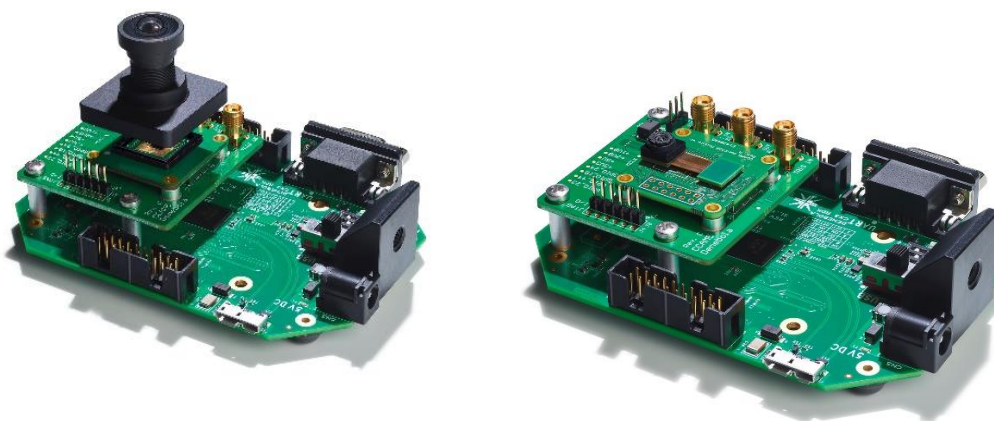




PROPHESEE
META VISION FOR MACHINES



EVK3 320 CAMERA MANUAL

Metavision® EVK3 GenX320 is your perfect entry point to Event-based Vision, by the inventors of the world's most advanced neuromorphic vision systems. This evaluation kit, which is fully compatible with Metavision® Intelligence software Suite, features at its core the revolutionary GenX320 Event-based Vision sensor, with its USB-3.0 Micro-B and SMA connectors, it is the ideal flexible tool for your advanced experiments. Two versions are available, with a Chip-On-Board module and a S-Mount optic for more flexibility or with a compact module on a flex. Welcome to our global inventor's community, we can't wait to see what frontiers you will be pushing.

Version 1.0

Last change: March 30, 2022

Product: EVK3 GenX320

REVISION HISTORY

Release date: Sept 09, 2023

Revision: 1.0

Description of changes: Initial version

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1. OVERVIEW

PROPHESEE EVK3-GenX320 is a flexible vision system that enables evaluation of the GenX320 stacked Event Based Vision sensor housed in a compact optical module with flex or mounted on a COB module with a lens holder.

The sensor outputs encoded events over a 1-lane MIPI interface compliant with the MIPI-CSI2 specification. The kit transfers without manipulating the events generated by the sensor. It converts simply from MIPI to USB so you can connect easily to a host pc.

The camera and its multiple applications can be quickly accessed using Event-Based Vision software [Metavision® Intelligence](#) from PROPHESEE (early support since v4.1.0, full-featured support since v4.4.0).

[Metavision® 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-3.0 Micro-B connector for power and data, the EVK3 – GenX320 provides dedicated SMA connectors to allow triggering and synchronization with compatible hardware.



EVK3 mounted with the CM2 flex module.



EVK3 mounted with the COB module and an S-Mount optic.

Figure 1 – EVK3 – GenX320 variants

2. SPECIFICATIONS

1. General Specification

Event Based Sensor	Model	GenX320
	Resolution (H x V Pixels)	320 x 320
	Sensor format	1/5"
	Pixel size	6,3µm
	Sensor diagonal	2.851 mm
	High Dynamic Range	>120dB Ultra-low
	Low Light Cutoff	0.05 lux
	Operating power	Down to 3mW (sensor power consumption)
	Timestamping precision	1 µs
	Maximum ReadOut throughput	1 Gevents/s
Output	Interface (event data & control)	USB 3.0 (USB Micro-B™ connector) Vendor ID: 0x04b4 Product ID: 0x00f5
	Raw format	EVT2.1 (default)/ EVT3
	Max EVK Bandwidth	1.6 Gbps
	Interface (Sync/Trigger)	3 x SMA female connector
Camera	Lens mount type	Optical Flex module or COB module with S Mount optic
	Dimensions (W-H-D) w/o lens	75.26mmx107.14mmx30mm
	Accessories	1x USB-Micro-B to USB-A cable, 1x mini tripod
	Power consumption	500mW (Typ), 1.5W (Max)
Optic (COB module)	Model	SND2636A1SD-8M (1.8mm) 1/2.8"
	Focal Length	1.8mm
	Aperture	f/2.8 Fixed Iris
	H-FOV/V-FOV	58°
	D-FOV	76°
	Lens Mount	M12
	IR cut filter	No
Optic (Flex module)	Body dimension	8mm x 8mm x 5mm
	Bend radius	< 180°
	Connector	Hirose BK13 Series
	Focal Length	1.11mm
	Aperture	f/2.4
	H-FOV/V-FOV	84°
	D-FOV	104°
	Lens Mount	M6
	IR cut filter	No
Software	Metavision® Intelligence early support since v4.1.0, full-featured support since v4.4.0	

2. Electrical Specifications

		Min	Typ	Max
V_{in}	Input Supply Voltage	4.75V	5V	5.25V
V_{IL}	Input Low Voltage Sync In, Trigger In		0V	1V
V_{IH}	Input High Voltage Sync In, Trigger In	2.2V	3.3V	7.7V
V_{OL}	Output Low Voltage Sync Out		0.4V	
V_{OH}	Output High Voltage Sync Out (*)	$V_{SEL} - 0.4V$		
I_{IH}	Input High Current Sync In, Trigger In	2mA		
I_{OL}	Output Low Current Sync Out			4mA
I_{OH}	Output High Current Sync Out			-24mA

* $V_{SEL} = 1.8V$ or $3.3V$.

3. Block diagram

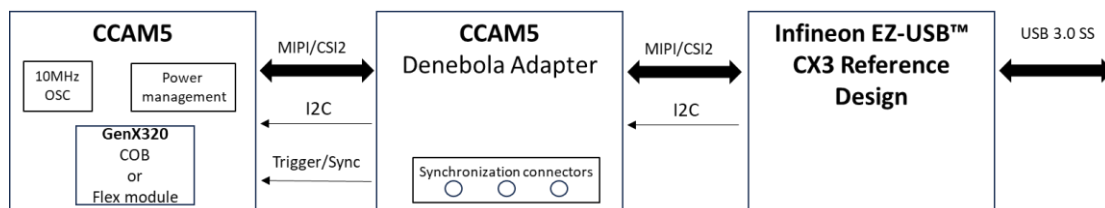


Figure 2 - Block Diagram

As illustrated in the - Block Diagram, the EVK is comprised of multiple PCBs that are delivered pre-assembled and ready to use out of the box.

The main carrier board is an Infineon Reference Design Kit, Denebola based on Infineon Semiconductor's EZ-USB™ CX3 USB 3.0 peripheral controller. The application executed on this controller transfers data from the Mobile Industry Processor Interface (MIPI) Camera Serial Interface Type 2 (CSI-2) standard to the USB 3.0 connectivity.

The CCAM5 Denebola Adapter connects between the CX3 Reference board and the CCAM5 series sensor modules. The adapter breaks out synchronization and trigger signals onto connectors.

The EVK3-GenX320 can be ordered with one of the two CCAM5 variants:

- The CCAM5 GenX320CM2 module adapter which allows the connection with the GENX320ES CM2 flex module.
- The CCAM5 GenX320 with the GenX320 bonded on the PCB (COB). It is delivered with a S-Mount lens holder with an optic.

4. Mechanical specifications

The COB lens holder is fabricated from aluminium and is a separate part directly mounted to the sensor module within the EVK. It is designed using the offset of the image sensing plane from the PCB so that the back focal distance is respected for the S-mount standard.

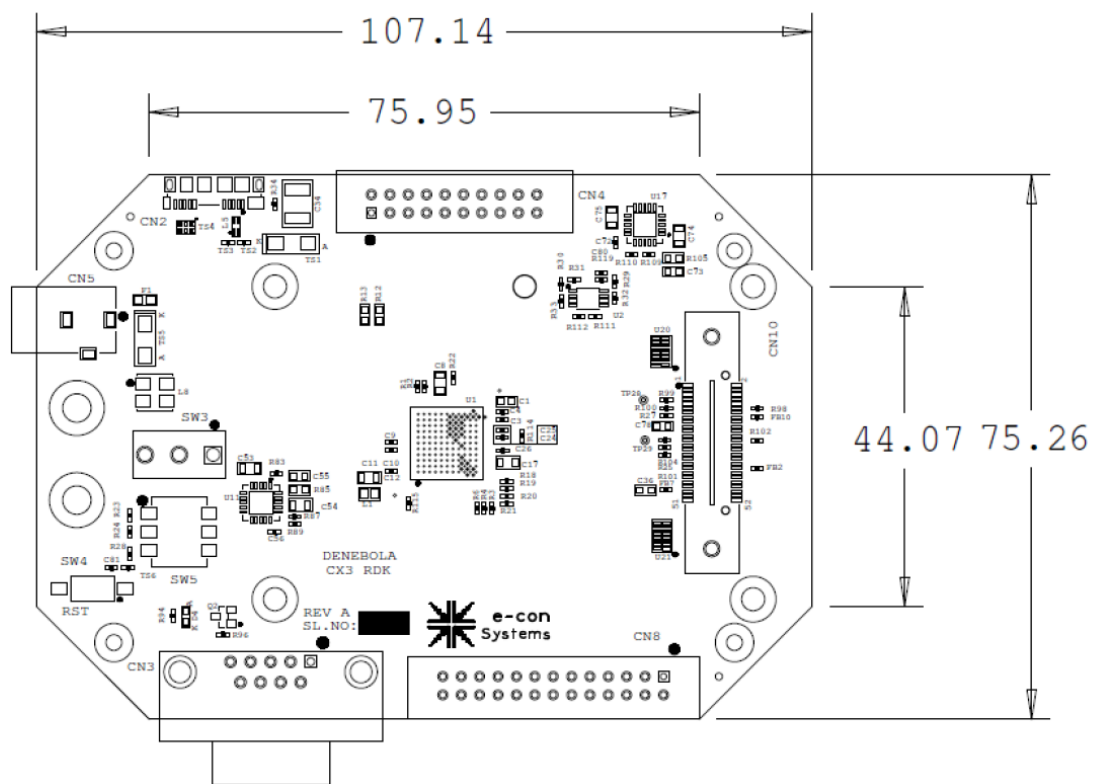


Figure 3 – Overall EVK Dimensions

3. REQUIREMENTS

1. Electrical requirements

The EVK3 – GenX320 is bus powered from the USB 3.0 Type-A 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

2. Environmental requirements

Operating temperature	0°C ~ +40°C
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The camera is RoHS compliant.

3. Software requirements Installation requirements:

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

The EVK3 – GenX320 can be operated via Prophesee's Metavision® Intelligence Suite. The software can be downloaded following the instructions at <https://www.prophesee.ai/metavision-intelligence-sdk-download/>

4. INTERFACES

1. USB interface

The EVK3 – GenX320 provides a USB Micro type-B connector USB 3.0 interface. It is compliant with USB 3.0 specification 1.0.

2. Timing interface

The EVK3 – GenX320 provides dedicated timing interfaces to allow for triggering and synchronization with compatible hardware. These interfaces are provided using SMA connectors on the CCAM5 Denebola adapter as shown below.

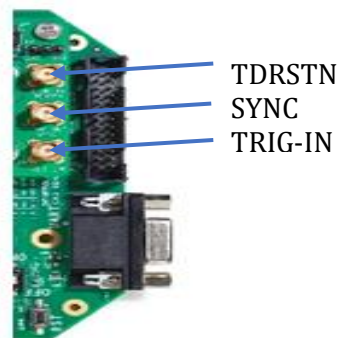


Figure 3 – Connectors for timing interface

The TDRSTN is directly connected to the GenX320 PXRSTN signal. It is used to reset the event pixels matrix and stop generation of pixels events.

Both TDRSTN and TRIG-IN signals allow 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.

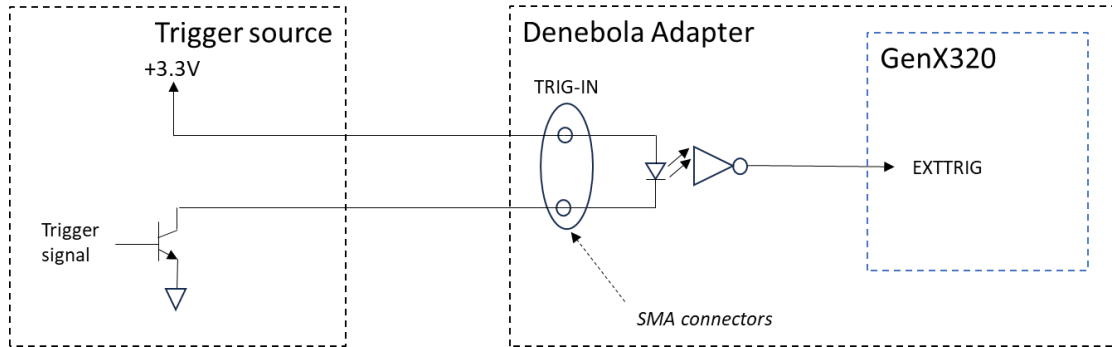


Figure 4 - Synchronization via trigger (it is applicable to TDRSTN).

TDRSTN and TRIG-IN Connections defined as inputs to the EVK are opto-isolated to protect the EVK and avoid any ground loops in application setups.

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

In input, this synchronization signal 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.

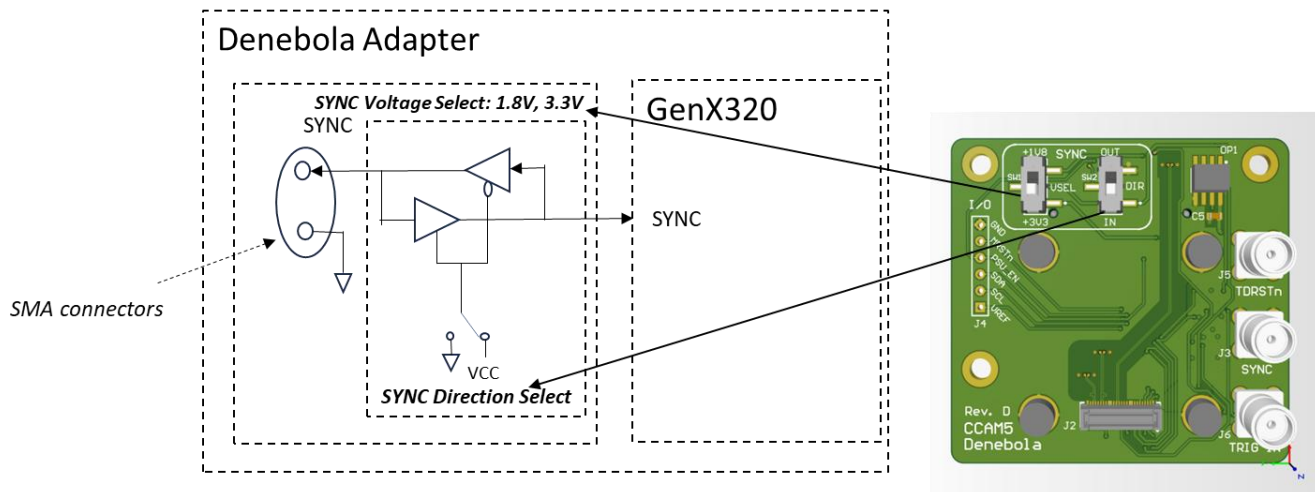


Figure 5 - Sensor clock synchronization.

The SYNC signal can also be configured in output by software to produce a 1MHz pulse train that is received by the Sync connection of another EVK. This allows the timestamping of the two event-streams to be synchronized.

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As illustrated in Figure 5, the SYNC connection defined as input/output passes via level-shifters. The voltage and the buffer direction are configurable with the VSEL and the DIR switches on the CCAM5 Denebola adapter board.

5. SETUP

Once the EVK3 – GenX320 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 EVK3 – GenX320 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 04b4:00f4 Cypress Semiconductor Corp.
```

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



Figure 6 - EVK3 Windows driver

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.

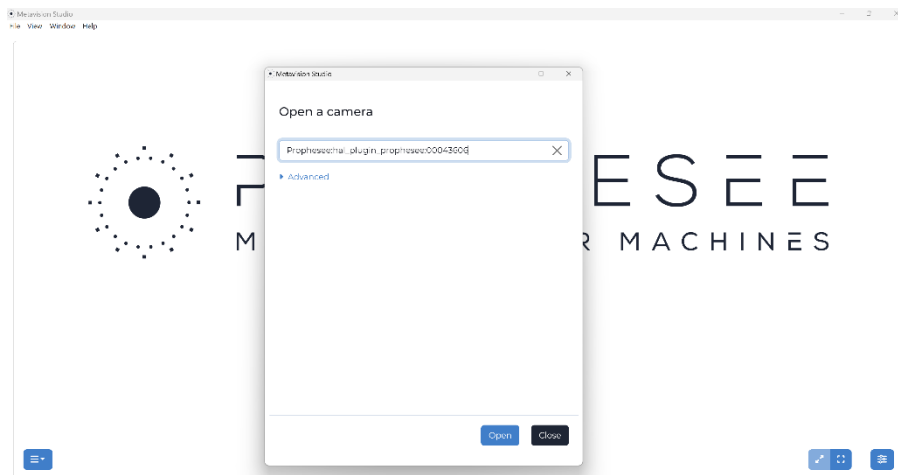


Figure 7 - GenX320 camera detected by Metavision Studio

As illustrated below, the command `metavision_platform_info` returns system information that can be communicated to support@prophesee.ai in case of difficulties:

```

Metavision Platform Info
#### INSTALLED SOFTWARE ####
Version: 4.3.0
Id: dd32fa23b19dfe5da2a0d16939dd0d958fe9cf
-----
METAVISION SYSTEMS INFORMATION
-----

#### SYSTEMS AVAILABLE ####

## Prophesee GenX320 320x320 ##

# System information
Available Data Encoding Formats EVT21
Connection USB
Current Data Encoding Format EVT21
EVK3 Build Date Tue Jan 3 16:47:11 2023
EVK3 Release Version 3.10.0
EVK3 Speed 5000
Integrator Prophesee
Sensor Name GenX320
Serial 00043606
SystemID 64
device0 compatible psee,cx3_saphir
device0 name CCam5 Saphir Event-Based Camera

# Available device config options
ll_biases_range_check_bypass default: 0 values: true | false

# Default Biases
bias_diff 51
bias_diff_off 40
bias_diff_on 40
bias_fo 29
bias_hpf 0
bias_refr 82
  
```

Figure 8 - Valid metavision_platform_info for GenX320

6. LINKS AND RELATED INFORMATION

Access your online EVK3 Quickstart to get all the information you need to get started:

<https://www.prophesee.ai/quickstart-evk3-genx320/>

Metavision® Intelligence software can be downloaded following the instructions at

<https://www.prophesee.ai/metavision-intelligence-sdk-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

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