



Meeting power, functionality, and cost requirements

## Broadcast video and image processing

Video and image processing applications increasingly require substantial data processing and sustained data integrity across a variety of electronic systems. There is also the added challenge of keeping pace with continually evolving standards and competitive price pressures.

Altera® Cyclone® V FPGA families provide a solution to these challenges by providing unparalleled combination of high functionality, low system cost, and the lowest power of any 28-nm FPGA. In addition, you receive the benefit of enhanced integrated transceivers and hard memory controllers for digital signal processing (DSP)-intensive applications. With our devices, you'll reduce overall systems cost, improve performance, and increase your productivity—all of which will give you an edge in this fast-moving market.



Cyclone V FPGAs deliver an unparalleled combination of high functionality, low system cost, and the lowest power of any 28-nm FPGA.



The Cyclone V family offers video and image processing features beyond any other low-cost FPGA.

### Design challenges

Your customers demand higher resolution images and faster access to video and image data, which has led to major advancements in image capture, compression techniques such as H.264, and video intelligence. As real-time processing bandwidth requirements accelerate, standards are rapidly changing. The off-the-shelf technology you've relied upon is no longer an ideal fit—you need a more scalable solution that delivers high-quality images at a low cost.

### An innovative solution

Cyclone V FPGAs deliver a unique, low-cost architecture with abundant logic, memory, and variable precision DSP resources—a great alternative to ASICs and ASSPs. You can now respond quickly to market shifts and new standards with devices that are optimized for image-processing applications.

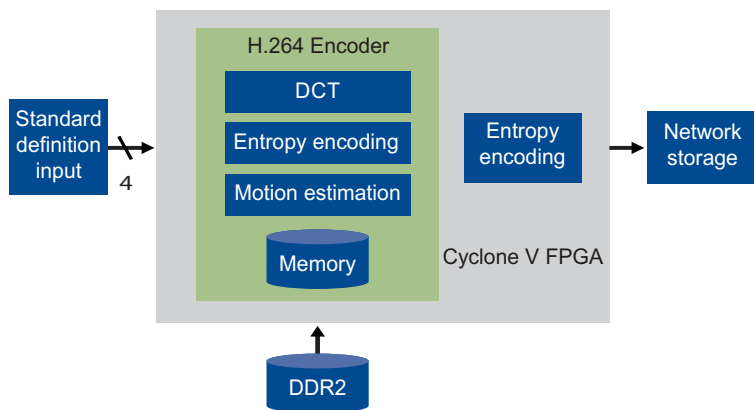
By replacing multiple ASICs, ASSPs, or DSP devices, Cyclone V FPGAs enable you to reduce cost, power consumption, and board space while also providing the flexibility to respond to unexpected market requirements. The improved functionality on these devices also allows you to easily implement H.264 encoding, giving you the performance you need at great value.

Our newest Cyclone devices, Cyclone V FPGAs, are optimized for high-throughput video, image, and audio processing. The variant provides 25K to 301K logic elements (LEs) with 28-nm variable-precision DSP blocks. Compared with competitive devices on the market, Cyclone V FPGAs deliver—ideal for broadcast system designs.

### Cyclone V FPGA highlights

| Highlighted features                         | Benefits   |
|--|--|
| Embedded memory                              | Up to 11.6 Mbit of embedded RAM, ideal for video frame buffering   |
| DSP multipliers                              | Up to 684 embedded 18x19 multipliers at up to 310 MHz to process DSP-interactive video algorithms                        |
| I/O bandwidth                                | Up to 840-Mbps LVDS I/O performance with dynamic phase alignment (DPA) and transceivers capable of 3G SDI                |
| Autocalibrating external memory interfaces   | Easy implementation to support high performance of up to 800 Mbps with easy timing closure for DDR3                      |
| Video and Image Processing Suite of IP cores | Pre-optimized video and image intellectual property (IP) cores and video debug infrastructure to increase productivity   |
| Nios® II embedded soft processor             | Versatile soft-core processor, ideal for implementing a low-cost microcontroller   |
| Free Quartus® II Web Edition software        | Industry-leading software for performance and productivity, with a power-aware design flow to minimize power consumption |

## Four-channel H.264 baseline encoder



By using IP available from Altera and our partners, you have the capability to design a four-channel H.264 encoder in a single Cyclone V FPGA. This allows you to meet your cost and performance requirements and eliminates the need to use multiple DSP devices or ASSPs to implement multiple channels.

We have optimized Cyclone V FPGAs with the right mix of on-chip memory, embedded multipliers, and logic to perform DSP-intensive video algorithms at a lower cost and in a smaller footprint than alternative solutions. For example, you can perform digital cosine transform (DCT), entropy encoding, and motion estimation algorithms in the H.264 encoder.

You can also use Altera's video over IP reference design in the same device to transport compressed video over IP through a network. These FPGAs also support multiple external memory interfaces such as DDR2 and DDR3 for data buffering.

## Want to dig deeper?

For more information about how our Cyclone V FPGAs can support your broadcast video and image processing design requirements, contact your local Altera FAE or sales representative, or visit [www.altera.com/broadcast](http://www.altera.com/broadcast).

## Altera's complete low-cost video and image processing solutions at your fingertips

- Cyclone V FPGAs—optimized for video and image processing applications
- Video and Image Processing Suite of IP cores
- Strong ecosystem of partnerships for leading-edge video and image-processing solutions
- Nios II soft-core embedded processor
- Free Quartus II Web Edition software
- Application-specific reference designs such as 4K, multi-screen, and format conversion
- Low-cost development kits
- White papers

## Altera Video and Image Processing Suite of IP cores

- De-interlacer
- Color space converter
- Scaler
- Alpha blending mixer
- Gamma corrector
- Chroma resampler
- 2D filter
- 2D median filter
- Line buffer compiler
- Plus more than 10 other IP cores

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