

## **Simply flexible – Bandwidth management with adjustable pixel clock**

You are using a multi-camera system or a high resolution camera? You want to use the full bandwidth of your camera interface without losing any image?

For IDS industrial cameras, you can set the pixel clock using the IDS Software Suite. So you can have a direct influence on the needed bandwidth of a camera.

### **Background**

The basic parameter for camera timing is the pixel clock. It determines the speed at which the sensor cells can be read out. In general, the pixel clock is set once when opening the camera and will not be changed.

The possible range of settings for the frame rate depends on the currently selected pixel clock. You can select a lower frame rate without changing the pixel clock. To set a higher frame rate, however, you need to increase the pixel clock.

The exposure time depends on the currently selected frame rate and is preset to its reciprocal value. You can select a shorter exposure time without changing the frame rate. To set a longer exposure time, however, you need to reduce the frame rate.

### **Setting the pixel clock**

Open the camera properties in uEye Cockpit via „uEye > Properties“. You can set the pixel clock, frame rate, and exposure time in the “Camera” tab.

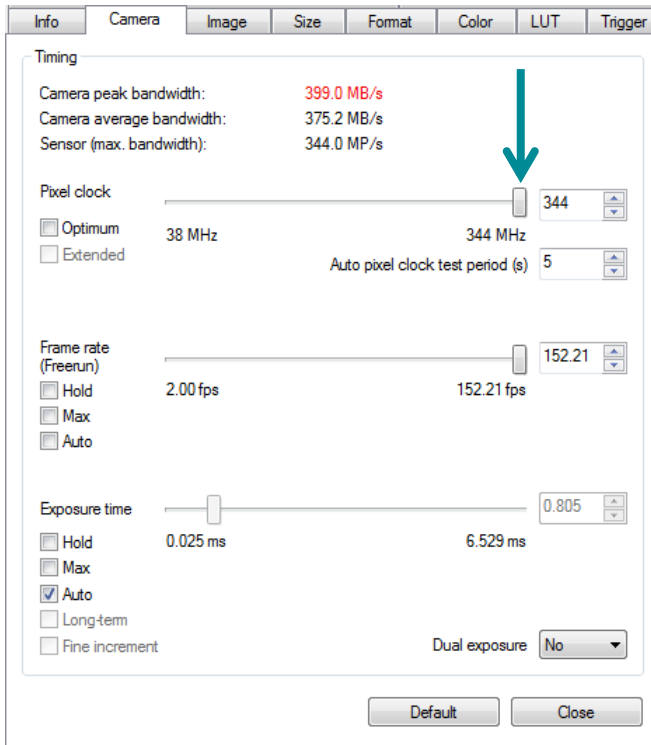
Note that, if you change the pixel clock, the setting ranges for frame rate and exposure time also changes. If you change a parameter, the following order is recommended:

1. Change the pixel clock
2. Set the frame rate
3. Set the exposure time

There are three approaches for setting the pixel clock: the camera should be operated as fast as possible or with long exposure or the camera should hold a defined frame rate.

### **High frame rates**

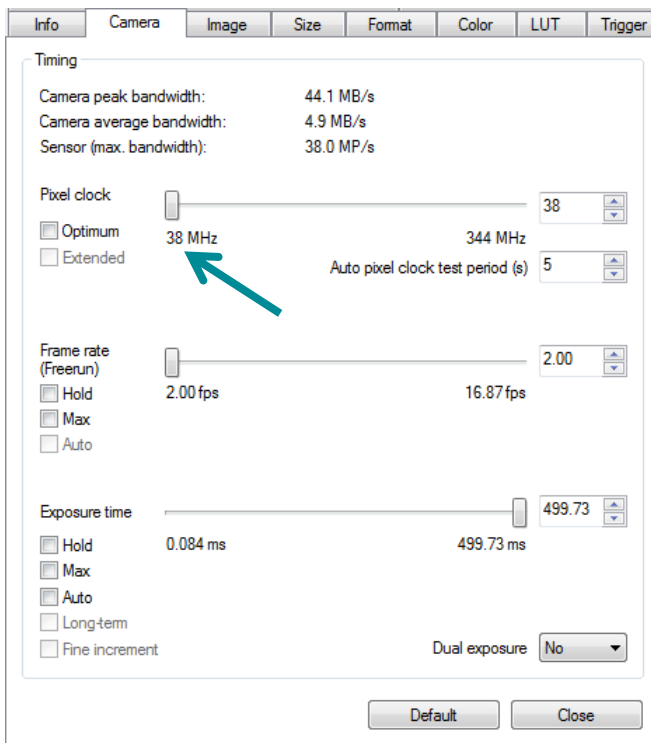
A high pixel clock allows short exposure times and higher frame rates. In case of rolling shutter sensors, you can reduce the rolling shutter effect with a high pixel clock.



Setting range of frame rate and exposure time at maximum pixel clock (UI-336x)

## Minimum pixel clock for long exposure

A low pixel clock allows longer exposure times and causes a lower CPU load.



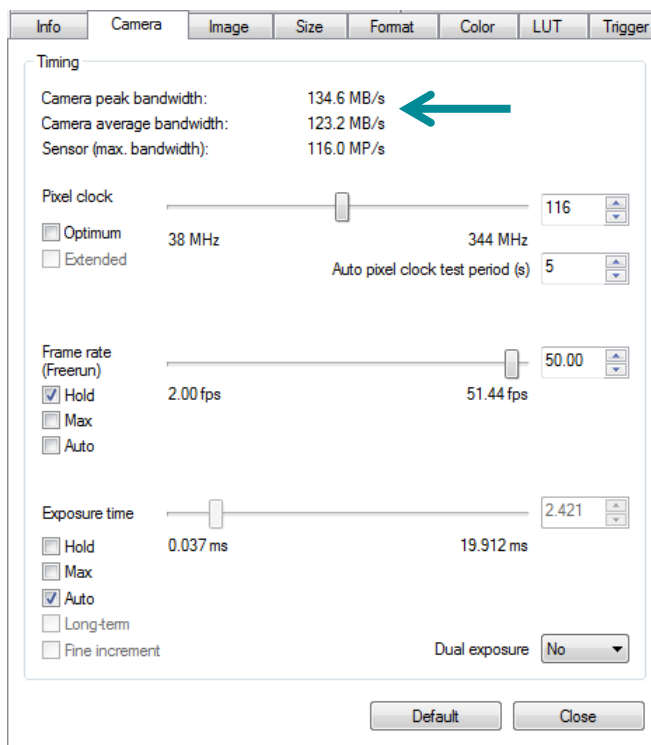
Setting range of frame rate and exposure time at minimum pixel clock (UI-336x)

### Setting the optimum pixel clock for a defined frame rate

In this case, you proceed in a slightly different order:

1. Set the frame rate to the desired value.
2. Enable the “Hold” option.
3. Reduce the pixel clock as far as possible, so that the selected frame rate is still achieved.

As the pixel clock has a direct effect on the frame rate, we recommend not setting the pixel clock any higher than necessary to achieve the desired frame rate. The goal should be that the values for the camera peak bandwidth and average bandwidth are close together.



**Setting the pixel clock for a fixed frame rate (UI-336x)**

### Application areas

Using the adjustable pixel clock, the camera can optimally be adjusted to the available bandwidth. In particular the bandwidth management is greatly simplified in multi-camera systems because each camera can be set easily and individually.

Additionally, uEye camera models with CCD sensors are calibrated for each pixel clock to get the best image quality.

### Summary

The pixel clock limit values can vary, depending on the camera model, interface, and operating mode. The preset default value is a compromise between the image quality and the frame rate.

An excessive pixel clock can cause delays or transmission errors. If the data is read from the sensor at a higher speed (high pixel clock), you will also need a

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faster transmission over the data connection. Thus, by controlling the pixel clock, you can also influence the bandwidth required for a camera.

The pixel clock influences the connected load and consequently the temperature inside the camera. At a lower pixel clock the camera temperature increases less.

Using IDS Software Suite, you can easily adjust the pixel clock for almost all IDS camera models. With the uEye API function "is\_PixelClock" or the uEye .NET class "PixelClock" you can query and set the pixel clock.

For further information on setting and programming the pixel clock, refer to the uEye manual at <http://en.ids-imaging.com/manuals-ueye.html>.

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