AtomS3R

SKU:C126





















Description

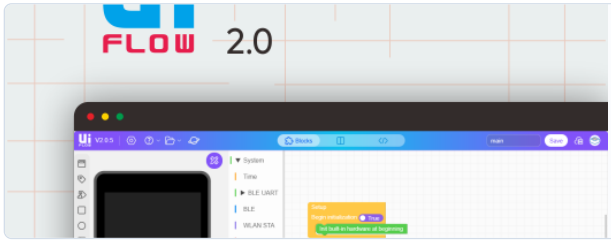
AtomS3R is a highly integrated IoT programmable controller based on the **ESP32-S3**. It embeds an **ESP32-S3-PICO-1-N8R8** SoC with on-chip Wi-Fi, 8MB **Flash**, and 8MB **PSRAM**. The device features a 0.85-inch color **IPS display** with a programmable button beneath it, an on-board 5 V-to-3.3 V power circuit, a three-axis **BMM150** geomagnetic sensor, and a six-axis **BMI270** IMU. Power supply and firmware downloading are handled through a **USB Type-C** connector, while a **HY2.0-4P** port and six **GPIO** plus power pins on the bottom make expansion easy. Compared with previous products, **AtomS3R** is equipped with an enhanced **3D antenna** that offers better performance and higher stability. With dimensions of just **24.0 x 24.0 x 12.9 mm**, it is ideal for a variety of embedded smart-device applications.

Tutorial



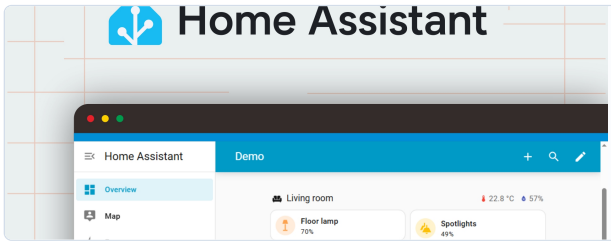
Arduino IDE

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



UiFlow2

This tutorial shows you how to control AtomS3R using the UiFlow2 graphical programming platform.



Home Assistant

This tutorial describes how to combine AtomS3R + Atomic Voice Base to integrate voice assistant functionality into Home Assistant.

Features

- Integrated ESP32-S3-PICO-1-N8R8 SoC
- Nine-axis sensor system (BMI270 6-axis IMU + BMM150 3-axis geomagnetic sensor)
- 8MB Flash and 8MB PSRAM
- Supports infrared transmission control

- Programmable button
- 0.85-inch LCD display
- Expandable pins and interfaces
- Development Platform
  - UiFlow2
  - Arduino IDE
  - ESP-IDF
  - PlatformIO

Includes

- 1 x AtomS3R

Applications

- Motion detection and attitude sensing
- 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
TFT Driver	ST7735
Color IPS Resolution	128 x 128
6-Axis IMU (BMI270)	Accuracy: 0.05 % (Accel), 0.05 °/s (Gyro) I2C Address: 0x68
3-Axis Geomagnetic Sensor (BMM150)	Accuracy: 0.3 µT Mounted on BMI270, magnetometer data obtained via BMI270
Infrared	180 ° FOV, transmission distance 12.46 m (unobstructed)
Sleep Current	GPIO-5V supply: 5 V @ 11.63 µA Grove-5V supply: 5 V @ 10.75 µA USB-5V supply: 5 V @ 92.50 µA (incl. PD resistor loss)
Bottom GPIO	G5 / G6 / G7 / G8 / G38 / G39
Operating Temperature	0 ~ 40 °C
Product Size	24.0 x 24.0 x 12.9 mm
Product Weight	6.8 g
Package Size	85.0 x 65.0 x 15.5 mm
Gross Weight	12.5 g

Learn

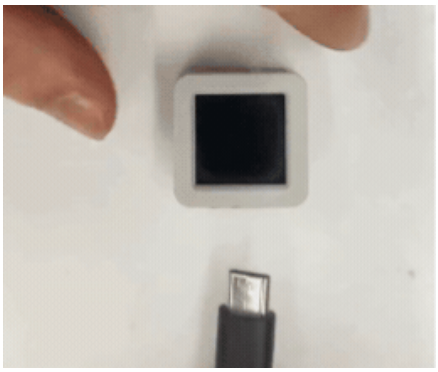
Operating Instructions

BMM150 Magnetic Interference

Products containing magnets may interfere with the BMM150 magnetic sensor, resulting in abnormal readings. When using M5 controllers with built-in magnets, remove the magnets and keep the BMM150 away from strong magnetic fields.

Download Mode

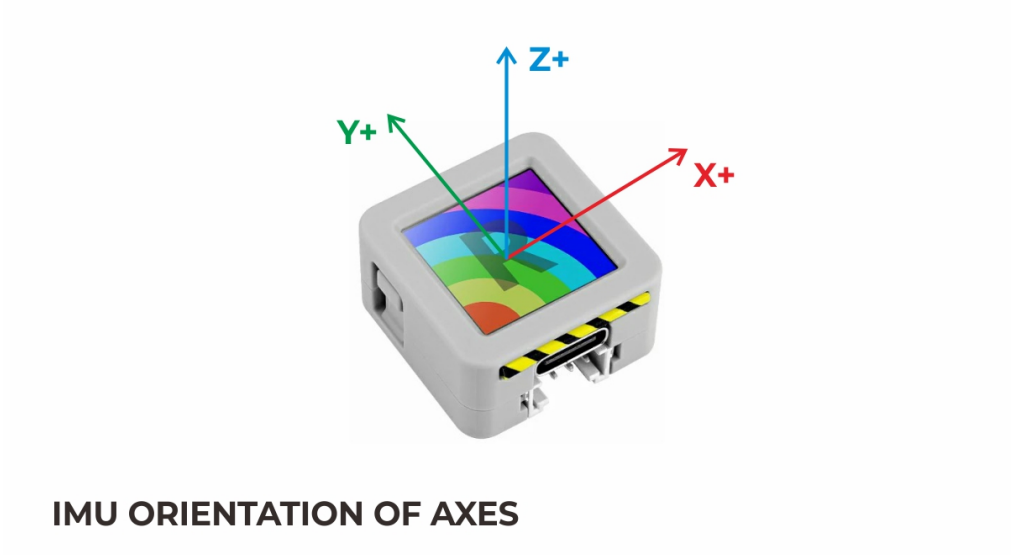
To flash firmware, press and hold the reset button for approximately 2 seconds until the internal green LED lights up, then release the button. After release, the green LED turns off, indicating that the device has entered download mode and is ready for flashing.



LCD Backlight Control

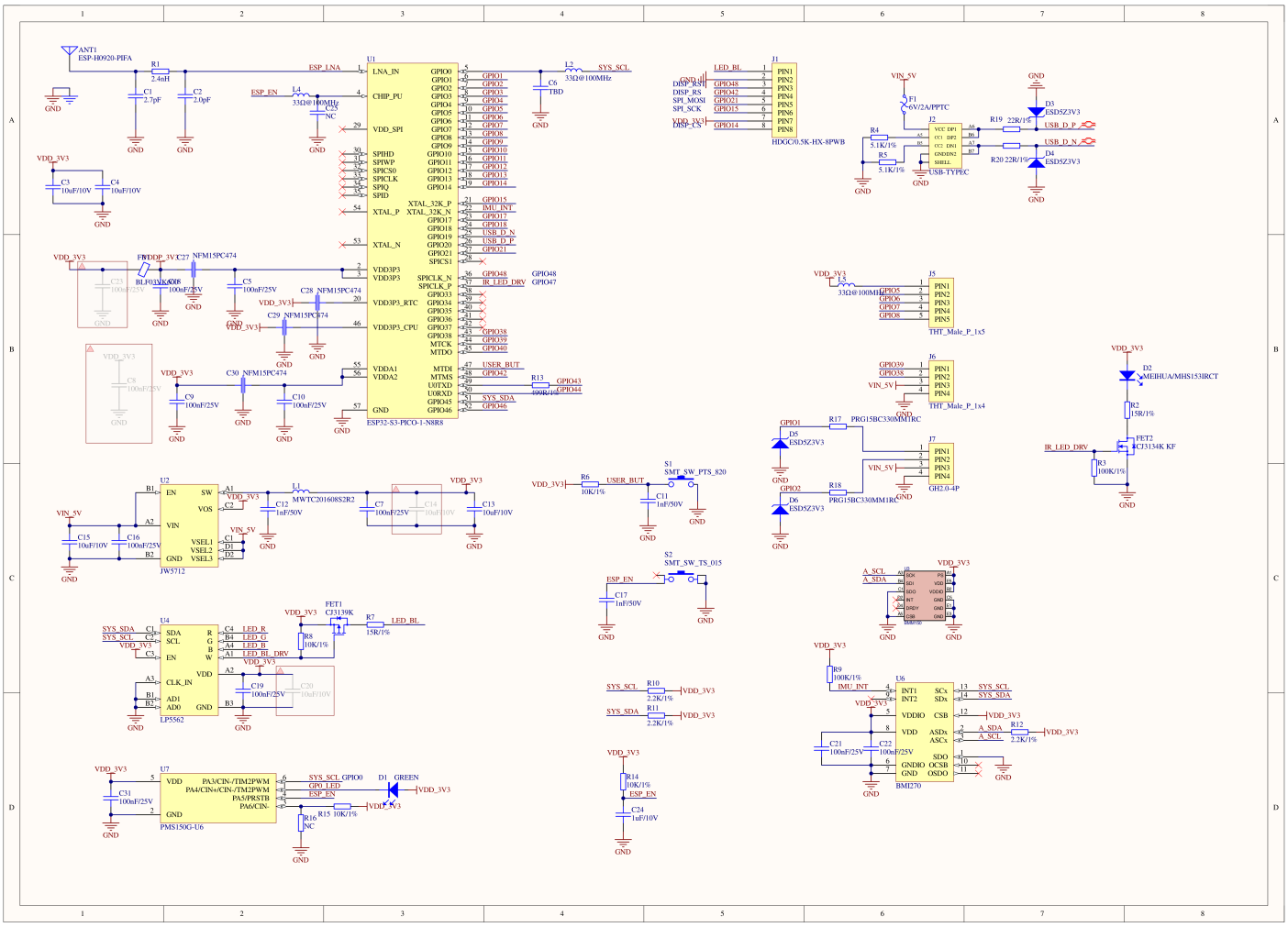
The recommended PWM signal frequency for the LCD backlight driver is 500Hz. Using a frequency that is too high may cause abnormal brightness adjustment behavior.

IMU Triaxial Direction Schematic Diagram

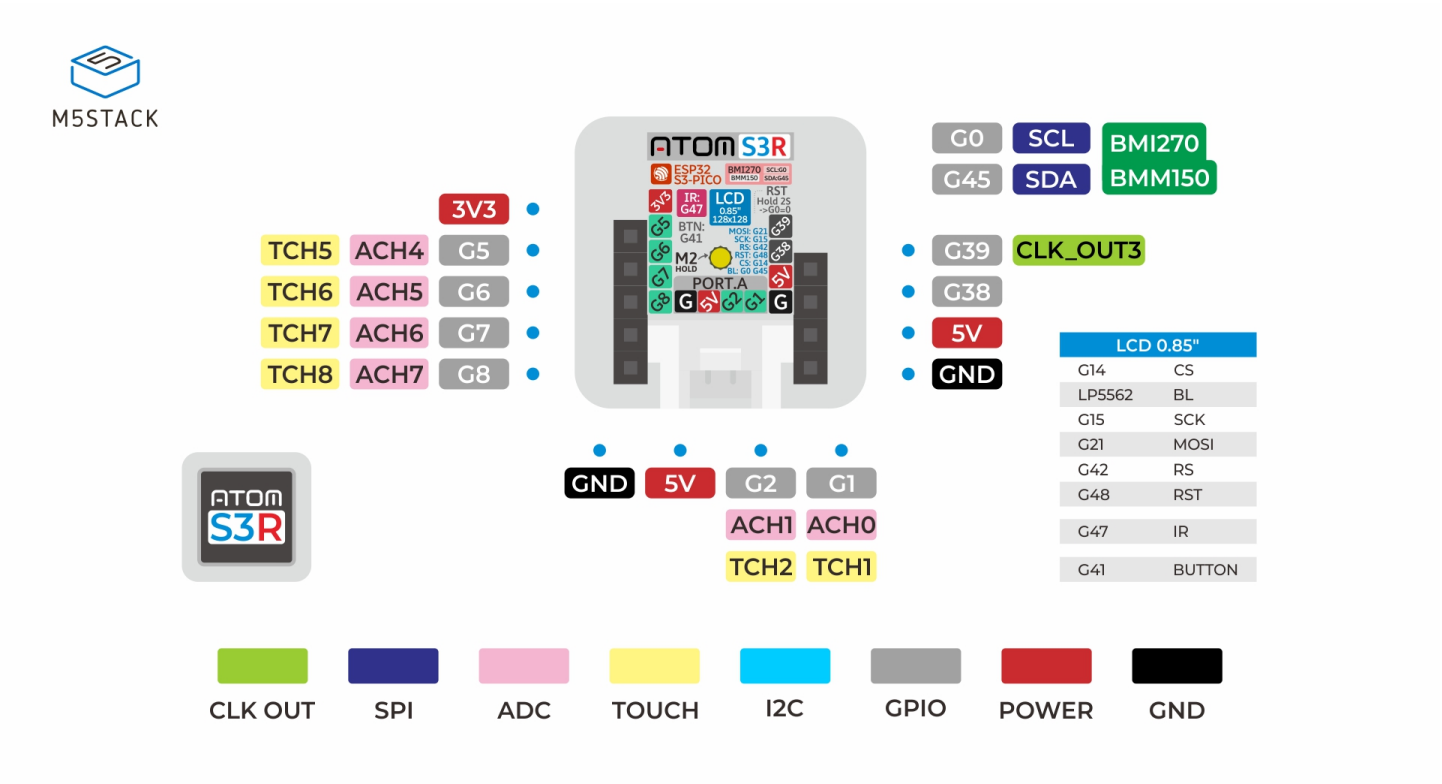


Schematics

- AtomS3R Schematics PDF



PinMap



RGB & BMI270 & IR & BUTTON

ESP32-S3-PICO-1-N8R8	G0	G45	G47	G41
LP5562 (RGB Driver)	SYS_SCL	SYS_SDA		
BMI270 (0x68)	SYS_SCL	SYS_SDA		
IR			IR_LED_DRV	
BUTTON				USER_BUT

BMM150

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 to realize unified 9-axis sensor data acquisition.

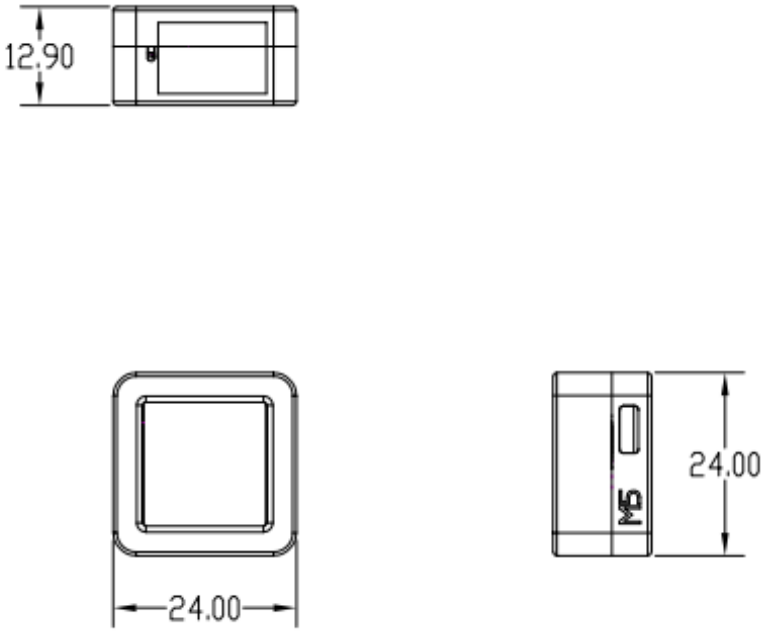
SCREEN

ESP32-S3-PICO-1-N8R8	LP5562_W	G48	G42	G21	G15	G14
0.85-inch IPS	LCD_BL	DISP_RST	DISP_RS	SPI_MOSI	SPI_SCK	DISP_CS

HY2.0-4P

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

Model Size



Structure

- AtomS3R Structure Files

Datasheets

- ESP32-S3-PICO-1-N8R8
- BMI270
- BMM150

Softwares

Quick Start

- AtomS3R + Atomic Voice Base Voice Assistant

Arduino

- AtomS3R Arduino Quick Start
- AtomS3R Arduino Library

UiFlow2

- AtomS3R UiFlow2 Quick Start

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 Factory Firmware

Easyloader

Easyloader	Download	Note
AtomS3R User Demo Easyloader	download	/

Video

Product Comparison

Product Compare		
	AtomS3R	AtomS3
SoC	ESP32-S3-PICO-1-N8R8	ESP32-S3FN8
Memory	8MB Flash + 8MB PSRAM	8MB Flash
Sensor	BMI270 + BMM150	MPU6886
Antenna	Enhanced 3D Antenna	Standard 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.

Version Change

Release Date	Product Changes
2026.05.14	Screen driver IC model changed from GC9107 to ST7735
2025.09.19	Initial release