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Product Specification

IEEE 802.11 b/g/n 2.4GHz 1T1R WiFi + NFC Module

Project Name RTL8711AM IoT Module

Model NO W87-AM

Customer

Customer's Part NO

Approved: tony chen

Checked: fei pan

Drafted: stven kan

Feedback of customer's Confirmation

We accept the specification after Confirmed.

Customer

Customer signature

Approved Date

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0. Revision History

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REV NO	Date	Modifications	Draft	Approved
Rev0.1	2015-03-20	First Released		Tony chen

1.1 Overview

W87-AM is a highly integrated module with low power 802.11n Wireless LAN(WLAN) network controller. It combines an ARM-CM3 MCU, WLAN MAC, a 1T1R capable WLAN baseband, and RF function. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage.

W87-AF integrates internal memories for complete WIFI protocol functions.

1.2 Product Features**General**

- 24mm*18mm*1.6mm
- CMOS MAC, Baseband PHY, and RF in the module for 802.11b/g/n compatible WLAN
- Complete 802.11n solution for 2.4G band
- 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth

Standards Supported

- 802.11b/g/n compatible WLAN
- 802.11e QoS Enhancement(WMM)
- 802.11i(WPA,WP2). Open, shared key, and pair-wise key authentication services
- WiFi Direct support
- Light Weight TCP/IP protocol

WLAN PHY Features

- 802.11n OFDM
- One Transmit and one Receive path(1T1R)
- 20MHz and 40MHz bandwidth transmission
- Short Guard Interval(400ns)
- Maximum data rate 54Mbps in 802.11g and 150Mbps in 802.11n

Host Interface

- 2 x UART
- 1x I2C
- 1x SPI
- 3x PWM
- 1x ADC
- GPIO

2. Block diagram

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The general block diagram for the module is shown in Figure 1

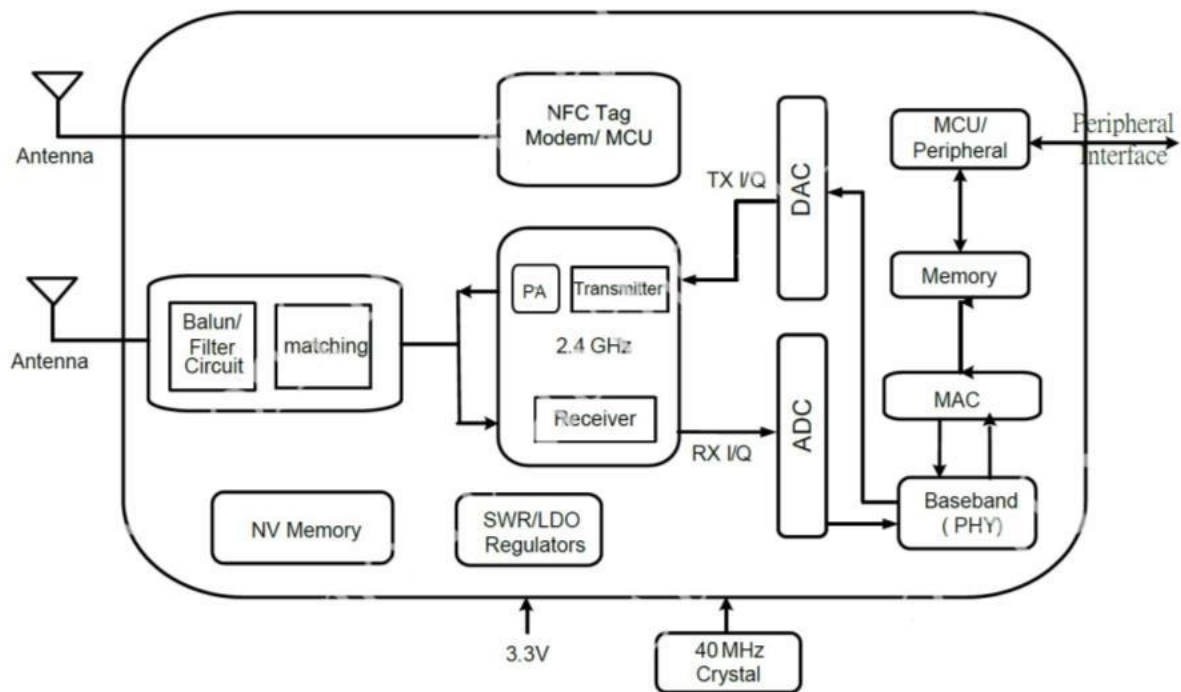


Figure 1

General features	
Main Chipset	Realtek RTL8711AM
Host Interface	UART,I2C,SPI,PWM,ADC
WiFi Standards	802.11b/g/n
Other RF Standards	NFC
Dimension	L24.0mm*W18.0mm*H1.6mm
Operating conditions	
Operating Voltage	3.3±10% Vdc
Operating Temperature	0°C to +70°C
Storage Temperature	-40°C to +80°C
RF features	
Operating Frequency	2.400~2.4835GHz
Channels	WiFi: USA/Canada: channel 1~11; Europe/China/Australia: channel 1~13; Japan: channel 1~14
Modulation	WiFi: 802.11b(DSSS): CCK(11, 5.5Mbps), DQPSK(2Mbps), DBPSK(1Mbps); 802.11g(OFDM): BPSK(9,6Mbps), QPSK(18,12Mbps), 16QAM(36,24Mbps), 64QAM(54,48Mbps); 802.11n(OFDM): BPSK, QPSK, 16QAM, 64QAM(150Mbps)
PHY Data rates	WiFi: 802.11b: 11,5.5,2,1 Mbps 802.11g: 54,48,36,24,18,12,9,6 Mbps 802.11n: up to 150Mbps
Output Power	WiFi: 802.11b 16±2dBm 802.11g 14±2dBm 802.11n 13±2dBm
EVM	802.11b EVM ≤ 35% 802.11g EVM ≤ -25dB 802.11n EVM ≤ -28dB

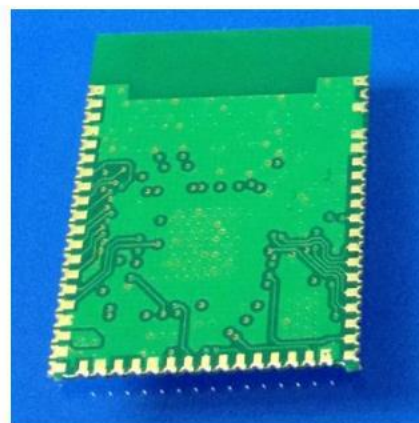
Sensitivity	WiFi: 802.11b@8% PER 1Mbps -88dBm 2Mbps -87dBm 5.5Mbps -85dBm 11Mbps -82dBm 802.11g@10% PER 6Mbps -86dBm 9Mbps -85dBm 12Mbps -84dBm 18Mbps -82dBm 24Mbps -80dBm 36Mbps -77dBm 48Mbps -73dBm 54Mbps -71dBm 802.11n_HT20@10% PER MCS 0 -83dBm MCS 1 -82dBm MCS 2 -80dBm MCS 3 -78dBm MCS 4 -75dBm MCS 5 -71dBm MCS 6 -69dBm MCS 7 -67dBm
Other features	
Antenna	Internal Antenna (External antenna supported)
Network Architecture	WiFi: Ad-hoc mode (Peer-to-Peer) Infrastructure mode WiFi Direct
Security	802.11i(WPA,WP2). Open, shared key, and pair-wise key authentication services

4. Mechanical and Electrical Specification

4.1 Outline Drawing(Unit: mm)

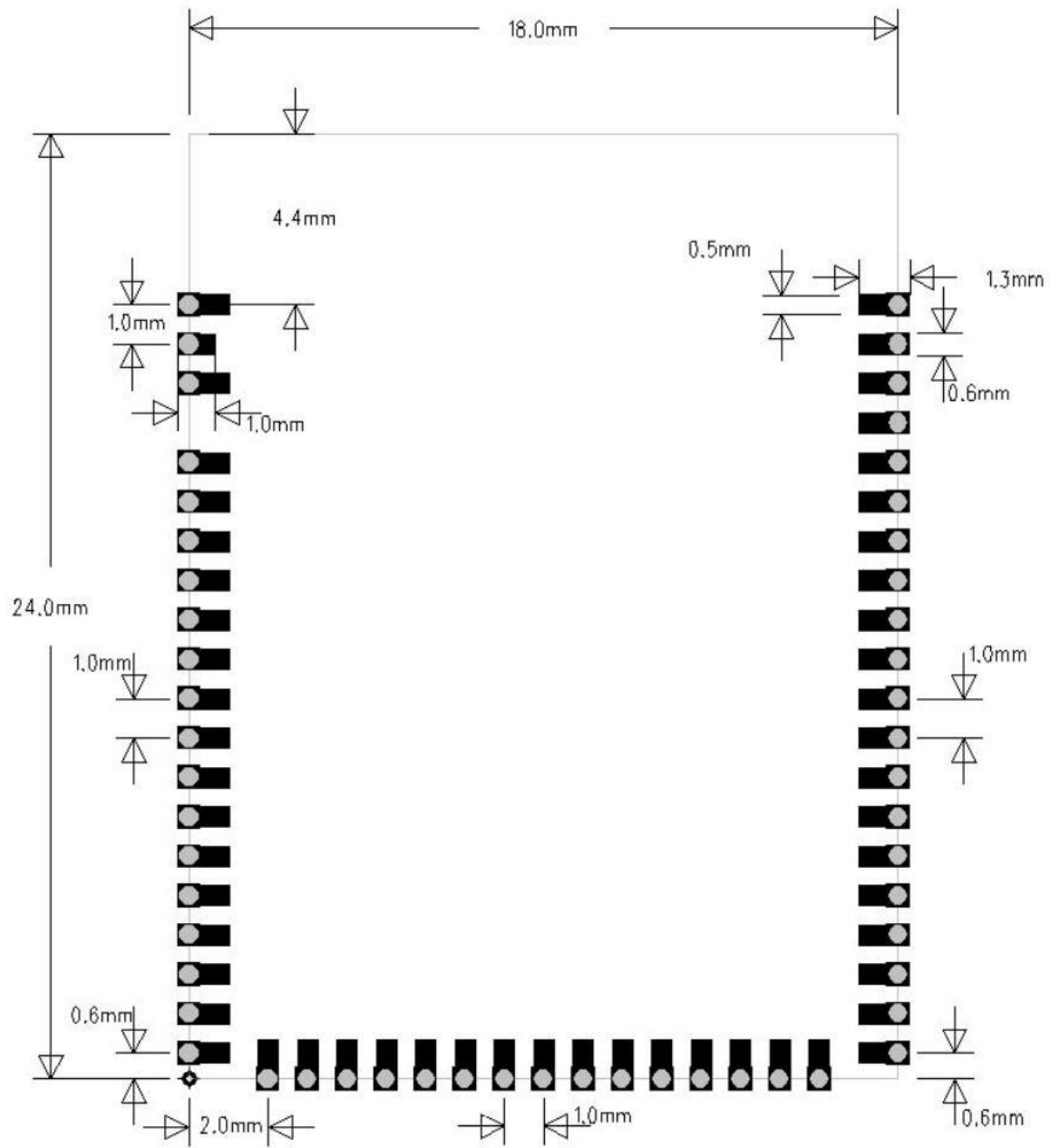


Top Side

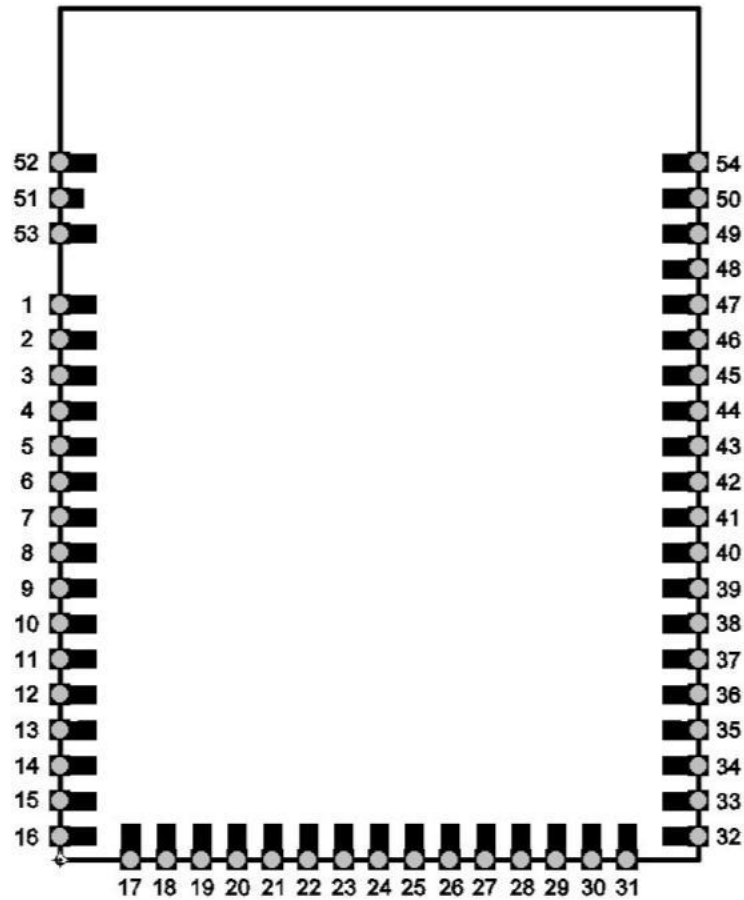


Bottom Side

(Top View)



4.2 Pin Definition(Top View)

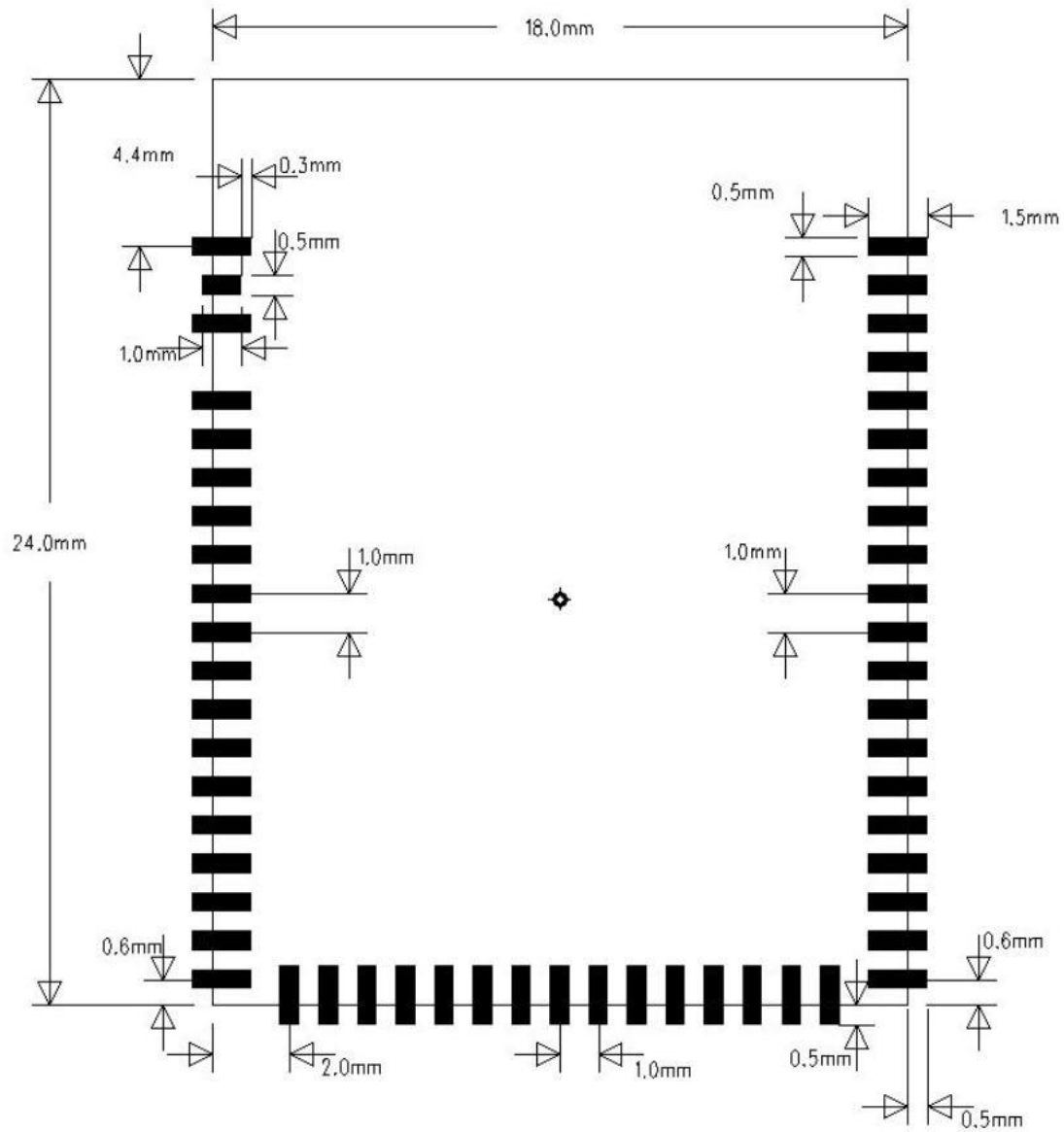


Pin Assignment

Pin#	Name	Description
1	GND	Ground
2	GND	Ground
3	NC	Not Connected
4	NC	Not Connected
5	NC	Not Connected
6	NC	Not Connected
7	VDDIO	GPIOE and GPIOC group IO power
8	NC	Not Connected
9	GPIO_4	GPIO Pin
10	GPIO_3	GPIO Pin
11	GPIOE_2/PWM2	GPIO Pin, PWM(multiplexing)
12	GPIOE_1/PWM1	GPIO Pin, PWM(multiplexing)
13	GPIOE_0	GPIO Pin
14	NC	Not Connected
15	ADC_CH2	AD converter input
16	NC	Not Connected
17	GND	Ground
18	CHIP_EN	1: Enable Chip 0: Disable chip in shutdown mode
19	NC	Not Connected

20	NC	Not Connected
21	NC	Not Connected
22	GPIOA_3	GPIO Pin
23	NC	Not Connected
24	GPIOA_5	GPIO Pin
25	GPIOA_6/UART0_RXD	GPIO Pin, UART0_IN(multiplexing)
26	GPIOA_7/UART0_TXD	GPIO Pin, UART0_OUT(multiplexing)
27	GND	Ground
28	NC	Not Connected
29	NC	Not Connected
30	GND	Ground
31	NC	Not Connected
32	NC	Not Connected
33	GND	Ground
34	VD33	3.3V Power Supply
35	GND	Ground
36	GPIOC_3/SPI0_MISO	GPIO Pin, SPI0_MISO(multiplexing)
37	GPIOC_2/SPI0_MOSI	GPIO Pin, SPI0_MOSI(multiplexing)
38	GPIOC_1/SPI0_CLK	GPIO Pin, SPI0_CLK(multiplexing)
39	GPIOC_0/PWM0	GPIO Pin, PWM(multiplexing)
40	GPIOC_4/SPI0_CS1	GPIO Pin, SPI0_CS1(multiplexing)
41	GPIOC_5	GPIO Pin
42	GPIOB_3/I2C_SDA	GPIO Pin
43	GPIOB_2/I2C_SCL	GPIO Pin
44	GPIOB_1/UART1_RXD	GPIO Pin, UART1_IN(multiplexing)
45	GPIOB_0/UART1_TXD	GPIO Pin, UART1_OUT(multiplexing)
46	NC	Not Connected
47	NC	Not Connected
48	GND	Ground
49	NFCIP_1	NFC input differential signal
50	NFCIN_1	NFC input differential signal
51	RF_1	WL RF signal
52	GND	Ground
53	GND	Ground
54	GND	Ground

4.3 PCB Lay-out Reference

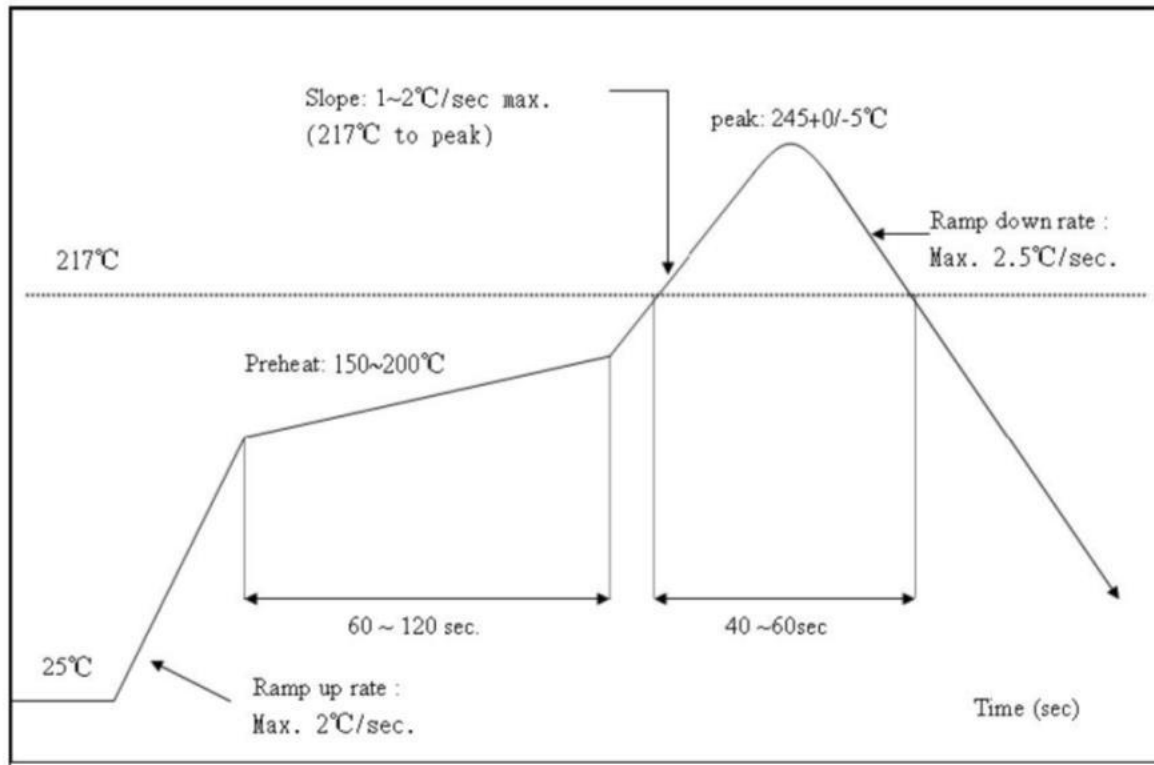


4.4 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : $<250^{\circ}\text{C}$

Number of Times : ≤ 2 times



4.5 Patch WIFI modules installed before the notice:

WIFI module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm, 0.12 mm thickness When open a stencil
2. Take and use the WIFI module, please insure the electrostatic protective measures.
3. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at $250 + 5^{\circ}\text{C}$ for the MID motherboard.

About the module packaging, storage and use of matters needing attention are as follows:

1. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: $< 40^{\circ}\text{C}$, relative humidity: $< 90\% \text{ r.h.}$
2. The module vacuum packing once opened, time limit of the assembly:
Card: 1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.
2.) factory environmental temperature humidity control: $\leq 30^{\circ}\text{C}$, $\leq 60\% \text{ r.h.}$
- 3). Once opened, the workshop the preservation of life for 168 hours.
3. Once opened, such as when not used up within 168 hours:
 - 1). The module must be again to remove the module moisture absorption.
 - 2). The baking temperature: 125°C , 8 hours.
 - 3.) After baking, put the right amount of desiccant to seal packages.

5. Package

TBD...