# WG229 IoT WLAN Module Datasheet

| Document Information | |
|---|---|
| **Title** | WG229 IoT WLAN Module Datasheet |
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# Contents

# 1 General Description

The Wi-Fi Module is a small form-factor, single stream, 802.11b/g/n WiFi module with on-board low power application processor. It is a low cost serial WiFi module, support UART-WiFi - Ethernet data transmission.

The has been optimized for client applications in the home, enterprise, smart grid, home automation and control that have lower data rates and transmit or receive data on an infrequent basis. The Wi-Fi Module also enables rapid application development of ultra low power devices with the complete application SW on-chip . This combination makes the Wi-Fi Module an ideal solution for low power automation and sensor solutions because of its high efficiency and low power consumption.

The Wi-Fi Module can be used to design applications using 802.11b/g/n communication protocols. All features are enhanced by a built-in antenna, external antenna connector and an interface port to the carrier board. This interface port includes power supply pins, GPIO ports and UART ports.

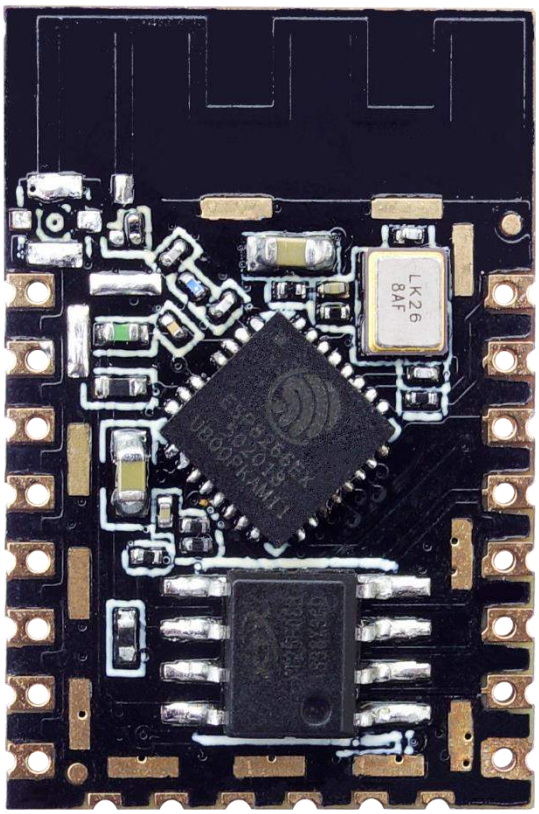


**Figure 1: WG229 Top View**

# 2 Applications

- ◆ IoT (internet of things)
- ◆ Network Consumer Device
- ◆ Metering
- ◆ Building Automation
- ◆ Home Automation
- ◆ Smart Home Gateway
- ◆ Smart Lighting
- ◆ Smart Plugs and Lights
- ◆ Baby Monitors
- ◆ Mesh Network
- ◆ Sensor Network
- ◆ Industry Control

# 3 Features

- ◆802.11 b/g/n/e/i
- ◆802.11 n (2.4 GHz), up to 72.2 Mbps
- ◆802.11 e: QoS for wireless multimedia technology
- ◆AT Set, Cloud Server, App
- ◆A-MPDU and A-MSDU aggregation
- ◆Network Protocols: IPv4, TCP/UDP/HTTP/FTP
- ◆Fragmentation and defragmentation
- ◆Automatic Beacon monitoring/scanning
- ◆802.11 i security features: pre-authentication and TSN
- ◆Wi-Fi Protected Access (WPA)/WPA2/WPA2-Enterprise/Wi-Fi Protected Setup (WPS)
- ◆Infrastructure BSS Station mode/Soft AP mode
- ◆Wi-Fi Direct (P2P), P2P Discovery, P2P Group Owner mode and P2P Power Management
- ◆UMA compliant and certified
- ◆Antenna diversity and selection
- ◆RoHS compliance (Lead-free)
- ◆FCC,CE compliance

# 4 Application Block Diagram

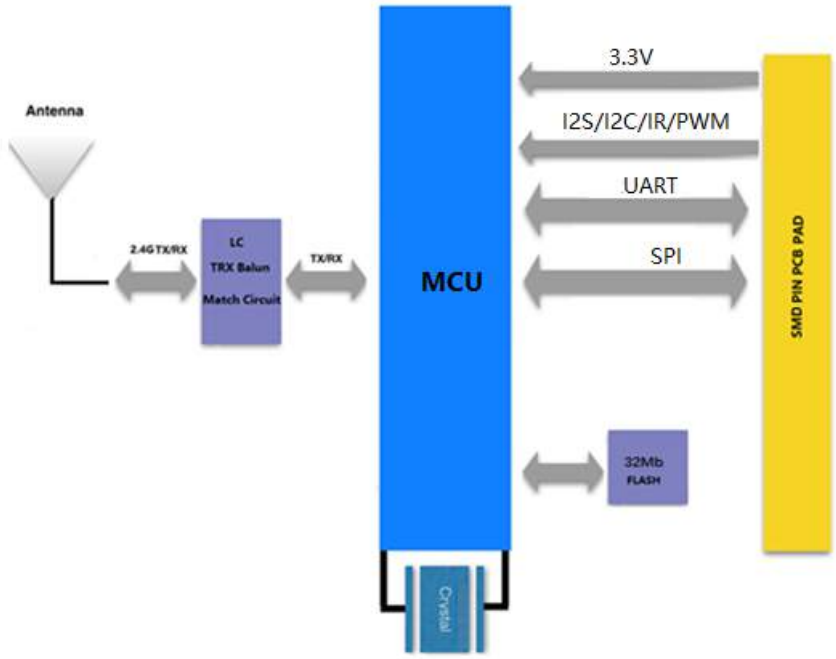



**Figure 2: WG229 Block Diagram**

# 5 Module Pinout and Pin Description

## 5.1 Module Pinout

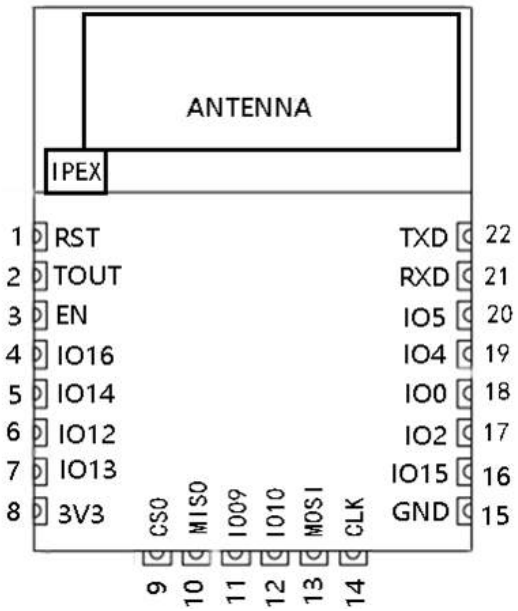



**Figure 3: WG229 Pin Packag**

## 5.2 Pin Description

| NO | Name | Function |
|---|---|---|
| 1 | RST | Reset Signal (Active Low) |
| 2 | TOUT | ADC Pin can be used to check the power voltage of VDD33 |
| 3 | EN | Chip enable pin. Active high. |
| 4 | IO16 | GPI16, Deep-Sleep Wakeup |
| 5 | IO14 | MTMS, GPI14, HSPI_CLK |
| 6 | IO12 | MTDI, GPI12, HSPI_MISO |
| 7 | IO13 | MTCK, GPIO13, HSPI_MOSI, UART0_CTS |
| 8 | VDD33 | 3.3 V power supply (VDD) |
| 9 | SCS/CMD | GPIO11, SD_CMD, SPI_CS0 |
| 10 | SDO/SD0 | GPIO7, SD_DATA0, SPI_MISO |
| 11 | SHD/SD2 | GPIO9, SD_DATA2, SPIHD, HSPIHD |
| 12 | SWP/SD3 | GPIO10, SD_DATA3, SPIWP, HSPIWP |
| 13 | SDI/SD1 | GPIO8, SD_DATA1, SPI_MOSI |
| 14 | SCK/CLK | GPIO6, SD_CLK, SPI_CLK |
| 15 | GND | GND |
| 16 | IO15 | MTDO, GPIO15, HSPI_CS, UART0_RTS |
| 17 | IO2 | GPIO2, UART TX during flash programming |
| 18 | IO0 | GPIO0, SPI_CS2 |
| 19 | IO4 | GPIO4 |
| 20 | IO5 | GPIO5 |
| 21 | RXD0 | GPIO3, U0RXD |
| 22 | TXD0 | GPIO1, U0TXD |

## 5.3 Strapping Pins

has three strapping pins:

- GPIO0: internal pull-up
- GPIO2: internal pull-up
- MTDO/GPIO15: internal pull-down

# 6 Interfaces

## 6.1 GPIO

The WG229 has 17 GPIO pins which can be assigned to various functions by programming the appropriate registers. These pins can be multiplexed with other functions such as I2C, I2S, UART, PWM, IR Remote Control, etc.

## 6.2 I2C

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 5 | MTMS | GPIO14 | I2C_SCL |
| 17 | GPIO2 | GPIO2 | I2C_SDA |

**Table6-1: I2C pin share scheme**

## 6.3 I2S

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 6 | MTDI | GPIO12 | I2SI_DATA |
| 7 | MTCK | GPIO13 | I2SI_BCK |
| 5 | MTMS | GPIO14 | I2SI_WS |
| 16 | MTDO | GPIO15 | I2SO_BCK |
| 21 | RXD0 | GPIO3 | I2SO_DATA |
| 17 | GPIO2 | GPIO2 | I2SO_WS |

**Table6-2: I2S pin share scheme**

## 6.4 UART

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 21 | RXD0 | GPIO3 | U0RXD |
| 22 | TXD0 | GPIO1 | U0TXD |
| 16 | MTDO | GPIO15 | U0RTS |
| 7 | MTCK | GPIO13 | U0CTS |
| 17 | GPIO2 | GPIO2 | U1TXD |
| 13 | SD_D1 | GPIO8 | U1RXD |

**Table6-3: UART pin share scheme**

## 6.5 SDIO

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 11 | SD_D2 | GPIO9 | SD_D2 |
| 12 | SD_D3 | GPIO10 | SD_D3 |
| 9 | SD_CMD | GPIO11 | SD_CMD |
| 14 | SD_CLK | GPIO6 | SD_CLK |
| 10 | SD_D0 | GPIO7 | SD_D0 |
| 13 | SD_D1 | GPIO8 | SD_D1 |

**Table6-4: SDIO pin share scheme**

## 6.6 SPI(Master/Slave)

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 11 | SD_D2 | GPIO9 | SPIHD |
| 12 | SD_D3 | GPIO10 | SPIWP |
| 9 | SD_CMD | GPIO11 | SPICS0 |
| 14 | SD_CLK | GPIO6 | SPI_CLK |
| 10 | SD_D0 | GPIO7 | SPIQ/NISO |
| 13 | SD_D1 | GPIO8 | SPID/MOSI |
| 22 | TXD0 | GPIO1 | SPICS1 |
| 18 | IO0 | GPIO0 | SPICS2 |

**Table6-5: SPI pin share scheme**

## 6.7 SPI(Slave)

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 11 | SD_D2 | GPIO9 | NC |
| 12 | SD_D3 | GPIO10 | SPIS_CS |
| 9 | SD_CMD | GPIO11 | SPIS_MOSI |
| 14 | SD_CLK | GPIO6 | SPIS_CLK |
| 10 | SD_D0 | GPIO7 | SPIS_MISO |
| 13 | SD_D1 | GPIO8 | SPIS_INT |

**Table6-6: SPI Slave pin share scheme**

## 6.8 HSPI(Slave)

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 5 | MTMS | GPIO14 | HSPICLK |

| | | | |
|---|---|---|---|
| 17 | GPIO2 | GPIO2 | HSPIQ/MISO |
| 7 | MTCK | GPIO13 | HSPID/MOSI |
| 16 | MTDO | GPIO15 | HSPICS |

**Table6-7: HSPI pin share scheme**

## 6.9 PWM

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 6 | MTDI | GPIO12 | PWM0 |
| 16 | MTDO | GPIO15 | PWM1 |
| 5 | MTMS | GPIO14 | PWM2 |
| 19 | IO4 | GPIO4 | PWM3 |

**Table6-8: PWM pin share scheme**

## 6.10 IR Remote

| WG229 Pin Number | Pin Name | GPIO | Function Name |
|---|---|---|---|
| 5 | MTMS | GPIO14 | IR TX |
| 20 | IO5 | GPIO5 | IR RX |

**Table6-9: IR pin share scheme**

# 7 PCB Footprint and Dimensions

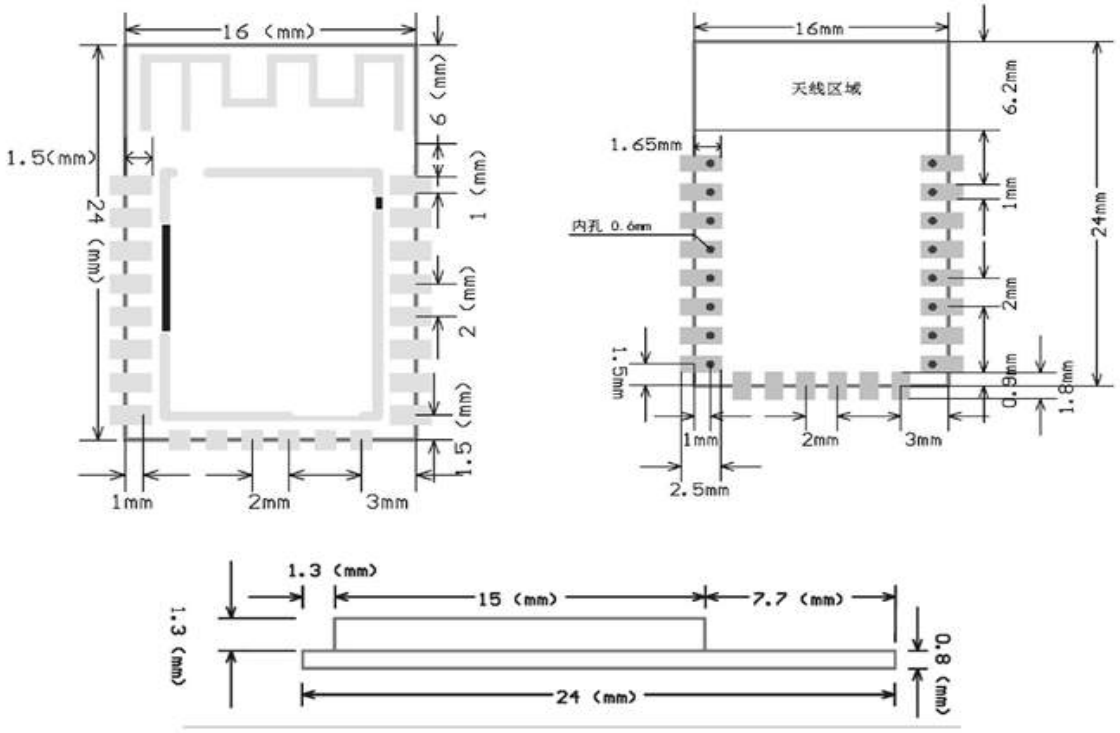



**Figure 4: WG229 Recommend PCB Footprint**

# 8 Electrical Characteristics

## 8.1 Absolute Maximum Ratings

| Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Storage Temperature Range | | -40 | | 125 | °C |
| ESD Protection | VESD | / | | 2000 | V |
| Supply Voltage | VDD33 | 0 | | 3.6 | V |
| Voltage On Any I/O Pin | | -0.3 | | 3.63 | V |

**Table8-1: Absolute Maximum Ratings**

Note: Absolute maximum ratings are stress ratings only, and functional operation at the maxims is not guaranteed. Stress beyond the limits specified in this table may affect device reliability or cause permanent damage to the device. For functional operating conditions, refer to the operating conditions tables as follow.

* series modules are Electrostatic Sensitive Devices and require special precautions while handling.


**ESD precautions**

The series modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the series modules without proper ESD protection may destroy or damage them permanently.

The series modules are electrostatic sensitive devices (ESD) and require special ESD precautions typically applied to ESD sensitive components. Proper ESD handling and packaging procedures must be applied throughout the processing, handling, transportation and operation of any application that incorporates the series module. Don't touch the module by hand or solder with non-anti-static soldering iron to avoid damage to the mode.

## 8.2 Recommended Operation Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Extended temp. range | TA | -20 | | 70 | ºC |
| Power Supply | VDD33 | 3.0 | 3.3 | 3.6 | V |
| Input Low Voltage | VIL | -0.3 | | 0.8 | V |
| Input High Voltage | VIH | 2 | | 3.6 | V |

**Table8-2: Operating Conditions**

## 8.3 Measurement Conditions

| System State | Description | Current (Typ.)@3.3V |
|---|---|---|
| Deep-sleep | Only RTC Power on | 10uA |

| | | |
|---|---|---|
| Light-sleep | Receive Beacon packages | 0.9mA |
| Modem-sleep | The CPU is Power on | 15 mA |
| Active RX(RF Working) | RX and Listening | 50-60 mA |
| Active TX(RF Working) | WIFI TX 13-18dBm | 120-180 mA |

**Table8-3:WG229 Power Consumption in Different States**

# 9. Performance Specification

| | |
|---|---|
| **Hardware Features** | |
| **Model** | |
| **ANTENNA TYPE** | PCB Antenna or IPEX Connector |
| **Voltage** | 3.3V+/-10% |
| **DIMENTIONS(L×W×H)** | 24.0mm*16.0mm*2.2mm |
| **2.4GHz WiFi Features** | |
| **WIRELESS STANDARDS** | IEEE 802.11 b/g/n/ |
| **FREQUENCY RANGE** | 2.412-2.484GHz |
| **DATA RATES** | IEEE 802.11a Standard Mode: 6,9,12,18,24,36,48,54Mbps<br>IEEE 802.11 b Standard Mode: 1,2,5.5,11Mbps |
| | IEEE 802.11g Standard Mode: 6,9,12,18,24,36,48,54Mbps |
| | IEEE 802.11n Standard Mode: 72.2Mbps @ HT20(MCS7) |
| **2.4G RECEIVE SENSITIVITY** | HT20 MCS7 : -70dBm@10% PER(MCS7) |
| | OFDM 54M: -73dBm@10% PER |
| | CCK, 11M: -88dBm@ 8% PER |
| **WIRELESS SECURITY** | Supports WEP64/128, WPA, WPA2, TKIP, WAPI, and AES hardware encryption |
| **WIRELESS TRANSMIT POWER**<br>**With ±2dBm tolerance** | IEEE 802.11n: 12-14dBm@HT20 MCS7 |
| | IEEE 802.11g: 16dBm |

| | |
|---|---|
| | IEEE 802.11b: 18dBm |
| **WORK MODE** | Soft AP/ Station/Soft AP+Station |
| **Others** | |
| **ENVIRONMENT** | Operating Temperature: -20℃~70℃ |
| | Storage Temperature: -40℃~125℃ |
| | Operating Humidity: 10%~90% non-condensing |
| | Storage Humidity: 5%~90% non-condensing |

# 10 Reference Schematics

## 10.1 Power Schematic

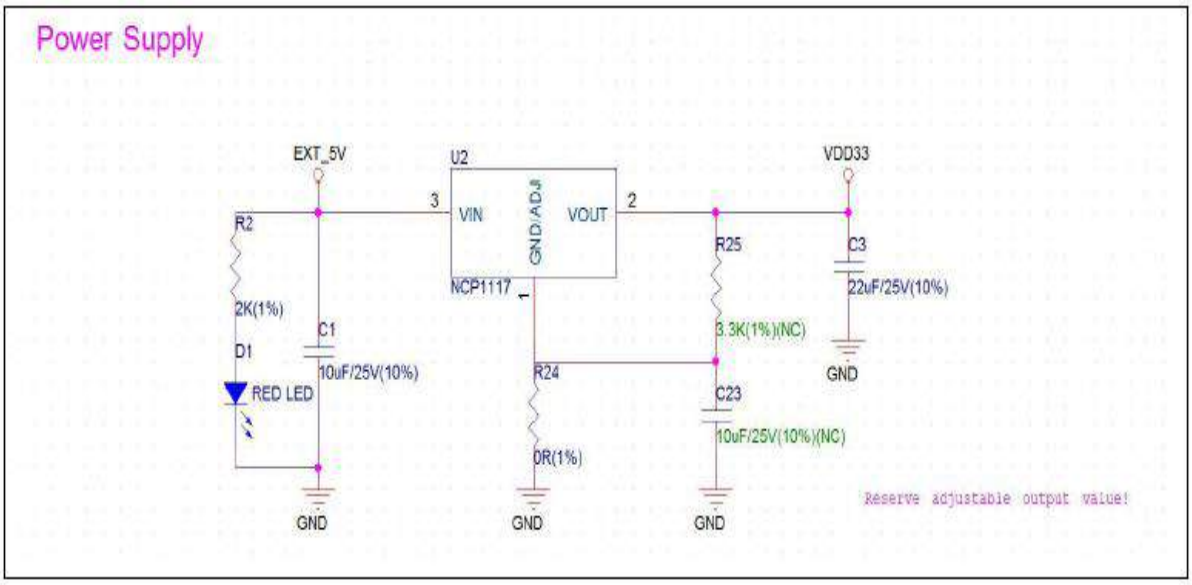



**Figure 5: WG229 Typical Power Schematics**

## 10.2 USB-UART Schematic

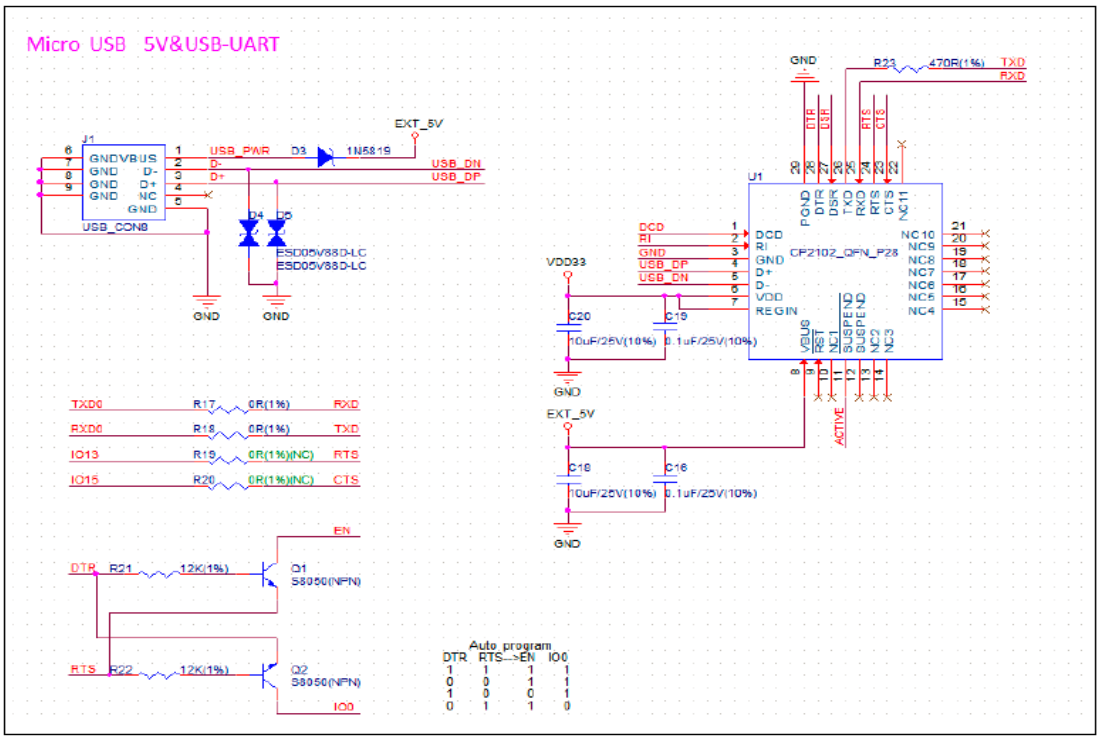



**Figure 6: WG229 Typical USB to UART Schematics**

## 10.3 Typical Schematic

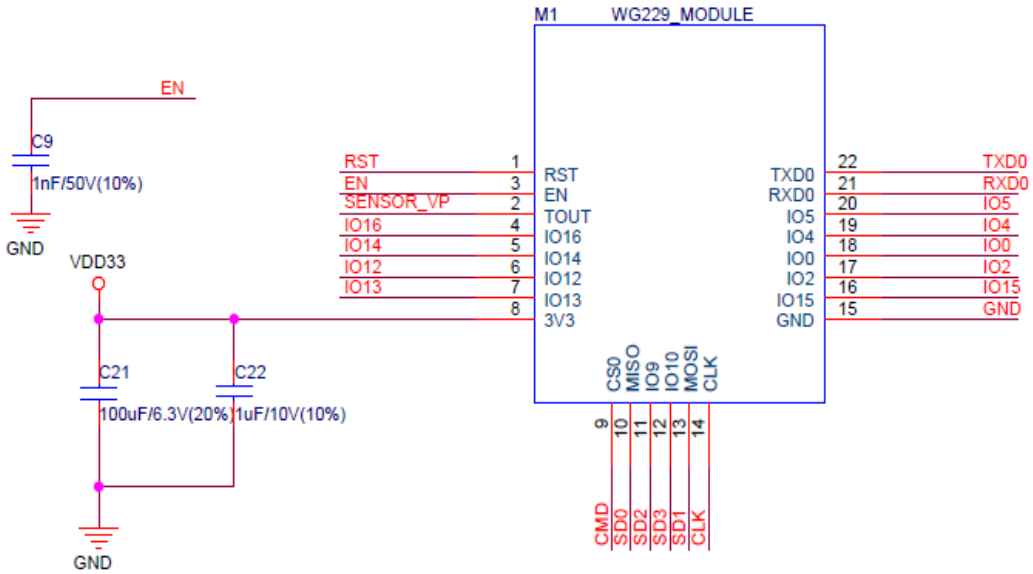



**Figure 7: WG229 Typical Schematics**

# 11 Hardware Boot Mode

| Boot Mode. | MTDO/IO15 | GPIO0 | GPIO2 |
|---|---|---|---|
| Download Mode | 0 | 0 | 1 |
| Normal Work Mode | 0 | 1 | 1 |

**Download Mode**

When GPIO15=0, GPIO0=0, GPIO2=1, is in the Download mode and you can download the firmware to the external flash.

**Normal Work Mode**

When GPIO15=0, GPIO0=1, GPIO2=1, is in the Flash mode. will automatically read and run programs from flash during power-on.

# 12 Manufacturing Process Recommendations

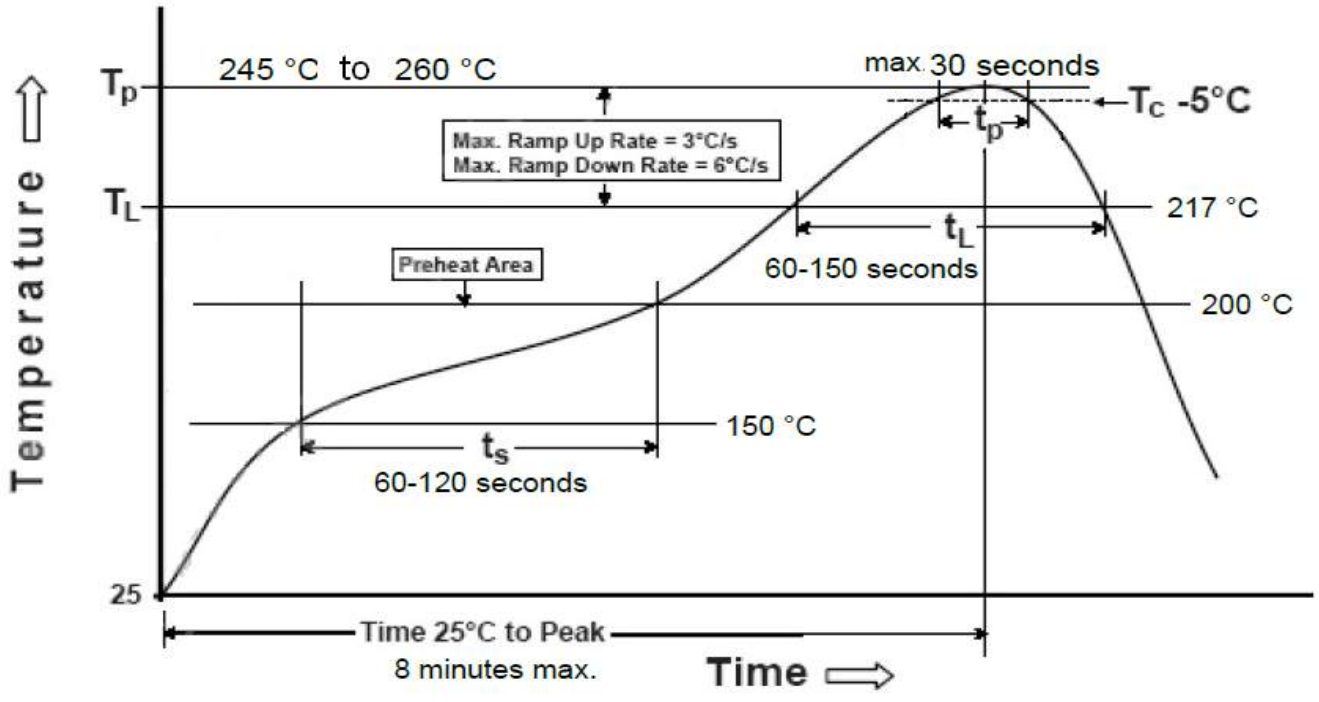



**Figure 8: WG229 Typical Lead-free Soldering Profile**

**Note：** The final soldering temperature chosen at the factory depends on additional external factors like choice of soldering paste，size，thickness and properties of the baseboard，etc. Exceeding the maximum soldering temperature in the recommended soldering profile may permanently damage the module.

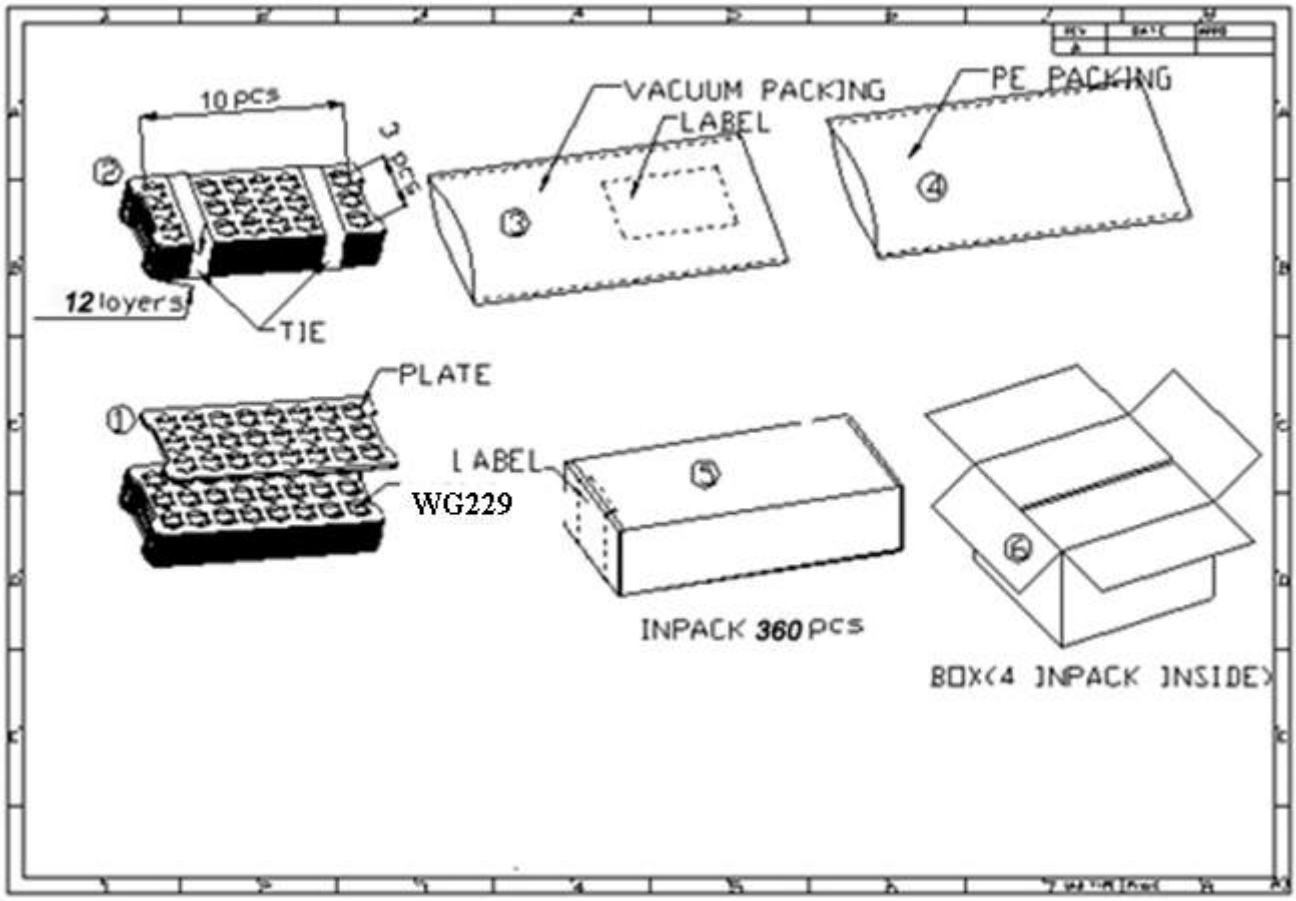
# 13 Ordering Information

| Module No. | Antenna Connector Type |
|---|---|
| WG229-E | IPEX Connector |
| WG229-P | PCB Antenna |


**Figure9: WG229-E**


**Figure9: WG229-P**

# 14 Packaging Specification



# 15 Revision History

| Revision | Description | Approved | Date |
|---|---|---|---|
| V1.01 | Initial Release | George He | 2019.03.25 |
| V1.02 | Replace prdouct physical picture | George He | 2019.08.13 |

# 16 Contact Information

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