User Manual

WIFI Module

Model: G7682

Edition：V1.0

Shanghai RinLink Intelligent Technology Co., Ltd.

■

File name：	G7682 User Manual
Edition：	V1.0
Date ：	2017-9-20

■ Overview

G7682 is a WIFI module. This document provides the users the guidance of designing the hardware of the module, as well as designing various terminal wireless products more conveniently and quickly on the basis of the module, by introducing G7682 V1.0 module and its hardware interface specification, electrical characteristics and mechanical specification products.

■ Reading object

This document applies to the following engineers:

- ✧ System Design Engineer
- ✧ Manufacture design Engineer
- ✧ Hardware engineer
- ✧ Software engineer
- ✧ Test Engineer

Contents

Version history

Date	Version	Change description	Author
2017-09-20	1.0	First	Qingsheng Yu

1. Product definition

1.1. Overview

G7682, is based on MT7682 scheme design, mainly providing the customer with the related peripheral circuit reference design. MT7682 sets ARM-Cortex M4 WLAN MAC/BB/RF in one body. Integrated 1MB Flash memory WiFi supports 802.11b / g / n standard and UART, I2C, SPI, I2S, PWM Peripheral interfaces such as SDIO and ADC

1.2. Major characteristics

This module contains the following hardware resources:

- UART X3
- SDIO X1
- I2C X1
- I2S X1
- PWM X5
- GPIO X14
- 12bit ADC X1
- WiFi

  With 20MHz bandwidth, the maximum transmission rate is 72.2 Mbps.

  With 40MHz bandwidth, the maximum transmission rate is 150 Mbps.

  Supports 802.11b / g / n and is compatible with WLAN

  Support wireless work in the STA / AP / AP+STA mode

  For IoT optimization of TCP/IP protocol stack

  Support UDP/ PPP / HTTP/ SSL

  Support Smart Link intelligent terminal configuration application

  Support WEP/WPA2/WPS

  Supporting UART/GPIO data Communication Interface

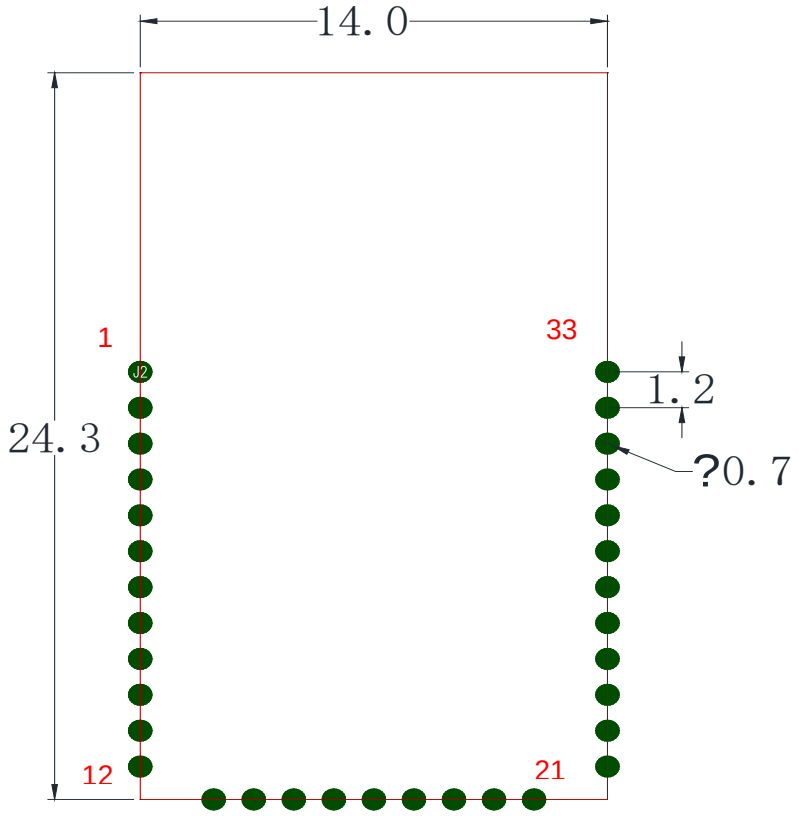
The application areas are as follows:

- Intelligent Home / Home Appliance
- Instruments and meters
- Medical care
- Industrial automation
- Intelligent security
- Smart Energy

2. Function and Application

2.1. Module appearance and pin distribution diagram

Modular Stamp Hole package Design is convenient for customers to debug, easy to disassemble and assemble, and provides the customers with a variety of options. Resistance soldering window and pad size is the same.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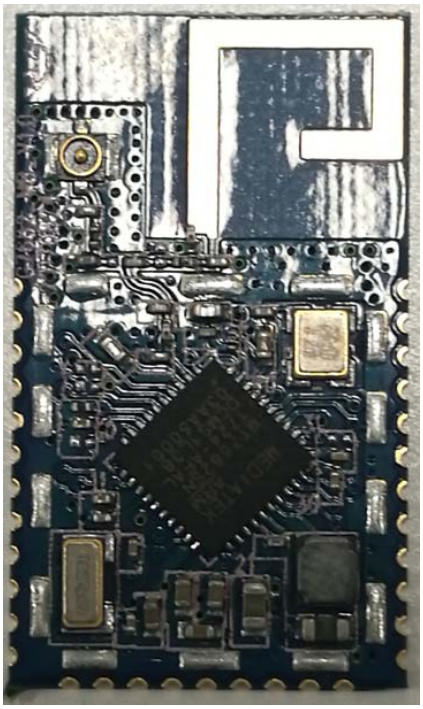


2.2. Pin definition

PIN NUM		Type	Function	Interrupt	Remarks
1	GPIO22	I/O	GPIO Software configurable		
2	GPIO21	I/O	GPIO Software configurable		
3	NC				
4	GPIO17	I/O	GPIO Software configurable		
5	GND	I/O			
6	GPIO16	I/O	GPIO Software configurable		
7	GPIO15	I/O	GPIO Software configurable		
8	GND	I			
9	GPIO14	I/O	GPIO Software configurable		
10	GPIO13	I/O	GPIO Software configurable	Y	
11	GPIO12	I/O	GPIO Software configurable		
12	GPIO11	I/O	GPIO Software configurable	Y	
13	RTC_INT		RTC Interrupt input		
14	EXT_PWR_EN				
15	VRTC				
16	CHIP_EN		Power Key	Y	
17	VDD		Power supply	Y	3.3V
18	VDD		Power supply		3.3V
19	VDD		Power supply		3.3V
20	NC			Y	
21	NC				
22	NC				
23	GND		GND		
24	NC				
25	NC				
26	NC				

27	NC				
28	GND		GND		
29	GPIO4		GPIO Software configurable		
30	GPIO2		GPIO Software configurable		
31	GPIO3		GPIO Software configurable		
32	GPIO1		GPIO Software configurable		
33	GPIO0		GPIO Software configurable		

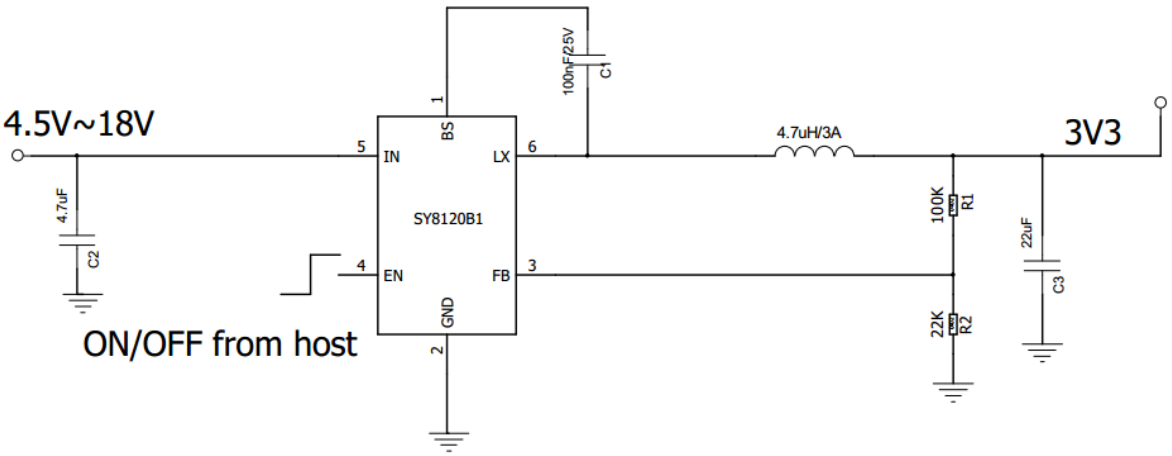
Note: the pin reuse list is shown in the appendix

2.3. Interface application

2.3.1 Power supply circuit

The module can adopt the following power supply mode:

- 3.3V unified power supply to internal circuits



2.3.2 Software download

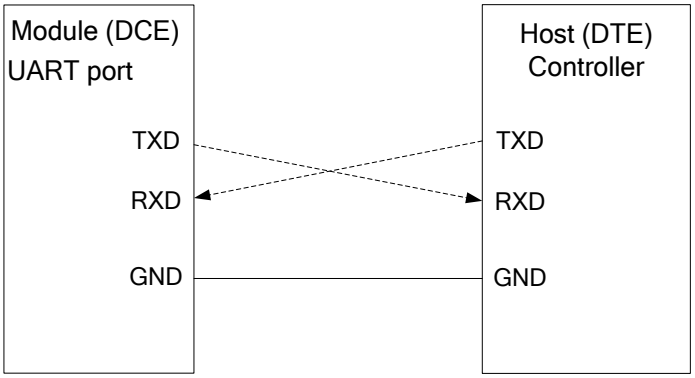
The module is downloaded by serial port UART mode, and the users can connect to UART0 with USB to serial port line, realizing the download of MT7682 software. The interface level of serial port is 3.3 V.

PIN		Typ	Function	Interface level	remarks
1	GPIO22	I/O	URXD0	3.3V	
2	GPIO21	I/O	UTXD0	3.3V	

2.3.3 Serial interface

The module provides three channels of UART interface for serial communication, in which UART0 is fixed for software download, while UART1, and UART2 can be used for communication.

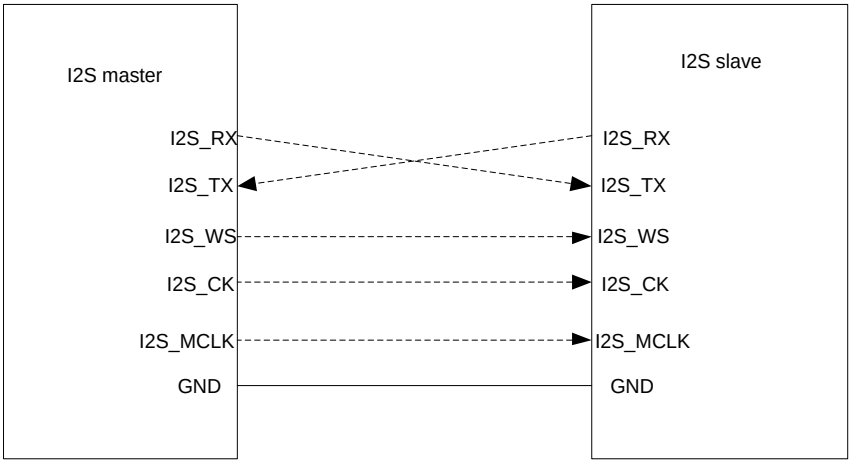
PIN		TYPE	FUNC	INTERFACE	REMARKS
1	GPIO22	I/O	URXD0	3.3V	For software download
2	GPIO21	I/O	UTXD0	3.3V	For software download
30	GPIO2	I/O	URXD1	3.3V	
31	GPIO3	I/O	UTXD1	3.3V	
12	GPIO11	I/O	URXD2	3.3V	
11	GPIO12	I/O	UTXD2	3.3V	



2.3.4 I2S

Module provides an I2S interface, which can be external to audio Codec in audio products.

PIN		TYP	FUNCTION	INTERFACE	REMARKS
33	GPIO0	I/O	I2S_RX	3.3V	
32	GPIO1	I/O	I2S_TX	3.3V	
30	GPIO2	I/O	I2S_WS	3.3V	
31	GPIO3	I/O	I2S_CK	3.3V	
29	GPIO4	I/O	I2S_MCLK	3.3V	

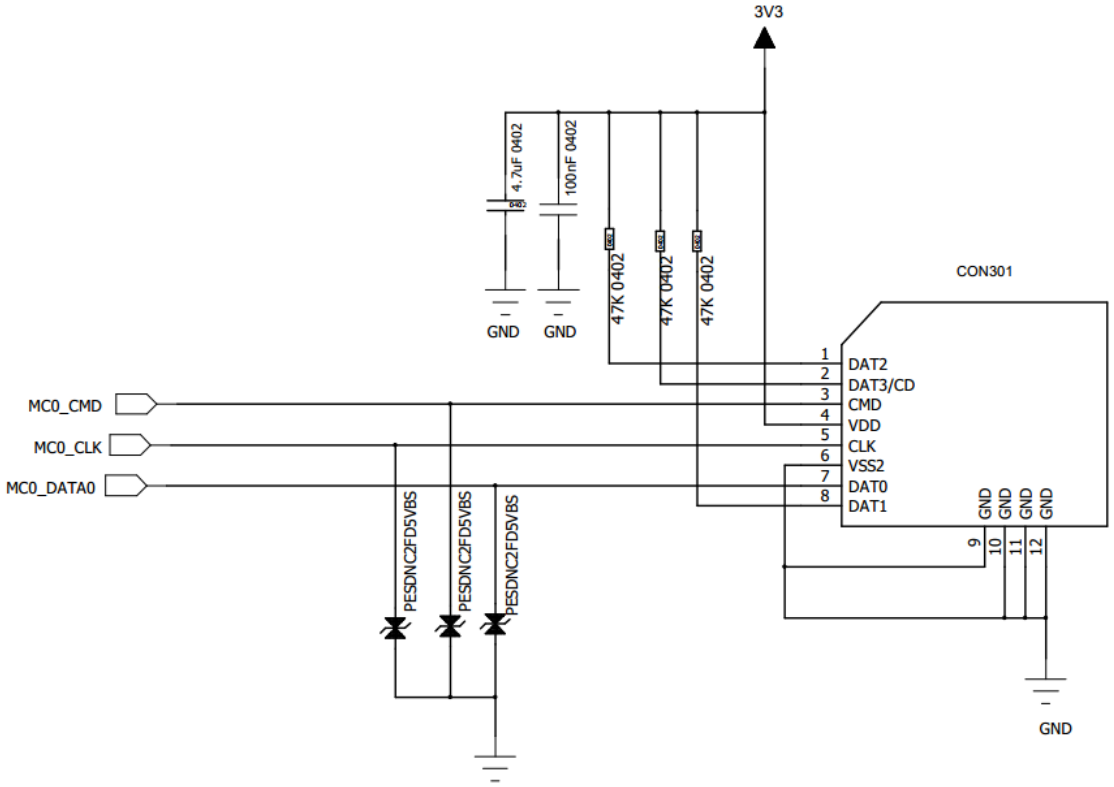


2.3.5 SDIO

Module provides a single SDIO interface for external SD cards

PIN		TYP	FUNCTI	INTERFACE	REMARKS
12	GPIO11	I/O	MC0_CLK	3.3V	
11	GPIO12	I/O	MC0_CMD	3.3V	
10	GPIO13	I/O	MC0_DATA0	3.3V	
9	GPIO14	I/O	MC0_DATA1	3.3V	
7	GPIO15	I/O	MC0_DATA2	3.3V	
6	GPIO16	I/O	MC0_DATA3	3.3V	

Note: users can only use GPIO 11 / GPIO 12 / GPIO 13 to connect SD card, and read and write SD card with single data line to reduce GPIO resources.



2.3.6 I2C

Module provides one I2C interface channel

PIN		TYPE	FUNCTIO	INTERFACE	REMARKS
33/7	GPIO0/ GPIO15	I/O	SCL1	3.3V	
32/6	GPIO1/GP IO16	I/O	SDA1	3.3V	

2.3.7 ADC

Module provides one ADC interface

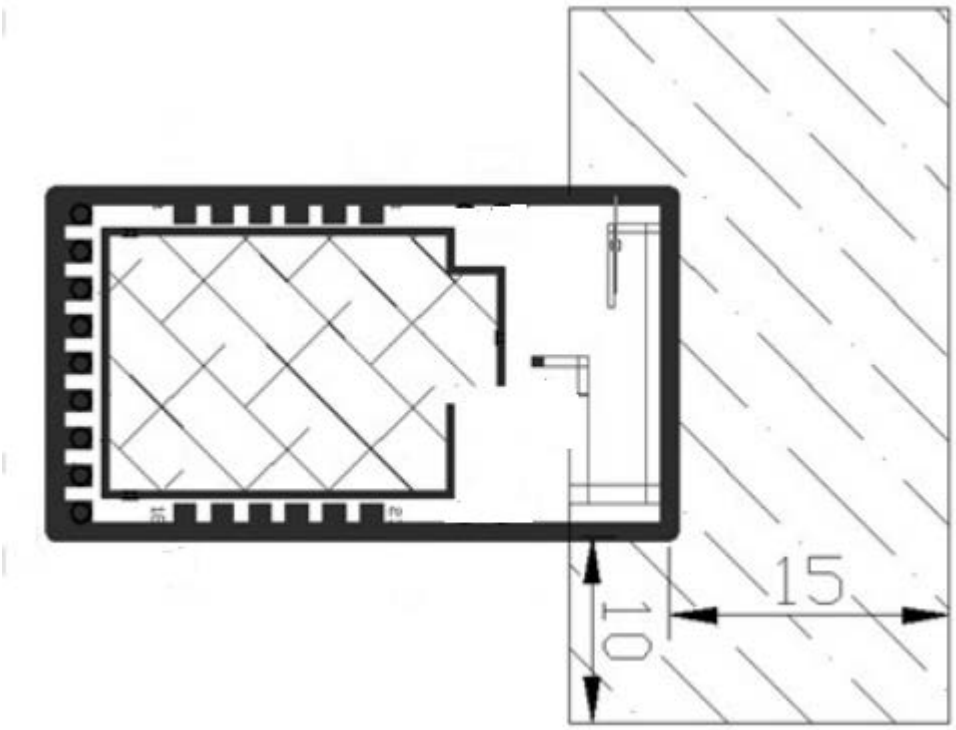
PIN		TYPE	FUNCTION	INTERFACE LEVEL	REMARKS
4	GPIO17	I/O	ADC0	3.3V	

3. Antenna (Default Antenna)

This module has its own antenna, PCB antenna clearance area.

It needs to ensure that the motherboard PCB and other metal devices should be at distance above 15mm, while using the PCB antenna on the WIFI module. Copper is forbidden in the shaded part below, where metal devices, sensors, and other sources of interference caused by signal interference materials should be away from. PCB module at the bottom of the antenna is suggested to be hollow.

It is recommended that the customer place the module in the following areas of the backboard to reduce the influence of metal devices on the PCB antenna and wireless signal.



It is recommended that customers place modules in the following areas of the bottom plate to reduce the impact of metal devices on PCB antennas and wireless signals.

3.1. Antenna Interface (Optional Antenna)

This module also reserve reverse antenna connector for user to use external optional antenna. It needs to confirm with the suppliers whether the antenna connector fits before selecting.

3.2. Radio frequency parameter

Project		Explain
Working frequency		2.412~2.462GHz
WiFi Wireless Standards		IEEE 802.11b/g/n
Rate of data transmission	20MHz	11b: 1,2,5.5 & 11Mbps 11g: 6,9,12,18,24,36,48,54Mbps 11n: MCS0~7,72.2Mbps
	40MHz	11n: MCS0~7,150Mbps
Antenna		PCB Antenna (default)

4. Electrical performance & Reliability

4.1. Absolute maximum

The following table shows the module digital, analog pin power supply voltage and current maximum tolerance.

Fig30：Absolute maximum

Parameter	Min	Max	Unit
VDD	-0.3	+3.6	V
VIN	-0.3	+3.6	V

4.2. Consumption current

MT7682 consumption current

Status	Current（3V3）	
Deep sleep	100uA	Low power consumption and GPIO wake-up wake-up timer
Sleep	25mA	Maintain connection but no data transfer
CPU only mode	40mA	CPU clock 166MHz UART / SPI / I2C available, Wi-Fi disabled
11n RX model	70mA	CPU clock 166MHz / UART / SPI / I2C is available, Wi-Fi works in 11n RX data receiving mode
11n TX transmission power @13dBm	300mA	CPU clock 166MHz , UART / SPI / I2C available , WiFi in 802.11n TX data transfer mode

4.3. Working temperature

The following table shows the working temperature of the module.

Fig31：Working temperature

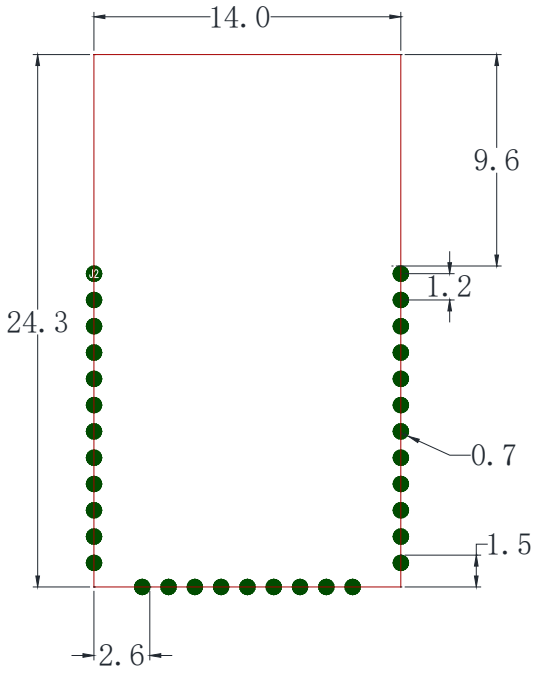
Parameter	**Min**	**Typical**	**Max**	**Unit**
Normal working temperature 1)	-35	+25	+80	℃
Extended temperature range 2)	-40		+85	℃

4.4. Electrostatic protection

In the module of application, because of the human body electrostatic, as well as the electrostatic charged friction between the microelectronic, through various channels to discharge module, it may cause some damage to the module, so ESD protection must be paid highly attention , whether in R & D, production and assembly, testing process, especially in product design, such as increasing the ESD protection during the circuit design in the interface or the place susceptible to ESD, as well as wearing anti-static gloves.

5. Dimension

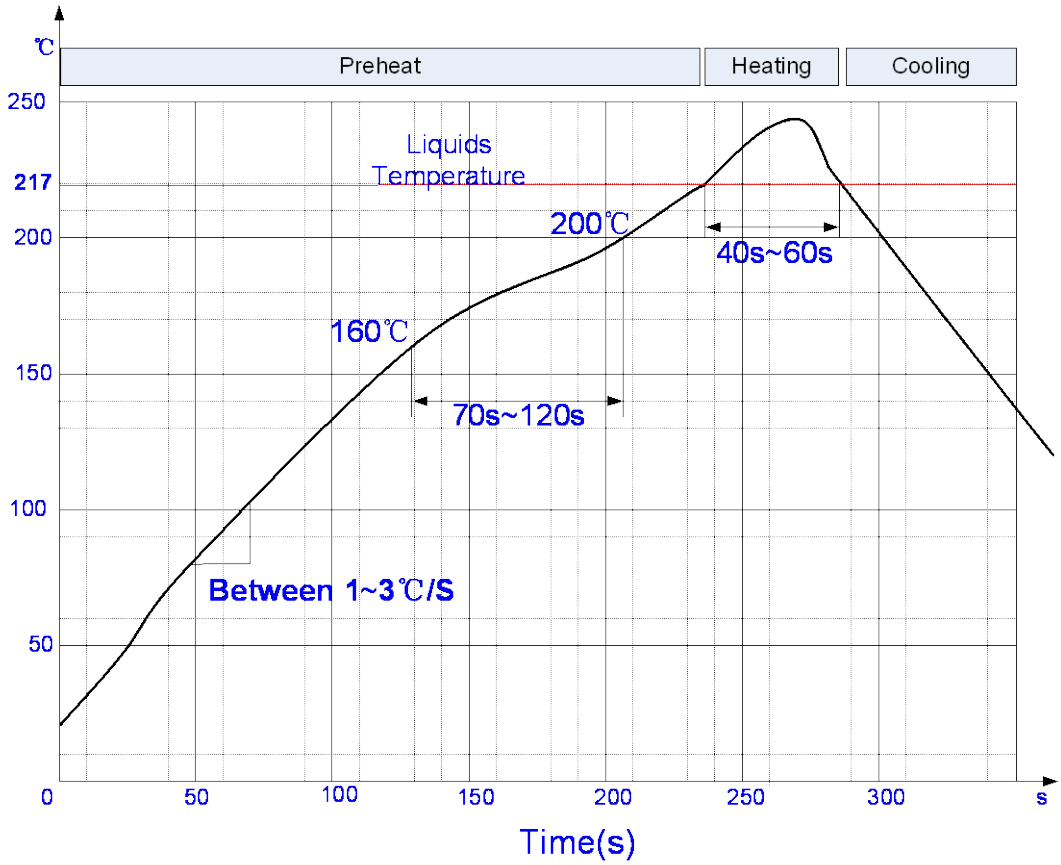
5.1. Module mechanical dimension



5.2. Production welding

The solder paste is printed on the screen plate by the printing scraper so that the solder paste can be printed on the PCB through the opening of the screen plate, the strength of the printing scraper shall be adjusted properly, and the thickness of the steel mesh corresponding to the pad part of the G7682 module shall be 0.2 mm in order to ensure the quality of the module printing paste.

It is suggested that the maximum reflux temperature range from 235 ° C to 245 C ~ (10) C SnAg3.0Cu0.5 alloy and the absolute maximum reflux temperature is 260 C. in order to avoid repeated thermal damage to the modules. It is recommended that the customer PCB board finish the reflow welding on the first side and then attach the remote module. The recommended furnace temperature curve is shown in the following figure:



Catalogue1：PIN reuse list

Ball Name	Aux Func.0	Aux Func.1	Aux Func.2	Aux Func.3	Aux Func.4	Aux Func.5	Aux Func.6	Aux Func.7	Aux Func.8	Aux Func.9	Aux Func.10
GPIO_0	GPIO0	EINT0		U1RTS	SCL1	I2S_RX	JTDI		WIFI_ANT_SEL0	BT_PRI1	PWM0
GPIO_1	GPIO1	EINT1		U1CTS	SDA1	I2S_TX	JTMS		WIFI_ANT_SEL1	BT_PRI3	PWM1
GPIO_2	GPIO2	EINT2		URXD1	PWM0	I2S_WS	JTCK	CLKO0		BT_PRI0	WIFI_ANT_SEL4
GPIO_3	GPIO3	EINT3		UTXD1	PWM1	I2S_CK	JTRST_B			WIFI_ANT_SEL2	I2S_CK
GPIO_4	GPIO4	SPISLV_A_SIO2	SPIMST_A_SIO2	EINT4		I2S_MCLK	JTDO			WIFI_ANT_SEL3	I2S_MCLK
GPIO_11	GPIO11	EINT11	PWM3	URXD2	MA_MC0_CK	SLV_MC0_CK	CLKO2			WIFI_ANT_SEL0	I2S_RX
GPIO_12	GPIO12	SPISLV_B_SIO3	SPIMST_B_SIO3	UTXD2	MA_MC0_CM0	SLV_MC0_CM0	EINT12			WIFI_ANT_SEL1	I2S_TX
GPIO_13	GPIO13	SPISLV_B_SIO2	SPIMST_B_SIO2	U2RTS	MA_MC0_DA0	SLV_MC0_DA0	CLKO4		EINT13		I2S_WS
GPIO_14	GPIO14	SPISLV_B_SIO1	SPIMST_B_SIO1	TDM_RX	MA_MC0_DA1	SLV_MC0_DA1	PWM4		EINT14		CLKO4
GPIO_15	GPIO15	SPISLV_B_SIO0	SPIMST_B_SIO0	TDM_TX	MA_MC0_DA2	SLV_MC0_DA2	SCL1		EINT15		PWM3
GPIO_16	GPIO16	SPISLV_B_SCK	SPIMST_B_SCK	TDM_WS	MA_MC0_DA3	SLV_MC0_DA3	SDA1		EINT16		
GPIO_17	GPIO17	SPISLV_B_CS	SPIMST_B_CS	TDM_CK	PWM5	CLKO3	AUXADC0		EINT17		BT_PRI0
GPIO_21	GPIO21	URXD0	EINT19	SCL1		PWM5					
GPIO_22	GPIO22	UTXD0	EINT20								

Catalogue2：Boot mode selection

Mode Selection	Pin name	Description	Trapping condition
DCXO source frequency select	GPIO_17	GND : XO input is 26MHz (default) DVDD_IO_0 : XO input is 40MHz	Power-on reset
32kHz clock source select	GPIO_14	GND : 32kHz source is from external DVDD_IO_0 : 32kHz source is from internal (divided from 26/40MHz clock) (default)	Power-on reset
Boot with host interface (HIF_EN)	GPIO_4	GND : Boot with host interface enabled DVDD_IO_1 : Boot with host interface disabled (default)	Power-on reset
Host interface select (active if HIF_EN is enabled)	GPIO_13	(Active if HIF_EN = 1) GND : Host interface via SPI slave DVDD_IO_0 : Host interface via SDIO slave (default)	Power-on reset
Boot ROM bypass select	GPIO_16	GND : Boot up bypass boot ROM (directly jump to flash) DVDD_IO_0 : Boot up with boot ROM (default)	Power-on reset
JTAG pins fixed for use	GPIO_15	GND : JTAG pins fixed for JTAG use DVDD_IO_0 : JTAG pins as GPIO (configurable after boot up) (default)	Power-on reset
UART download	GPIO_12	GND : Enter UART download mode in Boot ROM DVDD_IO_0 : Skip UART download in Boot ROM (default)	Power-on reset or system reset

FCC Statement:

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.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

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.

Radiation Exposure Statement:

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

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

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following" Contains **FCC ID: 2AOI5-G7682** ".

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

Antenna information

The WIFI Module has own PCB antenna as default antenna and just tested and certificate its default antenna for this application, while also reserve reverse antenna connector for user to use external optional antenna. It needs to confirm with the suppliers whether the antenna connector fits before selecting. The end user also need apply Class II permissive change when use optimal external antenna.