

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

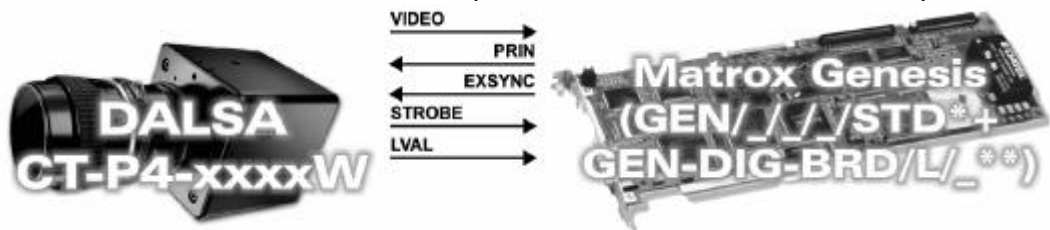
Mode of operations as
per Matrox Imaging (in
parentheses as per
camera manufacturer)

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)

Basics about the
interface modes



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

Matrox Genesis

Camera Interface Application Note

DALSA CT-P4-xxxxW

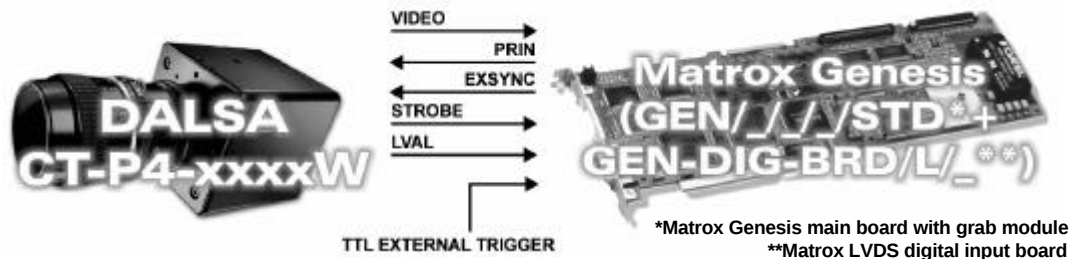
March 6, 2002

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: [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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Matrox Genesis

Camera Interface Application Note

DALSA CT-P4-xxxxW

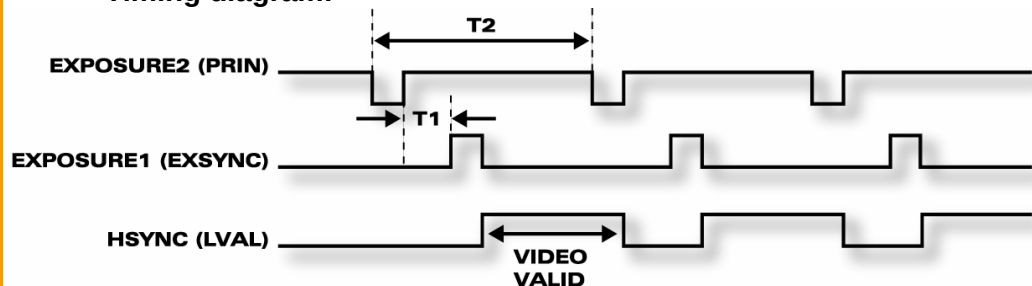
March 6, 2002

Specifics about the
interface modes

Camera Interface Details (continued)

Mode 1: Fixed line scan

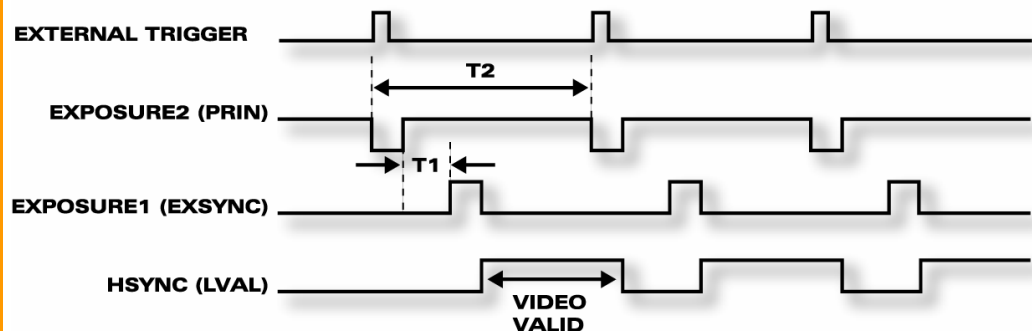
▪ Timing diagram:



	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

Matrox Genesis

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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/LI_ (100-pin connector)		DALSA CT-P4-xxxxW (37-pin connector)	
Pin name	Pin no.	Pin name	Pin no.
DATA, INPUT, 0+	01	←	AD0 16
DATA, INPUT, 0-	02	←	AD0B 35
DATA, INPUT, 1+	03	←	AD1 15
DATA, INPUT, 1-	04	←	AD1B 34
DATA, INPUT, 2+	05	←	AD2 14
DATA, INPUT, 2-	06	←	AD2B 33
DATA, INPUT, 3+	07	←	AD3 13
DATA, INPUT, 3-	08	←	AD3B 32
DATA, INPUT, 4+	09	←	AD4 12
DATA, INPUT, 4-	10	←	AD4B 31
DATA, INPUT, 5+	11	←	AD5 11
DATA, INPUT, 5-	12	←	AD5B 30
DATA, INPUT, 6+	13	←	AD6 10
DATA, INPUT, 6-	14	←	AD6B 29
DATA, INPUT, 7+	15	←	AD7 09
DATA, INPUT, 7-	16	←	AD7B 28
DATA, INPUT, 8+	17	←	BD0 08
DATA, INPUT, 8-	18	←	BD0B 27
DATA, INPUT, 9+	19	←	BD1 07
DATA, INPUT, 9-	20	←	BD1B 26
DATA, INPUT, 10+	21	←	BD2 06
DATA, INPUT, 10-	22	←	BD2B 25
DATA, INPUT, 11+	23	←	BD3 05
DATA, INPUT, 11-	24	←	BD3B 24
DATA, INPUT, 12+	25	←	BD4 04
DATA, INPUT, 12-	26	←	BD4B 23
DATA, INPUT, 13+	27	←	BD5 03
DATA, INPUT, 13-	28	←	BD5B 22
DATA, INPUT, 14+	29	←	BD6 02
DATA, INPUT, 14-	30	←	BD6B 21
DATA, INPUT, 15+	31	←	BD7 01
DATA, INPUT, 15-	32	←	BD7B 20
CLOCK, INPUT, +	39	←	STROBE 17
CLOCK, INPUT, -	40	←	STROBEB 36

Continued...

Matrox Genesis

Camera Interface Application Note

DALSA CT-P4-xxxxW

March 6, 2002

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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Matrox Genesis

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DALSA CT-P4-xxxxW

March 6, 2002

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 Electronics System, 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 Electronics System, 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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