RF Exposure Evaluation Report

Report No.: 2405X44367EC

Applicant: Sindcon (Singapore) IoT Technology Pte. Ltd.

Address: 7 Tampines Industrial Drive, #03-01 Zulin Building, Singapore, 528547

Product Name: LoRaWAN Bridge

Product Model: NPL-IN(AC)

Multiple Models: N/A

Trade Mark: sindcon

FCC ID: 2BHSMST0301

Standards: 47 CFR §1.1307
KDB 447498 D04 Interim General RF Exposure Guidance v01

Test Date: 2024-10-16

Test Result: Complied

Report Date: 2024-10-17

Reviewed by: Abel Chen

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NVLAP TESTING NVLAP LAB CODE 600335-0

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Revision History

Version No.	Issued Date	Description
00	*2024-10-17*	*Original*

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1 General Information

1.1 Client Information

Applicant:	Sindcon (Singapore) IoT Technology Pte. Ltd.
Address:	7 Tampines Industrial Drive, #03-01 Zulin Building, Singapore, 528547
Manufacturer:	Sindcon (Singapore) IoT Technology Pte. Ltd.
Address:	7 Tampines Industrial Drive, #03-01 Zulin Building, Singapore, 528547

1.2 Product Description of EUT

The EUT is LoRaWAN Bridge that contains a Lora radio.

Sample Serial Number	2RZQ-1 (assigned by WATC)
Sample Received Date	2024-09-24
Sample Status	Good Condition
Frequency Range	921.4~924.6MHz
Maximum E-field Strength:	91.66dBuV/m@3m
Modulation Technology	LoRa (CSS)
Antenna Gain#	2.28dBi
Spatial Streams	SISO (1TX, 1RX)
Power Supply	AC 85~250V/60Hz
Adapter Information	N/A
Modification	Sample No Modification by the test lab

1.3 Laboratory Location

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

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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. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

2 RF Exposure Evaluation

2.1 Standard

According to §1.1307(b)(3)(i), 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 this section. 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:

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

Where

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

and

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

d = the separation distance (cm);

(C) Or using Table 1 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).

Table 1 to § 1.1307(b)(3)(i)(C)—Single RF Sources Subject to Routine Environmental Evaluation

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.

According to §1.1307(b)(3)(ii), For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

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

2.2 Result

Single RF source:

Option A:

Radio	Frequency (MHz)	Exemption limit (mW)	Maximum EIRP		Result Option A
			(dBm)	(mW)	
Lora	921.4~924.6	1	-3.54	0.44	exempt

Note:

Use the maximum E-field strength is 91.66dBuV/m@3m distance

EIRP(dBm) = E-field strength(dBuV/m) – 95.2 for distance=3m

So EIRP = 91.66 - 95.2 = -3.54dBm

Multiple RF sources transmission simultaneously consider:

N/A

Result: Complied

---End of Report---