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Report No.: 2305RSU028-U4 Report Version: V01 Issue Date: 2023-07-25

# **RF Exposure Evaluation Declaration**

**FCC ID:** 2BBYQPCWL-0510

**Applicant:** PicoCELA Inc

Product: WiFi 6 (802.11ax) 4x4 MU-MIMO Tri Band Access point

Model No.: PCWL-0510

Brand Name: PicoCELA

FCC Classification: Digital Transmission System (DTS)

Unlicensed National Information Infrastructure (NII)

FCC Rule Part(s): FCC Part 2.1091

Test Procedure(s): KDB 447498 D04v01

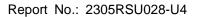
Approved By:

| Sobin Wu | Robin Wu | Robin

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.





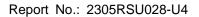
## **Revision History**

Report No.	Version	Description	Issue Date	Note
2305RSU028-U4	V01	Initial Report	2023-07-25	Valid



## **CONTENTS**

	cription		Page
1.	Gene	eral Information	4
	1.1.	Applicant	4
	1.2.	Manufacturer	4
	1.3.	Testing Facility	4
	1.4.	Product Information	5
	1.5.	Antenna Details	5
2.	RF E	xposure Evaluation	6
	2.1.	Test Limits	6
	2.2.	Test Exemptions	7
	2.3.	Test Result	10





#### 1. General Information

#### 1.1. Applicant

PicoCELA Inc

2-34-5 Nihonbashi Ningyo-cho Chuo-ku Tokyo 103-0013 JAPAN

#### 1.2. Manufacturer

PicoCELA Inc

2-34-5 Nihonbashi Ningyo-cho Chuo-ku Tokyo 103-0013 JAPAN

## 1.3. Testing Facility

$\boxtimes$	Test Site - MRT	Test Site – MRT Suzhou Laboratory						
	Laboratory Location (Suzhou - Wuzhong)							
	D8 Building, No.2	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China						
	Laboratory Loca	Laboratory Location (Suzhou - SIP)						
	4b Building, Liand	do U Valley, No.200	Xingpu Rd., Shengpu	u Town, Suzhou Indu	ıstrial Park, China			
	Laboratory Accre	editations						
	A2LA: 3628.01		CNAS	S: L10551				
	FCC: CN1166		ISED:	: CN0001				
	VOCI:	□R-20025	□G-20034	□C-20020	□T-20020			
	VCCI:	□R-20141	□G-20134	□C-20103	□T-20104			
	Test Site - MRT	Shenzhen Laborat	tory					
	Laboratory Loca	tion (Shenzhen)						
	1G, Building A, Ju	ınxiangda Building,	Zhongshanyuan Roa	ad West, Nanshan Di	strict, Shenzhen, China			
	Laboratory Accreditations							
	A2LA: 3628.02	CNAS: L10551						
	FCC: CN1284	FCC: CN1284 ISED: CN0105						
	Test Site - MRT	Taiwan Laboratory	/					
	Laboratory Loca	Laboratory Location (Taiwan)						
	No. 38, Fuxing 2n	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)						
	Laboratory Accre	editations						
	TAF: L3261-1907	25						
	FCC: 291082, TW	<b>/</b> 3261	ISED:	TW3261				



#### 1.4. Product Information

Product Name	WiFi 6 (802.11ax) 4x4 MU-MIMO Tri Band Access point		
Model No.	PCWL-0510		
Wi-Fi Specification	802.11a/b/g/n/ac/ax		
Antenna Information	Refer to Section 1.5		
Power Supply	AC/DC Adapter or PoE Adapter		
Accessories			
AC/DC Adapter	Model: PSAC60W-120		
	Input: 100-240V, 1.6A		
	Output: 12V, 5A		

Note 1: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

Note 2: AC/DC Adapter was not sold with the product.

#### 1.5. Antenna Details

Antenna Type	Frequency	Tx	Max	Directional Gain (dBi)		Beamforming
	Band (MHz)	Paths	Antenna	For Power	For PSD	Directional Gain
			Gain (dBi)			(dBi)
Wi-Fi Antenna 1# (Model No.: PIC04-220080(AP))						
Omni-Directional	2400 ~ 2500	4	4.50	4.50	10.52	10.52
Omni-Directional	5150 ~ 5875	4	7.00	7.00	13.02	13.02
Wi-Fi Antenna 2# (Model No.: SAA04-222060)						
Directional Panel	2400 ~ 2500	4	13.50	13.50	19.52	19.52
Directional Panel	5150 ~ 5875	4	15.50	15.50	21.52	21.52



## 2. RF Exposure Evaluation

#### 2.1. Test Limits

According to §1.1310: 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 §1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

. ,							
Frequency Range	Electric Field	d Magnetic Field Power Dens		Average Time			
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm <sup>2</sup> )	(Minutes)			
	(A) Limits fo	r Occupational/ Contro	ol Exposures				
0.3-3.0	614	1.63	*(100)	≤6			
3.0-30	1842/f	4.89/f	*(900/f²)	<6			
30-300	61.4	0.163	1.0	<6			
300-1,500			f/300 <6				
1,500-100,000			5	<6			
	(B) Limits for General Population/ Uncontrolled Exposures						
0.3-1.34	614	1.63	*(100)	<30			
1.34-30	824/f	2.19/f	*(180/f²)	<30			
30-300	27.5	0.073	0.2	<30			
300-1,500			f/1500	<30			
1,500-100,000			1.0	<30			

f= frequency in MHz. \* = Plane-wave equivalent power density.



#### 2.2. Test Exemptions

**For single RF sources** (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

(Option 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 §1.1307(b)(3)(ii)(A) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

(Option B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (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). P 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

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

(Option 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  $\lambda/2\pi$ , where  $\lambda$  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  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

19.2R<sup>2</sup>



1,500-100,000

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1920R <sup>2</sup>
1.34-30	3450R <sup>2</sup> /f <sup>2</sup>
30-300	3.83R <sup>2</sup>
300-1 500	0.0128R2/f

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

#### 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 §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(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.

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

#### Where:

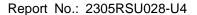
a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph 1.1307(b)(3)(i)(B) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

**c** = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

 $P_i$ = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

 $P_{th,i}$  = the exemption threshold power ( $P_{th}$ ) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.





 $ERP_j$  = the ERP of fixed, mobile, or portable RF source j.

 $ERP_{th,j}$  = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least  $\lambda/2\pi$  according to the applicable formula of paragraph  $\S1.1307(b)(3)(i)(C)$  of this section.

**Evaluated**<sub>k</sub> = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

**Exposure Limit**<sub>k</sub> = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.



Report No.: 2305RSU028-U4

#### 2.3. Test Result

Product	WiFi 6 (802.11ax) 4x4 MU-MIMO Tri Band Access point
Test Item	RF Exposure Evaluation

Test Mode	Frequency	Max.	Antenna Gain	Max EIRP	Max ERP	Max. Tune-up
	Band	Conducted	(dBi)	(dBm)	(dBm)	ERP (dBm)
	(MHz)	Power				
		(dBm)				
Antenna 1#	Antenna 1#					
802.11b/g/n/ax	2412 ~ 2462	29.02	4.50	33.52	31.37	32
802.11a/n/ac/ax	5180 ~ 5825	27.76	7.00	34.76	32.61	33
Antenna 2#						
802.11b/g/n/ax	2412 ~ 2462	22.37	13.50	35.87	33.72	34
802.11a/n/ac/ax	5180 ~ 5825	20.35	15.50	35.85	33.70	34

#### Note:

- 1. The level of max power was from RF report 2305RSU028-U1 and 2305RSU028-U2.
- 2. Tune-up power declared by manufacturer.
- 3. The ERP of beamforming mode is lower than CDD mode, so only CDD mode showed in this report.

#### For multiple RF sources, Option C

Frequency	Max ERP	λ / 2 π (cm) R (cm)		Threshold ERP	
(MHz) 2412 ~ 2462	(Watts) 2.512	1.98	55	(Watts) 5.808	
5180 ~ 5825	2.512	0.92	55	5.808	

Note: R is from user manual.

#### For multiple RF sources

The EUT supports Wi-Fi 2.4GHz + Wi-Fi 5GHz simultaneous transmissions.

So the Max Simultaneous Transmission =2.512 / 5.808 + 2.512 / 5.808 = 0.865 < 1

#### **CONCLUSION:**

Therefore, the device qualifies for RF exposure test exemption.

 <ul> <li>The End</li> </ul>	