OV9281 MIPI Camera Module

1MP Monochrome Global Shutter Camera

Module Datasheet

Rev 1.0, May 2019

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1 Introduction

The Arducam monochrome (B&W) global shutter 1280x800 resolution OV9281 MIPI camera module is mainly designed for Raspberry Pi boards, and it can be connected directly to RPi's CSI-2 camera interface without additional hardware. This camera is based on 1/4-inch Omnivision OV9281 image sensor which adopts OmniPixel3-GS technology to provide full-frame, sub-sampled, and windowed 8/10-bit MIPI images, and capable of operating at up to 120fps in full resolution at 2-lane MIPI bus with complete user control over image quality. The global shutter technology allows to reduce or eliminate unwanted image artifacts, which occur with traditional rolling shutter image sensors as a result of motion during image capture. The sensor's global shutter and excellent low-light sensitivity allow it to be used for any application that needs gesture detection, head and eye tracking, and depth and motion detection.

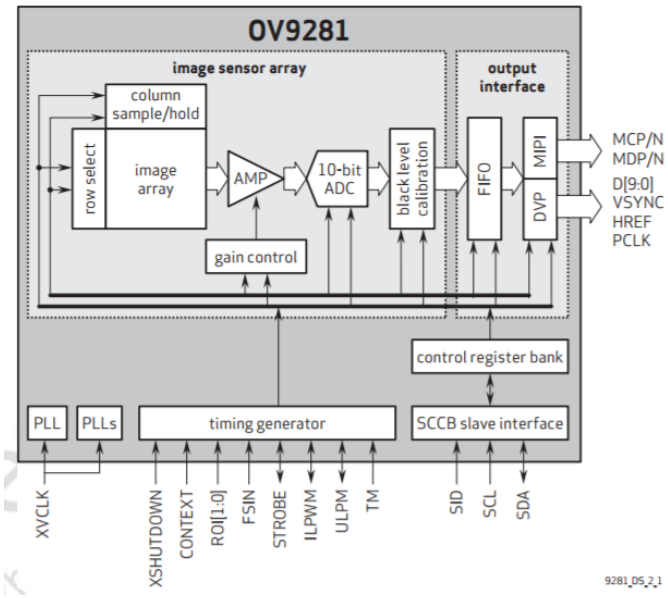
Leveraging the industry's smallest global shutter pixel, with 2-lane MIPI output the OV9281 is capable of capturing 1280x800 resolution video at 120 frames per second (fps), VGA (640x480) at 180fps, QVGA (320x240) at 210 fps with binning, and QQVGA (160x120) at 400 fps with binning and skipping. The OV9281's high frame rates make it an ideal solution for low-latency machine vision applications.

For Raspberry Pi platform Arducam developed a proprietary user-land camera driver SDK and examples which is supports RAW/JPEG/H.264 format, and manual or software auto exposure/gain/white balance, mirror/flip controls, and even the low-level sensor register access controls. Although the RPI camera driver is not V4L2 compliance, it is still good for advanced users who need high frame rate unprocessed RAW video for machine vision and is capable of doing image processing using OpenCV. This MIPI camera module can be used on other ARM, FPGA, DSP, or Nvidia Jetson TX1/TX2/Nano hardware platform as well.

2 Key Specifications

Parameter	Typical Value
Sensor	Monochrome global shutter OV9281
Pixel Size	3 µm x 3 µm
Active array size	1280 x 800
Optical Size	1/4 inch
Default Lens	M27280M07S
EFL	2.8 mm
F.NO	2.8
FOV	75º Horizontal
Build-in IR cut filter	None
Focusing Range	30cm ~ infinite (manually adjustable)
Output interface	2-lane MIPI serial output
Output formats	8/10-bit BW RAW
Maximum image transfer rate	1280 x 800@120 fps
Board Size	40mm x 40mm

3 Block Diagram



4 Application

- Security
- High dynamic range imaging
- Unattended surveillance
- Stereo vision
- Machine vision
- Automation

5 Pin Definition

The OV9281 module uses standard Raspberry Pi camera pinout. The pin number is listed below.

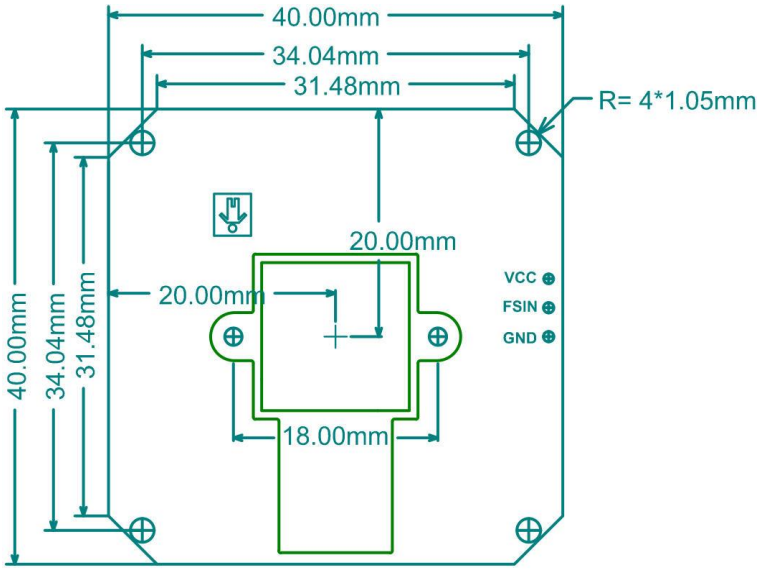
Table 1 J1 Connector Pin Definition

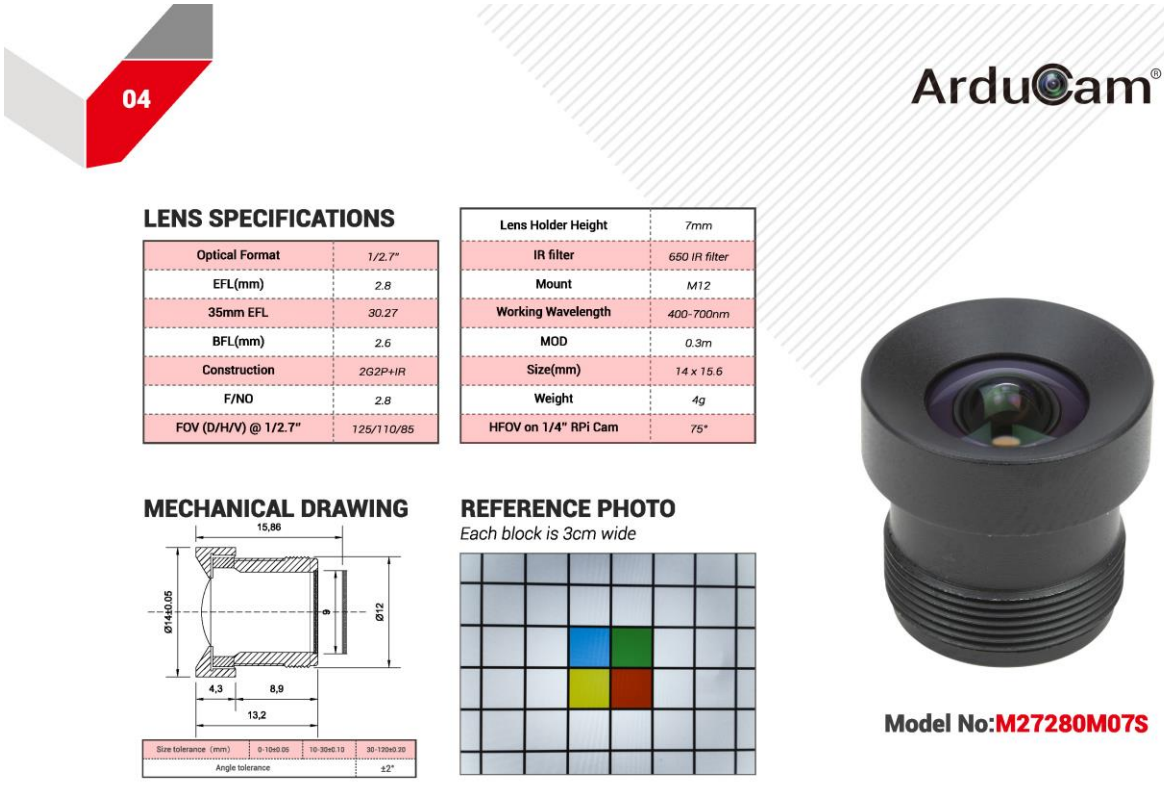
Pin No.	PIN NAME	TYPE	DESCRIPTION
1	DGND	Ground	Power ground
2	MDN0	Output	Pixel Data Lane0 Negative
3	MDP0	Output	Pixel Data Lane0 Positive
4	DGND	Ground	Power ground
5	MDN1	Output	Pixel Data Lane1 Negative
6	MDP1	Output	Pixel Data Lane1Positive
7	DGND	Ground	Power ground
8	MCN	Output	Pixel Clock Output Form Sensor Negative
9	MCP	Output	Pixel Clock Output Form Sensor Positive
10	DGND	Ground	Power ground
11	POWER-EN	Output	Power Enable
12	LED-EN	I/O	Led Enable
13	SCL	Input	SCCB serial interface clock input
14	SDA	I/O	SCCB serial interface data I/O
15	VCC	Power	3.3V Power supply

Table 1 J2 Connector Pin Definition

Pin No.	PIN NAME	TYPE	DESCRIPTION
1	VCC	Power	3.3V Power
2	FSIN	Input	Frame Sync Input
3	GND	Ground	Ground

6 Mechanical Dimension



7 Lens Options

The camera board shipped with default M12 mount low distortion lens M27280M07S. Lens specification lists as follows. Please contact us sales@arducam.com for more lens options or visit http://www.arducam.com/product-category/lenses/.