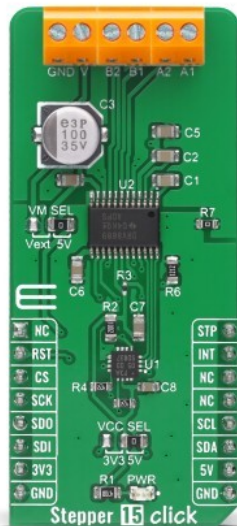


Stepper 15 Click



PID: MIKROE-4639

Stepper 15 Click is a compact add-on board that contains a bipolar stepper motor driver. This board features the DRV8889A, an automotive stepper driver with integrated current sense and stall detection from Texas Instruments. It supports up to 1.5A full-scale current with an internal microstepping indexer, smart tune decay technology, advanced stall detection algorithm, and integrated current sensing, eliminating the need for power sense resistors. With a simple STEP/DIR interface, the device supports up to 1/256 levels of microstepping to enable a smooth motion profile. Also, an advanced stall detection algorithm allows users to detect if the motor stopped and take action as needed, improving efficiency and reducing noise. This Click board™ is suitable for driving motors in any application that demands a precise and safe step motor driver.

Stepper 15 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?

Stepper 15 Click, uses the DRV8889A, an integrated motor-driver solution for bipolar stepper motors from Texas Instruments. The DRV8889A integrates two N-channel power MOSFET H-bridges (disabled by default after Power-Up), integrated current sense and regulation circuitry, and a microstepping indexer. It can be powered with a supply voltage from 4.5 to 45V, providing an output current up to 2.4A peak, 1.5A full-scale, or 1.1A RMS.

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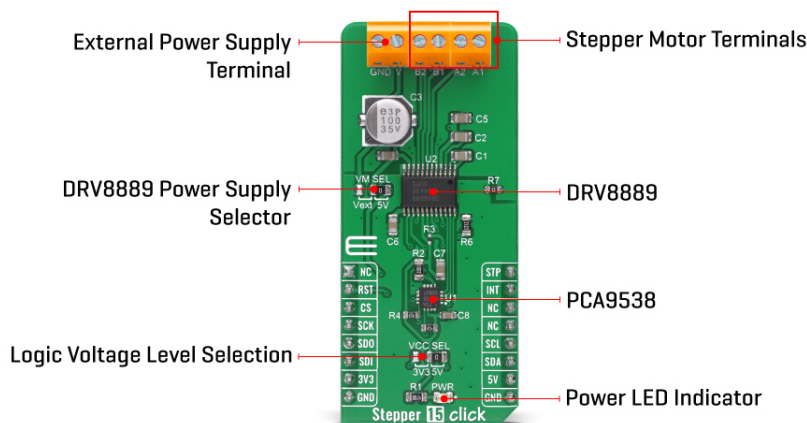
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The DRV8889A uses an integrated current-sense architecture which eliminates the need for two external power sense resistors. This architecture removes the power dissipated in the sense resistors using a current mirror approach and using the internal power MOSFETs for current sensing. It also includes an integrated torque DAC that allows the controller to scale the output current through a full-duplex, 4-wire synchronous SPI interface without needing to scale the voltage reference. The torque DAC allows the controller to save system power by decreasing the motor current consumption when high output torque is not required.

A simple STEP/DIR interface allows an external MCU to manage the direction and step rate of the stepper motor. The internal indexer can execute high-accuracy microstepping without requiring the MCU to handle the winding current level. The indexer is capable of the whole step, half step, and 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, and 1/256 microstepping. Also, a noncircular half stepping mode is available for increased torque output at higher motor RPM in addition to a standard half stepping mode.

Unlike the STEP pin controlled by the PWM pin from the mikroBUS™ socket, other pins from the DRV8889A such as Sleep mode selection, fault indicator, direction selection, and device disable pin are controlled through a well-known 8bit I/O expander, the [PCA9538](#) from NXP Semiconductor using the standard I2C 2-Wire interface with a maximum frequency of 400kHz. The PCA9538 also uses RST and INT pins from the mikroBUS™ socket as a hardware reset and interrupt function.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. It allows for both 3.3V and 5V capable MCUs to use the communication lines properly. Additionally, there is a possibility for stepper motor driver power supply selection via jumper labeled as VM SEL to supply the DRV8889A from an external input terminal in the range from 4.5 to 45V or with a 5V from mikroBUS™ power rail.

Specifications

Type	Stepper
Applications	Can be used for driving motors in any application that demands a precise and safe step motor driver.
On-board modules	DRV8889A - integrated motor-driver solution for bipolar stepper motors from Texas

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	Instruments
Key Features	Qualified for automotive, up to 1/256 microstepping, integrated current sense, various protection features, and more.
Interface	I2C,SPI
ClickID	No
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 Stepper 15 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS				Pin	Notes
	NC	1	AN	PWM	16	STP	Step Rate
Reset	RST	2	RST	INT	15	INT	Interrupt
SPI Chip Select	CS	3	CS	RX	14	NC	
SPI Clock	SCK	4	SCK	TX	13	NC	
SPI Data OUT	SDO	5	MISO	SCL	12	SCL	I2C Clock
SPI Data IN	SDI	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	VM SEL	Right	DRV8889A Power Supply Selection Vext/5V: Left position Vext, Right position 5V
JP2	VCC SEL	Right	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

Stepper 15 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage VCC	3.3	-	5	V
Supply Voltage Vext	4.5	-	45	V
Maximum Output Current	-	-	1.5	A
Step Resolution	1/256	-	1	μstep
Operating Temperature Range	-40	+25	+125	°C

Software Support

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We provide a library for the Stepper 15 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

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

Library Description

This library contains API for Stepper 15 Click driver.

Key functions:

- `stepper15_make_one_step` - Stepper 15 make one step function.
- `stepper15_set_direction` - Stepper 15 set direction function.
- `stepper15_step_by_angle` - Stepper 15 step by angle function.

Examples description

The application is composed of three sections :

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

Other mikroE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Stepper15

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](#)

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[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[Stepper 15 click 2D and 3D files](#)

[PCA9538 datasheet](#)

[DRV8889 datasheet](#)

[Stepper 15 click schematic](#)

[Stepper 15 click example on Libstock](#)

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