

# LA02305 Module User Manual

## 1. Introduction

### 1.1 Overview

The LA02305 is a Leedarson-developed universal Wi-Fi and Bluetooth SMART (BLE) combo module. It uses the Espressif Inc. ESP32-U4WD System in Package that integrates an embedded 4MB flash.

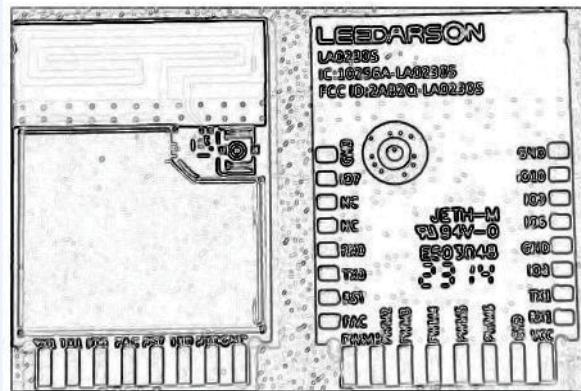


Figure 1.1.LA02305 Module

The LA02305 module is designed for a variety of IOT products such as Power Drivers, Sensors, Plugs, Lighting, Switches, etc.



Figure 1.2.Product Application

### 1.2 Key features

- Embedded Xtensa® 32-bit LX6 microprocessor, with clock up to 160MHz
- Data Memory: 520KB internal SRAM and 448KB internal ROM, 4MB Flash
- Power supply voltage: 3.0V~3.6V
- Operating temperature: -40~105Deg-C
- Frequency of crystal oscillator: 40MHz\32.768KHz
- Operating frequency: 2402~2480MHz (Bluetooth), 2412-2462MHz(WIFI)
- Support WIFI 802.11b/g/n up to 150Mbps
- Compliant with Bluetooth LE specifications
- Wi-Fi 802.11 b/g/n and BLE can't transmission simultaneous
- Interface:
  - Vertical Mount (Plug-In)
    - ◆ 6 PWMs (GPIOs)
    - ◆ 1 Available UART
    - ◆ 1 ADC
    - ◆ 1 Dedicated Triac Dimmer Detection Pin
  - Horizontal (SMD)
    - ◆ 6 PWMs (GPIOs)

- ◆ 3 GPIOs
- ◆ 1 Available UART
- ◆ 2 ADC
- ◆ 1 Dedicated Triac Dimmer Detection Pin

## 1.3 Block Diagram

The LA02305 module is a highly-integrated, high-performance system with all the hardware components needed to enable 2.4GHz wireless connectivity and support Wi-Fi and BLE protocols.

Built around the ESP32-U4WD Wireless SoC, the LA02305 includes a built-in PCB trace antenna, supply decoupling and filtering components, a 40MHz reference crystal, a 32.768KHz crystal, and an RF shield.

## 1.4 Power Supply

The LA02305 requires a single nominal supply level of 3.3V. All the necessary decoupling and filtering components are included in the module. The supply voltage noise tolerance of the module should be less than 100mVpp and the supply current should be more than 500mA.

## 1.5 Module Certification Information

Table 1.1. Module Certification Information

| Module  | Certification Type | Certification Information |
|---------|--------------------|---------------------------|
| LA02305 | FCC                | 2AB2Q-LA02305             |
|         | IC                 | 10256A-LA02305            |

## 2. Electrical characteristics

### 2.1 Absolute maximum ratings

Stresses above those listed below may cause permanent damage to the device. This is a stress rating only and functional operation of the devices at those or any conditions above those indicated in the operation listing of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Table 2.1. Absolute maximum ratings

| Symbol              | Parameter                  | Min. | Max. | Units |
|---------------------|----------------------------|------|------|-------|
| VCC                 | Power Supply               | -0.3 | +3.6 | V     |
| GND                 | Ground of Module           |      | 0    | V     |
| VIO                 | Voltage of Module IO       | -0.3 | +3.6 | V     |
| Storage temperature |                            | -40  | +125 | Deg-C |
| MSL                 | Moisture Sensitivity Level | 3    |      |       |
| ESD HBM             | Human Body Mode            |      | ±1.5 | KV    |
| ESD CDM             | Charge Device Mode         |      | ±500 | V     |

### 2.2 General Operating Conditions

This table specifies the general operating temperature range and supply voltage range for all supplies, the minimum and maximum values of all other tables are specified over this operating range, unless otherwise noted.

Table 2.2. General Operating Conditions

| Symbol      | Parameter                           | Min. | Typ. | Max. | Units |
|-------------|-------------------------------------|------|------|------|-------|
| VCC         | Supply voltage, normal              | 3.0  | 3.3  | 3.6  | V     |
| TA          | Operation temperature <sup>1</sup>  | -40  | 25   | 105  | Deg-C |
| ICC peak    | Supply Current Peak <sup>2</sup>    | -    | 400  | 450  | mA    |
| ICC average | Supply Current average <sup>2</sup> | -    | 150  |      | mA    |

Note:

1. It refers in particular to the surface temperature on 40MHz reference crystal of the LA02305 when it is working, if the surface temperature of 40MHz reference crystal is above 105 Deg-C, the RF parameters will be worse.

2. It is measured when the module runs the RF test Firmware @ 10% duty cycle and 25 Deg-C ambient temperature.

### 2.3 DC Specifications

Unless otherwise indicated, typical conditions are: VCC=3.3V.TA=25Deg-C.

Table 2.3. DC Specifications

| Symbol | Parameter(condition) | Min. | Typ. | Max. | Units |
|--------|----------------------|------|------|------|-------|
|        |                      |      |      |      |       |

|                     |   |          |     |          |    |
|---------------------|---|----------|-----|----------|----|
| VIH                 | Input high voltage                      | 0.75xVCC | -   | VCC      | V  |
| VIL                 | Input low voltage                       | GND      | -   | 0.25xVCC | V  |
| VOH                 | Output high voltage                     | 0.8xVCC  | -   | -        | V  |
| VOL                 | Output low voltage                      | -        | -   | 0.1xVCC  | V  |
| IOH                 | Output high current                     | -        | 40  | -        | mA |
| IOL                 | Output low current                      | -        | 28  | -        | mA |
| RPU                 | Pull-up resistance                      | -        | 45  | -        | kΩ |
| RPD                 | Pull-down resistance                    | -        | 45  | -        | kΩ |
| ITX 802.11b peak    | Transmit 11b DSSS 1Mbps Pout=+21.53dBm  | -        | 382 |          | mA |
| ITX 802.11b average | Transmit 11b DSSS 1Mbps Pout=+18.12dB   | -        | 148 | -        | mA |
| ITX 802.11b peak    | Transmit 11b DSSS 11Mbps Pout=+21.03dBm | -        | 378 | -        | mA |
| ITX 802.11b average | Transmit 11b DSSS 11Mbps Pout=+17.95dBm | -        | 146 | -        | mA |
| ITX 802.11g peak    | Transmit 11g OFDM 6Mbps Pout=+20.99dBm  | -        | 332 | -        | mA |
| ITX 802.11g average | Transmit 11g OFDM 6Mbps Pout=+16.30dBm  | -        | 139 | -        | mA |
| ITX 802.11g peak    | Transmit 11g OFDM 54Mbps Pout=+20.89dBm | -        | 272 | -        | mA |
| ITX 802.11g average | Transmit 11g OFDM 54Mbps Pout=+16.11dBm | -        | 130 | -        | mA |
| ITX 802.11n peak    | Transmit 11n OFDM MCS0 Pout=+23.59dBm   | -        | 328 | -        | mA |
| ITX 802.11n average | Transmit 11n OFDM MCS0 Pout=+16.61dBm   | -        | 140 | -        | mA |
| ITX 802.11n peak    | Transmit 11n OFDM MCS7 Pout=+23.44dBm   | -        | 256 | -        | mA |
| ITX 802.11n average | Transmit 11n OFDM MCS7 Pout=+16.35dBm   | -        | 128 | -        | mA |
| IRX 802.11b/g/n     | Rx average current                      | -        | 108 | -        | mA |
| ITX BLE             | Pout=9.41dBm                            | -        | 236 | -        | mA |
| ITX BLE average     | Pout=9.35dBm                            | -        | 184 | -        | mA |
| IRXBLE              | Rx average current                      | -        | 115 | -        | mA |

Note:  
The current is measured with the module running the RF test Firmware @ 10% duty cycle

## 2.4 RF Specifications

Unless otherwise indicated, typical conditions are: VCC=3.3V TA=25Deg-C.

Table 2.4. Wi-Fi Specifications

| Symbol | Description                     | Min. | Typ.  | Max. | Units |
|--------|---------------------------------|------|-------|------|-------|
| Fop    | Operating frequencies           | 2412 | -     | 2462 | MHz   |
| PRF11b | 11b DSSS 1Mbps output power     | -    | 18.12 | -    | dBm   |
|        | 11b DSSS 11Mbps output power    | -    | 17.95 | -    | dBm   |
| PRF11g | 11g OFDM 6Mbps output power     | -    | 16.30 | -    | dBm   |
|        | 11g OFDM 54Mbps output power    | -    | 16.11 | -    | dBm   |
| PRF11n | 11n OFDM HT20 MCS0 output power | -    | 16.24 | -    | dBm   |
|        | 11n OFDM HT20 MCS7 output power | -    | 16.13 | -    | dBm   |
|        | 11n OFDM HT40 MCS0 output power | -    | 16.61 | -    | dBm   |

|          |  |   |       |   |     |
|----------|--|---|-------|---|-----|
|          | 11n OFDM HT40 MCS7 output power              | - | 16.35 | - | dBm |
| PSENS11b | Receiver sensitivity @ 11b DSSS 1Mbps        | - | -95   | - | dBm |
|          | Maximum receiving level @ 11b DSSS 1Mbps     | - | 5     | - | dBm |
|          | Receiver sensitivity @ 11b DSSS 11Mbps       | - | -86   | - | dBm |
|          | Maximum receiving level @ 11b DSSS 11Mbps    | - | 5     | - | dBm |
| PSENS11g | Receiver sensitivity @ 11g OFDM 6Mbps        | - | -91   | - | dBm |
|          | Maximum receiving level @ 11g OFDM 6Mbps     | - | 0     | - | dBm |
|          | Receiver sensitivity @ 11g OFDM 54Mbps       | - | -73   | - | dBm |
|          | Maximum receiving level @ 11g OFDM 54Mbps    | - | -8    | - | dBm |
| PSENS11n | Receiver sensitivity @ 11n OFDM HT20 MCS0    | - | -90   | - | dBm |
|          | Maximum receiving level @ 11n OFDM HT20 MCS0 | - | 0     | - | dBm |
|          | Receiver sensitivity @ 11n OFDM HT20 MCS7    | - | -71   | - | dBm |
|          | Maximum receiving level @ 11n OFDM HT20 MCS7 | - | -8    | - | dBm |
|          | Receiver sensitivity @ 11n OFDM HT40 MCS0    | - | -88   | - | dBm |
|          | Maximum receiving level @ 11n OFDM HT40 MCS0 | - | 0     | - | dBm |
|          | Receiver sensitivity @ 11n OFDM HT40 MCS7    | - | -68   | - | dBm |
|          | Maximum receiving level @ 11n OFDM HT40 MCS7 | - | -8    | - | dBm |

Table 2.5. BLE Specifications

| Symbol  | Description                | Min. | Typ. | Max. | Units |
|---------|----------------------------|------|------|------|-------|
| Fop     | Operating frequencies      | 2402 | -    | 2480 | MHz   |
| PRFLE   | LE Output Power            | -    | 8    | -    | dBm   |
|         | LE Out Power Control range | -    | 24   | -    | dB    |
|         | LE Out Power Control step  | -    | 3    | -    | dB    |
| PSENSLE | LE Receiver sensitivity    | -    | -90  | -    | dBm   |
|         | LE Maximum receiving level | -    | 0    | -    | dBm   |

### 3. Pin Definition

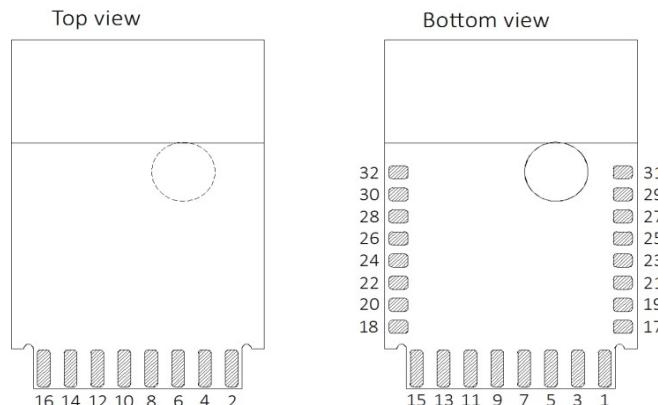


Figure 3.1.Vertical Mount (Plug-In)

Table 3.1. Plug-In pin definition

| Module No | Pin of IC                | Pin Definition | Pin Function Description                                      | Direction |
|-----------|--------------------------|----------------|---|-----------|
| 1         | 17_MTMS                  | PWM1/IO0       | PWM channel 1 output / GPIO 0                                 | I/O       |
| 2         | GND                      | GND            | Ground of Module  | --        |
| 3         | 15_GPIO26                | PWM2/IO1       | PWM channel 2 output / GPIO 1                                 | I/O       |
| 4         | 40_U0RXD                 | RX0            | FACTORY_UART_RX data in (RX)                                  | I         |
| 5         | 17_MTMS                  | PWM3/IO2       | PWM channel 3 output / GPIO 2                                 | I/O       |
| 6         | 41_U0TXD                 | TX0            | FACTORY_UART_TX data out (TX)                                 | O         |
| 7         | 21_MTDO                  | PWM4/IO3       | PWM channel 4 output / GPIO 3                                 | I/O       |
| 8         | 9_CHIP_PU                | RESET          | Reset, Low Active   | I         |
| 9         | 24_GPIO4                 | PWM5/IO4       | PWM channel 5 output / GPIO 4                                 | I/O       |
| 10        | 10_VDET_1                | FAC            | FACTORY MODE enable, low active                               | I         |
| 11        | 35_GPIO18                | PWM6/IO5       | PWM channel 6 output / GPIO 5                                 | I/O       |
| 12        | 5_SENSOR_VP              | ADC0           | Analog-to-Digital Converter                                   | I         |
| 13        | GND                      | GND            | Ground of Module  | --        |
| 14        | 16_GPIO27                | TX1            | HOST_UART_RX (data out from ESP32) , need an external pull up | O         |
| 15        | 1,3,4,19,26,37,4<br>3,46 | VCC            | Power Supply  | --        |
| 16        | 14_GPIO25                | RX1            | HOST_UART_TX (data in to ESP32) , need an external pull up    | I         |

Note:

1. AC\_TRIAC\_DETECT is used to detect if a device is powered through a triac dimmer and to determine the dimmer settings. The circuit that feeds this signal should give a scaled DC voltage representation of the average AC voltage integrated over approximately 200ms. If the triac is set to chop the AC waveform 50%, the AC\_TRIAC\_DETECT signal should be at 50% of VCC. If the triac dimmer is turned up completely, the AC waveform will be minimally chopped and the AC\_TRIAC\_DETECT signal should be at 100% of VCC.

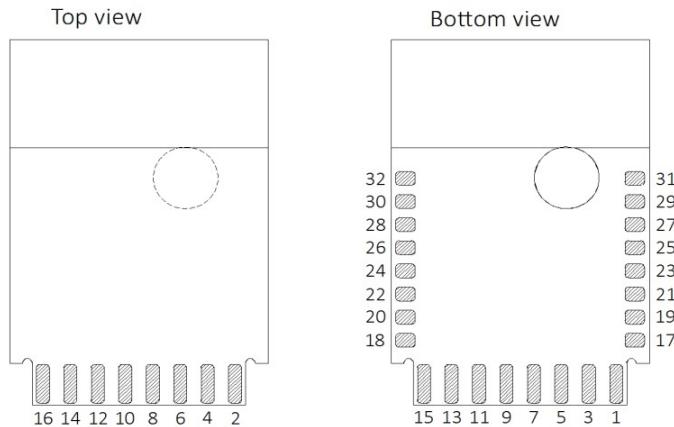


Figure 3.2. Horizontal (SMD)

Table 3.2. SMD pin definition

| Module No | Pin of IC             | Pin Definition | Pin Function Description                                     | Direction |
|-----------|-----------------------|----------------|--|-----------|
| 1         | 17_MTMS               | PWM1/IO0       | PWM channel 1 output / GPIO 0                                | I/O       |
| 2         | GND                   | GND            | Ground of Module   | --        |
| 3         | 15_GPIO26             | PWM2/IO1       | PWM channel 2 output / GPIO 1                                | I/O       |
| 4         | 40_U0RXD              | RX0            | FACTORY_UART_RX data in (RX)                                 | I         |
| 5         | 17_MTMS               | PWM3/IO2       | PWM channel 3 output / GPIO 2                                | I/O       |
| 6         | 41_U0TXD              | TX0            | FACTORY_UART_TX data out (TX)                                | O         |
| 7         | 21_MTDO               | PWM4/IO3       | PWM channel 4 output / GPIO 3                                | I/O       |
| 8         | 9_CHIP_PU             | RESET          | Reset, Low Active  | I         |
| 9         | 24_GPIO4              | PWM5/IO4       | PWM channel 5 output / GPIO 4                                | I/O       |
| 10        | 10_VDET_1             | FAC            | FACTORY MODE enable, low active                              | I         |
| 11        | 35_GPIO18             | PWM6/IO5       | PWM channel 6 output / GPIO 5                                | I/O       |
| 12        | 5_SENSOR_VP           | ADC0           | Analog-to-Digital Converter                                  | I         |
| 13        | GND                   | GND            | Ground of Module   | --        |
| 14        | 16_GPIO27             | TX1            | HOST_UART_RX (data out from ESP32), need an external pull up | O         |
| 15        | 1,3,4,19,26,37,43, 46 | VCC            | Power Supply   | --        |
| 16        | 14_GPIO25             | RX1            | HOST_UART_TX (data in to ESP32), need an external pull up    | I         |
| 17        | 10_VDET_1             | FAC            | FACTORY MODE enable, low active                              | I         |
| 18        | 14_GPIO25             | RX1            | HOST_UART_TX (data in to ESP32), need an external pull up    | I         |
| 19        | 9_CHIP_PU             | RESET          | Reset, Low Active  | I         |

|    |             |      |   |     |
|----|-------------|------|---|-----|
| 20 | 16_GPIO27   | TX1  | HOST_UART_RX (data out from ESP32),<br>need an external pull up | O   |
| 21 | 41_U0TXD    | TX0  | FACTORY_UART_TX data out (TX)                                   | O   |
| 22 | 42_GPIO21   | IO8  | GPIO8   | I/O |
| 23 | 40_U0RXD    | RX0  | FACTORY_UART_RX data in (RX)                                    | I   |
| 24 | GND         | GND  | Ground of Module  | --  |
| 25 | --          | NC   | --  | --  |
| 26 | 5_SENSOR_VP | ADC0 | Analog-to-Digital Converter                                     | I   |
| 27 | --          | NC   | --  | --  |
| 28 | 39_GPIO22   | IO9  | GPIO9   | I/O |
| 29 | 23_GPIO0    | IO7  | GPIO7   | I/O |
| 30 | 11_VDET_2   | ADC2 | Analog-to-Digital Converter                                     | I   |
| 31 | GND         | GND  | Ground of Module  | --  |
| 32 | GND         | GND  | Ground of Module  | --  |

Note:

1. AC\_TRIAC\_DETECT is used to detect if a device is powered through a triac dimmer and to determine the dimmer settings. The circuit that feeds this signal should give a scaled DC voltage representation of the average AC voltage integrated over approximately 200ms. If the triac is set to chop the AC waveform 50%, the AC\_TRIAC\_DETECT signal should be at 50% of VCC. If the triac dimmer is turned up completely, the AC waveform will be minimally chopped and the AC\_TRIAC\_DETECT signal should be at 100% of VCC.

## 4. Package Specifications

### 4.1 Dimension

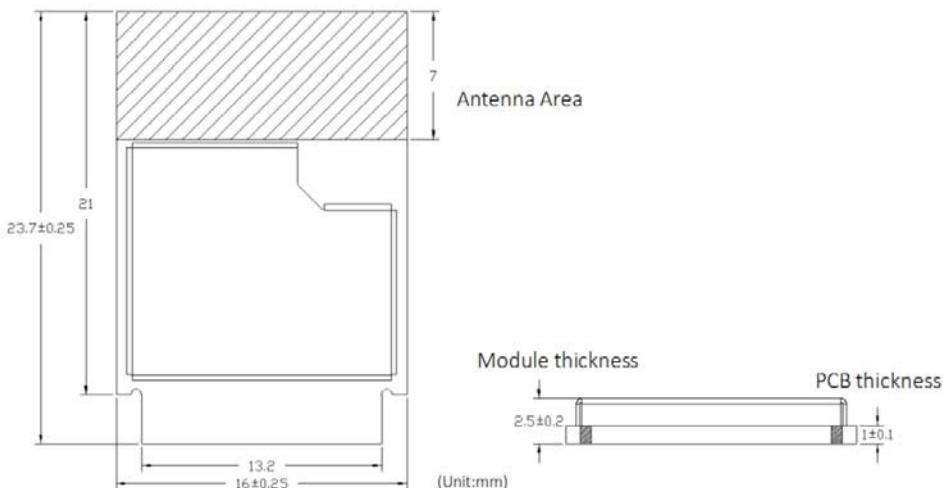


Figure 4.1.Module Dimensions (Unit: mm)

## 4.2 PCB Pads Information

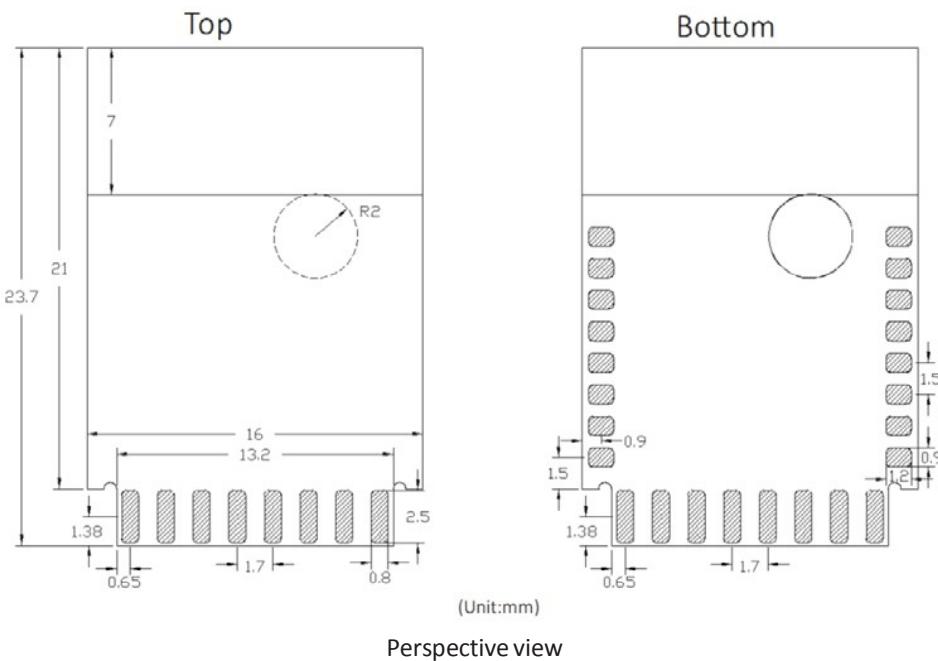


Figure 4.2. Pad Size (Unit: mm)

Note:

1. Shaded part is Antenna Trace.
2. The sizes of pads on the component side are the same to the opposite side.

### 4.3 Plug-in Land pattern example

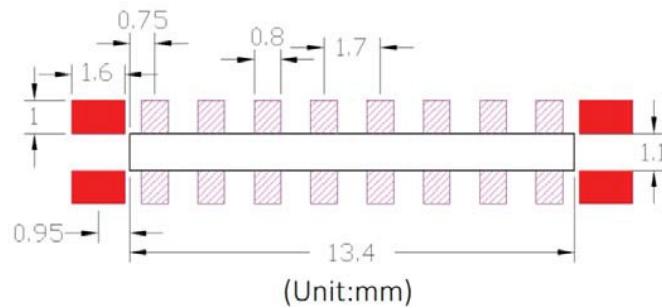


Figure 4.3. Plug-in PCB Land Pattern (Unit: mm)

Note:

Please see below lay-out:

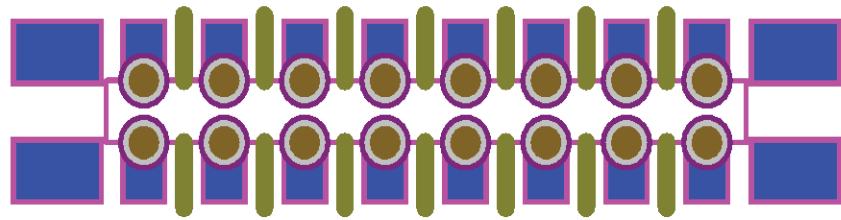


Figure 4.4. Plug-in PCB Land Pattern (Unit: mm)

#### 4.4 SMD Land pattern example

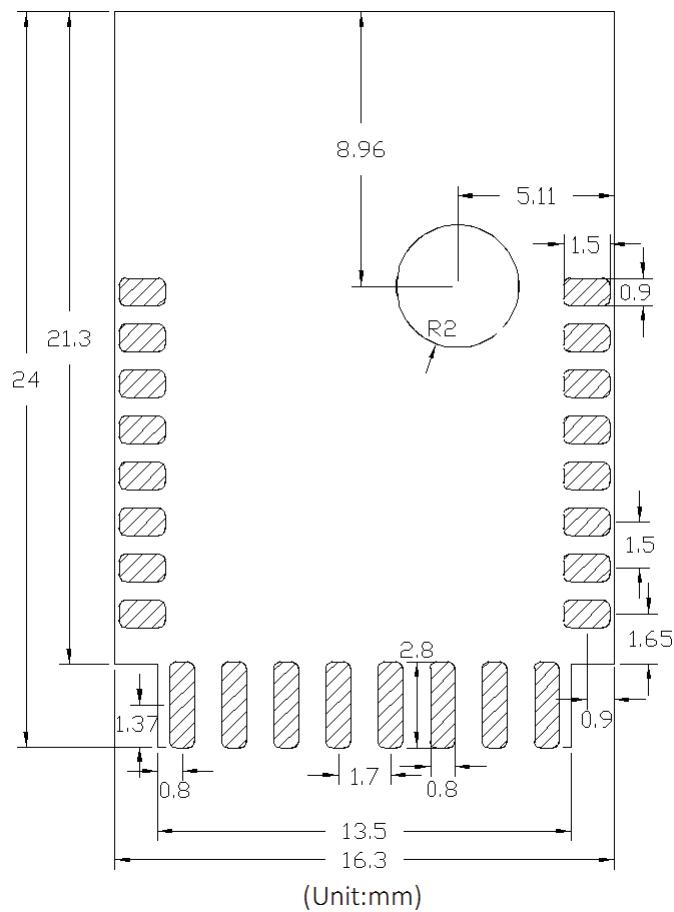


Figure 4.5. SMD PCB Land Pattern (Unit: mm)

Note:

Shaded part is Antenna Trace.

## 5. Soldering Recommendations

Refer to below information for SMT temperature settings. Note that the number of times of reflow should not above 2 times.

Table 5.1. SMT temperature setting

| Set points(C)                   |     |     |     |     |     |     |     |     |     |     |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Zone                            | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
| Top                             | 140 | 180 | 190 | 180 | 180 | 190 | 245 | 260 | 265 | 210 |
| Bottom                          | 140 | 180 | 190 | 180 | 180 | 190 | 245 | 260 | 265 | 210 |
| Conveyor Speed (cm/min) : 130.0 |     |     |     |     |     |     |     |     |     |     |

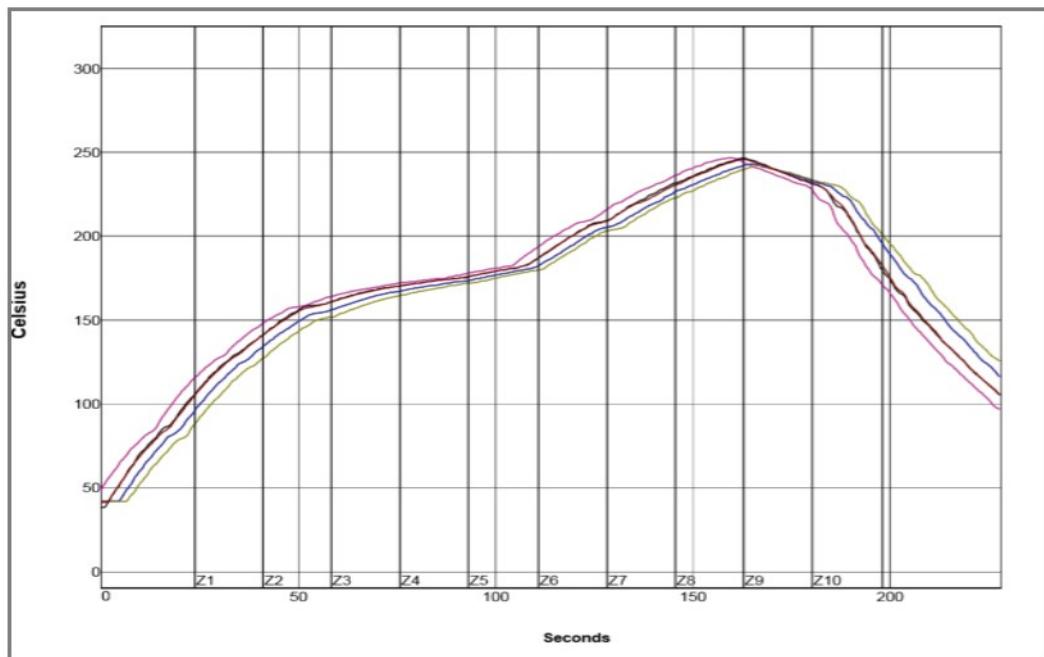


Figure 5.1.SMT temperature setting curve

## 6. Declaration

### FCC Statement

1. 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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

### 15.21

Note: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

### 15.105(b)

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

#### **RF 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 of 20 cm between the radiator and your body.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

#### **ISED RF exposure statement:**

This equipment complies with ISED 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 transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés. Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm ton corps. Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

## **Regulatory Module Integration Instructions**

### **1.1 List of applicable FCC rules**

This device complies with part 15.247 of the FCC Rules.

### **1.2 Summarize the specific operational use conditions**

This module can be applied in HID, sports and fitness sensors , health sensors, mobile accessories as well as smart home. The input voltage to the module should be nominally 3.0-3.6V DC , typical value 3V DC and the ambient temperature of the module should not exceed 105°C .

This module using one kind of PCB antenna with maximum gain is 4.0dBi If the antenna needs to be changed, the certification should be re-applied.

### **1.3 Limited module procedures**

Not applicable

### **1.4 Trace antenna designs**

Not applicable

### **1.5 RF exposure considerations**

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. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by 2.1093.

### **1.6 Antennas**

Module contains one PCB antenna.

### **1.7 Label and compliance information**

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID: 2AB2Q-LA02305 " , or "Contains FCC ID: 2AB2Q-LA02305 " ,Any similar wording that expresses the same meaning may be used.

### **1.8 Information on test modes and additional testing requirements**

a)The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions

limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

C) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected

The LA02035 module is based on ESP32-U4WD chip .support standard Bluetooth HCI UART commands. For the testing module on your product, user can refer to specification of the Bluetooth/WIFI system on how to configure and evaluate the module.This specification can also be found on the official Bluetooth website: <https://www.bluetooth.org/en-us/specification/adopted-specifications>.

### **1.9 Additional testing , Part 15 subpart B disclaimer**

The final host I module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device .

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

### **Frequency spectrum to be investigated**

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

### **Operating the host product**

When testing the host product, all the transmitters must be operating.The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.

The product under test is placed into a normal 'paired' mode with another BLE device, as per the normal intended use of the product (for example, transferring data).

**IC Label Instructions:**

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as:

"Contains Transmitter Module IC: 10256A-LA02305", or "Contains IC: 10256A-LA02305",

Any similar wording that expresses the same meaning may be used

Instructions d'étiquetage IC: L'extérieur des produits finis contenant ce module doit afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser des libellés tels que: contient le module émetteur IC: " 10256A-LA02305 "ou" contient IC:10256A-LA02305 ", tout libellé similaire exprimant le même sens peut être utilisé