

LoRa Module

RAK811

Datasheet V1.1

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1. General Description

RAK811 Low-Power Long Range LoRa Technology Transceiver module, provides an easy to use, small size, low-power solution for long range wireless data transmission.

First, The RAK811 module complies with the latest LoRaWAN Class A & C protocol specifications, it is simple to access LWPA IOT platforms, such as Actility etc. Second, it also support Lora Point to Point communications, this function can help customers implement their own private long range Lora network fast.

Module integrates semtech SX1276 and stm32L, offer user an serials At commands with UART Interface .It is easy to accomplish their applications, such as simple long range sensor data applications with external host MCU, low-power feature is suitable for battery applications.

This compact module is a total solution which developing of LORA-wan protocol techniques. The module' s applications as following:

1. Automated Meters Reading
2. Home and Building Automation
3. Wireless Alarm and Security Systems
4. Industrial Monitoring and Control
5. Long Range Irrigation Systems

2. Features

- Long Range LoraWAN operating in the 863 MHz - 928 MHz frequency bands
 - FCC Frequency range 902MHZ~928MHZ
 - CE Frequency range 863MHZ~870MHZ
 - MIC Frequency range 921MHZ~927MHZ
 - KCC Frequency range 920MHZ~923MHZ
- Lora Point to Point communication in the 860MHz-1020MHz frequency
- Small size and low power
- High Receiver Sensitivity: down to -146 dBm
- FSK, GFSK, and LoRa Technology modulation
- IIP3 = -11 dBm
- Up to 15 km coverage at suburban and up to 5 km coverage at urban area

3. System Block Diagram

The block diagram of module is depicted in the figure below.

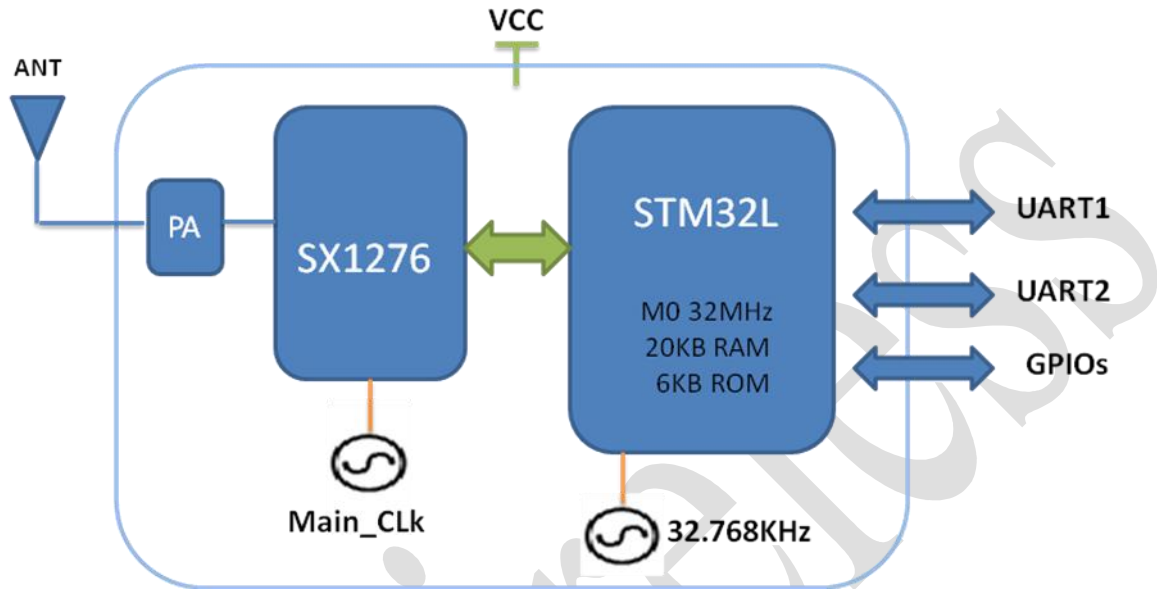


Figure 3-1 System Diagram

4. Hardware Description

4.1 Pin Outline

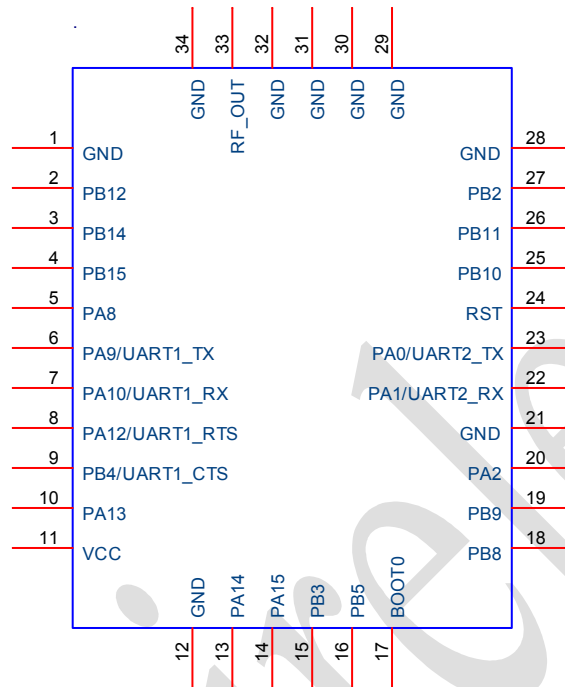


Figure 4-1 Module Pin outline

4.2 Pin definition

Table 4-1: Pin Definition

| NO | Name | Type | Description |
|----|----------------|------|---------------------------------|
| 1 | GND | — | Ground connections |
| 2 | PB12 | I/O | B part for GPIO port |
| 3 | PB14 | I/O | B part for GPIO port |
| 4 | PB15 | I/O | B part for GPIO port |
| 5 | PA8 | I/O | A part for GPIO port |
| 6 | PA9/UART1_TX | O | UART1 Interface |
| 7 | PA10/UART1_RX | I | UART1 Interface |
| 8 | PA12/UART1_RTS | O | UART1 Interface |
| 9 | PB4/UART1_CTS | I | UART1 Interface |
| 10 | PA13 | I/O | A part for GPIO port |
| 11 | VCC | P | Main power voltage source input |
| 12 | GND | — | Ground connections |

| | | | |
|----|--------------|-----|---------------------------|
| 13 | PA14 | I/O | A part for GPIO port |
| 14 | PA15 | I/O | A part for GPIO port |
| 15 | PB3 | I/O | B part for GPIO port |
| 16 | PB5 | I/O | B part for GPIO port |
| 17 | BOOT0 | I | Boot mode GPIO enable pin |
| 18 | PB8 | I/O | B part for GPIO port |
| 19 | PB9 | I/O | B part for GPIO port |
| 20 | PA2 | I/O | A part for GPIO port |
| 21 | GND | — | Ground connections |
| 22 | PA1/UART2_RX | I | UART2 Interface |
| 23 | PA0/UART2_TX | O | UART2 Interface |
| 24 | RST | I | Reset trigger input |
| 25 | PB10 | I/O | B part for GPIO port |
| 26 | PB11 | I/O | B part for GPIO port |
| 27 | PB2 | I/O | B part for GPIO port |
| 28 | GND | — | Ground connections |
| 29 | GND | — | Ground connections |
| 30 | GND | — | Ground connections |
| 31 | GND | — | Ground connections |
| 32 | GND | — | Ground connections |
| 33 | RF_OUT | I/O | RF I/O port |
| 34 | GND | — | Ground connections |

4.3 Physical Dimensions

(Unit: mm)

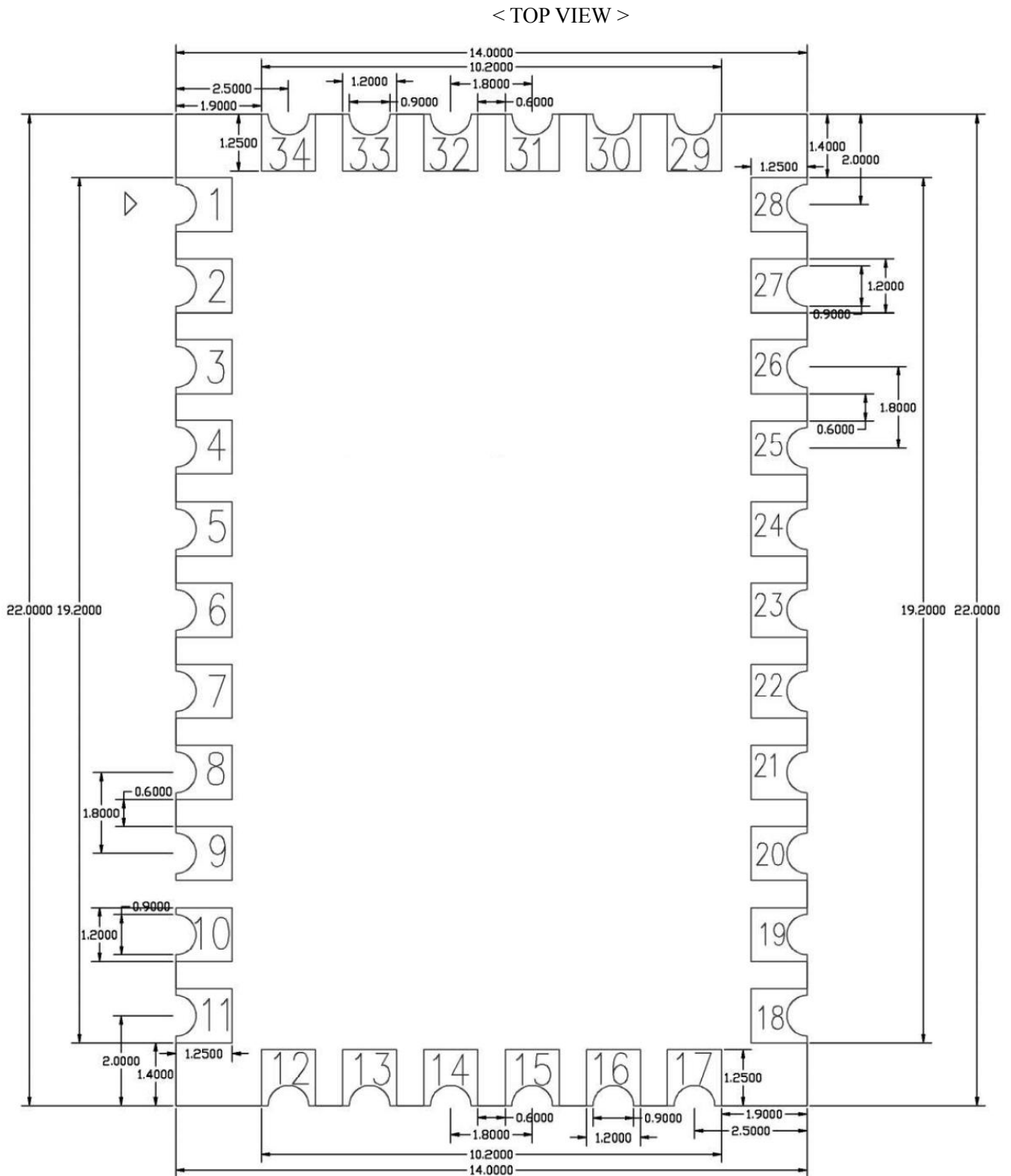


Figure 4-2 Module dimensions

5. General Specification

5.1 General specification

| | |
|-----------------------|-----------------------------|
| Model Name | RAK811 |
| Dimension | L x W x H: 22 x 14 x 1.7 mm |
| Interface | UART1, UART2, GPIOs |
| Operating temperature | -40°C to 85°C |
| Storage temperature | -40°C to 85°C |

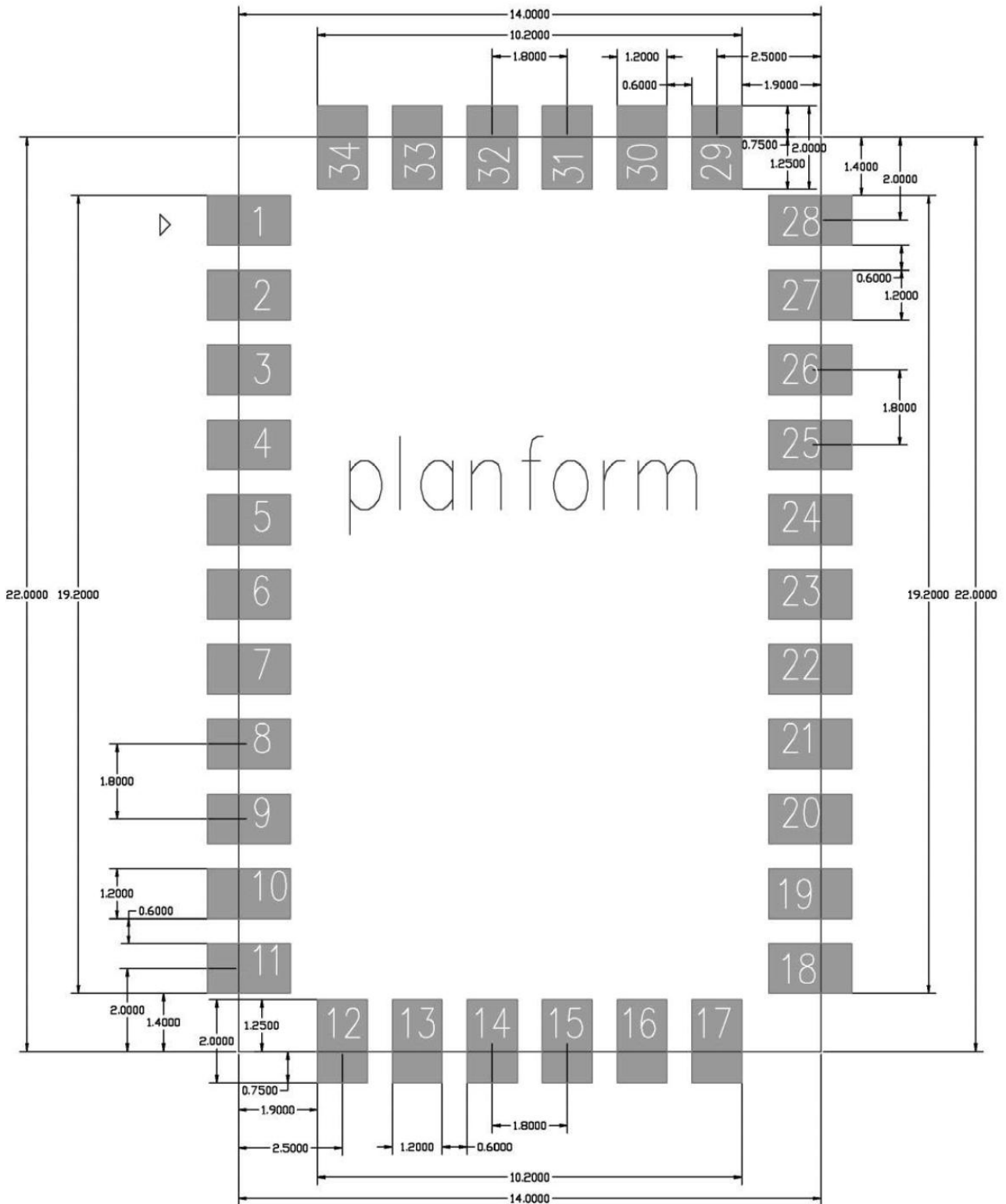
5.2 Recommended Operating Rating

| | Min. | Typ. | Max. | Unit |
|-----------------------|------|------|------|-------|
| Operating Temperature | -40 | 25 | 85 | deg.C |
| VCC | 3.15 | 3.3 | 3.45 | V |

6. Layout Recommendation

(Unit: mm)

< TOP VIEW >

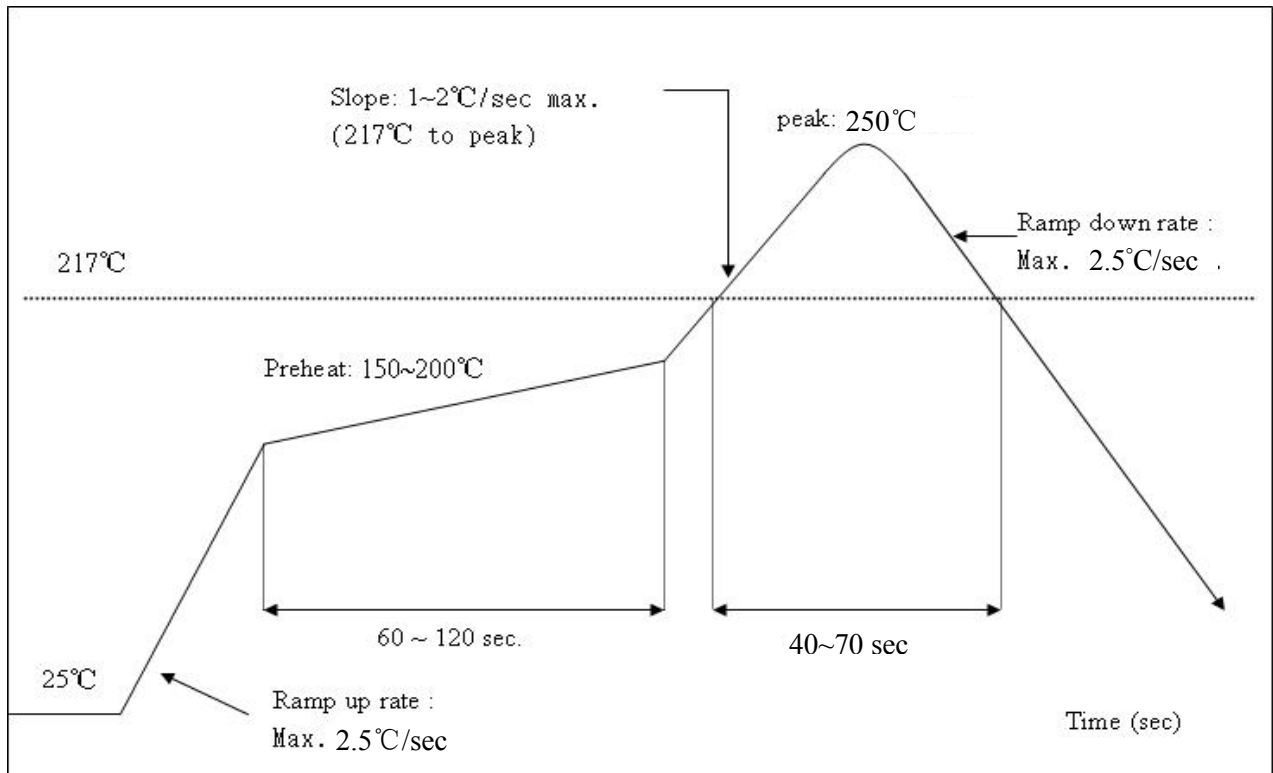


7. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

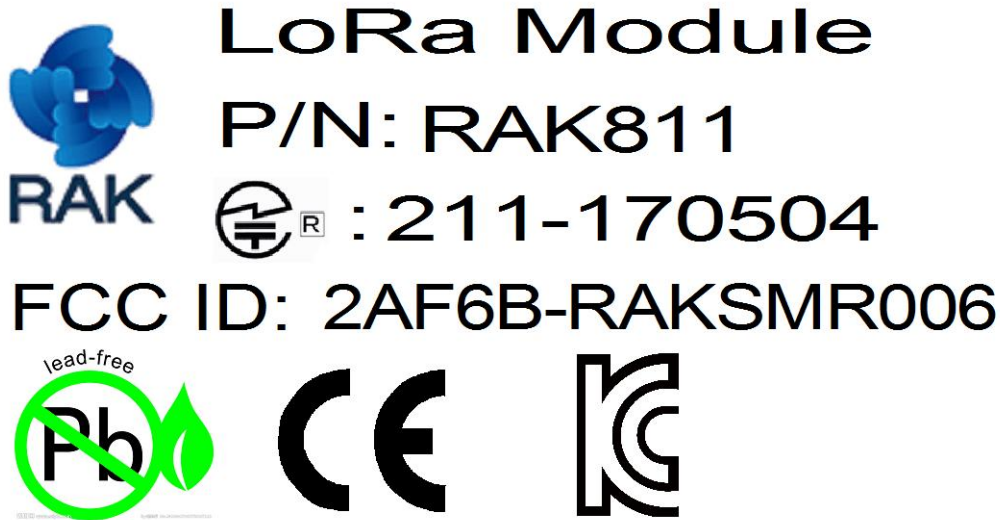
Peak Temperature : <math><250^{\circ}\text{C}</math>

Number of Times : ≤ 2 times



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8. Order Information



FCC Caution

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

The final end product must be labeled in a visible area with the following" Contains FCC ID: 2AF6B-RAKSMR006" and the frequency can't be changed by end users.

9. Contact information

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10. Change Note

| Version | Date | Change |
|---------|------------|------------------|
| V1.0 | 2016-06-11 | Draft |
| V1.1 | 2016-11-15 | Add LoraP2P mode |

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