

# Displays

**Design for the largest displays or handheld screens. Convert standard definition (SD) displays to high definition (HD) and back again. Cyclone III FPGAs are ideal for medical imaging, automotive navigation, consumer HDTV, industrial monitors, and much more.**

Your technical creativity can usher in the next generation of displays. But how will you convert your vision for the future into reality? Choose Altera® Cyclone® III FPGAs, with their unprecedented combination of low power, high functionality, and low cost. With Cyclone III FPGAs, you can go to market faster, reduce overall cost, and increase your productivity.



Cyclone III FPGAs—first low-cost FPGAs to meet 1080p HDTV performance requirements.

## The challenges you face

Your customers expect great picture quality on ever larger screens, but small artifacts can turn into big image problems. You can filter those artifacts out, smooth jagged edges, and stop jerky motion, while interfacing with a variety of systems, by building a custom-fit design. Finding an exact-fit ASSP can be challenging, and ASICs have notoriously long and costly development cycles. Product updates to frozen designs are high risk. Technology is moving faster than ever, and you need to keep up with evolving standards. In the end, relying on ASICs and ASSPs could cost your competitive edge and future revenue.

## You need to react fast

In the display market, who knows who your next competitor will be, or what features they will bring to market? You need the flexibility to change your designs—and get to production—fast. Because our devices are reprogrammable, you can update or enhance products quickly. You can also generate a single display platform for a wide array of display sizes and resolutions. You'll get your custom-fit solution while you increase productivity, get to market faster, and lower your development cost.

The Cyclone III family offers features beyond any other low-cost FPGA.

### Cyclone III FPGA highlights

Highlighted Features	Benefits
Abundant memory and multipliers	Efficient frame buffering, HD video line buffering, and image processing
Flexible column driver interface support	Integrated differential buffers, including LVDS, mini-LVDS, reduced swing differential signaling (RSDS), and point-to-point differential signaling (PPDS)
Flexible phase-locked loops (PLLs)	Dynamically reconfigurable frequency and phase shifts to support multiple refresh rates Five outputs per PLL to provide more clock outputs per device Cascadable to reduce jitter Supports 5-MHz to 440-MHz clock frequencies
Autocalibrating external memory interfaces	Easy implementation to support high performance of up to 400 Mbps with easy timing closure for DDR and DDR2

## Design an entire LCD TV system around a flexible, low-cost Cyclone III FPGA

The Cyclone III FPGA is an image enhancement engine that drives a typical liquid crystal display (LCD) interface. To implement the video algorithm function for LCD image enhancement, you can use pre-optimized intellectual property (IP) cores including de-interlacers, scalers, filters, and more from Altera's Video and Image Processing IP Suite. Process input from any video source and output to any LCD panel. Our devices support a wide range of I/O interfaces. They have reconfigurable PLLs for on-the-fly frequency and phase shifts to support changing refresh rates. Leverage a single platform to produce an entire product line.

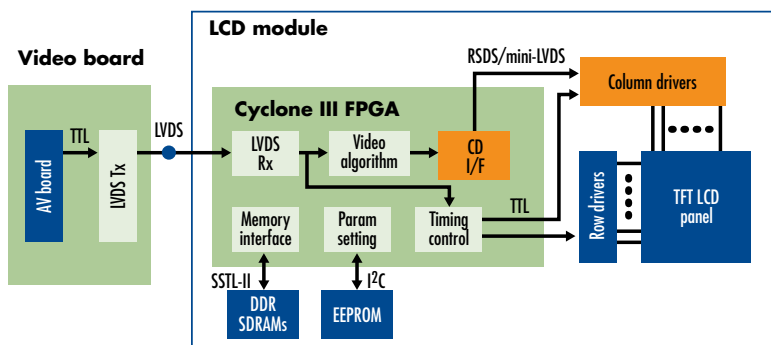
### Altera complete low-cost display solutions at your fingertips:

- Cyclone III FPGAs—optimized for display applications
- Video and Image Processing IP Suite
- Nios® II soft-core embedded processor
- Free Quartus® II Web Edition software
- Application-specific reference designs
- Low-cost development kits
- White papers, including *Cyclone III FPGAs Enable a New Class of LCD HDTVs*

### Altera Video and Image Processing IP Suite offers the following functions

- De-interlacer
- Color space converter
- Scaler
- Alpha blending mixer
- Gamma corrector
- Chroma resampler
- 2D filter
- 2D median filter
- Line buffer compiler

### LCD TV interface



Find out how you can enhance your image by using Cyclone III FPGAs today.

## Unlimited possibilities.

[www.altera.com/cyclone3-markets](http://www.altera.com/cyclone3-markets)

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