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ArduCam B0353 Pivariety Color Global Shutter Camera Module for Raspberry Pi User Guide

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INTRODUCTION

About Arducam
Arducam has been a professional designer and
manufacturer of SPI, MIPI, DVP and USB cameras
since 2012. We also offer customized turnkey design and manufacturing solution services for customers who want
their products to be unique.

- **About This Pivariety Camera**

  Arducam Pivariety is a Raspberry Pi camera solution to take the advantage of using its hardware ISP
  functions. Pivariety camera modules make users get better performance and a wider variety of camera, lens
  options. In other words, Pivariety breakthrough the limitations of the closed-source official supported camera
  driver and camera modules (V1/ V2/HQ).

  Pivariety camera modules made it possible to be well-tuned ISP with Auto Exposure, Auto White Balance, Auto
  Gain Control, Lens Shading Correction, etc. This series of cameras use the libcamera framework, they can't be
  supported by Raspistill, and the way to access the camera is libcamera SDK (for C++)/libcamera-
  still/libcamera-vid/Gstreamer.

  This Pivariety AR0234 Color Global Shutter Camera is migrated Raspberry Pi Cameras, which eliminate rolling
  shutter artifacts to shoot high speed moving objects in color sharp images.

SPECS

Image Sensor	2.3MP AR0234
Max. Resolution	1920Hx1200V
Pixel Size	3um x 3um
Optical Format	1/2.6"
Lens Spec	Default Mount: M12
	Focal length: 3.6mm
	F.NO: 3.0
	FOV: 120°(D)/90°(H)/75°(V)
IR Sensitivity	Integral 650nm IR filter, visible light only

Maximum Frame Rate	1920×1200@60fps,
	with ISP@30fps
	1920×1080@60fps,
	with ISP@30fps
	1280×720@120fps,
	with ISP@60fps
Sensor Output Format	RAW10
ISP Output Format	The output image format of JPG, YUV420, RAW, DNG The output video format of MJPEG, H.264
Interface Type	2-Lane MIPI
Camera Board	38×38mm
Pivariety Adapter Board	40×40mm

SOFTWARE

1. **Driver Installation**

```
wget -O install_pivariety_pkgs.sh https://github.com/
ArduCAM/Arducam-Pivariety-V4L2-Driver/releases/
download/Install_script/install_pivariety_pkgs.sh
```

```
chmod +x install_pivariety_pkgs.sh
```

```
. /install_pivariety_pkgs.sh -p kernel_driver
```

press y to reboot

NOTE: The kernel driver installation only supported by the latest version 5.10. For other kernel versions, please go to our Doc page: https://www.arducam.com/docs/cameras-for-raspberrypi/pivariety/how-to-install-kernel-driver-forpivariety-camera/#2-how-to-build-raspberry-pikernel-driver-for-arducam-pivariety-camera

You can also visit this doc page to refer to the hardware connection: https://www.arducam.com/ docs/cameras-for-raspberry pi/pivariety/pivarietyar0234-2-3mp-color-global shutter-cameramodule/

2. **Test the Driver and Camera**

   After you've finished the hardware assembly and driver installation, you can test whether the camera is detected and working.

   - View the Status of Driver and Camera

     It will display arducam-pivariety if driver installed successfully and firmware version if the camera can be detected.

     The display should be probe failed if the camera can't be detected, you might have to check the ribbon connection, then reboot the Raspberry Pi.

   - **View the Video Node**

```
dmesg | grep arducam
```

     The Pivariety camera modules are emulated as the standard video device under /dev/video* node, so you can use the ls command for listing the contents in the /dev folder.

```
ls /dev/video* -l
```

     Since the camera module is V4L2 compliant, you can use the V4l2 controls to list the supported color space, resolutions, and frame rates.

```
v4l2-ctl --list-formats-ext
```

     NOTE: Although V4L2 interface is supported, only RAW format images can be obtained, without ISP support.

3. **Official Libcamera App Installation**

```
. /install_pivariety_pkgs.sh -p libcamera_apps
```

```
. /install_pivariety_pkgs.sh -p libcamera_dev
```

4. **Capture Image and Record Video**

   - **Capture image**

     For example, preview for 5s and save the image named test.jpg

     ```
     libcamera-still -t 5000 -o test.jpg
     ```

   - **Record video**

     For example, record a H.264 10s video with the frame size 1920W × 1080H

     ```
     libcamera-vid -t 10000 --width 1920 --height 1080 -o
     test.h264
     ```

   - **Plugin gstreamer installation**

     Install gstreamer

     ```
     sudo apt update
     ```

     ```
     sudo apt install -y gstreamer1.0-tools
     ```

     Preview

     ```
     gst-launch-1.0 libcamerasrc ! 'video/x-
     raw,width=1920,height=1080' ! videoconvert ! autovide-
     osink
     ```

TROUBLESHOOT

1. **Cannot Allocate Memory**

   ```
   [3:45:35.833744413] [6019] INFO RPI raspberrypi.cpp:611 Sensor: /
   base/soc/i2c0mux/i2c@1/arducam@0c — Selected mode:
   5344×4012-pRAA
   [3:45:35.948442507] [6019] ERROR V4L2
   v4l2_videodevice.cpp:1126 /dev/video14[17:cap]: Unable to request
   4 buffers: Cannot allocate memory
   [3:45:35.948551358] [6019] ERROR RPI raspberrypi.cpp:808 Failed to
   allocate buffers
   ERROR: *** failed to start camera ***
   ```

Edit /boot/cmdline.txt and add cma=400M at the end More details:

https://lists.libcamera.org/pipermail/libcamera-devel/2020-December/015838.html

2. The Image Displays Color Dots Add code –denoise cdn_off at the end of command

```
./libcamera-still -t 5000 -o test.jpg --denoise cdn_off
```

More details: **https://github.com/raspberrypi/libcameraapps/issues/19**

3. **Failed to Install the Driver**

Please check the kernel version, we only provide the driver for the latest official kernel version image when this Pivariety camera released.

Note: If you want to compile the kernel driver by yourself,

please refer to Doc page: **https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/how-to-installkernel-driver-for-pivariety-camera/**

4. **Failed to import fd 18**

If you find the same error, you may make the wrong selection about the graphics driver. Please follow Arducam Doc page to select the correct graphics driver.

5. **Switch to the native camera**

(raspistill etc.) Edit the file of /boot/config.txt, make dtoverlay=arducam change to # dtoverlay=arducam

After the modification is completed, you need to reboot the Raspberry Pi.

NOTE: This camera module support trigger via an external signal, please refer to the Doc page to get the instruction https://www.arducam.com/docs/cameras-for-raspberrypi/pivariety/accessar02342-3mp-color-global-shutter-camera-usingexternal-trigger-snapshot-mode/
If you need our help or want to customize other models of Pi cameras, feel free to contact us via
support@arducam.com

Documents / Resources

	ArduCam B0353 Pivariety Color Global Shutter Camera Module for Raspberry Pi [pdf] User Guide B0353, Pivariety Color Global Shutter Camera Module for Raspberry Pi

References

- ⓒ **Cameras for Raspberry Pi - Arducam**
- ⓖ **GitHub: Let's build from here · GitHub**

- ⬡ [Color dot problem · Issue #19 · raspberrypi/libcamera-apps · GitHub](#)
- 🌐 [Index of /pipermail](#)
- ⬤ [Simplifying embedded vision for all. - Arducam](#)

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