Frame Grabbers for Imaging and Machine Vision

No matter what the application, images are more than pictures – they're data. Our frame grabbers provide accuracy and reliability, test after test.

Introduction

Frame grabbers are PC plug-in cards that capture and convert an image(s), supplied by a video source, into digital data. Video sources can include: video cameras, camcorders, VCRs, television broadcasts, X-ray equipment, CT scanners and many others. The frame grabber also stores, processes and enhances images to be analyzed or displayed on a video monitor. Frame grabbers are used in machine vision, thermal imaging, high-resolution medical imaging/diagnostics, surveillance/security, digital microscopy, high-accuracy gauging, astronomy, etc. Data Translation supplies a range of frame grabbers for these types of applications. Because they are designed for high-speed, accuracy and real-time acquisition and work with a range of video sources, they are the ideal solution for a customer's image acquisition needs.

There are two types of frame grabbers: those designed for industrial and scientific applications and those designed for multimedia applications. The former is used in applications requiring high speed, accuracy and the ability to use a range of video sources for image acquisition. To do this, a frame grabber must be designed to maximize every stage in the image acquisition process.

Typical Stages in Image Acquisition

Connecting video sources to the frame grabber is known as the video input stage. The next stage, known as analog-to-digital conversion, translates the incoming video, which is in analog form, to digital data that a computer can use. The interface and control stage handles real-time data delivery to a host computer's memory, where the image is manipulated, formatted or analyzed in some fashion. Once the image is processed, the next step is to communicate with an outside event, depending on the results gathered from the processed image. For example, if a program has been set-up to inspect the print quality of a label on a bottle and the image captured from the label doesn't meet certain criteria, there must be a way to perform some action on the bottle, such as rejecting it from the assembly line. This is known as a control or outside event. A frame grabber must communicate with an external device, such as a robotic arm, to perform this action. This is known as the digital input/output stage. Frame grabbers that provide this function save the cost of purchasing, installing, programming and connecting a separate digital I/O card.

New Era in Image Processing

Recently, a coalition of manufacturers along with the Automated Imaging Association Camera Committee joined forces to design a newer, faster, general-purpose communications interface. Camera Link became known as the interface standard to simply and inexpensively connect frame grabbers with digital cameras. Instead of a spaghetti cluster of wires and terminators, camera and frame grabber manufacturers have built-in two industry-standard 26-pin connectors into their products. Cable manufacturers have also designed Camera Link cables to complete the picture.

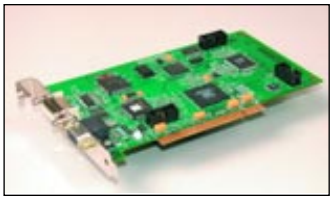
Frame Grabbers for Your Machine Vision/Imaging Applications

Data Translation has a wide array of frame grabbers for all your imaging or machine vision needs. Our new DT3145 is a high-performance digital frame grabber that allows customers to use both area-scan and line-scan digital Camera Link cameras which typically feature higher accuracy and higher input speeds than their analog counterparts.

The DT3162, our new all-purpose PCI frame grabber, features high speed and programmable front-end flexibility, making it ideal for demanding high-end imaging and machine vision applications. The 40 MHz pixel acquire rate allows for a higher resolution image. Asynchronous reset provides deterministic repeatability for machine vision. Its custom high-performance, high bandwidth PCI architecture provides zero wait state, while scatter gather transfers directly to host memory. The DT3162 features 2K x 2K resolution for high quality images, variable-scan capability, multiple camera inputs for multi-axis applications, and interrupt on change for mission-critical timing needs. Full software support is included with the DT3162, including an ActiveX control, DT-Acquire ready-to-run application, and a 32-bit WDM driver.

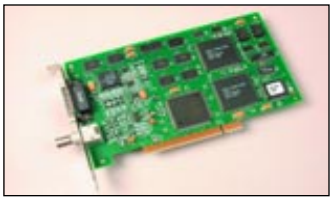
Other Data Translation frame grabbers include the low-cost DT3120, a great all-purpose PCI board. The DT3130 Series offers the functionality of up to three frame grabbers on one PCI frame grabber, enabling multiple image acquisition. The MACH Series of frame grabbers offers a wide range of choices from line-scan and variable-scan, composite color, monochrome, RGG, and digital boards.

Find out more about our frame grabbers on the next few pages.

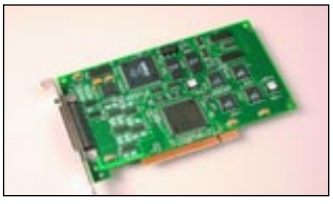


DT3145 Camera Link

DT3133 Multiple Images



DT3155 Monochrome



DT3157 Digital

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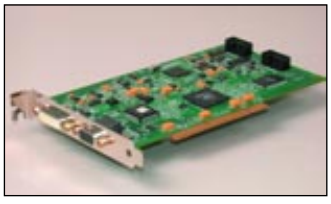
Hardware Selection Guide

	Model	Description	Spatial Resolution	Digitization Resolution	Video Input	Pixel Acquire Rate	Control Signals	Programmable Input Adjustment	Digital I/O
MACH II Series	DT3162	High-performance, High-speed Variable-Scan PCI Frame Grabber	16-2048 X 1-2048	256 levels (8-bits) 10-bit accuracy	(3) RS-170, RS-330, CCIR, non-interlaced, slow scan, other.	100 KHz-40 MHz -	Yes	Offset, gain	4 In/4 Out
Camera Link	DT3145	High-performance, Single-Camera Base configuration	Area 16 to 4096 pixel Line 16 to 16,384 Pixels per line	Up to 24-bit	Single-port 8, 10, 12, 14, 16 Mono-chrome, Dual-port 8, 10, 12, Monochrome 24-Bit RGB	Up to 66 MHz	Yes	—	4 In/4 Out
MACH Series	DT3152	Variable-Scan PCI Frame Grabber	4–4096 x 1–4096, 4 mpixels max [1]	256 levels (8-bits)	(4) RS-170, CCIR, or other	1 kHz–20 MHz	Yes	Gain, Reference, Offset	8 Out
	DT3152-LS	Line-scan/Variable-scan PCI Frame Grabber	4-4096 x 1-4096, 4 mpixels max [1,5] 1-8192 pixels [6]	256 levels (8-bits)	(4) RS-170, CCIR, other [5] or (1) line-scan [6]	1 kHz-20 MHz	Yes	Gain, Reference, Offset	4 In/4 Out
	DT3153	Low-cost Composite Color PCI Frame Grabber	640 x 480 (60 Hz) or 768 x 576 (50 Hz)	16-bit color (8-Bits x 2) (YCrCb)	(3) NTSC (60Hz), PAL (50Hz) or S-video (Y/C) and (2) composite	Fixed	Yes	Hue, Saturation, Brightness, Contrast	4 In/4 Out
	DT3154	Low-cost RGB PCI Frame Grabber	640 x 480 (60 Hz) or 768 x 576 (5 0Hz)	24-bit color (8-bits x 3)	(2) RGB inputs; (3) simultaneous monochrome (1) dual-channel progressive-scan [4]	Fixed	Yes	Brightness, Contrast, RGB levels	2 In/3 Out
	DT3155	Low-cost High-Performance PCI Frame Grabber	640 x 480 (60 Hz) or 768 x 576 (50 Hz)	256 levels (8-bits)	(4) RS-170 or CCIR	Fixed	Yes	Gain, Reference, Offset	8 Out
	DT3157	Dual-channel PCI Frame Grabber for Digital Cameras	4-4096 x 1-4096 [1,2] 4 mpixels max; 16-1024 x 2-1024 [3]	256 levels (8-bits)	(2) RS-422 inputs 8–16 bits (single channel) 8 bits (dual channel)	0–20 MHz	Yes	8- to 16-bit Word Lengths	8 In/8 Out
DT3131 Series Low Cost	DT3120	Low-cost Single Source PCI Frame Grabber	640 x 480 (60 Hz) 768 x 576 (50 Hz)	16-bit color (8-bits x 2)	(1) RS-170/NTSC (60 Hz), CCIR/PAL (50 Hz) or (1) S-video (Y/C)	Fixed	Yes	Hue, Saturation, Brightness, Contrast	–
	DT3131	PCI Multiple Frame Grabber	640 x 480 (60 Hz) 768 x 576 (50 Hz)	16-bit color (8-bits x 2) (YCrCb)	(3) RS-170/NTSC (60 Hz), CCIR/PAL (50 Hz) or (1) S-video (Y/C) and (2) composite	Fixed	Yes	Hue, Saturation, Brightness, Contrast	–
	DT3132	PCI Multiple Frame Grabber	640 x 480 (60 Hz) 768 x 576 (50 Hz)	16-bit color (8-bits x 2) (YCrCb)	(6) RS-170/NTSC (60 Hz), CCIR/PAL (50 Hz) or (2) S-video (Y/C) and (4) composite	Fixed	Yes	Hue, Saturation, Brightness, Contrast	–
	DT3133	PCI Multiple Frame Grabber	640 x 480 (60 Hz) 768 x 576 (50 Hz)	16-bit color (8-bits x 2) (YCrCb)	(9) RS-170/NTSC (60 Hz), CCIR/PAL (50 Hz) or (3) S-video (Y/C) and (6) composite	Fixed	Yes	Hue, Saturation, Brightness, Contrast	–

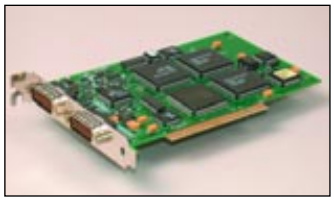
For ISA Frame Grabbers, visit our website at www.datatranslation.com/products/mvhw

1. DT3152-LS, DT3152, DT3157 can acquire 4-4096 pixels per line and 1-4096 lines per frame, up to a maximum of 4 M pixels.
2. Single-channel mode
3. Dual-channel mode
4. Select cameras, see datasheet for details.
5. DT3152-LS Area Scan mode only.
6. DT3152-LS Line Scan mode only

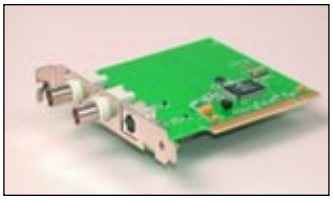


DT3162 High Accuracy

DT3154 RGB Color



DT3152 Variable-Scan



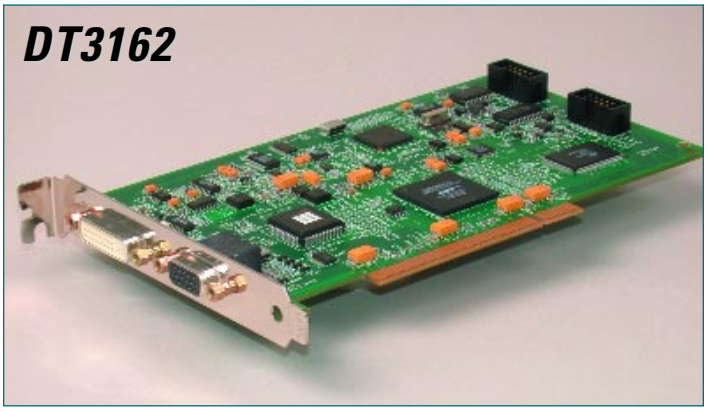
DT3120 Low-Cost

High-Performance, High-Speed Variable Scan Frame Grabber

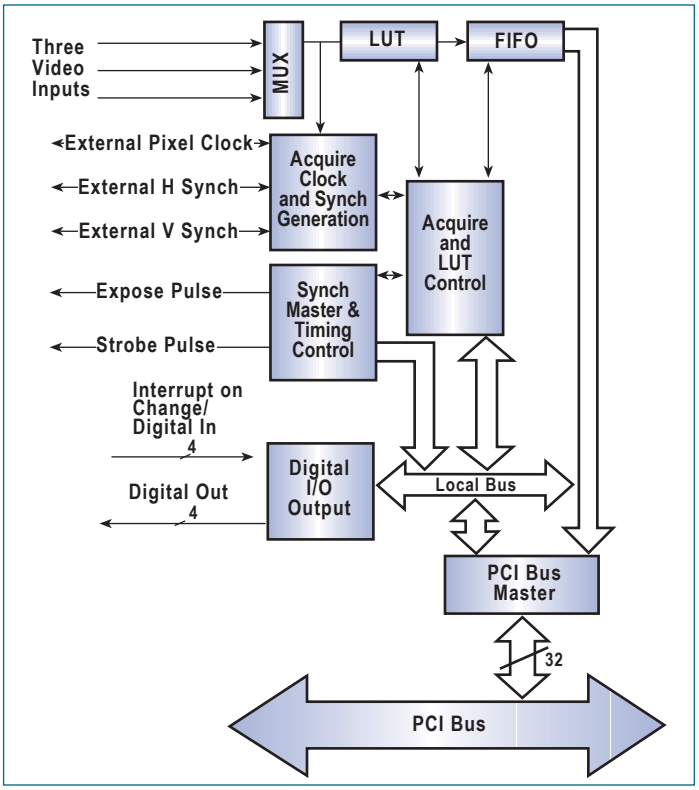
DT3162

Get details and data sheets at:
www.datatranslation.com/sfc/DT3162

- 40 MHz pixel acquire ... allows higher frame rates
- Asynchronous reset…gives deterministic repeatability for machine vision
- 2K x 2K resolution…high resolution image, 10-bit accuracy
- Variable-scan capability
- Custom high-performance, high-bandwidth PCI architecture provides zero wait state, scatter gather transfers directly to host memory
- Multiple camera inputs…support multi-axis applications
- Highest image quality…breakthrough noise-free design
- 4 digital in/4 digital out lines provide single board solution
- Interrupt on change for mission critical timing needs
- VSYNC, HSYNC, and pixel clock signals for complete camera/DT3162 control
- Ships with valuable software bundle featuring WDM drivers and DT-Acquire 2 ready-to-run application



DT3162 is perfect for progressive scan cameras.



The DT3162 is an all-purpose variable-scan frame grabber, ideal for almost any imaging or machine vision application.

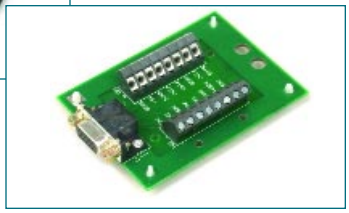
Accessories

- EP340 — Camera Interface Module (CIM) - DIN rail mountable enclosure; supports the three available channels on the DT3162; provides control signals and video inputs (via Hirose and BNC connectors) as well as camera power; user configurable. Includes 15-pin 2-meter cable.
- EP332 — 1.0m (3.25 ft.) integrated cable assembly; provides video inputs, trigger input, sync signal input/outputs, exposure/reset control; terminates to BNC connectors
- EP261 — BNC cable for use with CIM or EP332
- STP15 — Screw terminal panel for digital I/O Includes EP337 2-meter cable.

Camera Interface Module (CIM), EP340
Connect cameras, triggering devices and external clock signals to the DT3162 with the Camera Interface Module. (EP321 cable included)

EP332
Direct connect cable provides nine BNC terminated input connections to video, trigger and sync signals.

STP15
Provides access to the nine digital control lines of the DT3162. (EP337 cable included)



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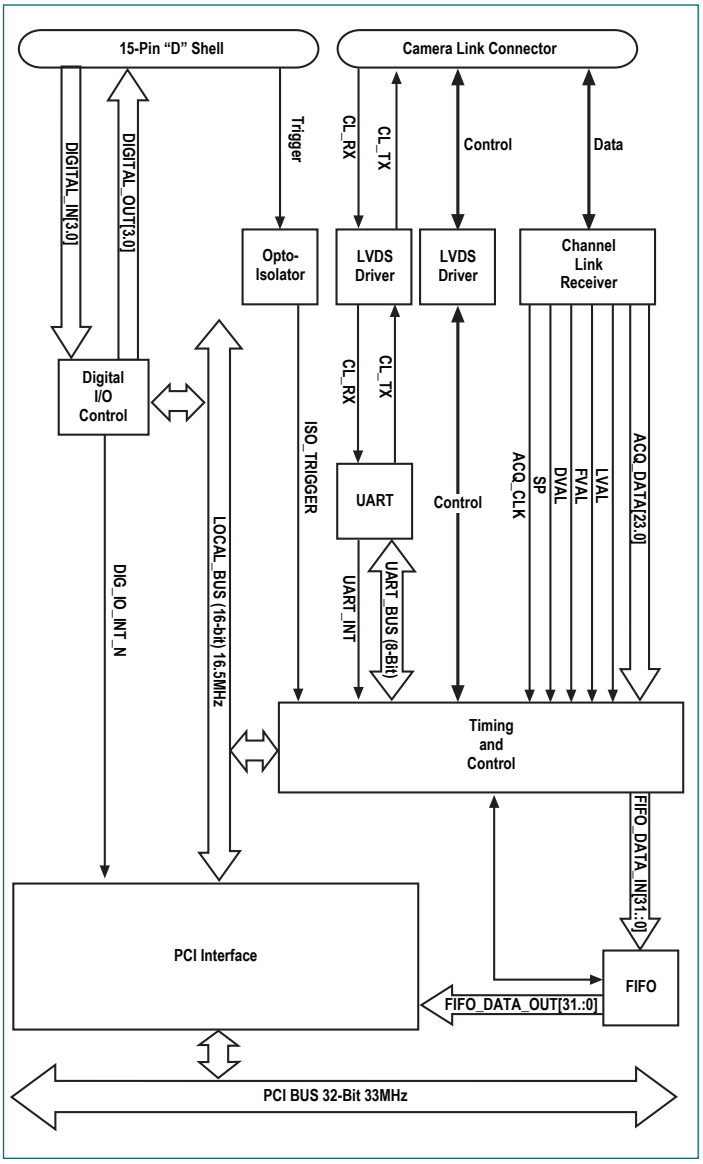
High-Performance, Digital Frame Grabber

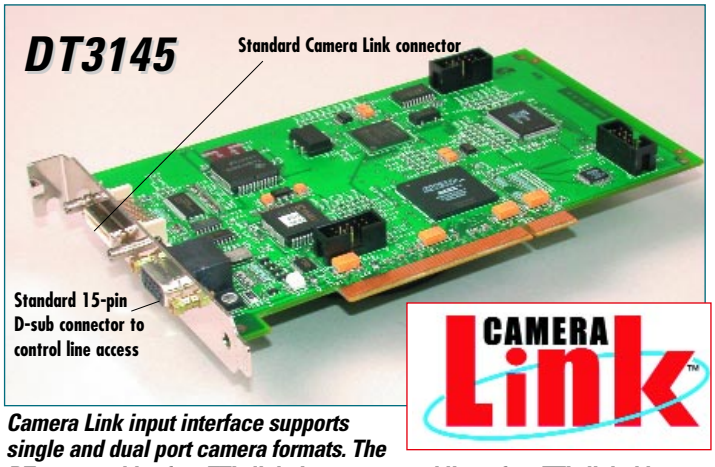
DT3145

Get details and data sheets at:
www.datatranslation.com/sfc/DT3145

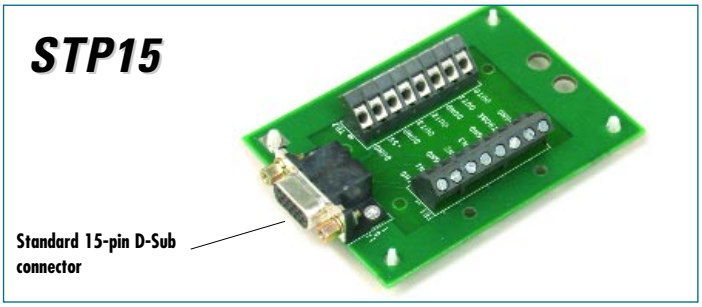
- Developed under the Camera Link standard for use with Camera Link digital cameras
- Performs area-scan and line-scan
- Universal cabling and interfacing
- Supports the following camera configurations:
  - Single 8-bit monochrome
  - Dual 10-bit monochrome
  - Single 12-bit monochrome
  - Dual 12-bit monochrome
  - Single 14-bit monochrome
  - Single 16-bit monochrome
  - 24-bit RGB
- External trigger
- 4 digital in and 4 digital out lines
- Ships with valuable software bundle featuring DT-Acquire™ ready-to-run application, drivers and complete documentation



The DT3145 is a high-performance digital camera interface specifically targeted for the Machine Vision, Scientific Image Analysis and general purpose imaging markets. The DT3145 lets you use both area-scan and line-scan digital Camera Link cameras which typically feature higher accuracy and higher input speeds than their analog counterparts.



Camera Link input interface supports single and dual port camera formats. The DT3145 provides four TTL digital output control lines, four TTL digital input control lines with interrupt on change, and one TTL external trigger.



STP15 provides easy access to digital control signals (ships with EP337 cable).

Accessories

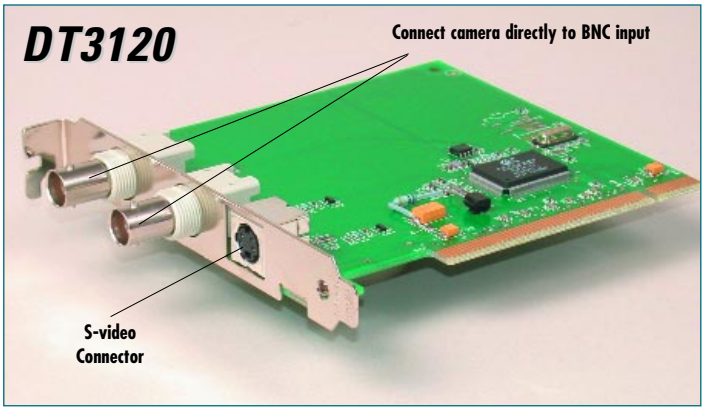
- STP15 — Screw terminal panel for digital I/O - includes EP337 cable

Low-Cost Monochrome and Composite Color

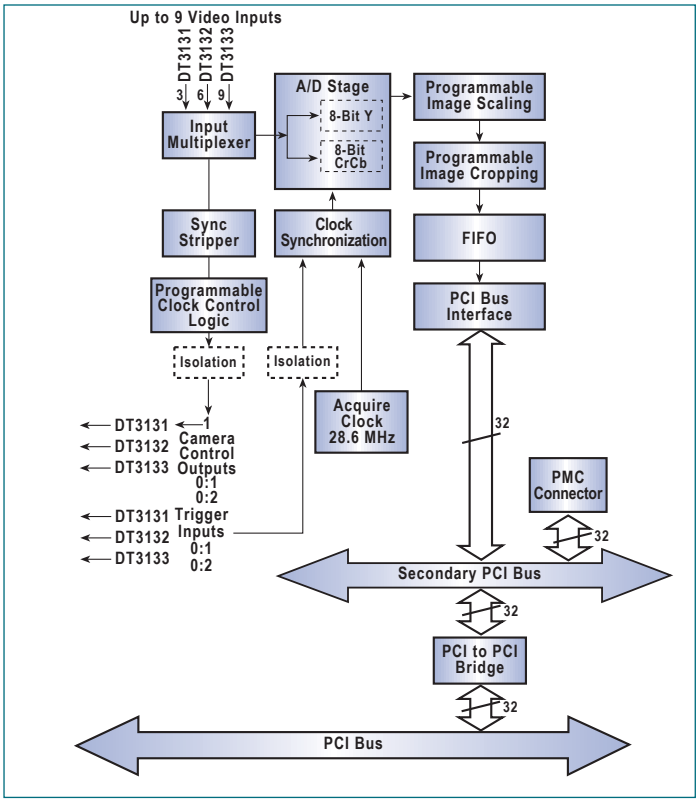
DT3120, DT3131, DT3132, DT3133

Get details and data sheets at:
www.datatranslation.com/sfc/DT3120
www.datatranslation.com/sfc/DT3131

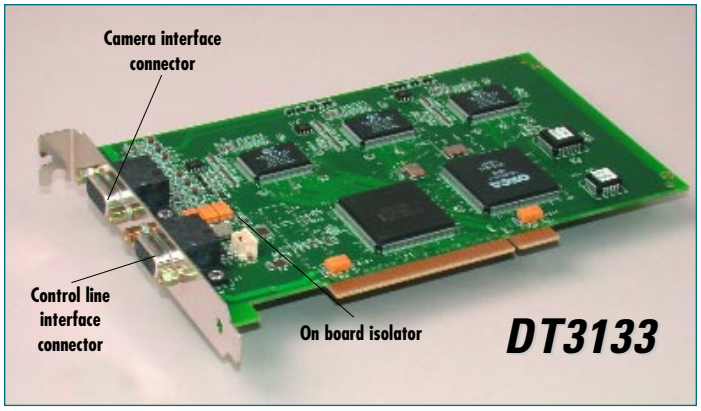
- Monochrome, composite color, and S-video input sources
- DT3120 is a low-cost, single channel frame grabber
- DT3131 Series offers the functionality of up to three frame grabbers on one PCI board, enabling multiple image acquisition
- 640 x 480 (60 Hz) or 768 x 576 (50 Hz) spatial resolution
- 16-bit color
- Ships with valuable software bundle featuring DT-Acquire™ ready-to-run application, drivers and complete documentation



The DT3120 low-cost frame grabber is an ideal solution for scientists, lab technicians, researchers, or anyone performing scientific and general-purpose imaging applications.



The DT3131 Series contains the functionality of up to three frame grabbers on one PCI short card, enabling multiple image acquisition at low cost.



The DT3133 includes 3 active inputs or nine muxed, for input of up to nine RS-170/CCIR monochrome, NTSC/PAL color cameras, or three S-video and six RS-170/CCIR, NTSC/PAL cameras.

Accessories — DT3120

- EP261 — 2 meter composite video cable with BNC connectors
- EP263 — 2 meter S-video cable with BNC connectors

Accessories — DT3131 Series

- EP311 — 60 cm (2 ft.) 25-pin cable for video connection (up to 3 cameras simultaneous)
- EP312 — 1 m (3 ft.) 25-pin cable for control signal connection (up to three triggers, three strobes, and 12V power)
- EP314 — 60 cm (2 ft.) cable for connection of up to 9 cameras multiplexed
- EP317 — 2 m (6 ft.) cable for S-video connection (1 camera)

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Line-Scan and Variable-Scan

DT3152 and DT3152-LS

Get details and data sheets at:
www.datatranslation.com/sfc/DT3152
www.datatranslation.com/sfc/DT3152-LS

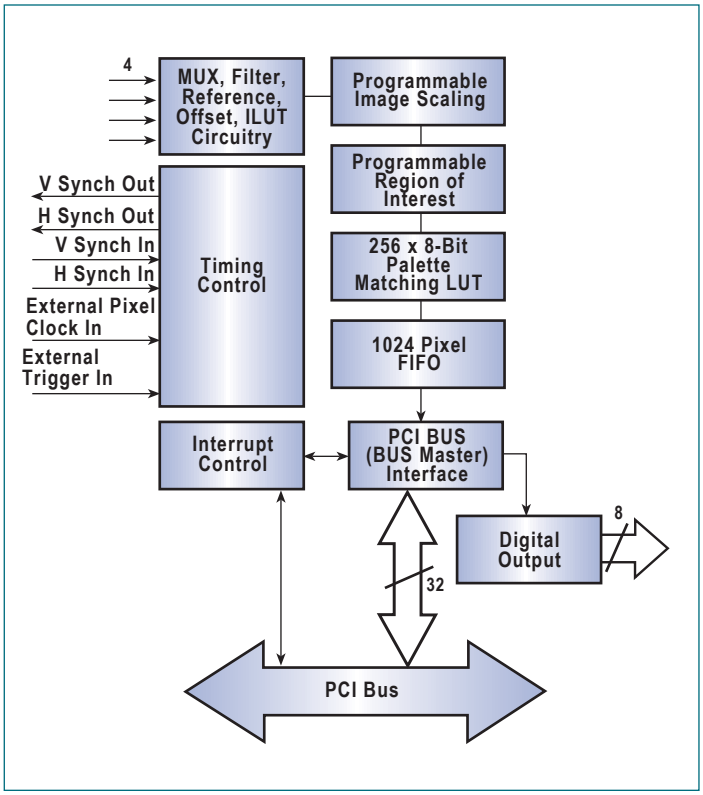
- **Flexible input timing and spatial resolution allows use with a wide range of cameras**
- **High-accuracy variable-scan up to 4 Mb image size**
- **Flexible pixel clock, trigger and sync controls**
- **256 levels (8 bits) resolution**
- **1 kHz – 20 MHz pixel acquire rate**
- **8 digital out control lines**
- **DT3152-LS captures line-scan images up to 8k pixels per line**
- **Ships with valuable software bundle featuring DT-Acquire ready-to-run application, drivers and complete documentation**

Video Input
Video Format: RS-170, RS-330, and NTSC (60 Hz) or CCIR and PAL (50 Hz); interlaced and/or non-interlaced/progressive-scan, slow-scan; software selectable
Timing Format: Standard, non-standard (variable-scan), asynchronous or custom timing; software selectable
Inputs: 4 monochrome composite inputs; ac coupled (dc coupled operation is available for one input channel)
Video Signal: 1 V peak-to-peak, 75 ohms
Spatial Resolution: Programmable, 4 to 4096 pixels/line by 1 to 4096 lines/frame (4 MPixels max)
Chrominance Filters: Notch type, 3.58 MHz (60 Hz) or 4.43 MHz (50 Hz); software selectable

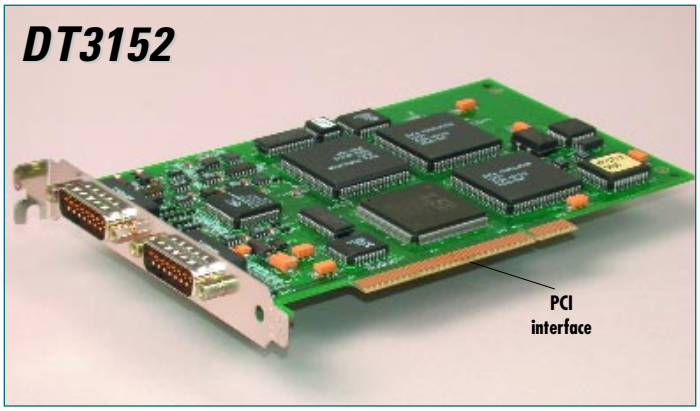
Acquisition
Digitization: 8 bits, 256 gray levels
Pixel Jitter: ±2.5 nsec typical, ±4 nsec max
Pixel Acquire Rate: 0–20 MHz
Onboard Pixel Clock: Programmable; 1 kHz– 20 MHz, 0.25% frequency resolution
Accuracy: Integral non-linearity ±0.5 LSB; RMS noise 0.4 LSB
Aspect Ratio: Programmable; determined by input format used
Frame Grab Speed: 1/30 s (60 Hz) or 1/25 s (50 Hz)
Modes: Interlaced or non-interlaced/progressive-scan, (start on next even, next odd, or next field for interlaced), single frame or continuous operation; all software selectable.
Input Ranges: Programmable, 0–0.06 V to 0–3.04 V (see table, Precision Input Ranges).
Gain Ranges: Programmable, 0.5, 1, 2, 4; equivalent to <0.5 to >16 overall when combined with A/D reference settings.
Offset Ranges: Programmable, ±1.07 V, selectable in increments of 8.4 mV

Onboard Processing
Input LUT: 256 x 8-bit; allows for gray-scale threshold adjustments on image in real-time
Palette-Match LUT: 256 x 8-bit; matches image gray-scale map to the palette used by Windows, ensures proper gray-scale image display
Region Of Interest: Programmable ROI window defines video data to be transferred to memory; pixels outside window are discarded
Scaling: 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 monochrome format



The DT3152 is a highly accurate variable-scan frame grabber with 8 digital out lines and flexible timing and control.



Software programmable input timing and spatial resolution lets you use the DT3152 with a wide variety of video inputs, including standard RS-170 or CCIR devices and large-format, progressive-scan, and slow-scan cameras.

Accessories

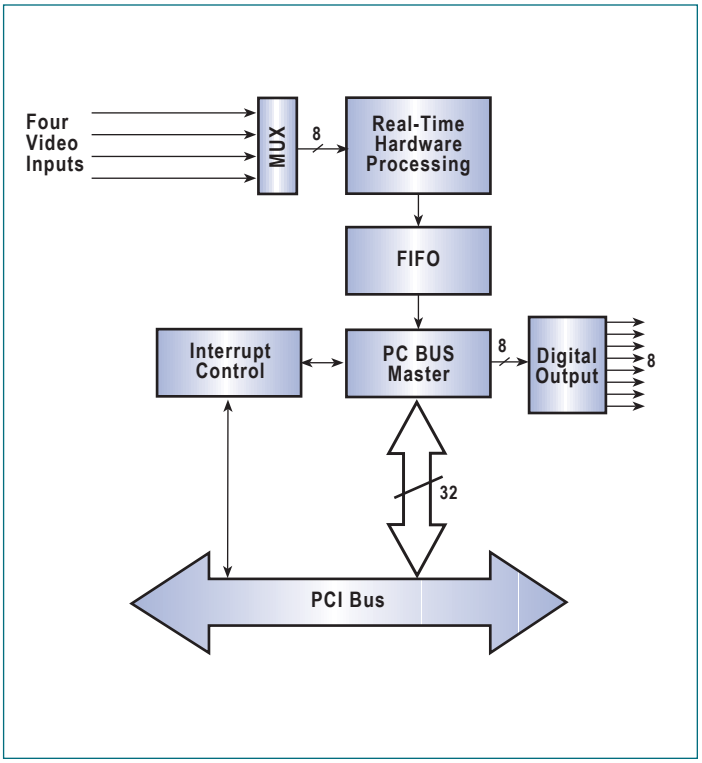
- **EP306 — 1.5m cable, accommodates four composite video inputs or three composite inputs and an external sync input**

High-Accuracy Monochrome

DT3155

Get details and data sheets at:
www.datatranslation.com/sfc/DT3155

- **Flexible A/D allows precise match of input range to video source**
- **High-speed analog circuitry delivers sharp images**
- **Digital Clock Sync reduces jitter for high-accuracy data sampling**
- **256 levels (8 bits) resolution**
- **640 x 480 (60 Hz) or 768 x 576 (50 Hz) spatial resolution**
- **8 digital out control lines**
- **Ships with valuable software bundle featuring DT-Acquire ready-to-run application, drivers and complete documentation**



The DT3155 is a high-accuracy monochrome frame grabber with flexible A/D and 8 digital out lines.

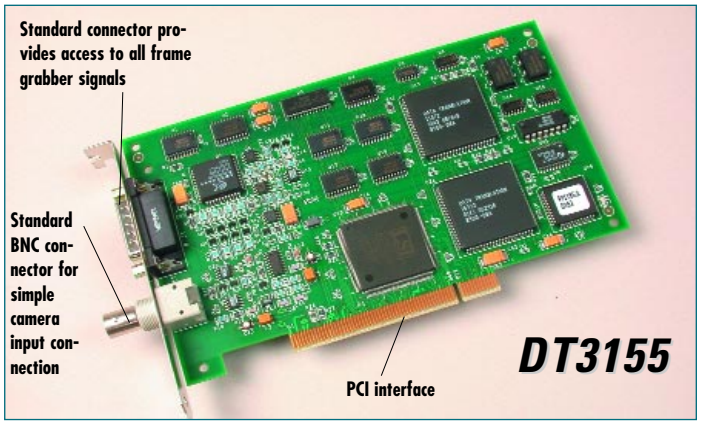
Video Input
Video Format: RS-170, RS-330, and NTSC (60 Hz) or CCIR and PAL (50 Hz); interlaced; software selectable
Timing Format: Standard 60 Hz and 50 Hz format timing supported; software selectable
Inputs: 4 monochrome composite inputs; ac coupled
Video Signal: 1 Volt peak-to-peak, 75 ohms
Spatial Resolution: 640 x 480 (60 Hz), 768 x 576 (50 Hz)
Chrominance Filters: Notch type, 3.58 MHz (60 Hz) or 4.43 MHz (50 Hz); software selectable

Acquisition
Video Format: RS-170, RS-330, and NTSC (60 Hz) or CCIR and PAL (50 Hz); interlaced; software selectable
Timing Format: Standard 60 Hz and 50 Hz format timing supported; software selectable
Inputs: 4 monochrome composite inputs; ac coupled
Video Signal: 1 Volt peak-to-peak, 75 ohms
Spatial Resolution: 640 x 480 (60 Hz), 768 x 576 (50 Hz)
Chrominance Filters: Notch type, 3.58 MHz (60 Hz) or 4.43 MHz (50 Hz); software selectable

Onboard Processing
Video Format: RS-170, RS-330, and NTSC (60 Hz) or CCIR and PAL (50 Hz); interlaced; software selectable
Timing Format: Standard 60 Hz and 50 Hz format timing supported; software selectable
Inputs: 4 monochrome composite inputs; ac coupled
Video Signal: 1 Volt peak-to-peak, 75 ohms
Spatial Resolution: 640 x 480 (60 Hz), 768 x 576 (50 Hz)
Chrominance Filters: Notch type, 3.58 MHz (60 Hz) or 4.43 MHz (50 Hz); software selectable

Data Formats
Image data can be output in 8-bit monochrome format

Control Signals
External Trigger Inputs: One, TTL levels, software selectable on rising/falling edge
Sync Select: Sync can be stripped from any of the four video inputs. Sync detection level is software programmable for 50, 75, 100 or 125 mV.
Digital Outputs: Eight general-purpose TTL outputs, fan-out of two TTL loads each



The high-speed analog circuitry of the DT3155 delivers sharp images, even across severe grayscale transitions.

Accessories

- **EP306 — 1.5m cable, accommodates four composite video inputs or three composite inputs and an external sync input**

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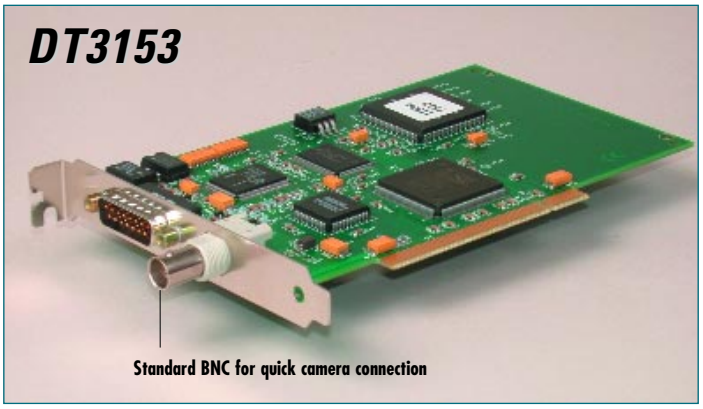
Composite Color

DT3153

Get details and data sheets at:
www.datatranslation.com/sfc/DT3153

- Composite and s-video input signals, 4 digital I/O lines
- Sync-master mode camera configurations
- 32-bit RGB, 15-bit RGB, or 16-bit YUV formats for image data output
- Ships with valuable software bundle featuring DT-Acquire ready-to-run application, drivers and complete documentation



The DT3153 is a flexible, low-cost, composite color frame grabber for the PCI Bus.

Accessories

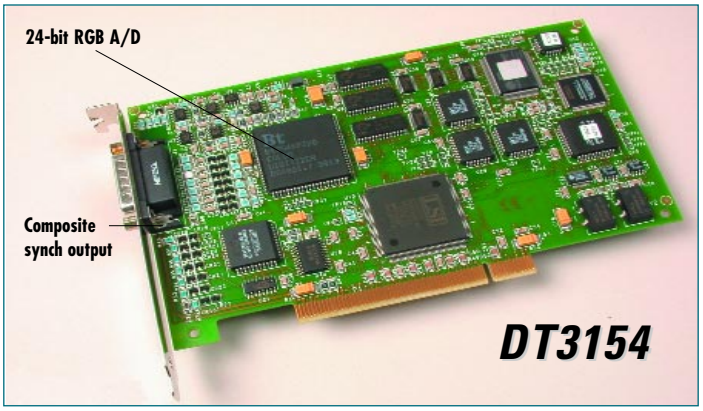
- EP306 — 1.5 meter cable

RGB Color

DT3154

Get details and data sheets at:
www.datatranslation.com/sfc/DT3154

- 24-bit RGB color format
- Composite sync output allows synchronization of multiple cameras
- On-board scaler enhances detail in small images
- 2 digital input lines, three digital output lines
- Ships with valuable software bundle featuring DT-Acquire ready-to-run application, drivers and complete documentation



The DT3154 is a flexible, 24-bit RGB color frame grabber for the PCI Bus.

Accessories

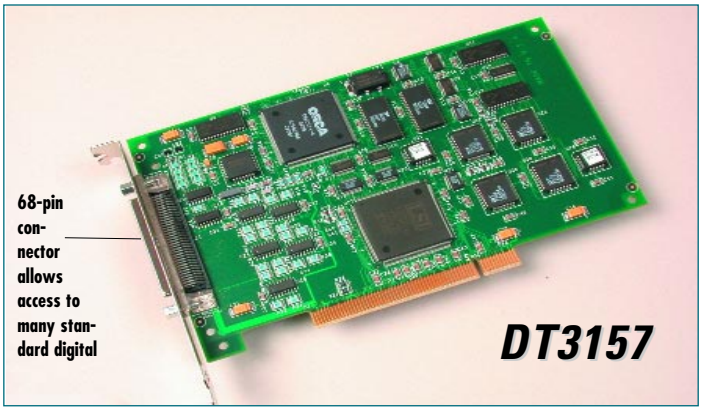
- EP306 — 1.5 meter cable

Dual-Channel Digital Camera Interface

DT3157

Get details and data sheets at:
www.datatranslation.com/sfc/DT3157

- Flexible front-end design compatible with most 8- to 16-bit digital cameras
- Easy interfacing to cameras
- Programmable camera control signals
- 256 levels (8 bits) resolution
- 8 digital I/O lines
- Ships with valuable software bundle featuring DT-Acquire ready-to-run application, drivers and complete documentation



The DT3157 is a PCI frame grabber for digital cameras.

Accessories

- EP299 — 2.75 meter cable with 68-pin connector
- EP300 — 2.75 meter cable with 37-pin connector
- EP301 — 2.75 meter cable with 31-pin connector