

# P3I\_ASYNC

## 4-Channel PCI Frame Grabber for Simultaneous Monochrome Analog Cameras

Four Grabbers in one

- Quadro acquisition
- PCI performance
- p3i\_ASYNC/F with additional Fifo and 40-MHz ADCs

→ Includes p3i\_ASYNC/F

### III Main Features

- Frame grabber for 4 simultaneous monochrome channels
- Digitizes four parallel, separate images from non-synchronized or synchronized cameras.
- Trigger inputs
- On-board sync generator
- Restart cameras supported
- Real-time acquisition of images or image sequences directly into main memory
- Image memory format: monochrome with 8 bits/pixel
- PCI 2.2 compliant

### III Technical Details

The p3i\_ASYNC is intended for four monochrome cameras (quadro mode). In quadro mode, the four images are stored in separate memory regions as separate monochrome images. The cameras (same type) do not have to be synchronized for this operating mode but must be used with the same number of pixels.

The region of interest, i.e. the part of the video information that is acquired, can be defined on a pixel basis for all 4 video inputs with the same values - not always the full frame has to be acquired.

### Pixel Clock Generation

The clock used to digitize all four channels is generated either by an on-board PLL, synchronized to the horizontal camera sync with a pixel jitter of  $\leq 7$  ns or it is taken directly from the pixel clock input for camera-synchronous digitization.

### Analog-Digital Converter / Multiplexer

The four independent A/D converters digitize data each with 8 bits resolution at rates between 5 and 30 MHz (40 MHz on p3i\_ASYNC/F). Each ADC can sample data from 4 input ports.

### Trigger Processing

The p3i\_ASYNC has opto-isolated trigger inputs with additional outputs used to trigger cameras. Strobe lights can also be triggered by the trigger inputs.

### DMA Controller

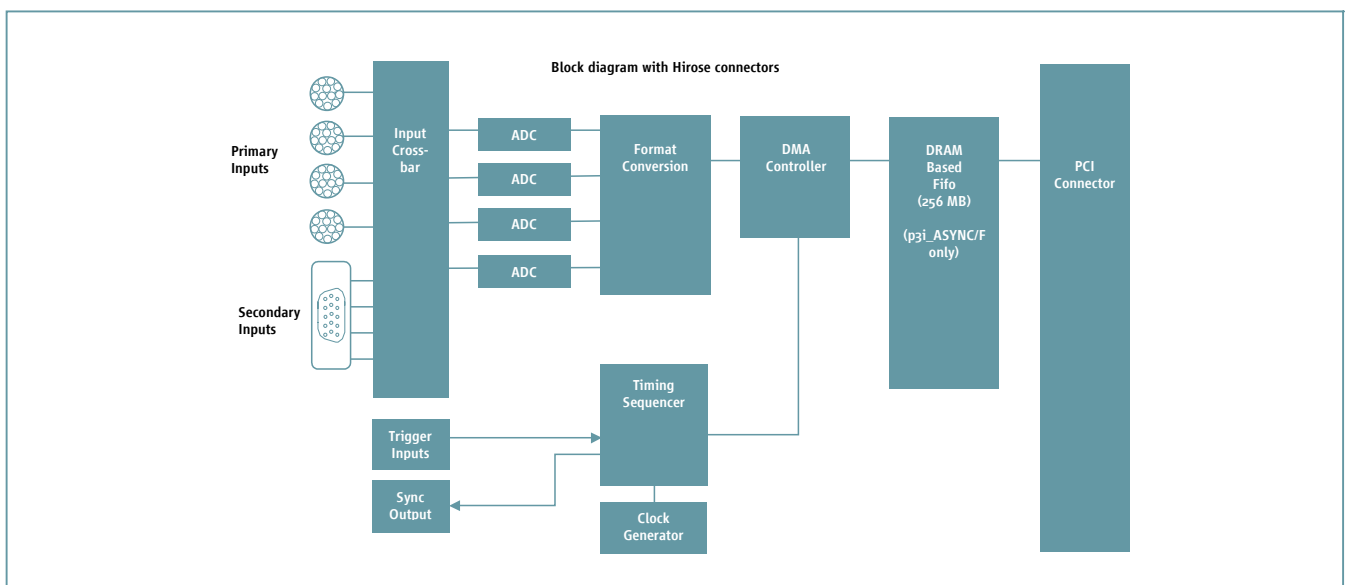
In the last step image data is transmitted by DMA directly into main memory or into the graphics card.

Bus	PCI / Rev 2.2
width	32 bits
speed	33 MHz
Usable bandwidth (p3i_ASYNC)	40..60 MB/s (typ.)
Usable bandwidth (p3i_ASYNC/F)	> 80 MHz (typ.)

This DMA controller consists actually of four independent controllers, capable of transferring four video data streams into four independent memory regions.

### Extended FIFO option on p3i\_ASYNC/F

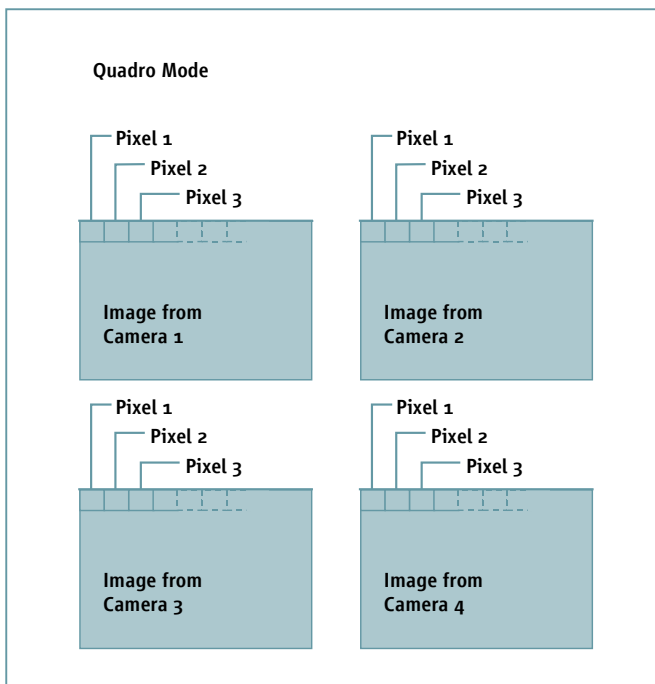
For applications with high bandwidth requirements there is the version p3i\_ASYNC/F with a DRAM-based Fifo. It has an additional SO-DIMM memory with DDR chips and with a capacity of 256 MB. So, no image data is lost even when the PCI bus is not available for more than a second. The maximum practical bandwidth of the PCI can be utilized in this way.



Additionally, this version is equipped with ADC that can run at 40 MHz for a video bandwidth of up to 20 MHz. All other features of the p3i\_ASYNC are unchanged.

### Pixel Packing Modes

Pixels are always stored in memory in four separate regions as four different monochrome images.. Each image consists of adjacent byte values.



### Frame Grabber Basic Tools

Drivers for Windows come in the form of a DLL for Windows 98/ME/NT/2000/XP. Setup of the ADC, offset/gain, region-of-interest adjustment, camera selection, 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 under Windows 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.

Frame Grabber Basic Tools is available for Windows 98/ME/NT/2000/XP and for Linux. For the real-time operating systems VxWorks and OS-9 there is a reduced version (available on request), where parameters are set in configuration files only and where no display routines are included.

### Cameras Supported

Cameras with reset/restart features are supported, as well as pixel clock input to the frame grabber for sub-pixel accuracy.

Camera	Features supported
Generic	Free-running
Generic CCIR625	Free-running
Generic EIA	Free-running
Sony XC-55	Full frame, Interlaced, Restart, Long time exp., E-Donpisha II
Sony 003 P	Restart
Sony XC-ST50CE	t.b.d.
Sony XC-ST70CE	t.b.d., Full frame, Donpisha
Sony XC 8500	Dual, Restart
Teli 3910	Full frame, fixed, RTS pulsed Megapixel
JAI M-10 RS	Dual, Full frame, Restart
JAI M50	Restart
JAI M70	Full frame, Restart
JAI M1	Free-running
JAI A11	Full frame, Restart
JAI A50/A60	Interlaced, Restart

### High-Level Software

Support for several 3rd-party imaging tools is available under Windows:

AdOculus (The Imaging Source) is a tool for visual image processing algorithm development. All of the basic algorithms are supplied in source form for easy modification and expansion.

Heurisko (Aeon Verlag+Studio) is a tool for development of highly optimized imaging algorithms using a C-like scripting language.

Halcon (MVTec) is a very complete tool set with an integrated scripting language.

The freeware imaging library IPL98 has been tested to work; there is a demo source, showing how to use it.

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### III Specifications

#### ADC

→ 8-bit, 30 MHz, 4 channels parallel (40 MHz on p3i\_ASYNC/F)

#### Connectors

- 4 \* 12-pin Hirose + 1 \* DB 15 (for triggers)
- 4 \* 12V-camera supplies
- 12 \* sync/restart outputs (75 Ohm)
- 4 Pixel clock input (TTL, 75 Ohm)
- 4 \* Trigger input (TTL)

#### 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

- 0.55A max., 0.5A typ. at + 5 VDC ± 5 %
- 0.2A max., 0.18A typ. at + 12 VDC ± 5 %
- 3A max. total, 12V for camera supply
- 1.1A max. for each of the 4 camera supply outputs

#### PCI bus Requirements

- PCI 2.2 compliant
- Graphics board should be connected to AGP, rather than to PCI
- Maximum bus load generated by other boards: <20 MB/s for 100µs max.

#### MTBF

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

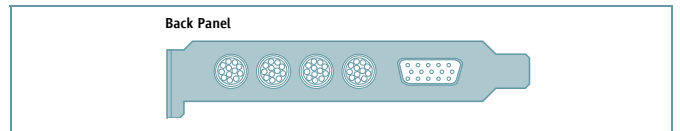
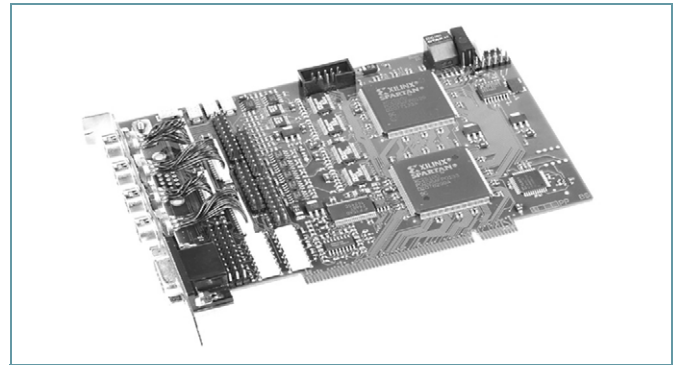
#### Documentation

→ Free Internet

Please contact your local sales office for detailed information.

#### Async Camera Quadro Mode Restrictions

Some restrictions may apply when the software tries to determine when the last acquisition is finished.



DB15		Hirose	
Pin	Signal	Pin	Signal
1	Video4 / Trig 2+	1	Gnd
2	Video5 / Trig 2-	2	+12V
3	Video6 / Trig 3-	3	Gnd
4	Video7 / Trig 3-	4	Video
5	Gnd	5	Gnd
6	Gnd	6	GPout
7	Gnd	7	Gpout/ExtClk
8	Gnd	8	Gnd
9	Pout4 / Trig 1+	9	Gpout/ExtClk/Video
10	Gnd	10	Gnd/GPin
11	Pout11 / Trig 1-	11	+12V/GPout
12	Clock	12	Gnd
13	Pout3 / Trig 0+		
14	Pout4 / Trig 0-		
15	+12V		

Note: Depend on jumper settings