

|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                |                                                                             |                                                                                                        |                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Prüfbericht-Nr.:</b><br>Test report no.:                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>CN21VQW2 004</b>                                                                                                                            | <b>Auftrags-Nr.:</b><br>Order no.:                                          | 168313547                                                                                              | Seite 1 von 9<br>Page 1 of 9 |
| <b>Kunden-Referenz-Nr.:</b><br>Client reference no.:                                                                                                                                                                                                                                                                                                                                                                                                        | N/A                                                                                                                                            | <b>Auftragsdatum:</b><br>Order date:                                        | 2021-05-06                                                                                             |                              |
| <b>Auftraggeber:</b><br>Client:                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Chengdu TD Tech Ltd.</b><br>3-5/F, C Area, Tianfu Software Park, 219# Tianhua 2nd Road, Gaoxin District, Chengdu 610041 Sichuan, P.R. China |                                                                             |                                                                                                        |                              |
| <b>Prüfgegenstand:</b><br>Test item:                                                                                                                                                                                                                                                                                                                                                                                                                        | Data Terminal                                                                                                                                  |                                                                             |                                                                                                        |                              |
| <b>Bezeichnung / Typ-Nr.:</b><br>Identification / Type no.:                                                                                                                                                                                                                                                                                                                                                                                                 | eCube-CP-AU, eCube-CG-AU                                                                                                                       |                                                                             |                                                                                                        |                              |
| <b>Auftrags-Inhalt:</b><br>Order content:                                                                                                                                                                                                                                                                                                                                                                                                                   | Test Report                                                                                                                                    |                                                                             |                                                                                                        |                              |
| <b>Prüfgrundlage:</b><br>Test specification:                                                                                                                                                                                                                                                                                                                                                                                                                | CFR47 FCC Part 2.1091                                                                                                                          |                                                                             |                                                                                                        |                              |
| <b>Wareneingangsdatum:</b><br>Date of sample receipt:                                                                                                                                                                                                                                                                                                                                                                                                       | 2021-04-02                                                                                                                                     | Refer to Photo Documentation                                                |                                                                                                        |                              |
| <b>Prüfmuster-Nr.:</b><br>Test sample no:                                                                                                                                                                                                                                                                                                                                                                                                                   | A003017285-001/002<br>A003028673-001~003                                                                                                       |                                                                             |                                                                                                        |                              |
| <b>Prüfzeitraum:</b><br>Testing period:                                                                                                                                                                                                                                                                                                                                                                                                                     | 2021-04-03 – 2021-06-10                                                                                                                        |                                                                             |                                                                                                        |                              |
| <b>Ort der Prüfung:</b><br>Place of testing:                                                                                                                                                                                                                                                                                                                                                                                                                | TÜV Rheinland (Shenzhen) Co., Ltd.                                                                                                             |                                                                             |                                                                                                        |                              |
| <b>Prüflaboratorium:</b><br>Testing laboratory:                                                                                                                                                                                                                                                                                                                                                                                                             | TÜV Rheinland (Shenzhen) Co., Ltd.                                                                                                             |                                                                             |                                                                                                        |                              |
| <b>Prüfergebnis*:</b><br>Test result*:                                                                                                                                                                                                                                                                                                                                                                                                                      | Pass                                                                                                                                           |                                                                             |                                                                                                        |                              |
| <b>geprüft von:</b><br>tested by:                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>genehmigt von:</b><br>authorized by:                                                                                                        |                                                                             |                                                                                                        |                              |
| <b>Datum:</b><br>Date: 2021-06-23                                                                                                                                                                                                                                                                                                                                                                                                                           |  <b>Lin Lin</b>                                             |                                                                             |  <b>Winni Hou</b> |                              |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                 | Senior Project Manager                                                                                                                         | <b>Ausstellungsdatum:</b><br>Issue date: 2021-06-23                         | Technical Certifier                                                                                    |                              |
| <b>Sonstiges / Other:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   | FCC ID: 2AZ2H-ECUBE-AU                                                                                                                         |                                                                             |                                                                                                        |                              |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br>Condition of the test item at delivery:                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                | Prüfmuster vollständig und unbeschädigt<br>Test item complete and undamaged |                                                                                                        |                              |
| <p>* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft<br/>P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet</p> <p>* Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor<br/>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/>This test report only relates to the a. m. 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.</p> |                                                                                                                                                |                                                                             |                                                                                                        |                              |

VO5

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*Test Report No.*

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## **1 General Remarks**

### **1.1 Complementary Materials**

None.

## 2 Test Sites

### 2.1 Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Accreditation Designation No.: CN1260

ISED wireless device testing laboratory: 25069

### 2.2 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

### 2.3 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.

### 2.4 Location of Original Data

The original copies of all test data taken during actual testing. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd.. file for certification follow-up purposes.

### 2.5 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

## 3 General Product Information

### 3.1 Product Function and Intended Use

The eCube-CP-AU, eCube-CG-AU are subscriber equipment in the GSM/WCDMA/LTE system. The GSM frequency bands include GSM850 and PCS1900. The UMTS frequency band includes band II and band V. The LTE frequency bands include band 2, band 4 and band 7.

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

### 3.2 Ratings and System Details

**Table 1: Technical Specification of EUT**

| General Information of EUT                         | Description                                                                                                                                                                                 |                                                                                                                                                                                      |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kind of Equipment:                                 | Data Terminal                                                                                                                                                                               |                                                                                                                                                                                      |
| Type Designation:                                  | eCube-CP-AU, eCube-CG-AU<br>Note: the eCube-CP-AU is selected to test as master device.                                                                                                     |                                                                                                                                                                                      |
| Difference between the eCube-CP-AU and eCube-CG-AU | Model                                                                                                                                                                                       | Ports                                                                                                                                                                                |
|                                                    | eCube-CP-AU                                                                                                                                                                                 | 2x RS232 (with RTS/CTS)<br>1x RS485 (WAGO)<br>4x Fast Ethernet<br>1x USB 2.0 host port<br>1x FXS port<br>1x Main 4G antenna port<br>1x Auxiliary 4G antenna port<br>1x SIM card slot |
|                                                    | eCube-CG-AU                                                                                                                                                                                 | 1x RS232 (with RTS/CTS)<br>1x RS485 (WAGO)<br>2x Fast Ethernet<br>1x USB 2.0 host port<br>1x Main 4G antenna port<br>1x Auxiliary 4G antenna port<br>1x SIM card slot                |
|                                                    | Note: the hardware design (including PCB layout, Circuit diagram, radio configuration, software and firmware) of the above two product are the same, only difference on the external ports. |                                                                                                                                                                                      |
| FCC ID:                                            | 2AZ2H-ECUBE-AU                                                                                                                                                                              |                                                                                                                                                                                      |
| Hardware Version:                                  | eCube-CP-AU: eCube-CP-V4.2<br>eCube-CG-AU: eCube-CG-V4.2                                                                                                                                    |                                                                                                                                                                                      |
| Software Version:                                  | V100R001C00                                                                                                                                                                                 |                                                                                                                                                                                      |
| Antenna Type:                                      | External Antenna                                                                                                                                                                            |                                                                                                                                                                                      |
| Operating Voltage:                                 | 12Vdc, Power by AC/DC Adapter                                                                                                                                                               |                                                                                                                                                                                      |
| Operating Temperature Range:                       | -10°C ~ +50°C                                                                                                                                                                               |                                                                                                                                                                                      |

**Table 2: Technical Specification of EUT**

| Characteristic  | Description |
|-----------------|-------------|
| Operated Modes: | GSM         |

|                                |                                                                                                                                                  |                                                                                        |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Operational Frequency Band(s): | Tx                                                                                                                                               | GSM850: 824 to 849MHz<br>PCS1900: 1850 to 1910MHz                                      |
|                                | Rx                                                                                                                                               | GSM850: 869 to 894MHz<br>PCS1900: 1930 to 1990MHz                                      |
| Modulation Type:               | GMSK, 8PSK                                                                                                                                       |                                                                                        |
| Antenna Type:                  | External Antenna                                                                                                                                 |                                                                                        |
| TX and RX Antenna Ports        | 1 * TX, 1 * RX                                                                                                                                   |                                                                                        |
| Antenna Gain:                  | GSM850: 4.29dBi<br>PCS1900: 2.96dBi                                                                                                              |                                                                                        |
| Device Category:               | Class B                                                                                                                                          |                                                                                        |
| DTM                            | Not Support                                                                                                                                      |                                                                                        |
| Subcarrier spacing:            | 200KHz                                                                                                                                           |                                                                                        |
| Power Class:                   | 4, tested with power level 5(GSM850)<br>1, tested with power level 0(PCS1900)                                                                    |                                                                                        |
| <b>Operated Modes:</b>         | <b>WCDMA</b>                                                                                                                                     |                                                                                        |
| Operational Frequency Band(s): | Tx                                                                                                                                               | WCDMA850: 824 to 849MHz<br>WCDMA1900: 1850 to 1910MHz                                  |
|                                | Rx                                                                                                                                               | WCDMA850: 869 to 894MHz<br>WCDMA1900: 1930 to 1990MHz                                  |
| Modulation Type:               | QPSK, 16QAM                                                                                                                                      |                                                                                        |
| Antenna Type:                  | External Antenna                                                                                                                                 |                                                                                        |
| TX and RX Antenna Ports        | 1 * TX, 2 * RX                                                                                                                                   |                                                                                        |
| Antenna Gain:                  | WCDMA850: 4.29dBi<br>WCDMA1900: 2.96dBi                                                                                                          |                                                                                        |
| Subcarrier spacing:            | 200KHz                                                                                                                                           |                                                                                        |
| Power Class:                   | 3, tested with power control "all 1"(UMTS Bands)                                                                                                 |                                                                                        |
| <b>Operated Modes:</b>         | <b>LTE</b>                                                                                                                                       |                                                                                        |
| Operational Frequency Band(s): | Tx                                                                                                                                               | LTE BAND2: 1850 to 1910MHz<br>LTE BAND4: 1710 to 1755MHz<br>LTE BAND7: 2500 to 2570MHz |
|                                | Rx                                                                                                                                               | LTE BAND2: 1930 to 1990MHz<br>LTE BAND4: 2110 to 2155MHz<br>LTE BAND7: 2620 to 2690MHz |
| Modulation Type:               | QPSK, 16QAM                                                                                                                                      |                                                                                        |
| Antenna Type:                  | External Antenna                                                                                                                                 |                                                                                        |
| TX and RX Antenna Ports        | 1 * TX, 2 * RX                                                                                                                                   |                                                                                        |
| Antenna Gain:                  | LTE BAND2: 2.96dBi<br>LTE BAND4: 2.79dBi<br>LTE BAND7: 0.9dBi                                                                                    |                                                                                        |
| Subcarrier spacing:            | LTE BAND2: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE BAND4: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz<br>LTE BAND7: 5MHz, 10MHz, 15MHz, 20MHz |                                                                                        |
| Power Class:                   | 3, tested with power control all Max.(LTE Bands)                                                                                                 |                                                                                        |
| <b>Operated Modes:</b>         | <b>Bluetooth</b>                                                                                                                                 |                                                                                        |
| Frequency Range:               | 2402 MHz to 2480 MHz                                                                                                                             |                                                                                        |
| Type of Modulation:            | GFSK(BT_LE)                                                                                                                                      |                                                                                        |
| Channel Number:                | 40 channels                                                                                                                                      |                                                                                        |
| Data Rate:                     | 1 Mbps, 2Mbps                                                                                                                                    |                                                                                        |
| Channel Separation:            | 2 MHz                                                                                                                                            |                                                                                        |
| Antenna Type:                  | Internal Antenna                                                                                                                                 |                                                                                        |
| Antenna Gain:                  | 0 dBi                                                                                                                                            |                                                                                        |

### 3.3 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

### 3.4 Submitted Documents

- FCC/IC Label and Location Info

- User Manual

## 4 RF Exposure Compliance

### 4.1 Test Standards

Test standard : FCC 47 CFR Part 2 Section 2.1091  
 Test Result : PASS

### 4.2 MPE Limits of FCC

#### MPE Limit for FCC

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <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                       |
| 300-1,500                                                      |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                                  |                               |                               | 1.0                                 | 30                       |

### 4.3 Test Result

#### Test Result: PASS

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm, detail minimum distance refer to to below calculation table. Therefore MPE measurement or computational modeling should be used to determine compliance.

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

- (1) The power density according to far-field model is:

$$S = \frac{P \times G_{(\theta, \phi)}}{4 \times \pi \times R^2}$$

Where:

$P$  = input power of the antenna.  
 $G$  = antenna gain relative to an isotropic antenna.  
 $\theta, \phi$  = elevation and azimuth angles.  
 $R$  = distance from the antenna to the point of investigation.

- (2) For single or multiple RF sources, the calculated power density should comply with following:



$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Where:

$S_i$  = the power density when the  $f$  is  $i$ .  
 $S_{Limit,i}$  = the reference level requirement for power density when  $f$  is  $i$ .  
 $f$  = operating frequency.

#### A. Stand-alone operation mode

| Operating Mode | Band        | Maximum Conducted Output Power (dBm) | Maximum Output Power with Tune-up (dBm) | Antenna Gain (dBi) | Min. Distance (cm) | Calculation (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------|-------------|--------------------------------------|-----------------------------------------|--------------------|--------------------|-----------------------------------|-----------------------------|
| Bluetooth LE   | 2.4GHz      | 7                                    | 8                                       | 0                  | 20                 | 0.001                             | 1                           |
| *GPRS          | 850(1slot)  | 32.05                                | 35                                      | 4.29               | 20                 | 0.21                              | 0.55                        |
|                | 850(2slot)  | 31.04                                | 32                                      | 4.29               | 20                 | 0.21                              | 0.55                        |
|                | 850(3slot)  | 29.37                                | 31                                      | 4.29               | 20                 | 0.25                              | 0.55                        |
|                | 850(4slot)  | 28.18                                | 29                                      | 4.29               | 20                 | 0.21                              | 0.55                        |
| *GPRS          | 1900(1slot) | 29.2                                 | 32                                      | 2.96               | 20                 | 0.08                              | 1                           |
|                | 1900(2slot) | 28.23                                | 29                                      | 2.96               | 20                 | 0.08                              | 1                           |
|                | 1900(3slot) | 26.13                                | 28                                      | 2.96               | 20                 | 0.09                              | 1                           |
|                | 1900(4slot) | 25.07                                | 26                                      | 2.96               | 20                 | 0.08                              | 1                           |
| *EGPRS         | 850(1slot)  | 26.38                                | 29                                      | 4.29               | 20                 | 0.05                              | 0.55                        |
|                | 850(2slot)  | 25.35                                | 26                                      | 4.29               | 20                 | 0.05                              | 0.55                        |
|                | 850(3slot)  | 23.34                                | 25                                      | 4.29               | 20                 | 0.06                              | 0.55                        |
|                | 850(4slot)  | 22.25                                | 23                                      | 4.29               | 20                 | 0.05                              | 0.55                        |
| *EGPRS         | 1900(1slot) | 25.02                                | 28                                      | 2.96               | 20                 | 0.03                              | 1                           |
|                | 1900(2slot) | 23.88                                | 25                                      | 2.96               | 20                 | 0.03                              | 1                           |
|                | 1900(3slot) | 21.84                                | 24                                      | 2.96               | 20                 | 0.04                              | 1                           |
|                | 1900(4slot) | 20.47                                | 22                                      | 2.96               | 20                 | 0.03                              | 1                           |
| WCDMA          | II          | 22.82                                | 25                                      | 2.96               | 20                 | 0.12                              | 1                           |
| WCDMA          | V           | 22.98                                | 25                                      | 4.29               | 20                 | 0.17                              | 0.55                        |
| LTE            | 2           | 23.23                                | 25                                      | 2.96               | 20                 | 0.12                              | 1                           |
|                | 4           | 23.76                                | 25                                      | 2.79               | 20                 | 0.12                              | 1                           |
|                | 7           | 23.14                                | 25                                      | 0.9                | 20                 | 0.08                              | 1                           |

#### B. Simultaneous Transmission operation mode

| Operating Mode         | Bluetooth Ratio | Max. License Radio Ratio | Sum Ratio | Limit |
|------------------------|-----------------|--------------------------|-----------|-------|
| Bluetooth + GPRS/EGPRS | 0.001           | 0.46                     | 0.461     | <1    |
| Bluetooth + WCDMA      | 0.001           | 0.31                     | 0.311     | <1    |
| Bluetooth + LTE        | 0.001           | 0.12                     | 0.121     | <1    |

Note:

- The GPRS/EGPRS, WCDMA and LTE modes cannot transmit simultaneous.
- \*The GPRS/EGPRS mode RF output power are calculation with division factor, 1Tx slot = 1 transmit time slot out of 8 time slots = -9.03dB; 2Tx slots = 2 transmit time slots out of 8 time slots = -6.02dB; 3Tx slots = 3 transmit time slots out of 8 time slots = -4.26dB; 4Tx slots = 4 transmit time slots out of 8 time slots = -3.01dB
- The GPRS/EGPRS, WCDMA and LTE RF output power refer to test reports CN21VQW2 001 issued by TÜV Rheinland (Shenzhen) Co., Ltd.
- The Bluetooth LE RF output power refer to test report CN21VQW2 002 issued by TÜV Rheinland (Shenzhen) Co., Ltd.
- $R = 20\text{cm}$ .