

# NOIP1SN1300A, NOIP1SN0500A, NOIP1SN0300A

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



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

### 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  $\mu\text{m}$  x 4.8  $\mu\text{m}$  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  $\mu\text{m}$  x 4.8  $\mu\text{m}$  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.



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](mailto:imagesensors@onsemi.com).

# NOIP1SN1300A, NOIP1SN0500A, NOIP1SN0300A

## 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<br>Zero ROT/Normal<br>ROT mode | P1-SN/SE:<br>210/175 fps @ SXGA<br>560/420 fps @ SVGA<br>860/620 fps @ VGA<br>P2-SN/SE: 43 fps                          |
| Master clock                              | P1-SN/SE:<br>72 MHz when PLL is used,<br>360 MHz (10-bit) / 288 MHz (8-bit)<br>when PLL is not used<br>P2-SN/SE: 72 MHz |
| Windowing                                 | 8 Randomly programmable windows.<br>Normal, sub-sampled and binned<br>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,<br>frame_valid, line_valid, clock   |
| Data rate                                 | P1-SN/SE:<br>4 x 720 Mbps (10-bit) /<br>4 x 576 Mbps (8-bit)<br>P2-SN/SE: 72 MHz  |
| Power dissipation                         | P1-SN/SE: 590 mW, 10-bit mode<br>P2-SN/SE: 375 mW   |
| Package type                              | 48-pin LCC  |

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.

**Table 2. ELECTRO-OPTICAL SPECIFICATIONS**

| Parameter                            | Specification  |
|--------------------------------------|--|
| Active pixels                        | SXGA: 1280 (H) x 1024 (V)<br>SVGA: 800 (H) x 600 (V)<br>VGA: 640 (H) x 480 (V)     |
| Pixel size                           | 4.8 $\mu\text{m}$ x 4.8 $\mu\text{m}$  |
| Conversion gain                      | 0.096 LSB10/e <sup>-</sup><br>140 $\mu\text{V}/\text{e}^-$                         |
| Dark temporal noise                  | < 9e <sup>-</sup> (Normal ROT, 1x gain)<br>< 7e <sup>-</sup> (Normal ROT, 2x gain) |
| Responsivity at 550 nm               | 7.7 V/lux.s  |
| Parasitic Light<br>Sensitivity (PLS) | < 1/8000   |
| Full Well Charge                     | 10000 e <sup>-</sup>   |
| Quantum Efficiency at<br>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 <sup>-</sup> /s  |
| Dark signal at 20°C                  | 5 e <sup>-</sup> /s, 0.5 LSB10/s   |
| Dynamic Range                        | > 60 dB in global shutter mode   |
| Signal to Noise Ratio<br>(SNR max)   | 40 dB  |

To receive a detailed product data sheet and supporting documentation, visit the CISP Extranet at [www.onsemi.com/MyON](http://www.onsemi.com/MyON).

### Worldwide Sales and Design Support

ON Semiconductor CMOS Image Sensor Business Unit offers standard and customized CMOS image sensors for consumer as well as industrial and professional applications. Consumer applications include solutions for fast growing high-speed machine vision, motion monitoring, medical imaging, intelligent traffic systems, security, and barcode applications. Our customized CMOS image sensors are characterized by very high pixel counts, large area, very high frame rates, large dynamic range, and high sensitivity.

ON Semiconductor maintains a worldwide network of offices, customer service centers, manufacturer's representatives and distributors. For more information on image sensors, contact [imagesensors@onsemi.com](mailto:imagesensors@onsemi.com).

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.