



Minimizes Cost, Power, and Integrates Higher Bandwidth

## Robust Image Format Conversion Solutions

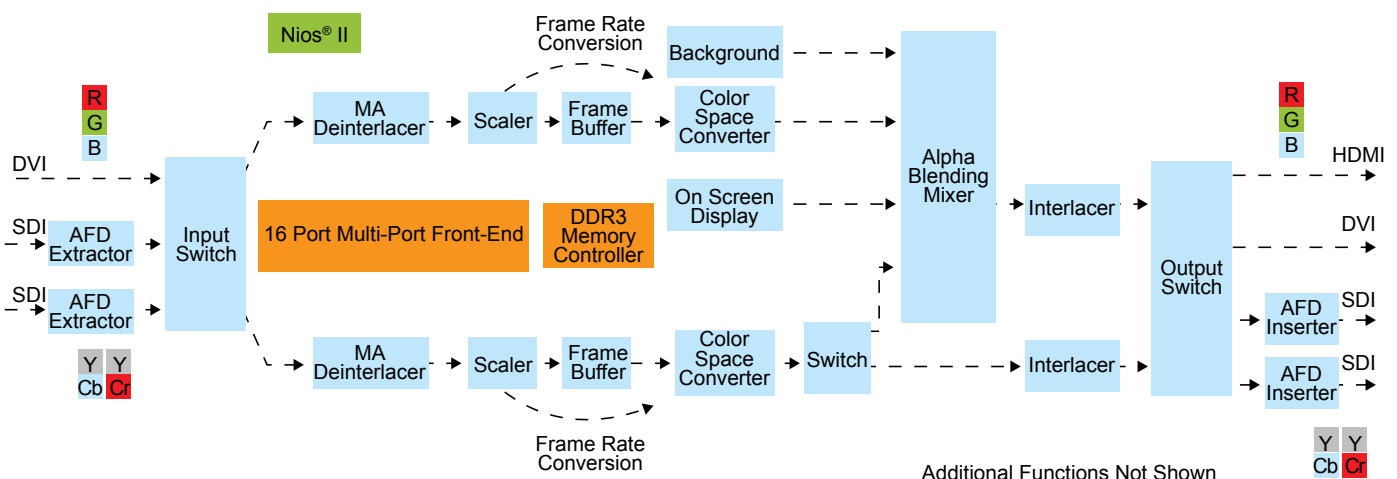
Ever-changing video formats and endless customizations for product differentiation means cross-conversion designs are becoming essential to many broadcast systems. Image format conversion is a commonly used function in various broadcast infrastructure systems, such as servers, switchers, head-end encoders, and specialty studio displays. The need for image format conversion is driven by the multitude of input image formats and interfaces that must be converted to high definition (HD) or a different resolution before they can be stored, encoded, or displayed.

Altera's 28-nm Arria® V FPGAs help you minimize cost, minimize power, and increase bandwidth, while enabling you to adjust to shifting market demands.

### Altera's Image Format Conversion Design

Altera's image format conversion design delivers four-channel, high-quality up-, down-, and cross-conversion of standard-definition (SD) and HD video streams in interlaced or progressive format, with on-screen display (OSD) and support for active format descriptions. The design takes in video over a serial digital interface (SDI) or digital visual interface (DVI) which can handle SD, HD, or 3G-SDI formats. The converted image is mixed and displayed over user-selectable output such as SDI, DVI, or high-definition multimedia interface (HDMI). The design uses Altera's SDI and video and image processing intellectual property (IP) cores.

Figure 1: Format Conversion Reference Design



## Four-Channel Up-, Down-, and Cross-Conversion Design Features

- Four-channel up-, down-, and cross-conversion: polyphase scaling, motion adaptive deinterlacing, mixing, and frame-rate conversion for resolutions up to 1080p
- SDI and DVI input support for interlaced and progressive formats
- SDI, DVI, and HDMI output support for interlaced and progressive formats
- Mixer to allow multiviewer
- OSD for logos and text overlay
- Active format description extraction and insertion
- Software configurable to speed up design cycles
- High-speed DDR3 memory interfaces
- Demonstration on Stratix® IV GX FPGA Audio Video development kit

**Table 1: Target Device and Resource Counts for Four Channel Up Down Cross Conversion Design**

FPGA Resource	Arria II GX FPGAs (40 nm)	Arria V FPGAs (28 nm)
Target device	2AGX190	5AGXA3
Logic elements (LEs)	190K	150K
Total memory (Mb)	9.9	10.4
Maximum 18x18 multipliers	656	792
Maximum transceiver channels	16	12
Maximum memory bandwidth with symmetric interfaces	51.2 Gbps (soft controller)	136.4 Gbps (hard controller)
PCIe® hard IP support	Up to Gen 1x8	Up to Gen 2x4
Capture card total power consumption	10.8 watts	5.8 watts

## Want to Dig Deeper?

Learn more about Altera's four-channel up-, down-, and cross-conversion design by meeting with your local Altera sales representative or FAE, or visiting [www.altera.com/end-markets/broadcast/1080p/bro-1080p.html](http://www.altera.com/end-markets/broadcast/1080p/bro-1080p.html).

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