Radio Frequency Exposure Evaluation Report

For:
Praesidium Inc.

Model Name:
2002BIO1A

Product Description:
Contactless vital sign detection sensor

FCC ID: 2A7ZX2002BIO1
IC: 28837-2002BIO1

Applied Rules and Standards:
CFR Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report #: EMC_PRAES_002-23001_MPE_FCC_ISED

DATE: 2023-06-20

A2LA Accredited

**IC recognized #
3462B**

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1 Assessment

This RF Exposure evaluation report, provides evidence for compliance of the below identified device, with the RF Exposure limits for mobile devices, as defined in FCC CFR Part1 (1.1307 & 1.1310), Part 2 (2.1091), under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body. Multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain, or minimum distance towards the human body calculated respectively where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20 cm distance to the body.

Company	Description	Model Name
Praesidium Inc.	Contactless vital sign detection sensor	2002BIO1A

Responsible for Testing Laboratory:

		Stoecker, Arndt	
		(Director of Regulatory Services)	
2023-06-20	Compliance		
Date	**Section**	**Name**	**Signature**

Responsible for the Report:

		Art Thammanavarat	
		(Senior EMC Engineer)	
2023-06-20	Compliance		
Date	**Section**	**Name**	**Signature**

2   Administrative Data

2.1   Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Director of Regulatory Services:	Stoecker, Arndt
Responsible Project Leader:	Saman, Rami

2.2   Identification of the Client / Manufacturer

Applicant's Name:	Praesidium Inc.
Street Address:	150 N 200 E
City/Zip Code	St. George, Utah 84770
Country	USA

2.3   Identification of the Manufacturer

Manufacturer's Name:	Same as client.
Manufacturers Address:	--------------------
City/Zip Code	--------------------
Country	--------------------

3   Equipment under Assessment

Model No:	2002BIO1
Marketing name:	BioFi
FCC ID:	2A7ZX2002BIO1
IC:	28837-2002BIO1
HW Version :	2002BIO1
SW Version :	V1.0.0
HVIN:	2002BIO1A
PMN:	RemWave Sleep
Product description:	Contactless vital sign detection sensor
Power Supply / Rated Operating Voltage Range: (V DC)	Vmin: 4.25 / Vnom: 5 / Vmax: 5.75
Operating Temperature range:	32 °F to 104 °F (0 °C to 40 °C)

Integrated Module Info:	❖ **Radar:**
	  ▪ Manufacturer: Texas Instruments
	  ▪ Part Number IWR6843AQGABL
	  ▪ Description: Single-chip 60-64 GHz intelligent mmWave sendor
	
	❖ **WLAN (Wi-Fi):** 802.11 b/g/n
	  ▪ Manufacturer: WIZnet H.K. LTD
	  ▪ Model: WIZFI360PA
	  ▪ FCC ID: 2ATUB-WIZFI360PA
	  ▪ IC: 20560-WIZI360CON

Regulatory Band:	❖ **Radar:** 60-64 GHz
	
	❖ **WLAN (Wi-Fi) 2.4:**
	  ▪ 2.4 GHz: 802.11 b/g/n
	    • 2.412 GHz to 2.462 GHz: Channel 1 – 11

Antenna Type and Peak gain:	❖ **Radar:** PCB embedded 60-64 GHz antenna array, 15 dBi gain ❖ **WLAN:** Flexible Planar Antenna, Laird Connectivity, 2.4 dBi gain
Maximum Conducted Output Power (dBm):	❖ **Radar:** -10 dBm ❖ **WLAN (Wi-Fi) 2.4:** 19 dBm ± 1 dB
Sample Revision:	☐ Prototype Unit; ☐ Production Unit; ■ Pre-Production
Device category:	Fixed installation
Exposure Category:	public/uncontrolled

4   RF Exposure Limits and FCC Basic Rules

4.1   FCC 1.1310((3)(i)(C) Table 1 – Exemption Threshold

Prerequisite: Separation R be at least λ/2π (R = 20 cm, λ/2π = ca. 0.08 cm)

RF Source frequency (MHz)	Threshold ERP (Watts)
1,500-100,000	$19.2R^2$

4.2   RSS-102 2.5.2 Exemption Limits for Routine Evaluation — RF Exposure Evaluation

- At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} \, f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- At or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

4.3   RF Exposure Estimation (MPE Estimation)

Having available the source, based average output power, and peak antenna gain, or the ERP/EIRP of the specified device, and for a known minimum distance of its radiating structures from the body of persons. According to its use cases (at least 20 cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm^2 or W/m^2)
         P = power input to the antenna (mW or W)
         G = power gain of the antenna in the direction of interest relative to an isotropic radiator
         R = distance to the center of radiation of the antenna (cm or m)

5   Evaluation

5.1   Analysis to Exclude Routine RF Exposure evaluation for Co-transmission Operation

Band	Frequency (MHz)	Output Power		Antenna Gain (dBi)	E.I.R.P		Separation Distances (cm)	FCC Pth Threshold (mW)	ISED Threshold EIRP (mW)	FCC ERP/PTH Ratio	ISED EIRP / Limit Ratio	MPE Exempt No evaluation required Ratios < 1
		dBm	mW		dBm	mW						
WiFi 2.4GHz	2412.0	20.00	100.00	2.4	22.40	173.780	20	768.00	2686.12	0.1302	0.065	Exempt
Radar 60-64GHz	62000.0	-10.00	0.10	15	5.00	3.162	20	768.00	24709.90	0.0001	0.0001	Exempt
Multiple RF sources										0.1303	0.0648	Exempt

Compliance with FCC Table 1 of § 1.1307(b)(3)(i)(C) and RSS-102 2.5.2 exemption limits

Conclusion:

- The worst-case simultaneous transmission mode Wi-Fi 2.4 GHz 802.11g and Radar radio is using 13.03% of the FCC limit and 5.91% of the ISED limit passing RF exposure requirements for 20 cm distance.

6   Revision History

Date	Changes to report	Report prepared by
2023-06-20	Initial Version	Art Thammanavarat

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6   Revision History