



English ▾

M5STACK

[HOME > CORE > TOUGH](#)

Product name

Search

TOUGH

SKU:K034



Description

The M5Stack ** Waterproof ESP32 embedded controller TOUGH** is **Industrial grade** programmable embedded controller featuring Espressif **ESP32** chipset with integrated **Wi-Fi** , It is equipped with dual-core low power **Xtensa® 32-bit LX6** microprocessor clock frequency up to **240MHz** . A combination of **8M PSRAM + 16M FLASH memory** , integrated **2.0-inch HD IPS display panel** + high-sensitive **capacitive touch screen** + **rich peripherals, expansion interface** . M5 TOUGH has full-coverage support dustproof and waterproof , which can ensure the stability of circuit operation even in complex industrial applications. The M5 TOUGH is ideal for industrial control, smart buildings, outdoor node data acquisition, and other applications.

Caution: Please DO NOT immerse the enclosure in water. There is no protection from immersion.



M5 TOUGH



DWD-V3

16MB Flash

8MB PSRAM



CAUTION: NO PROTECTION FROM IMMERSION IN WATER

- **Structural Design :**
 - Water-resistant with an 'o-ring sealing' contains Waterproof M12 Connectors can complete against solid objects, dust, sand, and dirt and against the effects of immersion.
 - **UV resistant** enclosure design
 - A variety of installations **Screw** , **Rolled strip** , **Magnetic** , **Adhesive Back**
 - Waterproof M12 Connectors
- **High integration :**
 - 2 inches LCD capacitive Multi-touch screen
 - NS4168 16bits I2S power amplifier + 1W speaker
 - TFCard slot
 - AXP192 power management chip + BM8563-RTC clock -> **Low-power power solution** , **Wake Up with an RTC Alarm Clock**
 - Delicate RF circuit delivers robust and consistent wireless communication
- **Strong expandability :**
 - Equipped with programmable expansion board
 - Integrated with 12v->5V flexible DC/DC converter. **flexible power supply**
 - **RS485** conversion circuit

- PortA, B, C/ 3x Grove expansion interface
- Easy access to M5Stack's software and hardware system, plug-and-play sensor expansion
- Low code development :
 - Support UIFlow graphical programming platform , scripting-free, cloud push
 - Fully compatible with Arduino, ESP32-IDF, and other mainstream development platforms
 - Executing Dual-core processor on FreeRTOS to run multiple tasks for better performance.

Product Features

- ESP32-D0WDQ6-V3
- 16MB Flash + 8MB PSRAM
- Waterproof and Dustproof
- UV resistant enclosure design protection
- 2 inches LCD capacitive Multi-touch screen
- Advanced low power techniques: Wake Up with an RTC Alarm Clock
- Integrated with 12v->5V flexible DC/DC converter. Flexible power supply
- RS485/I2C/GPIO/UART interface
- Development platform:
 - Arduino/UIFlow/ESP-IDF

Included

- 1x M5Stack TOUGH
- 1x Type-C USB(1m)
- 1x 2.5mm hexagon wrench
- 1x 1.25-2P single head terminal line
- 1x 1.25-4P single head terminal line
- 1x Waterproof O-ring
- 1x HY2.0-4P

Applications

-
- IoT controller
 - Data acquisition/display terminal
 - Timing controller

Specifications

Specifications	Parameters
ESP32-D0WDQ6-V3	240MHz dual core, 600 DMIPS, 520KB SRAM, Wi-Fi
Flash	16MB
PSRAM	8MB
Protection level	Waterproof/Dustproof
Input voltage	USB(5V @ 500mA) RS485 DC Input (24V @ 1A)
Interface	TypeC x 1, GROVE x4 (RS485/I2C/G/UART interface)
IPS LCD	2.0" @ 320*240 ILI9342C full color display, maximum brightness 853nit
Touch Panel Driver	CHSC6540
Chip	
Speaker configuration	NS4168 16bit I2S amplifier + 1W speaker
RTC clock chip	BM8563
PMU	AXP192
USB chip	CH9102 USB-TTL serial port/program download circuit

TF card slot Maximum support 16GB memory card

Antenna 3D-Wi-Fi Antenna

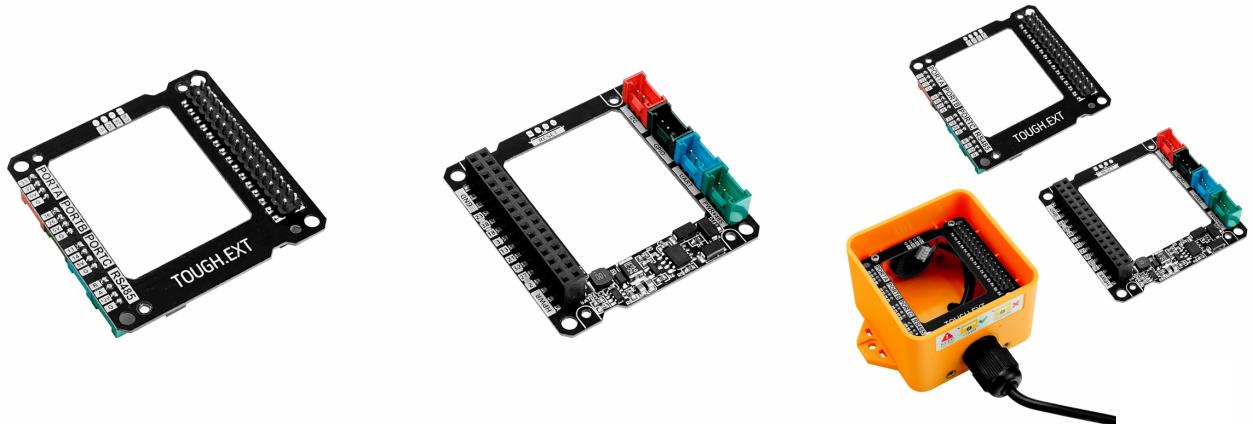
Shell material UV-resistant plastic

Net weight 108g

Gross weight 139g

Product size 58 * 76 * 41 mm

Packing size 99 * 80 * 45 mm



Driver Installation

Click the link below to download the driver that matches the operating system. select the installation package corresponding to the number of operating systems to install. During the installation process of

CH9102_VCP_SER_MacOS v1.7 , an error may occur, but the installation is actually completed, just ignore it.) When using it, if If the program cannot be downloaded normally (the prompt is overtime or Failed to write to target RAM), you can try to reinstall the device driver.

Driver name	Applicable driver chip	Download link
CH9102_VCP_SER_Windows	CH9102	Download
CH9102_VCP_CDC_Windows	CH9102	Download
CH9102_VCP_SER_MacOS v1.7	CH9102	Download

Pin Mapping

LCD Display & TF Card

ESP32	GPIO38	GPIO23	GPIO18	GPIO5	GPIO15	IO
Chip						
AXP192						
Chip						4
ILI9342	MISO	MOSI	SCK	CS	DC	RST
C						

ESP32 Chip	GPIO38	GPIO23	GPIO18	GPIO4	
TFCard	MISO	MOSI	SCK	CS	PWR

Cap.Touch

ESP32 Chip	GPIO21	GPIO22	GPIO39	
Cap.Touch	SDA	SCL	SCK	RST

Mic & NS4168(Speaker)

ESP32 Chip	GPIO12	GPIO0	GPIO2	AXP_IO2	GPIO34
NS4168	BCLK	LRCK	DATA	SPK_EN	
Mic		CLK			DATA

RTC-BM8563

ESP32 Chip	GPIO22	GPIO21		
AXP192			PWRKEY	AXP_LDO1
RTC-BM8563	SCL	SDA	INT	PWR

RS485

M5BUS	GPIO27	GPIO19	(DCDC 12->5V)	----
RS485	RX	TX	12V	GND

HY2.0_RESET

M5BUS	EN	GPIO25	VCC	GND
RESET	EN	GPIO25	5V	GND

TOUGH DEFINE

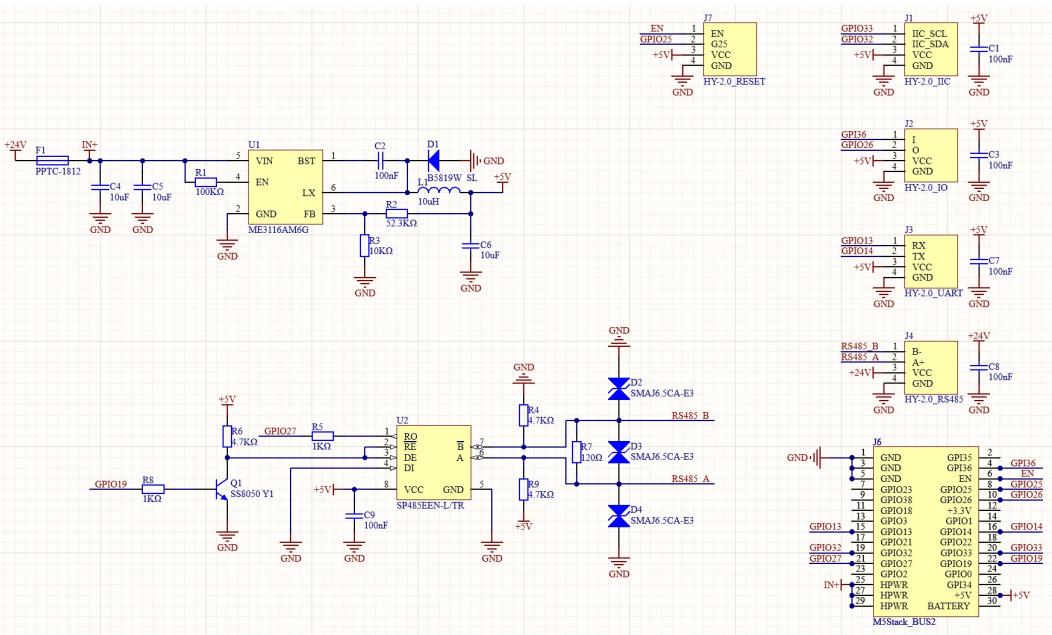
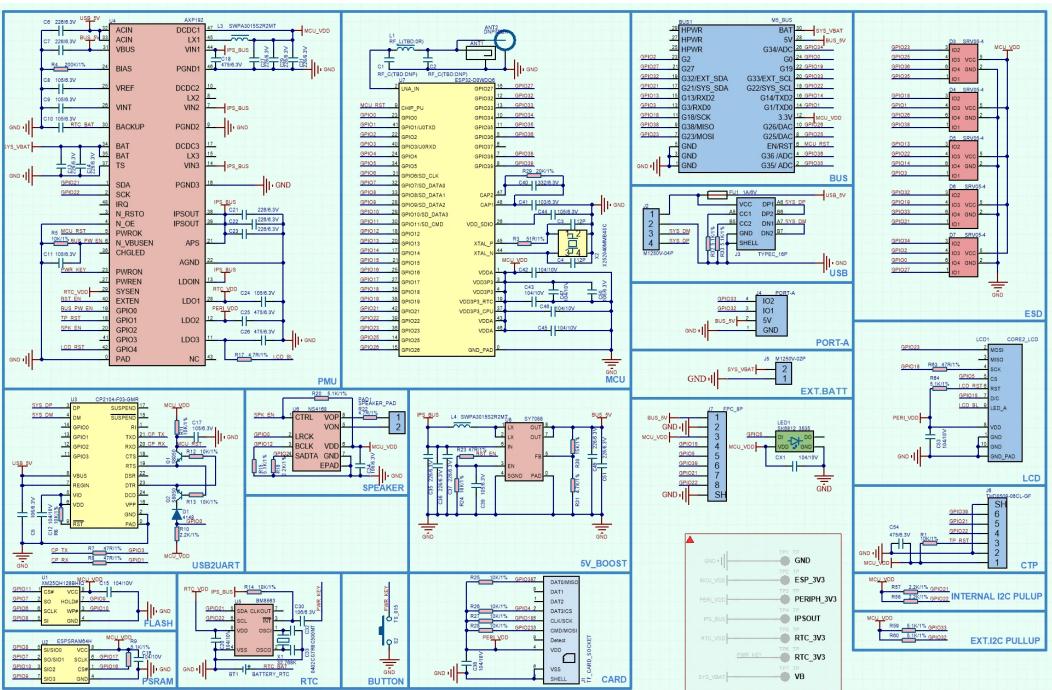
PORT	PIN	Note:
PORT-A(Red)	33/32(SCL/SDA)/VCC/GND	I2C
PORT-B(Black)	36/26(IN/OUT)/VCC/GND	DAC/AD
PORT-C(Blue)	13/14(RX/TX)/VCC/GND	UART

ESP32 ADC/DAC

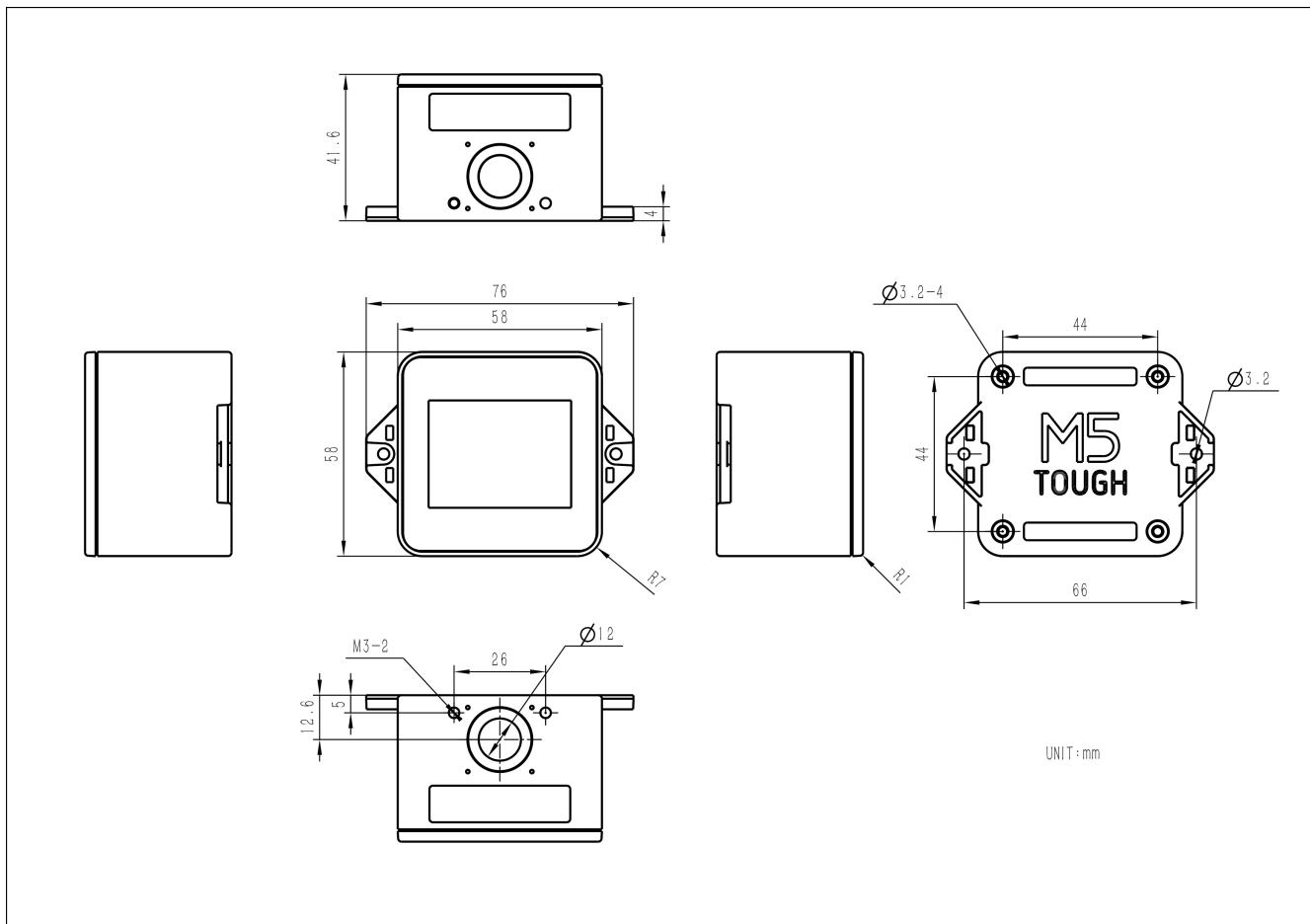
ADC1	ADC2	DAC1	DAC2
8 channel	10 channel	2 channel	2 channel
G32-39	G0/2/4/12-15/25-27	G25	G26

For more information on pin assignment and pin remapping, please refer to [ESP32 datasheet](#)

Schematics



Module Size



Examples

Arduino

- [M5Tough-Tools](#)
- [M5Tough-Lib](#)

Related Links

- **Datasheet**
 - [ESP32](#)
 - [NS4168](#)
 - [ILI9342C](#)
 - [HYM8563](#)

- [BM8563](#)
- [SY7088](#)
- [AXP192 datasheet](#)
- [AXP192 register](#)

Stay tuned

Weekly product releases, news,
special offers, and more.

Enter Email Address

Subscribe

• •

Address: 5F, Tangwei Stock Commercial Building, Youli Road, Bao'an
District, Shenzhen, China

TEL: +86 755 8657 5379

Where to buy

Support

Document

Terms & Conditions
