

## LM9647 Color CMOS Image Sensor VGA 68 FPS

### General Description

The LM9647 is a high performance, low power, 1/4" VGA CMOS Active Pixel Sensor capable of capturing color still or motion images and converting them to a digital data stream.

Excellent image quality is achieved by integrating a high performance analog signal processor comprising of a high speed 10 bit A/D convertor, fixed pattern noise elimination circuits and separate color gain amplifiers. The offset and black level can be automatically adjusted on chip using a full loop black level compensation circuit.

Furthermore, a programmable smart timing and control circuit allowing the user maximum flexibility in adjusting integration time, active window size, gain, frame rate. Various control, timing and power modes are also provided.

### Features

- Master and slave mode operation
- Progressive scan read out with horizontal and vertical flip
- Programmable Exposure:
  - Master clock divider
  - Inter row delay
  - Inter frame delay
  - Partial frame integration
- Four channels of digitally programmable analog gain
- Full automatic servo loop for black level & offset adjustment on each gain channel
- Horizontal & vertical sub-sampling (2:1 & 4:2) with averaging
- Windowing
- Programmable pixel clock, inter-frame and inter-line delays
- I<sup>2</sup>C compatible serial control interface
- Power on reset & power down mode

### Applications

- Dual Mode Camera
- Digital Still Camera
- Security Camera
- Machine Vision

### Key Specifications

|                      |   |
|----------------------|---|
| Array Format         | Total: 488 x 672<br>Active: 488 x 648             |
| Effective Image Area | Total: 2.93mm x 4.03mm<br>Active: 2.93mm x 3.89mm |
| Optical Format       | 1/4"  |
| Pixel Size           | 6.0μm x 6.0μm                                     |
| Video Outputs        | 8 & 10 Bit Digital                                |
| Frame Rate           | 68 frames per second                              |
| Dynamic Range        | 57 dB   |
| Electronic Shutter   | Rolling Reset                                     |
| FPN                  | 0.5%  |
| PRMU                 | 1.7%  |
| Sensitivity          | 2.5 volts/lux.s                                   |
| Fill Factor          | 49%   |
| Color Mosaic         | Bayer pattern                                     |
| Package              | 32 LCC  |
| Single Supply        | 3.0V +/-10%                                       |
| Power Consumption    | 130mW   |
| Operating Temp       | -10°C to 50°C                                     |

### Overall Chip Block Diagram

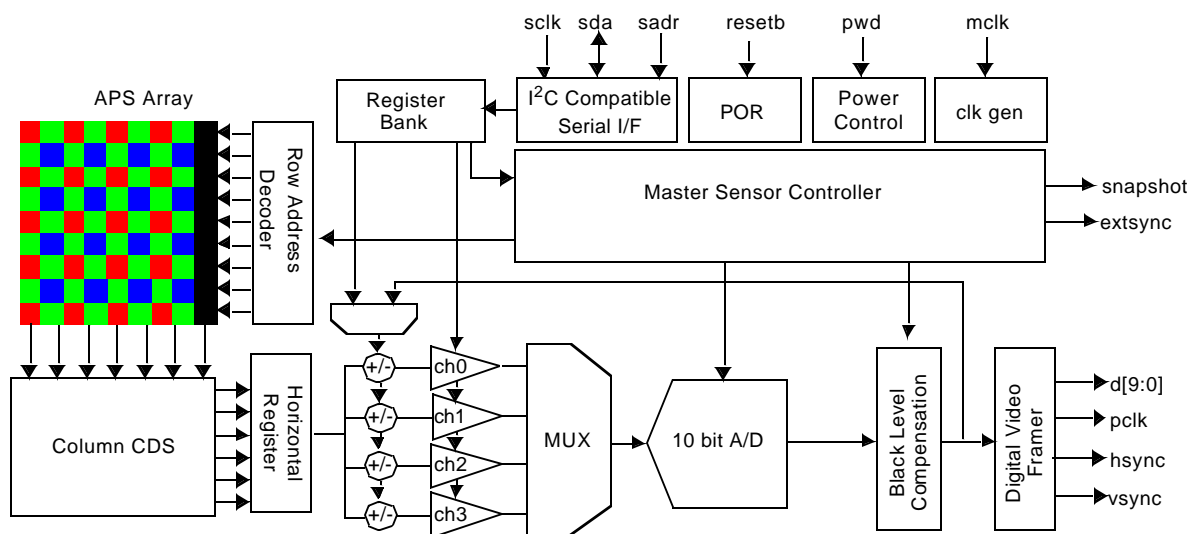


Figure 1. Chip Block Diagram

## Ordering Information (Product, Samples & Design In Tools)

| Item           | Description   | Part Number       |
|----------------|---|-------------------|
| LM9647         | LM9647 VGA, 68 frames per second, color CMOS image sensor. This sensor is shipped in a 48 pin ceramic leadless chip carrier package. Minimum order quantity, one tray of 176 units.   | LM9647CEA         |
| Sample Kit     | This kit includes 5 LM9647 samples and complete product datasheet.  | LM9647SAMPLE-KIT  |
| Headboard      | This is a small PCB that houses the LM9647 sensor together with all necessary discrete components. The headboard is supplied with C-MOUNT lens block (lens not included) and documentation. M12 Lens mounts (not included) can also be mounted on this board.   | LM9647HEADBOARD   |
| Evaluation Kit | <p>The evaluation kit is a complete software/hardware solution designed to give the system designer a complete raw data evaluation toolset for the LM9647 sensor.</p> <p>The kit contains a LM9647 headboard (see above), C-MOUNT lens, capture and display board, power supply, cables, SNAPS EVAL version Windows application software and documentation.</p> | LM9647EVAL-KIT    |
| 1/4" Lens Kit  | The 1/4" lens kit includes four 1/4" M12 lenses and an M12 mount that can be attached to any LM9647 headboard (see above). All lenses in the kit have been tested by National Semiconductor and are supplied with documentation and test data.  | LM96-1/4-LENS-KIT |

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