# TEST REPORT

| | |
|---|---|
| **Application No.:** | GZCR2207000894AT |
| **Applicant:** | Zhejiang Qiangnao Technology Co., Ltd. |
| **Address of Applicant:** | 201-5, Building #1, 1818-2 Wenyi West Road, Yuhang District, Hangzhou, 311121 China |
| **Manufacturer:** | Zhejiang Qiangnao Technology Co., Ltd. |
| **Address of Manufacturer:** | 201-5, Building #1, 1818-2 Wenyi West Road, Yuhang District, Hangzhou, 311121 China |
| **Factory:** | Zhejiang Qiangnao Technology Co., Ltd. |
| **Address of Factory:** | 201-5, Building #1, 1818-2 Wenyi West Road, Yuhang District, Hangzhou, 311121 China |
| **Equipment Under Test (EUT):** | |
| **EUT Name:** | Portable EEG Feedback Device |
| **Model No.:** | ZS-11 |
| **Trade Mark:** | BrainCo |
| **FCC ID** | 2AXO8-ZS11 |
| **Standard(s) :** | 47 CFR Part 15, Subpart C 15.247 |
| **Date of Receipt:** | 2022-06-23 |
| **Date of Test:** | 2022-06-28 to 2022-07-28 |
| **Date of Issue:** | 2022-07-29 |
| **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** | **Report No.** | **Date** | **Remark** |
| 01 | | 2022-07-29 | Original |
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|---|---|---|---|---|
| **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 6.4,6.5,6.6 | 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 |
| Duty Cycle | | ANSI C63.10 (2013) Section 11.6 | KDB 558074 D01 v05r02 section 6 | Pass |

**Note:**

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

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

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# 4 General Information

## 4.1 Details of E.U.T.

| | |
|---|---|
| Power supply: | DC3.7V 90mAH Rechargeable battery charged by USB port |
| Cable(s): | Type C cable:45cm unshielded |
| Operation Frequency: | 2402MHz to 2480MHz |
| Bluetooth Version: | V5.0 LE |
| Modulation Type: | GFSK |
| Number of Channels: | 40 |
| Channel Spacing: | 2MHz |
| Data rate: | 1Mbps |
| Antenna Type: | Chip Antenna |
| Antenna Gain: | 2.2dBi |

## 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); ±4.38dB (30MHz-1GHz; 10m); |
| Radiated Spurious Emissions (Above 1GHz) | ± 5.12dB (1GHz-6GHz); ± 5.38dB (6GHz-18GHz); ± 5.61dB (18GHz-40GHz) |
| Duty Cycle | ± 0.37% |

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## 4.4 Test Location

All tests were performed at:

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Tel: +86 20 82155555 Fax: +86 20 82075059

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)**

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

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

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

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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 | 2022-05-16 | 2023-05-15 |
| EXA Signal Analzer(10Hz-44GHz) | Agilent Technologies | N9010A | EMC2138 | 2021-09-16 | 2022-09-15 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2022-03-29 | 2023-03-28 |
| 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 | 2023-03-28 |
| 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 | 2023-03-28 |
| 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 | 2023-03-28 |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2021-11-01 | 2023-11-01 |
| Test Software | TST | V2.0 | GZE100-78 | N/A | N/A |

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| 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 | 2023-03-28 |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2021-11-01 | 2023-11-01 |
| Test Software | TST | V2.0 | GZE100-78 | N/A | N/A |

| 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 |

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| 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 | 2022-02-21 | 2025-02-20 |
| Amplifier(9kHz-1.3GHz) | HP | 8447F | EMC2065 | 2022-06-21 | 2023-06-20 |
| Active Loop Antenna-RED | ETS-Lindgren | 6502 | EMC2190 | 2022-04-06 | 2024-04-05 |
| 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 |
| EMI Test Receiver(1Hz-8GHz) | Rohde & Schwarz | ESW8 | EMC2220 | 2022-05-20 | 2023-05-19 |

| 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 |

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| Duty Cycle | | | | | |
|---|---|---|---|---|---|
| **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 | 2023-03-28 |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2021-11-01 | 2023-11-01 |
| Test Software | TST | V2.0 | GZE100-78 | N/A | N/A |

| General used equipment | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No** | **Inventory No** | **Cal Date** | **Cal Due Date** |
| DMM | Fluke | 73 | EMC0006 | 2022-06-24 | 2023-06-23 |
| DMM | Fluke | 73 | EMC0007 | 2022-06-24 | 2023-06-23 |

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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 2.2 dBi.

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: 25.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

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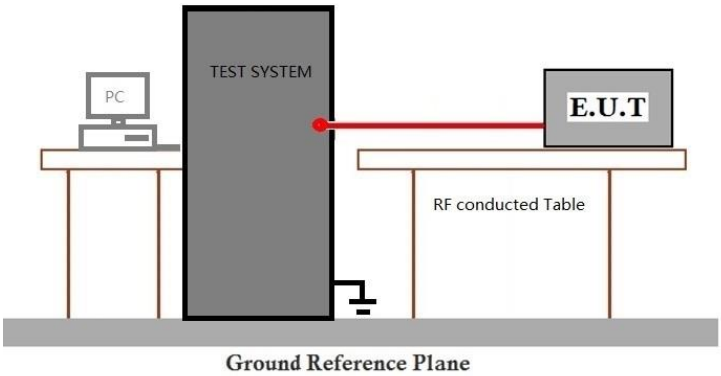
### 7.1.3 Test Setup Diagram




### 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

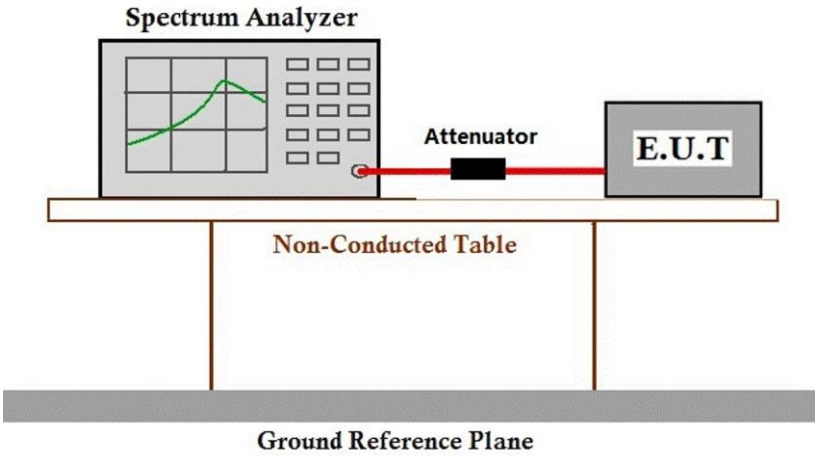
Operating Environment:

Temperature: 25.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_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

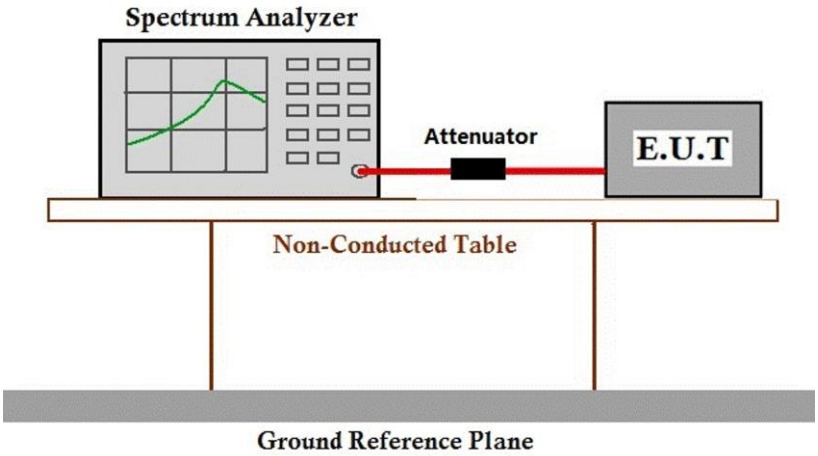
Operating Environment:

Temperature: 25.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_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

Please Refer to Appendix for Details

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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

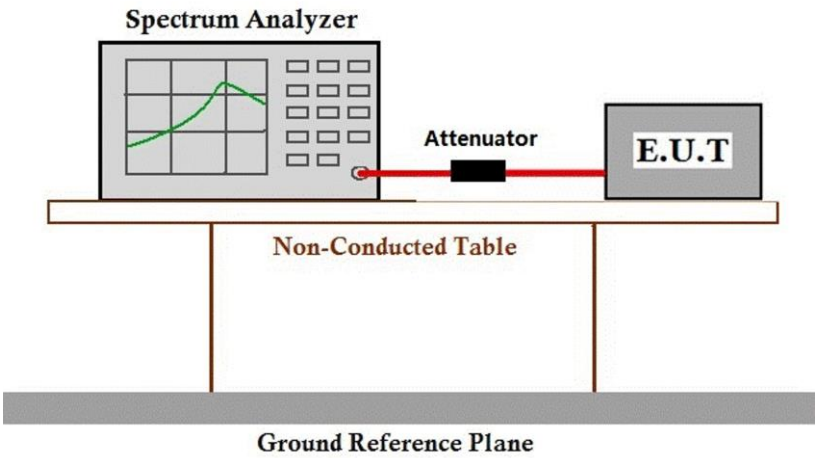
Operating Environment:

Temperature: 25.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.4.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_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

Please Refer to Appendix for Details

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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

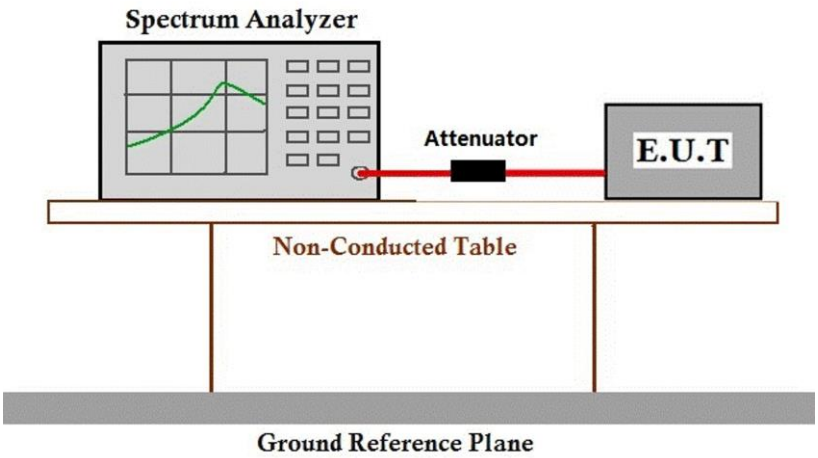
Operating Environment:

Temperature: 25.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.5.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_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

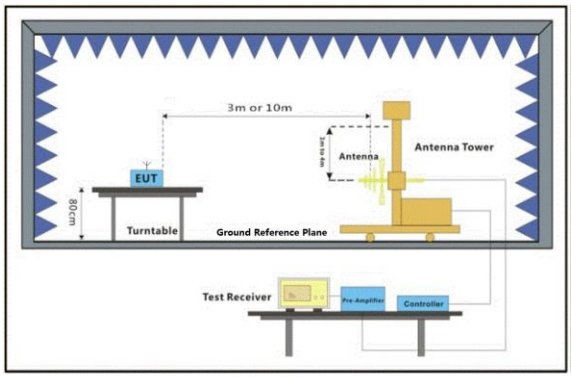
Operating Environment:

Temperature: 25.4 °C Humidity: 56.2 % RH Atmospheric Pressure: 1003 mbar

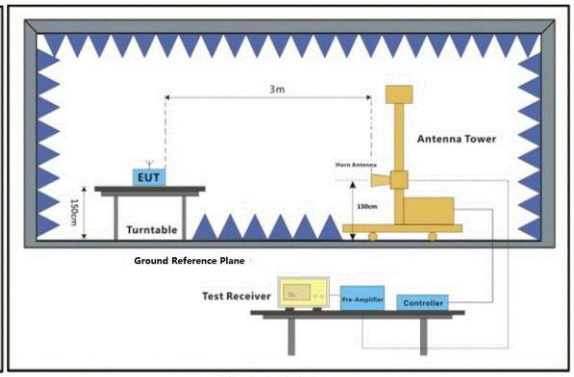
### 7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

### 7.6.3 Test Setup Diagram




30MHz-1GHz




Above 1GHz

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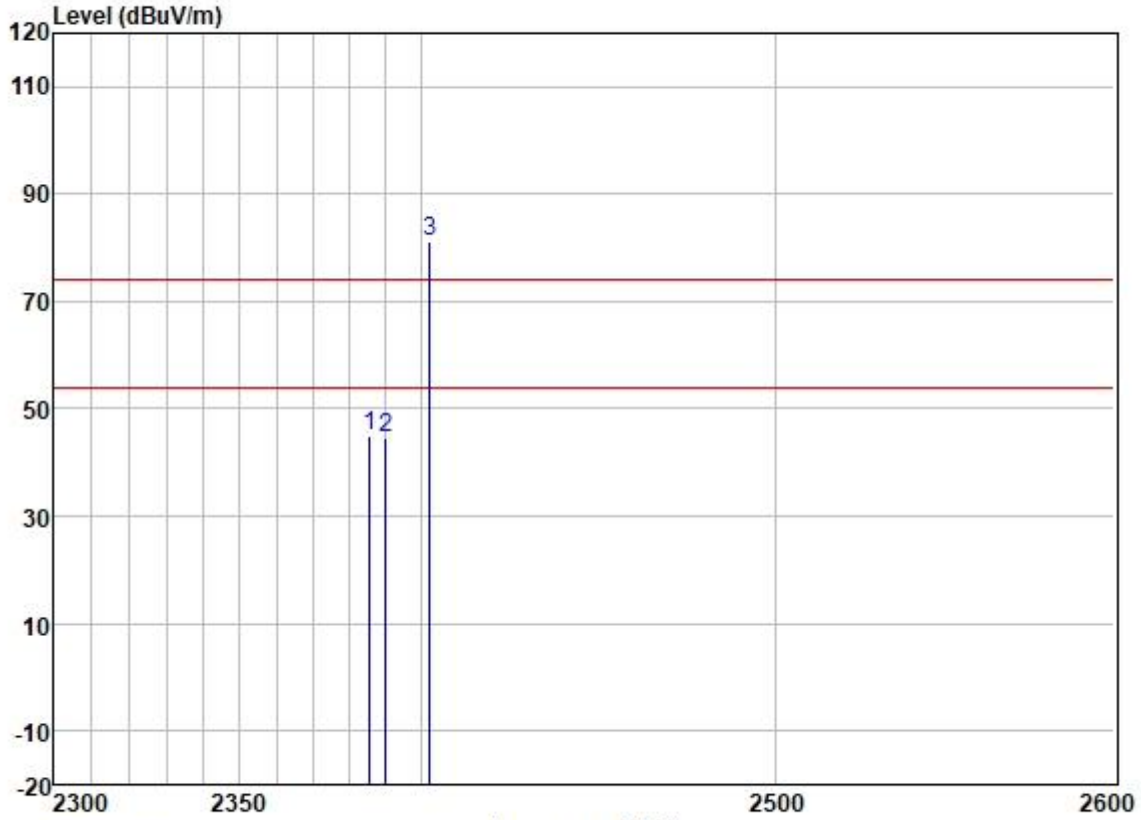
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low




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 | | 2385.410 | 51.91 | 27.33 | 3.48 | 37.60 | 45.12 | 74.00 | -28.88 | HORIZONTAL | Peak |
| 2 | | 2390.000 | 51.34 | 27.33 | 3.48 | 37.59 | 44.56 | 74.00 | -29.44 | HORIZONTAL | Peak |
| 3 | * | 2402.000 | 87.91 | 27.35 | 3.50 | 37.59 | 81.17 | 74.00 | 7.17 | HORIZONTAL | Peak |

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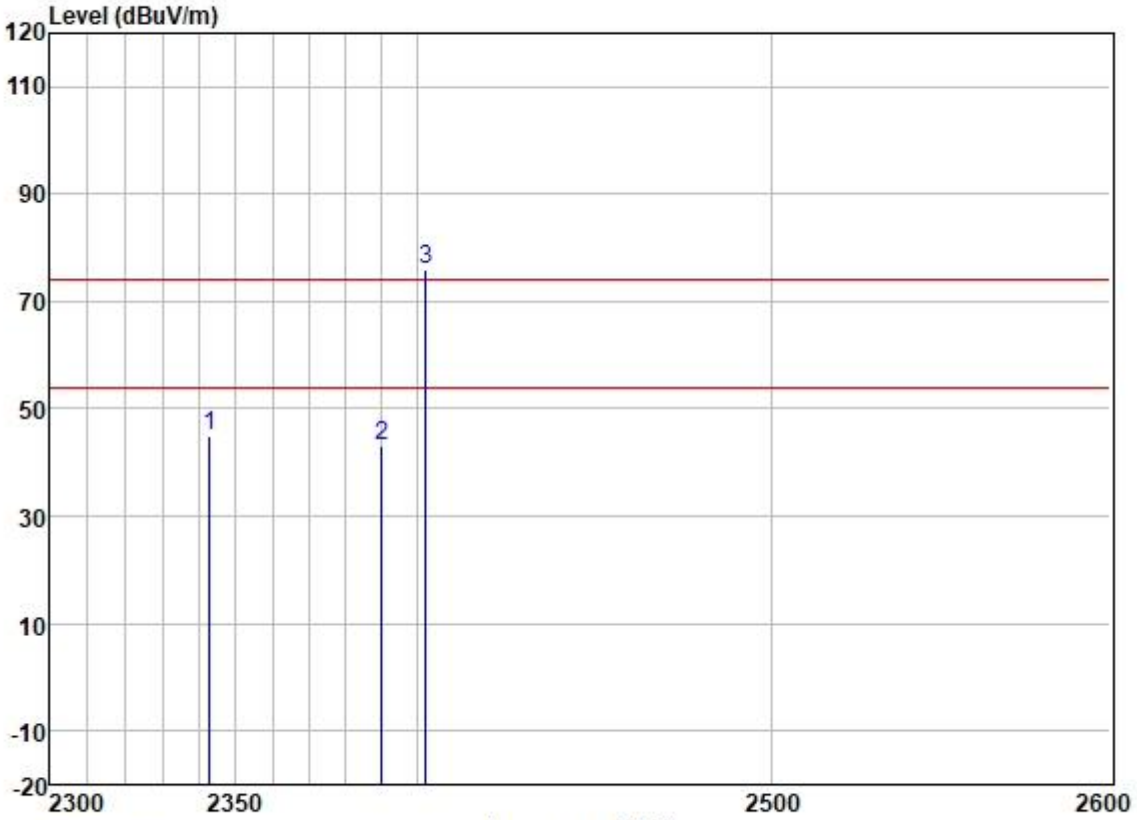
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:Low




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 | 2342.731 | 51.81 | 27.24 | 3.38 | 37.61 | 44.82 | 74.00 | -29.18 | VERTICAL | Peak |
| 2 | 2390.000 | 49.87 | 27.33 | 3.48 | 37.59 | 43.09 | 74.00 | -30.91 | VERTICAL | Peak |
| 3 * | 2402.000 | 82.58 | 27.35 | 3.50 | 37.59 | 75.84 | 74.00 | 1.84 | VERTICAL | Peak |

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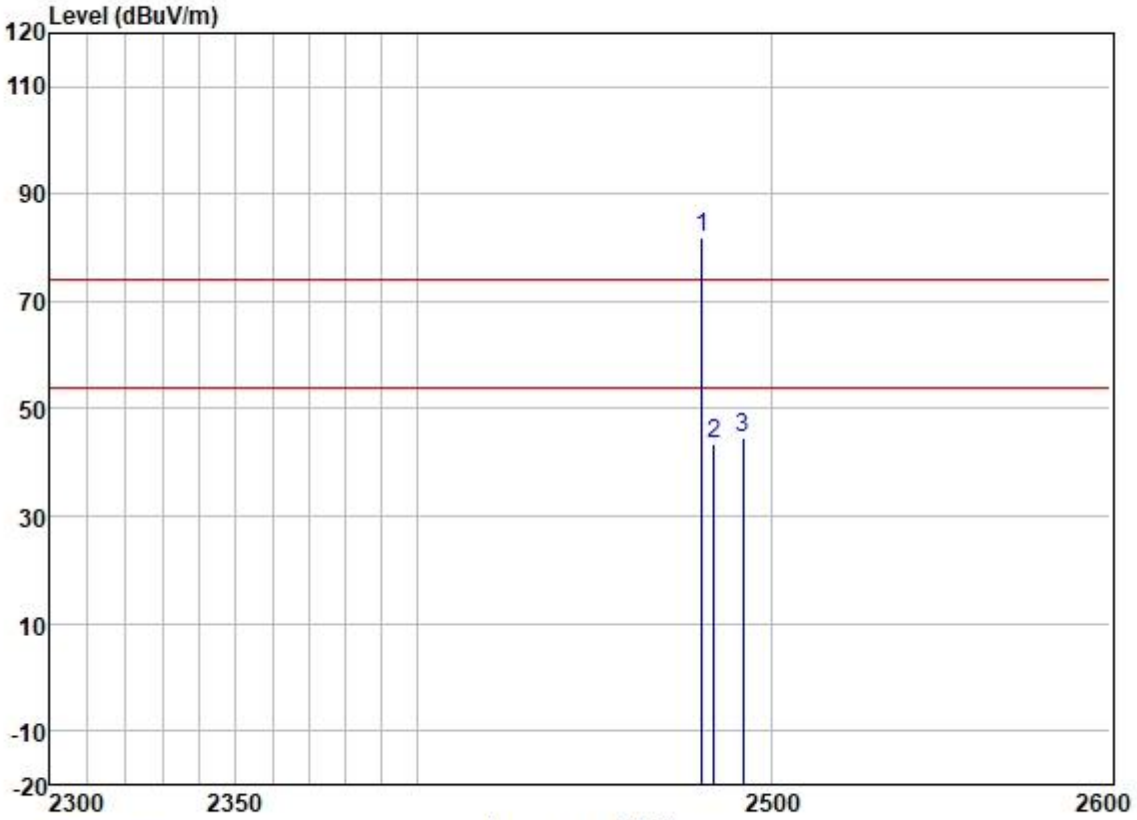
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:High




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 | * | 2480.000 | 88.57 | 27.47 | 3.60 | 37.57 | 82.07 | 74.00 | 8.07 | HORIZONTAL | Peak |
| 2 | | 2483.500 | 50.02 | 27.48 | 3.53 | 37.57 | 43.46 | 74.00 | -30.54 | HORIZONTAL | Peak |
| 3 | | 2491.672 | 51.08 | 27.49 | 3.47 | 37.56 | 44.48 | 74.00 | -29.52 | HORIZONTAL | Peak |

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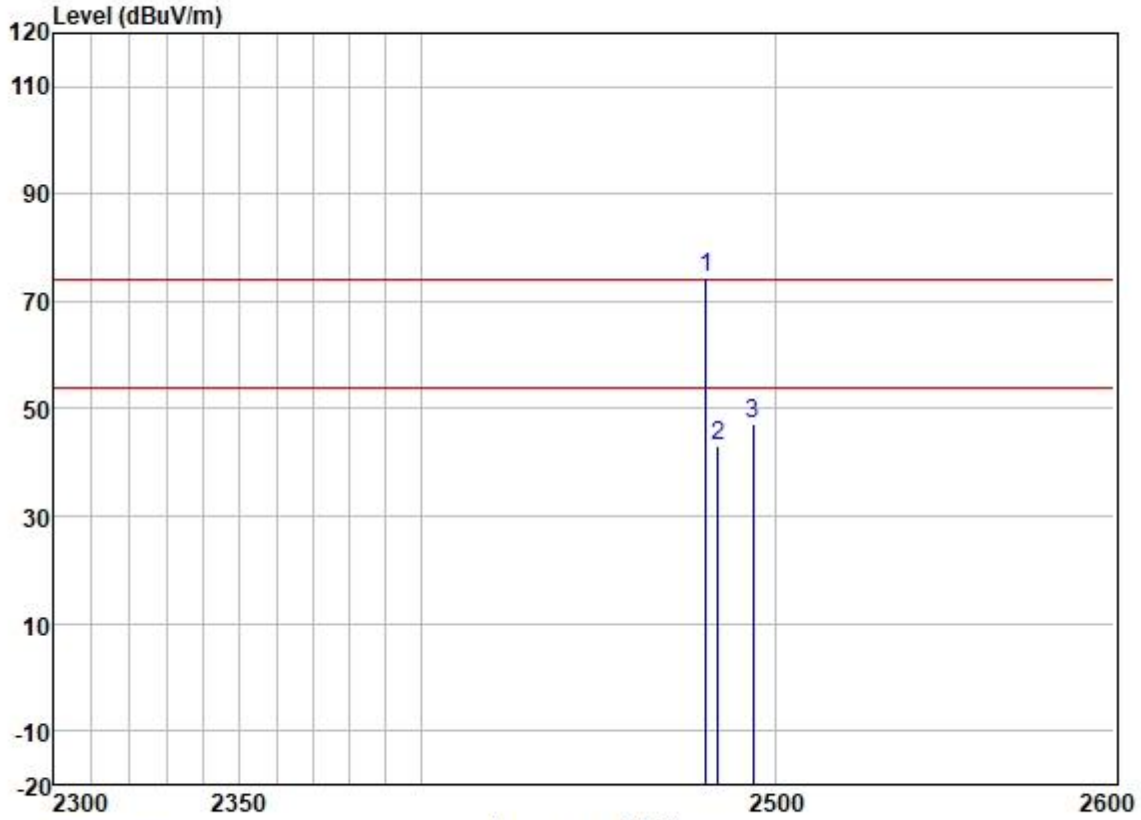
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:High




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 | 81.00 | 27.47 | 3.60 | 37.57 | 74.50 | 74.00 | 0.50 | VERTICAL | Peak |
| 2 | | 2483.500 | 49.78 | 27.48 | 3.53 | 37.57 | 43.22 | 74.00 | -30.78 | VERTICAL | Peak |
| 3 | | 2493.551 | 53.71 | 27.49 | 3.47 | 37.56 | 47.11 | 74.00 | -26.89 | 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 6.4,6.5,6.6
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. | | |

### 7.7.1 E.U.T. Operation

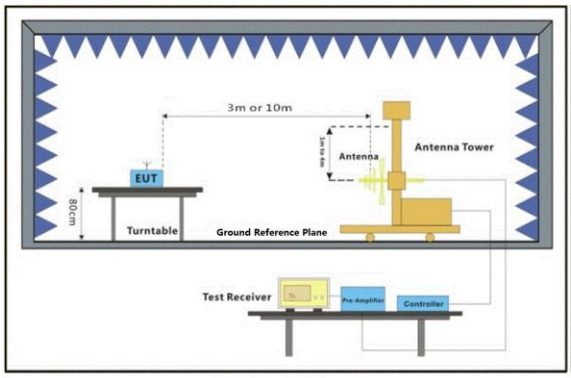
Operating Environment:

Temperature: 25.4 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

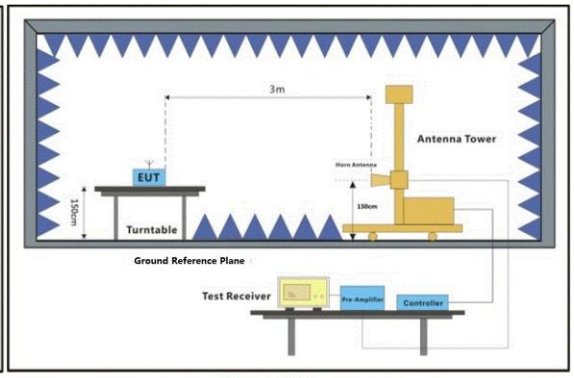
### 7.7.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

### 7.7.3 Test Setup Diagram




30MHz-1GHz




Above 1GHz

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### 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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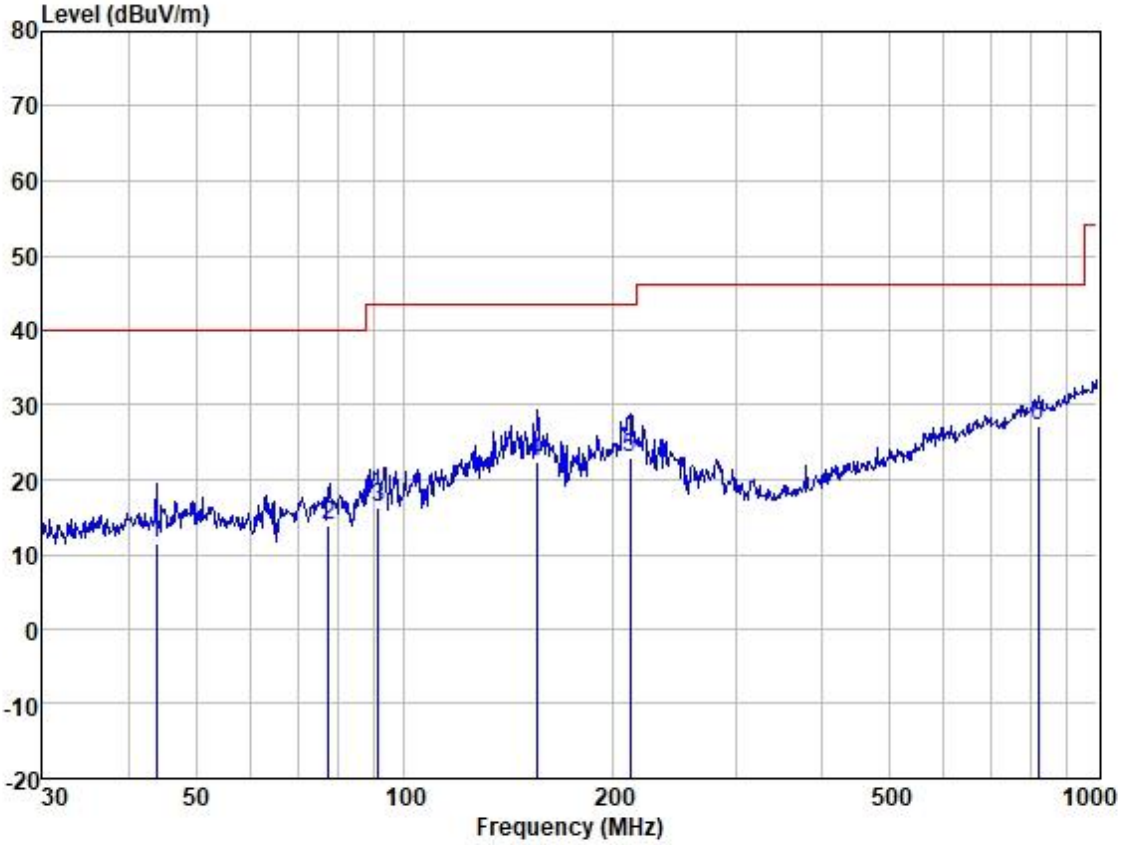
Test Mode: 00; Polarity: Horizontal




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 | 43.812 | 24.19 | 13.82 | 1.12 | 27.61 | 11.52 | 40.00 | -28.48 | HORIZONTAL | QP |
| 2 | 77.593 | 30.28 | 9.61 | 1.46 | 27.60 | 13.75 | 40.00 | -26.25 | HORIZONTAL | QP |
| 3 | 91.495 | 34.35 | 7.93 | 1.64 | 27.60 | 16.32 | 43.50 | -27.18 | HORIZONTAL | QP |
| 4 | 154.821 | 33.92 | 13.59 | 2.28 | 27.37 | 22.42 | 43.50 | -21.08 | HORIZONTAL | QP |
| 5 | 211.527 | 37.63 | 9.98 | 2.59 | 27.29 | 22.91 | 43.50 | -20.59 | HORIZONTAL | QP |
| 6 | 821.710 | 25.93 | 23.38 | 6.30 | 28.53 | 27.08 | 46.00 | -18.92 | HORIZONTAL | QP |

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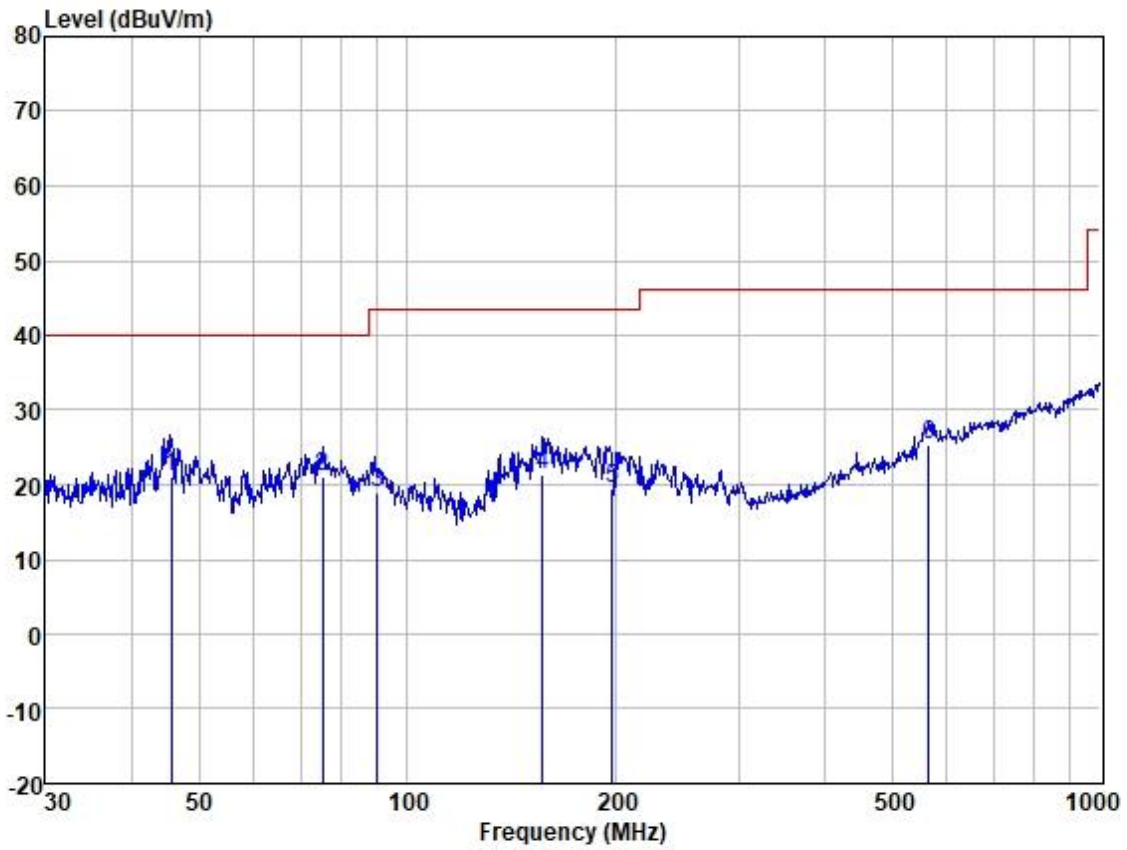
Test Mode: 00; Polarity: Vertical




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 | 45.535 | 33.68 | 13.93 | 1.12 | 27.60 | 21.13 | 40.00 | -18.87 | VERTICAL | QP |
| 2 | 75.446 | 36.95 | 10.16 | 1.45 | 27.60 | 20.96 | 40.00 | -19.04 | VERTICAL | QP |
| 3 | 90.537 | 37.08 | 7.90 | 1.62 | 27.60 | 19.00 | 43.50 | -24.50 | VERTICAL | QP |
| 4 | 156.458 | 32.92 | 13.61 | 2.30 | 27.37 | 21.46 | 43.50 | -22.04 | VERTICAL | QP |
| 5 | 197.200 | 33.89 | 10.27 | 2.51 | 27.30 | 19.37 | 43.50 | -24.13 | VERTICAL | QP |
| 6 | 564.639 | 30.30 | 18.75 | 4.93 | 28.75 | 25.23 | 46.00 | -20.77 | 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) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |
| Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. | | |

### 7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 25.4 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.8.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

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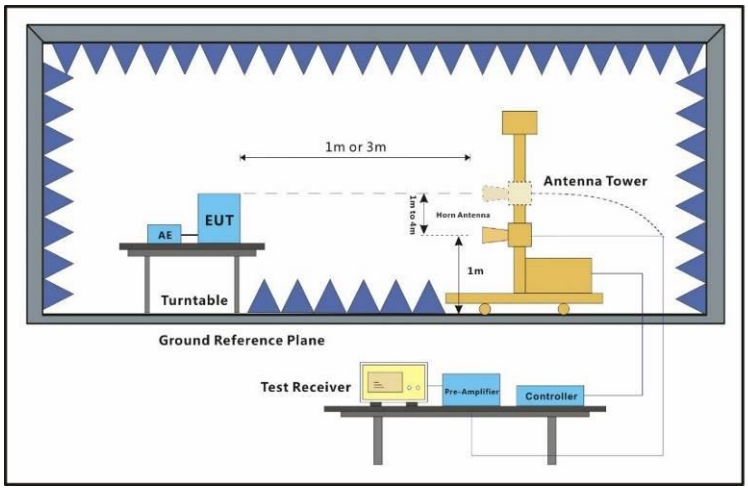
### 7.8.3 Test Setup Diagram

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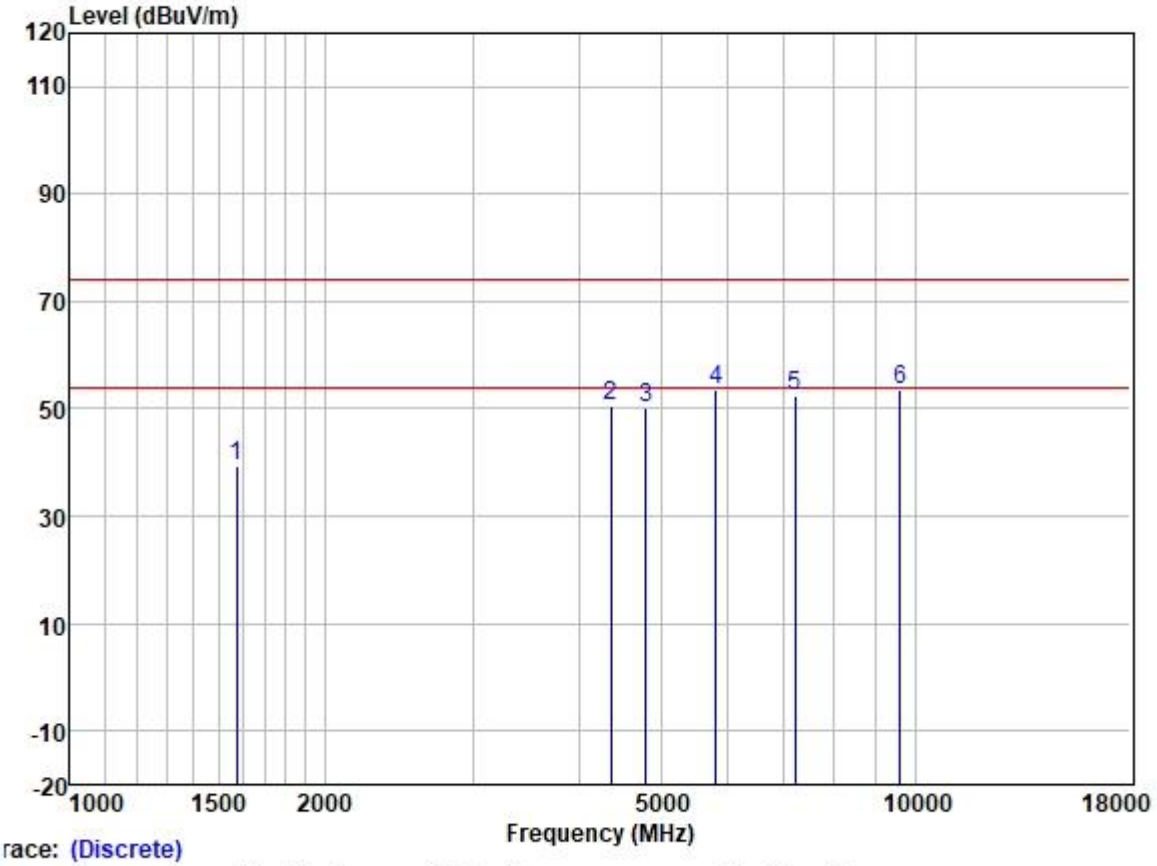
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low




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 | 1574.265 | 48.95 | 25.56 | 2.80 | 38.00 | 39.31 | 74.00 | -34.69 | HORIZONTAL | Peak |
| 2 | 4367.058 | 52.09 | 30.62 | 4.68 | 36.81 | 50.58 | 74.00 | -23.42 | HORIZONTAL | Peak |
| 3 | 4804.000 | 50.31 | 31.42 | 5.40 | 36.83 | 50.30 | 74.00 | -23.70 | HORIZONTAL | Peak |
| 4 | 5813.812 | 52.22 | 32.21 | 6.07 | 36.90 | 53.60 | 74.00 | -20.40 | HORIZONTAL | Peak |
| 5 | 7206.000 | 48.15 | 35.54 | 5.98 | 37.38 | 52.29 | 74.00 | -21.71 | HORIZONTAL | Peak |
| 6 | 9608.000 | 45.37 | 38.37 | 7.07 | 37.42 | 53.39 | 74.00 | -20.61 | HORIZONTAL | Peak |

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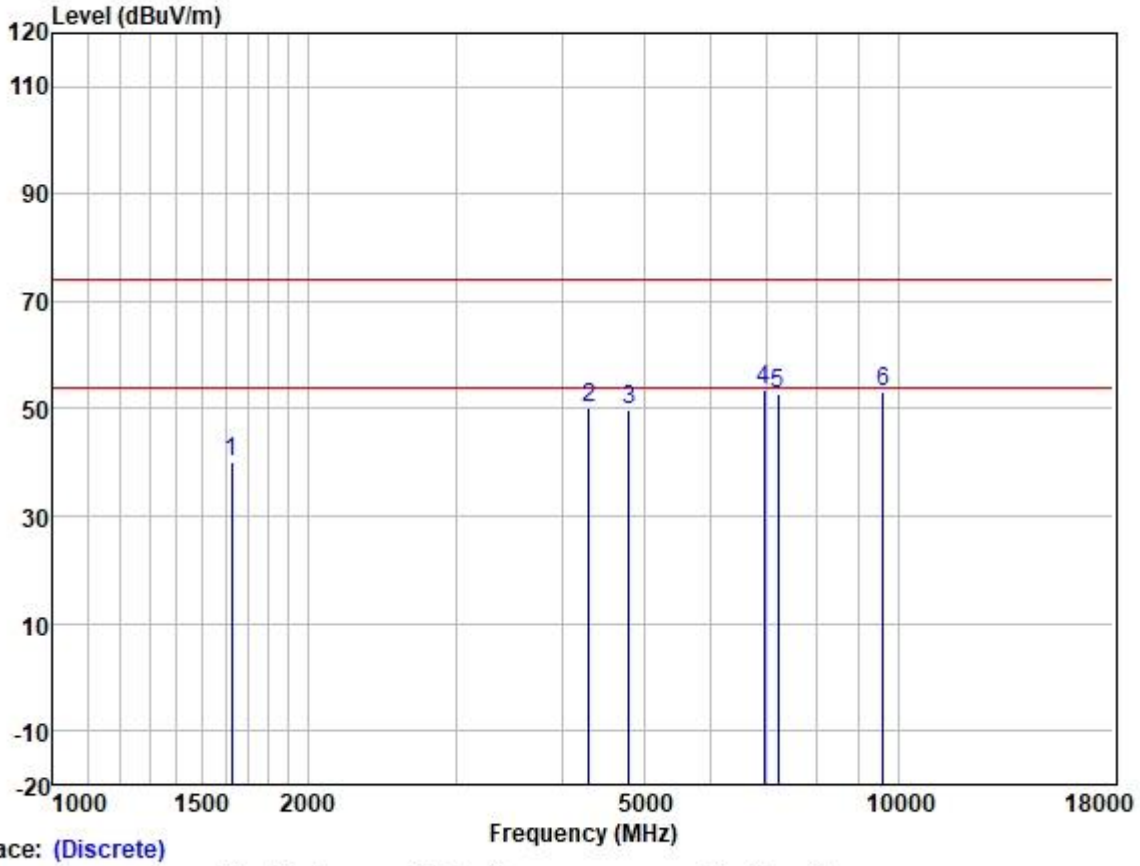
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:Low




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 | 1625.121 | 49.51 | 25.61 | 2.80 | 37.95 | 39.97 | 74.00 | -34.03 | VERTICAL | Peak |
| 2 | 4304.400 | 51.72 | 30.48 | 4.65 | 36.81 | 50.04 | 74.00 | -23.96 | VERTICAL | Peak |
| 3 | 4804.000 | 49.94 | 31.42 | 5.40 | 36.83 | 49.93 | 74.00 | -24.07 | VERTICAL | Peak |
| 4 | 6934.778 | 50.04 | 34.92 | 5.81 | 37.19 | 53.58 | 74.00 | -20.42 | VERTICAL | Peak |
| 5 | 7206.000 | 48.73 | 35.54 | 5.98 | 37.38 | 52.87 | 74.00 | -21.13 | VERTICAL | Peak |
| 6 | 9608.000 | 45.17 | 38.37 | 7.07 | 37.42 | 53.19 | 74.00 | -20.81 | VERTICAL | Peak |

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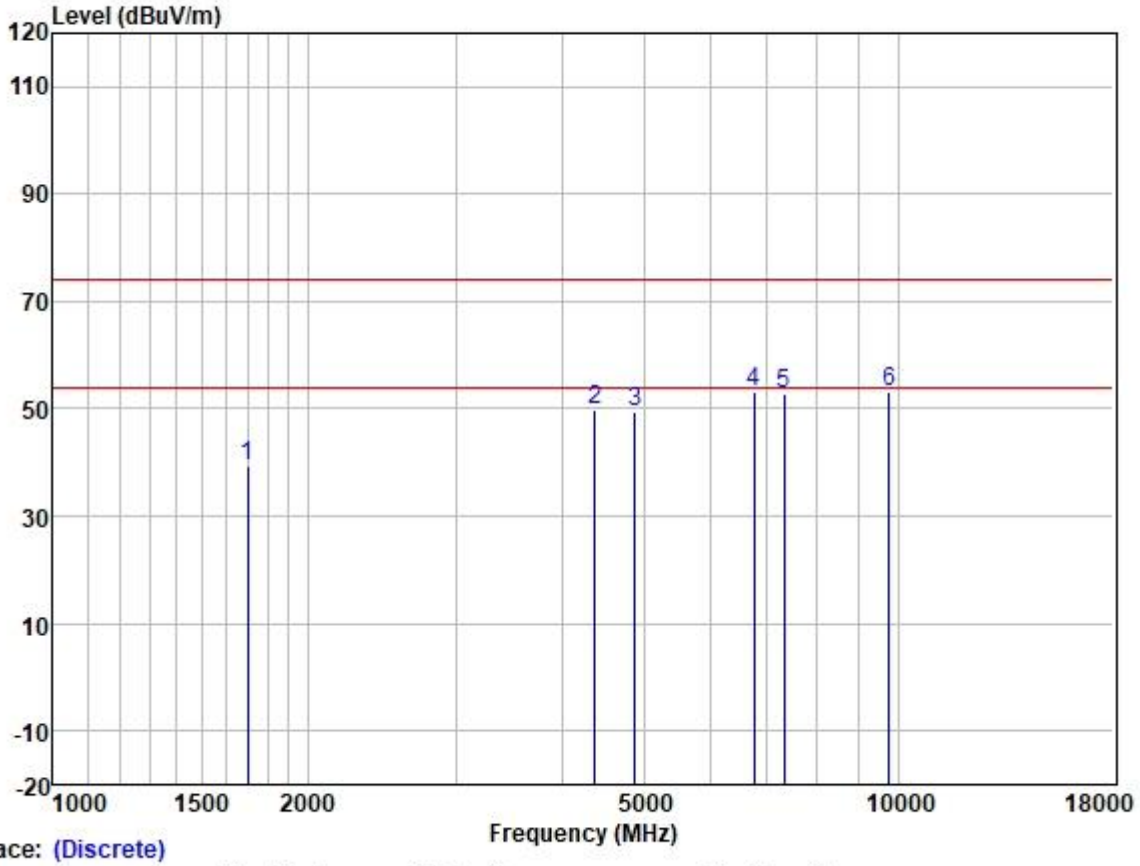
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle




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 | 1697.129 | 48.69 | 25.71 | 2.80 | 37.89 | 39.31 | 74.00 | -34.69 | HORIZONTAL | Peak |
| 2 | 4379.699 | 51.38 | 30.64 | 4.69 | 36.81 | 49.90 | 74.00 | -24.10 | HORIZONTAL | Peak |
| 3 | 4880.000 | 49.13 | 31.54 | 5.50 | 36.84 | 49.33 | 74.00 | -24.67 | HORIZONTAL | Peak |
| 4 | 6756.708 | 50.03 | 34.56 | 5.82 | 37.10 | 53.31 | 74.00 | -20.69 | HORIZONTAL | Peak |
| 5 | 7320.000 | 48.25 | 36.00 | 6.13 | 37.43 | 52.95 | 74.00 | -21.05 | HORIZONTAL | Peak |
| 6 | 9760.000 | 45.10 | 38.50 | 7.02 | 37.41 | 53.21 | 74.00 | -20.79 | HORIZONTAL | Peak |

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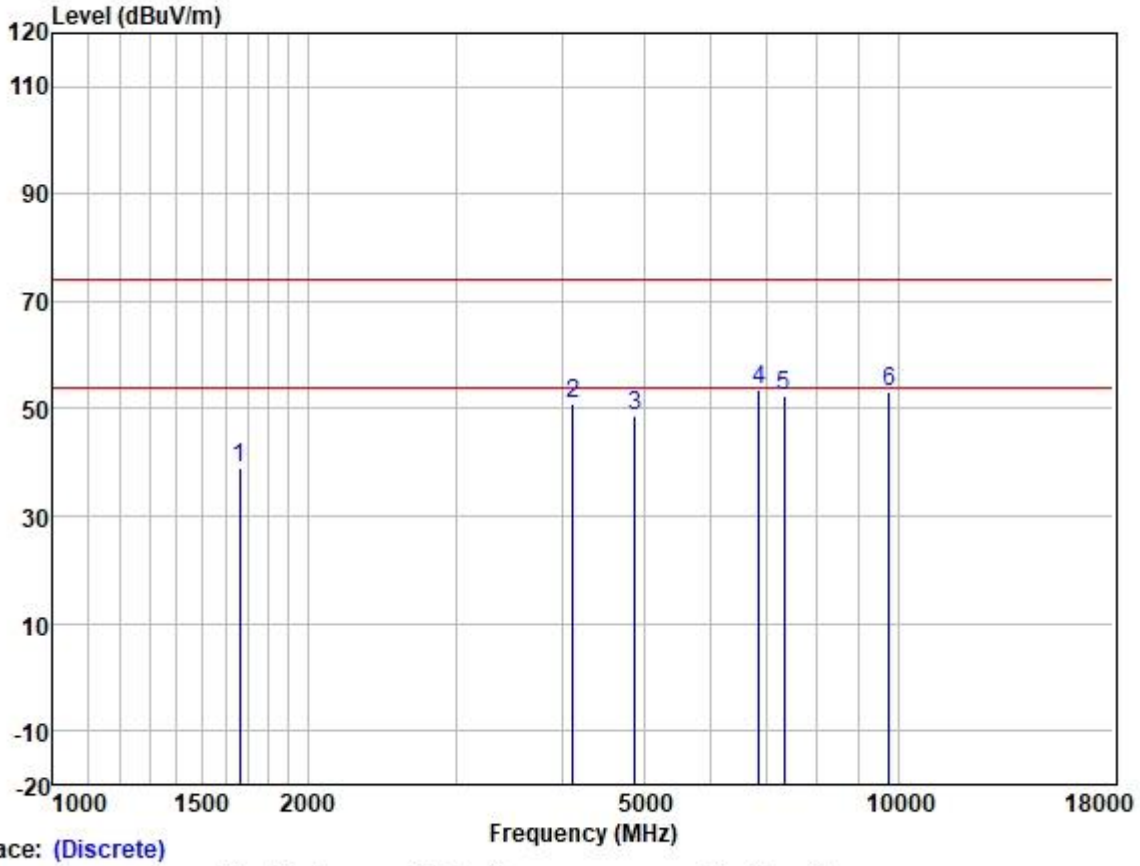
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:middle




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 | 1663.137 | 48.56 | 25.65 | 2.80 | 37.91 | 39.10 | 74.00 | -34.90 | VERTICAL | Peak |
| 2 | 4121.768 | 53.32 | 29.98 | 4.60 | 36.80 | 51.10 | 74.00 | -22.90 | VERTICAL | Peak |
| 3 | 4880.000 | 48.46 | 31.54 | 5.50 | 36.84 | 48.66 | 74.00 | -25.34 | VERTICAL | Peak |
| 4 | 6855.063 | 49.93 | 34.78 | 5.82 | 37.15 | 53.38 | 74.00 | -20.62 | VERTICAL | Peak |
| 5 | 7320.000 | 47.86 | 36.00 | 6.13 | 37.43 | 52.56 | 74.00 | -21.44 | VERTICAL | Peak |
| 6 | 9760.000 | 44.99 | 38.50 | 7.02 | 37.41 | 53.10 | 74.00 | -20.90 | VERTICAL | Peak |

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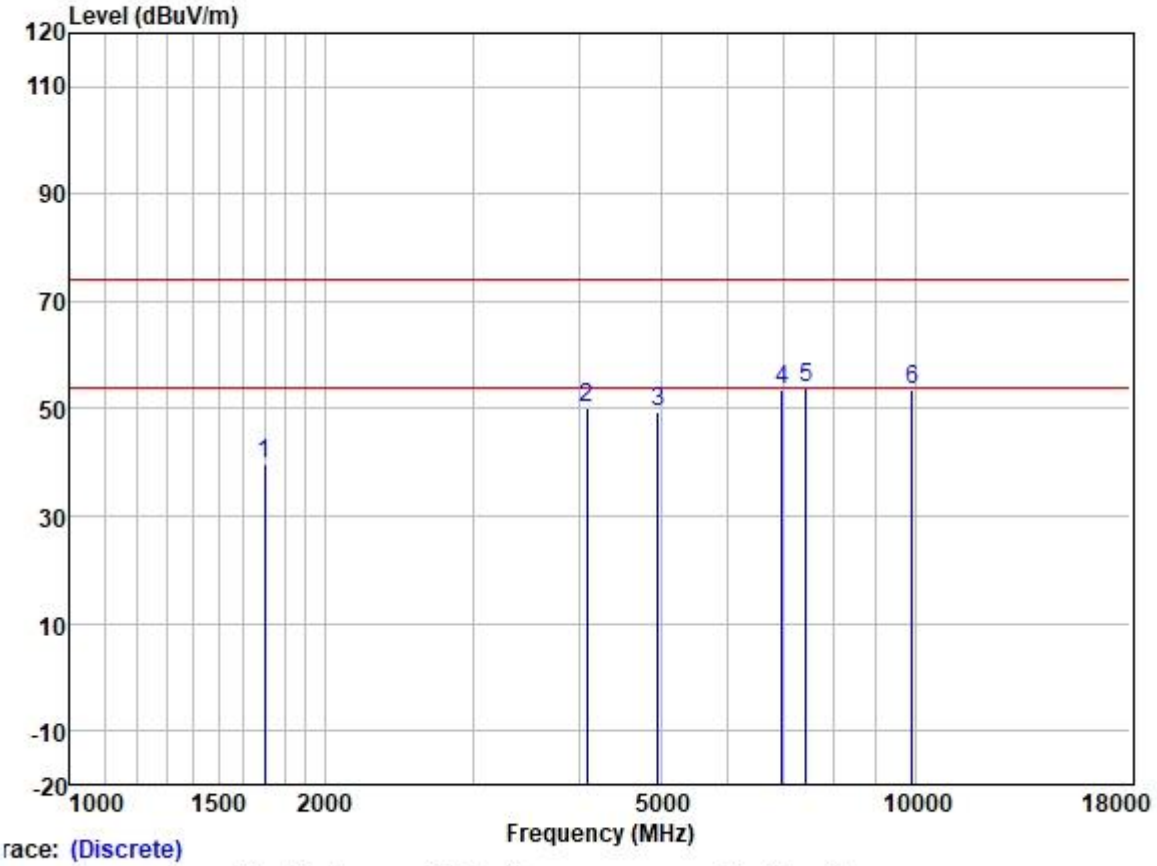
Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:High




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 | 1697.129 | 49.22 | 25.71 | 2.80 | 37.89 | 39.84 | 74.00 | -34.16 | HORIZONTAL | Peak |
| 2 | 4086.182 | 52.55 | 29.92 | 4.60 | 36.80 | 50.27 | 74.00 | -23.73 | HORIZONTAL | Peak |
| 3 | 4960.000 | 49.07 | 31.65 | 5.65 | 36.84 | 49.53 | 74.00 | -24.47 | HORIZONTAL | Peak |
| 4 | 6954.852 | 50.05 | 34.95 | 5.81 | 37.21 | 53.60 | 74.00 | -20.40 | HORIZONTAL | Peak |
| 5 | 7440.000 | 48.87 | 36.27 | 6.22 | 37.47 | 53.89 | 74.00 | -20.11 | HORIZONTAL | Peak |
| 6 | 9920.000 | 45.35 | 38.65 | 6.96 | 37.40 | 53.56 | 74.00 | -20.44 | HORIZONTAL | Peak |

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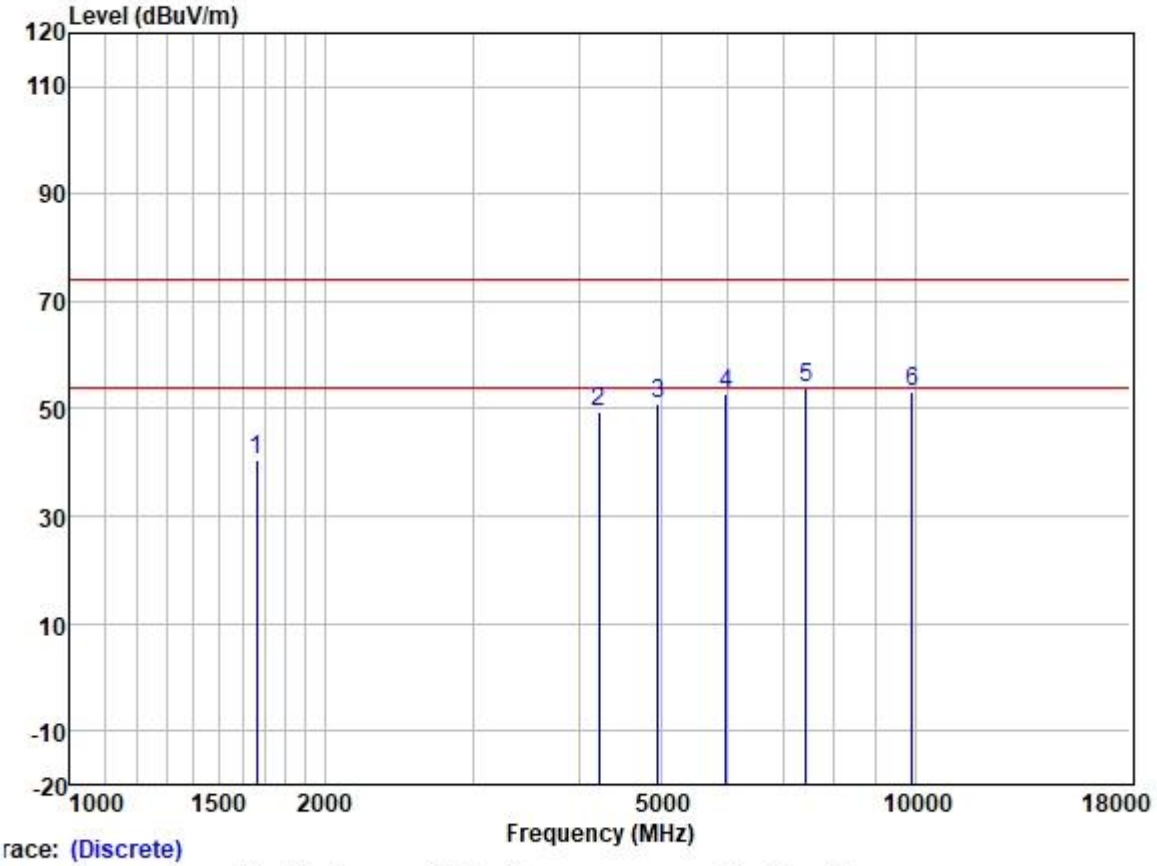
Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:High




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 | 1663.137 | 49.95 | 25.65 | 2.80 | 37.91 | 40.49 | 74.00 | -33.51 | VERTICAL | Peak |
| 2 | 4230.396 | 51.38 | 30.26 | 4.61 | 36.81 | 49.44 | 74.00 | -24.56 | VERTICAL | Peak |
| 3 | 4960.000 | 50.49 | 31.65 | 5.65 | 36.84 | 50.95 | 74.00 | -23.05 | VERTICAL | Peak |
| 4 | 5967.033 | 51.38 | 32.37 | 6.10 | 36.90 | 52.95 | 74.00 | -21.05 | VERTICAL | Peak |
| 5 | 7440.000 | 48.73 | 36.27 | 6.22 | 37.47 | 53.75 | 74.00 | -20.25 | VERTICAL | Peak |
| 6 | 9920.000 | 45.04 | 38.65 | 6.96 | 37.40 | 53.25 | 74.00 | -20.75 | VERTICAL | Peak |

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## 7.9 Duty Cycle

Test Requirement KDB 558074 D01 v05r02 section 6
Test Method: ANSI C63.10 (2013) Section 11.6

### 7.9.1 E.U.T. Operation

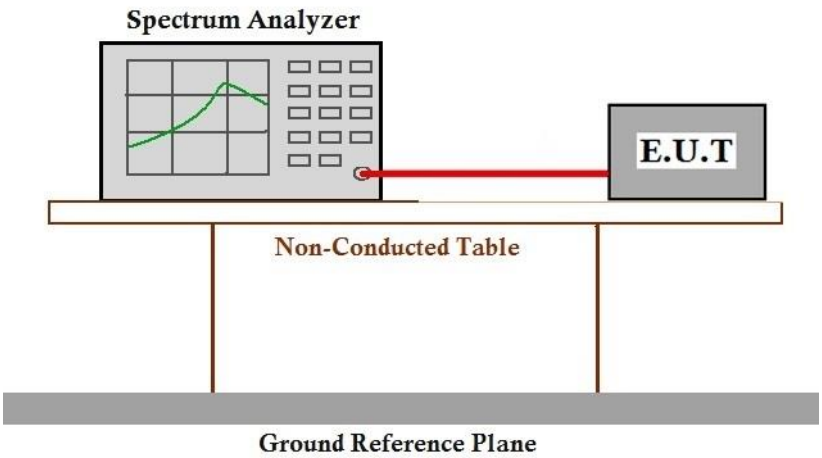
Operating Environment:

Temperature: 25.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1003 mbar

### 7.9.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 00 | TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation. |

### 7.9.3 Test Setup Diagram




### 7.9.4 Measurement Procedure and Data

cable loss=0.9dB

Please Refer to Appendix for Details

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# 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR2207000894AT

# 9 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for GZCR2207000894AT

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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 | 0.395 | 0.625 | 63.20 | 1.99 | 0.00 |
| | | 2440 | 0.395 | 0.625 | 63.20 | 1.99 | 0.02 |
| | | 2480 | 0.396 | 0.625 | 63.36 | 1.98 | 0.03 |

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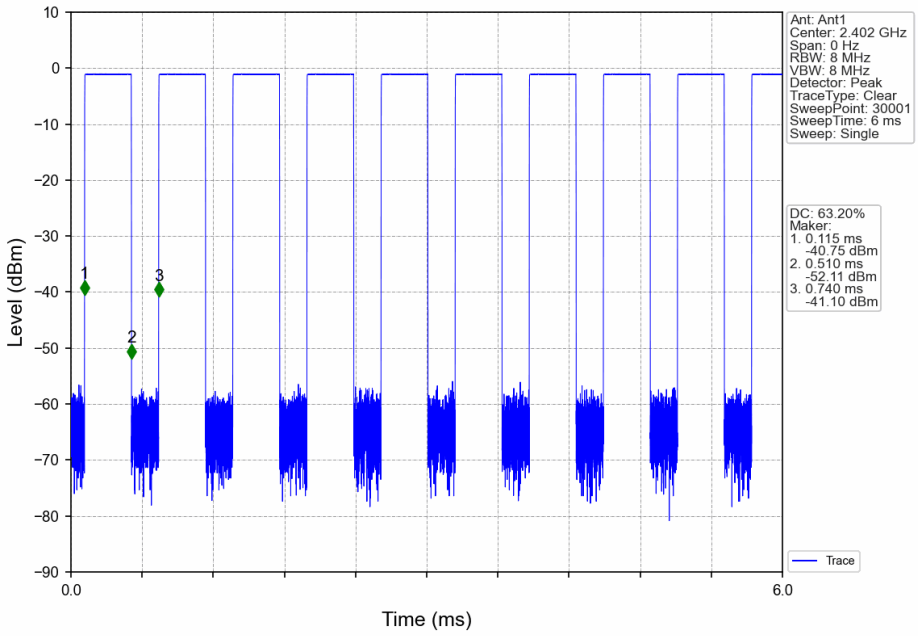
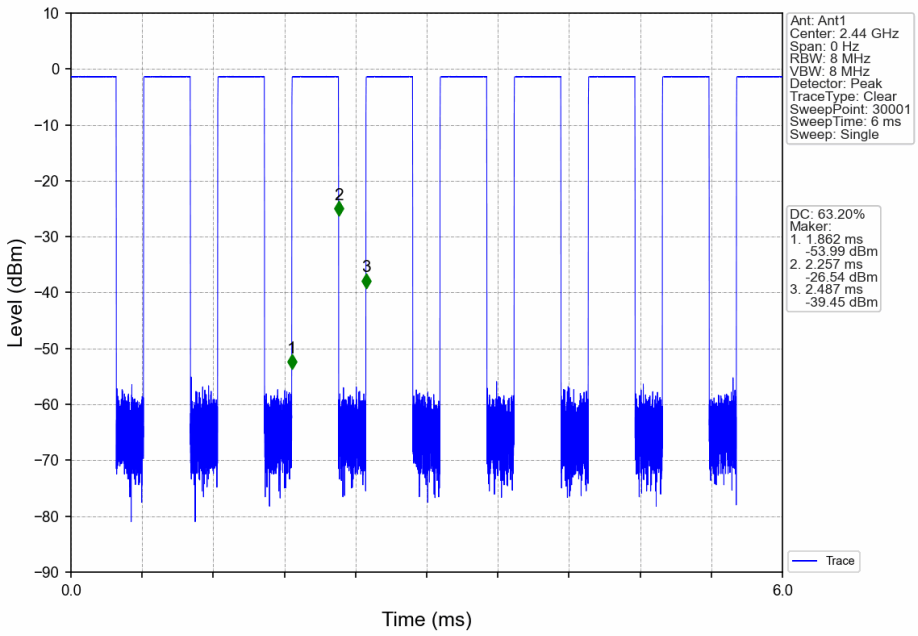
## 1.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV




1M_MCH_2440MHz_Ant1_NTNV

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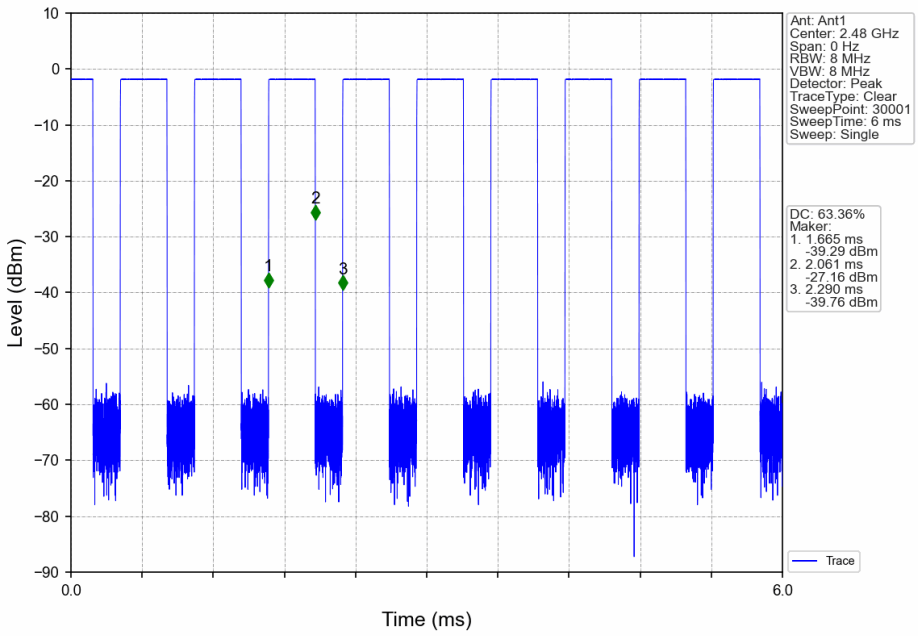
1M_HCH_2480MHz_Ant1_NTNV

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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 | 1.047 | Pass |
| | | 2440 | 1 | 1.050 | Pass |
| | | 2480 | 1 | 1.053 | Pass |

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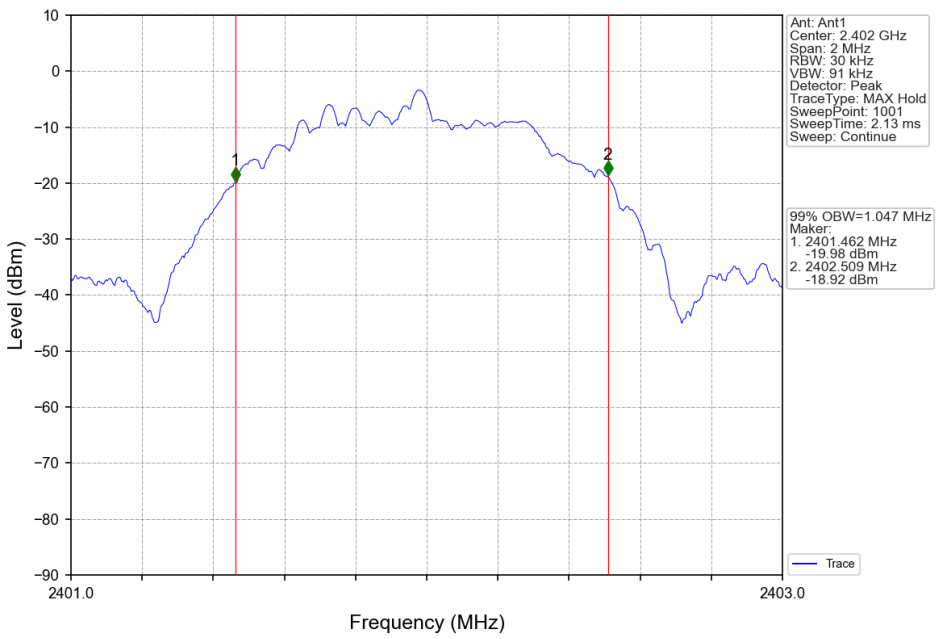
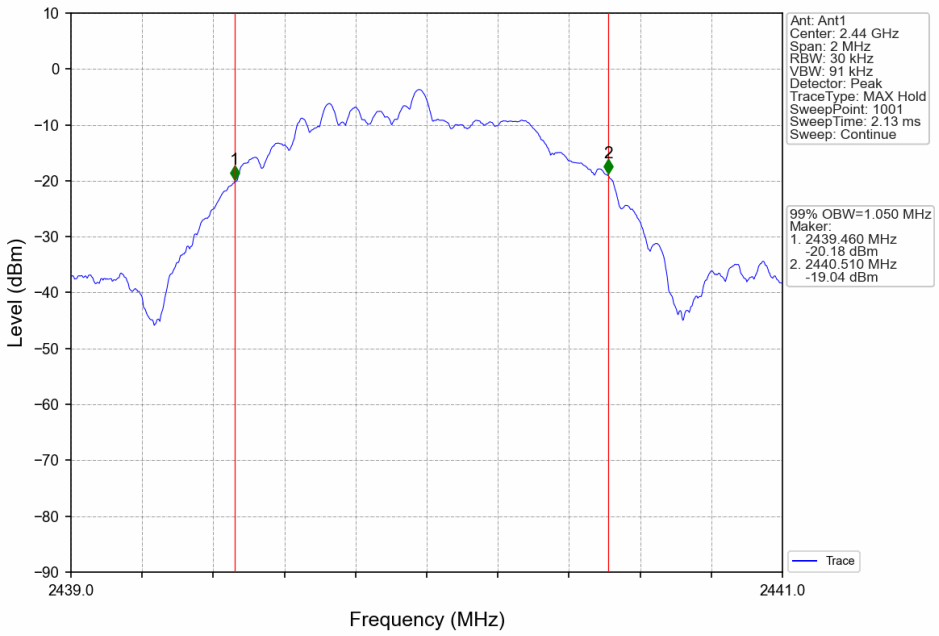
## 2.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV




1M_MCH_2440MHz_Ant1_NTNV

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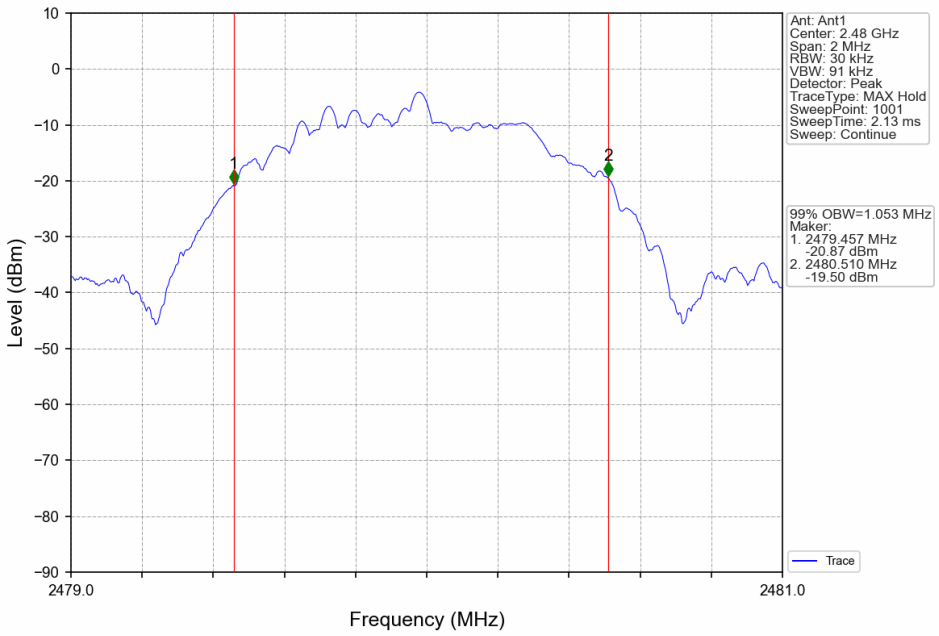
1M_HCH_2480MHz_Ant1_NTNV

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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 | 0.685 | >=0.5 | Pass |
| | | 2440 | 1 | 0.695 | >=0.5 | Pass |
| | | 2480 | 1 | 0.697 | >=0.5 | Pass |

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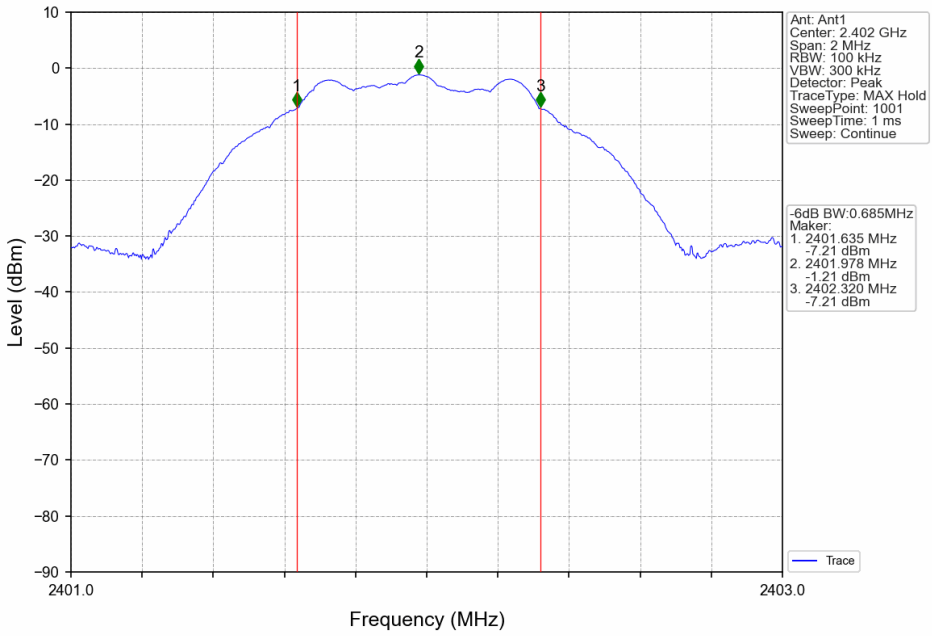
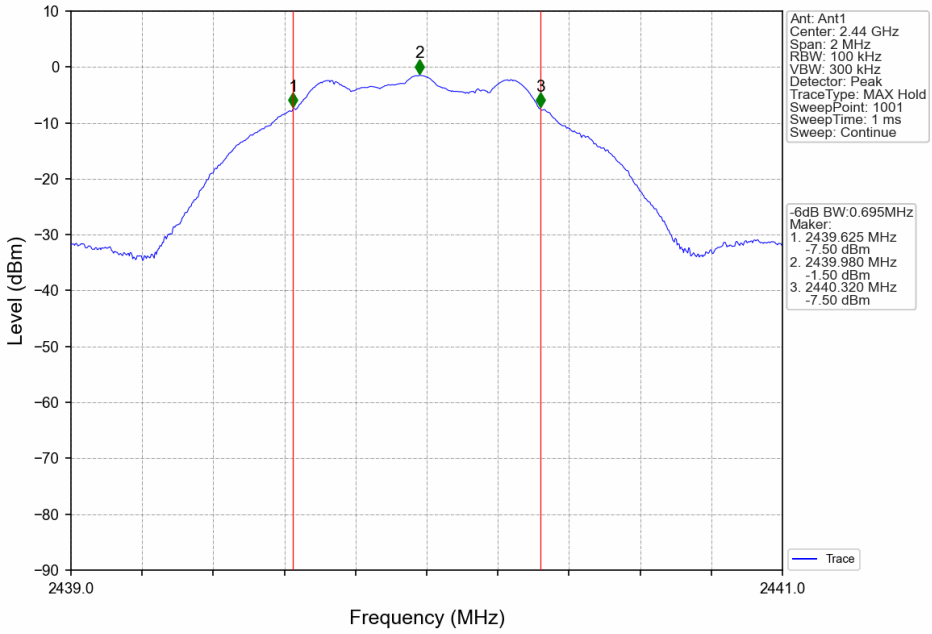
## 2.2.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV




1M_MCH_2440MHz_Ant1_NTNV

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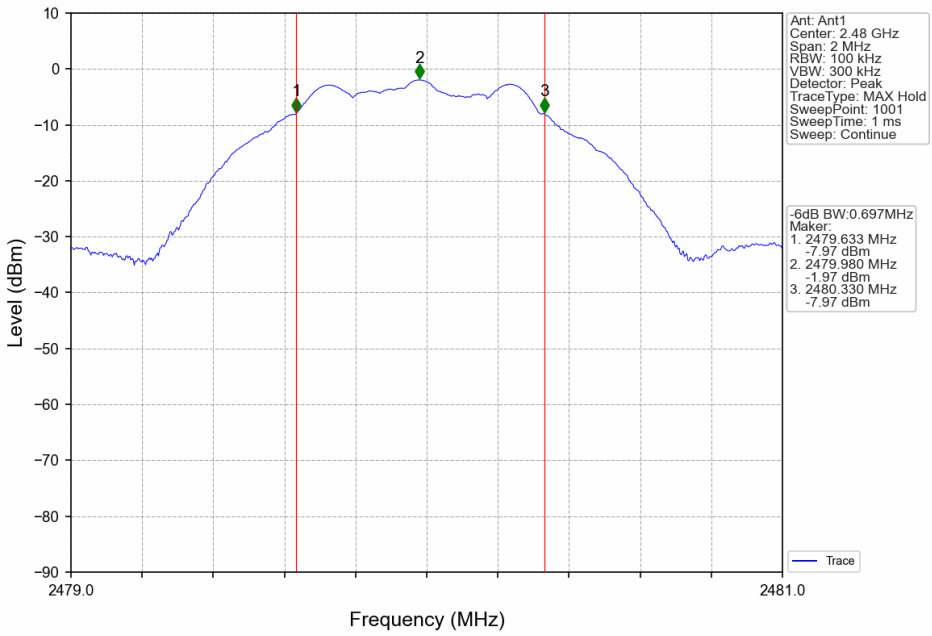


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# 3. Maximum Conducted Output Power

## 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 | -1.08 | <=30 | Pass |
| | | 2440 | -1.36 | <=30 | Pass |
| | | 2480 | -1.83 | <=30 | Pass |
| Note1: Antenna Gain: Ant1: 2.20dBi; | | | | | |

# 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 | -16.29 | <=8 | Pass |
| | | 2440 | -16.62 | <=8 | Pass |
| | | 2480 | -17.17 | <=8 | Pass |
| Note1: Antenna Gain: Ant1: 2.20dBi; | | | | | |

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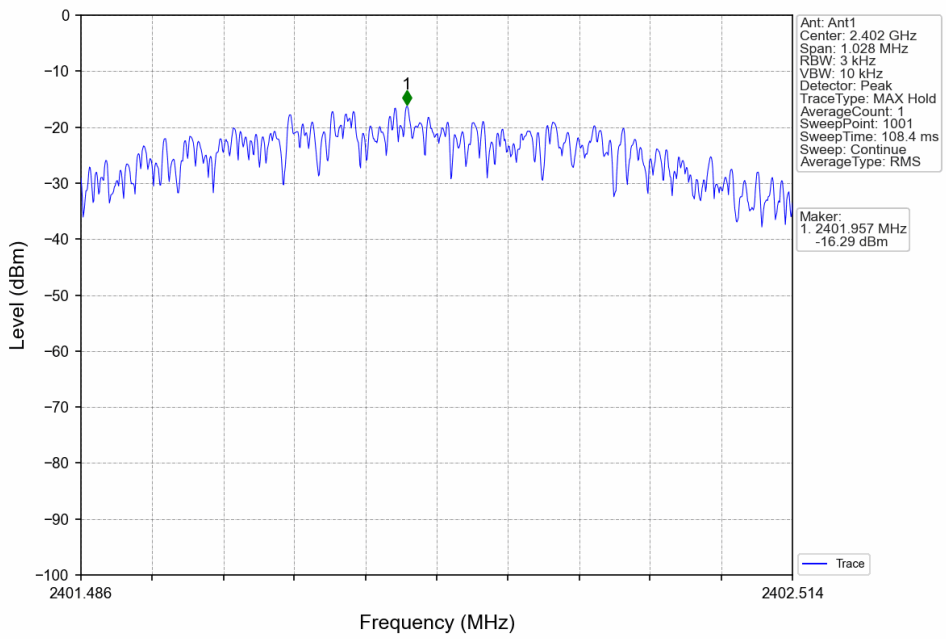
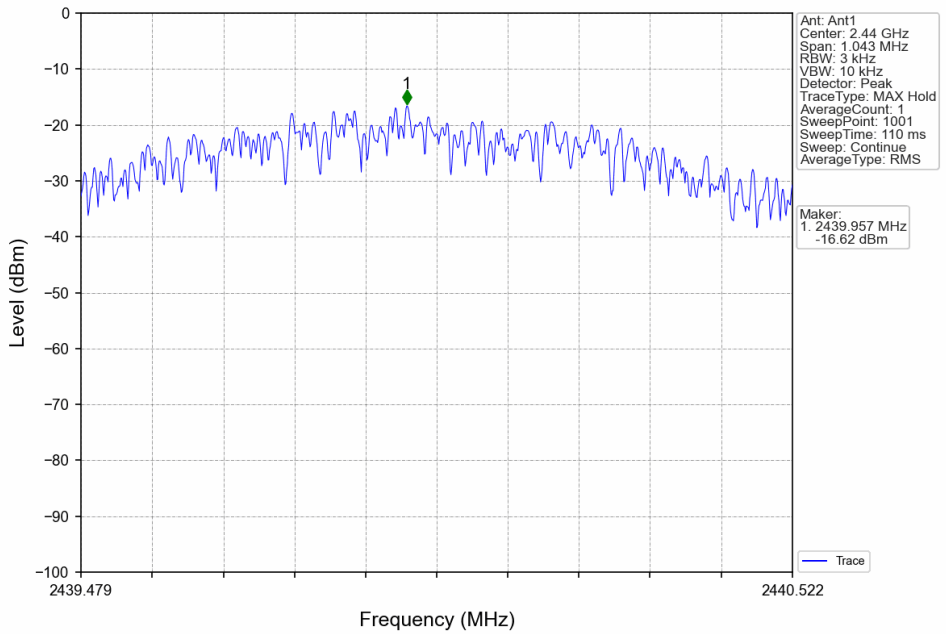
## 4.1.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV




1M_MCH_2440MHz_Ant1_NTNV

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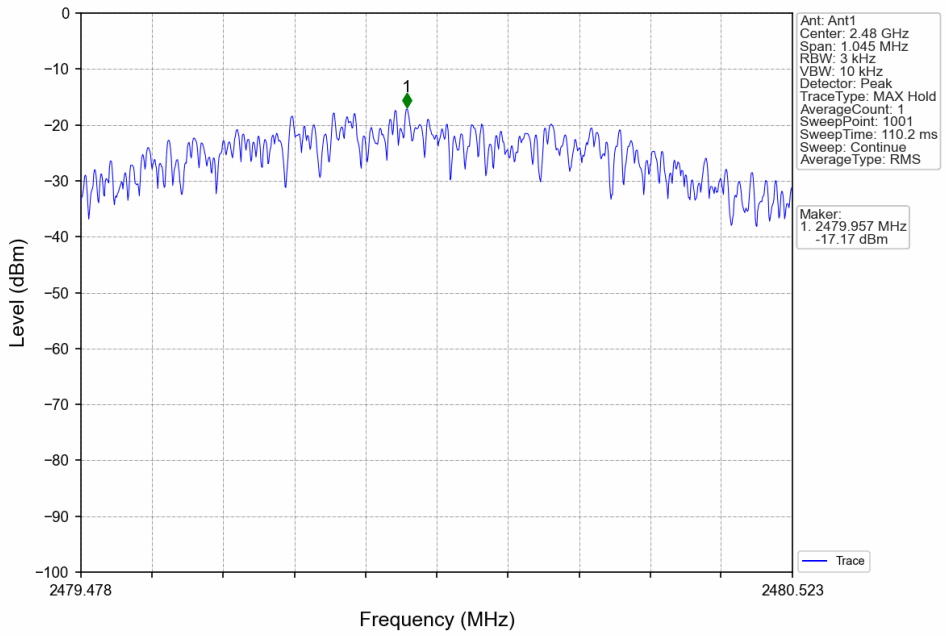
1M_HCH_2480MHz_Ant1_NTNV

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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 | -1.22 |
| | | 2440 | 1 | -1.52 |
| | | 2480 | 1 | -1.99 |
| 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.<br>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

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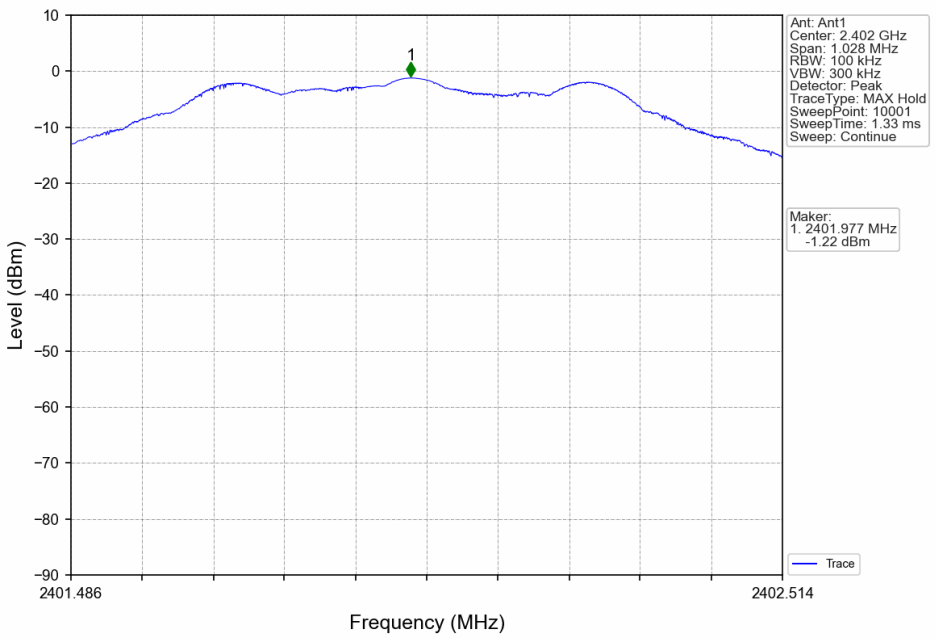
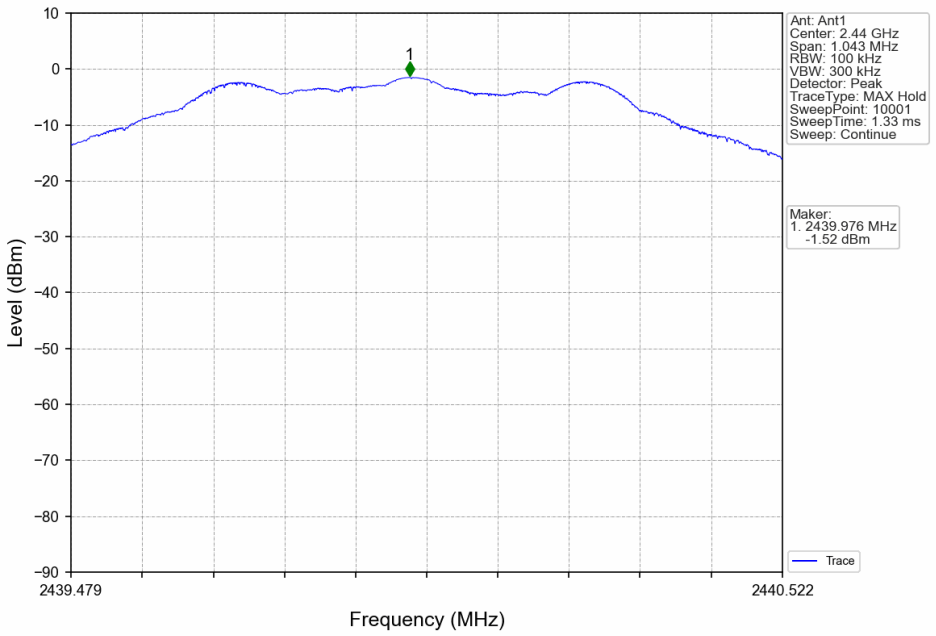



1M_MCH_2440MHz_Ant1_NTNV

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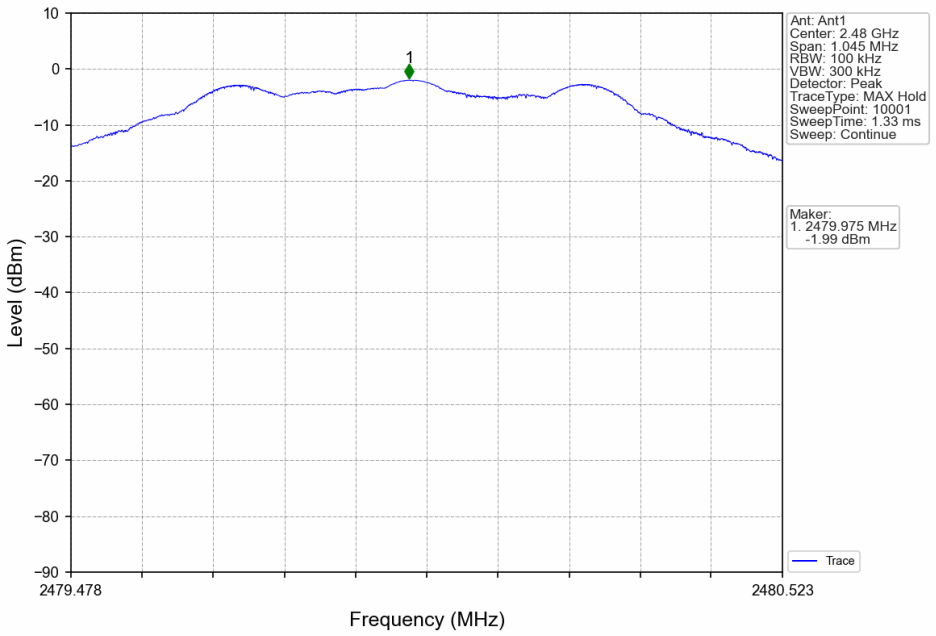


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## 5.2 CSE

### 5.2.1 Test Result

| Mode | TX Type | Frequency (MHz) | ANT | Level of Reference (dBm) | Limit (dBm) | Verdict |
|---|---|---|---|---|---|---|
| 1M | SISO | 2402 | 1 | -1.22 | -21.22 | Pass |
| | | 2440 | 1 | -1.22 | -21.22 | Pass |
| | | 2480 | 1 | -1.22 | -21.22 | 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.<br>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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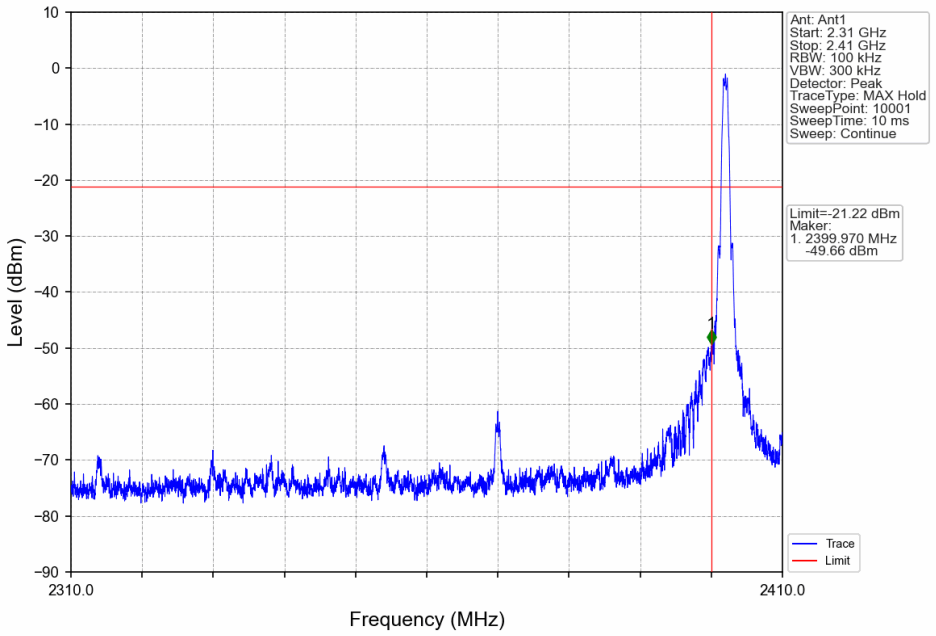
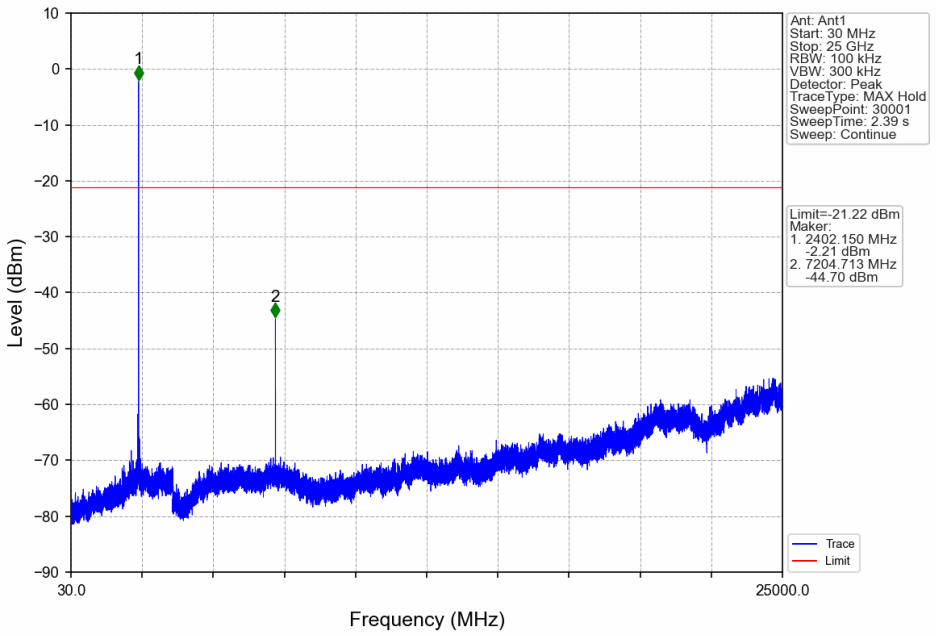
## 5.2.2 Test Graph

1M_LCH_2402MHz_Ant1_NTNV




1M_LCH_2402MHz_Ant1_NTNV

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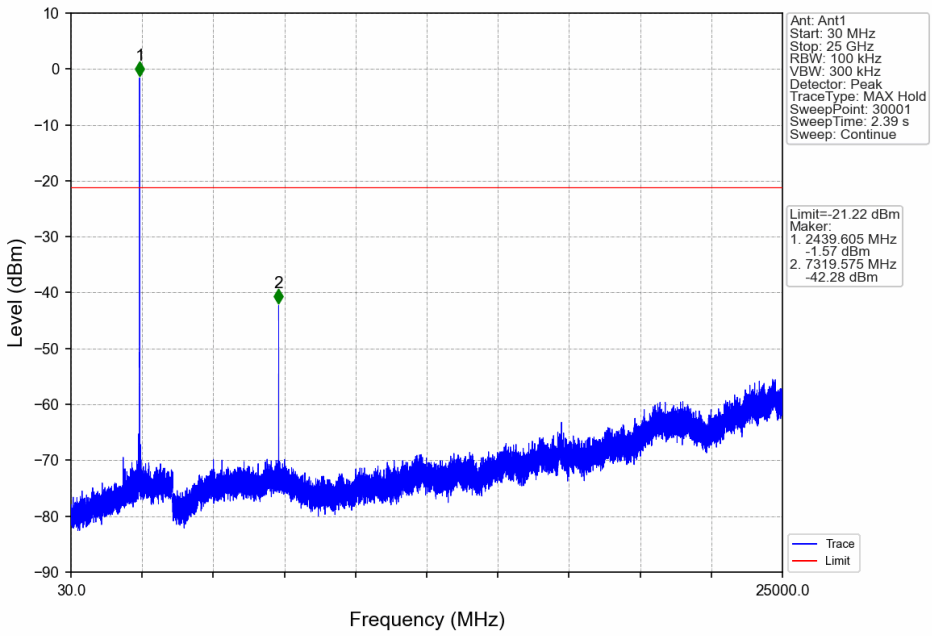
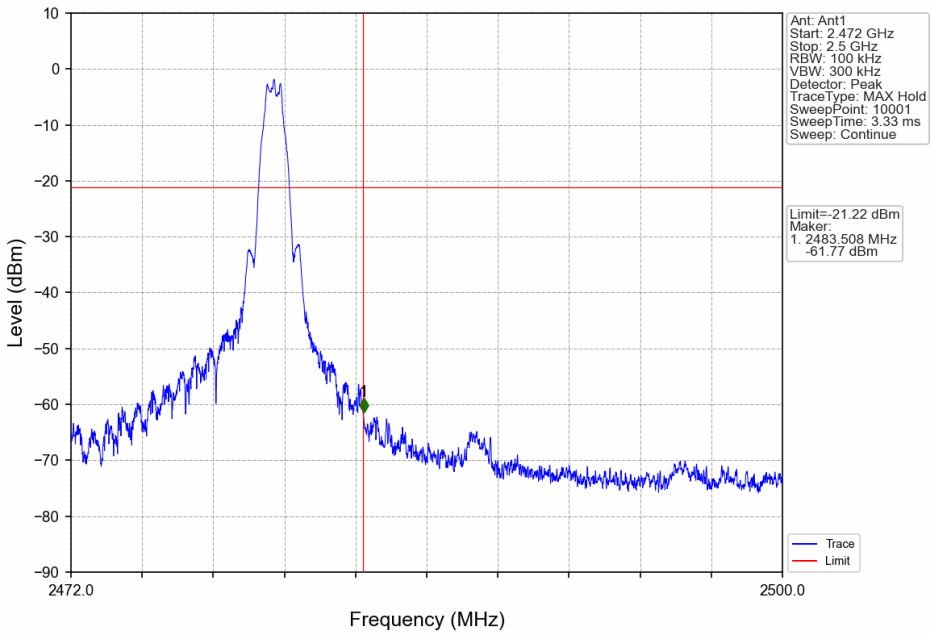
1M_MCH_2440MHz_Ant1_NTNV




1M_HCH_2480MHz_Ant1_NTNV

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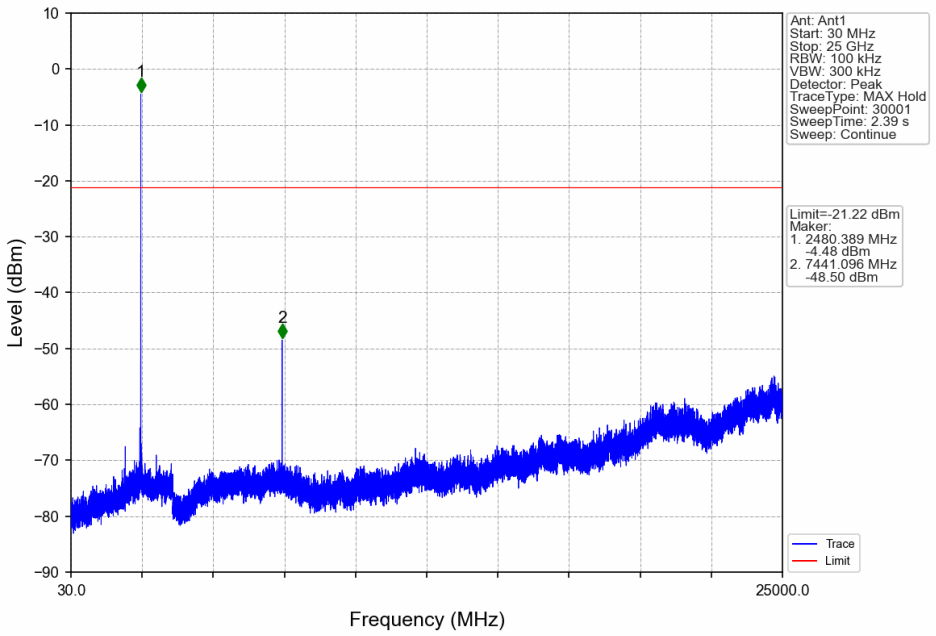
1M_HCH_2480MHz_Ant1_NTNV




- End of the Report -

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