HT-HC02 Design Guide

V1.0.0

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Document version

Version	Time	Description	Remark
Rev. 1.0.0	2025-10-29	First release	Richard

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Content

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1. Overview

The following information serves as a guideline for circuit design using the HT-HC02. It will cover recommended pin definitions, package dimensions, reference circuit design, and soldering temperature specifications.

1.1 Specifications

Item	Description
MCU	ESP32-S3FN8
Wi-Fi HaLow Chip	MM6108IQ
Frequency	902~928MHz
Memory	384KB ROM; 512KB SRAM; 16KB RTC SRAM; 8MB Flash
Interface	UART
Temperature	-40 ~ +85℃
Power Supply	2.7~3.6V，typical 3.3V
Dimensions	32*15*2.7mm
Package	SMD-20

1.2 Recommended Operating Conditions

Item	Parameter	Min.	TYP	Max.	Unit
Supply Voltage	VDD	2.7	3.3	3.6	V
Operating Temp.	TOPR	-40	25	85	℃
I/O Level	VIO	2.7	3.3	3.6	V

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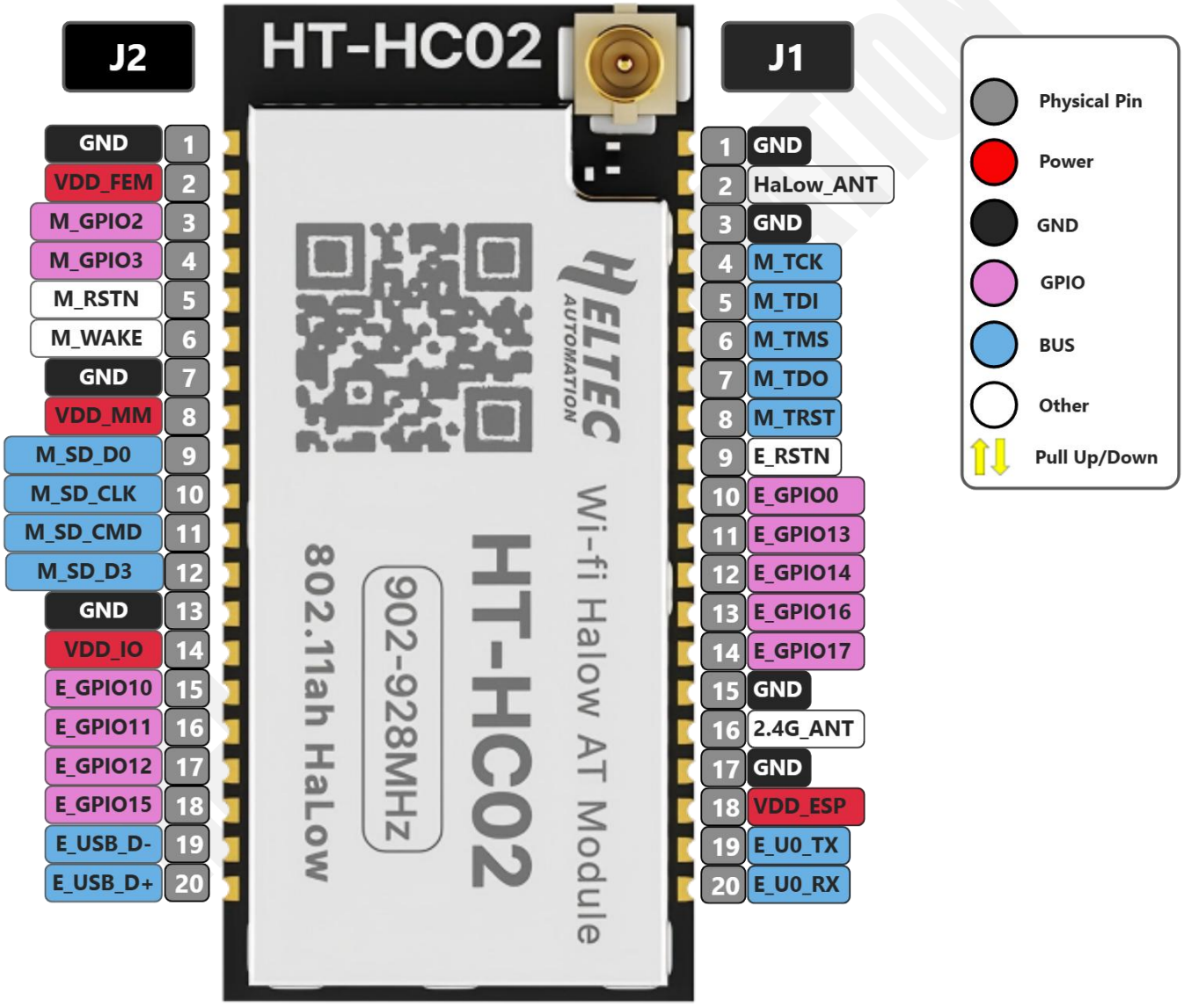
Digital Input Low	VIL	–	–	0.2	V
Digital Input High	VIH	0.8	–	–	V
Digital Output Low	VOL	–	–	0.1	V
Digital Output High	VOH	0.9	–	–	V

2. Pin Map



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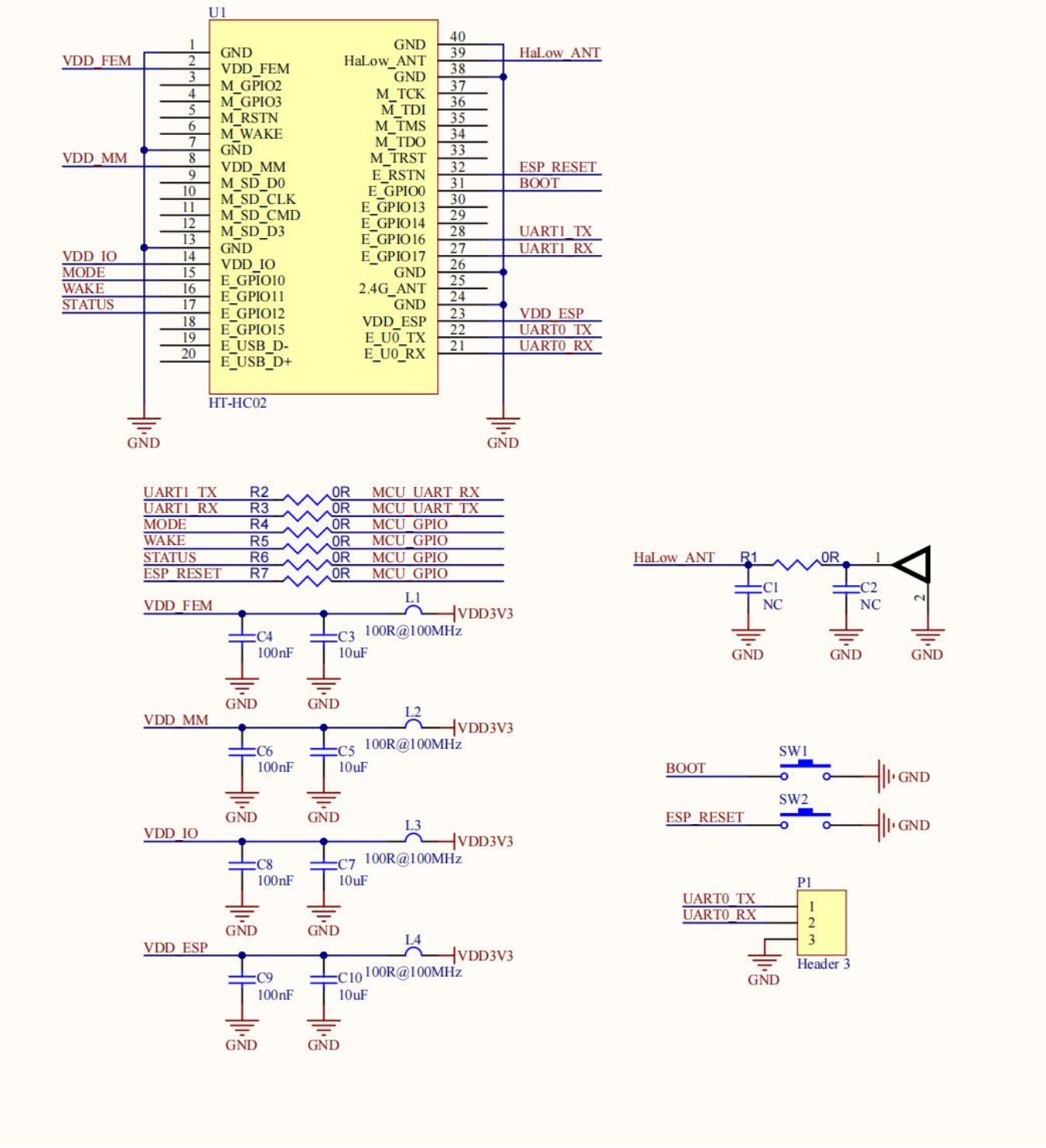
3. HT-HC02 Reference Design



Note:

• **Antenna Connection:** By default, the antenna is connected to the HaLow_ANT pin. To use an IPEX interface, components need to be repositioned.

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• **Operation Mode Switching:** The module's operating mode can be switched by toggling the level of Pin EGPIO_10:

- Low level: Transparent transmission mode
- High level: Configuration mode

4. HC02 Wireless Communication Test Procedure

4.1 Preparation

- Ensure the upstream HaLow gateway is operating normally.
- 1.2 Serial port tool: [XCOM V2.6]
- 1.3 TCP debug assistant: [TCP Debug Tool]

4.2 HC02 Configuration

1. Setting HC02 into configuration mode: Refer to the following table to correctly connect the relevant pins (RX, TX), and set GPIO10 to high level .

PINS	Type	Function	Description
GPIO10	DI	Mode Determination	"1" Configuration Mode, "0" Transparent Mode; The baud rate of configuration mode is fixed to 115200. When changing from 1 to 0, if there is a configuration change, the device will restart and reconnect to the HaLow AP.
GPIO11	DI	Wake-up Pin	"1" Wakes up, "0" AUTO-Sleep.
GPIO12	DO	Connection status	"0" Connected, "1" Disconnected
GPIO16	I/O	TX	
GPIO17	I/O	RX	

2. Open the serial port tool and configure via AT commands. For specific commands, please refer to

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the [AT Command Guide].

Important Serial Port Configuration Notes:

- **Region**: Must be consistent with the gateway.

- **HaLow gateway connection credentials**: SSID and password.

- **Server address**: Set to the test computer's IP address within the local area network.

- **Additional settings**: Configure port, IP mode, and other relevant parameters.

3. Enter Transparent Transmission Mode: Disconnect Pin GPIO10 (set to low) and set GPIO 11 to high.

4.3 Establish Communication

1. Connect the computer to the same local network as the HaLow gateway.
2. Open the TCP debug tool.
3. Configure the tool as follows:

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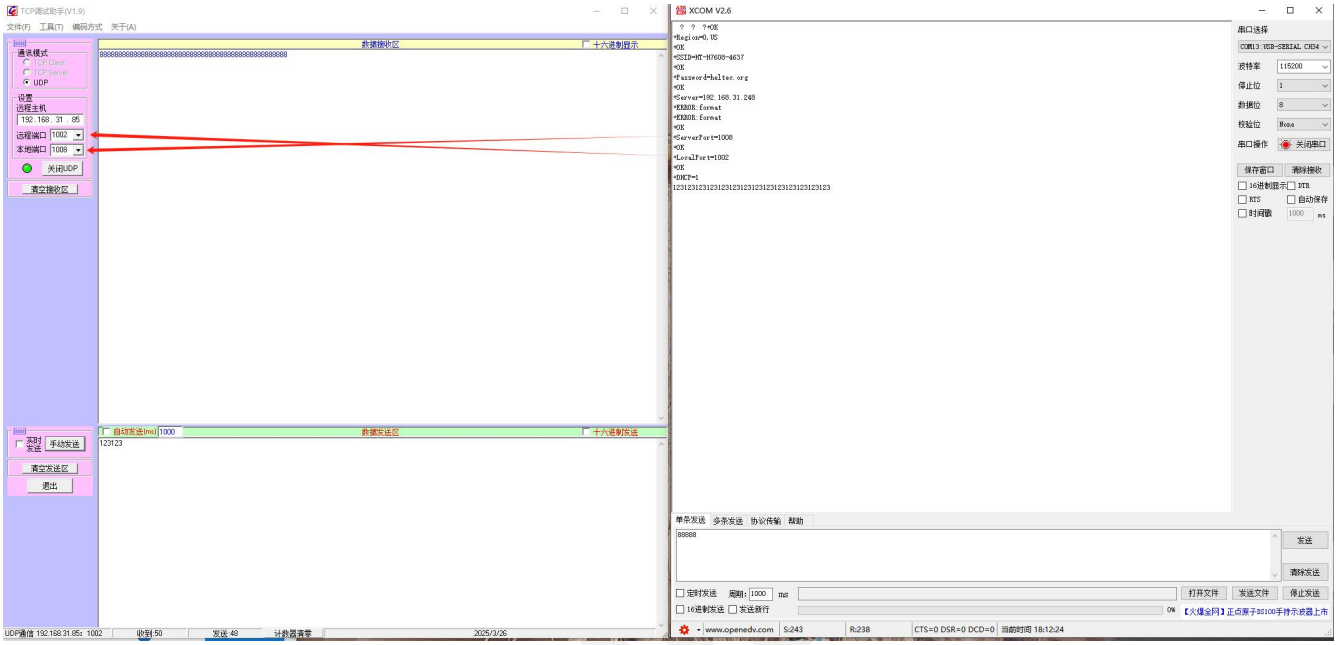
- **Communication Mode**: Select "UDP" (using UDP as an example).
- **Remote Host**: Enter the IP address of the HaLow gateway.
- **Remote Port**: Enter the "Local Port" configured in the AT module.
- **Local Port**: Enter the "Server Port" configured in the AT module.



4. Initiate Communication.

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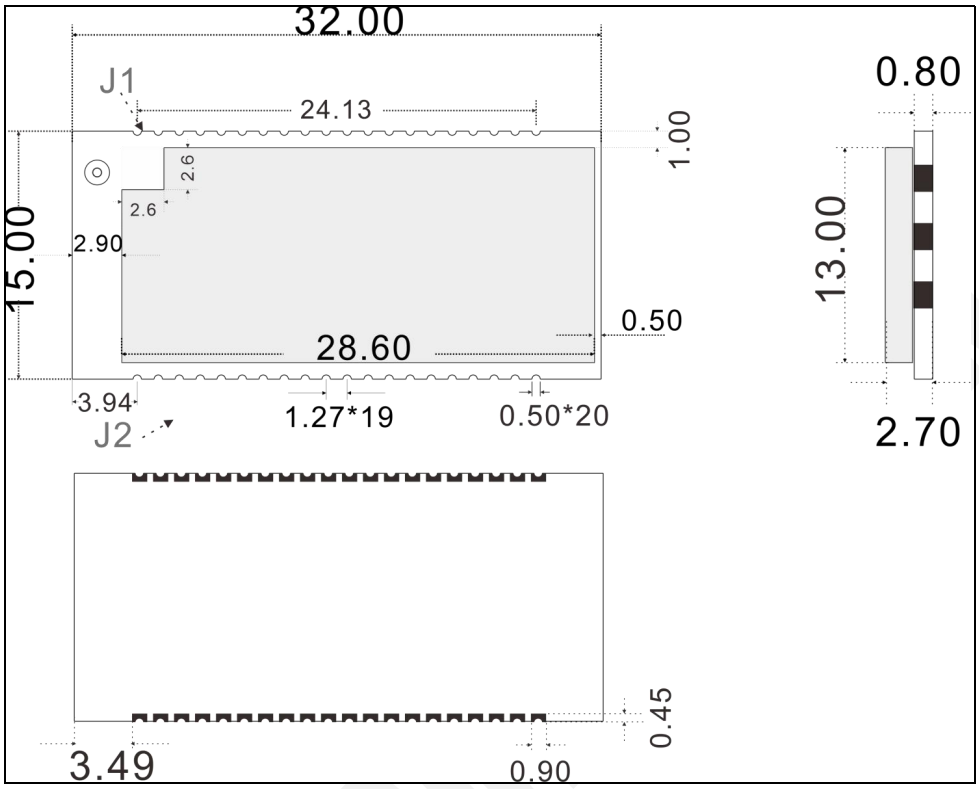
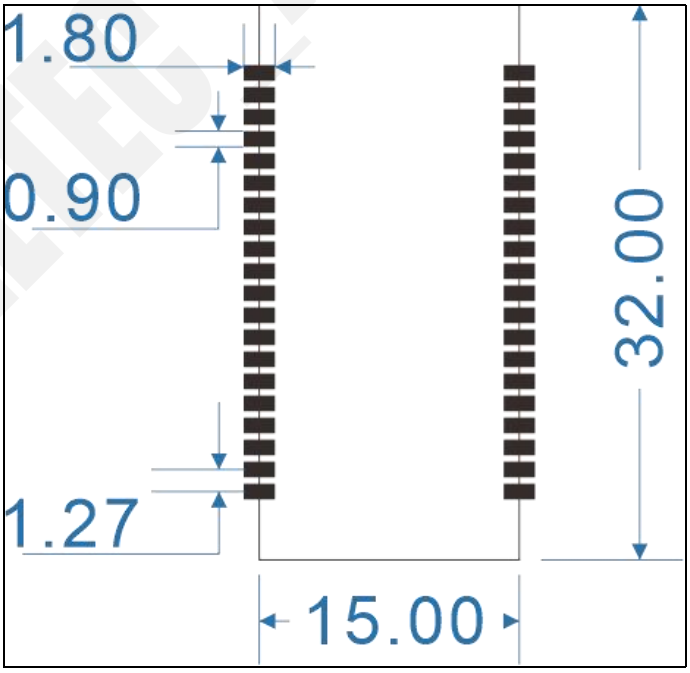
5. Package Dimension

5.1 HT-HC02 Dimension



5.2 Footprint Diagram



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6. Soldering Temperature

6.1Reflow Soldering Temperature

Item	Description
Ramp-up Rate (TS Max. to TL)	Max. 3°C/sec
Preheat - Min. Temp. (TS Min.) / Typical Temp. (TS Typ.) / Max. Temp. (TS Max.) / Time (tS)	150°C / 175°C / 200°C, 65-165 sec
Ramp-up (TL to TP)	Max. 3°C/sec
Liquidus Temperature (T_L) / Time Above Liquidus (t_L)	217°C, 60-150 sec
Peak Temperature (T_P)	Max. 260°C for up to 10 seconds
Target Peak Temperature (T_P Target)	260°C
Actual Peak (t_P) Duration	20-40 sec
Ramp-down Rate	Max. 6°C/sec
Total Time from 25°C to Peak Temperature (t)	Max. 4 minutes

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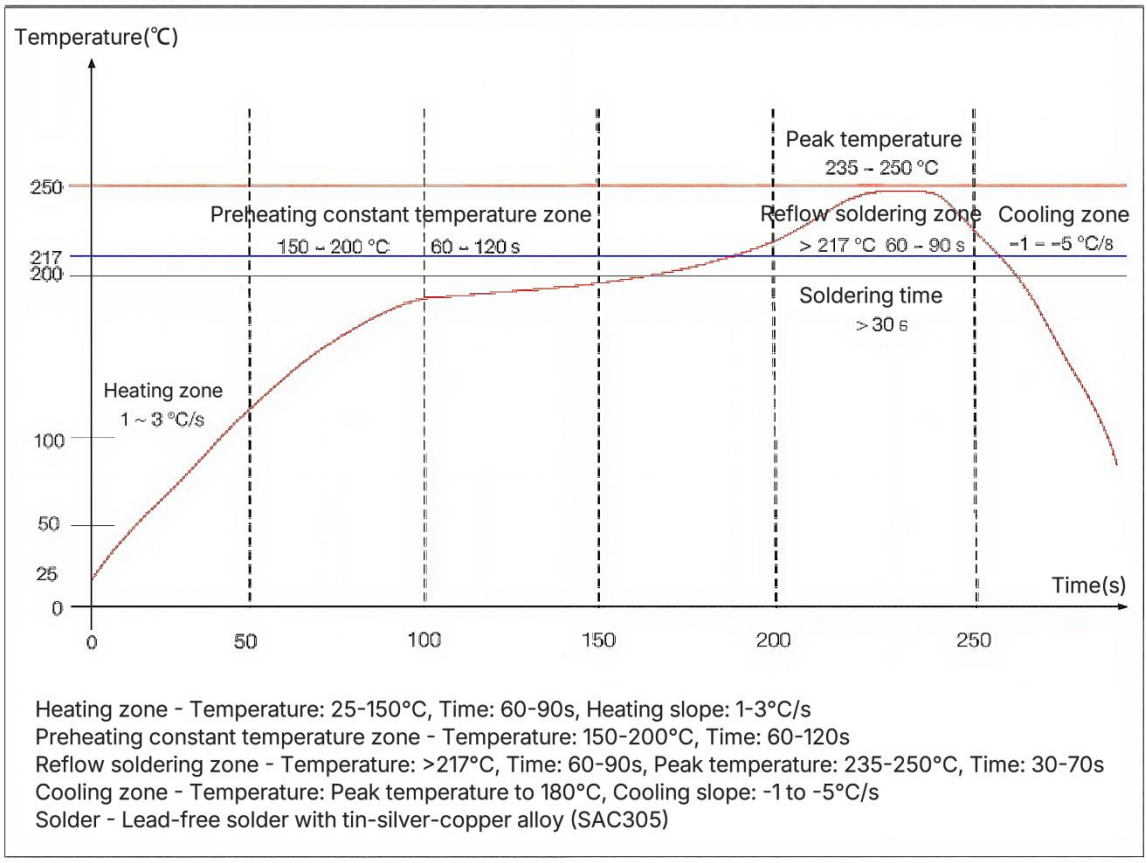
6.2 Reflow Soldering Profile



Heating zone - Temperature: 25-150°C, Time: 60-90s, Heating slope: 1-3°C/s
Preheating constant temperature zone - Temperature: 150-200°C, Time: 60-120s
Reflow soldering zone - Temperature: >217°C, Time: 60-90s, Peak temperature: 235-250°C, Time: 30-70s
Cooling zone - Temperature: Peak temperature to 180°C, Cooling slope: -1 to -5°C/s
Solder - Lead-free solder with tin-silver-copper alloy (SAC305)

Figure 15: Reflow Soldering Temperature Profile

7. Related Resource

- Resource.heltec.cn

8. Contact Information

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