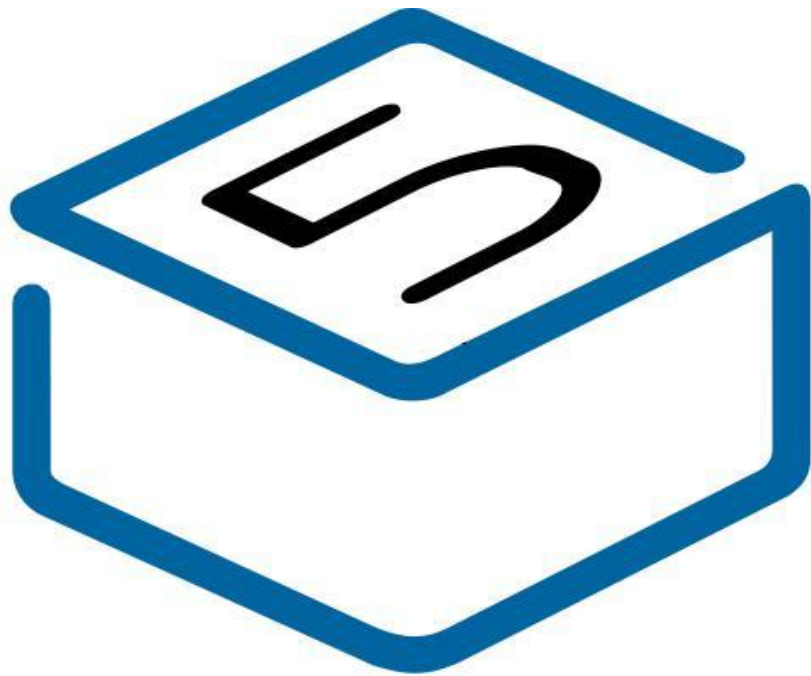


# M5AtomS3R

Model:  
AtomS3R Cam



# M5STACK

2024

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# 1. OUTLINE

The **AtomS3R Cam** is a highly integrated programmable controller based on the ESP32-S3 microcontroller. It incorporates the **ESP32-S3-PICO-1-N8R8** main controller, featuring Wi-Fi and BLE functionality, 8MB onboard FLASH, and 8MB PSRAM. The controller is equipped with a **GC0308** camera, supporting VGA resolution image capture. It has an onboard Type-C interface for power supply and firmware download, and an HY2.0-4P expansion port. The bottom of the device reserves 6 GPIO pins and power pins for easy expansion. The product measures only 24x24x13.5mm, making it suitable for various embedded intelligent device applications.

## 1.1. AtomS3R Cam

### 1. **Communication Capabilities:**

- Main Controller: ESP32-S3-PICO-1-N8R8
- Wireless Communication: Wi-Fi, BLE
- Expansion Interface: HY2.0-4P interface, supports connection and expansion of I2C sensors

### 2. **Processor and Performance:**

- Processor Model: Xtensa LX7 (ESP32-S3-PICO-1-N8R8)
- Storage Capacity: 8MB Flash, 8MB PSRAM
- Processor Operating Frequency: Xtensa® dual-core 32-bit LX7 microprocessor, up to 240 MHz

### 3. **Sensors:**

- Camera: GC0308 camera, supports VGA resolution image capture

### 4. **GPIO Pins and Programmable Interfaces:**

- Grove Interface: Supports connection and expansion of I2C sensors
- Bottom Pins: Power and 6 GPIO pin headers

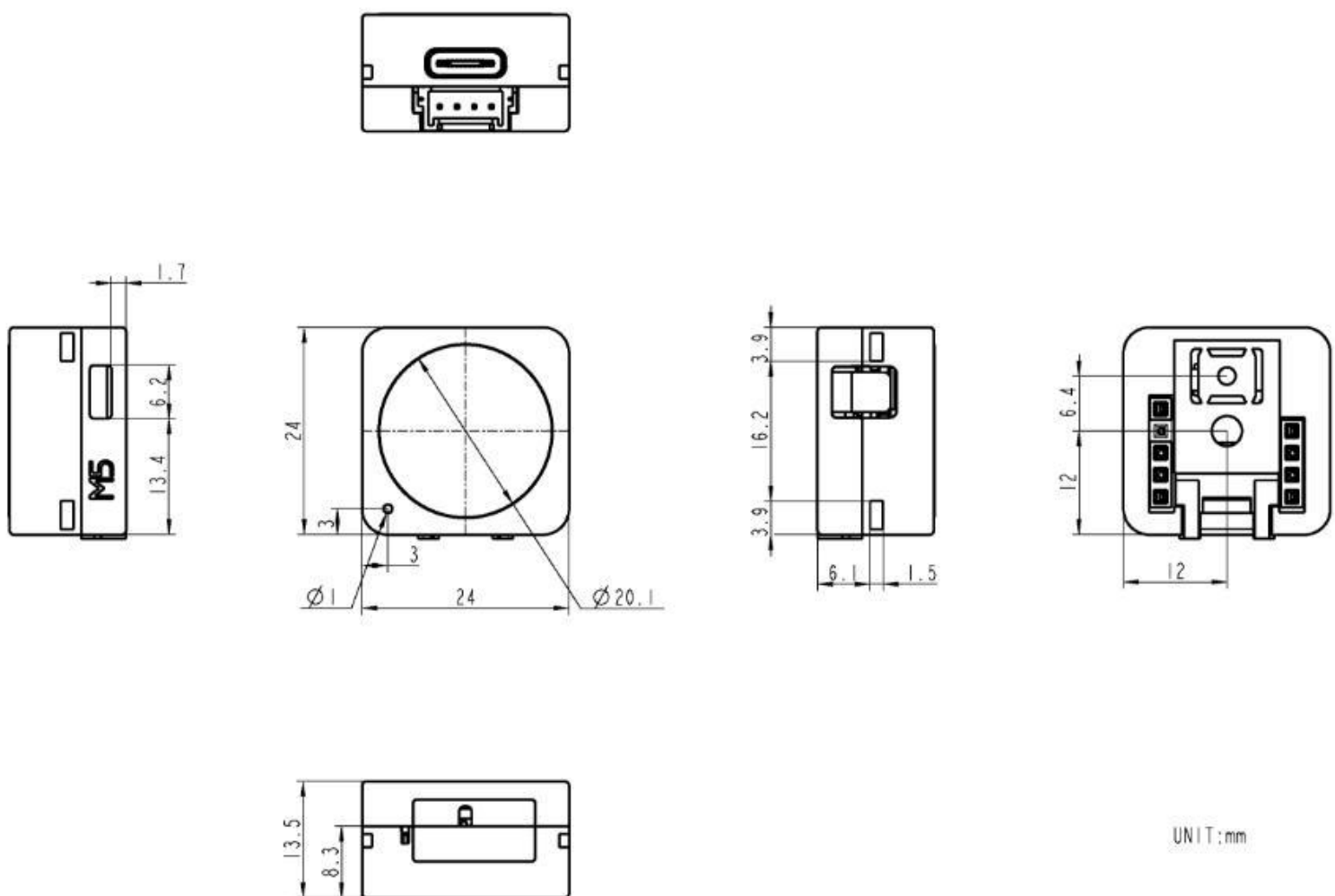
### 5. **Others:**

- Onboard Interface: Type-C interface for program downloading and serial communication
- Physical Dimensions: 24x24x13.5 mm, back provides an M2 screw hole for mounting

## 2. SPECIFICATIONS

Specification		Details		
MCU		ESP32-S3-PICO-1-N8R8 @ Xtensa dual-core 32-bit LX7, 240MHz		
Communication Capabilities		Wi-Fi, BLE, I2C sensor expansion, Infrared emitter		
Flash Storage Capacity		8MB FLASH		
PSRAM Storage Capacity		8MB PSRAM		
Expansion Port		HY2.0-4P interface, for connecting and expanding I2C sensors		
Power Supply Voltage		4.5~5.5V DC		
Dimensions		24 * 24 * 13.5 mm		
Operating Temperature		-10°C to 40°C		
Camera		GC0308, supports VGA resolution image capture		
MIC	Wi-Fi Working Frequency	802.11b/g/n20:2412 MHz-2472 MHz 802.11n40:2422 MHz-2462 MHz 802.11b:2484 MHz		
	BLE Working Frequency	2402MHz-2480MHz		
CE	Wi-Fi Working Frequency	802.11b:2412 MHz-2472 MHz 802.11g:2412 MHz-2472 MHz 802.11n-HT20:2412 MHz-2472 MHz 802.11n-H40:2422 MHz-2462 MHz		
		Wi-Fi Transmit Power	802.11b:17.27dBm 802.11g:16.82dBm 802.11n-HT20:16.17dBm 802.11n-H40:16.22dBm	
			BLE Working Frequency	2402MHz-2480MHz
			BLE Maximum EIRP	5.52dBm
	FCC	Wi-Fi Working Frequency	2412 MHz-2472 MHz (802.11b,g,n-HT20) 2422 MHz-2462 MHz(802.11n-H40)	
			Wi-Fi Maximum Conducted Peak Output Power	21.76dBm
		BLE Working Frequency	2402MHz-2480MHz(BLE 1M/2M)	
BLE Maximum Conducted Peak Output Power		8.71dBm		
Rated Current		0.5A		
Manufacturer		M5Stack Technology Co., Ltd		
Manufacturer address		501, Tangwei Business Building, Tangwei Community, Fuhai Street, Bao'an District, Shenzhen, China		

### 2.1 Product Size



# 3. QUICK START

## 3.1. Print WiFi information

1. Open Arduino IDE (Refer to [https://docs.m5stack.com/en/arduino/arduino\\_ide](https://docs.m5stack.com/en/arduino/arduino_ide) for the installation guide for the development board and software)
2. Press and hold the reset button for 2 seconds until the green light turns on
3. Select the ESP32S3 DEV Module board and the corresponding port, then upload the code
4. Open the serial monitor to display the scanned WiFi and signal strength information

```
ESP32S3R_CAM_WIFI | Arduino 1.8.19
File Edit Sketch Tools Help

ESP32S3R_CAM_WIFI
1 #include "WiFi.h"
2
3 void setup() {
4   Serial.begin(115200);
5   WiFi.mode(WIFI_STA);
6   WiFi.disconnect();
7   delay(100);
8
9   Serial.println("Scanning for WiFi networks...");
10  int n = WiFi.scanNetworks();
11  if (n == 0) {
12    Serial.println("No networks found.");
13  } else {
14    Serial.print(n);
15    Serial.println(" networks found.");
16    for (int i = 0; i < n; ++i) {
17      Serial.print(i + 1);
18      Serial.print(": ");
19      Serial.print(WiFi.SSID(i));
20      Serial.print(" (");
21      Serial.print(WiFi.RSSI(i));
22      Serial.print(")");
23      Serial.println((WiFi.encryptionType(i) == WIFI_AUTH_OPEN) ? " " : "*");
24      delay(10);
25    }
26  }
27  Serial.println("");
28 }
29
30 void loop() {
31   // put your main code here, to run repeatedly:
32 }
33
```

```
COM20
17:20:58.755 -> Scanning for WiFi networks...
17:20:58.755 -> 35 networks found.
17:20:58.755 -> 1: M5-UiFlow-Zone (-34)*
17:20:58.801 -> 2: XLOT (-34)*
17:20:58.801 -> 3: M5-R&D (-39)*
17:20:58.801 -> 4: WiFi_ADF4 (-39)*
17:20:58.801 -> 5: DIANJIXZ (-45)*
17:20:58.848 -> 6: Xiaomi_32BD (-47)*
17:20:58.848 -> 7: M5-UiFlow-Zone (-53)*
17:20:58.848 -> 8: M5-UiFlow-Zone (-54)*
17:20:58.848 -> 9: CenturyLink2842 (-55)*
17:20:58.848 -> 10: M5-UiFlow-Zone (-56)*
17:20:58.895 -> 11: esp-shui (-56)*
17:20:58.895 -> 12: CMCC-FSNg (-57)*
17:20:58.895 -> 13: YUESHIQI-602 (-57)*
17:20:58.895 -> 14: ChinaNet-hZsm (-57)*

Autoscroll Show timestamp Newline
```

# 3. QUICK START

## 3.1. Print BLE information

1. Open Arduino IDE (Refer to [https://docs.m5stack.com/en/arduino/arduino\\_ide](https://docs.m5stack.com/en/arduino/arduino_ide) for the installation guide for the development board and software)
2. Press and hold the reset button for 2 seconds until the green light turns on
3. Select the ESP32S3 DEV Module board and the corresponding port, then upload the code
4. Open the serial monitor to display the scanned BLE and signal strength information



The screenshot shows the Arduino IDE interface. The top menu bar includes 'File', 'Edit', 'Sketch', 'Tools', and 'Help'. The main editor area displays the code for 'ATOMS3R\_CAM\_BLE' in Arduino 1.8.19. The code defines a class for BLE device callbacks and sets up an active scan for 10 seconds. The serial monitor at the bottom shows a stream of output messages, each starting with a timestamp and 'Advertised Device: Name: , Address: ', followed by manufacturer data and RSSI values.

```
ATOMS3R_CAM_BLE | Arduino 1.8.19
File Edit Sketch Tools Help
ATOMS3R_CAM_BLE
1 #include "BLEDevice.h"
2
3 class MyAdvertisedDeviceCallbacks: public BLEAdvertisedDeviceCallbacks {
4     void onResult(BLEAdvertisedDevice advertisedDevice) {
5         Serial.print("Advertised Device: ");
6         Serial.println(advertisedDevice.toString().c_str());
7     }
8 };
9
10 void setup() {
11     Serial.begin(115200);
12     Serial.println("Starting BLE scan...");
13
14     BLEDevice::init("");
15
16     BLEScan* pBLEScan = BLEDevice::getScan();
17     pBLEScan->setAdvertisedDeviceCallbacks(new MyAdvertisedDeviceCallbacks());
18     pBLEScan->setActiveScan(true); // Active scan uses more power, but get results faster
19     pBLEScan->start(10, false); // Scan for 10 seconds
20 }
21
22 void loop() {
23     // Do nothing here
24 }
25
```

COM20

```
17:29:11.268 -> Advertised Device: Name: , Address: 1e:d5:b8:36:d7:f0, manufacturer data: 060001092022ceeb4b18b2a25c480999be8d0fb2bc315bab79f2d5d11d, rssi: -79
17:29:11.314 -> Advertised Device: Name: , Address: 72:27:a2:b5:6c:d1, manufacturer data: 3708c0a813b36f200000000000000000, rssi: -81
17:29:11.314 -> Advertised Device: Name: , Address: 3f:be:a5:a6:8d:e4, manufacturer data: 06000109202228fcb114ee27b7a67f143f0676e2b74805e30be1381ca62, rssi: -93
17:29:11.361 -> Advertised Device: Name: , Address: 66:96:70:d1:7e:f2, manufacturer data: 4c001608002b96fd5464d0c6, rssi: -83
17:29:11.361 -> Advertised Device: Name: , Address: 48:38:be:d9:3b:b5, manufacturer data: 4c0010052a9897f028, txPower: 8, rssi: -79
17:29:11.361 -> Advertised Device: Name: , Address: 42:37:ac:dc:a0:26, manufacturer data: 4c0010052518ed1a64, txPower: 8, rssi: -76
17:29:11.361 -> Advertised Device: Name: , Address: 4b:0c:e3:c5:79:a4, manufacturer data: 4c0009081371c0a808861b5813080a78131aab518200, rssi: -74
17:29:11.361 -> Advertised Device: Name: , Address: f5:48:55:fe:de:27, manufacturer data: 4c0012020000, rssi: -92
17:29:11.361 -> Advertised Device: Name: , Address: 49:19:14:2c:6a:e4, manufacturer data: 4c00090813d6c0a8021a1b581608001059c6baa8a0d0, rssi: -77
17:29:11.406 -> Advertised Device: Name: , Address: 54:17:d4:1e:04:7f, manufacturer data: 4c001007251f8d61ce4218, txPower: 12, rssi: -81
17:29:11.453 -> Advertised Device: Name: , Address: 6a:0e:77:6f:ad:6b, manufacturer data: 4c001608006ca92c384171e9, rssi: -84
17:29:11.705 -> Advertised Device: Name: , Address: f4:c1:57:42:9d:ca, manufacturer data: 4c0012023c02, rssi: -79
17:29:11.705 -> Advertised Device: Name: , Address: 6c:80:24:6d:fb:0a, manufacturer data: 4c0010073c1f75d3b68d58, txPower: 12, rssi: -74
17:29:11.705 -> Advertised Device: Name: SmartThings Station, Address: 2c:ba:ba:91:29:62, manufacturer data: 7500393752, txPower: 0, rssi: -89
17:29:11.705 -> Advertised Device: Name: , Address: 49:4f:cd:9c:ed:bd, manufacturer data: 4c001007281f5cb45f0068, txPower: 12, rssi: -84
17:29:11.822 -> Advertised Device: Name: , Address: 53:6c:80:b6:9b:b5, manufacturer data: 4c001608007bea843d1923c8, rssi: -85
17:29:11.822 -> Advertised Device: Name: , Address: 4c:0b:24:ea:70:fe, manufacturer data: 4c00160800832f760d9fac5f, rssi: -70
17:29:11.822 -> Advertised Device: Name: , Address: c2:a3:36:ce:eb:b9, manufacturer data: 4c0012020000, rssi: -66
17:29:11.822 -> Advertised Device: Name: , Address: fb:57:f3:53:27:49, manufacturer data: 4c0012020000, rssi: -70
17:29:12.006 -> Advertised Device: Name: , Address: 4a:bc:c8:9d:d9:fd, manufacturer data: 4c001608000f49007e1962bd, rssi: -68
17:29:12.100 -> Advertised Device: Name: , Address: 68:ff:5f:03:6e:25, manufacturer data: 4c001608002a396a632d48c5, rssi: -66
17:29:12.100 -> Advertised Device: Name: , Address: 7b:b5:c7:26:28:e5, manufacturer data: 4c0016080053d29b6ad7c8c7, rssi: -54
17:29:12.146 -> Advertised Device: Name: , Address: ec:02:1b:fa:b4:2a, manufacturer data: 4c0012020001, rssi: -66
17:29:12.607 -> Advertised Device: Name: , Address: ec:d1:e0:49:17:4e, manufacturer data: 4c0012020000, rssi: -78
17:29:12.653 -> Advertised Device: Name: , Address: e4:90:30:8f:b0:2b, manufacturer data: 4c0012020001, rssi: -81
17:29:12.745 -> Advertised Device: Name: , Address: ed:59:0f:81:2b:e1, manufacturer data: 4c0012020001, rssi: -72
17:29:13.159 -> Advertised Device: Name: , Address: de:46:ab:bb:58:5c, manufacturer data: 4c0012026e01071106d3bb7ae15f5d7ec2be7564f187fa44f2, rssi: -67
17:29:13.205 -> Advertised Device: Name: , Address: 3f:59:c8:82:90:1c, serviceUUID: 0000181a-0000-1000-8000-00805f9b34fb, rssi: -80, serviceData: p [0505??Y?
17:29:13.205 -> {}
17:29:13.252 -> Advertised Device: Name: , Address: d8:d8:06:8b:a6:73, manufacturer data: 4c0012020000, rssi: -77
17:29:13.528 -> Advertised Device: Name: , Address: f4:9b:7e:ac:96:7e, manufacturer data: 4c0012020002, rssi: -77
17:29:13.621 -> Advertised Device: Name: , Address: 80:ec:cb:00:21:d2, manufacturer data: 4c0002150112233445566778899aabbccddeeff0271627fec3, rssi: -93
17:29:13.621 -> Advertised Device: Name: , Address: 4f:59:7b:0a:e4:98, manufacturer data: 4c001005391ceb93db, txPower: 12, rssi: -87
17:29:13.667 -> Advertised Device: Name: , Address: d4:05:6e:64:b2:1f, rssi: -77
17:29:13.807 -> Advertised Device: Name: , Address: d9:38:0b:c1:a1:b3, manufacturer data: 4c0012020000, rssi: -88
17:29:13.853 -> Advertised Device: Name: , Address: e3:2c:bd:3d:e7:7f, manufacturer data: 4c0012020001, rssi: -77
17:29:13.899 -> Advertised Device: Name: , Address: 0c:3b:7f:85:41:d5, manufacturer data: 06000109202242d07ae0416c8558702c26cc667cbeaae107bad68dbf0c, rssi: -92
17:29:13.993 -> Advertised Device: Name: , Address: 68:13:24:e2:c9:a6, rssi: -94, serviceData: {}
17:29:14.085 -> Advertised Device: Name: , Address: 56:16:b6:dc:46:ef, manufacturer data: 4c001608008d9c75bba767cd, rssi: -82
17:29:14.132 -> Advertised Device: Name: , Address: 75:26:0b:6e:b4:fe, manufacturer data: 4c001007361f373c698a78, txPower: 12, rssi: -93
17:29:14.364 -> Advertised Device: Name: , Address: 5c:4a:2e:45:73:8a, manufacturer data: 4c0010063f1e9f8aa35c, txPower: 12, rssi: -94
17:29:14.364 -> Advertised Device: Name: , Address: 7b:4c:4a:da:15:59, manufacturer data: 4c000c0e08deb7efbe8365b4880002fd2cc91005411cbc4864, rssi: -94
17:29:14.364 -> Advertised Device: Name: , Address: 55:11:fc:e9:f3:77, manufacturer data: 4c00160800a53834a74fdb3c, rssi: -84
17:29:14.457 -> Advertised Device: Name: , Address: f7:b1:79:02:e9:69, manufacturer data: 4c0012020002, rssi: -87
```

## 4. FCC Warning

### FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### IMPORTANT NOTE:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

— Reorient or relocate the receiving antenna. — Increase the separation between the equipment and receiver. — Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. — Consult the dealer or an experienced radio/TV technician for help.

### FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The SAR was tested for the device in the body worn mode, and it can meet the SAR limit of FCC.