

Matrox Genesis

Camera Interface Application Note

DALSA CT-P4-xxxxW

March 6, 2002

Basics about the
camera

Camera Descriptions

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

Interface Modes

- Fixed line scan
- Variable line scan

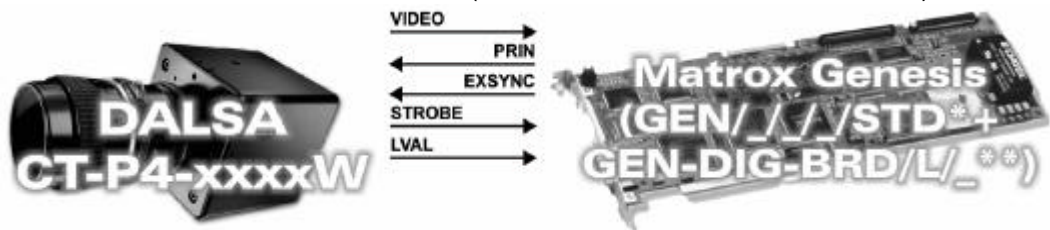
Mode of operations as
per Matrox Imaging (in
parentheses as per
camera manufacturer)

Basics about the
interface modes

Camera Interface Briefs

Mode 1: Fixed line scan

- Up to 8192×8 -bit.
- Quad 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: [CTP4DEL6.DCF](#) (6144×8 -bit: CT-P4-6144W model)
- DCF used: [CTP4DEL8.DCF](#) (8192×8 -bit: CT-P4-8194W model)



Mode 2: Variable line scan

- Up to 8192×8 -bit.
- Quad 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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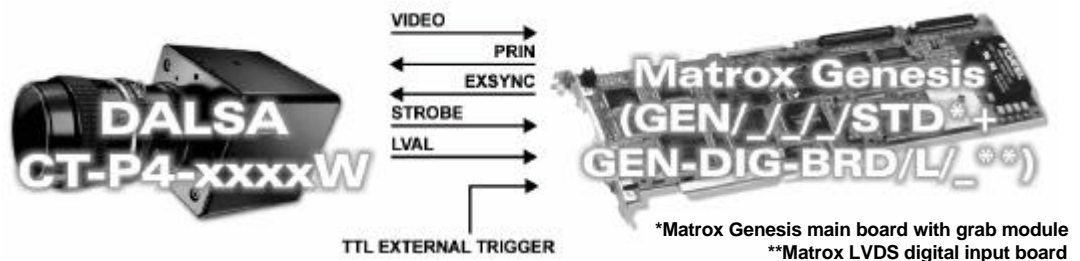
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Basics about the
interface modes

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: [CTP4DAE6.DCF](#) (6144 × 8-bit: CT-P4-6144W model)
- DCF used: [CTP4DAE8.DCF](#) (8192 × 8-bit: CT-P4-8194W model)



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 **4110/4610 pixels**, with a **25 MHz** pixel clock, this translates to a **6.08/5.42 kHz** line rate for models CT-P4-6144W/CT-P4-8194W respectively. The virtual frame rate equals **11.88/10.59 Hz** for models CT-P4-6144W/CT-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 $65536/25 \text{ MHz} = 2.62 \text{ ms}$. 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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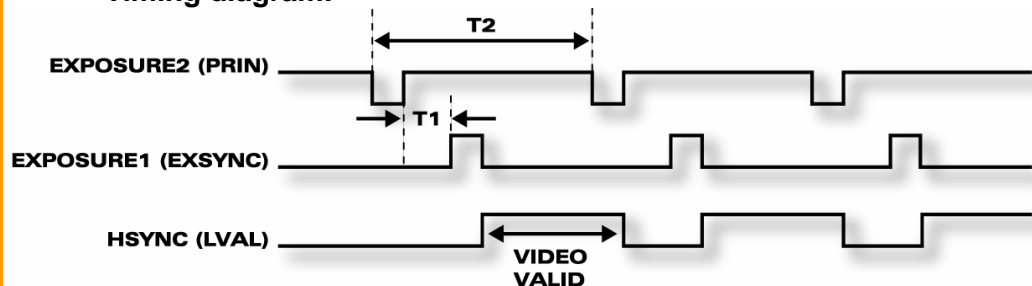
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Specifics about the
interface modes

Camera Interface Details (continued)

Mode 1: Fixed line scan

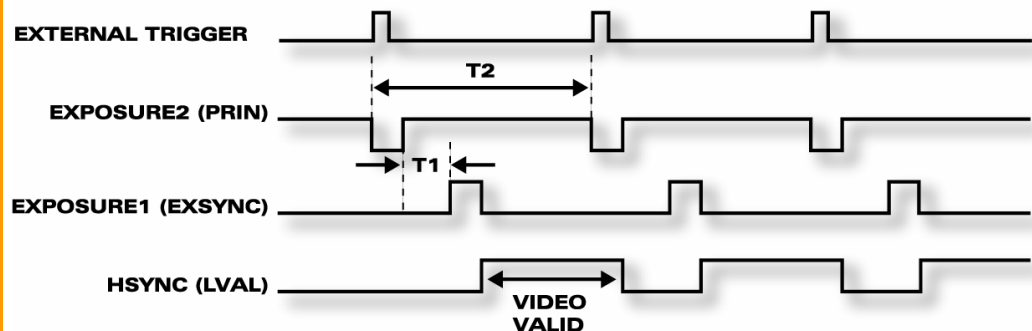
▪ Timing diagram:



	T1	T2	Video Valid
CT-P4-6144W	100 ms	160.4 ms	61.44 ms
CT-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
CT-P4-6144W	100 ms	160.4 ms	61.44 ms
CT-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 CT-P4-xxxxW (37-pin connector)	
Pin name	Pin no.	Pin name	Pin no.
DATA, INPUT, 0+	01	←	AD0
DATA, INPUT, 0-	02	←	AD0B
DATA, INPUT, 1+	03	←	AD1
DATA, INPUT, 1-	04	←	AD1B
DATA, INPUT, 2+	05	←	AD2
DATA, INPUT, 2-	06	←	AD2B
DATA, INPUT, 3+	07	←	AD3
DATA, INPUT, 3-	08	←	AD3B
DATA, INPUT, 4+	09	←	AD4
DATA, INPUT, 4-	10	←	AD4B
DATA, INPUT, 5+	11	←	AD5
DATA, INPUT, 5-	12	←	AD5B
DATA, INPUT, 6+	13	←	AD6
DATA, INPUT, 6-	14	←	AD6B
DATA, INPUT, 7+	15	←	AD7
DATA, INPUT, 7-	16	←	AD7B
DATA, INPUT, 8+	17	←	BD0
DATA, INPUT, 8-	18	←	BD0B
DATA, INPUT, 9+	19	←	BD1
DATA, INPUT, 9-	20	←	BD1B
DATA, INPUT, 10+	21	←	BD2
DATA, INPUT, 10-	22	←	BD2B
DATA, INPUT, 11+	23	←	BD3
DATA, INPUT, 11-	24	←	BD3B
DATA, INPUT, 12+	25	←	BD4
DATA, INPUT, 12-	26	←	BD4B
DATA, INPUT, 13+	27	←	BD5
DATA, INPUT, 13-	28	←	BD5B
DATA, INPUT, 14+	29	←	BD6
DATA, INPUT, 14-	30	←	BD6B
DATA, INPUT, 15+	31	←	BD7
DATA, INPUT, 15-	32	←	BD7B
CLOCK, INPUT, +	39	←	STROBE
CLOCK, INPUT, -	40	←	STROBEB

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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 CT-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 37-pin connector (**OS3/OS4**) of the camera and the 100-pin connectors of the Matrox Genesis are as follows:

GEN-DIG-BRD/L/_ (100-pin connector)			DALSA CT-P4-xxxxW (37-pin connector)	
Pin name	Pin no.		Pin name	Pin no.
DATA, INPUT, 16+	51	←	CD0	08
DATA, INPUT, 16-	52	←	CD0B	27
DATA, INPUT, 17+	53	←	CD1	07
DATA, INPUT, 17-	54	←	CD1B	26
DATA, INPUT, 18+	55	←	CD2	06
DATA, INPUT, 18-	56	←	CD2B	25
DATA, INPUT, 19+	57	←	CD3	05
DATA, INPUT, 19-	58	←	CD3B	24
DATA, INPUT, 20+	59	←	CD4	04
DATA, INPUT, 20-	60	←	CD4B	23
DATA, INPUT, 21+	61	←	CD5	03
DATA, INPUT, 21-	62	←	CD5B	22
DATA, INPUT, 22+	63	←	CD6	02
DATA, INPUT, 22-	64	←	CD6B	21
DATA, INPUT, 23+	65	←	CD7	01
DATA, INPUT, 23-	66	←	CD7B	20
DATA, INPUT, 24+	67	←	DD0	16
DATA, INPUT, 24-	68	←	DD0B	35
DATA, INPUT, 25+	69	←	DD1	15
DATA, INPUT, 25-	70	←	DD1B	34
DATA, INPUT, 26+	71	←	DD2	14
DATA, INPUT, 26-	72	←	DD2B	33
DATA, INPUT, 27+	73	←	DD3	13
DATA, INPUT, 27-	74	←	DD3B	32

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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 (**OS3/OS4**) of the camera and the 100-pin connectors of the Matrox Genesis are as follows:

GEN-DIG-BRD/L/_ (100-pin connector)		DALSA CT-P4-xxxxW (37-pin connector)	
Pin name	Pin no.	Pin name	Pin no.
DATA, INPUT, 28+	75 ←	DD4	12
DATA, INPUT, 28-	76 ←	DD4B	31
DATA, INPUT, 29+	77 ←	DD5	11
DATA, INPUT, 29-	78 ←	DD5B	30
DATA, INPUT, 30+	79 ←	DD6	10
DATA, INPUT, 30-	80 ←	DD6B	29
DATA, INPUT, 31+	81 ←	DD7	09
DATA, INPUT, 31-	82 ←	DD7B	28

- **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 CT-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 and 15-pin connectors of the camera and the 100-pin connectors of the Matrox Genesis are as in Mode 1 Fixed line scan.

The DCF(s) mentioned in this application note can be found on the MIL and Native Library CD, or our FTP site ([ftp.matrox.com](ftp:ftp.matrox.com)). The information furnished by Matrox Electronic Systems, Ltd. is believed to be accurate and reliable. Please verify on our FTP site ([ftp.matrox.com](ftp:ftp.matrox.com)). The information furnished by Matrox Electronic Systems, Ltd. is believed to be accurate and reliable. Please verify all interface connections with camera documentation or manual. Contact your local sales representative or Matrox Sales office or Matrox Imaging Applications at 514-822-6061 for assistance.

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