PROPHESEE
METAVISION FOR MACHINES

EVK4 HD
CAMERA MANUAL

Metavision® EVK4 HD is your perfect entry point to Event-based Vision, by the inventors of the world's most advanced neuromorphic vision systems. This ultra compact, light and full-featured platform is compatible with Metavision® Intelligence software Suite. This evaluation kit features at its core the revolutionary SONY IMX636 HD Event-based Vision sensor, realized in collaboration between SONY and PROPHESEE with its CS-mount, USB-C and ix series connectors as well as multiple attachment points, it is the ideal flexible tool for your advanced experiments. Welcome to our global inventors community, we can't wait to see what frontiers you will be pushing.

CONTENTS

Version 1.0

Last change: March 30, 2022

Product: EVK4 HD

REVISION HISTORY

Release date: March 30, 2021

Revision: 1.0

Description of changes: Initial version

1. OVERVIEW

PROPHESEE EVK4 - HD is a flexible vision system that enables evaluation of the SONY IMX636 ES (Engineering Sample) HD stacked Event Based Vision sensor, co-developed with PROPHESEE. This compact and lightweight camera has been designed to be easily embedded in diverse application environments.

The sensor outputs encoded events over a 2-lane MIPI interface compliant with the MIPI-CSI2 specification. Inside the camera, the data stream is transferred from MIPI to the USB3.1 interface.

The camera and its multiple applications can be quickly accessed using Event-Based Vision software Metavision® Intelligence from PROPHESEE (2.3.2 onward).

Metavision® Intelligence Studio can be used to control sensor parameters, to visualize and record data. In addition, users can easily start developing from an extensive set of algorithms tested with this camera.

In addition to a USB Type-C connector for power and data, the EVK4 – HD provides a dedicated connector to allow triggering and synchronization with compatible hardware.

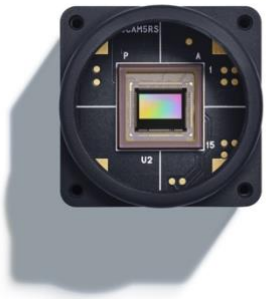


Figure 1 - EVK4 – HD (C/CS-Mount optics)

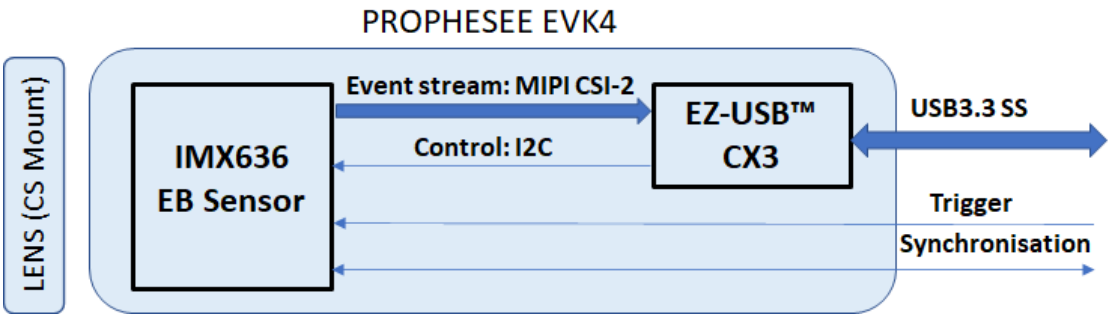


Figure 2 – Block Diagram

2. SPECIFICATIONS

1. General Specification

Event Based Sensor	**Model**	Sony IMX636ES realized in collaboration between Sony and Prophesee
	Resolution (H x V Pixels)	HD: 1280 x 720
	Sensor format	½.5"
	Pixel size	4.86um x 4.86um
	Aspect Ratio	16 / 9
	Sensor diagonal	7.14 mm
	High Dynamic Range	> 86dB*
	Pixel Typical Latency	220us
	Nominal contrast threshold	25%(In)
	Maximum ReadOut throughput	3 Gevents/s
Output	**Interface (event data & control)**	USB 3.0 (USB Type-C™ connector) Vendor ID: 0x04b4 Product ID: 0x00f5
	Raw format	EVT2.1/ EVT3 (default)
	Max Camera Bandwidth	1.6 Gbps
	Interface (Sync/Trigger)	IX Series Connector (IX80G-B-10P : HIROSE) (Plug: IX30G-B-10S-CV(7.0) | IX31G-B-10S-CV(7.0))
Camera	**Lens mount type**	C/CS Mount
	Dimensions (W-H-D) w/o lens	30mmx30mmx36mm
	Weight	40g +/- 2g
	Accessories	1x USB-C to USB-A, 1x mini tripod and 1x mobile case
	Power consumption	500mW (Typ), 1.5W (Max)
Optic	**Model**	SFA 0820-5M (Soyo Security Co.)
	Focal Length	8mm
	F/NO	2.0-C
	H-FOV	41.4°
	V-FOV	23.6°
	D-FOV	47.0°
	Focus distance	0.1m
	Mount	C-Mount
	Accessory	C-CS connection ring
Software	Prophesee Metavision® Intelligence Suite 2.3.2 onward Evaluation version available on Linux Ubuntu 18.04 and 20.04 64-bit and Windows 10 64-bits.	

***5 lux is the minimum light condition that guarantees imaging characteristics. DR >120 dB can be reached based on low light cutoff measurement being: 0.08 lux (imaging characteristics not guaranteed).**

2. Electrical Specifications

		Min	Typ	Max
V_{in}	**Input Supply Voltage**		5V	5.5V
V_{IL}	**Input Low Voltage Sync In, Trigger In**		0V	2V
V_{IH}	**Input High Voltage Sync In, Trigger In**	2.5V	3.3V	5.5V
V_{OL}	**Output Low Voltage Sync Out**		0V	
I_{IH}	**Input High Current Sync In, Trigger In**	2.7mA	5.4mA (at 3.3V)	
I_{OL}	**Output Sink Current Sync Out**			100mAA

3. Mechanical specifications

Prophesee EVK4 - HD evaluation kit is easy to embed with 4x M2 front, 2x M2.6 back fixing points, and a tripod screw.

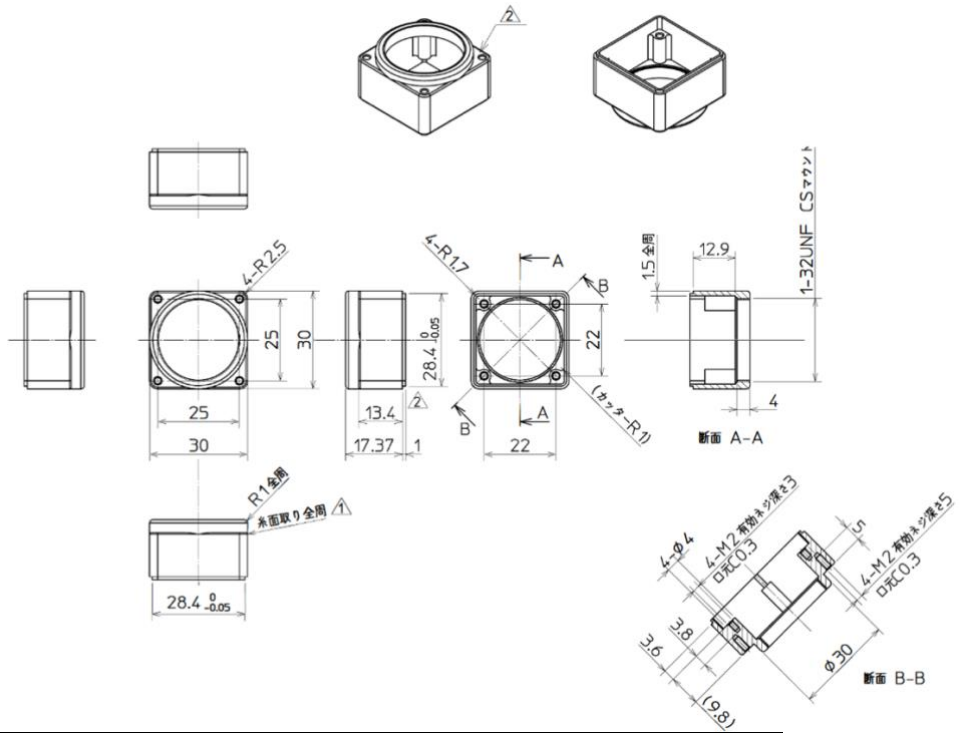


Figure 3 – Front Side

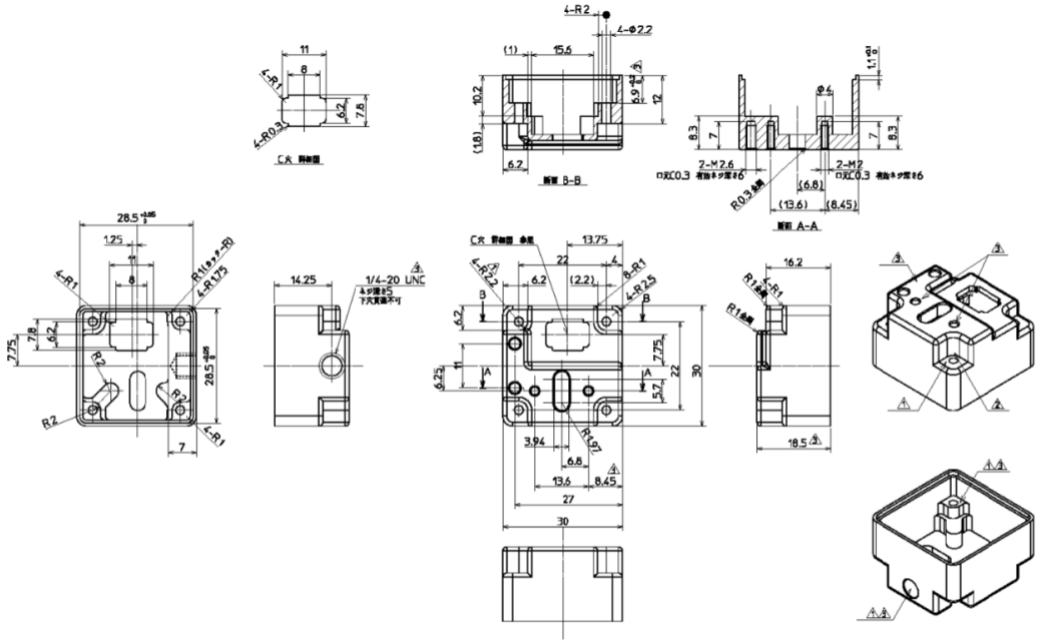


Figure 3 – Back Side

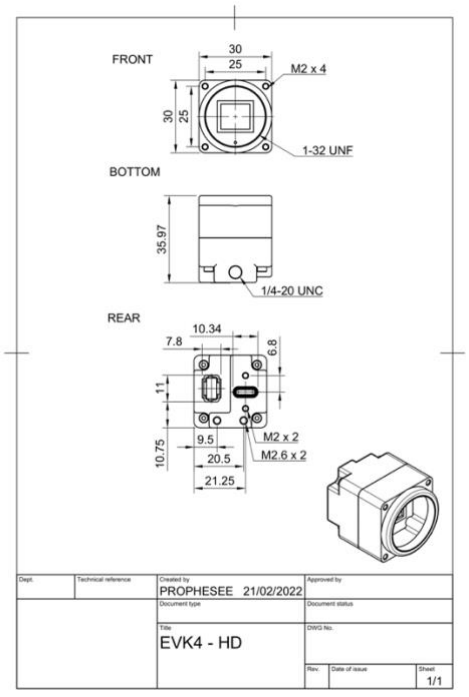


Figure 4

3. REQUIREMENTS

1. Electrical requirements

The EVK4 - HD is bus powered from the USB 3.0 Type-C connector from the host PC. The user must ensure the USB port of the host PC is USB 3.0 SuperSpeed compatible to provide the necessary communication bandwidth and power.

Input voltage	5V +/- 0.25V (From USB connector)
Max Input current:	300 mA
Input current (standby)	<80 mA
Input current (streaming 20 Mev/s)	110mA

2. Environmental requirements

The camera has been designed to endure IEC certifications (T° / Heat / Shocks / Electrostatic discharge).

Operating temperature	0°C ~ +50°C
Storage temperature	-30°C ~ +80°C
Operating humidity range	20 - 80%, relative, non-condensing
Storage humidity range	20 - 80%, relative, non-condensing

The camera is RoHS compliant and passed the following certifications:

- Change of temperature: IEC 60068-2-14
- Damp heat, steady state: IEC 60068-2-78
- Rough handling shocks: IEC 60068-2-31
- Electrostatic discharge immunity test: IEC 61000-4-2 (Level 3)
- CISPR32 Electromagnetic compatibility of multimedia equipment - Emission requirements (Class A)

3. Software requirements Installation requirements:

- For Linux, Administrator rights (sudo account)
- Internet access (to install dependencies)

The EVK can be operated via Prophesee's Metavision® Intelligence Suite. The software can be downloaded following the instructions at https://www.prophesee.ai/metavision-intelligence-essentials-download/.

4. Optical requirements

A CS-C adapter is required to mount the lens. This adapter is provided with the EVK4 - HD camera. It is also possible to adapt the CS-mount to S-mount by using an adapter with external threading and lockring. Details of typical adapter is shown in Figure 9 and Table 4.

Figure 2 - Mount adapters

Adapter	Manufacturer	Part Number
C/CS to S-Mount	Lensation GmbH	AD04M

Table 1 - C/CS Mount adapters

Further details of mechanics and lens holders can be found in the Prophesee Knowledge Center.

4. INTERFACES

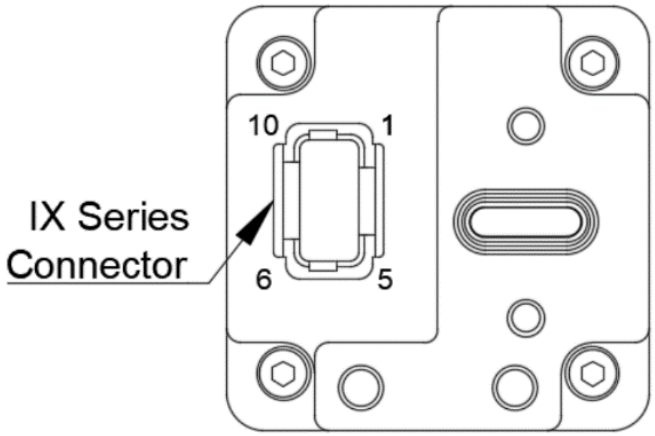
1. USB interface

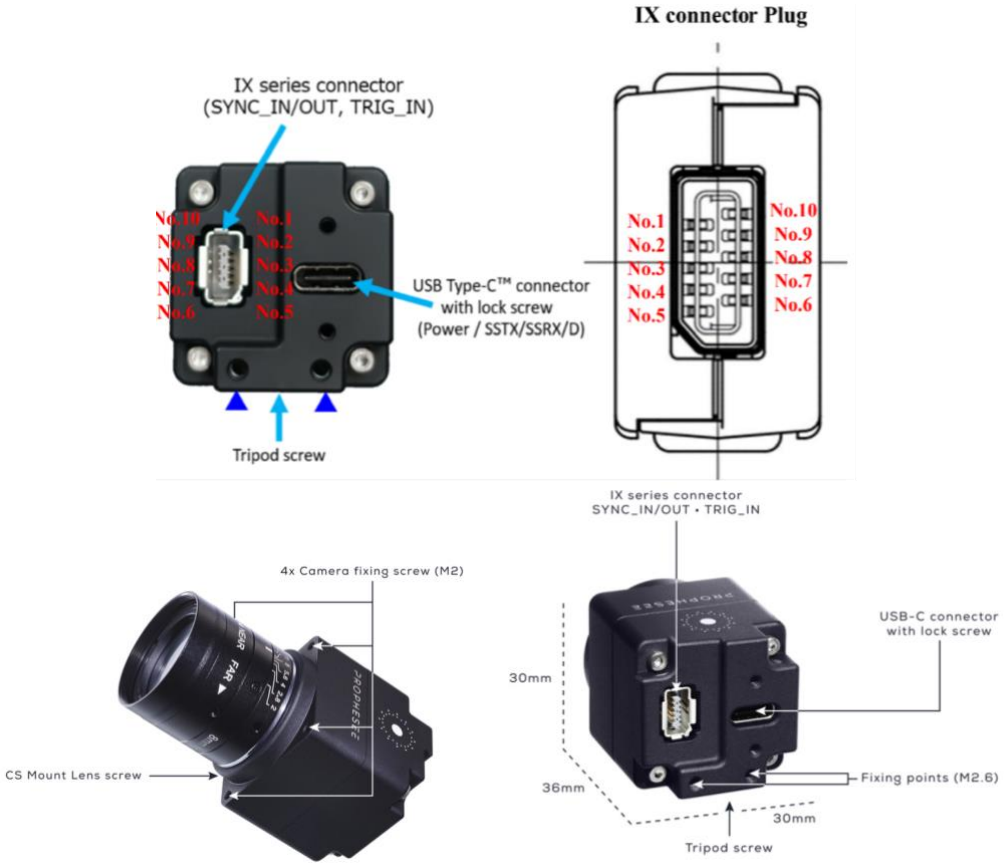
The EVK4 - HD provides a USB Type-C connector USB 3.0 interface. It is compliant with USB 3.0 specification 1.0. The camera can operate with a compatible Type-C cable connected in either orientation. In addition, two threaded holes are provided on the camera body to securely attach compatible USB3.0 cables.

2. Synchronization signals

The EVK4 – HD provides dedicated timing interfaces for multi-sensor synchronization with compatible hardware. These interfaces are provided to the user using an IX series connector.

Pin No.	Signal	Pin No.	Signal
1	SYNC_OUT_P	**6**	TRIG_IN_N-opto-coupled
2	SYNC_OUT_N	**7**	No Use
3	SYNC_IN_P-opto-coupled	**8**	No Use
4	SYNC_IN_N-opto-coupled	**9**	No Use
5	TRIG_IN_P-opto-coupled	**10**	No Use

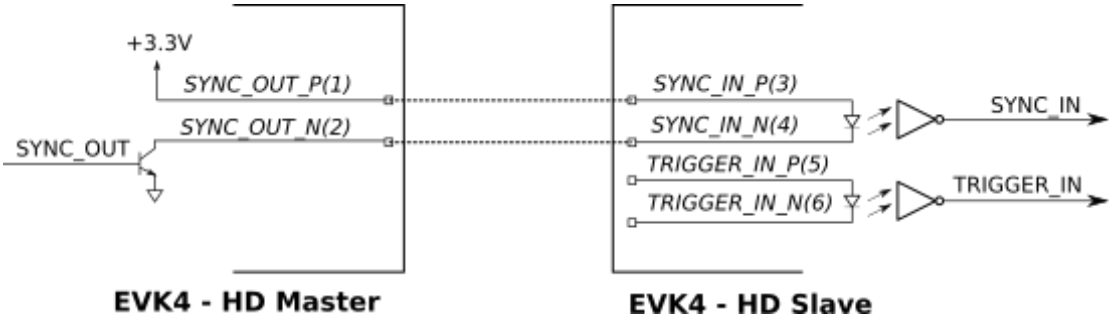




The Sync In signal allows a signal source to be connected to the EVK with which the event time base can be synchronized.

This synchronization input can be used in situations where multiple event-based data streams are merged to ensure that time bases are synchronized between sensors. Typically, this signal would be provided as a 1MHz pulse train to correspond to the internally generated 1µs timestamp resolution.

The Sync Out signal is a open-collector output signal that can be controlled by the user in their application.



Typically, Sync Out can be connected to the Sync In connection of another EVK from Prophesee. The Sync Out can be configured by software to produce a 1MHz pulse train that is received by the Sync In connection of another EVK. This allows the timestamping of the two event-streams to be synchronized.

Receptacle (EVK4)	IX Series Connector (IX80G-B-I0P: HIROSE)	
Plug (either for use)	IX30G-B-I0S-CV(7.0) (HIROSE)	IX31G-B-I0S-CV(7.0) (HIROSE)
Cable (UTP Cable*)	Cable diameter Φ6.3~7.2mm AWG#26~28, Core cable diameter Φ0.95~1.05	Cable diameter Φ6.3~7.2mm AWG#24~25, Core cable diameter Φ1.1~1.25

* Commercially available UTP (Unshielded Twisted Pair) cables are without standard (RJ-45)connectors. Synchronous signal connection uses only 4-core wires of 8-core. You can connect 5-8 core to a free terminal.

The Trig In signal allows the user to inject a marker into the stream of event data. The user signal applied to this input will be timestamped and added to the stream of event data as specific trigger event. This can be useful for making temporal measurements between stimuli of the event sensor and an external source.

5. SETUP

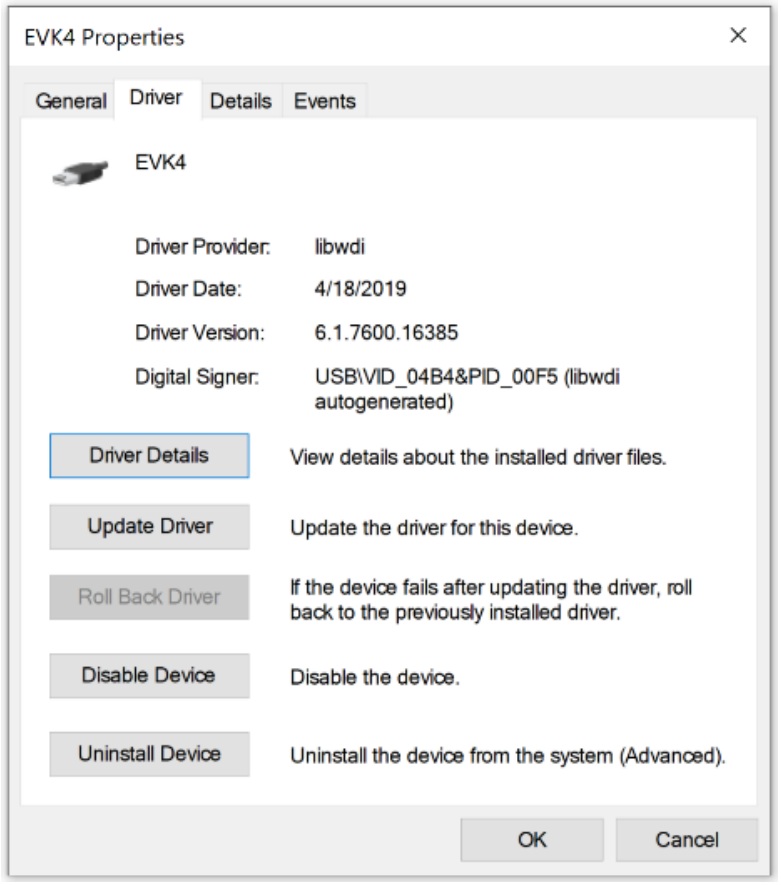
Once the EVK4 – HD is connected to a host PC, power is supplied via USB and the EVK will initiate enumeration with the host PC. All EVK control and data transfer is made via this USB 3.0 connection. The EVK4 - HD is based on a CX3 controller from Cypress Semiconductor. The VID and PID of the camera refer to this device.

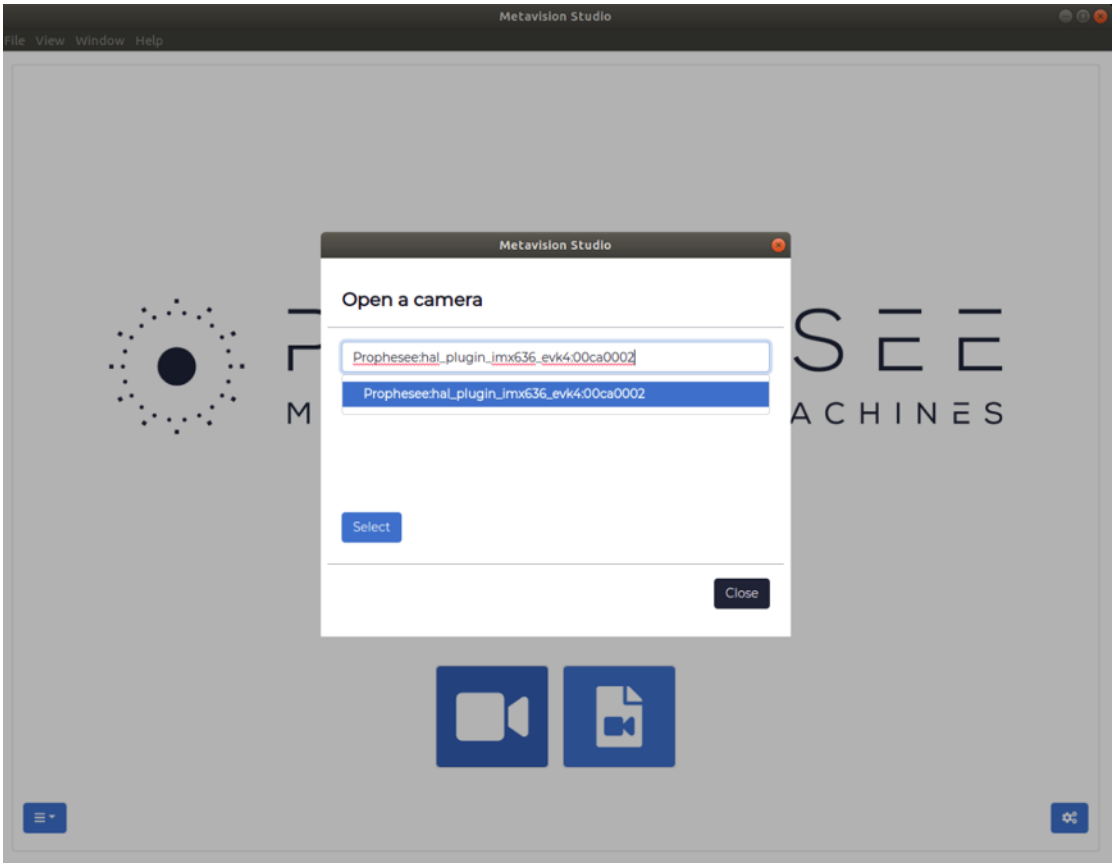
The success of the enumeration can be verified using the lsusb utility on Linux platform. The result of the command is shown below:

$ lsusb

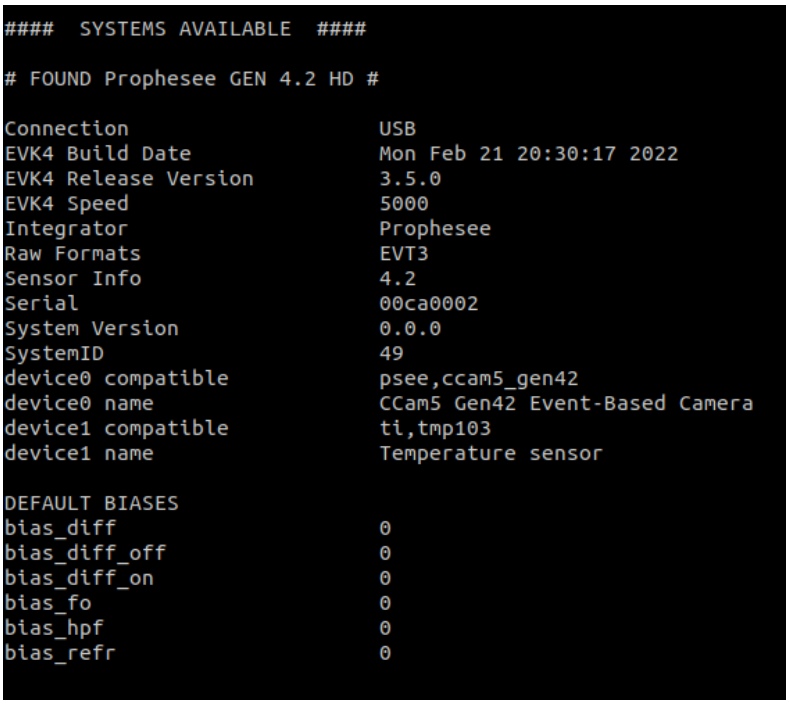
Bus 002 Device 002: ID 04b4:00f5 Cypress Semiconductor Corp.

On Windows, success of the enumeration can be verified opening parameters for peripherals and printers:





Metavision Studio is an ideal tool to start with and is part of the Prophesee's Metavision® Intelligence Suite. It features a Graphical User Interface allowing users to visualize and record data streamed by Prophesee-compatible event-based vision systems. You can visualize the events, adjust the display parameters and tune all the camera settings. As illustrated below, the command metavision_platform_info returns system information that can be communicated to support@prophesee.ai in case of difficulties:



6. LINKS AND RELATED INFORMATION

Access your online EVK4 Quickstart to get all the information you need to get started:

https://www.prophesee.ai/quickstart/

Metavision® Intelligence software can be downloaded following the instructions at

https://www.prophesee.ai/metavision-intelligence-essentials-download/

Metavision® Intelligence software documentation is available online at

https://docs.prophesee.ai/stable/index.html

Product information and support is available at https://support.prophesee.ai/

Prophesee Development Center is community page where Engineers and Researchers can share EB projects, resources, news update and more:

https://www.prophesee.ai/development-center/

7. COPYRIGHT