



**中认信通**

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)



## RF EXPOSURE EVALUATION REPORT

**Applicant:** ROOTCLOUD TECHNOLOGY CO.,LTD

**Address:** FCC: Room 303-309, No. 3, East Road, Pazhou Avenue, Haizhu District, Guangzhou China.

IC: 1-3/F, Building 5, No.190 Huazhou Road, Haizhu District  
Guangzhou 510320 China

**FCC ID:** 2A07J-LI1516

**IC:** 30982-LI1516

**HVIN:** LI1516

**Product Name:** T-AMS

**Standard(s):** 47 CFR §1.1307

RSS-102 Issue 5 March 2015, Amendment 1  
(February 2, 2021)

The above equipment has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

**Report Number:** CR230637426-00D

**Date Of Issue:** 2023/7/25

**Reviewed By:** Sun Zhong

*Sun Zhong*

**Title:** Manager

**Test Laboratory:** China Certification ICT Co., Ltd (Dongguan)

No. 113, Pingkang Road, Dalang Town, Dongguan,  
Guangdong, China

Tel: +86-769-82016888

## Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

## Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

This report cannot be reproduced except in full, without prior written approval of the Company.

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

## CONTENTS

|                                                         |    |
|---------------------------------------------------------|----|
| TEST FACILITY .....                                     | 2  |
| DECLARATIONS.....                                       | 2  |
| DOCUMENT REVISION HISTORY .....                         | 4  |
| 1. RF EXPOSURE EVALUATION .....                         | 5  |
| 1.1 SIMULTANEOUS TRANSMISSION WITH BOTH SAR-BASED ..... | 5  |
| 1.1.1 Applicable Standard.....                          | 5  |
| 1.1.2 EUT WWAN Information▲: .....                      | 7  |
| 1.1.3 Measurement Result.....                           | 8  |
| 1.2 MAXIMUM PERMISSIBLE EXPOSURE (MPE) .....            | 9  |
| 1.2.1 Applicable Standard.....                          | 9  |
| 1.2.2 Procedure .....                                   | 9  |
| 1.2.3 EUT WWAN Information▲: .....                      | 10 |
| 1.2.4 Calculated Result: .....                          | 11 |

## DOCUMENT REVISION HISTORY

| Revision Number | Report Number   | Description of Revision | Date of Revision |
|-----------------|-----------------|-------------------------|------------------|
| 1.0             | CR230637426-00D | Original Report         | 2023/7/25        |

## 1. RF EXPOSURE EVALUATION

### 1.1 Simultaneous Transmission with both SAR-based

#### 1.1.1 Applicable Standard

According to §1.1307(b)(3)(ii)(B)

Simultaneous Transmission with both SAR-based and MPE-Based Test Exemptions

This case is described in detail in § 1.1307(b)(3)(ii)(B) and covers the situations where both SAR-based and MPE-based exemption may be considered for test exemption in fixed, mobile, or portable device exposure conditions. For these cases, a device with multiple RF sources transmitting simultaneously will be considered an RF exempt device if the condition of Formula (1) is satisfied.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

$d$  = the separation distance (cm);

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1 \quad (1)$$

Where:

$a$  = number of fixed, mobile, or portable RF sources claiming exemption using [paragraph \(b\)\(3\)\(i\)\(B\)](#) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

$b$  = number of fixed, mobile, or portable RF sources claiming exemption using [paragraph \(b\)\(3\)\(i\)\(C\)](#) of this section for Threshold ERP, including existing exempt transmitters and those being added.

$c$  = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

$P_i$  = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source  $i$  at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,j}$  = the exemption threshold power ( $P_{th}$ ) according to [paragraph \(b\)\(3\)\(i\)\(B\)](#) of this section for fixed, mobile, or portable RF source  $i$ .

$ERP_j$  = the ERP of fixed, mobile, or portable RF source  $j$ .

$ERP_{th,j}$  = exemption threshold ERP for fixed, mobile, or portable RF source  $j$ , at a distance of at least  $\lambda/2\pi$  according to the applicable formula of [paragraph \(b\)\(3\)\(i\)\(C\)](#) of this section.

$Evaluated_k$  = the maximum reported SAR or MPE of fixed, mobile, or portable RF source  $k$  either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure\ Limit_k$  = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source  $k$ , as applicable from [§ 1.1310 of this chapter](#).

**1.1.2 EUT WWAN Information ▲ :**

| Operation Modes                                                                 | Operation Frequency (MHz) | Maximum Conducted Power including Tune-up Tolerance (dBm) | Antenna Gain (dBi) | Max Gain Allowed (dBi) |
|---------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------|--------------------|------------------------|
| GSM850                                                                          | 824-849                   | 25.81                                                     | -4.36              | 8.60                   |
| GSM1900                                                                         | 1850-1910                 | 22.81                                                     | -7.47              | 10.19                  |
| WCDMA B2                                                                        | 1850-1910                 | 25                                                        | -7.47              | 8.00                   |
| WCDMA B4                                                                        | 1710-1755                 | 25                                                        | -9.62              | 5.00                   |
| WCDMA B5                                                                        | 824-849                   | 25                                                        | -4.36              | 9.42                   |
| LTE B2                                                                          | 1850-1910                 | 25                                                        | -7.47              | 8.00                   |
| LTE B4                                                                          | 1710-1755                 | 25                                                        | -9.62              | 5.00                   |
| LTE B5                                                                          | 824-849                   | 25                                                        | -4.36              | 9.41                   |
| LTE B7                                                                          | 2500-2570                 | 25                                                        | -7.70              | 8.00                   |
| LTE B12                                                                         | 699-716                   | 25                                                        | -5.05              | 8.70                   |
| LTE B13                                                                         | 777-787                   | 25                                                        | -5.93              | 9.16                   |
| LTE B25                                                                         | 1850-1915                 | 25                                                        | -7.47              | 8.00                   |
| LTE B26                                                                         | 814-849                   | 25                                                        | -4.36              | 9.36                   |
| LTE B38                                                                         | 2570-2620                 | 25                                                        | -5.88              | 8.00                   |
| LTE B41                                                                         | 2496-2690                 | 25                                                        | -4.79              | 8.00                   |
| Note:<br>The devices may contain certified WWAN Module, FCC ID: XMR201903EG25G. |                           |                                                           |                    |                        |

## 1.1.3 Measurement Result

| Radio    | Frequency (MHz) | Distance (mm) | P <sub>th</sub> (mW) | Maximum Conducted Power including Tune-up Tolerance (dBm) | Antenna Gain (dBi) | The Greater of Conducted Power or ERP |        |
|----------|-----------------|---------------|----------------------|-----------------------------------------------------------|--------------------|---------------------------------------|--------|
|          |                 |               |                      |                                                           |                    | dBm                                   | mW     |
| BLE      | 2402-2480       | 200           | 3060                 | 4                                                         | 2.12               | 4                                     | 2.51   |
| WiFi     | 2412-2462       | 200           | 3060                 | 16                                                        | 1.50               | 16                                    | 39.81  |
| GSM850   | 824-849         | 200           | 1681                 | 25.81                                                     | -4.36              | 25.81                                 | 381.07 |
| GSM1900  | 1850-1910       | 200           | 3060                 | 22.81                                                     | -7.47              | 22.81                                 | 190.99 |
| WCDMA B2 | 1850-1910       | 200           | 3060                 | 25                                                        | -7.47              | 25                                    | 316.23 |
| WCDMA B4 | 1710-1755       | 200           | 3060                 | 25                                                        | -9.62              | 25                                    | 316.23 |
| WCDMA B5 | 824-849         | 200           | 1681                 | 25                                                        | -4.36              | 25                                    | 316.23 |
| LTE B2   | 1850-1910       | 200           | 3060                 | 25                                                        | -7.47              | 25                                    | 316.23 |
| LTE B4   | 1710-1755       | 200           | 3060                 | 25                                                        | -9.62              | 25                                    | 316.23 |
| LTE B5   | 824-849         | 200           | 1681                 | 25                                                        | -4.36              | 25                                    | 316.23 |
| LTE B7   | 2500-2570       | 200           | 3060                 | 25                                                        | -7.70              | 25                                    | 316.23 |
| LTE B12  | 699-716         | 200           | 1426                 | 25                                                        | -5.05              | 25                                    | 316.23 |
| LTE B13  | 777-787         | 200           | 1585                 | 25                                                        | -5.93              | 25                                    | 316.23 |
| LTE B25  | 1850-1915       | 200           | 3060                 | 25                                                        | -7.47              | 25                                    | 316.23 |
| LTE B26  | 814-849         | 200           | 1661                 | 25                                                        | -4.36              | 25                                    | 316.23 |
| LTE B38  | 2570-2620       | 200           | 3060                 | 25                                                        | -5.88              | 25                                    | 316.23 |
| LTE B41  | 2496-2690       | 200           | 3060                 | 25                                                        | -4.79              | 25                                    | 316.23 |

Note:

The WWAN, WiFi and BLE can transmit simultaneously.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k}$$

$$= P_{WWAN} / P_{th} + P_{WiFi} / P_{th} + P_{BLE} / P_{th}$$

$$= 381.07/1681 + 39.81/3060 + 2.51/3060$$

$$= 0.241$$

$$< 1.0$$

**Result:** The device meet FCC MPE at 20 cm distance.

## 1.2 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 1.2.1 Applicable Standard

According to RSS-102 § 4Table 4, RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

**Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)**

| Frequency Range (MHz)  | Electric Field (V/m rms)         | Magnetic Field (A/m rms)                        | Power Density (W/m <sup>2</sup> )  | Reference Period (minutes)      |
|------------------------|----------------------------------|-------------------------------------------------|------------------------------------|---------------------------------|
| 0.003-10 <sup>21</sup> | 83                               | 90                                              | -                                  | Instantaneous*                  |
| 0.1-10                 | -                                | 0.73/ <i>f</i>                                  | -                                  | 6**                             |
| 1.1-10                 | 87/ <i>f</i> <sup>0.5</sup>      | -                                               | -                                  | 6**                             |
| 10-20                  | 27.46                            | 0.0728                                          | 2                                  | 6                               |
| 20-48                  | 58.07/ <i>f</i> <sup>0.25</sup>  | 0.1540/ <i>f</i> <sup>0.25</sup>                | 8.944/ <i>f</i> <sup>0.5</sup>     | 6                               |
| 48-300                 | 22.06                            | 0.05852                                         | 1.291                              | 6                               |
| 300-6000               | 3.142 <i>f</i> <sup>0.3417</sup> | 0.008335 <i>f</i> <sup>0.3417</sup>             | 0.02619 <i>f</i> <sup>0.6834</sup> | 6                               |
| 6000-15000             | 61.4                             | 0.163                                           | 10                                 | 6                               |
| 15000-150000           | 61.4                             | 0.163                                           | 10                                 | 616000/ <i>f</i> <sup>1.2</sup> |
| 150000-300000          | 0.158 <i>f</i> <sup>0.5</sup>    | 4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> <i>f</i>   | 616000/ <i>f</i> <sup>1.2</sup> |

Note: *f* is frequency in MHz.  
 \*Based on nerve stimulation (NS).  
 \*\* Based on specific absorption rate (SAR).

### 1.2.2 Procedure

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

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

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

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

For simultaneously transmit system, the calculated power density should comply with:

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

**1.2.3 EUT WWAN Information ▲ :**

| Operation Modes                                                             | Operation Frequency (MHz) | Maximum Conducted Power including Tune-up Tolerance (dBm) | Antenna Gain (dBi) | Max Gain Allowed (dBi) |
|-----------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------|--------------------|------------------------|
| GSM850                                                                      | 824-849                   | 25.81                                                     | -4.36              | 7.44                   |
| GSM1900                                                                     | 1850-1910                 | 22.81                                                     | -7.47              | 10.19                  |
| WCDMA B2                                                                    | 1850-1910                 | 25                                                        | -7.47              | 8.00                   |
| WCDMA B4                                                                    | 1710-1755                 | 25                                                        | -9.62              | 5.00                   |
| WCDMA B5                                                                    | 824-849                   | 25                                                        | -4.36              | 8.26                   |
| LTE B2                                                                      | 1850-1910                 | 25                                                        | -7.47              | 8.00                   |
| LTE B4                                                                      | 1710-1755                 | 25                                                        | -9.62              | 5.00                   |
| LTE B5                                                                      | 824-849                   | 25                                                        | -4.36              | 8.25                   |
| LTE B7                                                                      | 2500-2570                 | 25                                                        | -7.70              | 8.00                   |
| LTE B12                                                                     | 699-716                   | 25                                                        | -5.05              | 7.76                   |
| LTE B13                                                                     | 777-787                   | 25                                                        | -5.93              | 8.09                   |
| LTE B25                                                                     | 1850-1915                 | 25                                                        | -7.47              | 8.00                   |
| LTE B26                                                                     | 824-849                   | 25                                                        | -4.36              | 8.25                   |
| LTE B38                                                                     | 2570-2620                 | 25                                                        | -5.88              | 8.00                   |
| LTE B41                                                                     | 2500-2690                 | 25                                                        | -4.79              | 8.00                   |
| Note:<br>The devices contain certified WWAN Module, IC: 10224A-201903EG25G. |                           |                                                           |                    |                        |

**1.2.4 Calculated Result:**

| Radio    | Frequency (MHz) | Antenna Gain |           | Conducted output power including Tune-up Tolerance |        | Evaluation Distance (cm) | Power Density       | MPE Limit           |
|----------|-----------------|--------------|-----------|----------------------------------------------------|--------|--------------------------|---------------------|---------------------|
|          |                 | (dBi)        | (numeric) | (dBm)                                              | (mW)   |                          | (W/m <sup>2</sup> ) | (W/m <sup>2</sup> ) |
| BLE      | 2402-2480       | 2.12         | 1.63      | 4                                                  | 2.51   | 20                       | 0.008               | 5.35                |
| WiFi     | 2412-2462       | 1.5          | 1.41      | 16                                                 | 39.81  | 20                       | 0.112               | 5.37                |
| GSM850   | 824-849         | -4.36        | 0.37      | 25.81                                              | 381.07 | 20                       | 0.281               | 2.58                |
| GSM1900  | 1850-1910       | -7.47        | 0.18      | 22.81                                              | 190.99 | 20                       | 0.068               | 4.48                |
| WCDMA B2 | 1850-1910       | -7.47        | 0.18      | 25                                                 | 316.23 | 20                       | 0.113               | 4.48                |
| WCDMA B4 | 1710-1755       | -9.62        | 0.11      | 25                                                 | 316.23 | 20                       | 0.069               | 4.24                |
| WCDMA B5 | 824-849         | -4.36        | 0.37      | 25                                                 | 316.23 | 20                       | 0.233               | 2.58                |
| LTE B2   | 1850-1910       | -7.47        | 0.18      | 25                                                 | 316.23 | 20                       | 0.113               | 4.48                |
| LTE B4   | 1710-1755       | -9.62        | 0.11      | 25                                                 | 316.23 | 20                       | 0.069               | 4.24                |
| LTE B5   | 824-849         | -4.36        | 0.37      | 25                                                 | 316.23 | 20                       | 0.233               | 2.58                |
| LTE B7   | 2500-2570       | -7.70        | 0.17      | 25                                                 | 316.23 | 20                       | 0.107               | 2.5                 |
| LTE B12  | 699-716         | -5.05        | 0.31      | 25                                                 | 316.23 | 20                       | 0.195               | 2.3                 |
| LTE B13  | 777-787         | -5.93        | 0.26      | 25                                                 | 316.23 | 20                       | 0.164               | 2.47                |
| LTE B25  | 1850-1915       | -7.47        | 0.18      | 25                                                 | 316.23 | 20                       | 0.113               | 4.48                |
| LTE B26  | 824-849         | -4.36        | 0.37      | 25                                                 | 316.23 | 20                       | 0.233               | 2.58                |
| LTE B38  | 2570-2620       | -5.88        | 0.26      | 25                                                 | 316.23 | 20                       | 0.164               | 5.6                 |
| LTE B41  | 2500-2690       | -4.79        | 0.33      | 25                                                 | 316.23 | 20                       | 0.208               | 5.5                 |

The WWAN, WiFi and BLE can transmit simultaneously:

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

$$=S_{WWAN}/S_{limit-WWAN} + S_{WiFi}/S_{limit-WiFi} + S_{BLE}/S_{limit-BLE}$$

$$=0.281/2.58+0.112/5.37+0.008/5.35$$

$$=0.131$$

$$< 1.0$$

**Result:** The device meet ISSED MPE at 20 cm distance

===== **END OF REPORT** =====