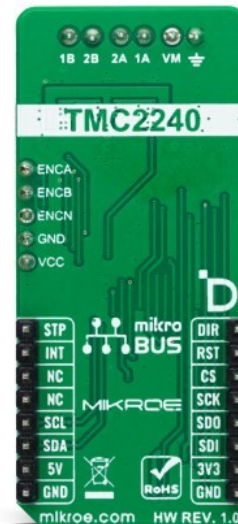


Silent Step 4 Click



PID: MIKROE-5980

Silent Step 4 Click is a compact add-on board representing a completely integrated step motor driver solution. This board features the [TMC2240](#), a smart integrated stepper driver from [Analog Devices](#). The driver is based on a 256 micro-steps built-in indexer, two fully integrated H-Bridges, and non-dissipative integrated current sensing (ICS). The two H-Bridges can drive motors of up to 36V and 3A at max. This Click board™ makes the perfect solution for the development of textile industry machines, lab and factory automation, 3D printers, and more.

Silent Step 4 Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the [mikroBUS™](#) standard. It comes with the [mikroSDK](#) open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this [Click board™](#) apart is the groundbreaking [ClickID](#) feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

Silent Step 4 Click is based on the TMC2240, a smart integrated stepper driver from Analog Devices. It is highly integrated and highly efficient with a best-in-class performance stepper driver. The maximum output current per H-Bridge is 3A, which an onboard resistor sets. You can, however, set it to a lower level over the software. The step driver also features abundant diagnostics and protections such as short protection/OCP, thermal shutdown, and under-voltage lockout. It can measure the driver temperature, estimate the motor temperature, and more.

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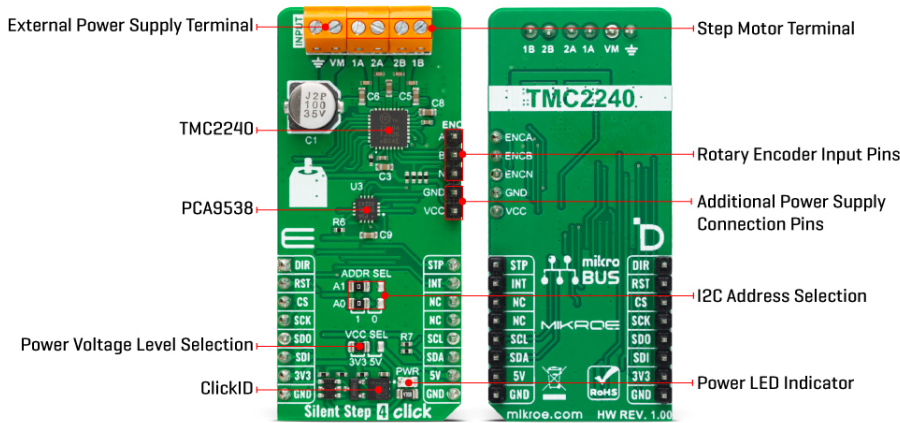
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One cool feature is the rotary encoder interface integration directly into the step driver. The external incremental encoder can be connected over the ENC connector. The encoder can be used for consistency checks on the fly between the encoder position and the external ramp generator position. A 32-bit encoder counter is provided. StallGuard2 is a great functionality for detecting a motor stall and is part of the diagnostic system of the stepper driver.

Silent Step 4 Click uses a 4-wire SPI serial interface to communicate with the host MCU, supporting a max frequency of up to 10MHz. The motor is controlled using step and direction inputs over the STP and DIR pins. Each step can be a full-step or a micro-step. The additional functionalities are provided over the [PCA9538](#), an 8-bit I/O port from NXP. The PCA9538 uses an I2C interface to communicate with the host MCU. The I2C address can be set over the ADDR SEL jumpers. It provides monitoring of both DIAG outputs and over-voltage indicators. It also controls the enable and sleep inputs of the stepper driver. The host MCU can reset the PCA9538 over the RST pin and receive interrupts over the INT pin.

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. 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	Can be used for the development of textile industry machines, lab and factory automation, 3D printers, and more
On-board modules	TMC2240 - smart integrated stepper driver from Analog Devices
Key Features	Two H-Bridges, fully integrated lossless current sensing, wide external voltage range, incremental encoder interface, high micro-step resolution, thermal shutdown, short protection, diagnostics, StallGuard2, StallGuard4, overvoltage protection, and more
Interface	I2C,SPI

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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 Silent Step 4 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Direction Control	DIR	1	AN	PWM	16	STP	Step Control
Reset / ID SEL	RST	2	RST	INT	15	INT	Interrupt
SPI Chip Select / ID COMM	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	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

Silent Step 4 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	4.5	-	36	V
Output Current per H-Bridge	-	-	3	A

Software Support

We provide a library for the Silent Step 4 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](#).

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Library Description

This library contains API for Silent Step 4 Click driver.

Key functions

- `silentstep4_set_direction` This function sets the motor direction by setting the DIR pin logic state.
- `silentstep4_set_step_res` This function sets the microstep resolution bits in CHOPCONF register.
- `silentstep4_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 Silent Step 4 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.SilentStep4

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 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](#)

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[Click boards™](#)

Downloads

[PCA9538A datasheet](#)

[TMC2240 datasheet](#)

[Silent Step 4 click 2D and 3D files](#)

[Silent Step 4 click schematic](#)

[Silent Step 4 click example on Libstock](#)

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