

# FCC Test Report

**Report No.:** RWAZ202300086A

**Applicant:** Shenzhen Qianyan Technology LTD

**Address:** No.3301, Block C, Section 1, Chuangzhi Yuncheng Building,  
Liuxian Avenue, Xili Community, Xili Street, Nanshan District,  
Shenzhen, China

**Product Name:** Govee Outdoor Ground Lights 2

**Product Model:** H7053

**Multiple Models:** H7052

**Trade Mark:** Govee

**FCC ID:** 2A7VD-H7053

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

**Test Date:** 2023-12-21 to 2023-12-29

**Test Result:** Complied

**Report Date:** 2024-01-08

**Reviewed by:**

*Abel Chen*

**Approved by:**

*Jacob Kong*

Abel Chen  
Project Engineer

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**Prepared by:**

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## Revision History

| Version No. | Issued Date | Description |
|-------------|-------------|-------------|
| 00          | 2024-01-08  | Original    |

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# 1 General Information

## 1.1 Client Information

|               |                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant:    | Shenzhen Qianyan Technology LTD                                                                                                          |
| Address:      | No.3301, Block C, Section 1, Chuangzhi Yuncheng Building, Liuxian Avenue, Xili Community, Xili Street, Nanshan District, Shenzhen, China |
| Manufacturer: | Shenzhen Qianyan Technology LTD                                                                                                          |
| Address:      | No.3301, Block C, Section 1, Chuangzhi Yuncheng Building, Liuxian Avenue, Xili Community, Xili Street, Nanshan District, Shenzhen, China |

## 1.2 Product Description of EUT

The EUT is Govee Outdoor Ground Lights 2 that contains 2.4G and BLE(1M), this report covers the full testing of the 2.4G WLAN radio.

|                                     |                                                                                                                                                                                                           |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample Serial Number                | 1O-3 & 1O-4 test, 1O-1 & 1O-3 & 1O-4 for RE test, 1O-2 for RF test conducted test(assigned by WATC)                                                                                                       |
| Sample Received Date                | 2023-12-20                                                                                                                                                                                                |
| Sample Status                       | Good Condition                                                                                                                                                                                            |
| Frequency Range                     | 2412MHz - 2472MHz(802.11b, g, n-HT20)                                                                                                                                                                     |
| Maximum Conducted Peak Output Power | 13.83dBm                                                                                                                                                                                                  |
| Modulation Technology               | DSSS, OFDM                                                                                                                                                                                                |
| Antenna Gain <sup>#</sup>           | 3.85dBi                                                                                                                                                                                                   |
| Spatial Streams <sup>#</sup>        | SISO (1TX, 1RX)                                                                                                                                                                                           |
| Operating Temperature <sup>#</sup>  | -20 deg. C~45 deg. C                                                                                                                                                                                      |
| Power Supply                        | H7053: DC 24V/3A from adapter<br>H7052: DC 24V/1.5A from adapter                                                                                                                                          |
| Adapter Information                 | For H7053:<br>Model: SOY-2400300US-306<br>Input: AC100-240V, 50/60Hz, 1.8A<br>Output: DC 24.0V/3.0A<br>For H7052:<br>Model: B136L-240150-AdU<br>Input: AC100-240V, 50/60Hz, 1.2A<br>Output: DC 24.0V/1.5A |
| 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 Wi-Fi antenna is an internal antenna which cannot replace by end-user. Please see product</p>                                                                                                                                                                                                                                                                                                                                                                                        |  |

internal photos for details.

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

No Related Submittal(s)/Grant(s)

## 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                                                 |
| Conducted Power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             | 0.74dB                                                  |
| Frequency Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             | 150Hz                                                   |
| Bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             | 0.34%                                                   |
| Power Spectral Density                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | 0.74dB                                                  |
| <p><b>Note 1:</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.</p> <p><b>Note 2:</b> The Decision Rule is based on simple acceptance with ISO Guide 98-4:2012 Clause 8.2 (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)</p> |             |                                                         |

## 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

KDB 662911 D01 Multiple Transmitter Output v02r01

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) |
| 1                                                                                                                                                                                                                                       | 2412            | 6              | 2437            | 11              | 2462            |
| 2                                                                                                                                                                                                                                       | 2417            | 7              | 2442            | 12              | 2467            |
| 3                                                                                                                                                                                                                                       | 2422            | 8              | 2447            | 13              | 2472            |
| 4                                                                                                                                                                                                                                       | 2427            | 9              | 2452            | /               | /               |
| 5                                                                                                                                                                                                                                       | 2432            | 10             | 2457            | /               | /               |
| 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: |                 |                |                 |                 |                 |
| 802.11b, 802.11g, 802.11n-HT20                                                                                                                                                                                                          |                 |                |                 |                 |                 |
| Lowest channel                                                                                                                                                                                                                          |                 | Middle channel |                 | Highest channel |                 |
| Channel No.                                                                                                                                                                                                                             | Frequency (MHz) | Channel No.    | Frequency (MHz) | Channel No.     | Frequency (MHz) |
| 1                                                                                                                                                                                                                                       | 2412            | 7              | 2442            | 13              | 2472            |

| Test Mode:                                                                         |                      |                                                         |                |              |
|------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------|----------------|--------------|
| Transmitting mode:                                                                 |                      | Keep the EUT in continuous transmitting with modulation |                |              |
| Exercise software <sup>#</sup> :                                                   |                      | AmebaZ2_mptool_1V3                                      |                |              |
| Mode                                                                               | Worst-case Data rate | Power Level Setting <sup>#</sup>                        |                |              |
|                                                                                    |                      | Low Channel                                             | Middle Channel | High Channel |
| 802.11b                                                                            | 1Mbps                | 55                                                      | 55             | 55           |
| 802.11g                                                                            | 6Mbps                | 32                                                      | 32             | 32           |
| 802.11n-HT20                                                                       | 6.5Mbps              | 25                                                      | 25             | 25           |
| The exercise software and the maximum power setting that provided by manufacturer. |                      |                                                         |                |              |

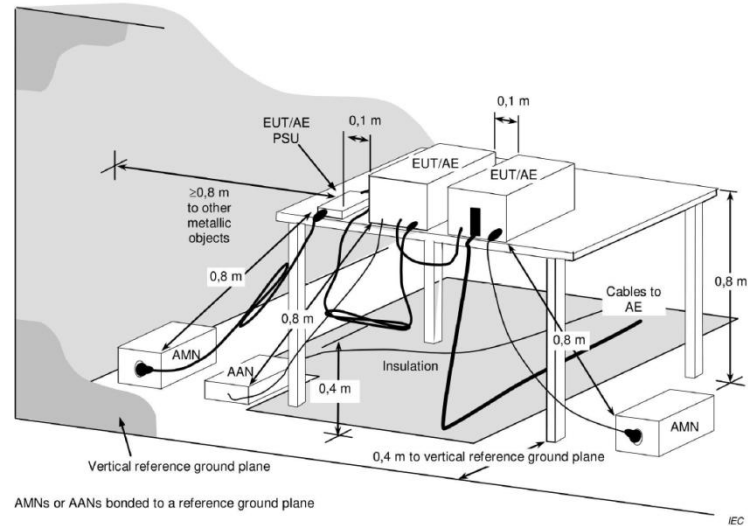
| Worst-Case Configuration:                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                    |
| For model H7053 and H7052, they have same control box(RF circuitry), difference for the lights and adapter, AC power line conducted emission and radiated emission 9kHz-1GHz test both two models, other items was select model H7053 to test. |

### 2.2 Test Auxiliary Equipment

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

## 2.3 Test Setup

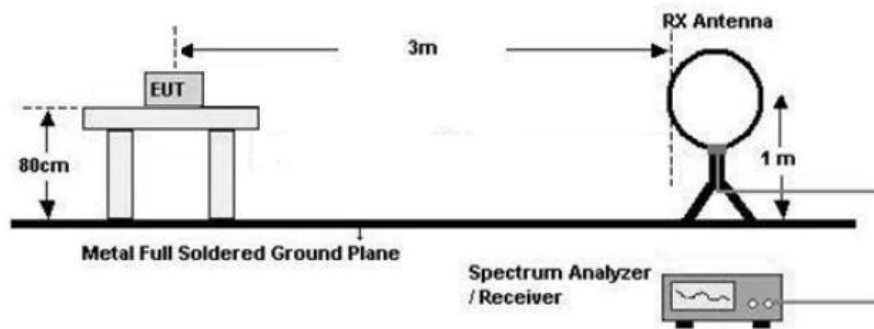
### 1) Conducted emission measurement:



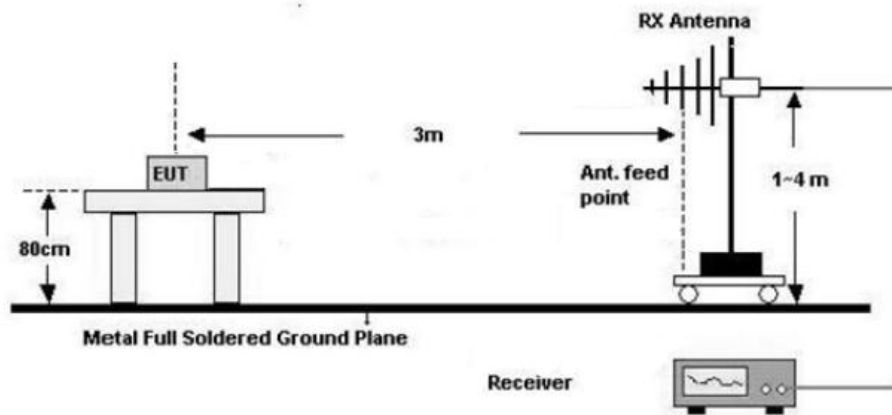
**Note:** The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

### 2) Radiated emission measurement:

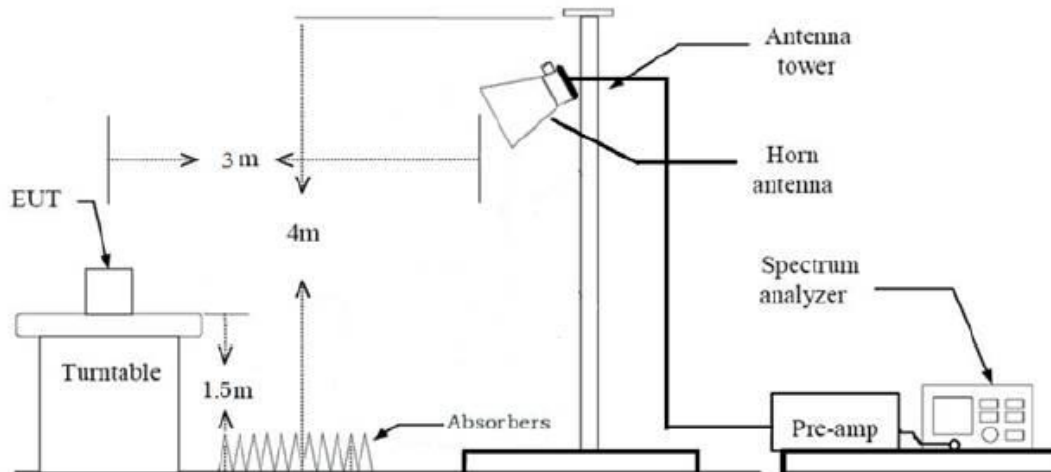
Below 30MHz (3m SAC)



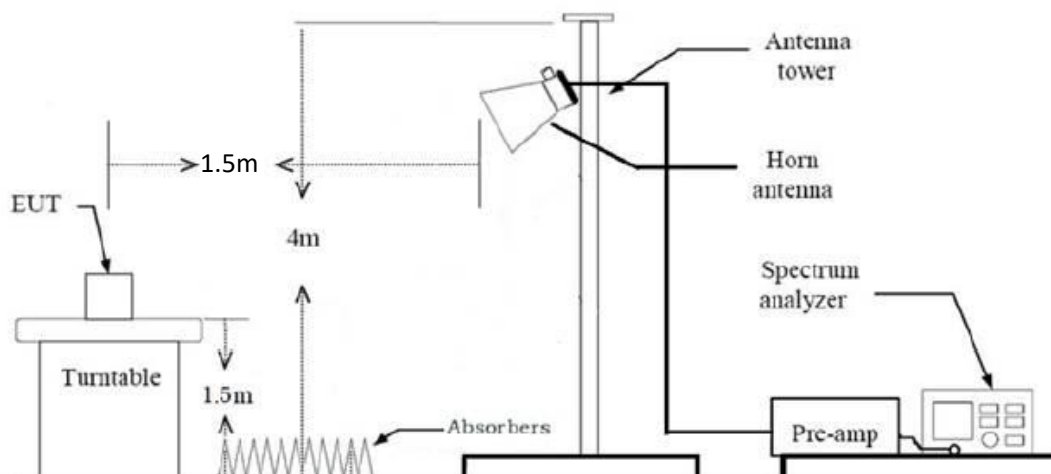
### 30MHz-1GHz (3m SAC)



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

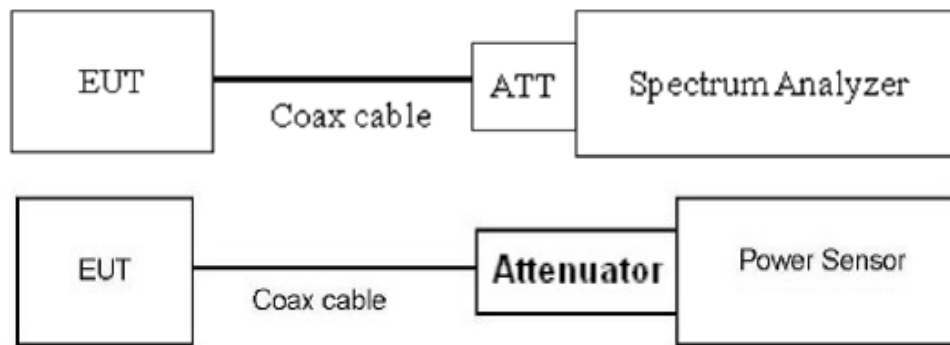


### Above 18GHz (3m FAC)





### 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 11.9.1.2 PKPM1 Peak power meter method or<br>ANSI C63.10-2020 Section 11.9.2.3.2 Method AVGPM-G |
| Power Spectral Density                  | ANSI C63.10-2020 Section 11.10.2 Method PKPSD (peak PSD)                                                                 |
| 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                                                                                     |
| 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         | 2024/7/31            |
| 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 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            |
| ANRITSU                         | USB Power Sensor                | MA24418A              | 12620          | 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 |

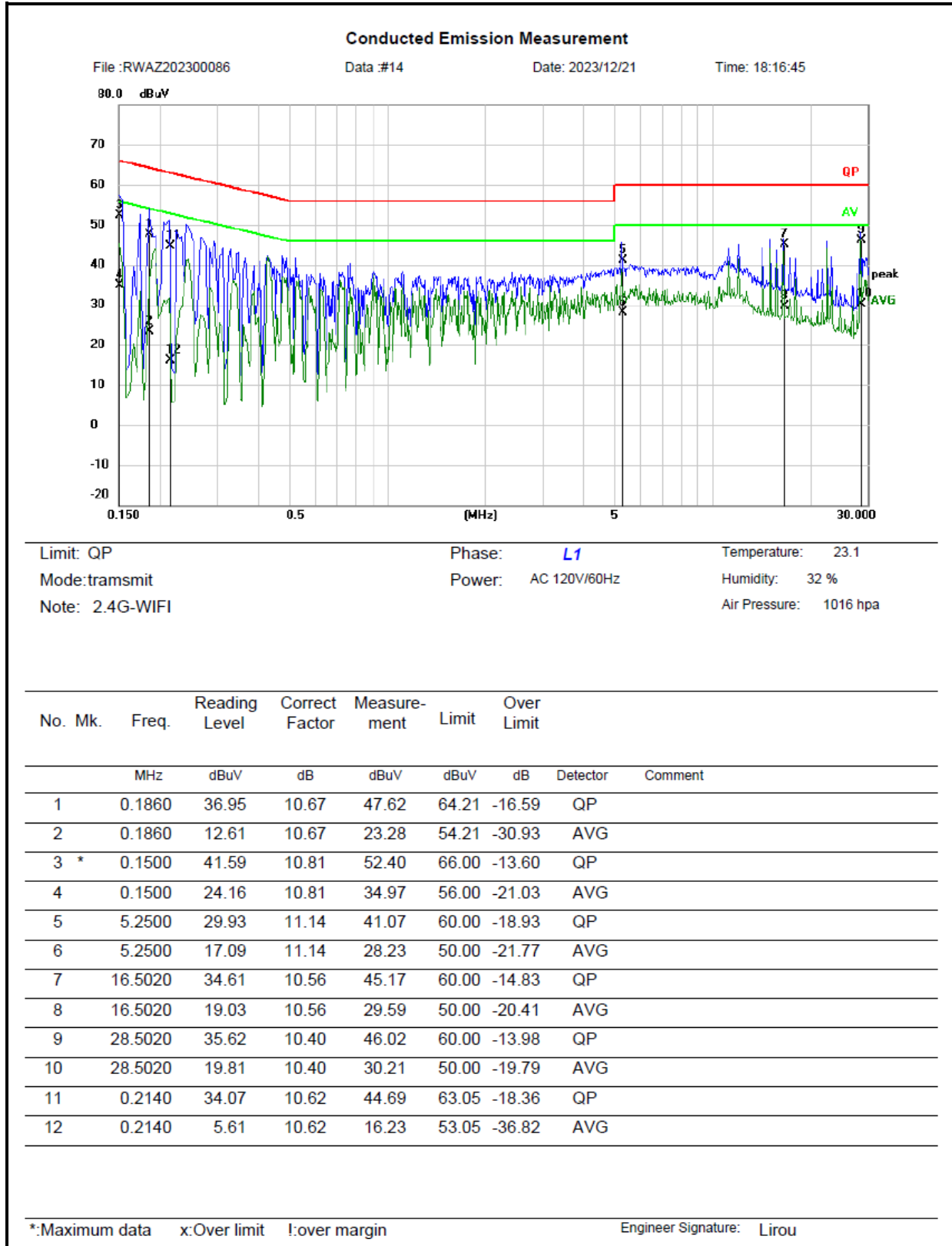
## 3.2 Limit

| 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>             | 2023-12-21                                                         | <b>Test By:</b> | Lirou Li |
| <b>Environment condition:</b> | Temperature: 23.1°C; Relative Humidity:32%; ATM Pressure: 101.6kPa |                 |          |

Model: H7053



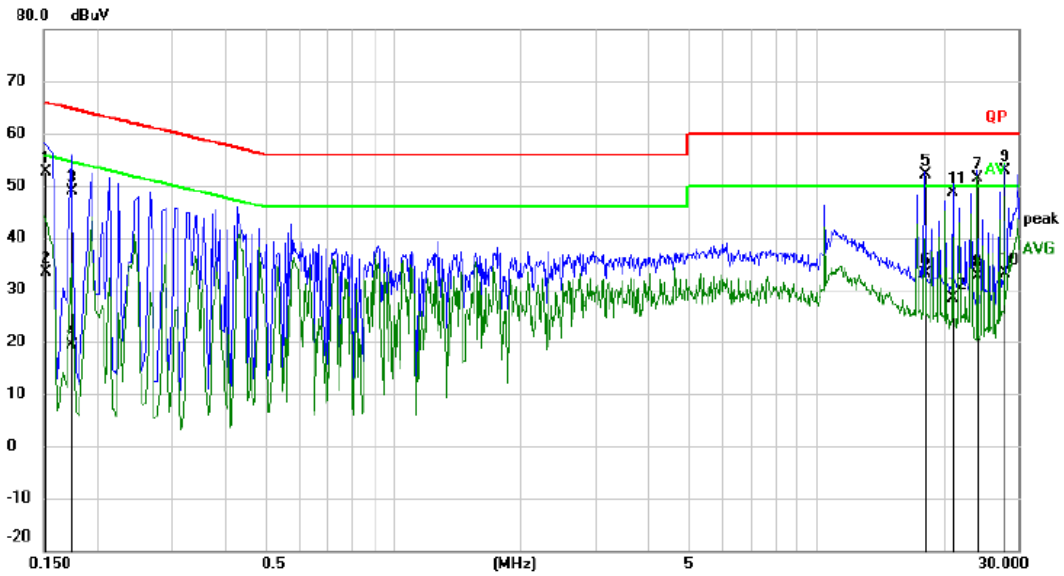
### Conducted Emission Measurement

File :RWAZ202300086

Data :#13

Date: 2023/12/21

Time: 18:11:04



Limit: QP

Mode:transmit

Note: 2.4G-WIFI

Phase: **N**

Power: AC 120V/60Hz

Temperature: 23.1

Humidity: 32 %

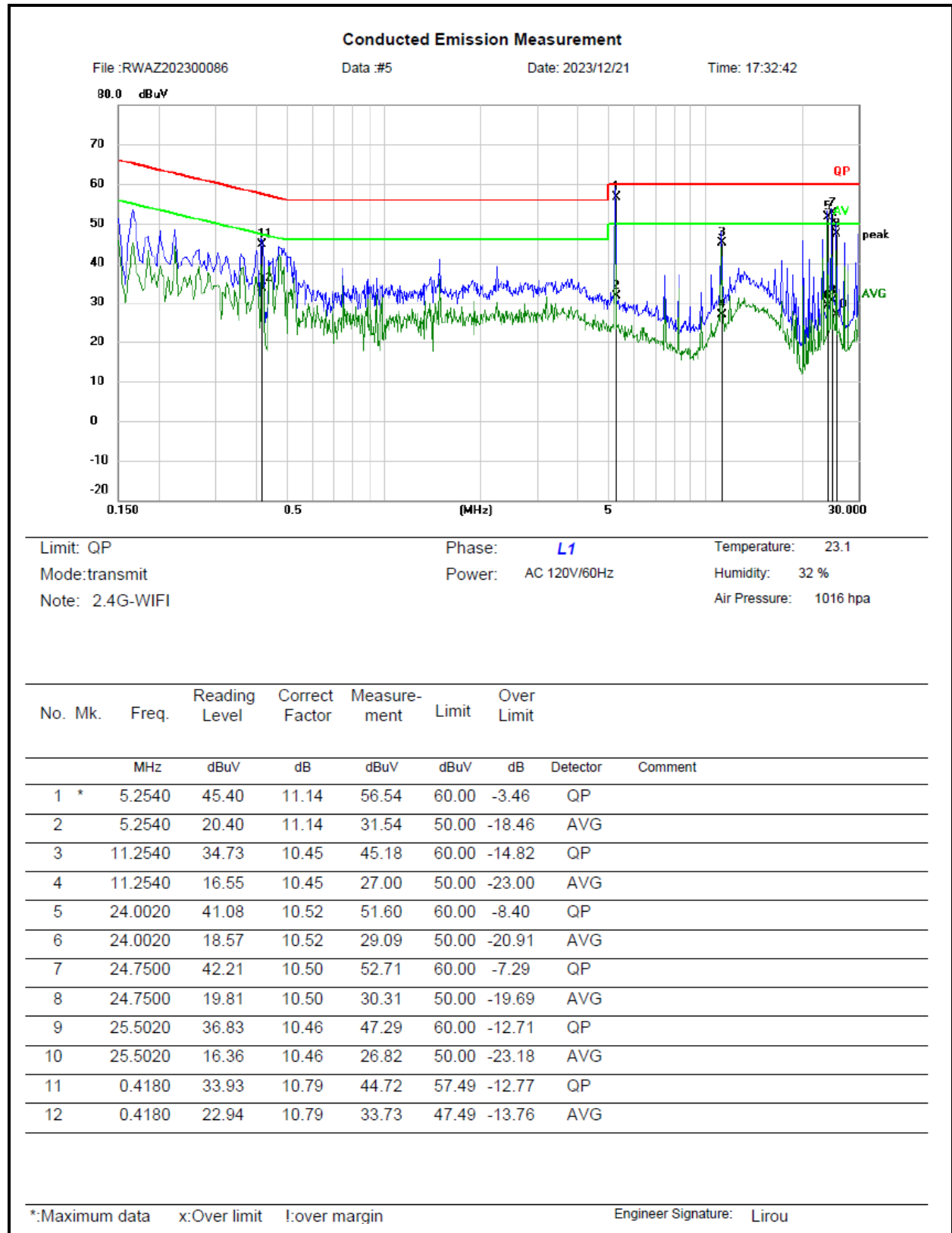
Air Pressure: 1016 hpa

| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit | Over Limit |                  |
|-----|-----|---------|---------------|----------------|-------------|-------|------------|------------------|
|     |     | MHz     | dBuV          | dB             | dBuV        | dBuV  | dB         | Detector Comment |
| 1   |     | 0.1516  | 41.93         | 10.60          | 52.53       | 65.91 | -13.38     | QP               |
| 2   |     | 0.1516  | 22.79         | 10.60          | 33.39       | 55.91 | -22.52     | AVG              |
| 3   |     | 0.1740  | 38.44         | 10.51          | 48.95       | 64.77 | -15.82     | QP               |
| 4   |     | 0.1740  | 8.92          | 10.51          | 19.43       | 54.77 | -35.34     | AVG              |
| 5   |     | 17.9980 | 41.28         | 10.73          | 52.01       | 60.00 | -7.99      | QP               |
| 6   |     | 17.9980 | 22.28         | 10.73          | 33.01       | 50.00 | -16.99     | AVG              |
| 7   |     | 24.0020 | 40.76         | 10.74          | 51.50       | 60.00 | -8.50      | QP               |
| 8   |     | 24.0020 | 22.00         | 10.74          | 32.74       | 50.00 | -17.26     | AVG              |
| 9   | *   | 27.7500 | 42.06         | 10.76          | 52.82       | 60.00 | -7.18      | QP               |
| 10  |     | 27.7500 | 22.46         | 10.76          | 33.22       | 50.00 | -16.78     | AVG              |
| 11  |     | 20.9980 | 38.03         | 10.65          | 48.68       | 60.00 | -11.32     | QP               |
| 12  |     | 20.9980 | 17.66         | 10.65          | 28.31       | 50.00 | -21.69     | AVG              |

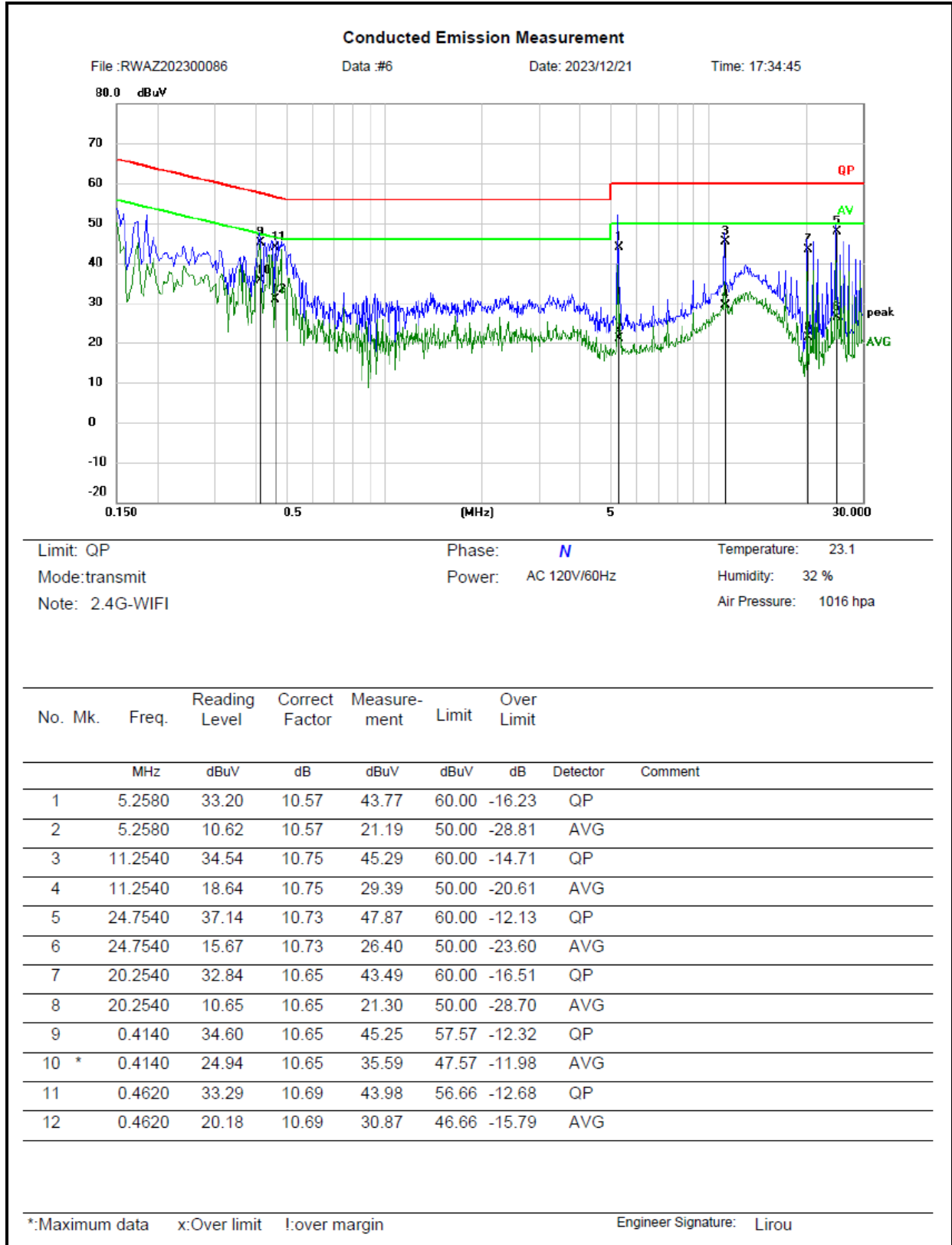
\*:Maximum data x:Over limit !:over margin

Engineer Signature: **Lirou**

Model: H7052







**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:

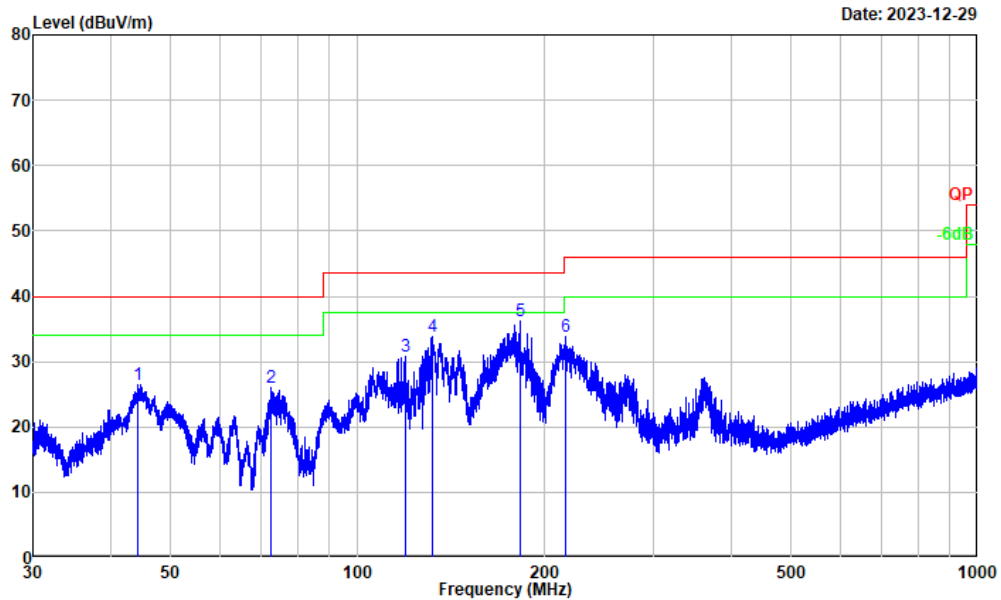
|                               |                                                                    |                 |         |
|-------------------------------|--------------------------------------------------------------------|-----------------|---------|
| <b>Test Date:</b>             | 2023-12-29                                                         | <b>Test By:</b> | Luke Li |
| <b>Environment condition:</b> | Temperature: 23.8°C; Relative Humidity:48%; ATM Pressure: 101.5kPa |                 |         |

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

**30MHz-1GHz:**

|                               |                                                                    |                 |         |
|-------------------------------|--------------------------------------------------------------------|-----------------|---------|
| <b>Test Date:</b>             | 2023-12-29                                                         | <b>Test By:</b> | Luke Li |
| <b>Environment condition:</b> | Temperature: 23.8°C; Relative Humidity:48%; ATM Pressure: 101.5kPa |                 |         |

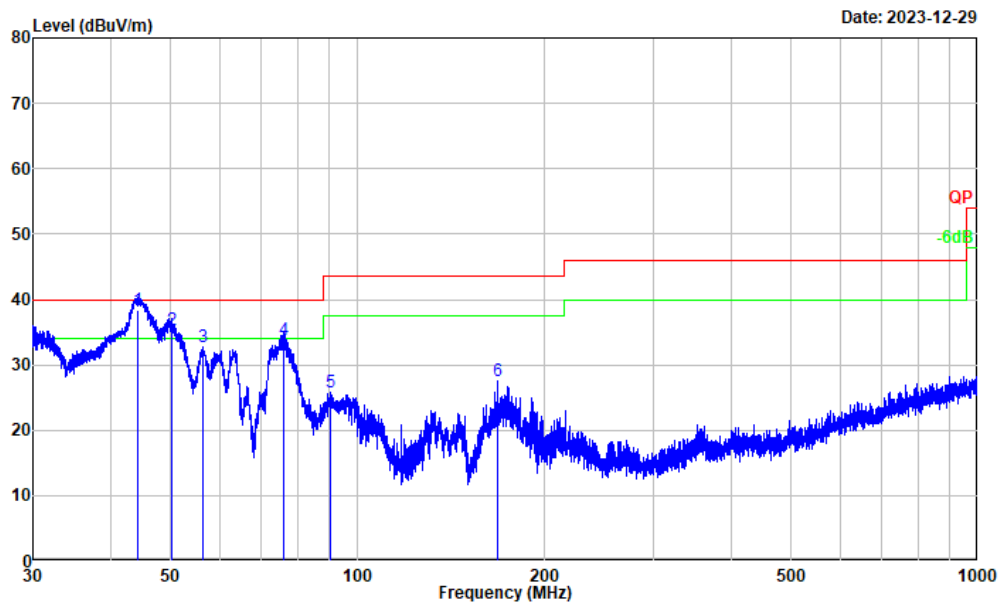
Model: H7053



Project No. : RWAZ202300086  
EUT/Model No.: H7053  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.8°C/48%R.H./101.5kPa  
Tested by : Luke Li  
Polarization : horizontal  
Remark : 802.11b High 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     | 44.333             | 38.73             | -12.27           | 26.46              | 40.00             | -13.54             | Peak     |
| 2     | 72.623             | 43.26             | -17.30           | 25.96              | 40.00             | -14.04             | Peak     |
| 3     | 119.331            | 46.42             | -15.72           | 30.70              | 43.50             | -12.80             | Peak     |
| 4     | 132.337            | 51.15             | -17.40           | 33.75              | 43.50             | -9.75              | Peak     |
| 5     | 183.040            | 51.51             | -15.39           | 36.12              | 43.50             | -7.38              | Peak     |
| 6     | 216.403            | 47.67             | -13.78           | 33.89              | 46.00             | -12.11             | Peak     |

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

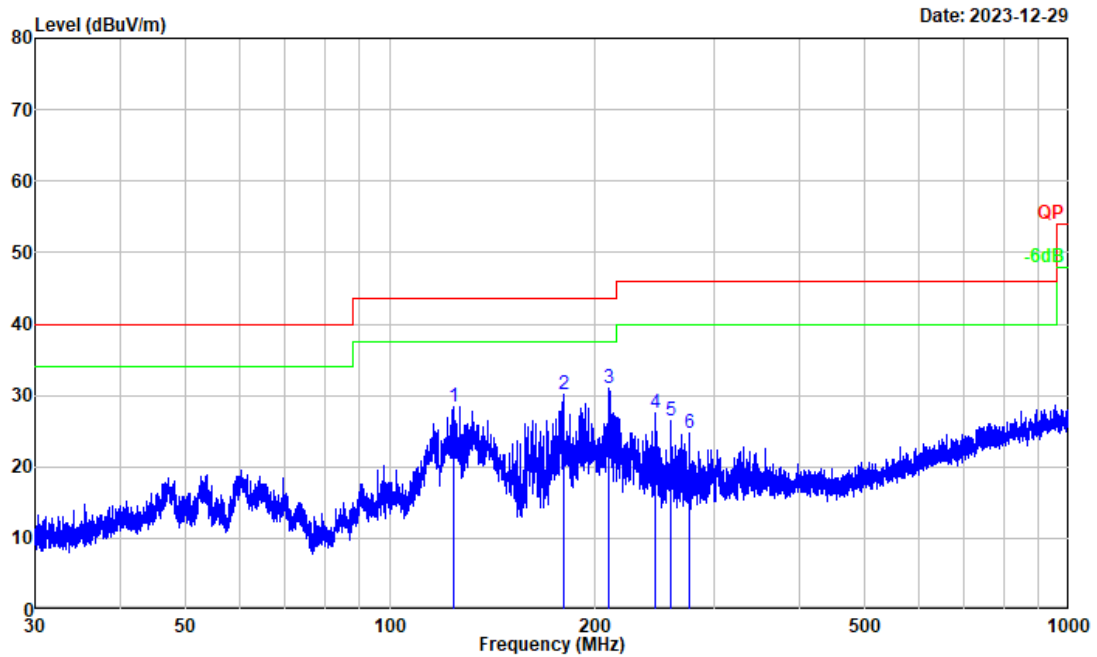


Project No. : RWAZ202300086  
EUT/Model No.: H7053  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.8°C/48%R.H./101.5kPa  
Tested by : Luke Li  
Polarization : vertical  
Remark : 802.11b High Channel

| --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     | 44.217             | 50.60             | -12.28           | 38.32              | 40.00             | -1.68              | QP       |
| 2     | 50.210             | 47.60             | -12.16           | 35.44              | 40.00             | -4.56              | QP       |
| 3     | 56.420             | 45.77             | -12.97           | 32.80              | 40.00             | -7.20              | Peak     |
| 4     | 76.177             | 51.91             | -18.13           | 33.78              | 40.00             | -6.22              | QP       |
| 5     | 90.498             | 41.35             | -15.59           | 25.76              | 43.50             | -17.74             | Peak     |
| 6     | 168.193            | 44.03             | -16.44           | 27.59              | 43.50             | -15.91             | Peak     |

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

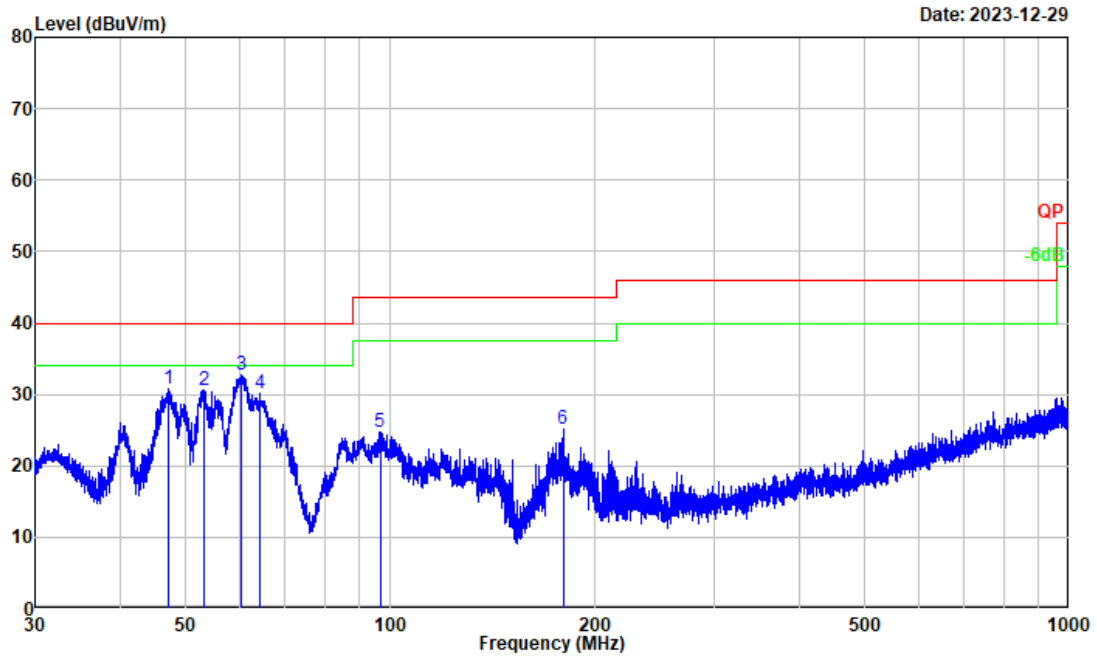
Model: H7052



Project No. : RWAZ202300086  
EUT/Model No.: H7052  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.8°C/48%R.H./101.5kPa  
Tested by : Luke Li  
Polarization : horizontal  
Remark : 802.11b High 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 |
|-------|--------------------|-------------------|------------------|--------------------|-------------------|--------------------|----------|
| <hr/> |                    |                   |                  |                    |                   |                    |          |
| 1     | 123.753            | 45.00             | -16.58           | 28.42              | 43.50             | -15.08             | Peak     |
| 2     | 180.017            | 45.91             | -15.71           | 30.20              | 43.50             | -13.30             | Peak     |
| 3     | 210.325            | 44.89             | -13.91           | 30.98              | 43.50             | -12.52             | Peak     |
| 4     | 245.198            | 39.96             | -12.51           | 27.45              | 46.00             | -18.55             | Peak     |
| 5     | 258.666            | 38.79             | -12.27           | 26.52              | 46.00             | -19.48             | Peak     |
| 6     | 276.124            | 36.55             | -11.91           | 24.64              | 46.00             | -21.36             | Peak     |

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



Project No. : RWAZ202300086  
EUT/Model No.: H7052  
Test Mode : Transmitting  
Test Voltage : AC 120V/60Hz  
Environment : 23.8°C/48%R.H./101.5kPa  
Tested by : Luke Li  
Polarization : vertical  
Remark : 802.11b High 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     | 47.160             | 42.88             | -12.18           | 30.70              | 40.00             | -9.30              | Peak     |
| 2     | 53.201             | 42.90             | -12.33           | 30.57              | 40.00             | -9.43              | Peak     |
| 3     | 60.254             | 46.49             | -13.70           | 32.79              | 40.00             | -7.21              | Peak     |
| 4     | 64.320             | 44.53             | -14.29           | 30.24              | 40.00             | -9.76              | Peak     |
| 5     | 96.648             | 39.24             | -14.63           | 24.61              | 43.50             | -18.89             | Peak     |
| 6     | 179.701            | 40.79             | -15.71           | 25.08              | 43.50             | -18.42             | Peak     |

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>             | 2023-12-22                                                         | <b>Test By:</b> | Luke Li |
| <b>Environment condition:</b> | Temperature: 23.0°C; Relative Humidity:60%; ATM Pressure: 100.7kPa |                 |         |

| Frequency (MHz) | Reading level (dBμV) | Polar      | Corrected Factor (dB/m) | Corrected Amplitude (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Remark  |
|-----------------|----------------------|------------|-------------------------|------------------------------|----------------|-------------|---------|
| 802.11b         |                      |            |                         |                              |                |             |         |
| Low Channel     |                      |            |                         |                              |                |             |         |
| 2390.000        | 37.50                | horizontal | 8.25                    | 45.75                        | 54.00          | -8.25       | Average |
| 2390.000        | 49.93                | horizontal | 8.25                    | 58.18                        | 74.00          | -15.82      | Peak    |
| 2390.000        | 37.43                | vertical   | 8.25                    | 45.68                        | 54.00          | -8.32       | Average |
| 2390.000        | 50.30                | vertical   | 8.25                    | 58.55                        | 74.00          | -15.45      | Peak    |
| 4824.000        | 49.80                | horizontal | 0.26                    | 50.06                        | 74.00          | -23.94      | Peak    |
| 4824.000        | 50.05                | vertical   | 0.26                    | 50.31                        | 74.00          | -23.69      | Peak    |
| Middle Channel  |                      |            |                         |                              |                |             |         |
| 4884.000        | 48.96                | horizontal | 0.46                    | 49.42                        | 74.00          | -24.58      | Peak    |
| 4884.000        | 49.46                | vertical   | 0.46                    | 49.92                        | 74.00          | -24.08      | Peak    |
| High Channel    |                      |            |                         |                              |                |             |         |
| 2484.052        | 42.23                | horizontal | 8.25                    | 50.48                        | 54.00          | -3.52       | Average |
| 2484.052        | 54.01                | horizontal | 8.25                    | 62.26                        | 74.00          | -11.74      | Peak    |
| 2483.500        | 37.85                | vertical   | 8.25                    | 46.10                        | 54.00          | -7.90       | Average |
| 2483.500        | 50.87                | vertical   | 8.25                    | 59.12                        | 74.00          | -14.88      | Peak    |
| 4944.000        | 49.19                | horizontal | 0.83                    | 50.02                        | 74.00          | -23.98      | Peak    |
| 4944.000        | 50.59                | vertical   | 0.83                    | 51.42                        | 74.00          | -22.58      | Peak    |
| 802.11g         |                      |            |                         |                              |                |             |         |
| Low Channel     |                      |            |                         |                              |                |             |         |
| 2390.000        | 37.57                | horizontal | 8.25                    | 45.82                        | 54.00          | -8.18       | Average |
| 2390.000        | 51.05                | horizontal | 8.25                    | 59.30                        | 74.00          | -14.70      | Peak    |
| 2390.000        | 37.43                | vertical   | 8.25                    | 45.68                        | 54.00          | -8.32       | Average |
| 2390.000        | 50.49                | vertical   | 8.25                    | 58.74                        | 74.00          | -15.26      | Peak    |
| 4824.000        | 49.59                | horizontal | 0.26                    | 49.85                        | 74.00          | -24.15      | Peak    |
| 4824.000        | 49.46                | vertical   | 0.26                    | 49.72                        | 74.00          | -24.28      | Peak    |
| Middle Channel  |                      |            |                         |                              |                |             |         |
| 4884.000        | 49.70                | horizontal | 0.46                    | 50.16                        | 74.00          | -23.84      | Peak    |
| 4884.000        | 48.92                | vertical   | 0.46                    | 49.38                        | 74.00          | -24.62      | Peak    |

| High Channel   |       |            |      |       |       |        |         |
|----------------|-------|------------|------|-------|-------|--------|---------|
| 2483.500       | 40.13 | horizontal | 8.25 | 48.38 | 54.00 | -5.62  | Average |
| 2483.500       | 60.85 | horizontal | 8.25 | 69.10 | 74.00 | -4.90  | Peak    |
| 2483.500       | 38.42 | vertical   | 8.25 | 46.67 | 54.00 | -7.33  | Average |
| 2483.500       | 54.67 | vertical   | 8.25 | 62.92 | 74.00 | -11.08 | Peak    |
| 4944.000       | 48.43 | horizontal | 0.83 | 49.26 | 74.00 | -24.74 | Peak    |
| 4944.000       | 50.01 | vertical   | 0.83 | 50.84 | 74.00 | -23.16 | Peak    |
| 802.11n20      |       |            |      |       |       |        |         |
| Low Channel    |       |            |      |       |       |        |         |
| 2390.000       | 37.59 | horizontal | 8.25 | 45.84 | 54.00 | -8.16  | Average |
| 2390.000       | 50.28 | horizontal | 8.25 | 58.53 | 74.00 | -15.47 | Peak    |
| 2390.000       | 37.50 | vertical   | 8.25 | 45.75 | 54.00 | -8.25  | Average |
| 2390.000       | 49.36 | vertical   | 8.25 | 57.61 | 74.00 | -16.39 | Peak    |
| 4824.000       | 48.92 | horizontal | 0.26 | 49.18 | 74.00 | -24.82 | Peak    |
| 4824.000       | 49.65 | vertical   | 0.26 | 49.91 | 74.00 | -24.09 | Peak    |
| Middle Channel |       |            |      |       |       |        |         |
| 4884.000       | 48.83 | horizontal | 0.46 | 49.29 | 74.00 | -24.71 | Peak    |
| 4884.000       | 48.50 | vertical   | 0.46 | 48.96 | 74.00 | -25.04 | Peak    |
| High Channel   |       |            |      |       |       |        |         |
| 2483.500       | 39.50 | horizontal | 8.25 | 47.75 | 54.00 | -6.25  | Average |
| 2483.500       | 62.50 | horizontal | 8.25 | 70.75 | 74.00 | -3.25  | Peak    |
| 2483.500       | 38.26 | vertical   | 8.25 | 46.51 | 54.00 | -7.49  | Average |
| 2483.500       | 54.73 | vertical   | 8.25 | 62.98 | 74.00 | -11.02 | Peak    |
| 4944.000       | 48.78 | horizontal | 0.83 | 49.61 | 74.00 | -24.39 | Peak    |
| 4944.000       | 50.19 | vertical   | 0.83 | 51.02 | 74.00 | -22.98 | Peak    |

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Corrected Amplitude – Limit

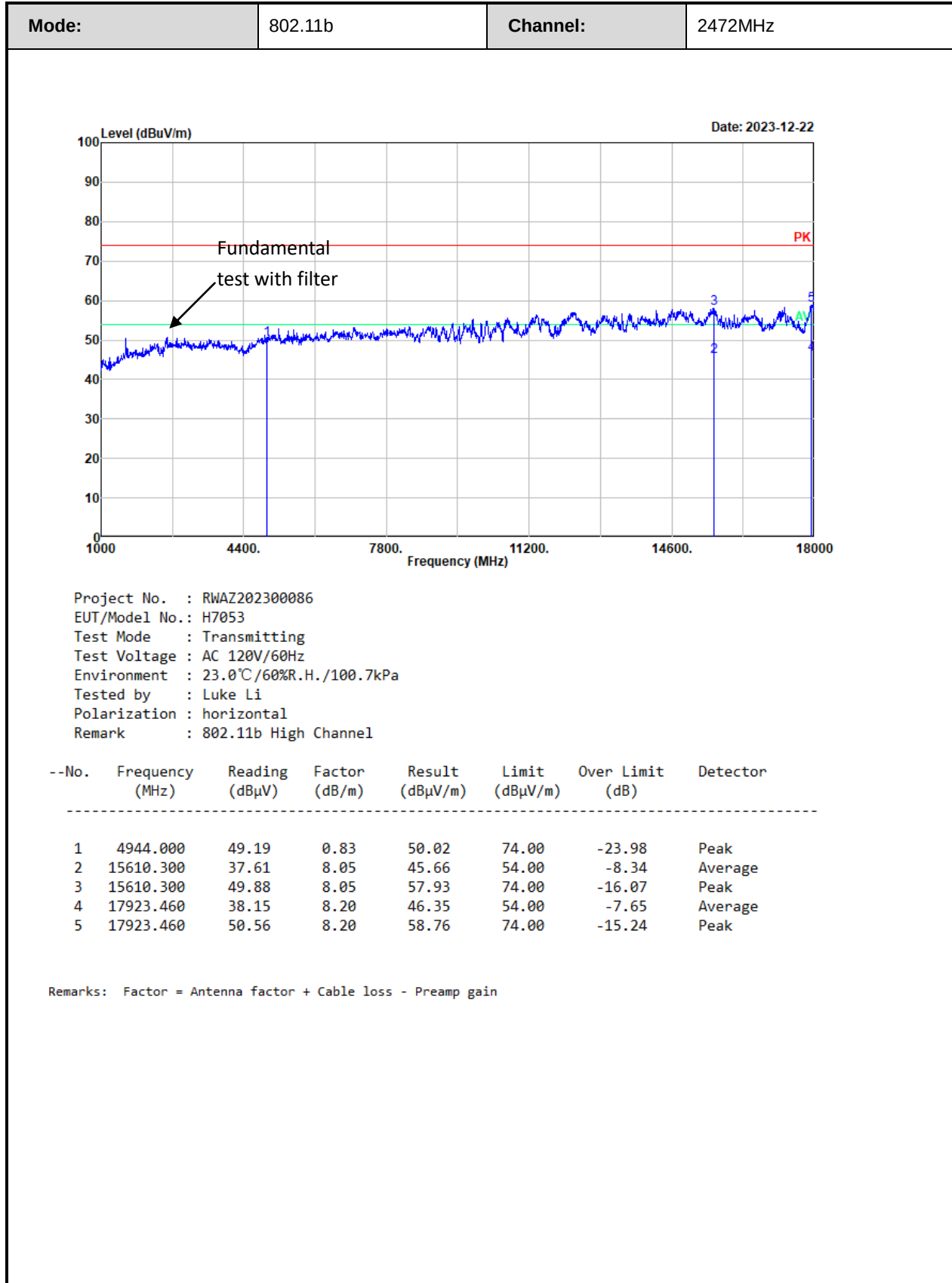
For the test result of PK was more than 20dB below the PK limit, which can compliance with the average limit, just the PK level was recorded.

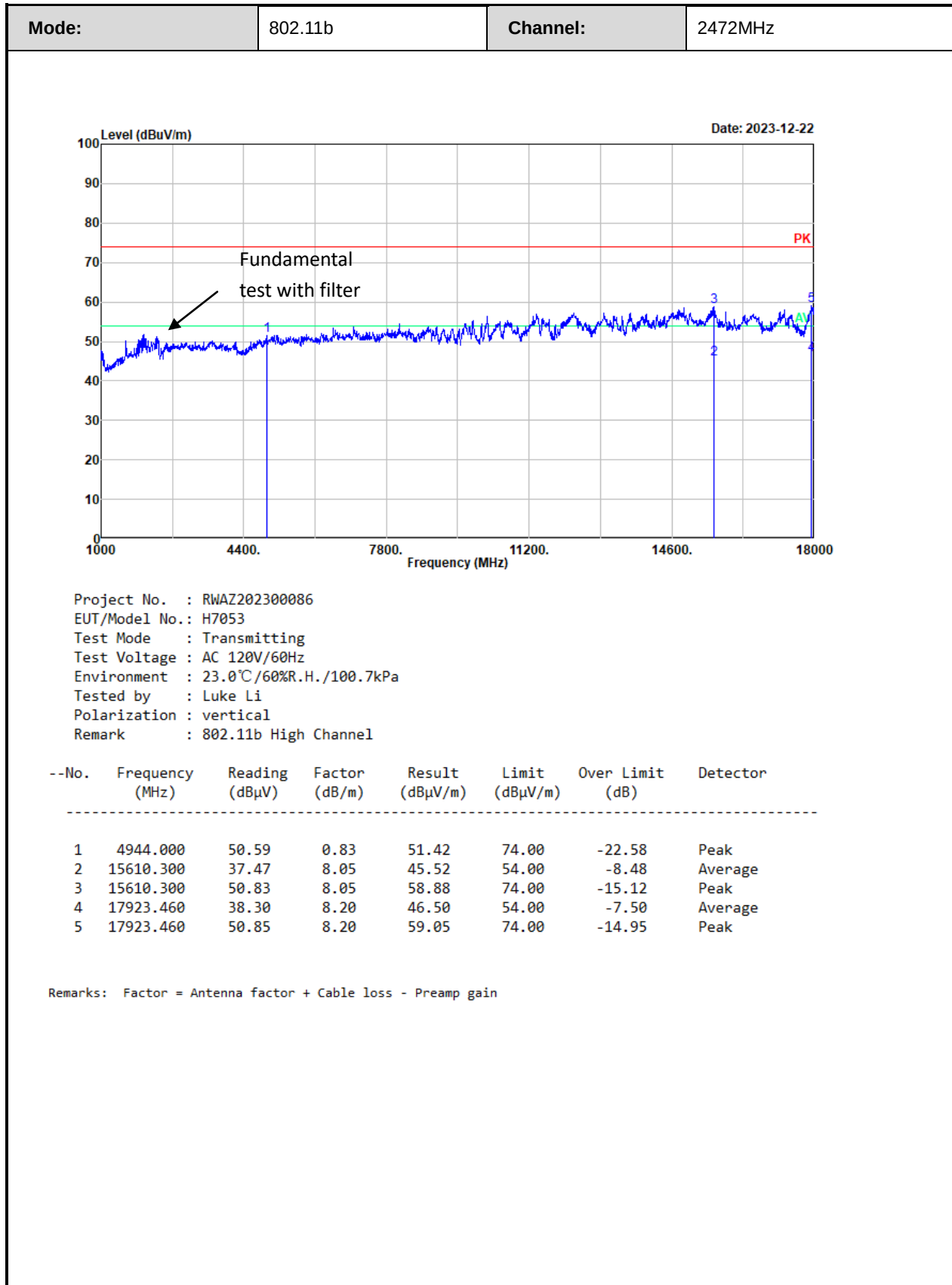
The emission levels of other frequencies that were lower than the limit 20dB not show in test report.

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>             | 2023-12-27                                                          | <b>Test By:</b> | Ryan Zhang |
| <b>Environment condition:</b> | Temperature: 18°C; Relative Humidity: 41.5%; ATM Pressure: 102.3kPa |                 |            |

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

| Test Mode | Antenna | Channel[MHz] | 6dB BW [MHz] | 99% OBW[MHz] | 6dB BW Limit[MHz] | Verdict |
|-----------|---------|--------------|--------------|--------------|-------------------|---------|
| 11B       | Ant1    | 2412         | 9.103        | 14.103       | 0.5               | pass    |
|           |         | 2442         | 9.154        | 14.167       | 0.5               | pass    |
|           |         | 2472         | 9.154        | 14.167       | 0.5               | pass    |
| 11G       | Ant1    | 2412         | 16.577       | 16.731       | 0.5               | pass    |
|           |         | 2442         | 16.679       | 16.731       | 0.5               | pass    |
|           |         | 2472         | 16.577       | 16.795       | 0.5               | pass    |
| 11N20     | Ant1    | 2412         | 17.885       | 17.885       | 0.5               | pass    |
|           |         | 2442         | 17.923       | 17.949       | 0.5               | pass    |
|           |         | 2472         | 17.821       | 17.885       | 0.5               | pass    |

### 3.5.2 Maximum Conducted Peak Output Power

| Test Mode  | Antenna | Channel [MHz] | Result [dBm] | Limit [dBm] | Verdict |
|------------|---------|---------------|--------------|-------------|---------|
| 11B SISO   | Ant1    | 2412          | 13.30        | 30          | Pass    |
|            |         | 2442          | 13.63        | 30          | Pass    |
|            |         | 2472          | 13.83        | 30          | Pass    |
| 11G SISO   | Ant1    | 2412          | 7.20         | 30          | Pass    |
|            |         | 2442          | 7.54         | 30          | Pass    |
|            |         | 2472          | 7.72         | 30          | Pass    |
| 11N20 SISO | Ant1    | 2412          | 6.02         | 30          | Pass    |
|            |         | 2442          | 6.36         | 30          | Pass    |
|            |         | 2472          | 6.55         | 30          | Pass    |

### 3.5.3 Maximum Conducted Average Output Power

Note: Report only

N/A

### 3.5.4 Power Spectral Density

| Test Mode  | Antenna | Channel [MHz] | Result [dBm/3kHz] | Limit [dBm/3kHz] | Verdict |
|------------|---------|---------------|-------------------|------------------|---------|
| 11B SISO   | Ant1    | 2412          | -12.92            | 8                | Pass    |
|            |         | 2442          | -13.45            | 8                | Pass    |
|            |         | 2472          | -13.15            | 8                | Pass    |
| 11G SISO   | Ant1    | 2412          | -29.66            | 8                | Pass    |
|            |         | 2442          | -29.49            | 8                | Pass    |
|            |         | 2472          | -28.89            | 8                | Pass    |
| 11N20 SISO | Ant1    | 2412          | -30.64            | 8                | Pass    |
|            |         | 2442          | -30.48            | 8                | Pass    |
|            |         | 2472          | -30.34            | 8                | Pass    |

### 3.5.5 100 kHz Bandwidth of Frequency Band Edge

| Test Mode  | Antenna | Channel | Result          | Limit           | Verdict |
|------------|---------|---------|-----------------|-----------------|---------|
| 11B SISO   | Ant1    | 2412    | Refer test plot | Refer test plot | Pass    |
|            |         | 2472    | Refer test plot | Refer test plot | Pass    |
| 11G SISO   | Ant1    | 2412    | Refer test plot | Refer test plot | Pass    |
|            |         | 2472    | Refer test plot | Refer test plot | Pass    |
| 11N20 SISO | Ant1    | 2412    | Refer test plot | Refer test plot | Pass    |
|            |         | 2472    | Refer test plot | Refer test plot | Pass    |

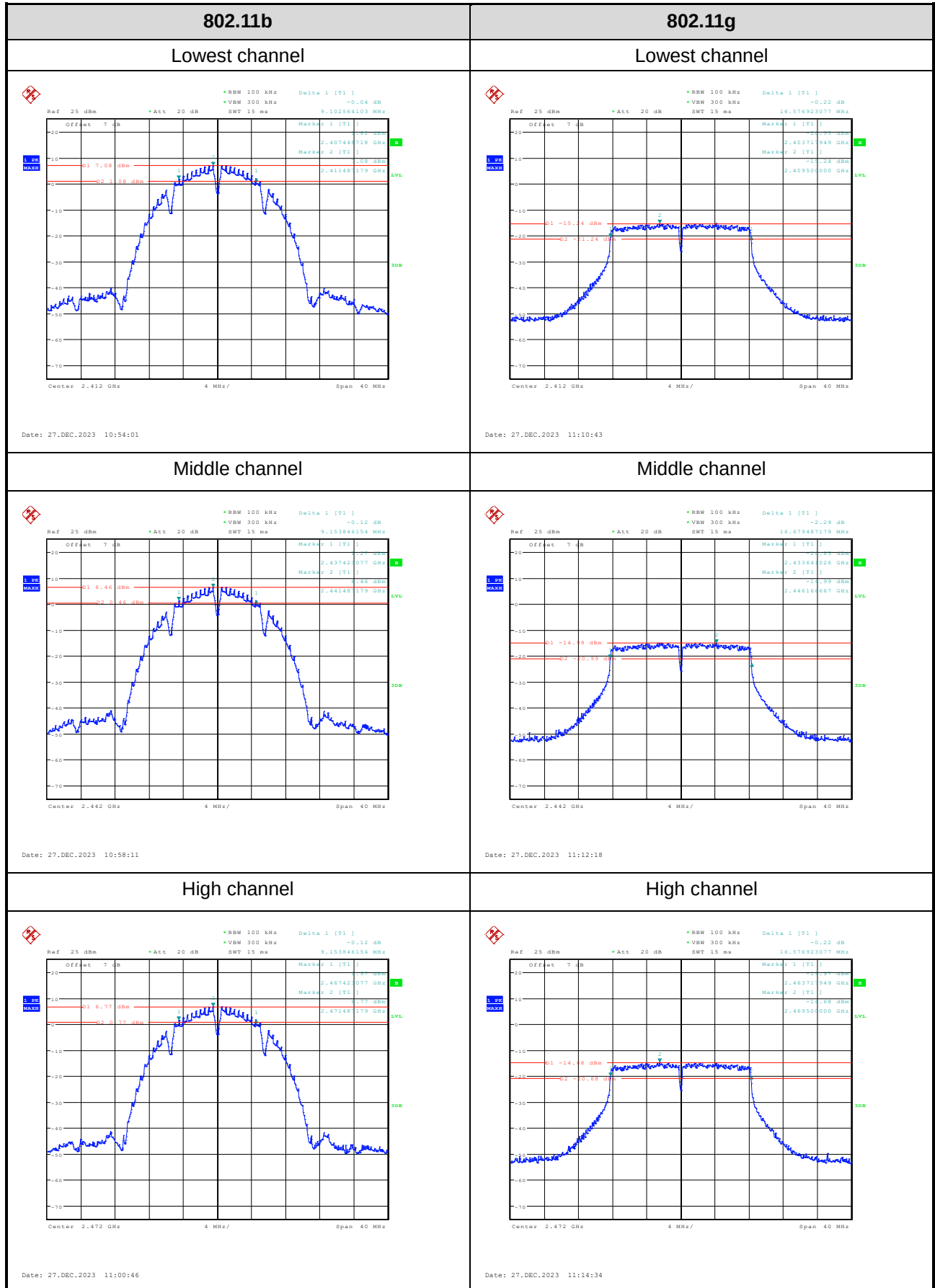
### 3.5.6 Duty Cycle

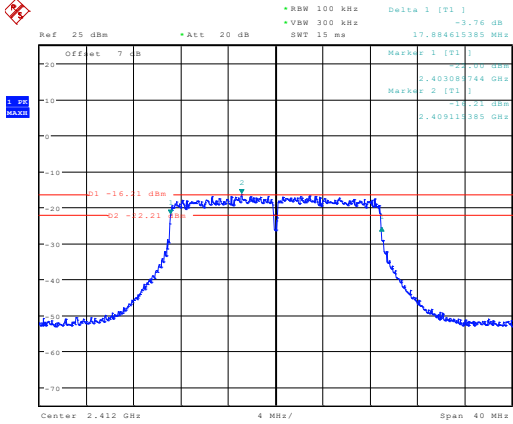
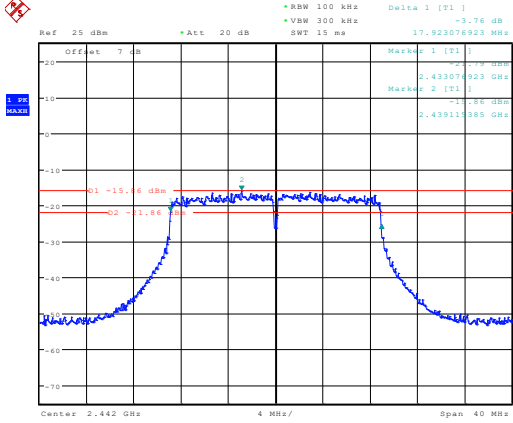
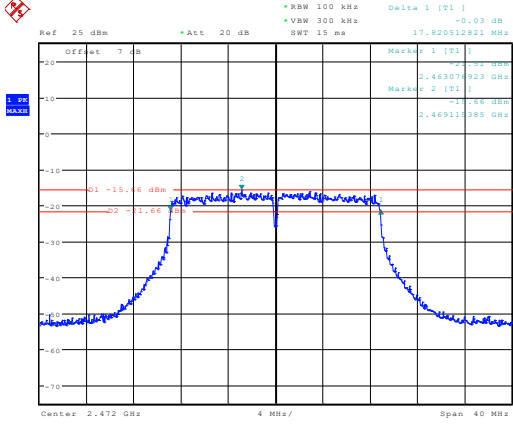
| Test Mode | Antenna | Channel | Ton (ms) | Ton+off (ms) | Duty Cycle [%] | 1/T | VBW setting* [Hz] |
|-----------|---------|---------|----------|--------------|----------------|-----|-------------------|
| 11B       | Ant1    | 2442    | 100      | 100          | 100            | /   | 10                |
| 11G       | Ant1    | 2442    | 100      | 100          | 100            | /   | 10                |
| 11N20     | Ant1    | 2442    | 100      | 100          | 100            | /   | 10                |

Note\*: Radiated emission test with average value, the Spectrum analyzer VBW setting information.

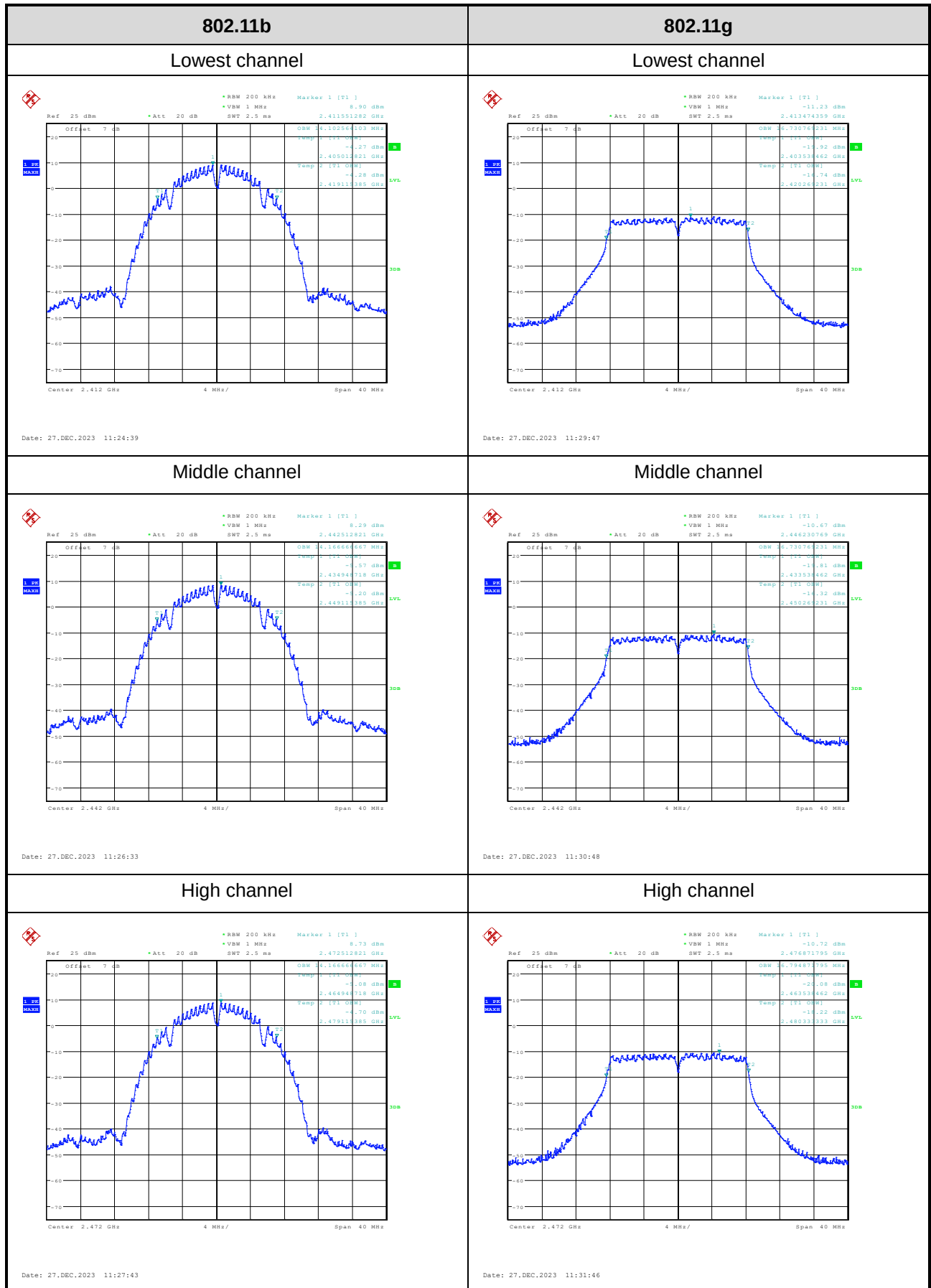
## Test Plots:

### 6 dB Emission Bandwidth:

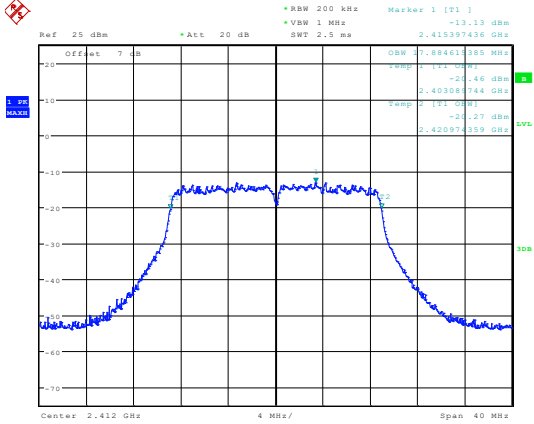
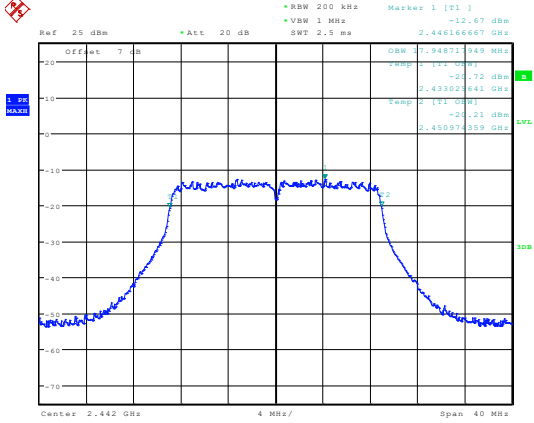
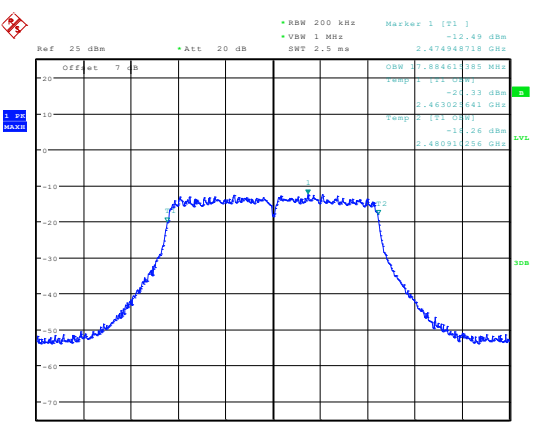


|                                                                                                                       |          |
|-----------------------------------------------------------------------------------------------------------------------|----------|
| <p><b>802.11n20</b></p>                                                                                               | <p>/</p> |
| <p>Lowest channel</p>                                                                                                 | <p>/</p> |
|  <p>Date: 27.DEC.2023 11:16:13</p>   | <p>/</p> |
| <p>Middle channel</p>                                                                                                 | <p>/</p> |
|  <p>Date: 27.DEC.2023 11:17:58</p>  | <p>/</p> |
| <p>High channel</p>                                                                                                   | <p>/</p> |
|  <p>Date: 27.DEC.2023 11:19:18</p> | <p>/</p> |

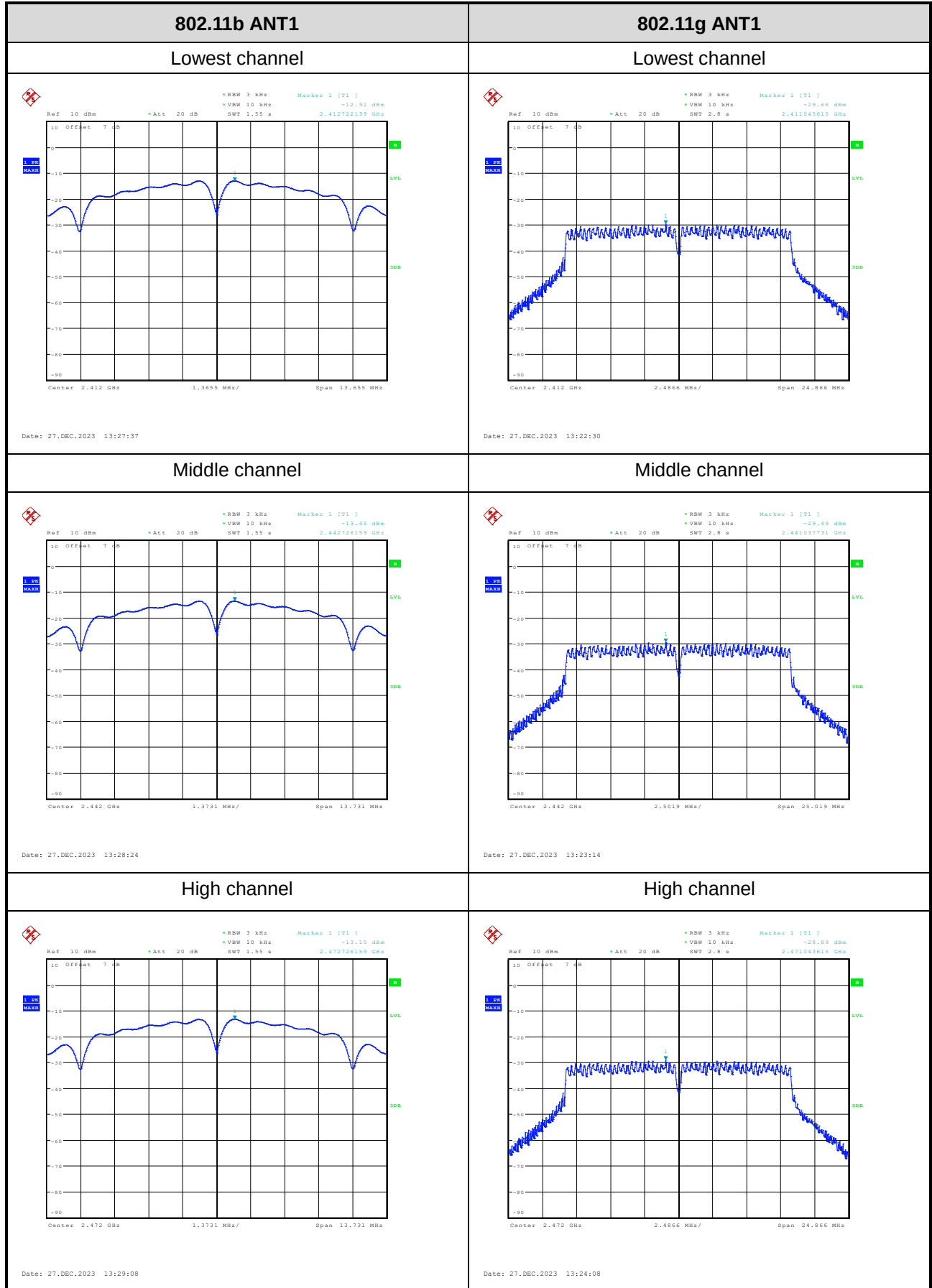
**99% Occupied Bandwidth:**

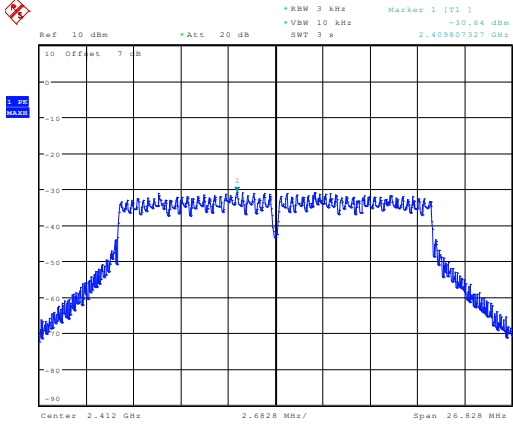
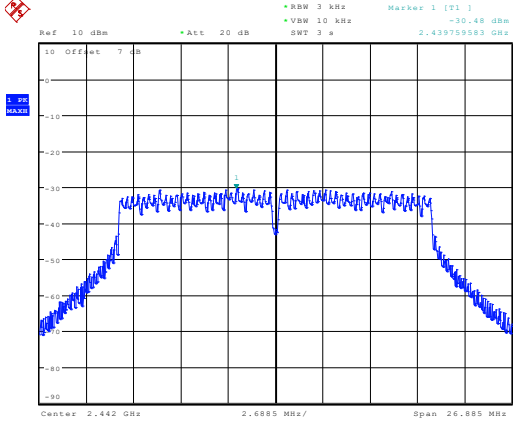
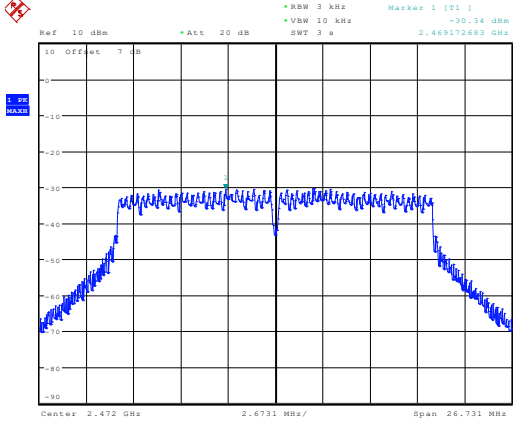




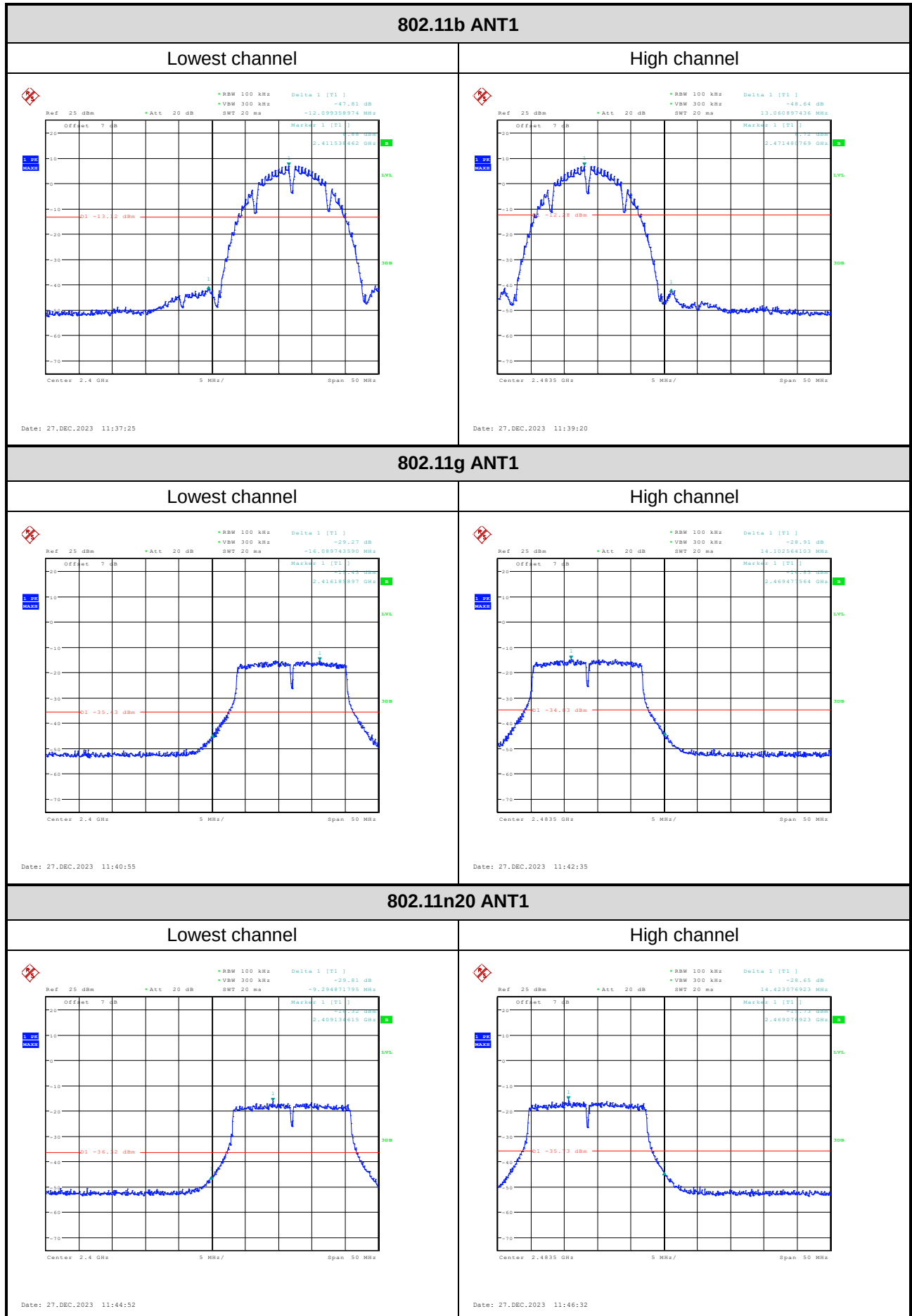
|                                                                                                                                                                                                                                                                                                                                                                                                                 |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <p><b>802.11n20</b></p>                                                                                                                                                                                                                                                                                                                                                                                         | <p>/</p> |
| <p>Lowest channel</p>                                                                                                                                                                                                                                                                                                                                                                                           | <p>/</p> |
|  <p>Ref: 25 dBm *Att: 20 dB RBW: 200 kHz VSW: 1 MHz SWT: 2.5 ms Marker 1 [T1] -12.13 dBm 2.415397436 GHz</p> <p>Offset: 7 dB dBm: 2.68461385 MHz -20.46 dBm 2.40308744 GHz</p> <p>1.98 MHz Peak 2 [T1] 0.0001 -20.27 dBm 2.420974359 GHz</p> <p>Center: 2.412 GHz 4 MHz/ Span: 40 MHz</p> <p>Date: 27.DEC.2023 11:32:45</p>    | <p>/</p> |
| <p>Middle channel</p>                                                                                                                                                                                                                                                                                                                                                                                           | <p>/</p> |
|  <p>Ref: 25 dBm *Att: 20 dB RBW: 200 kHz VSW: 1 MHz SWT: 2.5 ms Marker 1 [T1] -12.67 dBm 2.446166667 GHz</p> <p>Offset: 7 dB dBm: 2.948711843 MHz -20.72 dBm 2.433022641 GHz</p> <p>1.98 MHz Peak 2 [T1] 0.0001 -20.21 dBm 2.450074359 GHz</p> <p>Center: 2.442 GHz 4 MHz/ Span: 40 MHz</p> <p>Date: 27.DEC.2023 11:33:56</p> | <p>/</p> |
| <p>High channel</p>                                                                                                                                                                                                                                                                                                                                                                                             | <p>/</p> |
|  <p>Ref: 25 dBm *Att: 20 dB RBW: 200 kHz VSW: 1 MHz SWT: 2.5 ms Marker 1 [T1] -12.49 dBm 2.474948719 GHz</p> <p>Offset: 7 dB dBm: 2.98461385 MHz -20.33 dBm 2.463022641 GHz</p> <p>1.98 MHz Peak 2 [T1] 0.0001 -11.26 dBm 2.480011256 GHz</p> <p>Center: 2.472 GHz 4 MHz/ Span: 40 MHz</p> <p>Date: 27.DEC.2023 11:34:43</p> | <p>/</p> |

**Power Spectral Density:**

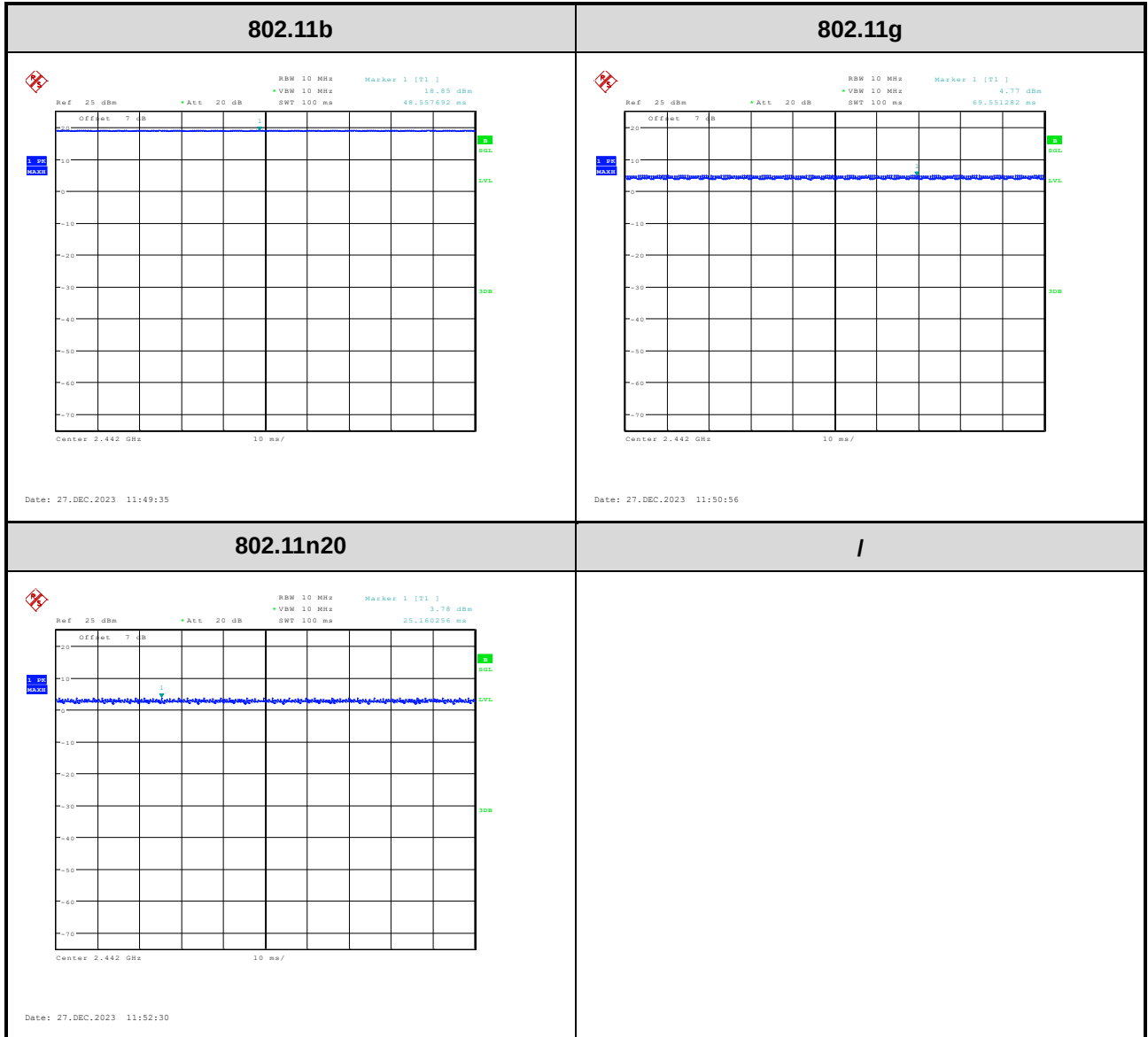


|                                                                                                                       |          |
|-----------------------------------------------------------------------------------------------------------------------|----------|
| <p><b>802.11n20 ANT1</b></p>                                                                                          | <p>/</p> |
| <p>Lowest channel</p>                                                                                                 | <p>/</p> |
|  <p>Date: 27.DEC.2023 13:24:56</p>   | <p>/</p> |
| <p>Middle channel</p>                                                                                                 | <p>/</p> |
|  <p>Date: 27.DEC.2023 13:25:46</p>  | <p>/</p> |
| <p>High channel</p>                                                                                                   | <p>/</p> |
|  <p>Date: 27.DEC.2023 13:26:24</p> | <p>/</p> |

# 100kHz Bandwidth of Frequency Band Edge:



**Duty Cycle:**



## 4 Test Setup Photo

Please refer to the attachment RWAZ202300086 Test Setup photo.

## 5 E.U.T Photo

Please refer to the attachment:

- (1) RWAZ202300086 H7053 External photo;
- (2) RWAZ202300086 H7053 Internal photo;
- (3) RWAZ202300086 H7052 External photo;
- (4) RWAZ202300086 H7052 Internal photo

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