VGA CMOS Image Sensor

BF3905

Datasheet
1. General Description

The BF3905 is a highly integrated VGA camera chip which includes CMOS image sensor (CIS), image signal processing function (ISP) and MIPI CSI-2(Camera Serial Interface 2). It is fabricated with the world’s most advanced CMOS image sensor process to realize ultra-low dark noise, high sensitivity and very low power imaging system. The sensor consists of a 648 x 488 effective pixel array which has an optical format of 1/10 inch. It has integrated noise canceling CDS (Correlated Double Sampling) circuits, analog global gain and separated R/G/B gain controller, auto black level compensation and on-chip 10-bit ADC. The on-chip ISP provides a very smooth AE (Auto Exposure) and accurate AWB (Auto White Balance) control. It provides various data formats, such as Bayer RGB, RGB444, RGB555, RGB565, YCBCR 4:2:2. It has a commonly used two-wire serial interface for host to control the operation of the whole sensor.

The product is capable of operating at up to 30 frames per second at 24MHZ clock in VGA mode, with complete user control over image quality and data formatting. All required image processing functions, including exposure control, white balance control, color saturation control and so on, are also programmable through the two-wire serial bus.

2. Features

- Standard optical format of 1/10 inch.
- 30 frame/sec VGA mode @ 24MHz master clock.
- Ultra-low dark noise at high temperature.
- Power supply: 2.7~3.1V for analog, 1.7~3.1V for I/O.
- Horizontal /Vertical mirror.
- 50/60Hz flicker cancellation.
- Programmable I/O drive capability.
- Automatic black level control.
- Image processing function: Lens Shading Correction, Gamma Correction, Bad pixel correction, Color Interpolation, False Color Suppression, Purple Fringe Correction, Low Pass Filter, Color Space Conversion, Color Correction, Edge Enhancement, Auto exposure, Auto White Balance, Color Saturation and Contrast, and Data Format Conversion.
- 12 types of special video effect
- On-chip test pattern generation of many types including customer programmable
- MIPI serial mode with 8-bit data streams
- Package: CSP, Bare Die
3. Applications

- Cellular Phone Cameras
- Notebook and desktop PC cameras
- PDAs
- Toys
- Digital still cameras and camcorders
- Video telephony and conferencing equipments
- Security systems
- Industrial and environmental systems

4. Technical Specifications

- Active pixel array: 648 x 488
- Pixel size: 2.25μm × 2.25μm
- Sensitivity: 1.3V/lux.s
- Dark current: TBD
- Power consumption: 90mW
- Standby current: Typical 30μA
- S/N Ratio: TBD
- Dynamic range: TBD
- Operating temperature: -20~60 ℃
- Stable Image temperature: 0~50 ℃
- Optimal lens chief ray angle: 28°

5. Functional Description

5.1 Architecture Overview
BF3905 has an active image array of 648x488 pixels. The active pixels are read out progressively through column/row driver circuits. In order to reduce fixed pattern noise, CDS circuits are adopted. The ASP block is mainly used to control global gain and color gains to get accurate exposure and white balance under different light conditions and color temperature. The analog signal is transferred to digital signal by A/D converter. The digital signals are processed in the ISP block, including Bayer interpolation, low pass filter, color correction, gamma correction, and data format conversion and so on. MIPI CSI-2 includes Protocol Layer and D-PHY Layer. CSI-2 enables multiple data streams using a single interface between CIS and host processor, which provides the mobile industry a standard, robust, scalable, low-power, high-speed, cost-effective interface that supports a wide range of imaging solutions for mobile devices. Users can easily control these functions via two-wire serial interface bus.
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