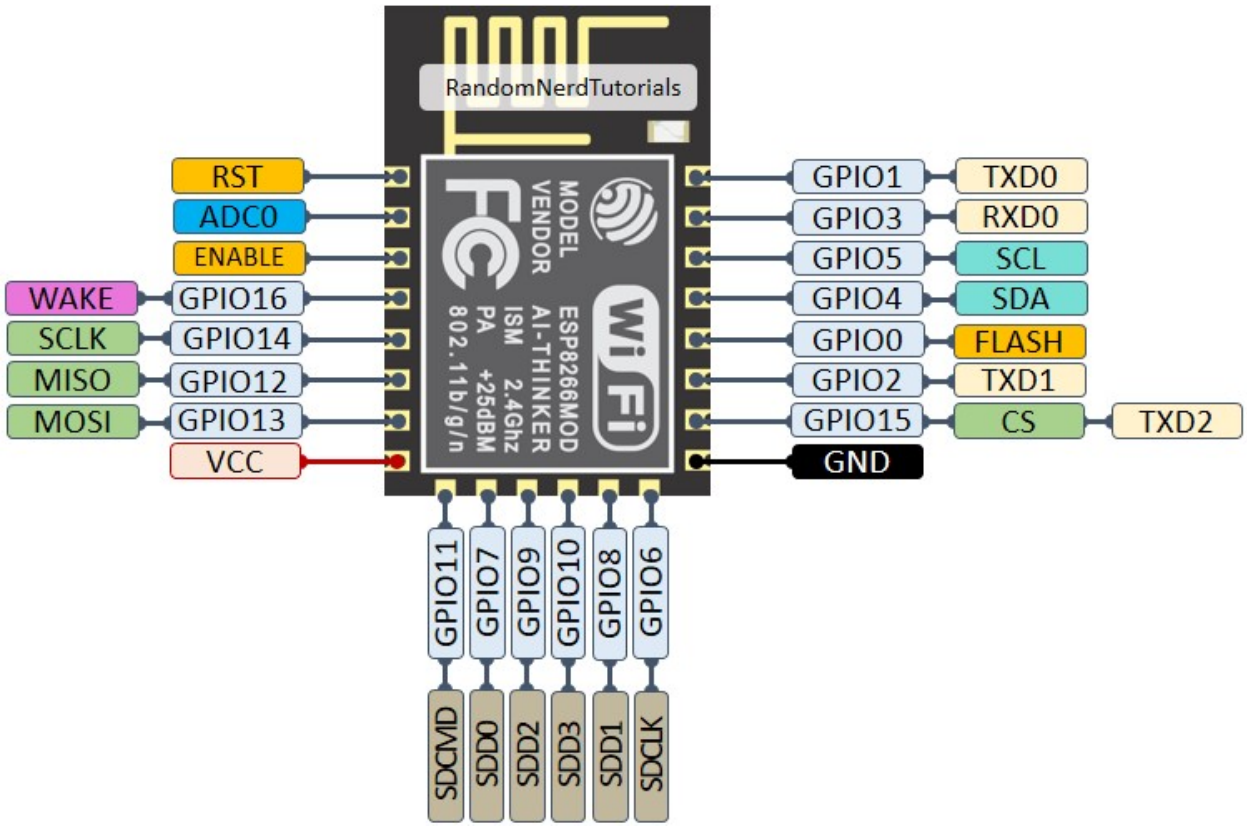
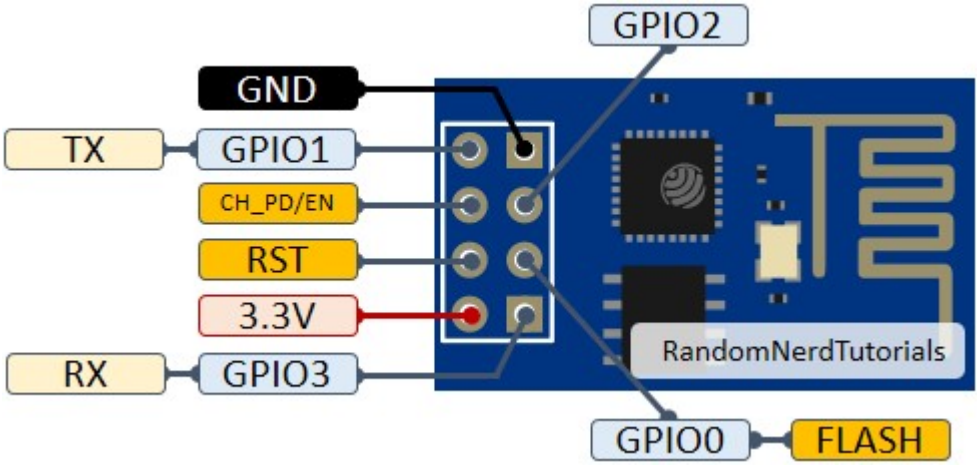
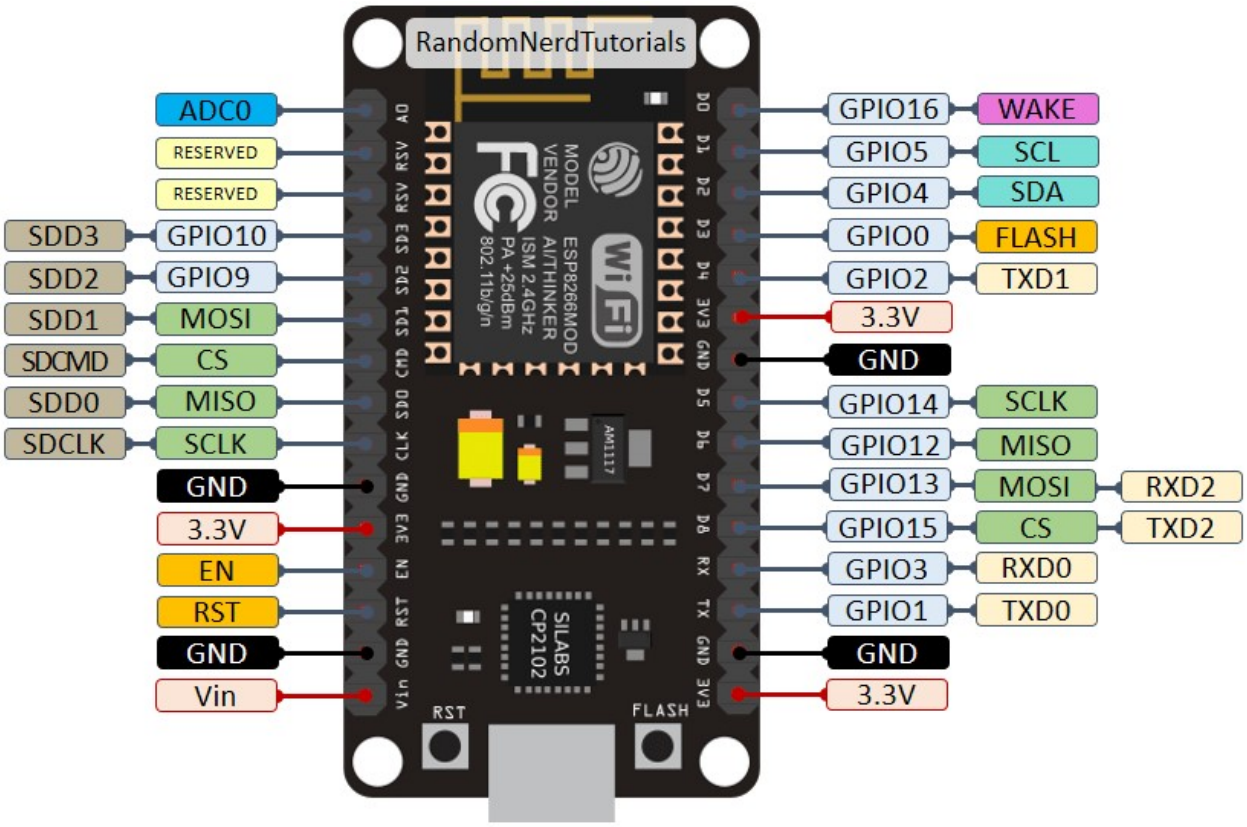
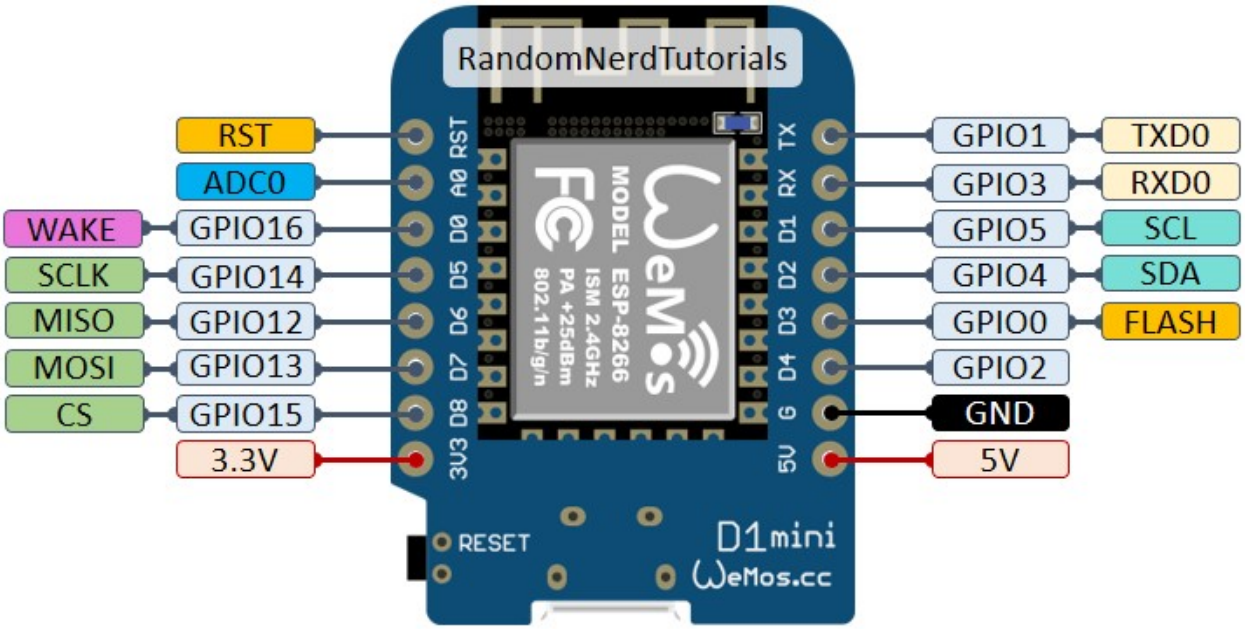
ESP8266 Pinout






RandomNerdTutorials
ADC0
RESERVED
RESERVED
SDD3
GPIO10
SDD2
GPIO9
SDD1
MOSI
SDCMD
CS
SDD0
MISO
SDCLK
SCLK
GND
3.3V
EN
RST
GND
Vin
GPIO16
WAKE
GPIO5
SCL
GPIO4
SDA
GPIO0
FLASH
GPIO2
TXD1
3.3V
GND
GPIO14
SCLK
GPIO12
MISO
GPIO13
MOSI
RXD2
GPIO15
CS
TXD2
GPIO3
RXD0
GPIO1
TXD0
GND
3.3V
RST
FLASH
ESP8266MOD
AI-THINKER
ISM 2.4GHz
PA +25dBm
802.11b/g/n
SILABS
CP2102
AM1117


RandomNerdTutorials
RST
ADC0
WAKE
GPIO16
SCLK
GPIO14
MISO
GPIO12
MOSI
GPIO13
CS
GPIO15
3.3V
GPIO1
TXD0
GPIO3
RXD0
GPIO5
SCL
GPIO4
SDA
GPIO0
FLASH
GPIO2
GND
5V
RESET
D1 mini
WeMos.cc
MODEL ESP-8266
ISM 2.4GHz
PA +25dBm
802.11b/g/n

ESP8266 Peripherals

The ESP8266 peripherals include:

- 17 GPIOs
- SPI
- I2C (implemented on software)
- I2S interfaces with DMA
- UART
- 10-bit ADC

Best Pins to Use – ESP8266

Label	GPIO	Input	Output	Notes
D0	GPIO16	no interrupt	no PWM or I2C support	HIGH at boot used to wake up from deep sleep
D1	GPIO5	OK	OK	often used as SCL (I2C)
D2	GPIO4	OK	OK	often used as SDA (I2C)
D3	GPIO0	pulled up	OK	connected to FLASH button, boot fails if pulled LOW
D4	GPIO2	pulled up	OK	HIGH at boot connected to on-board LED, boot fails if pulled LOW
D5	GPIO14	OK	OK	SPI (SCLK)
D6	GPIO12	OK	OK	SPI (MISO)
D7	GPIO13	OK	OK	SPI (MOSI)
D8	GPIO15	pulled to GND	OK	SPI (CS) Boot fails if pulled HIGH
RX	GPIO3	OK	RX pin	HIGH at boot
TX	GPIO1	TX pin	OK	HIGH at boot debug output at boot, boot fails if pulled LOW
A0	ADC0	Analog Input	X	

Pins used during Boot

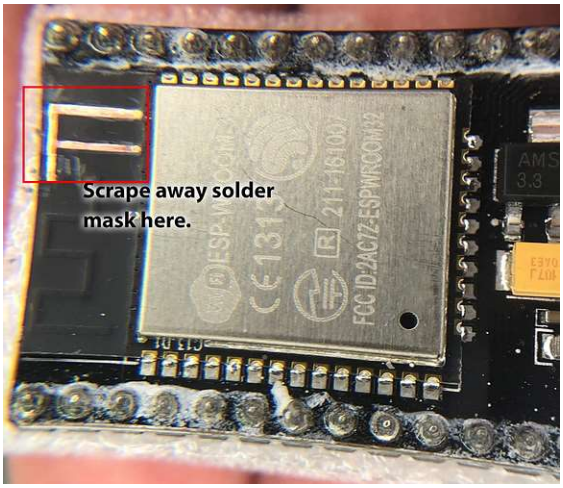
The ESP8266 can be prevented from booting if some pins are pulled LOW or HIGH. The following list shows the state of the following pins on BOOT:

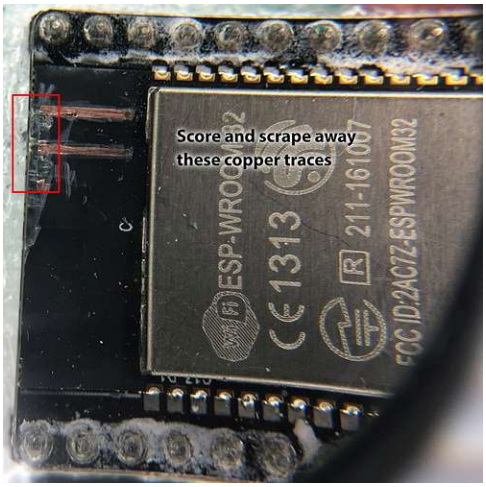
- GPIO16: pin is high at BOOT
- GPIO0: boot failure if pulled LOW
- GPIO2: pin is high on BOOT, boot failure if pulled LOW
- GPIO15: boot failure if pulled HIGH
- GPIO3: pin is high at BOOT
- GPIO1: pin is high at BOOT, boot failure if pulled LOW
- GPIO10: pin is high at BOOT
- GPIO9: pin is high at BOOT

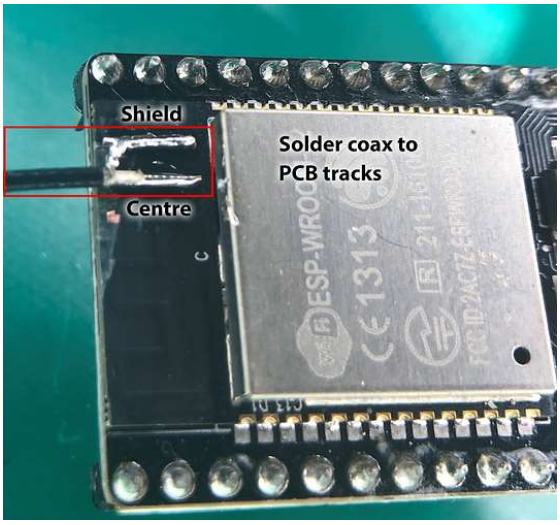
GPIO0, GPIO2 and GPIO15 Pins

GPIO15 (MTDO)	GPIO0	GPIO2	Mode	Comments
L	H	H	Flash	Boot from SPI Flash (Normal running)
L	L	H	UART	Program via UART (TX/RX)
H	x (not care)	x (not care)	SDIO	Boot from SD-card

External Antenna







	ESP8266 (ESP8285)	ESP32 (ESP32solo1)	ESP32-S2	ESP32-S3	ESP32-C3 (ESP8685)	ESP32-C2 (ESP8684)	ESP32-C6	ESP32-H2
CPU	Xtensa® single-core 32-bit L106	Xtensa® dual-core 32-bit LX6 (solo1:single core)	Xtensa® single-core 32-bit LX7	Xtensa® dual-core 32-bit LX7	32-bit RISC-V single-core processor	32-bit RISC-V single-core processor	32-bit RISC-V single-core processor	32-bit RISC-V single-core processor
Core	1	2 (solo1:1)	1	2	1	1	1	1
Freq. (MHz)	80	240 (solo1:160)	240	240	160	120	160	96
Voltage (V)	2.5 ~ 3.6	3.0 ~ 3.6	3.0 ~ 3.6	3.0 ~ 3.6	3.0 ~ 3.6	3.0 ~ 3.6	3.0 ~ 3.6	3.3 ~ 3.6
Introduction	2014	2016	2019	2021	2020	2022	2021	2021
Status (2023/05)	NRND	Mass Production (solo1: NRND)	NRND	Mass Production	Mass Production	Mass Production	Mass Production	Sample
Wi-Fi	IEEE 802.11 b/g/n; 2.4 GHz; HT20; up to 72 Mbps	IEEE 802.11 b/g/n; 2.4 GHz; HT20/40; up to 150 Mbps	IEEE 802.11 b/g/n; 2.4 GHz; HT20/40; up to 150 Mbps	IEEE 802.11 b/g/n; 2.4 GHz; HT20/40; up to 150 Mbps	IEEE 802.11 b/g/n; 2.4 GHz; HT20/40; up to 150 Mbps	IEEE 802.11 b/g/n; 2.4 GHz; HT20; up to 150 Mbps	IEEE 802.11 b/g/n; 2.4 GHz; HT20/40; up to 150 Mbps	No Wi-Fi
Wi-Fi 6							IEEE 802.11 ax; 2.4 GHz; HT20; up to 150 Mbps	
Zigbee / Thread (802.15.4)	N/A	N/A	N/A	N/A	N/A	N/A	Available	Available
Bluetooth	N/A	BR/EDR + Bluetooth LE v4.2	N/A	Bluetooth LE v5.0	Bluetooth LE v5.0	Bluetooth LE v5.0	Bluetooth LE v5.3	Bluetooth LE v5.0
SRAM (KB)	160	520	320	512	400	272	512	320
ROM (KB)		448	128	384	384	576	320	128
RTC SRAM (KB)	1	16	16	16	8	0	16	4
ADC	1*10-bit ADC, 1 channel	2*12-bit ADC, 18 channels	2*13-bit ADC, 20 channels	2*12-bit ADC, 20 channels	2*12-bit ADC, 6 channels	1*12-bit ADC, 5 channels	1*12-bit ADC, 7 channels	1*12-bit ADC, 5 channels
DAC	0	2*8-bit DAC	2*8-bit DAC	0	0	0	0	0
Touch	0	10	14	14	0	0	0	0

Temp Sensor		0	1	1	1	1	1	1
GPIO	16	26	37	36	15	14	23	19
Strapping GPIO	0, 2, 15	0, 2, 5, 12, 15	0, 45, 46	0, 3, 45, 46	2, 8, 9	8, 9	4, 5, 8, 9, 15	8, 9
GPIO for flash/PSRAM	6, 7, 8, 9, 10, 11	6, 7, 8, 9, 10, 11 (PSRAM or embedded flash: 16, 17)	27, 28, 29, 30, 31, 32 (OPI: 33, 34, 35, 36, 37)	27, 28, 29, 30, 31, 32 (OPI: 33, 34, 35, 36, 37)	11, 12, 13, 14, 15, 16, 17	11, 12, 13, 14, 15, 16, 17	20, 21, 22, 24, 25, 26	
UART	1.5 (Serial1 out only)	3	2	3	2	2	3	2
SPI	2	4	4	4	3	3	1	3
SDIO HOST		1	0	2	0	0	0	0
SDIO SLAVE		1	0	0	0	0	1	0
I2C	1(soft)	2	2	2	1	1	2	2
I2S	1	2	1	2	1	0	1	1
RMT	0	1*8 channels	1*4 channels	1*4 channels	1*4 channels	0	1*4 channels	1*2 channels
LED PWM	0	2*8 channels	1*8 channels	1*8 channels	1*6 channels	1*6 channels	1*6 channels	1*6 channels
MCPWM	0	2	0	2	0	0	1	1
USB OTG	0	0	1	1	0	0	0	0
USB Serial / JTAG	N/A	N/A	YES	YES	YES	N/A	YES	YES
Hall	0	1	0	0	0	0	0	0
Ethernet	0	1	0	0	0	0	0	0
TWAI (CAN)	0	1	1	1	1	0	2	1
JTAG		YES	YES	YES	YES	YES	YES	YES
Camera	N/A	1*DVP 8/16-bit	1*DVP 8/16-bit	1*DVP 8/16-bit	N/A	N/A	N/A	N/A
TOF	N/A	N/A	YES	N/A	N/A	N/A	N/A	N/A
BT Certification		BT SIG		BT SIG	BT SIG			
Wi-Fi Certification	WPA 2	Wi-Fi Alliance/WPA 3	Wi-Fi Alliance/WPA 3			WFA		
RF Certification		FCC / CE-RED / IC / TELEC / KCC / SRRC / NCC	FCC / CE-RED / SRRC / IC	SRRC / CE / FCC / IC / MIC / NCC / KCC	FCC / CE-RED / SRRC / IC	SRRC		
Sleep Power Consumption	900 µA light sleep, 20 µA deep sleep	800 µA light sleep, 10 µA deep sleep	750 µA light sleep, 25 µA deep sleep	240 µA light sleep, 8 µA deep sleep	130 µA light sleep, 5 µA deep sleep	140 µA light sleep, 5 µA deep sleep	180 µA / 35 µA light sleep, 7 µA deep sleep	