

Stepper 14 Click



PID: MIKROE-4125

The **Stepper 14 Click** is a Click board™ that features the [DRV8847PWP](#), a step motor driver, from [Texas Instruments](#). This Click board™ provides a bipolar step motor control. It features an H-bridge bipolar step motor driver, which supports full-, half-, quarter-, or eighth-step modes. This click board™ also carries a port expander so that the communication can be done with a minimal number of pins, through the mikroBUS™ I2C bus. This click board™ offers thermal protection, integrated kickback voltage protection, it has a wide range of input voltage, protection against current shoot-through the H-Bridge and high current capability. These features make Stepper 14 click an ideal solution for driving motors in any application that demands a precise and safe step motor driver.

Stepper 14 click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

How does it work?

This click board™ is equipped with two integrated circuits. The step motor driver IC is the DRV8847PWP, a dual full-bridge motor driver from Texas Instruments. This IC internal structure is somewhat symmetrical. It features two MOSFET H-bridges used to drive two coils of a bipolar step motor in both directions. The DRV8847PWP uses a wide input voltage range - from 2.7V to 18V. This is the voltage used to energize the motor coils. A jumper (JP4) is used to select whether to use external power supply or to obtain the power supply from the mikroBUS™ +3.3V or +5V rail. The DRV8847PWP has two PHASE inputs which are used to control the direction of current flow through H-bridges and thus, the motor coils. It also allows controlling step motor in both full step and half step modes, by toggling states on MS1 and MS1

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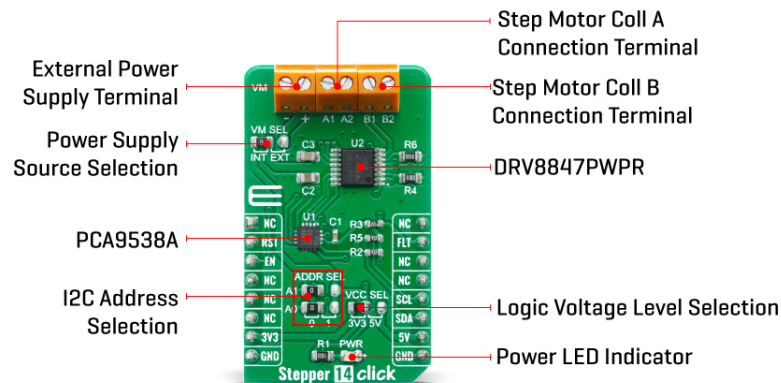


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pins.



The bipolar step motor coils can be connected to the onboard screw terminals. There are two terminals, used to connect each of the step motor coils. The third connector is used to connect an external voltage, ranging from 2.7V to 18V, depending on the used motor voltage requirements. It should be noted that without a valid external voltage connected to this terminal, the motor will not work. Also, it should be noted that 20V is an absolute maximum voltage allowed as per datasheet, thus the overtemperature protection might be activated when driving heavier loads. The recommended maximum voltage should not exceed 18V, as stated on the silkscreen layer of the PCB.

All of the DRV8847PWPR control lines are routed to the second IC on Stepper 14 board, which is the [PCA9538A](#), a well-known 8bit I/O expander with a serial interface, used on many of the MikroElektronika's designs for its simplicity and reliability. It allows the control lines of the DRV8847PWPR IC to be driven via the I2C and few pins it uses - reducing the required pin count of the Stepper 14 click. This also allows for sending compact I2C messages, instead of toggling several pins at once - which can introduce problems with timing sometimes, especially when those pins belong to different MCU ports. By changing states of the six control pins, it is possible to drive the step motor in full step mode as well as the half step mode. However, provided MikroElektronika libraries contain simple and intuitive functions to fully control the bipolar step motor, connected to Stepper 14 click. Their usage is demonstrated in the included example application, which can be used as a reference for a custom design.

The motor power supply can be connected to the input terminal labeled as VIN and should be within the range of 2.7V to 18V. Stepper motor coils can be connected to the terminals labeled as A1, B2, B1, and A2. The Click board™ supports an optional external power supply for the motor in order to work.

However, this Click board™ can be supplied and interfaced with both 3.3V and 5V without the need for any external components. The onboard SMD jumper labeled as VCC SEL allows voltage selection for interfacing with both 3.3V and 5V microcontrollers.

Specifications

Type	Stepper
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Applications	Refrigerator damper and ice maker, Washers, dryers and dishwashers, Electronic point-of-sale (ePOS) printers , Stage lighting equipment, Miniature circuit breakers and smart meters etc.
On-board modules	DRV8847PWPR Dual Full-Bridge 18V, 1A, Stepper Motor Driver, from Texas Instruments; PCA9538A 8bit I/O Expander with Serial Interface, from NXP
Key Features	Dual H-bridge motor driver, Single or dual brushed DC motors, One bipolar stepper motor, Solenoid loads, Multiple control interface options.
Interface	GPIO,I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Stepper 14 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
Reset In	RST	2	RST	INT	15	FLT	Fault
Enable	EN	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	SCL	I2C Clock
	NC	6	MOSI	SDA	11	SDA	I2C Data
Power Supply	3.3V	7	3.3V	5V	10	5V	Power Supply
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Supply Voltage Selection: Left position 3V3, right position 5V
JP2	ADDR SEL	Left	Slave address selection: Left position 0, right position 1.
JP3	ADDR SEL	Left	Slave address selection: Left position 0, right position 1.

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JP4	VM SEL	Left	Power select jumper for motor power supply: left position - On-board supply, right position - External supply.
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Stepper 14 Click electrical specifications

Description	Min	Typ	Max	Unit
Input Voltage	2.7	-	18	V
Output current	-	-	1	A

Software Support

We provide a library for the Stepper14 Click on our [LibStock](#) page, as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Library Description

The library covers all the necessary functions that enables the usage of the Stepper 14 Click board. It initializes and defines the I2C driver and drivers that allow full control of the device to the user. User can use the device to control forward and reverse motion, apply brake and coast functions for brushless dc motors, and forward and reverse motion in full step and half step for stepper motors.

Key functions:

- void stepper14_step_motor (uint8_t interface, uint8_t direction, uint32_t steps_no); - Function is used to drive two or four wire stepper motor in user defined direction, one step at a time.
- void stepper14_set_half_step (uint8_t hl_step); - Function is used to set specific half step.
- void stepper14_control_mode_set (uint8_t mode); - Function is used to set mode of operation.

Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C module, LOG and GPIO structures, sets INT pin as input and RST and CS pins as output.
- Application Initialization - Initializes I2C driver, applies setup for 4-pin interface and writes an initial log.
- Application Task - (code snippet) Demonstrates use of Stepper 14 click board by driving NEMA 17 stepper motor one turn forward and then one turn backward.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other mikroE Libraries used in the example:

- I2C

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- UART

Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART 2 click](#) or [RS232 click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. The terminal available in all MikroElektronika [compilers](#), or any other terminal application of your choice, can be used to read the message.

mikroSDK

This Click board™ is supported with [mikroSDK](#) - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the [LibStock](#) and installed for the compiler you are using.

For more information about mikroSDK, visit the [official page](#).

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

Downloads

[Stepper 14 click 2D and 3D files v100](#)

[PCA9538A datasheet](#)

[DRV8847 datasheet](#)

[Stepper 14 click example on Libstock](#)

[Stepper 14 click schematic v100](#)

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