

ARTCAM-990SWIR-TEC-CL

Camera Link Setting Manual

rev.1.07



Contents

1.	Intro	oduct	tion	3				
2.	Device and System Requirements							
3.	Camera Link Format							
3	.1.	Forr	nat	4				
3	.2.	Res	olution	4				
4.	Con	nect	or Pin Assignment	4				
5.	Con	nmur	nication Specifications	5				
5	.1.	Abo	ut the settings of the product.	5				
5	.2.	Con	nmunication Method	5				
5	.3.	Con	nmand Format	5				
5	.4.	List	of Commands	6				
5	.5.	Con	nmands Details	7				
	5.5.	1.	Reset	7				
	5.5.2	2.	Shutter	7				
	5.5.3	3.	Gain	8				
	5.5.4	4.	Temperature Control	8				
	5.5.5	5.	Mirror	9				
	5.5.6	6.	Camera Information	9				
	5.5.7	7.	Peltier1	0				
	5.5.8	8.	Capture mode1	1				
6.	Sett	ings	1	1				
6	6.1. Preparation11							
6	6.2. Connect to Camera 12							
6	.3.	Exa	mple of Serial Communication Software Settings1	3				
6	6.4. Example of Viewer Software Settings 15							

1. Introduction

This manual is for overall settings of cameras with Camera Link. Please refer to the camera instruction for more details of cameras.

This manual is especially for the following model:

Table 1-1: Target Model						
Model	Pixels	Frame Rate				
ARTCAM-990SWIR-TEC-CL	1.3M	72fps				

2. Device and System Requirements

To use a Camera Link camera, the following devices and software are required. Please have them prepared before starting up the camera.

Item	Note
Camera Link Frame Grabber Board	Compatible with Base Configuration
Viewer Software	Software accompanying with grabber board,
	or ArtMeasure
Serial Communication Software	e.g. Tera Term
PC	Any which can adopt items mentioned above.
Camera	
Camera Link Cable	The connector joining to camera should be SDR.
AC Adapter	Please use the AC adapter we offer

Table 2-1: Minimum Requirements

All the settings in this manual are under the condition with following devices which we recommend. While using other devices, users could adapt settings correspondent to the devices.

Table 2-2: Device and System recommended						
Item	Recommendation					
Camera Link Frame Grabber Board	PIXCI®EB1 (Manufactured by EPIX)					
Viewer Software	XCAP for Windows Lite					
Serial Communication Software	Tera Term					

Operation has been confirmed using the following framegrabbers and software combinations.

Table 2-3: Tested Framegrabbers + Software						
Manufacturer	Product name + software					
NI	NI PCIe-1433 + NI MAX					
AVAL	APX-3318 + AIPTool					
Dalsa	Xcelera-CL PX4 Full + CamExpert					
EPIX	PIXCIEB1 + XCAP					

※ Tested CameraLink cable length: 2m

3. Camera Link Format

3.1. Format

The following table shows the format of Camera Link compatible with this camera.

Table 3-1: Format List									
Configuration	Тар	Significant Bit	Color	Clock Frequency					
Base	12bit×2tap	12bit (MSB Justified)	Grayscale	63.000MHz					

3.2. Resolution

The following table shows the maximum pixels of this camera.

Table 3-2: Resolution					
Model	Horizontal Pixels	Vertical Pixels			
ARTCAM-990SWIR-TEC-CL	1280	1024			

4. Connector Pin Assignment

The connector pin assignment is as follows:

Table 4-1: Connector Pin Assignment							
Pin No.	Signal Name	Pin No.	Signal Name				
1	GND	14	GND				
2	X0-	15	X0+				
3	X1-	16	X1+				
4	X2-	17	X2+				
5	XCK-	18	XCK+				
6	X3-	19	X3+				
7	RX+	20	RX-				
8	TX-	21	TX+				
9	CC0-	22	CC0+				
10	CC1+	23	CC1-				
11	CC2-	24	CC2+				
12	CC3+	25	CC3-				
13	GND	26	GND				

5. Communication Specifications

5.1. About the settings of the product.

To change or check the settings of the Camera Link camera, you can send command to the camera through a serial communication software.

5.2. Communication Method

The serial communication method is as follows:

Table 5-1: Communication Method					
Item	Contents				
Communication Form	Asynchronous serial communication				
	(In accordance with standards of RS232C)				
Baud Rate	9600bps				
Data	8 bit				
Parity	None				
Stop	1 bit				
Flow Control	None				

5.3. Command Format

Please give command to the camera through serial communication software with the format listed below. If the format is not correct, the camera could not be controlled.

Please be sure to use half-width characters of ASCII code.

Table 5-2: Command Format						
	1	2	3	4	5	6
Format	cmd	Ø	-opt		val	< (CR or LF or CR+LF)
Details	1: On	e letter	which	repres	ents th	ne main purpose of the command.
	2: On	e spac	e (blan	k) as d	elimite	ır.
	3: Op	tion co	rrespor	ndent v	vith the	e main purpose.
	The	e forma	it is a le	etter go	ing aft	er a "-".
	4: On	e spac	e (blan	k) as d	elimite	r.
	5: Val	ue sett	ing: en	ter the	value	if necessary.
	Dee	cimal n	umeric	al valu	e: ente	er the number directly.
	He	kadecir	nal nur	nerical	value:	enter the number after an "x."
	The default value would be 0 if there is no value entered.					
	6: Line feed code					
Response Normal: OK쉭(CR+LF)						
If response is a value: <i>"value"</i> 쉬(CR+LF)					[]] (CR+LF)	
	Abno	rmal: N	IG⇔](C	R+LF)		
Note	omma	nd will	be dis	tinguis	hed once the line feed code is sent out. If	
	any n	one-ha	alf-widt	h char	acters	are typed (e.g. BackSpace) before line
	feed	code, t	he res	ponse	must l	be NG.
	lf you	want to	o cance	el the co	omman	nd, type a none-half-width character before
	line fe	eed co	de, the	e respo	nse w	ill be NG.

990SWIR-TEC-CL Camera Link Setting Manual ARTRAY

5.4. List of Commands

The commands listed below shows controllable functions.

For more details of each commands, please refer to "5.5 Commands Details."

Function and ant val Description						
Function	cmd	-opt	val	Description		
Reset	x	_	_	Reset camera		
Shutter	i	-V	0	Shutter speed setting		
Gain	g	-V	0	Gain setting		
Temperature	+	-v	—	Sensor Temperature readout [°C]		
Control	t	-vf	_	FPGA Temperature readout [°C]		
Mirror		-V	0	Vertical mirror enable/disable		
Mirror	m	-H	0	Horizontal mirror enable/disable		
Camera		-C	_	Show camera name		
Information	n	-v	_	Show firmware version		
Doltion Control		-у	_	Peltier ON		
Peltier Control	р	-n	—	Peltier OFF		
Conturo modo	r	-р	_	Sets preview mode		
Capture mode	r	-t	_	Sets trigger mode		

Table 5-3: List of Commands

5.5. Commands Details

The details of each commands are as follows. Please refer to the command correspondent to your needs.

5.5.1. Reset

	Table 5-4: Reset Camera							
	1	2						
Format	х	Ś						
Details	Details 1: x = Reset							
	2: Line feed code							
Response	Norm	nal: O	K십					
	Abnormal: NG							
Note								

5.5.2. Shutter

	1	2	3	4	5	6					
Format	i	Δ	-V		val	仓					
Details	1: i =	Shutte	er								
	2: De	2: Delimiter									
	3: -v	3: -v = Option: shutter speed settings									
	4: De	4: Delimiter									
	5: Va	5: Value of shutter speed									
	6: Lir	6: Line feed code									
Response	Norm	nal: OK	<								
	Abno	rmal: N	۹C∜								
Note	Sets	the sh	utter sp	beed							
	i‰To	%To calculate the shutter speed, please refer to the instruction of the									
	came	era.									

Table 5-5: Shutter Speed Settings

5.5.3. Gain

	Table 5-6: Gain Settings										
	1	1 2 3 4 5 6									
Format	g		-V		val	仓					
Details	1: g =	= Gain									
	2: De	2: Delimiter									
	3: -v	3: -v = Option: gain settings									
	4: Delimiter										
	5: Ga	5: Gain settings									
	6: Lin	ie feed	l code								
Response	Norm	al: OK	< (心								
	Abno	Abnormal: NG纪									
Note	To ch	To change the setting value of gain.									
	% Fo	r detail	s on g	ain set	ting, plea	se refer to the to the product manual					

5.5.4. Temperature Control

Table 5-7: sensor Temperature Readout

		10.010			Tempere					
	1	2	3	4						
Format	t		-V	Ŷ						
Details	1: t =	Tempe	erature	contro	bl					
	2: De	2: Delimiter								
	3: -v = Option: temperature readout									
	4: Line feed code									
Response	Norm	nal: ten	nperati	⊿re						
	Abnormal: NG쉳									
Note	To show the estimated temperature of camera sensor.									
	The t	emper	ature s	shown	here is m	erely a reference.				

Table 5-8: FPGA Temperature Readout

	1	2	3	4						
Format	t		-vf	Ś						
Details	2: De 3: -vf	1: t = Temperature control 2: Delimiter 3: -vf = Option: FPGA temperature readout 4: Line feed code								
Response		Normal: <i>temperature 식</i> Abnormal: NG식								
Note		To show the estimated temperature of camera FPGA. The temperature shown here is merely a reference.								

5.5.5. Mirror

Table 5-9: Mirror vertical

	1	2	3	4	5	6					
Format	m		-V		val	仓					
Details	1: m	1: m = Mirror									
	2: De	2: Delimiter									
	3: -V	3: -V = Option: Vertical									
	4: De	4: Delimiter									
	5: 0 =	5: 0 = disabled, 1 = enabled									
	6: Lir	6: Line feed code									
Response	Norm	nal: OK	(心								
	Abno	Abnormal: NG쉭									
Note	To er	nable/d	lisable	vertica	l mirror						

Table 5-10: Mirror horizontal

	1	2	3	4	5	6						
	1	Z	3	4	5	-						
Format	m	Δ	-H	\square	val	Ą						
Details	1: m :	1: m = Mirror										
	2: De	2: Delimiter										
	3: -H	3: -H = Option: Horizontal										
	4: De	4: Delimiter										
	5: 0 =	5: 0 = disabled, 1 = enabled										
	6: Lin	6: Line feed code										
Response	Norm	al: OK	ک									
	Abno	Abnormal: NG										
Note	To en	able/d	isable	horizo	ntal mirro	r						

5.5.6. Camera Information

Table 5-11: Camera Name

	1	2	3	4							
Format	n		-C	Ŷ							
Details	1: n =	- Came	era info	ormatic	n						
	2: De	2: Delimiter									
	3: -c = Option: Camera name										
	4: Line feed code										
Response	Norm	al: AR	TCAM	-990S\	NIR-TEC	-CL (example)쉬					
	Abnormal: NG纪										
Note	To sh	To show camera name.									

	1	2	3	4							
Format	n	Δ	-V	Ŷ							
Details	1: n =	1: n = Camera information									
	2: De	2: Delimiter									
	3: -v	3: -v = Option: Firmware version									
	4: Lin	4: Line feed code									
Response	Norm	al: Ver	sion: 2	202012	2041730 (example)쉬					
	Abnormal: NG쉭										
Note	To show firmware version.										

Table 5-12: Firmware Version

5.5.7. Peltier

Table 5-13: Peltier ON

	1	2	3	4				
Format	р	Ø	-у					
Details	2: De 3: -y	= Peltie limiter = Peltie ne feed	er ON					
Response	Normal: OK순 Abnormal: NG순							
Note	To er	able p	eltier					

Table 5-14: Peltier OFF

	1	2	3	4					
Format	р		-n	ĉ					
Details	2: De 3: -n	= Peltie elimiter = Pelti ne feed	er OFF	-					
Response		Normal: OK신 Abnormal: NG신							
Note	To di	sable p	oeltier						

5.5.8. Capture mode

	1	2	3	4					
Format	r	Δ	-p	Ś					
Details	1: r =	Captu	ire mo	de					
	2: De	limiter							
	3: -р	3: -p = Preview							
	4: Lir	4: Line feed code							
Response	Norm	nal: OK	<u>ر</u> ئ						
	Abno	Abnormal: NG纪							
Note	Confi	gures	captur	e as pi	eview mo	ode			

Table 5-15: Preview Mode

Table 5-16: Trigger Mode

	1	2	3	4							
Format	r		-t								
Details	1: r =	1: r = Capture mode									
	2: De	2: Delimiter									
	3: -t =	3: -t = Trigger									
	4: Lin	4: Line feed code									
Response	Norm	nal: OK	ک								
	Abno	Abnormal: NG쉬									
Note	Confi	gures	captur	e as tri	gger mod	le					

6. Settings

6.1. Preparation

Before connecting camera to your PC, please install Camera Link frame grabber board, including driver and all the software necessary.

In some cases, it is required to register the license of the product, please complete the registration before starting using the camera.

After installing, please open device manager to check if the grabber board is recognized normally. If you use our recommendations listed in table 2-2, the device names should be recognized as follows:

No.	Device
1	PIXCI®EB1 PCI Express Camera Link Video Capture Board for Win XP/Vista/7/8/10-64bit
2	PIXCI® Camera Link Serial Port (COM3涨₁)

Table 6-1: Devices Recognized

i: Will be differ depending on systems.

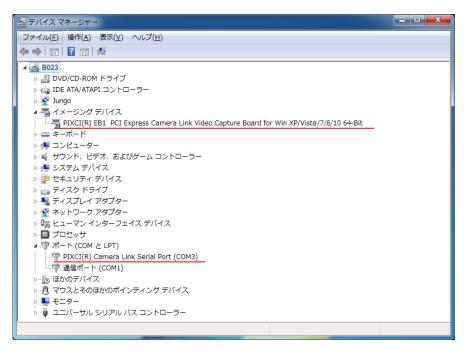


Figure 6-1: Sample of device manager

6.2. Connect to Camera

Please connect camera to the Camera Link frame grabber board with Camera Link cable. Before connect AC adapter to the camera, please start up the serial communication software. Command will be sent from the camera once it is connected to the power.

6.3. Example of Serial Communication Software Settings

Here we take "Tera Term" as the example of Serial Communication Software settings. Please start up "Tera Term" before connecting AC adapter to the camera.



Figure 6-2: Icon of Tera Term

After starting the software, please choose the port correspondent with the name shown in device manager. (At the time this manual is made, it is shown as COM3.)

Tera Term: New (connection	×
© TCP/IP	Host: myhost.example.com History Service: Telnet SSH Other Protocol:	SSH2 -
 Serial 	Port: COM3: PIXCI(RO) Camera Li	<mark>nk Serial Por</mark> t(COM3
	OK Cancel Help	

Figure 6-3: To Choose Serial Port on Tera Term

Please click "Setup" on menu bar, then choose "Serial Port" for communication method settings. Please refer to table 5-1 Communication Method for details of the settings.

Tera Term: Serial port setup			
Port:	сомз – ОК		
Speed:	9600 🗸		
Data:	8 bit Cancel		
Parity:			
Stop bits:	1 bit 🔹 Help		
Flow control:	none -		
Transmit delay 0 msec/	char 0 msec/line		

Figure 6-4: To Set up Serial Port on Tera Term



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Please click "Setup" on menu bar, then choose "Terminal" for communication protocol settings. The following table shows the recommended settings.

Please note that these settings are recommended for a smoother operation, but not necessary to be.

Item	Settings
New-line (Receive)	CR
New-line (Transmit)	CR+LF
Local echo	Check the box

Table 6-2: Communicat	ion Protocol
	-

Tera Term: Terminal setup		23
Terminal size 80 X 24 V Term size = win size	New-line Receive: CR • Transmit: CR+LF •	OK Cancel
Auto window resize Terminal ID: VT100	⊠ Local echo ⊡ Auto switch (VT<-	Help
Kanji (receive) UTF-8 Half-width kana Iocale: japanese		^[\$B → ^[(B →

Figure 6-5: To Set up Terminal on Tera Term

After connecting camera with power, Tera Term will be initialized. Once the initialization is finished, you will see "OK" on the dialog box. Then you can send command to control camera. Please note that camera will start up only when you send out the command.

💆 COM1 - Tera Term VT				
ファイル(E) 編集(E) 設定(S) コントロール(Q) ウィンドウ(W) ヘルプ(H)				
Wait	<u>^</u>			
OK				
	-			

Figure 6-6: Initialization



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6.4. Example of Viewer Software Settings

Here we take "EPIX®XCAP-LITE" as the example of viewer software settings. Please start up "XCAP".



Figure 6-7: Icon of XCAP

After starting up the software, you will see welcome message and license information. If you have already registered, please click OK directly.

If a warning or precaution concerning the license shows up, you may not complete the registration. In that case please register the license to continue.

🖥 EPIX® XCAP V3.8	x
	_
Welcome to XCAP-Lite.	
XCAP-Lite is a feature-limited software package for the PIXCI® Frame Grabbers. XCAP-Lite has the same	
appearance as XCAP-Ltd and XCAP-Std, our full-featured image analysis packages, but most Image	
Processing, Measurement, Analysis, and other advanced features are inactive.	
XCAP-Lite allows loading and viewing of images and image sequences from files, even if a PIXCI® frame	
grabber isn't present. To create an image and browse the features of XCAP with the PIXCI® Frame Grabber	
closed or not installed, click:	
Image	
New Image	
OK	
Modify	
Patterns	
OK	
Or use:	
File	
Load New Image	
or	
Load New Image Sequence	
to load and view an image or image sequence from file(s).	
To purchase XCAP-Ltd or XCAP-Std, and realize the full potential suggested by XCAP-Lite, contact EPIX, Inc.,	
or your distributor of EPIX® imaging products.	
The browsable Reference Manual is available under Help. A printed Reference Manual, covering XCAP-Lite,	
XCAP-Std, and XCAP-Ltd is also available from EPIX, Inc., or your distributor of EPIX® imaging products.	
UK V	

Figure 6-8: Welcome message

Please click "PIXCI®" from XCAP menu, then choose "PIXCI®Open/Close" to open the dialog box. Please click "Open" to start the camera.

PIXCI® Open/Close			
Options			
	Multiple Devices	Advanced	
	Camera & Format	Driver Assistant	
	Close C	ancel Board Info	

Figure 6-9: To Open Camera

After starting, you will see the settings of camera and display area.

First, please set communication settings: choose "Configure" to set Camera Link configuration, bit, tap and color.

Please refer to table 3-1 to confirm the Camera Link format.

🛅 EPIX® PIXCI® EB1: Generic Camera Link: Capture & A💻		
PIXCI® EB1 Capt Proc Cir Norm Preset Capture Buf Res Trig -Buffers	Camera Configure Resolution Timing MultiTap —Camera Configuration	
Current Buffer	Camera Link Base	
0 ★ Frame Buffers 12 Field Count 0 Clear Buffers	Base Configuration 14 bit × 1 tap Color Configuration Grey Level Non-Std Configuration Options	
C Live Snap C Unlive Reset	Tips Driver Assistant	

Figure 6-10: Configure Settings

Second, please set the resolution. Please refer to table 3-2 to confirm the resolution of each model.

EPIX® PIXCI® EB1: Gen PIXCI® EB1 Capt Proc Cir Norm Preset Capture Buf Res Trig -Buffers	camera Link: Capture & A
Current Buffer 0 Frame Buffers 12 Field Count 0 Clear Buffers	Horizontal Resolution 1280 (pixels/line) Vertical Resolution 1024 (pixels/col,) Data Valid Signal Use DVAL Horizontal Offset 0 Vertical Offset 0
Live Snap Unlive Reset *	

Figure 6-11: Resolution Settings

Third, please set clock frequency of Camera Link in "Timing." Please refer to table 3-1 to confirm the Camera Link format.

🛅 EPIX® PIXCI® EB1: Gene	eric Camera Link: Capture & A
PIXCI® EB1 Capt Proc Cir Norm Preset Capture Buf Res Trig Buffers	Camera Configure Resolution Ilmina MultiTap —Camera Mode & Timing
Current Buffer 0 Frame Buffers 12 Field Count 0 Clear Buffers	Timing Mode Free-run Camera Link Clock 85.000 (MHz) Clocks per LVAL 1280 Lines per FVAL 1024
C Live Snap	

Figure 6-12: Timing Settings

The settings are finished now. The image will be displayed either by clicking "Live" in "Capture" on the sub-window, or simply by clicking "Live Icon" on the left side of the sub-window.

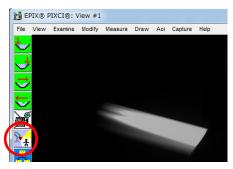


Figure 6-13: Live Icon