

Coral

Camera Datasheet

Version 1.0

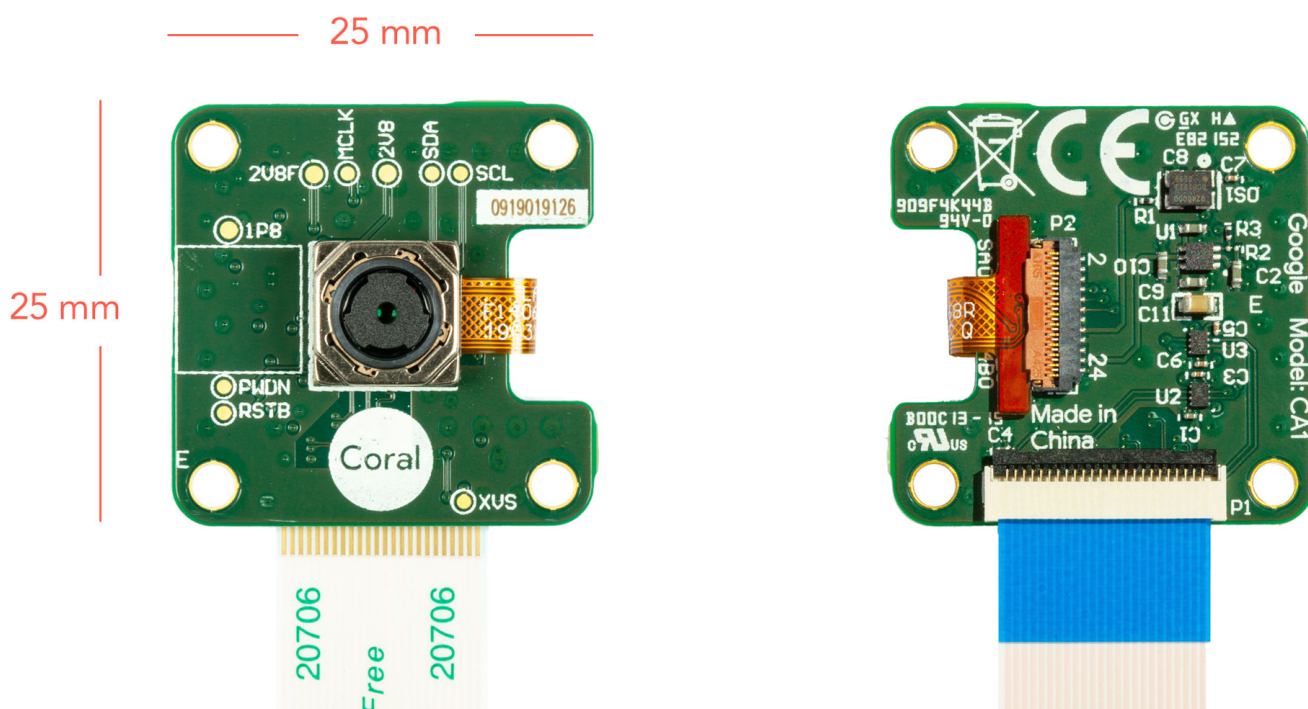


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Features

- 5-megapixel OmniVision sensor
 - 1.4um x 1.4um pixel
 - Active array size 2582x1933
- Optical size: 1/4"
- Field of view: 84.0° / 87.6°
- F-number: F=2.2 ±5%
- TV distortion: <1.5%
- Focal length: 2.5mm
- Focusing range: 10cm ~ ∞
- Dual lane MIPI output interface
- Board dimensions: 25 x 25 mm

Overview

The camera attaches to the Coral Dev Board with a 24-pin FFC.

Other features include:

- ISP function: Automatic exposure control (AEC), automatic white balance (AWB), automatic band filter (ABF), automatic 50/60 Hz lumination, automatic blacklevel calibration (ABLC).
- Image quality control: color saturation, hue, gamma, sharpness, lens correction, defective pixel canceling, and noise canceling.
- Support autofocus control (AFC) with embedded AF VCM Driver.

For more information about the sensor, read about the [Omnivision SOC](#).

To set up the camera, read [Connect a camera to the Dev Board](#).

Dimensions

Table 1. Camera module dimensions

Measurement	Value
Module size	25 x 25 x 6.98 mm
Hole size/spacing	Diameter: 2.4 mm Horizontal spacing: 20 mm Vertical spacing: 20 mm
Cable size	150 x 12.5 mm
Module weight	3 g (3.6 g with cable)

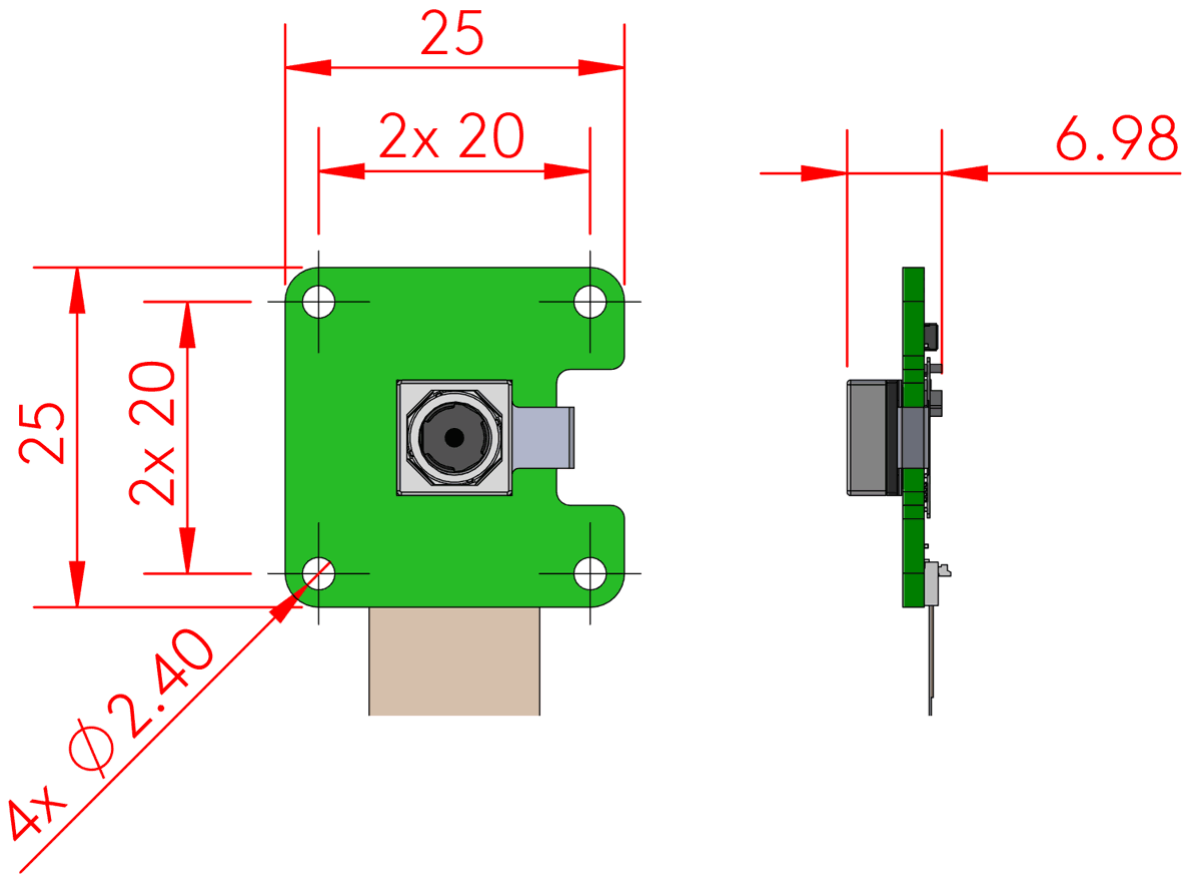


Figure 1. Camera module dimensions (in millimeters)

Autofocus interface

The camera supports one-shot autofocus and continuous autofocus modes.

The Dev Board's sysfs node for the autofocus hardware is at `/sys/module/ov5645_camera_mipi_v2/parameters/ov5645_af` and it reads back the decimal representation of the status register in the autofocus hardware. The read values are as follows.

Table 2. Autofocus read values from sysfs node

Read value	Description
0 (0x00)	Autofocus is running.
16 (0x10)	Autofocus is complete (focused).
32 (0x20)	Analyzing the image. This state occurs intermittently when attempting to reach focus. It occurs once during one-shot autofocus mode before focus locks, and it is the steady state during continuous autofocus mode.
112 (0x70)	Idle. Focus is released and the lens is at it's resting (furthest) position.

To change the autofocus mode, write one of the following values to the `/sys/module/ov5645_camera_mipi_v2/parameters/ov5645_af` file as follows.

Table 3. Autofocus write values for sysfs node

Write value	Description
0	Turn off autofocus.
1	Enable one-shot autofocus mode. The camera will seek focus and then lock focus. (It will analyze the image once, and focus once.)
2	Enable continuous autofocus mode. The camera will continuously seek focus. (It will analyze the image and focus, then continue to analyze the image and refocus when necessary.)

For example, the following command enables continuous autofocus:

```
echo 2 > /sys/module/ov5645_camera_mipi_v2/parameters/ov5645_af
```

Camera adapter

We designed a simple camera adapter board to interface the camera with the Dev Board, as illustrated in figure 2.

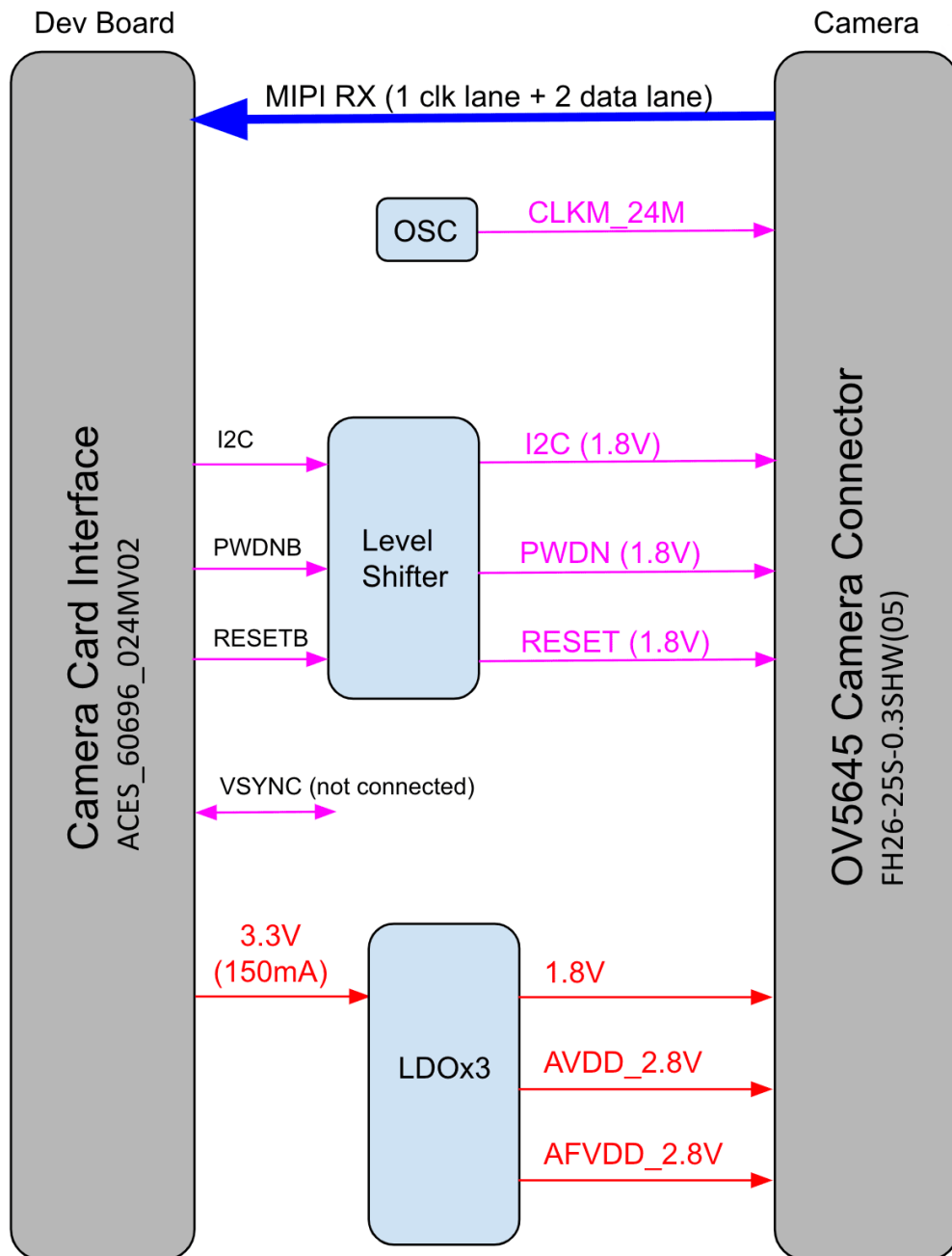


Figure 2. Camera adapter card diagram

The MIPI-CSI2 camera connector is a 24-pin flex cable connector that's designed for the Coral Camera. The pinouts for the camera's cable connector (on the camera module), are shown in table 4. Whereas the corresponding pins on the Dev Board's connector are shown in table 5.

Table 4. Pinout for the cable connector on the camera module

Pin #	Name
1	GND
2	NC
3	AFVDD 2.8V
4	DVDD 1.2V (NC)
5	CAM_I2C_SDA 1.8V
6	NC
7	CAM_I2C_SCL 1.8V
8	VDDIO 1.8V
9	GND
10	CAM_PWDN 1.8V
11	MIPI_CSI1_CLK_N
12	CAM_RESETB 1.8V

Pin #	Name
13	MIPI_CSI1_CLK_P
14	GND
15	MIPI_CSI1_D0_N
16	MCLK
17	MIPI_CSI1_D0_P
18	GND
19	MIPI_CSI1_D1_N
20	NC
21	MIPI_CSI1_D1_P
22	AVDD 2.8V
23	NC
24	GND
25	NC

Table 5. Pinout for the cable connector on the Dev Board

Pin #	Name	Pin #	Name
1	GND	13	GND
2	MIPI_CSI_D0_N	14	MIPI_CSI_D3_N
3	MIPI_CSI_D0_P	15	MIPI_CSI_D3_P
4	GND	16	GND
5	MIPI_CLK_N	17	CAM_PWDNB
6	MIPI_CLK_P	18	CAM_CLK
7	GND	19	GND
8	MIPI_CSI_D1_N	20	CAM_I2C_SCL
9	MIPI_CSI_D1_P	21	CAM_I2C_SDA
10	GND	22	CAM_VSYNC
11	MIPI_CSI_D2_N	23	CAM_RESETB
12	MIPI_CSI_D2_P	24	3.3V

Table 6. I2C address

Write	0X78
Read	0X79

Snapshot tool

The Mendel system image on the Coral Dev Board includes a Python program called `snapshot` that captures images with the connected Coral Camera.

To start it using an interactive mode, just run `snapshot` from the terminal. Then use the following keys to control the camera:

- Spacebar to snap a photo
- R to refocus
- Q to quit (or Control+C)

When using this interactive mode, each time you press Spacebar, it saves the image to the current directory as a JPEG. The filename includes an incrementing number, starting with `img0000.jpg`. Overwriting filenames is avoided by always starting with the first available enumeration of the filename.

The command also accepts the following arguments:

Table 7. Snapshot tool command arguments

Argument	Description
<code>--oneshot</code>	Enable one-shot mode: Capture just one picture and quit, instead of using the interactive mode that accepts keyboard commands.
<code>--prefix, -p <i>name</i></code>	The filename prefix. This name is also appended with a four-digit number to avoid overwriting any file with the same prefix—the number is always the first enumeration that's not used. For example, <code>name0000.jpg</code> and then <code>name0001.jpg</code> . The default prefix name is <code>img</code> .
<code>--format, -f <i>type</i></code>	The file format. The <i>type</i> may be either: <code>jpg</code> , <code>bmp</code> , or <code>png</code> . The default is <code>jpg</code> .

The snapshot code is located at `/usr/bin/snapshot`.

Certifications

Table 8. Camera module certifications

Market	Certifications
USA	FCC
European Union	CE

Document revisions

Table 9. History of changes to this document

Version	Changes
1.0 (August 2019)	<ul style="list-style-type: none">• Correct the connector pinout• Miscellaneous style cleanup
Beta (March 2019)	Initial release