



CMOS MT9M001 Infrared Camera Module

1/2-Inch 1.3-Megapixel Module Datasheet

Rev 1.0, Nov. 2013

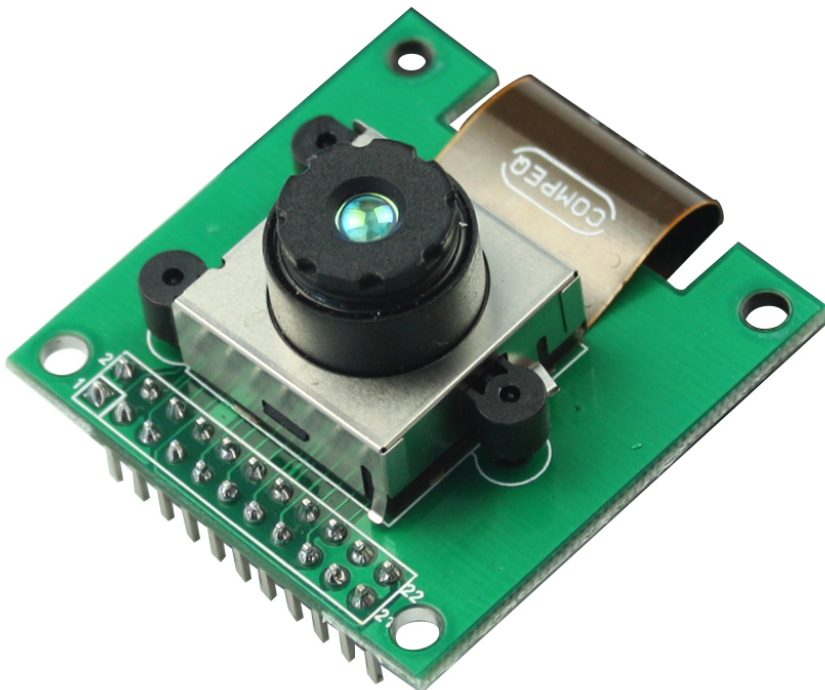


Table of Contents

1	Introduction.....	2
2	Features.....	2
3	Key Specifications	3
4	Application.....	3
5	Pin Definition.....	5
6	Typical Application	6
7	Mechanical Dimension.....	7

1 Introduction

The camera module uses Aptina Image sensor MT9M001 which is an SXGA-format with a 1/2-inch CMOS active-pixel digital monochrome image sensor with infrared band pass filter which is sensitive to 850nm infrared light. The active imaging pixel array is 1,280H x 1,024V. It incorporates sophisticated camera functions on-chip such as windowing, column and row skip mode, and snapshot mode. It is programmable through a simple two-wire serial interface. This camera module should work with extra 850nm infrared active light source.

2 Features

- Optical size 1/2 inch
- Monochrome sensor
- Onboard regulator, only single 3.3V supply needed
- Standard 0.1inch (2.54mm) pin pitch header connector
- Bandpass 850nm infrared filter built in
- Array Format (5:4): 1,280H x 1,024V
- Larger pixel size and excellent low light performance
- Frame Rate max: 30 fps progressive scan
- Shutter: Electronic Rolling Shutter (ERS)
- Programmable Controls: Gain, frame rate, frame size

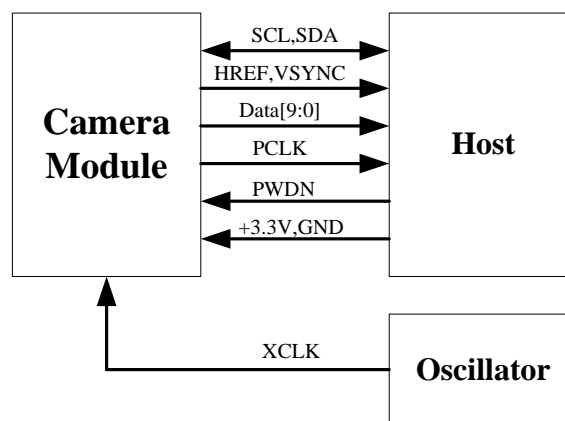
3 Key Specifications

Parameter		Typical Value
Optical format		1/2-inch (5:4)
Active imager size		6.66mm(H) x 5.32mm(V)
Active pixels		1,280H x 1,024V
Pixel size		5.2µm x 5.2µm
Shutter type		Electronic rolling shutter (ERS)
Maximum data rate/ master clock		48 MPS/48 MHz
Frame rate	SXGA (1280 x 1024)	30 fps progressive scan; programmable
ADC resolution		10-bit, on-chip
Responsivity		2.1 V/lux-sec
Dynamic range		68.2dB
SNR _{MAX}		45dB
Supply voltage		3.0V–3.6V, 3.3V nominal
Power consumption		325mW at 3.3V; Standby 275µW
Operating temperature		0°C to +70°C
Packaging		48-pin CLCC

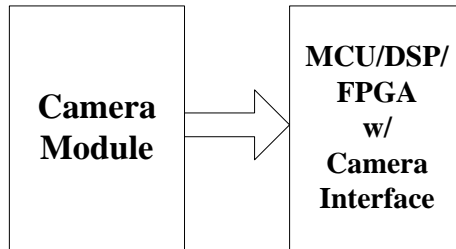
4 Application

- Digital still cameras
- Digital video cameras
- PC cameras
- Can be used in Arduino, Maple, ChipKit, STM32, ARM, DSP, FPGA platforms

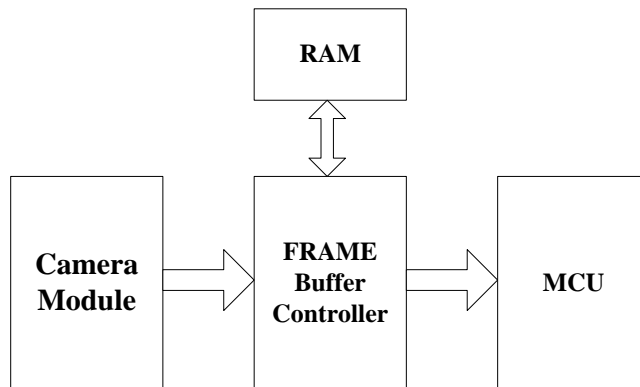
The following schematic diagram show a basic camera based system. The camera module is powered from a single +3.3V power supply. An external oscillator provides the clock source for camera module XCLK pin. With proper configuration to the camera internal registers via I2C bus, then the camera supply 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 needs 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.



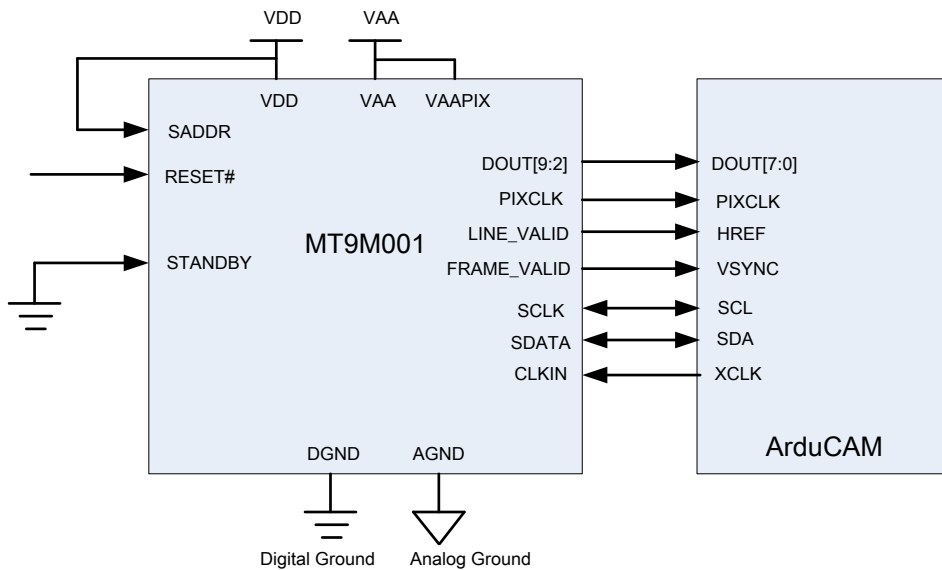
5 Pin Definition



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	HSYNC	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
17	DOUT1	Output	Pixel Data Output 1
18	DOUT0	Output	Pixel Data Output 0 (LSB)
19	RST	Input	Sensor reset signal, active low
20	SBY	Input	Controls sensor's standby mode, active high
19	TRG	Input	Trigger. Activates (HIGH) snapshot sequence
20	STR	Output	Strobe. Output is pulsed HIGH to indicate sensor reset operation of pixel array has completed.

6 Typical Application

This section describes how to connect MT9M001 module with ArduCAM shield, the connection diagram list as follows. [Contact us](#) if you have any problem to use this camera module.



I2C Slave Address: 0xBB (SADDR=1), 0xBA (SADDR=0)

Due to the LCD screen on the ArduCAM shield is limited to 320x240, user have to configure the module to output 320x240 resolution.

Please note that the MT9M001 pin SADDR is connected to GND inside the module, so the slave I2C address is 0xBA.

7 Mechanical Dimension

