



HLK-M50

[niki@hlktech.com](mailto:niki@hlktech.com)

Specification



**Shenzhen HaiLingKe Electronic co.,Ltd.**

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# HLK-M50 SPEC.





# Catalogue

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## 1. Product introduction

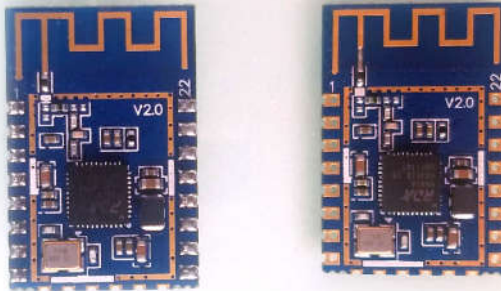
The HLK-M50 WiFi module is a low-power chip that integrates MCU, PMU, clock, and IEEE802.11b / g / n MAC / PHY / radio.

Module supports 2.4GHz IEEE802.11b / g / n, USB Host and Device 2.0 HS, Micro SD card (SDMMC interface), UART, I2C, I2S, PMW, SPI and other interfaces, analog keys (GPADC0).

Software using mbedOS5.1 operating system, has two versions : WiFi serial transmission function version and secondary development.

Second development version provides rich development interface, users can develop their own applications based on mbedOS through C or C ++. Development kit to provide a large number of guidance documents and test routines to facilitate rapid development of users.

### 1.1. HLK-M50 Module Type



Pin section and SMD section front

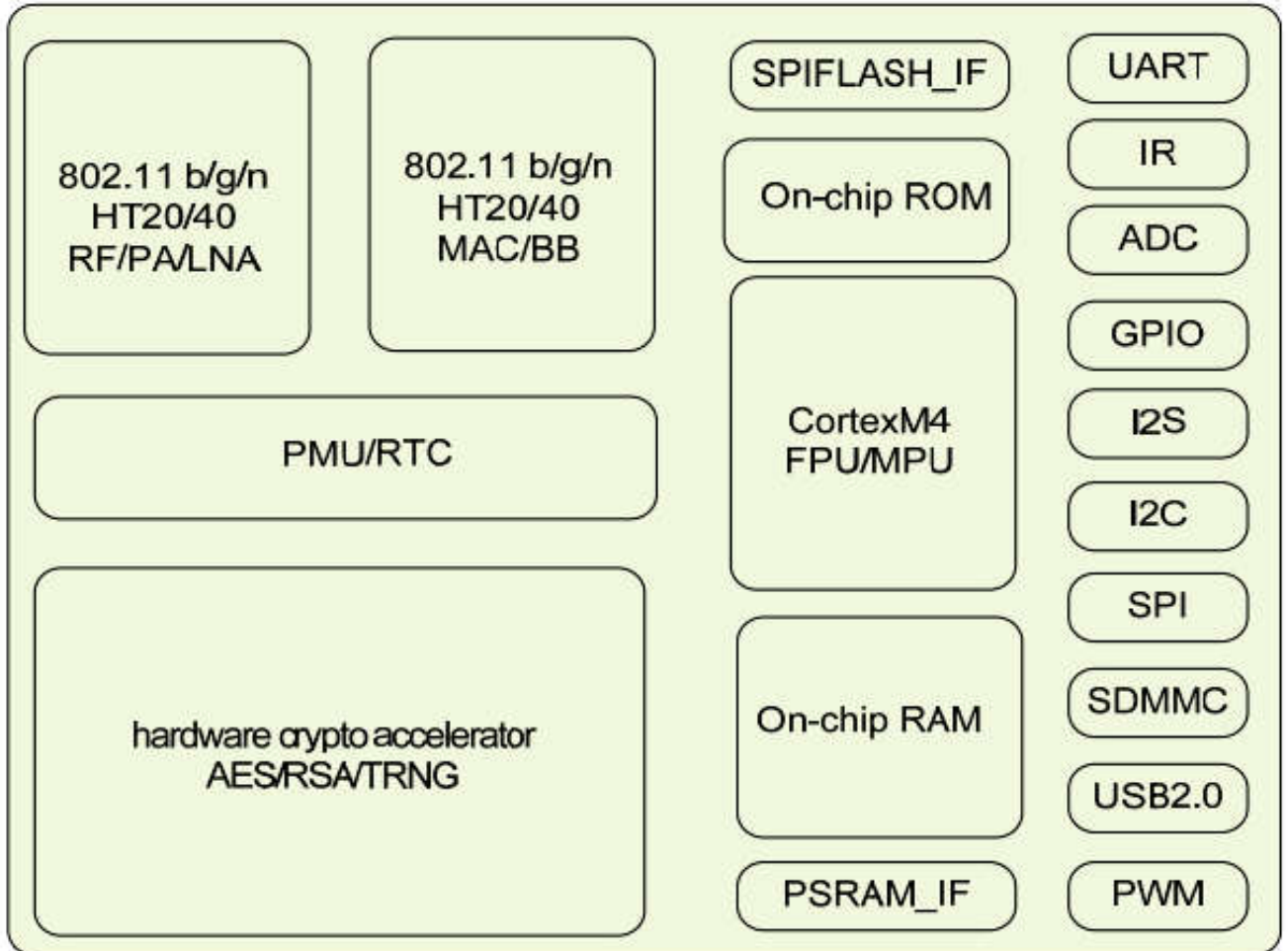
## 1.2. WLAN Features

- Single-chip integrated MAC/PHY/Radio
- Supports 2.4GHz IEEE 802.11b/g/n
- Integrated PA, LNA
- 20/40MHz bandwidth, maximum 150Mbps
- Support WPA, WPA2, WEP, TKIP,CCMP
- Support STA, softAP, P2P, STA+softAp,STA+P2P
- Support A-MPDU, A-MSDU, HT-BA
- Lightweight TCP / IP protocol stack

## 1.3. MCU Features

- Integrated ARM-CM4 MCU, the maximum clock frequency of 160MHz
- Integrated MPU and mbed uvisor
- Support external psram interface
- Built-in 8Mbit SPI flash
- Function pin position programmable
- Available external rising / falling edge interrupt or wake-up GPIO
- Integrated UART×2/I2S×2/I2C×1/PWM×8/SPI×4/SDMMC×1/USB2.0×1
- Integrated 2 channel ADC
- Integrated watchdog and low-power timer
- Operating system using mbedOS5.1

## 2. Functional diagram



HLK-M50 Module functional diagram

## 3. Specifications

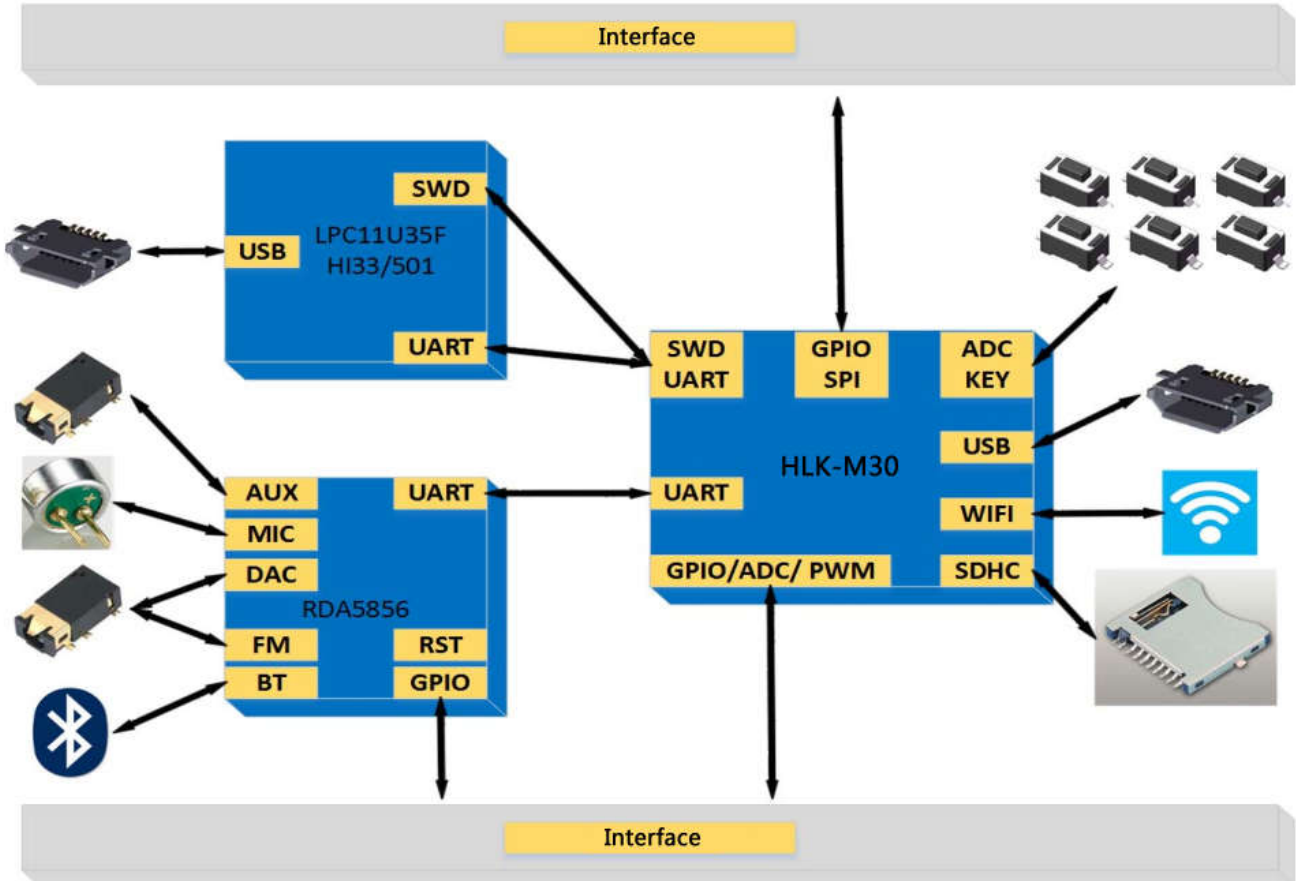
### 3.1 System memory

Project		Parameters
Memory System	Built-in RAM	96K Bytes User SRAM 32K Bytes icache
	Built-in Flash	Built-in 8Mbit flash

### 3.2 Interface

项目	参数																									
<b>GPIO</b>	supports up to 17 GPIO ports, of which 16 can trigger interrupts																									
<b>Serial performance</b>	supports up to 2 serial ports, baud rate can be configured to 1200bps - 4Mbps																									
<b>I2S Interface Features</b>	Supports 2 I2S Interfaces; I2S Host BCLK Supports 96/192/384/512 / 44.1 / 88.2KHz; Supports 16/32 bit per channel, Data Format Configurable as 16/20 / 24bit or Software Configurable Maximum 24bit per channel)																									
<b>I2C Interface Performance</b>	<p>Supports one I2C standard interface. Support master or slave operation. There are 3 standard speed modes:</p> <ol style="list-style-type: none"> <li>1. Standard mode (&lt;100Kb/s)</li> <li>2. Fast mode (&lt;400Kb/s)</li> <li>3. High-speed mode (&lt;3.4Mb/s)</li> </ol>																									
<b>PWM Interface Performance</b>	<p>Supports up to eight PWM interfaces; PWM cycle and duty cycle programmable, duty cycle can be configured between 0-100; cycle programmable, the software can choose a different clock to produce longcycles</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Name</th> <th>Number</th> <th>Duty</th> <th>Period</th> <th></th> </tr> </thead> <tbody> <tr> <td>PWM</td> <td>4</td> <td>1~100%</td> <td>5us-256s</td> <td>Standard PWM</td> </tr> <tr> <td>PWT</td> <td>1</td> <td>1~100%</td> <td>5us-4s</td> <td>Standard PWM</td> </tr> <tr> <td>LPG</td> <td>1</td> <td>&lt;25%</td> <td>&lt;2s</td> <td>The wave has a short pull up in a long period</td> </tr> <tr> <td>PWL</td> <td>2</td> <td>1~100%</td> <td>-</td> <td>The wave is non-periodic, use for screen background light</td> </tr> </tbody> </table>	Name	Number	Duty	Period		PWM	4	1~100%	5us-256s	Standard PWM	PWT	1	1~100%	5us-4s	Standard PWM	LPG	1	<25%	<2s	The wave has a short pull up in a long period	PWL	2	1~100%	-	The wave is non-periodic, use for screen background light
Name	Number	Duty	Period																							
PWM	4	1~100%	5us-256s	Standard PWM																						
PWT	1	1~100%	5us-4s	Standard PWM																						
LPG	1	<25%	<2s	The wave has a short pull up in a long period																						
PWL	2	1~100%	-	The wave is non-periodic, use for screen background light																						
<b>SPI Interface</b>	As the SPI host, up to 4 SPI slave; SPI clock programmable and maximum 20Mhz; data length can be configured by software, the maximum 64bit;																									
<b>SDMMC Interface</b>	Support 1 SDMMC interface																									
<b>USB Interface</b>	Support 1 USB interface																									

### 3.3 Interface Extension Application Example



**Note:**

1, The figure can be extended function, the common firmware do not support some features, please consult our FAE if you need.

2, The module factory default is USB HOST.

### 3.4 Power

Symbol	Function	Min.Voltage (V)	Typical Voltage (V)	Maximum Voltage (V)	Current (mA)
VBAT	Supply voltage range	3.3	3.3	3.5	≥500mA
I/O	I/O Input Voltage range	2.7	3.3	3.6	≤10mA

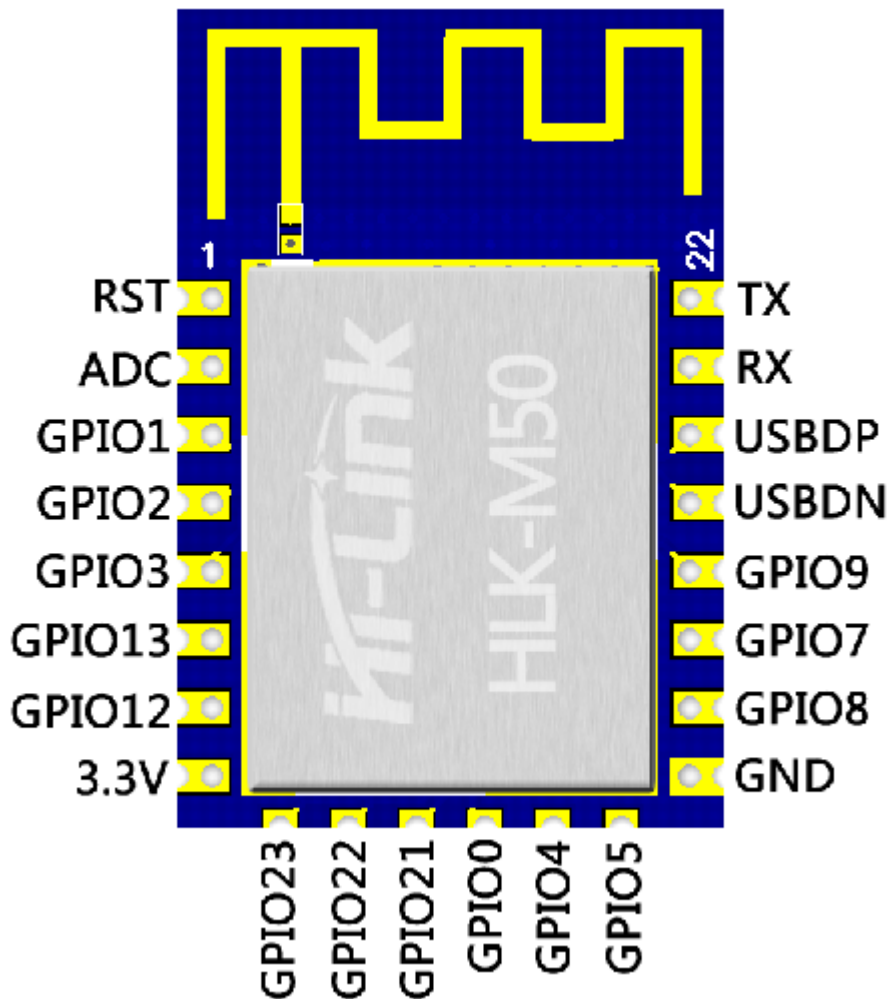
Symbol Function Min. Voltage (V) Typical Voltage (V) Maximum Voltage (V) Current (mA)

VBAT supply voltage range 3.3 3.3 3.5  $\geq 500\text{mA}$

I/O I/O Input Voltage Range 2.7 3.3 3.6  $\leq 10\text{mA}$

## 4. Module pin definition

### 4.1 Pin Diagram Definition



HLK-RM08S default Pin diagram definition

#### Note:

1, The figure is the default definition, the multiplexing function is not listed.

2, Please do not arbitrarily pull of each free function pin, so as cause the module does not start properly.



## 4.2 Default Pin definition

Number	Name	Type	Description
1	<b>RST</b>	I	RESET signal of the chip
2	<b>ADC</b>	I/O	General purpose ADC
3	<b>GPIO1</b>	I/O	General purpose input/output
4	<b>GPIO2</b>	I/O	General purpose input/output
5	<b>GPIO3</b>	I/O	General purpose input/output
6	<b>GPIO13</b>	I/O	General purpose input/output
7	<b>GPIO12</b>	I/O	General purpose input/output
8	<b>3.3V</b>	PWR	I/O power supply
9	<b>GPIO23</b>	I/O	General purpose input/output
10	<b>GPIO22</b>	I/O	General purpose input/output
11	<b>GPIO21</b>	I/O	General purpose input/output(no interrupt)
12	<b>GPIO0</b>	I/O	General purpose input/output
13	<b>GPIO4</b>	I/O	General purpose input/output
14	<b>GPIO5</b>	I/O	General purpose input/output
15	<b>GND</b>	GND	buck ground
16	<b>GPIO8</b>	I/O	General purpose input/output
17	<b>GPIO7</b>	I/O	General purpose input/output
18	<b>GPIO9</b>	I/O	General purpose input/output
19	<b>USB-DN</b>	I/O	USB negative signal
20	<b>USB-DP</b>	I/O	USB positive signal
21	<b>RX</b>	I/O	UART_RX
22	<b>TX</b>	I/O	UART_TX

### *Pin type definition :*

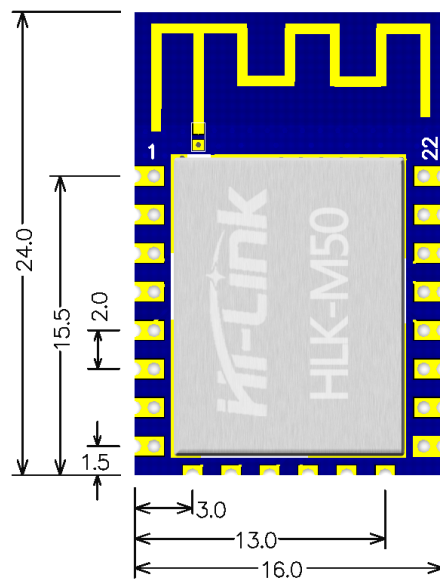
- *I/O → Digital input/output ;*
- *I → Digital input*
- *O → Digital output*
- *A,I → Analog input*
- *A,O → Analog output*
- *A,I/O → Analog input/output*
- *PWR → Power*
- *GND → Ground*

### 4.3 GPIO alternate function and function pin position

引脚名 引脚号 功能	GPIO0	GPIO1	GPIO2	GPIO3	GPIO4	GPIO5	ADC	GPIO7	GPIO8	GPIO9	GPIO12	GPIO13	GPIO21	GPIO22	GPIO23	RX	TX
	12	3	4	5	13	14	2	17	16	18	7	6	11	10	9	21	22
GPIO	GPIO0	GPIO1	GPIO2	GPIO3	GPIO4	GPIO5	GPIO6	GPIO7	GPIO8	GPIO9	GPIO12	GPIO13	GPIO21	GPIO22	GPIO23	GPIO26	GPIO27
UART1																Rx	Tx
UART2		Rx	Tx											CTS	RTS		
ADC							adc0	adc1									
SPI					clk	cs1	mosi/ data	miso			mosi	miso		clk	cs0	cs2	cs3
I2C			sda	scl										sda	scl		
I2S out		sd	ws	bclk													
I2S in					sd	ws			bclk								
SD	cmd			d0			d0	d1		clk	D2	D3					
PWM	pw2	pw1	lpg	pwt					pw0			pw1		pwm0	pwm1	pw0	pw3

功能引脚位置固定
此功能引脚有多个可变位置
非必要功能引脚

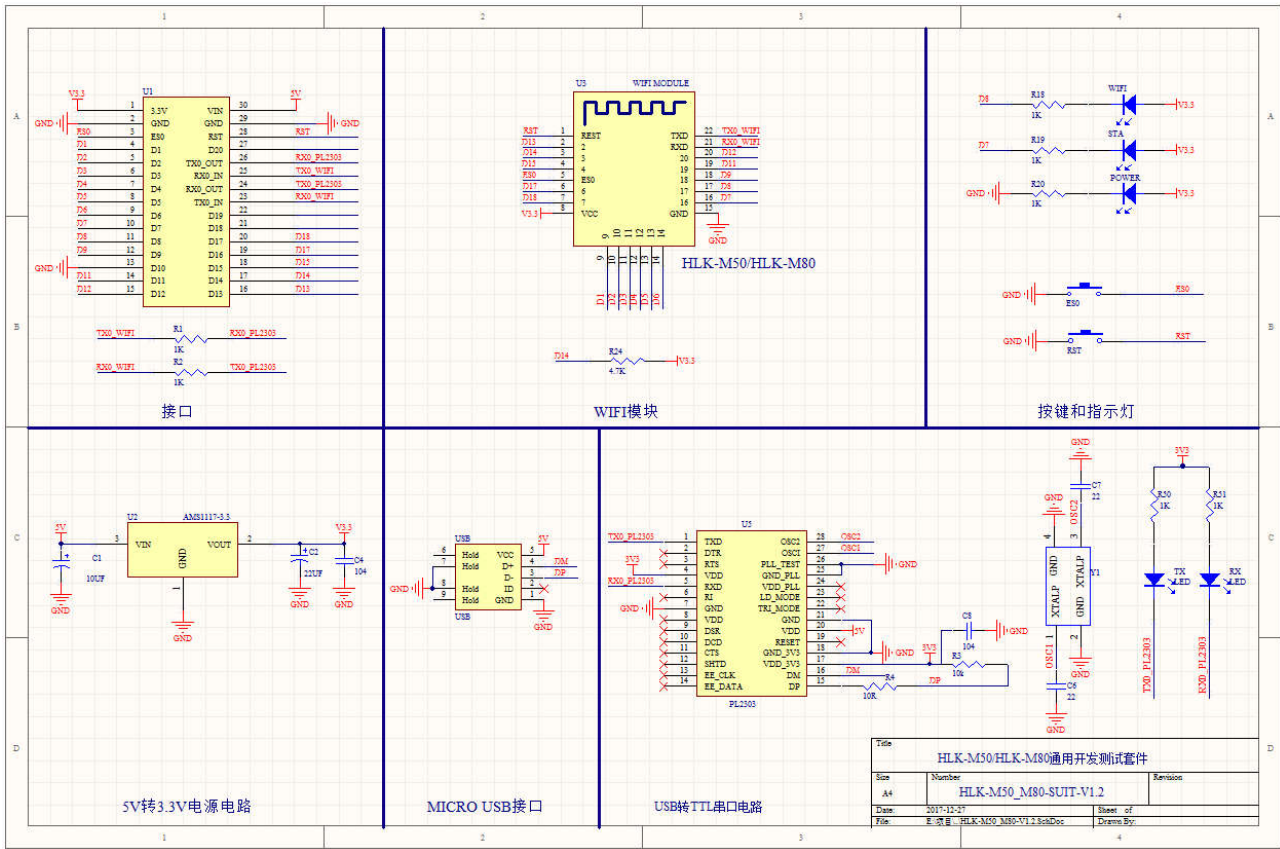
### 5. Module size chart



Unit: millimetre (mm)

HLK-M50 Dimension

### 6. Typical application circuit



**Note:**

This is a schematic diagram of the M50 development test suite. Schematic and PCB source files, please ask sales.

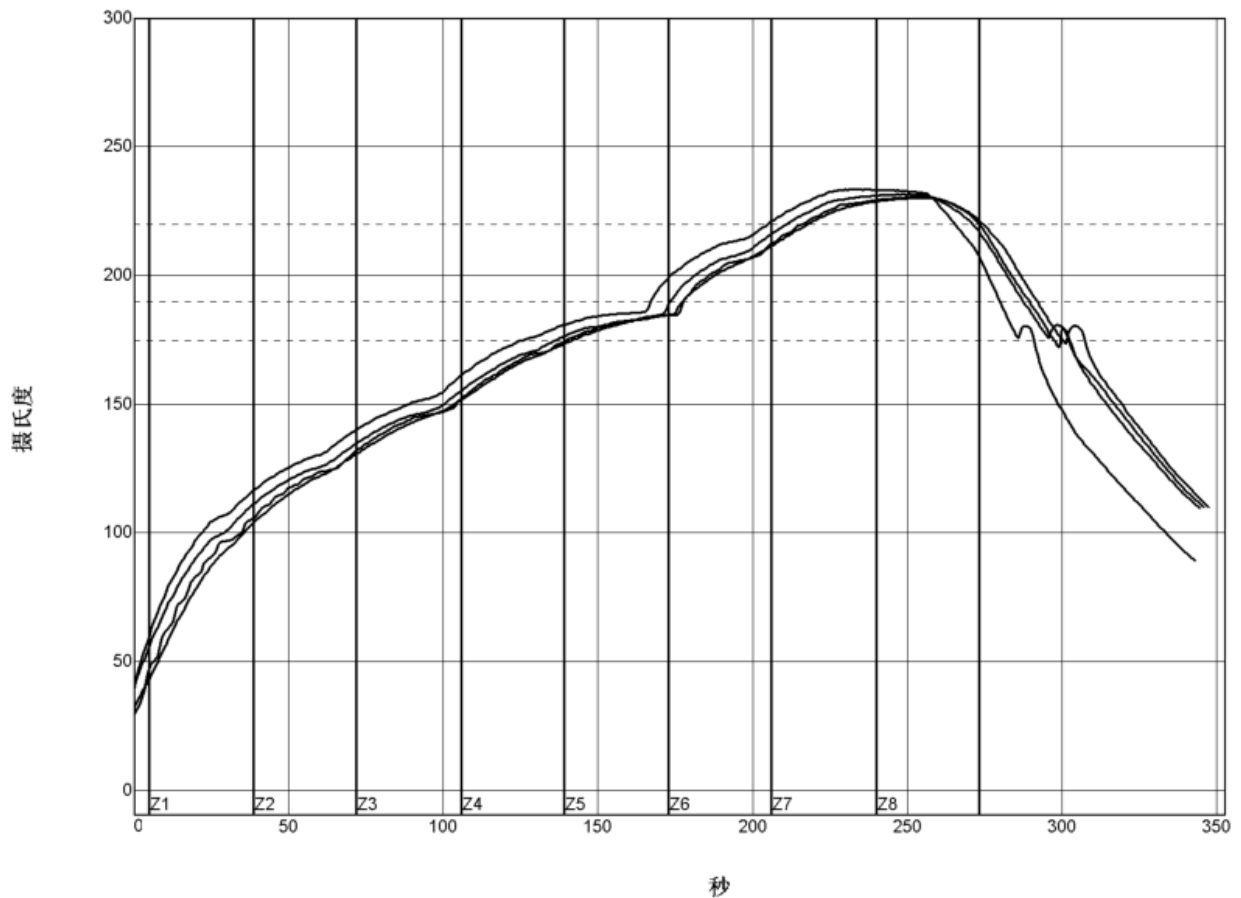
Module over the furnace, please follow this temperature curve in strict implementation. Reflow temperature deviation is too large will cause damage to the module!

### 7. Recommended reflow temperature

Module over the furnace, please follow this temperature curve in strict implementation. **Reflow temperature deviation too large will cause damage to the module!**

Temperature setting (centigrade)									
Temper. area	1	2	3	4	5	6	7	8	
Up	125	135	155	185	195	225	240	230	
Down	125	135	155	185	195	225	240	230	

Conveyor speed: 70.0 cm/min.



PWi= 94%	恒温时间175至190C		回流时间 /220C		最高温度	
<TC2>	35.53	-82%	55.58	-72%	230.28	-94%
<TC3>	37.66	-74%	58.66	-57%	230.56	-89%
<TC4>	41.52	-62%	60.63	-47%	233.62	-28%
<TC5>	37.07	-76%	60.44	-48%	231.67	-67%
温差	5.99		5.05		3.34	

**制程界限:**

锡膏: System Default for Reflow			
统计数名称	最低界限	最高界限	单位
恒温时间175-190摄氏度	30	90	秒
回流以上时间 - 220摄氏度	50	90	秒
最高温度	230	240	度 摄氏度

**FCC Warning**

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: 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.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label



can use wording such as the following: “Contains FCC ID: 2AD56HLK-M50” any similar wording that expresses the same meaning may be used.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The module is limited to OEM installation ONLY.

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

There is requirement that the grantee provide guidance to the host manufacturer for compliance with Part 15B requirements.

This module certified that complies with RF exposure requirement under mobile or fixed condition, this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.