

WG223 Datasheet

SDIO 2.4GHz 802.11n

1T1R Wi-Fi Module

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Revision	Description	Approved	Date
V1.01	Initial Release	George He	2018.02.10
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V1.03	Update Wireless Features	George He	2018.05.28
V1.04	Update Frequency Range	Wendy	20231107

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Product name	Type number	Product status
WG223	WG223	Mass Production

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1 General Description

The WG223 module is a highly integrated SDIO interface (SDIO 1.1/ 2.0/ 3.0 compliant) 2.4G 802.11b/g/n 1T1R Wireless LAN (WLAN) network controller. It has a WLAN MAC, a 1T1R capable WLAN baseband, and WLAN RF in a single module. The WG223 provides a complete solution for a high throughput performance integrated wireless LAN device. The module requiring only an external 3.3V power supply. Below is the module top view.

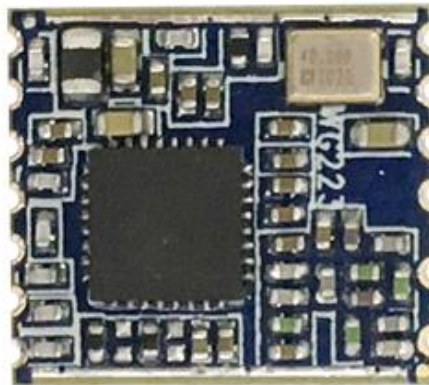


Figure 1: WG223 Top View

2 Features

Wi-Fi

- ◆ 802.11 b/g/n, up to 150Mbps data rate.
- ◆ 1T1R WLAN for 2.4 GHz.
- ◆ SDIO 1.1/2.0/3.0 interface for WLAN.
- ◆ 802.11e QoS enhancement(WMM).
- ◆ 802.11i(WPA, PWA2).

Host and Peripheral Interface

- ◆ Complies with SDIO 1.1/ 2.0/ 3.0 for WLAN with clock rate up to 100MHz.
- ◆ GSPI interface for configurable endian for WLAN.
- ◆ GPIO (8 pins).
- ◆ One configurable LED pins.

Standards Supported

- ◆ IEEE 802.11b/g/n compatible WLAN.

- ◆ IEEE 802.11e QoS Enhancement (WMM).
- ◆ 802.11i (WPA, WPA2), Open, shared key, and pair-wise key authentication services.

3 Application

- ◆ STB
- ◆ Smart Home
- ◆ Wi-Fi gateway
- ◆ Consumer electrical devices

4 Module Block Diagram

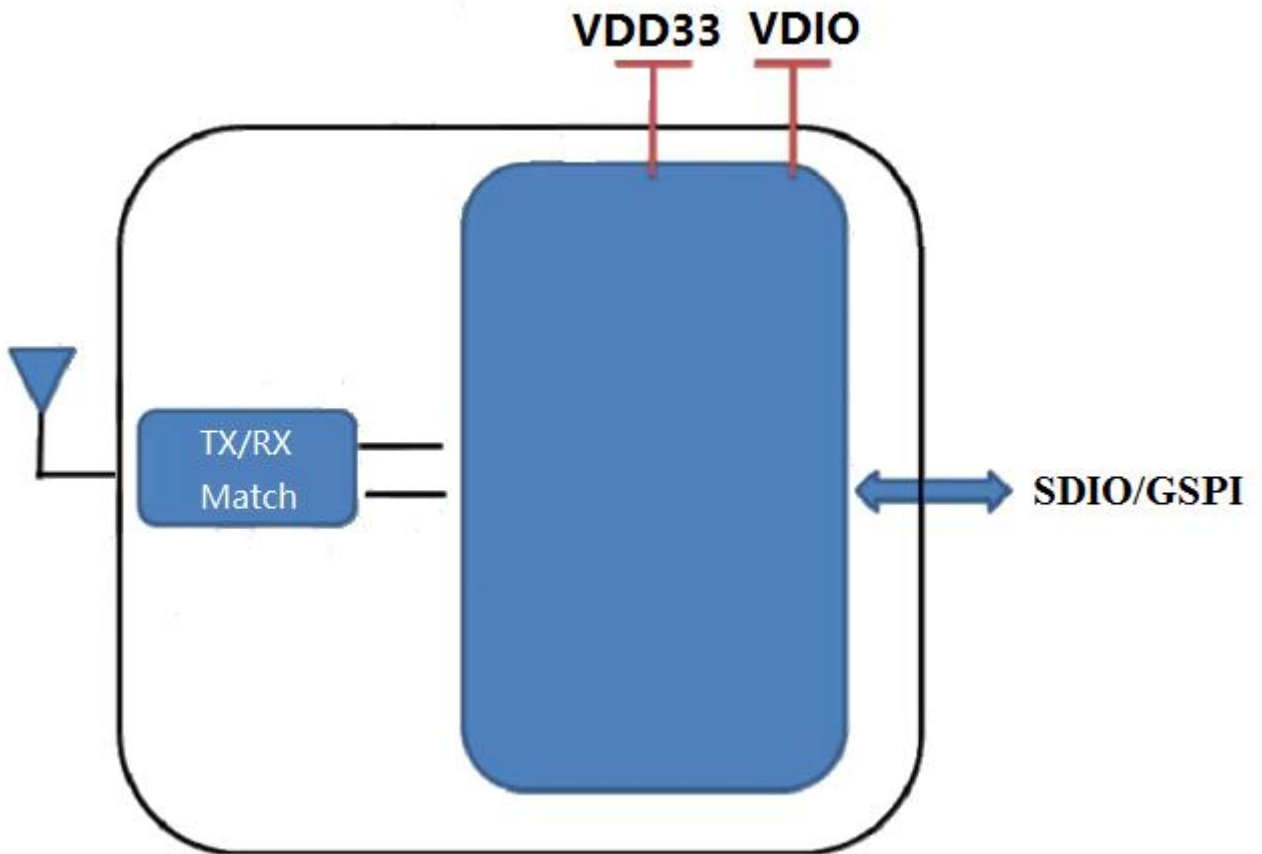


Figure 2: WG223 Block Diagram

5 Module Pinout and Pin Description

Module Pinout

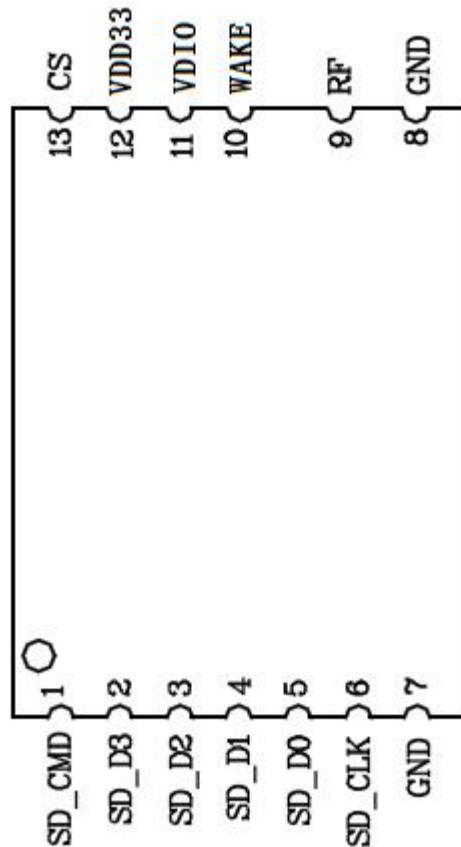


Figure 3: WG223 Pin Package

Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	SD_CMD	I/O	SDIO command	SD_CMD
2	SD_D3	I/O	SDIO data bit [3]	
3	SD_D2	I/O	SDIO data bit [2]	
4	SD_D1	I/O	SDIO data bit [1]	
5	SD_D0	I/O	SDIO data bit [0]	
6	SD_CLK	I	SDIO input clock from Host	
7	GND	G		

8	GND	G		
9	RF		RF antenna port for 2.4G	50 Ohm
10	WAKE	I	WG223 Wakeup Input	Active High Status
11	VDIO	P	SDIO GPIO Power Supply	1.8-3.3V
12	VDD33	P	Module Power Supply	3.0-3.6V
13	CS	I	WG223 Chip Set	Active High Status

6 PCB Footprint and Dimensions

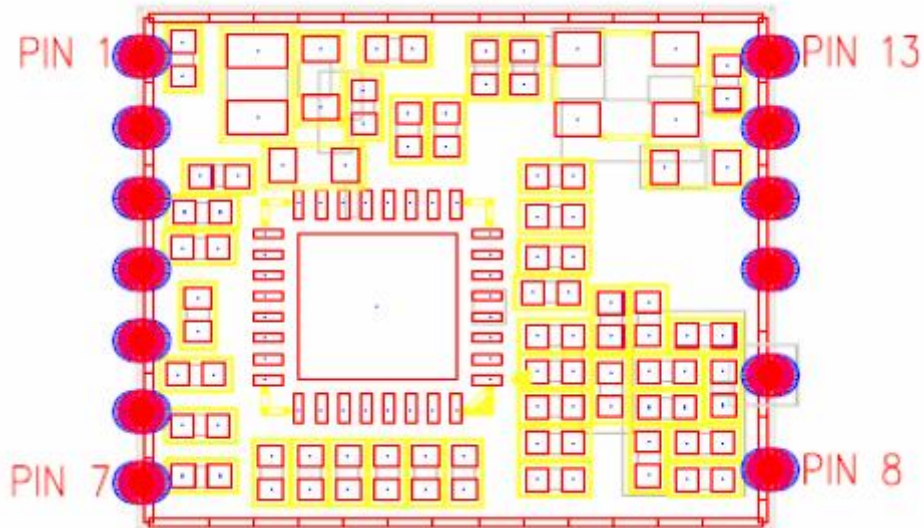


Figure 4: Top Layer (Top View)

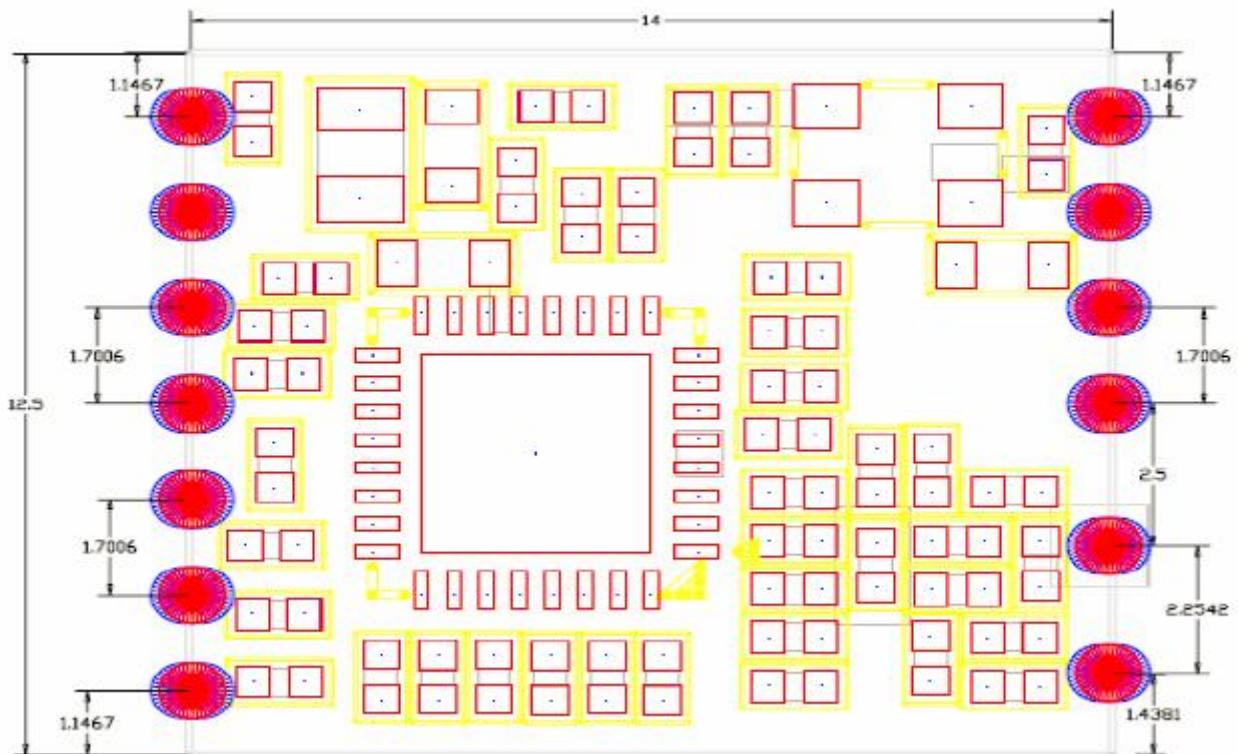


Figure 4: WG223 Dimensions (Top View)

7 Electrical Characteristics

a) Absolute Maximum Ratings

Table7-1: Absolute Maximum Ratings

Parameter	Condition	Min.	Typ.	Max.	Unit
Storage Temperature Range		-55		125	°C
ESD Protection (*)	VESD	/		2000	V
Maximum RFIN				+10	dBm
Supply Voltage	VDD33	0		4.0	V
Supply Voltage	VDIO	0		4.0	V
Voltage On Any I/O Pin		-0.3		VDD+0.3	V

*WG223 modules are Electrostatic Sensitive Devices and require special precautions while handling.



ESD precautions

The WG223 modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the WG223 modules without proper ESD protection may destroy or damage them permanently.

The WG223 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 WG223 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

Table7-2: Operating Conditions

Parameter	Symbol	Min	Typ.	Max.	Unit
Ambient Operating Temperature	TA	-20		70	°C
Power Supply	VDD33	3.135	3.3	3.465	V
Power Supply	VDIO	1.71	3.3	3.46	V

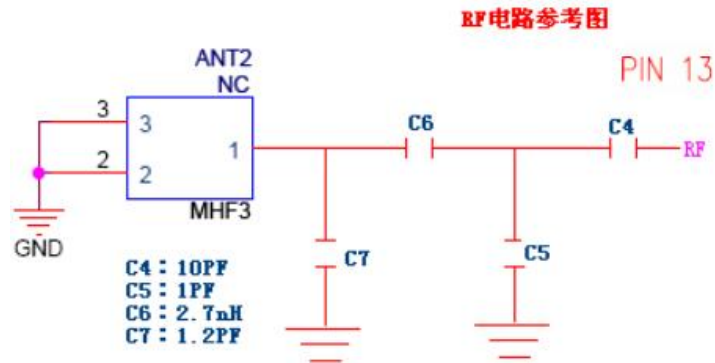
8 Performance Specification

Hardware Features	
Model	WG223
Antenna Type	PCB Pin
Chipset solution	RTL8189ES
Voltage	3.3V+/-5%
Dimension(L×W×H)	14.0mm*12.5mm*2.4mm
Wireless Features	

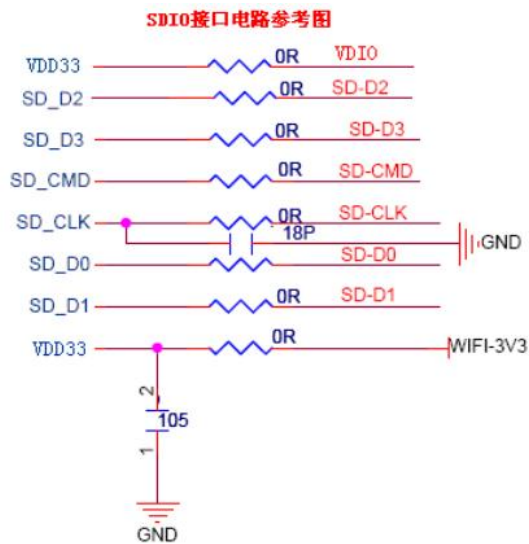
Wireless Standards	IEEE 802.11b/g/n/
Frequency Range	2412MHz---2484MHz
Data Rates	IEEE 802.11b : 1,2,5.5,11Mbps
	IEEE 802.11g : 6,9,12,18,24,36,48,54Mbps
	IEEE 802.11n : MCS0--MCS7 @ HT20 /2.4GHz band
	MCS0--MCS7 @ HT40 /2.4GHz band
Receiver Sensitivity	HT40 MCS7 : -65dBm@10% PER(MCS7) /2.4GHz band
	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)
Wireless Security	WPA/WPA2, WEP, TKIP and AES, WPS2.0, WAPI
Transmit Power	IEEE 802.11n: 14±2dBm @HT20/40 MCS7
	IEEE 802.11g: 16±2dBm @54Mbps
	IEEE 802.11b: 18±2dBm @11Mbps
OS supported	Windows XP/Win7/Linux/Android
Others	
Certification	RoHS, FCC, CE compliance
Environment	Operating Temperature: -20℃~70℃
	Storage Temperature: -55℃~125℃
	Operating Humidity: 10%~90% non-condensing
	Storage Humidity: 5%~90% non-condensing

9 Reference Circuit

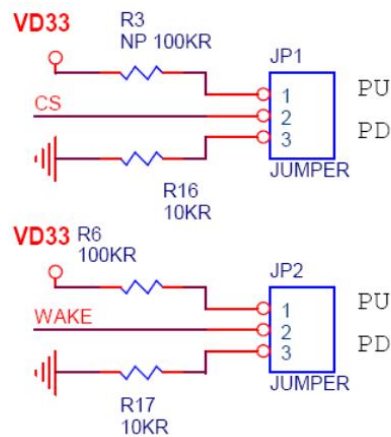
a) Wi-Fi RF Circuit reference pictures



b) SDIO interface Circuit reference pictures



c) CS WAKE Reference Circuit



CS, WAKE config.

10 Manufacturing Process Recommendations

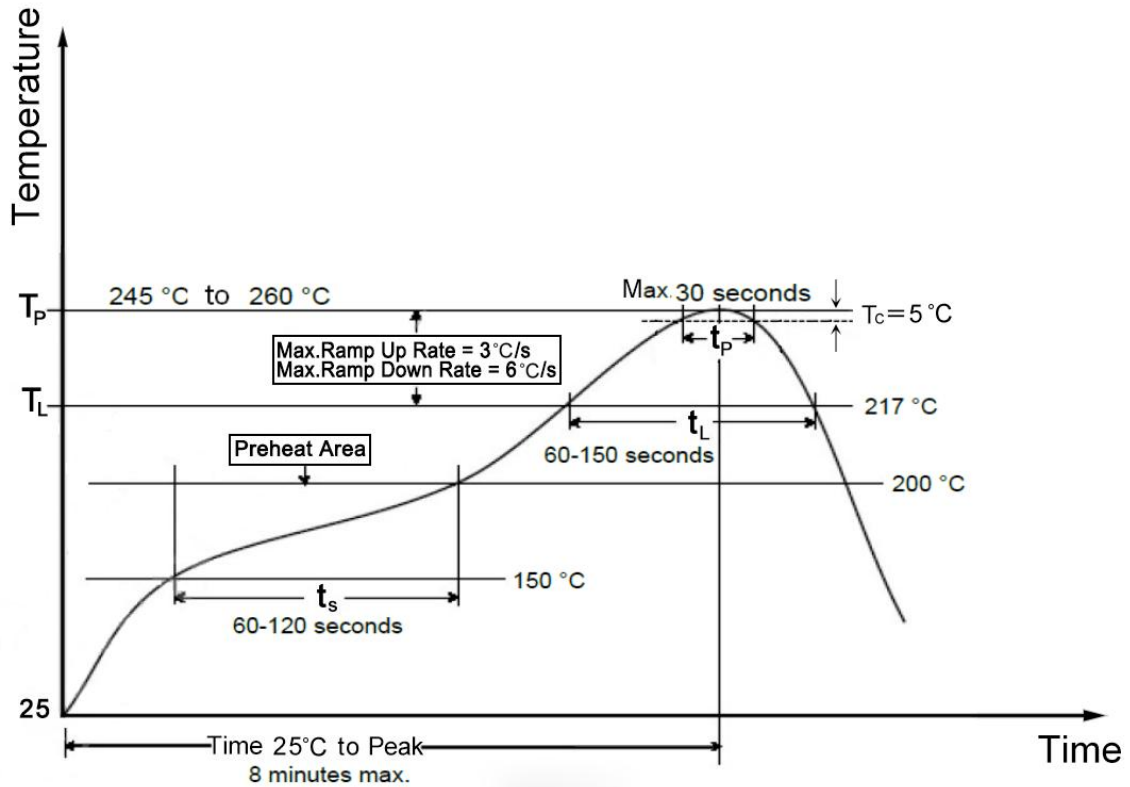


Figure 5: WG223 Typical Lead-free Soldering Profile

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.

11 Packaging Specification

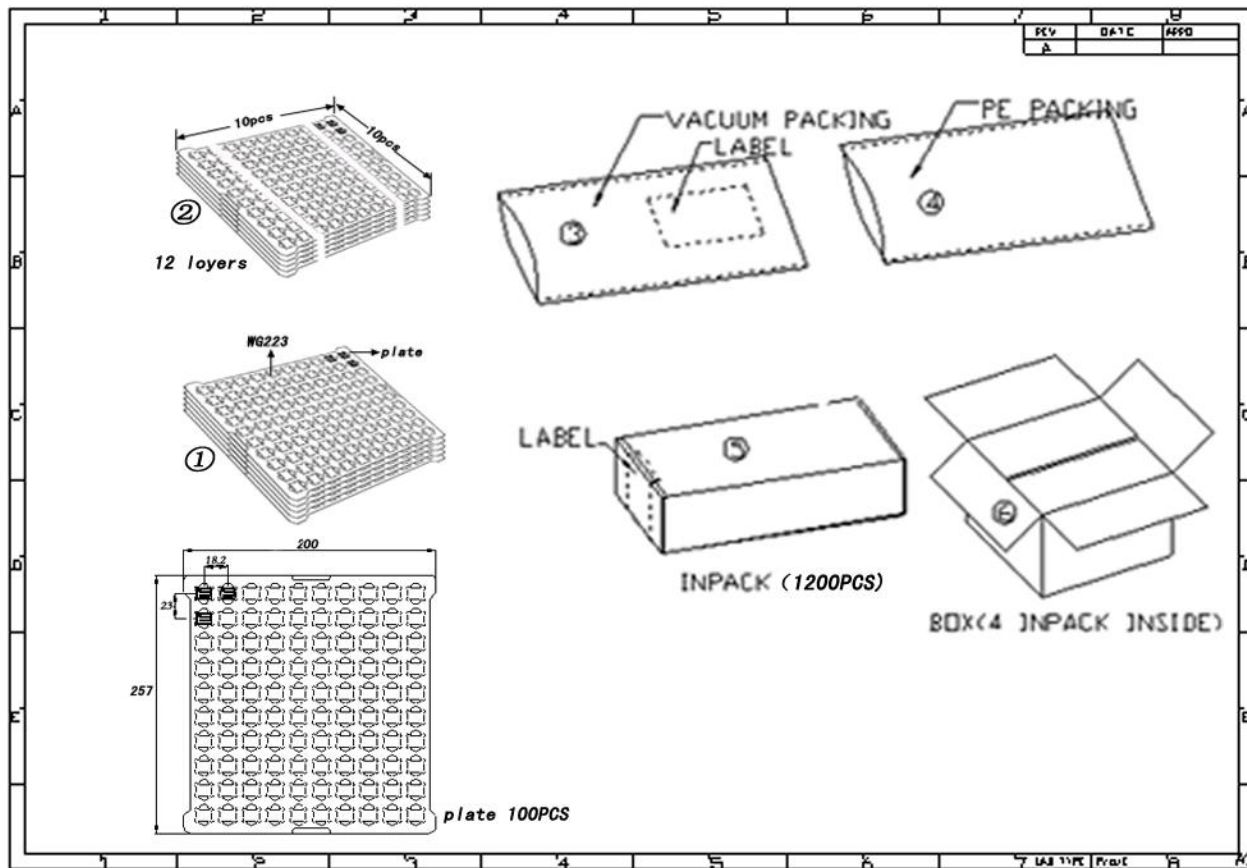


Figure 6: WG223 Packaging

12 Ordering Information

Module No.	Antenna Connector Type
WG223	PIN

13 Contact Information

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