

WG231 IoT WLAN Module Datasheet

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1 General Description

The WG231 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 WG231 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 WG231 Wi-Fi Module also enables rapid application development of ultra low power devices with the complete application SW on-chip . This combination makes the WG231 Wi-Fi Module an ideal solution for low power automation and sensor solutions because of its high efficiency and low power consumption.

The WG231 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: WG231 Top View

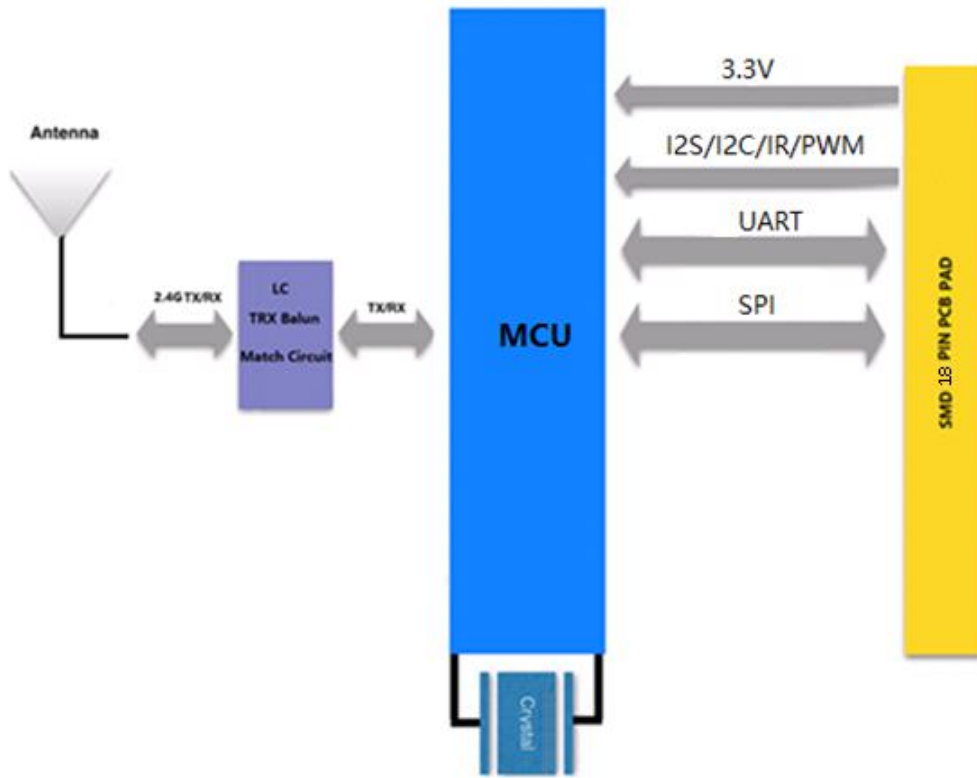
2 Applications

- ◆ 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: WG231 Block Diagram

5 Module Pinout and Pin Description

5.1 Module Pinout

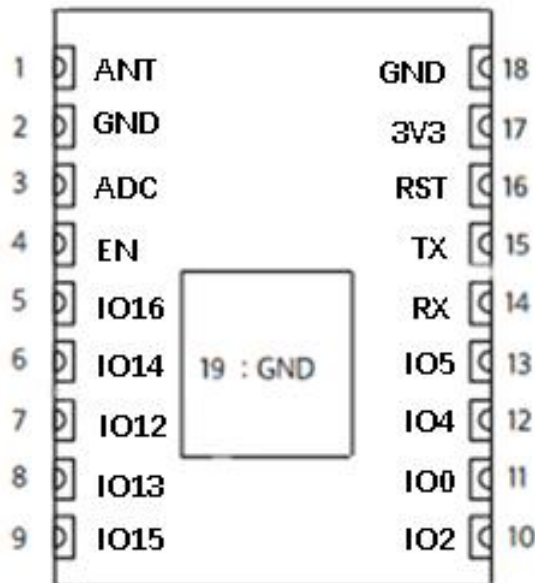


Figure 3: WG231 Pin Package

5.2 Pin Description

NO	Name	Function
1	ANT	Antenna PCB pin
2	GND	GND
3	ADC	ADC Pin can be used to check the power voltage of VDD33
4	EN	Chip enable pin. Active high.
5	IO16	GPIO16, Deep-Sleep Wakeup
6	IO14	MTMS, GPIO14, HSPI_CLK
7	IO12	MTDI, GPIO12, HSPI_MISO
8	IO13	MTCK, GPIO13, HSPI_MOSI, UART0_CTS
9	IO15	MTDO, GPIO15, HSPI_CS, UART0_RTS
10	IO2	GPIO2, UART TX during flash programming
11	IO0	GPIO0, SPI_CS2
12	IO4	GPIO4
13	IO5	GPIO5
14	RXD0	GPIO3, U0RXD

15	TXD0	GPIO1, U0TXD
16	RST	Reset Signal (Active Low)
17	VDD33	3.3 V power supply (VDD)
18	GND	GND

5.3 Strapping Pins

WG231 has three strapping pins:

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

6 Interfaces

6.1 GPIO

The WG231 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

WG231 Pin Number	Pin Name	GPIO	Function Name
6	MTMS	GPIO14	I2C_SCL
10	GPIO2	GPIO2	I2C_SDA

Table6-1: I2C pin share scheme

6.3 I2S

WG231 Pin Number	Pin Name	GPIO	Function Name
7	MTDI	GPIO12	I2SI_DATA
8	MTCK	GPIO13	I2SI_BCK
6	MTMS	GPIO14	I2SI_WS
9	MTDO	GPIO15	I2SO_BCK
14	RXD0	GPIO3	I2SO_DATA
10	GPIO2	GPIO2	I2SO_WS

Table6-2: I2S pin share scheme

6.4 UART

WG231 Pin Number	Pin Name	GPIO	Function Name
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14	RXD0	GPIO3	U0RXD
15	TXD0	GPIO1	U0TXD

Table6-3: UART pin share scheme

6.5 HSPI(Slave)

WG231 Pin Number	Pin Name	GPIO	Function Name
6	MTMS	GPIO14	HSPICKL
10	GPIO2	GPIO2	HSPIQ/MISO
8	MTCK	GPIO13	HSPID/MOSI
9	MTDO	GPIO15	HSPICS

Table6-4: HSPI pin share scheme

6.6 PWM

WG231 Pin Number	Pin Name	GPIO	Function Name
7	MTDI	GPIO12	PWM0
9	MTDO	GPIO15	PWM1
6	MTMS	GPIO14	PWM2
12	IO4	GPIO4	PWM3

Table6-5: PWM pin share scheme

6.7 IR Remote

WG231 Pin Number	Pin Name	GPIO	Function Name
6	MTMS	GPIO14	IR TX
13	IO5	GPIO5	IR RX

Table6-6: IR pin share scheme

7 PCB Footprint and Dimensions

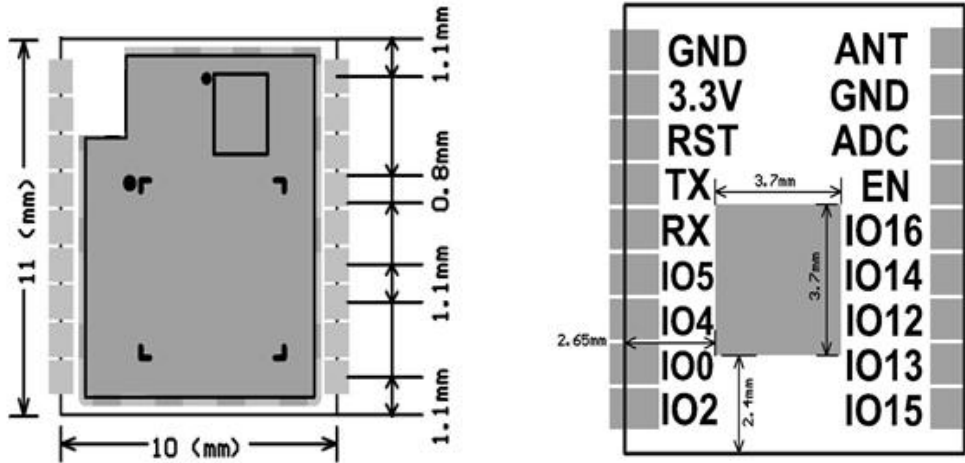
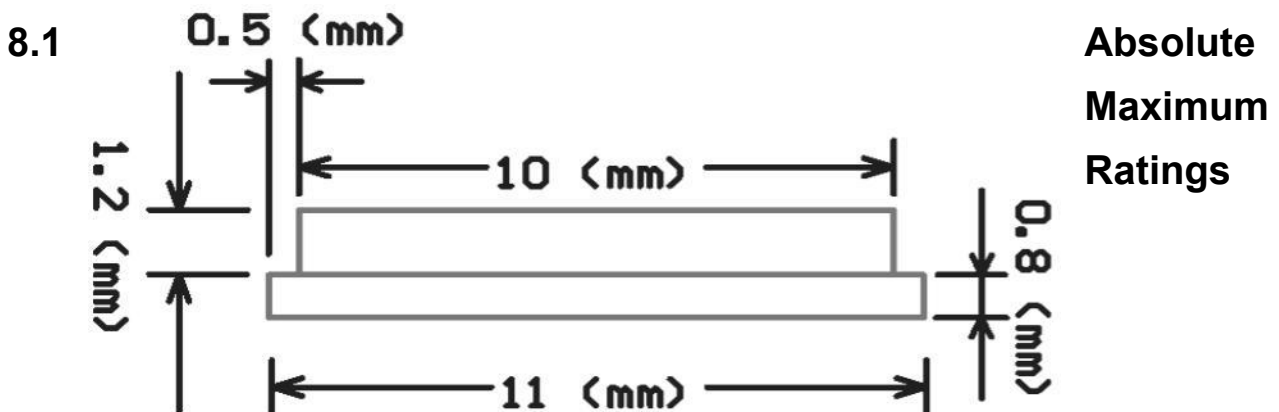


Figure 4: WG231 Recommend PCB Footprint

8 Electrical Characteristics



Parameter	Condition	Min.	Typ.	Max.	Unit
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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.

*WG231 series modules are Electrostatic Sensitive Devices and require special precautions while handling.



ESD precautions

The WG231 series modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the WG231 series modules without proper ESD protection may destroy or damage them permanently.

The WG231 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 WG231 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	°C
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: Power Consumption in Different States

9. Performance Specification

Hardware Features	
Model	WG231
ANTENNA TYPE	PCB PIN
Voltage	3.3V+/-10%
DIMENSIONS(L×W×H)	11.0mm*10.0mm*2.0mm
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
	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 With ± 2 dBm 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°C~70°C
	Storage Temperature: -40°C~125°C
	Operating Humidity: 10%~90% non-condensing
	Storage Humidity: 5%~90% non-condensing

10 Reference Schematics

10.1 Power Schematic

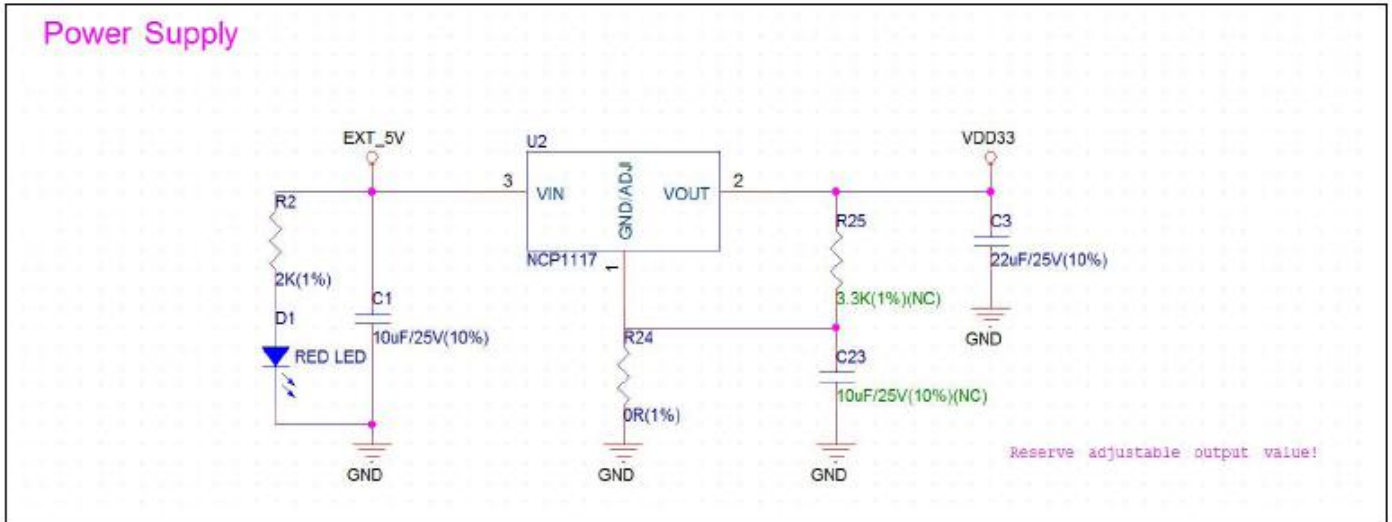


Figure 5: WG231 Typical Power Schematics

10.2 USB-UART Schematic

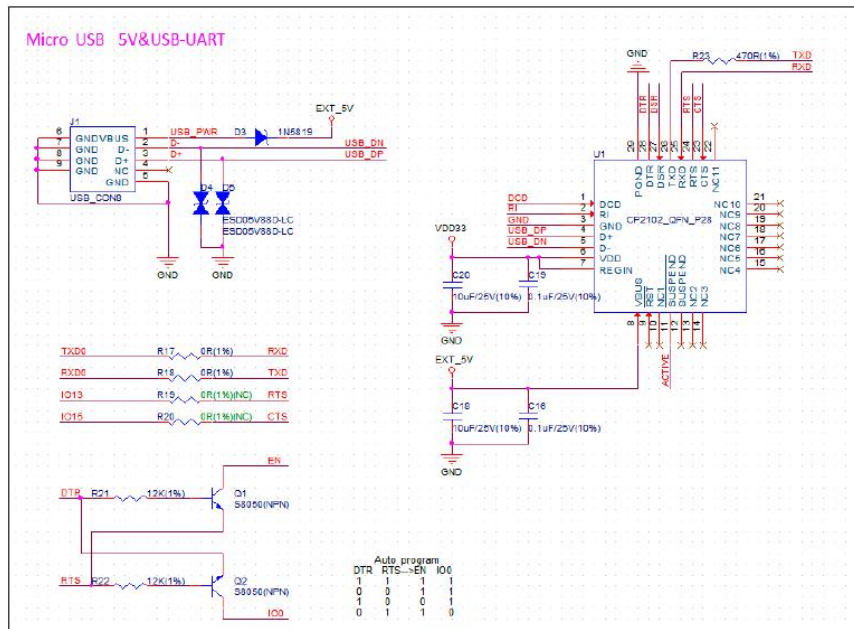


Figure 6: WG231 Typical USB to UART Schematics

10.3 Typical Schematic

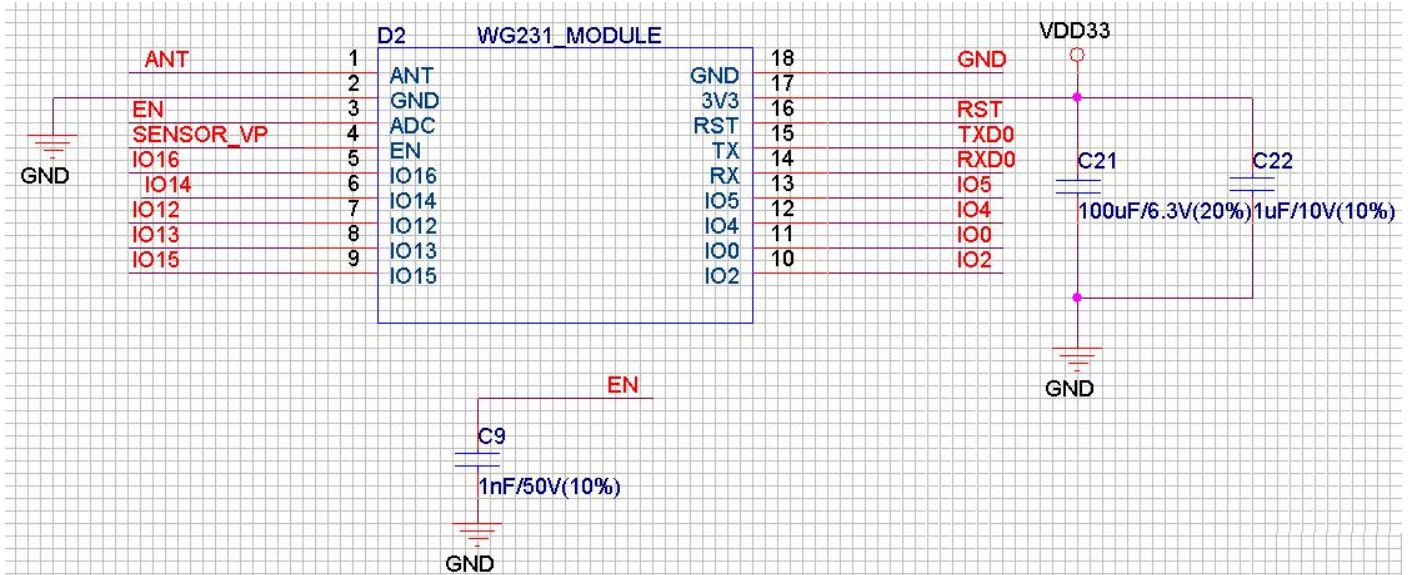


Figure 7: WG231 Typical Schematics

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, WG231 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, WG231 is in the Flash mode. WG231 will automatically read and run programs from flash during power-on.

12 Manufacturing Process Recommendations

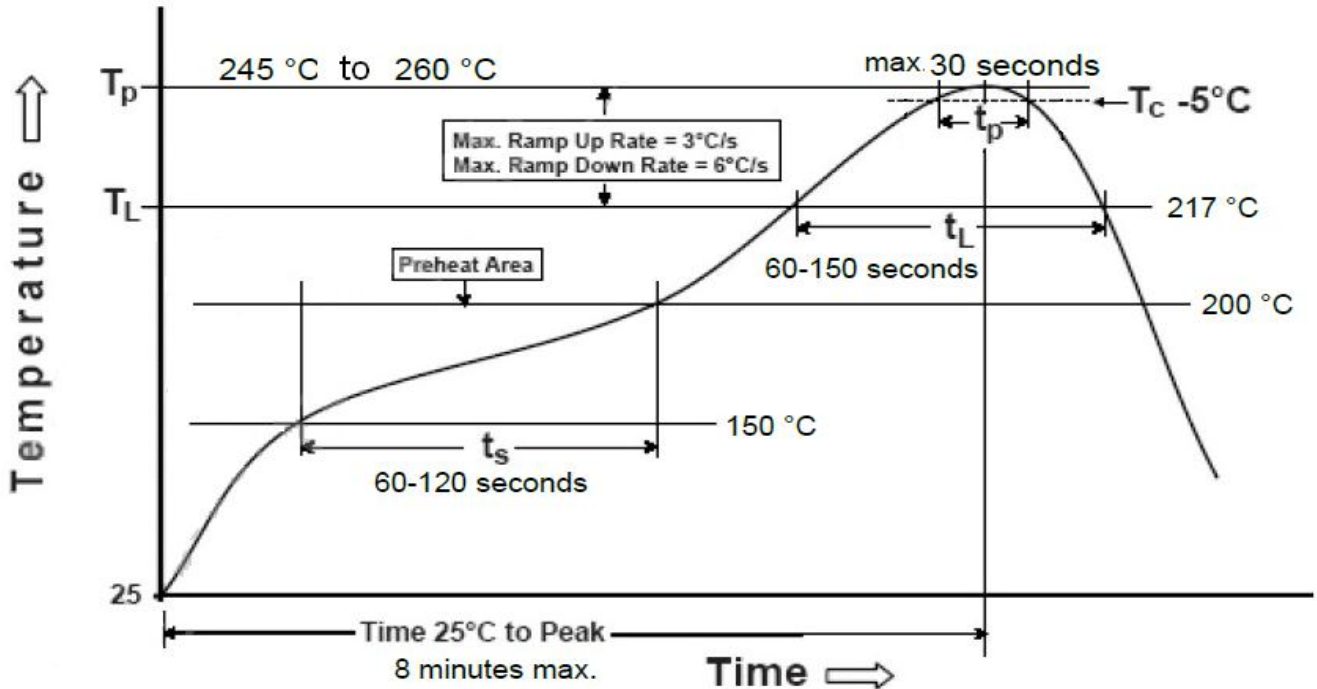


Figure 8: WG231 Typical Lead-free Soldering Profile

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
WG231	ANT PIN

14 Packaging Specification

15 Revision History

Revision	Description	Approved	Date
V1.01	Initial Release	George He	2019.03.22
V1.02	Update Packaging Information	George He	2019.05.30
V1.03	Update Pin Description	George He	2019.07.01

16 Contact Information

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