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LCD Resources:

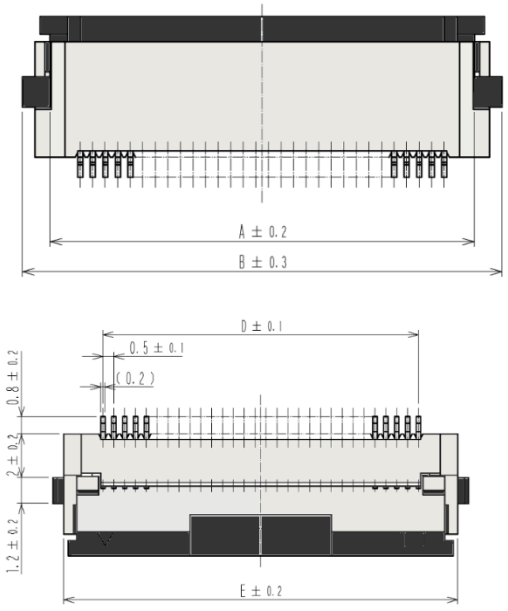
Soldering Display Connectors and Surface Mount Devices

Soldering Display Connectors and Surface Mount Devices

This resource will discuss how to solder small pin pitch display connectors and surface mount devices (SMDs). The pin pitch for many display connectors is 0.5 mm or less. Soldering small, pitched pins can be a simple process when using the right tools. The display connector can be soldered directly to a PCB or held in place by a ZIF connector. Both of these methods require the soldering of finely pitched pins.

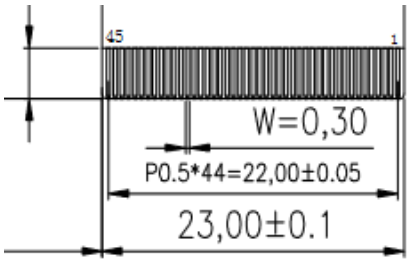
Many displays are interfaced through a ribbon cable or FPC connector. To communicate through this connection a surface mount ZIF connector can be soldered to a PCB to hold the display connector in place. If no connector is available, the cable can be soldered directly to the PCB.

It is recommended to use a ZIF connector to connect the display to the PCB. Soldering the display directly to the PCB can potentially damage the thin ribbon cable. The ZIF connector for the board will hold the display connector tightly in place a prevent any damage to the FPC.

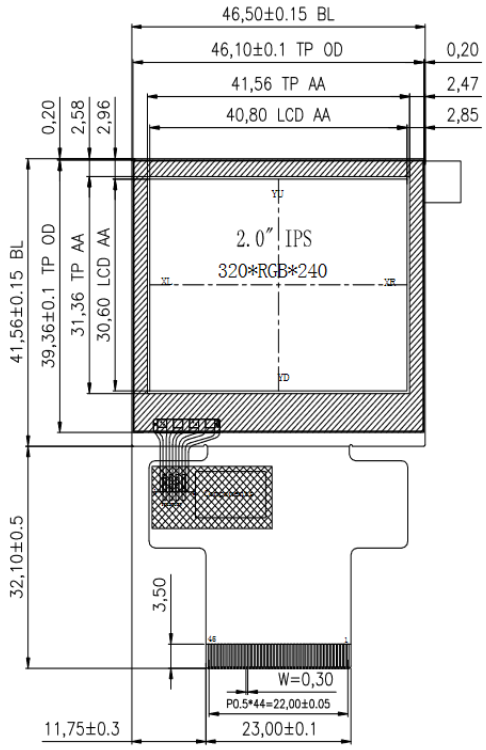


The ZIF connector used in this example is a 45 pin 0.5 mm pitch connector. This aligns with the connection port of the display interface. Once attached to the PCB the ZIP connector will lock the display ribbon cable in place.

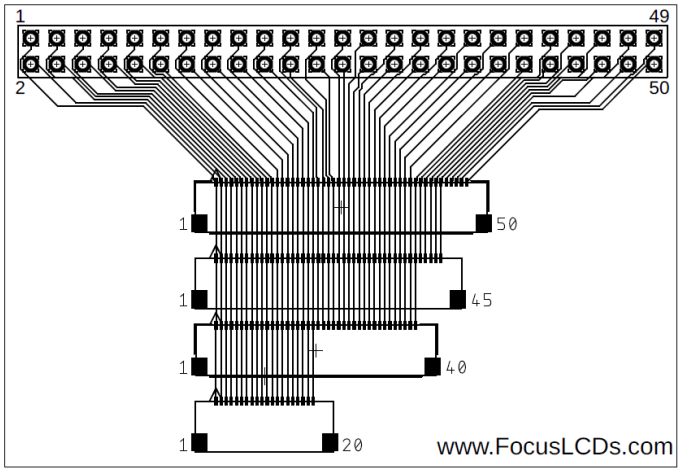
The positions available on the PCB will need to have the same spacing as the ZIF connector and the display pinout. For this example, the pin spacing of the display is 0.5 mm in pitch. The display in this application is E20RA-CW540-R, which is a 2.0" TFT with a ribbon cable connector containing 45 interface pins.



Below are the outline dimensions of the display and of the connected ribbon FPC cable.



The PCB in this example is a standard display printed circuit board designed for different sized display connectors. Each of the connector positions correspond to different displays offered by Focus LCDs. This board offers a quick solution for easily connecting to your display.



If you would like to avoid the soldering process, please reach out to Focus LCDs at www.FocusLCDs.com where you can find these boards preassembled with display connectors.

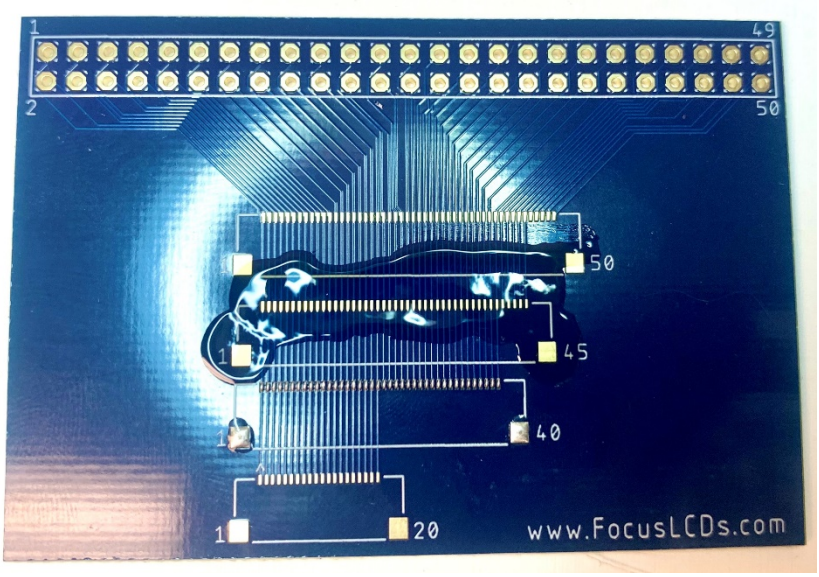
Required Materials

Below is a list of the required materials for soldering the display ZIF connector to the PCB.

1. Soldering iron
2. Solder wire
3. Liquid Flux
4. Solder wick
5. Isopropyl Alcohol
6. PCB with 0.5 mm pitch pads
7. Display ZIF connector with 0.5 mm pitch pins
8. Electrical tape
9. Magnifying glass with stand
10. E20RA-CW540-R

Step 1: Flux the PCB

The first step is to add flux to the PCB over the pins that will be used. A generous amount of liquid flux can be used to prevent the solder from forming a bridge between pins. The flux can be spread across all 45 pins as seen in the below image.



The flux primes and prepares the solder pads to accept solder more easily. The flux works by reducing the oxidation of the solder pads, which improves electrical contact and allows the solder to flow more freely.

The flux used in this example is called rosin flux, one of the more common types of flux. Rosin flux is liquid and can be applied to PCBs to make soldering small pin connections easier. The rosin flux is only active when heated and is safe for unheated electrical circuits.

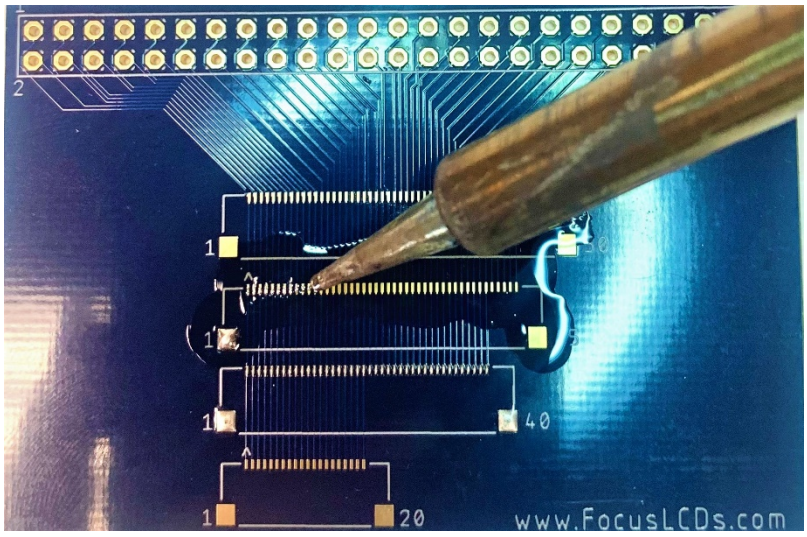
Step 2: Solder the PCB Pads

Plug in the soldering iron and set the temperature to a setting between 200˚C and 350˚C. Once the soldering iron is heated to a medium to low temperature, it is time to add the solder to the pads.

This is done before adding the ZIF connector to prevent over soldering each of the pads. This can avoid the pin connections from bridging together when soldering on the ZIF connector. Be sure to clean off any excess solder on the iron before beginning.

Add a small amount of solder to the tip of the soldering iron. This process is called tinning the soldering iron. There should be enough solder added to apply a small amount of solder to each of the 45 pins.

Hold the soldering iron at a 45 degree angle from the board and drag the iron across each of the pins in one even motion. The flux on the board will prevent the solder from sticking to the solder mask spaces between the pads.



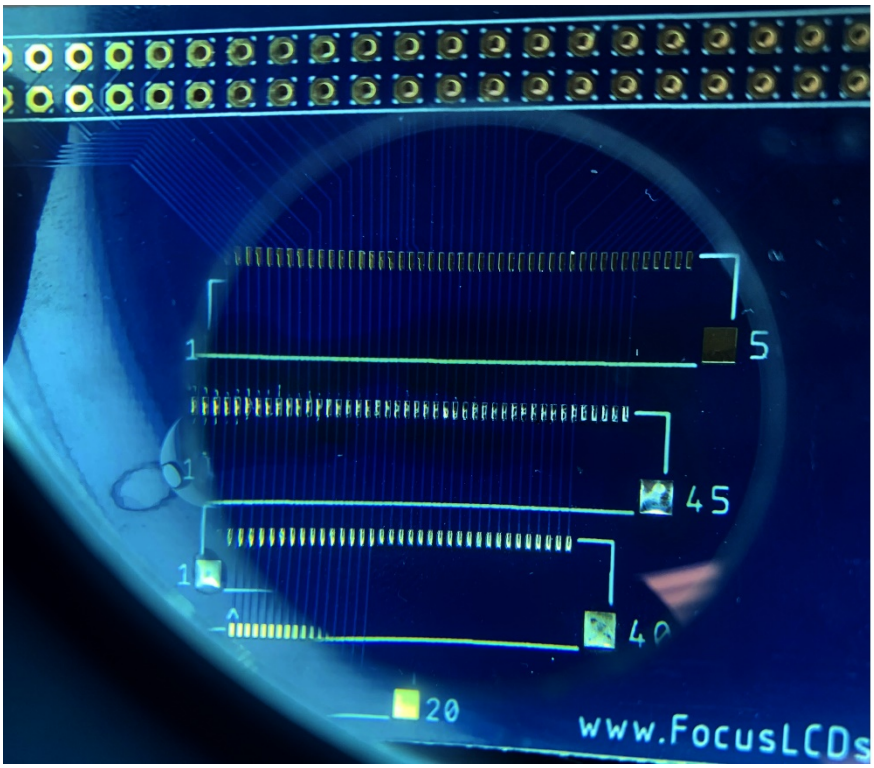
The motion across the pads with the soldering iron should be fluid and take approximately 3-5 seconds. There should be a visible wave across the fluid flux as the soldering iron is pulled across the pads.

Additional solder can be added to the soldering iron if there is not enough to cover all of the pads. Try to keep the soldering iron moving across the board in one smooth motion to avoid overheating the board. You can go over the pins until you are happy with the amount of solder placed on the pads.

Step 3: Examine the Pads

After soldering the flux onto the pads, it is a good idea to examine the spaces between the pads with a microscope and a bright light. It is good to check if any of the pads have formed a solder bridge between the connections. This can be fixed by heating a solder wick with the soldering iron on top of the bridges to absorb the excess solder.

After the pads are cleared of any overflow and have a small amount of solder in each position, the liquid flux can be removed with isopropyl alcohol. Clean off any remaining flux or dust that has adhered to the board is good to do before attaching the ZIF connector in order to prevent unwanted shorts.



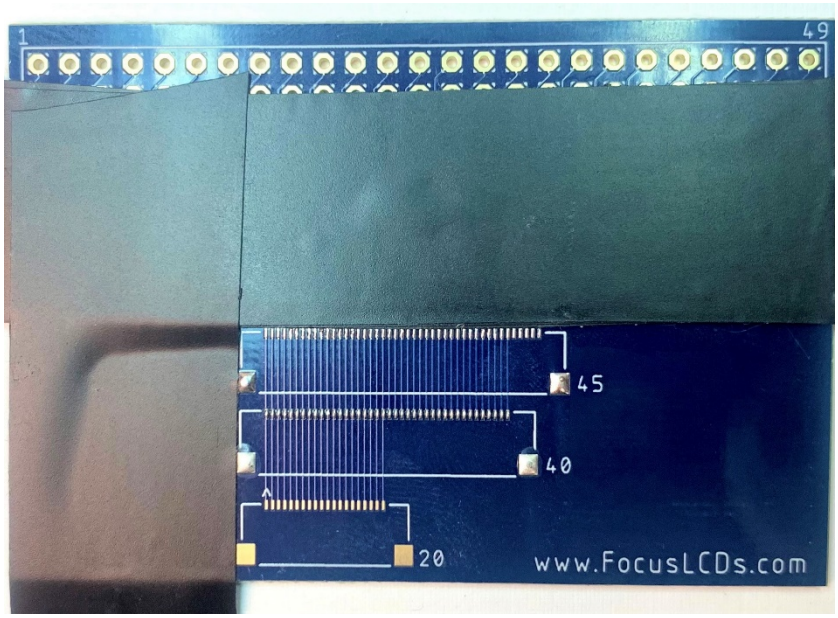
It is good to use a magnifying glass to check the solder pads and solder mask spaces for unwanted solder overflow. A stand for the magnifying glass will make reworking the solder an easier process

so that you can view and remove unwanted solder. Make sure there is good lighting to properly view the spaces in between the pins.

Step 4: Line up the Connector

The connector must be aligned so that the pins sit directly on top of the corresponding pads. This is probably the trickiest part of the process. Any bump to the board will displace the connector pins.

An outline of the connectors desired position can be prepared with electrical tape. This will prevent the connector from moving from the position when soldering the pins. The connector will stay in the desired place after the two large mounting pins are heated to the PCB.

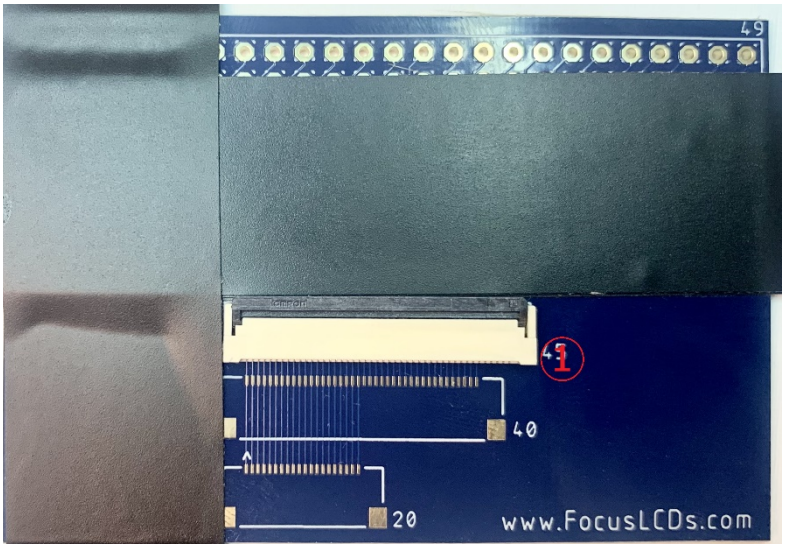


Line the edges of the connector with the electrical tape to create a boundary for the location of the connector. It is good to start with a front edge of tape that places the pins in a straight line across the board.

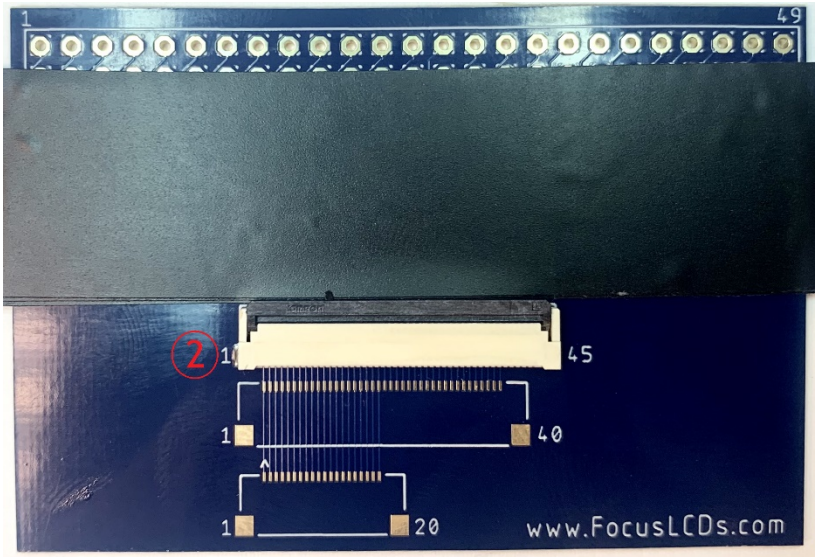
Try to place the electrical tape in the areas around the solder mask tracing of the connector. If the board does not have the tracing of the connector, place a straight across line at the top edge of the pre soldered pins. Additional electrical tape can be placed on other pads to avoid electrical shorting.

Step 5: Heat the Pins

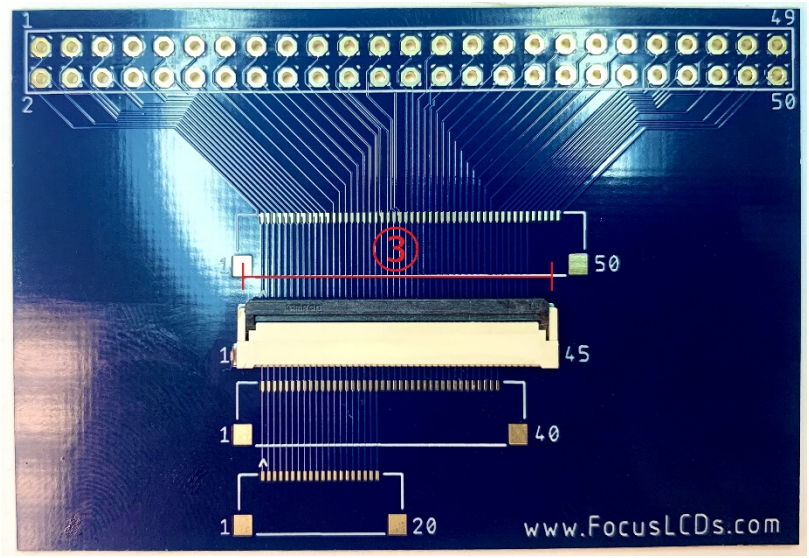
After the connector is placed in the correct position, it is time to heat the pads to attach the ZIF connector. Place a small amount of flux over the pins to prevent any shorting or bridging of the underlying solder. Heat the largest mounting pins first to hold the connector in place.



Be sure to maintain the proper pin alignment before heating. Heat the pin on the right that does not have electrical tape on its side. Once soldered, remove the left piece of electrical tape, and then heat the left mounting pin.



The electrical tape will melt if it comes near the soldering iron so you should remove the tape before heating the pins. There is no need to add solder to the tip of the soldering iron before heating the pins. The solder that has been placed on the board will be sufficient for attaching the connector.



The 0.5 mm pins on the top area of the connector can be heated once the connector is held in place. Similar to the soldering process the soldering iron can be pulled across the pins at a 45 degree angle.

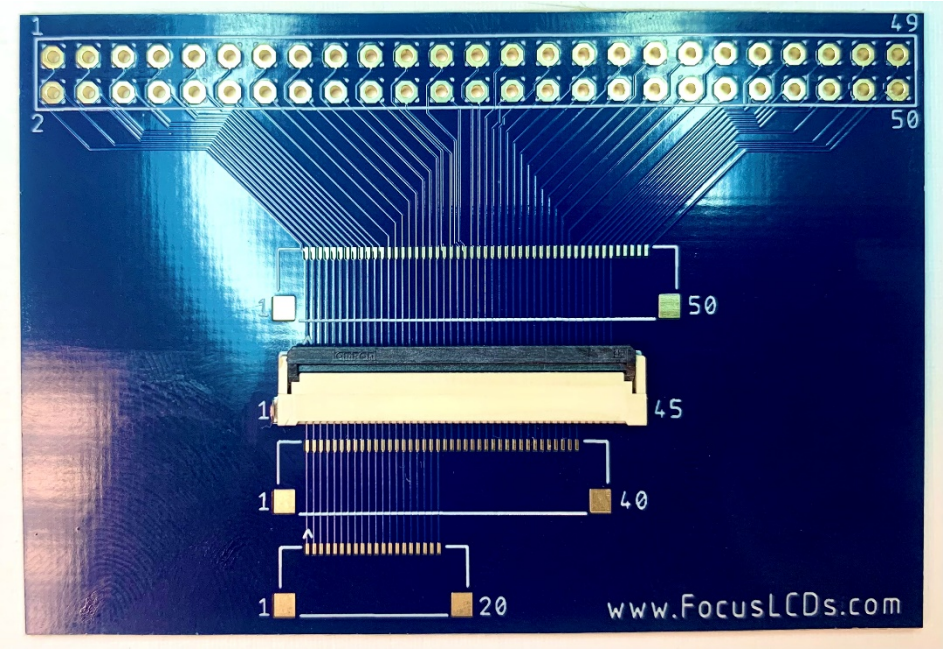
Add a small amount of flux to the top pins before heating the pins. Apply the soldering iron across each of the pins using the same technique as in step 2. The pins should be heated in a fluid motion across the width of the connector to prevent overheating the PCB.

Step 6: Verify the Connection

The last step is to take the magnifying glass and inspect the individual pins to confirm the connection. Make sure to check that there is space between each pin connected and the adjacent. The heating step can lead to solder overflow between pads. It is important to review the connections with a magnifying glass to ensure proper connection.

It is also good to look for unconnected solder joints. If there is not enough solder applied to a specific pad during the second step there can be unconnected or poorly connected pins. This can cause issues such as inconsistencies in display communication.

Solder wick can be used to remove any solder bridges between connections. Additional flux and a small amount of solder can be used to attach the unconnected pins.



After everything is connected and verifies, isopropyl alcohol can be used to clean off the additional flux on the board. Now the display can be connected to the board and operated through the DIP pins.

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