

Welcome to the thingSoC® ESP32S Wi-Fi/BT Radio

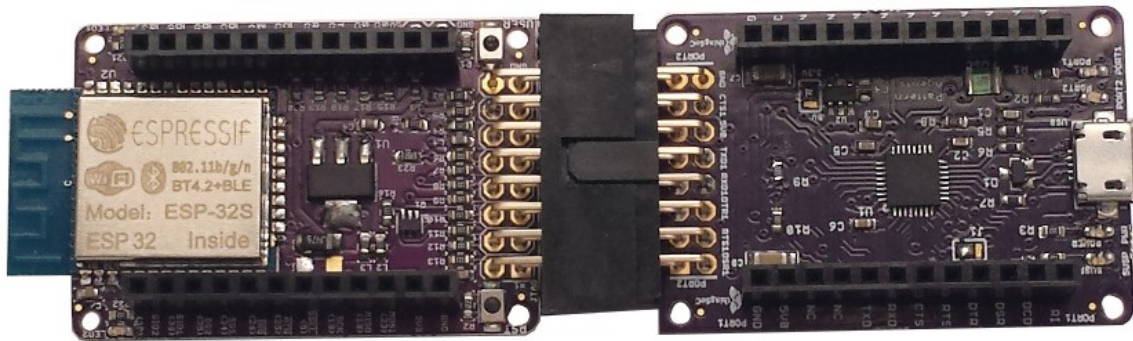
The TSOC_ESP32S is a Wi-Fi and Bluetooth Radio board, based on the Espressif ESP32 chip, in an Embedded Module format for the new thingSoC, Internet of Things open source hardware standard.

Getting Started :

The TSOC_ESP32S is very flexible, and there are a number of different ways to power and reprogram the board, including Over the Air using a Li-Po battery, using a thingSoC USBUART, or other "FTDI" type USB to UART adapters, as well as JTAG/SWD interfaces for "bare metal" programming.

Using the thingSoC USB to UART Adapter :

- 1) Plug the USBUART in the ESP32S and connect your USB cable to your computer.



- 2) Note that the Green Power LED (LED2) illuminates, indicating the the ESP32S is powered
- 3) Check your Wi-Fi connections, and you should see "Ai-Thinker_ESP32_xxxxxx", where the "xxxxxx" will be a unique number based on your MAC ID.
- 4) Connect to the "Ai-Thinker_ESP32_xxxxxx" as your Wi-Fi hot spot connection.

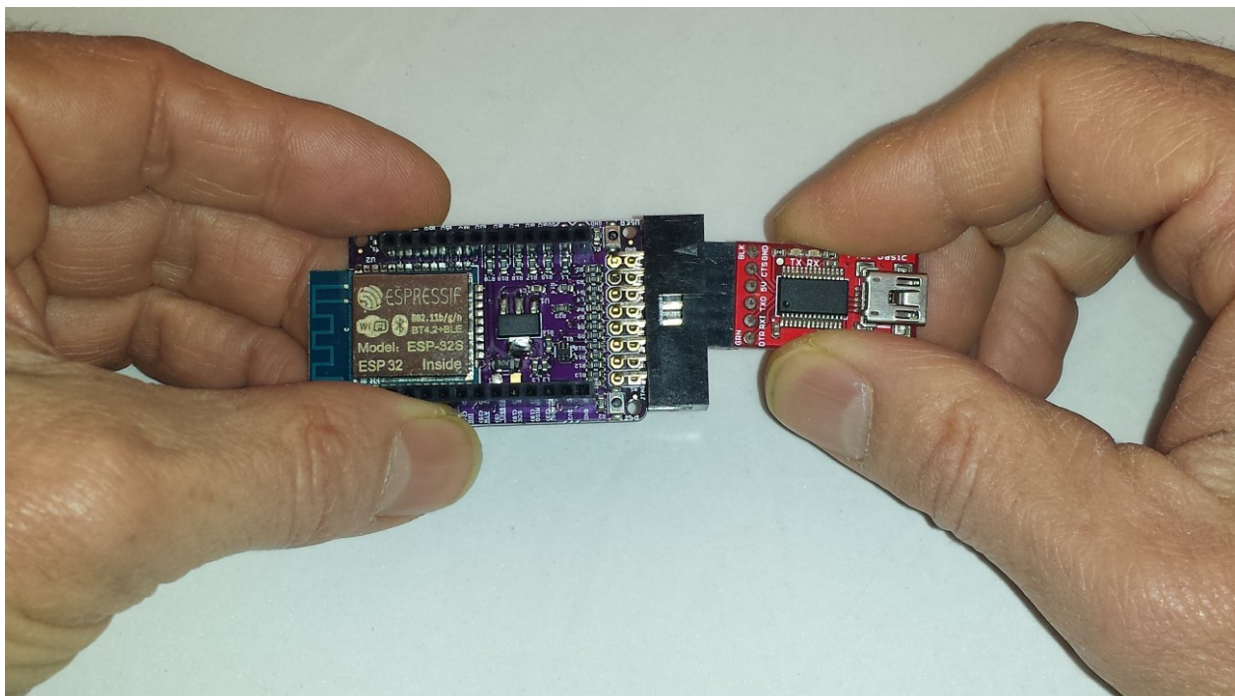


5) Now open a Web Browser and enter the URL "<http://192.168.4.1>" and you should see the following test web page :

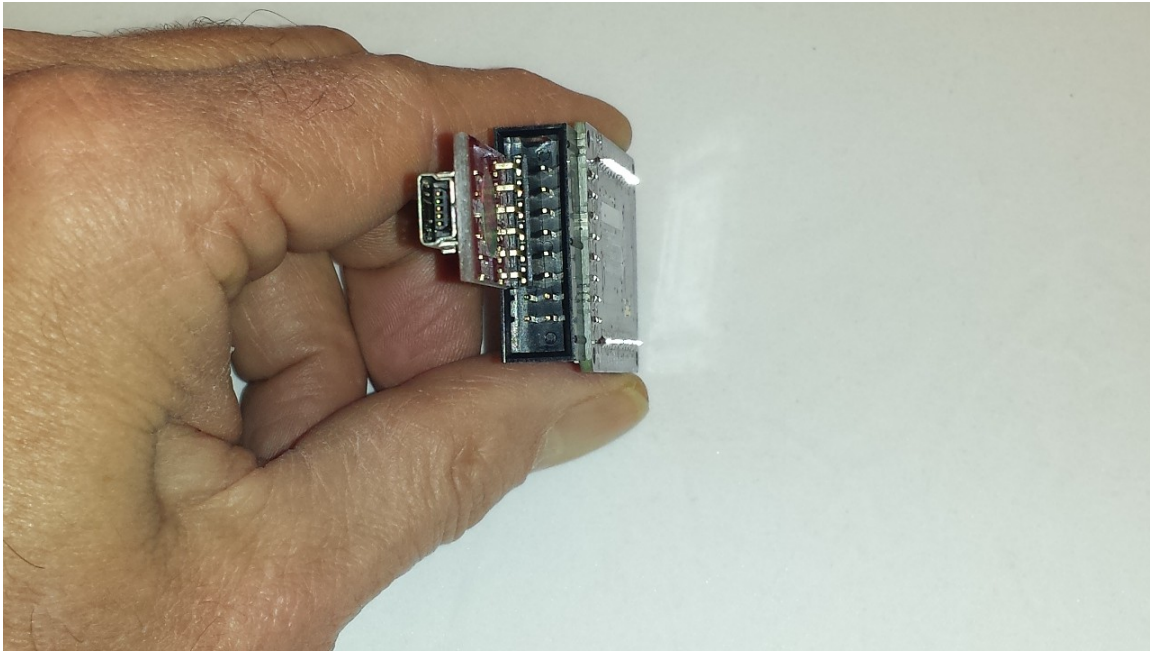


Using a Standard "FTDI" USB to UART Adapter :

- 1) Using a USB-to-UART adapter, like the Sparkfun 5.0 Volt "FTDI Basic", plug the ESP32S board into your Windows, MAC, or Linux PC.
- 2) Make sure to use the "top" row of pins and align the Ground Pins on top as shown below.
THIS IS IMPORTANT, as you can **DAMAGE your ESP32 board** if connected incorrectly.



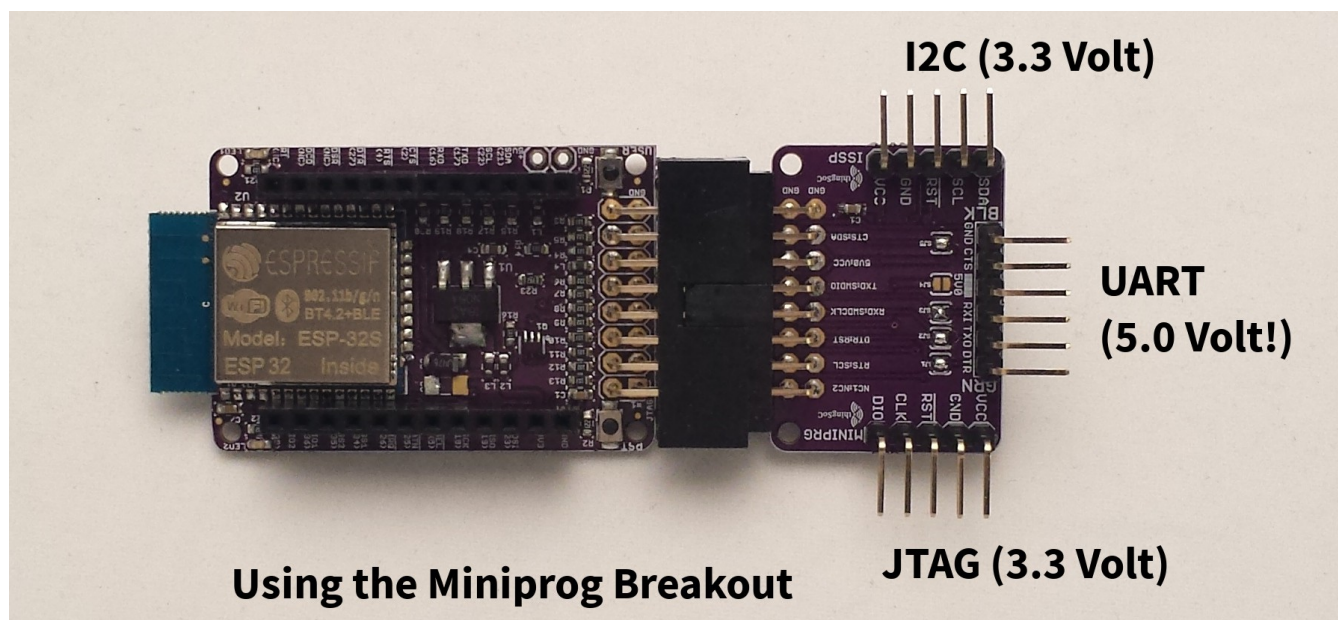
- 3) Make sure that you only use the "top" row of pins – the bottom row is for 3.3V JTAG/SWD programming only!



Using the thingSoC "Miniprogram" JTAG Adapter :

The TSOC_ESP32S board can also be used with the thingSoC "Miniprogram" adapter board, as shown below. The thingSoC "Miniprogram" adapter board breaks out the UART, I2C, and the JTAG/SWD connections for testing and monitoring.

If you need to do "bare metal" JTAG programming, this provides a simple connection.



Lithium Battery Operation :

The TSOC_ESP32S board includes two(2) pins for connecting a 5V power adapter, or directly connecting a 3.7 Volt to 4.2 Volt Lithium-Ion battery. That is all you need to do to power up the board when using Over-the-Air (OTA) programming. We are working on separate application note for Over-the-Air (OTA) programming using the ESP32S.

Safe Handling Precautions :

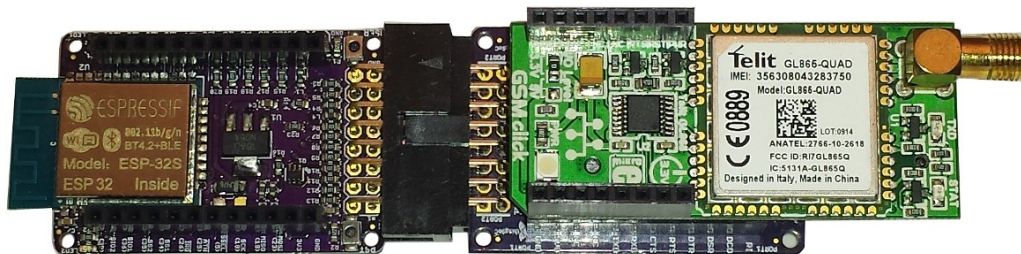
- 1) Always remove/unplug all power before inserting or removing peripherals.
- 2) Always ground yourself by touching a ground point before handling your boards.
- 3) Use a static safe bag when transporting your TSOC_ESP32S board.



Adding Peripherals :

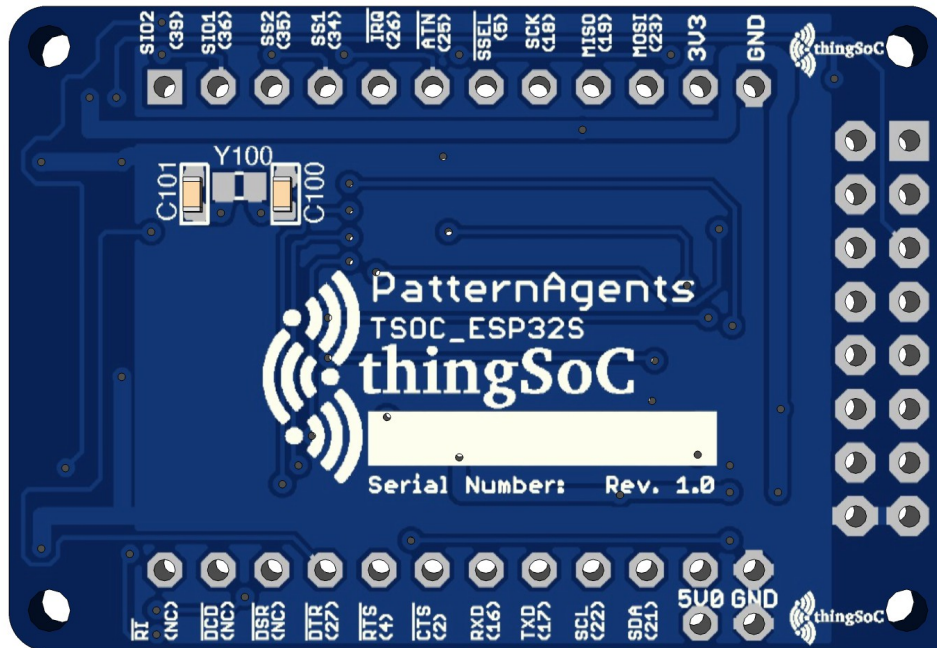
The TSOC_ESP32S board supports both thingSoC and Mikrobus peripherals.

- 1) **Make sure to align the SQUARE/CUT edges** of the boards together to insure that the polarity is correct. Push down **evenly** to seat the boards in the socket.
- 2) Note that the "stacking pins" are somewhat longer by design, and there will be some extra space between the boards when using stacking connectors.



thingSoC ESP32S Optional Hardware :

The TSOC_ESP32S has footprints on the reverse side of the board that are not populated by default. These include options for a Real-Time Clock Watch Crystal (32Khz) , and tank capacitors. Add these optional components if you require use of the onboard Real-Time Clock (RTC).



Complete documentation, including schematics, layouts, gerbers, and Bill of Materials (BOM) are available on the thingSoC website at :

https://github.com/thingSoC/TSOC_ESP32S/tree/master/TSOC_ESP32S

There is also a project Wiki available for asking questions and more information at :

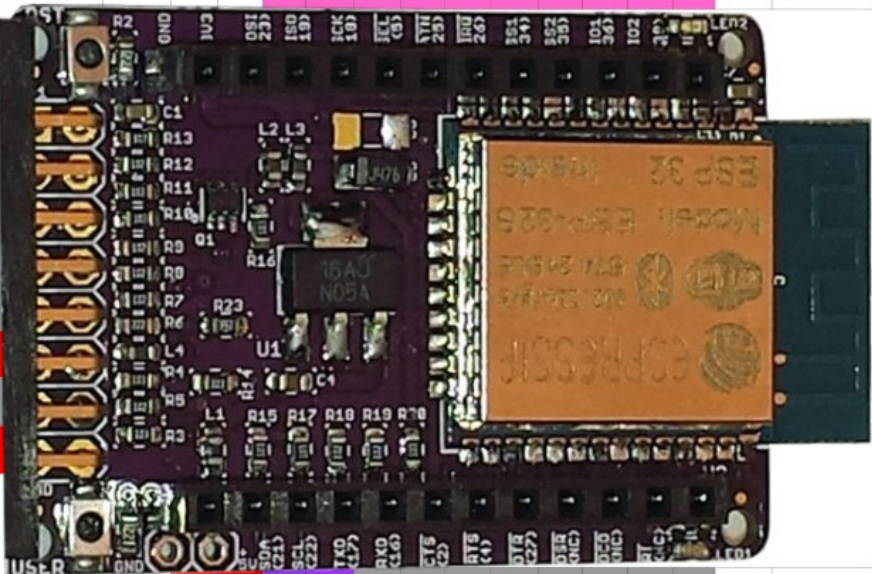
https://github.com/thingSoC/TSOC_ESP32S/wiki

thingSoC® ESP32S Features :

The TSOC_ESP32S is a low cost, embeddable module featuring an ESP32S device :

- Xtensa Dual-Core 32-bit LX6 microprocessor
- 160 or 240 MHz , performing at up to 600 DMIPS
- 520 KiB SRAM
- Wi-Fi 802.11b/g/n/e/i
- Bluetooth V4.2 BR/EDR and BLE
- 12-bit SAR Anaalog to Digital Converter (18 Channels)
- 8-bit Digital to Analog Converter (2 Channels)
- Touch Sensing (10 Channels)
- Temperature Sensor
- SPI (4 Channels)
- I2S Audio (2 Channels)
- I2C (2 Channels)
- UART (3 Channels)
- SDIO/MMC Host (1 Channel)
- SDIO/SPI Slave (1 Channel)
- CAN Bus 2.0 (1 Channel)
- Power and USER LEDs
- Reset and Boot Mode Pushbuttons
- Optional 32Khz Crystal for Real-Time Clock
- thingSoC Compliant Module
- [Mikrobus Compatible Module](#)

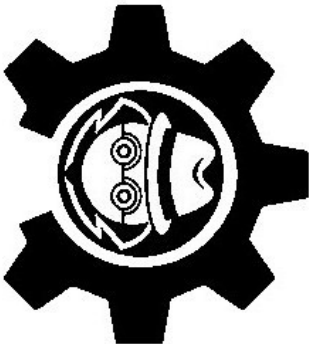
DEFAULT	PORT	ADC	PWM
POWER LED	3.3V		
IO2	IO39	X	X
IO1	IO36	X	X
SS2	IO36	X	X
SS1	IO34	X	X
IRQ	IO26	X	X
ATN	IO25	X	X
SSEL	IO5	X	X
SCK	IO18	X	X
MISO	IO19	X	X
MOSI	IO23	X	X
3.3 VOLTS	3V3		
GROUND	GND		
USER BUTTON	P3_4		



DSR1	RTS1	DTR1	TXD1 (IO3)	RXD1 (IO1)	SVD	CTS1	GND
DEBUG	SCL1 (IO12)	RESET#	SWDCLK (IO13)	SWDIO (IO14)	VCC	SDA1 (IO15)	GND

DEFAULT	PORT	PWM
USER LED	IO5	X
RI	NC	NC
DCD	NC	NC
DSR	NC	NC
DTR	IO27	X
RTS	IO4	X
CTS	IO2	X
RXD	IO16	X
TXD	IO17	X
SCL	IO22	X
SDA	IO121	X
5.0 VOLTS	SVD	
GND	GND	
RESET BUTTON	XRES	

LEGEND
POWER/GROUND PINS
DIGITAL PINS
ANALOG/ADC PINS
PWM PINS
TOUCH PINS
UART PINS
JTAG/DEBUG PINS
I2C BUS PINS
SPI BUS PINS



ESP32 Wi-Fi/BT Radio

<http://github.com/thingsSoc>