PRELIMINARY

SVS-VISTEK

Operation Manual

SVCam-EVO Series

Digital Camera Link Area Scan Cameras

Version 3.5 / last update: 08 / 2012

evo1050
evo2050
evo2150
evo4050
evo8050

Safety Messages

The classification of dangers is made pursuant to ISO 3864-2 and ANSI Y535.6 with the help of key words.

This Operating Manual uses the following Safety Messages:

Risk of death or serious injury

DANGER!

Danger indicates a hazard with a high level of risk which, if not avoided will result in death or serious injury.

WARNING!

Warning indicates a hazard with a medium level of risk which, if not avoided will result in death or serious injury.

CAUTION!

Caution indicates a hazard with a low level of risk which, if not avoided will result in death or serious injury.

Risk of damage

CAUTION!

A black graphical symbol inside a yellow triangle defines a safety sign that indicates a hazard.

PROHIBITION!

A black graphical symbol inside a red circular band with a red diagonal bar defines a safety sign that indicates that an action shall not be taken or shall be stopped.

MANDATORY ACTION!

A white graphical symbol inside a blue circle defines a safety sign that indicates that an action shall be taken to avoid a hazard.

Cross-references

NOTICE

Provides references and tipps

Company Information

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This Operation Manual is based on the following standards:
DIN EN 62079
DIN EN ISO 12100
ISO Guide 37
DIN ISO 3864-2
DIN ISO 3864-4

This Operation Manual contains important instructions for safe and efficient handling of SVCam Cameras (hereinafter referred to as „camera"). This Operation Manual is part of the camera and must be kept accessible in the immediate vicinity of the camera for any persons working on or with this camera.
Read carefully and make sure you understand this Operation Manual prior to starting any work with this camera. The basic prerequisite for safe work is compliance with all specified safety and handling instructions.
In addition, all local accident prevention guidelines and general safety regulations effective at the implementation site of the camera apply.
Illustrations in this Operation Manual are provided for basic understanding and can vary from the actual model of this camera. No claims can be derived from the illustrations in this Operation Manual.

The camera in your possession has been produced with great care and has been thoroughly tested. Nonetheless, should you have grounds for complaint, then please contact your local SVS-VISTEK distributor. You will find a list of distributors in your area under:
http://www.svs-vistek.com/company/distributors/distributors.php

Content

1 Introduction

1.1 Conformity

CE marking and certification
(as per EN 50022-2)

CE marking is a declaration by a manufacturer that a product meets all the appropriate provisions of the relevant legislation implementing certain European Directives.

This camera fulfills the requirements of current european and national regulations relating to EN 50022-2. The conformity has been tested and the corresponding declarations and documentation are available at SVS-VISTEK GmbH.

Federal Communications Commission (FCC / USA and Canada)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Operation Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Camera complies with FCC Form 47 Rules.

Restriction of Hazardous Substances complient.

Restriction of Hazardous Substances (RoHS) has been adopted by the European Union and prohibits the use of six hazardous substances in electrical and electronic products put on the market after July 1, 2006.

This camera fulfills the requirements of current european and national regulations concerning RoHs conformity.

1.2 Intended Use

Thank you for purchasing a SVS-VISTEK camera. This camera is a high-end electronic imaging device designed for use in Machine Vision applications. It can be used in stationary and mobile applications.

Failure to operate the camera other than its intended use and making modifications to the camera and its components can lead to personal injury or property damage for which the manufacturer assumes no liability. Ensure that the intended use and safe operation of the camera are not interfered with, even by unforeseen external forces. Intended use and safe operation of the camera is described in this operation manual. Operation of the camera has to be carried out only by trained personnel who are knowledgable of the rules for prevention of accidents and other general security measures for electrical devices. You can protect yourself from injury and prevent damage to the camera and other components through operation in the intended use and following the safety rules.

Avoid injury or damage!

Read and understand Operating Manual before operating this camera.

MANDATORY ACTION!

If any sign of overheating is observed, discontinue the use immediately. In the event that smoke, smell, or any other sign of overheating is observed, turn the power switch of the system OFF immediately and remove the power cable(s) from the system connectors, like computer, camera, lightning. Do NOT try to continue to use the system. To do so in spite of clear signs of malfunction invites a fire, an electric shock hazard, or serious damage to the system components. In such case, contact the dealer/distributor from which you purchased the system for repair service.

MANDATORY ACTION!

If any sign of malfuctioning is observed, discontinue the use immediately. Do NOT try to use the system when it is malfunctioning. (Ex. No images on the monitor) In the event of malfunction, turn the power switch of the system OFF immediately and remove the system power cables from the system components connectors. In such case, contact the dealer/distributor from which you purchased the system for repair service.

1.3 Safety first

MANDATORY ACTION!

If any foreign object gets into the system components, discontinue the use immediately. Do NOT try to continue to use the system. To do so invites a fire or an electric shock hazard. In that case, turn the power switch of the system components OFF immediately and remove the system power cables from the system components connectors.

PROHIBITION!

Do NOT disassemble the system components.
Do NOT attempt to pull apart; repair, or modify the system components on your own. To do so leads to a fire or an electric shock accident. Contact the dealer/ distributor from which you purchased the camera for repair/modifacation.

PROHIBITION!

Do NOT supply any power other than specified. The system components are designed to work only under specified voltage. Do NOT attempt to drive the system components with the power other than specified. It might invite a fire or a electric shock hazard.

PROHIBITION!

Do NOT use the system components in a high-humidity environment. Do NOT place the system components near a humidifier, or in other high-humidity environments. To do so may cause a fire or an electric shock accident.

PROHIBITION!

Avoid electromagnetic fields. There may be cases where noise (vertical, horizontal, or oblique stripes) may appear on the video output or other malfunctions may appear. Take preventive measures on the electromagnetic-wave generating source so that the system components do not receive the interference by the electromagnetic- wave. Take extra precautions against electromagneticwave-interference if the system components are used with a servomotor, inverter, or other electromagnetic-wave- generating equipment.

PROHIBITION!

Avoid strong shock against the system components. If your system components are used in the system where the connectors are subjected to strong repetitive shocks, then the connectors may breakdown. If you intend to use your system components in such a situation, make sure to use an optional-connector-fixing-hardware to connect the connector-plug to the system components body.

AVOID LASER BEAMS ON SENSOR

Do not expose the sensor to direct laser beams – this could damage the sensor.

Cases for indeminity (limited warranty)
We shall be exempted from taking responsibility and held harmless for damages or losses incurred by user in the following cases. In case damages or losses are caused by fire, earthquake, or other acts of Gods, the act by third party, misuse by the user deliberately or erroneously, use under extreme operating conditions.

- In case indirect, additional, consequential damages (loss of expected interest, suspension of business activities) are incurred as results of malfunction or non-function of the equipment, we shall be exempted from assuming responsibility for such damages.
- In case damages or losses are caused by incorrect use, which is not in line with the instructions in this instruction manual.
- In case damages or losses are caused by malfunction resulting from bad connection with other equipment.
- In case damages or losses are caused by repair or modification done by the user.

AVOID ELECTROSTATIC

Do not expose the camera to high voltage or electrostatic discharge, it might be damaged.

PROHIBITION!

Do NOT expose the camera to sunlight or other intense light directly. Its inner CCD (charge-coupled device) might be damaged.

MANDATORY ACTION!

This camera is designed and guaranteed to work under the temperature range of -10°C (+14°F)through +45°C (+113°F). Only use the camera between these limits. Usage outside of these limits will void the warranty.

MANDATORY ACTION!

When the system components are not in use, put a lens or a lens-cap onto the lens mount so that the image pick-up plane of CCD is protected from dust or other foreign objects. If the glass plane of the CCD gets dirty, then cleaning is recommended to be done only by specially trained personel. If you are not confident of having this ability, then contact the dealer/distributor from which you obtained the camera.

PROHIBITION!

Do NOT stress any cable. It may damage the jacket of the cable or break the wires inside.

MANDATORY ACTION!

Avoid condensation. When the system components are moved from a cold place to a significantly warmer one, we recommend placing the system in airtight plastic bags. This allows the condensation to form on the bag, thus protecting the camera as much as possible from condensation. Should the camera become wet, then dry the camera thoroughly before connecting power and use.

PROHIBITION!

Do NOT short circuit any input or output signals. Otherwise a malfunction or permanent damage may occur.

CAUTION!

Before mounting a lens, take extra care to ensure that the lens is not tilted and that the threads of the lens are not damaged. Also ensure that no dirt or other foreign objects fall inside the lens mount or are on the threads of lens or lens mount. Improper mounting may cause the parts to become locked together or contaminate the CCD cover glass.

2 Getting Started

2.1 Overview EVO-Series

Camera Specifications

Camera Type	Resolution, H x V [Pixel]	Sensor Size	max. Frame Rate	Pixel Size [µm]	Housing, H x W x L [mm]	ADC Bit used	ADC Output	Lens Mount	Output Taps
evo1050	1.024 x 1.024	1/2"	190 fps	5.5 x 5.5	50 x 50 x 48	14	12	C-Mount	2
evo2050	1.600 x 1.200	2/3"	105 fps	5.5 x 5.5	50 x 50 x 48	14	12	C-Mount	2
evo2150	1.920 x 1.080	2/3"	100 fps	5.5 x 5.5	50 x 50 x 48	14	12	C-Mount	2
evo4050	2.336 x 1.752	1"	50 fps	5.5 x 5.5	50 x 50 x 48	14	12	C-Mount	2
evo8050	3.296 x 2.472	22.66 mm diag.	24 fps	5.5 x 5.5	50 x 50 x 48	14	12	M42- / C-Mount	2

NOTICE

All CCD sensors on which these cameras are based might have following defects:
- Clusters (group of adjacent pixel)
- Single Pixel Defects (dark, white or out of PRNU)

For further information see datasheet of Truesense Inc. (formerly Kodak, Rochester NY, USA)

2.2 Camera Order Code

Camera Order Code

Order Code for EVO series
evo[sensor type][chroma][tap][speed][interface][bit]

Chroma
M = Monochrome
C = Color

Interface
CP = CameraLink
GE = Gigabit Ethernet (GigE)

Options
67 = IP67 protected
4IO = 4 channels

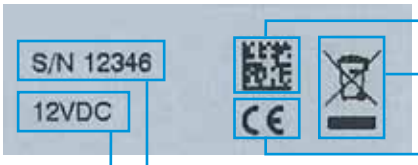
Bit A = 8 Bit C = 12 Bit
B = 10 Bit D = 14 Bit

evo xxxx X X X XX X XXXX

Sensor Type

Tap O = One
T = Two
F = Four

Speed
CP only: L = User-adjustable clock speed: 20, 32, 40 or 48 Mhz
H = User-adjustable clock speed: 20, 32, 40, 48 or 64 Mhz
R = 80 MHz
GE only: L = Non-adjustable clock speed: 50 MHz
H = 64 MHz



Dot Matrix Code - contact SVS-VISTEK for details.
This Divice has to be recycled
Conformity
Serial Number
Operating voltage

2.3 Content of Camera Set

Camera Set	
containing	
Camera (power supply and tripot adapter optional available)	
Manual as pdf file	(on CD)
ConvCam (program allowing interactive access to all camera settings) Win XP and Win 7	(on CD)
GUI, Camera Link documentation and **dLL**	(on CD)

2.4 Installation

Install the camera in the desired location:

- To mount the camera use the supplied tripod adapter or the the four M3 holes located on the camera front plate.
- Connect a Camera Link cable to your frame grabber.
- Connect the Camera Link cable to connector A of the camera (see drawing). In case you take advantage of the full speed of the camera, connect two CL cables. The cable should not be longer than 10 m when running camera with more than 64 MHz. (A "Repeater" is available to extend cable lenghth. Consult your local distributor.)
- Connect the power supply to the camera.
- Connect the power supply to main voltage.

NOTICE

If you have ordered a power supply connect the 12-pin Hirose connector on the camera. If you use your own power supply, it must be 12 V and have the appropriate mating connector with 10 – 25 V.

3 Hardware

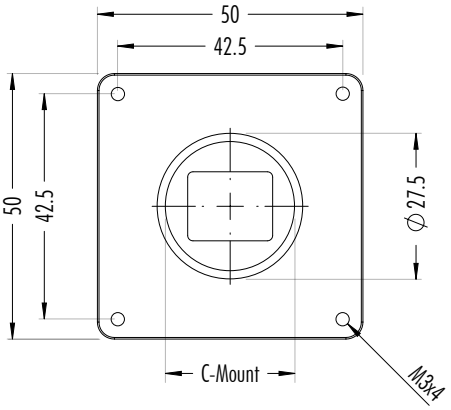
3.1 Technical Drawings of Cameras

3.1.1 C-Mount

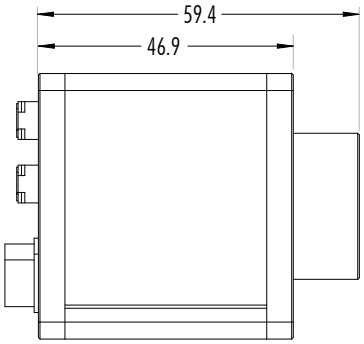
evo1050, evo2050, evo2150, evo4050, evo8050

Dimensions [mm]

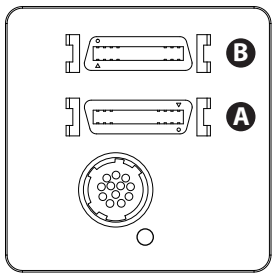
Front View



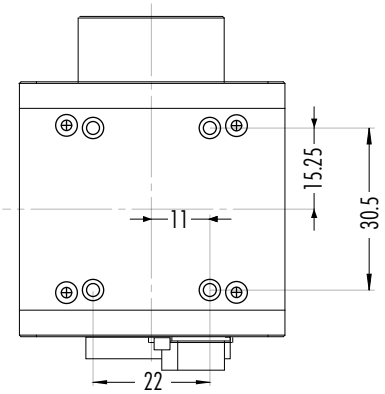
Side View

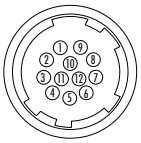


Rear View



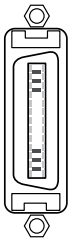
Bottom View





HR 10A-10R-12PB (mating connector: HR 10A-10P-12S)

1 VIN- (GND)	7 OUT1 (open drain max. 24V, 0.3A)
2 VIN+ (10V to 25V DC)	8 OUT2 (open drain max. 24V, 0.3A)
3 RXD (RS232)	9 IN3+ (RS422)
4 TXD (RS232)	10 IN3- (RS422)
5 IN1 (0-24V)	11 OUT3+ (RS422)
6 IN2 (0-24V)	12 OUT3- (RS422)



MDR 26 female Connector (mating connector: 3M)

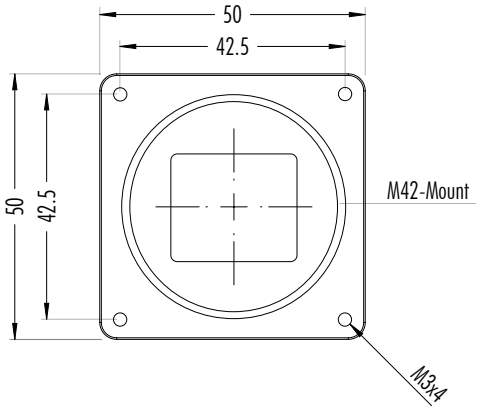
Sync and Dataserial LVDS
(see pinout in this manual)
Part-Nr. Connector: 10126-6000EL
Part-Nr. Hood: 10326-A200-00

3.1.2 M42-Mount

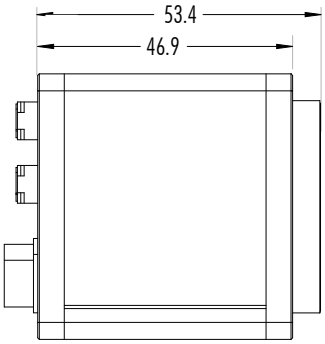
evo1050, evo2050, evo2150, evo4050, evo8050

Dimensions [mm]

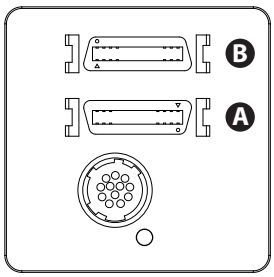
Front View



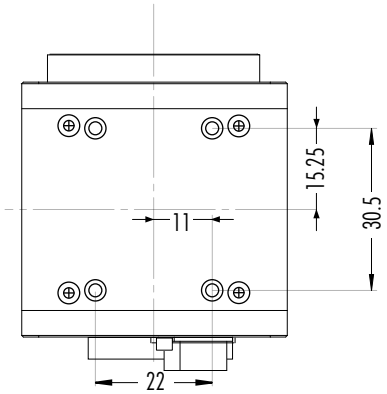
Side View

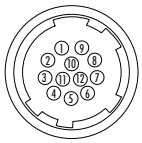


Rear View



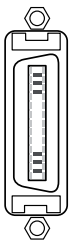
Bottom View





HR 10A-10R-12PB (mating connector: HR 10A-10P-12S)

1 VIN- (GND)	7 OUT1 (open drain max. 24V, 0.3A)
2 VIN+ (10V to 25V DC)	8 OUT2 (open drain max. 24V, 0.3A)
3 RXD (RS232)	9 IN3+ (RS422)
4 TXD (RS232)	10 IN3- (RS422)
5 IN1 (0-24V)	11 OUT3+ (RS422)
6 IN2 (0-24V)	12 OUT3- (RS422)



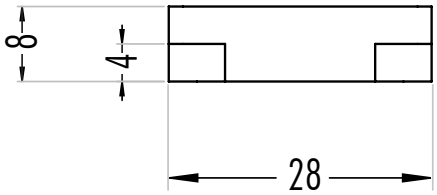
MDR 26 female Connector (mating connector: 3M)

Sync and Dataserial LVDS
(see pinout in this manual)
Part-Nr. Connector: 10126-6000EL
Part-Nr. Hood: 10326-A200-00

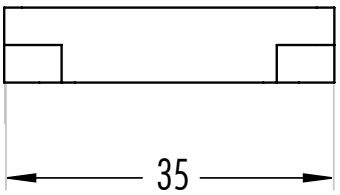
3.1.3 Tripod Adapter
(optional available)

Dimensions [mm]

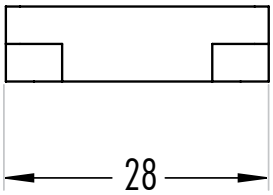
Front View



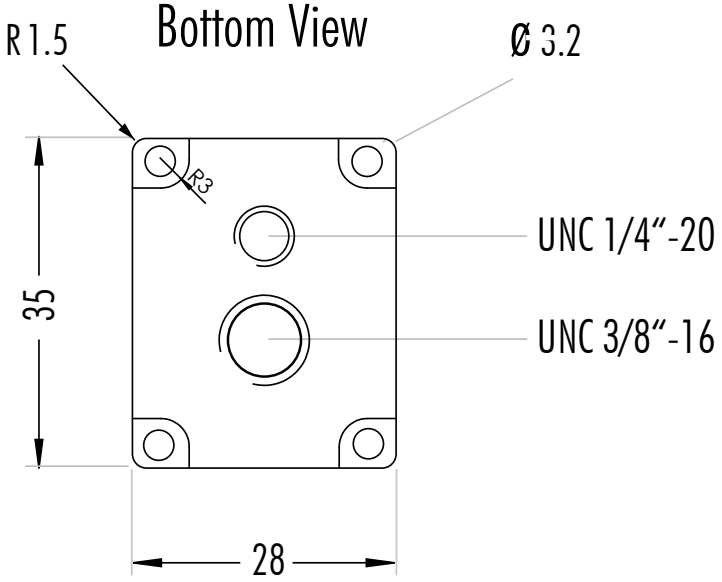
Side View



Back View



Bottom View



3.2 Connectors

3.2.1 LED Blink Codes

Blink Codes

LED		Description
	yellow slow (1 Hz)	Camera booting
	yellow permanent	Camera running
	red quick (8 Hz)	Camera is overheating
	red slow (1 Hz)	Firmware not configured

NOTICE

Note: Using the available M42-to-C-Mount adapter on cameras with sensors having a format larger than 1" may produce vignetting - a darkening of the corners and edges in the field of view caused by the geometry of the optics which are used in C-Mount lenses. It is recommended to use high-quality optical solutions designed for the M42 x 1mm lens-mounting specification. Please contact SVS-VISTEK or your local dealer for a lens recommendation.

If you must use the M42-to-C-Mount adapter with a large format sensor, then do not use a lens designed for less than 1" sensors. Using a lens with a focal length greater than 50 mm may also help reduce the vignetting effect.

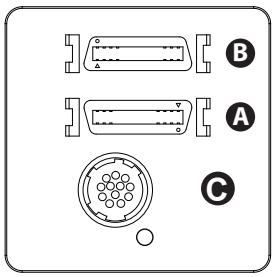
(Lens solutions for large format CCDs are e.g. available from SCHNEIDER, QUIOPTIQ, ZEISS or SILL.)

"To avoid vignetting, please use the right lenses"

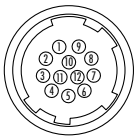
NOTICE

To avoid vignetting an optional F-Mount Adapter is availabe for the evo8050.

3.2.2 Power Connector



PB (mating connector: HR 10A-10P-12S)



C Power and I/O Connector

Requirement	
Voltage	+ 10 VDC to + 25 VDC
Current Consumption	450 mA,
Mating Connector	Switchcraft TA 3F

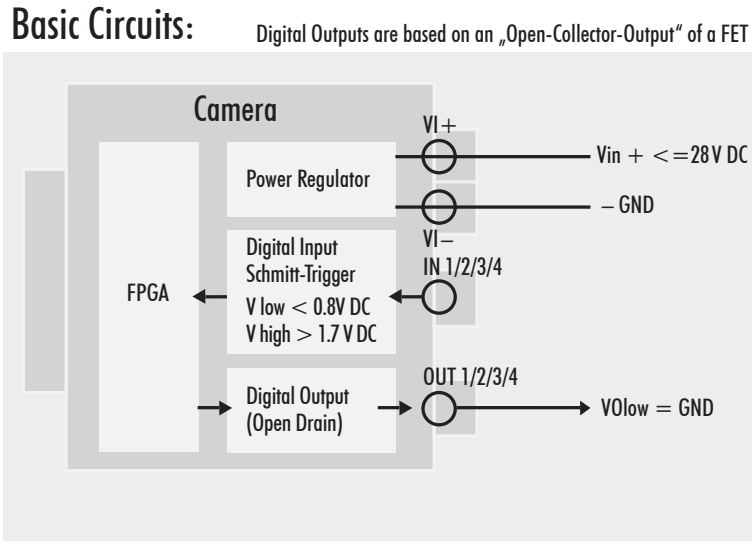
Specification	
Type	HR10A-10R-12PB
Mating Connector	HR10A-10R-12S

Pinout
1: Vin- (GND)
2: VIN+ (10 V to 25 V DC)
3: RXD (RS232)
4: TXD (RS232)
5: In 1 (0 - 24 V)
6: In 2 (0 - 24 V)
7: Out 1 (open drain max. 24 V, 0.3 A)
8: Out 2 (open drain max. 24 V, 0.3 A)
9: In 3+ (RS422)
10: In 3- (RS422)
11: Out 3+ (RS422)
12: Out 3- (RS422)

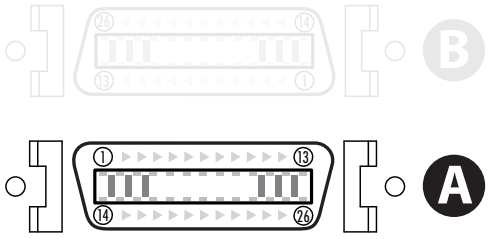
NOTICE

Peak current on “Power on” can be up to 2 Ampere! Current consumption increases rapidly when “partial scan” feature is used!

3.2.3 Basic Circuits for Hardware Interfacing



3.2.4 Camera Link™ Connector



Camera Link™ Connector A

Specification	
Type	26 Pin connector MDR female
Mating Connector	3M
Part-Nr. connector	10126-6000EL
Part-Nr. hood	10326-A200-00
Operating Mode	Camera Link™ Base / Medium configuration

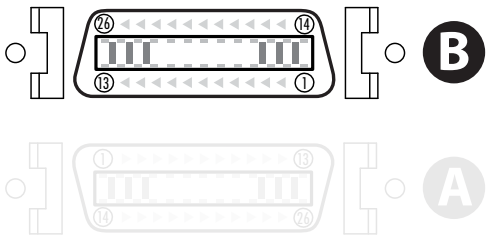
Pinout A

Pin	Signal Name	Direction	Signal Description
1 :	PoCL +12	-	
2:	X0-	Camera to FG	Data
3:	X1-	Camera to FG	Data
4:	X2-	Camera to FG	Data
5:	Xclk-	Camera to FG	Transmitter Clock / PVAL
6:	X3-	Camera to FG	Data
7:	SerTC+	FG to Camera	Camera Control (Serial Data)
8:	SerTFG-	Camera to FG	Camera Control (Serial Data)
9:	CC1-	FG to Camera	Trigger
10:	CC2+	FG to Camera	Trigger
11:	CC3-	FG to Camera	
12:	CC4+	FG to Camera	
13:	PoCL GND	-	
14:	PoCL GND	-	
15:	X0+	Camera to FG	Data
16:	X1+	Camera to FG	Data
17:	X2+	Camera to FG	Data
18:	Xclk+	Camera to FG	Transmitter Clock
19:	X3+	Camera to FG	Data
20:	SerTC-	FG to Camera	Camera Control (Serial Data)
21:	SerTFG+	Camera to FG	Camera Control (Serial Data)
22:	CC1+	FG to Camera	Trigger
23:	CC2-	FG to Camera	Trigger
24:	CC3+	FG to Camera	
25:	CC4 -	FG to Camera	
26:	PoCL +12	-	

NOTICE

For Camera Link™ - Medium configuration use A + B,
for Base configuration use A (framerate will be reduced)

3.2.4 Camera Link™ Connector



Camera Link™ Connector B

Specification	
Type	26 Pin connector MDR female
Mating Connector	3M
Part-Nr. connector	10126-6000EL
Part-Nr. hood	10326-A200-00
Operating Mode	Camera Link™ Medium configuration

Pinout B

Pin	Signal Name	Direction	Signal Description
1 :	PoCL +12	-	
2:	Y0-	Camera to FG	Data
3:	Y1-	Camera to FG	Data
4:	Y2-	Camera to FG	Data
5:	Yclk-	Camera to FG	Transmitter Clock
6:	Y3-	Camera to FG	Data
7:	100 Ω	FG to Camera	Camera Control
8:	Z0-	Camera to FG	Data
9:	Z1-	FG to Camera	Data
10:	Z2+	FG to Camera	Data
11:	Zclk-	FG to Camera	Transmitter Clock
12:	Z3-	FG to Camera	Data
13:	PoCL GND	-	
14:	PoCL GND	-	
15:	Y0+	Camera to FG	Data
16:	Y1+	Camera to FG	Data
17:	Y2+	Camera to FG	Data
18:	Yclk+	Camera to FG	Transmitter Clock
19:	Y3+	Camera to FG	Data
20:	100 Ω	FG to Camera	Camera Control (Serial Data)
21:	Z0+	Camera to FG	Data
22:	Z1+	FG to Camera	Data
23:	Z2-	FG to Camera	Data
24:	Zclk+	FG to Camera	Transmitter Clock
25:	Z3+ -	FG to Camera	Data
26:	PoCL +12	-	

NOTICE

If you want to use Power over Camera Link™ with evo8050, Medium configuration is required (use Connector A + B)

4 Software Control

4.1 ConvCam 4

What is ConvCam?

SVS-VISTEK supplies you with a Convenient Camera software control tool (called ConvCam) that allows you to control and set all parameters of the camera like; trigger mode, gain, offset, exposure, binning, etc. To do this, ConvCam creates a communcation path over the RS-232 serial port of your frame grabber.

Requirements

Operating System: XP, Windows 7, 32- or 64-bit. There are two versions of the "ConvCam4.exe" and "ConvCam40DLL.dll" files available supporting 32- or 64-bit applications.

32 or 64 bit?

NOTICE

In order to choose the correct version of the software (32- or 64-bit) you have to ensure that the entire system, including the frame grabber and any application software used, is compatible for the bit-count you want to use.

NOTICE

To get ConvCam 4.0 use ConvCam CD or contact your local support. ConvCam 3.0 does not work with new EVO cameras.

4.2 Installation of ConvCam

PRELIMINARY

The installation files for 64 bit applications are in the zipped folder "ConvCam4Setup64Vx.x", the files for 32 bit applications are in "ConvCam4Setup32Vx.x"

The 64 bit version runs only on 64 bit Windows. The 32 bit version is installable on 32 and 64 bit Windows. Which version is suitable depends on your application which makes use of the ConvCam installation.

64 bit applications (grabber etc.) need the 64 bit ConvCam version, 32 bit applications (grabber etc.) need the 32 bit ConvCam version.

Both versions of "ConvCam4.exe" depend on .NET framework 4.0 which is included in the installation files and has to be installed.

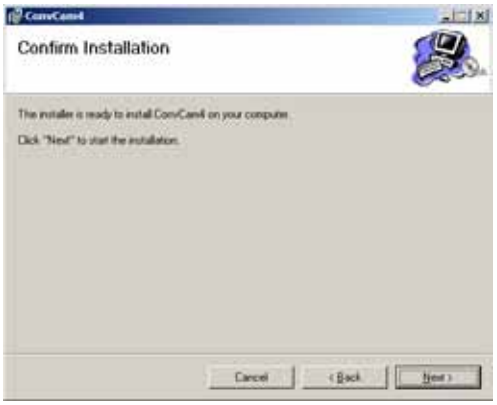
How to install ConvCam (make sure "DotNet" is installed or install it)

- Insert the Installation CD in PC's drive.
- Copy the correct bit-version (32 or 64) to the harddrive.
- Unzip the file.
- In the created folder will be the folder "DotNetFX40" and inside this folder the file "DotNetFX40_Full_x86_x64.exe". Double click to install "DotNet"
- After "DotNet" is installed then the installation of ConvCam can be started by double clicking on the file "ConvCam4Setup.msi".

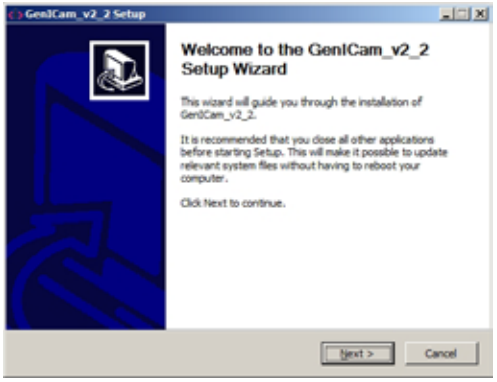
click on "Next"

select a folder, then click on “Next”

Click “Next” to start the installation



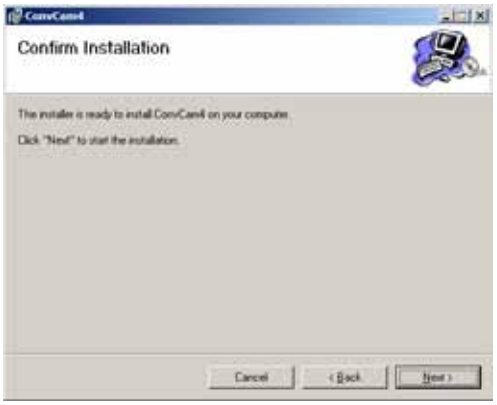
Confirm the installation of GenICam by click on “NEXT”



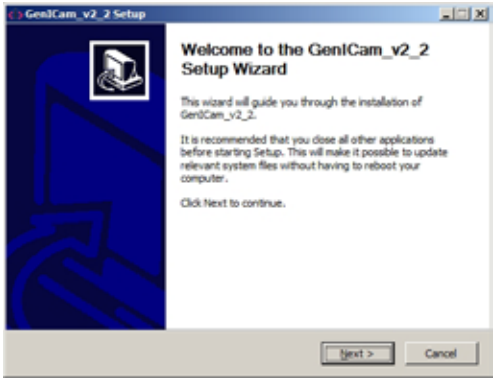
Confirm the GenICam License by click on “I Agree”

select a folder, then click on “Next”

Click “Next” to start the installation

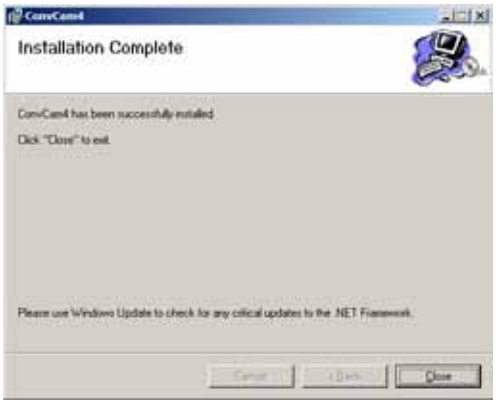


Confirm the installation of GenICam by click on “NEXT”



Confirm the GenICam License by click on “I Agree”

Installation is now complete, click on “Close”



ConvCam is installed, you now will find the ConvCam Icon on your desktop:

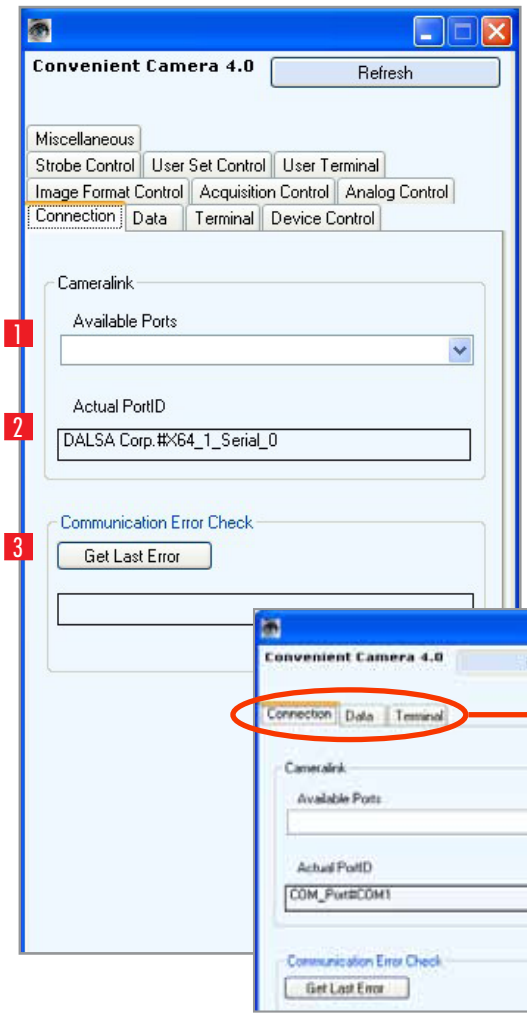
Double-click on Icon to start the program.

The “Connection” Folder
Here you can establish the communication between the camera and the ConvCam4.exe application

1 “Available Ports”:
With this combo box you can select camera link ports of your installed frame grabbers or serial ports like “COM1”,”COM2” (COM-Ports for testing purposes only)

2 “Actual PortID”:
Shows the actual selected framegrabber port. (Manufacturer#GrabberID#PortNumber)

3 “Communication Error Check”:
A Click on the button “Get Last Error” shows the last occurred communication error



If ConvCam does not detect any camera, only three tabs will be shown

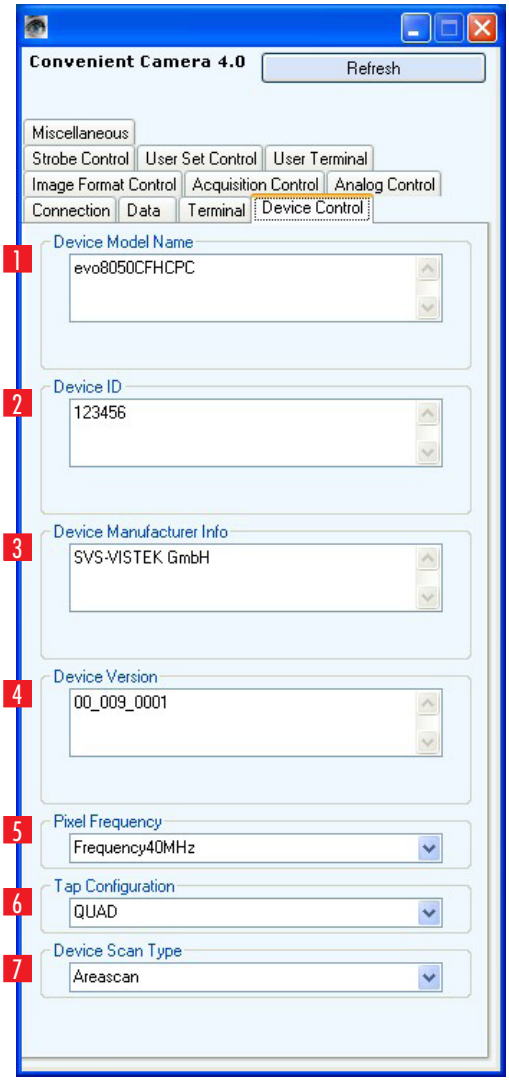
The "Device Control" Folder

1 **"Device Model Name":** Camera type name
2 **"Device ID":** Serial No.
3 **"Device Manufacturer Info":** Our company
4 **"Device Version":** Version no. of camera firmware

5 **"Pixel Frequency":**
Different pixel frequencies are selectable
Changing the pixel frequency affects the maximum frame rate, power consumption and signal to noise ratio of the camera:
Higher frequency -> higher max. frame rate -> lower S/N ratio. Lower frequency -> lower max. frame rate -> higher S/N ratio

6 **"Tap Configuration":**
Different output tap configurations are selectable
QUAD: all 4 taps are active
The frame is divided in 4 quarters, highest max. frame rate.
DUAL_X: 2 taps (one at the left and one at the right side of the sensor) are active. The frame is divided in a left and right part.
(max. frame rate is reduced to less than a half of QUAD-type frame rate)
DUAL_Y: 2 taps (one at the top and one at the bottom side of the sensor) are active. The frame is divided in an upper and lower part.
(max. frame rate is reduced to a half of QUAD-type frame rate)
SINGLE: only 1 tap is active. The frame is not divided (no tap balance required, max. frame rate is less than a quarter of QUAD-type frame rate

7 **"Device Scan Type:"** always area scan



The "Acquisition Control" Folder

1 **"Acquisition Mode":** Select one of the five acquisition modes of the camera: None, Continuous, Software Triggered, Triggered with Internal Exposure Control, Triggered with External (pulse width driven) Exposure Control

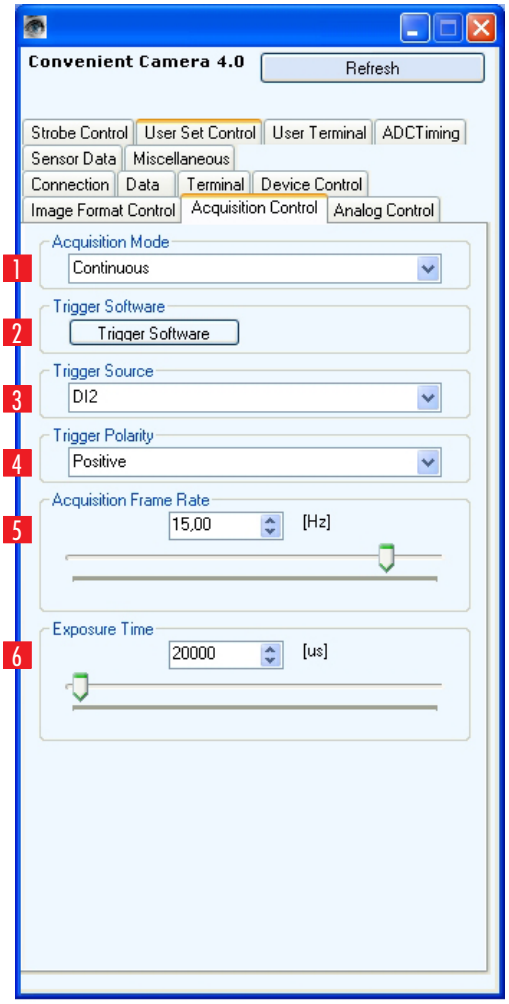
2 **"Trigger Software":** Will read one image only if camera is set to "Trigger Software".

3 **"Trigger Source":** Select the port of the hardware trigger input.
"CC1","CC2": LVDS input driven from frame grabber via camera link cable
"DI1","DI2": Single ended inputs on 12pin Hirose connector (see manual).

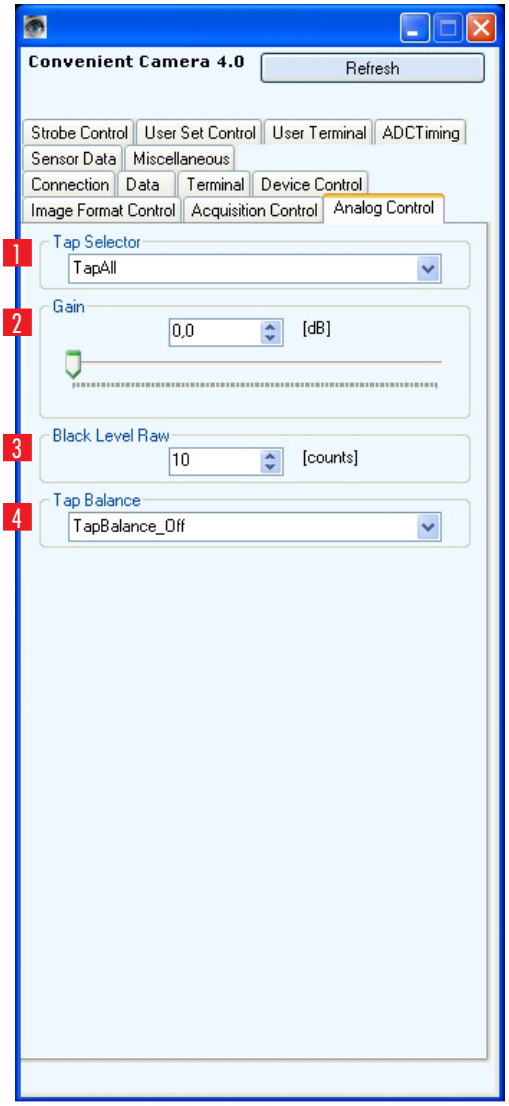
4 **"Trigger Polarity":** Select the polarity of the hardware trigger input:
"positive" or "negative"

5 **"Acquisition Frame Rate":** In "continuous" mode (default ex factory) you can adjust the framerate.

6 **Exposure time":** the exposure time can be set in µsec. The min exposure time is e.g. 20 µsec (depending on the camera type and speed). The longest is e.g. 1 second. Due to the internal timing of the camera the program will adjust the values to the appropriate value



The "Analog Control" Folder



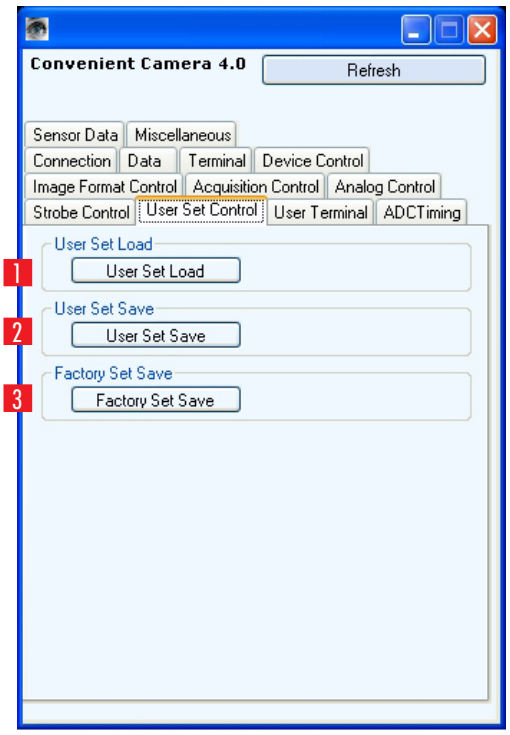
1 "Tap Selector":
Select the tap for the "Gain" and "Black Level" configuration:
"TapAll": gain and black level can be configured for all taps simultaneously.
"Tap0","Tap1","Tap2","Tap3": gain and black level can be adjusted for only one tap, useful for manual tap balancing.

2 "Gain":
Gain can be configured for the selected tap (see above).
The default gain setting is 0.0 dB (factor 1.0). You may change the gain up to 18.0 dB (factor 8.0) in steps of 1/10th dB. Note that the dynamic range will not be improved! For good image quality do not set gain to more than 6.0dB (factor 2.0), because the noise is also amplified.

3 "Black Level Raw":
Black level offset adjustment is possible for the selected tap (see above). Please note that factory adjustment is optimized for S/N ratio and sensitivity at gain 0 dB. You may lose dynamic range if the black level is set to high or to low.

4 "Tap Balance":
Select the tap balance operation:
"TapBalance_Off": no tap balance operation
"TapBalance_Once": taps are balanced until they match, then operation stops. The configuration is kept until camera is switched off
"TapBalance_Continuous": taps are balanced permanently during image acquisition.
"TapBalance_Reset": balancing of the taps is reset to factory default values.

The "UserSet Control" Folder



1 "User Set Load"
If you have troubles during configuration, you can reset the camera to the last saved configuration clicking this button. Click on "Refresh" button afterwards to update the user interface (you could also switch camera power off and on and then click on "Refresh" button).

2 "User Set Save"
If you have configured your camera successfully you can save the actual configuration in the EEPROM of the camera. Every time the camera is connected to power it will start with this configuration. Ensure that your camera is running correctly before you click this button!

3 "Factory Set Save"
This saves the factory default values to EEPROM. The button is only used during first run after production of the camera. Ensure that your camera is running correctly before you click this button!

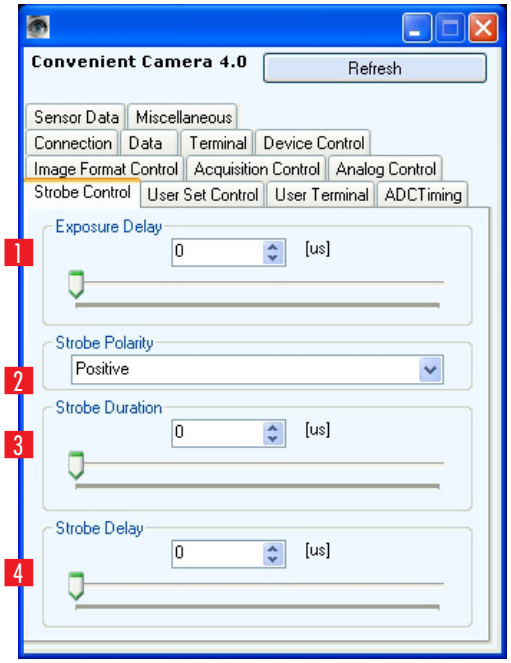
The "Strobe Control" Folder

1 "Exposure Delay"
This numeric value represents the time between the (logical) positive edge of trigger pulse and start of integration time. Unit is 1µs. Default is 0µs.

2 "Strobe Polarity"
Select the polarity of the hardware strobe ouput DO1: "positive" or "negative". Please check the timing diagram in the appendix of this manual.

3 "Strobe Duration"
Exposure time: the exposure time can be set in µsec. The min duration is 1 µsec The longest time is 1 second.

3 "Strobe Delay"
The delay between the (logical) positive edge of trigger pulse and strobe pulse output can be set in µsec. Unit is 1µs. Default is 0µs.



The "Image Format Control" Folder

1 "Size X":
This is a read only value. It represents the amount of valid pixels in one line

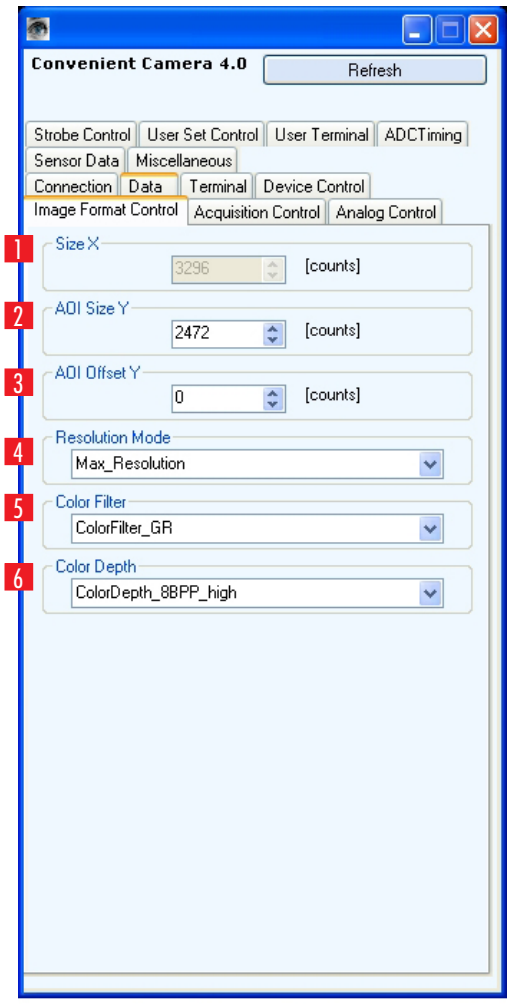
2 "AOI Size Y":
The AOI Size Y can be set to values divisible by 4 The AOI is always centered to the optical axis. Note that you have to change your grabber configuration after changing the resolution! The

3 "AOI Offset Y":
This is a read only value which changes automatically when "AOI Size Y" is altered.

4 "Resolution Mode":
You can choose different resolutions Max_Resolution: no binning(default setting), horizontal x 1, vertical x 1 Binning 2x2: Vertical 2x and Horizontal 2x at the same time: Resolution: horizontal x ½, vertical x ½, Sensitivity is 4x, pixel frequency is halved, max. frame rate is almost doubled. If you need other binning mode configurations consult factory or your nearest distributor. Using binning with a color version of the camera will cause incorrect colors and strange effects! However, for fast focusing it might be useful.

5 "Color Filter":
This is a read only entity. It shows the color sequence of the Bayer RGB pattern at the first two pixels in the first valid line ("GR", "RG", "BG", "BG"). It is "none" for B/W cameras

6 "Color Depth":
The data output format of the camera is configurable: "12BPP": 12-bit per pixel. Bit 13..2 of the ADC 14bit output "8BPP_high": 8-bit per pixel. Bit 13..6 of the ADC output (default) "8BPP_low": 8-bit per pixel. Bit 9..2 of the ADC output data



NOTICE

You have to change the configuration of your Frame Grabber after changing the data output format from 8 to 12 bit or vice versal.

The "Data" Folder

1 **"Save configuration to file"** allows to "Save" different camera configurations and 2 upload them with **"Load"**

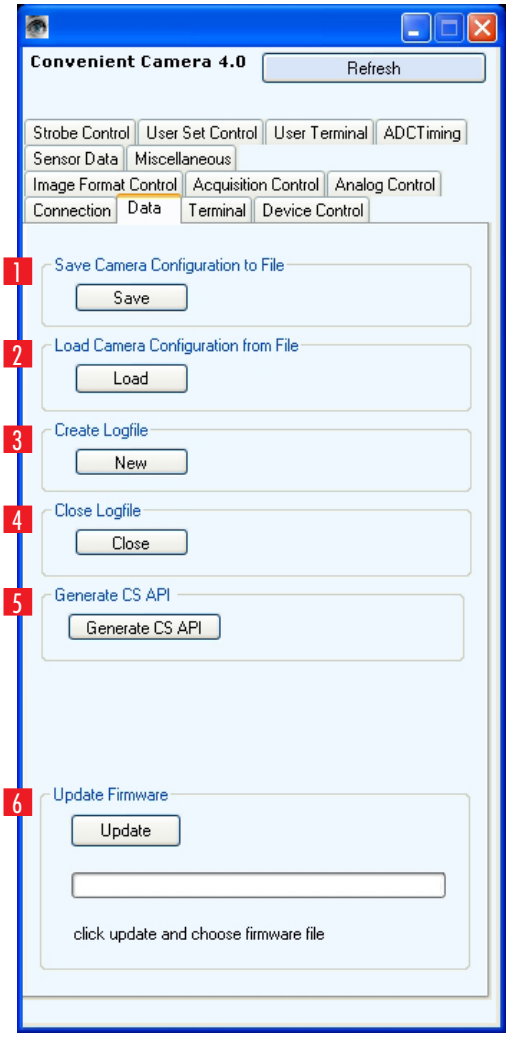
3 **"Create Log file"**
Creates a log file in a directory (e.g. program files/SVS-VISTEK GmbH/convcam4) It stores all changes made to the camera during operation period.

4 **"Close Logfile"**
Stops the command protocol.

5 **"Generate CS API"**
This generates a text file with "C#" source code useful for integrating the "Convcam40DLL.dll" into a customer's application.
A click on this button opens a file dialog where you can select a previous saved configuration file. This file provides as a (camera type specific) basis for the source code.

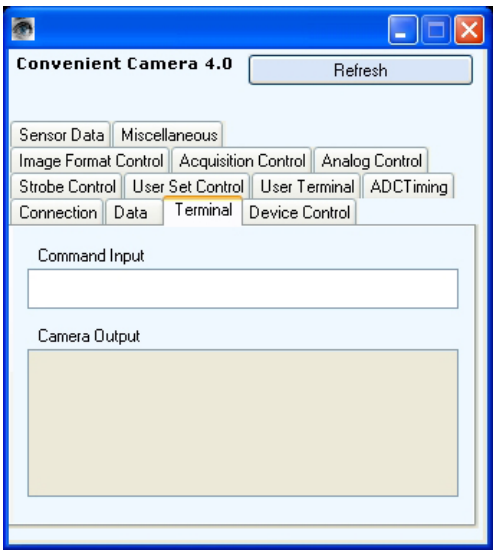
.

6 **"Update Firmware"**
A click on the "Update" button opens a file dialog where you can select a firmware file which is sent to the camera as firmware update. Don't use without contacting SVS-VISTEK support before! Updating with an improper file can damage your camera!



The "Terminal" Folder

In case you want to communicate alpha numeric with the camera via Camera Link.
For further Information contact SVS-VISTEK support.



Protocol

Baudrate: 115 K ,
8 Databit, 1 Stopbit, no parity, no Handshake.
When camera is powered on, the following message will be displayed.:
“SVS4022MTLCPC 48”(or other sensor resp.) “<0x0d,0x0a>”

4.3.17 Note on Camera Link Software DLL

Serial Interface to Camera Link Frame grabbers using Camera Link DLL:

If an interface is made according to the Camera Link standard, then the software does not communicate via the Serial Port of the PC but via the clser*.dll interface.

CameraLink standard 1.0:
The frame grabber uses the interface driver "clser*.dll" defined by the Camera Link 1.0 specification to communicate with the camera.
(The star "*" indicates the specific code of the FG manufacturer)

Camera Link standard 2.0:
The frame grabber uses the generic interface driver "clallserial.dll" defined by the Camera Link 2.0 specification to automatically load the correct frame grabber-specific drivers. If the frame grabber does not support version 2.0, then delete "clallserial.dll" and use version 1.0.

Operation:

- After starting ConvCam simply click "OK" on error message. This is due to not cleared "communication path" of the Serial Port and it must be initiated.
- for Camera Link standard 1.0 only:
  - Click on "Configuration".
  - Open "CamlinkDLL" (File browser will open)
  - Choose sub directory where clser*.dll is located. For example:
    For EURESYS (usually C:\WINNT\system32\), "clseremc.dll" .
- Set COM-Port to the appropriate number ("1 " for the first Camera Link connector , "2" for the second connector a.s.o.).
- Click on "ReadStatus".

If there is still a problem or you would like to receive the **"ConvCam User Guide for Programmers"** please contact SVS-VISTEK.

5 Interfacing and Timing

5.1 Pixel- and Line-Timing

5.1.1 Basic Info: Free Running

Free running with programmable exposure time. Frames are readout permanently and valid data is indicated by LVAL per line and FVAL by frame. There is no need to trigger the camera in order to get data. Exposure time is programmable via serial interface and calculated by the internal logic of the camera. The enclosed software allows the user to set exposure time e.g. from 60 µsec 1Sec (camera type dependent). Frame rate is configurable also (except SVS340xUCP). If the configuration is saved to EEPROM the exposure time and frame rate set stay resident after power off.

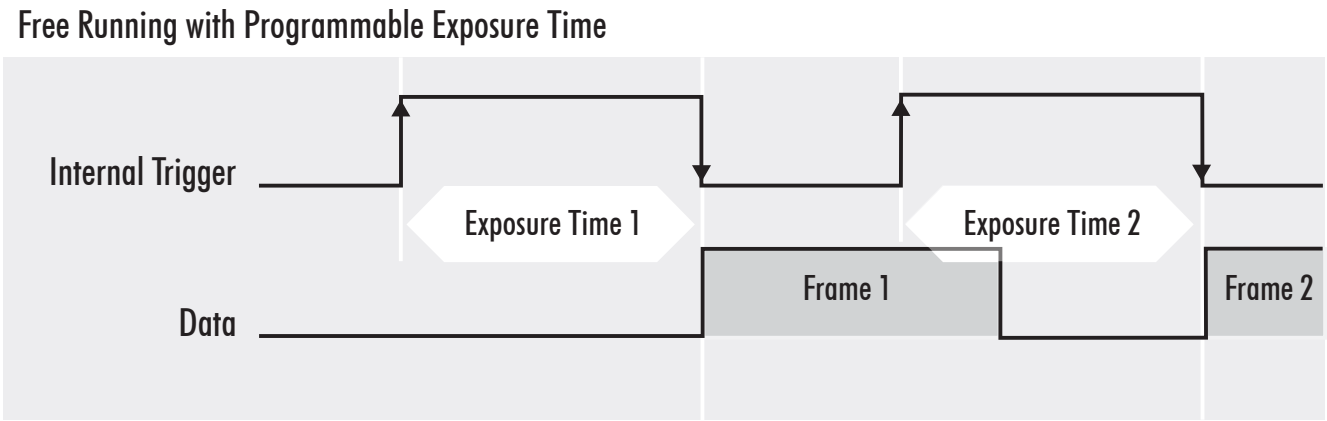


figure 7.1.1: Free Running using Serial Interface

NOTICE

The fundamental signals are:
Line Valid: LVAL,
Frame Valid: FVAL,
and in case of
triggered modes: trigger input.

5.1.2 Basic Info: Triggered Mode (Pulsewidth)

External trigger and pulsewidth controlled exposure time. In this mode the camera is waiting for an external trigger which starts integration and read out. Exposure time can be varied using the length of the trigger pulse (positive edge starts integration time, negative edge starts frame read out / end of integration time). This mode is useful in applications where the light level of the sceen changes during operation and the framegrabber can provide such a signal. Change of exposure time is possible from one frame to the next.

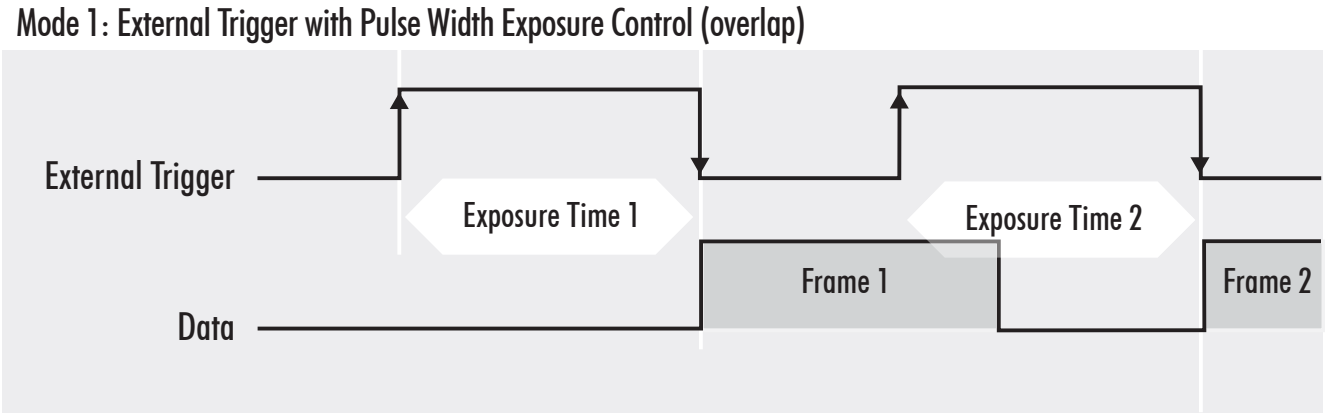


figure 7.1.2a: External Trigger with Pulse Width Exposure Control (overlap)

Exposure time of the next image can overlap with the frame readout of the actual image(positive edge of trigger pulse occurs when FVAL is high). When this happens the start of exposure time is synchronized to the negative edge of the LVAL signal (see figure 7.1.2a)

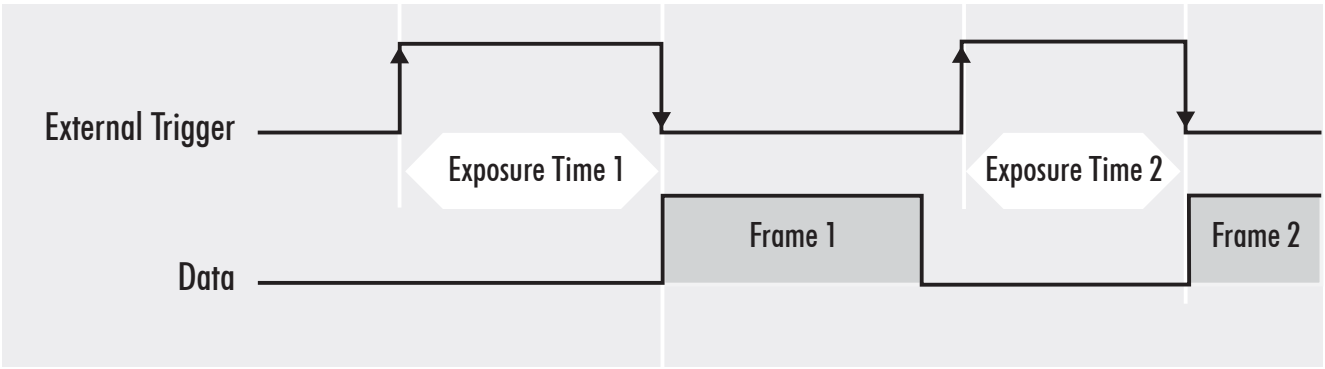


figure 7.1.2b: External Trigger with Pulse Width Exposure Control (non overlap)

When positive edge of trigger signal occurs after frame readout has ended (FVAL is low) the start of exposure time is not synchronized to LVAL and exposure time starts after a short and constant delay (see figure 7.1.2b).

The negative edge of the trigger signal must always occur after readout of the previous frame has ended (FVAL is low)

5.1.3 Basic Info: External Trigger (Exposure Time)

External Trigger with Programmable Exposure Time

External trigger with programmable exposure time. In this mode the camera is waiting for an external trigger which starts integration but exposure time is programmable via serial interface and calculated by the internal microcontroller of the camera.
With each positive transition (going high) the camera will readout a frame.

The enclosed software allows the user to set exposure time e.g. from 60 µsec 1Sec (camera type dependent).

Exposure time of the next image can overlap with the frame readout of the actual image(trigger pulse occurs when FVAL is high). When this happens the start of exposure time is synchronized to the negative edge of the LVAL signal (see figure 7.1.3a)

External Trigger with Programmable Exposure Time (overlap)

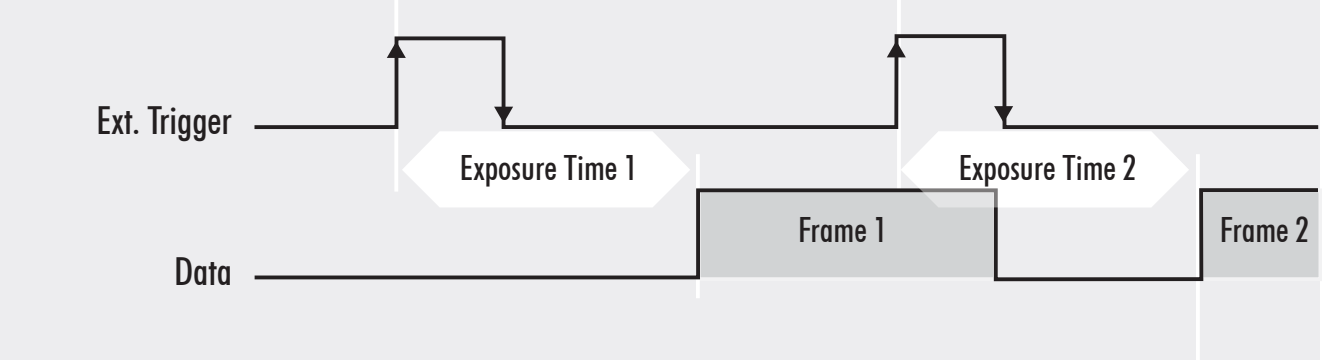


figure 7.1.3.a: External Trigger with Programmable Exposure Time (overlap)

When positive edge of trigger signal occurs after frame readout has ended (FVAL is low) the start of exposure time is not synchronized to LVAL and exposure time starts after a short and constant delay (see figure 7.1.3b).

External Trigger with Programmable Exposure Time (non overlap)

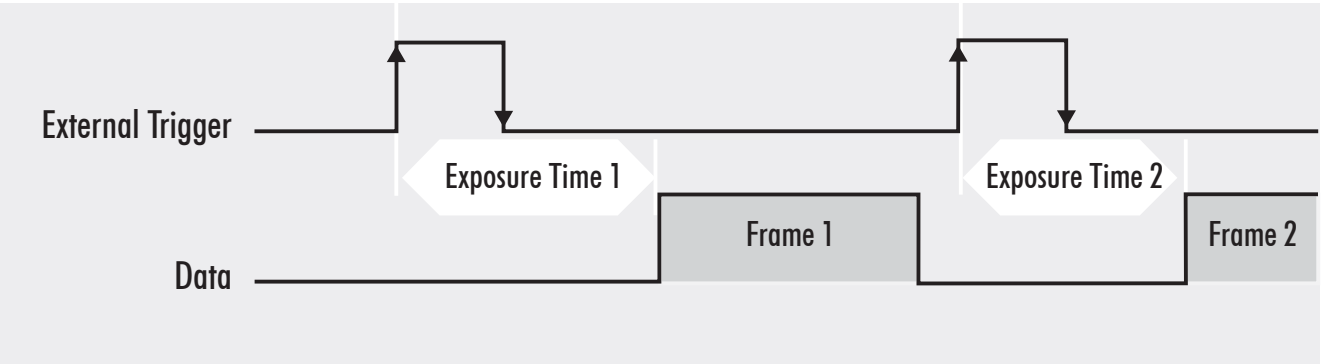
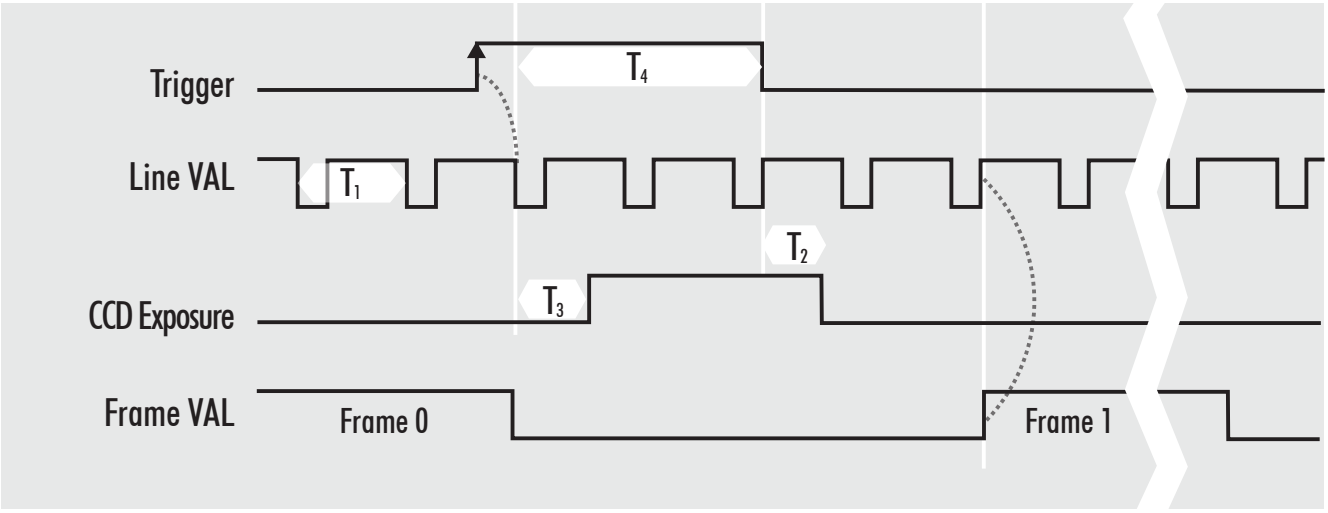


figure 7.1.3.a: External Trigger with Programmable Exposure Time (non overlap)

Exposure time can be changed online during operation. No frame is distorted during switching time. If the configuration is saved to EEPROM the exposure time set stays resident after power off.

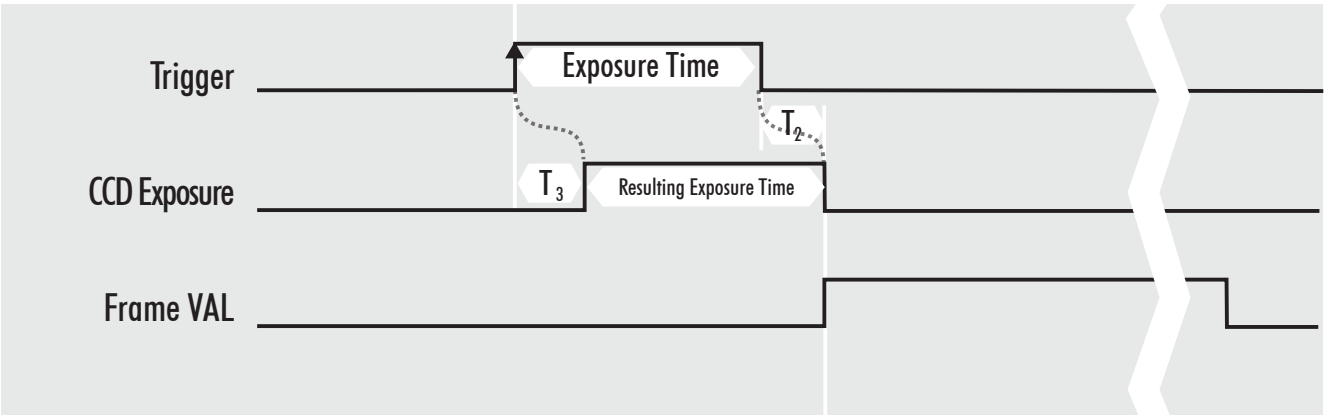
5.1.4 Detailed Info of External Trigger Mode

External Trigger with Pulse Width Exposure Control (overlap)



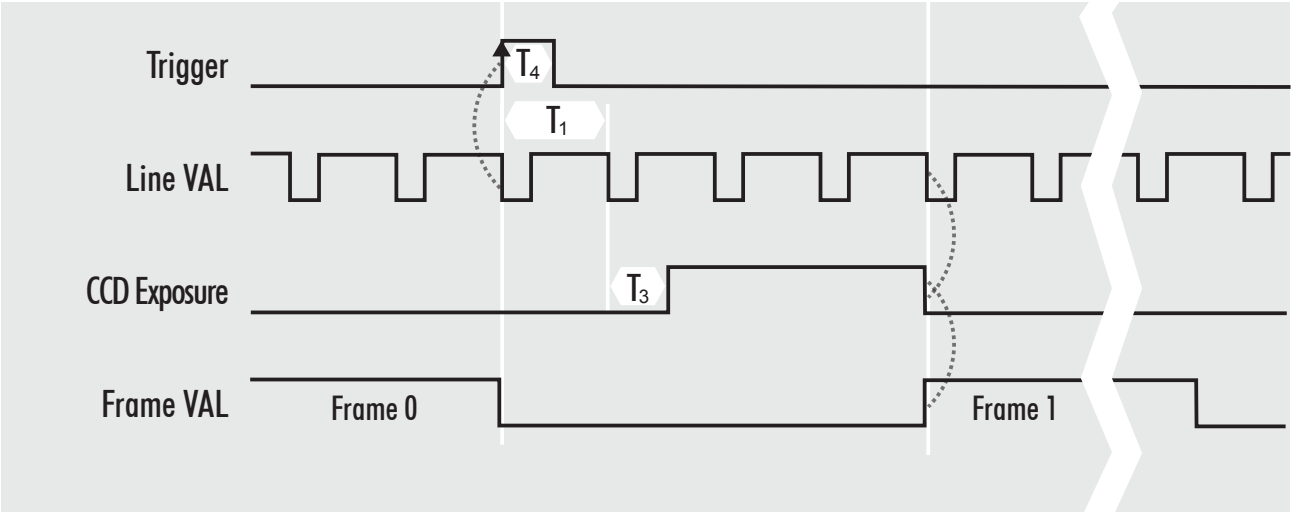
T_1: Line Duration T_2: Transfer Delay T_3: Exposure Delay T_4: min. Trigger Pulse Width

External Trigger with Pulse Width Exposure Control (non overlap)



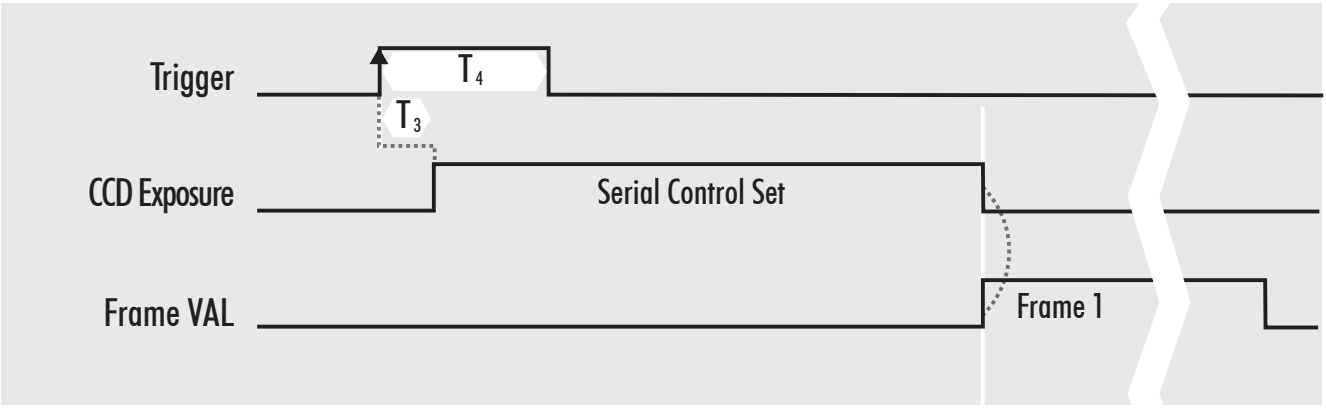
T_1: Line Duration T_2: Transfer Delay T_3: Exposure Delay T_4: min. Trigger Pulse Width

External Trigger with Programmable Exposure Time (overlap)



T_1: Line Duration T_2: Transfer Delay T_3: Exposure Delay T_4: min. Trigger

External Trigger with Programmable Exposure Time (non overlap)



T_1: Line Duration T_2: Transfer Delay T_3: Exposure Delay T_4: min. Trigger Pulse Width

5.1.5 Table of Line Durations, Delays and Pulse Width

Line Durations, Transfer- and Exposure Delays, Pulse Width (@ 40 MHz)

Camera Type	T_1: Line Duration, Quad/DualX Tap [µs]	T_1: Line Duration, DualY/Single Tap [µs]	T_2: Transfer Delay [µs]	T_3: Exposure Delay [µs]	T_4: min. Trigger Pulse Width [µs]
evo1050	17.40	30.95	7.50	1.18	2.00
evo2050	24.30	45.35	7.50	1.00	2.00
evo2150	28.30	53.35	7.50	1.00	2.00
evo4050	33.90	63.95	7.50	1.18	2.00
evo8050	45.90	87.95	9.00	1.18	2.00

Line Durations, Transfer- and Exposure Delays, Pulse Width (@ 64 MHz)

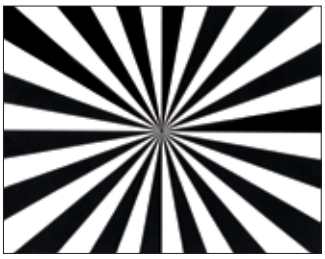
Camera Type	T_1: Line Duration, Quad/DualX Tap [µs]	T_1: Line Duration, DualY/Single Tap [µs]	T_2: Transfer Delay [µs]	T_3: Exposure Delay [µs]	T_4: min. Trigger Pulse Width [µs]
evo1050	10.45	18.92	4.69	0.63	5.50
evo2050	15.14	28.30	4.69	0.63	5.50
evo2150	17.64	33.30	4.69	0.63	5.50
evo4050	21.19	39.97	4.69	0.73	5.83
evo8050	29.88	56.16	9.00	1.02	10.98

6 Basic understanding of CCD Technology

6.1 Read out from CCD

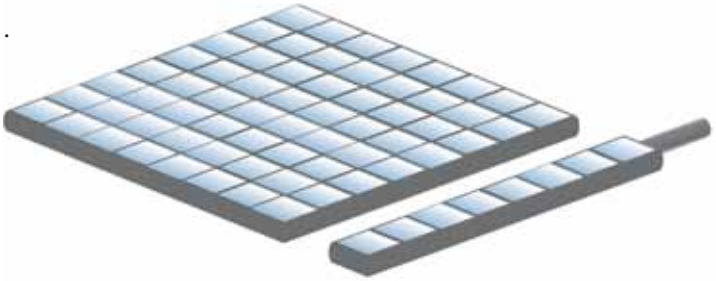
1 Tap Readout of CCD

In a single-tap CCD the read out of the pixel charges takes place in series, pixel for pixel and line by line sequence. The maximum frame rate is determined by the pixel clock frequency and the total number of pixels that are transferred for readout.



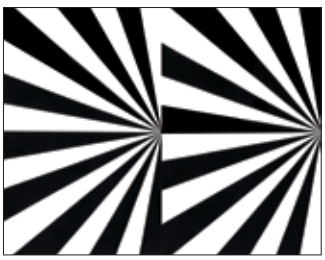
"Single Tap Output"

.

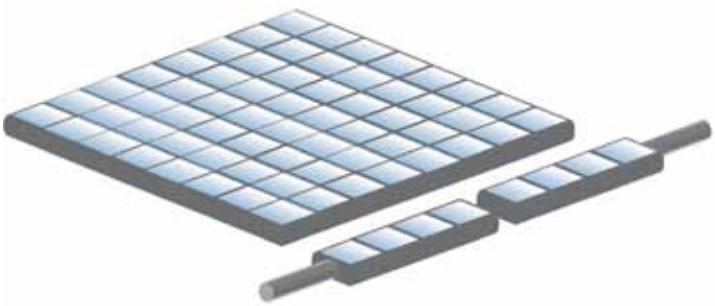


Dual Tap Readout of CCD

In a dual-tap CCD (CCD with two outputs) the read out of the pixel charges takes place in a serial/parallel sequence, where each line is divided in half and the pixels of each half are read out simultaneously in sequence and line by line. For a given pixel clock frequency only half the time is required to read out the entire array resulting in a doubling of the framerate. Due to the sequence of arriving pixel information the frame grabber has to "reconstruct" the pixel information in order to display the image correctly.

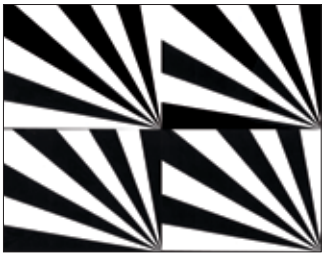


"Dual Tap Output"

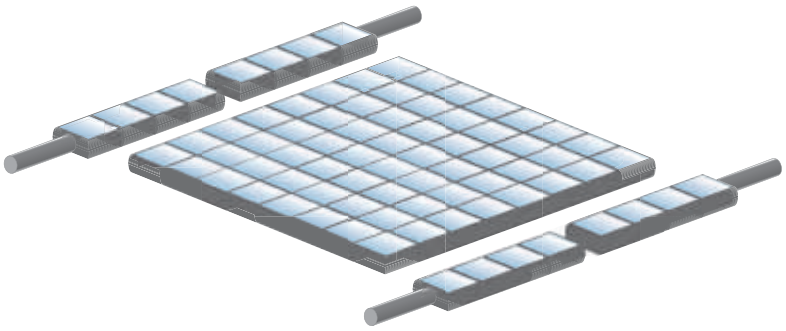


Quad Tap Readout of CCD

In a quad-tap CCD (CCD with four outputs) the read out of the pixel is four times faster than in a "normal" one.



"Quad Tap Output"



Tap Balancing

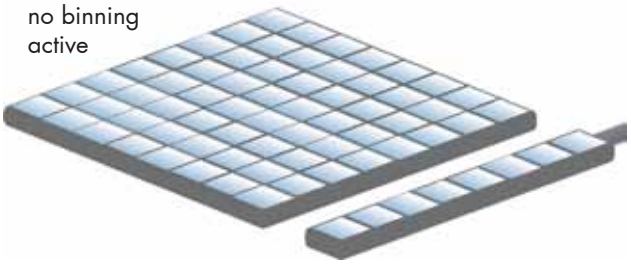
An image generated by a dual-tap CCD can have differing brightness between the two image halves. This is due to the requirement for a dual-ADC circuit to handle the simultaneous digitisation of the two channels of analog signal coming from the CCD. The fact that the two analog output channels not being perfectly linear and the two output amplifiers having physically different slopes leads to the necessity to sometimes manually or automatically. adjust the gain levels of each channel independantly to obtain a homogonous image.

Cameras with a Dual-Tap output can show image halves with different characteristics, eg. different brightness.

6.2 Binning- and Decimation-Modes

All BW-14 Bit cameras support "Vertical Binning" (1/2 vertical resolution). In horizontal direction "Decimation" can be used:

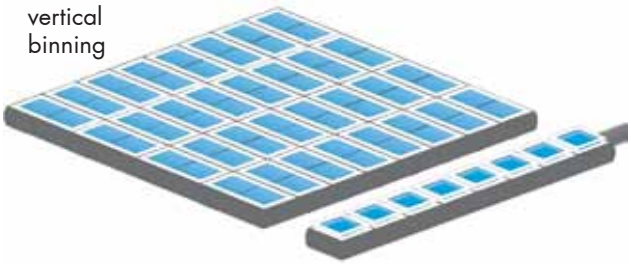
no binning active



The BW camera sends a DVAL signal with 1/2 pixel clock frequency. When DVAL signal is enabled on the grabber only every second pixel in horizontal direction is grabbed.

When vertical binning is enabled on the camera and DVAL signal is enabled on the grabber, the image looks like 2 x binned.

vertical binning

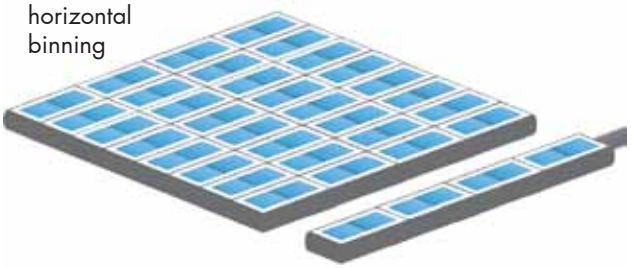


"Decimation Mode" : only evey third line is readout from the sensor and the DVAL signal from the camera masks out 2 of 3 pixels in horizontal direction 1/3 pixel frequency). (not supported by every sensor)

When DVAL signal is enabled on the grabber only every third pixel in horizontal direction is grabbed.

The "Bayer" pattern color information is preserved with 1/3 horizontal and vertical resolution. The frame readout speed increases approx. by factor 2.5.

horizontal binning

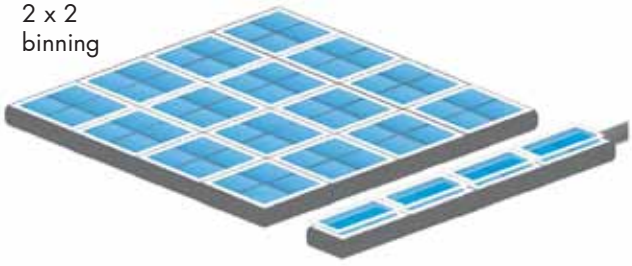


NOTICE

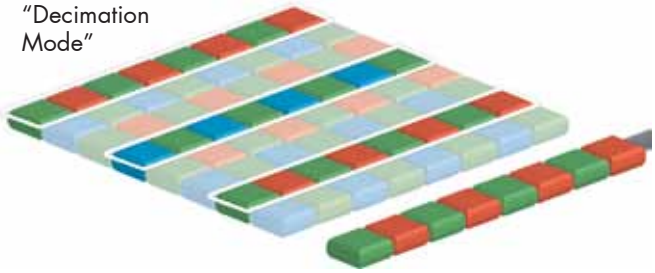
To get the full resolution from 14 Bit Cameras the DVAL signal has to be disabled on the Grabber

3.5.1

2 x 2 binning

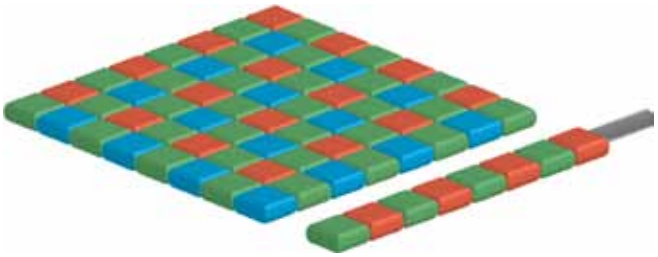


"Decimation Mode"



6.3 Cameras with Color Sensors

Color Pixels are transferred in Series



All color cameras are identical to the black and white versions. The color pixels are transferred in series from the camera, same as the monochrome but to be considered as “raw”

The camera uses a CCD which has a color mosaic filter. This filter is called “Bayer” filter named after the person who invented it. It has a pattern on the lines which alternates as follows:

E.g.: First line: GRGRGR... and so on. (R=red, B=blue, G=green)
Second line: BGBGBG... and so on. Please note that about half of the pixels are green, a quarter red and a quarter blue. This is due to the maximum sensitivity of the human eye at about 550 nm (green).

Because these cameras are single chip cameras it is necessary to use an algorithm which interpolates those colors which are “not known” by the specific pixel. E.g. the red pixel does not have information of green and blue components. This means that the performance of the image depends on the software used.

Please be aware that it is not possible to incorporate the algorithm into the camera so easily. Unlike NTSC/PAL cameras there is no hardware chip available which can do that for such large images. The user has the advantage to alter the colors depending on his needs. Thus the color image must be processed in the PC. A color source code is available on request.

NOTICE

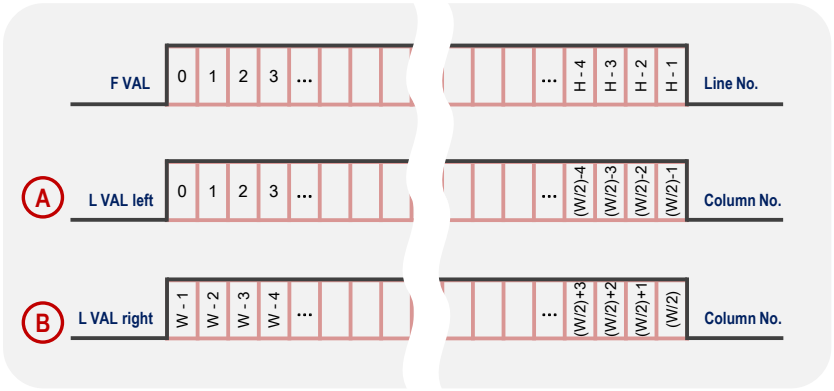
It is recommended to use a IR cut filter all times for color applications!

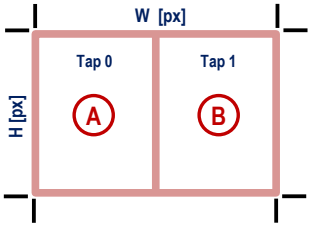
6.4 Tap Geometry

Dual Operation (2 Tap)

2XE-1Y (GEN<i>CAM)

Tap geometry





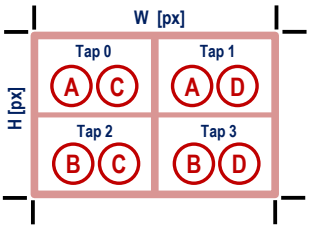
NOTICE

To switch from Quad to Dual or Single Tap see page 22: The „Device Control" Folder / Tap Configuration

Quad Operation (4 Tap)

2XE-2Y (GEN<i>CAM)

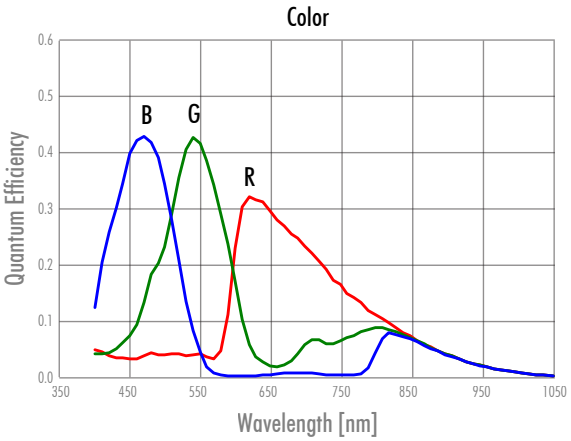
Tap geometry



7 Specifications

7.1 Basic Specifications

7.1.1 evo1050CFHCPC



Basic electro-optic specifications

evo1050CFHCPC

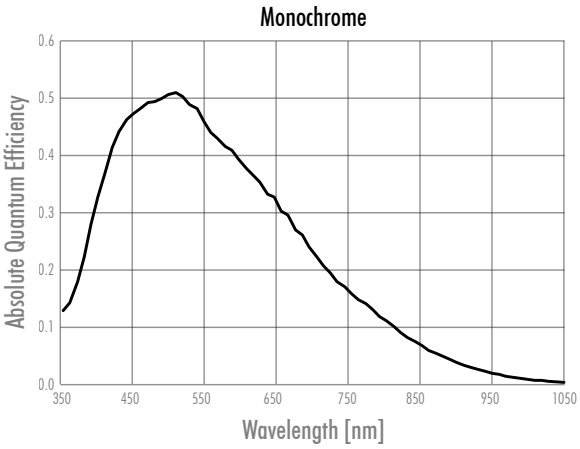
Camera	evo1050CFHCPC
Chroma	bayer (RGB)
Resolution Active [Pixel]	1024 x 1024
Framerate [fps]	180
Sensor	KAI-01050-C
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	5.64 x 5.64
Sensor Diagonal [mm]	8
CCD Size Equivalent [inch]	1/2
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	5
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	6
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1

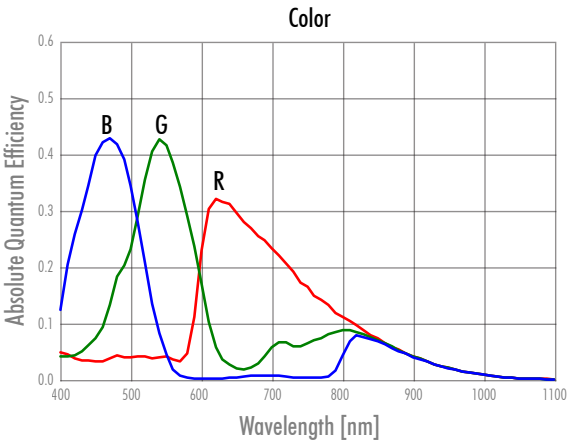
7.1.2 evo1050MFHCPC

Basic electro-optic specifications

evo1050MFHCPC

Camera	evo1050MFHCPC
Chroma	mono
Resolution Active [Pixel]	1024 x 1024
Framerate [fps]	180
Sensor	KAI-01050-A
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	5.64 x 5.64
Sensor Diagonal [mm]	8
CCD Size Equivalent [inch]	1/2
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	5
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	6
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1





7.1.3 evo2050CFHCPC

Basic electro-optic specifications

evo2050CFHCPC

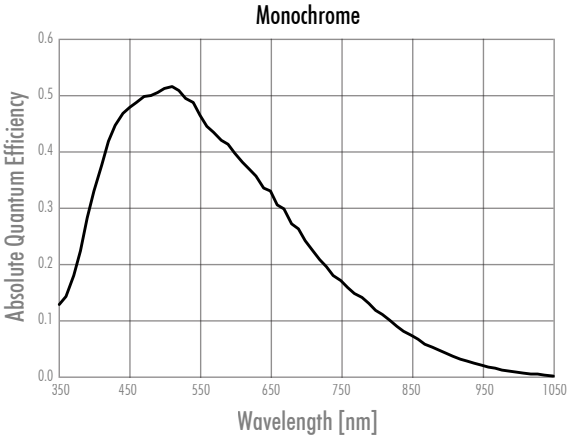
Camera	evo2050CFHCPC
Chroma	bayer (RGB)
Resolution Active [Pixel]	1600 x 1200
Framerate [fps]	106
Sensor	KAI-02050-C
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	8.8 x 6.6
Sensor Diagonal [mm]	11
CCD Size Equivalent [inch]	2/3
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	5
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	6
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1

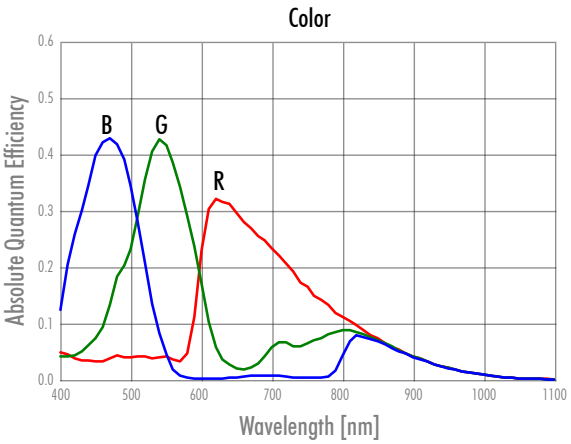
7.1.4 evo2050MFHCPC

Basic electro-optic specifications

evo2050MFHCPC

Camera	evo2050MFHCPC
Chroma	mono
Resolution Active [Pixel]	1600 x 1200
Framerate [fps]	106
Sensor	KAI-02050-A
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	8.8 x 6.6
Sensor Diagonal [mm]	11
CCD Size Equivalent [inch]	2/3
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	5
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	6
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1



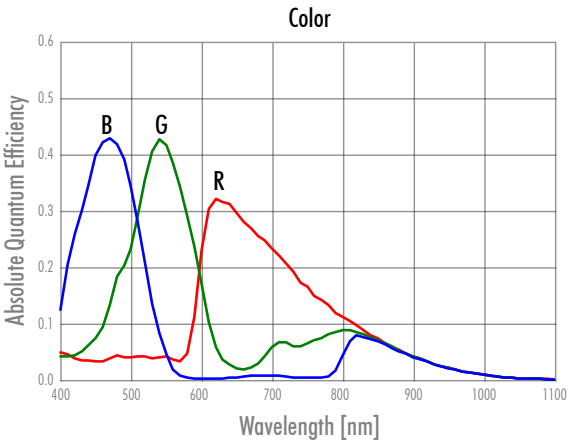


7.1.5 evo2150CFHCPC

Basic electro-optic specifications

evo2150CFHCPC

Camera	evo2150CFHCPC
Chroma	bayer (RGB)
Resolution Active [Pixel]	1920 x 1080
Framerate [fps]	100
Sensor	KAI-02150-C
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	10.56 x 5.94
Sensor Diagonal [mm]	12.1
CCD Size Equivalent [inch]	2/3
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	5
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	6
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1

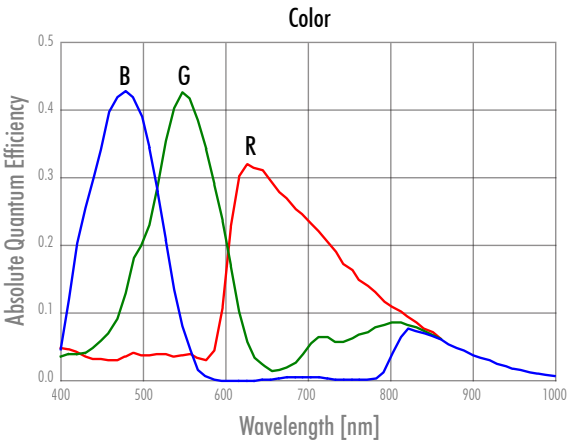


7.1.6 evo2150MFHCPC

Basic electro-optic specifications

evo2150MFHCPC

Camera	evo2150MFHCPC
Chroma	bayer (RGB)
Resolution Active [Pixel]	1920 x 1080
Framerate [fps]	100
Sensor	KAI-02150-C
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	10.56 x 5.94
Sensor Diagonal [mm]	12.1
CCD Size Equivalent [inch]	2/3
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	12
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	6
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1

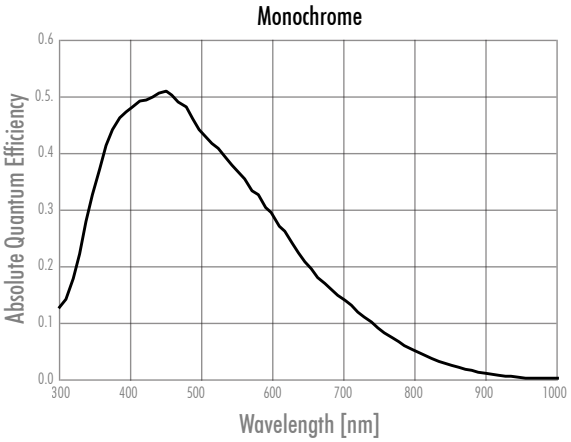


7.1.7 evo4050CFHCPC

Basic electro-optic specifications

evo4050CFHCPC

Camera	evo4050CFHCPC
Chroma	bayer (RGB)
Resolution Active [Pixel]	2336 x 1752
Framerate [fps]	52
Sensor	KAI-04050-C
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	12.85 x 9.64
Sensor Diagonal [mm]	16.1
CCD Size Equivalent [inch]	1
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	6
Exposure Time max. [µs]	1
SNR [dB]	18
SNR [bit]	3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	8
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1

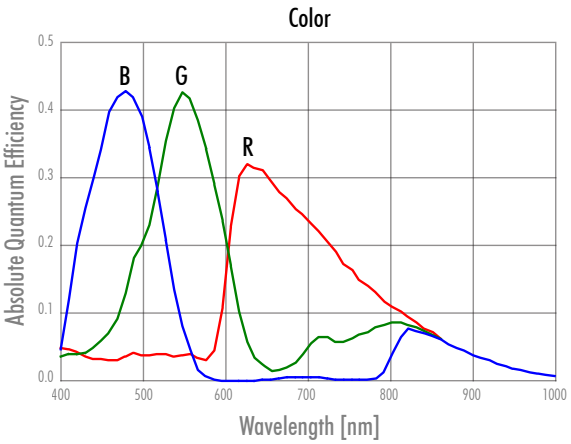


7.1.8 evo4050MFHCPC

Basic electro-optic specifications

evo4050MFHCPC

Camera	evo4050MFHCPC
Chroma	mono
Resolution Active [Pixel]	2336 x 1752
Framerate [fps]	52
Sensor	KAI-04050-A
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	12.85 x 9.64
Sensor Diagonal [mm]	16.1
CCD Size Equivalent [inch]	1
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	6
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	8
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1



7.1.9 evo8050CFHCPC

Basic electro-optic specifications

evo8050CFHCPC

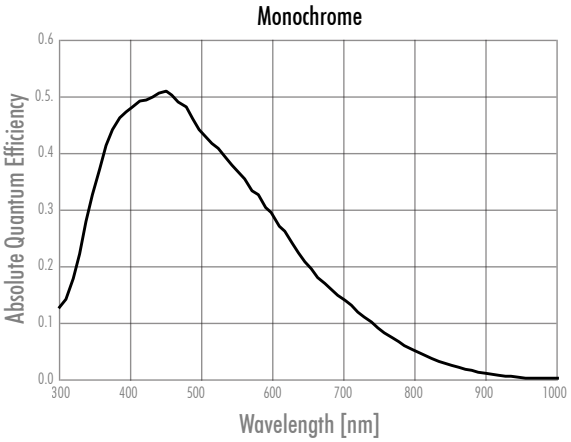
Camera	evo8050CFHCPC
Chroma	bayer (RGB)
Resolution Active [Pixel]	3296 x 2472
Framerate [fps]	26.8
Sensor	KAI-08050-C
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	18.13 x 13.6
Sensor Diagonal [mm]	22.7
CCD Size Equivalent [inch]	4/3
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	11
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	8
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1

7.1.10 evo8050MFHCPC

Basic electro-optic specifications

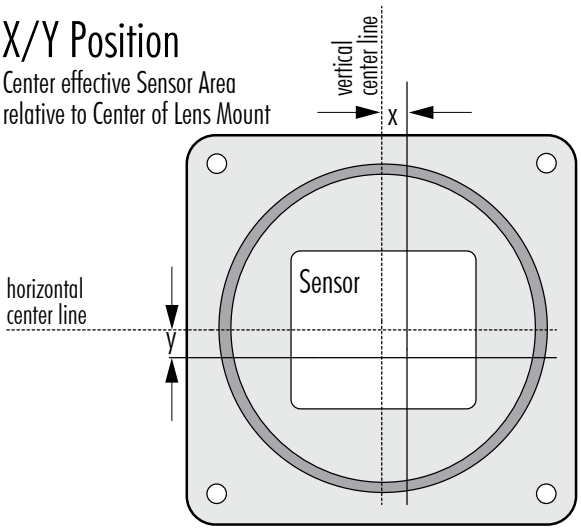
evo8050MFHCPC

Camera	evo8050MFHCPC
Chroma	mono
Resolution Active [Pixel]	3296 x 2472
Framerate [fps]	26.8
Sensor	KAI-08050-A
Sensor Vendor	Truesense Imaging (Kodak)
Type	CCD
Sensor Size H x V [mm]	18.13 x 13.6
Sensor Diagonal [mm]	22.7
CCD Size Equivalent [inch]	4/3
Pixel Size H x V [µm]	5.5 x 5.5
Exposure Time min. [µs]	11
Exposure Time max. [µs]	1
SNR [dB]	62
SNR [bit]	10.3
A/D Converter [bit]	14
Gain [dB]	0- 18db (manual)
Interface Type	
Max. Pixel Clock [MHz]	6425
Video Format	RAW8 / RAW12
Internal Memory	64
White Balance	-
Binning	Binning 2x2
AOI	yes
Lens Mount	C-Mount
Power Supply [VDC]	10 - 25
Power Consumption [W]	8
Dimensions (WxHxD) [mm]	50x50x46.7
Weight [g]	150
Readout Type	progressive scan
IO Output	
IO Output RS-422	1
IO Output RS-232	1
IO Input	2 x 24V
IO Input RS-422	1
IO Input RS-232	1



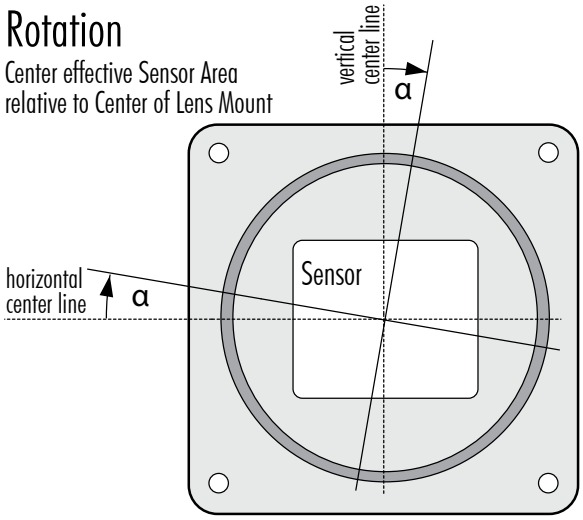
X/Y Position

Center effective Sensor Area
relative to Center of Lens Mount



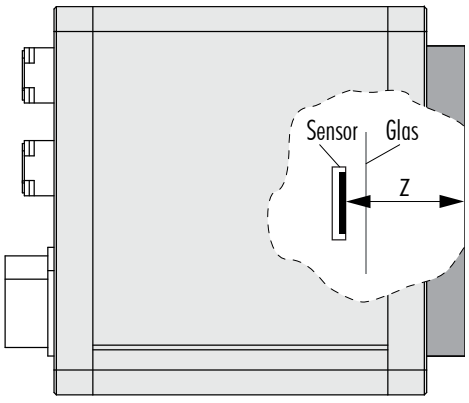
Rotation

Center effective Sensor Area
relative to Center of Lens Mount



Back Focus

Effective Image Plane
relative to Lens Mounting Flange



Flange Focal Distance [mm]
(Sensor Glas is Optical Corrected)

- C-Mount: 17.526
- M42x1-Mount: 11.48

7.2 Sensor Alignment Specification

Camera Type	+/- X / Y $_{M,typ}$ [mm]*	+/- max. Rotation [°]*	+/- Z $_{M,typ}$ [mm]**
evo1050	0.15	0.5	0.02
evo2050	0.15	0.5	0.02
evo2150	0.15	0.5	0.02
evo4050	0.15	0.5	0.02
evo8050	0.15	0.5	0.02
* Relative to center of lens mount			
** Relative to lens mounting flange			

8 Troubleshooting

8.1 FAQ

Troubleshooting

Problem	Solution
Camera does not respond to light.	Check if camera is in Freerunning with serial exposure ctrl . When done, check with the program “Convenient Cam“ if you can read back any data from the camera like “Mode“, “type“ of CCD, exposure time settings and so on. If “Mode Freerunning“ works properly, check the signals of the camera in the desired operation mode. In these modes check if the Trigger signal is present. Please note that a TTL signal must be fed to the trigger connector if it does not come from the framegrabber (LVDS type). The typical signal swing must be about 5 V. Below such level the drivers in the camera will not work. If you use a TTL level signal fed to the “TB 5 connector“ check the quality and swing. If these signals are not there or don’t have the right quality, the camera can not read out any frame. Beware of spikes on the signal.
Image is present but distorted.	Check the camera configuration file of your framegrabber. Check number of “front- and back porch“ pixel. Wrong numbers in configuration file can cause sync problems. Check if your frame grabber can work with the data rate of the camera.
Image of a color version camera looks strange or false color appear.	If the raw image looks OK, check the camera file to see if the pixels need to be shifted by either one pixel or one line. The image depends on the algorithm used. If the algorithm is starting with the wrong pixel such effects appear.
Colors of a color version are not perfect – especially when using halogen light.	Halogen light contains strong portions of IR radiation. Use cut-off filters at around 730 nm like “Schott KG 3“ to prevent IR radiation reaching the CCD.
No serial communication is possible between the camera and the PC.	Use “load camera DLL” and try again.

Please fax this form to your local distributor. The right Fax number you can find on our homepage: http://www.svs-vistek.com/company/distributors/distributors.php

8.2 Support Request Form / Check List

Sender: _____

Firm: _____

Tel.: _____

Fax: _____

Mail: _____

Dear valued customer,

In order to help you with your camera and any interfacing problems we request that you fill in a description of your problems when you use the camera. Please fax or email this form to the dealer/distributor from which you purchased the product.

Operating System used (e.g. Win 7, XP): _____

Which Camera are you using?

Type (e.g.: svs3625MTHCPC): _____

Serial Number: _____

Which Accessories are you using?

Power Supply: _____

Cable: _____

Lens Type and Focal Length: _____

Firmware

No. of Version: _____

Operation Mode: _____

Please send a screenshot of "ConvCam" screen or log file (3.0 or later).

In case of EURESYS Grabber:

Brand and Type: _____

Driver Version: _____

If Patch please specify: _____

Camera file used: _____

Short Description of Problem

(e.g. missing lines, noisy image, missing bits etc.): _____

_____

_____

_____

_____

_____

9 Terms of warranty

Standard Products Warranty and Adjustment

Seller warrants that the article to be delivered under this order will be free from defects in material and workmanship under normal use and service for a period of **2 years** from date of shipment. The liability of Seller under this warranty is limited solely to replacing or repairing or issuing credit (at the discretion of Seller) for such products that become defective during the warranty period. In order to permit Seller to properly administer this warranty, Buyer shall notify Seller promptly in writing of any claims,; provide Seller with an opportunity to inspect and test the products claimed to be detective. Such inspection may be on customer's premises or Seller may request return of such products at customer's expense. Such expense will subsequently be reimbursed to customer if the product is found to be defective and Buyer shall not return any product without prior return authorization from Seller. If a returned product is found to be out of warranty or found to be within the applicable specification, Buyer will have to pay an evaluation and handling charge, independent of possible repair and/or replacement costs. Seller will notify Buyer of the amount of said evaluation and handling charges at the time the return authorization is issued. Seller will inform Buyer of related repair and/or replacement costs and request authorization before incurring such costs. Buyer shall identify all returned material with Sellers invoice number, under which material has been received. If more than one invoice applies, material has to be clearly segregated and identified by applicable invoice numbers. Adjustment is contingent upon Sellers examination of product, disclosing that apparent defects have not been caused by misuse, abuse, improper installation of application, repair, alteration, accident or negligence in use, storage, transportation or handling. In no event shall Seller be liable to Buyer for loss of profits, loss of use, or damages of any kind based upon a claim for breach of warranty.

Development Product Warranty

Developmental products of Seller are warranted to be free from defects in materials and workmanship and to meet the applicable preliminary specification only at the time of receipt by Buyer and for no longer period of time in all other respects the warranties made above apply to development products. The aforementioned provisions do not extend the original warranty period of any article which has been repaired or replaced by Seller.

Do not break Warranty Label

If warranty label of camera is broken warranty is void.

Seller makes no other warranties express or implied, and specifically, seller makes no warranty of merchantability of fitness for particular purpose.

What to do in case of Malfunction

Please contact your local distributor first.

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Scale your vision.