



# RF MPE Report

**Applicant:** Quectel Wireless Solutions Co., Ltd.  
**Address:** Building 5, Shanghai Business Park Phase III (Area B), No.1016  
Tianlin Road, Minhang District, Shanghai, 200233, China  
**Product:** IATF 16949 Compliant Automotive Grade 5G NR + DSDS Module  
**Model No.:** AG598E-ROWA  
**Brand Name:** QUECTEL  
**FCC ID:** XMR025AG598EROWA  
**Standards:** 47 CFR Part 2.1091  
FCC KDB 447498 D01 v06  
**Report No.:** PD20250077-R3F  
**Issue Date:** 2025/08/15  
**Test Result:** PASS \*

\* Testing performed at Hefei Panwin Technology Co., Ltd. on the above equipment indicates the product meets the requirements of the relevant standards.

**Reviewed By:** Charlie Wang

**Approved By:** Alec Yang

## Hefei Panwin Technology Co., Ltd.

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## Revision History

| Report No.     | Version | Description    | Issue Date | Note  |
|----------------|---------|----------------|------------|-------|
| PD20250077-R3F | 01      | Initial Report | 2025/08/15 | Valid |

### Remark:

- The samples tested have been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and have been proven to meet the applicable limit requirements.

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## 1 Test Laboratory

### 1.1 Notes of the Test Report

This report is invalid without signature of auditor and approver or with any alterations. The report shall not be partially reproduced without written approval of the testing company. Entrusted test results are only responsible for incoming samples. If there is any objection to the testing report, it shall be raised to the testing company within 15 days from the date of receiving the report. In the test results, "NA" means "not applicable", and the test items marked with "Δ" are subcontracted projects.

### 1.2 Testing Laboratory

|              |                                                                                                                                |
|--------------|--------------------------------------------------------------------------------------------------------------------------------|
| Company Name | Hefei Panwin Technology Co., Ltd.                                                                                              |
| Address      | Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province, China |
| Telephone    | +86-0551-63811775                                                                                                              |
| Post Code    | 230031                                                                                                                         |

## 2 General Description of Equipment under Test

### 2.1 Details of Application

|                      |                                                                                                                        |
|----------------------|------------------------------------------------------------------------------------------------------------------------|
| Applicant            | Quectel Wireless Solutions Co., Ltd.                                                                                   |
| Applicant Address    | Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, 200233, China |
| Manufacturer         | Quectel Wireless Solutions Co., Ltd.                                                                                   |
| Manufacturer Address | Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, 200233, China |

## 2.2 Details of EUT

|                                                                                                                                                                                                                                    |                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Product                                                                                                                                                                                                                            | IATF 16949 Compliant Automotive Grade 5G NR + DSDS Module                        |
| Model                                                                                                                                                                                                                              | AG598E-ROWA                                                                      |
| Hardware Version                                                                                                                                                                                                                   | R1.1<br>R1.2                                                                     |
| Software Version                                                                                                                                                                                                                   | AG598EROWAABR02A10M8G_OCPU<br>AG598EROWABR02A10M8G_OCPU_YOCTO                    |
| Antenna Type                                                                                                                                                                                                                       | <input checked="" type="checkbox"/> External <input type="checkbox"/> Integrated |
| <b>Note:</b> The declared of product specification for EUT and/or Antenna presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |                                                                                  |

## 3 Test Condition

### 3.1 Laboratory Environment

|                                                                                                                                                                                                            |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Temperature                                                                                                                                                                                                | Min.= 20℃, Max.=30℃ |
| Relative Humidity                                                                                                                                                                                          | Min.= 25%, Max.=75% |
| Ground System Resistance                                                                                                                                                                                   | < 1 Ω               |
| <p>Ambient noise is checked and found very low and in compliance with requirement of standards.</p> <p>Reflection of surrounding objects is minimized and in compliance with requirement of standards.</p> |                     |

## 4 Maximum Permissible Exposure (MPE)

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

| Table 1 to § 1.1310(e)(1)—Limits for Maximum Permissible Exposure (MPE) |                                     |                                     |                                        |                                |
|-------------------------------------------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|--------------------------------|
| Frequency Range<br>(MHz)                                                | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm <sup>2</sup> ) | Averaging<br>time<br>(minutes) |
| (i) Limits for Occupational/Controlled Exposure                         |                                     |                                     |                                        |                                |
| 0.3–3.0                                                                 | 614                                 | 1.63                                | *(100)                                 | ≤6                             |
| 3.0–30                                                                  | 1842/f                              | 4.89/f                              | *(900/f <sup>2</sup> )                 | <6                             |
| 30–300                                                                  | 61.4                                | 0.163                               | 1.0                                    | <6                             |
| 300–1,500                                                               | --                                  | --                                  | f/300                                  | <6                             |
| 1,500–100,000                                                           | --                                  | --                                  | 5                                      | <6                             |
| (ii) Limits for General Population/Uncontrolled Exposure                |                                     |                                     |                                        |                                |
| 0.3–1.34                                                                | 614                                 | 1.63                                | *(100)                                 | <30                            |
| 1.34–30                                                                 | 824/f                               | 2.19/f                              | *(180/f <sup>2</sup> )                 | <30                            |
| 30–300                                                                  | 27.5                                | 0.073                               | 0.2                                    | <30                            |
| 300–1,500                                                               | --                                  | --                                  | f/1500                                 | <30                            |
| 1,500–100,000                                                           | --                                  | --                                  | 1.0                                    | <30                            |
| f = frequency in MHz. * = Plane-wave equivalent power density.          |                                     |                                     |                                        |                                |

The transmitter is using external antennas that operate at 20 cm or more from nearby persons. The maximum permitted level is calculated using the general equation:

$$S = PG / 4\pi R^2$$

Where:

**S** = power density (in appropriate units, e.g. Wm<sup>2</sup>)

**P** = power input to the antenna (in appropriate units, e.g., W)

**G** = power gain of the antenna in the direction of interest relative to an isotropic radiator

**R** = distance to the center of radiation of the antenna (appropriate units, e.g., m)

Solve S, the power density at 20 cm is shown in Appendix A, so the limit is kept.

----- THE END -----

## ANNEX A: RF Exposure Evaluation

### Maximum Measured Conducted Output Power and Antenna Gain

| Band    | Burst Turn up Power(dBm) | Division Factors (dB) | Time-Averaged Tune up Power (dBm) |
|---------|--------------------------|-----------------------|-----------------------------------|
| GSM850  | 35.00                    | -9.03                 | 25.97                             |
| GSM1900 | 32.00                    | -9.03                 | 22.97                             |

Remark:

To average the power, the division factor is as follows,

1Txslot = 1 transmit time slot out of 8 time slots => conducted power divided by (1/8) => -9.03 dB

| Band             | TX Freq. (MHz) | Maximum conducted output power (dBm) | Maximum Antenna Gain (dBi) |
|------------------|----------------|--------------------------------------|----------------------------|
| GSM 850          | 824 to 849     | 25.97                                | 0.30                       |
| GSM 1900         | 1850 to 1910   | 22.97                                | 1.80                       |
| WCDMA Band II    | 1850 to 1910   | 25.00                                | 1.80                       |
| WCDMA Band IV    | 1710 to 1755   | 25.00                                | 1.20                       |
| WCDMA Band V     | 824 to 849     | 25.00                                | 0.30                       |
| LTE Band 2       | 1850 to 1910   | 25.00                                | 1.80                       |
| LTE Band 4       | 1710 to 1755   | 25.00                                | 1.20                       |
| LTE Band 5       | 824 to 849     | 25.00                                | 0.30                       |
| LTE Band 7       | 2500 to 2570   | 25.00                                | 1.40                       |
| LTE Band 12      | 699 to 716     | 25.00                                | -0.50                      |
| LTE Band 25      | 1850 to 1915   | 25.00                                | 1.80                       |
| LTE Band 26      | 814 to 849     | 25.00                                | 0.30                       |
| LTE Band 38      | 2570 to 2620   | 25.00                                | 1.40                       |
| LTE Band 41(PC2) | 2496 to 2690   | 28.00                                | 1.40                       |
| LTE Band 42      | 3450 to 3550   | 25.00                                | 3.40                       |
| LTE Band 66      | 1710 to 1780   | 25.00                                | 1.50                       |
| LTE Band 71      | 663 to 698     | 25.00                                | -0.90                      |
| NR Band n2       | 1850 to 1910   | 25.00                                | 1.80                       |
| NR Band n5       | 824 to 849     | 25.00                                | 0.30                       |
| NR Band n7       | 2500 to 2570   | 25.00                                | 1.40                       |
| NR Band n12      | 699 to 716     | 25.00                                | -0.50                      |
| NR Band n25      | 1850 to 1915   | 25.00                                | 1.80                       |

|                         |              |       |       |
|-------------------------|--------------|-------|-------|
| NR Band n26             | 814 to 849   | 25.00 | 0.30  |
| NR Band n38             | 2570 to 2620 | 25.00 | 1.40  |
| NR Band n41             | 2496 to 2690 | 28.00 | 1.40  |
| NR Band n66             | 1710 to 1780 | 25.00 | 1.50  |
| NR Band n71             | 663 to 698   | 25.00 | -0.90 |
| NR Band n77 (3450-3550) | 3450 to 3550 | 27.00 | 1.88  |
| NR Band n77 (3700-3980) | 3700 to 3980 | 27.00 | 1.88  |
| NR Band n78 (3450-3550) | 3450 to 3550 | 27.00 | 1.88  |
| NR Band n78 (3700-3800) | 3700 to 3800 | 27.00 | 1.88  |

## Test Results of Maximum Permissible Exposure

| Band                    | Frequency (MHz) | Maximum Power (dBm) | Antenna Gain (dBi) | FCC ERP/EIRP Limit(W) | FCC MPE Result (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) | FCC MPE Result / FCC MPE Limit Ratio | Ant Gain to Meet FCC MPE limit (dBi) | Ant Gain to Meet FCC ERP/EIRP limit (dBi) | Max Gain Allowed (dBi) |
|-------------------------|-----------------|---------------------|--------------------|-----------------------|--------------------------------------|---------------------------------|--------------------------------------|--------------------------------------|-------------------------------------------|------------------------|
| GSM 850                 | 824.0           | 25.97               | 0.30               | 7.000                 | 0.0843                               | 0.5493                          | 0.1534                               | 8.4                                  | 12.5                                      | 8.4                    |
| GSM 1900                | 1850.0          | 22.97               | 1.80               | 2.000                 | 0.0597                               | 1.0000                          | 0.0597                               | 14.0                                 | 10.0                                      | 10.0                   |
| WCDMA Band II           | 1850.0          | 25.00               | 1.80               | 2.000                 | 0.0952                               | 1.0000                          | 0.0952                               | 12.0                                 | 8.0                                       | 8.0                    |
| WCDMA Band IV           | 1710.0          | 25.00               | 1.20               | 1.000                 | 0.0829                               | 1.0000                          | 0.0829                               | 12.0                                 | 5.0                                       | 5.0                    |
| WCDMA Band V            | 824.0           | 25.00               | 0.30               | 7.000                 | 0.0674                               | 0.5493                          | 0.1227                               | 9.4                                  | 13.5                                      | 9.4                    |
| LTE Band 2              | 1850.0          | 25.00               | 1.80               | 2.000                 | 0.0952                               | 1.0000                          | 0.0952                               | 12.0                                 | 8.0                                       | 8.0                    |
| LTE Band 4              | 1710.0          | 25.00               | 1.20               | 1.000                 | 0.0829                               | 1.0000                          | 0.0829                               | 12.0                                 | 5.0                                       | 5.0                    |
| LTE Band 5              | 824.0           | 25.00               | 0.30               | 7.000                 | 0.0674                               | 0.5493                          | 0.1227                               | 9.4                                  | 13.5                                      | 9.4                    |
| LTE Band 7              | 2500.0          | 25.00               | 1.40               | 2.000                 | 0.0868                               | 1.0000                          | 0.0868                               | 12.0                                 | 8.0                                       | 8.0                    |
| LTE Band 12             | 699.0           | 25.00               | -0.50              | 3.000                 | 0.0561                               | 0.4660                          | 0.1203                               | 8.7                                  | 9.8                                       | 8.7                    |
| LTE Band 25             | 1850.0          | 25.00               | 1.80               | 2.000                 | 0.0952                               | 1.0000                          | 0.0952                               | 12.0                                 | 8.0                                       | 8.0                    |
| LTE Band 26             | 814.0           | 25.00               | 0.30               | 7.000                 | 0.0674                               | 0.5427                          | 0.1242                               | 9.4                                  | 13.5                                      | 9.4                    |
| LTE Band 38             | 2570.0          | 25.00               | 1.40               | 2.000                 | 0.0868                               | 1.0000                          | 0.0868                               | 12.0                                 | 8.0                                       | 8.0                    |
| LTE Band 41(PC2)        | 2496.0          | 28.00               | 1.40               | 2.000                 | 0.1733                               | 1.0000                          | <b>0.1733</b>                        | 9.0                                  | 5.0                                       | 5.0                    |
| LTE Band 42             | 3450.0          | 25.00               | 3.40               | 1.000                 | 0.1376                               | 1.0000                          | 0.1376                               | 12.0                                 | 5.0                                       | 5.0                    |
| LTE Band 66             | 1710.0          | 25.00               | 1.50               | 1.000                 | 0.0889                               | 1.0000                          | 0.0889                               | 12.0                                 | 5.0                                       | 5.0                    |
| LTE Band 71             | 663.0           | 25.00               | -0.90              | 3.000                 | 0.0511                               | 0.4420                          | 0.1157                               | 8.5                                  | 9.8                                       | 8.5                    |
| NR Band n2              | 1850.0          | 25.00               | 1.80               | 2.000                 | 0.0952                               | 1.0000                          | 0.0952                               | 12.0                                 | 8.0                                       | 8.0                    |
| NR Band n5              | 824.0           | 25.00               | 0.30               | 7.000                 | 0.0674                               | 0.5493                          | 0.1227                               | 9.4                                  | 13.5                                      | 9.4                    |
| NR Band n7              | 2500.0          | 25.00               | 1.40               | 2.000                 | 0.0868                               | 1.0000                          | 0.0868                               | 12.0                                 | 8.0                                       | 8.0                    |
| NR Band n12             | 699.0           | 25.00               | -0.50              | 3.000                 | 0.0561                               | 0.4660                          | 0.1203                               | 8.7                                  | 9.8                                       | 8.7                    |
| NR Band n25             | 1850.0          | 25.00               | 1.80               | 2.000                 | 0.0952                               | 1.0000                          | 0.0952                               | 12.0                                 | 8.0                                       | 8.0                    |
| NR Band n26             | 814.0           | 25.00               | 0.30               | 7.000                 | 0.0674                               | 0.5427                          | 0.1242                               | 9.4                                  | 13.5                                      | 9.4                    |
| NR Band n38             | 2570.0          | 25.00               | 1.40               | 2.000                 | 0.0868                               | 1.0000                          | 0.0868                               | 12.0                                 | 8.0                                       | 8.0                    |
| NR Band n41             | 2496.0          | 28.00               | 1.40               | 2.000                 | 0.1733                               | 1.0000                          | <b>0.1733</b>                        | 9.0                                  | 5.0                                       | 5.0                    |
| NR Band n66             | 1710.0          | 25.00               | 1.50               | 1.000                 | 0.0889                               | 1.0000                          | 0.0889                               | 12.0                                 | 5.0                                       | 5.0                    |
| NR Band n71             | 663.0           | 25.00               | -0.90              | 3.000                 | 0.0511                               | 0.4420                          | 0.1157                               | 8.5                                  | 9.8                                       | 8.5                    |
| NR Band n77 (3450-3550) | 3450.0          | 27.00               | 1.88               | 1.000                 | 0.1537                               | 1.0000                          | 0.1537                               | 10.0                                 | 3.0                                       | 3.0                    |
| NR Band n77 (3700-3980) | 3700.0          | 27.00               | 1.88               | 1.000                 | 0.1537                               | 1.0000                          | 0.1537                               | 10.0                                 | 3.0                                       | 3.0                    |
| NR Band n78 (3450-3550) | 3450.0          | 27.00               | 1.88               | 1.000                 | 0.1537                               | 1.0000                          | 0.1537                               | 10.0                                 | 3.0                                       | 3.0                    |
| NR Band n78 (3700-3800) | 3700.0          | 27.00               | 1.88               | 1.000                 | 0.1537                               | 1.0000                          | 0.1537                               | 10.0                                 | 3.0                                       | 3.0                    |

**Note 1:** For mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate EMF distance is less.

**Note 2:** For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

**Note 3:** Chose the maximum RF output tune up power of all antennas among same frequency WWAN bands and the maximum antenna gain to perform MPE calculation conservatively.

## Collocated Power Density Calculation

| WWAN LTE Worst case situation | WWAN NR Worst case situation | $\Sigma$ Worst case situation of WWAN<br>LTE + WWAN NR |
|-------------------------------|------------------------------|--------------------------------------------------------|
| 0.1733                        | 0.1733                       | 0.3466                                                 |

### Note:

1. For collocation analysis, LTE band 41 is chosen for summation due to the highest (power density/limit) among all LTE modes.
2. For collocation analysis, NR n41 is chosen for summation due to the highest (power density/limit) among all NR modes.
3.  $\Sigma$ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)], for WWAN LTE+ WWAN NR.
4. Considering the WWAN LTE module collocation with the WWAN NR transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant.

## ANNEX B: The EUT Appearance

The EUT Appearance (internal and external photographs) are submitted separately.