IDS

uEye LE USB 3.1 Rev. 1.2

Technical Manual

uEye+
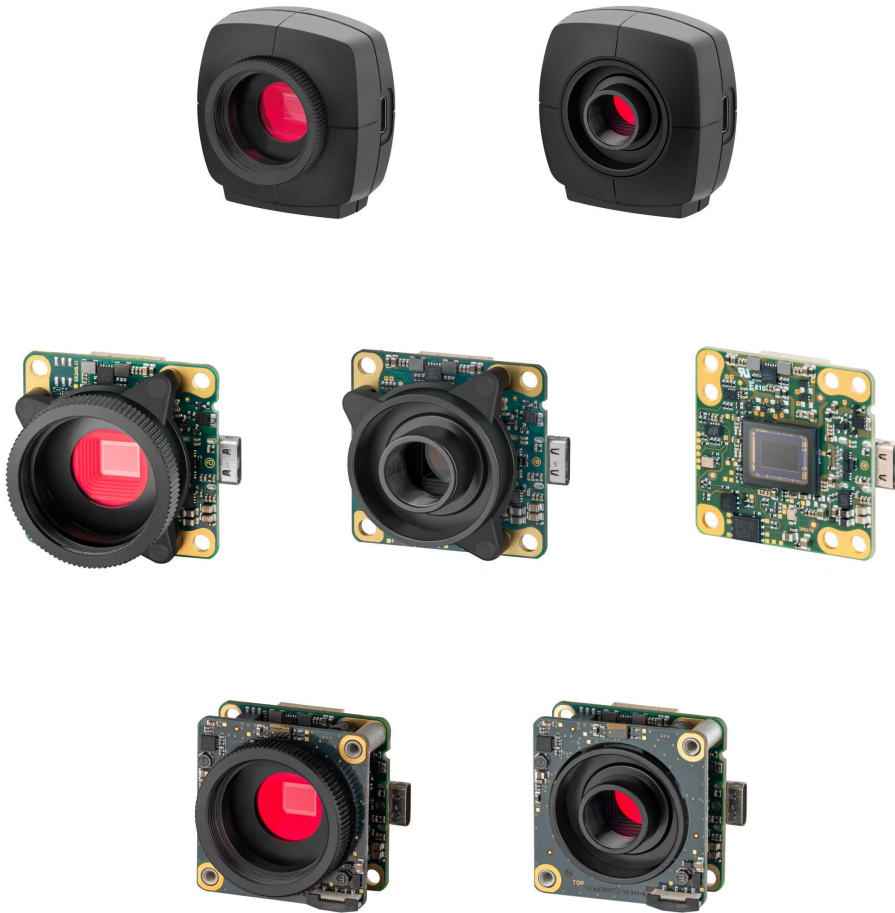
Imprint

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Contents

1 Symbols and hints

This symbol indicates hints with useful information for better understanding and using features and functions.

This symbol indicates important warnings for product safety to prevent damage.

This symbol indicates important warnings for personal safety to prevent injury.

2 Safety instructions

Read carefully these safety instructions before installing and using the product. The producer is not responsible for damages and injury, which can occur due to false handling of the product and ignoring the safety instructions. All warranty will be spoiled in this case.

Intended use

IDS industrial cameras are to be used to capture images for visualization and image processing tasks. They are designed for use in industrial environments. Observe the requirements for the proper use of this product. Failure to do so will render the warranty void.

- The product is not authorized for use in security relevant applications. If it is used in security relevant applications, the customer is responsible for the necessary approvals.

- If the product is modified or changed, all approval becomes invalid. In this case, the customer is responsible for ensuring product conformity.

- The warranty expires if the product is improperly disassembled, reworked or repaired by the customer or a third party and IDS Imaging Development Systems GmbH assumes no liability for defects. If you need service, please contact the support team.

- The product is not a toy. Operate and store out of the reach of children.

Protection against electrostatic discharge (ESD)

Board-level cameras are especially sensitive to electrostatic discharge. Make sure to avoid mechanical or electrical damage of the printed circuit board or its connections. Wear ESD-protective clothing and observe the rules for handling ESD-sensitive components.

- Do not touch the printed circuit board while it is powered.

- Always hold the board by the edges to avoid the risk of electrostatic discharge damage.

- For optimum ESD behavior, a clearance of 4 mm from non-shielded housings must be maintained all the way around. For shielded housings, a smaller clearance is possible.

- Attach the board to a conductive surface using the fixing screws. If this is not possible, ensure an insulating connection.

- Use connecting cable with a low-resistance shield on both sides.

Installation, operation and maintenance

The product must be connected, taken into operation and maintained only by appropriately qualified personnel. The error-free and safe operation of this product can only be ensured if it is properly transported, stored, set up and assembled, and operated and maintained with due care. The installation, inspection, maintenance, extension, and repair may only be done by authorized personnel.

- Observe the specifications in the documentation when installing the product.

- Do not subject the product to direct sunlight, moisture or shock. Ensure that the IP code of the product meets the requirements for the ambient conditions.

- Only operate the product under ambient conditions for which the respective product is approved. The use under other ambient conditions may result in damage.

- To avoid any damage to the connectors, only mount or remove the product with the cables disconnected.

- Lay cables in such a way that no one is endangered.

- Before starting up, check if the electrical wiring corresponds to the specifications in the documentation. Faulty wiring (overvoltage, undervoltage) can result in a damage in the electronics.

Transport

- Only use ESD packaging for storage and transport of ESD-sensitive components.

- Keep packing materials like films away from children. Abuse may result in suffocation.

Operation and power supply

The camera power supply must meet the requirements for SELV (safety extra low voltage)/LPS (limited power source) or ES1/PS2.

WARNING! A USB hub with external power supply may cause painful or dangerous electric shock. Serious injury or death may occur. Use a USB hub that meet the requirements for SELV (safety extra low voltage)/LPS (limited power source) or ES1/PS2.

Avis pour le Canada
Fonctionnement et alimentation électrique

L'alimentation électrique de la caméra doit être conforme aux exigences de sécurité SELV (très basse tension de sécurité)/LPS (source à puissance limitée) ou ES1/PS2.

AVERTISSEMENT ! Sur un concentrateur USB équipé d'une alimentation externe, il existe des risques de décharges électriques douloureuses ou dangereuses. Celles-ci peuvent provoquer des blessures graves, voire mortelles. Utilisez un concentrateur USB conforme aux exigences de sécurité SELV (très basse tension de sécurité)/LPS (source à puissance limitée) ou ES1/PS2.

CAUTION! As the camera housing may get hot depending on the operating conditions there may be risk of burns. Provide sufficient heat dissipation so that the housing temperature does not exceed 55 °C (131 °F).

Correct disposal

Dispose the camera and accessories properly and separately from other types of waste to encourage recycling of reusable materials and to protect the environment.

According to the EC Directive 2012/19/EU (WEEE) we are obliged to take back this product, distributed by us after August 13, 2005, free of charge at the end of its useful life and to ensure it correct disposal. As this product is exclusively for commercial use (B2B), it must not be handed over to a public disposal facility. The product can be disposed of by specifying the date of purchase and the serial number at the following address:

IDS Imaging Development Systems GmbH
Dimbacher Str. 10
D-74182 Obersulm, Germany

3 uEye LE USB 3.1 Rev. 1.2

Housing/board-level	+/+
Dimensions height x width x length	Housing version: 47 x 46 x 24.3 mm PCB version: 36 x 36 x 8.6 mm PCB version with CS-mount: 36 x 36 x 19.7 mm PCB version with S-mount: 36 x 36 x 19.9 mm
Mechanical specifications	Mechanical specifications
IP code housing version	**IP 30** • Protection against the ingression of small particles (diameter ≥ 2.5 mm) • No protection against water
IP code PCB version	**IP 00** • No protection against the ingression of particles • No protection against water
Ambient conditions	Ambient conditions
Lens mount	S-/C-/CS-mount, see Optical specifications
Mounting holes bottom/top/side/front	Housing version: 2/0/0/0 PCB version: 4x rear, see Notes on PCB version
Thread diameter	M2.5
Status LED	Status LED
Interface connector	USB Type-C®
Power supply	USB
I/O connector	10-pin connector
Electrical specifications	Electrical specifications
Special features	Internal pixel preprocessing

USB 3/USB 3.1 uEye+ cameras are limited usable under USB 2.0. Depending on the camera model, not all camera functions are available in USB 2.0 mode. USB 3/USB 3.1 uEye+ cameras are optimized for USB 3.0 ports and are not tested by IDS Imaging Development Systems GmbH under USB 2.0.
Please note that due to the high performance of modern sensors, some USB 3/USB 3.1 uEye+ models are not supported in USB 2.0 mode anymore, as the USB 2.0 interface does not provide enough power.

3.1 Standards and directives

Housing version

PCB version

3.1.1 Housing version

IDS Imaging Development Systems GmbH hereby confirms that this product has been developed, designed and manufactured in compliance with the following European directives:

- 2014/30/EU: EMC - Electromagnetic compatibility

- 2011/65/EU: RoHS - Restriction of the use of certain hazardous substances in electrical and electronic equipment

- Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

- The CE declaration of conformity is available on the IDS website.

If the product is modified or changed all approval becomes invalid. In this case the customer is responsible for ensuring product conformity.

Product type	uEye LE USB 3.1 Rev. 1.2
Information for CE EMC specifications	EN 61000-6-2 EN 61000-6-3* EN 55032 (Class B)
Information for USA This equipment has been tested and found to comply with part 15 of the FCC Rules.	Class B
Information for Canada **Renseignements pour le Canada**	CAN ICES-3 (B)/NMB-3(B)
Information for UL	UL Listed UL 62368-1 CAN/CSA C22.2 No. 62368-1-14
Information for UK EMC specifications	UKCA EN 61000-6-2 EN 61000-6-3* EN 55032 (Class B)
Further Information	RCM KC (R-R-img-USB31LE) ChinaRoHS EFUP 25

* Cameras are intended for use in industrial, residential, commercial and light industrial environments.

For customers in the USA

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and Receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Name of Responsible Party
IDS Imaging Development Systems Inc.
92 Montvale Ave, Suite 4750
02180 Stoneham, MA | U.S.A
+1 781 787-0048

3.1.2 PCB version

IDS Imaging Development Systems GmbH hereby confirms that this product has been developed, designed and manufactured in compliance with the following European directives

- 2011/65/EU: RoHS - Restriction of the use of certain hazardous substances in electrical and electronic equipment

- Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Further Information

- UL Recognized
  UL 62368-1
  CAN/CSA C22.2 No. 62368-1-14

- ChinaRoHS EFUP 25

3.2 Ambient conditions

The temperature values given below refer to the outer device temperature of the camera housing. The temperature inside of the camera housing is generally higher than the outer temperature and may be up to 70 °C (158 °F).

Allowed device temperature during operation	0 °C … 55 °C 32 °F … 131 °F
U3-304xLE Rev. 1.2 Allowed device temperature during operation	0 °C … 50 °C 32 °F … 122 °F
Allowed device temperature during storage	-20 °C … 80 °C -4 °F … 176 °F
Humidity	20 % … 80 %, relative, non-condensing

Non-condensing means that the relative air humidity must be below 100 %. Otherwise, moisture will form on the camera surface. If, for example, air has a relative humidity of 40 % at 35 °C (95 °F), the relative humidity will increase to over 100 % if the air cools down to 19.5 °C (67 °F); condensation begins to form.

CAUTION! As the camera housing may get hot depending on the operating conditions there may be risk of burns. Provide sufficient heat dissipation so that the housing temperature does not exceed 55 °C/131 °F (U3-304xLE Rev. 1.2: 50 °C/122 °F).

Notes on ambient conditions

- Avoid high air humidity levels and rapid temperature changes when using IDS cameras.

- Temperatures below +4 °C (39 °F) combined with excessive relative air humidity levels can cause icing.

- Note that with increasing device temperatures, the image quality may decrease due to thermal noise, even if the camera is operated below the maximum specified temperature.

Provide sufficient heat dissipation to keep temperatures within the specified ranges. The exact temperature conditions depend on the mounting situation. In general, the following recommendations apply:

- Use a thermally-conductive surface, like a metal plate or a heat sink, for a passive heat dissipation.

- If necessary, provide an active cooling for example by means of a fan.

3.3 System requirements

For operating the cameras, the following system requirements must be met:

- Interface: USB 3.0 port (Super Speed)

- CPU/Memory: The requirements regarding CPU/memory depend on the software used for image acquisition.

Depending on the sensor model, the camera performance may be limited with the minimum system requirements.

USB interface

For best performance and stability, all USB drivers and the firmware must be updated to the latest version. Current generation CPUs with energy saving technologies can cause bandwidth problems on the USB bus.

3.4 Connecting a uEye LE USB 3.1 Rev. 1.2

> When you connect a new USB device with a PC or a new USB port for the first time, Windows update searches automatically online for a suitable driver. This may take some time depending on your system.

1. Install a USB3 Vision compliant software featuring a suitable USB driver e.g. IDS peak.

2. Connect the camera to a USB3 port on the PC either directly or using USB hubs or repeaters. The camera will be recognized automatically. When the camera has been correctly installed, the camera LED lights green.

It is recommended to connect the cameras directly to the USB ports on the mainboard to get the maximum bandwidth.

> When using a USB hub with external power supply the camera LED still may light green even if the data connection between the PC and the USB hub is interrupted after the camera driver was loaded completely.

Cables

Use USB compatible data cables that allow for USB Super Speed (5Gbit/s). Be aware of the maximum cable lengths for USB.

Notes on lens mounting

Mount only lenses that are suitable for the camera. Observe the information on the maximum immersion depth for lenses.

- Mount lenses in a dust-free environment.
- When removing the protection cap, hold the camera with the front facing downward to prevent dust or particles getting into the camera.
- Mount the lens while holding the camera with the front facing downward.
- Always store the camera and lens with the protection cap mounted.

4 Mechanical specifications

Housing/PCB version

uEye LE USB 3.1 AF Rev. 1.2

4.1 Housing/PCB version

The mechanical data for each camera model can be found on our website directly at the respective camera model beneath in the "Downloads" tab.
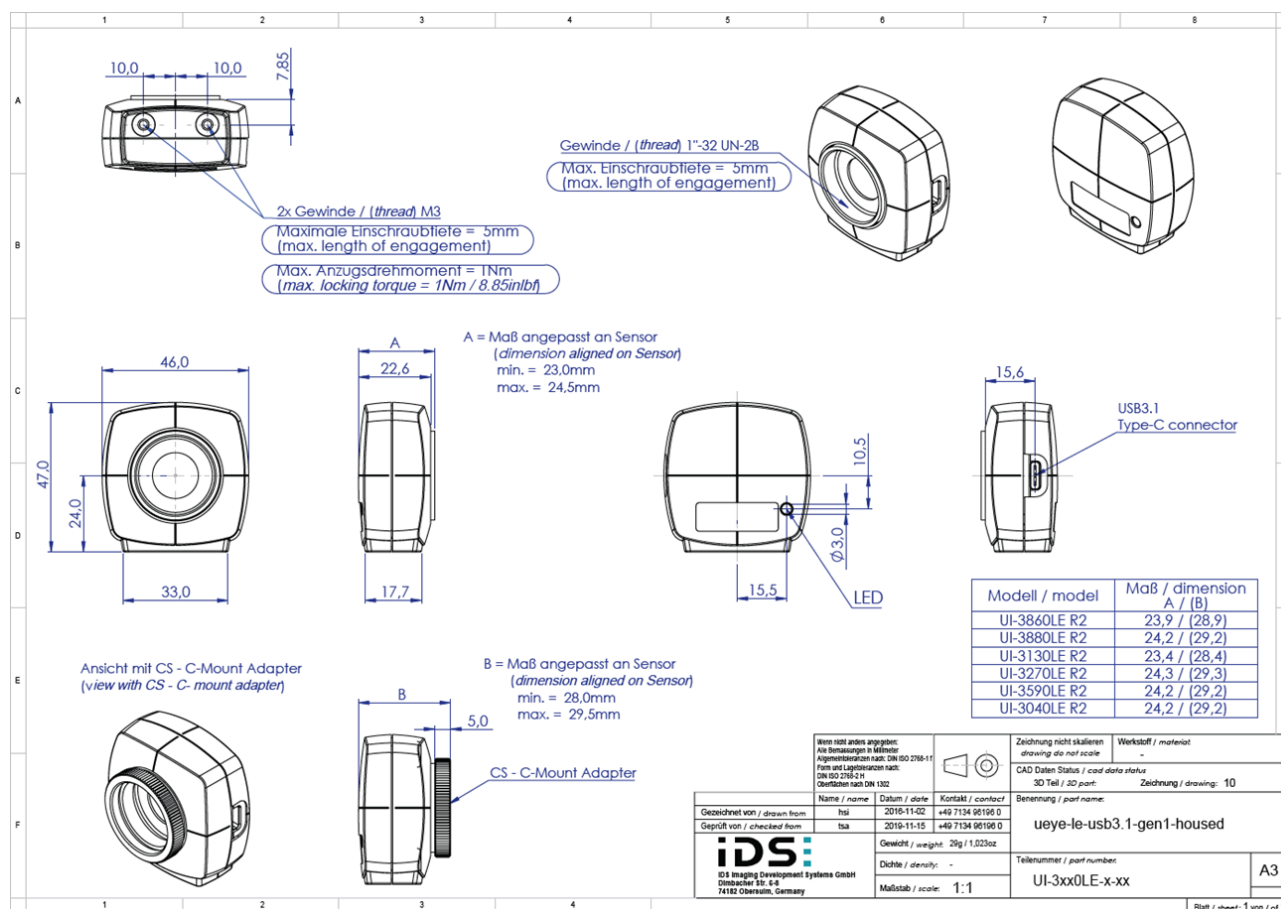

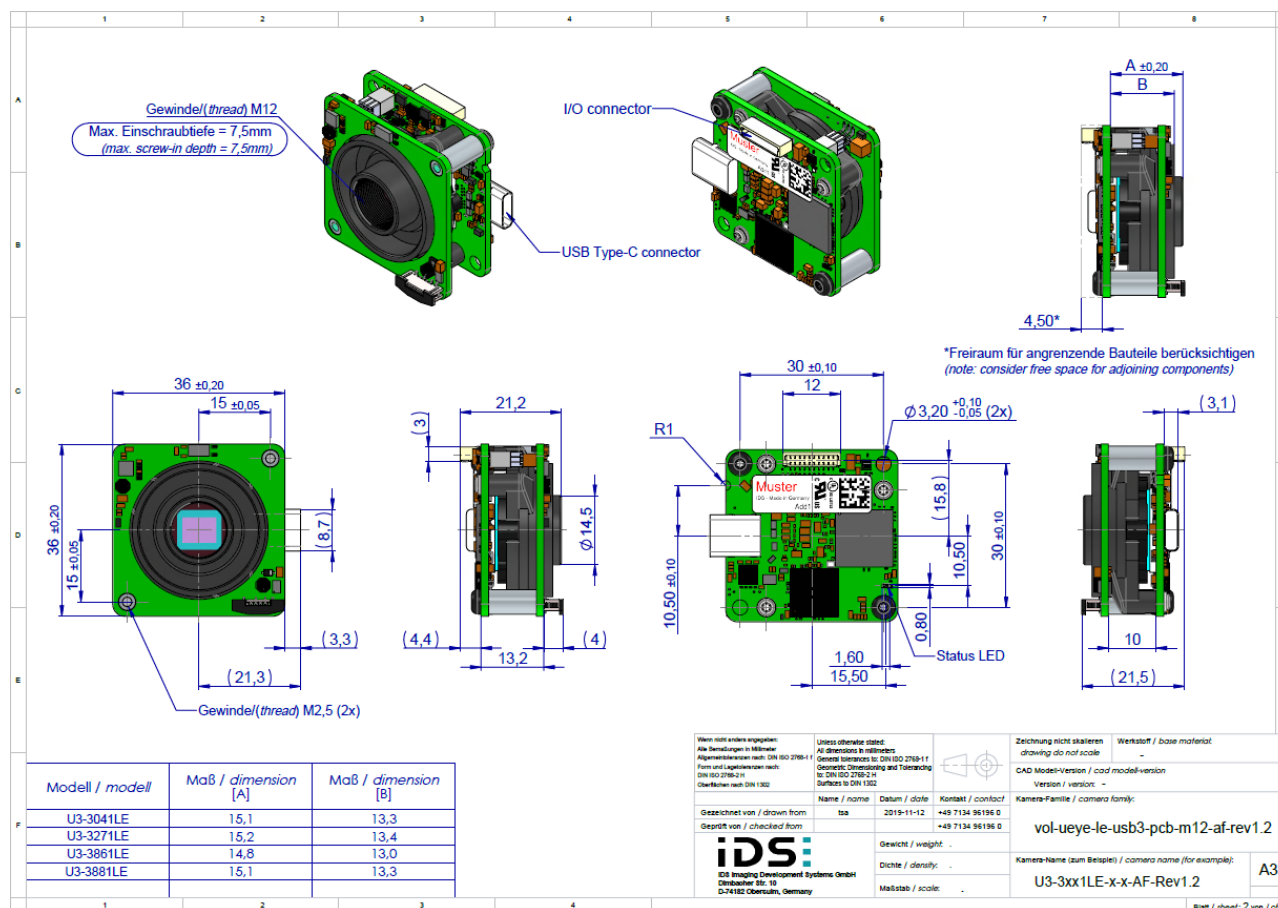Fig. 1: uEye LE USB 3.1 Rev. 1.2

NOTICE! Make sure to avoid mechanical or electrical damage of the printed circuit board or its connections. Do not touch the printed circuit board while it is powered. Always hold the board by the edges to avoid the risk of electrostatic discharge damage.

NOTICE! The camera connectors may be damaged if you install or remove the camera with plugged in cables. Therefore, first unplug the USB and/or I/O cable from the camera.

The applicable tolerances for the overall dimensions of PCBs are higher than the tolerances for housing dimensions.

4.2 uEye LE USB 3.1 AF Rev. 1.2

The camera models of the uEye LE USB 3.1 Rev. 1.2 are also available in the AF (active focus) variant.

The mechanical data for each camera model can be found on our website directly at the respective camera model beneath in the "Downloads" tab.

Fig. 2: uEye LE USB 3.1 AF Rev. 1.2

Modell / *model*	Maß / *dimension* [A]	Maß / *dimension* [B]
U3-3041LE	15,1	13,3
U3-3271LE	15,2	13,4
U3-3861LE	14,8	13,0
U3-3881LE	15,1	13,3

NOTICE! Make sure to avoid mechanical or electrical damage of the printed circuit board or its connections. Do not touch the printed circuit board while it is powered. Always hold the board by the edges to avoid the risk of electrostatic discharge damage.

NOTICE! The camera connectors may be damaged if you install or remove the camera with plugged in cables. Therefore, first unplug the USB and/or I/O cable from the camera.

Follow the manufacturer's instructions for mounting the liquid lens.

Technical data

Liquid lens specification	Corning® C-S series liquid lens with 4-pin flex cable (pitch 1 mm)

Software function

You can either control the focus directly via the IDS peak Cockpit (dialogs "Focus" and "Position and size") or use the corresponding camera parameters (**OpticControl** and "AutoFeatureFocusAuto" in the **SubRegionSelector**).

5 Notes on PCB version

Using the U3-388xLE as an example, specifications for maximum temperatures, mounting, shield and ESD protection are provided. The listed data is applicable for all uEye LE USB 3.1 Rev. 1.2 board level versions.

Temperature management
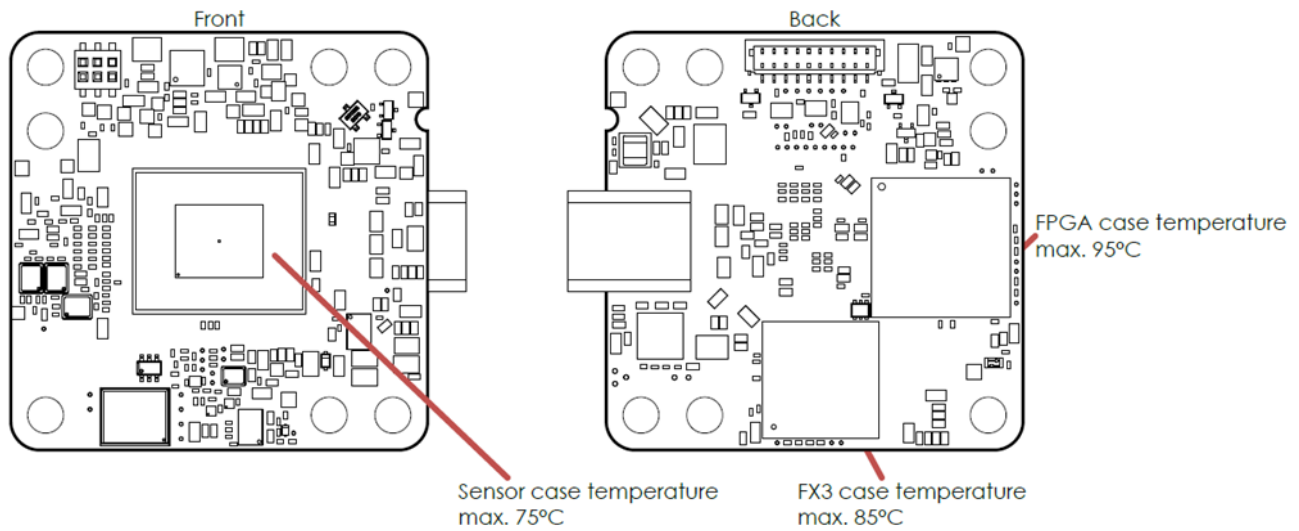
Fig. 3: Temperature information

Assembly information

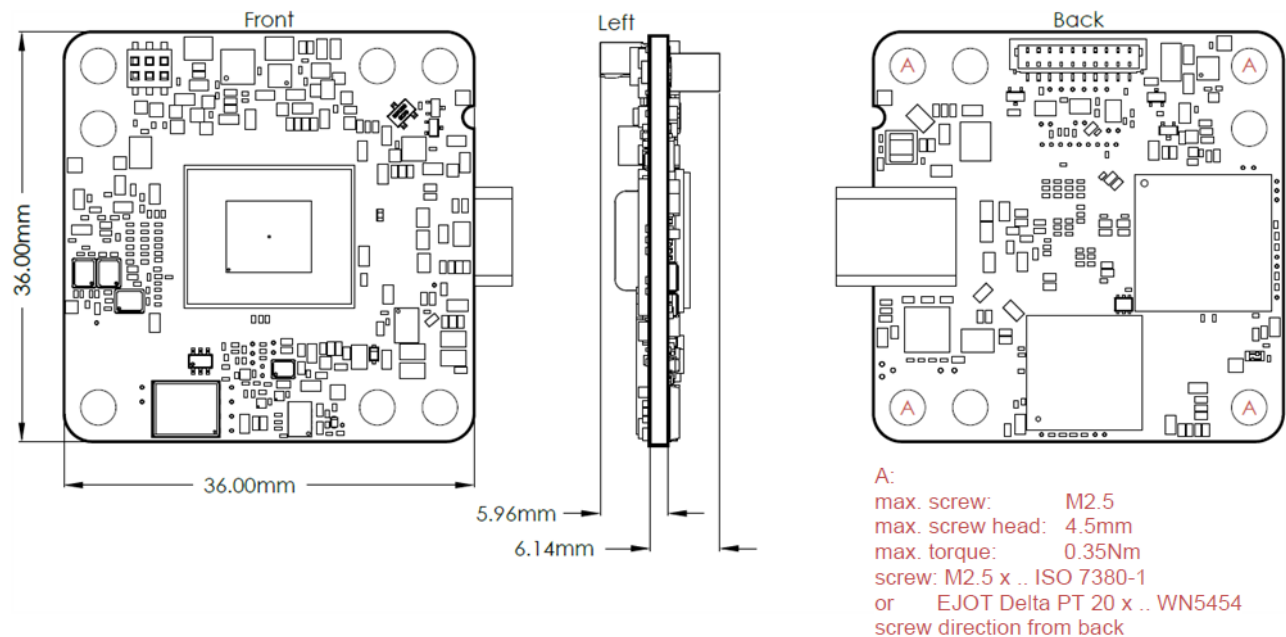The uEye LE USB 3.1 Rev. 1.2 cameras can only be assembled from back to front.

A:
max. screw: M2.5
max. screw head: 4.5mm
max. torque: 0.35Nm
screw: M2.5 x .. ISO 7380-1
or   EJOT Delta PT 20 x .. WN5454
screw direction from back

Fig. 4: Assembly information

Assembly hole attachment
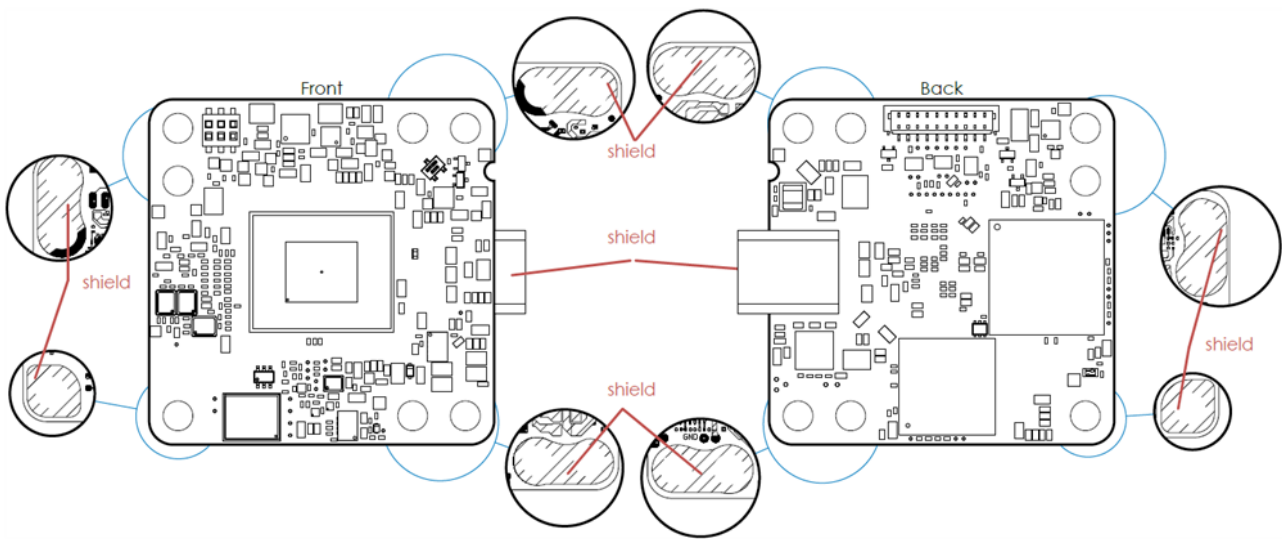
Fig. 5: Assembly hole attachment

ESD protection

- For optimum ESD protection, keep a clearance on all sides of 4 mm from unshielded housings. A smaller clearance is possible with shielded housings.

- The PCB should be mounted with the fixing screws on a base connected to the shield. If this is not possible, an insulating connection must be ensured.

- The connection cable should have a shield with low-resistance on both sides.

Front

Back
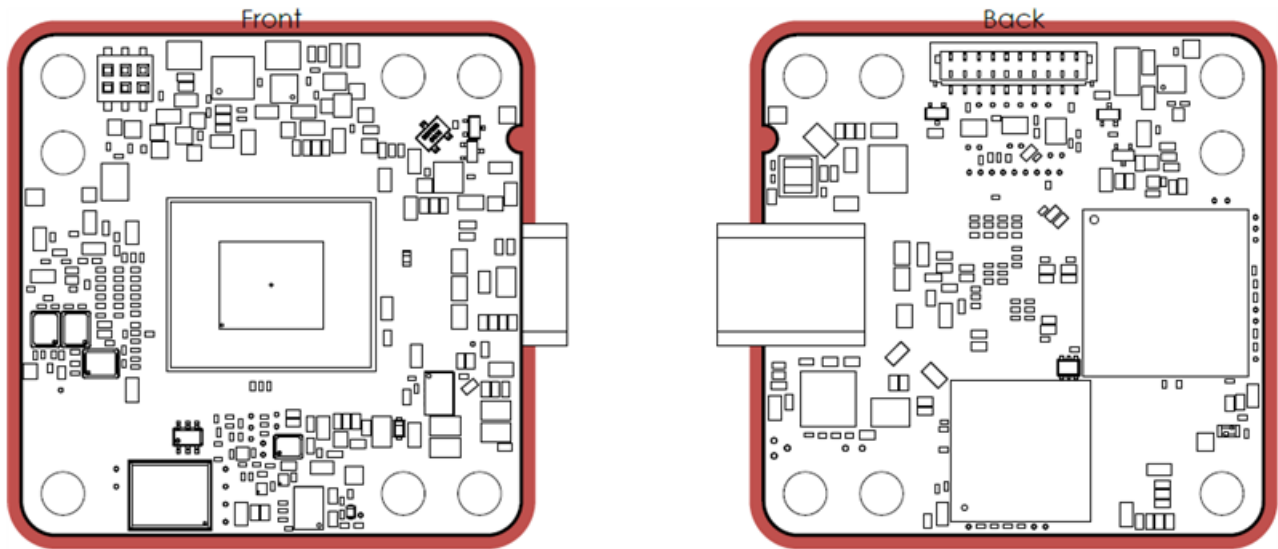
At least 4mm clearance between board outline and non-shielded housing.

For shielded housings less clerance is possible.

Fig. 6: ESD protection

6 Optical specifications

6.1 Immersion depth for lenses

Some C-mount lenses reach deep into the camera flange. This may cause the lens to push against the back of the filter glass inside the camera or even make it impossible to screw in the lens.

The table below indicates the maximum possible immersion depth. The actual immersion depth of a lens is given in the relevant data sheet. As lens parts with a small diameter are allowed to reach deeper into the camera flange, the immersion depths are specified based on the diameter (named as A, B, and C in the image below).

Beside the immersion depth also the back focal length has to be considered, that means the distance between the last lens and the sensor (named "bfl" in the image below). The back focal length can be calculated for C-mount/TFL-mount with the following formula:

$$bfl = 17,526 - x$$

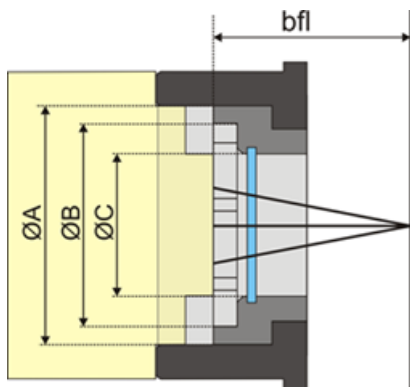x stands for the maximum immersion depth (see table below).

Fig. 7: Camera front (sectional view)

The data given in the table include the following tolerances as a safety clearance:
- Immersion depth: 0.2 mm
- Diameter: 0.2 mm

Type	Thread depth (min.)	For diameter at lens end [mm] Ø A	Resulting maximum Immersion depth [mm]	Minimum required back focal length [mm]
CS mount	6 mm	24.0	7	5.5
C-mount with extension ring	4 mm*	22.0*	12	5.5

Type	Thread depth (min.)	For diameter at lens end [mm] Ø A	Resulting maximum Immersion depth [mm]	Minimum required back focal length [mm]
S-Mount M12	7.8 mm	M12	With filter glass: 8 Without filter glass: 12	With filter glass: 6.5 Without filter glass: 1.2

* may vary depending on the inside diameter of the extension ring used

6.2 Position accuracy of the sensor

The following illustrations show the tolerance margins of the sensor position relative to the outer camera front.
A maximum error in all directions (rotation, translation) cannot occur at the same time.
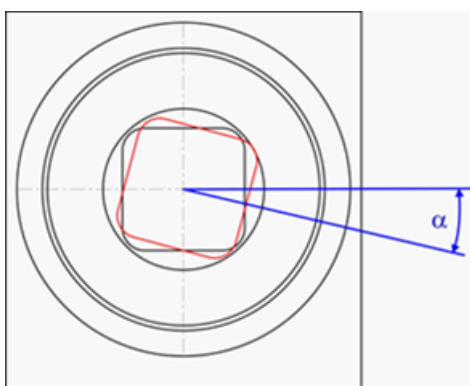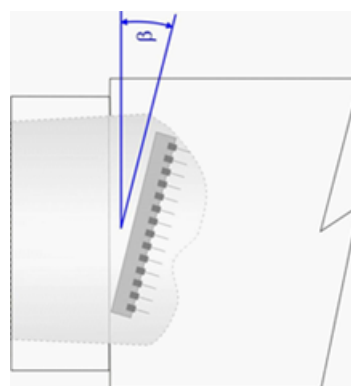

Fig. 8: Position accuracy of the sensor (1)

Fig. 9: Position accuracy of the sensor (2)

It cannot be guaranteed that the sensor cover glass or filter glass are absolutely parallel to each other.

C-mount/TFL-mount lenses can also be subject to inaccuracies of the flange back distance. The tolerance usually is ±0.05 mm. In some cases, however, the inaccuracies of camera and lens might add up, resulting in a total error > 0.05 mm.

Position accuracy, in each direction	±0.3 mm
Horizontal/vertical rotation (α)	±1.0°
Translational rotation (β)	±1.0°
Flange back distance	±0.05 mm

6.3 Notes on S-mount lenses

- The focus point of S-mount lenses may shift due to temperature changes. The effect intensity depends on the temperature change and the lens setup (lens, working distance).

- It is recommended to perform focusing in a warmed-up state and consequently to operate the camera only after it has warmed up.

- For applications with particular attention to temperature stability and for measurement applications, it is recommended to use cameras in metal housing and C-mount lenses.

7 Electrical specifications

Pin assignment I/O connector

Digital input wiring

Digital output wiring

General Purpose I/O wiring

> **NOTICE!** Make sure to avoid mechanical or electrical damage of the printed circuit board or its connections. Do not touch the printed circuit board while it is powered. Always hold the board by the edges to avoid the risk of electrostatic discharge damage.

7.1 Pin assignment I/O connector

> **NOTICE!** The General Purpose I/Os are not potential-free and have no protective circuit. Faulty wiring (overvoltage, undervoltage) can result in a damage in the electronics.

The following specifications apply to the board level versions of the uEye LE USB 3.1 Rev. 1.2. The inputs/outputs mentioned are not accessible in the housing versions.
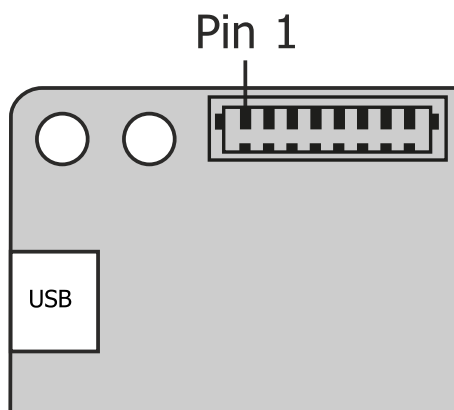
10-pin connector (Würth 665310124022)

Fig. 10: uEye LE USB 3.1 Rev. 1.2 board level version - I/O connector

Pin	Description
1	Voltage output: 5 V, max. 400 mA
2	Ground (GND)
3	General Purpose I/O (GPIO) 2, 3.3 V
4	General Purpose I/O (GPIO) 1, 3.3 V
5	I^2C clock signal (internal 10k pull-up to 3.3 V) - requires USB3 Vision Firmware 3.2 or higher

Pin	Description
6	I^{2}C data signal (internal 10k pull-up to 3.3 V) - requires USB3 Vision Firmware 3.2 or higher
7	Trigger input, without optocoupler 3.3 V
8	Flash output, without optocoupler 3.3 V
9	Ground (GND)
10	Voltage output 3.3 V, max. 300 mA ± 10 %

The color assignment of the used I/O cable is specified in the data sheet of the cable. For I/O cables from IDS Imaging Development Systems GmbH, you can find the data sheet on the website. Select the specific I/O cable in the download area and view the associated data sheet.

The maximum length of the I/O cable is 30 m. The cable must be shielded.

Power supply

The camera is supplied with power via the USB 3.0 interface. Information on the power consumption of individual camera models can be found in the model data sheet.

I^{2}C operation

The I^{2}C runs at a clock frequency of approx. 400 kHz. Multi master operation on the I^{2}C is not permitted when using the uEye LE USB 3.1 Rev. 1.2.

The following address is reserved for uEye LE USB 3.1 Rev. 1.2 / uEye LE USB 3.1 AF Rev. 1.2 cameras and must not be used: 0x77.

7.2 Digital input wiring

	Symbol	Min.	Typ.	Max.	Unit
Voltage range		0	-	3.3	V
Input high range	V_{IH}	2.0	-	3.3	V
Input low range	V_{IL}	0	-	0.8	V
Input leakage current	I_I	-	-	5	µA
Trigger pulse width (edge)		250	-	-	ns
Trigger edge steepness		0.25	-	-	V/ns

NOTICE! The digital input of the uEye LE USB 3.1 Rev. 1.2 is not potential-free and has no protective circuit.

Digital input wiring

Fig. 11: Wiring of the digital input
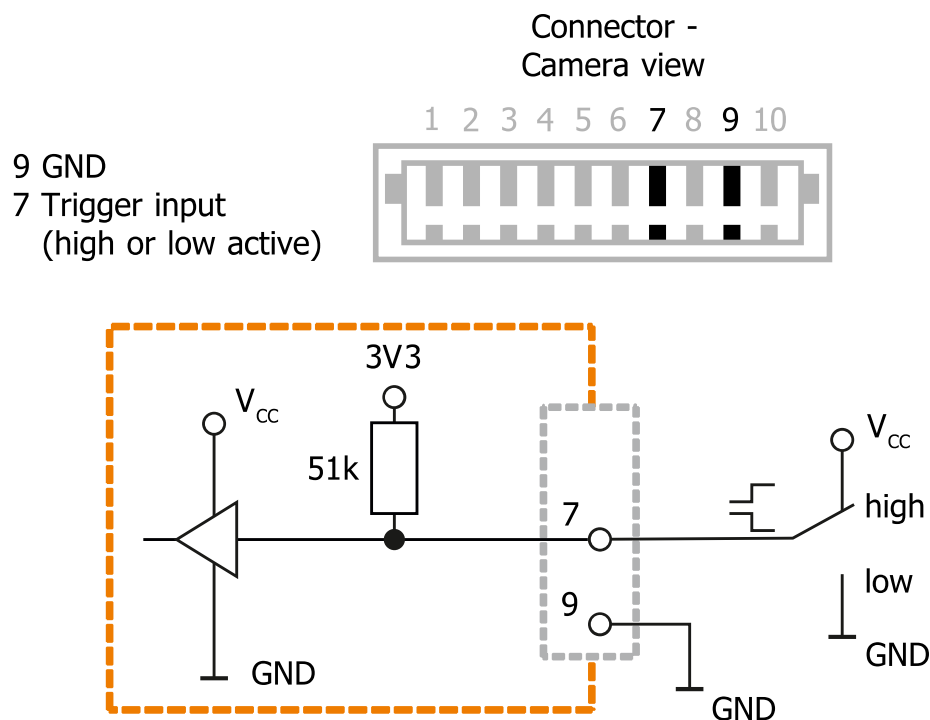
7.3 Digital output wiring

	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	-	3.3	-	V
Output high range	V_{OH}	3.2	-	3.3	V
Output low range	V_{OL}	-	0	0.2	V
Output current high	I_{OH}	-	-	4	mA
Output current low	I_{OL}	-4	-	-	mA

NOTICE! The digital output of the uEye LE USB 3.1 Rev. 1.2 is not potential-free and has no protective circuit. It is recommended to use the flash as high active.

Further information on flash configuration can be found in the IDS peak manual in the "Flash configuration" topic.

Digital output wiring

Fig. 12: Wiring of the digital output (non-inverted logic)
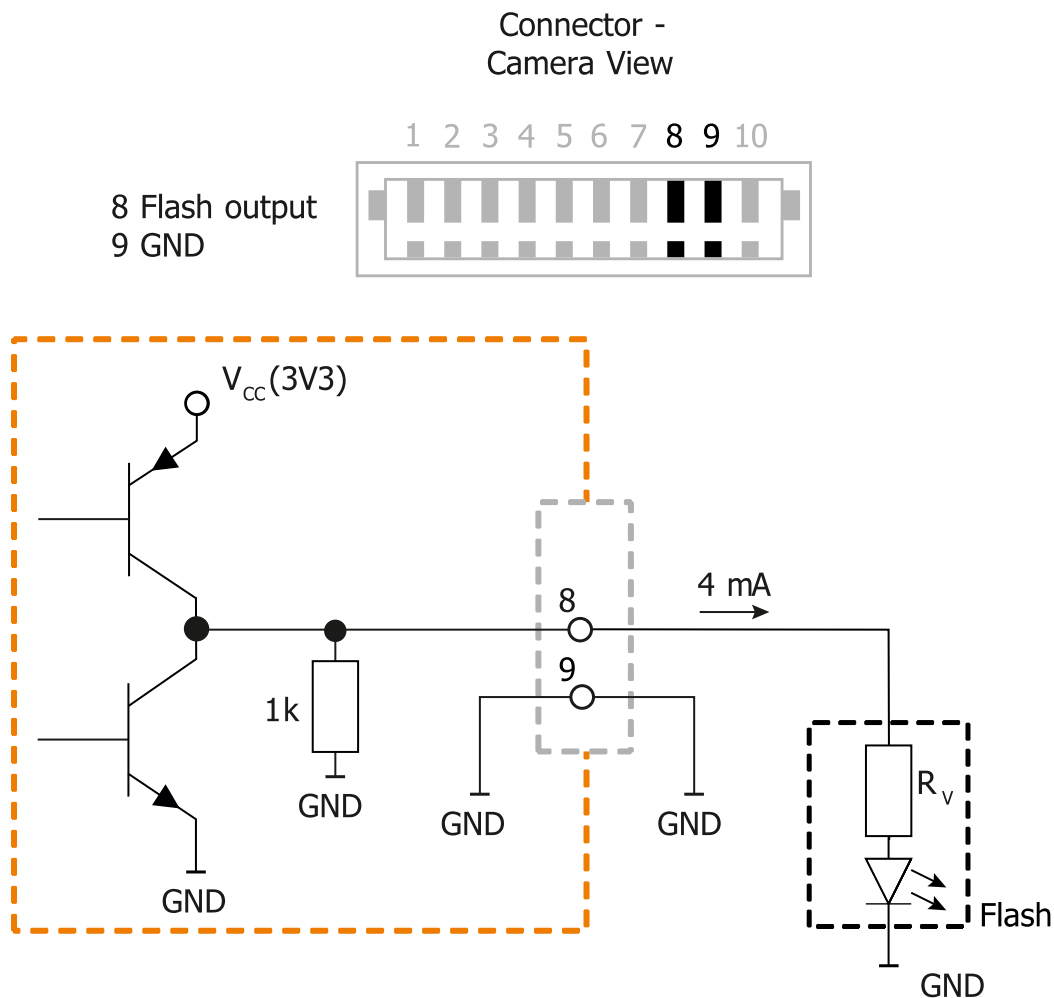
7.4 General Purpose I/O wiring

The two programmable GPIOs (general purpose I/O) can be used as inputs or outputs. This selection is made by software using the corresponding functions. Observe the following criteria:

	Symbol	Min.	Typ.	Max.	Unit
IO voltage range	V_{CCIO}	0	-	3.3	V
Input high range	V_{IH}	2.0	-	3.3	V
Input low range	V_{IL}	0	-	0.15	V
Output high range	V_{OH}	2.2	-	3.3	V
Output low range	V_{OL}	-	0	0.4	V

NOTICE! The General Purpose I/Os are not potential-free and have no protective circuit. Faulty wiring (overvoltage, undervoltage) can result in a damage in the electronics.

The two GPIOs (general purpose I/O) are initially configured as inputs.
- The initial level is "high" with 10K internal pullup (even if the camera is only powered and no images are captured yet).
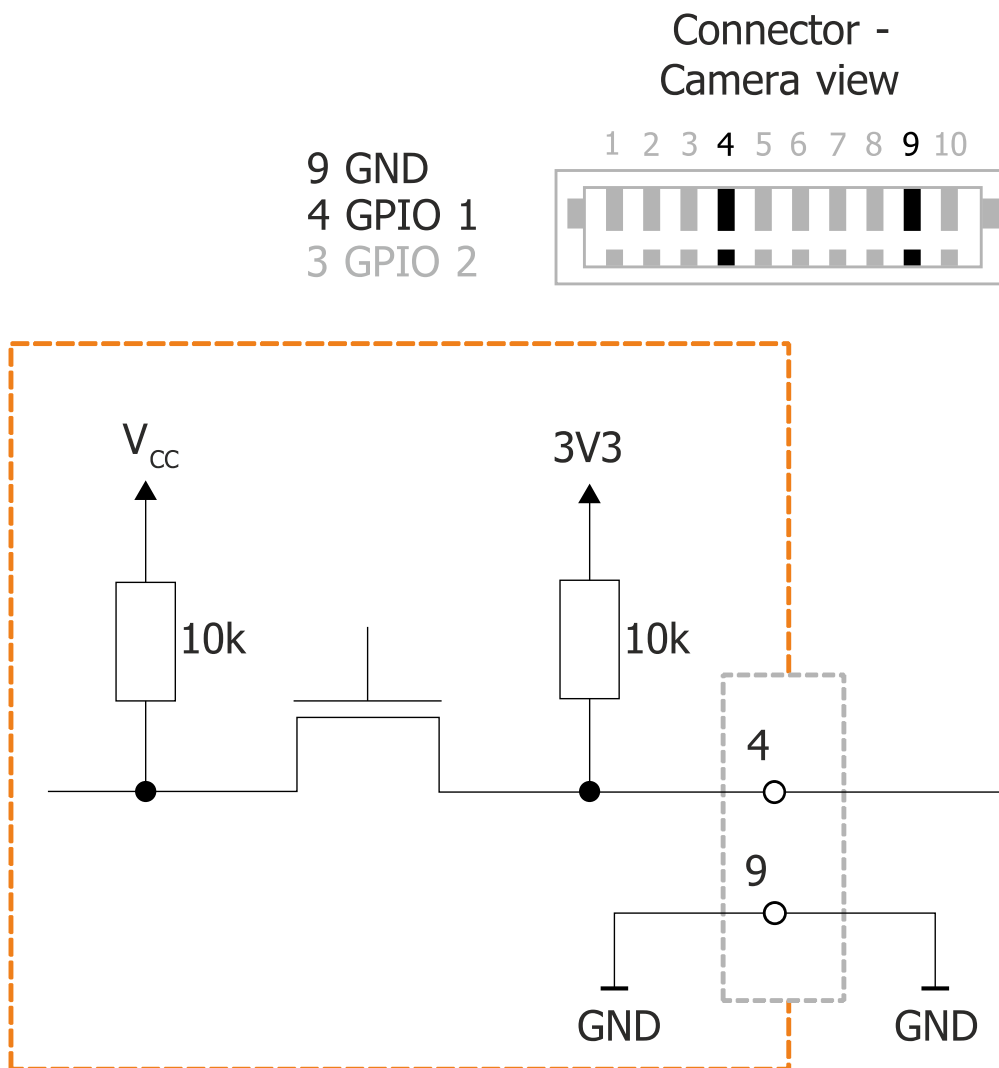- The output cannot drive current, thus it is only suitable for logic inputs without pulldown.

GPIO wiring

Fig. 13: GPIO wiring

8 Operating the uEye LE USB 3.1 Rev. 1.2

The uEye LE USB 3.1 Rev. 1.2 cameras are Vision compliant models. All camera features are described in the Camera feature reference in the IDS peak user manual. An overview of the specific functions of your camera model can be found in the corresponding data sheet.

You can operate your uEye LE USB 3.1 Rev. 1.2 camera using the software development kit IDS peak. IDS peak contains all libraries and software tools required for operating and programming. With an easy to understand programming interface, it simplifies the use of GenICam without limiting or bypassing its functionality.

For the software and documentation for your camera go to https://en.ids-imaging.com/downloads.html and select your camera model.

For additional information on operating the camera, see the following sections:
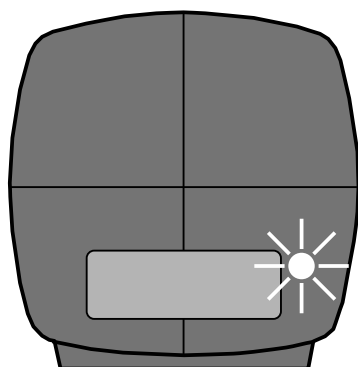
Status LED

Filter types

8.1 Status LED

Fig. 14: Status LED

The camera has a two-color LED that indicates information on the current status.

Status	LED Pattern
Camera is off/no power	⬜⬜⬜⬜⬜⬜⬜⬜
Camera is booting	🟩⬜🟩⬜🟩⬜🟩⬜
Camera is open	🟩🟩🟩🟩🟩🟩🟩🟩
Camera is open (reduced speed at USB 2.0 port)	🟧🟧🟧🟧🟧🟧🟧🟧
No firmware loaded	🟥🟥🟥🟥🟥🟥🟥🟥
Service firmware is active	🟧🟧⬜⬜🟧🟧⬜⬜
Service firmware: configuration by host	🟩🟧🟩🟧🟩🟧🟩🟧
Camera error: contact support	🟥🟧⬜🟥🟧⬜🟥🟧

> ⓘ The status LED also lights up red if the USB cable is not connected but voltage is applied to the GPIOs.

8.2 Filter types

Every camera has a filter glass in the front flange to prevent the entry of dust particles. Color cameras by default use an IR cut filter (type HQ), which is required to ensure correct color rendering. For monochrome cameras, the standard filter is a glass filter (type GL). The filter type is given at the end of the model name.

The following table shows an overview of the different optical filters used in IDS cameras:

| Filter type	Name	Refractive index (n_{Filter})	Glass type	Thickness (f)	Cut-on wavelength	Cut-off wavelength	Non-reflective
IR cut filter	HQ	1.53	D263	1 mm	-	650 ±10 nm	On one side
Glass	GL	1.53	D263T	1 mm	330 nm	-	On both sides
Daylight cut filter	DL	1.53	RG695	1 mm	695 nm	-	-

You can tell the filter type from the outside by its coloration:

- Reddish glass: HQ filter

- Plain glass: GL filter

- Dark glass: DL filter

> ⓘ All sensors have a cover glass. The transmission of the cover glass is taken into account in the camera data sheet.

Infrared cut filter (type HQ)
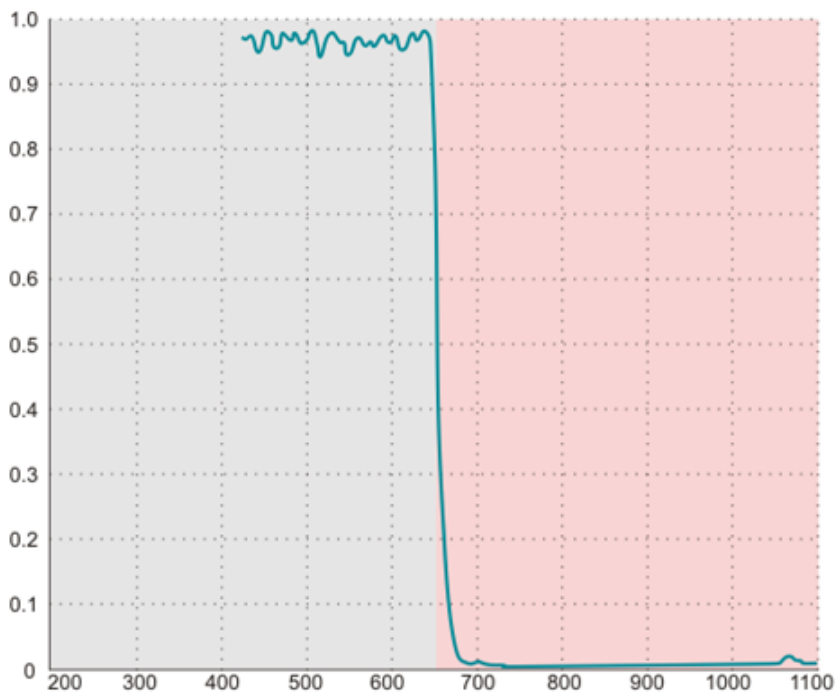
Fig. 15: HQ filter

Plain glass filter (typ GL)
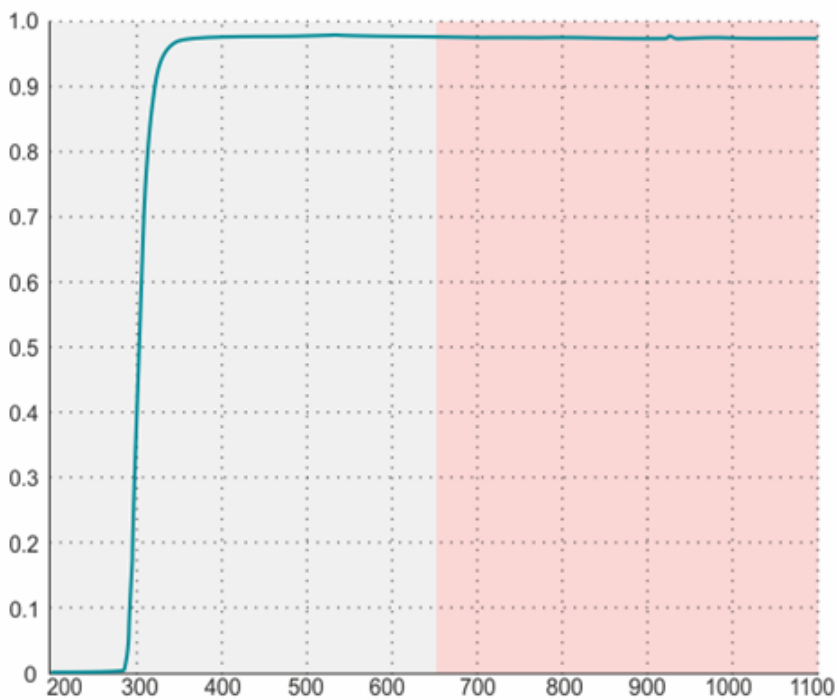
Fig. 16: Glass filter

Daylight cut filter (type DL)
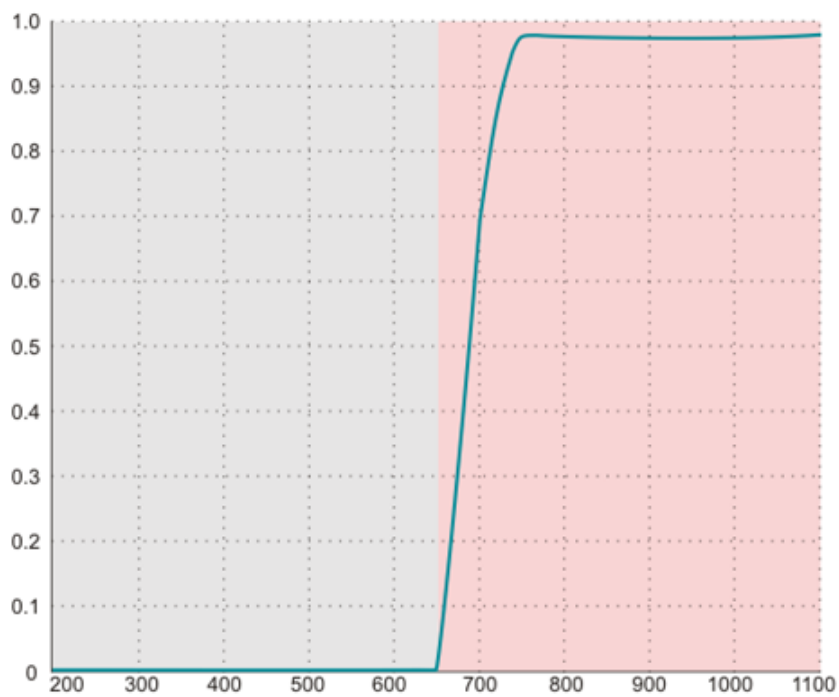
Fig. 17: DL cut filter

9 Maintenance

9.1 Cleaning the filter glasses

When handling the camera with its lens removed, the filter glass can get soiled from the outside. This might be visible in the images that are captured. The filter glass should therefore be cleaned in that case.

It is strongly recommended to return the cameras to IDS Imaging Development Systems GmbH for professional cleaning.
IDS Imaging Development Systems GmbH is not liable for any damage resulting from cleaning the filter glasses. This even applies if the following instructions have been observed.

Instructions for cleaning filter glasses

- The filter glasses may only be cleaned from the outside. If you remove the glasses, the sensor might get soiled.IDS Imaging Development Systems GmbH is not liable for any damage to the sensor resulting from removal of the filter glasses.

- First, remove dirt particles on the glass using compressed air. Do not use compressed air from compressors or spray cans since it often contains oil droplets or droplets of other liquids. For best results, use purified nitrogen from nitrogen bottles.

- Only use lint-free wipes or cotton-free swabs for cleaning. Never touch the filter glasses with your bare fingers because often, fingerprints cannot be removed completely afterwards.

- We recommend to use pure alcohol for cleaning. 100% isopropyl alcohol evaporates without leaving any residues. Only add small quantities of alcohol to the wipe. Never pour alcohol directly onto the camera.

NOTICE! Never use cleaning agents containing acetone for cleaning the filter glasses! Acetone may damage the filter glass coating and may deteriorate the optical quality of the glasses.

Cleaning the filter glass

Use a soft wipe to wipe off dirt particles in a single sweep beyond the edge of the filter glass.

Fig. 18: Cleaning the filter glass (example)

9.2 Cleaning the sensor for PCB version

Prerequisites:

- All work must only be carried out by appropriately qualified personnel. Improper cleaning will void the warranty.

- Perform cleaning in a clean, dust-free environment.

- Pay attention to the ESD protection, as the camera can be damaged by static discharge (ESD).

  o Use antistatic gloves, clothing and materials. Wear antistatic straps for ESD protection and conductive shoes.

  o Place a conductive mat on the work table to prevent the generation of static electricity.

- For cleaning, use lint-free ESD-safe cloths that do not contain particles that could scratch the window and ESD-safe cotton-free cleaning swabs

- Use a compressed air product approved for optics

Steps:

- Prepare the cleaning cloth:

  o Fold the cleaning cloth lengthwise several times until the flat area is no wider than the sensor.

  o Fold the cloth in half so that a cleaning swab can be placed inside.

  o Place a cleaning swab in the cloth.

- Blow off loose particles from sensor and camera with compressed air. We recommend using ionized air to be able to remove even statically charged particles.

  o Do not shake the compressed air tank during this process. Do not use compressed air from compressors.

  o Use only short, targeted blasts of air to prevent the camera from cooling down and causing condensation.

- Moisten the cleaning cloth with isopropyl alcohol.

- Clean the sensor with the cleaning cloth in an oriented cleaning direction with a single wiping motion.

- Check if the cleaning was successful. If necessary, repeat the cleaning process with a new cleaning cloth.