Getting started with the LCD 480x320 panel

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1 LCD panel

1.1 Glass panel

The LCD panel ships with a protective plastic sheet over the glass. Remove it by gently pulling it off.

1.2 Adapter board

The LCD kit comes with an adapter board that provides an easy interface between an FPGA board and the LCD panel. The adapter also generates the voltages the LCD needs.

1.3 Adapter board to LCD

To connect the LCD, open the adapter's flat cable connector (pull on its front part), insert the LCD flat cable, and close the connector.

1.4 Adapter board signals

The FPGA board connects to the adapter board through a 4-wire cable: two wires carry power (5V) and two carry the video information.

Wire	Function	Note
1. Black	GND	
2. Yellow	LCD_Data	LVCMOS33 data signal
3. White	LCD_Clock	LVCMOS33 clock signal running from 15MHz to 50MHz
4. Red	VCC	+5V, about 100mA

Because the adapter board works with clock frequencies from 15MHz to 50MHz (typical) and uses only 2 FPGA IO pins, it works easily with many FPGA boards.

1.5 LCD image

Adjust the LCD 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.

1.6 3.3V power

Some boards, like Xylo-E, provide +3.3V instead of 5V by default. The easiest workaround is to add a connector on top of the existing one, solder its first 3 pins in parallel, and add a wire that brings +5V from another source.

2 HDL reference designs

2.1 FPGA

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

2.2 Static demo

This design uses only Verilog files and runs on its own: a slide show alternating between 2 images, one with diagonal lines and one with the FPGA4FUN logo.

2.3 Dynamic demo

This design uses Verilog and C files and 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 4 graphical video generators:

- Bitmap
- Text console (80x40 characters, 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);