E101-C6WN8 Series

User Manual



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1. Functional Overview

1.1 Introduction

E101-C6WN8-PS and E101-C6WN8-XS are developed based on the built-in ESP32-C6 series chip solution .

E101-C6WN8-PS and E101-C6WN8-XS are universal Wi-Fi 6 and low-power Bluetooth 5.3 (Bluetooth LE) modules with rich peripheral interfaces and 8 MB embedded flash . Equipped with RISC-V 32-bit single-core processor. The chip integrates a wealth of peripherals, including GPIO, SPI, parallel IO, UART, I2C, I2S, RMT (TX/RX), pulse counter, LED PWM, USB serial port/JTAG controller, MCPWM, SDIO2.0 slave control processor, GDMA, TWAI® controller, on-chip JTAG debugging function, event task matrix, ADC, temperature sensor, general timer, watchdog timer, etc.

It can be used in smart home, industrial automation, healthcare, consumer electronics and other fields.



E101-C6WN8-PS



E101-C6WN8-XS

1.2 Features and functions

- Works in the 2412~2484 MHz frequency band, 1T1R ;
- Supports IEEE 802.11ax protocol and is fully compatible with IEEE 802.11b/g/n protocol ;
- Support Bluetooth Low Energy (Bluetooth LE): passed Bluetooth 5.3 certification;
- The Bluetooth part supports: Bluetooth mesh, broadcast extension, multi-broadcast, power control and other functions;
- With 8MB SPI flash ;
- Support MQTT protocol;
- Support IPV6 network settings;
- Support HTTP protocol;
- Support low power consumption mode;
- Support AT commands;
- Support three role interchanges of AP, STA and AP+STA;
- Support serial communication and flow control. The baud rate supports up to 128000 ;
- Support automatic and manual networking ;

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2. Electrical Characteristics

2.1 Absolute Maximum Ratings

symbol	parameter	minimum value	maximum value	unit
VDD	Power pin voltage	–0.3	3.6	V
T *STORE*	Storage temperature	–40	85	°C

Chart 1- 1 Absolute Maximum Ratings

2.3 Recommended working conditions

symbol	parameter	minimum value	Typical value	maximum value	unit
VDD	Power pin voltage	3.0	3.3	3.6	V
IVDD	Supply current from external power supply	0.5	—	—	A
T	Recommended operating temperature	–40	—	85	°C
Humidity	humidity	—	85	—	%RH
I	Transmitting current	251	—	382	mA
	Receiving current	—	78	—	
	Sleep current	14	—	38	

Chart 1- 3 Recommended working conditions

2.3 Radio frequency characteristics

Module model		E101-C6WN8-PS	E101-C6WN8-XS
Working channel center frequency range		**2412~2484MHz**	**2412~2484MHz**
Wi-Fi		Protocol IEEE802.11b/g/n	Protocol IEEE802.11b/g/n
Antenna type		PCB antenna	IPEX-1
Distance	With router @Mercury MW305R	300m	260 m
	between modules	300m	260 m

Chart 1- 5 RF Characteristics

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3. Hardware Description

3.1 Functional block diagram

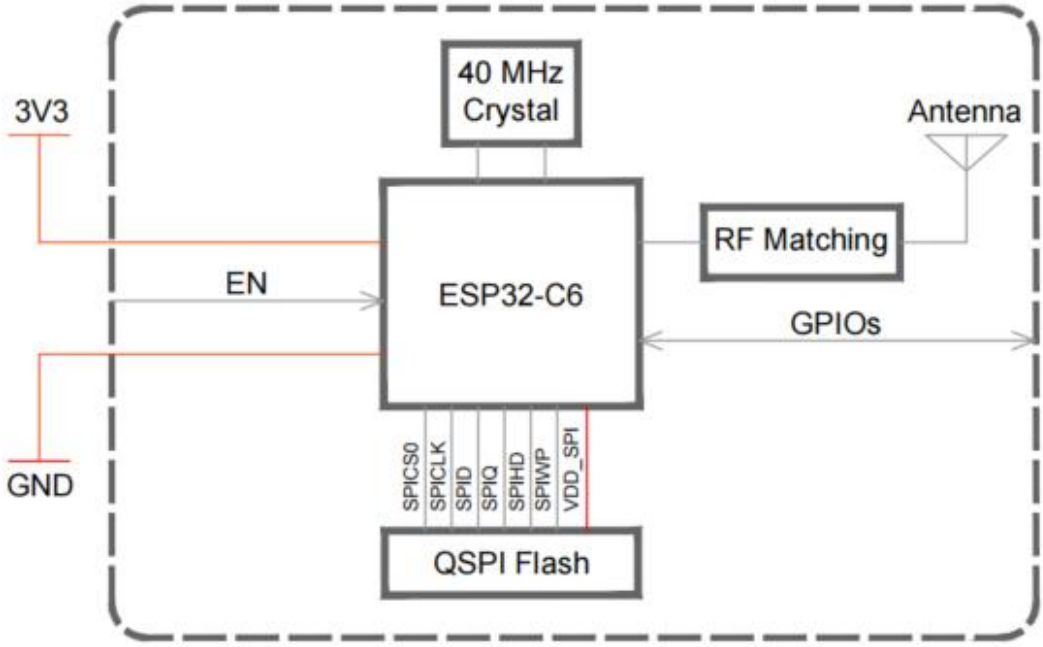


Figure 1 E101-C6WN8-PS functional block diagram

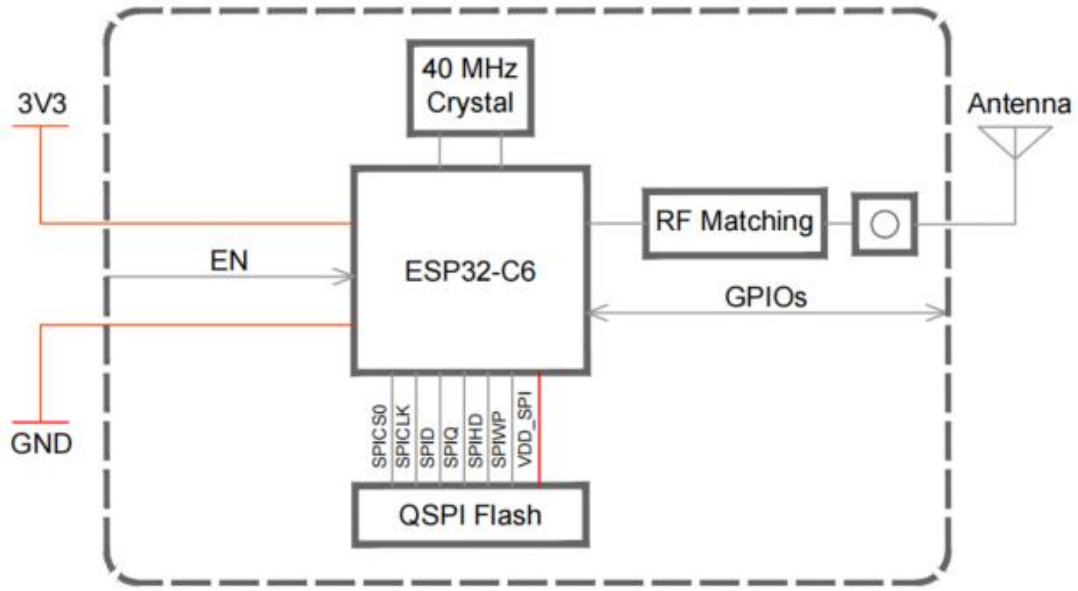


Figure 2 E101-C6WN8-XS functional block diagram

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3.2 E101-C6WN8-PS & E101-C6WN8-XS pin definition

The pin layout diagram shows the approximate location of the pins on the module. Please refer to Figure 8.1 Module Dimensions for the actual layout drawn to scale.

Note : The pin layout of E101-C6WN8-XS is the same as that of E101-C6WN8-PS, but there is no keepout zone.

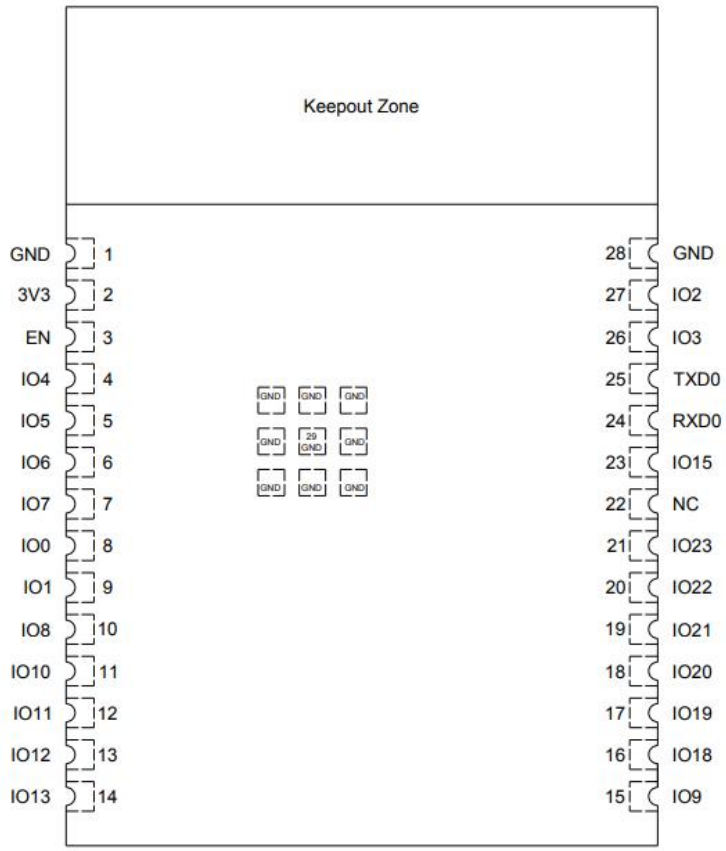


Chart 2- 1 pin layout diagram(top view)

Name	Serial number	Type	Function
GND	1, 28	P	Ground
3V3	2	P	Powered by
EN	3	I	High level: chip enabled; low level: chip turned off; Be careful not to let the EN pin float.
IO4	4,	I/O/T	MTMS, GPIO4, LP_GPIO4, LP_UART_RXD, ADC1_CH4, FSPIHD
IO5	5	I/O/T	MTDI, GPIO5, LP_GPIO5, LP_UART_TXD, ADC1_CH5, FSPIWP
IO6	6	I/O/T	MTCK, GPIO6, LP_GPIO6, LP_I2C_SDA, ADC1_CH6, FSPICLK
IO7	7	I/O/T	MTDO, GPIO7, LP_GPIO7, LP_I2C_SCL, FSPID
IO0	8	I/O/T	GPIO0, XTAL_32K_P, LP_GPIO0, LP_UART_DTRN, ADC1_CH0
IO1	9	I/O/T	GPIO1, XTAL_32K_N, LP_GPIO1, LP_UART_DSRN, ADC1_CH1
IO8	10	I/O/T	GPIO8

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IO10	11	I/O/T	GPIO10
IO11	12	I/O/T	GPIO11
IO12	13	I/O/T	GPIO12,USB_D-
IO13	14	I/O/T	GPIO13,USB_D+
IO9	15	I/O/T	GPIO9
IO18	16	I/O/T	GPIO18, SDIO_CMD, FSPICS2
IO19	17	I/O/T	GPIO19, SDIO_CLK, FSPICS3
IO20	18	I/O/T	GPIO20, SDIO_DATA0, FSPICS4
IO21	19	I/O/T	GPIO21, SDIO_DATA1, FSPICS5
IO22	20	I/O/T	GPIO22, SDIO_DATA2
IO23	21	I/O/T	GPIO23, SDIO_DATA3
NC	22	—	NC (users do not need to pay attention)
IO15	23	I/O/T	GPIO 15
RXD0	24	I/O/T	U0RXD, GPIO17, FSPICS1
TXD0	25	I/O/T	U0TXD, GPIO16, FSPICS0
IO3	26	I/O/T	GPIO3, LP_GPIO3, LP_UART_CTSN, ADC1_CH3
IO2	27	I/O/T	GPIO2, LP_GPIO2, LP_UART_RTSN, ADC1_CH2, FSPIQ
EPAD	29	P	Ground

Chart 2 - 2 pin definition list

Note:

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

2. The E101-C6 Series Module AT features two UART ports: UART0 handles firmware updates and log output, while UAR T1 manages AT command transmission and response reception. Both ports operate at a default baud rate of 115200.

Function	Development board pins/Module	Other device pins
Download firmware/output log	UART0 • GPIO17 (RX) • GPIO16 (TX)	PC：TX、RX
AT command/response	UART1： • GPIO6 (RX) • GPIO7 (TX) • GPIO5 (CTS) • GPIO4 (RTS)	USB to UART module：TX，RX，RTS，CTS

For details, please download the AT Instruction Set from the website.

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3.3 Recommended schematic diagram

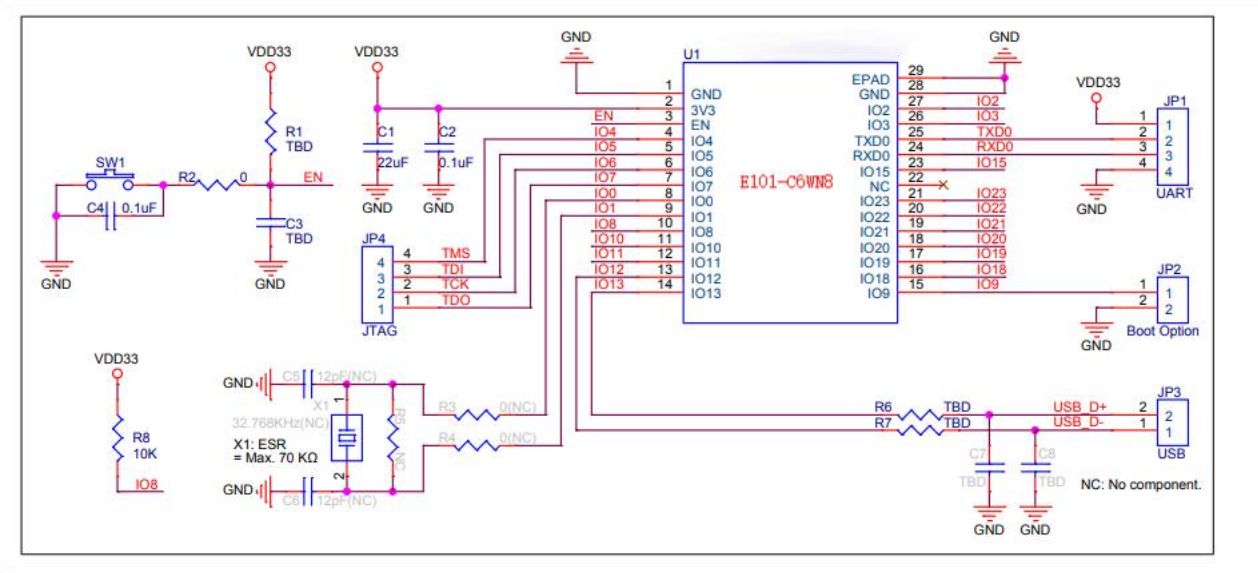


Figure - Recommended schematic diagram

3.4 Module size

3.4.1 E101-C6WN8-PS dimension drawing

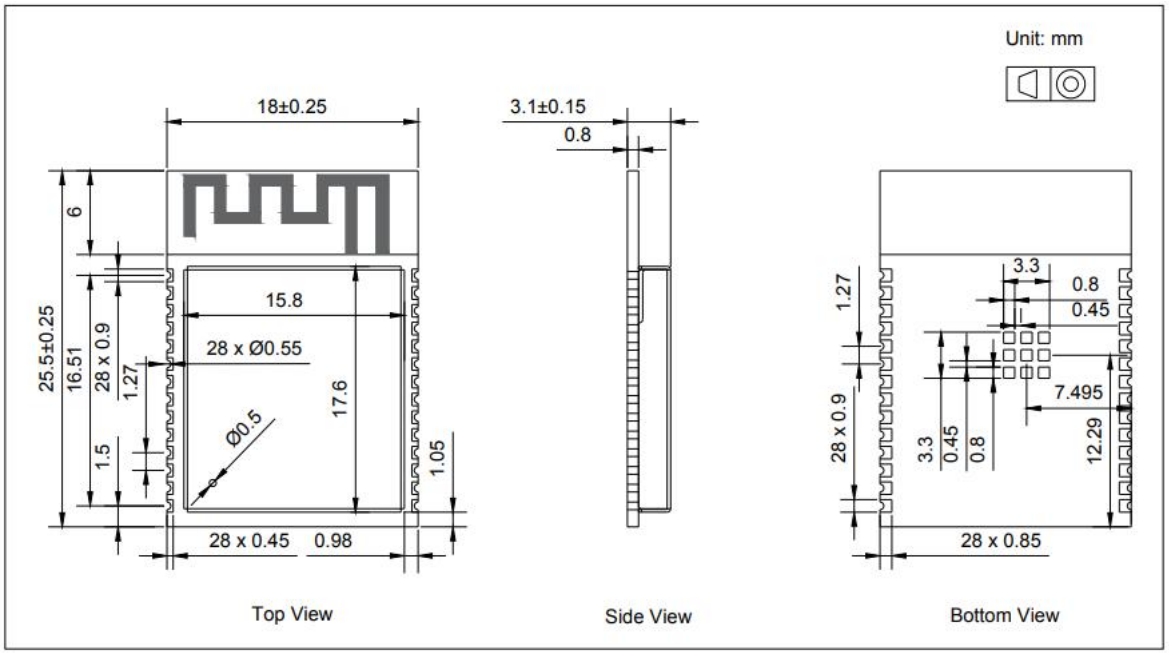


Chart 2-4 module dimensions

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3.4.2 E101-C6WN8-XS Dimensional Drawing

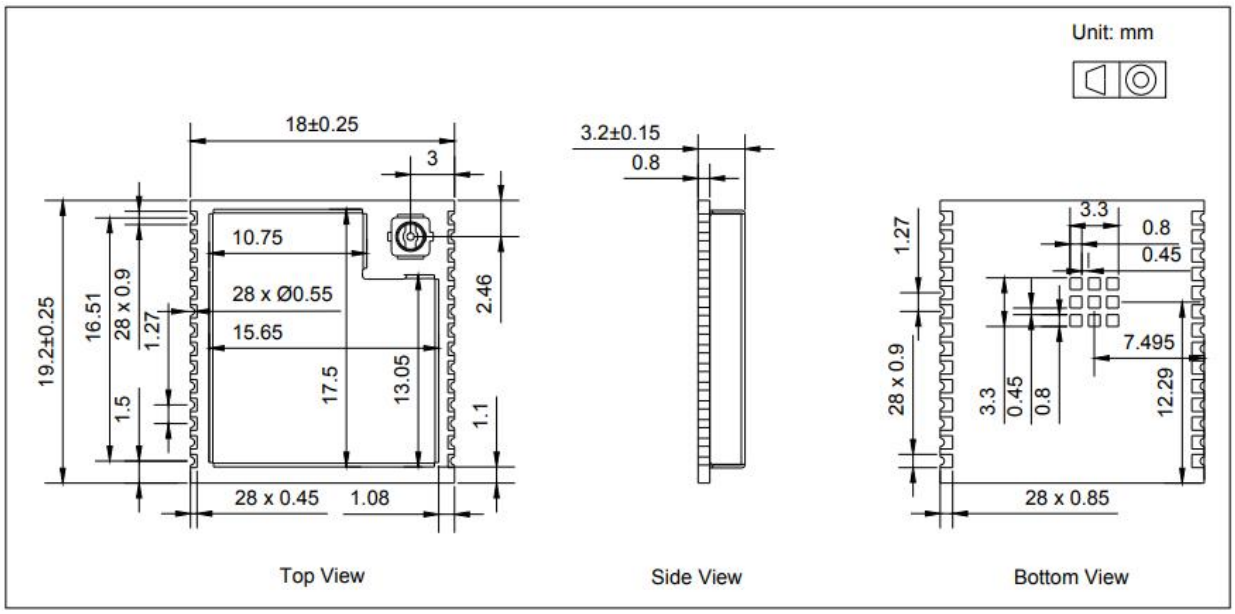


Chart 2- 5 module dimensions

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3.5 PCB packaging graphics

3.5.1 E101-C6WN8-PS

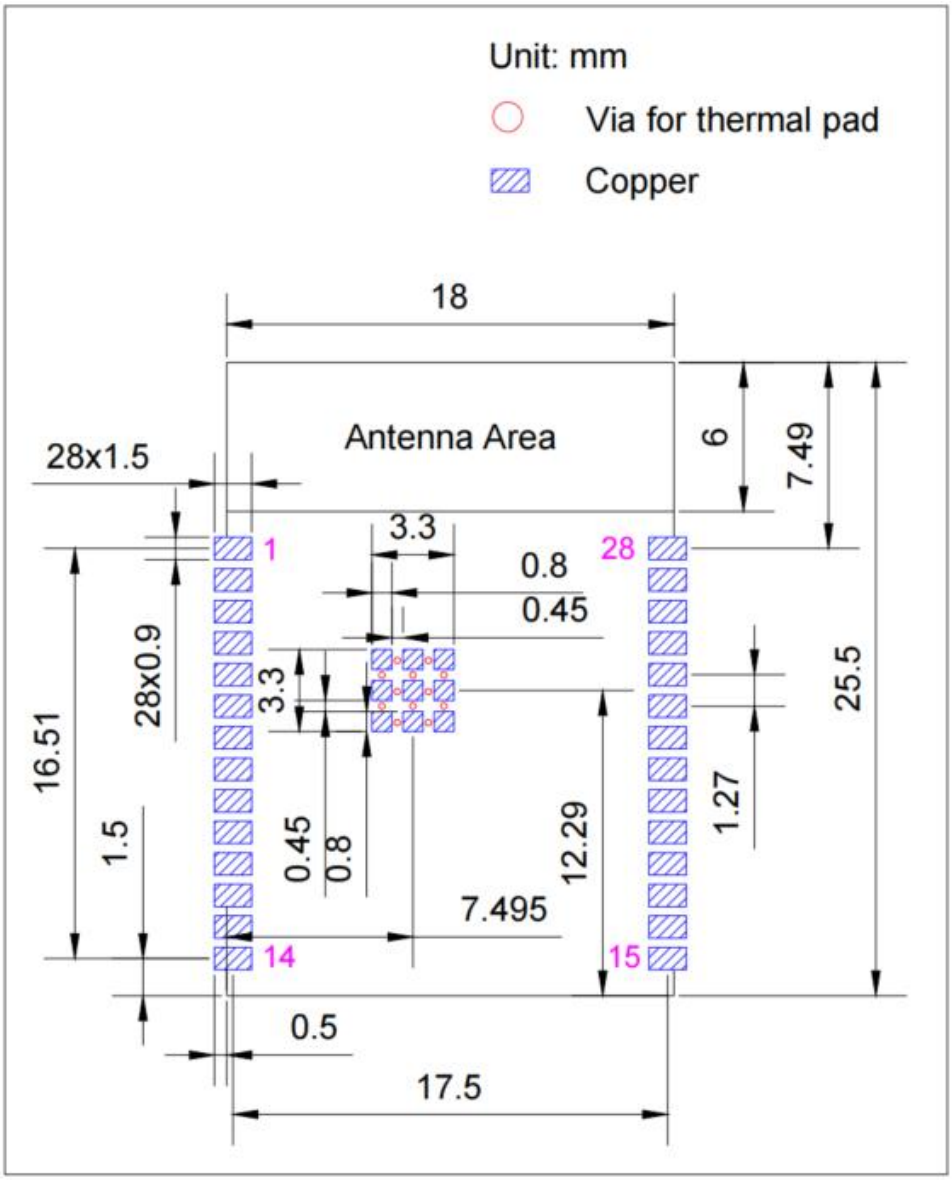


Chart 2 - 6 PCB packaging

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3.5.2 E101-C6WN8-XS

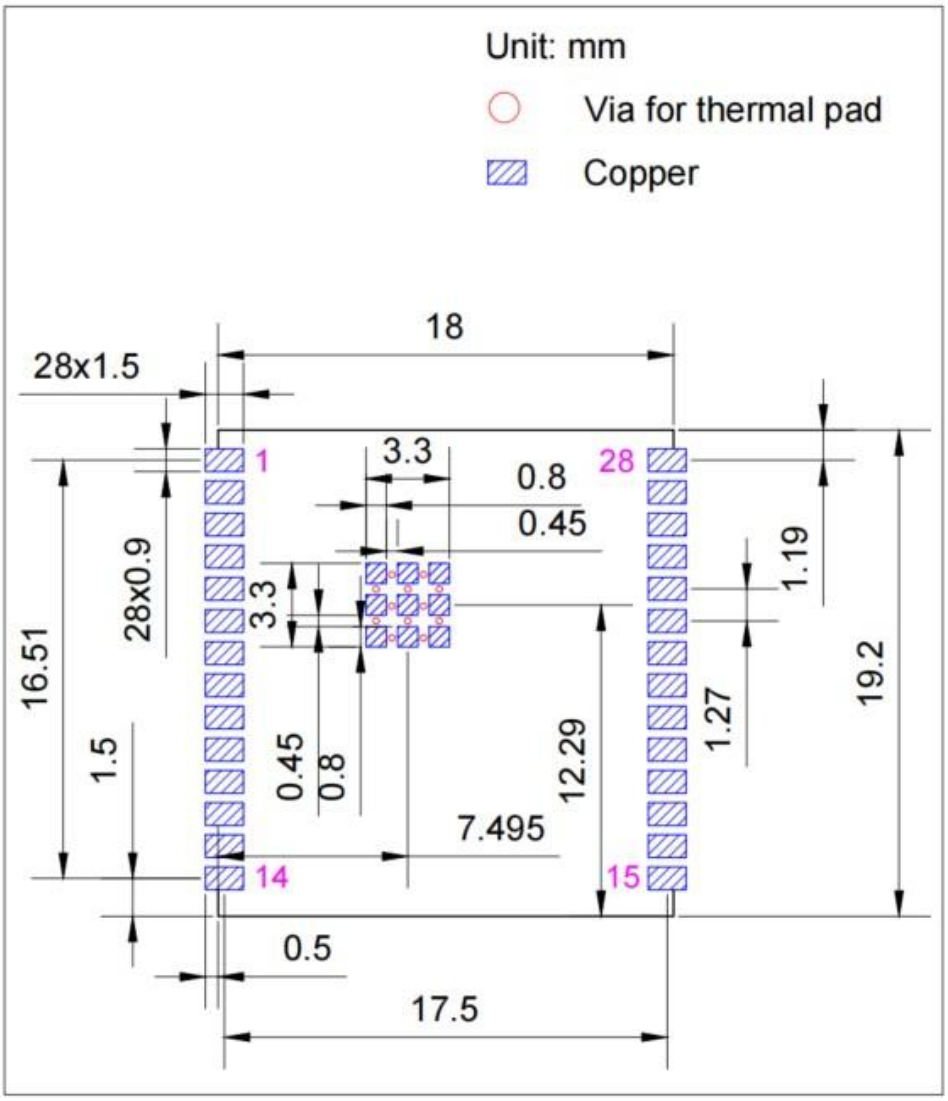
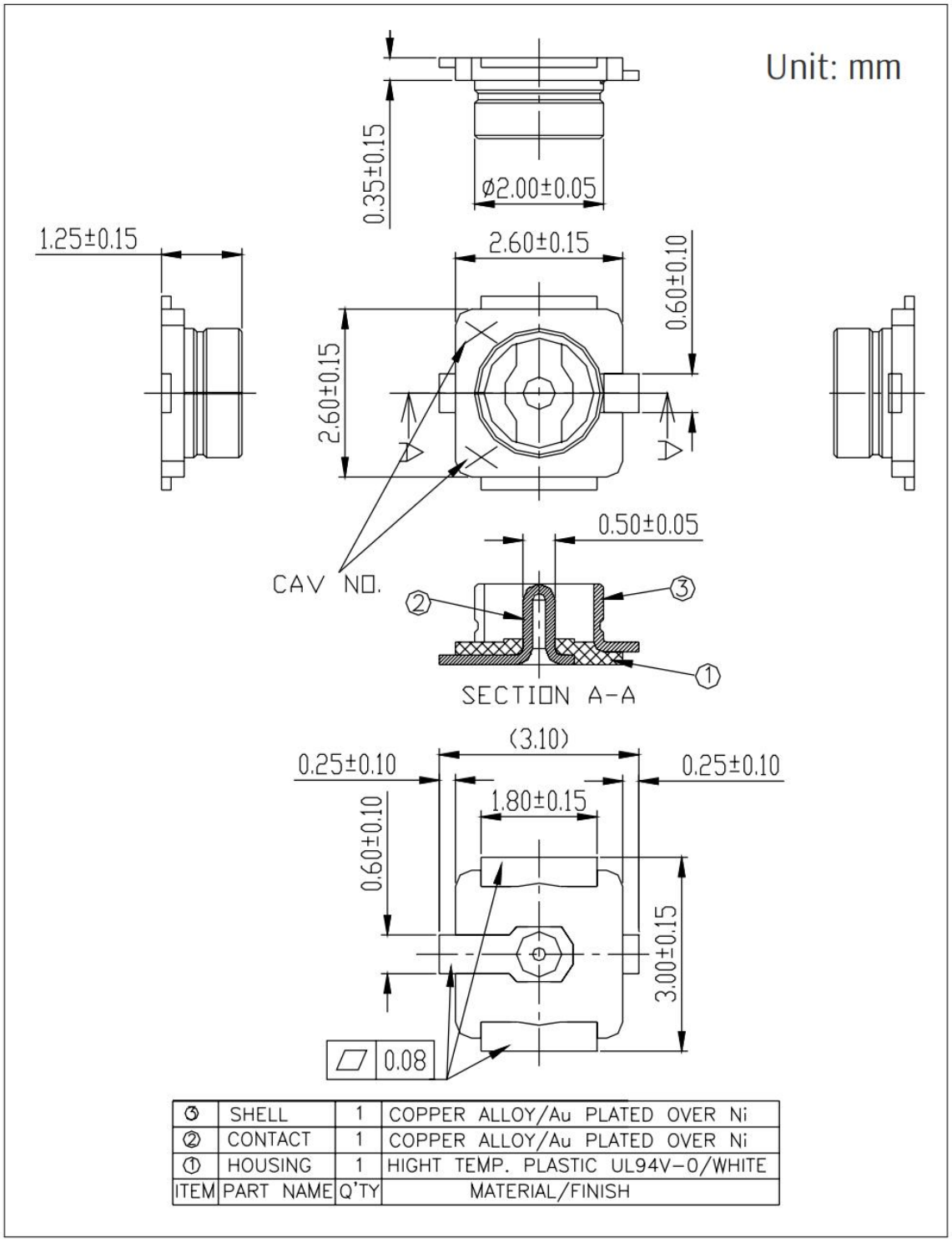


Chart2 - 7 PCB packaging

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3.6 External antenna connector dimensions



ITEM	PART NAME	Q'TY	MATERIAL/FINISH
③	SHELL	1	COPPER ALLOY/Au PLATED OVER Ni
②	CONTACT	1	COPPER ALLOY/Au PLATED OVER Ni
①	HOUSING	1	HIGHT TEMP. PLASTIC UL94V-0/WHITE

Chart 2- 8 External antenna connector dimensions

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4. AT Commands

For details on AT commands, please see the download page "ESP32-C6-4MB-AT-V4.0.0.0"

5. Frequently Asked Questions

5.1 Transmission distance is not ideal

- When there are straight-line communication obstacles, the communication distance will be correspondingly attenuated;
- Temperature, humidity, and co-channel interference will cause the communication packet loss rate to increase;
- The ground absorbs and reflects radio waves, and the test effect is poor when close to the ground;
- Seawater has a strong ability to absorb radio waves, so the test results at the seaside are poor;
- If there are metal objects near the antenna, or if it is placed in a metal case, the signal attenuation will be very serious;
- The power register setting is wrong and the air rate is set too high (the higher the air rate, 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 smaller the power generated;

5.2 Modules are 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. The voltage cannot fluctuate greatly and frequently;
- Please ensure anti-static operation during installation and use, as high-frequency devices are sensitive to static electricity;
- Please ensure that the humidity during installation and use should not be too high, as some components are humidity-sensitive devices;
- If there are no special needs, it is not recommended to use it at too high or too low temperature.

5.3 Bit error rate is too high

- If there is co-channel signal interference nearby, stay away from the interference source or modify the frequency or 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 code, so be sure to ensure the reliability of the power supply;

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6. Welding Operation Guidance

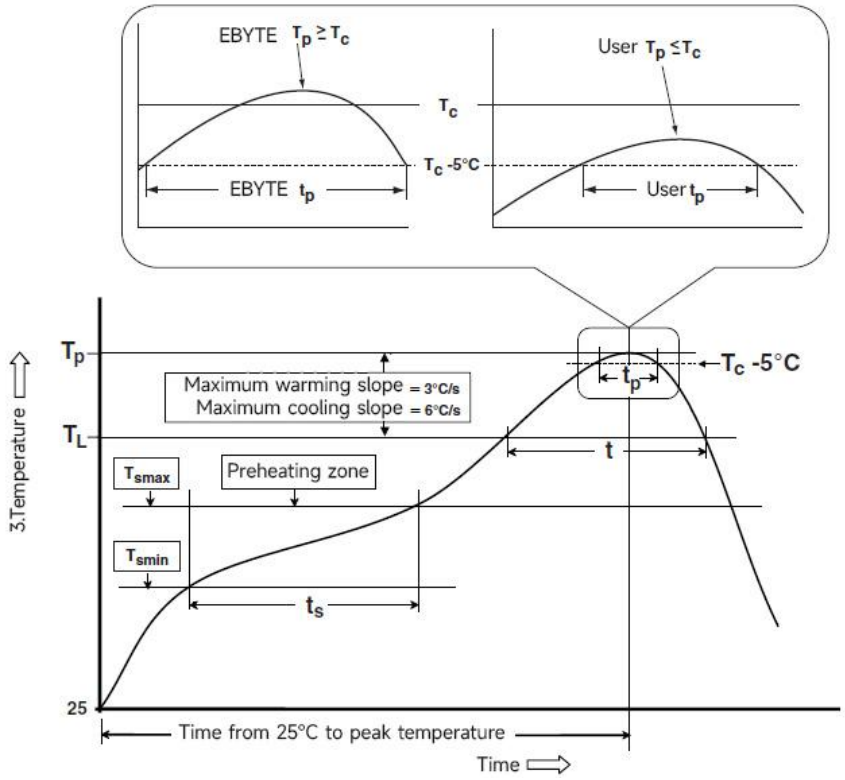
6.1 Reflow soldering temperature

Reflow soldering curve characteristics		Lead process assembly	Lead-free process assembly
Preheat/keep warm	Minimum temperature (T_{smin})	100℃	150℃
	Maximum temperature (T_{smax})	150℃	200℃
	Time (T_{smin} ~T_{smin})	60-120 seconds	60-120 seconds
Temperature rise slope (T_L ~T_P)		3℃/second, maximum	3℃/second, maximum
Liquidus temperature (T_L)		183℃	217℃
Holding time above T_L		60~ 90 seconds	60~ 90 seconds
Package peak temperature T_p		Users should not exceed the temperature indicated on the product's "Moisture Sensitivity" label.	Users should not exceed the temperature indicated on the product's "Moisture Sensitivity" label.
Time (Tp) within 5 ℃ of the specified grading temperature (Tc), see the figure below		20 seconds	30 seconds
Cooling slope (Tp ~T_L)		6℃/second, maximum	6℃/second, maximum
Time from room temperature to peak temperature		6 minutes, maximum	8 minutes, maximum
※The peak temperature (Tp) tolerance definition of the temperature curve is the upper limit of the user			

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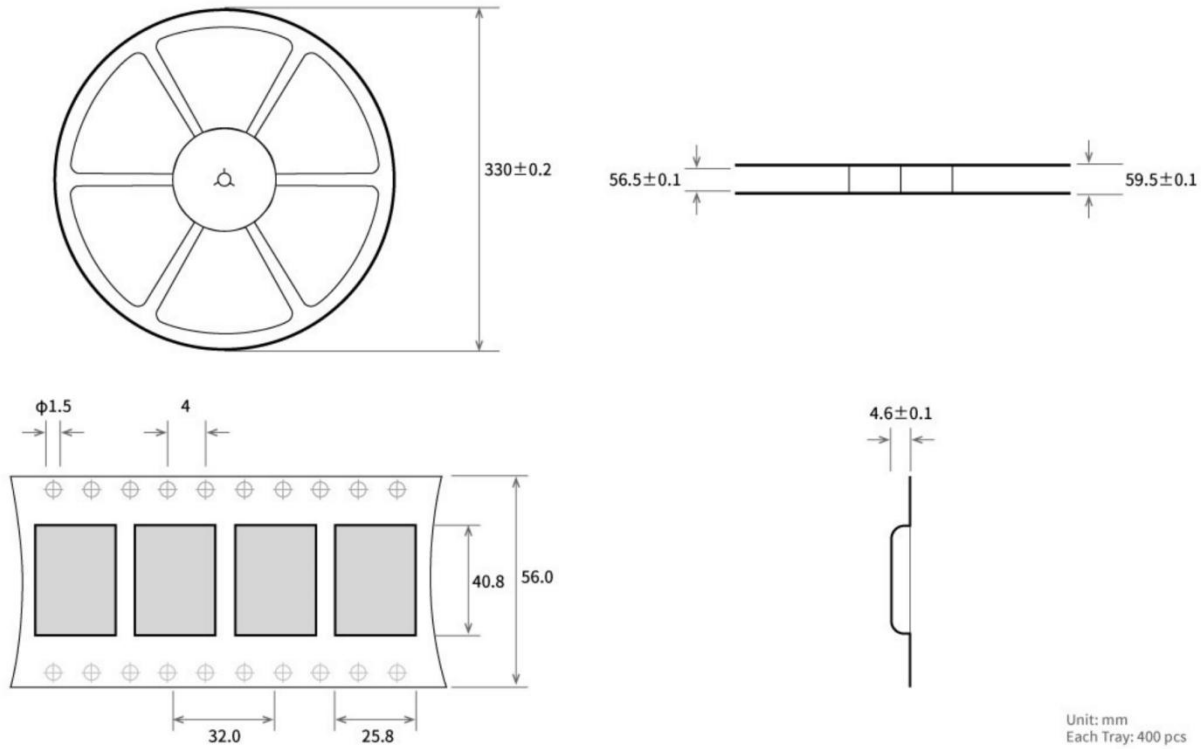
6.2 Reflow soldering curve



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7. Packing

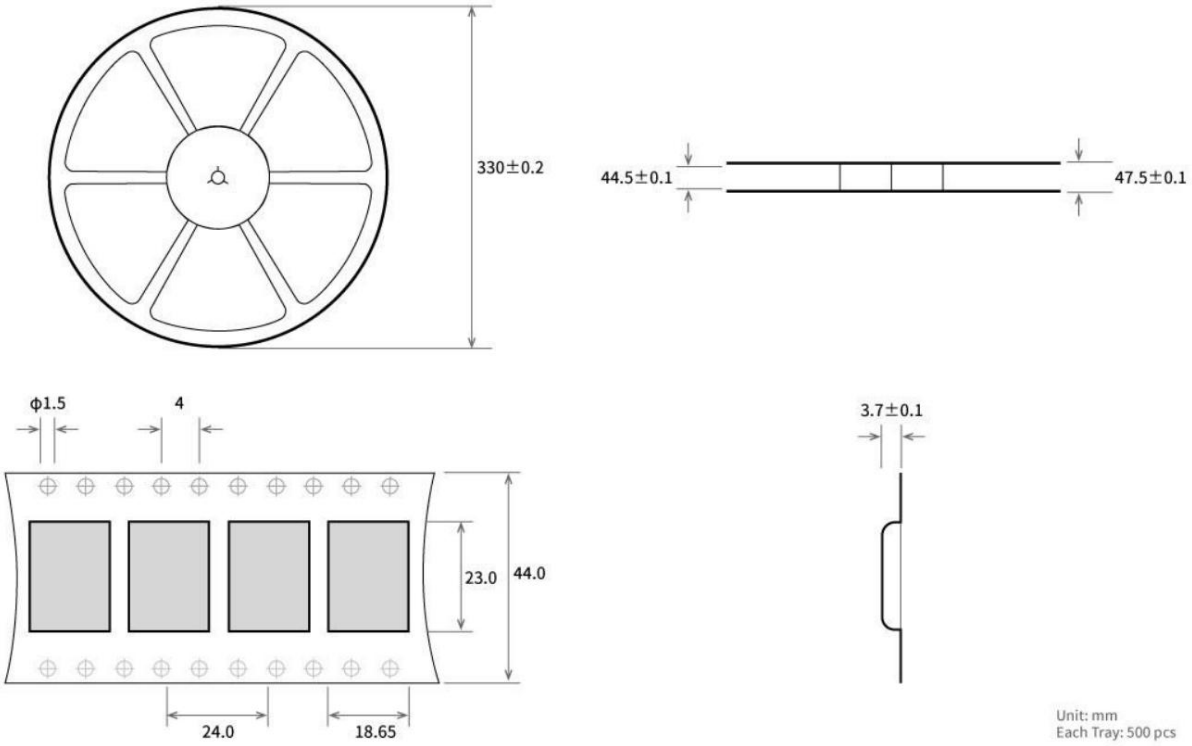
7.1 E101-C6WN8-PS packaging method



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7.2 E101-C6WN8-XS packaging method



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Revise history

Version	Revision date	Revision Notes	Maintenance man
1.0	2024-4-2	initial version	Hao
1.1	2025-4-10	Add pin description	Hao
1.2	2025-5-16	Content revised	Hao
1.3	2025-9-24	Add pin description	Hao

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