

# Stepper 21 Click



PID: MIKROE-5678

**Stepper 21 Click** is a compact add-on board that contains a bipolar stepper motor driver. This board features the DRV8825, a stepper motor controller integrated circuit from [Texas Instruments](https://www.ti.com). It is a PWM micro-stepping stepper motor driver with up to 1/32 micro-stepping resolution and a built-in micro-stepper indexer. The driver has two H-bridge drivers and is intended to drive a bipolar stepper motor in a voltage supply operating range of 8.2V up to 45V. This Click board™ makes the perfect solution for small stepping motors in various applications such as office automation and commercial and industrial equipment.

## How does it work?

Stepper 21 Click is based on the DRV8825, a stepper motor controller integrated circuit from Texas Instruments. By integrating two NMOS H-bridges, current sense, and a STEP/DIR interface, the DRV8825 allows easy interfacing with the controller circuit. The STEP/DIR interface provides a simple method for advancing through the indexer table, with the direction determined by the DIR input pin and the indexer traveling for each rising edge on the STEP input pin. It uses three decay modes of operation, fast, slow, and mixed decay, as a highly configurable current regulation. Additional features are overcurrent protection, thermal shutdown, supply voltage undervoltage lockout, and fault condition indication.

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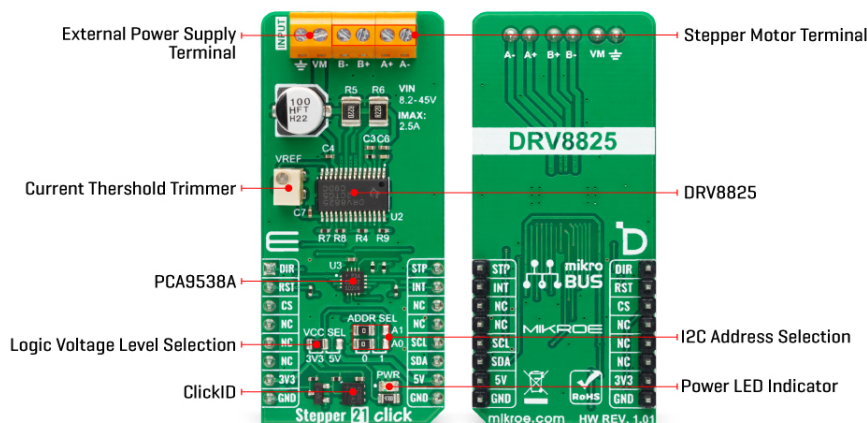
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The host MCU can control the direction and steps of the stepper driver directly through the DIR and STP pins of the mikroBUS™ socket. As a feature of its own, the Stepper 21 Click comes with a VREF potentiometer to set a reference voltage for winding current on both A and B bridges. The Stepper 21 Click also uses the [PCA9538A](#), a low-voltage 8-bit I/O port expander from NXP Semiconductors, and its standard 2-Wire interface to communicate with the host MCU and control some of the features of the stepper driver.

The PCA9538A provides a flexible set of GPIOs, contains an 8-bit register set, and is necessary for interfacing the DRV8825 control pins to the host MUC over the pins-limited mikroBUS™ socket. Besides the standard 2-Wire interface, the host MCU has access to the expander's reset and interrupt lines over the RST and INT pins of the mikroBUS™ socket. The interrupt output is activated when any input state differs from its corresponding input port register state. The I2C address of the expander can be selected over the ADDR SEL jumper with 0 set by default.

The expander can also control other features like Sleep mode, home position indication, decay mode selection, fault indicator triggered by over-temperature and over-current protection, or allow you to enable or disable the stepper driver. Last but not least, the expander controls micro-step modes combination (Mode 0-2), thus allowing the selection of full, 1/2, 1/4, 1/8, 1/16, and 1/32 steps.

The Stepper 21 Click supports an external power supply for the DRV8825, which can be connected to the input terminal labeled as INPUT VM and should be within the range of 8.2V to 45V (2.5A), while the stepper motor coils can be connected to the terminals labeled as B+, B-, A-, and A+.

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 properly. However, the 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	Can be used for small stepping motors in various applications such as office automation and commercial and industrial equipment

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On-board modules	DRV8825 - stepper motor controller integrated circuit from Texas Instruments
Key Features	Low power consumption, capable of controlling the bipolar stepping motor, operational in full, half, quarter, 1/8, 1/16, and 1/32 step resolutions, built-in a mixed decay mode, anomaly detection functions, expander that controls most of I/O of the stepper driver with interrupt abilities, and more
Interface	GPIO,I2C
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

## Pinout diagram

This table shows how the pinout on Stepper 21 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Stepper Direction	<b>DIR</b>	1	AN	PWM	16	<b>STP</b>	Stepper Indexer
Reset	<b>RST</b>	2	RST	INT	15	<b>INT</b>	Interrupt
ID COMM	<b>CS</b>	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	<b>SCL</b>	I2C Clock
	NC	6	MOSI	SDA	11	<b>SDA</b>	I2C Data
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

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2-JP3	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1
P1	VREF	-	Current Threshold Trimmer

## Stepper 21 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V

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External Supply Voltage VM	8.2	-	45	V
Maximum Output Current	-	-	2.5	A

## Software Support

We provide a library for the Stepper 21 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

## Library Description

This library contains API for Stepper 21 Click driver.

Key functions

- `stepper21_set_step_mode` This function sets the step mode resolution settings.
- `stepper21_set_direction` This function sets the motor direction by setting the DIR pin logic state.
- `stepper21_drive_motor` This function drives the motor for the specific number of steps at the selected speed.

## Example Description

This example demonstrates the use of the Stepper 21 Click board™ by driving the motor in both directions for a desired number of steps.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Stepper21

## 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. UART terminal is available in all MIKROE [compilers](#).

## mikroSDK

This Click board™ is supported with [mikroSDK](#) - MIKROE Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be

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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™](#)

[ClickID](#)

## Downloads

[Stepper 21 click example on Libstock](#)

[PCA9538A datasheet](#)

[DRV8825 datasheet](#)

[Stepper 21 click 2D and 3D files v101](#)

[Stepper 21 click schematic v101](#)

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