RF Test Report

For

Applicant Name:	**Dongguan SuiShouhua Electronic Technology Co., Ltd.**
Address:	Room 201, Building 1, No. 3, Lianhu Dongsiheng Road, Tangxia Town, Dongguan, Guangdong
EUT Name:	Stylus pen
Brand Name:	N/A
Model Number:	C37
Series Model Number:	C37-A, C37-B, C37-C, C37-D, C37-E

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Report Number:	BTF240830R00101
Test Standards:	47 CFR Part 15.247
Test Conclusion:	Pass
FCC ID:	2BE2Z-C37
Test Date:	2024-08-30 to 2024-09-13
Date of Issue:	2024-10-09
Prepared By:	Sunny Qin / Project Engineer
Date:	2024-10-09
Approved By:	Ryan CJ / EMC Manager
Date:	2024-10-09

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2024-10-09	Original
Note: Once the revision has been made, then previous versions reports are invalid.		

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1 Introduction

1.1 Identification of Testing Laboratory

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

1.2 Identification of the Responsible Testing Location

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

1.3 Announcement

(1) The test report reference to the report template version v0.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
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2 Product Information

2.1 Application Information

Company Name:	Dongguan SuiShouhua Electronic Technology Co., Ltd.
Address:	Room 201, Building 1, No. 3, Lianhu Dongsiheng Road, Tangxia Town, Dongguan, Guangdong

2.2 Manufacturer Information

Company Name:	Dongguan SuiShouhua Electronic Technology Co., Ltd.
Address:	Room 201, Building 1, No. 3, Lianhu Dongsiheng Road, Tangxia Town, Dongguan, Guangdong

2.3 Factory Information

Company Name:	Dongguan SuiShouhua Electronic Technology Co., Ltd.
Address:	Room 201, Building 1, No. 3, Lianhu Dongsiheng Road, Tangxia Town, Dongguan, Guangdong

2.4 General Description of Equipment under Test (EUT)

EUT Name:	Stylus pen
Test Model Number:	C37
Series Model Number:	C37-A, C37-B, C37-C, C37-D, C37-E
Description of Model name differentiation:	Only the model name is different.
Hardware Version:	SYH-LS-C37-V2
Software Version:	2024050006

2.5 Technical Information

Power Supply:	DC 5V from adapter or DC 3.7V from battery
Battery:	DC 3.7V 165mAh 0.61Wh
Power Adaptor:	N/A
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Modulation Type:	GFSK
Antenna Type:	Chip antenna
Transmission rate	1M, 2M
Antenna Gain#:	-3.43dBi
Note: #: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.	
Bluetooth Version:	5.2

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3 Summary of Test Results

3.1 Test Standards

The tests were performed according to following standards:
47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Uncertainty of Test

Item	Measurement Uncertainty
Conducted Emission (150 kHz-30 MHz)	±2.64dB
Occupied Bandwidth	±69kHz
Transmitter Power, Conducted	±0.87dB
Power Spectral Density	±0.69dB
Conducted Spurious Emissions	±0.95dB
Radiated Spurious Emissions (above 1GHz)	1-6GHz: ±3.94dB 6-18GHz: ±4.16dB
Radiated Spurious Emissions (30M - 1GHz)	±4.12dB
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3.3 Summary of Test Result

Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass

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4 Test Configuration

4.1 Test Equipment List

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

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

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Band edge emissions (Radiated) Emissions in frequency bands (below 1GHz) Emissions in frequency bands (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23
Preamplifier	SCHWARZBECK	BBV9744	00246	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	2023-11-16	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2023-11-13	2024-11-12
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI7	101032	2023-11-16	2024-11-15
SIGNAL ANALYZER	ROHDE&SCHWARZ	FSQ40	100010	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	2023-11-16	2024-11-15
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	00008	2023-11-16	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2022-05-22	2024-05-21
EZ_EMC	Frad	FA-03A2 RE+	/	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	2023-11-16	2024-11-15
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2023-11-13	2024-11-12

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4.2 Test Auxiliary Equipment

The EUT was tested as an independent device.

4.3 Test Modes

No.	Test Modes	Description
TM1	TX mode	Keep the EUT connect to AC power line and works in continuously transmitting mode with BLE 1M GFSK modulation.
TM2	TX mode	Keep the EUT connect to AC power line and works in continuously transmitting mode with BLE 2M GFSK modulation.

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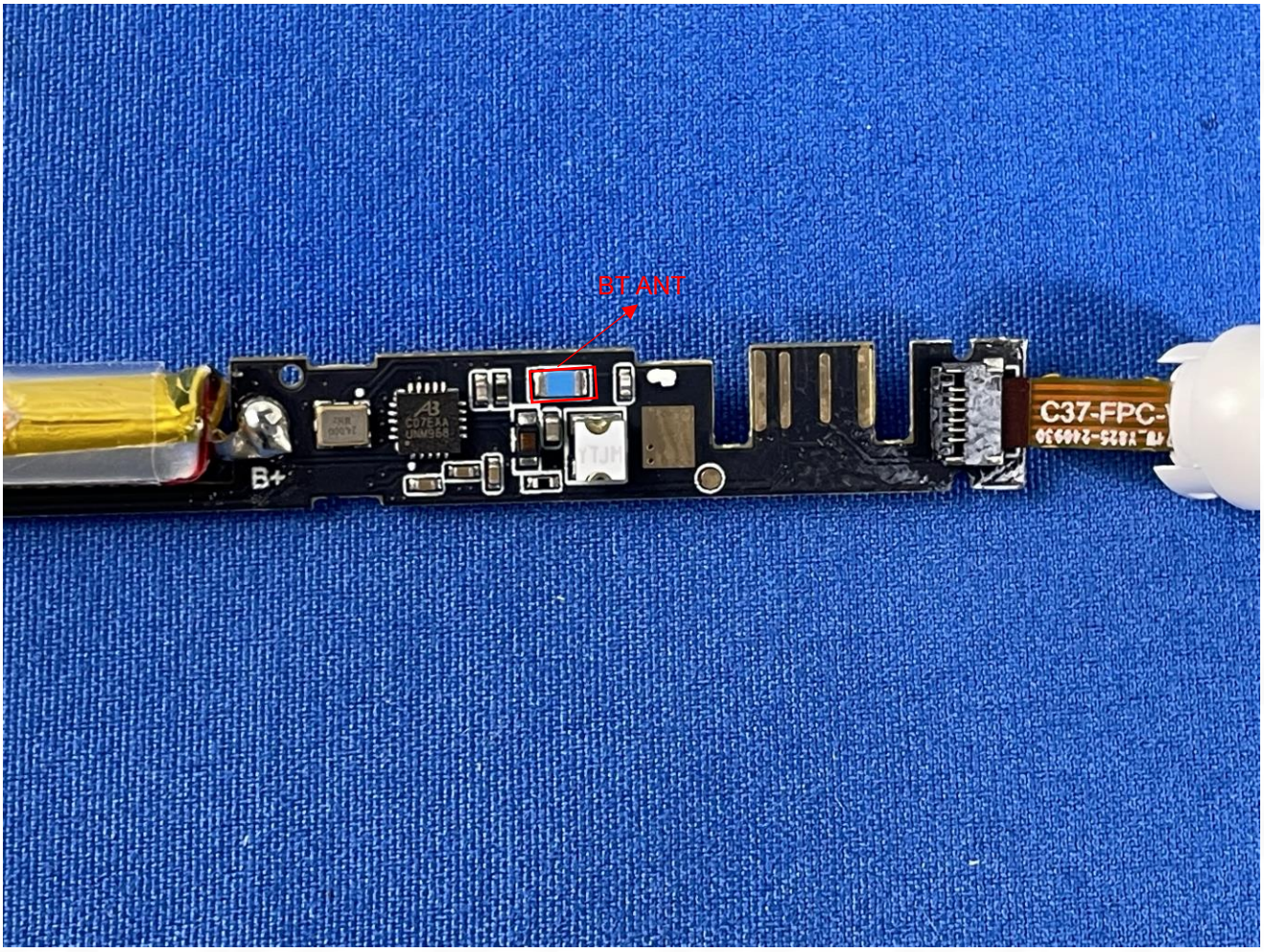
5 Evaluation Results (Evaluation)

5.1 Antenna requirement

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

5.1.1 Conclusion:



6 Radio Spectrum Matter Test Results (RF)

6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).
Test Method:	ANSI C63.10-2020 section 6.2
Test Limit:	

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

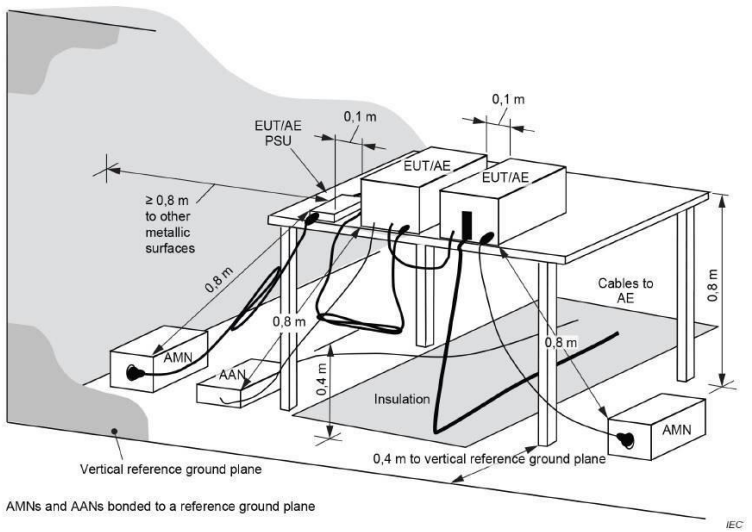
*Decreases with the logarithm of the frequency.

Procedure:	Refer to **ANSI C63.10-2020** section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

6.1.1 E.U.T. Operation:

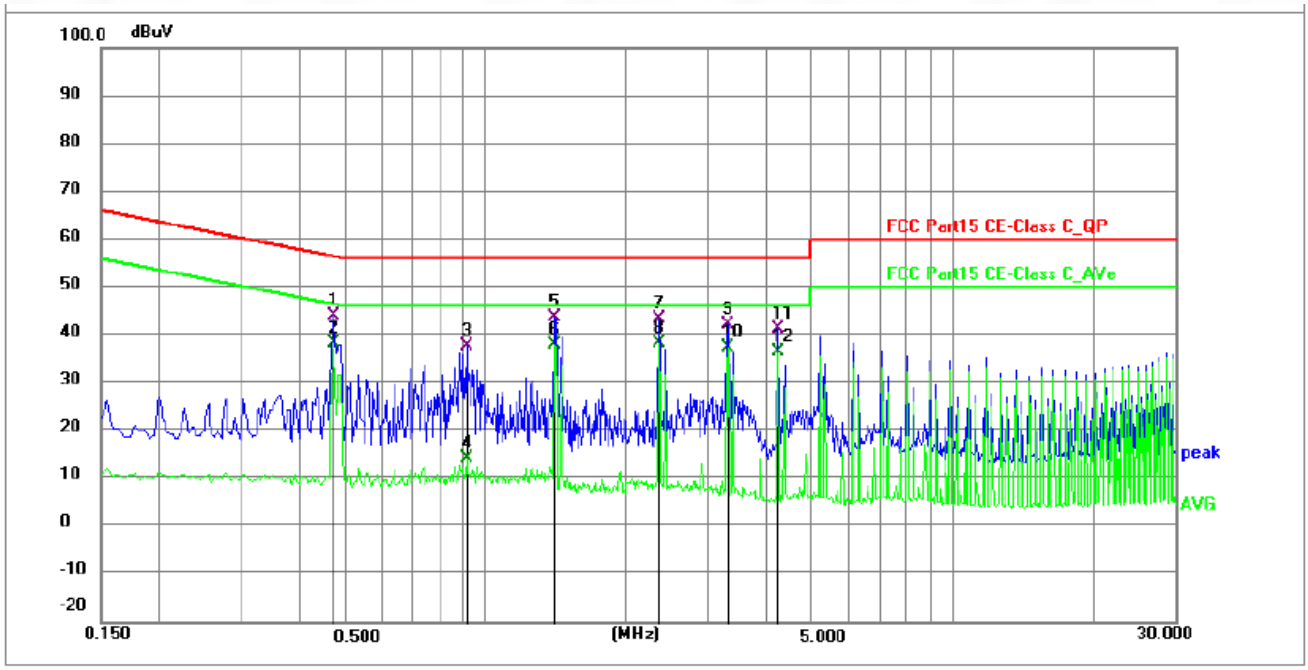
Operating Environment:	
Temperature:	23.1 °C
Humidity:	52.4 %
Atmospheric Pressure:	1010 mbar

6.1.2 Test Setup Diagram:



6.1.3 Test Data:

All modes are tested, and only the worst mode GFSK 2M 2480MHz is showed in the report
Line: Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4694	33.50	10.57	44.07	56.52	-12.45	QP	P	
2	0.4694	27.69	10.57	38.26	46.52	-8.26	AVG	P	
3	0.9104	27.06	10.67	37.73	56.00	-18.27	QP	P	
4	0.9104	3.54	10.67	14.21	46.00	-31.79	AVG	P	
5	1.4100	33.07	10.66	43.73	56.00	-12.27	QP	P	
6	1.4100	27.29	10.66	37.95	46.00	-8.05	AVG	P	
7	2.3550	32.74	10.67	43.41	56.00	-12.59	QP	P	
8 *	2.3550	27.58	10.67	38.25	46.00	-7.75	AVG	P	
9	3.2955	31.48	10.65	42.13	56.00	-13.87	QP	P	
10	3.2955	26.69	10.65	37.34	46.00	-8.66	AVG	P	
11	4.2360	30.53	10.69	41.22	56.00	-14.78	QP	P	
12	4.2360	25.92	10.69	36.61	46.00	-9.39	AVG	P	

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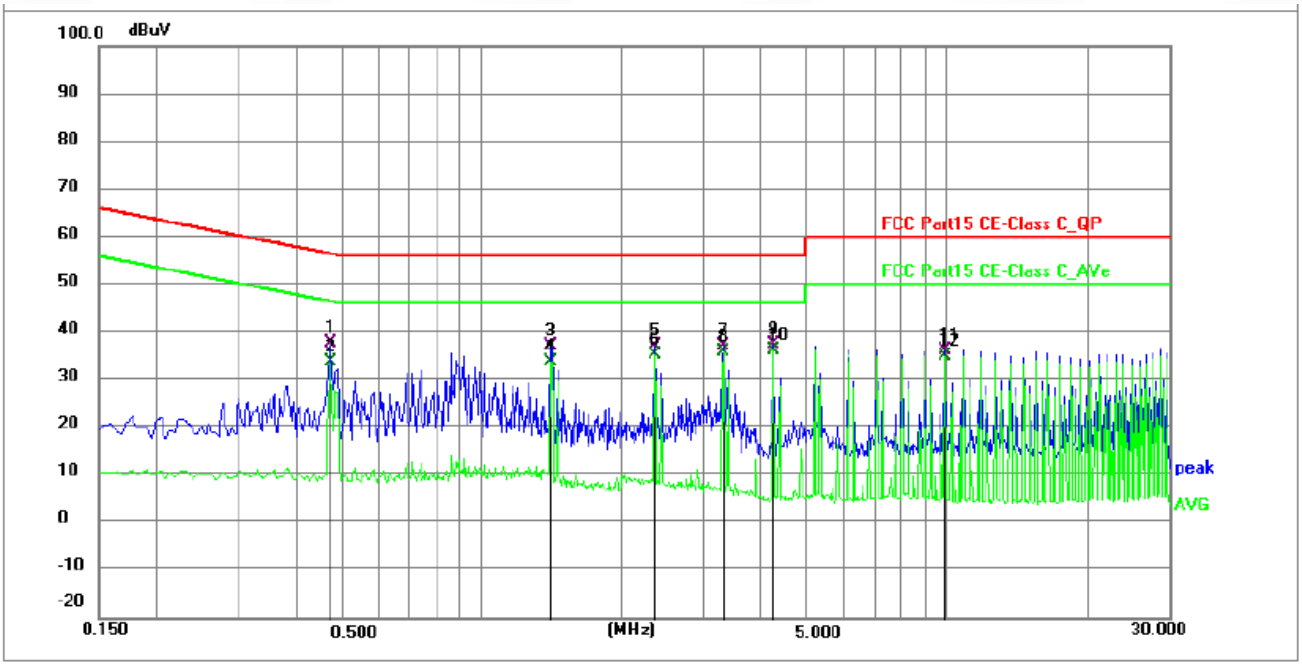
Line: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4695	27.15	10.57	37.72	56.52	-18.80	QP	P	
2	0.4695	23.39	10.57	33.96	46.52	-12.56	AVG	P	
3	1.4144	26.39	10.66	37.05	56.00	-18.95	QP	P	
4	1.4144	23.22	10.66	33.88	46.00	-12.12	AVG	P	
5	2.3550	26.37	10.67	37.04	56.00	-18.96	QP	P	
6	2.3550	24.64	10.67	35.31	46.00	-10.69	AVG	P	
7	3.2955	26.39	10.65	37.04	56.00	-18.96	QP	P	
8	3.2955	25.18	10.65	35.83	46.00	-10.17	AVG	P	
9	4.2360	26.69	10.69	37.38	56.00	-18.62	QP	P	
10 *	4.2360	25.55	10.69	36.24	46.00	-9.76	AVG	P	
11	9.8835	25.49	10.85	36.34	60.00	-23.66	QP	P	
12	9.8835	24.31	10.85	35.16	50.00	-14.84	AVG	P	

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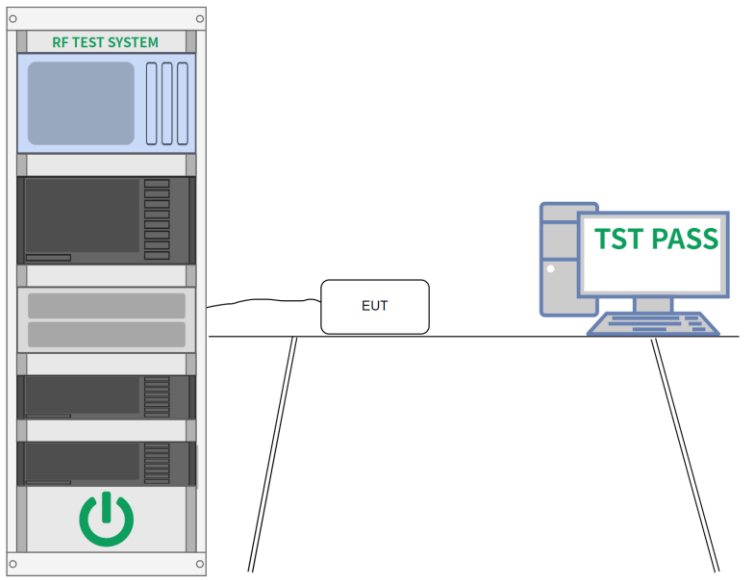
6.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Method:	ANSI C63.10-2020, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW >= [3 × RBW]. c) Detector = peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.2.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	52.7 %
Atmospheric Pressure:	1010 mbar

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

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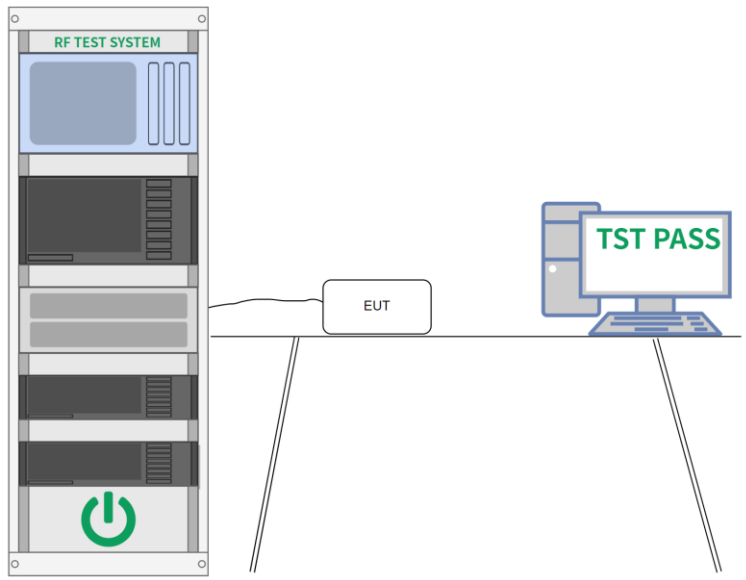
6.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Method:	ANSI C63.10-2020, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Procedure:	ANSI C63.10-2020, section 11.9.1 Maximum peak conducted output power

6.3.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	52.7 %
Atmospheric Pressure:	1010 mbar

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

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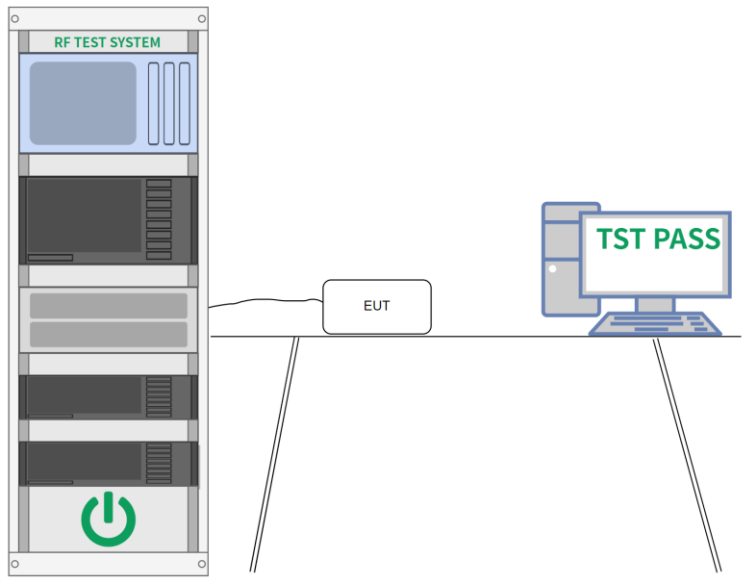
6.4 Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Method:	ANSI C63.10-2020, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Procedure:	ANSI C63.10-2020, section 11.10, Maximum power spectral density level in the fundamental emission

6.4.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	52.7 %
Atmospheric Pressure:	1010 mbar

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Please Refer to Appendix for Details.

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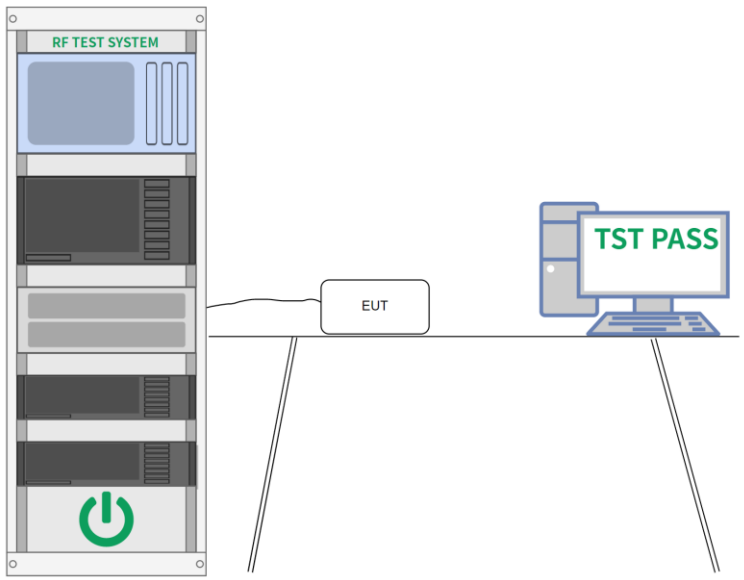
6.5 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Method:	ANSI C63.10-2020 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Procedure:	ANSI C63.10-2020 Section 11.11.1, Section 11.11.2, Section 11.11.3

6.5.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.9 °C
Humidity:	52.7 %
Atmospheric Pressure:	1010 mbar

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Please Refer to Appendix for Details.

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6.6 Band edge emissions (Radiated)

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Method:	ANSI C63.10-2020 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

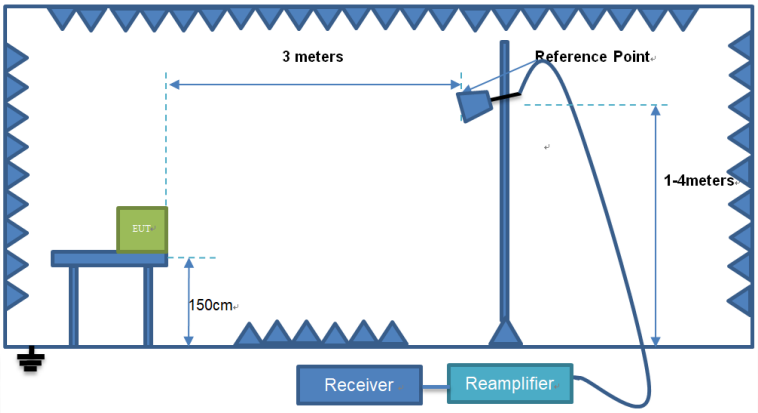
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Procedure:	ANSI C63.10-2020 section 6.10.5.2

6.6.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	48.1 %
Atmospheric Pressure:	1010 mbar

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Note:
All modes are tested, and only the worst mode GFSK 2M is showed in the report

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
GFSK 2M-2402MHz TX mode							
2310.00	77.75	-30.59	47.16	74.00	-26.84	Peak	V
2310.00	67.06	-30.59	36.47	54.00	-17.53	AVG	V
2310.00	78.29	-30.59	47.70	74.00	-26.30	Peak	H
2310.00	69.71	-30.59	39.12	54.00	-14.88	AVG	H
2390.00	77.87	-30.49	47.38	74.00	-26.62	Peak	H
2390.00	65.47	-30.49	34.98	54.00	-19.02	AVG	H
2390.00	77.87	-30.49	47.38	74.00	-26.62	Peak	V
2390.00	65.47	-30.49	34.98	54.00	-19.02	AVG	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
GFSK 2M-2480MHz TX mode							
2483.50	76.65	-30.39	46.26	74.00	-27.74	Peak	V
2483.50	65.26	-30.39	34.87	54.00	-19.13	AVG	V
2483.50	78.26	-30.39	47.87	74.00	-26.13	Peak	H
2483.50	66.34	-30.39	35.95	54.00	-18.05	AVG	H
2500.00	78.18	-30.37	47.81	74.00	-26.19	Peak	H
2500.00	68.04	-30.37	37.67	54.00	-16.33	AVG	H
2500.00	75.15	-30.37	44.78	74.00	-29.22	Peak	V
2500.00	64.31	-30.37	33.94	54.00	-20.06	AVG	V

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6.7 Emissions in frequency bands (below 1GHz)

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Method:	ANSI C63.10-2020 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

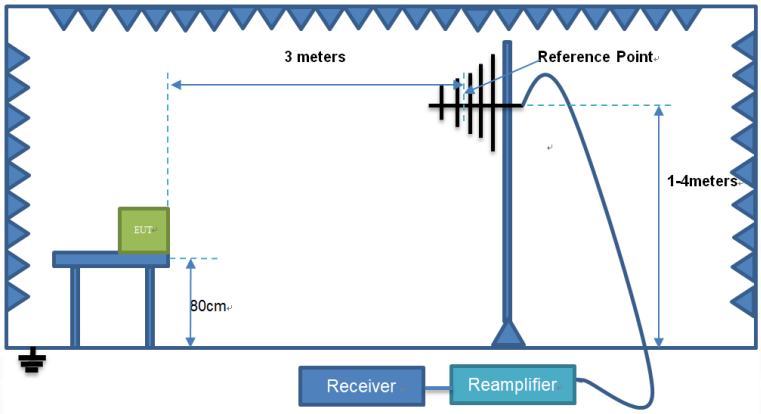
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Procedure:	ANSI C63.10-2020 section 6.6.4

6.7.1 E.U.T. Operation:

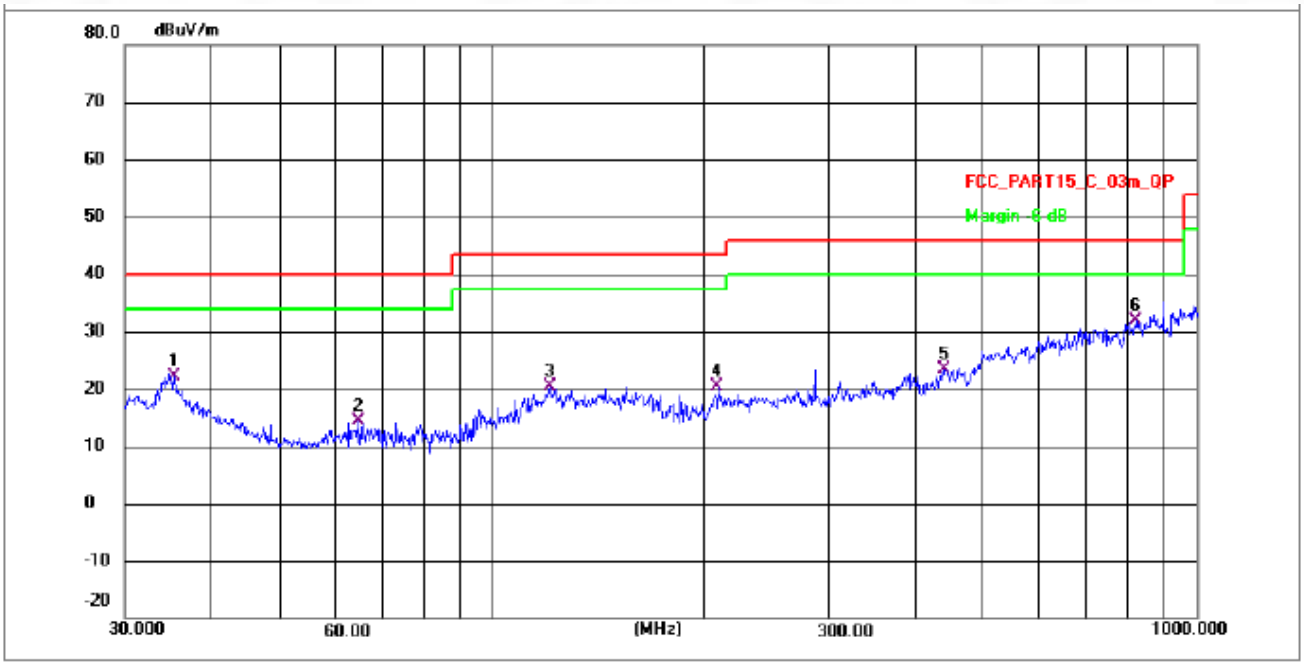
Operating Environment:	
Temperature:	25.7 °C
Humidity:	48.1 %
Atmospheric Pressure:	1010 mbar

6.7.2 Test Setup Diagram:



6.7.3 Test Data:

All modes are tested, and only the worst mode GFSK 2M 2480MHz is showed in the report
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	35.2512	31.72	-9.68	22.04	40.00	-17.96	QP	P
2	64.4331	23.89	-9.41	14.48	40.00	-25.52	QP	P
3	120.2766	42.68	-22.29	20.39	43.50	-23.11	QP	P
4	209.3129	41.88	-21.44	20.44	43.50	-23.06	QP	P
5	439.4252	42.92	-19.50	23.42	46.00	-22.58	QP	P
6 *	821.7103	49.48	-17.50	31.98	46.00	-14.02	QP	P

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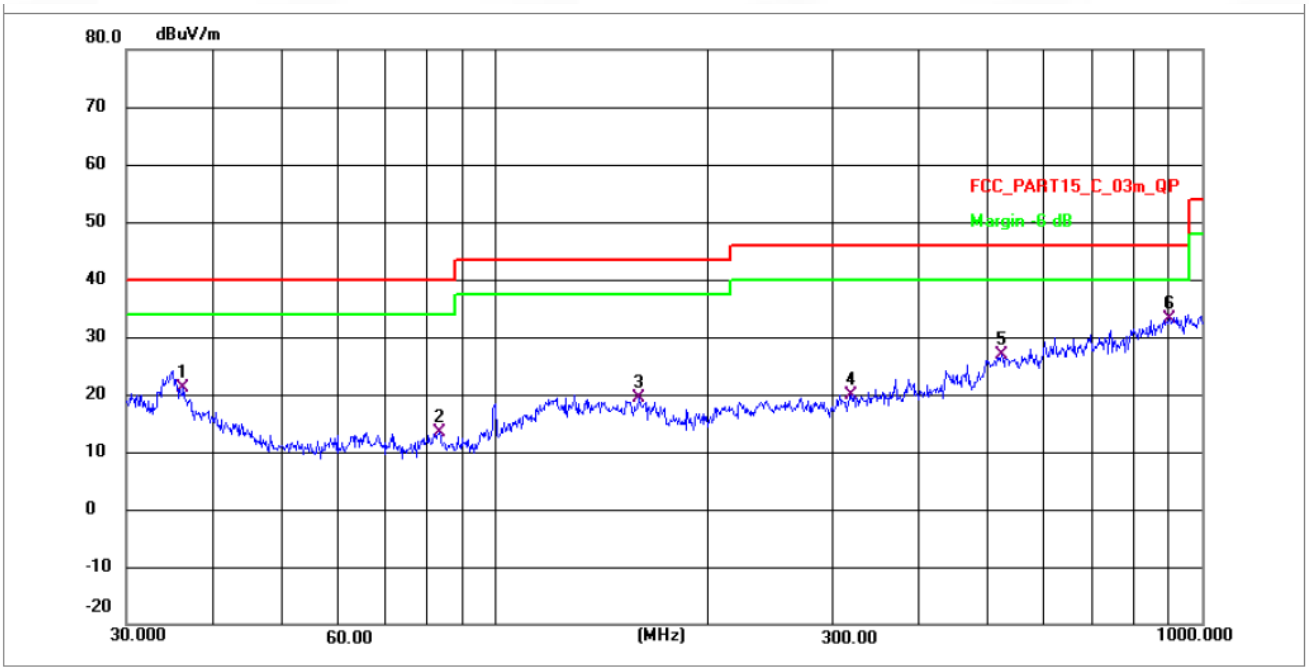
Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	36.1906	30.69	-9.66	21.03	40.00	-18.97	QP	P
2	83.3759	36.00	-22.72	13.28	40.00	-26.72	QP	P
3	160.0648	41.21	-21.92	19.29	43.50	-24.21	QP	P
4	318.8170	40.41	-20.47	19.94	46.00	-26.06	QP	P
5	521.8023	45.82	-18.85	26.97	46.00	-19.03	QP	P
6 *	901.7270	49.24	-16.21	33.03	46.00	-12.97	QP	P

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6.8 Emissions in frequency bands (above 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`
Test Method:	ANSI C63.10-2020 section 6.6.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

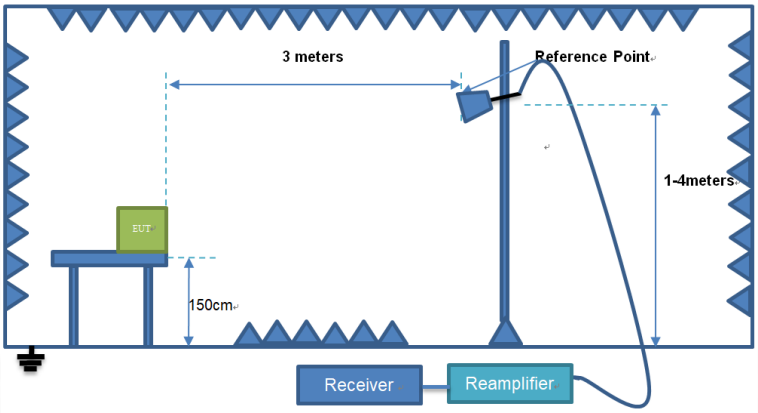
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Procedure:	ANSI C63.10-2020 section 6.6.4

6.8.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.7 °C
Humidity:	48.1 %
Atmospheric Pressure:	1010 mbar

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Note: All modes are tested, and only the worst mode GFSK 2M is showed in the report.

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
GFSK 2M-2402MHz TX mode							
4804.00	69.35	-27.92	41.43	74.00	-32.57	Peak	V
4804.00	58.18	-27.92	30.26	54.00	-23.74	AVG	V
7206.00	70.58	-24.87	45.71	74.00	-28.29	Peak	V
7206.00	59.05	-24.87	34.18	54.00	-19.82	AVG	V
9608.00	68.31	-23.43	44.88	74.00	-29.12	Peak	V
9608.00	59.17	-23.43	35.74	54.00	-18.26	AVG	V
4804.00	70.65	-27.92	42.73	74.00	-31.27	Peak	H
4804.00	60.98	-27.92	33.06	54.00	-20.94	AVG	H
7206.00	69.33	-24.87	44.46	74.00	-29.54	Peak	H
7206.00	58.65	-24.87	33.78	54.00	-20.22	AVG	H
9608.00	67.08	-23.43	43.65	74.00	-30.35	Peak	H
9608.00	57.44	-23.43	34.01	54.00	-19.99	AVG	H

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
GFSK 2M-2440MHz TX mode							
4880.00	68.32	-27.71	40.61	74.00	-33.39	Peak	V
4880.00	58.19	-27.71	30.48	54.00	-23.52	AVG	V
7320.00	67.95	-24.83	43.12	74.00	-30.88	Peak	V
7320.00	57.62	-24.83	32.79	54.00	-21.21	AVG	V
9760.00	66.29	-23.77	42.52	74.00	-31.48	Peak	V
9760.00	55.98	-23.77	32.21	54.00	-21.79	AVG	V
4880.00	71.07	-27.71	43.36	74.00	-30.64	Peak	H
4880.00	60.08	-27.71	32.37	54.00	-21.63	AVG	H
7320.00	69.57	-24.83	44.74	74.00	-29.26	Peak	H
7320.00	59.73	-24.83	34.90	54.00	-19.10	AVG	H
9760.00	67.80	-23.77	44.03	74.00	-29.97	Peak	H
9760.00	57.83	-23.77	34.06	54.00	-19.94	AVG	H

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Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
GFSK 2M -2480MHz TX mode							
4960.00	69.62	-24.79	44.83	74.00	-29.17	Peak	V
4960.00	59.46	-24.79	34.67	54.00	-19.33	AVG	V
7440.00	68.48	-24.80	43.68	74.00	-30.32	Peak	V
7440.00	58.07	-24.80	33.27	54.00	-20.73	AVG	V
9920.00	66.24	-24.11	42.13	74.00	-31.87	Peak	V
9920.00	56.78	-24.11	32.67	54.00	-21.33	AVG	V
4960.00	70.65	-24.79	45.86	74.00	-28.14	Peak	H
4960.00	60.76	-24.79	35.97	54.00	-18.03	AVG	H
7440.00	69.45	-24.80	44.65	74.00	-29.35	Peak	H
7440.00	59.41	-24.80	34.61	54.00	-19.39	AVG	H
9920.00	68.02	-24.11	43.91	74.00	-30.09	Peak	H
9920.00	57.10	-24.11	32.99	54.00	-21.01	AVG	H

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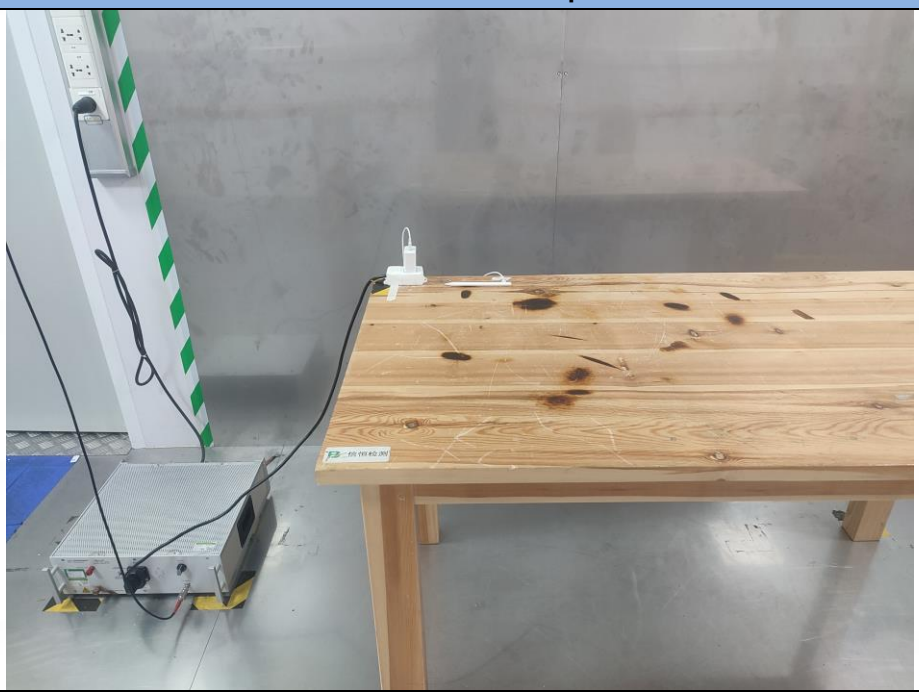
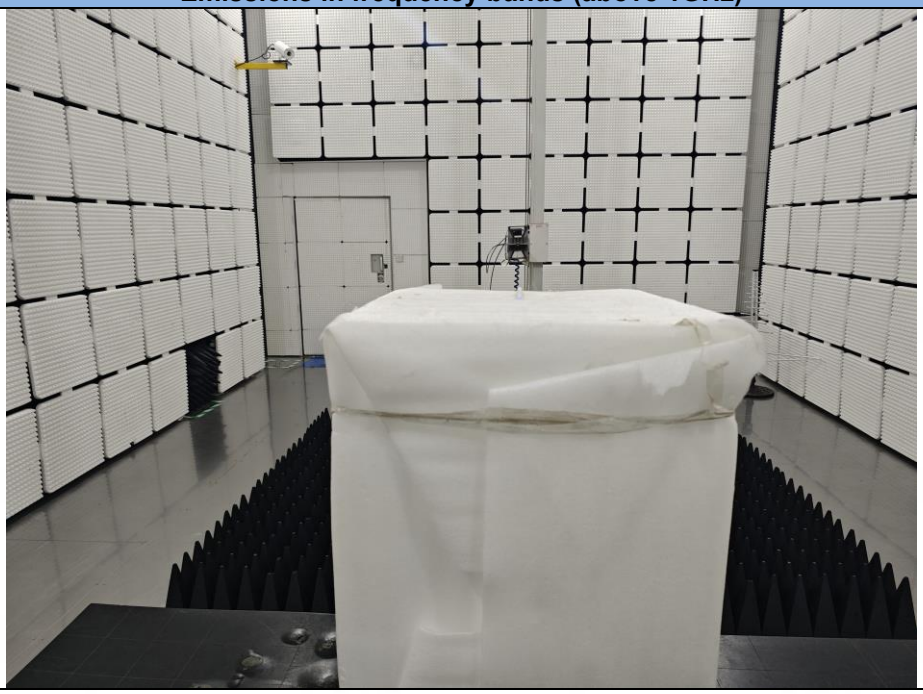
7 Test Setup Photos

Conducted Emission at AC power line


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


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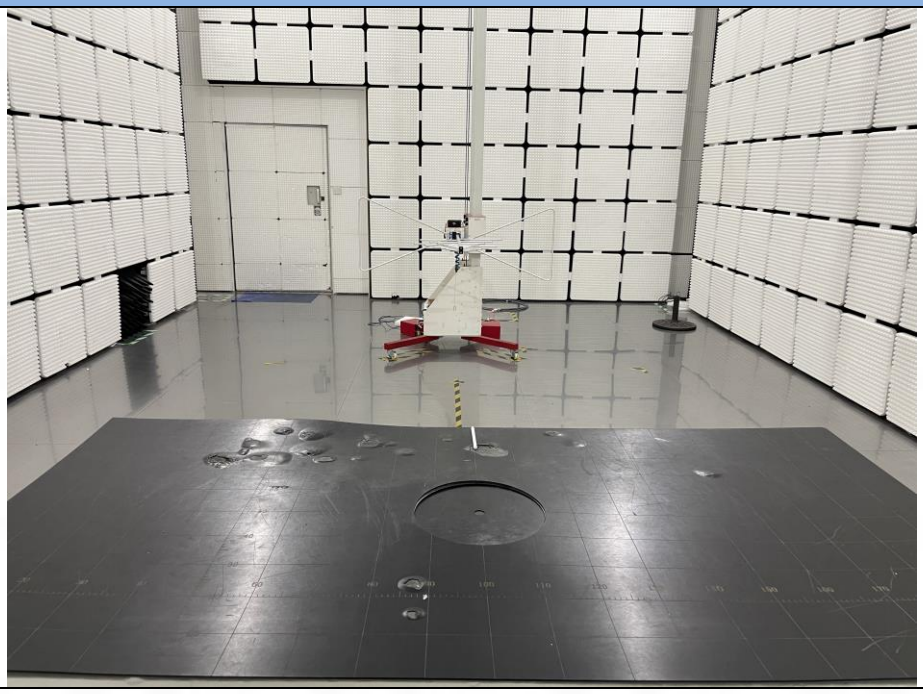
Emissions in frequency bands (below 1GHz)


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Appendix

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1. Duty Cycle

1.1 Test Result

1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.417	0.625	66.72	1.76	0.08
		2440	0.417	0.625	66.72	1.76	0.12
		2480	0.418	0.626	66.77	1.75	0.12
2M	SISO	2402	0.233	0.625	37.28	4.29	0.12
		2440	0.219	0.625	35.04	4.55	0.12
		2480	0.234	0.626	37.38	4.27	0.05

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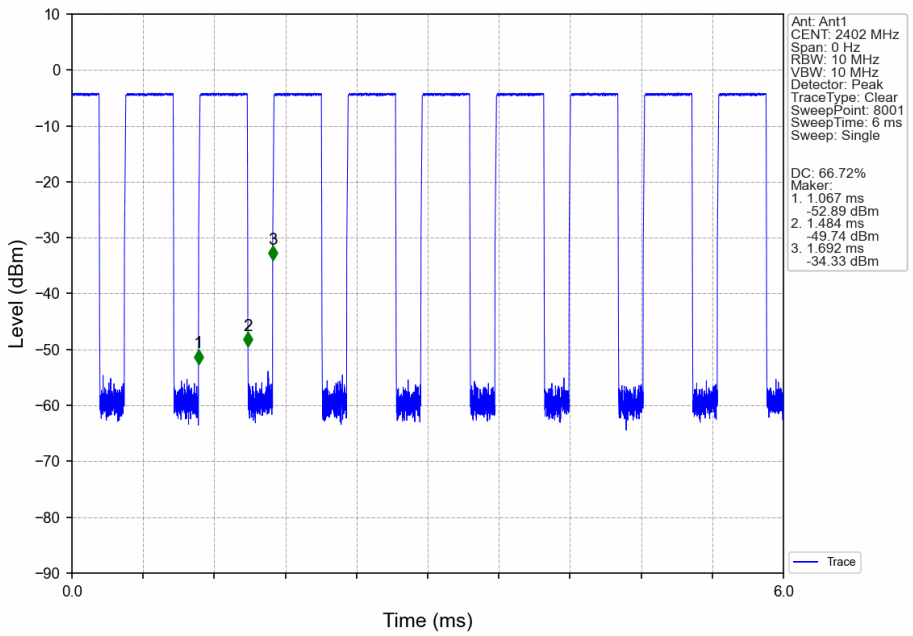
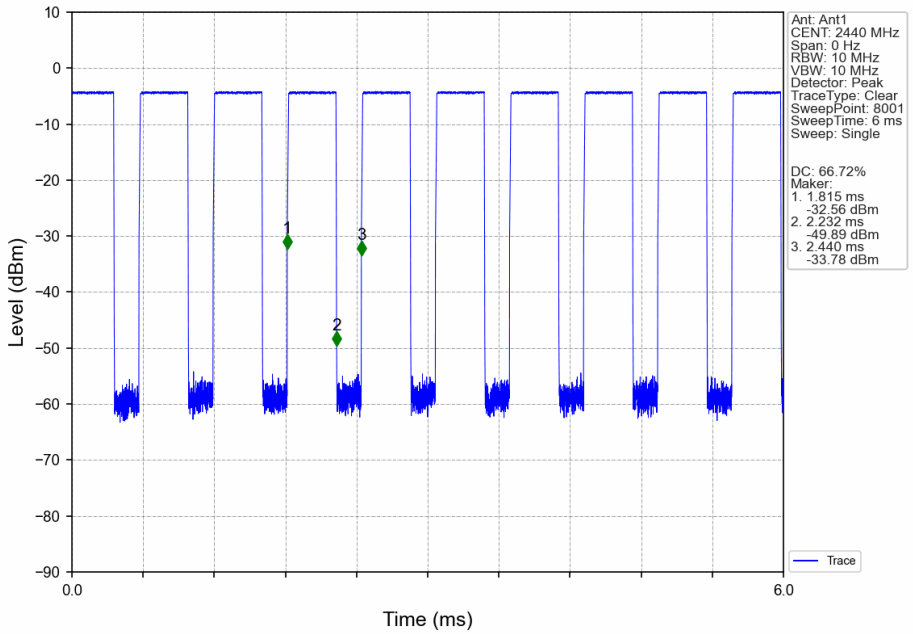
1.2 Test Graph

1.2.1 Ant1

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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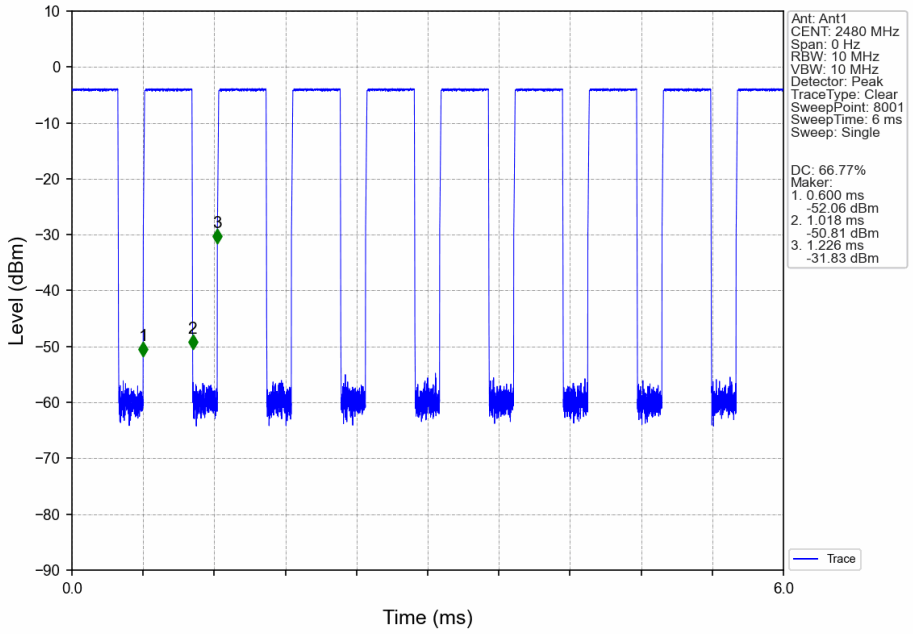
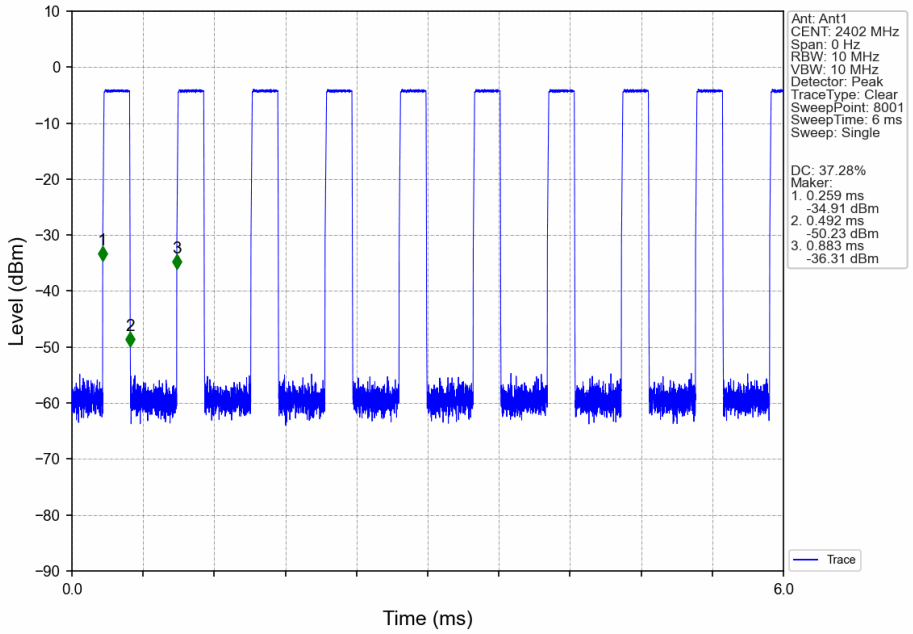
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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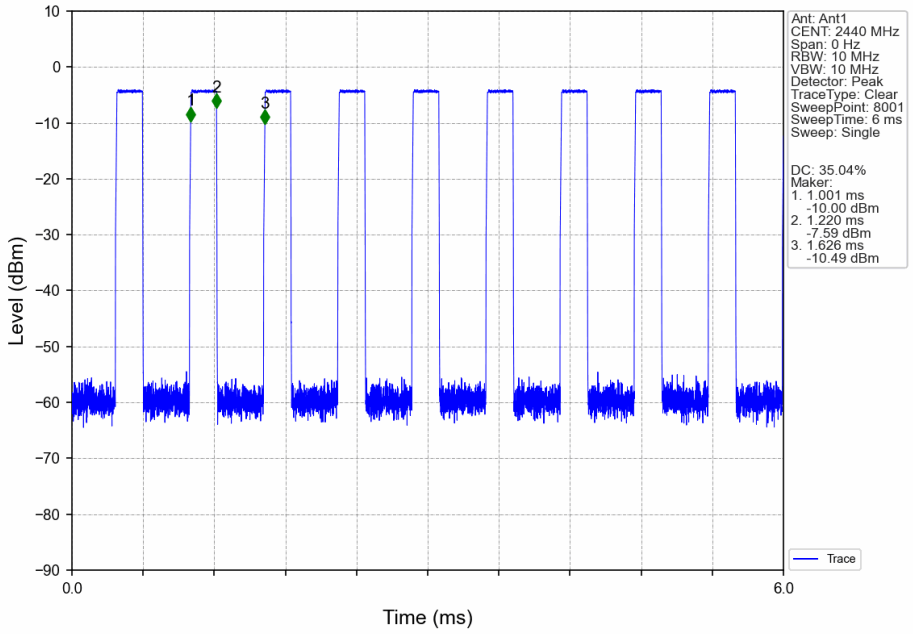
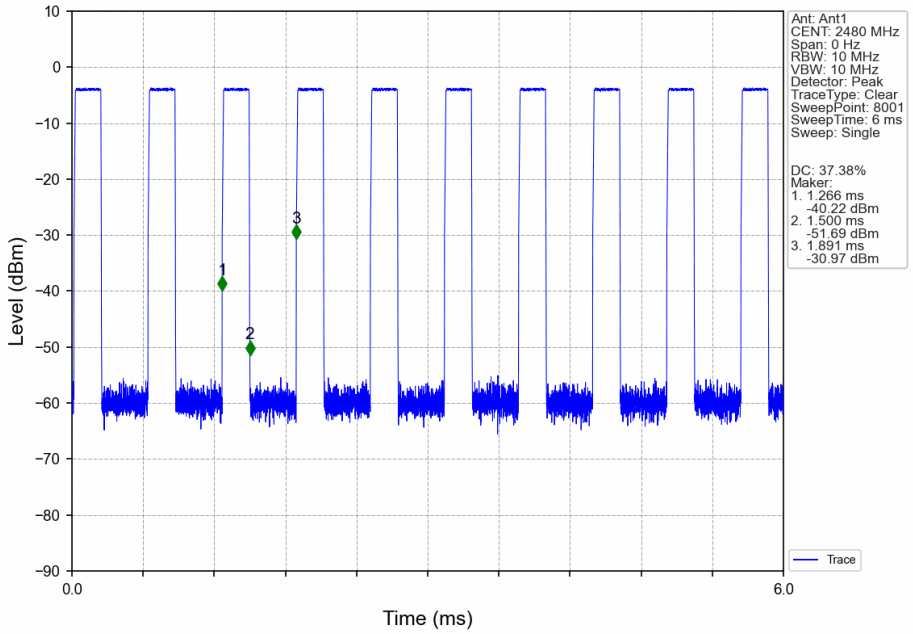
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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2. Bandwidth

2.1 Test Result

2.1.1 OBW

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	1.015	/	Pass
		2440	1	1.015	/	Pass
		2480	1	1.018	/	Pass
2M	SISO	2402	1	2.018	/	Pass
		2440	1	2.020	/	Pass
		2480	1	2.017	/	Pass

2.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.663	>=0.5	Pass
		2440	1	0.663	>=0.5	Pass
		2480	1	0.664	>=0.5	Pass
2M	SISO	2402	1	1.148	>=0.5	Pass
		2440	1	1.153	>=0.5	Pass
		2480	1	1.149	>=0.5	Pass

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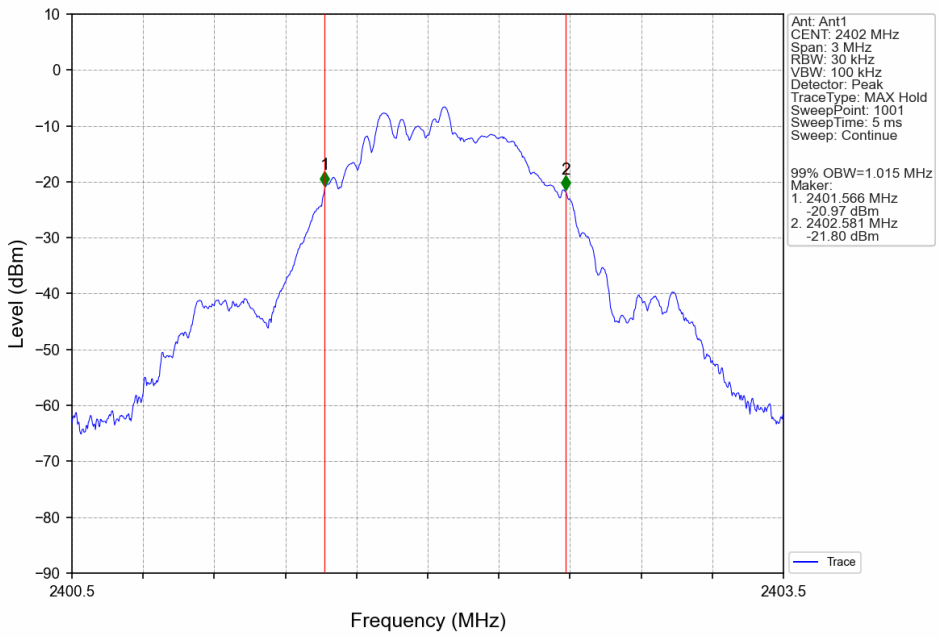
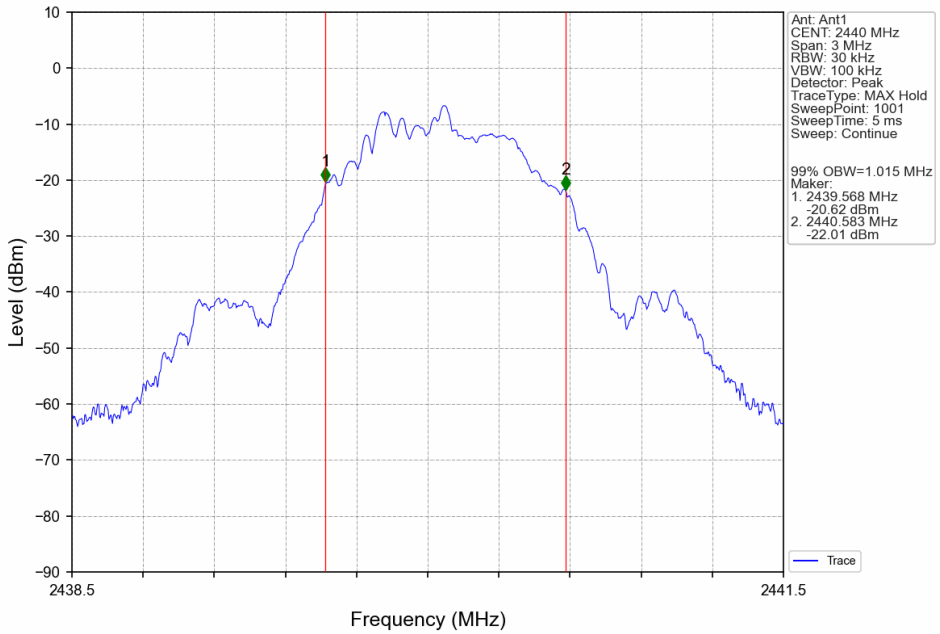
2.2 Test Graph

2.2.1 OBW

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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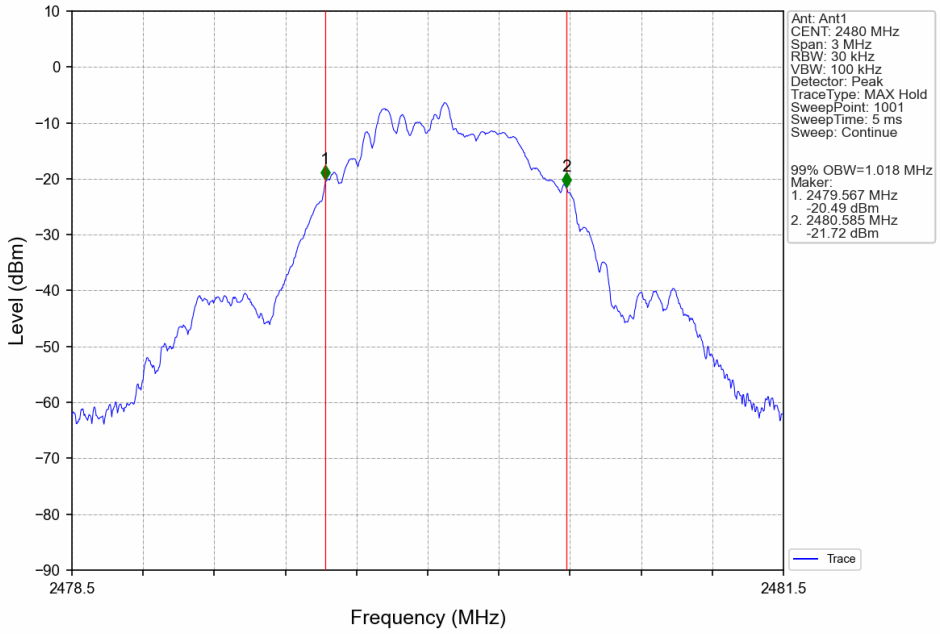
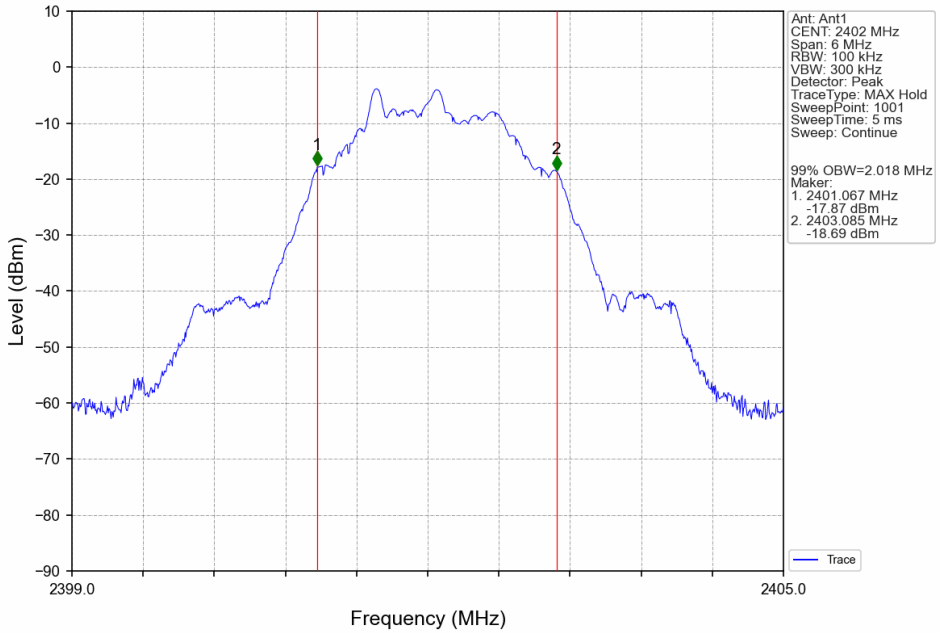
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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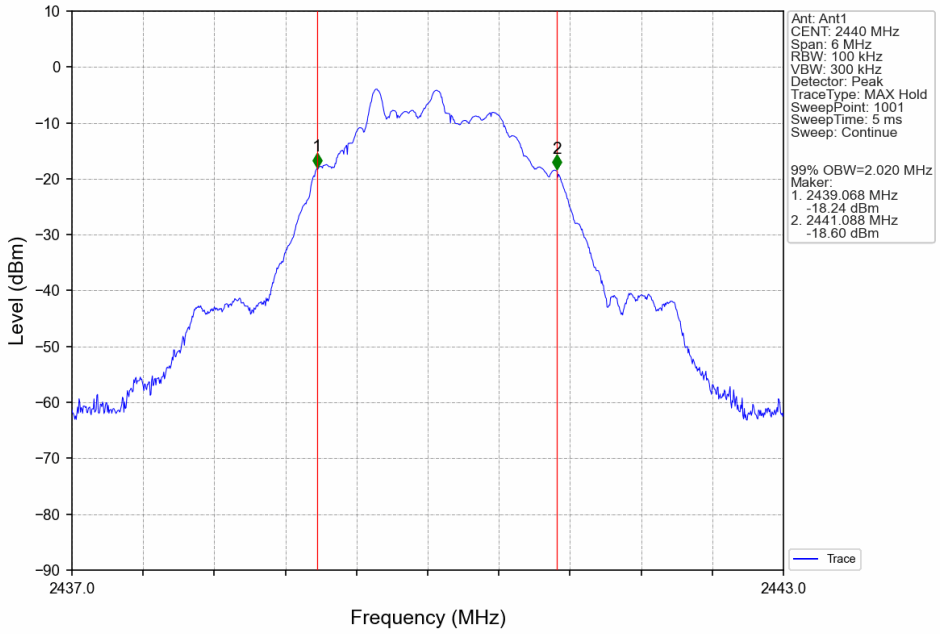
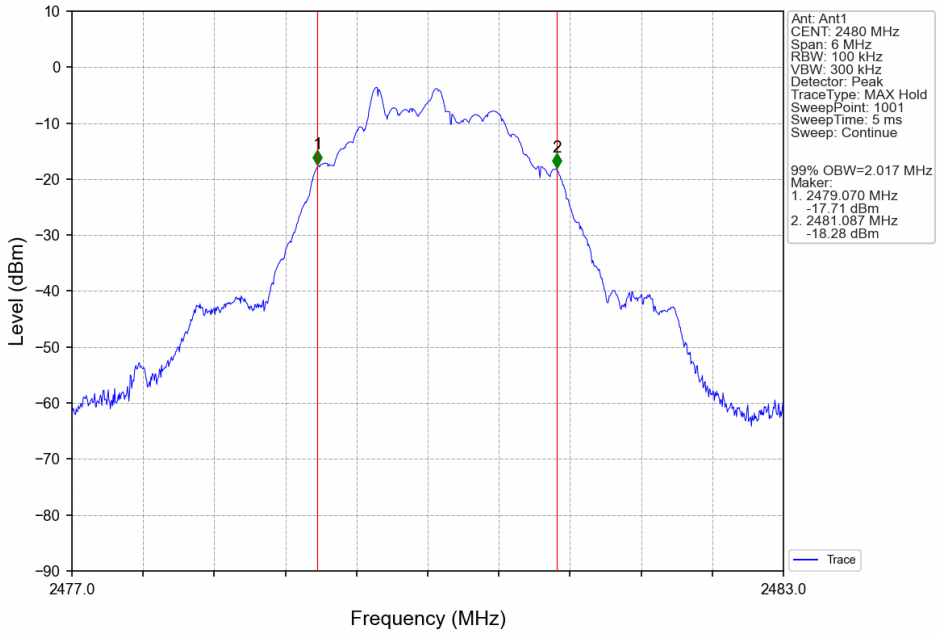
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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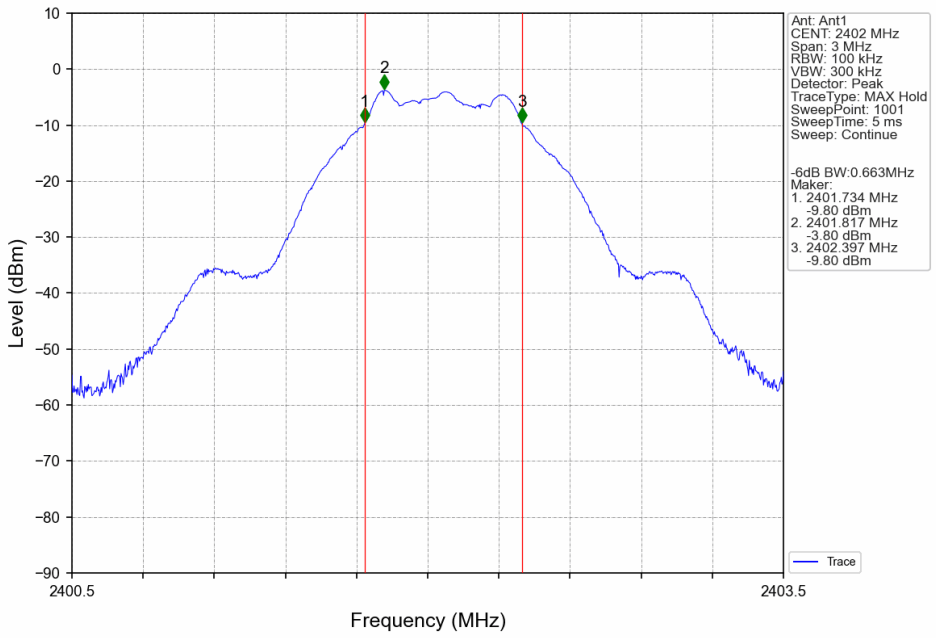
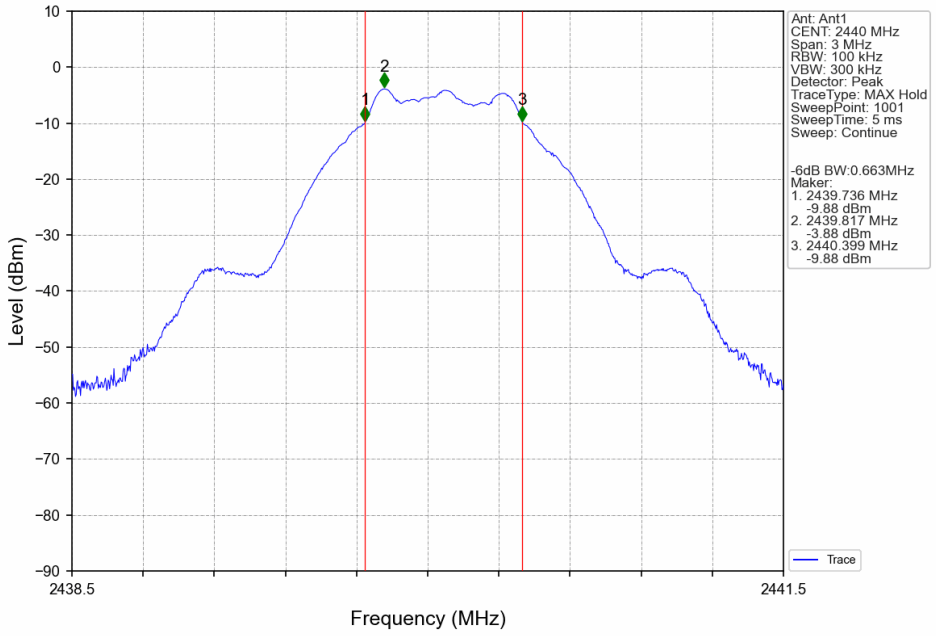
2.2.2 6dB BW

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



1M_HCH_2480MHz_Ant1_NTNV

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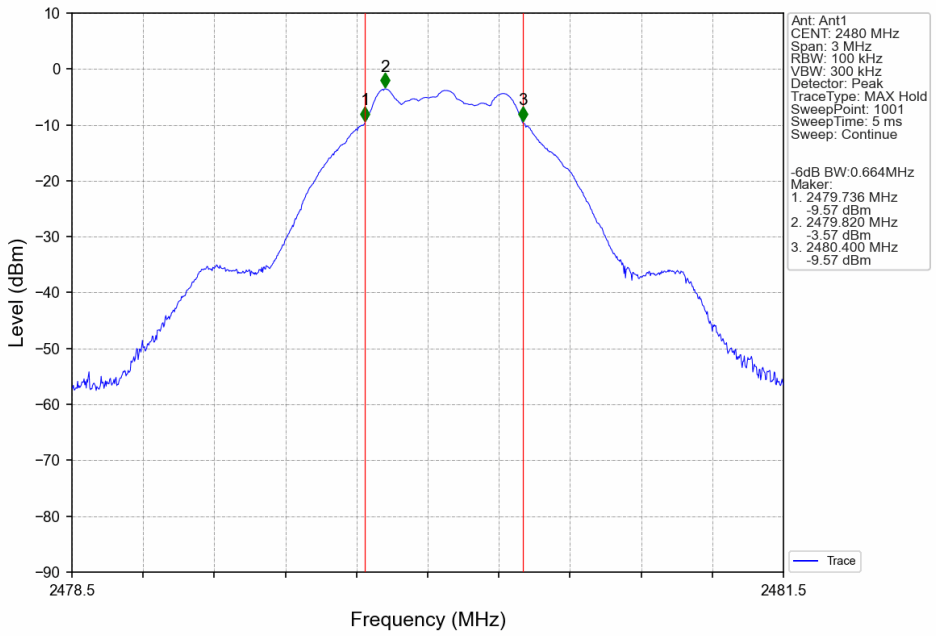
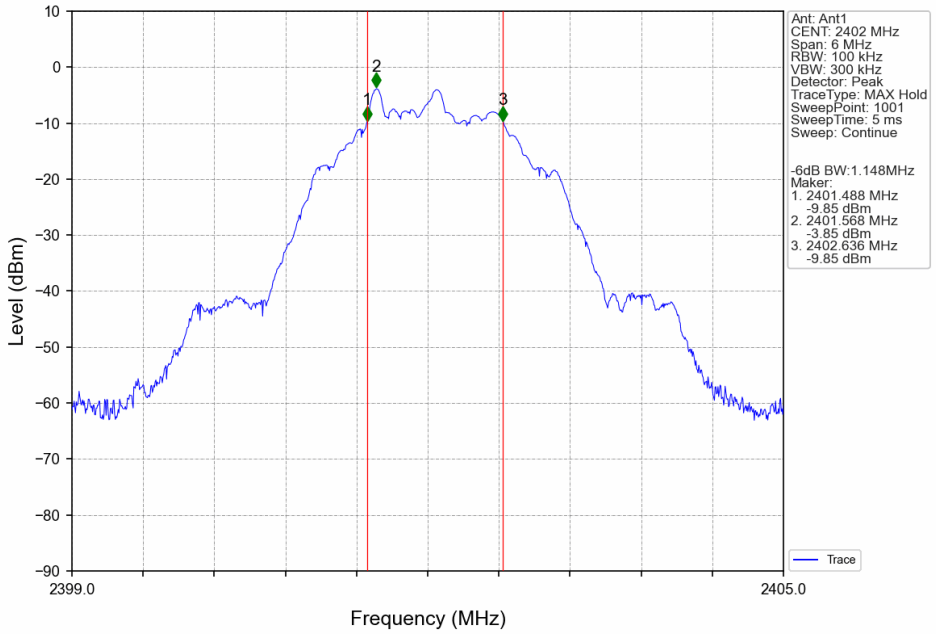


2M_LCH_2402MHz_Ant1_NTNV



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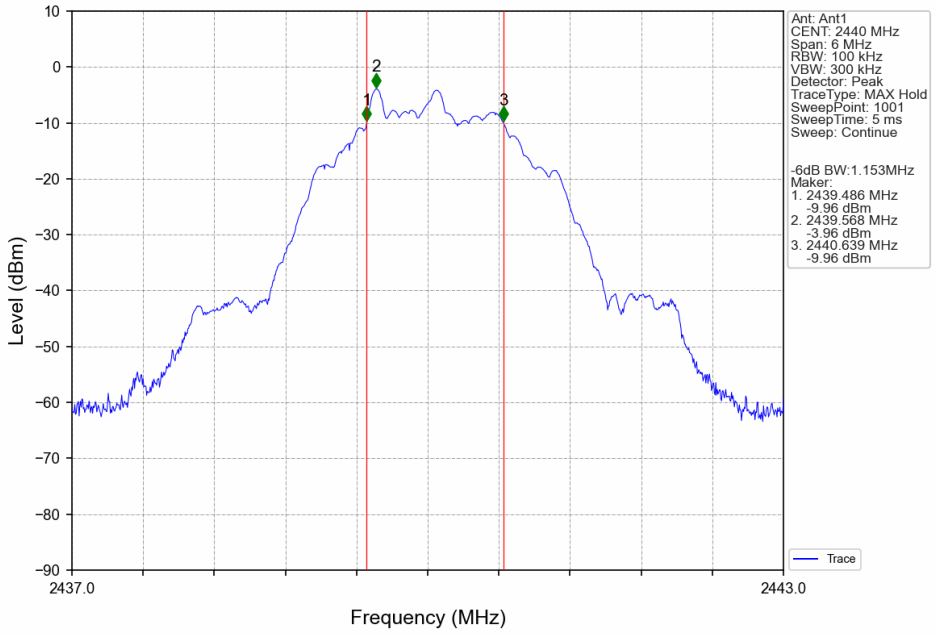
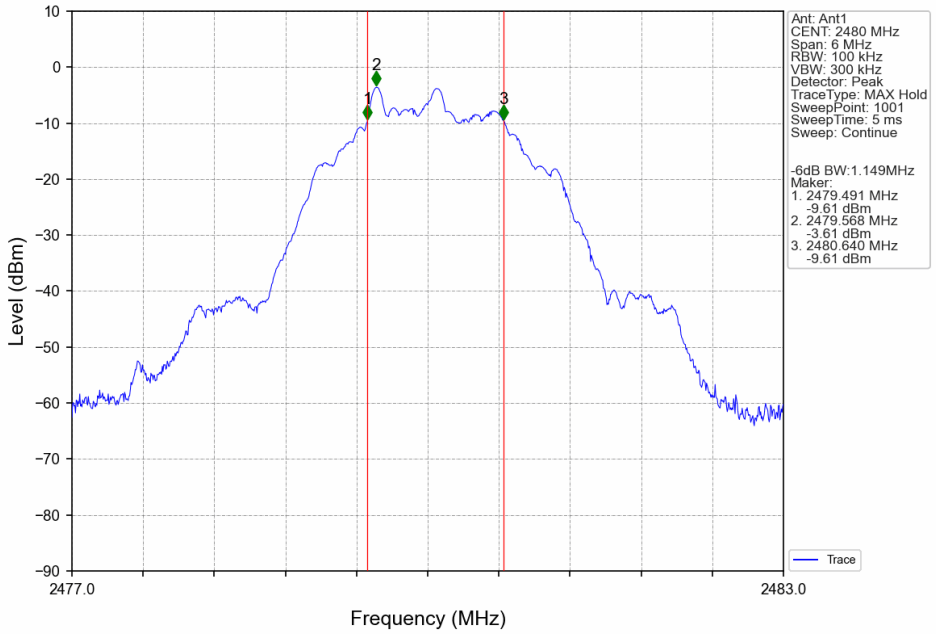
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	-3.96	<=30	Pass
		2440	-4.05	<=30	Pass
		2480	-3.76	<=30	Pass
2M	SISO	2402	-3.81	<=30	Pass
		2440	-3.93	<=30	Pass
		2480	-3.53	<=30	Pass
Note1: Antenna Gain: Ant1: -3.43dBi;					

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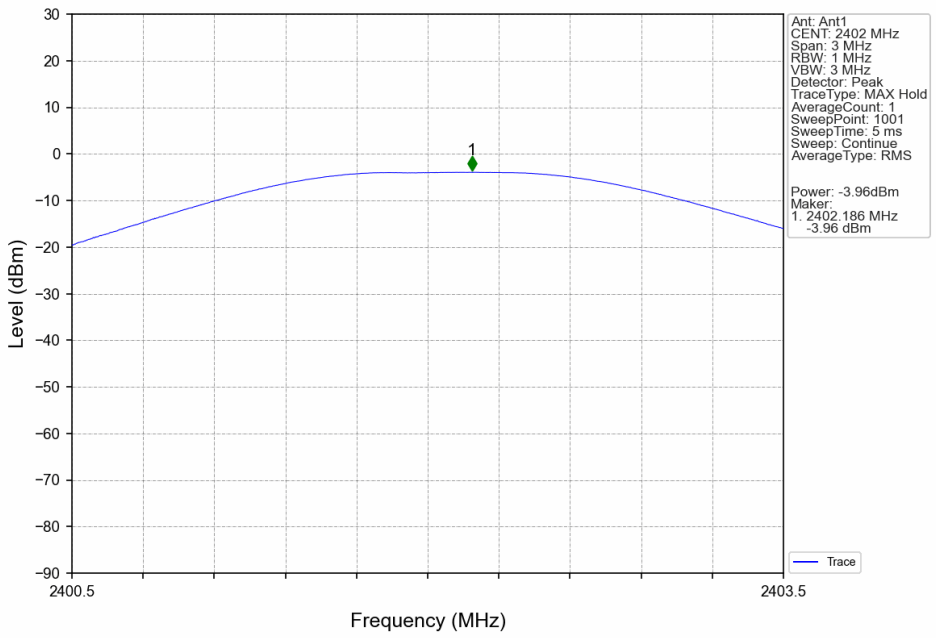
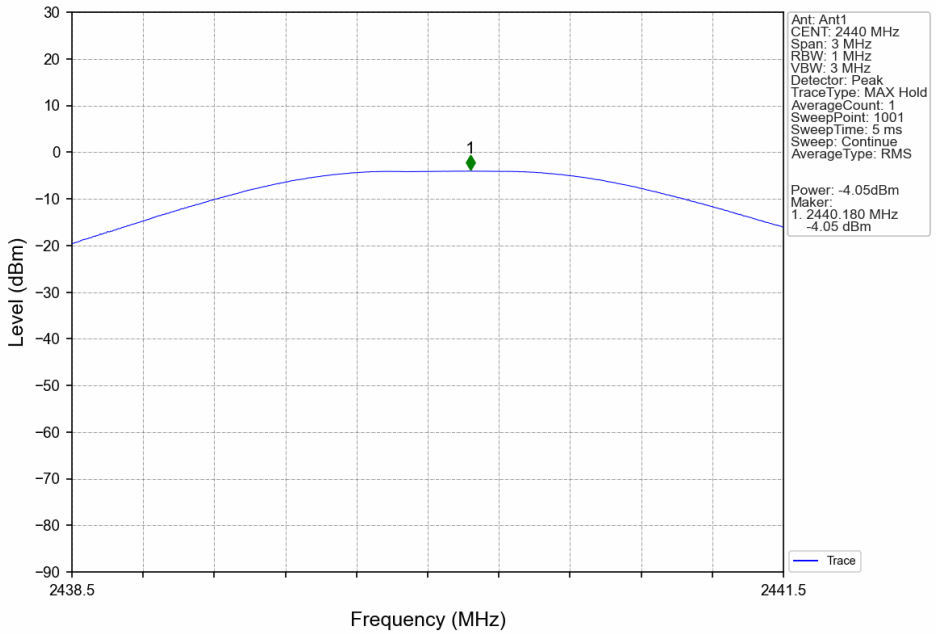
3.2 Test Graph

3.2.1 Power

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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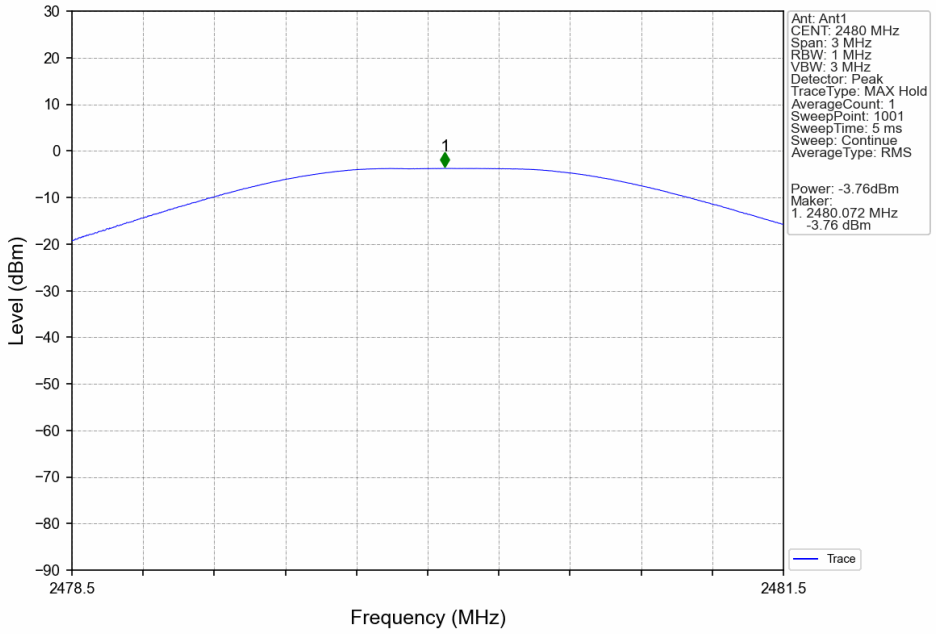
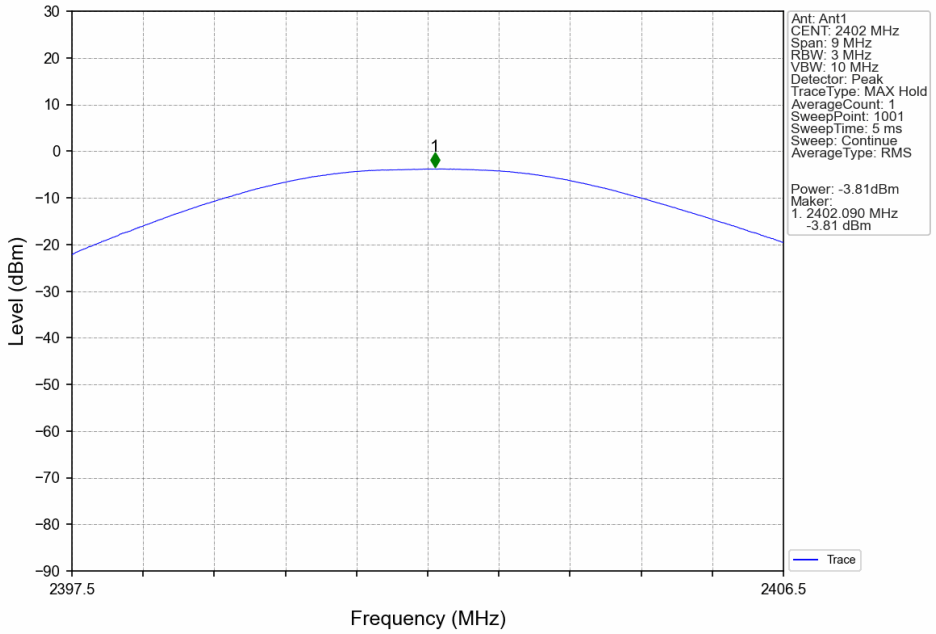
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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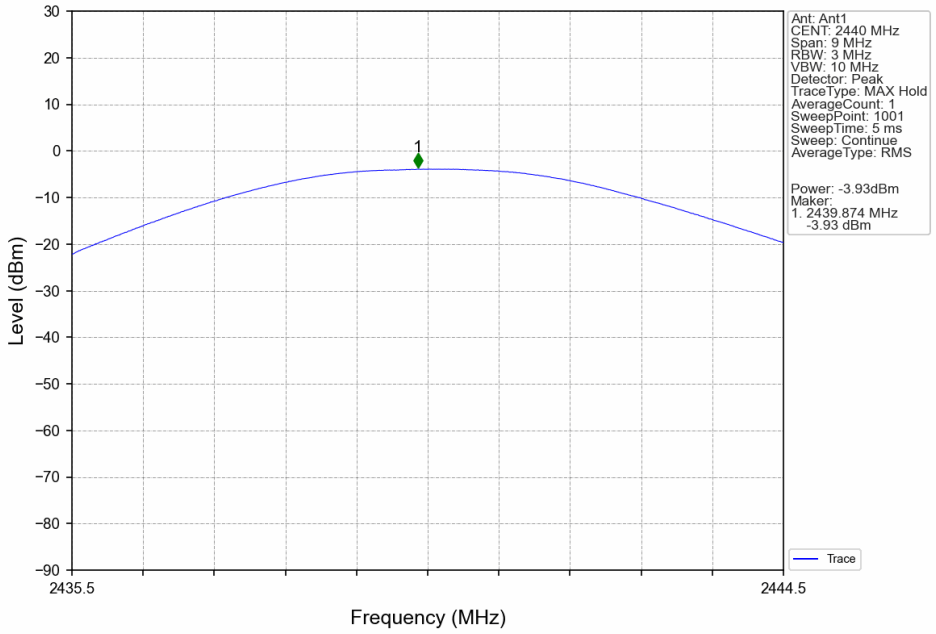
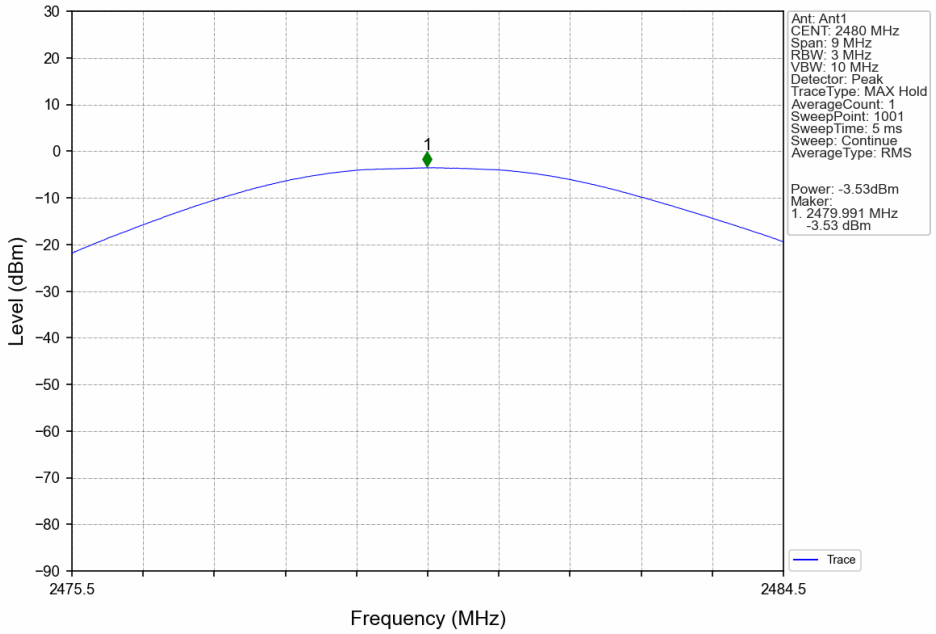
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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4. Maximum Power Spectral Density

4.1 Test Result

4.1.1 PSD

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-19.30	<=8	Pass
		2440	-19.47	<=8	Pass
		2480	-19.15	<=8	Pass
2M	SISO	2402	-22.41	<=8	Pass
		2440	-22.39	<=8	Pass
		2480	-22.30	<=8	Pass
Note1: Antenna Gain: Ant1: -3.43dBi;					

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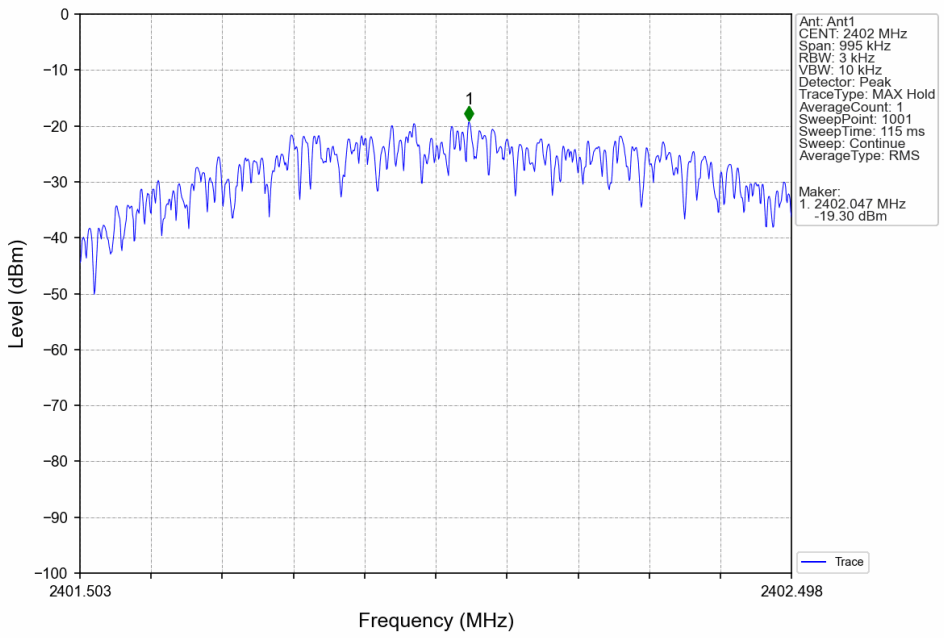
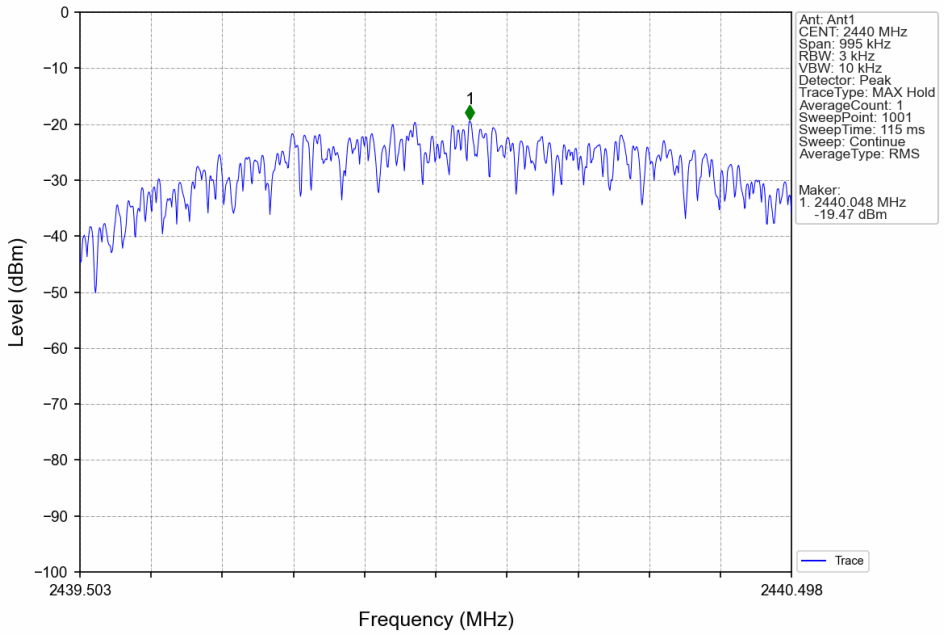
4.2 Test Graph

4.2.1 PSD

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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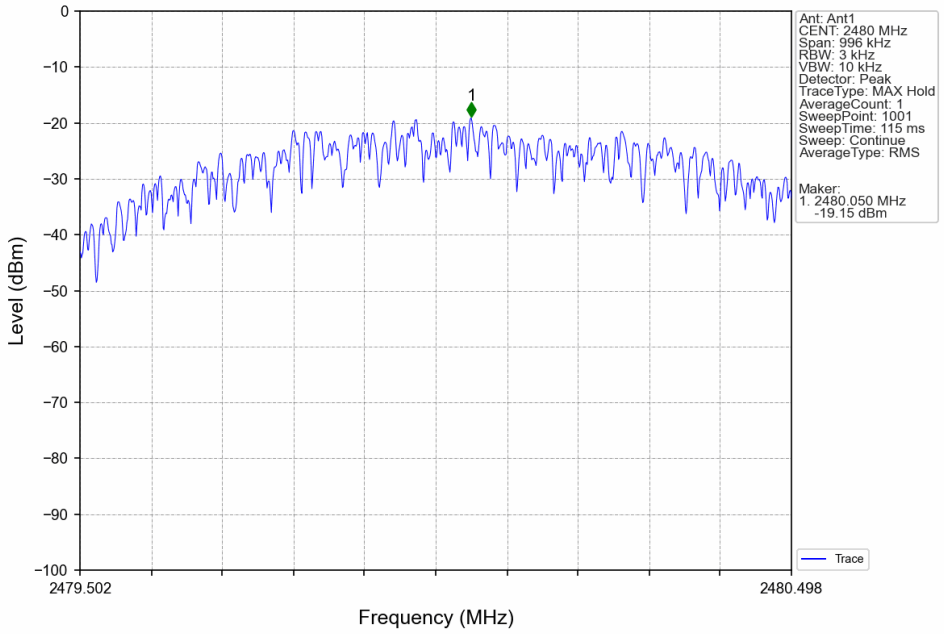
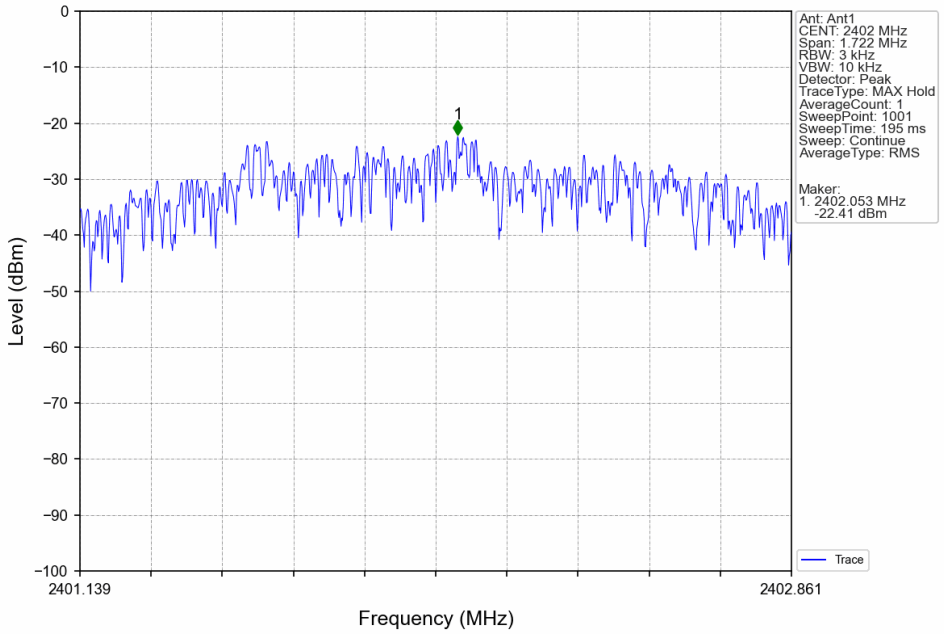
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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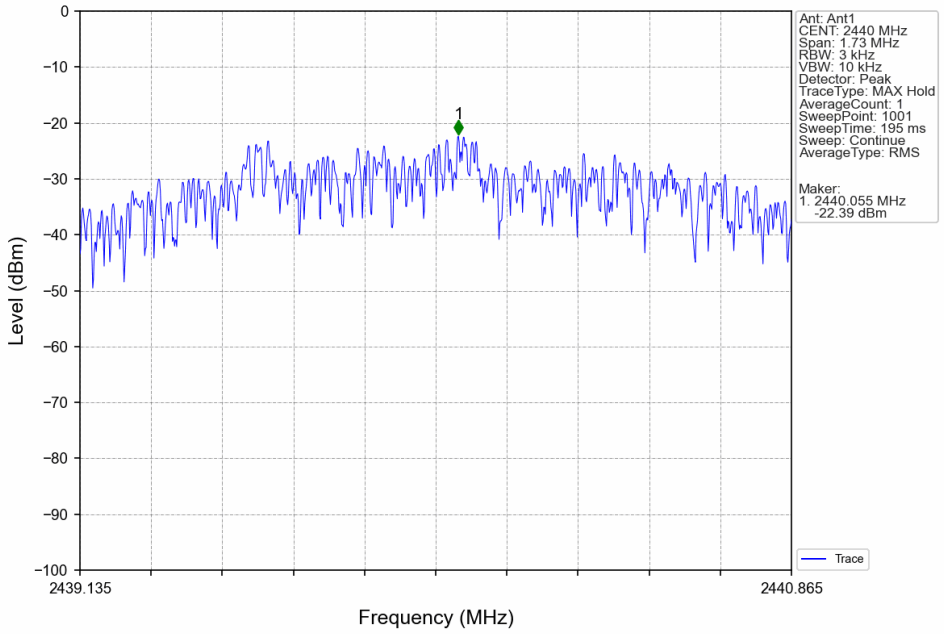
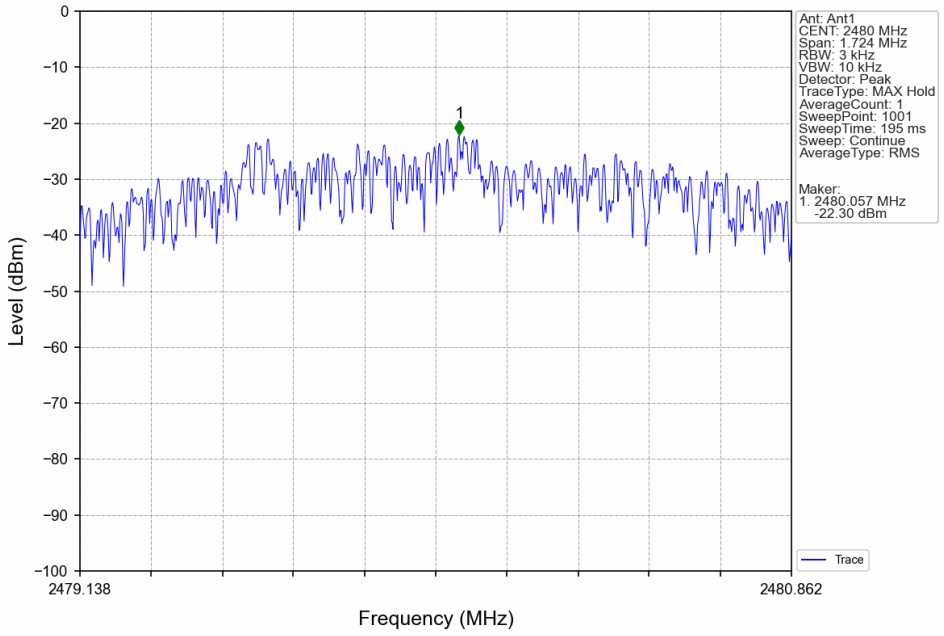
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	-3.79
		2440	1	-3.89
		2480	1	-3.55
2M	SISO	2402	1	-3.84
		2440	1	-3.96
		2480	1	-3.61
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.				

5.1.2 CSE

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	-3.55	-23.55	Pass
		2440	1	-3.55	-23.55	Pass
		2480	1	-3.55	-23.55	Pass
2M	SISO	2402	1	-3.61	-23.61	Pass
		2440	1	-3.61	-23.61	Pass
		2480	1	-3.61	-23.61	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.						

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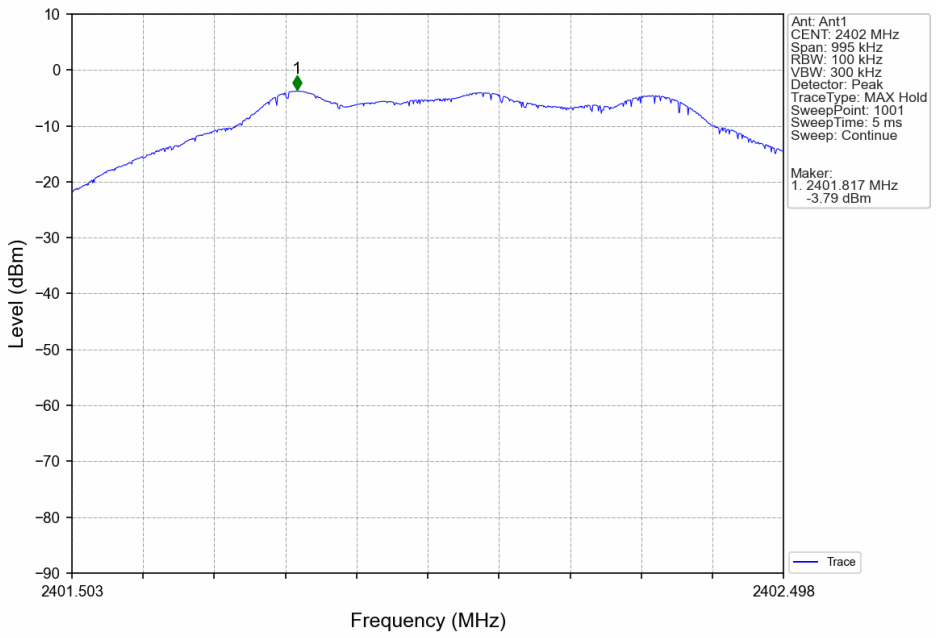
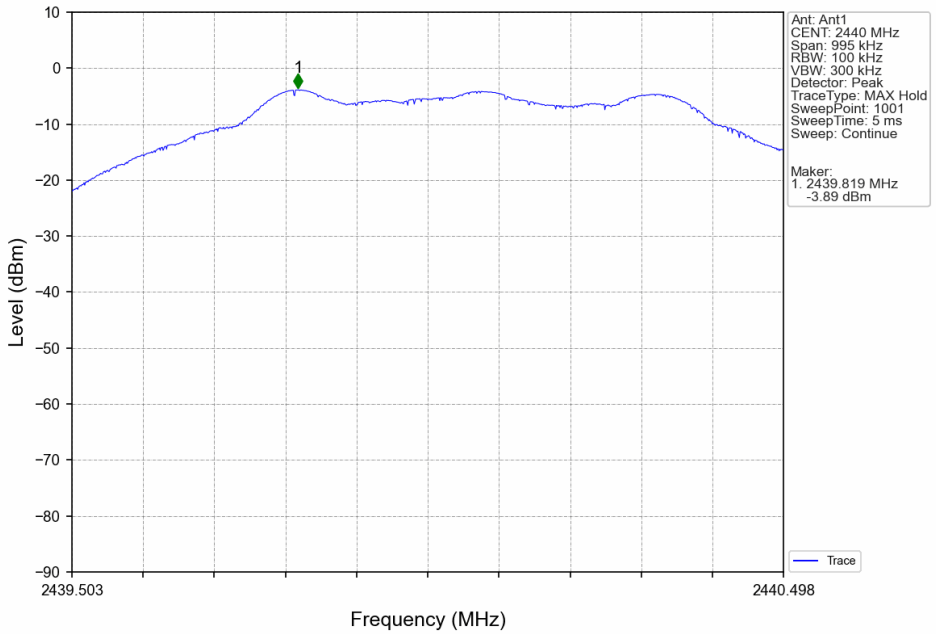
5.2 Test Graph

5.2.1 Ref

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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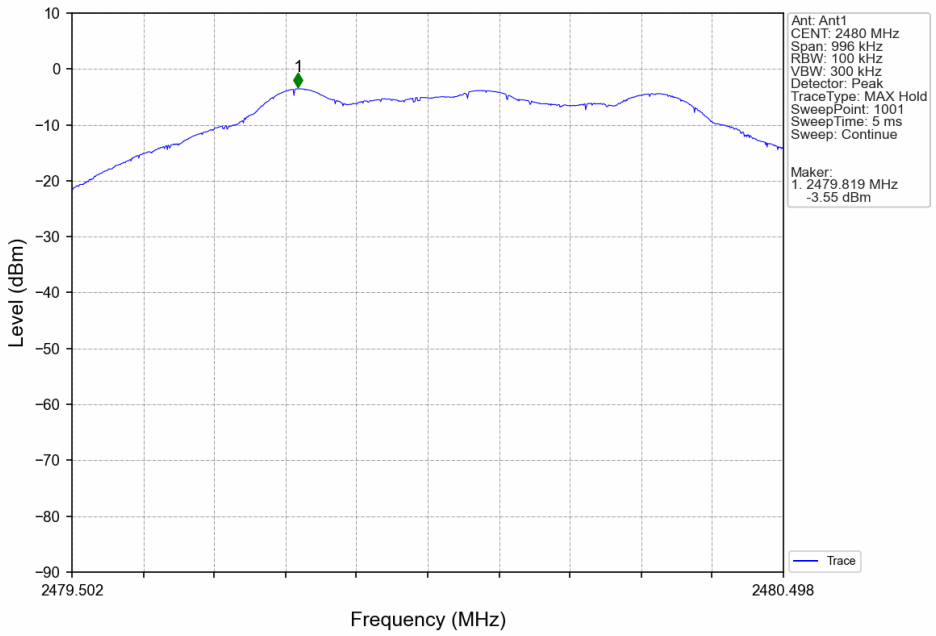
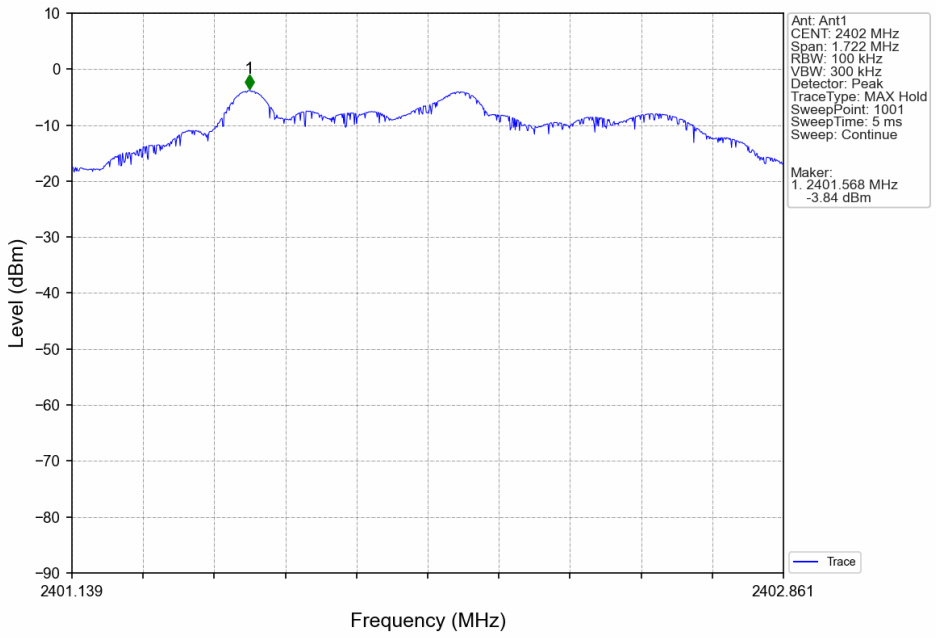
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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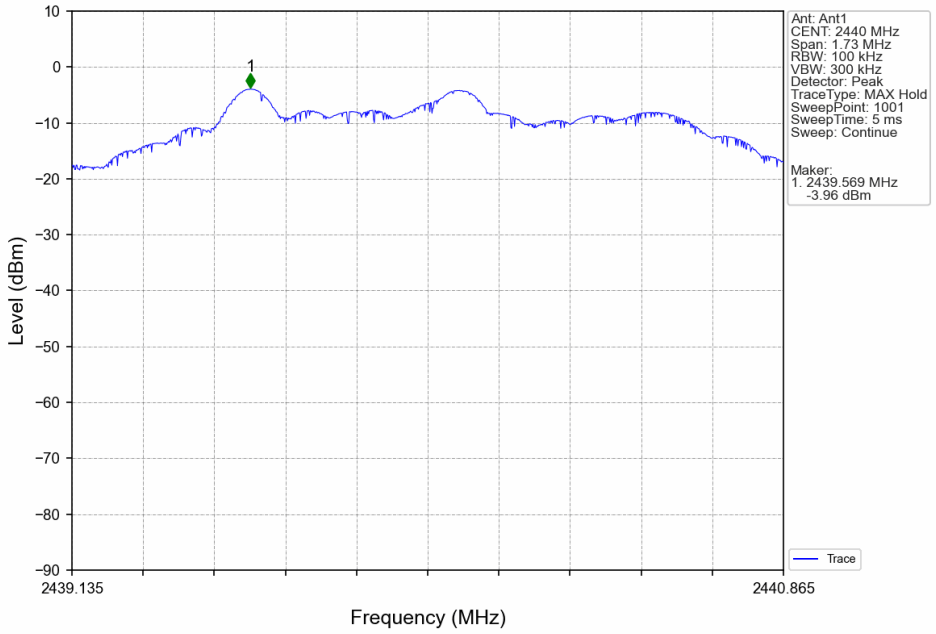
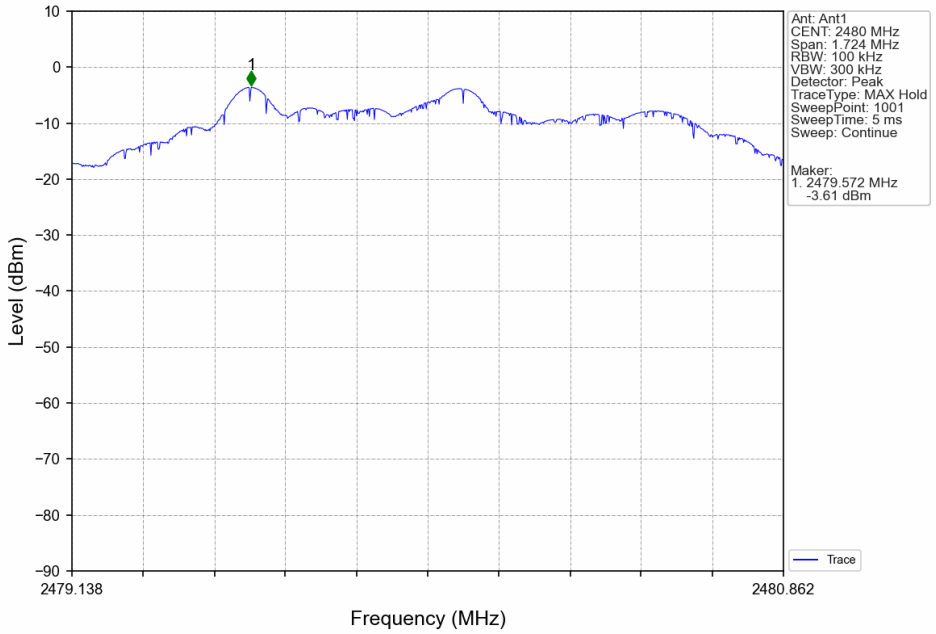
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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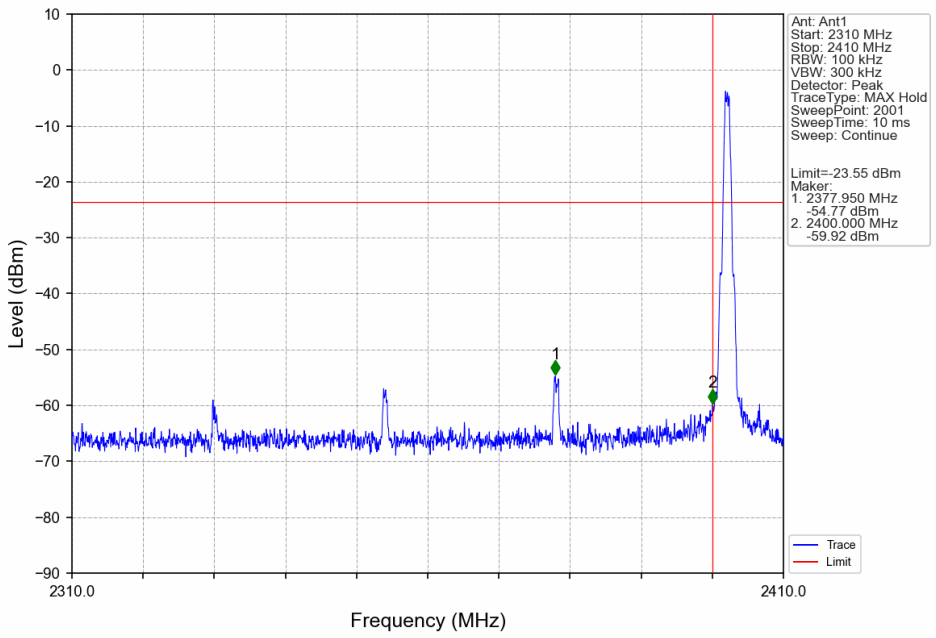
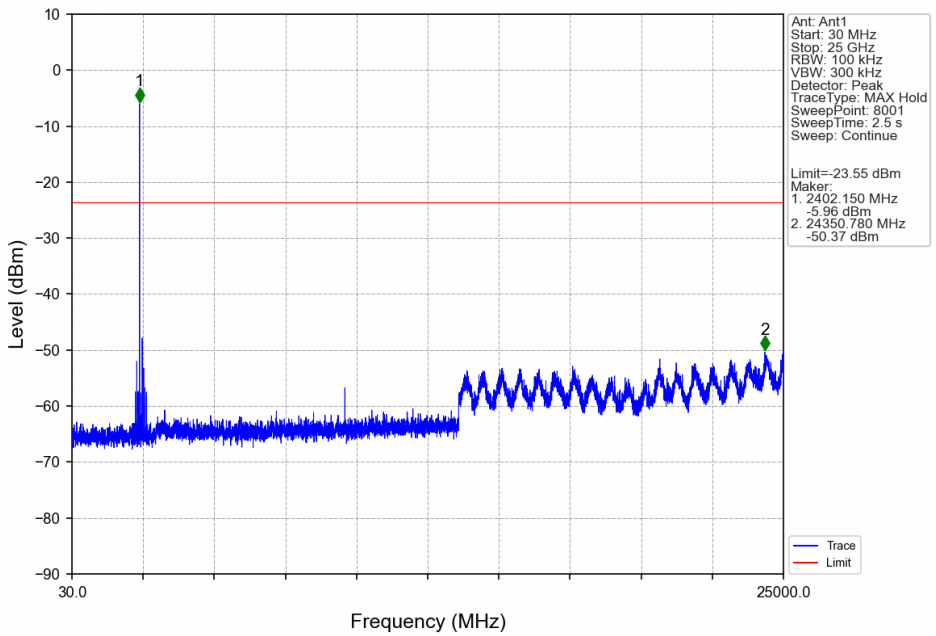
5.2.2 CSE

1M_LCH_2402MHz_Ant1_NTNV



1M_LCH_2402MHz_Ant1_NTNV



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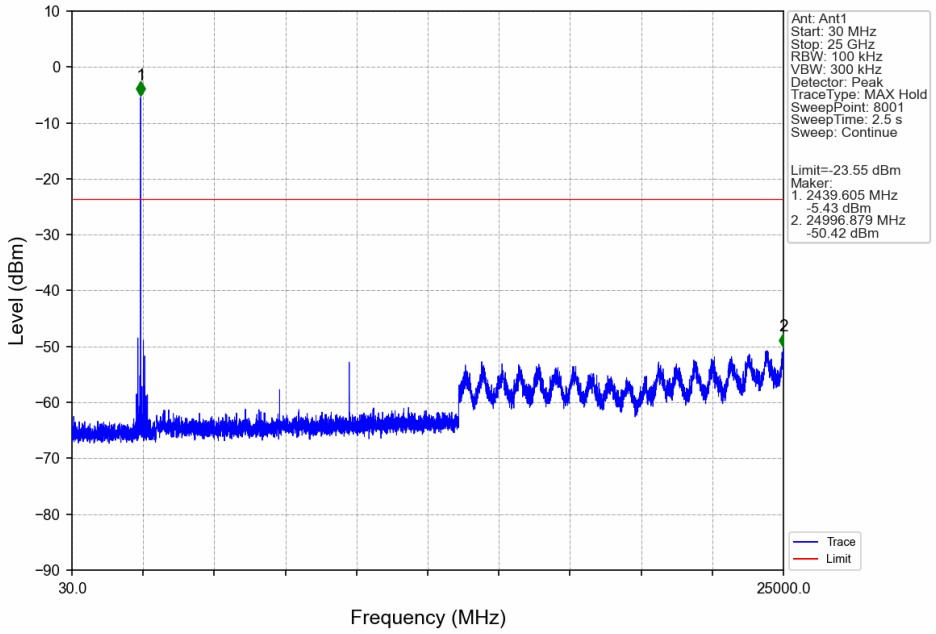
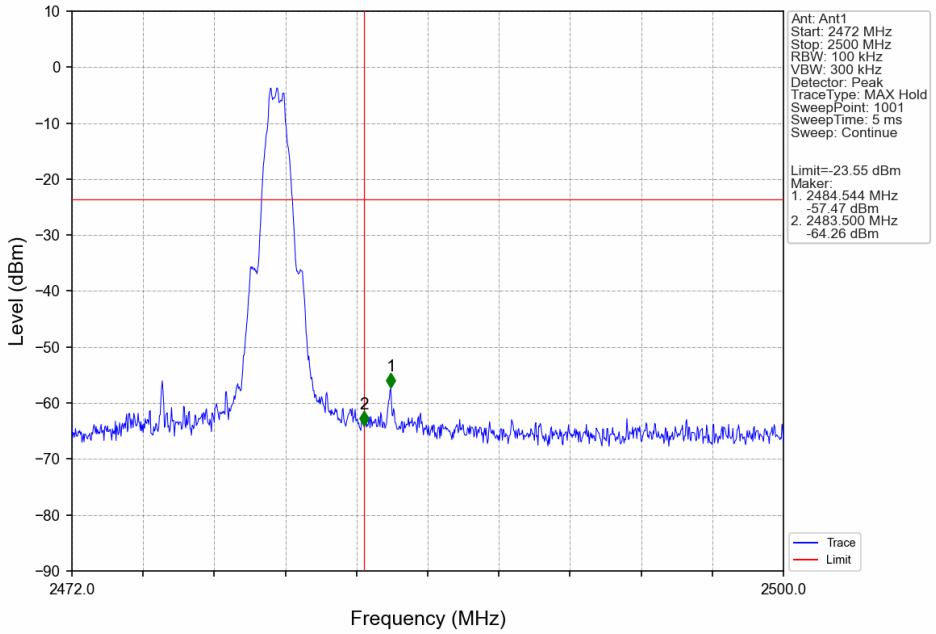
1M_MCH_2440MHz_Ant1_NTNV



1M_HCH_2480MHz_Ant1_NTNV



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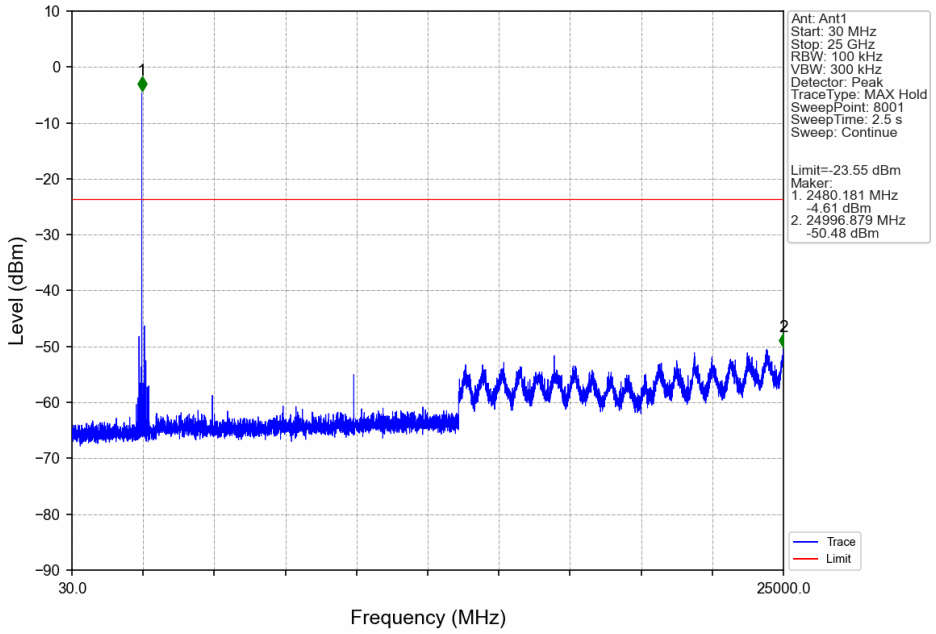
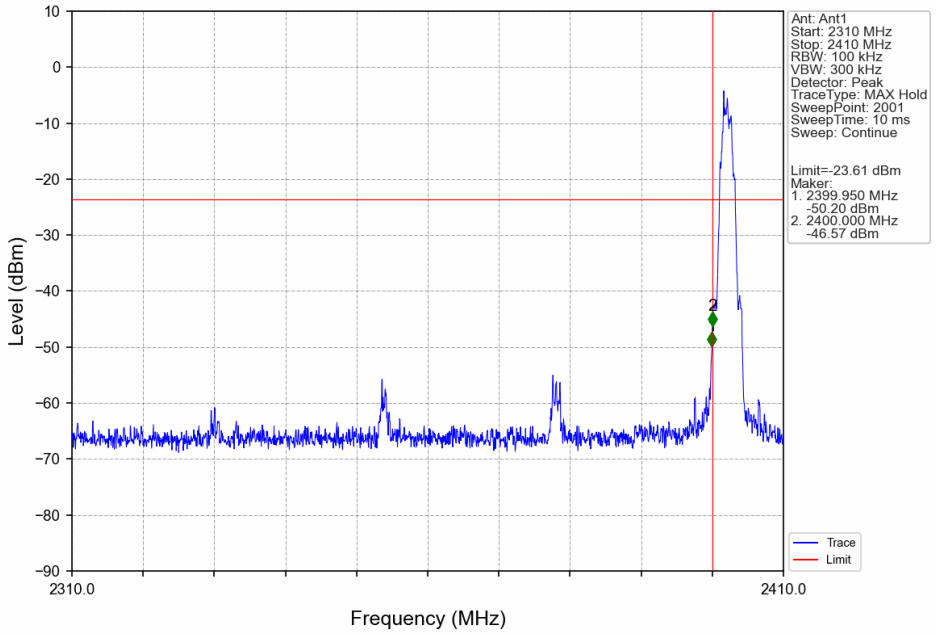
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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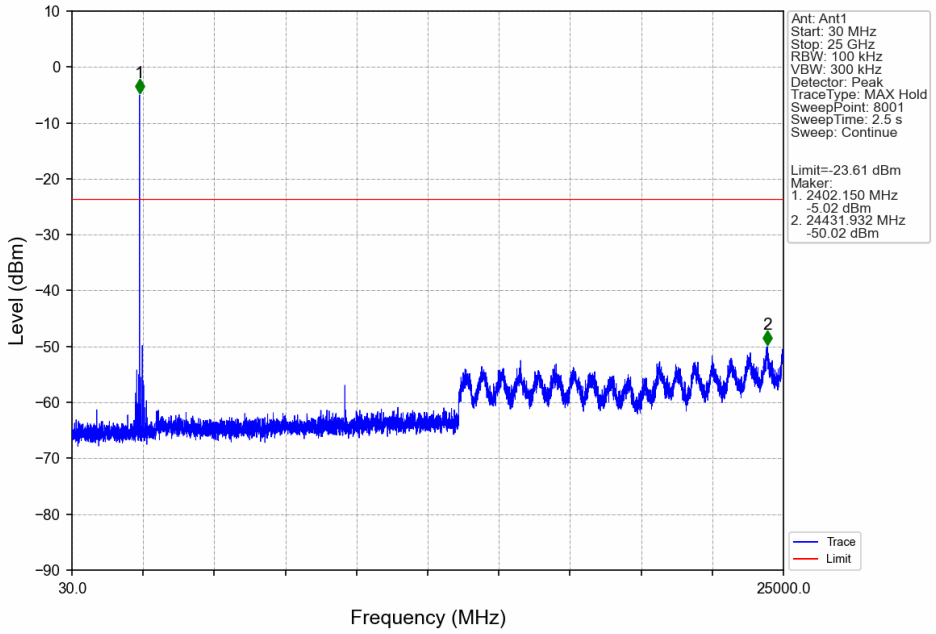
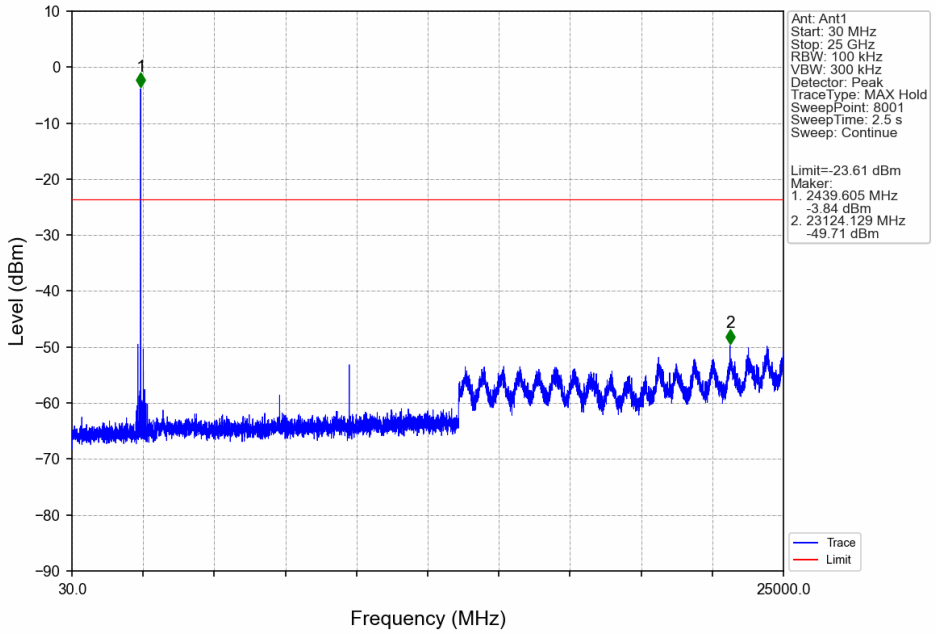
2M_LCH_2402MHz_Ant1_NTNV



2M_MCH_2440MHz_Ant1_NTNV



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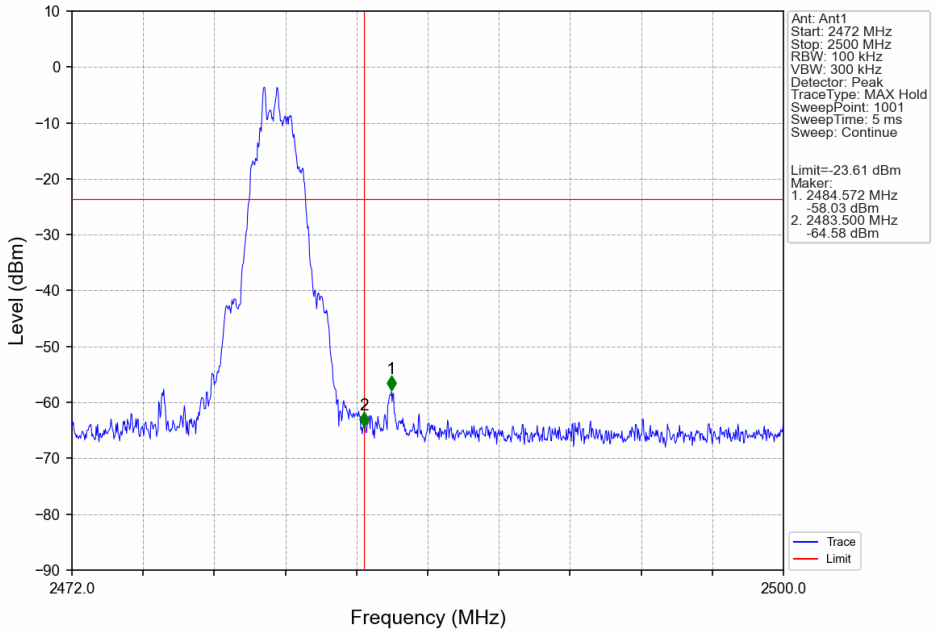
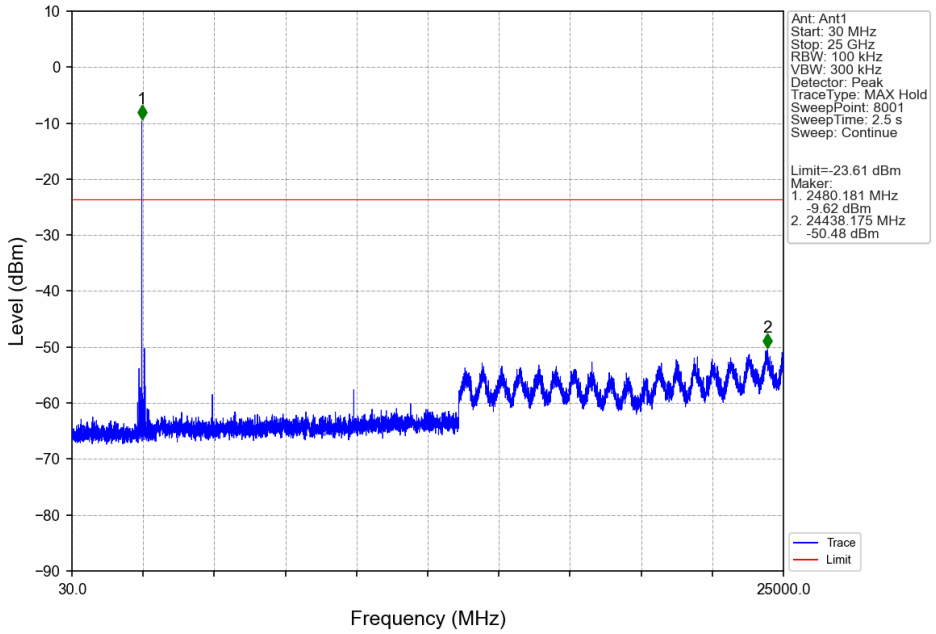
2M_HCH_2480MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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6. Form731

6.1 Test Result

6.1.1 Form731

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2402	2480	0.0004	-3.53

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