PRODUCT SPECIFICATION

WiFi module

WPC0GR2231　Specification

IEEE 802.11a/b/g/n/ ac Wi-Fi Module
(Realtek RTL8196cd+ RTL8192er+ RTL8812ar)

Custom Approval Section		
Custom Name	Xiamen Prima Technology Inc	
Department		
Approval		Date：

DESIGN	CHECK	APPROVAL
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Document revision history

Revision	Date	Approved by	Remarks
Version 1.0	2015-03-23	Jason yu	Draft

1 General Description

WPC0G2231 is to specify the product requirements for **802.11 a/b/g/n/ ac Wi-Fi Module.** This Module is based on Realtek RTL8198CD+RTL8192ER+RTL8812AR chipset .that complied with IEEE 802.11n 、 IEEE 802.11ac,and it is also backward complied with IEEE 802.11b/g standard from 2.4~2.5GHz.It can be used to provide up to 54Mbps for IEEE 802.11a, 11Mbps for IEEE 802.11b, 54Mbps for IEEE 802.11g, 300Mbps for IEEE 802.11n and 866.7Mbps for IEEE 802.11ac to connect your wireless LAN.

2 Features

l   Compatible with IEEE 802.11a standard to provide wireless 54Mbps data rate.
l   Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate.
l   Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate.
l   Compatible with IEEE 802.11n standard to provide wireless 300Mbps data rate.
l   Compatible with IEEE 802.11ac standard to provide wireless 866.7Mbps data rate.
l   Operation at 2.412~2.462GHz and 5.180~5.240GHz 5.745~5.825GHzfrequency band to meet worldwide regulations
l   Provides simple legacy and 20MHz/40MHz co-existence mechanisms to ensure backward and network compatibility.
l   Supports infrastructure networks via Access Point and ad-hoc network via peer-to-peer communication
l   Supports IEEE 802.11i (WPA and WPA2), WAPI, enhanced security
l   Friendly use figuration and diagnostic utilities
l   62 AP Access points
l   ROHS compliant

3. Application Diagrams

3.1 Functional Block Diagram
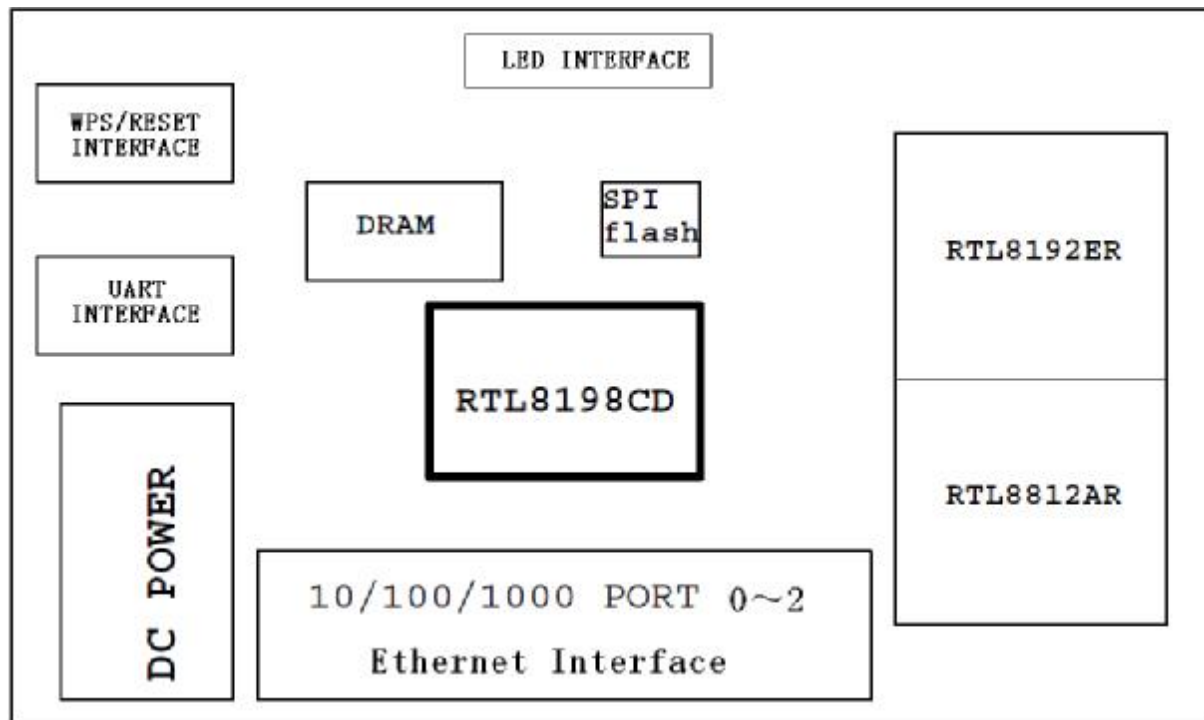
RTL8198CD+RTL8192ER+RTL8812AR

Figure 1

3.2 General Requirements

3.2.1 IEEE 802.11b Section

	Feature	Detailed Description
3.2.1.1	Standard	● IEEE 802.11b
3.2.1.2	Radio and Modulation Schemes	● DQPSK , DBPSK , DSSS , and CCK
3.2.1.3	Operating Frequency	● 2412 ～ 2462MHz ISM band
3.2.1.4	Channel Numbers	● 11 channels for United States ● 13 channels for Europe Countries ● 14 channels for Japan
3.2.1.5	Data Rate	● 11,5.5,2,and 1Mbps
3.2.1.6	Media Access Protocol	● CSMA/CA with ACK
3.2.1.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power at each RF chain, Data Rate and at room Temp. 25 degree C ● 17dBm(±2dB) at 1,2,5.5,11Mbps
3.2.1.8	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at Which Frame(1000-byte PDUs)Error Rate=8% ● -76 dBm at 2Mbps ● -76 dBm for 11Mbps

3.2.2 IEEE 802.11g Section

	Feature	Detailed Description
3.2.2.1	Standard	● IEEE 802.11g
3.2.2.2	Radio and Modulation Type	● QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.2.3	Operating Frequency	● 2412 ～ 2462MHz ISM band
3.2.2.4	Channel Numbers	● 11 channels for United States ● 13 channels for Europe Countries ● 13 channels for Japan
3.2.2.5	Data Rate	● 6,9,12,18,24,36,48,54Mbps
3.2.2.6	Media Access Protocol	● CSMA/CA with ACK
3.2.2.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power(tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25degree C ● +17 dBm at 6,9Mbps ● +16 dBm at 12,18Mbps ● +15 dBm at 24,36Mbps ● +14 dBm at 48,54Mbps
3.2.2.8	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at each RF chain. Frame(1000-byte PDUs)Error Rate<10% at room Temp 25 degree C ● -82 dBm at 6Mbps ● -81 dBm at 9Mbps ● -79 dBm at 12Mbps ● -77 dBm at 18Mbps ● -74 dBm at 24Mbps ● -70 dBm at 36Mbps ● -66 dBm at 48Mbps ● -65 dBm at 54Mbps

3.2.3 IEEE 802.11a Section

	Feature	Detailed Description
3.2.3.1	Standard	● IEEE 802.11a
3.2.3.2	Radio and Modulation Type	● QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.3.3	Operating Frequency	● 5.15~5.25GHz and 5.725~5.825GHz for US and Canada ● 5.15~5.25GHz for Japan ● 5.15~5.25GHz for Europe ● 5.725~5.825GHz for China
3.2.3.4	Channel Numbers	● 12 non-overlapping channels for US and Canada ● 8 non-overlapping channels for Japan ● 19 non-overlapping channels for Europe ● 4 non-overlapping channels for China
3.2.3.5	Data Rate	● 6,9,12,18,24,36,48,54Mbps
3.2.3.6	Media Access Protocol	● CSMA/CA with ACK
3.2.3.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power(tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25degree C ● +14 dBm at 6,9Mbps ● +13 dBm at 12,18Mbps

		• +12 dBm at 24,36Mbps • +11 dBm at 48,54Mbps
3.2.3.8	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at each RF chain. Frame(1000-byte PDUs)Error Rate<10% at room Temp 25 degree C • -82 dBm at 6Mbps • -81 dBm at 9Mbps • -79 dBm at 12Mbps • -77 dBm at 18Mbps • -74 dBm at 24Mbps • -70 dBm at 36Mbps • -66 dBm at 48Mbps • -65 dBm at 54Mbps

3.2.4 IEEE 802.11n Section

	Feature	Detailed Description				
3.2.4.1	Standard	• IEEE 802.11n				
3.2.4.2	Radio and Modulation Type	• BPSK , QPSK , 16QAM ,64QAM with OFDM				
3.2.4.3	Operating Frequency	• 2.4GHz band:2412 ~ 2462MHz • 5GHz and:5150 ~ 5250MHZ and 5725 ~ 5825MHZ				
3.2.4.4	Data Rate	MCS	GI=800ns		GI=400ns	
			20MHz	40MH	20MHz	40MHz
		0	6.5	13.5	7.2	15
		1	13	27	14.4	30
		2	19.5	40.5	21.7	45
		3	26	54	28.9	60
		4	39	81	43.3	90
		5	52	108	57.8	120
		6	58.5	121.5	65.0	135
		7	65	135	72.2	150
3.2.4.5	Media Access Protocol	• CSMA/CA with ACK				
3.2.4.6	Transmitter Output Power at Antenna Connector	• Typical RF Output Power (tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25 degree C				
		• 2.4GHz Band/HT20 +14dBm at MCS0~7			• 2.4GHz Band/HT40 +14dBm at MCS0~7	
		• 5GHz Band/HT20 +11dBm at MCS0~7			• 5GHz Band/HT40 +11dBm at MCS0~7	
3.2.4.7	Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain at Which Frame(1000-byte PDUs)Error Rate=10% and at room Temp.25 degree C				
		2.4GHz Band/HT20 • -82dBm at MCS0 • -79dBm at MCS1 • -77dBm at MCS2 • -74dBm at MCS3 • -70dBm at MCS4 • -66dBm at MCS5 • -65dBm at MCS6 • -64dBm at MCS7			2.4GHz Band/HT40 • -79dBm at MCS0 • -76dBm at MCS1 • -74dBm at MCS2 • -71dBm at MCS3 • -67dBm at MCS4 • -63dBm at MCS5 • -62dBm at MCS6 • -61dBm at MCS7	

5GHz Band/HT20	5GHz Band/HT40
● -82dBm at MCS0	● -79dBm at MCS0
● -79dBm at MCS1	● -76dBm at MCS1
● -77dBm at MCS2	● -74dBm at MCS2
● -74dBm at MCS3	● -71dBm at MCS3
● -70dBm at MCS4	● -67dBm at MCS4
● -66dBm at MCS5	● -63dBm at MCS5
● -65dBm at MCS6	● -62dBm at MCS6
● -64dBm at MCS7	● -61dBm at MCS7

3.2.5 IEEE 802.11ac Section

	Feature	Detailed Description
3.2.5.1	Standard	● IEEE 802.11ac
3.2.5.2	Radio and Modulation Type	● QPSK , BPSK , 16QAM ,64QAM,256QAM with OFDM
3.2.5.3	Operating Frequency	● 5.15~5.25GHz and 5.725~5.825GHz for US and Canada ● 5.15~5.25GHz for Japan ● 5.15~5.25GHz for Europe ● 5.725~5.825GHz for China
3.2.5.4	Channel Numbers	● 12 non-overlapping channels for US and Canada ● 8 non-overlapping channels for Japan ● 19 non-overlapping channels for Europe ● 4 non-overlapping channels for China
3.2.5.5	Data Rate	● at most 433.3 Mbps
3.2.5.6	Media Access Protocol	● CSMA/CA with ACK
3.2.5.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power(tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25degree C ● +11 dBm at HT20 / HT40
3.2.5.8	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at each RF chain. Frame(1000-byte PDUs)Error Rate<10% at room Temp 25 degree C

5GHz Band / HT20	5GHz Band / HT40
● -82dBm at MCS0	● -79dBm at MCS0
● -79dBm at MCS1	● -76dBm at MCS1
● -77dBm at MCS2	● -74dBm at MCS2
● -74dBm at MCS3	● -71dBm at MCS3
● -70dBm at MCS4	● -67dBm at MCS4
● -66dBm at MCS5	● -63dBm at MCS5
● -65dBm at MCS6	● -62dBm at MCS6
● -64dBm at MCS7	● -61dBm at MCS7
● -59dBm at MCS8	● -56dBm at MCS8
● -57dBm at MCS9	● -54dBm at MCS9

		5GHz Band / HT80 not enabled ● -76dBm at MCS0 ● -73dBm at MCS1 ● -71dBm at MCS2 ● -68dBm at MCS3 ● -64dBm at MCS4 ● -60dBm at MCS5 ● -59dBm at MCS6 ● -58dBm at MCS7 ● -55dBm at MCS8 ● -51dBm at MCS9		

4.   Electrical and Thermal Characteristics

4.1   General Section

	Feature	Detailed Description
4.1.1	Antenna Type	● External antenna
4.1.2	Operating Voltage	● 12V±10%
4.1.3	Current Consumption	● 1000mA at continuous transmit mode ● 500mA at receive mode w/o receiving packet

4.2   Software Requirements

The Configuration Software supports Microsoft Windows 2000, xp32/64-bit and Vista 32/64-bit. This configuration software includes the following functions:

● Information
  Information allows you to monitor network status.
● Configuration
  Configuration allows you to configure parameters for wireless networking.
● Encryption
  Encryption provides WEP, WPA, WPA2, and802.1X security control.
● Diagnosis
 Diagnosis allows you to display all channel status and search neighboring access points

4.3   Environmental Requirements

	Feature	Detailed Description
4.3.1	Operating Temperature Conditions	● 0℃ ~ + 60℃.
4.3.2	Non-Operating Temperature Conditions	● -40℃ ~ +80℃.
4.3.3	Operating Humidity conditions	● 10% ~ 90%
4.3.4	Non-Operating Humidity Conditions	● 5% ~ 95%

4.4　Mechanical Requirements

	Feature	Detailed Description
4.4.1	Length	● 130mm
4.4.2	Width	● 105mm
4.4.3	Height	● 23mm

4.5　Mechanical Dimensions
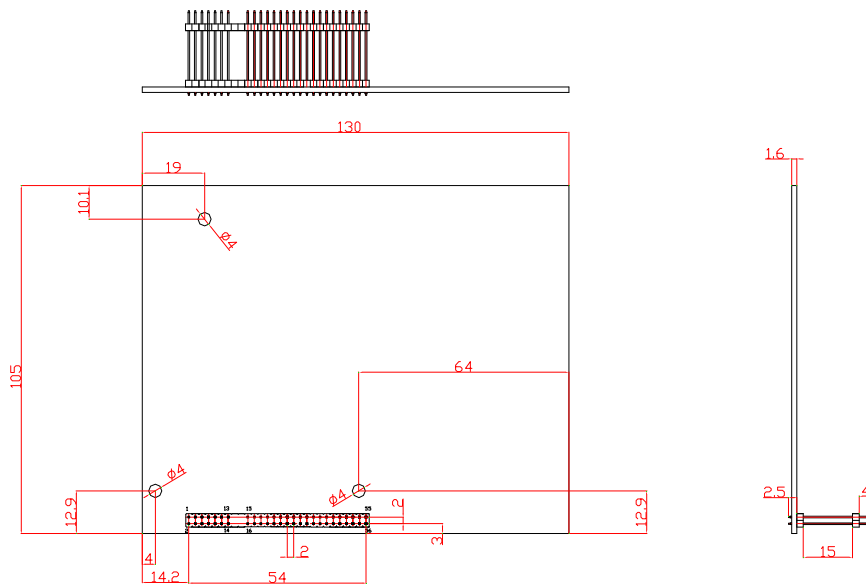
* TOLERANCES ARE +/-0.5mm UNLESS OTHERWISE SPECIFIED
* UNITE :mm

4.6　Connector Pin Definitions

5-Pin 1.25mm connector（Horizontal Type）

PIN	1	2	3	4	5	6
Definition	12V	12V	12V	12V	GND	GND
PIN	7	8	9	10	11	12
Definition	GND	GND	WAN B- （WAN□PIN6）	WAN D- （WAN□PIN8）	WAN B+ （WAN□PIN3）	WAN D+ （WAN□PIN7）
PIN	13	14	15	16	17	18
Definition	GND	GND	WAN A- （WAN□PIN2）	WAN C- （WAN□PIN5）	WAN A+ （WAN□PIN1）	WAN C+ （WAN□PIN4）
PIN	19	20	21	22	23	24
Definition	LAN B- （LAN□PIN6）	LAN C+ （LAN□PIN4）	LAN B+ （LAN□PIN3）	LAN C+ （LAN□PIN5）	GND	GND

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PIN	25	26	27	28	29	30
Definition	LAN A- （LAN□PIN2）	LAN D- （LAN□PIN7）	LAN A+ （LAN□PIN1）	LAN D+ （LAN□PIN8）	GND	GND
PIN	31	32	33	34	35	36
Definition	LAN RX*N	GND	LAN RX*P	GND	LAN TX*N	GND
PIN	37	38	39	40	41	42
Definition	LAN TX*P	GND	GND	GND	LAN1 LED	LAN2 LED
PIN	43	44	45	46	47	48
Definition	WAN LED（Y）	5G LED	WAN LED（G）	GND	RST	GND
PIN	49	50	51	52	53	54
Definition	WPS	GND	GND	GND	UART RX	GND
PIN	55	56				
Definition	UART TX	GND				

FCC STATEMENT

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) This device must accept any interference received, including interference that may cause undesired operation.

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

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:

This equipment complies with FCC radiation limits set forth for an uncontrolled environment. This equipment mush not be co-located or operating with any other antenna or transmitter.

This module is designed to comply with FCC statement FCC ID is: 2ADID-WPC0GR

The host system using this module should have label in a visible area indicated the following texts "Contains FCC ID: 2ADID-WPC0GR".

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, Human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.

When OEG purchase the module, they can only buy this antenna to match the modules

The max antenna gain of antenna is 2dBi. The following is a example of the module and antenna: