

WG215 Wi-Fi and Bluetooth

Combo Module Datasheet

Name: Wi-Fi and Bluetooth Combo Module

Model No.: WG215

Revision: V2.03

Revision History

Revision	Description	Approved	Date
V1.01	Initial Release	George He	20161224
V1.02	Update Photo	George He	20170512
V2.01	Update Specification	George He	20170615
V2.02	Update certification information	George He	20170831
V2.03	Update Photo	George He	20171205

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1. General Description

WG215 is a single 2.4 GHz Wi-Fi and Bluetooth combination solution to support 1 x 1 802.11 b/g/n WLAN standards and Bluetooth v4.2 BR/EDR and BLE, enabling seamless integration of WLAN/BT and low-energy technology. The module requiring only an external 3.3V power supply.

All features are enhanced by a built-in antenna and an interface port to the carrier board. This interface port includes power supply pins, SDIO, ADC, GPIO ports and UART ports.



Figure 1: WG215 Top View

2 Applications

- ◆ Generic low-power IoT sensor hub
- ◆ Generic low-power IoT loggers
- ◆ Video streaming from camera
- ◆ Over The Top (OTT) devices
- ◆ Music players
 - Internet music players
 - Audio streaming devices
- ◆ Wi-Fi-enabled speech recognition devices
- ◆ Audio headsets
- ◆ Smart power plugs
- ◆ Home automation
- ◆ Mesh network
- ◆ Industrial wireless control
- ◆ Baby monitors
- ◆ Wearable electronics
- ◆ Wi-Fi location-aware devices
- ◆ Security ID tags
- ◆ Healthcare
 - Proximity and movement monitoring trigger devices
 - Temperature sensing loggers
- ◆ NZIF receiver with -98 dBm sensitivity
- ◆ Adaptive Frequency Hopping(AFH)

3. Features

■ Wi-Fi

- ◆ 802.11 b/g/n/e/i
- ◆ 802.11 n (2.4 GHz), up to 150 Mbps
- ◆ 802.11 e: QoS for wireless multimedia technology
- ◆ WMM-PS,UAPSD
- ◆ A-MPDU and A-MSDU aggregation
- ◆ Block ACK
- ◆ Fragmentation and defragmentation
- ◆ Automatic Beacon monitoring/scanning
- ◆ 802.11 i security features: pre-authentication and TSN
- ◆ Wi-Fi Protected Access (WPA)/WPA2/WPA2-Enterprise/Wi-Fi Protected Setup (WPS)
- ◆ Infrastructure BSS Station mode/Soft AP mode
- ◆ Wi-Fi Direct (P2P), P2P Discovery, P2P Group Owner mode and P2P Power Management
- ◆ UMA compliant and certified
- ◆ Antenna diversity and selection

■ Bluetooth

- ◆ Compliant with Bluetooth v4.2 BR/EDR and BLE specification
- ◆ Class-1, class-2 and class-3 transmitter without external antenna

- ◆ Standard HCI based on SDIO/SPI/UART
- ◆ High-speed UART HCI, up to 4 Mbps
- ◆ BT 4.2 controller and host stack
- ◆ Service Discover Protocol (SDP)
- ◆ General Access Profile (GAP)
- ◆ Security Manage Protocol (SMP)
- ◆ Bluetooth Low Energy (BLE)

- ◆ Internal power amplifier
- ◆ Enhanced power control
- ◆ +10 dBm transmitting power
- ◆ Bluetooth Low Energy (BLE)
- ◆ ATT/GATT
- ◆ HID
- ◆ All GATT-based profile supported
- ◆ SPP-Like GATT-based profile
- ◆ BLE Beacon
- ◆ A2DP/AVRCP/SPP, HSP/HFP, RFCOMM
- ◆ CVSD and SBC for audio codec
- ◆ Bluetooth Piconet and Scatternet
- ◆ RoHS compliance (Lead-free)
- ◆ FCC,CE compliance

4. Application Block Diagram

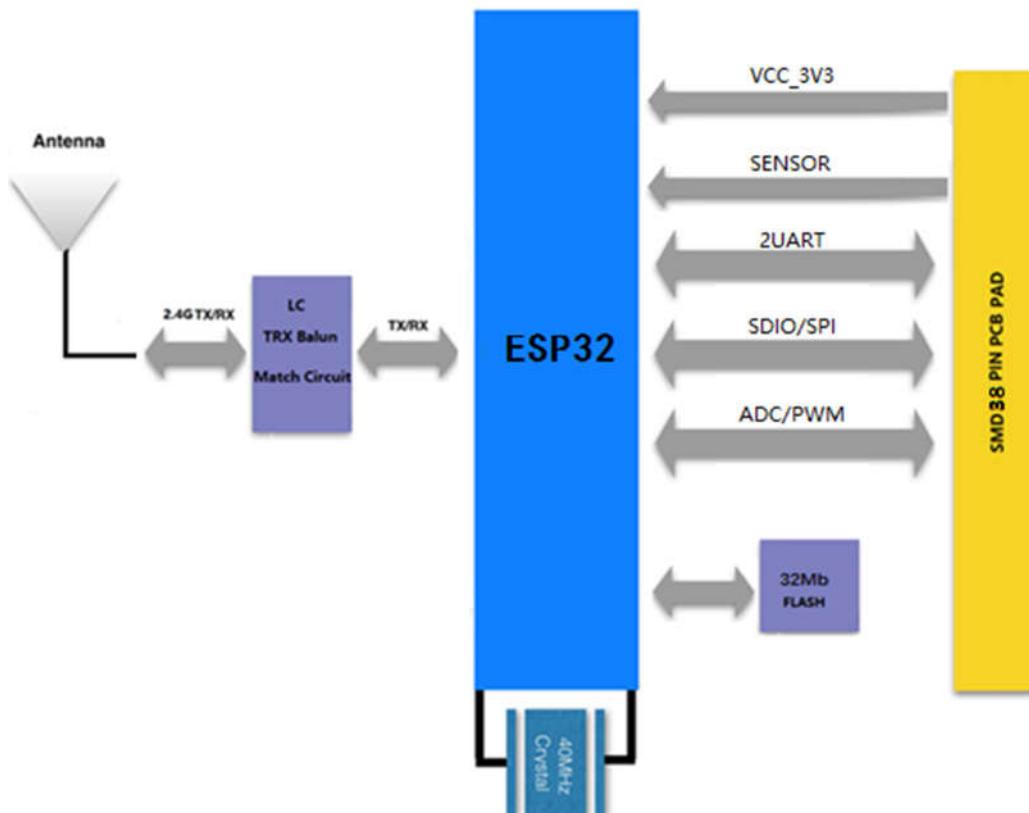


Figure 2: WG215 Block Diagram

5. Module Pinout and Pin Description

Module Pinout:

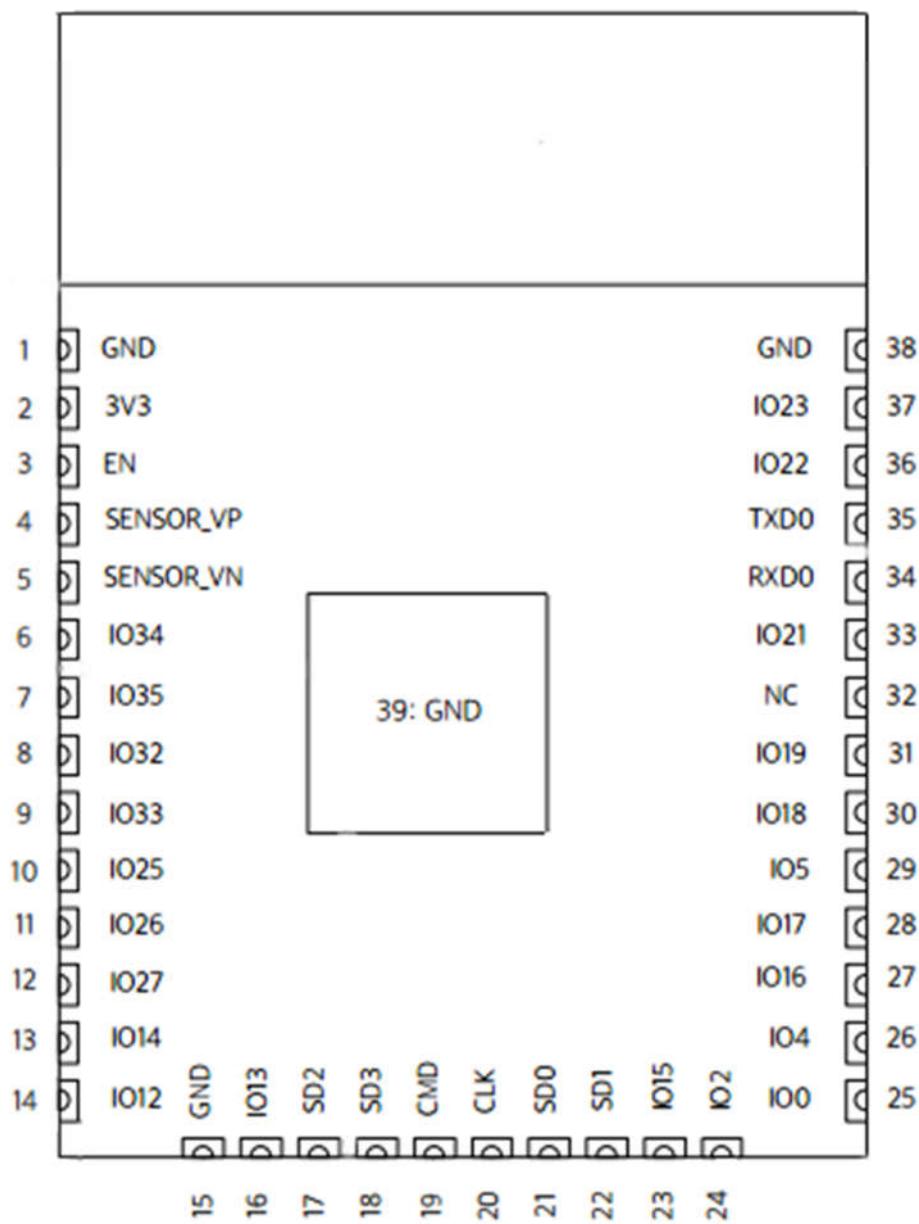


Figure 3: WG215 Pin Package

Pin Description:

NO	Name	Function
1	GND	GND
2	VDD33	3.3 V power supply (VDD)
3	CHIP_PU	Chip enable pin. Active high.
4	SENSOR_VP	GPIO36, SENSOR_VP, ADC_H, ADC1_CH0, RTC_GPIO0
5	SENSOR_VN	GPIO39, SENSOR_VN, ADC1_CH3, ADC_H, RTC_GPIO3
6	IO34	GPIO34, ADC1_CH6, RTC_GPIO4
7	IO35	GPIO35, ADC1_CH7, RTC_GPIO5
8	IO32	GPIO32, XTAL_32K_P (32.768 kHz crystal oscillator input), ADC1_CH4, TOUCH9, RTC_GPIO9
9	IO33	GPIO33, XTAL_32K_N (32.768 kHz crystal oscillator output), ADC1_CH5, TOUCH8, RTC_GPIO8
10	IO25	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
11	IO26	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
12	IO27	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
13	IO14	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
14	IO12	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPIQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
15	GND	GND
16	IO13	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
17	SHD/SD2	GPIO9, SD_DATA2, SPIHD, HS1_DATA2, U1RXD
18	SWP/SD3	GPIO10, SD_DATA3, SPIWP, HS1_DATA3, U1TXD
19	SCS/CMD	GPIO11, SD_CMD, SPICS0, HS1_CMD, U1RTS
20	SCK/CLK	GPIO6, SD_CLK, SPICLK, HS1_CLK, U1CTS

21	SDO/SD0	GPIO7, SD_DATA0, SPIQ, HS1_DATA0, U2RTS
22	SDI/SD1	GPIO8, SD_DATA1, SPID, HS1_DATA1, U2CTS
23	IO15	GPIO15, ADC2_CH3, TOUCH3, MTDO, HSPICS0, RTC_GPIO13, HS2_CMD, SD_CMD, EMAC_RXD3
24	IO2	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPIWP, HS2_DATA0, SD_DATA0
25	IO0	GPIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
26	IO4	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
27	IO16	GPIO16, HS1_DATA4, U2RXD, EMAC_CLK_OUT
28	IO17	GPIO17, HS1_DATA5, U2TXD, EMAC_CLK_OUT_180
29	IO5	GPIO5, VSPICS0, HS1_DATA6, EMAC_RX_CLK
30	IO18	GPIO18, VSPICLK, HS1_DATA7
31	IO19	GPIO19, VSPIQ, U0CTS, EMAC_TXD0
32	NC	
33	IO21	GPIO21, VSPIHD, EMAC_TX_EN
34	RXD0	GPIO3, U0RXD, CLK_OUT2
35	TXD0	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
36	IO22	GPIO22, VSPIWP, U0RTS, EMAC_TXD1
37	IO23	GPIO23, VSPIID, HS1_STROBE
38	GND	GND

Strapping Pins:

WG215 has six strapping pins:

- MTDI/GPIO12: internal pull-down
- GPIO0: internal pull-up
- GPIO2: internal pull-down
- GPIO4: internal pull-down
- MTDO/GPIO15: internal pull-up
- GPIO5: internal pull-up

Software can read the value of these six bits from the register "GPIO_STRAPPING".

During the chip power-on reset, the latches of the strapping pins sample the voltage level as strapping bits with states "0" or "1", and hold these bits until the chip is powered down or shut down. The strapping bits configure the device boot mode, the operating voltage of VDD_SDIO and other system initial settings.

Each strapping pin is connected with its internal pull-up/pull-down during the chip reset. Consequently, if a strapping pin is unconnected or the connected external circuit is high-impedance, the internal weak pull-up/pull-down will determine the default input level of the strapping pins.

To change the strapping bit values and consequently change the WG215 boot mode, users can apply the external pull-down/pull-up resistances, or use the host MCU's GPIOs to control the voltage level of these pins when powering on the WG215.

After reset procedure is complete, the strapping pins work as the normal function pins. Please see Table 2 for detailed information on boot mode configuration using strapping pins.

Voltage of Internal LDO (VDD_SDIO)					
Pin	Default	3.3V		1.8V	
MTDI	Pull-down	0		1	
Booting Mode					
Pin	Default	SPI Boot		Download Boot	
GPIO0	Pull-up	1		0	
GPIO2	Pull-down	Don't-care		0	
Debugging Log on U0TXD During Booting					
Pin	Default	U0TXD Toggling		U0TXD Silent	
MTDO	Pull-up	1		0	
Timing of SDIO Slave					
Pin	Default	Falling-edge Input	Falling-edge Input	Rising-edge Input	Rising-edge Input
		Falling-edge Output	Rising-edge Output	Falling-edge Output	Rising-edge Output
MTDO	Pull-up	0	0	1	1
GPIO5	Pull-up	0	1	0	1

Table5-1: strapping pins

Note: Firmware can configure register bits to change the setting of "Voltage of Internal LDO (VDD_SDIO)" and "Timing of SDIO Slave" after booting.

6. PCB Footprint and Dimensions

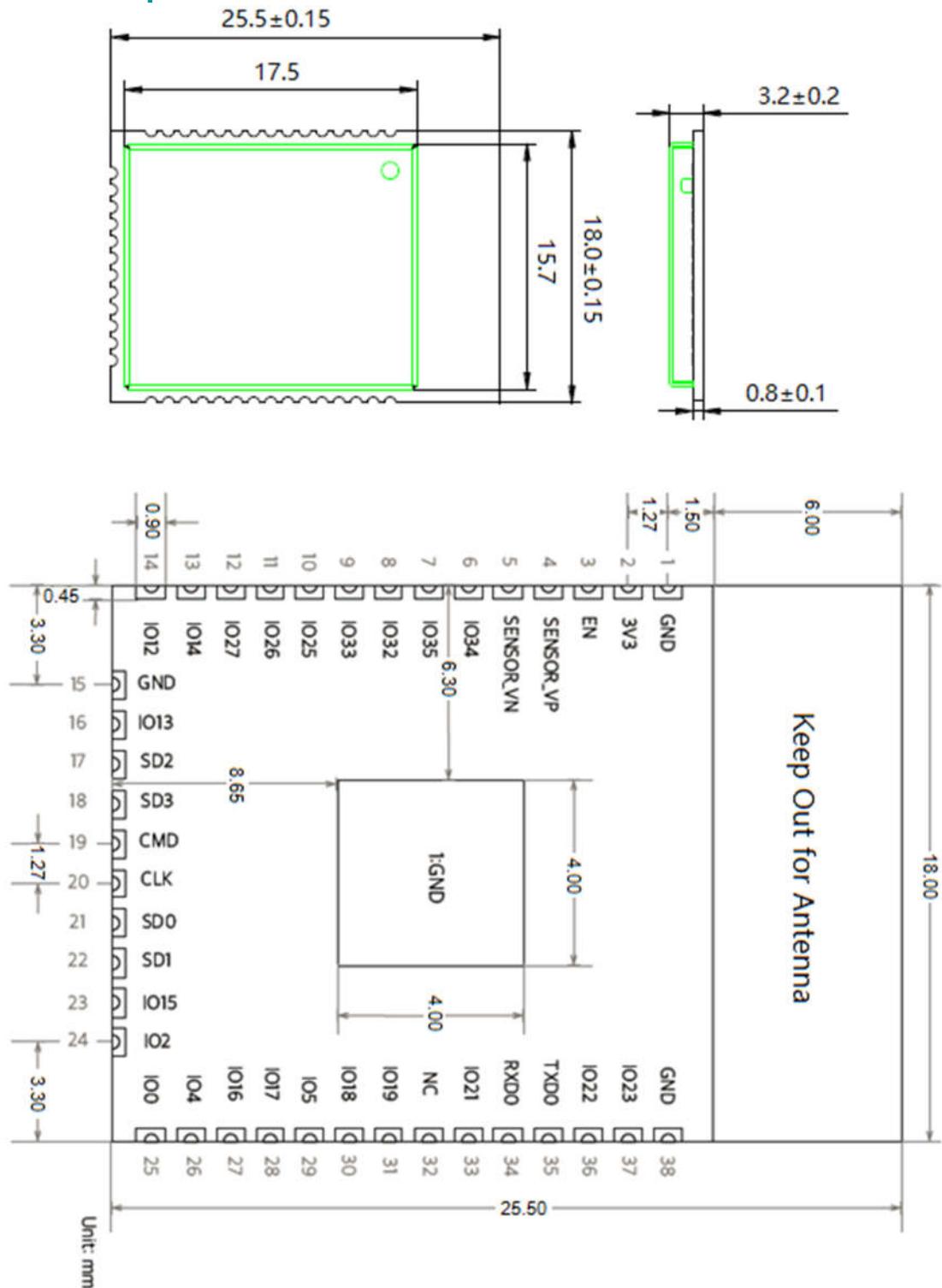


Figure 4: WG215 Recommend PCB Footprint

7. Electrical Characteristics

a) Absolute Maximum Ratings

Parameter	Condition	Min.	Typ.	Max.	Unit
Storage Temperature Range		-40		125	°C
ESD Protection	VESD	/		2000	V
Supply Voltage	VDD33	0		3.6	V
Voltage On Any I/O Pin		-0.3		3.63	V

Table7-1: Absolute Maximum Ratings

b) Recommended Operation Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Extended temp. range	TA	-20		70	°C
Power Supply	VDD33	2.97	3.3	3.63	V
Input Low Voltage	VIL	-0.3		0.8	V
Input High Voltage	VIH	2		3.63	V

Table7-2: Operating Conditions

c) Measurement Conditions

System State	Description	Current (Typ.)@3.3V
Deep-sleep	Only RTC Power on	10uA
Modem-sleep	The CPU is Power on	5-10 mA
Active RX(RF Working)	RX and Listening	80-90 mA
Active TX(RF Working)	WIFI TX 13-18dBm	160-225 mA

Table7-3: Power Consumption in Different States

8. Performance Specification

Hardware Features	
Model	WG215
ANTENNA TYPE	PCB Antenna
Chipset solution	WG215
Voltage	3.3V+/-10%
DIMENTIONS(L×W×H)	25.5mm*18.0mm*3.2mm
2.4GHz WiFi Features	
WIRELESS STANDARDS	IEEE 802.11 b/g/n/
FREQUENCY RANGE	2.412-2.484GHz
DATA RATES	IEEE 802.11a Standard Mode: 6,9,12,18,24,36,48,54Mbps IEEE 802.11 b Standard Mode: 1,2,5.5,11Mbps IEEE 802.11g Standard Mode: 6,9,12,18,24,36,48,54Mbps IEEE 802.11n Standard Mode: 150Mbps @ HT20
2.4G RECEIVE SENSITIVITY	HT40 MCS7: -69dBm@10% PER(MCS7) HT20 MCS7 : -70dBm@10% PER(MCS7) OFDM 54M: -74dBm@10% PER CCK, 11M: -88dBm@ 8% PER
WIRELESS SECURITY	Supports WEP64/128, WPA, WPA2, TKIP, WAPI, and AES hardware encryption
WIRELESS TRANSMIT POWER With ±2dBm tolerance	IEEE 802.11n: 12-14dBm @HT40 MCS7 12-14dBm@HT20 MCS7 IEEE 802.11g: 16dBm IEEE 802.11b: 18dBm

WORK MODE	AP/ Infrastructure mode
Others	
ENVIRONMENT	Operating Temperature: -20°C~70°C Storage Temperature: -40°C~125°C Operating Humidity: 10%~90% non-condensing Storage Humidity: 5%~90% non-condensing

9 Reference Schematics

Power Schematic:

Power Supply

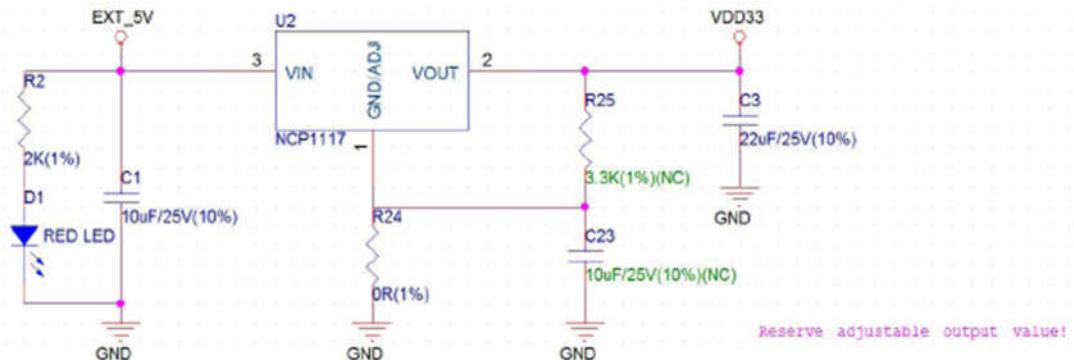


Figure 5: WG215 Typical Power Schematics

USB-UART Schematic:

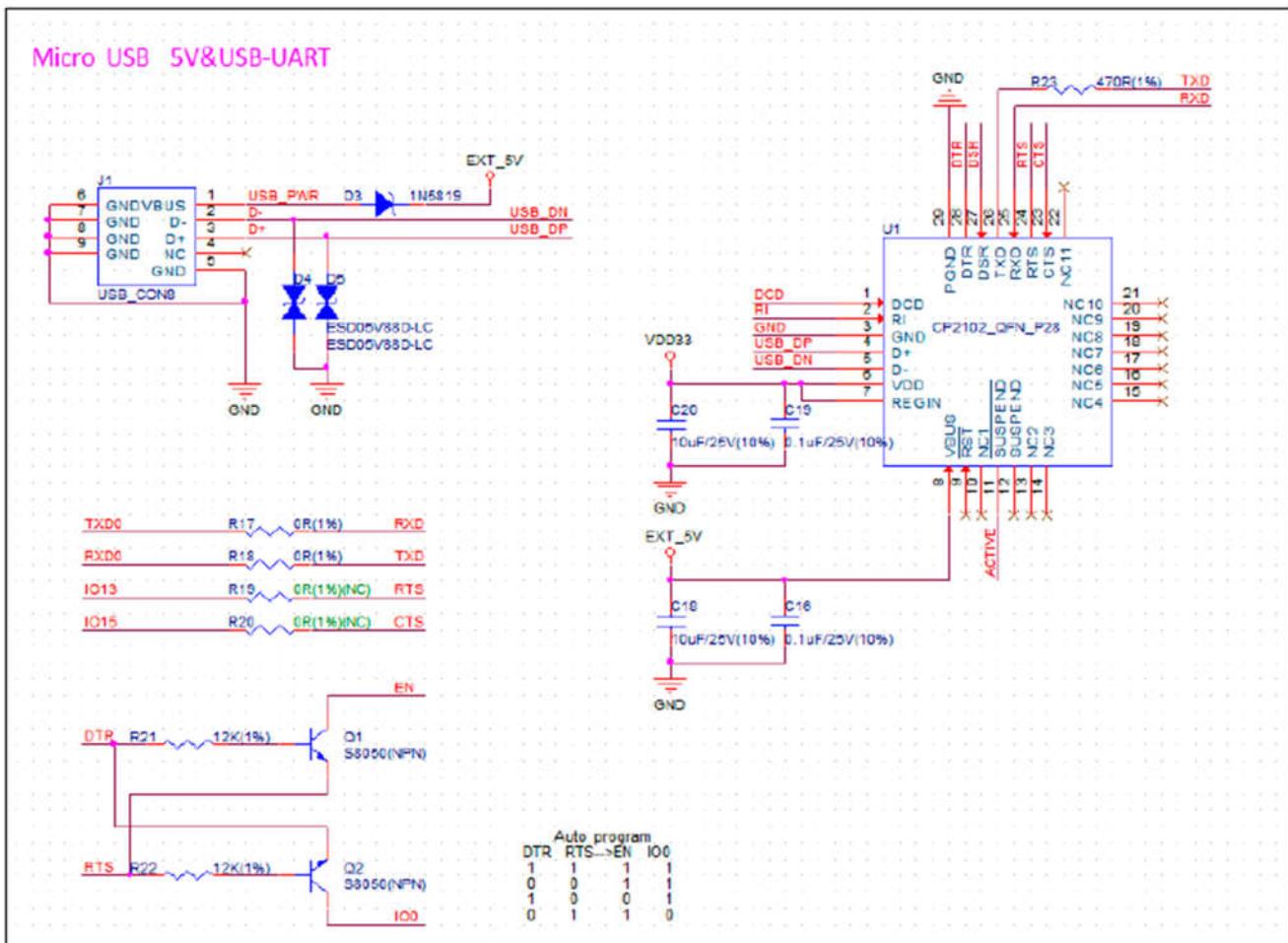


Figure 6: WG215 Typical USB to UART Schematics

Typical Schematic:

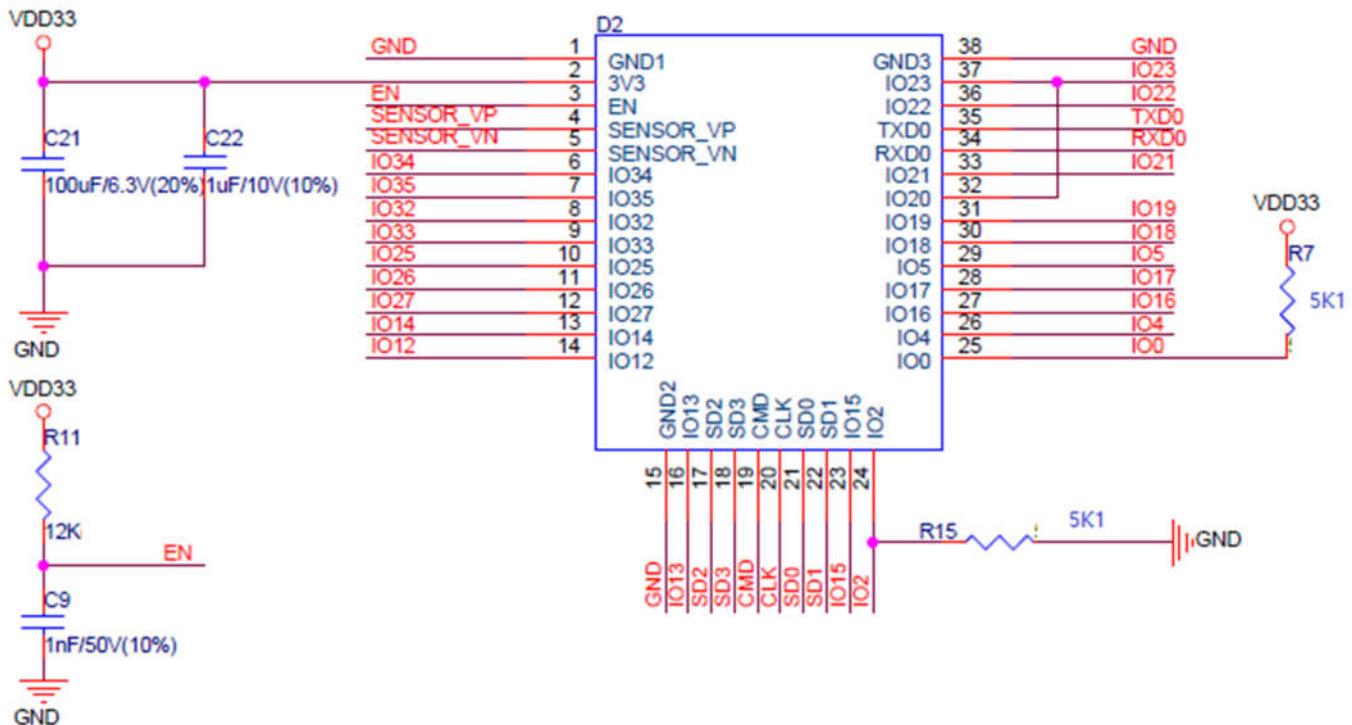


Figure 7: WG215 Typical Schematics

10. Hardware Boot Mode

Boot Mode.	GPIO0	GPIO2
Download Mode	0	0
Normal Work Mode	1	/

Download Mode

When GPIO0=0, GPIO2=0, WG215 is in the Download mode and you can download the firmware to the external flash.

Normal Work Mode

When GPIO0=1, WG215 is in the Flash mode. WG215 will automatically read and run programs from flash during power-on.

11. Manufacturing Process Recommendations

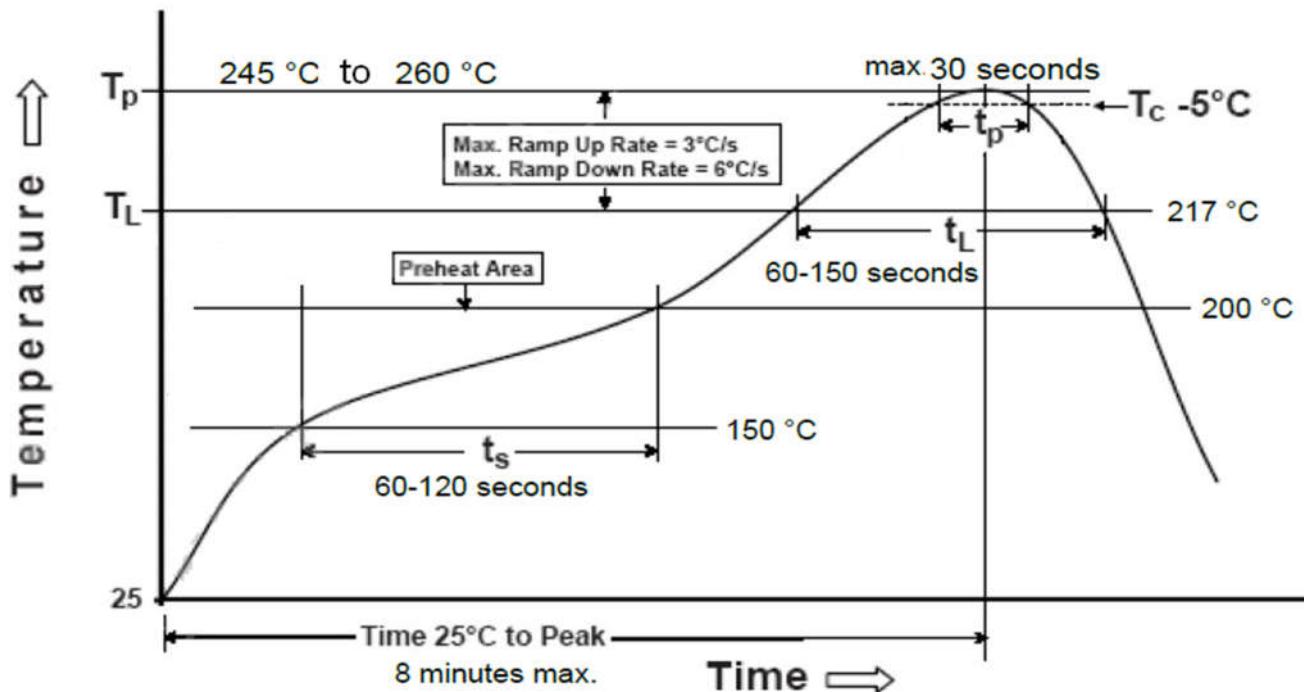


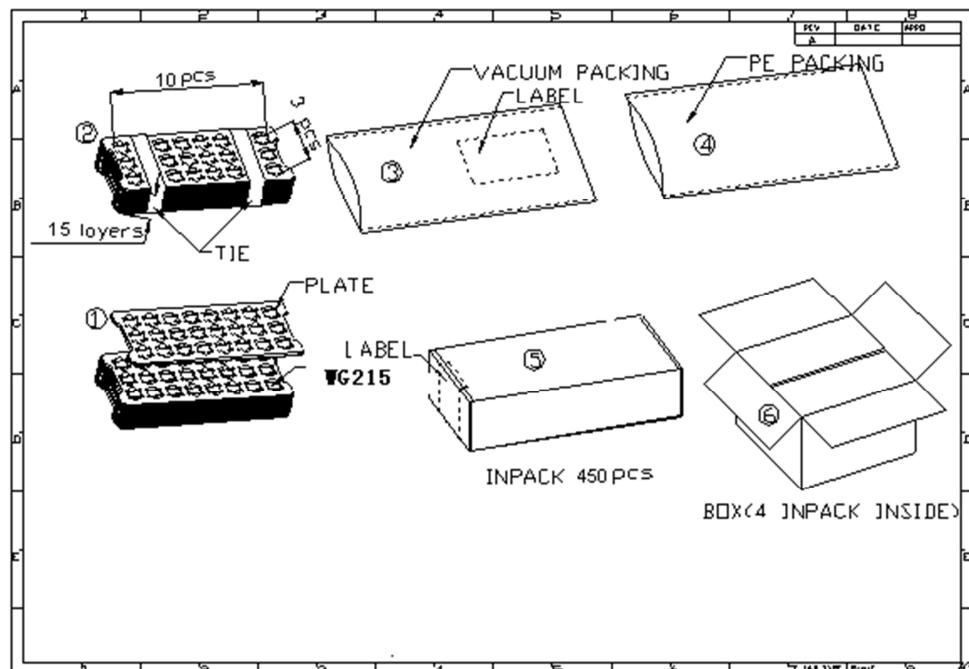
Figure 5: WG215 Typical Lead-free Soldering Profile

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.

12. Ordering Information

Module No.	Antenna Connector Type
WG215P	PCB Antenna
WG215E	IPEX Connector

13. Packaging Specification



14. Contact Information



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