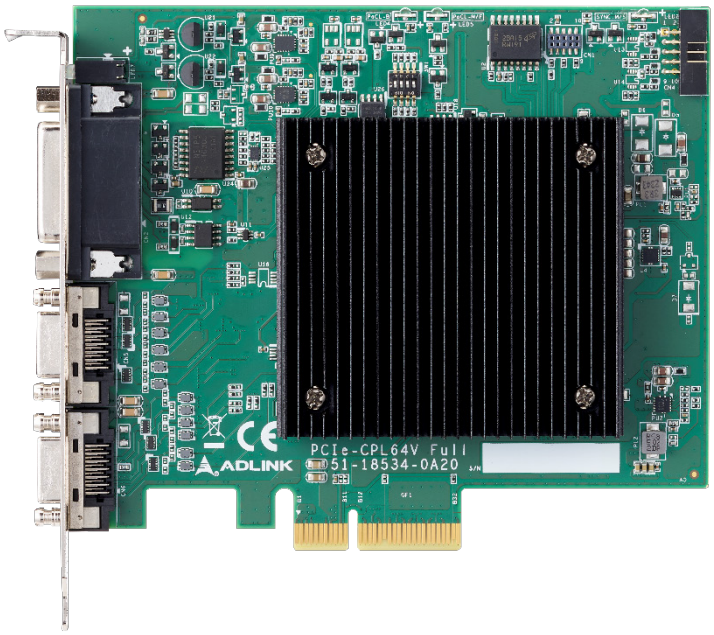
PCIe-CPL64V Series

User's Manual

PCI Express x4
Base / Medium / Full Configuration
Camera Link Frame Grabber



Manual Rev.: Rev. 1.0
Revision Date: January 22, 2026
Part Number: 50M-18534-1000

Leading **EDGE COMPUTING**

Preface

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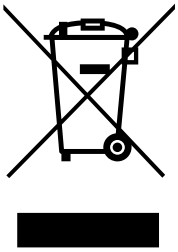

Battery Labels (for products with battery)

California Proposition 65 Warning

WARNING: This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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Revision History

Revision	Description	Date
1.0	Initial release	2026-01-22

Table of Contents

1 Introduction

The PCIe-CPL64V is a Camera Link frame grabber featuring PCIe Gen3 x4 high-bandwidth connectivity and PoCL (Power over Camera link) support. It supports 1-channel Base/Medium/Full configurations and Multi-Card Synchronous Intra-PC, making it a flexible solution for high-throughput, high-resolution machine vision systems.

Camera Link: A Stable and Reliable High-Speed Imaging Standard

Camera Link is a high-speed image transmission standard specifically developed for industrial vision applications. It simplifies the connection and communication between industrial cameras and host computers through standardized serialized transmission formats and connector specifications. Camera Link ensures stable, real-time image data transfer, supports high-resolution and high-frame-rate imaging, and features excellent noise immunity—making it ideal for harsh industrial environments.

As such, Camera Link has become one of the most widely adopted mainstream technologies in the field of machine vision.

Exceptional Image Processing Performance

The PCIe-CPL64V supports image transfer rates of up to 850 MB/s, making it well-suited for applications requiring fast acquisition and processing of large volumes of high-resolution images. Ideal use cases include:

- Line scan inspection systems
- 3D imaging and stereoscopic analysis
- High-speed defect detection and Automated Optical Inspection (AOI)

These applications demand high data throughput and exceptional processing stability—requirements that the PCIe-CPL64V meets with reliable and robust performance.

PCI Express Architecture for Easy Integration

Built on the PCI Express Gen3 x4 standard, the PCIe-CPL64V offers high-speed, point-to-point data transfer. This architecture allows seamless integration into standard industrial PC platforms without the need for specialized hardware environments, enabling users to build high-performance machine vision systems with ease.

1.1 Features

- Support *Base*, *Medium*, or *Full* Camera Link configuration
- PCI Express® Gen3 x4 compliant
- Maximum aggregated camera data transfer rate: 850 MB/s
- Camera Link clock rates up to 85 MHz
- 512 MB DDR for acquisition
- Provides 4-channel isolated digital inputs and 4-channel isolated digital outputs
- - Include 4-CH Trigger input and 4-CH Strobe out
- Provides 1-pair A/B phase encoder input
- Multi-card synchronization, up to 4 cards

2 Hardware Reference

2.1 PCIe-CPL64V Specifications

Power Supply	
PCI Express Specification	PCI Express Gen 3 x4
Port	
Connector	• 2x Shrunk Delta Ribbon (SDR) Connectors for Camera Link • 1x D-Sub 26-Pin Connector for I/O • 1x Box Header ML 2x5P for Multi-Card Synchronization
Video Input	
Camera Link Configuration	Supports Base, Medium, Full Camera Link® Configuration Cameras
Supported Camera Types	• Area-Scan Cameras • Line-Scan Cameras
Maximum Aggregated Camera Data Transfer Rate	850 MB/s
Tap Configuration	• 1 Tap - 8/10/12-Bit Mono/Bayer • 1 Tap -12-Bit RGB • 1 Tap - 8-Bit RGB • 2 Taps - 8/10/12-Bit Mono/Bayer • 2 Taps - 8-Bit RGB • 4 Taps - 8/10/12-Bit Mono • 8 Taps - 8/10-Bit Mono • 10 Taps - 8-Bit Mono Line-Scan Cameras
Camera Link Clock Frequency	From 20 MHz up to 85 MHz
On-Board Processing	
On-Board Memory	512 MB
General Purpose I/O & Advanced Functions	
Digital Input / Trigger In	4-CH Isolated Digital Input / Trigger Input @ 10 KHz
Digital Output / Strobe Out	4-CH Isolated Digital Output / Strobe Out @ 500 KHz
Encoder Input	1x A, B Phase Encoder, Isolated differential input @ 5 MHz (Max. 20 MHz @ 4x AB Phase mode)
	Supports 1/2/4 x AB Phase, Out/DIR, CW/CCW mode
Multi-card synchronization	Up to 4 cards
	The latency between multiple cameras < 100ns
Isolation Voltage	500 Vrms
Power over Camera Link	
PoCL Function	Power Line Output per SDR Connector: max 0.8A
	Over-Current Protection Function Automatically Detects When Non-PoCL Cable or PoCL Camera is Connected

Software	
OS	Windows® 10/11 64bit
Programming Languages	VC++, C#, VB, NET
Utility	CamCreator
Environmental Conditions	
Operating Environment	0°C to 60°C (32° to 140°F), 5% to 90% RH, non-condensing
Physical	
Dimensions (L x H)	130 mm x 111.28 mm
Certifications	
CE/FCC Part 15, Class A	Yes
EN 61000-6-4	Yes

2.2 Layout, I/O, and Indicators

Please note that all dimensions are shown in mm (millimeters)

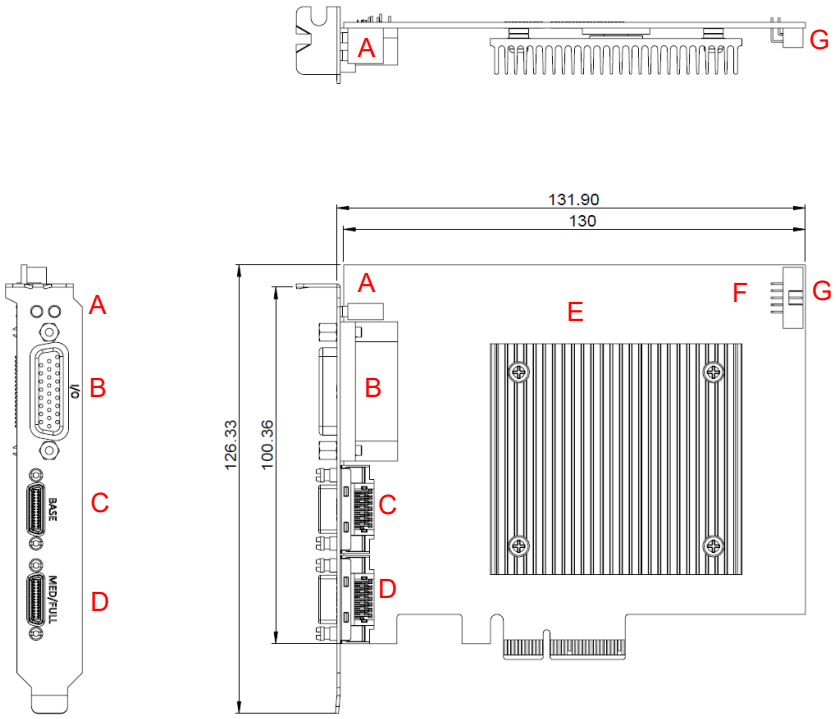


Figure 1: PCIe-CPL64V layout

Position	Function	Description
A	LED7	Camera link status LED
B	CN2	D-Sub I/O connector
C	CN5	Camera link base video input
D	CN6	Camera link medium / full video input
E	SW1	Card ID switch
F	LED2	Multi-card sync status LED
G	CN4	Multi-card sync connector

2.3 Connectors, I/O, Controls

2.3.1 Camera Link Video Inputs (CN5 & CN6)

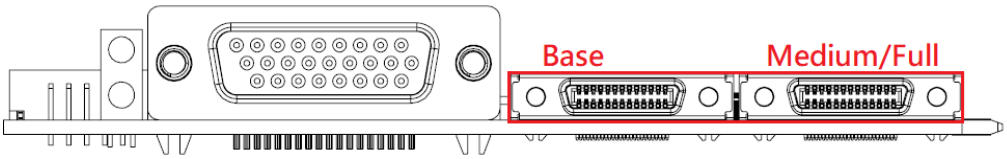


Figure 2: Camera link video inputs

2.3.1.1 Camera Link Base (CN5)

Pin	Function	Description	Pin	Function	Description
1	GND / PoCL_+12V	nonPoCL: Digital GND PoCL: PoCL Power	14	GND	Digital GND
2	CC4-	Control signal pair-	15	CC4+	Control signal pair+
3	CC3+	Control signal pair+	16	CC3-	Control signal pair-
4	CC2-	Control signal pair-	17	CC2+	Control signal pair+
5	CC1+	Control signal pair+	18	CC1-	Control signal pair-
6	STFG+	Serial com. Pair+	19	STFG-	Serial com. Pair-
7	STC-	Serial com. Pair-	20	STC+	Serial com. Pair+
8	X3+	Base data pair+	21	X3-	Base data pair-
9	XCLK+	Base clock pair+	22	XCLK-	Base clock pair-
10	X2+	Base data pair+	23	X2-	Base data pair-
11	X1+	Base data pair+	24	X1-	Base data pair-
12	X0+	Base data pair+	25	X0-	Base data pair-
13	GND	Digital GND	26	GND / PoCL_+12V	nonPoCL: Digital GND PoCL: PoCL Power

2.3.1.2 Camera Link Medium/Full (CN6)

Pin	Function	Description	Pin	Function	Description
1	GND / PoCL_+12V	nonPoCL: Digital GND PoCL: PoCL Power	14	GND	Digital GND
2	Z3+	Full data pair+	15	Z3-	Full data pair-
3	ZCLK+	Full clock pair+	16	ZCLK-	Full clock pair-
4	Z2+	Full data pair+	17	Z2-	Full data pair-
5	Z1+	Full data pair+	18	Z1-	Full data pair-
6	Z0+	Full data pair+	19	Z0-	Full data pair-
7	Terminated	100 Ω terminated	20	Terminated	100 Ω terminated
8	Y3+	Medium data pair+	21	Y3-	Medium data pair-
9	YCLK+	Medium clock pair+	22	YCLK-	Medium clock pair-
10	Y2+	Medium data pair+	23	Y2-	Medium data pair-
11	Y1+	Medium data pair+	24	Y1-	Medium data pair-
12	Y0+	Medium data pair+	25	Y0-	Medium data pair-
13	GND	Digital GND	26	GND / PoCL_+12V	nonPoCL: Digital GND PoCL: PoCL Power

2.3.2 D-SUB 26-Pin I/O Connector (CN2)

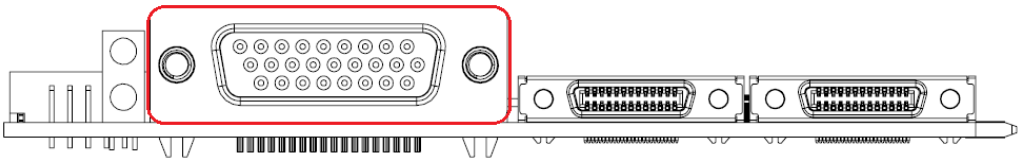


Figure 3: D-SUB 26-pin I/O

Pin	Function	Description	Pin	Function	Description
1	NC	Floating	14	DI2+	Digital Input Pair2+
2	EB+	Encoder Input Pair B+	15	DI3+	Digital Input Pair3+
3	DI0+	Digital Input Pair0+	16	DO1+	Digital Output1
4	DI2-	Digital Input Pair2-	17	DO3+	Digital Output3
5	DI3-	Digital Input Pair3-	18	DO3-	DO GND
6	DO1-	DO GND	19	EA-	Encoder Input Pair A-
7	NC	Floating	20	EA+	Encoder Input Pair A+
8	NC	Floating	21	DI1-	Digital Input Pair1-
9	NC	Floating	22	DO0-	DO GND
10	NC	Floating	23	DO0+	Digital Output0
11	EB-	Encoder Input Pair B-	24	DO2-	DO GND
12	DI0-	Digital Input Pair0-	25	DO2+	Digital Output2
13	DI1+	Digital Input Pair1+	26	NC	Floating

2.3.3 Camera Link Status LED (LED7)

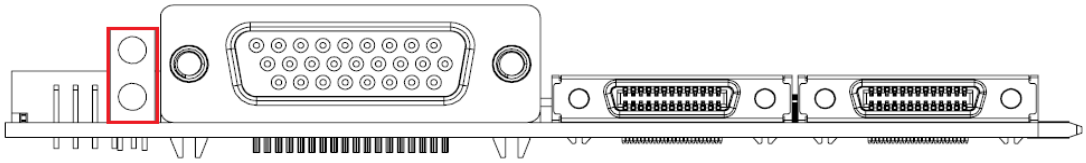
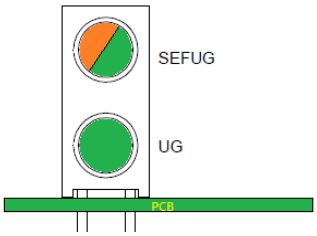


Figure 4: Camera link status LED

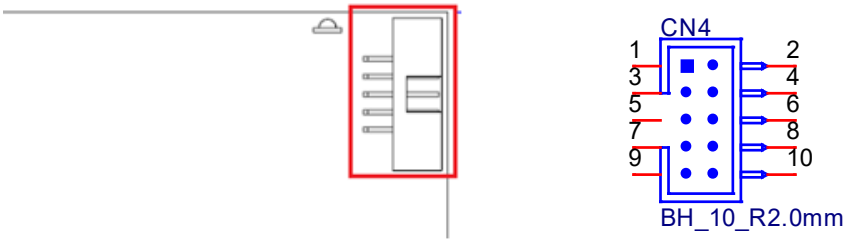


Function	Status / Color
Camera Link Configuration (SEFUG)	- Full Camera Detected : Green ON - Medium Camera Detected : Green Blinking (2Hz) - Base Camera Detected : Orange ON - Abnormal status : Orange Blinking (2Hz) - Not detected : OFF
Capture Image (UG)	- Start Capture : Green ON - Capturing : Green Blinking (2Hz) - Stop Capture / Time out : OFF

Note:

- The Camera Link configuration is referenced to the camera's clock.
- If only Pair X is detected, it is determined as Base.
- If Pair X and Pair Y are detected, it is determined as Medium.
- If Pair X, Pair Y, and Pair Z are detected, it is determined as Full.
- Any other pair combination is considered abnormal.
- If the camera outputs all three clock pairs simultaneously, it is determined as Full.

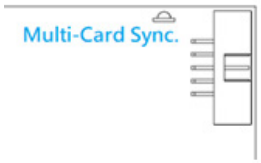
2.3.4 Multi-Card Sync. Connector (CN4)



Pin	Function	Description	Pin	Function	Description
1	GND	Digital GND	2	GND	Digital GND
3	CARD_SYNC1	Multi-card sync. Signal 1	4	GND	Digital GND
5	Reserve	Reserve	6	GND	Digital GND
7	Reserve	Reserve	8	GND	Digital GND
9	Reserve	Reserve	10	GND	Digital GND

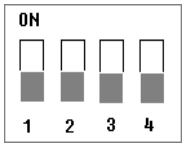
Note: The master card and the slave card are connected via a dedicated cable.

2.3.5 Multi-Card Status LED (LED2)



Function	Status/ Color
Multi-card Sync. Info	- Master Mode : Red ON - Slave Mode : Green ON - Sync. Disable : OFF (Default)

2.3.6 Card ID Select (SW1)



No. of ID	1	2	3	4
0 (Default)	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Note: When using multiple cards, each card must be assigned a different card ID.

2.4 I/O Interface

2.4.1 Encoder Differential Input (EA & EB)

The PCIe-CPL64V includes A-B encoder signals, the input signal for the encoder capture mode.

The phase A input is for the Channel 0 Line/Area Trigger input when set to the Line Area Trigger capture mode.
The phase B input is for the Channel 0 Line/Area Trigger input when set to the Line Area Trigger capture mode.

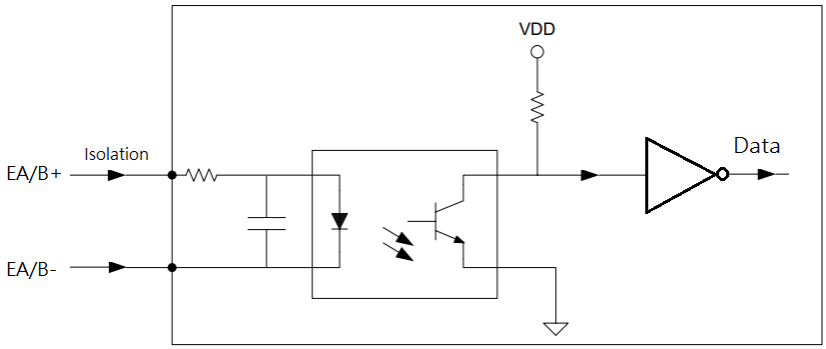


Figure 5: Encoder differential input schematic

The PCIe-CPL64V provides Bipolar Isolation Input ports

Function	Specification
Max. Common-Mode Input Range	±7V
Max. Positive-going input threshold voltage	0.2V
Min. Negative-going input threshold voltage	-0.2V

2.4.2 2.4.2 Digital Input (DI0-DI3)

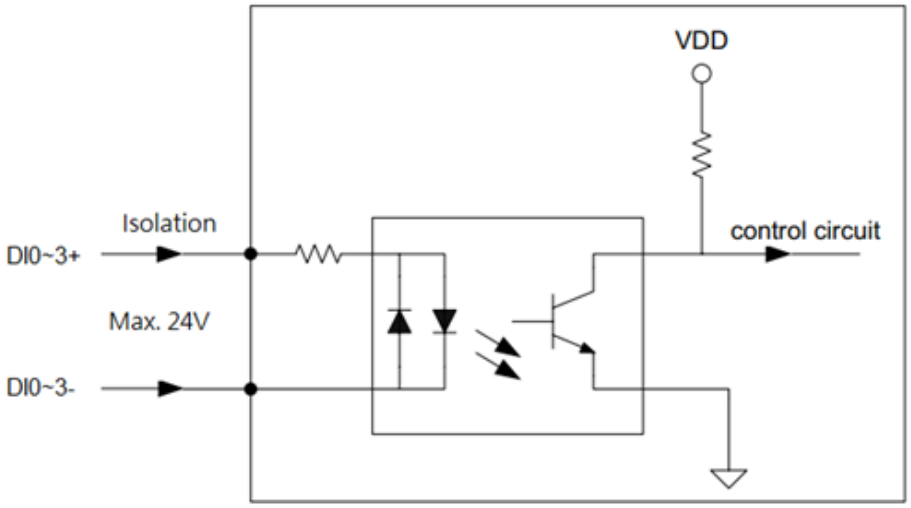


Figure 6: Digital input schematic

The PCIe-CPL64V provides bipolar isolation input ports.

Function	Specification
Input voltage range	0 to 24V
Input Low level	0 to 0.8V
Input High level	3 to 24V

2.4.3 2.4.2 Digital Output (DO0-DO3)

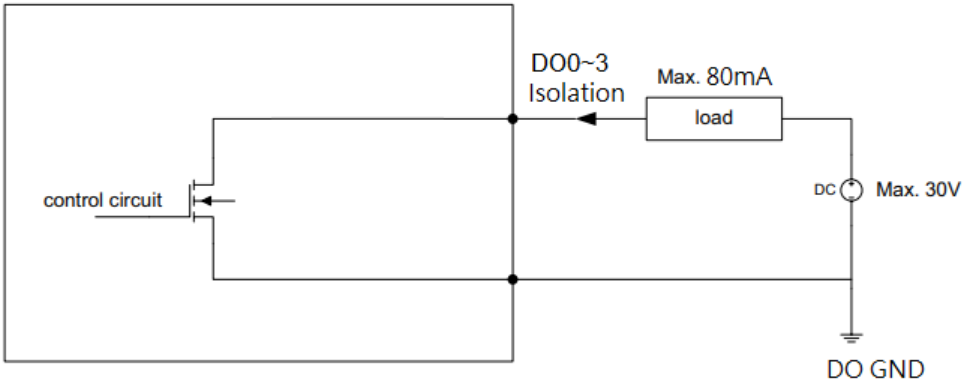


Figure 7: Digital output schematic

The PCIe-CPL64V provides open-drain isolation output ports.

Function	Specification
Output voltage range	Open-drain max. to 30V
Output Low level	0 to 0.8V

3 Getting Started

3.1 Unpacking Checklist

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the following items are included in the package.

- PCIe-CPL64V unit

Note: ODM versions with non-standard configuration, functionality, or packaging may vary according to individual requirements.

3.2 Hardware Installation

1. Remove the computer cover according to the computer manual.
2. Remove the slot cover (if any).
3. Carefully position the board in the selected PCI Express

   If installing in a tower computer, align the board with the board slots.
4. Press the board firmly but carefully into the connector.
5. Anchor the board with the screw.
6. Connect the Camera Link device via SDR connector.
7. Power up the computer.
8. Locate the system controller slot (Slot 1).

Note:

- The Camera Link configuration is referenced to the camera's clock.
- If only Pair X is detected, it is determined as Base.
- If Pair X and Pair Y are detected, it is determined as Medium.

3.3 Driver Installation

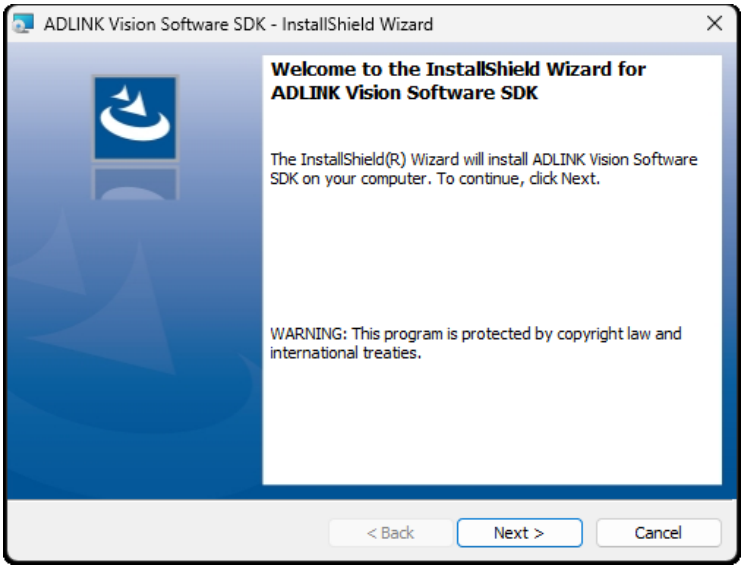
3.3.1 System Requirement

- Windows requires one of the following operating systems to be installed on your computer: Win10 x64 or Win11 x64
- To create a new project for any .NET language. The project needs to target .NET Framework 4.0 or a later version (4.8).
- Visual C++ Redistributable Package 2015 or a later version. C++ MFC is optional based on your project version.
- Power saving modes of the operating systems are not supported.
- Kernel DMA Protection is not supported.

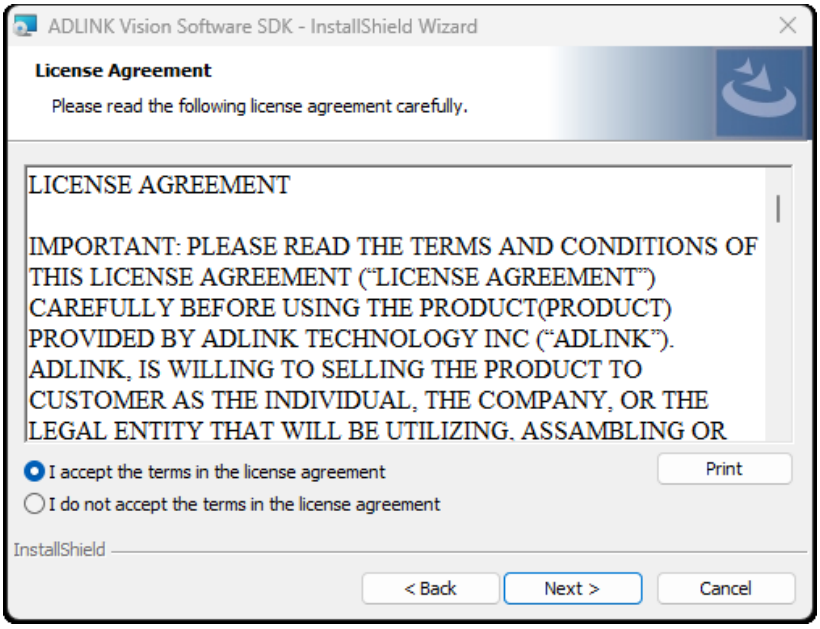
3.3.2 PCIe-CPL64V Driver Installation

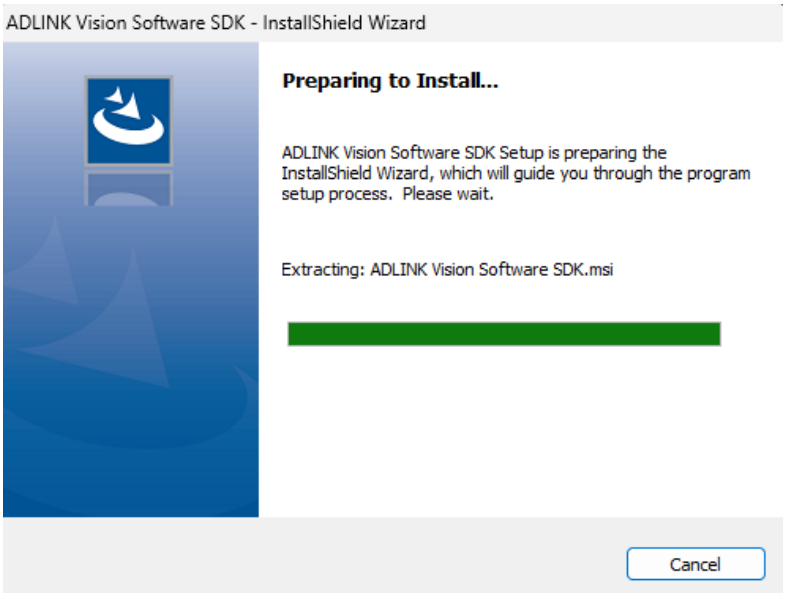
Follow the instructions in the setup wizard. The wizard will guide you through the installation process.

1. Click to run the AVS SDK installation file
2. Click the “Next” button then the SDK and driver will begin installing. Remove the slot cover (if any).

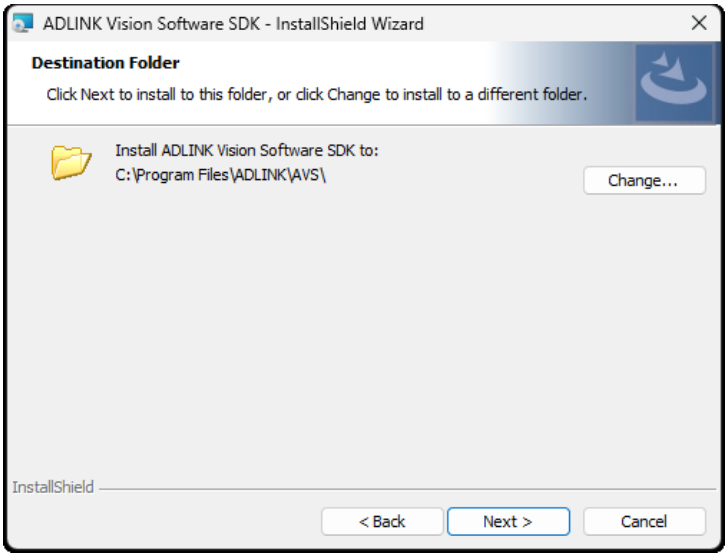


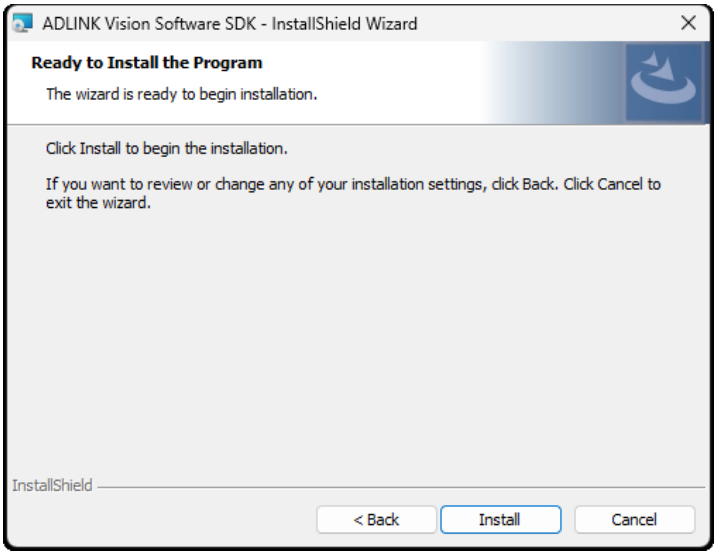
3. Please read the license agreement and select “I accept…” Click “Next”

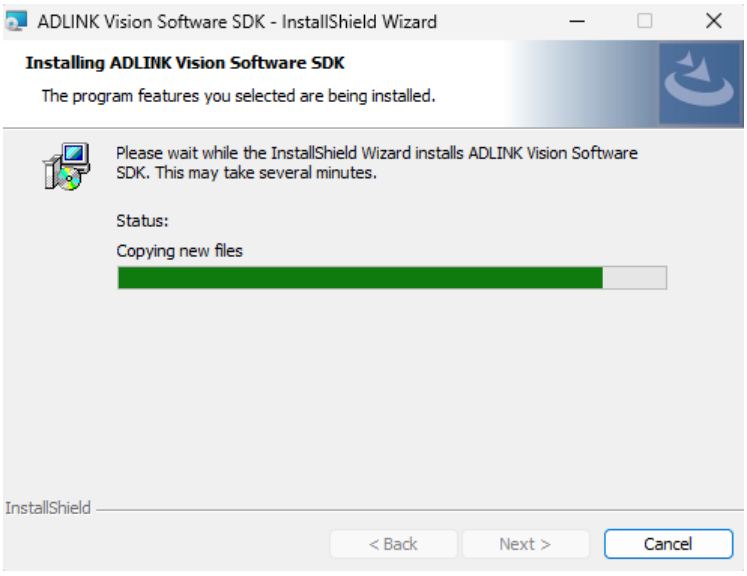




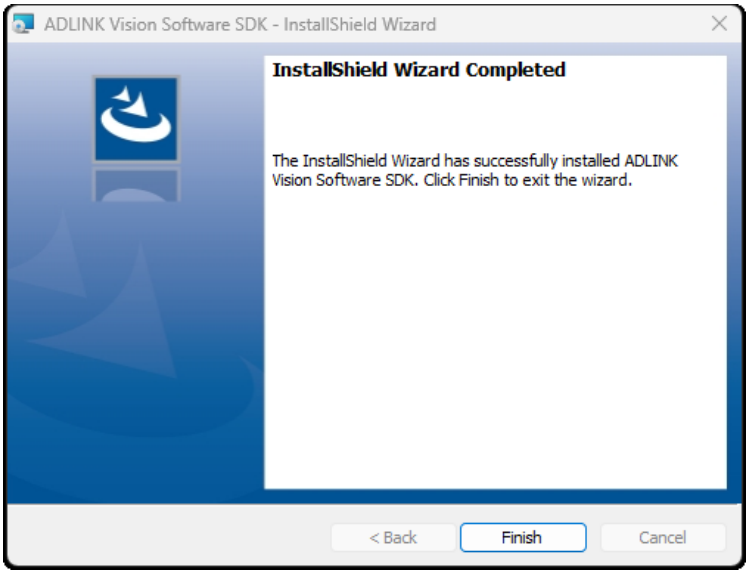
4. Select the destination folder for installing. (Default path is C:\Program Files\ADLINK\AVS). Click “Install”



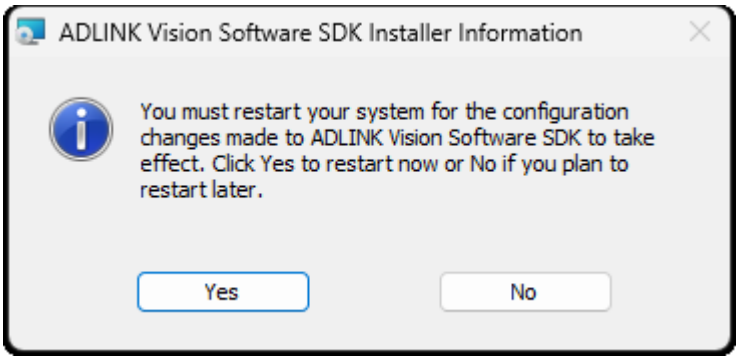




5. When the installation is successful, a window is displayed. Click “Finish”



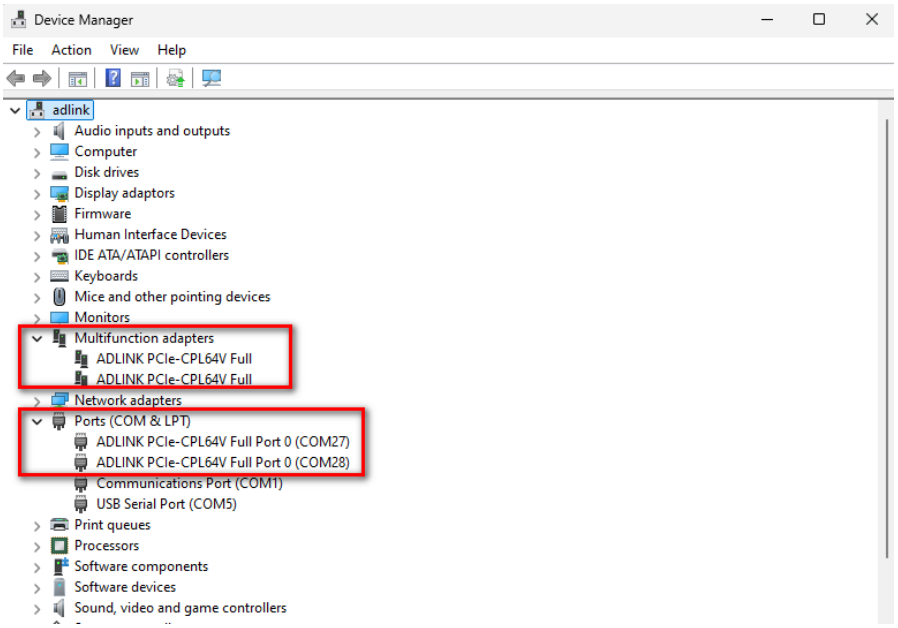
6. Click “Yes” and restart the system.



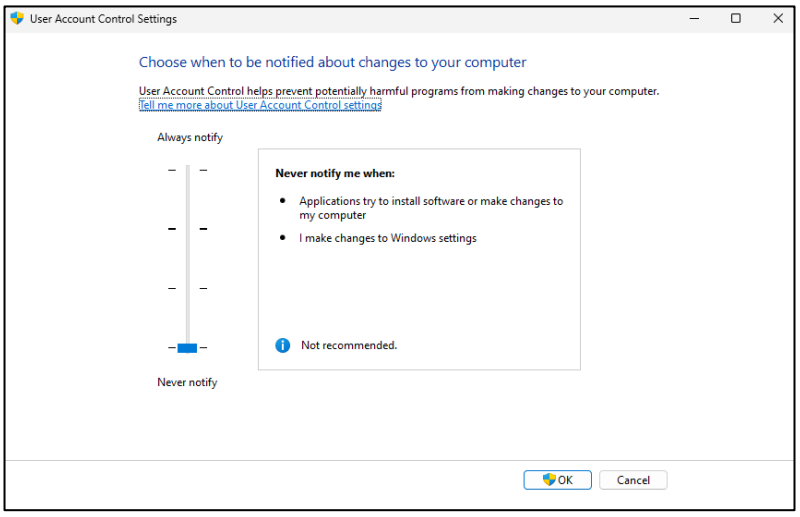
Note: The PCIe-CPL64V series products cannot be mixed with or used alongside the legacy PCIe-CPL64 series products. Please ensure that the SDK and drivers for the PCIe-CPL64 series are completely removed before using the PCIe-CPL64V series products.

7. Go to the system control panel and check the following:
    - ADLINK PCIe-CPL64V Full
    - ADLINK PCIe-CPL64V Full Port (COMXX)

    When operating in a two-card configuration, the System Control Panel should be displayed as shown in the figure below.



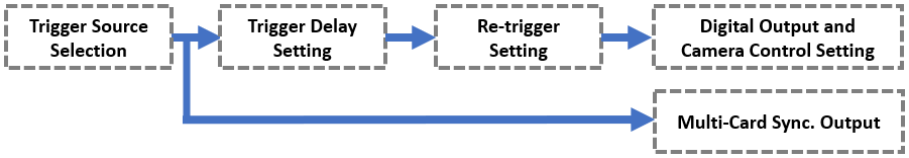
Note: If you encounter a COM port conflict, please manually remove the residual COM ports



Note: When using Windows 10/11, the User Account Control (UAC) feature must be disabled before using the PCIe-CPL64V. Open the Control Panel by searching for it in the Start Menu. Then, navigate to the "User Accounts" section. Here, you will find the option to "Change User Account Control settings." Click on it. In the UAC settings window, you will see a slider with different levels of security. To disable UAC, simply move the slider all the way down to the "Never notify" option. Click "OK" to save the changes for the PCIe-CPL64V to function normally under Windows 10/11.

4 Trigger Architecture

4.1 Trigger Block Diagram



Trigger settings can be configured based on user requirements.

The following sections describe the Trigger Block Diagram and related settings.

- **Trigger Source Selection**
  The trigger source for Digital Output and Camera Control can be selected from Encoder, Digital Input, Software Trigger, or Multi-card Sync. Input.

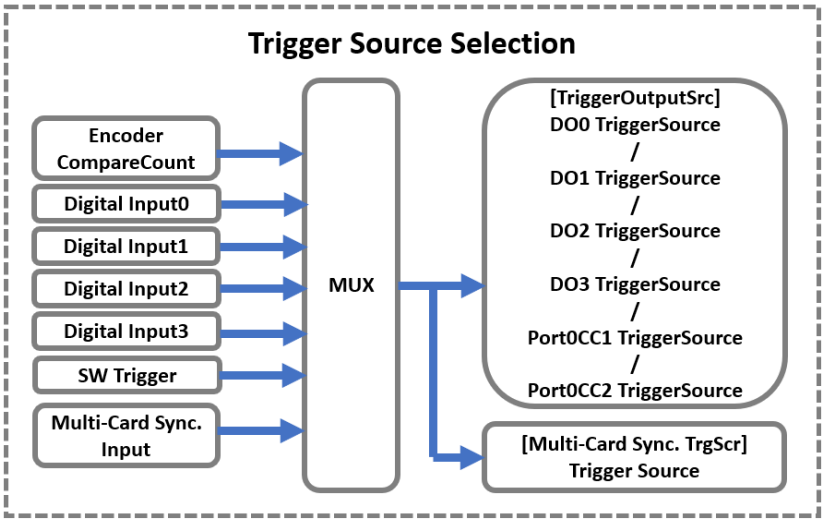
- **Trigger Delay Setting**
  Digital Output and Camera Control support delayed trigger output, which can be configured in either Encoder mode or Timer mode.

- **Re-trigger Setting**
  Set the number of re-trigger and the trigger conditions.
  A fixed Encoder or Timer can be specified as the condition for repeated triggering, which is commonly used in Line Scan mode.

- **Digital Output and Camera Control Setting**
  Configure the output mode for Digital Output and Camera Control, which can be set to either manual mode or trigger mode. In trigger mode, the pulse width for high and low levels must be specified.

- **Multi-card Sync. Output**
  Multi-card synchronous triggering can be achieved through the CN4 connector.

4.1.1 Trigger Source and Selection



Users should select the input trigger source for every output channel that is enabled. There are 7 different types of trigger source including DI0-DI3 Event, encoder compare event, Multi-card sync trigger event, and software trigger event.

For DI0-DI3, polarity can be changed to rising or falling, we also provide a debounce filter with several different debounce time. The DI0-3 Event will be generated accordingly if the corresponding signal level is detected.

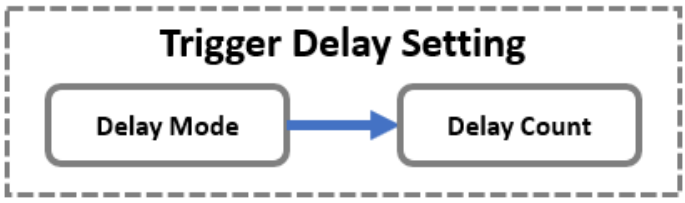
For encoder compare event, the trigger will be generated if the encoder value equals the compare value.

For Multi-card sync event, we use this trigger source to do Multi-card synchronization. User needs to select a card to be master and others to be slave. Only slaves listen to this event. The master is responsible for generating the Multi-card sync event for all the slaves.

For software trigger event, this is just a manual trigger event by software.

> **Note:** Users should set the TriggerSource parameter for every Output channel, including 4 DO channels and 2 CC Lines.

4.1.2 Trigger Delay Setting



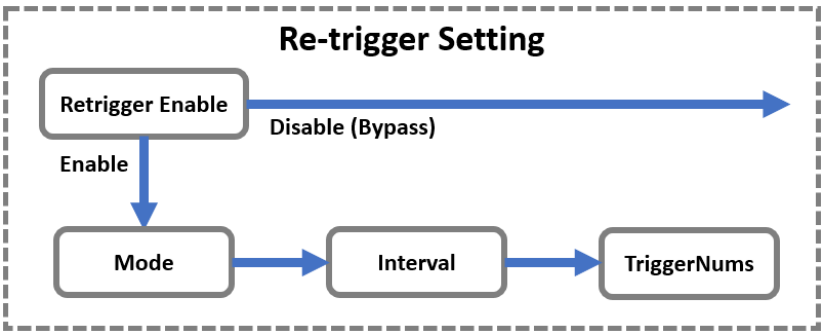
This part is for trigger delay that users can set by timer or by encoder.

There are two parameters in this block:

- Delay Mode: can be set to timer (in 1μs unit) or encoder
- Delay Count: the value to be delayed

Example: when delay count is set to 1000: If the delay mode is set to timer mode, this block will delay the trigger for 1000 μs. If the delay mode is set to encoder, the trigger will be delayed until the encoder value is reached, which is the current encoder value plus 1000.

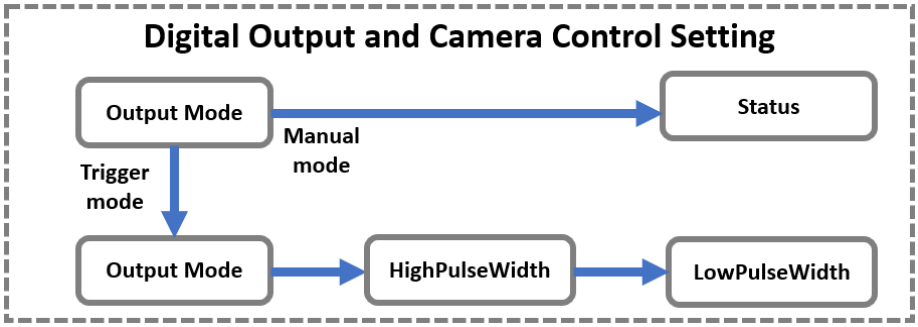
4.1.3 Re-trigger Setting



Once a trigger is received, Retrigger Block will generate a number of triggers by a pre-defined interval if the retrigger enable parameter is set. This function is usually suitable for applications related to line scan cameras.

Example: generating 10 CC1 signals for the camera per every 20 encoder counts when triggered: Then, we should enable CC1RetriggerEnable, set the CC1Mode to encoder mode, set the CC1interval to 20 and the CC1TriggerNums to 10.

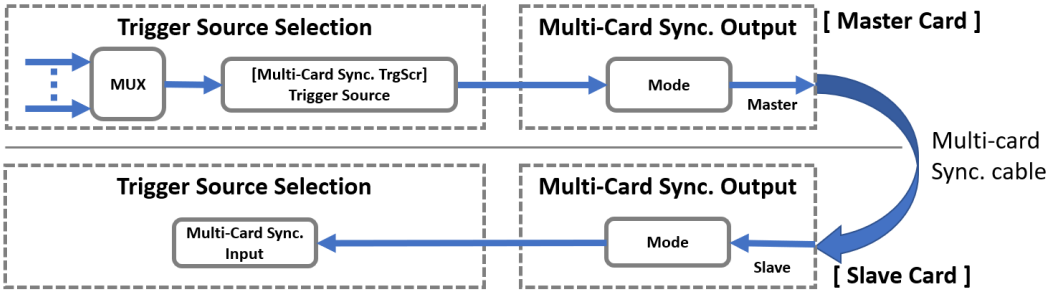
4.1.4 Trigger Output and Camera Control (CC1, CC2)



This block is responsible for generating the output PWM pulse or output level. We support 2 modes in this block. In manual mode, users can control the output pin manually by software. In trigger mode, the pre-defined PWM signal will be generated if the trigger event is received.

To select the mode, we use DOxOutputMode or CCxOutputMode. The PWM pulse width can also be set for the low part and the high part duration.

4.1.5 Multi-Card Sync.



The PCIe-CPL64V provides a multi-card synchronization mechanism for users.

Users must select one card as the master card, while the remaining cards serve as slave cards. Communication among the cards is achieved through the Multi-card Sync. Connector and cable.

The master card is responsible for generating multi-card synchronization events, which are monitored by all slave cards.

For the configuration of Trigger Source, please refer to Section 4.1.1.

5 CAM File

5.1 CAM File Introduction

ADLINK PCIe-CPL64V Frame Grabbers support .ini files for camera configuration.

- Camera Configuration File (referred to as CAM file hereafter) templates serve as camera-specific parameter sets that configure the grabber channel via AVS Camera Link feature parameter
- The frame grabber driver processes a Cam file by executing a sequence of write parameter calls—essentially mapping camera settings into the AVS API.
- Standard templates are installed under …{Installfolder}\ADLINK\AVS\CameraFile

Warning: When the frame grabber starts capturing images, dynamic parameter settings are not supported.

5.1.1 Importing CAM File

Cam files are intended to be customized by PCIe-CPL64V users who want to interface a particular camera with a PCIe-CPL64V board. They allow users to set certain section settings, for example, only import the [ImageFormat] and [TriggerOutput]…etc.

5.1.2 Image Format Section

[ImageFormat]

SensorWidth = 32 to 65504

SensorHeight = 0 to 65535

Tap = 1 / 10 / 2 / 4 / 8

PixelSize = 10 / 12 / 8

TapPlacement = 1x / 1x10 / 1x2 / 1x4 / 1x8

PixelFormat = Mono / RGB

FVALEnable = False / True

LVALEnable = False / True

DVALEnable = False / True

FVALPolarity = Falling / Rising

LVALPolarity = Falling / Rising

DVALPolarity = Falling / Rising

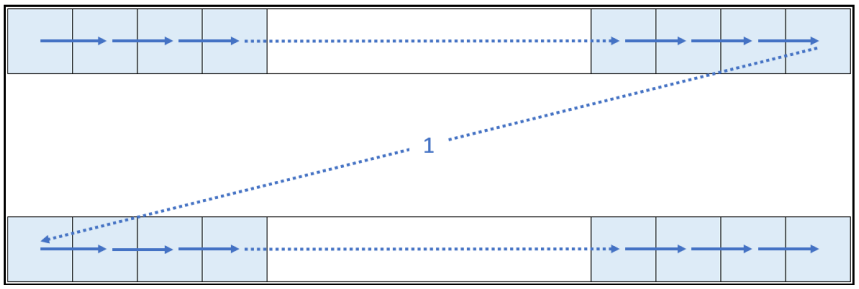
- Supported image pixel formats are set by the combination of {PixelFormat/PixelSize}. The available formats are RGB8, RGB12, Mono8, Mono10 , Mono12.

Tap Configuration	1tap	2tap	4tap	8tap	10tap
Mono8	v	v	v	v	v
Mono10	v	v	v	v	
Mono12	v	v	v		
RGB8	v	v			
RGB12	v				

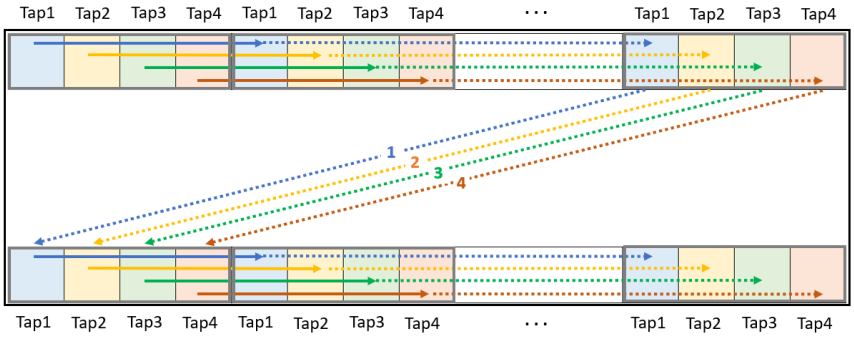
Note: ODM versions with non-standard configuration, functionality, or packaging may vary according to individual requirements.

- TapPlacement needs to be matched with the Tap number. The available formats are {Tap/ TapPlacement} 1/1x, 2/1x2, 4/1x4, 8/1x8, 10/1x10.

EX: 1x1 designates that the pixels are delivered one at a time on a single tap beginning with the leftmost pixel of the top line.



EX: 1X4 designates four adjacent pixels that are delivered simultaneously on 4 taps beginning with the leftmost pixels.



When setting the image pixel formats and Tap number, the {CameraConfiguration} should be noted for setting Base, Medium, and/or Full.

Configuration	Number of Data Bits	Maximum Possible Throughput (MB/s)	Number of Cables Required
Base	24	255	1
Medium	48	510	2
Full	64	680	2
Full (80 bits)	80	850	2

- PCIe-CPL64V boards unpack RGB 12-bit pixel component data into 16-bit pixel data for each RGB channel. Mono 10-bit and 12-bit pixel component data are also unpacked into 16-bit pixel data.

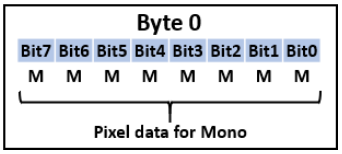
- The following tables show the data bits allocation.

{PixelFormat/PixelSize}	{Mono/8}	{Mono/10}	{Mono/12}
Unpacked data bits	8	16	16

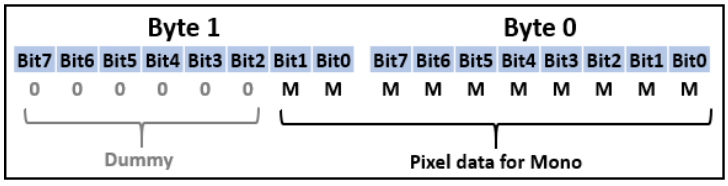
{PixelFormat/PixelSize}	{RGB/8}	{ RGB/12}
Unpacked data bits	32	64

- The significant bits of the pixel component data are aligned to the LSB of the data container. Padding dummy '0' bits are put as necessary in the most significant bits to reach the next 8-bit boundary. Example: RGB8 aligns to 2^n, allocating 4-byte data

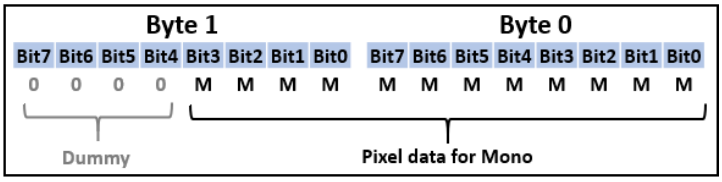
- Mono8



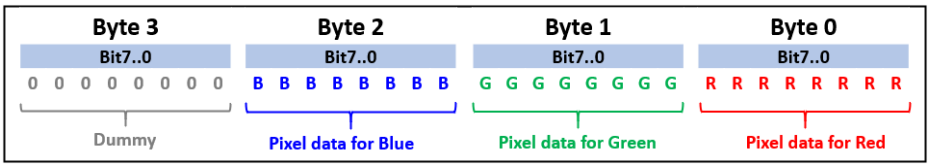
- Mono10



- Mono12

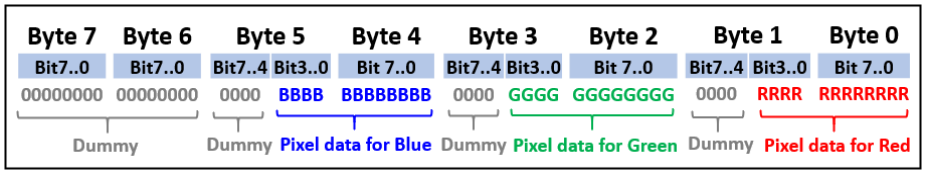


- RGB8



- RGB12

  Assume that you have chosen a 12-bit unpacked pixel format. The camera outputs 16 bits per pixel: 12 bits of pixel data and 4 padding bits to reach the next 8-bit boundary.



Note: Image buffer declaration limitation: The total frame size must be a multiple of 32 bytes, and the width must be greater than or equal to 32 pixels.

The width multiple requirements are as follows:

For MONO 8-bit x 10tap: The Width should be a multiple of 160 pixels

For MONO 10-bit x 8tap: The Width should be a multiple of 320 pixels

For MONO 8-bit x 1tap/2tap/4tap/8tap: The Width should be a multiple of 32 pixels

For MONO 10-bit x 1tap/2tap/4tap: The Width should be a multiple of 16 pixels

For MONO 12-bit x 1tap/2tap/4tap: The Width should be a multiple of 16 pixels

For RGB 8-bit x 1tap/2tap: The Width should be a multiple of 8 pixels

For RGB 12-bit x 1tap: The Width should be a multiple of 4 pixels

Warning: If you set an incorrect image buffer size or tap placement, you will get an error when calling the AVS_CameraLinkImportCamFile and AVS_FrameGrabberStartAcquisition API.

The Camera Link standard requires that enabled signals are provided on Channel Link chips as follows:

Camera Link Configuration	FVAL	LVAL	DVAL
Base	X	X	X
Medium	X and Y	X and Y	X and Y
Full	X, Y and Z	X, Y and Z	X, Y and Z
80-bit	X only	X, Y and Z	-

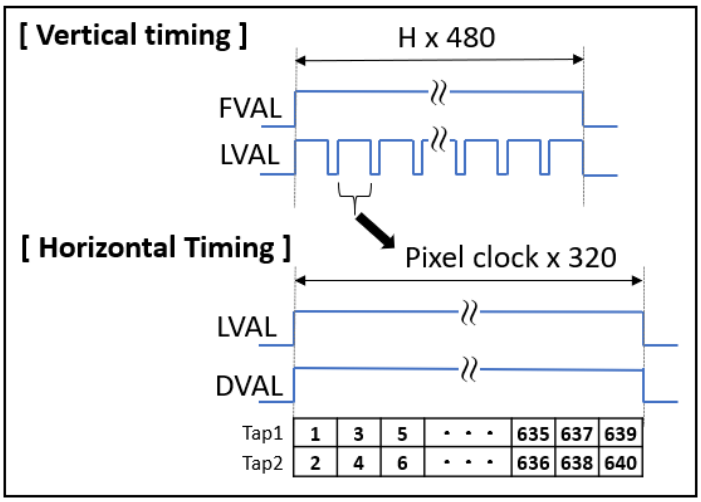
Note: X: Cameralink chip X signals

Y: Cameralink chip Y signals

Z: Cameralink chip Z signals

The CAM files can be configured to enable/disable signals, such as Line Valid / Frame Valid / Data Valid.

Take 640 x 480 MONO 8-bit, 2-tap as an example:



Note: In 2-tap mode, each pixel clock can carry two-pixel data values.

5.1.3 Capture Mode Section

[CaptureMode]

ScanMode = AreaScan /LineScan

- Please select the ScanMode based on your camera.
- Line Scan is ideal for high-speed processes and for inspecting continuous webs, surfaces, or large objects.
- Area Scan is better suited for capturing detailed still images and for inspecting smaller, defined items.
- If the scan mode settings does not match the camera, the image will be erroneous or cannot be captured.

5.1.4 Trigger Input Section

```
[TriggerInput]
DI0TrigPolarity = Falling / Rising
DI1TrigPolarity = Falling / Rising
DI2TrigPolarity = Falling / Rising
DI3TrigPolarity = Falling / Rising
EnATrigPolarity = Falling / Rising
EnBTrigPolarity = Falling / Rising
DebounceTime = 0 / 200 / 500 / 800
```

- This section defines the trigger input polarity and debounce configuration for digital inputs and encoder triggers. These parameters determine how external trigger signals are interpreted by the system.
  Note: The DebounceTime unit is nanosecond.

  Warning: The trigger-related function are available only when AVS_FrameGrabberStartAcquisition is called.

5.1.5 Trigger Output TrigSrc Section

Please refer to the introduction in Section 4.1.1 for instructions

[TriggerOutputTrigSrc]

DO0TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

DO1TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

DO2TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

DO3TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

Port0CC1TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

Port0CC2TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

- PCIe-CPL64V provides 4 DO and CC1/CC2 outputs. Each output source supports multiple selections from one input signal source. DO outputs can be connected to different external devices, such as flashes based on the application. CC1 is used to send external triggers for camera.
  Note: When MultiCardSync is set as the input signal source, MultiCardSync Mode in Section 5.1.8 needs to be set to Slave.

  Note: SoftwareTrigger requires calling TriggerControl.SWTrigger via the Advanced Configuration API.

5.1.6 Encoder Input Section

This section configures the encoder interface behavior. The encoder inputs allow position or speed tracking based on signal transitions from external encoders.

[EncoderInput]

Mode = ABphaseX1 / ABphaseX2 / ABphaseX4 / CW/CCW / OUT/DIR

CompareCount = 0 ~ 4,294,967,295

Note: CompareCount sets the target count for comparison. Range: 0 to 4,294,967,295 (32-bit unsigned integer). This value can be used to trigger events when the encoder count reaches a specific value. |

5.1.7 Multi Card TrigSrc Section

[MultiCardTrigSrc]

TriggerSource = DI0 / DI1 / DI2 / DI3 / Disable / EncoderComparer / MultiCardSync / SoftwareTrigger

Note:To use the MultiCard synchronization function, you must select which TriggerSource serves as the initial signal source of the Master card. Please refer to Section 4.1.1

5.1.8 Multi-Card Sync Section

[MultiCardSync]

Mode = Master / Slave

Warning: When it is used as an output signal, it means that the card is the Master card and MultiCardSync Mode needs to be set to Master. When it is used as an input signal, it means that this card is the Slave card. In the same system, only one master card is allowed to exist. Please refer to Section 4.1.5 Multi-card Sync.

5.1.9 Trigger Delay Section

This section configures the trigger delay module behavior. The delay mode can be set based on EncoderMode or TimerMode. Please refer to the introduction in Section 4.1.2 for instructions.

[TriggerDelay]

DO0DelayMode = EncoderMode / TimerMode

DO0DelayCount = 0 to 4,294,967,295 / 0 to 16,777,215

DO1DelayMode = EncoderMode / TimerMode

DO1DelayCount = 0 to 4,294,967,295 / 0 to 16,777,215

DO2DelayMode = EncoderMode / TimerMode

DO2DelayCount = 0 to 4,294,967,295 / 0 to 16,777,215

DO3DelayMode = EncoderMode / TimerMode

DO3DelayCount = 0 to 4,294,967,295 / 0 to 16,777,215

Port0CC1DelayMode = EncoderMode / TimerMode

Port0CC1DelayCount = 0 to 4,294,967,295 / 0 to 16,777,215

Port0CC2DelayMode = EncoderMode / TimerMode

Port0CC2DelayCount = 0 to 4,294,967,295 / 0 to 16,777,215

- This section configures the trigger delay interface behavior. The delay module inputs allow position- or time-based on signal transitions from external encoders or internal timer. Please refer to the introduction in Section 4.1.2 for instructions.
- This parameter {DO0DelayCount / DO1DelayCount/ DO2DelayCount/ DO3DelayCount / Port0CC1DelayCount / Port0CC2DelayCount } can be used to insert a delay between the trigger input source and the trigger output source.
- **Note (DelayCount)**: If Port0CC1DelayMode is set to EncoderMode, The delay is determined by the encoder count (range 0 to 4,294,967,295). If TimerMode is set, it will be calculated based on time. The TimerMode unit is microsecond (range 0 to 16,777,215).

5.1.10 Retrigger Section

Please check the introduction in Section 4.1.3 for instructions.

[Retrigger]
DO0RetriggerEnable = False / True
DO0Mode = EncoderMode / TimerMode
DO1RetriggerEnable = False / True
DO1Mode = EncoderMode / TimerMode
DO2RetriggerEnable = False / True
DO2Mode = EncoderMode / TimerMode
DO3RetriggerEnable = False / True
DO3Mode = EncoderMode / TimerMode
Port0CC1RetriggerEnable = False / True
Port0CC1Mode = EncoderMode / TimerMode
Port0CC2RetriggerEnable = False / True
Port0CC2Mode = EncoderMode / TimerMode
DO0TriggerNums = 0 ~ 4,294,967,295
DO0Interval = 0 ~ 4,294,967,295 / 0 ~ 16,777,215
DO1TriggerNums = 0 ~ 4,294,967,295
DO1Interval = 0 ~ 4,294,967,295 / 0 ~ 16,777,215
DO2TriggerNums = 0 ~ 4,294,967,295
DO2Interval = 0 ~ 4,294,967,295 / 0 ~ 16,777,215
DO3TriggerNums = 0 ~ 4,294,967,295
DO3Interval = 0 ~ 4,294,967,295 / 0 ~ 16,777,215
Port0CC1TriggerNums = 0 ~ 4,294,967,295
Port0CC1Interval = 0 ~ 4,294,967,295 / 0 ~ 16,777,215
Port0CC2TriggerNums = 0 ~ 4,294,967,295
Port0CC2Interval = 0 ~ 4,294,967,295 / 0 ~ 16,777,215

- This section configures the retrigger module behavior. The retrigger function default is disabled by set {DO0RetriggerEnable/ DO1RetriggerEnable/ DO2RetriggerEnable / DO3RetriggerEnable/ Port0CC1RetriggerEnable/ Port0CC2RetriggerEnable}. Depending on the usage scenario, PCIe-CPL64V generates DO or CC signals through the retrigger function automatically.

- **For example**, if the camera is set to external signal trigger and the image line size setting is 1024, then Port0CC1TriggerNums is set to 1024. When the frame grabber receives a trigger input event, it automatically triggers 1024 CC1 signals and then captures a complete image.

- **Note (Interval):** The {DO0Interval / DO1Interval / DO2Interval / DO3Interval / Port0CC1Interval / Port0CC2Interval } setting is based on the following mode: EncoderMode unit is encoder count (range 0 to 4,294,967,295). TimerMode unit is microsecond (range 0 to 16,777,215).

  Note: If Port0CC1TriggerNums=0 is set, the signal will be continuously generated until AVS_FrameGrabberStopAcquisition is called.

5.1.11 Trigger Output Section

Please check the introduction in Section 4.1.4 for instructions

[TriggerOutput]
DO0InvertedPolarity = Active / Inactive
DO1InvertedPolarity = Active / Inactive
DO2InvertedPolarity = Active / Inactive
DO3InvertedPolarity = Active / Inactive
DO0HighPulseWidth = 0 ~ 16,777,215
DO0LowPulseWidth = 0 ~ 16,777,215
DO1HighPulseWidth = 0 ~ 16,777,215
DO1LowPulseWidth = 0 ~ 16,777,215
DO2HighPulseWidth = 0 ~ 16,777,215
DO2LowPulseWidth = 0 ~ 16,777,215
DO3HighPulseWidth = 0 ~ 16,777,215
DO3LowPulseWidth = 0 ~ 16,777,215
DO0OutputMode = Manual / Trigger
DO1OutputMode = Manual / Trigger
DO2OutputMode = Manual / Trigger
DO3OutputMode = Manual / Trigger

- This section configures the TriggerOutput module behavior. The pulse width of DO1to DO3 can be set for strobe out.
  Note: The HighPulseWidth / LowPulseWidth unit is 1 μs.
- {DO0OutputMode/ DO1OutputMode / DO2OutputMode / DO3OutputMode } can be used as a general DO. For example: It should be called by AVS_AdvancedConfigWritePars API to set the parameter TriggerOutput.DO0OutputMode to Manual mode, then call the TriggerOutput.DO0Status. Please refer to the FLR Section in 4.2.

5.1.12 Camera Control Section

Please check the introduction in Section 4.1.4 for instructions.

[CameraControl]
Port0CC1HighPulseWidth = 0 ~ 16,777,215
Port0CC1LowPulseWidth = 0 ~ 16,777,215
Port0CC2HighPulseWidth = 0 ~ 16,777,215
Port0CC2LowPulseWidth = 0 ~ 16,777,215
Port0CC1InvertedPolarity = Active / Inactive
Port0CC2InvertedPolarity = Active / Inactive
Port0CC1OutputMode = Manual / Trigger
Port0CC2OutputMode = Manual / Trigger

- This section configures the CameraControl module behavior. The pulse width of CC1 and CC2 can be set.
  Note: The HighPulseWidth / LowPulseWidth unit is 1 μs
- { Port0CC1OutputMode / Port0CC2OutputMode /} can be used as a software control command. For example: Its should be called by AVS_AdvancedConfigWritePars API to set the parameter CameraControl.Port0CC1OutputMode to Manual mode or modify the CAM file, then call the CameraControl.Port0CC1Status. Please refer to the FLR Section in 4.2.

5.1.13 Power-over-Camera Link Section (Optional)

[PoCL]
ClockStartupTimeTolerance = 0 ~ 3,000,000
ClockDropOutTimeTolerance = 0 ~ 100,000
VoltageDropDurationTolerance = 0 ~ 20,000

- This section configures the PoCL clock parameter, the unit is microsecond
- PoCL Clock Start Time Tolerance: default 500,000 us
- PoCL Clock Drop Time Tolerance: default 50,000 us
- PoCL Voltage Below Time Tolerance: default 0 us

5.2 Application Examples

This section provides a practical exploration of Camera Link application development guide and usage contexts. Drawing on examples from the established AVS SDK and modifications to the CAM file definition, we walk through the end-to-end process of initializing frame grabbers, configuring acquisition modes (e.g., continuous, triggered), and managing data buffers for real-time image acquisition and processing.

- **Get Frame**
  The applications can implement their own acquisition logic by creating a dedicated thread that continuously polls the AVS_FrameGrabberGetFrame() function.

  For optimal stability and performance, it is strongly recommended not to perform image processing directly in the acquisition thread. The frame acquisition APIs, such as AVS_FrameGrabberGetFrame(), are blocking functions, which means they wait for new data and hold the thread during this period. Performing heavy computation (e.g., image analysis, saving to disk) in the same thread may result in increased latency. Frame drops due to delayed buffer queuing.

  The DMA transfer mechanism internally uses a ring buffer structure for efficient data handling. By default, the number of DMA buffers is 4. Users receive and return the buffer via the AVS_FrameGrabberGetFrame() and AVS_FrameGrabberQueueBuffer () call procedure.

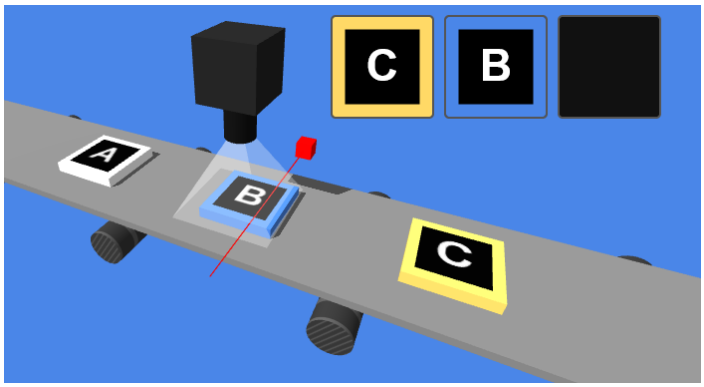
- **Callback**
  The AVS SDK provides a user callback mechanism through the AVS_FrameGrabberSetCallback() function for frame-ready notifications. The callback function prototype is declared in the header file. When a frame event occurs, the callback function is automatically invoked.

  The SDK also provides the AVS_FrameGrabberSetBufferCount() function to configure the number of pre-allocated frame buffers used for image acquisition. These buffers will be allocated and assigned when the AVS_FrameGrabberStartAcquisition() function is called.

  Note:

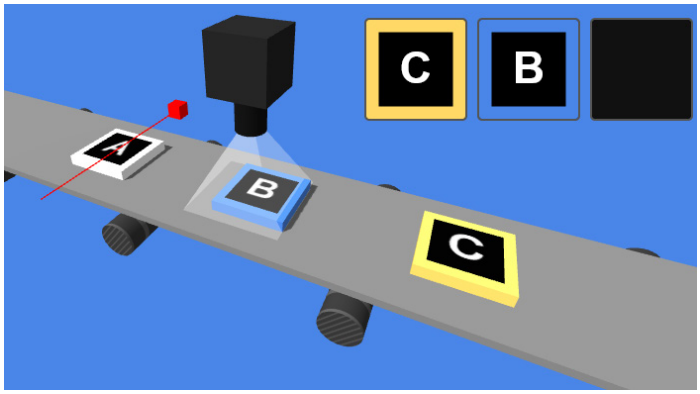
  - Do not mix frame retrieval functions AVS_FrameGrabberGetFrame with callback-based acquisition AVS_FrameGrabberSetCallback.
  - The condition for enabling triggers is only met after AVS_FrameGrabberStartAcquisition().

5.2.1 Area Scan 1: Capture



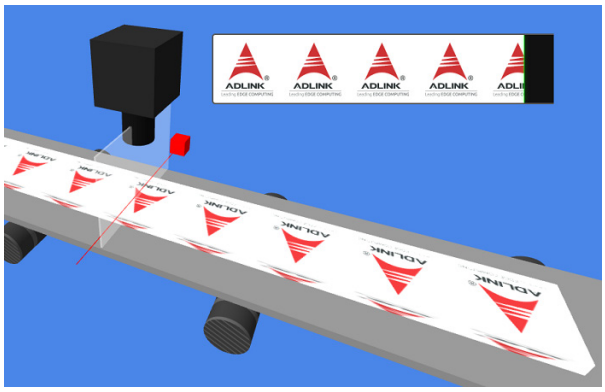
- Area scan cameras can be triggered by external sensors to capture images. When starting capture, you can select the trigger input in the 5.1.5 TriggerOutputTrigSrc section.

5.2.2 Area Scan 2: Capture with Delay



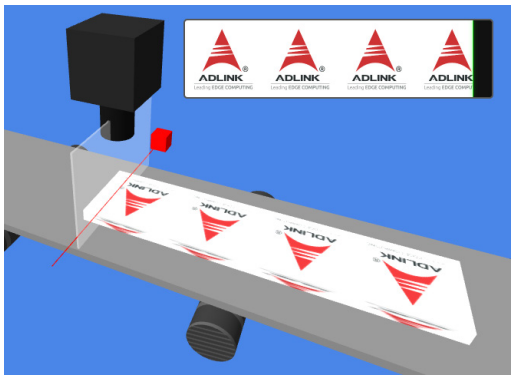
- Area scan cameras can be triggered by external sensors to capture images with a trigger delay. When starting capture, you can select the trigger input in 5.1.5 TriggerOutputTrigSrc section and set the trigger delay in 5.1.9 (using the encoder or timer delay parameters).

5.2.3 Line Scan 1: Infinite



- Line scan cameras with encoder signal for continuous imaging. When starting capture, you can select the trigger input in 5.1.5 TriggerOutputTrigSrc section.
- For example: Set the external trigger to initial trigger, and then set the retrigger parameter for infinite triggering (Port0CC1TriggerNums = 0) in Section 5.1.10.

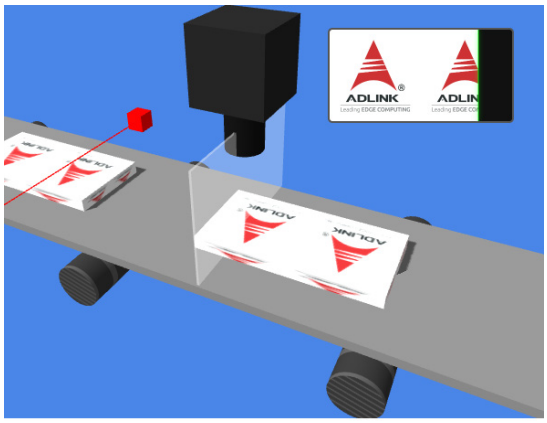
5.2.4 Line Scan 2: Single-Page



- Line scan cameras work with an encoder and external sensor to capture images on the page. When starting capture, you can select the trigger input in 5.1.5 TriggerOutputTrigSrc section. After triggering, one line will be captured per trigger. The total line length of images captured on each page can be set by the user. The retrigger number should be equal to the total line length of the images.
- For example: Set TriggerOutputTrigSrc.DO0TriggerSource = 0x1: DI0,
  then configure the retrigger by the following CAM file settings:

Retrigger
Port0CC1RetriggerEnable = 0x1: True
Port0CC1Mode = TimerMode
Port0CC1TriggerNums = 1024
Port0CC1Interval =10000

5.2.5 Line Scan 3: Single-Page with Delay



- Line scan cameras work with an encoder and external sensor to capture images on the page with delay. When starting capture, you can select the trigger input in 5.1.5 TriggerOutputTrigSrc section and set the trigger delay in 5.1.9 (using the encoder or timer delay parameters). After triggering, one line will be capture per trigger. The total line length of the images captured on each page can be set by the user. The retrigger number should be equal to the total line length of the images.
- For example: Set TriggerOutputTrigSrc.DO0TriggerSource = 0x1:DI0, then set the retrigger by the following CAM file settings:

Retrigger
Port0CC1RetriggerEnable = 0x1: True
Port0CC1Mode = 0x0: EncoderMode
Port0CC1TriggerNums = 1024
Port0CC1Interval =5

Delay
Port0CC1DelayMode = 0x0: EncoderMode
Port0CC1DelayCount = 5

6 Status Parameters

This chapter introduces various parameters that users can reference.

Users can check these parameters to verify whether the current status meets expectations.

For detailed descriptions of each parameter, please refer to the ADLINK Vision Software SDK documentation.

Status Parameters	Description	Address
Encoder counter	Number of Encoder counter	0x1502
DI0 Status	Digital Input 0 status - Active is 1 / Inactive is 0	0x180B
DI1 Status	Digital Input 1 status - Active is 1 / Inactive is 0	0x180C
DI2 Status	Digital Input 2 status - Active is 1 / Inactive is 0	0x180D
DI3 Status	Digital Input 3 status - Active is 1 / Inactive is 0	0x180E
DO0 Status	Digital Output 0 Status - Active is 1 / Inactive is 0	0x1924
DO1 Status	Digital Output 1 Status - Active is 1 / Inactive is 0	0x1925
DO2 Status	Digital Output 2 Status - Active is 1 / Inactive is 0	0x1926
DO3 Status	Digital Output 3 Status - Active is 1 / Inactive is 0	0x1927
MultiCard Sync Mode	Multi-card synchronization setting status - Master: 1 (Default); Slave: 0	0x1A00
DMAInterruptCount	Number of DMA interrupt issued by FPGA	0x1C00
DataStreamStatus	Data Stream Status Confirmation - The board is receiving data from the front-end device - The board is transmitting data to the host	0x1C01
Camera Link Configuration	Camera Link configuration status - Full / Medium / Base / Error / Not detected	0x1C02
PoCLStatus	PoCL Status for Port 0 (Base) & Port1 (Medium / Full)	0x1C03
Camera Link clock frequency	External device clock frequency detection	0x1C04
PoCL SafePower Status	The PoCLSafePowerStatus includes the Clock Start Time, Clock Drop Time and Voltage Below Flag.	0x1C19
Clock Startup Time Tolerance	Allows a PoCL device to extend its clock startup time beyond the default limit.	0x1D00
Clock Drop Out Time Tolerance	Allows a PoCL device to extend its clock drop out time beyond the default limit.	0x1D01
Voltage Drop Duration Tolerance	Allows a PoCL device to extend its voltage drop duration beyond the default limit.	0x1D02

Note:

- The Camera Link configuration is referenced to the camera's clock.
- If only Pair X is detected, it is determined as Base.
- If Pair X and Pair Y are detected, it is determined as Medium.
- If Pair X, Pair Y, and Pair Z are detected, it is determined as Full.
- Any other pair combination is considered abnormal.
- If the camera outputs all three clock pairs simultaneously, it is determined as Full.

Note: When the PoCL SafePower Status returns a value other than 0, it means the PoCL device is operating outside the Camera Link Specification v2.1. Users can manually modify the corresponding parameters (0x1D00–0x1D02) to relax the detection tolerance, or modify the information in the CAM file.

Status Parameters	Description	Address
Port0LineCount	Number of lines received by FPGA	0x1C13
Port0FrameCount	Number of frames received by FPGA	0x1C15
DO0DelayBufferCount	Number of DO0 Delay Buffer data count	0x1C07
DO0DelayBufferOverflow	DO0 Delay Buffer overflow flag	0x1C08
DO1DelayBufferCount	Number of DO1 Delay Buffer data count	0x1C09
DO1DelayBufferOverflow	DO1 Delay Buffer overflow flag	0x1C0A
DO2DelayBufferCount	Number of DO2 Delay Buffer data count	0x1C0B
DO2DelayBufferOverflow	DO2 Delay Buffer overflow flag	0x1C0C
DO3DelayBufferCount	Number of DO3 Delay Buffer data count	0x1C0D
DO3DelayBufferOverflow	DO3 Delay Buffer overflow flag	0x1C0E
Port0CC1DelayBufferCount	Number of CC1 Delay Buffer data count	0x1C0F
Port0CC1DelayBufferOverflow	CC1 Delay Buffer overflow flag	0x1C10
Port0CC2DelayBufferCount	Number of CC2 Delay Buffer data count	0x1C11
Port0CC2DelayBufferOverflow	CC2 Delay Buffer overflow flag	0x1C12

Note: PCIe-CPL64V series provides a position memory buffer, "DelayBufferCount," between the external trigger and the camera.

This buffer can record up to 255 object positions between the two points. Users can monitor "DelayBufferCount" to determine how many objects remain in the buffer.

When the memory buffer "DelayBufferCount" exceeds 255, a “DelayBufferOverflow” event is logged and retained until the next Start Acquisition is initiated, at which point it will be cleared.

Status Parameters	Description	Address
DI0EventCount	Number of DI0 trigger event received	0x180F
DI1EventCount	Number of DI1 trigger event received	0x1810
DI2EventCount	Number of DI2 trigger event received	0x1811
DI3EventCount	Number of DI3 trigger event received	0x1812
EncoderCompareEventCount	Number of Encoder Compare trigger event received	0x1813
MultiCardSyncEventCount	For the Master, it refers to the number of Multi-card Sync trigger events sent. For the Slave, it refers to the number of Multi-card Sync trigger events received.	0x1814
SWTriggerEventCount	Number of SW trigger event received	0x1815
DO0TriggerEventCount	Number of trigger event received by DO0Delay	0x191C
DO1TriggerEventCount	Number of trigger event received by DO1Delay	0x191E
DO2TriggerEventCount	Number of trigger event received by DO2Delay	0x1920
DO3TriggerEventCount	Number of trigger event received by DO3Delay	0x1922
Port0CC1TriggerEventCount	Number of trigger event received by Port0CC1Delay	0x1308
Port0CC2TriggerEventCount	Number of trigger event received by Port0CC2Delay	0x130A
DO0RetriggerEventCount	Number of trigger event received by DO0Retrigger	0x1B18
DO1RetriggerEventCount	Number of trigger event received by DO1Retrigger	0x1B1A
DO2RetriggerEventCount	Number of trigger event received by DO2Retrigger	0x1B1C
DO3RetriggerEventCount	Number of trigger event received by DO3Retrigger	0x1B1E
Port0CC1RetriggerEventCount	Number of trigger event received by Port0CC1Retrigger	0x1B20
Port0CC2RetriggerEventCount	Number of trigger event received by Port0CC2Retrigger	0x1B22
DO0TriggerOutEventCount	Number of trigger event received by DO0TriggerOut	0x1928
DO1TriggerOutEventCount	Number of trigger event received by DO1TriggerOut	0x192A
DO2TriggerOutEventCount	Number of trigger event received by DO2TriggerOut	0x192C
DO3TriggerOutEventCount	Number of trigger event received by DO3TriggerOut	0x192E
Port0CC1EventCount	Number of trigger event received by Port0CameraControl1	0x130C
Port0CC2EventCount	Number of trigger event received by Port0CameraControl2	0x130E
DO0TriggerDropCount	Number of trigger event dropped by DO0Delay	0x191D
DO1TriggerDropCount	Number of trigger event dropped by DO1Delay	0x191F
DO2TriggerDropCount	Number of trigger event dropped by DO2Delay	0x1921
DO3TriggerDropCount	Number of trigger event dropped by DO3Delay	0x1923
Port0CC1TriggerDropCount	Number of trigger event dropped by Port0CC1Delay	0x1309
Port0CC2TriggerDropCount	Number of trigger event dropped by Port0CC2Delay	0x130B
DO0RetriggerDropCount	Number of trigger event dropped by DO0Retrigger	0x1B19
DO1RetriggerDropCount	Number of trigger event dropped by DO1Retrigger	0x1B1B
DO2RetriggerDropCount	Number of trigger event dropped by DO2Retrigger	0x1B1D
DO3RetriggerDropCount	Number of trigger event dropped by DO3Retrigger	0x1B1F
Port0CC1RetriggerDropCount	Number of trigger event dropped by Port0CC1Retrigger	0x1B21
Port0CC2RetriggerDropCount	Number of trigger event dropped by Port0CC2Retrigger	0x1B23
DO0TriggerOutDropCount	Number of trigger event dropped by DO0TriggerOut	0x1929

Status Parameters	Description	Address
DO1TriggerOutDropCount	Number of trigger event dropped by DO1TriggerOut	0x192B
DO2TriggerOutDropCount	Number of trigger event dropped by DO2TriggerOut	0x192D
DO3TriggerOutDropCount	Number of trigger event dropped by DO3TriggerOut	0x192F
Port0CC1DropCount	Number of trigger event dropped by Port0CameraControl1	0x130D
Port0CC2DropCount	Number of trigger event dropped by Port0CameraControl2	0x130F

Note: The “DropCount” should normally be zero. A non-zero value indicates that trigger information has been lost.

7 CamCreator Utility

Once hardware installation is complete, ensure that it is configured correctly before running the CamCreator utility. This chapter outlines how to establish a vision system and how to manually control PCIe-CPL64V cards to verify correct operation. CamCreator provides a simple way to set up, configure, test, and debug the system.

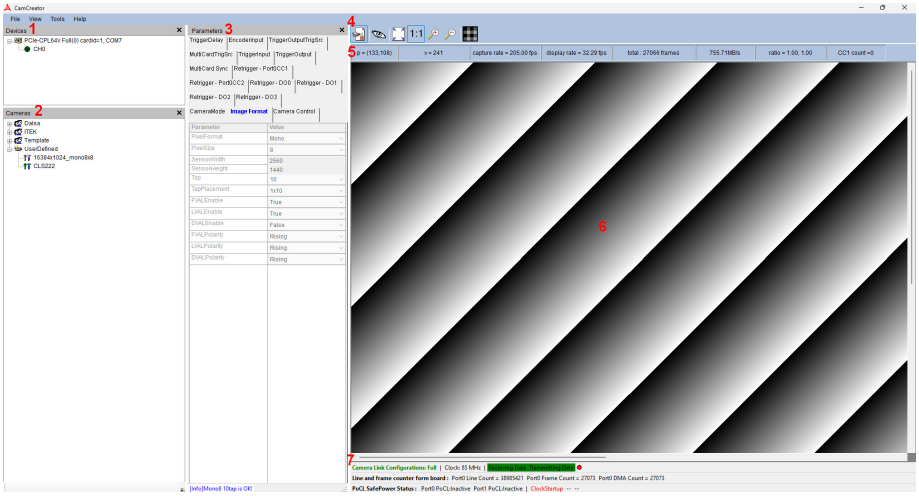
7.1 Utility Overview

CamCreator offers the following features:

- Automatic detection of acquisition hardware
- Creation and modification of camera file
- Instant modification of camera parameters
- Saving operation of the raw image files
- Direct access to general-purpose I/Os
- Captured Image viewing
- .Net Framework 4.8 for CamCreator

7.2 Component Description

Start the utility, and the view should like the following:



1. **Devices panel**
   The list window displays the PCIe-CPL64V cards installed on the local computer.
2. **Cameras panel**
   The tree browser window lists all available cameras and their camera files or user-defined camera files.
3. **Parameters panel**
   The tab window lists all adjustable parameters.
4. **Tool bar**
   The tool strip lists all adjustable parameters.
5. **Status bar**
   The status bar shows the information about the captured image.
6. **Display panel**
   This window shows captured image.
7. **Board status strip**
   This board status strip shows the information about the board LED status, capture status, and PoCL status.

7.3 Operation Theory

CamCreator provides some preview functions for the PCIe-CPL64V Full card, as described below:

When opening CamCreator, the program automatically scans the system for cpl64v devices and displays them in the Device Panel.

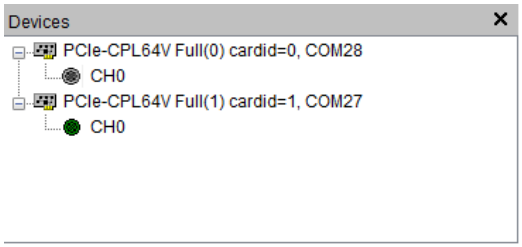
Warning: When using multiple cards, please adjust the card ID. Please refer to Section 2.3.6

When selecting a device, please select the channel that needs to be activated. If this is your first time using CamCreator, the program will not automatically import the CAM file settings for you.

As mentioned above, when you select a CAM file from the Cameras Panel, CamCareator will save the current settings. Alternatively, you can customize your own CAM file by adjusting the appropriate parameters in the Parameter panel. Remember to click File Menu->"Save CAM file".

7.3.1 Devices Panel

Currently, CamCreator does not support capturing images from multiple channels simultaneously. Please select the appropriate active channel to set up.



Device

- ▷ The Device displays the PCIe-CPL64V device index, card index, and the system's corresponding COM number. **Note**: If another camera software that accesses the PCIe-CPL64V's COM port is opened first, the COM number will return -1.
- ▷ **Warning**: When using multiple cards, please adjust the card ID. Please refer to Section 2.3.6

Current active channel

- ▷ All operations will apply to this channel.

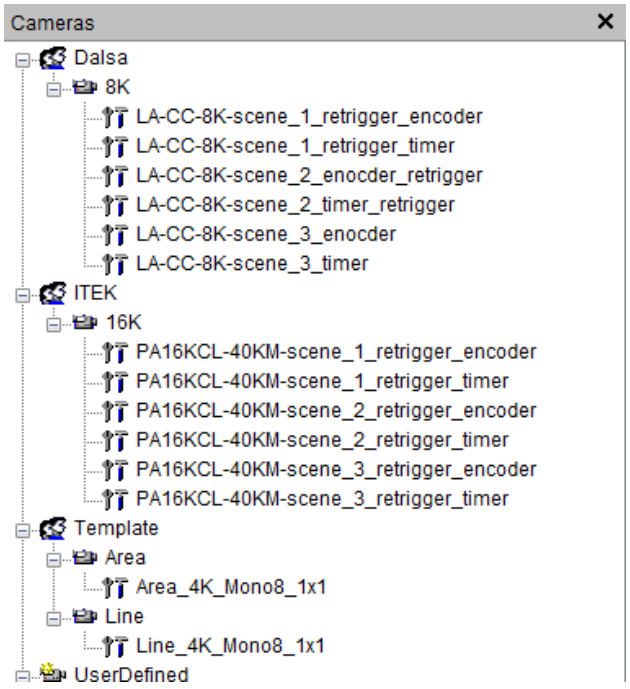
Inactive channel

- ▷ Click the channel after this icon to activate this channel. Only one channel can be active at one time. If you select standby channel, the current active channel will become inactive.

Close this panel

7.3.2 Cameras Panel

Currently, only some template CAM files and some scenario references are provided. Please refer to Section 5.2.1-5.2.5



Camera provider

Camera type

Camera file

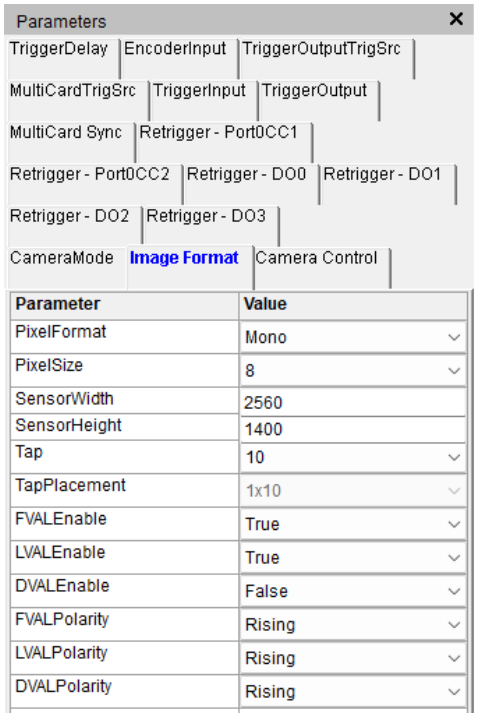
Current loaded camera file

- ▷ Select an appropriate camera file for your camera. CamCreator will load this camera file to the device and shows its parameters in the parameters panel.
- ▷ If you are using CamCreator for the first time, the utility will use the default settings of the current card until you select a camera CAM file.

Close this panel

7.3.3 Parameters Panel

The parameters panel shows the parameters of the selected camera file. Any modifications are applied immediately to the current active device. Users can save the camera file with the modified parameters by using the “Save Cam File” command in main menu.



× **Close this panel**

7.3.4 Toolbar

Continuous Grab

- ▷ Starts grabbing images and displays the images on the Display panel. Click it again to stop grabing. This is a toggle button.
- ▷ **Warning**: If your image does not conform to the supported format and restrictions, CamCreator will display a warning window. Please refer to Section 5.1.2

Hide Image

- ▷ Hide or unhide the displayed image. This is a toggle button.

Fit Size

- ▷ Fit the image to the entire Display panel.

Original Size

- ▷ Restores to the original size.

Zoom In

- ▷ Zooms in the image

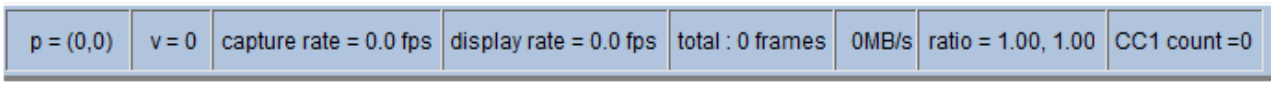
Zoom Out

- ▷ Zooms out the image

Bayer Decoder

- ▷ Converts the Bayer pattern to RGB24 (Note: CamCreator only)
- ▷  Disables Bayer
- ▷  BayerBG
- ▷  BayerGB
- ▷  BayerGR
- ▷  BayerRG

7.3.5 Status Bar

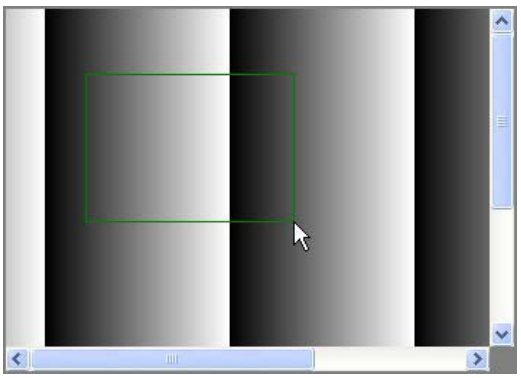


From left to right, the panel items are: cursor position, pixel value, frame rate, display rate, total captured frames, data transfer rate, magnification (horizontal ratio, vertical ratio) and CC1 count.

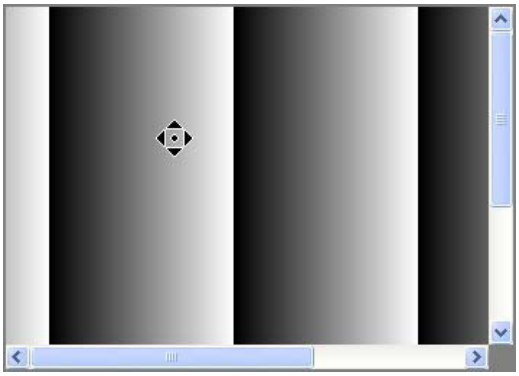
Note: The CC1 count is cleared after calling the Advanced Configuration API.(ResetDebugCount) or by clicking the “Reset All Statistics” button in the TriggerIOCounters form.

7.3.6 Display Panel

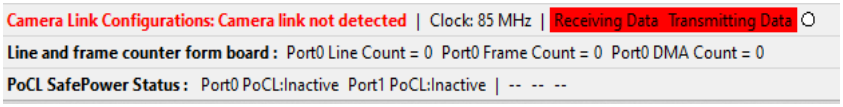
Click the left mouse button and drag to create a rectangular region on the Display panel, which will be zoomed in. If you hold Ctrl while dragging, the image will be zoomed in with equal width and height proportions. See example below:



Click the right mouse button, and the cursor will change to a move2D icon. The user can drag the image. As shown below:



From left to right, the bottom of the draw panel displays the following status indicators: CameraLink Configurations (Camera link not detected / Base / Medium / Full / Abnormal), front end device clock rate, whether the device is receiving data from the front end device (Green/Red), whether the device is transmitting data to the host (Green/Red), and Line count, frame count kernel DMA count, and PoCL SafePower Status. As shown below:



Note: The PoCL SafePower Status indicates that the PoCL channel status is active or inactive and also shows any Power-over-Cameralink error. (-- -- --) indicates no error; if there is an error, it will display on of the following: (Clock Startup, Clock Drop, Voltage Below).

	Receiving data	**Receiving data**
Transmitting data	Starts capturing, video stream is received by the FPGA, and the FPGA is transmitting the video stream data to the host	FPGA is not receiving the video stream from the front-end device, and continues to transmit the residual data stored internally within the FPGA to the host.
Transmitting data	Start capturing, video stream is received by the FPGA, but the FPGA is not transmitting the video stream data to the host	No video stream

Note: These are the debug status that can be used to retrieve the current frame grabber's image acquisition status through the Advanced Configuration API.

Debug.DataStreamStatus	Bit 1	Bit 0	Description
`0` (`0b00`)	0	0	No data transfer
`1` (`0b01`)	0	1	Receiving data from front-end device only
`2` (`0b10`)	1	0	N/A

`3` (`0b11`)	1	1	Simultaneously receiving and transmitting data

7.3.7 Main Menu

File Menu

Open Cam File

▷ Load camera parameters from a camera file.

Save Cam File

▷ Save the current camera parameters to the current loaded camera file.

Save Cam File As

▷ Save the current camera parameters to a new camera file.

Delete Cam File

▷ Delete the currently loaded camera file.

▷ Note: Template CAM file cannot be deleted.

Save Image

▷ Save the currently displayed image as a raw and bitmap file.(RGB/MONO only)

Exit

▷ Terminate CamCreator.

View Menu

Devices

▷ Hide or unhide the Devices panel.

Cameras

▷ Hide or unhide the Cameras panel.

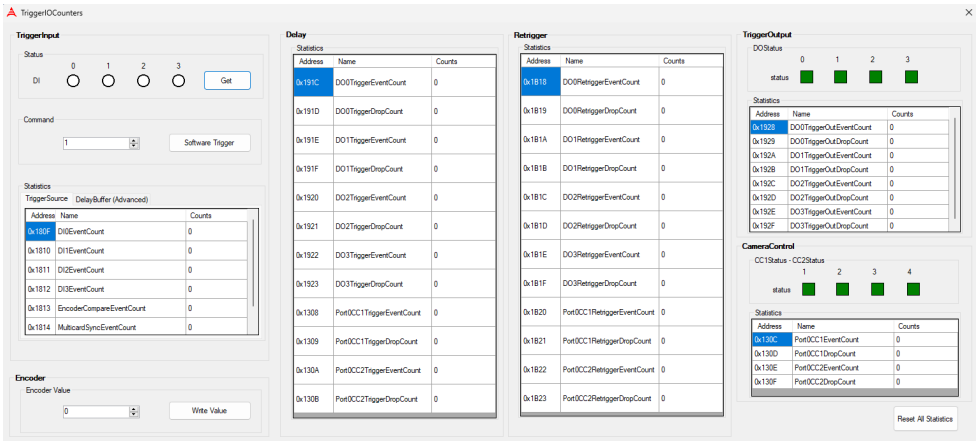
Parameters

▷ Hide or unhide the Parameters panel.

Tools Menu

(TriggerIOCounters)

▷ Open the General I/O purpose, encoder counter, and trigger event statistics. All the values can also be accessed through the Advanced Configuration API.
For details, please refer to Chapter 6.



Help Menu

About CamCreator

- ▷ Show the CamCreator version.

About Device

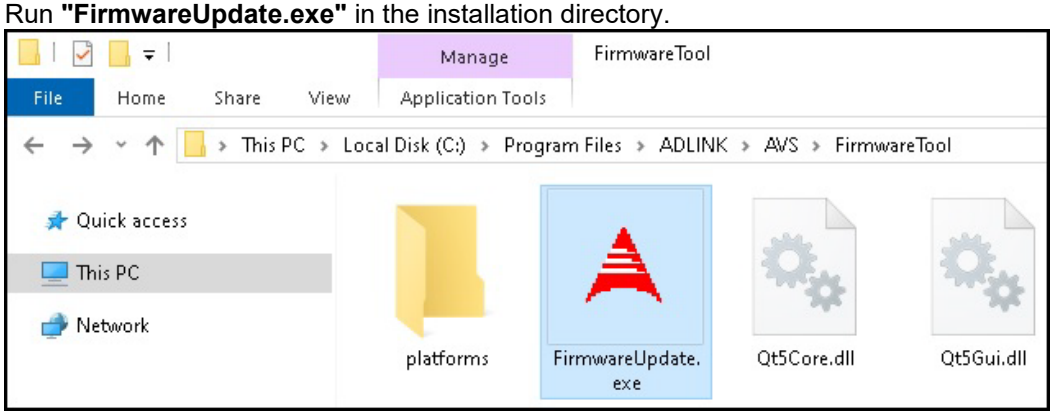
- ▷ Show device information.
- ▷ Show SDK version.

8 Firmware Update

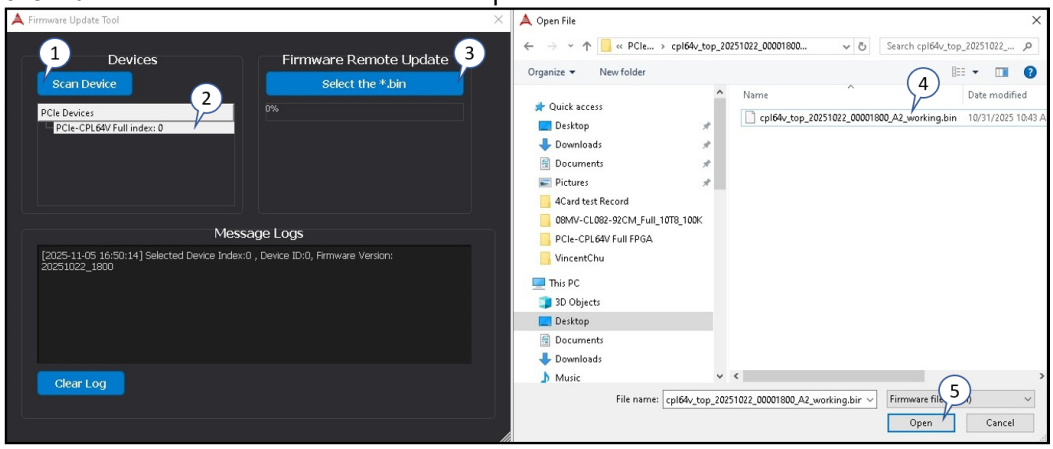
ADLINK provides a firmware update tool that helps users to update the firmware when necessary.

8.1 Firmware Update Procedures

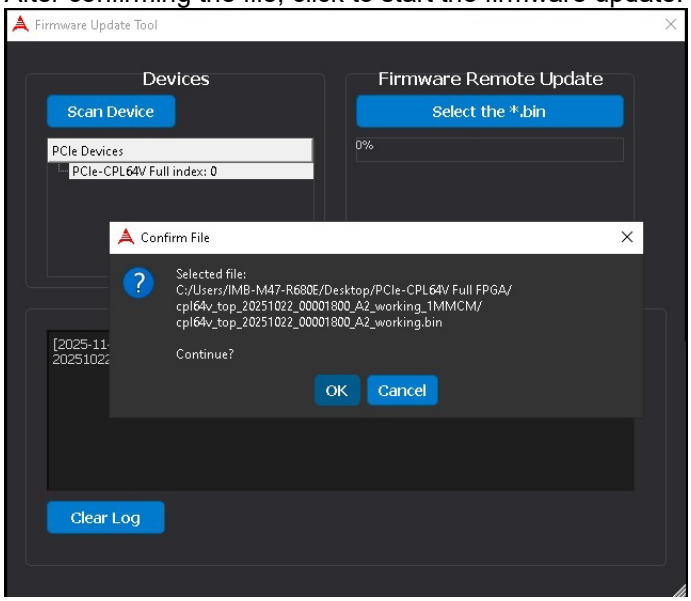
1. Run **"FirmwareUpdate.exe"** in the installation directory.



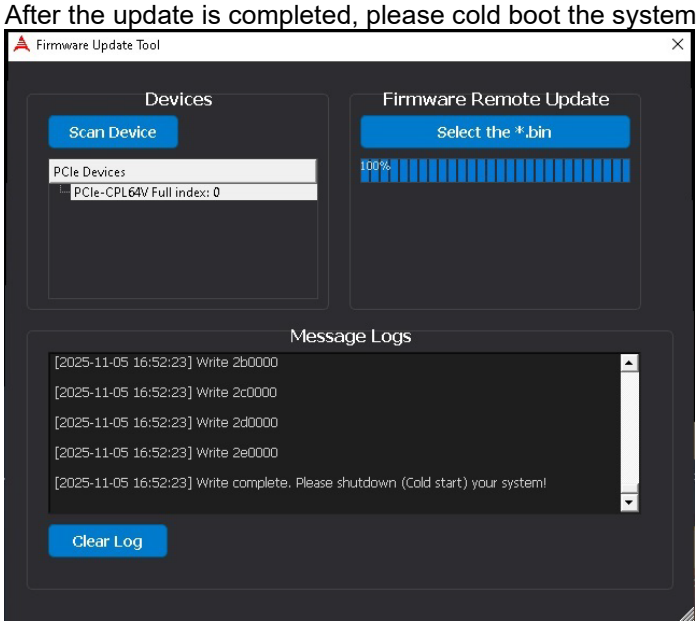
2. Click **"Scan Device"**, select the **"PCIe-CPL64V Full"** that needs to be updated, and then click **"Select the *.bin"** to choose the firmware file to update.



3. After confirming the file, click to start the firmware update.



4. After the update is completed, please cold boot the system.



Safety Instructions

Read and follow all instructions marked on the product and in the documentation before you operate your system. Retain all safety and operating instructions for future use.

- Please read these safety instructions carefully.
- Please keep this User‘s Manual for later reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment, turn off the power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources.
  - Keep equipment away from high heat or high humidity.
  - Keep equipment properly ventilated (do not block or cover ventilation openings).
  - Make sure to use recommended voltage and power source settings.
  - Always install and operate equipment near an easily accessible electrical socket-outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings.
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
- For indoor use only.
- Altitude during operation: up to 2000 m.
- Over voltage category: OVC II
- Pollution degree: 2
- Ingress protection: X0

Getting Service

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

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