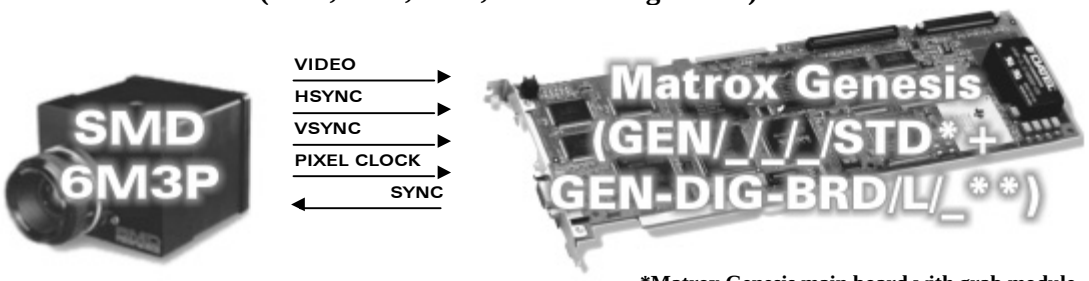
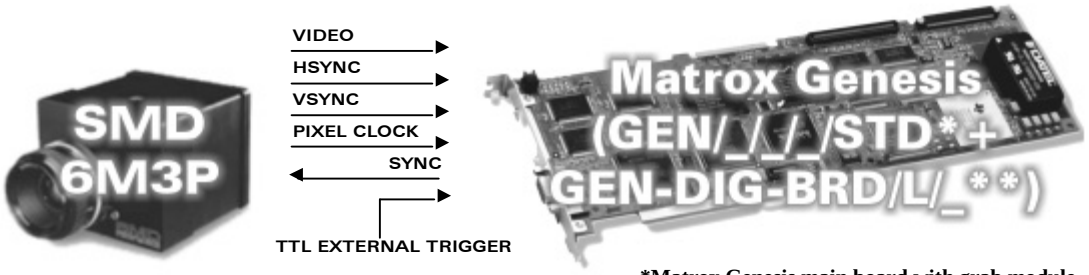
Application Note:
Interfacing non-standard cameras to Matrox Genesis

MATROX GENESIS

SMD 6M3P **May 9, 2000**

Camera Descriptions	• 3072 × 2048 × 12-bit @ up to 2.75 fps • Single tap LVDS digital video output. • Progressive scan. • External or internal exposure control. • Internal and external synchronization. • Maximum frame rate: 12.5 fps (8 × 8 binning mode). • Pixel clock rate: up to 20 MHz.
Interface modes	• Continuous, Asynchronous reset (1 × 1, 2 × 2, 4 × 4, 8 × 8 binning modes)
Camera Interface Briefs	**Mode 1: Continuous (1 ´ 1, 2 ´ 2, 4 ´ 4, 8 ´ 8 binning modes)**  ***Matrox Genesis main board with grab module** ****Matrox LVDS digital data input board** • 3072 × 2048 × 12-bit @ 1 fps. • Single tap LVDS digital video. • Progressive scan. • Continuous video. • Matrox Genesis sending periodic EXPOSURE1 (SYNC) signal to camera: EXPOSURE1 (SYNC) signal initiates exposure and controls exposure time. • Matrox Genesis receiving HSYNC, VSYNC, PIXEL CLOCK (PCLK) and video signals from camera. • DCF used: G6M3PC1.DCF (1 × 1 binning mode: 3072 × 2048 @ 20 MHz) • DCF used: G6M3PC2.DCF (2 × 2 binning mode: 1535 × 1024 @ 10 MHz) • DCF used: G6M3PC4.DCF (4 × 4 binning mode: 766 × 511 @ 5 MHz) • DCF used: G6M3PC8.DCF (8 × 8 binning mode: 383 × 255 @ 2.5 MHz) **Mode 2: Asynchronous reset (1 ´ 1, 2 ´ 2, 4 ´ 4, 8 ´ 8 binning modes)**  ***Matrox Genesis main board with grab module** ****Matrox LVDS digital data input board** • 3072 × 2048 × 12-bit @ 1 fps. • Single tap LVDS digital video. • Matrox Genesis receiving TTL external trigger signal. continued

Camera Interface Briefs (continued)

- Matrox Genesis sending EXPOSURE1 (SYNC) signal to camera: EXPOSURE1 (SYNC) signal initiates exposure and controls exposure time.
- Matrox Genesis receiving HSYNC, VSYNC, PIXEL CLOCK (PCLK) and video signals from camera.
- DCF used: G6M3PA1.DCF (1 × 1 binning mode: 3072 × 2048 @ 20 MHz)
- DCF used: G6M3PA2.DCF (2 × 2 binning mode: 1535 × 1024 @ 10 MHz)
- DCF used: G6M3PA4.DCF (4 × 4 binning mode: 766 × 511 @ 5 MHz)
- DCF used: G6M3PA8.DCF (8 × 8 binning mode: 383 × 255 @ 2.5 MHz)

Camera Interface Details

Mode 1: Continuous (1 ´ 1, 2 ´ 2, 4 ´ 4, 8 ´ 8 binning modes)

- Matrox Genesis sends the periodic EXPOSURE1 (SYNC) signal to the camera to initiate and control the exposure time (integration).
- **Frame rate**: The frame rate is determined by the frequency of the periodic EXPOSURE1 (SYNC) signal. Default frame rate for the DCFs is 1 frame per second. In order to change the frame rate, adjust the total exposure period (active and inactive portions) of Timer1 in the Exposure Settings menu tab in Matrox Intellicam. For a list of maximum possible frame rates per binning mode, refer to the camera specifications.
- **Exposure time**: The active width of the EXPOSURE1 (SYNC) signal equals the exposure time. Exposure is initiated on the rising edge and halted on the falling edge of the EXPOSURE1 (SYNC) signal. The default exposure time for the DCFs is equal to **300 ms**. In order to change the exposure time, adjust the active duration of Timer1 in the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information.
- **Camera settings (configuration)**: As outlined in the camera specifications, camera configurations may be modified through the manipulation of control registers. All registers are accessed via an RS-232 serial interface. For this camera interface, Integrate Mode and Binning Mode control registers must be set as follows:

Binning Mode	Setting
1×1	00
2×2	01
4×4	10
8×8	11

Integrate Mode	Setting
External	1

Mode 2: Asynchronous reset (1 ´ 1, 2 ´ 2, 4 ´ 4, 8 ´ 8 binning modes)

- Once it has received the external trigger signal, Matrox Genesis sends the EXPOSURE1 (SYNC) signal to the camera to initiate and control the exposure time (integration).
- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time**: The pulse width of the EXPOSURE1 (SYNC) signal equals the exposure time. Exposure is initiated on the rising edge and halted on the falling edge of the EXPOSURE1 (SYNC) signal. The default exposure time for the DCF is equal to **300 ms**. In order to change the width and deployment time of EXPOSURE1 (SYNC), adjust the pulse portion of Timer1 in the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information.
- **Camera settings (configuration)**: Are as in *Mode 1: Continuous*.

Cabling Requirements

Mode 1: Continuous (1 ´ 1, 2 ´ 2, 4 ´ 4, 8 ´ 8 binning modes)

- DBHD100-TO-OPEN cable and GEN/DIG/BRD/L/_ board required for digital data, synchronization and control signals.
- Connections between the 60-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/L/_ are as follows:

GEN-DIG-BRD/L/_ (100-pin connector)			**SMD 6M3P (60-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 0+	01	←	DA0	01
DATA, INPUT, 0-	02	←	DA0*	02
DATA, INPUT, 1+	03	←	DA1	03
DATA, INPUT, 1-	04	←	DA1*	04
DATA, INPUT, 2+	05	←	DA2	05
DATA, INPUT, 2-	06	←	DA2*	06
DATA, INPUT, 3+	07	←	DA3	07
DATA, INPUT, 3-	08	←	DA3*	08
DATA, INPUT, 4+	09	←	DA4	09
DATA, INPUT, 4-	10	←	DA4*	10
DATA, INPUT, 5+	11	←	DA5	11
DATA, INPUT, 5-	12	←	DA5*	12
DATA, INPUT, 6+	13	←	DA6	13
DATA, INPUT, 6-	14	←	DA6*	14
DATA, INPUT, 7+	15	←	DA7	15
DATA, INPUT, 7-	16	←	DA7*	16
DATA, INPUT, 8+	17	←	DA8	17
DATA, INPUT, 8-	18	←	DA8*	18
DATA, INPUT, 9+	19	←	DA9	19
DATA, INPUT, 9-	20	←	DA9*	20
DATA, INPUT, 10+	21	←	DA10	21
DATA, INPUT, 10-	22	←	DA10*	22
DATA, INPUT, 11+	23	←	DA11	23
DATA, INPUT, 11-	24	←	DA11*	24
GROUND	37	--	GND	45
GROUND	50	--	GND	46
VSYNC, INPUT, +	35	←	VSYNC	56
VSYNC, INPUT, -	36	←	VSYNC*	55
HSYNC, INPUT, +	33	←	HSYNC	58
HSYNC, INPUT, -	34	←	HSYNC*	57
CLOCK, INPUT, +	39	←	PCLK	60
CLOCK, INPUT, -	40	←	PCLK*	59
EXPOSURE1, OUTPUT, TTL	87	→	SYNC	Camera Rear

Application Note:
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Cabling Requirements (continuous)	**Mode 2: Asynchronous reset (1 ´ 1, 2 ´ 2, 4 ´ 4, 8 ´ 8 binning modes)** • DBHD100-TO-OPEN and IMG-7W2-TO-5BNC cables, and GEN/DIG/BRD/L/_ board required for external trigger, digital data, synchronization, and control signals. • TTL external trigger source should be connected to the TTL trigger input of the IMG-7W2-TO-5BNC cable. • Connections between the 60-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/L/_ are as in *Mode 1: Continuous*.

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