IEEE 802.11 b/g/n 1T/1R IOT Module

Model Number: WL21S1500
（ASR5502）

客户认可 Custom Approval Section		
Custom Name		
Department		
Approval		Date：

拟制 DESIGN	审核 CHECK	批准 APPROVAL
许冰	管晖	陈宇科
2019-07-15	2019-07-15	2019-07-15

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Document revision history

Revision	Date	Approved by	Remarks
Version 1.0	2019-07-15	许冰	Draft

Contents

1. General Description

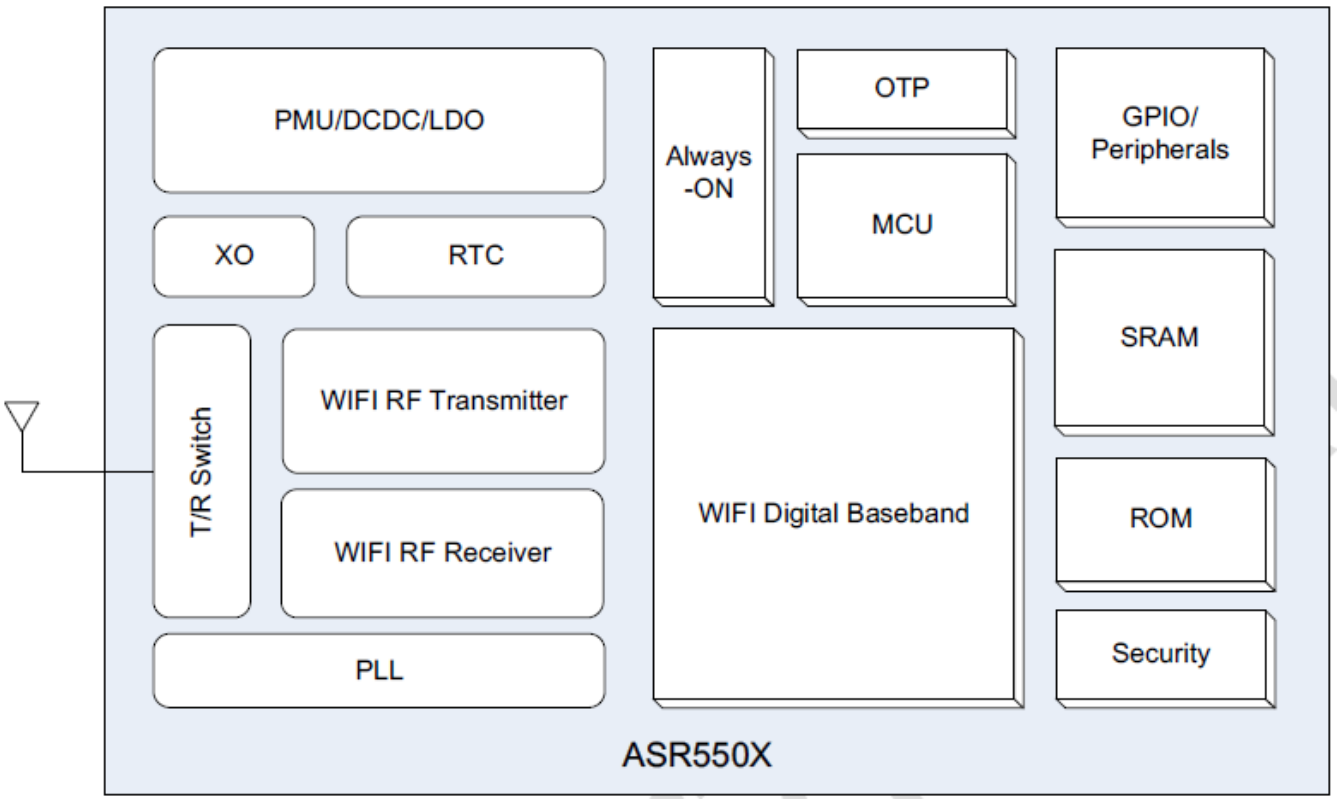
This document is to specify the product requirements for 802.11 b/g/n IOT Module. This module is based on ASR5502 chipset . The ASR5502 integrates RF transceiver, 802.11 PHY+MAC, ARM Cortex-M4F, advanced peripheral interfaces, Real Time Counter (RTC) and power management circuits. The integrated RF and analog circuit incorporate T/R switch, RF balun, power amplifier, low-noise amplifier, and entire power management modules. Therefore, the ASR5502 provides a small form-factor solution with minimal external components for the IoT applications, such as smart lighting, security, remote control, appliances and more. With the complete and self-contained 802.11b/g/n WLAN networking capabilities, the chip can perform either as a standalone IoT applications with Supplicant/HostAP/Sniffer mode, or as a slave with SDIO interface.

2. Features

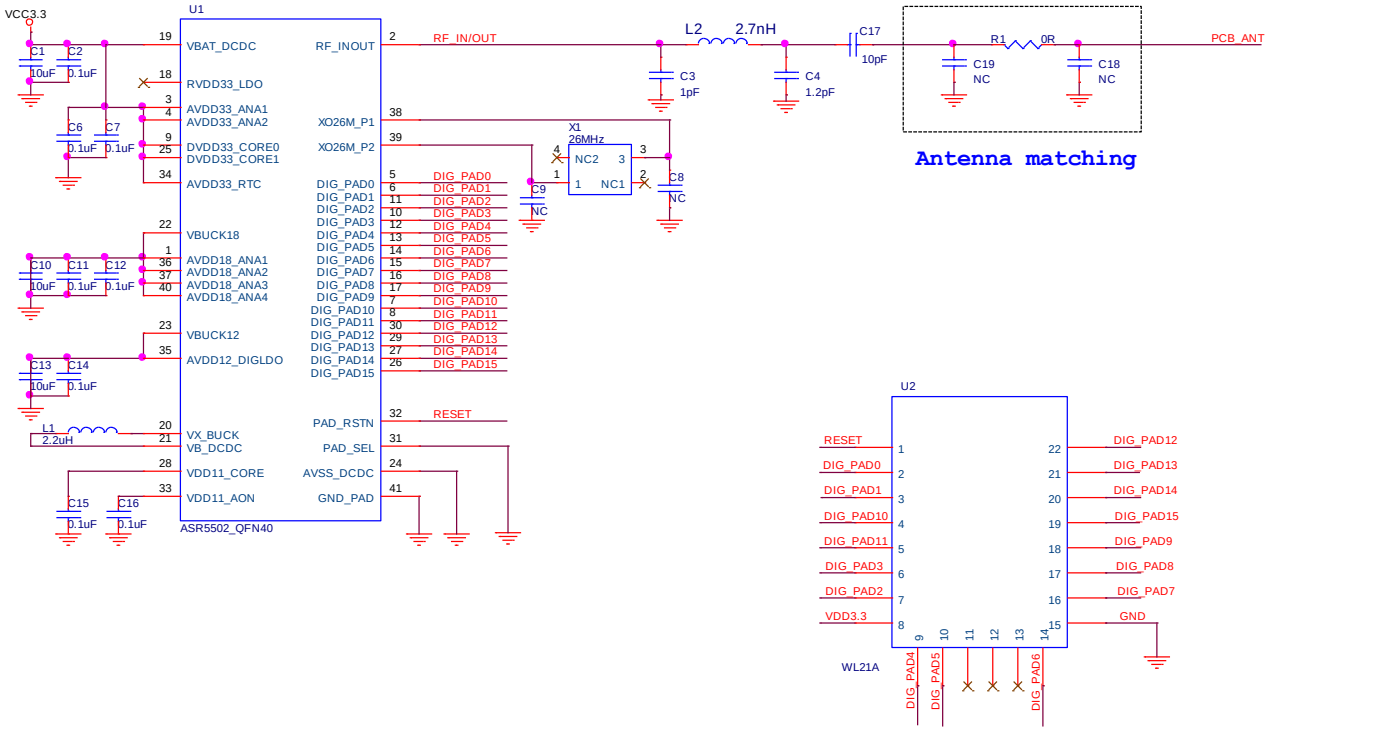
- Support 802.11 b/g/n compatible WLAN
- Support 802.11 e QoS enhancement (WMM)
- Support 802.11 i (WPA/WPA2 PSK), Open/WEP/ TKIP/CCMP
- Operation at 2.4~2.5GHz frequency band to meet worldwide regulations
- Security support AES/ RSA/ ECC/MAC
- UART/ SPI/ I2C/ PWM/ SDIO/ Generic AUXADC x8 Channels
- ROHS compliant

3. Application Diagrams

3.1 Functional Block Diagram



3.2 Schematic Diagram



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3.3 General Requirements

3.3.1 IEEE 802.11b Section

	Feature	Detailed Description
3.3.1.1	Standard	● IEEE 802.11b
3.3.1.2	Radio and Modulation Schemes	● DQPSK , DBPSK and CCK with DSSS
3.3.1.3	Operating Frequency	● 2400 ~ 2483.5MHz ISM band
3.3.1.4	Channel Numbers	● 13 channels for Worldwide
3.3.1.5	Data Rate	● at most 11Mbps
3.3.1.6	Media Access Protocol	● CSMA/CA with ACK
3.3.1.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power at each RF chain, and at room Temp. 25℃ ● 18±2 dBm at 11Mbps
3.3.1.8	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate<8% at room Temp 25℃ ● -83 dBm for 11Mbps

3.3.2 IEEE 802.11g Section

	Feature	Detailed Description
3.3.2.1	Standard	● IEEE 802.11g
3.3.2.2	Radio and Modulation Type	● QPSK , BPSK , 16QAM ,64QAM with OFDM
3.3.2.3	Operating Frequency	● 2400 ~ 2483.5MHz ISM band
3.3.2.4	Channel Numbers	● 13 channels for Worldwide
3.3.2.5	Data Rate	● at most 54Mbps
3.3.2.6	Media Access Protocol	● CSMA/CA with ACK
3.3.2.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power at each RF chain, at room Temp. 25℃ ● 16±2 dBm at 54Mbps
3.3.2.8	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate<10% at room Temp 25℃ ● -71 dBm for 54Mbps

3.3.3 IEEE 802.11n Section

	Feature	Detailed Description	
3.3.3.1	Standard	● IEEE 802.11n	
3.3.3.2	Radio and Modulation Type	● BPSK , QPSK , 16QAM ,64QAM with OFDM	
3.3.3.3	Operating Frequency	● 2.4GHz :2400 ~ 2483.5MHz ISM band	
3.3.3.4	Data Rate	at most 150 Mbps	
3.3.3.5	Media Access Protocol	● CSMA/CA with ACK	
3.3.3.6	Transmitter Output Power at Antenna Connector	● Typical RF Output Power at each RF chain, at roomTemp 25℃	
		2.4GHz Band/HT20 ● 15.5±2 dBm at MCS7	2.4GHz Band/HT40 ● 15.5±2 dBm at MCS7
3.3.3.7	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate=10% and at room Temp 25℃	
		2.4GHz Band/HT20 ● -68dBm at MCS7	2.4GHz Band/HT40 ● -66dBm at MCS7

4. Electrical and Thermal Characteristics

4.1 Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-40	125	℃
Ambient Operating Temperature	-40	85	℃
Junction Temperature	0	125	℃

4.2 General Section

	Feature	Detailed Description
4.2.1	Antenna Type	● Printed Antenna
4.2.2	Operating Voltage	● 3.3V±10%

5. Memory

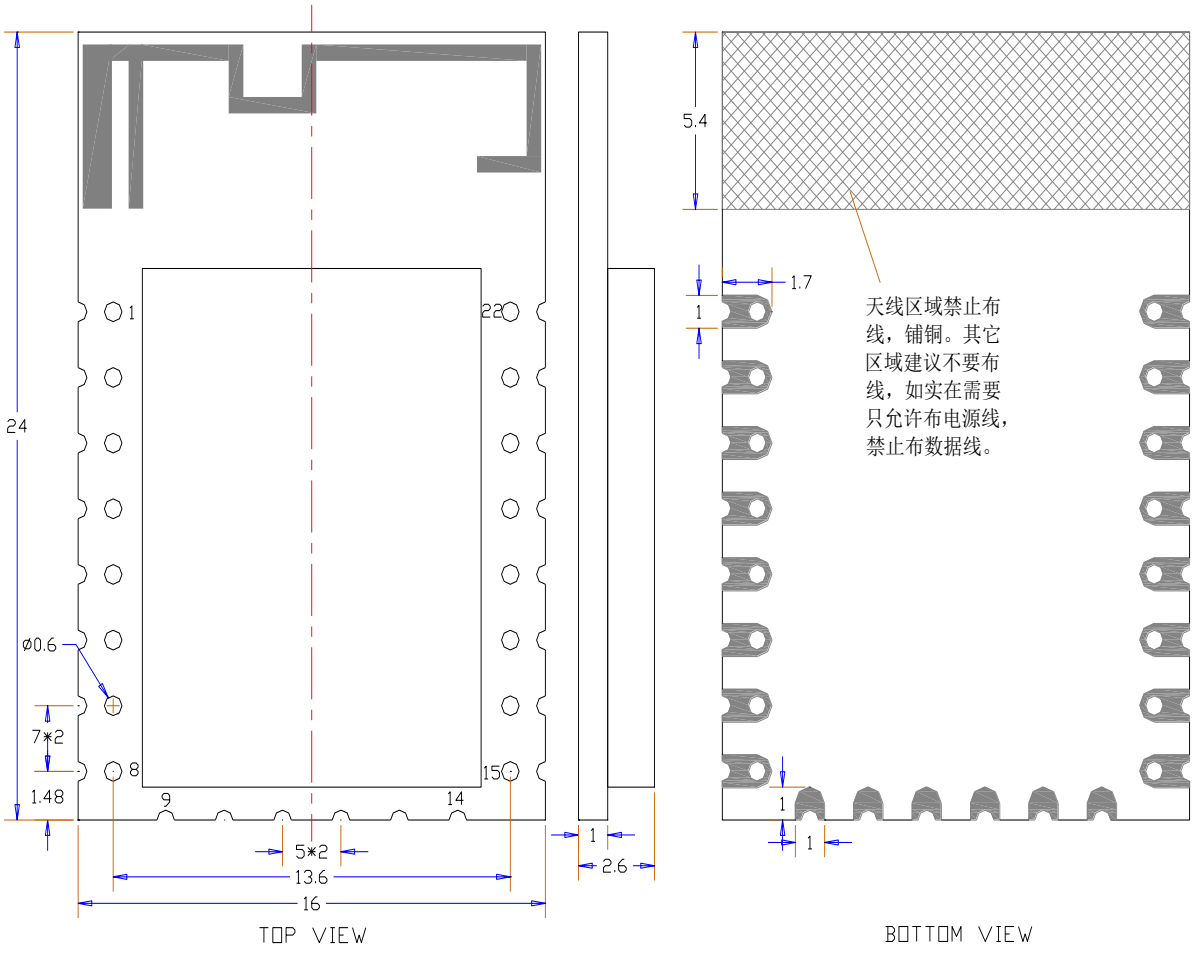
- Embedded 256KB SRAM and 24KB ROM
- 2MB of SiP QPSI Flash

6. Mechanical Characteristics

6.1 Mechanical Requirements

#	Feature	Detailed Description
6.1.1	Length	● 24 mm
6.1.2	Width	● 16 mm
6.1.3	Height	● 1.0 mm(PCB)

6.2 Mechanical Dimensions



UNIT :mm

长度(mm)	误差(mm)
0-5	±0.15
5-10	±0.20
10-50	±0.30
>50	±0.40

6.3 Pin Description

Pin	Symbol	Description	Pin	Symbol	Description
1	Reset	External system reset	12	nc	nc
2	DIG_PAD0	GPIO	13	nc	nc
3	DIG_PAD1	GPIO	14	DIG_PAD6	GPIO
4	DIG_PAD10	GPIO	15	GND	GND
5	DIG_PAD11	GPIO	16	DIG_PAD7	GPIO
6	DIG_PAD3	GPIO	17	DIG_PAD8	GPIO
7	DIG_PAD2	GPIO	18	DIG_PAD9	GPIO
8	VDD	3.3V	19	DIG_PAD15	GPIO
9	DIG_PAD4	GPIO	20	DIG_PAD14	GPIO
10	DIG_PAD5	GPIO	21	DIG_PAD13	GPIO
11	nc	nc	22	DIG_PAD12	GPIO

Pinmux Alternate Functions

Num	Pin Name	GPIO Func=0	GPIO Func=1	GPIO Func=2	GPIO Func=3	GPIO Func=4
1	DIG_PAD0	GPIO0	UART0_TXD	SWC	SPI1_CSN	PWM5
2	DIG_PAD1	GPIO1	UART0_RXD	SWD	SPI1_SCK	PWM7
3	DIG_PAD2	GPIO2	UART1_TXD	UART1_TXD	SPI1_MISO	I2C0_SCL
4	DIG_PAD3	GPIO3	UART1_RXD	SDIO_INT	SPI1_MOSI	I2C0_SDA
5	DIG_PAD4	SWC	GPIO4	SDIO_CMD	UART0_TXD	PWM0
6	DIG_PAD5	SWD	GPIO5	SDIO_CLK	UART0_RXD	PWM2
7	DIG_PAD6	GPIO6	SPI0_CSN	SDIO_DATA0	UART0_CTS	PWM4
8	DIG_PAD7	GPIO7	SPI0_SCK	SDIO_DATA1	UART0_RTS	PWM6
9	DIG_PAD8	GPIO8	SPI0_MOSI	SDIO_DATA2	I2C1_SCL	UART1_TXD
10	DIG_PAD9	GPIO9	SPI0_MISO	SDIO_DATA3	I2C1_SDA	UART1_RXD
11	DIG_PAD10	MODE_SEL3	PWM1	GPIO10	UART2_CTS	SPI2_SCK
12	DIG_PAD11	GPIO11	PWM3	SDIO_INT	UART2_RTS	SPI2_MOSI
13	DIG_PAD12	GPIO12	GPIO12	SPI2_CSN	UART2_TXD	GPIO12
14	DIG_PAD13	GPIO13	GPIO13	SPI2_MISO	UART2_RXD	GPIO13
15	DIG_PAD14	STRAP/SEL1	PWM0	SPI2_SCK	UART1_CTS	GPIO14
16	DIG_PAD15	STRAP/SEL2	PWM2	SPI2_MOSI	UART1_RTS	GPIO15

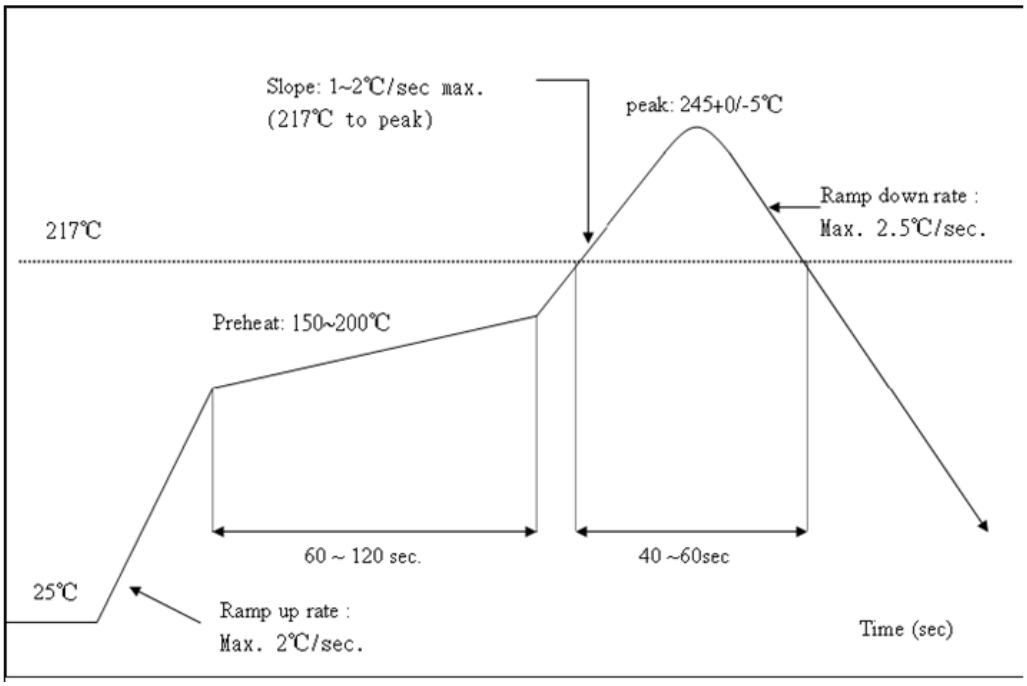
7. Note

7.1 ESD

Can't get the wifi module bare hands when needs, must wear the gloves and static ring.

有需要拿 wifi 模块时，禁止用手直接接触，一定要戴上手套以及静电环。

7.2 Reflow



Referred to IPC/JEDEC standard. Peak Temperature : 245±5° C Times : ≤2 s

8. Wireless module before the SMT note

1.When customers Open stencil must be sure the hole bigger to the Wireless module plate, please press 1 to 1 and 0.7 mm is widened to open outward, the thickness of 0.12 mm.
2.Can't get the wifi module bare hands when needs, must we wear the gloves and static ring.
3.The furnace temperature according to the size of the customer the mainboard, generally like to stick on a tablet standard temperature of 250 + - 5,can do 260+ - 5.

Storage and use Wifi module control should pay attention to the following matters:
• Module of the storage life of vacuum packaging:
1-1.Storage life : 12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.
1-2.After this bag is opened , devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be :
1-3.Check the humidity card: stored at≦ 20%RH.If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption.
① Mounthed within 168 hours at factory conditions of: t≦ 30%℃, ≦ 60%R.H.
② Once opened, the workshop the preservation of life for 168 hours.
1-4.If baking is required, devices may be baked for:
① Modules must be to remove module moisture problem.
② Baking temperature: 125 ℃, 8 hours.
③ After baking, put proper amount of desiccant to seal packages.
1-5. The actual number of module vacuum packing which is based on the actual number of packages to the customer requirements,
2.Module reel packaging items as follows.
2-1.Storage life:12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.
2-2.Module apart packing after 168 hours, To launch patch need to bake, to remove the module hygroscopic, baking temperature
conditions: 125℃, 8hours.
2-3. The actual number of module reel packing which is based on the actual number of packages to the customer requirements,
3.Module pallet packaging items as follows:
3-1.Storage life: 3 months. Storage conditions:<40℃. Relative humidity:<90%R.H.
3-2.Module if not used within 48 hours, before launch the need for baking, baking temperature: 125 ℃, 8 hours.
3-3. Pallet packaging each plate is 100 PCS. The actual number of module pallet packing which is based on the actual number of packages to the customer requirements.