



# **RF Test Report**

## For

## Safemo Pte. Ltd.

Product Name: <u>Smart Battery Cam</u>

Tested Model: SS121

Additional Model No.: N/A

Brand Name: N/A

**FCC ID**: <u>2BC5I-SS121</u>

Classification (DTS) Digital Transmission System

**Report No.:** EC2408012RF02

**Tested Date:** 2024-12-18 to 2025-01-08

**Issued Date:** <u>2025-01-11</u>

Laxy Ruan

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Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of Hunan Ecloud Testing Technology Co., Ltd., the test report shall not be reproduced except in full.





# **Report Revise Record**

| Report Version | Revise Time | Issued Date | Valid Version | Notes           |
|----------------|-------------|-------------|---------------|-----------------|
| V1.0           | 1           | 2025-01-11  | Valid         | Original Report |

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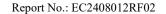




# **Summary Of Test Result**

| FCC Rule           | Description                                   | Limit                 | Result | Remark                                  |
|--------------------|---|-----------------------|--------|---|
| 15.247(a)(2)       | 6dB Bandwidth                                 | ≥ 0.5MHz              | Pass   | -                                       |
| -                  | 99% Bandwidth                                 | -                     | Pass   | -                                       |
| 15.247(b)(3)       | Output Power                                  | ≤ 30dBm               | Pass   | -                                       |
| 15.247(e)          | Power Spectral Density                        | ≤ 8dBm/3kHz           | Pass   | -                                       |
| 15.247(d)          | Conducted Band Edges and<br>Spurious Emission | ≤ 30dBc               | Pass   | -                                       |
| 15.247(d)          | Radiated Band Edges and<br>Spurious Emission  | 15.209(a) & 15.247(d) | Pass   | Under limit<br>5.04 dB at<br>85.29 MHz  |
| 15.207             | AC Conducted Emission                         | 15.207(a)             | Pass   | Under limit<br>24.20 dB at<br>0.402 MHz |
| 15.203 & 15.247(b) | Antenna Requirement                           | -                     | Pass   | -                                       |

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## 1 Test Laboratory

## 1.1 Test facility

CNAS (accreditation number: L11138)

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1244, Test Firm Registration Number: 793308)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

ISED(CAB identifier: CN0012, ISED# :24347)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

A2LA (Certificate Code: 4895.01)

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



# 2 General Description

## 2.1 Applicant

Safemo Pte. Ltd.

61 BUKIT BATOK CRESCENT #05-505, HENG LOONG BUILDING, SINGAPORE

## 2.2 Manufacturer

Safemo Pte. Ltd.

61 BUKIT BATOK CRESCENT #05-505, HENG LOONG BUILDING, SINGAPORE

## 2.3 General Description Of EUT

| Product                | Smart Battery Cam                    |  |  |
|------------------------|--------------------------------------|--|--|
| Model No.              | SS121                                |  |  |
| Additional No.         | N/A                                  |  |  |
| Difference Description | N/A                                  |  |  |
| FCC ID                 | 2BC5I-SS121                          |  |  |
| Power Supply           | 3.6Vdc From Battery                  |  |  |
| Madulation Tachnology  | CCK, DQPSK, DBPSK for DSSS           |  |  |
| Modulation Technology  | 64QAM, 16QAM, QPSK, BPSK for OFDM    |  |  |
| Modulation Type        | 802.11b : DSSS                       |  |  |
| Modulation Type        | 802.11g/n : OFDM                     |  |  |
| Operating Frequency    | 2412-2462MHz                         |  |  |
| Number Of Channel      | 11                                   |  |  |
|                        | 802.11b : 17.48 dBm (0.05598 W)      |  |  |
| Max. Output Power      | 802.11g : 14.96 dBm (0.03133 W)      |  |  |
|                        | 802.11n HT20 : 14.87 dBm (0.03069 W) |  |  |
| Antenna Type           | FPC Antenna with 0.04dBi gain        |  |  |
| HW Version             | SS121_C01_V5                         |  |  |
| SW Version             | 1.9.10                               |  |  |
| Sample no.             | 2408012R-1/4~4/4                     |  |  |
| Sample Received Date   | 2024-12-17                           |  |  |
| I/O Ports              | Refer to user's manual               |  |  |

#### NOTE:

 The above EUT information is declared by manufacturer. The laboratory is not responsible for the information provided by the manufacturer.

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- 2. For a more detailed features description, please refer to the manufacturer's specifications or the user's
- 3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

## 2.4 Test Location

All tests were performed at:

Building A1, Changsha E Centre, No. 18 Xiangtai Avenue, Liuyang Economic and Technological Development Zone, Hunan, P.R.C.

Telephone: +86 (0) 731 8963 4887 Fax:+86 (0) 731 8963 4887

No tests were sub-contracted.

## 2.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 2.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C
- ANSI C63.10-2020
- KDB 558074 D01 15.247 Meas Guidance v05r02

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# 3 Test Configuration of Equipment Under Test

## 3.1 Descriptions of Test Mode

11 channels are provided for 802.11b, 802.11g and 802.11n(HT20):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---------|-----------|---------|-----------|
| 1       | 2412 MHz  | 7       | 2442 MHz  |
| 2       | 2417 MHz  | 8       | 2447 MHz  |
| 3       | 2422 MHz  | 9       | 2452 MHz  |
| 4       | 2427 MHz  | 10      | 2457 MHz  |
| 5       | 2432 MHz  | 11      | 2462 MHz  |
| 6       | 2437 MHz  |         |           |

The transmitter has a maximum conducted output power as follows:

| Frequency<br>Range(MHz) | Mode         | Rate | Output<br>Power(dBm) |
|-------------------------|--------------|------|----------------------|
| 2412~2462               | 802.11b      | 1M   | 17.48                |
| 2412~2462               | 802.11g      | 6M   | 14.96                |
| 2412~2462               | 802.11n HT20 | MCS0 | 14.87                |

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

## 3.2 Test Mode

### 3.2.1 Antenna Port Conducted Measurement

| Summary table of Test Cases |               |               |               |  |  |
|-----------------------------|---------------|---------------|---------------|--|--|
| Test Item                   | Modulation    |               |               |  |  |
| rest item                   | 802.11 b      | 802.11 g      | 802.11n HT20  |  |  |
| Conducted                   | Mode 1: CH01  | Mode 1: CH01  | Mode 1: CH01  |  |  |
| Test Cases                  | Mode 2: CH06  | Mode 2: CH06  | Mode 2: CH06  |  |  |
|                             | Mode 3: CH011 | Mode 3: CH011 | Mode 3: CH011 |  |  |

## 3.2.2 Radiated Emission Test (Below 1GHz)

| Radiated   | 802.11 b     |
|------------|--------------|
| Test Cases | Mode 1: CH01 |

Note: 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna

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diversity architecture) and packet type. Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

2. Following channel(s) was (were) selected for the final test as listed above.

## 3.2.3 Radiated Emission Test (Above 1GHz)

| Test Item  |              | Modulation   |              |
|------------|--------------|--------------|--------------|
| rest item  | 802.11 b     | 802.11 g     | 802.11n HT20 |
| Dedicted   | Mode 1: CH01 | Mode 1: CH01 | Mode 1: CH01 |
| Radiated   | Mode 2: CH06 | Mode 2: CH06 | Mode 2: CH06 |
| Test Cases | Mode 3: CH11 | Mode 3: CH11 | Mode 3: CH11 |

Note: 1. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

- 2. Following channel(s) was (were) selected for the final test as listed above
- 3. For frequency above 18GHz, the measured value is much lower than the limit, therefore, it is not reflected in the report.

### 3.2.4 Power Line Conducted Emission Test

| AC Conducted | Mode 1 - Adenter - Netcheek |
|--------------|-----------------------------|
| Emission     | Mode 1 : Adapter + Notebook |

## 3.3 Support Equipment

| It | em | Equipment | Trade Name | Model Name | Serial Number   | Note |
|----|----|-----------|------------|------------|-----------------|------|
| 1  | 1. | Notebook  | Lenovo     | E580       | PF-12XLH6       | SDoC |
| 2  | 2. | Adapter   | Xiaomi     | MDY-12-EF  | TA62212E209292G | SDoC |

## 3.4 Test Setup

For WLAN test items, an engineering test program was provided and enabled to make EUT continuous transmitting and receiving signals.

The following picture is a screenshot of the test software.

Xshell 7 7.0.0039

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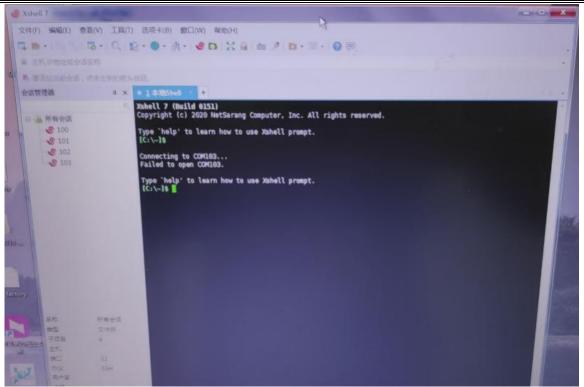
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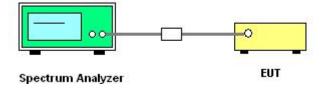
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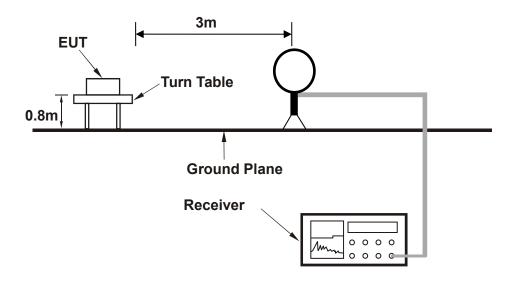
## **Setup diagram for Conducted Test**



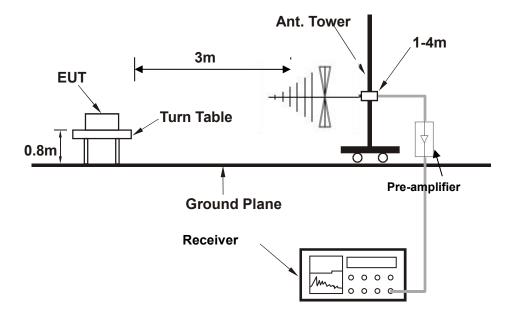
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## Setup diagram for Radiation(9KHz~30MHz) Test

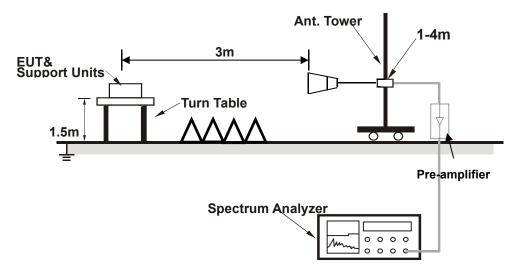


## Setup diagram for Radiation(Below 1G) Test

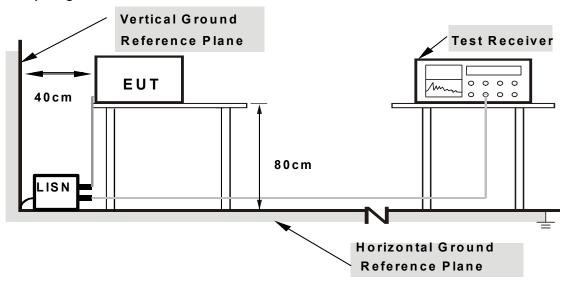




### Setup diagram for Radiation(Above1G) Test



## **Setup diagram for AC Conducted Emission Test**



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes



## 3.5 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

#### Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

 $Offset(dB) = RF \ cable \ loss(dB) + attenuator \ factor(dB).$ 

$$= 5 + 10 = 15 (dB)$$

#### For all radiated test items:

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level Over Limit  $(dB\mu V/m)$  = Level $(dB\mu V/m)$  - Limit Level  $(dB\mu V/m)$ 

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## 4 Test Result

## 4.1 6dB and 99% Bandwidth Measurement

### 4.1.1 Limit of 6dB and 99% Bandwidth

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 4.1.2 Test Procedures

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Turn on the EUT and connect it to measurement instrument.
- 3. Set to the maximum power setting and enable Transmitting the EUT transmit continuously
- 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz. Set the Video bandwidth (VBW) ≥ [3 × RBW]. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
- 5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW.

#### 4.1.3 Test Result of 6dB Bandwidth

Please refer to Appendix A of this report.

### 4.1.4 Test Result of 99% Bandwidth

Please refer to Appendix B of this report.

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## **4.2 Output Power Measurement**

## 4.2.1 Limit of Output Power

FCC §15.247 (b)(3)

For systems using digital modulation in the 2400-2483.5 MHz bands: 30dBm.

#### 4.2.2 Test Procedures

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Turn on the EUT and connect it to spectrum analyzer.
- 3. Set to the maximum power setting and enable Transmitting the EUT transmit continuously
- 4. Measure the duty cycle, x, of the transmitter output signal as described in below:
  - a. Set the center frequency of the instrument to the center frequency of the transmission.
  - b. Set RBW to the largest available Transmitting value.
  - c. Set detector = peak
- 5. Set span to more than 1.5\*OBW.Set RBW=510KHz,VBW=2MHz, Number of points in sweep ≥ [2 × span / RBW]. Sweep time = auto. Detector = RMS.
- 6. Allow the sweep to "free run". Trace average 100 traces in RMS mode
- 7. Compute power by integrating the spectrum across the OBW of the signal using the instrument's Channel power measurement function with band limits set equal to the OBW band edges.
- 8. Add 10  $\log (1/x)$ , where x is the duty cycle.

## 4.2.3 Test Result of Duty Cycle

Please refer to Appendix G of this report.

### 4.2.4 Test Result of Output Power

Please refer to Appendix C of this report.

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## 4.3 Power Spectral Density Measurement

## 4.3.1 Limits of Power Spectral Density

FCC§15.247(e)

The power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

#### 4.3.2 Test Procedure

- 1. Turn on the EUT and connect it to measurement instrument.
- 2. Measure the duty cycle, x, of the transmitter output signal as described in below:
  - a. Set the center frequency of the instrument to the center frequency of the transmission.
  - b. Set RBW to the largest available Transmitting value.
  - c. Set detector = peak.
- Set span to more than 1.5\*OBW.Set RBW= 30 KHz,VBW=100 KHz, Number of points in sweep ≥ [2 × span / RBW]. Sweep time = auto.
- 4. Detector = power averaging (rms), Sweep time = auto couple, Trace mode = averaging (rms) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.
- 5. Add 10 log (1/x), where x is the duty cycle.
- 6. Measure and record the results in the test report. The final Result[dBm/3kHz]= Result[dBm/30kHz]-10\*log10(30/3).

## 4.3.3 Test Result of Power Spectral Density

Please refer to Appendix D of this report.

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## 4.4 Conducted Band Edges and Spurious Emission Measurement

#### 4.4.1 **Limit of Conducted Band Edges and Spurious Emission**

FCC §15.247 (d)

Maximum conducted (average) output power was used to determine compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

#### 4.4.2 **Test Procedures**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 1. Turn on the EUT and connect it to measurement instrument.
- 2. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
- 3. Measure and record the results in the test report.
- 4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

## 4.4.3 Test Result of Conducted Band Edges

Please refer to Appendix E of this report.

### 4.4.4 Test Result of Conducted Spurious Emission

Please refer to Appendix F of this report.

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## 4.5 Radiated Band Edges and Spurious Emission Measurement

## 4.5.1 Limit of Radiated Band Edges and Spurious Emission

FCC §15.247 (d)

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

| Frequency     | Field Strength     | Measurement Distance |  |  |
|---------------|--------------------|----------------------|--|--|
| (MHz)         | (microvolts/meter) | (meters)             |  |  |
| 0.009 - 0.490 | 2400/F(kHz)        | 300                  |  |  |
| 0.490 – 1.705 | 24000/F(kHz)       | 30                   |  |  |
| 1.705 – 30.0  | 30                 | 30                   |  |  |
| 30 – 88       | 100                | 3                    |  |  |
| 88 – 216      | 150                | 3                    |  |  |
| 216 - 960     | 200                | 3                    |  |  |
| Above 960     | 500                | 3                    |  |  |

#### 4.5.2 Test Procedures

- The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 2. The measurement distance is 3 meter.
- 3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 4. Set to the maximum power setting and enable the EUT transmit continuously.
- 5. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz; VBW≥3×RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
  - (3) For average measurement:

VBW = 10 Hz, when duty cycle is no less than 98 percent.

VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

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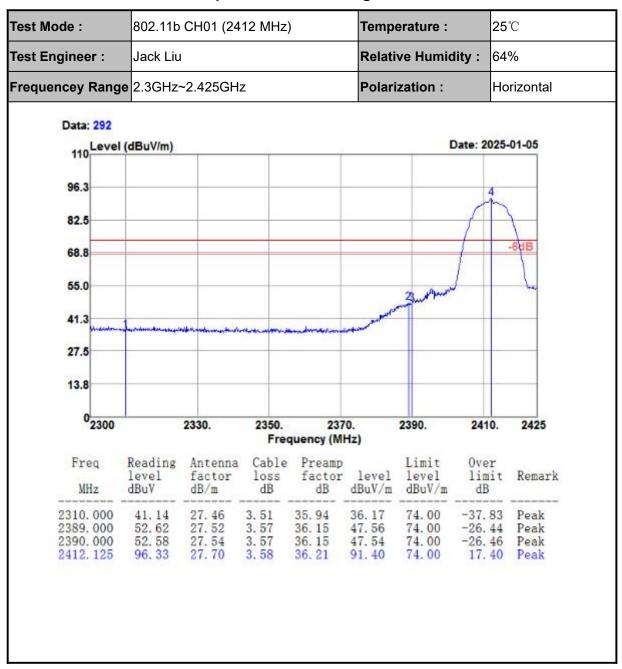


Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level. 6.

#### 4.5.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

#### 4.5.4 Test Result of Radiated Spurious at Band Edges



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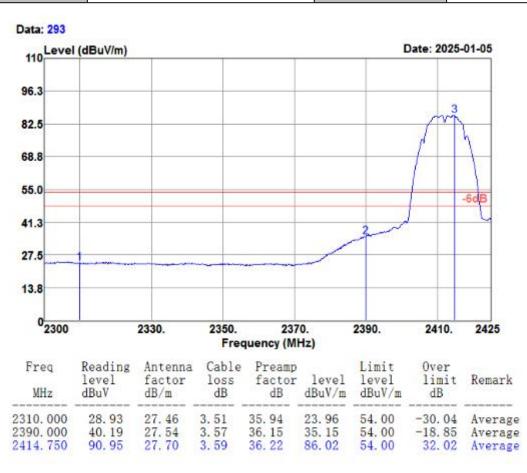




 Test Mode :
 802.11b CH01 (2412 MHz)
 Temperature :
 25°C

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

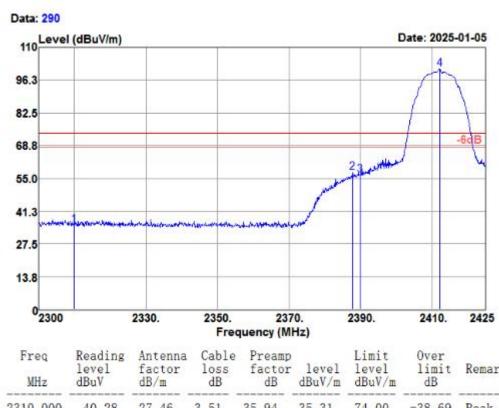
 Frequencey Range
 2.3GHz~2.425GHz
 Polarization :
 Horizontal



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Test Mode: 802.11b CH01 (2412 MHz) **25**℃ Temperature: **Relative Humidity:** Test Engineer: Jack Liu 64% Frequencey Range 2.3GHz~2.425GHz Polarization: Vertical

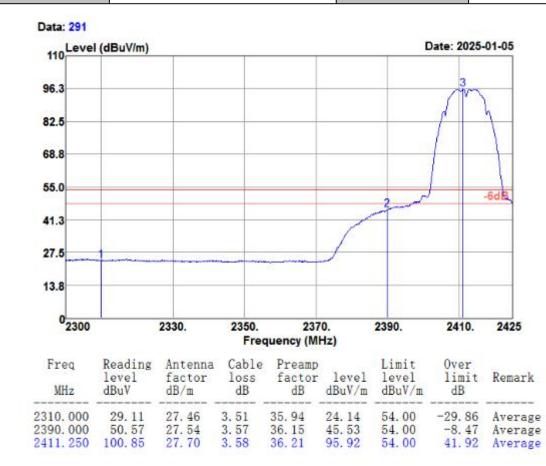


| MHz                    | level<br>dBuV    | factor<br>dB/m   |       |                  | level            | level<br>dBuV/m |                    | Remark            |
|------------------------|------------------|------------------|-------|------------------|------------------|-----------------|--------------------|-------------------|
| 2310.000               | 40.28            | 27. 46           | 3.51  | 35.94            | 35. 31           | 74.00           | -38. 69            | The second second |
| 2387. 875<br>2390. 000 | 62. 66<br>61. 43 | 27. 51<br>27. 54 | 3.57  | 36. 15<br>36. 15 | 57. 59<br>56. 39 | 74.00<br>74.00  | -16. 41<br>-17. 61 |                   |
| 2412. 125              |                  | 27. 70           | 3. 58 |                  | 100.90           | 74.00           | 26. 90             |                   |
|                        |                  |                  |       |                  |                  |                 |                    |                   |

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| Test Mode :      | 802.11b CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                | Relative Humidity : | 64%         |
| Frequencey Range | 2.3GHz~2.425GHz         | Polarization :      | Vertical    |



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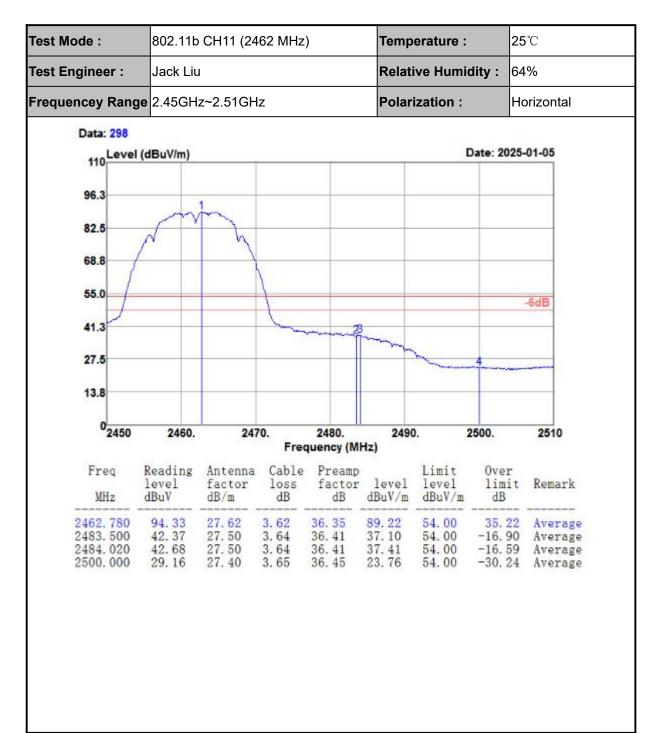


| Test Mode :      | 802.11b CH11 (2462 MHz) | Temperature :       | 25℃        |
|------------------|-------------------------|---------------------|------------|
| Test Engineer :  | Jack Liu                | Relative Humidity : | 64%        |
| Frequencey Range | 2.45GHz~2.51GHz         | Polarization :      | Horizontal |



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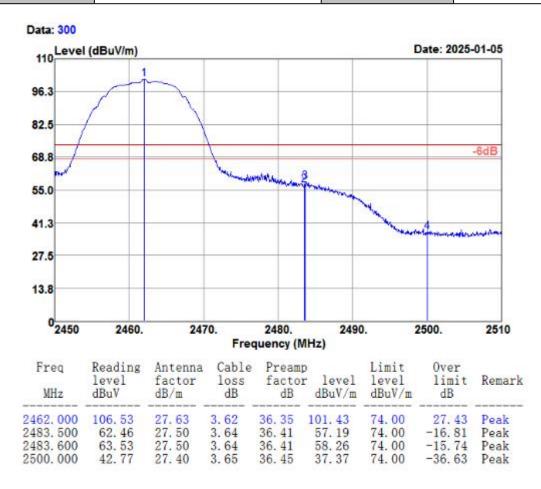
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 Test Mode :
 802.11b CH11 (2462 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 2.45GHz~2.51GHz
 Polarization :
 Vertical



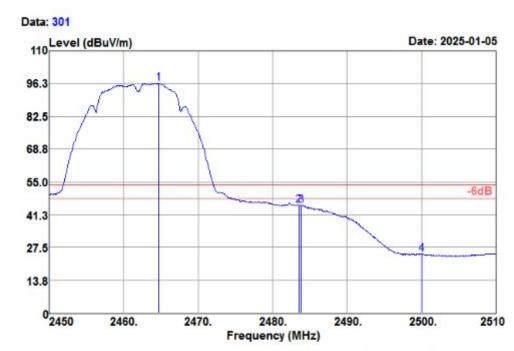
Tel.:+86-731-89634887



 Test Mode :
 802.11b CH11 (2462 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 2.45GHz~2.51GHz
 Polarization :
 Vertical



| Freq     | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB |           | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|----------|--------------------------|---------------------------|---------------------|------------------------|-----------|--------------------------|---------------------|---------|
| 31112    | abu v                    | UD/ III                   | шь                  |                        | ubu 1/III | ubuv/III                 |                     |         |
| 2464.700 | 101.57                   | 27.61                     | 3.62                | 36. 35                 | 96.45     | 54.00                    | 42.45               | Average |
| 2483.500 | 50.46                    | 27.50                     | 3.64                | 36.41                  | 45.19     | 54.00                    | -8.81               | Average |
| 2483.840 | 50.52                    | 27.50                     | 3.64                | 36. 41                 | 45. 25    | 54.00                    | -8.75               | Average |
| 2500.000 | 30.18                    | 27.40                     | 3.65                | 36. 45                 | 24.78     | 54.00                    | -29.22              | Average |

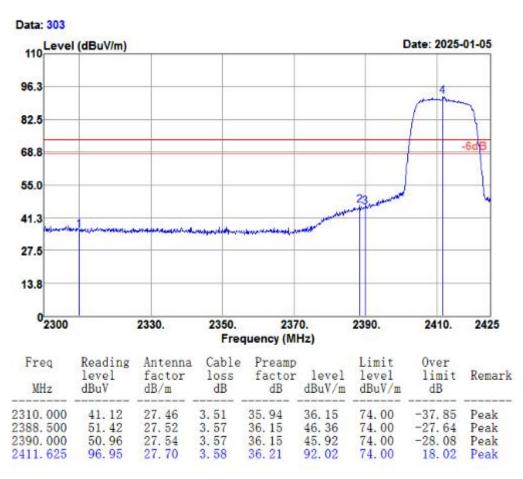
Tel.:+86-731-89634887 Fax.: +86-731-89634887



 Test Mode :
 802.11g CH01 (2412 MHz)
 Temperature :
 25℃

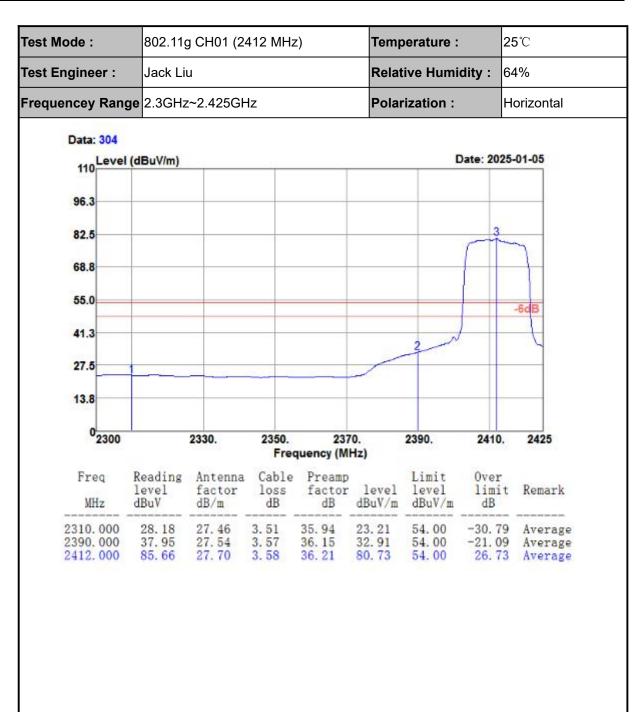
 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 2.3GHz~2.425GHz
 Polarization :
 Horizontal



Tel.:+86-731-89634887

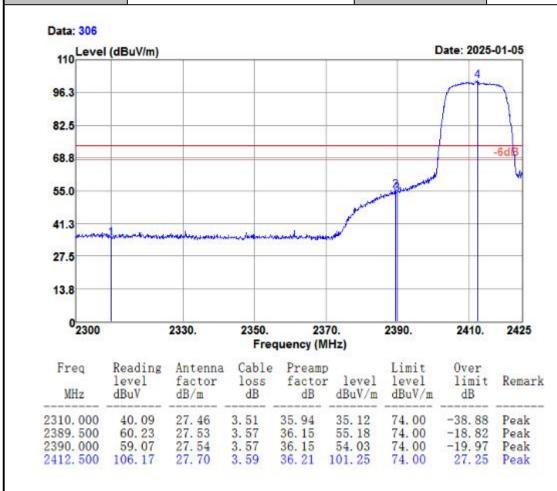




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| Test Mode :      | 802.11g CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                | Relative Humidity : | 64%         |
| Frequencey Range | 2.3GHz~2.425GHz         | Polarization :      | Vertical    |

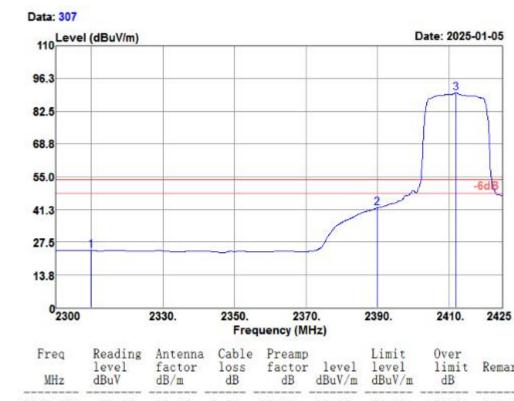


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Test Mode: 802.11g CH01 (2412 MHz) **25**℃ Temperature: Jack Liu **Relative Humidity:** 64% Test Engineer: Frequencey Range 2.3GHz~2.425GHz Polarization: Vertical



| MHz      | level<br>dBuV | factor<br>dB/m |      |        | level | level<br>dBuV/m | limit<br>dB | Remark  |
|----------|---------------|----------------|------|--------|-------|-----------------|-------------|---------|
|          |               |                |      |        |       |                 |             |         |
| 2310.000 | 28.96         | 27.46          | 3.51 | 35.94  | 23.99 | 54.00           | -30.01      | Average |
| 2390,000 | 46.90         | 27.54          | 3.57 | 36. 15 | 41.86 | 54.00           |             | Average |
| 2412.000 | 95. 16        | 27.70          | 3.58 | 36.21  | 90.23 | 54.00           | 36. 23      | Average |
|          |               |                |      |        |       |                 |             |         |

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25℃ Test Mode: 802.11g CH11 (2462 MHz) Temperature: Test Engineer: Jack Liu **Relative Humidity:** 64% Frequencey Range 2.45GHz~2.51GHz Polarization: Horizontal Data: 311 110 Level (dBuV/m) Date: 2025-01-05 96.3 82.5 -6dB 68.8 55.0 41.3 27.5 13.8 02450 2480. 2500. 2460. 2470. 2490. 2510 Frequency (MHz) Freq Reading Cable Preamp Antenna Limit 0ver factor Remark level factor loss level level limit MHz dBuV dBuV/m dBuV/m dB/m dB dB dB 2462.540 98.44 27.62 3.62 36.35 93.33 74.0019.33 Peak 2483.500 49.04 27.50 3.64 36.41 43.77 74.00 -30.23Peak 2486.300 50.20 27.48 3.64 36.41 44.91 74.00 -29.09Peak 2500.000 40.81 27.40 3.65 35.41 74.00 -38.5936.45 Peak

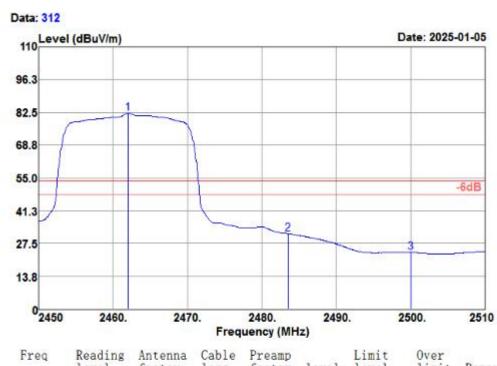
Tel.:+86-731-89634887



 Test Mode :
 802.11g CH11 (2462 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 2.45GHz~2.51GHz
 Polarization :
 Horizontal



| MHz                                 | level<br>dBuV | factor<br>dB/m             | loss<br>dB              | factor                     | level                      | level<br>dBuV/m            | <br>Remark                    |
|-------------------------------------|---------------|----------------------------|-------------------------|----------------------------|----------------------------|----------------------------|-------------------------------|
| 2462. 060<br>2483. 500<br>2500. 000 | 36.90         | 27. 63<br>27. 50<br>27. 40 | 3. 62<br>3. 64<br>3. 65 | 36. 35<br>36. 41<br>36. 45 | 82. 08<br>31. 63<br>23. 77 | 54. 00<br>54. 00<br>54. 00 | Average<br>Average<br>Average |

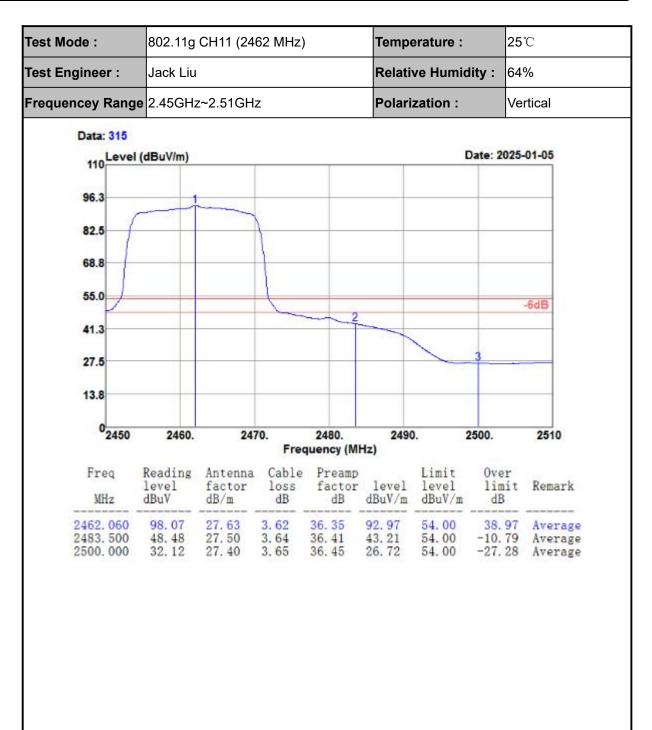
FCC ID : 2BC5I-SS121 www.hn-ecloud.com



25℃ Test Mode: 802.11g CH11 (2462 MHz) Temperature: Test Engineer: Jack Liu **Relative Humidity:** 64% Frequencey Range 2.45GHz~2.51GHz **Polarization:** Vertical Data: 314 110 Level (dBuV/m) Date: 2025-01-05 96.3 82.5 -6dB 68.8 55.0 41.3 27.5 13.8 2450 2460. 2470. 2480. 2490. 2500. 2510 Frequency (MHz) Reading Antenna Cable Preamp Freq Limit 0ver factor level factor loss level level limit Remark MHz dBuV dBuV/m dB/m dB dB dBuV/m dB 30. 21 -17. 93 -16. 90 109.31 3.62 74.00 2462. 180 27.63 36.35 104.21 Peak 2483. 500 2484. 380 61.34 62.38 27. 50 27. 49 56. 07 57. 10 3.64 36.41 74.00 Peak 3.64 74.00 36.41 Peak 41.76 -37.642500.000 27.40 3.65 36.45 36.36 74.00 Peak

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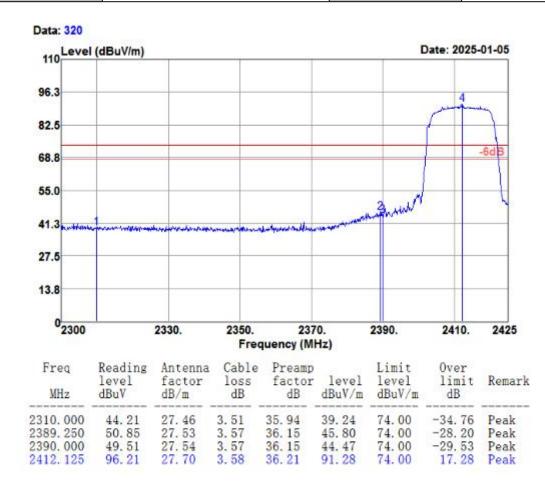




Tel.:+86-731-89634887



| Test Mode :      | 802.11nHT20 CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-----------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%         |
| Frequencey Range | 2.3GHz~2.425GHz             | Polarization :      | Horizontal  |



Tel.:+86-731-89634887

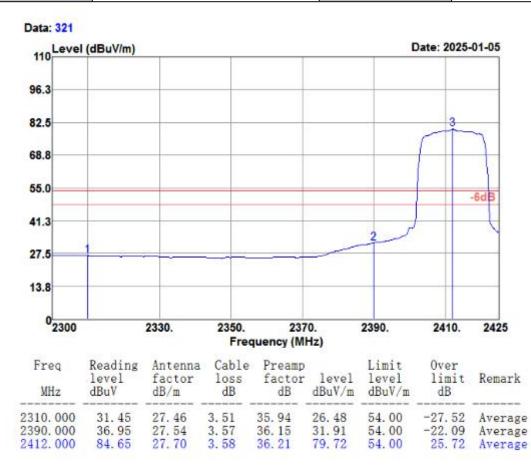




 Test Mode :
 802.11nHT20 CH01 (2412 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

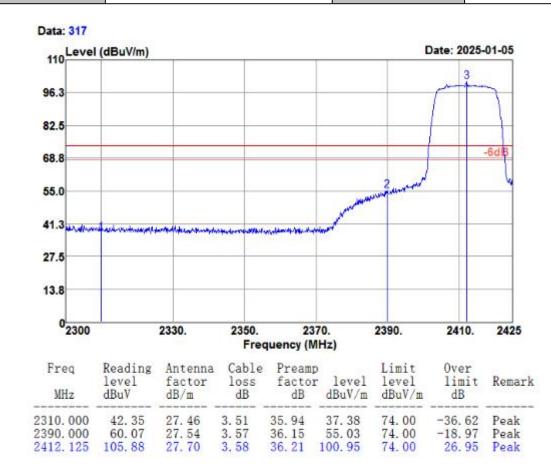
 Frequencey Range
 2.3GHz~2.425GHz
 Polarization :
 Horizontal



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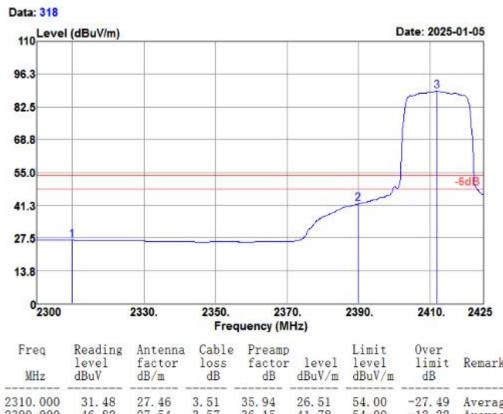
| Test Mode :                    | 802.11nHT20 CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|--------------------------------|-----------------------------|---------------------|-------------|
| Test Engineer : Jack Liu Relat |                             | Relative Humidity : | 64%         |
| Frequencey Range               | 2.3GHz~2.425GHz             | Polarization :      | Vertical    |







Test Mode: 802.11nHT20 CH01 (2412 MHz) **25**℃ Temperature: Test Engineer: Jack Liu **Relative Humidity:** 64% Frequencey Range 2.3GHz~2.425GHz Polarization: Vertical



| MHz      | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | loss<br>dB | factor<br>dB | level | level<br>dBuV/m | limit<br>dB | Remark  |
|----------|--------------------------|---------------------------|------------|--------------|-------|-----------------|-------------|---------|
|          |                          |                           |            |              |       |                 |             |         |
| 2310.000 | 31.48                    | 27.46                     | 3.51       | 35.94        | 26.51 | 54.00           |             | Average |
| 2390,000 | 46.82                    | 27.54                     | 3.57       | 36. 15       | 41.78 | 54.00           | -12.22      | Average |
| 2412.000 | 94.34                    | 27.70                     | 3.58       | 36.21        | 89.41 | 54.00           |             | Average |

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25℃ Test Mode: 802.11nHT20 CH11 (2462 MHz) Temperature: Test Engineer: Jack Liu **Relative Humidity:** 64% Frequencey Range 2.45GHz~2.51GHz Polarization: Horizontal Data: 328 110 Level (dBuV/m) Date: 2025-01-05 96.3 82.5 -6dB 68.8 55.0 41.3 27.5 13.8 02450 2460. 2470. 2480. 2490. 2500. 2510 Frequency (MHz) Freq Reading Antenna Cable Preamp Limit 0ver level level Remark factor level limit loss factor MHz dBuV/m dBuV dB/m dB dB dBuV/m dB 2462, 120 27.63 3.62 36.35 96.72 91.6274.0017.62 Peak 2483. 500 2483. 720 49.27 27. 50 27. 50 3.64 36.41 44.00 74.00 -30.00Peak 50.04 -29.233.64 36.41 44.77 74.00Peak 2500.000 43.96 27.40 3.65 36.45 38.56 -35.44Peak 74.00

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25℃ Test Mode: 802.11nHT20 CH11 (2462 MHz) Temperature: Test Engineer: Jack Liu **Relative Humidity:** 64% Frequencey Range 2.45GHz~2.51GHz **Polarization:** Horizontal Data: 329 110 Level (dBuV/m) Date: 2025-01-05 96.3 82.5 68.8 55.0 -6dB 41.3 27.5 13.8 2450 2460. 2470. 2480. 2490. 2500. 2510 Frequency (MHz) Freq Reading Antenna Cable Preamp Limit 0ver limit level factor level loss factor level Remark MHz dBuV dBuV/m dB/m dB dB dBuV/m dB 27. 63 27. 50 2462.060 86.31 3.62 36.35 81.21 54.00 27.21 Average 2483.500 37.38 3.64 36.41 32.11 54.00 -21.89Average 2500.000 31.87 27.40 54.00 3.65 36.45 26.47 -27.53 Average

FCC ID : 2BC5I-SS121 www.hn-ecloud.com

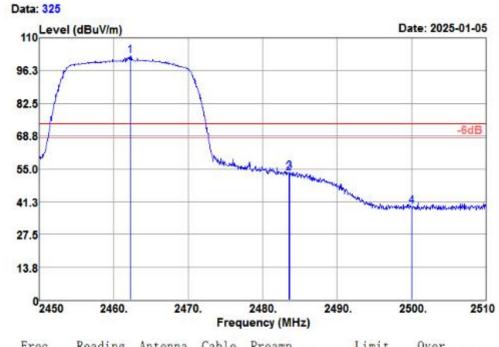
Tel.:+86-731-89634887



 Test Mode :
 802.11nHT20 CH11 (2462 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 2.45GHz~2.51GHz
 Polarization :
 Vertical

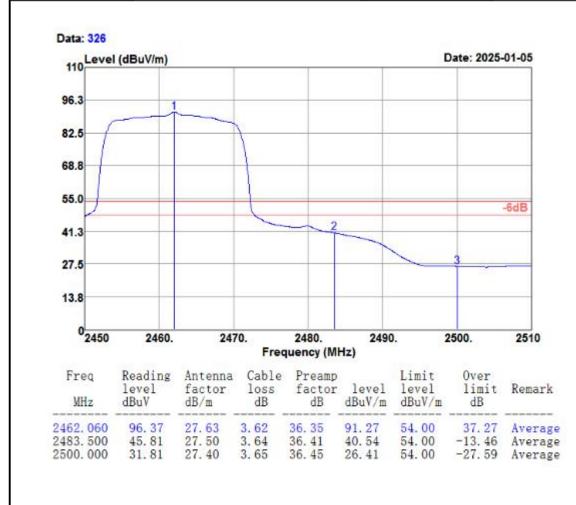


| MHz       | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | loss<br>dB |        | level  | level<br>dBuV/m | limit<br>dB | Remark |
|-----------|--------------------------|---------------------------|------------|--------|--------|-----------------|-------------|--------|
|           |                          | -                         |            |        |        |                 |             |        |
| 2462, 240 | 107.52                   | 27.63                     | 3.62       | 36. 35 | 102.42 | 74.00           | 28. 42      | Peak   |
| 2483.500  | 58.36                    | 27.50                     | 3.64       | 36.41  | 53.09  | 74.00           | -20.91      | Peak   |
| 2483.660  | 59. 26                   | 27.50                     | 3.64       | 36.41  | 53.99  | 74.00           | -20.01      | Peak   |
| 2500.000  | 44.68                    | 27.40                     | 3.65       | 36.45  | 39. 28 | 74.00           | -34.72      | Peak   |

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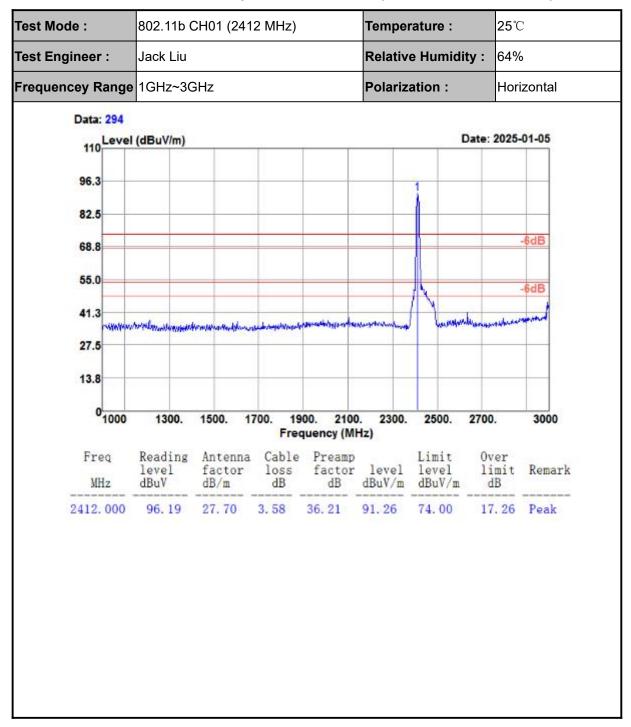
| Test Mode :      | 802.11nHT20 CH11 (2462 MHz)           | Temperature :  | 25℃      |
|------------------|---------------------------------------|----------------|----------|
| Test Engineer :  | Engineer: Jack Liu Relative Humidity: |                | 64%      |
| Frequencey Range | 2.45GHz~2.51GHz                       | Polarization : | Vertical |







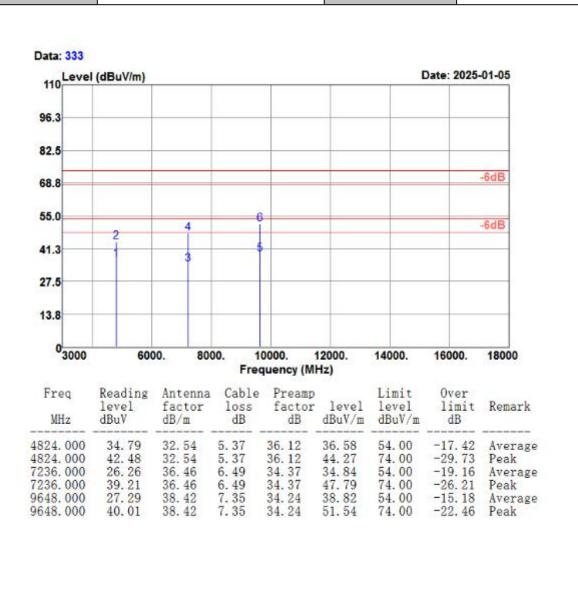
## 4.5.5 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)



Tel.:+86-731-89634887



| Test Mode :      | 802.11b CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                | Relative Humidity : | 64%         |
| Frequencey Range | 3GHz~18GHz              | Polarization :      | Horizontal  |



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

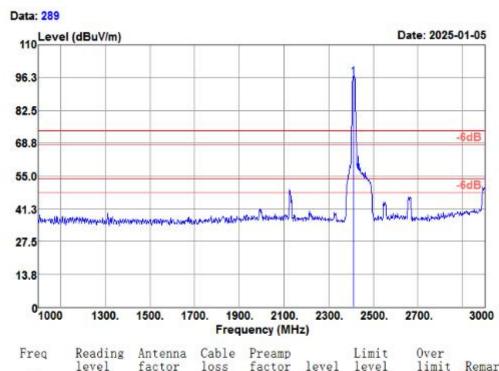
FCC ID : 2BC5I-SS121 www.hn-ecloud.com



 Test Mode :
 802.11b CH01 (2412 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 1GHz~3GHz
 Polarization :
 Vertical



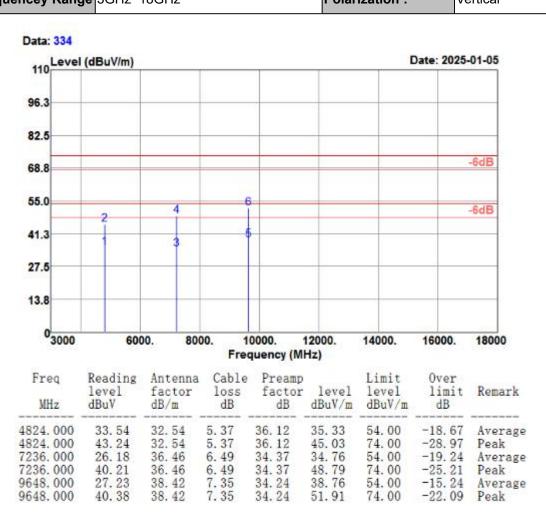
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 Test Mode :
 802.11b CH01 (2412 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 3GHz~18GHz
 Polarization :
 Vertical

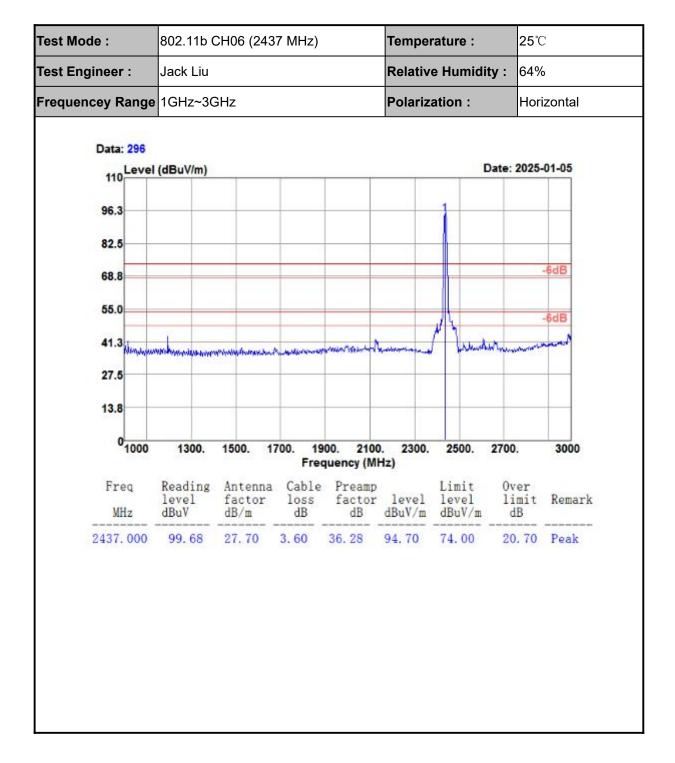


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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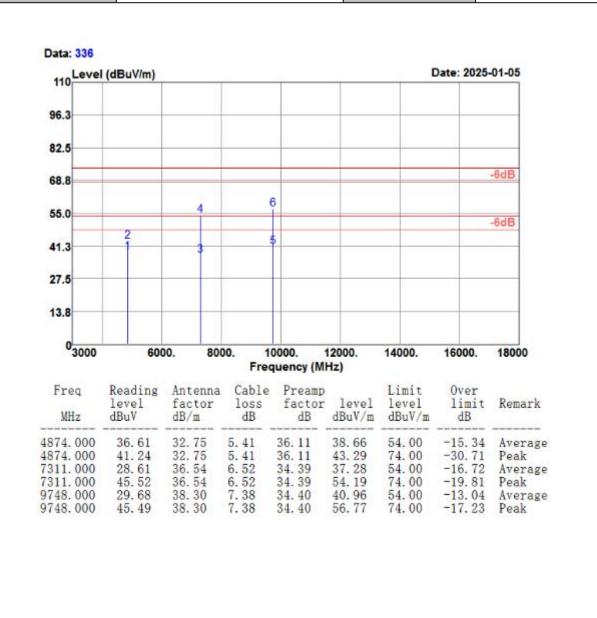








| Test Mode :              | 802.11b CH06 (2437 MHz) | Temperature :       | 25℃        |
|--------------------------|-------------------------|---------------------|------------|
| Test Engineer : Jack Liu |                         | Relative Humidity : | 64%        |
| Frequencey Range         | 3GHz~18GHz              | Polarization :      | Horizontal |



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

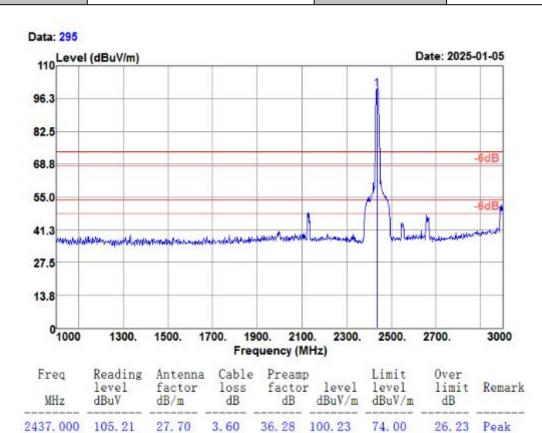
FCC ID : 2BC5I-SS121 www.hn-ecloud.com



 Test Mode :
 802.11b CH06 (2437 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

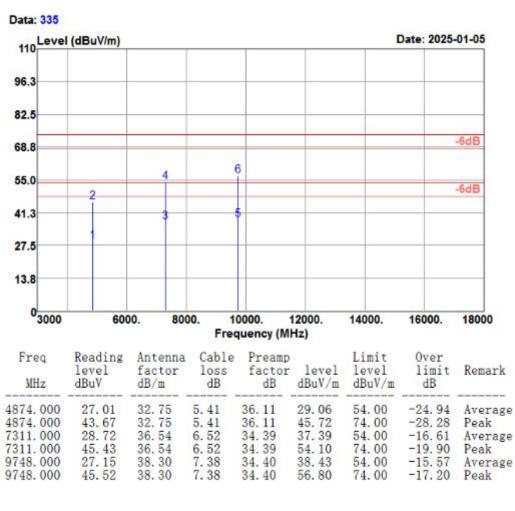
 Frequencey Range
 1GHz~3GHz
 Polarization :
 Vertical



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| Test Mode :      | 802.11b CH06 (2437 MHz)           | Temperature :  | 25℃      |
|------------------|-----------------------------------|----------------|----------|
| Test Engineer :  | er: Jack Liu Relative Humidity: 6 |                | 64%      |
| Frequencey Range | 3GHz~18GHz                        | Polarization : | Vertical |
|                  |                                   |                |          |

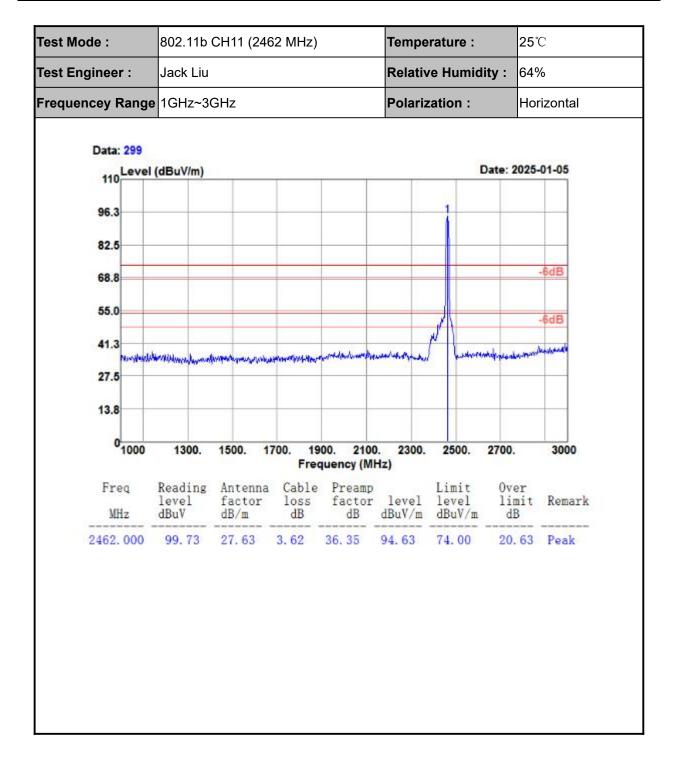


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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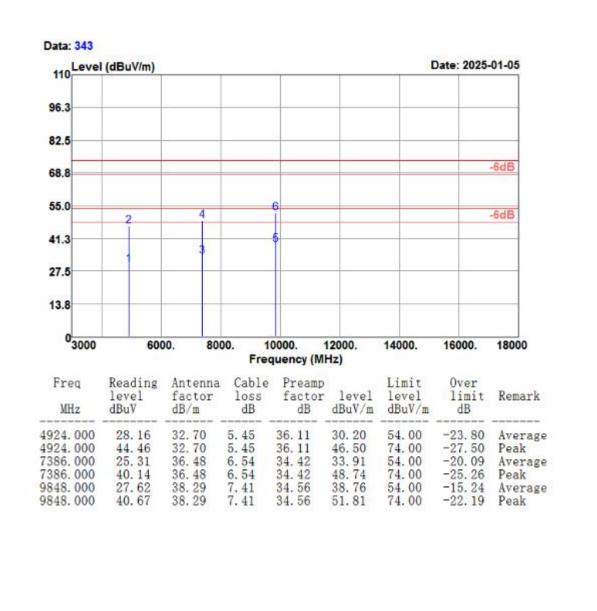




 Test Mode :
 802.11b CH11 (2462 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 3GHz~18GHz
 Polarization :
 Horizontal



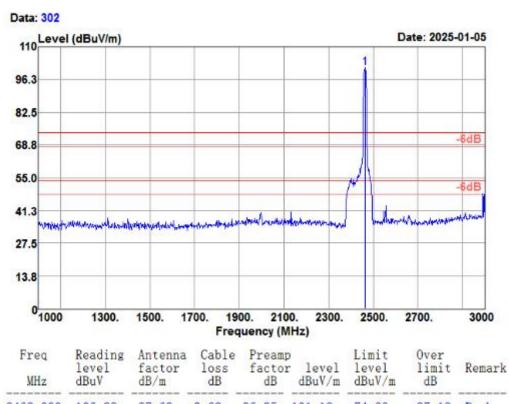
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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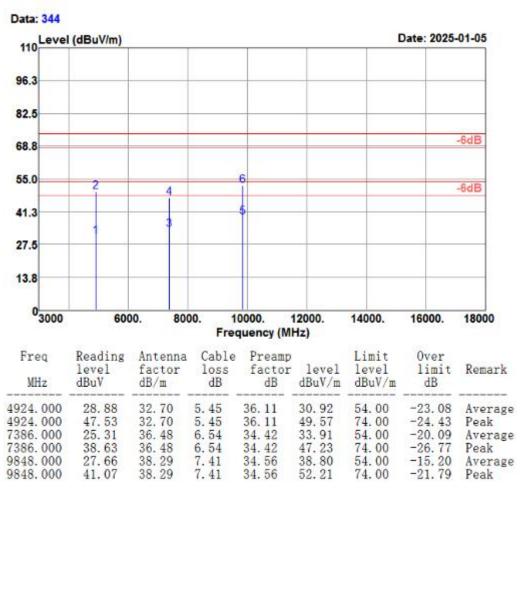


**25**℃ Test Mode: 802.11b CH11 (2462 MHz) Temperature : Relative Humidity: 64% Test Engineer: Jack Liu Polarization: Frequencey Range 1GHz~3GHz Vertical





| Test Mode :      | 802.11b CH11 (2462 MHz) | Temperature :       | 25℃      |
|------------------|-------------------------|---------------------|----------|
| Test Engineer :  | Jack Liu                | Relative Humidity : | 64%      |
| Frequencey Range | 3GHz~18GHz              | Polarization :      | Vertical |
| 111 60.531       |                         |                     |          |

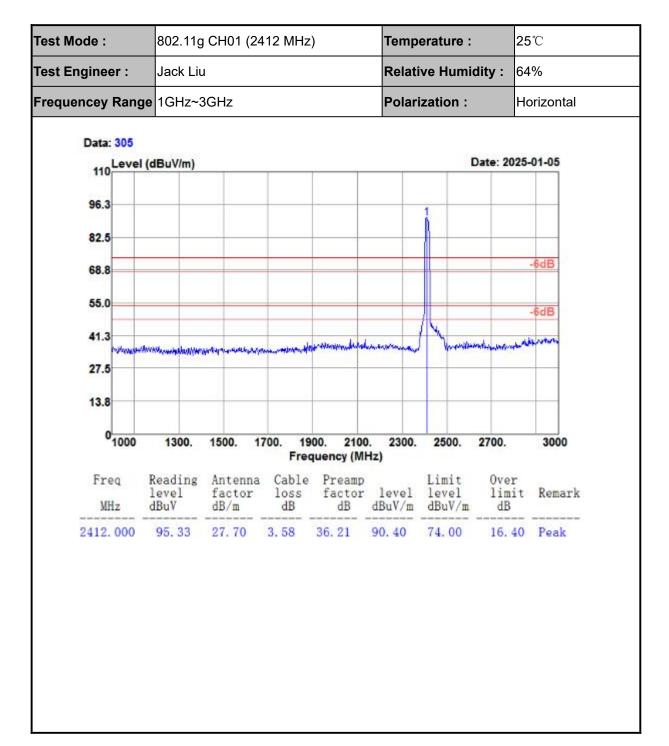


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

FCC ID : 2BC5I-SS121 www.hn-ecloud.com

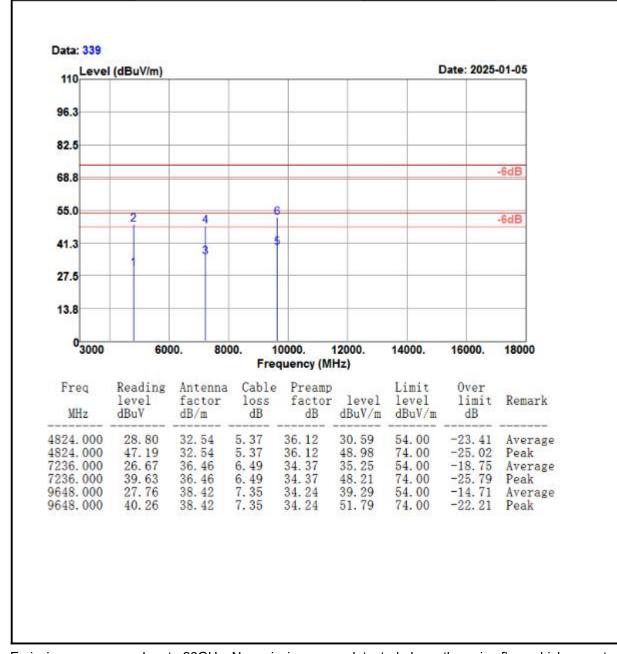








| Test Mode :                   | 802.11g CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|-------------------------------|-------------------------|---------------------|-------------|
| Test Engineer : Jack Liu Rela |                         | Relative Humidity : | 64%         |
| Frequencey Range              | 3GHz~18GHz              | Polarization :      | Horizontal  |



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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Test Mode:

Report No.: EC2408012RF02

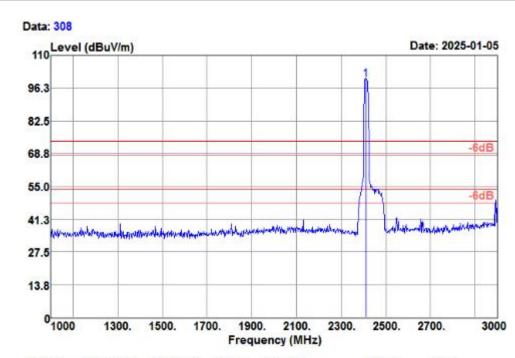
Temperature :

**25**℃

Test Engineer: Jack Liu Relative Humidity: 64%

802.11g CH01 (2412 MHz)

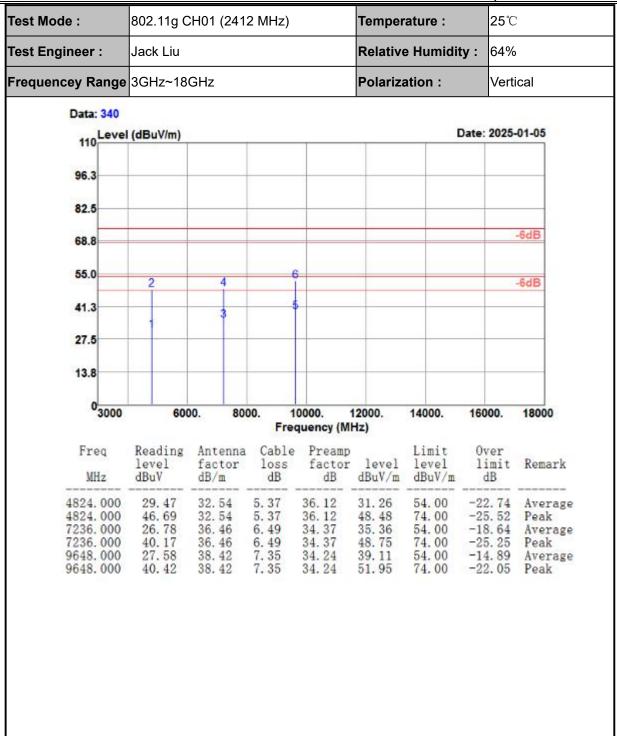
Frequencey Range | 1GHz~3GHz | Polarization : Vertical



| Freq     |        | Antenna |       |        |       |       | Over<br>limit | Remark |
|----------|--------|---------|-------|--------|-------|-------|---------------|--------|
| MHz      |        | dB/m    |       |        |       |       |               |        |
|          |        |         |       |        |       |       |               |        |
| 2412,000 | 104.90 | 27.70   | 3, 58 | 36, 21 | 99.97 | 74.00 | 25.97         | Peak   |

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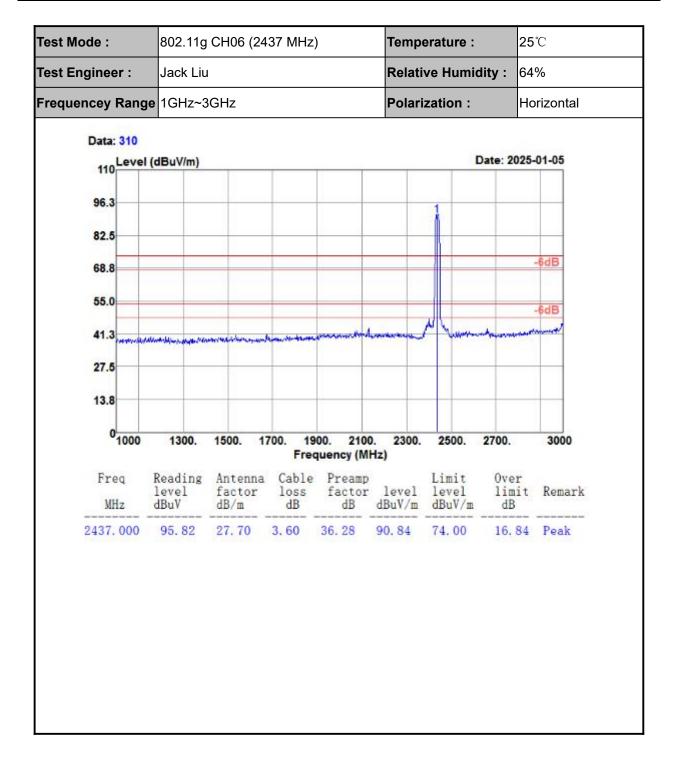


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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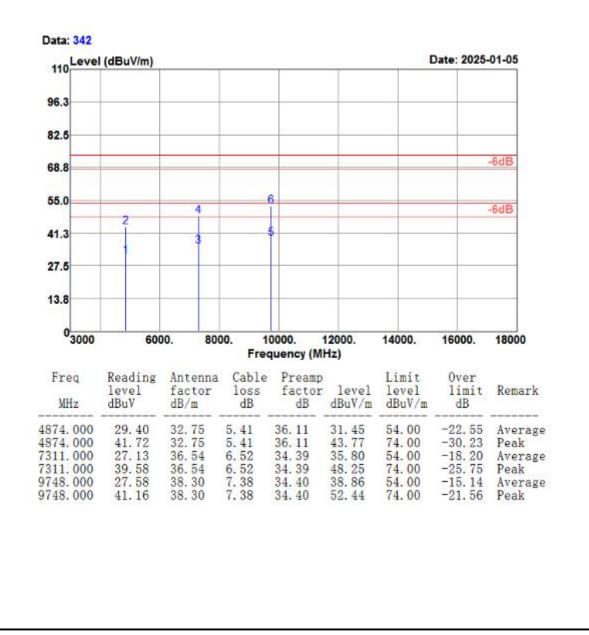








| Test Mode :                   | 802.11g CH06 (2437 MHz) | (2437 MHz) Temperature : |            |
|-------------------------------|-------------------------|--------------------------|------------|
| Test Engineer : Jack Liu Rela |                         | Relative Humidity :      | 64%        |
| Frequencey Range              | 3GHz~18GHz              | Polarization :           | Horizontal |



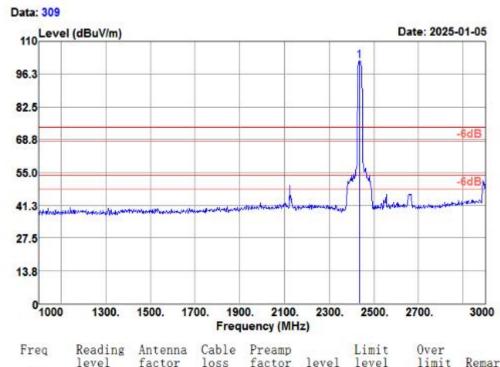
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



 Test Mode :
 802.11g CH06 (2437 MHz)
 Temperature :
 25℃

 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

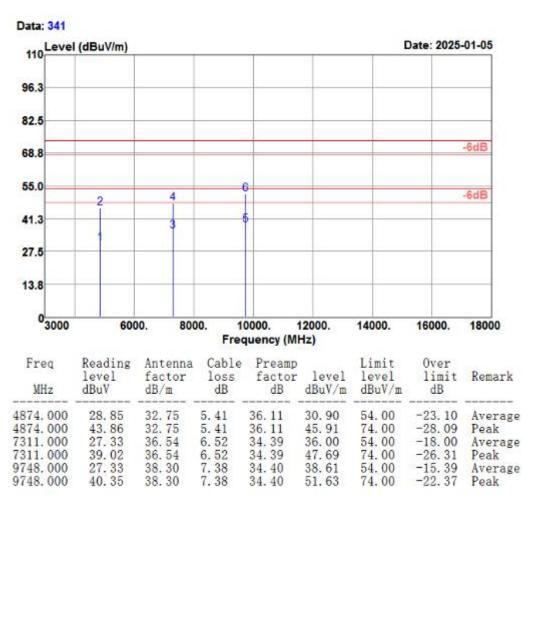
 Frequencey Range
 1GHz~3GHz
 Polarization :
 Vertical



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| Test Mode :      | 802.11g CH06 (2437 MHz)               | 37 MHz) <b>Temperature</b> : |          |
|------------------|---------------------------------------|------------------------------|----------|
| Test Engineer :  | Engineer: Jack Liu Relative Humidity: |                              | 64%      |
| Frequencey Range | 3GHz~18GHz                            | Polarization :               | Vertical |



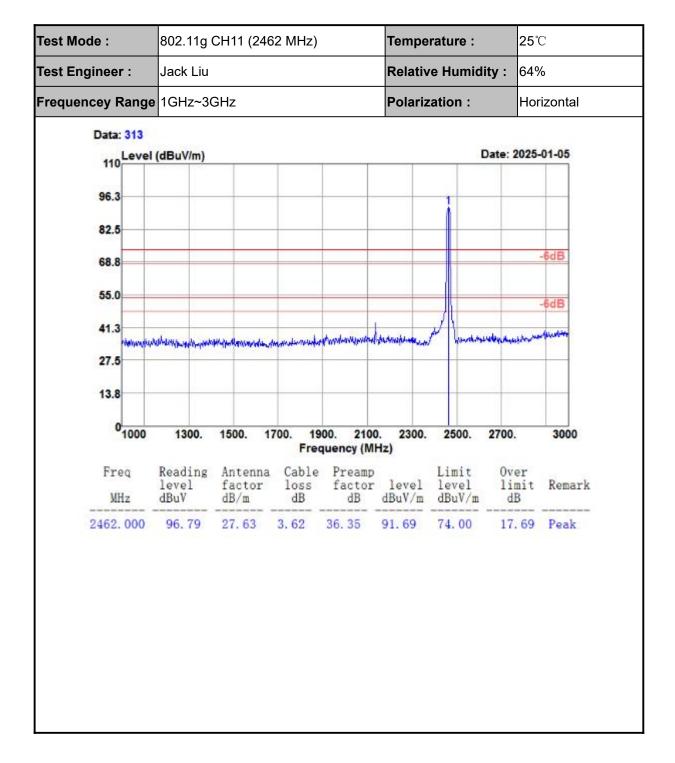
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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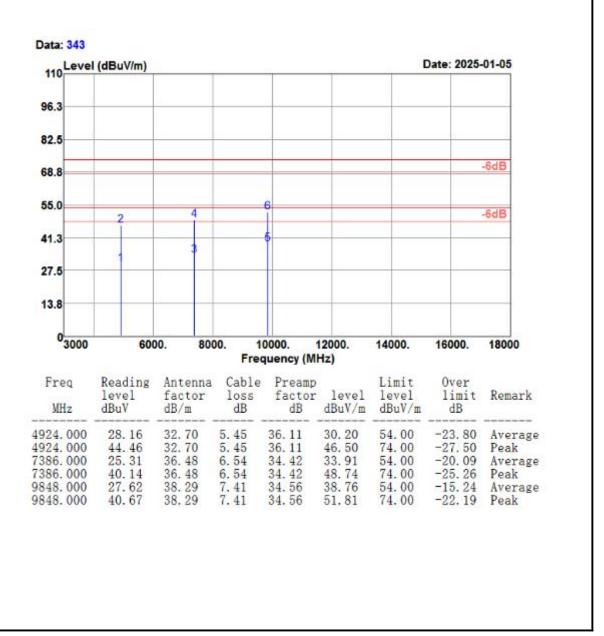








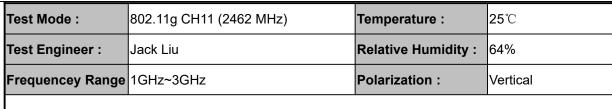
| Test Mode :      | 802.11g CH11 (2462 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                | Relative Humidity : | 64%         |
| Frequencey Range | 3GHz~18GHz              | Polarization :      | Horizontal  |

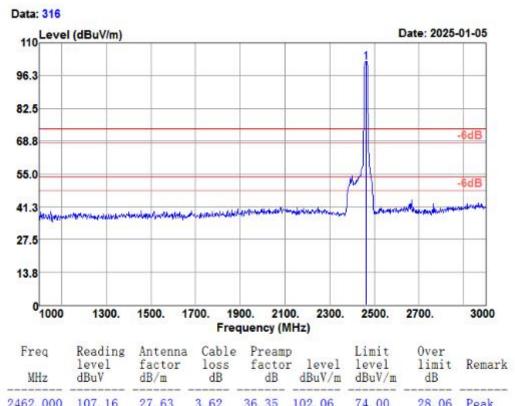


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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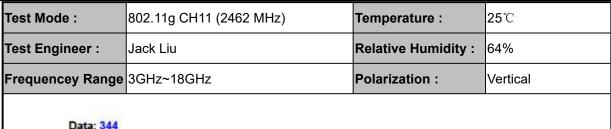


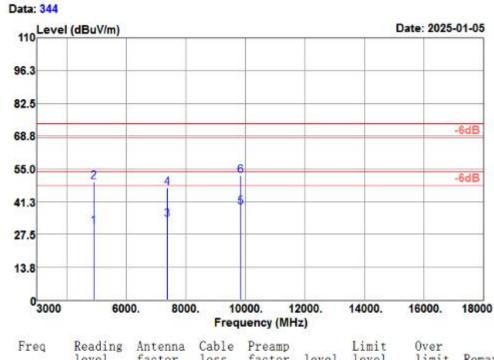


| MHz      | level   | factor<br>dB/m | loss | factor | level  |       |       | Remark |
|----------|---------|----------------|------|--------|--------|-------|-------|--------|
|          |         |                |      |        |        |       |       |        |
| 2462.000 | 107. 16 | 27.63          | 3.62 | 36. 35 | 102.06 | 74.00 | 28.06 | Peak   |

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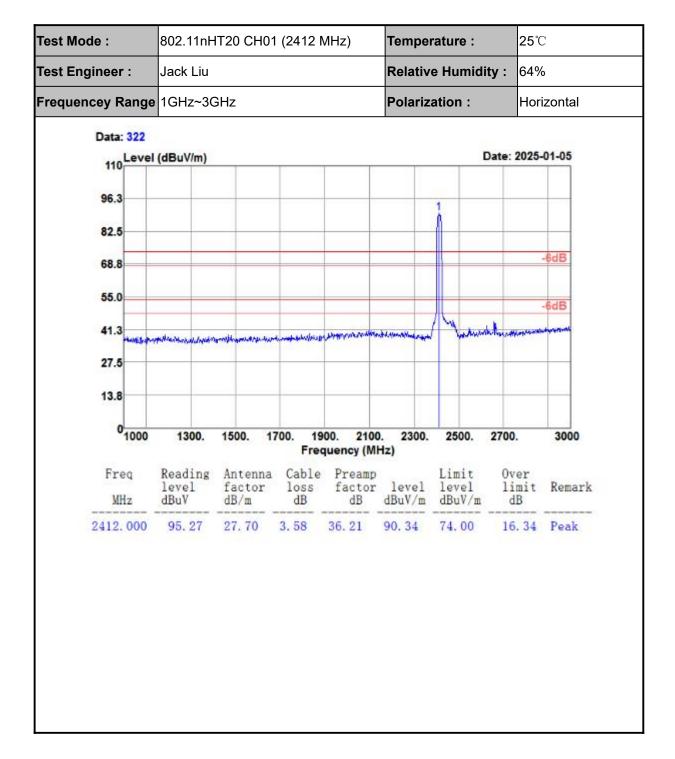
| Freq<br>MHz | Reading<br>level<br>dBuV | Antenna<br>factor<br>dB/m | Cable<br>loss<br>dB | Preamp<br>factor<br>dB |        | Limit<br>level<br>dBuV/m | Over<br>limit<br>dB | Remark  |
|-------------|--------------------------|---------------------------|---------------------|------------------------|--------|--------------------------|---------------------|---------|
| 4924.000    | 28.88                    | 32.70                     | 5.45                | 36.11                  | 30.92  | 54.00                    | -23.08              | Average |
| 4924.000    | 47.53                    | 32.70                     | 5.45                | 36. 11                 | 49.57  | 74.00                    | -24.43              | Peak    |
| 7386, 000   | 25. 31                   | 36.48                     | 6.54                | 34.42                  | 33.91  | 54.00                    | -20.09              | Average |
| 7386.000    | 38. 63                   | 36.48                     | 6.54                | 34. 42                 | 47.23  | 74.00                    | -26.77              | Peak    |
| 9848.000    | 27.66                    | 38. 29                    | 7.41                | 34.56                  | 38.80  | 54.00                    | -15.20              | Average |
| 9848,000    | 41.07                    | 38. 29                    | 7.41                | 34.56                  | 52, 21 | 74.00                    | -21.79              | Peak    |

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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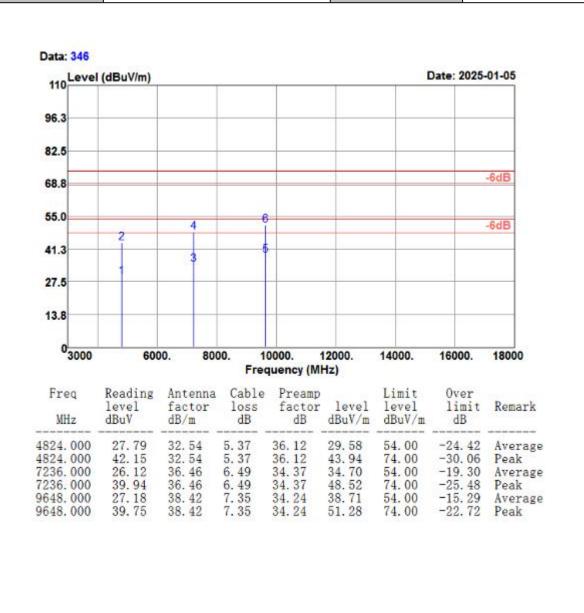








| Test Mode :      | 802.11nHT20 CH01 (2412 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-----------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%         |
| Frequencey Range | 3GHz~18GHz                  | Polarization :      | Horizontal  |



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

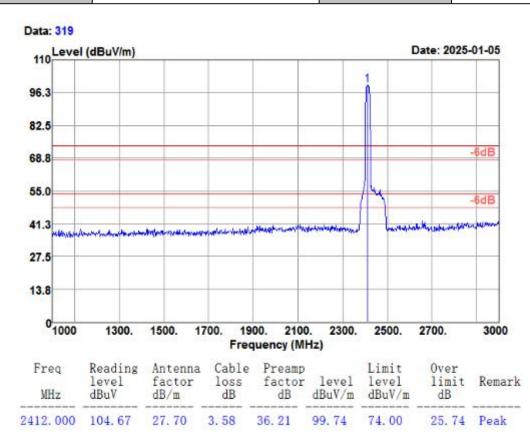
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 Test Mode :
 802.11nHT20 CH01 (2412 MHz)
 Temperature :
 25℃

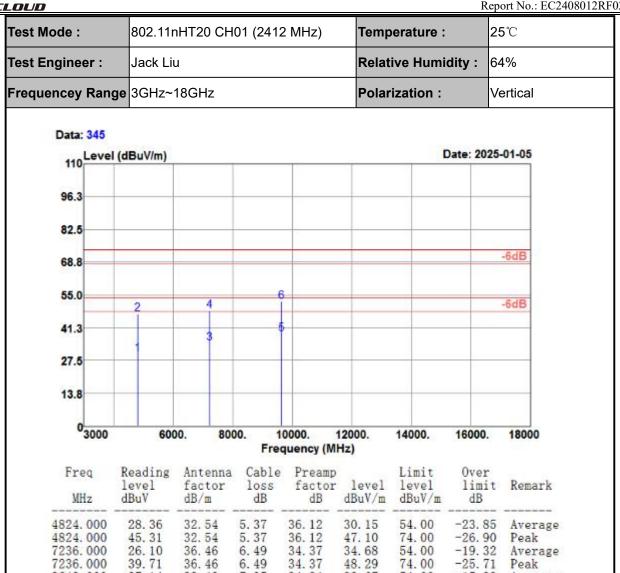
 Test Engineer :
 Jack Liu
 Relative Humidity :
 64%

 Frequencey Range
 1GHz~3GHz
 Polarization :
 Vertical



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Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

34.24

34.24

38, 67

52, 21

54.00

74.00

-15.33

-21.79

Average

Peak

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9648.000

9648,000

27.14

40.68

38.42

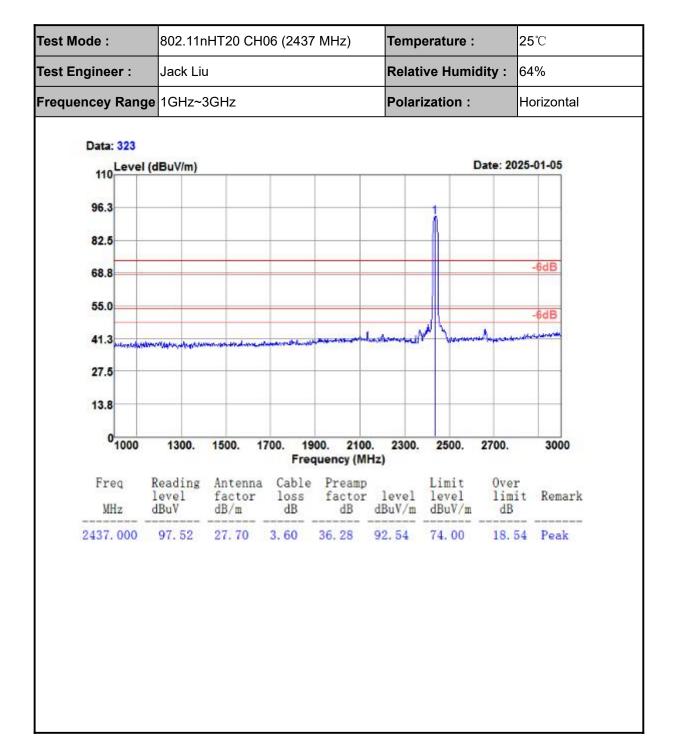
38, 42

7.35

7.35

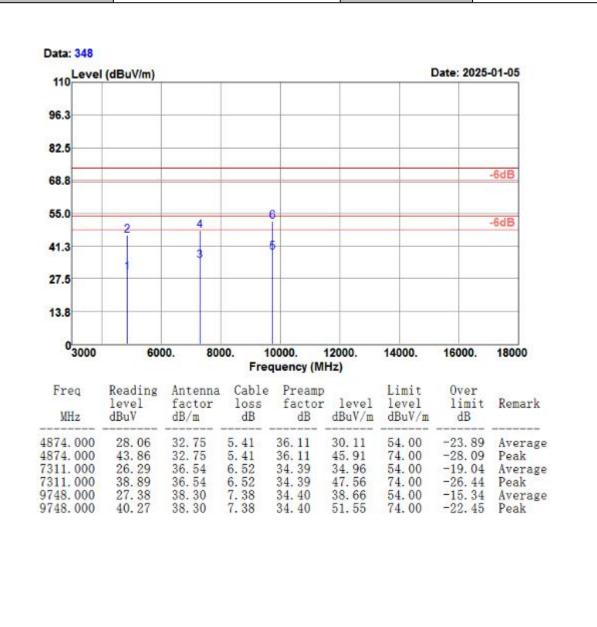








| Test Mode :      | 802.11nHT20 CH06 (2437 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-----------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%         |
| Frequencey Range | 3GHz~18GHz                  | Polarization :      | Horizontal  |

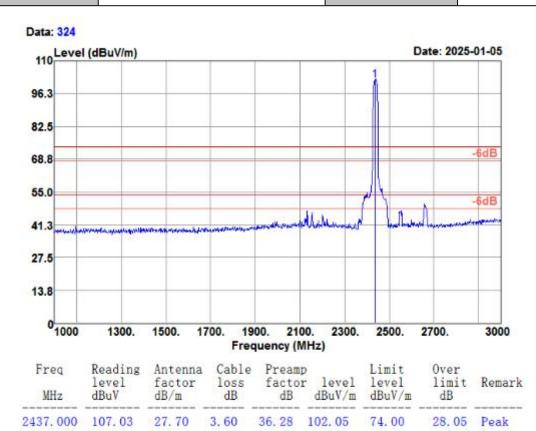


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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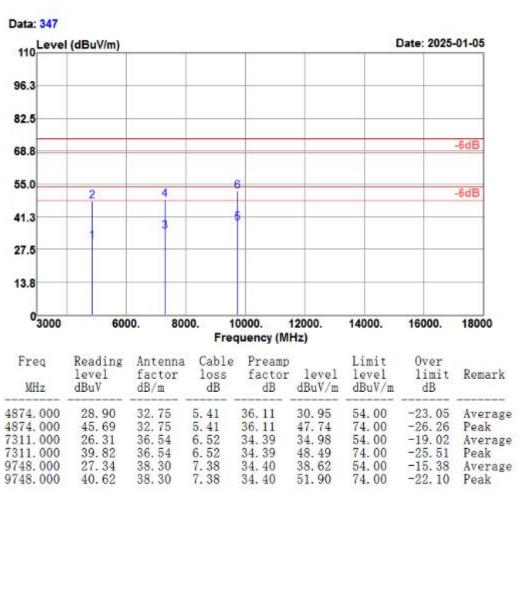
| Test Mode :      | 802.11nHT20 CH06 (2437 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-----------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%         |
| Frequencey Range | 1GHz~3GHz                   | Polarization :      | Vertical    |



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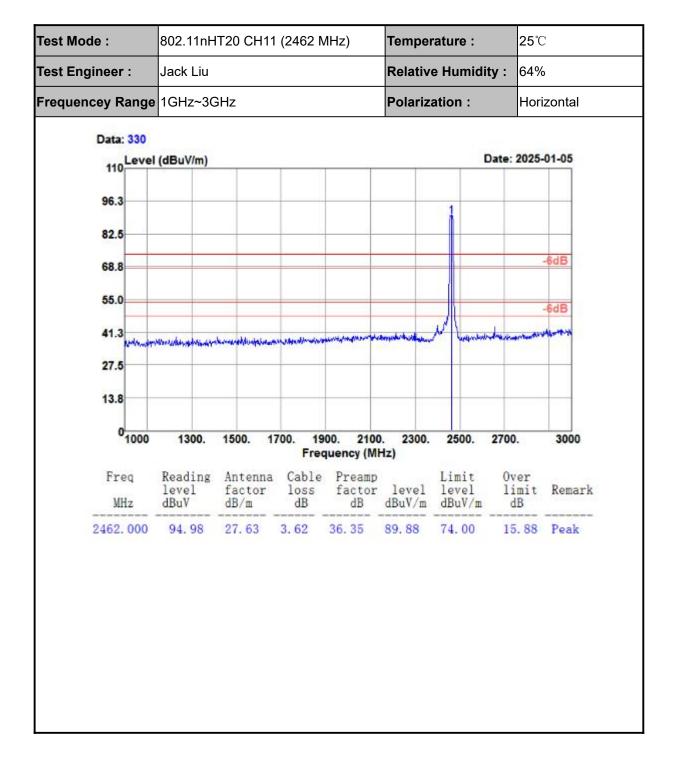
| Test Mode :      | 802.11nHT20 CH06 (2437 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-----------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%         |
| Frequencey Range | 3GHz~18GHz                  | Polarization :      | Vertical    |



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



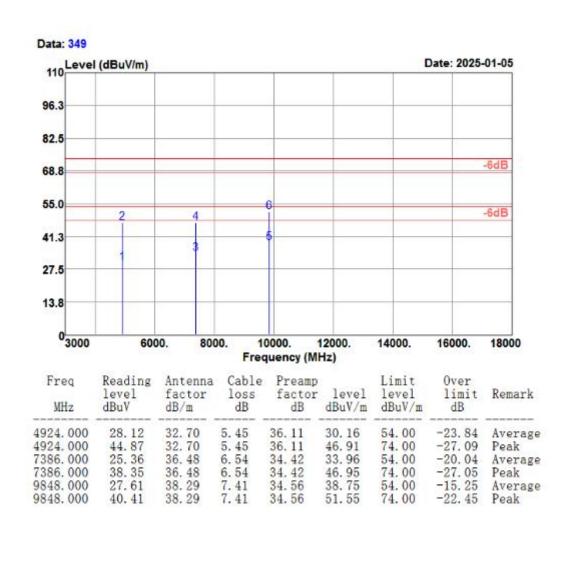




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| Test Mode :      | 802.11nHT20 CH11 (2462 MHz) | Temperature :       | <b>25</b> ℃ |
|------------------|-----------------------------|---------------------|-------------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%         |
| Frequencey Range | 3GHz~18GHz                  | Polarization :      | Horizontal  |

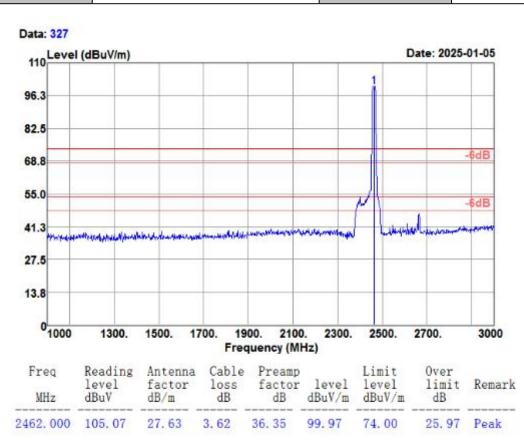


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

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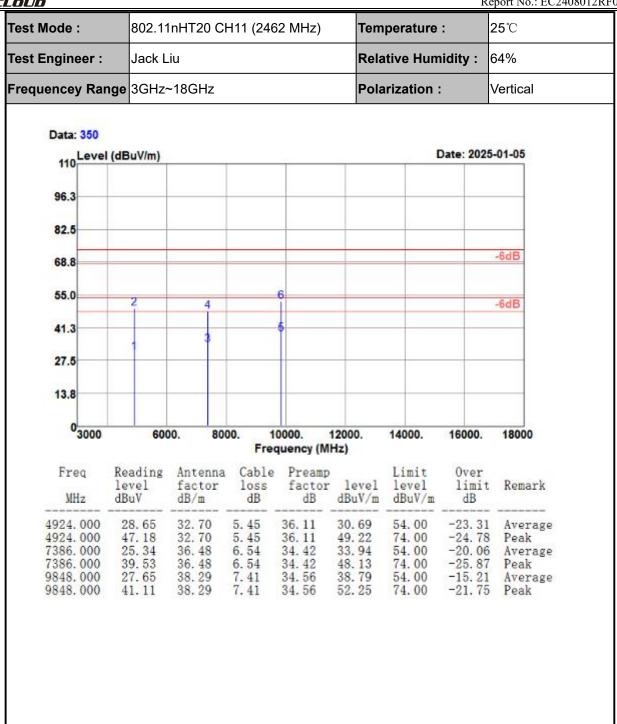


| Test Mode :      | 802.11nHT20 CH11 (2462 MHz) | Temperature :       | 25℃      |
|------------------|-----------------------------|---------------------|----------|
| Test Engineer :  | Jack Liu                    | Relative Humidity : | 64%      |
| Frequencey Range | 1GHz~3GHz                   | Polarization :      | Vertical |

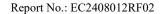


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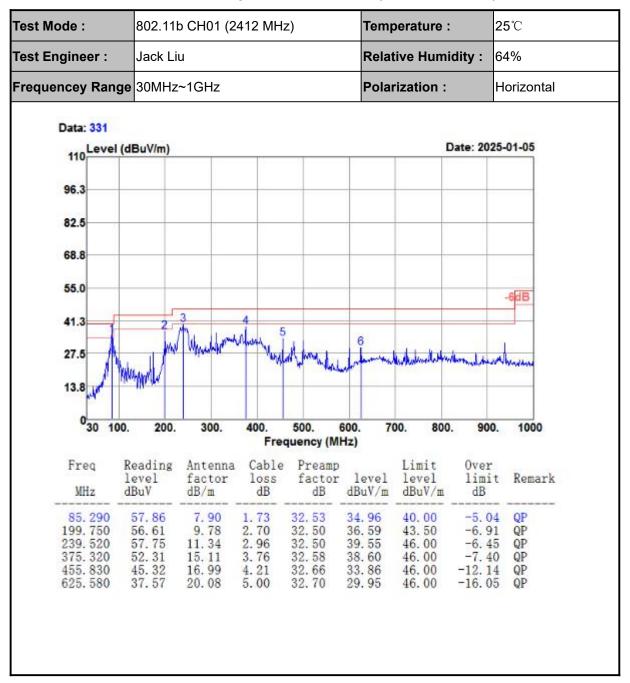


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.



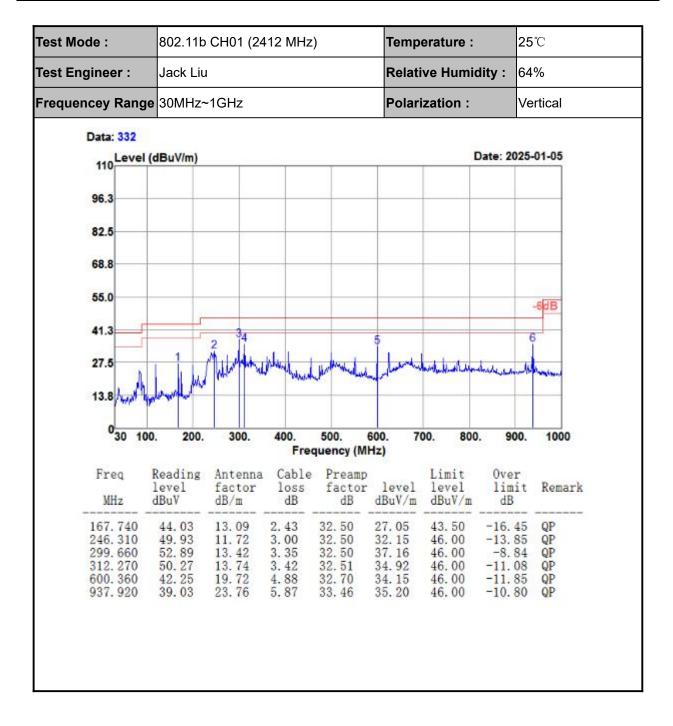


## 4.5.6 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)



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### 4.6 AC Conducted Emission Measurement

#### 4.6.1 Limit of AC Conducted Emission

FCC §15.207

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBµV) |           |  |
|-----------------------------|------------------------|-----------|--|
| Frequency of emission (MHZ) | Quasi-peak             | Average   |  |
| 0.15-0.5                    | 66 to 56*              | 56 to 46* |  |
| 0.5-5                       | 56                     | 46        |  |
| 5-30                        | 60                     | 50        |  |

<sup>\*</sup>Decreases with the logarithm of the frequency.

#### 4.6.2 Test Procedures

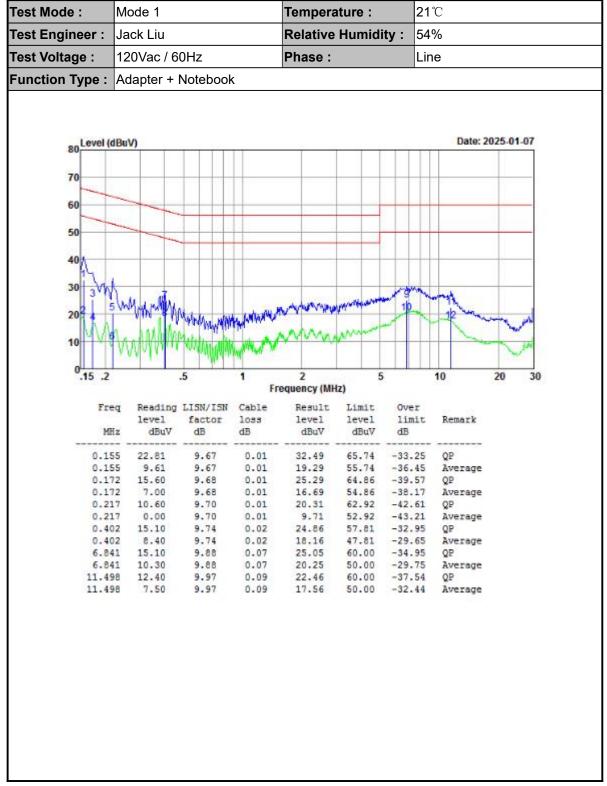
- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- 8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

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#### 4.6.3 Test Result of AC Conducted Emission



Result Level= Reading Level + LISN Factor + Cable Loss





Test Mode: Mode 1 Temperature: **21**℃ 54% Test Engineer: Jack Liu Relative Humidity: Test Voltage: 120Vac / 60Hz Phase: **NEUTRAL** Function Type : | Adapter + Notebook 80 Level (dBuV) Date: 2025-01-07 70 60 50 40 30 10 0.15 .2 2 5 10 30 Frequency (MHz) Freq Reading LISN/ISN Cable Result Limit Over level factor 1055 level level limit Remark MHz dBuV dB dB dBuV dBuV dB 21.51 0.159 9.58 0.01 31.10 65.52 -34.42 QP 0.159 5.91 9.58 0.01 15.50 55.52 -40.02 Average 0.172 16.20 9.59 0.01 25.80 64.86 -39.06 0.172 6.00 15.60 54.86 -39.26 Average 9.59 0.01 12.20 21.80 -41.300.213 9.59 0.01 63.10 QP 0.213 1.90 9.59 0.01 11.50 53.10 -41.60 Average 0.402 19.20 9.59 0.02 28.81 57.81 -29.00 QP 0.402 14.00 0.02 23.61 47.81 -24.20 9.59 Average 0.07 7.407 17.60 9.77 27.44 60.00 -32.56OP 7.407 12.70 9.77 0.07 22.54 50.00 -27.46Average 11.257 13.20 9.89 0.09 23.18 60.00 -36.82 11.257 8.60 9.89 0.09 18.58 50.00 -31.42Average

Result Level= Reading Level + LISN Factor + Cable Loss

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4.7 Antenna Requirements

4.7.1 Standard Applicable

According to antenna requirement of §15.203.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the

responsible party shall be used with the device. The use of a permanently attached antenna or of an

antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to

comply with the provisions of this Section. The manufacturer may design the unit so that a broken

antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector

is prohibited. This requirement does not apply to carrier current devices or to devices operated under

 $the\ provisions\ of\ Sections\ 15.211,\ 15.213,\ 15.217,\ 15.219,\ or\ 15.221.\ Further,\ this\ requirement\ does$ 

not apply to intentional radiators that must be professionally installed, such as perimeter protection

systems and some field disturbance sensors, or to other intentional radiators which, in accordance

with Section 15.31(d), must be measured at the installation site. However, the installer shall be

responsible for ensuring that the proper antenna is employed so that the limits in this Part are not

exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used

exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain

greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1

dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 Antenna Connected Construction

An FPC antenna design is used.

4.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum

peak output power limit.

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Liuyang Economic and Technological Development Zone, Hunan, P.R.C

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# 5 List of Measuring Equipment

| Instrument           | Manufacturer | Model No. | Serial No. | Calibration<br>Date | Due Date   | Remark    |
|----------------------|--------------|-----------|------------|---------------------|------------|-----------|
| Spectrum<br>Analyzer | Keysight     | N9010A    | MY56070788 | 2024/12/17          | 2025/12/16 | Conducted |
| 10dB<br>Attenuator   | MCLI         | FAS-8-10  | 1693       | 2024/7/5            | 2025/7/4   | Conducted |
| Test Software        | Tonscend     | JS1120-3  | V3.5.39    | N/A                 | N/A        | Conducted |

| Instrument           | Manufacturer  | Model No.     | Serial No. | Calibration<br>Date | Due Date   | Remark    |
|----------------------|---------------|---------------|------------|---------------------|------------|-----------|
| Spectrum<br>Analyzer | R&S           | FSV30         | 103728     | 2024/12/17          | 2025/12/16 | Radiation |
| EMI Test<br>Receiver | R&S           | ESR3          | 102144     | 2024/12/17          | 2025/12/16 | Radiation |
| Amplifier            | Sonoma        | 310           | 363917     | 2024/12/17          | 2025/12/16 | Radiation |
| Amplifier            | Schwarzbeck   | BBV 9718      | 327        | 2024/12/17          | 2025/12/16 | Radiation |
| Amplifier            | Narda         | TTA1840-35-HG | 2034380    | 2024/12/24          | 2025/12/23 | Radiation |
| Loop Antenna         | Schwarzbeck   | FMZB 1519 B   | 00051      | 2023/2/12           | 2026/2/11  | Radiation |
| Broadband<br>Antenna | Schwarzbeck   | VULB 9168     | 9168-757   | 2023/9/17           | 2026/9/16  | Radiation |
| Horn Antenna         | Schwarzbeck   | BBHA 9120 D   | 01677      | 2024/1/30           | 2027/1/29  | Radiation |
| Horn Antenna         | COM-POWER     | AH-1840       | 101117     | 2024/1/31           | 2027/1/30  | Radiation |
| Test Software        | Audix         | E3            | 6.111221a  | N/A                 | N/A        | Radiation |
| Filter               | Micro-Tronics | BRM 50702     | G266       | N/A                 | N/A        | Radiation |

| Instrument           | Manufacturer | Model No. | Serial No. | Calibration<br>Date | Due Date   | Remark    |
|----------------------|--------------|-----------|------------|---------------------|------------|-----------|
| LISN                 | R&S          | ENV216    | 102125     | 2024/12/17          | 2025/12/16 | Conducted |
| LISN                 | R&S          | ENV432    | 101327     | 2024/12/17          | 2025/12/16 | Conducted |
| EMI Test<br>Receiver | R&S          | ESR3      | 102143     | 2024/12/17          | 2025/12/16 | Conducted |
| EMI Test<br>Software | Audix        | E3        | N/A        | N/A                 | N/A        | Conducted |

N/A: No Calibration Required

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## 6 Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT         | FREQUENCY     | UNCERTAINTY |
|---------------------|---------------|-------------|
| Conducted emissions | 9kHz~30MHz    | ±3.02 dB    |
|                     | 30MHz ~ 1GHz  | ±5.67 dB    |
| Radiated emissions  | 1GHz ~ 18GHz  | ±5.16 dB    |
|                     | 18GHz ~ 40GHz | ±5.18 dB    |

| MEASUREMENT                | UNCERTAINTY |
|----------------------------|-------------|
| Occupied Channel Bandwidth | ±99.44 Hz   |
| RF output power, conducted | ±0.80 dB    |
| Power density, conducted   | ±2.02dB     |
| Emissions, conducted       | ±2.02dB     |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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