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.

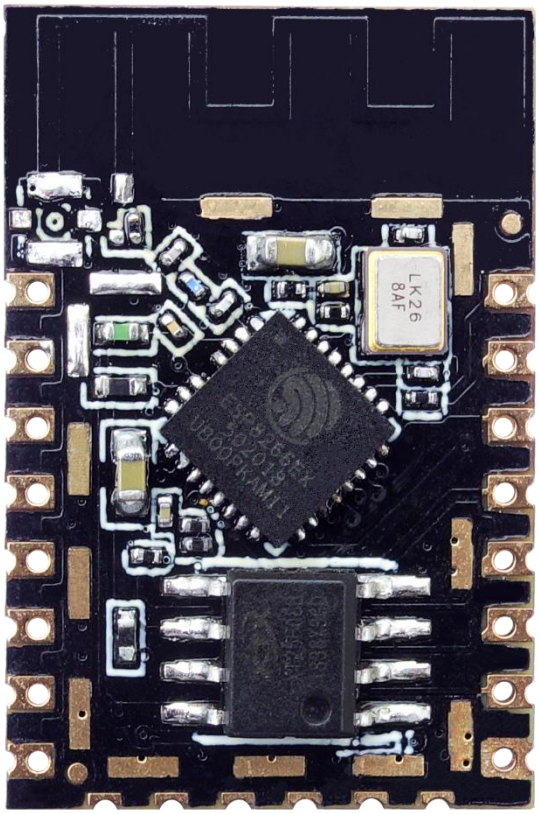


Figure 1: WG229 Top View

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

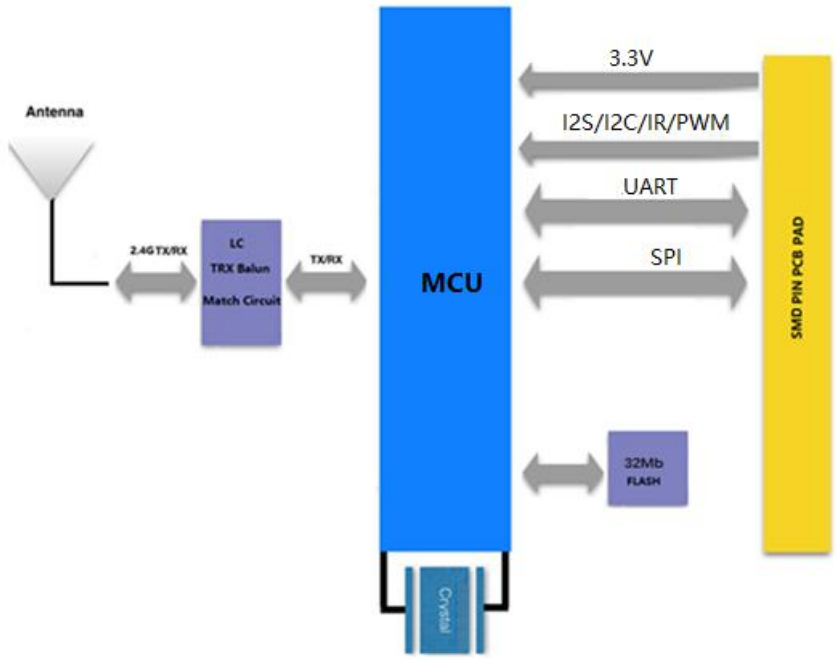


Figure 2: WG229 Block Diagram

5 Module Pinout and Pin Description

5.1 Module Pinout

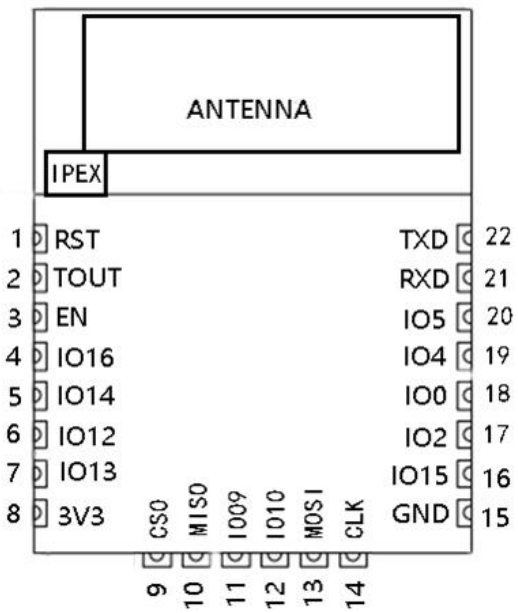


Figure 3: WG229 Pin Packag

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

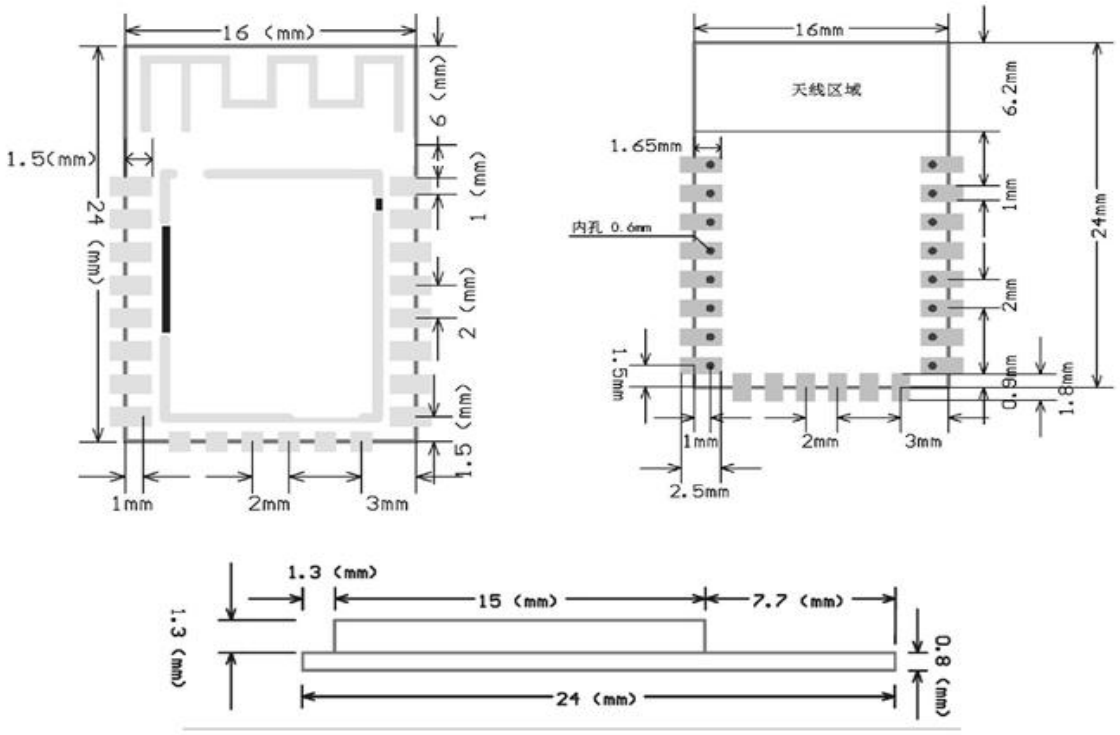


Figure 4: WG229 Recommend PCB Footprint

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
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	2.412-2.462GHz
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 ±2dBm tolerance**	IEEE 802.11n:12-14dBm@HT20 MCS7
	IEEE 802.11g: 14.5dBm
	IEEE 802.11b: 14dBm
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

Ellipsis

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

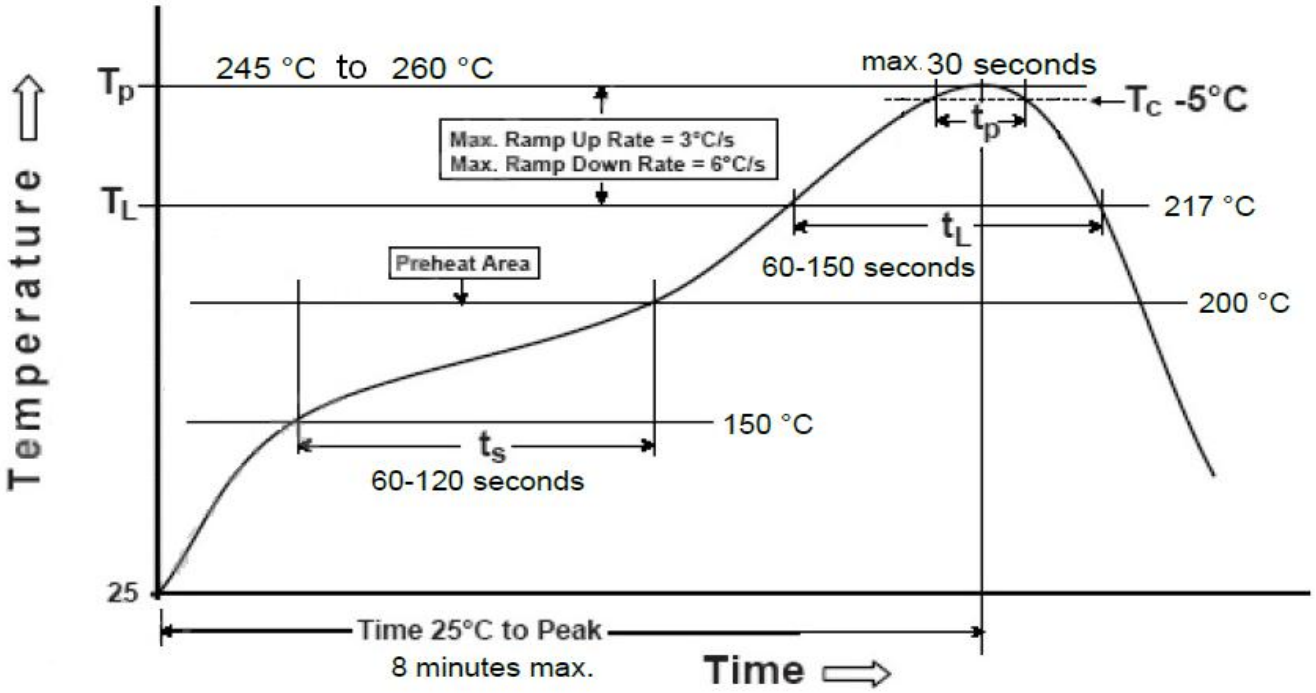


Figure 8: WG229 Typical Lead-free Soldering Profile

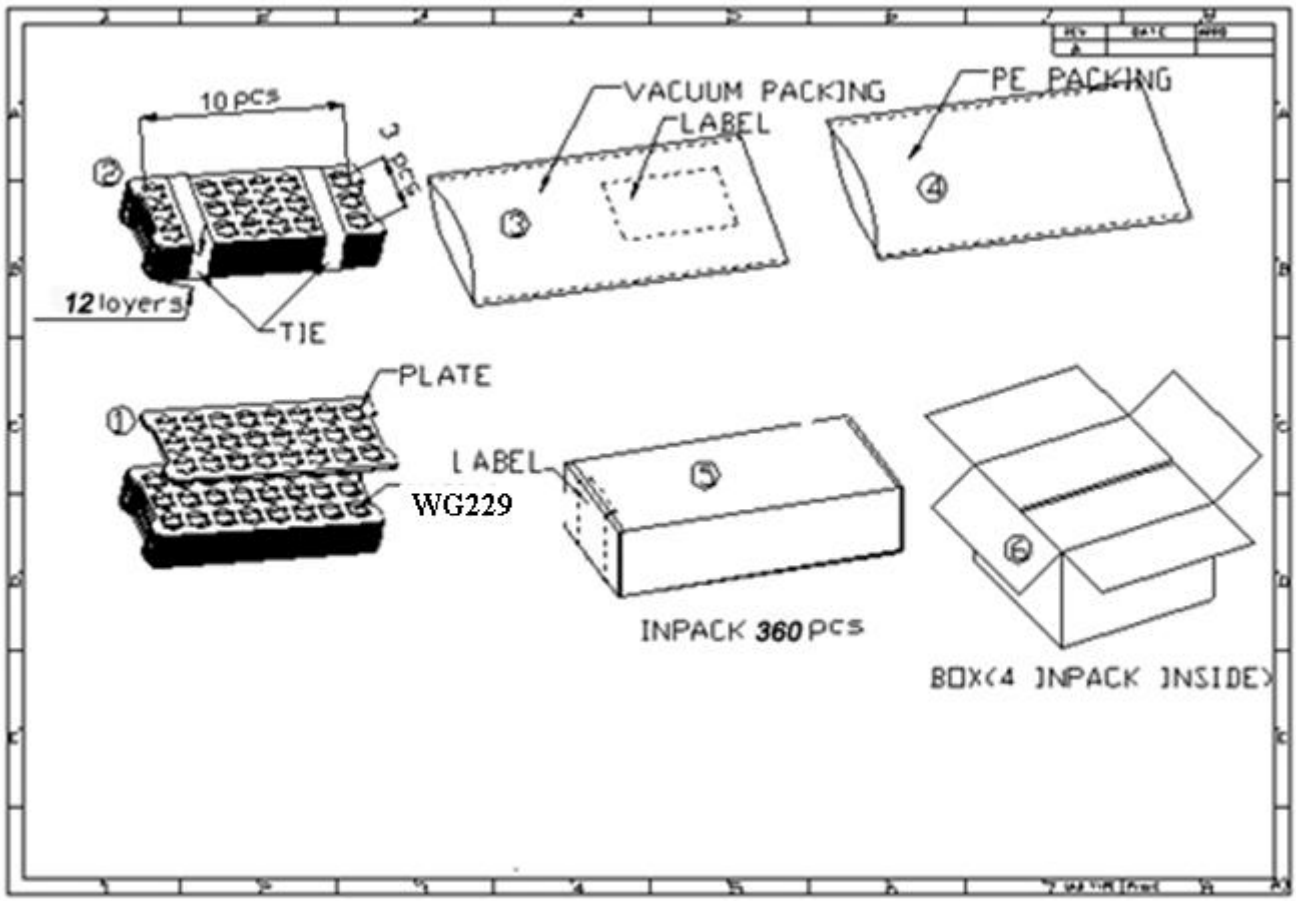
Note：The final soldering temperature chosen at the factory depends on additional external factors like choice of soldering paste，size，thickness and properties of the baseboard，etc. Exceeding the maximum soldering temperature in the recommended soldering profile may permanently damage the module.

13 Ordering Information

Module No.	Antenna Connector Type
-E	IPEX Connector
-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

Skylab M&C Technology Co., Ltd.

深圳市天工测控技术有限公司

Address: 6 Floor, No.9 Building, Lijincheng Scientific & Technical park, Gongye East Road, Longhua District, Shenzhen, Guangdong, China

Phone: 86-755 8340 8210（Sales Support）

Phone: 86-755 8340 8510（Technical Support）

Fax: 86-755-8340 8560

E-Mail: sales1@skylab.com.cn

Website: www.skylab.com.cn www.skylabmodule.com

CE NB

Herby, Skylab M&C Technology Co., Ltd. declares that this WiFi module， WG229 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

In accordance with Article 10(2) and Article 10(10), this product allowed to be used in all EU member states.

Use the WiFi module in the environment with the temperature between -20℃ and 70℃.

This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

Manufacturer：Skylab M&C Technology Co., Ltd.
Address：6/F, Building 9,Lijincheng park, Gongye East Rd, Longhua St, Longhua District, Shenzhen, 518109 China Tel: +860755-83408210
Fax: +860755-83408560
E-mail: sam.chen@skylab.com.cn

FCC Statement
FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
PCB antenna with antenna gain 1.5dBi

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.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Note: 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.

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

PCB Antenna with antenna gain 1.5dBi

We will retain control over the final installation of the modular such that compliance of the end product is assured. In such cases, an operating condition on the limit modular approval for the module must be only approved for use when installed in devices produced by a specific manufacturer. If any hardware modify or RF control software modify will be made by host manufacturer,C2PC or new certificate should be apply to get approval,if those change and modification made by host manufacturer not expressly approved by the party responsible for compliance ,then it is illegal.

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device. This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ACOE-WG229 Or Contains FCC ID: 2ACOE-WG229 "

OEM INTEGRATION INSTRUCTIONS:

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

The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 3 conditions above are met, further transmitter test 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 (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

Upgrade Firmware:
The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

End product labeling:
This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains 2ACOE-WG229”.

Information that must be placed in the end user manual:

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.

When the module is installed inside another device, the user manual of the host must contain below warning statements;
1. 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) (2) this device must accept any interference received, including interference that may cause undesired operation.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part15 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.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with limit modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally.

Declaration of Conformity

I hereby declare that the product

Product:

Product Name: WiFi module
Model: WG229, WG229-E, WG229-P
Brand Name: N/A
Hardware Version: V2.0
Software Version: W0207

satisfies all the technical regulations applicable to the product within the scope of Council Directives 2014/35/EU, 2014/30/EU and 2014/53/EU:

EN 62311:2008
EN 62368-1:2014+A11:2017
Draft ETSI EN 301 489-17 V3.2.2 (2019-12)
ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 300 328 V2.2.2 (2019-07)

(Title(s) of regulations, standards, etc.)

All essential radio test suites have been carried out.

NOTIFIED BODY: PHOENIX TEST-LAB GmbH
– **Address:**

Königswinkel 10
D-32825 Blomberg
Germany
Identification Number: 0700

MANUFACTURER or AUTHORISED REPRESENTATIVE:
– **Address:**

Skylab M&C Technology Co., Ltd
6/F, Building9, Lijincheng park, Gongye East Road, Longhua St. Longhua District, Shenzhen, Guangdong, 518109 China

This declaration is issued under the sole responsibility of the manufacturer and, if applicable, his authorized representative.

Signature: Samchen.

May, 29, 2020

Name	Sam Chen
Position	manager
Company Name	Skylab M&C Technology Co., Ltd
Address	6/F, Building9, Lijincheng park, Gongye East Road, Longhua St. Longhua District, Shenzhen, Guangdong, 518109 China
Tel / Fax	+860755-83408210/ +860755-83408560
E-Mail	sam.chen@skylab.com.cn