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

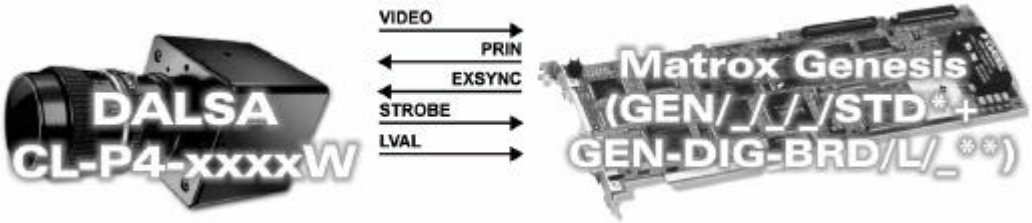
- Fixed line scan
- Variable line scan

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**

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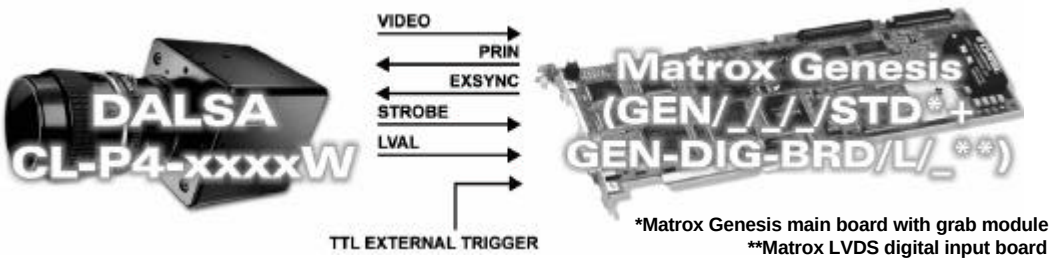
Basics about the interface modes

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**.

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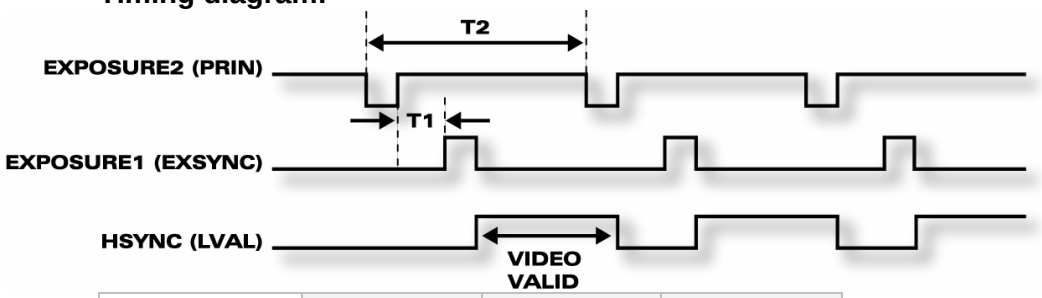
Specifics about the interface modes

Camera Interface Details (continued)

Mode 1: Fixed line scan

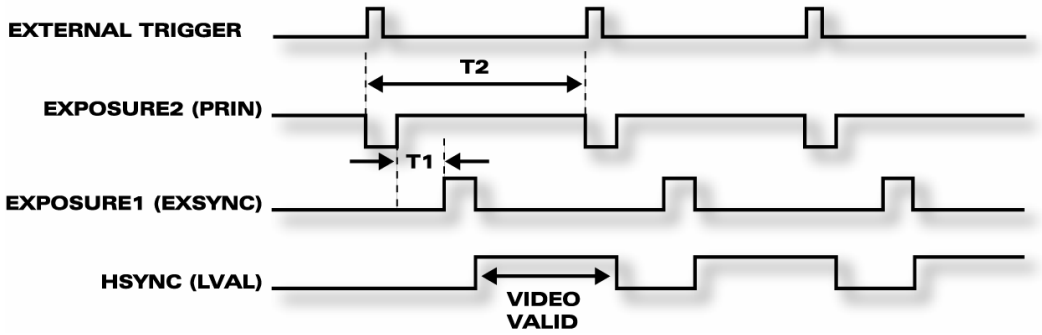
- **Timing diagram:**



	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

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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

Continued…

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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