# Matrox Genesis

## Camera Interface Application Note

## DALSA CL-P4-xxxxW

**March 6, 2002**

*Basics about the camera*

### Camera Descriptions

- Effective resolution: up to 8192 × 8-bit.
- Dual channel LVDS digital video output.
- External sync.
- External exposure control.
- 25 MHz pixel clock rate per output.

*Mode of operations as per Matrox Imaging (in parentheses as per camera manufacturer)*

### Interface Modes

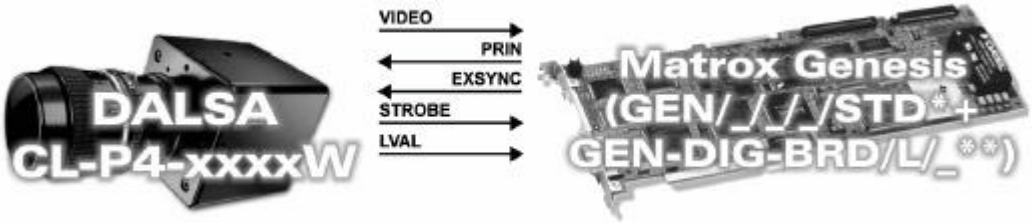
- Fixed line scan
- Variable line scan

*Basics about the interface modes*

### Camera Interface Briefs

#### *Mode 1: Fixed line scan*

- Up to 8192 × 8-bit.
- Dual channel LVDS digital video output.
- DCF configured for 512 lines per virtual frame.
- Line rate is fixed and determined by EXPOSURE2 (PRIN) frequency.
- Matrox Genesis sending EXPOSURE1 (EXSYNC) and EXPOSURE2 (PRIN) signals to camera to control exposure time and line readout.
- Matrox Genesis receiving HSYNC (LVAL), PIXEL CLOCK (STROBE @ 25 MHz) and video signals from camera.
- DCF used: CLP4DEL6.DCF (6144 × 8-bit: CL-P4-6144W model)
- DCF used: CLP4DEL8.DCF (8192 × 8-bit: CL-P4-8194W model)




#### *Mode 2: Variable line scan*

- Up to 8192 × 8-bit.
- Dual channel LVDS digital video output.
- DCF configured for 512 lines per virtual frame.
- Line rate is variable and determined by external trigger frequency.

Continued…

***Matrox Genesis main board with grab module**
****Matrox LVDS digital input board**

# Matrox Genesis

## Camera Interface Application Note

## DALSA CL-P4-xxxxW

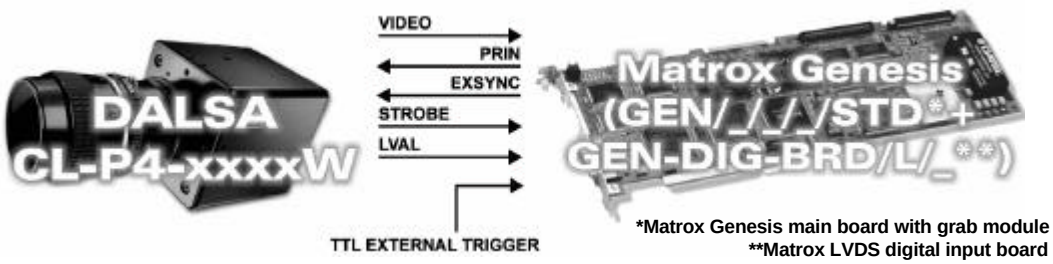
March 6, 2002

*Basics about the interface modes*

### Camera Interface Briefs (continued)

#### *Mode 2: Variable line scan*

- Matrox Genesis receiving TTL external trigger signal.
- Matrox Genesis sending EXPOSURE1 (EXSYNC) and EXPOSURE2 (PRIN) signals to camera to control exposure time and line readout.
- Matrox Genesis receiving HSYNC (LVAL), PIXEL CLOCK (STROBE @ 25 MHz) and video signals from camera.
- DCF used: CLP4DAE6.DCF (6144 × 8-bit: CL-P4-6144W model)
- DCF used: CLP4DAE8.DCF (8192 × 8-bit: CL-P4-8194W model)




***Matrox Genesis main board with grab module**
****Matrox LVDS digital input board**

*Specifics about the interface modes*

### Camera Interface Details

#### *Mode 1: Fixed line scan*

- **Line Rate:** The EXPOSURE2 (PRIN) signal period specifies the line rate. It is currently set to **6010/6610 pixels**, with a **25 MHz** pixel clock, this translates to a **4.16/3.78 kHz** line rate for models CL-P4-6144W/CL-P4-8194W respectively. The virtual frame rate equals **11.88/10.59 Hz** for models CL-P4-6144W/CL-P4-8194W respectively.
- **Exposure time:** The period (rising edge to rising edge) between of the EXPOSURE2 (PRIN) and EXPOSURE1 (EXSYNC) signals is the exposure time. The default exposure time is equal to **100 ms**. The exposure time can be modified in the DCF using Matrox Intellicam, Genesis Native Library (GNL) imCamControl() or with the MIL MdigControl() function. Consult the respective manual for more information.
- **Maximum/Minimum exposure time:** Since the Matrox Genesis timer is 16-bit wide, the maximum exposure time is calculated to be 65536/25 MHz = **2.62 ms**. For proper operation, the exposure signal must remain inactive for a minimum of 6 clock pulses before being asserted. Therefore the minimum exposure time is **240 ns**. The pixel clock is the reference clock that the exposure time is being set by. The smallest increment of the exposure time is **40 ns**.

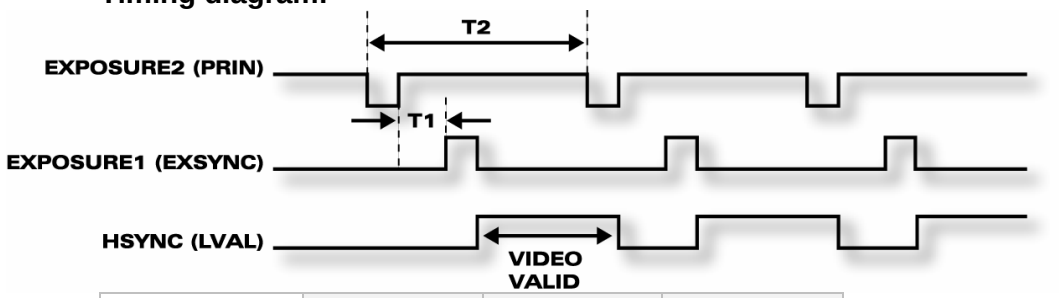
Continued…

*Specifics about the interface modes*

## Camera Interface Details (continued)

### *Mode 1: Fixed line scan*

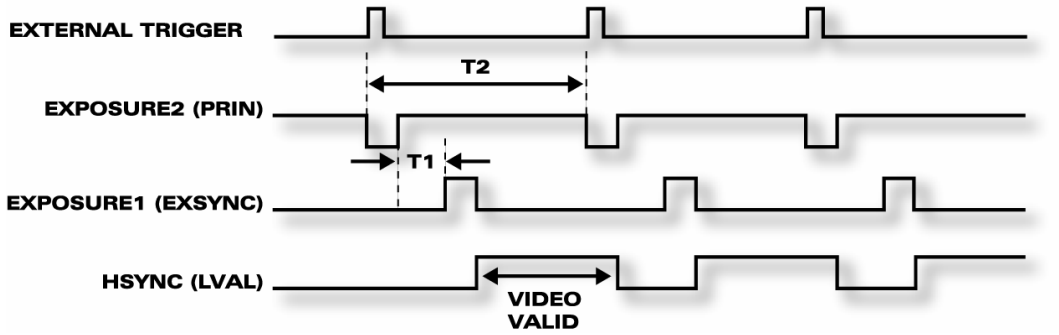
- **Timing diagram:**




| | T1 | T2 | Video Valid |
|---|---|---|---|
| CL-P4-6144W | 100 ms | 160.4 ms | 61.44 ms |
| CL-P4-8194W | 100 ms | 180.4 ms | 81.92 ms |

### Mode 2: Variable line scan

- **Line Rate:** Line rate and virtual frame rates are variable and controlled by the frequency of the external trigger signal.
- **Exposure time/ Maximum/Minimum exposure time:** Same as for Mode 1: Fixed line scan.
- **Timing diagram:**




| | T1 | T2 | Video Valid |
|---|---|---|---|
| CL-P4-6144W | 100 ms | 160.4 ms | 61.44 ms |
| CL-P4-8194W | 100 ms | 180.4 ms | 81.92 ms |

# Matrox Genesis

## Camera Interface Application Note

## DALSA CL-P4-xxxxW

March 6, 2002

*Cabling details for this interface mode*

### Cabling Requirements

#### *Mode 1: Fixed line scan*

- **Cable:** DBHD100-TO-OPEN (open ended) cable required for video, synchronization and control signals.
- **Connection:** Connections between the 37-pin connector (**OS1/OS2**) of the camera and the 100-pin connectors of the Matrox Genesis are as follows:

| **GEN-DIG-BRD/L/_ (100-pin connector)** | | | **DALSA CL-P4-xxxxW (37-pin connector)** | |
|---|---|---|---|---|
| ***Pin name*** | ***Pin no.*** | | ***Pin name*** | ***Pin no.*** |
| DATA, INPUT, 0+ | 01 | ← | D0 | 16 |
| DATA, INPUT, 0- | 02 | ← | D0B | 35 |
| DATA, INPUT, 1+ | 03 | ← | D1 | 15 |
| DATA, INPUT, 1- | 04 | ← | D1B | 34 |
| DATA, INPUT, 2+ | 05 | ← | D2 | 14 |
| DATA, INPUT, 2- | 06 | ← | D2B | 33 |
| DATA, INPUT, 3+ | 07 | ← | D3 | 13 |
| DATA, INPUT, 3- | 08 | ← | D3B | 32 |
| DATA, INPUT, 4+ | 09 | ← | D4 | 12 |
| DATA, INPUT, 4- | 10 | ← | D4B | 31 |
| DATA, INPUT, 5+ | 11 | ← | D5 | 11 |
| DATA, INPUT, 5- | 12 | ← | D5B | 30 |
| DATA, INPUT, 6+ | 13 | ← | D6 | 10 |
| DATA, INPUT, 6- | 14 | ← | D6B | 29 |
| DATA, INPUT, 7+ | 15 | ← | D7 | 09 |
| DATA, INPUT, 7- | 16 | ← | D7B | 28 |
| DATA, INPUT, 8+ | 17 | ← | D0 | 08 |
| DATA, INPUT, 8- | 18 | ← | D0B | 27 |
| DATA, INPUT, 9+ | 19 | ← | D1 | 07 |
| DATA, INPUT, 9- | 20 | ← | D1B | 26 |
| DATA, INPUT, 10+ | 21 | ← | D2 | 06 |
| DATA, INPUT, 10- | 22 | ← | D2B | 25 |
| DATA, INPUT, 11+ | 23 | ← | D3 | 05 |
| DATA, INPUT, 11- | 24 | ← | D3B | 24 |
| DATA, INPUT, 12+ | 25 | ← | D4 | 04 |
| DATA, INPUT, 12- | 26 | ← | D4B | 23 |
| DATA, INPUT, 13+ | 27 | ← | D5 | 03 |
| DATA, INPUT, 13- | 28 | ← | D5B | 22 |
| DATA, INPUT, 14+ | 29 | ← | D6 | 02 |
| DATA, INPUT, 14- | 30 | ← | D6B | 21 |
| DATA, INPUT, 15+ | 31 | ← | D7 | 01 |
| DATA, INPUT, 15- | 32 | ← | D7B | 20 |
| CLOCK, INPUT, + | 39 | ← | STROBE | 17 |
| CLOCK, INPUT, - | 40 | ← | STROBEB | 36 |

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# Matrox Genesis

## Camera Interface Application Note

## DALSA CL-P4-xxxxW

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*Cabling details for the interface modes*

### Cabling Requirements (Continued)

#### Mode 1: Fixed line scan

- **Connection:** Connections between the 37-pin connector (**OS1/OS2**) of the camera and the 100-pin connectors of the Matrox Genesis are as follows:

| GEN-DIG-BRD/L/_ (100-pin connector) | | | DALSA CL-P4-xxxxW (37-pin connector) | |
|---|---|---|---|---|
| ***Pin name*** | ***Pin no.*** | | ***Pin name*** | ***Pin no.*** |
| HSYNC, INPUT, + | 33 | ← | LVAL | 18 |
| HSYNC, INPUT, - | 34 | ← | LVALB | 37 |

- **Connection:** Connections between the 15-pin connector (**CONTROL**) of the camera and the 100-pin connectors of the Matrox Genesis are as follows:

| GEN-DIG-BRD/L/_ (100-pin connector) | | | DALSA CL-P4-xxxxW (15-pin connector) | |
|---|---|---|---|---|
| ***Pin name*** | ***Pin no.*** | | ***Pin name*** | ***Pin no.*** |
| EXPOSURE1, OUTPUT, + | 95 | ← | EXSYNC | 12 |
| EXPOSURE1, OUTPUT, - | 96 | ← | EXSYNCB | 04 |
| EXPOSURE2, OUTPUT, + | 97 | ← | PRIN | 05 |
| EXPOSURE2, OUTPUT, - | 98 | ← | PRINB | 13 |

#### Mode 2: Variable line scan

- **Cable:** DBHD100-TO-OPEN (open ended) and IMG-7W2-TO-5BNC cables required for video, synchronization and control signals.
- **External trigger:** TTL external trigger source should be connected to the TTL Trigger Input of the IMG-7W2-TO-5BNC cable (gray BNC).
- **Connection:** Connections between the 37-pin/15-pin connectors of the camera and the 100-pin connectors of the Matrox Genesis are as in Mode 1: *Fixed line scan*.



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