WT8266-S2 WiFi Module

Extreme / Open / Small / Easy

Specification

Version 1.1

2016/7/13

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Amendment record

Version	Changed by	Time	Reason	Details
V1.0	Lemme	2016.05.10	Original	
V1.1	Lemme	2016.07.13	Update	

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1.Overview

WT8266-S2 Wi-Fi module is a low consumption, high performance Wi-Fi network control module designed by Wireless-Tag. It can meet the IoT application requirements in smart power grids, building automation, security and protection, smart home, remote health care etc.

The module's core processor ESP8266 integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor with smaller package size and 16 bit compact mode, main frequency support 80 MHz and 160 MHz, support RTOS, integrated Wi-Fi MAC / BB / RF / PA / LNA, on-board ceramic antenna and ipex connector.

The module supports standard IEEE802.11 b / g / n protocol, a complete TCP / IP protocol stack. It can be used to host the application or to offload Wi-Fi networking functions from another application processor.

2. Main Features

- Operating Voltage: 3.3V
- Operating Temperature：-40 - 85°C
- CPU Tensilica L106
  - RAM 50KB（Available）
  - Flash 16Mbit
- System
  - 802.11 b/g/n
  - IntegratedTensilica L106 ultra-low power 32-bitmicro MCU, with 16-bit RSIC. The CPU clock speed is 80MHz. It can also reach a maximum value of 160MHz.
  - WIFI 2.4 GHz， supportWPA/WPA2
  - Ultra-Small 18.6mm*15.0mm
  - Integrated10 bit high precision ADC
  - Integrated TCP/IP Stack
  - IntegratedTR switch, balun,LNA, Power amplifier and matching network
  - Integrated PLL, Regulator and power source management components, +20 dBm output power in 802.11b mode
  - Supports antenna diversity
  - Deep sleep current < 20uA, Power down leakage current < 5uA
  - Rich interface on processor: SDIO 2.0, (H) SPI, UART, I2C, I2S, IRDA, PWM, GPIO
  - STBC, 1x1 MIMO, 2x1 MIMO, A-MPDU & A-MSDU aggregation & 0.4s guard interval
  - Wake up ,build the connection and transmit packets in < 2ms
  - Standby power consumption<1.0mW (DTIM3)
  - Support AT remote upgrades and cloud OTA upgrade
  - Support STA/AP/STA+AP operation modes

- FCC/CE/RoHs

3. Hardware Specifications

3.1 System Diagram

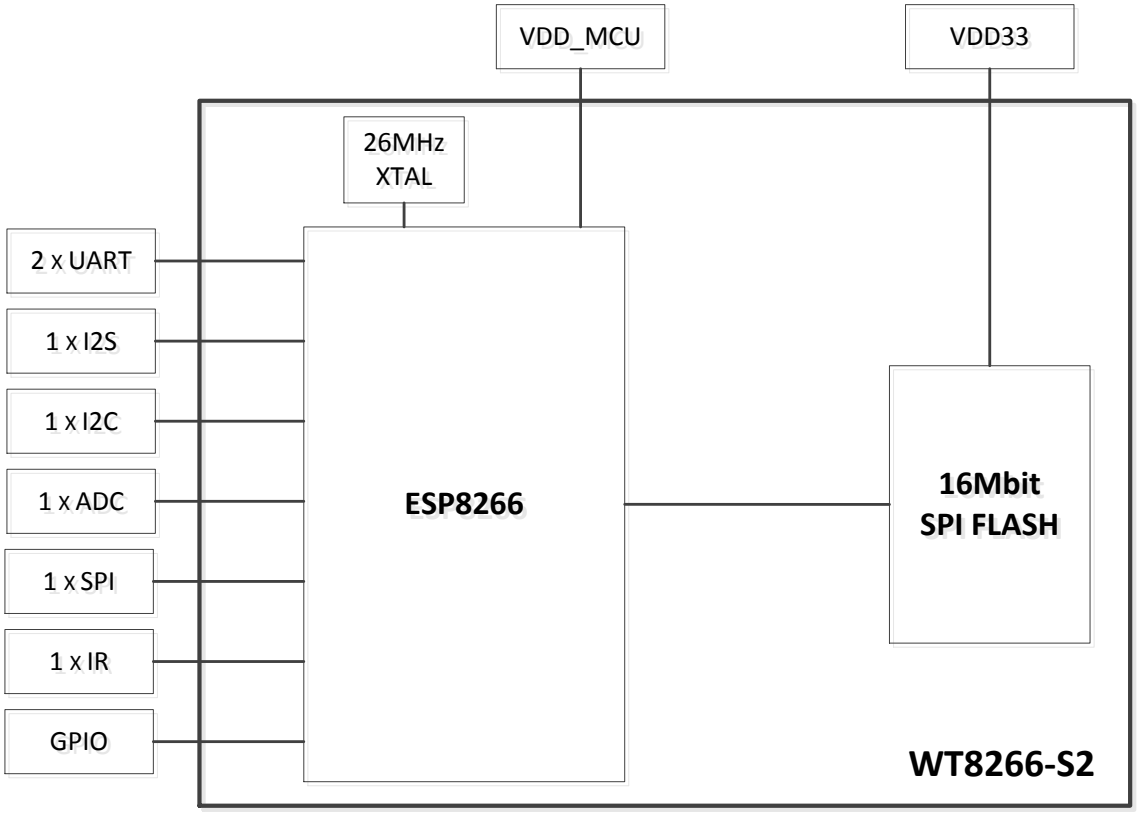

Figure-1System Diagram

3.2Pin Description

Figure-2 Physical Map (Top View)

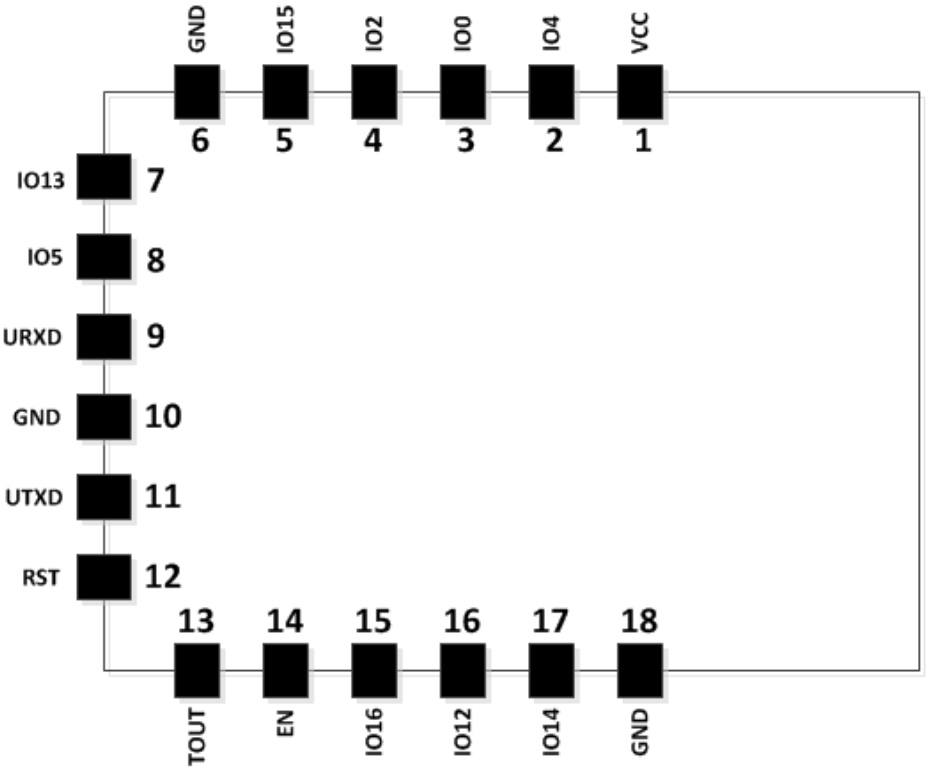

Figure-3 WT8266-S2 Pinout (Top View)

Table 1 Pin Definition and Description

Pin	Name	Description
1	VCC	3.3V supply（VDD）
2	IO4	GPIO4
3	IO0	GPIO0
4	IO2	GPIO2;UART1_TXD
5	IO15	GPIO15;MIDO; HSPICS;UART0_RTS
6	GND	GND
7	IO13	GPIO13; HSPI_MOSI;UART0_CTS
8	IO5	GPIO5
9	URXD	UART0_RXD;GPIO3
10	GND	GND
11	UTXD	UART0_TXD;GPIO1
12	RST	Reset Module
13	TOUT	Detecting chip VDD3P3 supply voltage or TOUT pin input voltage (not available at the same time)
14	EN	Chip Enable. High: On, chip works properly; Low: Off, small current
15	IO16	GPIO16; Deep sleep wakeup, by connecting to RST pin
16	IO12	GPIO12;HSPI_MISO

17	IO14	GPIO14;HSPI_CLK
18	GND	GND

Note：

Table-2 Pin Mode

Mode	GPIO15	GPIO0	GPIO2
UARTDownload Mode	Low	Low	High
Flash Boot Mode	Low	High	High

Table-3 Interface Description

Name	Pin	Function Description
HSPI Interface	IO12(MISO),IO13(MOSI),IO14(CLK),IO15(CS)	Can connect external SPI Flash, display and MCU etc.
PWM Interface	IO12(R),IO15(G),IO13(B)	The official demo provides4-channel PWM (user can expand to 8-channel), can be used to control lights, buzzers, relays and motors, etc.
IR Interface	IO14(IR_T), IO5(IR_R)	The functionality of Infrared remote control interface can be implemented via software programming. NEC coding, modulation, and demodulation are used by this interface. The frequency of modulated carrier signal is 38KHz.
ADC Interface	TOUT	ESP8266EX integratesa 10-bit precision SARADC. ADC_IN interface is used to test the power supply voltage of VDD3P3(Pin 3 and Pin 4), as well as the input voltage of TOUT (Pin 6). It can be used in sensors application.
I2C Interface	IO14(SCL), IO2(SDA)	Can connect to external sensor and display, etc.
UART Interface	**UART0:** TXD(U0TXD),RXD(U0RXD),IO15(RTS),IO13(CTS) **UART1:** IO2(TXD)	Devices with UART interfaces can be connected **Download：** U0TXD+U0RXD or GPIO2+U0RXD **Communication：** (UART0):U0TXD,U0RXD,MTDO(U0RTS),MTCK(U0CTS) **Debug：** UART1_TXD(GPIO2)Can be used to print debugging information
		By default, UART0 will output some printed information when the device is powered on and is booting up. If this issue exerts influence on some specific applications, users can exchange the inner pins of UART when initializing, that is to say, exchange U0TXD, U0RXD with U0RTS, U0CTS.
I2S Interface	I2S input： IO12 (I2SI_DATA); IO13 (I2SI_BCK); IO14 (I2SI_WS);	Mainly used for audio capturing, processing and transmission.

	I2S output: IO15 (I2SO_BCK); IO3 (I2SO_DATA); IO2 (I2SO_WS);	

3.3Electrical Characteristic

3.3.1Maximum Ratings

Table- 4. Maximum Ratings

Ratings	Condition	Value	Unit
Storage Temperature	/	-45 to 125	°C
Maximum Soldering Temperature	/	260	°C
Supply Voltage	IPC/JEDEC J-STD-020	+3.0 to +3.6	V

3.3.2Recommended Operating Environment

Table -5 Recommended Operating Environment

Working Environment	Name	Min Value	Typical Values	Max Value	Unit
Operating Temperature	/	-40	20	85	°C
Supply Voltage	VDD	3.0	3.3	3.6	V

3.3.3Digital Port Characteristics

Table -6 Digital Port Characteristics

Port	Typical Values	Min Value	Max Value	Unit
Input low logic level	VIL	-0.3	0.25VDD	V
Input high logic level	VIH	0.75vdd	VDD+0.3	V
Output low logic level	VOL	N	0.1VDD	V
Output high logic level	VOL	0.8VDD	N	V

3.4Power Consumption

3.4.1Operating Power Consumption

Table -7 Operating Power Consumption

Mode	Standard	Speed Rate	Typical Value	Unit
Tx	11b	1	215	mA
		11	197	
	11g	6	197	
		54	145	

	11n	MCS7	120	
Rx	All rates		56	mA

Note: RX mode data packet length is 1024 bytes;

3.4.2Standby Power Consumption

The following current consumption is based on 3.3V supply and 25°C ambient with internalregulators.Values are measured at antenna port without SAW filter. All the transmissionmeasurements valuesare based on 90% duty cycle, continuous transmission mode.

Table -8 Standby Power Consumption

Mode	Status	Typical Value				
Standby	Modem Sleep	15mA				
	Light Sleep	0.9mA				
	Deep Sleep	20uA				
	Off	0.5uA				
Power Save Mode (2.4G) (Low Power Listen disabled) [1]	DTIM period	Current Cons. (mA)	T1 (ms)	T2 (ms)	Tbeacon (ms)	T3 (ms)
	DTIM 1	1.2	2.01	0.36	0.99	0.39
	DTIM 3	0.9	1.99	0.32	1.06	0.41

①: Modem-Sleep requires the CPU to be working, as in PWM or I2S applications. According to802.11 standards (like U-APSD), it saves power to shut down the Wi-Fi Modem circuit whilemaintaining a Wi-Fi connection with no data transmission. E.g. in DTIM3, to maintain a sleep 300mswake 3ms cycle to receive AP's Beacon packages, the current is about 15mA.

②: During Light-Sleep, the CPU may be suspended in applications like Wi-Fi switch. Without datatransmission, the Wi-Fi Modem circuit can be turned off and CPU suspended to save poweraccording to the 802.11 standard (U-APSD). E.g. in DTIM3, to maintain a sleep 300ms-wake 3mscycle to receive AP's Beacon packages, the current is about 0.9mA.

③: Deep-Sleep does not require Wi-Fi connection to be maintained. For application with long timelags between data transmission, e.g. a temperature sensor that checks the temperature every 100s,sleep 300s and waking up to connect to the AP (taking about 0.3~1s), the overall average current isless than 1mA.

3.5RF Characteristics

3.5.1RF Configuration and General Specifications of Wireless LAN

Table-9 RF Configuration and General Specifications of Wireless LAN

Items	Specifications		Unit
Country/Domain Code	Reserved		—
Center Frequency	11b	2.412-2.472	GHz
	11g	2.412-2.472	GHz
	11n HT20	2.412-2.472	GHz

Rate	11b	1, 2, 5.5, 11	Mbps
	11g	6, 9, 12, 18, 24, 36, 48, 54	Mbps
	11n 1stream	MCS0, 1, 2, 3, 4, 5, 6, 7	Mbps
Modulation type	11b	DSSS	—
	11g/n	OFDM	—

3.5.2 RF Tx Characteristics

Table-10 Emission Characteristics

Mark	Parameters	Condition	Min Value	Typical Value	Max Value	Unit
Ftx	Input Frequency	—	2.412	—	2.484	GHz
Pout	Output Power					
	11b	1Mbps	—	19.5	—	dBm
		11Mbps	—	18.5	—	dBm
		54Mbps	—	16	—	dBm
		MCS7	—	14	—	dBm

3.5.3RF Rx Characteristics

Table-11RF Receiving Characteristics

Mark	Parameters	Condition	Min Value	Typical Value	Max Value	Unit
Frx	Input Frequency	—	2.412	—	2.484	GHz
Srf	Sensitivity					
	DSSS	1 Mbps	—	-98	—	dBm
		11 Mbps	—	-91	—	dBm
	OFDM	6 Mbps	—	-93	—	dBm
		54 Mbps	—	-75	—	dBm
	HT20	MCS7	—	-71	—	dBm

4. Mechanical Dimensions

4.1Module Size

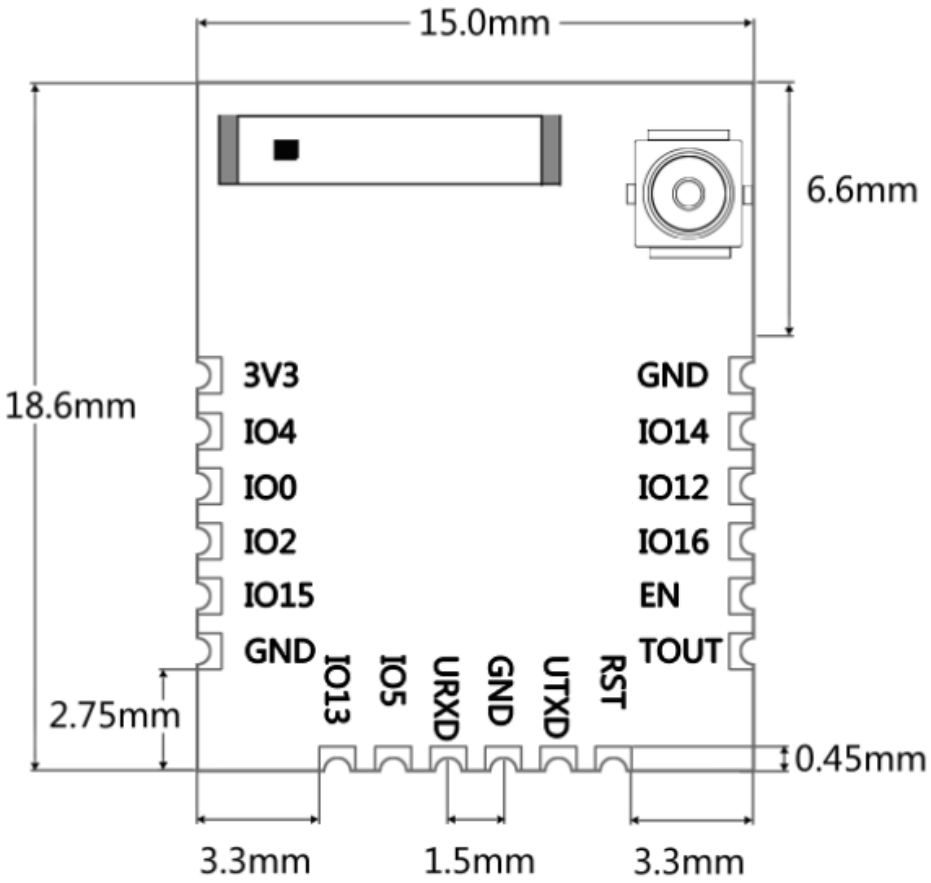

Figure -4 Module Size (Front View)

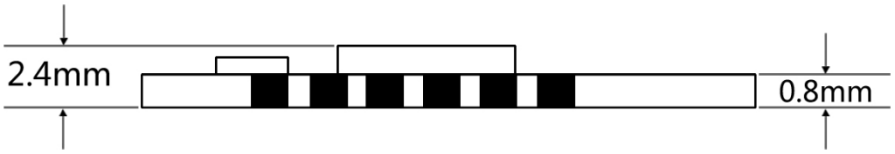

Figure -5 Module Size (Side View)

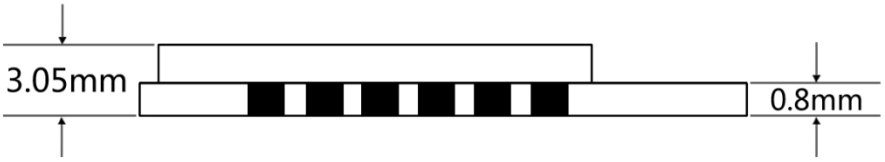

Figure -6 Module Size - shieldingcase (Side View)

4.2 Schematics

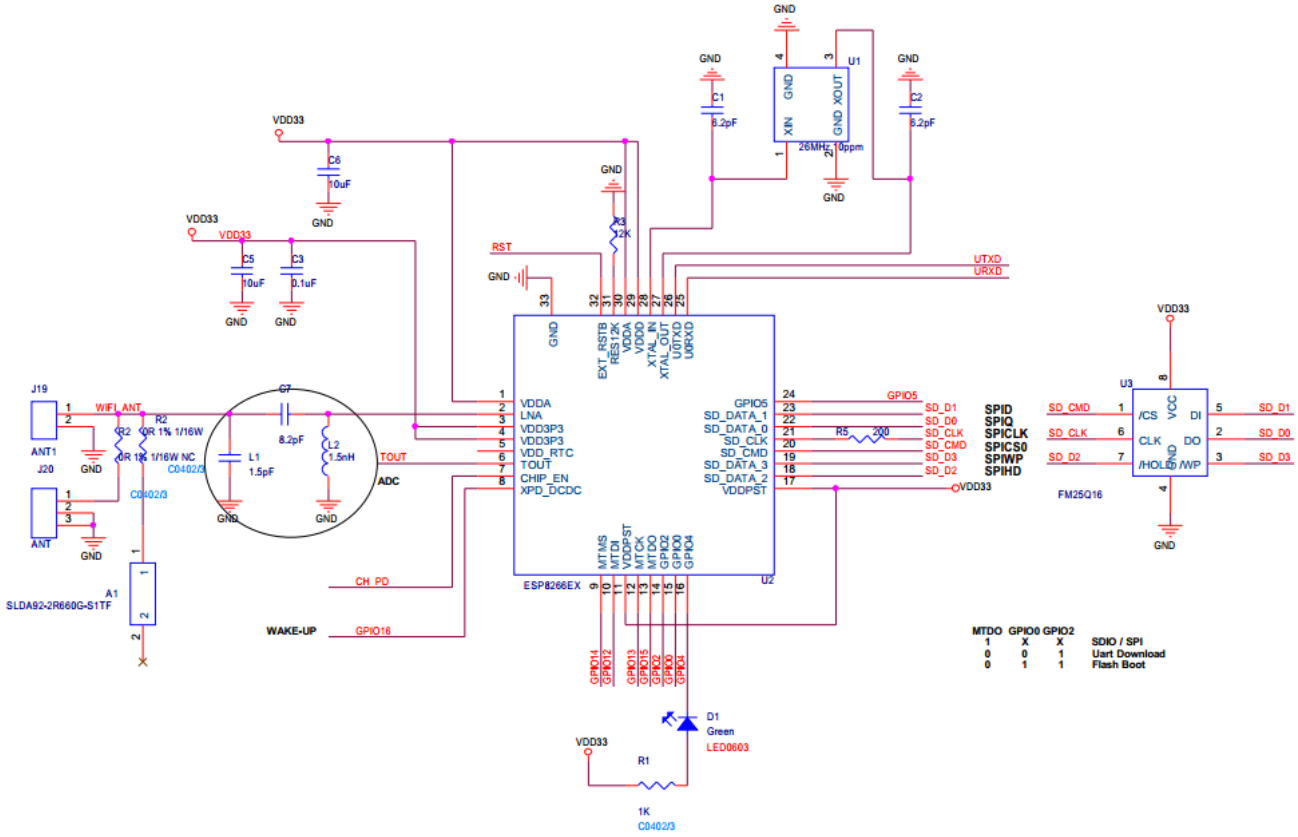

Figure -7 WT8266-S2 Schematics

5. Product Trial

- Forum：bbs.wireless-tag.com
- Technical Support ： technical@wireless-tag.com
- Linkedin: http://www.linkedin.com/company/9452027?trk=cws-btn-overview-0-0

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