

# WG209–USB WiFi Module Datasheet

## Document Information

<b>Title</b>	WG209 802.11b/g/n USB WiFi Module Datasheet	
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This document applicable to the following products:

Product name	Type number	Product status
WG209	WG209(0913317)	Mass production

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## 1 General Description

WG209 is a 802.11n/ b/g WiFi one-stream USB interface designed specifically to provide enhanced WiFi performance and value for home gateways, set-top boxes, gaming consoles, printers, IP cameras, and variety of other products that host processors not originally intended to support WiFi functions. WG209's MT7601 single-chip features a new architecture that integrates both a CPU and memory to run more of the WiFi function on-chip. The integrated CPU offloads the wireless processing overhead from the host appliance and enables consumer electronic devices to support WiFi functions seamlessly without change of original host processors.



Figure 1: WG209 Top View

## 2 Applications

- Desktop Computer
- Laptop Computer,
- IP Camera
- IP TV
- IP DVD(Internet VOD Player)
- Set Top Box
- Home Gateways
- Gaming Consoles
- Printers

## 3 Features

- Compliant to IEEE 802.11b/g/n WLANs
- 2.4 GHz WLAN MAC/BB processing
- Security: WEP 64/128, WPA, WPA2, TKIP, AES, WAPI

- Supports for Windows XP 32/64, 2000, Vista 32/64bit, Windows 7 32/64bit,
- Support Linux up to V3.10, and support for Android..
- Power Supply: 3.3V or 5.0V
- Package: SMD or 4pin/6pin Connector
- USB 2.0 high speed interface.
- Supports 72.2 Mbps for 20 MHz and 150 Mbps for 40 MHz channel operations.
- FCC,CE,IC certificated
- RoHS certificated meets environment-friendly requirement.
- 30±0.3(L) x 15±0.3 (W) x 2.4±0.2(H) mm small dimension (WG209-5PS、WG209-5ES、WG209-3PS、WG209-3ES)
- 30±0.3(L) x 15±0.3 (W) x 8.8±0.2(H) mm small dimension (WG209-5P6、WG209-5P4、WG209-5E6、WG209-5E4、WG209-3P6、WG209-3P4、WG209-3E6、WG209-3E4)

## 4 Applications Block Diagram

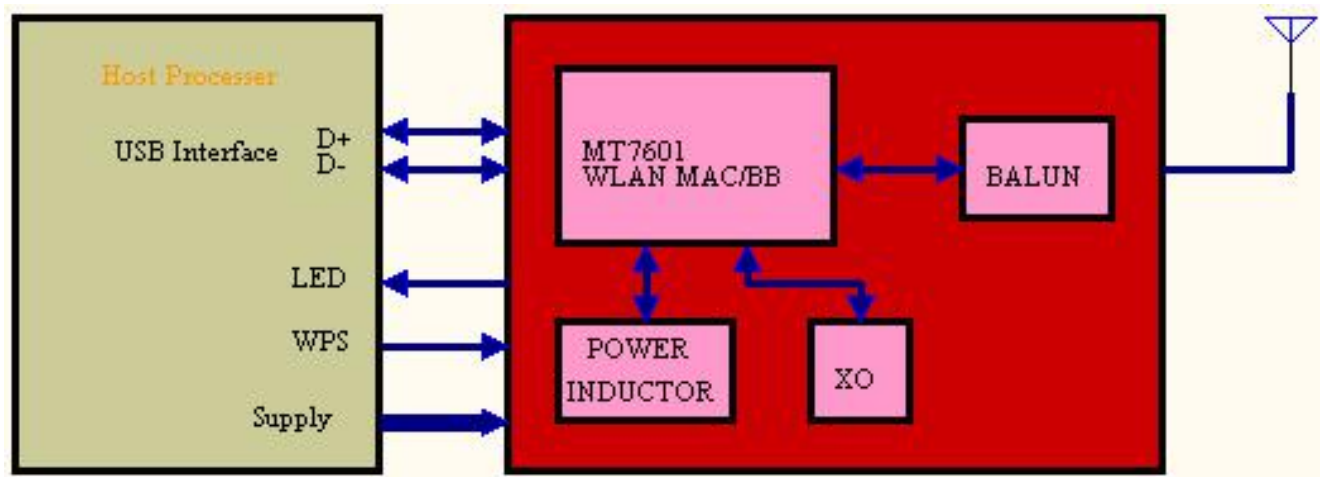
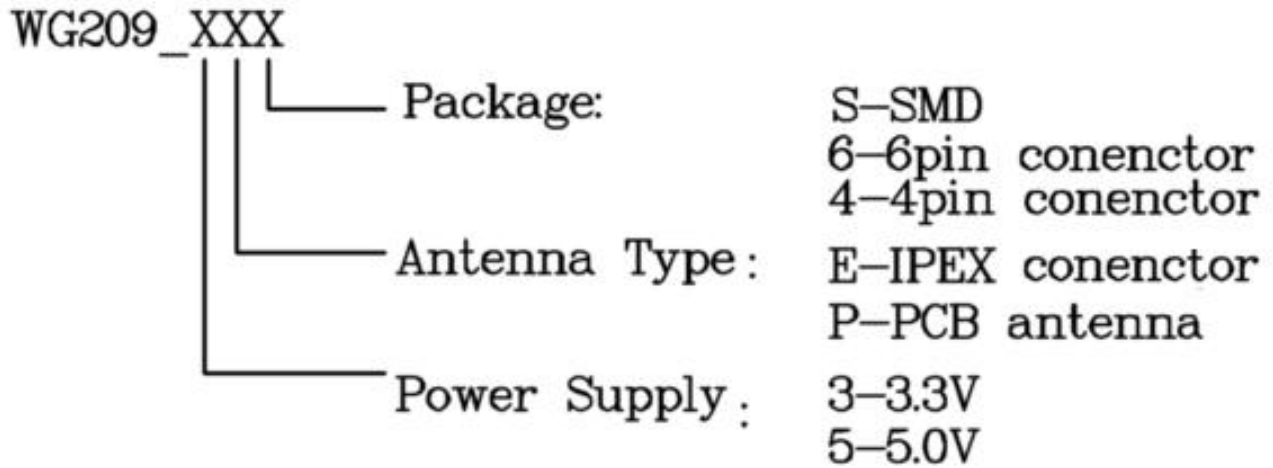


Figure 2: WG209 Block Diagram

## 5 Ordering Information



## 6 Performance Specification

### Wireless Specifications

<b>Model</b>	WG209
<b>Antenna Type</b>	IPEX connector or PCB Antenna
<b>Standard Conformance</b>	802.11b, 802.11g, and 802.11n
<b>Frequency Range</b>	USA: 2.400 ~ 2.483GHz
	Europe: 2.400 ~ 2.483GHz
	Japan: 2.400 ~ 2.497GHz
	China: 2.400 ~ 2.483GHz
<b>Modulation Technique</b>	DSSS with CCK, DQPSK, DBPSK
	OFDM with BPSK, QPSK, 16QAM, 64QAM
<b>Channel Spacing</b>	5MHz/20MHz/40MHz
<b>Data Rate</b>	802.11b: 1, 2, 5.5 and 11Mbps
	802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
	802.11n: 20MHz channel: 1Nss: 65Mbps @ 800GI, 72.2Mbps @ 400GI

	(Max.)
	40MHz channel: 1Nss: 135Mbps @ 800GI, 150Mbps @ 400GI (Max.)
<b>Operating Channels</b>	USA/Canada: 11 (1~11)
	Major Europe Countries: 13 (1~13)
	France: 4 (10~13)
	Japan: 14 for 802.11b (1~13 or 14th), 13 for 802.11g (1~13)
	China: 13 (1~13)
<b>Wi-Fi Compliance</b>	Wi-Fi 2.4GHz by request
<b>Certification</b>	FCC、CE
<b>Security</b>	64/128/152-bit WEP encryption
	WPA/WPA2 encryption
	AES-CCM & TKIP encryption

### Transmit Power And Receive Sensitivity

<b>Transmit Power</b>	target power tolerance $\pm 2$ dBm			
	802.11b:	+18 dBm for 802.11b CCK		
	802.11g:	+16dBm @ 6, 9, 12,18,24,36,48Mbps		
		+15dBm @ 54Mbps		
	802.11n HT20:	+15dBm @ MCS 7/15		
	802.11n HT40:	+15dBm @ MCS 7/15		
<b>Receiver Sensitivity</b>		Data Rate	IEEE Spec(1 Rx dBm)	Typical
	802.11b	1M	-82	-92
		5.5M	-80	-89
		11M	-76	-87
	802.11g	6M	-82	-92
		9M	-81	-92

		12M	-79	-91	
		18M	-77	-90	
		24M	-74	-86	
		36M	-70	-83	
		48M	-66	-78	
		54M	-65	-76	
	802.11n HT20	MCS0	-82	-92	
		MCS1	-79	-91	
		MCS2	-77	-90	
		MCS3	-74	-85	
		MCS4	-70	-82	
		MCS5	-66	-79	
		MCS6	-65	-75	
		MCS7	-64	-73	
	802.11n HT40	MCS0	-79	-88	
		MCS1	-76	-87	
		MCS2	-74	-86	
		MCS3	-71	-82	
		MCS4	-67	-78	
		MCS5	-63	-75	
		MCS6	-62	-72	
		MCS7	-61	-70	
	<b>Operation Distance</b>		Outdoor		Indoor
			802.11b	150m @ 11Mbps	
		300m @ 1Mbps		100m @ 1Mbps	
		802.11g	50m @ 54Mbps		30m @ 54Mbps
			300m @ 6Mbps		100m @ 6Mbps
		802.11n HT20	30m @ 150Mbps		20m @ 150Mbps



		30m @ 65Mbps	20m @ 65Mbps
		250m @ 6.5Mbps	100m @ 6.5Mbps

## 7 Electrical Characteristics

### Absolute Maximum Rating

Parameter	Symbol	Min	Max	Units
Supply Voltage	VCC_3V3	0.3	4	V
Supply Voltage	VCC_5.0V	0.3	7	V
RF input (reference to 50 Ω)	RFin		10	dBm
Storage Temperature	Tstore	-40	125	°C
Junction Temperature	Tjunction		125	°C
Electrostatic Discharge Tolerance	ESD		2000	V

\*WG209 series modules are Electrostatic Sensitive Devices and require special precautions while handling.



#### ESD precautions

The WG209 series modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling the WG209 series modules without proper ESD protection may destroy or damage them permanently.

The WG209 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 WG209 series module. Don't touch the module by hand or solder with non-anti-static soldering iron to avoid damage to the module.

## Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Supply Voltage	VCC_3V3	3	3.3	3.6	V
Supply Voltage	VCC_5.0V	3.6	5.0	7.0	V
RF input (reference to 50 Ω)	RFin		10	dBm	dBm
Operation temperature	Toperation	-20	25	70	°C
Thermal Parameter	PsiJT			3.23	°C/W

## 8 Power Consumption for 2.4 GHz Operation

Mode	Operating Mode	VDD_3V3(mA)	Max(mA)
HT40 @15dBm	Standby	50	
	TX	135	330
	RX	101	
802.11b @18dBm	Sleep	50	
	TX	205	330
	RX	101	

**Note:** For Tx, transmitter and synthesizer are on. Tx power at 18 dBm for 802.11b and 15 dBm for HT40. For Rx, receiver and synthesizer are on with maximum receiver gain.

## 9 Module Pinout

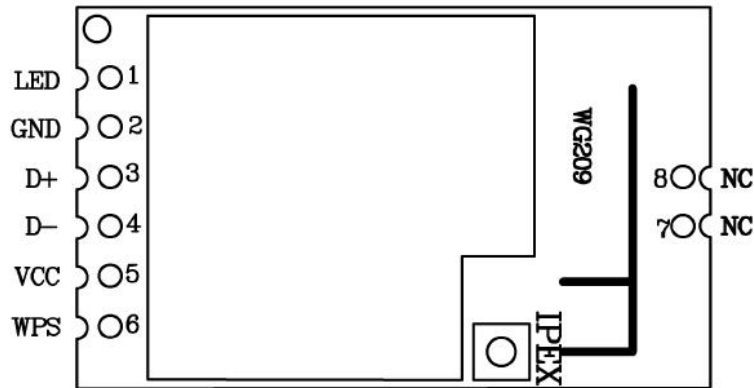


Figure 3: WG209 Pin Name

## 10 Pin Description

Pin No.	Pin name	I/O	Description	Remark
1	LED	O	LED pin	
2	GND	G	Ground	
3	D+	I/O	USB Interface DP	
4	D-	I/O	USB Interface DM	
5	VCC	P	Module Power Supply	
6	WPS	I	WPS pin	
7	NC			
8	NC			

## 11 PCB Dimensions

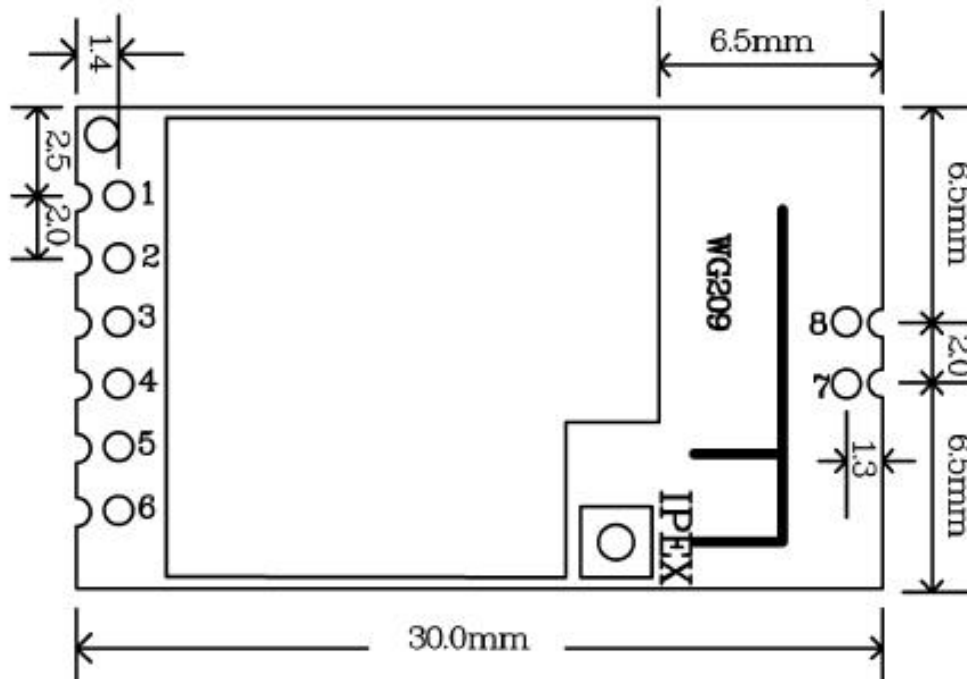


Figure 4: WG209 Dimensions

## Manufacturing Process Recommendations

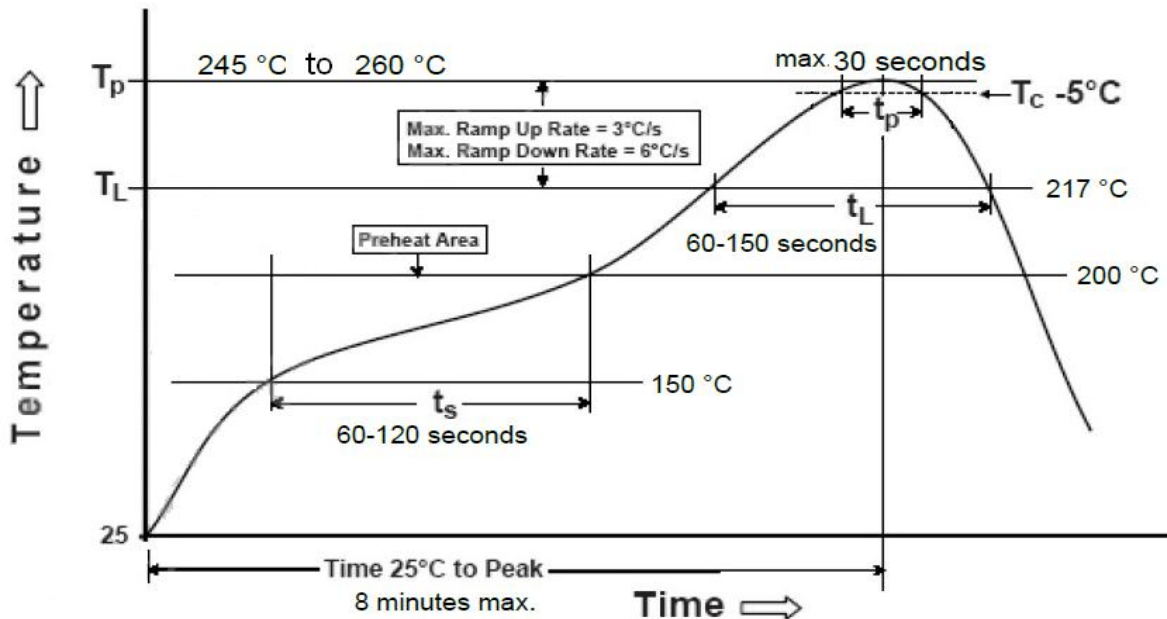


Figure 5: WG209 Typical Leadfree Soldering Profile

**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.

## 12 Reference design schematic

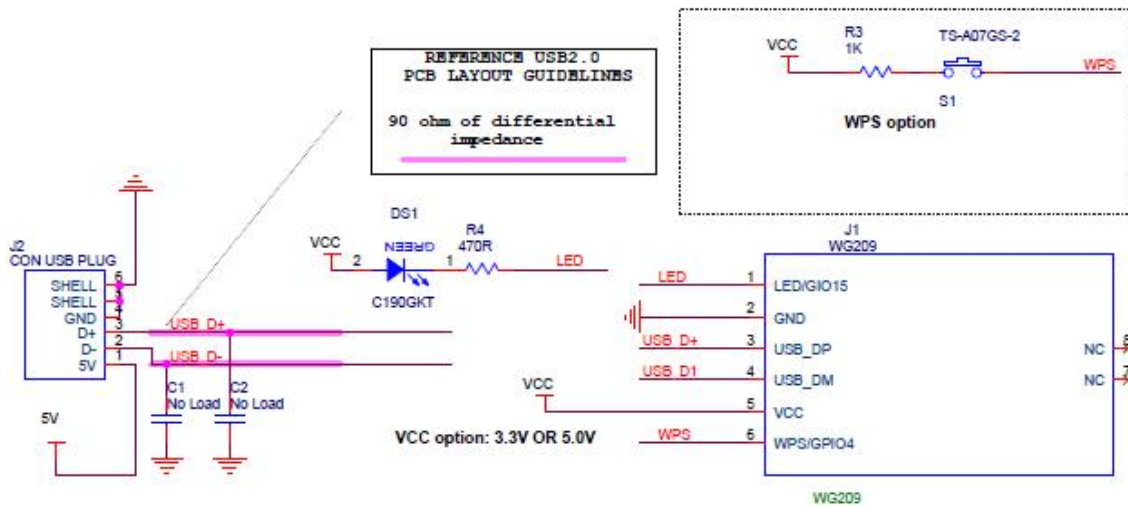
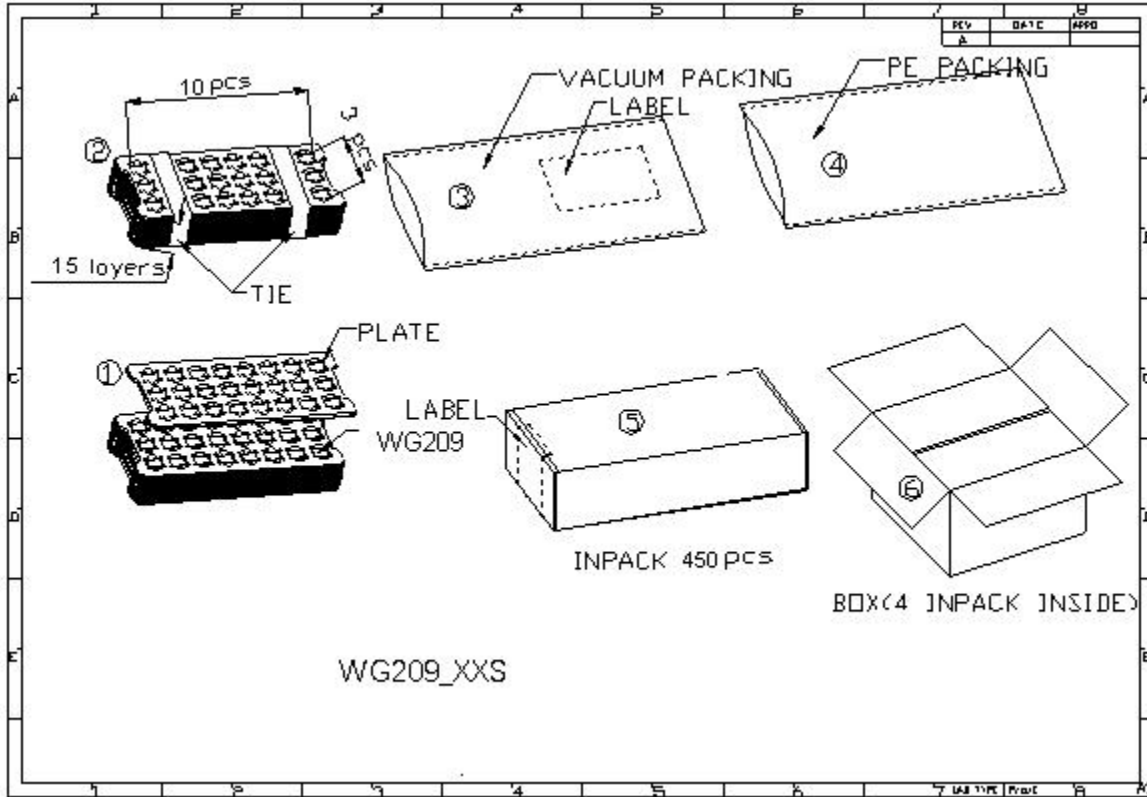


Figure 6: WG209 schematic application

## 13 Packaging Specification



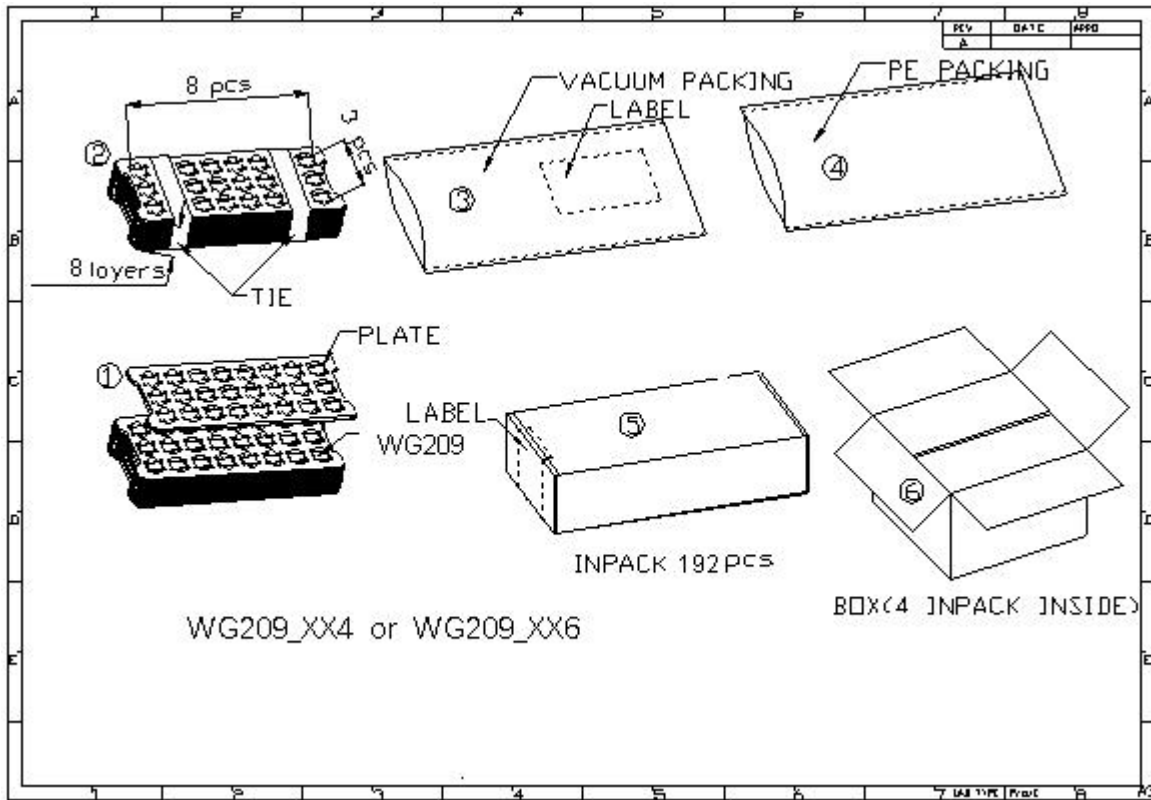


Figure 7: WG209 Packaging

## 14 Revision History

Revision	Description	Approved	Date
V1.01	Initial	George	20140115
V2.01	FCC/CE certification	George	20140712
V2.02	Update soldering temperature	George	20160418
V2.03	Update Top View Photo	George	20170331
V2.04	Update certification information	George	20170831
V2.05	Update Top View Photo	George	20180503
V2.06	Update Package Information	George	20180723
V2.07	Add Dimension deviation indication	George	20180926
V2.08	Linux Driver Update	George	20200430

## 15 Contact Information

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