

AtomS3R-CAM

SKU:C126-CAM





Description

AtomS3R-CAM is a mini IoT programmable controller with an integrated camera. It is powered by the **ESP32-S3-PICO-1-N8R8** SoC featuring Wi-Fi connectivity, 8MB on-chip **Flash**, and 8MB **PSRAM**. The unit carries a 5 V-to-3.3 V power-management circuit, a three-axis **BMM150** geomagnetic sensor, and a six-axis **BMI270** IMU. In addition, it is equipped with a 0.3 MP **GC0308** camera that supports image acquisition and infrared transmission control. Protective glass is fitted in front of the camera to keep dust out and enhance image quality. Compared with previous products, the **3D antenna** of **AtomS3R-CAM** has been enhanced to deliver higher performance and stability.

The factory firmware supports **UVC** (USB Video Class), allowing the device to work as a driver-free USB camera—simply connect via USB and use it directly. The product also features a **USB Type-C** port for power supply and firmware download, plus a **HY2.0-4P** expansion port. Six **GPIOs** and power pins are exposed on the bottom for further expansion. With compact dimensions of **24.0 x 24.0 x 13.5 mm**, it is well suited for IoT monitoring, educational development tools, and other embedded scenarios.

Tutorial



Arduino IDE

This tutorial shows you how to program and control the AtomS3R-CAM with the Arduino IDE.

Features

- Integrated ESP32-S3-PICO-1-N8R8 SoC
- 0.3 MP GC0308 camera
- 9-axis sensor system (BMI270 6-axis IMU + BMM150 3-axis geomagnetic sensor)
- 8MB Flash and 8MB PSRAM
- Supports infrared transmission control
- Expandable pins and interfaces
- Development Platform
 - Arduino IDE
 - ESP-IDF
 - PlatformIO

| Includes

- 1 x AtomS3R-CAM

| Applications

- Driver-free USB camera
- Motion detection & orientation sensing
- Wearable devices
- Smart device control
- IoT applications

| Specifications

Specification	Parameter
SoC	ESP32-S3-PICO-1-N8R8 @ Xtensa® 32-bit LX7 dual-core processor, clock frequency 240MHz
USB	USB OTG, USB Serial/JTAG
Flash	8MB
PSRAM	8MB Octal
Wi-Fi	2.4 GHz Wi-Fi
6-axis IMU (BMI270)	Accuracy: 0.05 % (acceleration), 0.05 °/s (gyro) I2C address: 0x68
3-axis geomagnetic sensor (BMM150)	Accuracy: 0.3 μT. Mounted on BMI270, magnetometer data obtained via BMI270
Camera	GC0308. Max frame rate: 30 fps. Output formats: YCbCr4:2:2, RGB565, Raw Bayer. Aperture: F2.6. Resolution: 0.3 MP. Sensor size (diagonal): 1/6.5". Field of view: FOV 57.6°
Camera panel material	Glass
Infrared IR	IR emission distance: 12.46 m @ ∠180° (unobstructed)
Sleep current	GPIO-5V supply: DC 5 V @ 11.63 μA; Grove-5V supply: DC 5 V @ 10.75 μA; USB-5V supply: DC 5 V @ 92.50 μA (including PD resistor loss)
Bottom GPIO	G5/G6/G7/G8/G38/G39
Operating temperature	0 ~ 40 °C
Product Size	24.0 x 24.0 x 13.5 mm
Product Weight	7.4 g
Package Size	85.0 x 65.0 x 14.3 mm
Gross Weight	13.6 g

Learn

BMM150 Magnetic Interference

Products containing magnets may interfere with the BMM150 magnetic sensor and cause abnormal readings. When used with M5 controllers that include magnets, please remove the magnets and avoid placing the BMM150 near strong magnetic fields.

Enable Camera

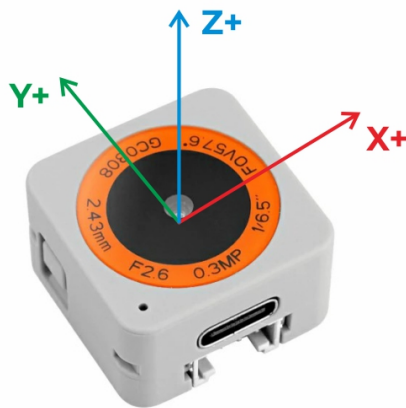
Before camera initialization, set **GPIO18** low to enable power; this action also turns on the power indicator LED.

Download Mode

To flash firmware, press and hold the reset button for about 2 seconds until the internal green LED lights up, then release it. The device is now in download mode and ready for flashing.



IMU Triaxial Direction Schematic Diagram

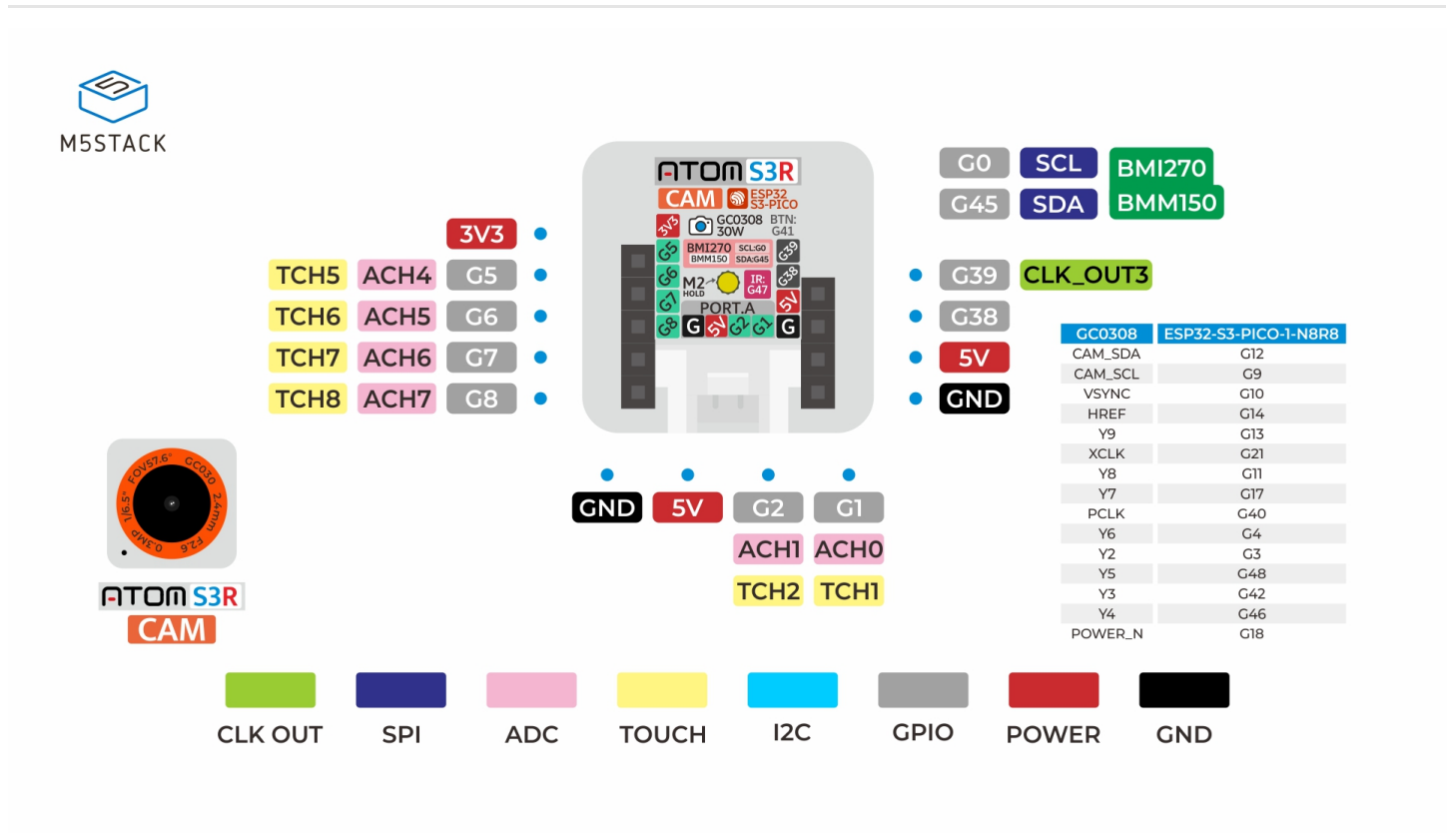


IMU ORIENTATION OF AXES

Schematics

- [AtomS3R-CAM main board Schematics PDF](#)
- [AtomS3R-CAM ext board Schematics PDF](#)

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ESP32-S3-PICO-1-N8R8	G0	G45	G47
BMI270 (0x68)	SYS_SCL	SYS_SDA	
IR			IR_LED_DRV

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BMI270	BMI270_ASDx	BMI270_ASCx
BMM150	A_SDA	A_SCL

BMM150 Mounted on BMI270

The BMM150 is connected via the BMI270 Sensor Hub auxiliary I2C interface, providing unified 9-axis sensor data acquisition.

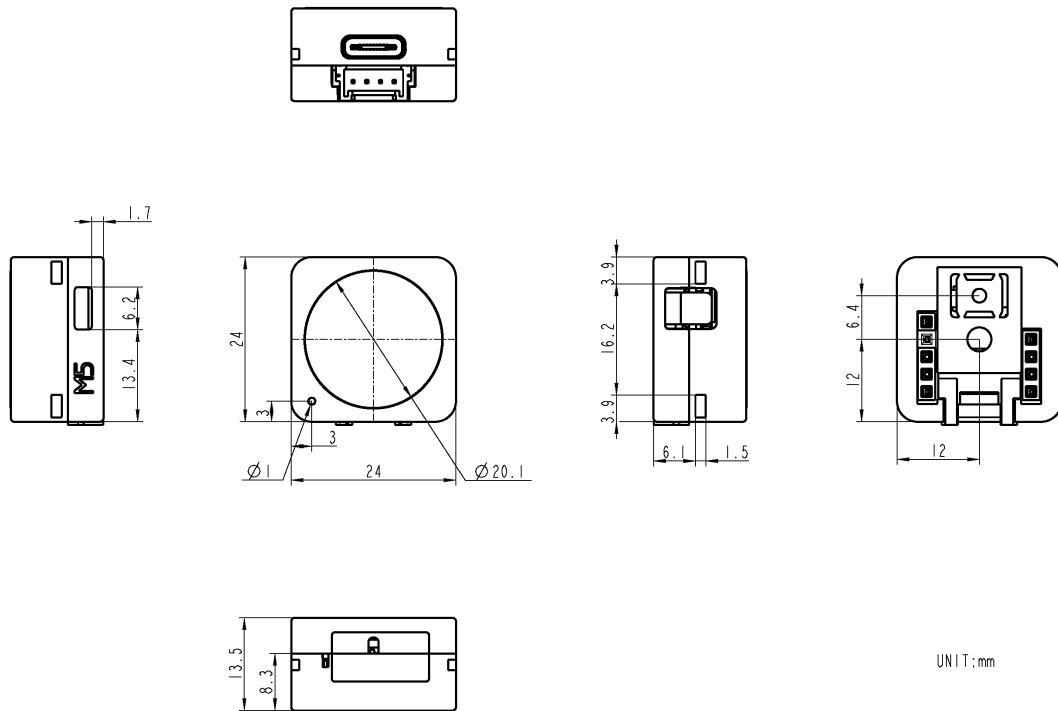
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GC0308	ESP32-S3-PICO-1-N8R8
CAM_SDA	G12
CAM_SCL	G9
VSYNC	G10
HREF	G14
Y9	G13
XCLK	G21
Y8	G11
Y7	G17
PCLK	G40
Y6	G4
Y2	G3
Y5	G48
Y3	G42
Y4	G46
POWER_N	G18

HY2.0-4P

HY2.0-4P	Black	Red	Yellow	White
PORT.CUSTOM	GND	5V	G2	G1

Model Size



Structure

- [AtomS3R-CAM Structure Files](#)

Datasheets

- [ESP32-S3-PICO-1-N8R8](#)
- [GC0308](#)
- [BMI270](#)
- [BMM150](#)

Softwares

Arduino

- [AtomS3R-CAM Arduino Quick Start](#)
- [AtomS3R-CAM Arduino Network Camera Example](#)

PlatformIO

```
[env:m5stack-atoms3r]
platform = espressif32@6.7.0
board = esp32-s3-devkitc-1
framework = arduino
board_build.arduino.memory_type = qio_opi
build_flags =
    -DESP32S3
    -DBOARD_HAS_PSRAM
    -mfix-esp32-psram-cache-issue
    -DCORE_DEBUG_LEVEL=5
    -DARDUINO_USB_CDC_ON_BOOT=1
    -DARDUINO_USB_MODE=1
lib_deps =
    M5Unified=https://github.com/m5stack/M5Unified
```

ESP-IDF

- [AtomS3R-CAM Factory Firmware](#)

Factory Firmware Function

The factory firmware provides both **UVC** and **Wi-Fi video streaming** functions. The UVC mode allows direct PC connection and image preview via any camera application. For Wi-Fi streaming, connect to the AP "AtomS3R-CAM-WiFi" and open 192.168.4.1 in a browser to view the stream.

Easyloader

Easyloader	Download	Note
AtomS3R-CAM User Demo Easyloader	download	/

Video

- AtomS3R-CAM product introduction and demo cases

[C126-CAM.mp4](#)

Product Comparison

Product

Compare



AtomS3R-M12

AtomS3R-Cam

Camera	Image Sensor: OV3660 Max Frame Rate: 30 fps Output Formats: RAW RGB, RGB565/555/444, CCIR656, YCbCr422, and compression Aperture: F2.4 Resolution: 3 MP (3 megapixels) Focal Length: 1.8 ± 5 % mm Field of View (FOV): 120°	Image Sensor: GC0308 Max Frame Rate: 30 fps Output Formats: YCbCr4:2:2, RGB565, Raw Bayer Aperture: F2.6 Resolution: 0.3 MP (300 k pixels) Sensor Size (diagonal): 1/6.5" Focal Length: 2.43 mm Field of View (FOV): 57.6°
Resolution	3 MP	0.3 MP
Communication	Supports UVC and Wi-Fi	Supports UVC and Wi-Fi
SoC	ESP32-S3-PICO-1-N8R8	ESP32-S3-PICO-1-N8R8
Memory	8MB Flash + 8MB PSRAM	8MB Flash + 8MB PSRAM
Sensor	BMI270 + BMM150	BMI270 + BMM150
Antenna	Enhanced 3D antenna	Enhanced 3D antenna

To compare information on the Atom series products, you can visit the [Product Selection Table](#), check the target products, and get the comparison results. The selection table covers key information such as core parameters and functional features, and supports comparison of multiple products simultaneously.