

# Why USB3, USB 3.0, USB 3.1

## Why USB3, USB 3.0, USB 3.1

Because of:

NEW WAY

SUPPORT

SPEED

SIZE

POWER and HEAT

PRICE

MISCELLANEOUS

Why USB3 Vision? Because XIMEA



Because of:

## NEW WAY

The next generation of widely popular USB (Universal Serial Bus) technology, [USB 3.0](#) made a huge leap forward in every way. For example:

Where USB 2.0 uses host-directed (master - slave) architecture allowing data to flow only in a single direction at a time, USB 3.0 adds five wires (nine overall) and takes advantage of unicast dual-simplex data interface making the flow two-directional.

USB 3.0 also has asynchronous notifications, where the device signals to the host when it is ready for transfer which considerably reduces the overhead of the system and ensures **low CPU usage** in comparison to the polling mechanism in USB 2.0.

Further improvements include support of streaming for bulk transfers and increased efficiency in token/data/handshake sequence, enhancing system efficiency and also lowering power consumption.

XIMEA: To underline the advancements we use only [the most modern sensors and components](#) (like FPGA) for our line of cameras taking full potential of the [sophisticated technology](#).

That means the newest **CMOS** and **CCD** which are faster and bigger with Global shutters and overwhelming parameters.



## SUPPORT

The predecessor of USB3 being immensely popular provides a platform of support and acceptance which is easy to build on.

Vendors of hardware and software are ready to provide all necessary solutions to progress the utilization of the interface.

Motherboards, chipsets, host controllers, cables (screw lock connectors), hubs, libraries or operational systems – everyone is onboard.

This also ensures easy switch from USB 2.0 and other interfaces to USB 3.0 (managed by the USB Implementers Forum (USB-IF), especially since USB3 is **backward compatible to USB 2.0**

**XIMEA:** USB3 Vision provides further benefits which create leverage in the community to push for better conditions and reliability. Therefore being a member of the USB3 Vision Technical committee (hosted by Automated Imaging Association or AIA) XIMEA strives to ensure the widest interoperability of USB 3.0 cameras with **accessories, libraries, Windows, Linux, ARM, macOS** and compliance to **USB3 Vision Standard**.



## SPEED

Among other improvements, USB 3.0 adds a new transfer mode called "SuperSpeed" (SS), with a theoretical transfer rate of 5 Gbit/s.

The effective bandwidth is around 400 MByte/s. which is still 10 times faster than USB 2.0, and 5 times than 1394b (Firewire).

A successor is underway called [USB 3.1 Gen2](#), which will provide speeds up to 10 Gbit/s (1.25 GB/s, called "SuperSpeed+") thus easily surpassing CameraLink.

All this speed requires appropriate hardware – chipset, motherboard, host adapter, cables and you can learn more about it [HERE](#).

**XIMEA:** In the question of speed we push the pedal to the limit having the fastest USB3 model that [gives 500 fps](#) and where others claim to have incredible speed with 2Mpix at 141fps, XIMEA delivers 170 fps.

This is also true when using different libraries like for example [Matrox MIL](#) where our cameras are able to achieve 90 fps with 4 Mpix and competing cameras struggle at 82 fps.



## SIZE

USB3 technology due to mentioned popularity and modernization factors also enables to use of new, smaller components (FPGA) and one device needs fewer of such already small components overall.

This results, besides other benefits, in a more compact size of footprint and of course also lighter weight which are parameters important in [mobile applications](#) and miniaturization trend.

Affected are also [accessories](#) like lenses or cables that are getting smaller as well, making it easier to design robust applications and sturdy housings or enclosures.

Size is further reduced by removing the need for intermediary equipment like for example **Frame grabbers** – you can forget about them for good.

**XIMEA:** Where you need a small size, XIMEA is your extreme measure. Last resort when everyone else is too big – the first company to provide [single planar board version](#) of the camera.

We produce the smallest USB3 cameras worldwide ([26x26x21mm, 27g](#)) and are able to provide special OEM customization services which would reduce the footprint and increase robustness even more.



## POWER and HEAT

Better power management rules that are incorporated in USB3 Vision along with compact design and new components strongly influence the energy consumption of the system.

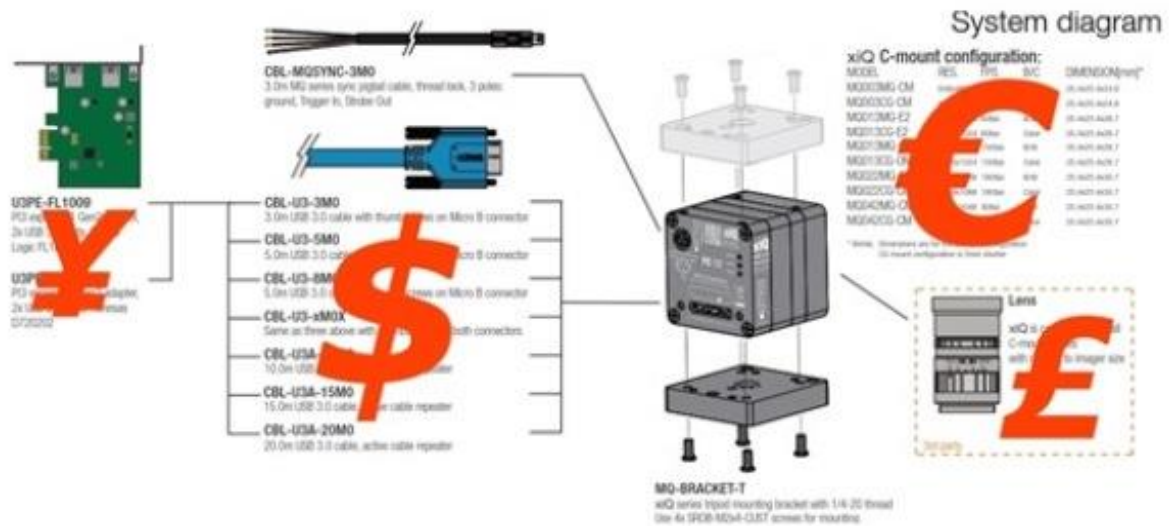
This in turn is closely related to the low amount of heat dissipation and helps to avoid unnecessary motion of the sensor and degradation in imaging quality.

Temperature sensors are placed near the imager or on it aiding in the control of the output, even though the USB3 camera only rarely gets to the limit.

To make it yet more comfortable for the user power and data is transferred through single cable (up to 4.5W) removing the power supply. In the future USB Battery Charging will allow up to 7.5 W.

**XIMEA:** It is only logical that XIMEA cameras being the smallest will consume the least energy and emit the least heat, but the fact that some models go under 1W – is still exceptional.

Some would say this is enough, but XIMEA is currently working on a future option where the cable would be able to provide 10W and supply enough power even for most demanding sensors.



## PRICE

In summary, each of the mentioned factors helps to reduce the cost of the final product, but customer's savings with switching to USB3 will not stop with the camera.

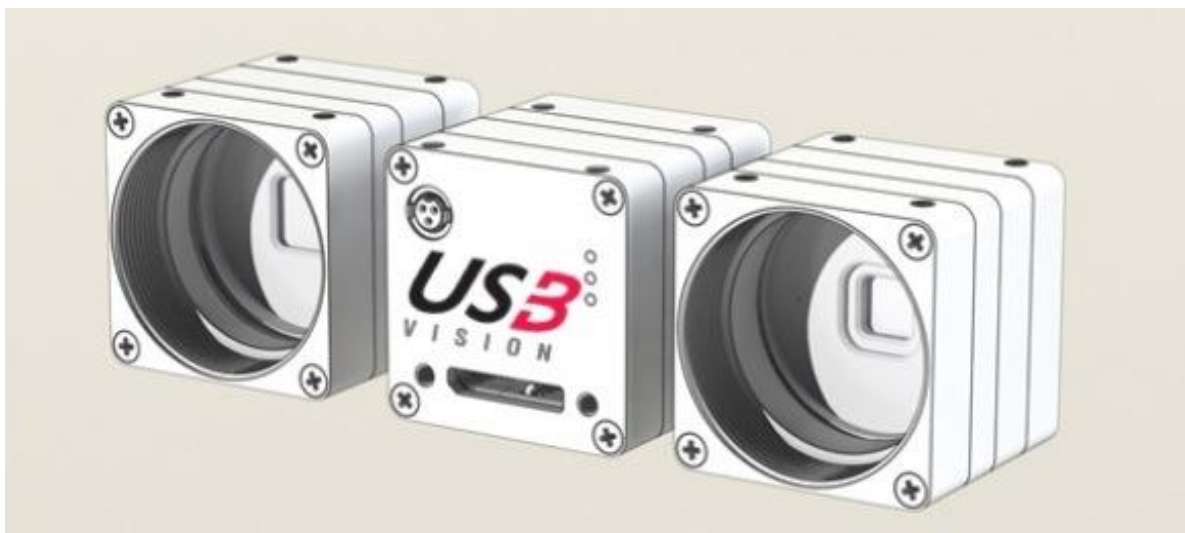
Losing Frame grabber and power supply intensifies the payoff process which continues with using fewer cheaper cables as well as new, cost effective lenses and host cards.

Add to the equation the simplified Integration efforts of **Plug&Play** architecture and you realize the full range of overall system cost reduction.

While doing such calculations you need to keep in mind a given - that initially price of a USB 3.0 camera is lower than equivalent competitive GigE or CameraLink models.

**XIMEA:** Another simple truth is that price is certainly not everything and sometimes cheap is too cheap, which is why XIMEA is not interested to engage in price wars.

This being said, we always try to help smaller startups and advice different **OEM companies** regarding optimal options and reliable solutions. Just ask our [info@ximea.com](mailto:info@ximea.com)



## MISCELLANEOUS

Worth to mention reasons include - many new applications where USB 3.0 can and will be used because of its advantages. Like Robotics, 3D scanning, UAV, Virtual / Augmented reality or Movement Tracking.

An important feature of USB3 is exceptional support of multiple cameras – theoretically, up to 255 units can be interconnected on the network (with more cameras on the same bus)

Not to neglect is also the factor of CPU usage which is lower when compared to USB 2.0 and GigE and that comes in handy by complex applications and high speeds.

Last, but certainly not least is the USB3 Vision Standard compliance that ensures compatibility and reliability of all components aiding in infrastructure design.

## Why USB3 Vision? Because XIMEA