CMOS OV7725 Camera Module

1/4-Inch 0.3-Megapixel Module Datasheet

Rev 2.0, June 2015

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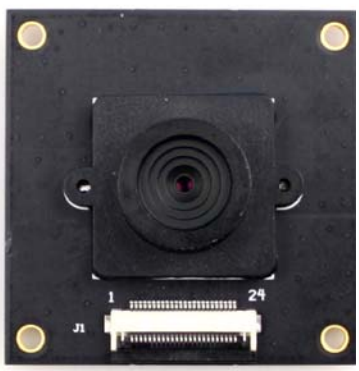
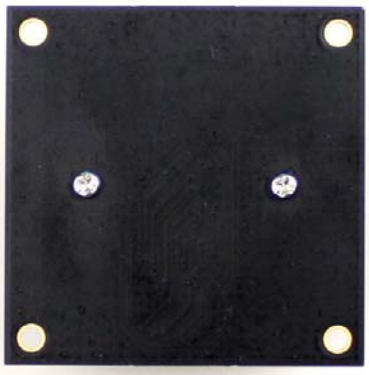
1 Introduction

The OV7725 camera module is based on Omnivision OV7725 image sensor which is a low voltage CMOS device that provides the full functionality of a single-chip VGA camera and image processor, as well as the extraordinary high frame rate and low light performance. The OV7725 provides full-frame, sub-sampled or windowed 8-bit/10-bit images in a wide range of formats, controlled through the Serial Camera Control Bus (SCCB) interface. This device has an image array capable of operating at up to 60 frames per second (fps) in VGA with complete user control over image quality, formatting and output data transfer. All required image processing functions, including exposure control, gamma, white balance, color saturation, hue control and more, are also programmable through the SCCB interface. In addition, OmniVision sensors use proprietary sensor technology to improve image quality by reducing or eliminating common lighting/electrical sources of image contamination, such as fixed pattern noise, smearing, blooming, etc., to produce a clean, fully stable color image.





2 Features

- High sensitivity for low-light operation
- Standard SCCB interface
- Output support for Raw RGB, RGB (GRB 4:2:2, RGB565/555/444) and YCbCr (4:2:2) formats
- Supports image sizes: VGA, QVGA, and any size scaling down from CIF to 40x30
- VarioPixel® method for sub-sampling
- Automatic image control functions including: Automatic Exposure Control (AEC), Automatic Gain Control (AGC), Automatic White Balance (AWB), Automatic Band Filter (ABF), and Automatic Black-Level Calibration (ABLC)
- Image quality controls including color saturation, hue, gamma, sharpness (edge enhancement), and anti-blooming
- ISP includes noise reduction and defect correction
- Lens shading correction
- Saturation level auto adjust (UV adjust)
- Edge enhancement level auto adjust
- De-noise level auto adjust
- Frame synchronization capability

3 Key Specifications

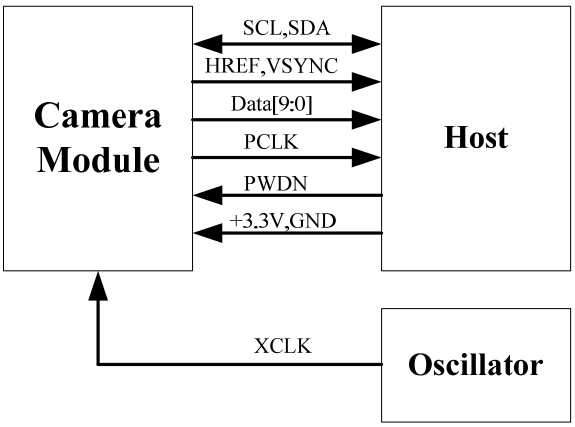
- Optical Size: 1/4”
- Resolution: 640 x 480
- Pixel Size: 6.0um x 6.0um
- Shutter: Electronic Rolling Shutter
- Max Frame Rate: 60fps for VGA
- Sensitivity: 3.8V/(Lux*sec)
- Output Format: YUV, RGB, RAW
- EFL: 3.96mm
- FNo: 2.6
- FOV : 56.8º
- MOD : 10cm
- IR: 650nm

4 Application

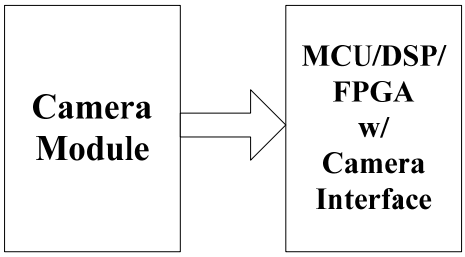
- Cellular phones
- PDAs
- Toys
- Other battery-powered products
- Can be used in Arduino, Maple, ChipKit, STM32, ARM, DSP, FPGA platforms

The following schematic diagram show a basic camera based system. The camera module is powered from a single +3.3V power supply. An external oscillator provide the clock source for camera module XCLK pin. With proper configuration to the camera internal registers via I2C bus, then the camera supply pixel clock (PCLK) and camera data (Data[9:0]) back to the host with

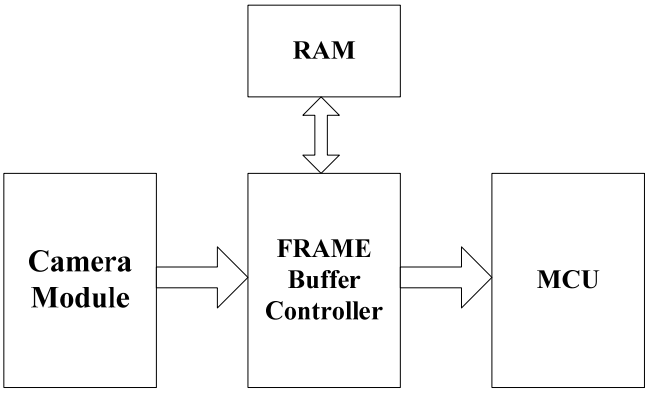
synchronize signal like HREF and VSYNC.



The host may have integrate camera interface like STM32F2 or STM32F4 series MCUs, or ARM9/11 which has dedicate camera port, and DPS like TI TMS320DM series, as well as FPGAs that user can design special logic for camera application. The typical connection between these system and camera module would show like following diagram.



For the host that doesn't have a dedicate camera interface, additional hardware is needed. User need to buffer a entire frame before read them out with low speed MCUs. For example ArduCAM shield is a additional hardware that can be connected to Arduino UNO/Mega board, user can take a photo or something like that easily. The following diagram show the system without dedicate camera interface.

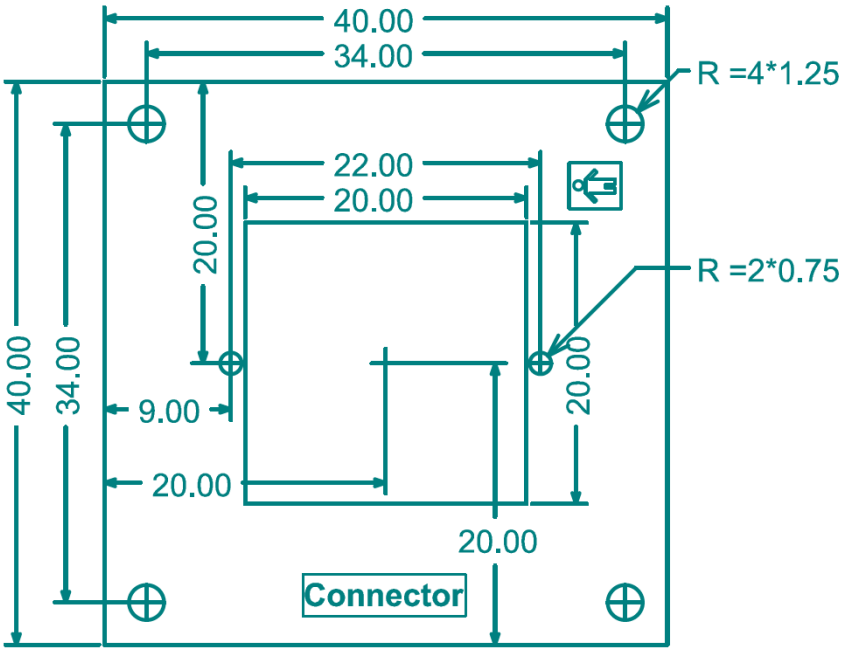


5 Pin Definition

The connector part number is SFV24R-1STE1HLF which is bottom contact 24POS 0.50MM pitch right angle FFC connector. User need extra 0.5pitch FPC cable to extend the camera to controller board.

Pin No.	PIN NAME	TYPE	DESCRIPTION
1	RSV	NC	Reserved
2	AGND	Ground	Analog Power ground
3	SDATA	Bi-directional	Two-Wire Serial Interface Data I/O
4	AVDD	POWER	Analog Power supply
5	SCL	Input	Two-Wire Serial Interface Clock
6	RESET	Input	Sensor Reset, Active Low
7	VSYNC	Output	Active High: Frame Valid; indicates active frame
8	PWDN	Input	Power down, Active High
9	HREF	Output	Active High: Line/Data Valid; indicates active pixels
10	DVDD	POWER	Digital Core Power supply
11	DOVDD	POWER	Digital IO Power supply
12	DOUT9	Output	Pixel Data Output 9 (8bit Mode MSB)
13	XCLK	Input	Master Clock into Sensor
14	DOUT8	Output	Pixel Data Output 8
15	DGND	Ground	Digital Power ground
16	DOUT7	Output	Pixel Data Output 7
17	PCLK	Output	Pixel Clock output from sensor
18	DOUT6	Output	Pixel Data Output 6
19	DOUT2	Output	Pixel Data Output 2 (8bit Mode LSB)
20	DOUT5	Output	Pixel Data Output 5
21	DOUT3	Output	Pixel Data Output 3
22	DOUT4	Output	Pixel Data Output 4
23	RSV	NC	Reserved
24	RSV	NC	Reserved

6 Mechanical Dimension



All dimensions are in mm