NOIP1SN1300A, NOIP1SN0500A, NOIP1SN0300A

PYTHON 0.3/0.5/1.3 Megapixel Global Shutter CMOS Image Sensors

Features

- SXGA: 1280 x 1024 Active Pixels, 1/2" Optical Format SVGA: 800 x 600 Active Pixels, 1/3.6" Optical Format VGA: 640 x 480 Active Pixels, 1/4" Optical Format
- 4.8 μm x 4.8 μm Low Noise Global Shutter Pixels with In-pixel CDS
- Monochrome (SN) or Color (SE)
- Zero ROT Mode Enabling Faster Frame Rate
- Frame Rate at Full Resolution (LVDS)
 - 210/175 frames per second @ SXGA (Zero ROT/Normal ROT)
 - 560/420 frames per second @ SVGA (Zero ROT/Normal ROT)
 - 860/620 frames per second @ VGA (Zero ROT/Normal ROT)
- 43 Frames per Second (fps) at Full Resolution (CMOS)
- On-chip 10-bit Analog-to-Digital Converter (ADC)
- 8-bit or 10-bit Output Mode
- Four Low Voltage Differential Signaling (LVDS) High Speed Serial Outputs or Parallel CMOS Output
- Random Programmable Region of Interest (ROI) Readout
- Pipelined and Triggered Global Shutter, Rolling Shutter
- On-chip Fixed Pattern Noise (FPN) Correction
- Serial Peripheral Interface (SPI)
- Automatic Exposure Control (AEC)
- Phase Locked Loop (PLL)
- High Dynamic Range (HDR)
- Dual Power Supply (3.3 V and 1.8 V)
- -40°C to +85°C Operational Temperature Range
- 48-pin LCC and Bare Die
- 590 mW Power Dissipation (LVDS)
- 375 mW Power Dissipation (CMOS)
- These Devices are Pb-Free and are RoHS Compliant

Applications

- Machine Vision
- Motion Monitoring
- Security
- Barcode Scanning (2D)

Description

The Python's high sensitivity 4.8 µm x 4.8 µm pixels support low noise "pipelined" and "triggered" global shutter readout modes. In global shutter mode, the sensor supports correlated double sampling (CDS) readout, reducing noise and increasing dynamic range.



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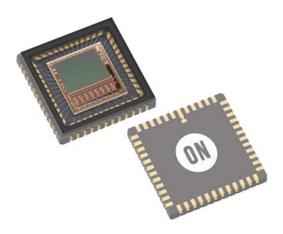


Figure 1. PYTHON 1300 Photograph

The sensor has on-chip programmable gain amplifiers and 10-bit A/D converters. The integration time and gain parameters can be reconfigured without any visible image artifact. Optionally the on-chip automatic exposure control loop (AEC) controls these parameters dynamically. The image's black level is either calibrated automatically or can be adjusted by adding a user programmable offset.

A high level of programmability using a four wire serial peripheral interface enables the user to read out specific regions of interest. Up to 8 regions can be programmed, achieving even higher frame rates.

The image data interface of the P1-SN/SE part consists of four LVDS lanes, facilitating frame rates up to 210 frames per second in Zero ROT mode. Each channel runs at 720 Mbps. A separate synchronization channel containing payload information is provided to facilitate the image reconstruction at the receiving end. The P2-SN/SE part provides a parallel CMOS output interface at reduced frame rate.

The PYTHON low resolution family is packaged in a 48-pin LCC package and is available in a monochrome and color version. For NIR variants, please contact your local distributor or email us at imagesensors@onsemi.com.

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SPECIFICATIONS

Key Specifications

Table 1. GENERAL SPECIFICATIONS

| Parameter | Specification |
|---|---|
| Pixel type | In-pixel CDS. Global shutter pixel architecture |
| Shutter type | Pipelined and triggered global shutter |
| Frame rate Zero ROT/Normal ROT mode | P1–SN/SE: 210/175 fps @ SXGA 560/420 fps @ SVGA 860/620 fps @ VGA P2–SN/SE: 43 fps |
| Master clock | P1–SN/SE: 72 MHz when PLL is used, 360 MHz (10–bit) / 288 MHz (8–bit) when PLL is not used P2–SN/SE: 72 MHz |
| Windowing | 8 Randomly programmable windows. Normal, sub-sampled and binned readout modes |
| ADC resolution | 10-bit, 8-bit (Note 1) |
| LVDS outputs | P1-SN/SE: 4/2/1 data + sync + clock |
| CMOS outputs | P2-SN/SE: 10-bit parallel output, frame_valid, line_valid, clock |
| Data rate | P1–SN/SE: 4 x 720 Mbps (10–bit) / 4 x 576 Mbps (8–bit) P2–SN/SE: 72 MHz |
| Power dissipation | P1–SN/SE: 590 mW, 10–bit mode P2–SN/SE: 375 mW |
| Package type | 48-pin LCC |

| Parameter | Specification |
|--------------------------------------|--|
| Active pixels | SXGA: 1280 (H) x 1024 (V) SVGA: 800 (H) x 600 (V) VGA: 640 (H) x 480 (V) |
| Pixel size | 4.8 μm x 4.8 μm |
| Conversion gain | 0.096 LSB10/e ⁻ 140 μV/e ⁻ |
| Dark temporal noise | < 9e⁻ (Normal ROT, 1x gain) < 7e⁻ (Normal ROT, 2x gain) |
| Responsivity at 550 nm | 7.7 V/lux.s |
| Parasitic Light Sensitivity (PLS) | <1/8000 |
| Full Well Charge | 10000 e⁻ |
| Quantum Efficiency at 550 nm | 56% |
| Pixel FPN | < 0.5 LSB10 |
| PRNU | < 10 LSB10 |
| MTF | 68% @ 535 nm – X-dir & Y-dir |
| PSNL at 20°C | 120 LSB10/s, 1200 e ⁻ /s |
| Dark signal at 20°C | 5 e ⁻ /s, 0.5 LSB10/s |
| Dynamic Range | > 60 dB in global shutter mode |
| Signal to Noise Ratio (SNR max) | 40 dB |

1. The ADC is 11-bit, down-scaled to 10-bit. The PYTHON uses a larger word-length internally to provide 10-bit on the output.

To receive a detailed product data sheet and supporting documentation, visit the CISP Extranet at www.onsemi.com/MyON.

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