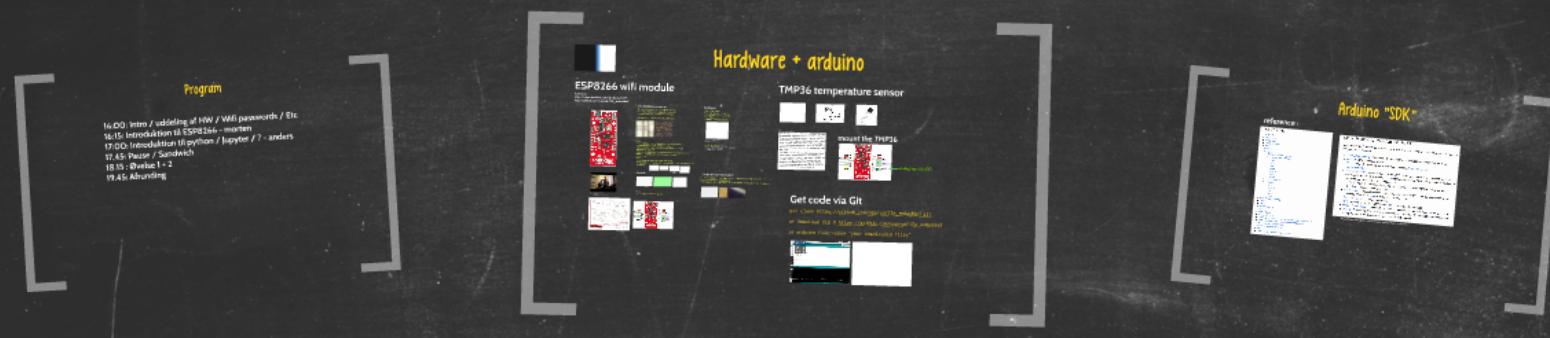


Byg in egen IoT *ting*

IDA Embedded, 26 April 2016



Byg in egen IoT *ting*

IDA Embedded, 26 April 2016



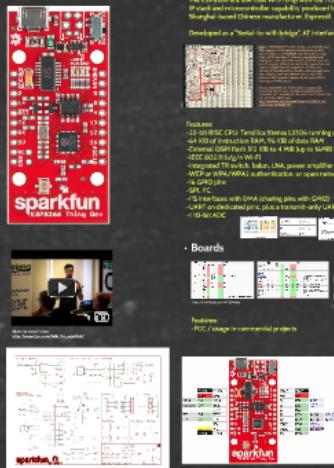
Program

- 16:00: Intro / uddeling af HW / Wifi passwords / Etc
- 16:15: Introduktion til ESP8266 - morten
- 17:00: Introduktion til python / Jupyter / ? - anders
- 17.45: Pause / Sandwich
- 18.15 : Øvelse 1 + 2
- 19.45: Afrunding

Hardware + arduino

ESP8266 wifi module

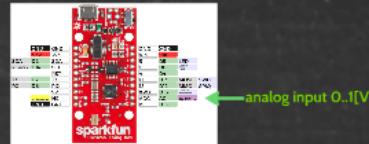
resources:
<https://www.sparkfun.com/products/13711>
https://github.com/opprud/IDA_embedded



TMP36 temperature sensor



mount the TMP36

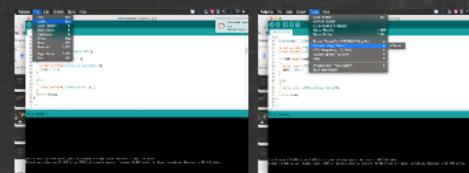


Get code via Git

```
git clone https://github.com/opprud/IDA\_embedded.git
```

or download zip @ https://github.com/opprud/IDA_embedded

in arduino file->open "your downloaded files"





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NEW CHIP ALERT: THE ESP8266 WIFI MODULE (IT'S \$5)

by: Brian Benchoff

f t g+

145 Comments

August 26, 2014



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by Brian Benchoff

145 Comments

August 26, 2014

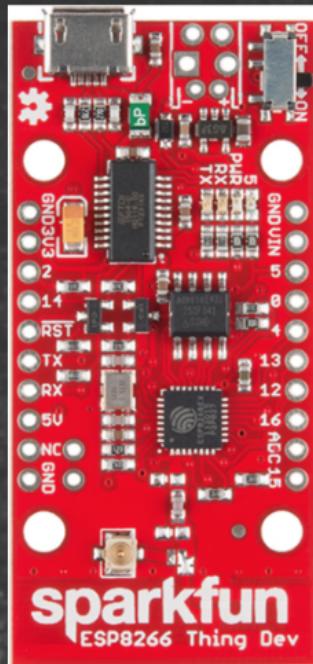
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ESP8266 wifi module

resources:

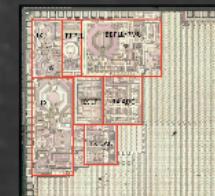
<https://www.sparkfun.com/products/13711>
https://github.com/opprud/IDA_embedded



• The ESP8266 processor

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif.

Developed as a "Serial-to-wifi-bridge", AT interface



Espressif ESP8266 WiFi-serial interface - weekend die-shot
 Since August 2014 internet access is available by WiFi
 without any additional SoC or MCU chip which are usually
 being sold for less than 4\$. Chinese company Espressif
 managed to claim entire WiFi, TCP/IP and AT/TFTP stack into
 one single chip. This is achieved by integrating high-end
 wireless receiver/transmitter, WiFi MAC, long-end
 requires minimum external components, off-chip memory
 internal. All this allowed them to offer extremely aggressive
 price. Chip has marking ESP8266, which is their more
 advanced family product. Apparently, they only differ in
 booting ROM code.

Die size 200x200 µm, half of which is occupied by
 transmitter and RAM. 25% - on-chip memory (stack size
 estimations are ~700kB), and the rest is Xtensa LX106 CPU
 core and other digital logic.
<http://esp8266.com/en/read/Espressif-ESP8266-wifi.html>

Features:

- 32-bit RISC CPU: Tensilica Xtensa LX106 running at 80 MHz
- 64 KIB of instruction RAM, 96 KIB of data RAM
- External QSPI flash 512 KIB to 4 MiB (up to 16MiB is supported)
- IEEE 802.11 b/g/n Wi-Fi
- Integrated TR switch, balun, LNA, power amplifier and matching network
- WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI, I²C,
- I²S interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
- 110-bit ADC



• Boards



<https://en.wikipedia.org/wiki/ESP8266>

• Toolchains

- Espressif SDK available
- NodeMCU, run LUA on the ESP
- micropython, espruino, jerryscript
- FreeRTOS-clones
- Arduino for ESP8266 (03/2015)



<http://arduino.esp8266.com/versions/1.6.5-1160-gcf26c5f/doc/reference.html>

Install Arduino ESP8266 Add-on

https://learn.sparkfun.com/tutorials/esp8266-thing-hookup-installing-the-esp8266-arduino-addon?_ga=1.674834.164221504.141577892

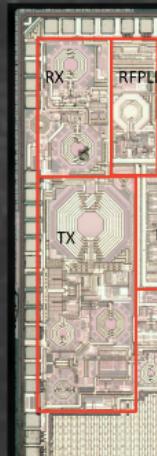
• (Lack off) Documentation

Niel Kolban's ESP8266 book: <https://leanpub.com/nielk/esp8266-hands-on-hacking>
 Hackaday: <http://hackaday.com/?s=esp>
 CPU manual available at <http://espressif.com>

Kolban's

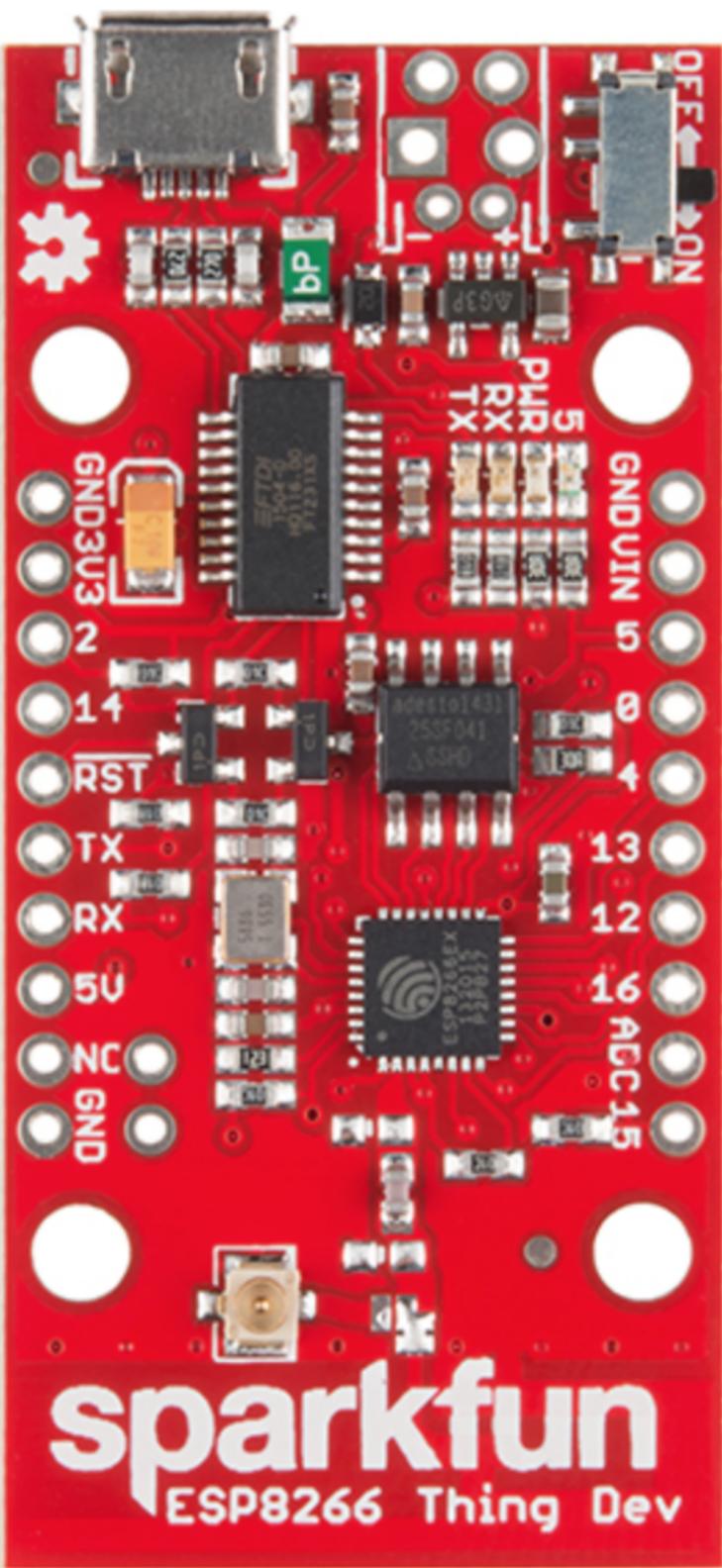
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Feature

- 32-bit
-64 KiB
-External
-IEEE
-Integration
-WEP
-16 GPIOs
-SPI, I²C
-I²S interface
-UART
-110-pin



- The ESP8266 processor

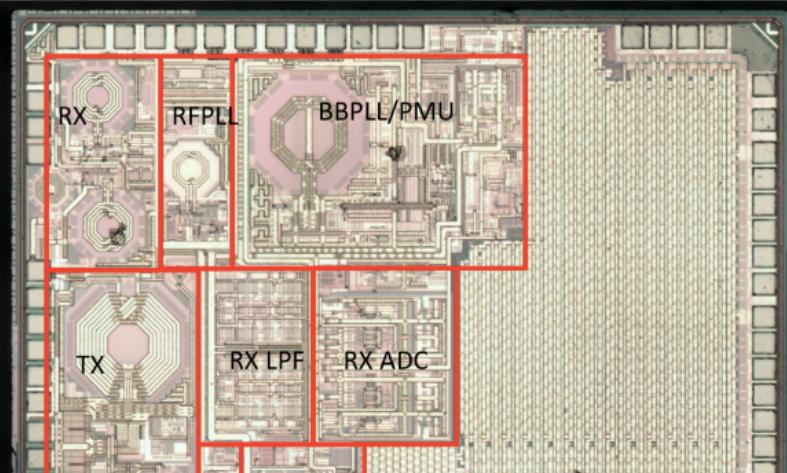
The ESP8266 is a low-cost Wi-Fi chip with IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.

Developed as a "Serial-to-wifi-bridge", AT interface

- The ESP8266 processor

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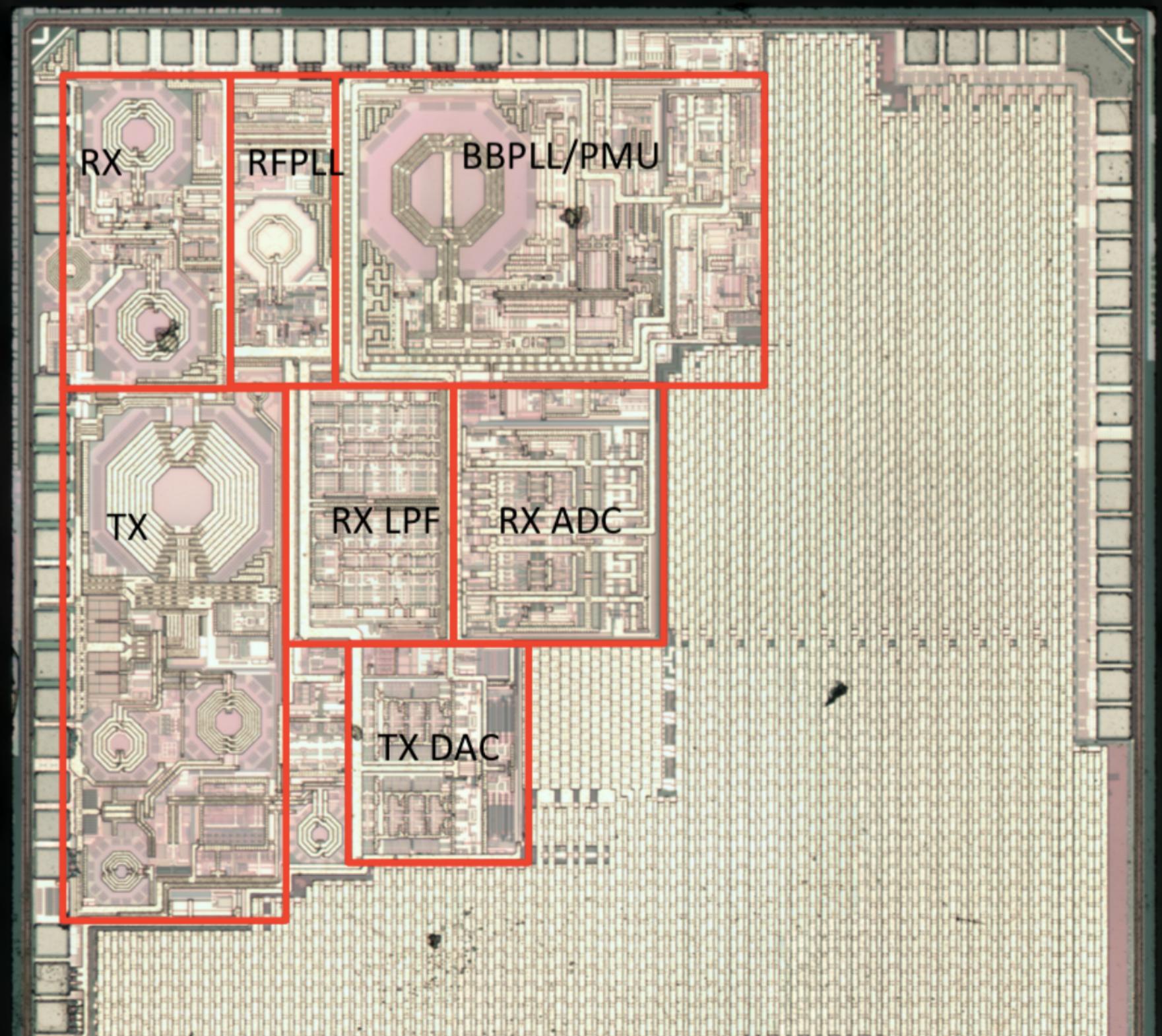
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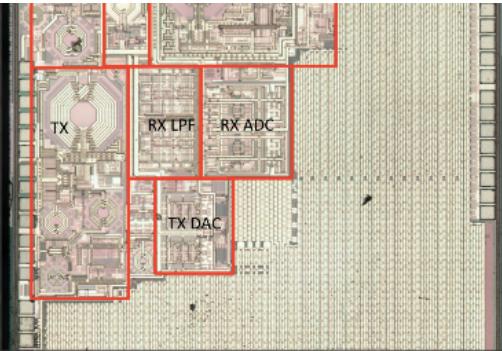
Espressif ESP8266 WiFi-serial interface : weekend die-shot Since August of 2014 internet is literally blown by WiFi-serial modules on new ESP8266 chip which are currently being sold for less than 4\$. Chinese company Espressif managed to cram entire WiFi, TCP/IP and HTTP stack into on-chip memory, without external DRAM. Analog front-end requires minimal external components, all filters are internal. All this allowed them to offer extremely aggressive price. Chip has marking ESP8089, which is their more advanced 40nm product. Apparently, they only differ in bonding and ROM content.

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*Die size 2050x2169 µm, half of which is occupied by
transceiver and PA, 25% - on-chip memory (rough size
estimations are ~300KiB), and the rest is Xtensa LX106 CPU
core and other digital logic.
[http://zeptobars.com/en/read/Espressif-ESP8266-wifi-
serial-rs232-ESP8089-IoT](http://zeptobars.com/en/read/Espressif-ESP8266-wifi-serial-rs232-ESP8089-IoT)*



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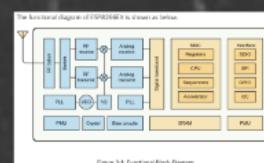


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Features:

- 32-bit RISC CPU: Tensilica Xtensa LX106 running at 80 MHz
 - 64 KiB of instruction RAM, 96 KiB of data RAM
 - External QSPI flash 512 KiB to 4 MiB (up to 16MiB is supported)
 - IEEE 802.11 b/g/n Wi-Fi
 - Integrated TR switch, balun, LNA, power amplifier and matching network
 - WEP or WPA/WPA2 authentication, or open networks
 - 16 GPIO pins
 - SPI, I²C,
 - I²S interfaces with DMA (sharing pins with GPIO)
 - UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
 - 1 10-bit ADC



Voltage	3.3V
Current consumption	10mA - 17mA
Flash memory available	16Mbit (512K words)
Processor	Tensilica L10 32 bit
Processor speed	80-160MHz
RAM	32K + 8KB
CPUs	17 (multiplexed with other functions)
Analog to Digital	Higher than 16bit resolution
Digital I/O support	8parallel ports

- It's a Unidirectional Bus
- It uses SPI, I₂C, ADC, DAC, SPI, PWM and some more
- It's running at 5MHz
- 64Kbytes of instruction RAM
- 40KBytes of data RAM
- 64Kbytes EEPROM
- It runs at 16MHz with VDD_{core} = 3.3V
- It has 100 pins

- Boards



• (L)
Niel K
Hacka
CPU

What is this ESP8266

- It's a wireless [SoC](#)
- It has GPIO, I2C, ADC, SPI, PWM and some more
- It's running at 80MHz
- 64KBytes of instruction RAM
- 96KBytes of data RAM
- 64KBytes boot ROM
- It has a Winbond [W25Q40BVNIG](#) SPI flash
- It's a RISC architecture
- The core is a 106micro Diamond Standard core (LX3) made by [Tensilica](#)
- The [ESP8266 chip](#) is made by [Espressif](#)
- [Modules](#) bearing this chip are made by various manufacturers

Features

- 802.11 b/g/n protocol
- Wi-Fi 2.4 GHz, support WPA/WPA2
- Super small module size (11.5mm x 11.5mm)
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack (ipv4 only at the moment)
- Integrated TR switch, balun, LNA, power amplifier and matching network Integrated PLL, regulators, and power management units
- +20dBm output power in 802.11b mode
- Supports antenna diversity
- Deep sleep power <10uA, Power down leakage current < 5uA
- Integrated low power 32-bit MCU
- SDIO 2.0, SPI, UART, **I2C**
- STBC, 1x1 MIMO, 2x1 MIMO
- A-MPDU & A-MSDU aggregation & 0.4 μ s guard interval
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- Operating temperature range -40C ~ 125C

Voltage	3.3V
Current consumption	10uA – 170mA
Flash memory attachable	16MB max (512K normal)
Processor	Tensilica L106 32 bit
Processor speed	80-160MHz
RAM	32K + 80K
GPIOs	17 (multiplexed with other functions)
Analog to Digital	1 input with 1024 step resolution
802.11 support	b/g/n/d/e/i/k/r
Maximum concurrent TCP connections	5

The functional diagram of ESP8266EX is shown as below.

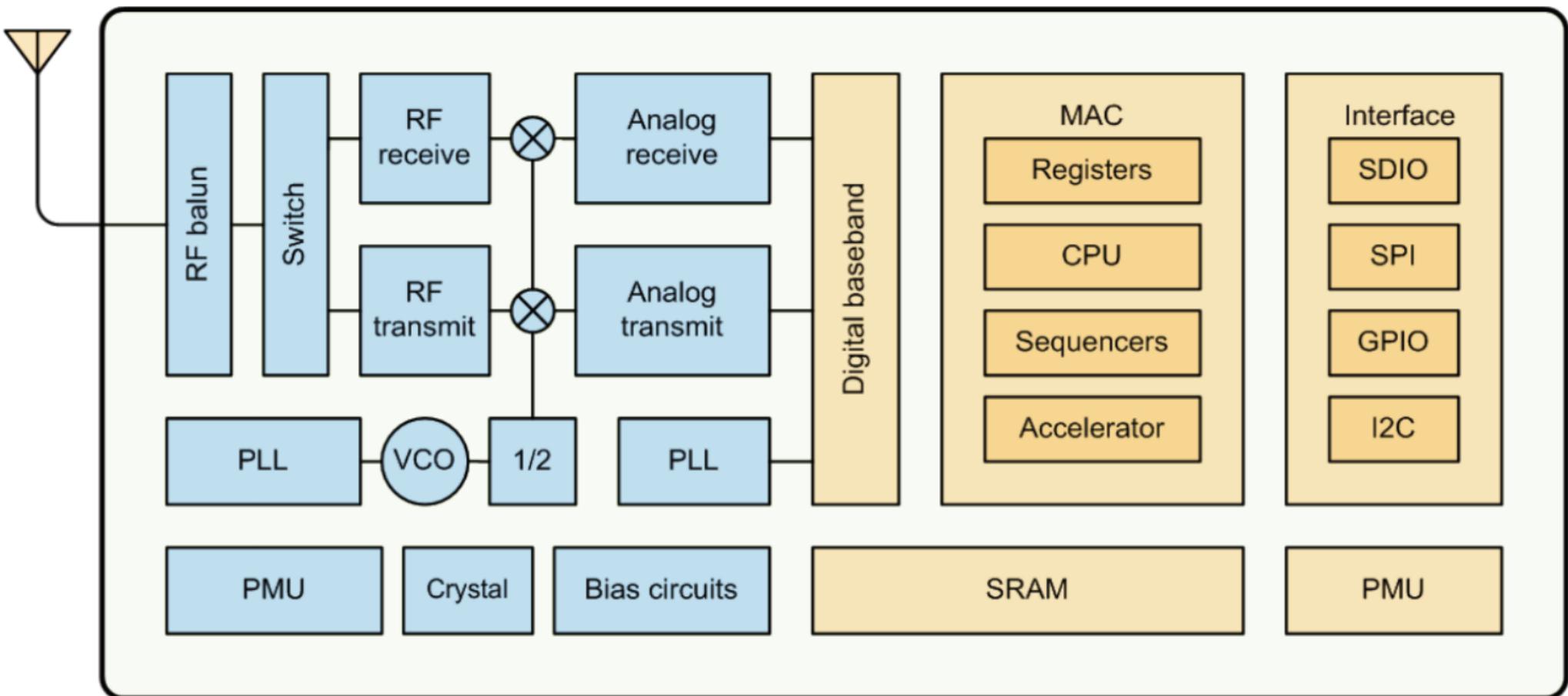


Figure 3-1: Functional Block Diagram

-Integrated TX switch, datum, LNA, power amplifier and matching network

-WEP or WPA/WPA2 authentication, or open networks

-16 GPIO pins

-SPI, I²C,

-I²S interfaces with DMA (sharing pins with GPIO)

-UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2

-110-bit ADC



• Boards



<https://en.wikipedia.org/wiki/ESP8266>



Features:

-FCC / usage in commercial projects

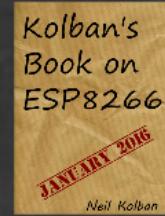
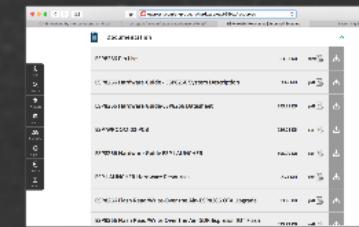


	GND	GND
SDA	3.3V	3V3
SCL/SCLK	D2	SDA
TX	D14	SCL
RX	NC	RST
	NC	TX
	5V	RX
	Not Connected	NC
	GND	GND

	GND	GND
Vin	Vin	LED
5	D5	Used in reset
0	D0	
4	D4	
13	D13	MOSI
12	D12	MISO
XPO	D16	SPIQ
ADC	AO	Reset to deep sleep
15	D15	10-bit I ² S

• (Lack off) Documentation

Niel Kolban's **ESP8266** book: <https://leanpub.com/esp8266>
Hackaday: <http://hackaday.com/?s=esp>
CPU manual available at <http://espressif.com/>



Name	Active pins	Pitch	Form factor	LEDs	Antenna	Shielded?	dimensions (mm)	Notes
ESP-01	6	0.1"	2x4 DIL	Yes	PCB trace	No	14.3 x 24.8	
ESP-02	6	0.1"	2x4 castellated	No	U-FL connector	No	14.2 x 14.2	
ESP-03	10	2 mm	2x7 castellated	No	Ceramic	No	17.3 x 12.1	
ESP-04	10	2 mm	2x4 castellated	No	None	No	14.7 x 12.1	
ESP-05	3	0.1"	1x5 SIL	No	U-FL connector	No	14.2 x 14.2	
ESP-06	11	misc	4x3 dice	No	None	Yes	14.2 x 14.7	Not FCC approved
ESP-07	14	2 mm	2x8 pinhole	Yes	Ceramic + U-FL connector	Yes	20.0 x 16.0	Not FCC approved
ESP-08	10	2 mm	2x7 castellated	No	None	Yes	17.0 x 16.0	Not FCC approved
ESP-09	10	misc	4x3 dice	No	None	No	10.0 x 10.0	
ESP-10	3	2 mm?	1x5 castellated	No	None	No	14.2 x 10.0	
ESP-11	6	0.05"	1x8 pinhole	No	Ceramic	No	17.3 x 12.1	
ESP-12	14	2 mm	2x8 castellated	Yes	PCB trace	Yes	24.0 x 16.0	FCC and CE approved ^[12]
ESP-12-E	20	2 mm	2x8 castellated	Yes	PCB trace	Yes	24.0 x 16.0	
ESP-12-F	20	2 mm	2x8 castellated	Yes	PCB trace	Yes	24.0 x 16.0	FCC and CE approved. Improved antenna performance. 4MB Flash
ESP-13	16	1.5 mm	2x9 castellated	No	PCB trace	Yes	W18.0 x L20.0	Marked as "FCC". Shielded module is placed sideways, as compared to the ESP-12 modules.

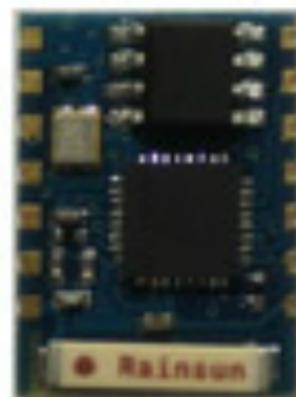
Name	Active pins	Pitch	Form factor	LEDs	Antenna	Shielded?	dimensions (mm)	Notes
Olimex MOD-WIFI-ESP8266 ^[13]	2	0.1"	UEXT module	Yes	PCB trace	No	?	Only RX/TX are connected to UEXT connector
Olimex MOD-WIFI-ESP8266-DEV ^[14]	20	0.1"	2x11 DIL + castellated	Yes	PCB trace	No	?	All available GPIO pins are connected, also has pads for soldering UEXT connector (with RX/TX and SDA/SCL signals)
NodeMCU DEVKIT	14	0.1"	2x15 DIL	Yes	PCB trace	Yes	?	Uses the ESP-12 module, includes USB serial interface
Adafruit Huzzah ESP8266 breakout ^[15]	14	0.1"	2x10 DIL	Yes	PCB trace	Yes	25 x 38	Uses the ESP-12 module
SparkFun ESP8266 Thing ^[16] WRL-13231	12	0.1"	2x10 DIL	Yes	PCB trace + U.FL socket	No	58 x 26	FTDI serial header, Micro-USB socket for power, includes Li-ion battery charger
KNEWRON Technologies smartWIFI ^[17]	12	0.1"	2x20 DIL	Yes 1 RGB	PCB trace	Yes	25.4 x 50.8	CP2102 USB bridge, includes battery charger, micro-USB socket for power and battery charging, 1 RGB LED and USER / Reflash button
WeMos D1 ^[18]	12	0.1"	Arduino Uno	Yes	PCB trace	Yes	53.4 x 68.6	Uses the ESP-12F module, Micro-USB socket
WeMos D1 R2 ^[19]	12	0.1"	Arduino Uno	Yes	PCB trace	Yes	53.4 x 68.6	Uses the ESP-12F module, Micro-USB socket
WeMos D1 Mini ^[20]	12	0.1"	2x8 DIL	Yes	PCB trace	Yes	25.6 x 34.2	Uses the ESP-12F module, Micro-USB socket
ESPerf [®] ESPresso Lite ^[21]	16	0.1"	2x8 DIL	Yes	PCB trace	Yes	26.5 x 57.6	Uses the WROOM-02 module. Produced in limited quantity as beta version.
ESPerf [®] ESPresso Lite V2.0 ^[22]	24	0.1"	2x10 DIL	Yes	PCB trace	Yes	28 x 61	Improved design and feature to ESPresso Lite.
In-Circuit ESP-ADC ^[23]	18	0.1"	2x9 DIL	No	U.FL socket	No	22.9 x 14.9	Uses the ESP8266EX



ESP-01



ESP-02



ESP-03



ESP-04



ESP-05



ESP-06



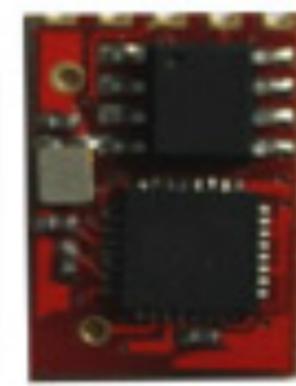
ESP-07



ESP-08



ESP-09



ESP-10

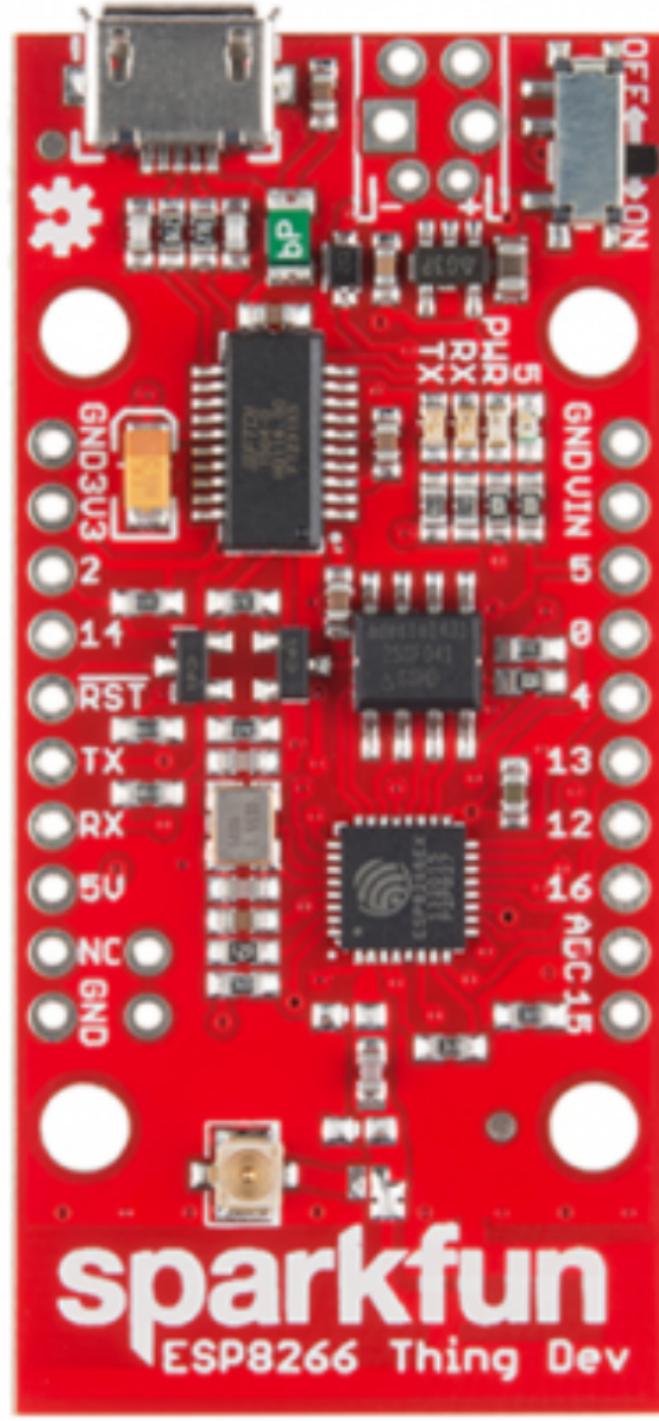


ESP-11

			castellated					
ESP-09	10	misc	4x3 dice	No	None	No	10.0 × 10.0	
ESP-10	3	2 mm?	1x5 castellated	No	None	No	14.2 × 10.0	
ESP-11	6	0.05"	1x8 pinhole	No	Ceramic	No	17.3 × 12.1	
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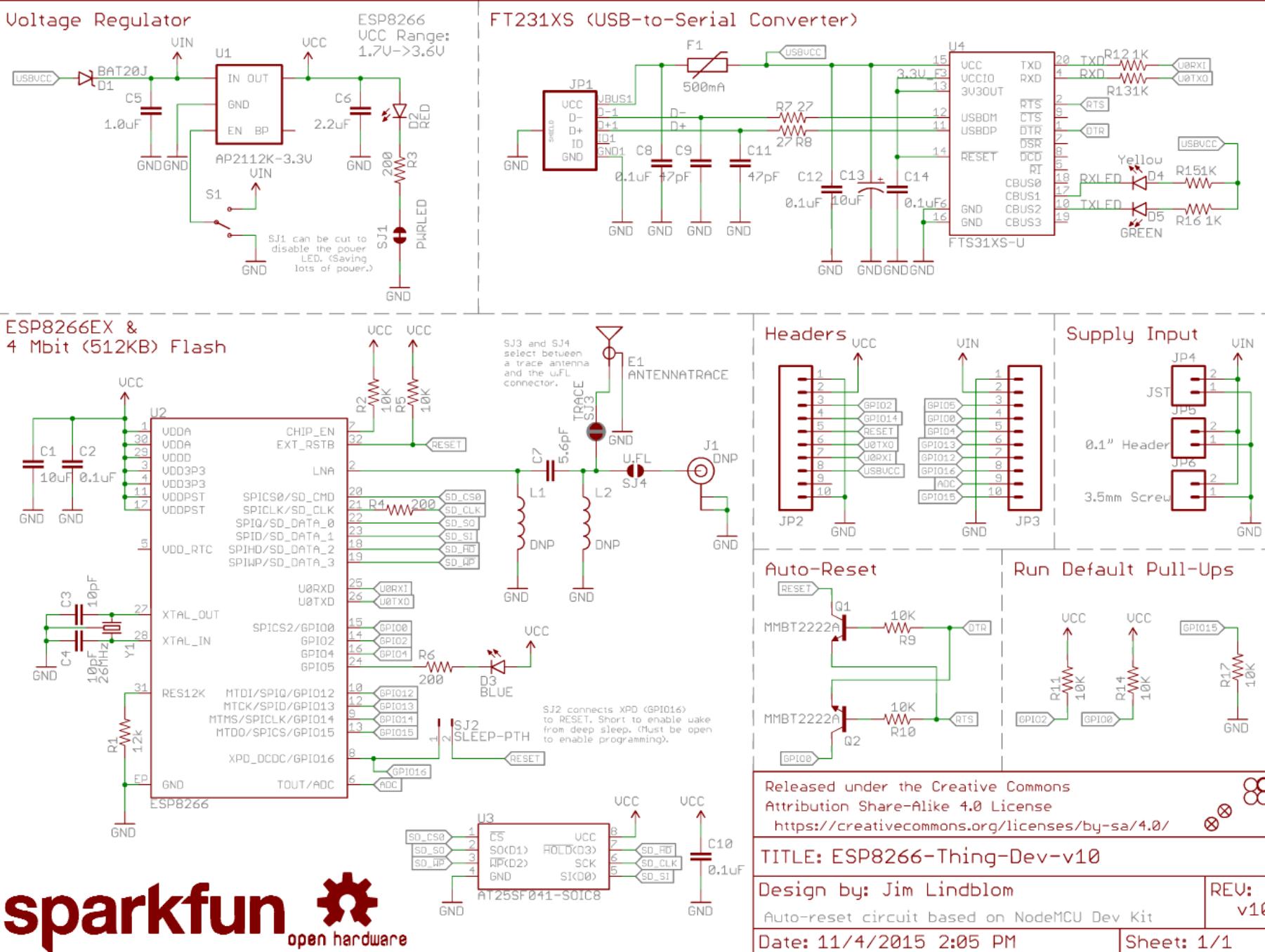
<https://en.wikipedia.org/wiki/ESP8266>

Features:



GND	GND
3.3V	3V3
SDA	D2 SDA
SCL/SCLK	D14 SCL
TX	D7 TXO
RX	D8 RXI
	5V
Not Connected	NC
GND	GND

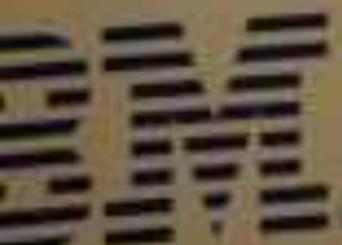
GND	GND	
Vin	Vin	
5	D5 LED	Used in reset
0	D0	
4	D4	
13	D13 MOSI SPIID	
12	D12 MISO SPIQ	
XPO	D16	Reset to deep sleep
ADC	A0 10-bit 1V	
15	D15	



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http://projectgus.com/talks/lca_esp8266/

Voltage Regulator



ESP8266
VCC Range:
1.7V->3.6V

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NEW CHIP ALERT: THE ESP8266 WiFi MODULE (IT'S \$5)

By Brian Bechtold

188 Comments April 24, 2014

NEVER

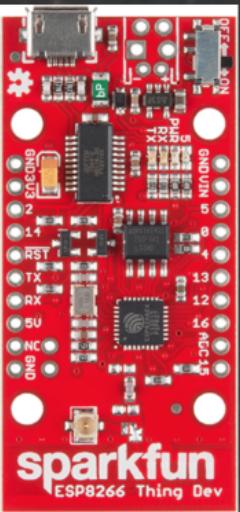
IF YOU

Hardware +

ESP8266 wifi module

resources:

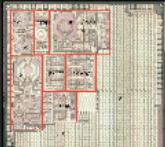
<https://www.sparkfun.com/products/13711>
https://github.com/opprud/IDA_embedded



The ESP8266 processor

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Developed as a "Serial-to-wifi-bridge", AT interface



Espressif ESP8266 WiFi serial interface - needful die shot
 Stacy Auger of Espressif Systems developed the WiFi
 chip in 2012. This was an ESP8266 chip which was originally
 being sold for less than 45.00. Espressif acquired
 the rights to the WiFi chip from a company called Ralink. The WiFi
 chip contains a Tensilica Xtensa LX106 CPU running at 80 MHz,
 64 KB of instruction RAM, 96 KB of data RAM, and 16 KB of
 on-chip memory, without external DRAM. Analog front-end and
 baseband logic are integrated on-chip, along with a 2.4 GHz WiFi
 transceiver. All this is achieved in a smaller, more aggressive
 package than the WiFi chip it replaced. The WiFi chip has a
 surface area of 40mm² and is manufactured using a 40nm process. Apparently, there only differs in
 bonding and RDRAM content.

The size 20.13x24.9 mm, lead of which is rounded by
 0.5 mm. The thickness of the chip is 0.45 mm.
 The dimensions are: 35.0x35.0, and the thickness 1.034 mm.
 File:Espressif_ESP8266_WiFi_Serial_Interface_Die_Shot_2012-05-07.pdf

Features:

- 32-bit RISC CPU: Tensilica Xtensa LX106 running at 80 MHz
- 64 KB of instruction RAM, 96 KB of data RAM
- External QSPI flash 512 KiB to 4 MiB (up to 16MiB is supported)
- IEEE 802.11 b/g/n Wi-Fi
- Integrated TR switch, balun, LNA, power amplifier and matching network
- WEP or WPA/WPA2 authentication, or open networks
- 16 GPIO pins
- SPI, I²C,
- I²S interfaces with DMA (sharing pins with GPIO)
- UART on dedicated pins, plus a transmit-only UART can be enabled on GPIO2
- 110-bit ADC

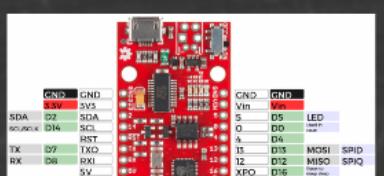
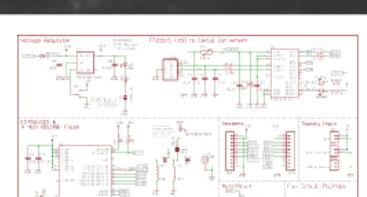


Boards



Features:

- FCC / usage in commercial projects



Toolchains

- Espressif SDK available
- NodeMCU, run LUA on the ESP
- micropython, espruino, jerryscript
- FreeRTOS-clones
- Arduino for ESP8266 (03/2015)



<http://arduino.esp8266.com/v1.6.5-1160-gcf2fc5f/doc/reference.html>

Install Arduino ESP8266 Add-on

<https://learn.sparkfun.com/tutorials/esp8266-things-setup-guide#installing-the-esp8266-arduino-addon>

(Lack off) Documentation

Niel Kolban's ESP8266 book: https://leanpub.com/ESP8266_ESP32 (see github folder)
 Hackaday: <http://hackaday.com/?s=esp>
 CPU manual available at <http://espressif.com/en/products/hardware/esp8266ex/resources>



FEATURES

Low voltage operation (2.7 V to 5.5 V)
 Calibrated directly in °C
 10 mV/°C scale factor (20 mV/°C on TM)
 ±2°C accuracy over temperature (typ)
 ±0.5°C linearity (typ)
 Stable with large capacitive loads
 Specified -40°C to +125°C operation
 Less than 50 µA quiescent current
 Shutdown current: 0.5 µA max
 Low self-heating
 Qualified for automotive applications

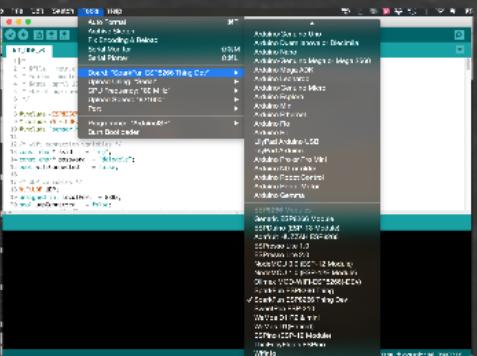
The low output impedance of the TMP36 allows its linear output and precise temperature control circuit to be used in a single-supply application. The supply current is very low, self-heating is less than 0.5 µA, and the shutdown function is provided by a single digital input.

The TMP35 is functionally equivalent to the TMP36 and provides a 250 mV output for temperatures from 10°C to +125°C. It operates from +5V and provides a 250 mV output for temperatures from -40°C to +125°C. It is functionally compatible with the TMP36 and has an output scale factor of 10 mV/°C.

G
git
or

• Toolchains

- Express SDK available
- NodeMCU, run LUA on the ESP
- micropython, espruino, jerryscript
- Free-RTOS-clones
- Arduino for ESP8266 (03/2015)



<http://arduino.esp8266.com/versions/1.6.5-1160-gef26c5f/doc/reference.html>

Install Arduino ESP8266 Add-on

https://learn.sparkfun.com/tutorials/esp8266-thing-hookup-guide/installing-the-esp8266-arduino-addon?_ga=1.6774834.1642215804.1415778928

FEATURES

- Low voltage operation (2.7V to 5.5V)
- Calibrated directly in °C
- 10 mV/°C scale factor (20°C)
- ±2°C accuracy over temperature range
- ±0.5°C linearity (typ)
- Stable with large capacitive loads
- Specified –40°C to +125°C
- Less than 50 µA quiescent current
- Shutdown current 0.5 µA
- Low self-heating
- Qualified for automotive applications

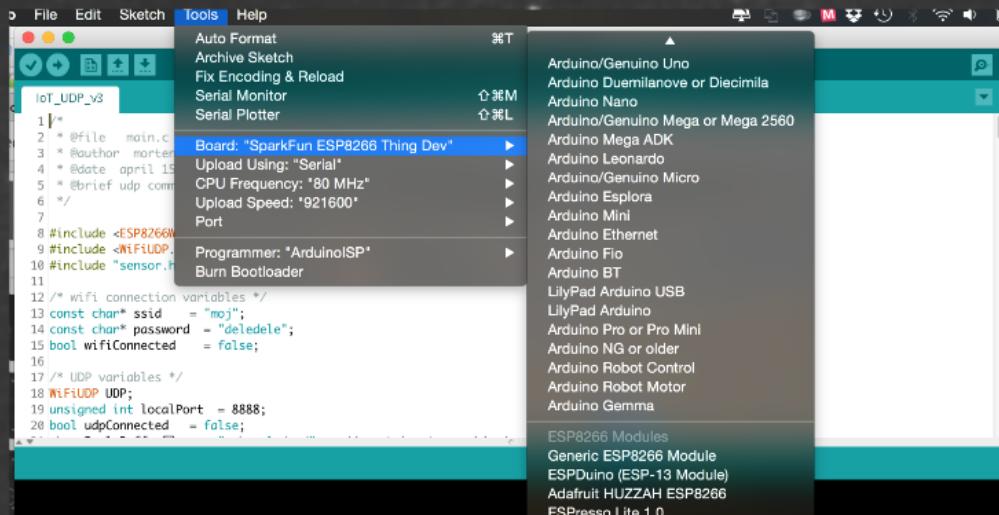
The low output impedance of the TMP36 makes it ideal for temperature monitoring. The supply current is very low, and the shutdown function consumes less than 0.5 µA.

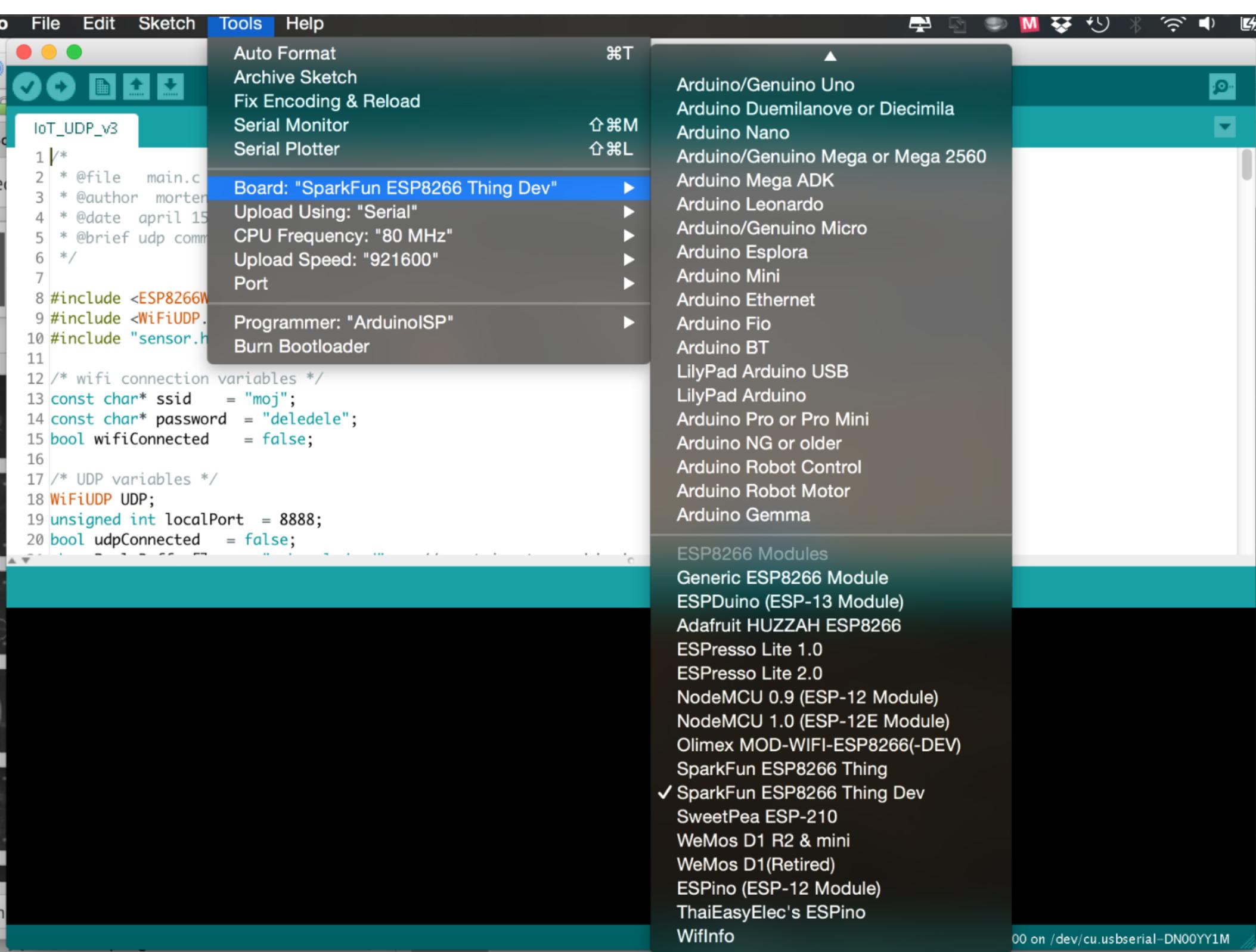
The TMP35 is fully calibrated and provides a 25-bit digital output for temperatures from –40°C to +125°C, and it operates to 125°C. The TMP35 is functionally compatible with the TMP36, but the TMP36 have an on-chip reference voltage source.

- Toolchains
 - Express SDK available
 - NodeMCU, run LUA
 - micropython esp8266

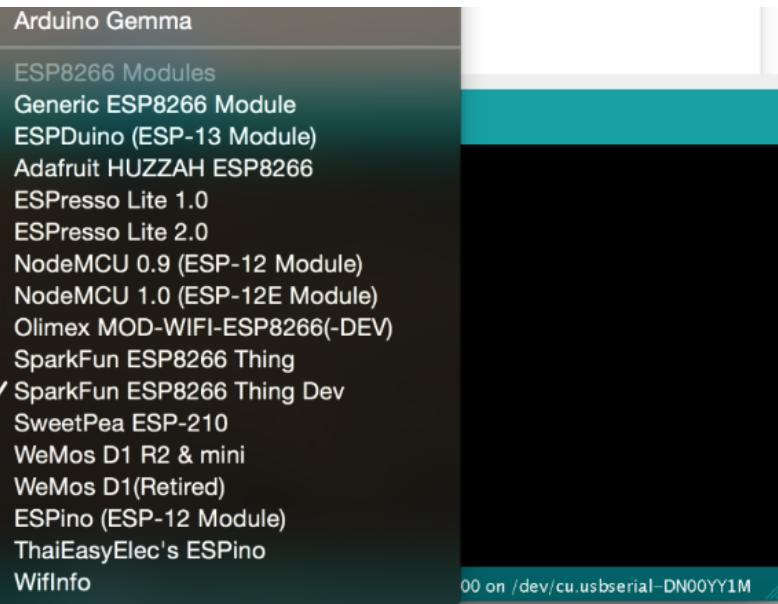
• Toolchains

- Express SDK available
- NodeMCU, run LUA on the ESP
- micropython, espruino, jerryscript
- FreeRTOS-clones
- Arduino for ESP8266 (03/2015)





```
19 unsigned int localPort = 8888;  
20 bool udpConnected = false;
```



<http://arduino.esp8266.com/versions/1.6.5-1160-gef26c5f/doc/reference.html>

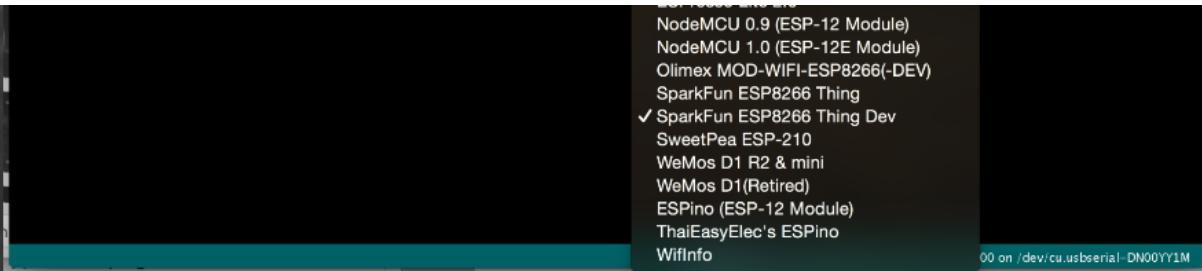
Install Arduino ESP8266 Add-on

[https://learn.sparkfun.com/tutorials/esp8266-thing-hooking-up-the-esp8266-arduino-addon?
_ga=1.6774834.1642215804.1415778928](https://learn.sparkfun.com/tutorials/esp8266-thing-hooking-up-the-esp8266-arduino-addon?_ga=1.6774834.1642215804.1415778928)

<http://arduino.esp8266.com/versions/1.6.5-1160/gef26c5f/doc/reference.html>

Install Arduino ESP8266 Add-on

https://learn.sparkfun.com/tutorials/esp8266-tutorial-installing-the-esp8266-arduino-addon?_ga=1.6774834.1642215804.1415778928



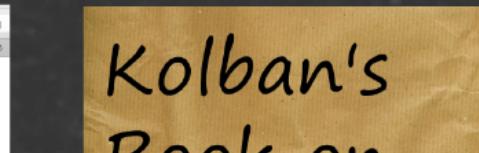
<http://arduino.esp8266.com/versions/1.6.5-1160-gef26c5f/doc/reference.html>

Install Arduino ESP8266 Add-on

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ga=1.6774834.1642215804.1415778928](https://learn.sparkfun.com/tutorials/esp8266-thing-hookup-guide/installing-the-esp8266-arduino-addon?ga=1.6774834.1642215804.1415778928)

- (Lack off) Documentation

Niel Kolban's ESP8266 book: <https://leanpub.com>
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CPU manual available at <http://espressif.com/en>



The TMP36
and provides
temperature
-40°C to +
operates to
functionality
TMP36 ha

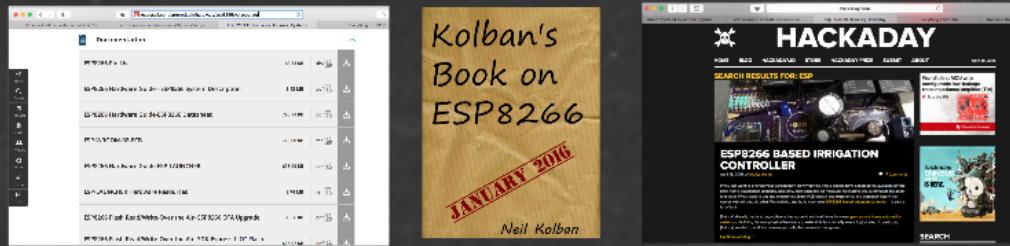
2

• (Lack off) Documentation

Niel Kolban's **ESP8266** book: https://leanpub.com/ESP8266_ESP32 (see github folder)

Hackaday: <http://hackaday.com/?s=esp>

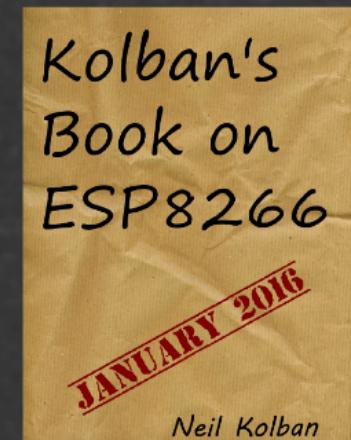
CPU manual available at <http://espressif.com/en/products/hardware/esp8266ex/resources>



Niel Kolban's ESP8266 book: https://leanpub.com/ESP8266_E
Hackaday: <http://hackaday.com/?s=esp>
CPU manual available at <http://espressif.com/en/products/hard>

A screenshot of a web browser displaying the Espressif website. The page title is "Documentation". It lists several files for download:

- ESP8266 Pin List (63.33 KB)
- ESP8266 Hardware Guide - ESP8266 System Description (3.42 MB)
- ESP8266 Hardware Guide-ESP8266 Datasheet (793.71 KB)
- ESP-WROOM-02-PCB (726.08 KB)
- ESP8266 Hardware Guide ESP-LAUNCHER (595.09 KB)
- ESP-LAUNCHER Hardware Resources (2.74 MB)
- ESP8266 Flash Read/Write-Over the Air- ESP8266 OTA Upgrade (933.6 KB)
- ESP8266 Flash Read/Write-Over the Air- SDK-Espressif IOT Flash (415.47 KB)



A screenshot of the Hackaday website. The main header features the word "HACKADAY" in large, bold letters. Below the header, there is a search bar and a navigation menu with links to "HOME", "BLOG", "HACKADAY.IO", "STORE", "HACKADAY PRIZE", "SUBMIT", and "ABOUT".

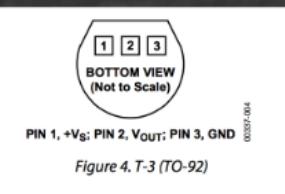
The main content area shows a "SEARCH RESULTS FOR: ESP" section. It includes a thumbnail image of a circuit board and a project title "ESP8266 BASED IRRIGATION CONTROLLER" by Merle Walker. The article summary discusses a project to prevent a garden from turning into a desert using an ESP8266 and a relay driver. There are 17 comments and a link to "Continue reading →".

re + arduino

TMP36 temperature sensor

FEATURES

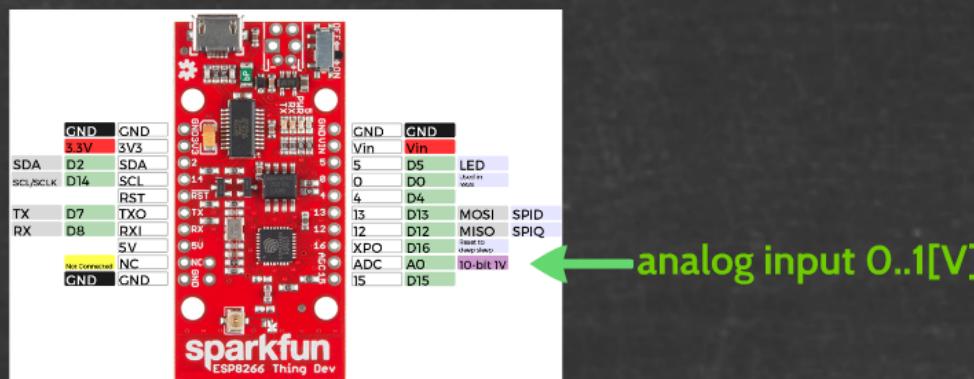
Low voltage operation (2.7 V to 5.5 V)
Calibrated directly in °C
10 mV/°C scale factor (20 mV/°C on TMP37)
±2°C accuracy over temperature (typ)
±0.5% linearity (typ)
Stable with large capacitive loads
Specified -40°C to +125°C, operation to +150°C
Less than 50 µA quiescent current
Shutdown current 0.5 µA max
Low self-heating
Qualified for automotive applications



The low output impedance of the TMP35/TMP36/TMP37 and its linear output and precise calibration simplify interfacing to temperature control circuitry and ADCs. All three devices are intended for single-supply operation from 2.7 V to 5.5 V maximum. The supply current runs well below 50 µA, providing very low self-heating—less than 0.1°C in still air. In addition, a shutdown function is provided to cut the supply current to less than 0.5 µA.

The TMP35 is functionally compatible with the LM35/LM45 and provides a 250 mV output at 25°C. The TMP35 reads temperatures from 10°C to 125°C. The TMP36 is specified from -40°C to +125°C, provides a 750 mV output at 25°C, and operates to 125°C from a single 2.7 V supply. The TMP36 is functionally compatible with the LM50. Both the TMP35 and TMP36 have an output scale factor of 10 mV/°C.

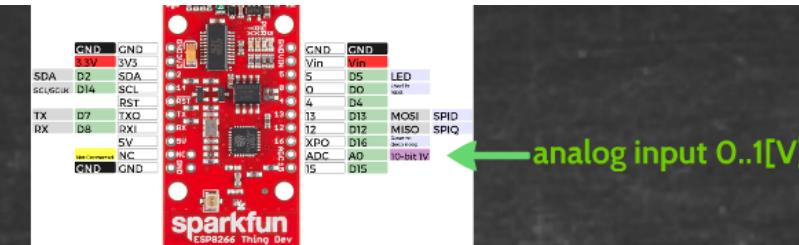
mount the TMP36



Get code via Git

than 0.5 µA.

The TMP35 is functionally compatible with the LM35/LM45 and provides a 250 mV output at 25°C. The TMP35 reads temperatures from 10°C to 125°C. The TMP36 is specified from -40°C to +125°C, provides a 750 mV output at 25°C, and operates to 125°C from a single 2.7 V supply. The TMP36 is functionally compatible with the LM50. Both the TMP35 and TMP36 have an output scale factor of 10 mV/°C.

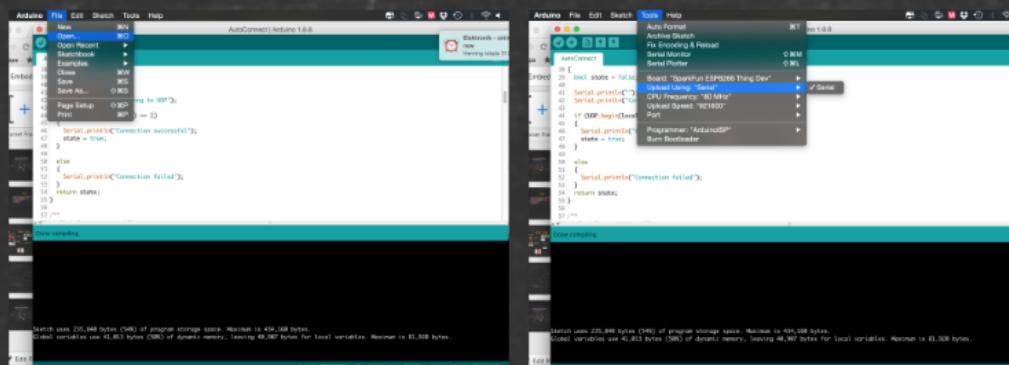


Get code via Git

git clone https://github.com/opprud/IDA_embedded.git

or download zip @ https://github.com/opprud/IDA_embedded

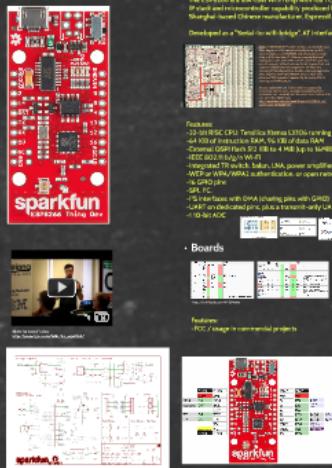
in arduino file->open "your downloaded files"



Hardware + arduino

ESP8266 wifi module

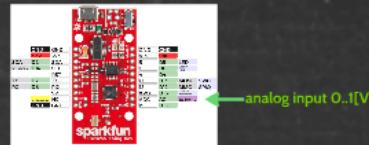
resources:
<https://www.sparkfun.com/products/13711>
https://github.com/opprud/IDA_embedded



TMP36 temperature sensor



mount the TMP36

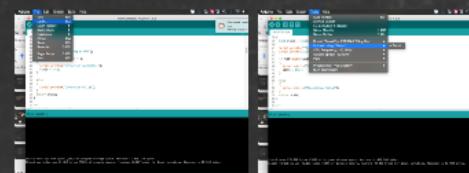


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Arduino "SDK"

reference :

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 - remove
 - rename
 - Directory object (Dir)
 - File object
 - seek
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 - size
 - name
 - close
- WiFiESP8266WiFi library
- Timer
- EEPROM
- I2C (Wire library)
- SPI
- SoftwareSerial
- ESP-specific APIs
 - OneWire (from https://www.pjrc.com/teensy/fd_1bs_OneWire.htm)
 - mDNS and DNS-SD responder (ESP8266mDNS library)
 - SSDP responder (ESP8266SSDP)
 - DNS server (DNSServer library)
 - Servo
- Other libraries (not included with the IDE)

Other libraries (not included with the IDE)

Libraries that don't rely on low-level access to AVR registers should work well. Here are a few libraries that were verified to work:

- [arduinoWebSockets](#) - WebSocket Server and Client compatible with ESP8266 (RFC6455)
- [aREST](#) REST API handler library.
- [Blynk](#) - easy IoT framework for Makers (check out the [Kickstarter page](#)).
- [DallasTemperature](#)
- [DHT-sensor-library](#) - Arduino library for the DHT11/DHT22 temperature and humidity sensors. Download latest v1.1.1 library and no changes are necessary. Older versions should initialize DHT as follows: `DHT dht(DHTPIN, DHTTYPE, 15)`
- [NeoPixel](#) - Adafruit's NeoPixel library, now with support for the ESP8266 (use version 1.0.2 or higher from Arduino's library manager).
- [NeoPixelBus](#) - Arduino NeoPixel library compatible with ESP8266. Use the "NeoPixelAnimator" branch for ESP8266 to get HSL, color support and more.
- [PubSubClient MQTT library by @lMrroy](#).
- [RTC](#) - Arduino Library for DS1307 & DS3231 compatible with ESP8266.
- [Souliss_Smart_Home](#) - Framework for Smart Home based on Arduino, Android and openHAB.
- [ST7735](#) - Adafruit's ST7735 library modified to be compatible with ESP8266. Just make sure to modify the pins in the examples as they are still AVR specific.

<https://ttapu.com/esp8266-wifi-connection-manager/library-arduino-ide/>

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- [arduinoWebSock](#)
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- [DallasTemperatur](#)
- [DHT-sensor-librar](#)

Download latest v
as follows: [DHT c](#)
- [NeoPixel - Adafru](#)

higher from Ardui
- [NeoPixelBus - Ar](#)

branch for ESP82
- [PubSubClient MC](#)
- [RTC - Arduino Lib](#)
- [Souliss, Smart Ho](#)
- [ST7735 - Adafruit](#)

modify the pins in

<https://tzapu.com/es>

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