

USB3 Vision IP Core

USB3 VISION IP CORE FOR FPGA

AT A GLANCE

- Compatible with Xilinx 7 Series (and higher) and Intel Cyclone V devices (and higher)
- Compact, customizable
- Delivered with a working reference design

USB3 Vision is a standard communication protocol for vision applications based on the widely used USB 3.0 interface. As the protocol is standard and supports GenICam, it allows easy interfacing between cameras and PCs. Sensor to Image offers a set of IP cores and a development framework to build FPGA-based products using the USB3 Vision interface. Due to the speed of USB3 Vision, senders and receivers require a fast FPGA-based implementation of the embedded USB core. USB3 Vision cores compatible with Xilinx 7 Series devices (and higher) and Intel Cyclone V devices (and higher).

Working Reference Design

Sensor to Image USB3 Vision FPGA solution is delivered as a working reference design along with FPGA IP cores. This minimizes development time and allows for top-notch performance at a small footprint, while leaving enough flexibility to customize the design. Sensor to Image cores are compact and leave enough space in the FPGA for your application.

Top Level Design

The first component of the IP Core is the Top Level Design. It is an interface between external hardware (imager, sensors, USB3 PHY) and FPGA internal data processing. We deliver this module as VHDL source code and it can be adapted to custom hardware.

Video Acquisition Module

The Video Acquisition Module of the reference design simulates a camera with a test pattern generator. This module is delivered as VHDL source code, which is easily replaced by a sensor interface and pixel processing logic in the camera design.

USB3 Vision Streaming Protocol Packet Composer

The USB3 Vision Streaming Protocol Packet Composer takes all data from the video source and builds the USB3 Vision streaming packets. It also handles all low-level communication to the USB3 PHY.

Framebuffer Core

The Framebuffer core interfaces to the FPGA vendor specific memory controller. The framebuffer is used for

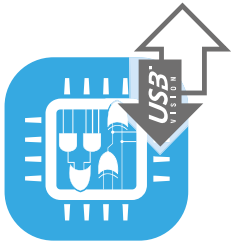
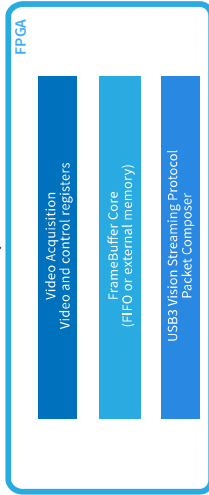


IMAGE SENSOR



Cypress FX3: ARM CPU USB3 control protocol
Cypress FX3: USB3 PHY

leveling out communication delays between camera and PC.
This system is used as a reference design and evaluation board. The reference design uses the Xilinx or Intel development tools (not in the scope of delivery).

A Cypress FX3 chip (with integrated ARM CPU and physical interface) is used to handle all USB3 initialization routines and USB3 Vision control channel communication.
Sensor to Image MVDK development kit allows flexible evaluation platform for machine vision applications. It supports USB3 Vision device designs and various Encustera™ FPGA modules with Intel and Xilinx FPGAs.



USB3 interface board

AVAILABLE MODULES

MODULE	DESCRIPTION	ARTIX-7	ZYNQ-7	CYCLONE-5
Video acquisition interface	Simple CMOS imager interface or test pattern generator	•	•	•
FB-FIFO Encrypted VHDL VHDL source code	BlockRAM based streaming buffer	•	•	•
FB-AXI encrypted VHDL	External memory based streaming buffer, uses Xilinx or Intel-AXI memory controller	•	•	•
USB3 Vision Packet composer	USB3 Vision streaming protocol packet composer	•	•	•
FX3 USB3 Vision application sources	USB3 Vision user application	•	•	•
FX3 USB3 Vision library Object file C source code	USB3 Vision control protocol library	•	•	•

RESOURCE USAGE

MODULE	ARTIX-7	ZYNQ-7	CYCLONE-5
Top Level and Video acquisition interface - Test pattern generator			
Registers	622	623	679
Lookup Tables	381	424	551
BlockRAMs	0	0	0
CPU System - iBlaze/ARM/NIOS based CPU system with AXI memory controller			
Registers	7642	1897	3523
Lookup Tables	8864	1564	3341
BlockRAMs	6	1	49
DSP	3	0	3
FB-FIFO - BlockRAM based streaming buffer (64KB)			
Registers	1832	1890	2038
Lookup Tables	811	808	1077
BlockRAMs	16	16	64
DSP	5	5	4
FB-AXI - External memory based streaming buffer, uses Xilinx or Intel AXI memory controller			
Registers	4360	4326	4615
Lookup Tables	3296	3284	3167
BlockRAMs	6	6	15
USB3 Vision Packet composer - USB3 Vision streaming protocol packet composer			
Registers	2743	2727	2936
Lookup Tables	2127	2117	2386
BlockRAMs	1	1	4

USB3 VISION HOST SOFTWARE

SOFTWARE MODULE	WIN7	WIN10	LINUX	MAC OS
USB3 Vision driver No sources C-sources	•	•	•	•
USB3 Vision library Object file C-sources	•	•	•	•
USB3 Vision Sphinx Viewer application C-sources	•	•	•	•

LEGEND

Included
Optional
Please contact us