

## Power Step Click



PID: MIKROE-6623

**Power Step Click** is a compact add-on board designed for control of high-power two-phase bipolar stepper motors in industrial applications. It is based on the [A4989SLD](#) gate driver with integrated microstepping translator from [Allegro Microsystems](#). This Click board uses external N-channel MOSFETs to deliver motor currents up to 20A at supply voltages from 12V to 35V, and supports full-, half-, quarter-, and sixteenth-step resolutions via a simple STEP/DIR interface. Key features include programmable decay modes (slow, mixed, fast), a REF trimmer for fine-tuning motor current, and a selectable synchronous rectification mode. Power Step Click is ideal for industrial automation, CNC machinery, robotic platforms, and any application requiring accurate and efficient high-power stepper motor control.

For more information about **Power Step Click** visit the official [product page](#).

### How does it work?

Power Step Click is based on the A4989SLD, a dual full-bridge MOSFET driver with a microstepping translator from Allegro Microsystems. Designed to control higher power industrial two-phase stepper motors typically ranging from 30 to 500 watts, this board uses eight external N-channel power MOSFETs ([IPZ40N04S5L-4R8](#)) to deliver motor currents up to 20A at operating voltages between 12 and 35V on the VIN terminal. At the core of the Power Step Click, the A4989SLD features two sinusoidal DACs that serve as reference voltage generators for two individual fixed off-time PWM current controllers, ensuring precise current regulation across both full-bridge driver outputs. In addition to the internal DACs, the board includes a REF trimmer that allows users to manually set the reference voltage for current regulation, providing an extra layer of flexibility when fine-tuning the motor current according to specific application requirements. The Power Step Click is an ideal solution for engineers

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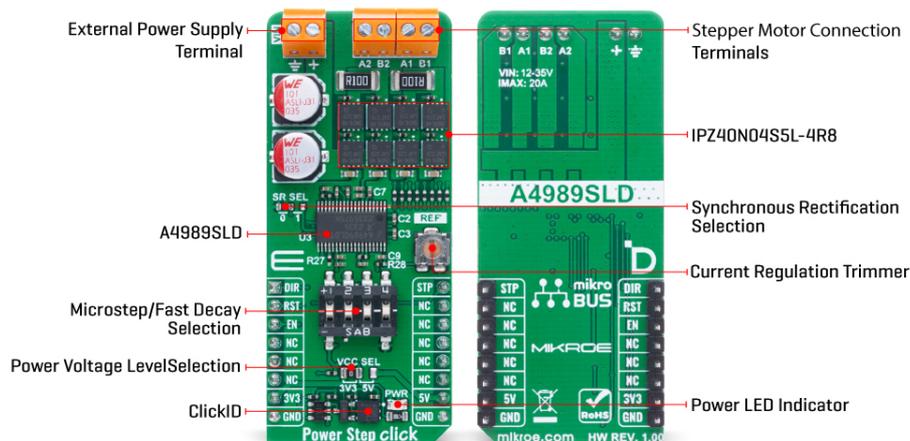


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seeking a robust and flexible stepper motor driver platform that minimizes control complexity while offering high power performance.



The board is equipped with a simple two-wire control interface - step and direction (STP and DIR) - enabling microstepping control at selectable resolutions of full, half, quarter, and sixteenth steps, configured via combination of multifunctional switch pins 3 and 4. The internal translator logic of the A4989SLD simplifies implementation by eliminating the need for high-frequency control signals or complex phase-sequencing, as each input pulse on the STP pin directly advances the motor by one step at the chosen resolution. Additionally, the driver supports multiple decay modes - slow, mixed, and fast - which can be created using multifunctional switch pins 1 and 2 to select the proportion of fast decay when mixed decay is active. This intelligent decay mode configuration contributes to quieter operation, improved step accuracy, and lower overall power dissipation.

In addition to the STP pin used for stepping control, Power Step Click incorporates several other control inputs to enhance the flexibility and performance. The DIR pin functions as the direction input, determining the rotational direction of the motor - when held LOW, the motor rotates clockwise, and when held HIGH, it rotates counter-clockwise. Importantly, any change in the DIR pin state takes effect only on the rising edge of the next pulse on the STP pin, ensuring accurate directional control synchronized with the stepping logic.

The board also includes an RST pin that serves to reset the A4989SLD IC, returning it to a known default state when triggered, as well as an EN pin that acts as an output enable signal. When the EN pin is asserted, the power output stages are activated, allowing motor control; when deasserted, all outputs are disabled, putting the system into a low-power or idle state. Additionally, Power Step Click features a jumper labeled SR SEL, which is used to set the behavior of the synchronous rectification feature.

When the SR SEL jumper is in position 0 (active mode), the device actively prevents current reversal by disabling synchronous rectification once a zero-current condition is detected, thus stopping the motor windings from conducting in the reverse direction. This mode is optimal for reducing power dissipation through the MOSFETs while maintaining precise current control. Alternatively, when SR SEL is set to position 1 (disabled mode), synchronous rectification is turned off entirely.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines

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properly. Also, this Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used as a reference for further development.

## Specifications

Type	Stepper
Applications	Ideal for industrial automation, CNC machinery, robotic platforms, and any application requiring accurate and efficient high-power stepper motor control
On-board modules	A4989SLD - dual full-bridge MOSFET driver with a microstepping translator from Allegro Microsystems
Key Features	High-power stepper motor control, eight external N-channel MOSFETs, support for full-, half-, quarter-, and sixteenth-step microstepping, integrated sinusoidal DACs for smooth current regulation, adjustable reference voltage via onboard REF trimmer, selectable decay modes including slow, mixed, and fast, direction and step input control interface, reset and output enable functionality, configurable synchronous rectification, and more
Interface	GPIO, PWM
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V, External

## Pinout diagram

This table shows how the pinout on Power Step Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Direction Control	<b>DIR</b>	1	AN	PWM	16	<b>STP</b>	Stepping Control
Reset / ID SEL	<b>RST</b>	2	RST	INT	15	NC	
Output Enable / ID COMM	<b>EN</b>	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	<b>5V</b>	Power Supply
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

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Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	SR SEL	Left	Synchronous Rectification Selection 0/1: Left position 0, Right position 1
RV1	REF	-	Current Regulation Trimmer

## Power Step Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Supply Voltage	12	-	35	V
Output Current (Peak)	-	-	20	A

## Software Support

[Power Step Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

## Example Description

This example demonstrates the use of the Power Step Click board by driving the motor in both directions for a desired number of steps.

### Key Functions

- `powerstep_cfg_setup` This function initializes Click configuration structure to initial values.
- `powerstep_init` This function initializes all necessary pins and peripherals used for this Click board.
- `powerstep_reset_device` This function resets the device by setting the RST pin logic state.
- `powerstep_drive_motor` This function drives the motor for the specific number of steps at the selected speed.

### Application Init

Initializes the driver and resets the device.

### Application Task

Drives the motor clockwise for 100 slow steps and 300 medium speed steps and then counter-clockwise for 400 fast steps with a 1 second delay on driving mode change. All data is being logged on the USB UART where you can track the program flow.

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## Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

## Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

## Downloads

[Power Step click example package](#)

[Power Step click 2D and 3D files v100](#)

[A4989 datasheet](#)

[IPZ40N04S5L-4R8 datasheet](#)

[Power Step click schematic v100](#)

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