UXGA CMOS Image Sensor

BF3A20CS

Datasheet

1. General Description

The BF3A20 is a highly integrated UXGA 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 1616 x 1217 effective pixel array which has an optical format of 1/5 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, used with either a serial MIPI interface or the traditional parallel data output interface via the control of a commonly used two-wire serial interface.

This product is capable of operating at up to 15 frames per second at 72MHz master clock in UXGA resolution, 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 1/5 inch.
- Ultra-low dark noise at high temperature.
- Ultra-low Power consumption of typical 170mW@15fps, 80uA@power down
- Various output formats: YCbCr4:2:2, RGB444, RGB555, RGB565, Raw Bayer (1608 x 1208).
- Power supply: 1.7~3.1V for I/O and digital，2.7~3.1V for Analog.
  Can work with signal 2.8V（optional）power supply.
- Horizontal /Vertical mirror.
- 50/60Hz flicker cancellation.
- Programmable I/O drive capability.
- Support for black sun cancellation.
- 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, Contrast, Image Scaling, and Data Format Conversion.

- Video resolution: UXGA, SXGA,720P, any resolution scaling down less than 1608 x 1208
- On-chip test pattern generation of many types including customer programmable
- Package: CSP, Bare Die

3. Applications

- Cellular Phone Cameras
- Notebook and desktop PC cameras
- PDAs
- Toys
- MP4
- Digital still cameras and camcorders
- Video telephony and conferencing equipments
- Security systems
- Industrial and environmental systems

4. Technical Specifications

- Active pixel array: 1616 x 1217
- Pixel size: 1.75μm×1.75μm
- Sensitivity: 0.8 V/Lux-sec
- Dark current: 4 mV/S at 40℃
- Power consumption: 170mW @ 15fps,UXGA
- Standby current: 80uA
- S/N Ratio: TBD
- Dynamic range: TBD
- Operating temperature: -20~60℃
- Optimal lens chief ray angle: 25º non-linear

5. Functional Overview

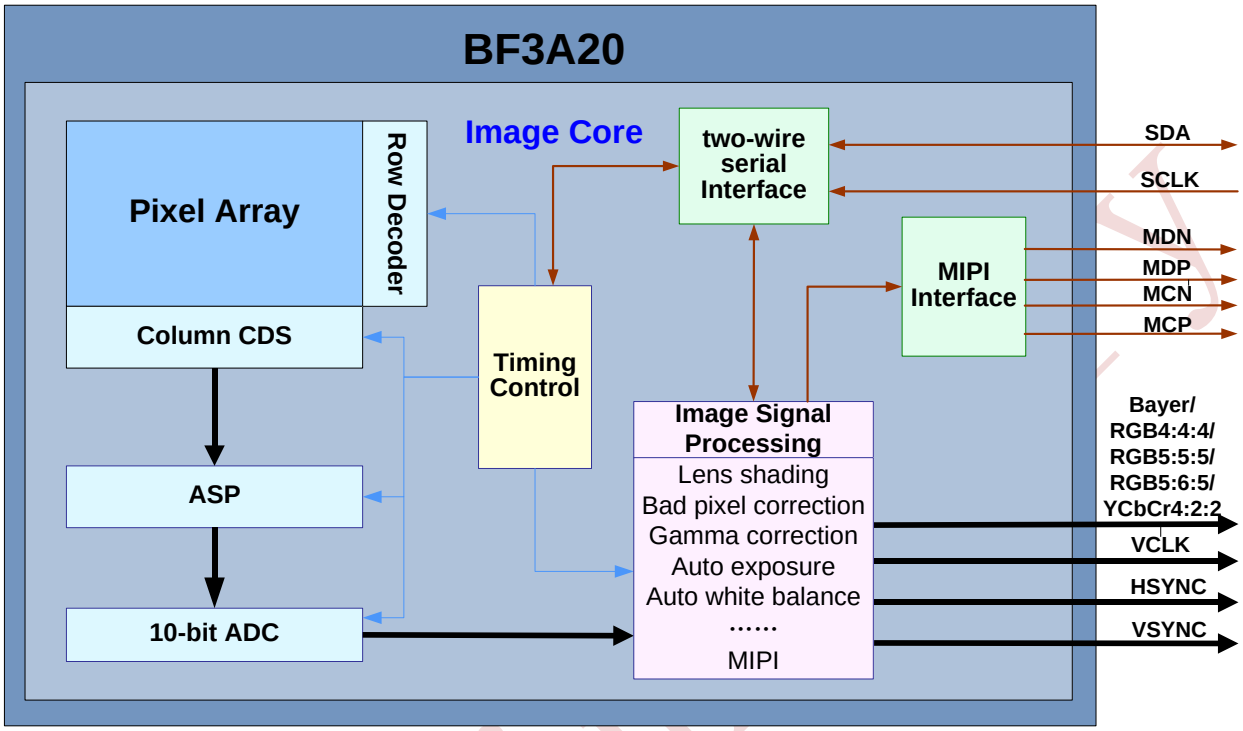

Figure 1. Block Diagram

BF3A20 has an active image array of 1616 x 1217 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 condition and color temperature. Analog signal is transferred to digital signal by A/D converter. Digital signals are processed in the ISP Block, including Bayer interpolation, low pass filter, color correction, gamma correction, skin tone detection, data format conversion and so on. Users can easily control these functions via two-wire serial interface bus. In addition, BF3A20 has a one lane MIPI interface. The processed image data can transmit to the host system either through a parallel bus or MIPI interface.

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