SKYLAB WG225 Combo Module User Manual

SKYLAB
Simplify Your System

SDIO 802.11ac WIFI + UART BT2.1/4.2 Combo Module User Manual
Skylab M&C Technology Co., Ltd
Model No.: WG225
WG225 SDIO 802.11ac

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This document applies 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 a temperature between -20℃ and +70℃,
This modular must be installed and operated with a minimum distance of 20cm between the radiator and the user body

Contents

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

Applications

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

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 transmitters 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)

Module Pinout and Pin Description

Module Pinout

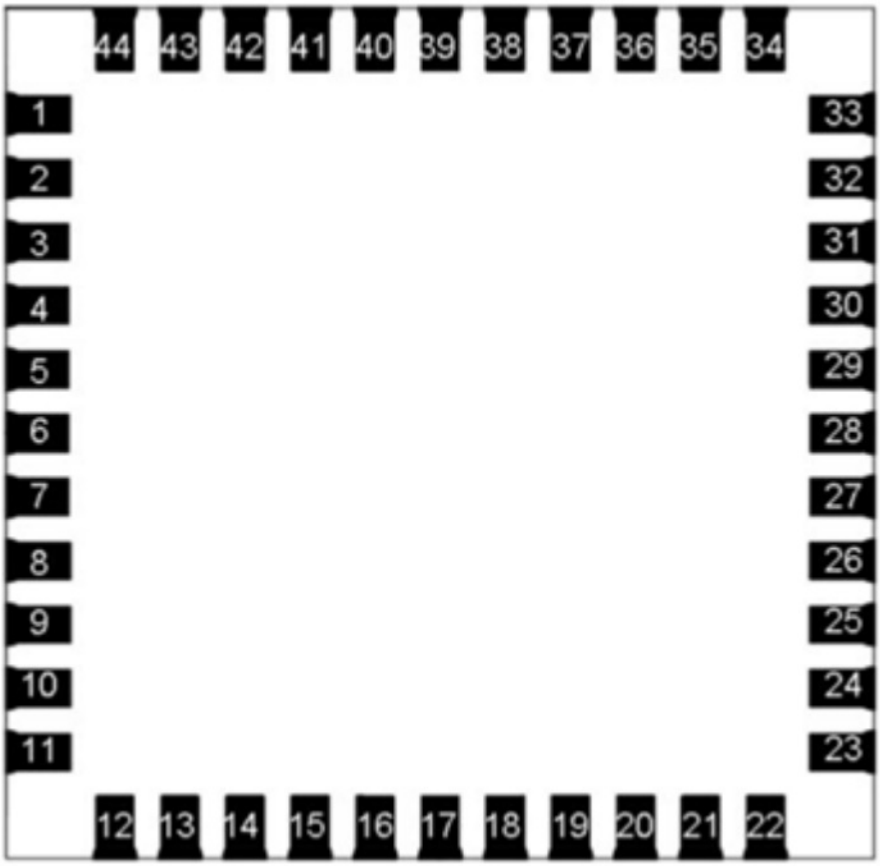

Figure 3: WG225 Pin Package

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 shut down 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	VIDEO	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 shut down the module BT function, active low.	
35	BAT EN	This pin can externally shut down the	

		module, active low.	
36	GND	Ground	
37	NC	NC	
38	NC	NC	
39	NC	NC	
40	NC	NC	
41	UARTRTSN	Bluetooth/FM UART interface	
42	UARTTXD	Bluetooth/FM UART interface	
43	UARTRXD	Bluetooth/FM UART interface	
44	UARTCTSN	Bluetooth/FM UART interface	

PCB Footprint and Dimensions

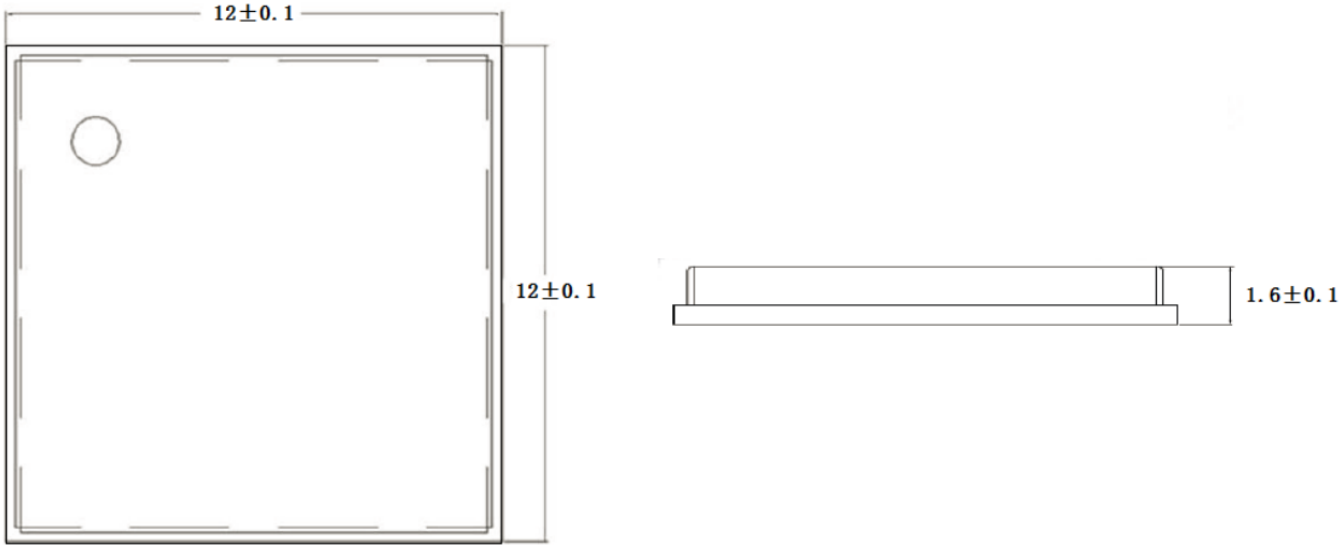

Figure 4: WG225 Dimensions

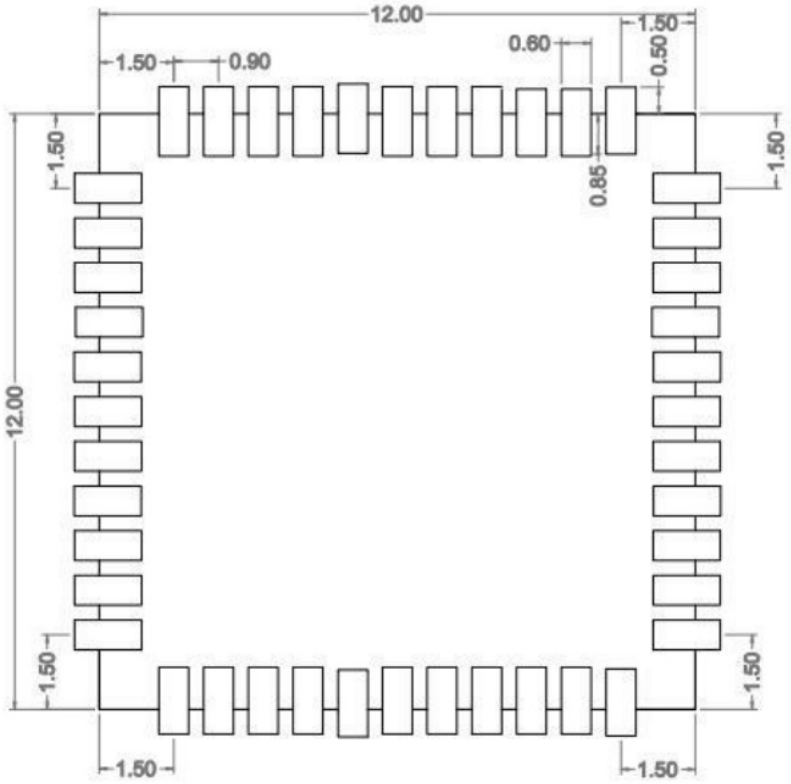

Figure 5: WG225 PCB Footprint Dimensions

6. Electrical Characteristics

a) Absolute Maximum Ratings

Parameter	Condition	Min.	Typ.	Max.	Unit
Storage Temperature Range		-40		135	t
ESD Protection	VEST	/		2000	V
Maximum RFID				+10	dBm
Supply Voltage	VDD	0		4.0	V
Supply Voltage	VIDEO	0		4.0	V
Voltage On Any I/O Pin		0.		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 contains highly sensitive electronic circuitry and is an Electrostatic Sensitive Device (ESD). Handling the WG225 module without proper ESD protection may destroy or damage them permanently.

The WG225 module is an electrostatic-sensitive device (ESD) and requires 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 a 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.	3.	3.	V
Power Supply	VCC	2.	3.	3.	V

Table7-2: Operating Conditions

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 802.1 lb : 1,2,5.5,11Mbps
	IEEE 802.11g : 6,9,12,18,24,36,48,54Mbps
	IEEE 802.11n : MCSO–MCS7 @ HT20 /2.4GHz band
	MCSO–MCS7 @ HT40 /2.4GHz band
	MCSO–MCS9 @ HT40 /5GHz band
	IEEE 802.1 lac : MCSO–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
	11 M: -83dBm@ 8% PER
Modulation Technique	DSSS (DBPSK, DQPSK, CCK)
	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 125-QAM, 256-QAM)
Wireless Security	WPAMPA2, WEP, TKIP and AES, WPS2.0, WAPI
Transmit Power	IEEE 802.1 lac: 11+ 1.5dBm @HT80 MCS9 /5GHz band
	IEEE 802.1 lac: 13±1.5dBm @HT80 MCSO /5GHz band
	IEEE 802.11n: 12±1.5dBm @HT20/40 MCS7 /5GHz band
	IEEE 802.11n: 14±1.5dBm @HT20/40 MCSO /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

Packaging Specification

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

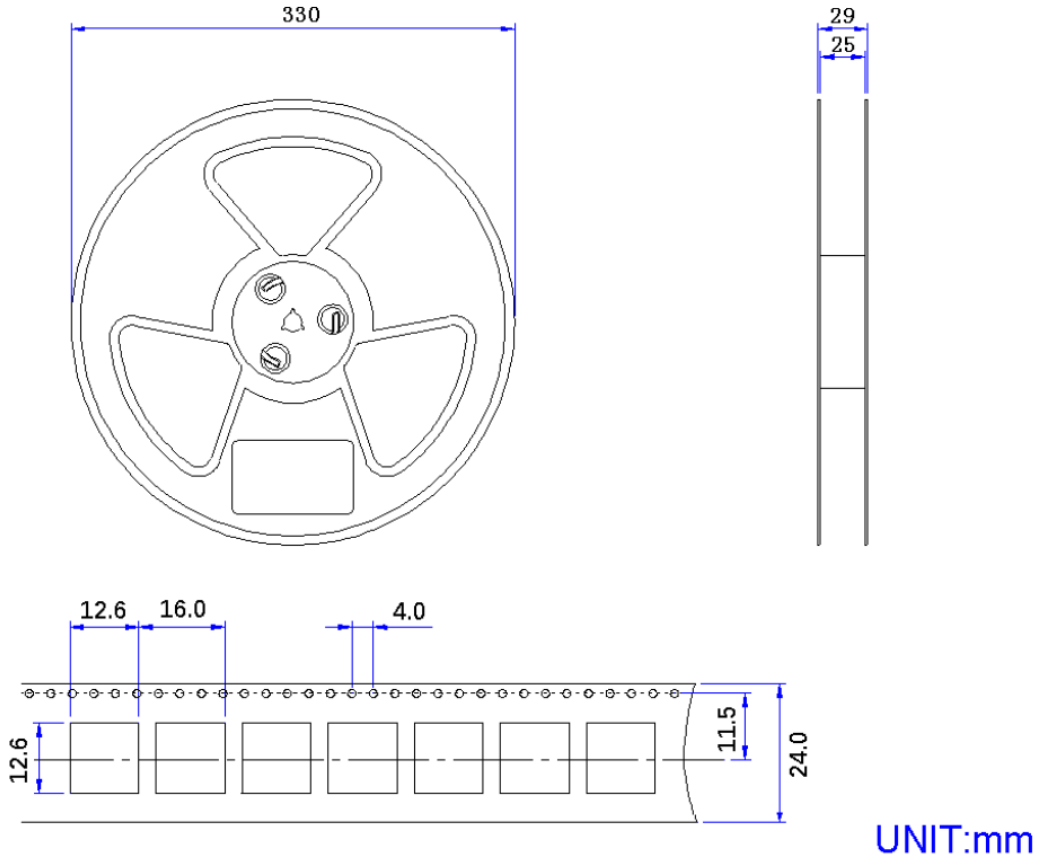

Figure 6: WG225 Packaging

Manufacturing Process Recommendations

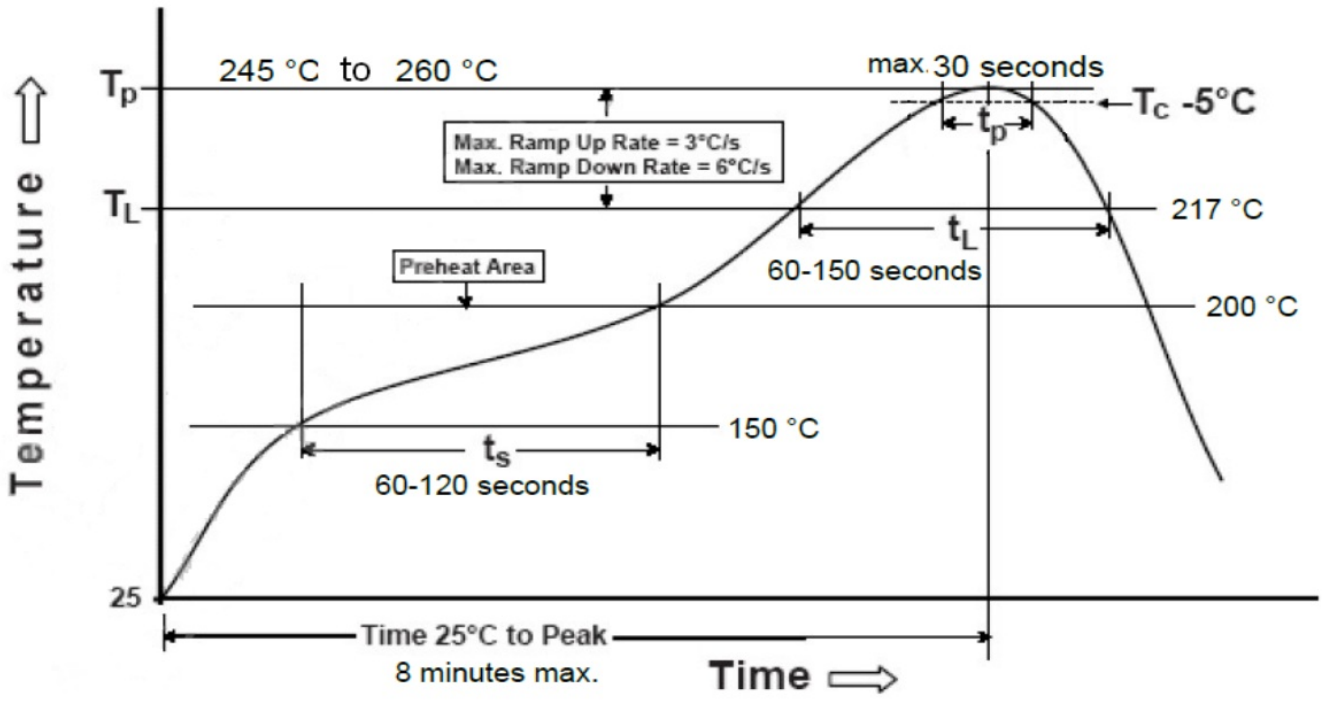

Figure 7: WG225 Typical Lead-free Soldering Profile

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.

Ordering Information

Module No.	Antenna Connector Type
WG225	PCB PIN

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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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 in 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 which 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 and15.203 & 15.207, 15B Class B requirement, only if the tests result complies 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 hose contains below
1) This device may not cause harmful interference.
2) This device must accept any interference received, including interference that may cause undesired operation.

Documents / Resources

	SKYLAB WG225 Combo Module [pdf] User Manual WG225, 2ACOE-WG225, 2ACOEWG225, WG225 Combo Module, WG225, Combo Module

References

- GPS _ _ _WiFi _ _ _
- GPS _ _ _WiFi _ _ _
- WiFi Module|Bluetooth Module|GPS Module|Beacon-SKYLAB
- WiFi Module|Bluetooth Module|GPS Module|Beacon-SKYLAB