allPIXA SWIR GigE Camera | Manual

CD40199

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1 General information

1.1 About Chromasens

The name of our company, Chromasens, is a combination of 'Chroma' which means color, and 'Sens' which stands for sensor technology.

Chromasens designs, develops, and produces high-quality and user-friendly products:

- Line scan cameras
- Camera systems
- Camera illumination systems
- Image acquisition systems
- Image processing solutions

Today, Chromasens GmbH is experiencing steady growth and is continually penetrating new sales markets around the globe. The company's technologies are used, for example, in products and for applications such as book and document scanners, sorting systems and inspection systems for quality assurance monitoring.

Customers from all over the world of a wide range of industrial sectors have placed their trust in the experience of Chromasens in the field of industrial image processing.

1.1.1 Contact information

Chromasens GmbH
Max-Stromeyer-Str. 116
78467 Konstanz
Germany

Phone: +49 (0) 7531 / 876-500
Fax: +49 (0) 7531 / 876-303

Email: support@chromasens.de
HP: https://www.chromasens.de/

1.1.2 Support

Should you ever have problems with the allPIXA SWIR camera that you cannot solve by yourself, look into this manual for additional information, check the troubleshooting chapter 10, contact your local distributor, or send us an e-mail.

Chromasens GmbH
Max-Stromeyer-Str. 116
78467 Konstanz
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Email: support@chromasens.de
HP: https://chromasens.de/support

Visit our website at https://www.chromasens.de which features detailed information on our company and products.

1.2 Firmware version and references

This document refers to the following firmware and document versions:

- allPIXA SWIR GigE Camera Firmware Package Version 1.3.0
- Features Reference for allPIXA SWIR Camera XML Version 4.5.3
- GenICam Standard Features Naming Convention (SFNC) Version 2.7

Newer firmware versions may contain additional features and bugfixes. Check https://chromasens.de/allpixa-swir-downloads or contact the Chromasens support for updates.

1.3 Definitions and abbreviations

Term / Abbreviation	Synonym / Meaning	Expanation
Black level	Offset	Used for additive (“brightness”) corrections, see also gamma
Camera Link®	Communication protocol standard for camera interface applications	The Camera Link standard is maintained and administered by the Automated Imaging Association (AIA), , now part of the Association for Advancing Automation (A3)
Corona II	LED illumination	Chromasens product
DHCP	Dynamic Host Configuration Protocol	A network management protocol for automatically assigning IP addresses. See DHCP (Wikipedia)
DSNU	Dark signal non-uniformity	Irregularity in the dark image (offset of the individual pixels), additive part of the fixed-pattern noise (FPN)
DVAL	Data valid	Pixel-by-pixel enabled for Camera Link
FFC	Flat-field correction	Can be used to correct the fixed-pattern noise of the image sensor, the vignetting of the lens, and the non-uniformity of the illumination. FFC is performed in the camera by means of dark signal non-uniformity (DSNU) and photo response non-uniformity (PRNU) correction tables
FPN	Fixed-pattern noise	Temporally constant lateral non-uniformity of the imaging system
FVAL	Frame valid	Frame signal for an image on the Camera Link (corresponds to VSync)
Gain		Used for multiplicative (“contrast”) corrections
Gamma		Gain, BlackLevel and Gamma features will transform the original pixel value Y to a new value Y' according to the following formula: $Y' = \left[(Y + BlackLevel) \cdot Gain\right]^{Gamma}$
GCT	GenICam Control Tool	Chromasens camera control and configuration tool for GenICam cameras
GenICam™	Generic Interface for Cameras	Generic camera programming interface standard published and maintained by the European Machine Vision Association emva.org
GigE Vision®	Ethernet-based Camera interface standard	Camera interface standard using the Gigabit Ethernet communication protocol initiated by the Automated Imaging Association (AIA), now part of the Association for Advancing Automation (A3)
GPIO	General-purpose input/output	Versatile, configurable digital signal pin, e.g. at the digital I/O connector of the camera (see section 5.1.3)
LED	Light emitting diode	-

Term / Abbreviation	Synonym / Meaning	Expanation
LLA	Link-local address	Local IP address, typically automatically assigned when no DHCP server is available. See LLA (Wikipedia) and Zero-configuration_networking (Wikipedia)
LUT	Lookup table	Array with precalculated values, to store e.g., gamma correction or tone response curves (TRCs)
LVAL	Line valid	Frame signal for a line on the Camera Link
LVTTL	Low-voltage TTL	Transistor-Transistor-Logic with reduced supply voltage (3.3 instead of 5V). See e.g. Transistor–transistor_logic Sub-types (Wikipedia)
PRNU	Photo response non-uniformity	Difference in sensitivity of the individual pixels, multiplicative part of the fixed-pattern noise (FPN)
ROI	Region of interest	A rectangular section of the captured frame or a contiguous subsection of the image sensor. Can already be defined in the camera, e.g., to reduce the amount of data to be transferred or to increase the achievable frame rate.
RS422	RS-422, TIA/EIA-422	Technical standard for Differential Interface Circuits. See e.g. RS-422 (Wikipedia)
SDK	Software Development Kit	A set of tools, headers, libraries, sample code, and documentation to facilitate software developers creating custom applications.
SFNC	GenICam Standard Features Naming Convention	Provides a standard features naming convention and a standard behavioral model for the devices based on the GenICam standard. Can be downloaded free of charge on the GenICam download page of the emva.org web site.
TRC	Tone reproduction curve (or tone response curve)	Can be used to encode more complex response curves (like the L* or sRGB response curve) as LUTs which can otherwise only be approximated by a gamma value.
VSync	Vertical synchronization	Frame signal for an image (corresponds to FVAL)
White reference		The white reference is a physical patch in the field of view of the camera that can be used for gain adjustment
XLC4	Light controller	Controller that permits to control up to four channels of Corona II illuminations.

1.4 Scope of supply of the allPIXA SWIR camera

Check your device upon delivery to ensure that it is undamaged and complete.

The following components are supplied with the allPIXA SWIR camera:

- allPIXA SWIR camera packaging

  Check the packaging for damage, which may have occurred during transport.

- allPIXA SWIR camera with C-mount adapter

  Check the camera for damage, which may have occurred during transport.

  The rating plate is located on the rear of the allPIXA SWIR camera. It shows the camera resolution and the serial number.

- Additionally ordered and supplied accessories

  Cables, extension rings, lenses and other accessories are not included in the standard scope of delivery. These items must be ordered separately as accessories.

  Check additionally ordered accessories for completeness and for damage, which may have occurred during transport.

Read this manual carefully before using the camera, contacting your local partners or the Chromasens support.

Should there be any questions left, do not hesitate to contact your local partner or us.

We would be pleased to be of assistance to you.

1.5 Design of a line scan camera system

The following figure demonstrates the basic setup of a typical line scan camera system:

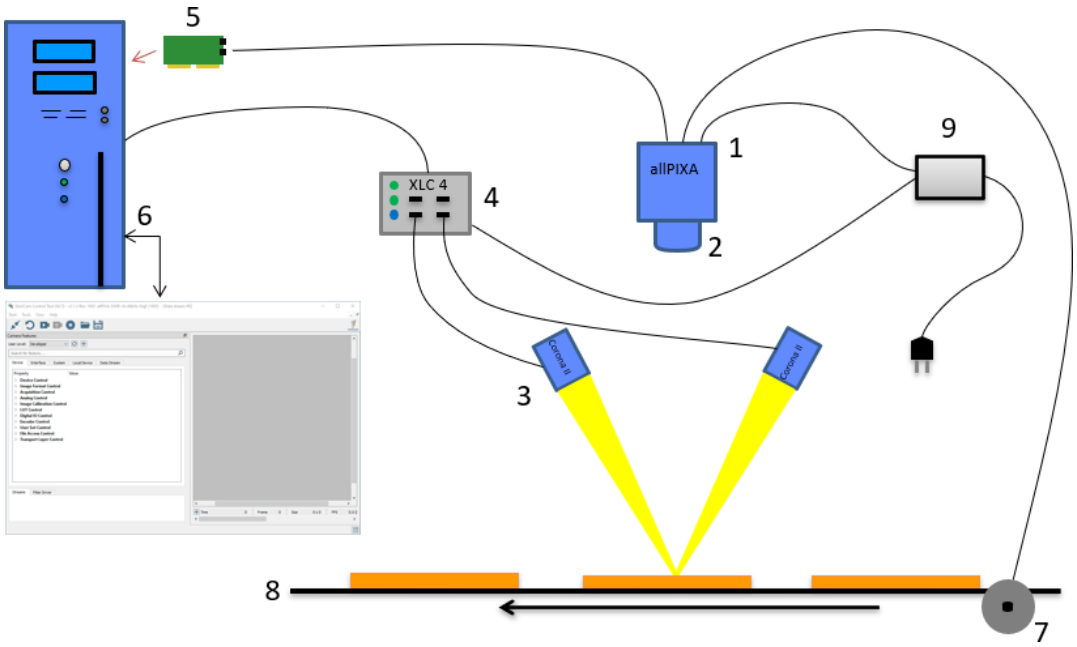


Figure 1: Design of a line scan camera application

The following components are present in typical line scan camera applications:

Component	No.
Line scan camera: An allPIXA SWIR camera, which scans the image line by line and communicates with the PC (5).	**1**
The optical system: Optical lenses with tubes and mounts with an adjusted focusing	**2**
Illumination: The illumination system lights up the information carrier / scan area on the passing object. The Chromasens Corona II SWIR illumination system is an ideal supplementary option for the allPIXA SWIR camera.	**3**
Illumination controller: Controls and monitors the illumination unit. The Chromasens Corona II illumination (3) has integrated temperature sensors which can be read out with the XLC4 controller. By use of the XLC4 controller, the illumination unit can be monitored and kept stable.	**4**
Network cable and suitable network adapter: The image data are sent to a PC using a standard 1000BASE-T network connection. Use a Cat-5e, Cat-6, or better S/STP Gigabit Ethernet cable and a suitable Gigabit Ethernet network adapter in the PC.	**5**
PC: The PC system performs subsequent processing of the image data and can optionally control the illumination system (3 + 4).	**6**
Speed control: The line rate of the camera can be controlled and synchronized with the transport speed of the object or conveyor belt by means of an optional rotary encoder or external line trigger signal. Synchronization of the camera with strobed illumination is also possible this way.	**7**
Conveyor unit: The conveyor unit moves the scanned object past the allPIXA SWIR camera.	**8**
Power supply: Both, the allPIXA SWIR camera and the illumination system, require a suitable power supply.	**9**

2 Specifications and definitions

The allPIXA SWIR GigE camera is compliant with the GigE Vision 2.0 specification which defines the communication interface protocol for any GigE Vision device. The device description of the camera is contained in an XML file. For more information about GigE Vision see: https://www.automate.org/a3-content/vision-standards-gige-vision.

Flat-field correction (FFC), which consists of an offset and a shading correction, compensates for differences in pixel sensitivities, lens vignetting, and lighting unevenness.

FFC is performed in the camera by means of dark signal non-uniformity (DSNU) and photo response non-uniformity (PRNU) correction tables.

DSNU and PRNU correction tables can be created with the in-camera wizard, saved to the PC, and later restored to the camera.

By default, the camera is delivered with a C-Mount adapter. An F-Mount is available as accessory. Other lens adapters are available on request.

2.1 Camera highlights

The allPIXA SWIR camera is especially suitable for inspection systems requiring a very high speed and a consistently high image quality.

- Short-wave infrared line scan camera
- High-speed InGaAs line scan sensor with 512 or 1024 pixels and up 40 kHz line frequency
- 8, 10 or 12-bit mono output
- Digital I/O port on GigE camera models for direct input and output of external trigger signals, e.g. from/to incremental encoders, photoelectric sensors or lighting controllers
- Built-in floating point encoder frequency converter to simplify synchronization between camera and transport speed
- Flatfield correction: Factory calibration and internal wizard for calculating custom shading (PRNU) and offset (DSNU) corrections
- Robust metal housing
- Lens adapter: C-Mount lens adapter included, F-Mount adapter available as accessory
- Internal test image generator

2.2 Available camera models

The allPIXA SWIR camera is available in the following configurations:

GigE version	CP000700-IR-01K-GE	CP000700-IR-512-GE	
Camera Link version	CP000700-IR-01K-CL	CP000700-IR-512-CL	
Number of pixels	1024	512	pixels
Pixel size	12.5 x 12.5	25 x 25	µm
Image size	12.8 x 0.0125	12.8 x 0.025	mm
Spectral response range	950 … 1700		nm

2.3 Import and export regulations

IMPORTANT NOTE:	We would like to point out that the cameras described in this manual are covered by Annex I to EC Regulation No. 2021/821 under ECCN 6A003, also known as "dual-use" items. Prior the import, export, transit or transfer, the exporter shall diligently check on its own responsibility for any applicable reporting or license requirements, restrictions, and prohibitions. The import, export, transit, or transfer may be subject to licensing requirements, or prohibited in accordance with the aforementioned regulation. We also point out that similar licensing obligations as well as restrictions or prohibitions may apply outside the European Union according to the respective export control law and regulations of the country from where the products shall be exported to or shall be imported into.

2.4 Technical specification

Sensor	InGaAs short-wave infrared line sensor
Spectral sensitivity	950 nm to 1700 nm
Resolution	1024 px or 512 px
Pixel size	12,5 µm or 25 µm (square)
Pixel bit depth	8 / 10 / 12 bit
Line scan operating mode	Free-running / software trigger / external trigger
Maximum line frequency	40 kHz
Minimum integration time	21 µs
Interface	GigE Vision (1000BASE-T, RJ-45)
Other interfaces	Power supply (6-pin Hirose, male) External I/O (12-pin Hirose, male)
Digital input	3x RS422 or LVTTL
Digital output	2x RS422
Lens mount	C-Mount (F-Mount on request)
Protection class	IP40
Conformity	CE, RoHS
Power supply	12 to 24 VDC +/- 10 %; 6 W
Housing dimensions	L = 62 mm, H = 62 mm, D = 52 mm
Weight	170g
Storage temperature	-20 °C to +70 °C; -4 °F to +158 °F
Operating temperature (housing)	-10 °C to +50 °C; +14 °F to +122 °F
Maximum operating temperature mainboard	+100 °C; +212 °C
Maximum operating temperature sensor	+60 °C; +140 °F
Air humidity during operation	10% - 90% relative air humidity, non-condensing

General ambient conditions	
Operation	IEC 721-3-3:IE33
Transport	IEC 721-3-2:IE21
Storage	IEC 721-3-1:IE11

NOTE: You should use thermal conductive mounting (for example direct attachment on metal frame) to decrease temperature, improve camera performance and avoid damages to the camera. See also section 5.5.

2.5 Features Reference and SDK

For detailed information on camera controls and features, please refer to the allPIXA SWIR Features Reference, which is available on the allPIXA SWIR download page https://chromasens.de/allpixa-swir-downloads and to the GenICam Standard Features Naming Convention (SFNC) which is available free of charge on the GenICam download page of the EMVA web site https://www.emva.org/.

The allPIXA SWIR Features Reference describes all standard and camera specific GenICam features. Make sure that you always refer to the features reference that matches the XML version used in your firmware.

Further documentation and downloads for software developers can be found in the Chromasens Download Center https://chromasens.de/downloads. The Windows SDK is optional component of the GCT installer, the Linux SDK is available on request.

2.6 Sensor orientation

The sensor lines of different camera models vary in length, depending on maximum resolution and pixel size.

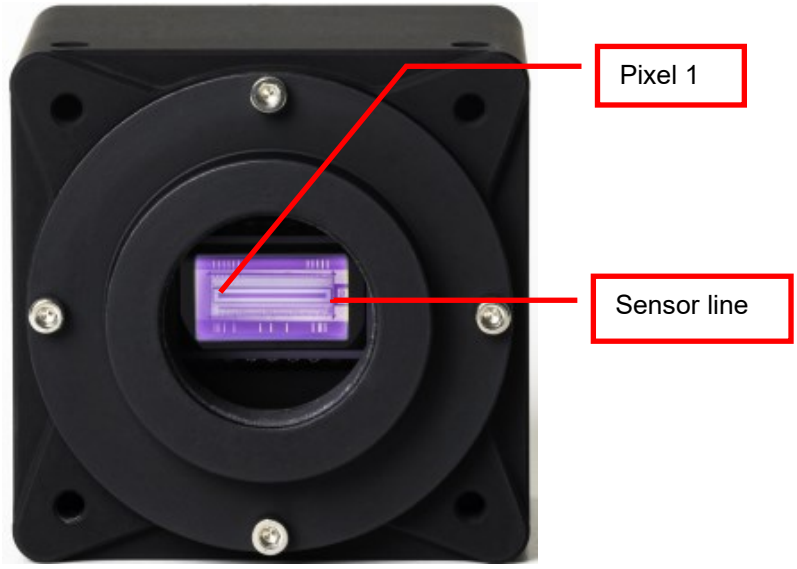


Figure 2: Camera sensor line location

NOTE	The logo Chromasens on the side of the camera indicates the orientation of the pixel line and the position of the first pixel.

2.7 Factory settings

SWIR cameras are delivered with the following factory settings, which can be changed in the **Gev Interface Selector 0** of the **GigE Vision** subcategory in the **Transport Layer Control** feature group:

Gev Feature	Value
Persistent IP Address	192.168.100.10
Persistent Default Gateway	0.0.0.0
Persistent Subnet Mask	255.255.255.0
Current IP Configuration LLA	On
Current IP Configuration DHCP	On
Current IP Configuration Persistent IP	Off

To use DHCP or LLA autoconfiguration, you have to disable **Persistent IP** as this has the highest priority.

3 Safety

3.1 Depiction of safety instructions

Safety-relevant information is indicated in this manual as follows:

WARNING

Indicates a potentially hazardous situation or task, which, if not avoided, could result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation or task, which, if not avoided, may result in minor or moderate injury.

NOTICE Indicates a potentially hazardous situation or task, which, if not avoided, could result in damage to the product or the surrounding environment.

3.2 Basic safety regulations

Always observe the following:

- Do not attempt to install the device or start operation before you have read all supplied documentation carefully and have understood its contents.
- Safe and correct operation of the device requires correct and appropriate transport, storage, mounting and installation as well as careful operation and maintenance.
- Operation of the allPIXA SWIR camera device is only permitted if it is in a faultless and safe condition. If a fault or defect occurs, the allPIXA SWIR camera, the machine, or the system in which the allPIXA SWIR camera is installed, must be stopped immediately, and the responsible person must be informed.
- Modifications and extensions to the allPIXA SWIR camera are only permitted if the prior written consent of Chromasens GmbH is obtained. This applies in particular to modifications and extensions which can negatively affect the safety of the allPIXA SWIR camera.
- Compliance with the ambient conditions described in this manual is essential.

3.3 Safety instructions on the allPIXA SWIR camera

Risks from hot surfaces

The body of the allPIXA SWIR camera heats up during operation.

Do not touch hot surfaces without suitable protective gloves. Always allow hot surfaces to cool down before carrying out any work on the unit.

Electric voltage hazard

The allPIXA SWIR camera runs with electric power. Before any work is carried out on the allPIXA SWIR camera, be aware to disconnect the mains cables. Make sure that the device is safely isolated from the power supply!

Risk of electrostatic discharge

The allPIXA SWIR camera contains components and units which are sensitive to electrostatic charge.

Observe all precautionary measures for handling electrostatically sensitive equipment.

Make sure that the allPIXA SWIR camera, its corresponding tools, its equipment, and the person who is handling it have the same electrical potential.

3.4 Purpose / applications

- The allPIXA SWIR camera is designed for machines and systems which are used for commercial and industrial applications.
- The owner of the machine or system in which the allPIXA SWIR camera has been installed is responsible for compliance with relevant safety regulations, standards, and directives. Commissioning of the allPIXA SWIR camera is only permitted if the machine or system, in which the allPIXA SWIR camera is installed, complies with the safety regulations and standards of the country in which the allPIXA SWIR camera runs.
- The owner of the machine or system with the installed allPIXA SWIR camera must verify the suitability of allPIXA SWIR camera for its intended use.
- Safety regulations of the country in which the device is used must be complied with it.
- The allPIXA SWIR camera may only be connected or used as described in this manual.

- The allPIXA SWIR camera must be set up and installed in compliance with the instructions contained in this manual.

3.5 Staff requirements

- The system owner must ensure that all persons working on the system are trained for the required work and have read and understood this manual. This applies particularly to the employees who only work occasionally with the allPIXA SWIR camera, for example, during commissioning and maintenance work.
- Work on the electrical installation of the system may only be carried out by a qualified electrician or persons who have undergone the necessary electrotechnical training under the supervision of a qualified electrician, in compliance with applicable electrotechnical regulations.
- Be aware that only suitably trained and qualified persons are permitted to work with the allPIXA SWIR camera. Such persons are qualified to work with the allPIXA SWIR camera device if they are familiar with its assembly, installation, care, and all necessary precautionary measures.
- Assignments and responsibilities of the staff charged with operation, commissioning, maintenance, and repair must be clearly defined and specified by the owner of the device in which the allPIXA SWIR camera is installed.

3.6 Organizational measurements

- The instruction manual must be stored safely in the vicinity of the camera in operation.
- Information contained in this manual must be integrated into the documentation of the device in which the allPIXA SWIR camera is installed.
- The allPIXA SWIR camera and all connected peripheries must be checked regularly for visible external damages.

3.7 Safety instructions for maintenance / cleaning

- Before any service or maintenance work is carried out, the responsible staff must be informed.
- Deadlines and intervals for regular inspections must be complied with.
- Before maintenance is started, the allPIXA SWIR camera must be isolated from the power supply.
- Due to the risk of fire, devices such as radiators, heaters, or lighting equipment must be allowed first to cool down.
- Only technicians of the Chromasens GmbH are permitted to open or slacken screws or housing sections of the allPIXA SWIR camera.
- Necessary repairs may only be carried out by Chromasens GmbH.
- Cleaning of the device is only allowed with a soft, lint-free cloth and Isopropanol (optional).
- To avoid damages, the camera should only be transported in its original packaging.

3.8 Maintenance and cleaning of the allPIXA SWIR camera

During operation of the device, particles such as dust etc. may be settled on the optical components (lens) of the camera. These deposits affect the optical image and the function of the camera negatively.

NOTICE Chromasens recommends regular inspection and cleaning. The cleaning intervals depend on the actual operating and ambient conditions (for example dust-laden atmosphere).

3.8.1 Cleaning intervals

Cleaning intervals depend on the environment. Regular inspection and cleaning intervals must be specified depending on the degree of soiling.

3.8.2 Cleaning process

Body of the allPIXA SWIR camera heats up during operation.

Before cleaning, you must switch off the device. Always allow hot surfaces to cool down before cleaning the device.

The device works with electric power. Before cleaning the device, make sure that the device is disconnected from the power supply.

All surfaces requiring cleaning can be wiped with a soft, lint-free cloth which can be moistened with Isopropanol.

Never use any other liquid or cleaning agent than those stated in this manual.

Never use hard or sharp tools for cleaning the device.

Inspect the device to ensure that cleaning was effective and repeat, if necessary.

If it is not possible to clean a component due to irremovable contamination, it must be replaced.

3.9 Disposal

This symbol indicates that electrical and electronic equipment should not be disposed with normal garbage at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Please dispose this product in accordance with your local regulations and contact your local government office, for details of where and how they can take this item for environmentally safe recycling.

4 allPIXA SWIR – basic functionality

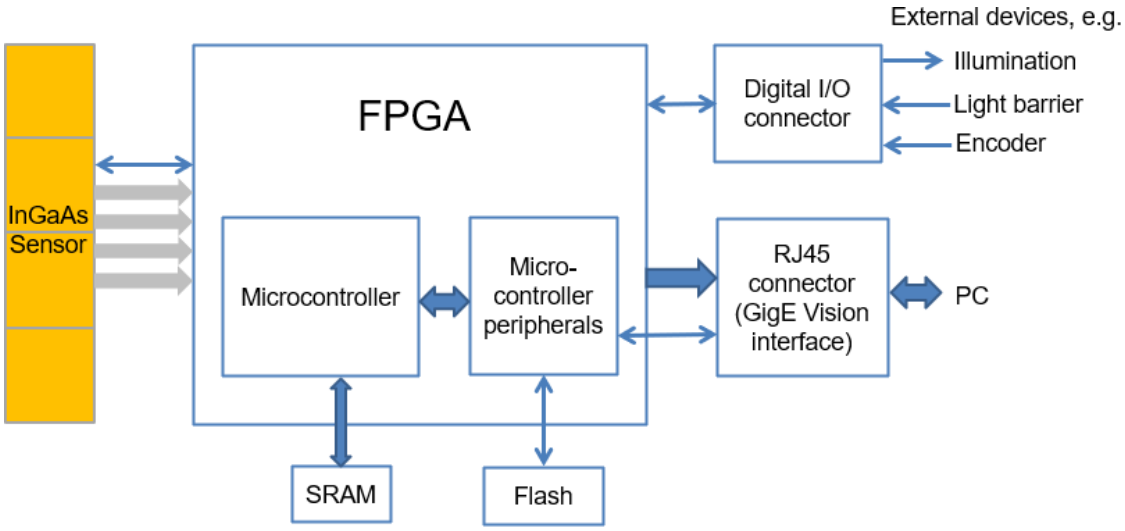
4.1 Basic design of the allPIXA SWIR camera

During operation, an object is scanned line by line by the InGaAs sensor.

The FPGA also includes a softcore microcontroller (or microprocessor) with its peripherals like RAM and flash memory. The software running in the microcontroller configures and supports the FPGA logic to process and transfer image data and to communicate with the host application.

The allPIXA SWIR camera can be used and configured with any GigE Vision 2.0 compliant Software or SDK. We recommend using the Chromasens GenICam Control Tool (GCT) and the Chromasens SDK which is available for Linux and Windows. The Windows SDK is an optional component of the GCT installer, the Linux SDK is available on request.

External trigger signals from sources like incremental encoders, light barriers, or light and trigger controllers can be input by the GPIOs (general purpose inputs/outputs) of the Digital I/O connector of the GigE models or by the CC of the camera.



FPGA	Field-programmable gate array
SRAM	Static random-access memory (volatile memory: information is lost if power is removed)
Flash	non-volatile memory (for firmware and settings)

Figure 3: Basic design of the allPIXA SWIR camera (block diagram)

4.2 Line Scan Sensors of the allPIXA SWIR camera

4.2.1 Design

The allPIXA SWIR camera is available with two sensor variants:

Total number of pixels	512	1024
Pixel size (µm)	25 x 25	12.5 x 12.5
Pixel pitch (µm)	25	12.5

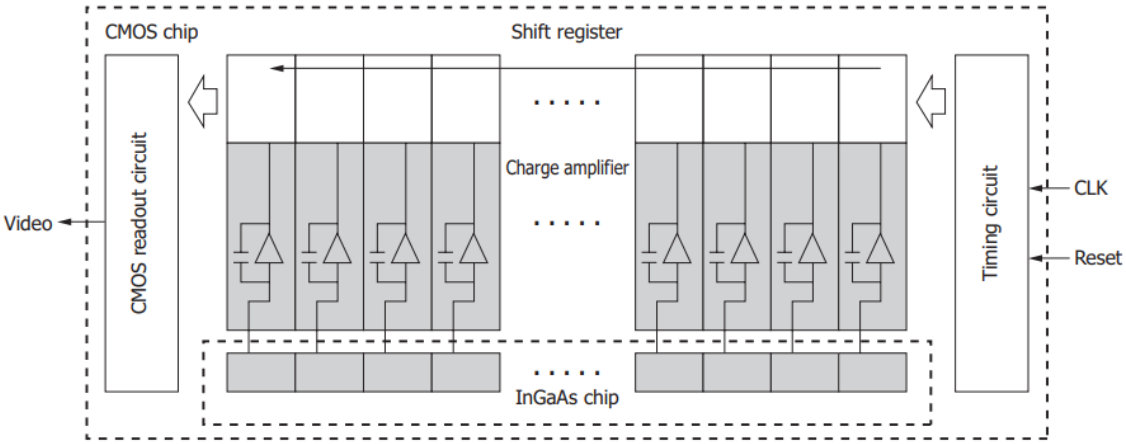


Figure 4: Camera sensor (block diagram)

4.2.2 Spectral sensitivity

The figure below represents the spectral response of the camera sensor (spectral responsivity in A/W). The representation is based on sensor vendor information.

Normalized spectral sensitivity of the color camera (range 950nm – 1700nm):

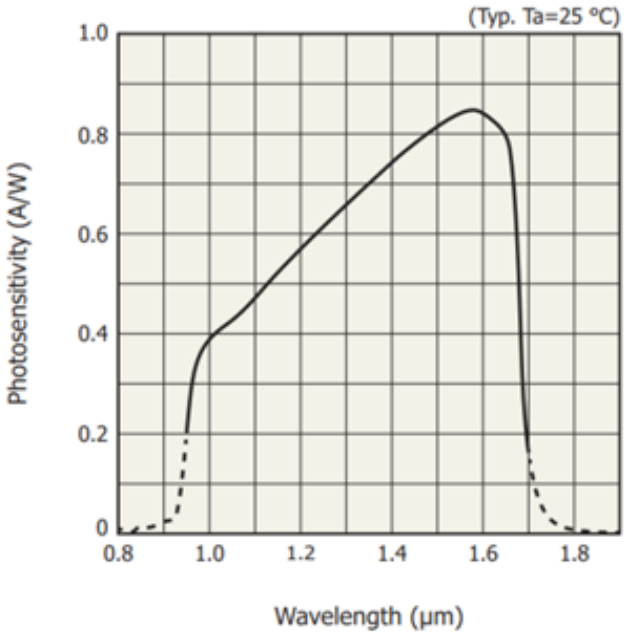


Figure 5: Spectral sensitivity of the line scan sensor

5 Installing the allPIXA SWIR camera

5.1 Connectors and LEDs of the camera with GigE Vision interface

On the backside of the camera, you find the following interfaces:

- An RJ-45 Gigabit Ethernet connector for image signaling and for communication between the allPIXA SWIR camera and the image processing computer.
- A general-purpose digital input/output (GPIO) connector (Hirose 12 pin HD10A-10P-12S(73) male) to connect external trigger sources like incremental encoders, light barriers or other external devices.
- A power connection (Hirose HR10A-7P-6S(73) male) for power supply
- A red power LED, which indicates whether the allPIXA SWIR camera is connected to the power supply.
- An orange status LED, which blinks as soon as the camera firmware has booted successfully.

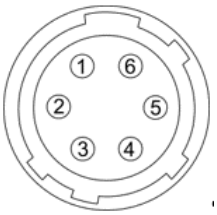
Figure 6: Connections and LEDs of the allPIXA SWIR GigE camera

5.1.1 Power supply

Following connector is required for the power supply cable:

Manufacturer: Hirose

Manufacturer Part no.: HR10A-7P-6S “female”
(male counterpart is located on the camera)

Pin no.	Description	
1	Power +24 V	Connector on camera (male, front view): 
2	Power +24 V	
3	Not connected	
4	Ground	
5	Ground	
6	Not connected	

For available power supply cables and connectors see section 9.3.1.

For more details about input voltage and currents, see section 2.4.

5.1.2 RJ45 connector

The GigE RJ-45 jack connector permits to use a Cat-5e, Cat-6 or better S/STP Gigabit Ethernet cable with lengths of up to 100 m.

5.1.3 Digital I/O connector

Manufacturer and Type: Hirose 12 pin (male part on camera side)

Standard mating part: HR10A-10P-12S(73) (female on cable).

Mating cables: T18445 (5m, straight, open leads),
T18446 (5m right angle, open leads).

For more details about available I/O cables, see section 9.3.4.

You can connect up to three digital input signals and two digital output signals to the digital I/O connector of the camera.

Figure 7: I/O connector on camera (male, front view)

Pin	Signal	Description
1	IN1 **-**	RS422 Digital Input Line 1 -
2	IN1 **+**	RS422 or LVTTL Digital Input Line 1 +
3	IN3 **-**	RS422 Digital Input Line 3 -
4	IN3 **+**	RS422 or LVTTL Digital Input Line 3 +
5	GND I/O	I/O Ground reference
6	OUT1 **-**	RS422 Digital Output Line A -
7	OUT1 **+**	RS422 Digital Output Line A +
8	IN2 **-**	RS422 Digital Input Line 2 -
9	IN2 **+**	RS422 or LVTTL Digital Input Line 2 +
10	N.C.	Not Connected
11	OUT2 **-**	RS422 Digital Output Line B -
12	OUT2 **+**	RS422 Digital Output Line B +

5.1.3.1 Input Lines

Type	Channels
RS422 or LVTTL inputs	3

Each of the three input lines can be used with either single ended **Low Voltage TTL** (LVTTL) or differential **RS422** signals.

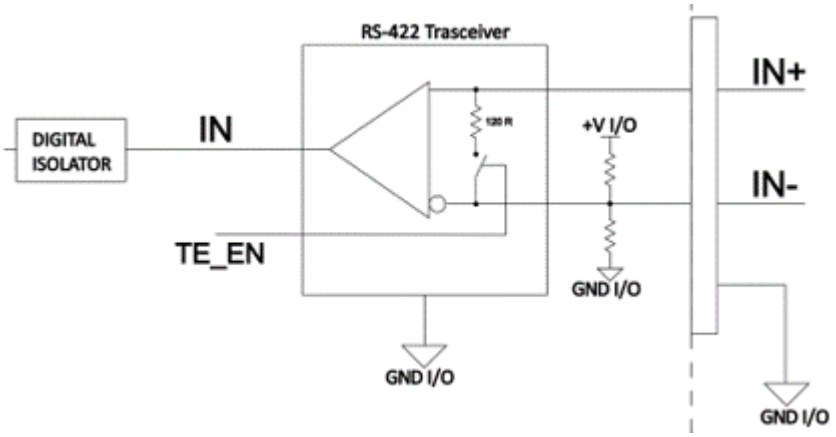


Figure 8: Input schematic

Requirements when using differential **RS422** input signals:

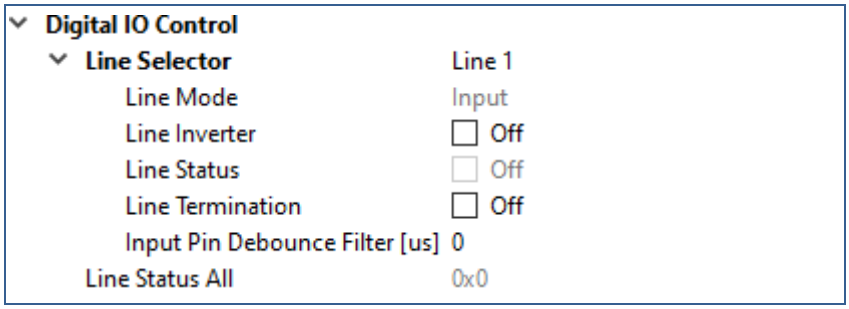
- The termination resistor must be enabled only on the first and last device of the RS422 bus.
- Although RS422 is a differential signal, a proper ground connection is required additionally between the source (for example encoder) and the drain (camera **GND I/O** ground reference).

Requirements when using single ended **Low Voltage TTL** input signals:

- Do not connect the channel **IN-**.
- Provide **GND I/O** ground reference.
- Disable the termination resistors (disable **Line Termination** in the **Digital IO Control** feature group for input lines used in single ended mode).

The termination resistors of all inputs are disabled by default.

Please note that feature groups like **Digital IO Control** are only visible for user level **Expert** or higher, not in the default user level **Beginner**. Refer to the GCT manual for information on how to set the user level.



5.1.3.2 Output Lines

Type	Channels
RS422 Digital Output	2

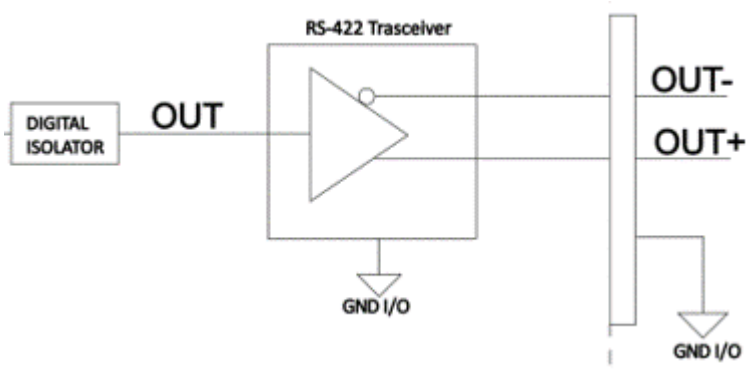
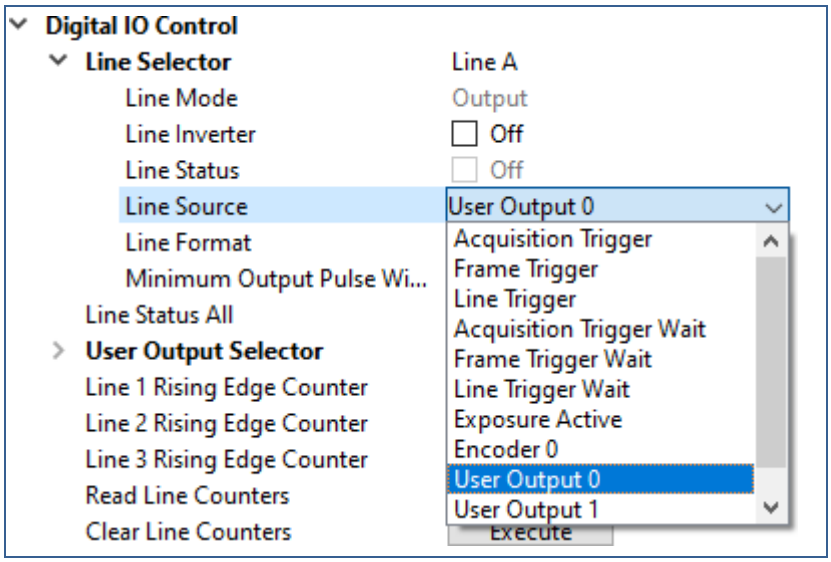


Figure 9: Output schematic

Output lines can be configured in the **Digital IO Control** feature group. Please note that this feature Group is only visible in user level **Expert** or higher, not in the default user level **Beginner**. Refer to the GCT manual for information on how to set the user level.



5.1.3.3 I/O Voltage requirements

Voltage	Description
+0 to + 5.0 VDC	Represents the recommended I/O operating voltage.
+0 to + 0.8 VDC	The voltage value indicates a logical state of 0.
> +0.8 to +2.0 VDC	Defines the value interval for the transition threshold. No logical state is defined in this region.
> +2.0 VDC	The voltage value indicates a logical state of 1.
+6.0 VDC	Defines the absolute maximum voltage value. Do not exceeded absolute maximum value.

NOTICE **Never exceeded absolute maximum value for the I/O voltage as this will result in damage to the camera and/or the surrounding environment.**

5.2 Connectors and LEDs of the camera with Camera Link interface

On the backside of the camera, you find the following interfaces:

- Two Camera Link MDR connectors for image data transfer and communication between the allPIXA SWIR camera and the image processing computer. Only CamLINK 1 is required.
- A power connection (Hirose HR10A-7P-6S(73) male) for power supply. For more information, see section 5.1.1.
- A power LED, which indicates whether the allPIXA SWIR camera is connected to the power supply.
- A status LED, which blinks as soon as the camera firmware has booted successfully.

Figure 10: Connections and LEDs of the allPIXA SWIR Camera Link camera

5.3 Using an encoder or external triggers

Acquisition Start, **Frame Start** and **Line Start** can optionally be triggered by (synchronized with) external trigger sources like rotary encoders or light barriers.

Line Start (an hence the line frequency of the camera) can be controlled either directly by a trigger signal matching the intended camera line frequency or by the signal of an incremental encoder, e.g. mounted on a conveyor belt.

When the frequency (resolution) of the incremental encoder does not match the frequency required for the line trigger of the camera (which depends on the optical resolution of the camera), the resulting image will be distorted. The distortion can be corrected by means of the **Encoder Divider Float** parameter of the camera's **Encoder Control** feature.

Refer to section 5.3.1 when using an incremental encoder as line trigger source and to section 5.3.2 when providing the external line trigger signal directly.

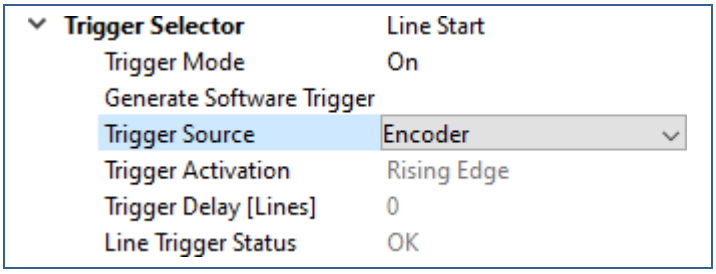
If you want to control frame start e.g., by means of a light barrier, please refer to section 5.3.3.

5.3.1 Using an encoder as line trigger source

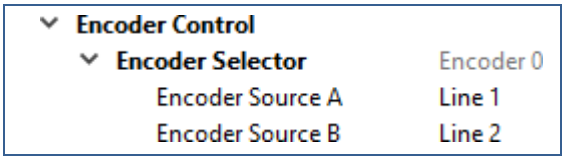
Application example: scanning objects on a conveyor belt moving with variable speed. Adapt camera line rate to transport speed of the object by means of an incremental encoder signal to get undistorted images. Refer to section 5.6 and 5.1.3 on how to connect the incremental encoder to the digital I/O connector of the camera.

To configure the camera for rotary encoder usage:

1. select **Line Start** in the **Trigger Selector** of the **Acquisition Control** feature group.
2. Set **Trigger Mode** to **On**.
3. Select **Encoder** as **Trigger Source**:



4. In the **Encoder Control** feature group, open **Encoder Selector.**
5. Select the I/O lines the encoder is connected to as **Encoder Source A** and **Encoder Source B,** e.g., when encoder output A is connected to camera input **Line 1** and encoder output B is connected to camera input **Line 1**, encoder settings should look like this:

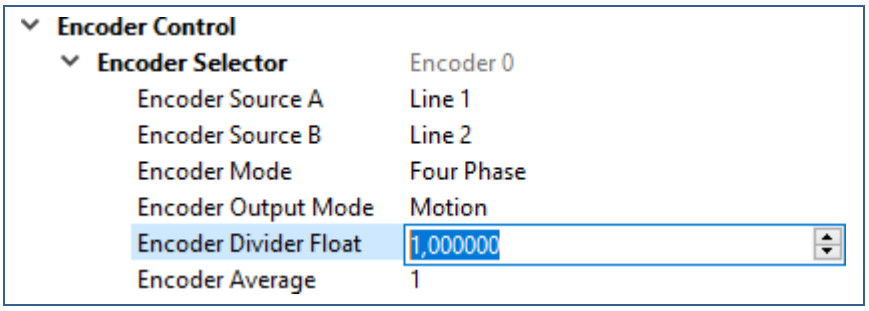


6. **Encoder Mode** has two possible settings:
   - **Four Phase**: The counter increments or decrements 1 for every full quadrature cycle with jitter filtering.
   - **High Resolution**: The counter increments or decrements every quadrature phase for high resolution counting, but without jitter filtering.
7. **Encoder Output Mode** has two possible settings:
   - **Motion:** Output pulses are generated in both directions.

- **Direction Up:** Output pulses are generated only in the positive direction while motion in negative direction will be ignored.

If only a single encoder line is connected, make sure that **Encoder Output Mode** has the value **Motion**. In this case, the rotating direction of the encoder cannot be detected.

8. **Encoder Divider Float** specifies the number of encoder steps needed to generate an encoder output pulse (to be used as line trigger).



Adjust the value when required according to transport speed, optical resolution of the camera and the pulses per revolution of the encoder.

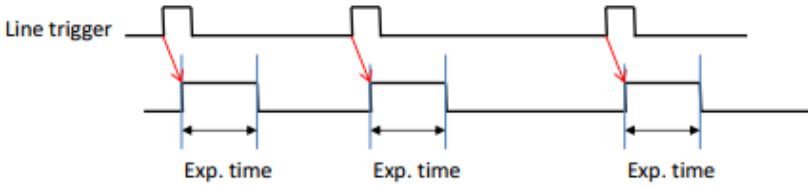
The correct value can be calculated using the formulas in the calculation example below.

Optical resolution Camera in pixels per inch	PPI	254	ppi
Optical resolution Camera in pixels per mm	PPMM=PPI/25.4	10	px/mm
= requred line trigger resolution for an undistorted image (width/height ration =1)	LPMM=PPMM * 1	10	lines/mm
Encoder resolution in cycles per revolution	CPR	1000	cycles/rev
Feed rate in mm per revolution	MMPR	50	mm/rev
Encoder resolution in cycles per mm	CPMM=CPR/MMPR	20	cycles/mm
Encoder Divider Float for **Four Phase mode** (=encoder cycles per line)	EDF=CPMM/LPMM	2	cycles/line
Encoder Divider Float for **High Res mode** (=encoder singal transitions per line, requres encoder signal A and B to be connected)	EDFH=EDF * 4	8	edges/line
		input	result

Figure 11: Calculation example for Encoder Divider Float

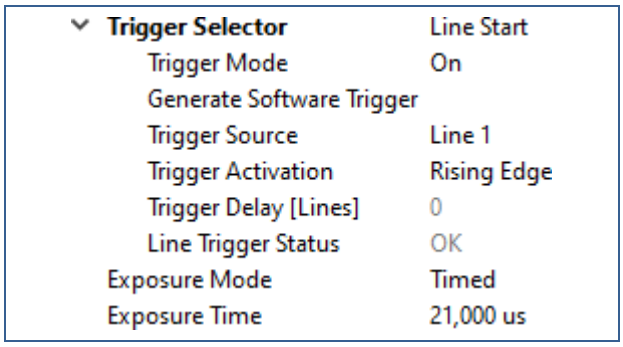
5.3.2 Using an external line trigger signal

A line trigger controls the capturing of a single line in the camera. **Exposure Time** can be fixed (timed by the camera) or variable (determined by the trigger width).



Refer to section 5.6 and 5.1.3 on how to connect the external line trigger to the digital I/O connector of the camera.

Feature settings in feature group **Acquisition Control**:



Trigger Selector: **Line Start**

Trigger Mode: **On**

Trigger Source: e.g., **Line 1**
(when the trigger signal is connected to line 1 of the digital I/O connector of the camera)

Trigger Activation: typically **Rising Edge**

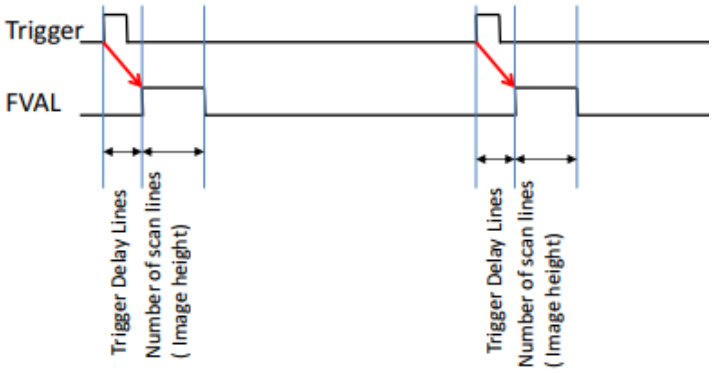
Exposure Mode: typically **Timed** (i.e., camera controls exposure time)

Exposure Time: see section 7.3

5.3.3 Using a light barrier to trigger frame start

Application example: scanning objects of fixed length but variable distance on a conveyor belt.

Frame start is controlled by a light barrier. Image height is fixed.



Refer to section 5.6 and 5.1.3 on how to connect the light barrier to the digital I/O connector of the camera.

Feature settings in feature group **Acquisition Control**:

Trigger Selector	Frame Start
Trigger Mode	On
Generate Software Trigger	
Trigger Source	Line 3
Trigger Activation	Rising Edge
Trigger Delay [Lines]	0

Trigger Selector: **Frame Start**

Trigger Mode: **On**

Trigger Source: e.g., **Line 3**
(when the light barrier is connected to line 3 of the digital I/O connector of the camera)

Trigger Activation: typically **Rising Edge**

Trigger Delay [Lines]: depending on the distance (in captured lines) between light barrier and camera.

5.4 Mechanical installation

Various mounting options are provided by the allPIXA SWIR camera housing. Thanks to its numerous threaded holes for attachment, the installation of the allPIXA SWIR camera is very simple and versatile.

Figure 12: Mechanical connection points of the allPIXA SWIR camera

The allPIXA SWIR camera is equipped with 4 fastening points on its front and 2 on each side and on top and bottom with M4 threads. Use maximum torque of 4 Nm for full threat length.

For information about the exact mechanical dimensions, see section 9.2.1.

5.5 Thermal links / cooling

The camera works within the defined temperature range (see section 2.4). To this purpose it may be screwed to thermally conductive parts on a wide and flat surface. A thermal connection to heat-conductive parts has a positive effect on operation of the allPIXA SWIR camera.

To dissipate the heat more effectively to the surrounding area, we also recommend using heat conduction pads between the allPIXA SWIR camera and heat-conductive parts. You can also cool the camera with a fan, which should be directed at a large surface area of the camera.

If questions are left, or if you are not sure how to adapt the allPIXA SWIR camera most effectively to its ambient conditions, do not hesitate to contact our support team.

The following temperatures, which can be monitored in the **Device Temperature Selector** at the **Device Control** feature group, must not be exceeded:

Mainboard: 100°C

Sensor: 60°C

NOTICE Exceeding the above temperature limits may cause damage to the camera.

Please refer to section 8.2 for temperature-related errors and warnings issued by the camera software.

5.6 Electrical installation

WARNING

Only the authorized electro-technical trained staff is permitted to install and to start operation of the device.

NOTICE

Before connecting and switching on the power supply, make sure that all required plug connections have been established correctly.

This precaution prevents damage to the allPIXA SWIR camera and to its connected components.

NOTICE

When the allPIXA SWIR camera has been secured in its final working position and all cables are connected and screwed, check the cable configuration.

The weight of the cables must not be applied to the connectors. No other mechanical load should be applied to the connectors.

NOTICE

Comply with the minimum permissible bending radii and maximum permissible bending cycles specified by cable manufacturers. Where applicable, use cables that are suitable for drag chains.

NOTICE

Grounding of the housing and the outer cable shield:

In an environment with electromagnetic contamination, it may be necessary to avoid ground loops and/or establish additional contact between the housing to the installation's electrical ground.

Excessive leakage currents on the power supply or I/O lines can cause damage to the camera or the surrounding environment

5.6.1 Power supply

Connect a power cable from the camera to a 12-24V DC power supply.

For more details about input voltage and currents, see section 2.4.

NOTICE	**Exceeding the voltage limits mentioned in section 2.4. may cause damage to the camera.**

For the pin allocation of the Hirose connector, see section 5.1.1.

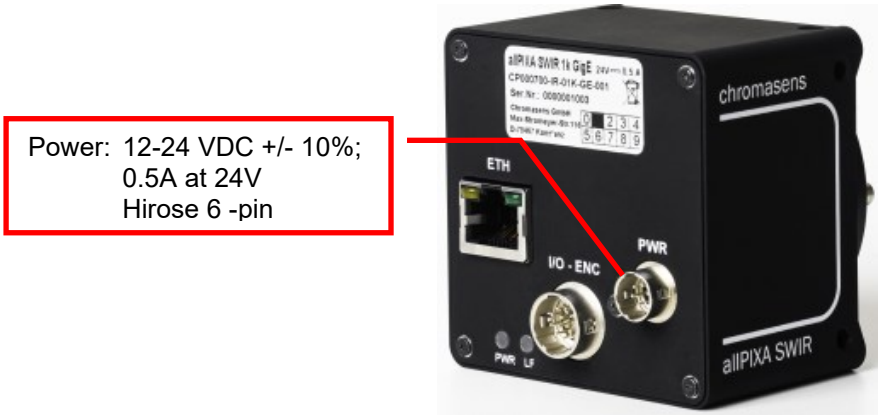


Figure 13: Connecting the allPIXA SWIR camera to the power supply

5.6.2 Connecting external I/O devices to the allPIXA SWIR GigE camera

You can connect up to three digital input signals and two digital output signals to the digital I/O connector of the allPIXA SWIR GigE camera. Input signals can, for example, be provided by sources such as incremental encoders or photoelectric sensors.

Refer to section 5.1.3 for the specification of the I/O interface and signal requirements. Refer to section 5.3 for typical usage examples.

Figure 14: Connections and LEDs of the allPIXA SWIR GigE camera

5.6.3 Connecting the camera to the computer

The camera is connected to the computer or network using the RJ45 connector.

Connecting the network cable:

Image data is sent to a image processing computer using a standard 1000BASE-T network connection. Use a Cat-5e, Cat-6, or better S/STP Gigabit Ethernet cable and a suitable Gigabit Ethernet network adapter in the computer.

Figure 15: Connecting the allPIXA SWIR camera to the computer

For configuration of the network settings on host computer and camera as well as discovering and connecting the camera to GCT, please refer to the GCT manual which can be downloaded from Chromasens Download Center https://chromasens.de/downloads.

6 Working with GCT

6.1 Discovering and connecting the camera in GCT

The camera can be configured with any GenICam compliant software. We recommend using the Chromasens Software GCT (GenICam Control Tool) Version 2 or higher, which is optimized for the use with Chromasens cameras.

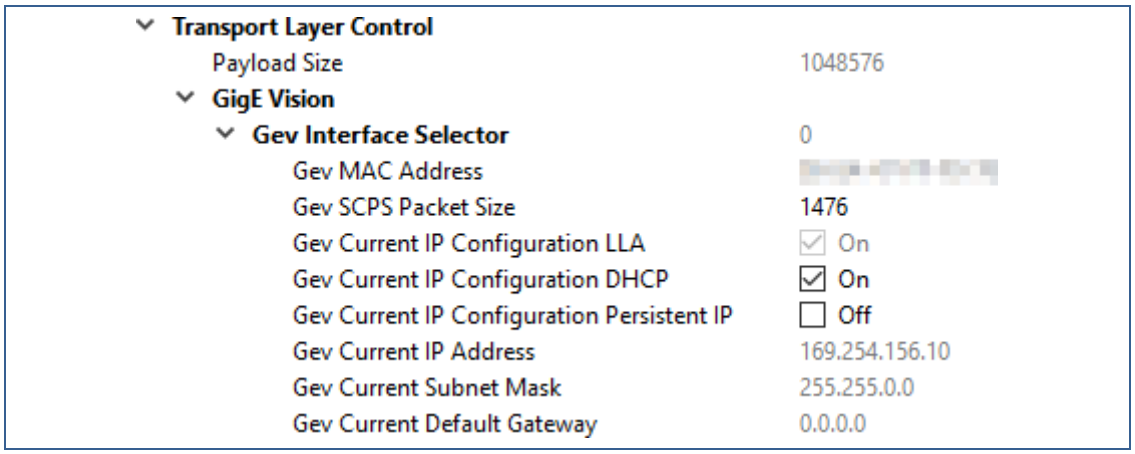
GCT is available for download free of charge in the Chromasens Download Center https://chromasens.de/downloads.

For information about installing and using GCT, refer to the GCT manual.

If the camera cannot be detected by GCT or if the camera shows up but cannot be opened, it may be necessary to adjust the configuration of the network adapter of your computer or the network settings of the camera.

For details on the factory settings of the camera, see section 2.7.

To use DHCP or LLA autoconfiguration, **Persistent IP** must be disabled in the camera settings as shown in the screenshot below as **Persistent IP** has higher priority than **DHCP** or **LLA**.



For more details on network settings camera discovery please refer to the GCT manual.

6.2 Updating the firmware

If a new firmware package is available, it can be downloaded from the Chromasens website as **.bin** file. For more information about updating the firmware, refer to the GCT manual.

7 Camera system set-up

7.1 Installing the camera

Prepare the general setup:	
1	**Prepare the camera and lens** • Select the correct lens and accessories to operate your camera in the desired environment. (For more information about available accessories, see section 9.3.) • Install the lens and adapters correctly.
2	**Prepare the right cabling for your application** • The allPIXA SWIR connectors are described in section 5.1. • Connection to the PC: The allPIXA SWIR can be connected with a Cat-5e, Cat-6 or better S/STP Gigabit Ethernet cable with lengths of up to 100 m. See section 5.6.3. • Connect the camera to a power supply (12-24 VDC +/- 10 %, typically 6 W), see section 5.6.
3	**Install and configure the network adapter on your PC** • See GCT manual.
4	**Adjust the focusing point of your illumination unit and position it correctly.** • Refer to the manual of the illumination manufacturer for proper installation of the illumination. • Make sure that the illumination is positioned correctly to illuminate the scanning area.
5	**Mechanically install the camera in your machine** • Refer to sections 5.4 and 5.5 for details. • **Make sure that the camera is positioned correctly** The sensor line should be adjusted horizontally to the transport direction and the camera should look perpendicular to the inspection area. • **Make sure that you have the correct object-to-sensor distance** The sensor line is positioned 17.526 mm (optical photosensitive surface) behind the front surface of the allPIXA SWIR camera (C-Mount standard).

7.2 Starting up the system

Start up the camera:

1

You can acquire images and adjust camera parameters using the Chromasens software GCT. For information about installation and use of GCT, refer to the GCT manual.

- Turn on illumination and camera.
- Set up communication between PC and camera.

Set the camera to free-run mode:

2

To check the basic functionality of the system, set the camera free-run mode. This can be done most easily by loading the **Default** user set. Loading the **Default** user set will reset most camera settings to the factory defaults. For example, it will reset **Sensor Gain** and **Exposure Time**, switch off all external triggers and set the camera to free-run mode. If you have already changed settings on the camera and do not want to lose them, save them in a custom **User Set** before you load the **Default** user set.

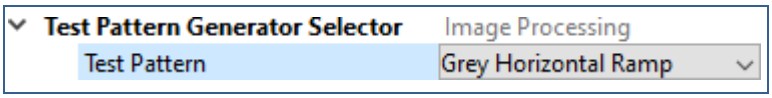
To load the **Default** user set:

- In the **User Set Control** feature group, select User Set **Default,** open the **User Set Selector** and execute the **User Set Load** command.

Capture a test image:

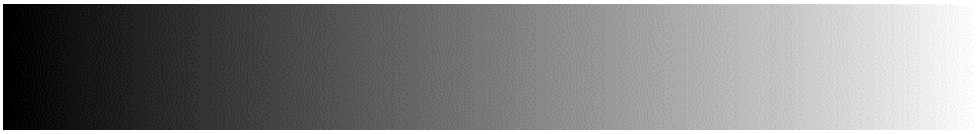
3

- In the **Image Format Control** feature group, open **Test Pattern Generator Selector**, and select **Grey Horizontal Ramp** in the **Test Pattern** list.

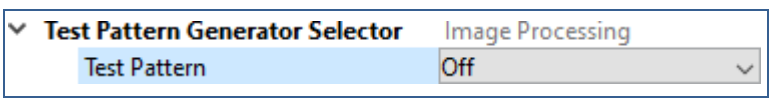


- On the toolbar, click **Start grabbing**  .

  The captured images should look like this:



- On the toolbar click **Stop grabbing**  .
- In the **Image Format Control** feature group, open **Test Pattern Generator Selector**, and select **Off** in the **Test Pattern** list to disable the Test Pattern Generator.



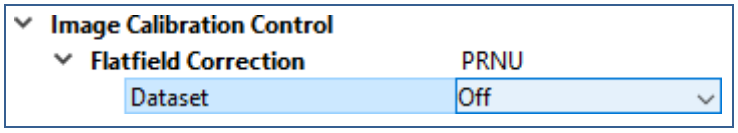
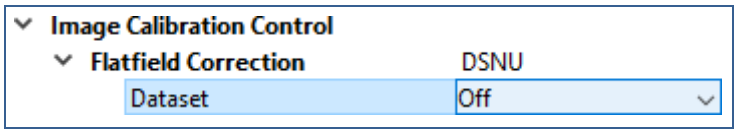
Proceed to section 7.3 to calibrate the camera and adjust the camera settings to your operating conditions.

7.3 Adjusting camera and illumination

- Put camera and illumination in operation as described in section 7.1 and 7.2 above.
  Refer to the user manual of the illumination system for details on setting up and operating the illumination.
- Prepare a suitable white reference target.

> **NOTE** The white reference target must cover the full scanning width. It must be placed in the object plane of the scanning system. Even very small damages or stains on the white reference can seriously affect the quality of the PRNU calibration. When possible, use professional, diffuse reflecting white reference targets (typically made of sintered PTFE or ceramics). The white reference should move during the PRNU calibration process. The movement results in averaging, which helps to mitigate the negative effect of dust and scratches on the white reference.

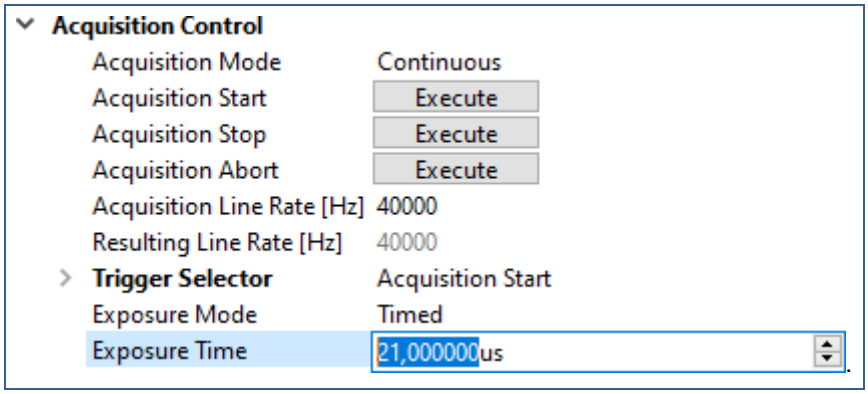
- Keep ready appropriate sharpness test patterns to measure and optimize focus and magnification across the scan width. Stripe patterns with known spatial resolution are suitable for this purpose.
- Further useful tools:
  - An infrared detector card can be helpful to make the beam of the SWIR illumination visible while adjusting the illumination.
  - Special adjustment tools or rulers customized to your scanning system can be very helpful when setting up and aligning camera and illumination.
- To adjust the camera setting to your operating conditions, follow the steps below.

Prepare the scanning system for calibration:	
1	• Set the camera to continuous, free-running mode by loading the **Default** user set. • In the Image **Calibration Control** feature group, disable **Flatfield Correction** for both **PRNU** and **DSNU**:   • Click **Start grabbing**  in the GCT toolbar to get a live image from the camera. • Place the white reference target into the object plane of the scanning system.
Align system components:	
2	• **Illumination alignment:** Switch on the illumination and align it optimally with the scanning area. The line captured by the camera should be illuminated as homogeneously and brightly as possible. • **Camera alignment:** Align the camera exactly perpendicular to the transport direction and to the center of the optimally illuminated area. • **Focusing and f-stop:** Set an appropriate f-stop and focus the camera using sharpness test patterns in the object plane. Compare sharpness and magnification in the center of the image and at the edges to achieve an optimal result. • If the image is overexposed or too dark to accurately judge sharpness and alignment, continue with step 3 and repeat step 2 afterwards.

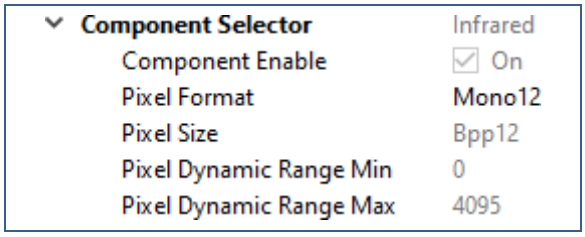
Adjust integration time, sensor gain and illuminance (LED current):

3

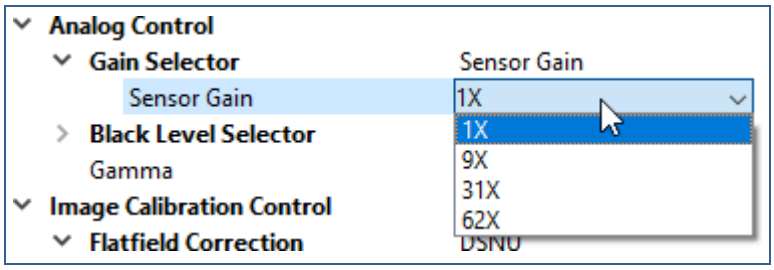
- In the **Acquisition Control** feature group, adjust **Exposure Time** to get a normally exposed image.



"Normally exposed" means that the gray values of the brightest parts of the white reference image are approx. 60-80% of the maximum value for the selected bit depth.
*For the respective maximum value see **Pixel Dynamic Range Max** in the **Component Selector** of the **Image Format Control** feature group:*



- When the **Resulting Line Rate** drops below your speed requirements (defined by camera resolution and transport speed), increase illumination intensity (LED current) or **Sensor Gain** in the **Gain Selector** of the **Analog Control** feature group:



Please note: For optimal image quality keep both sensor gain and digital gain as low as possible. The higher the gain, the worse the signal-to-noise ratio and overall image quality.

Save settings and reference images:

4

Optionally, you can grab and safe an image of the white reference, a dark image (captured with covered lens) and the camera settings you came up with for future reference. For information on grabbing and saving images and user settings refer to the GCT user manual.

7.4 Creating flat field correction tables

Flat field correction (FFC) is used to eliminate vertical stripes and inhomogeneities in the image caused by fixed pattern noise of the image sensor, vignetting of the lens and non-uniformity of illumination.

FFC can be performed in-camera using separate correction datasets **for dark signal non-uniformity** (**DSNU**) and **photo response non-uniformity** (**PRNU**).

The camera is delivered with generic factory FFC datasets (factory calibrated DSNU and PRNU correction tables).

Once the operating conditions are set, user DSNU and PRNU correction tables should be created and used instead of the Factory settings in order to achieve optimal scan results.

When the operating conditions change (e.g. when the lens is changed, the camera is repositioned, the aperture is adjusted, or illumination, sensor gain or exposure time is changed) the user DSNU and PRNU datasets should be updated to match the new operating conditions.

User DSNU and PRNU datasets can be created or updated using in-camera calibration wizards.

Make sure that image sensor, lens, illumination, and white reference target are free of dust and dirt before creating or updating your user DSNU and PRNU datasets.

> **NOTICE** To avoid damage to the camera, please contact Chromasens support for instructions on image sensor cleaning.

- When you execute the **Calculate User Coefficients** command, the **DSNU** calibration wizard will automatically capture a dark image, calculate a new DSNU correction table from the dark image and overwrite the existing **User DSNU Dataset** with the newly created table.

  Therefore, make sure to cover front lens and/or turn the illumination off before executing the command.

- In a similar way, the **PRNU** calibration wizard will capture and use an image of the (moving) white reference to calculate and overwrite the **User PRNU Dataset.**

- Both images must be captured under typical operating conditions. Refer to section 7.3 for required camera adjustments and further details on the white reference target.

  DSNU and PRNU calibration can be performed either in free-run mode or with external line and/or frame triggers. Sometimes it is easier to perform the calibration in free-run mode, even if the camera is operated in normal mode with external line and or frame triggers. You might want to prepare a special user set for this purpose and download it to the computer for later use. Make sure to set up the camera accordingly or upload the user set to the camera that may have been prepared before for this purpose. Refer to section 7.3 for camera adjustment in free-run mode and to section 5.3 for setting up external triggers or encoder signals.

  In any case, it is important to perform FFC calibration under typical operation conditions, this means:

- Camera sensor and illumination should already have reached normal operating temperature before you start the calibration.

- Sensor gain, exposure time, and when possible, also line rate should correspond to the parameters in normal operation.

- The white reference target should be placed exactly in object plane and should move during the PRNU calibration.

  If a PRNU calibration with moving object is not possible, the camera can be slightly defocused for the PRNU calibration, for example. However, optimal results can only be achieved under the above-mentioned operating conditions.

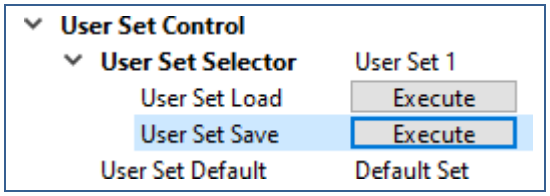
- To create or update the DSNU and PRNU correction tables, follow the steps below.

Safe or restore camera settings for FFC calibration:

1

*Currently only one user set (**User Set 1**) can be stored in the camera and saving it will overwrite the previous setting, but you can download user settings from the camera as files to your computer and restore them for later use. The same applies to user DSNU and PRNU correction tables. Please refer to the GCT manual for details about uploading and downloading files from/to the camera.*

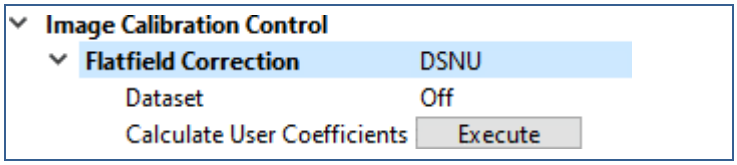
- When you use different settings for calibration and normal operation, it is recommended to save the settings used for FFC calibration to **User Set 1** and download this user setting also to a file on your computer and restore it for later re-calibrations.
- To save the current camera settings to **User Set 1**, select **User Set 1** in the **User Set Selector** of the **User Set Control** feature group, then execute the **User Set Save** command.



Generate User DSNU correction:

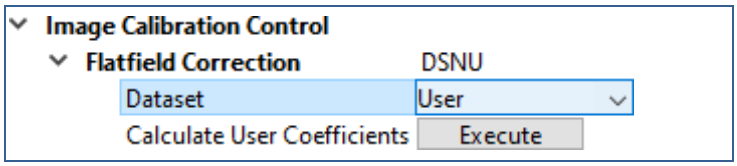
2

- Open the **Image Calibration Control** feature group and select DSNU in the **Flatfield Correction** selector. Cover the lens, then execute **Calculate User Coefficients** to update/overwrite the user DSNU correction of the camera.



The calibration will capture approximately 500 lines and may take several seconds to complete. Please don't forget to remove the lens cover when the calibration is finished.

- If you want to apply the newly created DSNU correction to subsequent scans, select Dataset **User** for the DSNU Flatfield Correction.

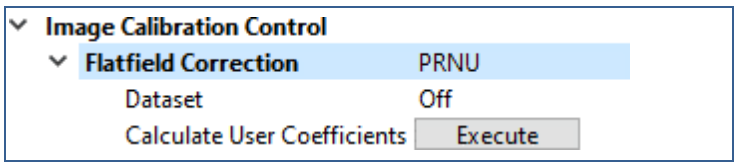


Generate User PRNU correction:

3

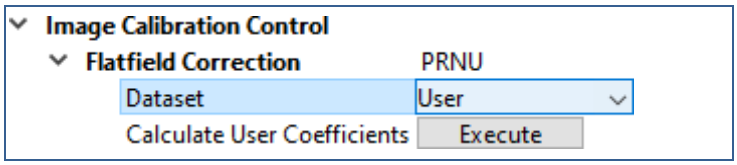
- At the **Flatfield Correction** feature, select **PRNU**.

  Open the Lens cover and make sure that the white reference target is moving and covers the complete scan area for at least 300 scan lines before you execute **Calculate User Coefficients**.



  This will update/overwrite the user **PRNU** correction of the camera.

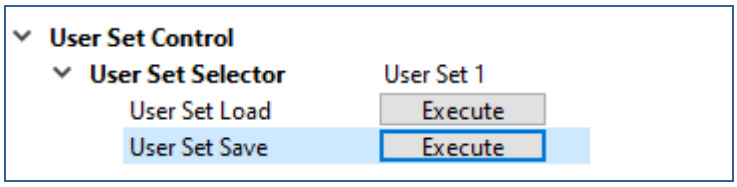
- If you want to apply the newly created PRNU correction to subsequent scans, select Dataset **User** for the PRNU Flatfield Correction.



Save settings and reference images:

4

- If you want the **User DSNU** and **PRNU Dataset** to be activated in **User Set 1**, save the current settings to **User Set 1** in the **User Set Selector** of the **User Set Control** feature group by executing the **User Set Save command**. Please note that the user set only stores which dataset to use (**Factory Setting**, **User** or **Off**), not the user DSNU or PRNU correction tables itself.

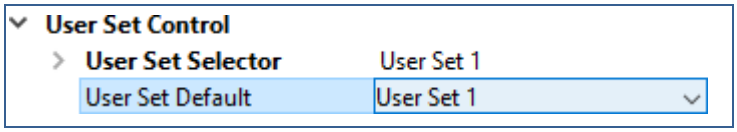


- Optionally, you can grab and safe an image of the white reference and a dark image for reference and backup the user set and DSNU and PRNU correction tables you came up with by downloading them from the camera. Refer to the GCT user manual for details on downloading those files from the camera.

Optionally customize your camera boot setting:

5

- If you want the camera to boot with the settings saved in **User Set 1**, select **User Set 1** at the **User Set Default** feature.



8 Troubleshooting and support

The troubleshooting information in this chapter may help you to identify common problems and lets you know how to solve them.

If you are not able to solve the problem with the information in this troubleshooting chapter, you may decide to contact Chromasens technical support for further help. Before you contact Chromasens technical support, look at the support form (see section 8.2) and prepare the answers or fill out the form completely. With this information you can make sure that you have most of the information available which is required for the technical support team to help you best with your problem.

8.1 Returning material (obtain an RMA number)

Before returning material to Chromasens you must request an RMA number (Return Material Authorization). This RMA number must be stated in all your delivery documents if material is returned to Chromasens. Returned material without RMA number may not be processed in time and we also reserve the right to reject material without an RMA number.

To obtain an RMA number, contact Chromasens support first.

Chromasens GmbH
Max-Stromeyer-Straße 116
78467 Konstanz
Germany

Phone: +49 (0) 7531 - 876-0
Fax: +49 (0) 7531 - 876-303
E-Mail: support@chromasens.de
Internet: https://www.chromasens.de

For return of material, you should use the original packaging material to avoid any damages to the cameras.

8.2 Temperature warnings and errors

The camera issues warning and error messages when the temperatures of camera mainboard or the image sensor exceed certain thresholds.

Error Code	Error Description	Threshold °C [1]
DEV_CTRL_WARNING_BOARD_TEMPERATURE_TOO_HIGH	Warning! The mainboard temperature is too high! You need to provide cooling for the camera.	70
DEV_CTRL_ERROR_BOARD_TEMPERATURE_TOO_HIGH	Error! The mainboard temperature is too high! You need to shut down and cool the camera!	80
DEV_CTRL_WARNING_SENSOR_TEMPERATURE_TOO_HIGH	Warning! The image sensor temperature is too high! You need to provide cooling for the camera.	50
DEV_CTRL_ERROR_SENSOR_TEMPERATURE_TOO_HIGH	Error! The image sensor temperature is too high! You need to shut down and cool the camera! The sensor clock is turned off. Please reboot the camera to recover from this error.	55

[1] warning/error is triggered when the temperature exceeds this threshold.

For information about permissible temperatures and cooling, see sections 2.4 and 5.5.

NOTICE Check the camera and image sensor temperature regularly and, in the event of an error, immediately follow the instructions specified in the error description to prevent damage to the product.

8.3 Before contacting Chromasens technical support

If you have a problem with the camera and decide to contact Chromasens technical support, it is very important that you collect all relevant information beforehand.

This ensures fast and efficient problem solving with the Chromasens technical support.

We recommend using the form in appendix 9.1 as a guideline to collect the most relevant information. You can also download the form from our support website https://www.chromasens.de/support.

Please fill out this form and provide the data including the requested files before you contact Chromasens technical support.

9 Appendix

9.1 Support request form

Contact Data			
Company name			
Name			
E-Mail		Phone	
Street		City	
Zip code		State/Country	
Contact person CS		Date	

Technical Information				
System Information				
Camera type	☐allPIXA SWIR GigE		☐ 1k	☐ 512
Camera serial number				
GCT version used				
Operating system				
Network Cable	Category			
	Type		Length	m

Problem Description	
Description of the problem (as detailed as possible)	
When did the problem occur?	☐ after start ☐ during operation
	☐ at a specific action, please describe:
How often did the problem occur?	☐ once ☐ always
	☐ regularly ☐ rarely please describe:
Did the application ever run ok	☐ yes ☐ no
If known, please describe the reason for the problem or any abnormal behavior	

Image and Parameter Files provided	
Camera settings	☐ (It is very important to provide the camera settings used when the problem occurred. Save and download them as user setting from the camera as described in the GCT manual)
Live images	☐ (Live or test images showing the problem. Save images in TIF format.)
GCT Message log	☐ (Message log can be shown in GCT by clicking Show message log window in the lower right corner of the GCT window. Select all text in the window, then copy and paste it to a new text file.)

9.2 Mechanical specification

9.2.1 Mechanical dimensions of the allPIXA SWIR GigE camera

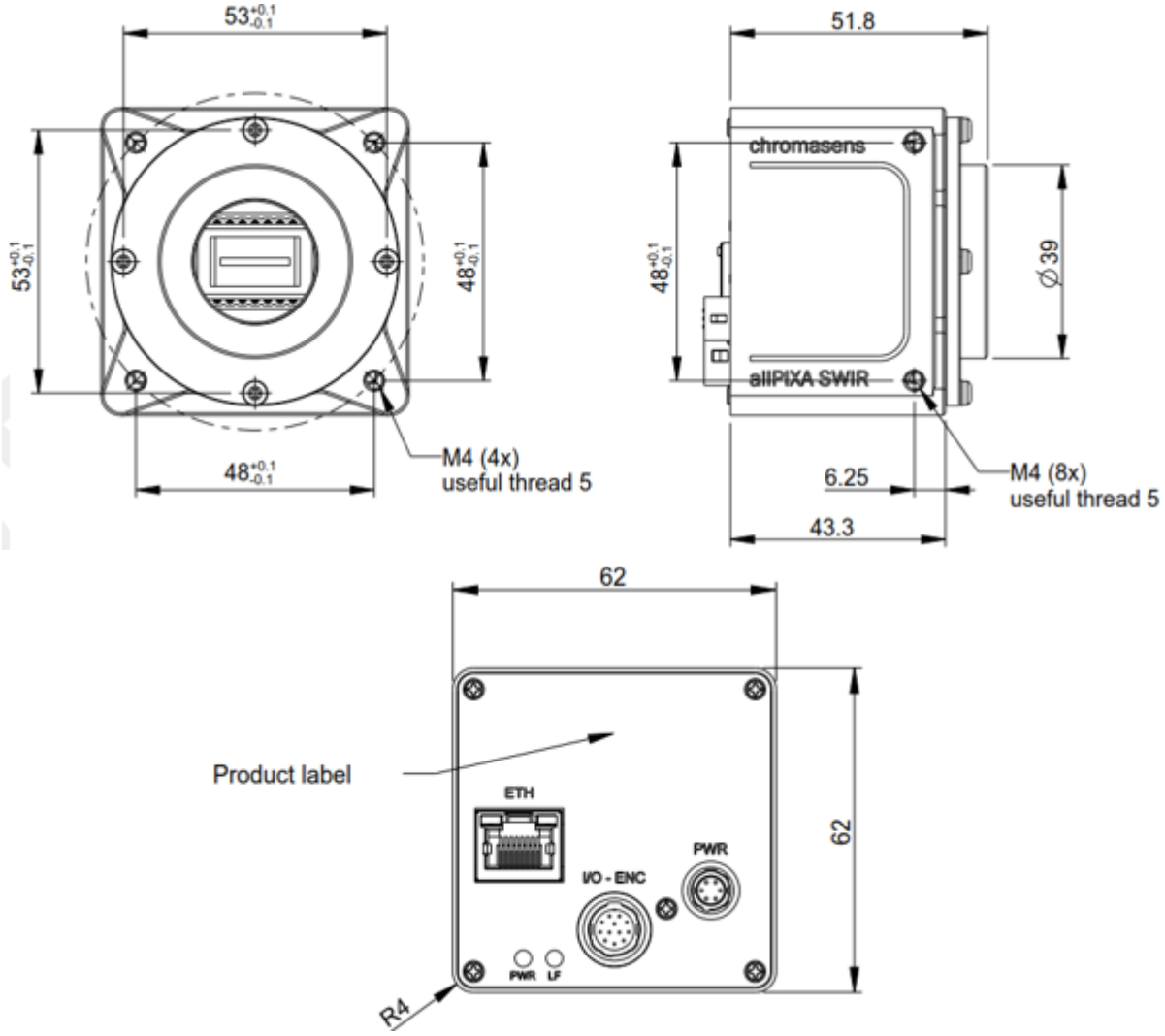


Figure 16: Mechanical dimensions of the allPIXA SWIR camera

9.3 Adapters and accessories

The allPIXA SWIR camera is delivered with a C-Mount adapter. An F-Mount adapter is available as an accessory and must be ordered separately.

9.3.1 Power supply connector and cables

Following power supply cables can be used for the allPIXA SWIR:

Order Code	Description
CP000430	allPIXA Power Supply (1,5m, banana plugs)
CP000504	allPIXA Power Supply (5m, banana plugs)
T18419	TAG-7 Power Supply cable (5m, ferrules)

The power supply connector is also available separately:

Manufacturer: Hirose

Manufacturer Order Code: HR10A-7P-6S(73) “female”
(male counterpart is located on the camera)

Chromasens Order Code: CP000459

For pin assignment of the power supply connector: see section 5.1.1

9.3.2 C-Mount adapter

Order code	Description
T19212	C-Mount adapter (included in standard scope of delivery)

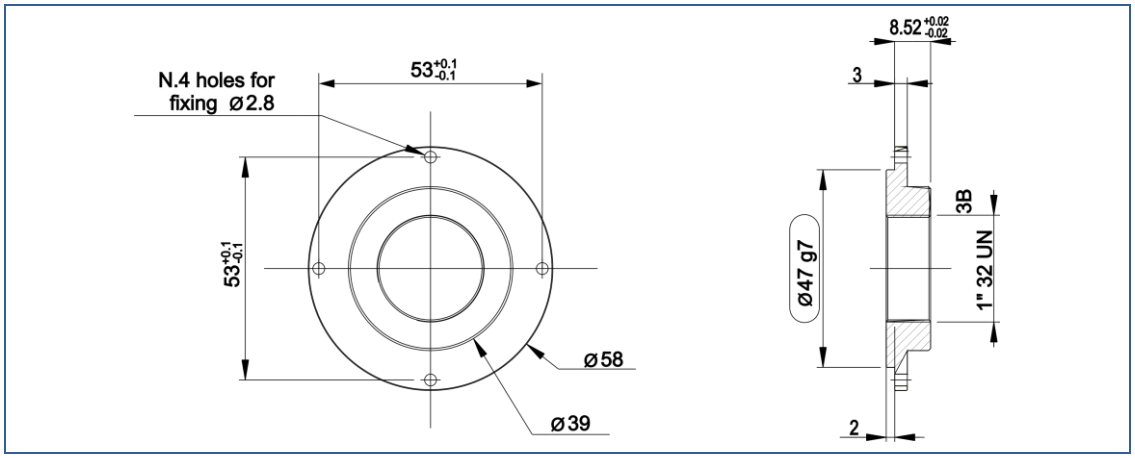


Figure 17: C-Mount adapter dimensions

9.3.3 F-Mount adapter

Order code	Description
T19014	F-Mount adapter (order separately if needed)

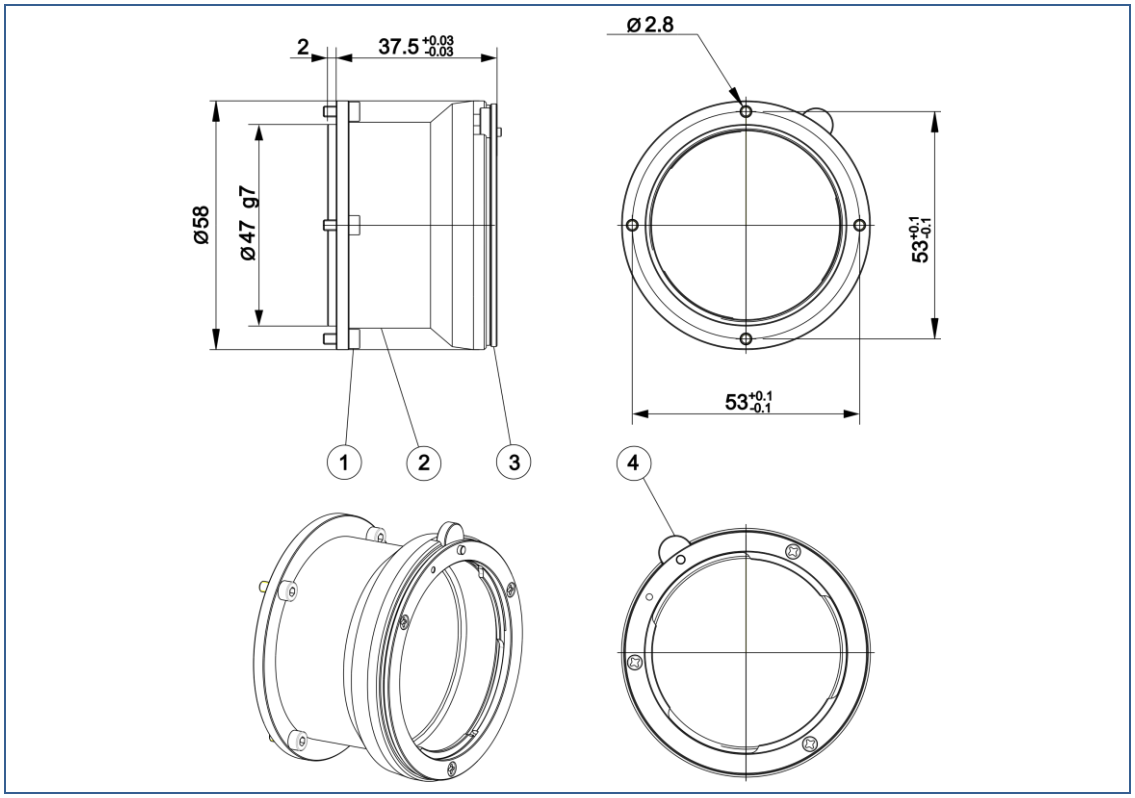


Figure 18: F-Mount adapter dimensions

#	Description	#	Description
1	Fastening screw	3	Fastening ring
2	Adapter	4	Release button

9.3.4 I/O Cables

The I/O cable is available in two variants:

Order Code	Description	Length
T18445	TAG-7 12 PF HIROSE PLUG STRAIGHT OPEN LEADS CABLE	5 m
T18446	TAG-7 12 PF HIROSE PLUG RIGHT ANGLE OPEN LEADS CABLE	5 m

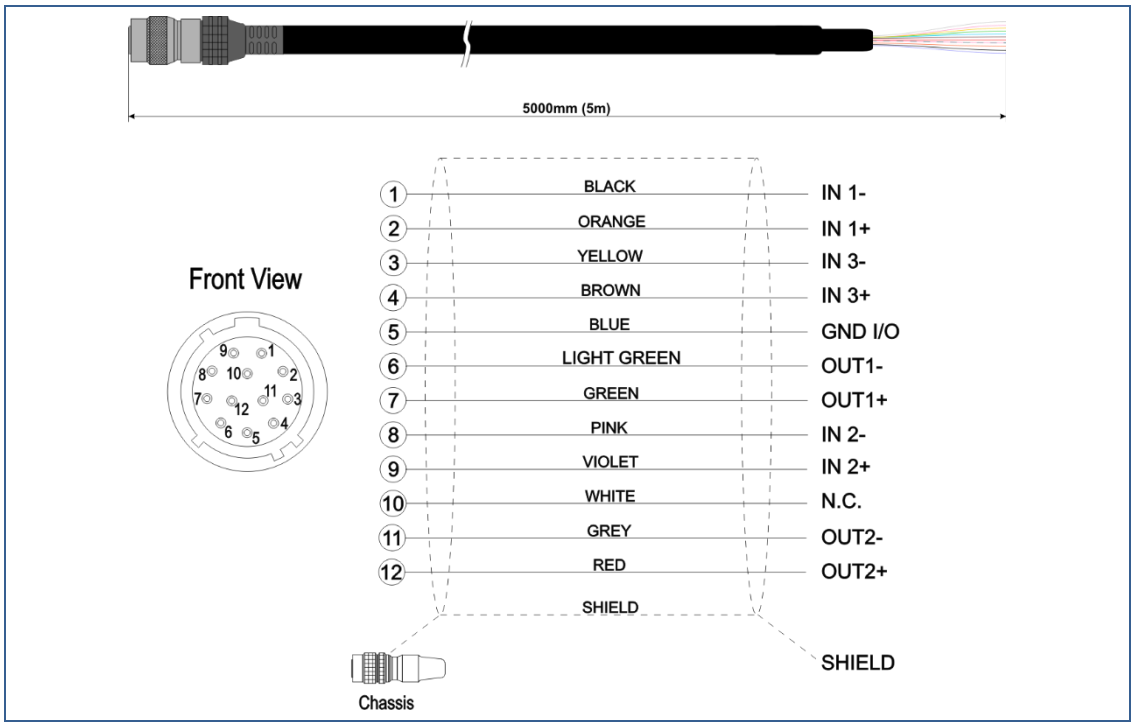


Figure 19: T18445, TAG-7 12 PF HIROSE PLUG STRAIGHT OPEN LEADS CABLE

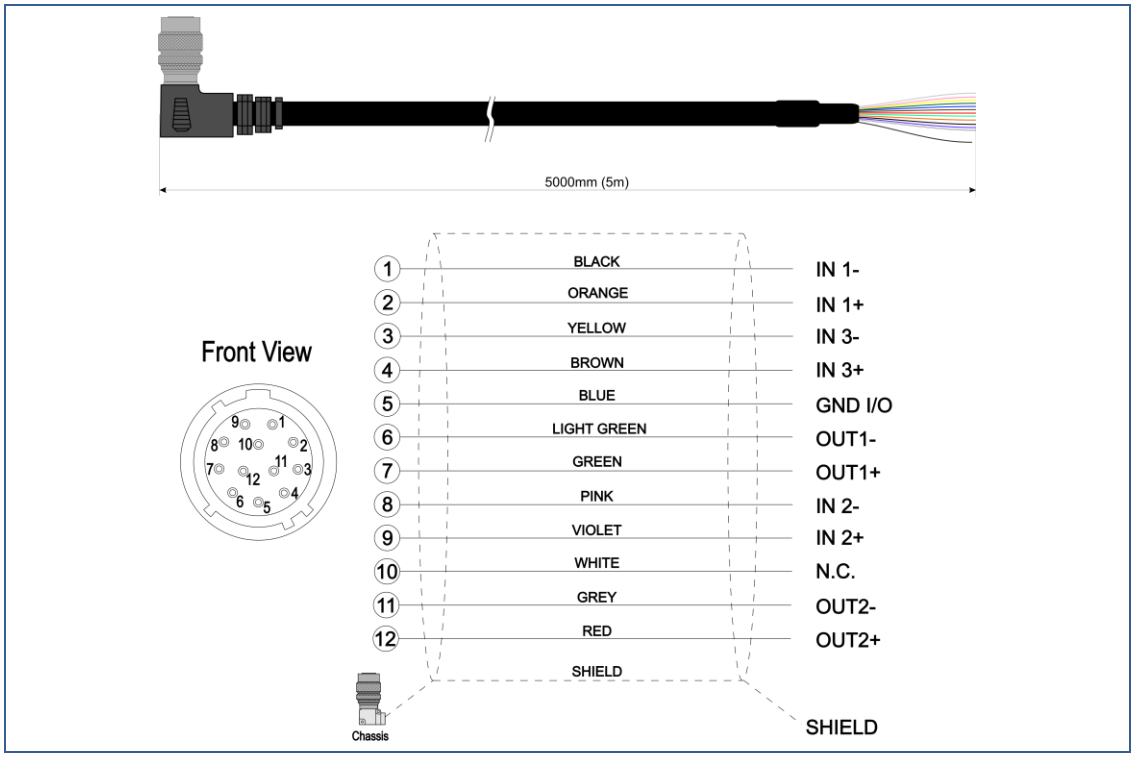


Figure 20: T18446, TAG-7 12 PF HIROSE PLUG RIGHT ANGLE OPEN LEADS Cable

9.4 EU declaration of conformity for allPIXA SIWR GigE cameras

chromasens Imaging for Professionals	**EU Declaration of Conformity**	DCE_ CP000700_GE_R01

We declare that the following products comply with the requirements of the listed directives and standards. Each type listed below, stands for all its related model variants.

Designation:	High speed InGaAs line scan camera with GigE-Interface
Series:	Chromasens allPIXA SWIR GigE
Types:	**CP000700-IR**-xxx-**GE**-yyy (all derivations)

Manuafcturer authorized representive:	**Chromasens GmbH** Max-Stromeyer-Str. 116 D-78467 Konstanz Germany www.chromasens.com

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

Electromagnetic compatibility	2014/30/EU	of February 26, 2014
RoHS	2011/65/EU	of June 8, 2011

Applied standards:

Risk Assessment:

- DIN EN ISO 12100:2011-03

Electromagnetic Compatibility Emission:

- DIN EN 61000-6-4: 2020-09
- DIN EN 55032:2016-02

Electromagnetic Compatibility Immunity:

- DIN EN 61000-6-2:2019-11
- DIN EN 61000-4-2:2009-12
- DIN EN 61000-4-3:2021-11
- DIN EN 61000-4-4:2013-04
- DIN EN 61000-4-5:2019-03
- DIN EN 61000-4-6:2014-08

The notified body (Reg. No. D-PL-19366-01-01) performed measurements of Electromagnetic compatibility and issued the certificate: 29PBI009808-01 dated 2022-01-13

Konstanz, February 7, 2022

Martin Hund, CEO

9.5 EU declaration of conformity for allPIXA SIWR CameraLink cameras

chromasens Imaging for Professionals	**EU Declaration of Conformity**	DCE_ CP000700_CL_R01

We declare that the following products comply with the requirements of the listed directives and standards. Each type listed below, stands for all its related model variants.

Designation:	High speed InGaAs line scan camera with CameraLink-Interface
Series:	Chromasens allPIXA SWIR CL
Types:	**CP000700-IR**-xxx-**CL**-yyy (all derivations)

Manuafcturer authorized representive:	**Chromasens GmbH** Max-Stromeyer-Str. 116 D-78467 Konstanz Germany www.chromasens.com

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

Electromagnetic compatibility	2014/30/EU	of February 26, 2014
RoHS	2011/65/EU	of June 8, 2011

Applied standards:

Risk Assessment:

- DIN EN ISO 12100:2011-03

Electromagnetic Compatibility Emission:

- DIN EN 61000-6-4: 2020-09
- DIN EN 55032:2016-02

Electromagnetic Compatibility Immunity:

- DIN EN 61000-6-2:2019-11
- DIN EN 61000-4-2:2009-12
- DIN EN 61000-4-3:2021-11
- DIN EN 61000-4-4:2013-04
- DIN EN 61000-4-5:2019-03
- DIN EN 61000-4-6:2014-08

The notified body (Reg. No. D-PL-19366-01-01) performed measurements of Electromagnetic compatibility and issued the certificate: 29PBI009908-01 dated 2022-01-13

Konstanz, February 7, 2022

Martin Hund, CEO

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