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Report Template Version: V04  
Report Template Revision Date: 2018-07-06

# RF Exposure Evaluation Report

**Report No.:** CQASZ20201001193E-02  
**Applicant:** Chengdu Ebyte Electronic Technology Co., Ltd.  
**Address of Applicant:** Building B5, Mould Industrial Park, 199# Xiqu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China  
**Equipment Under Test (EUT):**  
**EUT Name:** Wireless transceiver  
**Model No.:** E22-900T30S  
**Brand Name:** EBYTE  
**FCC ID:** 2ALPH-E22900T30S  
**Standards:** 47 CFR Part 1.1307  
47 CFR Part 1.1310  
KDB447498D01 General RF Exposure Guidance v06  
**Date of Receipt:** 2020-10-13  
**Date of Test:** 2020-10-13 to 2020-11-06  
**Date of Issue:** 2020-11-09  
**Test Result:** PASS\*

\*In the configuration tested, the EUT complied with the standards specified above

**Tested By:**

Tiny You

(Tiny You)

**Reviewed By:**

Sheek, Luo

(Sheek Luo)

**Approved By:**

Jack Ai

(Jack Ai)



## 1 Version

### Revision History Of Report

| Report No.           | Version | Description    | Issue Date |
|----------------------|---------|----------------|------------|
| CQASZ20201001193E-02 | Rev.01  | Initial report | 2020-11-09 |

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### 3 General Information

#### 3.1 Client Information

|                          |                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------|
| Applicant:               | Chengdu Ebyte Electronic Technology Co., Ltd.                                                           |
| Address of Applicant:    | Building B5, Mould Industrial Park, 199# Xiqu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China |
| Manufacturer:            | Chengdu Ebyte Electronic Technology Co., Ltd.                                                           |
| Address of Manufacturer: | Building B5, Mould Industrial Park, 199# Xiqu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China |

#### 3.2 General Description of EUT

|                       |                                                                                                                    |
|-----------------------|--------------------------------------------------------------------------------------------------------------------|
| Product Name:         | Wireless transceiver                                                                                               |
| Model No.:            | E22-900T30S                                                                                                        |
| Trade Mark:           | EBYTE                                                                                                              |
| Hardware Version:     | V1.0                                                                                                               |
| Software Version:     | V1.0                                                                                                               |
| Test sample SN:       | W020285O02072                                                                                                      |
| Frequency Range:      | 903~927MHz                                                                                                         |
| Modulation Type:      | LoRa                                                                                                               |
| Number of Channels:   | 25 (declared by the client)                                                                                        |
| Sample Type:          | <input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Fix Location |
| Test Software of EUT: | RF test (manufacturer declare)                                                                                     |
| Antenna Type:         | External antenna                                                                                                   |
| Antenna Gain:         | 0 dBi                                                                                                              |
| Power Supply:         | DC 5V                                                                                                              |

## 4 RF Exposure Evaluation

### 4.1 RF Exposure Compliance Requirement

#### 4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency range<br>(MHz)                                       | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm <sup>2</sup> ) | Averaging time<br>(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                          |

F= Frequency in MHz

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

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

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

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

#### 4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

## 4.2 EUT RF Exposure Evaluation

### 1) For LoRa

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

### Measurement Data

| LoRa(DTS) mode |                            |                            |                       |        |
|----------------|----------------------------|----------------------------|-----------------------|--------|
| Test channel   | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                |                            |                            | (dBm)                 | (mW)   |
| Lowest         | 11.76                      | 11±1                       | 12                    | 15.849 |
| Middle         | 11.74                      | 11±1                       | 12                    | 15.849 |
| Highest        | 9.94                       | 10±1                       | 11                    | 12.589 |

The worst case:

| Maximum tune-up Power<br>(mW) | Antenna Gain<br>(dBi) | Power Density<br>at R = 20 cm<br>(mW/cm <sup>2</sup> ) | Limit | Result |
|-------------------------------|-----------------------|--------------------------------------------------------|-------|--------|
| 15.849                        | 0                     | 0.0032                                                 | 0.6   | PASS   |

Note: 1) Refer to report No. CQASZ20201001193E-01 for EUT test Max Conducted Peak Output Power value.

2)  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (15.849 \cdot 1) / (4 \cdot 3.1416 \cdot 20^2) = 0.0032$