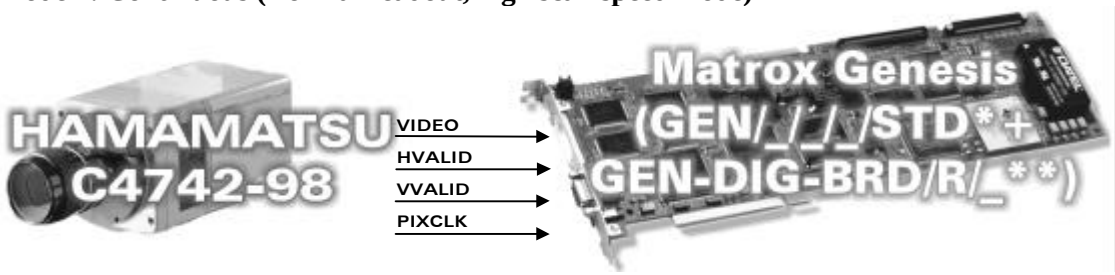
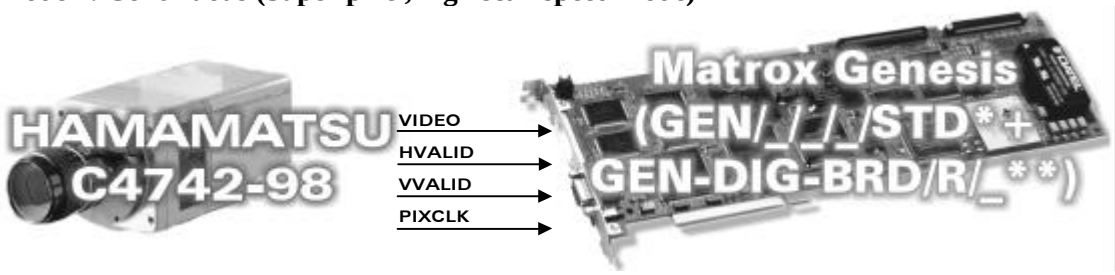
Application Note:
Interfacing non-standard cameras to Matrox Genesis

MATROX GENESIS

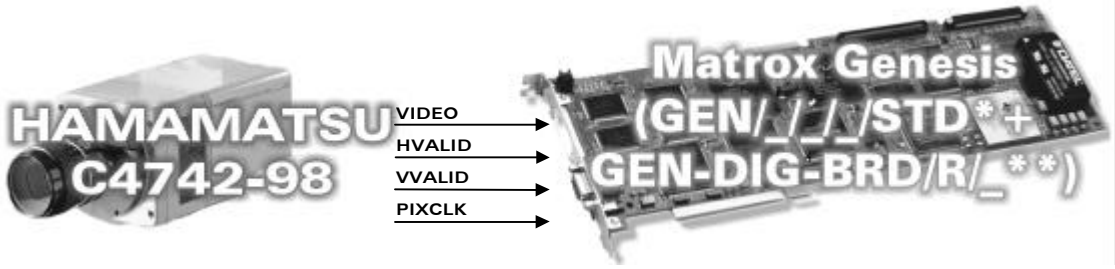
HAMAMATSU ORCA-II C4742-98

October 5, 2000

Camera Descriptions	• 1280 × 1024 × 12/14-bit. • Single channel RS-422 digital video output. • Progressive scan. • Internal or external exposure control. • Pixel clock rate: up to 10 MHz.
Interface mode	• Continuous (normal or super pixel, high or slow scan speed)
Camera Interface Briefs	**Mode 1: Continuous (Normal readout, high scan speed mode)**  *Matrox Genesis main board with grab module **Matrox RS-422 digital data input board • 1280 × 1024 × 12-bit @ 5.4 fps. • Single channel RS-422 digital video. • Progressive scan. • Continuous video. • Matrox Genesis receiving HSYNC (HVALID), VSYNC (VVALID), PIXEL CLOCK (PIXCLK @ 10 MHz) and video signals from camera. • DCF used: G4742F1.DCF **Mode 2: Continuous (Super pixel, high scan speed mode)**  *Matrox Genesis main board with grab module **Matrox RS-422 digital data input board • up to 640 × 512 × 12-bit. • Single channel RS-422 digital video. • Progressive scan. • Continuous video. • Matrox Genesis receiving HSYNC (HVALID), VSYNC (VVALID), PIXEL CLOCK (PIXCLK) and video signals from camera. • DCF used: G4742F2.DCF (2 × 2, 640 × 512 @ 10 fps, PIXCLK @ 5 MHz) • DCF used: G4742F4.DCF (4 × 4, 320 × 256 @ 17.57 fps, PIXCLK @ 2.5 MHz) • DCF used: G4742F8.DCF (8 × 8, 160 × 128 @ 28.2 fps, PIXCLK @ 1.25 MHz)

Camera Interface Briefs (continued)

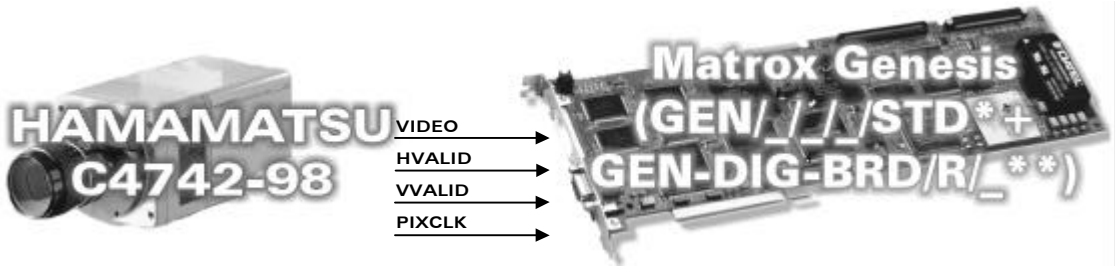
Mode 3: Continuous (Normal readout, slow scan speed mode)



***Matrox Genesis main board with grab module**
****Matrox RS-422 digital data input board**

- 1280 × 1024 × 14-bit @ 0.83 fps.
- Single channel RS-422 digital video.
- Progressive scan.
- Continuous video.
- Matrox Genesis receiving HSYNC (HVALID), VSYNC (VVALID), PIXEL CLOCK (PIXCLK @ 1.25 MHz) and video signals from camera.
- DCF used: G4742S1.DCF

Mode 4: Continuous (Super pixel, slow scan speed mode)



***Matrox Genesis main board with grab module**
****Matrox RS-422 digital data input board**

- up to 640 × 512 × 14-bit.
- Single channel RS-422 digital video.
- Progressive scan.
- Continuous video.
- Matrox Genesis receiving HSYNC (HVALID), VSYNC (VVALID), PIXEL CLOCK (PIXCLK) and video signals from camera.
- DCF used: G4742S2.DCF (2 × 2, 640 × 512 @ 1.59 fps, PIXCLK @ 0.625 MHz)
- DCF used: G4742S4.DCF (4 × 4, 320 × 256 @ 2.96 fps, PIXCLK @ 0.3125 MHz)
- DCF used: G4742S8.DCF (8 × 8, 160 × 128 @ 5.19 fps, PIXCLK @ 0.1563 MHz)

Camera Interface Details

Mode 1 and 2: Continuous (High scan speed mode)

- **Frame rate:** Frame rate is fixed and inversely proportionate to the exposure time. Refer to Camera Interface Briefs for actual frame rates for individual DCF files.
- **Exposure time:** Exposure time is adjustable (on camera) and inversely proportionate to the frame rate. Refer to the camera manual for more information.

Camera Interface Details (continued)

Mode 1 and 2: Continuous (High scan speed mode)

- **Camera mode setting commands:** Refer to the camera manual for additional information. Commands should be set as follows:

Command	*G4742F1.DCF*	*G4742F2.DCF*	*G4742F4.DCF*	*G4742F8.DCF*
AMD	N	N	N	N
SPX	1	2	4	8
SMD	N	S	S	S
NMD	N	N	N	N
SSP	H	H	H	H

Mode 3 and 4: Continuous (Slow scan speed mode)

- **Frame rate:** Frame rate is fixed and inversely proportionate to the exposure time. Refer to Camera Interface Briefs for actual frame rates for individual DCF files.
- **Exposure time:** Exposure time is adjustable (on camera) and inversely proportionate to the frame rate. Refer to the camera manual for more information.
- **Camera mode setting commands:** Refer to the camera manual for additional information. Commands should be set as follows:

Command	*G4742S1.DCF*	*G4742S2.DCF*	*G4742S4.DCF*	*G4742S8.DCF*
AMD	N	N	N	N
SPX	1	2	4	8
SMD	N	S	S	S
NMD	N	N	N	N
SSP	S	S	S	S

Cabling Requirements

Mode 1-4: Continuous

- DBHD100-TO-OPEN cable and GEN/DIG/BRD/R/_ board required for synchronization, control and video signals from camera.
- Connections should be made between the 68-pin connector (**DIGITAL VIDEO**) of the camera and Matrox Genesis are as follows:

GEN/DIG/BRD/R/_ (100-pin connector)			**HAMAMATSU C4742-98 (68-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
CLOCK, INPUT, -	40	←	PIXCLK-	01
CLOCK, INPUT, +	39	←	PIXCLK+	35
HSYNC, INPUT, -	34	←	HVALID-	02
HSYNC, INPUT, +	33	←	HVALID+	36
VSYNC, INPUT, -	36	←	VVALID-	03
VSYNC, INPUT, +	35	←	VVALID+	37
DATA, INPUT, 0-	02	←	DB0-	04
DATA, INPUT, 0+	01	←	DB0+	38

continued

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Cabling Requirements

GEN/DIG/BRD/_/_ (100-pin connector) Pin name	Pin no.		HAMAMATSU C4742-98 (68-pin connector) Pin name	Pin no.
DATA, INPUT, 1-	04	←	DB1-	05
DATA, INPUT, 1+	03	←	DB1+	39
DATA, INPUT, 2-	06	←	DB2-	06
DATA, INPUT, 2+	05	←	DB2+	40
DATA, INPUT, 3-	08	←	DB3-	07
DATA, INPUT, 3+	07	←	DB3+	41
DATA, INPUT, 4-	10	←	DB4-	08
DATA, INPUT, 4+	09	←	DB4+	42
DATA, INPUT, 5-	12	←	DB5-	09
DATA, INPUT, 5+	11	←	DB5+	43
DATA, INPUT, 6-	14	←	DB6-	10
DATA, INPUT, 6+	13	←	DB6+	44
DATA, INPUT, 7-	16	←	DB7-	11
DATA, INPUT, 7+	15	←	DB7+	45
DATA, INPUT, 8-	18	←	DB8-	12
DATA, INPUT, 8+	17	←	DB8+	46
DATA, INPUT, 9-	20	←	DB9-	13
DATA, INPUT, 9+	19	←	DB9+	47
DATA, INPUT, 10-	22	←	DB10-	14
DATA, INPUT, 10+	21	←	DB10+	48
DATA, INPUT, 11-	24	←	DB11-	15
DATA, INPUT, 11+	23	←	DB11+	49
DATA, INPUT, 12-	26	←	DB12-	16
DATA, INPUT, 12+	25	←	DB12+	50
DATA, INPUT, 13-	28	←	DB13-	17
DATA, INPUT, 13+	27	←	DB13+	51
USER, INPUT, 0-	42	←	A/D OVF-	20
USER, INPUT, 0+	41	←	A/D OVF+	54

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). 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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