NodeMCU-32 Specification

Version V1.3

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Change History of Revision

Version	Date	Contents of Revision Change	Compilation	Verify
V1.0	2016.10.06	Initial release	Xiaofei Yang	
V1.1	2018.04.04	Information changes	Xiaofei Yang	
V1.2	2019.10.24	Version update	Yiji Xie	
V1.3	2020.04.22	Information changes	Yiji Xie	

Contents

1. Product overview

Nodemcu-32s module is developed by Anxinke Technology. At the heart of this module is the ESP32 chip, which is available extended, adaptive features. two CPU cores can be controlled separately. A clock frequency adjustment range of 80 MHz to 240MHz, support RTOS, is a universal Wi-Fi +BT +BLE MCU module.

Nodemcu-32s module integrates traditional Bluetooth, low power Bluetooth and Wi-Fi. Has a wide range of applications: Wi-Fi support for a wide range of communication connections and direct connection to the Internet through routers; Bluetooth allows users to connect Cell phone or broadcast BLE Beacon to facilitate signal detection. Data transfer rates up to 150 Mbps, supported by the module.Antenna output power up to 20 dBm, can achieve maximum range of wireless communication. So this module has a leading industry in high integration, wireless transmission distance, power consumption and network connectivity performance is excellent.

ESP32 operating system is LwIP freeRTOS, with hardware acceleration 1.2. Chip also supports OTA encryption upgrade, easy for users to continue to upgrade after product release.

Features

- ■ 802.11b/g/n （802.11n，Speed up to 150Mbps）
- ■ WIFI frequency range 2400~2483.5MHz
- ■ Adjusting range of clock frequency for 80 MHz to 240 MHz，support RTOS
- ■ Built-in 2 channels 12 bit high precision ADC, up to 18 channels
- ■ Support UART/GPIO/ADC/DAC/SDIO/PWM/I2C/I2S interface
- ■ Support multiple sleep modes, ESP32 chip sleep current less than 5μA
- ■ Embedded Lwip protocol stack
- ■ Supporting STA/AP/STA AP operating mode
- ■ Support for local serial port upgrades and remote firmware upgrades（FOTA）
- ■ Generic AT instructions can be used quickly

Parameters

Figure 1 Main Parameter

Model	NodeMCU-32
Package	DIP38(2.54mm standard pin header)
Size	25.4mm(W)*48.3mm(H) ±0.2 mm
Antenna	PCB antenna/IPEX external antenna
Frequency Range	2400 ~ 2483.5MHz
Operating Temperature	-20 ℃ ~ 70 ℃
Storage Environment	-40 ℃ ~ 125 ℃ , < 90%RH
Power supply range	Micro USB supply voltage 4.75 V~5.25 V, recommended 5.0 V , supply voltage 3.0 V ~3.6 V, supply current 500 mA, recommended 3.3 V
Support Interface	UART/SPI/SDIO/I2C/PWM/I2S/IR/ADC/DAC
IO	3（reserved ）
UART Baut	Support 110 ~ 4608000 bps ， default 115200 bps
Security	WEP/WPA-PSK/WPA2-PSK
SPI Flash	Default 32Mbit, Max support 128Mbit
Certification	FCC/CE-RED/IC/TELEC/KCC/SRRC/NCC/BQB/RoHS/REACH

2. Electrical parameter

Electrical Characteristics

Absolute maximum ratings

Any exceeding the following absolute maximum ratings may cause chip damage

Name	Min	Typ	Max	Unit
Micro USB voltage supply	4.75	5.0	5.25	V
Power supply voltage	2.6	3.3	3.6	V
Operating temperature	-20	-	+70	℃
Storage temperature	-40	-	+125	℃

WiFi Radio Performance

Description	Typ	Unit
Operating frequency	2400 - 2483.5	MHz
Output Power		
11n mode，PA output power	13±2	dBm
11g mode，PA output power	14±2	dBm
11b mode，PA output power	17±2	dBm
Sensitivity		
CCK, 1 Mbps	<=-98	dBm
CCK, 11 Mbps	<=-90	dBm

6 Mbps (1/2 BPSK)	<=-93	dBm
54 Mbps (3/4 64-QAM)	<=-75	dBm
HT20 (MCS7)	<=-73	dBm

Bluetooth Radio Performance

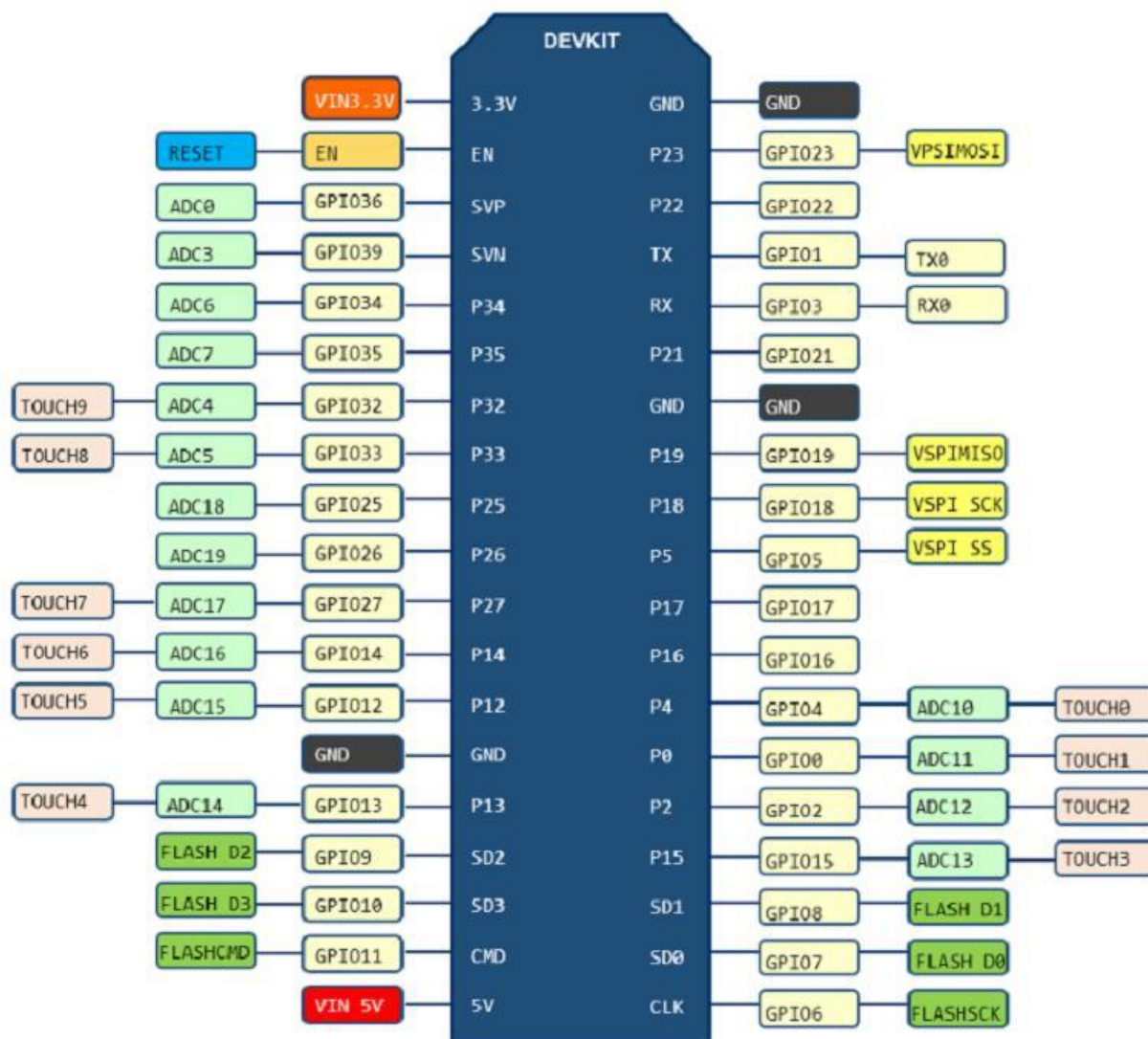| Description	Min	Typ	Max	Unit
Output characteristics				
Transmit frequency	-	+7.5	+10	dBm
Receiving characteristics				
Receiving sensitivity	-	-98	-	dBm

3. Appearance size
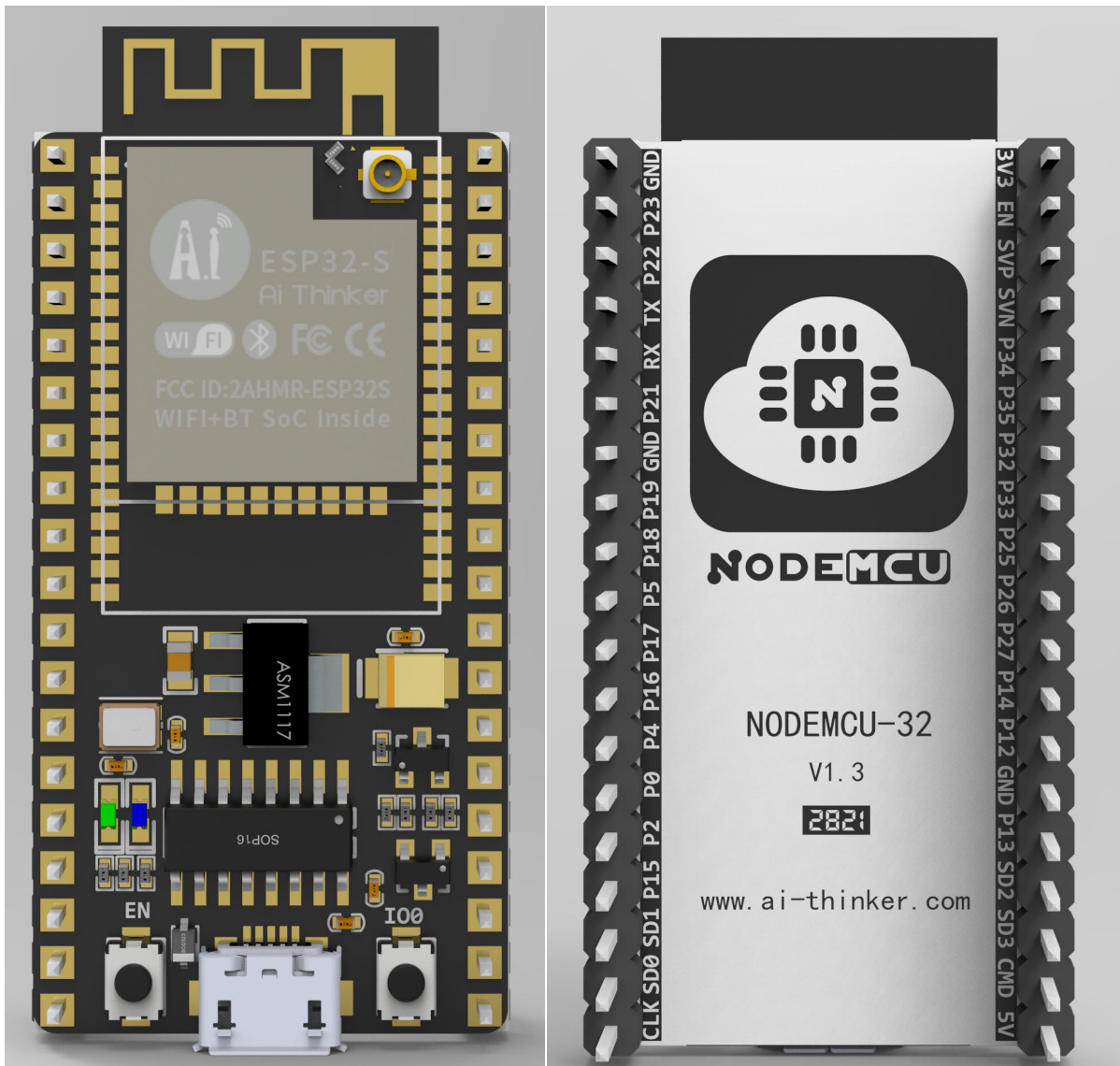
4. Pin definition

A total of 38 interfaces are connected NodeMCU-32_V1.3 the development board module, refer to below pin diagram, pin function definition table is interface definition.

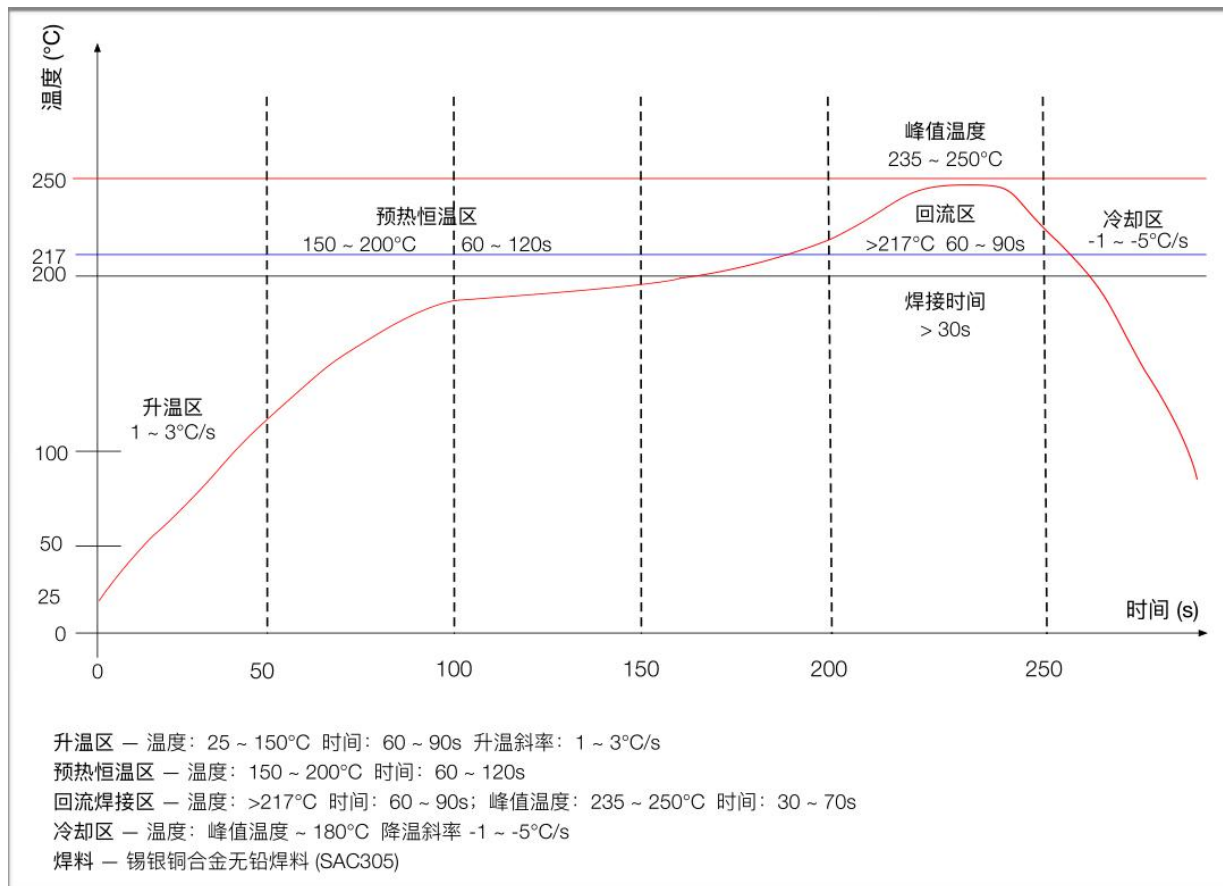NodeMCU-32 Pin diagram

Table 2.2 Pin function definition

No.	Name	Function
1	3.3V	Power supply
2	EN	Enable module, high level efficient
3	SVP	GPIO36/ADC1_CH0/RTC_GPIO0
4	SVN	GPIO39/ADC1_CH3/RTC_GPIO3

5	P34	GPIO34/ADC1_CH6/RTC_GPIO4
6	P35	GPIO35/ADC1_CH7/RTC_GPIO5
7	P32	GPIO32/XTAL_32K_P (32.768 kHz crystal intut), ADC1_CH4/TOUCH9/RTC_GPIO9
8	P33	GPIO33/XTAL_32K_N (32.768 kHz Crystal output), ADC1_CH5/TOUCH8/RTC_GPIO8
9	P25	GPIO25/DAC_1/ADC2_CH8/RTC_GPIO6/EMAC_RXD0
10	P26	GPIO26/DAC_2/ADC2_CH9/RTC_GPIO7/EMAC_RX_DV
11	P27	GPIO27/ADC2_CH7/TOUCH7/RTC_GPIO17/EMAC_RX_DV
12	P14	GPIO14/ADC2_CH6/TOUCH6/RTC_GPIO16/MTMS/ HSPICLK/HS2_CLK/SD_CLK/EMAC_TXD2
13	P12	GPIO12/ADC2_CH5/TOUCH5/ RTC_GPIO15/ MTDI/ HSPIQ/ HS2_DATA2/SD_DATA2/EMAC_TXD3
14	GND	Ground
15	P13	GPIO13/ ADC2_CH4/TOUCH4/RTC_GPIO14/MTCK/ HSPID/HS2_DATA3/SD_DATA3/EMAC_RX_ER
16	SD2	GPIO9/SD_DATA2/SPIHD/HS1_DATA2/U1RXD
17	SD3	GPIO10/SD_DATA3/SPIWP/ HS1_DATA3/U1TXD
18	CMD	GPIO11/SD_CMD/SPICS0/HS1_CMD/U1RTS
19	5V	Power supply
20	CLK	GPIO6/SD_CLK/SPICLK/HS1_CLK/U1CTS
21	SD0	GPIO7/SD_DATA0/SPIQ/HS1_DATA0/ U2RTS
22	SD1	GPIO8/SD_DATA1/SPID/HS1_DATA1/U2CTS
23	P15	GPIO15/ ADC2_CH3/ TOUCH3/ MTDO/ HSPICS0, RTC_GPIO13/HS2_CMD/SD_CMD/EMAC_RXD3
24	P2	GPIO2/ADC2_CH2/TOUCH2/RTC_GPIO12/HSPIWP/ HS2_DATA0/SD_DATA0
25	P0	GPIO4/ADC2_CH0/TOUCH0/RTC_GPIO10/HSPIHD/HS2_DATA1/SD_DATA1/EMAC_TX_ER Download mode: external pull down, running mode: suspended or external pull up
26	P4	GPIO4/ADC2_CH0/TOUCH0/RTC_GPIO10/HSPIHD/HS2_DATA1/SD_DATA1/EMAC_TX_ER

27	P16	GPIO16/HS1_DATA4/U2RXD/EMAC_CLK_OUT
28	P17	GPIO17/ HS1_DATA5/ U2TXD/ EMAC_CLK_OUT_180
29	P5	GPIO5/ VSPICS0/ HS1_DATA6/ EMAC_RX_CLK
30	P18	GPIO18/ VSPICLK/ HS1_DATA7
31	P19	GPIO19/ VSPIQ/ U0CTS/ EMAC_TXD0
32	GND	Ground
33	P21	GPIO21/VSPIHD/ EMAC_TX_EN
34	RX	GPIO3/U0RXD/CLK_OUT2
35	TX	GPIO1/U0TXD/ CLK_OUT3/ EMAC_RXD2
36	P22	GPIO22/VSPIWP/U0RTS/EMAC_TXD1
37	P23	GPIO23/VSPID/HS1_STROBE
38	GND	Ground

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5. Schematics

6. Design Guidance

1).Power Supply

（1）、Recommended   voltage 3.3V, Peak:Current over 500mA .

（2）、It is recommended to use the LDO power supply；If   DC-DC is used, the ripple is controlled within 30 mV.

（3）、DC-DC power supply circuit is recommended to reserve the position of the dynamic response capacitor, and the output ripple can be optimized when the load change is large.

（4）、Proposed addition of ESD Devices to 5V Power supply Interface.

7. Reflow Welding Curve

升温区 — 温度：25 ~ 150℃ 时间：60 ~ 90s 升温斜率：1 ~ 3℃/s
预热恒温区 — 温度：150 ~ 200℃ 时间：60 ~ 120s
回流焊接区 — 温度：>217℃ 时间：60 ~ 90s；峰值温度：235 ~ 250℃ 时间：30 ~ 70s
冷却区 — 温度：峰值温度 ~ 180℃ 降温斜率 -1 ~ -5℃/s
焊料 — 锡银铜合金无铅焊料 (SAC305)

8. Package Information

NodeMCU-32_V1.3 development board is in anti-static bag.

9. Contacts

Company website：https://www.ai-thinker.com

Developer Wiki：http://wiki.ai-thinker.com

Company forum：http://bbs.ai-thinker.com

Sampling purchasing：https://anxinke.taobao.com

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