

PC_EYE/JPG

16-Channel PCI Express Frame Grabber for Security Applications

16 Analog Camera Inputs

- On-Board hardware JPEG compression for 16 channels
- PCI Express high-performance bus interface
- Multiple DMA engines for video (4), JPEG (16)
- For 16 low-cost color cameras

→ preliminary

III Main Features

- Frame grabber for security applications
- Acquires data from analog color cameras
- 16 Parallel inputs with individual ADCs
- On-board scaling circuit 1:1 to 1:8
- Real-time acquisition of images or image sequences directly into main memory
- Image memory formats include monochrome with 8 or colour with 16/32 bits/pixel
- 4-Channel DMA for up to 4 uncompressed image streams
- 16-channel JPEG compression (opt.) with DMA support
- PCI Express x1 interface with 250 MB/s bandwidth

III Technical Details

The PC_EYE/JPG is intended for security applications where video images from up to 16 color cameras are acquired into a PC's main memory for storage or into the graphics board for display. Data is acquired in compressed or in raw format.

An on-board scaling unit can transform full-resolution images to CIF size of smaller for efficient display in split screen applications.

Images are transferred by up to 16 DMA controllers. Image format can be

selected to be luminance / chrominance-separated for optimum video detection or to be RGB for display.

Camera Signals

The frame grabber board interfaces to standard composite video (CVBS) color cameras, conforming to PAL (NTSC / SECAM) standards.

All camera signals are routed to four on-board header-connector with 10 pins each, intended for connection to a separate I/O panel with 4 BNC connectors each, e.g.

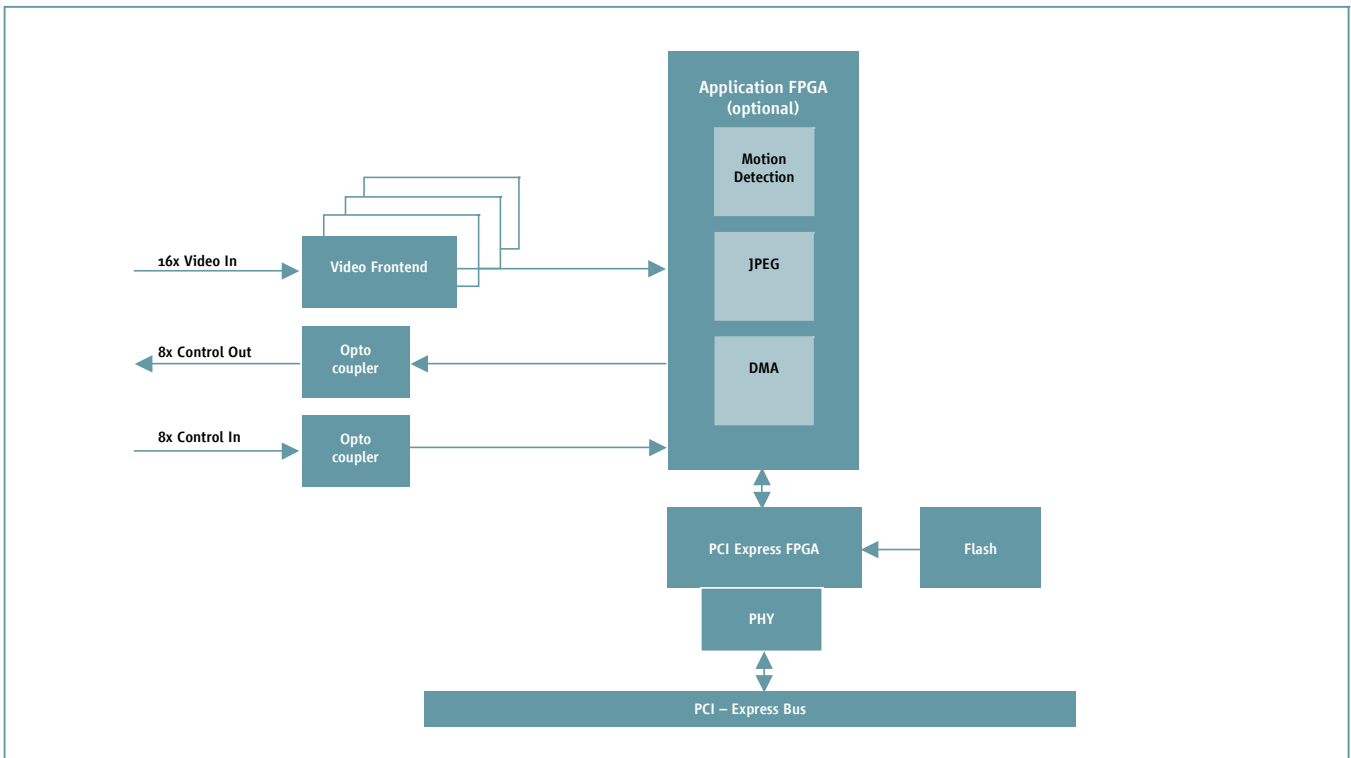
ADCs

There are 16 analog-to-digital converters (ADCs) where up to 16 cameras can be connected to. Each camera has its own ADC (SAA 7113-type) as well as its own color separator. This makes it possible to switch cameras in the digital domain, minimizing multiplex times: Since the analog input is not switched, there is no PLL settling delay, which can take up to several frame times in other multiplexing schemes.

The clock used for acquisition (13.5 MHz) is generated in the ADC chip. It is phase-locked to the horizontal sync.

JPEG Encoder Option

The optional JPEG encoder can encode 16 color video streams in real-time,



resulting in full-resolution and full-rate motion JPEG films. JPEG is the preferred coding scheme for applications using multiplexed camera data, where inter-frame coding, such as MPEG, is not applicable and where each video frame must have the same video quality. Each video field is encoded separately.

Scaler

An FPGA-based scaler can be used to reduce video data by line / pixel dropping over original pixels in blocks of 1*1, 2*2, 4*4, or 8*8. By using two DMA channels for storing the same video stream, simultaneous storage of scaled and non-scaled data is possible.

Fifo

A fifo associated with every DMA channel provides buffer space (256 B for JPEG, resp. 1 kB for uncompressed data) to ensure uninterrupted acquisition even in situations with high PCI bus loads.

DMA Controllers

In the last step, image data is transmitted by DMA directly into main memory. These DMA controllers consist actually of forty independent controllers, capable of transferring data streams into memory.

There are 16 controllers for JPEG video data, four transmit uncompressed video data (sufficient bandwidth on PCI Express provided).

Bus	PCI Express Rev. 1.1
width	X1 (single lane)
speed	2.5 Gbps
bandwidth	250 Mbytes/s max., 170 MB/s typ.

Pixel Packing Modes

To support different cameras and applications, there are several modes of storing pixel data in memory:

Mode	Memory storage
Mono8	One monochrome image, byte-aligned
Y:U:V	YUV/YCbCr components are stored in 4:4:4, 4:2:2, or 4:1:1 mode
RGB	RGB24 uses 24 bits for each RGB pixel, RGB32 uses one zero-filled 32-bit word.

PC_EYE/JPG Software

Software for the PC_EYE/JPG is available for Windows and for Linux in different forms:

Under Windows, the EL-Interface library covers standard frame grabber settings. In addition, it can acquire sequences of images.

Region-of-interest adjustment, camera selection, scaling, color format conversion, and camera setup files are supported. Permanent (live), single-shot, and double-buffered acquisition of images can be requested and the status of the acquisition (active / finished) can be inquired.

Memory allocation for image buffers is also handled by the DLL at runtime; frame buffers appear in linear memory for easy addressing.

A setup program supports test and configuration of the board. Display routines using the DirectDraw standard are supplied in source. This software level is intended for users who already have their own software support available, such as image processing libraries, or wish to create application programs by themselves.

Under Windows, there is the possibility to acquire JPEG-compressed data into memory. Here it is available for further processing.

For Linux, ELTEC offers a security-oriented library, optimized for fast input switching and handling many cameras. This library supports a linked-list approach to acquire image sequences from varying cameras, each one with their own setup parameters, such as brightness.

Under Linux, there is the possibility to acquire JPEG-compressed data into memory (each video field is encoded separately). Here it is available for further processing.

Cameras Supported

All standard color and monochrome video camera are supported in hardware and software. The video standards PAL, NTSC, and SECAM can be used.

High-Level Software

ELTEC uses the PC_EYE/JPG board in its own product EL_MODEC, where it is utilized for motion detection and for transmission of compressed video images over Ethernet networks.

GERMANY**FRANCE****USA****UK****ELTEC Elektronik AG**

Galileo-Galilei-Strasse 11
55129 Mainz
PO Box 10 03 64
55134 Mainz

Fon +49 6131 918 100
Fax +49 6131 918 195
Email info@eltec.com
www eltec.com

ELTEC International SARL

1, Allée des Garays
91872 Palaiseau
France

Fon +33 1 64 47 18 77
Fax +33 1 64 47 09 33
Email info.fr@eltec-france.fr
www eltec-france.fr

American ELTEC, Inc.

2401 Windjammer Way
Las Vegas, Nevada 89107
USA

Fon +1 702 878 40 85
Fax +1 702 878 47 35
Email info.us@eltec.com
www americaneltec.com

ELTEC International PLC

Unit 32, Stratford Office Village
Wolverton Mill
Milton Keynes MK12 5NS
United Kingdom

Fon +44 1908 32 00 55
Fax +44 1908 31 01 07
Email info.uk@eltec.com
www eltec.com

III Specifications

Connectors

- 16 * CVBS video + Gnd, 1 Vpp, 75 Ohm, 4 on front panel BNC, 12 or all 16 on separate front panels with BNC
- Digital inputs (8), opto-coupled, 0..30V, threshold 2V. Routed via adapter board with screw terminals (on request)
- Digital outputs (8), opto-coupled, collector-emitter, 100 mA max. Routed via adapter board with screw terminals
- 2-Line I2C bus

Environmental Conditions

- Storage Temperature: -20 °C - 70 °C
- Operating Temperature: 0 °C - 45 °C (2 m/s forced air cooling)
- Maximum Operating Humidity: 85 % relative

Power Requirements

- 2.5 A max. at 3.3 V,
- 1.0 A max. at 12 V,
- 0.5 A max. at 5.0 V
- routed through PCI Express connector with additional floppy power supply connector.

MTBF

- T.b.d. hrs (computed after MIL-HDBK-217F)

PCI bus

- PCI Express compliant x1

Documentation

- Free Internet

Please contact your local sales office for detailed information.

