

---

**DAVIS346**

*Release 2024-05-14*

**iniVation AG**

**2024-05-14**

# CONTENTS

<b>1</b>	<b>Specifications</b>	<b>2</b>
1.1	Event Output . . . . .	2
1.2	Frame Output . . . . .	2
1.3	Color Event and Frame Output . . . . .	3
1.4	IMU . . . . .	3
1.5	Camera Synchronization / Trigger Input . . . . .	3
1.6	Other Attributes . . . . .	3
<b>2</b>	<b>Sensor Limitations</b>	<b>5</b>
<b>3</b>	<b>Physical Dimensions</b>	<b>6</b>
<b>4</b>	<b>Connectors</b>	<b>7</b>
4.1	USB 3.0 Connector . . . . .	7
4.2	Sync Connectors . . . . .	7
<b>5</b>	<b>Optics</b>	<b>9</b>
5.1	Field of View Computations . . . . .	9
<b>6</b>	<b>Additional Information</b>	<b>10</b>
6.1	Software . . . . .	10
6.2	Serial Number . . . . .	10
6.3	Package Contents . . . . .	10
6.4	Safety Information . . . . .	10
6.5	Correct Disposal . . . . .	11
6.6	CE Certification . . . . .	12

Buy Device<sup>1</sup>

Download PDF<sup>2</sup>



Date: 2024-05-14

- Prototype DAVIS sensor in 180 nm CIS technology
- Concurrent QVGA+ (346 x 260) resolution event and frame output from single sensor
- Event output with up to 120 dB dynamic range, sub 1  $\mu$ s latency, 1  $\mu$ s temporal resolution and up to 12 million events per second throughput
- 6-axis IMU, up to 8 kHz sampling rate
- Supports multi-camera time synchronization via daisy chain connection and external event injection
- Consumes less than 180 mA at 5 V power supply
- Anodized aluminium case with CS lens mount, 4-side mounting options
- Screw-locked USB port and fully isolated multi-camera sync ports

---

<sup>1</sup> <https://inivation.com/buy/>

<sup>2</sup> [https://docs.inivation.com/\\_static/hardware\\_guides/davis346.pdf](https://docs.inivation.com/_static/hardware_guides/davis346.pdf)

## SPECIFICATIONS

## 1.1 Event Output

Description	Value
Spatial Resolution	346 x 260
Temporal Resolution <sup>1</sup>	1 $\mu$ s
Typical Latency <sup>2</sup>	<1 ms
Max Throughput	12 MEPS
Dynamic Range	~ 120 dB (0.1-100k lux with 50% of pixels respond to 80% contrast)
Contrast Sensitivity	14.3% (on) 22.5% (off) (with 50% of pixels respond)

<sup>1</sup> The temporal resolution is characterized by the timestamp unit. In fact, a timestamp unit of 1 us offers minimum gain over a timestamp unit of 200 us. For more explanation, please refer to our white paper.

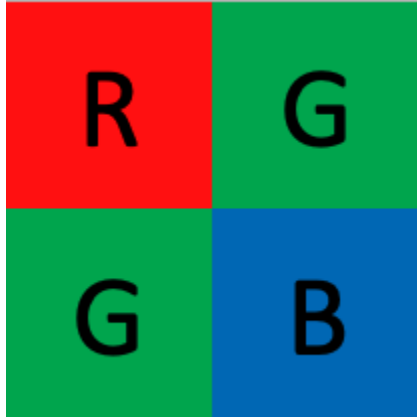
<sup>2</sup> The temporal latency is given as a nominal number and can be improved with strong lighting or optimised biases.

## 1.2 Frame Output

Description	Value
Spatial Resolution	346 x 260
Frame Rate	40 FPS
Dynamic Range	55 dB
FPN	4.2%
Dark Signal	18000 e-/s
Readout Noise	55 e-

## 1.3 Color Event and Frame Output

We provide both a mono (grayscale) and a color version of DAVIS 346. The mono version is a monochrome sensor and the color version is a color sensor that uses a Bayer color filter (RGGB as seen in the image below) for both events and frames. By default, the camera uses demosaicing for reconstructing RGB frames. In order to change to raw color output, please refer to DV software or dv-processing. Note that the color frames are not calibrated, and thus do not faithfully reproduce the real observed color.



## 1.4 IMU

6-axis (Gyro + Accelerometer), up to 8 kHz sampling rate. The IMU is synchronized with the event and frame output. Read more in the IMU section.

## 1.5 Camera Synchronization / Trigger Input

Supports multi-camera time synchronization via daisy chain connection and external event injection.

## 1.6 Other Attributes

Description	Value
Dimensions [mm]	W 40 x H 60 x D 25
Weight	100 g without lens
Lens Mount	CS-mount
Case Material	Anodized aluminium
Mounting Options	4-side Whitworth 1/4"-20 female and M3 mounting points
Connectors	USB 3.0 micro B port with locking screws, fully isolated sync input and output connectors
Multi-cam sync	Yes
Power Consumption	<180 mA @ 5 VDC (USB)
Sensor Technology	0.18 $\mu\text{m}$ 1P6M MIM CIS
Pixel Pitch [ $\mu\text{m}$ ]	18.5 $\mu\text{m}$
Sensor Supply Voltage	1.8 V and 3.3 V
Certifications	CE

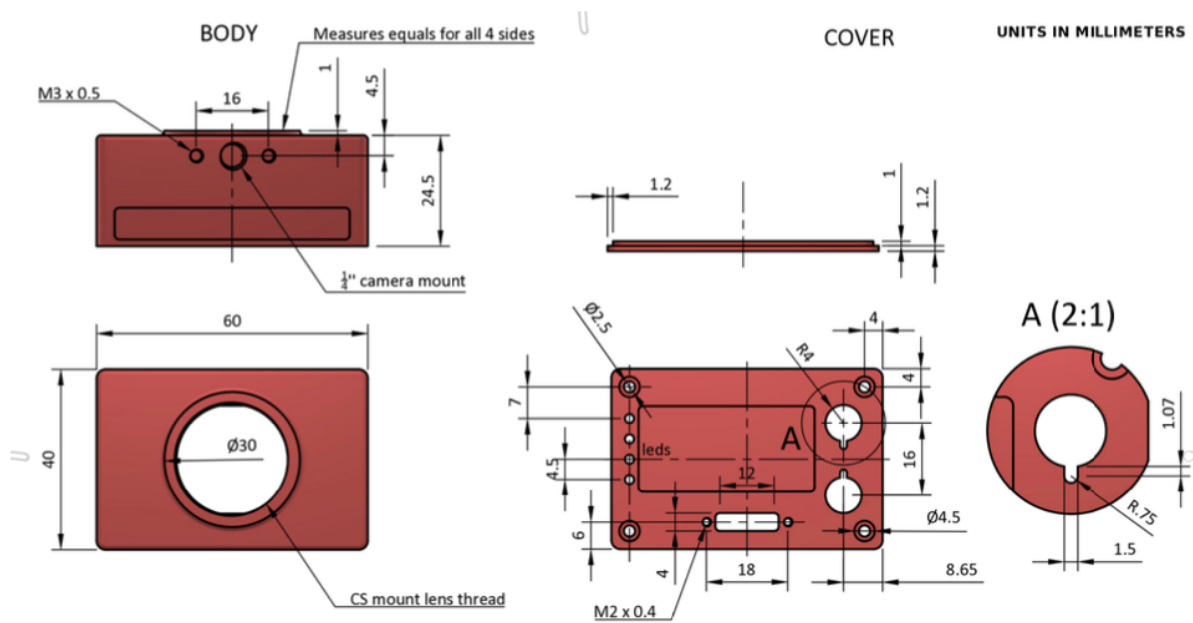
*Specifications not guaranteed. All specifications subject to change without notice.*

## SENSOR LIMITATIONS

- In APS GlobalShutter mode, bursts of DVS events can be caused by the capture of an APS frame.
- Due to bandwidth limitations, the DVS event output tends to follow a scanning pattern when under high load.
- The frame output has below average performance in terms of image quality compared to conventional image sensors.
- Color frames are not calibrated, and thus do not faithfully reproduce the real observed color.
- The event output can be destabilized if a strong light source impacts a sensitive spot outside the photosensitive pixel array.

## PHYSICAL DIMENSIONS

The DAVIS camera is housed in an anodized aluminum case. The case dimensions are depicted below.





## CONNECTORS

DAVIS has three connectors on the back. One USB 3.0 Micro B connector for data and power, and two sync connectors for multi-camera synchronization or external trigger input.



### 4.1 USB 3.0 Connector

The USB 3.0 Micro B connector is used for data and power. Any USB 3.0 or USB 2.0 cable with Micro B type connector can be used. However, USB 3.0 speeds are only supported when using a USB 3.0 cable. Usage of cables with appropriate locking screws are recommended for a more secure and robust connection.

### 4.2 Sync Connectors

The synchronization connectors are HiRose HR10A-7R-4P (male, SYNC OUTPUT) and HR10A-7R-4S (female, SYNC INPUT) connectors. Cables should use the matching connectors HR10A-7P-4S (female) and HR10A-7P-4P (male).

Please note that to keep full electrical isolation between different cameras, the cable should not be shielded, or if it is, the shield should not connect one end of the cable to the other.

Input signals can be 3.3V or 5V, depending on the VDD\_IN supplied externally, output signals are 5V, as is VDD\_OUT. If you chain cameras together for synchronization, the clock and VDD will be 5V, for example.



Synchronization connectors pinout is shown in the image above. Please note that all the pins in the SYNC IN ports are isolated from the SYNC OUT ports.

The camera lens mount is designed to accommodate CS-mount lenses. Other lenses can be accommodated by using adapters. The standard lens shipped with the camera is a C-mount lens and ships with an adapter. The chip requires a lens designed for 1/2" imagers.

The field of view (FOV) depends on the focal length **L** of the lens and the size **W** of the pixel array. It is computed from geometrical optics, not accounting for any lens distortion. The angular field of view (**AFOV**) is given by:

$$AFOV = 2 \arctan\left(\frac{W}{2L}\right)$$

The linear FOV (**LFOV**) at a distance **D** from the lens is given by:

$$LFOV = \frac{D * W}{L}$$

The pixel array has a resolution of 346 x 260 and measures:

- Width: 346 pixels x 18.5 μm/pixel = 6.4 mm
- Height: 260 pixels x 18.5 μm/pixel = 4.81 mm
- Diagonal: 8 mm

## 5.1 Field of View Computations

The following table shows the horizontal and vertical field of view in degrees and its size at various distances for different common focal lengths.

Lens Focal Length [mm]	Horizontal Angular FoV [deg]	Vertical Angular FoV [deg]	Diagonal Angular FoV [deg]	Horizontal Linear FoV at 10 cm distance [cm]	Horizontal Linear FoV at 30 cm distance [cm]	Horizontal Linear FoV at 1 m distance [cm]	Horizontal Linear FoV at 2 m distance [cm]
2.10	113.46	97.75	124.64	30.48	91.44	304.81	609.62
2.80	97.64	81.32	110.06	22.86	68.58	228.61	457.21
3.00	93.70	77.44	106.31	21.34	64.01	213.37	426.73
3.60	83.28	67.49	96.07	17.78	53.34	177.81	355.61
4.50	70.84	56.24	83.32	14.22	42.67	142.24	284.49
6.00	56.15	43.69	67.43	10.67	32.01	106.68	213.37
9.00	39.15	29.92	47.96	7.11	21.34	71.12	142.24
12.00	29.87	22.67	36.90	5.33	16.00	53.34	106.68
16.00	22.62	17.10	28.10	4.00	12.00	40.01	80.01

## ADDITIONAL INFORMATION

### 6.1 Software

DAVIS 346 is compatible with all our software. You can use it in:

- DV software
- dv-processing

### 6.2 Serial Number

The serial number of the device can be found on the case, usually a four-digit number printed on a black label located at the top of the camera case.

### 6.3 Package Contents

DAVIS 346 ships with the following items:

- DAVIS 346 camera
- USB 3.0, 1m with locking screws
- Varifocal C mount lens ( [Datasheet<sup>3</sup>](#))
- CS to C mount lens adapter
- Tripod

### 6.4 Safety Information

To prevent damage to property or injury to yourself or to others, read this safety information in its entirety before using this product.

- This product is intended to be used in a laboratory and for industrial applications under controlled conditions.
- We strongly recommend that you only use high quality USB cables, like the ones provided by iniVation. Using low quality USB cables could cause damages to the device.

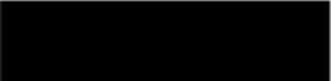
---

<sup>3</sup> [https://docs.inivation.com/\\_static/lenses/vari-focal-lens-incl.pdf](https://docs.inivation.com/_static/lenses/vari-focal-lens-incl.pdf)

- Keep the product dry. Do not handle the product with wet hands. Do not handle the plug with wet hands. Do not operate the camera near water. This could cause damage to the device. The camera is not water-safe.
- Handling: Handle your product with care. It is made of metal, glass, and plastic and has sensitive electronic components inside. The product can be damaged if dropped, burned, punctured, or crushed, or if it comes in contact with liquid. If you suspect damage to the product, please contact iniVation.
- Repairing: Do not open the product and do not attempt to repair the product yourself. Disassembling the product may damage it and will void your warranty. If your product is damaged or malfunctions, please contact iniVation.
- Do not disassemble or modify this product.
- Do not touch internal parts that become exposed as the result of a fall or other accident.
- Keep this product out of reach of children. Should a child swallow any part of this product, seek immediate medical attention.
- Use travel converters or adapters designed to convert from one voltage to another or with DC-to-AC inverters.
- Explosive and other atmospheric conditions. Connecting or using the product in any area with a potentially explosive atmosphere, such as areas where the air contains high levels of flammable chemicals, vapors, or particles (such as grain, dust, or metal powders), may be hazardous. Exposing the product to environments which have high concentrations of industrial chemicals, including near evaporating liquified gasses such as helium, may damage or impair the product's functionality.
- Turn this product off when its use is prohibited.
- Do not leave the product where it will be exposed to elevated temperatures for an extended period such as in an enclosed automobile or in direct sunlight. This can lead to malfunction.

## 6.5 Correct Disposal



 This product and its electronic accessories should not be disposed of with other household waste. If you are unable to dispose of this item safely please return it to iniVation AG.

## 6.6 CE Certification



approved.

iniVation declares that this device is CE certified. This product is not ATEX