DevLab: CH552 Multi-Protocol Programmer Module Product Brief

USB tool for flashing/debugging via SWD, JTAG, ISP or UART. Compact, open-source, and versatile.

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Introduction

The CH552 USB Multi-Protocol Programmer is a compact and versatile USB programming tool powered by the WCH CH552 microcontroller. Designed for developers, educators, and hobbyists, it supports programming and debugging across three key domains: AVR microcontrollers, ARM Cortex-M processors, and Intel/Altera CPLDs.

With multiple firmware profiles, this device can seamlessly switch between USBasp, CMSIS-DAP, and USB-Blaster compatible JTAG modes. Its hardware voltage selector ensures compatibility with target boards operating at 3.3V or 5V. The built-in USB bootloader simplifies firmware flashing, and compatibility with tools like 'avrdude', 'OpenOCD', and Quartus Programmer makes it an ideal choice for embedded development in diverse environments.

Functional Description

- USB Full-Speed interface (CDC or HID, depending on firmware)
- Programmable firmware profiles: AVR, CMSIS-DAP, and CPLD
- CH552G / CH552E microcontroller
- Selectable target voltage: 3.3V or 5V
- Bootloader mode for firmware flashing

Electrical Characteristics

- The target voltage can be toggled between 3.3V and 5V using a physical switch.
- Programming interfaces include JTAG (TCK, TMS, TDI, TDO, nTRST) via a 2x5 1.27mm header, SWD (SWDIO, SWCLK) via a standard or JST connector, and SPI (MISO, MOSI, SCK, CS) via an inline header.
- A dedicated JST 1.0mm connector provides SWDIO, SWCLK, VCC, and GND for quick connections.

Features

- Multiple firmware modes: AVR, ARM CMSIS-DAP, CPLD JTAG
- Standard USB HID/CDC communication
- Compatible with major programming tools (avrdude, OpenOCD, Quartus)
- Small footprint, easy to integrate into projects
- SDCC-compatible source code
- Support for Linux, and macOS

Applications

- AVR programming via USBasp and UPDI
- ARM Cortex-M debugging via CMSIS-DAP (OpenOCD, PyOCD)
- JTAG programming for Intel/Altera MAX II CPLDs
- Universal compact programmer for educational kits
- Embedded development and prototyping

Settings

Interface Overview

Interface	Signals / Pins	Typical Use
JTAG	TCK, TMS, TDI, TDO, nTRST	Full chip programming, in-circuit test, debug
SPI	MOSI, MISO, SCK, CS	Flash memory programming, peripheral data exchange
SWD	SWCLK, SWDIO	Cortex-M programming and debugging
JST Header	SWCLK, SWDIO, VCC, GND	Quick-connect to target board for SWD and power

Supported Pins

Symbol	I/O	Description
VCC	Input	Power supply (3.3V or 5V)
GND	-	Ground
BOOT	Input	Enter bootloader mode
P3.0	I/O	General purpose (protocol-specific)
P3.1	I/O	General purpose (protocol-specific)
P3.2	Input	BOOT button

Firmware Modes: AVR Programmer

Feature	Description
Protocols	USBasp, Serial UPDI
Targets	ATmega, ATtiny, other AVR MCUs
Tools Supported	avrdude, PlatformIO
USB Mode	HID (USBasp), CDC (UPDI)
Voltage Output	3.3V / 5V selectable

Firmware Modes: CMSIS-DAP Debugger

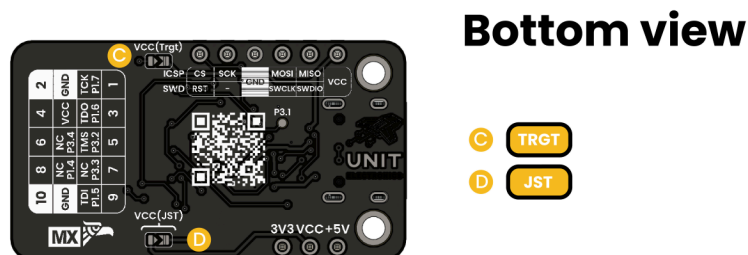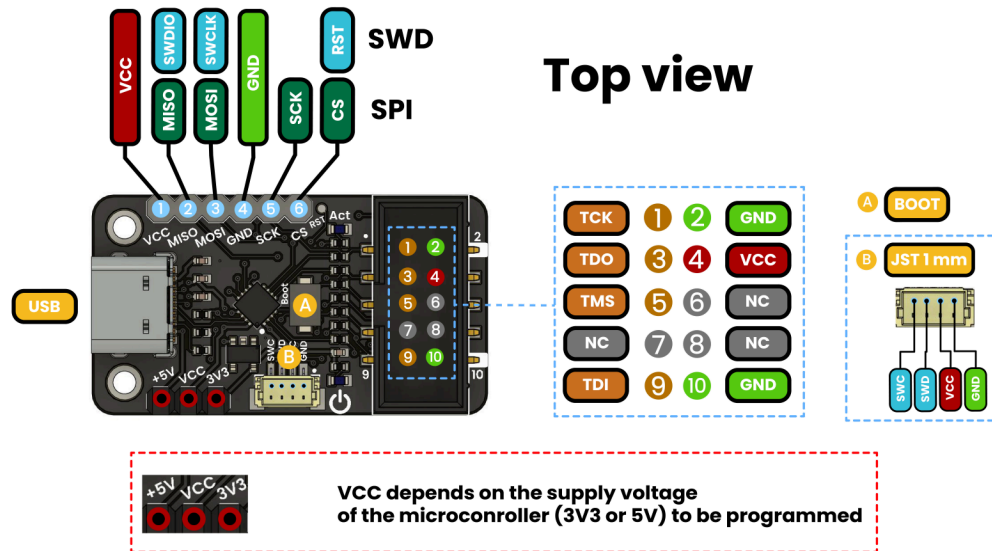| Feature	Description
Protocols	SWD, JTAG (CMSIS-DAP v1)
Targets	ARM Cortex-M (STM32, nRF52, SAMD, etc.)
Tools Supported	OpenOCD, PyOCD, Keil µVision, SEGGER
USB Mode	HID + optional CDC UART
Drivers	Native (Linux/macOS)

Firmware Modes: CPLD Programmer

Feature	Description
Protocol	JTAG via USB-Blaster emulation
Targets	Intel/Altera MAX II (e.g., EPM240)
Tools Supported	Quartus Programmer
USB VID/PID	Safe: 0x16C0:0x05DC, Compatible: 0x09FB:0x6001
Voltage Output	3.3V / 5V selectable

Pin & Connector Layout

Color	Signal Type	Description
Red	Power	Supply voltage (VCC)
Green	Ground	Common ground (GND)
Blue	SWD	SWDIO and SWCLK signals
Teal	SPI	SPI interface signals
Orange	JTAG	JTAG interface signals
Gray	Not Connected	Unused or reserved lines
Color	Signal Type	Description

Block Diagram

Multi-Protocol Programmer

Top view

SWD

SPI

TCK	❶ ❷	GND
TDO	❸ ❹	VCC
TMS	❺ ❻	NC
NC	❼ ❽	NC
TDI	❾ ❿	GND

Ⓐ BOOT

Ⓑ JST 1 mm

SWC SWD VCC GND

VCC depends on the supply voltage of the microconroller (3V3 or 5V) to be programmed

Bottom view

Ⓒ TRGT

Ⓓ JST

Description:

🟥 Supply voltage	⬜ No conection	🟦 SWD
🟩 GND	🟩 SPI	
🟨 Components	🟧 JTAG	

Dimensions
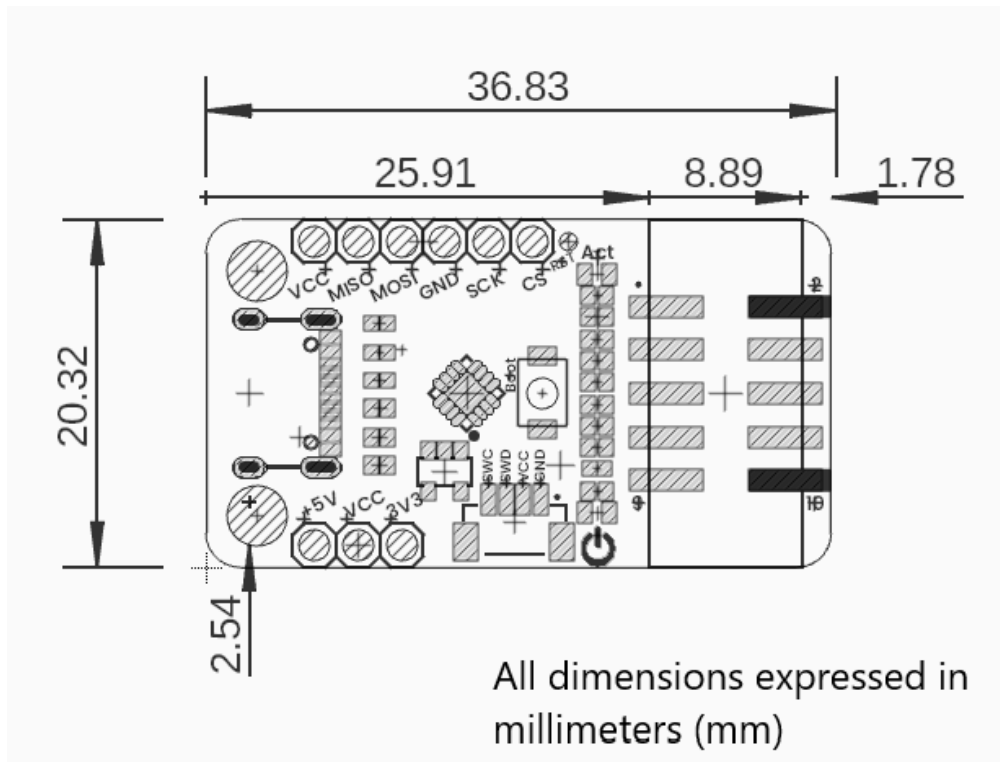
Usage

- Arduino AVR
- Raspberry Pi RP2040
- STM32
- NRF
- PY32
- MAX II

Downloads

- Schematic PDF

Purchase

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