## Quickstart Guide

Product Name
—SKU 20-011-C45

#### QUICK SPECS:

**Brief Description** 

#### Included Items

- -3.2" 320x240 pixel SSD1289based TFT LCD with integrated SD card reader and touch
- -TFT shield for Arduino Mega with adjustable backlight potentiometer

#### Also Needed:

-Arduino Mega 2560 or ADK

#### Additional Notes:

- -This item is not suitable for the Arduino UNO due to the number of I/O pins required for operation
- -Because of the voltage, logic levels, and shield requirements this item is not suitable for use on the Arduino DUE

# 3.2" TFT LCD with SD and Touch for Arduino Mega with adjustable TFT shield



#### **Getting Started:**

Congratulations on your purchase of the SainSMART 3.2" TFT with touch screen and SD reader for Arduino Mega.. These items have been paired to provide you with a working solution to quickly create your Arduino display project

First, unpack your items and inspect for damage. The LCD module docks onto the shield which then plugs directly onto the Arduino Mega board. Use caution when inserting and removing the modules to prevent damage to the interface pins. The LCD will function when the Arduino is powered from either the USB interface or external power adapter.

Next, you will need to download and install the needed libraries found in the list to the right. While not mandatory, these libraries will allow to you get up and running with your LCD quickly and provide an easy way to interface to the hardware through the Arduino IDE.

Visit <a href="http://arduino.cc/en/Guide/Libraries">http://arduino.cc/en/Guide/Libraries</a> for information about installing additional Arduino libraries.

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The Arduino libraries needed to use this display can be downloaded as a single package at:

https://www.dropbox.com/s/ egguwqx49qr143i/3 2 LCD\_Libraries.zip?dl=0

#### UTFT

The UTFT library by Henning Karlsen provides an easy way to interface with many popular TFT modules.

#### - ITDB02\_Touch

ITDB02\_Touch is the legacy version of Henning Karlsen's UTouch library. The UTouch library does not function properly with the touch controller used on the 3.2" TFT.

#### -UTFT\_SDRaw

UTFT\_SDRaw is an alternative to Henning Karlsen's UTFT\_TinyFAT and allows the loading of raw bitmap images to the LCD from the SD card. It uses the standard SdFat Arduino library for card access.

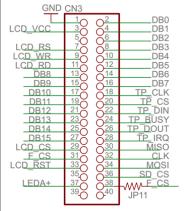
#### -UTFT\_Buttons\_ITDB

UTFT\_Buttons\_ITDB is a modified version of Henning Karlsen's Buttons library that has been adjusted to work with the ITDB02\_Touch library

## LCD and Shield pinouts:

#### LCD:





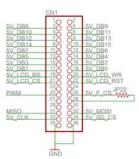
#### **Pin Descriptions:**

| Pin(s)  | Description                           |
|---|---------------------------------------|
| LCD_VCC   | +5V supply                            |
| GND   | LCD ground bus                        |
| LEDA+   | LCD backlight supply                  |
| DB0—DB15  | LCD 16-bit parallel data interface    |
| LCD_RS, LCD_WR,<br>LCD_RD, LCD_CS,<br>LCD_RST   | LCD data flow control lines           |
| TP_CLK, TP_CS, TP_DIN, TP_BUSY, TP_DOUT, TP_IRQ | Touch Panel data flow control lines   |
| SD_CS, MISO, CLK,<br>MOSI                       | SD card slot data control lines (SPI) |

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#### Shield:







| <b>Note:</b> The F_CS pins are not |  |  |
|------------------------------------|--|--|
| used, as the 3.2" LCD does not     |  |  |
| come with the flash chip. All      |  |  |
| unlabeled pins are NC (not         |  |  |
| connected)                         |  |  |
|                                    |  |  |

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SainLABS products are engineered with the hobbyist in mind: our products are supported through the local and online SainLABS Community.

#### LEARNING SERVICES

Not sure what steps to take next? Visit <a href="http://sainlabs.org">http://sainlabs.org</a> to find classes and maker-spaces in your area!

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| Pin(s)- Arduino pin in ()   | Description                           |
|---|---------------------------------------|
| +3V3 <u>(3.3V)</u> , +5V <u>(5V)</u>  | +3.3V and +5V supply                  |
| GND (GND)   | LCD ground bus                        |
| LEDA+ <u>(5V)</u>   | LCD backlight supply                  |
| DB0—DB15 (D37-D30, D22-<br>D29)   | LCD 16-bit parallel data interface    |
| LCD_RS ( <u>D38</u> ), LCD_WR ( <u>D39</u> ),<br>LCD_RD ( <u>3.3V</u> ), LCD_CS ( <u>D40</u> ),<br>LCD_RST ( <u>D41</u> )                 | LCD data flow control lines           |
| TP_CLK ( <u>D6</u> ), TP_CS ( <u>D5</u> ),<br>TP_DIN ( <u>D4</u> ), TP_BUSY ( <u>D7</u> ),<br>TP_DOUT ( <u>D3</u> ), TP_IRQ ( <u>D2</u> ) | Touch Panel data flow control lines   |
| SD_CS ( <u>D53</u> ), MISO ( <u>D50</u> ),<br>CLK ( <u>D52</u> ), MOSI ( <u>D51</u> )   | SD card slot data control lines (SPI) |

### Assembling the shield and LCD to the Mega:

#### Nood Assessation?

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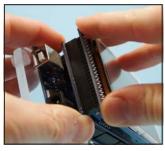
Begin by carefully starting the rear connector of the TFT shield onto the Arduino Mega. Go slowly and ensure that all pins are inserted correctly and are straight.



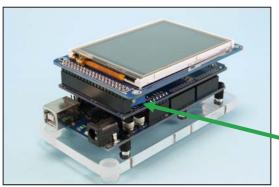
Press down on the shield to seat all three connectors fully onto the Arduino Mega. Check to ensure all pins are seated fully.



**Start the** LCD display connector into the 40-pin header on the TFT shield, ensuring that all pins are properly aligned.



While applying pressure to the underside of the TFT shield, fully seat the LCD connector onto the TFT shield header using a slight rocking motion.



**Finished!** Your LCD is now ready to use.

**To adjust the backlight:** using a non-conductive tuning wand or screwdriver, turn the potentiometer screw on the TFT shield while the unit is powered to achieve the desired brightness level.

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### Using the LCD: UTFT example sketch

The UTFT library is used to display content to the LCD. UTFT alone does not handle any of the touch or SD card access functions.



From the Arduino IDE, open the UTFT\_Demo\_320x240 sketch from the AVR category.

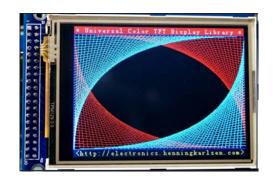
**The configuration** of the example sketch from the download link on page 1 should be correct for this type of display. Line 31 declares the display model for UTFT (for more information on the supported displays, see the UTFT documentation). This will allow UTFT to correctly communicate with this LCD.

```
31 UTFT myGLCD(SSD1289,38,39,40,41);

*SSD1289- declares the type of display

*38, 39, 40, 41- defines the pins UTFT should use
```

**Select the** correct board and port from the Arduino IDE in the 'Tools' menu. Upload the sketch and if all goes well, the LCD demo should run in a loop.



### Additional Resources

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#### UTFT Demo Sketch

This sample program allows you test the LCD for proper operation. If the program runs without error, proceed to the next section to test the touch panel.

#### Extending the Program

Once you are able to view the demo, why not make your own graphics? Read through the documentation provided with the UTFT library to learn how to use library functions.

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### Using the Touch Panel: ITDB02\_Touch example sketch

#### DAC MCP49x1 ITDB02 Touch ITDB02 Touch ButtonTest MIDI-modified ITDB02\_Touch\_Calibration **SPIflash** ITDB02\_Touch\_QuickDraw TinvGPSPlus

From the Arduino IDE, open the ITDB02\_Touch\_Button\_Test sketch from File -> Examples -> ITDB02 Touch

The configuration of the example sketch from the download link on page 1 should be correct for this type of display. Lines 22 and 23 declare the display model and touch pins for UTFT and ITDB02 Touch. Lines 37 and 40 set the correct display and touch orientation so that the LCD and touch panel are in sync.

```
22 UTFT myGLCD(SSD1289, 38, 39, 40, 41);
23 ITDB02_Touch myTouch(6, 5, 4, 3, 2);
37 myGLCD.InitLCD(LANDSCAPE);
```

IDE— click File, then choose Preferences. Be sure that 'display line numbers' is checked.

**TIP:** If you do not see

line numbers in the

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Select the correct board and port from the Arduino IDE in the 'Tools' menu. Upload the sketch and if all goes well, you will see a button matrix and entry display. Typing numbers and pressing 'Enter' will empty the buffer and start a new line. Tap away!



The ITDB02\_Touch\_Button\_Test example sketch will allow you to test operation of the touch panel and ensure that your libraries are properly installed.

Once you can use the buttons in

the demo sketch, read through

the ITDB02\_Touch documenta-

tion to learn how to take touch

input from your new project.

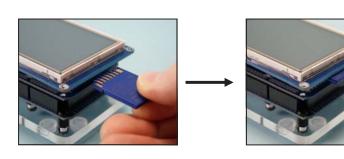
```
40 myTouch.InitTouch(LANDSCAPE);
```

### Reading from SD: UTFT\_SDRaw example

**NOTE:** SD card access can be achieved with the standard SDFat Arduino library alone. UTFT\_SDRaw allows an easy way to also load bitmap images directly to the LCD from SD card. Images must be in '565' .raw format. The UTFT library includes an image converter in the 'Tools' folder within the library. Images must be uploaded to a FAT formatted SD card prior to inserting into the LCD card slot.



Prepare your SD card for this demo by ensuring that is formatted with the FAT file system. Then copy the contents of the 'Image-files' folder from the library download to the SD card. This will allow the demo sketch access



With the SD contacts facing up, carefully insert the SD card into the slot on the back of the LCD and ensure that it is fully seated.



**From 'Examples'** in the Arduino IDE, open the SdRaw\_320x240 test sketch.

**The configuration** of the example sketch from the download link on page 1 should be correct for this type of display. Lines 33 and 50 declare the display model and touch pins for UTFT and ITDB02 Touch. Line 81 sets the correct touch orientation.

```
33 UTFT myGLCD(SSD1289, 38, 39, 40, 41);
-----
50 ITDB02_Touch myTouch(6, 5, 4, 3, 2);
-----
81 myTouch.InitTouch(LANDSCAPE);
```

**Select the** correct board and port from the Arduino IDE in the 'Tools' menu. Upload the sketch and if all goes well you will see the demo play, loading images from the SD card.



#### SdRaw example sketch

This example will ensure that all functions of your LCD and shield are in order. The SD card can also be accessed by any sketch using the SdFat Arduino library. The SD card slot uses the standard SPI interface pins.

#### Extending the program

Now that you can load images from SD, ad some cool custom images to your next project, or even create a picture slideshow!

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