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innomaker CAM-MIPI296RAW

innomaker GS Camera Module CAM-MIPI296RAW for Raspberry Pi

Instruction Manual

1. INTRODUCTION

This manual provides detailed instructions for the innomaker CAM-MIPI296RAW Global Shutter Camera Module. This module is designed for use with all Raspberry Pi boards, including Pi 5/4/3B+/3/Zero, offering a plug-and-play experience with compatible drivers. It features an IMX296 Mono Global Shutter Sensor, delivering 1.58MP (1456x1088) resolution at 60 frames per second.

Key features include high-speed Y10/YUV output with Stream Mode and Flash Strobe support, an isolated hardware trigger for external capture, and dual driver flexibility supporting both Raspberry Pi OS libcamera tools and InnoMaker v4I2-ctl trigger control.

2. WHAT'S IN THE BOX

Carefully unpack the contents and ensure all items listed below are present:

- CAM-IMX296RAW Mono Sensor Module
- 1x 15-pin to 15-pin FPC Cable
- 1x 15-pin to 22-pin FPC Cable
- 1x CS Lens Mount Seat
- 1x M12 Lens and Lens Seat

For Color imx296: Filter fixed on
For Mono imx296: No filter



M12 Lens FOV 140°



CS Lens Holder



C / CS Converter



22Pin FPC



15Pin FPC

Image: The complete packing list for the innomaker CAM-MIP1296RAW camera module, including the module, various lens mounts, and FPC cables.

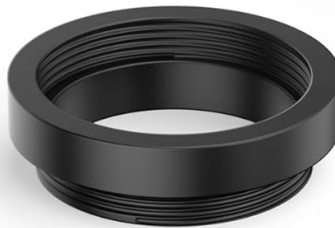
For Color imx296: Filter fixed on
For Mono imx296: No filter



M12 Lens FOV 140°



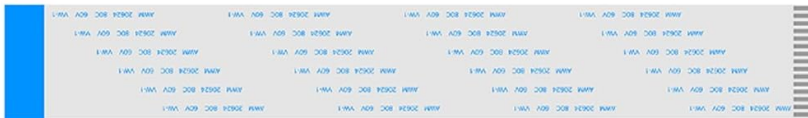
CS Lens Holder



C / CS Converter



22Pin FPC



15Pin FPC

Image: Components of the camera kit, showing the M12 lens, CS lens holder, C/CS converter, 22-pin FPC, and 15-pin FPC.

3. SETUP INSTRUCTIONS

Follow these steps to set up your inmaker CAM-MIPI296RAW camera module with your Raspberry Pi:

3.1 Hardware Connection

1. **Connect the FPC Cable:** Gently connect the appropriate FPC cable (15-pin or 22-pin depending on your Raspberry Pi model) to the camera module's MIPI CSI connector and to the CSI port on your Raspberry Pi. Ensure the silver contacts face the correct direction (usually towards the HDMI port on the Pi).
2. **Install the Lens:** Attach either the M12 lens or the CS lens mount seat to the camera module. If using a CS lens, you may need the C/CS converter. Ensure the lens is securely threaded.

Fish-Eye Lens

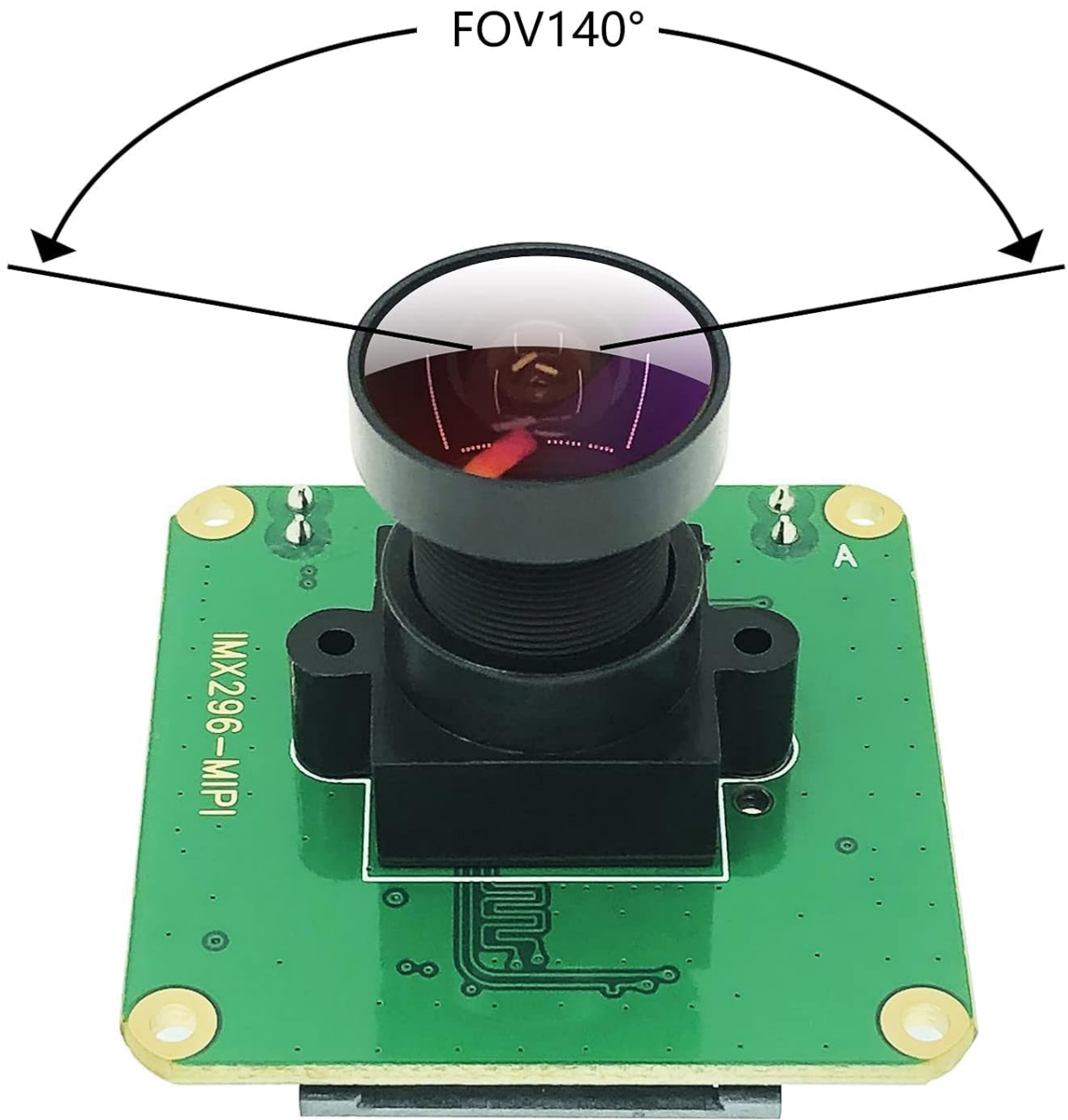
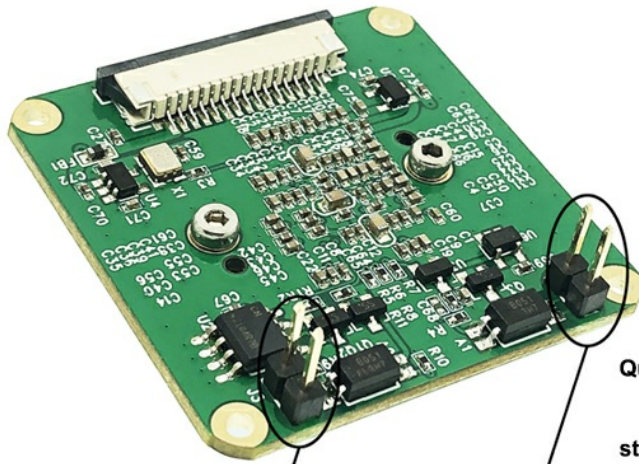


Image: The camera module with an M12 fish-eye lens installed, demonstrating the field of view (FOV 140°).

3.2 Software Configuration (Quick Start)

For initial setup and review, follow these quick steps. For detailed instructions and advanced configurations, refer to the official documentation link provided below.



Easily Wire

Quick Start:

step1, “`sudo nano /boot/config.txt`”,
add “`dtoverlay=imx296`” to the last line;

step2, “`sudo nano /boot/cmdline.txt`”,add
“`cma=128M`” to the last line; **Save and Reboot.**

step3, “`libcamera-vid --width 1456 --height 1088 -t 0`”
for review

External Trigger

Isolated Trigger and Strobe signal,
Trigger the capture in the falling
edge of external trigger signal

Flash Strobe

Only support stream mode.

Image: Diagram showing the camera module's wiring points and quick start software commands for Raspberry Pi OS.

1. Step 1: Configure `config.txt`

Open the `config.txt` file for editing:

```
sudo nano /boot/config.txt
```

Add the following line to the end of the file:

```
dtoverlay=imx296
```

2. Step 2: Configure `cmdline.txt`

Open the `cmdline.txt` file for editing:

```
sudo nano /boot/cmdline.txt
```

Add the following to the end of the line (ensure it's on a single line):

```
cma=128M
```

Save and reboot your Raspberry Pi.

3. Step 3: Review with `libcamera-vid`

After rebooting, you can test the camera feed using `libcamera-vid`:

```
libcamera-vid --width 1456 --height 1088 -t 0
```

This command will display a continuous video stream from the camera.

For comprehensive setup guides, driver downloads, and advanced configurations, please visit the official wiki:
<http://wiki.inno-maker.com/display/HOMEPAGE/picam-mipi296-trigger>

4. OPERATING INSTRUCTIONS

The inno-maker CAM-MIPI296RAW camera module supports various operating modes, including continuous streaming and external triggering for precise control.

4.1 Continuous Streaming

As demonstrated in the setup section, continuous video streaming can be initiated using `libcamera-vid` or other compatible tools. The camera supports Y10/YUV output at 1456x1088 resolution and 60fps.

4.2 External Trigger and Flash Strobe

The module features isolated hardware trigger and strobe pins for synchronized image capture, ideal for machine vision and high-speed applications. The external trigger captures on the falling edge of an external signal, while the flash strobe supports stream mode.

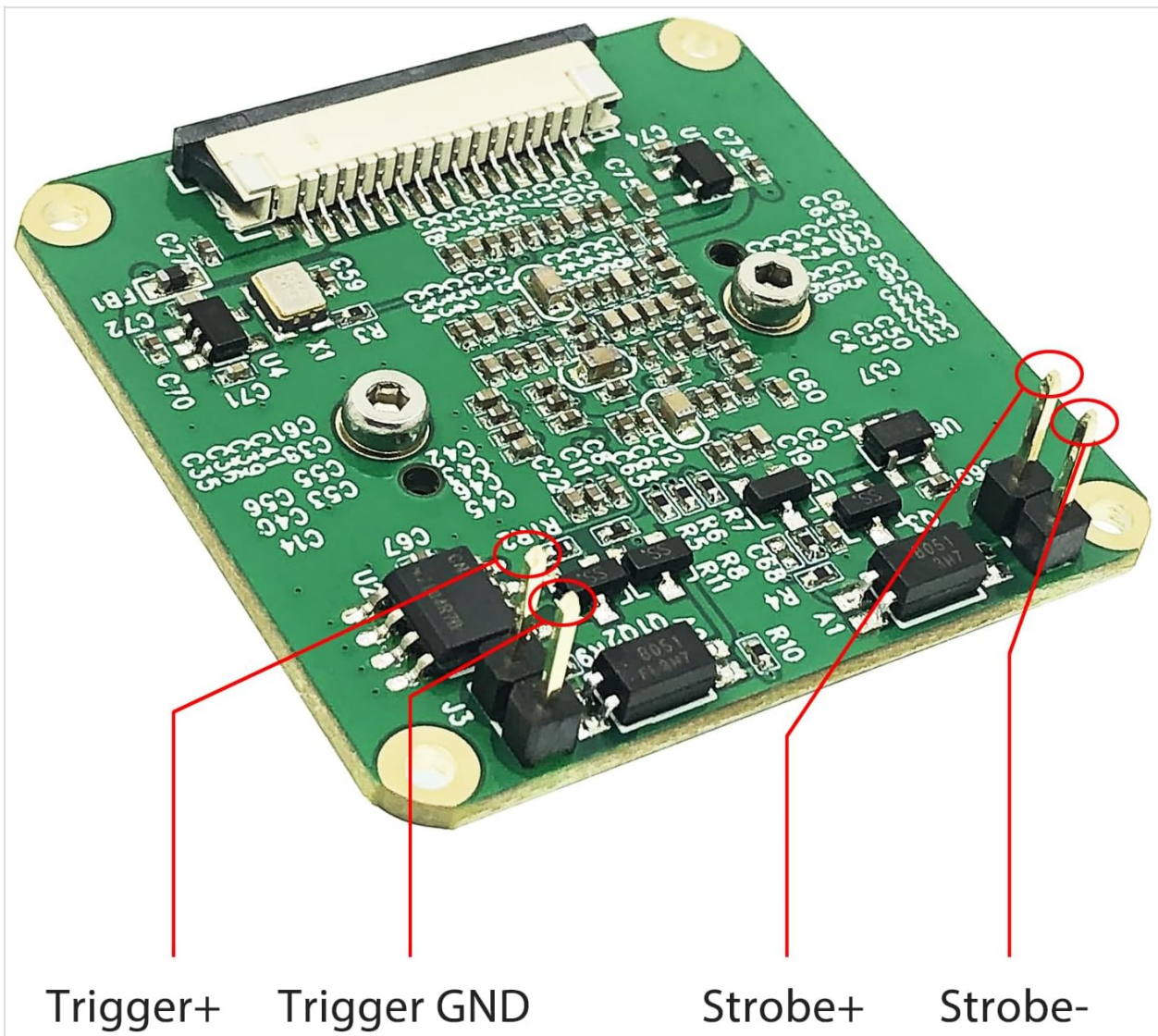
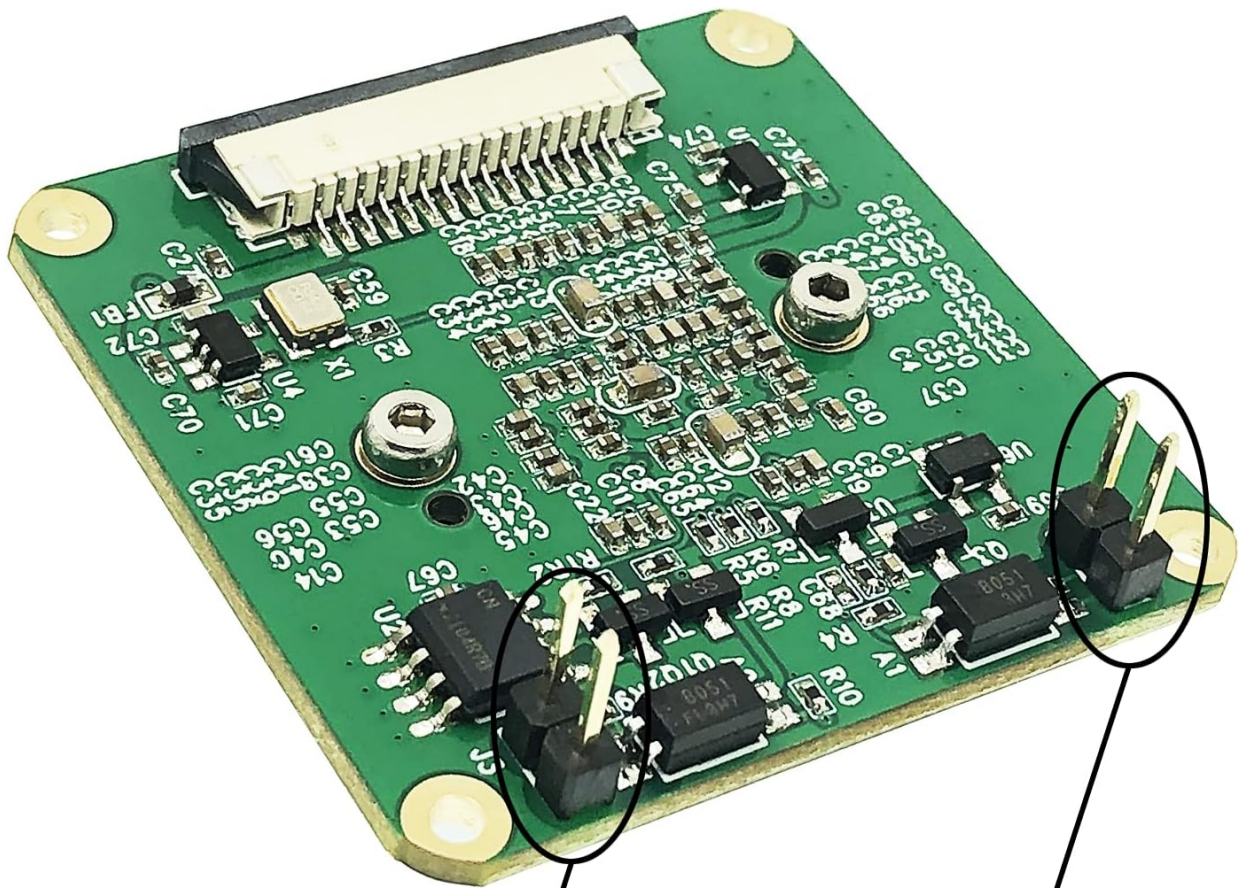


Image: Detailed view of the camera module's J3 and J2 pin headers, labeled for Trigger+ (J3), Trigger GND (J3), Strobe+ (J2), and Strobe- (J2).



External Trigger

Isolated Trigger and Strobe signal,
Trigger the capture in the falling
edge of external trigger signal

Flash Strobe

Only support stream mode.

Image: Explanation of the External Trigger, which captures on the falling edge of an external signal, and Flash Strobe, which supports stream mode.

For detailed programming and control of the external trigger and strobe functions, refer to the InnoMaker v4I2-ctl documentation available on their wiki.

5. MAINTENANCE

Proper maintenance ensures the longevity and optimal performance of your camera module:

- **Cleaning:** Use a soft, lint-free cloth to gently clean the lens and sensor surface. Avoid abrasive materials or harsh chemicals. For stubborn dust, use a camera air blower.
- **Handling:** Always handle the camera module by its edges to avoid touching the sensor or delicate components. Static electricity can damage electronic components, so use anti-static precautions when handling.
- **Storage:** Store the module in a dry, dust-free environment, preferably in its original packaging or an anti-static bag, when not in use.
- **Environmental Conditions:** Avoid exposing the module to extreme temperatures, high humidity, or direct sunlight for extended periods.

6. TROUBLESHOOTING

If you encounter issues with your camera module, consider the following troubleshooting steps:

6.1 Camera Not Detected or No Image

- **Check FPC Cable:** Ensure the FPC cable is correctly inserted into both the camera module and the Raspberry Pi's CSI port. Verify that the silver contacts are fully seated and facing the correct direction.
- **Software Configuration:** Double-check that the `dtoverlay=imx296` and cma=128M` lines have been correctly added to /boot/config.txt` and /boot/cmdline.txt` respectively, and that the Raspberry Pi has been rebooted.`
- **Raspberry Pi OS Version:** Ensure your Raspberry Pi OS is up-to-date. Older kernel versions might have compatibility issues. Consider updating your system: `sudo apt update && sudo apt full-upgrade -y.`
- **Power Supply:** Insufficient power to the Raspberry Pi can sometimes cause peripheral issues. Ensure you are using a stable and adequate power supply.

6.2 Image Quality Issues

- **Focus Adjustment:** The lens requires manual focus. Gently rotate the lens to achieve sharp focus.
- **Lighting Conditions:** Ensure adequate and even lighting for optimal image quality.
- **Lens Cleanliness:** Check the lens for dust, smudges, or fingerprints and clean it as described in the Maintenance section.

6.3 External Trigger Not Responding

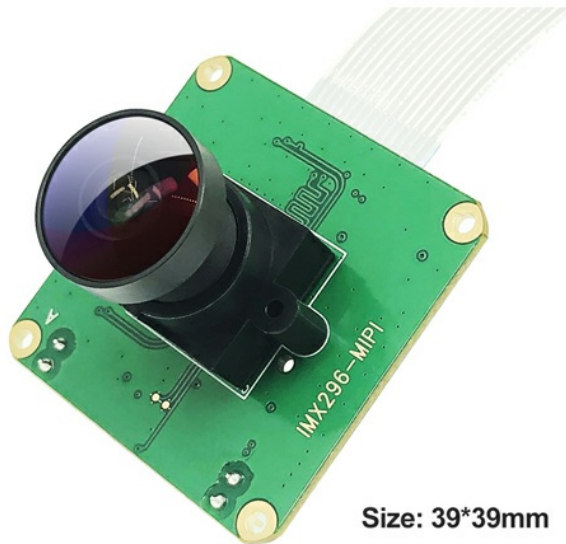
- **Wiring:** Verify that the Trigger and Strobe pins are correctly wired to your external trigger source.
- **Signal Integrity:** Ensure the external trigger signal meets the module's specifications (e.g., voltage levels, pulse duration).
- **Software Control:** Confirm that your software (e.g., v4l2-ctl commands) is correctly configured to enable and respond to the external trigger.

If problems persist, consult the innomaker wiki or contact customer support for further assistance.

7. SPECIFICATIONS

Detailed technical specifications for the innomaker CAM-MIPI296RAW Global Shutter Camera Module:

MONO Sensor



Size: 39*39mm

SONY IMX296LLR-C
Global Shutter CMOS Sensor

1456*1088 / 60fps



Image: The mono sensor module with its dimensions (39x39mm) and key specifications: SONY IMX296LLR-C Global Shutter CMOS Sensor, 1456*1088 / 60fps.

Feature	Specification
Sensor	SONY IMX296 Mono Global Shutter CMOS Sensor
Resolution	1.58 MP (1456 x 1088 pixels)
Frame Rate	Up to 60 fps at full resolution
Sensor Type	Type 1/2.9 CMOS
Output Format	Y10/YUV
Interface	MIPI CSI-2
Compatibility	All Raspberry Pi boards (Pi 5/4/3B+/3/Zero)
Trigger Support	Isolated hardware external trigger (falling-edge signal)
Strobe Support	Flash Strobe (supports stream mode)
Driver Support	Raspberry Pi OS libcamera tools, InnoMaker v4I2-ctl
Dimensions	39 x 39 mm (Module size)
Lens Mounts	M12, CS (with adapter)
Item Weight	Approximately 2.11 ounces

8. WARRANTY AND SUPPORT

For warranty information, please refer to the purchase documentation or contact your retailer. innomaker provides technical support for its products.

8.1 Technical Support

If you require technical assistance or have questions not covered in this manual, please visit the innomaker official website or their Amazon store for support resources and contact information:

- **innomaker Wiki:** <http://wiki.inno-maker.com/display/HOMEPAGE/picam-mipi296-trigger>
- **innomaker Amazon Store:** Visit the innomaker Store on Amazon