Comchips

# KX6354
# Module Data sheet

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**Website: www.comchips.com**

Customer Approval

Company _____

Title _____

Signature _____

Date _____

FTY _____

Version Update Record

| Version | Date | Revision Content | Editorial staff | approval |
|---|---|---|---|---|
| V1.0 | 2021/07/18 | The first version | | |

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# 1 Overview

## 1.1Introduction

The KX6354 is a highly integrated single-chip that support 1-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input , Multiple-Output) STA mode with Wireless LAN (WLAN) PCIExpress network interface controller with integrated Bluetooth 2.1/4.2 USB interface controller. Itcombines a WLAN MAC, a 1T1R capable WLAN baseband, and RF in s single chip. The RTL8821CE provides a complete solution for a high-performance integrated wireless and Bluetooth device.

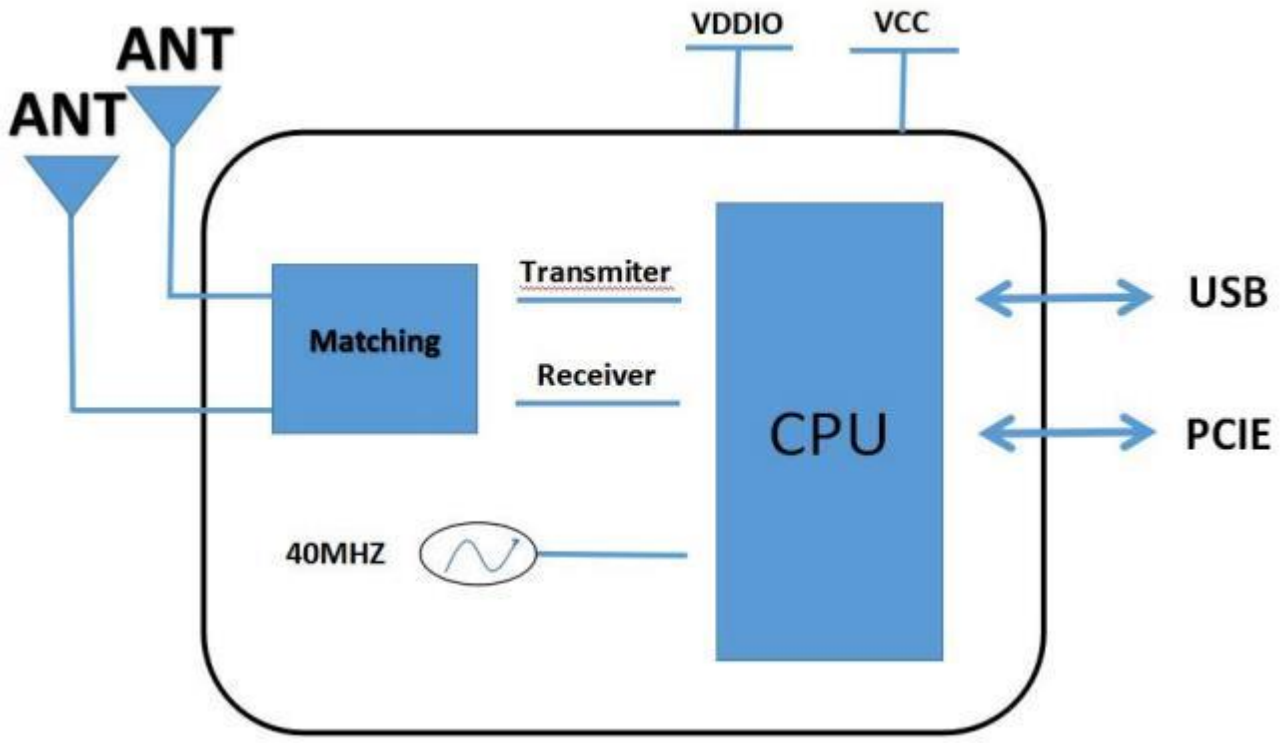
The KX6354 base band implements Multi-user Multiple Input, Multiple Output (MU MIMO)Orthogonal Frequency Division Multiplexing (OFDM) STA mode with one transmit and one receive paths(1T1R).For legacy compatibility, Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK)and OFDM base band processing are included to support all IEEE 802.11b, 802.11g and 802.11a data rates。

The KX6354 builds in an enhanced signal detector, an adaptive frequency domain equalizer, and a soft-decision Viterbi decoder to alleviate severe multi-path effects and mutual interference in the reception of multiple streams. Robust interference detection and suppression are provided to protect against Bluetooth, cordless phone, and microwave oven interference

## 1.2 Features

- CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802. 11a/b/g/n/ac compatible WLAN
- Supports BT : V2.1+ EDR and V4.2, For BR/EDR,V4.0BLE
- Maximum PHY data rate up to 86.7Mbps using 20MHz bandwidth, 200Mbps using 40MHz bandwidth, and 433.3Mbps using 80MHz bandwidth.
- supports WLAN low power consumption
- Complete 802. 11n MIMO solution for 2.4GHz and 5Ghz band
- Backward compatible with 802. 11a/b/g devices while operating at 802. 11n data rates
- supports 20/40MHz at 2.4GHz
- Support 20/40/80MHz 5GHz
- supports WLAN-Bluetooth coexistence
- supports low power Bluetooth
- Bluetooth 4.0 Dual Mode support: Simultaneous LE and BR/EDR

## 1.3 Block Diagram




## 1.4 General Specification

| | |
|---|---|
| Model Name | KX6354 |
| Product Description | Support WLAN-Bluetooth coexistence |
| Dimension | L x W x H: 16.x 12 (±0.2) mm |
| Wi-Fi Interface | Support PCIE |
| BT interface | Support USB 2.0 |
| Operating temperature | 0 to +70° C |
| Storage temperature | -55°C to 125°C |
| RoHS | All hardware components are fully compliant with EU RoHS directive |

## 1.5 DC Characteristics

Power Supply Characteristics

| Symbol | Parameter | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|
| VDD33 | 3.3V I/O Supply Voltage | 3.0 | 3.3 | 3.6 | V |
| VD10 | 1.05V Core Supply Voltage | 0.945 | 1.05 | 1.155 | V |

# 2 RF Specifications

## 2.1 2.4GHz RF Specification

| Features | Description |
|---|---|
| WLAN Standard | IEEE802.11a/b/g/n/ac/e/i/h |
| Frequency Range | 2.4~2.4835GHz (2.4GHz ISM Band) |
| Modulation Method | DSSS,DBPSK, DQPSK, CCK and OFDM<br>(BPSK, QPSK, 16QAM,64QAM and 256-QAM) |
| Number of Channel | 2.4GHz:<br>11: (Ch. 1-11) – United States<br>13: (Ch. 1-13) – Europe<br>14: (Ch. 1-14) – Japan<br>BT 2.4GHz: Ch. 0 ~78 |

2.4G Transmitter Specifications

| TX Rate | TX Power | TX Power Tolerance | EVM |
|---|---|---|---|
| 802.1 1b @ 11 Mbps | 17dBm | ±2dBm | ≤-13dB |
| 802.11g@54Mbps | 14dBm | ±2dBm | ≤-25dB |
| 802.11n@BW20_MCS7 | 13dBrn | ±2dBm | ≤-28dB |
| 802.11n@BW40_MCS7 | 13dBrn | ±2dBm | ≤-28dB |

2.4G Receiver Specifications

| RX Rate | Min Input Level(Typ) | Max Input Level(Typ) | PER |
|---|---|---|---|
| 802.11b@11Mbps | -85dBm | -85dBm | <8% |
| 802.11g@54Mbps | -68dBm | -68dBm | < 10% |
| 802.11n@BW20_MCS7 | -66dBrn | -66dBrn | < 10% |
| 802.11n@BW40_MCS7 | -65dBrn | -65dBrn | < 10% |

## 2.2 5GHz RF Specification

| Features | Description |
|---|---|
| WLAN Standard | IEEE802.11a/b/g/n/ac/e/i/h |
| Frequency Range | 4.9GHz ~ 6.0GHz (5GHz ISM Band) |
| Modulation Method | DSSS,DBPSK, DQPSK, CCK and OFDM (BPSK, QPSK, 16QAM,64QAM and 256-QAM) |

5G Transmitter Specifications

| TX Rate | TX Power | TX Power Tolerance | EVM |
|---|---|---|---|
| 802.1 1a@ 54Mbps | 13dBm | ±2dBm | ≤-25dB |
| 802. 11n@BW40_MCS7 | 12dBrn | ±2dBm | ≤-28dB |
| 802.11ac@BW80_MCS9 | 10dBrn | ±2dBm | ≤-32dB |

5G Receiver Specifications

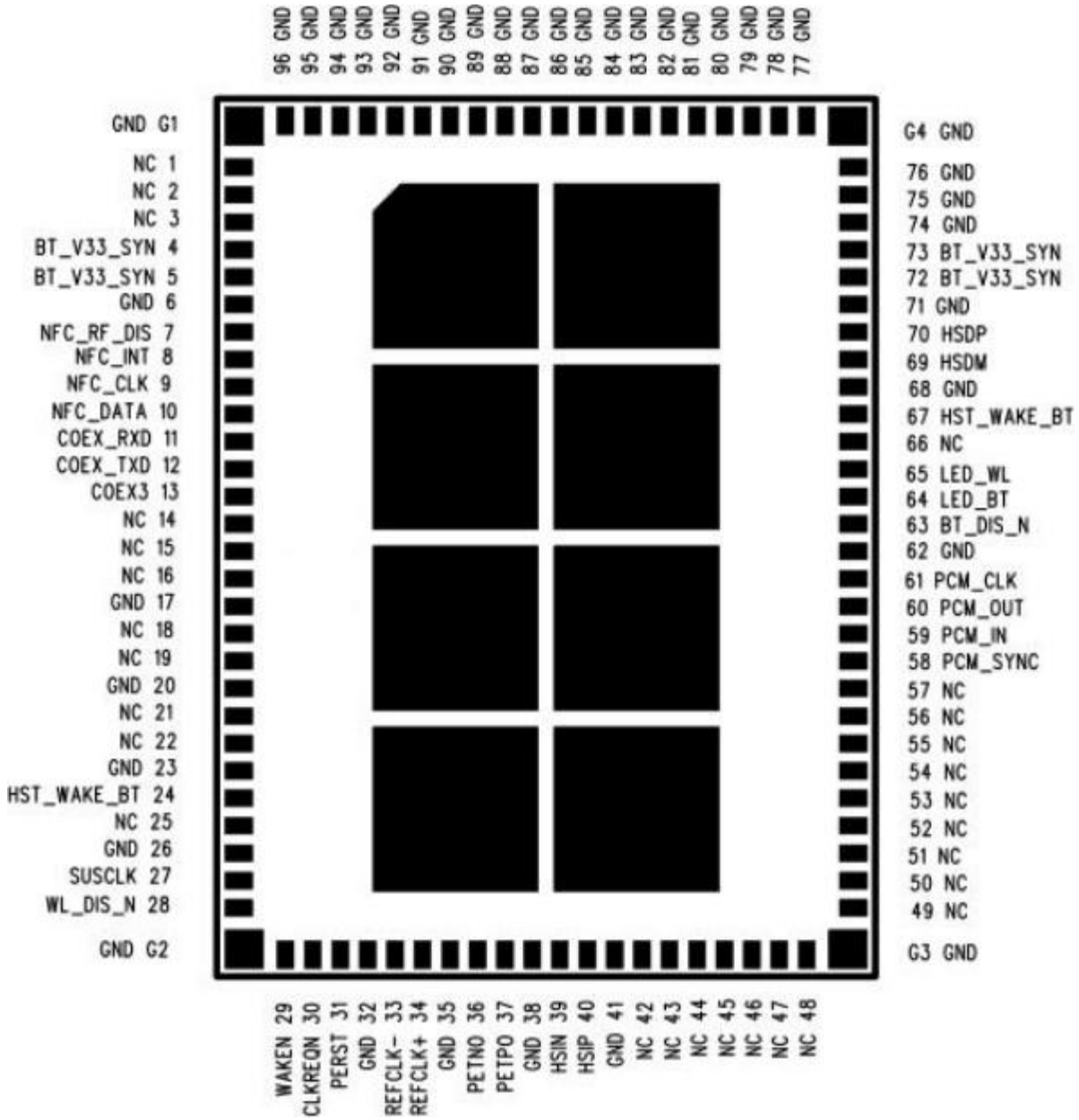
| RX Rate | Min Input Level(Typ) | Max Input Level(Typ) | PER |
|---|---|---|---|
| 802.11a@54Mbps | -70dBm | -70dBm | <10% |
| 802. 11n@BW40_MCS7 | -65dBm | -65dBm | < 10% |
| 802.11ac@BW80_MCS9 | -56dBm | -56dBm | < 10% |

## 2.3 Bluetooth Specification

| Feature | Description | | |
|---|---|---|---|
| **General Specification** | | | |
| Bluetooth Standard | Bluetooth V3.3 of 1, 2 and 3 Mbps | | |
| Host Interface | USB 2.0 | | |
| Antenna Reference | Small antennas with 0~2 dBi peak gain | | |
| Frequency Band | 2.400 GHz ~ 2483.5 GHz | | |
| Number of Channels | 79 channels | | |
| Modulation | FHSS, GFSK, DPSK, DQPSK | | |
| **RF Specification** | | | |
| Power (BDR：GFSK/1Mbps) | 0dBm | 5 dBm | 10dBm |
| Power(EDF：π /4-DQPSK/2Mbps) | 0dBm | 5 dBm | 10dBm |
| Power (BLE：GFSK/1Mbps) | 0dBm | 5 dBm | 10dBm |
| Sensitivity @ BER=0.1%<br>for (BDR：GFSK/1Mbps) | | -85 dBm | |
| Sensitivity @ BER=0.1%<br>for(EDF：π /4-DQPSK/2Mbps) | | -85 dBm | |
| Sensitivity @ BER=0.1%<br>for (BLE：GFSK/1Mbps) | | -85 dBm | |
| Initial Freq Error | BDR：GFSK/1Mbps:±75KHZ | | |
| | EDF：π /4-DQPSK/2Mbps :±75KHZ | | |
| | BLE：GFSK/1Mbps :±75KHZ | | |

# 3 Pin Assignments

## 3.1 Pin Outline



## 3.2 Pin Definition

| Pin | Definition | Description |
|---|---|---|
| G1 | GND | Ground |
| 1 | NC | NC |
| 2~3 | NC | NC |
| 4 | VDD33 | 3.3V |
| 5 | VDD33 | 3.3V |
| 6 | GND | Ground |
| 7 | NFC_RF_DIS | NC |
| 8 | NFC_INT | NC |
| 9 | NFC_CLK | NC |
| 10 | NFC_DATA | NC |
| 11 | COEX_RXD | GPIO6 |
| 12 | COEX_TXD | GPIO12 |
| 13 | COEX3 | GPIO7 |
| 14~16 | NC | NC |
| 17 | GND | Ground |
| 18~19 | NC | NC |
| 20 | GND | Ground |
| 21~22 | NC | NC |
| 23 | GND | Ground |
| 24 | HST_WAKE_DEV | GPIO13 |
| 25 | NC | NC |
| 26 | GND | GND |
| 27 | SUSCLK | Shared with EECS. External 32K or RTC clock input |
| 28 | WL_DIS_N | GPIO9 |
| G2 | GND | Ground |
| 29 | WAKE_N | GND. |
| 30 | CLKREQ | GND |

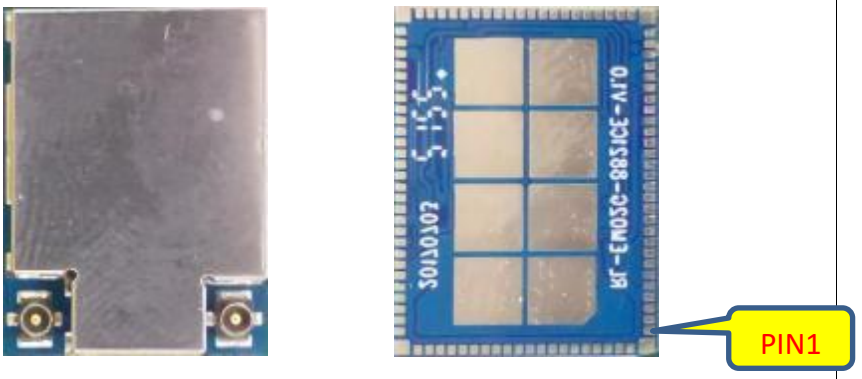
| | | |
|---|---|---|
| 31 | PERSTB | PCI Express Reset Signal: active low.When the PERST# is asserted at power-on state, the RTL8821CE returns to a pre-defined reset state and is ready for initialization and configuration after the de-assertion of the PERST#. |
| 32 | GND | Ground |
| 33 | REFCLK_N | PCI Express Differential Reference Clock Source: 100MHz±300ppm |
| 34 | REFCLK_P | PCI Express Differential Reference Clock Source: 100MHz±300ppm |
| 35 | GND | Ground |
| 36 | HSON | PCI Express Transmit Differential Pair |
| 37 | HSOP | PCI Express Transmit Differential Pair |
| 38 | GND | Ground |
| 39 | HSIN | PCI Express Receive Differential Pair |
| 40 | HSIP | PCI Express Receive Differential Pair |
| 41 | GND | Ground |
| 42~48 | NC | NC |
| G3 | GND | Ground |
| 49~56 | NC | NC |
| 57 | GND | Ground |
| 58 | PCM_SYNC | GPIO2 |
| 59 | PCM_IN | GPIO0 |
| 60 | PCM_OUT | GPIO1 |
| 61 | PCM_CLK | GPIO3 |
| 62 | GND | Ground |
| 63 | BT_DIS | GPIO11 |
| 64 | BT_LED | LED1 |
| 65 | WL_LED | LED2 |
| 66 | NC | NC |
| 67 | HOST_WAKE_BT | GPIO13 |
| 68 | GND | Ground |

| | | |
|---|---|---|
| 69 | HSDM | High-Speed USB D- Signal |
| 70 | HSDP | High-Speed USB D+ Signal |
| 71 | GND | GND |
| 72 | VDD33 | 3.3V |
| 73 | VDD33 | 3.3V |
| 74~76 | GND | Ground |
| G4 | GND | Ground |
| 77~96 | GND | Ground |

# 4 Dimensions

## 4.1 Module Picture

L x W：16.1 x 12 (±0.2) mm

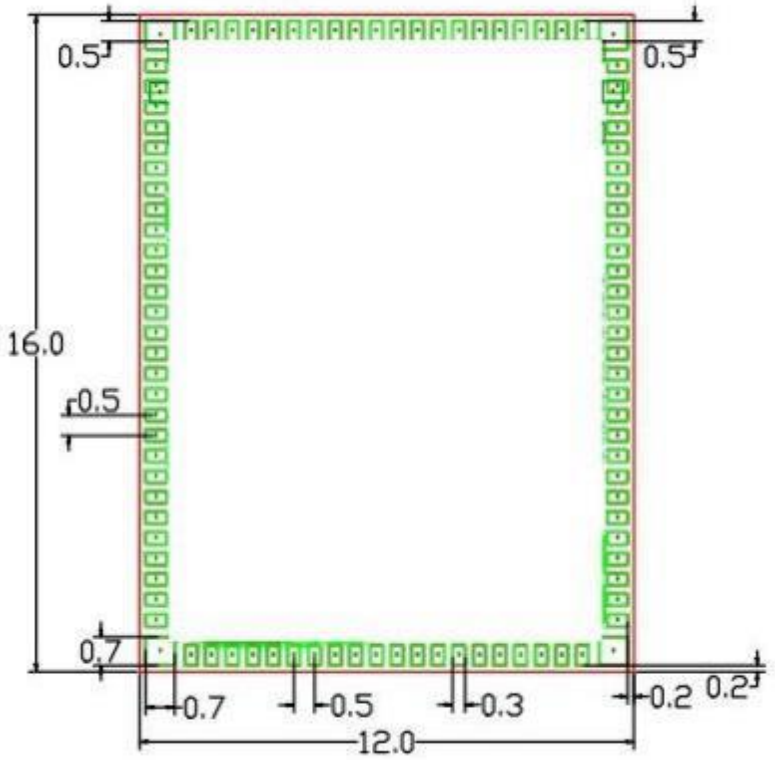



H:2.1(±0.2)mm

## .2 Module Physical Dimensions

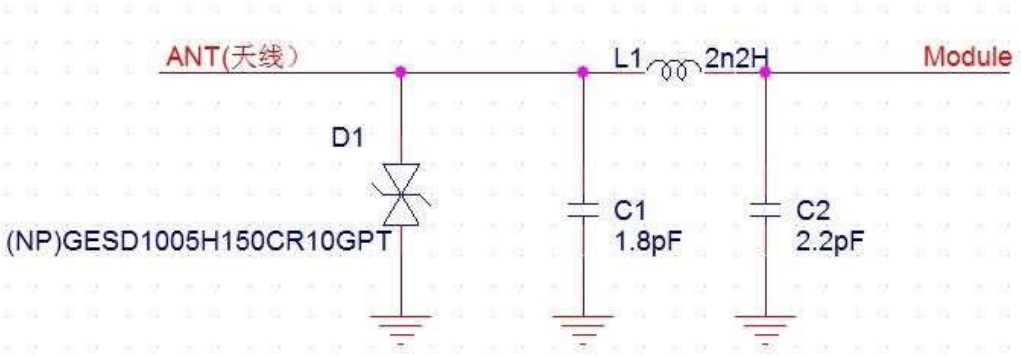
(Unit: mm)

< TOP VIEW >



# 5 Reference Design

## 5.1WIFI RF Circuit reference pictures

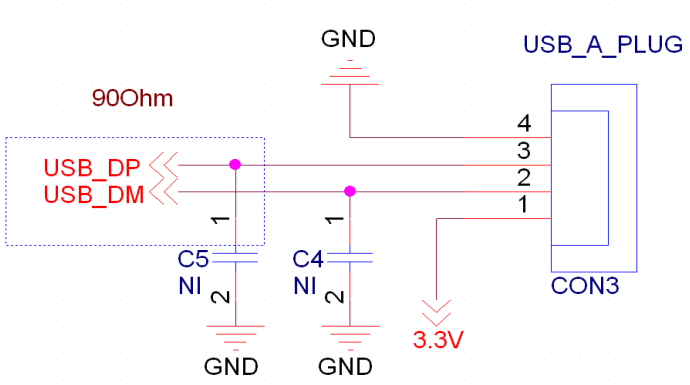



1. Above the dotted box part of the antenna matching is needed, the actual antenna matching electronic parameters shall prevail.

2. For RF part layout to do 50 ohm impedance. can't go on 90°of layout .The line length can't more than20 mm.

Note: Please be sure to add a TVS tube at the end of the welding antenna to prevent ESD static electricity from damaging the WIFI module (as shown in the reference circuit above).

## 5.2 USB interface electrical characteristics




Note:

1.USB data cable need to do 90Ohm impedance

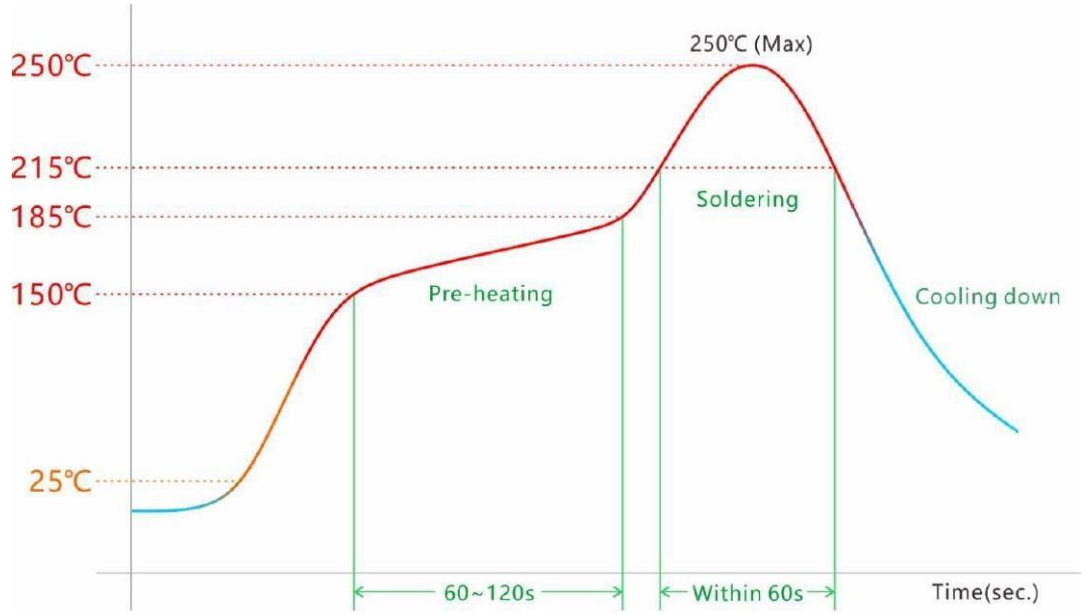
2.It is recommended to keep a power switch at the input end of the power supply. Each time the card is opened or closed, it can be used for power on and power off. WIFI can be reset, so that there will be no error phenomenon of not opening WIFI.

# 6 The Key Material List

| No. | Parts | Specification | Manufacturer | Note |
|---|---|---|---|---|
| 1 | Chipset | RTL8821CE-CG BGA100 | Realtek Semiconductor Corp | Chipset |
| 2 | PCB | RL-EM02G-8821CE-V1.0 | Shenzhen xiangyu circuit co., LTD | PCB |
| 3 | PCB | RL-EM02G-8821CE-V1.0 | Shenzhen Kexiang Precision Circuit Technology Co., LTD | PCB |
| 4 | Crystal oscillator | 2016/40MHz/± 8ppm/12pF(-20~85°C) | hefei jing wei Electronics Co. Ltd. | Crystal oscillator |
| 5 | Crystal oscillator | 2016/40MHz/± 8ppm/12pF(-20~85°C) | ZhejiangLanjingxin Microelectronics Co., LTD. | Crystal oscillator |

# 7 Recommended Reflow Profile

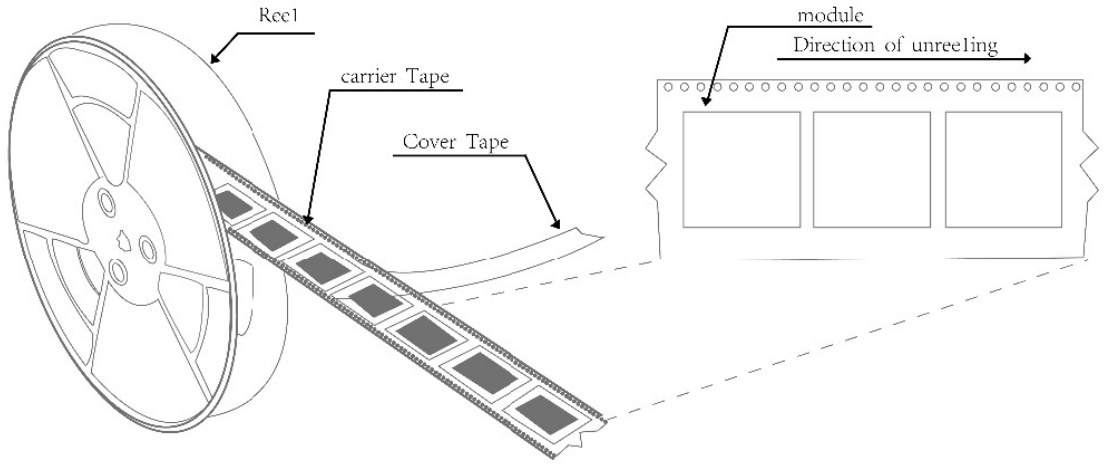
Referred to IPC/JEDEC standard.
Peak Temperature : <250° C
Number of Times : ≤2 times



# 8 Package Information

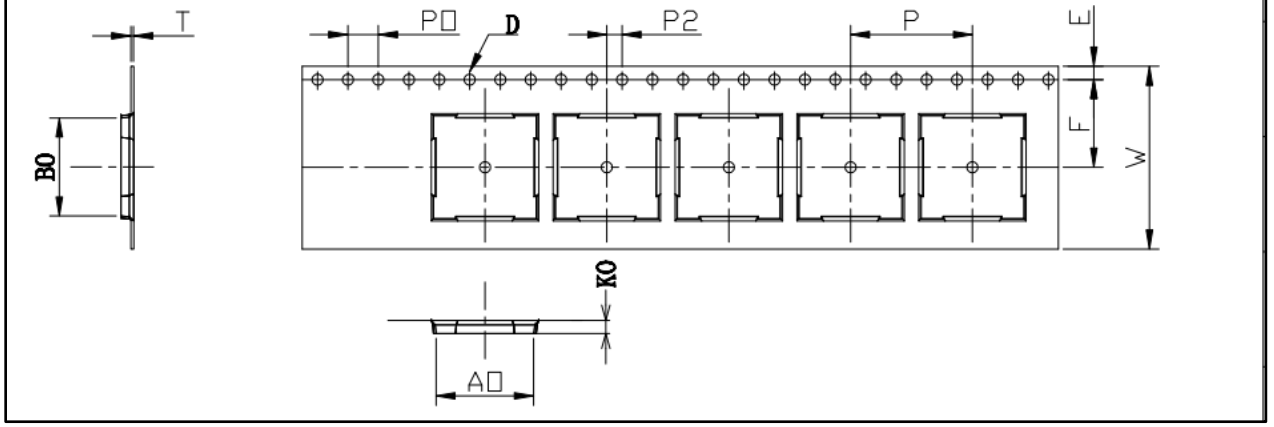
## 8.1 Reel

A roll of 1500pcs

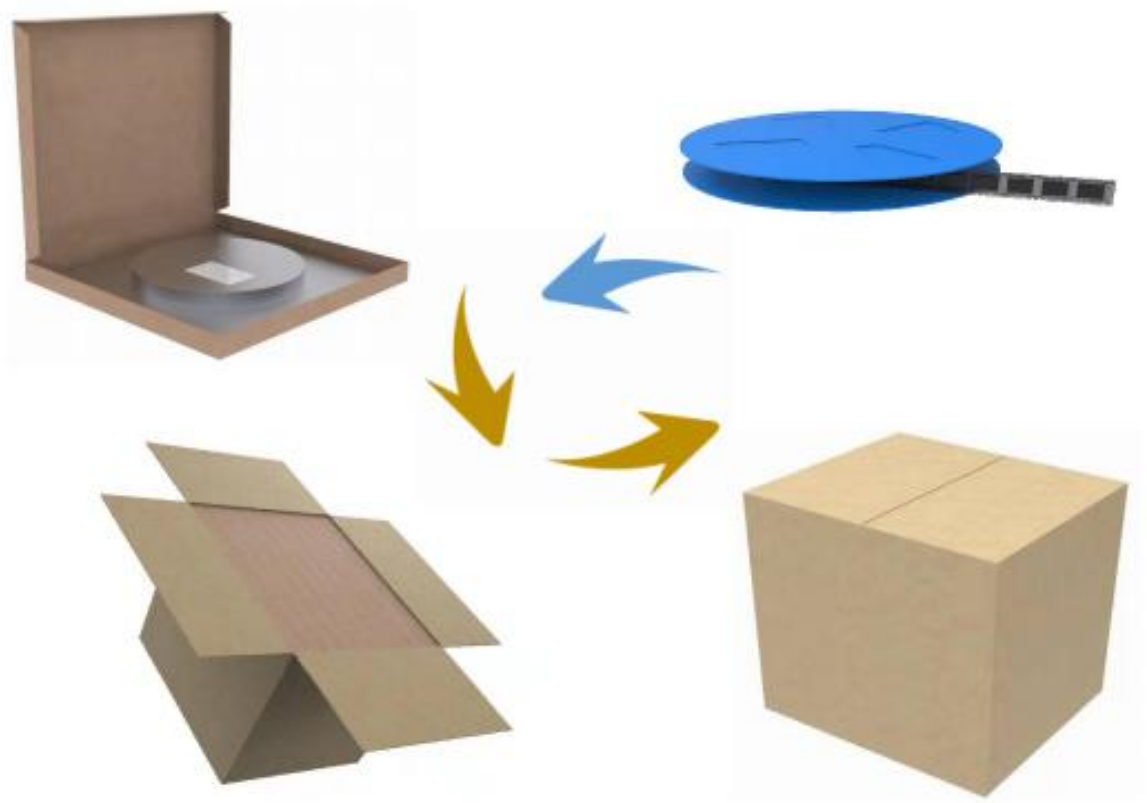



## 8.2 Carrier Tape Detail

| ITEM | W | A0 | B0 | D | F | E | K0 | P0 | P2 | P | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DIM | 24 | 12.47 | 12.47 | 1.50 | 11.5 | 1.75 | 1.90 | 4.0 | 2.0 | 16.0 | 0.30 |
| TOLE | +0.3 -0.3 | ±0.10 | ±0.10 | +0.1 -0.0 | +0.1 -0.1 | ±0.1 | ±0.10 | ±0.1 | ±0.1 | ±0.1 | ±0.05 |



## 8.3 Packaging Detail



## 8.4 Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH).

b)Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5.

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

b) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected

e) Baking is required if conditions b) or c) are not respected

f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more