

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                     |                                             |                           |                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------|------------------------------|
| <b>Prüfbericht-Nr.:</b><br><i>Test report no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>CN23GDAD 003</b>                                                                                                                                 | <b>Auftrags-Nr.:</b><br><i>Order no.:</i>   | <b>168361679</b>          | Seite 1 von 9<br>Page 1 of 9 |
| <b>Kunden-Referenz-Nr.:</b><br><i>Client reference no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                                                                                                                                                 | <b>Auftragsdatum:</b><br><i>Order date:</i> | 2022-03-04                |                              |
| <b>Auftraggeber:</b><br><i>Client:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Hui Zhou Gaoshengda Technology Co.,LTD</b><br>No.2, Jin-da Road, Huinan High-tech Industrial Park, Hui-ao Avenue, Huizhou City, Guangdong, China |                                             |                           |                              |
| <b>Prüfgegenstand:</b><br><i>Test item:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                   | WIFI Module                                                                                                                                         |                                             |                           |                              |
| <b>Bezeichnung / Typ-Nr.:</b><br><i>Identification / Type no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                            | D31R1601F, D31R1601<br>(Trademark: GSD)                                                                                                             |                                             |                           |                              |
| <b>Auftrags-Inhalt:</b><br><i>Order content:</i>                                                                                                                                                                                                                                                                                                                                                                                                                              | Test Report                                                                                                                                         |                                             |                           |                              |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                           | CFR47 FCC Part 2.1091<br>RSS-102 Issue 5 February 2021                                                                                              |                                             |                           |                              |
| <b>Wareneingangsdatum:</b><br><i>Date of sample receipt:</i>                                                                                                                                                                                                                                                                                                                                                                                                                  | 2022-03-08                                                                                                                                          | Please refer to Photo Document              |                           |                              |
| <b>Prüfmuster-Nr.:</b><br><i>Test sample no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                             | A003220063-005~010                                                                                                                                  |                                             |                           |                              |
| <b>Prüfzeitraum:</b><br><i>Testing period:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                | 2023-11-07 - 2023-11-14                                                                                                                             |                                             |                           |                              |
| <b>Ort der Prüfung:</b><br><i>Place of testing:</i>                                                                                                                                                                                                                                                                                                                                                                                                                           | TÜV Rheinland<br>(Shenzhen) Co., Ltd.                                                                                                               |                                             |                           |                              |
| <b>Prüflaboratorium:</b><br><i>Testing laboratory:</i>                                                                                                                                                                                                                                                                                                                                                                                                                        | TÜV Rheinland<br>(Shenzhen) Co., Ltd.                                                                                                               |                                             |                           |                              |
| <b>Prüfergebnis*:</b><br><i>Test result*:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                 | Pass                                                                                                                                                |                                             |                           |                              |
| <b>geprüft von:</b><br><i>tested by:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>genehmigt von:</b><br><i>authorized by:</i>                                                                                                      |                                             |                           |                              |
| <b>Datum:</b><br><i>Date:</i> 2023-12-01                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Ausstellungsdatum:</b><br><i>Issue date:</i> 2023-12-01                                                                                          |                                             |                           |                              |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Sachverständige(r)/Expert                                                                                                                           | <b>Stellung / Position:</b>                 | Sachverständige(r)/Expert |                              |
| <b>Sonstiges /</b><br><i>Other:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                           | FCC ID: 2AC23-D31<br>IC: 12290A-D31<br>HVIN: 1.0                                                                                                    |                                             |                           |                              |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br><i>Condition of the test item at delivery:</i>                                                                                                                                                                                                                                                                                                                                                                        | Prüfmuster vollständig und unbeschädigt<br><i>Test item complete and undamaged</i>                                                                  |                                             |                           |                              |
| <p>* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet<br/>         * Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested</p>                                                                                                                                                                     |                                                                                                                                                     |                                             |                           |                              |
| <p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br/> <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p> |                                                                                                                                                     |                                             |                           |                              |

**Prüfbericht-Nr.: CN23GDAD 003**  
**Test report no.:**

Seite 2 von 9  
Page 2 of 9

**Anmerkungen**  
*Remarks*

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.<br/>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>                                                                                                                                                                 |
| 2 | <p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</p> <p><i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.</i></p>                                                                                      |
| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.<br/>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i><br/><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p> |

**Prüfbericht - Nr.: CN23GDAD 003**  
Test Report No.:

**Seite 3 von 9**  
Page 3 of 9

## TEST SUMMARY

### 3.1.1 RF EXPOSURE COMPLIANCE

RESULT: Pass

## CONTENTS

|            |                                                                                |          |
|------------|--------------------------------------------------------------------------------|----------|
| <b>1.</b>  | <b>TEST SITES.....</b>                                                         | <b>5</b> |
| <b>1.1</b> | <b>TEST FACILITIES .....</b>                                                   | <b>5</b> |
| <b>1.2</b> | <b>TRACEABILITY .....</b>                                                      | <b>5</b> |
| <b>1.3</b> | <b>CALIBRATION.....</b>                                                        | <b>5</b> |
| <b>1.4</b> | <b>LOCATION OF ORIGINAL DATA .....</b>                                         | <b>5</b> |
| <b>1.5</b> | <b>STATUS OF FACILITY USED FOR TESTING .....</b>                               | <b>5</b> |
| <b>2.</b>  | <b>GENERAL PRODUCT INFORMATION.....</b>                                        | <b>6</b> |
| <b>2.1</b> | <b>GENERAL DESCRIPTION .....</b>                                               | <b>6</b> |
| <b>2.2</b> | <b>RATING AND SYSTEM DETAILS .....</b>                                         | <b>6</b> |
| <b>3.</b>  | <b>TEST RESULTS .....</b>                                                      | <b>7</b> |
| <b>3.1</b> | <b>TRANSMITTER REQUIREMENTS &amp; TEST SUITES.....</b>                         | <b>7</b> |
| 3.1.1      | <i>RF Exposure Compliance .....</i>                                            | <i>7</i> |
| 3.1.1.1    | FCC Part 1.1310, Part 2.1091 .....                                             | 7        |
| 3.1.1.2    | RSS-102 Exemption Limits for Routine Evaluation – RF Exposure Evaluation ..... | 9        |

## 1. TEST SITES

### 1.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.

Address: No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

FCC Accreditation Designation No.: 694916

ISED wireless device testing laboratory: 25069

### 1.2 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

### 1.3 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

### 1.4 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendixes of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

### 1.5 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. facility located at No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

## 2. GENERAL PRODUCT INFORMATION

### 2.1 GENERAL DESCRIPTION

The EUT is a WIFI Module which supports 2.4GHz Wi-Fi and 5GHz Wi-Fi functions.

According to the client's declaration, the models D31R1601 are the same as the original ones D31R1601F in circuit design, layout only difference modular debug port type.

For details refer to the User Manual, Technical Description and Circuit Diagram.

### 2.2 RATING AND SYSTEM DETAILS

**Table 1: Technical Specification of EUT**

| General Information of EUT                           | Value                                                                                                                  |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Kind of Equipment:                                   | WIFI Module                                                                                                            |
| Type Designation:                                    | D31R1601F, D31R1601                                                                                                    |
| Trademark:                                           | GSD                                                                                                                    |
| FCC ID:                                              | 2AC23-D31                                                                                                              |
| IC:                                                  | 12290A-D31                                                                                                             |
| HVIN:                                                | 1.0                                                                                                                    |
| Operating Voltage:                                   | DC 3.3V                                                                                                                |
| <b>Technical Specification of Wi-Fi 802.11 b/g/n</b> |                                                                                                                        |
| Operating Frequency:                                 | 2412 - 2462 MHz for 802.11b/g/n(HT20)<br>2422 - 2452 MHz for 802.11n(HT40)                                             |
| Type of Modulation:                                  | DSSS(DBPSK/DQPSK/CCK)<br>OFDM(BPSK/QPSK/16QAM/64QAM)                                                                   |
| Data Rate:                                           | 1/2/5.5/11 Mbps for 802.11b<br>6/9/12/18/24/36/48/54 Mbps for 802.11g<br>MCS0 ~ MCS7 for 802.11n                       |
| Channel Number:                                      | 11 channels for 802.11b/g/n(HT20)<br>7 channels for 802.11n(HT40)                                                      |
| Channel Separation:                                  | 5 MHz                                                                                                                  |
| Antenna Type:                                        | PIFA Antenna                                                                                                           |
| Antenna Number:                                      | 2                                                                                                                      |
| Antenna Gain:                                        | 1.72 dBi for ANT1, 2.96 dBi for ANT2 (Provided by the Client)                                                          |
| <b>Technical Specification of Wi-Fi 802.11 a/n</b>   |                                                                                                                        |
| Operating Frequency:                                 | 5180-5320MHz, 5500-5720MHz, 5745-5825MHz                                                                               |
| Type of Modulation:                                  | OFDM(BPSK/QPSK/16QAM/64QAM/256QAM)                                                                                     |
| Channel Number:                                      | 5180-5320MHz, 12CHs, 802.11 a/n20/n40<br>5500-5700MHz, 11CHs, 802.11 a/n20/n40<br>5745-5825MHz, 7CHs, 802.11 a/n20/n40 |
| Channel Separation:                                  | 20 MHz, 40MHz                                                                                                          |
| Antenna Type:                                        | PIFA Antenna                                                                                                           |
| Antenna Number:                                      | 2                                                                                                                      |
| Antenna Gain:                                        | 2.57 dBi for ANT1, 2.57 dBi for ANT2 (Provided by the Client)                                                          |

### 3. Test Results

#### 3.1 Transmitter Requirements & Test Suites

##### 3.1.1 RF Exposure Compliance

**RESULT:**
**Pass**

Test standard : RSS-102 Issue 5  
47 CFR FCC Part 2.1091  
Limit : Table 1 of 47 CFR FCC Part 1.1310  
Section 2.5.2 of RSS-102 Issue 5  
Kind of test site : Shielded room

**FCC requirement:** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

##### 3.1.1.1 FCC Part 1.1310, Part 2.1091

###### a) Radio Frequency Exposure Limit

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.

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 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                        |
| 300-1500                                                       |                               |                               | f/300                               | 6                        |
| 1500-100,000                                                   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 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                       |
| 300-1500                                                       |                               |                               | f/1500                              | 30                       |
| 1500-100,000                                                   |                               |                               | 1.0                                 | 30                       |

**b) Radio Frequency Exposure Calculation Formula**

MPE Calculation is based on the conducted power and considering maximum power and Antenna gain. The following formula is used to MPE evaluation.

$$P_d = \frac{P_{out} * G}{4R^2\pi}$$

Where,

$P_d$  = power density in mW/cm<sup>2</sup> or W/m<sup>2</sup>

$P_{out}$  = output power to antenna in mW or W

$G_{num}$  = Antenna gain in numeric

$\pi$  = 3.14159

R = Distance between observation point and the center of radiator in cm or m

**c) RF Exposure Calculations for FCC, stand-alone mode**

| Operating Mode | Max. EIRP incl. tune-up (dBm) | Distance (cm) | MPE $P_d$ (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Verdict |
|----------------|-------------------------------|---------------|---------------------------------|-----------------------------|---------|
| 2.4G Wi-Fi     | 25.60                         | 20            | 0.072                           | 1.0                         | Pass    |
| 5G Wi-Fi       | 18.18                         | 20            | 0.013                           | 1.0                         | Pass    |

Note: The 2.4G Wi-Fi and 5G Wi-Fi of EUT cannot transmitting sync.

**➤ Conclusion**

Therefore the maximum calculations result of above are meet the requirement of Radio Frequency Exposure (MPE) limit.

### 3.1.1.2 RSS-102 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

The EUT shall comply with the requirement of RSS-102 section 2.5.2.

#### Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;

- RF exposure evaluation exempted power for 2.4GHz: 2.68 W
- RF exposure evaluation exempted power for 5GHz Wi-Fi: 4.53 W

#### a) RF Exposure Calculations for ISED, Stand-alone mode

| Operating Mode | Max. EIRP incl. tune-up (dBm) | Distance (cm) | Maximum EIRP (W) | Threshold power (W) | Verdict |
|----------------|-------------------------------|---------------|------------------|---------------------|---------|
| 2.4G Wi-Fi     | 25.60                         | 20            | 0.363            | 2.68                | Pass    |
| 5G Wi-Fi       | 18.18                         | 20            | 0.066            | 4.53                | Pass    |

Note: The maximum EIRP lower than the threshold power in section 2.5.2, thus compliant.

Both e.i.r.p. for 2.4G Wi-Fi & 5G Wi-Fi are less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

#### ➤ Conclusion

**“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”**