User's Manual
ELI121-CRW

Revision 1.12

996 A Cleaner Way, Huntsville, AL 35805

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1.0 Introduction

About ELI (the Easy LCD Interface)

ELI® is Future Designs, Inc.'s family of long-life, plug-and-play embedded displays. ELI products are true modular embedded display solutions that require no engineering or lead-time. All ELI products are compatible with a wide range of single board computers including Raspberry Pi, BeagleBone Black and Windows-based units. FDI designed ELI as an embedded display option that requires minimal development time to help customers reach production quickly. Once a product is in production, FDI's 10-15 year ELI product availability guarantee helps ensure production schedules without the risk of expensive or time consuming redesigns. Learn more about ELI at TeamFDI.com/ELI.

ELI Compatibility

ELI products are compatible with most Single Board Computers, PCs and operating systems. See https://www.teamfdi.com/product-details/eli121-crw#compatibility for the results of FDI's compatibility tests with popular operating systems and platforms. Our results, as indicated in the table, demonstrate ELI versatility but the table is not exhaustive. ELI products are designed to work with any single board computer that has an HDMI output. To submit a question about ELI compatibility with a platform or operating system that is not included in the table, contact a member of the FDI support team at Support@teamfdi.com.

Your ELI Experience

Share your experience connecting ELI devices to various (single board) computers at: https://www.teamfdi.com/edid/#edidform.

2.0 Recommended Accessories (Purchased Separately)

- 12V DC (+/- 5%) 2A Power Supply with a center positive barrel plug
  - 2.1mm I.D. x 5.5mm O.D. x 9.5mm
  - All ELI units operate from +12V DC so this is the recommended power supply input voltage for the entire Family.
  - See Section 8, Power Details, for more info
- USB Type A to Mini Type B Cable (For touch)
- HDMI Cable (Type A Male)
- Lengths for the USB and HDMI cables will be determined by the ELI mounting location and position in each user application.

3.0 ESD Warning

Figure 1. Electrostatic Sensitive Device

Our ELI units are shipped in a protective anti-static package. Do not subject the module to high electrostatic potentials. Exposure to high electrostatic potentials may cause damage to the boards that will not be covered under warranty. General practice for working with static sensitive devices should be followed when working with this device.

4.0 Determining the Revision of your ELI

All ELI devices have a label placed on the board to identify the part number and revision of the unit. This label will help you quickly and correctly identify your ELI unit's part number and revision number. An example of an ELI label is shown below.
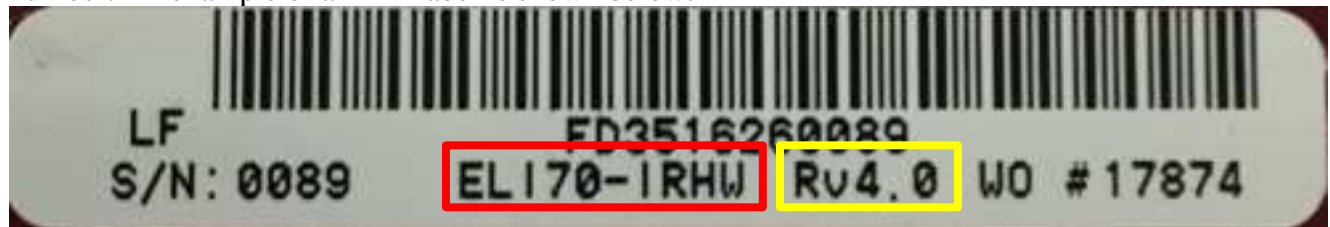
ELI Part Number   ELI Revision Number

5.0 Technical Specifications

Table 1. Technical Specifications

Screen Size (inches):	12.1
Display Technology:	a-Si TFT LCD
Resolution:	1024 x 768 (XGA)
Brightness (nits typical):	400
Contrast Ratio (typical):	700:1
Aspect Ratio:	4:3
Interface Input Mode:	HDMI
Colors:	16.7M (24 bit)
Horizontal Viewing Angle:	80/80°
Vertical Viewing Angle:	70/70°
Surface:	Antiglare
Touch Screen:	4-Wire Resistive
Touch Screen Interface:	USB Device
Touch Panel Hardness:	≥ 3H
Touch Panel Force (gF max):	80
Active Area (in mm W x H):	245.76 x 184.32
Response Time (ms):	16 tr & 16 tf
Backlight:	LED
Backlight Life (K hours typical):	> 30
Backlight Power Consumption (W Typical):	4.8
Operating Temperature:	-20° to 60° C
Storage Temperature:	-30° to 70° C
Input Voltage:	+12.0 VDC ± 5%
Power Consumption:	800mA (typ) / 950mA (max) @ 12VDC
Backlight Power Consumption:	Up to 65% of Power Consumption
USB Power Consumption:	50mA (typ) / 100mA (max) @ 5.0VDC
RoHS Compliant:	Yes
Dimensions (in mm W x H x D)	263.00 x 204.00 x 22.30
Mounting:	M2 screws in 4 locations
Weight (grams)	736

6.0 Mechanical and Mounting Details

A 2D Mechanical Drawing of the unit is available on our website under the Documentation tab
https://www.teamfdi.com/product-details/eli121-crw

3D Mechanical Models (in both STEP and EASM format) are available from our website after completing a simple fillable NDA or Non-Disclosure Agreement.
https://www.teamfdi.com/mechanicalmodelrequest

ELI121-CRW comes with a bracket that provides a variety of mounting options. The dimensions of the bracket and mounting holes are shown below for your reference. If necessary, the brackets can be removed or replaced by removing two screws on each side of the ELI display.
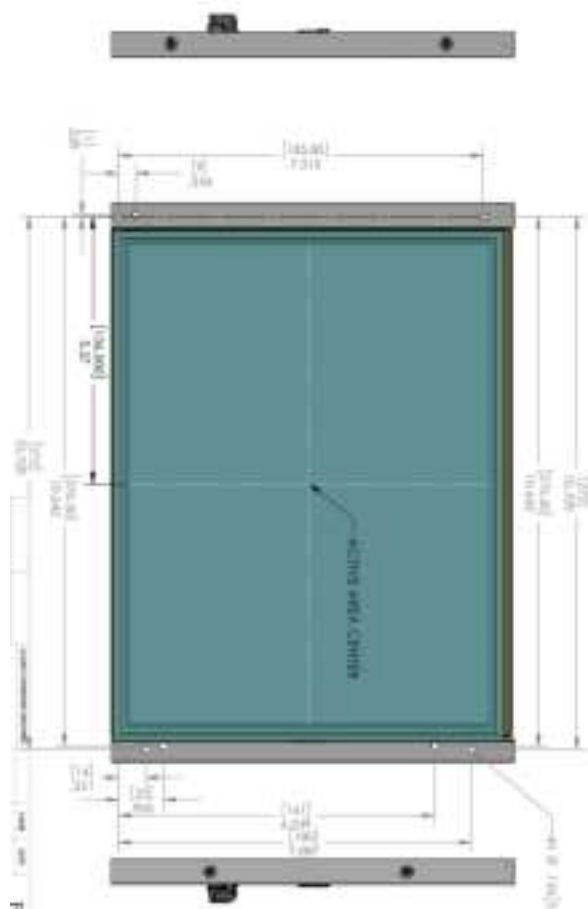

Figure 2. Dimensions of the ELI121-CRW including Mounting Brackets
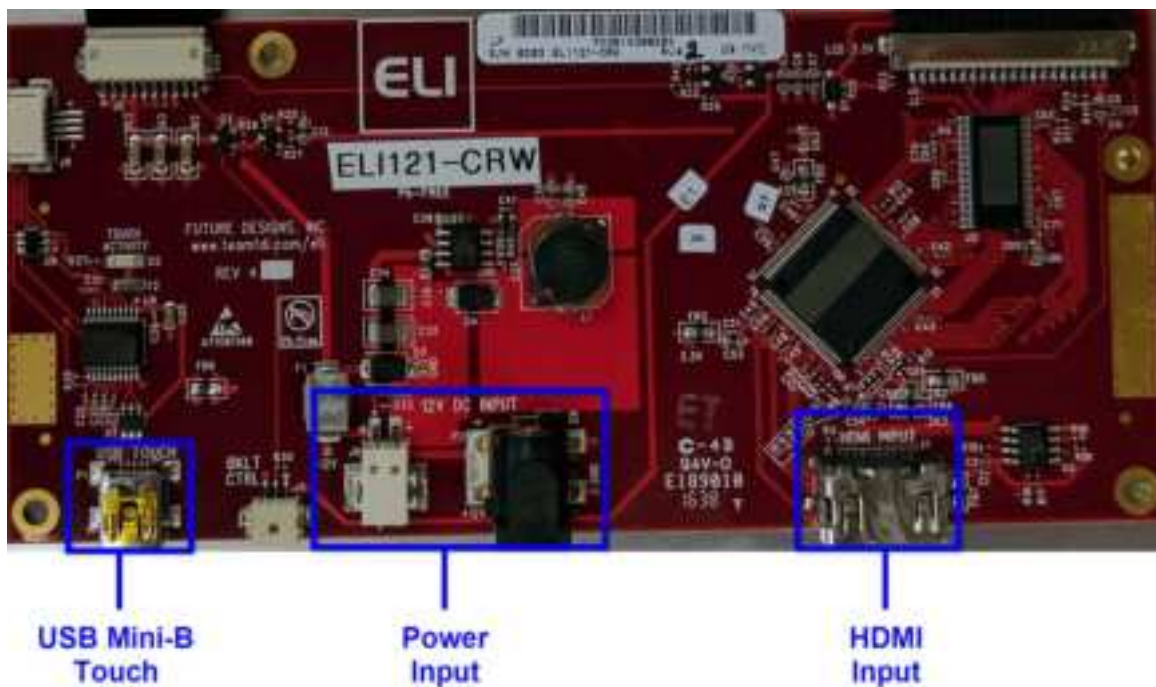
7.0 Connectors

Figure 3. ELI121-CRW Connectors

8.0 Power Details

A 12VDC +/- 5% power supply with a 2.0A output will power any board from the ELI Family. This allows a common, off-the-shelf power supply such as the **T1071-P5P-ND** to be used for quick demos or prototyping across the entire ELI Family. In general, any 12VDC power supply with a 2.1mm center positive plug will be acceptable if it can provide enough current to power the particular ELI unit being used. On the ELI121-CRW plug power into the (P2) connector.

All ELI121-CRW units use 12.0V DC $\pm$ 5% (2.0A) power supplies.

For volume production applications, the input power can be optimized for your ELI unit and lower capacity power supplies can be used.

In cases where the barrel connector is not desired, you can use the alternate power input connector (J9) with supports directly plugging in 20-26 AWG wire with maximum 5A current per contact. The datasheet for this J9 connector (PCB terminal block - PTSM 0,5/ 2-2,5-H SMD WH R24 – 1814634) can be found at https://tinyurl.com/1814634.
To verify that the ELI11201-CRW unit is correctly powered you may check the input voltage with a Fluke multi-meter or scope by probing the +12V and GND contacts shown below. Please verify that the input voltage is present, and within the +/- 5% tolerance and is free from excessive noise or AC ripple.

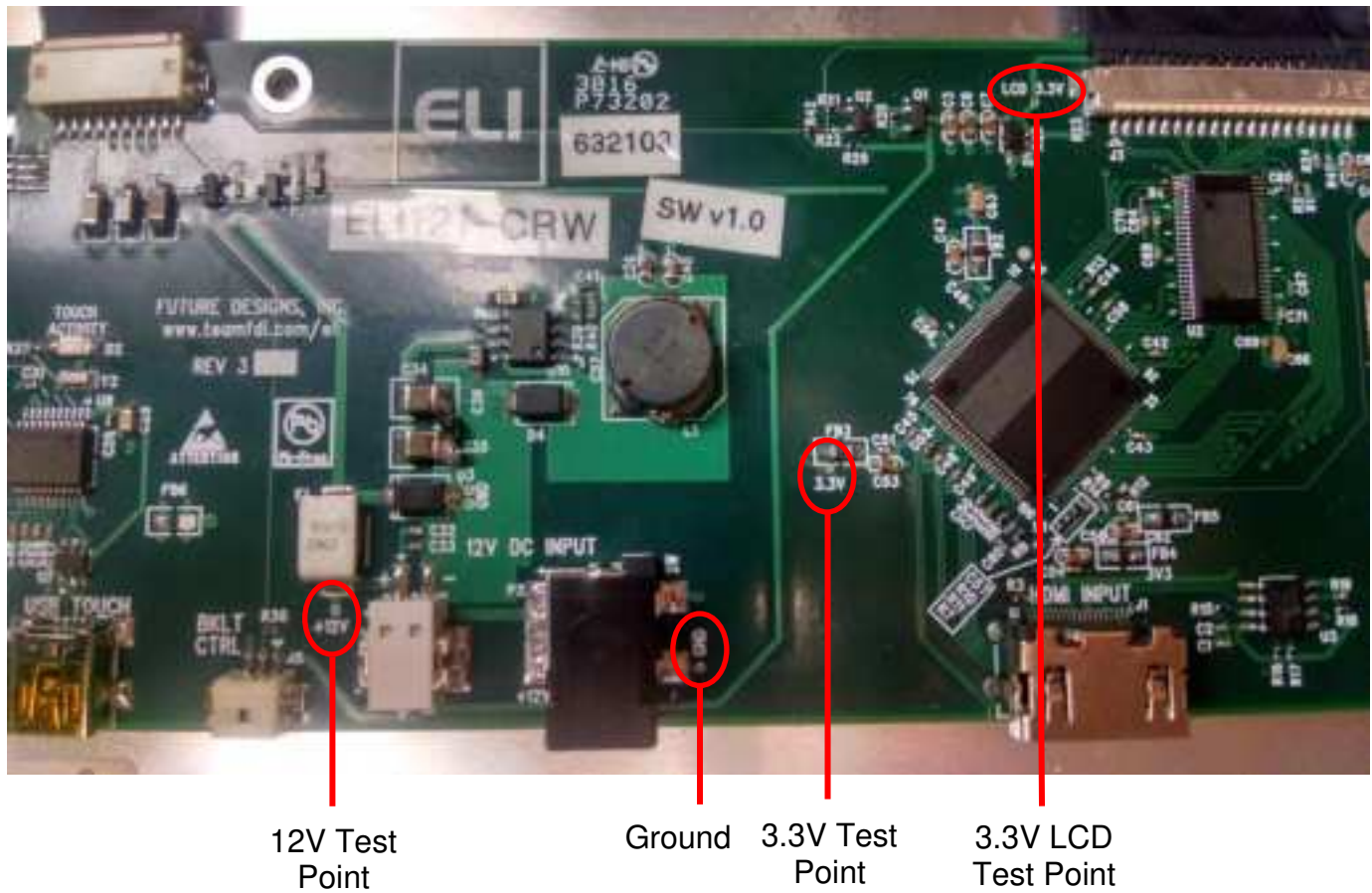12V Test Point   Ground   3.3V Test Point   3.3V LCD Test Point

Figure 4. ELI121-CRW Power Test Points

9.0 Touch Activity LED

ELI121-CRW units have a touchscreen activity LED (*D2*) located near the USB touch connector (P1):
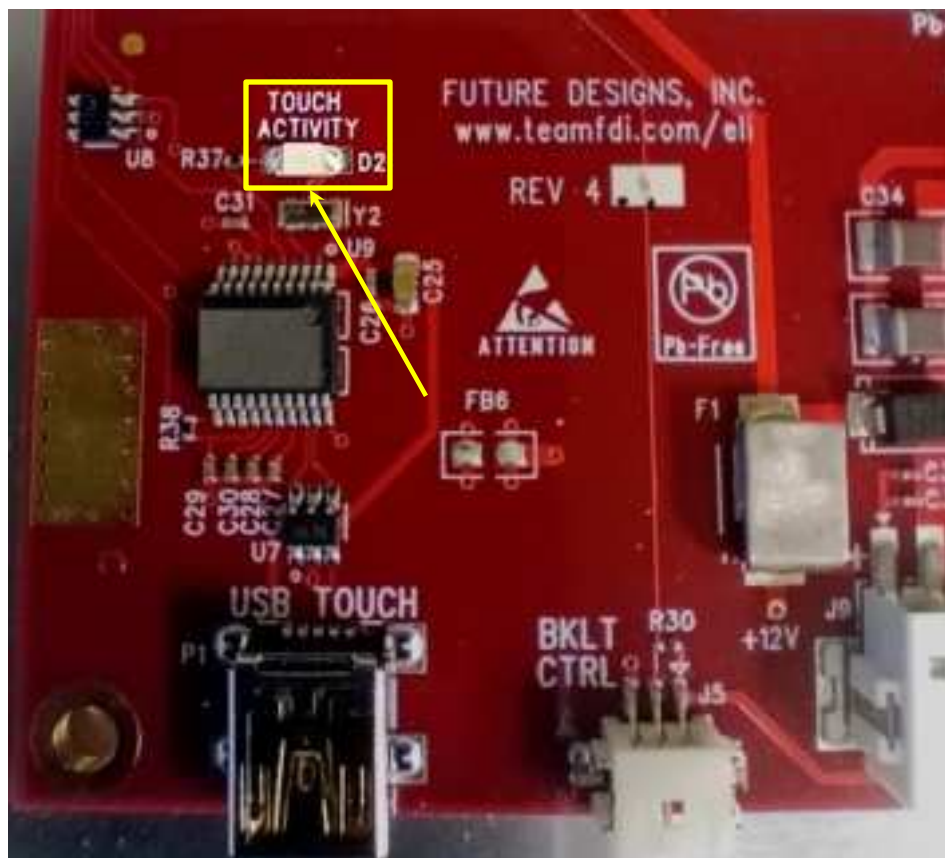

Figure 5. ELI121-CRW – Touch Activity LED

This Green LED will turn ON whenever any touchscreen input is detected, allowing for verification of the touch response even without a connected display.

10.0 Extended Display Information Data (EDID)

ELI uses Extended Display Identification Data (EDID) for automatic configuration with many operating systems. You can find out more on our website at https://www.teamfdi.com/edid/.
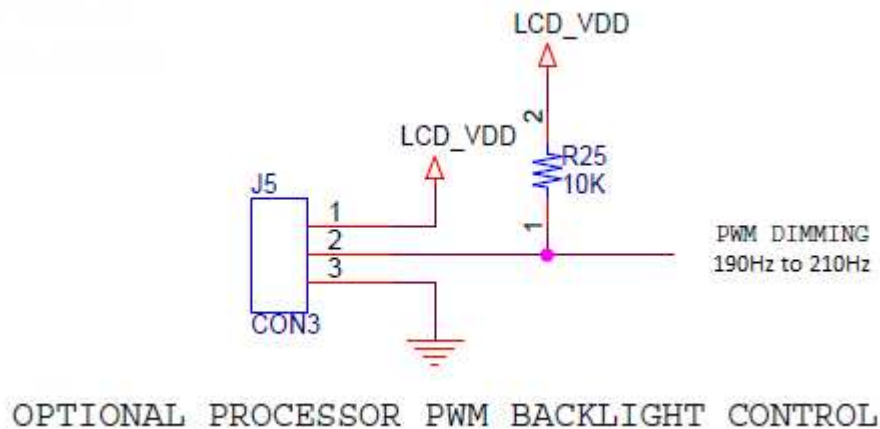
11.0 PWM Control of Backlight

Figure 6 PWM Backlight Control

J5 mating connector housing information:
- Manufacturer: Hirose
- Part Number: DF12-3S-1.25C
- Digi-Key Link: https://www.digikey.com/products/en?keywords=H2180-ND
- Pre-terminated wires https://www.digikey.com/products/en?PPV=1811-9-566967

ELI provides an input so external processor or SBC can control the backlight to vary the display brightness or to reduce power consumption (the display backlight is typically one of the larger sources of power consumption in the unit). PWM dimming is an input with a 0 to 3.3 VDC range and the user should drive this with a push-pull type output or a suitable open collector output.

To control the display backlight, the user should connect an externally generated Pulse Width Modulated (PWM) signal to J5 pin 2 along with a common ground to J5 pin 3. The frequency range for this signal is from 190Hz to 210Hz. Each ELI unit's display backlight properties will vary, so the user should test their version for an acceptable range of brightness control. For example, your 0 to 100% brightness range may be 40% to 90% of the PWM range. In certain installations, a series resistor on J5 pin 2 may be required to ensure a clean PWM signal is provided to the ELI. The suggested value for the resistor is 100ohms. See Figure 8 below, for example of connectivity. Actual testing in your installation may require this resistor to be changed, or possibly not required at all.

On the ELI unit, the PWM dimming signal is pulled up to LCD_VDD providing 100% backlight power when no PWM signal is applied at pin 2 of J5. If nothing is connected to J5 the ELI will drive the display at 100% brightness (default).

The LCD_VDD output at pin 1 of J5 is a 3.3VDC ± 5%. If the external system is capable of directly driving the PWM dimming signal at 3.3VDC, there is no need to connect pin 1 to the cable. ELI

provides the 3.3 VDC signal, called LCD_VDD, for the external system in case this voltage is needed to generate the correct levels on the PWM dimming input.
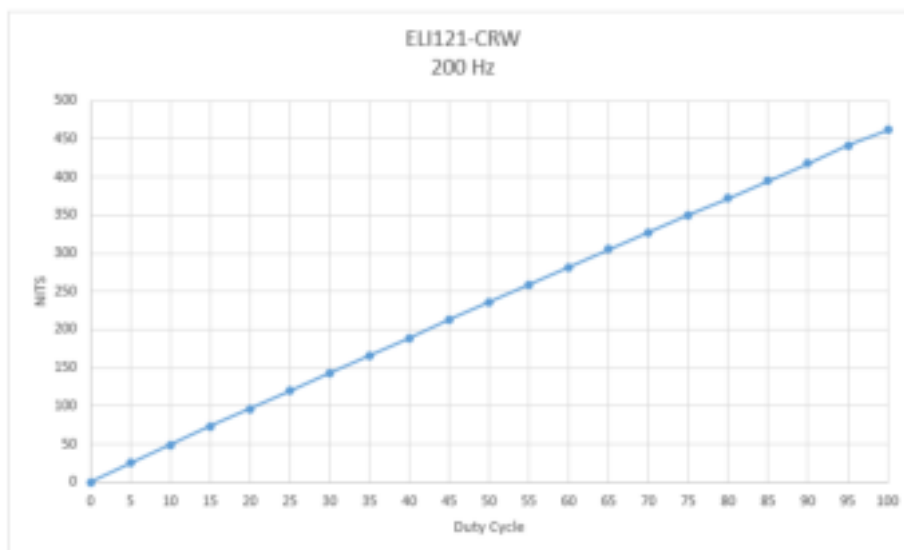

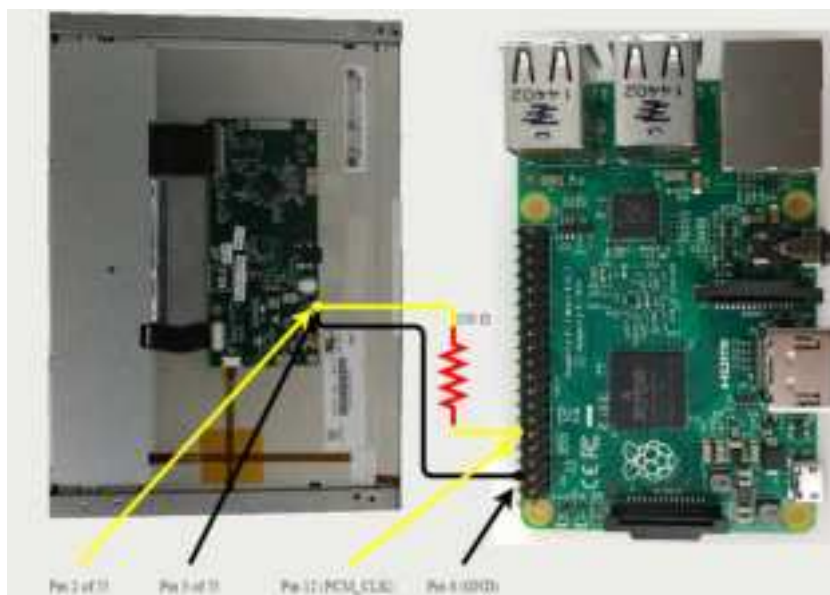Figure 7. ELI121-CRW Backlight Curve in Nits

Figure 8 Raspberry Pi Signal and Ground

The ELI backlight can be controlled from a Raspberry Pi. See Figure 8 for a wiring diagram. Our software is available on the FDI website https://www.teamfdi.com/product-details/eli121-crw#software or you may copy the code from here:
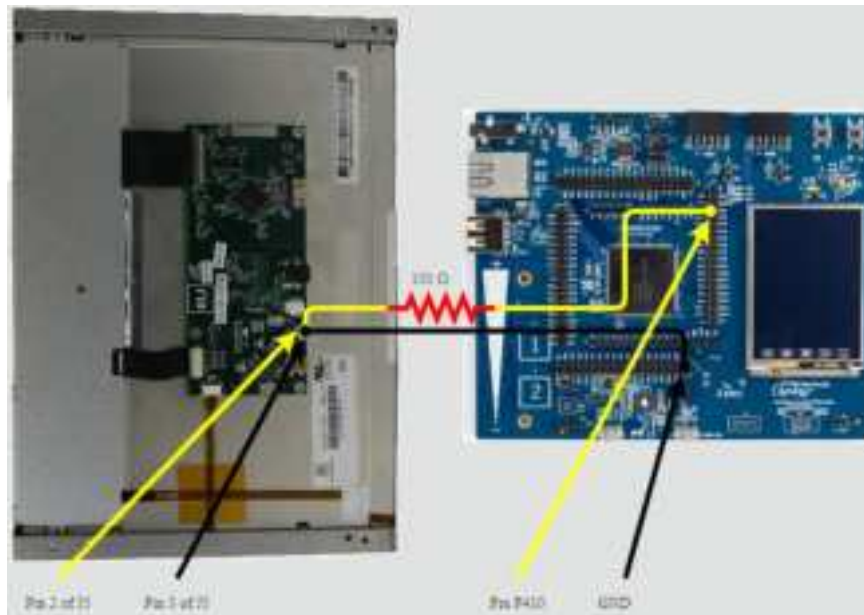
Figure 9. Renesas Synergy S7G2 Signal and Ground

The ELI backlight can also be controlled from a Renesas Synergy S7G2 wired as shown in Figure 9. The software for Synergy can be found on our website at https://www.teamfdi.com/product-details/eli121-crw#software.

12.0 Support

12.1 Where to Get Help

Online technical support is available at https://www.teamfdi.com/support/

12.2 Useful Links

- Future Designs, Inc. Forums: https://www.teamfdi.com/forum
- ELI121-CRW Product Page: https://www.teamfdi.com/product-details/eli121-crw
- ELI Software User's Manual: https://fdiwebdocs.s3.us-east-2.amazonaws.com/2024/wp-content/uploads/ELI-Software-Users-Manual.pdf
- Tell us about your ELI experience: https://www.teamfdi.com/edid/#edidform
- EDID Information Page: https://www.teamfdi.com/edid/