

# Product Specification

## GW10 WIFI Module

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## Version Record

Document version	Recorder	Lead Reviewer	Approver	Update Date	Remark
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# 1 Product Introduction

GW10 is a WIFI module developed by GUQIAO Information Technology Co., Ltd.. The module adopts Espressif's ESP8266EX platform.

The module is integrated with antenna switch, RF BALUN, power amplifier, low noise receiver amplifier, filter, power management module, 16Mbit (expandable to 32Mbit) SPI Flash, 400Kbit RAM, etc.. The RF baseband integration design has the feature of high integration but low cost.

The GW10 module is a SMD component with dimension of only 20mm\*18mm\*3.0mm and a total of 18 pins, which can be embedded in various product applications through solder pads for secondary development. The product has good compatibility and rich peripheral interface, which has obvious advantages compared with other similar products.

The GW10 module is a basic module for data communication mainly for IOT field. It can provide good communication with stable performance and extensive coverage. The application scenario is wide, and the communication service can be well supported as long as the WIFI signal is covered.

## 1.1 Product Structure Introduction

Figure 1 shows the functional block diagram of GW10 module

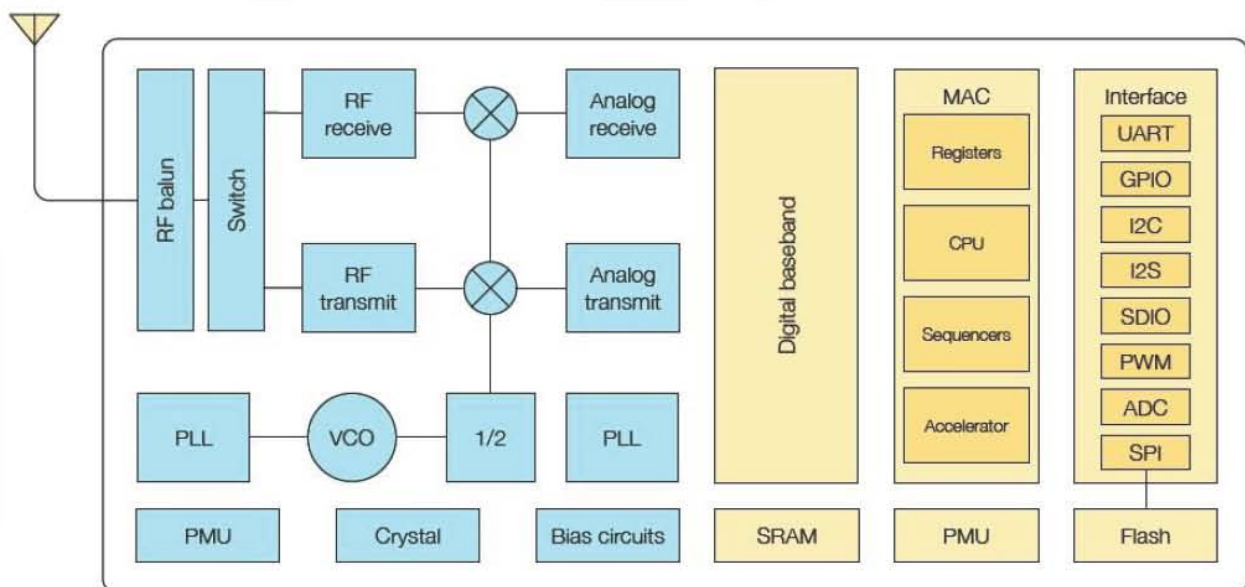


Figure 1 Functional Block Diagram

## 1.2 Main Performance Description

Item	Description
Power supply	VBAT connected to external power, voltage range 2.5~3.6V, typical value 3.3V
Frequency band	802.11 b/g/n
Power consumption	Average module operating current is about 80mA in operating mode
Temperature	Module operating temperature: -40° C~125° C
Antenna	PCB Antenna

Table 2 Performance Summary

## 1.3 External Interface Summary

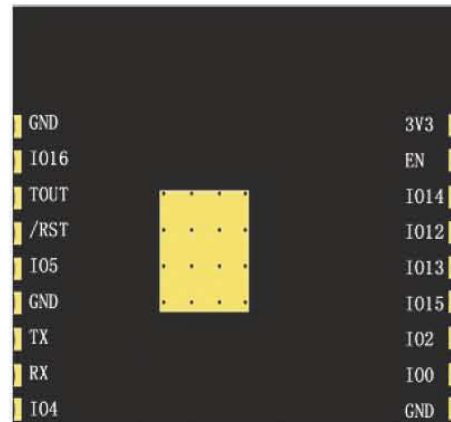
VDD	Standard 3.3V, input, recommended current 500mA
I/O	9-way, can be used to control peripherals
RESET	External reset circuit, default high level, low level effective
UART	Used for debugging and software downloading
EN	Enable, external need to be pulled up for normal operation

Table 3 Summary of external interfaces



#### 1.4 Module pin introduction

The following figure shows the exterior information description of the module, and the overall size is 20 mm x 18 mm x 3.0 mm, LCC package. There are total 18 pins. The dimension of the appearance and pin distribution are shown as below.



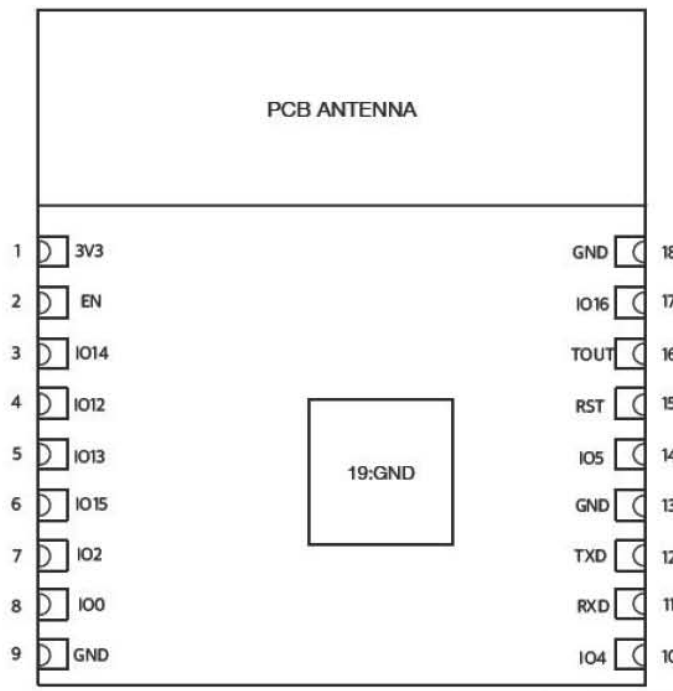


Figure 2 (TOP view)

## 2 Detailed description of module pin

### 2.1 Port status description

Shown in Table 4 as below.

Type	Description
DI	Digital Input
DO	Digital Output
PI	Power Input
PO	Power Output
AI	Analog Input
AO	Analog Output
OD	Open Drain

Table 4

## 2.2 Interfaces of the module

Shown in Table 5 as below.

Item	Pin Name	Function Description
1	3V3	Power supply(VDD) 3.3V <b>State:</b> The max output current of the external power supply is recommended to be 500mA and above.
2	EN	Enable, external need to be pulled up for normal operation
3	IO14	GPIO14, HSPI_CLK
4	IO12	GPIO12, HSPI_MISO
5	IO13	GPIO13, HSPI_MOSI, UART0_CTS
6	IO15	GPIO15, MTDO, HSPICS, UART0_RTS External need to be pulled down
7	IO2	GPIO2, UART1_TXD Floating (internal pull-up) or external pull-up
8	IO0	GPIO0 <ul style="list-style-type: none"> <li>• UART download: External pull-down</li> <li>• Flash start: Floating or external pull-up</li> </ul>
9	GND	Ground
10	IO4	GPIO4
11	RXD	UART0_RXD, UART download Receiver GPIO3
12	TXD	UART0_TXD, UART download Transmitter, floating or external pull-up. GPIO1
13	GND	Ground
14	IO5	GPIO5
15	RST	Reset
16	TOUT	Detect the chip VDD3P3 power supply voltage or TOUT input voltage (the two cannot be used at the same time)
17	IO16	GPIO16 A deep-sleep wake-up call can be made when connected to the RST
18	GND	Ground

Table 5



### 2.3 Reset and ADC detection pin description

As below shown in Table 6

Pin Name	Pin Number	I/O Type	Description	DC Feature	Remark
RESET	15	DI	Reset Module	RPU $\approx$ 78k $\Omega$ VIH max=3.3V Internal pull-up. VIH min=2.1V Low level valid. VIL max=0.6V	Low level active, and level active time is better than 100 $\mu$ s .

Table 6

The peripheral circuit design of the reset pin for reference is shown in Figure 3 as below.

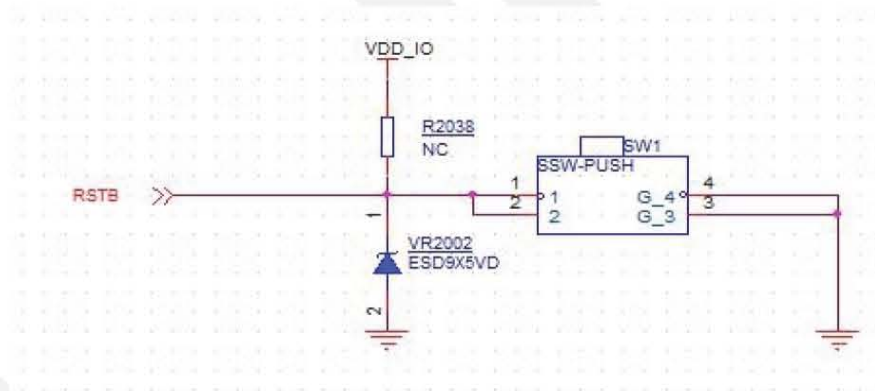


Figure 3 Reset circuit design for reference

### 2.4 Main serial port pin description

As shown in Table 7 as below, the power voltage domain is 3.0V , which can be floated when not used.

Pin Name	Pin Number	I/O Type	Electrical properties
MAIN_UART_RX	11	DI	V <sub>IL</sub> max=0.6V V <sub>IH</sub> min=2.1V V <sub>IH</sub> max=3.3V
MAIN_UART_TX	12	DO	V <sub>OL</sub> max=0.3V V <sub>OH</sub> min=2.4V

Table 7

## 2.5 The unified description of the Module interfaces

Interface Name	Pin Name	Function Description
HSPI Interface	IO12(MISO), IO13(MOSI), IO14 (CLK), IO15 (CS)	External connection available with SPI Flash, display and MCU, etc.
PWM Interface	IO12(R), IO15(G), IO13(B)	The Demo provide 4 channels of PWM (user can expand to 8 channels), which can be used to control color lights, buzzers, relays and motors, etc.
IR Interface	IO14 (IR_T), IO5 (IR_R)	The IR remote control interface is implemented by software, using NEC coding and modulation & demodulation with a 38 kHz modulated carrier.
ADC Interface	TOUT	The ADC interface can be used to detect the VDD3P3 (Pin3,Pin4) power supply voltage and the TOUT (Pin6) input voltage (the two cannot be used simultaneously). Can be used for applications such as sensors.
I2C Interface	IO14 (SCL), IO2 (SDA)	Can be connected to external sensors and displays, etc.
UART Interface	UART0: TXD(U0TXD), RXD (U0RXD), IO15 (RTS), IO13 (CTS) UART1: IO2 (TXD)	External connection available to the UART interface device. <b>Download:</b> U0TXD+U0RXD or GPIO2+U0RXD <b>Communication</b> (UART0): U0TXD, U0RXD, MTDO (U0RTS), MTCK (U0CTS) <b>Debug:</b> UART1-TXD (GPIO2) can be used as a printout of debug information. UART0 outputs some print information by default when the ESP8266EX is powered up. For this sensitive application, you can use the internal pin swap function of UART to swap U0TXD, U0RXD, with U0RTS, U0CTS respectively during initialization. The hardware connects MTDO MTCK to the serial port of the corresponding external MCU for communication.
I2S Interface	I2S Input: IO12 (I2SI_DATA); IO13 (I2SI_BCK); IO14 (I2SI_WS) I2S Output: IO15 (I2SO_BCK); IO3 (I2SO_DATA); IO2 (I2SO_WS)	Mainly used for audio acquisition, processing and transmission.

Figure 4 All IO interface descriptions

## 2.6 Electrical characteristics

As shown in the following figure.

Parameter	Name	Min	Typ	Max	Unit
Storage temperature	-	-40	Normal temperature	85	°C
Operating temperature	-	-40	20	85	°C
Maximum welding temperature (welding condition: IPC/JEDEC J-STD-020)	-	-	-	260	°C
Supply voltage	VDD	2.7	3.3	3.6	V
Low input logic level	V <sub>IL</sub>	-0.3	-	0.25 VDD	V
High input logic level	V <sub>IH</sub>	0.75 VDD	-	VDD + 0.3	V
Low output logic level	V <sub>OL</sub>	-	-	0.1 VDD	V
High output logic level	V <sub>OH</sub>	0.8 VDD	-	-	V

Figure 5 Electrical characteristics illustration diagram

## 2.7 Power Consumption Data

The power consumption data as below is based on a 3.3V supply with an ambient temperature of 25° C, and measured with the internal regulator.

All transmission data are based on a 50% duty cycle and measured in continuous emission mode.

Mode	Min	Typ	Max	Unit
Transmit 802.11b, CCK 11Mbps, POUT=+17 dBm	-	170	-	mA
Transmit 802.11g, OFDM 54Mbps, POUT=+15 dBm	-	140	-	mA
Transmit 802.11n, MCS7, POUT = +13 dBm	-	120	-	mA
Receive 802.11b, Packet length 1024 bytes, -80dBm	-	50	-	mA
Receive 802.11g, packet length 1024 bytes, -70dBm	-	56	-	mA
Receive 802.11n, packet length 1024 bytes, -65dBm	-	56	-	mA
Modem-sleep <sup>1</sup>	-	15	-	mA
Light-sleep <sup>2</sup>	-	0.9	-	mA
Deep-sleep <sup>3</sup>	-	20	-	μA
Power down	-	0.5	-	μA

Figure 6 Power Consumption Data

## 2.8 RF parameters

Parameter	Min	Typ	Max	Unit
Input Frequency	2412	-	2462	MHz
Input Reflection	-	-	-10	dB
<b>Output Power</b>				
Output power of PA at 72.2Mbps	13	14	15	dBm
Output power of PA in 11b mode	15.5	16	16.5	dBm
<b>Receiving Sensitivity</b>				
Parameter	Min	Typ	Max	Unit
DSSS, 1 Mbps	-	-98	-	dBm
CCK, 11 Mbps	-	-91	-	dBm
6Mbps (1/2 BPSK)	-	-93	-	dBm
54Mbps (3/4 64-QAM)	-	-75	-	dBm
HT20, MCS7 (65 Mbps, 72.2 Mbps)	-	-72	-	dBm
<b>Adjacent Frequency Suppression</b>				
OFDM,6 Mbps	-	37	-	dB
OFDM,54 Mbps	-	21	-	dB
HT20,MCS0	-	37	-	dB
HT20,MCS7	-	20	-	dB

Figure 7 RF parameters

## 3 Recommended pads and oven temperature curve

### 3.1 Recommended pad size

The module pad package design used on the end-product can be referred to the following Figure 8, besides, we have the recommended module PCB Package library, detailed information can be found in the file "GW10-PCBLib.pcb".



Figure 9 shows the module package size of GW10.

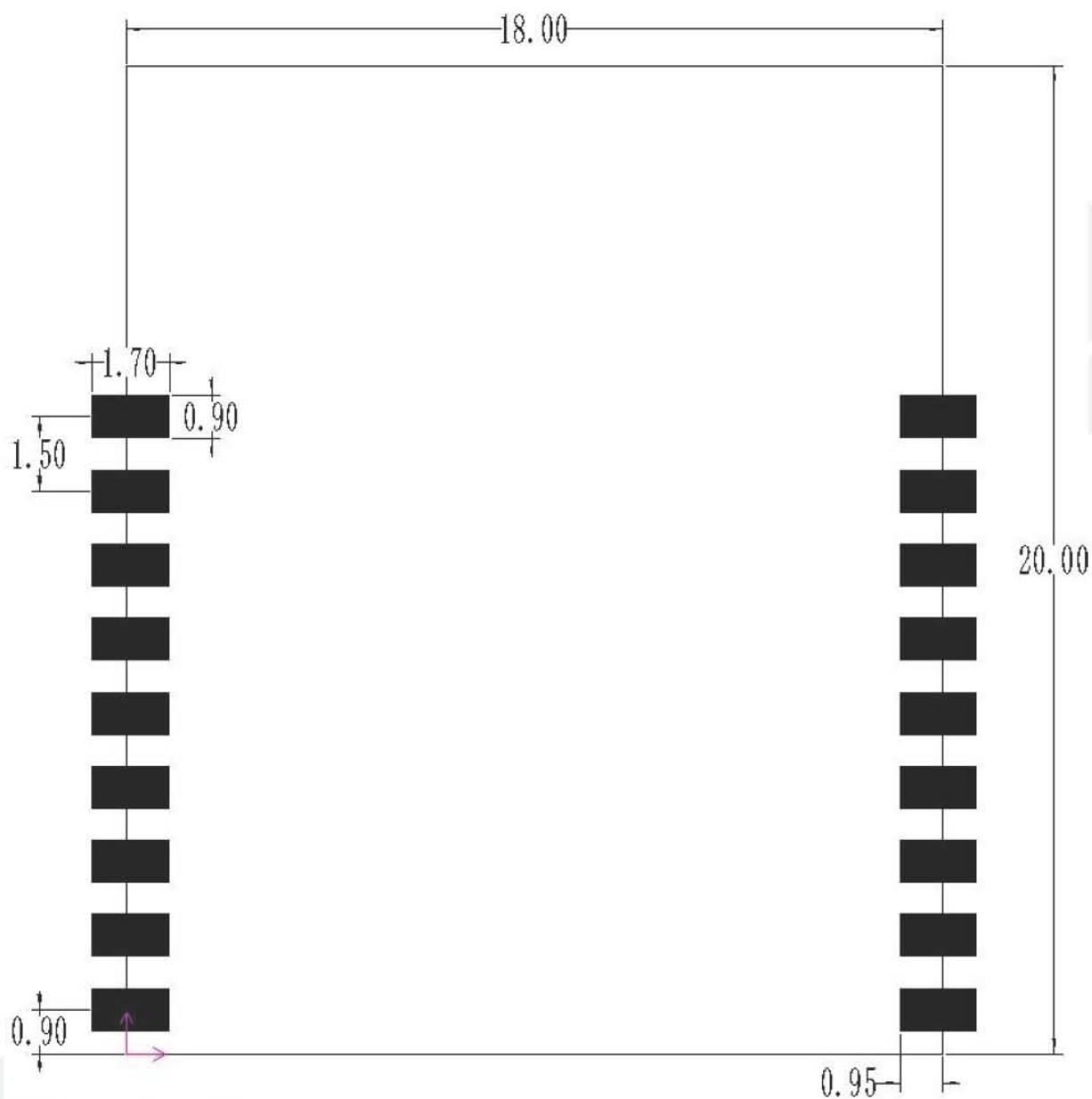


Figure 8 Module pad package size used on end-product (TOP side)



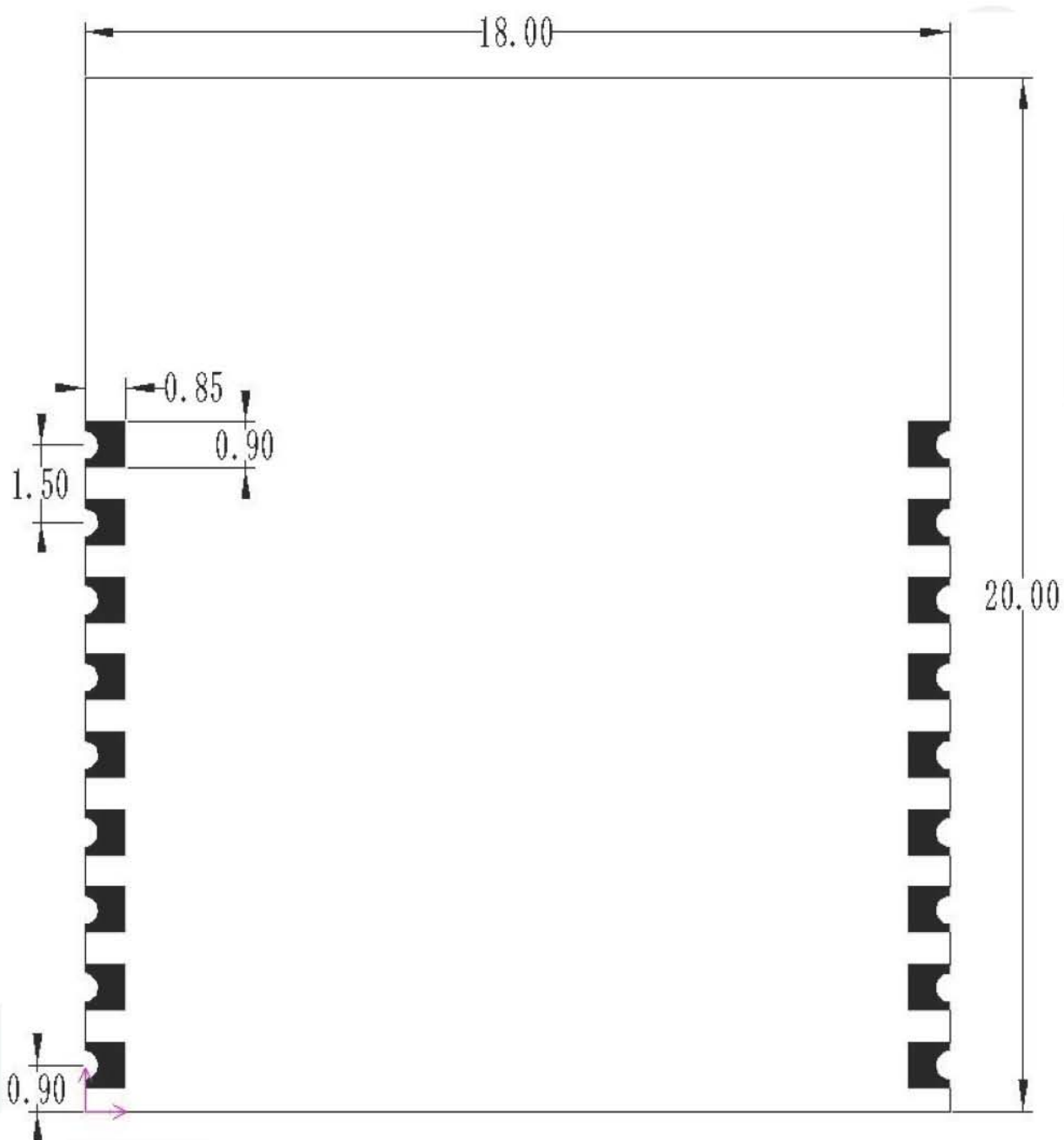


Fig. 9 Module package size used on end-product (BOTTOM side)

### 3.2 Recommended Furnace Temperature Curve

As below shown in Figure 10.

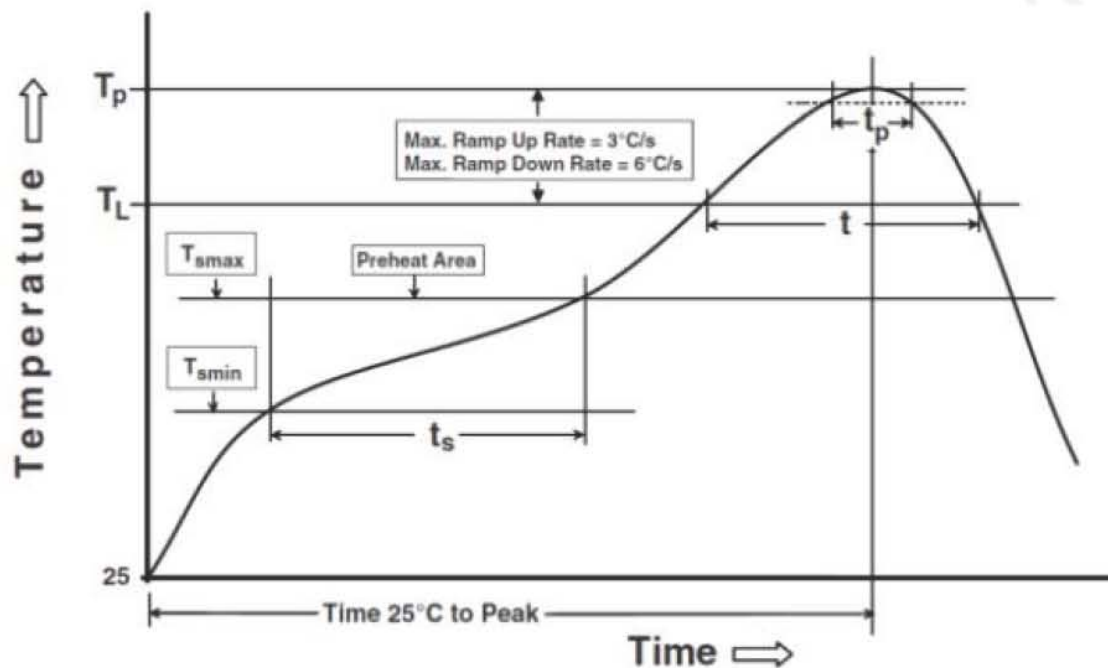


Figure 10 Furnace temperature curve

The corresponding furnace temperature setting parameters are shown in Figure 11 as below.

Item	Min	Typ	Max	Unit
Preheat/Soak:				
Temperature minimum ( $T_{smin}$ )	150			°C
Temperature maximum ( $T_{smax}$ )			200	°C
Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60		120	sec.
Ramp Up Rate ( $T_L$ to $T_p$ )			3	°C/sec
Liquidous Temperature ( $T_L$ )		217		°C
Time ( $t_L$ ) maintained above $T_L$	60		150	sec
Peak package body temperature ( $T_p$ )			260	°C
Time ( $t_p$ ) within 5°C of actual peak temperature			30	sec
Ramp Down Rate ( $T_p$ to $T_L$ )			6	°C/sec
Time 25°C to peak temperature			8	min

Figure 11 furnace temperature parameters

## 4 Packing and transportation



Fig. 12 Vacuum packaging in blister box

### Packing schematic



Fig. 13 Packing schematic

## 5 After-sale service

### 5.1 Warranty period

Within 18 months from the shipping date, our company is responsible for free repair or replacement if there is any quality issue under the condition that the user complies with the requirements of the operation instruction.

After 18 months, the company guarantees to provide after-sales service.

### 5.2 Contact us

If you have any question about this manual, or have problems & requirements during the application, and need related technical support, you can contact us through the following ways. We will timely respond and provide the solutions accordingly.

Address: Wisdom Island Building, No. 6 Zhongdao East Road, Zhengdong New District, Zhengzhou City, Henan Province, China

Postal code: 450000

### 5.3 Statements

The contents of this manual may be updated due to design improvements, and we reserve the right to modify these instructions without prior notice.

**RF exposure considerations**

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

**Label and compliance information**

Remind end customers to FCC ID label on the final system must be labeled with “Contains FCC ID: 2BAIA-GW10” or “Contains transmitter module FCC ID: 2BAIA-GW10” .

**Information on test modes and additional testing requirements**

Contact Guqiao Information Technology(Zhengzhou)Co.,Ltd. will provide stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

**Additional testing, Part 15 Subpart B disclaimer**

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier’s Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, Guqiao Information Technology(Zhengzhou)Co.,Ltd. shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

**FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

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 separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

**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 product 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 product 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 product 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.

**NOTE 3:** Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

**NOTE 4:** The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.

**NOTE 5:** For all products market in US, OEM has to limit the operation channels to CH1 to CH11 for 802.11b/g/n-HT20 by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.