

TMPDIFF-128

Vision Sensor Chip Description

GENERAL DESCRIPTION

The TMPDIFF128 Vision Sensor is an optical CMOS Dynamic Vision Sensor (DVS) chip that reacts to relative light intensity changes with low latency and high time resolution, irrespective of absolute background illumination.

Unlike conventional image sensors the chip has no pixel readout clock but signals the detected changes instantaneously. This information is signalled as so-called "events" that contain the information of the responding pixels x-y addresses in the imager array via an asynchronous address-event-representation (AER) interface. 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 (see schematics on next page).

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 moving edges in the scene, where the background is automatically suppressed.

Due to the on-chip pre-processing of the visual information the processing of the data is computationally less demanding as in image processing and the technology allows for especially compact "single-box" solutions.

ADVANTAGES

- ▶ Extremely high time resolution
- ▶ Wide intra scene dynamic range
- ▶ Automatic on-chip background suppression

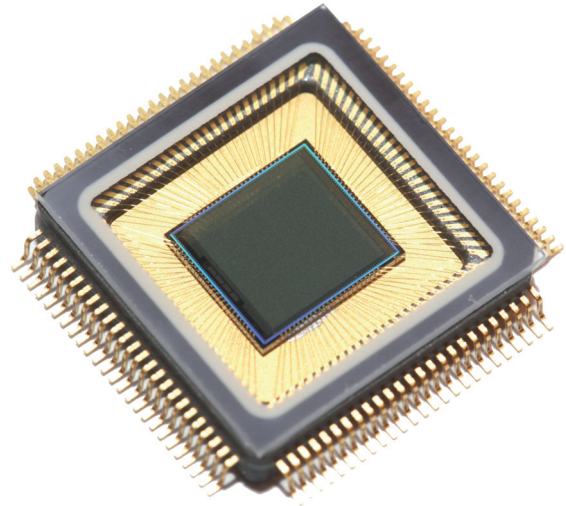
SPECIFICATIONS

▶ Pixel pitch:	40 μm
▶ Pixel resolution:	128 x 128
▶ Accuracy: (@1 kLux, 30% contrast)	1.5 μs ¹⁾
▶ Latency: (@1 kLux, 30% contrast)	15 μs ¹⁾
▶ Time resolution: (@600 Lux, 50% contrast)	300 μs ¹⁾
▶ Sensitivity, min. pulse width: (@0.7 $\mu\text{W}/\text{pixel}$, ∞ contrast)	250 ns
▶ Sensitivity, min. contrast: (@1 kLux)	20%
▶ Dynamic range: (@21°C)	120 dB
▶ Data interface:	15 bit parallel asynchronous AER
▶ Max. data rate:	1 Mevent/s
▶ Configuration interface:	288 bit shift-register
▶ CMOS technology:	0.35 μm
▶ Supply voltage:	3.3 V
▶ Power consumption, typ.:	23 mW
▶ Chip size:	6.0 x 6.3 mm
▶ Chip package type:	CQFP-100
▶ Pin count:	100
▶ Operation temperature range:	0..55 °C
▶ Chip cover:	Glass Lid

¹⁾ Single pixel data. Performance can degrade under high scene activity conditions due to shared AER bus

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



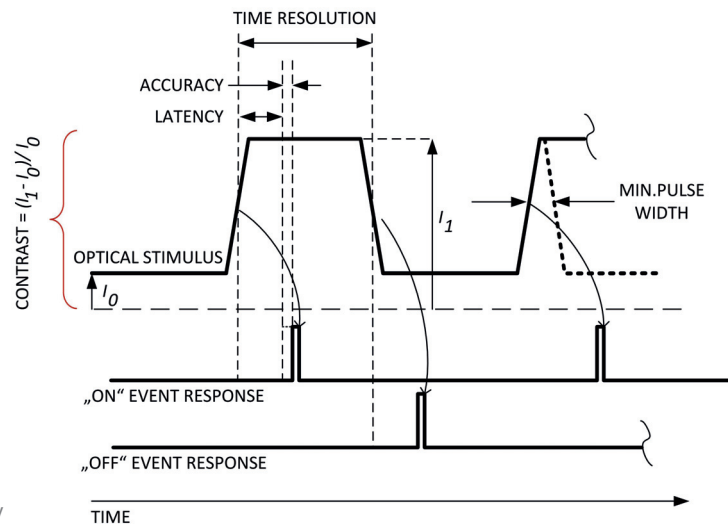
OPERATION PARAMETERS

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

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

EXPLANATION OF KEY PARAMETERS

The key parameters of the TMPDIFF-128 vision sensor pixel are depicted in the schematics below.



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