TEST REPORT

Application No.:	GZCR2205000600AT
Applicant:	FOCAL_JMlab SAS
Address of Applicant:	ZI Molina La Chazotte-108, rue de l'avenir BP374 42353 LA TALAUDIERE Cedex France.
Manufacturer:	FOCAL_JMlab SAS
Address of Manufacturer:	ZI Molina La Chazotte-108, rue de l'avenir BP374 42353 LA TALAUDIERE Cedex France.
Factory:	Shenzhen Grandsun Electronic Co., Ltd.
Address of Factory:	East Park,Gaoqiao Industry Zone,Pingdi Street,Longgang,Shenzhen
Equipment Under Test (EUT):	
EUT Name:	Noise cancelling Headphones
Model No.:	Bathys, Bathys MG ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark:	Focal
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2022-05-25
Date of Test:	2022-05-10 to 2022-05-30
Date of Issue:	2022-05-30
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2022-05-30*		*Original*

Authorized for issue by				
		Curry Wu/Project Engineer		
		Ricky Liu/Reviewer		

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1.3	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions (Below 1GHz)		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions (Above 1GHz)		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

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.

Declaration of EUT Family Grouping:

Model No.:Bathys, Bathys MG

Only the model Bathys was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on Color, Model name.

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4 General Information

4.1 Details of E.U.T.

Power Supply:	Rechargeable battery DC3.7V 1060mAh,Charged by DC5V
Cable(s):	Type-C USB cable:125cm unshielded
	AUX IN cable:125cm unshielded
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.1 Dual mode
Modulation Type:	GFSK
Channel Spacing:	2MHz
Number of Channels:	40
Data Rate:	Support 1Mb/s and 2Mb/s
Antenna Type:	IPEX
Antenna Gain:	2.25dBi

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

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4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 3%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Emissions which fall in the restricted bands	±5.00dB (30MHz-1GHz; 3m); ± 5.12dB (1GHz-6GHz); ± 5.38dB (6GHz-18GHz); ± 5.61dB (18GHz-40GHz)
Radiated Spurious Emissions (Below 1GHz)	±5.00dB (30MHz-1GHz; 3m)
Radiated Spurious Emissions (Above 1GHz)	± 5.12dB (1GHz-6GHz); ± 5.38dB (6GHz-18GHz); ± 5.61dB (18GHz-40GHz)
Remark: The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

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4.4 Test Location

All tests were performed at:

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No tests were sub-contracted.

4.5 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **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.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **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)**

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

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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

Conducted Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Power Meter (U2021XA_Ch2)	Agilent Technologies	U2021XA_Ch2	SEM009-02	2021-05-19	2022-05-18
				2022-05-16	2022-05-15
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-03-29	2024-03-28
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Minimum 6dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-03-29	2024-03-28
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Power Spectrum Density					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-03-29	2024-03-28
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Conducted Band Edges Measurement					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-03-29	2024-03-28
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Conducted Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2022-03-29	2024-03-28
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01

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Test Software	TST	V2.0	GZE100-78	N/A	N/A

Radiated Emissions which fall in the restricted bands					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver(20Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2021-11-01	2022-10-31
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2021-07-29	2022-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29

Radiated Spurious Emissions (Below 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver(10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Trilog Broadband Antenna(25MHz-1GHz)-Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-08-08	2022-08-07
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
				2022-05-16	2023-05-15
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-12-17	2022-12-16
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05

Radiated Spurious Emissions (Above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver(20Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2021-11-01	2022-10-31
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2021-07-29	2022-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05

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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

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of 15.211, 15.213, 15.217, 15.219, 15.221, or 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.25dBi.

Antenna location: Refer to internal photo.

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7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method: ANSI C63.10 (2013) Section 11.9.1.3
Limit:

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

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 51.5 % RH Atmospheric Pressure: 1015 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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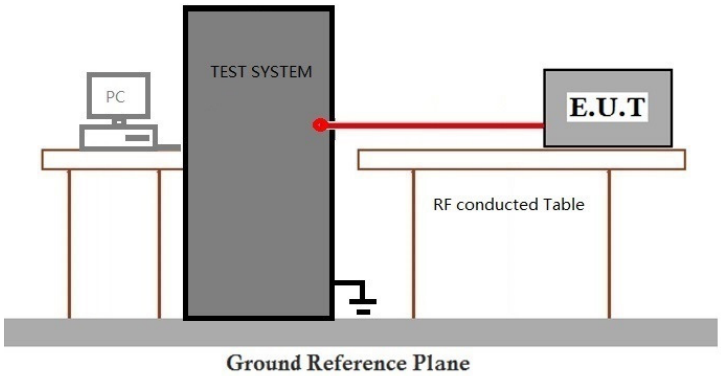
7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

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7.2 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit:

≥500 kHz

7.2.1 E.U.T. Operation

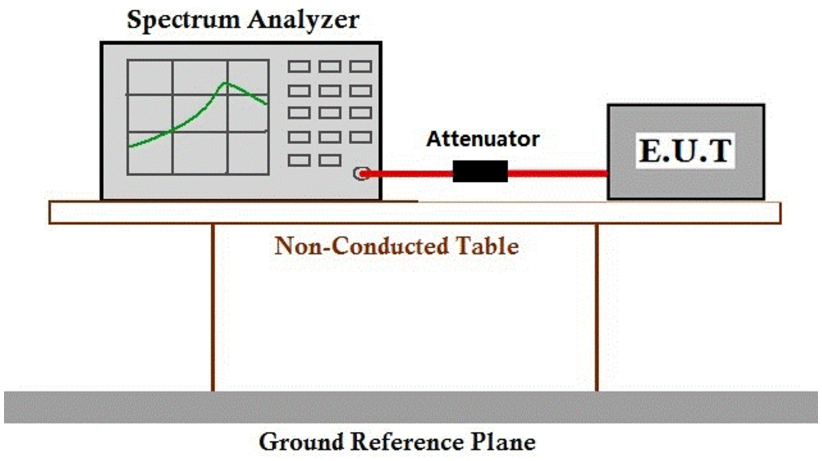
Operating Environment:

Temperature: 23.5 °C Humidity: 51.5 % RH Atmospheric Pressure: 1015 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

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7.3 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)
Test Method: ANSI C63.10 (2013) Section 11.10.2
Limit:
≤8dBm in any 3 kHz band during any time interval of continuous transmission

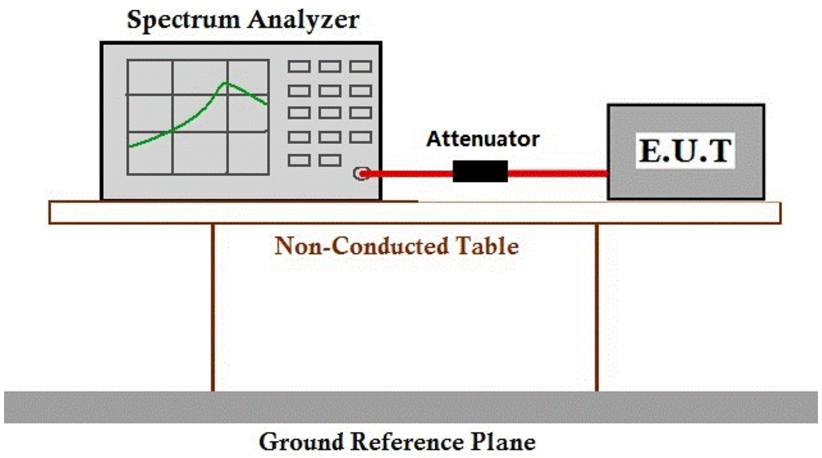
7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 23.5 °C Humidity: 51.5 % RH Atmospheric Pressure: 1015 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

cable loss=0.9dB

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7.4 Conducted Band Edges Measurement

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

Test Method: ANSI C63.10 (2013) Section 11.13.3.2

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).

7.4.1 E.U.T. Operation

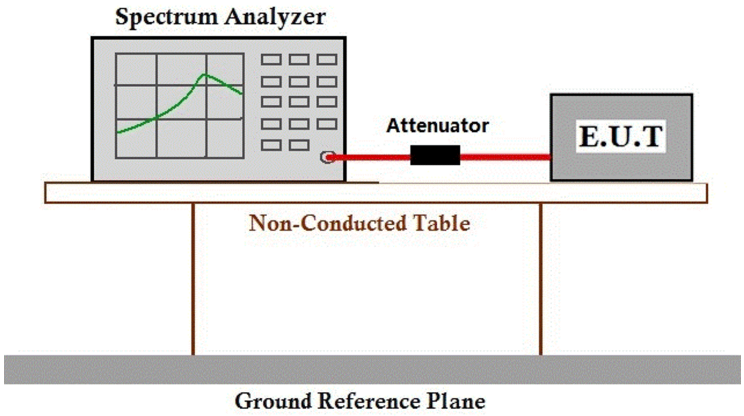
Operating Environment:

Temperature: 23.5 °C Humidity: 51.5 % RH Atmospheric Pressure: 1015 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

cable loss=0.9dB

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7.5 Conducted Spurious Emissions

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

Test Method: ANSI C63.10 (2013) Section 11.11

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).

7.5.1 E.U.T. Operation

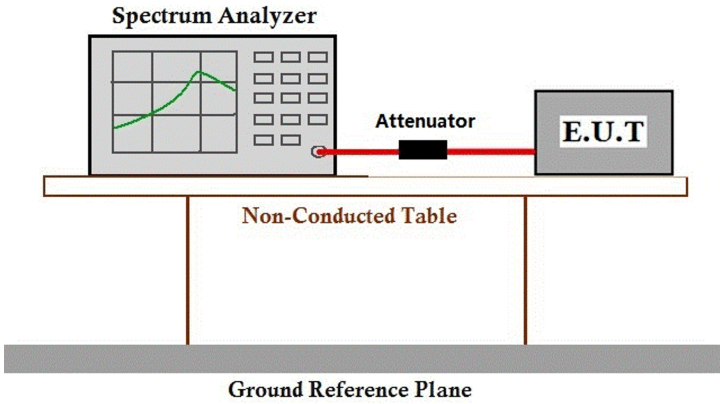
Operating Environment:

Temperature: 23.5 °C Humidity: 51.5 % RH Atmospheric Pressure: 1015 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

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7.6 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 24.8 °C Humidity: 52.6 % RH Atmospheric Pressure: 1015 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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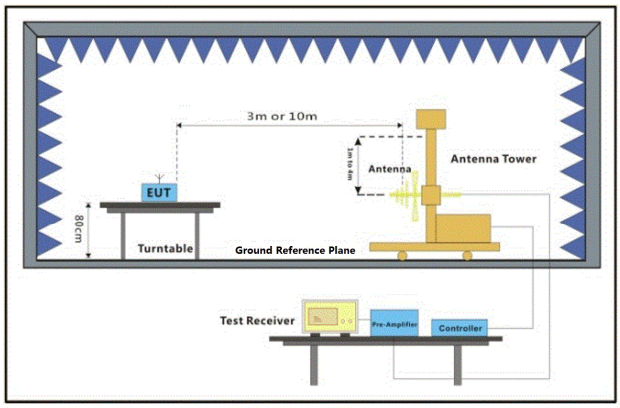
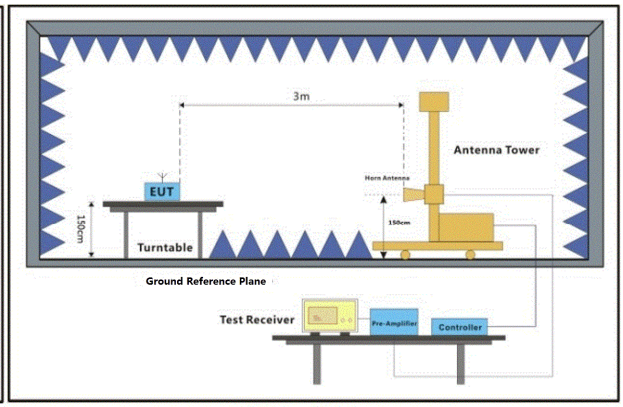
7.6.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz

7.6.4 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.

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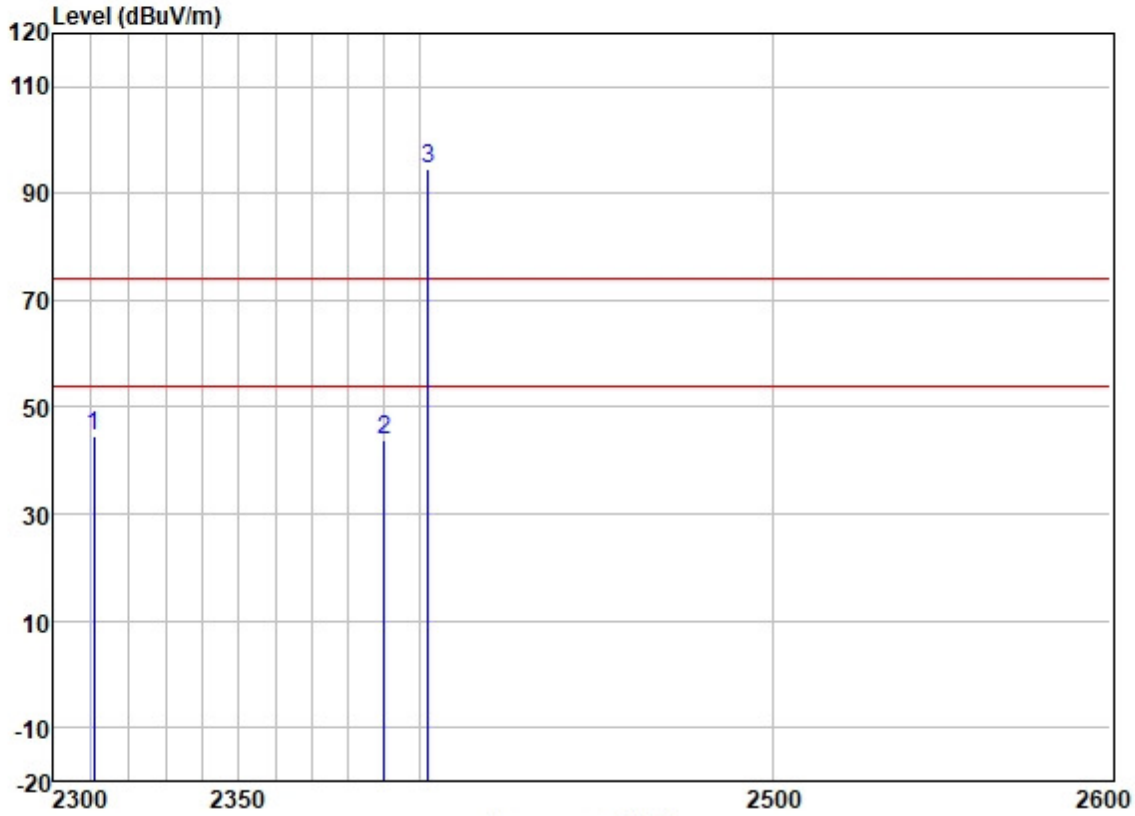
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1		2310.881	51.86	27.15	3.32	37.62	44.71	74.00	-29.29	HORIZONTAL	Peak
2		2390.000	50.64	27.33	3.48	37.59	43.86	74.00	-30.14	HORIZONTAL	Peak
3	*	2402.000	101.50	27.35	3.50	37.59	94.76	74.00	20.76	HORIZONTAL	Peak

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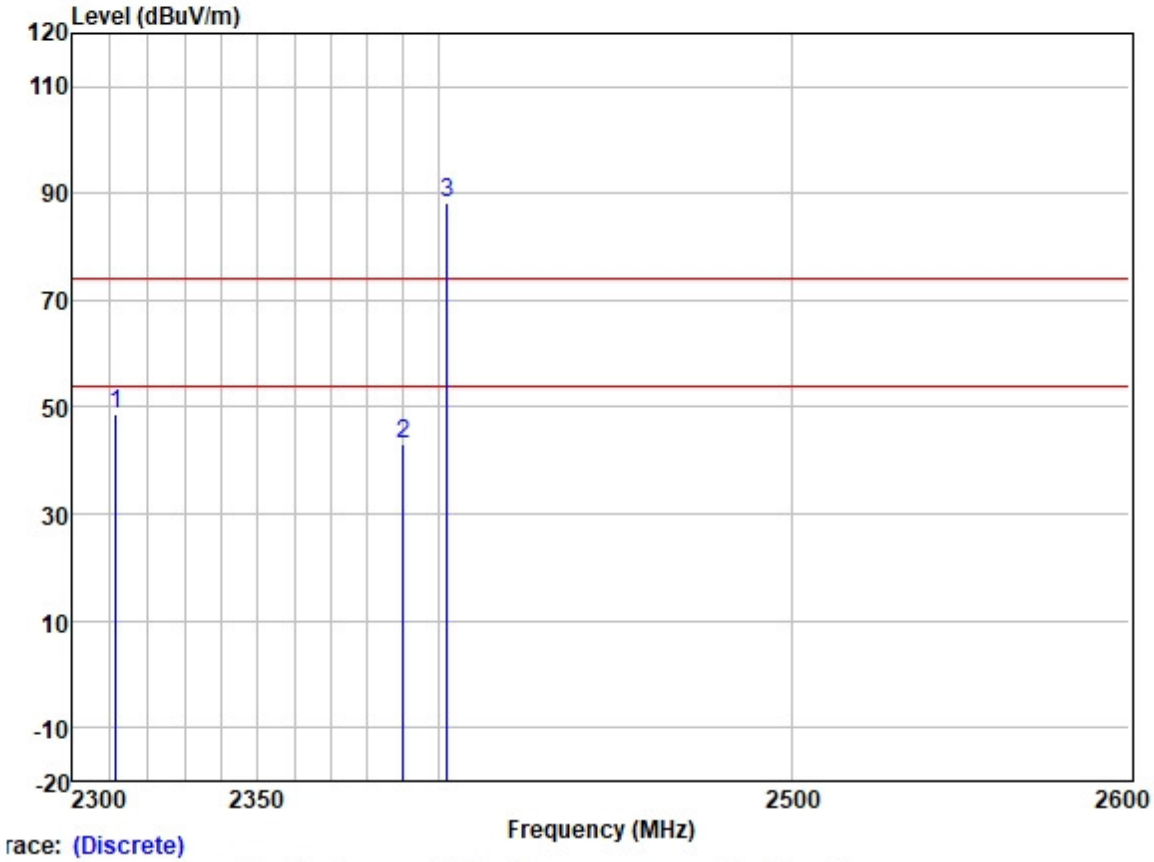
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1		2311.469	55.89	27.15	3.32	37.62	48.74	74.00	-25.26	VERTICAL	Peak
2		2390.000	49.75	27.33	3.48	37.59	42.97	74.00	-31.03	VERTICAL	Peak
3	*	2402.000	95.10	27.35	3.50	37.59	88.36	74.00	14.36	VERTICAL	Peak

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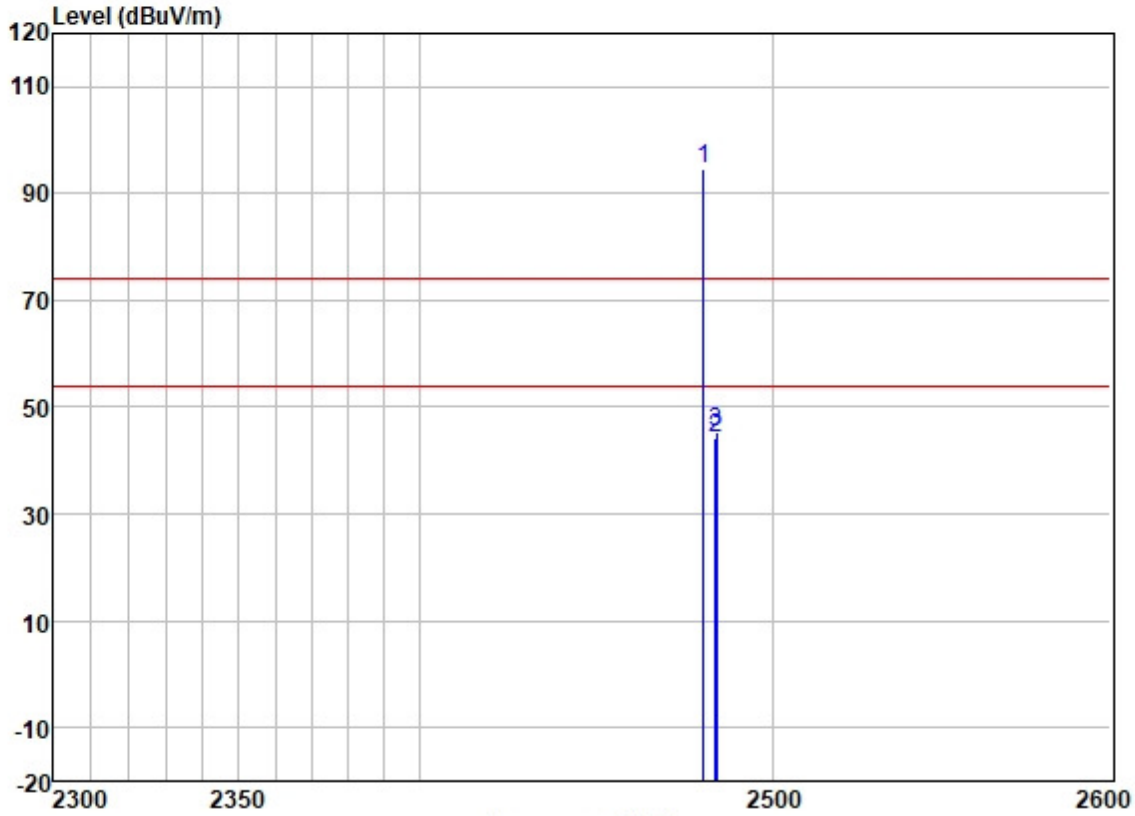
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 *	2480.000	101.24	27.47	3.60	37.57	94.74	74.00	20.74	HORIZONTAL	Peak
2	2483.500	50.70	27.48	3.53	37.57	44.14	74.00	-29.86	HORIZONTAL	Peak
3	2483.871	51.99	27.48	3.53	37.57	45.43	74.00	-28.57	HORIZONTAL	Peak

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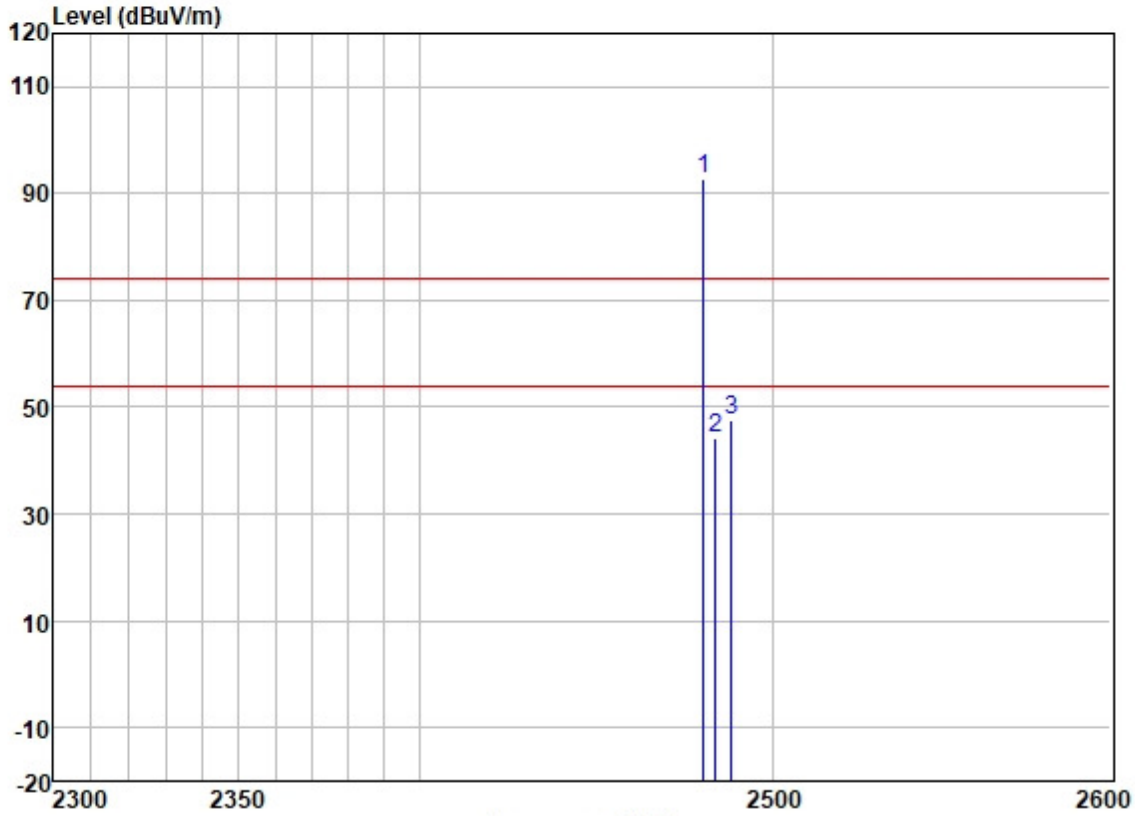
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:High



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	*	2480.000	99.39	27.47	3.60	37.57	92.89	74.00	18.89	VERTICAL	Peak
2		2483.500	50.86	27.48	3.53	37.57	44.30	74.00	-29.70	VERTICAL	Peak
3		2488.069	54.27	27.48	3.53	37.56	47.72	74.00	-26.28	VERTICAL	Peak

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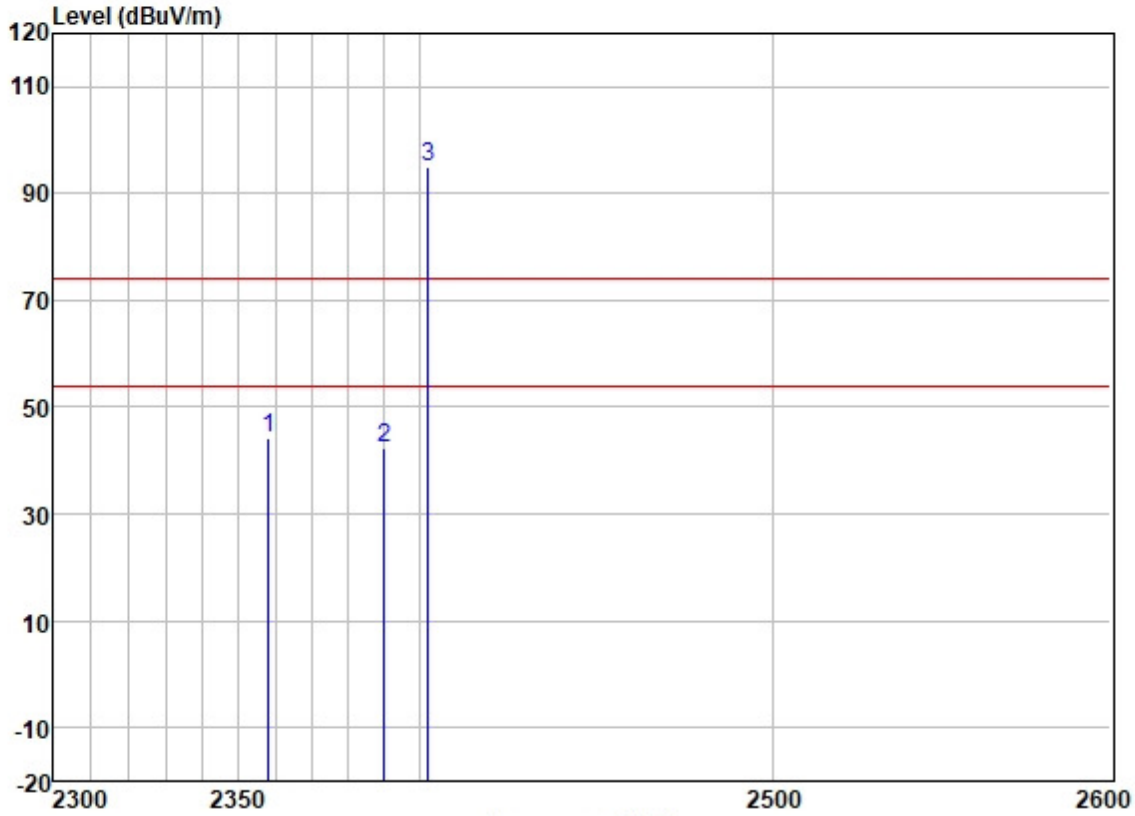
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1		2357.971	51.01	27.27	3.42	37.61	44.09	74.00	-29.91	HORIZONTAL	Peak
2		2390.000	49.17	27.33	3.48	37.59	42.39	74.00	-31.61	HORIZONTAL	Peak
3	*	2402.000	101.72	27.35	3.50	37.59	94.98	74.00	20.98	HORIZONTAL	Peak

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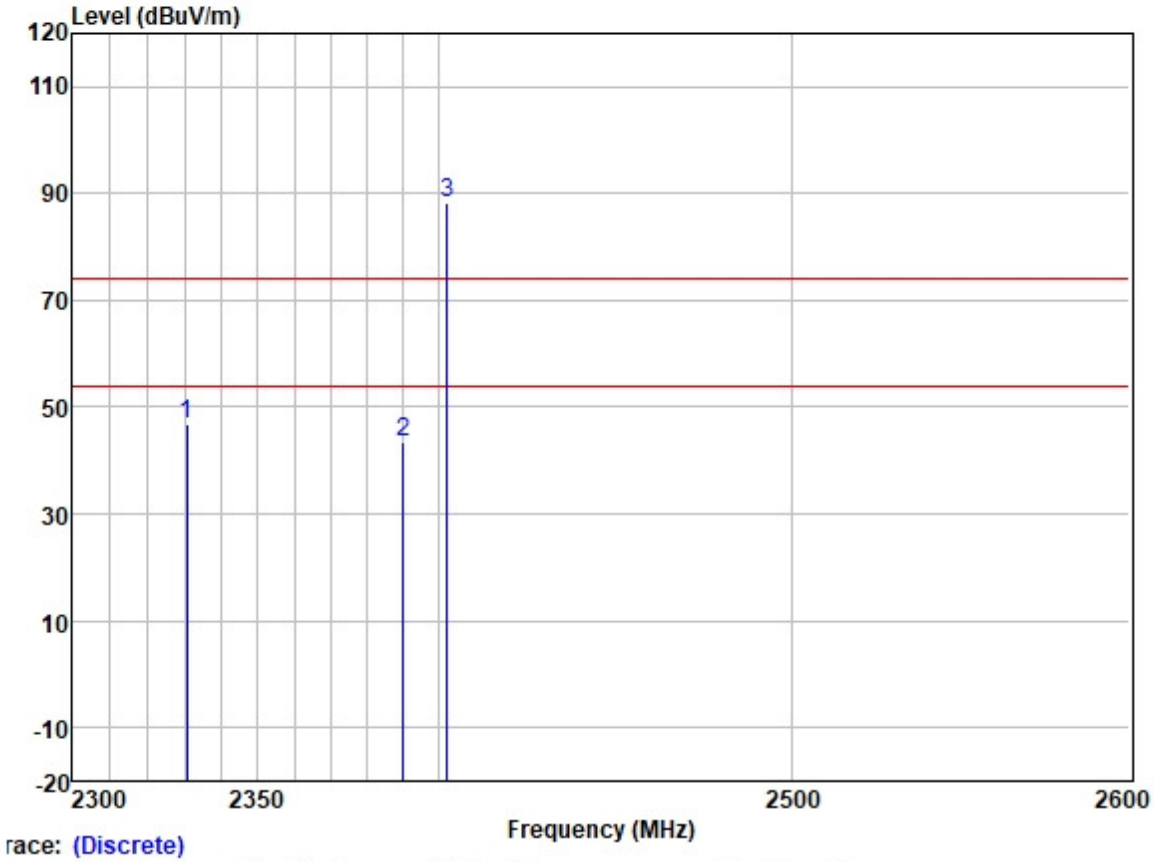
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1		2330.749	53.83	27.20	3.36	37.62	46.77	74.00	-27.23	VERTICAL	Peak
2		2390.000	50.09	27.33	3.48	37.59	43.31	74.00	-30.69	VERTICAL	Peak
3	*	2402.000	94.95	27.35	3.50	37.59	88.21	74.00	14.21	VERTICAL	Peak

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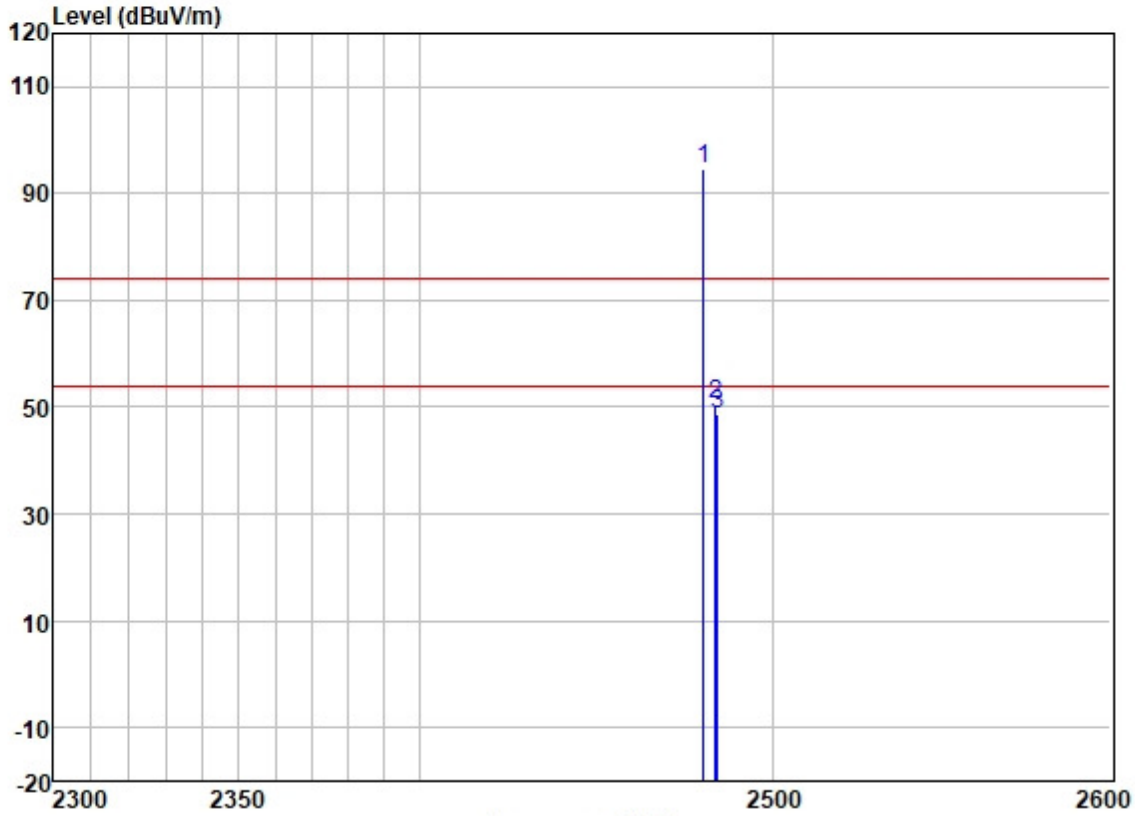
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:High



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	*	2480.000	101.22	27.47	3.60	37.57	94.72	74.00	20.72	HORIZONTAL	Peak
2		2483.500	56.99	27.48	3.53	37.57	50.43	74.00	-23.57	HORIZONTAL	Peak
3		2483.921	55.29	27.48	3.53	37.57	48.73	74.00	-25.27	HORIZONTAL	Peak

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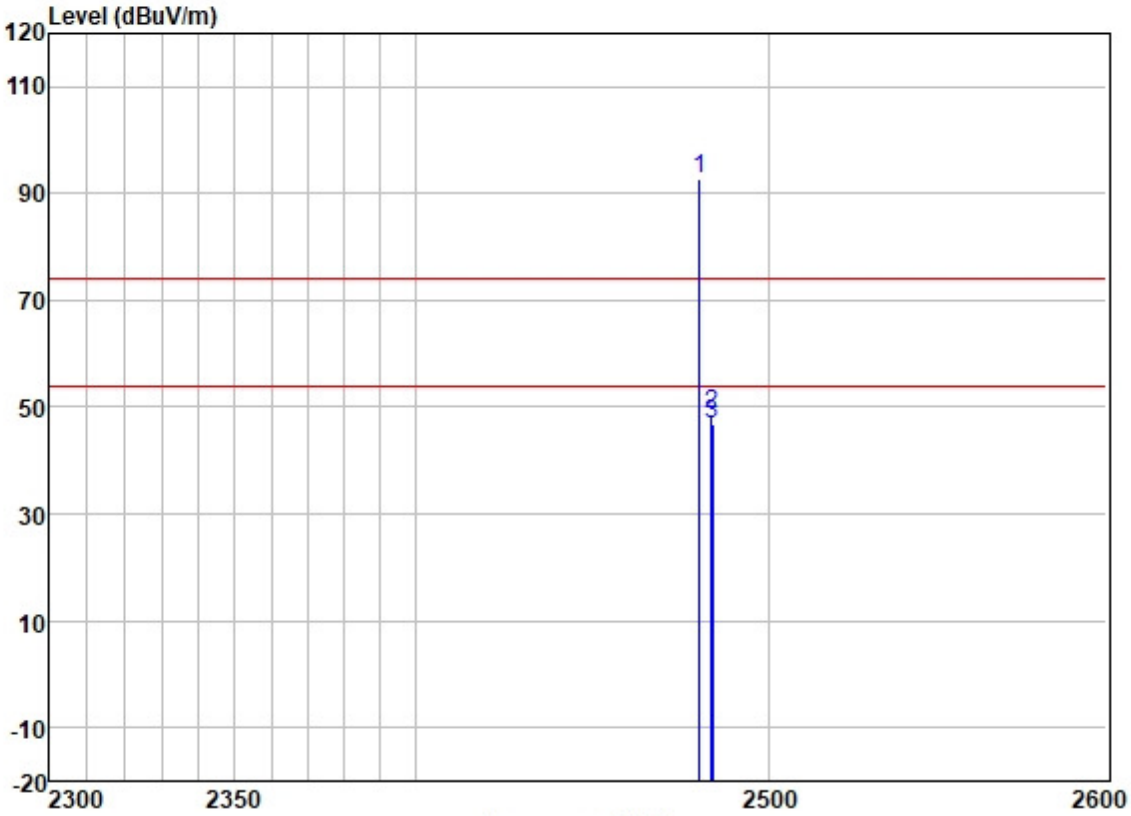
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:High



race: (Discrete)

		Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	*	2480.000	99.29	27.47	3.60	37.57	92.79	74.00	18.79	VERTICAL	Peak
2		2483.500	55.13	27.48	3.53	37.57	48.57	74.00	-25.43	VERTICAL	Peak
3		2483.846	53.26	27.48	3.53	37.57	46.70	74.00	-27.30	VERTICAL	Peak

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7.7 Radiated Spurious Emissions (Below 1GHz)

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

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

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 52.5 % RH Atmospheric Pressure: 1015 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

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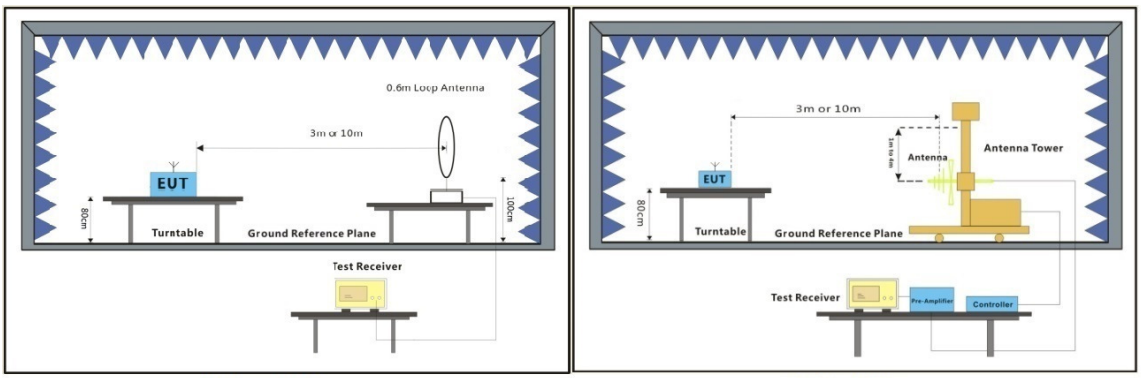
7.7.3 Test Setup Diagram



Below 30MHz 30MHz-1GHz

7.7.4 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 peak, quasi-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) Through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

3) Scan from 9kHz to 1 GHz, 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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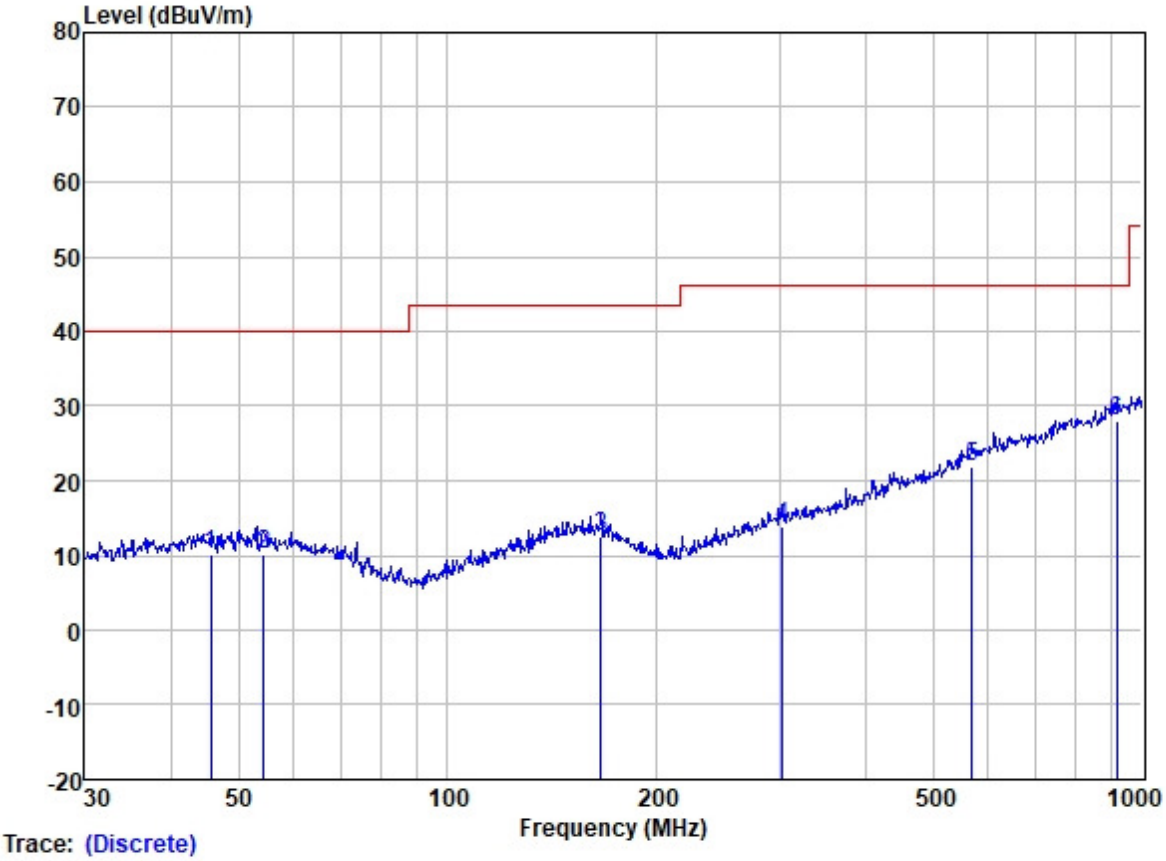
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	45.535	22.65	13.45	1.12	27.10	10.12	40.00	-29.88	HORIZONTAL	QP
2	54.261	22.70	13.43	1.18	27.09	10.22	40.00	-29.78	HORIZONTAL	QP
3	166.068	23.75	13.01	2.37	26.66	12.47	43.50	-31.03	HORIZONTAL	QP
4	303.544	23.78	13.32	3.18	26.51	13.77	46.00	-32.23	HORIZONTAL	QP
5	568.613	26.32	18.74	4.93	28.14	21.85	46.00	-24.15	HORIZONTAL	QP
6	919.287	24.91	23.84	7.01	27.67	28.09	46.00	-17.91	HORIZONTAL	QP

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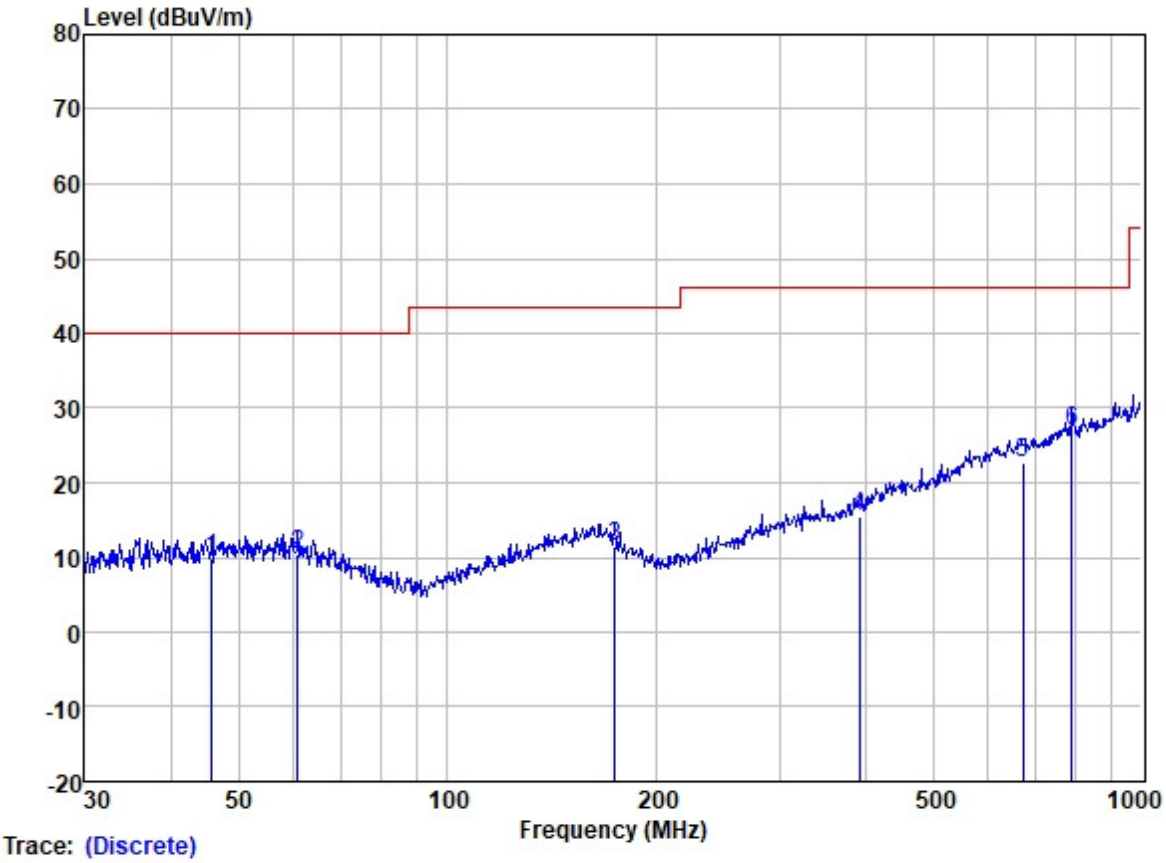
Test Mode: 02; Polarity: Vertical; ; Modulation:GFSK; ; Channel:Low



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	45.695	22.34	13.46	1.12	27.10	9.82	40.00	-30.18	VERTICAL	QP
2	60.704	23.49	12.80	1.27	27.08	10.48	40.00	-29.52	VERTICAL	QP
3	173.814	23.44	12.36	2.41	26.64	11.57	43.50	-31.93	VERTICAL	QP
4	392.095	23.56	15.27	3.89	27.17	15.55	46.00	-30.45	VERTICAL	QP
5	672.845	24.80	20.47	5.65	28.12	22.80	46.00	-23.20	VERTICAL	QP
6	793.396	26.23	22.44	6.14	27.91	26.90	46.00	-19.10	VERTICAL	QP

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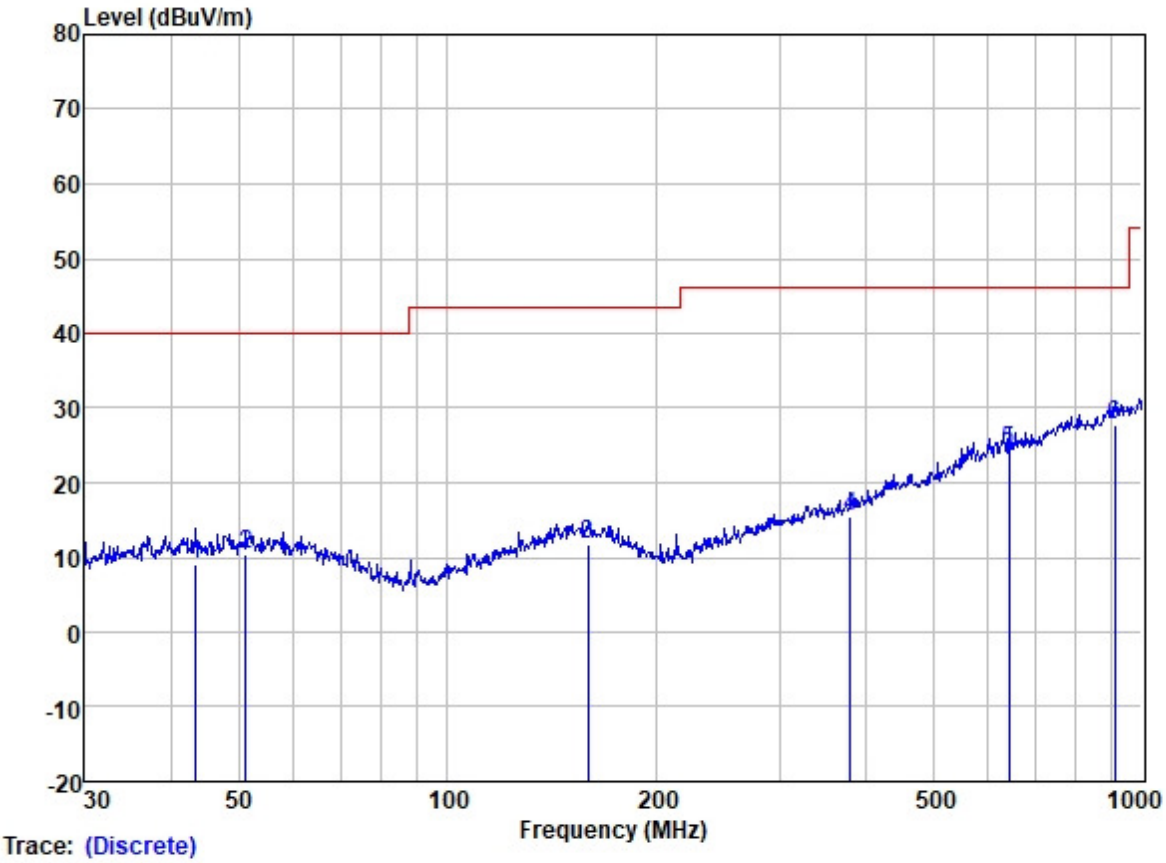
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	43.353	21.56	13.35	1.12	27.10	8.93	40.00	-31.07	HORIZONTAL	QP
2	51.121	22.74	13.60	1.15	27.10	10.39	40.00	-29.61	HORIZONTAL	QP
3	159.225	22.75	13.34	2.33	26.68	11.74	43.50	-31.76	HORIZONTAL	QP
4	379.914	23.84	15.03	3.84	27.13	15.58	46.00	-30.42	HORIZONTAL	QP
5	642.861	26.85	20.15	5.45	28.16	24.29	46.00	-21.71	HORIZONTAL	QP
6	912.862	24.92	23.45	6.96	27.68	27.65	46.00	-18.35	HORIZONTAL	QP

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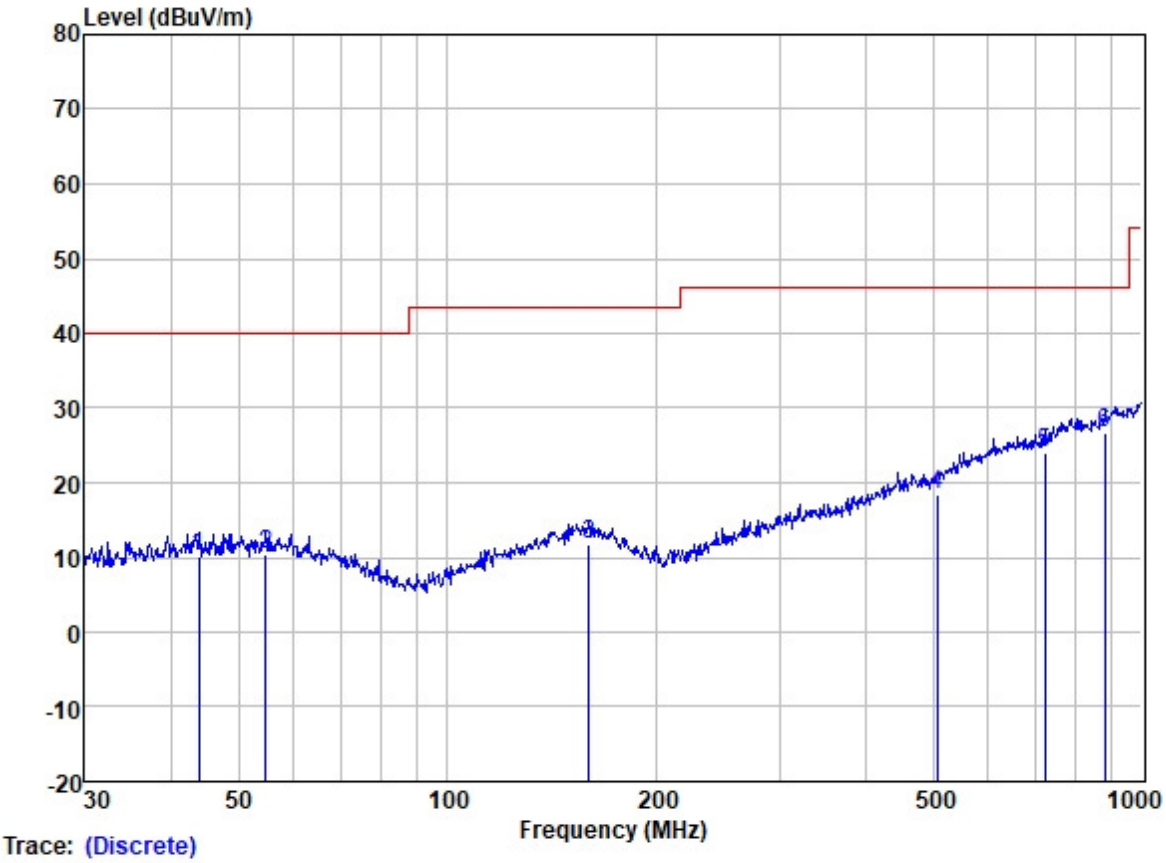
Test Mode: 03; Polarity: Vertical; ; Modulation:GFSK; ; Channel:Low



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	43.812	22.84	13.39	1.12	27.10	10.25	40.00	-29.75	VERTICAL	QP
2	54.643	23.01	13.39	1.19	27.09	10.50	40.00	-29.50	VERTICAL	QP
3	159.784	22.65	13.33	2.33	26.68	11.63	43.50	-31.87	VERTICAL	QP
4	506.479	23.96	17.87	4.43	27.91	18.35	46.00	-27.65	VERTICAL	QP
5	724.261	25.24	20.90	5.86	28.06	23.94	46.00	-22.06	VERTICAL	QP
6	884.503	24.83	22.75	6.79	27.72	26.65	46.00	-19.35	VERTICAL	QP

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7.8 Radiated Spurious Emissions (Above 1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.6
Measurement Distance: 3m
Limit:

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

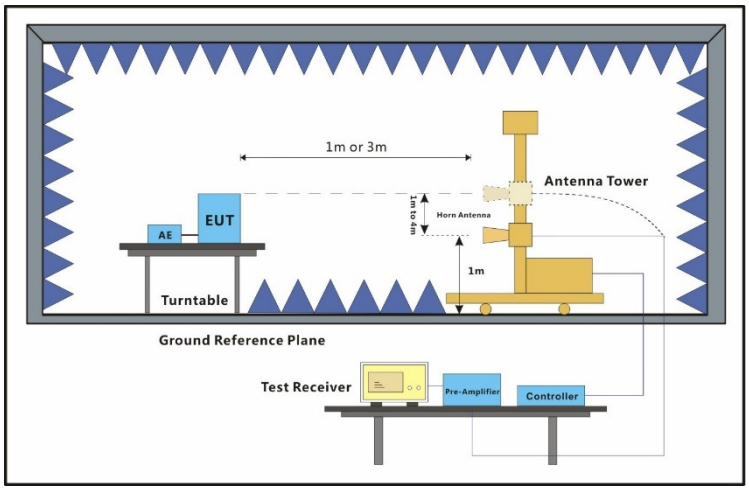
7.8.1 E.U.T. Operation

Operating Environment:
Temperature: 24.8 °C Humidity: 52.6 % RH Atmospheric Pressure: 1015 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram



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7.8.4 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 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, quasi-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) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier 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) 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.

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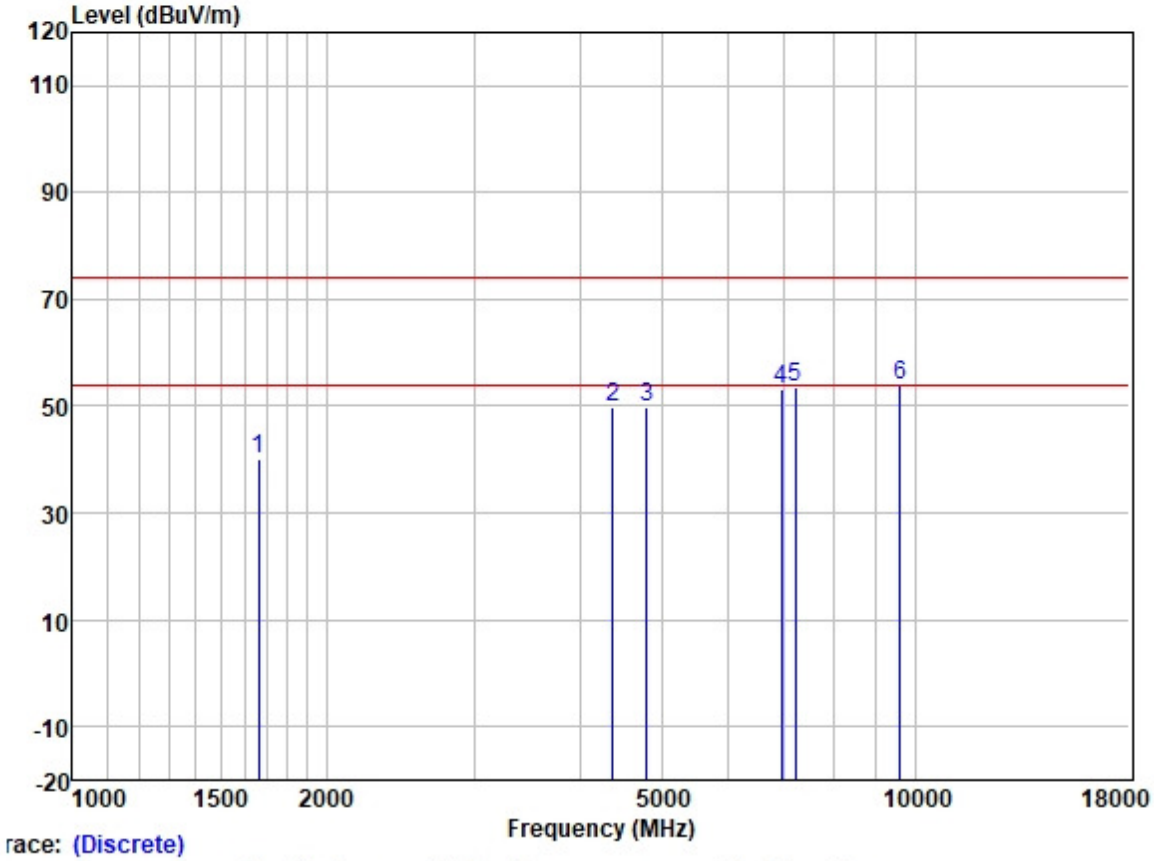
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1663.137	49.46	25.65	2.80	37.91	40.00	74.00	-34.00	HORIZONTAL	Peak
2	4379.699	51.39	30.64	4.69	36.81	49.91	74.00	-24.09	HORIZONTAL	Peak
3	4804.000	50.00	31.42	5.40	36.83	49.99	74.00	-24.01	HORIZONTAL	Peak
4	6934.778	49.58	34.92	5.81	37.19	53.12	74.00	-20.88	HORIZONTAL	Peak
5	7206.000	49.54	35.54	5.98	37.38	53.68	74.00	-20.32	HORIZONTAL	Peak
6	9608.000	45.78	38.37	7.07	37.42	53.80	74.00	-20.20	HORIZONTAL	Peak

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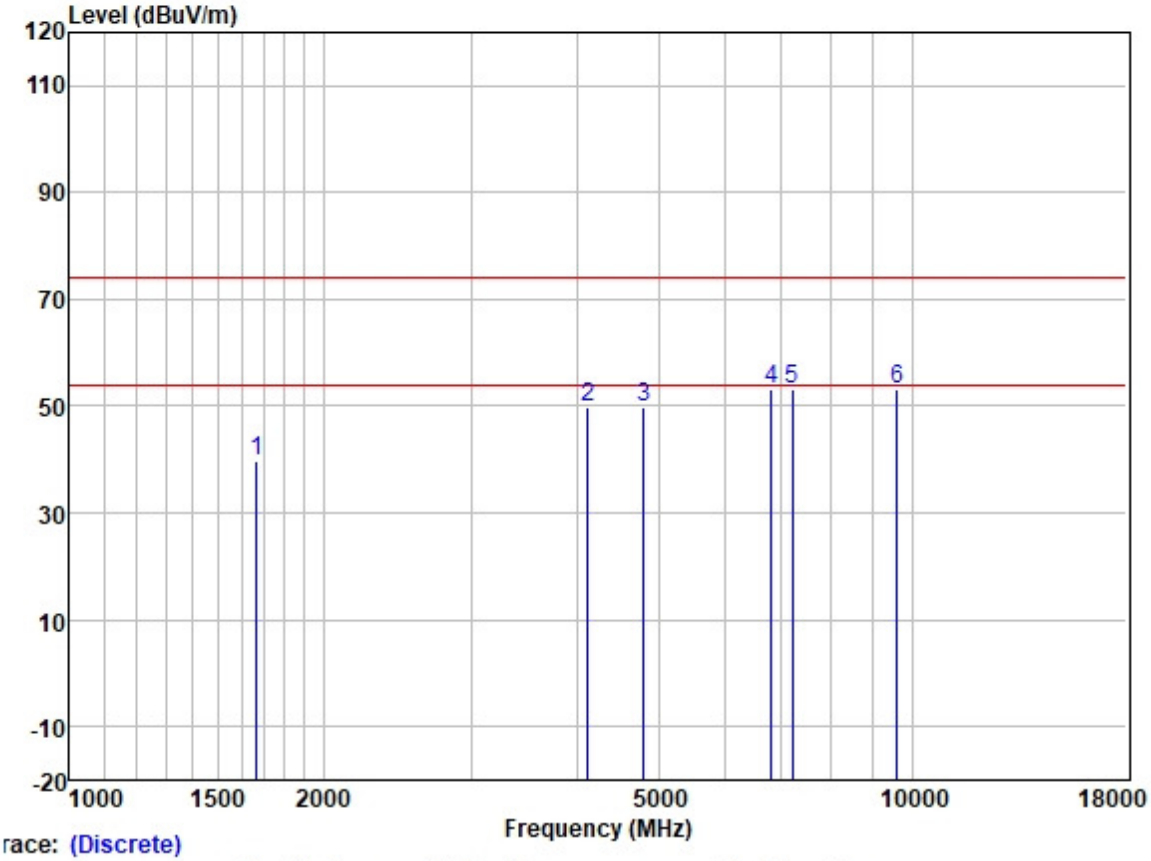
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1667.951	49.06	25.66	2.80	37.91	39.61	74.00	-34.39	VERTICAL	Peak
2	4121.768	52.21	29.98	4.60	36.80	49.99	74.00	-24.01	VERTICAL	Peak
3	4804.000	49.74	31.42	5.40	36.83	49.73	74.00	-24.27	VERTICAL	Peak
4	6815.551	49.74	34.70	5.82	37.13	53.13	74.00	-20.87	VERTICAL	Peak
5	7206.000	48.98	35.54	5.98	37.38	53.12	74.00	-20.88	VERTICAL	Peak
6	9608.000	45.29	38.37	7.07	37.42	53.31	74.00	-20.69	VERTICAL	Peak

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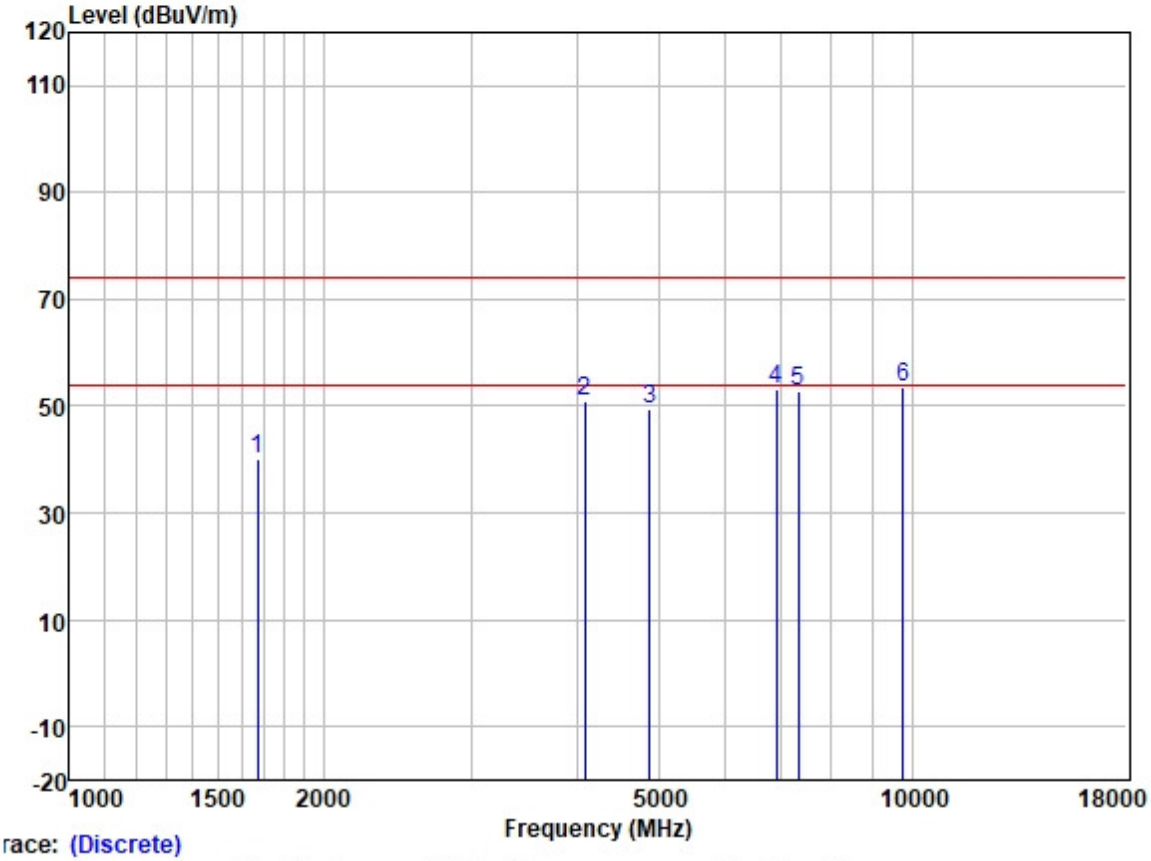
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1672.779	49.44	25.67	2.80	37.91	40.00	74.00	-34.00	HORIZONTAL	Peak
2	4086.182	53.12	29.92	4.60	36.80	50.84	74.00	-23.16	HORIZONTAL	Peak
3	4880.000	49.13	31.54	5.50	36.84	49.33	74.00	-24.67	HORIZONTAL	Peak
4	6894.806	49.86	34.85	5.81	37.18	53.34	74.00	-20.66	HORIZONTAL	Peak
5	7320.000	47.93	36.00	6.13	37.43	52.63	74.00	-21.37	HORIZONTAL	Peak
6	9760.000	45.39	38.50	7.02	37.41	53.50	74.00	-20.50	HORIZONTAL	Peak

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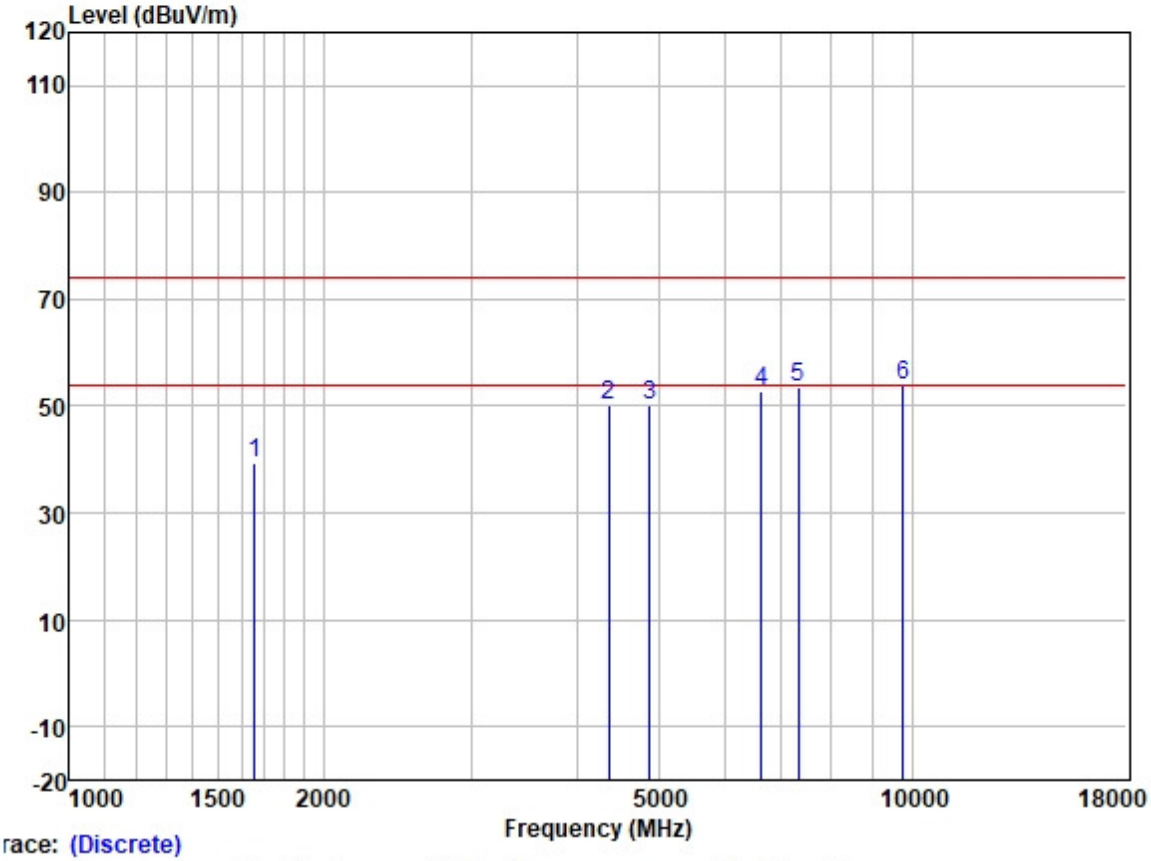
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:middle



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1658.337	48.98	25.65	2.80	37.93	39.50	74.00	-34.50	VERTICAL	Peak
2	4367.058	51.66	30.62	4.68	36.81	50.15	74.00	-23.85	VERTICAL	Peak
3	4880.000	50.14	31.54	5.50	36.84	50.34	74.00	-23.66	VERTICAL	Peak
4	6621.375	49.98	34.20	5.83	37.05	52.96	74.00	-21.04	VERTICAL	Peak
5	7320.000	48.74	36.00	6.13	37.43	53.44	74.00	-20.56	VERTICAL	Peak
6	9760.000	45.77	38.50	7.02	37.41	53.88	74.00	-20.12	VERTICAL	Peak

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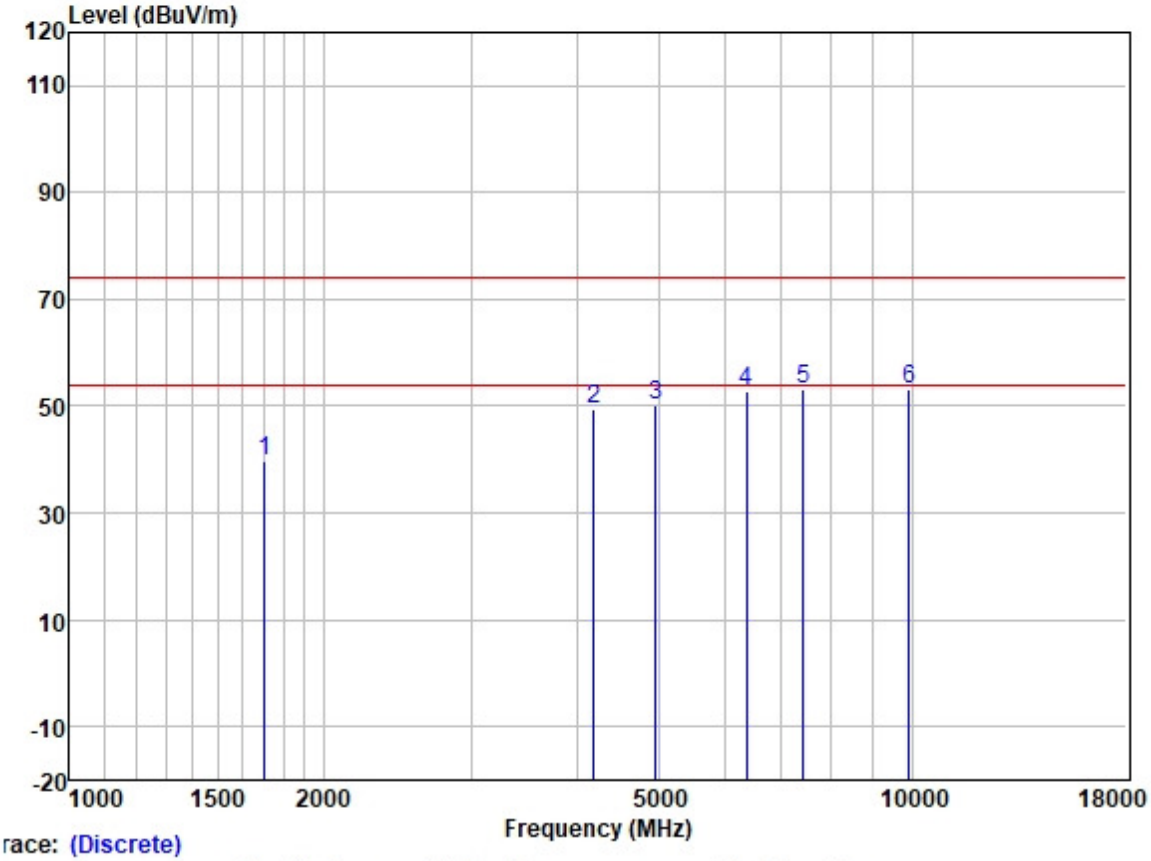
Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; ; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1702.042	48.97	25.72	2.80	37.89	39.60	74.00	-34.40	HORIZONTAL	Peak
2	4193.872	51.50	30.15	4.60	36.81	49.44	74.00	-24.56	HORIZONTAL	Peak
3	4960.000	49.55	31.65	5.65	36.84	50.01	74.00	-23.99	HORIZONTAL	Peak
4	6358.789	50.40	33.63	5.92	36.97	52.98	74.00	-21.02	HORIZONTAL	Peak
5	7440.000	48.22	36.27	6.22	37.47	53.24	74.00	-20.76	HORIZONTAL	Peak
6	9920.000	44.78	38.65	6.96	37.40	52.99	74.00	-21.01	HORIZONTAL	Peak

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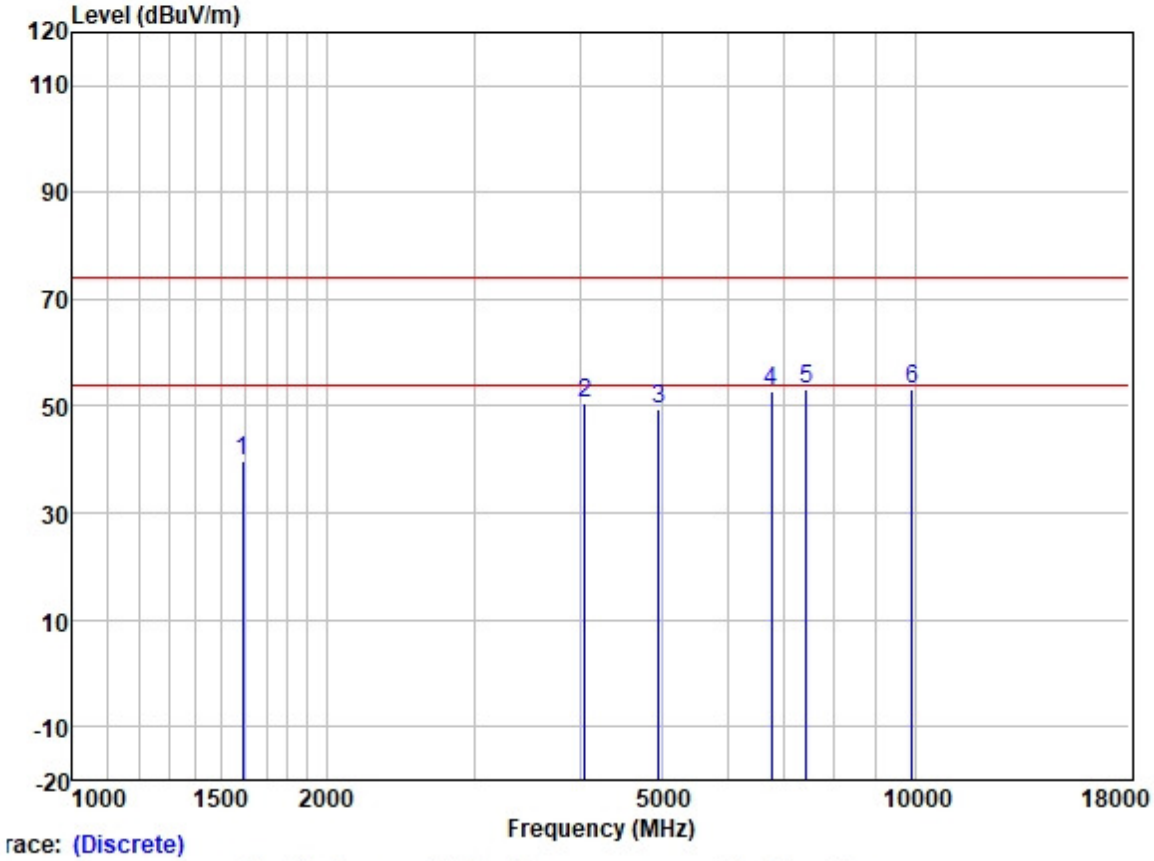
Test Mode: 02; Polarity: Vertical; Modulation:GFSK; ; Channel:High



race: (Discrete)

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1592.571	49.21	25.57	2.80	37.98	39.60	74.00	-34.40	VERTICAL	Peak
2	4050.904	52.92	29.87	4.60	36.80	50.59	74.00	-23.41	VERTICAL	Peak
3	4960.000	49.01	31.65	5.65	36.84	49.47	74.00	-24.53	VERTICAL	Peak
4	6756.708	49.58	34.56	5.82	37.10	52.86	74.00	-21.14	VERTICAL	Peak
5	7440.000	48.01	36.27	6.22	37.47	53.03	74.00	-20.97	VERTICAL	Peak
6	9920.000	44.86	38.65	6.96	37.40	53.07	74.00	-20.93	VERTICAL	Peak

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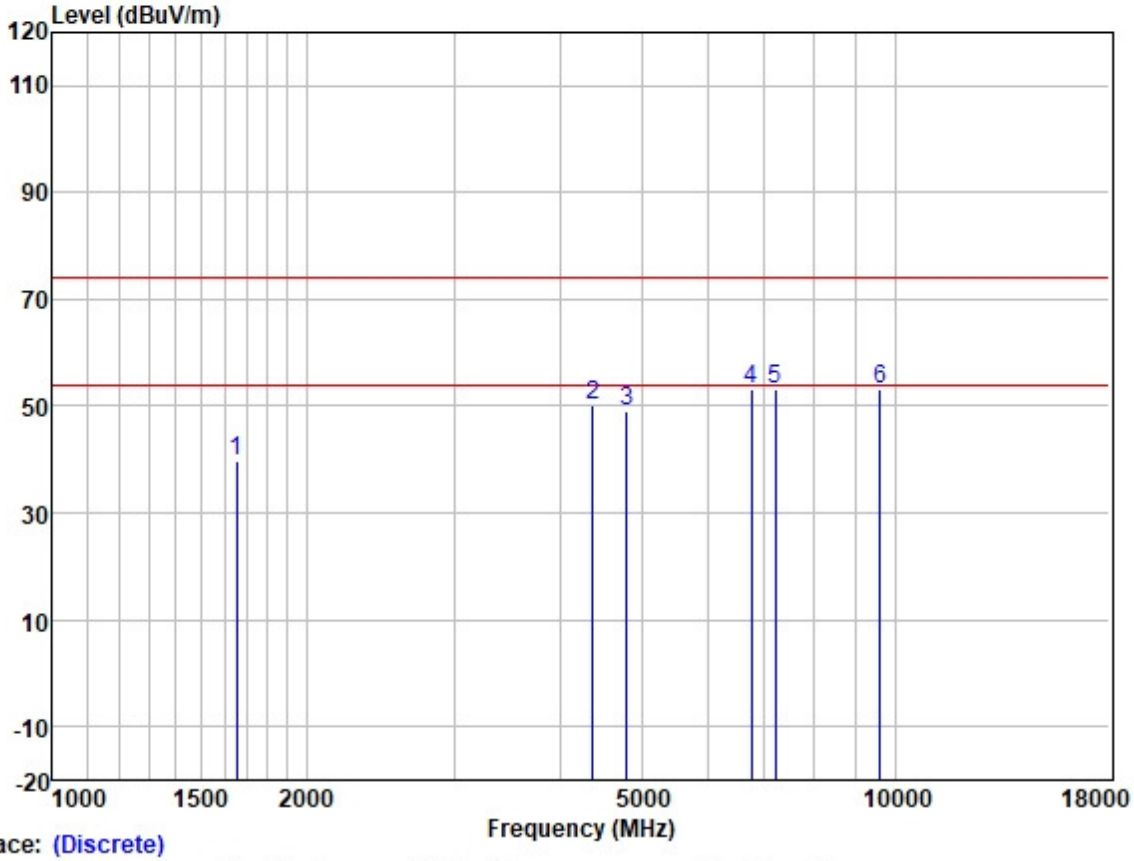
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



race: (Discrete)

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1653.550	49.39	25.64	2.80	37.93	39.90	74.00	-34.10	HORIZONTAL	Peak
2	4379.699	51.57	30.64	4.69	36.81	50.09	74.00	-23.91	HORIZONTAL	Peak
3	4804.000	49.25	31.42	5.40	36.83	49.24	74.00	-24.76	HORIZONTAL	Peak
4	6756.708	50.03	34.56	5.82	37.10	53.31	74.00	-20.69	HORIZONTAL	Peak
5	7206.000	49.02	35.54	5.98	37.38	53.16	74.00	-20.84	HORIZONTAL	Peak
6	9608.000	45.07	38.37	7.07	37.42	53.09	74.00	-20.91	HORIZONTAL	Peak

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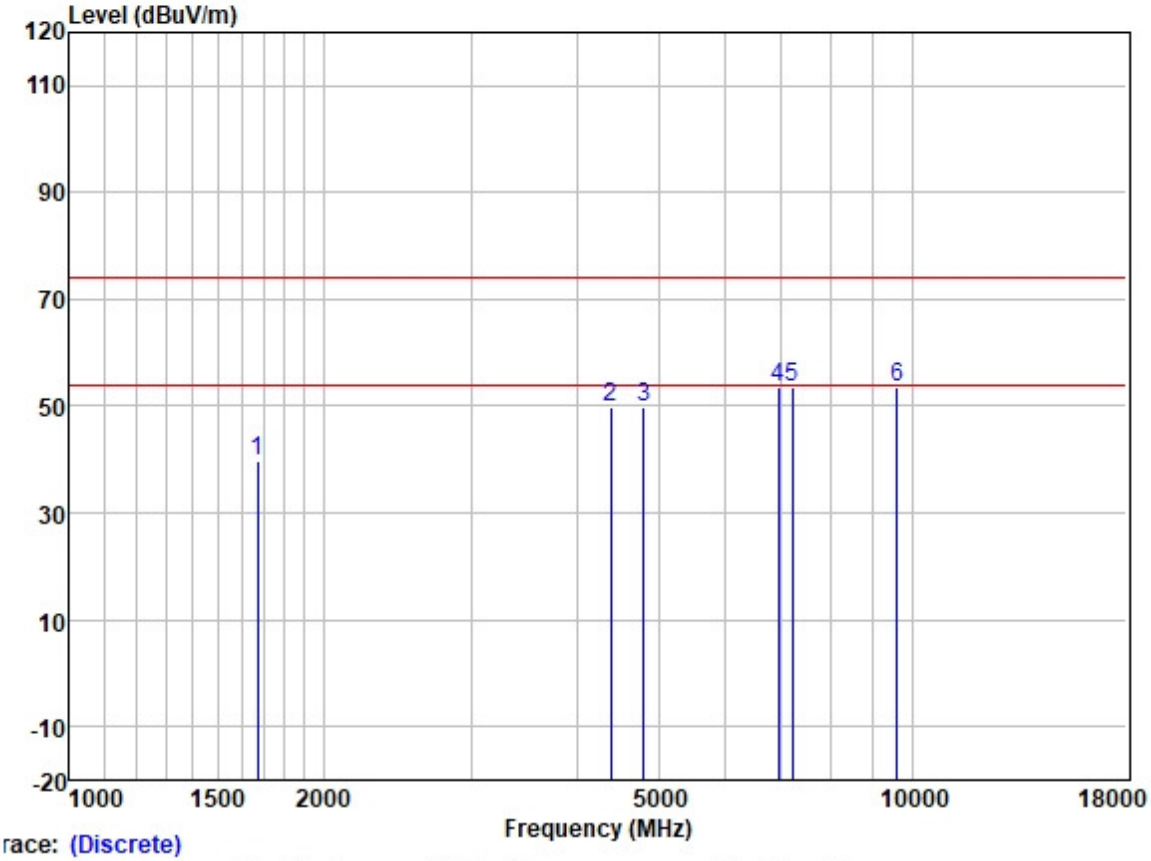
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1672.779	49.31	25.67	2.80	37.91	39.87	74.00	-34.13	VERTICAL	Peak
2	4392.376	51.26	30.66	4.70	36.81	49.81	74.00	-24.19	VERTICAL	Peak
3	4804.000	49.90	31.42	5.40	36.83	49.89	74.00	-24.11	VERTICAL	Peak
4	6934.778	49.94	34.92	5.81	37.19	53.48	74.00	-20.52	VERTICAL	Peak
5	7206.000	49.44	35.54	5.98	37.38	53.58	74.00	-20.42	VERTICAL	Peak
6	9608.000	45.63	38.37	7.07	37.42	53.65	74.00	-20.35	VERTICAL	Peak

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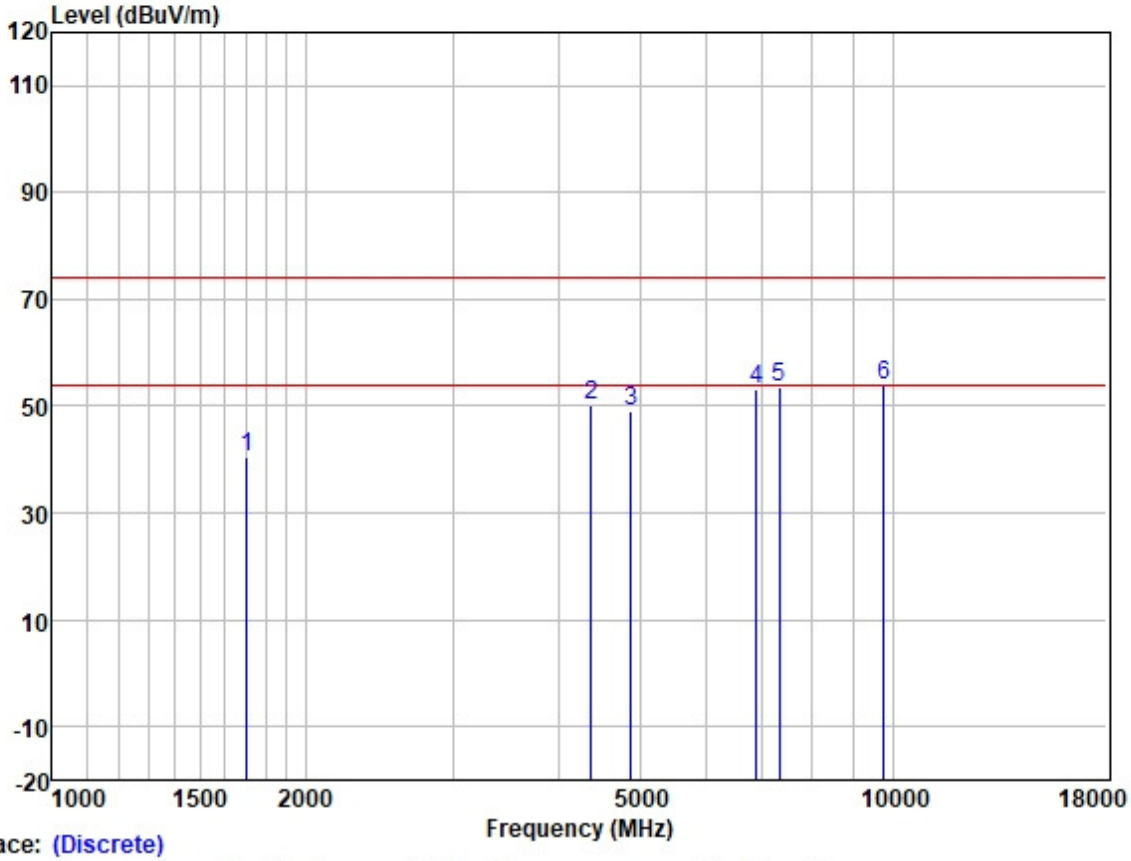
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle



race: (Discrete)

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1702.042	49.79	25.72	2.80	37.89	40.42	74.00	-33.58	HORIZONTAL	Peak
2	4379.699	51.68	30.64	4.69	36.81	50.20	74.00	-23.80	HORIZONTAL	Peak
3	4880.000	48.77	31.54	5.50	36.84	48.97	74.00	-25.03	HORIZONTAL	Peak
4	6874.906	49.75	34.82	5.82	37.16	53.23	74.00	-20.77	HORIZONTAL	Peak
5	7320.000	48.90	36.00	6.13	37.43	53.60	74.00	-20.40	HORIZONTAL	Peak
6	9760.000	45.77	38.50	7.02	37.41	53.88	74.00	-20.12	HORIZONTAL	Peak

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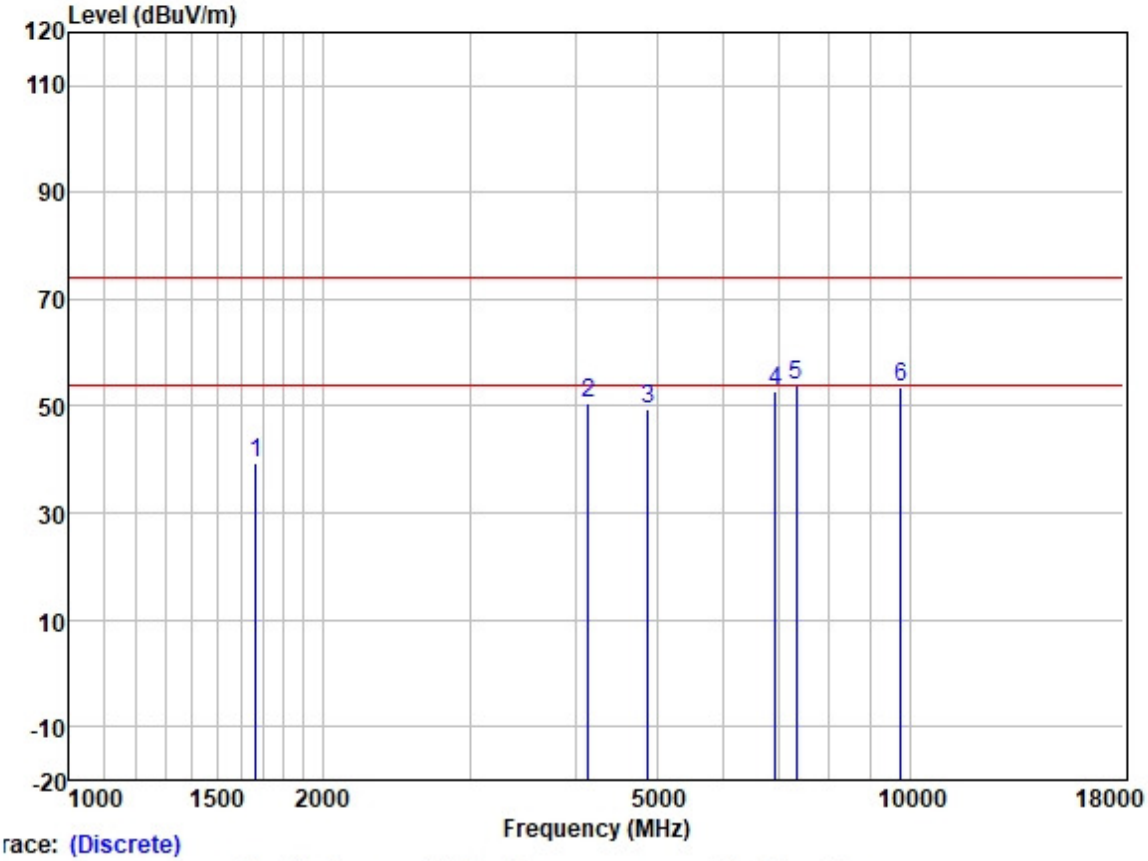
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:middle



race: (Discrete)

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1667.951	48.76	25.66	2.80	37.91	39.31	74.00	-34.69	VERTICAL	Peak
2	4145.664	52.79	30.03	4.60	36.80	50.62	74.00	-23.38	VERTICAL	Peak
3	4880.000	49.16	31.54	5.50	36.84	49.36	74.00	-24.64	VERTICAL	Peak
4	6914.763	49.30	34.89	5.81	37.19	52.81	74.00	-21.19	VERTICAL	Peak
5	7320.000	49.11	36.00	6.13	37.43	53.81	74.00	-20.19	VERTICAL	Peak
6	9760.000	45.60	38.50	7.02	37.41	53.71	74.00	-20.29	VERTICAL	Peak

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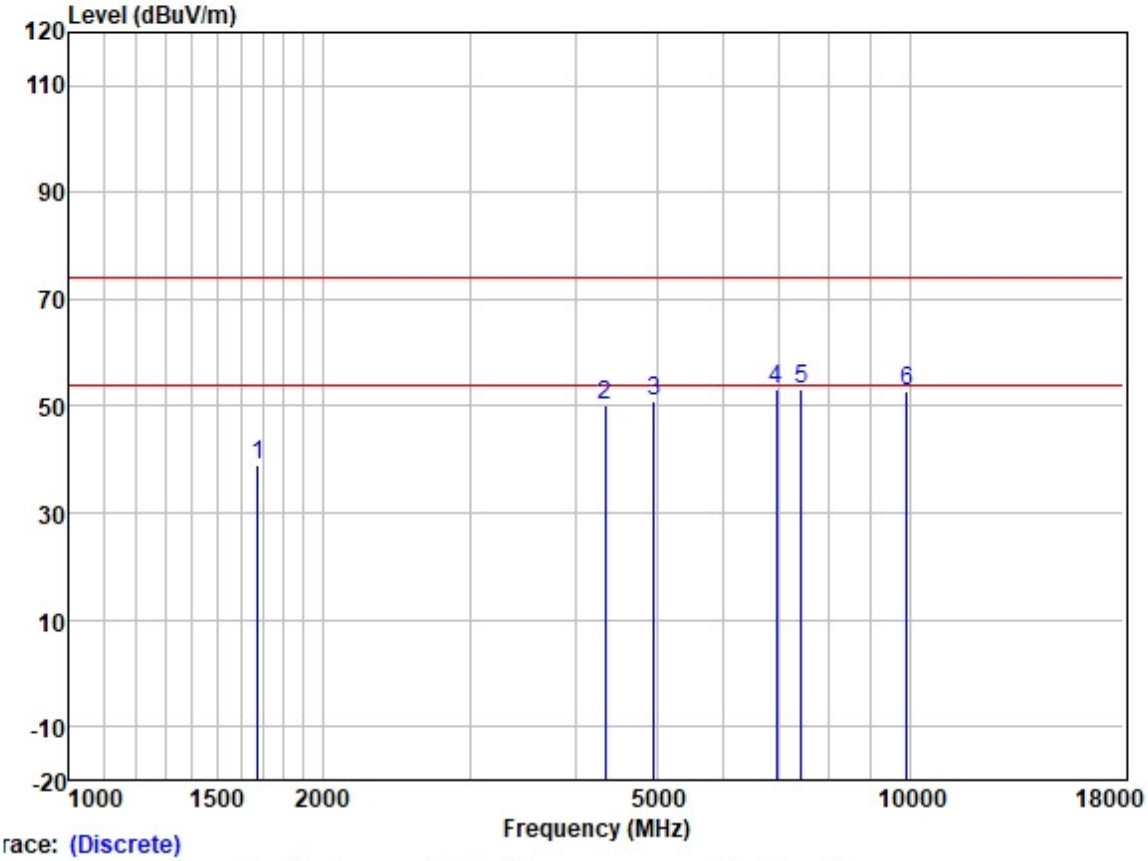
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1677.621	48.46	25.68	2.80	37.91	39.03	74.00	-34.97	HORIZONTAL	Peak
2	4341.886	51.68	30.57	4.67	36.81	50.11	74.00	-23.89	HORIZONTAL	Peak
3	4960.000	50.31	31.65	5.65	36.84	50.77	74.00	-23.23	HORIZONTAL	Peak
4	6934.778	49.61	34.92	5.81	37.19	53.15	74.00	-20.85	HORIZONTAL	Peak
5	7440.000	48.17	36.27	6.22	37.47	53.19	74.00	-20.81	HORIZONTAL	Peak
6	9920.000	44.47	38.65	6.96	37.40	52.68	74.00	-21.32	HORIZONTAL	Peak

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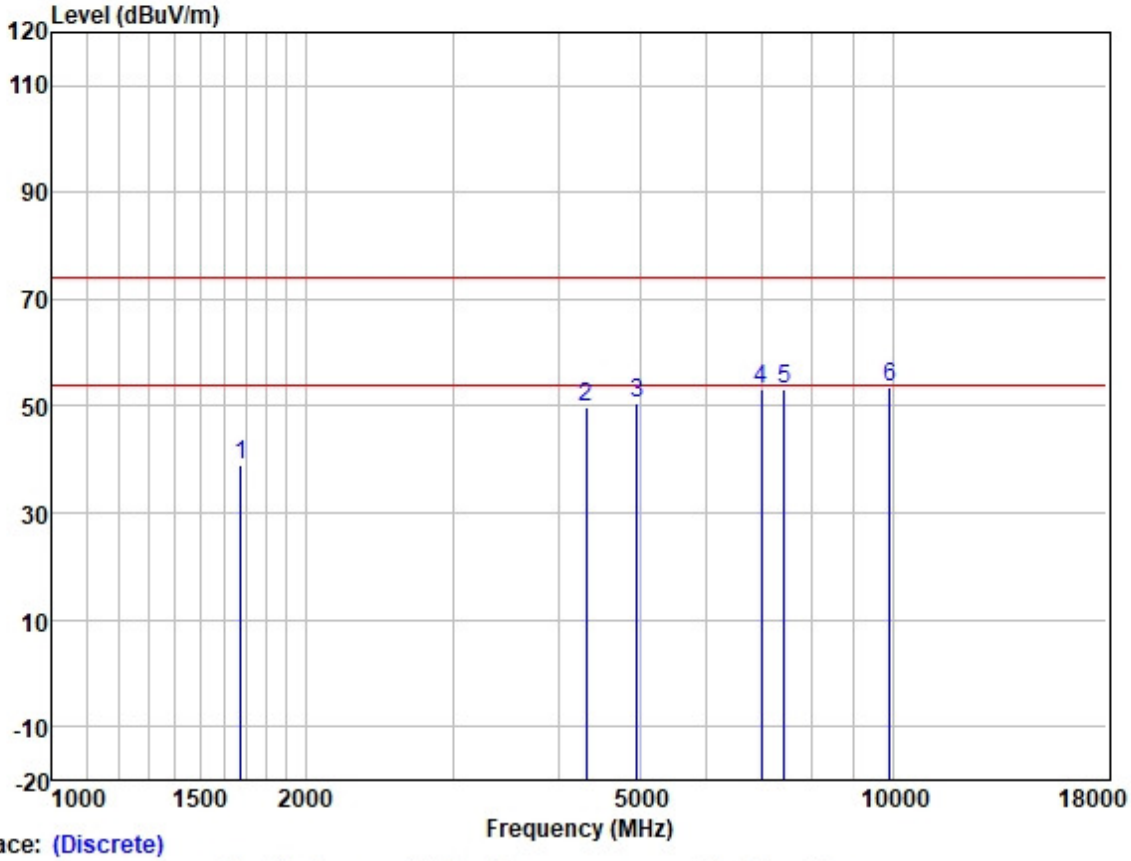
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1677.621	48.39	25.68	2.80	37.91	38.96	74.00	-35.04	VERTICAL	Peak
2	4316.859	51.62	30.51	4.66	36.81	49.98	74.00	-24.02	VERTICAL	Peak
3	4960.000	49.95	31.65	5.65	36.84	50.41	74.00	-23.59	VERTICAL	Peak
4	6974.982	49.59	34.97	5.81	37.23	53.14	74.00	-20.86	VERTICAL	Peak
5	7440.000	48.03	36.27	6.22	37.47	53.05	74.00	-20.95	VERTICAL	Peak
6	9920.000	45.51	38.65	6.96	37.40	53.72	74.00	-20.28	VERTICAL	Peak

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8 Test Setup Photo

Refer to Appendix - Setup Photos for GZCR2205000600AT

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9 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for GZCR2205000600AT

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10 Appendix

1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
1M	SISO	2402	0.397	0.625	63.52	1.97	0.03
		2440	0.397	0.625	63.52	1.97	0.04
		2480	0.397	0.625	63.52	1.97	0.02
2M	SISO	2402	0.213	0.625	34.08	4.68	0.10
		2440	0.212	0.625	33.92	4.70	0.03
		2480	0.213	0.625	34.08	4.68	0.03

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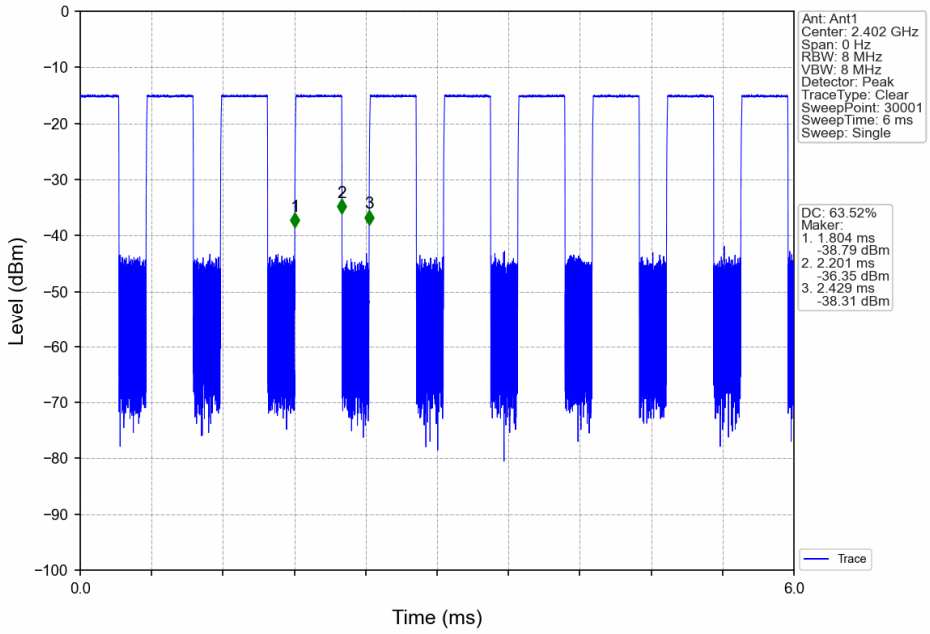
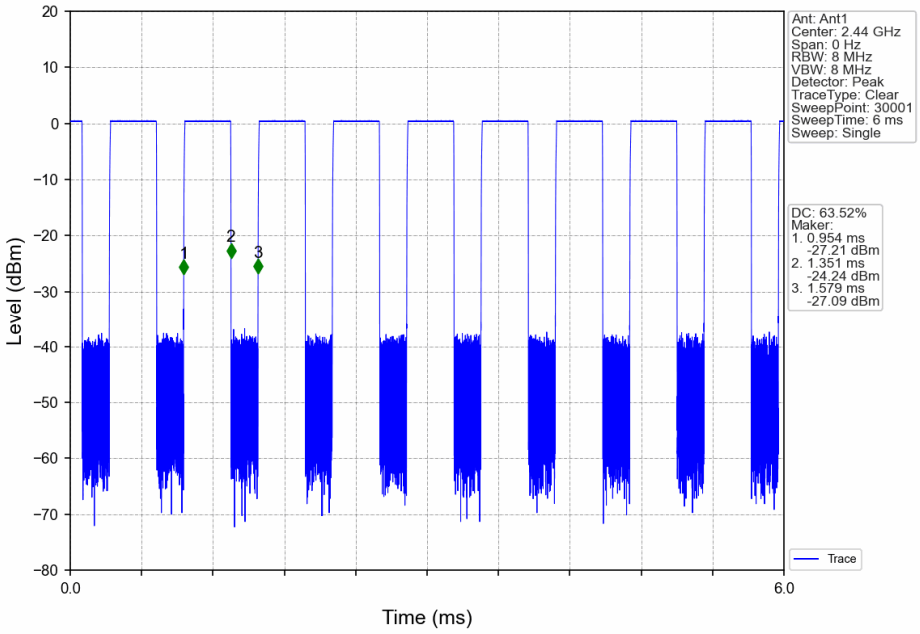
1.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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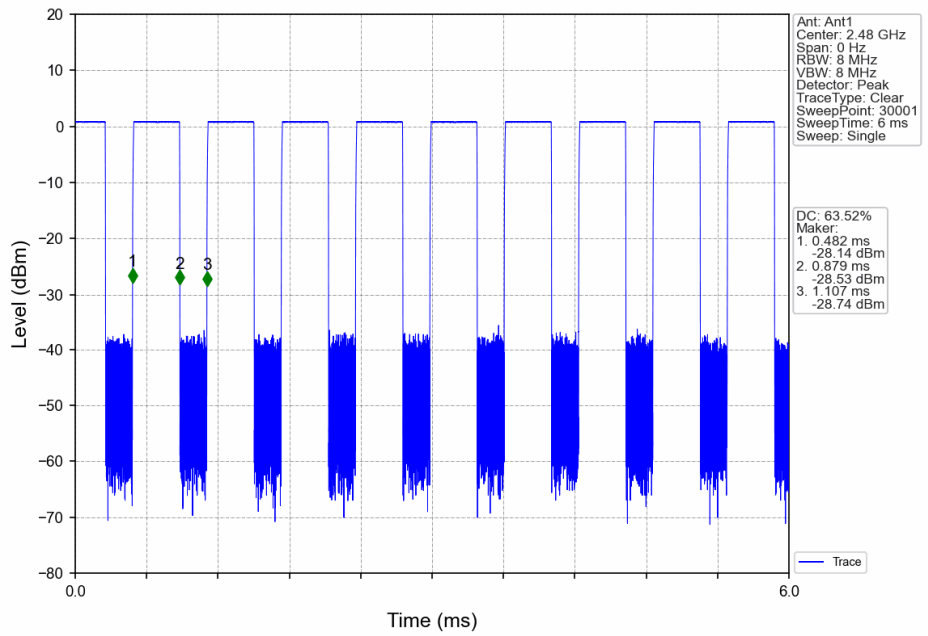
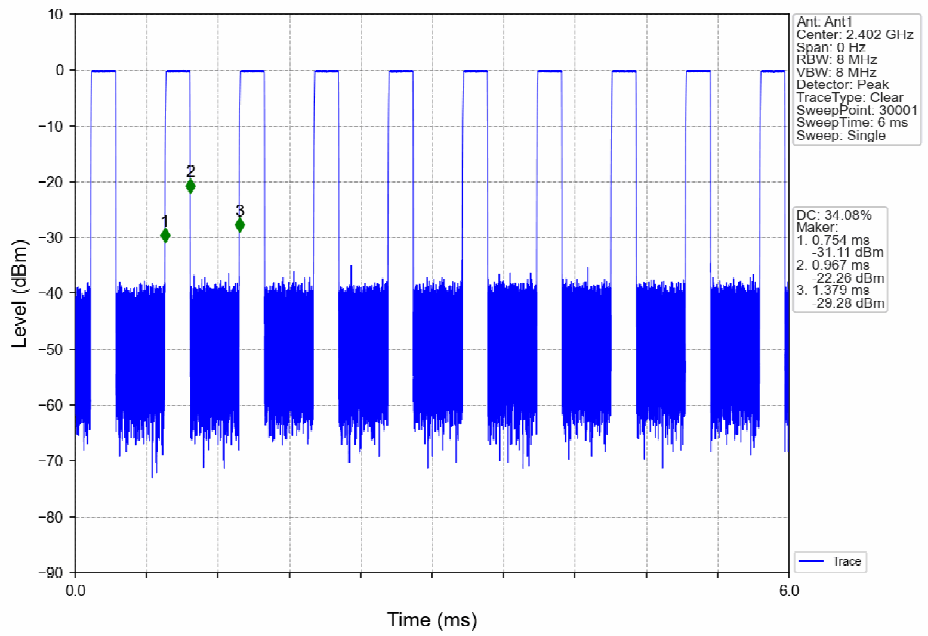
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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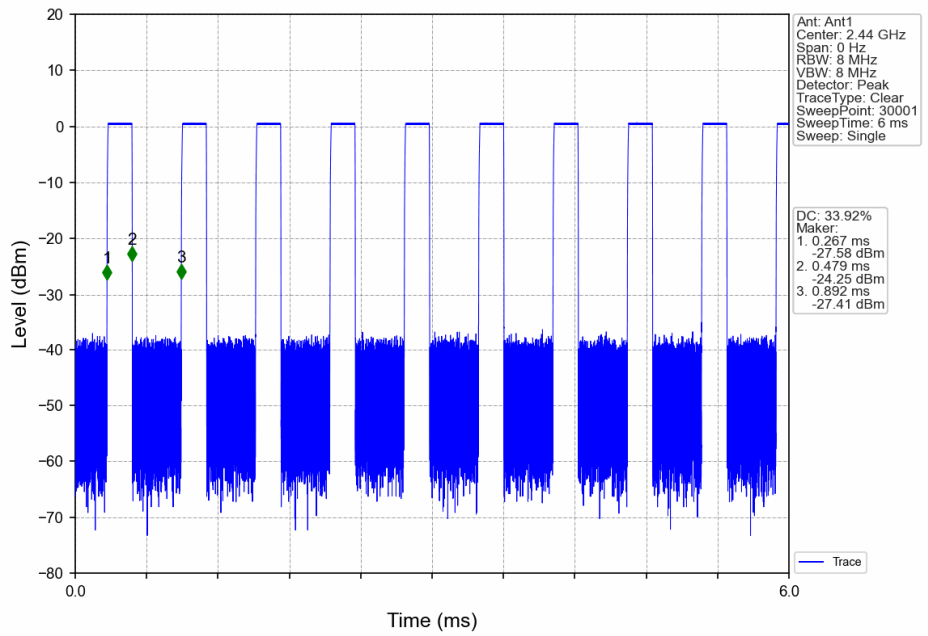
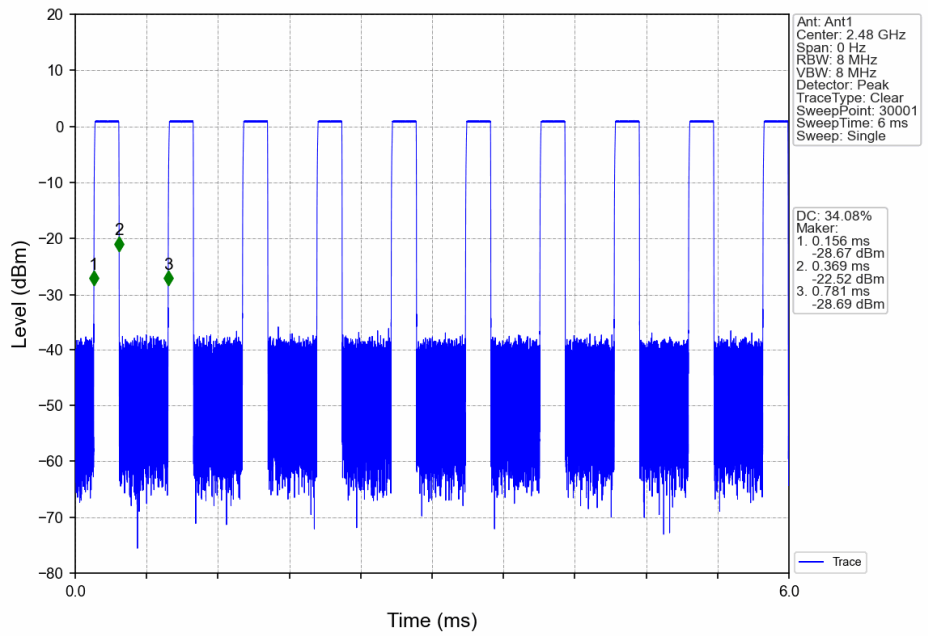
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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2. Bandwidth

2.1 OBW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)	Verdict
				Result	
1M	SISO	2402	1	1.042	Pass
		2440	1	1.042	Pass
		2480	1	1.038	Pass
2M	SISO	2402	1	2.077	Pass
		2440	1	2.074	Pass
		2480	1	2.074	Pass

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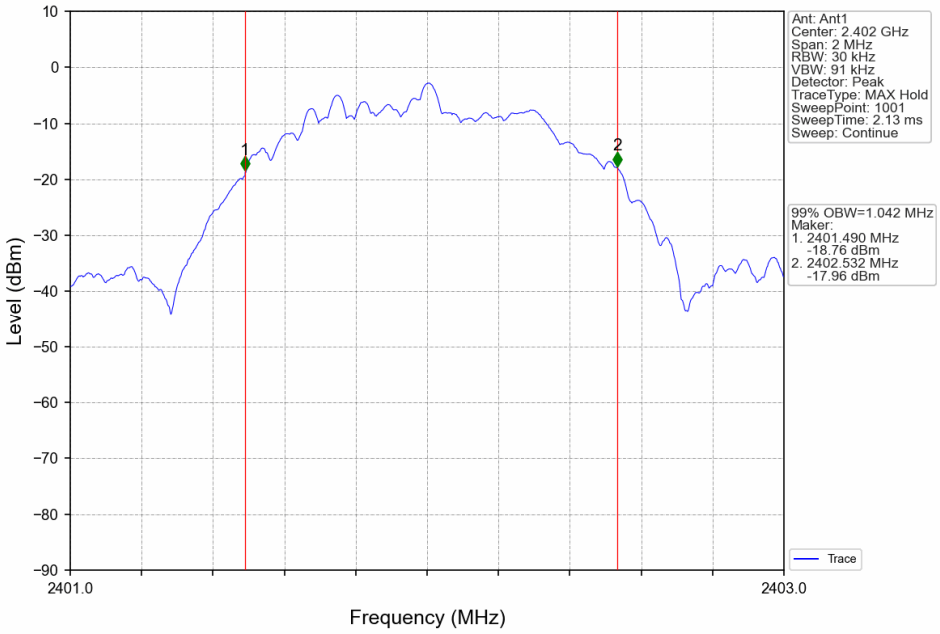
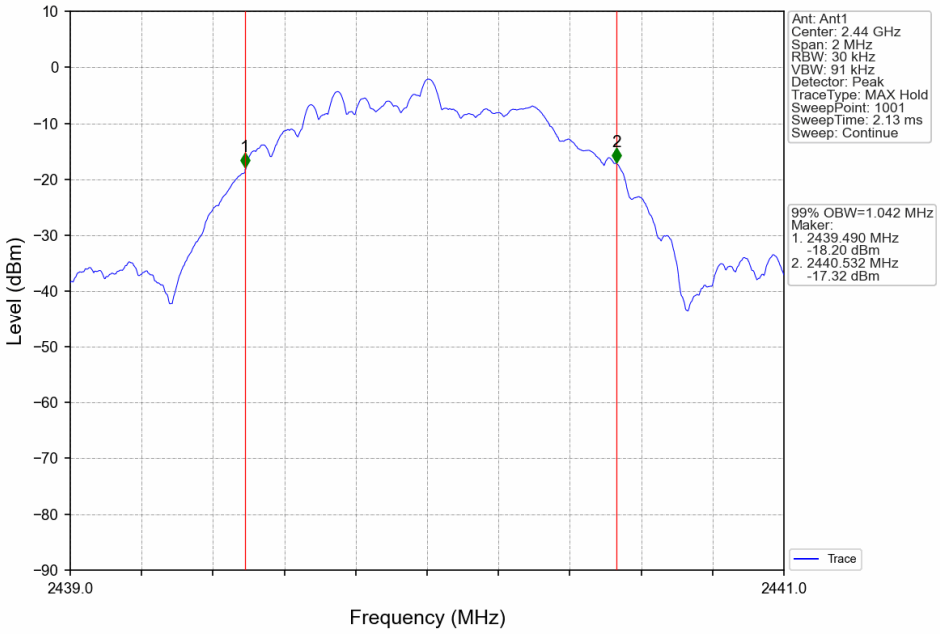
2.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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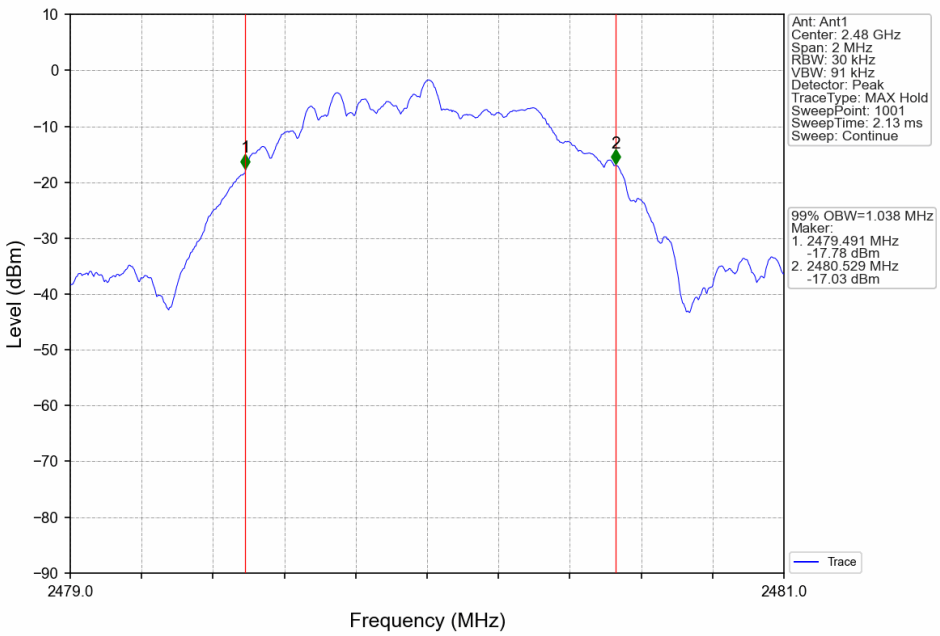
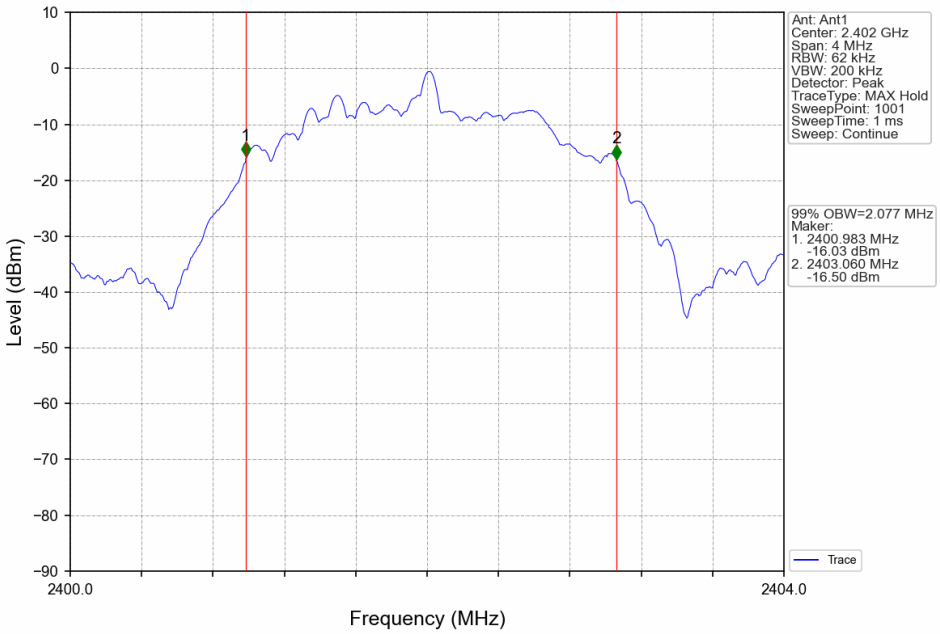
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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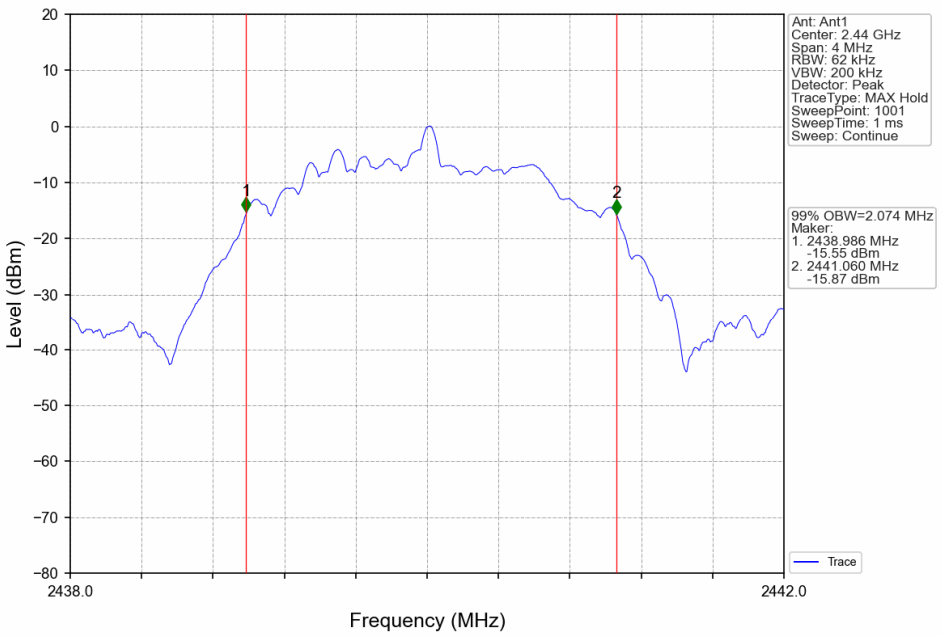
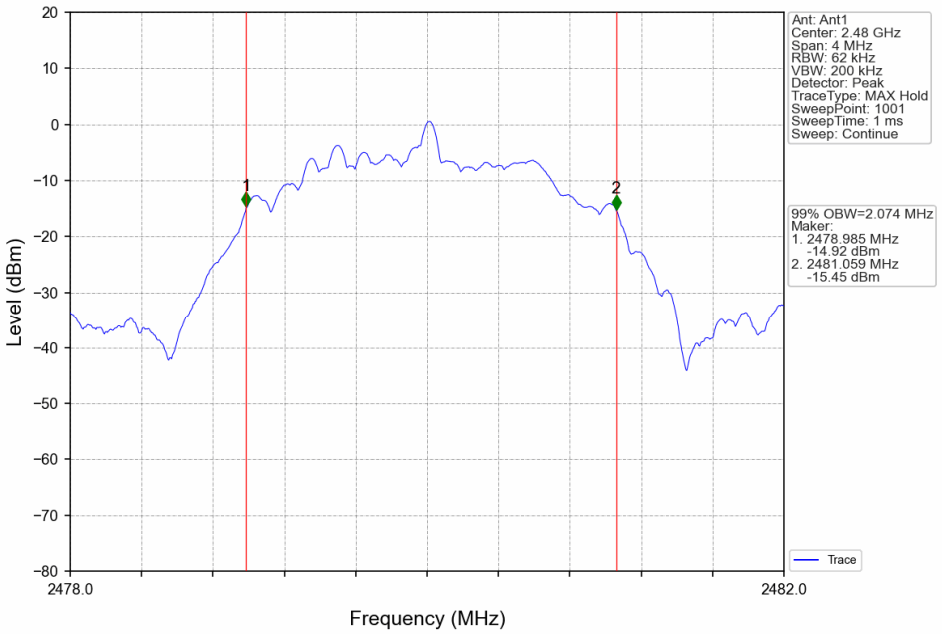
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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2.2 6dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
1M	SISO	2402	1	0.722	>=0.5	Pass
		2440	1	0.724	>=0.5	Pass
		2480	1	0.719	>=0.5	Pass
2M	SISO	2402	1	1.206	>=0.5	Pass
		2440	1	1.255	>=0.5	Pass
		2480	1	1.252	>=0.5	Pass

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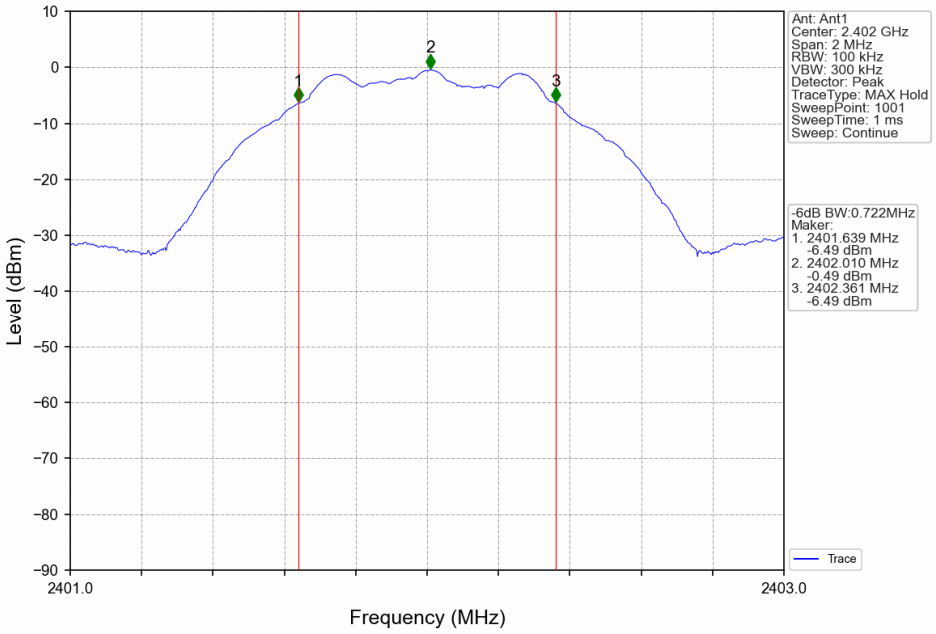
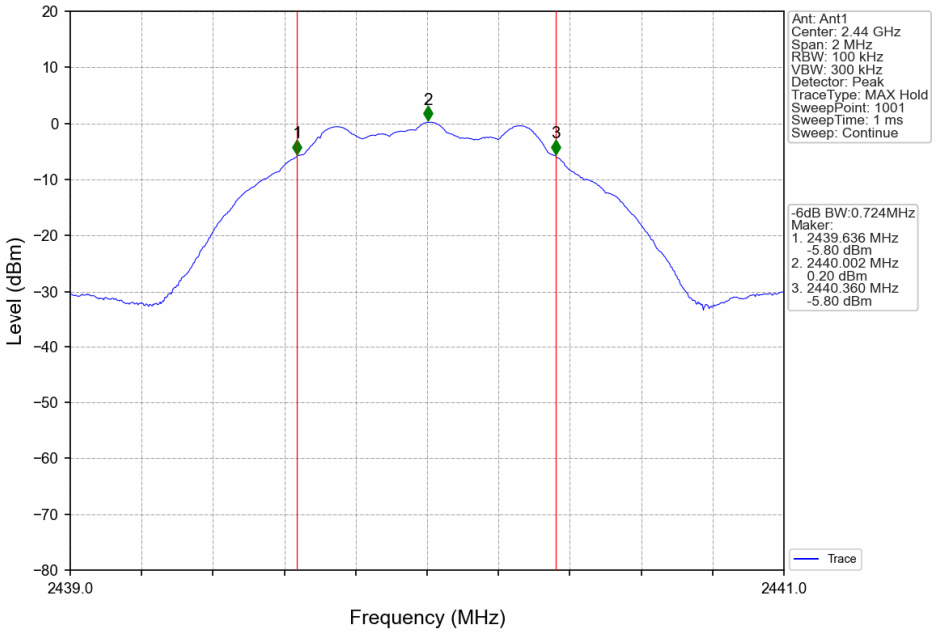
2.2.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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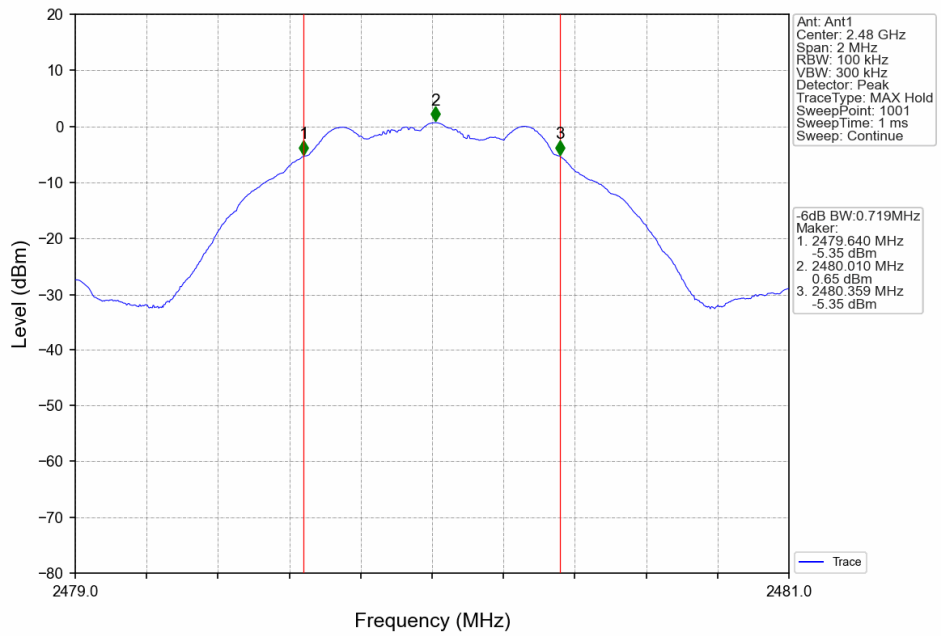
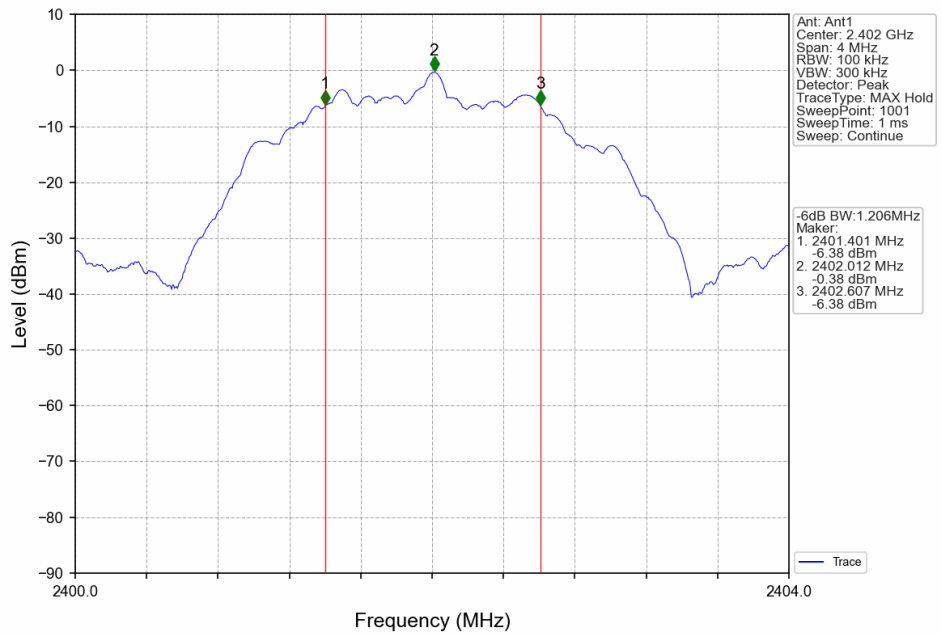
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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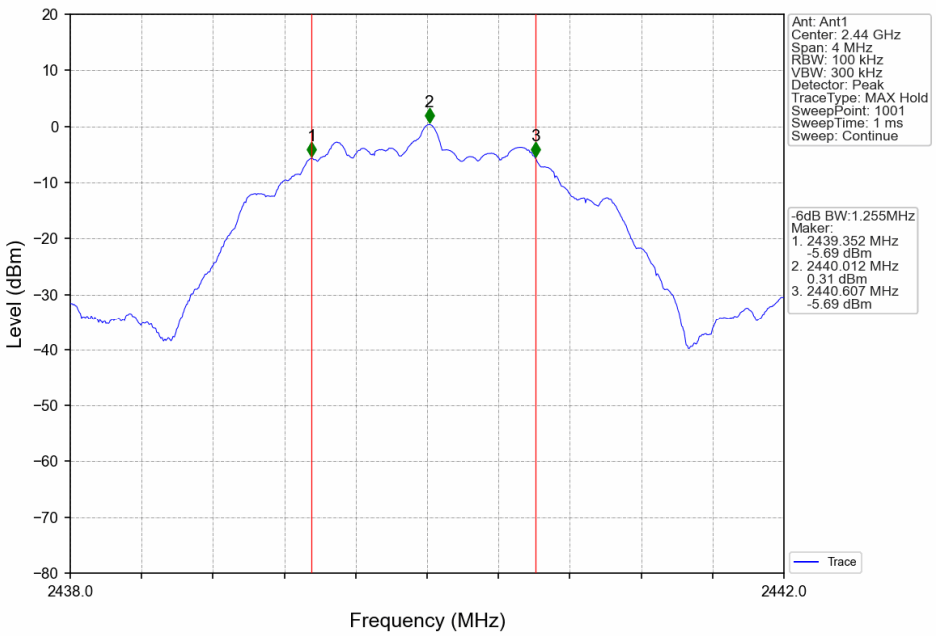
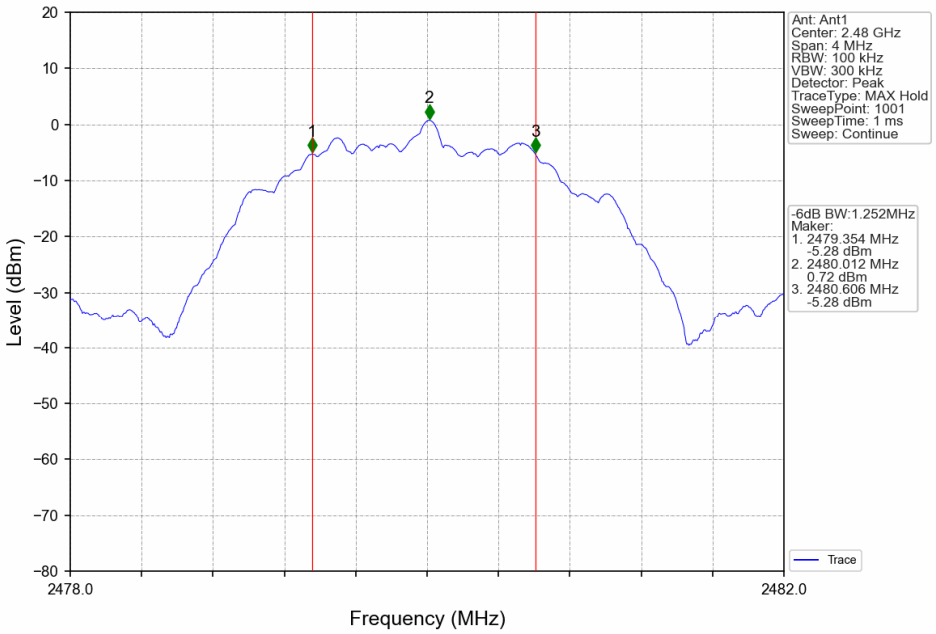
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
1M	SISO	2402	-0.25	<=30	Pass
		2440	0.43	<=30	Pass
		2480	0.85	<=30	Pass
2M	SISO	2402	-0.16	<=30	Pass
		2440	0.51	<=30	Pass
		2480	0.91	<=30	Pass

4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
1M	SISO	2402	-15.41	<=8	Pass
		2440	-14.79	<=8	Pass
		2480	-14.33	<=8	Pass
2M	SISO	2402	-18.10	<=8	Pass
		2440	-17.79	<=8	Pass
		2480	-16.90	<=8	Pass

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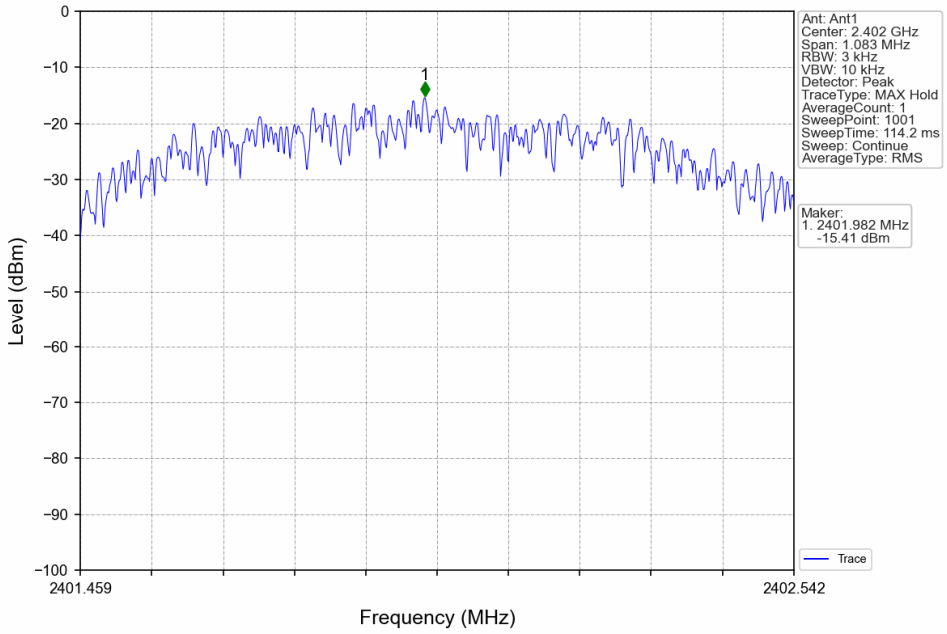
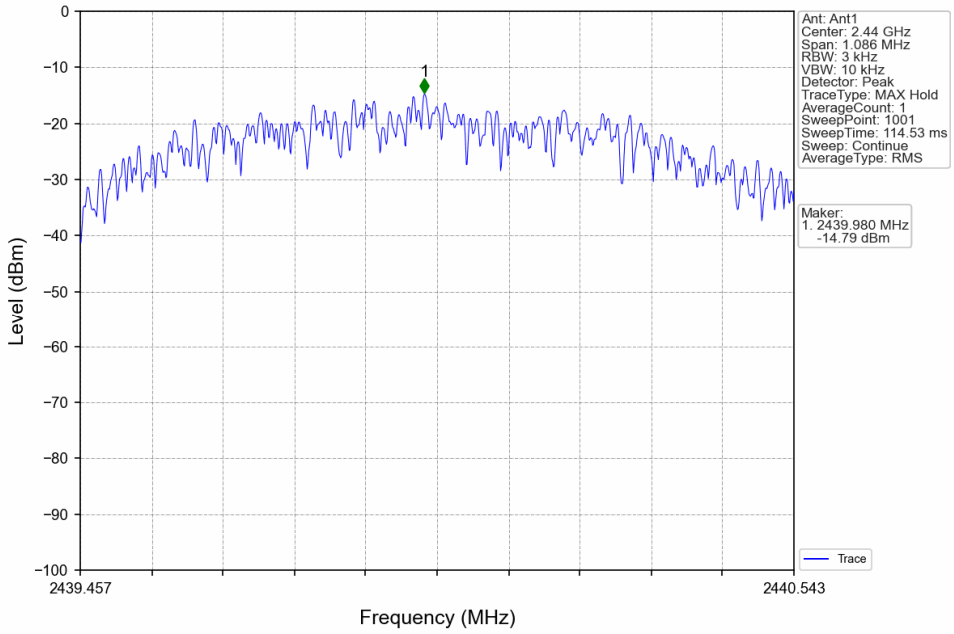
4.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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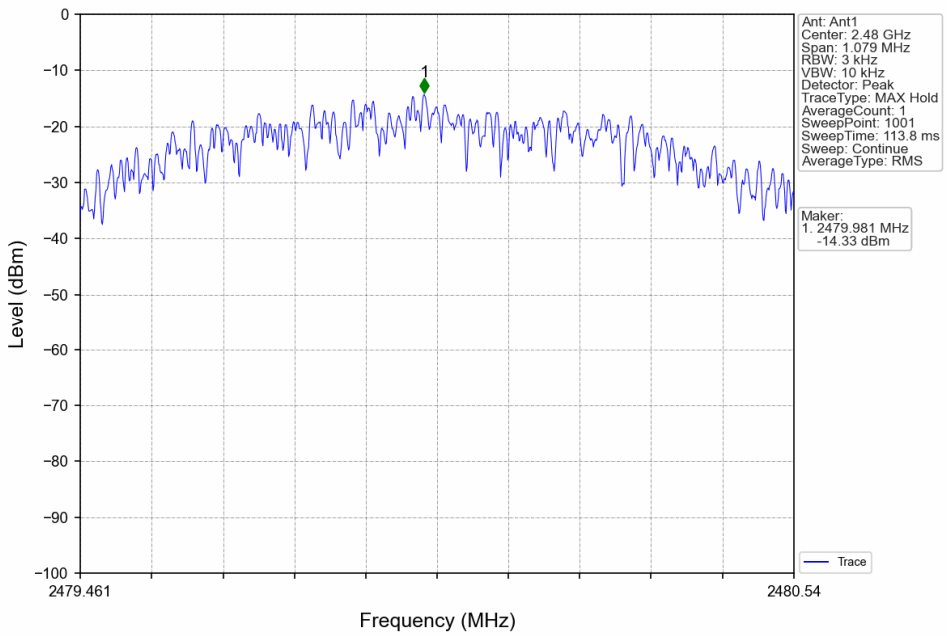
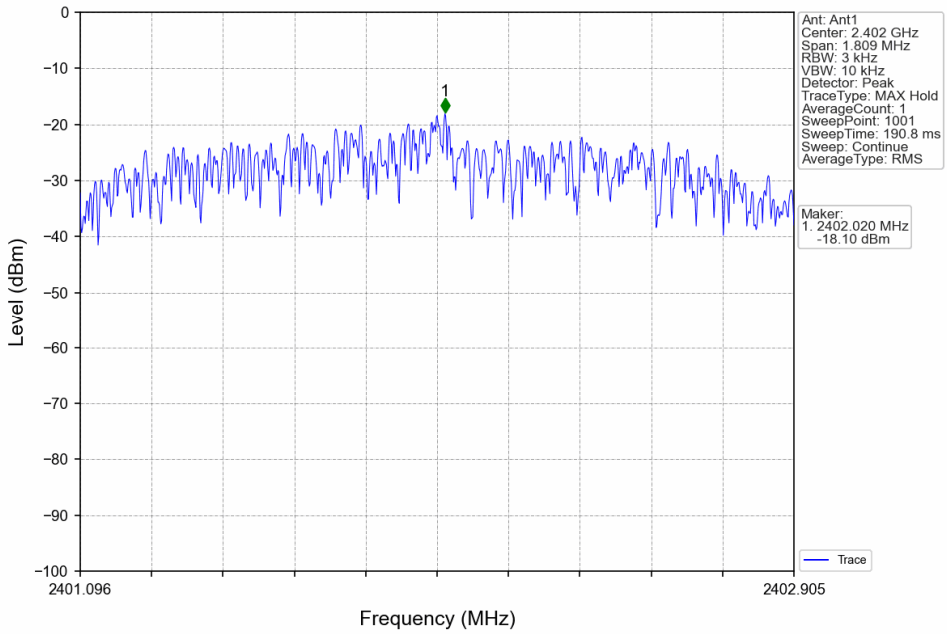
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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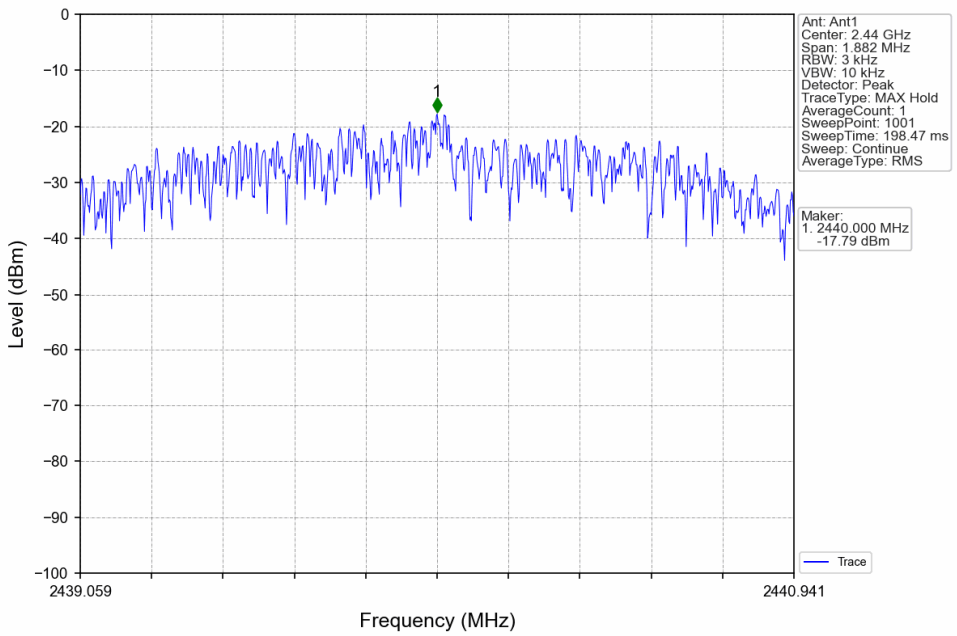
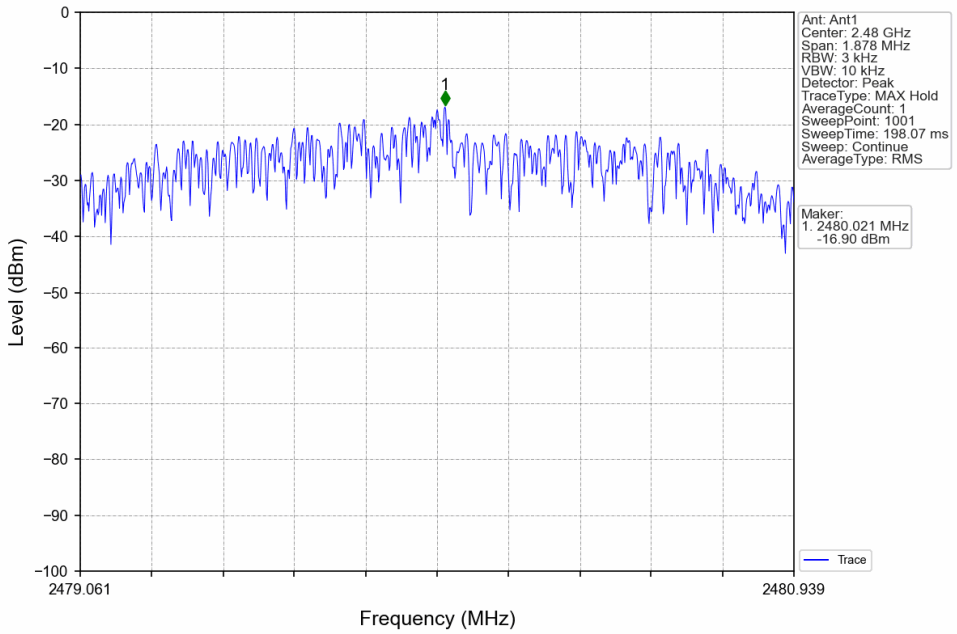
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
1M	SISO	2402	1	-0.50
		2440	1	0.19
		2480	1	0.63
2M	SISO	2402	1	-0.45
		2440	1	0.24
		2480	1	0.64

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.
Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.

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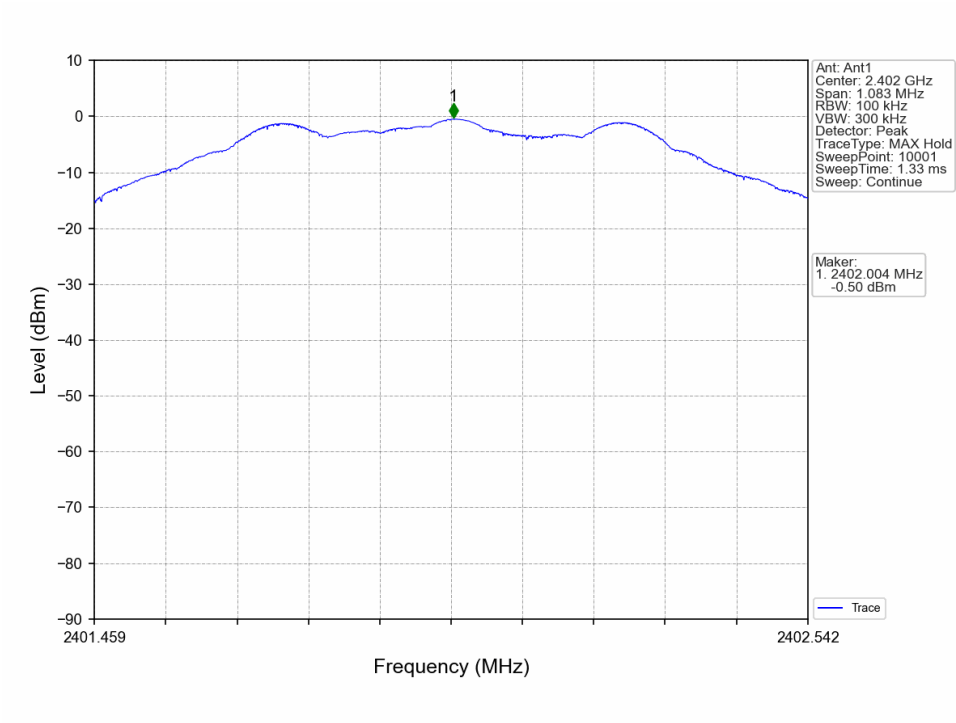
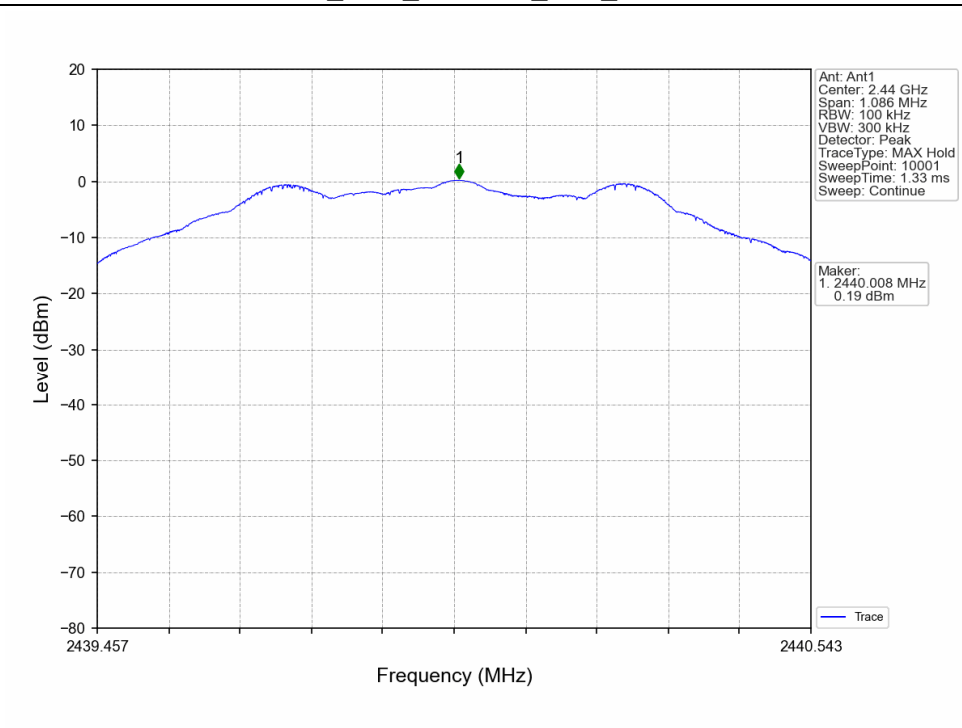
5.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV



1M_MCH_2440MHz_Ant1_NTNV



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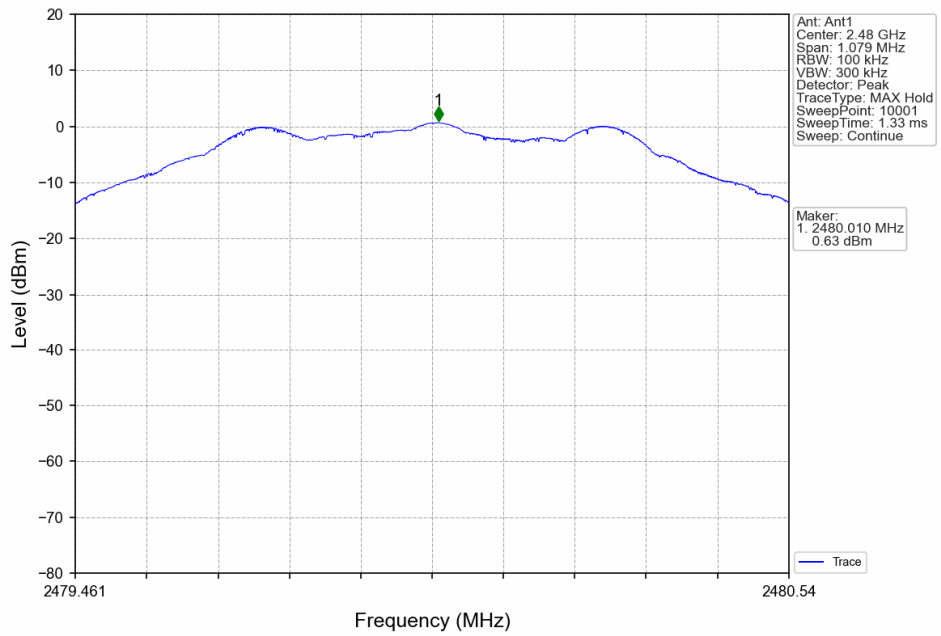
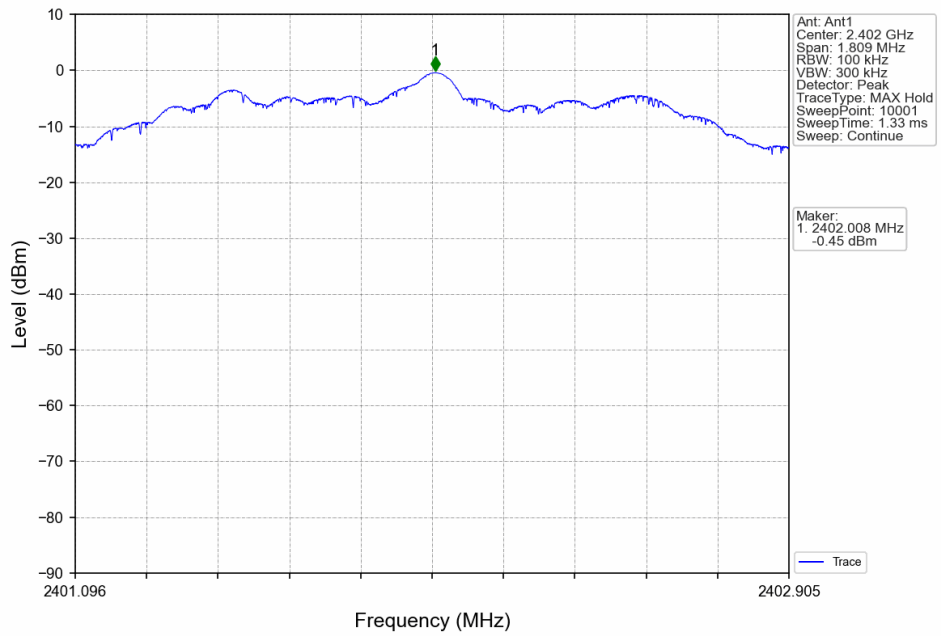
1M_HCH_2480MHz_Ant1_NTNV



2M_LCH_2402MHz_Ant1_NTNV



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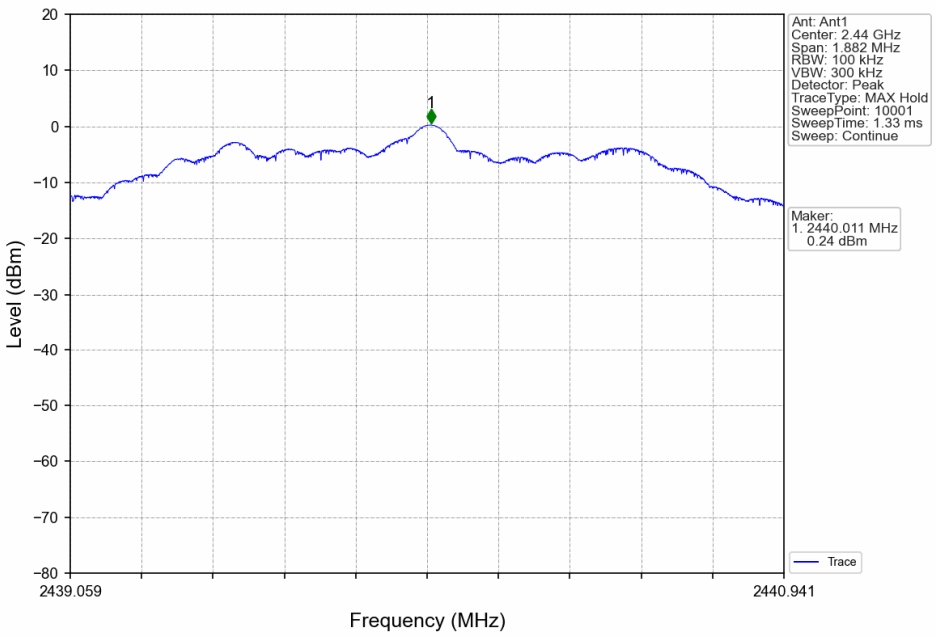
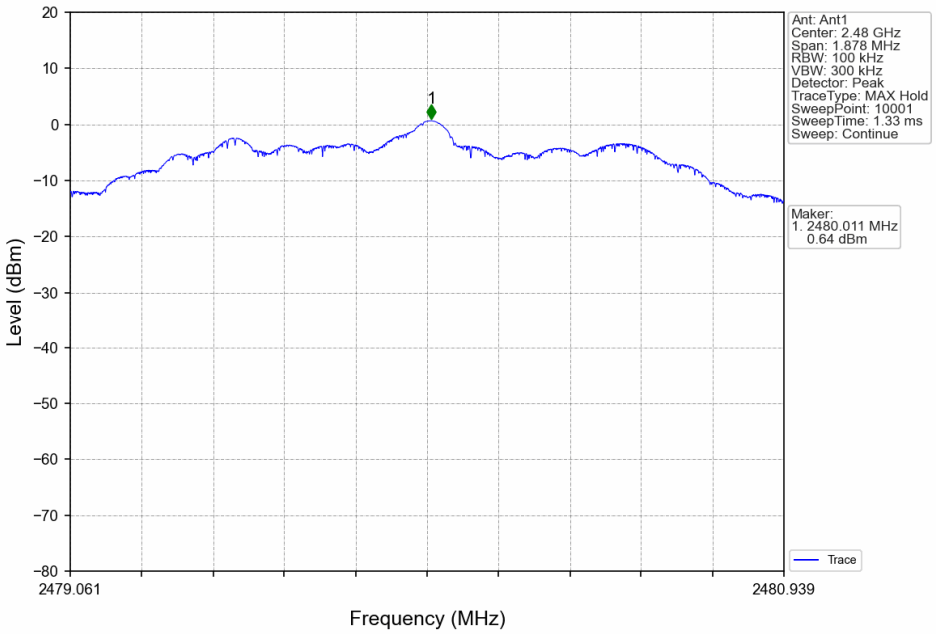
2M_MCH_2440MHz_Ant1_NTNV



2M_HCH_2480MHz_Ant1_NTNV



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5.2 CSE

5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	0.63	-19.37	Pass
		2440	1	0.63	-19.37	Pass
		2480	1	0.63	-19.37	Pass
2M	SISO	2402	1	0.64	-19.36	Pass
		2440	1	0.64	-19.36	Pass
		2480	1	0.64	-19.36	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. Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.						

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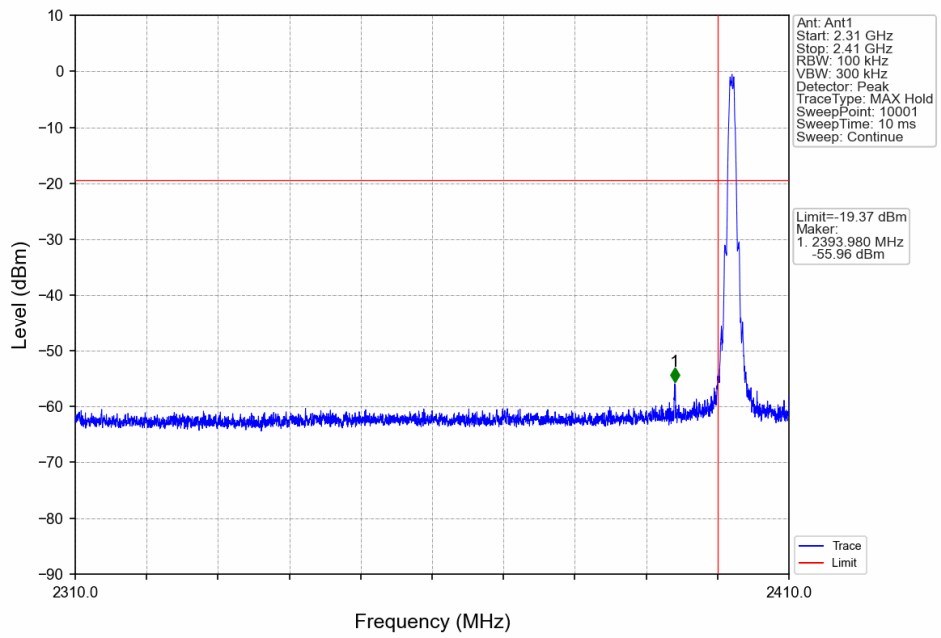
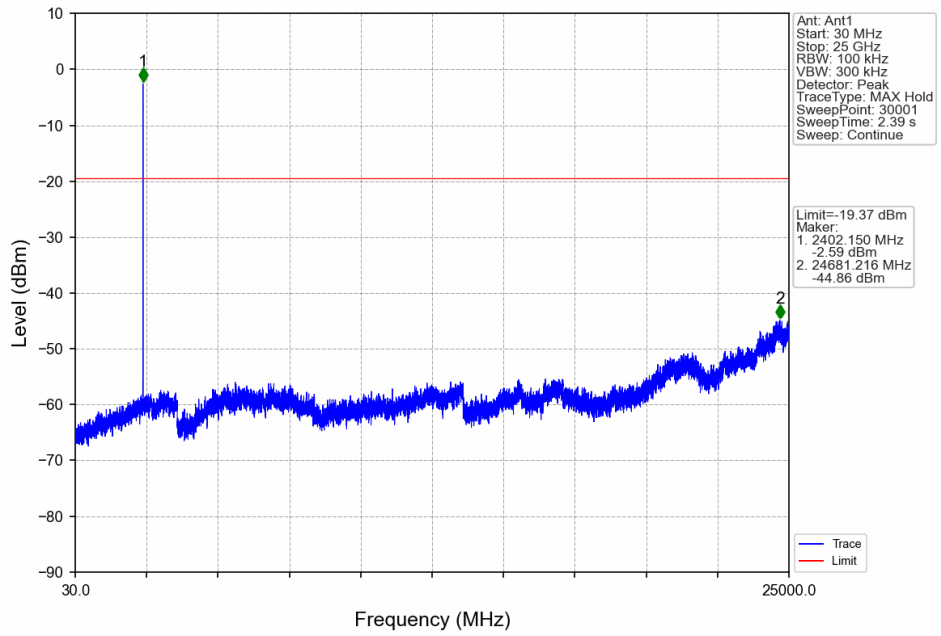
5.2.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV



1M_LCH_2402MHz_Ant1_NTNV



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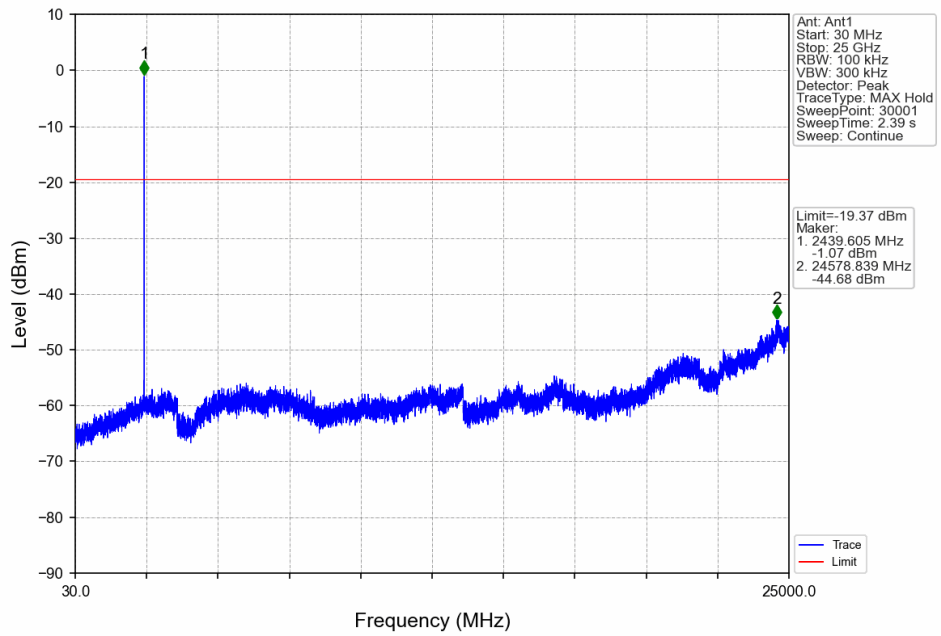
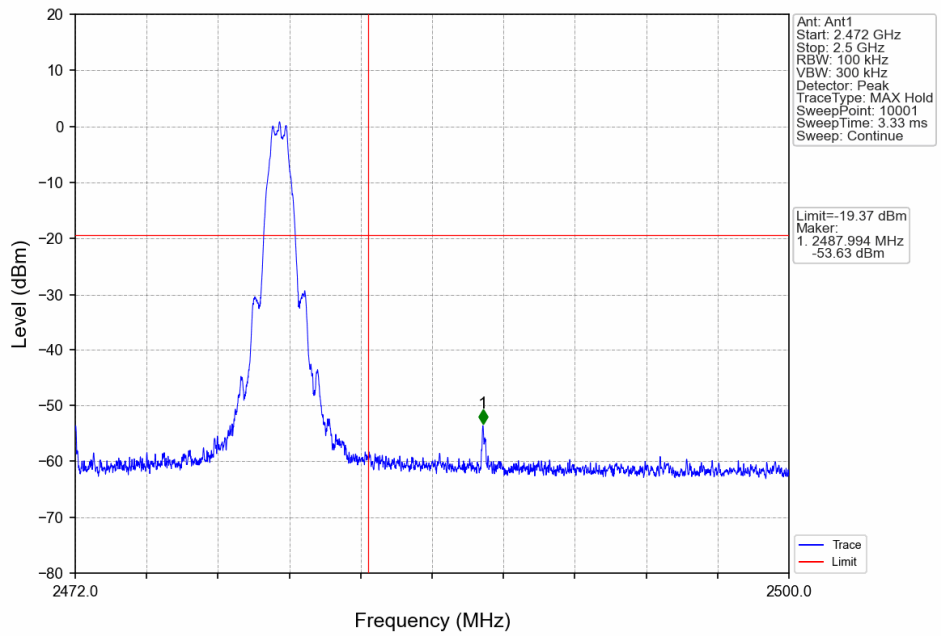


1M_HCH_2480MHz_Ant1_NTNV



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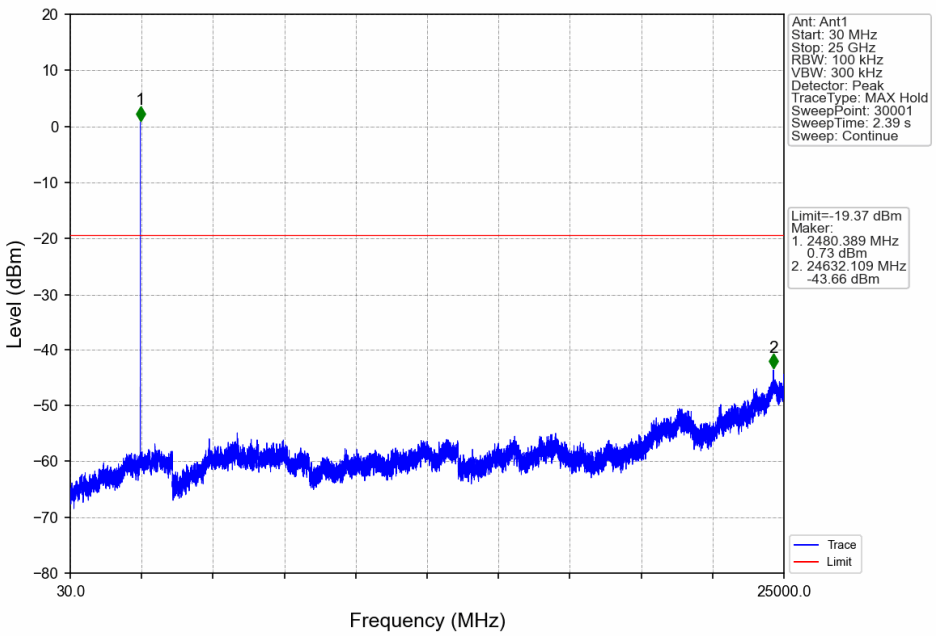
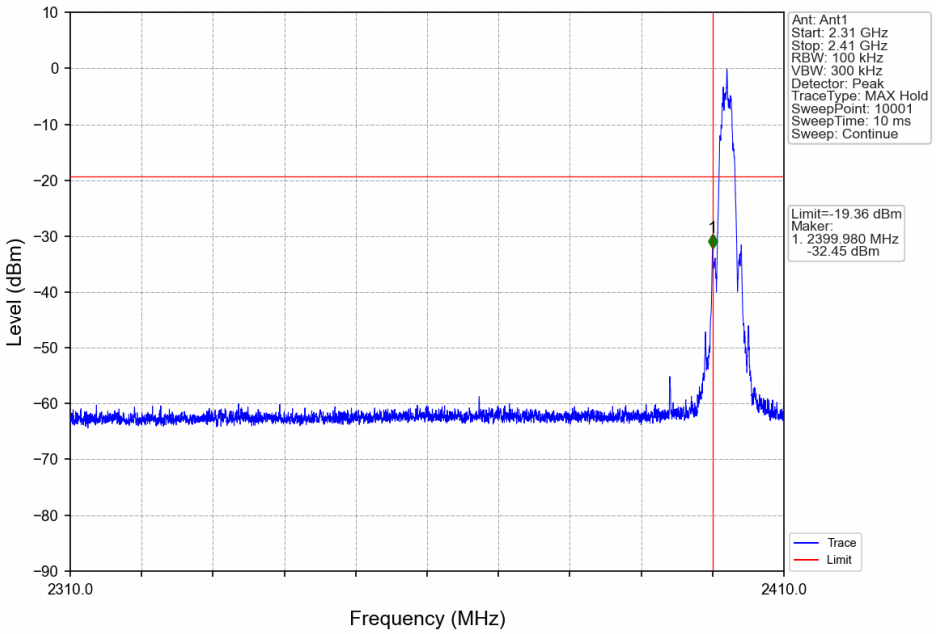


2M_LCH_2402MHz_Ant1_NTNV



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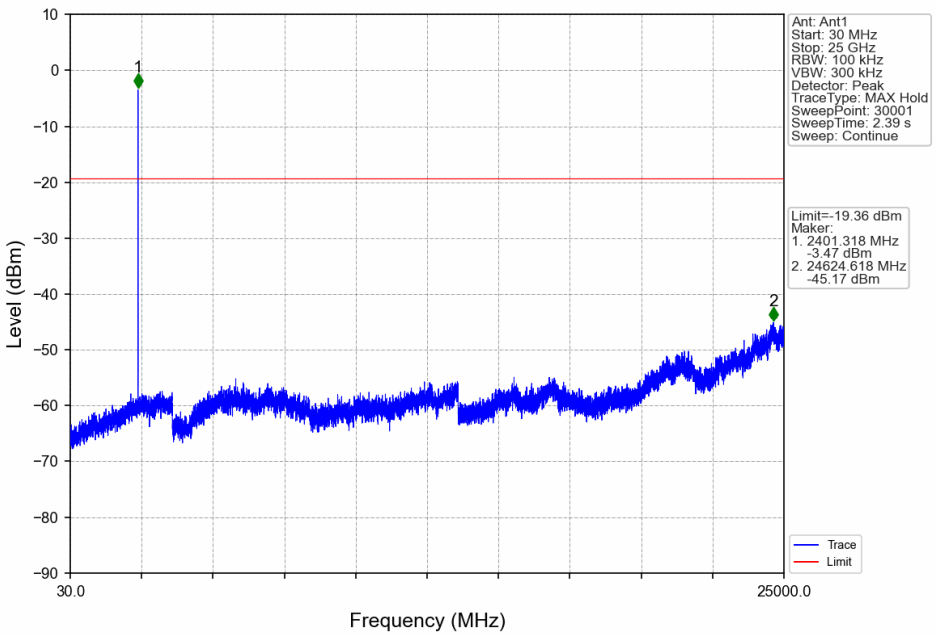
2M_LCH_2402MHz_Ant1_NTNV



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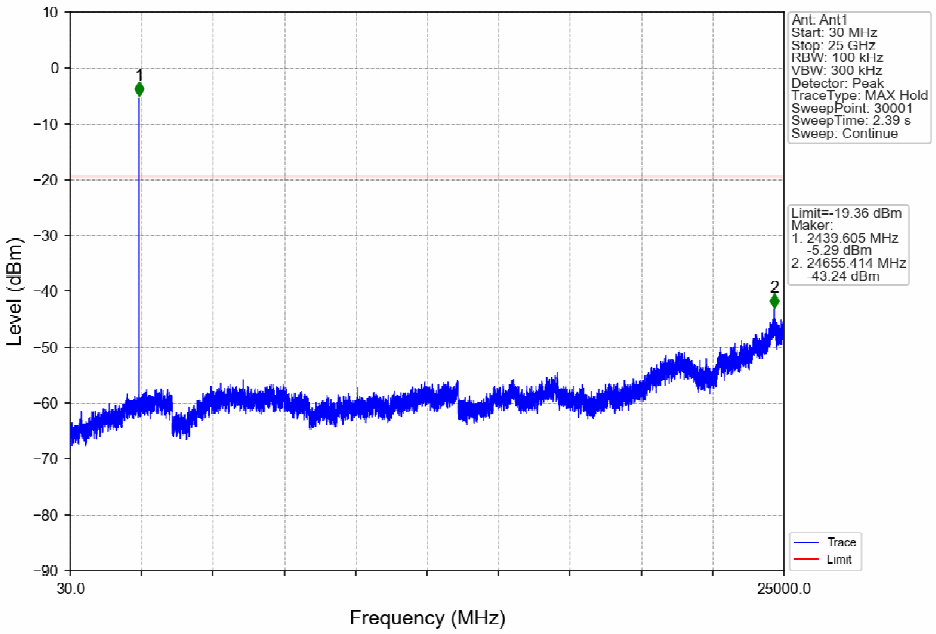

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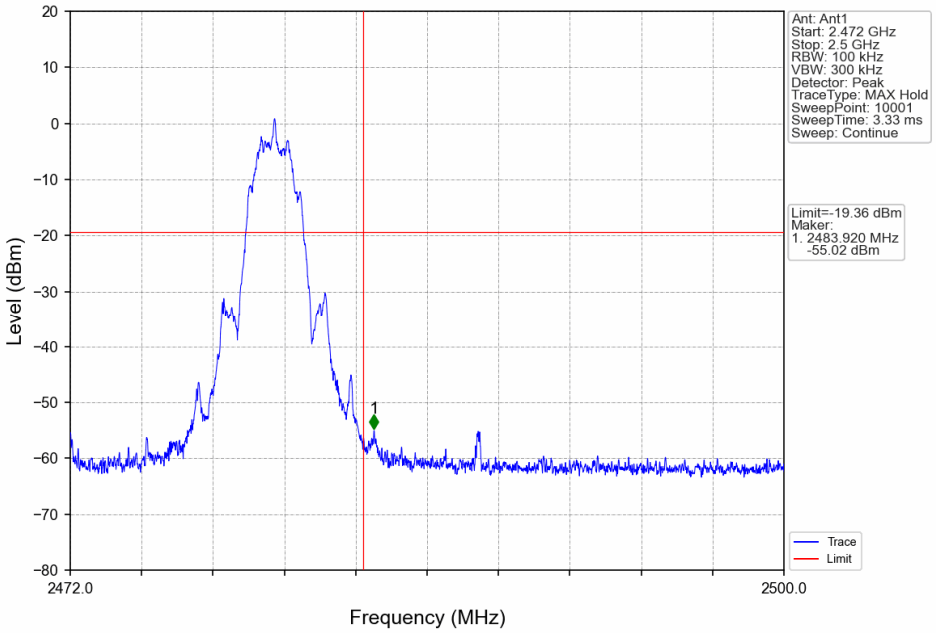
2M_HCH_2480MHz_Ant1_NTNV



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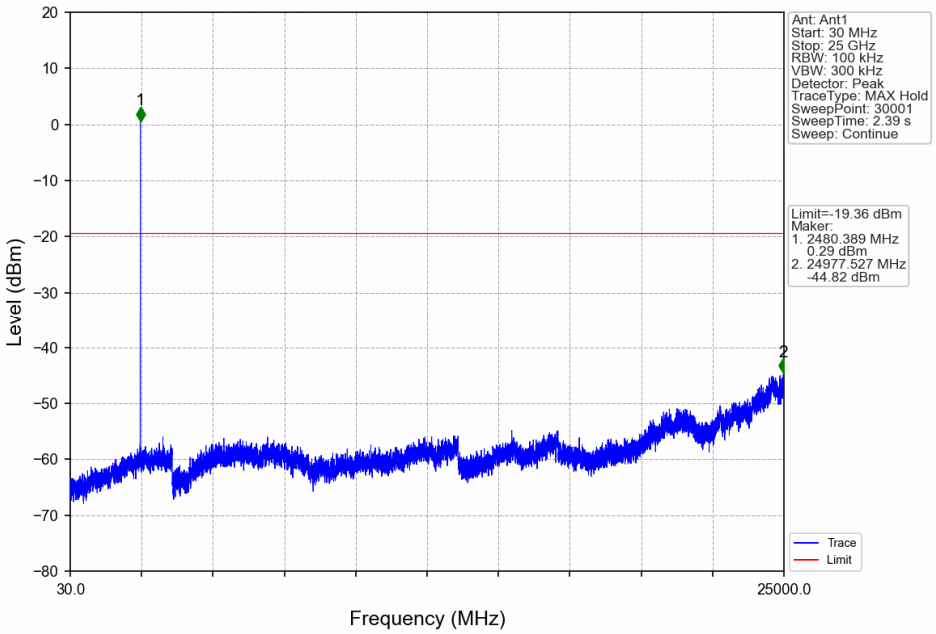

- End of the Report -

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