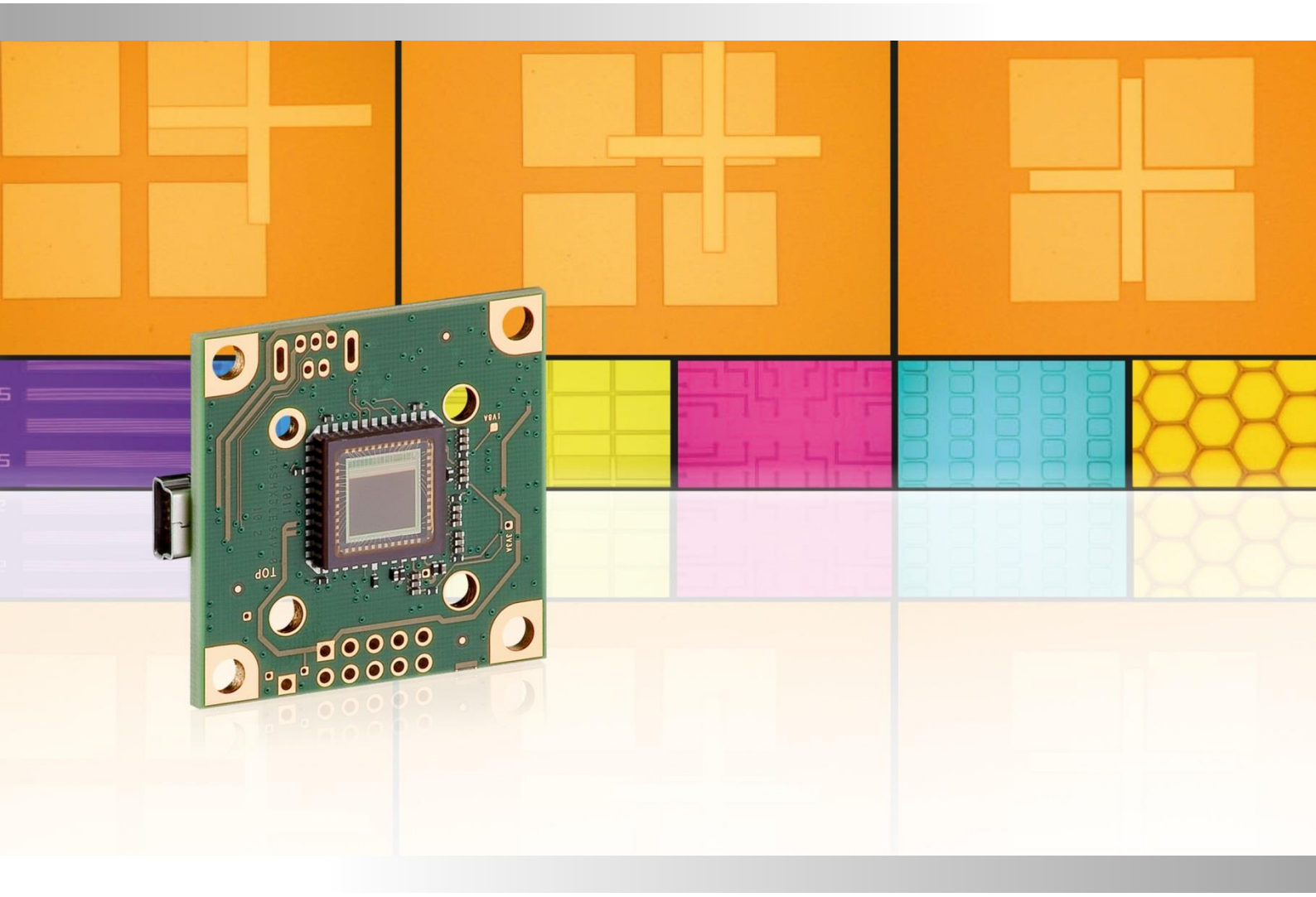


Space-saving and cost-effective camera solution for apparatus engineering

# Focus on the essentials

**Engineers and OEM customers who use industrial cameras in their systems mostly select board-level solutions as these solutions are cost-effective, space-saving, and they focus on key features. The very compact design of the single-board cameras of IDS' uEye LE series, measuring only 36 x 36 mm, plays an important role because space is often limited in devices or embedded systems. The French manufacturer Kloé uses them in their mask writers, which are designed as desktop systems, providing fast and accurate alignment of photomasks.**

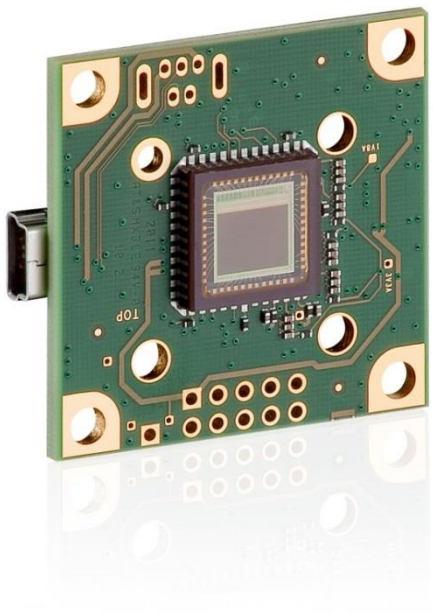
Kloé, based in Montpellier (France), develops and manufactures a range of equipment dedicated to microtechnology fabrication. Among others, their portfolio includes maskless direct laser lithography systems and UV LED masking and mask aligners systems. The latter are in particular used in the fabrication of microchips but also in micro optics and Biotechnology (Lab on Chip), to align photomasks with patterns presents on silicon, glass substrate or on a wafer and to expose the surface underneath.

Microchips like CPU's consist of different layers arranged vertically, building the electronic circuit and there for the entire function of the chip. These layers have to be positioned exactly one above the other during the fabrication to assure the electrical connection among each other. Alignment marks like cross, squares or micro rules are made on the first layer exposed on the wafer. Those patterns are used for further alignment of the following layers by adjusting the targets of the photomask before UV exposition.

To make the alignment as accurate and as easy as possible, Kloé takes advantage of industrial cameras and uses two single-board cameras from IDS each in its latest-generation UV-KUB 3 mask aligners. The two camera models of the USB2 uEye LE series are only about 36 x 36 mm in size, and in the upcoming version without lens holder, they are only 5 mm in height. Kloé puts the cameras directly on a special optical system, saving a lot of space with this solution. Both cameras are connected via USB 2.0 to a Linux-Embedded computer. The captured images with the enlarged positioning marks are visualized directly on the device on an integrated screen. Then, by using a joypad, the operator is able to align the photomasks exactly.


UV-KUB3: There are two in-built board cameras from IDS which allow the positioning marks to be aligned with an accuracy <2 µm.

“There is also the possibility to use binocular microscopes instead but the solution to use singleboard-sized industrial cameras is considerably more space saving,” describes Benjamin Rolland, Range Manager at Kloé for the UV-KUB series, as one advantage. "Our system is designed as a desktop system. With a side length of only 47.5 cm, it allows the exposure of 5" photomasks on a wafer area of 100 mm diameter. When used with a large screen, it offers a better ease of use. By considering these simple ways of imaging (contrast enhancement, HDR) we can achieve an alignment accuracy of less than 2 microns.“



With or without lens holder:

The board cameras of IDS' USB2 uEye LE series measure only 36 x 36 mm.

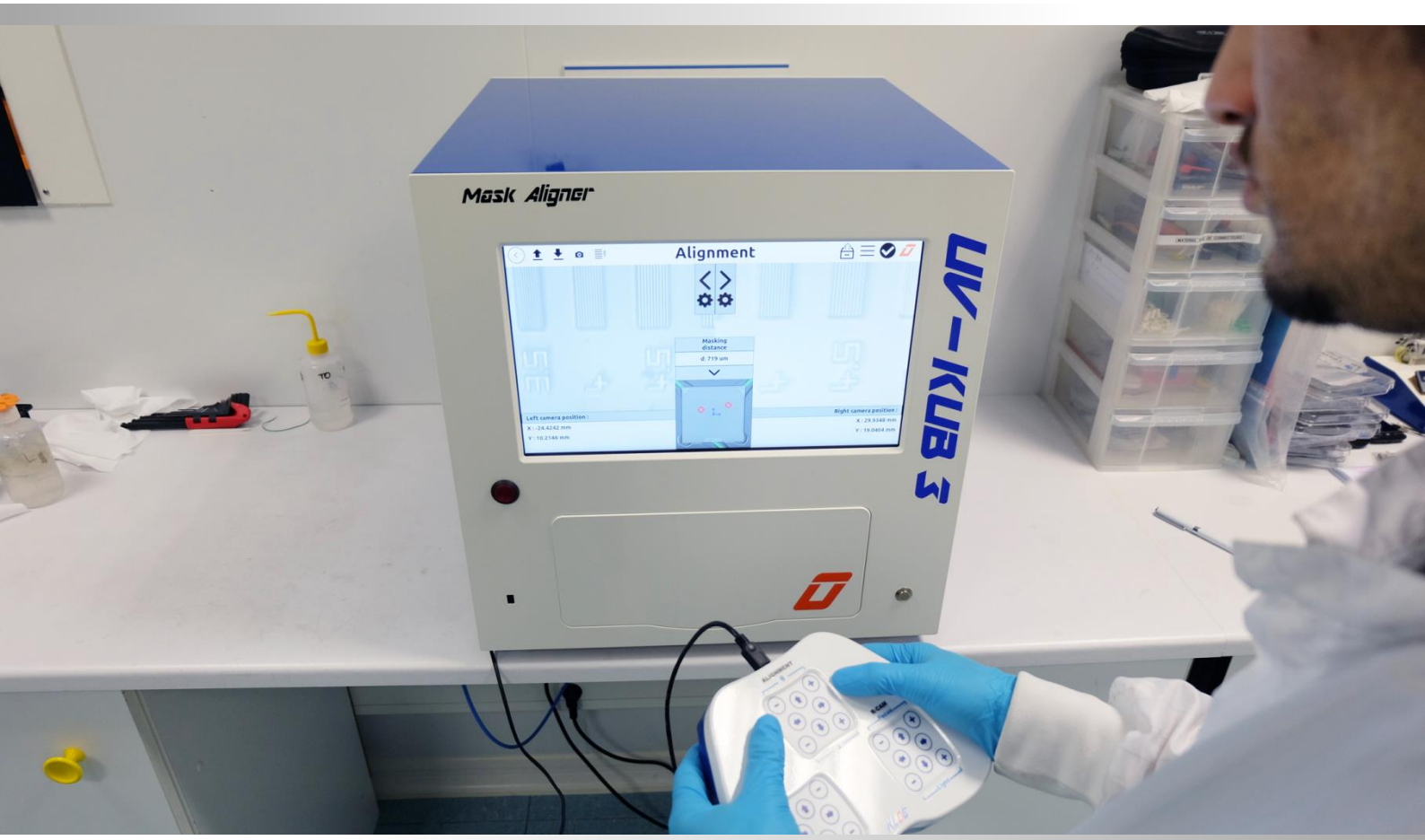
Just as Kloé itself, even OEM customers have individual demands on the functionality of the cameras as well as on image quality and resolution. Therefore, the uEye LE series from IDS covers a wide range of board cameras in different variants. The models are available with GigE, USB 2.0, USB 3.0 and more recently, as USB 3.1 Gen 1 camera with USB Type-C connector. Likewise there are versions with different sensors and resolutions from 0.4 up to 18 Megapixels. They are available as single-board cameras without lens holder, as single-board cameras with S-mount or with CS/C-mount and last but not least as a housed version. OEM customers easily find the cameras that meet their needs best and that are equipped with the features they require. No more, no less.

Kloé integrates two models of the UI-1242LE per unit. The USB 2.0 board camera without lens holder is equipped with a very light-sensitive 1.3 Megapixel CMOS sensor from e2v (1280 x 1024 px). The manufacturer uses the monochrome version of the sensor. In addition to the outstanding light sensitivity at CCD quality, the camera is characterized by a number of useful features: the sensor provides two, switchable global and rolling shutter options, and thus maximum flexibility in changing requirements and conditions. There is a maximum of four areas of interest available (AOI). An 8 pin Hirose connector featuring 5 V power supply, trigger and flash, 2 GPIOs and an I2C bus to control peripheral devices provide nearly unlimited connectivity and flexibility.

Speaking of flexibility: thanks to the SDK that is identical for all IDS cameras, OEM customers remain flexible for further feature extensions of their devices. Using the uEye API, Kloé can integrate all sensor features of the board-level camera into their application quickly and easily. The API is part of the IDS Software Suite, which is available for Windows 7, 8 and 10, as well as for Linux and Linux Embedded. The SDK belongs to the scope of supply for cameras from IDS, and it is identical for all models whether with USB 3.0, USB 2.0 or GigE interface.

Thus, the integration of the cameras is regardless of model and interface. Engineers can easily change from a USB 2.0 camera to a more powerful model with USB 3.0 or Gigabit Ethernet interface. There is no need to redevelop the application, but only to adjust the camera-specific parameters.

The IDS Software Suite also comes with programing demos for camera integration and image acquisition with the corresponding source code in C, C ++ and VB. Developers can quickly extract parameters for use in their own programs. There is also other machine vision software available such as HALCON, MERLIC, NeuroCheck, or LabVIEW as well as direct interfaces.



**USB 2 uEye LE industrial camera: The ideal project camera - compact, versatile and reasonably-priced**

| | |
|---|---|
| Name: | UI-1242LE |
| Interface: | USB 2.0 |
| Sensor type: | CMOS |
| Framerate: | 25.8 fps |
| Resolution : | 1280 x 1024 px |
| Manufacturer: | e2v |
| Shutter: | Global Start Shutter |
| | Global Shutter, Rolling Shutter |
| Optical class: | 1/1.8” |
| Dimensions: | 36 x 36 x 5.7 mm |
| Weight: | 12 g |
| Applications: | Machine vision |
| | Quality assurance |
| | Medical technology |

**Customer: Kloé SA**

Thanks to the high performance of its Dilase Technology, Kloé is today the world leader of high-resolution direct laser writing with a very high aspect ratio over thick photoresist layers. Its expertise in producing laser lithography systems and photosensitive resins provides Kloé with a unique know-how in the control of photon-matter interactions. http://www.kloe.fr/