

# FCC Test Report

**Report No.:** RWAZ202300081E  
**Applicant:** Shenzhen Neutop Optoelectronics Co., Ltd  
**Address:** 502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community, Taoyuan Street, Nanshan District, Shenzhen, China  
**Product Name:** Projector  
**Product Model:** BOOM 3  
**Multiple Models:** BOOM03, F503, K501, K502 , K503, K504, K505  
**Trade Mark:** N/A  
**FCC ID:** 2BEGB-YX01  
**Standards:** FCC CFR Title 47 Part 15C (§15.247)  
**Test Date:** 2024-01-18 to 2024-01-19  
**Test Result:** Complied  
**Report Date:** 2024-01-25

**Reviewed by:**

frank yin

**Approved by:**

Jacob Kong

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## Revision History

| Version No. | Issued Date | Description |
|-------------|-------------|-------------|
| 00          | 2024-01-25  | Original    |

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# 1 General Information

## 1.1 Client Information

|               |                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Applicant:    | Shenzhen Neutop Optoelectronics Co., Ltd                                                                                               |
| Address:      | 502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community, Taoyuan Street, Nanshan District, Shenzhen, China |
| Manufacturer: | Shenzhen Neutop Optoelectronics Co., Ltd                                                                                               |
| Address:      | 502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community, Taoyuan Street, Nanshan District, Shenzhen, China |

## 1.2 Product Description of EUT

The EUT is a Projector that contains Classic Bluetooth(BDR/EDR), BLE, 2.4G and 5G WLAN radios, this report covers the full testing of the BLE radio.

|                                     |                                                                         |
|-------------------------------------|-------------------------------------------------------------------------|
| Sample Serial Number                | 1L-2 for CE&RE test, 1L-3 for RF test conducted test (assigned by WATC) |
| Sample Received Date                | 2023-12-21                                                              |
| Sample Status                       | Good Condition                                                          |
| Frequency Range                     | 2402MHz - 2480MHz(BLE1M/2M)                                             |
| Maximum Conducted Peak Output Power | 6.03dBm                                                                 |
| Modulation Technology               | GFSK                                                                    |
| Spatial Streams                     | SISO (1TX, 1RX)                                                         |
| Antenna Gain <sup>#</sup>           | 3dBi                                                                    |
| Power Supply                        | AC 110-240V, 50/60Hz                                                    |
| Adapter Information                 | N/A                                                                     |
| Modification                        | Sample No Modification by the test lab                                  |

## 1.3 Antenna information

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><b>15.203 requirement:</b></p> <p>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.</p> |  |
| <b>Device Antenna information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| <p>The BLE antenna is an internal antenna which cannot replace by end-user, please see product internal photos for details.</p>                                                                                                                                                                                                                                                                                                                                                             |  |

## 1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment Class: DSS, FCC ID: 2BEGB-YX01  
FCC Part 15, Subpart E, Equipment Class: NII, FCC ID: 2BEGB-YX01

## 1.5 Measurement Uncertainty

| Parameter                                                                                                                                                                                                                                                                                             |             | Expanded Uncertainty<br>(Confidence of 95%(U = 2Uc(y))) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------|
| AC Power Lines Conducted Emissions                                                                                                                                                                                                                                                                    |             | ±3.14dB                                                 |
| Emissions, Radiated                                                                                                                                                                                                                                                                                   | Below 30MHz | ±2.78dB                                                 |
|                                                                                                                                                                                                                                                                                                       | Below 1GHz  | ±4.84dB                                                 |
|                                                                                                                                                                                                                                                                                                       | Above 1GHz  | ±5.44dB                                                 |
| Emissions, Conducted                                                                                                                                                                                                                                                                                  |             | 1.75dB                                                  |
| Conducted Power                                                                                                                                                                                                                                                                                       |             | 0.74dB                                                  |
| Frequency Error                                                                                                                                                                                                                                                                                       |             | 150Hz                                                   |
| Bandwidth                                                                                                                                                                                                                                                                                             |             | 0.34%                                                   |
| Power Spectral Density                                                                                                                                                                                                                                                                                |             | 0.74dB                                                  |
| <b>Note:</b> The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. |             |                                                         |

## 1.6 Laboratory Location

World Alliance Testing and Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: [qa@watc.com.cn](mailto:qa@watc.com.cn)

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

## 1.7 Test Methodology

FCC CFR 47 Part 2

FCC CFR 47 Part 15

KDB 558074 D01 DTS Meas Guidance v05r02

ANSI C63.10-2020

## 2 Description of Measurement

### 2.1 Test Configuration

| Operating channels:                                                                                                                                                                                                                     |                 |                |                 |                 |                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|-----------------|-----------------|-----------------|
| Channel No.                                                                                                                                                                                                                             | Frequency (MHz) | Channel No.    | Frequency (MHz) | Channel No.     | Frequency (MHz) |
| 0                                                                                                                                                                                                                                       | 2402            | 19             | 2440            | 38              | 2478            |
| 1                                                                                                                                                                                                                                       | 2404            | 20             | 2442            | 39              | 2480            |
| ...                                                                                                                                                                                                                                     | ...             | ...            | ...             | /               | /               |
| 18                                                                                                                                                                                                                                      | 2438            | ...            | ...             | /               | /               |
| According to ANSI C63.10-2020 chapter 5.6.1 Table 11 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows: |                 |                |                 |                 |                 |
| Lowest channel                                                                                                                                                                                                                          |                 | Middle channel |                 | Highest channel |                 |
| Channel No.                                                                                                                                                                                                                             | Frequency (MHz) | Channel No.    | Frequency (MHz) | Channel No.     | Frequency (MHz) |
| 0                                                                                                                                                                                                                                       | 2402            | 19             | 2440            | 39              | 2480            |

| Test Mode:                                                                         |           |                                                         |                |              |
|------------------------------------------------------------------------------------|-----------|---------------------------------------------------------|----------------|--------------|
| Transmitting mode:                                                                 |           | Keep the EUT in continuous transmitting with modulation |                |              |
| Exercise software <sup>#</sup> :                                                   |           | Combo-Tool                                              |                |              |
| Mode                                                                               | Data rate | Powel Level Setting <sup>#</sup>                        |                |              |
|                                                                                    |           | Low Channel                                             | Middle Channel | High Channel |
| BLE 1M                                                                             | 1Mbps     | default                                                 | default        | default      |
| BLE 2M                                                                             | 2Mbps     | default                                                 | default        | default      |
| The exercise software and the maximum power setting that provided by manufacturer. |           |                                                         |                |              |

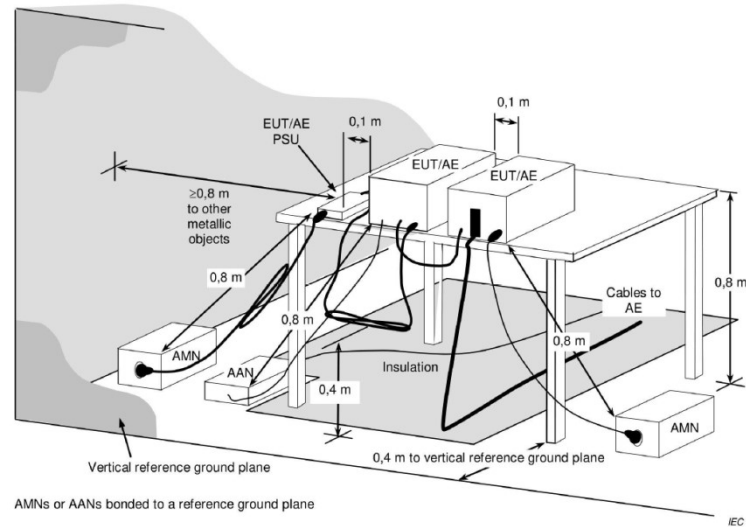
| Worst-Case Configuration:                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| For AC power line conducted emission and radiated emission 9kHz-1GHz and above 18GHz were performed with the EUT transmits at the channel with highest output power as worst-case scenario. |

### 2.2 Test Auxiliary Equipment

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| /            | /           | /     | /             |

## 2.3 Test Setup

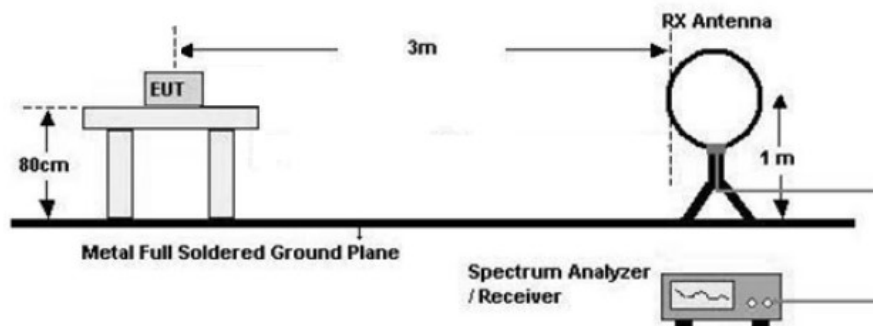
**1) Conducted emission measurement:**



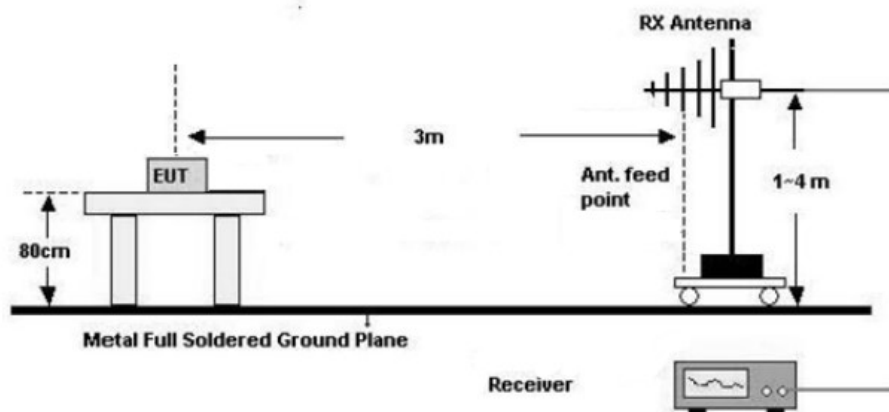
**Note:** The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

**2) Radiated emission measurement:**

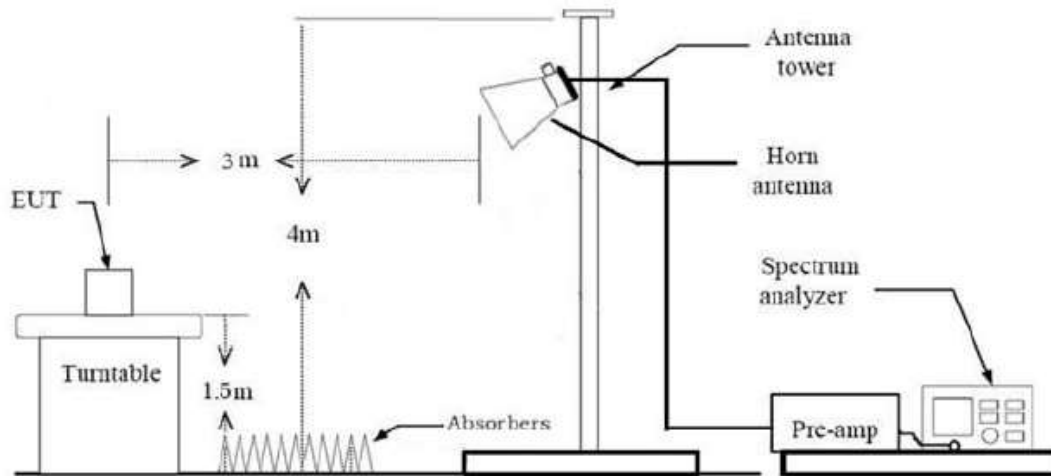
Below 30MHz (3m SAC)



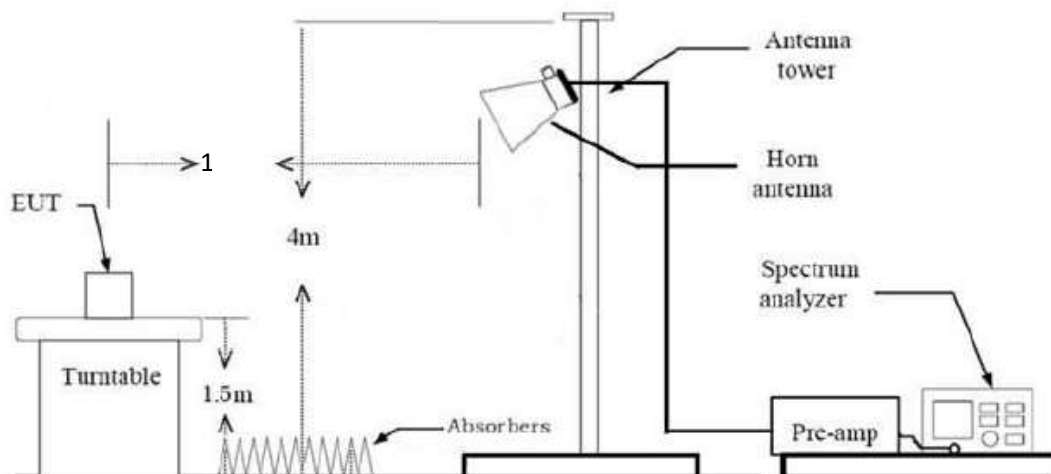
30MHz-1GHz (3m SAC)



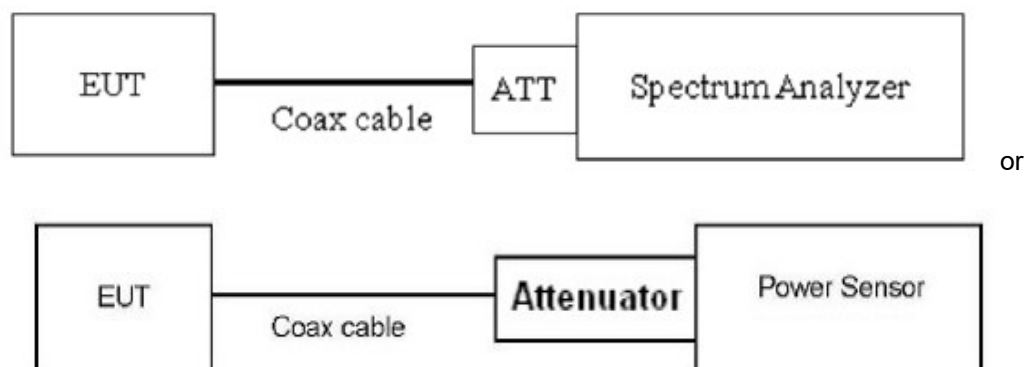
### 1GHz-18GHz(3m FAC)



### Above 18GHz (3m FAC)



### 3) RF Conducted Test



## 2.4 Test Procedure

### Conducted emission:

1. The E.U.T is placed on a non-conducting table 40cm from the vertical ground plane and 80cm above the horizontal ground plane (Please refer to the block diagram of the test setup and photographs).
2. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
3. Line conducted data is recorded for both Line and Neutral

### Radiated Emission Procedure:

#### a) For below 30MHz

1. All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz- 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were  $40 \cdot \log(\text{test distance} / \text{specification distance})$ .
2. Loop antenna use, investigation was done on the three antenna orientations (parallel, perpendicular, ground-parallel)

#### b) For 30MHz-1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

#### c) For above 1GHz:

1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m (1-18GHz) and 1.5 m (above 18GHz).
2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
4. Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

### RF Conducted Test:

1. The antenna port of EUT was connected to the RF port of the test equipment (Power Meter or

Spectrum analyzer) through Attenuator and RF cable.

2. The cable assembly insertion loss of 7.0dB (including 6.0 dB Attenuator and 1.0 dB cable) was entered as an offset in the power meter. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 1.0dB was assumed as worst case. This was later verified to be true by laboratory. ( if the RF cable provided by client, the cable loss declared by client)
3. The EUT is keeping in continuous transmission mode and tested in all modulation modes.

## 2.5 Measurement Method

| Description of Test                     | Measurement Method                     |
|-----------------------------------------|----------------------------------------|
| AC Line Conducted Emissions             | ANSI C63.10-2020 Section 6.2           |
| Maximum Conducted Output Power          | ANSI C63.10-2020 Section 11.9.1.1      |
| Power Spectral Density                  | ANSI C63.10-2020 Section 11.10.2       |
| 6 dB Emission Bandwidth                 | ANSI C63.10-2020 Section 11.8.1        |
| 99% Occupied Bandwidth                  | ANSI C63.10-2020 Section 6.9.3         |
| 100kHz Bandwidth of Frequency Band Edge | ANSI C63.10-2020 Section 6.10          |
| Radiated emission                       | ANSI C63.10-2020 Section 11.11&11.12.1 |
| Duty Cycle                              | ANSI C63.10-2020 Section 11.6          |

## 2.6 Measurement Equipment

| Manufacturer                    | Description             | Model    | Management No.   | Calibration Date | Calibration Due Date |
|---------------------------------|-------------------------|----------|------------------|------------------|----------------------|
| AC Line Conducted Emission Test |                         |          |                  |                  |                      |
| ROHDE& SCHWARZ                  | EMI TEST RECEIVER       | ESR      | 101817           | 2023/7/3         | 2024/7/2             |
| R&S                             | LISN                    | ENV216   | 101748           | 2023/8/1         | 2024/7/30            |
| N/A                             | Coaxial Cable           | NO.12    | N/A              | 2023/7/3         | 2024/7/2             |
| Farad                           | Test Software           | EZ-EMC   | Ver.<br>EMEC-3A1 | /                | /                    |
| Radiated Emission Test          |                         |          |                  |                  |                      |
| R&S                             | EMI test receiver       | ESR3     | 102758           | 2023/7/3         | 2024/7/2             |
| ROHDE& SCHWARZ                  | SPECTRUM ANALYZER       | FSV40-N  | 101608           | 2023/7/3         | 2024/7/2             |
| SONOMA INSTRUMENT               | Low frequency amplifier | 310      | 186014           | 2023/7/12        | 2024/7/11            |
| COM-POWER                       | preamplifier            | PAM-118A | 18040152         | 2023/8/21        | 2024/8/20            |
| COM-POWER                       | Amplifier               | PAM-840A | 461306           | 2023/8/8         | 2024/8/7             |

|                       |                                 |                          |            |           |           |
|-----------------------|---------------------------------|--------------------------|------------|-----------|-----------|
| ETS                   | Passive Loop Antenna            | 6512                     | 29604      | 2023/7/7  | 2024/7/6  |
| SCHWARZBECK           | Log - periodic wideband antenna | VULB 9163                | 9163-872   | 2023/7/7  | 2024/7/6  |
| Astro Antenna Ltd     | Horn antenna                    | AHA-118S                 | 3015       | 2023/7/6  | 2024/7/5  |
| Ducommun technologies | Horn Antenna                    | ARH-4223-02              | 1007726-03 | 2023/7/10 | 2024/7/9  |
| Oulitong              | Band Reject Filter              | OBSF-2400-248<br>3.5-50N | OE02103119 | 2023/9/15 | 2024/9/14 |
| N/A                   | Coaxial Cable                   | N/A                      | NO.9       | 2023/8/8  | 2024/8/7  |
| N/A                   | Coaxial Cable                   | N/A                      | NO.10      | 2023/8/8  | 2024/8/7  |
| N/A                   | Coaxial Cable                   | N/A                      | NO.11      | 2023/8/8  | 2024/8/7  |
| Audix                 | Test Software                   | E3                       | 191218 V9  | /         | /         |
| RF Conducted Test     |                                 |                          |            |           |           |
| ROHDE& SCHWARZ        | SPECTRUM ANALYZER               | FSU-26                   | 200680/026 | 2023/7/12 | 2024/7/11 |
| narda                 | 6dB attenuator                  | 603-06-1                 | N/A        | 2023/7/26 | 2024/7/25 |

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.

### 3 Test Results

#### 3.1 Test Summary

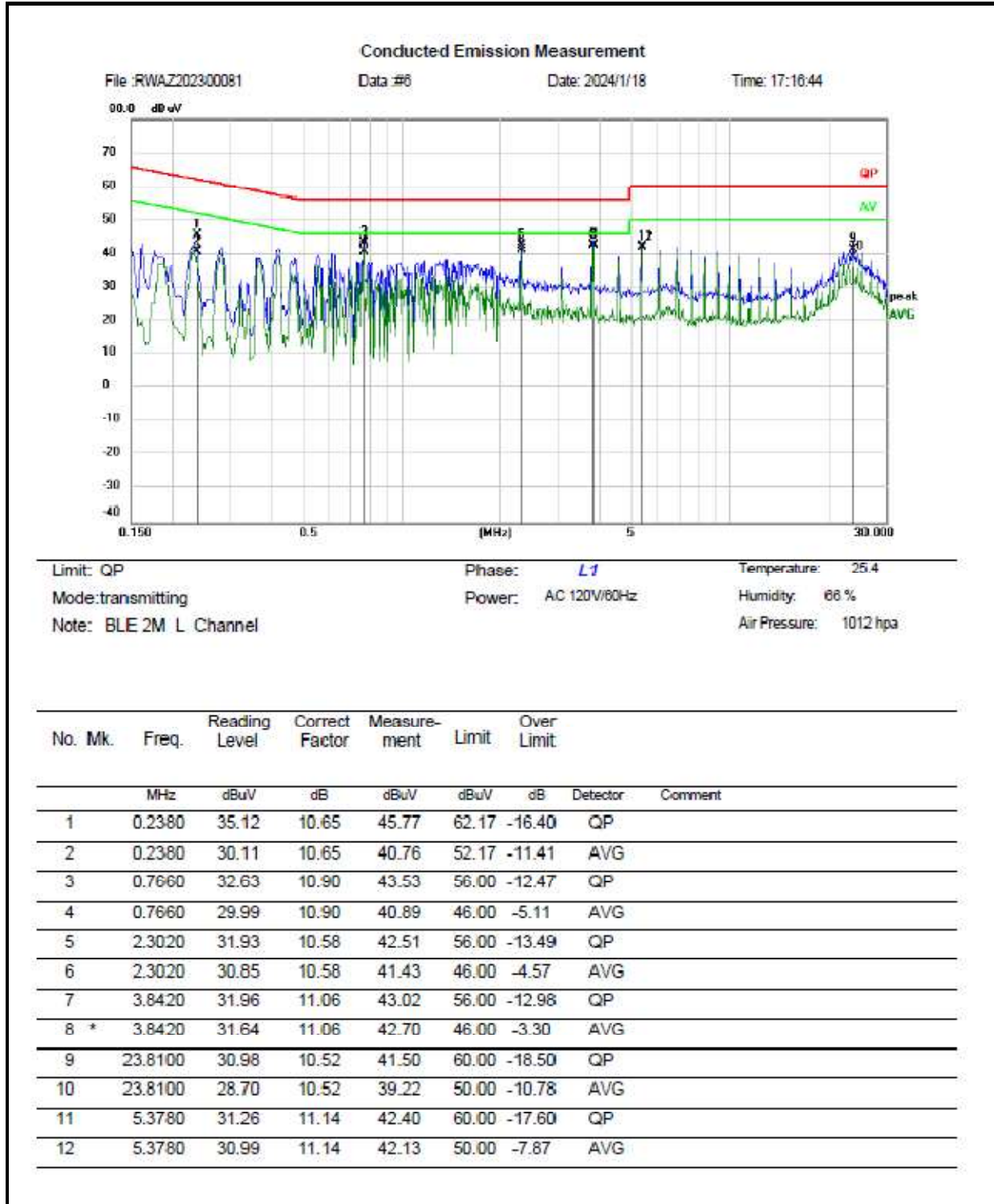
| FCC Rules                    | Description of Test                     | Result      |
|------------------------------|-----------------------------------------|-------------|
| §15.203                      | Antenna Requirement                     | Compliance  |
| §15.207 (a)                  | AC Line Conducted Emissions             | Compliance  |
| §15.247(b)(3)                | Maximum Conducted Output Power          | Compliance  |
| §15.247(e)                   | Power Spectral Density                  | Compliance  |
| §15.247 (a)(2)               | 6 dB Emission Bandwidth                 | Compliance  |
| -                            | 99% Occupied Bandwidth                  | Report only |
| §15.247(d)                   | 100kHz Bandwidth of Frequency Band Edge | Compliance  |
| §15.205, §15.209, §15.247(d) | Radiated emission                       | Compliance  |
| -                            | Duty Cycle                              | Report only |

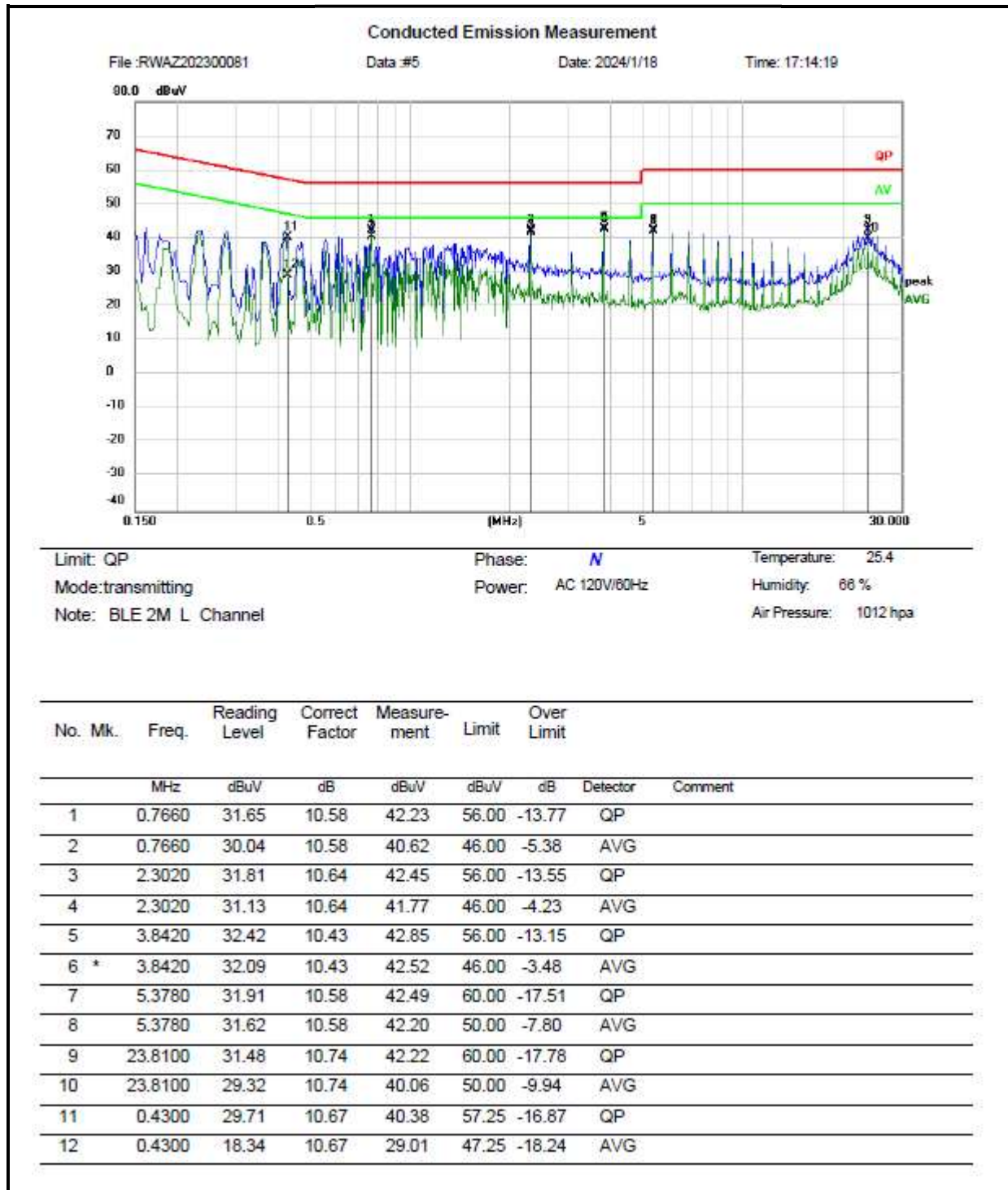
## 3.2 Limit

| Test items                                                        | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Line Conducted Emissions                                       | See details §15.207 (a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Conducted Output Power                                            | For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6dB Emission Bandwidth                                            | The minimum 6 dB bandwidth shall be at least 500 kHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Power Spectral Density                                            | For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Spurious Emissions,<br>100kHz Bandwidth of Frequency<br>Band Edge | 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)). |

### 3.3 AC Line Conducted Emissions Test Data

|                               |                                                                    |                 |          |
|-------------------------------|--------------------------------------------------------------------|-----------------|----------|
| <b>Test Date:</b>             | 2024-01-18                                                         | <b>Test By:</b> | Lirou Li |
| <b>Environment condition:</b> | Temperature: 25.4°C; Relative Humidity:66%; ATM Pressure: 101.2kPa |                 |          |





**Remark:**

Measurement (dBuV)= Reading Level (dBuV) + Correct Factor(dB)

Correct Factor(dB)= LISN Voltage Division Factor (dB)+ Cable loss(dB)

Over Limit = Measurement – Limit

### 3.4 Radiated emission Test Data

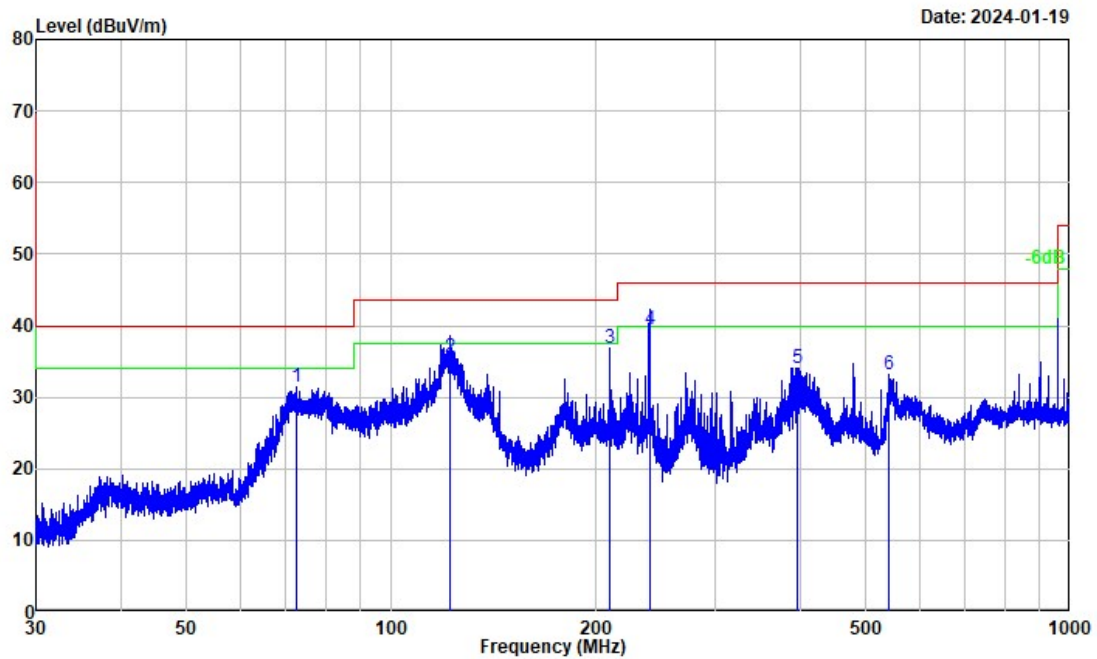
9 kHz-30MHz:

|                        |                                                                    |          |            |
|------------------------|--------------------------------------------------------------------|----------|------------|
| Test Date:             | 2024-01-18                                                         | Test By: | Bard Huang |
| Environment condition: | Temperature: 23.0°C; Relative Humidity:60%; ATM Pressure: 100.7kPa |          |            |

For radiated emissions below 30MHz, there were no emissions found within 20dB of limit.

**30MHz-1GHz:**

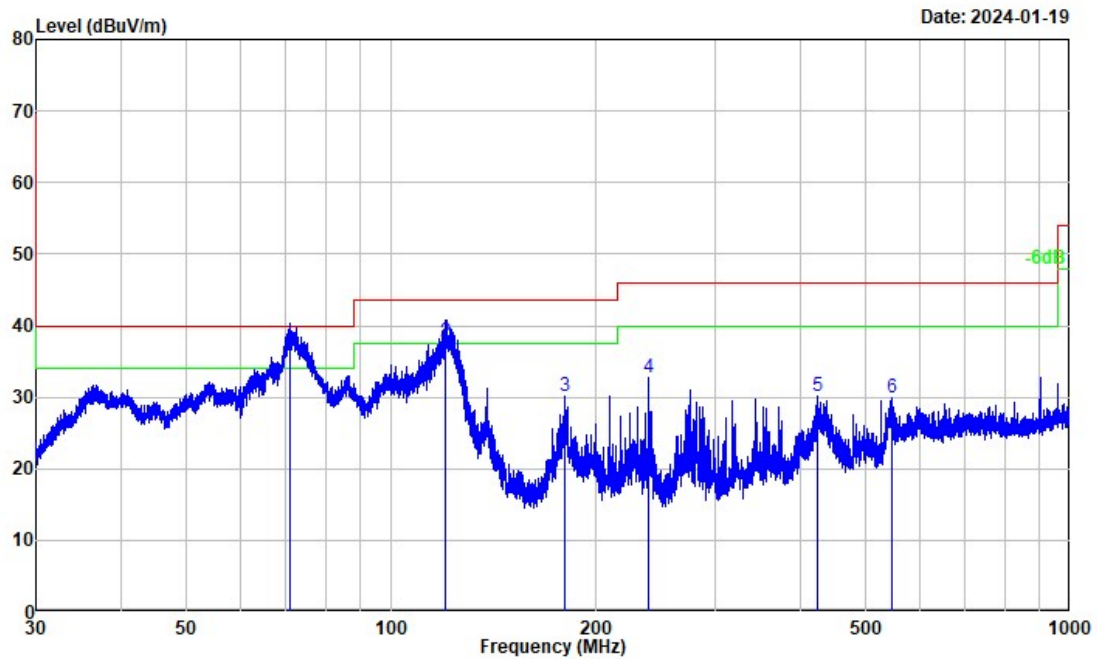
|                               |                                                                    |                 |            |
|-------------------------------|--------------------------------------------------------------------|-----------------|------------|
| <b>Test Date:</b>             | 2024-01-19                                                         | <b>Test By:</b> | Bard Huang |
| <b>Environment condition:</b> | Temperature: 23.0°C; Relative Humidity:60%; ATM Pressure: 100.7kPa |                 |            |



Project No. : RWAZ202300081  
 Test Mode : Transmitting  
 Test Voltage : AC 120V/60Hz  
 Environment : 23.0°C/60%R.H./100.7kPa  
 Tested by : Bard Huang  
 Polarization : horizontal  
 Remark : BLE 2M low channel

| --No. | Frequency<br>(MHz) | Reading<br>(dBμV) | Factor<br>(dB/m) | Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Over Limit<br>(dB) | Detector |
|-------|--------------------|-------------------|------------------|--------------------|-------------------|--------------------|----------|
| ----- |                    |                   |                  |                    |                   |                    |          |
| 1     | 72.496             | 48.70             | -17.27           | 31.43              | 40.00             | -8.57              | Peak     |
| 2     | 121.922            | 51.80             | -16.22           | 35.58              | 43.50             | -7.92              | QP       |
| 3     | 210.048            | 50.72             | -13.92           | 36.80              | 43.50             | -6.70              | Peak     |
| 4     | 240.093            | 52.10             | -12.70           | 39.40              | 46.00             | -6.60              | QP       |
| 5     | 395.894            | 42.84             | -8.70            | 34.14              | 46.00             | -11.86             | Peak     |
| 6     | 540.898            | 39.66             | -6.55            | 33.11              | 46.00             | -12.89             | Peak     |

Remarks: Factor = Antenna factor + Cable loss - Preamp gain



Project No. : RWAZ202300081  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.0℃/60%R.H./100.7kPa  
Tested by : Bard Huang  
Polarization : vertical  
Remark : BLE 2M low channel

| --No. | Frequency<br>(MHz) | Reading<br>(dBμV) | Factor<br>(dB/m) | Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Over Limit<br>(dB) | Detector |
|-------|--------------------|-------------------|------------------|--------------------|-------------------|--------------------|----------|
| 1     | 71.111             | 53.10             | -16.76           | 36.34              | 40.00             | -3.66              | QP       |
| 2     | 119.908            | 53.60             | -15.83           | 37.77              | 43.50             | -5.73              | QP       |
| 3     | 180.017            | 45.81             | -15.71           | 30.10              | 43.50             | -13.40             | Peak     |
| 4     | 239.882            | 45.34             | -12.70           | 32.64              | 46.00             | -13.36             | Peak     |
| 5     | 423.726            | 38.47             | -8.29            | 30.18              | 46.00             | -15.82             | Peak     |
| 6     | 545.661            | 36.27             | -6.44            | 29.83              | 46.00             | -16.17             | Peak     |

Remarks: Factor = Antenna factor + Cable loss - Preamp gain

**Remark:**

Result = Reading + Factor

Factor = Antenna factor + Cable loss – Amplifier gain

Over Limit = Result – Limit

**Above 1GHz:**

|                               |                                                                    |                 |            |
|-------------------------------|--------------------------------------------------------------------|-----------------|------------|
| <b>Test Date:</b>             | 2024-01-18                                                         | <b>Test By:</b> | Bard Huang |
| <b>Environment condition:</b> | Temperature: 23.6°C; Relative Humidity:43%; ATM Pressure: 101.7kPa |                 |            |

| Frequency (MHz) | Reading level (dBμV) | Polar      | Corrected Factor (dB/m) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Remark  |
|-----------------|----------------------|------------|-------------------------|------------------------------|----------------|-------------|---------|
| BLE 1M          |                      |            |                         |                              |                |             |         |
| Low Channel     |                      |            |                         |                              |                |             |         |
| 2389.982        | 37.53                | horizontal | 8.25                    | 45.78                        | 54.00          | -8.22       | Average |
| 2389.982        | 49.22                | horizontal | 8.25                    | 57.47                        | 74.00          | -16.53      | Peak    |
| 2389.982        | 37.12                | vertical   | 8.25                    | 45.37                        | 54.00          | -8.63       | Average |
| 2389.982        | 48.85                | vertical   | 8.25                    | 57.10                        | 74.00          | -16.90      | Peak    |
| 4804.000        | 49.10                | horizontal | 0.21                    | 49.31                        | 74.00          | -24.69      | Peak    |
| 4804.000        | 48.78                | vertical   | 0.21                    | 48.99                        | 74.00          | -25.01      | Peak    |
| Middle Channel  |                      |            |                         |                              |                |             |         |
| 4880.000        | 47.93                | horizontal | 0.44                    | 48.37                        | 74.00          | -25.63      | Peak    |
| 4880.000        | 48.27                | vertical   | 0.44                    | 48.71                        | 74.00          | -25.29      | Peak    |
| High Channel    |                      |            |                         |                              |                |             |         |
| 2483.504        | 37.36                | horizontal | 8.25                    | 45.61                        | 54.00          | -8.39       | Average |
| 2483.504        | 49.27                | horizontal | 8.25                    | 57.52                        | 74.00          | -16.48      | Peak    |
| 2483.504        | 37.51                | vertical   | 8.25                    | 45.76                        | 54.00          | -8.24       | Average |
| 2483.504        | 49.82                | vertical   | 8.25                    | 58.07                        | 74.00          | -15.93      | Peak    |
| 4960.000        | 48.76                | horizontal | 0.93                    | 49.69                        | 74.00          | -24.31      | Peak    |
| 4960.000        | 48.58                | vertical   | 0.93                    | 49.51                        | 74.00          | -24.49      | Peak    |
| BLE 2M          |                      |            |                         |                              |                |             |         |
| Low Channel     |                      |            |                         |                              |                |             |         |
| 2389.982        | 37.94                | horizontal | 8.25                    | 46.19                        | 54.00          | -7.81       | Average |
| 2389.982        | 49.57                | horizontal | 8.25                    | 57.82                        | 74.00          | -16.18      | Peak    |
| 2389.982        | 37.83                | vertical   | 8.25                    | 46.08                        | 54.00          | -7.92       | Average |
| 2389.982        | 50.09                | vertical   | 8.25                    | 58.34                        | 74.00          | -15.66      | Peak    |
| 4804.000        | 48.55                | horizontal | 0.21                    | 48.76                        | 74.00          | -25.24      | Peak    |
| 4804.000        | 48.60                | vertical   | 0.21                    | 48.81                        | 74.00          | -25.19      | Peak    |
| Middle Channel  |                      |            |                         |                              |                |             |         |
| 4880.000        | 48.69                | horizontal | 0.44                    | 49.13                        | 74.00          | -24.87      | Peak    |
| 4880.000        | 48.87                | vertical   | 0.44                    | 49.31                        | 74.00          | -24.69      | Peak    |
| High Channel    |                      |            |                         |                              |                |             |         |
| 2483.554        | 38.52                | horizontal | 8.25                    | 46.77                        | 54.00          | -7.23       | Average |
| 2483.554        | 51.52                | horizontal | 8.25                    | 59.77                        | 74.00          | -14.23      | Peak    |

|          |       |            |      |       |       |        |         |
|----------|-------|------------|------|-------|-------|--------|---------|
| 2483.542 | 39.97 | vertical   | 8.25 | 48.22 | 54.00 | -5.78  | Average |
| 2483.542 | 51.24 | vertical   | 8.25 | 59.49 | 74.00 | -14.51 | Peak    |
| 4960.000 | 47.57 | horizontal | 0.93 | 48.50 | 74.00 | -25.50 | Peak    |
| 4960.000 | 47.12 | vertical   | 0.93 | 48.05 | 74.00 | -25.95 | Peak    |

*Remark:*

*Corrected Amplitude= Reading level + corrected Factor*

*Corrected Factor = Antenna factor + Cable loss – Amplifier gain*

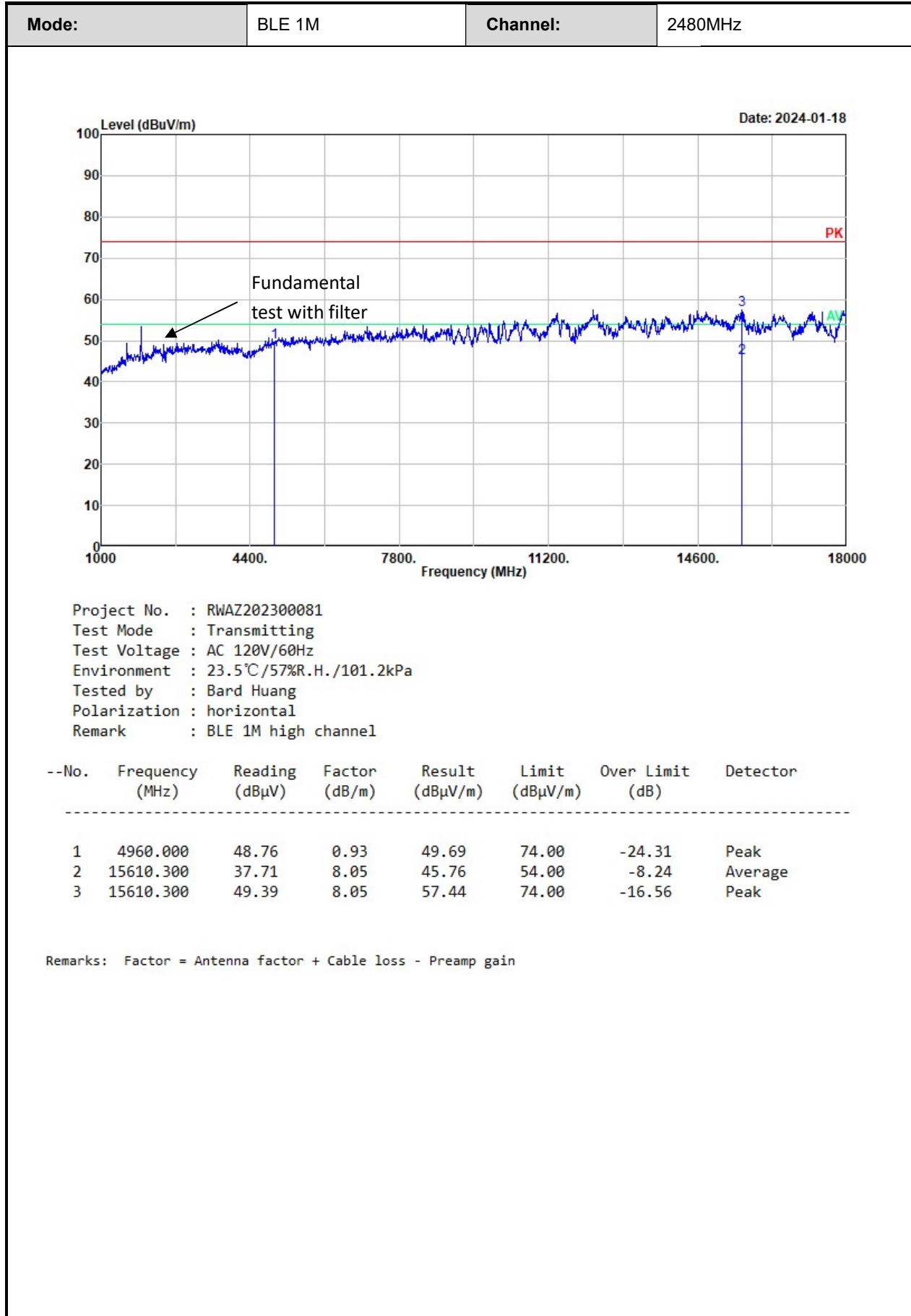
*Margin = Corrected Amplitude – Limit*

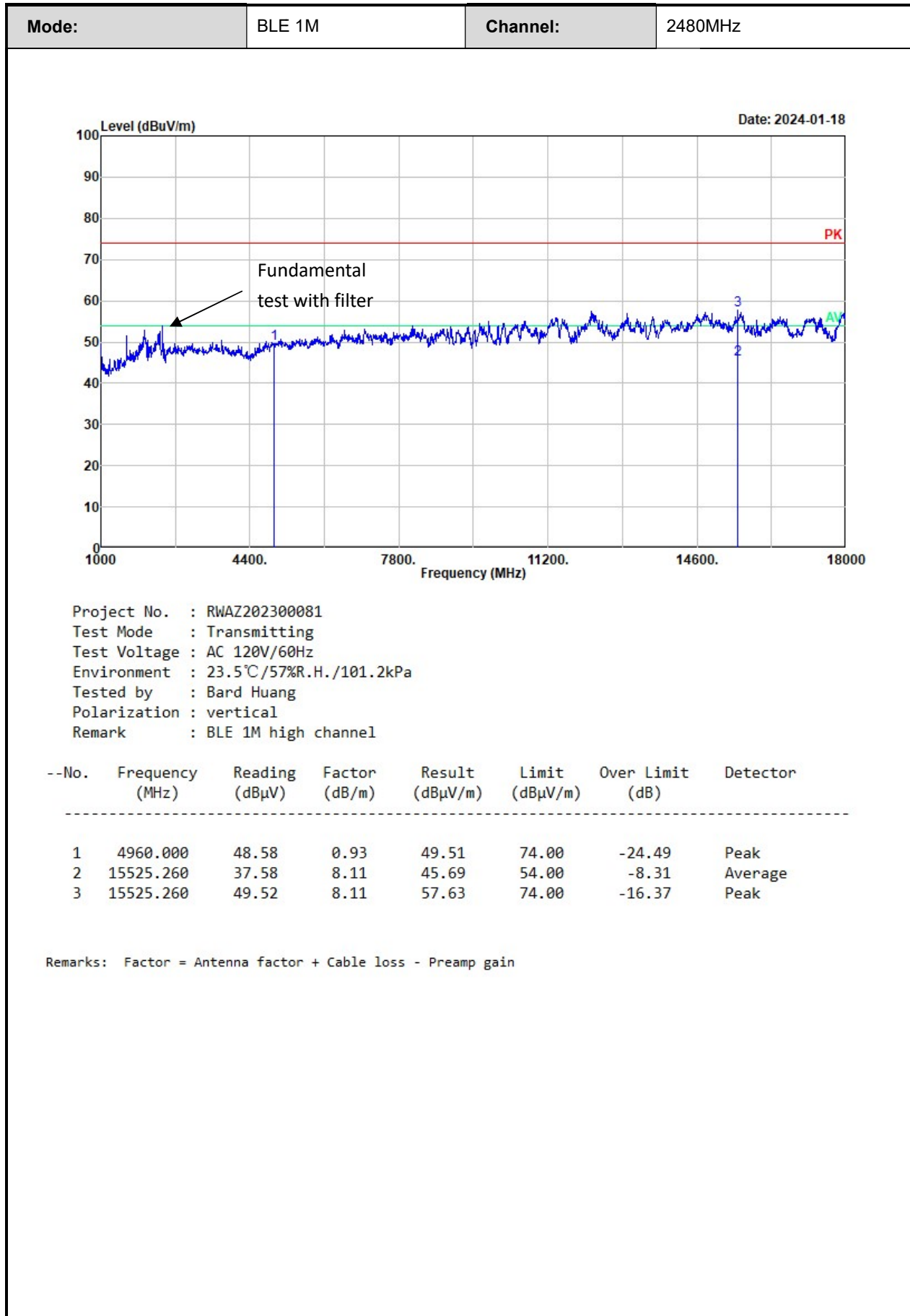
*For the test result of Peak below the Peak limit more than 20dB, which can compliance with the average limit, just the Peak level was recorded.*

*The emission levels of other frequencies that were lower than the limit 20dB, not show in test report.*

*For emissions in 18GHz-25GHz range, all emissions were investigated and in the noise floor level.*

**Test plot for example as below:**





### 3.5 RF Conducted Test Data

|                               |                                                                    |                 |           |
|-------------------------------|--------------------------------------------------------------------|-----------------|-----------|
| <b>Test Date:</b>             | 2024-01-18                                                         | <b>Test By:</b> | Baylor Li |
| <b>Environment condition:</b> | Temperature: 23.5°C; Relative Humidity:46%; ATM Pressure: 101.6kPa |                 |           |

#### 3.5.1 6 dB Emission Bandwidth and 99% Occupied Bandwidth

| Test Mode | Channel | 6dB BW [MHz] | 99% OBW[MHz] | 6dB BW Limit[MHz] | Verdict |
|-----------|---------|--------------|--------------|-------------------|---------|
| BLE 1M    | 2402    | 0.668        | 1.052        | 0.5               | pass    |
|           | 2440    | 0.672        | 1.052        | 0.5               | pass    |
|           | 2480    | 0.668        | 1.056        | 0.5               | pass    |
| BLE 2M    | 2402    | 1.256        | 2.096        | 0.5               | pass    |
|           | 2440    | 1.256        | 2.104        | 0.5               | pass    |
|           | 2480    | 1.248        | 2.104        | 0.5               | pass    |

#### 3.5.2 Maximum Conducted Peak Output Power

| Test Mode | Channel [MHz] | Result [dBm] | Limit [dBm] | Verdict |
|-----------|---------------|--------------|-------------|---------|
| BLE 1M    | 2402          | 5.97         | 30          | Pass    |
|           | 2440          | 4.03         | 30          | Pass    |
|           | 2480          | 2.03         | 30          | Pass    |
| BLE 2M    | 2402          | 6.03         | 30          | Pass    |
|           | 2440          | 4.05         | 30          | Pass    |
|           | 2480          | 2.05         | 30          | Pass    |

#### 3.5.3 Power Spectral Density

| Test Mode | Channel [MHz] | Result [dBm/3kHz] | Limit [dBm/3kHz] | Verdict |
|-----------|---------------|-------------------|------------------|---------|
| BLE 1M    | 2402          | -10.91            | 8                | Pass    |
|           | 2440          | -12.95            | 8                | Pass    |
|           | 2480          | -14.97            | 8                | Pass    |
| BLE 2M    | 2402          | -13.89            | 8                | Pass    |
|           | 2440          | -16.18            | 8                | Pass    |
|           | 2480          | -17.87            | 8                | Pass    |

### 3.5.4 100 kHz Bandwidth of Frequency Band Edge

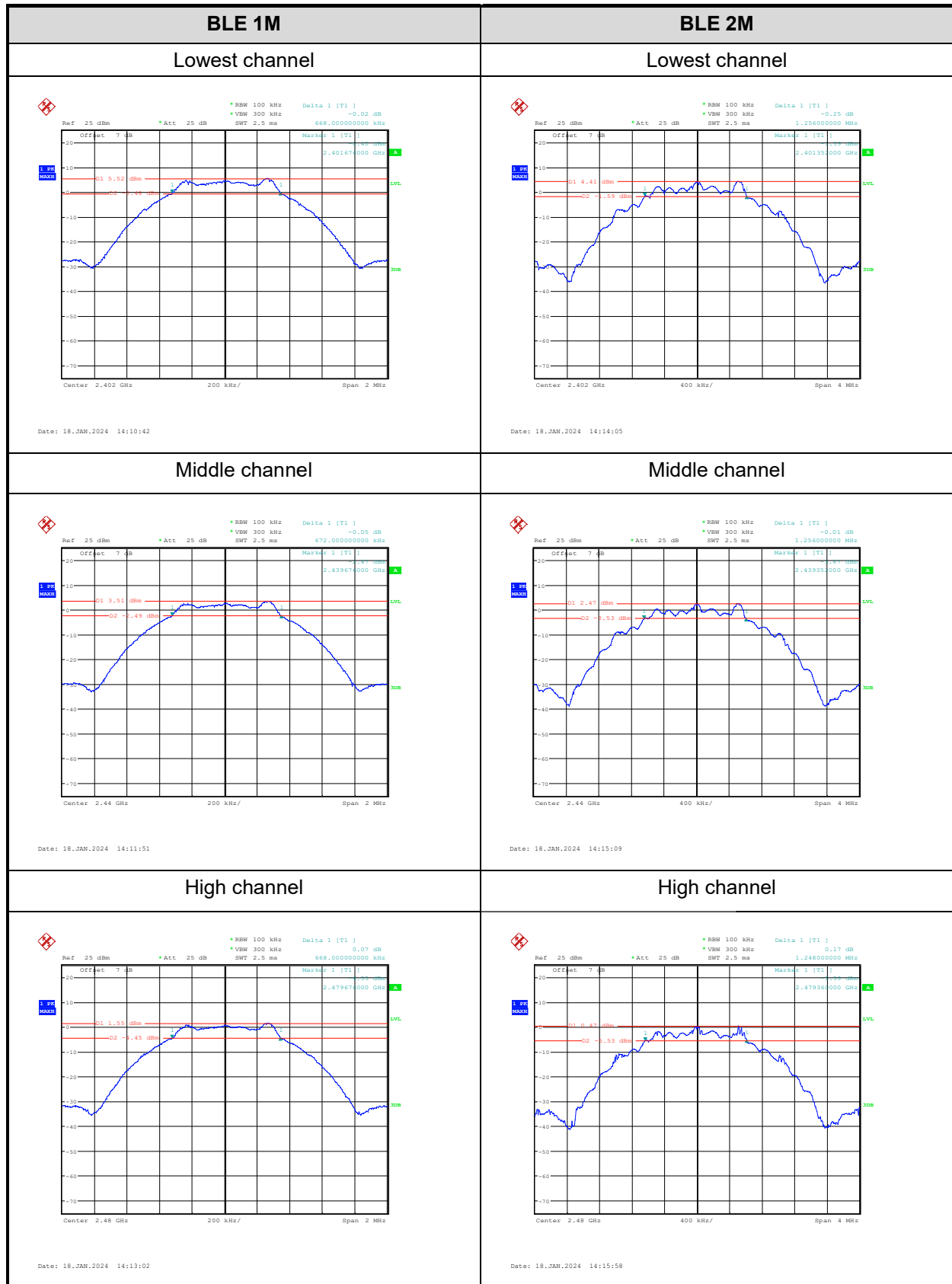
| Test Mode | Channel | Result          | Limit           | Verdict |
|-----------|---------|-----------------|-----------------|---------|
| BLE 1M    | 2402    | Refer test plot | Refer test plot | Pass    |
|           | 2440    | Refer test plot | Refer test plot | Pass    |
| BLE 2M    | 2480    | Refer test plot | Refer test plot | Pass    |
|           | 2402    | Refer test plot | Refer test plot | Pass    |

### 3.5.5 Duty Cycle

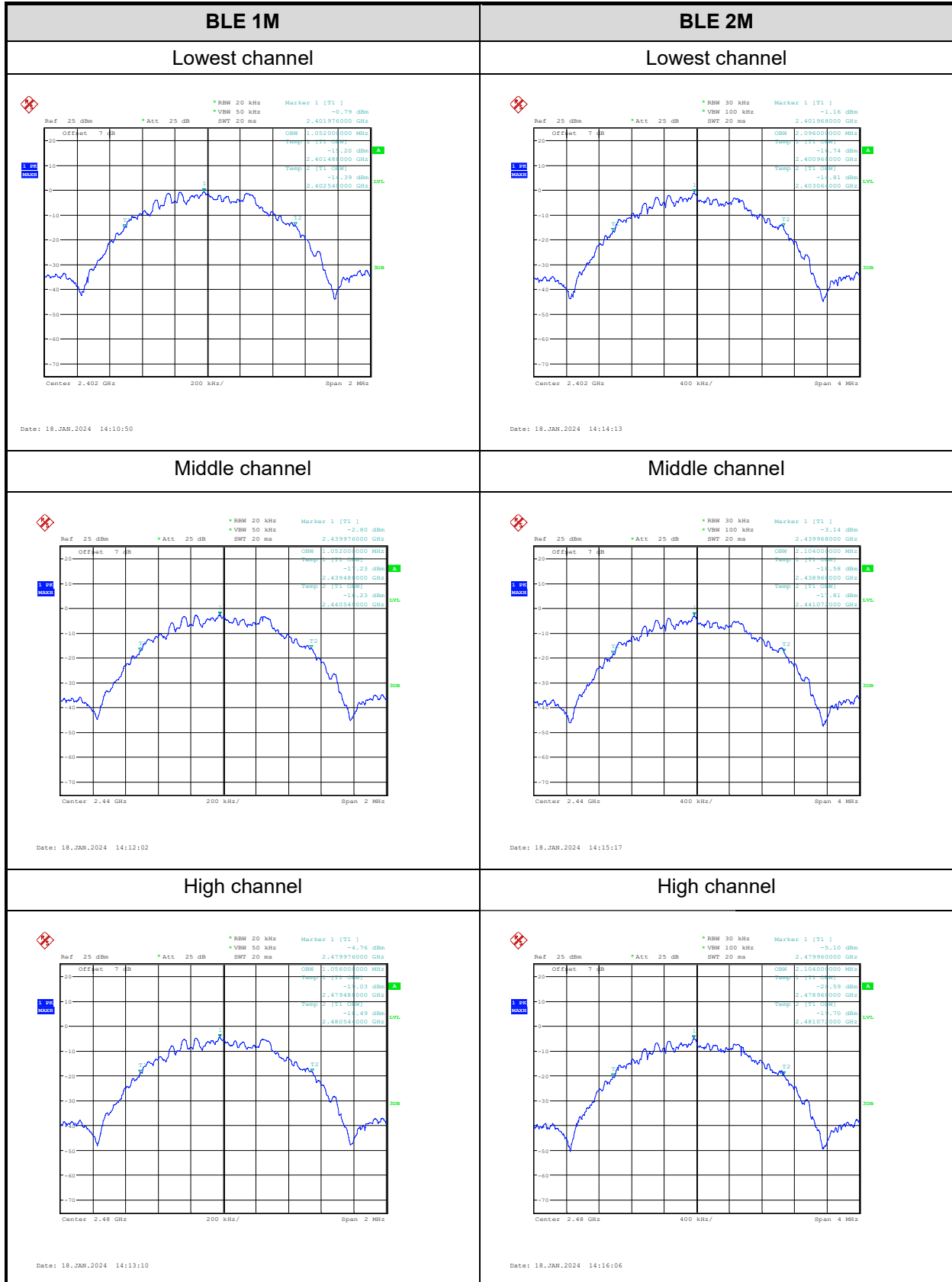
| Test Mode | Channel | Ton (ms) | Ton+off (ms) | Duty Cycle [%] | 1/T [kHz] | VBW setting [Hz] |
|-----------|---------|----------|--------------|----------------|-----------|------------------|
| BLE 1M    | 2440    | 2.178    | 2.514        | 86.63          | 0.459     | 500              |
| BLE 2M    | 2440    | 1.135    | 1.875        | 60.53          | 0.881     | 1000             |

## Test Plots:

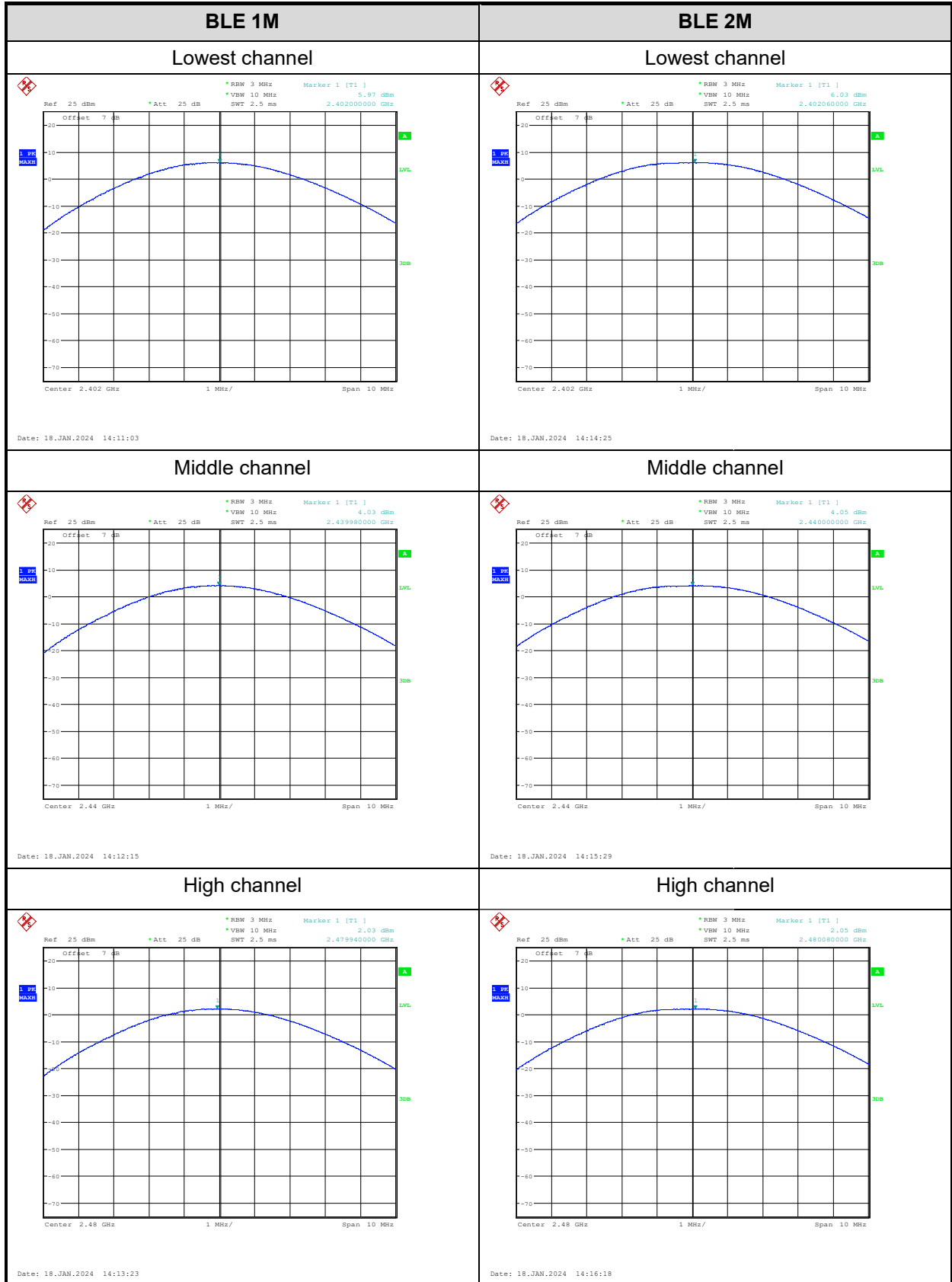
### 6 dB Emission Bandwidth:



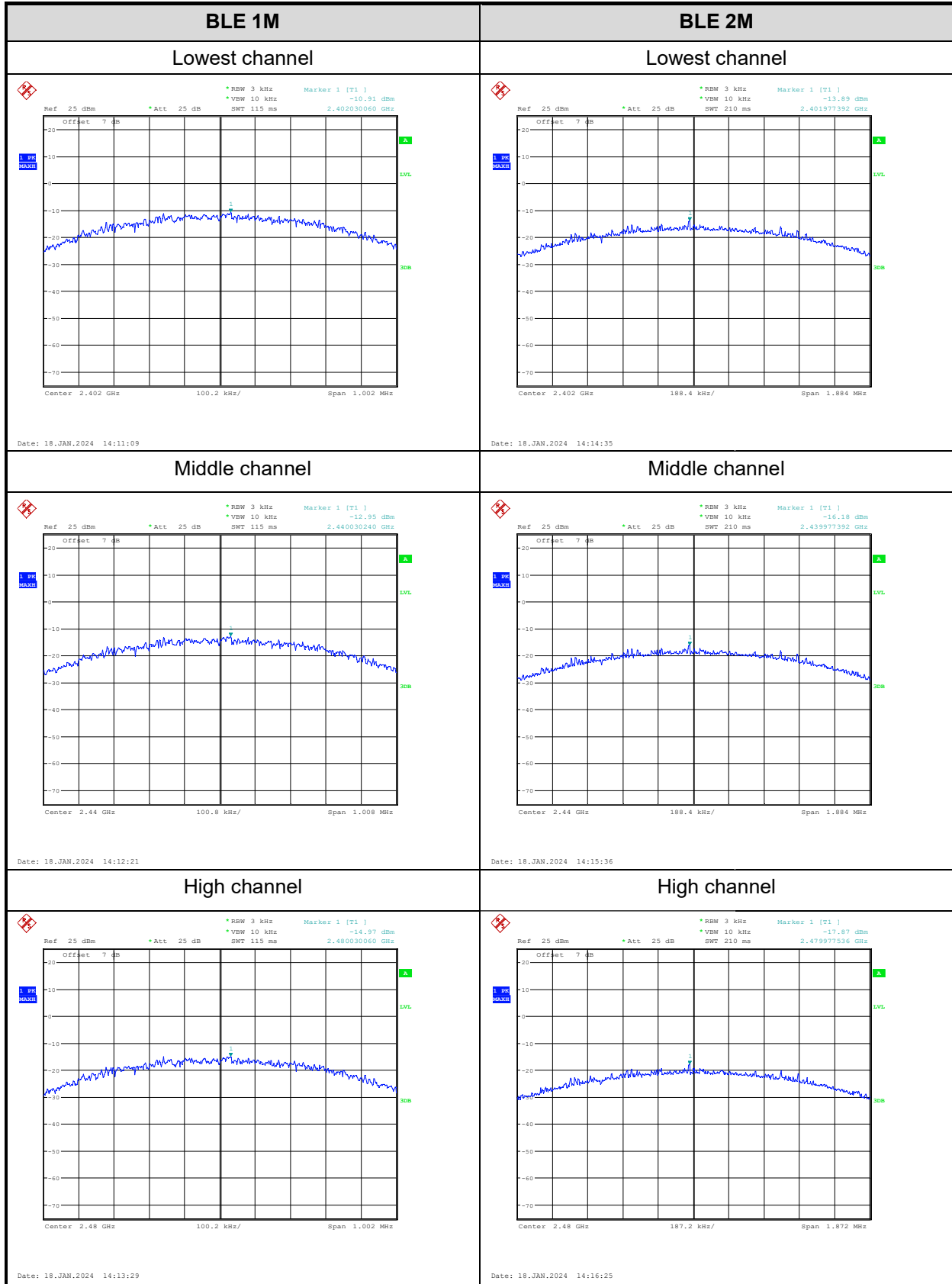
**99% Occupied Bandwidth:**



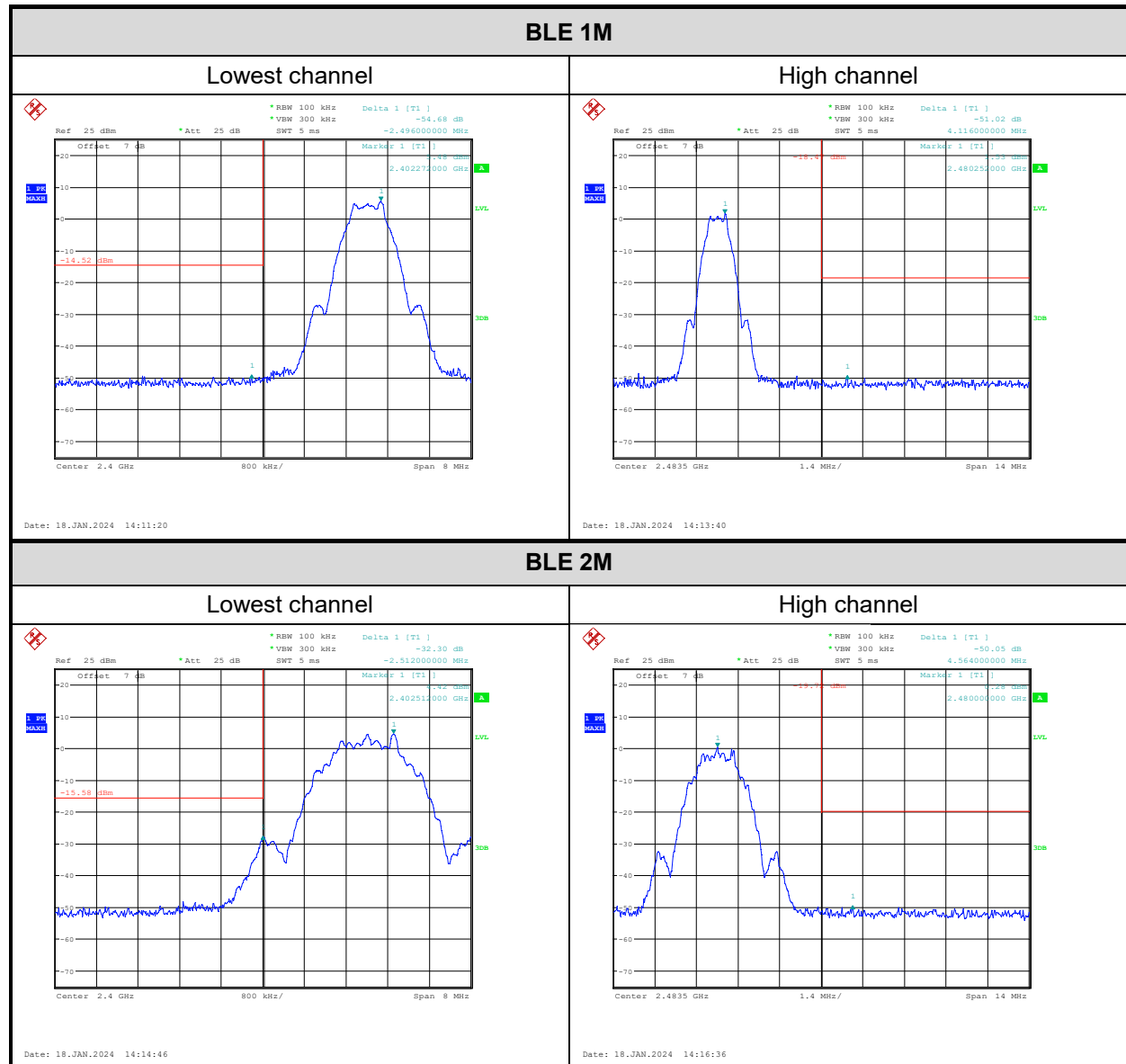
**Maximum Conducted Peak Output Power:**



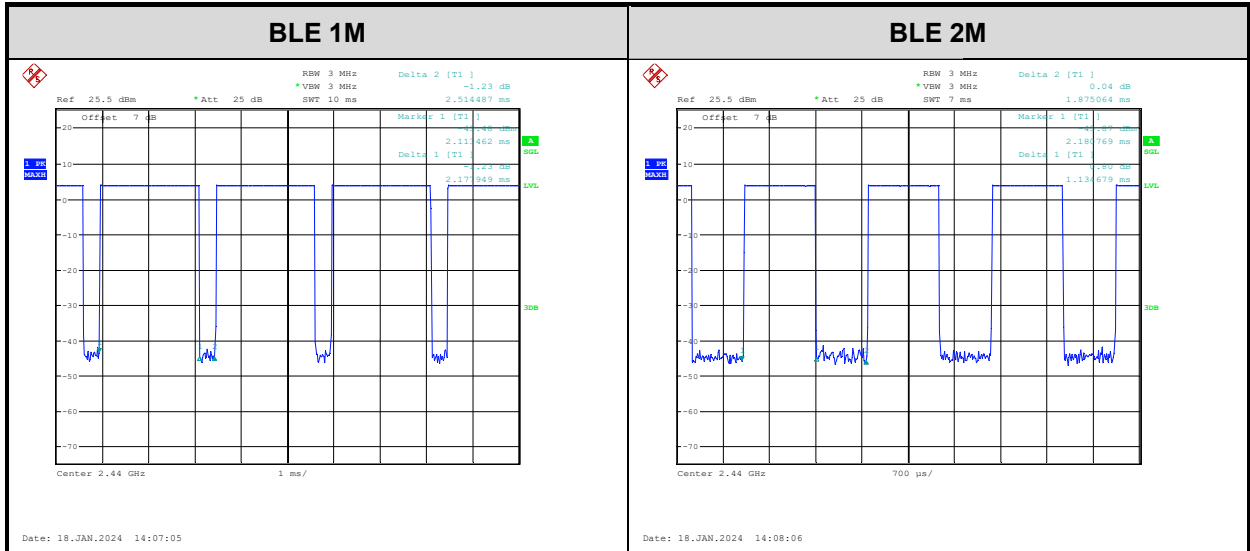
**Power Spectral Density:**



# 100kHz Bandwidth of Frequency Band Edge:



Duty cycle:



## 4 Test Setup Photo

Please refer to the attachment RWAZ202300081 Test Setup photo.

## 5 E.U.T Photo

Please refer to the attachment RWAZ202300081 BOOM 3 External photo and RWAZ202300081 BOOM 3 Internal photo.

**---End of Report---**