

smart eye ► LAB

DYNAMIC VISION SENSOR

GENERAL DESCRIPTION

The smart eye LAB Sensor is a test and demonstration device for Dynamic Vision Sensor (DVS) technology. The device comprises a TMPDIFF-128 vision sensor that is a CMOS optical sensor chip that reacts to relative light intensity changes with low latency (~15 µs) and high accuracy (~1.5 µs), irrespective of absolute background illumination.

Unlike conventional image sensors the chip has no pixel readout clock but signals the detected changes instantaneously as so called "events". The sensor can produce two types of events for each pixel: "On"-events for a relative increase in light intensity and "off"-events for a relative decrease. This information is time stamped by the digital signal processor (DSP) of the device and transferred in a timed-address event (TAE) data stream via TCP UDP over a standard LAN connection. The TAE stream contains the information of the responding pixels x-y addresses in the imager array, the "polarity" (on/off) and a precise time stamp for each event.

Because the pixels of the vision sensor individually control their gain the sensor has a very high intra scene dynamic range of 120 dB.

As of these features the output of the sensor is not a conventional image but an abstract representation of the shapes of moving objects in a scene, where the background is automatically suppressed.

AVAILABLE SOFTWARE AND TOOLS

- Microsoft Windows® compatible graphical user interface software
- Command line interface for expert configuration
- Matlab® tools for handling recorded TAE data files are available

SPECIFICATIONS

► Pixel resolution:	128 x 128
► Peak sensor AER data rate:	900 kevent/s
► Sustained TAE/UDP data rate:	700 kevent/s
► Data protocol:	TAE via UDP
► TAE digital time stamp resolution:	100 µs
► Data interface:	100 Mbit
► EthernetConfiguration interface:	UDP command console
► Supply voltage:	5 V DC
► Power consumption, max.:	4 W
► Housing:	Aluminium
► Dimension (without lens):	H: 100 mm W: 100 mm D: 60 mm
► Weight:	0.5 kg
► Mount:	4 tripod sockets
► Lens mount:	CS-Mount
► Operation temperature range:	0..55 °C
► Certification:	No CE-mark, For use in laboratory environment

ADVANTAGES

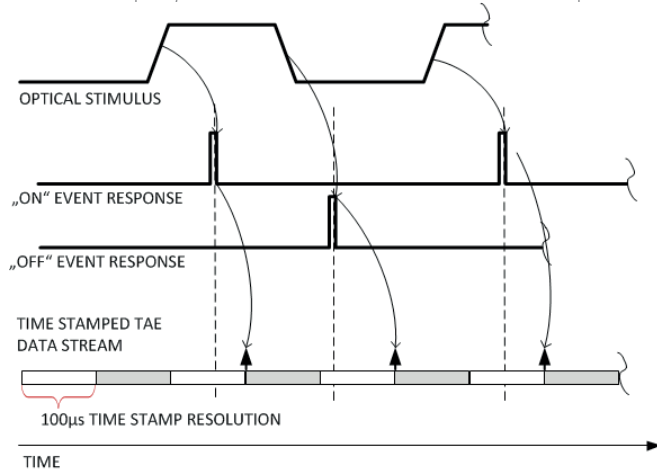
- Extremely high time stamp resolution (10.000 fps equivalent)
- Wide intra scene dynamic range
- Automatic on-chip background suppression

APPLICATIONS

- ▶ High-speed object tracking
- ▶ Shape detection, object counting and classification
- ▶ Vision applications under outdoor and uncontrolled lighting situations
- ▶ Real-time control systems
- ▶ Surveillance applications with strict privacy requirements (as no image is generated)
- ▶ Compact smart camera solutions

EXPLANATION OF KEY PARAMETERS

Time stamping of events from the vision sensor chip



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OPERATION PARAMETERS

The following operation parameters of the chip can be configured via the configuration interface:

- ▶ Contrast sensitivity
- ▶ Photoreceptor bandwidth
- ▶ Event rate limitation per pixel

OPTIONAL

The embedded processing capabilities of the Analog Devices BF537 Blackfin® DSP allow for optional implementation of TAE data processing algorithms directly in the device for test and prototype implementations.

- ▶ 600 MHz processor core clock frequency
- ▶ 32 MB SDRAM memory
- ▶ 4 MB non-volatile FLASH memory
- ▶ On-board temperature measurement
- ▶ On-board measurement of total chip illumination



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