Radio Test Report

Report No.: CTA231109002H01

Issued for

TOPPAN TECHNICAL DESIGN CENTER CO., LTD.

7-21-33 Nobidome, Niiza-shi, Saitama 352-0011 JAPAN

Product Name:	ZETABOX
Brand Name:	Toppan
Model Name:	TZS9011S-00
Series Model(s):	TZS9021
FCC ID:	2BC9DTZS9011S-00
Test Standard:	FCC 47CFR §2.1091

TEST REPORT

Applicant's Name	:	TOPPAN TECHNICAL DESIGN CENTER CO., LTD.
Address	:	7-21-33 Nobidome, Niiza-shi, Saitama 352-0011 JAPAN
Manufacturer's Name	:	TOPPAN TECHNICAL DESIGN CENTER CO., LTD.
Address	:	7-21-33 Nobidome, Niiza-shi, Saitama 352-0011 JAPAN
Product Description		
Product Name	:	ZETABOX
Brand Name	:	Toppan
Model Name	:	TZS9011S-00
Series Model(s)	:	TZS9021
Test Standards	:	FCC 47CFR §2.1091 447498 D04 Interim General RF Exposure Guidance v01

Date of Test	:	
Date of receipt of test item	:	16 Oct. 2023
Date (s) of performance of tests	:	16 Oct. 2023 ~ 24 Oct. 2023
Date of Issue	:	24 Oct. 2023
Test Result	:	**Pass**

Testing Engineer : Zoey Cao

(Zoey Cao)

Technical Manager : Amy Wen

(Amy Wen)

Authorized Signatory : Eric Wang

(Eric Wang)

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	24 Oct. 2023	CTA231109002H01	ALL	Initial Issue

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>ZETABOX</td></tr>
<tr><td>Brand Name</td><td>Toppan</td></tr>
<tr><td>Model Name</td><td>TZS9011S-00</td></tr>
<tr><td>Series Model(s)</td><td>TZS9021</td></tr>
<tr><td>Model Difference</td><td>TZS9011S-00: 4-20mA sensor IF TZS9021: RS-485 sensor IF, Only the sensor interface is different</td></tr>
<tr><td>Product Description</td><td>The EUT is ZETABOX
<table>
<tr><td>Operation Frequency:</td><td>920-925MHz</td></tr>
<tr><td>Modulation Type:</td><td>2FSK</td></tr>
<tr><td>Antenna gain:</td><td>3dBi</td></tr>
<tr><td>Antenna Designation:</td><td>monopole Antenna</td></tr>
</table></td></tr>
<tr><td>Rating</td><td>Input: DC 3.3V
Output:DC 5V, DC 12V</td></tr>
<tr><td>Hardware Version</td><td>V1.0</td></tr>
<tr><td>Software Version</td><td>V5.1</td></tr>
</table>

1.2 TEST FACTORY

Shenzhen CTA Testing Technology Co., Ltd.
Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community,Fuhai Street, Bao'an District, Shenzhen, China

FCC test Firm Registration Number: 517856

IC test Firm Registration Number: 27890

A2LA Certificate No.: 6534.01

IC CAB ID: CN0127

2. FCC 47CFR §2.1091 REQUIREMENT

2.1 TEST STANDARDS

Follow the maximum permissible exposure (MPE) limits specified in 447498 D04 Interim General Radio Frequency Exposure Guidelines v01. The gain of the antenna used in the product was extracted from the supplied antenna data sheet and the maximum total power input to the antenna was also measured. Calculate the distance from the product to the MPE limit by the formula.

2.2 LIMIT

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of Part 1.1307. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

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

Where

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

and

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

d = the separation distance (cm);

(C) Or using below table and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

RF Source frequency (MHz)	Threshold ERP(watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

2.3 TEST RESULT

Turn up

Mode	Detector	Turn up Power
900 MHz	AV	-22±1dBm

Protocol	Separation distance (cm)	Max Turn up power (dBm)	Max ERP (dBm)	Max EIRP (W)	Max ERP (W)	Limit (W)	Result
900 MHz	20	-21	-23.15	0.00000794	0.0000048	0.4735	Pass

Note: 1. Calculated formula: EIRP(dBm)=72.72(dBuV/m)-95.2

2. The Maxinum power is less than the limit, complies with the exemption requirements.

3. ERP = EIRP - 2.15

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