

**TEST REPORT**

<b>Application No.:</b>	GZCR2505000736AT
<b>Applicant:</b>	The House of Marley.LLC
<b>Address of Applicant:</b>	3000 Pontiac Trail, Commerce Township, Michigan 48390 United States
<b>Manufacturer:</b>	The House of Marley.LLC
<b>Address of Manufacturer:</b>	3000 Pontiac Trail, Commerce Township, Michigan 48390 United States
<b>Factory:</b>	Shenzhen 3nod Digital Technology Co., Ltd
<b>Address of Factory:</b>	Room 101, No. 1 Yanchao Road, Yanchuan Community, Yanluo, Bao'an District, Shenzhen, China
<b>Product Name:</b>	Get Together Go
<b>Model No.:</b>	EM-JA036
<b>Trade Mark:</b>	Marley
<b>Standard(s) :</b>	47 CFR Part 15, Subpart C 15.247
<b>Date of Receipt:</b>	2025-05-21
<b>Date of Test:</b>	2025-06-02 to 2025-06-12
<b>Date of Issue:</b>	2025-07-03

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.



Ricky Liu  
Manager

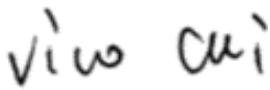


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<b>Revision Record</b>			
<b>Version</b>	<b>Report No.</b>	<b>Date</b>	<b>Remark</b>
01	GZCR250500073602	2025-07-03	Original

<b>Authorized for issue by:</b>			
		 Luke Lin	
		<b>Luke Lin/Project Engineer</b>	
		 Vico Cui	
		<b>Vico Cui/Reviewer</b>	



## 2 Test Summary

<b>Radio Spectrum Technical Requirement</b>				
<b>Item</b>	<b>Standard</b>	<b>Method</b>	<b>Requirement</b>	<b>Result</b>
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

<b>Radio Spectrum Matter Part</b>				
<b>Item</b>	<b>Standard</b>	<b>Method</b>	<b>Requirement</b>	<b>Result</b>
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	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
Conducted Peak Output Power		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

**Note:**

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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**Remark:**

This product is available in two colors: Cream and signature black.

According to the declaration from the applicant, the electrical circuit design, layout, components used, and internal wiring were identical for all models, with only difference on appearance and color.



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## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	DC 5V Supplied by AC/DC adapter for charging Powered by built in Rechargeable battery as below for normal working: Model: 18650-2S1P Rated: DC7.2 V, 3200mAh, 23.04Wh.
Cable(s):	USB-C port* 1pcs AUX IN port *1pcs USB-C to USB-C unshielded cable 1m
Test Voltage:	AC 120 V, 60 Hz
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Antenna Type:	PCB antenna
Antenna Gain:	1.05 dBi according to antenna specification
Antenna Number:	1

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	Lenovo Xiaoxinchao 5000	PF0TLJX7
AC/DC Adapter	HUAWEI	Model:HW- 110600C02; Input:AC 100-240V,1.8A Max.50/60Hz; Output:DC 5V/2A, 10V/4A, 11V/6A Max.	JL28L4NBM03275



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#### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±3.22dB
Radiated Emissions which fall in the restricted bands	±5.14dB (3m); ±4.90dB (10m); ±4.88dB (1GHz-6GHz); ±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±3.08dB (9kHz to 150kHz); ±3.19dB (150kHz to 30MHz); ±5.14dB (30MHz-1GHz) (3m); ±4.90dB (30MHz-1GHz) (10m)
Radiated Spurious Emissions Above 1GHz	±4.88dB (1GHz-6GHz); ±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Conducted Peak Output Power	± 0.75dB
20dB Bandwidth	± 0.274%
Carrier Frequencies Separation	± 7.25 x 10 <sup>-8</sup>
Hopping Channel Number	± 7.25 x 10 <sup>-8</sup>
Dwell Time	± 0.029%
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Remark:	
The $U_{lab}$ (lab Uncertainty) is less than $U_{cisp}$ (CISPR Uncertainty) or $U_{ETSI}$ (ETSI Uncertainty).	
Emission decision rule:	
– Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit, marked as Pass in the report.	
– Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.	

#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou,  
Guangdong, China 510663

Tel: +86 20 82155555

No tests were sub-contracted.



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## 4.5 Test Facility

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

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IEC60061 and Rules of procedure IEC60062, and the relevant IEC60065 CB-Scheme Operational documents.

## 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None



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Guangzhou Branch, Testing & EEC Laboratory

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## 5 Equipment List

<b>Radiated Emissions which fall in the restricted bands</b>					
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal Date</b>	<b>Cal Due Date</b>
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2025-05-13	2027-05-12
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

**Radiated Spurious Emissions Below 1GHz**

<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal Date</b>	<b>Cal Due Date</b>
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Coaxial cable	Mirco-COAX UTIFLEX	311A	EMC0540	2024-08-19	2026-08-18
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2024-12-04	2025-12-03
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR7	EMC2220	2024-12-04	2025-12-03
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-2GHz)	Schwarzbeck Mess-Elektronik	VULB 9168	EMC2174	2025-04-21	2027-04-20

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**Radiated Spurious Emissions Above 1GHz**

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2025-05-13	2027-05-12
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2024-10-14	2025-10-13
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

**RF Conducted Test**

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2136	2023-11-02	2025-11-01
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2024-08-19	2025-08-18
Test Software	TST	V2.0	GZE100-82	N/A	N/A
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2024-12-03	2025-12-02

**General used equipment**

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2025-06-03	2026-06-02

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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 1.05 dBi.

Antenna location:

Refer to internal photo.



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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.

#### 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 coordinate 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 Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	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.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

#### 7.1.1 E.U.T. Operation

Operating Environment:

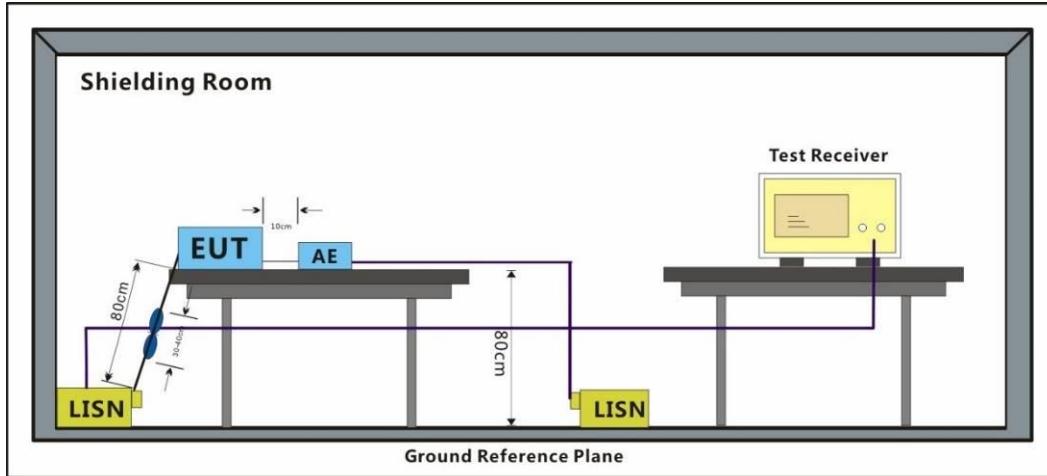
Temperature: 23.1 °C Humidity: 53.3 % RH Atmospheric Pressure: 1008 mbar

#### 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.



### 7.1.3 Test Setup Diagram



#### 7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
  - 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50µH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
  - 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
  - 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
  - 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

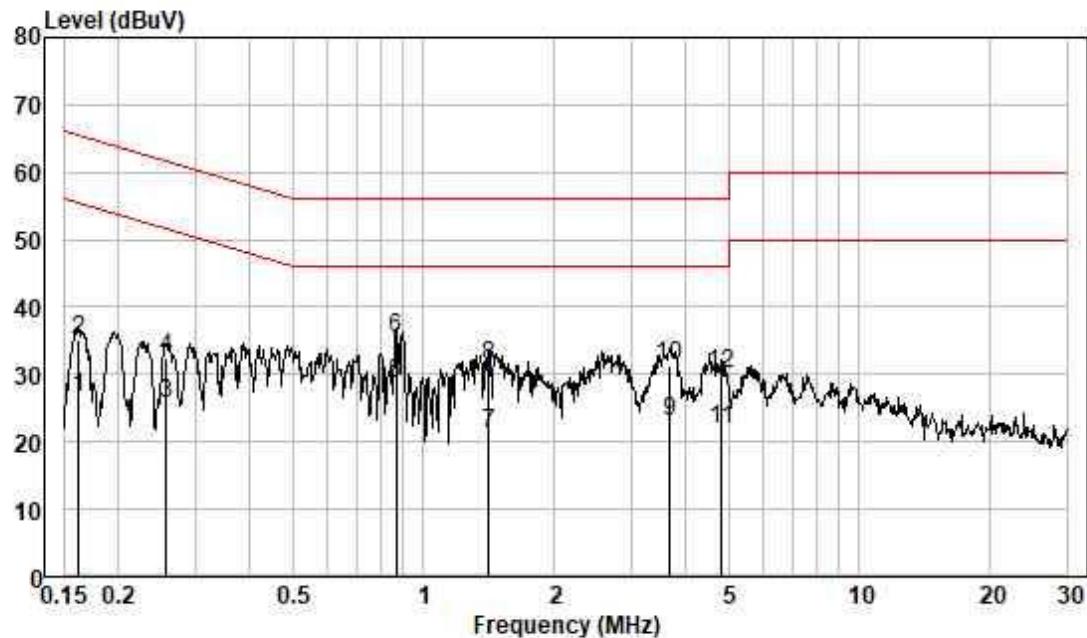
Remark : Level=Read Level+ Cable Loss+ LISN Factor



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Test Mode: 00; Line: Live line



Pol :LINE

Mode :

Model :

Power :

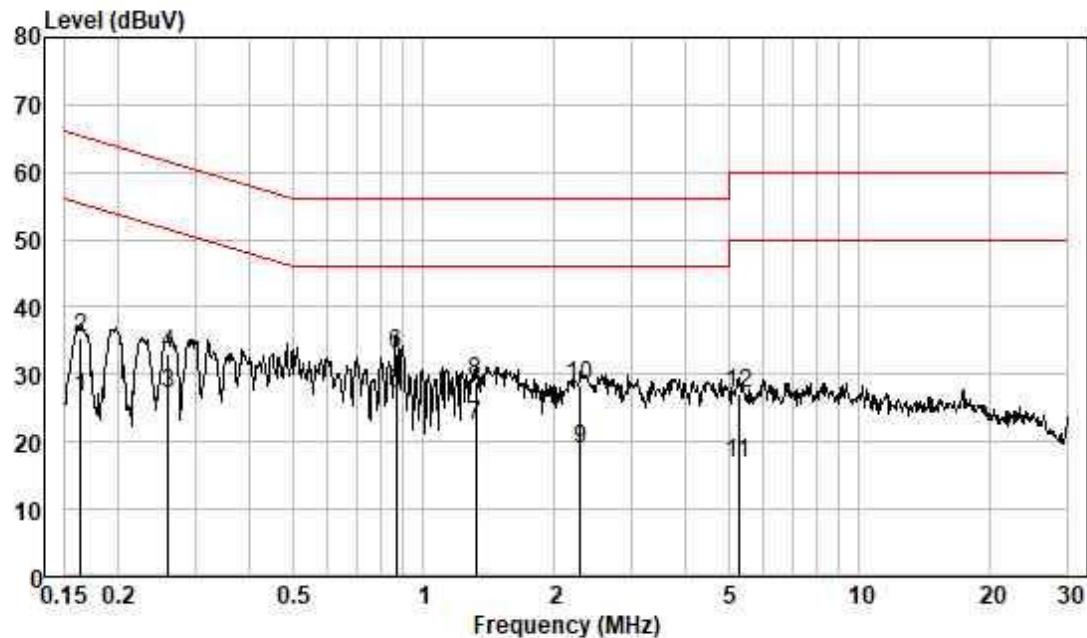
	Frequenc	Read	Cable	LISN	Measured	Limit	Over	Remark
	MHz	Level	Loss	Factor	Level	Line	Limit	
		dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	16.84	0.04	9.55	26.43	55.38	-28.95	Average
2	0.162	25.53	0.04	9.55	35.12	65.38	-30.26	QP
3	0.258	16.12	0.04	9.59	25.75	51.51	-25.76	Average
4	0.258	22.96	0.04	9.59	32.59	61.51	-28.92	QP
5	0.866	19.04	0.07	9.61	28.72	46.00	-17.28	Average
6	0.866	25.65	0.07	9.61	35.33	56.00	-20.67	QP
7	1.411	11.47	0.10	9.58	21.15	46.00	-24.85	Average
8	1.411	21.47	0.10	9.58	31.15	56.00	-24.85	QP
9	3.681	13.18	0.17	9.61	22.96	46.00	-23.04	Average
10	3.681	21.39	0.17	9.61	31.17	56.00	-24.83	QP
11	4.822	12.09	0.19	9.61	21.89	46.00	-24.11	Average
12	4.822	20.34	0.19	9.61	30.14	56.00	-25.86	QP



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Test Mode: 00; Line: Neutral Line



Pol : NEUTRAL

Mode :

Model :

Power :

Frequenc	Read	Cable	LISN	Measured	Limit	Over	Remark
MHz	Level	Loss	Factor	Level	Line	Limit	
	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.163	17.11	0.04	9.53	26.68	55.30	-28.62
2	0.163	25.87	0.04	9.53	35.44	65.30	-29.86
3	0.260	17.66	0.04	9.53	27.23	51.42	-24.19
4	0.260	23.59	0.04	9.53	33.16	61.42	-28.26
5	0.866	17.53	0.07	9.53	27.13	46.00	-18.87
6	0.866	23.59	0.07	9.53	33.19	56.00	-22.81
7	1.317	12.79	0.09	9.55	22.43	46.00	-23.57
8	1.317	19.34	0.09	9.55	28.98	56.00	-27.02
9	2.285	9.20	0.14	9.56	18.90	46.00	-27.10
10	2.285	18.71	0.14	9.56	28.41	56.00	-27.59
11	5.277	6.89	0.20	9.66	16.75	50.00	-33.25
12	5.277	17.19	0.20	9.66	27.05	60.00	-32.95



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## 7.2 Radiated Emissions which fall in the restricted bands

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

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

Limit:

Test Distance: 3 m

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.

### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.8 °C      Humidity: 55.0 % RH      Atmospheric Pressure: 1004 mbar

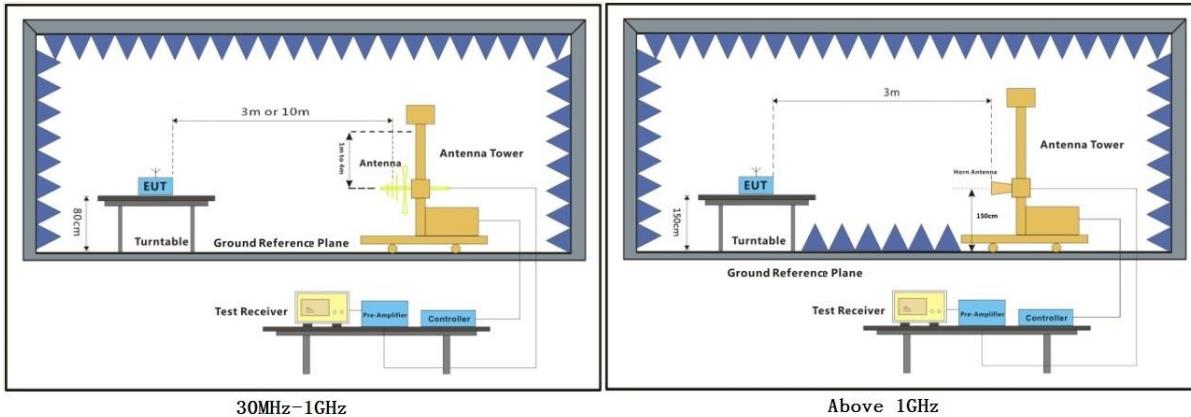
### 7.2.2 Test Mode Description

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.



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**7.2.3 Test Setup Diagram**

30MHz-1GHz

Above 1GHz



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**7.2.4 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 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.

Remark 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

Remark 4: For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.



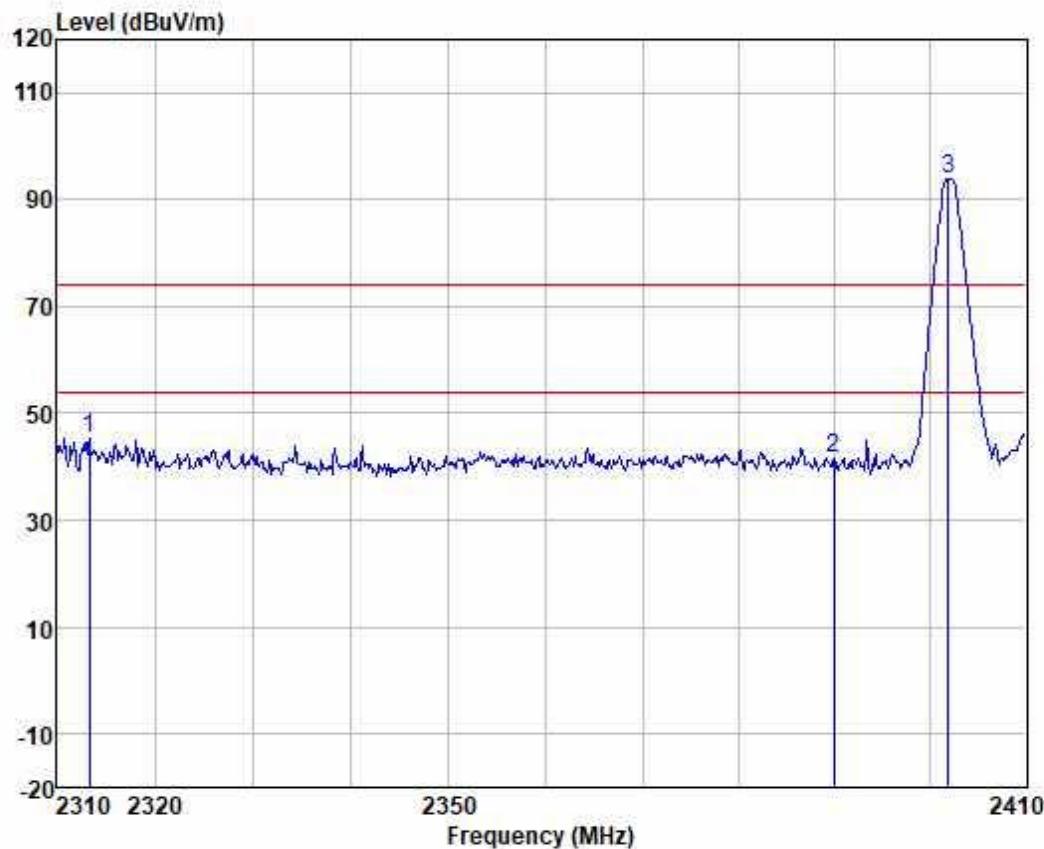
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



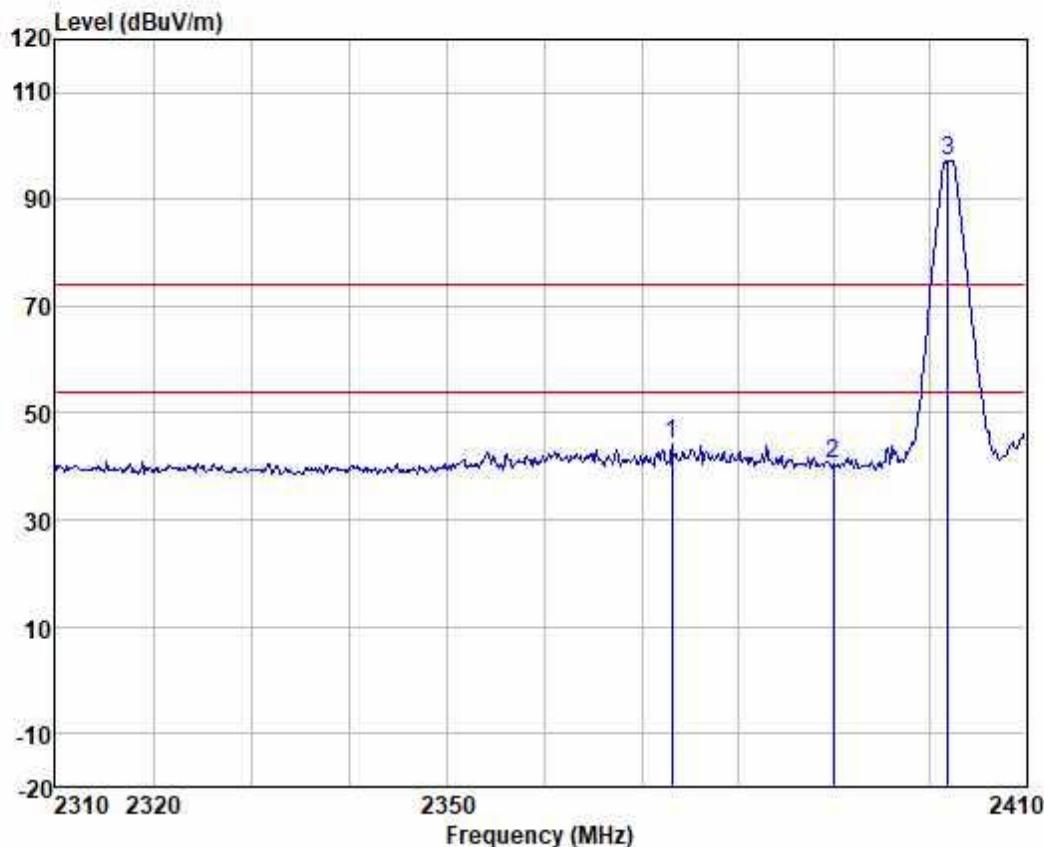
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Over Line Pol/Phase	Remark
	Level	Factor	Loss	Factor	Level	dBuV/m	dBuV/m	dB		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 2313.233	52.16	27.49	3.40	37.78	45.27	74.00	-28.73	VERTICAL	peak	
2 2390.000	48.31	27.68	3.44	37.77	41.66	74.00	-32.34	VERTICAL	peak	
3 * 2402.000	100.58	27.71	3.45	37.77	93.97	74.00	19.97	VERTICAL	peak	

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



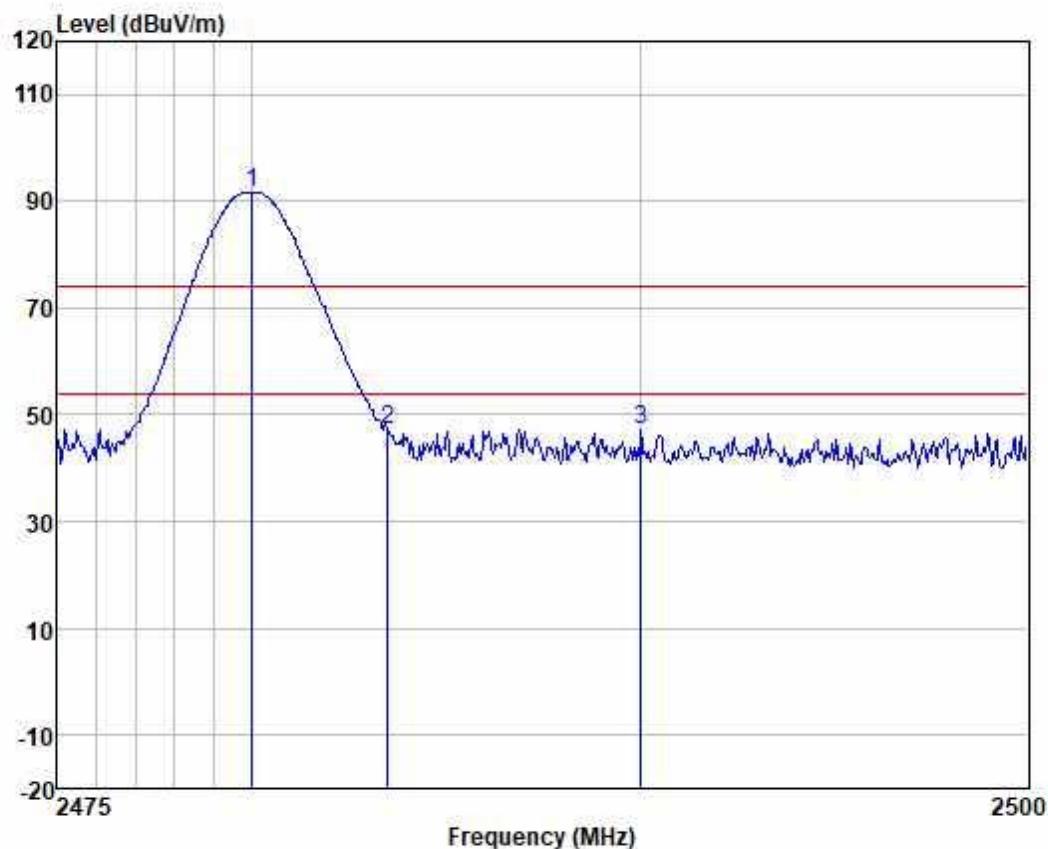
Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Level	Factor	Loss	Factor	Level	Line				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 2373.109	50.74	27.66	3.44	37.77	44.07	74.00	-29.93	HORIZONTAL	peak	
2 2390.000	47.15	27.68	3.44	37.77	40.50	74.00	-33.50	HORIZONTAL	peak	
3 * 2402.000	103.93	27.71	3.45	37.77	97.32	74.00	23.32	HORIZONTAL	peak	



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



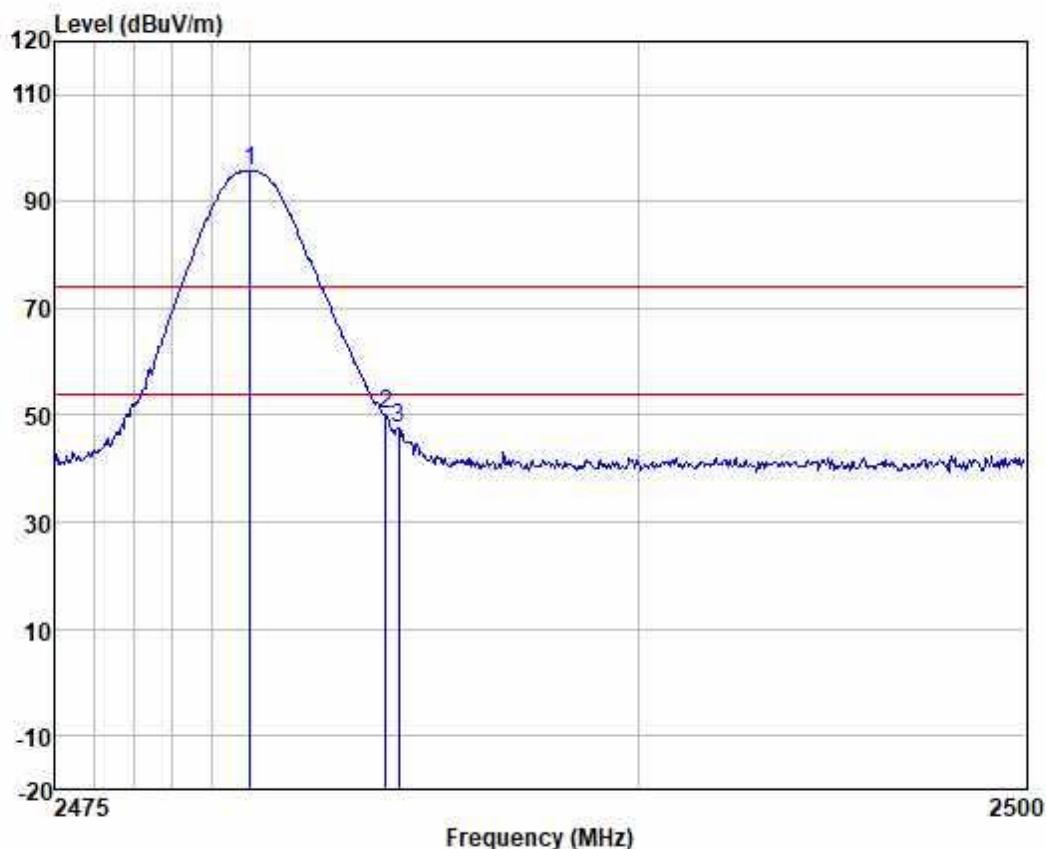
Freq	ReadAntenna		Cable		Preamp Loss Factor	Level	Limit Line	Over Line	Over Limit Pol/Phase	Remark
	MHz	Level Factor	dBuV	dB/m						
1 * 2480.000	97.92	27.84	3.48	37.76	91.48	74.00	17.48	VERTICAL	peak	
2 2483.500	53.50	27.85	3.49	37.76	47.08	74.00	-26.92	VERTICAL	peak	
3 2490.020	53.55	27.86	3.49	37.76	47.14	74.00	-26.86	VERTICAL	peak	



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



Freq	ReadAntenna		Cable		Preamp Loss Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	Level Factor	dB						
1 *	2480.000	102.03	27.84	3.48	37.76	95.59	74.00	21.59	HORIZONTAL	peak
2	2483.500	56.44	27.85	3.49	37.76	50.02	74.00	-23.98	HORIZONTAL	peak
3	2483.821	54.02	27.85	3.49	37.76	47.60	74.00	-26.40	HORIZONTAL	peak



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### 7.3 Radiated Spurious Emissions Below 1GHz

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

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

Limit:

Test Distance: 3 m below 30 MHz; 10 m above 30 MHz

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

#### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.3 °C

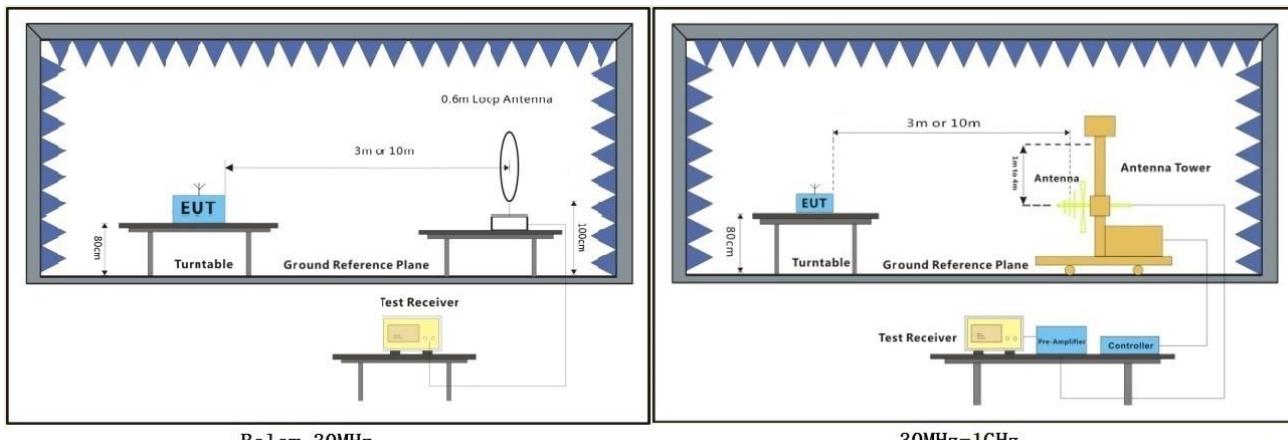
Humidity: 54.1 % RH

Atmospheric Pressure: 1008 mbar

#### 7.3.2 Test Mode Description

Pre-scan / Mode 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.

#### 7.3.3 Test Setup Diagram



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**7.3.4 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:

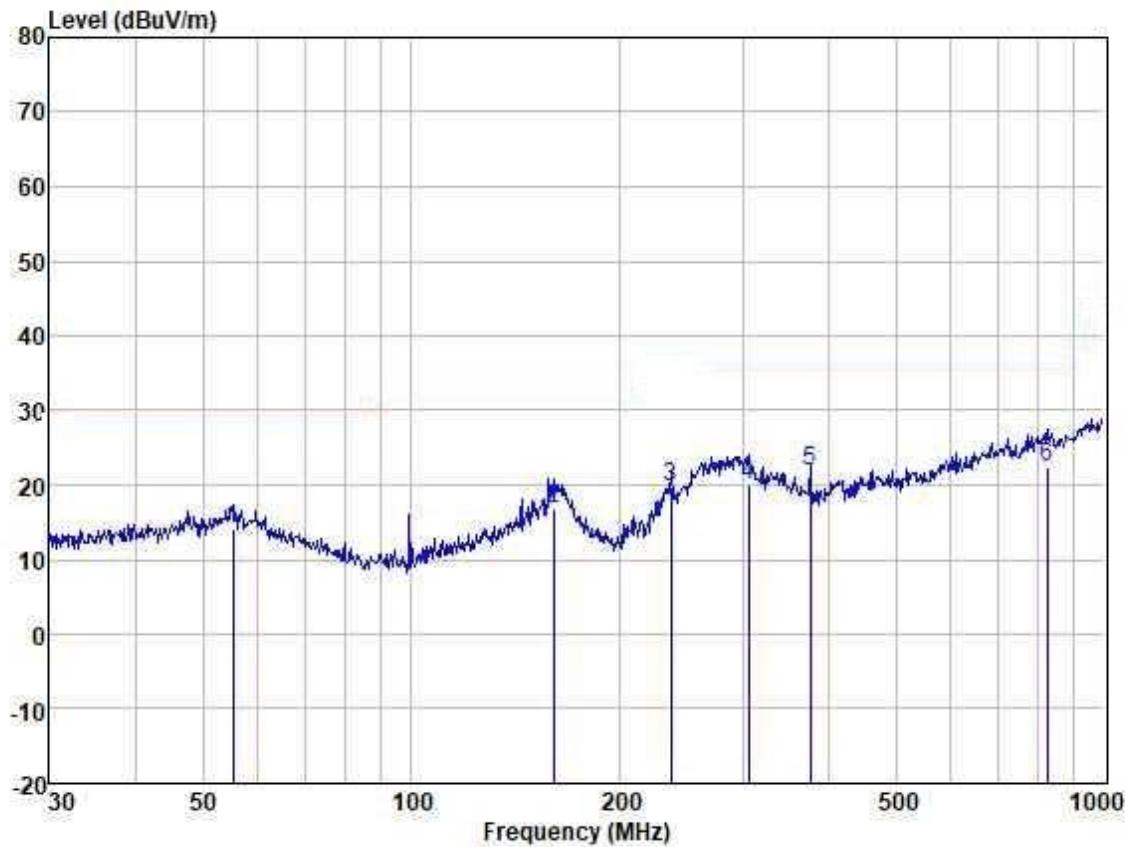
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from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



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Test Mode: 00; Polarity: Horizontal



Site : SGS  
:  
Model :  
Power : 120V  
Test Mode : TX\_non-Hop

Freq	Read	Antena	Cable	Preamp	Measured	Limit	Over	Pol/	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit	Phase	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	55.221	27.54	13.81	0.76	27.95	14.16			HORIZONTAL QP
2	160.346	29.83	13.69	1.02	27.70	16.84			HORIZONTAL QP
3	236.645	34.11	11.40	1.47	27.31	19.67			HORIZONTAL QP
4	306.754	31.83	13.65	1.70	27.22	19.96			HORIZONTAL QP
5	375.939	32.46	15.02	1.80	27.52	21.76			HORIZONTAL QP
6	827.493	24.81	23.25	2.57	28.26	22.37			HORIZONTAL QP

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Frequency (MHz)	Level @10m (dBuV/m)	Convert Factor (dB)*	Level @ 3m (dBuV/m)	Limit @3m (dBuV/m)	Over limit (dB)	Remark
55.221	14.16	10.46	24.62	40.00	-15.38	QP
160.346	16.84	10.46	27.30	43.52	-16.22	QP
236.645	19.67	10.46	30.13	46.02	-15.89	QP
306.754	19.96	10.46	30.42	46.02	-15.60	QP
375.939	21.76	10.46	32.22	46.02	-13.80	QP
827.493	22.37	10.46	32.83	46.02	-13.19	QP

\*Remark:

Level (dBuV/m) @3m = Level (dBuV/m) @10m + Convert Factor (dB)

Convert Factor (dB) =  $20 \cdot \log(\text{Measurement Distance}/\text{Specified Distance}) = 20 \cdot \log(10/3) = 10.46$  dB according to 15.31 (f) (1)



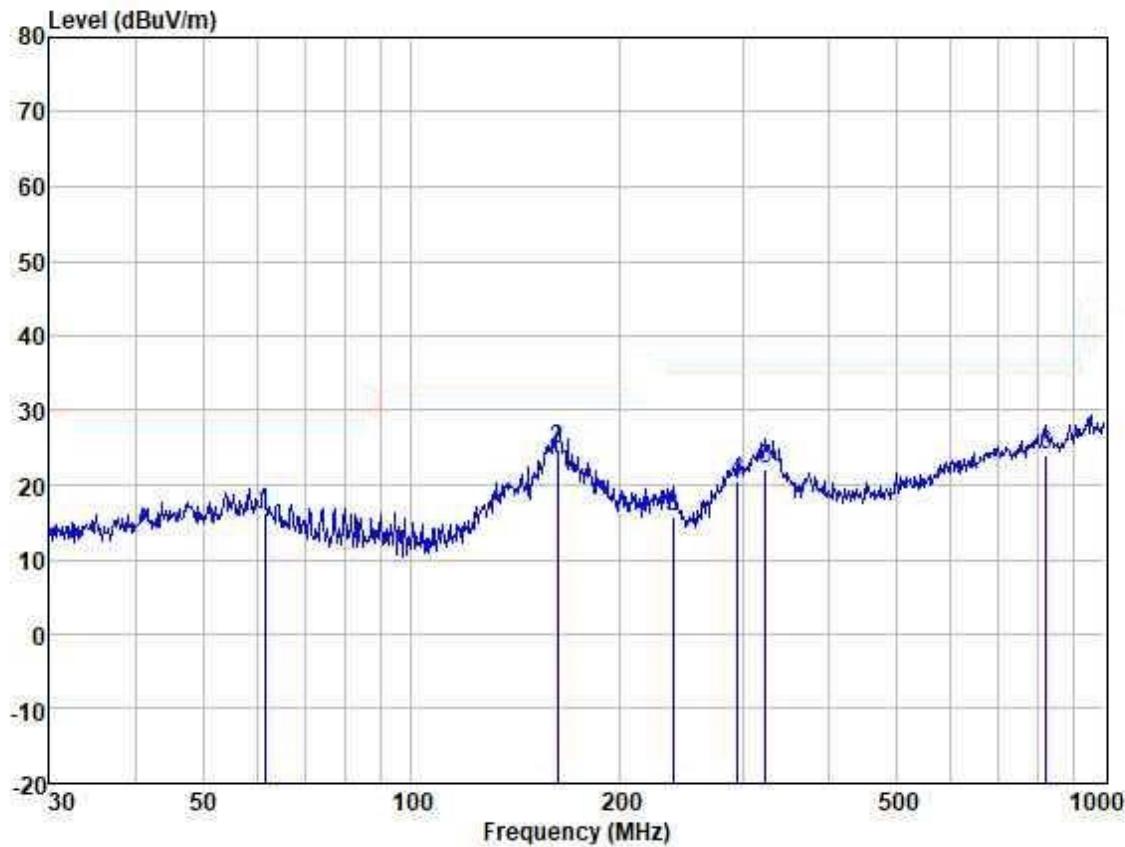
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Test Mode: 00; Polarity: Vertical



Site : SGS  
:  
Model :  
Power : 120V  
Test Mode : TX\_non-Hop

Freq	Read	Antena	Cable	Preamp	Measured	Limit	Over	Pol/	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit	Phase	
1 61.346	30.34	13.20	0.78	27.92	16.40			VERTICAL	QP
2 162.611	37.83	13.52	1.03	27.69	24.69			VERTICAL	QP
3 238.310	29.91	11.53	1.48	27.30	15.62			VERTICAL	QP
4 295.147	32.66	13.30	1.68	27.21	20.43			VERTICAL	QP
5 324.456	33.44	14.14	1.73	27.27	22.04			VERTICAL	QP
6 824.597	26.48	23.32	2.55	28.27	24.08			VERTICAL	QP

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Frequency (MHz)	Level @10m (dBuV/m)	Convert Factor (dB)*	Level @ 3m (dBuV/m)	Limit @3m (dBuV/m)	Over limit (dB)	Remark
61.346	16.40	10.46	26.86	40.00	-13.14	QP
162.611	24.69	10.46	35.15	43.52	-8.37	QP
238.310	15.62	10.46	26.08	46.02	-19.94	QP
295.147	20.43	10.46	30.89	46.02	-15.13	QP
324.456	22.04	10.46	32.50	46.02	-13.52	QP
824.597	24.08	10.46	34.54	46.02	-11.48	QP

\*Remark:

Level (dBuV/m) @3m = Level (dBuV/m) @10m + Convert Factor (dB)

Convert Factor (dB) =  $20 \times \log(\text{Measurement Distance}/\text{Specified Distance}) = 20 \times \log(10/3) = 10.46$   
dB according to 15.31 (f) (1)



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## 7.4 Radiated Spurious Emissions Above 1GHz

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

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

Limit:

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

### 7.4.1 E.U.T. Operation

Operating Environment:

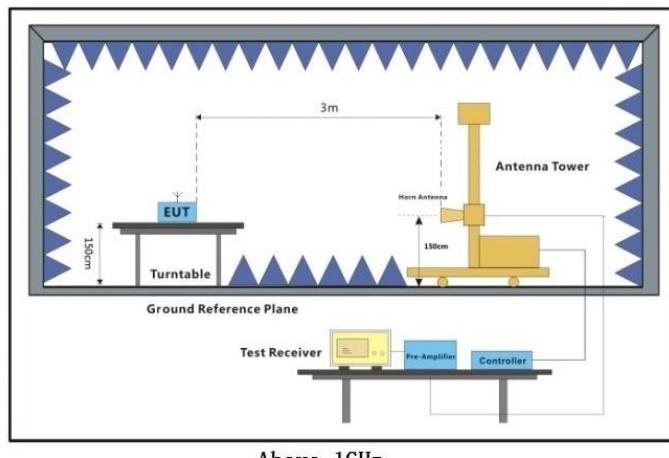
Temperature: 24.8 °C      Humidity: 55.0 % RH      Atmospheric Pressure: 1004 mbar

### 7.4.2 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.

### 7.4.3 Test Setup Diagram



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**7.4.4 Measurement Procedure and Data**

- a. 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.
- b. The EUT was set 3 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 peak or average 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:

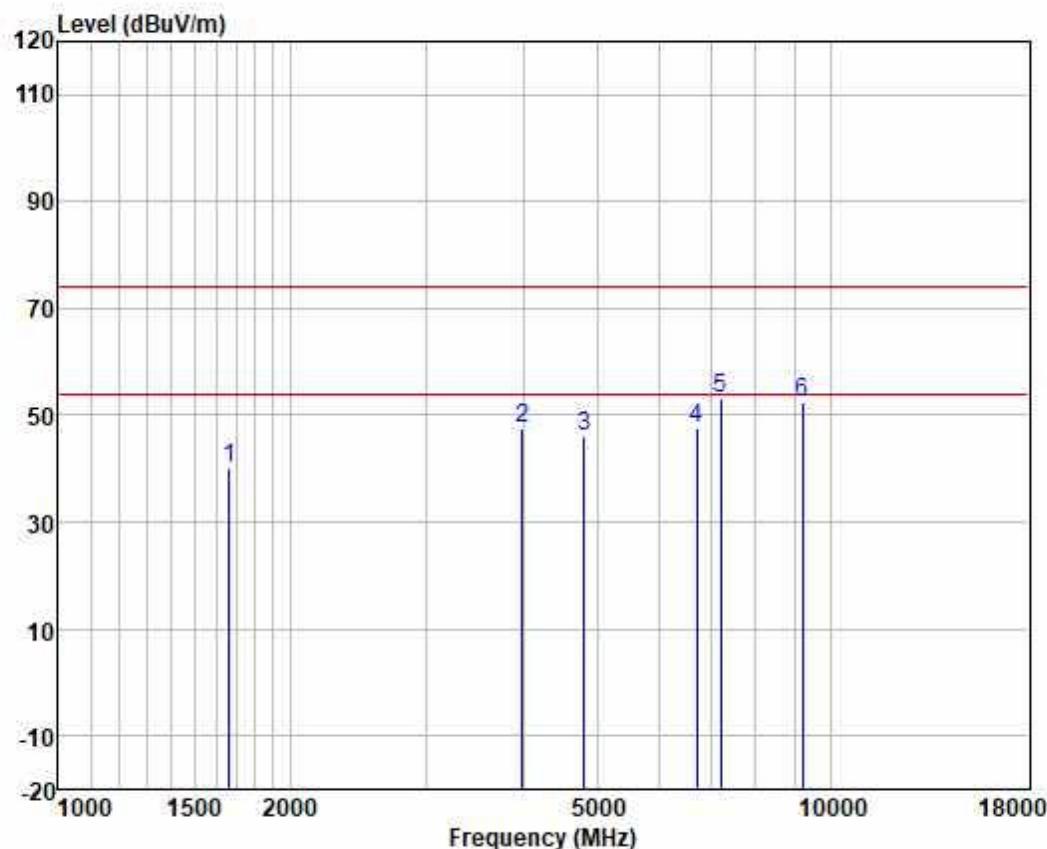
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. 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.
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
- 5:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.



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



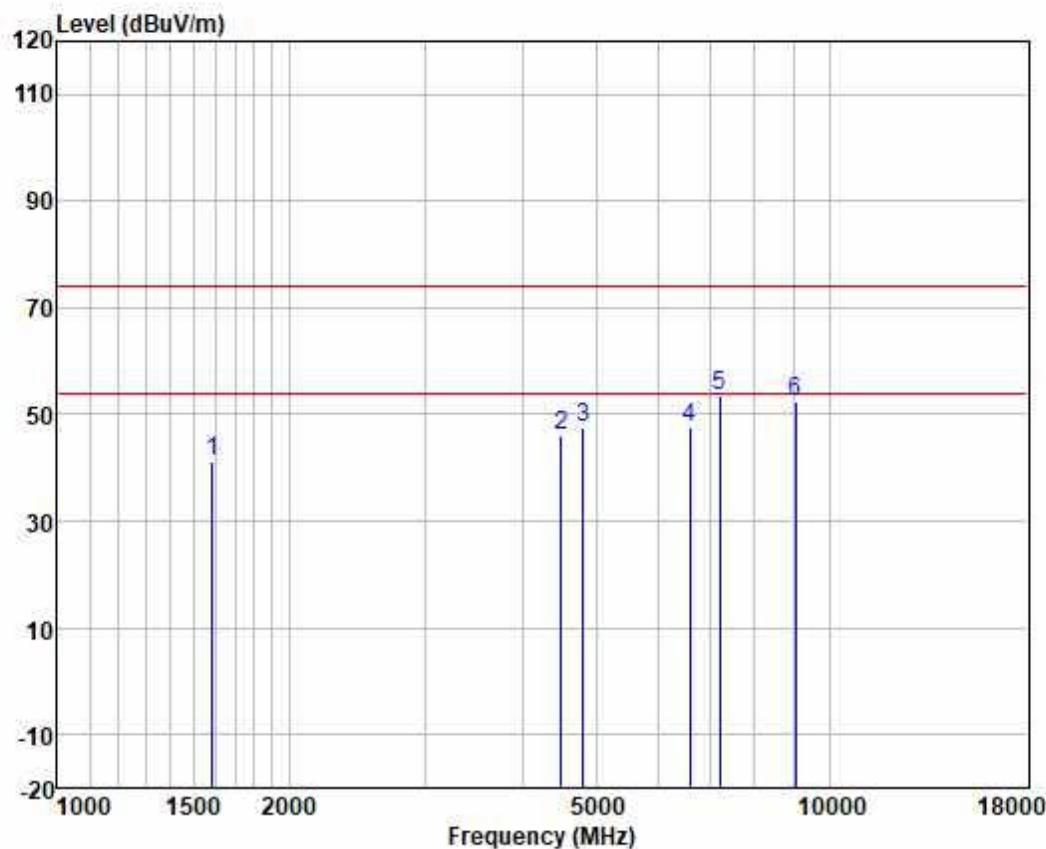
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Line	Over Limit	Pol/Phase	Remark
	Freq	Level	Antenna	Loss	Factor	Preamp					
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1	1663.137	50.53	24.93	2.81	38.06	40.21	74.00	-33.79	VERTICAL	peak	
2	3992.781	50.01	30.59	4.49	37.50	47.59	74.00	-26.41	VERTICAL	peak	
3	4804.000	44.66	34.16	4.81	37.38	46.25	74.00	-27.75	VERTICAL	peak	
4	6717.762	44.65	34.42	5.75	37.12	47.70	74.00	-26.30	VERTICAL	peak	
5	7206.000	48.69	35.63	5.93	37.17	53.08	74.00	-20.92	VERTICAL	peak	
6	9205.540	44.95	37.97	6.73	37.13	52.52	74.00	-21.48	VERTICAL	peak	



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



Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Line	Over Limit Pol/Phase	Remark
	MHz	Level Factor	Loss Factor	dB	dBuV/m	dBuV/m	dB		
1	1587.975	51.83	24.65	2.75	38.15	41.08	74.00	-32.92	HORIZONTAL peak
2	4495.125	44.87	34.17	4.62	37.44	46.22	74.00	-27.78	HORIZONTAL peak
3	4804.000	45.92	34.16	4.81	37.38	47.51	74.00	-26.49	HORIZONTAL peak
4	6602.265	45.03	34.07	5.69	37.12	47.67	74.00	-26.33	HORIZONTAL peak
5	7206.000	49.16	35.63	5.93	37.17	53.55	74.00	-20.45	HORIZONTAL peak
6	9047.272	45.27	37.67	6.60	37.14	52.40	74.00	-21.60	HORIZONTAL peak

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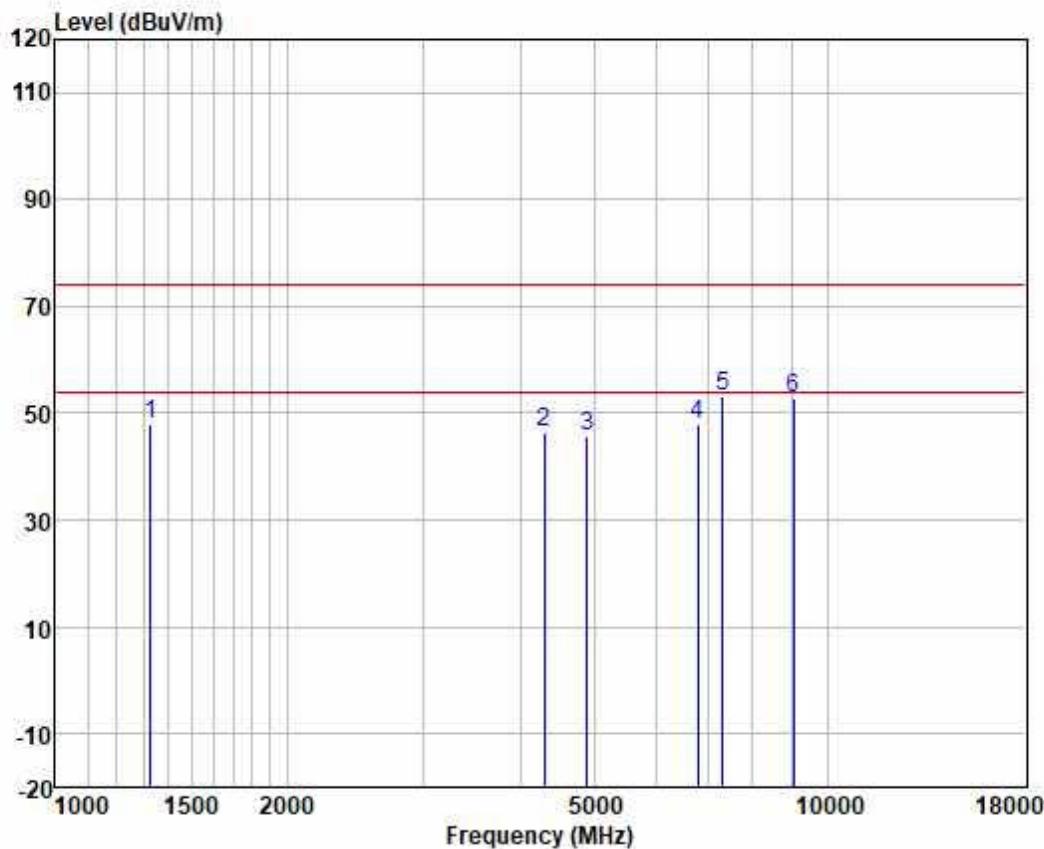
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中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 sgs.china@sgs.com

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



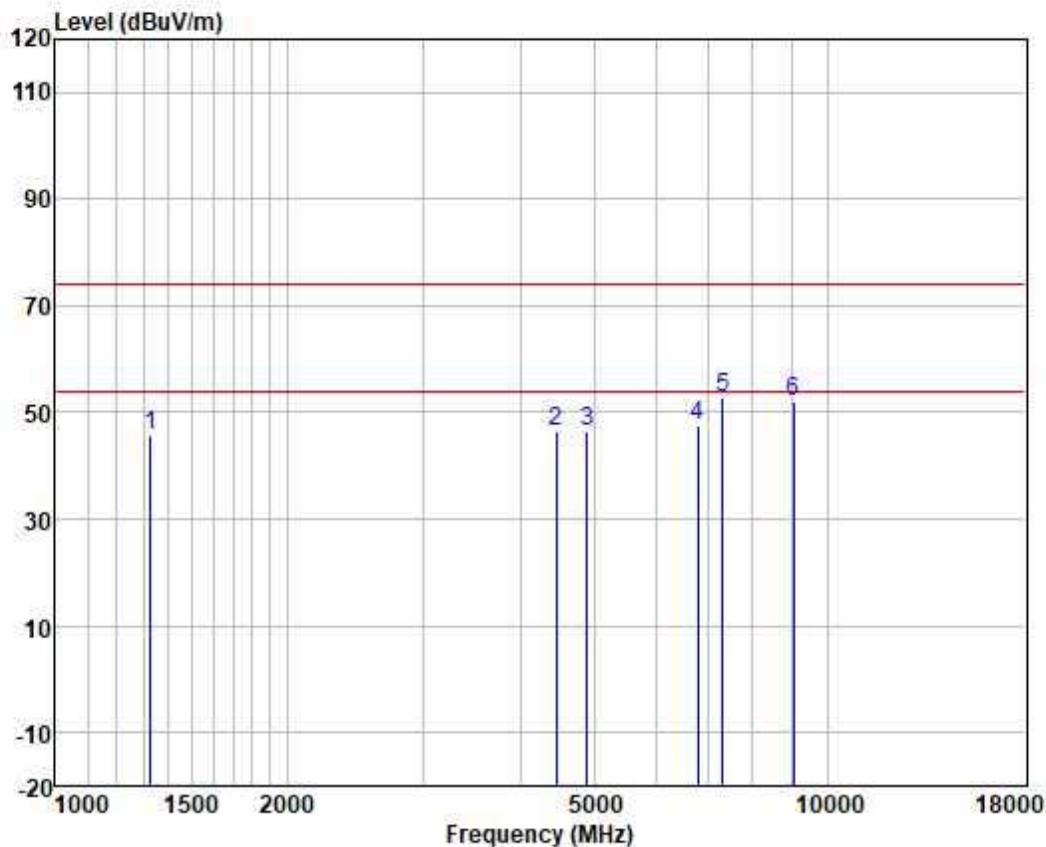
Freq	Read	Antenna	Cable	Preamp	Limit	Over	Over	Remark
	Freq	Level	Factor	Loss				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	1327.446	59.74	24.07	2.61	38.57	47.85	74.00	-26.15 VERTICAL peak
2	4304.400	46.19	33.05	4.58	37.47	46.35	74.00	-27.65 VERTICAL peak
3	4882.000	43.93	34.15	4.86	37.35	45.59	74.00	-28.41 VERTICAL peak
4	6795.879	44.42	34.69	5.79	37.13	47.77	74.00	-26.23 VERTICAL peak
5	7323.000	48.15	36.07	5.98	37.18	53.02	74.00	-20.98 VERTICAL peak
6	9047.272	45.54	37.67	6.60	37.14	52.67	74.00	-21.33 VERTICAL peak

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



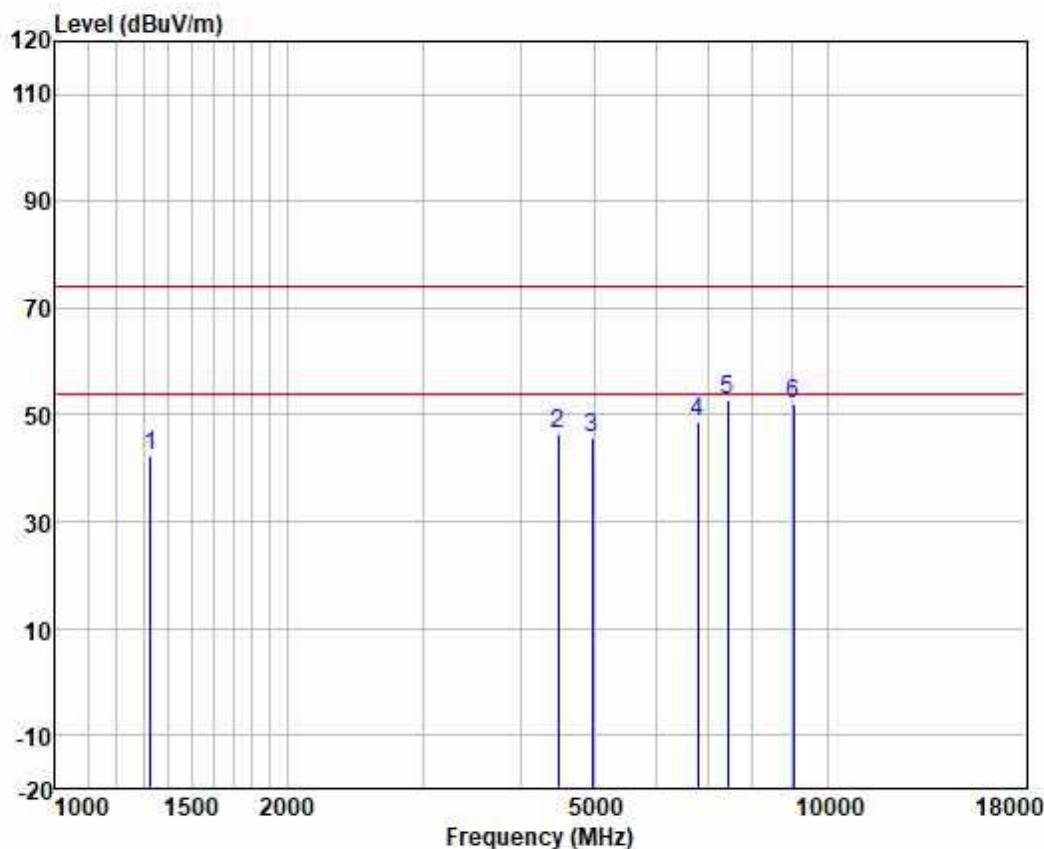
Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Level	Factor	Loss	Factor	Level	Line				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1327.446	57.53	24.07	2.61	38.57	45.64	74.00	-28.36	HORIZONTAL	peak
2	4456.315	45.25	34.00	4.61	37.45	46.41	74.00	-27.59	HORIZONTAL	peak
3	4882.000	44.88	34.15	4.86	37.35	46.54	74.00	-27.46	HORIZONTAL	peak
4	6795.879	44.32	34.69	5.79	37.13	47.67	74.00	-26.33	HORIZONTAL	peak
5	7323.000	48.06	36.07	5.98	37.18	52.93	74.00	-21.07	HORIZONTAL	peak
6	9047.272	45.03	37.67	6.60	37.14	52.16	74.00	-21.84	HORIZONTAL	peak

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



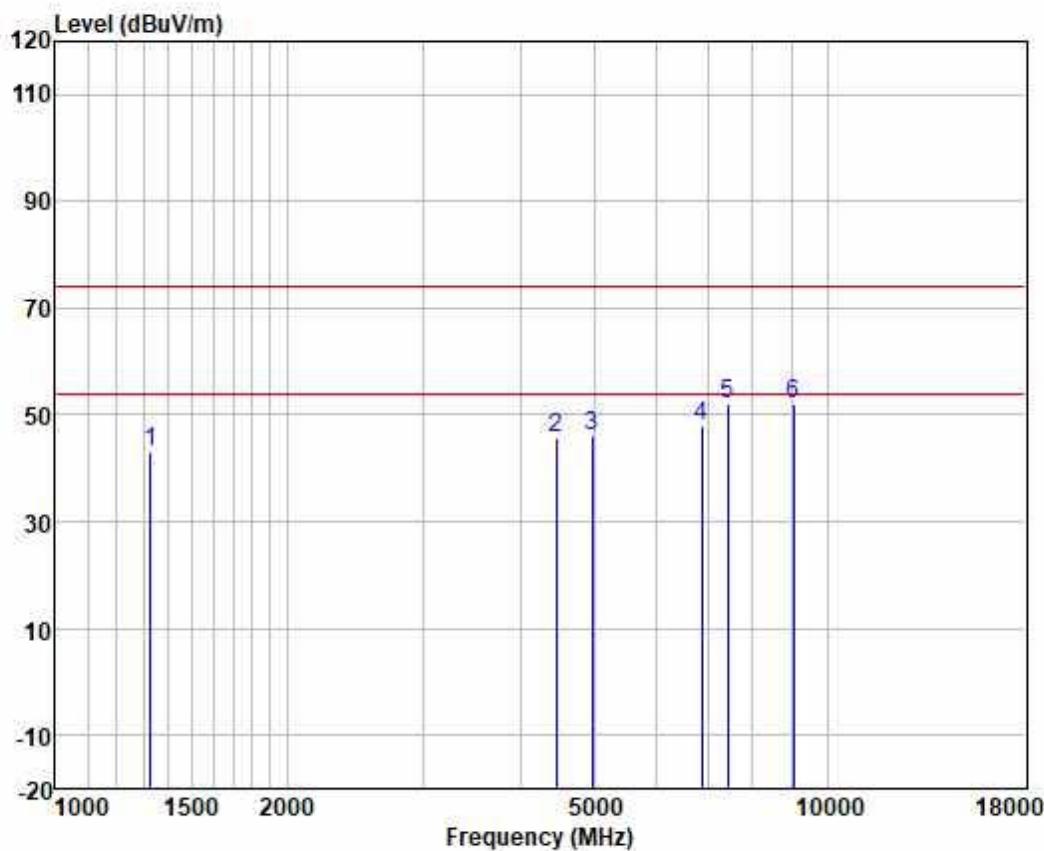
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Over Line Pol/Phase	Remark
	Level	Factor	Loss	Factor	Level	dBuV/m				
MHz	dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB		
1 1327.446	54.29	24.07	2.61	38.57	42.40	74.00	-31.60	VERTICAL	peak	
2 4482.150	45.15	34.12	4.62	37.44	46.45	74.00	-27.55	VERTICAL	peak	
3 4960.000	44.16	34.15	4.89	37.32	45.88	74.00	-28.12	VERTICAL	peak	
4 6795.879	45.49	34.69	5.79	37.13	48.84	74.00	-25.16	VERTICAL	peak	
5 7440.000	47.56	36.33	6.02	37.18	52.73	74.00	-21.27	VERTICAL	peak	
6 9047.272	45.04	37.67	6.60	37.14	52.17	74.00	-21.83	VERTICAL	peak	

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



Freq	ReadAntenna		Cable		Preamp	Limit	Over	Over	Remark
	Level	Factor	Loss	Factor					
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dB	
1 1327.446	55.04	24.07	2.61	38.57	43.15	74.00	-30.85	HORIZONTAL	peak
2 4456.315	44.61	34.00	4.61	37.45	45.77	74.00	-28.23	HORIZONTAL	peak
3 4960.000	44.53	34.15	4.89	37.32	46.25	74.00	-27.75	HORIZONTAL	peak
4 6874.906	44.43	34.88	5.83	37.14	48.00	74.00	-26.00	HORIZONTAL	peak
5 7440.000	47.00	36.33	6.02	37.18	52.17	74.00	-21.83	HORIZONTAL	peak
6 9047.272	45.05	37.67	6.60	37.14	52.18	74.00	-21.82	HORIZONTAL	peak

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## 7.5 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 $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ 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

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C      Humidity: 63.3 % RH      Atmospheric Pressure: 1004 mbar

### 7.5.2 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.

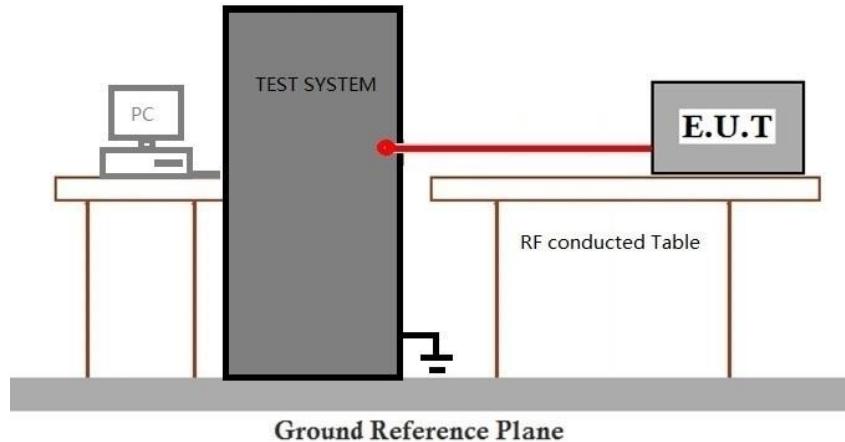
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Guangzhou Branch, Testing & EEC Laboratory

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### 7.5.3 Test Setup Diagram



### 7.5.4 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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## 7.6 20dB Bandwidth

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

Test Method: ANSI C63.10 (2013) Section 7.8.7

Limit:

20 dB bandwidth of the hopping channel	Hopping frequencies	Average time of occupancy
less than 250 kHz	least 50 hopping frequencies	shall not be greater than 0.4 seconds within a 20 second period
250 kHz to 500kHz	least 25 hopping frequencies	shall not be greater than 0.4 seconds within a 10 second period

### 7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24.2 °C

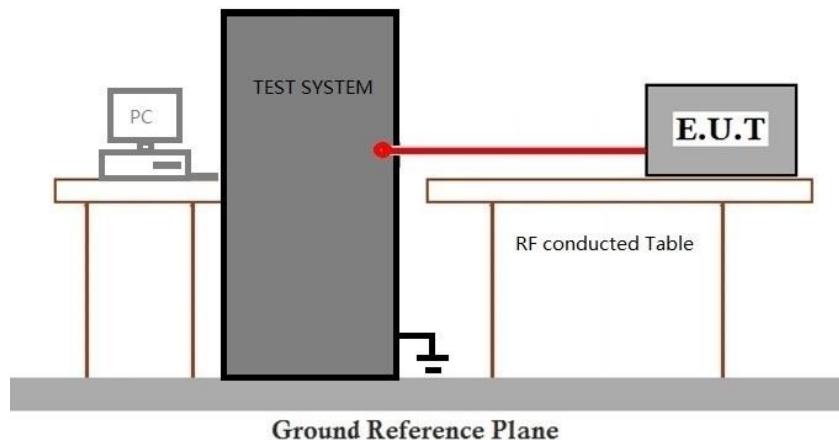
Humidity: 61.7 % RH

Atmospheric Pressure: 1008 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.

### 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 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.

### 7.7.1 E.U.T. Operation

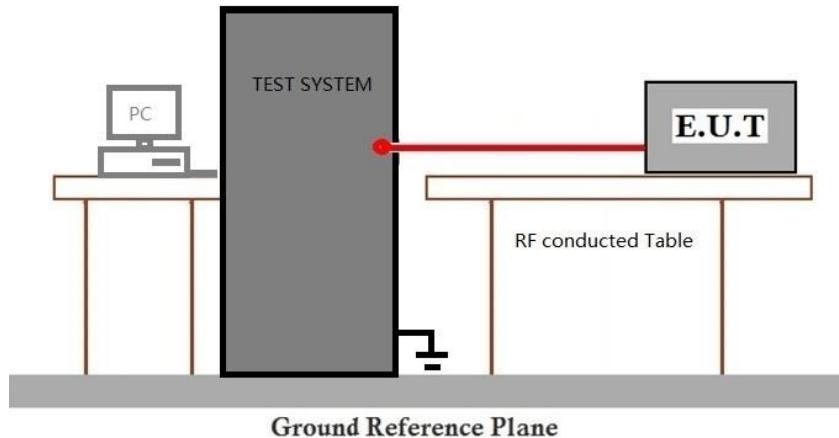
Operating Environment:

Temperature: 24.2 °C      Humidity: 61.7 % RH      Atmospheric Pressure: 1008 mbar

### 7.7.2 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.

### 7.7.3 Test Setup Diagram



### 7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.8 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

### 7.8.1 E.U.T. Operation

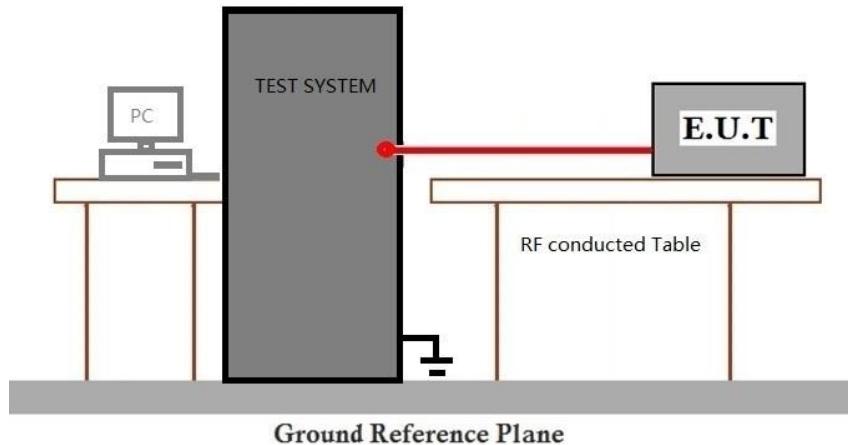
Operating Environment:

Temperature: 24.2 °C Humidity: 61.7 % RH Atmospheric Pressure: 1008 mbar

### 7.8.2 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.

### 7.8.3 Test Setup Diagram



### 7.8.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.9 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

### 7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 24.2 °C

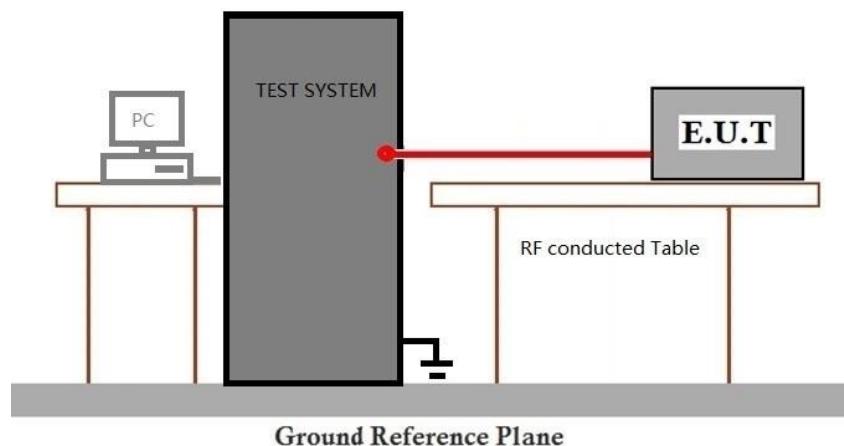
Humidity: 61.7 % RH

Atmospheric Pressure: 1008 mbar

### 7.9.2 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.

### 7.9.3 Test Setup Diagram



### 7.9.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.10 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)).

### 7.10.1 E.U.T. Operation

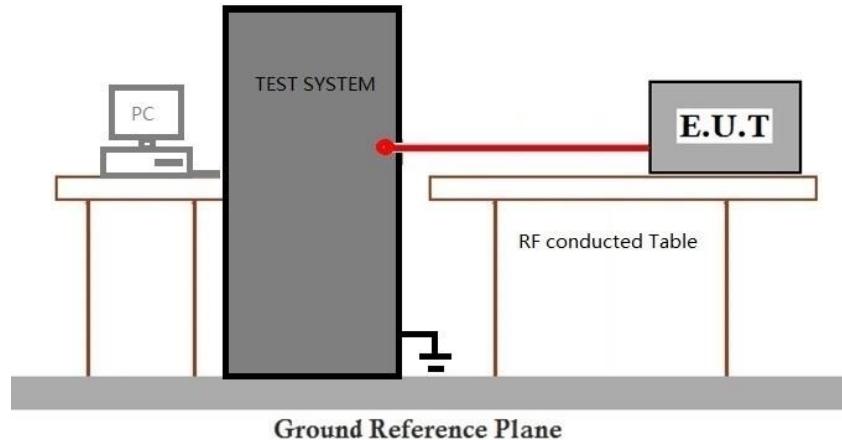
Operating Environment:

Temperature: 22.2 °C      Humidity: 63.3 % RH      Atmospheric Pressure: 1004 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.
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.



**7.10.3 Test Setup Diagram****7.10.4 Measurement Procedure and Data**

Please Refer to Appendix for Details



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## 7.11 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)).

### 7.11.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C      Humidity: 63.3 % RH      Atmospheric Pressure: 1004 mbar

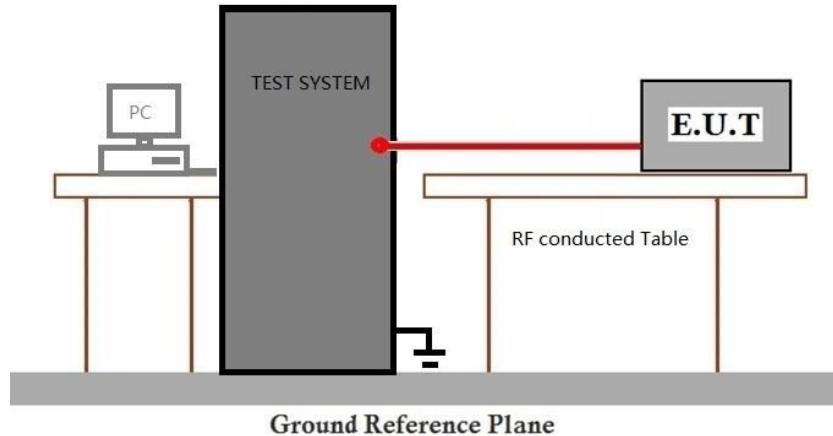
### 7.11.2 Test Mode Description

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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**7.11.3 Test Setup Diagram****7.11.4 Measurement Procedure and Data**

Please Refer to Appendix for Details



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## 8 Test Setup Photo

Refer to Setup Photos for GZCR250500073602



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## 9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2505000736AT



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## 10 Appendix

### 1. Bandwidth

#### 1.1 Test Result

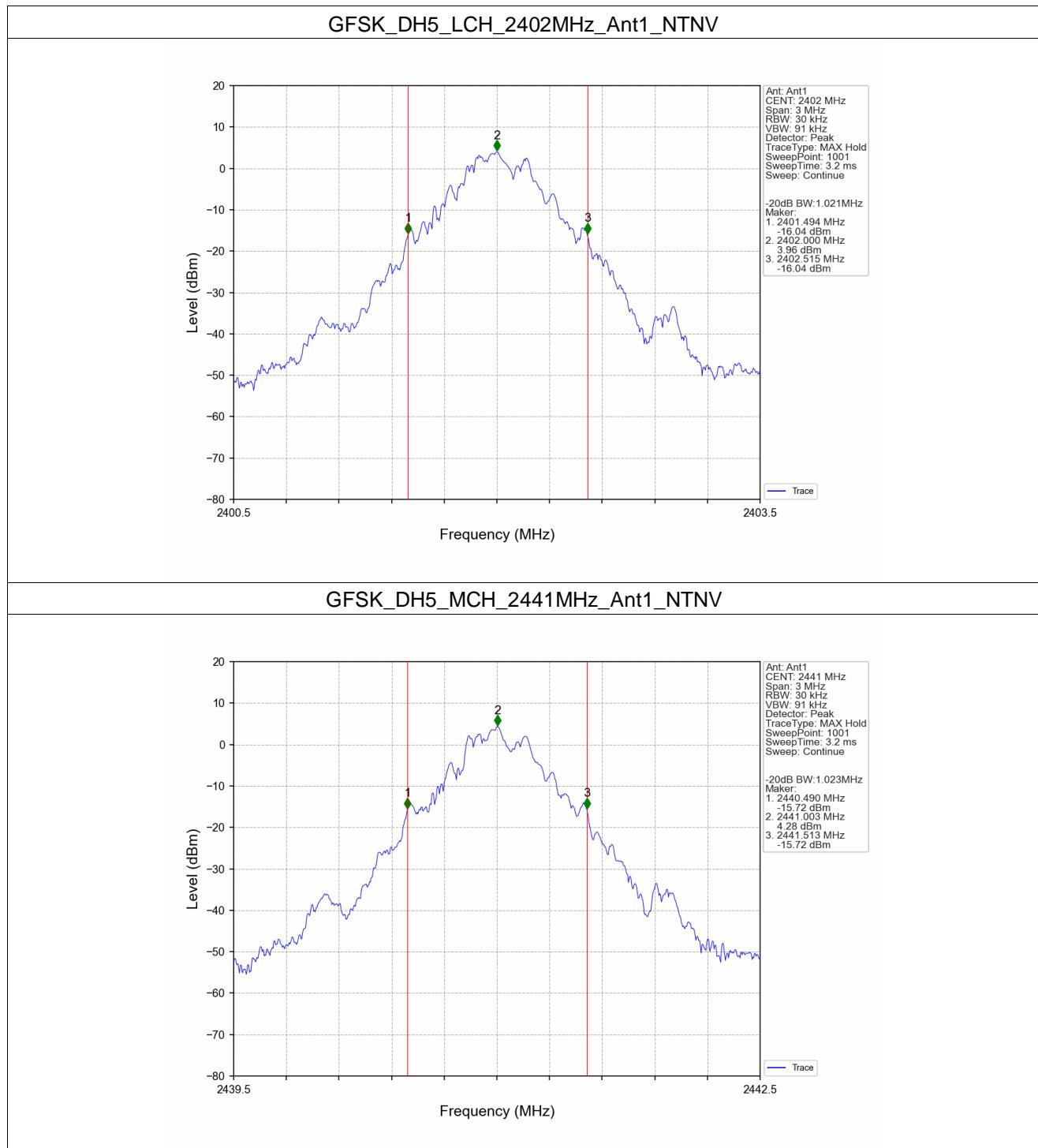
##### 1.1.1 20dB BW

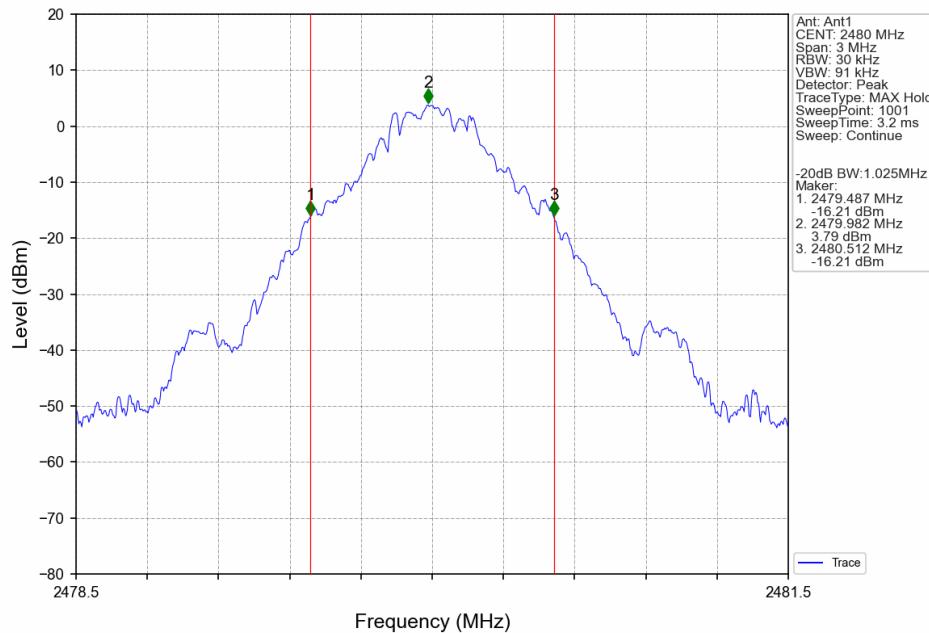
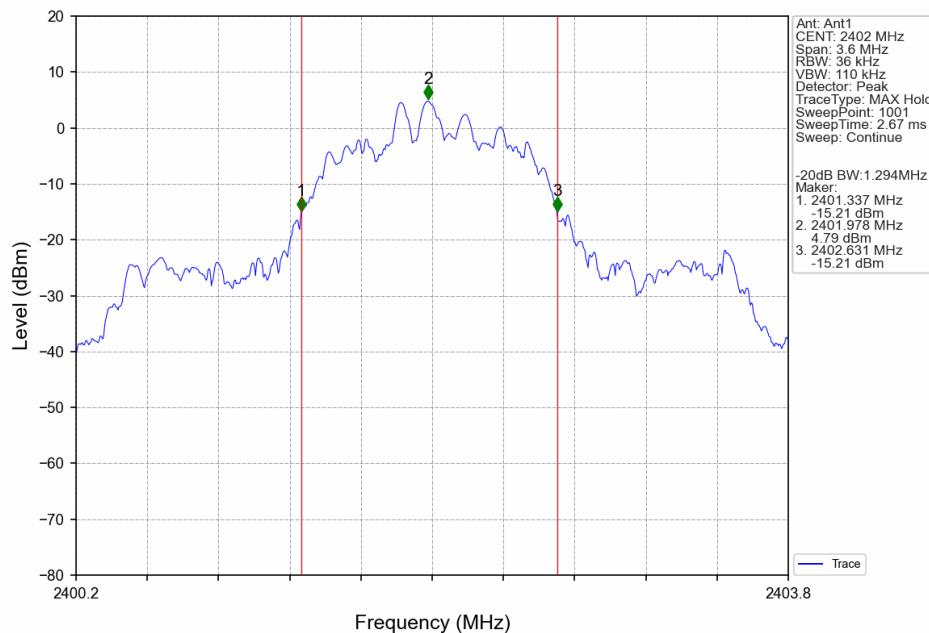
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	20dB Bandwidth (MHz)		Verdict
					Result	Limit	
GFSK	SISO	2402	DH5	1	1.021	/	Pass
		2441	DH5	1	1.023	/	Pass
		2480	DH5	1	1.025	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	1.294	/	Pass
		2441	2DH5	1	1.362	/	Pass
		2480	2DH5	1	1.298	/	Pass
8DPSK	SISO	2402	3DH5	1	1.224	/	Pass
		2441	3DH5	1	1.219	/	Pass
		2480	3DH5	1	1.315	/	Pass



## 1.2 Test Graph

### 1.2.1 20dB BW



**GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV**

**Pi/4DQPSK\_2DH5\_LCH\_2402MHz\_Ant1\_NTNV**


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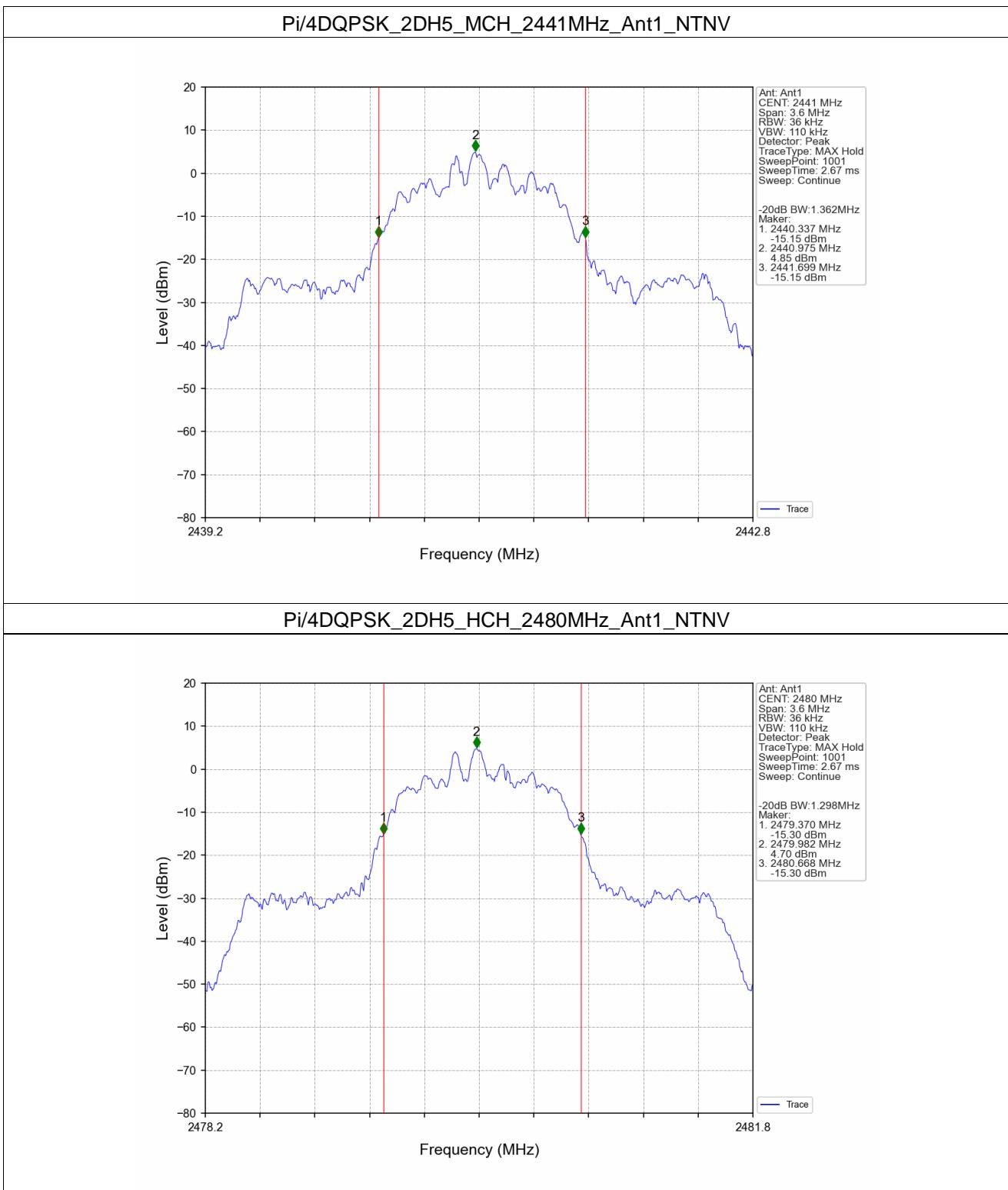
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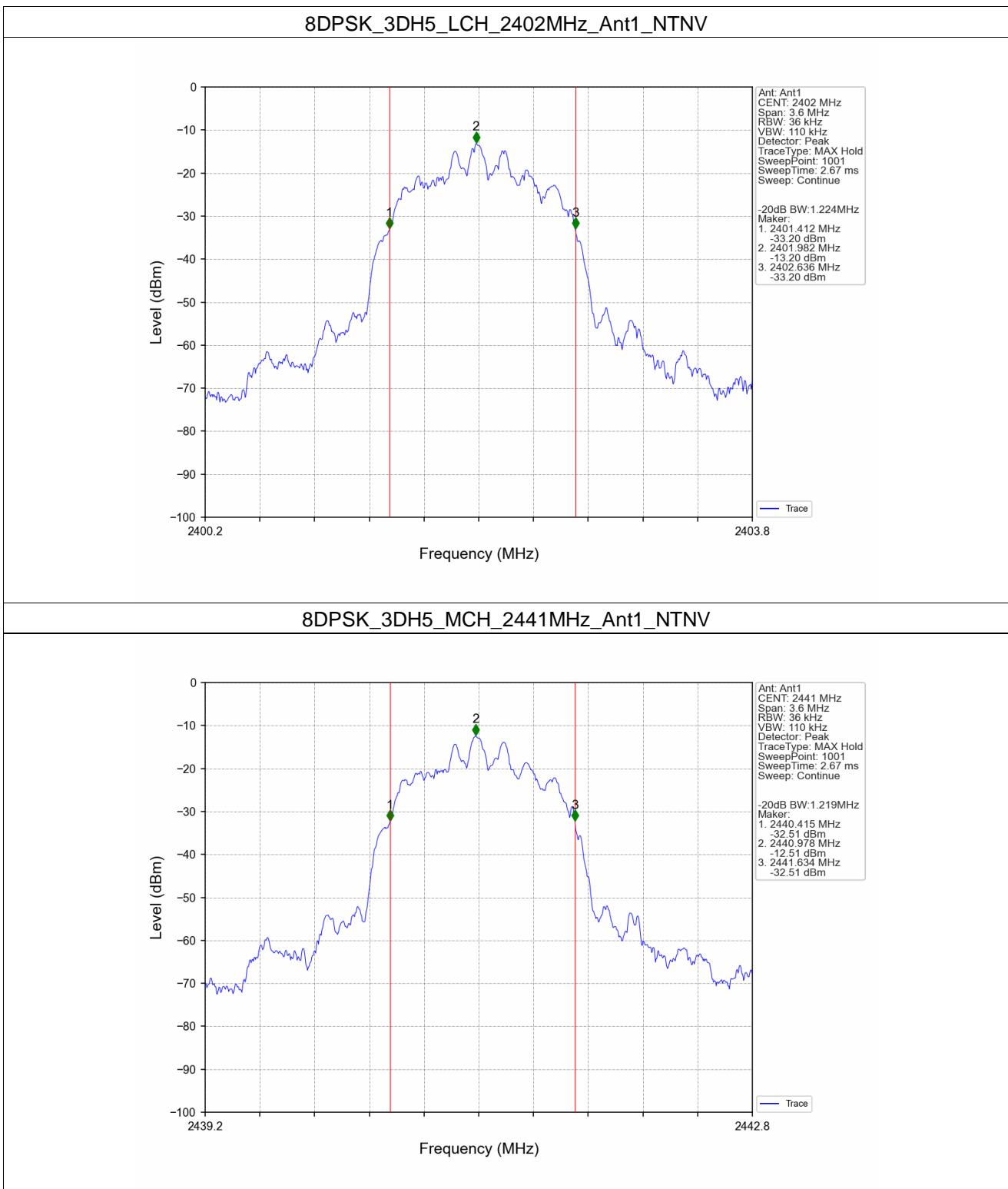


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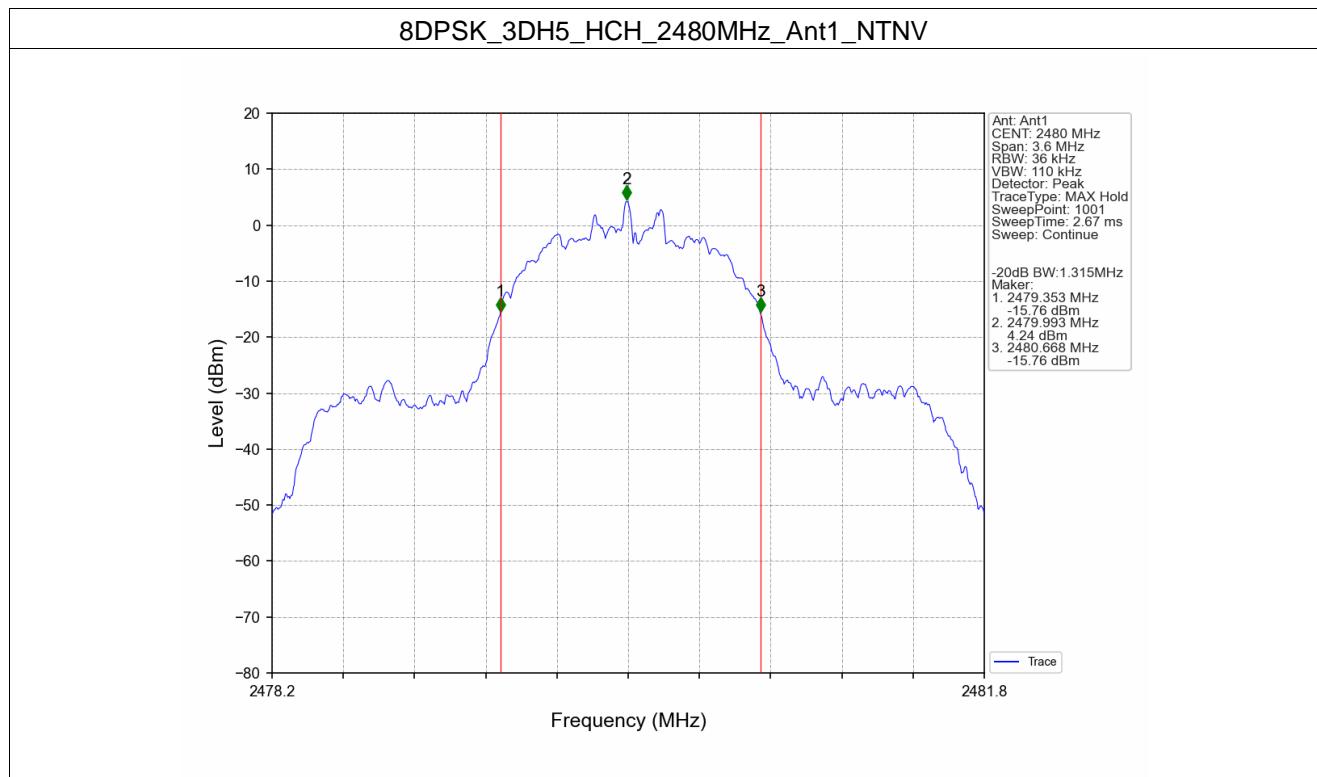
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## 2. Maximum Conducted Output Power

### 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	4.45	<=20.97	Pass
		2441	DH5	4.15	<=20.97	Pass
		2480	DH5	4.12	<=20.97	Pass
Pi/4DQPSK	SISO	2402	2DH5	4.74	<=20.97	Pass
		2441	2DH5	4.77	<=20.97	Pass
		2480	2DH5	<b>5.10</b>	<=20.97	Pass
8DPSK	SISO	2402	3DH5	3.03	<=20.97	Pass
		2441	3DH5	2.58	<=20.97	Pass
		2480	3DH5	2.30	<=20.97	Pass



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### 3. Carrier Frequency Separation

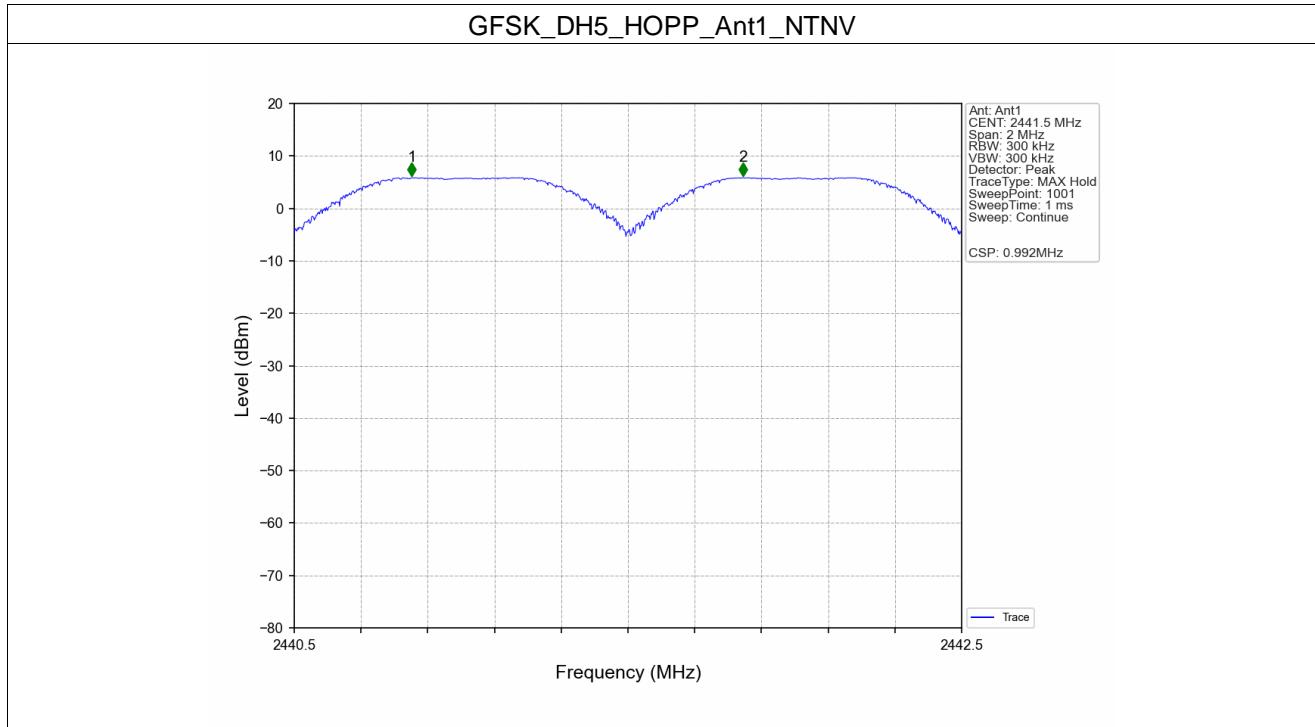
#### 3.1 Test Result

##### 3.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	0.992	1.025	>=0.683	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	0.991	1.362	>=0.908	Pass
8DPSK	SISO	HOPP	3DH5	0.977	1.315	>=0.877	Pass

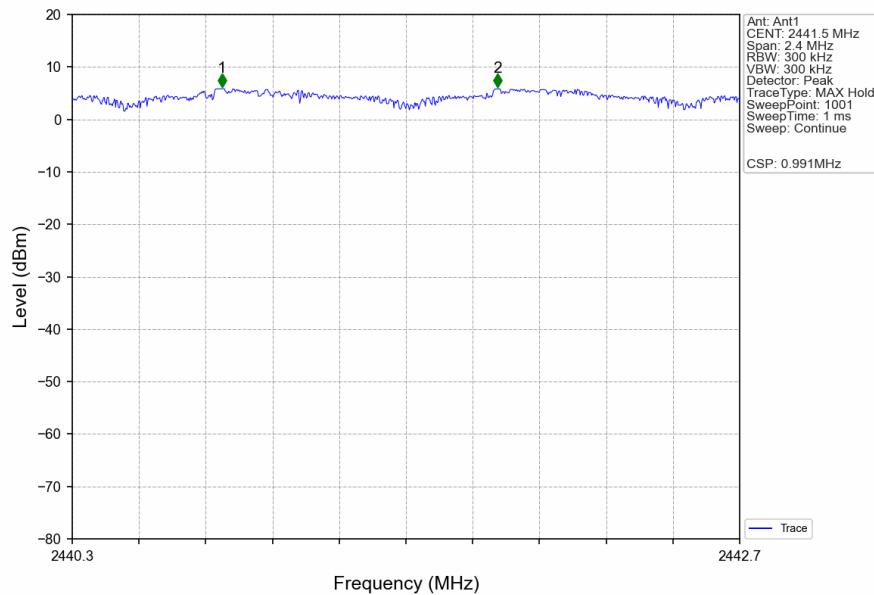
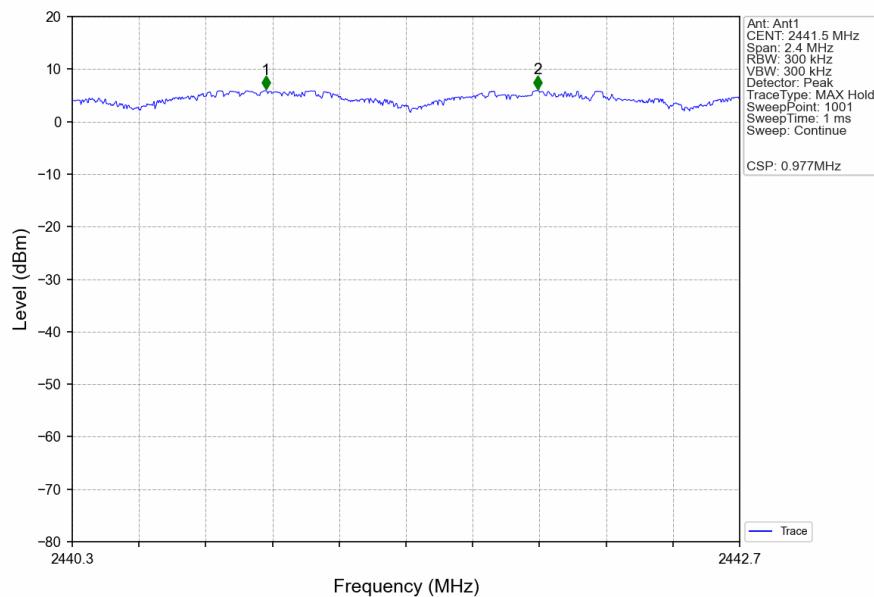
#### 3.2 Test Graph

##### 3.2.1 Ant1



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**Pi/4DQPSK\_2DH5\_HOPP\_Ant1\_NTNV****8DPSK\_3DH5\_HOPP\_Ant1\_NTNV**

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## 4. Number of Hopping Frequencies

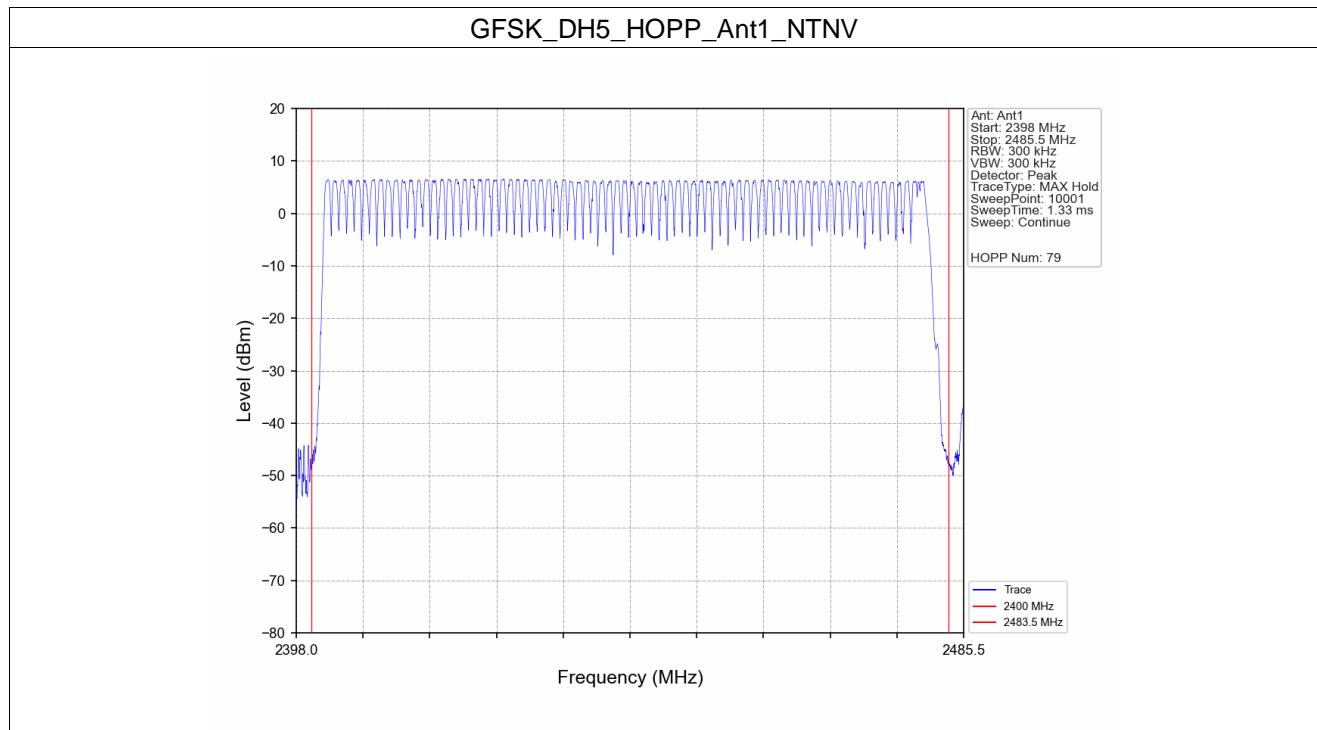
### 4.1 Test Result

#### 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

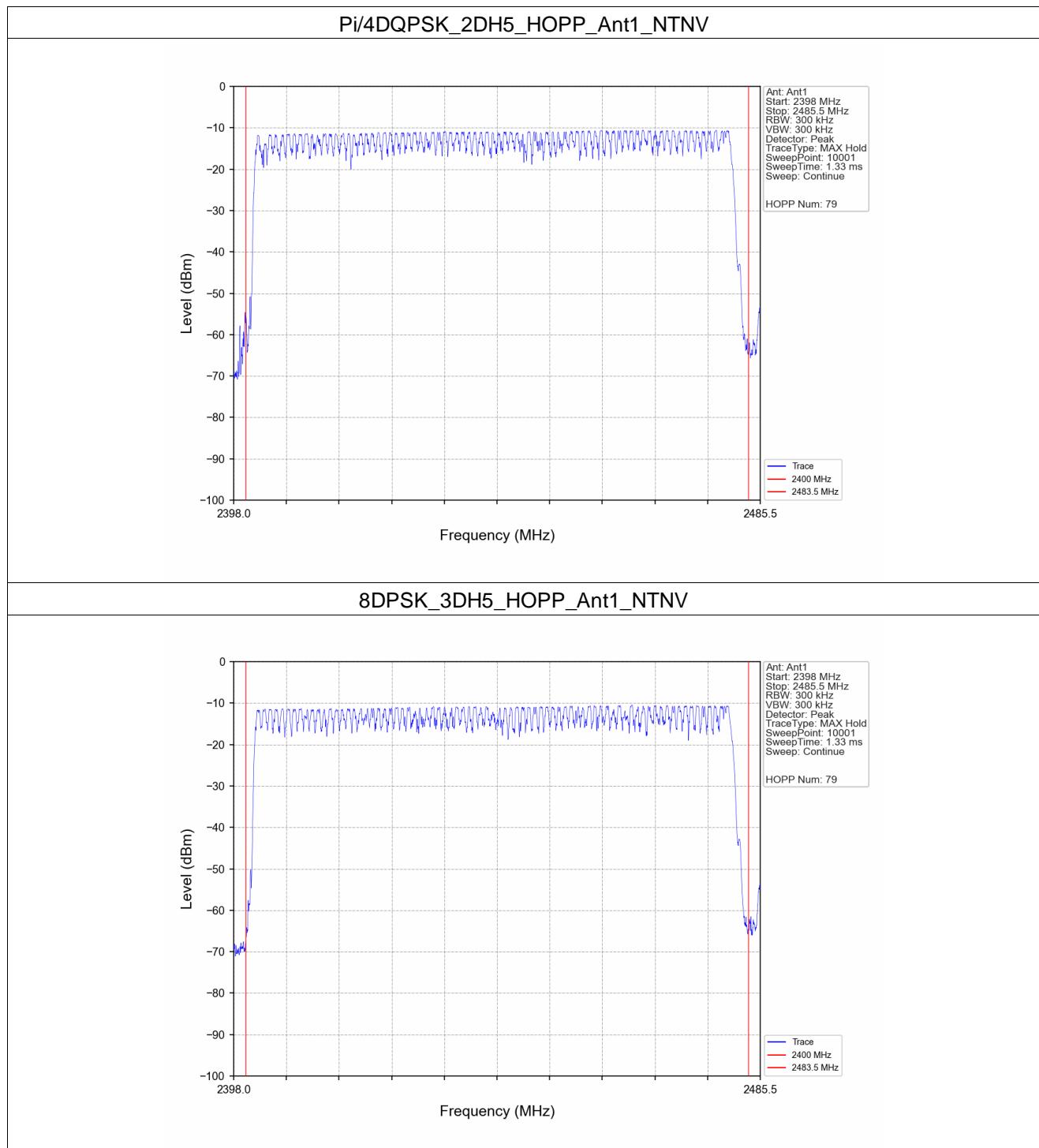
### 4.2 Test Graph

#### 4.2.1 HoppNum



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## 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	0.364	31.600	320	116.480	<=400	Pass
			DH3	0.362	31.600	320	115.840	<=400	Pass
			DH5	0.364	31.600	320	116.480	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH1	0.366	31.600	319	116.754	<=400	Pass
			2DH3	0.364	31.600	320	116.480	<=400	Pass
			2DH5	0.362	31.600	321	116.202	<=400	Pass
8DPSK	SISO	HOPP	3DH1	0.364	31.600	320	116.480	<=400	Pass
			3DH3	0.364	31.600	319	116.116	<=400	Pass
			3DH5	0.364	31.600	319	116.116	<=400	Pass

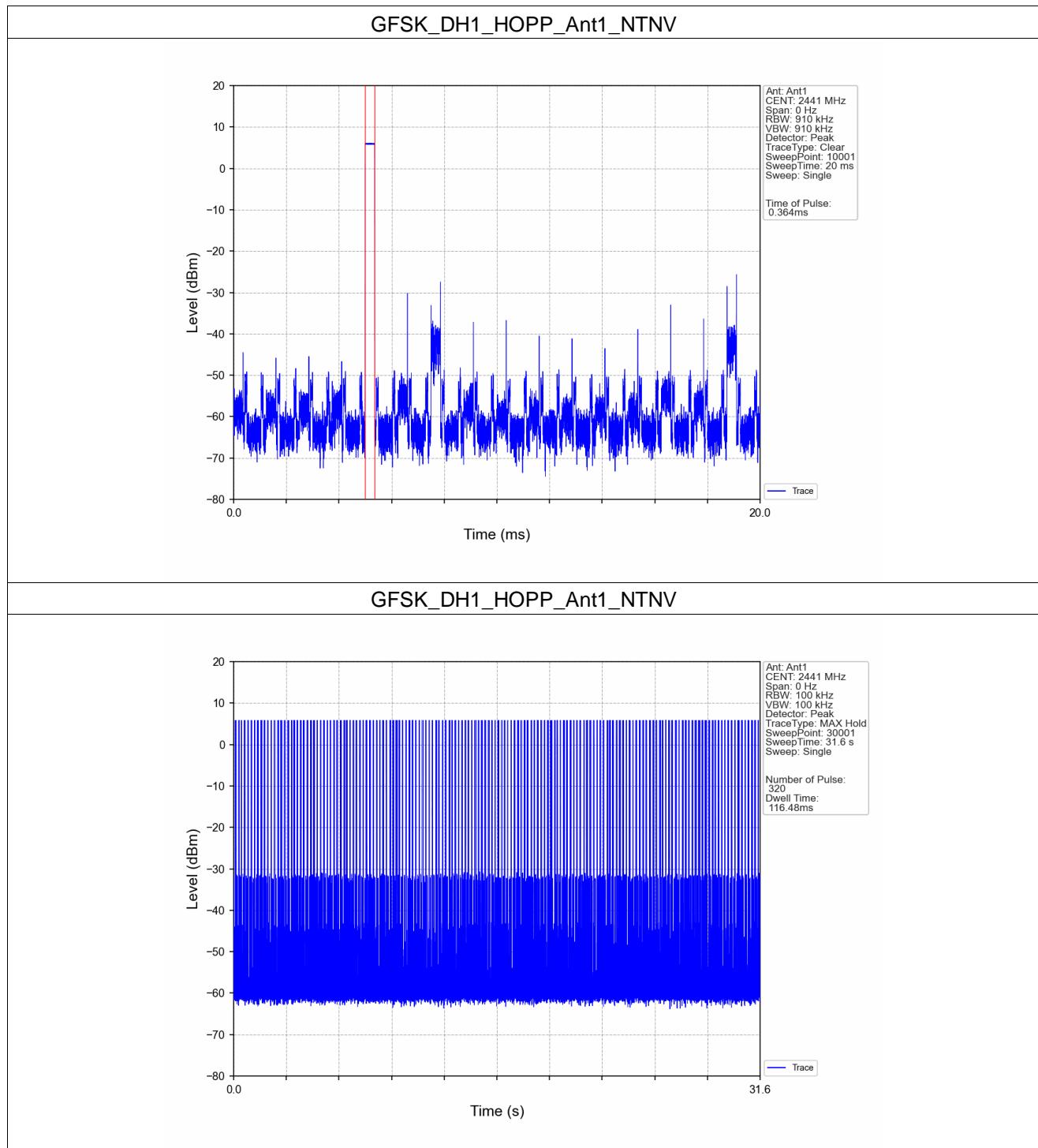


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## 5.2 Test Graph

### 5.2.1 Ant1



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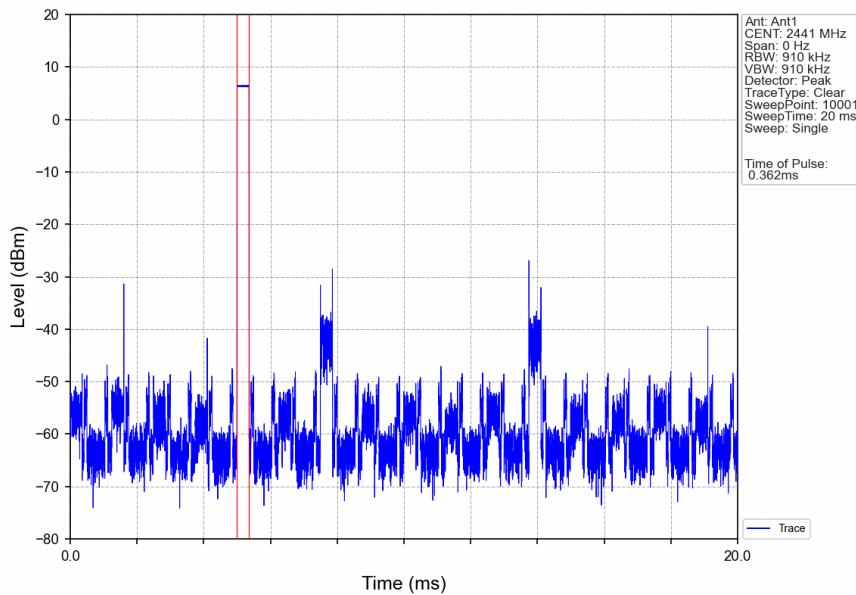
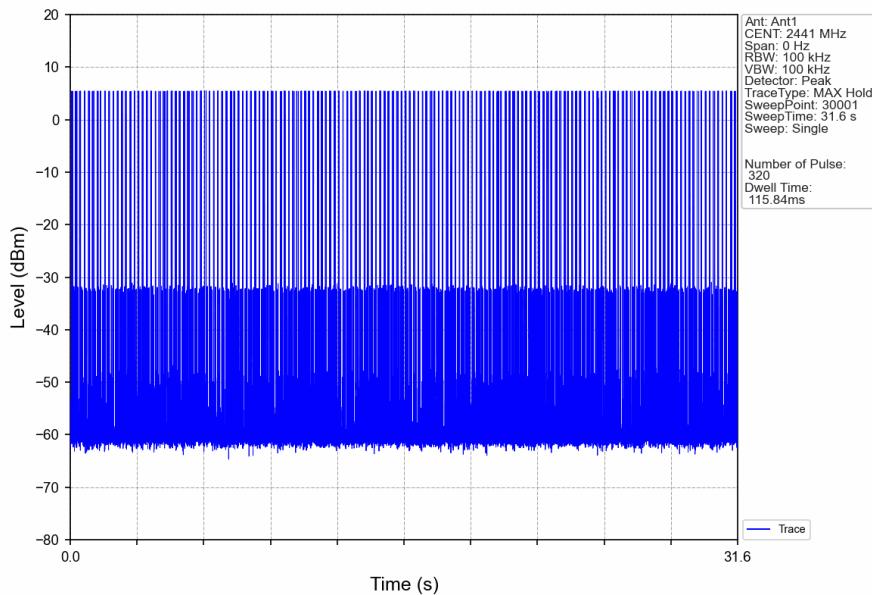
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**GFSK\_DH3\_HOPP\_Ant1\_NTNV****GFSK\_DH3\_HOPP\_Ant1\_NTNV**

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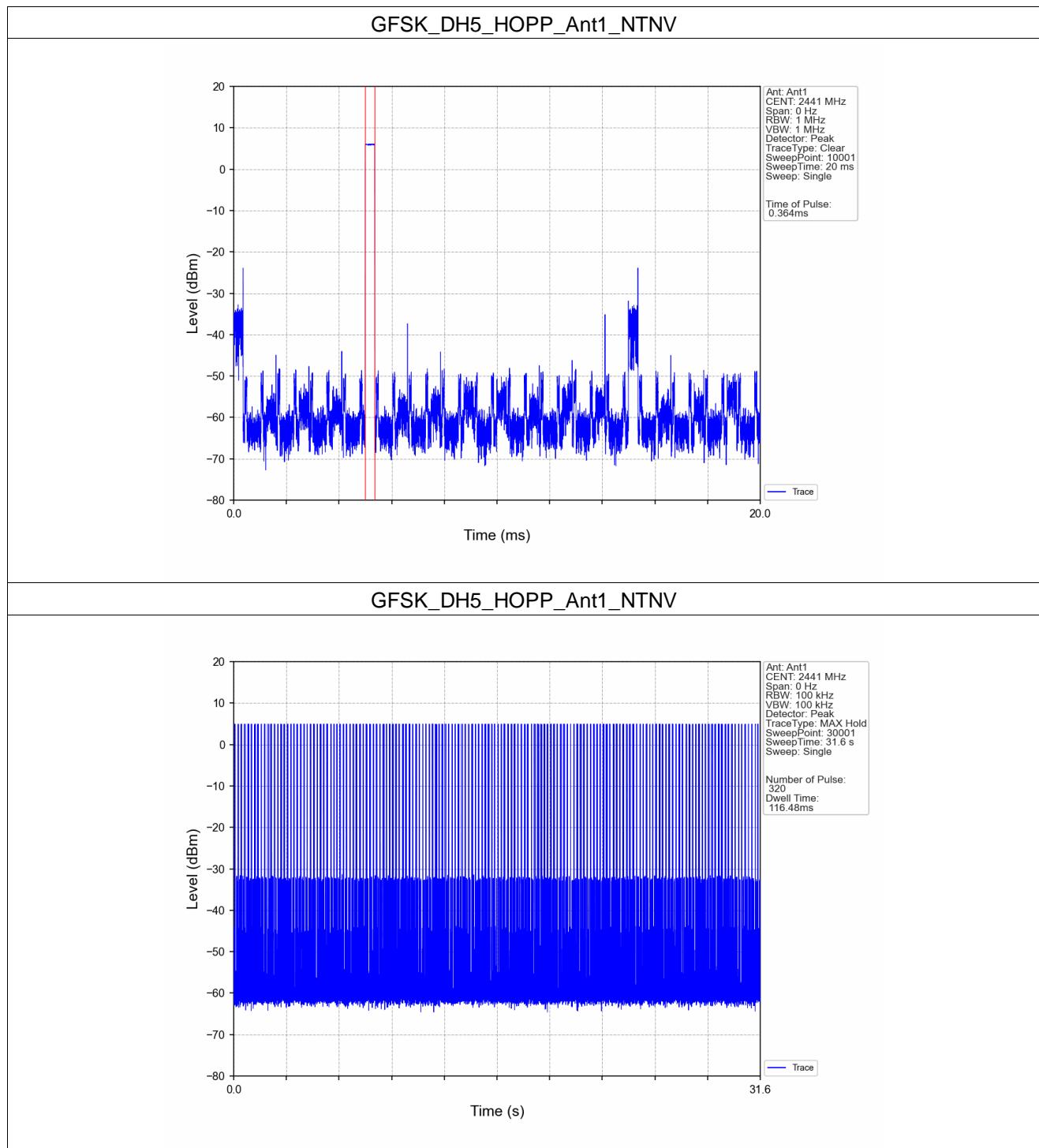
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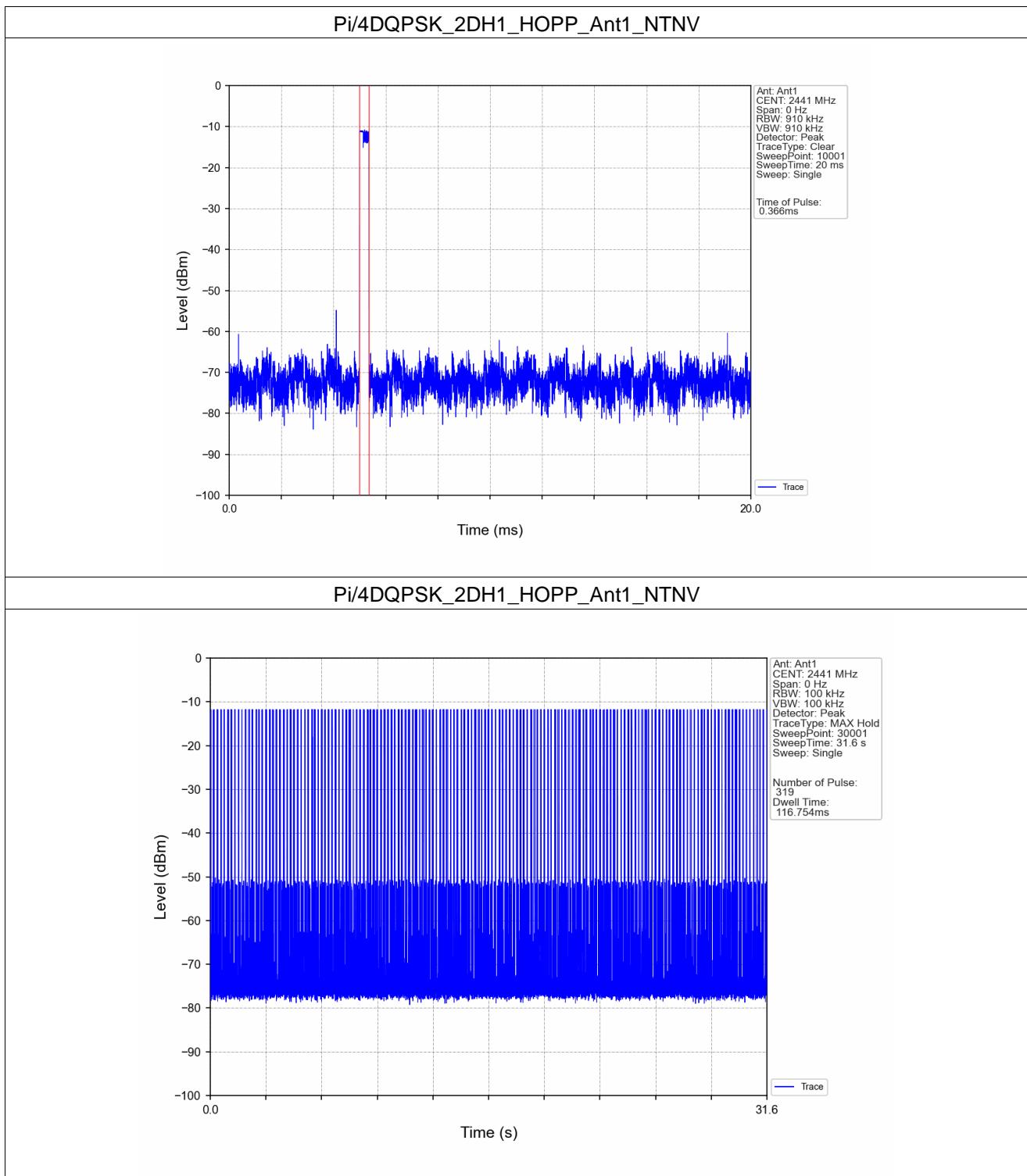
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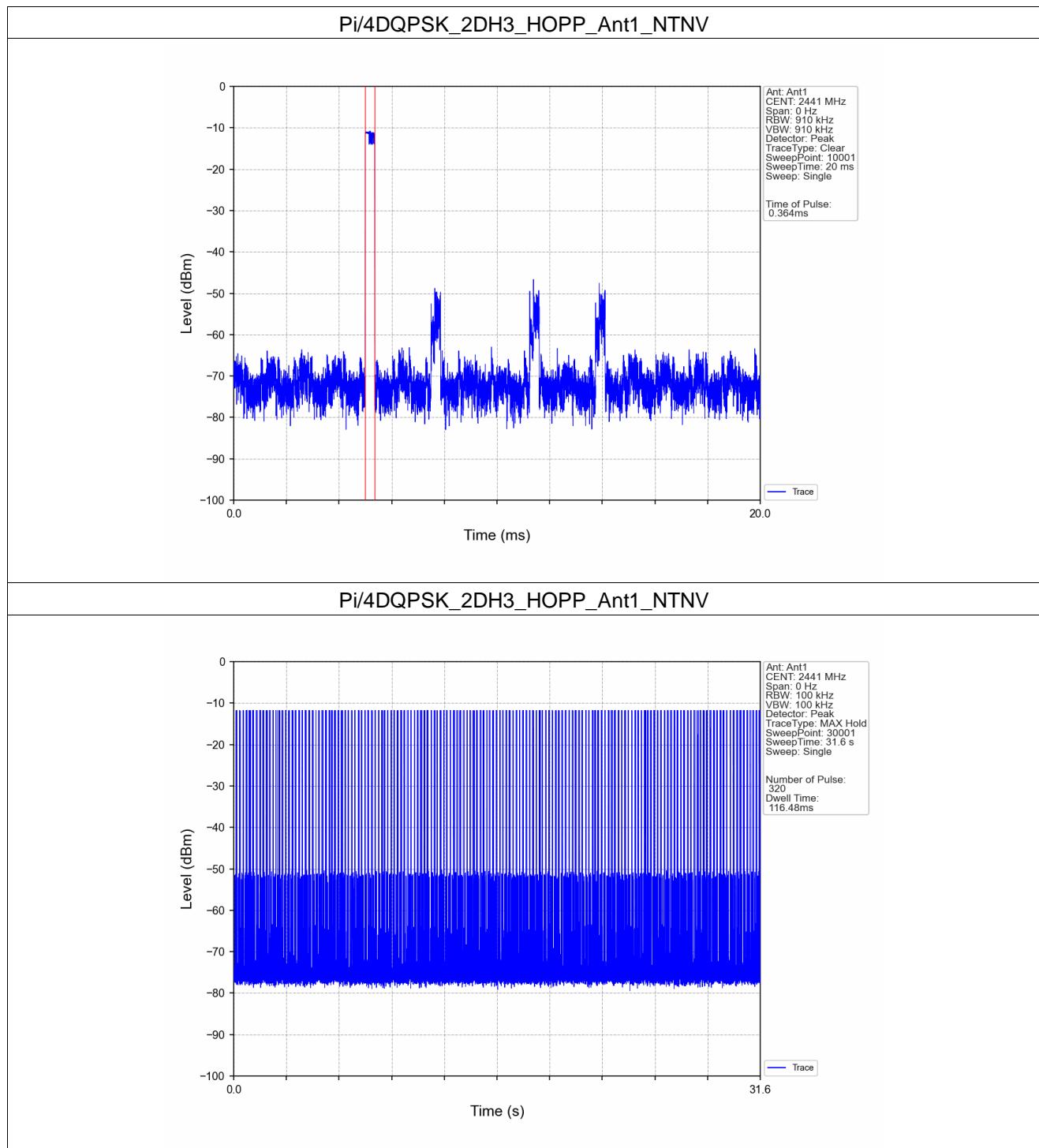
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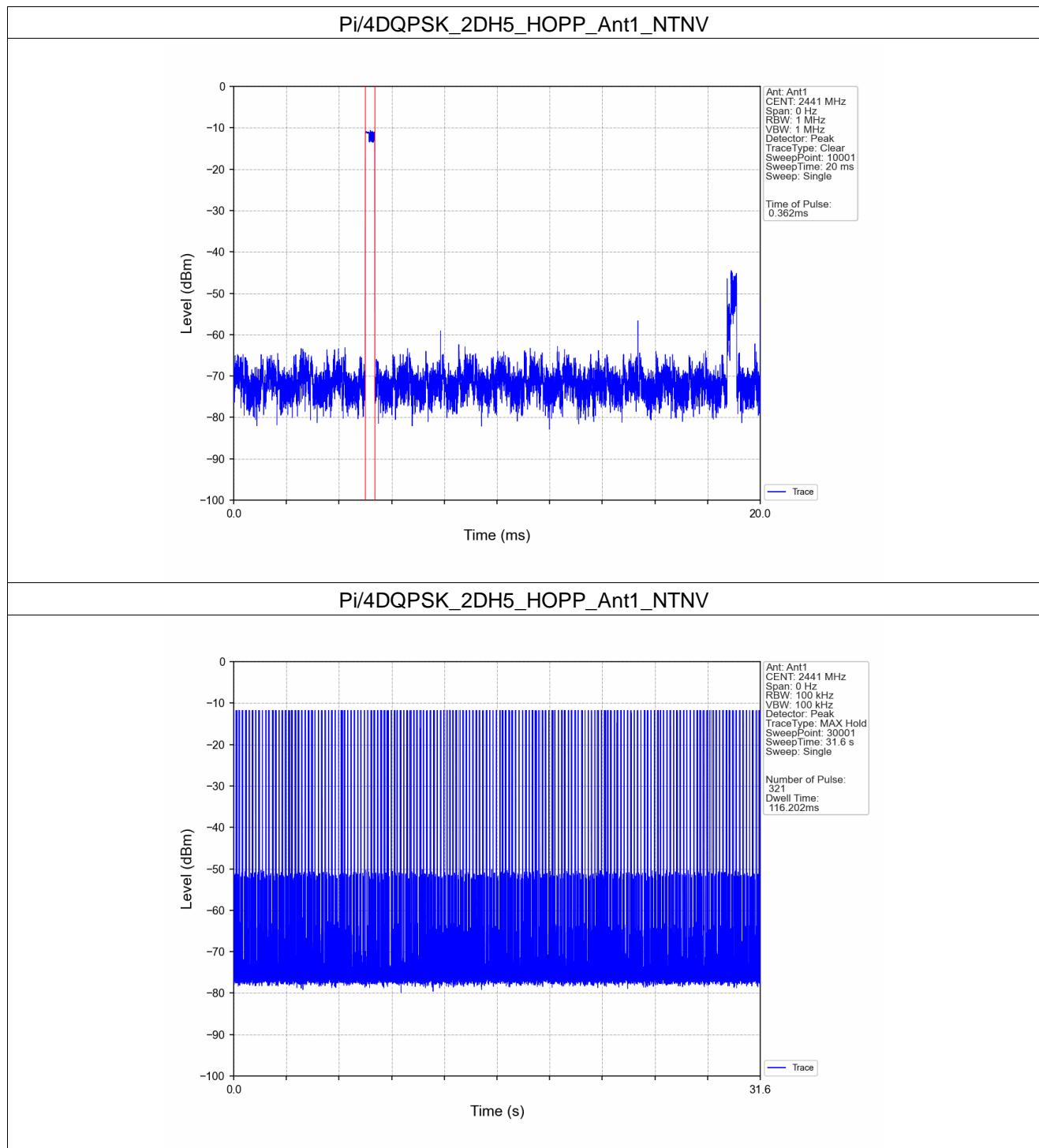
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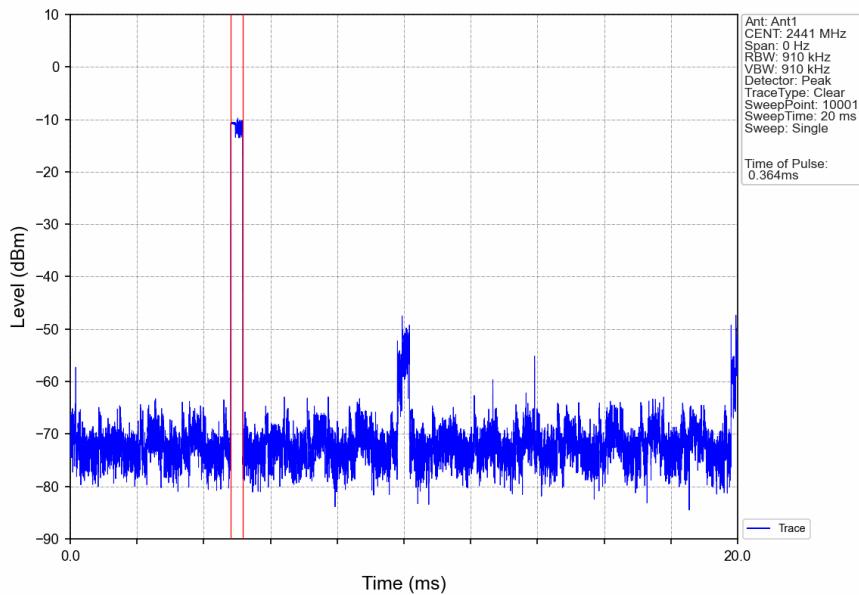
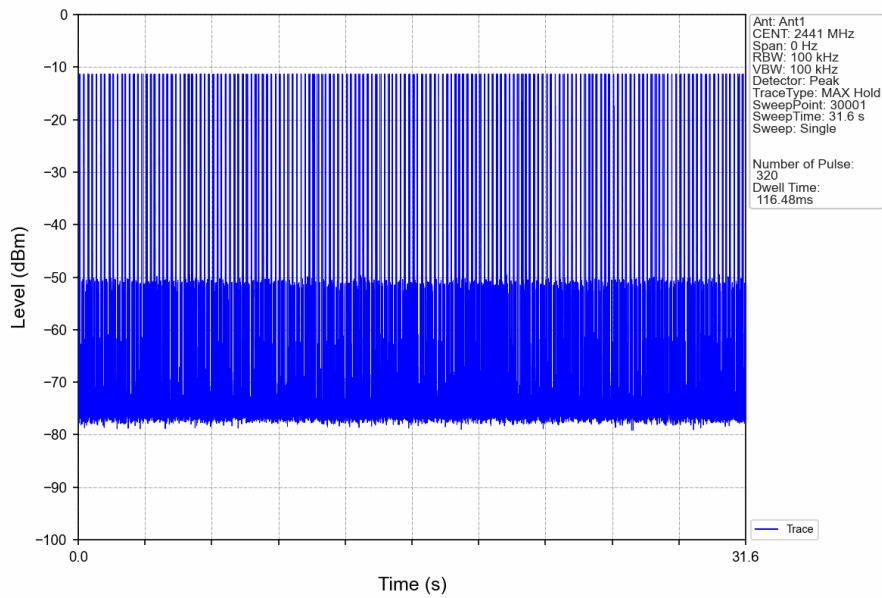
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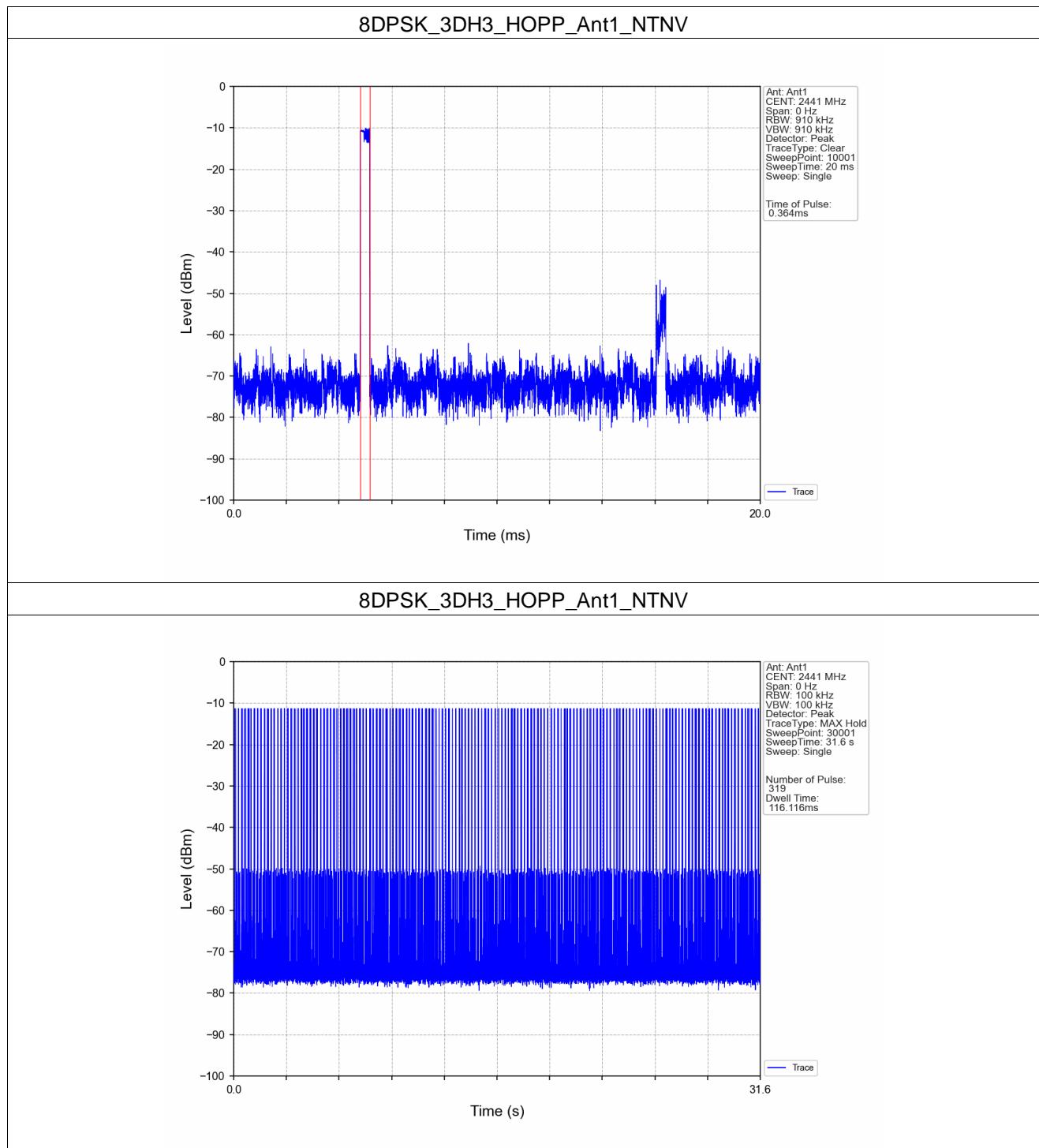
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**8DPSK\_3DH1\_HOPP\_Ant1\_NTNV****8DPSK\_3DH1\_HOPP\_Ant1\_NTNV**

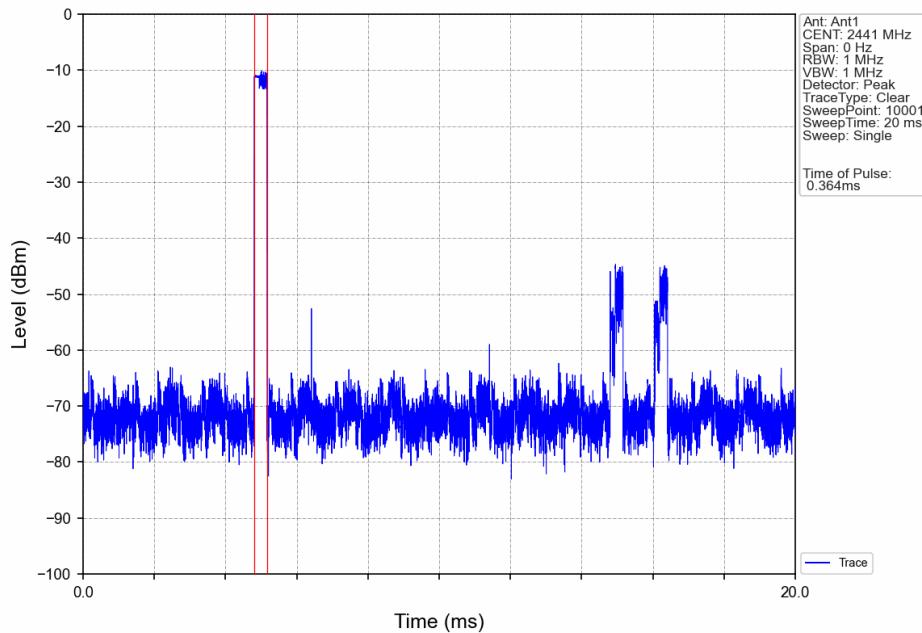
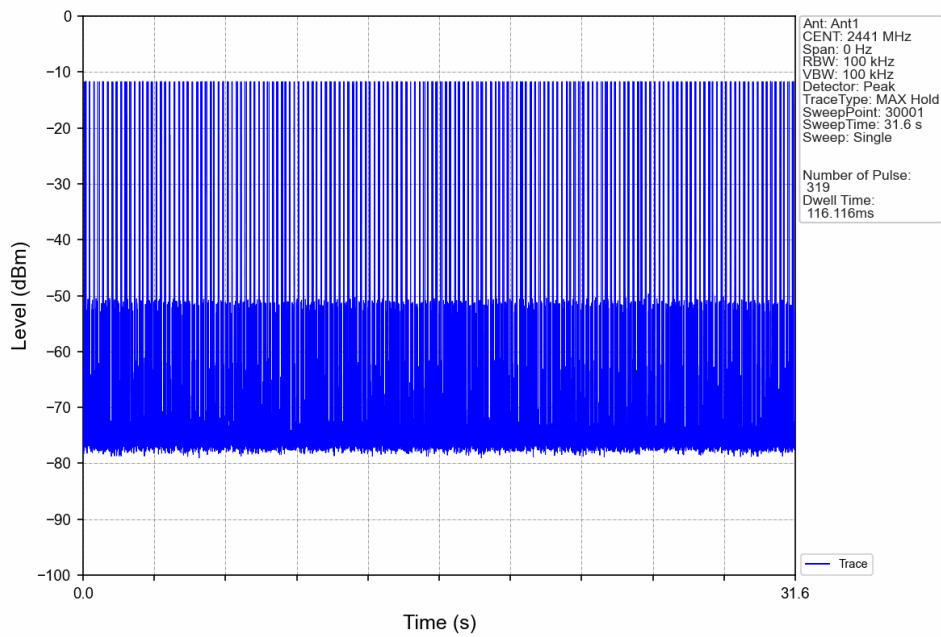
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**8DPSK\_3DH5\_HOPP\_Ant1\_NTNV****8DPSK\_3DH5\_HOPP\_Ant1\_NTNV**

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## 6. Unwanted Emissions In Non-restricted Frequency Bands

### 6.1 Test Result

#### 6.1.1 Ref

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
GFSK	SISO	2402	DH5	1	6.27
		2441	DH5	1	5.91
		2480	DH5	1	5.89
Pi/4DQPSK	SISO	2402	2DH5	1	6.45
		2441	2DH5	1	6.34
		2480	2DH5	1	6.61
8DPSK	SISO	2402	3DH5	1	-11.77
		2441	3DH5	1	-11.12
		2480	3DH5	1	-10.90

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

#### 6.1.2 CSE and Band Edge

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
GFSK	SISO	2402	DH5	1	6.27	-13.73	Pass
		2441	DH5	1	6.27	-13.73	Pass
		2480	DH5	1	6.27	-13.73	Pass
		HOPP	DH5	1	6.27	-13.73	Pass
					6.27	-13.73	Pass
Pi/4DQPSK	SISO	2402	2DH5	1	6.61	-13.39	Pass
		2441	2DH5	1	6.61	-13.39	Pass
		2480	2DH5	1	6.61	-13.39	Pass
		HOPP	2DH5	1	6.61	-13.39	Pass
					6.61	-13.39	Pass
8DPSK	SISO	2402	3DH5	1	-10.90	-30.90	Pass
		2441	3DH5	1	-10.90	-30.90	Pass
		2480	3DH5	1	-10.90	-30.90	Pass
		HOPP	3DH5	1	-10.90	-30.90	Pass
					-10.90	-30.90	Pass

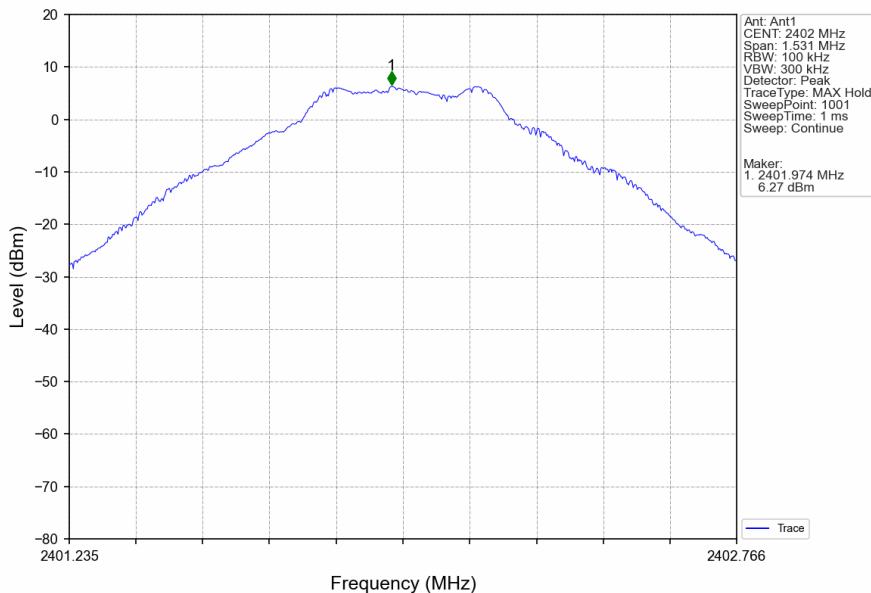
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



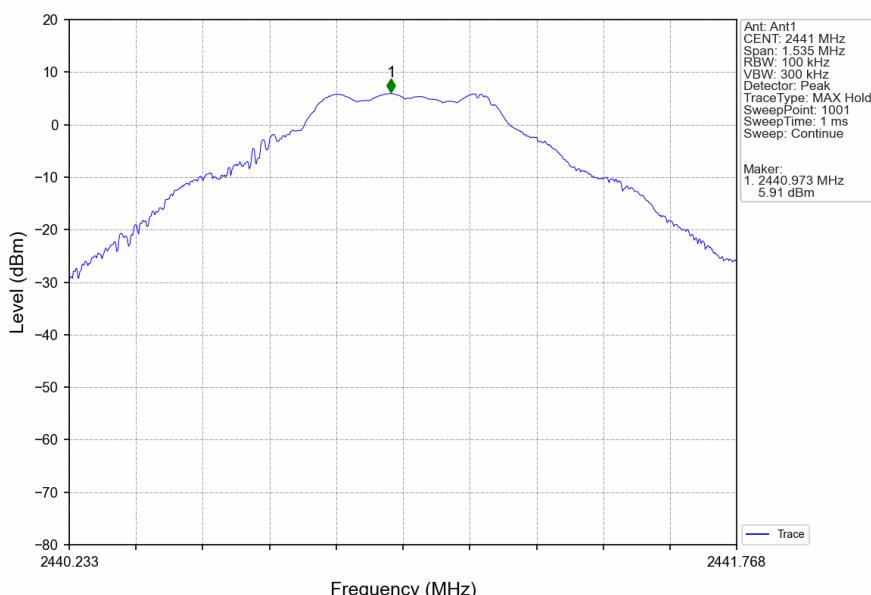
## 6.2 Test Graph

### 6.2.1 Ref

GFSK\_DH5\_LCH\_2402MHz\_Ant1\_NTNV



GFSK\_DH5\_MCH\_2441MHz\_Ant1\_NTNV



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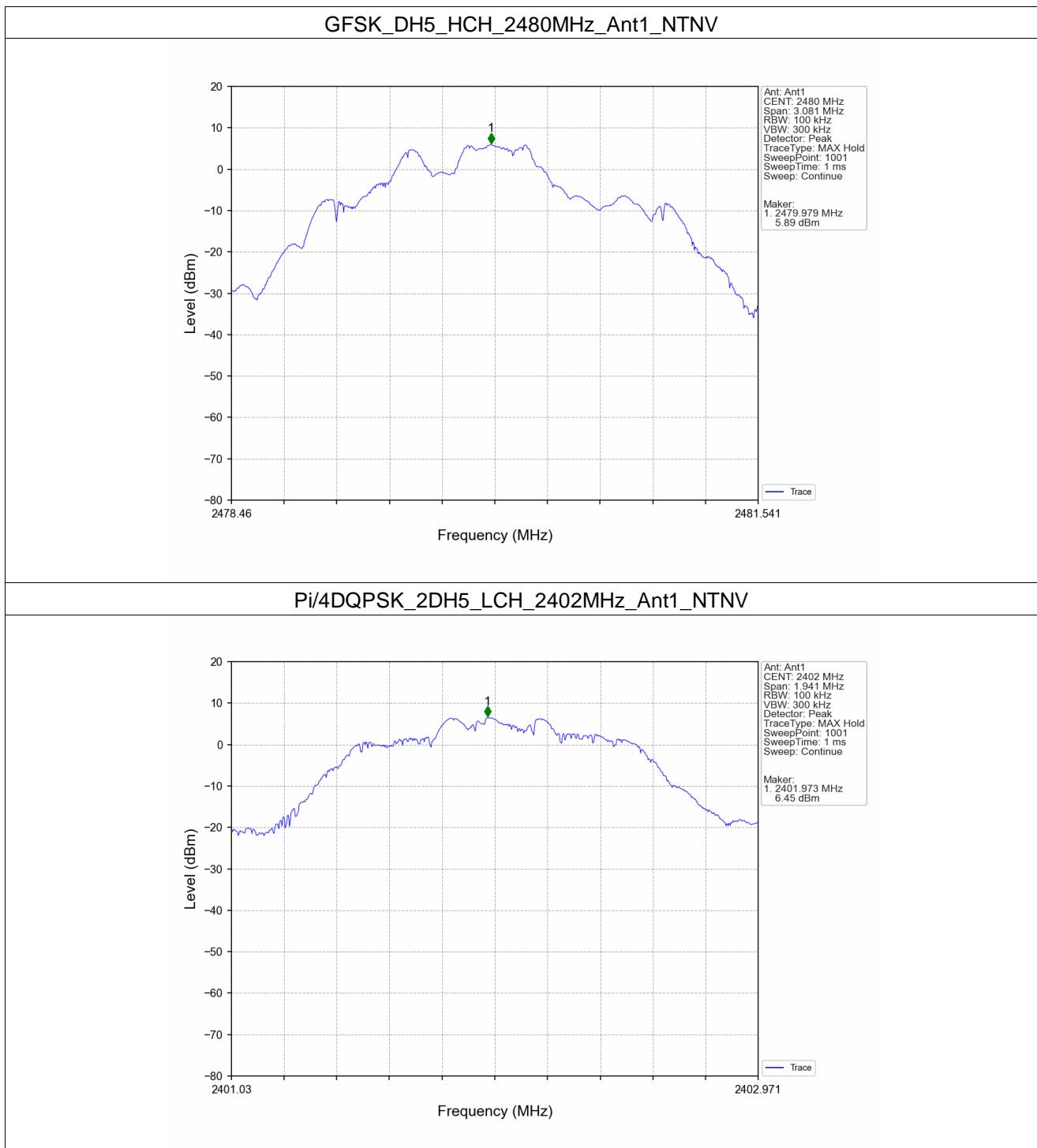
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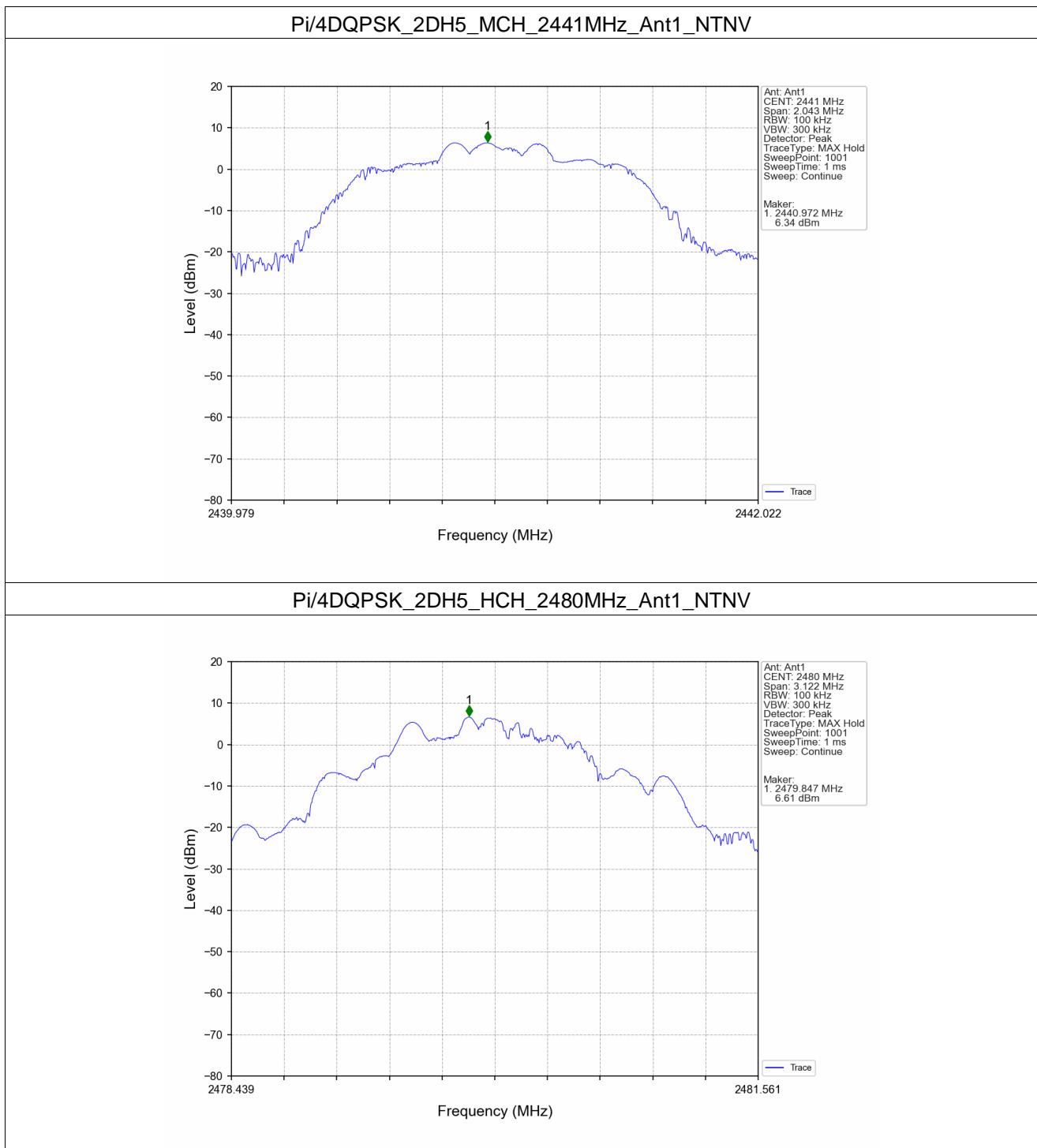


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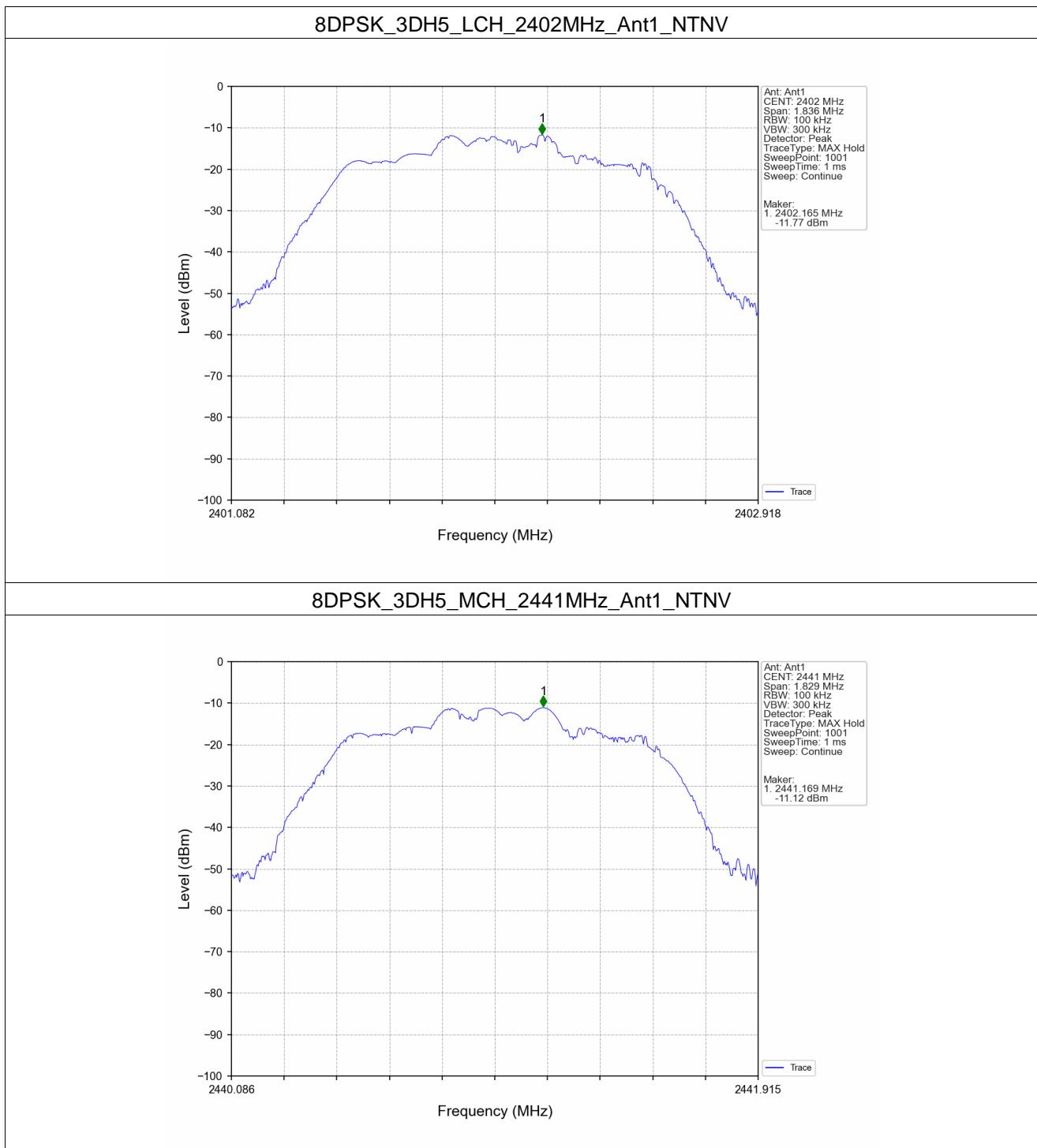


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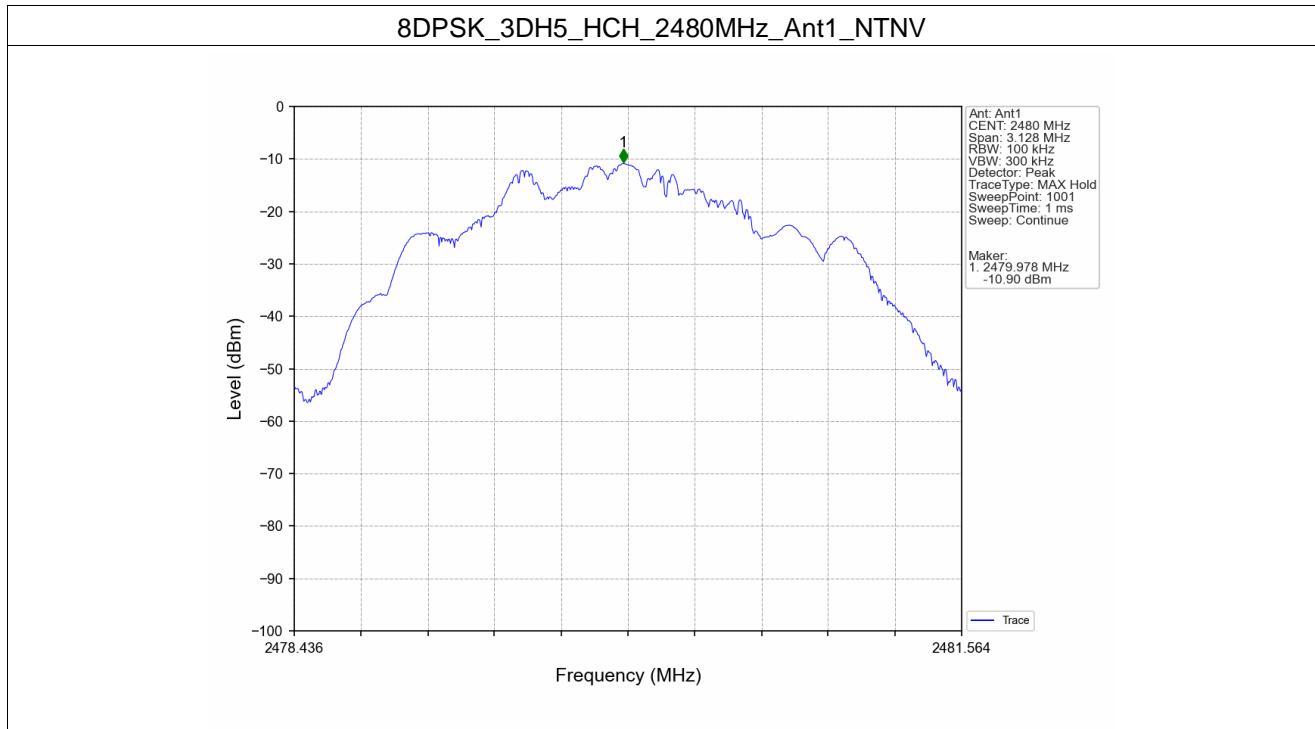


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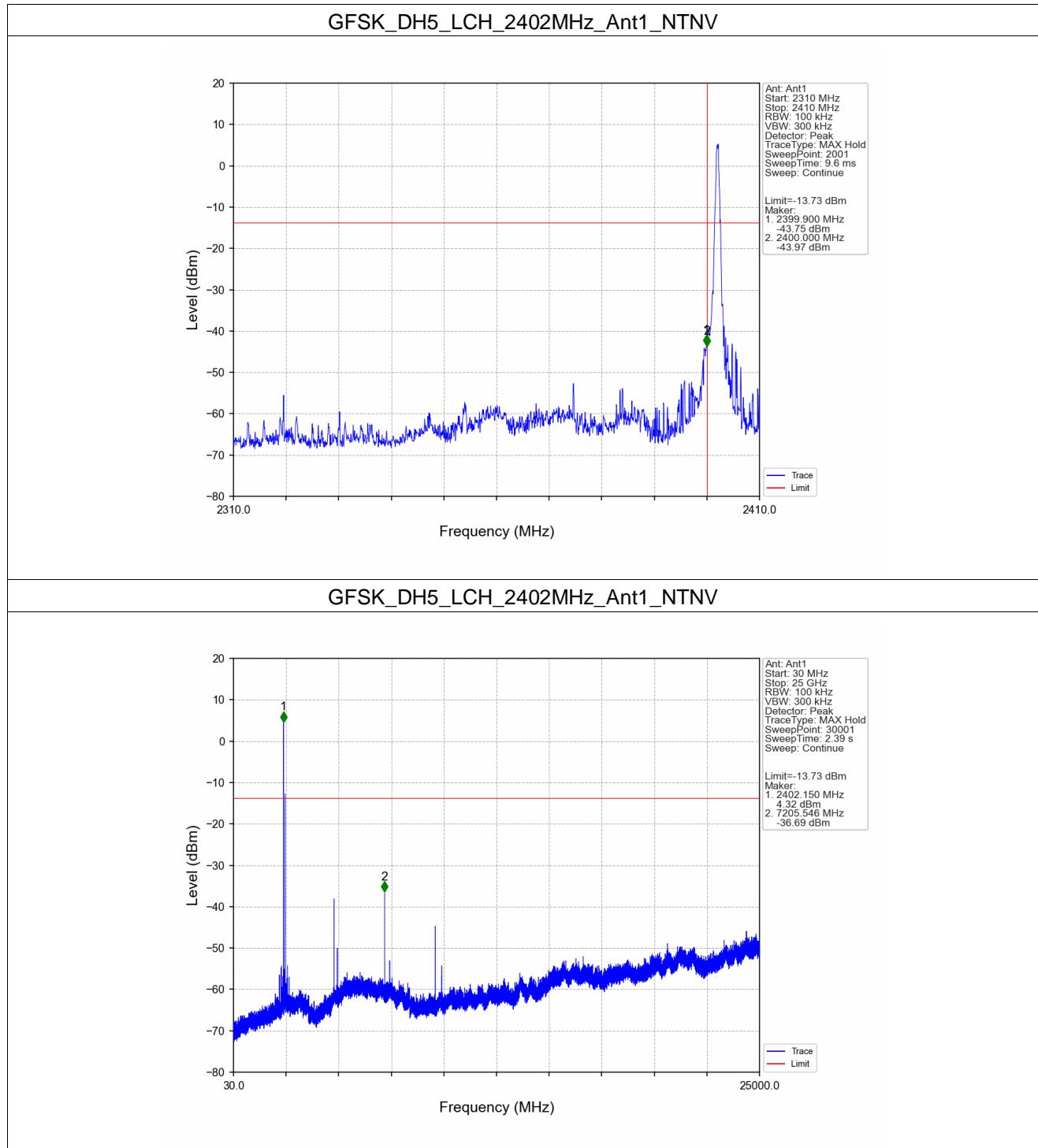
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## 6.2.2 CSE and Band Edge



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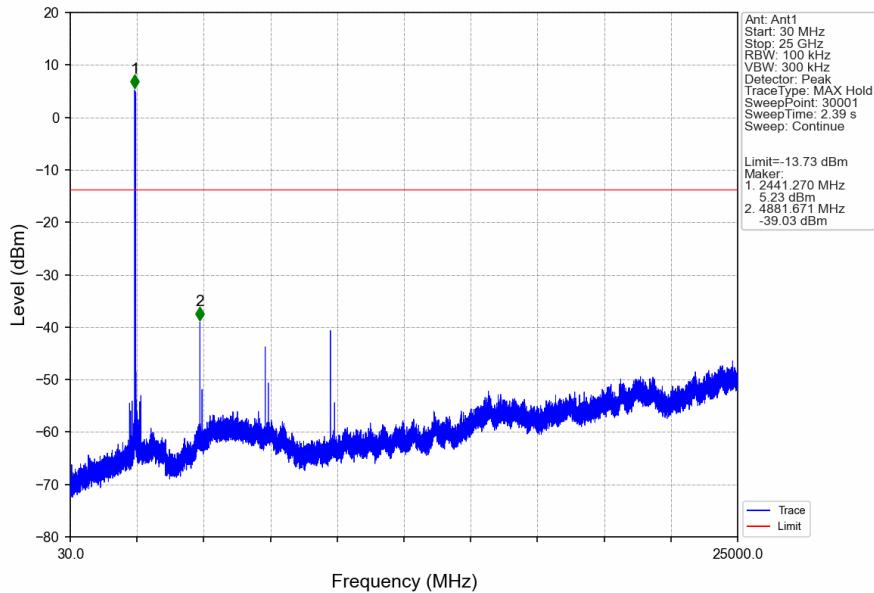
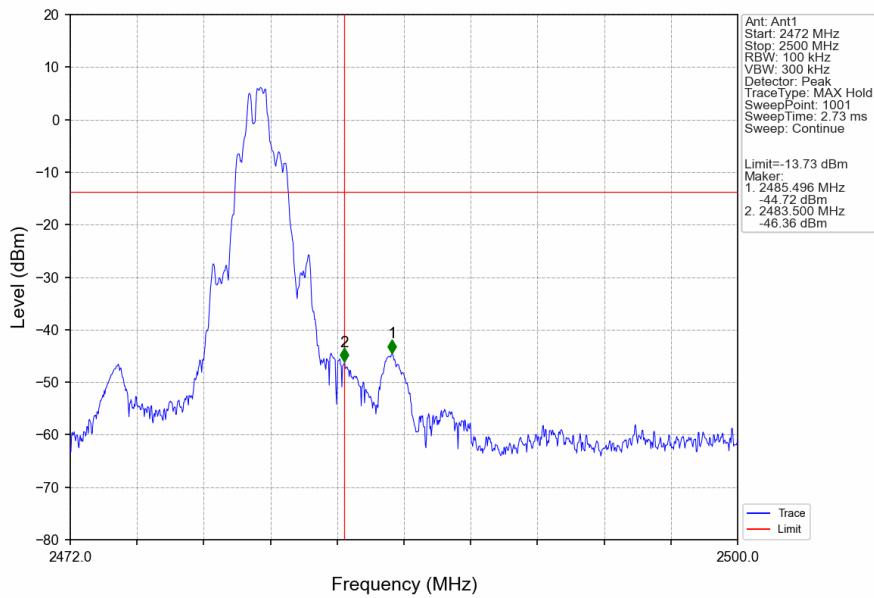
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**GFSK\_DH5\_MCH\_2441MHz\_Ant1\_NTNV****GFSK\_DH5\_HCH\_2480MHz\_Ant1\_NTNV**

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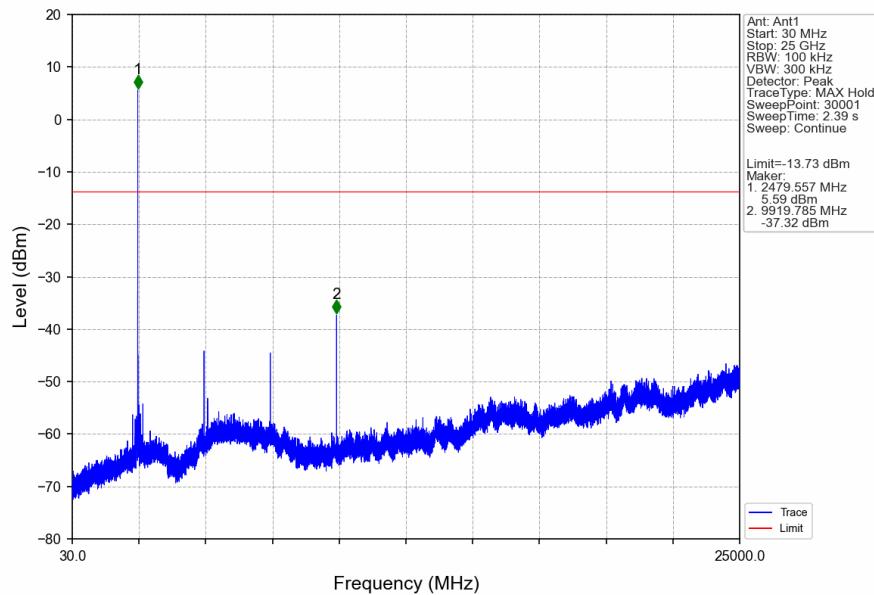
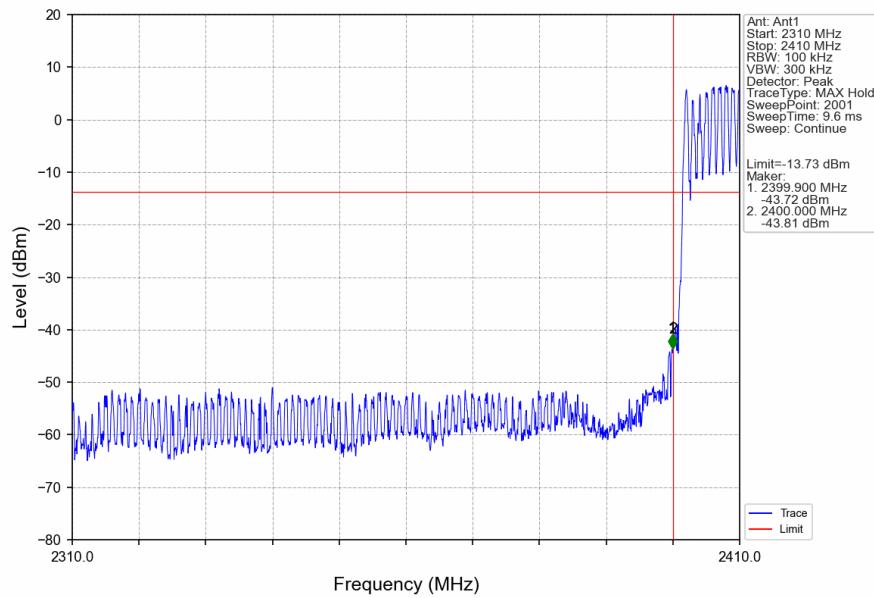
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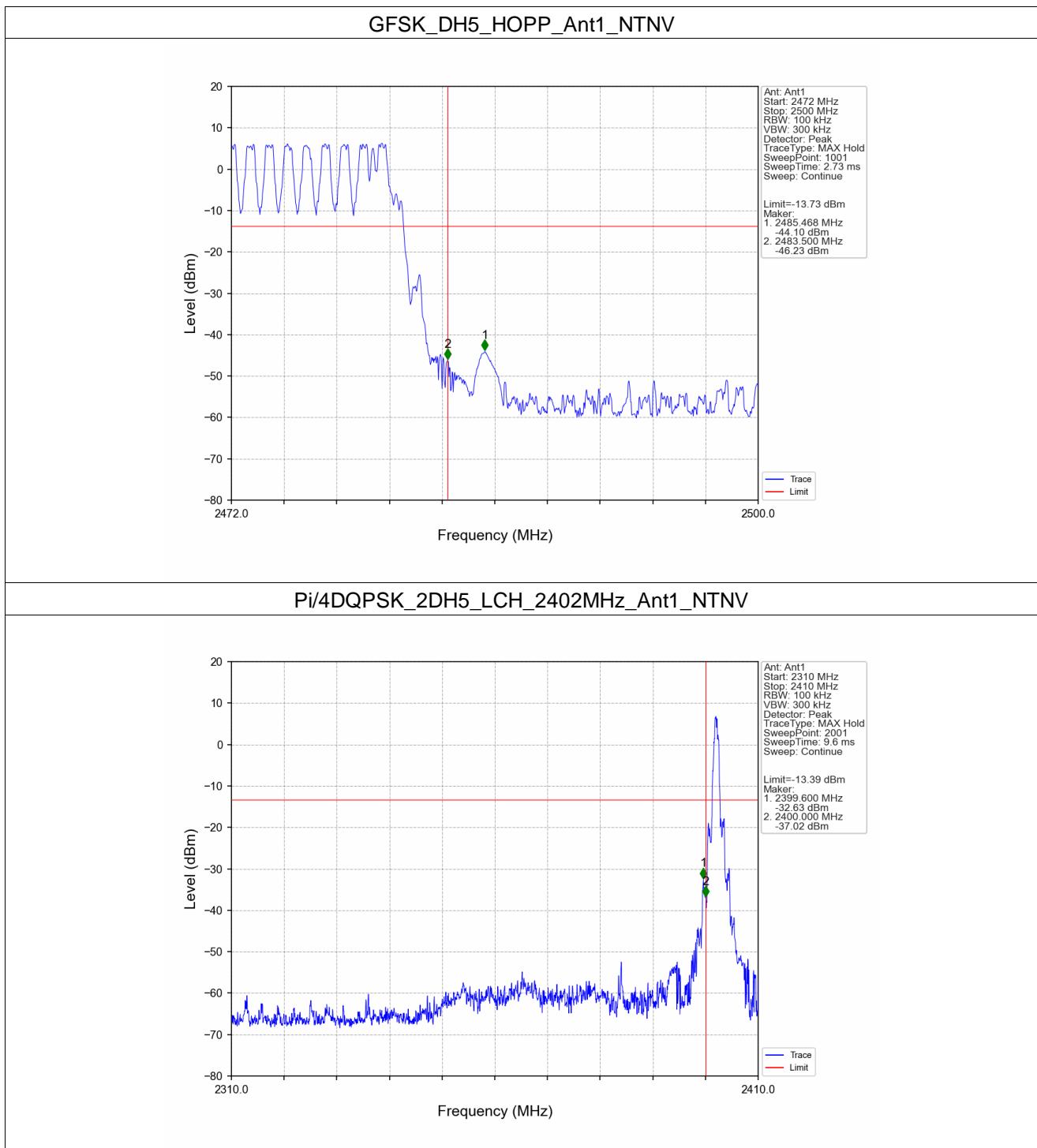
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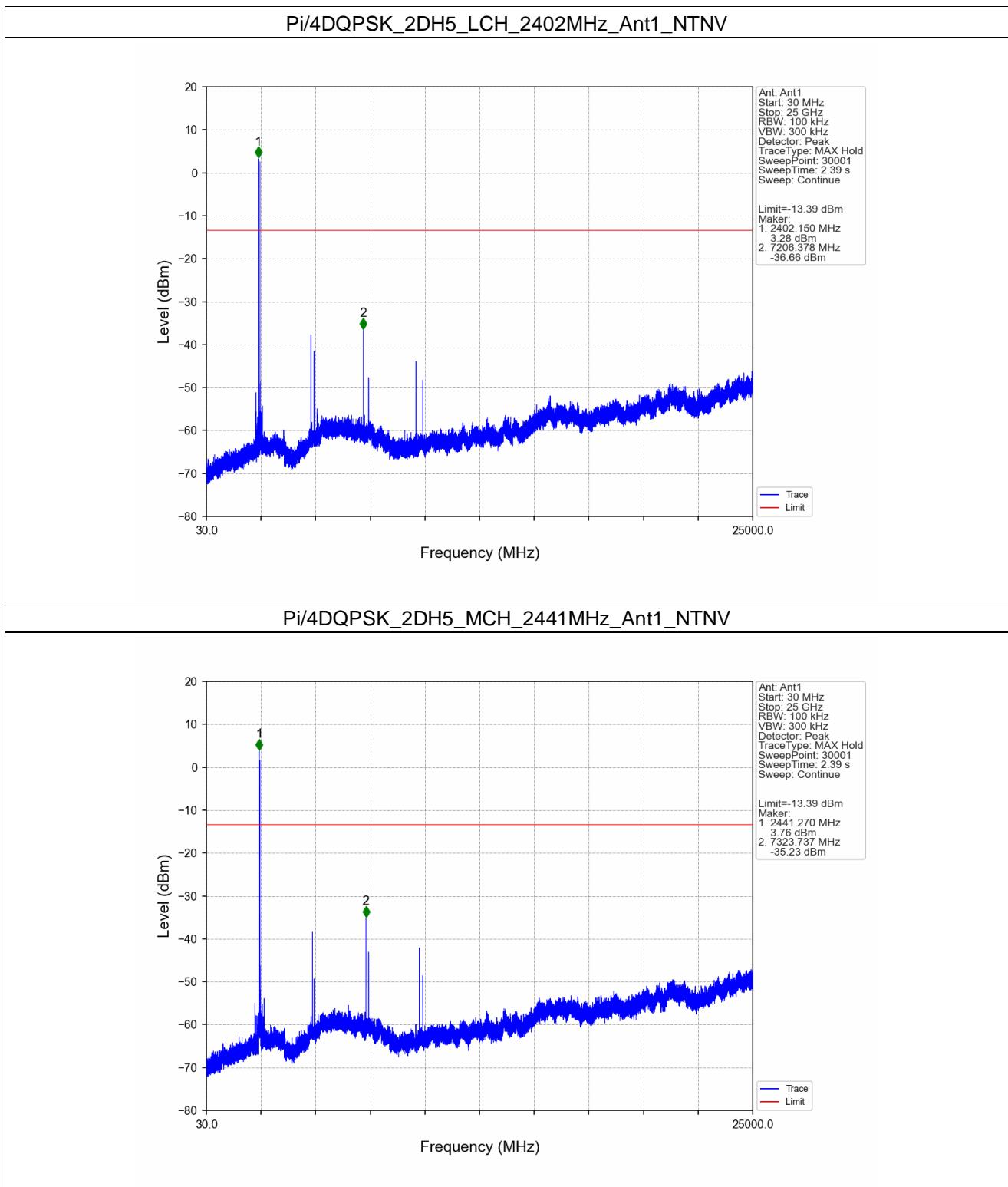
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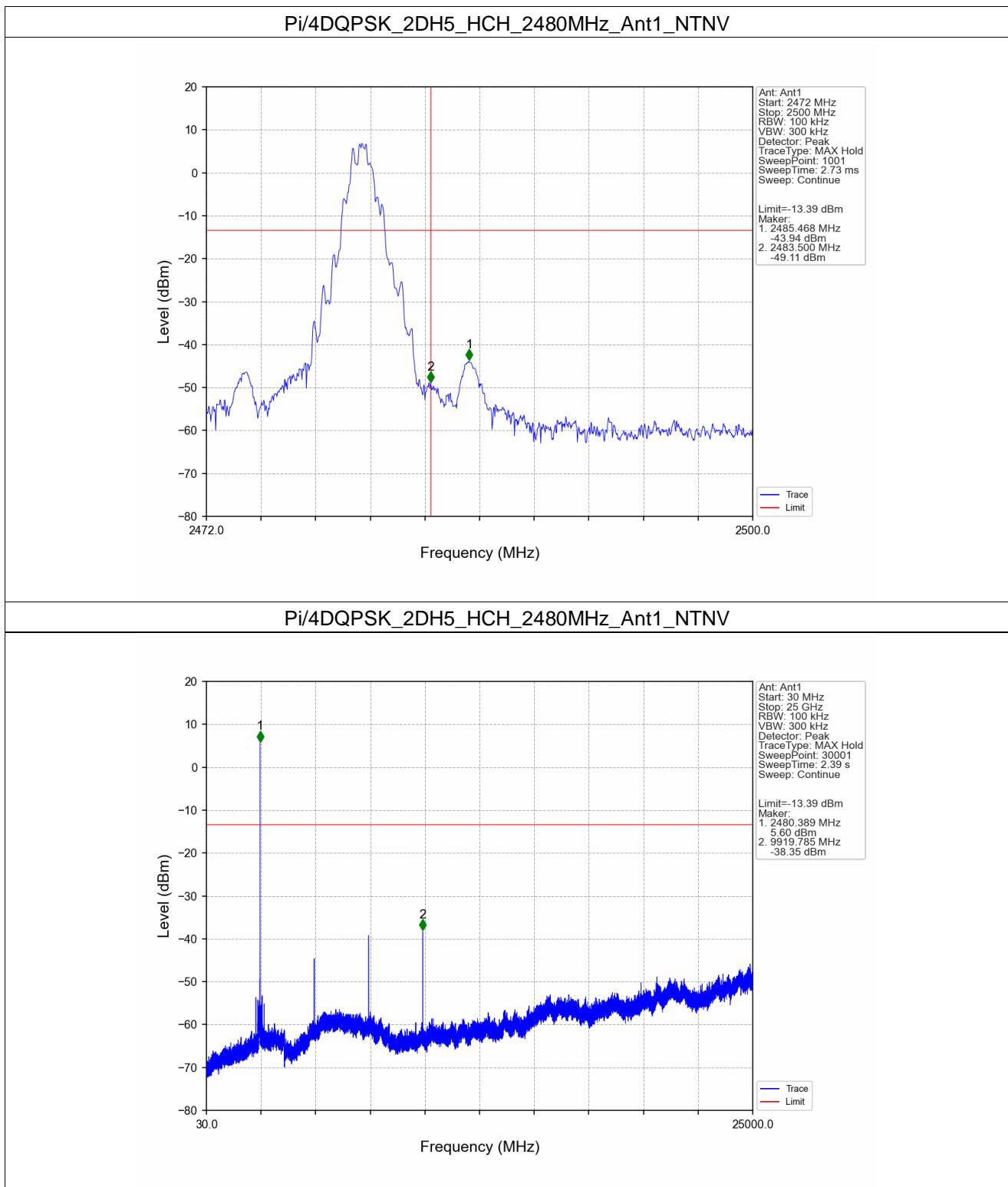
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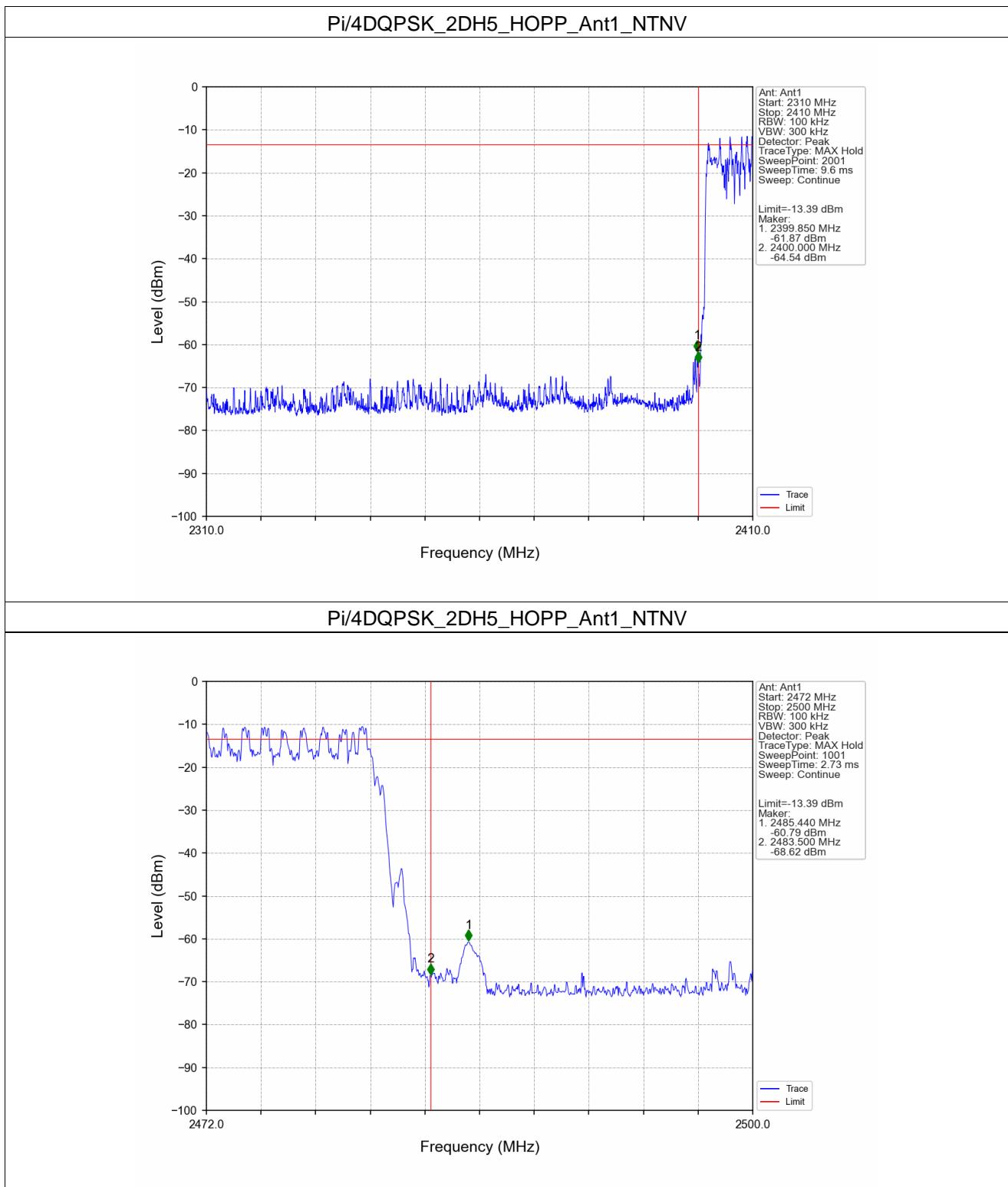
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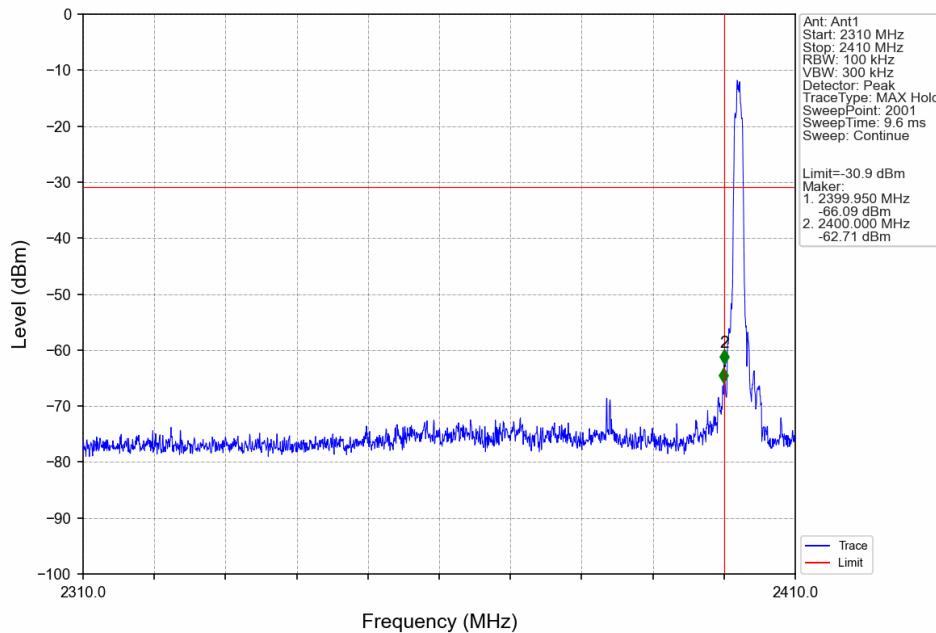
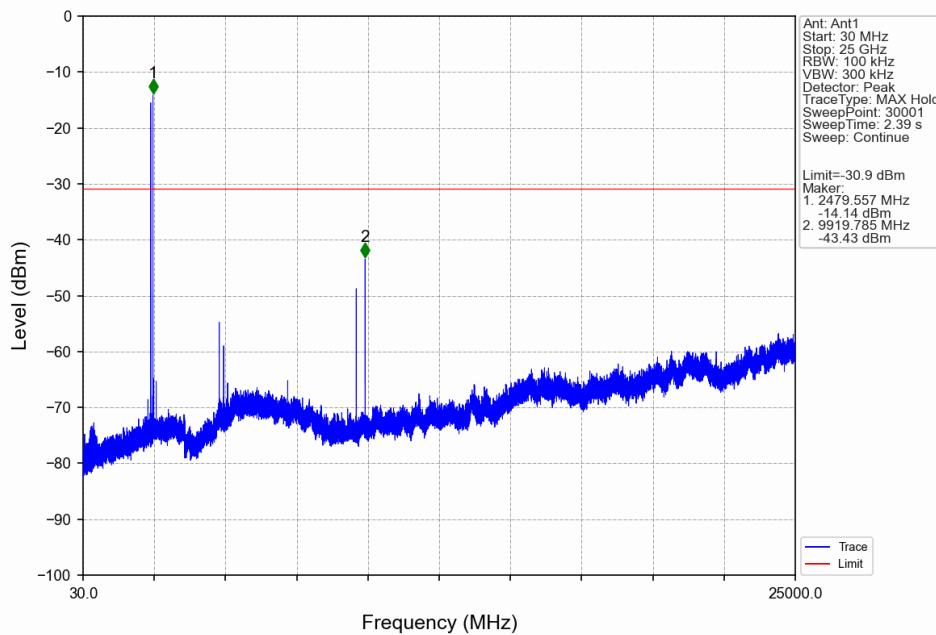
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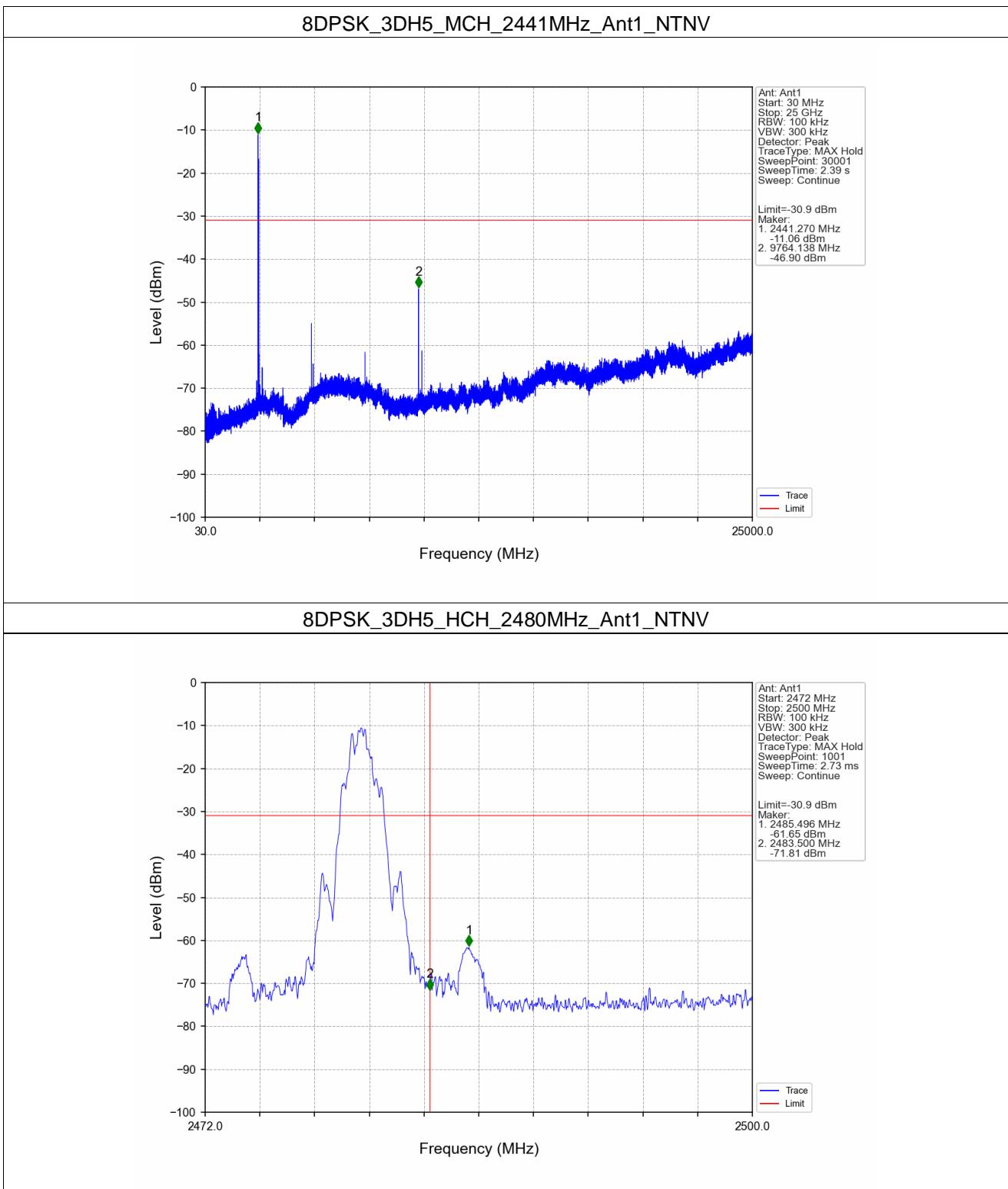
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**8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV****8DPSK\_3DH5\_LCH\_2402MHz\_Ant1\_NTNV**

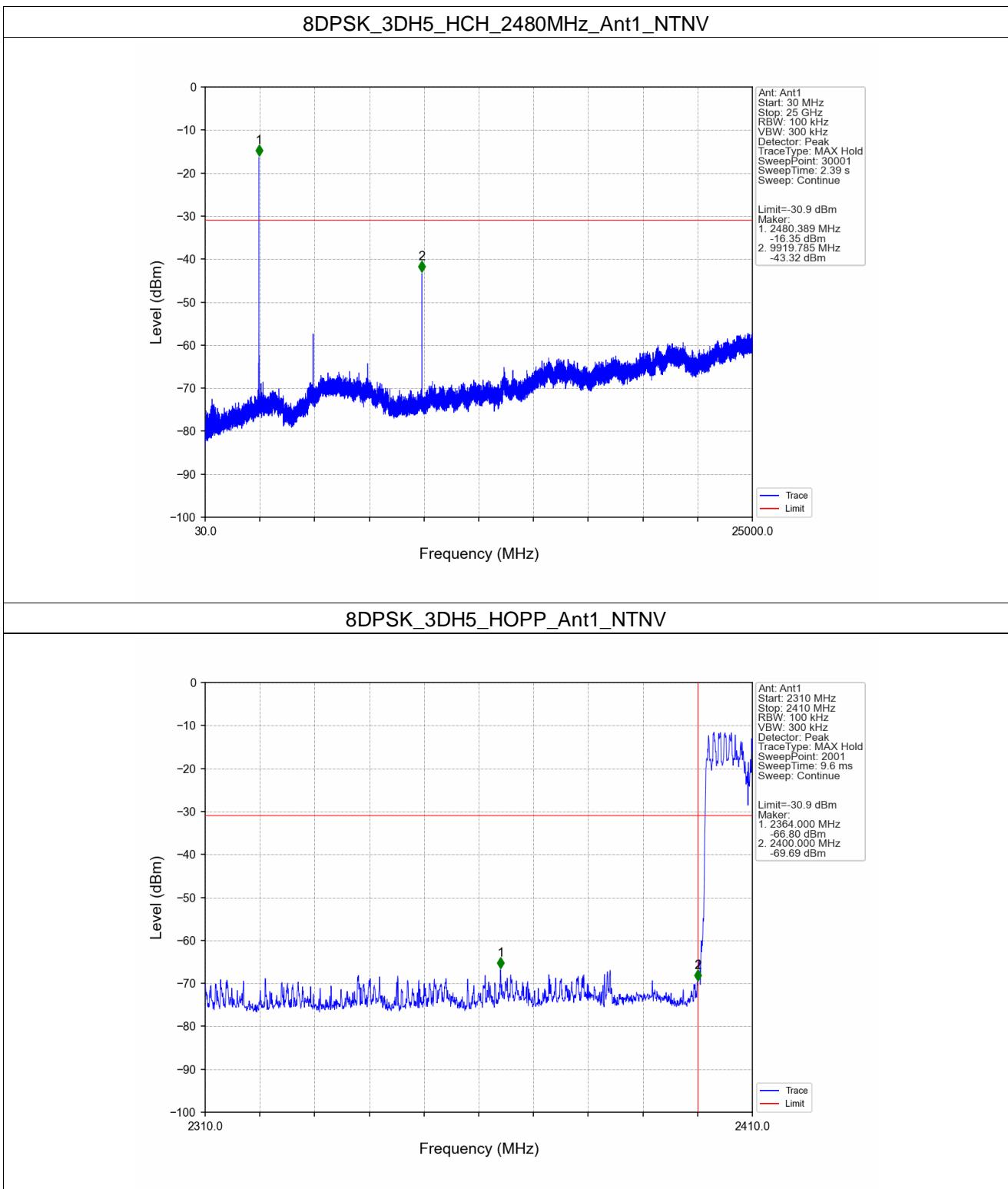
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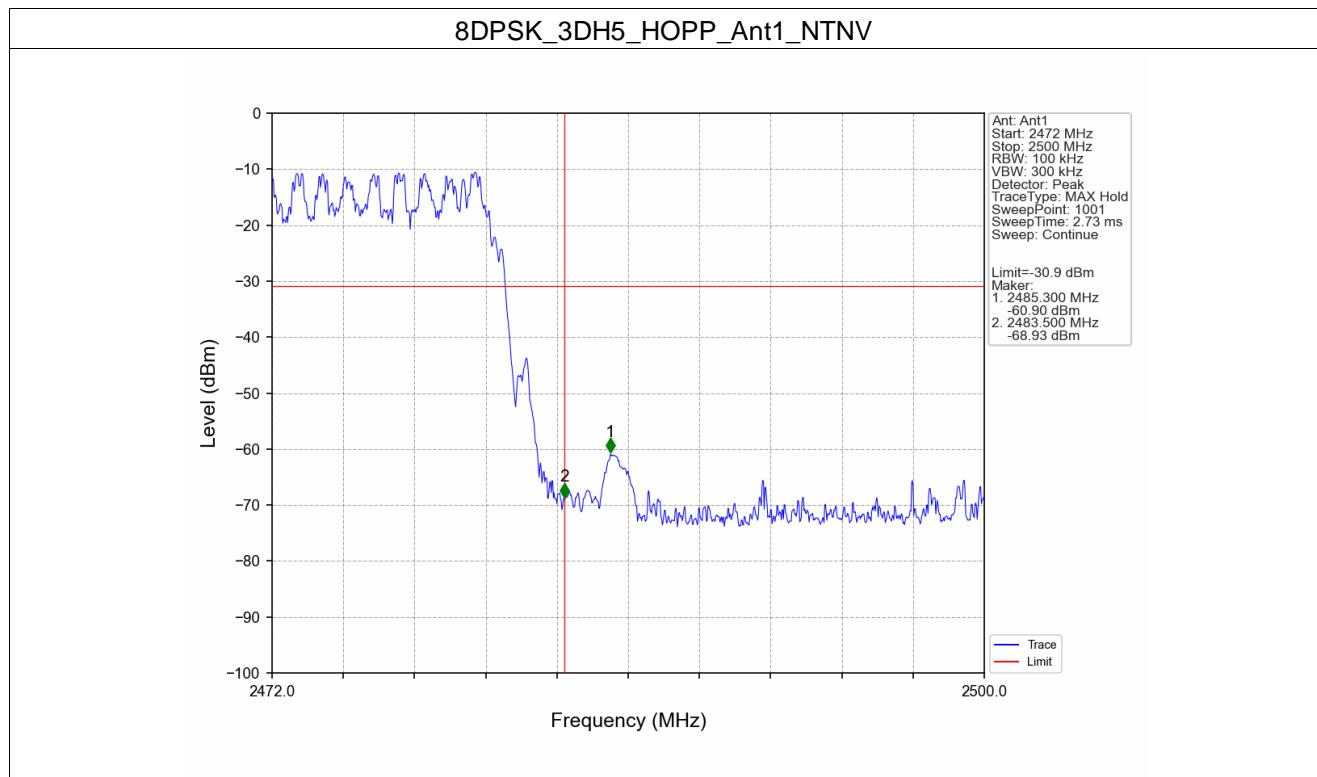
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