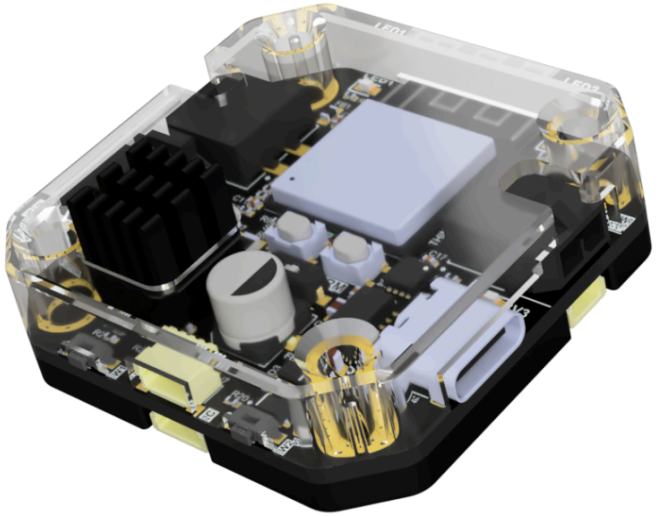
CANBUS Stepper

Daisy Chain-able Closed Loop Stepper motor driver and controller.



Product Overview

The CANBUS Stepper integrates all essential components required to drive a NEMA 17 stepper motor into a single compact board, with control handled over CAN bus. Its CAN-based interface, combined with high-current connectors, enables straightforward daisy chaining of multiple boards.

Built around the ESP32-S3 microcontroller, the design incorporates a TMC2209 stepper driver for quiet and precise motion, along with a 14-bit rotary position sensor to enable closed-loop feedback. It is optimised for scalable, multi-axis systems requiring compact integration, low-noise operation, and precise closed-loop control.

Key Features

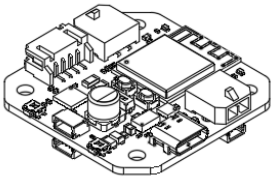
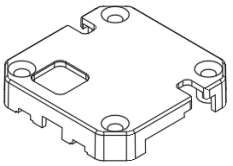
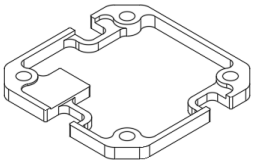
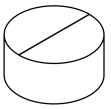
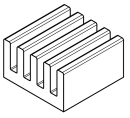
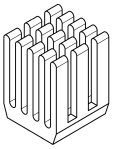
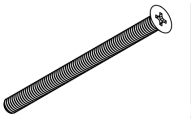
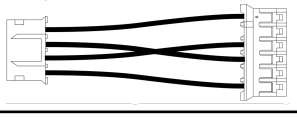
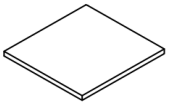
- Daisy Chainable
- ESP32-S3 Processor
- TMC2209 Silent Stepper Driver
- 14 Bit Magnetic Absolute Rotary Encoder
- Qwiic / Stemma QT Compatible
- Web Based GUI For Configuration
- Open-Source software with example code
- WiFi and BLE
- Works with ESPHome

For first time use and assembling a kit please refer to the getting started guide.

For more information, please refer to the project's GitHub repository.

Kit:

Table 1: Components included as part of standard kit

Description	QTY	Image
CANBUS Stepper PCB	1	
Injection Molded Cover	1	
Aluminium Heat Spreader	1	
Diametrically Magnetised Magnet (5x2.5mm)	1	
Small heatsink (8.8 x 8.8 x 5mm)	1	
Large Heatsink (9 x 9 x 12mm)	1	
Screws (M3 x 40mm)[1]	4	
1 to 1 Loom (For ABAB motor)	1	
Crossover Loom (For ABBA motor)	1	
Heat pad (0.5mm thick)	2	

[1] Included screws are best suited for a 34mm length Nema 17 motor

Electrical Information:

Table 2: Electrical Specifications

Specification	Min.	Typ.	Max.	Notes
DC Voltage	5V	12-24V	29V	
AUX Logic Level		3.3V		Refer to ESP32-S3 datasheet for more details
CAN Baud Rate		1M		CAN Transceiver: TCAN3414DRBR
Operating Motor Current			1.92A	Software adjustable
Power Pass Though			12A	12A fuse on Power In connector

Connector Pinouts:

Table 4: **CAN IN/OUT Pinout**

Pin	Signal	Description
1	GND	Ground [3]
2	CAN_L	CAN bus low
3	CAN_H	CAN bus high

[3] For optional shielded cable connection. (If shielding is only required on one end, R17 or R18 resistors can be removed on the PCB).

Table 5: **Power IN/OUT Pinout**

Pin	Signal	Description
1	PWR	Power in / out
2	GND	Ground

Table 6: **AUX Pinout**

Pin	Signal	Description
1	GND	Ground
2	3V3	3.3V Output
3	AUX2	Configurable Auxiliary output 2
4	AUX1	Configurable Auxiliary output 1

Table 7: **I2C Pinout** [4]

Pin	Signal	Description
1	GND	Ground
2	3V3	3.3V Output
3	SDA	I2C Serial Data
4	SCL	I2C Serial Clock

[4] I2C connector is compatible with Qwiic / Stemma QT.

Table 8: **Motor Pinout**

Pin	Signal	Description
1	A1	Motor coil A output 1
2	B1	Motor coil B output 1
3	A2	Motor coil A output 2
4	B2	Motor coil B output 2

Connector Part Numbers:

Table 3: Connectors

Connector	Description	PCB Connector Part Number	Mating Receptacle	Mating Crimp
Power In / OUT	Molex Micro-Fit+ 2 Pin	2189890210	2157591002	Molex 206460 Series
CAN In / OUT	JST SH 3 Pin	SHR-03V-S-B	SHR-03V-S-B	SSH-003T-P0.2-H [5]
AUX	JST SH 4 Pin	SHR-04V-S-B	SHR-04V-S-B	SSH-003T-P0.2-H [5]
I2C	JST SH 4 Pin	SHR-04V-S-B	SHR-04V-S-B	SSH-003T-P0.2-H [5]
Motor	JST PH 4 Pin	S4B-PH-SM4-TB	PHR-4	SPH-002T-P0.5S

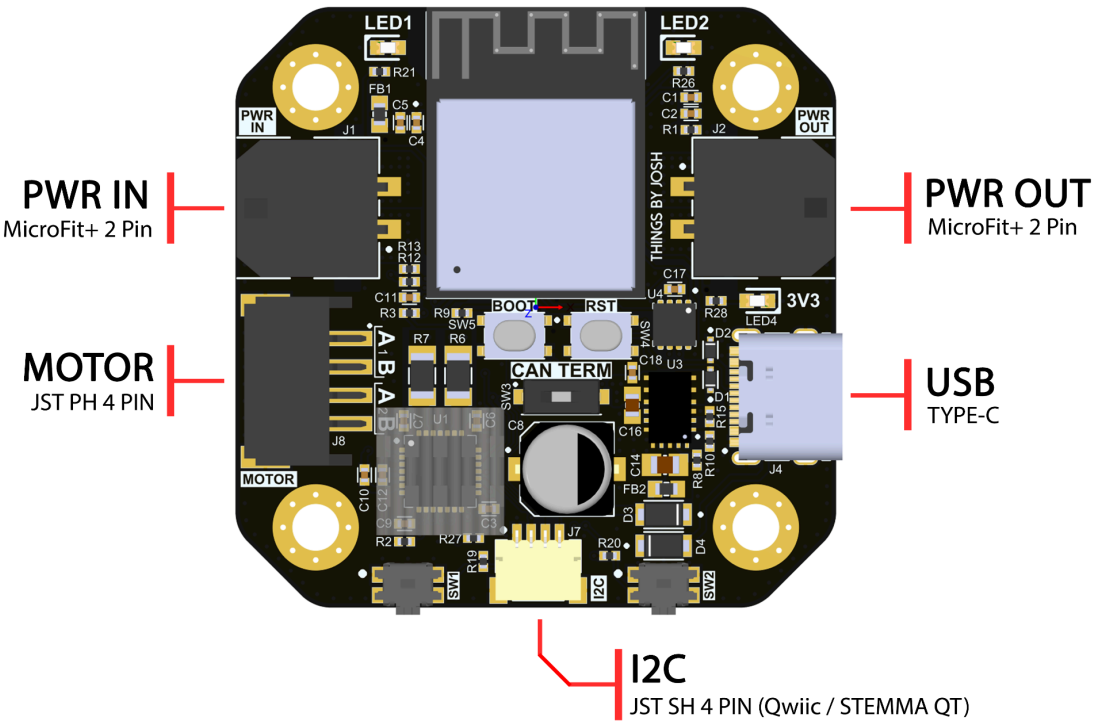
[5] Pre-crimped leads: SSH-003T-P0.2-H X2

Available Looms:

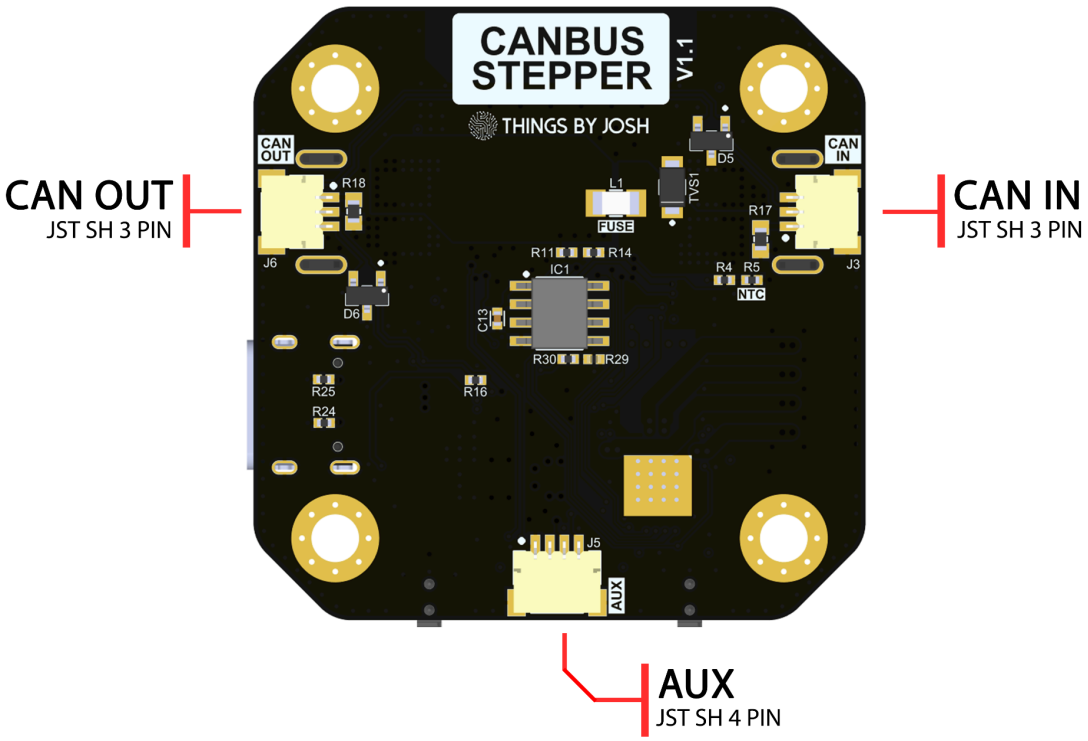
Pre-made power and CAN looms are available at thingsbyjosh.com
For custom lengths & configurations please contact: info@thingsbyjosh.com

Connector Locations:

Top Side



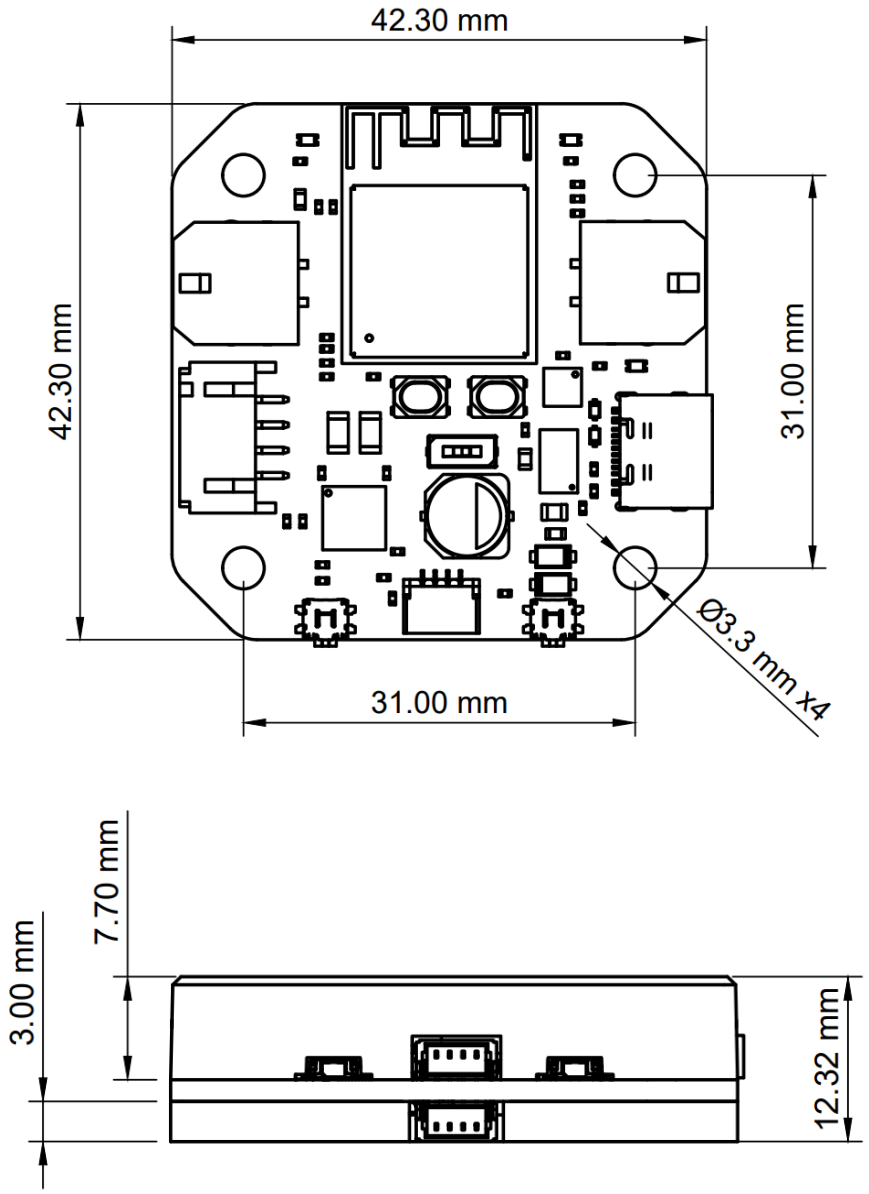
Bottom Side



Software Information:

All boards ship with the standard CANBUS Stepper node software pre-flashed. This allows control of multiple motors over a single CAN bus and use of the online GUI. For more information on software and control please refer to the project GitHub.

Mechanical Overview:



For any queries please contact: info@thingsbyjosh.com