

WG225 SDIO 802.11ac WIFI + UART BT2.1/4.2 Combo Module User Manual

Document Information

Title	WG225 SDIO 802.11ac WIFI + UART BT2.1/4.2 Combo Module Datasheet
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This document applicable to the following products:

Product name	Type number	Product status
WG225	WG225(09308)	Mass Production

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WARNING:

Herby, Skylab M&C Technology Co., Ltd declares that this SDIO WIFI module, WG225 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Use the WG225 in the environment with the temperature between -20°C and +70°C,

This modular must be installed and operated with a minimum distance of 20cm between the radiator and user body

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1 General Description

The WG225 module is WLAN and Bluetooth combination solution to support 1 x 1 802.11 a/b/g/n/ac WLAN standards and BT 4.2 + HS, enabling seamless integration of WLAN/BT and low-energy technology. The module requires only an external 3.3V power supply.

The module is based on the single chip RTL8821. It supports a low-power SDIO 3.0 interface for WLAN and a UART/PCM interface for BT.



Figure 1: WG225 Top View

2 Applications

- ◆ SDIO 2.4GHz/5GHz 802.11n WIFI
- ◆ SDIO 5GHz 802.11ac WIFI
- ◆ SDIO WIFI+ UART BT 2.1/4.2

3 Features

■ Wi-Fi

- ◆ 802.11 a/b/g/n/ac, up to 433.3 Mbps data rate.
- ◆ 1T1R WLAN for 5 GHz 802.11ac, or 2.4 GHz/5 GHz 802.11n WLAN applications.
- ◆ SDIO 3.0 interface for WLAN

■ Bluetooth

- ◆ Compliant with Bluetooth v2.1 + EDR
- ◆ Support Bluetooth 4.2 features
- ◆ Class-1, class-2 and class-3 transmitter without external power amplifier
- ◆ Enhanced power control
- ◆ Integrated internal Class 1, Class 2, and Class 3 PAs
- ◆ Support BT-WLAN coexistence
- ◆ RoHS compliance (Lead-free)

Figure 2: WG225 Block Diagram

4 Module Pinout and Pin Description

Module Pinout

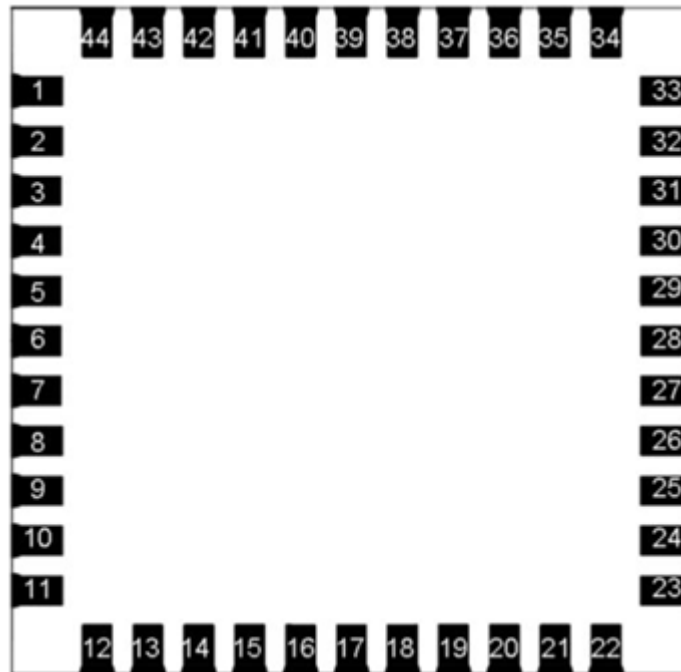


Figure 3: WG225 Pin Package

Pin Description

Pin No.	Pin name	Description	Remark
1	GND	Ground	
2	WL_BT_ANT	RF port	
3	GND	Ground	
4	NC	NC	
5	NC	NC	
6	BT_WAKE	HOST wake-up Bluetooth device	
7	BT_HOST_WAKE	Bluetooth device to wake-up HOST	
8	NC	NC	
9	VDD	Main power voltage source input	IN:3.135-3.465V
10	NC	NC	

11	NC	NC	
12	WL_REG_ON	This pin can externally shutdown the module WLAN function, active low.	
13	WL_HOST_WAKE	WLAN to wake-up HOST	
14	SDIO_DATA_2	SDIO data line 2	
15	SDIO_DATA_3	SDIO data line 3	
16	SDIO_DATA_CMD	SDIO command line	
17	SDIO_DATA_CLK	SDIO clock line	
18	SDIO_DATA_0	SDIO data line 0	
19	SDIO_DATA_1	SDIO data line 1	
20	GND	Ground	
21	NC	NC	
22	VDDIO	I/O Voltage supply input	IN:1.8V or3.3V
23	NC	NC	
24	LPO	External Low Power Clock input (32.768KHz)	
25	PCM_OUT	PCM Data output	
26	PCM_CLK	PCM clock	
27	PCM_IN	PCM data input	
28	PCM_SYNC	PCM sync signal	
29	NC	NC	
30	NC	NC	
31	GND	Ground	
32	NC	NC	
33	GND	Ground	
34	BT_REG_ON	This pin can externally shutdown the module BT function, active low.	
35	BAT_EN	This pin can externally shutdown the	

		module, active low.	
36	GND	Ground	
37	NC	NC	
38	NC	NC	
39	NC	NC	
40	NC	NC	
41	UART_RTS_N	Bluetooth/FM UART interface	
42	UART_TXD	Bluetooth/FM UART interface	
43	UART_RXD	Bluetooth/FM UART interface	
44	UART_CTS_N	Bluetooth/FM UART interface	

5 PCB Footprint and Dimensions

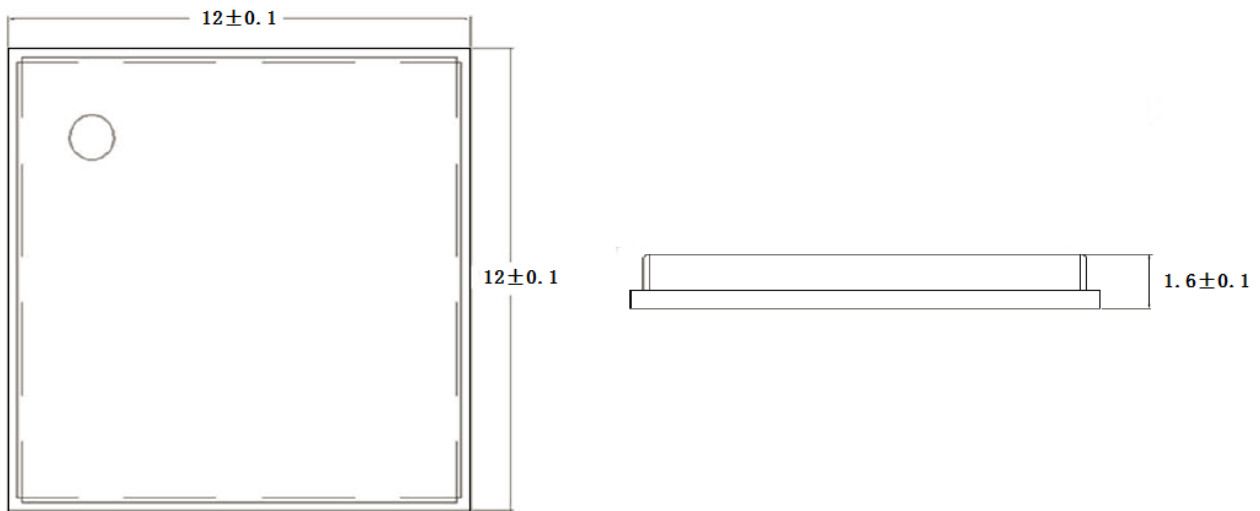


Figure 4: WG225 Dimensions

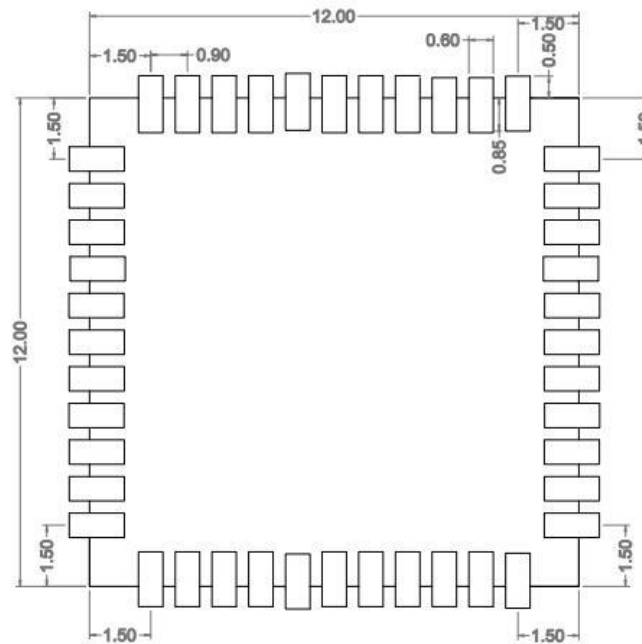


Figure 5: WG225 PCB Footprint Dimensions

6. Electrical Characteristics

a) Absolute Maximum Ratings

Parameter	Condition	Min.	Typ.	Max.	Unit
Storage Temperature Range		-40		135	°C
ESD Protection	VESD	/		2000	V
Maximum RFIN				+10	dBm
Supply Voltage	VDD	0		4.0	V
Supply Voltage	VDDIO	0		4.0	V
Voltage On Any I/O Pin		-0.3		VDD+0.3	V

Table7-1: Absolute Maximum Ratings

WG225 series modules are Electrostatic Sensitive Devices and require special precautions while handling.



ESD precautions

The WG225 module contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the WG225 module without proper ESD protection may destroy or damage them permanently.

The WG225 module 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 WG225 module. Don't touch the module by hand or solder with non-anti-static soldering iron to avoid damage to the module.

b) Recommended Operation Ratings

Parameter	Symbol	Min	Typ.	Max.	Unit
Operating Temperature Range	TA	-20		70	°C
Power Supply	VDD	3.135	3.3	3.465	V
Power Supply	VCC	1.71	3.3	3.46	V

Table7-2: Operating Conditions

7 Performance Specification

Hardware Features	
Model	WG225
Antenna Type	PCB Pin
Chipset Solution	RTL8821
Voltage	3.3V+/-5%
Dimension(LxWxH)	12.0mm*12.0mm*1.8mm
Wireless Features	

Wireless Standards	IEEE 802.11a/b/g/n/ac
Frequency Range	2.412GHz--2.484GHz & 5.180GHz --5.825GHz
Data Rates	IEEE 802.11b : 1,2,5.5,11Mbps
	IEEE 802.11g : 6,9,12,18,24,36,48,54Mbps
	IEEE 802.11n : MCS0--MCS7 @ HT20 /2.4GHz band
	MCS0--MCS7 @ HT40 /2.4GHz band
	MCS0--MCS9 @ HT40 /5GHz band
	IEEE 802.11ac : MCS0--MCS9 @ VHT80 /5GHz band
Receiver Sensitivity	VHT80 MCS9 : -53dBm@10% PER(MCS9) /5GHz band
	HT40 MCS9 : -60dBm@10% PER(MCS9) /5GHz band
	HT40 MCS7 : -65dBm@10% PER(MCS7) /2.4GHz band
	HT20 MCS7 : -66dBm@10% PER(MCS7) /2.4GHz band
	54M: -71dBm@10% PER
	11M: -83dBm@ 8% PER
Modulation Technique	DSSS (DBPSK, DQPSK, CCK)
	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 125-QAM, 256-QAM)
Wireless Security	WPA/WPA2, WEP, TKIP and AES, WPS2.0, WAPI
Transmit Power	IEEE 802.11ac: 11±1.5dBm @HT80 MCS9 /5GHz band
	IEEE 802.11ac: 13±1.5dBm @HT80 MCS0 /5GHz band
	IEEE 802.11n: 12±1.5dBm @HT20/40 MCS7 /5GHz band
	IEEE 802.11n: 14±1.5dBm @HT20/40 MCS0 /5GHz band
	IEEE 802.11n: 14±2dBm @HT20/40 MCS7 /2.4GHz band
	IEEE 802.11g: 16±2dBm @54Mbps
	IEEE 802.11b: 18±2dBm @11Mbps
Others	
Certification	RoHS
Environment	Operating Temperature: -20°C~70°C
	Storage Temperature: -40°C~135°C

	Operating Humidity: 10%~90% non-condensing
	Storage Humidity: 5%~90% non-condensing

8 Packaging Specification

WG225 modules are shipped in reel and with 1200 units per reel. Each tray is 'dry' package.

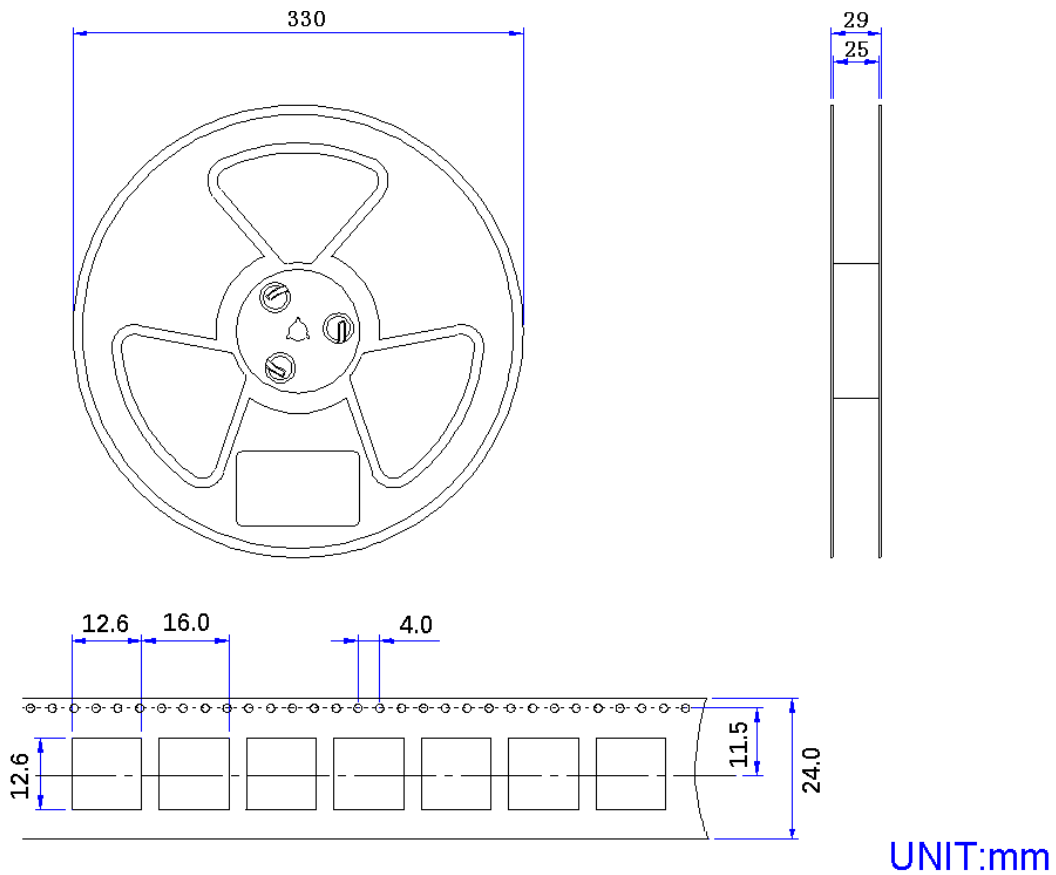


Figure 6: WG225 Packaging

9 Manufacturing Process Recommendations

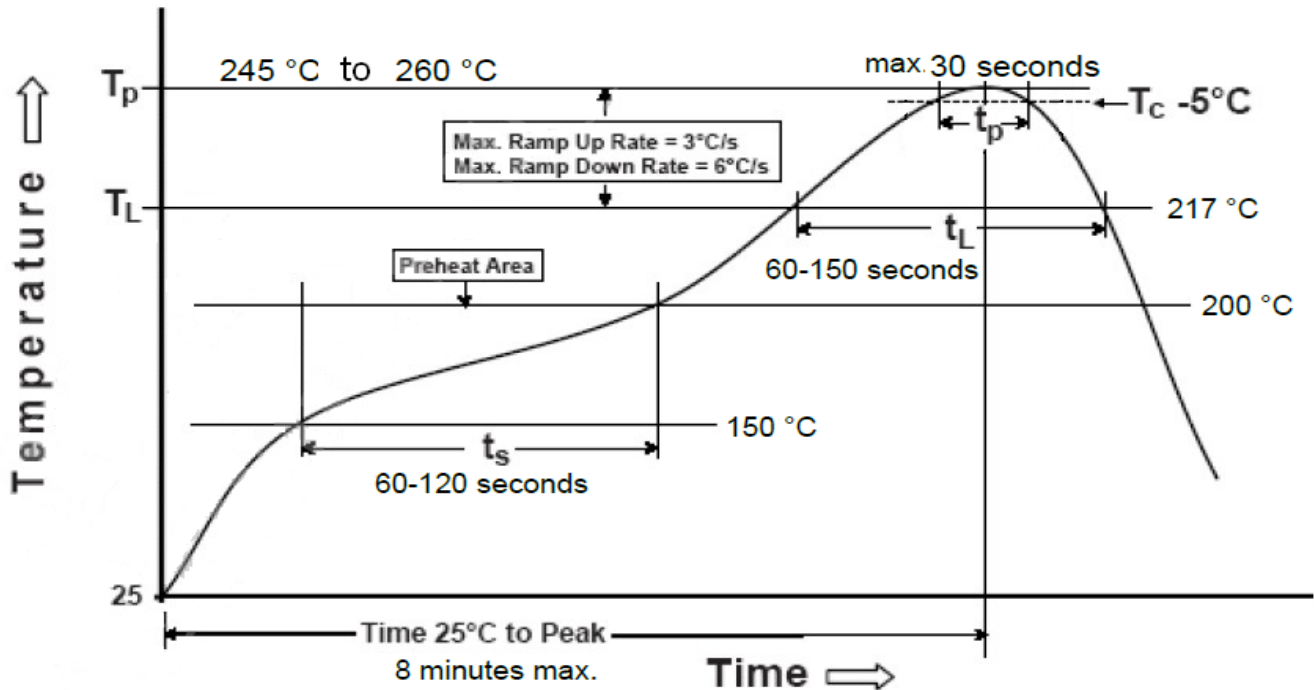


Figure 7: WG225 Typical Lead-free Soldering Profile

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.

10 Ordering Information

Module No.	Antenna Connector Type
WG225	PCB PIN

11 Reversion History

Revision	Description	Approved	Date
V1.01	Initial Release	George He	2018.04.10
V1.02	Update Wireless Features	George He	2018.05.28
V1.03	Update PCB Footprint Dimensions	George He	2018.05.20

V1.04	Adding Packaging Specification	George He	2018.07.23
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12 Contact Information

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FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247 and FCC CFR Title 47 Part 15 Subpart E Section 15.407: 2016

External antenna with gain BT/BLE/2.4GWifi: 2dBi 5G Wifi: 4dBi

FCC Regulatory Compliance:

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: 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.

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

If power exceeds the limit and the distance(Over 20cm distance in actual use between the device and user) is compliance with the requirement

RF Exposure Compliance:

This equipment complies with FCC 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.

Notice to OEM integrator

If the FCC ID 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. The end product shall have the words "Contains Transmitter Module FCC ID: 2ACOE-WG225".

The device must be professionally installed.

The intended use is generally not for the general public. It is generally for industry/commercial use.

The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required. The user has no access to the connector.

Installation must be controlled. Installation requires special training.

Any company of the host device which installs this modular with unlimited modular approval should perform the test of radiated & conducted emission and spurious emission, etc. according to FCC part 15C: 15.407 and 15.203 & 15.207, 15B Class B requirement, only if the tests result comply with FCC part 15C: 15.407 and 15.203 & 15.207, 15B Class B requirement, then the host can be sole legally.

When the module is installed inside another device, the user manual of the host contain below

- 1) This device may not cause harmful interference.
- 2) This device must accept any interference received, including interference that may cause undesired operation