

# TEST REPORT

**Application No.:** SUCR2510001040AT  
**FCC ID:** XMR2022SC668SWF  
**Applicant:** Quectel Wireless Solutions Co., Ltd.  
**Address of Applicant:** No. 8 Waipojing Road, Sijing Town, Songjiang District, Shanghai 201601, China  
**Manufacturer:** Quectel Wireless Solutions Co., Ltd.  
**Address of Manufacturer:** No. 8 Waipojing Road, Sijing Town, Songjiang District, Shanghai 201601, China  
**Equipment Under Test (EUT):**  
**EUT Name:** SBC(Single-Board Computers)  
**Model No.:** QSM668SR-WF  
**Trade Mark:** QUECTEL  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.247  
**Date of Receipt:** 2025-10-23  
**Date of Test:** 2025-11-19 to 2025-11-20  
**Date of Issue:** 2025-11-27

**Test Result:**
**Pass\***

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

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

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| Revision Record |             |            |        |
|-----------------|-------------|------------|--------|
| Version         | Description | Date       | Remark |
| 01              | Original    | 2025-11-27 | /      |
|                 |             |            |        |
|                 |             |            |        |

|                          |  |                              |  |
|--------------------------|--|------------------------------|--|
| Authorized for issue by: |  |                              |  |
| Tested By                |  | Nature Shen                  |  |
|                          |  | Nature Shen/Project Engineer |  |
| Approved By              |  | Cedar cheng                  |  |
|                          |  | Cedar Cheng /Reviewer        |  |

## 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) | Customer Declaration |

| Radio Spectrum Matter Part                            |                                  |                                    |                                           |                                |
|-------------------------------------------------------|----------------------------------|------------------------------------|-------------------------------------------|--------------------------------|
| Item                                                  | Standard                         | Method                             | Requirement                               | Result                         |
| Conducted Emissions at AC Power Line (150kHz-30MHz)   | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2020) Section 6.2     | 47 CFR Part 15, Subpart C 15.207          | Reference report FR2N1442B-R01 |
| Radiated Emissions which fall in the restricted bands |                                  | ANSI C63.10 (2020) Section 6.10.5  | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass                           |
| Radiated Spurious Emissions Below 1GHz                |                                  | ANSI C63.10 (2020) Section 6.4,6.5 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass                           |
| Radiated Spurious Emissions Above 1GHz                |                                  | ANSI C63.10 (2020) Section 6.6     | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass                           |
| Conducted Peak Output Power                           |                                  | ANSI C63.10 (2020) Section 11.9.2  | 47 CFR Part 15, Subpart C 15.247(b)(3)    | Pass                           |
| Minimum 6dB Bandwidth                                 |                                  | ANSI C63.10 (2020) Section 11.8.1  | 47 CFR Part 15, Subpart C 15.247a(2)      | Pass                           |
| Power Spectrum Density                                |                                  | ANSI C63.10 (2020) Section 11.10.2 | 47 CFR Part 15, Subpart C 15.247(e)       | Reference report FR2N1442B-R01 |
| Conducted Band Edges Measurement                      |                                  | ANSI C63.10 (2020) Section 6.10.4  | 47 CFR Part 15, Subpart C 15.247(d)       |                                |
| Conducted Spurious Emissions                          |                                  | ANSI C63.10 (2020) Section 11.11   | 47 CFR Part 15, Subpart C 15.247(d)       |                                |

### Remark:

The Smart Module (Model: SC668S-WF) has been certified, and the report number is FR2N1442B-R01 issued by Sporton International Inc.(Kunshan). So, we only evaluate the Radiated Emissions which fall in the restricted bands, Radiated Spurious Emissions Below 1GHz, Radiated Spurious Emissions Above 1GHz, Conducted Peak Output Power and Minimum 6dB Bandwidth test of this sample, other test data please refer to module test report.

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## 4 General Information

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

|                      |                                       |
|----------------------|---------------------------------------|
| Power supply:        | 12V                                   |
| Operation Frequency: | 2402MHz to 2480MHz                    |
| Modulation Type:     | GFSK                                  |
| Number of Channels:  | 40                                    |
| Channel Spacing:     | 2MHz                                  |
| Antenna Type:        | Dipole Antenna                        |
| Antenna Gain:        | 0.3dBi (Provided by the manufacturer) |
| Antenna Number:      | 1                                     |

### 4.2 Environment Parameter

| Environment Parameter                               | Selected Values During Tests |            |
|-----------------------------------------------------|------------------------------|------------|
| Relative Humidity                                   | Ambient                      |            |
| Value                                               | Temperature(°C)              | Voltage(V) |
| NTNV                                                | 25                           | 12         |
| Note:<br>NV:Normal Voltage<br>NT:Normal Temperature |                              |            |

### 4.3 Description of Support Units

| Description | Manufacturer | Model No.        | Serial No. |
|-------------|--------------|------------------|------------|
| Computer    | Lenovo       | T14              | 2YK6GR     |
| Mouse       | Lenovo       | 3D optical Mouse | N/A        |

#### 4.4 Measurement Uncertainty & Decision Rule

| No.                                                                                                                                                                                                                                                                                                                                                    | Item                         | Measurement Uncertainty              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------|
| 1                                                                                                                                                                                                                                                                                                                                                      | Radio Frequency              | $\pm 7.25 \times 10^{-8}$            |
| 2                                                                                                                                                                                                                                                                                                                                                      | Duty cycle                   | $\pm 0.37\%$                         |
| 3                                                                                                                                                                                                                                                                                                                                                      | Occupied Bandwidth           | $\pm 3\%$                            |
| 4                                                                                                                                                                                                                                                                                                                                                      | Conduction emission          | $\pm 3.0\text{dB}$ (150kHz to 30MHz) |
| 5                                                                                                                                                                                                                                                                                                                                                      | RF conducted power           | $\pm 0.75\text{dB}$                  |
| 6                                                                                                                                                                                                                                                                                                                                                      | RF power density             | $\pm 2.84\text{dB}$                  |
| 7                                                                                                                                                                                                                                                                                                                                                      | Conducted Spurious emissions | $\pm 0.75\text{dB}$                  |
| 8                                                                                                                                                                                                                                                                                                                                                      | RF Radiated power            | $\pm 3.3\text{dB}$ (9KHz-30MHz)      |
|                                                                                                                                                                                                                                                                                                                                                        |                              | $\pm 2.6\text{dB}$ (30MHz-1GHz)      |
|                                                                                                                                                                                                                                                                                                                                                        |                              | $\pm 2.7\text{dB}$ (1GHz-18GHz)      |
|                                                                                                                                                                                                                                                                                                                                                        |                              | $\pm 4.8\text{dB}$ (Above 18GHz)     |
| 9                                                                                                                                                                                                                                                                                                                                                      | Temperature test             | $\pm 1^\circ\text{C}$                |
| 10                                                                                                                                                                                                                                                                                                                                                     | Humidity test                | $\pm 3\%$                            |
| 11                                                                                                                                                                                                                                                                                                                                                     | Supply voltages              | $\pm 1\%$                            |
| 12                                                                                                                                                                                                                                                                                                                                                     | Time                         | $\pm 3\%$                            |
| <b>Remark:</b><br>The $U_{\text{lab}}$ (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results<br>– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;<br>– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit. |                              |                                      |

#### 4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.

South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu)  
Pilot Free Trade Zone

No tests were sub-contracted.

Note:

1.SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).

2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).

3. Sample source: sent by customer.

#### 4.6 Test Facility

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

- **A2LA**

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 6336.01.

- **FCC**

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd. has been recognized as an accredited testing laboratory. Designation Number: CN1312.

- **ISED**

SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 27594

#### 4.7 Deviation from Standards

None

#### 4.8 Abnormalities from Standard Conditions

None

## 5 Equipment List

| Item                     | Equipment                                 | Manufacturer               | Model            | Inventory No  | Cal Date   | Cal. Due Date |
|--------------------------|-------------------------------------------|----------------------------|------------------|---------------|------------|---------------|
| <b>RF Conducted Test</b> |                                           |                            |                  |               |            |               |
| 1                        | Shielding Room                            | Brilliant-emc              | N/A              | SUWI-04-08-01 | 11/9/2025  | 11/8/2028     |
| 2                        | Signal Analyzer                           | ROHDE&SCHWARZ              | FSW43            | SUWI-01-02-04 | 1/20/2025  | 1/19/2026     |
| 3                        | Signal Analyzer                           | KEYSIGHT                   | N9020A           | SUWI-01-02-15 | 11/21/2024 | 11/20/2025    |
| 4                        | MXG Vector signal genitor                 | KEYSIGHT                   | N5182B           | SUWI-01-38-01 | 1/16/2025  | 1/15/2026     |
| 5                        | Signal Generator                          | ROHDE&SCHWARZ              | SMW200A          | SUWI-01-07-08 | 3/27/2025  | 3/26/2026     |
| 6                        | Signal Generator                          | ROHDE&SCHWARZ              | SMW100A          | SUWI-01-8-01  | 1/16/2025  | 1/15/2026     |
| 7                        | MXG Vector Signal Generator               | ROHDE&SCHWARZ              | SMR20            | SUWI-01-33-01 | 3/17/2025  | 3/16/2026     |
| 8                        | Wideband Radio Communication Tester       | ROHDE&SCHWARZ              | CMW500           | SUWI-01-16-13 | 5/8/2025   | 5/7/2026      |
| 9                        | Wideband Radio Communication Test Ststion | Anritsu                    | MT8000A          | SUWI-01-34-02 | 8/25/2025  | 8/24/2026     |
| 10                       | Wideband Radio Communication Tester       | Anritsu                    | MT8821C          | SUWI-01-26-03 | 8/25/2025  | 8/24/2026     |
| 11                       | Power meter                               | Anritsu                    | ML2495A          | SUWI-01-31-01 | 8/25/2025  | 8/24/2026     |
| 12                       | Pulse power sensor                        | Anritsu                    | MA2411B          | SUWI-01-32-01 | 8/25/2025  | 8/24/2026     |
| 13                       | DC Power Supply                           | HYELEC                     | HY3005B          | SUWI-01-18-01 | 1/15/2025  | 1/14/2026     |
| 14                       | Temperature and humidity meter            | MingGao                    | TH101B           | SUWI-01-01-07 | 2/13/2025  | 2/12/2026     |
| 15                       | Temperature Chamber                       | GIANT FORCE                | ICT-017-40-SP-SD | SUWI-01-13-02 | 5/7/2025   | 5/6/2026      |
| 16                       | Measurement Software                      | TST                        | TST 272 V2.0     | SUWI-03-55-03 | NCR        | NCR           |
| <b>RF Radiated Test</b>  |                                           |                            |                  |               |            |               |
| 1                        | Semi-Anechoic Chamber                     | Brilliant-emc              | N/A              | SUWI-04-02-01 | 6/3/2023   | 6/2/2026      |
| 2                        | Signal Analyzer                           | ROHDE&SCHWARZ              | FSW43            | SUWI-01-02-04 | 1/20/2025  | 1/19/2026     |
| 3                        | Signal Analyzer                           | KEYSIGHT                   | N9020A           | SUWI-01-02-09 | 11/21/2024 | 11/20/2025    |
| 4                        | Test receiver                             | ROHDE&SCHWARZ              | ESR7             | SUWI-01-10-01 | 1/15/2025  | 1/14/2026     |
| 5                        | Signal Generator                          | ROHDE&SCHWARZ              | SMW100A          | SUWI-01-18-01 | 1/16/2025  | 1/15/2026     |
| 6                        | Receiving antenna                         | SCHWRZBECK MESS-ELEKTRONIK | VULB 9168        | SUWI-01-11-04 | 9/10/2025  | 9/9/2027      |
| 7                        | Receiving antenna                         | SCHWRZBECK MESS-ELEKTRONIK | BBHA 9120D       | SUWI-01-11-02 | 5/7/2025   | 5/6/2027      |
| 8                        | Receiving antenna                         | SCHWRZBECK MESS-ELEKTRONIK | BBHA 9170        | SUWI-01-11-03 | 5/7/2025   | 5/6/2027      |
| 9                        | Active Loop Antenna                       | SCHWRZBECK MESS-ELEKTRONIK | FMZB 1519B       | SUWI-01-21-01 | 5/7/2025   | 5/6/2027      |

|    |                                     |               |                 |               |                          |                          |
|----|-------------------------------------|---------------|-----------------|---------------|--------------------------|--------------------------|
| 10 | Amplifier                           | Tonscend      | TAP9K3G40       | SUWI-01-14-01 | 1/16/2025                | 1/15/2026                |
| 11 | Amplifier                           | Tonscend      | TAP01018050     | SUWI-01-14-02 | 1/16/2025                | 1/15/2026                |
| 12 | Amplifier                           | Tonscend      | TAP18040048     | SUWI-01-14-03 | 1/20/2025                | 1/19/2026                |
| 13 | Wideband Radio Communication Tester | Anritsu       | MT8820C         | SUWI-01-26-01 | 8/25/2025                | 8/24/2026                |
| 14 | Wideband Radio Communication Tester | Anritsu       | MT8821C         | SUWI-01-26-03 | 8/25/2025                | 8/24/2026                |
| 15 | Wideband Radio Communication Tester | ROHDE&SCHWARZ | CMW500          | SUWI-01-16-09 | 8/26/2025                | 8/25/2026                |
| 16 | Radio Communication Analyzer        | StarPoint     | SP9500E         | SUWI-01-28-02 | 11/19/2024<br>11/19/2025 | 11/18/2025<br>11/18/2026 |
| 17 | Signal Generator                    | ROHDE&SCHWARZ | SMB100A         | SUWI-01-08-01 | 1/16/2025                | 1/15/2026                |
| 18 | DC Power Supply                     | HYELEC        | HY3005B         | SUWI-01-18-01 | 1/15/2025                | 1/14/2026                |
| 19 | Temperature and humidity meter      | MingGao       | TH101B          | SUWI-01-01-05 | 2/13/2025                | 2/12/2026                |
| 20 | Measurement Software                | Tonscend      | JS32-RE 4.0.0.0 | SUWI-02-09-06 | NCR                      | NCR                      |

## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

#### 6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

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

EUT Antenna:

The module uses a dedicated RF connector not intended for user replacement, meeting §15.203.

The best case gain of the antenna is 0.3dBi

## 7 Radio Spectrum Matter Test Results

### 7.1 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 (2020) Section 6.10.5

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.

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

Operating Environment:

Temperature: 23 °C

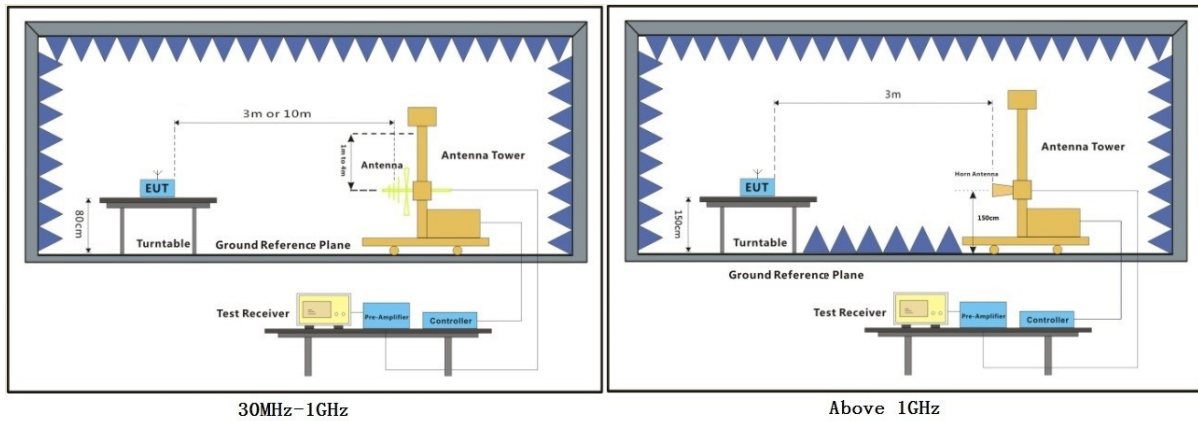
Humidity: 43 % RH

Atmospheric Pressure: 1024 mbar

#### 7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                                                                                     |
|-----------------------|-----------|-------------------------------------------------------------------------------------------------|
| Final test            | 01        | TXmode(1Mbps) Keep the EUT in charging and continuously transmitting mode with GFSK modulation. |
| Final test            | 02        | TXmode(2Mbps) Keep the EUT in continuously transmitting mode with GFSK modulation.              |

## 7.1.3 Test Setup Diagram



#### 7.1.4 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 middle 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.

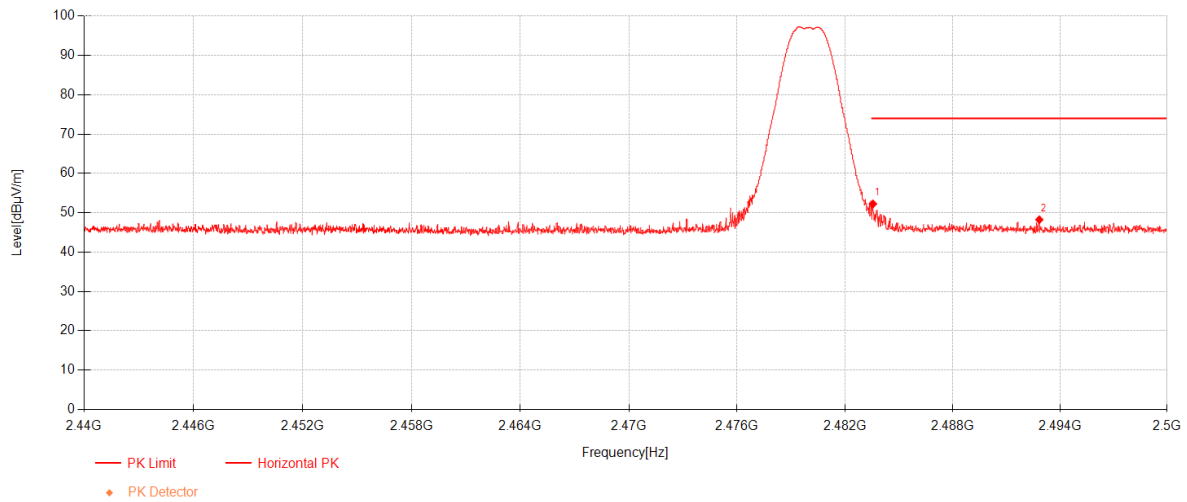
Remark 1:  $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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

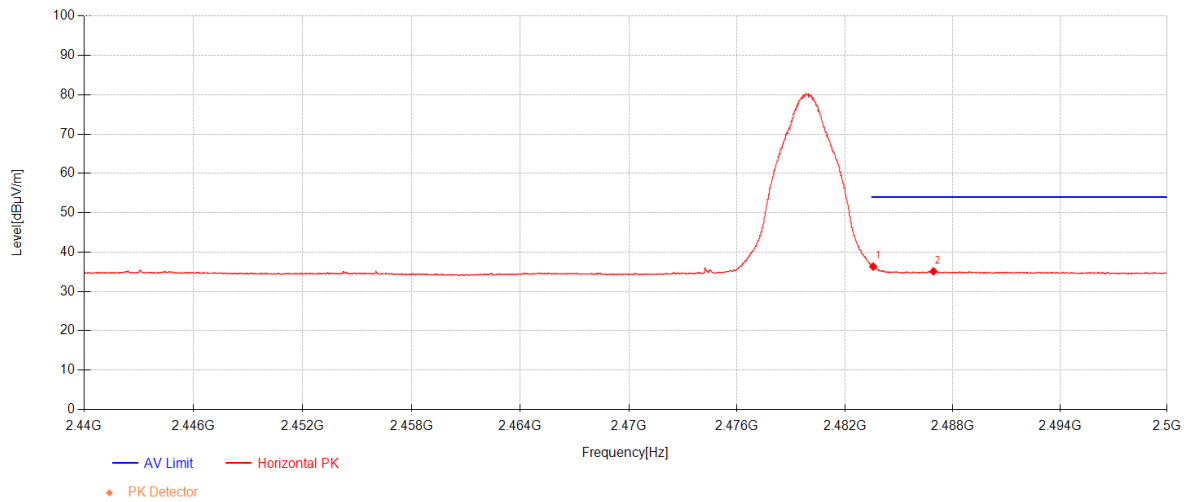
Remark 4: For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.

## BLE\_2M\_TX\_CH\_39\_Horizontal\_Peak



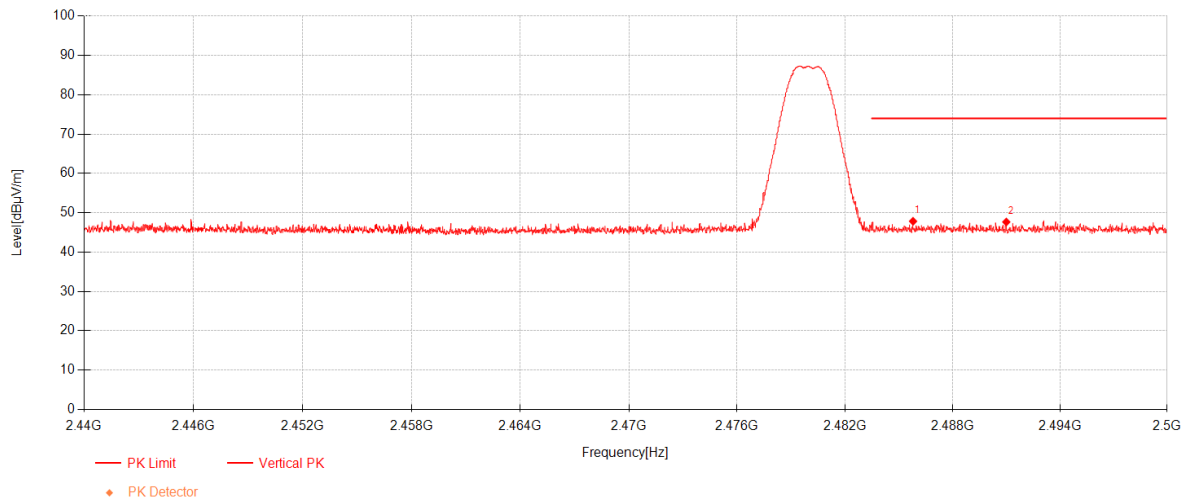
| Data List |                 |                |           |             |                |                |             |            |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity   |
| 1         | 2483.56         | 48.27          | 27.17     | -23.18      | 52.26          | 74.00          | 21.74       | Horizontal |
| 2         | 2492.845        | 44.19          | 27.19     | -23.14      | 48.24          | 74.00          | 25.76       | Horizontal |

## BLE\_2M\_TX\_CH\_39\_Horizontal\_Average



| Data List |                 |                |           |             |                |                |             |            |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity   |
| 1         | 2483.575        | 32.33          | 27.17     | -23.18      | 36.32          | 54.00          | 17.68       | Horizontal |
| 2         | 2486.935        | 31.08          | 27.18     | -23.16      | 35.09          | 54.00          | 18.91       | Horizontal |

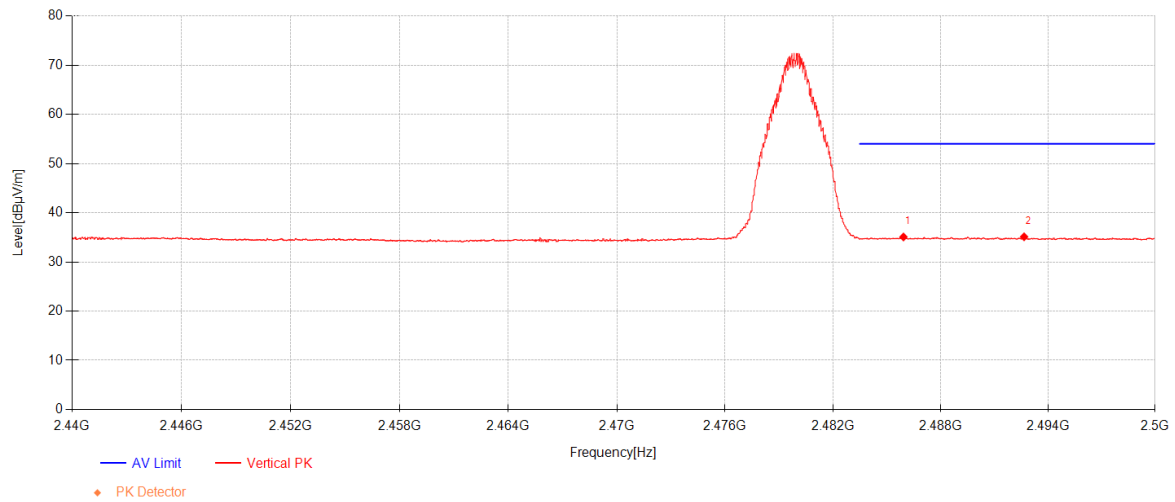
## BLE\_2M\_TX\_CH\_39\_Vertical\_Peak



### Data List

| NO. | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity |
|-----|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|----------|
| 1   | 2485.795        | 43.84          | 27.17     | -23.17      | 47.84          | 74.00          | 26.16       | Vertical |
| 2   | 2491            | 43.62          | 27.18     | -23.15      | 47.66          | 74.00          | 26.34       | Vertical |

# BLE\_2M\_TX\_CH\_39\_Veritical\_Average



| Data List |                 |                |           |             |                |                |             |          |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|----------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity |
| 1         | 2485.93         | 31.07          | 27.17     | -23.17      | 35.08          | 54.00          | 18.92       | Vertical |
| 2         | 2492.665        | 31.06          | 27.19     | -23.14      | 35.11          | 54.00          | 18.89       | Vertical |

## 7.2 Radiated Spurious Emissions Below 1GHz

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

Test Method: ANSI C63.10 (2020) 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                            |
| 960-1000       | 500                              | 3                            |

### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C

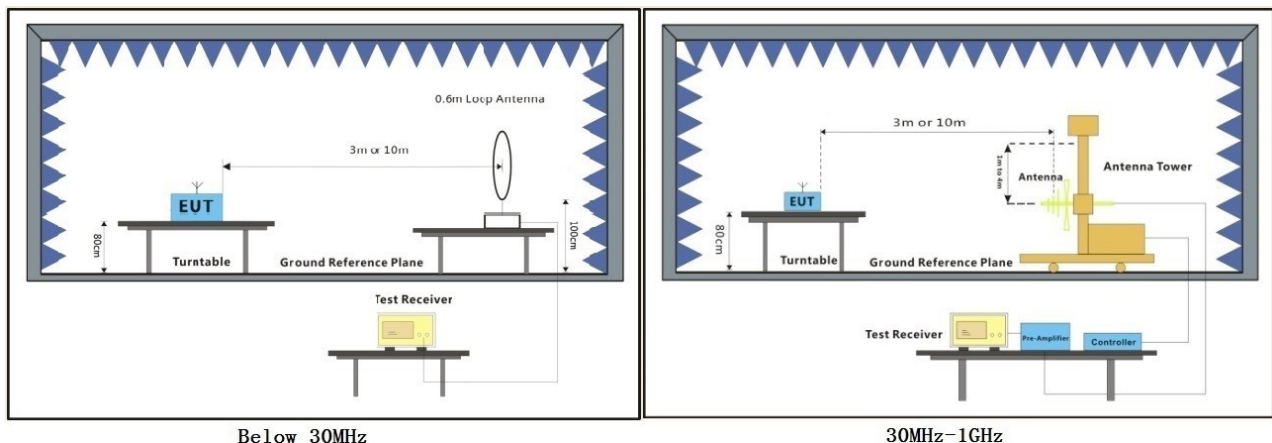
Humidity: 44 % RH

Atmospheric Pressure: 1024 mbar

### 7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                                                                                     |
|-----------------------|-----------|-------------------------------------------------------------------------------------------------|
| Final test            | 01        | TXmode(1Mbps) Keep the EUT in charging and continuously transmitting mode with GFSK modulation. |
| Final test            | 02        | TXmode(2Mbps) Keep the EUT in continuously transmitting mode with GFSK modulation.              |

### 7.2.3 Test Setup Diagram



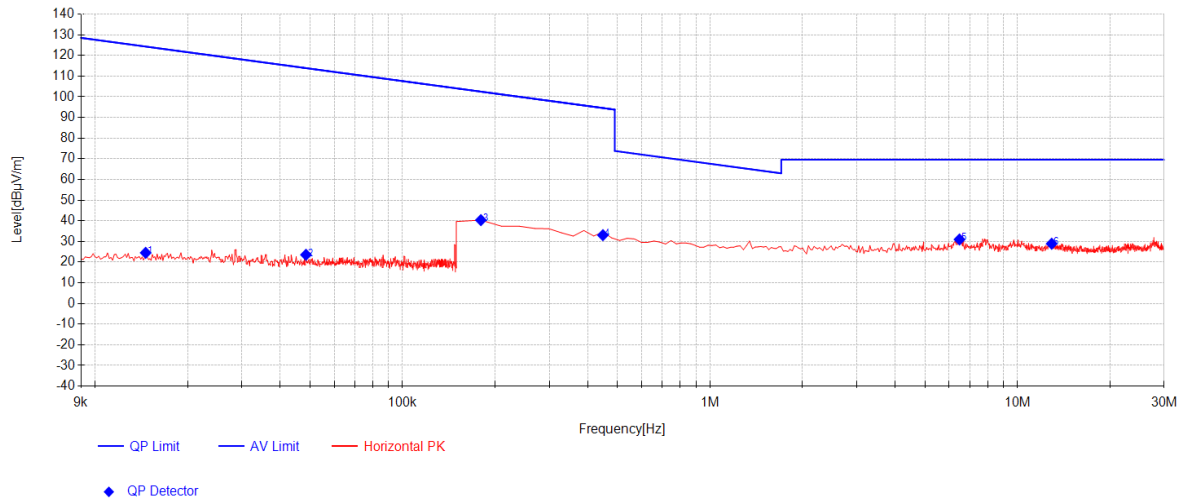
#### 7.2.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

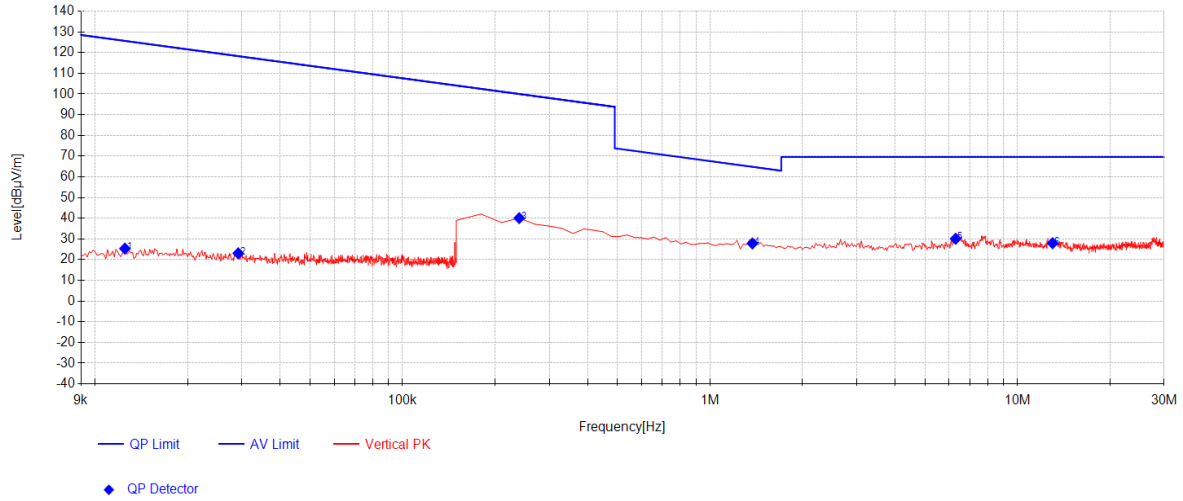
## BLE\_2M\_TX\_CH\_39\_Coaxial



### Final Data List

| NO. | Frequency [MHz] | Reading [dBμV]    | AF [dB/m] | Factor [dB] | QP Value [dBμV/m] | QP Limit [dBμV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-----------------|-------------------|-----------|-------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| 4   | 0.4485          | 12.64             | 19.99     | 0.44        | 33.06             | 94.57             | 61.51          | 100         | 150       | Coaxial  |
| 5   | 6.4782          | 10.13             | 20.27     | 0.55        | 30.96             | 69.54             | 38.58          | 100         | 240       | Coaxial  |
| 6   | 12.9258         | 8.12              | 20.10     | 0.68        | 28.90             | 69.54             | 40.64          | 100         | 160       | Coaxial  |
| NO. | Frequency [MHz] | AV Reading [dBμV] | AF [dB/m] | Factor [dB] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1   | 0.0146          | 4.38              | 19.70     | 0.43        | 24.51             | 124.31            | 99.80          | 100         | 320       | Coaxial  |
| 2   | 0.0485          | 3.35              | 19.79     | 0.43        | 23.57             | 113.88            | 90.31          | 100         | 130       | Coaxial  |
| 3   | 0.1798          | 19.98             | 19.91     | 0.43        | 40.32             | 102.51            | 62.19          | 100         | 110       | Coaxial  |

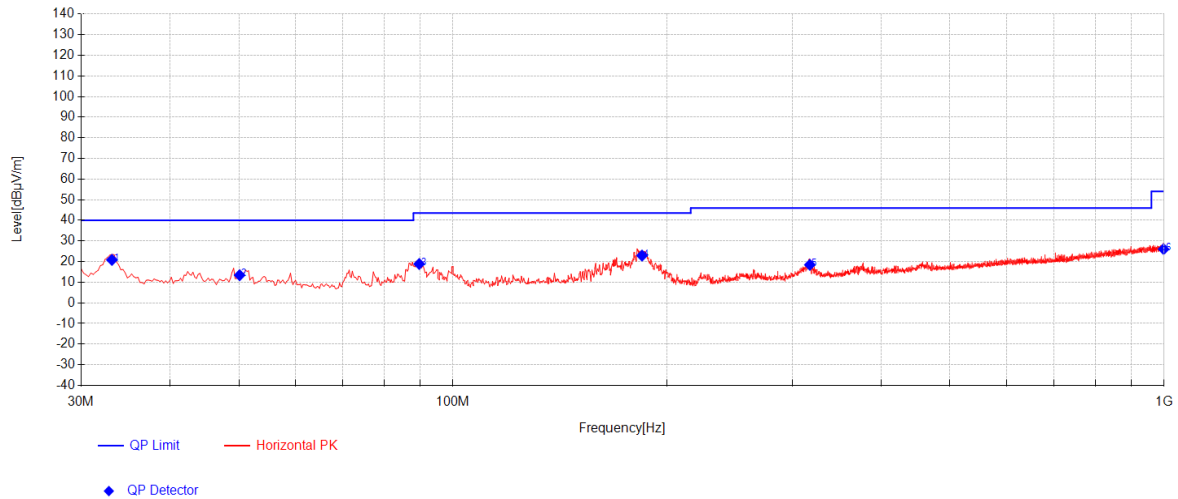
## BLE\_2M\_TX\_CH\_39\_Coplanar



### Final Data List

| NO. | Frequency [MHz] | Reading [dBμV]    | AF [dB/m] | Factor [dB] | QP Value [dBμV/m] | QP Limit [dBμV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-----------------|-------------------|-----------|-------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| 4   | 1.3738          | 7.29              | 20.06     | 0.46        | 27.81             | 64.85             | 37.04          | 100         | 100       | Coplanar |
| 5   | 6.2991          | 9.28              | 20.26     | 0.55        | 30.09             | 69.54             | 39.45          | 100         | 320       | Coplanar |
| 6   | 13.0154         | 7.15              | 20.10     | 0.68        | 27.93             | 69.54             | 41.61          | 100         | 100       | Coplanar |
| NO. | Frequency [MHz] | AV Reading [dBμV] | AF [dB/m] | Factor [dB] | AV Value [dBμV/m] | AV Limit [dBμV/m] | AV Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1   | 0.0125          | 5.21              | 19.70     | 0.43        | 25.34             | 125.66            | 100.32         | 100         | 10        | Coplanar |
| 2   | 0.0292          | 2.94              | 19.70     | 0.43        | 23.07             | 118.29            | 95.22          | 100         | 340       | Coplanar |
| 3   | 0.2396          | 19.71             | 19.93     | 0.43        | 40.07             | 100.01            | 59.94          | 100         | 170       | Coplanar |

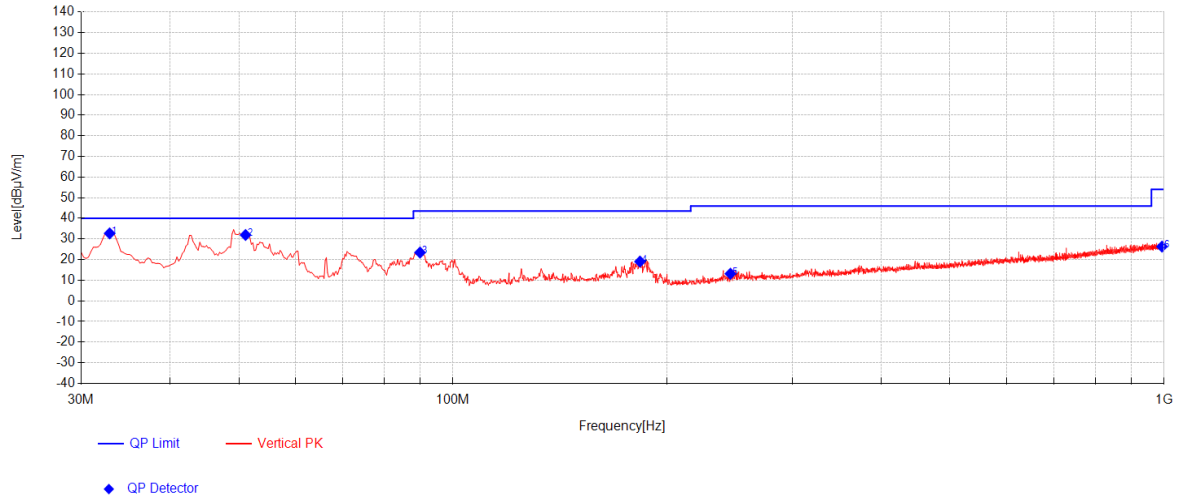
## BLE\_2M\_TX\_CH\_39\_Horizontal



### Final Data List

| NO. | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | QP Value [dBμV/m] | QP Limit [dBμV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-----------------|----------------|-----------|-------------|-------------------|-------------------|----------------|-------------|-----------|------------|
| 1   | 33.1525         | 42.12          | 12.69     | -33.98      | 20.83             | 40.00             | 19.17          | 142         | 95        | Horizontal |
| 2   | 50.1275         | 33.61          | 13.48     | -33.69      | 13.41             | 40.00             | 26.59          | 163         | 338       | Horizontal |
| 3   | 89.655          | 43.2           | 8.91      | -33.26      | 18.85             | 43.50             | 24.65          | 180         | 249       | Horizontal |
| 4   | 184.4725        | 44.78          | 10.50     | -32.35      | 22.92             | 43.50             | 20.58          | 142         | 249       | Horizontal |
| 5   | 317.605         | 36.66          | 13.33     | -31.54      | 18.45             | 46.00             | 27.55          | 152         | 286       | Horizontal |
| 6   | 998.545         | 29.36          | 24.49     | -27.82      | 26.03             | 54.00             | 27.97          | 137         | 84        | Horizontal |

## BLE\_2M\_TX\_CH\_39\_Verical



### Final Data List

| NO. | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | QP Value [dBμV/m] | QP Limit [dBμV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity |
|-----|-----------------|----------------|-----------|-------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| 1   | 32.91           | 54.02          | 12.67     | -33.98      | 32.71             | 40.00             | 7.29           | 130         | 356       | Vertical |
| 2   | 51.0975         | 52.24          | 13.37     | -33.68      | 31.93             | 40.00             | 8.07           | 159         | 125       | Vertical |
| 3   | 89.8975         | 47.78          | 8.90      | -33.26      | 23.42             | 43.50             | 20.08          | 186         | 185       | Vertical |
| 4   | 183.26          | 40.86          | 10.55     | -32.36      | 19.05             | 43.50             | 24.45          | 147         | 319       | Vertical |
| 5   | 245.5825        | 33.32          | 11.84     | -32.00      | 13.17             | 46.00             | 32.83          | 195         | 352       | Vertical |
| 6   | 993.21          | 29.75          | 24.45     | -27.87      | 26.32             | 54.00             | 27.68          | 146         | 328       | Vertical |

## 7.3 Radiated Spurious Emissions Above 1GHz

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

Test Method: ANSI C63.10 (2020) Section 6.6

Limit:

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

### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C

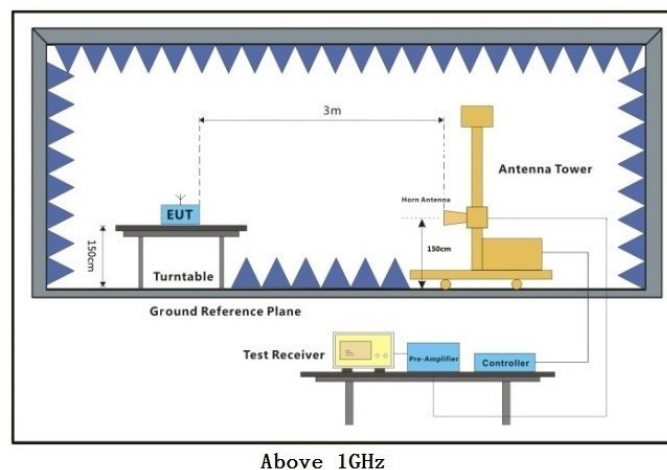
Humidity: 44 % RH

Atmospheric Pressure: 1024 mbar

### 7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                                                                                     |
|-----------------------|-----------|-------------------------------------------------------------------------------------------------|
| Final test            | 01        | TXmode(1Mbps) Keep the EUT in charging and continuously transmitting mode with GFSK modulation. |
| Final test            | 02        | TXmode(2Mbps) Keep the EUT in continuously transmitting mode with GFSK modulation.              |

### 7.3.3 Test Setup Diagram



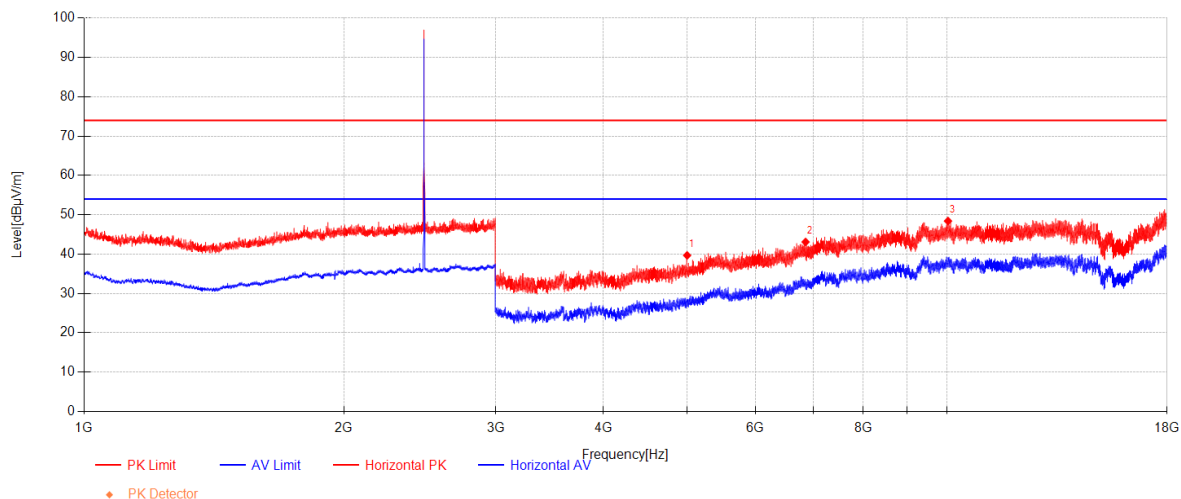
### 7.3.4 Measurement Procedure and Data

- 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 anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

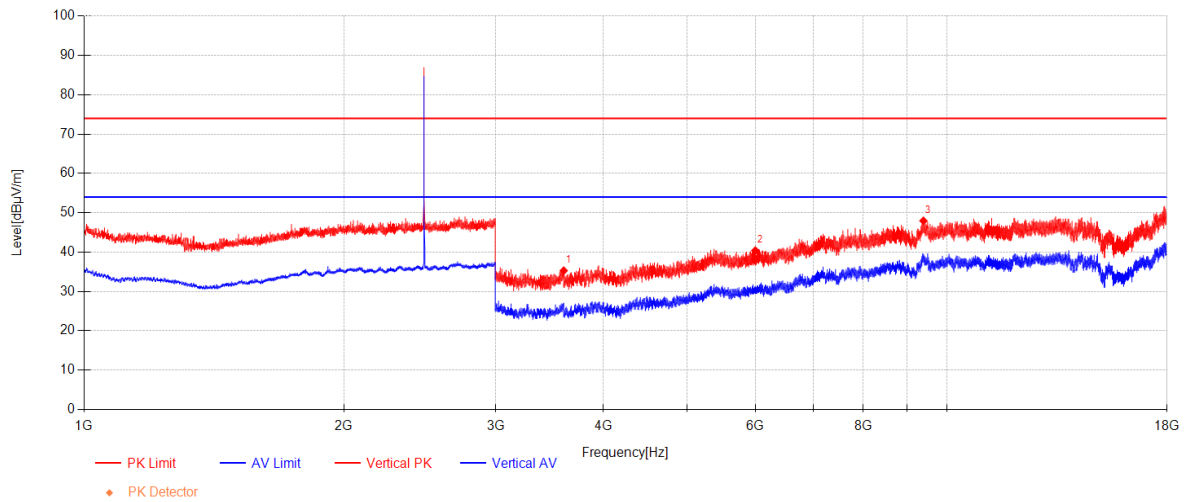
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
- 4:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle<98%) or 10Hz (Duty cycle $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.

## BLE\_2M\_TX\_CH\_39\_Horizontal



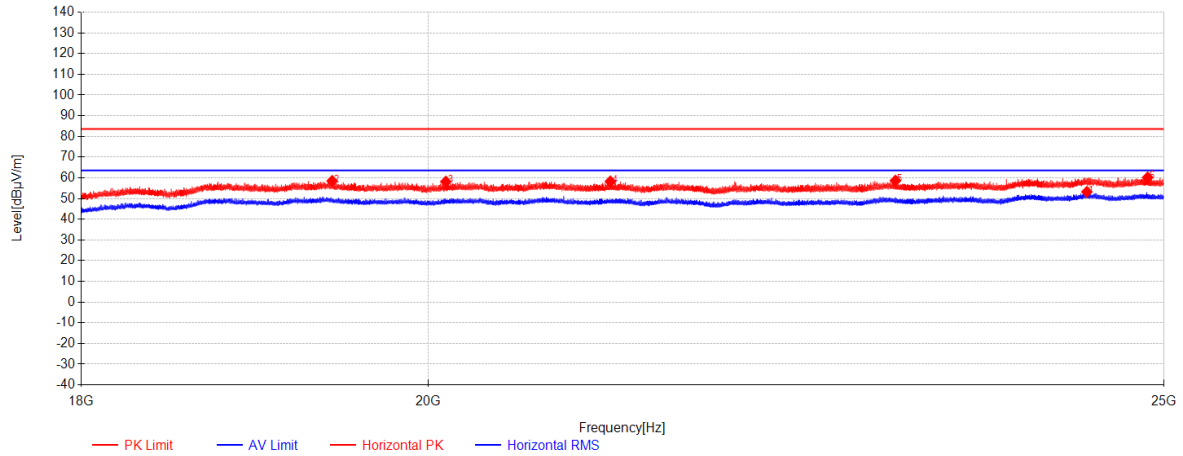
| Data List |                 |                |           |             |                |                |             |            |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity   |
| 1         | 4999.875        | 56.48          | 31.20     | -48.01      | 39.67          | 74.00          | 34.33       | Horizontal |
| 2         | 6859.125        | 54.61          | 35.27     | -46.80      | 43.09          | 74.00          | 30.91       | Horizontal |
| 3         | 10030.5         | 51.33          | 38.82     | -41.75      | 48.40          | 74.00          | 25.60       | Horizontal |

## BLE\_2M\_TX\_CH\_39\_Verical



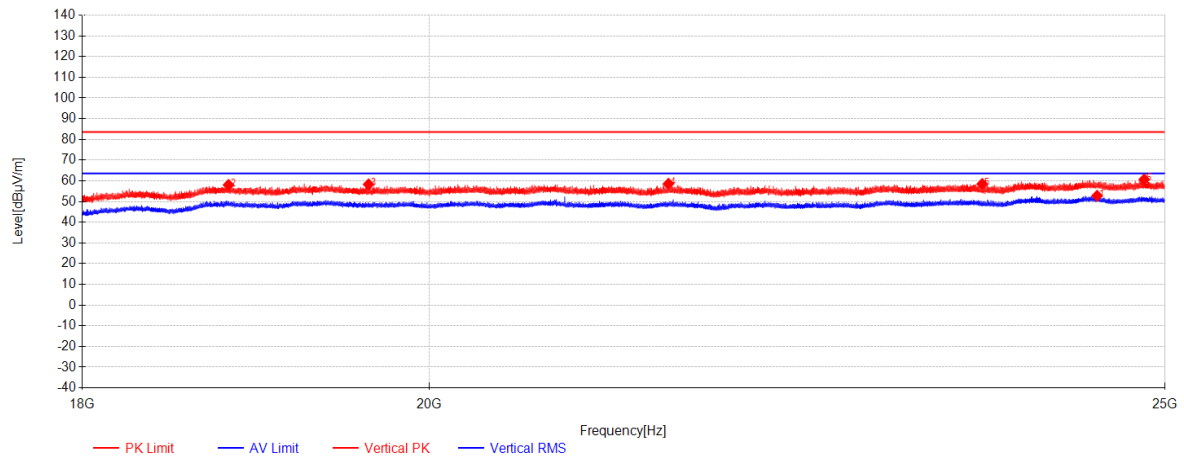
| Data List |                 |                |           |             |                |                |             |          |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|----------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity |
| 1         | 3597            | 54.91          | 28.66     | -48.28      | 35.28          | 74.00          | 38.72       | Vertical |
| 2         | 5997.75         | 55.07          | 32.80     | -47.49      | 40.38          | 74.00          | 33.62       | Vertical |
| 3         | 9394.125        | 53.04          | 37.95     | -43.04      | 47.95          | 74.00          | 26.05       | Vertical |

## BLE\_2M\_TX\_CH\_39\_Horizontal



| Data List |                 |                |           |             |                |                |             |            |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity   |
| 1         | 24421.275       | 37.84          | 39.38     | -23.99      | 53.24          | 63.54          | 6.30        | Horizontal |
| 2         | 19424.325       | 47.92          | 38.64     | -28.09      | 58.47          | 83.54          | 21.07       | Horizontal |
| 3         | 20105.95        | 47.20          | 38.65     | -27.67      | 58.17          | 83.54          | 21.37       | Horizontal |
| 4         | 21134.775       | 46.56          | 38.11     | -26.45      | 58.22          | 83.54          | 21.32       | Horizontal |
| 5         | 23043.325       | 45.70          | 38.15     | -25.21      | 58.64          | 83.54          | 20.90       | Horizontal |
| 6         | 24875.75        | 45.16          | 39.48     | -24.47      | 60.16          | 83.54          | 19.38       | Horizontal |

## BLE\_2M\_TX\_CH\_39\_Vertical



| Data List |                 |                |           |             |                |                |             |          |
|-----------|-----------------|----------------|-----------|-------------|----------------|----------------|-------------|----------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF [dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Polarity |
| 1         | 24489.35        | 37.67          | 39.40     | -24.29      | 52.78          | 63.54          | 6.76        | Vertical |
| 2         | 18817.6         | 48.23          | 38.22     | -28.45      | 58.00          | 83.54          | 21.54       | Vertical |
| 3         | 19634.325       | 48.02          | 38.66     | -28.40      | 58.28          | 83.54          | 21.26       | Vertical |
| 4         | 21503.675       | 46.67          | 37.85     | -25.94      | 58.57          | 83.54          | 20.97       | Vertical |
| 5         | 23650.75        | 44.91          | 38.88     | -25.31      | 58.48          | 83.54          | 21.06       | Vertical |
| 6         | 24841.975       | 45.39          | 39.47     | -24.21      | 60.65          | 83.54          | 18.89       | Vertical |

## 7.4 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2020) Section 11.9.1

Limit:

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

### 7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

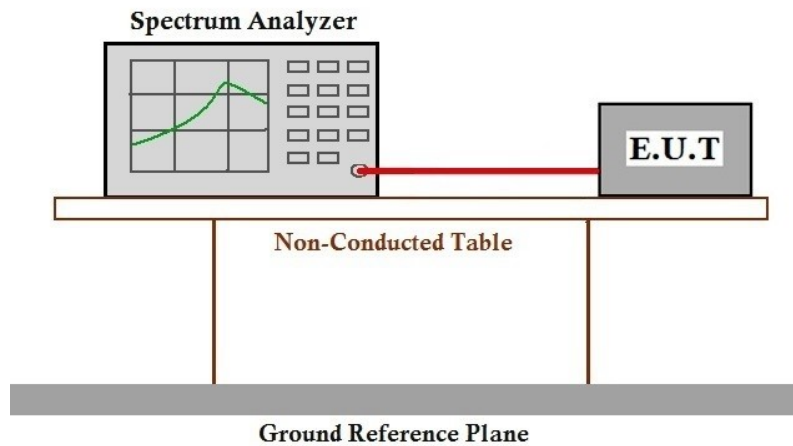
Humidity: 44 % RH

Atmospheric Pressure: 1024 mbar

### 7.4.2 Test Mode Description

| Pre-scan /<br>Final test | Mode<br>Code | Description                                                                                     |
|--------------------------|--------------|-------------------------------------------------------------------------------------------------|
| Final test               | 01           | TXmode(1Mbps) Keep the EUT in charging and continuously transmitting mode with GFSK modulation. |
| Final test               | 02           | TXmode(2Mbps) Keep the EUT in continuously transmitting mode with GFSK modulation.              |

## 7.4.3 Test Setup Diagram



## 7.4.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details

## 7.5 Minimum 6dB Bandwidth

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

Test Method: ANSI C63.10 (2020) Section 11.8.1

Limit:

≥500 kHz

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C

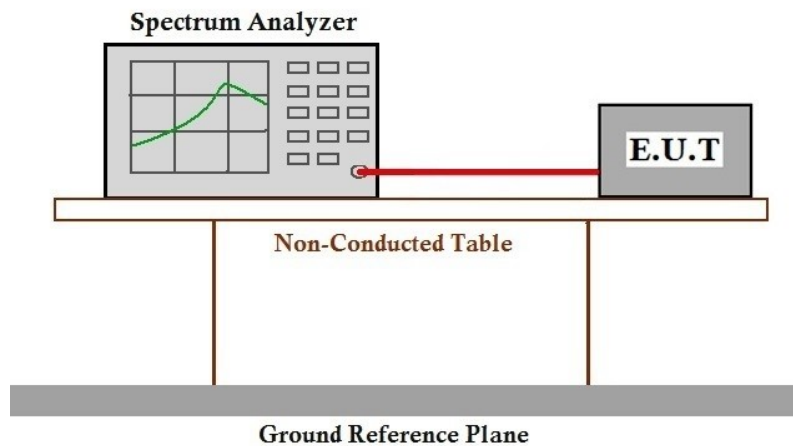
Humidity: 44 % RH

Atmospheric Pressure: 1024 mbar

### 7.5.2 Test Mode Description

| Pre-scan /<br>Final test | Mode<br>Code | Description                                                                                     |
|--------------------------|--------------|-------------------------------------------------------------------------------------------------|
| Final test               | 01           | TXmode(1Mbps) Keep the EUT in charging and continuously transmitting mode with GFSK modulation. |
| Final test               | 02           | TXmode(2Mbps) Keep the EUT in continuously transmitting mode with GFSK modulation.              |

### 7.5.3 Test Setup Diagram



### 7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details

## 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SUCR2510001040AT

## 9 EUT Constructional Details (EUT Photos)

Refer to Appendix\_Photographs of EUT Constructional Details for SUCR2510001040AT

## 10 Appendix

### 1. Maximum Conducted Output Power

#### 1.1 Test Result

##### 1.1.1 Power

| Mode | TX Type | Frequency (MHz) | Maximum Peak Conducted Output Power (dBm) |       | Verdict |
|------|---------|-----------------|-------------------------------------------|-------|---------|
|      |         |                 | ANT1                                      | Limit |         |
| 1M   | SISO    | 2402            | 1.45                                      | <=30  | Pass    |
|      |         | 2440            | 1.56                                      | <=30  | Pass    |
|      |         | 2480            | 2.38                                      | <=30  | Pass    |
| 2M   | SISO    | 2402            | 1.42                                      | <=30  | Pass    |
|      |         | 2440            | 1.88                                      | <=30  | Pass    |
|      |         | 2480            | 2.66                                      | <=30  | Pass    |

Note1: Antenna Gain: Ant1: 0.30dBi;

## 2. Bandwidth

### 2.1 Test Result

#### 2.1.1 OBW

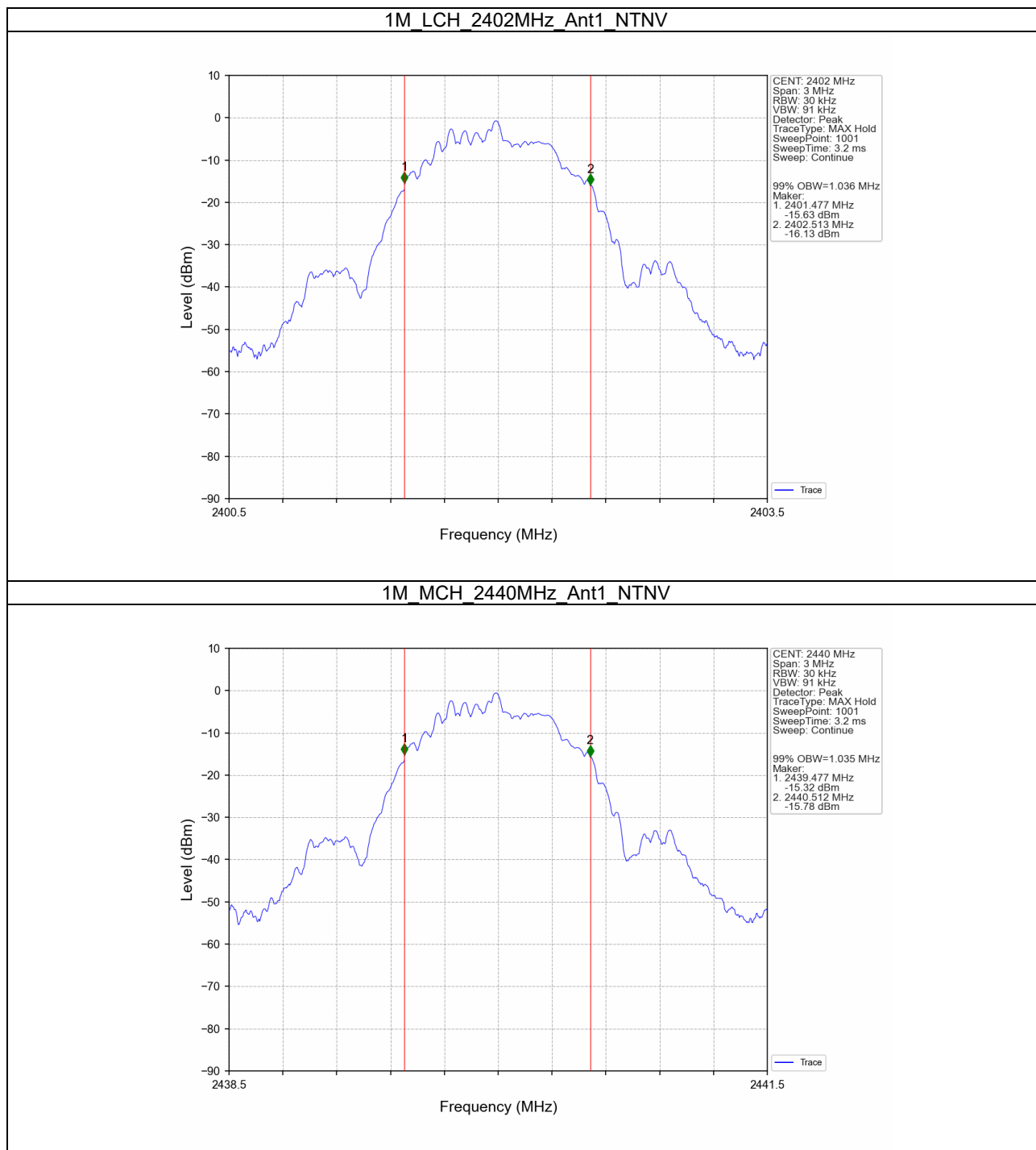
| Mode | TX Type | Frequency (MHz) | ANT | 99% Occupied Bandwidth (MHz) |       | Verdict |
|------|---------|-----------------|-----|------------------------------|-------|---------|
|      |         |                 |     | Result                       | Limit |         |
| 1M   | SISO    | 2402            | 1   | 1.036                        | /     | Pass    |
|      |         | 2440            | 1   | 1.035                        | /     | Pass    |
|      |         | 2480            | 1   | 1.039                        | /     | Pass    |
| 2M   | SISO    | 2402            | 1   | 2.067                        | /     | Pass    |
|      |         | 2440            | 1   | 2.066                        | /     | Pass    |
|      |         | 2480            | 1   | 2.068                        | /     | Pass    |

#### 2.1.2 6dB BW

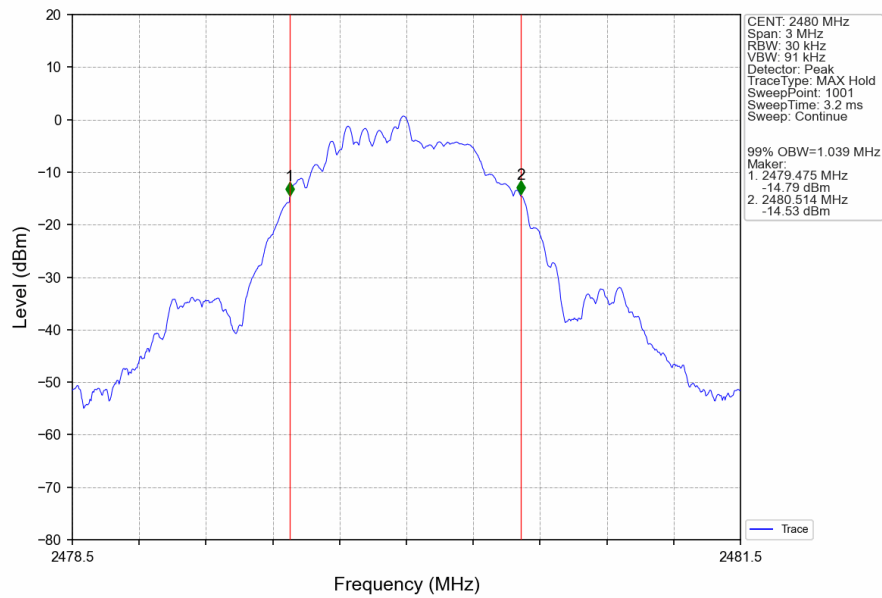
| Mode | TX Type | Frequency (MHz) | ANT | 6dB Bandwidth (MHz) |            | Verdict |
|------|---------|-----------------|-----|---------------------|------------|---------|
|      |         |                 |     | Result              | Limit      |         |
| 1M   | SISO    | 2402            | 1   | 0.668               | $\geq 0.5$ | Pass    |
|      |         | 2440            | 1   | 0.673               | $\geq 0.5$ | Pass    |
|      |         | 2480            | 1   | 0.670               | $\geq 0.5$ | Pass    |
| 2M   | SISO    | 2402            | 1   | 1.153               | $\geq 0.5$ | Pass    |
|      |         | 2440            | 1   | 1.164               | $\geq 0.5$ | Pass    |
|      |         | 2480            | 1   | 1.157               | $\geq 0.5$ | Pass    |

## 2.2 Test Graph

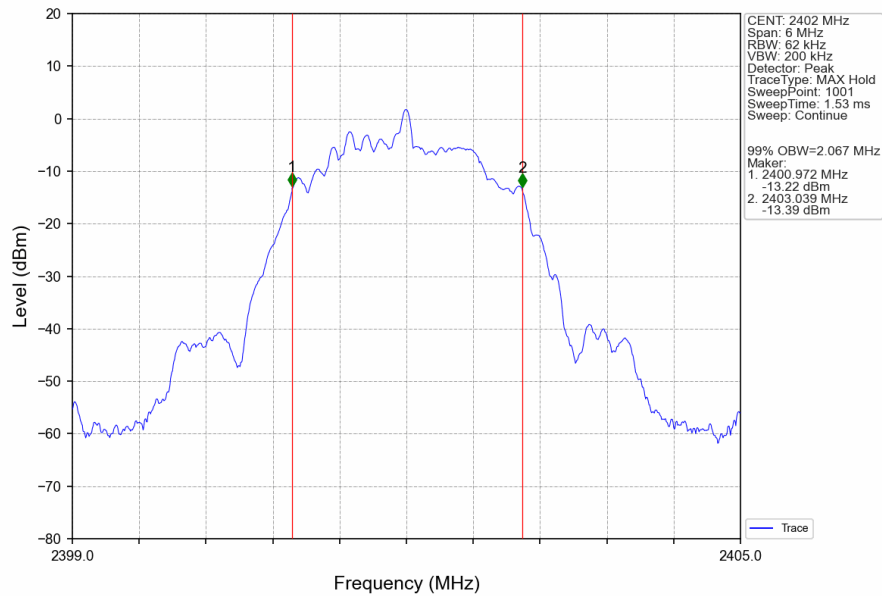
### 2.2.1 OBW



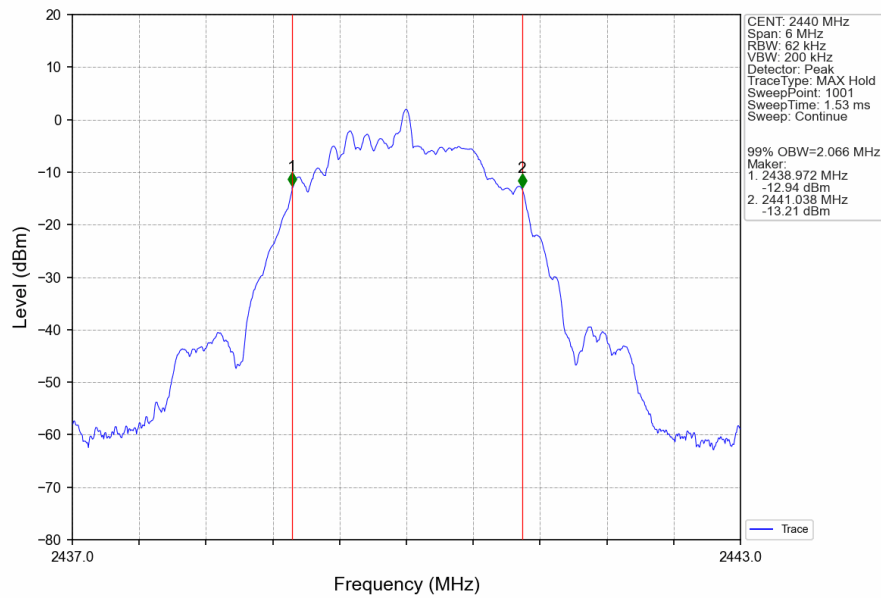
## 1M HCH 2480MHz Ant1 NTN



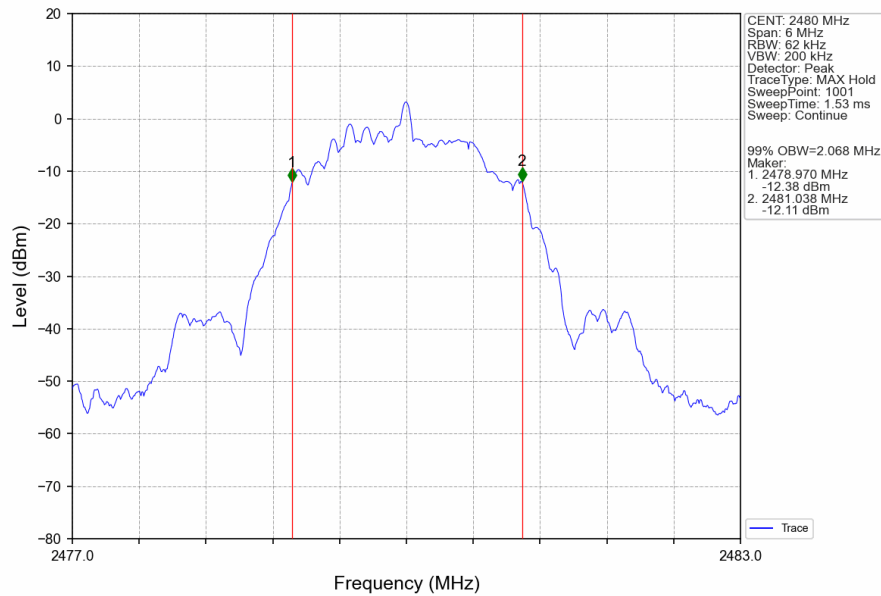
## 2M LCH 2402MHz Ant1 NTN



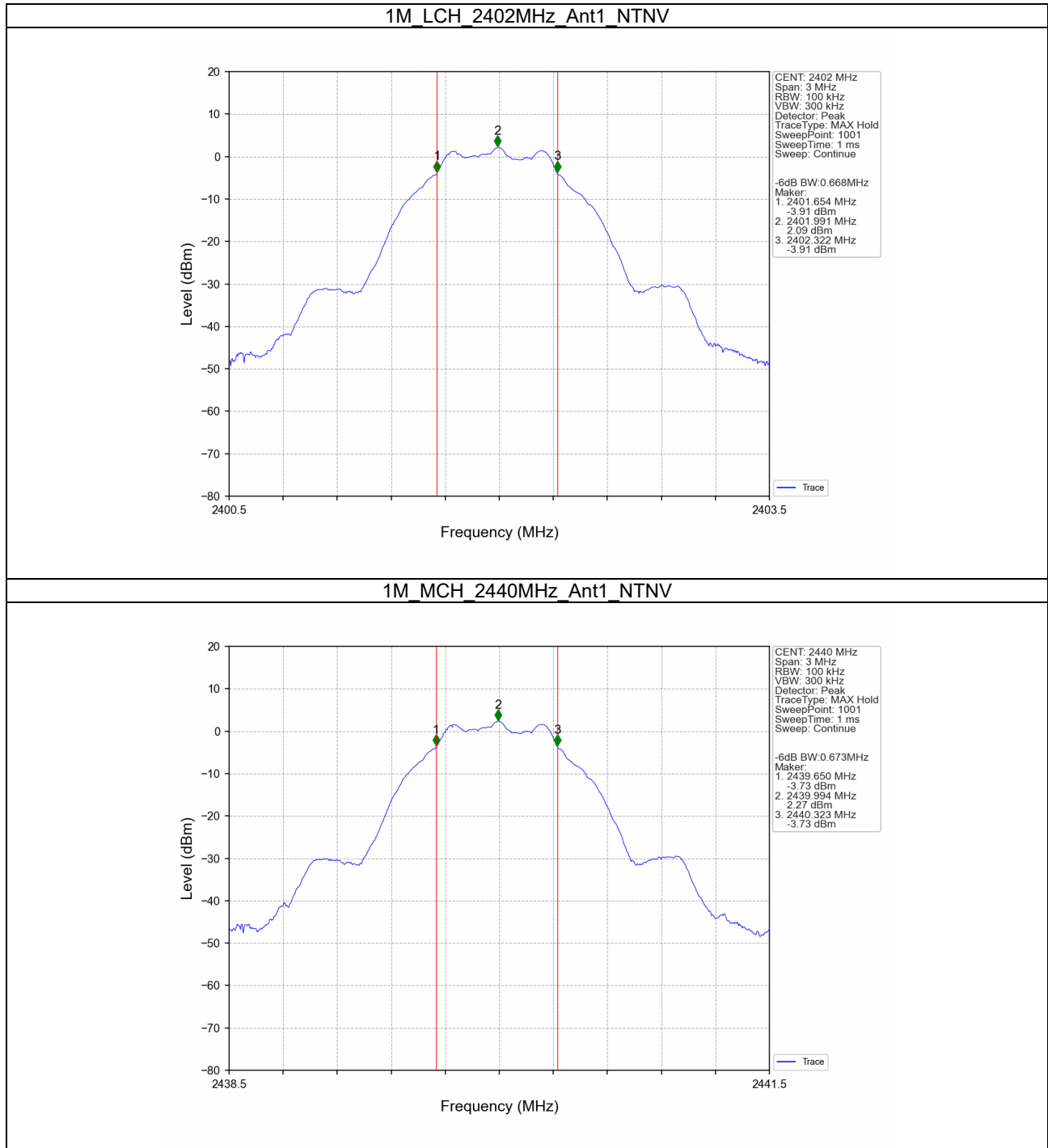
## 2M MCH 2440MHz Ant1 NTN



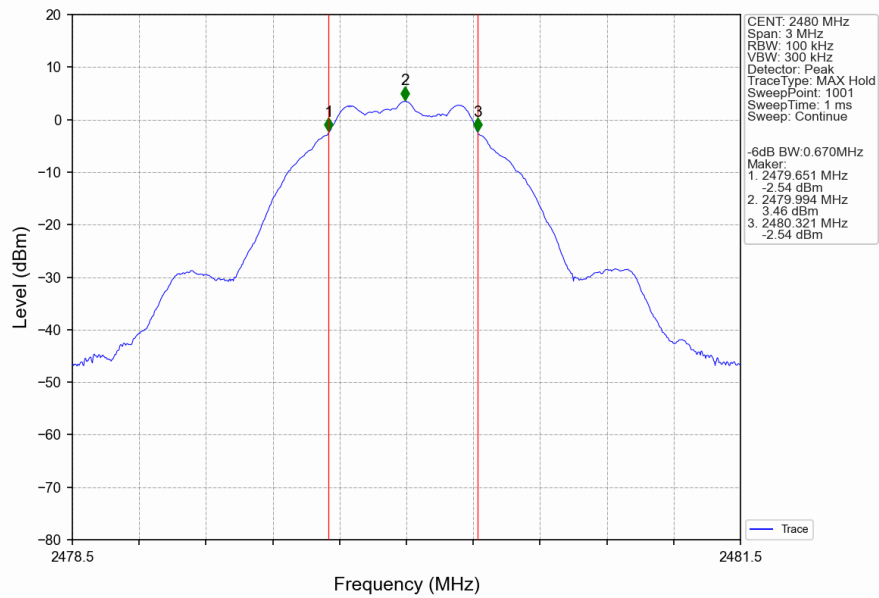
## 2M HCH 2480MHz Ant1 NTN



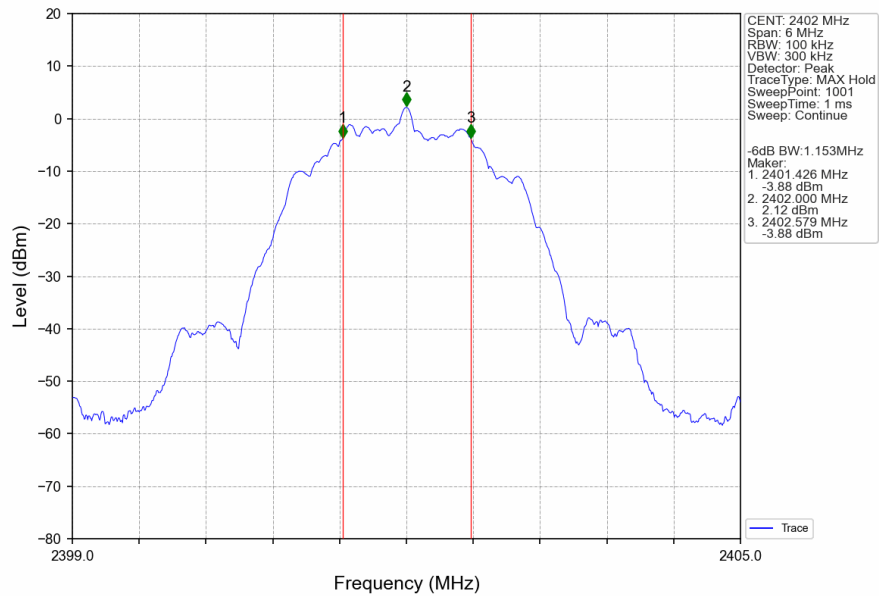
## 2.2.2 6dB BW



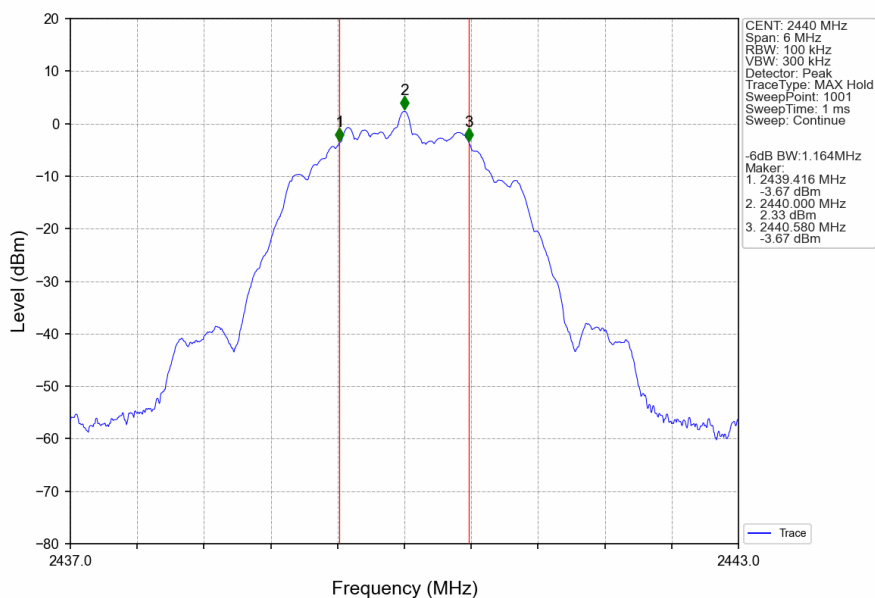
## 1M HCH 2480MHz Ant1 NTN



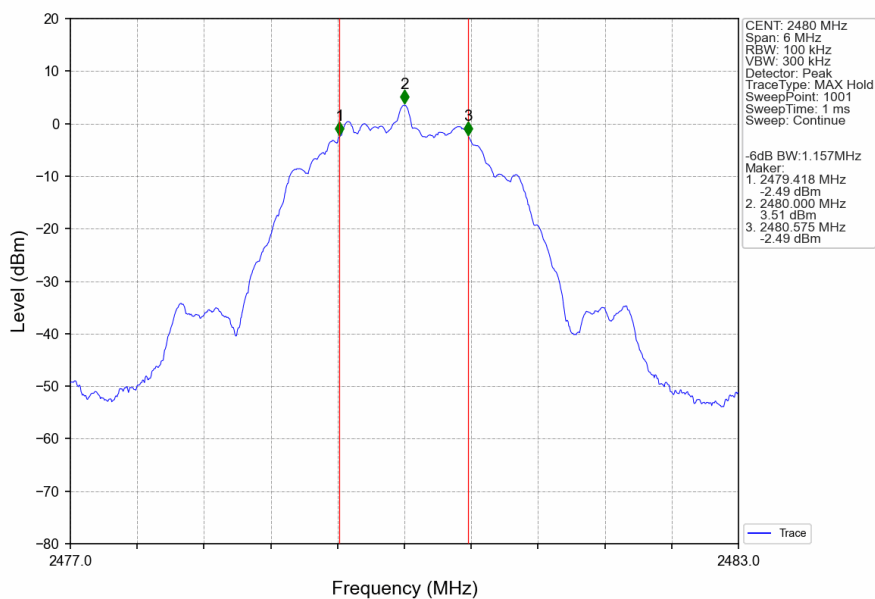
## 2M LCH 2402MHz Ant1 NTN



## 2M MCH 2440MHz Ant1 NTN



## 2M HCH 2480MHz Ant1 NTN



- End of the Report -