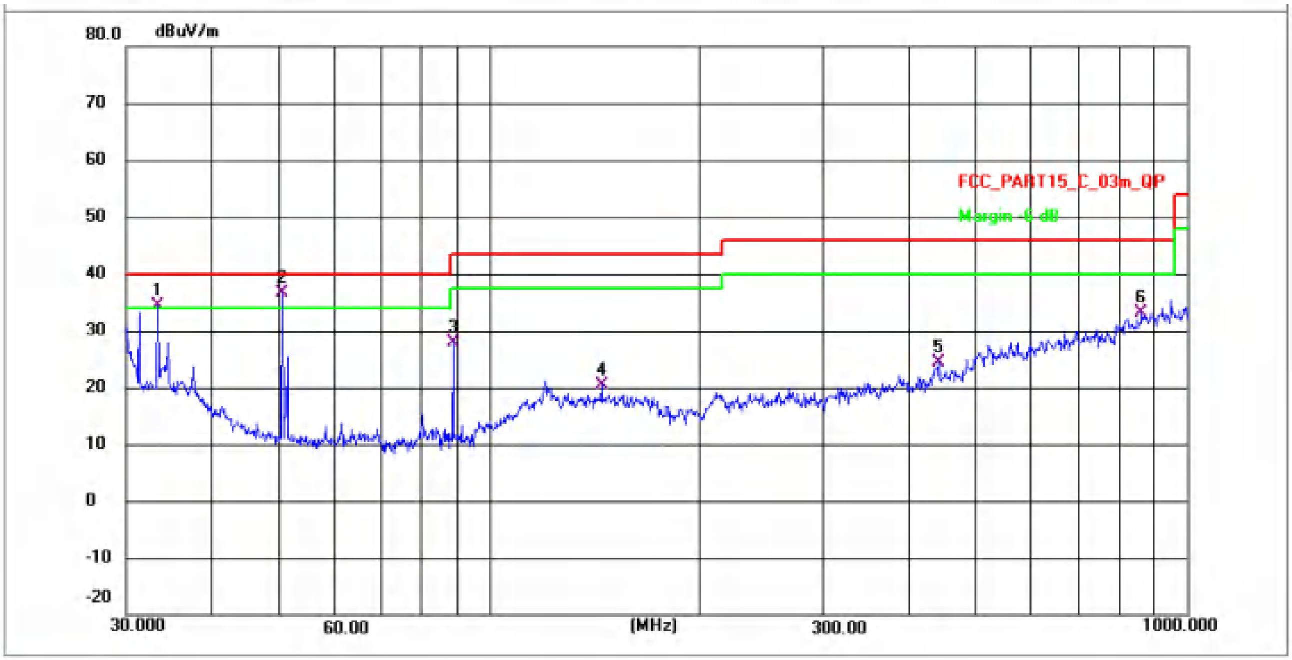
5.4 Emissions in Non-restricted Frequency Bands(below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>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>Radiated emissions tests</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.</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2020 section 6.6.4</td></tr>
<tr><td>Test Setup:</td><td>See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos</td></tr>
<tr><td colspan="2">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>22.5℃</td></tr>
<tr><td>Humidity:</td><td>46%RH</td></tr>
<tr><td>Atmospheric Pressure:</td><td>1010 hpa</td></tr>
<tr><td>Test voltage:</td><td>DC7.4V From Battery</td></tr>
</table>

5.4.1 Test Data:

Remark: The report only reflects the test data of worst mode.

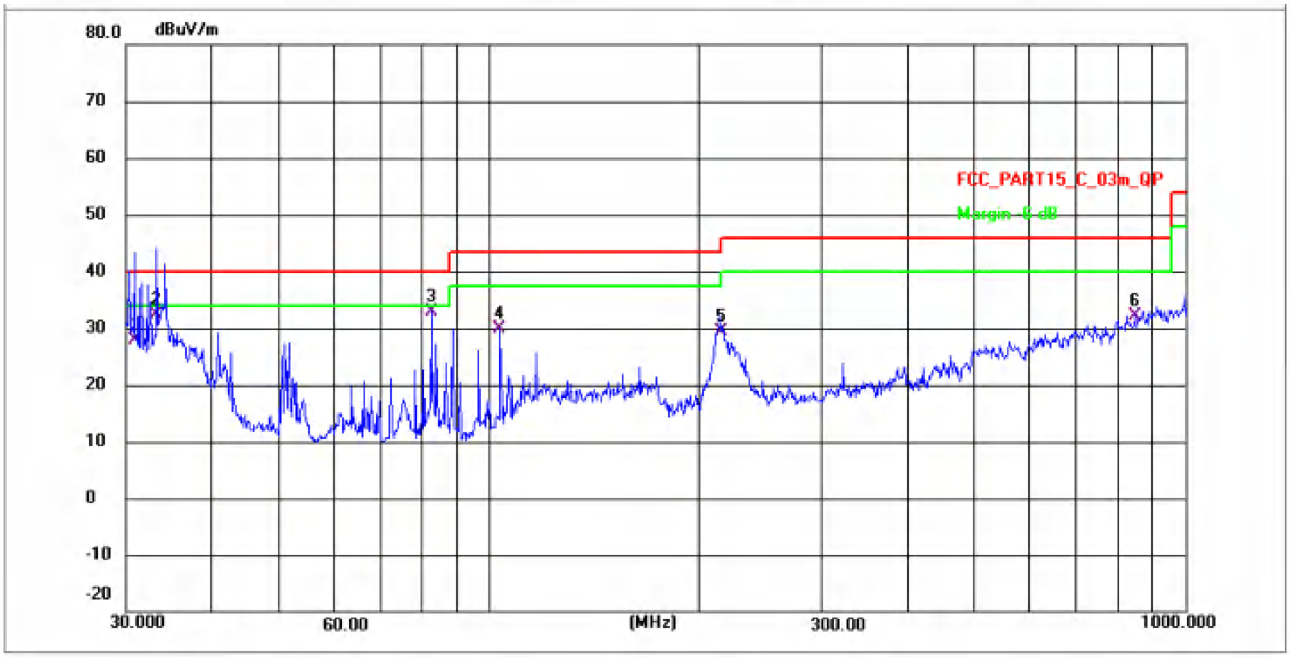
Test antenna polarization: Horizontal(30 MHz to 1 GHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 !	33.3864	44.07	-9.68	34.39	40.00	-5.61	QP	P
2 *	50.2324	46.27	-9.55	36.72	40.00	-3.28	QP	P
3	88.4972	50.53	-22.65	27.88	43.50	-15.62	QP	P
4	144.5880	42.38	-22.06	20.32	43.50	-23.18	QP	P
5	440.9687	43.99	-19.49	24.50	46.00	-21.50	QP	P
6	863.0562	49.98	-16.82	33.16	46.00	-12.84	QP	P

Note:Margin=Level-Limit=Reading+factor-Limit

Test antenna polarization: Vertical (30 MHz to 1 GHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	30.9076	37.63	-9.73	27.90	40.00	-12.10	QP	P
2	33.2112	42.18	-9.68	32.50	40.00	-7.50	QP	P
3 *	82.6482	55.56	-22.73	32.83	40.00	-7.17	QP	P
4	103.6237	52.21	-22.43	29.78	43.50	-13.72	QP	P
5	215.6456	50.74	-21.38	29.36	43.50	-14.14	QP	P
6	848.0563	49.30	-17.07	32.23	46.00	-13.77	QP	P

Note:Margin=Level-Limit=Reading+factor-Limit

5.5 Emissions in Non-restricted 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:	Radiated emissions tests
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.
Procedure:	ANSI C63.10-2020 section 6.6.4
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 7.4V From Battery

5.5.1 Test Data:

Remark: The report only reflects the test data of worst mode.

Test Channel: Lowest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
4804.00	79.44	-48.89	30.55	74.00	-43.45	Peak	Pass
4804.00	69.91	-48.89	21.03	54.00	-32.97	AVG	Pass
7206.00	76.78	-47.02	29.75	74.00	-44.25	Peak	Pass
7206.00	66.80	-47.02	19.78	54.00	-34.22	AVG	Pass
Test Channel: Lowest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
4804.00	78.58	-48.89	29.70	74.00	-44.30	Peak	Pass
4804.00	67.82	-48.89	18.93	54.00	-35.07	AVG	Pass
7206.00	75.04	-47.02	28.01	74.00	-45.99	Peak	Pass
7206.00	64.51	-47.02	17.49	54.00	-36.51	AVG	Pass

Test Channel: Middle channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
4882.00	79.57	-48.84	30.73	74.00	-43.27	Peak	Pass
4882.00	69.94	-48.84	21.10	54.00	-32.90	AVG	Pass
7323.00	75.42	-46.90	28.52	74.00	-45.48	Peak	Pass
7323.00	65.75	-46.90	18.85	54.00	-35.15	AVG	Pass
Test Channel: Middle channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
4882.00	79.21	-48.84	30.36	74.00	-43.64	Peak	Pass
4882.00	69.27	-48.84	20.42	54.00	-33.58	AVG	Pass
7323.00	75.77	-46.90	28.87	74.00	-45.13	Peak	Pass
7323.00	65.66	-46.90	18.76	54.00	-35.24	AVG	Pass
Test Channel: Highest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
4960.00	78.28	-48.79	29.50	74.00	-44.50	Peak	Pass
4960.00	67.32	-48.79	18.53	54.00	-35.47	AVG	Pass
7440.00	74.90	-46.74	28.16	74.00	-45.84	Peak	Pass
7440.00	64.55	-46.74	17.81	54.00	-36.19	AVG	Pass
Test Channel: Highest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBµV)	Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Marging (dB)	Detector	Result
4960.00	79.84	-48.79	31.06	74.00	-42.94	Peak	Pass
4960.00	70.10	-48.79	21.32	54.00	-32.68	AVG	Pass
7440.00	75.62	-46.74	28.88	74.00	-45.12	Peak	Pass
7440.00	65.71	-46.74	18.97	54.00	-35.03	AVG	Pass

Note:Margin=Level-Limit=Reading+factor-Limit

5.6 Occupied Bandwidth

Test Requirement:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	Occupied bandwidth—relative measurement procedure
Test Limit:	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 spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five 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 video bandwidth (VBW) shall be approximately three times 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 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “−xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth. k) The occupied bandwidth shall be reported by providing 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).
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 3.7V From Battery

5.6.1 Test Data:

Please Refer to Appendix-BT for Details

5.7 Maximum Conducted Output Power

Test Requirement:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Method:	Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices
Test Limit:	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.
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 3.7V From Battery

5.7.1 Test Data:

Please Refer to Appendix-BT for Details

5.8 Channel Separation

Test Requirement:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Test Method:	Carrier frequency separation
Test 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.
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.
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 3.7V From Battery

5.8.1 Test Data:

Please Refer to Appendix-BT for Details

5.9 Number of Hopping Frequencies

Test Requirement:	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.
Test Method:	Number of hopping frequencies
Test Limit:	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.
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos.
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 3.7V From Battery

5.9.1 Test Data:

Please Refer to Appendix-BT for Details

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/ 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Email: info@btf-lab.com Tel: +86-755-23146130 http://www.btf-lab.com

5.10 Dwell Time

Test Requirement:	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.
Test Method:	Time of occupancy (dwell time)
Test Limit:	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.
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos.
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 3.7V From Battery

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/ 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Email: info@btf-lab.com Tel: +86-755-23146130 http://www.btf-lab.com

5.10.1 Test Data:

Please Refer to Appendix-BT for Details

5.11 Emissions in non-restricted frequency bands

Test Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	Conducted spurious emissions test methodology
Test 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.
Procedure:	Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers. 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 instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.
Test Setup:	See section 4.6 for test setup description. The photo of test setup please refer to Appendix I Test Setup Photos.
Operating Environment:	
Temperature:	22.5℃
Humidity:	46%RH
Atmospheric Pressure:	1010 hpa
Test voltage:	DC 3.7V From Battery

5.11.1 Test Data:

Please Refer to Appendix-BT for Details

6 Test Setup Photos

Please refer to the Appendix I Test Setup Photos

7 EUT Constructional Details (EUT Photos)

Please refer to the Appendix II External Photos &Appendix III External Photos

Appendix - BT

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	0.879	/	Pass
		2441	DH5	1	0.878	/	Pass
		2480	DH5	1	0.872	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.200	/	Pass
		2441	2DH5	1	1.188	/	Pass
		2480	2DH5	1	1.196	/	Pass
8DPSK	SISO	2402	3DH5	1	1.186	/	Pass
		2441	3DH5	1	1.192	/	Pass
		2480	3DH5	1	1.183	/	Pass

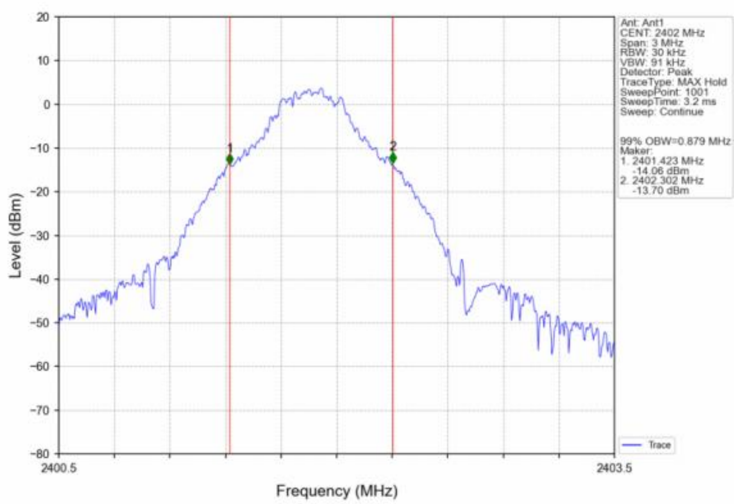
1.1.2 20dB BW

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	0.990	/	Pass
		2441	DH5	1	0.999	/	Pass
		2480	DH5	1	0.989	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.334	/	Pass
		2441	2DH5	1	1.332	/	Pass
		2480	2DH5	1	1.309	/	Pass
8DPSK	SISO	2402	3DH5	1	1.313	/	Pass
		2441	3DH5	1	1.314	/	Pass
		2480	3DH5	1	1.323	/	Pass

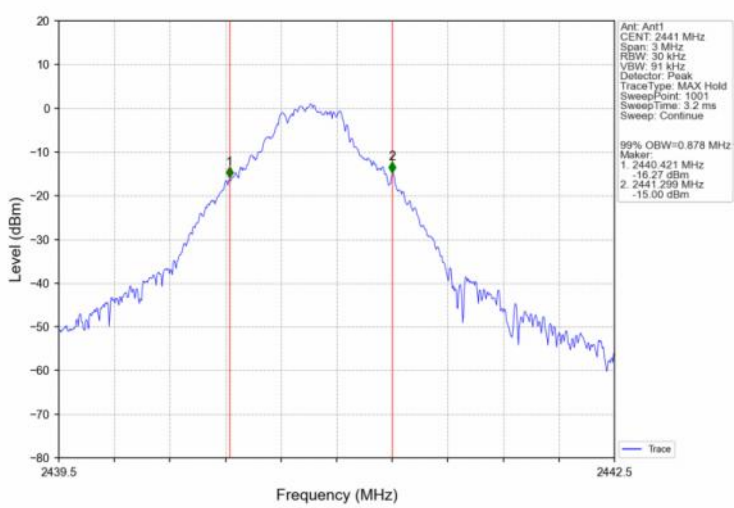
1.2 Test Graph

1.2.1 OBW

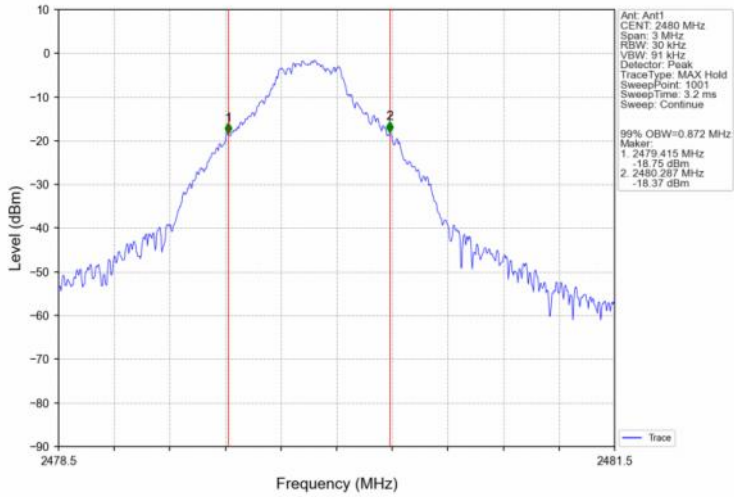
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



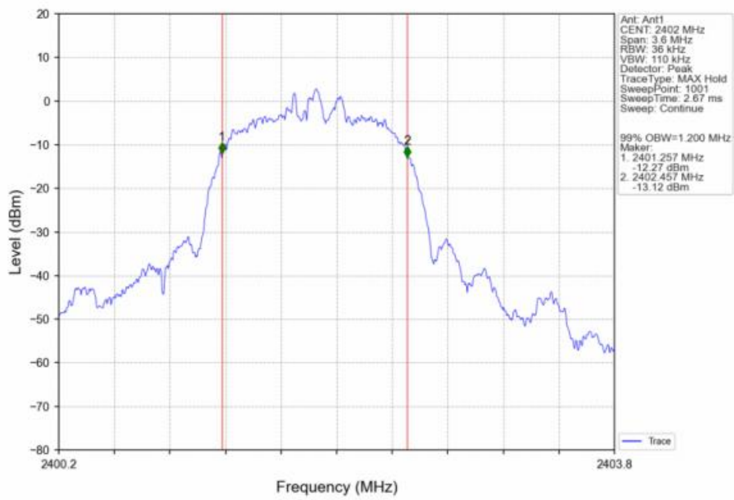
GFSK_DH5_MCH_2441MHz_Ant1_NTNV

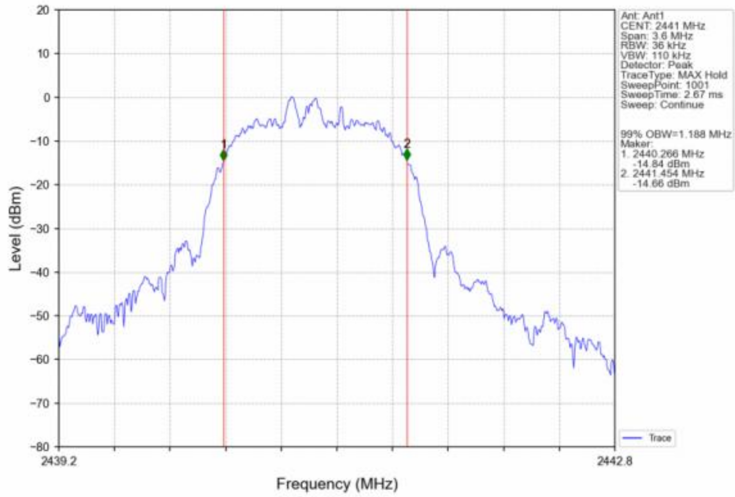
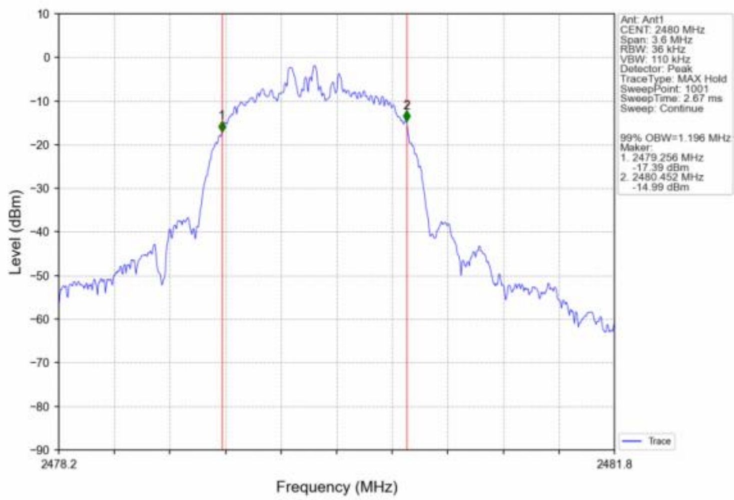


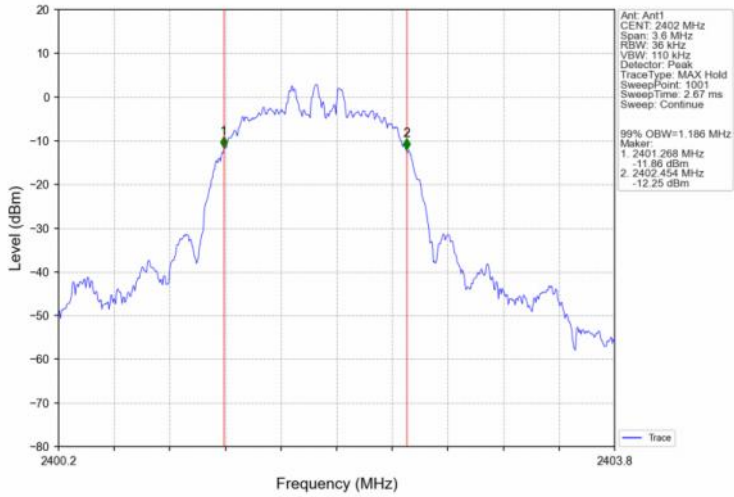
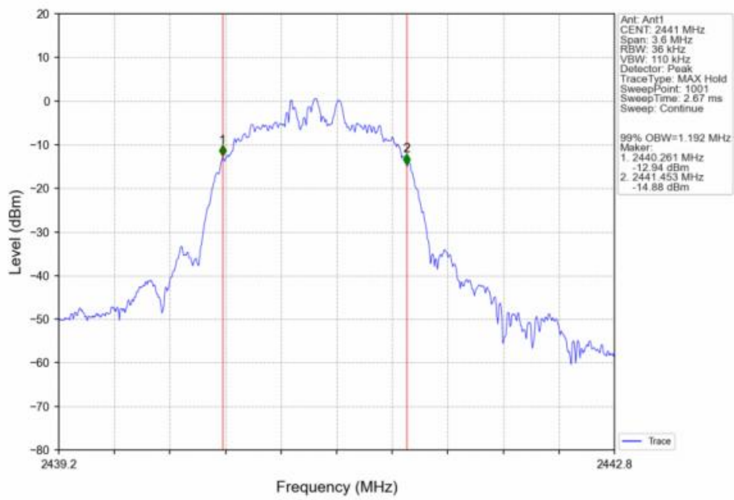
GFSK_DH5_HCH_2480MHz_Ant1_NTNV

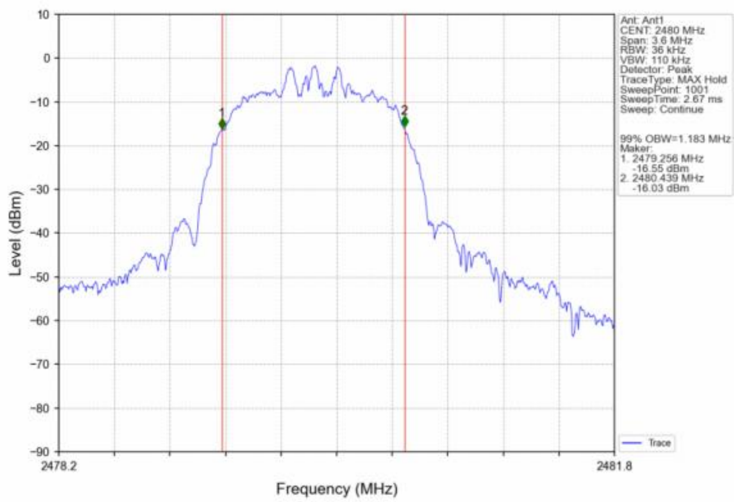


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV



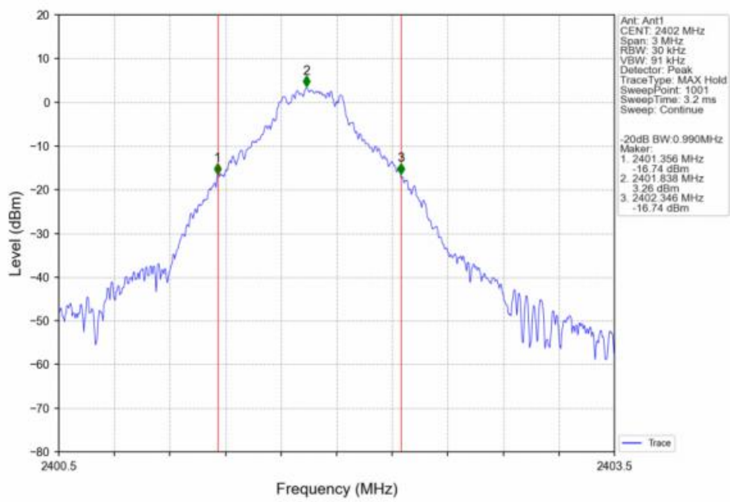
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV


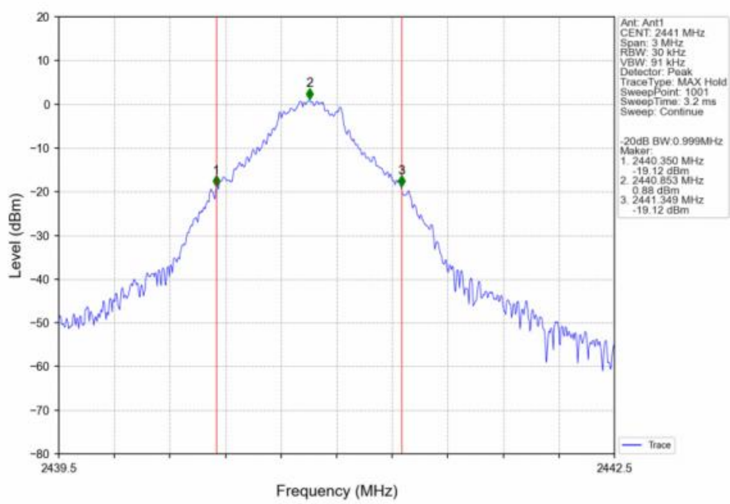
8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV


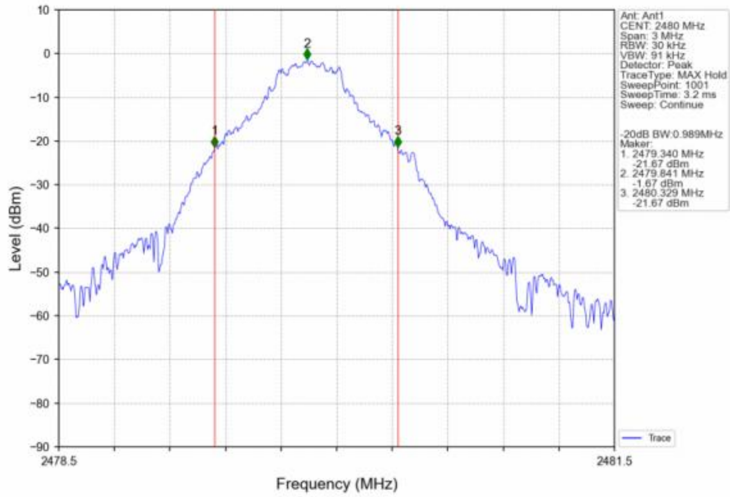
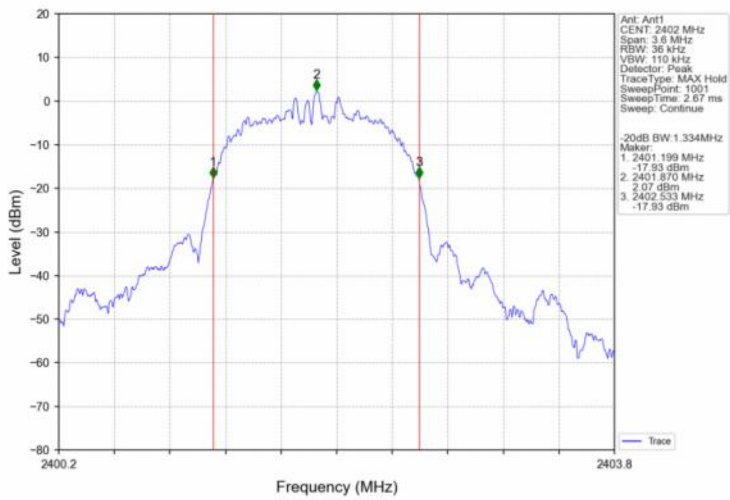
1.2.2 20dB BW

GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_MCH_2441MHz_Ant1_NTNV



GFSK_DH5_HCH_2480MHz_Ant1_NTNV

Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV


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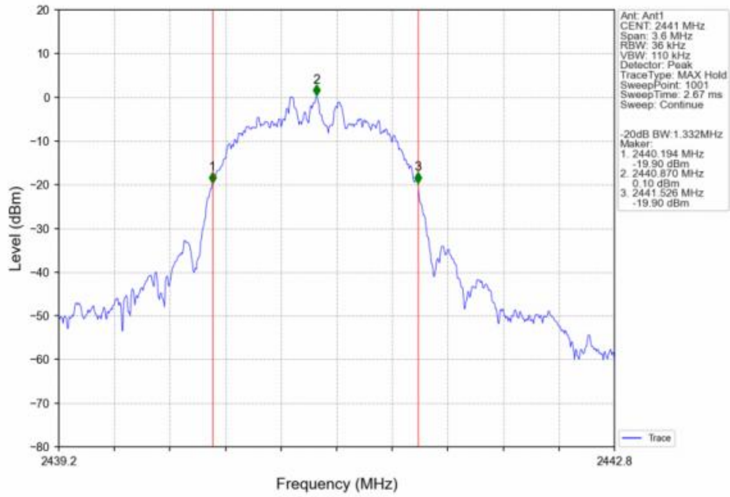
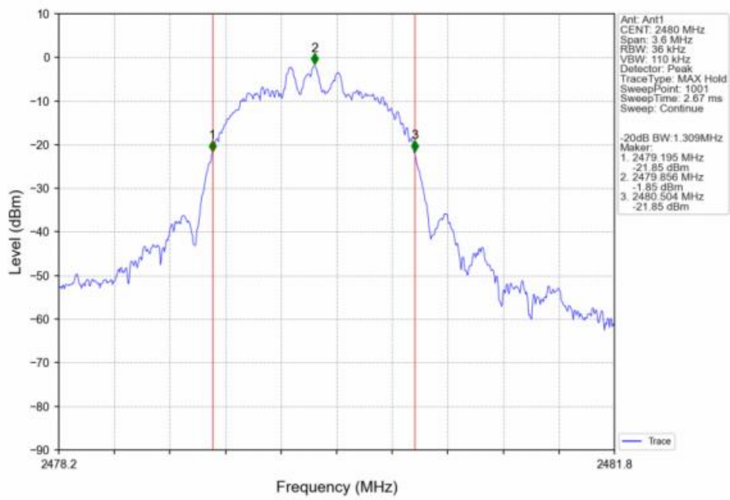
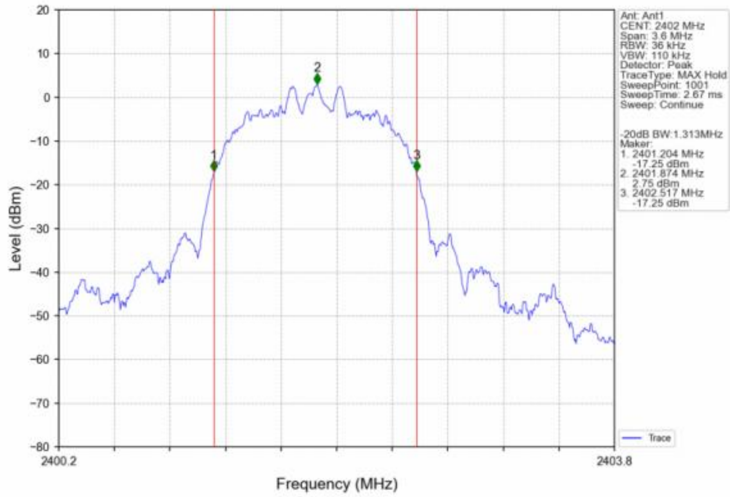
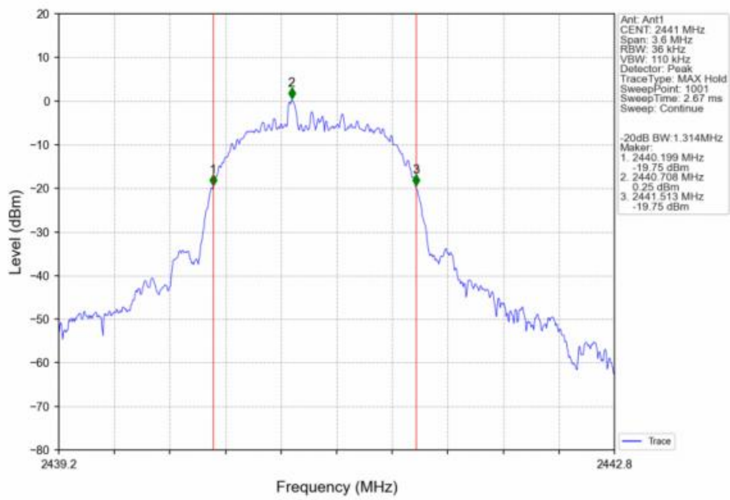
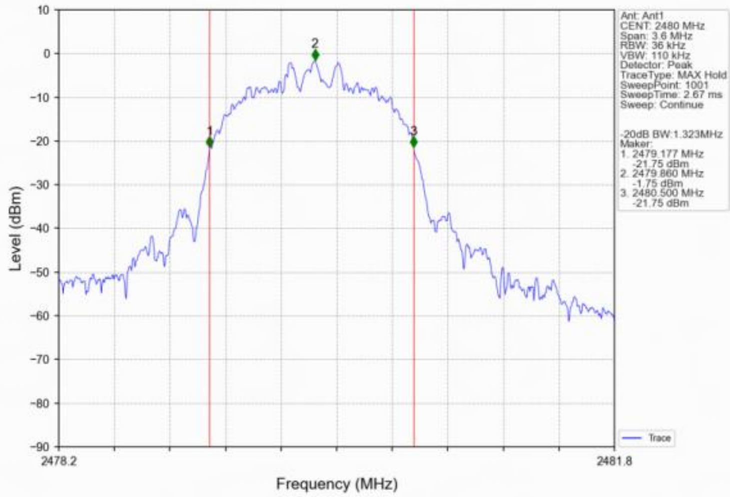
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV



Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV



8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV

8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV


8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV


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2. Maximum Conducted Output Power

2.1 Test Result

2.1.1 Power

Mode	TX Type	Frequency (MHz)	Packet Type	Maximum Peak Conducted Output Power (dBm)		Verdict
				ANT1	Limit	
GFSK	SISO	2402	DH5	4.91	<=30	Pass
		2441	DH5	2.64	<=30	Pass
		2480	DH5	0.26	<=30	Pass
Pi/4DQPSK	SISO	2402	2DH5	5.01	<=20.97	Pass
		2441	2DH5	2.75	<=20.97	Pass
		2480	2DH5	0.36	<=20.97	Pass
8DPSK	SISO	2402	3DH5	5.46	<=20.97	Pass
		2441	3DH5	3.17	<=20.97	Pass
		2480	3DH5	0.81	<=20.97	Pass
Note1: Antenna Gain: Ant1:3.13dBi;						

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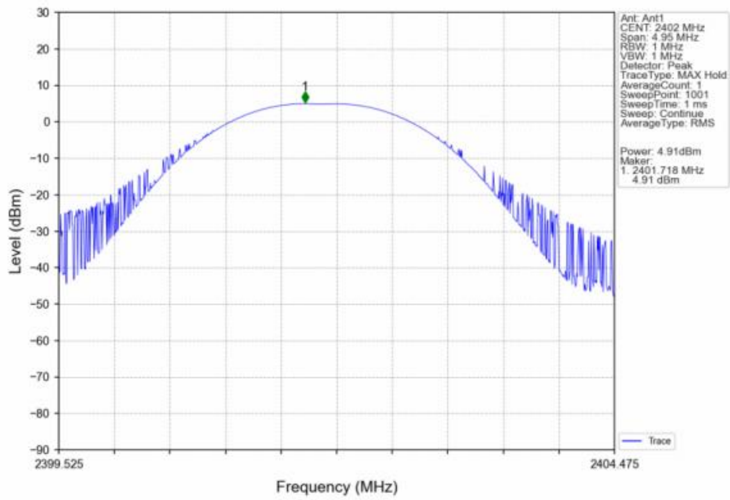
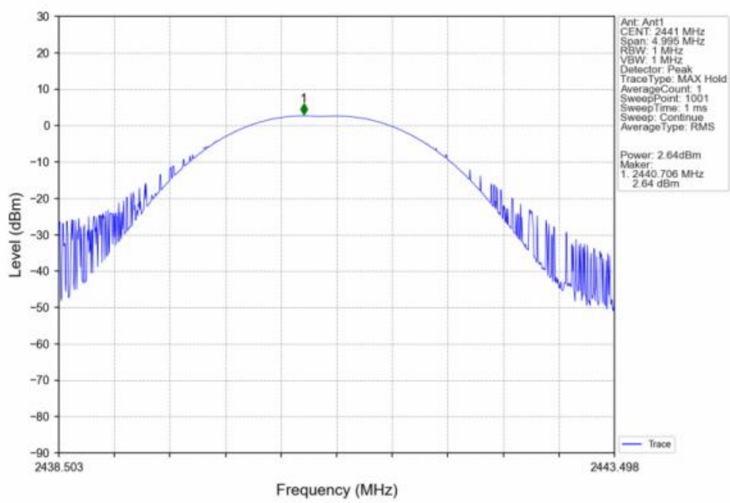
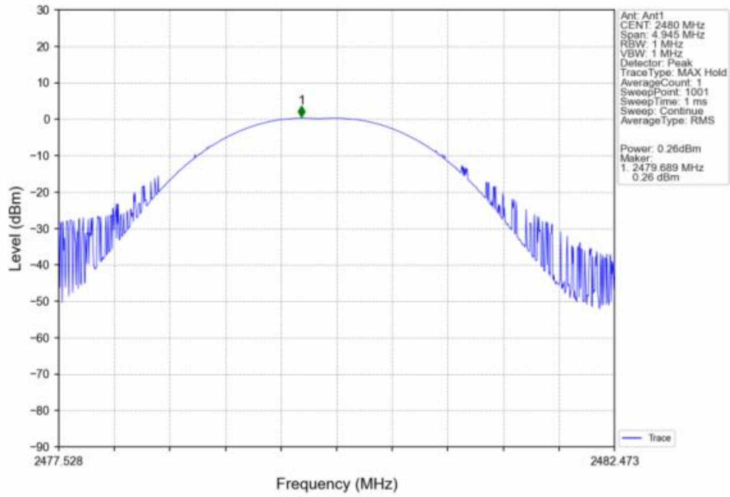
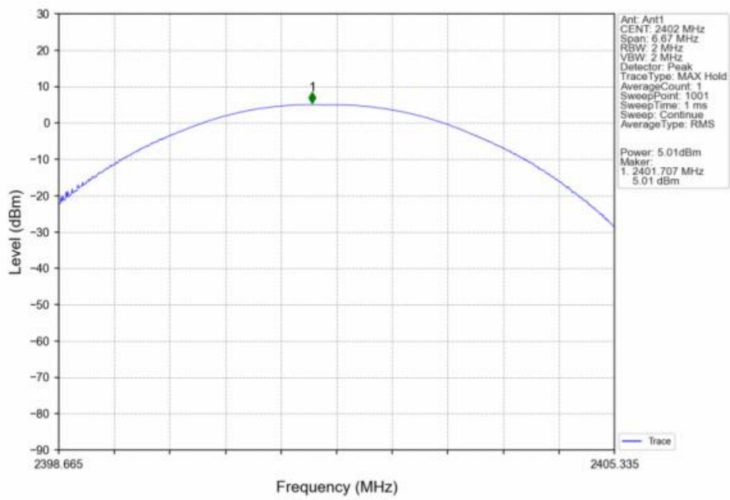
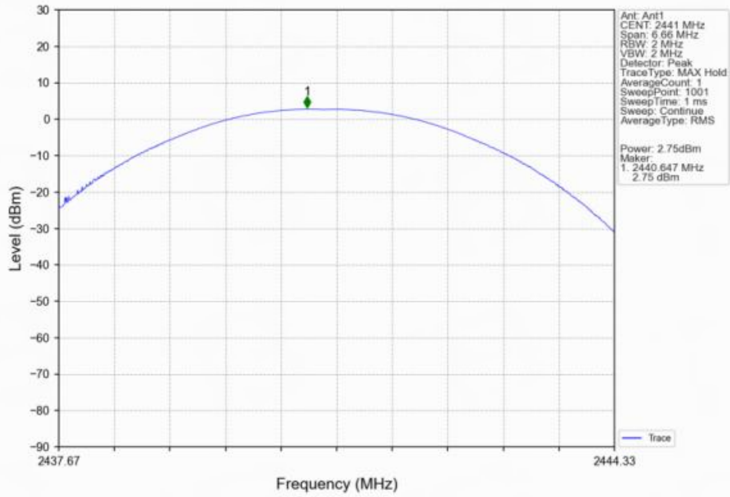
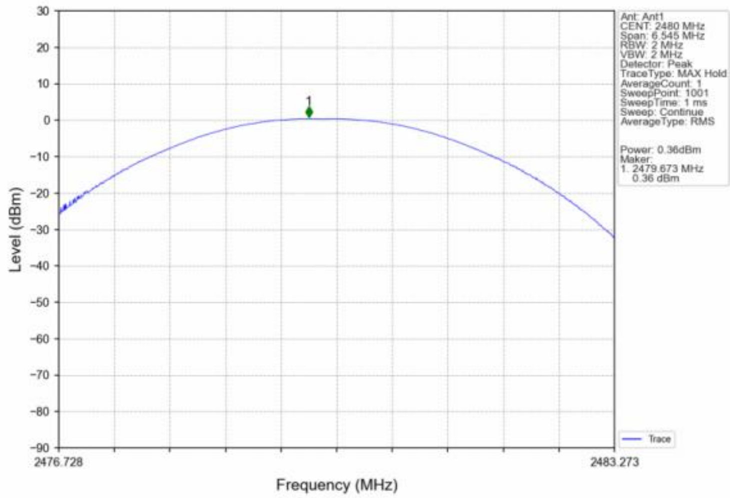
2.2 Test Graph

2.2.1 Power

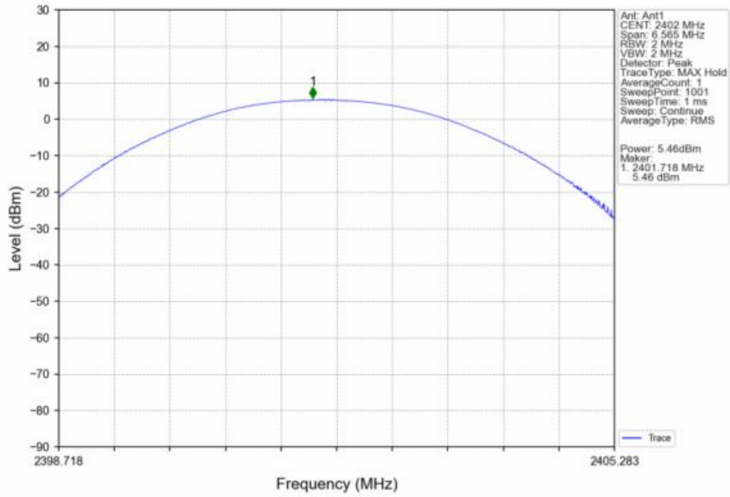
GFSK_DH5_LCH_2402MHz_Ant1_NTNV

GFSK_DH5_MCH_2441MHz_Ant1_NTNV


GFSK_DH5_HCH_2480MHz_Ant1_NTNV


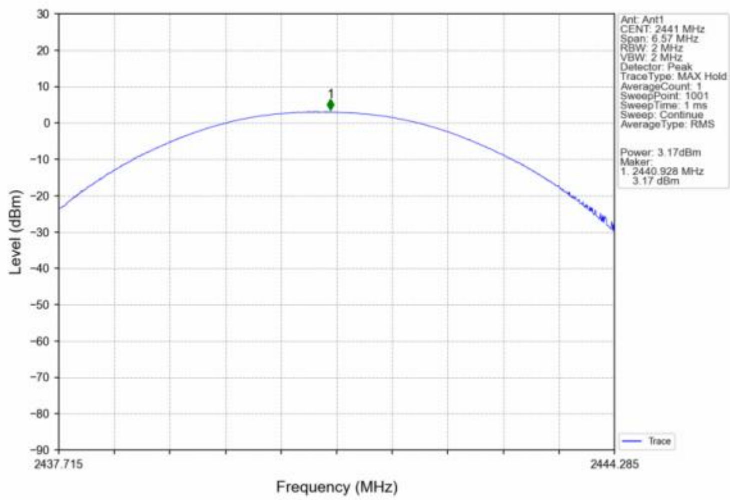
Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV


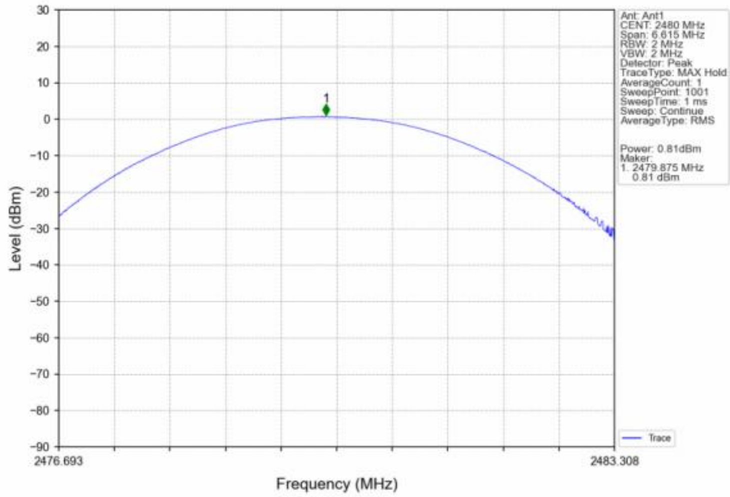
Pi/4DQPSK_2DH5_MCH_2441MHz_Ant1_NTNV

Pi/4DQPSK_2DH5_HCH_2480MHz_Ant1_NTNV


8DPSK_3DH5_LCH_2402MHz_Ant1_NTNV



8DPSK_3DH5_MCH_2441MHz_Ant1_NTNV



8DPSK_3DH5_HCH_2480MHz_Ant1_NTNV


3. Carrier Frequency Separation

3.1 Test Result

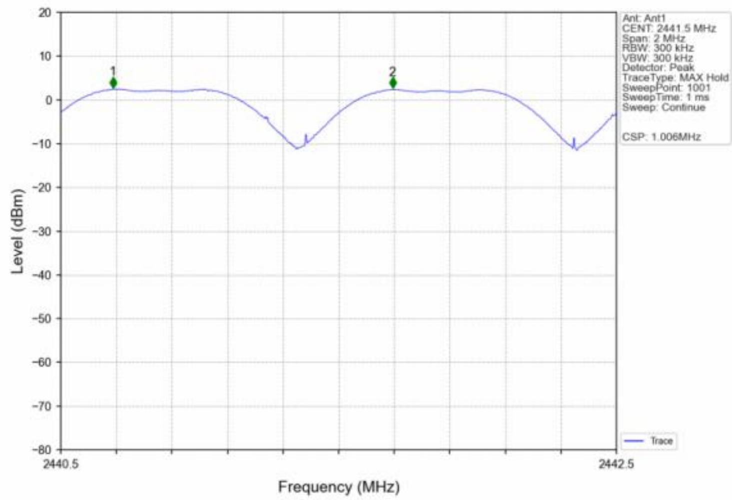
3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.006	0.999	>=0.999	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	1.003	1.334	>=0.889	Pass
8DPSK	SISO	HOPP	3DH5	0.996	1.323	>=0.882	Pass

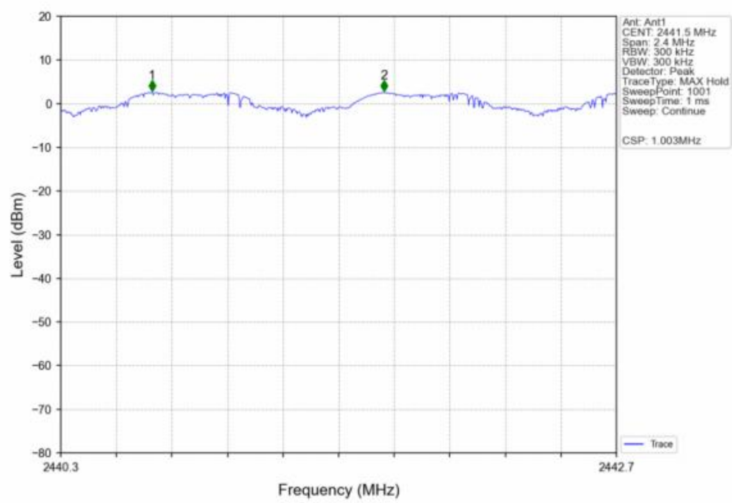
3.2 Test Graph

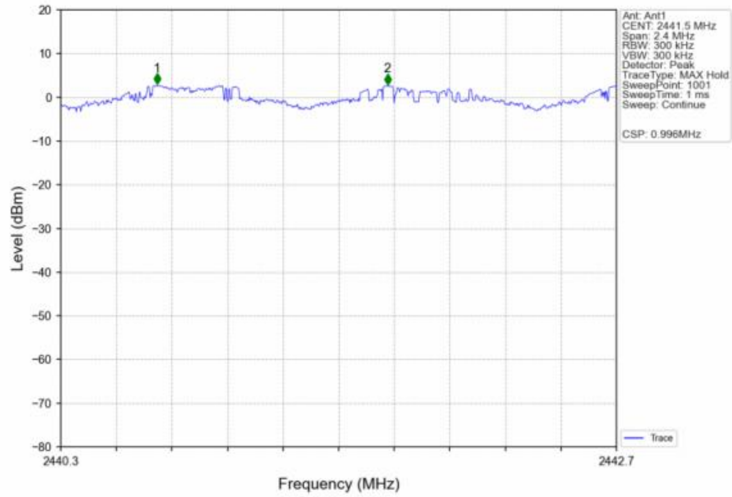
3.2.1 Ant1

GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV


4. Number of Hopping Frequencies

4.1 Test Result

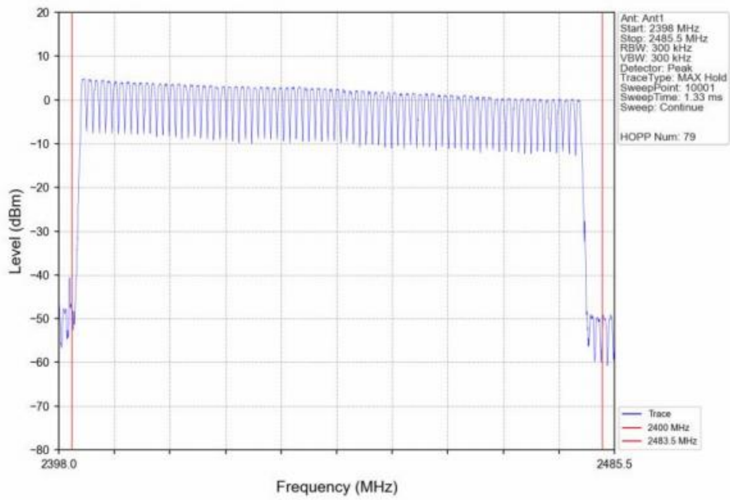
4.1.1 HoppNum

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

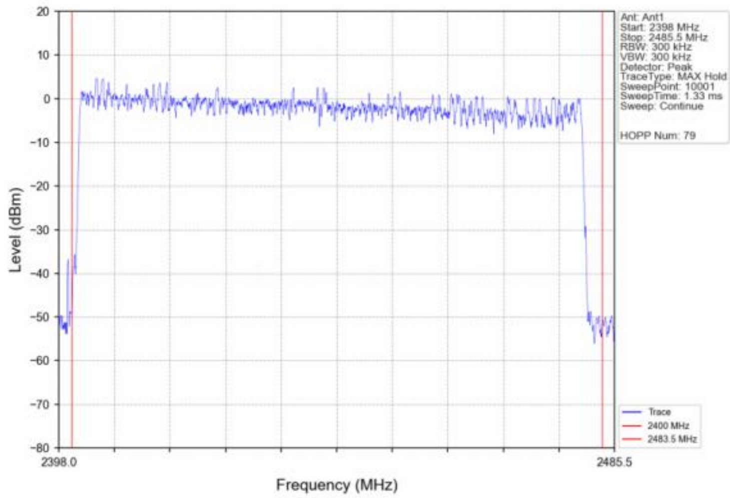
4.2 Test Graph

4.2.1 HoppNum

GFSK_DH5_HOPP_Ant1_NTNV



Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV



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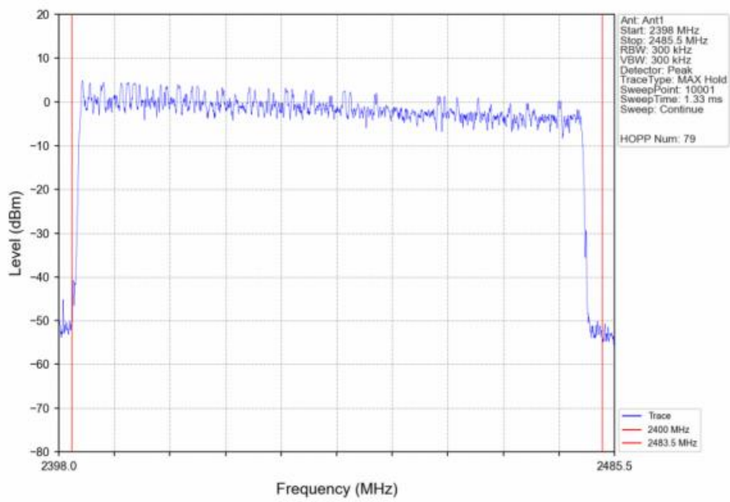
8DPSK_3DH5_HOPP_Ant1_NTNV


5. Time of Occupancy (Dwell Time)

5.1 Test Result

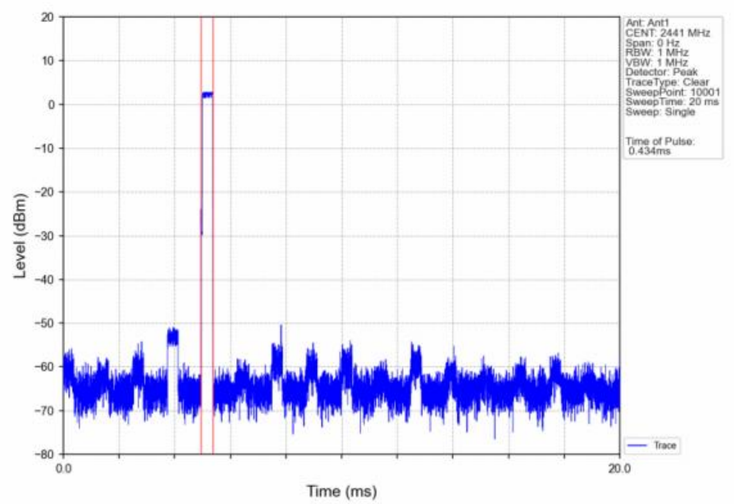
5.1.1 Ant1

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	0.434	31.600	314	136.276	<=400	Pass
			DH3	1.648	31.600	168	276.864	<=400	Pass
			DH5	2.946	31.600	109	321.114	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.390	31.600	315	122.850	<=400	Pass
			2DH3	1.704	31.600	173	294.792	<=400	Pass
			2DH5	2.954	31.600	97	286.538	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.390	31.600	314	122.460	<=400	Pass
			3DH3	1.702	31.600	173	294.446	<=400	Pass
			3DH5	2.954	31.600	107	316.078	<=400	Pass

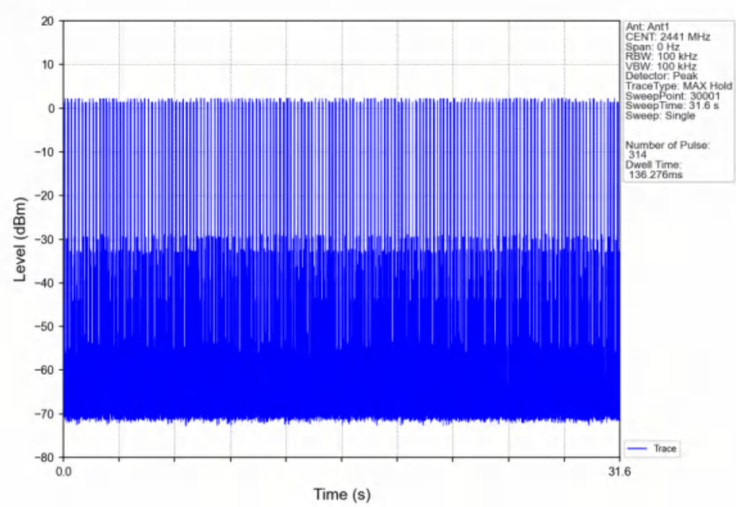
5.2 Test Graph

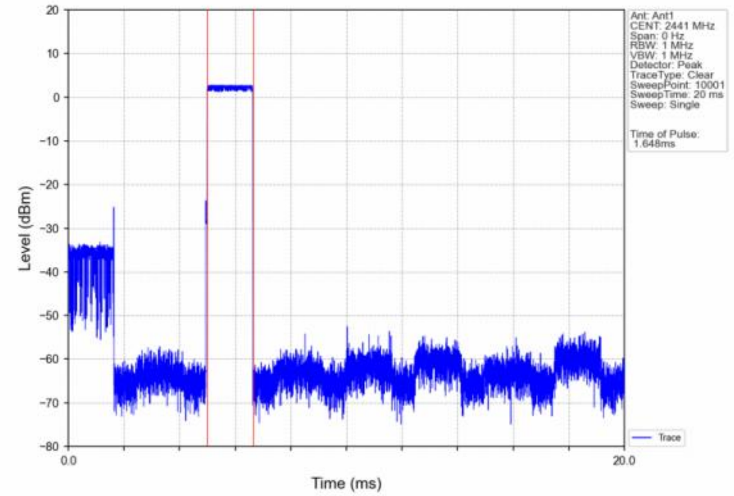
5.2.1 Ant1

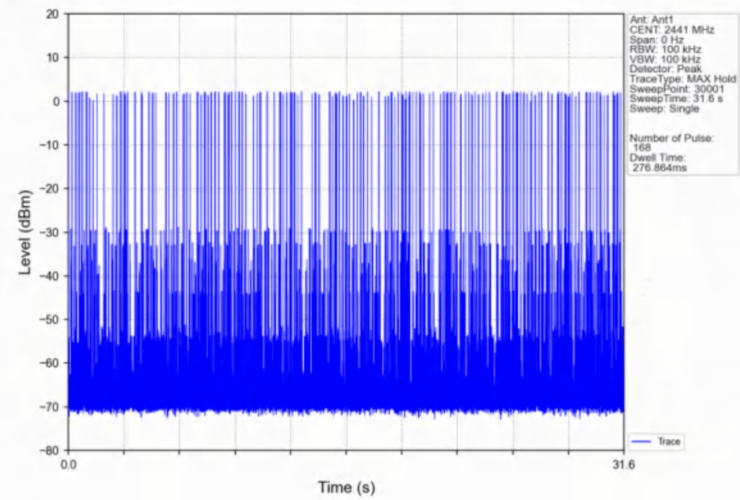
GFSK_DH1_HOPP_Ant1_NTNV



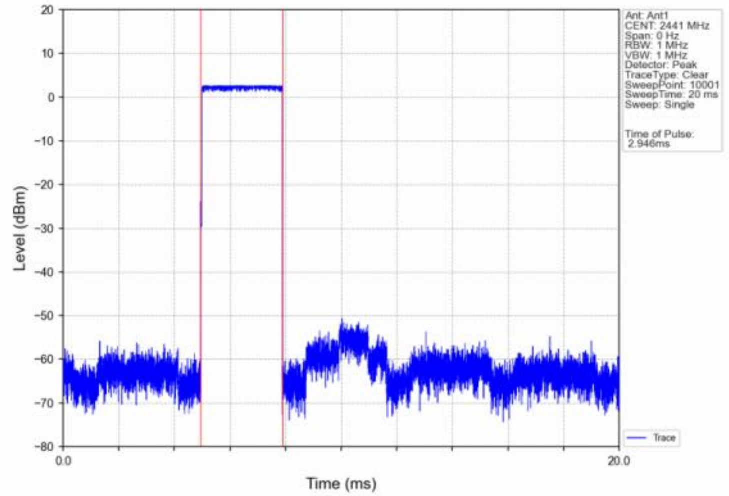
GFSK_DH1_HOPP_Ant1_NTNV



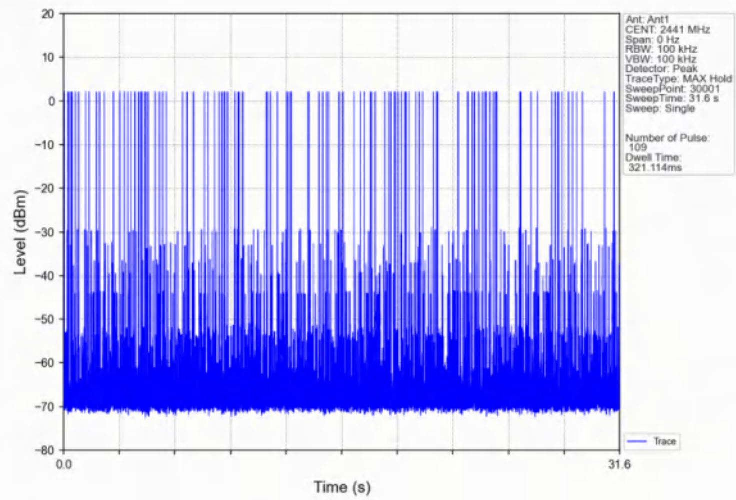
GFSK_DH3_HOPP_Ant1_NTNV


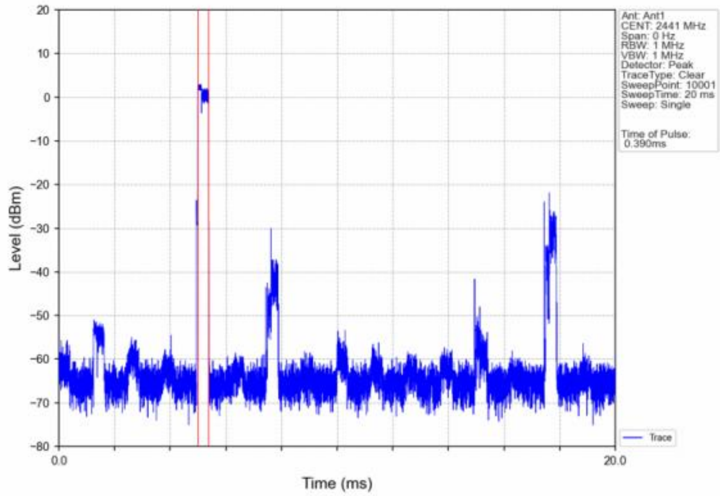
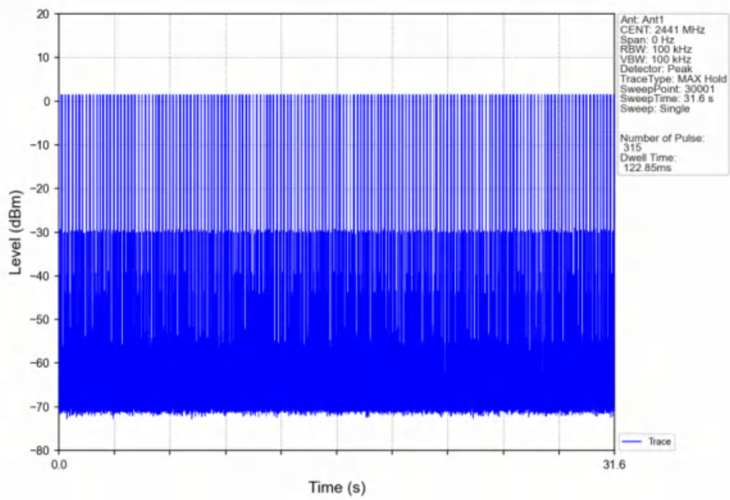
GFSK_DH3_HOPP_Ant1_NTNV


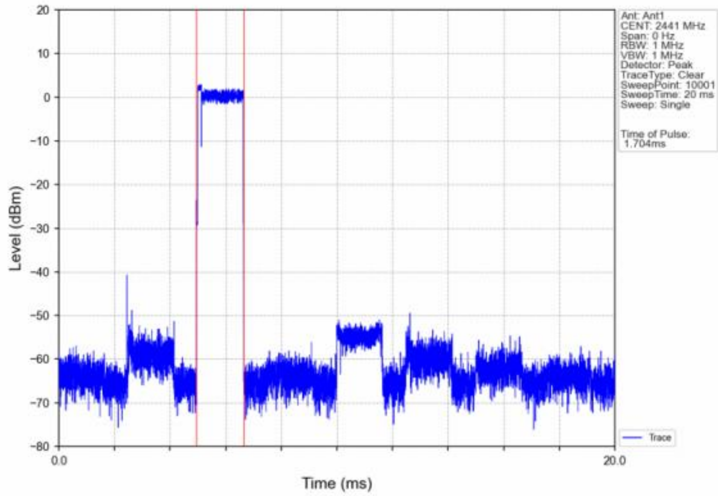
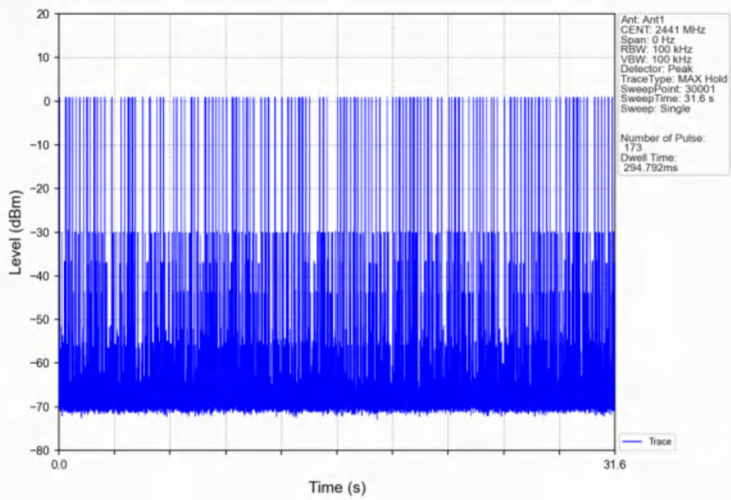
GFSK_DH5_HOPP_Ant1_NTNV

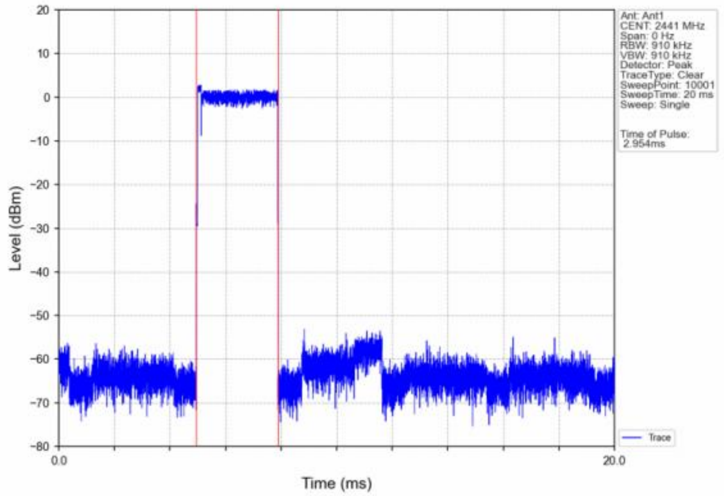


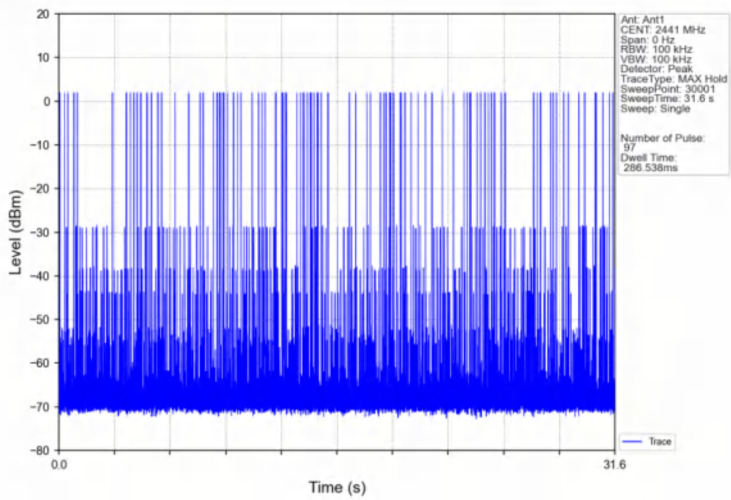
GFSK_DH5_HOPP_Ant1_NTNV

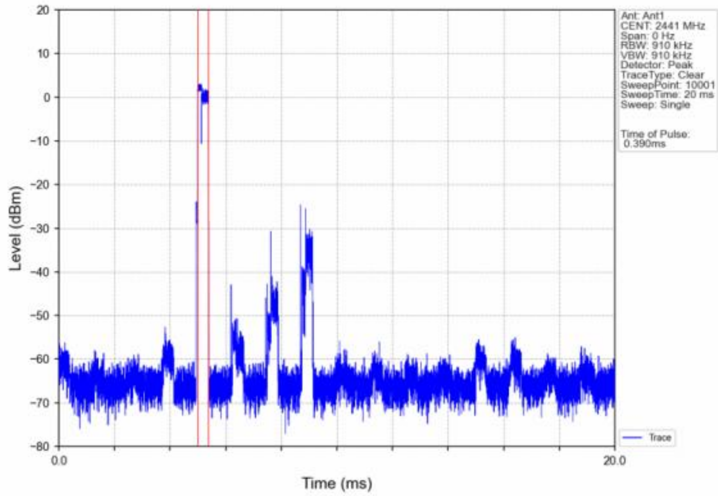
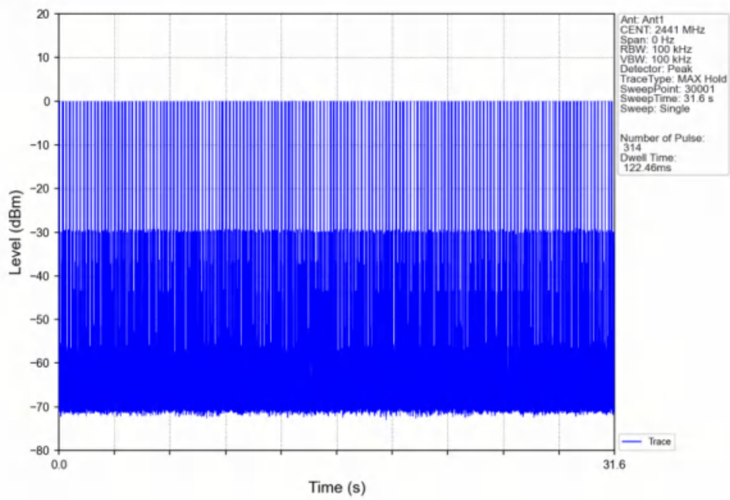


Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV

Pi/4DQPSK_2DH1_HOPP_Ant1_NTNV


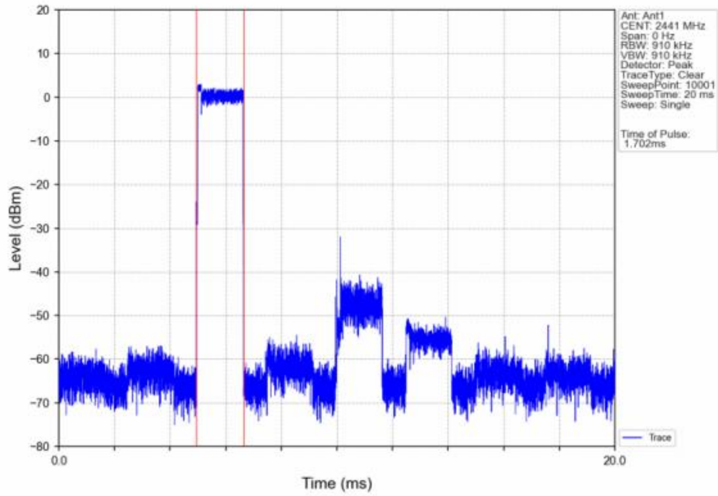
Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV

Pi/4DQPSK_2DH3_HOPP_Ant1_NTNV


Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV


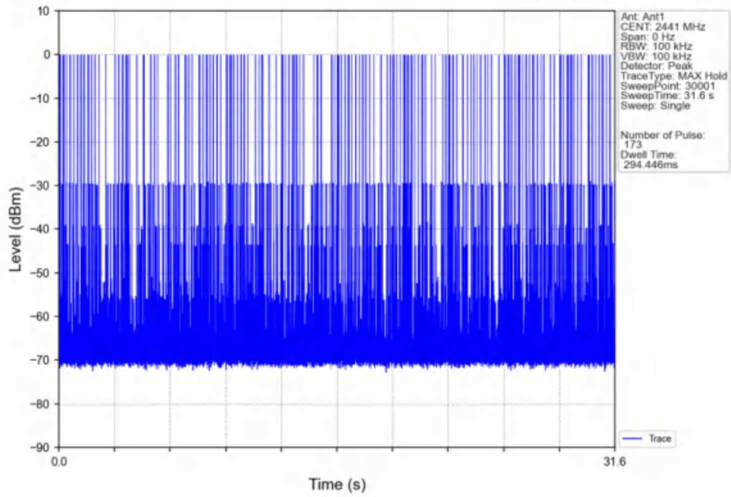
Pi/4DQPSK_2DH5_HOPP_Ant1_NTNV


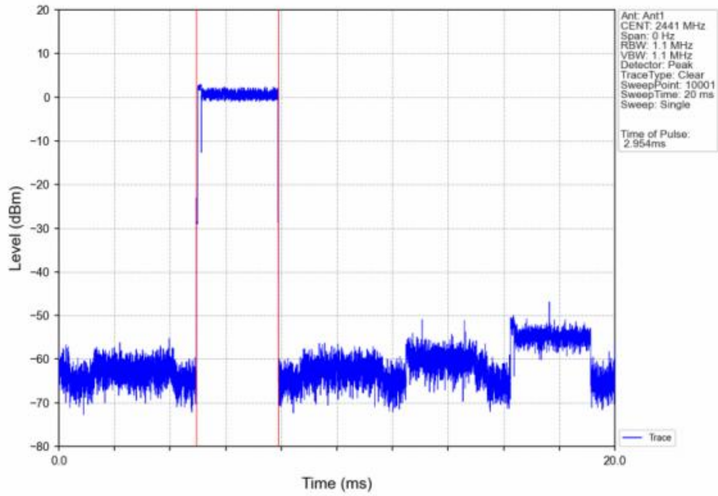
8DPSK_3DH1_HOPP_Ant1_NTNV

8DPSK_3DH1_HOPP_Ant1_NTNV


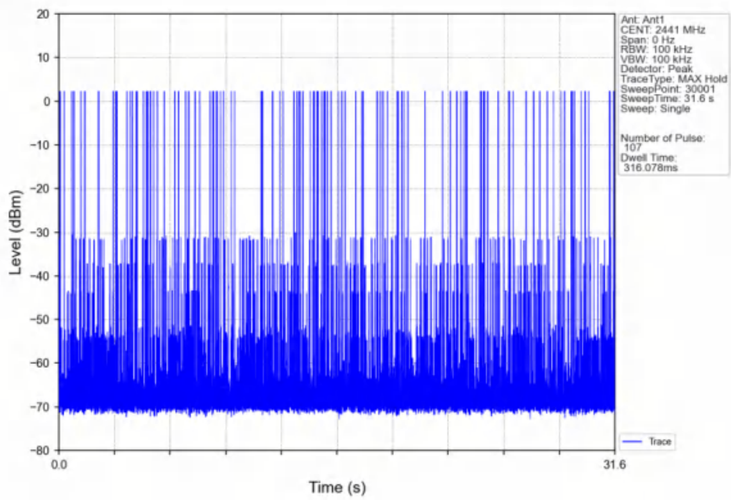
8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH3_HOPP_Ant1_NTNV



8DPSK_3DH5_HOPP_Ant1_NTNV


8DPSK_3DH5_HOPP_Ant1_NTNV


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	4.52
		2441	DH5	1	2.33
		2480	DH5	1	-0.05
		HOPP	DH5	1	4.57
					4.57
Pi/4DQPSK	SISO	2402	2DH5	1	4.66
		2441	2DH5	1	2.42
		2480	2DH5	1	0.04
		HOPP	2DH5	1	4.15
					4.15
8DPSK	SISO	2402	3DH5	1	4.72
		2441	3DH5	1	2.54
		2480	3DH5	1	0.13
		HOPP	3DH5	1	4.24
					4.24
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.					

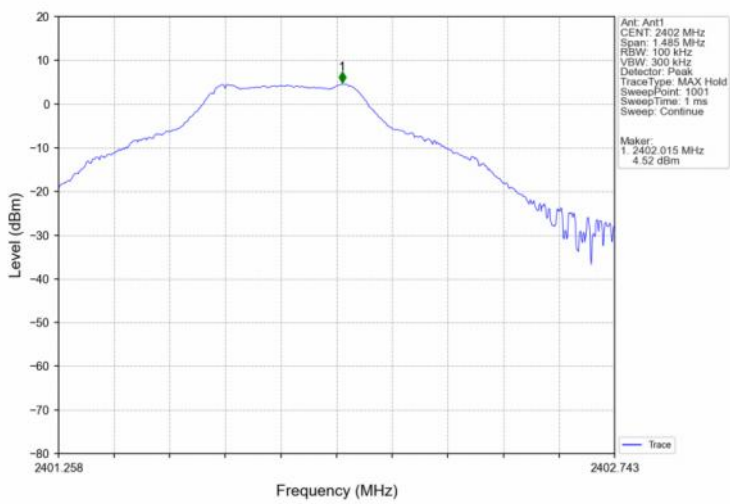
6.1.2 CSE

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	4.52	-15.48	Pass
		2441	DH5	1	2.33	-17.67	Pass
		2480	DH5	1	-0.05	-20.05	Pass
		HOPP	DH5	1	4.57	-15.43	Pass
					4.57	-15.43	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	4.66	-15.34	Pass
		2441	2DH5	1	2.42	-17.58	Pass
		2480	2DH5	1	0.04	-19.96	Pass
		HOPP	2DH5	1	4.15	-15.85	Pass
					4.15	-15.85	Pass
8DPSK	SISO	2402	3DH5	1	4.72	-15.28	Pass
		2441	3DH5	1	2.54	-17.46	Pass
		2480	3DH5	1	0.13	-19.87	Pass
		HOPP	3DH5	1	4.24	-15.76	Pass
					4.24	-15.76	Pass
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.							

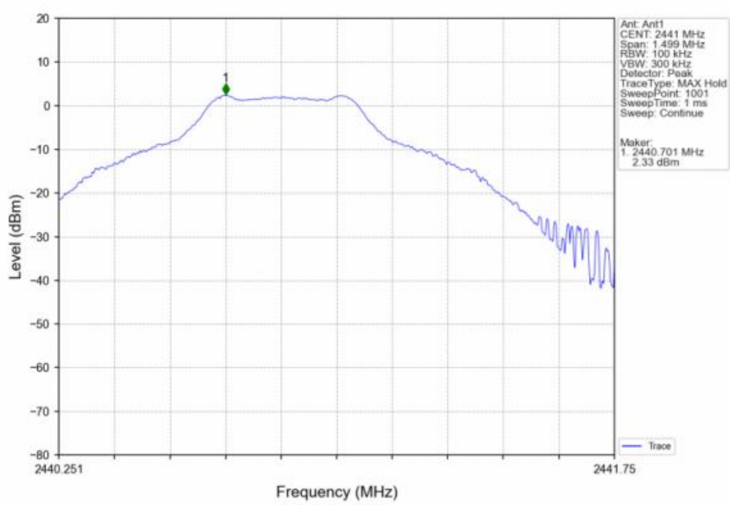
6.2 Test Graph

6.2.1 Ref

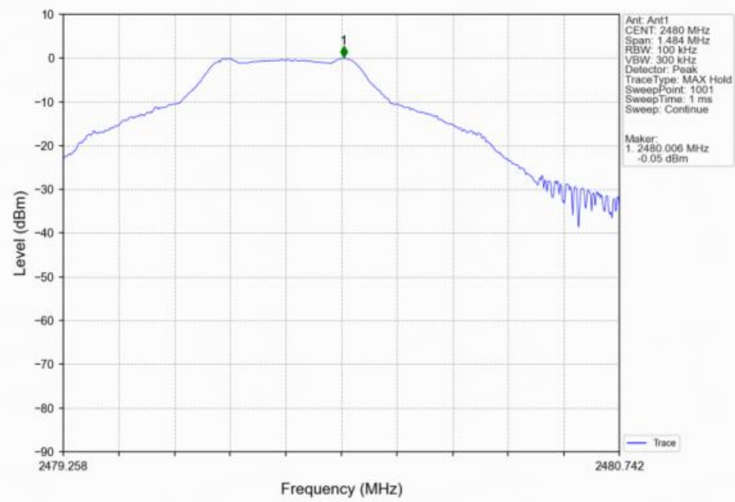
GFSK_DH5_LCH_2402MHz_Ant1_NTNV



GFSK_DH5_MCH_2441MHz_Ant1_NTNV



GFSK_DH5_HCH_2480MHz_Ant1_NTNV



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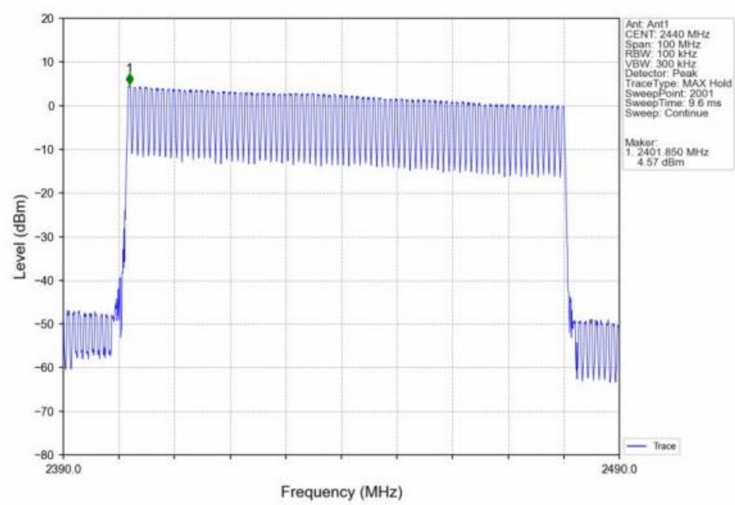

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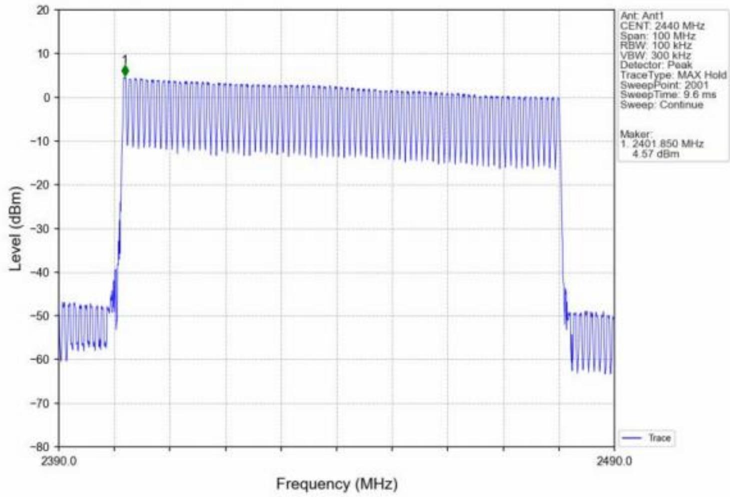

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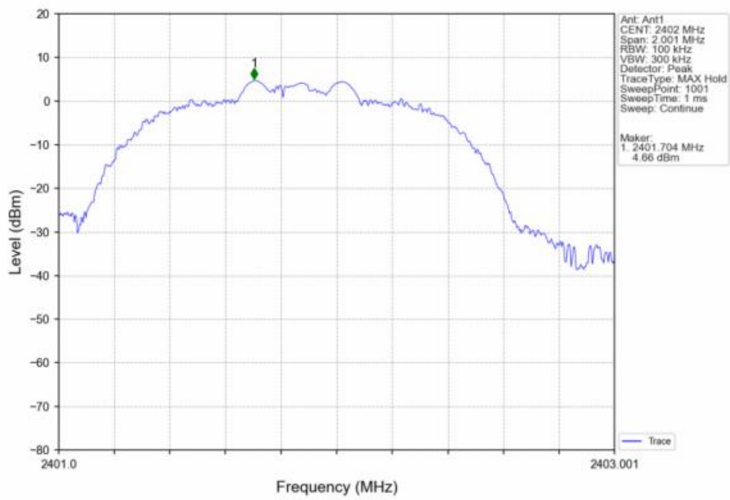

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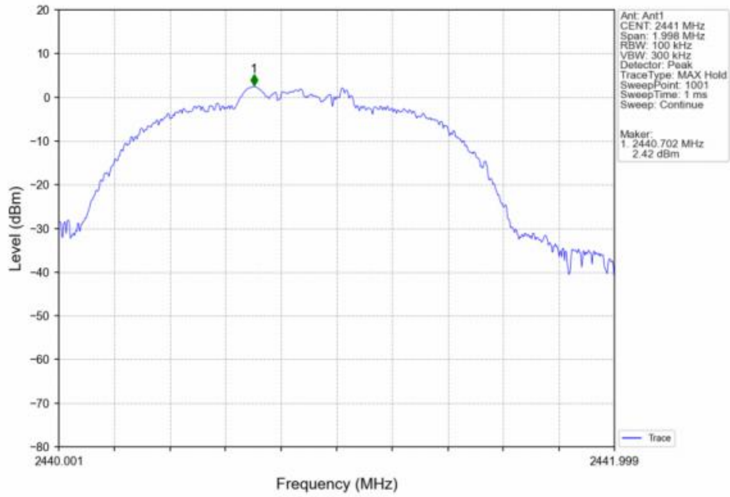

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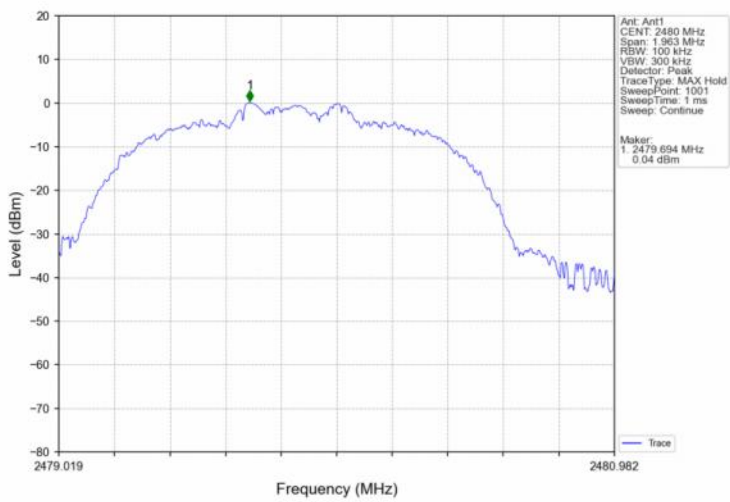

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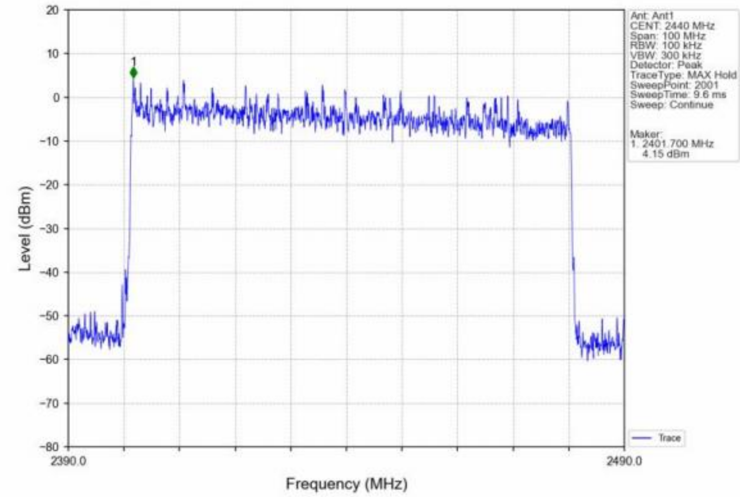
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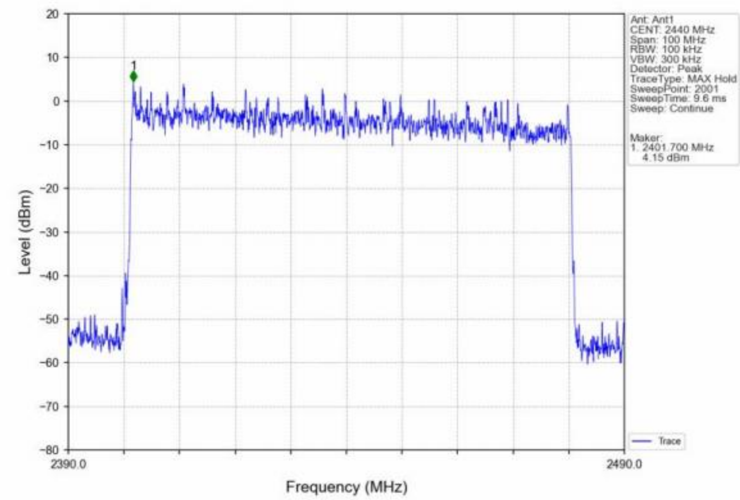

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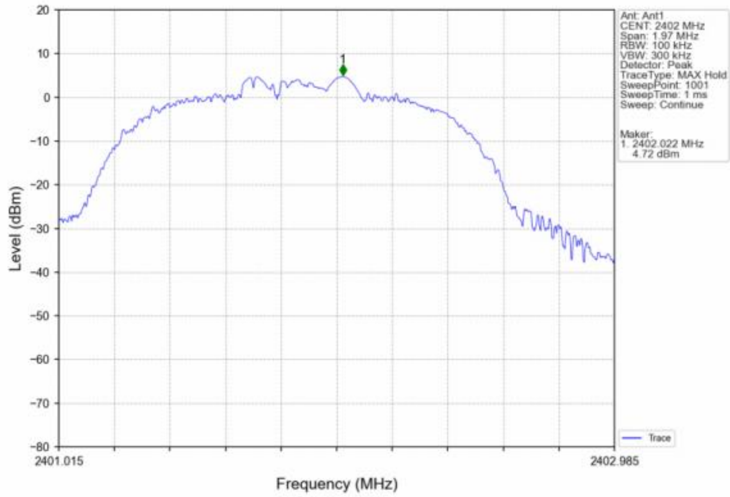

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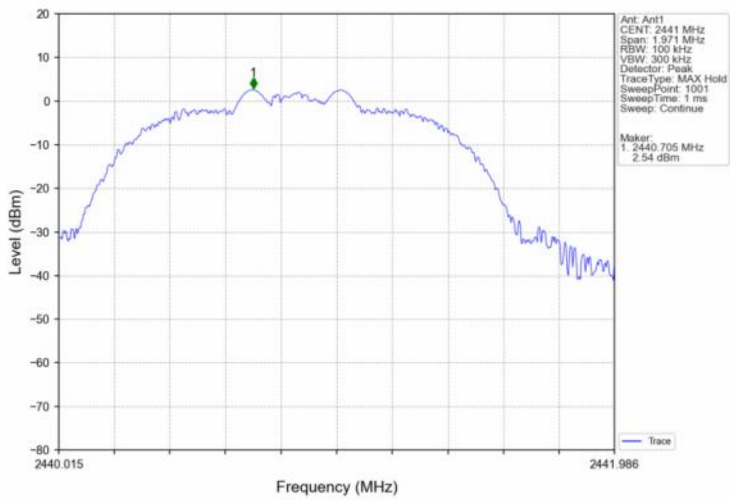

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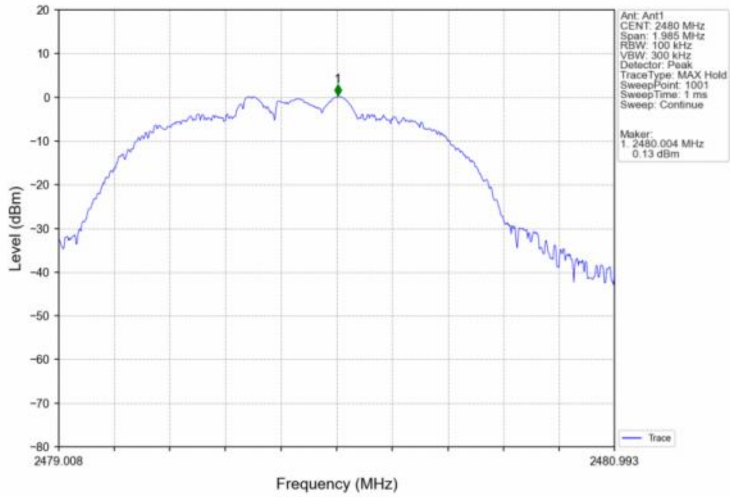

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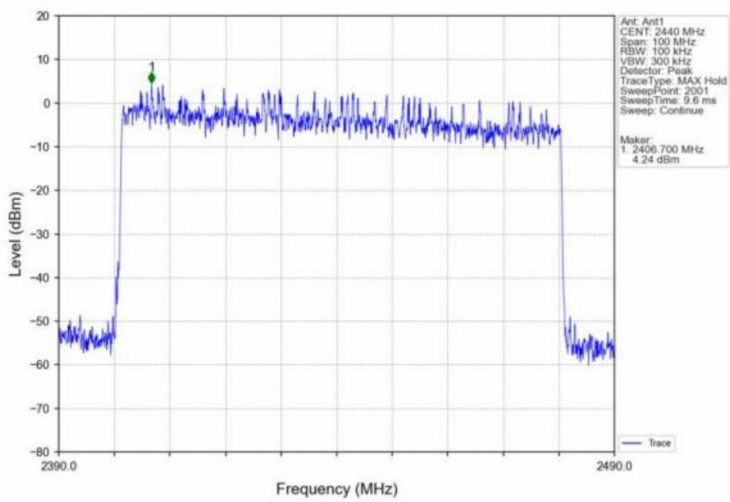

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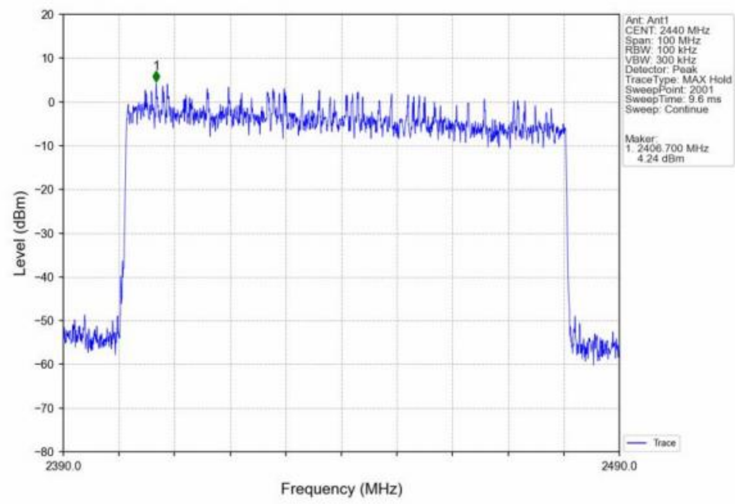

6.2.2 CSE

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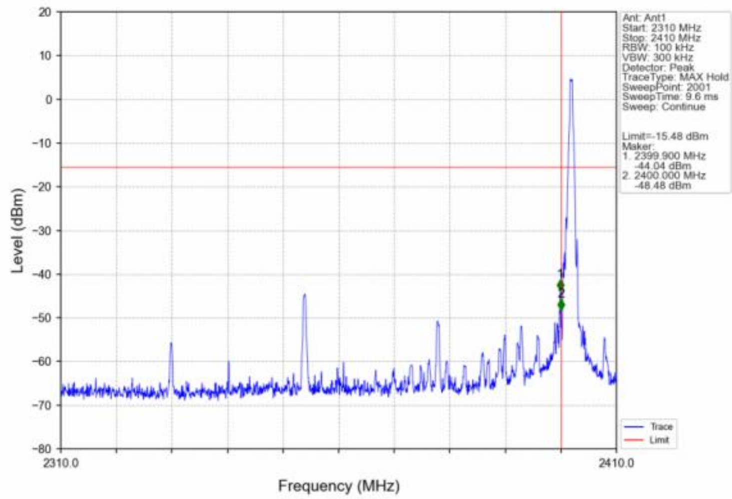

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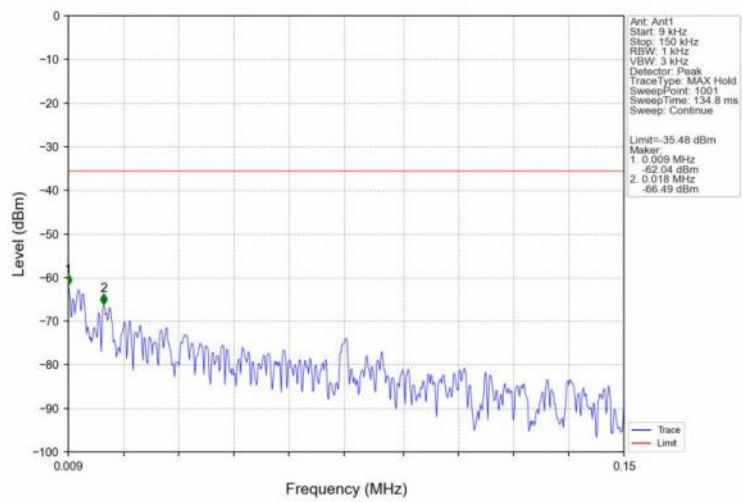

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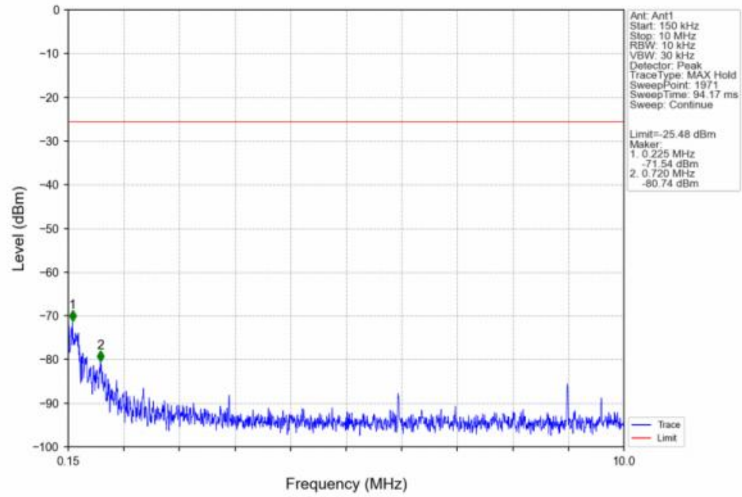

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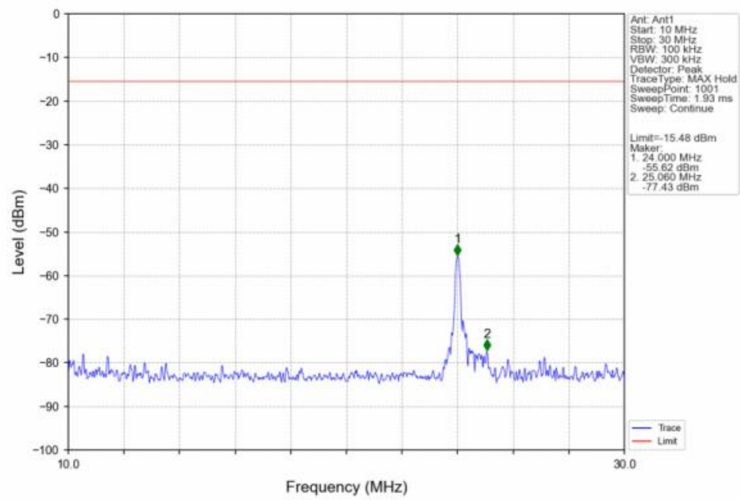

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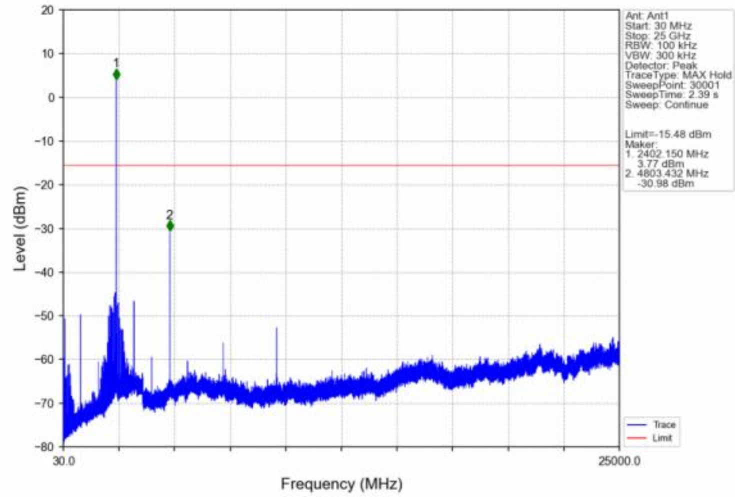
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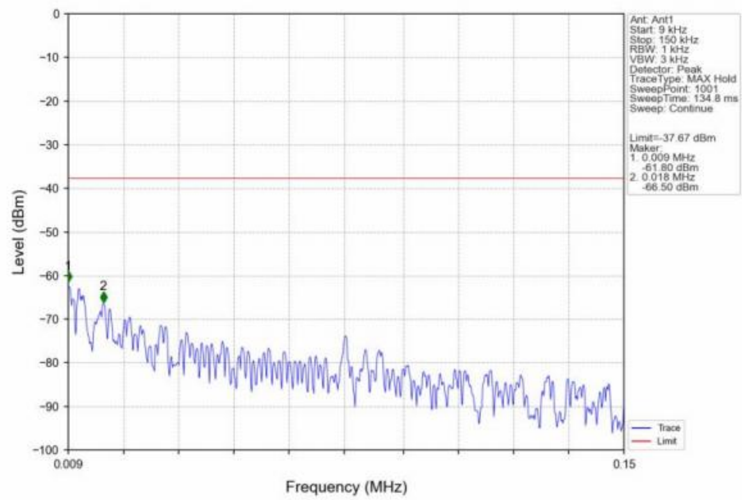

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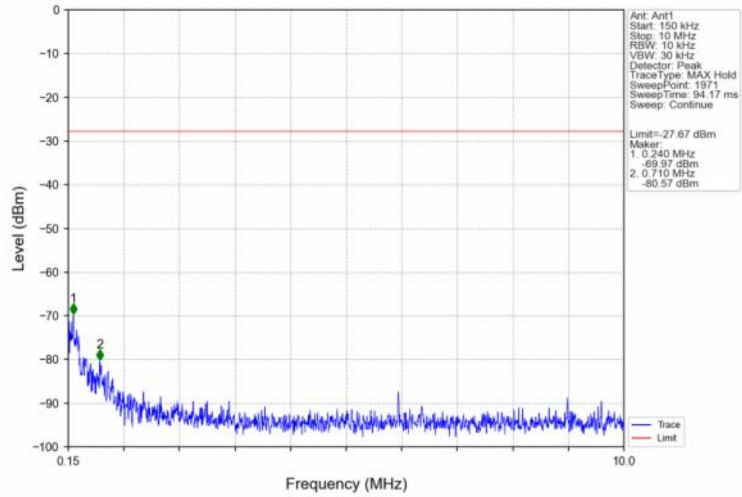

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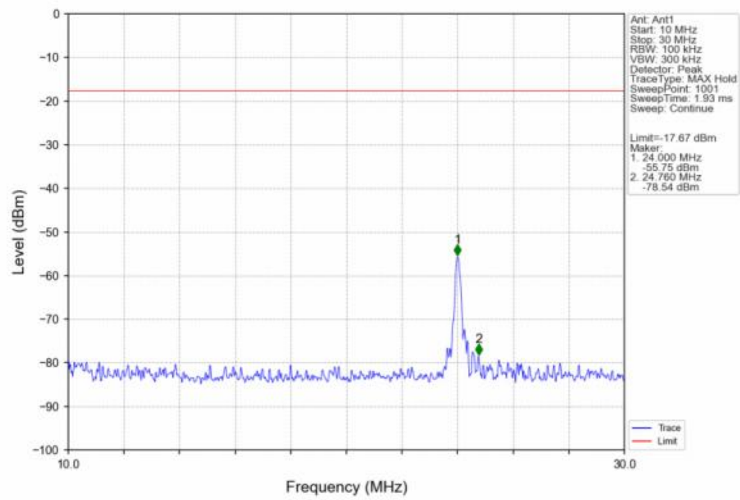

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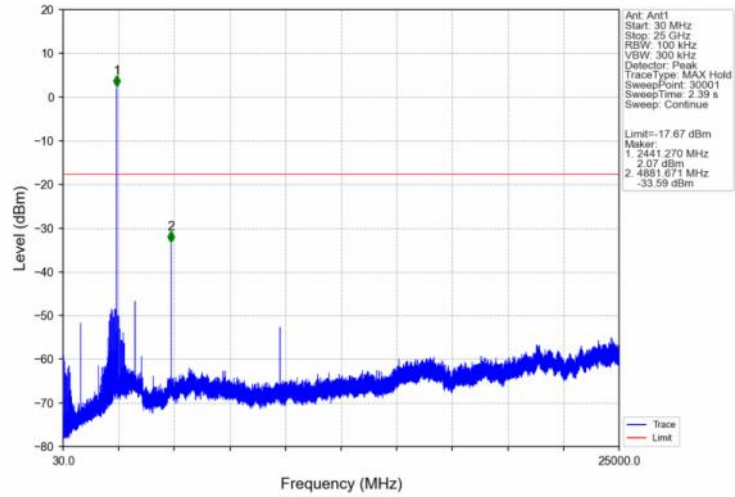

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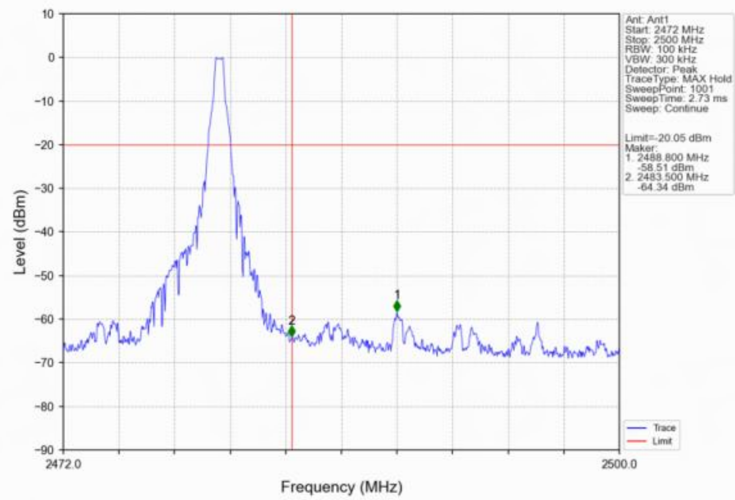

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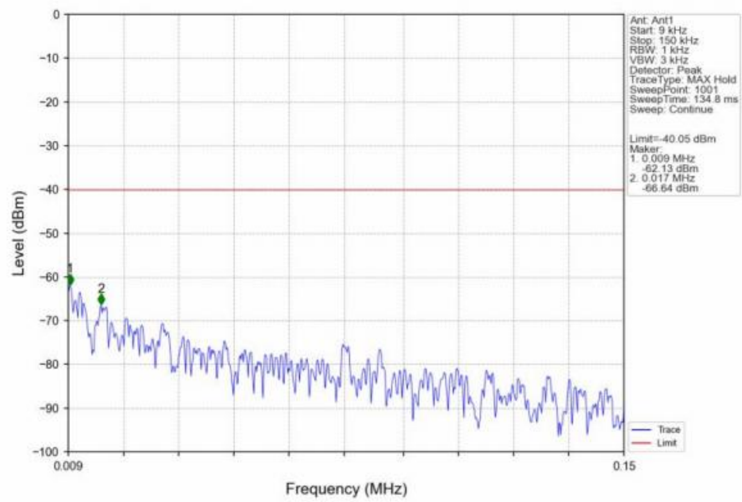
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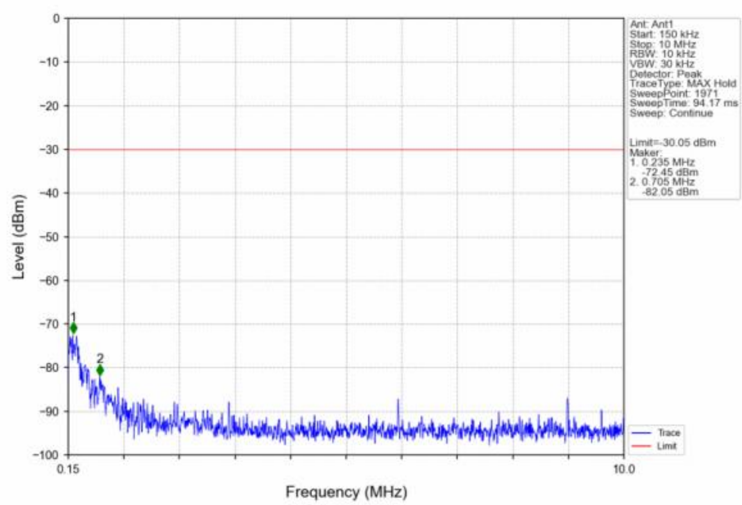

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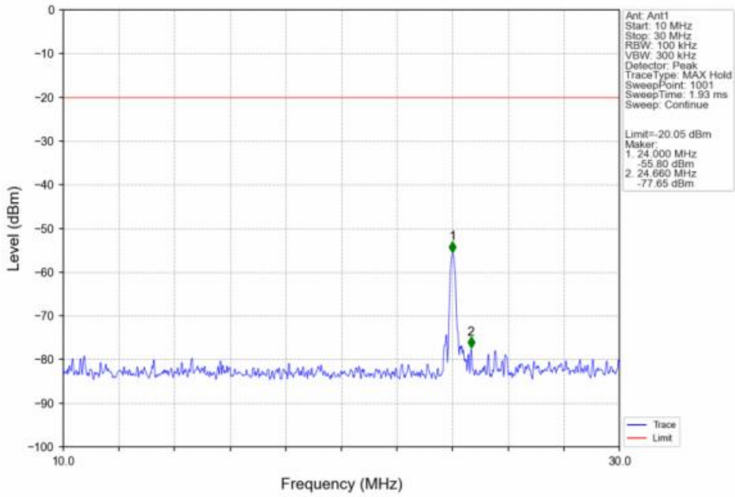

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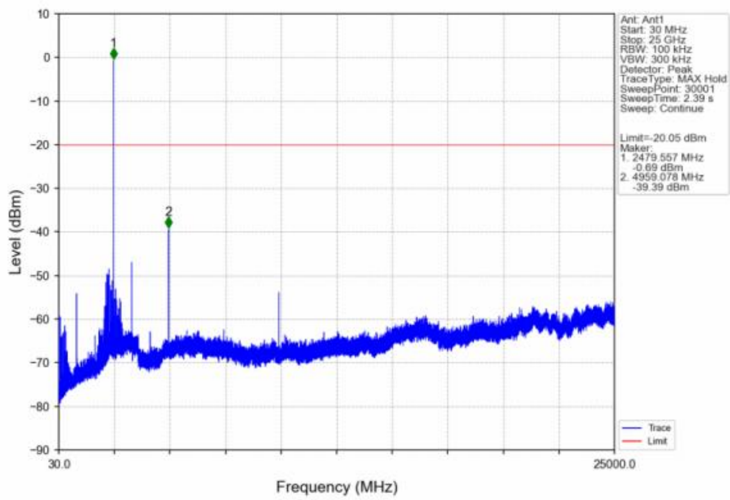

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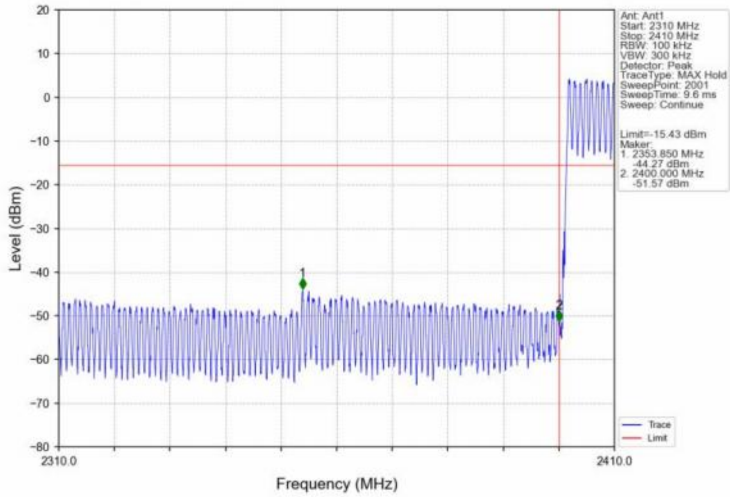

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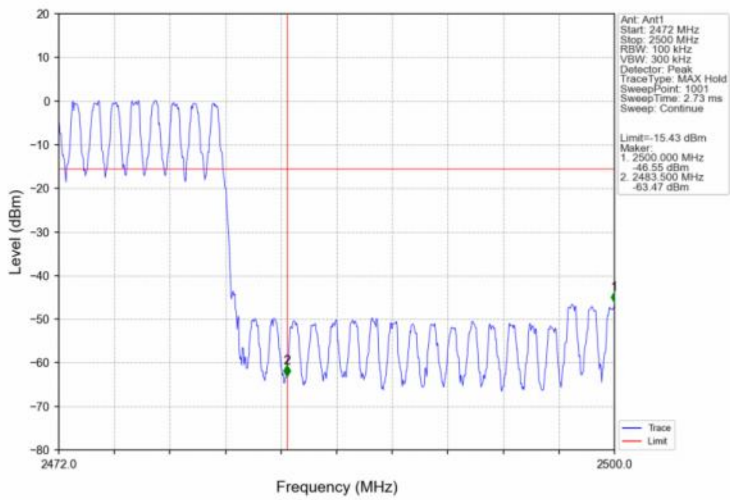

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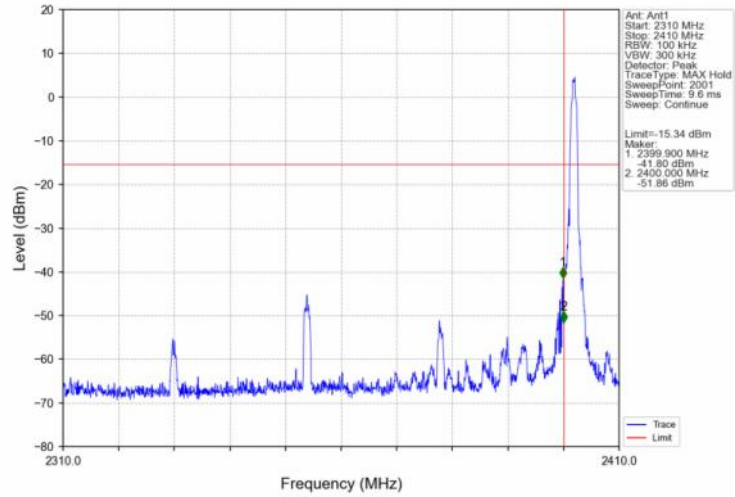

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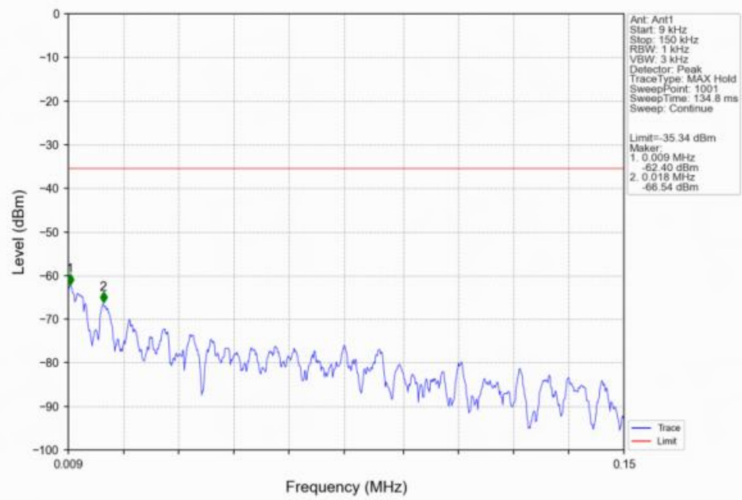

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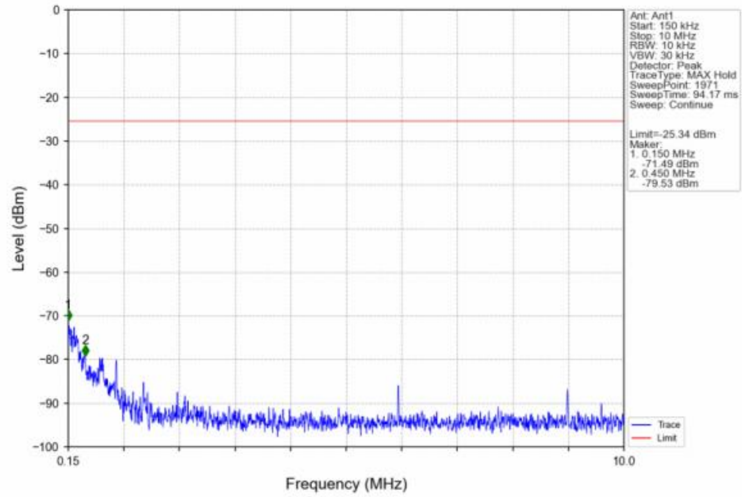

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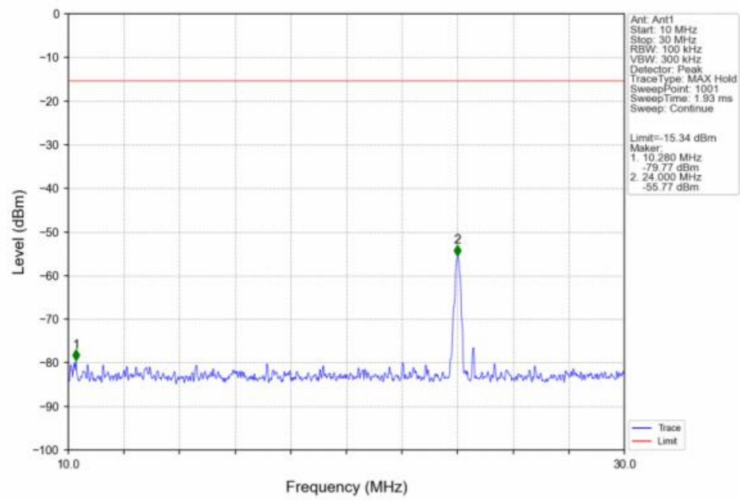

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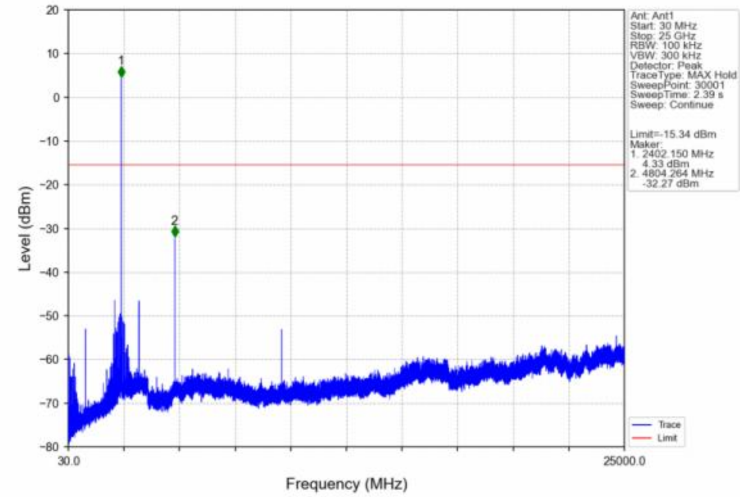

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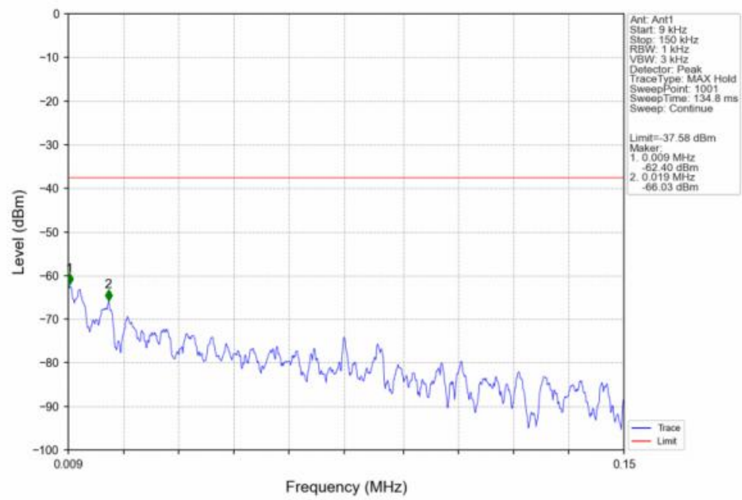

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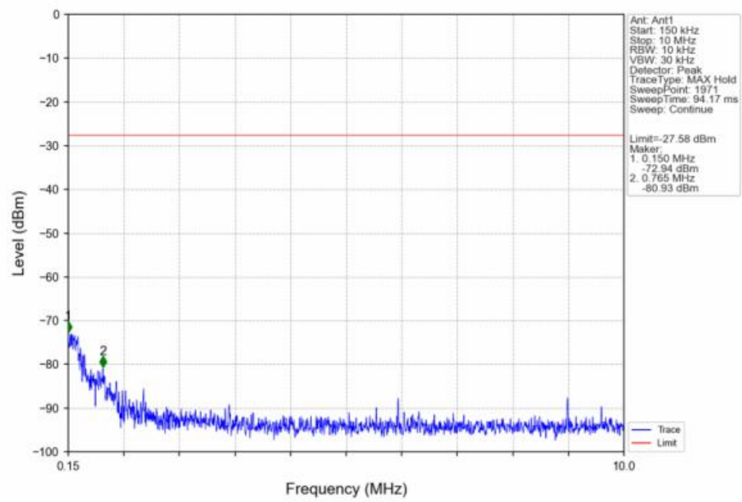

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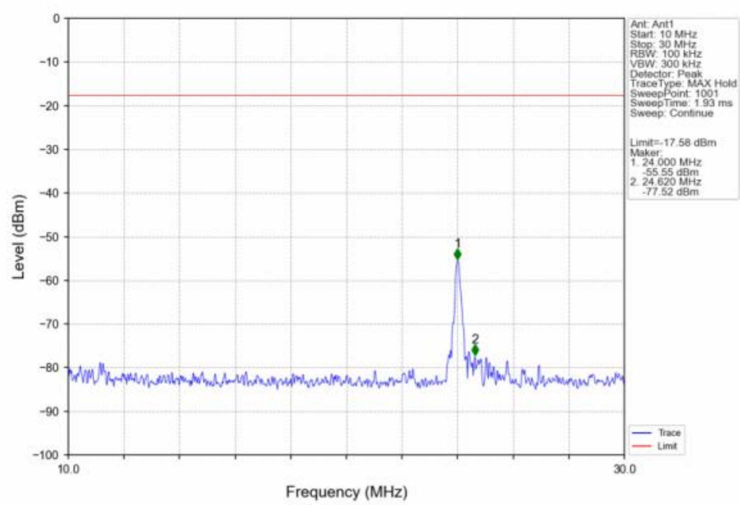

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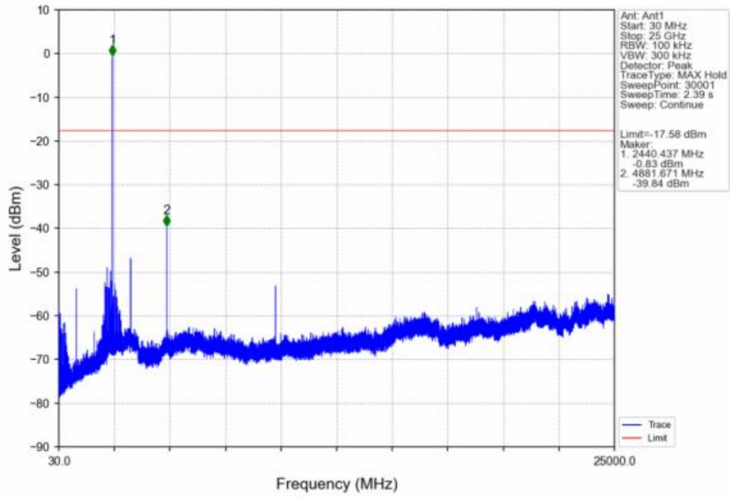

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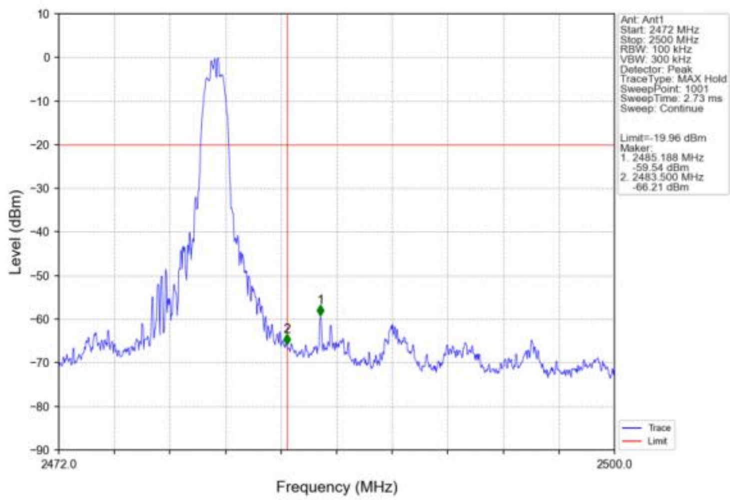

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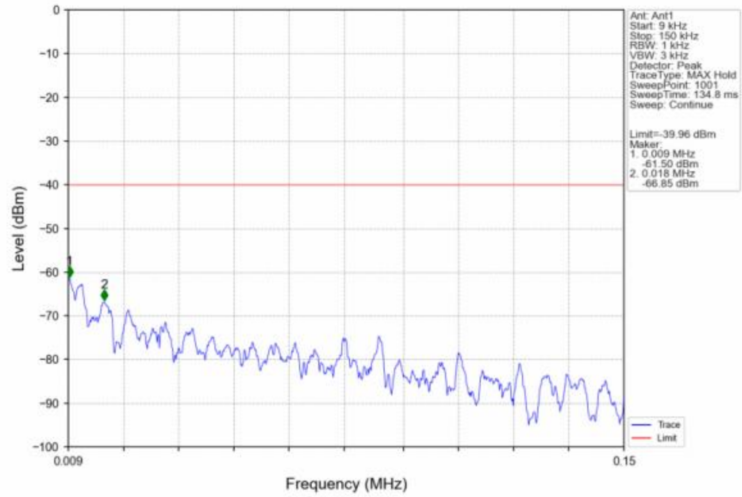

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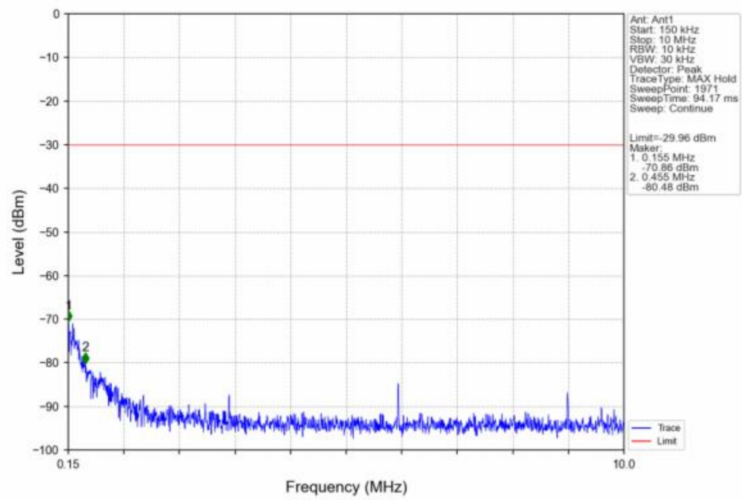

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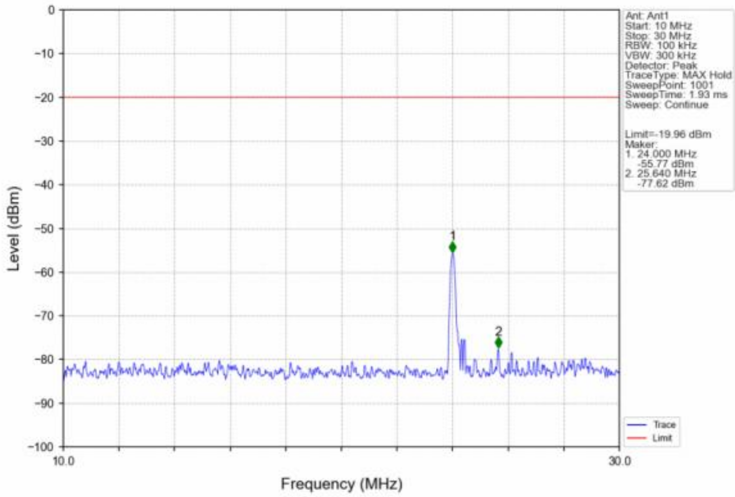

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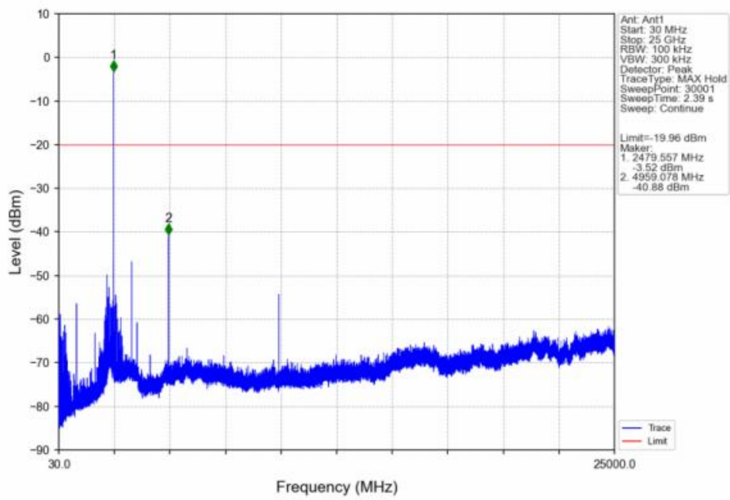

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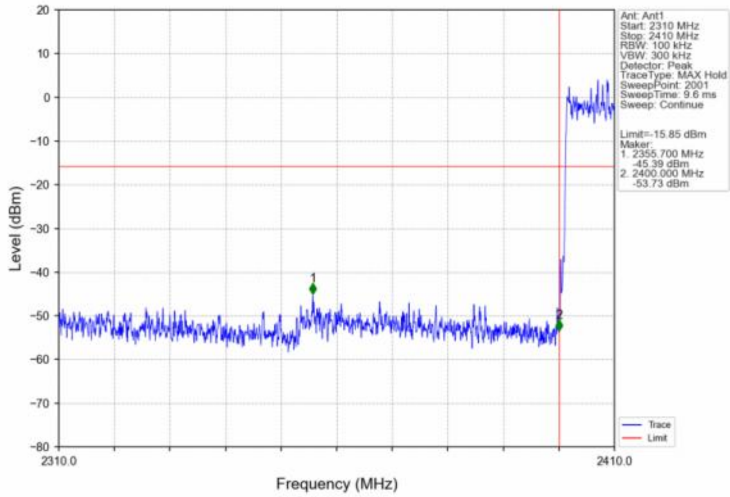

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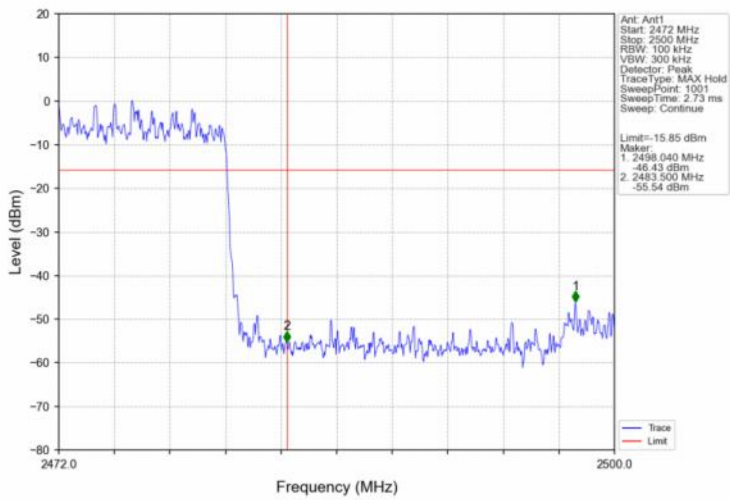

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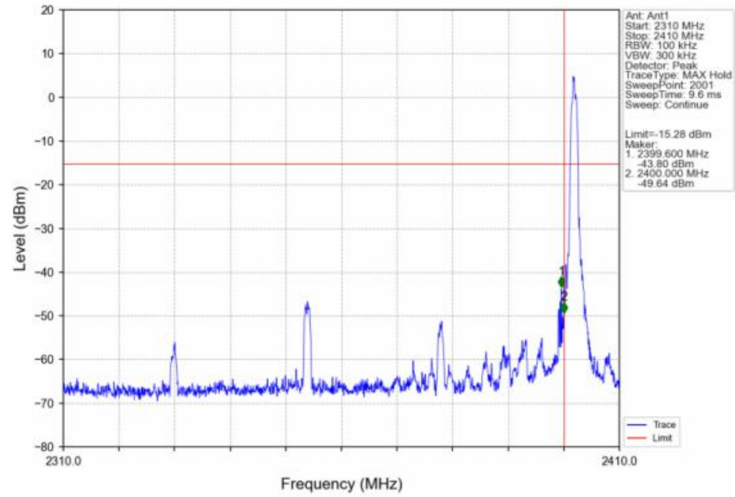

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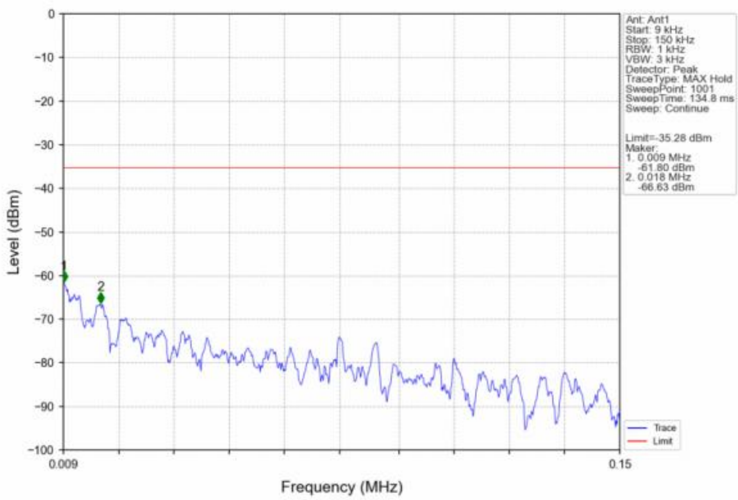

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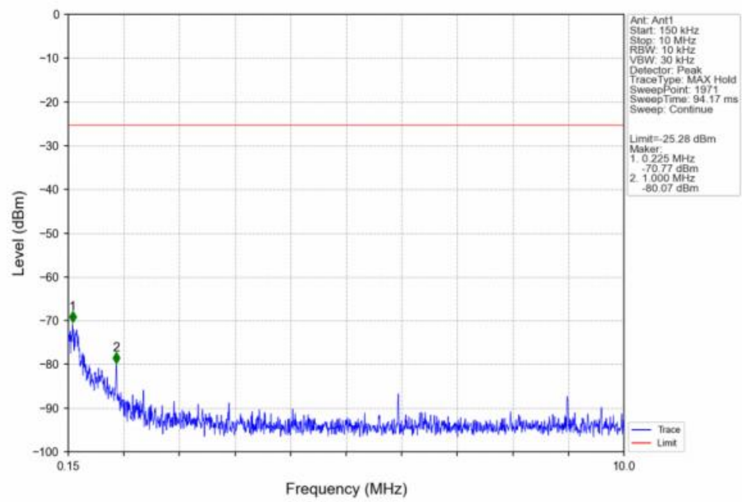

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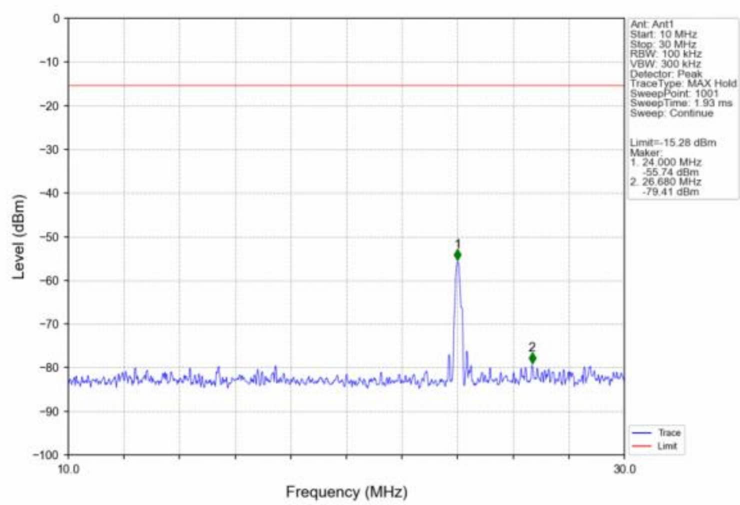

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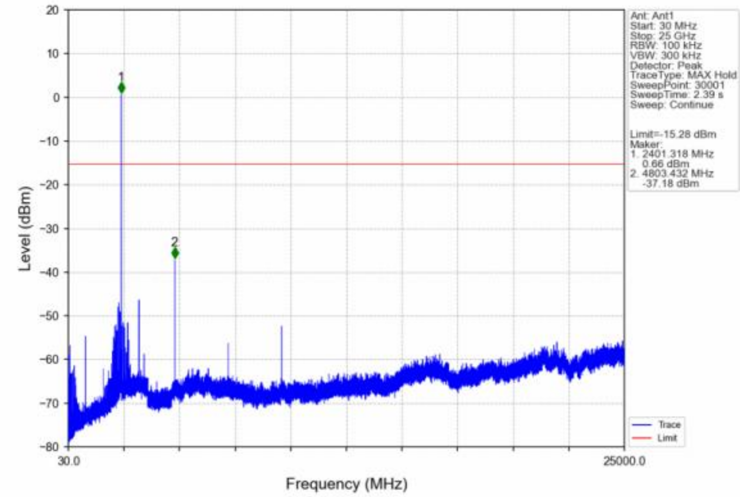

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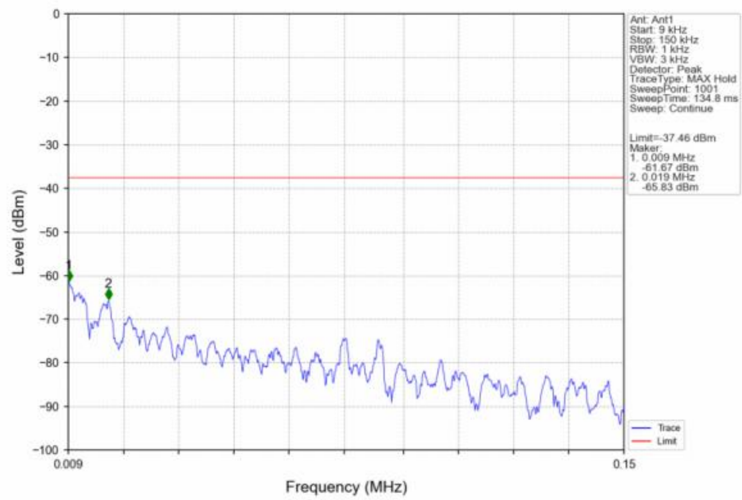

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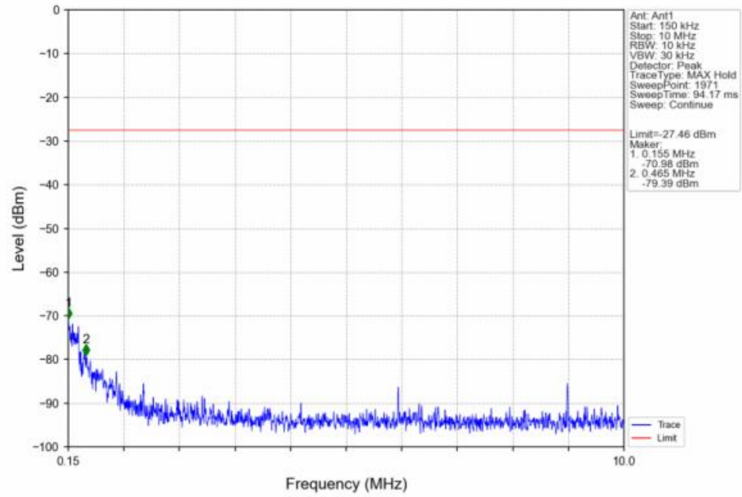
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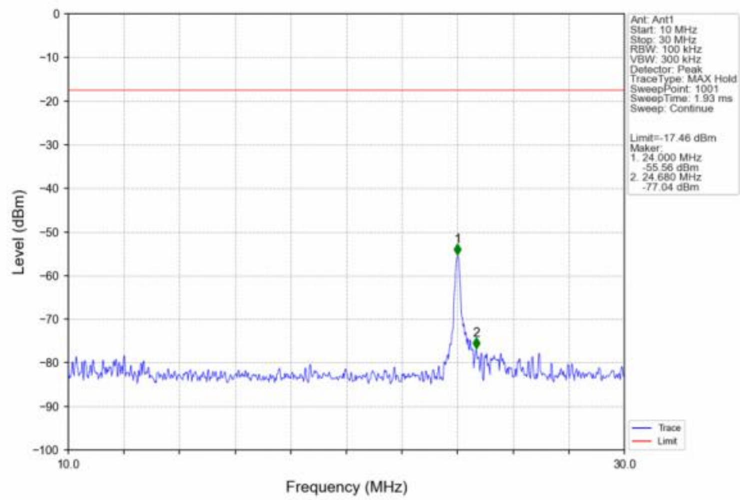

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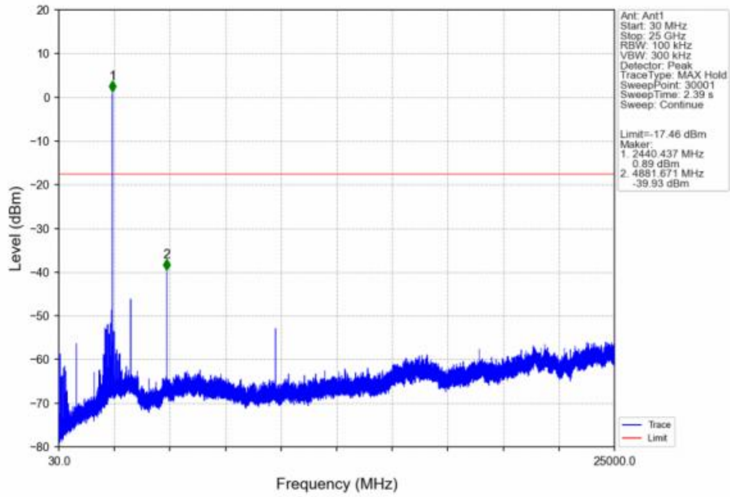
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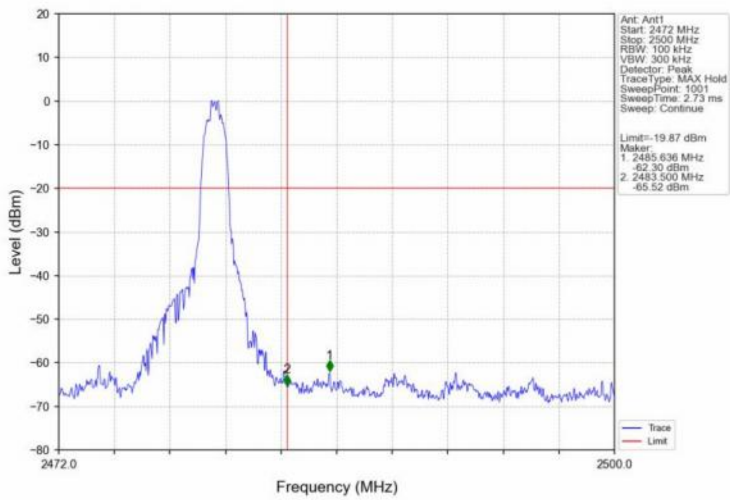

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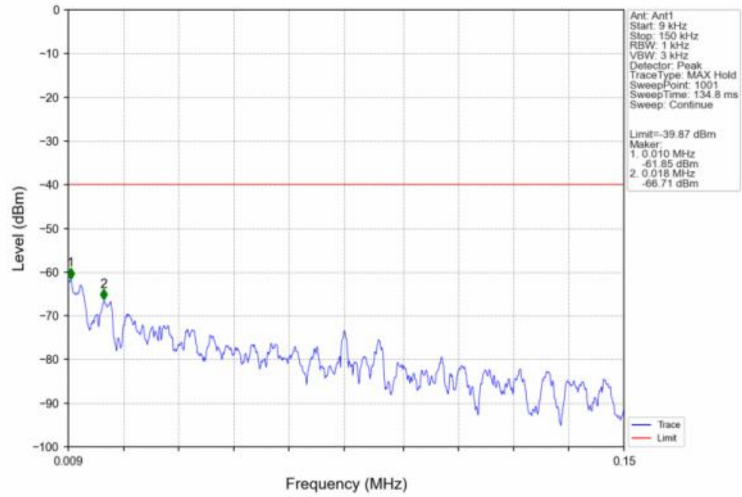

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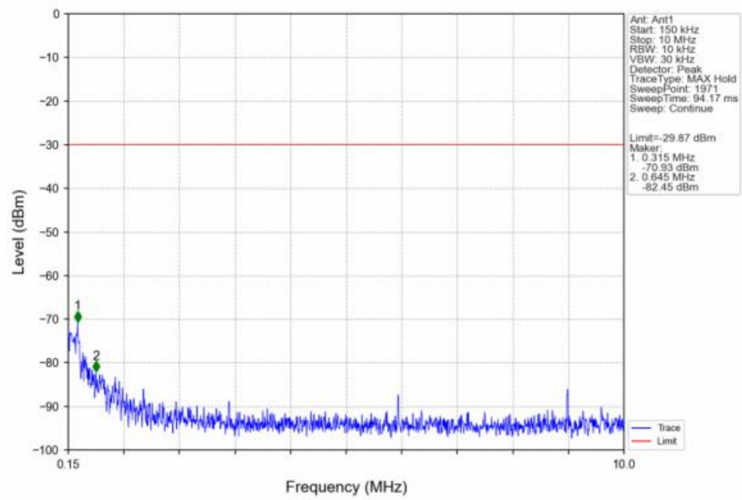

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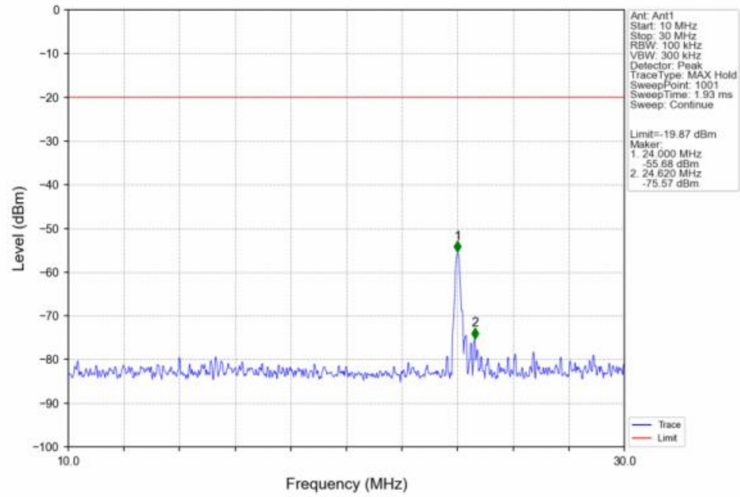
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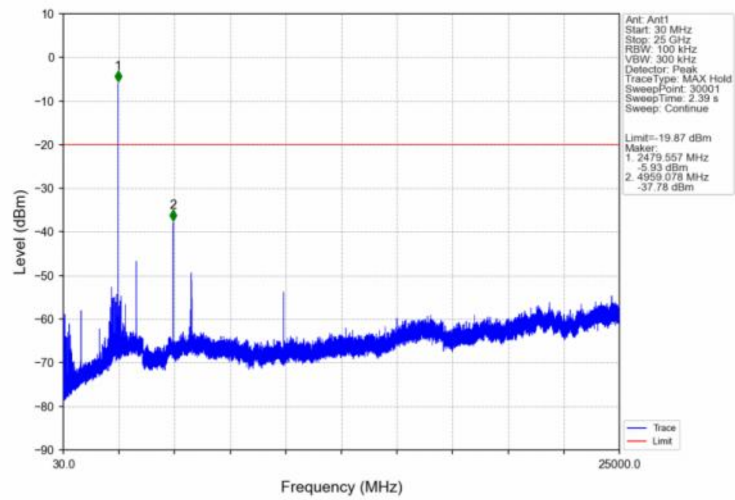

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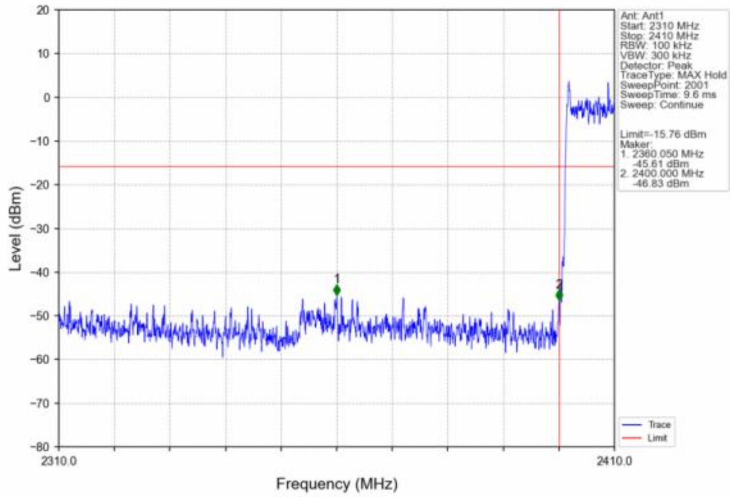
Email: info@btf-lab.com Tel: +86-755-23146130 http://www.btf-lab.com

8DPSK_3DH5_HOPP_Ant1_NTNV



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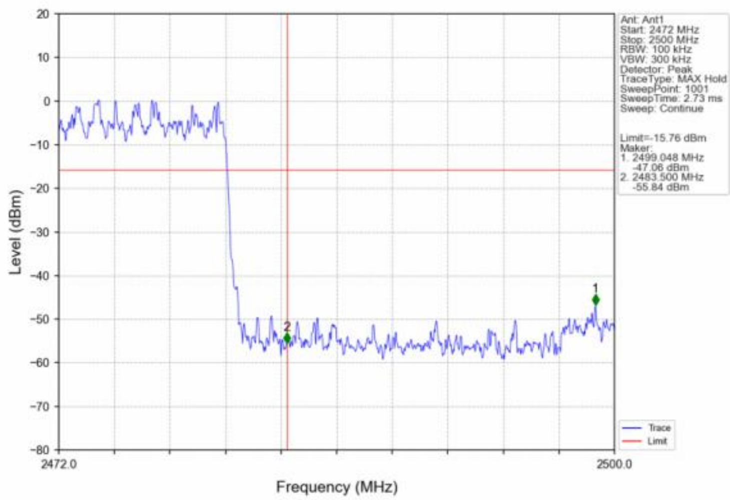

7. Form731

7.1 Test Result

7.1.1 Form731

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2402	2480	0.0035	5.46

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--END OF REPORT--