ARTCAM-130SWIR-CL
Camera Link Setting Manual
rev.1.05

Contents

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-130SWIR-CL	1.3M	30fps

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.

Table 2-1: Minimum Requirements

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

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

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	Tap	Significant Bit	Color	Clock Frequency
Base	14bit×1tap	13bit (MSB Justified)	Grey Level	85.000MHz

3.2. Resolution

The following table shows the maximum pixels of this camera.

Table 3-2: Resolution

Model	Horizontal Pixels	Vertical Pixels
ARTCAM-130SWIR-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	☒	-opt	☒	val	⏎ (CR or LF or CR+LF)
Details	1: One letter which represents the main purpose of the command. 2: One space (blank) as delimiter. (Omissible) 3: Option correspondent with the main purpose. The format is a letter going after a "-". 4: One space (blank) as delimiter. (Omissible) 5: Value setting: enter the value if necessary. Decimal numerical value: enter the number directly. Hexadecimal numerical 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: OK⏎(CR+LF) If response is a value: *"value"*⏎(CR+LF) Abnormal: NG⏎(CR+LF)					
Note	The command will be distinguished once the line feed code is sent out. If any none-half-width characters are typed (e.g. BackSpace) before line feed code, the response must be NG. (If only line feed code is typed, there will be no reaction.) If you want to cancel the command, type a none-half-width character before line feed code, the response will be NG. It doesn't matter the letters of command is in upper case or lower case. Option is omissible. (In this case, a default option will be chosen automatically.)					

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.”

Table 5-3: List of Commands

Function	cmd	-opt	val	Description
Reset	x	-c	—	Start camera (Option is omissible)
		-p	—	Stop camera
		-i	—	Initialize
Shutter	i	-s	—	Synchronous mode
		-r	—	Asynchronous mode
		-v	O	Shutter speed settings (Option is omissible)
External I/O	p	-i	O	External trigger input settings (Option is omissible)
		-p	O	External trigger polarity settings
		-a	O	Select signal of external output 1
		-b	O	Select signal of external output 2
Analog Gain	a	-l	—	Low gain (Option is omissible)
		-m	—	Medium gain
Digital Gain	g	-y	—	ON
		-n	—	OFF
		-v	O	Settings (Option is omissible)
Offset	o	-y	—	ON
		-n	—	OFF
		-v	O	Settings (Option is omissible)
Black Level Correction	l	-y	—	ON (Option is omissible)
		-n	—	OFF
Sensitivity Correction	s	-y	—	ON (Option is omissible)
		-n	—	OFF
Defective Pixel Correction	f	-y	—	ON (Option is omissible)
		-n	—	OFF
Temperature Control	t	-w	—	Temperature settings
		-r	—	Temperature readout (Option is omissible)
Frame Control	u	-s	—	Start (Option is omissible)
		-p	—	Stop
Camera Mode	z	-s	—	SIM (Standard image mode)
		-l	—	LNIM (Low noise image mode)
Camera Information	n	-c	—	Show camera name (Option is omissible)
		-v	—	Show firmware version

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: Start Camera

	1	2	3	4		
Format	x	☒	-c	⏎		
Details	1: x = Reset 2: Delimiter (Omissible) 3: -c = Option: start camera (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To start camera. While camera is already turned on, plug-in adapter and start again.					

Table 5-5: Stop Camera

	1	2	3	4		
Format	x	☒	-p	⏎		
Details	1: x = Reset 2: Delimiter (Omissible) 3: -p = Option: stop camera 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To stop camera.					

Table 5-6: Initialize

	1	2	3	4		
Format	x	☒	-i	⏎		
Details	1: x = Reset 2: Delimiter (Omissible) 3: -i = Option: initialize camera 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To initialize the camera while it is on.					

5.5.2. Shutter

Table 5-7: Synchronous Mode

	1	2	3	4		
Format	i	⍁	-s	⏎		
Details	1: i = Shutter 2: Delimiter (Omissible) 3: -s = Option: synchronous mode 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change to synchronous mode. Shutter will be synchronized with external trigger signal.					

Table 5-8: Asynchronous Mode

	1	2	3	4		
Format	i	⍁	-r	⏎		
Details	1: i = Shutter 2: Delimiter (Omissible) 3: -r = Option: asynchronous mode 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change to asynchronous mode.					

Table 5-9: Shutter Speed Settings

	1	2	3	4	5	6
Format	i	⍁	-v	⍁	val	⏎
Details	1: i = Shutter 2: Delimiter (Omissible) 3: -v = Option: shutter speed settings (Omissible) 4: Delimiter (Omissible) 5: Value of shutter speed 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To set the shutter speed in synchronous and asynchronous modes. ※To calculate the shutter speed, please refer to the instruction of the camera.					

5.5.3. External I/O

Table 5-10: External trigger input settings

	1	2	3	4	5	6
Format	p	☒	-i	☒	val	⏎
Details	1: p = External trigger input settings 2: Delimiter (Omissible) 3: -i = Option: choose CC 4: Delimiter (Omissible) 5: Trigger no. 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change external trigger to one of followings: 0: external I/O 1: CC1 2: CC2 3: CC3 4: CC4					

Table 5-11: External trigger polarity settings

	1	2	3	4	5	6
Format	p	☒	-p	☒	val	⏎
Details	1: p = External trigger input settings 2: Delimiter (Omissible) 3: -p = Option: choose polarity 4: Delimiter (Omissible) 5: Polarity 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change the polarity of external trigger to one of followings: 0: Active-low (Synchronized when signal falls) 1: Active-high (Synchronized when signal rises)					

Table 5-12: Select signal of external output 1

	1	2	3	4	5	6
Format	p	☒	-a	☒	val	⏎
Details	1: p = External trigger input settings 2: Delimiter (Omissible) 3: -a = Option: select signal of external output 1 4: Delimiter (Omissible) 5: Output no. 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change external output 1 to one of followings: 0: Low-fixed/ 1: LINE_VALID / 2: FRAME_VALID / 3: TRIG_READY / 4: STROBE / 8: High-fixed					

Table 5-13: Select signal of external output 2

	1	2	3	4	5	6
Format	p	☒	-b	☒	val	⏎
Details	1: p = External trigger input settings 2: Delimiter (Omissible) 3: -b = Option: select signal of external output 2 4: Delimiter (Omissible) 5: Output no. 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change external output 2 to one of followings: 0: Low-fixed/ 1: LINE_VALID / 2: FRAME_VALID / 3: TRIG_READY / 4: STROBE / 8: High-fixed					

5.5.4. Analog Gain

Table 5-14: Low Gain

	1	2	3	4		
Format	a	☒	-l	⏎		
Details	1: p = Analog gain 2: Delimiter (Omissible) 3: -l = Option: low gain (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To set analog gain low.					

Table 5-15: Medium Gain

	1	2	3	4		
Format	a	☒	-m	⏎		
Details	1: p = Analog gain 2: Delimiter (Omissible) 3: -m = Option: medium 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To set analog gain medium.					

5.5.5. Digital Gain

Table 5-16: Digital Gain ON

	1	2	3	4		
Format	g	☒	-y	⏎		
Details	1: g = Digital gain 2: Delimiter (Omissible) 3: -y = Option: digital gain ON 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To enable digital gain.					

Table 5-17: Digital Gain OFF

	1	2	3	4		
Format	g	☒	-n	⏎		
Details	1: g = Digital gain 2: Delimiter (Omissible) 3: -n = Option: digital gain OFF 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To disable digital gain.					

Table 5-18: Digital Gain Settings

	1	2	3	4	5	6
Format	g	☒	-v	☒	val	⏎
Details	1: g = Digital gain 2: Delimiter (Omissible) 3: -v = Option: digital gain settings (Omissible) 4: Delimiter (Omissible) 5: Digital gain settings 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change the setting value of digital gain.					

5.5.6. Offset

Table 5-19: Offset ON

	1	2	3	4		
Format	o	⍁	-y	⏎		
Details	1: o = Offset 2: Delimiter (Omissible) 3: -y = Option: offset ON 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To enable offset.					

Table 5-20: Offset OFF

	1	2	3	4		
Format	o	⍁	-n	⏎		
Details	1: o = Offset 2: Delimiter (Omissible) 3: -n = Option: offset OFF 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To disable offset.					

Table 5-21: Offset Settings

	1	2	3	4	5	6
Format	o	⍁	-v	⍁	val	⏎
Details	1: o = Offset 2: Delimiter (Omissible) 3: -v = Option: offset settings (Omissible) 4: Delimiter (Omissible) 5: Offset settings 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To change the setting value of offset.					

5.5.7. Black Level Correction

Table 5-22: Black Level Correction ON

	1	2	3	4		
Format	l	☒	-y	⏎		
Details	1: l = Black level correction 2: Delimiter (Omissible) 3: -y = Option: black level correction ON (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To enable black level correction.					

Table 5-23: Black Level Correction OFF

	1	2	3	4		
Format	l	☒	-n	⏎		
Details	1: l = Black level correction 2: Delimiter (Omissible) 3: -n = Option: black level correction OFF 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To disable black level correction.					

5.5.8. Sensitivity Correction

Table 5-24: Sensitivity Correction ON

	1	2	3	4		
Format	s	☒	-y	⏎		
Details	1: s = Sensitivity correction 2: Delimiter (Omissible) 3: -y = Option: sensitivity correction ON (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To enable sensitivity correction.					

Table 5-25: Sensitivity Correction OFF

	1	2	3	4		
Format	s	☒	-n	⏎		
Details	1: s = Sensitivity correction 2: Delimiter (Omissible) 3: -n = Option: sensitivity correction OFF 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To disable sensitivity correction.					

5.5.9. Defective Pixel Correction

Table 5-26: Defective Pixel Correction ON

	1	2	3	4		
Format	f	☒	-y	⏎		
Details	1: f = Defective pixel correction 2: Delimiter (Omissible) 3: -y = Option: defective pixel correction NO (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To enable defective pixel correction.					

Table 5-27: Defective Pixel Correction OFF

	1	2	3	4		
Format	f	☒	-n	⏎		
Details	1: f = Defective pixel correction 2: Delimiter (Omissible) 3: -n = Option: defective pixel correction OFF 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To disable defective pixel correction.					

5.5.10. Temperature Control

Table 5-28: Temperature Settings

	1	2	3	4	5	6
Format	t	☒	-w	☒	val	⏎
Details	1: t = Temperature control 2: Delimiter (Omissible) 3: -w = Option: Temperature settings 4: Delimiter (Omissible) 5: Temperature 6: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To set camera to the temperature assigned. The range available is 10°C to 40°C. For example, to set temperature as 25°C, enter 25. Please enter whole number between 10 to 40 only, or the response will be “NG.”					

Table 5-29: Temperature Readout

	1	2	3	4		
Format	t	☒	-r	⏎		
Details	1: t = Temperature control 2: Delimiter (Omissible) 3: -r = Option: temperature readout (Omissible) 4: Line feed code					
Response	Normal: Temperature: *temperature* C⏎					
Note	To show the estimated temperature of camera. The temperature shown here is merely a reference.					

5.5.11. Frame Control

Table 5-30: Start Frame

	1	2	3	4		
Format	u	☒	-s	⏎		
Details	1: u = Frame control 2: Delimiter (Omissible) 3: -s = Option: start frame transfer (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To start frame transfer.					

Table 5-31: Stop Frame

	1	2	3	4		
Format	u	☒	-p	⏎		
Details	1: u = Frame control 2: Delimiter (Omissible) 3: -p = Option: stop frame transfer 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To stop frame transfer.					

5.5.12. Camera Mode

Table 5-32: SIM Mode

	1	2	3	4		
Format	z	☒	-s	⏎		
Details	1: z = Camera mode 2: Delimiter (Omissible) 3: -s = Option: SIM mode (Omissible) 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To set camera mode as SIM (standard image mode).					

Table 5-33: LNIM Mode

	1	2	3	4		
Format	z	☒	-l	⏎		
Details	1: z = Camera mode 2: Delimiter (Omissible) 3: -l = Option: LNIM mode 4: Line feed code					
Response	Normal: OK⏎ Abnormal: NG⏎					
Note	To set camera mode as LNIM (low noise image mode).					

5.5.13. Camera Information

Table 5-34: Camera Name

	1	2	3	4		
Format	n	☒	-c	⏎		
Details	1: n = Camera information 2: Delimiter (Omissible) 3: -c = Option: camera name (Omissible) 4: Line feed code					
Response	Normal: ARTCAM-130SWIR-CL (example)⏎ Abnormal: NG⏎					
Note	To show camera name.					

Table 5-35: Firmware Version

	1	2	3	4		
Format	n	☒	-v	⏎		
Details	1: n = Camera information 2: Delimiter (Omissible) 3: -v = Option: camera name 4: Line feed code					
Response	Normal: Version: *00.18.20180305* (example)⏎ Abnormal: NG⏎					
Note	To show firmware version.					

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:

Table 6-1: Devices Recognized

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※1)

※1: Will be differ depending on systems.

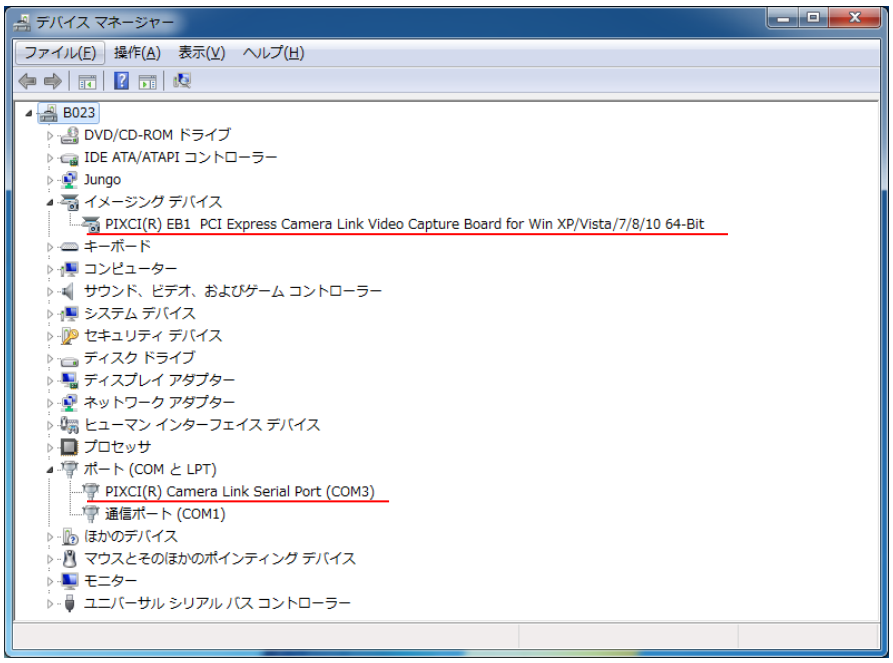

Figure 6-1: Sample of device manager

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.

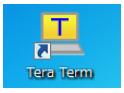

Figure 6-2: Icon of Tera Term

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.)

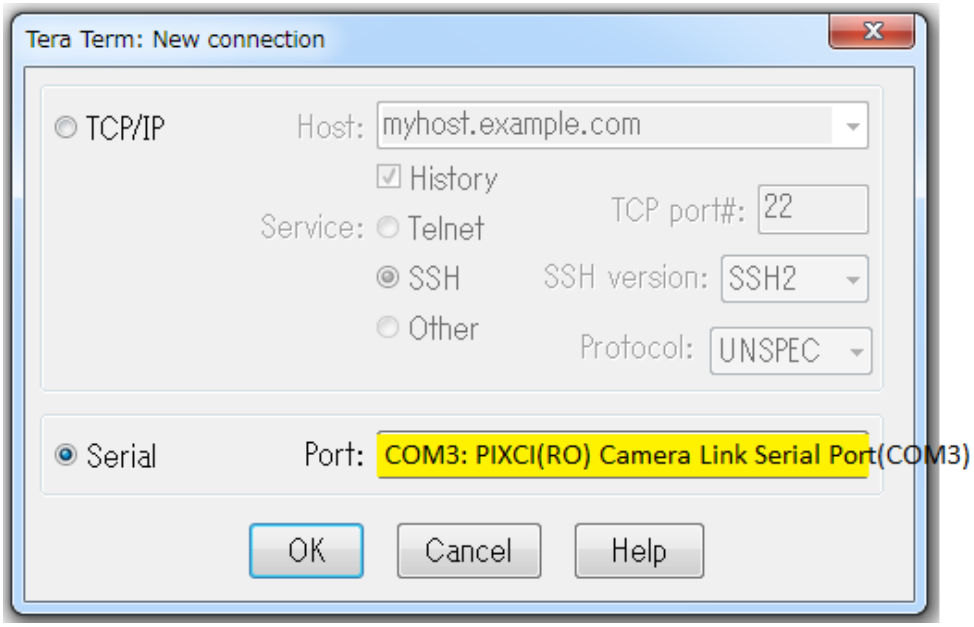

Figure 6-3: To Choose Serial Port on Tera Term

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.

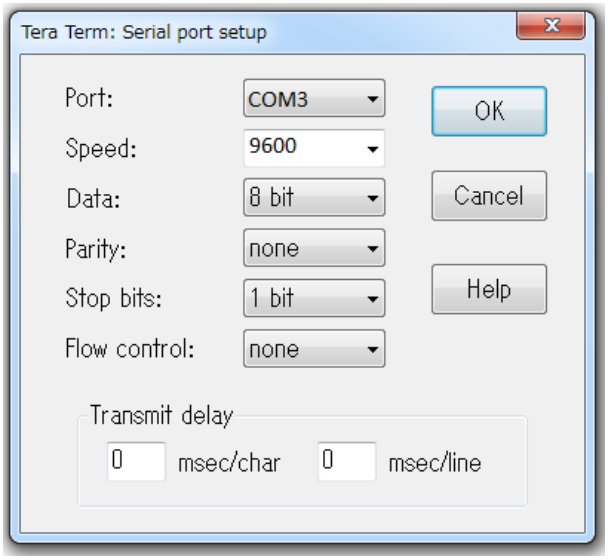

Figure 6-4: To Set up Serial Port on Tera Term

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.

Table 6-2: Communication Protocol

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

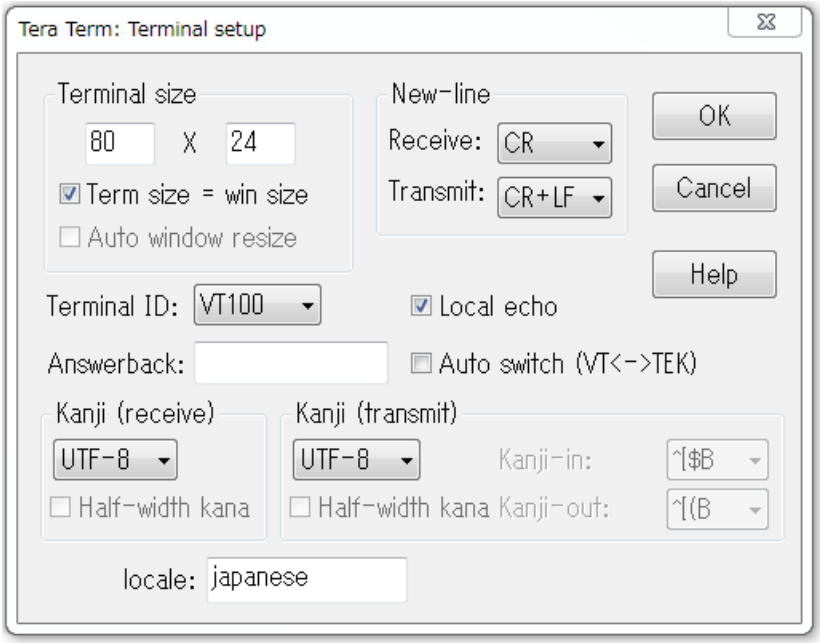

Figure 6-5: To Set up Terminal on Tera Term

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.

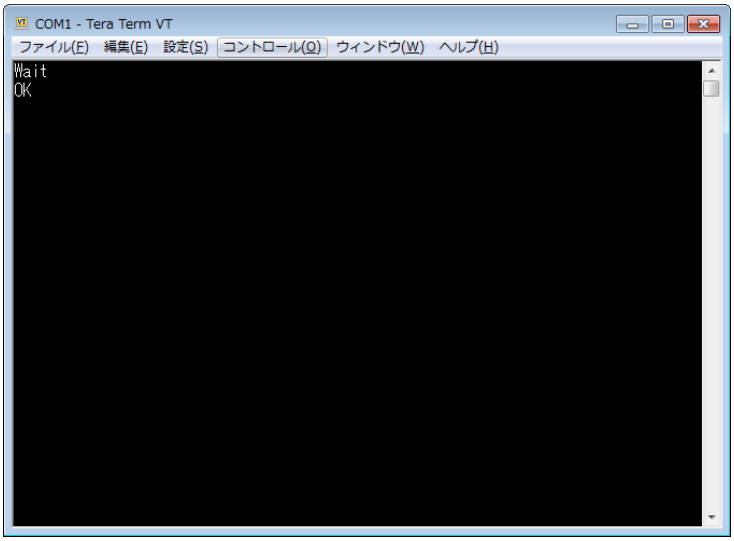

Figure 6-6: Initialization

6.4. Example of Viewer Software Settings

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

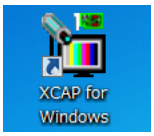

Figure 6-7: Icon of XCAP

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.

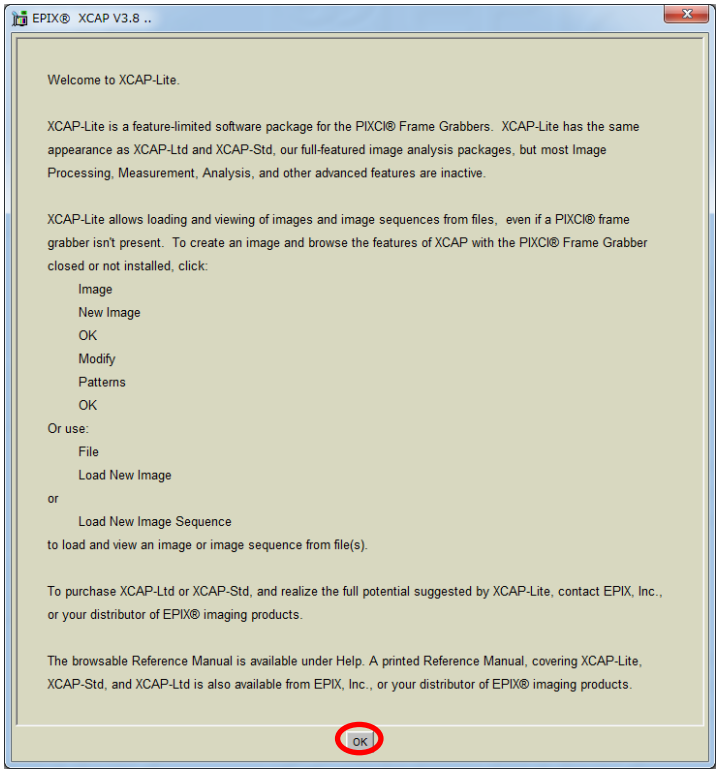

Figure 6-8: Welcome message

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

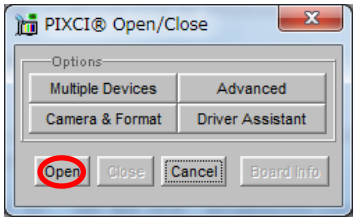

Figure 6-9: To Open Camera

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.

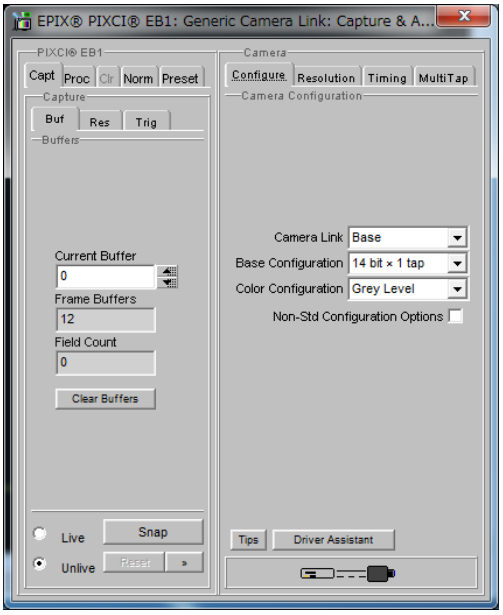

Figure 6-10: Configure Settings

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

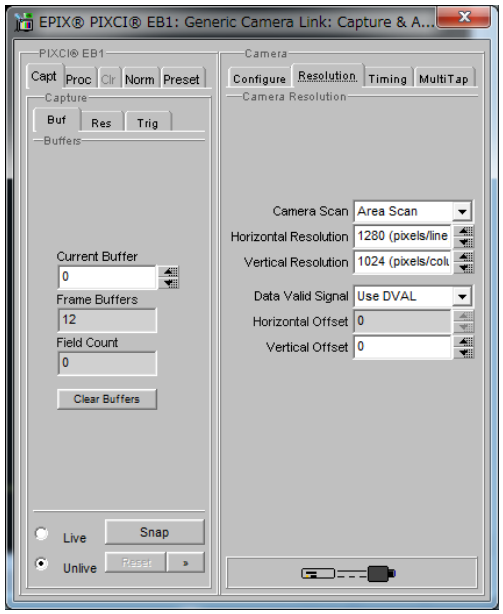

Figure 6-11: Resolution Settings

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

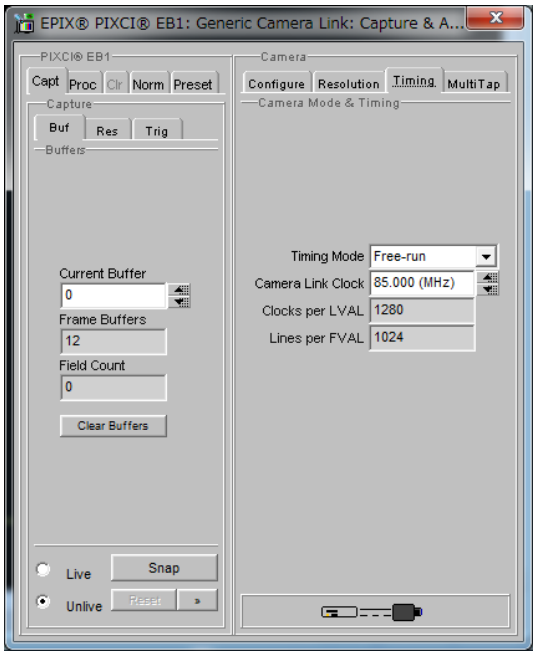

Figure 6-12: Timing Settings

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.

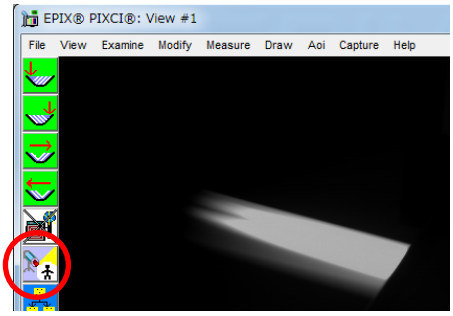

Figure 6-13: Live Icon