



# TEST REPORT

**REPORT NUMBER: I22W00019-WiFi RF-2.4GHz-Rev4**

**ON**

**Type of Equipment: Wi-Fi Module**

**Type of Designation: W82**

**Brand Name: SIMCom**

**Manufacturer: SIMCom Wireless Solutions Limited**

**FCC ID 2AJYU-8XN0002**

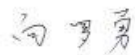
**ACCORDING TO  
FCC Part15 Subpart C  
ANSI C63.10-2013**

**Chongqing Academy of Information and Communications Technology**

***Month date, year***

*May, 23, 2023*

***Signature***



**Director**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of Chongqing Academy of Information and Communications Technology.



## Report No.: I22W00019-WiFi RF-2.4GHz-Rev4

Revision Version

| Report Number                 | Revision | Date       | Memo                            |
|-------------------------------|----------|------------|---------------------------------|
| I22W00019-WiFi RF-2.4GHz      | 00       | 2022-12-30 | Initial creation of test report |
| I22W00019-WiFi RF-2.4GHz-Rev1 | 01       | 2023-05-04 | First change of test report     |
| I22W00019-WiFi RF-2.4GHz-Rev2 | 02       | 2023-05-17 | Second change of test report    |
| I22W00019-WiFi RF-2.4GHz-Rev3 | 03       | 2023-05-19 | Third change of test report     |
| I22W00019-WiFi RF-2.4GHz-Rev4 | 04       | 2023-05-23 | Fourth change of test report    |

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## 1. Test Laboratory

### 1.1. Testing Location

|                     |                                                                                                                                     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Name:               | Chongqing Academy of Information and Communications Technology                                                                      |
| Designation Number: | CN1239                                                                                                                              |
| Address:            | Building C, Technology Innovation Center, No.8, Yuma Road, Chayuan New Area, Nan'an District, Chongqing, People's Republic of China |
|                     | No.19 East Road, Xiantao Big-data Valley, Yubei District, Chongqing, People's Republic of China                                     |
| Postal Code:        | 401336                                                                                                                              |
| Telephone:          | 0086-23-88069965                                                                                                                    |
| Fax:                | 0086-23-88608777                                                                                                                    |

### 1.2. Testing Environment

|                     |         |
|---------------------|---------|
| Normal Temperature: | 15-35°C |
| Relative Humidity:  | 30-60%  |

### 1.3. Project data

|                     |            |
|---------------------|------------|
| Testing Start Date: | 2022-03-20 |
| Testing End Date:   | 2023-05-11 |

### 1.4. Signature



2023-05-23

**Li Quan**  
(Prepared this test report)

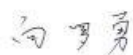
**Date**



2023-05-23

**Xiao Yu**  
(Reviewed this test report)

**Date**



2023-05-23

**Xiang Luoyong**  
Director of the laboratory  
(Approved this test report)

**Date**

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## 2. Client Information

### 2.1. Applicant Information

|                 |                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------|
| Company Name:   | SIMCom Wireless Solutions Limited                                                                  |
| Address /Post:  | SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai, China |
| City:           | Shanghai                                                                                           |
| Country:        | China                                                                                              |
| Telephone:      | 86 21 3157 5100                                                                                    |
| Fax:            | --                                                                                                 |
| Email:          | Yongsheng Li@simcom.com                                                                            |
| Contact Person: | Yongsheng Li                                                                                       |

### 2.2. Manufacturer Information

|                 |                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------|
| Company Name:   | SIMCom Wireless Solutions Limited                                                                  |
| Address /Post:  | SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai, China |
| City:           | Shanghai                                                                                           |
| Country:        | China                                                                                              |
| Telephone:      | 86 21 3157 5100                                                                                    |
| Fax:            | --                                                                                                 |
| Email:          | Yongsheng Li@simcom.com                                                                            |
| Contact Person: | Yongsheng Li                                                                                       |

### 3. Equipment under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

|                      |                                                                                                                   |
|----------------------|-------------------------------------------------------------------------------------------------------------------|
| EUT Description      | Wi-Fi Module                                                                                                      |
| Model name           | W82                                                                                                               |
| Brand name           | SIMCom                                                                                                            |
| WLAN Frequency Band  | 2.4G/UNII 1/2A/2C/3/5/6/7/8                                                                                       |
| Product Type         | UNII-1/2A/2C/3:Indoor Access Point                                                                                |
|                      | UNII-5/6/7/8:Low-power Indoor Client                                                                              |
| Frequency Range      | 2.4G: 802.11b/g/n20/ax20: 2412-2462MHz; 802.11n40/ax40: 2422-2452MHz                                              |
|                      | 5.1G : UNII-1:802.11a/n20/ac20/ax20 : 5180-5240MHz ; 802.11n40/ac40/ax40 : 5190-5230MHz; 802.11ac80/ax80: 5210MHz |
|                      | UNII-2A: 802.11a/n20/ac20/ax20: 5260-5320MHz; 802.11n40/ac40/ax40: 5270-5310MHz                                   |
|                      | 802.11ac80/ax80: 5290MHz; UNII-1and UNII-2A: 802.11ac160/ax160: 5250MHz                                           |
|                      | UNII-2C:802.11a/n20/ac20/ax20: 5500-5700MHz; 802.11n40/ac40/ax40: 5510-5670MHz                                    |
|                      | 802.11ac80/ax80: 5530-5610MHz; 802.11ac160/ax160: 5570MHz                                                         |
|                      | UNII-3:802.11a/n20/ac20/ax20:5745-5825MHz; 802.11n40/ac40/ax40: 5755-5795MHz                                      |
| 802.11 mode          | 802.11ac80/ax80: 5775MHz                                                                                          |
|                      | Band5: 802.11ax20: 5955-6415MHz; 802.11ax40: 5965-6405MHz; 802.11ax80: 5985-6385MHz; 802.11ax160: 6025-6345MHz    |
|                      | Band6: 802.11ax20: 6435-6515MHz; 802.11ax40: 6445-6525MHz; 802.11ax80: 6465MHz; 802.11ax160: 6505MHz              |
|                      | Band7: 802.11ax20: 6535-6855MHz; 802.11ax40: 6565-6845MHz; 802.11ax80: 6545-6865MHz; 802.11ax160: 6665-6825MHz    |
|                      | Band8: 802.11ax20: 6895-7115MHz; 802.11ax40: 6885-7085MHz; 802.11ax80: 6945-7025MHz; 802.11ax160: 6985MHz         |
| 802.11 mode          | b/g/a/n/ac/ax                                                                                                     |
| Modulation mode      | DSSS/CCK/OFDM/OFDMA                                                                                               |
| Antenna port         | Ant0/Ant1                                                                                                         |
| Extreme Temperature  | -30/+70°C                                                                                                         |
| Nominal Voltage      | 3.8V                                                                                                              |
| Extreme High Voltage | 4.4V                                                                                                              |
| Extreme Low Voltage  | 3.3V                                                                                                              |

Note1: Photographs of EUT are shown in ANNEX A of this test report.

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Note2: High and low voltage values in extreme condition test are given by manufacturer.

Note3: This report is only for 2.4G test results.

### Test frequency list:

#### WLAN\_2.4G:

|        |           |      |      |      |
|--------|-----------|------|------|------|
| BW_20M | Channel   | 1    | 6    | 11   |
|        | Fre.(MHz) | 2412 | 2437 | 2462 |
| BW_40M | Channel   | 3    | 6    | 9    |
|        | Fre.(MHz) | 2422 | 2437 | 2452 |

#### UNII-1 and UNII-2A:

|         |           |      |      |      |      |      |      |      |      |
|---------|-----------|------|------|------|------|------|------|------|------|
| BW_20M  | Channel   | 36   | 40   | 44   | 48   | 52   | 56   | 60   | 64   |
|         | Fre.(MHz) | 5180 | 5200 | 5220 | 5240 | 5260 | 5280 | 5300 | 5320 |
| BW_40M  | Channel   | 38   |      | 46   |      | 54   |      | 62   |      |
|         | Fre.(MHz) | 5190 |      | 5230 |      | 5270 |      | 5310 |      |
| BW_80M  | Channel   | 42   |      |      |      | 58   |      |      |      |
|         | Fre.(MHz) | 5210 |      |      |      | 5290 |      |      |      |
| BW_160M | Channel   | 50   |      |      |      |      |      |      |      |
|         | Fre.(MHz) | 5250 |      |      |      |      |      |      |      |

#### UNII-2C:

|         |           |      |      |      |      |      |      |      |      |      |      |      |  |  |  |
|---------|-----------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|
| BW_20M  | Channel   | 100  | 104  | 108  | 112  | 116  | 120  | 124  | 128  | 132  | 136  | 140  |  |  |  |
|         | Fre.(MHz) | 5500 | 5520 | 5540 | 5560 | 5580 | 5600 | 5620 | 5640 | 5660 | 5680 | 5700 |  |  |  |
| BW_40M  | Channel   | 102  |      | 110  |      | 118  |      | 126  |      | 134  |      | /    |  |  |  |
|         | Fre.(MHz) | 5510 |      | 5550 |      | 5590 |      | 5630 |      | 5670 |      | /    |  |  |  |
| BW_80M  | Channel   | 106  |      |      |      | 122  |      |      |      | /    |      |      |  |  |  |
|         | Fre.(MHz) | 5530 |      |      |      | 5610 |      |      |      |      |      |      |  |  |  |
| BW_160M | Channel   | 114  |      |      |      |      |      |      |      |      |      |      |  |  |  |
|         | Fre.(MHz) | 5570 |      |      |      |      |      |      |      |      |      |      |  |  |  |

Note: “/” Represents empty

#### UNII-3:

|         |           |      |      |      |      |      |
|---------|-----------|------|------|------|------|------|
| BW_20M  | Channel   | 149  | 153  | 157  | 161  | 165  |
|         | Fre.(MHz) | 5745 | 5765 | 5785 | 5805 | 5825 |
| BW_40M  | Channel   | 151  |      | 159  |      | /    |
|         | Fre.(MHz) | 5755 |      | 5795 |      |      |
| BW_80M  | Channel   | 155  |      |      |      |      |
|         | Fre.(MHz) | 5775 |      |      |      |      |
| BW_160M | Channel   | /    |      |      |      |      |
|         | Fre.(MHz) | /    |      |      |      |      |

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Note: “/” Represents empty

### WLAN\_6G:

|         |           | UNII-5 |      |      | UNII-6 |      |      | UNII-7 |      |      | UNII-8 |      |      |
|---------|-----------|--------|------|------|--------|------|------|--------|------|------|--------|------|------|
| BW_20M  | Channel   | 1      | 45   | 93   | 97     | 105  | 113  | 117    | 149  | 181  | 185    | 209  | 233  |
|         | Fre.(MHz) | 5955   | 6175 | 6415 | 6435   | 6475 | 6515 | 6535   | 6695 | 6855 | 6875   | 6995 | 7115 |
| BW_40M  | Channel   | 3      | 43   | 91   | 99     | 107  | 115  | 123    | 147  | 179  | 187    | 203  | 227  |
|         | Fre.(MHz) | 5965   | 6165 | 6405 | 6445   | 6485 | 6525 | 6565   | 6685 | 6845 | 6885   | 6965 | 7085 |
| BW_80M  | Channel   | 7      | 39   | 87   | 103    | /    | /    | 119    | 151  | 183  | 199    | 215  | /    |
|         | Fre.(MHz) | 5985   | 6145 | 6385 | 6465   | /    | /    | 6545   | 6705 | 6865 | 6945   | 7025 | /    |
| BW_160M | Channel   | 15     | 47   | 79   | 111    | /    | /    | 143    | 175  | /    | 207    | /    | /    |
|         | Fre.(MHz) | 6025   | 6185 | 6345 | 6505   | /    | /    | 6665   | 6825 | /    | 6985   | /    | /    |

Note1: CH115/119/183/111/175/187 includes cross frequency  
Note2: “/” Represents empty

### 3.2. Internal Identification of EUT used during the test

| EUT ID* | SN or IMEI         | HW Version | SW Version | Date of receipt |
|---------|--------------------|------------|------------|-----------------|
| S1      | SN:MP0622033CCC290 | V1.01      | V1.0.01    | 2022-03-04      |
| S2      | SN:MP0622033CCC308 | V1.01      | V1.0.01    | 2022-03-04      |

\*EUT ID: is used to identify the test sample in the lab internally.

| Technology | Band | Frequency range(MHz)                                                                                       | Support mode                                                                       | Antenna gain <sup>note2</sup>                                              | MIMO Tx function <sup>note3</sup> | Directional gain <sup>note4</sup>                                                                                                                                                                                                                                    |
|------------|------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WLAN       | 2.4G | 2400-2483.5                                                                                                | 802.11b/g/n(HT20/40)/<br>ax(HE20/40) <sup>note1</sup>                              | 2.97dBi                                                                    | 2TX                               | b/g:2.97dBi<br>n/ax:2.97dBi+10log(2)=5.98dBi                                                                                                                                                                                                                         |
|            | 5G   | UNII 1: 5150MHz-5250MHz<br>UNII 2A: 5250MHz-5350MHz<br>UNII 2C: 5470MHz-5725MHz<br>UNII 3: 5725MHz-5850MHz | 802.11a/n(HT20/40)/ac<br>(VHT20/40/80/160)/ax<br>(HE20/40/80/160) <sup>note1</sup> | UNII 1: 3.50dBi<br>UNII 2A: 3.47dBi<br>UNII 2C: 3.94dBi<br>UNII 3: 3.52dBi | 2TX                               | a:UNII 1: 3.50dBi<br>a:UNII 2A: 3.47dBi<br>a:UNII 2C: 3.94dBi<br>a:UNII 3: 3.52dBi<br>n/ac/ax:UNII 1: 3.50dBi+10log(2)=6.51dBi<br>n/ac/ax:UNII 2A: 3.47dBi+10log(2)=6.48dBi<br>n/ac/ax:UNII 2C: 3.94dBi+10log(2)=6.95dBi<br>n/ac/ax:UNII 3: 3.52dBi+10log(2)=6.53dBi |
|            | 6G   | UNII 5: 5925MHz-6425MHz<br>UNII 6: 6425MHz-6525MHz<br>UNII 7: 6525MHz-6875MHz<br>UNII 8: 6875MHz-7125MHz   | 802.11ax(HE20/40/80/<br>160) <sup>note1</sup>                                      | UNII 5: 3.99dBi<br>UNII 6: 3.29dBi<br>UNII 7: 3.95dBi<br>UNII 8: 3.82dBi   | 2TX                               | UNII 5: 3.99dBi+10log(2)=7.00dBi<br>UNII 6: 3.29dBi+10log(2)=6.30dBi<br>UNII 7: 3.95dBi+10log(2)=6.96dBi<br>UNII 8: 3.82dBi+10log(2)=6.83dBi                                                                                                                         |

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Note1: This device only supports full RU transmission.

Note2: Antenna gain data provided by the customer.ANT0 and ANT1 antennas have the same gain.

Note3:Only 802.11n/ac/ax supports MIMO.MIMO function don't support simultaneous CDD technology and Beamforming .

Note4:According to KDB 662911D01 Multiple Transmitter Output V02R01, If any transmit signals are correlated with each other, Directional gain = Gant + 10 log (Nant) dBi

### 3.3. Internal Identification of AE used during the test

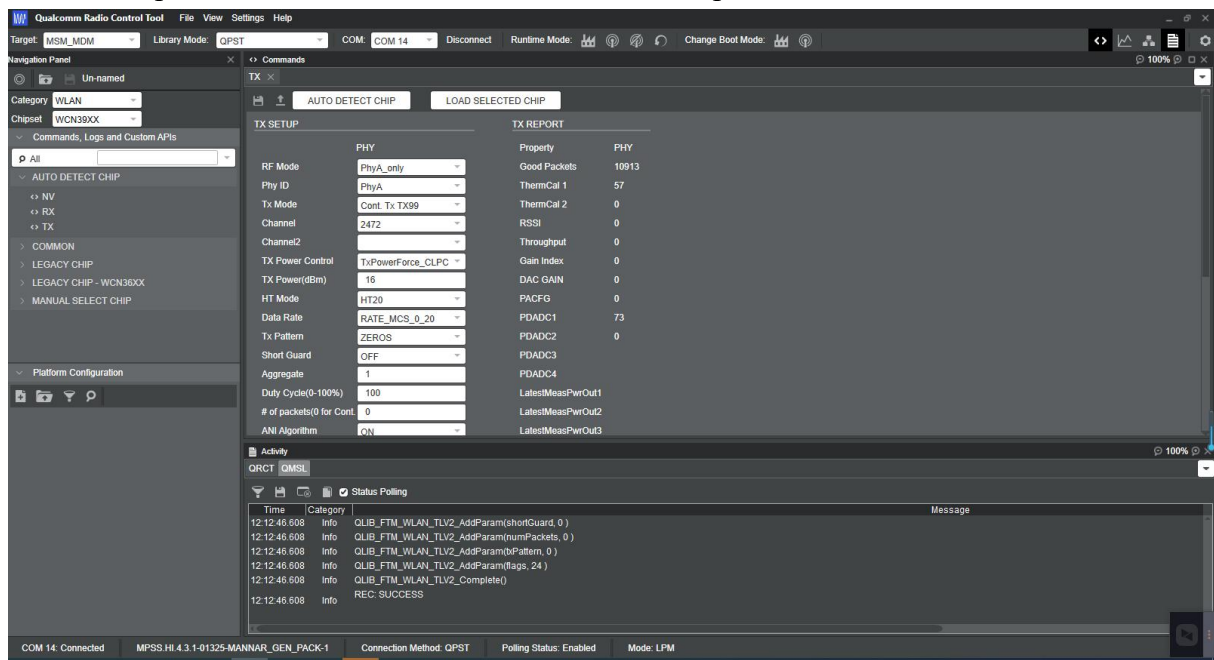
| AE ID* | Description | dB*                                  |
|--------|-------------|--------------------------------------|
| AE1    | RF cable    | 2.4GHz:1.2<br>5GHz: 2.5<br>6GHz: 2.5 |

\*AE ID: is used to identify the test sample in the lab internally.

dB\*: is provided customer.

### 3.4. EUT Test RF Confagle ConPicuration

EUT uses tool to control emission measurement,Change power level, channel, rate and HT .11b transmitter power level set to 15;11g transmitter power level set to 12;11n HT20 transmitter power level set to 8;11n HT40 transmitter power level set to 8;11ax HE20 transmitter power level set to 8;11ax HE40 transmitter power level set to 8.



### 3.5. Test software line loss compensation list

| Frequency(MHz) | Cable loss(dB) |
|----------------|----------------|
| 2400           | 1.2            |
| 5000           | 1.8            |
| 5800           | 2.0            |

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|                                                                                                                                                                                                                                                                                                                                                                     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 6000                                                                                                                                                                                                                                                                                                                                                                | 2.2 |
| 7000                                                                                                                                                                                                                                                                                                                                                                | 2.5 |
| Note: The test line loss file consists of two parts: the cable line loss provided by the customer, see report 3.3 RF cable for details; All cable losses used in system construction are detailed in this table. The test line loss file value was called by the testing software and has been compensated for in the test power test project and PSD test project. |     |

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## 4. Reference Documents

### 4.1. Documents supplied by applicant

PICS/PIXIT, referring to Annex B for detailed information, is supplied by the client or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference                                         | Title                                                                                                                                                                                    | Version |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| FCC Part 15, Subpart C                            | Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices                                                                                                 | --      |
| ANSI C63.10                                       | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                                                                                           | 2013    |
| KDB 662911 D01 Multiple Transmitter Output v02r01 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band                                                                                                                 | 2013    |
| KDB 558074 D01 15.247 Meas Guidance v05r02        | GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES | 2019    |

Note1: KDB 558074/662911 is not A2AL certified.

## 5. Test Equipments Utilized

### 5.1. RF Test System

| No. | Equipment         | Model  | SN         | HW Version | SW Version | Manufacture | Cal.Due Date |
|-----|-------------------|--------|------------|------------|------------|-------------|--------------|
| 1   | spectrum analyzer | N9030A | MY55410223 | --         | --         | Keysight    | 2023-06-29   |
| 2   | spectrum analyzer | N9030B | MY57140708 | --         | --         | Keysight    | 2023-06-29   |

### 5.2. RSE Test System

| No. | Equipment                                 | Model     | SN         | HW Version | SW Version | Manufacture | Cal.Due Date |
|-----|-------------------------------------------|-----------|------------|------------|------------|-------------|--------------|
| 1   | Test Receiver                             | ESU40     | 100350     | 01         | 4.43 SP3   | R&S         | 2023-06-29   |
| 2   | Ultra-wideband<br>Log Periodic<br>Antenna | VULB 9163 | 9163-586   | --         | --         | Schwarzbeck | 2024-10-28   |
| 3   | Double Ridged<br>Guide Antenna            | 9120D     | 9120D-1103 | --         | --         | Schwarzbeck | 2024-05-05   |
| 4   | Test Receiver                             | ESW 26    | 101382     | 00         | 1.50 SP1   | R&S         | 2023-06-29   |
| 5   | 18GHz-26.5GHz<br>Horn Antenna             | DATE 1152 | LM7127     | --         | --         | ETS         | 2024-09-06   |
| 6   | Loop Antenna                              | 6502      | 00143163   | --         | --         | ETS         | 2024-09-06   |
| 7   | Preamplifier                              | SCU-08F1  | 08320027   | --         | --         | R&S         | --           |
| 8   | Preamplifier                              | SCU-18F   | 180093     | --         | --         | R&S         | --           |

### 5.3. CE Test System

| No. | Equipment                  | Model   | SN     | HW Version | SW Version | Manufacture | Cal.Due Date |
|-----|----------------------------|---------|--------|------------|------------|-------------|--------------|
| 1   | Test Receiver              | ESR 3   | 102477 | 03         | 3.48 SP2   | R&S         | 2023-06-29   |
| 2   | ArtiPicial Main<br>Network | ENV 216 | 102368 | --         | --         | R&S         | 2023-04-31   |

### 5.4. Climate Chamber

| No. | Name                   | Type   | SN | Manufacture | Cal.Due Date |
|-----|------------------------|--------|----|-------------|--------------|
| 1   | Fully anechoic chamber | FAC-5  | -- | TDK         | 2024-08-30   |
| 2   | Semi-anechoic chamber  | FAC-10 | -- | TDK         | 2024-08-28   |

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**5.5. Vibration table**

| No. | Name | Type | SN | Manufacture | Cal.Due Date |
|-----|------|------|----|-------------|--------------|
| --  | --   | --   | -- | --          | --           |

**Anechoic chamber**

Fully anechoic chamber by TDK.

**5.6. Test software**

| No. | Name     | version   | SN | Manufacture                                                   |
|-----|----------|-----------|----|---------------------------------------------------------------|
| 1   | EMC32    | V 9.26.01 | -- | R&S                                                           |
| 2   | EMC32    | V10.20.10 | -- | R&S                                                           |
| 3   | T-RFS500 | V2.0      | -- | Manufacturer:Beijing<br>Zhiwang Xince Technology<br>Co., Ltd. |

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## 6. Test Results

### 6.1. Summary of Test Results

A brief summary of the tests carried out is shown as following.

| FCC Rules                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Name of Test                            | Result                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------|
| FCC Part 15.247(b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Maximun Conducted Output Power          | Pass                  |
| FCC CFR Part 15.247(e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Peak Power Spectral Density             | Pass                  |
| FCC 47 CFR Part 15.247(a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6dB Occupied Bandwidth                  | Pass                  |
| FCC 47 CFR Part 15.247(d)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Band Edges -conducted                   | Pass                  |
| FCC 47 CFR Part 15.247(d)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Band Edges Compliance-Radiated          | Pass                  |
| FCC 47 CFR Part15.247 (d)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Transmitter Spurious Emission-Conducted | Pass                  |
| FCC 47 CFR Part 15.247, 15.205, 15.209                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Transmitter Spurious Emission-Radiated  | Pass                  |
| FCC 47 CFR Part15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Power line Conducted Emissions          | Pass                  |
| FCC 47 CFR Part 15.203                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Antenna requiement                      | Pass <sup>note1</sup> |
| Note1:The EUT have two RF welding disc interfaces for connecting external antennas and contain the two unique antenna connectors. Antenna type is Sector Glue Stick Antenna ; Two antenna ports use same antennas. The max antenna gain is : 2.4G: 2.97dBi, UNII 1: 3.50dBi, UNII 2C: 3.94dBi, UNII 3: 3.52dBi, UNII 5: 3.99dBi, UNII 6: 3.29dBi, UNII 7: 3.95dBi, UNII 8: 3.82dBi; So this EUT Complies with the FCC section 15.203 antenna requirements, please refer to the internal photos. |                                         |                       |

## 6.2. Maximun Conducted Output Power

|                           |                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------|
| <b>SpeciPications:</b>    | FCC Part 15.247(b)                                                                      |
| <b>DUT Serial Number:</b> | S1                                                                                      |
| <b>Test conditions:</b>   | Ambient Temperature: 15°C-35°C<br>Relative Humidity: 30%-60%<br>Air pressure: 86-106kPa |
| <b>Test Results:</b>      | Pass                                                                                    |

### Limit Level Construction:

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note: Directional gain according to section 3.2 of this report

| Band | 802.11b/g<br>Directional gain (dBi) | 802.11n/ax<br>Directional gain (dBi) |
|------|-------------------------------------|--------------------------------------|
| 2.4G | 2.97                                | 5.98                                 |

### Measurement Uncertainty:

|                         |         |
|-------------------------|---------|
| Measurement Uncertainty | ±0.52dB |
|-------------------------|---------|

The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.

Enable EUT transmitter maximum power continuously.

**Method of Measurement:** See ANSI C63.10-2013-clause 11.9.2.2.2

- a) Set span to at least 1.5 times the OBW.
- b) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- c) Set VBW  $\geq [3 \cdot \text{RBW}]$ .
- d) Number of points in sweep  $\geq [2 \cdot \text{span} / \text{RBW}]$ . (This gives bin-to-bin spacing  $\leq \text{RBW} / 2$ , so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- g) If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep.

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If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle  $\geq 98\%$ , and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”

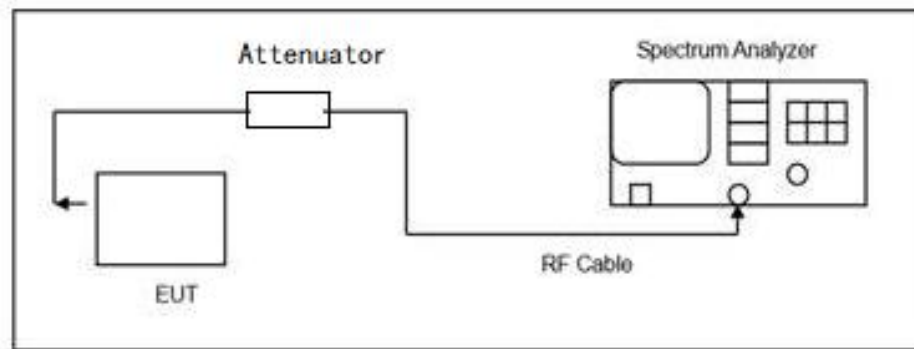
h) Trace average at least 100 traces in power averaging (rms) mode.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

**Note1:** The MIMO test requirement, RF conducted output power shall measure each transmitter chain by using channel power method. And after obtain each individual transmitter chain power, then sum the output power.

**Note2:** The test screenshot only reflects the worst-case rate results.

### Test block diagram:



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**Measurement Results:**
**Chain0**

| Mode          | Data Rate(Mbps) | Teat Result(dBm)(Av) |       |       | Conclusion |
|---------------|-----------------|----------------------|-------|-------|------------|
|               |                 | Ch1                  | Ch6   | Ch11  |            |
| 802.11b       | 1 Mbps          | 19.87                | /     | /     | PASS       |
|               | 2 Mbps          | 20.60                | 20.50 | 20.32 | PASS       |
|               | 5.5 Mbps        | 20.39                | /     | /     | PASS       |
|               | 11 Mbps         | 19.90                | /     | /     | PASS       |
| 802.11g       | 6 Mbps          | 17.12                | /     | /     | PASS       |
|               | 9 Mbps          | 17.11                | /     | /     | PASS       |
|               | 12 Mbps         | 17.13                | /     | /     | PASS       |
|               | 18 Mbps         | 17.18                | /     | /     | PASS       |
|               | 24 Mbps         | 17.69                | /     | /     | PASS       |
|               | 36 Mbps         | 17.74                | /     | /     | PASS       |
|               | 48 Mbps         | 17.79                | 17.73 | 17.68 | PASS       |
|               | 54 Mbps         | 17.74                | /     | /     | PASS       |
| 802.11n-HT20  | MCS 0           | 12.64                | /     | /     | PASS       |
|               | MCS 1           | 12.69                | /     | /     | PASS       |
|               | MCS 2           | 12.62                | /     | /     | PASS       |
|               | MCS 3           | 13.16                | /     | /     | PASS       |
|               | MCS 4           | 13.40                | /     | /     | PASS       |
|               | MCS 5           | 13.57                | /     | /     | PASS       |
|               | MCS 6           | 13.62                | 13.49 | 13.49 | PASS       |
|               | MCS 7           | 13.40                | /     | /     | PASS       |
| 802.11ax-HE20 | MCS 0           | 13.45                | /     | /     | PASS       |
|               | MCS 1           | 13.37                | /     | /     | PASS       |
|               | MCS 2           | 13.31                | /     | /     | PASS       |
|               | MCS 3           | 13.82                | /     | /     | PASS       |
|               | MCS 4           | 13.93                | /     | /     | PASS       |
|               | MCS 5           | 14.03                | /     | /     | PASS       |
|               | MCS 6           | 14.00                | /     | /     | PASS       |
|               | MCS 7           | 14.09                | 13.94 | 14.19 | PASS       |

The data rate 2M, 48Mbps, MCS6 and MCS7 are selected as worse condition, and the following cases are performed with this condition.

| Mode | Data Rate(Mbps) | Teat Result(dBm)(Av) |     |     | Conclusion |
|------|-----------------|----------------------|-----|-----|------------|
|      |                 | Ch3                  | Ch6 | Ch9 |            |

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|               |       |       |       |       |      |
|---------------|-------|-------|-------|-------|------|
| 802.11n-HT40  | MCS 0 | 12.44 | /     | /     | PASS |
|               | MCS 1 | 12.44 | /     | /     | PASS |
|               | MCS 2 | 12.58 | /     | /     | PASS |
|               | MCS 3 | 12.84 | /     | /     | PASS |
|               | MCS 4 | 13.11 | /     | /     | PASS |
|               | MCS 5 | 13.12 | /     | /     | PASS |
|               | MCS 6 | 13.12 | /     | /     | PASS |
|               | MCS 7 | 13.18 | 13.27 | 13.25 | PASS |
| 802.11ax-HE40 | MCS 0 | 13.36 | /     | /     | PASS |
|               | MCS 1 | 13.33 | /     | /     | PASS |
|               | MCS 2 | 13.38 | /     | /     | PASS |
|               | MCS 3 | 13.52 | /     | /     | PASS |
|               | MCS 4 | 13.77 | /     | /     | PASS |
|               | MCS 5 | 13.90 | 14.01 | 13.95 | PASS |
|               | MCS 6 | 13.88 | /     | /     | PASS |
|               | MCS 7 | 13.82 | /     | /     | PASS |

The data rate MCS7 and MCS5 are selected as worse condition, and the following cases are performed with this condition.

### Chain1

| Mode         | Data Rate(Mbps) | Teat Result(dBm)(Av) |       |       | Conclusion |
|--------------|-----------------|----------------------|-------|-------|------------|
|              |                 | Ch1                  | Ch6   | Ch11  |            |
| 802.11b      | 1 Mbps          | 19.65                | /     | /     | PASS       |
|              | 2 Mbps          | 20.51                | 20.46 | 20.67 | PASS       |
|              | 5.5 Mbps        | 20.11                | /     | /     | PASS       |
|              | 11 Mbps         | 19.43                | /     | /     | PASS       |
| 802.11g      | 6 Mbps          | 17.13                | /     | /     | PASS       |
|              | 9 Mbps          | 17.13                | /     | /     | PASS       |
|              | 12 Mbps         | 17.07                | /     | /     | PASS       |
|              | 18 Mbps         | 17.13                | /     | /     | PASS       |
|              | 24 Mbps         | 17.74                | /     | /     | PASS       |
|              | 36 Mbps         | 17.63                | /     | /     | PASS       |
|              | 48 Mbps         | 17.88                | /     | /     | PASS       |
|              | 54 Mbps         | 17.91                | 18.02 | 17.92 | PASS       |
| 802.11n-HT20 | MCS 0           | 12.12                | /     | /     | PASS       |
|              | MCS 1           | 12.14                | /     | /     | PASS       |
|              | MCS 2           | 12.21                | /     | /     | PASS       |
|              | MCS 3           | 12.69                | /     | /     | PASS       |

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|               |       |       |       |       |      |
|---------------|-------|-------|-------|-------|------|
|               | MCS 4 | 12.77 | /     | /     | PASS |
|               | MCS 5 | 12.87 | /     | /     | PASS |
|               | MCS 6 | 13.00 | 13.14 | 13.21 | PASS |
|               | MCS 7 | 12.81 | /     | /     | PASS |
| 802.11ax-HE20 | MCS 0 | 13.07 | /     | /     | PASS |
|               | MCS 1 | 12.92 | /     | /     | PASS |
|               | MCS 2 | 12.83 | /     | /     | PASS |
|               | MCS 3 | 13.53 | /     | /     | PASS |
|               | MCS 4 | 13.60 | /     | /     | PASS |
|               | MCS 5 | 13.61 | /     | /     | PASS |
|               | MCS 6 | 13.68 | /     | /     | PASS |
|               | MCS 7 | 13.74 | 13.90 | 13.83 | PASS |

The data rate 2M and 54Mbps, MCS6 and MCS7 are selected as worse condition, and the following cases are performed with this condition.

| Mode          | Data Rate(Mbps) | Teat Result(dBm)(Av) |       |       | Conclusion |
|---------------|-----------------|----------------------|-------|-------|------------|
|               |                 | Ch3                  | Ch6   | Ch9   |            |
| 802.11n-HT40  | MCS 0           | 12.39                | /     | /     | PASS       |
|               | MCS 1           | 12.34                | /     | /     | PASS       |
|               | MCS 2           | 12.38                | /     | /     | PASS       |
|               | MCS 3           | 12.71                | /     | /     | PASS       |
|               | MCS 4           | 13.03                | /     | /     | PASS       |
|               | MCS 5           | 12.99                | /     | /     | PASS       |
|               | MCS 6           | 12.99                | /     | /     | PASS       |
|               | MCS 7           | 13.10                | 13.00 | 13.14 | PASS       |
| 802.11ax-HE40 | MCS 0           | 13.15                | /     | /     | PASS       |
|               | MCS 1           | 13.12                | /     | /     | PASS       |
|               | MCS 2           | 13.21                | /     | /     | PASS       |
|               | MCS 3           | 13.47                | /     | /     | PASS       |
|               | MCS 4           | 13.64                | /     | /     | PASS       |
|               | MCS 5           | 13.72                | 13.75 | 13.86 | PASS       |
|               | MCS 6           | 13.66                | /     | /     | PASS       |
|               | MCS 7           | 13.68                | /     | /     | PASS       |

The data rate MCS7 and MCS5 are selected as worse condition, and the following cases are performed with this condition.

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### MIMO

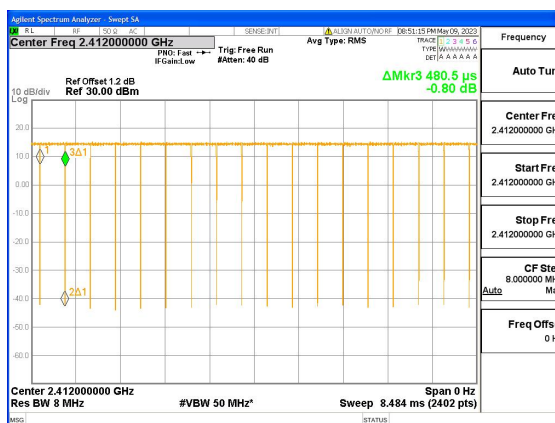
| Mode          | Chain0 Test Result(dBm) |       |       | Chain1 Test Result(dBm) |       |       | Totle Result(dBm) |       |       | Conclusion |
|---------------|-------------------------|-------|-------|-------------------------|-------|-------|-------------------|-------|-------|------------|
|               | Ch1                     | Ch6   | Ch11  | Ch1                     | Ch6   | Ch11  | Ch1               | Ch6   | Ch11  |            |
| 802.11n-HT20  | 13.62                   | 13.49 | 13.49 | 13.00                   | 13.14 | 13.21 | 16.33             | 16.33 | 16.36 | PASS       |
| 802.11ax-HE20 | 14.09                   | 13.94 | 14.19 | 13.74                   | 13.90 | 13.83 | 16.93             | 16.93 | 17.02 | PASS       |

| Mode          | Chain0 Test Result(dBm) |       |       | Chain1 Test Result(dBm) |       |       | Totle Result(dBm) |       |       | Conclusion |
|---------------|-------------------------|-------|-------|-------------------------|-------|-------|-------------------|-------|-------|------------|
|               | Ch3                     | Ch6   | Ch9   | Ch3                     | Ch6   | Ch9   | Ch3               | Ch6   | Ch9   |            |
| 802.11n-HT40  | 13.18                   | 13.27 | 13.25 | 13.10                   | 13.00 | 13.14 | 16.15             | 16.15 | 16.21 | PASS       |
| 802.11ax-HE40 | 13.90                   | 14.01 | 13.95 | 13.72                   | 13.75 | 13.86 | 16.82             | 16.89 | 16.92 | PASS       |

Test Picture as below:

Duty cycle:

|           |      |
|-----------|------|
| 11b       | >98% |
| 11g       | >98% |
| 11n-HT20  | >98% |
| 11n-HT40  | >98% |
| 11ax-HE20 | >98% |
| 11ax-HE40 | >98% |

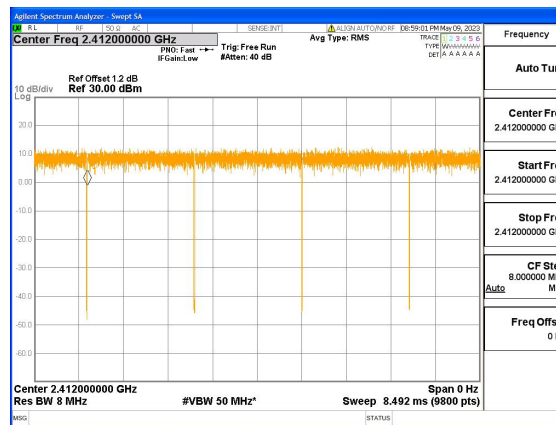


11b

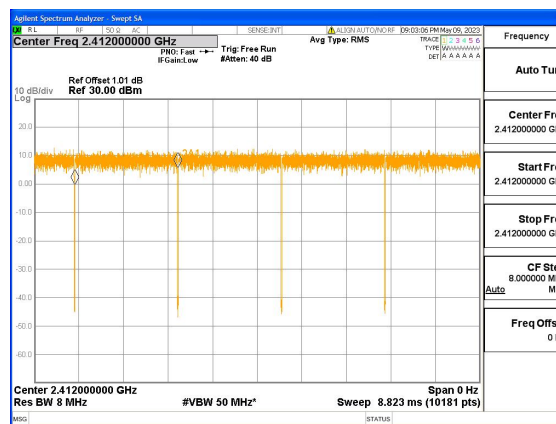
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11g



11n-HT20:

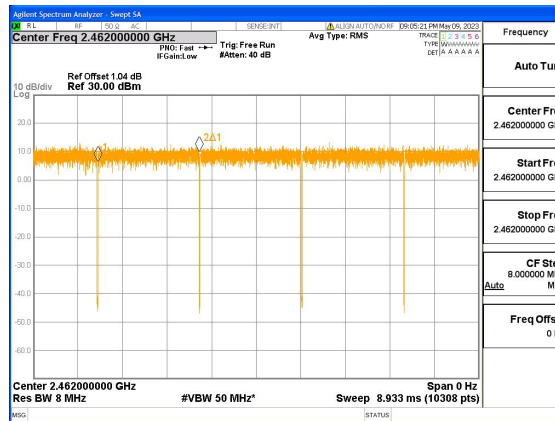


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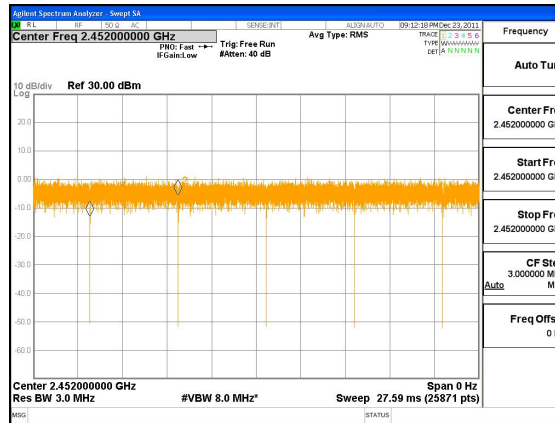
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11n-HT40:



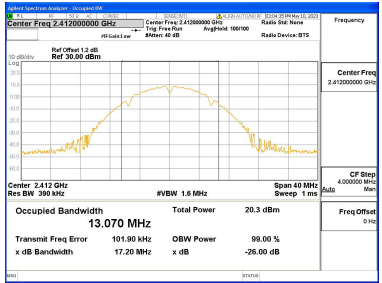
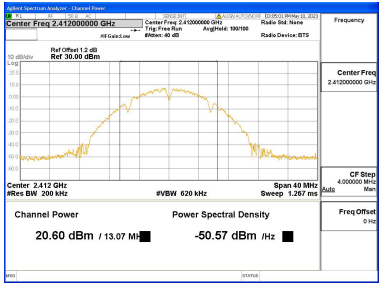
11ax-HE20:



11ax-HE40:

Chain0

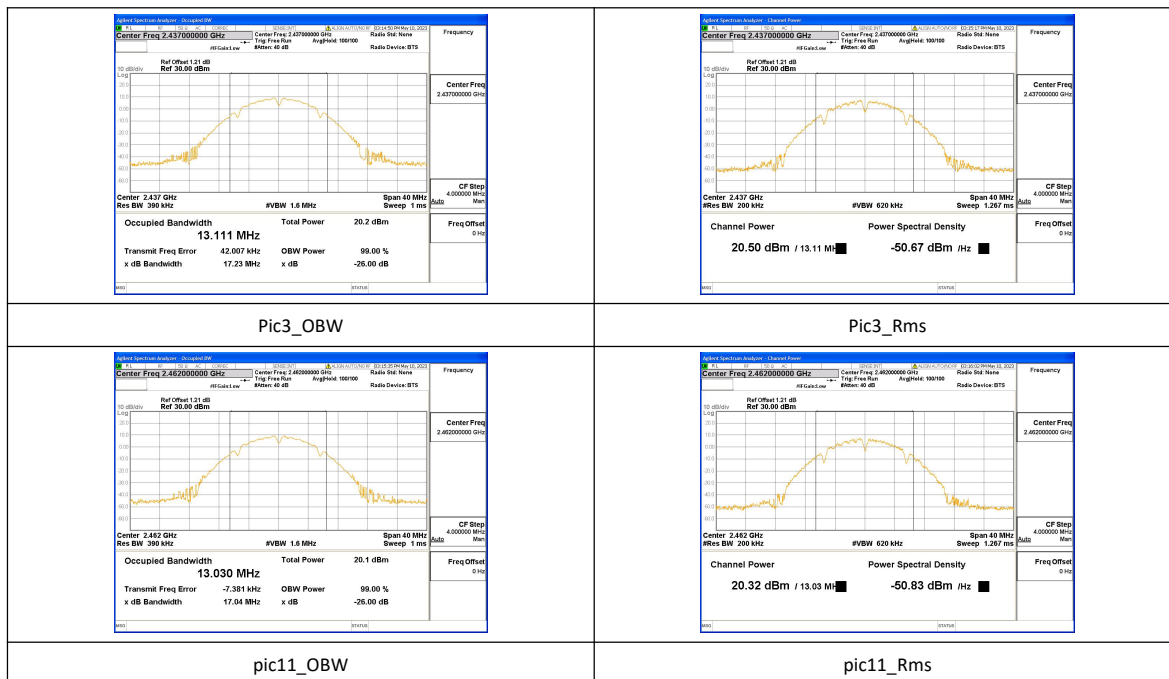
11b:

| Pic1_OBW                                                                            | Pic1_Rms                                                                             |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |
| Pic2_OBW                                                                            | Pic2_Rms                                                                             |

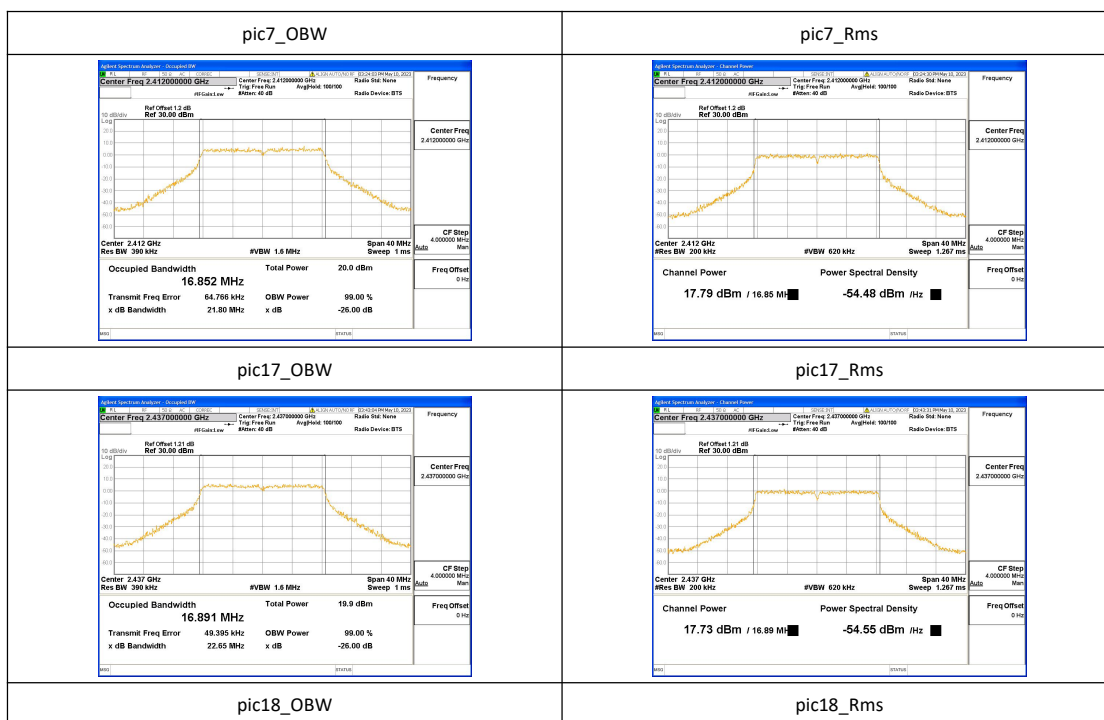
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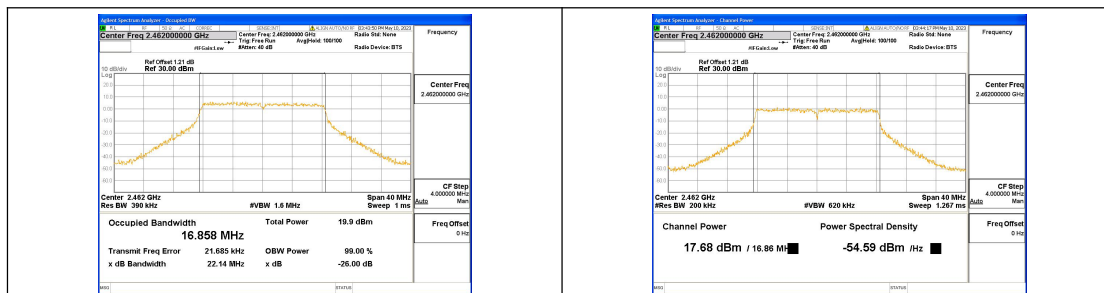
11g:



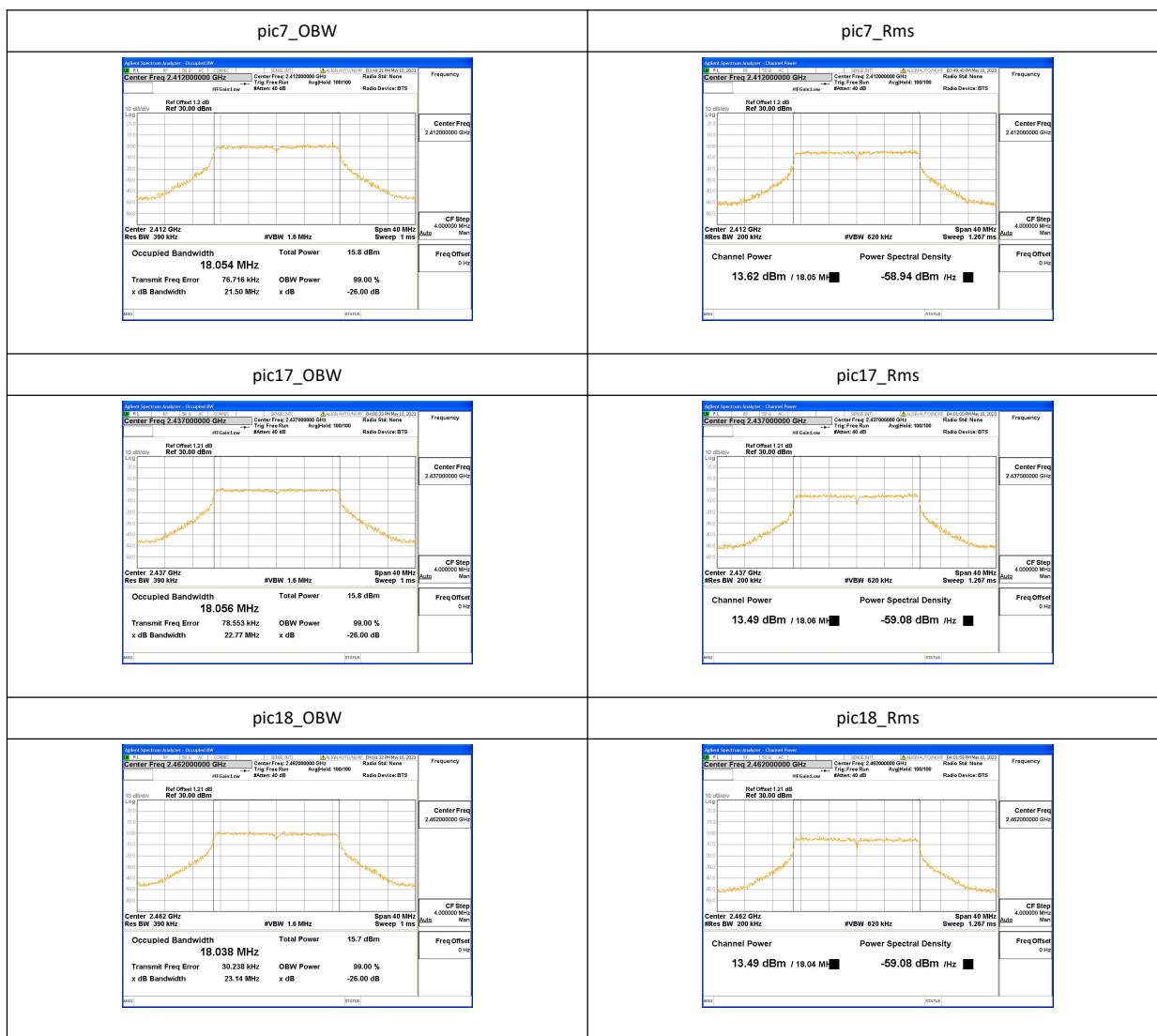
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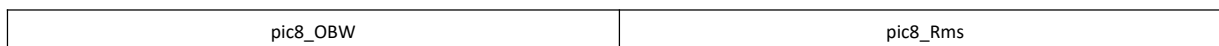
# Report No.: I22W00019-WiFi RF-2.4GHz-Rev4



11n-HT20:



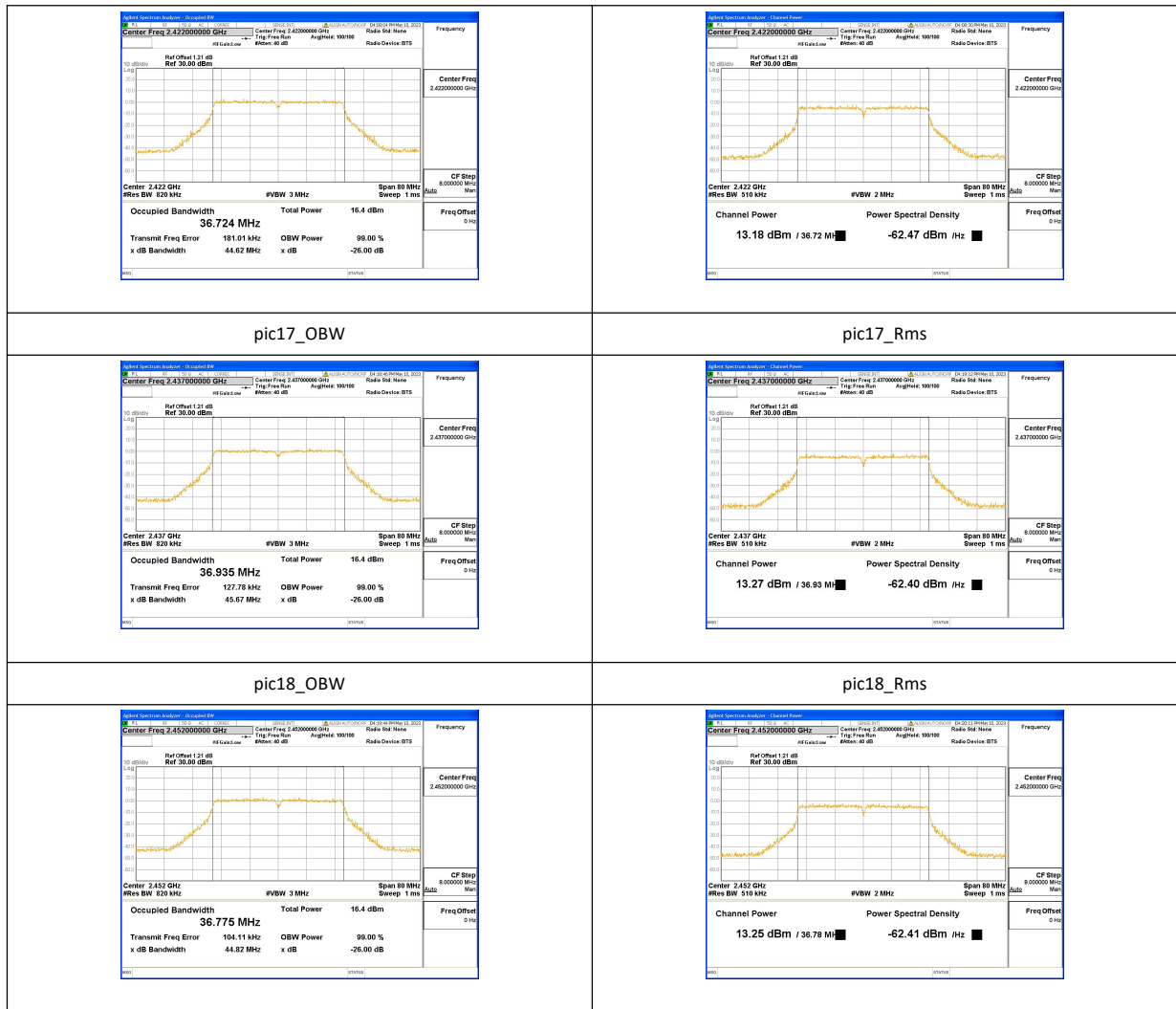
11n-HT40:



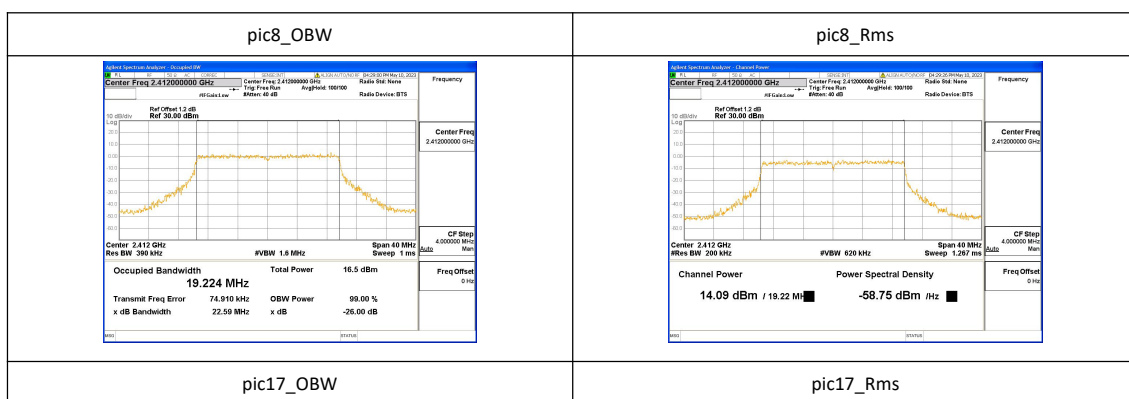
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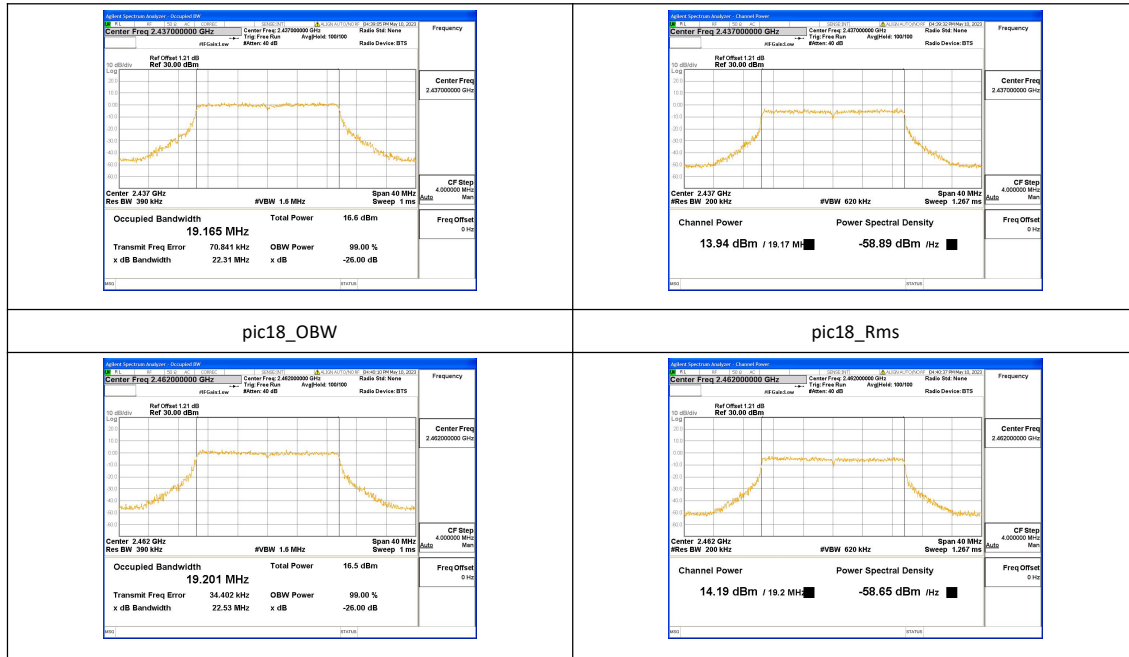
11ax-HE20:



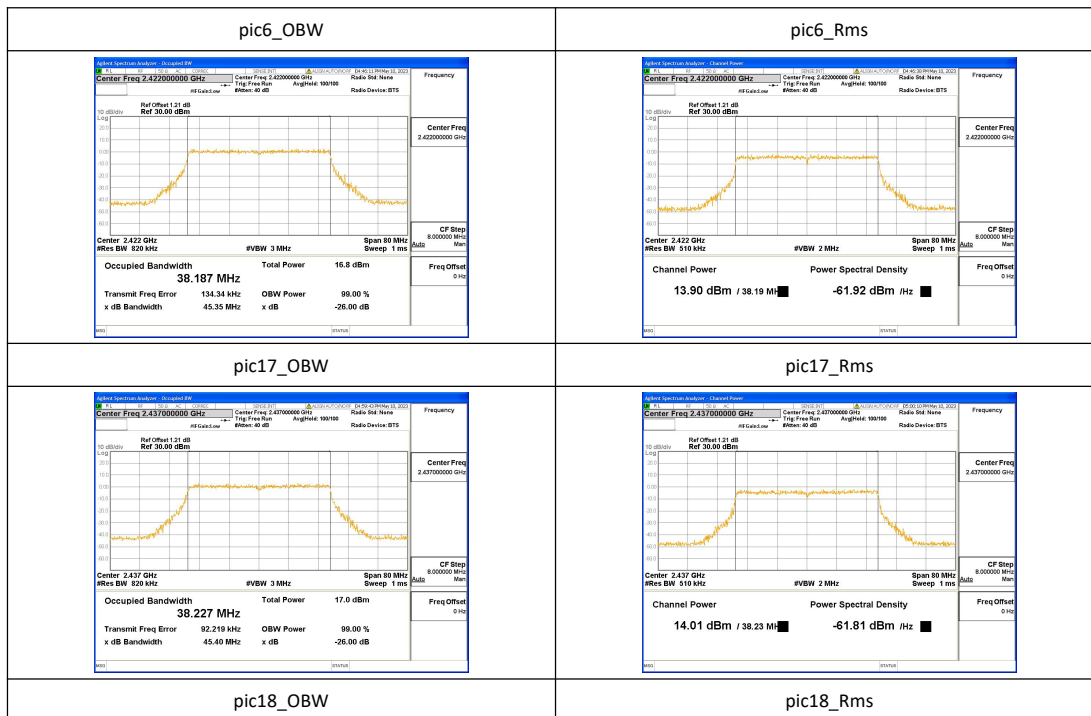
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11ax-HE40:



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