804x704 advanced global shutter with 2.16 µm pixel, and small die size

Order code	Description
VD55G1CCB0/RW	Bare die

Application

Engineered for high performance computer vision applications, including AR/VR, personal and industrial robotics, drones, barcodes, biometrics and gestures, embedded vision, or scene recognition.

Typical use cases where high performance near-IR sensing is key. Also demanding computer vision on scene with movement requiring no shutter artifacts.

Features

- Compact global shutter technology (40 nm/65 nm)
    - High performance 2.16 µm x 2.16 µm BSI deep CDTI pixel
- Smallest global shutter 804x704 pixels with a 5.9 mm^2 footprint
    - Die size of only 2.7 mm x 2.2 mm; smaller than VGA equivalents
    - Small pixel array size of 1.73 mm x 1.73 mm
    - Optical format 1/10" with 600x600 crop
- Disruptive streaming modes, with ST in-pixel, enabling features with a single frame only for ultralow latency and power
    - Differential mode: ultrafast change tracking, event-like image
    - Background removal, without host processing
    - Spatial HDR, enabling 90dB+, without frame ghosting or latency
- Autonomous auto wake-up mode, with always-on scene change detection. Host can be fully off, with only VD55G1 consuming
    - 1.0 mW at 1 Hz
    - 1.5 mW at 5 Hz
    - 2.7 mW at 10 Hz
- Very low power consumption
    - 800x700 (full IQ, 5 msec exposure)
        - 7 mW at 10 fps
        - 35 mW at 48 fps
    - 640x480 (full IQ, 5 msec exposure)
        - 6 mW at 10 fps
        - 29 mW at 48 fps
    - Power consumption scaling with features/framerate and software standby
- High frame rate: 170 fps at 800x700, 260 fps at VGA and 460 fps at 320x240
- Disruptive I3C interface
    - 10x faster control interface, fully backward compatible with I²C
    - I3C image output in parallel of CSI-2 (10 fps at 320x240 or 5 fps at 400x400)
- Advanced raw ISP
    - Dynamic defective pixel correction
    - Smart noise pixel control (3 dB to 9 dB noise reduction)
    - Embedded multi auto exposure. Independent auto exposure per context
    - Different exposure for each pixel on the same frame (up to 3 exposures per frame)
    - Piece wise linear gamma (PWL), one setup per context, 4 points x/y per setup
    - Crop, analog, and digital binning (x2 and x4) and subsampling (x2 and x4)
    - Mirror/flip readout

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- Flexible camera module system
  – Programmable sequences of 4-frame contexts, including illumination control
  – Up to 4-LED control outputs, synchronized on sensor integration periods with flexible timings and PWM (pulse-width modulation) control
  – Master/slave with external frame start
  – 1024 bits OTP available for the user/host
  – Integrated temperature sensor with ± 2°C accuracy [25°C; 85°C]
  – 1.2 Gb/s single lane transmitter MIPI CSI-2, with support down to 400 Mb/s
- Operating junction temperature: -30°C to 85°C
- High optical performance: QE peak >= 90% and MTF 940 nm at 55% Nyquist/2, dynamic range of 65 dB

Description

The VD55G1 is an advanced global shutter with 2.16 μm pixel. It has a small die size of 2.7 x 2.2 mm².

Revision history

Table 1. Document revision history

Date	Version	Changes
16-May-2023	1	Initial release

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