

HK NATER TECH LIMITED

AR9331- ITM-AP02 Specification

Customer: _____

Description: AR9331-ITM-AP02

Customer P/N: _____

Date: _____

Customer		
Approve	Auditing	Admit

Provider		
Approve	Auditing	Admit

Customer:

Add:

Tel:

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General Description

The module of AR9331 is a complete, small form factor 802.11 b/g/n Wi-Fi Solution optimized for low power, low-cost, and highly integrated AP and consumer electronic devices, the module integrates all Wi-Fi functionality in a package friendly to low-cost PCB design, requiring only a few external 3.3V power supply and connection to antenna.

The module based on the single chip AR9331 which integrates an 802.11n 1x1 MAC/BB/radio with internal PA and LNA. It supports 802.11n operations up to 72 Mbps for 20 MHz and 150 Mbps for 40 MHz channel respectively, and IEEE 802.11b/g data rates.

The module support AP mode and client mode at the same time and include mass service application software to reduce the research and design work of customer.

Features

- Chipset: AR9331, MIPS 24K processor operating at up to 400 Mhz.
- IEEE802.11b/g/n, IEEE802.3u MDI / MDIX
- Frequency Band: 2.4~2.4835GHz ISM Band
- DD2 memory up to 512 Mb.(e.g.: H5PS5162GFR-G7C)
- SPI NOR Flash memory up to 64Mb.(e.g.:W25Q64FVSIQ)
- Power Supply: DC:3V3,2A
- 4LAN ports and 1 WAN port
- High-speed UART for console support
- USB 2.0 host/device mode support
- GPIO/LED support
- SPI support.
- ANTENNA: Through I-PEX
- Data rate: 150Mbps (Max.)
- Operation Range: Up to 100 meters in open space
- Humidity (non-condensing): 0%~90% typical
- Temperature Range: Operating -10°C~70°C; Storage -30°C to 80°C
- Dimensions: 40.5mm (L) x 27.5mm (W) x 1.8mm (H)

Radio Receiver Characteristics for 2.4 GHz Operation

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F _{rx}	Receiver input frequency range	5 MHz center frequency	2.412	—	2.472	GHz
NF	Receive chain noise figure (max gain)				—	
		LNA1 (Tx/Rx shared)	—	5.0	—	
S _{rf}	Sensitivity ^[1]					
	CCK, 1 Mbps	See Note ^[2]	-80	-93	—	dBm
	CCK 11 Mbps		-76	-87	—	
	OFDM, 6 Mbps		-82	-88	—	
	OFDM, 54 Mbps		-65	-74	—	
	HT20, MCS0, 1 stream, 1 Tx, 1 Rx	See Note ^[2]	-82	-88	—	dBm
	HT20, MCS7, 1 stream, 1 Tx, 1 Rx		-64	-71	—	
	HT40, MCS0, 1 stream 1 Tx, 1 Rx	See Note ^[2]	-79	-85	—	dBm
	HT40, MCS7, 1 stream 1 Tx, 1 Rx		-61	-69	—	
IP1dB	Input 1 dB compression (min. gain)	—	—	-4	—	dBm
IIP3	Input third intercept point (min. gain)	—	—	5.5	—	dBm
Z _{RFin_input}	Recommended LNA differential drive impedance	LNA2	—	27-j5	—	Ω
ER _{phase}	I, Q phase error	—	—	0.15	—	°
ER _{amp}	I, Q amplitude error	—	—	1.0	—	dB
R _{adj}	Adjacent channel rejection					
	OFDM, 6 Mbps	10 to 20 MHz ^[3]	16	34	—	dB
	OFDM, 54 Mbps		-1	19	—	
	HT20, MCS0		16	34	—	dB
	HT20, MCS7		-2	18	—	
TR _{powup}	Time for power up (from synthesizer)	—	—	1.5	—	μs

Transmitter Characteristics for 2.4 GHz Operation

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F _{tx}	Transmit output frequency range	5 MHz center frequency	2.412	—	2.472	GHz
P _{out}	Mask Compliant CCK output power	See Note ^[1]	—	19.5	—	dBm
	Mask Compliant OFDM output power					
	802.11g BPSK 6 Mbps	See Note ^[2]	—	20	—	dBm
	HT20, MCS0		—	19	—	
	HT40, MCS0		—	16	—	
	EVM Compliant OFDM output power					
	802.11g 64 QAM 54 Mbps	See Note ^[1]	—	19	—	dBm
	HT20, MCS7		—	17	—	
	HT40, MCS7		—	16	—	
SP _{gain}	PA gain step	See Note ^[2]	—	0.5	—	dB
A _{pl}	Accuracy of power leveling loop	See Notes ^{[3][4]}	—	±0.5	—	dB
Z _{RFout_load}	Recommend differential PA load impedance	See Note ^[5]	—	12+j13	—	Ω
OP1dB	Output P1dB (max. gain)	2.442 GHz	—	21	—	dBm
OIP3	Output third order intercept point (max. gain)	2.442 GHz	—	31	—	dBm
SS	Sideband suppression	—	—	-37	—	dBc
RS	Synthesizer reference spur	—	—	-62	—	dBc
TT _{powup}	Time for power up (from synthesizer on)	—	—	1.5	—	μs

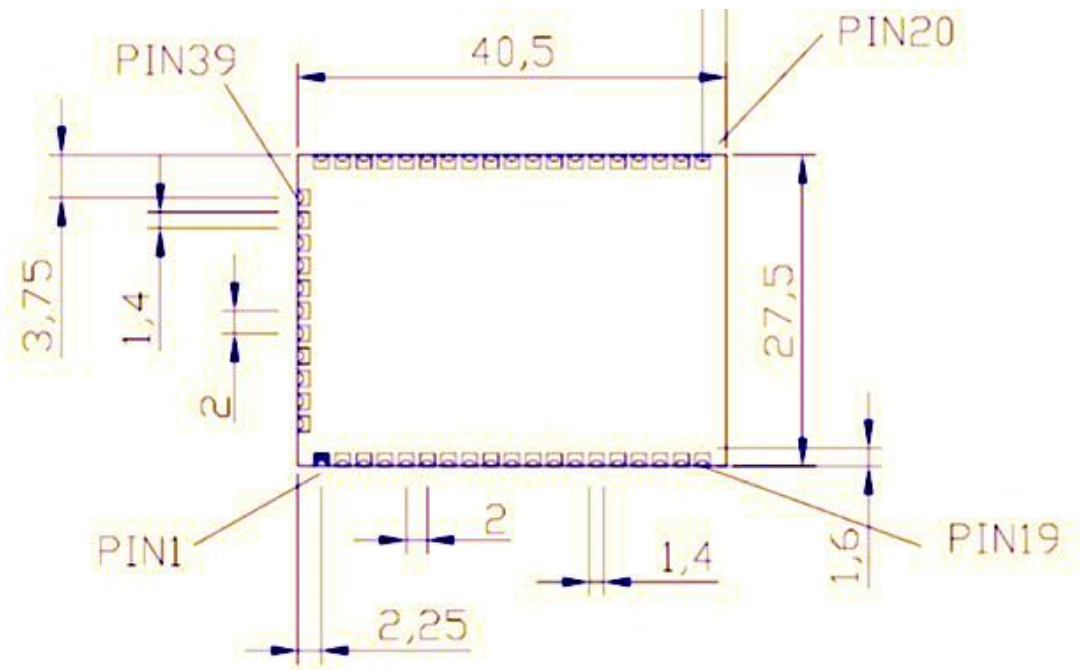
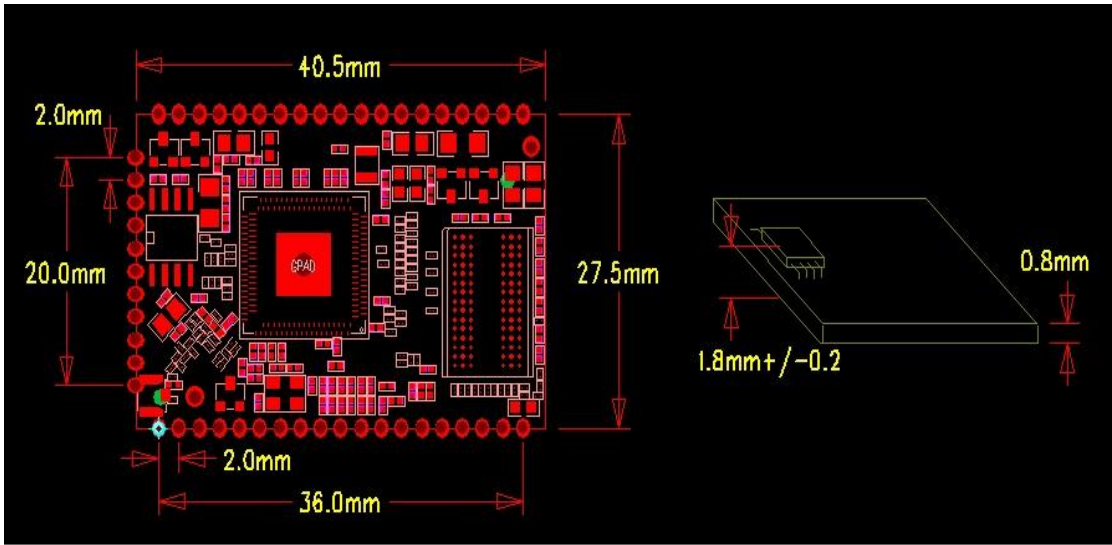
Pin Description

Pin No.	Name	Description
1/3/18/19/36/40	GND	GROUND
2	ANTENNA	Customer can select connection point, top or side
4	SPI_MOSI	SPI serial interface
5	SPI_CLK	SPI serial interface
6	SPI_MISO	SPI serial interface
7	RESET_CONFIG	resets the firmware to its default configuration when pushed
8	LED6	WLAN LED
9	LED5	LAN_PORT3_LED
10	LED4	LAN_PORT2_LED
11	LED3	LAN_PORT1_LED
12	GPIO_22	KEY_INPUT
13	GPIO_23	KEY_INPUT
14	LED2	LAN_PORT0_LED
15	LED0	Wireless LED
16	UART_RX (SPI_CS1)	Serial data in
17	UART_TX (SPI_CS2)	Serial data out
20	WAN_PORT_RX+	Ethernet port
21	WAN_PORT_RX-	Ethernet port
22	WAN_PORT_TX+	Ethernet port
23	WAN_PORT_TX-	Ethernet port
24	LAN_PORT3_TX+	Ethernet port
25	LAN_PORT3_TX-	Ethernet port
26	LAN_PORT3_RX+	Ethernet port
27	LAN_PORT3_RX-	Ethernet port
28	LAN_PORT2_RX+	Ethernet port
29	LAN_PORT2_RX-	Ethernet port
30	LAN_PORT2_TX+	Ethernet port
31	LAN_PORT2_TX-	Ethernet port
32	LAN_PORT1_TX+	Ethernet port
33	LAN_PORT1_TX-	Ethernet port
34	LAN_PORT1_RX+	Ethernet port
35	LAN_PORT1_RX-	Ethernet port
37/38	VDD_3.3V	3.3V input 1000mA
39	VDD_2.0V OUTPUT	Power supply output for peripheral network transformer
41	LAN_PORT0_RX+	Ethernet port
42	LAN_PORT0_RX-	Ethernet port
43	LAN_PORT0_TX+	Ethernet port
44	LAN_PORT0_TX-	Ethernet port
45	USB -	USB signal, carries USB data to and from the USB 2.0 PHY
46	USB +	USB signal, carries USB data to and from the USB 2.0 PHY
47	LED8	JUMP START LED
48	JUMPSTART UART_RTS)	KEY_INPUT

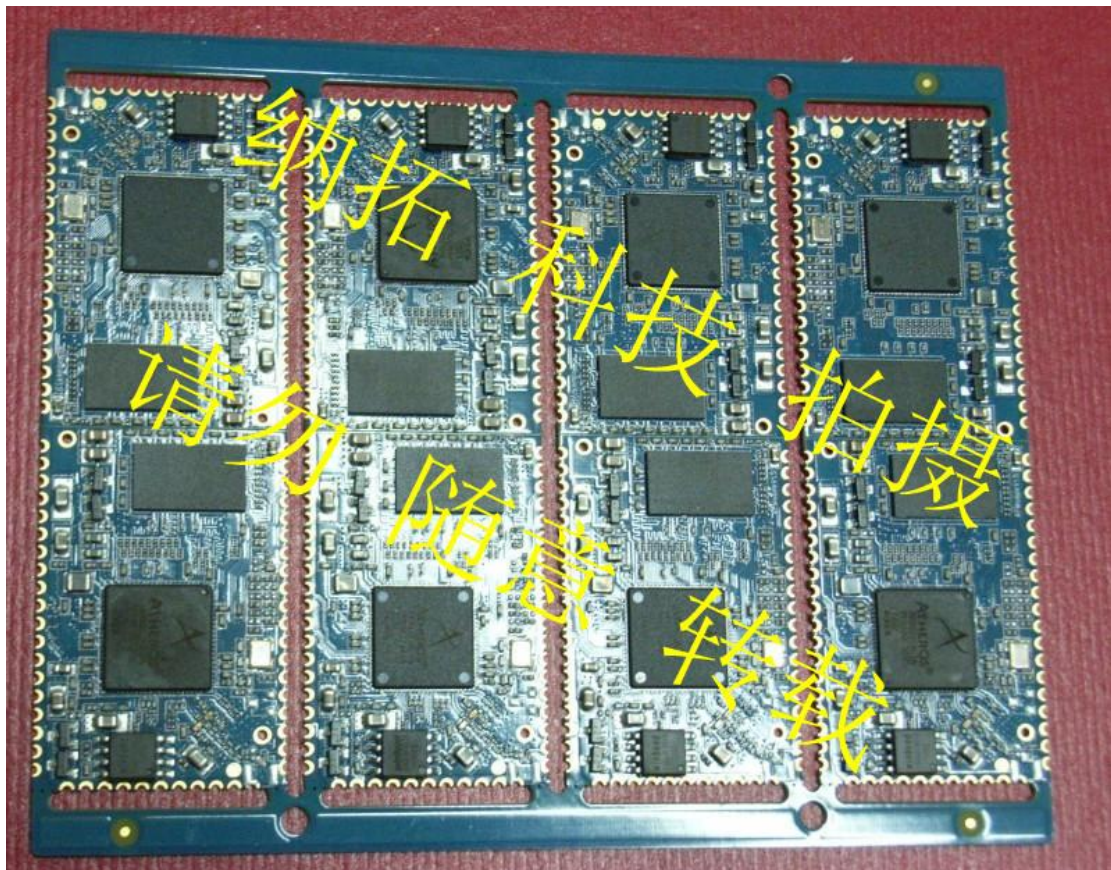
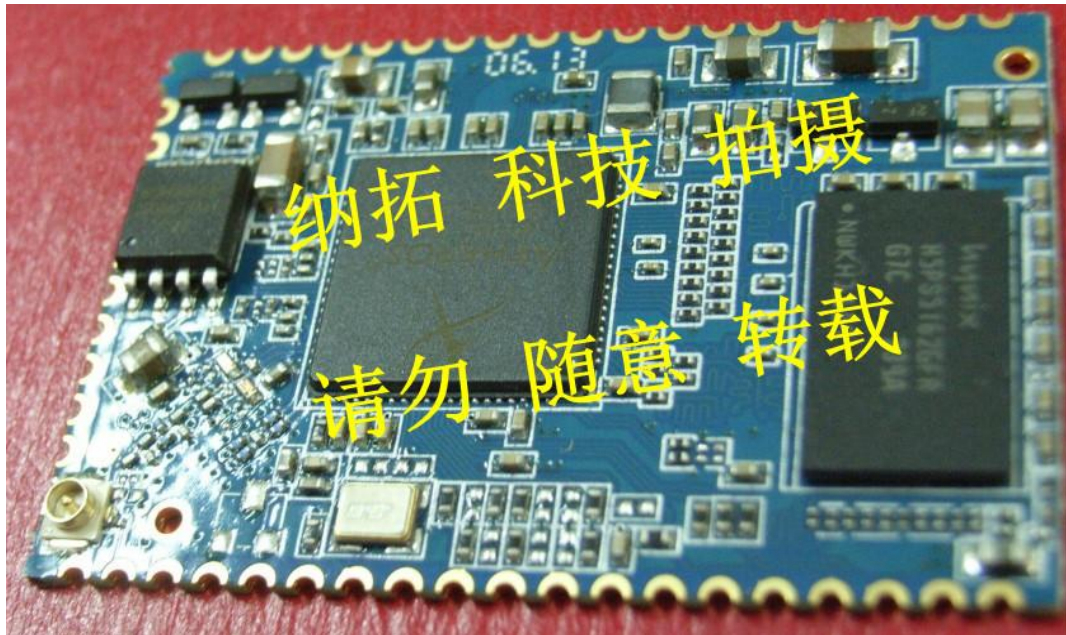
Mechanical

Dimensions (mm)	Length	Width	Height
	40.5	27.5	1.8
	(Tolerance:±0.2mm)	(Tolerance:±0.2mm)	(Tolerance:±0.2mm)

Dimensions and Footprint



Module Physical Picture



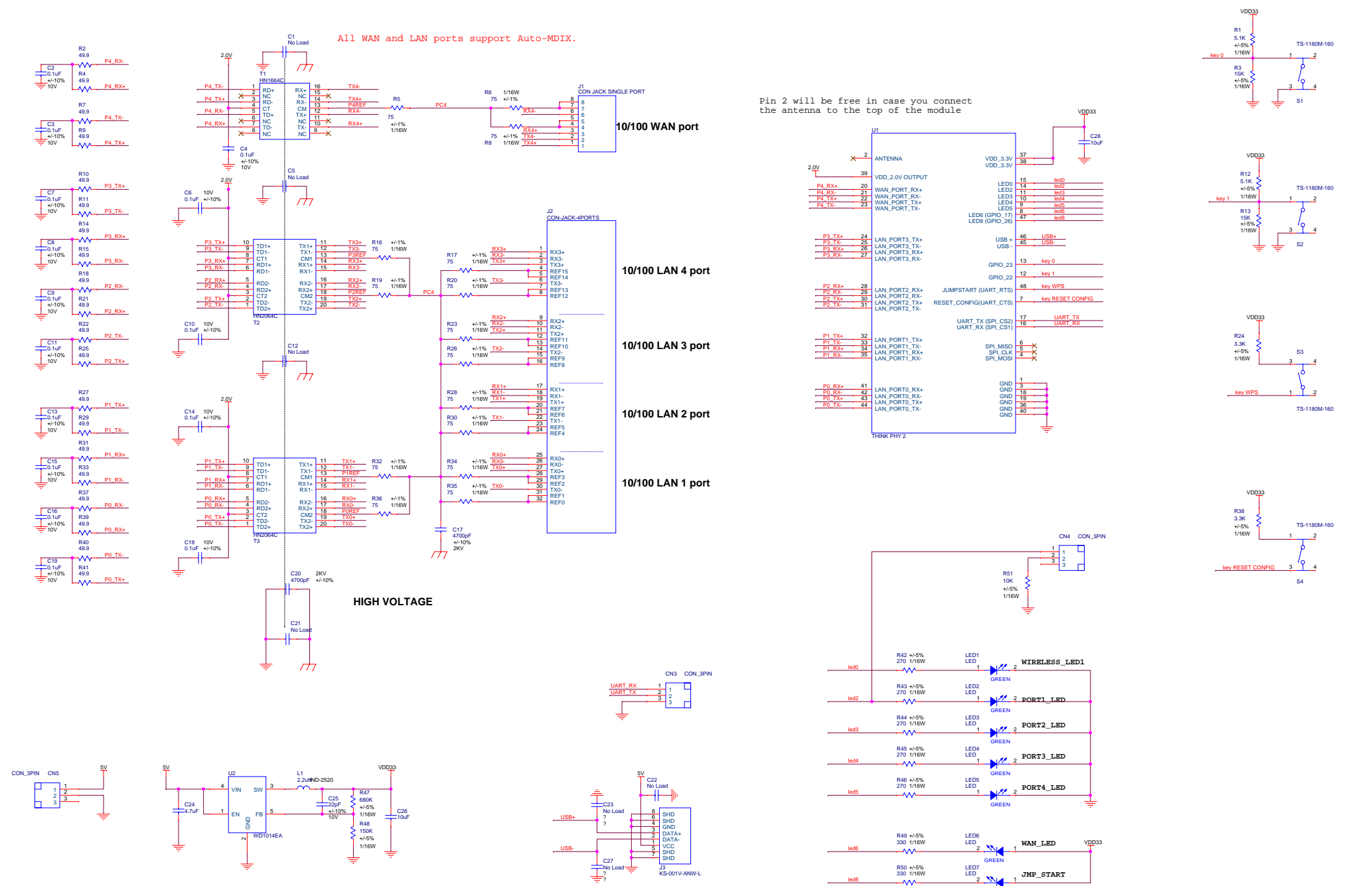
Packaging Appearance Picture



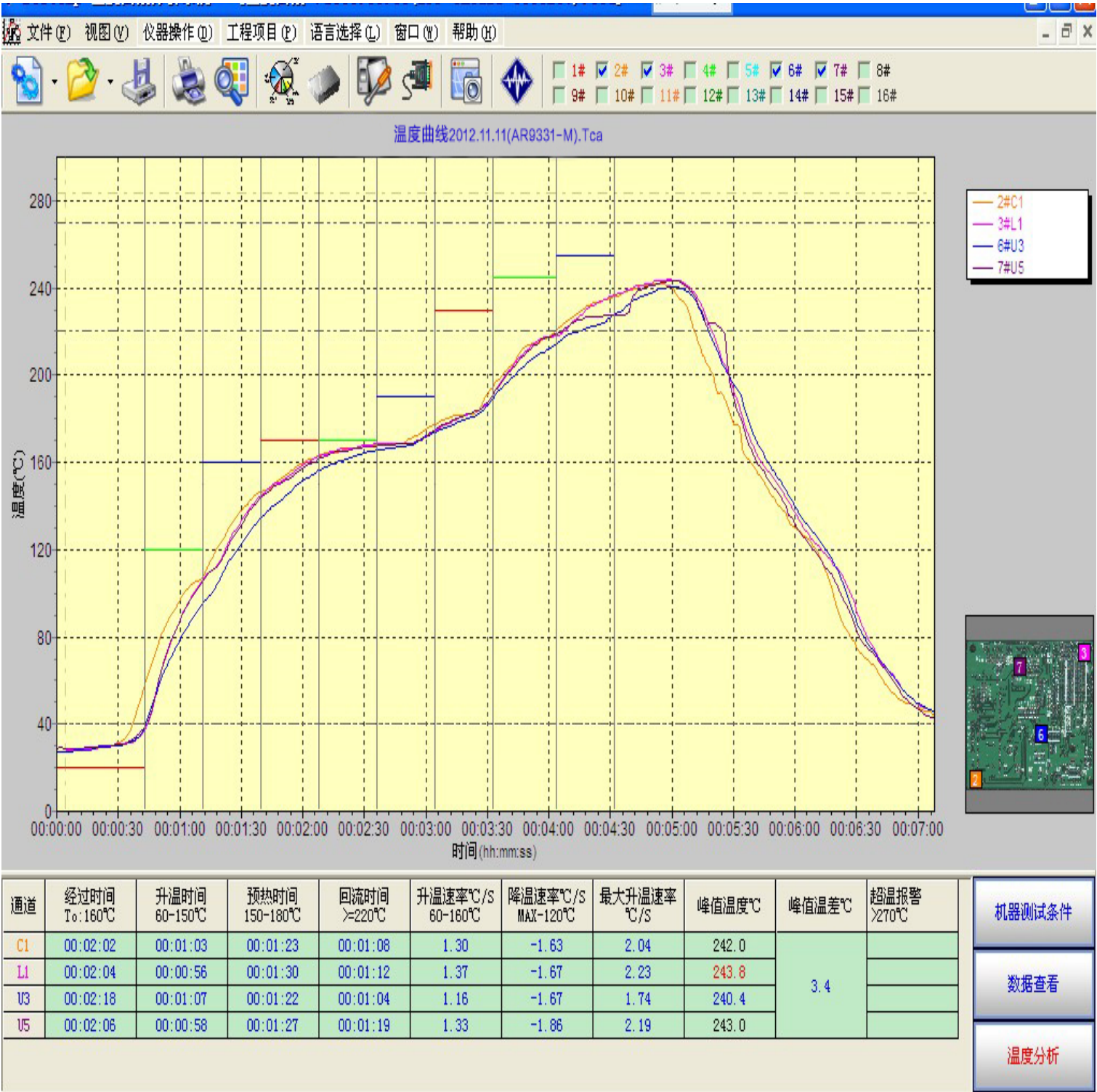
Module Reference Main Board



Development Board Circuit



The Module Making temperature curve



Environmental Requirements and Specifications TP Content

1 Temperature

1.1 Operating Temperature Conditions

The product shall be capable of continuous reliable operation when operating in ambient temperature of -10°C to +70°C.

1.2 Non-Operating Temperature Conditions

Neither subassemblies shall be damaged nor shall the operational performance be degraded when restored to the operating temperature when exposed to storage temperature in the range of -45°C to +135°C.

2 PCB Bending

The PCB bending spec shall be keep planeness under 0.1mm for both NATER and end assembly customer.

3 Handling environment

3.1. ESD

Symbol	Ratings	Max	Unit
V_{ESD} (HBM)	Electrostatic discharge voltage (human body model)	2000	V
V_{ESD} (CDM)	Electrostatic discharge voltage (charge device model)	500	

Please handle it under ESD protection environment.

3.2. Terminals

The product is mounted with motherboard through half hole. In order to prevent poor soldering, please do not touch the pad by hand.

3.3. Falling

It will cause damage on the mounted components when the product is falling or receiving drop shock. It may cause the product mal-function.

4 Storage Condition

4.1 Moisture barrier bag before opened

Moisture barrier bag must be stored under 30 degree C, humidity under 85% RH. The calculated shelf life for the dry packed product shall be a 12 months from the bag seal date.

4.2. Moisture barrier bag open

Humidity indicator cards must be blue, <30%.

5 Baking Condition

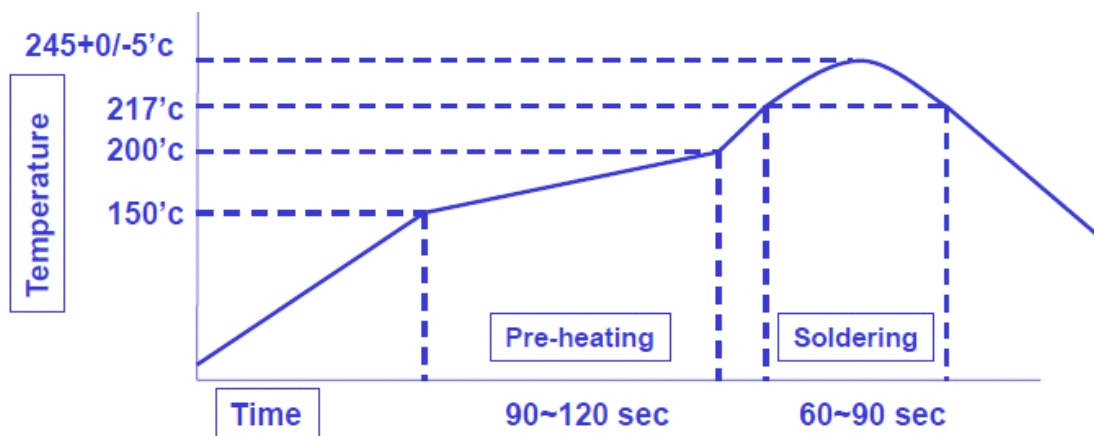
Products require baking before mounting if

- a) humidity indicator cards reads >30%
- b) temp <30 degree C, humidity < 70% RH, over 96 hours

Baking condition: 90 degree C, 12-24 hours

Baking times: 1 time

6 Soldering and reflow condition



- ◆ Follow the solder paste composition to set the reflow profile
- ◆ Lead free solder paste(SAC305, SAC387 or SAC405) reflow profile setting as above :
 - Ramp up rate (to Peak temp) : < 1.2°C/sec, typically
 - Time above Liquidus(217°C) : 60~90Sec
 - Peak Temp : 245±0/-5°C
 - Ramp-down rate (Peak to RT) : 1~3°C/sec, typically