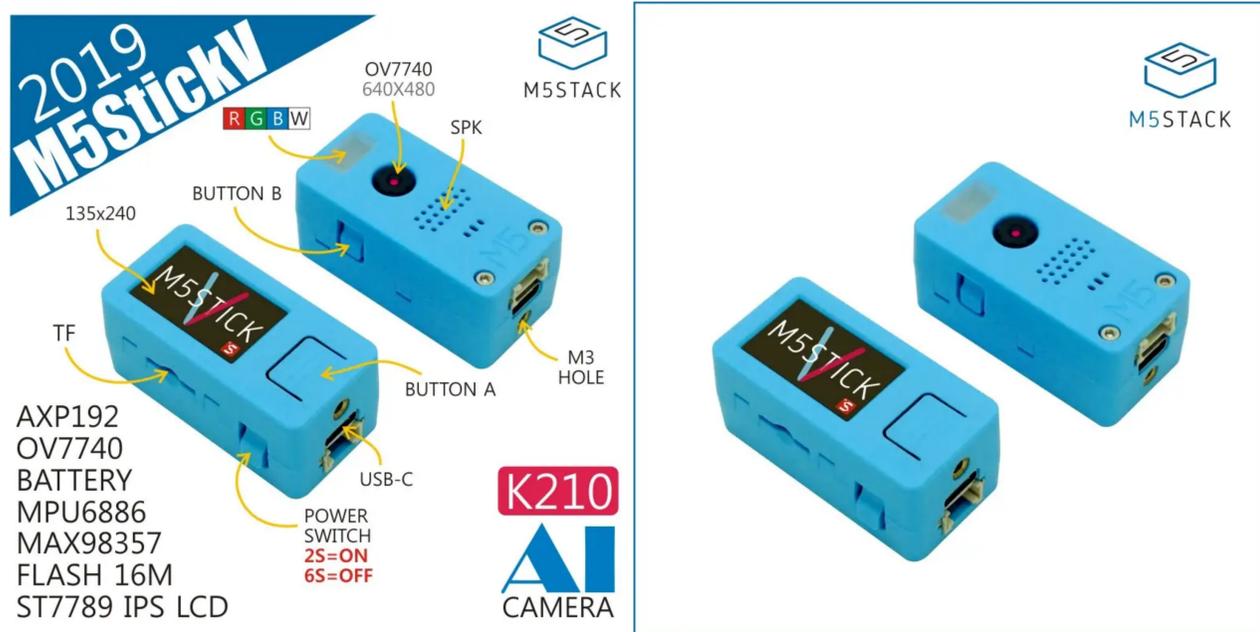


M5StickV

SKU:K027



Tutorial&Quick-Start

Choose the development platform you want to use, view the corresponding tutorial&quick-Start.

[V-Function](#)

[V-Training](#)

[Maixpy](#)

Description

M5Stack recently launched the new AIoT(AI+IoT) Camera powered by Kendryte K210 -an edge computing system-on-chip(SoC) with dual-core 64bit RISC-V CPU and advanced neural network processor..

M5StickV AI Camera possesses machine vision capabilities, equips OmniVision OV7740 image sensor, adopts OmniPixel®3-HS technology, provides optimum low light sensitivity, supports various vision identification capabilities. (e.g. Real-time acquisition of the size, type and coordinates of the detected target) In addition to an OV7740 sensor, M5StickV features more hardware resources such as a speaker with built-in I2S Class-D DAC, IPS screen, 6-axis IMU, 200mAh Li-po battery, and more.

It is able to perform convolutional neural network calculations at low power consumption, so M5StickV will be a good zero-threshold machine vision embedded solution. It is in support with MicroPython, which makes your code to be more concise when you use M5stick-V for programming.

Switching operations:



Power on: Long press power button for 2 seconds

Power off: Short press power button for 6 seconds

Product Features

- Dual-Core 64-bit RISC-V RV64IMAFDC (RV64GC) CPU / 400Mhz(Normal)
- Dual Independent Double Precision FPU
- Neural Network Processor(KPU) / 0.8Tops
- Field-Programmable IO Array (FPIOA)
- Dual hardware 512-point 16bit Complex FFT
- SPI, I2C, UART, I2S, RTC, PWM, Timer Support
- AES, SHA256 Accelerator
- Direct Memory Access Controller (DMAC)
- Micropython Support
- Firmware encryption support
- Case Material: PC + ABS

| Include

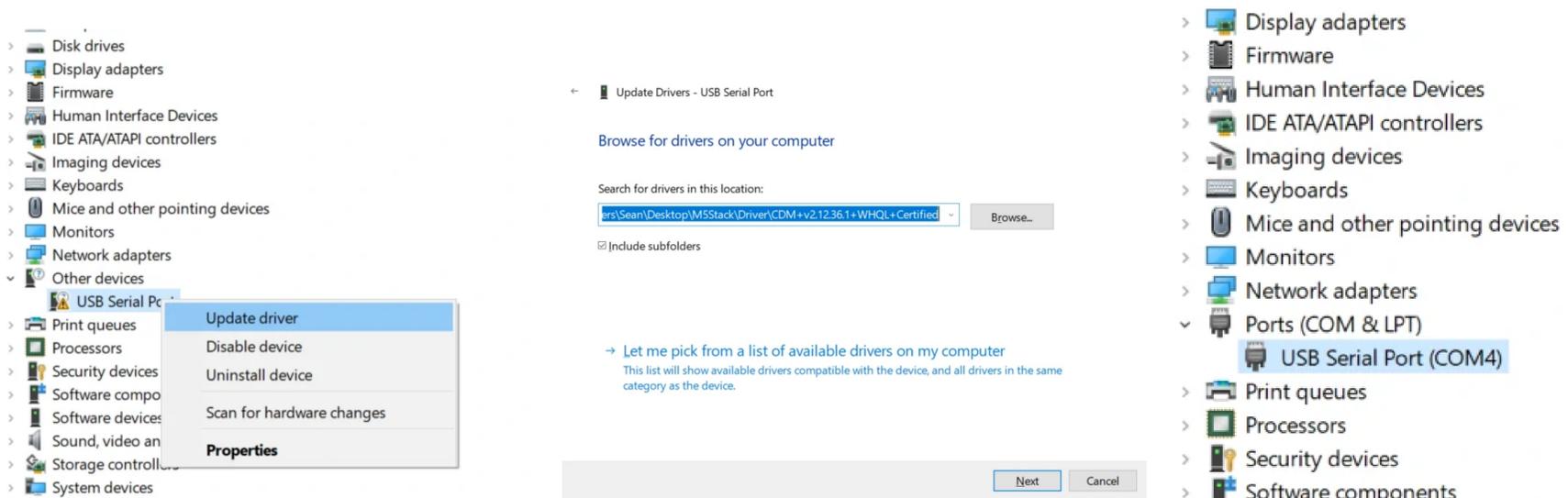
- 1x M5StickV
- 1x USB Type-C(100cm)
- 1x Bracket
- 1x HEX KEY

| Applications

- Face recognition/detection
- Object detection/classification
- Obtaining size and coordinates of the target in real-time
- Obtaining the type of detected target in real-time
- Shape recognition
- Video/Display
- Game simulator

| USB Drive problems

UnitV/M5StickV/M5StickC/ATOM may not work without driver in some systems. Users can manually install **FTDI driver** to fix this problem. Take the win10 environment as an example, download the driver file that matches the operating system, decompress it, and install it through the device manager. (Note: In some system environments, the driver needs to be installed twice for the driver to take effect. The unrecognized device name is usually **M5Stack** or **USB Serial** . Windows recommends using the driver file to install directly in the device manager (custom Update), the executable file installation method may not work properly).



Specification

Resources	Parameter
Kendryte K210	Dual core 64-bit RISC-V RV64IMAFDC (RV64GC) CPU / 400Mhz(Normal)
SRAM	8MiB
Flash	16M
Power input	5V @ 500mA
KPU Parameter size of neural network	5.5MiB - 5.9MiB
Port	TypeC x 1, GROVE(I2C+I/O+UART) x 1
RGB LED	RGBW x 1
Button	Custom button x 2
IPS screen	1.14 TFT, 135*240, ST7789
Camera	OV7740(30W pixels)
FOV	55deg
PMU	AXP192
Battery	200mAh
External storage	TF-card(microSD)
MEMS	MPU6886
Net weight	23g
Gross weight	82g
Product Size	48*24*22mm
Package Size	144*44*43mm
Case Material	Plastic (PC)

TF-card(microSD) test

M5StickV does not currently recognize all types of TF-card(microSD). We have tested some common TF-card(microSD). The test results are as follows.



Brand	Storage	Type	Class	Format	Test Results
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Kingston	8G	HC	Class4	FAT32	OK
Kingston	16G	HC	Class10	FAT32	OK
Kingston	32G	HC	Class10	FAT32	NO
Kingston	64G	XC	Class10	exFAT	OK
SanDisk	16G	HC	Class10	FAT32	OK
SanDisk	32G	HC	Class10	FAT32	OK
SanDisk	64G	XC	Class10	/	NO
SanDisk	128G	XC	Class10	/	NO
XIAKE	16G	HC	Class10	FAT32	OK(purple)
XIAKE	32G	HC	Class10	FAT32	OK
XIAKE	64G	XC	Class10	/	NO
TURYE	32G	HC	Class10	/	NO

EasyLoader

EasyLoader is a concise and fast program writer, which has a built-in case program related to the product. It can be burned to the main control by simple steps to perform a series of function verification.

Download Windows Version Easyloader

Description:

Equipped with Maixpy firmware, test camera, screen graphics display function, and then press the HOME button to turn on the rear fill light.

Charging current measured value

charging current	Fully charged current(Power OFF)	Fully charged current(Power ON)
0.376A	0.078A	0.255A

FUNCTIONAL DESCRIPTION

KENDRYTE K210

The Kendryte K210 is a system-on-chip (SoC) that integrates machine vision. Using TSMC's ultra-low-power 28-nm advanced process with dualcore 64-bit processors for better power efficiency, stability and reliability. The SoC strives for "zero threshold" development and to be

deployable in the user's products in the shortest possible time, giving the product artificial intelligence

- Better low power vision processing speed and accuracy
- KPU high performance Convolutional Neural Network (CNN) hardware accelerator
- Advanced TSMC 28nm process, temperature range -40°C to 125°C
- Firmware encryption support
- Unique programmable IO array maximises design flexibility
- Low voltage, reduced power consumption compared to other systems with the same processing power
- 3.3V/1.8V dual voltage IO support eliminates need for level shifters

CPU

The chip contains a high-performance, low power RISC-V ISA-based dual core 64-bit CPU with the following features:

- Core Count: Dual-core processor
- Bit Width: 64-bit CPU 400MHz
- Frequency: 400MHz
- ISA extensions: IMAFDC
- FPU: Double Precision
- Platform Interrupts: PLIC
- Local Interrupts: CLINT
- I-Cache: 32KiB x 2
- D-Cache: 32KiB x 2
- On-Chip SRAM: 8MiB

OV7740

- support for output formats: RAW RGB and YUV
- support for image sizes: VGA, QVGA, CIF and any size smaller
- support for black sun cancellation
- support for internal and external frame synchronization
- standard SCCB serial interface
- digital video port (DVP) parallel output interface
- embedded one-time programmable (OTP) memory
- on-chip phase lock loop (PLL)
- embedded 1.5 V regulator for core
- Sophisticated Edge Rate Control Enables Filterless Class D Outputs
- 77dB PSRR at 1kHz
- Low RF Susceptibility Rejects TDMA Noise from GSM Radios
- Extensive Click-and-Pop Reduction Circuitry
- array size: 656 x 488
- power supply: – core: 1.5VDC \pm 5% – analog: 3.3V \pm 5% – I/O: 1.7 ~ 3.47V
- temperature range: – operating: -30° C to 70°C – stable image: 0° C to 50° C
- output format: – 8-/10-bit raw RGB data – 8-bit YUV
- lens size: 1/5"
- input clock frequency: 6 ~ 27 MHz
- max image transfer rate: VGA (640x480): 60 fps – QVGA (320 x 240): 120 fp
- sensitivity: 6800 mV/(Lux-sec)
- maximum exposure interval: 502 x tROW
- pixel size: 4.2 μ m x 4.2 μ m
- image area: 2755.2 μ m x 2049.6 μ m
- package/die dimensions: – CSP3: 4185 μ m x 4345 μ m – COB: 4200 μ m x 4360 μ m

MAX98357

- Single-Supply Operation (2.5V to 5.5V).
- 3.2W Output Power into 4 Ω at 5V
- 2.4mA Quiescent Current
- 92% Efficiency (RL = 8 Ω , POUT = 1W)

- 22.8μVRMS Output Noise (AV = 15dB)
- Low 0.013% THD+N at 1kHz
- No MCLK Required
- Sample Rates of 8kHz to 96kHz
- Supports Left, Right, or (Left/2 + Right/2) Output
- Sophisticated Edge Rate Control Enables Filterless Class D Outputs
- 77dB PSRR at 1kHz
- Low RF Susceptibility Rejects TDMA Noise from GSM Radios
- Extensive Click-and-Pop Reduction Circuitry

AXP192

- Operation Voltage: 2.9V - 6.3V(AMR: -0.3V~15V)
- Configurable Intelligent Power Select system
- Current and voltage limit of adaptive USB or AC adapter input
- The resistance of internal ideal diode lower than 100mΩ

MPU6886

GYROSCOPE FEATURES

- Digital-output X-, Y-, and Z-axis angular rate sensors (gyroscopes) with a user-programmable full-scale range of ±250 dps, ±500 dps, ±1000 dps, and ±2000 dps and integrated 16-bit ADCs
- Digitally-programmable low-pass filter
- Low-power gyroscope operation
- Factory calibrated sensitivity scale factor
- lens size: 1/5"
- Self-test

ACCELEROMETER FEATURES

- Digital-output X-, Y-, and Z-axis accelerometer with a programmable full scale range of ±2g, ±4g, ±8g and ±16g and integrated 16-bit ADCs
- User-programmable interrupts
- Wake-on-motion interrupt for low power operation of applications processor
- Self-test

SPI/I2C dual communication mode

Note: There are two versions of M5StickV currently released by M5Stack. When programming, users need to configure differently according to their corresponding pin mapping. The specific differences are as follows.

- In the M2StickV circuit design of the I2C single-mode (blue PCB) version, MPU6886 only supports the user to configure its communication mode to I2C, and its pin mapping is SCL-28, SDA-29.
- In the SPI/I2C dual mode (black PCB) version of the M5StickV circuit design, MPU6886 supports the user to configure its communication mode to SPI or I2C, and its pin mapping is SCL-26, SDA-27., when using, you can switch CS Pin level to switch modes (high level 1 is I2C mode, low level 0 is SPI mode)
- The specific pin mapping is shown below:

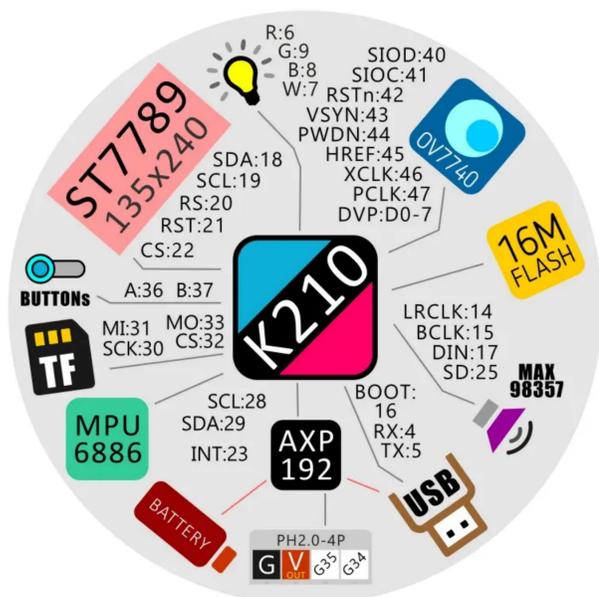


Links

- **datasheet**
 - [MPU6886](#)
 - [SH200Q](#)
 - [OV7740](#)
- **Web page**
 - [Sipeed](#)
- **Quick Start Guide**
 - [M5StickV Guide](#)
- **Github**
 - [API](#)
- **Example**
 - [Code](#)

Schematic

K210_CAM



Learn



Detecting Object for Vehicle Blind Spot by M5StickV

Detect cars and people which is blinding by drivers. You need only putting M5Stack and you aren't doing dedicated construction.



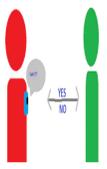
Getting Started with the M5StickV AI + IOT Camera

The M5Stick-V is an AIOT (AI + IOT) camera with machine vision capabilities.



MiMaMori Alert for Your Home Security

"MiMaMori Alert" is automatic security camera for your home. Automatic learning without teacher images, and notify if something is visitor.



Mobile Social Distancing using Face detection (M5stickV)

Mountable device for your Personal AI Social Distancing Alarm by detecting how far the person's face from you..... (M5StickV)



Wireless Barcode Scanner

M5StickV and M5StickC with HID Bluetooth Wireless or Atomic QR-Code reader

V-Training

◦ [V-Training](#)

Version Change

Release Date	Product Change	Note:
2019.7	Initial public release	/
2020.3	The circuit supports configuring MPU6886 to use SPI or I2C protocol for communication.I2C pin change SCL (28=>26), SDA (29=>27)	Program to drive the chip select pin CS for modification, high level 1 is I2C mode, low level 0 is SPI mode.
2020.3	Add with Microphone	/
2020.4	Standard package add with bracket	/