1. General descriptions
LXMS21ACNP-184 is an innovative RFID module designed to operate in electronic products/applications. It incorporates an industry standard IC.

[Features]
- Small package design
- Reflow SMT compatible
- UHF band (865~928MHz)
- ISO18000-63 / EPC Global Gen2(v2) Compliant
- Size is 2.0 x 1.2 x 0.5mm
- Using NXP UCODE7xm
- Read range: 7m *Reference
- RoHS compliant

2. Block diagram

Fig. 1 MAGICSTRAP® Block Diagram
3. Mechanical information

3-1. Dimensions

![Top View](image1)

![Side View](image2)

![Bottom View](image3)

Unit: mm

<table>
<thead>
<tr>
<th>Mark</th>
<th>Dimensions</th>
<th>Mark</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>2.00±0.15</td>
<td>b</td>
<td>0.6±0.1</td>
</tr>
<tr>
<td>W</td>
<td>1.2±0.15</td>
<td>c1</td>
<td>0.2±0.2</td>
</tr>
<tr>
<td>T</td>
<td>0.5MAX</td>
<td>c2</td>
<td>0.2±0.2</td>
</tr>
<tr>
<td>a</td>
<td>0.85±0.10</td>
<td>d</td>
<td>0.4±0.1</td>
</tr>
</tbody>
</table>

3-2. Recommended land pattern

![Land Pattern](image4)

Unit: mm

<table>
<thead>
<tr>
<th>Mark</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>0.90</td>
</tr>
<tr>
<td>g</td>
<td>1.00</td>
</tr>
<tr>
<td>h</td>
<td>0.40</td>
</tr>
</tbody>
</table>

---

All Rights Reserved, Copyright© Murata Manufacturing Co., Ltd.

< Specification is subject to change without notice >

Rev1.1 November, 2018
4. Electrical performance

4-1. Frequency range
865 – 928MHz

4-2. IC / Memory size

<table>
<thead>
<tr>
<th>IC</th>
<th>EPC</th>
<th>TID</th>
<th>USER</th>
</tr>
</thead>
<tbody>
<tr>
<td>NXP UCODE 7xm</td>
<td>448bit</td>
<td>96bits</td>
<td>2048bit</td>
</tr>
</tbody>
</table>

5. Absolute maximum ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_{stg}$</td>
<td>Storage temperature</td>
<td>-40</td>
<td>+85</td>
<td>ºC</td>
</tr>
<tr>
<td>$T_a$</td>
<td>Operating temperature</td>
<td>-40</td>
<td>+85</td>
<td>ºC</td>
</tr>
</tbody>
</table>
6. Reference antenna design on PCB

6-1. Top layer

Mounting pattern (normal)
Please conduct to PCB ground

6-2. How to design layers below the mounting pattern

Please remove all the copper pattern area from all layers of the PCB, if it is located under mounting pattern on surface layer.

Surface Layer

Other Layers

Acceptable

Not Acceptable
6-3 how to put via hole
Please put via holes as shown in the figure below. If there is no via hole in multi layered PCB, unnecessary inductance degrade performance.

6-3-1 For normal pattern
The example of via hole layout

![Diagram of normal pattern](image)

- diameter: 0.3mm\(\Phi\)
- pitch: 2.5mm, 2.75mm (around pattern)
  5mm, 5.25 mm (other)

At the point of (\(\star\)), The less value will get the less degradation.
Also increasing the number of via holes will get PCB less degradation.
At blue arrow direction, Please place the via holes to the edge of the board.
(If there is a GND electrode on other layers)

6-3-2 For small pattern
The example of via hole layout

![Diagram of small pattern](image)

- diameter: 0.3mm\(\Phi\)
- pitch: 1.5mm, 2.75mm (around pattern)
  3.75, 5.25 mm (other)

At the point of (\(\star\)), The less value will get the less degradation.
Also increasing the number of via holes will get PCB less degradation.
At blue arrow direction, Please place the via holes to the edge of the board.
(If there is a GND electrode on other layers)
6-4. Reading distance
Max. 7.5 meter (at 4wEIRP, with 15cm length of PCB ground)
The reading distance of MAGICSTRAP® onto PCB, depends on the length of PCB ground.

**technical information**
Reading distance is derived by the parameters of mounting pattern and length of PCB ground.

**LXMS21ACMF-184@920MHz**

![Graph 1: Reading distance vs. length of PCB GND](image1)

**LXMS21ACMF-184@865MHz**

![Graph 2: Reading distance vs. length of PCB GND](image2)

6-5. Metal enclosure under printed circuit board
When the PCB is in close proximity to the metal enclosure, sensitivity is reduced. Removing material directly under the MAGICSTRAP® antenna pattern will greatly improve sensitivity.

---

All Rights Reserved, Copyright© Murata Manufacturing Co., Ltd.
< Specification is subject to change without notice >

Rev1.1 November, 2018
6-6. Antenna location on PCB

Important area of PCB ground is the edge part shown as “dark green” below. The mounting pattern should be located closest to the edge of the PCB. Variations of ideal design are also acceptable.

![Ideal antenna location](image)

![Variations of antenna design](image)

6-7. Position of MAGICSTRAP® on PCB

MAGICSTRAP® should be centered on the long side of the PCB to maximize read range. The following illustrates the relationship between “X” length and read range.

<table>
<thead>
<tr>
<th>length “X” (cm)</th>
<th>Read Range (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td>1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

All Rights Reserved, Copyright©  Murata Manufacturing Co., Ltd.
< Specification is subject to change without notice >
6-8. Soldering Conditions
Soldering is allowed up through 2 times.

Reflow soldering standard conditions (Example)

- Temperature (°C)
  - MAX 260 °C
  - 255 °C
  - 217 °C
  - 200 °C
  - 150 °C

- Time (s.)
  - Pre-heating: 60-180 sec
  - Cooling down slowly
  - 255-260 °C, 20-40 sec

All Rights Reserved, Copyright© Murata Manufacturing Co., Ltd.
< Specification is subject to change without notice >

Rev 1.1 November, 2018
7. Tape and Reel Packing

7-1. Dimensions of Tape

7-2. Dimensions of Reel

Unit: mm
7-3. Taping Diagrams

[1] Feeding Hole : As specified in (1)
[2] Hole for chip : As specified in (1)
[3] Cover tape : 50um in thickness
[4] Base tape : As specified in (1)

7-4. Leader and Tail tape

Unit: mm

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1160-1190 mm</td>
</tr>
<tr>
<td>B</td>
<td>400-500 mm</td>
</tr>
<tr>
<td>C</td>
<td>150-200 mm</td>
</tr>
<tr>
<td>D</td>
<td>20-40 mm</td>
</tr>
</tbody>
</table>

All Rights Reserved, Copyright© Murata Manufacturing Co., Ltd.
< Specification is subject to change without notice >

Rev1.1 November, 2018
7-5. Taping direction
The tape for chips are wound clockwise, the feeding holes to the right side as the tape is pulled toward the user.

7-6. Quantity per reel
5,000 pcs

7-7. Minimum order quantity
5,000 pcs

7-8. Material
Base tape: Plastic
Reel: Plastic

7-9. Peeling force
0.1~1.0 N in the direction of peeling as shown below.

8. Contact window

URL: http://www.murata.com/products/RFID
Email: magicstrap@murata.com

"MAGICSTRAP®" is the registered trademark of Murata Manufacturing Co., Ltd.

For any inquiries/queries, please feel free to contact us.
NOTICE

1. Storage Conditions:
To avoid damaging, be sure to observe the following points.
- Store products where the ambient temperature is 15 to 35 °C and humidity 45 to 75% RH.
  (Packing materials, in particular, may be deformed at the temperature over 40 °C.).
- Store products in non corrosive gas (Cl₂, NH₃, SO₂, Nox, etc.).
- Stored products should be used within 6 months of receipt.
- This product is applicable to MSL1 (Based on IPC/JEDEC J-STD-020)

2. Handling Conditions:
Be careful in handling or transporting products because excessive stress or mechanical shock
may break products.

⚠️ Note:
Please make sure that your product has been evaluated and confirmed against your specifications when our
product is applied to your product.

All the items and parameters in this product specification have been prescribed on the premise that our product
is used for the purpose, under the condition and in the environment agreed upon between you and us. You are
requested not to use our product deviating from such agreement.