

User Manual



IC-M29

Digital Monochrome 29Megapixel CCD Camera with Camera Link Interface



Revision History

Revision	Descriptions		
0.1	Draft		
0.2	Added Serial Communication specification		
0.3	Added Camera control tool(GUI) Fixed Minor errors		
0.4	Fixed Minor errors		
0.5	Fixed Minor errors		
0.6	Updated function information Updated Serial Communication Command Updated Camera Control Tool(GUI) Added Grabber(Matrox DCF File) Setting Added Firmware Writing Fixed Minor errors		
0.7 Updated Camera Control Tool(GUI)			
0.8	Fixed Minor errors		
0.9	Updated Camera Control Tool(GUI) Rev 1.1D Added M72 Mount Camera		
1.0	Fixed Minor errors		



- Table of Contents -

1.	Precautions	6
	1.1 General	6
	1.2 Precautions in Use	6
	1.3 Maintenance	6
2.	Overview	7
3.	Specification	7
	3.1 Electrical specification	7
	3.2 Electrical shutter specification	8
	3.3 Mechanical spec	8
	3.4 Input signal specification	8
	3.5 Operating ambient conditions	9
	3.6 Various safety standards	9
	3.7 Sensor Spectral Response(Quantum Efficiency) Information	10
	3.7.1 Spectral response Mono	
4.	Camera Interface	
4.	Camera Interface 4.1 General Description	
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector	
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface	
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector	
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector	
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit	
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit	10 10 12 13 13 13 13 13 13 14 14
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit	10 10 12 13 13 13 13 13 14 15
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations	10 10 12 13 13 13 13 13 14 15 15
 4. 5. 	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations 5.1 Basic Functions	10 10 12 13 13 13 13 13 13 14 15 15 15
4. 5.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations 5.1 Basic Functions 5.2 Trigger operation	10 10 12 13 13 13 13 13 14 14 15 15 15 15 15
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations 5.1 Basic Functions 5.2 Trigger operation 5.2.1 free Run Mode	10 10 12 13 13 13 13 13 13 14 15 15 15 15 15 15
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations 5.1 Basic Functions 5.2 Trigger operation 5.2.1 free Run Mode 5.2.2 Trigger Mode/Master/Slave	10 10 12 13 13 13 13 13 13 14 15 15 15 15 15 15 15 15
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations 5.1 Basic Functions 5.2 Trigger operation 5.2.1 free Run Mode 5.2.2 Trigger Mode/Master/Slave 5.2.3 Overlap Mode	10 10 12 13 13 13 13 13 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15
4.	Camera Interface 4.1 General Description 4.2 CameraLink Connector 4.3 Camera Link Interface 4.4 Power Input Connector 4.5 Control Connector 4.6 Trigger Input Circuit 4.7 Strobe Output Circuit Functions and Operations 5.1 Basic Functions 5.2 Trigger operation 5.2.1 free Run Mode 5.2.2 Trigger Mode/Master/Slave 5.2.3 Overlap Mode 5.3 Gamma Correction(LUT)	10 10 12 13 13 13 13 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15

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5.5 Flat Fi	eld Correction	
5.6 Test P	attern Image	
5.7 Regio	n of interest(ROI)	
5.8 Binnir	ıg	
6. External	Appearance and Dimensions	
7. Commu	nication specification	
7.1 Comm	nunication Setting	
7.2 Comn	nand Format	
7.3 Comm	nand List	
7.3.1	Readout Mode	
7.3.2	ROI Horizontal Area	
7.3.3	ROI Vertical Area	
7.3.4	Binning Mode	
7.3.5	Data Bits	
7.3.6	Test Pattern Enable	
7.3.7	LUT Mode	
7.3.8	Reset	
7.3.9	Defective Pixel Correction	
7.3.10	D Flat Field Correction	
7.3.11	Flat Field Offset	
7.3.12	2 Generate Flat Field Data	
7.3.13	3 Save Flat Field Data	
7.3.14	Trigger Mode	
7.3.15	5 Overlap Mode	
7.3.16	5 Trigger Source	
7.3.17	7 Trigger Polarity	
7.3.18	3 Exposure Time	
7.3.19	Strobe Out Offset	
7.3.20) Strobe Out Polarity	
7.3.21	L VGA Gain	
7.3.22	2 VGA Gain Offset	
7.3.23	3 Optical Black Clamp Level	
7.3.24	Optical Black Clamp Level Offset	
7.3.25	5 Config Initialization	
7.3.26	5 Load & Save Config	



7.3.27 Current Temperature	
7.3.28 MCU Version	
7.3.29 Model Number	
7.3.30 FPGA Version	
7.4 Storage Area	
7.5 Sensor Area Define	
8. Camera Control Iool(GUI)	
8.1 Camera Connect	
8.2 User work space	
8.3 Main Tab	
8.4 Trigger Tab	
8.5 Gain Tab	
8.6 Gamma Tab	
8.7 FFC/DPC Tab	
8.8 Temperature Monitor	
C.O. 38	
9. Grabber(Matrox DCF File) Setting	
9.1 Overview Tab	
9.2 Camera Tab	43
9.3 Video Signal Tab	
9.4 Video Timing Tab	
9.5 Pixel Clock Tab	48
10. Firmware Writing	
10.1 For Firmware write requirements	
10.1.1 Hardware	
10.1.2 Software	50
10.2 Firmware writing	
10.2.1 Cable Connection & writing	



1. Precautions

1-1. General

- Do not drop or damage the device
- Do not disassemble, repair or alter the device
- E Keep the machine not to be stained with the alien substances
- Contact your nearest distributor in case of trouble or problem.

1-2. Precautions in Use

- Do not expose the camera's image-pickup-plane to sunlight or other intense light directly. Its inner CCD sensor might be damaged.
- In clearing, do not splash water on the device but wipe it out with smooth cloth or towel.
- Do not place magnets near the product.
- Be careful not to let liquid like water, drinks or chemicals leak inside the device.
- Clean the device often to remove dust on it.
- If the camera is not in use, attach the lens cap to the camera to protect the Image Pickup surface.

1-3. Maintenance

Turn off power to the equipment and wipe it with a dry cloth. If it becomes severely contaminated, gently wipe the affected areas with a soft Cloth dampened with diluted neutral detergent. Never use alcohol, benzene, thinner, or other chemicals because such chemicals may damage or discolor the paint and indications. If the image pickup surface becomes dusty, contaminated, or scratched, consult your sales representative.

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2. Overview

IC-M29 is a mono area scan CCD camera.

IC-M29 has 29 million pixels resolution.

These Cameras are suitable for a wide range of application within factory Automation, an also for application outside the factory floor, such as AOI(Automatic Optical Inspection), High-end surveillance and medical.

Main Function

- 1) ROI(Region of interest)
- 2) DPC(Defective Pixel Correction)
- 3) FFC(Flat Field Correction)
- 4) Binning
- 5) VGA(Variable gain amplifier) Gain Control
- 6) Black Clamp Level Control
- 7) Gamma Control
- 8) Mode : Trigger Master Mode / Trigger Slave Mode / Free Run Mode
- 9) Image Data Output & Speed Selectable
- 10) Exposure Time Control
- 11) Test Pattern
- 12) External Trigger Support / External Strobe Output Support
- 13) Temperature Monitoring

3. Specification

3.1 Electrical specification

- Image Sensor : Truesense KAI-29050 29M CCD image Sensor(Global Shutter)
- Number of active pixels : 6576(H) x 4384(V)
- full resolution in continuous operation : 5 frames/second [2Tap Base]
- Pixel size : 5.5µm (H) × 5.5µm (V)
- Optical size : 35mm Optical Format
- Active Sensor Size : 36.17mm(H) x 24.11mm(V)
- Number of Output : Quad
- Sensitivity : 34uV / e-
- ADC resolution : 8bit / 10bit / 12bit Raw Bayer Pattern Output
- S/N Ratio : 55dB Over

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- Dynamic Range : 64dB
- Full Well Capacity : 20000 e-
- Operating Temp : 0°C ~ +40°C(Performance assurance)
- Humidity : 20% ~ 90% RH(Non Condensing)
- Camera Link Configuration : 2Tap Camera Link Base Mode
- Built in LUT (Look Up Table)
- Defective Correction Circuit built in
- Pre-select and pulse width trigger modes
- Power supply voltage : DC12 V ± 10%(ripple 50 mV or less) / MAX 15W
- LVAL-synchronous / A-synchronous operation (auto-detect)
- Setup by Windows XP / VISTA / WIN7 serial communication

3.2 Electrical shutter specification

- Shutter Speed :
 - -. Exposure Time is 100µsec to 7000msec
 - -. Factory default : 10ms
- Random Trigger Shutter (Factory default : Fixed Mode)
 - -. Fixed mode : The exposure time depends on the shutter speed setting
 - -. Pulse width mode : The exposure time depends on the pulse width.
 - -. Minimum pulse width : 100µsec(Minimum exposure time: 100µsec)

3.3 Mechanical spec

Lens mount	: F Mount / M72 Mount
Dimensions	: F Mount 97mm(L) * 97mm(W) * 86mm(H)
	M72 Mount 97mm(L) * 97mm(W) * 77mm(H)
Weight	: Approx 1.0kg
Camera body grounding	: Conductive between circuit GND and camera body

3.4 Input signal specification

- TRIG : Camera Link I/F(CC1) and External Control connector input
 - -. Signal level : TTL level
 - -. Polarity : High/Low switching (Factory default: Active-High)
 - -. Pulse width : 100µsec or more



3.5 Operating ambient conditions

- Performance assurance
 - -. Temperature : 0°C to +40°C
 - -. Humidity : 20% ~ 90% RH(Non Condensing)
- Operation Temperature(Image & Life cycle cannot guarantee)
 - -. Temperature : 0°C to +70°C
 - -. Humidity : 10% to 90% (No dew formation)
- Storage Temperature
 - -.Temperature : -20°C to +70°C
 - -. Humidity : 90% or less (No dew formation)

3.6 Various safety standards

 Performance assurance
 -.CE(AoC)
 Test Standard(2004/108/EC) : EN55022:2006 +A1:2007 [Class A Equipment] EN 55024 : 1998 +A1:2001, +A2:2003
 -.FCC(Verification)

Test Standard : Section 15.107, Section 15.109 (Class A Equipment)

NOTE : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



3.7 Sensor Spectral Response(Quantum Efficiency) Information



3.7.1 Spectral response Mono

4. Camera Interface

4.1 General Description

As shown in the following figure, 3 types of connectors and status indicator LED Are located on the back of the camera and have the functions as follows :

- (1) Power Connector : 6 pin Power Input
 - ▷ Camera Power Input(DC-12V/15W)
- (2) Control Connector : 12 pin Control Connector
 - ▷ External Trigger Signal Input(2 Pin) and Strobe Output(1 Pin)
 - ▷ Firmware Download Input(9 Pin)
- (3) 26 pin Camera-Link Connector
 - ▷ Video Data Transmission, Camera Control
- (4) Status LED
 - ▷ Initial Status Red LED Sequence
 - 1) Red LED on 0.7 second : Camera operates in power on
 - 2) Red LED off 8.3 second : Initial Status
 - 3) Red LED flashing at 0.5 second intervals : Camera Freerun operation





Fig 4.1 Operation Red LED Status(Gray Tone timing is LED on status)



Fig 4.2 IC-M29 CONNECTOR



4.2 Camera Link Connector

- (1) Video output/controlling (Camera Link Base Configuration) : CAMERA LINKO
 - ▷ Connector type: MDR 26-PIN connector 10226-52A2PL (Manufactured by 3M)
 - ▷ Camera output complies with Camera Link Standard and following list shows the pin configuration of connector.
 - ▷ Base : 2tap(8bit /10bit /12bit) : Camera link 0 connector



Pin No	I/O	Signal Name	Pin No	I/O	Signal Name
1	Ground	Inner shield	14	Ground	Inner shield
2	OUT	Х0-	15	OUT	X0+
3	OUT	X1-	16	OUT	X1+
4	OUT	Х2-	17	OUT	X2+
5	OUT	XCLKOUT-	18	OUT	XCLKOUT+
6	OUT	Х3-	19	OUT	X3+
7	INPUT	RX+_SERTC+	20	INPUT	RXSERTC-
8	OUT	TXSERTFG-	21	OUT	TX+_SERTFG+
9	INPUT	CC1-(Trigger-)	22	INPUT	CC1+(Trigger+)
10	INPUT	CC2+	23	INPUT	CC2-
11	INPUT	CC3-	24	INPUT	CC3+
12	INPUT	CC4+	25	INPUT	CC4-
13	Ground	Inner shield	26	Ground	Inner shield

Fig 4.3 Camera Link0 Connector

Fig 4.4 Camera Link 0 Pin Assignments



4.3 Camera Link Interface

The video output is Camera Link, where the 8 channels with 8bit video are placed in a base configuration. The digital output signals follow the Camera Link standardized multiplexed signal output interface.

The output driver is NS type DS90CR287, and the receiver is NS type DS90CR288. The data bits from the digital video, FVAL, LVAL and DVAL are multiplexed into the twisted pairs, which are a part of the Camera Link. Trigger signals and the serial camera control are feed directly through its own pairs.

The 26 pin connector pin assignment follows the Camera Link base configuration. For a detailed description of Camera Link specifications, please refer to the Camera Link standard specifications found on <u>http://www.machinevisiononline.org</u>

4.4 Power Input Connector

Power input connector of camera is Hirose 6 pin connector(part # HR10A-7R-6PB). Pin arrangement and configuration are as follows:



Pin No	I/O	Signal Name
1	INPUT	+12V
2	INPUT	+12V
3	INPUT	+12V
4	GND	GROUND
5	GND	GROUND
6	GND	GROUND

Fig 4.5 Power Input Connector

Power plug can be configured using the Hirose 6 pin plug (part # HR10A-7R-6PB) or compatible parts enclosed in the camera box. For power supply, it is recommended to use the power adapter with over 2A current output at 12VDC $\pm 10\%$ voltage output.

4.5 Control Connector

The control connector used is Hirose 12 pin connector(part # HR10A-10R-12SB) and consists of external trigger signal input and strobe output port. Pin arrangement and configuration are as follows:





Pin	I/O	Signal Name	Pin	I/O	Signal Name
1	INPUT	Trigger +	7	OUTPUT	Reserved
2	INPUT	Trigger -	8	INPUT	Reserved
3	OUTPUT	Strobe Output	9	INPUT	Reserved
4	INPUT	Reserved	10	OUTPUT	Reserved
5	GND	GROUND	11	INPUT	Reserved
6	INPUT	Reserved	12	INPUT	Reserved

Fig 4.6 I/O Control Connector

▷ Camera firmware upgrade

Camera firmware upgrade is available through the ISVI firmware cable.

ISVI	ISVI
	CXP Camera Firmware

Fig 4.7 ISVI Firmware cable

4.6 Trigger Input Circuit

Following figure shows trigger signal input circuit of 12 pin connector. Trigger signal entered is delivered to internal circuit through photo coupler. Minimum trigger width that can be recognized at camera is 100us. If trigger signal entered is less than 100us, trigger signal is ignored in camera. External trigger signal can approve signals to the circuits in the 2 methods shown below.



Fig 4.8 Trigger Input Schematic



4.7 Strobe Output Circuit

Strobe output signal is output through TTL Driver IC of 3.3 V output level and pulse width of signal is output in synchronization with exposure of camera.



Fig 4.9 Strobe Output Schematic

5. Functions and Operations

5.1 Basic Functions

The IC-M29 cameras is a interline transfer CCD camera with 29 Mega pixels monochrome. The interface to the host PC is via digital Camera Link. Output video as 8,10,12bits. The camera also features several pre-processing functions. There are two trigger modes in addition to continuous operation. The Pre-Select and Pulse Width trigger modes are available with a unique Automatic LVAL sync or a-sync selection function. Below the functions are described in detail below.

5.2 Trigger operation

Trigger mode of camera is divided into Free-Run mode where image is synchronized to Internal Trigger signal created inside camera, and External Sync mode where image is synchronized to the trigger signal entered in external port.

5.2.1 Free Run Mode

In FreeRun mode, the cycle of internal trigger signal is determined by Transfer Time (1 Frame data transmission time) and Exposure setting value, and image is obtained with such periodic signal. FreeRun mode is always operating in overlap mode(Exposure time should be within 1 frame transfer time-224.7ms)





Fig 5.1 Freerun Mode Normal Operation

5.2.2 Trigger Mode/Master/Slave

In Trigger Mode, camera keeps standby status until trigger signal is entered, and when trigger input occurs, Readout start after Exposure process set earlier. After Readout is completed, and returns to trigger standby status again. In Trigger mode, if a new trigger input occurs during readout, the new trigger input is ignored.

In Trigger mode, it is required to set Trigger Source regarding which input, CC1 input port(Camera Link) or External Trigger port, will be used for trigger signal, as well as Polarity and Exposure source of signal entered.



Fig 5.2 Trigger Mode / Master





Fig 5.3 Trigger Mode / Slave

5.2.3 Overlap mode

Camera keeps standby status until trigger signal is entered and Readout starts after exposure process set earlier if trigger input occurs. When new trigger input occurs during Readout of First image, it keeps Readout and pass exposure process of new trigger input. Provided, however, that when trigger input occurs during Exposure since Exposure Time is longer than trigger interval, that trigger signal is ignored. To obtain the image as maximum frame for trigger input, Exposure Time should not be longer than Readout time, trigger time should not be shorter than Readout time. Readout time for the IC-M29 is 224.7ms.(Quad Output) Overlap mode operates ideally when trigger signal interval or exposure time is constantly kept. Overlap mode only operating in the Trigger mode.



Fig 5.4 Overlap Mode Operation(Transfer Time > Exposure Time)



5.3 Gamma Correction - LUT(Look Up Table)

LUT (Lookup Table) enables the conversion of the original image value into an ad-hoc level value. Since one-on-one mapping is performed for each level value, you can connect the ad-hoc 12-bit input to the ad-hoc 12-bit output. LUT has a programmable look-up table (LUT) that lets the user adjust the transfer function of the video output. Selectable settings include multiple-point LUT and Gamma 0.45. The look up table has 4096 setting points by which the full range of input signal is divided. On each of the point, the gain can be set to get a required transfer function. Gamma 0.45 or programmable LUT can be selected by software control. If the LUT is not configured, Gamma is set at 1.0(off).



5.4 Defective Pixel Correction

There could be incidence of light-malfunctioning defective pixel in the CCD. In this case, additional correction is required to enhance the degraded quality of output images. For each camera, defective pixel information of CCD is encoded during the shipping process. If a user demands an addition of defective pixel information, a new coordinate of defective pixel must be entered into the camera.

5.5 Flat Field Correction

Flat Field Correction is a function which corrects a non-uniform pixel response across a CCD and makes the response as uniform as possible (flat), assuming the offsets are non-varying (fixed) patterns.

5.6 Test Pattern Image

It can be set to output test image created inside instead of image data output from image sensor, in order to check normal operation of camera. 2 types of test image are available.(Test Pattern 1 : Fixed Image, Test Pattern 2 : Moving Image)



Fig 5.6 Test Pattern Image 1(Left Image-Fixed) or 2(Right Image-Moving)

5.7 Region Of Interest

ROI is the area containing the data required by the user within the entire image. The user can obtain the image faster than obtaining overall areas by designating the area as ROI while keeping the same high quality.



Fig 5.7 ROI(Region Of Interest)



5.8 Binning

CCD Binning (or Pixel Binning) is the process of combining neighboring pixels on an image sensor (CCD sensor) into a "super pixel". This super pixel represents the area of all the individual pixels contributing to the charge. For example, in 2 x 2 CCD binning, the charge from a square of 4 adjacent pixels is combined into 1, and in 4 x 4 CCD binning, the charge from a square of 16 adjacent pixels is combined into 1.



Fig 5.8 Binning

Binning provides several beneficial results:

1) An increase in signal equal to the number of pixels binned.

This allows the camera to detect fainter signals and reduce exposure time.

- 2) An increase in frame rate due to the reduction in exposure time and a reduction in the number of pixels to be measured
- 3) An increase in the signal to noise ratio resulting from a single read error being applied to the charge of the binned pixels rather than the addition of multiple read errors if the pixels were read individually.
- 4) An increase in the dynamic range of the sensor resulting from the larger charge capacity of the summing node (typically 1.65-2 times increase in well depth).

The trade off for the gains due to binning are:

- 1) A loss of image resolution equal to the binning level.
- 2) An increase in dark current proportional to the number of pixels binned.



6. External Appearance and Dimensions



Fig. 6-2 M72-mount Dimension



7. Communication specification

All configuration of the 29M series camera is done via Camera Link. All types of camera setting commands, requiring data transmission are delivered in Hex command type. The camera can be set up from a PC running terminal emulator software, or using iSVi camera control software.(IC-M29_Mon GUI)

7.1 Communication Setting:

- Baud Rate : 19,200 bps
- Data bit : 8 bit
- Parity : None
- Stop bit : 1 bit
- Flow Control : None

7.2 Command Format

<command> <parameter1> <parameter2> < \ r>

($0 \sim 2$ Parameters follow the command.)

Example 1.

```
Command : "set 10000<\r>"
73 65 74 20 31 30 30 30 0D
Response : "OK<\r><\n>"
4F 4B 0D 0A
```

7.3 Command List

7.3.1 Readout Mode

Туре	Command	Response	Description
Get	"grm<\r>"	"<0 1 2><\r><\n>"	0 = Normal Mode 1 = ROI Mode
Set	"srm <0 1 2><\r>"	"OK<\r><\n>"	2 = Binning(2 or 4) Mode



7.3.2 ROI Horizontal Area

Туре	Command	Response	Description
Get	"gha<\r>"	"<0~6574> <1~6575> <\r><\n>"	<0~6574> starting point
Set	"sha <0~6574> <1~6575> <\r>"	"OK<\r><\n>"	<1~6575> Endpoint

7.3.3 ROI Vertical Area

Туре	Command	Response	Description	
Get	"gva<\r>"	"<0~2190><\r><\n>"	<0 ~ 2190>	
Set	"sva <0~2190><\r>"	"OK<\r><\n>"	starting point	

7.3.4 Binning Mode

Туре	Command	Response	Description
Get	"gbf<\r>"	"<0 1><\r><\n>"	0 = 2 by 2 binning
Set	"sbf <0 1><\r>"	"OK<\r><\n>"	1 = 4 by 4 binning

7.3.5 Data Bits

Туре	Command	Response	Description
Get	"gdb<\r>"	"<0 1 2><\r><\n>"	0 = 8-bit
Set	"sdb <0 1 2><\r>"	"OK<\r><\n>"	2 = 12-bit

7.3.6 Test Pattern Enable

Туре	Command	Response	Description
Get	"gte<\r>"	"<0 1 2><\r><\n>"	0 = disable 1 = test image 1
Set	"ste <0 1 2> <0~255> <\r>"	"OK<\r><\n>"	2 = test image 2 <0~255> speed of moving test image



7.3.7 LUT Mode

Туре	Command	Response	Description
Get	"gls<\r>"	"<0 1 2><\r><\n>"	0 = Off
Set	"sls<0 1 2><\r>"	"OK<\r><\n>"	1 = LUT1 2 = LUT2

7.3.8 Reset

Туре	Command	Response	Description
Set	"rst <0 1><\r>"	"OK<\r><\n>"	0 = EPCS 1 = SDR

7.3.9 Defective Pixel Correction

Туре	Command	Response	Description
Get	"gdc<\r>"	"<0 1><\r><	0 = disable
Set	"sdc <0 1><\r>"	"OK<\r><\n>"	1 = enable

7.3.10 Flat Field Correction

Туре	Command	Response	Description
Get	"gfc<\r>"	"<0 1><\r><	0 = disable
Set	"sfc <0 1><\r>"	"OK<\r><\n>"	1 = enable

7.3.11 Flat Field Offset

Туре	Command	Response	Description
Get	"gfo<\r>"	"<0~4095><\r><\n>"	<0~4095> Elat Field Tanget
Set	"sfo <0~4095><\r>"	"OK<\r><\n>"	Level

7.3.12 Generate Flat Field Data

Туре	Command	Response	Description
Set	"ggd <1~16><\r>"	"OK<\r><\n>"	<1~16> Number of frames



7.3.13 Save Flat Field Data

Туре	Command	Response	Description
Set	"sgf<\r>"	"OK<\r><\n>"	Save Flat Field Data to nonvolatile memory

7.3.14 Trigger Mode

Туре	Command	Response	Description
Get	"gtm<\r>"	"<0 1 2><\r><\n>"	0 = Free-Run Mode
Set	"stm <0 1 2><\r>"	"OK<\r><\n>"	1 = Trigger-Master Mode 2 = Trigger-Slave Mode

7.3.15 Overlap Enable

Туре	Command	Response	Description
Get	"goe<\r>"	"<0 1><\r><\n>"	0 = disable
Set	"soe <0 1><\r>"	"OK<\r><\n>"	1 = enable

7.3.16 Trigger Source

Туре	Command	Response	Description
Get	"gts<\r>"	"<0 1><\r><\n>"	0 = Camera Link CC1
Set	"sts <0 1><\r>"	"OK<\r><\n>"	1 = External Trigger Input

7.3.17 Trigger Polarity

Туре	Command	Response	Description
Get	"gtp<\r>"	"<0 1><\r><	0 = Active-Low
Set	"stp <0 1><\r>"	"OK<\r><\n>"	1 = Active-High



7.3.18 Exposure Time

Туре	Command	Response	Description
Get	"get<\r>"	"<100~7000000><\r><\n>"	Min. Exposure Time 100 = 100 usec
Set	"set <100~7000000><\r>"	"OK<\r><\n>"	Max. Exposure Time 7000000 = 7 sec

7.3.19 Strobe Out Offset

Туре	Command	Response	Description
Get	"gso<\r>"	"<0~10000><\r><\n>"	Min. 0 = 0 usec
Set	"sso <0~10000><\r>"	"OK<\r><\n>"	Max. 10000 = 10,000 usec

7.3.20 Strobe Out Polarity

Туре	Command	Response	Description
Get	"gsp<\r>"	"<0 1><\r>	0 = Active-Low
Set	"ssp <0 1><\r>"	"OK<\r><\n>"	1 = Active-High

7.3.21 VGA Gain

Туре	Command	Response	Description
Get	"gvg<\r>"	"<0~700><\r><\n>"	Min. VGA Gain 0 = 0 dB
Set	"svg <0~700><\r>"	"OK<\r><\n>"	Max. VGA Gain 700 = 25.06 dB

7.3.22 VGA Gain Offset

Туре	Command	Response	Description
Set	"sgo <0 1 2 3> <0 ~ 700><\r>"	"OK<\r><\n>"	<pre><0 1 2 3> 0 = Channel A 1 = Channel B 2 = Channel C 3 = Channel D <0 ~ 700> 0 = 0 dB(Min.) 700 = 25.06 (Max.)</pre>

7.3.23 Optical Black Clamp Level

Туре	Command	Response	Description
Get	"gcl<\r>"	"<0~700><\r><\n>"	0 = Min.Black Clamp Level
Set	"scl <0~700><\r>"	"OK<\r><\n>"	700 = Max.Black Clamp Level

7.3.24 Optical Black Clamp Level Offset

Туре	Command	Response	Description
Set	"sco <0 1 2 3> <0 ~ 700><\r>"	"OK<\r><\n>"	<pre><0 1 2 3> 0 = Channel A 1 = Channel B 2 = Channel C 3 = Channel D <0 ~ 700> 0 = Min. 700 = Max.</pre>

7.3.25 Config Initialization

Туре	Command	Response	Description
Get	"gci<\r>"	"<0 1 2><\r><\n>"	0 = Factory Default
Set	"sci <0 1 2><\r>"	"OK<\r><\n>"	2 = User 2

7.3.26 Load & Save Config

Туре	Command	Response	Description
Load	"lcf <0 1 2><\r>"	"OK<\r><\n>"	0 = Factory Default 1 = User 1 2 = User 2
Save	"sct <1 2><\r>"	"OK<\r><\n>"	1 = User 1 2 = User 2

7.3.27 Current Temperature

Туре	Command	Response	Description
Get	"gct<\r>"	" <s1> <s2><\r><\n>"</s2></s1>	<pre>s1 = Fahrenheit's temperature scale s2 = Celsius temperature scale</pre>



7.3.28 MCU Version

Туре	Command	Response	Description
Get	"gmv<\r>"	" <s><\r><\n>"</s>	Displays MCU Version

7.3.29 Model Number

Туре	Command	Response	Description
Get	"gmn<\r>"	" <s><\r><</s>	Displays Model Number

7.3.30 FPGA Version

Туре	Command	Response	Description
Get	"gfv<\r>"	" <s><\r><</s>	Displays FPGA Version



7.4 Storage Area

The camera has 3 storage area.(Factory Area, User1 Area, User2 Area)

Storage area to store the camera setting value. User area can be read and written, but Factory area can be read only. At camera booting, setting value in one of 3 storage area is copied to camera according to config initialization value and value of the area is used for camera setting.

Defa	ult(Factory) Setting
Trigger Mode	Freerun
Output Pixel Format	12 bit
Sensor Output Channel	Quad Output
Camera Link Output Channel	2 TAB
External Trigger Source	Camera Link CC1
Trigger Source Polarity	Active High
Strobe Out Polarity	Active High
Exposure Time	10ms
VGA Gain / Black Clamp Level	0 / 0
DPC / FFC	On / Off

7.5 Sensor Area Define

The camera is divided into four areas. Camera sensor area appears as shown in Fig 7-1.



Fig. 7-1 29M CCD Sensor Area Define

8 Camera Control Tool(GUI)

8.1 Camera Connect

Camera configuration utility software, the IC-M29_Mon, is provided with change its settings and save the settings a file or in the camera.

- 1) ISVI Camera Scan.
 - When you execute the program while the camera is turned on, Camera Scan window appears as shown in the figure below. At this time, the program checks serial port of computer and DLL provided by camera link to scan whether the camera is connected. If there is a camera connected, it displays Version information and model name on the screen. If the camera is not properly displayed on the screen check the connection of cable with power of camera and press Scan button If you found a camera, Configurations is executed and displays current setting value of camera connected.

COM4 Scan Factory Save Reset Main Trigger Gain Gamma FEC / DPC Data Bits 0 bit 10-bit 12-bit Image Processing Test Pattern Test Pattern #1 Competence Test Pattern #1 Test Pattern #2 Readout Mode 0 0 Normal ROI 0 Binning 2x2 0 4x4 0 5575 FPGA 1.1 0 MCU 1.1b Symmetric Camera Scan *COM2* - cannot Access *COM2* - cannot Access *COM3* - not Found Com4* - IC-M29 *COM6* - not Found Camera Configurations Update Done Come	😪 ISVI IC-X29 V1.1d (Apr 2 2014)	
Main Trigger Gain Gamma FFC / DPC Data Bits 8-bit 10-bit 12-bit Image Processing Test Pattern Test Pattern #1 Test Pattern #1 Flat Field Correction Test Pattern #2 Readout Mode Normal ROI Binning 2x2 4x4 Version Info. FPGA 1.1 MCU 1.1b Symmetric Camera Scan 'COM2' - cannot Access 'COM2' - cannot Access 'COM2' - not Found Camera Configurations Update Done Done Camera Configurations Update Done Come Come<th>COM4 V Scan</th><th>actory Save Reset</th>	COM4 V Scan	actory Save Reset
Data Bits B-bit 10-bit 12-bit Image Processing Test Pattern Image Processing Test Pattern #1 Flat Field Correction Test Pattern #1 Readout Mode 0 Normal 0 Rol 9 Binning 2x2 4x4 4384 Version Info. 6576 FPGA 1.1 MCU 1.1b Camera Scan Symmetric Comera Scan Symmetric Comera Scan COM* - rot Found Camera Configurations Update Done	Main Trigger Gain Gamm	a FFC / DPC
Image Processing Test Pattern Image Processing Test Pattern #1 Image Processing Test Pattern #1 Image Processing Image Processing Image Process Image Processing Image Process Image Process Ima	Data Bits 8-bit 10-bit 12-bit	\$ P
Image: Construction Image: Construction Image: Constreconstruction Image: Construc	Image Processing	Test Pattern
Flat Field Correction Test Pattern #2 Readout Mode 0 Normal ROI Binning 2x2 4x4 4383 4383 4383 FPGA 1.1 MCU 1.1b Symmetric Gottomation Constraints Gottomation Constraints Roin Constratite Roin Constratite	Defective Pixel Correction	Test Pattern #1
Readout Mode 0 RoI Binning 2x2 4384 PFGA 1.1 Comera Scan COM1* - cannot Access COM2* - cannot Access COM3* - not Found Comera Configurations Update Done 	Flat Field Correction	Test Pattern #2
Camera Scan "COM1" - cannot Access "COM2" - cannot Access "COM3" - not Found "COM4" - not Found Camera Configurations Update 	Readout Mode Normal ROI Binning 2x2 4x4 Version Info. FPGA 1.1 MCU 1.1b	0 ▲ 4384 4383 ▲ 4383 ▲ ✓ 5776 6575 ▲ ✓ Full Area ✓ Symmetric
37.00C	Camera Scan "COM1" - cannot Access "COM2" - cannot Access "COM2" - not Found "COM4" - IC-M29 "COM6" - not Found Camera Configurations Update Done	

Fig. 8-1 ISVI Camera Scan



8.2 User work space

St ISVI IC-X29 V1.1d (Apr 2 2014)	Factory Save Reset
Data Bits	
Image Processing	Test Pattern Test Pattern #1 Test Pattern #2
Readout Mode Normal ROI Binning 2x2 Ax4 Version Info. FPGA 1.1 Version 0	0 × 4384 4383 × 4383 × Full Area
MCU 1.1b Camera Scan "COM1" - cannot Access "COM2" - cannot Access "COM3" - not Found "COM4" - IC-M29 "COM6" - not Found Camera Configurations Update	Symmetric
Done 42.97C	Clear

Fig. 8-2 User work space

- 1) User Work Space Selection window.
 - If you change the User Space is immediately stored in the camera and reset.
- 2) Save : Saves the camera setting values to the camera memory(User1,User2)
- 3) Reset : Camera Reset



8.3 Main Tab

🚱 ISVI IC-X29 V1.1d (Apr 2 2014)	
COM4 V Scan	ctory Save Reset
Main Trigger Gain Gamma	a FFC / DPC
Data Bits	
Image Processing	Test Pattern
Defective Pixel Correction	Test Pattern #1
Flat Field Correction	Test Pattern #2
Readout Mode	0 ▲ 4384 4383 ▲ 6576 6575 ▲ Full Area
Camera Scan "COM1" - cannot Access "COM2" - cannot Access "COM3" - not Found "COM4" - IC-M29 "COM6" - not Found Camera Configurations Update Done 42.94C	Clear

Fig. 8-3 Main Tab

- 1) Data Bits : Selects width of data output.
- 2) Image Processing : Defective Pixel Correction on/off, Flat Field Correction on/off
- 3) Test Pattern
 - Test Pattern #1 On/Off(Fixed Image), Test Pattern #2 On/Off(Moving Image)



Fig. 8-4 Test Pattern(Left : Fixed Image, Right : Left Moving Image)



- 4) Readout Mode
 - Normal : Normal Operation Mode
 - ROI : Region Of Interest Mode

SVI ISVI IC-X29 V1.1d (Apr 2 2014)	
COM4 v Scan	Factory Save Reset
Main Trigger Gain G	amma FFC / DPC
Data Bits	
Image Processing	Test Pattern
Defective Pixel Correction	Test Pattern #1
Flat Field Correction	Test Pattern #2
Readout Mode	568
Normal	
© ROI	
Binning Declaration	3248
@ 4y4	
	3815
Version Info.	5723
MCU 1.1b	
	(*) bynincure
"COM4" - IC-M29 "COM6" - not Found	·
Camera Configurations Lindate	
Done	
srm 1 107 83E 42 12C	=
sha 852 5723	
sva 568	
42.12C sva 568	Clear



b Set to the Y area width of the symmetry



Fig. 8-9 ROI Window

- (e) Adjust X area to the Left position.
- ① Adjust X area to the Right position.

15



- Binning : Binning Mode(2*2, 4*4)

SVI IC-X29 V1.1d (Apr 2 2014	4)			- - X
COM4 👻 Scan	Fa	ctory	Reset	
Main Trigger Gain	Gamma	FFC / DPC		
Data Bits	12-bit			
Image Processing		Test Pattern		
Defective Pixel Correction		Test Pattern #1		
Flat Field Correction		Test Pattern #2		
Readout Mode Normal ROI				568
Binning Binz 2x2 4x4			2	3248
Version Info.	852	4070	5723	
MCU 1.1b	Y	Symmetric		
sva 568 srm 0 OK srm 2 OK srm 0 OK srm 2 107.94F, 42.19C sbf 0 OK	5			E T
12.100				

Fig. 8-10 Binning Mode



8.4 Trigger Tab

ISVI IC-X29 V1.1d (Apr 2 2014) COM4 Scan	ctory V Save Reset
Main Trigger Gain Gamma	a FFC / DPC
Trigger Mode © Free-Run	Trigger/Slave
Trigger Source	Trigger Source Polarity
Oamera Link External	Active-Low Active-High
Exposure Time (100 usec ~ 7 sec)	100ms 1s 7s
Strobe-Out Polarity O Active-Low O Active-High	
42.16C gct	Clear

Fig. 8-11 Trigger Tab

- 1) Trigger Mode : Selects trigger mode. Once a mode has been selected, related selections will be activated.
 - Free-run Mode : Regardless external trigger, it's output image based on designated exposure time.
 - Trigger/Master : It's output an image through designated exposure time by Source Trigger (Camera Link & External)
 - Trigger/Slave : It's output an image through designated Trig Width by Source Trigger (Camera Link & External)
- 2) Trigger Source
 - Camera Link : The source setting of trigger to Camera link(CC1).
 - External : The source setting of trigger Camera to External.(12Pin Connector)
- 3) Trigger Source Polarity



- Active low : It's for setting active mode in the Trigger
- ► Active High : It's for setting active mode in the Trigger
- 4) Exposure Time
 - ► It's for setting exposure time of Camera internal register. It's available to set from 100us to 7000msec
 - ▶ It's able to use this function on the Mode of Free Run & Trigger/Master
 - ▶ After changing the value of one should press the enter key.
- 5) Strobe-out Polarity
 - ▶ Output strobe signal by Camera Exposure Time.
 - ▶ It's available to use for light and shutter control
 - Active low : It's for setting active mode in the Strobe Trigger
 - ► Active High : It's for setting active mode in the Strobe Trigger

8.5 Gain Tab

JOM4	♥ Scan		Factory	Save R	set	
Main	Trigger	Gain	Gamma	FFC / DPC		
VGA G	ain (0 - 700)		VGA Gain (Offset (0 - 700)		
	0.0000 dB	0	A	4	1 _B	
	0.0000 dB		С	3	0 D	
Black (Clamp Level (0 -	700)	Black Clam	o Level Offset (0 - 7	00)	
			Α	0	0	
		0			- D	
	5	0	c	0	0 D	
Ма	x. Log Files	100	c	0		

Fig. 8-12 Gain Tab

- 1) VGA Gain
 - ▶ VGA Gain allows the user to set gain settings of the image.
 - ▶ It's available to set Camera Gain Value from "0" to "700".
 - ▶ After changing the value of one should press the enter key.
- 2) VGA Gain Offset
 - Sets gain value of each channel(Sensor Area).
 - ▶ It's available to set Camera Gain Value from "0" to "700".
 - ▶ After changing the value of one should press the enter key.



Fig. 8-13 VGA Gain Curve(Value 1: 0.035dB)

- 3) Black Clamp Level
 - The black clamp level is used to remove residual offsets in the signal chain and to track low frequency variations in the black level of the CCD.
 - ▶ It's available to set Camera Black Clamp Level from "0" to "700".
 - ▶ After changing the value of one should press the enter key.
- 4) Black Clamp Level Offset
 - Sets level value of each channel(Sensor Area).
 - ▶ It's available to set Camera Black Clamp Level Offset Value from "0" to "700".
 - ▶ After changing the value of one should press the enter key.



8.6 Gamma Tab



Fig. 8-14 FFC Tab

- 1) Provides 2 non-volatile spaces for LUT data storage.(LUT #1, LUT #2)
- 2) Gamma : Gamma Curve value setting.
- 3) Load & Save

Load : LUT data import to GUI from the user computer.(CSV File) Save : LUT data export to GUI to the user computer.(CSV File)

- 4) LUT#1, LUT#2 : Spaces Select.
- 5) Download to Camera : Created by gamma value is sent to the camera.
- 6) Apply LUT : LUT Curve applied.
- 7) Save to Flash : Gamma data is saved in the camera.
- 8) Backup : Camera of the Gamma value is saved in the User Computer.(CSV File).
- 9) Gamma Correction : Gamma LUT #1/Gamma LUT #2 On/Off.



8.7 FFC/DPC Tab

SVI IC-X29 V1.1d (Apr 2 2014)
COM4 v Scan User 1 v Save Reset
Main Trigger Gain Gamma FFC / DPC
FFC Data
(1 ~ 16) Generate Gray Data
FFC Reference Level 2047 Flat Field Correction Save Gray Data to Flash
DPC Data
Defective Pixel Point Defective Pixels Map Horizontal Vertical Pixel No. Line No.
Load from *.csv File
Write Defective Pixel
Defective Pixel Correction Backup to *.csv from Flash
User 1 Restore and Save FFC and DPC Data from Factory Default User 1 User 2
*
41.91C sci 1 Clear

Fig. 8-15 FFC Tab

- 1) Number of Frames
 - Sets how many images will be used for the generation.
 - ▶ It's available to set Value from "1" to "16".
 - ▶ After changing the value of one should press the enter key.
- 2) Generate Gray Data : Generates the flat field data to be used for correction.
- 3) Save Gray Data to Flash : Saves the generated flat field data to flash in order to reuse in the future or retrieves the saved flat field data
- 4) FFC Offset
 - Sets the offset value of the image after Flat Field Correction is applied..
 - ▶ It's available to set Value from "0" to "4095".(Default Value : 2047)
 - ▶ After changing the value of one should press the enter key.
- 5) If you use the FFC is produces by gray card.(Gray Level 50%(0x7FF))



- 6) Write Defective Pixel : Add to defect pixel point in DPC data(Not Save to Camera)
- 7) Load frome*.csv File : DPC data import to GUI from the user computer.(CSV File)
- 8) Download to Camera : Created by DPC data is sent to the camera.
- 10) Save to Flash : DPC data is saved in the camera.
- 11) Backup to*.csv from Flash : Camera of the DPC data is saved in the use computer.
 Total time ≒ about 85sec(Data generation: 40sec, PC Transfer: 30sec ~60sec
 Depending on the number of DPC)
- 12) Restore and Save FFC and DPC Data from Factory Default : Recover function for FFC and DPC data
 - * FFC/DPC TAB will become valid only USER1, USER2 mode.

8.8 Temperature Monitor

Data Bits © 8-bit © 10-bit © 12-bit	
Image Processing Image Processing Image Defective Pixel Correction Image Flat Field Correction	Test Pattern Test Pattern #1 Test Pattern #2
Readout Mode Normal ROI Dinning 2x2 0 4x4	4384
Version Info. FPGA 1.1 MCU 1.1b	4383 ▲ 6576 6575 ▲ Full Area √ Symmetric

Fig. 8-16 Temperature Monitor

- 1) IC-M29 is embedded in the camera to monitor the internal temperature.
 - Temperature is displayed in real time.



9 Grabber(Matrox DCF File) Setting

9.10verview Tab

► Show the General Information.(DCF File)

🐖 IC-M29_12bit_fREER	JN.dcf	
Exposure Signal (arab Mode Sync, Signal Digital Sy	nchro, Other
Overview Came	era 🔋 Video Signal 🔋 Video Timing	Pixel Clock
	SOLIOS/CL/FULL/EVCL	
	Matrox Solios	
General Informatio	in	
Digitizer	0 🗸	
Camera	no name	
Camera	Digital	
Camera	6576 x 4384, 12 bits	
Vertical	Non-Interlaced	
Video	Monochrome	
Trigger	Continuous	
Camera	Frame Scan	
Pixel	80,0000 MHz	
-DCF Information -		
Directory:	C:₩Users₩SENSOR1₩Desktop₩29N	4 DCF₩Noi
Creation date:	Wed Apr 10 14:31:06 2013	
Infofile revision:	9,0032	
On Solios eV-CL Full 0 E	Digitizer O	

Fig. 9-1 Overview Tab – Freerun Mode



9.2 Camera Tab

- 1) Camera Tab
 - ▶ IC-M29 use the 2 Tab Base Camera Link configuration.

posure Sign: verview Camera Car	al Grab Camera mera Link	Mode S Video S Configurat	iync, Si ignal ion Ta	gnal Vide o Con	Digital Sy o Timing figuration	ynchro, Pixe	Othe el Cloc
Description:							
no name							
Туре:	[Frame Sca	In	•	1		
Number of	ſ	1 🚽			·		
Number of		2 Taps 👻					
Conventio	on inverted	1	<u> </u>				
Bayer	Disable		•				
Comments							
Matrox Elec Copyright 2 no name D(tronic Sy: 005, CF templa	stems Ltd, te,					*

Fig. 9-2 Camera Tab





isvi

- ► IC-M29 use the 2 Tab Base Camera Link configuration.
- ► Camera Mode Setting
 - Data Bit 10 bit or 12bit : 2 Tabs 10/12bits
 - Data Bit 8 bit : 2 Tabs 8bits

2 Taps 10/12 Bits	-
2 Taps 8 Bits	
2 Taps 10/12 Bits	

IC-M29_12bit_fREERUN.dcf	
Exposure Signal Grab Mode Sync, Signal Digital Syn Overview Camera Video Signal Video Timing	chro, Other Pixel Clock
Camera Camera Link Configuration Tap Configuration	
Configuration Type base	29-
- Camera Mode	
2 Taps 10/12 Bits	
On Solios eV-CL Full 0 Digitizer 0	

Fig. 9-3 Camera Link Configuration Tab



- 3) Tab Configuration Tab
 - ▶ As shown in the following figure, data regions and tab orders and directions.

IC-M29_12bit_fREERUN.dcf	- • 💌
Exposure Signal Grab Mode Sync, Signal Digital Syn Overview Camera Video Signal Video Timing	chro, Other Pixel Clock
Camera Camera Link Configuration Tap Configuration	
Regions Adjacent Pixels X: 1 Y: 2	
Tap orders and directions:	
ź.	ġ-
£	
On Solios eV-CL Full 0 Digitizer 0	0 0 0

Fig. 9-4 Tap Configuration Tab



9.3 Video Signal Tab

isvi

- ► Data bus width Setting
 - Camera Data Bit 12 bit : 12bit
 - Camera Data Bit 10 bit : 10bits
 - Camera Data Bit 8 bit : 8bits

🔮 IC-M29_12bi	t_fREERUN.dcf	- • •
Exposure Sig Overview	inal Grab Mode Sync, Signal Digital Sy Camera Video Signal Video Timing	nchro, Other Pixel Clock
Video Sign Type: Standard:	Digital	bits 👻
*A,P,: C	oupling Filter:	
	C With DC Restoration	
2 🗆 🖉 3 🗖 🖗	C With DC Restoration -	
* Acquisiti	on Classel la favora stian	
Format:	VDS -	
On Solios eV-CL	Full 0 Digitizer 0	

Fig. 9-5 Video Signal Tab



9.4 Video Timing Tab

- ▶ Pixel Clock Frequency : 80MHz
- ▶ Image Size : X 6576 * Y 2192

IC-M29_12bit_fREERUN.dcf	- • •
Exposure Signal Grab Mode Sync, Signal Digital Synch Overview Camera Video Signal Video Timing	hro, Other Pixel Clock
Valid Signal Source	anced
Settings	
Vertical Non-Interlaced -	
Pixel clock frequency: 80,0000 MHz	
Cameral Link Settings	
Image size X: 6576 🚔 Delay X: 0 🚔	4
Image size Y: 2192 🚔 Delay Y: 0 🚔	R C
For multi-tap cameras, specify the video timings pe	r
On Solios eV-CL Full 0 Digitizer 0	• • •

Fig. 9-6 Video Timing Tab



9.5 Pixel Clock Tab

► Pixel Clock Frequency : 80MHz

xposure Signa Overview (
	I Grab Mode Synd Camera Video Sign	c, Signal Digital al Video Timin	Synchro, Other Ig Pixel Clock
Pixel Clock F	requency		
Frequency:	80,000 MHz		0-
Auto-ad ⊚ uSec ⊚ Pclk	ljust in the Video Timin	gs	
- I/O Characte	ristics xternal circuit (other th:	an camera)	
External Clo	ck	an camera,	
No Clock Ex	kchange		•
	Input	Output	-JARA
Frequency:	1 * Pixel Clock 🚽	1 * Pixel Clock	+
Format:	TTL 👻	TTL	*
Polarity:	Pos, Edge Trig, 🚽	Pos, Edge Trig,	*
Delay:	0		Dps
	10000	138000	

Fig. 9-7 Pixel Clock Tab



10 Firmware Writing

- **10.1** For Firmware Write requirements
- 10.1.1 Hardware

• Altera USB-Blaster and Download Cable

: The USB-Blaster and download cable interface a USB port on a host computer to an Altera FPGA mounted on a printed circuit board.

USB Blaster Datasheet : http://www.altera.com/literature/ug/ug_usb_blstr.pdf



Fig. 10-1 Altera USB-Blaster Download Cable

• ISVI Firmware Cable

: The ISVI Fimware Cable interface a Circular 12pin on a ISVI camera to an Altera USB-Blaster Download Cable.



Fig. 10-2 ISVI Firmware Cable



10.1.2 Software

• Quartus II Stand-Alone Programmer

Download the 'Quartus II Stand-Alone Programmer' in Altera Download Center This program is free-ware, you can get for free from the following link.

https://www.altera.com/download/sw/dnl-sw-index.jsp



Fig. 10-3 Altera Download Center page

Fig.10-3 is a figure of Altera Download Center site. Click the 'Select by software' tap at the bottom of the screen.



IC-M29



Fig. 10-4 Altera Download Center - Select by Software Tap

ftware Selector			
elect by Version Select by Device	Select by Software University Softw	ware	
I. Select Altera Software Products	2. Select Version or Product	3. Download Selected File	
ModelSim-Altera Edition ModelSim-Altera Starter Edition Nios II Embedded Design Suite DSP Builder	13.0 Service Pack 1 13.0 12.1 Service Pack 1	Download	
Licensing Software	12.0 Service Pack 2		
Altera SDK for OpencL SoC Embedded Desian Suite	12.0		
Programming Software Drivers Board Layout and Test MAX+PLUS II (Legacy)	11.1 Service Pack 2 11.1 Service Pack 1 11.1 11.0 Service Pack 1 11.0	-	

Fig. 10-5 Altera Download Center -Software Selector

Select sequentially Programming Software - 12.0 Service Pack 2, and then click the download button at the end.



IC-M29

MEASURABLE ADVANTAGE		Search 🗸 🔍
ک Devices کا Design Tools & Se	rvices 🏾 End Markets 🛸 Technology 🛸 Training	ng 🛛 Support 🗳 About 🛸 Buy
Devices Design Tools & Set Design Software Quartus II Subscription Edition Quartus II Subscription Edition Quartus II Web Edition MegaCore IP Library ModelSim-Altera ModelSim-Altera Starter Nios II EDS Legacy Tools DSP Builder Altera SDK for OpenCL SoC EDS OS Support Archives Service Packs Design Software Licensing Get and Manage Licenses Licensing FAQ License Daemon Software Programming Software Quartus II Programmer Jam™ STAPL Software Drivers Cable & Adapter Drivers Board Layout and Test BSDL Models SPICE Models IBIS Models Schmatic Review Worksheets Layout Review Worksheets	vices Send Markets STechnology STraining Quartus II Stand-Alone Programme Home > Support > Downloads > Quartus II Stand-Alone Pro Release date: June, 2012 Quartus II Programmer Software v12.0 > Select a previous version of Quartus II: 12.0 Download Manager Individual Files DVD .iso Download Option 1: Altera Installer Use Altera [®] Installer to select your choice of design matulet reduces in edownload acc by grot to oper Mindows Version (14 MB) Download Linux Version (21 MB) Install Subscription Edition Service Pack 2	g Support About Buy Icr rogrammer ModelSim. Nios'II OURTUS'II OSPBuilder o File o File o File o software with non-NTLM proxies. You must first download this oose the software and device you want to install. The Altera o software o File g Rate This Page
Gerber Files		
Legacy Software MAX+PLUS II Other Legacy Software		
Please give us feedback		
Devices Design Tools & Services End Jobs Investor Relations Contact Us Copyright © 1995-2013 Altera Corporat	Markets Technology Training Support About Buy Site Map Privacy Legal Notice tion. All Rights Reserved.	Altera Forum Wiki Updates Us

Fig. 10-6 Quartus II Stand-Alone Programmer OS version select

Will be selected according to the OS Version



IC-M29

MEASJRABLE ADVANTAGE **	YEARS Search Q In a person provide the second seco
myAltera Account How to Register Terms and Conditions Help	myAltera Account Sign-In Home > Support > mySupport > myAltera Account Sign-In User Name Password Remember me Sign In
	On't have an account? Our myAltera Account Your myAltera Account allows you to file a service request, register for a class, download software, and more. Enter your email address. (If your email address already exists in our system we will retrieve the associated information.) Create Account Create Account We associated information. Create Account We associated information. Create Account Get One-Time Access One-time guest access can be used to access the download center without creating an myAltera account. However, you must complete this form on each return visit. Company / Organization Name Enail Address Enail Address Create Account Get One-Time Access Get One-Time Access Constrained information. Create Account Constrained information. Create Account Get One-Time Access Constrained information. Create Account Constrained information. Create Account Constrained information. Create Account Create Account Constrained information. Create Account Create Account Constrained information. Constrained information. Constrained information. Create Account Constrained information. Cons
Please give us feedback	Rate This Page
Devices Design Tools & Services End Jobs Investor Relations Contact Us Copyright © 1995-2013 Altera Corporal	Markets Technology Training Support About Buy Site Map Privacy Legal Notice ion. All Rights Reserved.

Fig. 10-7 myAltera Account sign-in

You must logged in to 'myAltera Account' If you want to download the program eventually.



10.2 Firmware Writing

10.2.1 Cable Connection & Writing

First, USB cable of USB-Blaster Cable connect to PC Second, 10pin connector(Female) of USB-Blaster Cable connected 10pin connector(Male) ISVI Firmware Cable.

Third, Circular 12pin connector of ISVI Firmware Cable is connected ISVI camera. Finally, recheck the cable connection, IC-M29 camera power on

Execute Quartus II programmer



Quartus II 32-bit Pro	ogrammer - [Chain1.cdt] ocessing <u>T</u> ools <u>W</u> indow <u>H</u>	elp 🛡			the star	Sear	rch altera.co	om
Hardware Setup	USB-Blaster [USB-0] to allow background programmin	Mode:	JTAG IAX V devices)	•	Progress:			
Start	File	Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine
Stop								
Auto Detect								
💢 Delete								
Add File								
Change File	•							
Save File								
Add Device								
பிற பிற								
J [™] Down								
All 😢 🛆 🥼	🔰 👩 💙 < <search>></search>			~				
Type ID 1	Message							
٠								
System Process	sing /							

Fig. 10-8 Quartus II Programmer execute



Quartus II 32-bit Pro	ogrammer - [Chain1.cdf] cessing <u>T</u> ools <u>W</u> indov	v Help 🕏				Sear	ch altera.co	
🔔 Hardware Setup	USB-Blaster [USB-0]	lode:	JTAG	•	Progress:			
Start	File	Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine
Stop								
Delete								
Add File								
Change File	•							
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¶ ¹ ¹ ¹ ¹ Up								
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AII 😢 🔝 🥼	🖌 🧟 🗟 Search	>>		~				
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System Process	sing /			-			10	

Fig. 10-9 Quartus II Programmer mode select

Check to be sure that USB-Blaster [USB-0]

Mode Select -> JTAG Mode

Quartus II 32-bit Pro	grammer - [Chain1	.cdf]		1 N				
le <u>E</u> dit <u>V</u> iew P <u>r</u> o	cessing <u>T</u> ools <u>W</u> i	ndow <u>H</u> elp 💎	£			Sea	rch altera.c	m
🔔 Hardware Setup	USB-Blaster [USB-0]	Mode:	JTAG	•	Progress:			
Enable real-time ISP	to allow background p	rogramming (for MAX II and I	MAX V devices)					
⊌ ³ Start	File	Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine
🖏 Stop								
Auto Detect								
💥 Delete								
Add File								
Change File	•		m					
Save File								
Add Device								
1 th Up								
U ™ Down								
		60.000						
	∫	arch>>		~				
TADC ID L	icoouge							
System / Process	ing /							

Fig. 10-10 Quartus II Programmer Add file

Add File Click.

JTAG Mode need *.jic file.(example : ts29m_s3_1.1b.jic)



Select Programming File									
Look in: 🔐 D: \backup\sw\isvi\ic-m29\1.Finalprog_ts29m_s3_1p1b_20140401 🔹 🔾 🔾 🔾	: : :								
My Computer									
File name:	Open								
Files of type: Programming Files (*.sof *.pof *.jam *.jbc *.ekp *.jic)	Cancel								

Fig. 10-11 : Quartus II Programmer Add file popup

You can see that likely below

🐌 Quartus II 32-bit P	Programmer - [Chain1.cdf]*						-			X
File Edit View Pr	rocessing Tools Window Help 🛡	200	123	7				Search alt	era.com	0
Hardware Setup	USB-Blaster [USB-0] P to allow background programming (for MAX II an	nd MAX V devices)	Mode: (JTAG		▼ Pr	ogress:			
Start	File Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine	Security Bit	Erase	ISP CLAMP
Stop	<none> EP3SL110</none>	0000000	FFFFFFF							
Add File										
Save File										+
Add Device	EPCS128									
Jim Down										
										▼

Fig. 10-12 Quartus II Programmer Added



Quartus II 32-bit P	rogrammer - [Chain1.cdf]* ocessing Tools Window	Help 🛡							Search alt	era.com) X
Hardware Setup	USB-Blaster [USB-0]	nming (for MAX II an	d MAX V devices)	Mode:	JTAG		▼ Pr	ogress:			
Start	File	Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine	Security Bit	Erase	ISP CLAMP
Auto Detect Delete Delete Add File	Factory default enhanced D:/backup/sw/isvi/ic	EP3SL110 EPCS128	04783583 DFEA6EE4	FFFFFFF	V V						
Change File	•			III							+
Add Device											E
					_		2	10			

Fig. 10-13 Quartus II Programmer progress select

"Program/Configuration", "Verify" box check.

Start button click. You can see progress bar progressing.

🐌 Quartus II 32-bit P	Programmer - [Chain1.cdf]*									1 X	
File Edit View Pr	rocessing Tools Window Help 🛡		14	5				Search alt	tera.com		
Hardware Setup	USB-Blaster [USB-0]		Mode:	JTAG		▼ F	Progress: 100% (Succ			cessful)	
Enable real-time IS	P to allow background programming (for MAX II an	d MAX V devices)									
Start	File Device	Checksum	Usercode	Program/ Configure	Verify	Blank- Check	Examine	Security Bit	Erase	ISP CLAMP	
Stop	Factory default enhanced EP3SL110 D:/backup/sw/isvi/ic EPCS128	04783583 DFEA6EE4	FFFFFFF	V	V						
Delete											
Change File	4									•	
Add Device										E	
										-	

Fig. 10-14 Quartus II Programmer Progressing

Progress is 100% done, Camera power off, and ISVI Firmware Cable reject. Download Time : About 85sec.



CE

EN 55024 : 1998+A1:2001, +A2:2003 EN 55022 : 2006+A1:2007 [Class A Equipment]

FCC

Section 15.107, Section 15.109 (Class A Equipment)

NOTE : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



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