Basler dart

AREA SCAN CAMERAS

US3 VISION BCON FOR LVDS

- Board level cameras with bare board, S- and CS-mount options

- Designed for minimal space, lowest weight and power requirements

- Long-term availability and industrial-proven reliability

- PGI – Basler's unique feature set for powerful in-camera image optimization

BASLER
the power of sight

Basler dart – Highly Flexible not only for Your Embedded Imaging Solutions

The Basler dart camera line has been developed to meet the requirements of a broad variety of vision applications. With its single-board design, this camera series offers the latest technology in a very small format. A distinctive combination of high quality and cost-effectiveness in development and product design allows us to offer you a starting list price of € 99. You can benefit from:

- Bare board model without any additional lens mount for highest flexibility

- M12 / S-mount or CS-mount front for a wide variety of vision applications

- Sensors with resolutions from 1.3 to 5 MP as global shutter and rolling shutter versions in color and monochrome

- Single cable solution with plug and play USB 3.0 interface or Basler's LVDS-based BCON interface – designed to meet your requirements for lean embedded vision architecture

With PGI, the dart camera offers a unique new feature set for a powerful in-camera image optimization. Even at full speed it improves the camera image, and combines improved 5×5 debayering, color-anti-aliasing, denoising and improved sharpness. As a result, you get the best pictures directly from your camera according to your settings without any additional processor load. Learn more at *www.baslerweb.com/PGI*.
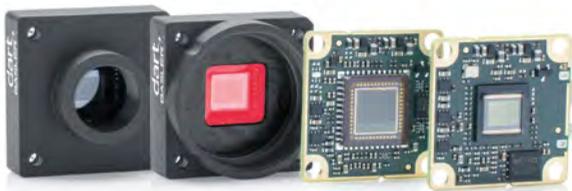
The dart also offers separate in- and outputs for trigger or flash control, and a broad set of features. With its low power consumption, dart also reduces heat dissipation challenges.

Your benefits include:

- Smallest board level cameras with extremely low weight and low power consumption

- USB3 Vision: Plug and play with a single cable solution compliant with industry standards

- Basler's LVDS-based interface BCON for challenging embedded technology requirements

- Field-proven Basler pylon Camera Software Suite with sophisticated drivers

- Perfect price/performance ratio with starting list price of € 99

- Excellent color reliability and image adjustment features for color-critical applications

Basler dart Power Packs – Easy-to-use Kits to Facilitate Development

Get acquainted with the dart series: The PowerPack dart USB for Evaluation is a plug and play evaluation kit including a Basler dart USB camera. It is the right choice for you to:

- get familiar with camera properties and pylon SDK
- evaluate the camera's optical performance

Both is also useful if you are planning an embedded vision solution with a dart BCON camera.

For smooth LVDS based integration of a dart BCON camera, Basler offers the PowerPack for Embedded Vision. This designated development kit with a Basler dart BCON and a processing board provides engineers with a sample integration including code examples for easier realization, adaption, and testing.

Both PowerPacks come with additional components such as a lens, cables, and the pylon Camera Software Suite.

Basler pylon Camera Software Suite

The pylon Camera Software Suite operates with all Basler cameras – no matter what interface they use. It offers stable, reliable, and flexible data exchange between Basler cameras and computer systems: for Linux on ARM-based systems, but also on Windows, Linux and OS X on x86 – at a very low processor load.

pylon Viewer	Direct Show	C++ API		GenICam XML File

IP Configurator

CL Configurator

USB Configurator

TWAIN

C

.NET

pylon Camera Software Suite
(Windows/Linux/OS X, 32/64 Bit)

GEN<i>CAM

USB3 Vision Driver	GigE Vision Filter Driver	GigE Vision Performance Driver	Camera Link Configuration Driver	IEEE 1394 Driver	BCON Adapter API
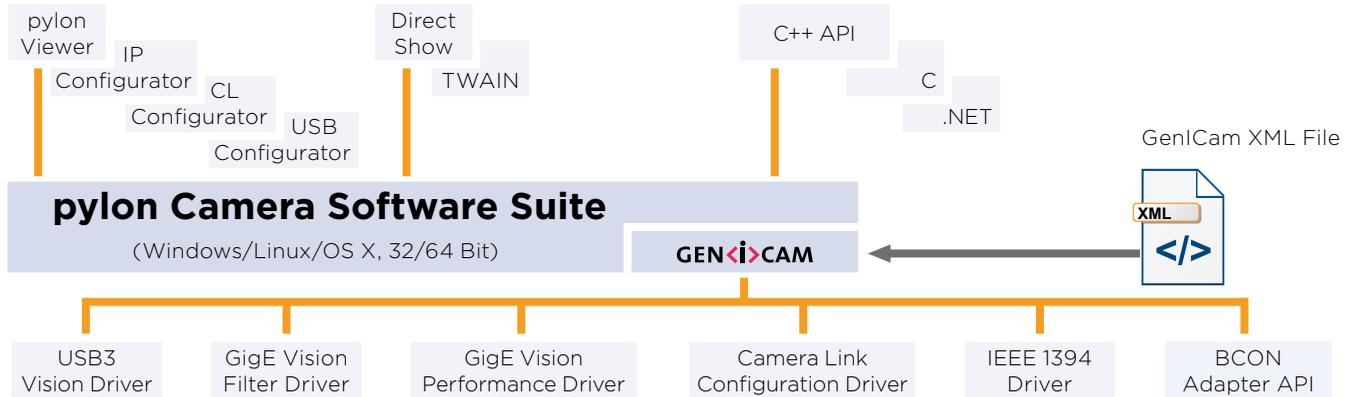
The architecture of the pylon Camera Software Suite is based on GenICam Technology, which offers easy access to the newest camera models and the latest features. Changing an existing camera device in any application essentially becomes a plug and play process.

An easy-to-use set of tools lets you configure the camera's interface. Use the **pylon Viewer** to set camera parameters, to capture and display images, and to evaluate the camera. The pylon Camera Software Suite also contains a powerful SDK that supports any type of application development.

Besides other Basler camera interfaces like GigE Vision, IEEE1394 and Camera Link, pylon also supports the interfaces which are of particular interest for embedded vision applications: USB3 Vision and BCON for LVDS. For those applications, Basler's pylon for Linux is the ideal solution - for ARM-based as well as for x86-based embedded systems.

pylon for USB 3.0 interface

pylon contains a USB3 Vision Driver which fully supports the USB3 Vision standard. It allows the camera to use the full speed and bandwidth of USB 2.0 or USB 3.0 respectively for image transmission, while reducing resource load and using off-the-shelf hardware components. The easy-to-use pylon SDK is available for Windows, Mac OS X, and Linux (on x86/x64 and ARM-based sys-

tems) and allows the creation of applications in C, C++, and .NET languages (e.g. C#, VB.NET).

pylon for BCON interface

The proven and user-friendly pylon Camera Software Suite also supports Basler's BCON for LVDS interface and is available for Linux on x86 or ARM-based systems. The programming interface for creating user-specific applications is identical to other interfaces, such as USB 3.0. This fact makes migrations from one camera model to another much easier.

Based on GenICam technology, the camera configuration is performed via the I^2C bus of the Linux system. For this purpose, pylon introduces a new BCON Adapter API which needs to be implemented in order to let pylon communicate with the system's I^2C bus. A ready-to-use sample implementation is provided as binary as well as in source code – it can be used as-is without any modification or as a blueprint for a custom adapter implementation.

The BCON Adapter API also provides an interface for implementing the logic for grabbing images. Subsequently, pylon can be used without limitation, even for image data transfer. For the development kit with a dart BCON camera, a ready-to-use sample implementation is provided as binary and in source code. Image data transfer can also be implemented independently from pylon.

USB3
VISION

Basler dart with USB 3.0 Interface – Plug and Play for Easy Integration

The dart camera series offers two interface options to tailor to your system`s requirements. With the USB 3.0 interface, you can benefit from compliance with the international USB3 Vision standard and the upcoming next generation of camera interfaces.

All dart cameras with USB 3.0 interface provide camera data and power over only one cable. The high bandwidth of USB 3.0 technology enables the dart cameras to deliver high-quality raw picture and video data in full motion. Compressing data, which causes image quality loss, is not necessary. These models also offer backwards compatibility to USB 2.0.

With USB 3.0, you can be sure to enjoy an extraordinarily high transfer bandwidth, outstanding real-time capability, high stability and smooth fault handling,

as well as simple integration with all machine vision applications.

Find more benefits of this interface on
baslerweb.com/USB3.

Dimensions (in mm)

Bare board

≈ 28.3
27
22.4

≈ 7.2 (daA1600-60um/uc ≈ 8.2)
max. 1.1

27
22.4

4 x Ø3

CS-mount

Photosensitive
surface of the sensor

≈ 19.3
14.3

5.4

Ø 28.3

29
22.4

≈ 17.42

29
22.4

4 × Ø2.2

max. 12.526
daA1600-60um/uc:
max. 12,071 + spacer ring 0,5 = 12,571

Specifications

USB3 VISION
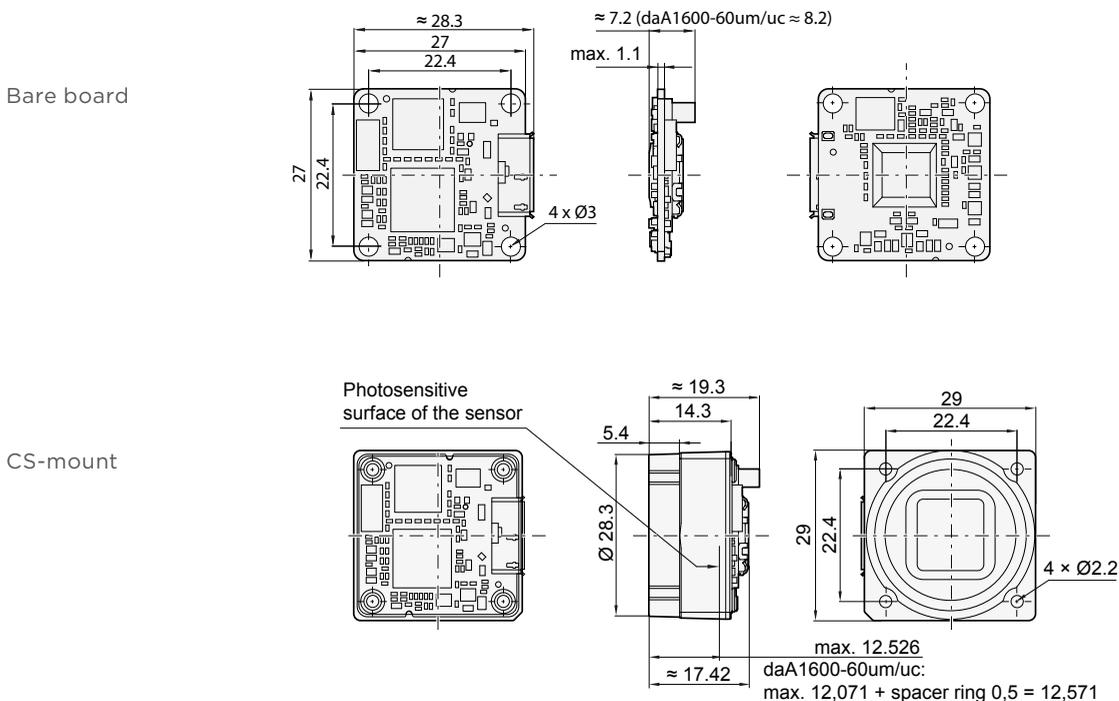
Basler dart USB 3.0	daA1280-54 um/uc	daA1600-60 um/uc	daA1920-15 um	daA1920-30 um/uc	daA2500-14 um/uc
Camera					
Resolution (H × V pixels)	1280×960	1600×1200	1920×1080	1920×1080	2592×1944
Sensor	Aptina AR0134	EV76C570	Aptina MT9P031	Aptina MT9P031	Aptina MT9P031
Sensor Size (optical)	1/3"	1/1.8"	1/3.7"	1/3.7"	1/2.5"
Sensor Technology	CMOS, global shutter		CMOS, rolling shutter		
Pixel Size [µm²]	3.75×3.75	4.5×4.5	2.2×2.2	2.2×2.2	2.2×2.2
Frame Rate [fps]	54	60	15	30	14
Mono / Color	Mono / Color		Mono	Mono / Color	
Video Output Format	Mono (8, 12), YUV 4:2:2 Packed (YCbCr 422), Bayer (8, 12), RGB 8				
Interface	USB 3.0				
Synchronization	Via external trigger or free-run				
Exposure Control	Programmable via the camera API		Via external trigger or programmable via the camera API		
Mechanical / Electrical					
Housing Size (L × W × H) [mm]	Bare board model: 7.2×27×27 (daA1600-60um/uc: 8.2×27×27) S-mount models: 20×29×29 CS-mount models: 20×29×29				
Housing Temperature	Up to 50°C				
Lens Mount	Bare board, S, CS		Bare board	Bare board, S, CS	
Digital I/O	2 Fast-GPIO (configurable as In/Out)				
Power Requirements	Via USB 3.0 interface				
Power Suspend Mode	Yes, less than 20 mW, configurable				
Power Consumption (typical)	~1.3 W	~1.3 W	~1.2 W	~1.3 W	
Weight (typical)	S-, CS-mount models: <15 g Bare board model: <5 g				
Conformity	CE, FCC, RoHS, UL, USB3 Vision				
Software / Driver					
Driver	Basler pylon Camera Software Suite or 3rd party USB3 Vision Software				
Operating System	Windows, Linux, Mac OS X				
Conformity	USB3 Vision, GenICam				

Specifications are subject to change without prior notice.
Latest specifications and availability can be found on our website www.baslerweb.com/dart. Please visit www.baslerweb.com/manuals for the detailed camera User's Manual and www.baslerweb.com/thirdparty for information on third party software.

S-mount

Photosensitive surface of the sensor

≈ 19.9
14.9
6
Ø 16
max. 13.05
≈ 18.04

29
22.4
29
22.4
4 × Ø2.2
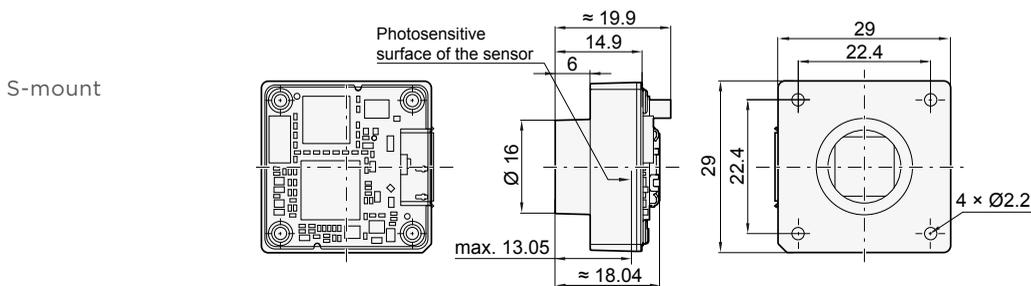
TECHNICAL DETAILS

Basler BCON Interface Based on LVDS Technology – Flexible and Lean Embedded Vision Architectures

With the dart series, Basler introduces its BCON interface, developed to meet your challenging requirements in embedded vision technology. BCON offers high flexibility for connecting to LVDS-based technology, and is ideal for many applications with digital image processing. LVDS (Low-Voltage-Differential-Signaling) describes a standardized interface for high speed data transfer. As this does not define the image transmission in detail, Basler developed a unique interface for image data transfer called BCON. It also enables the developer of an embedded system to switch from one dart camera model to another without any additional integration costs or effort.

The dart BCON camera enables savings in your system's setup and operation. In particular, dart can be used with an embedded processing board for lean, next-generation imaging front end and vision architecture. Moreover, in-/output signals and power supply can be enabled through a Flat Flex cable. Powerful new-generation FPGA (Field Programmable Gate Array) boards, as well as SoCs (System on Chip), can be connected. Well known for Basler's cameras and also compatible with BCON, the pylon Camera Software Suite based on GenICam delivers an easy-to-use SDK for seamless software integration of dart cameras.

The new dart models with BCON interface are also attractive to embedded technology experts through benefits including small board level design and powerful in-camera image optimization (PGI). Your choice includes e.g. factors such as lens mount, resolution, and speed provided by sensors from leading manufacturers. Secure your competitive advantage through improved performance and an optimized total cost of ownership for your vision system. To find out more please visit *baslerweb.com/BCON*.

Dimensions (in mm)

Bare board

CS-mount

Photosensitive surface of the sensor

daA1600-60bm/bc: max. 12,071

Specifications

BCON
F O R   L V D S

Basler dart BCON	daA1280-54bm/bc	daA1600-60bm/bc	daA2500-14bm/bc
Camera			
Resolution (H × V pixels)	1280 × 960	1600 × 1200	2592 × 1944
Sensor	Aptina AR0134	EV76C570	Aptina MT9P031
Sensor Size (optical)	1/3″	1/1.8″	1/2.5″
Sensor Technology	CMOS, global shutter		CMOS, rolling shutter
Pixel Size [µm^2]	3.75 × 3.75	4.5 × 4.5	2.2 × 2.2
Frame Rate [fps]	54	60	14
Mono / Color	Mono / Color		
Video Output Format	Mono 8/12, YUV 4:2:2 Packed (YCbCr 422), Bayer 8/12, RGB 8		
Interface	Basler BCON		
Synchronization	Via external trigger or free-run		
Exposure Control	Programmable via the camera API		Via external trigger or programmable via the camera API
Mechanical / Electrical			
Dimensions (L × W × H) [mm]	Bare-Mount Models: 4.9 × 27 × 27 (daA1600-60bm/bc: 5.9 × 27 × 27)	S-Mount Models: 17.5 × 29 × 29 CS-Mount Models: 16.9 × 29 × 29	
Board Temperature	Up to 50°C		
Lens Mount	Bare board, S, CS		
Digital I/O	1 LVDS Input, 2 Outputs encoded with serial image data stream		
Power Requirements	Via Basler BCON interface		
Power Consumption (typical)	~1.3 W	~1.3 W	~1.4 W
Weight (typical)	S-, CS-mount models: <15 g Bare board model: <5 g		
Conformity	CE, FCC, RoHS		
Software / Driver			
Driver	Basler pylon Camera Software Suite		
Operating System	Linux - 32 bit and 64 bit		
Conformity	GenICam		

Specifications are subject to change without prior notice.
Latest specifications can be found on our website. Please visit www.baslerweb.com/manuals for the detailed camera User's Manual and www.baslerweb.com/thirdparty for information on third party software.

CS-mount

Photosensitive surface of the sensor
≈ 17.5
14.9
6
Ø 16
max. 13.05
29
22.4
4 x Ø2.2
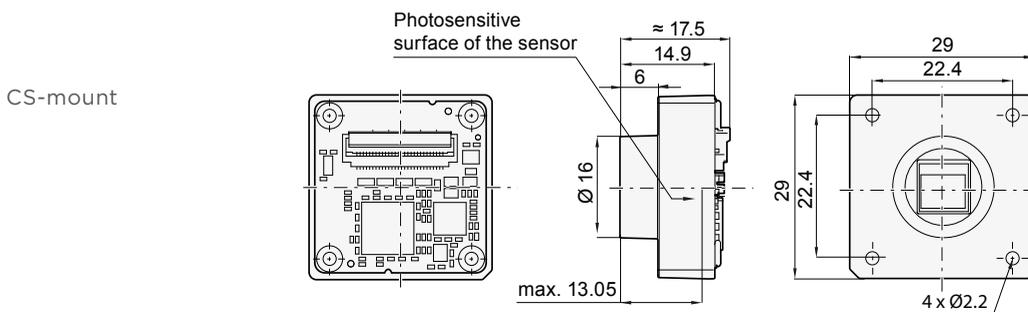
About Basler

Founded in 1988, Basler is a leading global manufacturer of high quality digital cameras and lenses for factory automation, medical & life sciences, retail and traffic applications. The company employs 500 people at its headquarters in Ahrensburg, Germany and subsidiaries in the United States and Asia.

Basler's portfolio of products offers customers the vision industry's widest selection of industrial and network cameras as well as lenses. Today it includes some 300 camera models – and it's still growing. We're committed to developing technology that drives business results for our customers: cameras and lenses that are easy to use, easy to integrate, and deliver an exceptional price/performance ratio.

3-Year Warranty

Basler offers a 3-year warranty for their cameras and Basler Lenses. We make this unprecedented promise because we have unparalleled confidence in our products. We continually reinvest in research, development and superior manufacturing capabilities so that our customers can fully rely on the products we manufacture.

How Does Basler Ensure Superior Quality and Reliable High Performance?

Our approach to quality assurance is rigorous: we continually audit all facets of our business to ensure powerful performance, increase efficiency and reduce costs for our customers. We are compliant with all major quality standards including ISO 9001, CE, RoHS, and more. To ensure consistently high product quality, we employ several quality inspection procedures during manufacturing.

Every Basler camera is subjected to exhaustive optical and mechanical tests before leaving the factory. We have developed a unique combination of optics, hardware, and software tools that can quickly and efficiently calibrate a camera and measure its performance against a set of standard performance criteria. Regardless of what technology or camera model you choose you can be assured of consistent performance.

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