Allied Vision

member of the TKH Group

Sales Presentation Alvium

July 2019

Contents

Allied Vision

Positioning Alvium Series

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“The Alvium Camera Series addresses the needs of embedded and machine vision system designers with simplified integration, versatility, power efficiency, and industrial robustness.”

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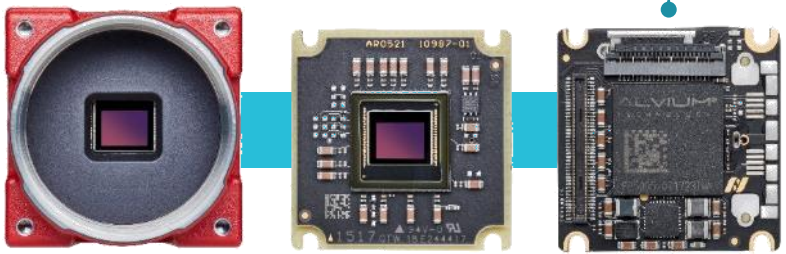
Flexible powerhouse in small package

Alvium platform overview

// Industrial Grade Design

// Single Board PCB

// Various Housing & Mounting Options



// Image Sensors up to 1.1“

// Up to 20Mpx Resolution

// Support for various sensor interfaces

ALVIUM® TECHNOLOGY

// Image Processing Library

// Intelligent Power Management

// Low Power Consumption

mipi® USB3 VISION

// One driver for all CSI-2 models

// USB3 Vision compliant

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Alvium USPs matched to key customer requirements – focus on ease of system integration and future standards

What **YOU** want	What **WE** offer	**YOUR** benefit
Low system costs	Platform design and manufacturing Technology	Starting price of 129€
Low power consumption	ALVIUM Technology	Intelligent power Management
Off the shelf image pre-processing		Pre-programmed image processing algorithms
Broad image sensor variety		Support of all Sony and ONSEMI image sensors
Small and lightweight camera module		26.5 mm camera dimensions and 10g weight
Low hardware integration efforts		Standard interfaces USB3 and MIPI
	Platform design	Various mount options with C/CS/S-Mount
	Manufacturing technology	Accurate sensor alignment
Low software integration efforts	Internal R&D External R&D partnerships Community support due to open source	Lens recommendation guide
		Software SDK
		GeniCam support
		V4L2 and GStreamer support
		OpenCV examples
		Off the shelf MIPI drivers for i.MX6/8, TX, Xavier, Nano
Industrial grade camera module	Platform design	Intelligent heat dissipation concept
		Operating temperature 5°C to 65°C
Flexibility for system updates		Same footprint for all Alvium camera modules
		Same register for all Alvium camera modules
	ALVIUM Technology	Flexible algorithms for up to 30MPx resolution

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Positioning 1500 C Series

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Positioning 1500 C Series

// The Alvium 1500 C Series targets embedded vision systems running Linux and using Video4Linux2 (V4L2).

// It comes with 1 open source driver for all camera models (per system architecture) easing system integration tremendously.

// All image optimizations are done on the camera ISP freeing up processing power on the embedded boards.

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USP‘s 1500 C Series

// All the camera modules have the same driver which is open source on Github.com/alliedvision
- This ensures a fast integration into systems lowering development costs

// All the camera modules come with a long term availability of at least 10 years.
- Design your system once and don‘t worry about long term supply.

// Control the module via driver and V4L2 control or through the registers directly
- Multiple well documented possibilities to control the camera

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1500 C Series Use Cases

// 1500 C cameras are made for streaming applications:

- There is no triggering available, streaming is turned on or off (Acquisition Start / Stop)
- Triggering for CSI-2 cameras will later be available in the 1800 C Series (Q4 2019)

// 1500 C cameras are the best fit for low SWaP applications (low size, weight, and power)

- Low camera power consumption
- Low interface overhead with CSI-2
- Single board design

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Target Markets and Applications

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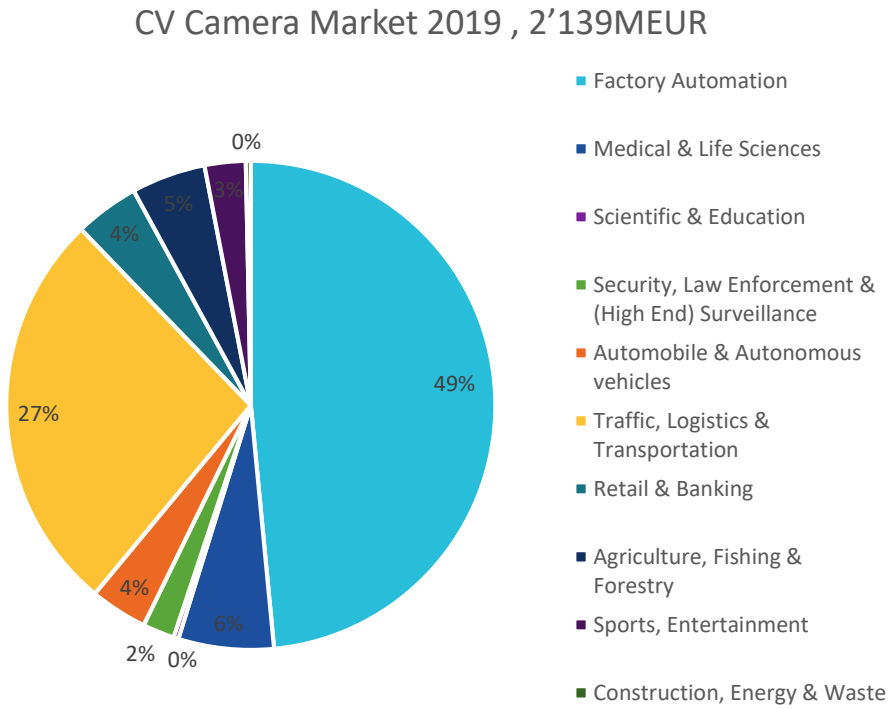
Target Markets 1500 C

// Traffic, Logistics & Transportation

// Medical & Life Sciences

// Retail & Banking

// Factory Automation



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Target Applications

// Traffic, Logistics & Transportation
- ITS – Speed enforcement
- Shelf monitoring systems
- Intelligent Warehouses

// Medical & Life Sciences
- Small diagnostic devices
- Portable medical devices

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Target Applications

// Retail & Banking

- Automatic checkout systems
- Barcode scanners
- Vending machines
- ATM systems

// Factory Automation

- Robotics - Proximity recognition
- 3D / Handheld measuring systems

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Features and Capabilities

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1500 C Functionalities

Release Feature Set

Auto control	*Auto exposure*
	Auto gain
	Auto white balance
Basic control	*Black level*
	Exposure time
	Gain
	Gamma
	White balance
Image Size	*Region of interest**
Image Enhanc.	*De-Bayering*
Image Correction	*FPNC (fixed pat. noise c.)***
Maintenance	*Firmware update*
	Temperature monitoring

Plannded Additions

- *Auto contrast*
- *Contrast*
- *Hue*
- *Saturation*
- *Sharpness*
- *Sensor Binning (if supported)*
- *Defect pixel correction*
- *Anti-flickering mode*
- *Test image generation*
- *Power saving mode*
- *User data storage*
- *Frame statistics*

* currently only height adjustable
** for C-050 and C-120 model only

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File Formats and Standards

// V4L2 uses different file formats than GenICam

- We are used to GenICam PFNC naming

// 1500 C Series cameras support the following pixel formats:

- Monochrome: RAW8
- Color: YUV422_10, BGR888, RGB888, RAW8

// 1500 C Series cameras comply with:

- Mipi CSI-2 V1.1
- Mipi D-PHY V1.1

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File Formats and Standards

// Shock and Vibration testing:

- IEC 60068-2-6 sinusoidal vibration
- IEC 60068-2-27 non-repetitive shock
- IEC 60068-2-27 repetitive shock
- IEC 60068-2-64 random vibration

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Models and Specifications

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1500 C Camera Models

Camera Models	1500 C-050	1500 C-120	1500 C-500
Sensor Name	PYTHON 480	AR0135CS	AR0521
Resolution	0.5MP	1.2MP	5.0MP
Pixels	800x600	1280x960	2592x1944
Pixel Size [µm]	4.80	3.75	2.20
Optical Format	1/3.6"	1/3"	1/2.5"
Shutter	Global	Global	Rolling
Frame Rate	116	50	67
Power Consumption	1.3 W	1.1 W	1.7 W
Interface	MIPI CSI-2 D-PHY with 1,2 or 4 lanes and 1.5GBit/s per lane		

mipi®

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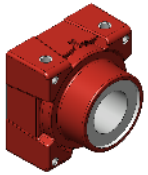
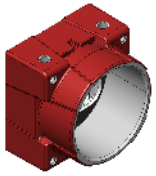
1500 C Variants

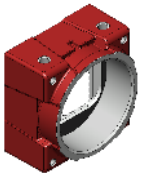
// Mono / Color

// Bareboard, Open Housing

// S- (M12-), C-, or CS-mount







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Detailed Specifications 1500 C-050

Feature	Monochrome models	Color models
Sensor model	ON Semiconductor PYTHON 480	ON Semiconductor PYTHON 480
Resolution	808 (H) × 608 (V) | 0.48 megapixels	
Sensor type	Progressive scan CMOS	
Shutter type	Global shutter	
Sensor size	Type 1/3.6 |3.92 mm × 2.96 mm | 4.91 mm diagonal	
Pixel size	4.8 µm × 4.8 µm	
Chief ray angle (CRA)	1.65°	
ADC	10-bit	
YUV color pixel formats	-	YUV422_10
RGB color pixel formats	-	BGR888, RGB888 (default)
RAW pixel formats	RAW8 (default)	RAW8
Maximum image bit depth	10-bit	
Maximum frame rate	116 fps, using 1 to 4 lanes, RAW8, 10-bit, full resolution	
Exposure time	63 µs to 63.2 s	
Image buffer (RAM)	256 KB	
Non-volatile memory (Flash)	1024 KB	
Gain	0 dB to 11 dB; 0.1 dB increments	
Power requirements	Power over MIPI CSI-2	
Power consumption	Typical: 1.3 W | Max. 1.4 W (at 5 VDC, 20 °C)	
Storage temperature	-10 °C to +70 °C ambient temperature	
Operating temperature	Housing: +5 °C to +65 °C with heat sink Protect the camera from excessive heat, operate only with lens and heat sink mounted. Ambient temperature: below 30 °C. See Housed cameras: handling hot cameras on page 15.	
Relative humidity	0% to 80% (non-condensing)	
Digital interface	MIPI CSI-2 D-PHY V1.1 | 1, 2, or 4 lanes | maximum 1.125 Gb/s per lane	
Camera controls	V4L2 controls (Video4Linux Access), Direct Register Access	

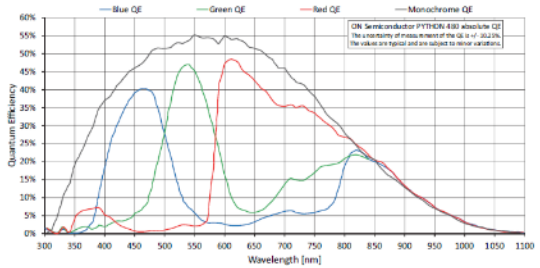
Dimensions, mass, and filter

Bare board cameras	Specification
Dimensions (L × W × H [mm])	7 × 26 × 26
Mass [g]	10 g

Table 8: Bare board dimensions and mass for 1500 C-050m/c

Open housing cameras	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread	M12 mm × 0.5 mm	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	20 × 29 × 29	21 × 29 × 29	26 × 29 × 29
Mass [g]	40	35	40
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

Quantum efficiency (QE)



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Detailed Specifications 1500 C-120

Feature	Monochrome models	Color models
Sensor model	ON Semiconductor AR0135CS	ON Semiconductor AR0135CS
Resolution	1280 (H) × 960 (V) | 1.2 megapixels	
Sensor type	Progressive scan CMOS	
Shutter type	Global shutter	
Sensor size	Type 1/3 | 4.8 mm × 3.6 mm | 6.0 mm diagonal	
Pixel size	3.75 µm × 3.75 µm	
Chief ray angle (CRA)	0°	
ADC	12-bit	
YUV color pixel formats	-	YUV422_10
RGB color pixel formats	-	BGR888, RGB888 (default)
RAW pixel formats	RAW8 (default)	RAW8
Maximum image bit depth	12-bit	
Maximum frame rate	50 fps, using 1 to 4 lanes, RAW8, 12-bit, full resolution	
Exposure time	56 µs to 1.2 s	
Image buffer (RAM)	256 KB	
Non-volatile memory (Flash)	1024 KB	
Gain	0 dB to 18 dB; 0.1 dB increments	
Power requirements	Power over MIPI CSI-2	
Power consumption	Typical: 1.1 W | Max. 1.2 W (at 5 VDC, 20 °C)	
Storage temperature	-10 °C to +70 °C ambient temperature	
Operating temperature	Housing: +5 °C to +65 °C with heat sink Protect the camera from excessive heat, operate only with lens and heat sink mounted. Ambient temperature: below 30 °C. See Housed cameras: handling hot cameras on page 15.	
Relative humidity	0% to 80% (non-condensing)	
Digital interface	MIPI CSI-2 D-PHY V1.1 | 1, 2, or 4 lanes | maximum 1.125 Gb/s per lane	
Camera controls	V4L2 controls (Video4Linux Access), Direct Register Access	

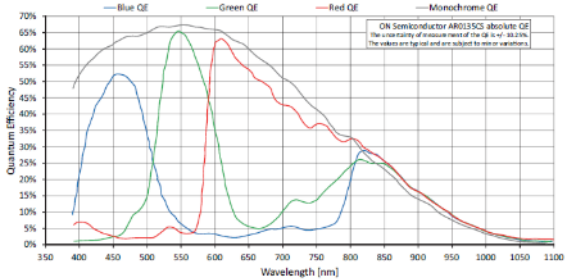
Dimensions, mass, and filter

Bare board cameras	Specification
Dimensions (L × W × H [mm])	7 × 26 × 26
Mass [g]	10 g

Table 12: Bare board dimensions and mass for 1500 C-120m/c

Open housing cameras	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread	M12 mm × 0.5 mm	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	20 × 29 × 29	21 × 29 × 29	26 × 29 × 29
Mass [g]	40	35	40
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

Quantum efficiency (QE)



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Detailed Specifications 1500 C-500

Feature	Monochrome models	Color models
Sensor model	ON Semiconductor AR0521	ON Semiconductor AR0521
Resolution	2592 (H) × 1944 (V) | 5.1 megapixels	
Sensor type	Progressive scan CMOS	
Shutter type	Rolling shutter	
Sensor size	Type 1/2.5 | 5.7 mm × 4.3 mm | 7.13 mm diagonal	
Pixel size	2.2 µm × 2.2 µm	
Chief ray angle (CRA)	9°	
ADC	12-bit	
YUV color pixel formats	-	YUV422_10
RGB color pixel formats	-	BGR888, RGB888 (default)
RAW pixel formats	RAW8 (default)	RAW8
Maximum image bit depth	10-bit	
Maximum frame rate	67 fps, using 1 to 4 lanes, RAW8, 10-bit, full resolution	
Exposure time	7 µs to 0.5 s	
Image buffer (RAM)	256 KB	
Non-volatile memory (Flash)	1024 KB	
Gain	0 dB to 24 dB; 0.1 dB increments	
Power requirements	Power over MIPI CSI-2	
Power consumption	Typical: 1.7 W | Max. 1.8 W (at 5 VDC, 20 °C)	
Storage temperature	-10 °C to +70 °C ambient temperature	
Operating temperature	Housing: +5 °C to +65 °C with heat sink Protect the camera from excessive heat, operate only with lens and heat sink mounted. Ambient temperature: below 30 °C. See Housed cameras: handling hot cameras on page 15.	
Relative humidity	0 to 80% (non-condensing)	
Digital interface	MIPI CSI-2 D-PHY V1.1 | 1, 2, or 4 lanes | maximum 1.125 Gb/s per lane	
Camera controls	V4L2 controls (Video4Linux Access), Direct Register Access	

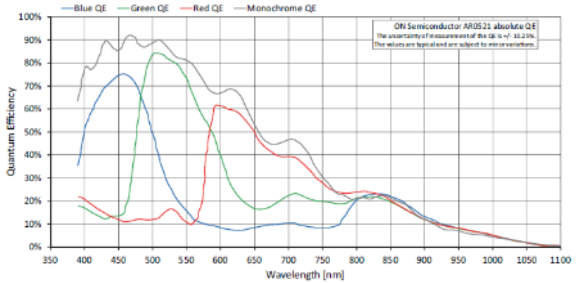
Dimensions, mass, and filter

Bare board cameras	Specification
Dimensions (L × W × H [mm])	7 × 26 × 26
Mass [g]	10 g

Table 16: Bare board dimensions and mass for 1500 C-500m/c

Open housing cameras	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread	M12 mm × 0.5 mm	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	20 × 29 × 29	21 × 29 × 29	26 × 29 × 29
Mass [g]	40	35	40
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

Quantum efficiency (QE)



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Documentation

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Available Documentation

// The most important documents:

Allied Vision

Documentation Alvium CSI-2 - 1/3

Camera operation

// Alvium CSI-2 Cameras User Guide V1.0.0
https://cdn.alliedvision.com/fileadmin//content/documents/products/cameras/Alvium_CSI-2/techman/Alvium-CSI-2-Cameras_User-Guide.pdf

// Alvium CSI-2 Cameras Safety and Usage Instructions V1.0.0 (multilingual document)
https://cdn.alliedvision.com/fileadmin//content/documents/products/cameras/Alvium_CSI-2/techman/Alvium-CSI-2-Cameras_Safety-Usage-Instructions.pdf

Hardware options

// Alvium Cameras Hardware Options V1.0.0
https://cdn.alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_common/hardware-options/Alvium-Cameras_Hardware-Options.pdf

Register controls

// Alvium CSI-2 Cameras Direct Register Access Controls Reference V1.0.0
https://cdn.alliedvision.com/fileadmin//content/documents/products/cameras/Alvium_CSI-2/techman/Alvium_CSI-2_Register_Controls_Reference.pdf

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Documentation Alvium CSI-2 - 2/3

Electromagnetic interference

// Electromagnetic Compatibility for Open Housing Alvium Cameras V1.0.0
https://cdn.alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_common/appnote/Alvium-Cameras_EMC-Housings.pdf

Heat dissipation

// Optimum heat Dissipation for Housed Alvium Cameras V1.0.0
https://cdn.alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_common/appnote/Alvium-Cameras_Heat-Dissipation.pdf

Ground loops

// Avoiding Ground Loops in Vision Systems V1.0.0
https://cdn.alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_common/appnote/GND-Loops_in_Vision-Systems.

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Documentation Alvium CSI-2 - 3/3

Designing individual embedded boards and FPC cables

// FPC Cables and Embedded Boards for Alvium CSI-2 Cameras V1.0.0 **Confidential**
(available from PM Public only with access rights granted)
https://avtgmbh.sharepoint.com/:b:/r/pm/PMPublic/Product%20Information/Alvium%20Series/00_General/Requirement%20Spec%20-%20Confidential/FPC-Cables_Embed-Board_Requ_Confidential_V1.0.0.pdf?csf=1&e=bCwB8V

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Positioning 1800 U Series

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Positioning 1800 U Series

// The Alvium 1800 U Series targets entry level machine vision and high-end embedded vision users.

// It is a very modular and cost effective camera solution supporting USB3 Vision

// It offers basic pre-processing functionalities and various triggering options

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USP‘s 1800 U Series

// Available as 26 x 26 mm bareboard version, one of the smallest on the market.

// 14 variants per model readily available (various housings, various Mounts, 2 interface orientations)

// 5 MP sensor with 67 fps in freerun.

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Features and Capabilities

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File Formats and Standards

// 1800 U Series cameras support the following pixel formats:

- mono cameras: Mono8 (default), mono10, mono10p
- color cameras: BayerGR8, BayerGR10, BayerGR10p, RGB8, BGR8, YCbCr411_8_CbYYCrYY, YCbCr422_8_CbYCrY, YCbCr8_CbYCr

// 1800 U Series cameras comply with:

- USB 3.1 Gen1
- USB 2.0
- GenICam V2.0

Standards

// Shock and Vibration testing:

- IEC 60068-2-6 sinusoidal vibration
- IEC 60068-2-27 non-repetitive shock
- IEC 60068-2-27 repetitive shock
- IEC 60068-2-64 random vibration

// Alvium 1800 U closed housing cameras have IP30 class according to IEC 60529

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1800 U Functionalities

Release Feature Set

Auto control	*Auto exposure*
	Auto gain
	Auto white balance
Basic control	*Black level*
	Exposure time
	Frame Rate
	Gain
	Gamma
	White balance
	Throughput Limit
Image Size	*Region of interest*
Image Enhanc.	*De-Bayering*
Image Correction	*FPNC (fixed pat. noise c.)**
	Mirror image
Triggering	*Triggering by external inputs*
	Triggering by software
Maintenance	*Firmware update*
	Temperature monitoring
	Device Reset
	Test image generation
	Signal LED control

Plannded Additions

- *Auto contrast*
- *Contrast*
- *Hue*
- *Saturation*
- *Sharpness*
- *Sensor Binning***
- *Defect pixel correction*
- *Power saving mode*
- *User data storage*
- *Frame statistics*
- *User Set (light)*
- *Adaptive noise reduction*
- *Creative filters*
- *Look-up table (light)*
- *Color transform matrix*
- *Trigger by counters / timers*

* not in U-500, will be in U-050 and U-120
** if supported

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Feature Highlights – Auto Modes and Intensity Controller

// Alvium Cameras feature improved and updated control features for Auto Modes (Auto Exposure, Auto Gain, Auto White Balance).

// A sub-region (Auto Mode Region) within the image can be selected to control the auto modes.

// Both Gain and Exposure time influence the intensity, so a controller is introduced to give one precedence over the other:

- Minimize motion blur (increase gain first)
- Minimize noise (increase exposure time first)

// Many more adjustment possibilities for intensity controller

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Auto Gain and Exposure Settings can be adjusted and prioritized depending on Customers Use Case

Dark Current Noise

// Minimize noise

→ Increase **exposure** time, before gain

Motion Blur

// Minimize motion blur

→ Increase **gain**, before exposure time

Fine Tuning available

- // Min Gain Values
- // Max Gain Values
- // Min Exposure Values
- // Max Exposure Values
- // Controller Tolerance
- // Controller Target
- // Control Update Rate

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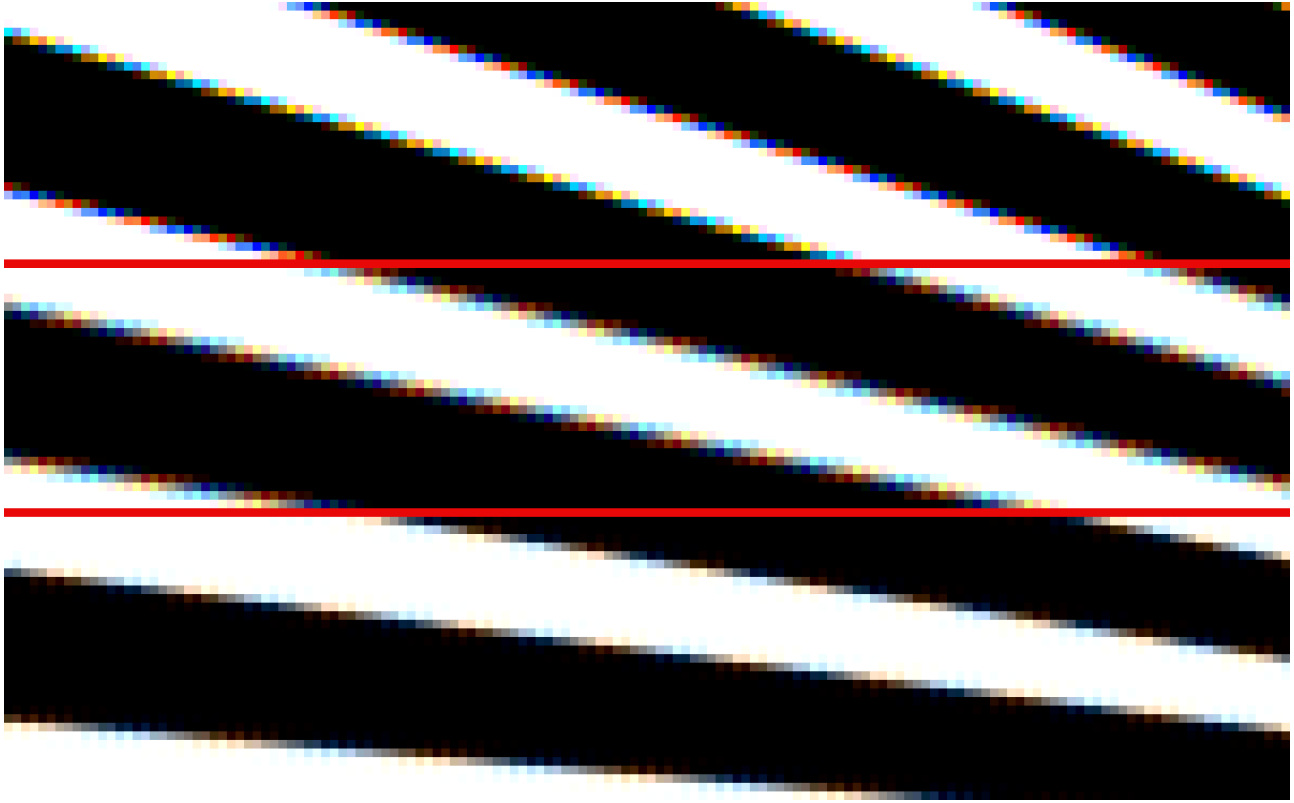
Feature Highlight - De-Bayering



2x2

3x3

5x5

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Models and Specifications

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1800 U Camera Model

Camera Models	1800 U-500
Sensor Name	AR0521
Resolution	5.0MP
Pixels	2592x1944
Pixel Size [µm]	2.20
Optical Format	1/2.5"
Shutter	Rolling
Frame Rate	67
Interface	USB3 Vision

Frame Rate

- By default we limit the throughput of the camera to 200MB/s (i.e. feature DeviceThroughputLimit is activated and set to 200MB/s). So, the camera reaches 38 fps.
- This ensures a good user experience and not overloading regular PC‘s or laptops.
- If you are sure that your PC (i.e. your USB3 chipset and memory) can handle more data, the data rate can be increased. Max. framerate (Mono8) is reached at approx. 340MB/s.

- Please note: It is not possible to trigger the camera at maximum framerate. If the camera is triggered the max. framerate is 33.7fps

USB3 VISION™

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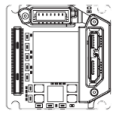
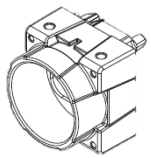
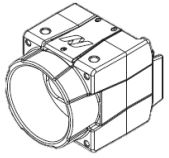
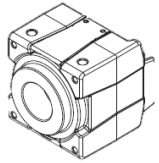
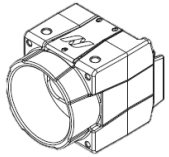
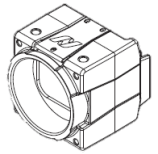
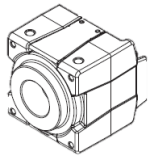
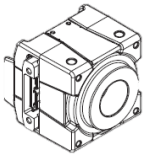
1800 U Variants
14 mono and 14 color variants per sensor

- Mono / Color
- Bareboard, Open, Closed housing
- S- (M12-), C-, or CS-mount
- Standard interface orientation, 90° side orientation



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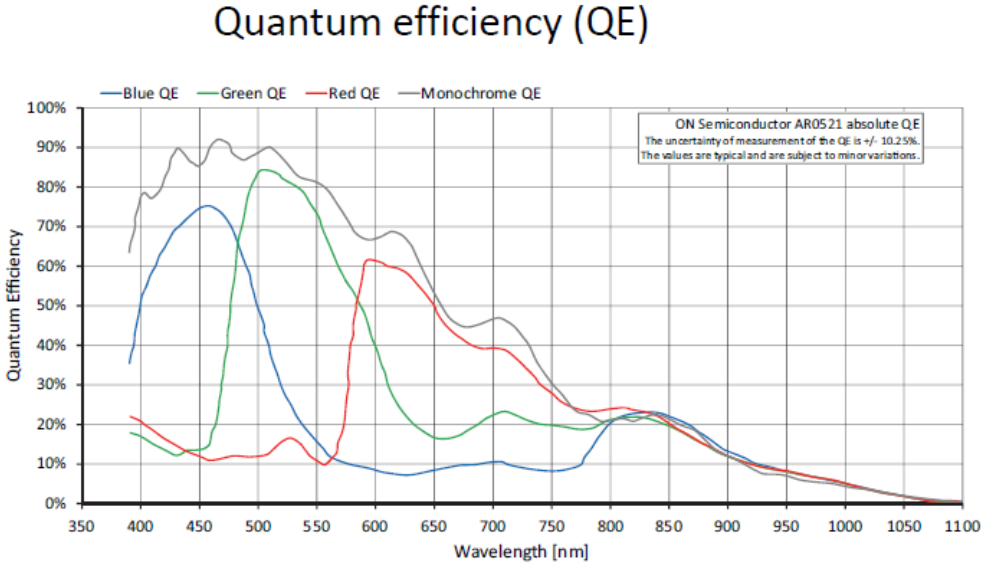
Detailed Specifications 1500 U-500

Feature	Specification	
	Monochrome models	Color models
Sensor model	ON Semiconductor AR0521	ON Semiconductor AR0521
Resolution	2592 (H) × 1944 (V) | 5.1 megapixels	
Sensor type	Progressive scan CMOS	
Shutter type	Rolling shutter	
Sensor size	Type 1/2.5 | 5.7 mm × 4.3 mm | 7.13 mm diagonal	
Pixel size	2.2 µm × 2.2 µm	
Chief ray angle (CRA)	9°	
ADC	12-bit	
Monochrome pixel formats	Mono8 (default), Mono10	Mono8 (default), Mono10
YUV color pixel formats	-	YCbCr411_8_CbYYCrYY, YCbCr422_8_CbYCrY, YCbCr8_CbYCr
RGB color pixel formats	-	BayerXY8, BayerXY10, BayerXY10p
Maximum image bit depth	10-bit	
Maximum frame rate	67 fps at 350 MByte/s, RAW8, 10-bit, full resolution	
Exposure time	7 µs to 0.5 s	
Image buffer (RAM)	256 KB	
Non-volatile memory (Flash)	1024 KB	
Gain	0 dB to 24 dB; 0.1 dB increments	
GPIOs	4 programmable GPIOs As direct inputs (push-pull): 0 to 5.5 VDC As direct outputs (push-pull): 0 to 3.3 VDC @ 12 mA	
ExposureModes	Timed	
Power requirements	Power over USB | External power	
Power consumption	USB power (5 VDC): 2.2 W (typical), 2.3 W (max.) | Ext. power (5 VDC): 2.5 W (typical), 2.6 W (max.) | (values at 20 °C)	
Storage temperature	-10 °C to +70 °C ambient temperature	
Operating temperature	Housing: +5 °C to +65 °C with heat sink Protect the camera from excessive heat, operate only with lens and heat sink mounted. Ambient temperature: <30 °C. See Housed cameras: handling hot cameras on page 17.	
Relative humidity	0% to 80% (non-condensing)	

Feature	Specification	
	Monochrome models	Color models
Digital interface	Micro-B USB 3.1 Gen 1 interface	
Camera controls	GenICam V2.0 (GenICam Access)	



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Dimensions, mass, and filter

Bare board cameras

Feature	USB 90°	USB 180°
Dimensions (L × W × H [mm])	13 × 30 × 26	13 × 26 × 26
Mass [g]	15 g	15 g

USB 180° closed housing	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread [mm]	M12 × 0.5	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	33 × 29 × 29	33 × 29 × 29	38 × 29 × 29
Mass [g]	60	60	60
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

USB 180° open housing	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread [mm]	M12 × 0.5	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	25 × 29 × 29	25 × 29 × 29	30 × 29 × 29
Mass [g]	45	40	45
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

USB 90° closed housing	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread [mm]	M12 × 0.5	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	33 × 32 × 29	33 × 32 × 29	38 × 32 × 29
Mass [g]	65 g	60 g	65 g
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

USB 90° open housing	S-Mount	CS-Mount	C-Mount
Flange focal distance, optical [mm]	12.63 (in air)	12.526 (in air)	17.526 (in air)
Thread [mm]	M12 × 0.5	1x32TPI-UNS-2B	1x32TPI-UNS-2B
Max. protrusion[1] [mm]	11.0	8.6	13.6
Body dimensions (L × W × H [mm])	25 × 32 × 29	25 × 32 × 29	30 × 32 × 29
Mass [g]	45 g	45 g	50 g
Optical filter	No filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter	**Color sensor**: IR cut filter **Monochrome sensor**: no filter

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Documentation

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Documentation Alvium USB3

Camera operation

// Alvium USB Cameras User Guide V1.1.0
https://alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_USB/techman/Alvium-USB-Cameras_QS-Guide.pdf

// Alvium USB Cameras Quickstart Guide V1.0.0 (multilingual document)
https://alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_USB/techman/Alvium-USB-Cameras_User-Guide.pdf

Data sheet

// Alvium 1800 U-500 Data Sheet V1.0.0
https://alliedvision.com/fileadmin/content/documents/products/cameras/Alvium_USB/techman/Alvium_DataSheet_1800_U-500.pdf

Features

// Alvium Cameras Features Reference V1.0.0
https://alliedvision.com/fileadmin/content/documents/products/cameras/various/features/Alvium_Features_Reference.pdf

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Alvium - Accessories

CSI Accessories

Embedded System

1. Boundary Devices Nitrogen6_MAX
2. Wandboard i.MX6

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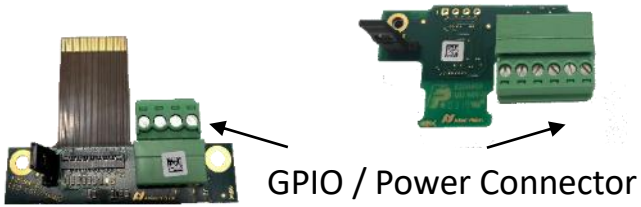
CSI-2 Accessories Overview & Pricing

Part
Cable CSI-2 120mm
Cable CSI-2 220mm
Cable CSI-2 420mm
Adapter Board for Nitrogen6_MAX Board
Adapter Board CSI-2 Wandboard i.MX6



GPIO / Power Connector

// Made for Alvium
// Ensures compatibility

USB Accessories – Cables Overview & Pricing

Part
I/O cable 400mm no screw
I/O cable 3m screw-lock*
USB cable 1m screw-lock
USB cable 3m screw-lock
USB cable 5m screw-lock
USB cable 8m screw-lock

// Made for Alvium
// Optimized performance

* We start with 3m length. Other may follow, based on demand

USB Accessories – USB Peripherals Overview & Pricing

Part
6-port USB 3 hub
4-Port USB 3 host adapter
2-Port USB 3 host adapter

// Ensures compatibility
// Optimized performance
// Compliance ensured

* Introduced, once IOI USB cards are used up

Interface Independent - S-Mount Lenses Overview & Pricing

Item Id	Focal Length	F/No.	IR-Cut	Lens Code
12338	2.97	4		S-2.97-F4-5MP-T1-2.5
12340	4.1	3		S-4.1-F3-5MP-T1-2.5
12342	6	1.8		S-6-F1.8-5MP-T1-2.5
12344	8	1.8		S-8-F1.8-5MP-T1-2.5
12346	12	2.8		S-12-F2.8-5MP-T1-2.5
12339	2.97	4	X*	S-2.97-F4-5MP-T1-2.5-IRC
12341	4.1	3	X*	S-4.1-F3-5MP-T1-2.5-IRC
12343	6	1.8	X*	S-6-F1.8-5MP-T1-2.5-IRC
12345	8	1.8	X*	S-8-F1.8-5MP-T1-2.5-IRC
12347	12	2.8	X*	S-12-F2.8-5MP-T1-2.5-IRC

- // Optimized for Alvium Phase 1 (1/2.5“; 5MP)
- // Locking Ring included
- // Small size, attractive pricing

* Required for S-Mount color cameras, coming without IR/Cut filter

mipi®

USB™ VISION

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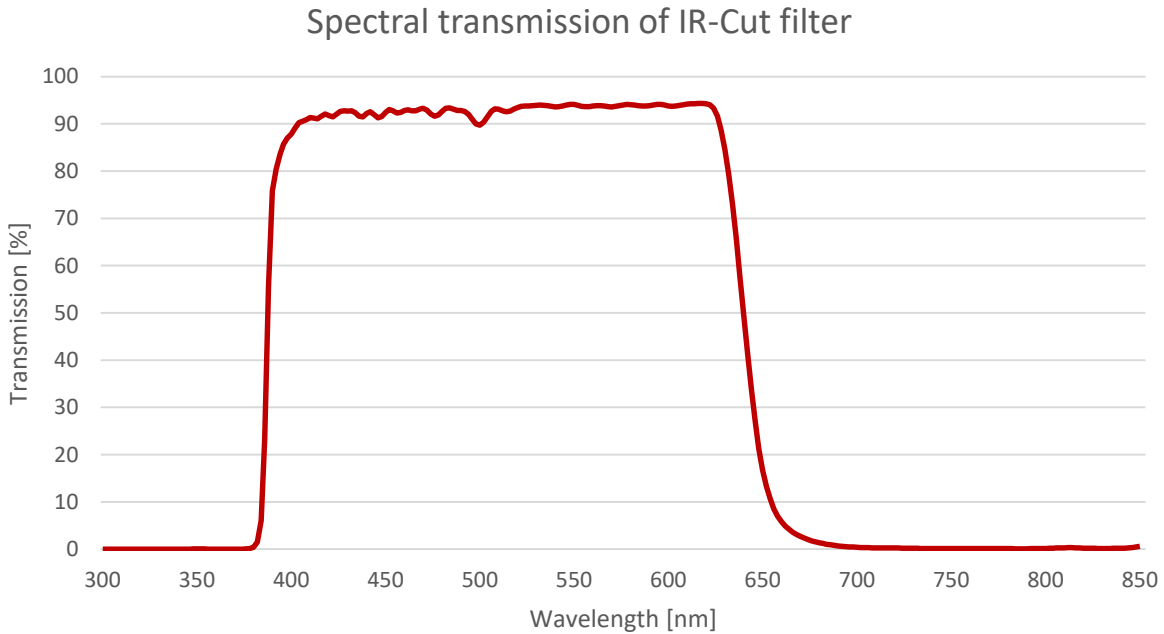
Accessories - Spectral Transmission of S-Mount Lens Filter



Characteristic similar to IR-Cut type Jenofilt / IRC30

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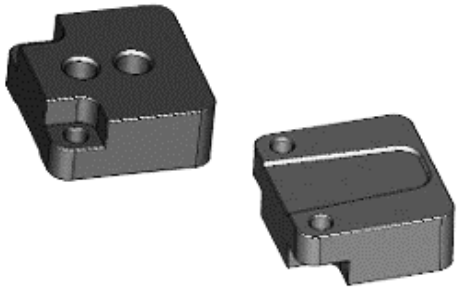
Interface Independent – Mounting Plate

// **Mounting plate** for open & closed housing cameras

1x UNC ¼” + 1x M6 thread



Machined aluminum

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Accessories - Documentation resources

// The most important documents:

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Accessories - Documentation resources

// Alvium Accessories Guide & Data sheets →PM_Public\Product Information\Alvium Series\Accessories

// S-Mount Lenses User Guide -> PM_Public\Product Information\Accessories\Lenses\Allied Vision\Technical Documentation

// Lens Recommendation Guide & Pricelist
→ Available prior COM release

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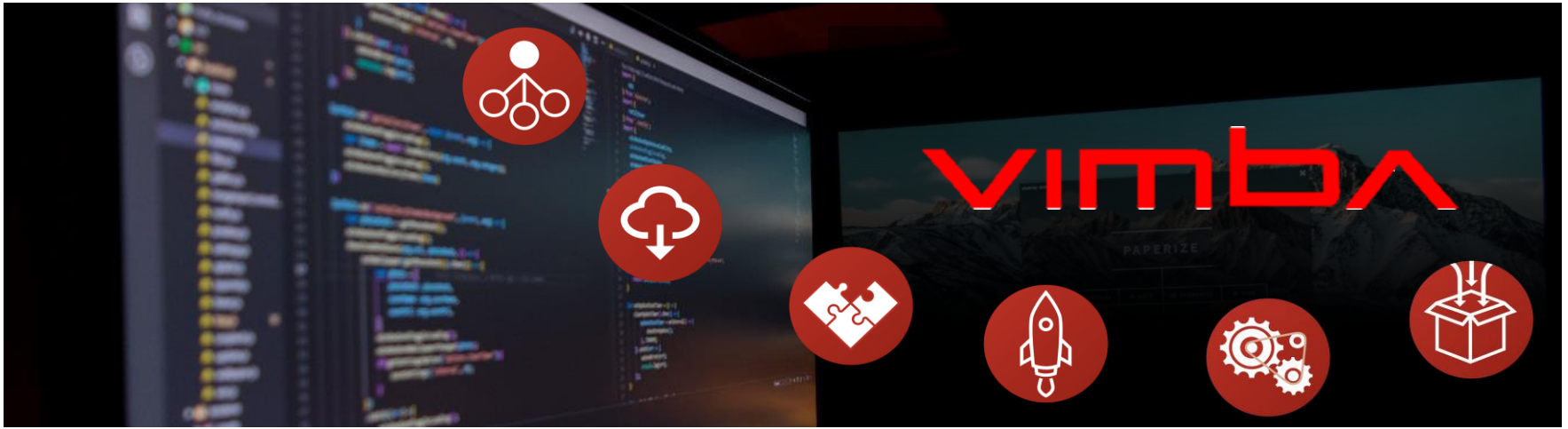
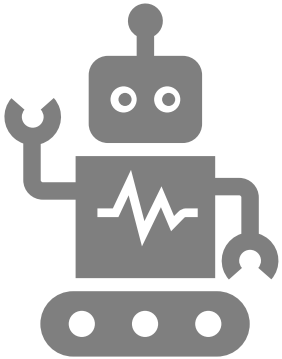


Software for Alvium:
Vimba Suite 3.0 and CSI-2 Drivers

There must be something between the Camera and a Customer’s Applications…

?



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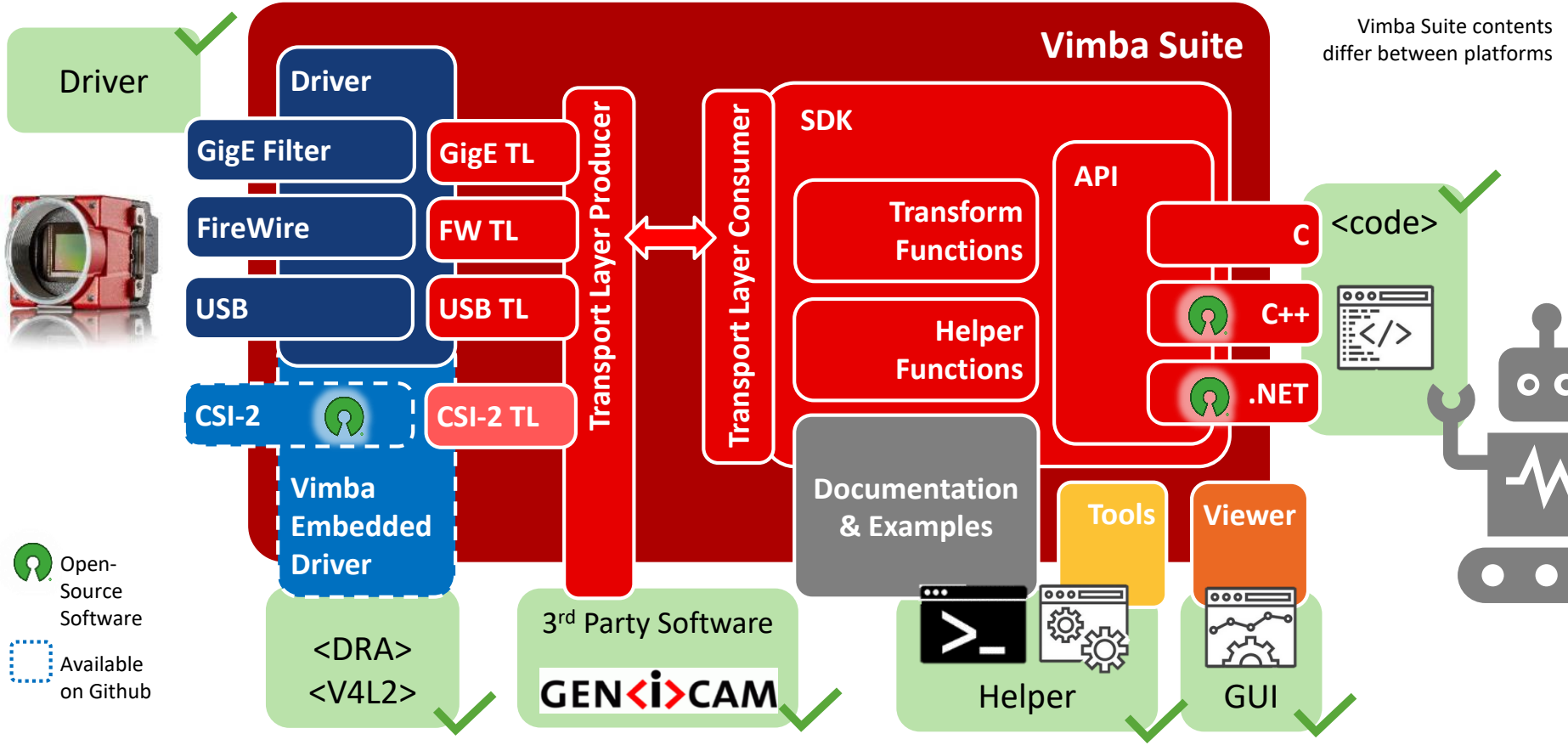
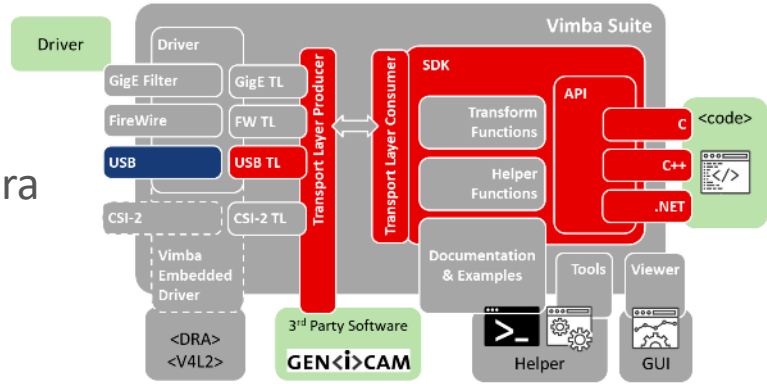
How is the power put on the road?

Recap: What is included in the Vimba Suite?



Vimba support for Alvium 1800U

- Vimba Suite 3.0 supports Alvium 1800U on all supported platforms
- Generic Vimba APIs make an exchange of the camera interface very easy
- Enables GenICam compatible 3rd party software through GenTL interface



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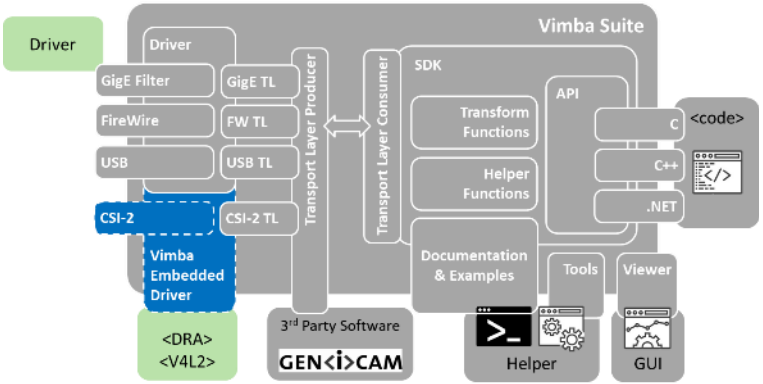
Vimba support for Alvium 1500C

// Allied Vision will provide MIPI CSI-2 drivers for selected Arm boards, enabling

- Direct register access
- Video4Linux 2
- GenICam (coming with Alvium 1800C)

// CSI-2 Driver will be open-sourced on Github.com



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Content on Github.com

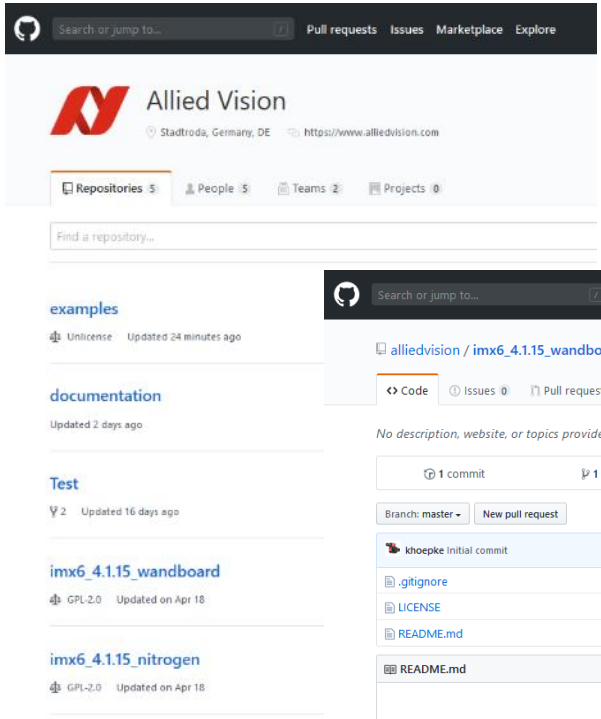
// URL: https://github.com/alliedvision

// User will find various repositories with

- Ready to use examples
- Documentation (and a planned FAQ area)
- Individual CSI-2 drivers

// In each CSI-2 driver repositories there

- are CSI-2 driver sources for usage and investigation
- is a user guide to install and use driver
- will take place the Customer Service inside the “Issues” tab



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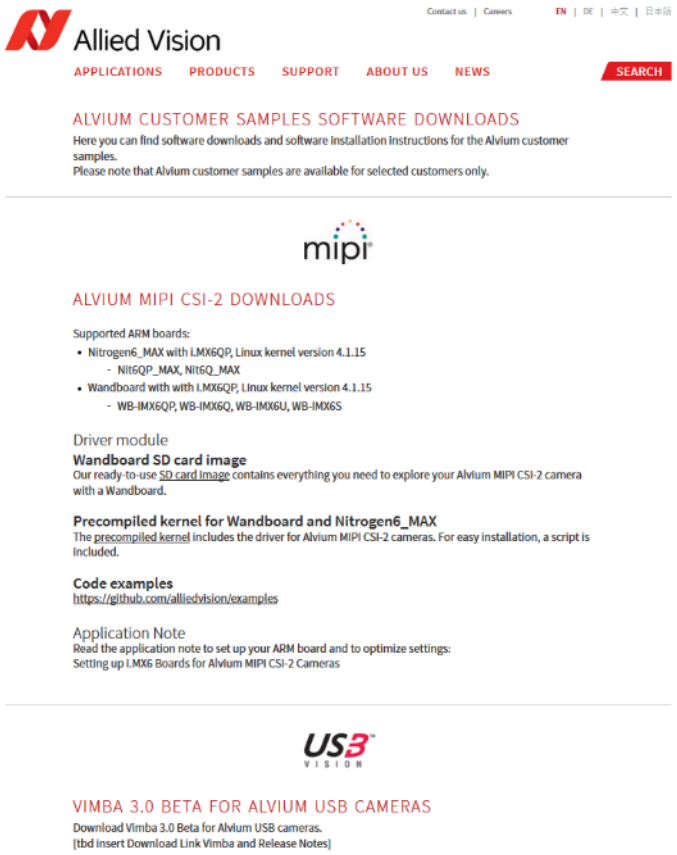
Good Starting Point for Embedded Vision Customers

// URL: https://www.alliedvision.com/en/products/software/embedded-software-and-drivers.html

// Hub for Embedded Vision related software

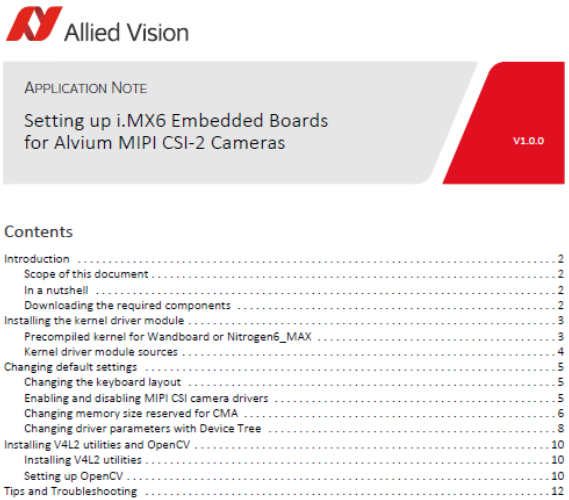
- Link to CSI-2 drivers sources on Github.com
- Downloadable precompiled kernels
- Downloadable ready to use SD card images (starting with Wandboard)
- Links to examples
- Guiding Documents / App notes



Application Note: „Setting up i.MX6 Embedded Boards with Alvium MIPI CSI-2 Cameras“

// Contents

- Required components
- Installing of driver module
- Changing default settings
- Installing of additional V4L2 utilities and OpenCV library
- Tips and Troubleshooting



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APPLICATION NOTE

Setting up i.MX6 Embedded Boards for Alvium MIPI CSI-2 Cameras

v1.0.0

Contents

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Supported CSI-2 platforms in June 2019

i.MX6

Board	CPU	GPU	RAM
Nitrogen 6MAX	4x A9, 1 GHz	20 cores, 800 MHz	4GB, DDR3
Wandboard	4x A9, 1 GHz	20 cores, 800 MHz	2GB, DDR3

NVIDIA **added shortly after first release*

Board	CPU	GPU	RAM
Jetson TX2	2x Denver2, 4x A57, 2GHz	256 cores, 1120 MHz	8GB, LPDDR4
Jetson AGX Xavier	8x Carmel, 2.26 GHz	412 cores, 1270 MHz	16GB, LPDDR4

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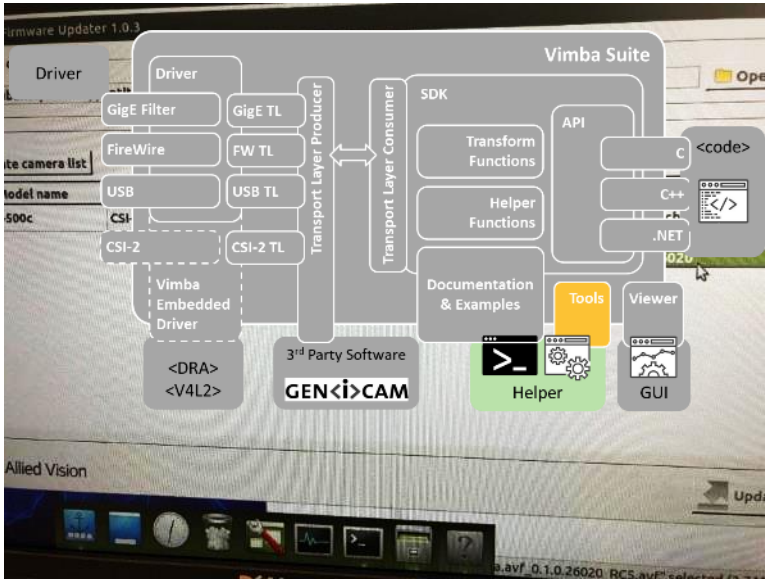
Vimba Firmware Updater

// Vimba Firmware Updater can be used as GUI or terminal application

// Enables firmware updates for Alvium USB on Windows, Linux and Linux Arm platforms

// Allows firmware updates for Alvium CSI-2 on Linux Arm platforms

// .avf firmware files will be available on our website for download



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General Improvements in Vimba Suite 3.0

// Performance enhancement GigE callback

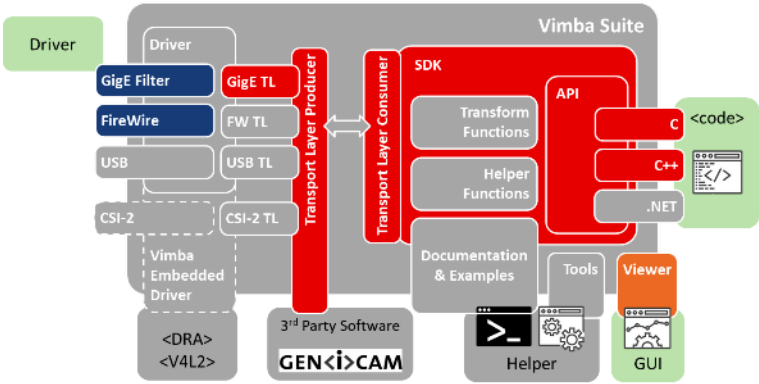
// Release of new Firewire driver

// Release of 15+ customer related bugfixes

// Improvements in Vimba Viewer

// New tested Operating Systems and platforms

- Windows x86/x64 (version 7, 8.1, 10)
- Linux x86/x64 (Ubuntu 18.04 LTS, Debian 8, Fedora 28)
- Linux Armv7 (Nitrogen, Wandboard)
- Linux Armv8 (Nvidia Jetson TX2, ODROID XU4)



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Thank you!
Questions?

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