**Alkeria**

IMAGIN**ACTION**

**CELERA** P

dual–USB3 polarization camera

# CELERA P series

CELERA P is a dual-USB3 camera with a special polarization image sensor, providing a new way to perform inspection processes.

Thanks to its advanced sensor technology, CELERA P gets rid of external filters, combining the ease-of-use of Alkeria dual-USB3 cameras with the capabilities of polarization imaging and unique FusionView feature. Capable of reaching up to 152 fps while processing over 200 million vectors per second, CELERA P can execute polarization detection directly on-board, without overloading the computer.

CELERA P provides powerful on-line user-controlled image processing with a control sequencing mechanism, allowing to apply up 64 different video settings to a chain of subsequent frames.

## Even beyond

Alkeria development team is also deeply focused on full-custom camera products. If you need more from your CELERA P camera, we can implement smarter hardware and extra firmware features for you. Depending on volumes, we can design your custom camera to protect your IP, differentiate your products and let you gain market share over competitors. If you have been discouraged with custom designs, give us a call: you'll be surprised.

## Features

### Polarization image sensor

SONY Pregius IMX250MZR is a 5 MP global shutter sensor with unique polarization imaging capabilities. It features an array of polarizer filters overlaid on top of the pixel array and beneath the micro-lenses: thanks to this technology, camera sensor directly acquires data on light polarization without any additional filter.

### FPGA architecture

Thanks to its powerful FPGA architecture, CELERA P is capable of reaching up to 152 fps while processing over 200 million vectors per second, without overloading the computer.

### Tiny rugged design

Small, ultra-lightweight, rugged aluminum machined high precision case allows maximum installation flexibility even in space constrained environments.

### FusionView feature

FusionView is a unique feature available only on CELERA P: it maps AoLP on the Hue component of the HSV color space and DoLP on the Saturation component, giving an intuitive preview of these properties of light.

### Versatile I/O

CELERA P offers unprecedented flexibility for interfacing to outer world signals: line/frame triggering, direct encoder readout and strobed lighting have never been so easy.

### Advanced triggering

With CELERA P camera, you can choose among a long list of triggering mechanisms. Acquisition can be driven by logic levels, edges and encoder position. Furthermore, the frequency of triggering signals can be internally converted to solve even the most challenging problems.

# Polarizing sensor vs filter

Some applications require the inspection of polarized light to get relevant information. Standard digital monochrome sensors capture light intensity and wavelength for each pixel: to detect light polarization, special filters can be used.

Polarizer filters absorb all the components of light with random angles, allowing only the light with a specific polarization angle to pass. Those filters are usually mounted in front of camera lenses: if you need to change polarization acquisition parameters, you have to rotate the filter.

SONY, however, developed a machine vision global shutter sensor featuring a **unique array of polarizer filters** overlaid on top of the pixel array and beneath the micro-lenses. Thanks to this technology, camera sensor **directly acquires the data on light polarization** without any additional filter on top of the lens, thus reducing system complexity.

Each pixel is provided with a dedicated polarized filter. Those filters are orientated 0°, 45°, 90° and 135°, arranged in a 2x2 pixel array called *"superpixel"*.



**Photodiode**

**Polarizer**

**On-chip lens**
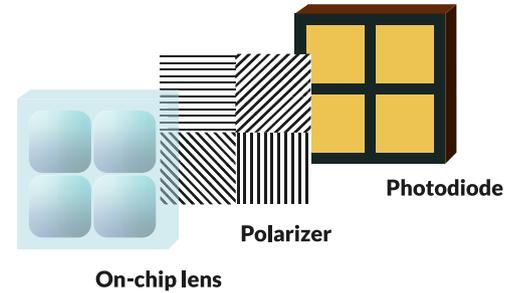
# Get more out of the light

Alkeria developed a new camera model featuring SONY special polarization image sensor that can be used instead of external polarizing filters.

Thanks to the special polarization filter array applied on the sensor, each *"superpixel"* can acquire **4 different polarization angles simultaneously**. Based on the information acquired from these four channels, a special interpolation algorithm computes data for all the in-between angles, as if a rotating polarizer had been put in front of a plain monochrome camera.

This measure is the key to deriving complex parameters such as the **Degree of Linear Polarization** (DoLP), an estimate of the polarization coherency of the light, and the **Angle of Linear Polarization** (AoLP), an estimate of the polarization angle.

Since monochrome video format is not suitable to visualize AoLP and DoLP informations, we developed **FusionView**, an advanced feature for our cameras.

FusionView is an unique feature available only on CELERA P: it maps AoLP on the Hue component of the HSV color space and DoLP on the Saturation component, giving an intuitive preview of these properties of light.





*FusionView feature example*

## Accessories

Image quality does not depend only on the resolution of the camera: to get top performances out of a vision system it is essential to choose the best combination of all components. For this reason we offer our customers a complete range of high-quality accessories to equip our cameras with: lens adapters, I/O and USB3 industrial-grade cables, selected machine vision lenses and more.

Visit *www.alkeria.com/accessories* to discover the complete range of accessories.

**C-mount**          **F-mount**

## Interfacing

### dual-USB3

Cost-effective, wide-spread, highly performant, plug&play, directly powered by the PC. All of these perks make USB3 the right choice for cameras intended to be ready out-of-the-box.

### I/O

CELERA P provides a versatile 24 V tolerant I/O interface to control external devices such as strobe lights, encoders, etc.: 2 input lines with direct encoder interface, 2 output lines and 1 input/output (RS422, RS644 LVDS, LVTTL). Its multipurpose I/O connector provides user I/O, line/frame triggering and direct encoder interface.

## Vision libraries

**HALCON** COMPATIBLE

**COGNEX** COMPATIBLE

Image processing libraries represent the most flexible way of developing vision applications: these systems provide a complete range of powerful vision analysis tools, as well as the possibility to develop tailor-made algorithms and functionality to address specific application needs.

That's why our cameras are totally compatible with the major vision libraries, such as MVTech Halcon or COGNEX VisionPro.

### Want to use your own code instead?

Our cameras come with a comprehensive SDK for Windows and Linux featuring a sample player for live view and setting of the camera, and a rich list of code samples in C# and C++ (WIN32 and Qt).

# Technical specifications

| MODEL | CSS-MP |
|---|---|
| Sensor | SONY Pregius® IMX 250 MZR |
| Megapixels | 5 MP |
| Resolution (w x h) | 2464 x 2056 |
| Format | 2/3" |
| Pixel Size | $3.45 \times 3.45$ µm² |
| Color mode | Mono Polarized |
| Max framerate | 152 fps |
| Pixel format | MONO8/16, RAW8/16, RGB24 |
| Min Shutter | 17 µs |
| Max Shutter | 5 s |
| A / D Conversion | 8 - 10 - 12 bit |
| Synchronization | External trigger, software trigger |
| Power Supply | < 3 W, powered by USB3 interface |
| Inputs / Outputs | 2 in (direct encoder interface), 2 out and 1 I/O (RS422, RS644 LVDS, LVTTL), 24 V tolerant |
| Interface | 2 × USB 3.2 Gen 1 |
| Lens adapter | C-mount included \| F-mount optional |
| Weight | <150 g (with C-mount lens adapter) |
| Dimensions | 56 mm × 56 mm × 26.7 mm - camera only |
| Conformity | CE, RoHS, FCC/IC |
| Main Controls | Shutter, gain, LUT, Virtual Angle, FusionView |
| Operative Temp | 0 ÷ 50 °C |

## Sensors specifications
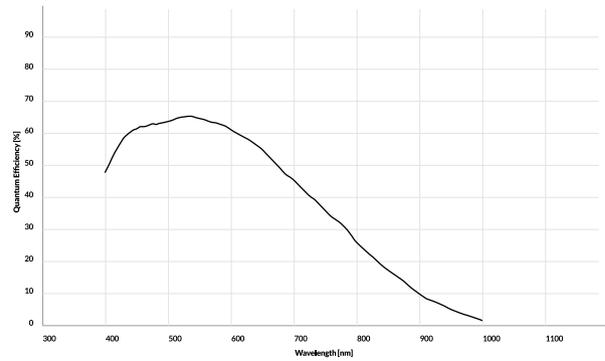


## Mechanical specifications
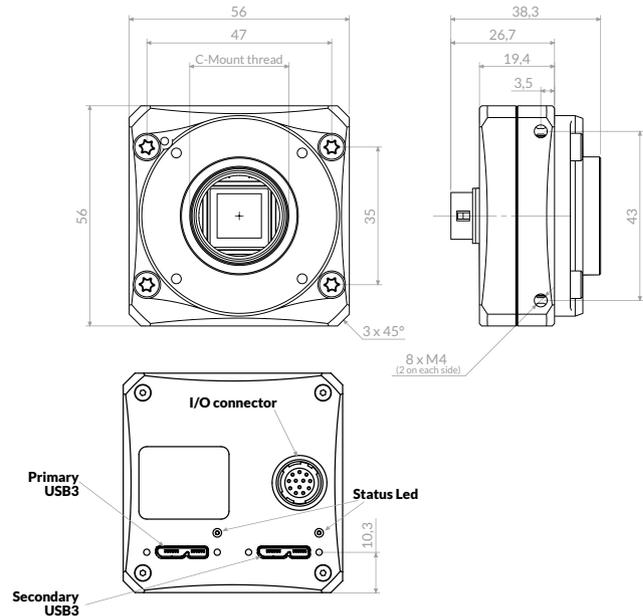


All dimensions are expressed in millimeters.
Camera specifications are subject to change without notice.
Sensor specifications are taken from the data sheet of the manufacturer.

This chart shows all technical specifications of the current CELERA P product line.

To know more about specifications and prices, please contact our Sales department at **sales@alkeria.com**: we'll help you finding the right camera for your application.

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