

Pico with 2.4" Tenstar SPI LCD

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Introduction



Over the last couple of weeks we have been playing with a lot of LCD Panels from our favorite shop AliExpress. Some have been okay, some have been great (the 0.96" OLED Panels have been my favorite so far) but this display we are going to look at today is fantastic. Why?

- Its bright and clear.
- It has the viewing angle of an OLED
- The backlight doesn't bleed through the LCD.
- It's a great size for most projects.
- The driver supports Text, graphics etc.

This is an LCD you can certainly incorporate in to many projects where an LCD is a requirement. Now things appear and disappear on AliExpress quite a lot, so here is the listing description, and if you search the internet for this you are bound to find these LCDs somewhere?

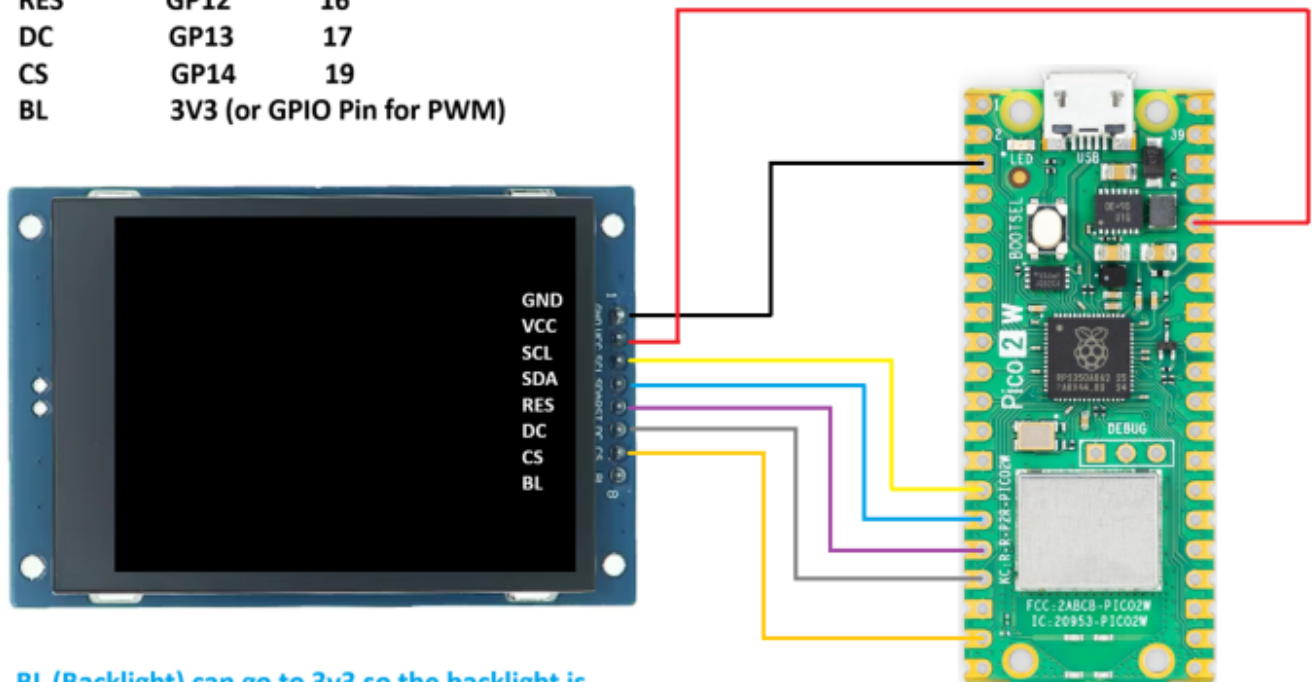
TENSTAR R0B0 2.4 / 2.8 / 3.5 Inch 240x320 320x480 SPI TFT Serial Port Module 5V/3.3V PCB Adapter
T7789V/ST7796S LCD Display

Yes, quite a long description, but searching this will get you one of these LCDs. I recommend you buy at least 2, this makes postage more affordable and means you can have a development and production model.

The Wiring

Here is the wiring diagram, thankfully with a lot of these LCD SPI modules, the pins are in the same order, so once you have a test rig, you can swap displays to try them out (you will need to change the driver also).

LCD	GPIO	Pin	
GND	n/a	3	
VCC	n/a	36	
SCL	GPI10	14	SCK
SDA	GPI11	15	MOSI
RES	GP12	16	
DC	GP13	17	
CS	GP14	19	
BL	3V3 (or GPIO Pin for PWM)		



BL (Backlight) can go to 3v3 so the backlight is always on. Or you can drive it from a GPI Pin, and use software to adjust the brightness.

Just a note on the Pin Labels on the LCD. This LCD is using the following pin labels.

- GND
- VCC
- SCL
- SDA
- RES
- DC
- CS
- BL

But some LCDs use very different names, here is a table below where you can hopefully work out what other Pin Lables are.

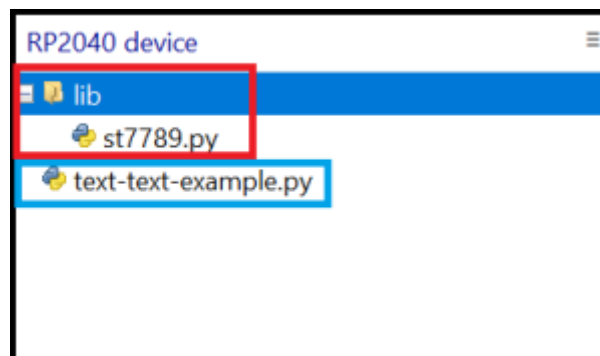
Display Pin	Alternate Labels	Pico Function	Pico Physical Pin
GND	Ground, 0V, G	Power Ground	Pin 3
VCC	3V3, 5V, VDD, POWER	3.3V Power (3V3_OUT)	Pin 36
SCL	SCK, CLK, SCLK, CLOCK	SPI1 SCK (GPIO 10)	Pin 14
SDA	MOSI, SDI, DIN, DATA	SPI1 TX / MOSI (GPIO 11)	Pin 15
RES	RST, RESET	Display Reset (GPIO 12)	Pin 16
DC	RS, A0, Data/Command	Data / Command (GPIO 13)	Pin 17
CS	SS, CE, Chip Select	SPI1 CS (GPIO 14)	Pin 19
BL	BLK, LIGHT, LED, BACKLIGHT	Backlight Power / Control	Pin 40

Test Code

We need two files to be able to test this project.

- 1. The Driver for the LCD.
- 2. A test Python script to write to the LCD.

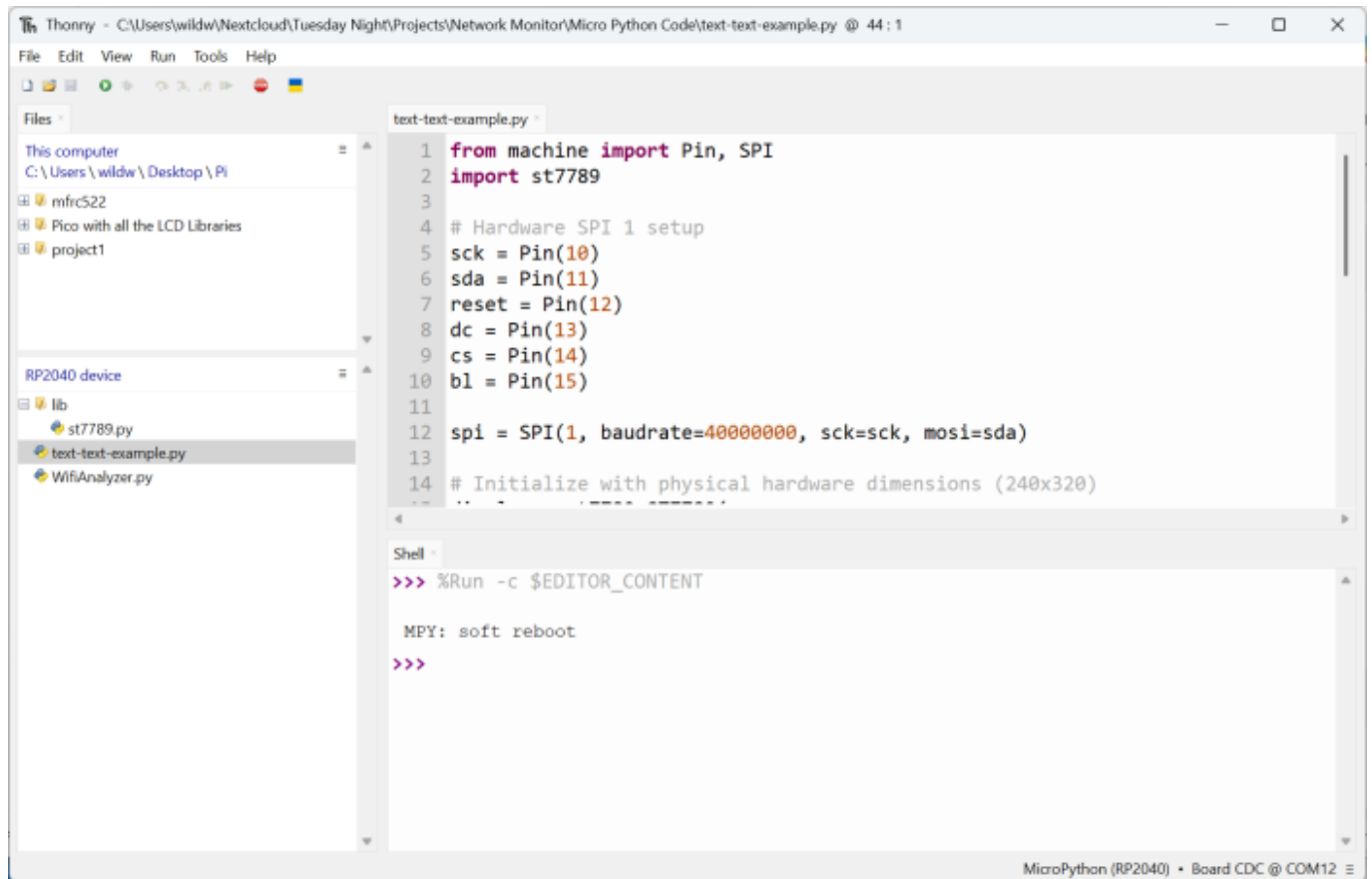
We need to put the driver in the lib folder on the Pico. If you don't have a lib folder you need to create one.



Above we can see the Pico drive, and there is a folder 'lib' with the driver st7789.py, then in the top level folder there is a test file called text-text-examply.py

- You can download the driver
Here.
- You can download the test Python file
Here.

Once these are both saved to your Pico, you can open the test file in Thonny.

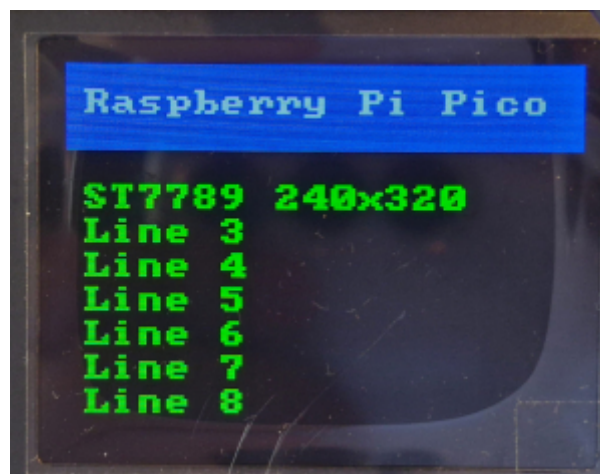


```
1 from machine import Pin, SPI
2 import st7789
3
4 # Hardware SPI 1 setup
5 sck = Pin(10)
6 sda = Pin(11)
7 reset = Pin(12)
8 dc = Pin(13)
9 cs = Pin(14)
10 bl = Pin(15)
11
12 spi = SPI(1, baudrate=40000000, sck=sck, mosi=sda)
13
14 # Initialize with physical hardware dimensions (240x320)
```

```
>>> %Run -c $EDITOR_CONTENT
MPY: soft reboot
>>>
```

Now click the green play button, top left in Thonny, and the code should execute with zero errors.

If you have wired your LCD up correctly, and have placed the driver and the test script in the right place, then you should see something similar to below.



Now you are ready to tackle any project on this wiki, or indeed your own project, that requires a nice LED.

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