

LCD-Pro IP Library

The library offers simplified system and host interfacing due to the use of widely adopted, industry standard AMBA bus architecture and included system interface cores. The cores, which are configurable with various implementation options, offer a high degree of solution scalability. Additionally, the cores are designed and optimized for the high speed required by state-of-the-art graphics systems, providing simplified timing closure and short development time.

The library allows easy integration of advanced FPGA-based graphics systems with powerful features:

- Ability to control a wide range of flat panel displays ranging from low-end CIF and QVGA up to high definition TFT, in 8, 16 or 24-bit color (field proven with more than 30 commercially available displays).
- Multi-layer image compositing available in display controller, supporting simple overlaying, color keyed transparency, alpha blending and alpha masking.
- Variable layer color depth, size, positioning, memory geometry and location, smooth scrolling.
- Display refresh synchronization.
- Support for fast hardware BITBLT operations with standard ROP or alpha composition.
- Support for 8,16, 24 and 32-bit bitmap formatting, variable and independent memory geometry for source and destination bitmaps.
- Powerful alpha blending operations supporting Porter-Duff alpha composition rules.
- Solid and pattern fill operations.
- Hardware color expansion of monochromatic bitmaps; color channel mixing support.
- Versatile video input allowing multiple video input channels with multiple input muxing, supporting ITU-R BT.656 (ITU656) or digital RGB video inputs.
- Real-time down-scaling of input video stream.
- Variable video image memory geometry, cropping and positioning.
- Frame grabbing, video input signal synchronization.
- High bandwidth DDR frame buffer memory support.
- FPGA-based A/D, D/A controller employing external analog circuitry.
- Touch sensing, backlight and dimming control.
- Control of embedded peripheral memories over SPI and I²C buses.
- System interfacing over peripheral SPI bus or via USB link from an external USB host.

Applications Support

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LCD-Pro Version Examples

IP Core	Base Enhanced Video Controller Module	Base Plus Graphic Accelerator Module IP Library	Base Plus 2D and Video Module
UltiEVC Video Controller	✓	✓	✓
UltiEMC Memory Controller	✓	✓	✓
UltiADDA A/D, D/A Controller	✓	✓	✓
UltiEBB 2D Graphics Accelerator		✓	✓
UltiVIDIN Video Input			✓
AMBA APB AHB System Bus IP Modules	✓	✓	✓
UltiSPI_M SPI Master	✓	✓	✓
UltiSPI_S SPI Slave	✓	✓	✓

Ordering Information

Product	Ordering Part #
LCD-Pro Evaluation Kit	LFE2-50E-LCDPRO-EVN

LCD-Pro Evaluation Kit Contents

- Carrier Board including 2x CVBS and 1x VGA Video Input Ports
- LatticeECP2-based FPGA Module
- 7" WVGA LCD Color Touch Display
- LCD-Pro Configurator Installation CD
- Video Camera Included
- 12V DC Power Supply
- 1 USB 2.0 Cable
- Adapter for Lattice JTAG Cable

FPGA Module Features

- FPGA: LFE2-50E 5FN484C
- SPI Flash M25P32 - 4Mx8-bit
- DDR Video Memory 64MB (32Mx16-bit)
- Clocking - 48MHz Oscillator
- JTAG Port

Carrier Board

- Analog Circuits for A/D, D/A Converters
- Analog Front-End for Video Input
- USB 2.0 Device Port
- Universal LCD and Touch Screen Connectors
- Expansion Connector
- 3.3V Power Supply
- Display Power Supply

LCD Module

- 7" WVGA 800x480 64K Color TFT
- White LED Backlight
- 4-wire Analog Resistive Touch Screen
- 1²C 256 Byte EEPROM



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