Crucial IP

Silicon IP for video and display processing

VSC-4KU Silicon IP Core

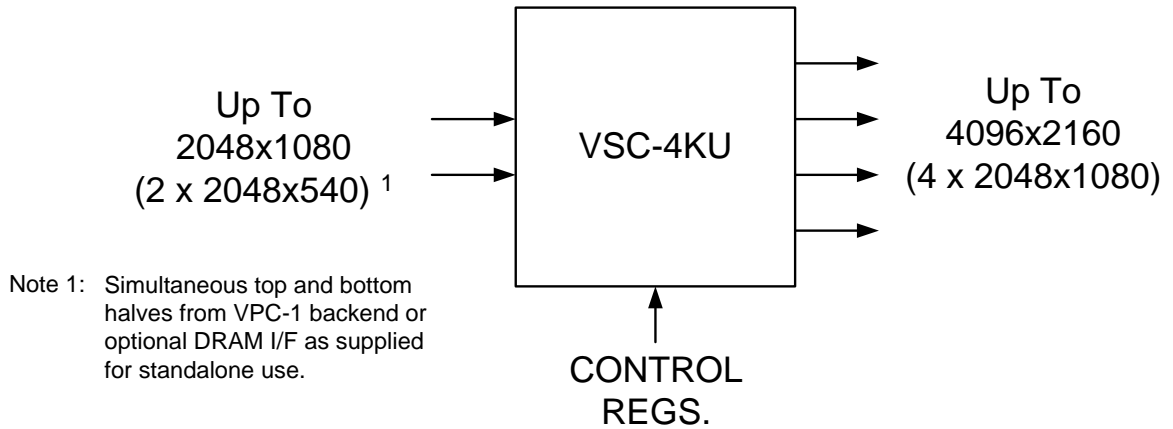## Video Scaler with Up Conversion to 4K

Overview

The VSC-4KU is a high quality polyphase scaler for up converting standard definition and high definition video signals to 4K resolution. 4K quadrant based format as used with Quad 3G-SDI links, as well as side-by-side format used with DisplayPort 1.2, are both supported. Pixels at the boundaries between tiles are processed correctly such that no seams are ever visible. The scaler may be used in conjunction with the VPC-1 Video Processor and Deinterlacer IP core or with any other customer or third party IP. Support for any scale factor allows full screen display of any input as well as arbitrary resizing for PIP and multiviewer applications. In addition, the core includes a number of Verilog parameters that allow it to be tailored at build time to satisfy specific requirements. Flexibility and robust design combine to make the VSC-4KU ideal for both consumer electronic and broadcast applications.

The VSC-4KU is available with complete Verilog source code, Verilog test bench and bit-accurate C models as part of the license. Integration and programming guidelines are also included backed up by expert technical support.
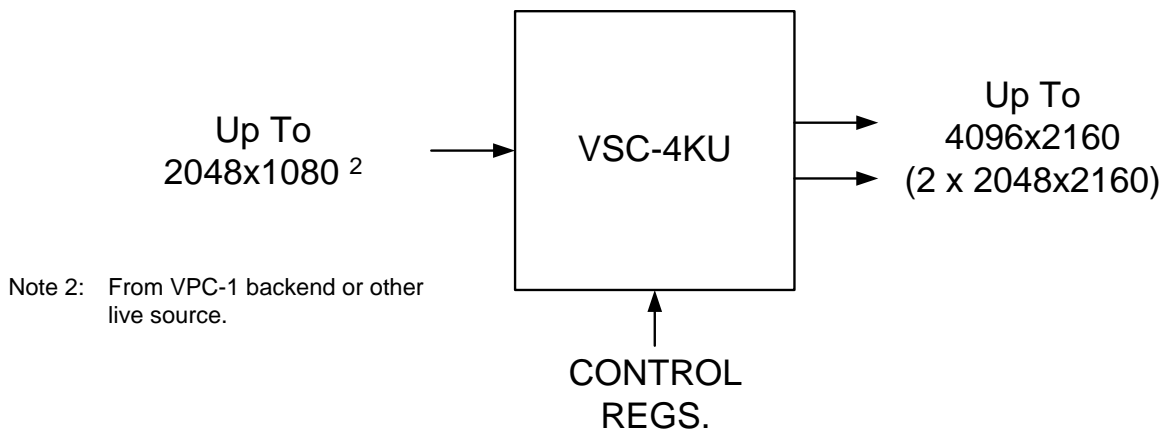
A VSC-4KU reference design is available for standard development kits from Xilinx and Altera for demonstration and evaluation purposes. The design includes a built-in user interface with embedded OSD to simplify access to key features of the IP. In addition to simplifying the evaluation of the VSC-4KU IP core, the design also serves as a template for customer application development.

Features

- **General**
  - Any input <= 2048x1080p scaled to any output <= 4096x2160p
  - Supports both quadrant based format (Quad 3G-SDI) and side-by-side format (DisplayPort 1.2)
  - High quality polyphase scaling
  - Invisible seams between tiles
  - Dynamic resizing and aspect ratio conversion (ARC) without artifacts
  - Selective crop and zoom (Ultra Zoom)
  - Supports all frame rates up to 60 Hz
  - 8/10/12-bit 4:2:2 or 4:4:4 processing
  - Seamless interface to VPC-1 deinterlacer back-end (no additional pass through DRAM required)
- **Programmability**
  - Dynamically loadable coefficients for flexible image quality
  - Optional image sharpening
- **Build Time Options**
  - 4:2:2 or 4:4:4 data path
  - 8, 10 or 12-bit data path precision
  - Number of taps, number of phases, coefficient precision
  - Quadrant based or side-by-side format
- **Compatibility**
  - Support for both Xilinx and Altera devices

Up To
2048x1080
(2 x 2048x540) [1]

VSC-4KU

Up To
4096x2160
(4 x 2048x1080)

CONTROL
REGS.

Note 1: Simultaneous top and bottom halves from VPC-1 backend or optional DRAM I/F as supplied for standalone use.

Fig.1   VSC-4KU (Quadrant Mode)

Up To
2048x1080 [2]

VSC-4KU

Up To
4096x2160
(2 x 2048x2160)

CONTROL
REGS.

Note 2: From VPC-1 backend or other live source.

Fig.2   VSC-4KU (Side-by-Side Mode)

Design Deliverables

The following deliverables are included with the license:

- Synthesizable Verilog RTL source code (encrypted or unencrypted as per license agreement)
- Verilog testbench
- Bit-accurate C model
- Verification test suite
- Product documentation
- Integration guidelines
- Integration support