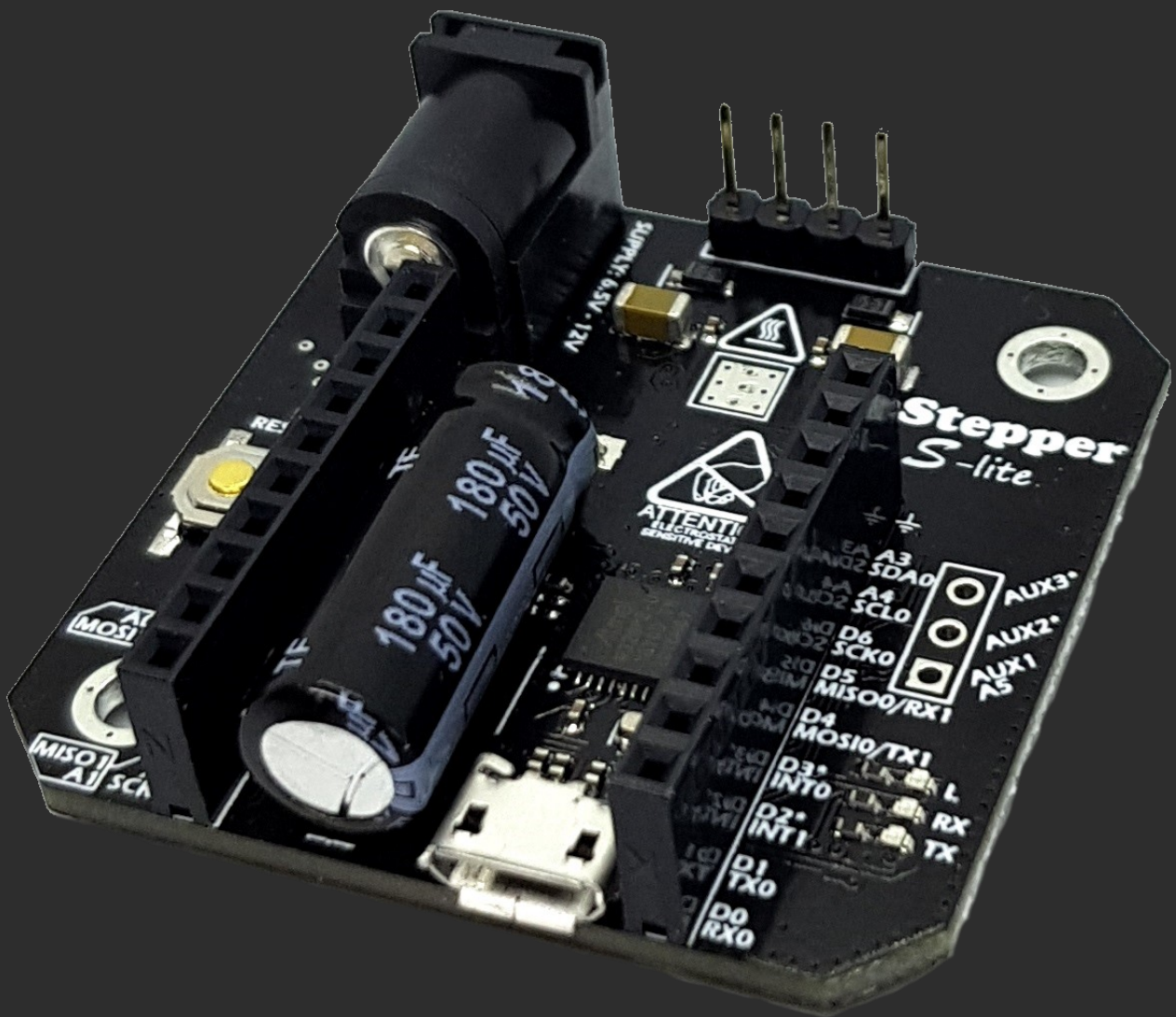


uStepper *S-lite*

Datasheet

Microcontroller, stepper driver and encoder in an ultra-compact design!



Product: **uStepper** *S-lite*

Document revision: 1.3

Author: MGN

Approved by: THO

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System overview

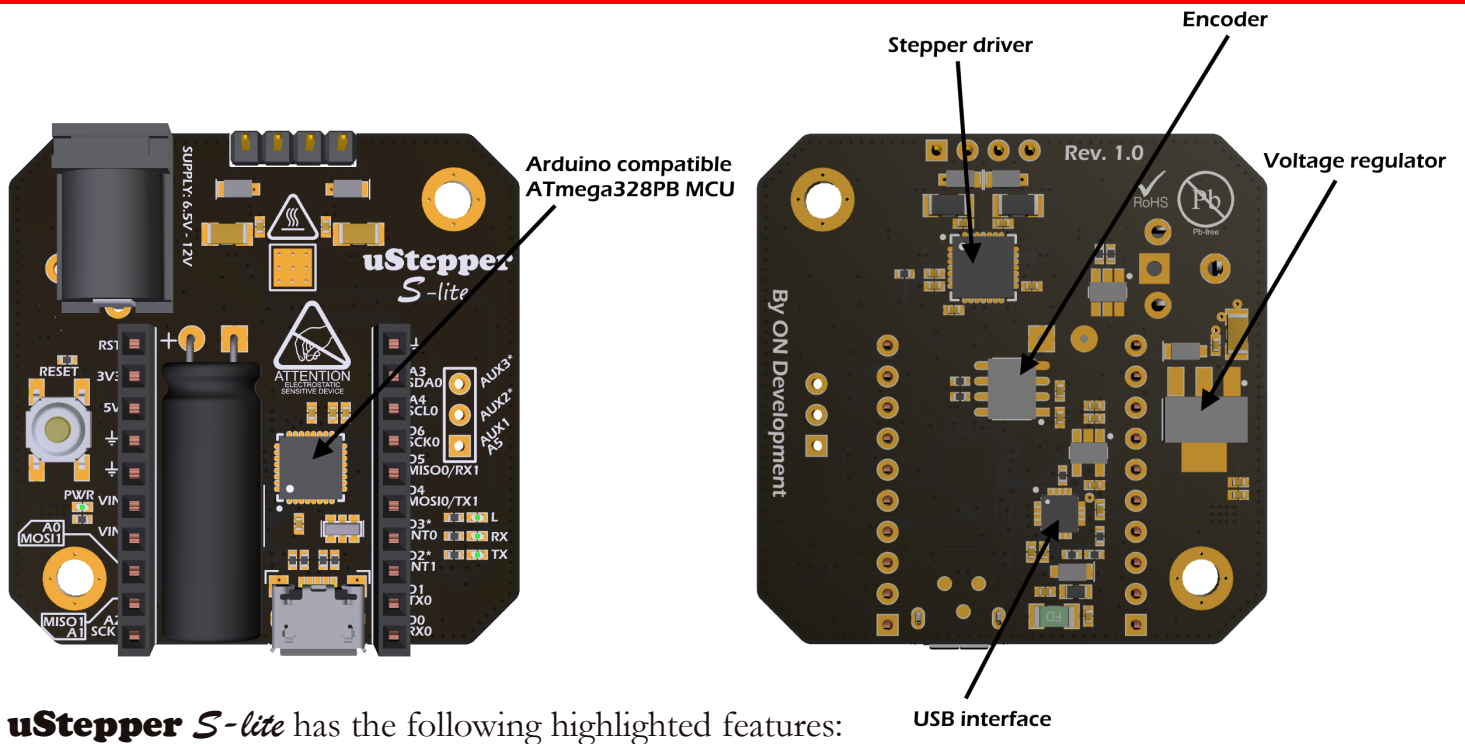
uStepper S-lite incorporates super silent stepper drivers, high resolution encoders and Arduino compatible MCU in a super slim design!

- Program uStepper with ease using the Arduino IDE and our extensive Arduino library !
- Make your stepper motor applications extremely compact !
- Make sure that you never miss a step again, thanks to the on-board encoder and control algorithm !



The super slim design of **uStepper S-lite** makes it possible to develop applications using a stepper motor, without the need for long and messy wiring to an external Arduino/stepper shield. Furthermore the 12-bit rotary encoder ensures that the absolute position of the motor shaft can be tracked, enabling the **uStepper S-lite** to detect any loss of steps and act on it !

uStepper S-lite features



uStepper S-lite has the following highlighted features:

- Compact design, fitting on the back of a NEMA 17 size stepper motor (41.8 mm x 41.8 mm)
- Incorporates the Trinamic TMC2208 with dynamic microstepping for very smooth operation
- Driver delivers 2 A current (peak)
- New upgraded 328PB MCU from Microchip
- 12-bit encoder (0.088 degrees resolution)
- Drive current is software controllable
- 15 I/O
- 6 Analog, 7 PWM
- 2 x SPI , 2 x UART, 1 x I2C
- Supply voltage 6.5 - 12 V
- Reverse polarity protection

Even though **uStepper S-lite** features reverse polarity protection, it is always advisable to check the polarity before supplying power to the board in order to prevent damaging the board.

uStepper *S-lite* features

MCU

uStepper *S-lite* uses the successor of the well tested and widely used ATmega328P - the ATmega328PB. Why? Because it does the job and does it good! The new upgraded ATmega328PB has been upgraded on multiple points including double USART, double I2C, double SPI and upgraded timers !

Stepper driver chip

The TMC2208 features a whopping 1/256th microstepping interpolation algorithm, which means that it takes in 1/16th microstepping pulses, as send out by most 3D printer controllers for example, and dividing each of these into 16 substeps ! This means that the rotor inside the motor travels much shorter distances between the steps, and hereby significantly reduces the resonances generated by stepper motors. This in turn ensures that you gets the smoothest possible operation while keeping the noise to an absolute minimum !

Encoder

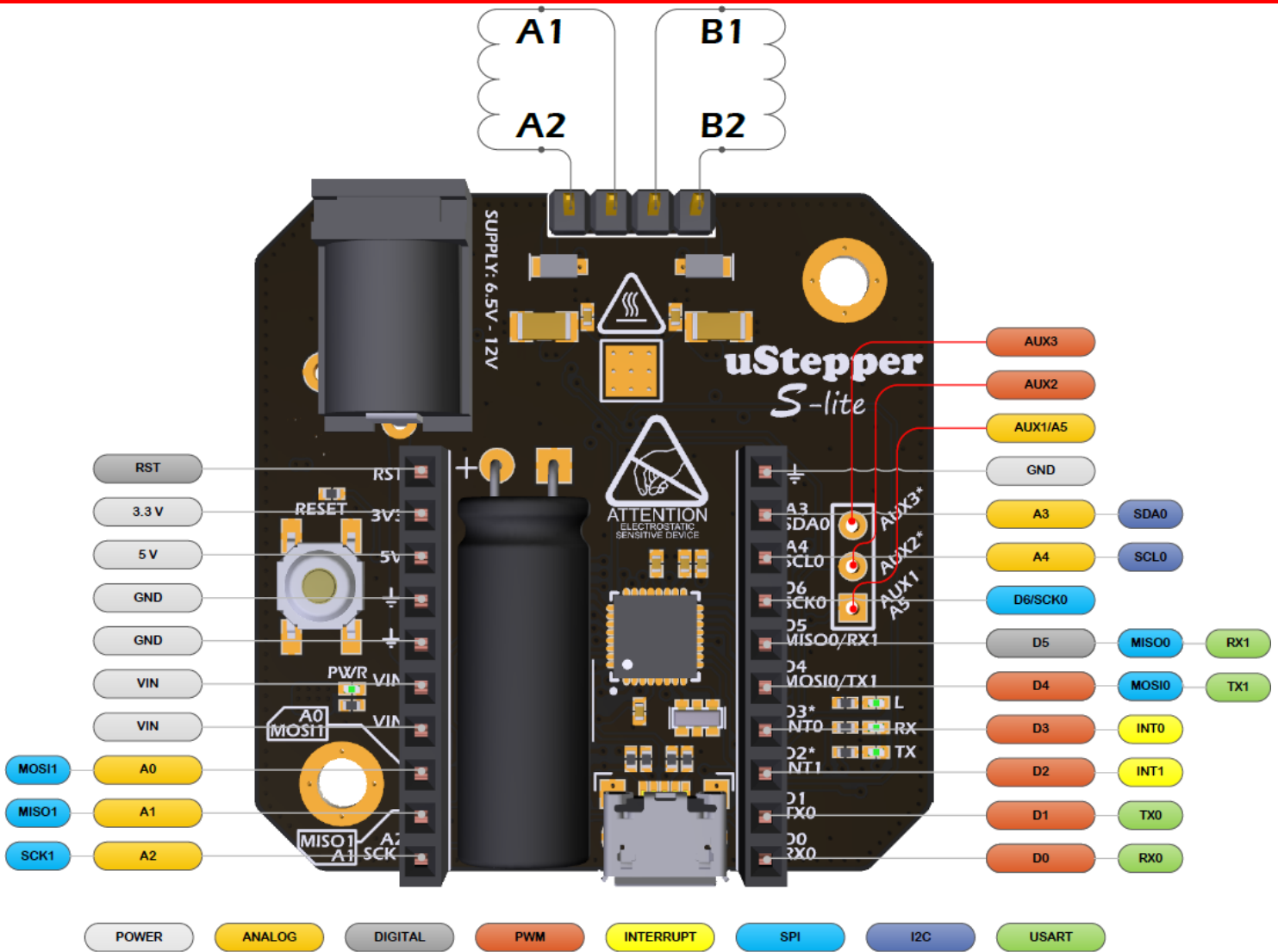
The **uStepper *S-lite*** uses the AS5600 encoder from AMS, delivering 12 bits resolution and delivers great performance for the money.

Software Features

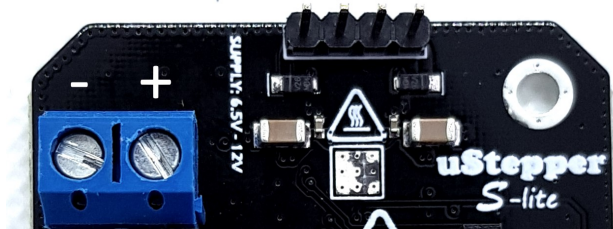
uStepper *S-lite* uses the code base of the original **uStepper**. This will give you a lot of functionality, and some of the key ones are:

- Closed loop position control
- Drop-in capability
- Simple move/stop commands
- Stall detection feedback
- Encoder diagnostics
- Multi-turn absolute position feedback (almost infinite revolutions)

uStepper S-lite pin mapping



As it can be seen from the PIN mapping above, **uStepper S-lite** offers a vast amount of GPIO's from it's ATmega328PB MCU. This makes the uStepper capable of interacting with various sensors, actuators, communication modules etc. - Besides functioning as a stepper driver with feedback capability.



Polarity Screw Terminal

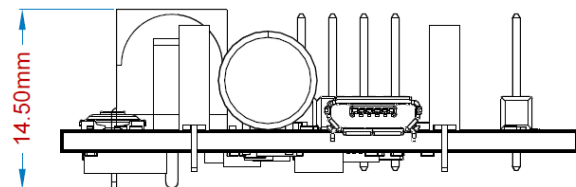
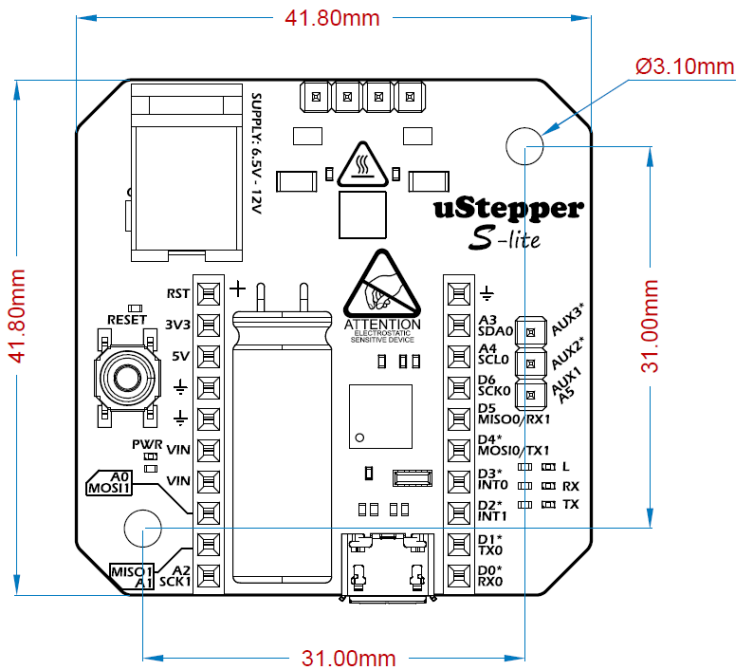
uStepper S-lite characteristics

Electrical characteristics

I/O Voltage	5 V
Input Voltage (recommended)	6.5 - 12 V
DC Current per I/O Pin (max)	40 mA (max 200 mA total I/O draw)
DC Current for 5 V Pin (max)	200 mA
DC Current for 3.3 V Pin (max)	50 mA
Stepper drive current	Up to 2A (peak)

Physical characteristics

Dimensions	41.8 x 41.8 x 14.5 mm
Weight	~13g

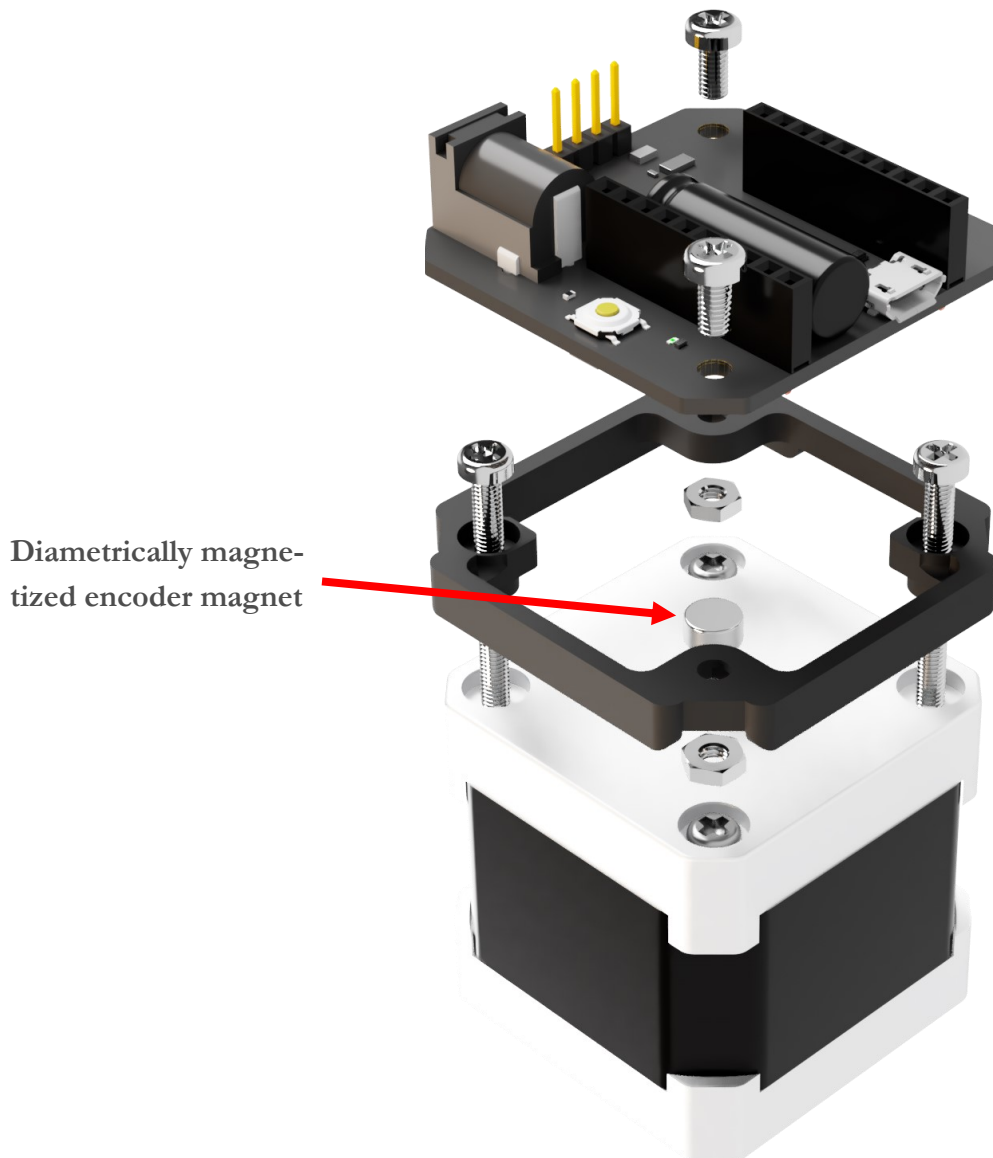


uStepper *S-lite* mounting

uStepper *S-lite* comes with a bracket allowing you to easily mount it on the back of a NEMA 17 stepper motor ! And here is how you do it:

Permanent mount:

1. Remove two motor screws
2. Place encoder magnet on motor shaft
3. Insert nuts into bracket and mount bracket to motor w. two long screws
4. Secure **uStepper *S-lite*** to the bracket with screws



uStepper *S-lite* FAQ

For information on how to setup uStepper in the Arduino IDE, visit our GitHub repository at www.github.com/uStepper or have a look at our videos on YouTube - search for uStepper.

More information/documentation on the uStepper Arduino library is also found in the readme section on our GitHub repository.

Q: I can't program uStepper from the Arduino IDE, what is wrong?

A: Three most common issues:

1. If you use the Windows store app "Arduino IDE" you might experience problems. Download the executable or portable version of Arduino IDE from www.arduino.cc
2. Install hardware support and the **uStepper *S-lite*** library
3. Remember to choose **uStepper *S-lite*** as the board you program to

Q: When I run uStepper closed loop PID or Drop-in the motor spins up and runs fast in one direction, what is wrong?

A: Two most common issues:

1. Check that the encoder magnet is placed correctly on the motor shaft
2. Check that your PID parameters in the Arduino code are sane. A good starting point is to set P and I to 0.5 and D to 0.

For more FAQ visit www.ustepper.com !

uStepper *S-lite* applications

Because of low cost and reliability stepper motors are favored over servo drives in a variety of applications, as for example robots, CNC machines, 3D-printers etc. With added feedback uStepper can add a new dimension to stepper operation utilizing closed loop control or correction of missed steps - making the stepper even more appealing than a more costly servo drive. With the numerous features and the vast amount of I/O's (including various busses), uStepper is the choice for DIY hobbyists when in need of a reliable, precise and compact actuator for almost any application.

Almost unlimited applications and ease of programming using the Arduino IDE also makes uStepper well suited for educational purposes !

"After all, learning just gets a bit more fun when there's movement involved!"

Disclaimer

1 Disclaimers and Limitation of Liability

1.1 uStepper ApS and/or ON Development IVS (or any individuals affiliated with either of the two companies) can not be held responsible for any damage inflicted upon mounting or interfacing with the uStepper board. This also includes damage to stepper motor (both electrical and mechanical) or any other 3rd party hardware connected to uStepper. Most stepper motor cases are made of aluminum, and care must be taken when preparing the mountings for uStepper.

1.2 By using the uStepper products (including, but not limited to, hardware and software) you acknowledge that uStepper ApS and/or ON Development IVS (or any individuals affiliated with either of the two companies) can not be held responsible for any personal injuries and/or damage to any 3rd party hardware that may occur when using the uStepper products.

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