Getting started with the LCD 320x240 panel

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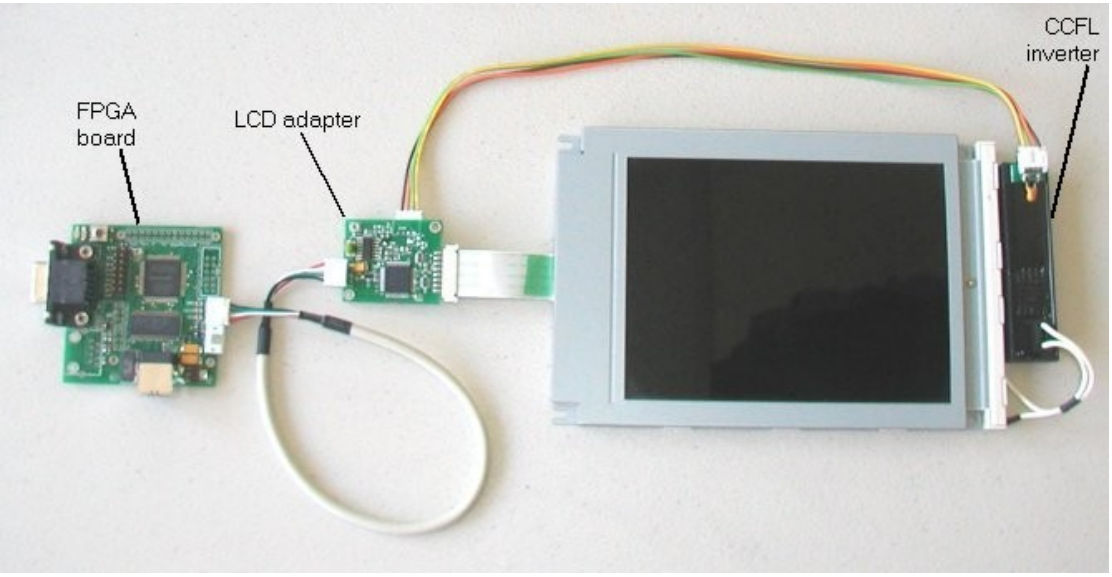
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1 Kit overview

1.1 LCD kit

The LCD kit comes with:

- An LCD panel with CCFL backlight.
- An LCD adapter board that provides an easy interface between an FPGA board and the LCD panel.
- A CCFL inverter that generates the high voltage needed by the LCD backlight.



1.2 LCD adapter board

The LCD adapter board has two 4-pin connectors, an LCD flat cable connector, and a power connector.

The first 4-pin connector connects the adapter to the FPGA board. The second one powers the CCFL inverter.

The flat cable connector drives the LCD:

- First open the connector (pull on its front part).
- Then insert the LCD flat cable, and close the connector.

The power connector is optional: it lets you power the CCFL inverter from a separate supply. See 1.5 for more details.

1.3 FPGA signals

The FPGA board connects to the adapter board through the gray 4-wire tubed cable: two wires carry power and two carry the video information.

Wire	Function	Note
1. Black	GND	
2. Green	LCD_Data	Data signal, 3.3V
3. White	LCD_Clock	Clock signal, 3.3V (10MHz to 20MHz typ.)
4. Red	VCC	+5V power for the LCD (100mA), and optionally for the CCFL inverter (400mA)

1.4 LCD image

Adjust the image contrast with the small potentiometer on the adapter board, using a small screwdriver (not included).

The LCD image can appear to flicker under artificial lighting. If it does, changing the clock frequency slightly fixes the problem.

1.5 CCFL inverter

Drive the CCFL inverter with 5V; a lower voltage reduces the CCFL brightness.

By default, the CCFL inverter is powered through the gray 4-wire tubed cable. To power it separately, use the power connector on the adapter board (and change the jumper position).

2 HDL reference designs

2.1 FPGA

The reference designs can be used with Xilinx or Altera FPGAs. The kit includes the source code (Verilog and C files).

2.2 LCD_HDM3224C_static

This design sends a static pattern to the LCD.

Note: with Quartus II (Altera FPGAs), select the right revision (“Project/Revisions” menu) before compiling the design.

2.3 LCD_HDM3224C_console

This design is controlled from the PC, which sends commands to the FPGA to control what is displayed.

2.3.1 Verilog reference design

The design implements several graphical video generators:

- Bitmap
- Text console (using a 6x8 font)
- Curve y=f(x)
- Rotozoom

The generator outputs are merged to form the image sent to the LCD.

Depending on how many block RAMs the FPGA has, not all generators can be enabled at the same time.

2.3.2 C reference design

Use the high-level functions, such as:

- LCD_PutString(char *, int x, int y);
- LCD_SetCursorPos(int x, int y);

That's all folks.

Have fun with the LCD!