ESP32-WROOM-32UE

User Manual

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Chengdu Ebyte Electronic Technology Co.,Ltd.

Catalog

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Ⅰ Functional Overview

1.1 Introduction

ESP32-WROOM-32UE is a WIFI module based on ESP32-DOWD-V3 chip solution.

ESP32-WROOM-32UE is a universal Wi-Fi module with powerful functions, built-in ESP32-DOWD-V3 chip, Xtensa® dual-core 32-bit LX6 microprocessor, 448 KB ROM, 520 KB SRAM, 16 KB RTC SRAM supports up to 240 clock frequency in MHz.

Can be used for low-power sensor networks and demanding tasks such as speech encoding, audio streaming, and MP3 decoding.

1.2 Features

- 4 MB SPI flash,
- Support AT commands;
- Support serial communication, flow control. The baud rate supports up to 128000;
- Support automatic and manual networking.

Ⅱ Electrical Characteristics

2.1 Absolute maximum ratings

Symbol	Parameter	Minimum	Maximum	Unit
VDD33	Power pin voltage	-0.3	3.6	V
TSTORE	Storage temperature	-40	85	°C

Chart 2- 1 Absolute maximum ratings

2.2 Recommended working conditions

Symbol	Parameter	Minimum	Typical	Maximum	Unit
VDD33	Power Pin Voltage	3.0	3.3	3.6	V
IVDD	Supply current of external power supply	0.5	—	—	A
T	Recommended working temperature	-40	—	85	°C
Humidity	Humidity	—	85	—	%RH
Imax	Peak current			400	mA

I	Average current			100	mA

Chart 2- 2 Recommended working conditions

2.3 RF Characteristics

Working channel center frequency range		2412~2484MHz
Wi-Fi		Protocol IEEE802.11b/g/n
Antenna type		IPEX Interface
Distance	With router @Mercury MW305R	400m
	Between Modules	400m

Chart 2- 3 RF Characteristics

III Hardware Description

3.1 Mechanical size and pin definition

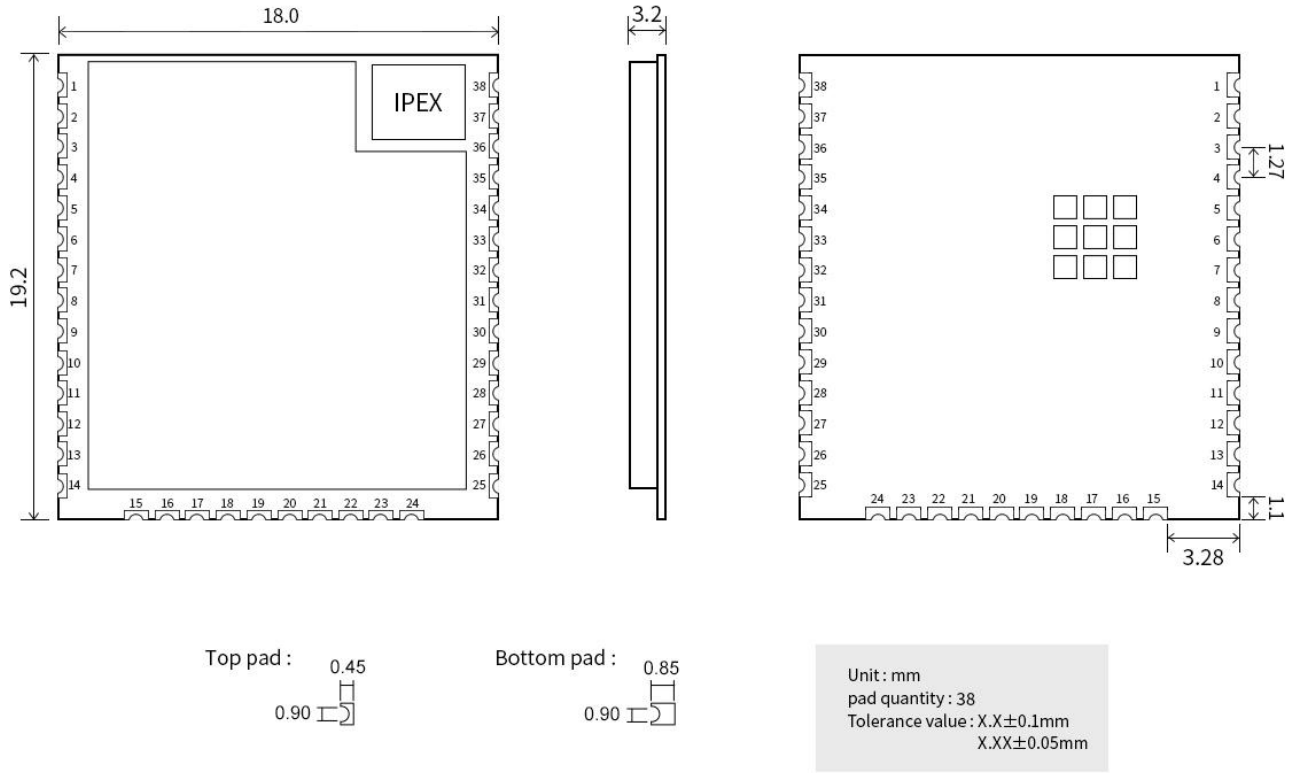


Chart 3- 1 Pin layout diagram

Name	Serial number	Type	Function
GND	1	P	Grounded
3V3	2	P	Powered by
EN	3	I	High level: chip enable; low level: chip off; Note: The EN pin cannot be left floating.
SENSOR_VP	4	I	GPIO36, ADC1_CH0, RTC_GPIO0
SENSOR_VN	5	I	GPIO39, ADC1_CH3, RTC_GPIO3
IO34	6	I	GPIO34, ADC1_CH6, RTC_GPIO4
IO35	7	I	GPIO35, ADC1_CH7, RTC_GPIO5
IO32	8	I/O	GPIO32, XTAL_32K_P (32.768 kHz Crystal input), ADC1_CH4, TOUCH9, RTC_GPIO9
IO33	9	I/O	GPIO33, XTAL_32K_N (32.768 kHz Crystal output), ADC1_CH5, TOUCH8, RTC_GPIO8
IO25	10	I/O	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
IO26	11	I/O	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
IO27	12	I/O	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
IO14	13	I/O	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
IO12	14	I/O	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPIQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
GND	15	P	Grounded
IO13	16	I/O	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
NC	17	-	See note 1 below the table
NC	18	-	See note 1 below the table
NC	19	-	See note 1 below the table

NC	20	-	See note 1 below the table
NC	21	-	See note 1 below the table
NC	22	-	See note 1 below the table
IO15	23	I/O	GPIO15, ADC2_CH3, TOUCH3, MTDO, HSPICS0, RTC_GPIO13, HS2_CMD, SD_CMD, EMAC_RXD3
IO2	24	I/O	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPIWP, HS2_DATA0, SD_DATA0
IO0	25	I/O	GPIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
IO4	26	I/O	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
IO16	27	I/O	GPIO16, HS1_DATA4, U2RXD, EMAC_CLK_OUT
IO17	28	I/O	GPIO17, HS1_DATA5, U2TXD, EMAC_CLK_OUT_180
IO5	29	I/O	GPIO5, VSPICS0, HS1_DATA6, EMAC_RX_CLK
IO18	30	I/O	GPIO18, VSPICLK, HS1_DATA7
IO19	31	I/O	GPIO19, VSPIQ, U0CTS, EMAC_TXD0
NC	32	-	-
IO21	33	I/O	GPIO21, VSPIHD, EMAC_TX_EN
RXD0	34	I/O	GPIO3, U0RXD, CLK_OUT2
TXD0	35	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
IO22	36	I/O	GPIO22, VSPIWP, U0RTS, EMAC_TXD1
IO23	37	I/O	GPIO23, VSPID, HS1_STROBE
GND	38	P	Grounded

1 P：power supply；I：Input；O：Output；T：can be set to high impedance.

Chart 3- 2 Pin definition list

3.2 Minimal Schematic

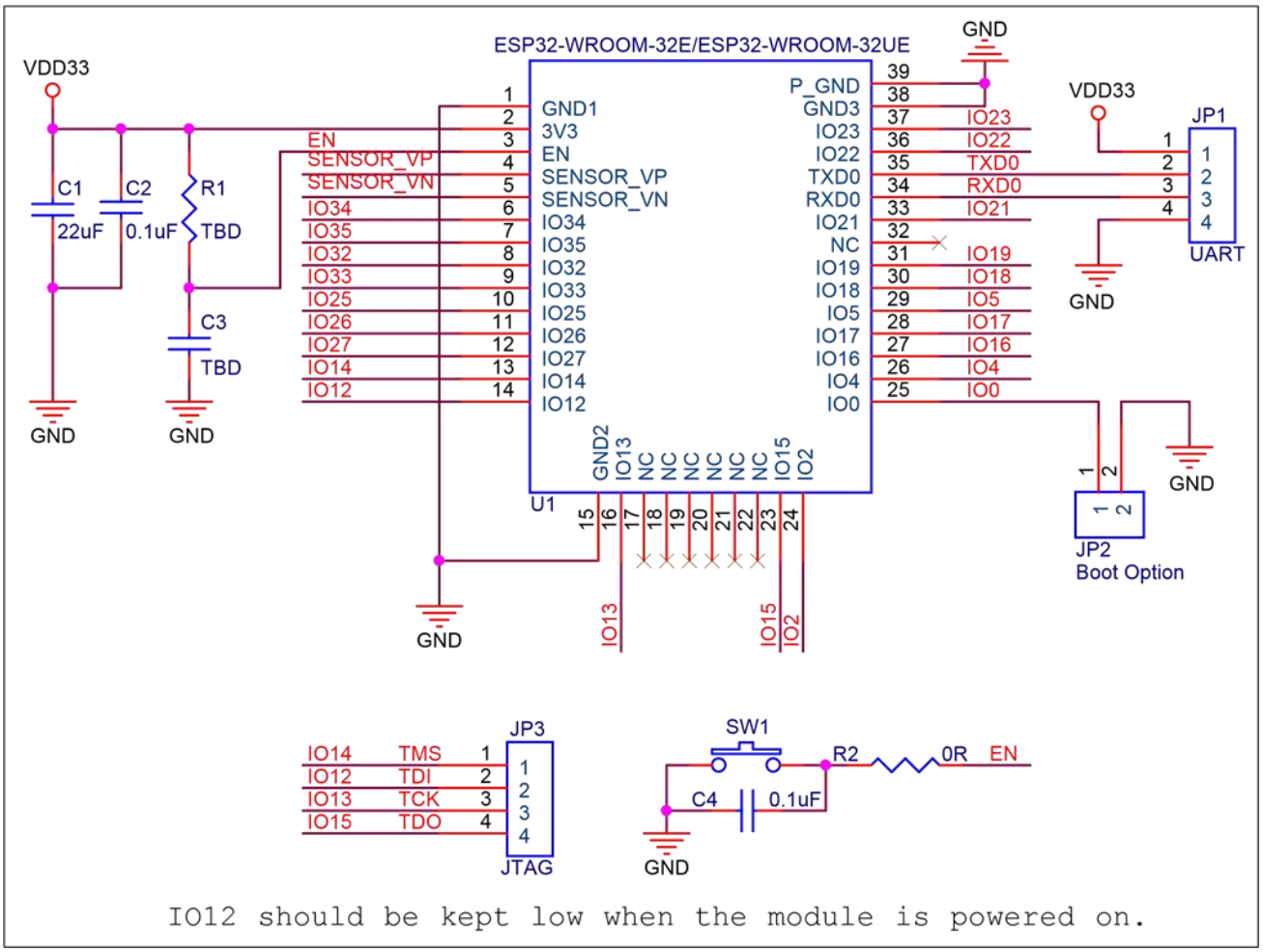


Chart 3- 3 Minimal Schematic

3.3 Module size

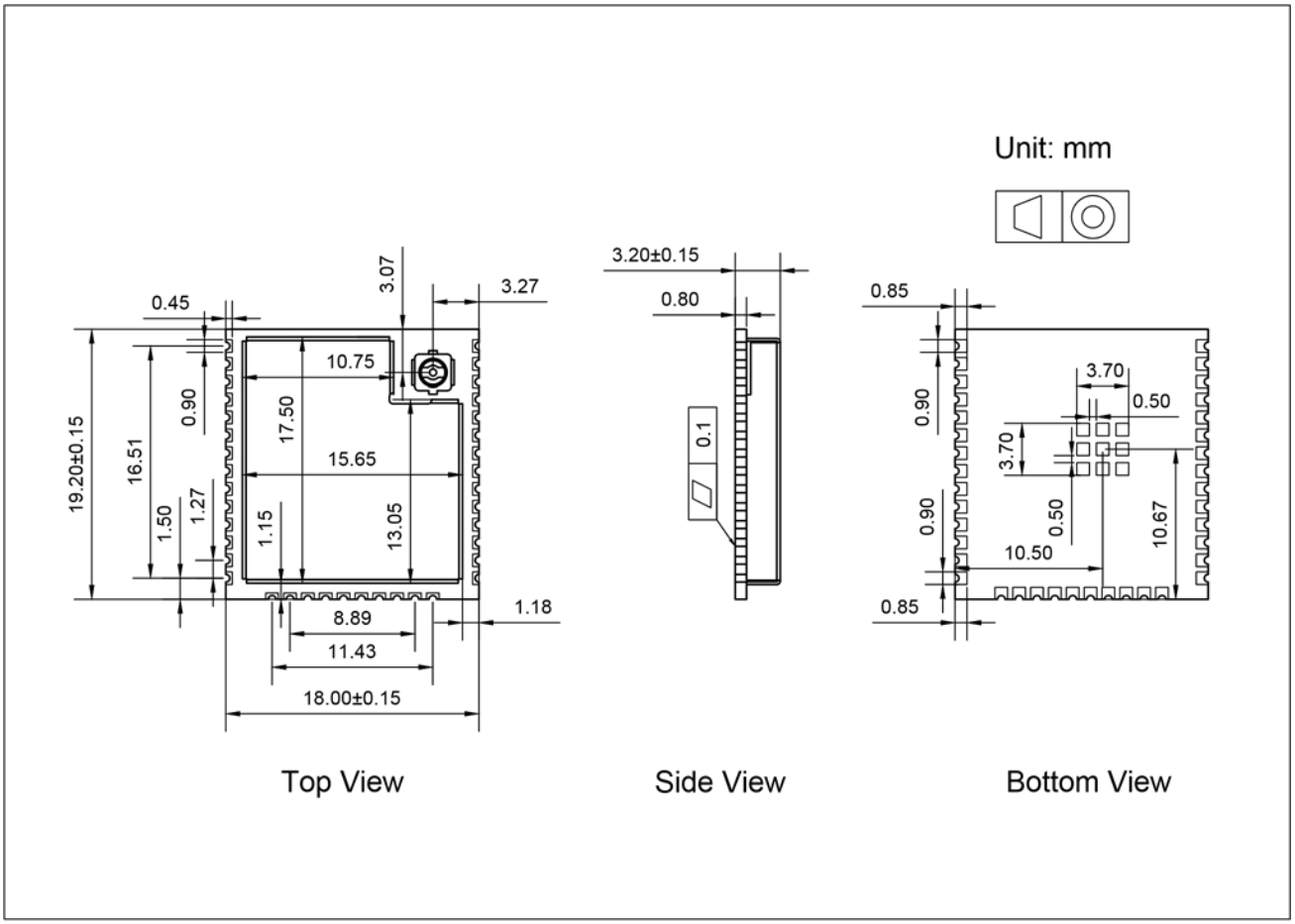


Chart 3- 4 Module size

3.4 PCB package pattern

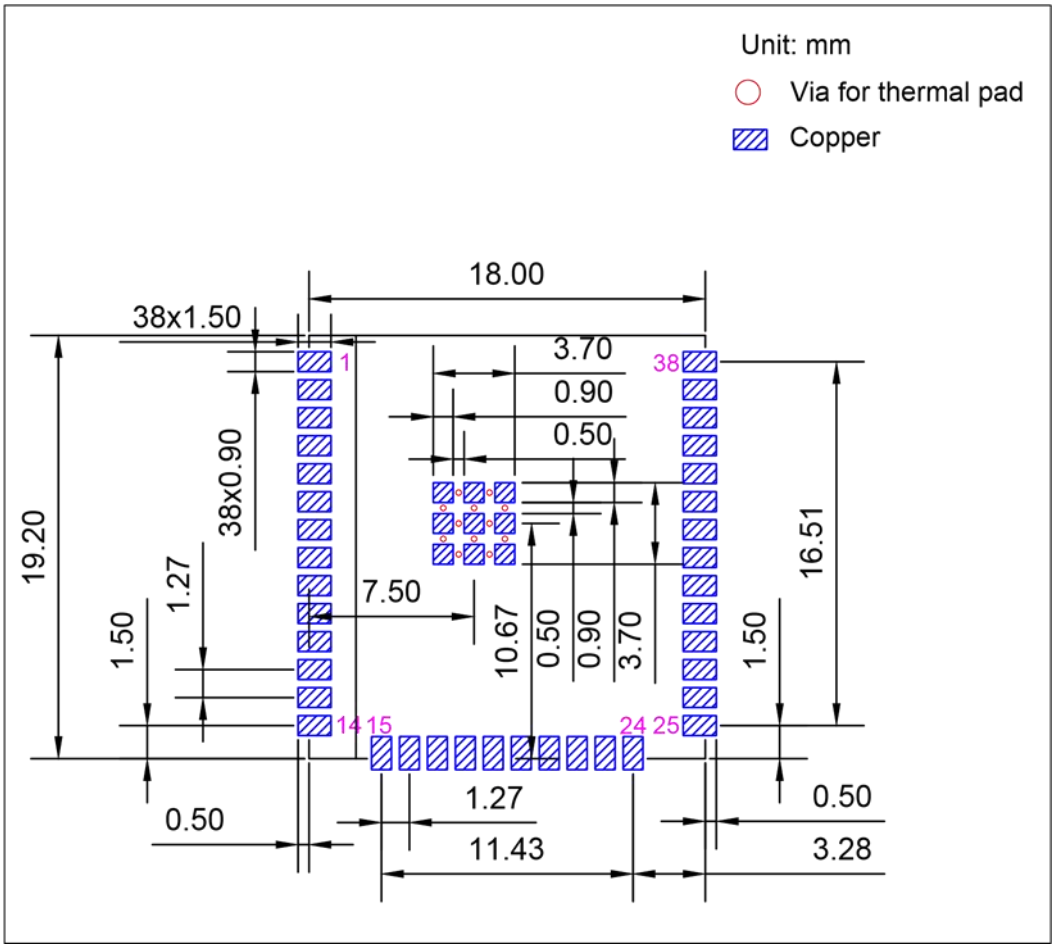


Chart 3- 5 PCB package

Ⅳ AT Command

For details on AT commands, please refer to the download page <ESP32-WROOM-32UE_AT_Bin_V2.2.0.0>

V Common Questions

5.1 Unsatisfactory transmission distance

- When there is a straight line communication obstacle, the communication distance will be attenuated accordingly;
- Temperature, humidity, and co-frequency interference will increase the communication packet loss rate;
- The ground absorbs and reflects radio waves, and the test effect is poor when it is close to the ground;
- Sea water has a strong ability to absorb radio waves, so the seaside test effect is poor;
- If there is a metal object near the antenna or placed in a metal shell, the signal attenuation will be very serious;
- The power register is set incorrectly, and the air speed is set too high (the higher the air speed, the closer the distance);
- The low voltage of the power supply at room temperature is lower than the recommended value, the lower the voltage, the lower the power output.

5.2 Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, it will cause permanent damage to the module;
- Please check the stability of the power supply, and the voltage should not fluctuate greatly and frequently;
- Please ensure that the installation and use process is anti-static, and high-frequency components are electrostatically sensitive;
- Please ensure that the humidity should not be too high during installation and use, and some components are humidity sensitive devices;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

5.3 Bit error rate is too high

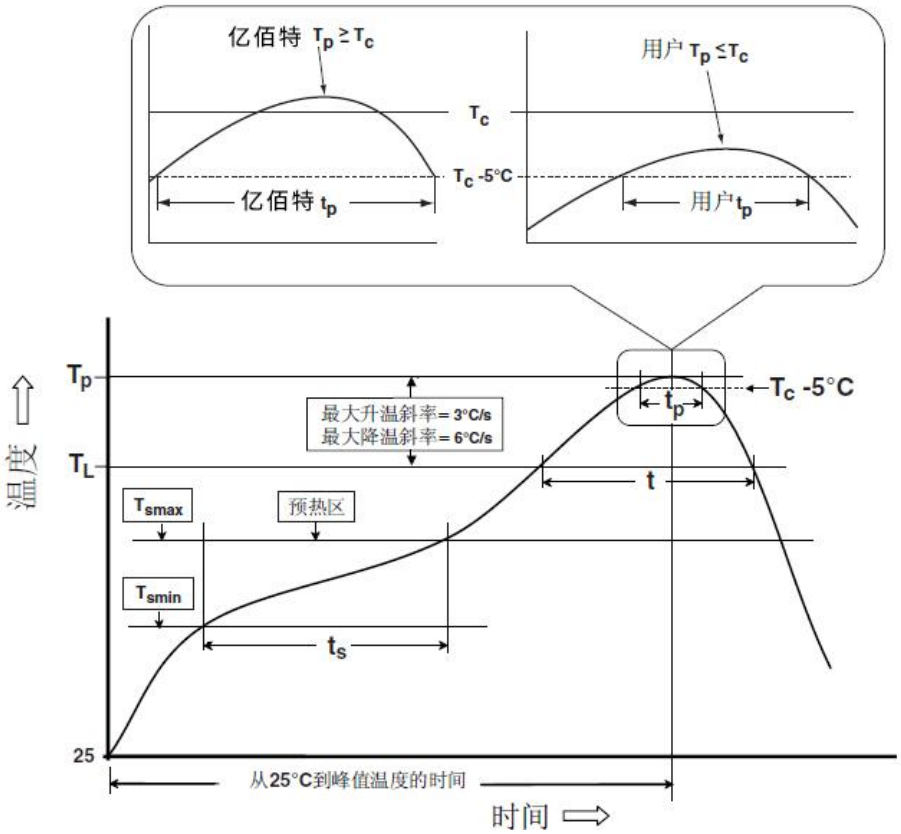
- There is co-frequency signal interference nearby, stay away from the interference source or modify the frequency and channel to avoid interference;
- The clock waveform on the UART is not standard, check whether there is interference on the UART line;
- Unsatisfactory power supply may also cause garbled codes, so the reliability of the power supply must be ensured;

Ⅵ Welding Operation Guidance

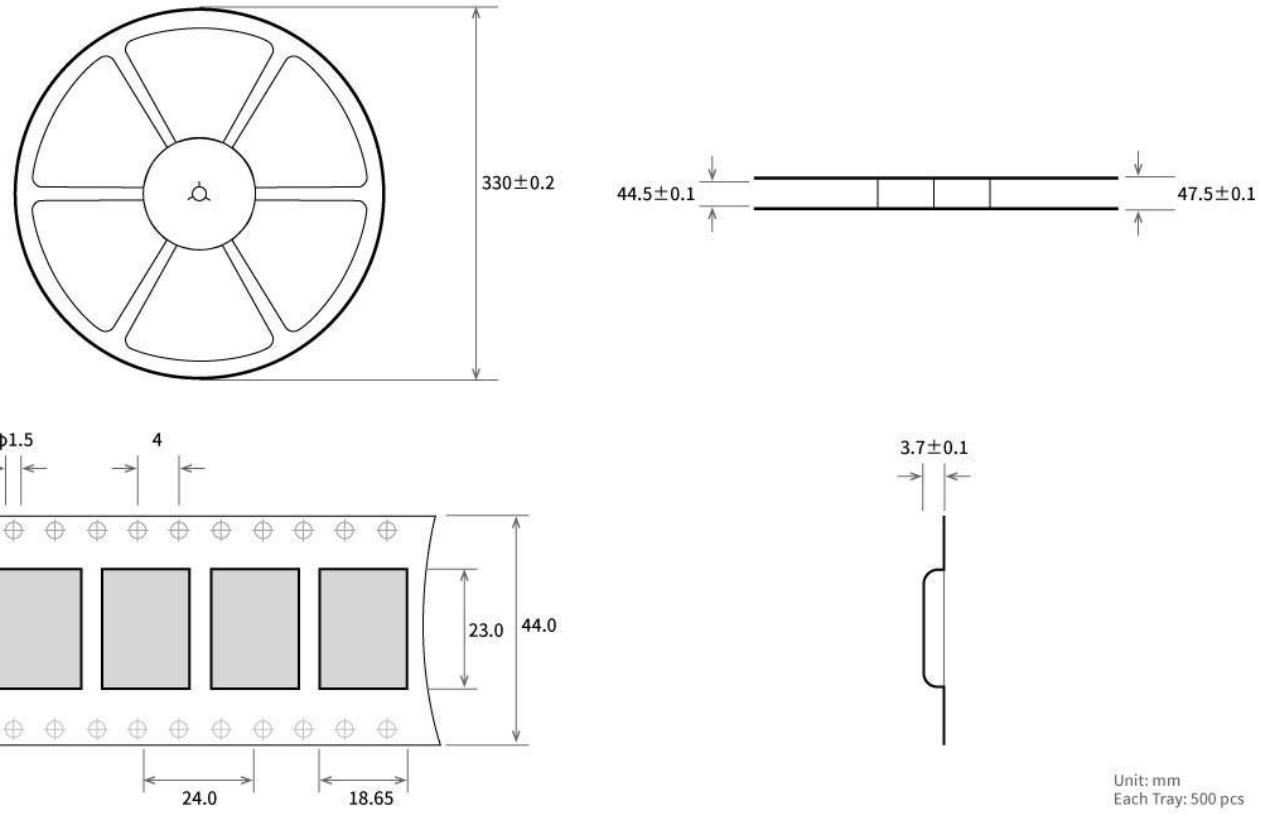
6.1 Reflow temperature

Flux welding curve characteristics		There is a lead process for assembly	Lead-free process assembly
Preheat / heat preservation	▪	100℃	150℃
	Maximum temperature (T smax)	150℃	200℃
	Time (T smin ~T smin)	In the next seconds, 60-120 sec	In the next seconds, 60-120 sec
Heat-up slope (T L ~T p)		3℃ / sec, max	3℃ / sec, max
Liquid-phase temperature (T L)		183℃	217℃
T L		60~90 Seconds	60~90 Seconds
Package body peak temperature T p		The user cannot exceed the temperature noted on the product moisture Sensitivity tab.	The user cannot exceed the temperature noted on the product moisture Sensitivity tab.
Time (T p) within 5℃ of the specified grade temperature (Tc), see the figure below		20 Seconds	30 Seconds
Cooling Slope (T p ~T L)		6℃ / sec, max	6℃ / sec, max
Time from the room temperature to the peak temperature		Six minutes, the longest	8 Minutes, longest
The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user			

6.2 Reflow soldering curve



Ⅶ Manner of packing



Ⅷ Disclaimer

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Revise History

Version	Revision Date	Revision Description	Maintainer
1.0	2021-12-14	The initial version	-
1.1	2022-10-26	Content correction	Hao

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