Matrox Genesis

Camera Interface Application Note

TOSHIBA IK-TU51 December 6, 2002

Basics about the camera

Camera Descriptions

- 1506 × 484 × 8-bit @ 30 fps.
- Three channel (RGB) analog/LVDS digital video output.
- Interlaced scan.
- Internal (composite) sync.
- Internal or external exposure control.
- 28.6364 MHz pixel clock rate.

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

Interface Modes

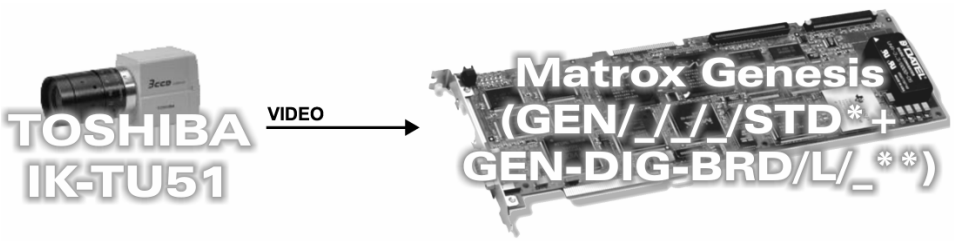
- Continuous
- Asynchronous reset (1 pulse SR)

Basics about the interface modes

Camera Interface Briefs

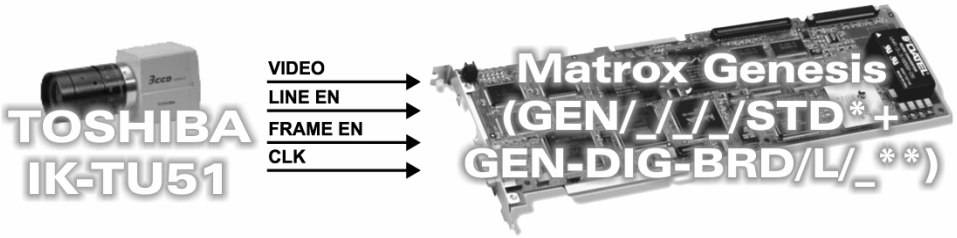
Mode 1: Continuous (analog)

- 640 × 480 × 8-bit @ 30 fps.
- Three channel (RGB) analog video.
- Interlaced scan.
- Matrox Genesis receiving video signals from camera.
- DCF used: IKTU51CA.DCF



Mode 2: Continuous (digital)

- 1506 × 484 × 8-bit @ 30 fps.
- Three channel (RGB) LVDS digital video.
- Interlaced scan.
- Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 28.6364 MHz) and video signals from camera.
- DCF used: IKTU51CD.DCF



***Matrox Genesis main board with grab module**
****Matrox LVDS digital data input board**

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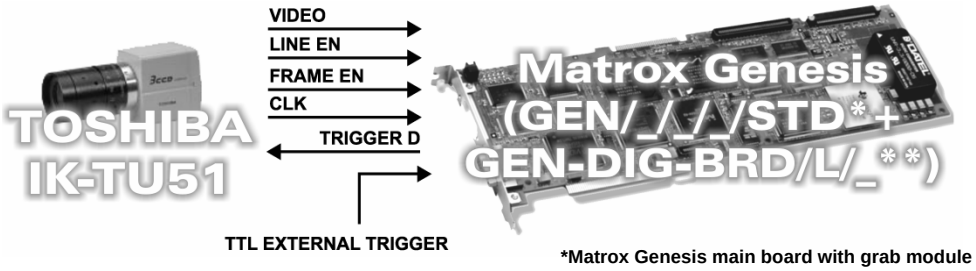
Basics about the interface modes

Camera Interface Briefs (continued)

Mode 3: Asynchronous reset (1 pulse SR)

- 1506 × 242 × 8-bit (single field).
- Three channel (RGB) LVDS digital video.
- Interlaced scan.
- Matrox Genesis receiving external trigger signal.
- Matrox Genesis sending EXPOSURE2 (TRIGGER D) to camera to initiate and control exposure time.
- Matrox Genesis receiving HSYNC (LINE EN), VSYNC (FRAME EN), PIXEL CLOCK (CLK @ 28.6364 MHz) and video signals from camera.
- DCF used: IKTU51AR.DCF



***Matrox Genesis main board with grab module**
****Matrox LVDS digital data input board**

Specifics about the interface modes

Camera Interface Details

Modes 1 and 2: Continuous (analog, digital)

- **Frame Rate:** Matrox Genesis receives the continuous video from the camera at 30 frames per second.
- **Exposure time:** Exposure time is inversely proportionate to the frame rate (no shutter) or determined by the shutter setting. Refer to the camera manual for more information.
- **Camera Control Unit settings:** In order to use the Camera Control Unit (CCU), the unit must be powered up while holding down the **Disp** and **Page** buttons for at least 3 seconds. This will change the default setting of the CCU to send the fields with Horizontal Sync (HD) instead of Line Enable, and vertical Sync (VD) instead of Frame Enable pulses. This is necessary for proper integration of the CCU with the Matrox Genesis. Refer to the IK-TU51CU camera control unit manual for additional information.

Switches should be set as follows:

Switch	Setting
Shutter Control	As Desired

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Specifics about the interface modes

Camera Interface Details (cont.)

Mode 3: Asynchronous reset (1 pulse SR)

- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Maximum frame rate**: Maximum frame rate equals **33.3 ms** + **16 ms** () = **49.3 ms**. Since the frame rate is based on the external trigger signal frequency, to achieve a maximum frame rate the external trigger signal period must be equal to **50 ms**.
- **Exposure time**: The exposure time is controlled through the IK-TU51CU camera control unit. Refer to the camera control unit manual for more information.
- **Camera Control Unit settings:** In order to use the Camera Control Unit (CCU), the unit must be powered up while holding down the **Disp** and **Page** buttons for at least 3 seconds. This will change the default setting of the CCU to send the fields with Horizontal Sync (HD) instead of Line Enable, and vertical Sync (VD) instead of Frame Enable pulses. This is necessary for proper integration of the CCU with the Matrox Genesis. Refer to the IK-TU51CU camera control unit manual for additional information.

  Switches should be set as follows:

Switch	Setting
Shutter Control	1 Pulse SR

Cabling details for this interface mode

Cabling Requirements

Mode 1: Continuous (analog)

- **Cable:** IMG-7W2-TO-5BNC cable required for video, synchronization and control signals.
- **Connection:** Video input BNC of IMG-7W2-TO-5BNC cable should be connected to VIDEO OUT BNC connector of camera.

Mode 2: Continuous (digital)

- **Cable:** DBHD100-TO-OPEN (open ended) cable required for video, synchronization and control signals.
- **Connection:** Connections between the 120-pin connector of the IK-TU51CU camera control unit and the 100-pin connectors of the Matrox Genesis are as follows:

GEN-DIG-BRD/L/_ (100-pin connector)			**TOSHIBA IK-TU51CU (120-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 7+	15	←	R9+ (MSB)	10
DATA, INPUT, 7-	16	←	R9-	40
DATA, INPUT, 6+	13	←	R8+	09
DATA, INPUT, 6-	14	←	R8-	39

Continued…

Cabling details for the interface modes

Cabling Requirements (Continued)

Mode 2: Continuous (digital)

GEN-DIG-BRD/L/_ (100-pin connector)			TOSHIBA IK-TU51CU (120-pin connector)	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 5+	11	←	R7+	08
DATA, INPUT, 5-	12	←	R7-	38
DATA, INPUT, 4+	09	←	R6+	07
DATA, INPUT, 4-	10	←	R6-	37
DATA, INPUT, 3+	07	←	R5+	06
DATA, INPUT, 3-	08	←	R5-	36
DATA, INPUT, 2+	05	←	R4+	05
DATA, INPUT, 2-	06	←	R4-	35
DATA, INPUT, 1+	03	←	R3+	04
DATA, INPUT, 1-	04	←	R3-	34
DATA, INPUT, 0+	01	←	R2+	03
DATA, INPUT, 0-	02	←	R2-	33
DATA, INPUT, 15+	31	←	G9+ (MSB)	20
DATA, INPUT, 15-	32	←	G9-	50
DATA, INPUT, 14+	29	←	G8+	19
DATA, INPUT, 14-	30	←	G8-	49
DATA, INPUT, 13+	27	←	G7+	18
DATA, INPUT, 13-	28	←	G7-	48
DATA, INPUT, 12+	25	←	G6+	17
DATA, INPUT, 12-	26	←	G6-	47
DATA, INPUT, 11+	23	←	G5+	16
DATA, INPUT, 11 -	24	←	G5-	46
DATA, INPUT, 10+	21	←	G4+	15
DATA, INPUT, 10-	22	←	G4-	45
DATA, INPUT, 9+	19	←	G3+	14
DATA, INPUT, 9-	20	←	G3-	44
DATA, INPUT, 8+	17	←	G2+	13
DATA, INPUT, 8-	18	←	G2-	43
DATA, INPUT, 23+	65	←	B9+ (MSB)	30
DATA, INPUT, 23-	66	←	B9-	60
DATA, INPUT, 22+	63	←	B8+	29
DATA, INPUT, 22-	34	←	B8-	59
DATA, INPUT, 21+	61	←	B7+	28
DATA, INPUT, 21-	62	←	B7-	58
DATA, INPUT, 20+	59	←	B6+	27
DATA, INPUT, 20-	60	←	B6-	57
DATA, INPUT, 19+	57	←	B5+	26
DATA, INPUT, 19-	58	←	B5-	56

Continued…

Cabling details for the interface modes

Cabling Requirements (Continued)

Mode 2: Continuous (digital)

GEN-DIG-BRD/L/_ (100-pin connector)			TOSHIBA IK-TU51CU (120-pin connector)	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 18+	55	←	B4+	25
DATA, INPUT, 18-	56	←	B4-	55
DATA, INPUT, 17+	53	←	B3+	24
DATA, INPUT, 17-	54	←	B3-	54
DATA, INPUT, 16+	51	←	B2+	23
DATA, INPUT, 16-	52	←	B2-	53
CLOCK, INPUT, +	39	←	PIXEL CLK +	62
CLOCK, INPUT, -	40	←	PIXEL CLK -	92
HSYNC, INPUT, +	33	←	LINE EN +	65
HSYNC, INPUT, -	34	←	LINE EN -	95
TRIGGER, INPUT, +	47	←	FIELD ID +	64
TRIGGER, INPUT, -	48	←	FIELD ID -	94
VSYNC, INPUT, +	35	←	FRAME EN +	63
VSYNC, INPUT, -	36	←	FRAME EN -	93
EXPOSURE2, OUTPUT, +	97*	→	TRIGGER D +	62*
EXPOSURE2, OUTPUT, -	98*	→	TRIGGER D -	92*

* This connection is not required for this mode, however allows this cable to be used with both digital modes.

- **Connection:** Connections between the 9-pin (DB9F) serial connector of the host system and the 120-pin connectors of the IK-TU51CU camera control unit are as follows:

HOST SYSTEM (9-pin connector)			TOSHIBA IK-TU51CU (120-pin connector)	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
RD RECEIVE DATA	2	←	TXD	87
TD TRANSMIT DATA	3	→	RXD	88
GROUND	5	--	GND	89

Cabling details for the interface modes

Mode 3: Asynchronous reset (1 pulse SR)

- **Cable:** IMG-7W2-TO-5BNC and DBHD100-TO-OPEN (open ended) cables required for video, synchronization trigger, 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 120-pin connector of the IK-TU51CU camera control unit and the 100-pin connectors of the Matrox Genesis are as in Mode 2: Continuous (Digital), including the following additional connections:

GEN-DIG-BRD/L/_ (100-pin connector)			**TOSHIBA IK-TU51CU (120-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
EXPOSURE2, OUTPUT, +	97	→	TRIGGER D +	62
EXPOSURE2, OUTPUT, -	98	→	TRIGGER D -	92

Corporate headquarters:

Canada and U.S.A.

Matrox Electronic Systems Ltd.
1055 St. Regis Blvd.
Dorval, Quebec H9P 2T4
Canada
Tel: (514) 685-2630
Fax: (514) 822-6273