

# FCC Test Report

**Report No.:** RWAZ202300121A

**Applicant:** Shenzhen Youmi Intelligent Technology Co., Ltd.

**Address:** 406-407 Jinqi Zhigu Building, 4/F, 1 Tangling Road, Nanshan District, Shenzhen City, China

**Product Name:** Smart Tablet

**Product Model:** TG3DBG1MA

**Multiple Models:** TG3DBG2MA, TG2405GBA, TG4JBG2PA

**Trade Mark:** UMIDIGI

**FCC ID:** 2ATZ4-G1TABMINI

**Standards:** FCC CFR Title 47 Part 15C (§15.247)

**Test Date:** 2024-01-17~2024-01-23

**Test Result:** Complied

**Report Date:** 2024-01-26

**Reviewed by:**

Frank Yin

**Approved by:**

Jacob Kong

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## Revision History

| Version No. | Issued Date | Description |
|-------------|-------------|-------------|
| 00          | 2024-01-26  | Original    |

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# 1 General Information

## 1.1 Client Information

|               |                                                                                            |
|---------------|--------------------------------------------------------------------------------------------|
| Applicant:    | Shenzhen Youmi Intelligent Technology Co., Ltd.                                            |
| Address:      | 406-407 Jinqi Zhigu Building, 4/F, 1 Tangling Road, Nanshan District, Shenzhen City, China |
| Manufacturer: | Shenzhen Youmi Intelligent Technology Co., Ltd.                                            |
| Address:      | 406-407 Jinqi Zhigu Building, 4/F, 1 Tangling Road, Nanshan District, Shenzhen City, China |

## 1.2 Product Description of EUT

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

|                                     |                                                                                   |
|-------------------------------------|-----------------------------------------------------------------------------------|
| Sample Serial Number                | 38-2 for CE&RE test, 38-1 for RF test conducted test (assigned by WATC)           |
| Sample Received Date                | 2024/1/16                                                                         |
| Sample Status                       | Good Condition                                                                    |
| Frequency Range                     | 2402MHz - 2480MHz                                                                 |
| Maximum Conducted Peak Output Power | 3.76dBm                                                                           |
| Modulation Technology               | GFSK, $\pi/4$ DQPSK, 8DPSK                                                        |
| Spatial Streams                     | SISO (1TX, 1RX)                                                                   |
| Antenna Gain <sup>#</sup>           | 1.44dBi                                                                           |
| Power Supply                        | DC 3.8V from Lithium_ion polymer Battery or DC 5V from Adapter                    |
| Adapter Information                 | Model: HJ-0502000W2-US<br>Input: AC100-240V~ 50/60Hz 0.3A<br>Output: DC 5.0V 2.0A |
| Modification                        | Sample No Modification by the test lab                                            |

## 1.3 Antenna information

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

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

FCC Part 15, Subpart C, Equipment Class: DTS, FCC ID: 2ATZ4-G1TABMINI  
FCC Part 15, Subpart E, Equipment Class: NII, FCC ID: 2ATZ4-G1TABMINI

## 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            | 39             | 2441            | 76              | 2478            |
| 1                                                                                                                                                                                                                                       | 2403            | 40             | 2442            | 77              | 2479            |
| ...                                                                                                                                                                                                                                     | ...             | ...            | ...             | 78              | 2480            |
| 38                                                                                                                                                                                                                                      | 2440            | ...            | ...             | /               | /               |
| 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            | 39             | 2441            | 78              | 2480            |

| Test Mode:                                                                         |           |                                                         |                |              |
|------------------------------------------------------------------------------------|-----------|---------------------------------------------------------|----------------|--------------|
| Transmitting mode:                                                                 |           | Keep the EUT in continuous transmitting with modulation |                |              |
| Exercise software <sup>#</sup> :                                                   |           | Cmd .exe                                                |                |              |
| Mode                                                                               | Data rate | Powel Level Setting <sup>#</sup>                        |                |              |
|                                                                                    |           | Low Channel                                             | Middle Channel | High Channel |
| GFSK                                                                               | 1Mbps     | Default                                                 | Default        | Default      |
| $\pi/4$ DQPSK                                                                      | 2Mbps     | Default                                                 | Default        | Default      |
| 8DPSK                                                                              | 3Mbps     | Default                                                 | Default        | Default      |
| The exercise software and the maximum power setting that provided by manufacturer. |           |                                                         |                |              |

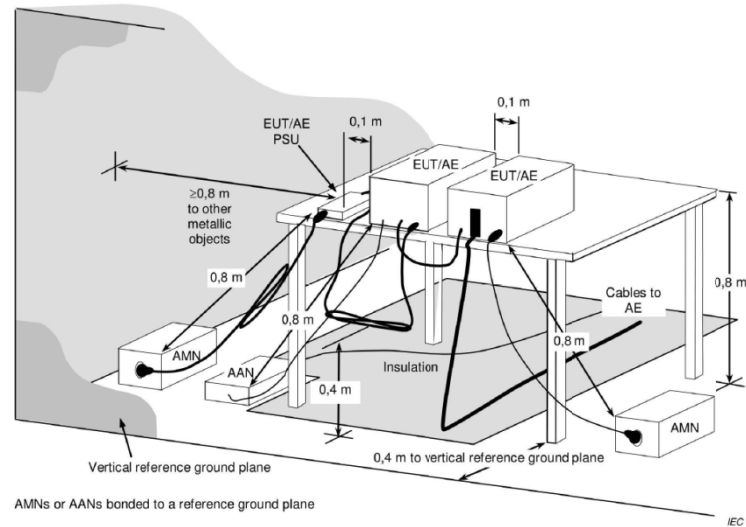
| Worst-Case Configuration:                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| For radiated emissions, EUT was investigated in three orthogonal orientation, the worst-case orientation was recorded in report                                                             |
| 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

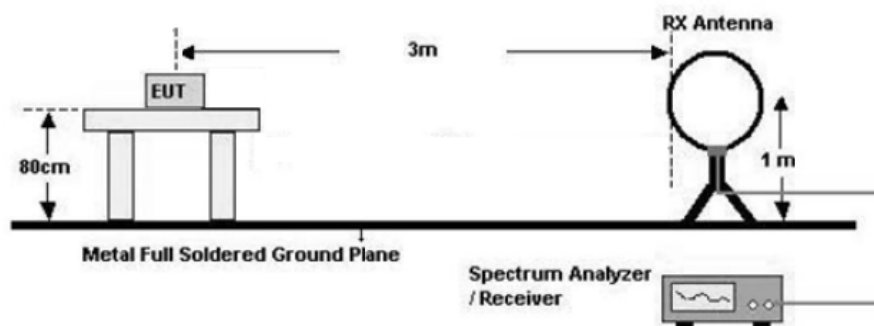
**1) Conducted emission measurement:**



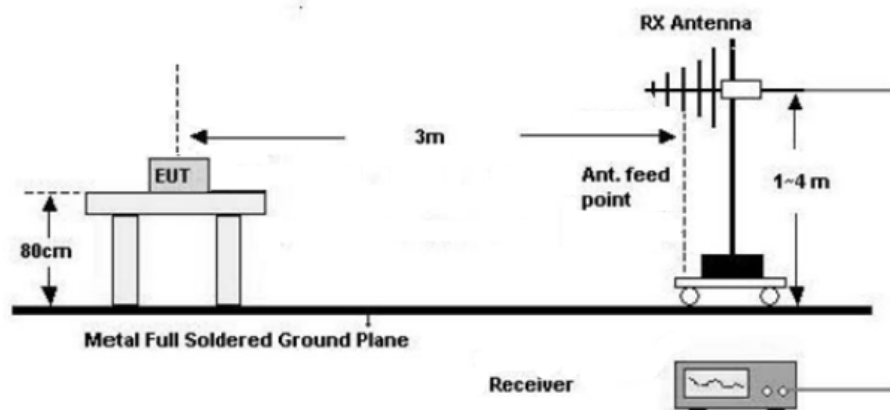
**Note:** The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

**2) Radiated emission measurement:**

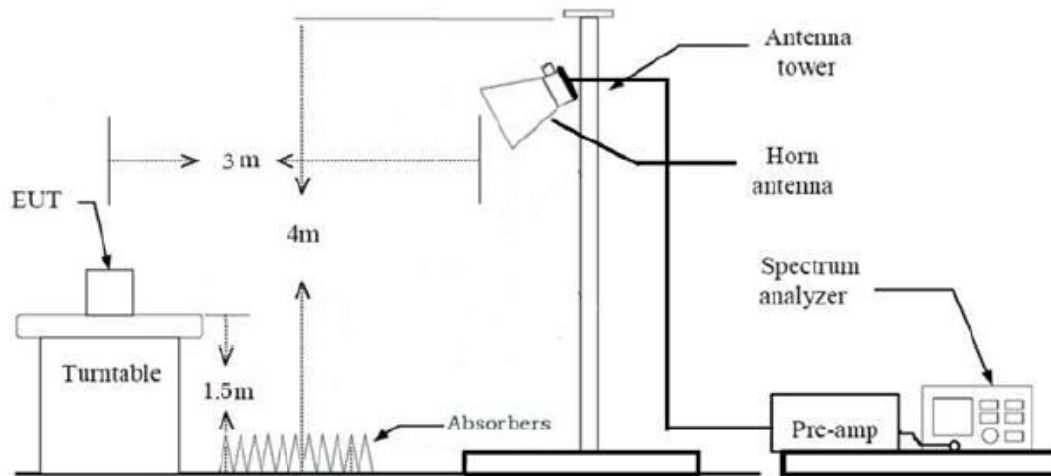
Below 30MHz (3m SAC)



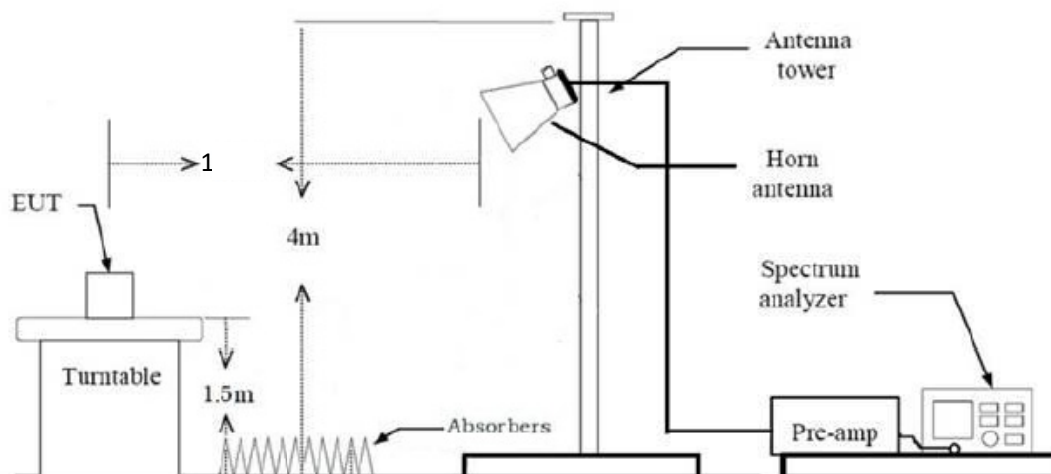
30MHz-1GHz (3m SAC)



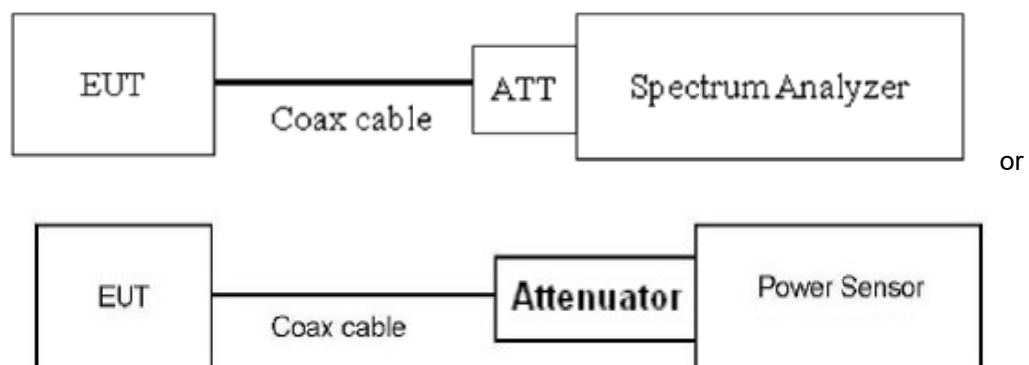
### 1GHz-18GHz(3m FAC)



### 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.
- The cable assembly insertion loss of 11dB (including 10dB 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)
  - 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 7.8.5               |
| 20 dB Emission Bandwidth                | ANSI C63.10-2020 Section 6.9.2               |
| 99% Occupied Bandwidth                  | ANSI C63.10-2020 Section 6.9.3               |
| Channel separation                      | ANSI C63.10-2020 Section 7.8.2               |
| Number of hopping Frequency             | ANSI C63.10-2020 Section 7.8.3               |
| Time of occupancy (dwell time)          | ANSI C63.10-2020 Section 7.8.4               |
| 100kHz Bandwidth of Frequency Band Edge | ANSI C63.10-2020 Section 7.8.7.2&6.10        |
| Radiated emission                       | ANSI C63.10-2020 Section 7.8&6.3&6.4&6.5&6.6 |

## 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. 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                   | NO.9                     | N/A        | 2023/8/8   | 2024/8/7   |
| N/A                   | Coaxial Cable                   | NO.10                    | N/A        | 2023/8/8   | 2024/8/7   |
| N/A                   | Coaxial Cable                   | NO.11                    | N/A        | 2023/8/8   | 2024/8/7   |
| RF Conducted Test     |                                 |                          |            |            |            |
| ROHDE& SCHWARZ        | SPECTRUM ANALYZER               | FSU-26                   | 200680/026 | 2023/7/12  | 2024/7/11  |
| ANRITSU               | USB Power Sensor                | MA24418A                 | 12620      | 2023/7/12  | 2024/7/11  |
| MARCONI               | 10dB Attenuator                 | 1692595                  | 2942       | 2023/10/25 | 2024/10/24 |

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

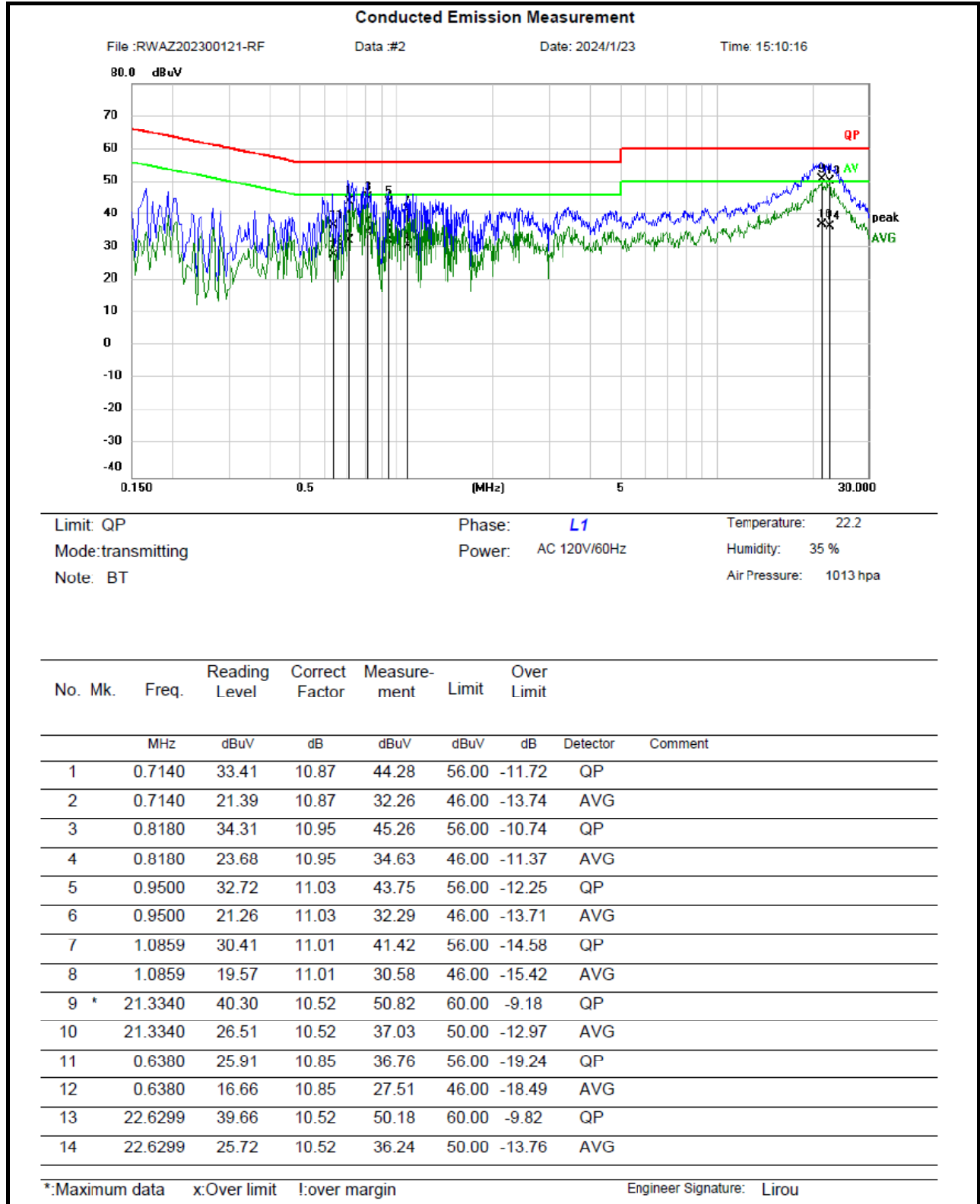
| FCC Rules                    | Description of Test                     | Result      |
|------------------------------|-----------------------------------------|-------------|
| §15.203                      | Antenna Requirement                     | Compliance  |
| §15.207 (a)                  | AC Line Conducted Emissions             | Compliance  |
| §15.247 (a)(1)               | 20dB Emission Bandwidth                 | Report only |
| -                            | 99% Occupied Bandwidth                  | Report only |
| §15.247 (a)(1)               | Channel separation                      | Compliance  |
| §15.247 (a)(1)(iii)          | Number of hopping Frequency             | Compliance  |
| §15.247 (a)(1)(iii)          | Time of occupancy (dwell time)          | Compliance  |
| §15.247(b)(1)                | Maximum Conducted Output Power          | Compliance  |
| §15.247(d)                   | 100kHz Bandwidth of Frequency Band Edge | Compliance  |
| §15.205, §15.209, §15.247(d) | Radiated emission                       | Compliance  |

### 3.2 Limit

| Test items                                                        | Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Line Conducted Emissions                                       | See details §15.207 (a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Conducted Output Power                                            | For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Channel separation                                                | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Number of hopping Frequency                                       | Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Time of occupancy (dwell time)                                    | The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 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

|                        |                                                                                             |          |          |
|------------------------|---------------------------------------------------------------------------------------------|----------|----------|
| Test Date:             | 2024-1-23                                                                                   | Test By: | Lirou Li |
| Environment condition: | Temperature: <u>22.2</u> °C; Relative Humidity: <u>35</u> %; ATM Pressure: <u>101.3</u> kPa |          |          |



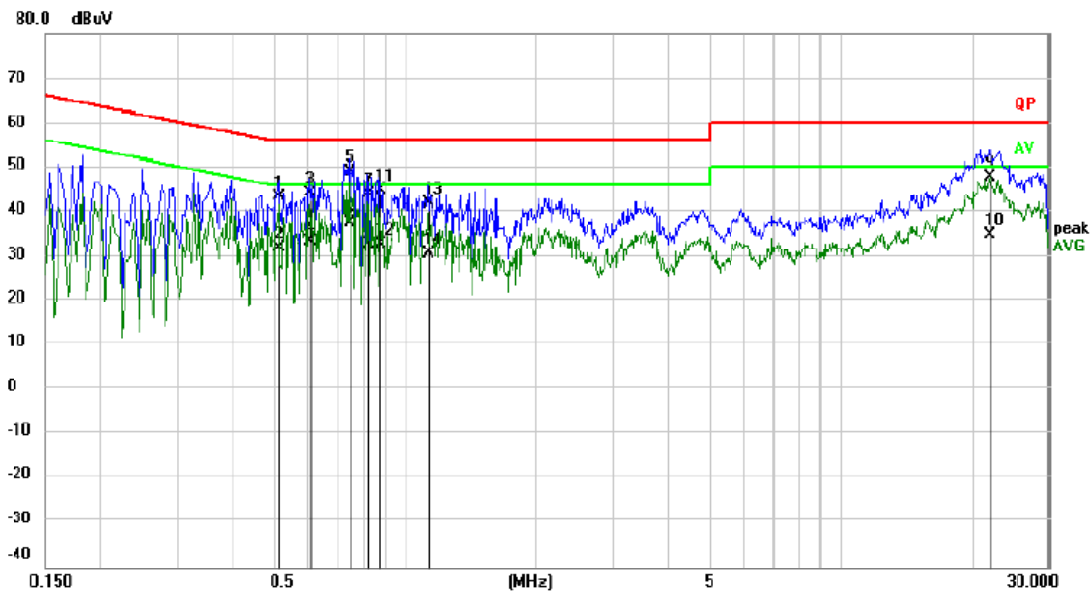
### Conducted Emission Measurement

File :RWAZ202300121-RF

Data :#1

Date: 2024/1/23

Time: 15:01:41



Limit: QP

Mode:transmitting

Note: BT

Phase: **N**

Power: AC 120V/60Hz

Temperature: 22.2

Humidity: 35 %

Air Pressure: 1013 hpa

| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit | Over Limit |          |
|-----|-----|---------|---------------|----------------|-------------|-------|------------|----------|
|     |     | MHz     | dBuV          | dB             | dBuV        | dBuV  | dB         | Detector |
| 1   |     | 0.5140  | 32.70         | 10.70          | 43.40       | 56.00 | -12.60     | QP       |
| 2   |     | 0.5140  | 21.10         | 10.70          | 31.80       | 46.00 | -14.20     | AVG      |
| 3   |     | 0.6060  | 33.63         | 10.63          | 44.26       | 56.00 | -11.74     | QP       |
| 4   |     | 0.6060  | 22.74         | 10.63          | 33.37       | 46.00 | -12.63     | AVG      |
| 5   | *   | 0.7500  | 38.47         | 10.58          | 49.05       | 56.00 | -6.95      | QP       |
| 6   |     | 0.7500  | 27.11         | 10.58          | 37.69       | 46.00 | -8.31      | AVG      |
| 7   |     | 0.8220  | 33.24         | 10.61          | 43.85       | 56.00 | -12.15     | QP       |
| 8   |     | 0.8220  | 22.10         | 10.61          | 32.71       | 46.00 | -13.29     | AVG      |
| 9   |     | 21.9740 | 36.96         | 10.68          | 47.64       | 60.00 | -12.36     | QP       |
| 10  |     | 21.9740 | 24.23         | 10.68          | 34.91       | 50.00 | -15.09     | AVG      |
| 11  |     | 0.8780  | 34.04         | 10.63          | 44.67       | 56.00 | -11.33     | QP       |
| 12  |     | 0.8780  | 22.27         | 10.63          | 32.90       | 46.00 | -13.10     | AVG      |
| 13  |     | 1.1340  | 30.98         | 10.66          | 41.64       | 56.00 | -14.36     | QP       |
| 14  |     | 1.1340  | 20.11         | 10.66          | 30.77       | 46.00 | -15.23     | AVG      |

\*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

#### Remark:

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

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

Over = Measurement – Limit

### 3.4 Radiated emission Test Data

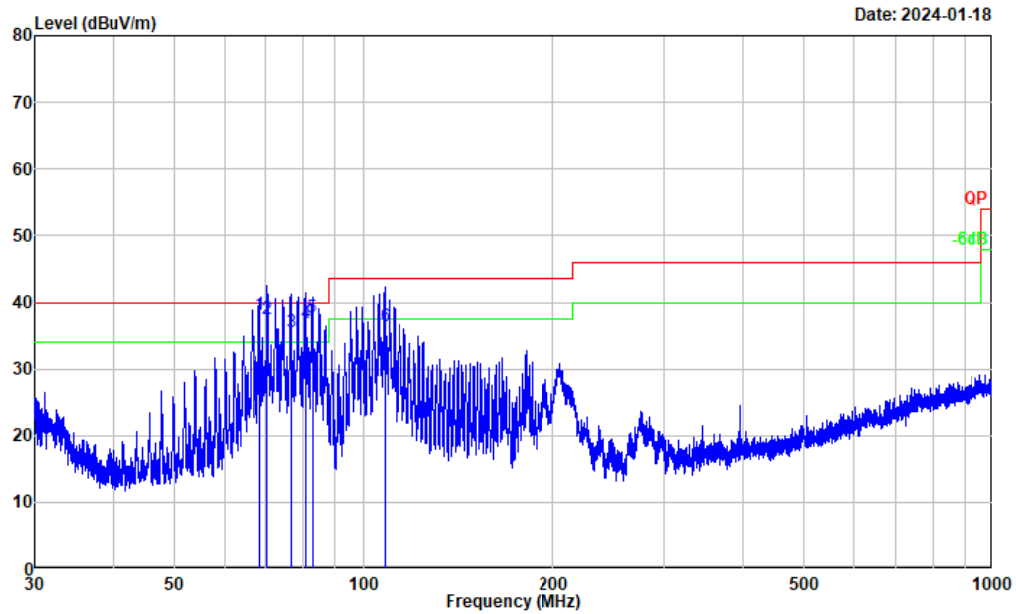
9 kHz-30MHz:

|                               |                                                                    |                 |            |
|-------------------------------|--------------------------------------------------------------------|-----------------|------------|
| <b>Test Date:</b>             | 2024-01-18                                                         | <b>Test By:</b> | Bard Huang |
| <b>Environment condition:</b> | Temperature: 23.5°C; Relative Humidity:57%; ATM Pressure: 101.2kPa |                 |            |

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

30MHz-1GHz:

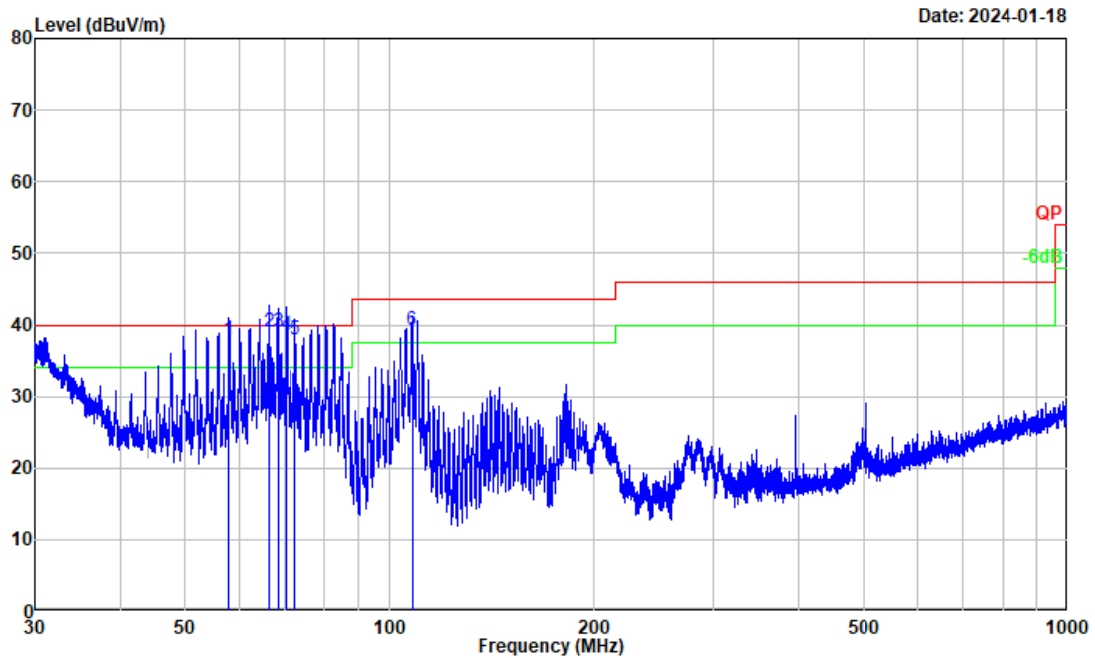
|                        |                                                                    |          |            |
|------------------------|--------------------------------------------------------------------|----------|------------|
| Test Date:             | 2024-01-18                                                         | Test By: | Bard Huang |
| Environment condition: | Temperature: 23.5°C; Relative Humidity:57%; ATM Pressure: 101.2kPa |          |            |



Project No. : RWAZ202300121-RF  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.5°C /57%R.H./101.2kPa  
Tested by : Bard Huang  
Polarization : horizontal  
Remark : BT

| --No. | Frequency<br>(MHz) | Reading<br>(dBμV) | Factor<br>(dB/m) | Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Over Limit<br>(dB) | Detector |
|-------|--------------------|-------------------|------------------|--------------------|-------------------|--------------------|----------|
| <hr/> |                    |                   |                  |                    |                   |                    |          |
| 1     | 68.361             | 53.80             | -15.60           | 38.20              | 40.00             | -1.80              | QP       |
| 2     | 70.429             | 54.10             | -16.49           | 37.61              | 40.00             | -2.39              | QP       |
| 3     | 76.747             | 53.70             | -18.17           | 35.53              | 40.00             | -4.47              | QP       |
| 4     | 80.927             | 54.80             | -17.98           | 36.82              | 40.00             | -3.18              | QP       |
| 5     | 82.975             | 55.20             | -17.56           | 37.64              | 40.00             | -2.36              | QP       |
| 6     | 107.982            | 50.50             | -14.04           | 36.46              | 43.50             | -7.04              | QP       |

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



Project No. : RWAZ202300121-RF  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.5°C/57%R.H./101.2kPa  
Tested by : Bard Huang  
Polarization : vertical  
Remark : BT

| --No. | Frequency<br>(MHz) | Reading<br>(dBμV) | Factor<br>(dB/m) | Result<br>(dBμV/m) | Limit<br>(dBμV/m) | Over Limit<br>(dB) | Detector |
|-------|--------------------|-------------------|------------------|--------------------|-------------------|--------------------|----------|
| <hr/> |                    |                   |                  |                    |                   |                    |          |
| 1     | 57.999             | 51.30             | -13.37           | 37.93              | 40.00             | -2.07              | QP       |
| 2     | 66.237             | 53.79             | -14.71           | 39.08              | 40.00             | -0.92              | QP       |
| 3     | 68.361             | 54.70             | -15.60           | 39.10              | 40.00             | -0.90              | QP       |
| 4     | 70.460             | 55.10             | -16.50           | 38.60              | 40.00             | -1.40              | QP       |
| 5     | 72.464             | 55.11             | -17.26           | 37.85              | 40.00             | -2.15              | QP       |
| 6     | 107.935            | 53.20             | -14.04           | 39.16              | 43.50             | -4.34              | QP       |

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

**Remark:**

Level = Reading + Factor

Factor = Antenna factor + Cable loss – Amplifier gain

Over Limit = Level – Limit

**Above 1GHz:**

|                               |                                                                    |                 |            |
|-------------------------------|--------------------------------------------------------------------|-----------------|------------|
| <b>Test Date:</b>             | 2024-01-18                                                         | <b>Test By:</b> | Bard Huang |
| <b>Environment condition:</b> | Temperature: 23.5°C; Relative Humidity:57%; ATM Pressure: 101.2kPa |                 |            |

| Frequency (MHz) | Reading level (dBμV) | Polar (H/V) | Corrected Factor (dB/m) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Remark  |
|-----------------|----------------------|-------------|-------------------------|------------------------------|----------------|-------------|---------|
| GFSK            |                      |             |                         |                              |                |             |         |
| Low Channel     |                      |             |                         |                              |                |             |         |
| 2389.076        | 48.96                | Horizontal  | 8.25                    | 57.21                        | 74             | -16.79      | Peak    |
| 2389.076        | 39.07                | Horizontal  | 8.25                    | 47.32                        | 54             | -6.68       | Average |
| 2387.124        | 50.16                | Vertical    | 8.25                    | 58.41                        | 74             | -15.59      | Peak    |
| 2387.124        | 38.63                | Vertical    | 8.25                    | 46.88                        | 54             | -7.12       | Average |
| 4804            | 51.03                | Horizontal  | 0.21                    | 51.24                        | 74             | -22.76      | Peak    |
| 4804            | 39.39                | Horizontal  | 0.21                    | 39.6                         | 54             | -14.40      | Average |
| 4804            | 51.3                 | Vertical    | 0.21                    | 51.51                        | 74             | -22.49      | Peak    |
| 4804            | 39.72                | Vertical    | 0.21                    | 39.93                        | 54             | -14.07      | Average |
| Middle Channel  |                      |             |                         |                              |                |             |         |
| 4882            | 51.46                | Horizontal  | 0.45                    | 51.91                        | 74             | -22.09      | Peak    |
| 4882            | 40.59                | Horizontal  | 0.45                    | 41.04                        | 54             | -12.96      | Average |
| 4882            | 52.07                | Vertical    | 0.45                    | 52.52                        | 74             | -21.48      | Peak    |
| 4882            | 41.02                | Vertical    | 0.45                    | 41.47                        | 54             | -12.53      | Average |
| High Channel    |                      |             |                         |                              |                |             |         |
| 2484.081        | 60.36                | Horizontal  | 8.25                    | 68.61                        | 74             | -5.39       | Peak    |
| 2484.081        | 38.87                | Horizontal  | 8.25                    | 47.12                        | 54             | -6.88       | Average |
| 2483.762        | 61.72                | Vertical    | 8.25                    | 69.97                        | 74             | -4.03       | Peak    |
| 2483.762        | 39.14                | Vertical    | 8.25                    | 47.39                        | 54             | -6.61       | Average |
| 4960            | 52.53                | Horizontal  | 0.93                    | 53.46                        | 74             | -20.54      | Peak    |
| 4960            | 42.2                 | Horizontal  | 0.93                    | 43.13                        | 54             | -10.87      | Average |
| 4960            | 52.97                | Vertical    | 0.93                    | 53.90                        | 74             | -20.10      | Peak    |
| 4960            | 42.62                | Vertical    | 0.93                    | 43.55                        | 54             | -10.45      | Average |
| π/4-DQPSK       |                      |             |                         |                              |                |             |         |
| Low Channel     |                      |             |                         |                              |                |             |         |
| 2355.155        | 49.75                | Horizontal  | 8.25                    | 58.00                        | 74             | -16.00      | Peak    |
| 2355.155        | 38.37                | Horizontal  | 8.25                    | 46.62                        | 54             | -7.38       | Average |
| 2356.984        | 49.94                | Vertical    | 8.25                    | 58.19                        | 74             | -15.81      | Peak    |
| 2356.984        | 38.28                | Vertical    | 8.25                    | 46.53                        | 54             | -7.47       | Average |
| 4804            | 50.75                | Horizontal  | 0.21                    | 50.96                        | 74             | -23.04      | Peak    |
| 4804            | 38.36                | Horizontal  | 0.21                    | 38.57                        | 54             | -15.43      | Average |
| 4804            | 50.22                | Vertical    | 0.21                    | 50.43                        | 74             | -23.57      | Peak    |
| 4804            | 38.93                | Vertical    | 0.21                    | 39.14                        | 54             | -14.86      | Average |
| Middle Channel  |                      |             |                         |                              |                |             |         |
| 4882            | 50.39                | Horizontal  | 0.45                    | 50.84                        | 74             | -23.16      | Peak    |
| 4882            | 39.03                | Horizontal  | 0.45                    | 39.48                        | 54             | -14.52      | Average |
| 4882            | 49.91                | Vertical    | 0.45                    | 50.36                        | 74             | -23.64      | Peak    |
| 4882            | 38.65                | Vertical    | 0.45                    | 39.10                        | 54             | -14.90      | Average |

| High Channel   |       |            |      |       |    |        |         |
|----------------|-------|------------|------|-------|----|--------|---------|
| 2483.563       | 49.60 | Horizontal | 8.25 | 57.85 | 74 | -16.15 | Peak    |
| 2483.563       | 38.85 | Horizontal | 8.25 | 47.10 | 54 | -6.90  | Average |
| 2483.6         | 47.11 | Vertical   | 8.25 | 55.36 | 74 | -18.64 | Peak    |
| 2483.6         | 38.79 | Vertical   | 8.25 | 47.04 | 54 | -6.96  | Average |
| 4960           | 50.65 | Horizontal | 0.93 | 51.58 | 74 | -22.42 | Peak    |
| 4960           | 39.43 | Horizontal | 0.93 | 40.36 | 54 | -13.64 | Average |
| 4960           | 50.27 | Vertical   | 0.93 | 51.20 | 74 | -22.80 | Peak    |
| 4960           | 37.99 | Vertical   | 0.93 | 38.92 | 54 | -15.08 | Average |
| 8DPSK          |       |            |      |       |    |        |         |
| Low Channel    |       |            |      |       |    |        |         |
| 2362.415       | 48.73 | Horizontal | 8.24 | 56.97 | 74 | -17.03 | Peak    |
| 2362.415       | 39.16 | Horizontal | 8.24 | 47.40 | 54 | -6.60  | Average |
| 2361.755       | 48.72 | Vertical   | 8.24 | 56.96 | 74 | -17.04 | Peak    |
| 2361.755       | 39.92 | Vertical   | 8.24 | 48.16 | 54 | -5.84  | Average |
| 4804           | 51.26 | Horizontal | 0.21 | 51.47 | 74 | -22.53 | Peak    |
| 4804           | 39.42 | Horizontal | 0.21 | 39.63 | 54 | -14.37 | Average |
| 4804           | 50.69 | Vertical   | 0.21 | 50.9  | 74 | -23.10 | Peak    |
| 4804           | 38.93 | Vertical   | 0.21 | 39.14 | 54 | -14.86 | Average |
| Middle Channel |       |            |      |       |    |        |         |
| 4882           | 50.91 | Horizontal | 0.45 | 51.36 | 74 | -22.64 | Peak    |
| 4882           | 38.96 | Horizontal | 0.45 | 39.41 | 54 | -14.59 | Average |
| 4882           | 50.43 | Vertical   | 0.45 | 50.88 | 74 | -23.12 | Peak    |
| 4882           | 38.59 | Vertical   | 0.45 | 39.04 | 54 | -14.96 | Average |
| High Channel   |       |            |      |       |    |        |         |
| 2483.525       | 49.88 | Horizontal | 8.25 | 58.13 | 74 | -15.87 | Peak    |
| 2483.525       | 38.10 | Horizontal | 8.25 | 46.35 | 51 | -4.65  | Average |
| 2483.606       | 49.15 | Vertical   | 8.25 | 57.40 | 74 | -16.60 | Peak    |
| 2483.606       | 40.47 | Vertical   | 8.25 | 48.72 | 54 | -5.28  | Average |
| 4960           | 51.16 | Horizontal | 0.93 | 52.09 | 74 | -21.91 | Peak    |
| 4960           | 38.28 | Horizontal | 0.93 | 39.21 | 54 | -14.79 | Average |
| 4960           | 50.71 | Vertical   | 0.93 | 51.64 | 74 | -22.36 | Peak    |
| 4960           | 38.94 | Vertical   | 0.93 | 39.87 | 54 | -14.13 | Average |

*Remark:*

*Corrected Amplitude= Reading level + corrected Factor*

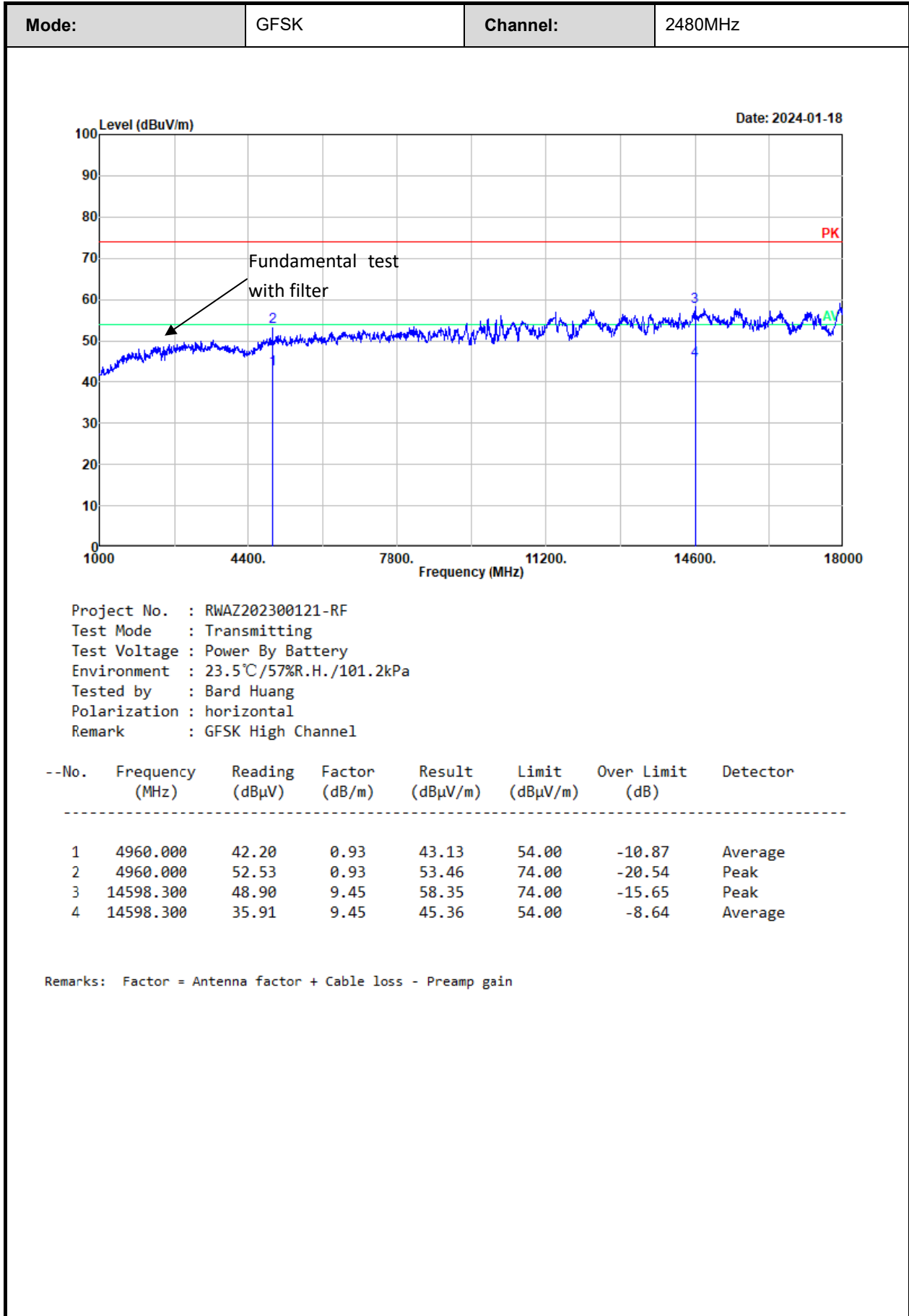
*Corrected Factor = Antenna factor + Cable loss – Amplifier gain*

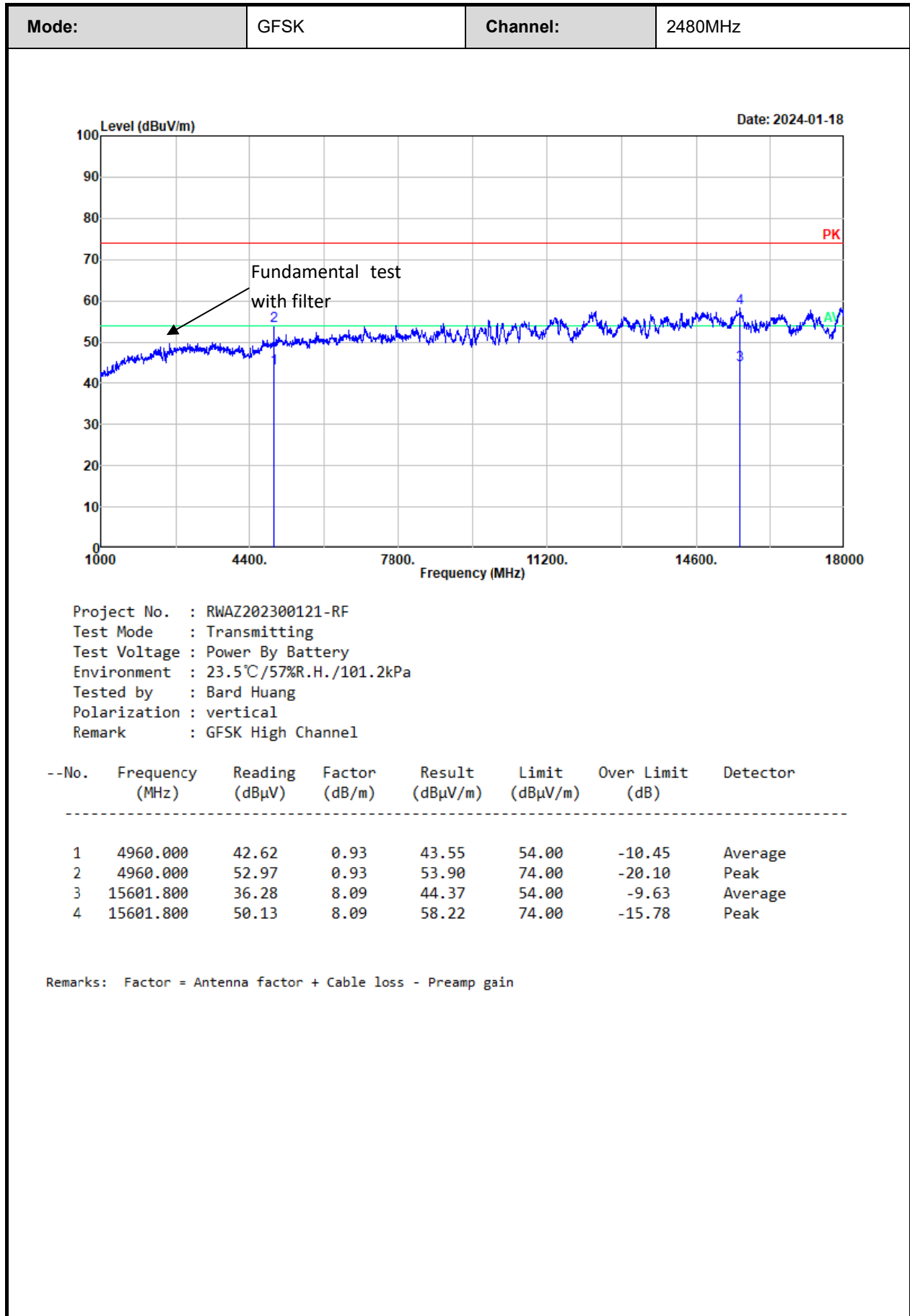
*Margin = Corrected Amplitude – Limit*

*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

|                        |                                                                                  |          |            |
|------------------------|----------------------------------------------------------------------------------|----------|------------|
| Test Date:             | 2024-01-17                                                                       | Test By: | Ryan Zhang |
| Environment condition: | Temperature: 23.9~24.5°C; Relative Humidity:55~68%;<br>ATM Pressure: 99~102.1kPa |          |            |

#### 3.5.1 20 dB Emission Bandwidth and 99% Occupied Bandwidth

| Test Mode     | Channel | 20dB BW [MHz] | 99% OBW[MHz] |
|---------------|---------|---------------|--------------|
| GFSK          | 2402    | 0.94          | 0.852        |
|               | 2441    | 0.94          | 0.848        |
|               | 2480    | 0.94          | 0.856        |
| $\pi/4$ DQPSK | 2402    | 1.312         | 1.172        |
|               | 2441    | 1.304         | 1.172        |
|               | 2480    | 1.316         | 1.176        |
| 8DPSK         | 2402    | 1.288         | 1.172        |
|               | 2441    | 1.284         | 1.172        |
|               | 2480    | 1.284         | 1.172        |

#### 3.5.2 Maximum Conducted Peak Output Power

| Test Mode     | Channel[MHz] | Result[dBm] | Limit[dBm] | Verdict |
|---------------|--------------|-------------|------------|---------|
| GFSK          | 2402         | 2.75        | 21         | Pass    |
|               | 2441         | 3.14        | 21         | Pass    |
|               | 2480         | 3.71        | 21         | Pass    |
| $\pi/4$ DQPSK | 2402         | 3.13        | 21         | Pass    |
|               | 2441         | 3.43        | 21         | Pass    |
|               | 2480         | 3.76        | 21         | Pass    |
| 8DPSK         | 2402         | 3.64        | 21         | Pass    |
|               | 2441         | 3.55        | 21         | Pass    |
|               | 2480         | 3.61        | 21         | Pass    |

### 3.5.3 Channel separation

| Test Mode     | Channel[MHz] | Result[MHz] | Limit[MHz] | Verdict |
|---------------|--------------|-------------|------------|---------|
| GFSK          | 2402         | 1.002       | 0.627      | Pass    |
|               | 2441         | 1.002       | 0.627      | Pass    |
|               | 2480         | 1.002       | 0.627      | Pass    |
| $\pi/4$ DQPSK | 2402         | 1.002       | 0.875      | Pass    |
|               | 2441         | 1.002       | 0.869      | Pass    |
|               | 2480         | 1.002       | 0.877      | Pass    |
| 8DPSK         | 2402         | 1.002       | 0.859      | Pass    |
|               | 2441         | 1.002       | 0.856      | Pass    |
|               | 2480         | 0.996       | 0.856      | Pass    |

Note: Limit  $\leq 2/3 \times 20\text{dB BW}$

### 3.5.4 Number of hopping Frequency

| Test Mode     | Frequency Range [MHz] | Number of hopping Frequency | Limit     | Verdict |
|---------------|-----------------------|-----------------------------|-----------|---------|
| GFSK          | 2400-2483.5           | 79                          | $\geq 15$ | Pass    |
| $\pi/4$ DQPSK | 2400-2483.5           | 79                          | $\geq 15$ | Pass    |
| 8DPSK         | 2400-2483.5           | 79                          | $\geq 15$ | Pass    |

### 3.5.5 Time of occupancy (dwell time)

| Test Mode     | Packet Type | Channel[MHz] | Pulse Time [ms] | Result[s] | Limit[s] | Verdict |
|---------------|-------------|--------------|-----------------|-----------|----------|---------|
| GFSK          | DH1         | 2402         | 0.379           | 0.121     | 0.400    | Pass    |
|               | DH3         | 2441         | 1.638           | 0.262     | 0.400    | Pass    |
|               | DH5         | 2480         | 2.900           | 0.309     | 0.400    | Pass    |
| $\pi/4$ DQPSK | 2DH1        | 2402         | 0.389           | 0.124     | 0.400    | Pass    |
|               | 2DH3        | 2441         | 1.641           | 0.263     | 0.400    | Pass    |
|               | 2DH5        | 2480         | 2.910           | 0.310     | 0.400    | Pass    |
| 8DPSK         | 3DH1        | 2402         | 0.389           | 0.124     | 0.400    | Pass    |
|               | 3DH3        | 2441         | 1.641           | 0.263     | 0.400    | Pass    |
|               | 3DH5        | 2480         | 2.910           | 0.310     | 0.400    | Pass    |

Note:

DH1: Dwell time = Pulse time (ms)  $\times (1600/2/79) \times 31.6\text{s}$

DH3: Dwell time = Pulse time (ms)  $\times (1600/4/79) \times 31.6\text{s}$

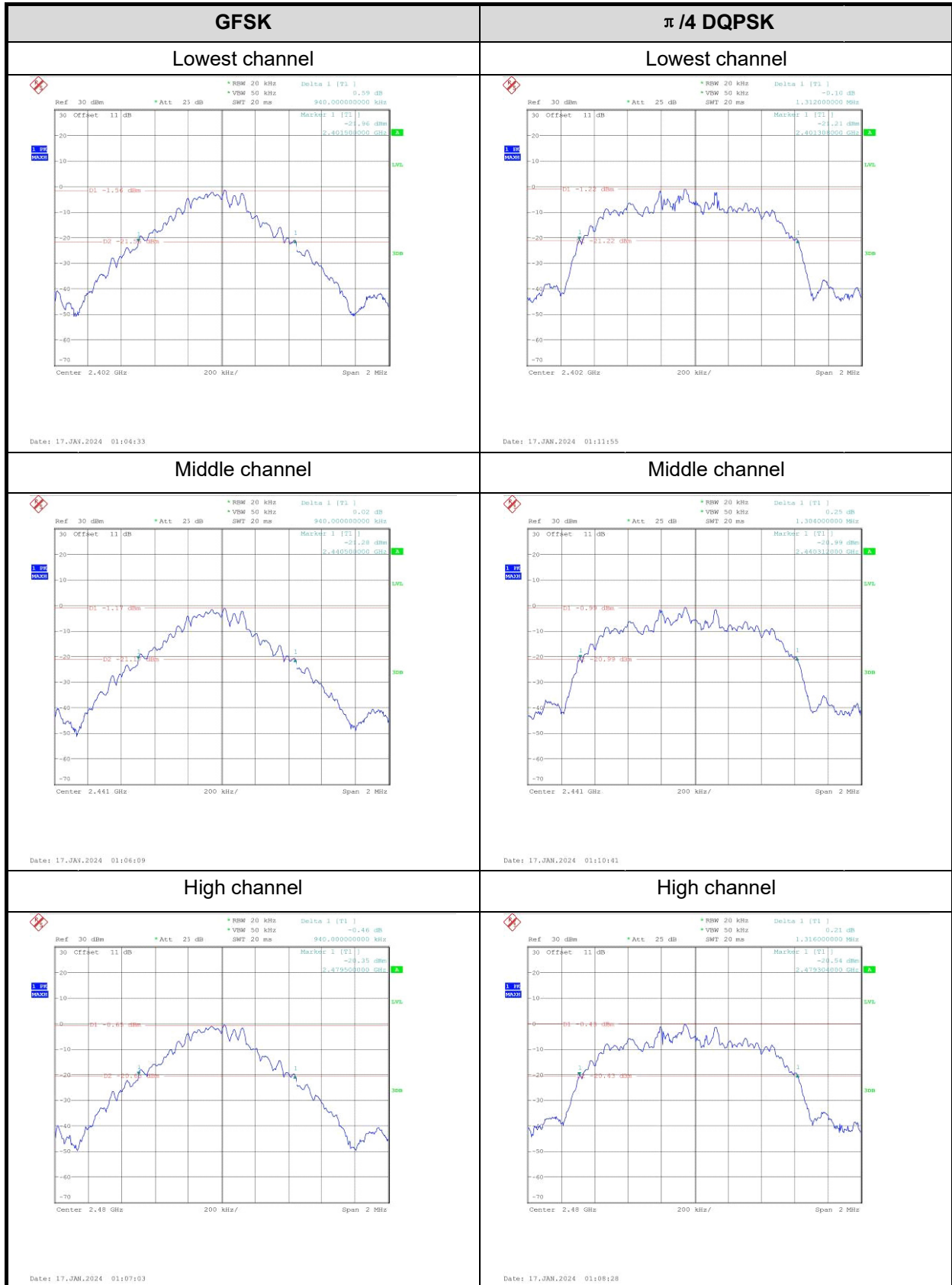
DH5: Dwell time = Pulse time (ms)  $\times (1600/6/79) \times 31.6\text{s}$

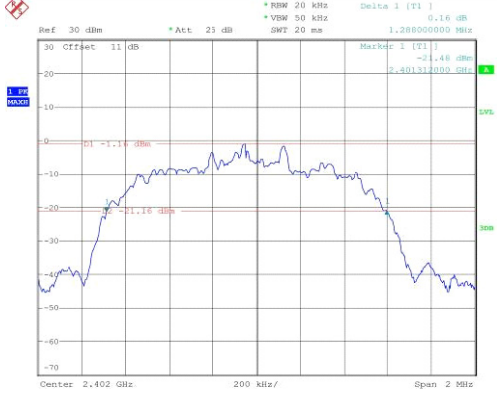
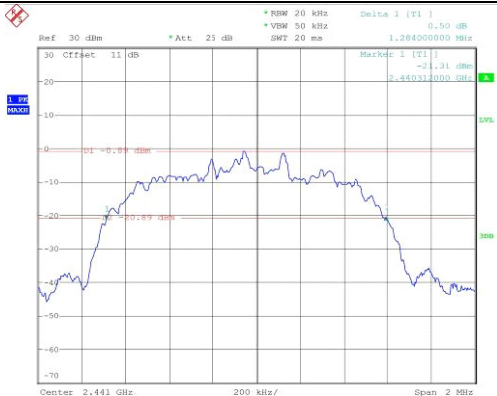
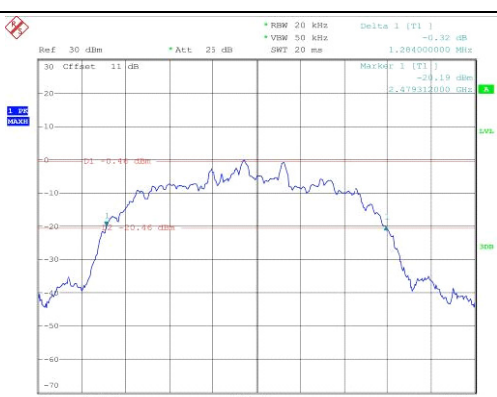
### 3.5.6 100 kHz Bandwidth of Frequency Band Edge

| Test Mode     | Channel | Result          | Limit           | Verdict |
|---------------|---------|-----------------|-----------------|---------|
| GFSK          | 2402    | Refer test plot | Refer test plot | Pass    |
|               | 2480    | Refer test plot | Refer test plot | Pass    |
| $\pi/4$ DQPSK | 2402    | Refer test plot | Refer test plot | Pass    |
|               | 2480    | Refer test plot | Refer test plot | Pass    |
| 8DPSK         | 2402    | Refer test plot | Refer test plot | Pass    |
|               | 2480    | Refer test plot | Refer test plot | Pass    |

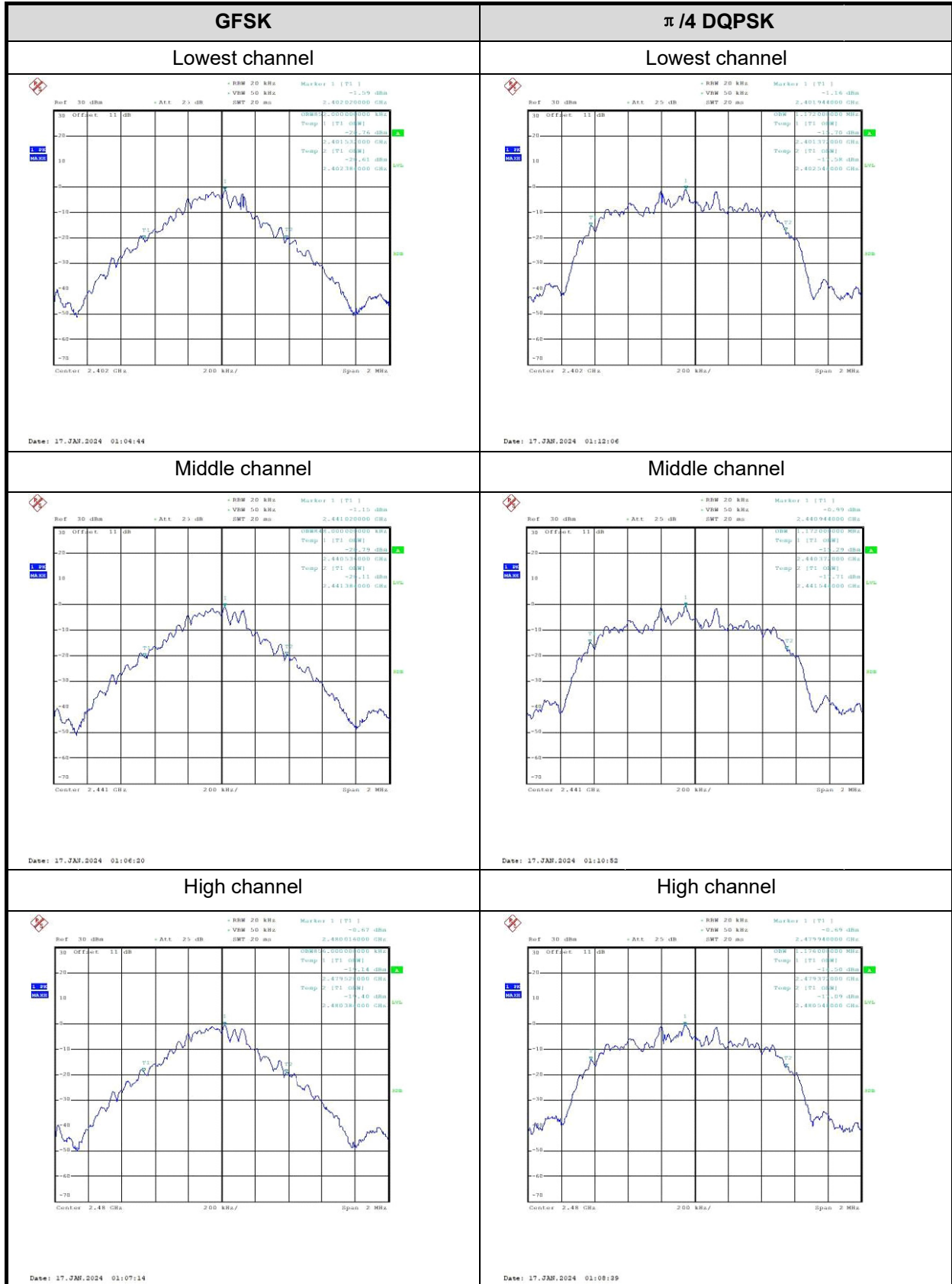
## Test Plots:

### 20 dB Emission Bandwidth:



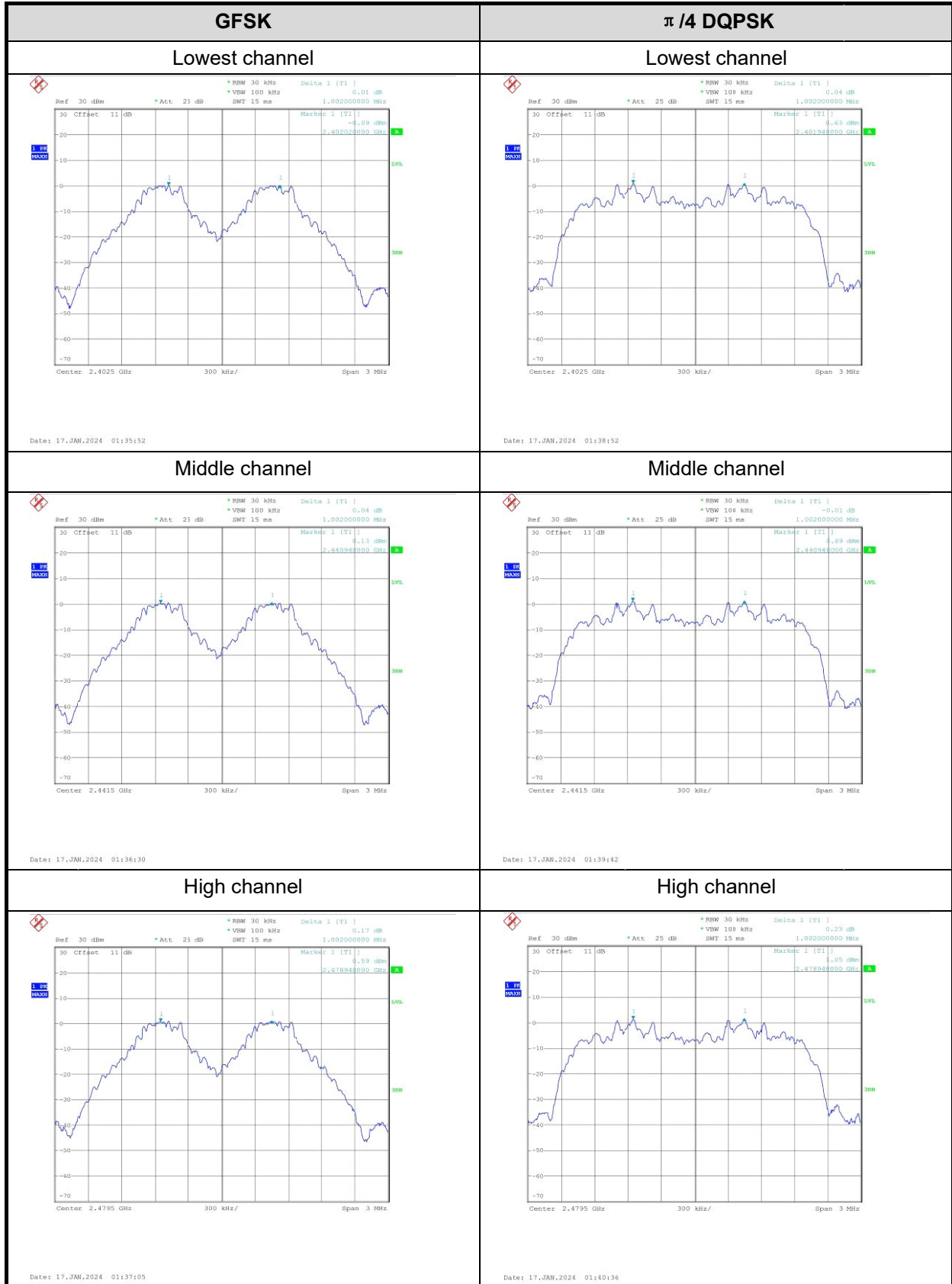
| 8DPSK                                                                                                                                                                                                                                                                                                                                                       | / |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Lowest channel                                                                                                                                                                                                                                                                                                                                              | / |
|  <p>Ref: 30 dBm * Att: 23 dB * BW: 20 kHz * VSW: 50 kHz * SWF: 20 ms Delta: 1 (T1) 0.16 dB 1.286500000 MHz</p> <p>Marker: 1 (T1) -21.48 dBm 2.401312000 GHz</p> <p>Offset: -1.14 dBm</p> <p>Center: 2.402 GHz 200 kHz/ Span: 2 MHz</p> <p>Date: 17.JAN.2024 01:13:57</p>   | / |
| Middle channel                                                                                                                                                                                                                                                                                                                                              | / |
|  <p>Ref: 30 dBm * Att: 23 dB * BW: 20 kHz * VSW: 50 kHz * SWF: 20 ms Delta: 1 (T1) 0.50 dB 1.284000000 MHz</p> <p>Marker: 1 (T1) -21.31 dBm 2.440312000 GHz</p> <p>Offset: -0.89 dBm</p> <p>Center: 2.441 GHz 200 kHz/ Span: 2 MHz</p> <p>Date: 17.JAN.2024 01:15:20</p>  | / |
| High channel                                                                                                                                                                                                                                                                                                                                                | / |
|  <p>Ref: 30 dBm * Att: 23 dB * BW: 20 kHz * VSW: 50 kHz * SWF: 20 ms Delta: 1 (T1) -0.32 dB 1.284000000 MHz</p> <p>Marker: 1 (T1) -20.19 dBm 2.479312000 GHz</p> <p>Offset: -0.46 dBm</p> <p>Center: 2.48 GHz 200 kHz/ Span: 2 MHz</p> <p>Date: 17.JAN.2024 01:16:10</p> | / |

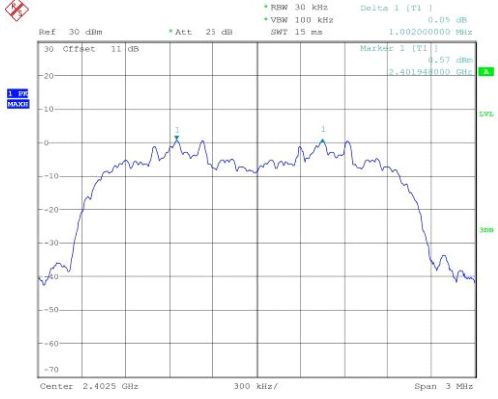
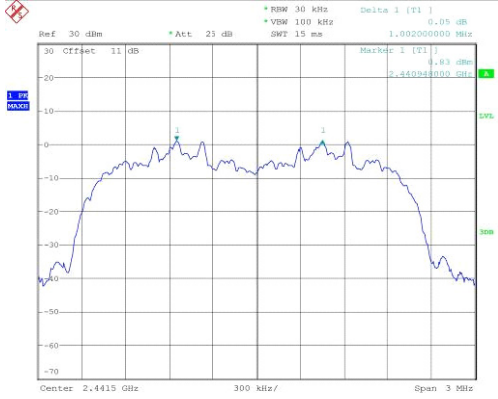
**99% Occupied Bandwidth:**



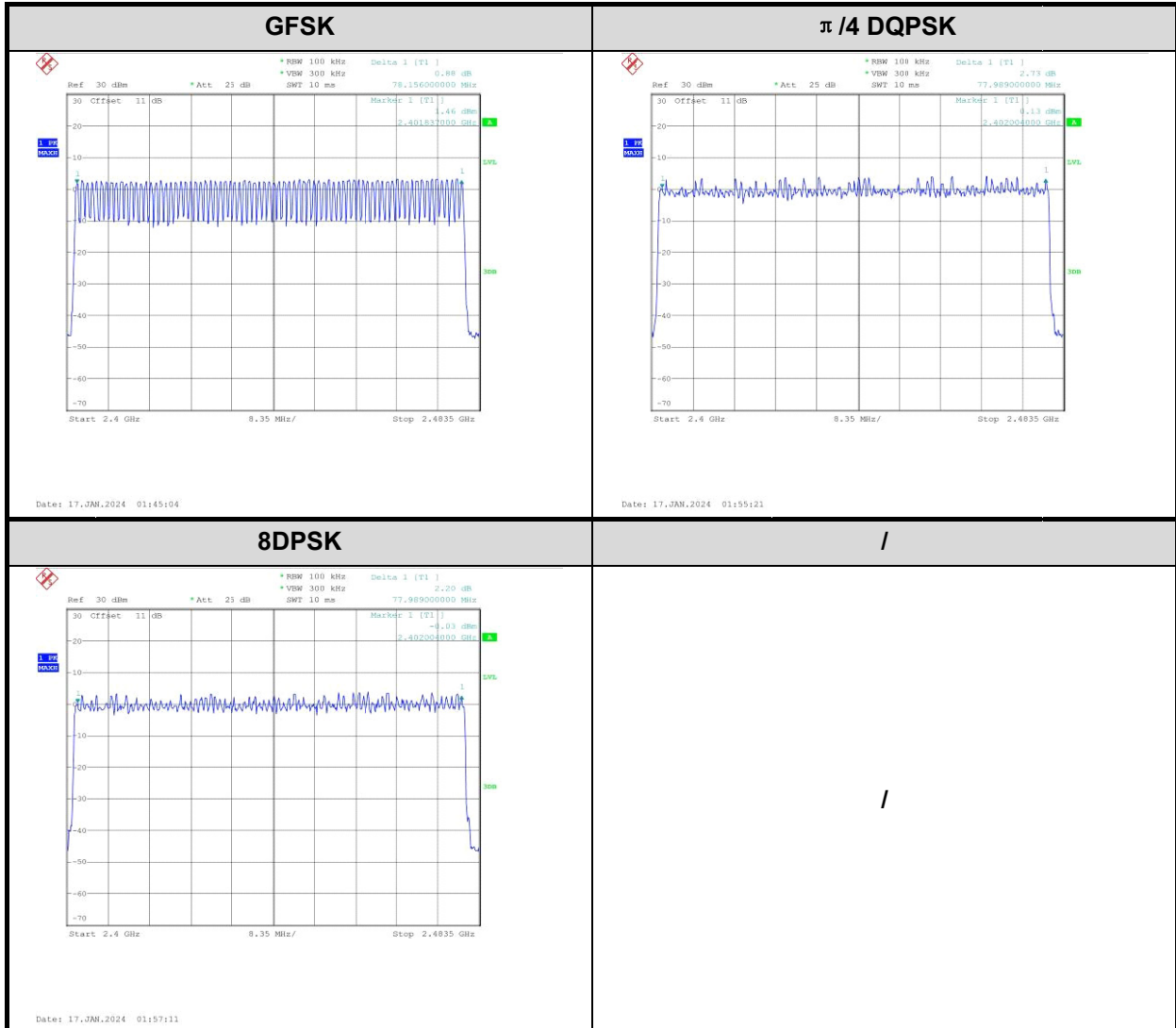
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Channel separation:

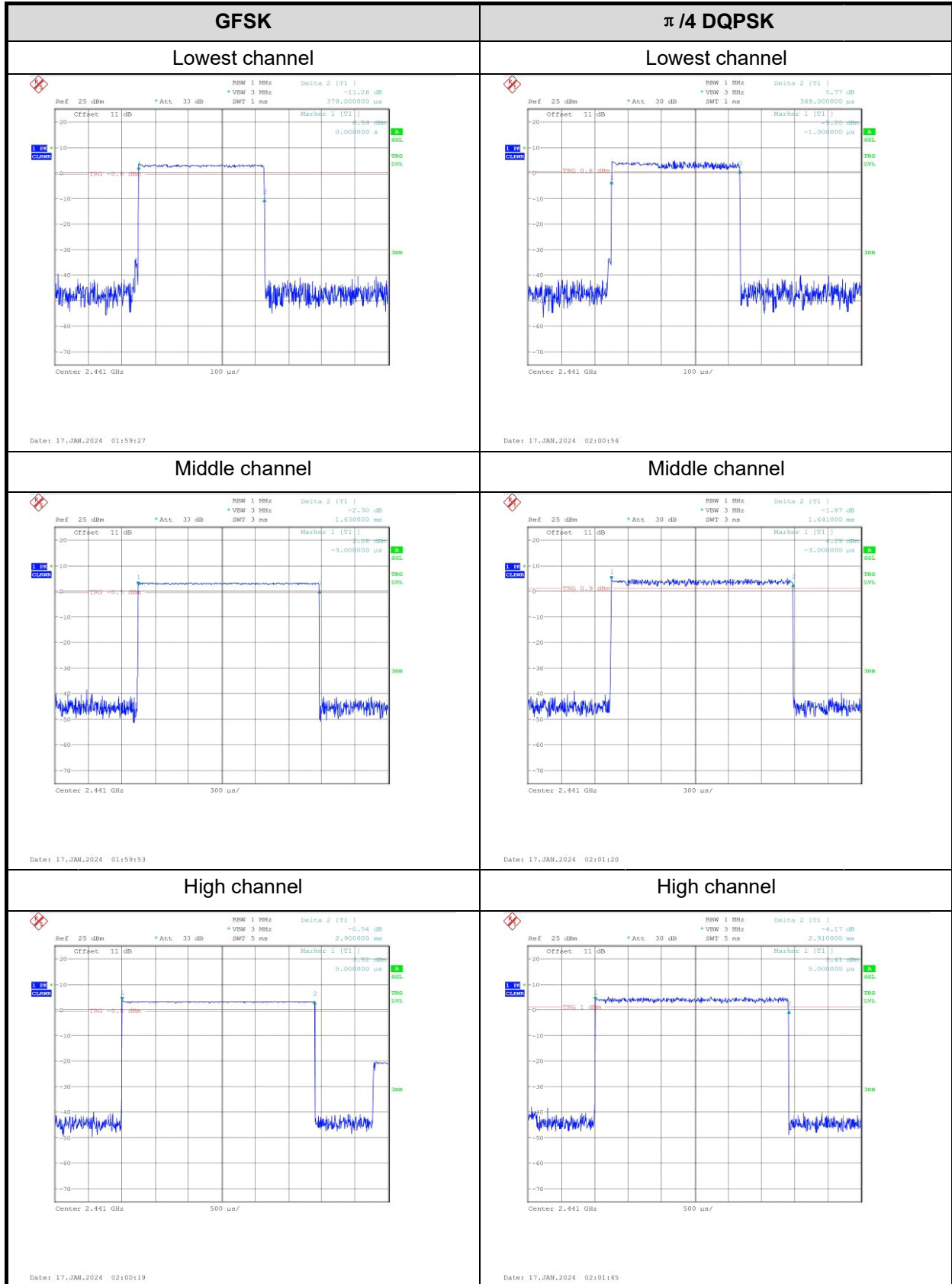


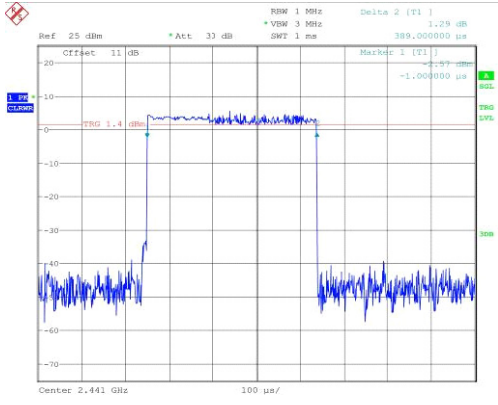
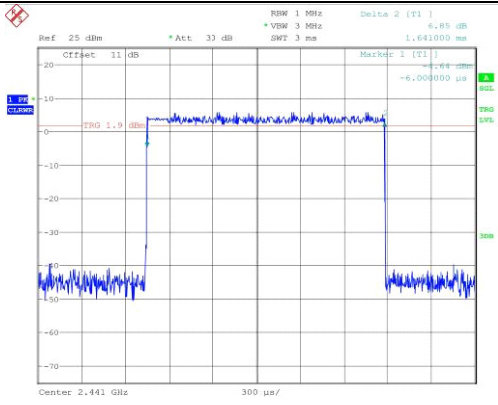
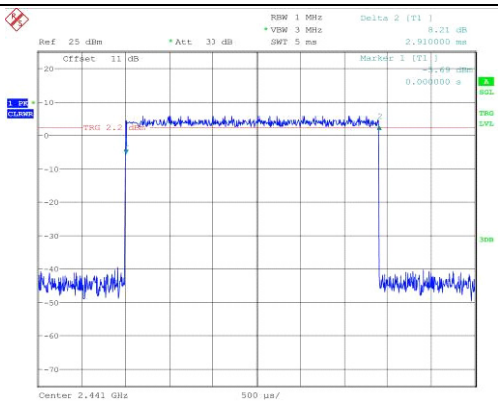
| 8DPSK                                                                                                                                                                                                                                                                                                               | / |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Lowest channel                                                                                                                                                                                                                                                                                                      | / |
|  <p>Ref: 30 dBm * Att: 23 dB * BW: 30 kHz * VSW: 100 kHz * SWF: 15 ms Delta: 1 (T1) 0.05 dB<br/>Marker: 1 (T1) 4.57 dBm<br/>2.402500000 GHz</p> <p>Center: 2.4025 GHz 300 kHz/ Span: 3 MHz</p> <p>Date: 17-JAN-2024 01:41:41</p>   | / |
| Middle channel                                                                                                                                                                                                                                                                                                      | / |
|  <p>Ref: 30 dBm * Att: 23 dB * BW: 30 kHz * VSW: 100 kHz * SWF: 15 ms Delta: 1 (T1) 0.05 dB<br/>Marker: 1 (T1) 4.83 dBm<br/>2.440940000 GHz</p> <p>Center: 2.4415 GHz 300 kHz/ Span: 3 MHz</p> <p>Date: 17-JAN-2024 01:42:19</p>  | / |
| High channel                                                                                                                                                                                                                                                                                                        | / |
|  <p>Ref: 30 dBm * Att: 23 dB * BW: 30 kHz * VSW: 100 kHz * SWF: 15 ms Delta: 1 (T1) 0.04 dB<br/>Marker: 1 (T1) 9.81 dBm<br/>2.479540000 GHz</p> <p>Center: 2.4795 GHz 300 kHz/ Span: 3 MHz</p> <p>Date: 17-JAN-2024 01:43:12</p> | / |

## Number of hopping Frequency

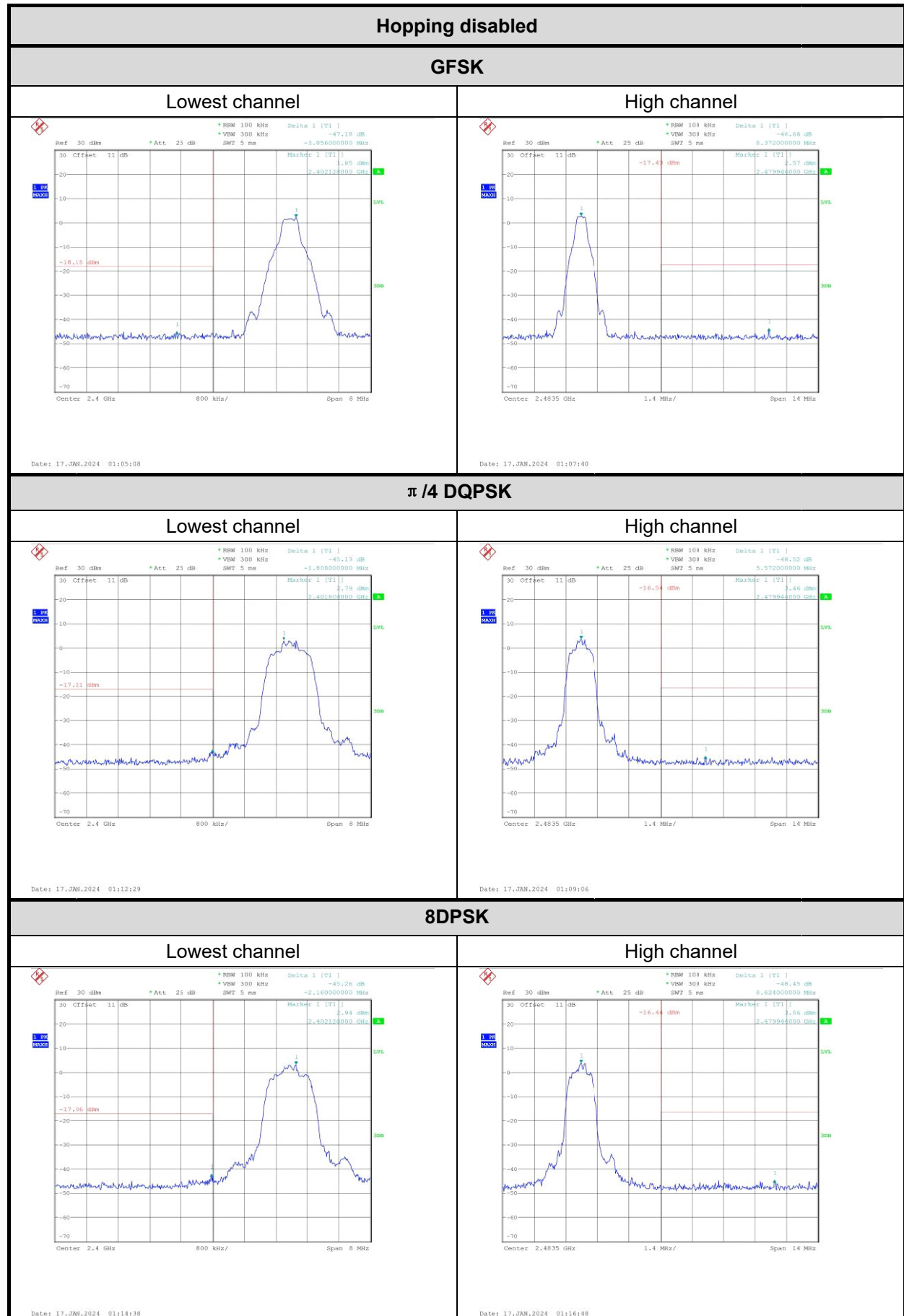


# Time of occupancy (dwell time)



| 8DPSK                                                                                                                                                                                                                                                                                      | / |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Lowest channel                                                                                                                                                                                                                                                                             | / |
|  <p>Ref: 25 dBm * Att: 33 dB BW: 1 MHz Delta: 2 (T1) 1.29 dB<br/>* VSW: 3 MHz SWF: 1 ms 389,000000 µs<br/>Marker: 1 (T1) -1.000000 µs<br/>Center: 2.441 GHz 100 µs/</p> <p>Date: 17.JAN.2024 02:02:11</p> | / |
| Middle channel                                                                                                                                                                                                                                                                             | / |
|  <p>Ref: 25 dBm * Att: 33 dB BW: 1 MHz Delta: 2 (T1) 6.85 dB<br/>* VSW: 3 MHz SWF: 3 ms 1,641000 µs<br/>Marker: 1 (T1) -6.000000 µs<br/>Center: 2.441 GHz 300 µs/</p> <p>Date: 17.JAN.2024 02:02:35</p>  | / |
| High channel                                                                                                                                                                                                                                                                               | / |
|  <p>Ref: 25 dBm * Att: 33 dB BW: 1 MHz Delta: 2 (T1) 8.21 dB<br/>* VSW: 3 MHz SWF: 5 ms 2,910000 µs<br/>Marker: 1 (T1) 0.000000 µs<br/>Center: 2.441 GHz 500 µs/</p> <p>Date: 17.JAN.2024 02:03:01</p>  | / |

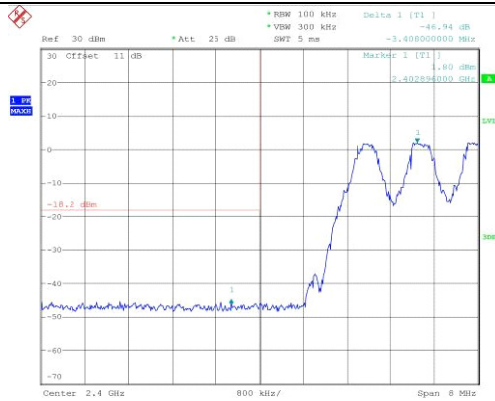
# 100kHz Bandwidth of Frequency Band Edge:



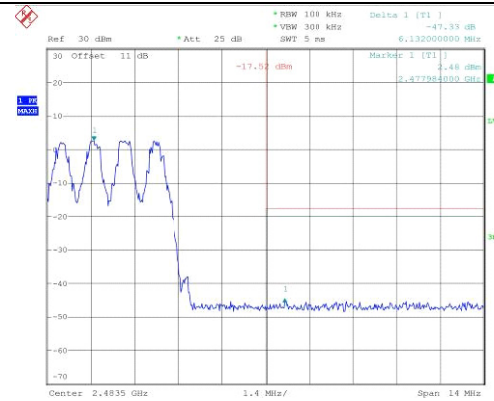
## Hopping enabled

### GFSK

#### Lowest channel

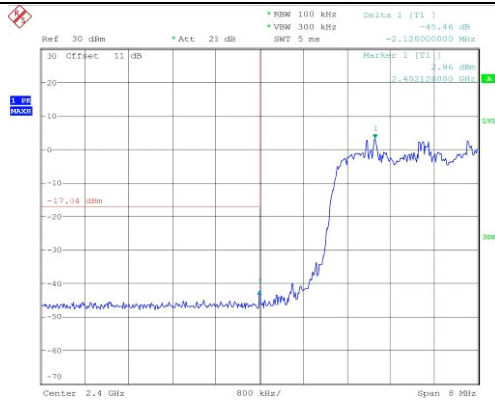


#### High channel

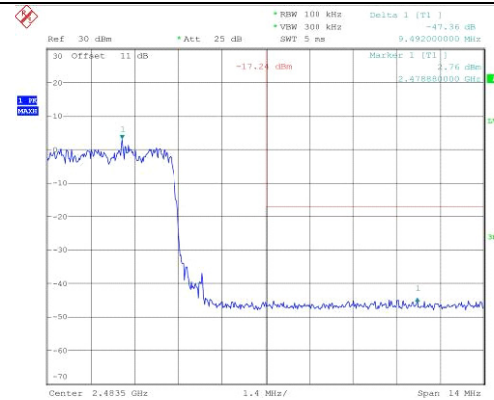


### $\pi/4$ DQPSK

#### Lowest channel

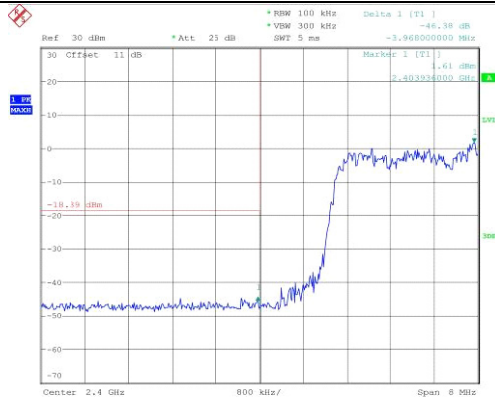


#### High channel

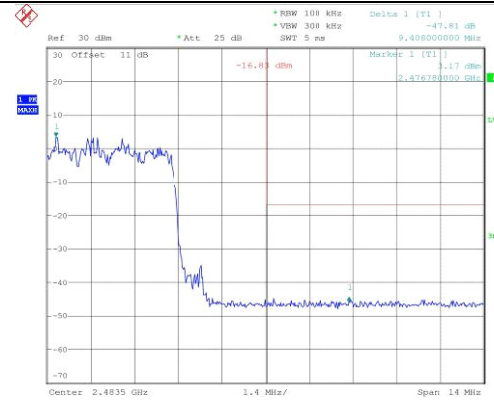


### 8DPSK

#### Lowest channel



#### High channel



## 4 Test Setup Photo

Please refer to the attachment RWAZ202300121 Test Setup photo.

## 5 E.U.T Photo

Please refer to the attachment RWAZ202300121 External photo and RWAZ202300121 Internal photo.

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