Video and image processing solutions for military applications

Designing next-generation electro-optical/infrared (EO/IR) systems calls for complex, real-time video processing and a low power budget. Altera offers low-power, low-cost FPGA families—with inherently parallel digital signal processing (DSP) blocks and plenty of embedded memory blocks, registers, and high-speed memory interfaces—that are ideal for meeting these requirements. To complement the FPGAs, we also provide video design solutions that can significantly increase your productivity.

A typical EO/IR sensor processing signal chain
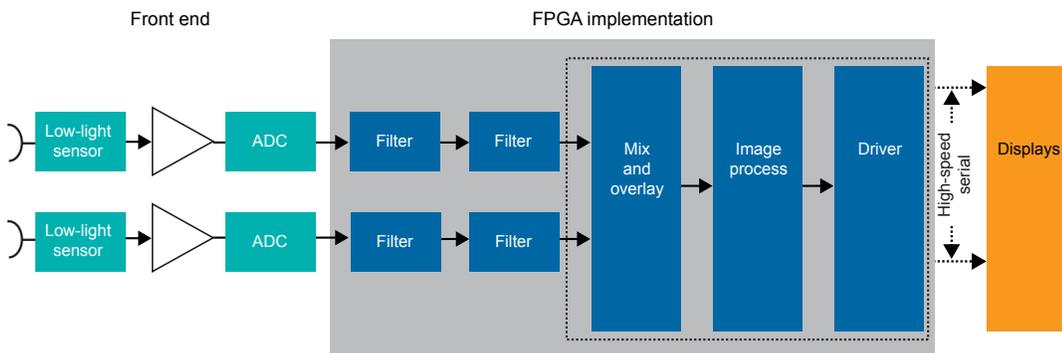
A streaming interface connects the different video blocks that implement specific video-processing functions, while a system-level design tool ties together the functions.

FPGAs equipped for high-performance video processing

Our Cyclone® III FPGAs provide power, cost, and performance levels suited to EO/IR applications, from night vision to thermal imaging and head-mounted/avionics displays. Built on TSMC's 65-nm and 60-nm low power (LP) process technology, Cyclone III devices feature a logic-, memory-, and DSP-rich architecture that helps you improve system integration. Our new Cyclone III LS variant offers 200K logic elements for less than ¼ Watt in the smallest footprint. The FPGA is equipped with security features including 256-bit volatile Advanced Encryption Security (AES) bitstream encryption, anti-tamper capabilities, and information assurance through design separation.

Our 40-nm Arria® II GX FPGAs provide a low-power, cost-effective FPGA family with integrated transceivers up to 3.75 Gbps. Supporting a variety of protocols and easy to use, Arria II GX FPGAs enable you to achieve 20 Gbps of bandwidth at less than 3 Watts.

Both the Cyclone III and Arria II GX FPGA families are part of the Altera® Enhanced COTS PLD Initiative, which spearheads the development of commercial off-the-shelf (COTS) programmable logic device (PLD) solutions that overcome extraordinary military and aerospace challenges beyond baseline DoD requirements.
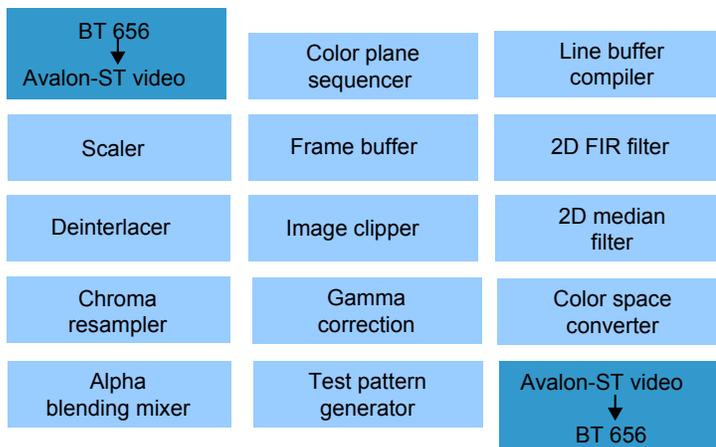
Key Cyclone III FPGA features

18x18 multipliers	Up to 396
Memory	Up to 8.2 Mbits of embedded RAM
Logic	Up to 198K LEs

Key Arria II GX FPGA features

18x18 multipliers	Up to 736
Memory	Up to 950 blocks of 9K RAM
Logic	Up to 256K LEs

Video and Image Processing Suite

BT 656 ↓ **Avalon-ST video**	Color plane sequencer	Line buffer compiler
Scaler	Frame buffer	2D FIR filter
Deinterlacer	Image clipper	2D median filter
Chroma resampler	Gamma correction	Color space converter
Alpha blending mixer	Test pattern generator	**Avalon-ST video** ↓ **BT 656**

Altera's Video and Image Processing Suite is a collection of intellectual property (IP) cores that facilitate development of custom video and image processing designs.

Intellectual property cores streamline design process

Altera and our partners have developed a variety of reference designs using our Video and Image Processing (VIP) Suite IP cores, along with some custom cores that can help you get off the ground quickly with your design.

All of these cores are pre-tested and verified, and use an open, low-overhead Avalon® Streaming (Avalon-ST) video interface that allows them to be easily connected into a video signal chain. The Avalon-ST interface defines how any type of video data can be broken down into packets of video data and packets of control data.

A standard slave interface called Avalon Memory-Mapped (Avalon-MM) enables two-way communication between a video block and an on-chip processor. With this interface, the processor can program the video function, and the function can notify the processor of exceptional events.

Tools simplify and accelerate design process

With our SOPC Builder system integration tool, you can automatically generate arbitration and control logic to quickly build your video systems. The tool, a feature of our Quartus® II design software, simplifies embedded system design with Altera's library of soft core processors, interfaces, memory, bridge and DSP IP cores, as well as other elements.

Development kits for video and imaging applications

- Cyclone III Video and Image Processing Development Kit: Available from Bitec, this kit helps you get started in developing complex video applications. It supports various video I/O interfaces and includes several daughtercards.
- Arria II GX FPGA Development Kit: This new kit provides a full-featured hardware development platform for prototyping and testing high-speed serial interfaces to an Arria II GX FPGA.

Want to dig deeper?

For more information about how Altera's video and image processing solutions can support your EO/IR applications, contact your local Altera sales representative or FAE, or visit: **www.altera.com/military**.