



FCC ID: 2ARB9-GPM-RF2021  
Report No.: T210115W01-MF

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**KDB 447498 D03**  
**47 C.F.R. Part 1, Subpart I, Section 1.1310**  
**47 C.F.R. Part 2, Subpart J, Section 2.1091**

## **RF EXPOSURE REPORT**

**For**

**Gpacers LoRa module**

**Model: GPM-RF2021**

**Trade Name: Gpacers**

Issued to

**Gpacers Technology**  
**4th Floor, No.168 Yongji Road, Xinyi District, Taipei 110, Taiwan**

Issued by

**Compliance Certification Services Inc.**  
**Wugu Laboratory**  
**No.11, Wugong 6th Rd., Wugu Dist.,**  
**New Taipei City, Taiwan. (R.O.C.)**  
**Issue Date: April 23, 2021**

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.  
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### Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 23, 2021	Initial Issue	ALL	Doris Chu



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# 1. TEST RESULT CERTIFICATION

## We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
KDB 447498 D03 47 C.F.R. Part 1, Subpart I, Section 1.1310 47 C.F.R. Part 2, Subpart J, Section 2.1091	No non-compliance noted
Statements of Conformity	
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

Approved by:

Kevin Tsai  
Deputy Manager  
Compliance Certification Services Inc.

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## 2. LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

§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), except in the case of portable devices which shall be evaluated according to the provisions of FCC part 2.1093 of the chapter.

**TABLE 1 - LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* 900/f <sup>2</sup>	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 Exposure				
0.3-1.34	614	1.63	* 100	30
1.34-30	824/f	2.19/f	* 180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
<b>1,500-100,000</b>			1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

Note 1 to Table 1: Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2 to Table 2: General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

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### 3. EUT SPECIFICATION

<b>EUT</b>	Gpacers LoRa module			
<b>Model</b>	GPM-RF2021			
<b>Trade Name</b>	Gpacers			
<b>Model Discrepancy</b>	N/A			
<b>Received Date</b>	January 15, 2021			
<b>Frequency band (Operating)</b>	<input type="checkbox"/> Bluetooth: 2402MHz-2480MHz <input type="checkbox"/> 802.11b/g/n HT20: 2412MHz ~ 2462 MHz <input type="checkbox"/> 802.11n HT40: 2422MHz ~ 2452MHz <input type="checkbox"/> 802.11a/n HT20: 5180MHz ~ 5240MHz / 5260 ~ 5320MHz / 5500 ~ 5700MHz / 5745MHz ~ 5825MHz <input type="checkbox"/> 802.11n HT40: 5190MHz ~ 5230MHz / 5270 ~ 5310MHz / 5510 ~ 5670MHz / 5755MHz ~ 5795MHz <input type="checkbox"/> 802.11ac VHT80: 5210MHz / 5290MHz / 5530 MHz~5610MHz / 5775MHz <input checked="" type="checkbox"/> Others: LoRa: 920.5 MHz-924.5 MHz			
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others			
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=f/1500 mW/cm <sup>2</sup> )			
<b>Antenna Specification</b>	Dipole Antenna / Gain: 2 dBi  Directional Gain : 2.00 dBi (Numeric gain: 1.58) Worst			
<b>Maximum Measurement Average Power</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">LoRa: 920.5 MHz ~ 924.5 MHz</td> <td style="width: 20%;">26.23 dBm</td> <td style="width: 20%;">(419.759 mW)</td> </tr> </table>	LoRa: 920.5 MHz ~ 924.5 MHz	26.23 dBm	(419.759 mW)
LoRa: 920.5 MHz ~ 924.5 MHz	26.23 dBm	(419.759 mW)		
<b>Maximum tune up power</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">LoRa: 920.5 MHz ~ 924.5 MHz</td> <td style="width: 20%;">27.00 dBm</td> <td style="width: 20%;">(501.187 mW)</td> </tr> </table>	LoRa: 920.5 MHz ~ 924.5 MHz	27.00 dBm	(501.187 mW)
LoRa: 920.5 MHz ~ 924.5 MHz	27.00 dBm	(501.187 mW)		
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A			

**Remark:**

- For more details, please refer to the User's manual of the EUT.
- Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
- The tune up power referred the AVG power of the test report T210115W01-RP for RF Exposure assessment purpose.

## 4. TEST RESULTS

**No non-compliance noted.**

### Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{377}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm<sup>2</sup>

## 5. MAXIMUM PERMISSIBLE EXPOSURE

Substituting the MPE safe distance using  $d = 20$  cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where  $P$  = Power in mW

$G$  = Numeric antenna gain

$S$  = Power density in mW / cm<sup>2</sup>

### LoRa:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm <sup>2</sup>	Limit (mW/cm2)
924.5	501.187	1.58	20	0.1576	0.6163

--End of Report--