RF Exposure Report

For

Applicant Name:	**Pella Corporation**
Address:	102, Main St Pella, Iowa, 50219, US.
EUT Name:	Bridge
Brand Name:	N/A
Model Number:	20AT0000 V15

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Report Number:	BTF240326R00202
FCC ID:	XXXX
IC:	XXXX
Test Standards:	47 CFR Part 2 Subpart J Section 2.1091 RSS-102, Issue 6, December 15, 2023
Test Conclusion:	Pass
Test Date:	2024-03-14 to 2024-03-25
Date of Issue:	2024-03-26

Prepared By: Gavin Cui

Gavin Cui / Project Engineer

Date: 2024-03-26

Approved By:

Ryan.CJ / EMC Manager

Date: 2024-03-26

Note: All the test results in this report only related to the testing samples. Which can be duplicated completely for the legal use with approval of applicant; it shall not be reproduced except in full without the written approval of BTF Testing Lab (Shenzhen) Co., Ltd., All the objections should be raised within thirty days from the date of issue. To validate the report, you can contact us.

Revision History		
Version	Issue Date	Revisions Content
R_V0	2024-03-26	Original
Note:	*Once the revision has been made, then previous versions reports are invalid.*	

Table of Contents

1. Introduction 4
1.1 Identification of Testing Laboratory 4
1.2 Identification of the Responsible Testing Location 4
1.3 Laboratory Condition 4
1.4 Announcement 4
2. Product Information 5
2.1 Application Information 5
2.2 Manufacturer Information 5
2.3 Factory Information 5
2.4 General Description of Equipment under Test (EUT) 5
3. Test Requirement 7
3.1 Assessment Result 9

BTF Testing Lab (Shenzhen) Co., Ltd.
F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

1. Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Test Location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Description:	All measurement facilities used to collect the measurement data are located at F101,201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
FCC Registration Number:	518915
Designation Number:	CN1330

1.3 Laboratory Condition

Ambient Temperature:	20℃ to 25℃
Ambient Relative Humidity:	45% to 55%
Ambient Pressure:	100 kPa to 102 kPa

1.4 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2. Product Information

2.1 Application Information

Company Name:	Pella Corporation
Address:	102, Main St Pella, Iowa, 50219, US.

2.2 Manufacturer Information

Company Name:	GADGEON SMART SYSTEMS PRIVATE LIMITED
Address:	BLOCK 9, SCK01 640, 641, SMART CITY, ERNAKULAM, Kerala. 682042. India

2.3 Factory Information

Company Name:	GADGEON SMART SYSTEMS PRIVATE LIMITED
Address:	BLOCK 9, SCK01 640, 641, SMART CITY, ERNAKULAM, Kerala. 682042. India

2.4 General Description of Equipment under Test (EUT)

EUT Name:	Bridge
Test Model Number:	20AT0000 V15
Hardware Version:	REV15 (Main Board) & REV2.6 (Daughter Board)
Software Version:	REV_G & UB20RevB
Power Adaptor:	PHIHONG PSA05A-050QL6-H Input：100-240V~0.2A 50-60Hz 12-16VA OUTPUT:5V⎓1A
Description:	Bridge is the wireless communication hub that connects the Pella Insynctive Products to status indicator or a compatible security or home automation system.

2.5 General Description of Equipment under Test (EUT)

For BLE:	
Modulation Type:	GFSK
Modulation Technology:	Hopping
Transfer Rate:	1Mbps, 2Mbps
Operating Frequency:	2402~2480MHz
Number of Channel:	40
Antenna Type:	On board ceramic chip antenna with 1.86dBi of gain
Note: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.	

For SDR:	
Modulation Type:	OOK
Center Frequency Intentional radiator:	433.92MHz
Number of Channel:	1
Antenna Type:	Monopole Copper-Clad antenna

1. Test Requirement

1.1 For test standard: 47 CFR Part 2 Subpart J Section 2.1091.

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 1.1307(b), Limits for Maximum Permissible Exposure (MPE),

Frequency range (MHz)	Electric field strength(V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500	-	-	f/300	6
1500–100,000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	-	-	f/1500	30
1500–100,000	-	-	1.0	30

Note: f = frequency in MHz

EVALUATION METHOD

Transmission formula: **$Pd = (Pout*G)/(4*pi*r^2)$**

Where

Pd = power density in mW/cm^2, **Pout** = 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.

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1.2 For test standard: RSS-102, Issue 6, December 15, 2023.

Declaration of RF exposure compliance for exemption from routine evaluation limits.

According to the section 6.6 of RSS-102, Issue 6:

Field reference level exposure exemption limits

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $4.49/f^{0.5} W$ (adjusted for tune-up tolerance), where ƒ is in MHz
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} W$ (adjusted for tune-up tolerance), where ƒ is in MHz
- at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

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2. Assessment Result

2.1 FCC Part 2.1091 RF Exposure Evaluation:

For BLE:

Mode	Frequency (MHz)	Conducted Power (dBm)	Numeric antenna gain(dBi)	Power Density at (mW/cm^2)	Limit (mW/cm2)	Result
BLE_1Mbps	2402	8.128	1.86	0.00198	1.0000	Pass
BLE_2Mbps	2404	8.091	1.86	0.00197	1.0000	Pass

For OOK:

Frequency (MHz)	Modulation	ERP (mW)	Power Density (mW/cm2)	Limit (mW/cm2)	Result
433.92	OOK	0.0257	0.000005	0.289	Pass

Note: The exposure evaluation safety distance is 20cm.
When BLE and 433.92MHz transmitted simultaneously, the Max ratio = 0.00198 + 0.000005/0.289 = 0.00200 < 1
Conclusion: PASS.

2.2 RSS 102 RF Exposure Evaluation:

For BLE:

Mode	Frequency (MHz)	Conducted Power (dBm)	Numeric antenna gain(dBi)	EIRP (W)
BLE_1Mbps	2402	8.128	1.86	0.00997
BLE_2Mbps	2404	8.091	1.86	0.00989

EIRP (W) = 10 ^ ((Conducted Power (dBm) + Numeric antenna gain(dBi)) / 10) / 1000

For Bluetooth LE 1Mbps Channel 0, Maximum EIRP is 0.00997w less than 1.31×10−2 2402 0.6834W=2.676W, So No RF exposure required.
For Bluetooth LE 2Mbps Channel 1, Maximum EIRP is 0.00989 w less than 1.31×10−2 2404 0.6834W=2.678W, So No RF exposure required.

For OOK:

Frequency (MHz)	Modulation	EIRP (mW)	EIRP (W)
433.92	OOK	0.0422	0.000042

For SRD 433.92MHz, Maximum EIRP is 0.000042w less than 1.31×10−2 433.92 0.6834W=0.831W, So No RF exposure required.

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