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Compatible Windows Software

- DT-Active Open Layers
- 32-Bit Frame Grabber SDK for Windows 98/NT/4.0/2000/ME
- DT-Acquire
- DT Vision Foundry
- GLOBAL LAB Image/2

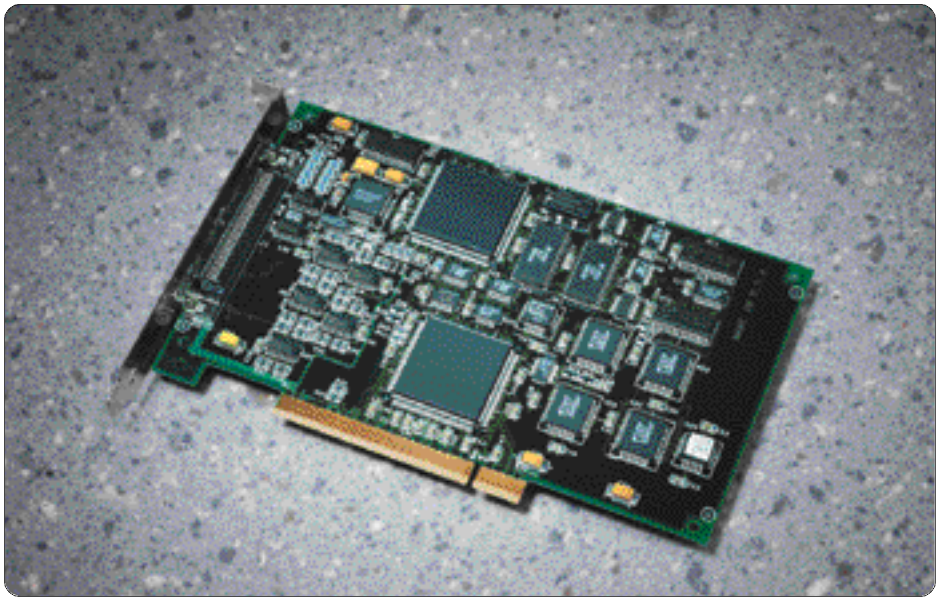
Member of MACH Series™

DT3157

PCI Frame Grabber for Digital Cameras

Key Features

- *Flexible front-end design is compatible with most 8- to 16-bit digital cameras.*
- *Easy interfacing to cameras with standard AIA 68-pin, RS-422 signal connector and convenient set-up files.*
- *MACH Series™ PCI bus-mastering architecture enables acquisition and transfer to memory at 30 fps (RS-170/NTSC).*
- *General-purpose digital inputs/outputs for interfacing to peripheral devices.*
- *Programmable camera control signals for precise image capture.*
- *Free DT-Acquire™ software enables you to capture, display, and save image data.*



M-5992

DT3157 PCI Frame Grabber for Digital Cameras

Overview

Unlike other frame grabbers that have digital input circuitry added to an analog design, the DT3157 has been designed specifically for digital sources. This gives you two critical benefits: First, the board costs less because it does not include unnecessary analog hardware. Second, hardware interfacing is simplified since there are no extra pins, jumpers, or signals to contend with.

Easy Interfacing to Cameras

The DT3157 uses a modified version of the AIA standard 68-pin connector, so interfacing to cameras that use this standard can use a standard cable, freeing users from having to buy or make expensive custom cables. For other popular cameras that have not yet implemented the AIA standard, Data Translation supplies optional interface cables. In addition, supporting software for the DT3157 includes camera set-up files for an expanding list of cameras.

Flexible, Digital Front End

The DT3157 has an extremely flexible front end, so it is compatible with the vast majority of digital cameras available today. It can acquire images up to 4096 pixels per line by 4096 lines per frame (4 mpixels max) in single-channel mode, and 1024 pixels per line by 1024 lines per frame in dual-channel mode. Maximum data rate is 40 MB/s. Pixel grayscale resolutions of 8, 10, 12, 14, and 16 bits are fully supported. In addition, both single-channel and dual-channel (Kodak dual-format 8-bit) cameras are supported.

Ideal Applications

Microscopy
Machine Vision
Medical Imaging/Diagnostics
Thermal Imaging
Scientific Image Analysis

High Performance Data Transfer and Display

The DT3157 employs the industry-leading MACH Series architecture for real-time image display. Taking advantage of the PCI

bus' high speed; up to 132 MB/s, the DT3157 can transfer an unlimited number of consecutive frames, in real-time, across the bus to host memory. And by using the DirectDraw (DDI) standard built into Windows 98/NT 4.0/2000/ME, you can display live video with non-destructive overlays without having expensive display hardware on the frame grabber. By using a separate VGA card for display, you are free to choose the graphics card that satisfies your particular application needs and performance requirements.

System CPU Free for Image Processing

Because system resources are not involved in transferring data with the DT3157 Bus Master design, your computer's CPU is free to perform high-speed image processing on the data you acquire. You can acquire a second image while using the host CPU to process the first.

DT3157 Input Modes

The DT3157 is compatible with single-and dual-channel cameras. The acquisition and transfer rate of the board varies depending on the number of input channels and the pixel bit depth of the camera. The table below summarizes the performance for each of the input modes of the DT3157.

Extensive Software Support Saves Time, Protects Your Investment

Several software products are available to help you get your application up and running quickly and easily. The Frame Grabber SDK™ (included) is a complete library of hardware-independent function calls that enables you to control the operations of Data Translation's PCI frame grabbers in Visual C or Visual C++. Optionally, DT-Active Open Layers™ is an ActiveX® control that enables you to use Data Translation's PCI frame grabbers with graphical programming environments such as Microsoft Visual Basic and Visual C++.

Both packages adhere to Data Translation's DT-Open Layers® software architecture, which provides a common application programming interface (API) across all DT PCI frame grabbers. This means that you can easily switch from one Data Translation frame grabber to another, or add more frame grabbers, with little or no reprogramming. Adding support for a new board is as easy as installing a new driver.

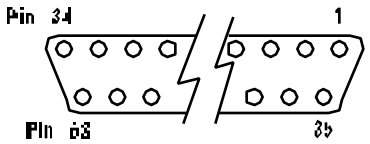
Input Modes

Input Channels	Bit Depth	Maximum Data Rate per Channel	Aggregate Data Data Rate	Maximum Image Size
Single	8	20 MHz	20 MB/s	4 MB
Dual	8	20 MHz	40 MB/s	1 MB
Single	10–16	20 MHz	40 MB/s	4 MB

User Connections

Digital Interface Connector Pinout

SIGNAL NAME	PIN	SIGNAL NAME	PIN
Ground	1	Ground	35
AD0 (+) **(MSB)**	2	AD0 (–)	36
AD1 (+)	3	AD1 (–)	37
AD2 (+)	4	AD2 (–)	38
AD3 (+)	5	AD3 (–)	39
AD4 (+)	6	AD4 (–)	40
AD5 (+)	7	AD5 (–)	41
AD6 (+)	8	AD6 (–)	42
AD7 (+)	9	AD7 (–)	43
AD8 (+) or BD0 (+)	10	AD8 (–) or BD0 (–)	44
AD9 (+) or BD1 (+)	11	AD9 (–) or BD1 (–)	45
Ground	12	Ground	46
AD10 (+) or BD2 (+)	13	AD10 (–) or BD2 (–)	47
AD11 (+) or BD3 (+)	14	AD11 (–) or BD3 (–)	48
AD12 (+) or BD4 (+)	15	AD12 (–) or BD4 (–)	49
AD13 (+) or BD5 (+)	16	AD13 (–) or BD5 (–)	50
DIG_I00	17	DIG_I01	51
DIG_I02	18	DIG_I03	52
AD14 (+) or BD6 (+)	19	AD14 (–) or BD6 (–)	53
AD15 (+) or BD7 (+) **(LSB)**	20	AD15 (–) or BD7 (–)	54
External Trigger In	21	Ground	55
Reserved	22	Reserved	56
Reset Out (+)	23	Reset Out (–)	57
Frame Enable Out (+)	24	Frame Enable Out (–)	58
Frame Enable In (+)	25	Frame Enable In (–)	59
Line Enable In (+)	26	Line Enable In (–)	60
Line Enable Out (+)	27	Line Enable Out (–)	61
Pixel Clock Out (+)	28	Pixel Clock Out (–)	62
Pixel Clock In (+)	29	Pixel Clock In (–)	63
Expose (+) or SHUT (+)	30	Expose (–) or SHUT (–)	64
DIG_I04	31	Ground	65
DIG_I05	32	Ground	66
DIG_I06	33	DIG_I07	67
Ground	34	Ground	68



Video Input Connector

Why Digital?

In general, digital cameras have inherent advantages over their analog counterparts, mostly due to the fact that there is no conversion circuitry. The elimination of this circuitry significantly improves performance and simplifies design. Important improvements are noted in the following areas:

More Than 256 Gray Levels of Resolution

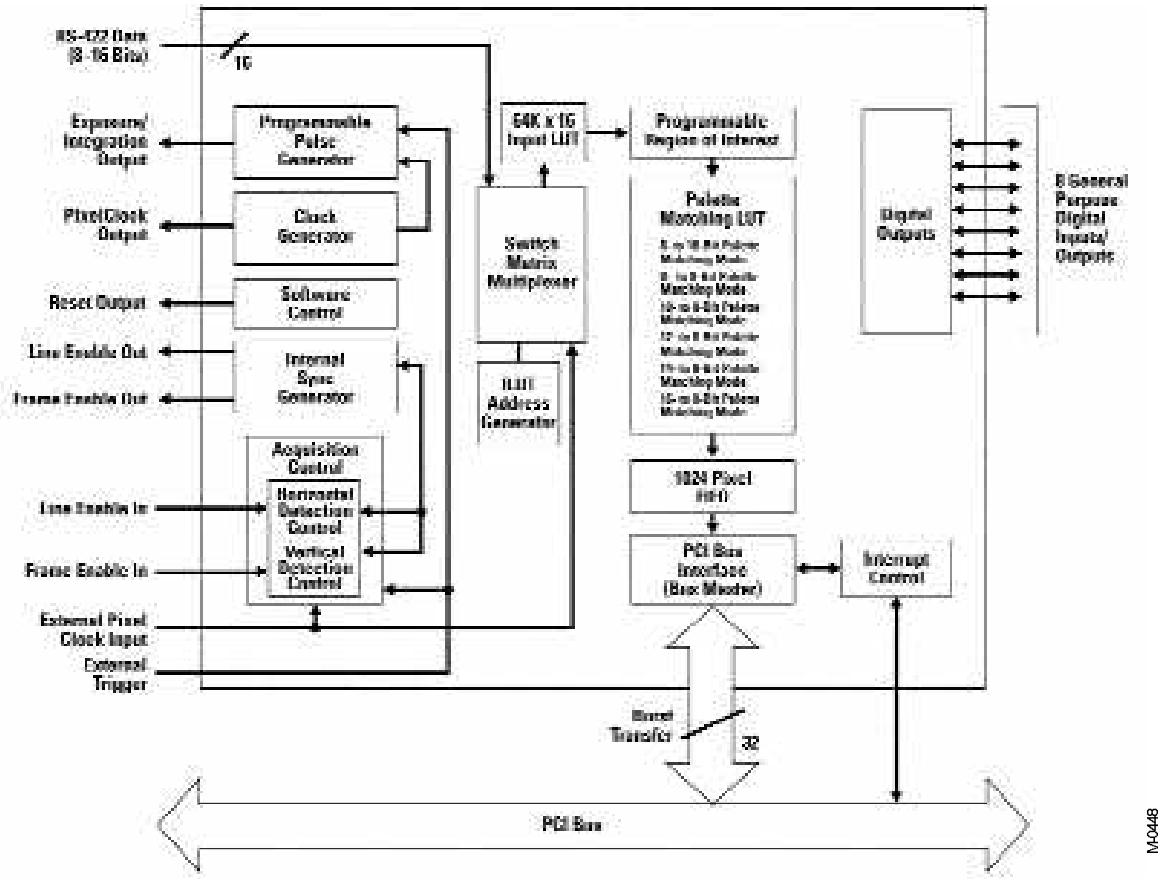
Technically, increased dynamic range really has nothing to do with whether a camera has analog or digital output. However, digital output cameras have become the de facto standard for 10- to16-bit applications. Higher dynamic range is often required in x-ray, medical, astronomy, and thermal imaging applications.

Lower Noise

By digitizing at the CCD camera rather than at a frame grabber, signal noise is typically lower, resulting in better grayscale image accuracy (higher signal-to-noise ratio). By its nature, analog video is susceptible to noise, whereas digital video is immune to it. In addition, by digitizing at the camera instead of at a frame grabber installed in the PC, the potential signal degradation caused by internal PC noise or a poorly shielded analog input cable is eliminated.

Transmission Length

Due to bandwidth limitations of analog video, the distance between a camera and the image capture/processing PC is limited to roughly two to three meters. Due to the use of differential drivers, digital data can be transmitted distances over 5 meters without special requirements.



DT3157 Block Diagram

User Connections

Cabling

Uses 68-pin SCSI-2 connector; cabling options vary from manufacturer to manufacturer (see table for options available from Data Translation)

Mating Connectors

AMP SCSI 2 connector part number: 749109, AMP SCSI 2 shell housing part number: 750752

Compatible Cameras*

Camera	Description	Cable/Connector
Pulnix TM-9701	8-bit, 768 x 484, 14 MHz, analog and digital outputs, 30 fps	EP301
Pulnix TM-1001	8-bit, 1024 x 1024, 20 MHz, analog and digital outputs, 15 fps	EP301
Pulnix TM-1010	10-bit, 1024 x 1024, 20 MHz, single channel, 15 fps	Custom 31-pin cable required
Pulnix TM-1300	10-bit, 1300 x 1030, 20 MHz, single channel, 12 fps	Custom 31-pin cable required
Kodak ES1.0	8-bit, 1008 x 1018, 20 MHz, dual-channel, 15 fps (single-channel), 30 fps (dual-channel)	EP299 RS-232 connector required
Kodak 1.4i	8-bit, 1317 x 1035, 10 MHz, single-channel, 6.9 fps	EP299 RS-232 connector required
Kodak 1.6i	10-bit, 1534 x 1024, 10 MHz, single-channel, 5.5 fps	EP299 RS-232 connector required
Kodak 4.2i	8-bit, 2025 x 2044, 10 MHz, single-channel, 2.1 fps	EP299 RS-232 connector required
Hamamatsu C4742-95	10-bit, 1280 x 1040, 14.5 MHz, single-channel, 9 fps	Custom 68-Pin cable required
Hitachi KP-F100V	10-bit, 1300 x 1030, 20 MHz, analog and digital outputs, 12 fps	Custom 26-Pin cable required
Adimec MX12P	12-bit, 1024 x 1024, 20 MHz, analog and digital, output, 15 fps	Custom cable required

*Visit www.datatranslation.com/products for the most up-to-date camera compatibility information.
Subject to change due to vendor model/specification changes. 2/01

DT3157 Specifications

All specifications are typical at +25°C and rated voltage, unless otherwise specified.

Digital Video Input

Data Format: 8 to 16-bit word depth; programmable; frame-based transfers

Inputs: Single or dual channel operation; single channel programmable from 8 to 16-bits; dual channel operation fixed at 8-bits per channel, uses Kodak dual channel data format

Signal Format: RS-422 differential

Spatial Resolution: **Single channel**—Programmable, 4 to 4096 pixels/line (multiples of 4) by 1 to 4096 lines/frame (4 MPixels max). **Dual channel**—Programmable, 16 to 1024 pixels/line (multiples of 4) by 2 to 1024 lines/frame.

Acquisition

Digitization: 8 bits (256 gray levels) to 16 bits (65,536 gray levels); programmable

Pixel Acquire Rate: 0–20 MHz per channel

On-board Pixel Clock: Programmable; 1 kHz–40 MHz

Aspect Ratio: Programmable; determined by input format used

Modes: Single frame or continuous operation; software selectable.

Onboard Processing

Input LUT: Two 64 k x 16-bit LUTs (one per input channel); allows for gray-scale threshold adjustments on image in real-time

Palette-Match LUT: 8, 10, 12, 14, 16 to 8-bit modes; software selectable; matches image gray-scale map to the palette used by Windows, ensures proper image display

Region Of Interest: Programmable ROI window defines video data to be transferred to memory; pixels outside window are discarded

Scaling: Single channel mode only—Scales images by discarding lines, pixels, or both; increments programmable from every other line/pixel (1/2) to every sixteenth (1/16); line and pixel scaling separately selected.

Data Formats

Image data can be output in 8-bit, 10-bit, 12-bit, 14-bit and 16-bit formats

Control Signals

External Trigger Inputs: One, TTL levels, software selectable on rising/falling edge

Control Inputs: Frame Enable, Line Enable, Pixel Clock; signals supplied by camera to board; all signals RS-422 format

Control Outputs: Frame Enable, Line Enable, Pixel Clock; signals provided to camera, board acts as Sync Master; Reset control, software selectable on rising/falling edge; Exposure control, programmable pulse width from 82 µsec to 1.34 sec, can be hardware or software triggered; all signals RS-422 format

Digital Inputs/Outputs: Eight general-purpose bi-directional TTL inputs/outputs; fan-out of seven TTL loads each

Video Display

Uses PC's graphics card and monitor for display. Real-time video display and non-destructive, real-time animated overlays performed using Direct Draw (DDI). Video display is in 256 gray levels, images greater than 8-bits deep are mapped to 8-bits using a palette-matching LUT during live display. Note that images sent to host memory retain their full bit depth.

Video Transfer Rate

10 to 40 MB/s typical, 132 MB/s max. Board operates as a Bus Master using Burst Mode for data transfer to host memory

Power Requirements

+5V @ 1.8 A typical

Physical/Environmental

Form: Half-size PCI bus board (short card)

Dimensions: 10.7 cm x 17.5 cm (4.2 in. x 6.875 in.)

Weight: 130 g (4.2 ounces)

Operating Temperature: 0° C to 50° C (32° F to 122° F)

Storage Temperature: –25° C to 70° C (–13° F to 158° F)

Relative Humidity: Up to 90%, non-condensing

Warranty

One year limited parts and labor

Technical Support

As you develop your application, technical support is available when you need it. Extensive information is available 24 hours a day on our web site at www.datatranslation.com, including drivers, example code, bug fixes, pinouts, a searchable KnowledgeBase, and much more.

Support is also available from your point of purchase. Telephone support is free for the first 90 days; you can also request complimentary support via e-mail or fax at any time. Additional support options are available; contact your Data Translation representative for details.

DT3157 (MACH Series™)

BUS: PCI

Type: Digital Camera Interface

System Requirements

Due to the high data-throughput available from the DT3157, the following PC configuration requirements are necessary for operation:

- Pentium-class processor, 133 MHz or faster; Pentium II recommended
- At least one available PCI Bus slot
- Microsoft Windows 98/NT 4.0/2000/ME
- Triton PCI chipset (or better) and supporting system BIOS
- 16 MB of system RAM minimum for Windows 98; 32 MB minimum for Windows NT 4.0/2000/ME
- CD-ROMdrive
- DDI-compatible graphics adapter

Ordering Summary

All Data Translation hardware products are covered by a 1-year warranty. For prices please consult a price list, visit our web site, or contact your local reseller.

DT3157

The DT3157 is shipped with DT-Acquire software, software driver, 32-bit SDK, and a comprehensive User's Manual.

- DT3157

Call for information on OEM and volume discounts

Accessories

- EP299—2.75 m (9 ft.) cable assembly with 68-pin AIA type connector and RS-232 cable, for use with Kodak Series ES 1.0, 1.4i, 1.6i, and 4.2i cameras
- EP300—2.75 m (9 ft.) cable assembly with 37-pin connector for use with compatible single channel cameras
- EP301—2.75 m (9 ft.) cable assembly with 31-pin connector for use with Pulnix TM9701 and TM1001 cameras

Software

All software packages include a copy of the software on CD-ROM, a user's manual, and 90 days of complimentary telephone support.

- DT-Active Open Layers
  ActiveX control for Microsoft Visual Basic 5.0 or higher, Visual C++ 5.0 or higher, running under Windows 98/NT 4.0/2000/ME
  SP0974-CD

For other compatible software, consult the software section of this handbook, or call for details.

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