STM32F103 Generic Breakout Board

User Manual

Introduction:

The STM32F103 board, is a low-cost development board featuring an ARM Cortex-M3 processor running at up to 72 MHz. It is widely used in embedded systems for applications like robotics, IoT devices, and home automation due to its versatile interfaces, including GPIO, UART, SPI, I2C, ADC, and PWM, as well as USB 2.0 and CAN communication. With 64–128 KB of flash memory, 20 KB of RAM, and multiple low-power modes, it is ideal for power-efficient, high-performance projects, offering a balance of affordability and functionality for hobbyists and professionals alike.

The board has TL431 which is a programmable shunt voltage reference with an adjustable output from 2.5V to 36V. Here it is providing an adjustable voltage reference for analog pins of the board to preserve the resolution of the ADC at multiple voltage levels. It also has on board low (**32.768 KHz**) and high (**16 MHz**) speed oscillators. On board CAN (**SN65HVD230**) transceiver and RS485 (**MAX3485**) transceiver for differential voltage generation. There is an on board SK6812BWW addressable LED for indicating the board status. 2 EEPROM's (**AT24C64**) are available for data storage, accessible only through software I2C.

Specification:

Processor:
- **STM32F103RBT6**
- ARM Cortex-M3, 32-bit RISC core.
- Maximum clock speed: 72 MHz.

Memory:
- Flash Memory: 128 KB
- SRAM: 20 KB.

Peripherals and Interfaces:
- GPIO: 37 GPIO pins for general-purpose input/output.
- UART: Up to 3 UARTs for serial communication.
- I2C: 2 I2C interfaces for external peripheral control.
- SPI: 2 SPI interfaces for high-speed data transfer.
- CAN: 1 CAN interface for automotive and industrial applications.
- USB: Full-speed USB 2.0 interface. (Not used on board)
- ADC: 12-bit ADC with up to 16 channels.
- Timers: 7 timers, including 4 general-purpose and 3 advanced-control timers.
- PWM: Supports PWM generation for motor control and signal modulation.

Clock:
- Internal RC oscillator: 8 MHz.
- External crystal oscillator: 16MHz and 32.768 KHz (Low speed).

Power:
- Operating voltage: 3.3V. (TC1262-3.3), 5V available on board (MIC5209-5.0YS)
- Low-power modes: Sleep, Stop, and Standby for energy-efficient applications.

Packaging:
- LQFP64

Debugging and Programming:
- SWD (Serial Wire Debug): Supported for debugging and firmware programming.
- Trace asynchronous Sw (SWD with SWO Pin).
- Providing ST-Link V2 for programming and debugging.
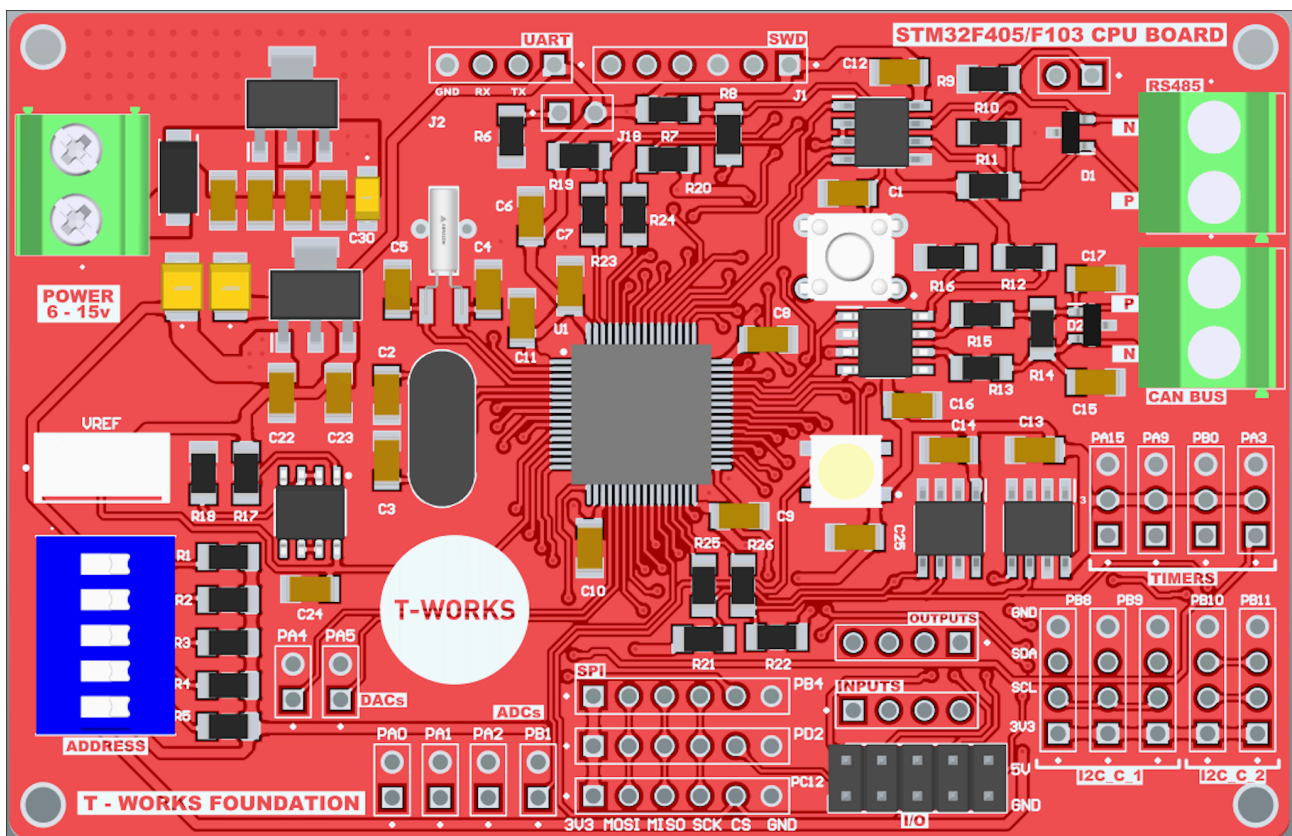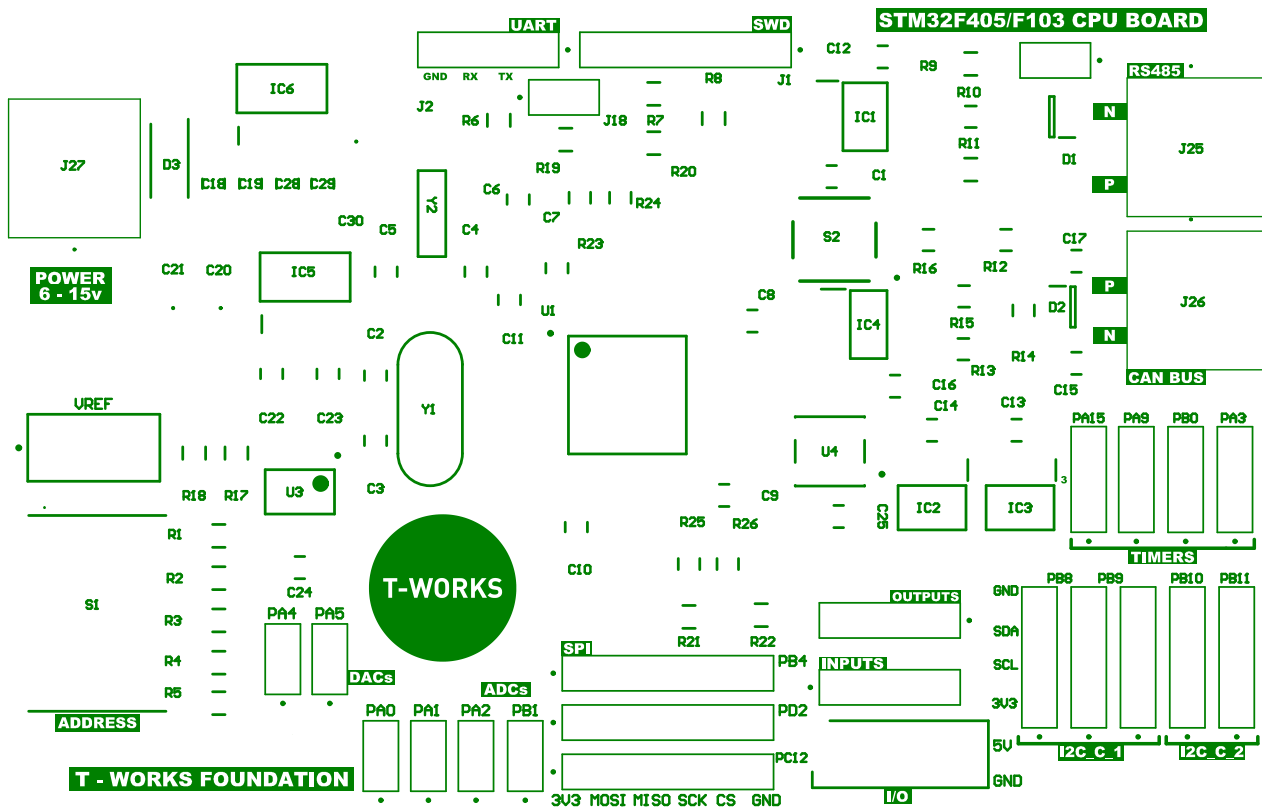- Bootloader for in-system programming via UART.

Applications:
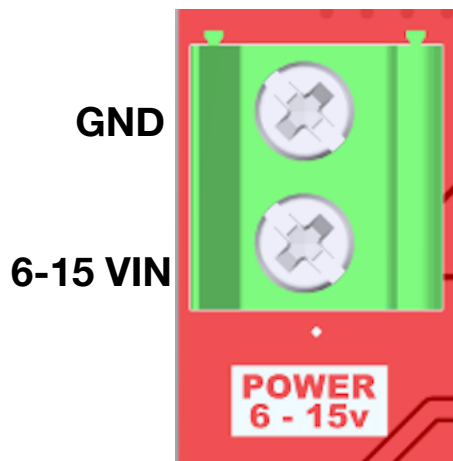- Motor control, robotics, IoT devices, CNC machines, home automation, and general embedded systems.

Dimensions:
- Length: 92 mm.
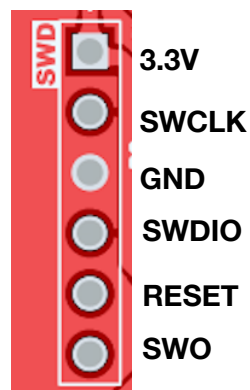- Width: 58 mm.
- Height: 2.5 mm (excluding pin headers).

Board Layout:

STM32F405/F103 CPU BOARD

Connector Details:

GND

6-15 VIN

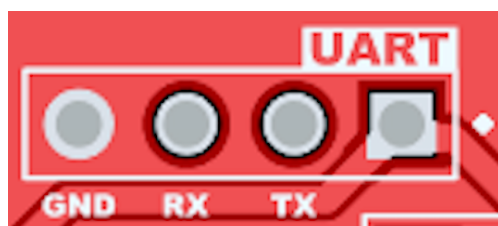Power connector

3.3V

SWCLK

GND

SWDIO

RESET

SWO

Debugging and Programming connector
Pin to pin compatible with provided ST-Link

BOOT0 Jumper (Connect to enable BOOT0 mode)

UART Connector
RX : PB7
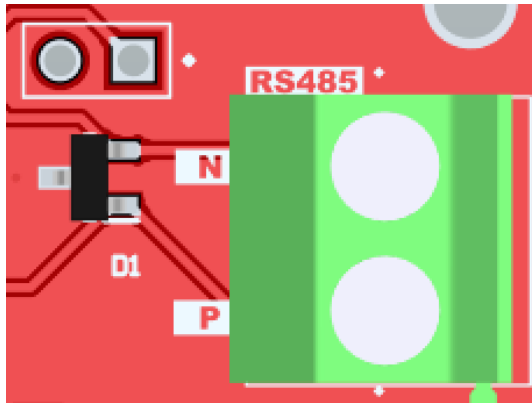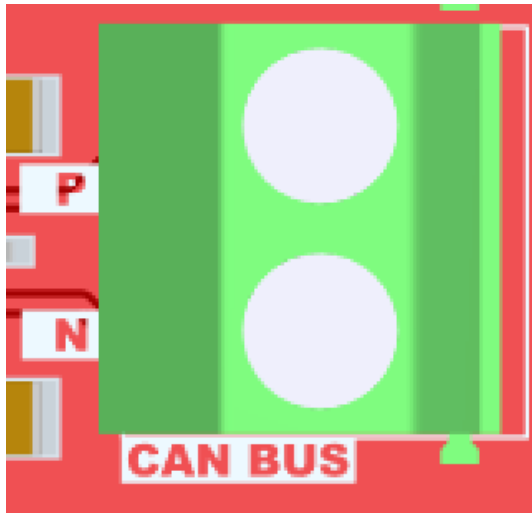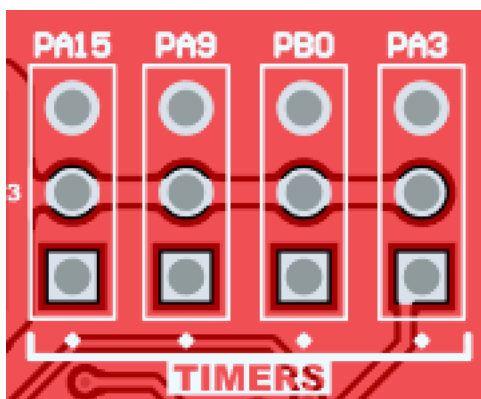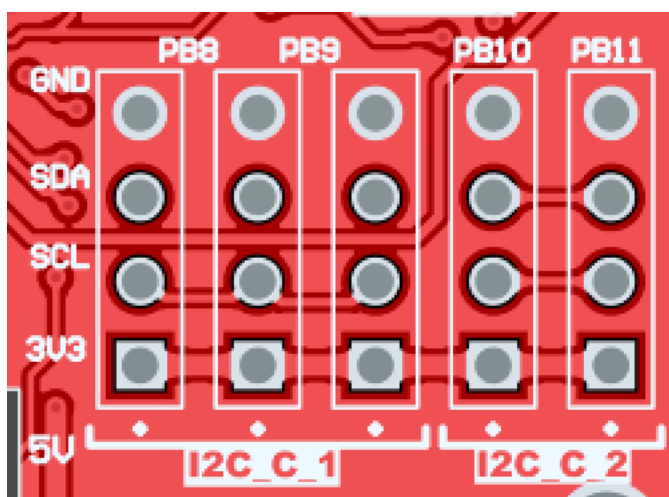TX : PB6
VCC : 3.3 V

GND   RX   TX

RS485 Differential Pair Terminal Block
Jumper is for 120R termination resistor

CAN Bus Differential pair Terminal Block

Timers for driving servos
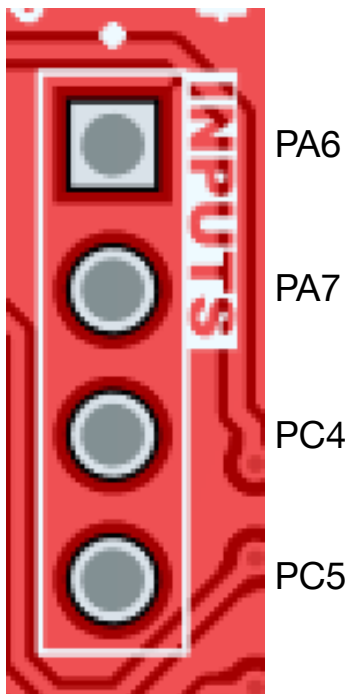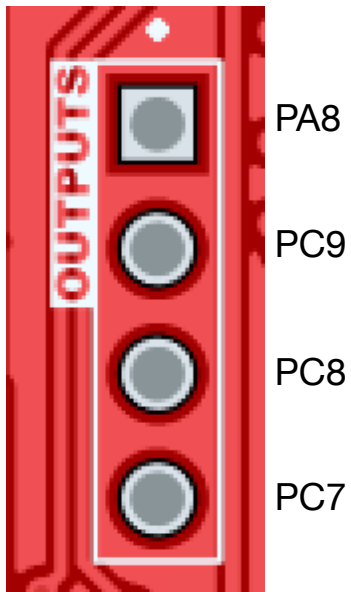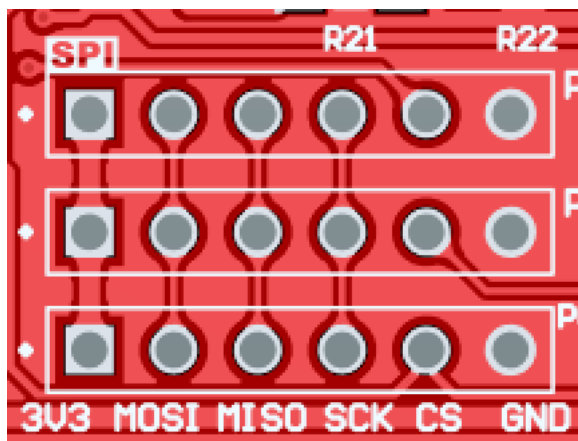**Compatible with standard servos connector pins**

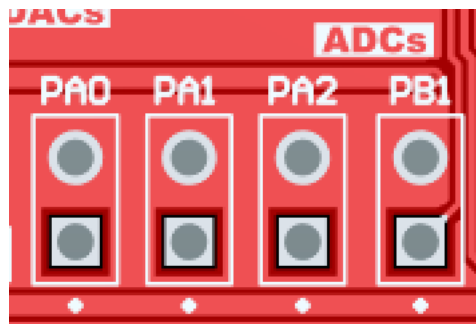
SCL **(ONLY FOR I2C2)**

SDA **(ONLY FOR I2C2)**

I2C1 (SCL: PB8, SDA: PB9)
I2C2 (SCL: PB10, SDA PB11)

OUTPUTS

PA8

PC9

PC8

PC7

INPUTS

PA6

PA7

PC4

PC5

SPI
R21 R22
3V3 MOSI MISO SCK CS GND

SPI

DACS
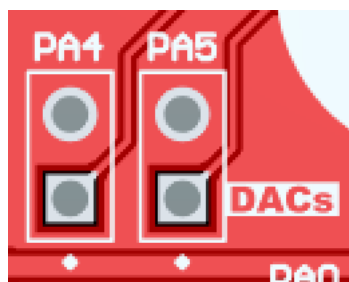ADCs
PA0 PA1 PA2 PB1

ADC

PA4 PA5
DACs
PA0

IO

5V
GND
I/O

IO

Refer to schematic for detailed pin out