

0.3MP: OV7670



OV7670 Camera Module



OV7670 TOP



OV7670 Bottom

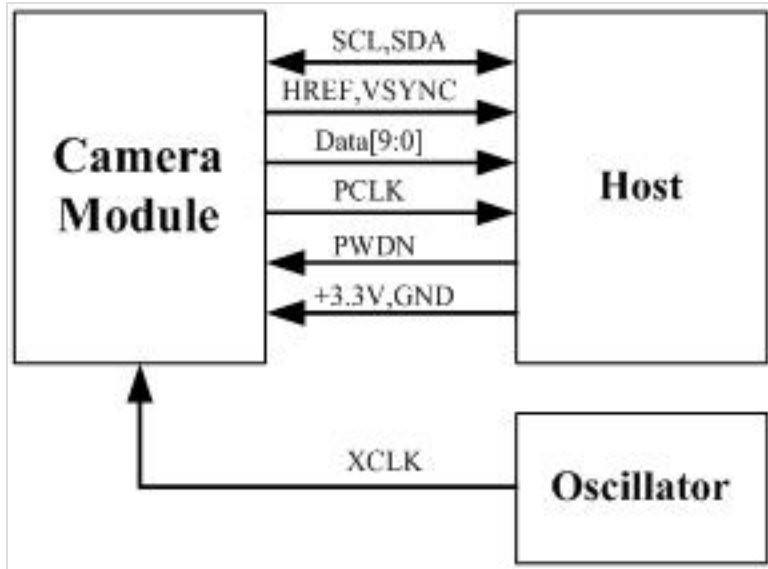


OV7670 Side

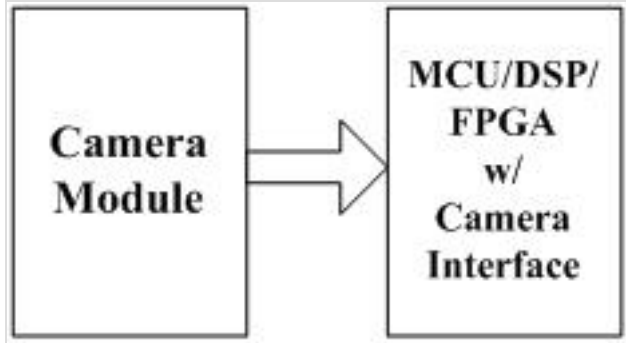
- **Features**
- Optical size 1/6 inch
- Resolution 640×480 VGA
- Onboard regulator, only single 3.3V supply needed
- Standard 0.1inch (2.54mm) pin pitch header connector
- Mounted with high quality F1.8 / 6mm lens
- Output support for Raw RGB, RGB (GRB 4:2:2, RGB565/555/444), YUV (4:2:2) and YCbCr (4:2:2) formats

- High sensitivity for low-light operation
- Low operating voltage for embedded portable apps
- Standard SCCB interface compatible with I2C interface
- Supports image sizes: VGA, CIF, and any size scaling down from CIF to 40×30
- 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
- Supports LED and flash strobe mode
- Supports scaling
- Lens shading correction
- Flicker (50/60 Hz) auto detection
- Saturation level auto adjust (UV adjust)
- Edge enhancement level auto adjust
- De-noise level auto adjust
- **Application**
- Cellular phones
- PDAs
- Toys
- Other battery-powered products
- Can be used in Arduino, Maple, ChipKit, STM32, ARM, DSP, FPGA platforms

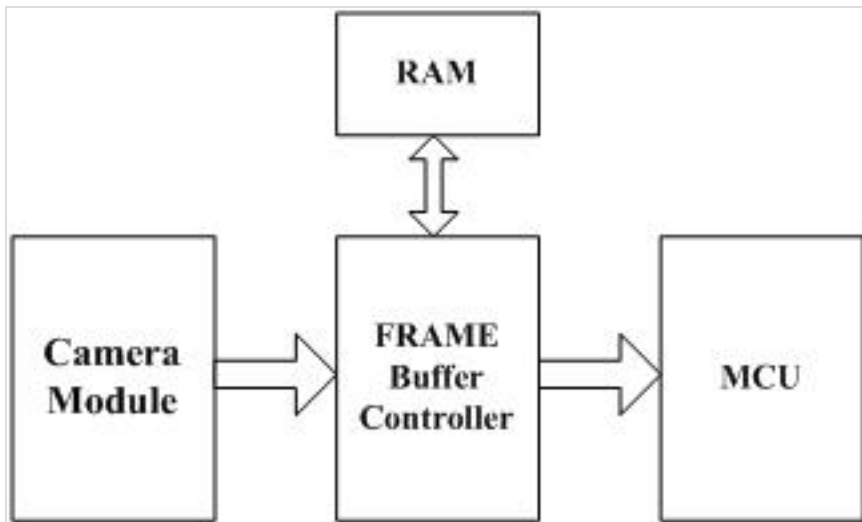
The following schematic diagram show a basic camera based system. The camera module is powered from a single +3.3V power supply. An external oscillator provide the clock source for camera module XCLK pin. With proper configuration to the camera internal registers via I2C bus, then the camera supply pixel 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 dedicated camera interface, additional hardware is needed. User needs to buffer an entire frame before reading them out with low-speed MCUs. For example, the ArduCAM shield is additional hardware that can be connected to an Arduino UNO/Mega board, allowing users to take a photo or something like that easily. The following diagram shows the system without a dedicated camera interface.

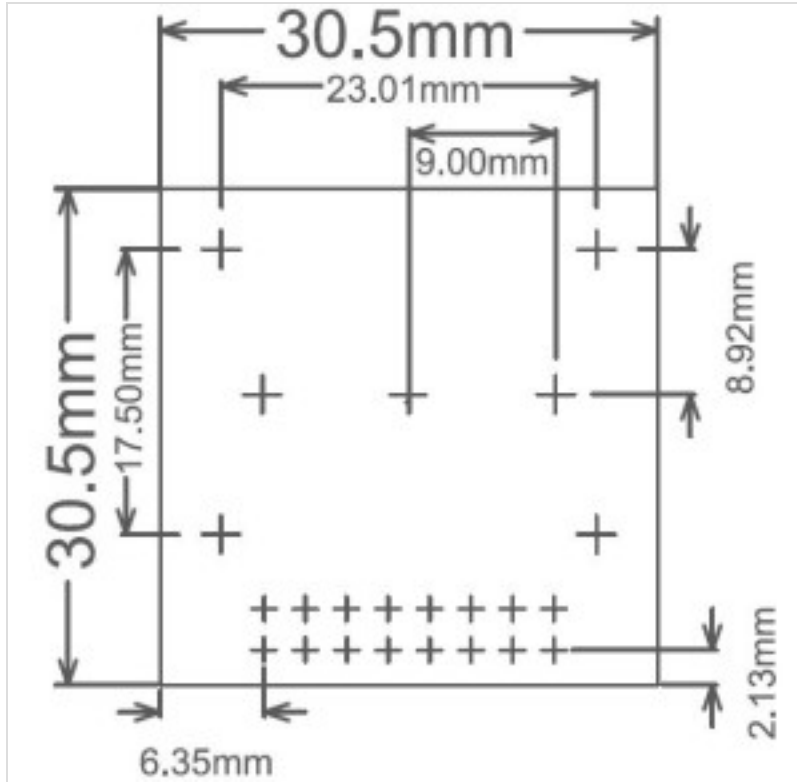


- **Pin Definition**

Pin No.	PIN NAME	TYPE	DESCRIPTION
1	VCC	POWER	3.3v Power supply
2	GND	Ground	Power ground
3	SCL	Input	Two-Wire Serial Interface Clock
4	SDATA	Bi-directional	Two-Wire Serial Interface Data I/O
5	VSYNC	Output	Active High: Frame Valid; indicates active frame
6	HREF	Output	Active High: Line/Data Valid; indicates active pixels
7	PCLK	Output	Pixel Clock output from sensor
8	XCLK	Input	Master Clock into Sensor

9	DOUT9	Output	Pixel Data Output 9 (MSB)
10	DOUT8	Output	Pixel Data Output 8
11	DOUT7	Output	Pixel Data Output 7
12	DOUT6	Output	Pixel Data Output 6
13	DOUT5	Output	Pixel Data Output 5
14	DOUT4	Output	Pixel Data Output 4
15	DOUT3	Output	Pixel Data Output 3
16	DOUT2	Output	Pixel Data Output 2 (LSB)

- **Mechanical Dimension**



- **Demonstration**

ArduCAM provides a full demonstration for OV7670 camera module on Arduino platform. Please download the [ArduCAM_OV7670_Camera_Playback.ino](#) from github.

It will turn the ArduCAM into a real digital camera with capture and playback functions.

1. Preview the live video on LCD Screen.
2. Capture and buffer the image to FIFO when shutter pressed quickly.
3. Store the image to Micro SD/TF card with BMP format.
4. Playback the capture photos one by one when shutter button hold on for 3 seconds.

This program requires the latest ArduCAM library and [Rev.C](#) or [Rev.C+](#) ArduCAM shield and use Arduino IDE 1.5.2 compiler or above.