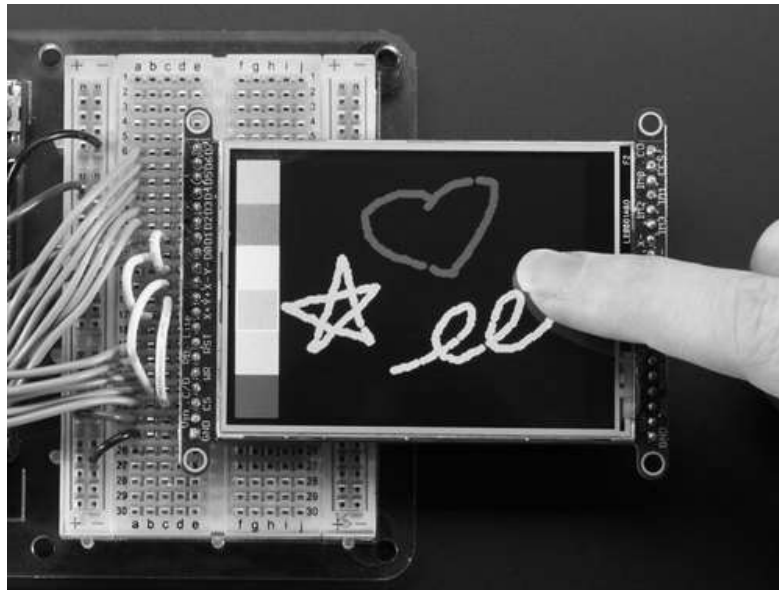




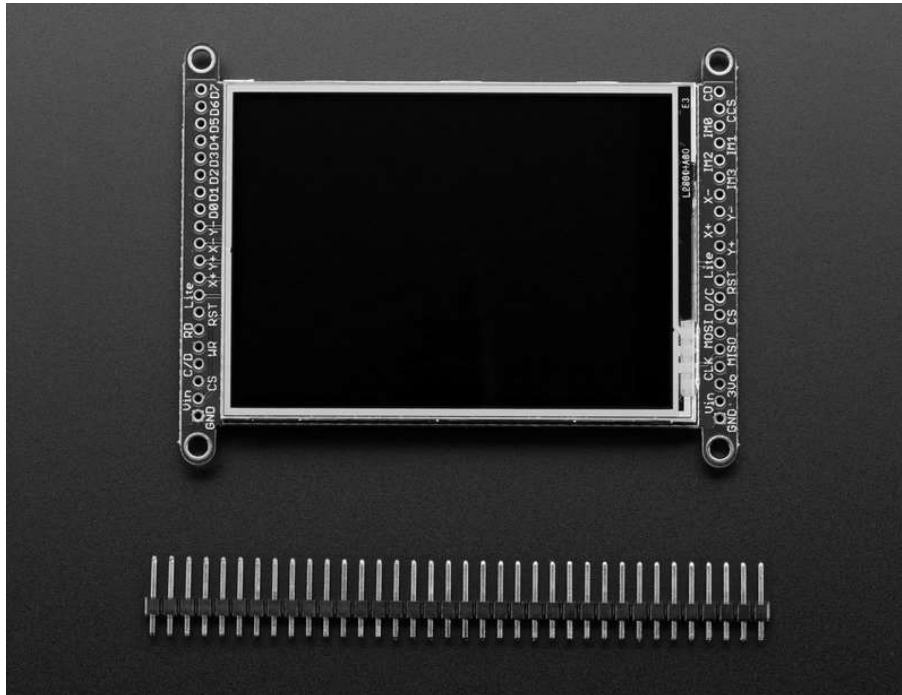
Adafruit 2.8" and 3.2" Color TFT Touchscreen Breakout v2

Created by lady ada



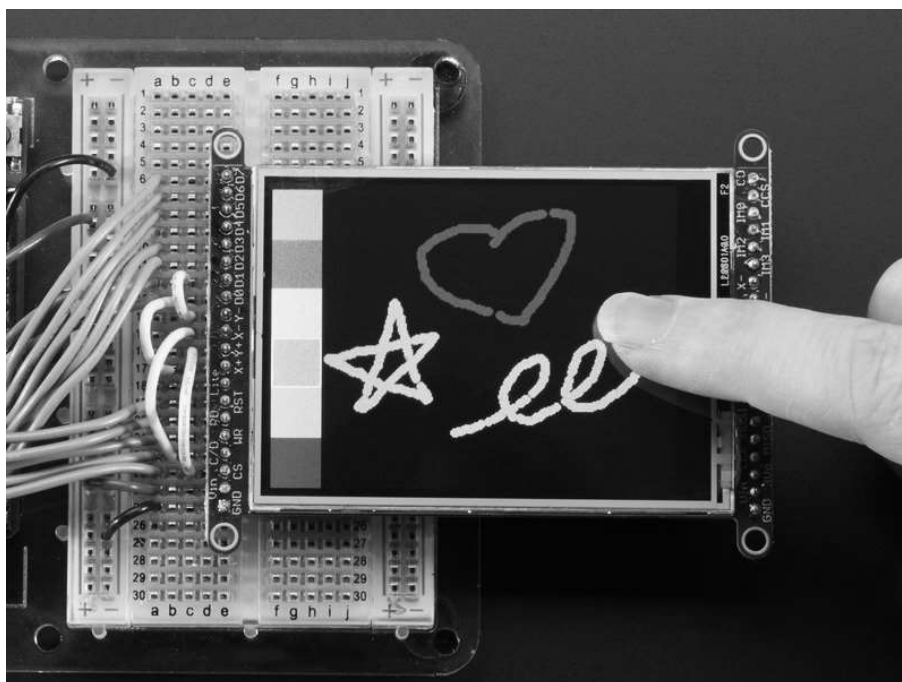
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Overview



Add some jazz & pizazz to your project with a color touchscreen LCD. These TFT displays are big (2.8" or 3.2" diagonal) bright (4 or 6 white-LED backlight) and colorful! 240x320 pixels with individual RGB pixel control, this has way more resolution than a black and white 128x64 display.

As a bonus, this display has either a resistive or capacitive touchscreen attached to it already, so you can detect finger presses anywhere on the screen.



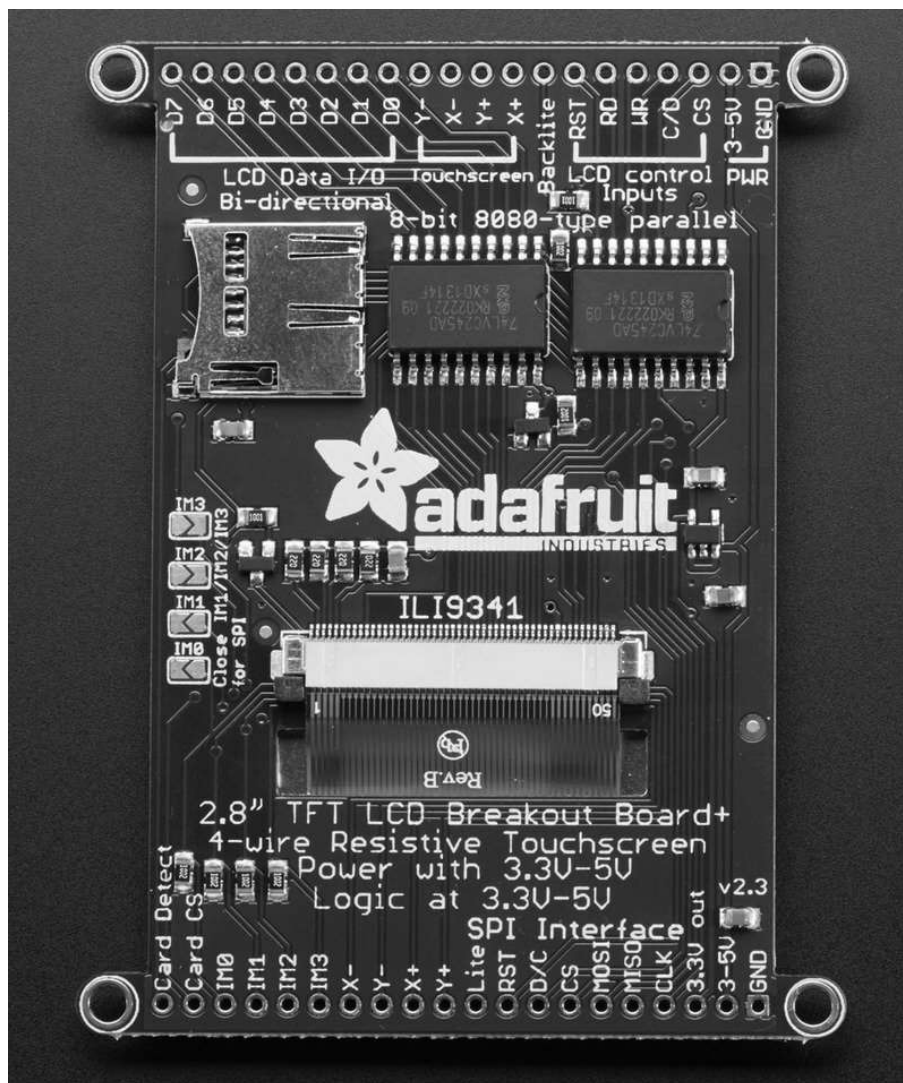
Pinouts

The 2.8" and 3.2" TFT display on this breakout supports many different modes - so many that the display itself has 50 pins. However, we think most people really only use 2 different modes, either "SPI" mode or 8-bit mode (which includes both 6800 and 8080). Each 'side' of the display has all the pins required for that mode. You can switch between modes, by rewiring the display, but it cannot be used in two modes at the same time!

All logic pins, both 8-bit and SPI sides, are 3-5V logic level compatible, the 74LVX245 chips on the back perform fast level shifting so you can use either kind of logic levels. If there's data output, the levels are at 3.3V



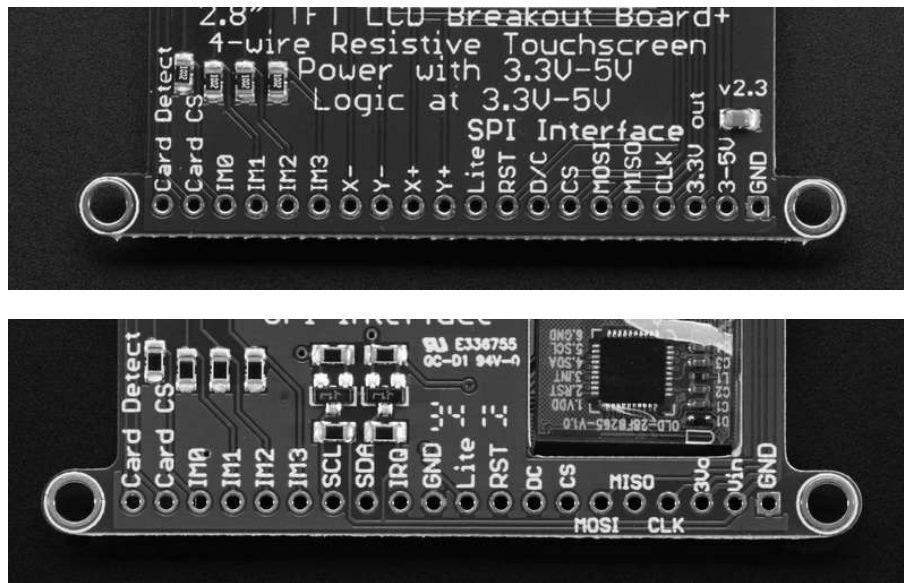
We show the 2.8" version of this breakout in the photos below but the 3.2" TFT is identical, just a lil bit bigger



SPI Mode

This is what we think will be a popular mode when speed is not of the utmost importance. It doesn't use as many pins (only 4 to draw on the TFT if you skip the MISO pin), is fairly flexible, and easy to port to various microcontrollers. It also allows using a microSD card on the same SPI bus. However, its slower than parallel 8-bit mode because you

have to send each bit at a time instead of 8-bits at a time. Tradeoffs!



- **GND** - this is the power and signal ground pin
- **3-5V / Vin** - this is the power pin, connect to 3-5VDC - it has reverse polarity protection but try to wire it right!
- **3.3Vout** - this is the 3.3V output from the onboard regulator
- **CLK** - this is the SPI clock input pin
- **MISO** - this is the SPI Microcontroller In Serial Out pin, its used for the SD card mostly, and for debugging the TFT display. It isn't necessary for using the TFT display which is write-only
- **MOSI** - this is the SPI Microcontroller Out Serial In pin, it is used to send data from the microcontroller to the SD card and/or TFT
- **CS** - this is the TFT SPI chip select pin
- **D/C** - this is the TFT SPI data or command selector pin
- **RST** - this is the TFT reset pin. There's auto-reset circuitry on the breakout so this pin is not required but it can be helpful sometimes to reset the TFT if your setup is not always resetting cleanly. Connect to ground to reset the TFT
- **Lite** - this is the PWM input for the backlight control. It is by default pulled high (backlight on) you can PWM at any frequency or pull down to turn the backlight off
- **IM3 IM2 IM1 IM0** - these are interface control set pins. In general these breakouts aren't used, and instead the onboard jumpers are used to fix the interface to SPI or 8-bit. However, we break these out for advanced use and also for our test procedures
- **Card CS / CCS** - this is the SD card chip select, used if you want to read from the SD card.
- **Card Detect / CD** - this is the SD card detect pin, it floats when a card is inserted, and tied to ground when the card is not inserted. We don't use this in our code but you can use this as a switch to detect if an SD card is in place without trying to electrically query it. Don't forget to use a pullup on this pin if so!

Resistive touch pins

- **Y+ X+ Y- X-** these are the 4 resistive touch screen pads, which can be read with analog pins to determine touch points. They are completely separated from the TFT electrically (the overlay is glued on top)

Capacitive touch pins

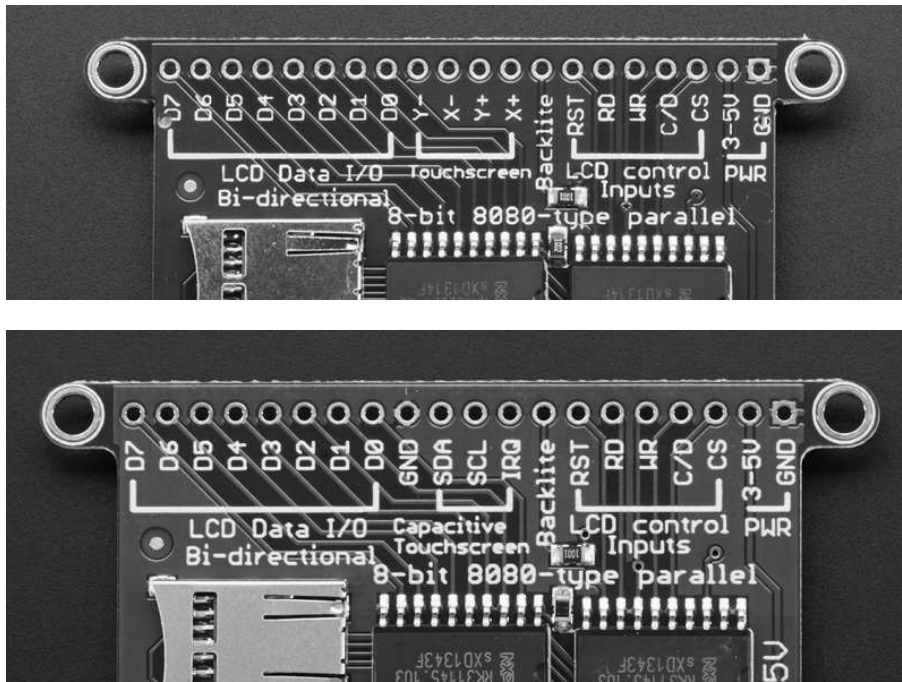
- **SDA** - this is the I2C data pin for the captouch chip, there's level shifting on this pin so you can use 3-5V logic.

There's also a 10K pullup

- **SCL** - this is the I2C clock pin for the captouch chip, there's level shifting on this pin so you can use 3-5V logic. There's also a 10K pullup
- **IRQ** - this is the captouch interrupt pin. When a touch is detected, this pin goes low.

8-Bit Mode

This mode is for when you have lots of pins and want more speed. In this mode we send 8 bits at a time, so it needs way more pins, 12 or so (8 bits plus 4 control)! This isn't recommended because most microcontrollers don't have a ton of pins and also we optimize our libraries for SPI!



- **GND** - this is the power and signal ground pin
- **3-5V (Vin)** - this is the power pin, connect to 3-5VDC - it has reverse polarity protection but try to wire it right!
- **CS** - this is the TFT 8-bit chip select pin (it is also tied to the SPI mode **CS** pin)
- **C/D** - this is the TFT 8-bit data or command selector pin. It is **not the same as the SPI D/C pin!** Instead, it's the same as the SPI CLK pin.
- **WR** - this is the TFT 8-bit write strobe pin. It is also connected to the SPI **D/C** pin
- **RD** - this is the TFT 8-bit read strobe pin. You may not need this pin if you don't want to read data from the display
- **RST** - this is the TFT reset pin. There's auto-reset circuitry on the breakout so this pin is not required but it can be helpful sometimes to reset the TFT if your setup is not always resetting cleanly. Connect to ground to reset the TFT
- **Backlite** - this is the PWM input for the backlight control. It is by default pulled high (backlight on) you can PWM at any frequency or pull down to turn the backlight off
- **D0** thru **D7** - these are the 8 bits of parallel data sent to the TFT in 8-bit mode. **D0** is the least-significant-bit and **D7** is the MSB