# 1/2.5-Inch 5 Mp CMOS Digital Image Sensor

## MT9P401 Datasheet, Rev. F

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## Features

- High frame rate
- Superior low-light performance
- Low dark current
- Global reset release, which starts the exposure of all rows simultaneously
- Bulb exposure mode, for arbitrary exposure times
- Snapshot mode to take frames on demand
- Horizontal and vertical mirror image
- Column and row skip modes to reduce image size without reducing field-of-view (FOV)
- Column and row binning modes to improve image quality when resizing
- Simple two-wire serial interface
- Programmable controls: gain, frame rate, frame size, exposure
- Automatic black level calibration
- On-chip phase-locked loop (PLL)
- 720p HDTV video at 60 fps

## Applications

- Digital still cameras
- Digital video cameras
- PC cameras
- Converged DSCs/camcorders
- Cellular phones
- PDAs

## General Description

The ON Semiconductor MT9P401 is a 1/2.5-inch CMOS active-pixel digital image sensor with an active imaging pixel array of 2592H x 1944V. It incorporates sophisticated camera functions on-chip such as windowing, column and row skip mode, and snapshot mode. It is programmable through a simple two-wire serial interface.

The 5 Mp CMOS image sensor features ON Semiconductor's breakthrough low-noise CMOS imaging technology that achieves CCD image quality (based on signal-to-noise ratio and low-light sensitivity) while maintaining the inherent size, cost, and integration advantages of CMOS.

**Table 1: Key Performance Parameters**

| Parameter | | Value |
|---|---|---|
| Optical format | | 1/2.5-inch (4:3) |
| Active imager size | | 5.70 mm (H) x 4.28 mm (V)<br>7.13 mm diagonal |
| Active pixels | | 2592H x 1944V |
| Pixel size | | 2.2 x 2.2µm |
| Color filter array | | RGB Bayer pattern |
| Shutter type | | Global reset release (GRR),<br>Snapshot only<br>Electronic rolling shutter (ERS) |
| Maximum data rate/ master clock | | 96 Mp/s at 96 MHz (2.8V I/O)<br>48 Mp/s at 48 MHz (1.8V I/O) |
| Frame rate | Full resolution | Programmable up to 15 fps |
| | HDTV (1280 x 720) | Programmable up to 60 fps (with binning) |
| ADC resolution | | 12-bit, on-chip |
| Responsivity | | 1.4 V/lux-sec (550nm) |
| Pixel dynamic range | | 70.1 dB |
| $SNR_{MAX}$ | | 38.1 dB |
| Supply Voltage | I/O | 1.7—3.1 V |
| | Digital | 1.7—1.9 V (1.8 V nominal) |
| | Analog | 2.6—3.1 V (2.8 V nominal) |
| Power consumption | | 381 mW at 15 fps full resolution |
| Operating temperature | | –30°C to +70°C |
| Packaging | | 48-pin iLCC, die |

# Ordering Information

**Table 2: Available Part Numbers**

| Part Number | Product Description | Orderable Product Attribute Description |
|---|---|---|
| MT9P401D00C18B-N3001-200 | VGA 1/3" GS CIS | Die Sales, 200μm Thickness |
| MT9P401I12STC-DP | 5 MP 1/2.5" CIS | Dry Pack with Protective Film |
| MT9P401I12STC-DR | 5 MP 1/2.5" CIS | Dry Pack without Protective Film |