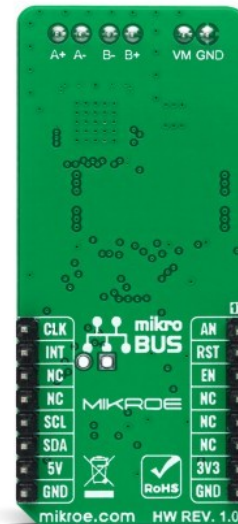


Multi Stepper Click - TB67S101



PID: MIKROE-5044

Multi Stepper Click is a compact add-on board that contains a bipolar stepper motor driver. This board features the TB67S101AFG, a PHASE-in controlled bipolar stepping motor driver from Toshiba Semiconductor. It supports a PWM constant-current control drive and full-, half-, and quarter-step operation for less motor noise and smoother control. It has a wide operating voltage range of 10V to 47V with an output current capacity of 4A maximum in addition to several built-in error detection circuits. This Click board™ makes the perfect solution for stepping motors in various applications such as office automation, commercial, and industrial equipment.

Multi Stepper 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?

Multi Stepper Click as its foundation uses the TB67S101AFG, a two-phase bipolar stepping motor driver using a PWM chopper (customized by external resistance R2 and capacitor C1) from Toshiba Semiconductor. The TB67S101AFG incorporates a low on-resistance MOSFET output stage, which can deliver a 2.8A current with a motor output voltage rating of 47V, in addition to integrated protection mechanisms such as over-current and over-temperature detection. In addition, it supports full-, half-, and quarter-step resolution, with the help of which motor noise can be significantly reduced with smoother operation and more precise control.

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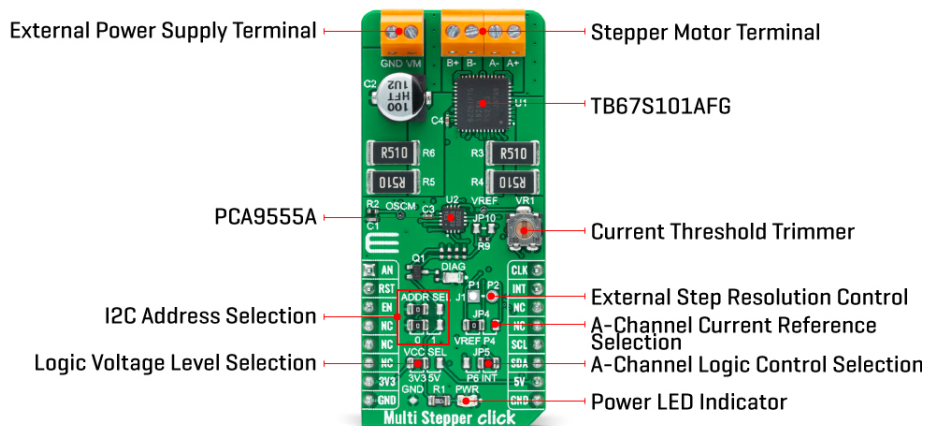
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As mentioned in the product description, this stepping motor driver is PHASE-in controlled. These control signals are provided through the [PCA9555A](#) port expander, which establishes communication with the MCU via the I2C serial interface. This Click board™ also allows a connection of external control signals on the onboard header J1 on pins labeled as P1 and P2 for the device's PHASE-in control. The PCA9555A also allows choosing the least significant bit (LSB) of its I2C slave address by positioning SMD jumpers labeled as ADDR SEL to an appropriate position marked as 0 and 1.

In addition to PHASE signals, four A/B channel logic signals, INA1, INB1, INB2, and INA2, are used to control the motor, adjusting the desired step resolution. The first three signals are controlled by AN, CLK, and EN pins of the mikroBUS™ socket. The INA2 signal provides the possibility of dual control selected by positioning SMD jumper labeled as JP5 to an appropriate position marked as P6 or INT, which choose control via expander or INT pin of the mikroBUS™ socket. In the case of the selected INT position of the JP5 jumper, the JP10 jumper needs to be unpopulated.

Also, this Click board™ has a Standby function routed to the RST pin of the mikroBUS™ socket used to switch to Standby mode by setting all motor control pins to a low logic state. When the Standby mode is active, the TB67S101AFG stops supplying the power to the internal oscillating circuit and motor output part (the motor drive cannot be performed). This Click board™ also has an additional LED for anomaly indication, but since this version of the stepper driver does not support this feature, this indicator cannot be used.

The motor A/B channel current output value can be set manually using an onboard trimmer labeled as VR1, which sets the reference voltage from 0V to 3.3V. The default configuration of the JP4 jumper is the VREF position that sets both channels' output current via the VR1 trimmer. In this case, avoid position P4 on a jumper JP4 since the VREFA pin requires an analog signal for setting.

Multi Stepper Click supports an external power supply for the TB67S101AFG, which can be connected to the input terminal labeled as VM and should be within the range of 10V to 47V, while the stepper motor coils can be connected to the terminals labeled as B+, B-, A-, and A+.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use 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.

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Specifications

Type	Stepper
Applications	Can be used for stepping motors in various applications such as office automation, commercial, and industrial equipment
On-board modules	TB67S101AFG - PHASE-in controlled bipolar stepping motor driver from Toshiba Semiconductor
Key Features	Low power consumption, capable of controlling 1 bipolar stepping motor, full/half/quarter-step resolution, integrated error detection circuits, and more
Interface	GPIO,I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V,External
Driving Signal	Phase
Voltage Max	50V
Current Max	4A
Micro Step	4
RDSOn	0.49
ADMD	Yes
MO	No
Error Signal (LO)	No
ULVO	No

Pinout diagram

This table shows how the pinout on Multi Stepper Click - TB67S101 corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
A-Channel Control 1	AN	1	AN	PWM	16	CLK	B-Channel Control 1
Standby Control	RST	2	RST	INT	15	INT	Interrupt / A-Channel Control 2
B-Channel Control 2	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

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Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	DIAG	-	LED for anomaly indication is not supported on this MCD version
JP1-JP2	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1
JP3	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP4	JP4	Left	A-Channel Current Reference Selection VREF/P4: Left position VREF, Right position P4
JP5	JP5	Right	A-Channel Logic Control Selection P6/INT: Left position P6, Right position INT
JP10	JP10	Unpopulated	Not supported in this MCD version
J1	J1	Unpopulated	External PHASE Signals Connection Header
VR1	VR1	-	Current Threshold Trimmer
TP1	VREF	-	Voltage Reference Testpoint
TP2	OSCM	-	Oscillating Circuit Frequency Testpoint
TP3	GND	-	Ground Testpoint

Multi Stepper Click - TB67S101 electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage VCC	3.3	-	5	V
External Supply Voltage VM	10	24	47	V
Motor Output Current	-	2.8	-	A
Motor Output Voltage	10	-	47	V
Operating Temperature Range	-20	+25	+85	°C

Software Support

We provide a library for the Multi Stepper TB67S101 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

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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 Multi Stepper TB67S101 Click driver.

Key functions

- multisteppertb67s101_set_step_mode This function sets the step mode resolution settings in ctx->step_mode.
- multisteppertb67s101_drive_motor This function drives the motor for the specific number of steps at the selected speed.
- multisteppertb67s101_set_direction This function sets the motor direction to clockwise or counter-clockwise in ctx->direction.

Example Description

This example demonstrates the use of the Multi Stepper TB67S101 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 way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.MultiStepperTB67S101

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 MikroElektronika [compilers](#).

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™](#)

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[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[TB67S101AFG datasheet](#)

[PCA9555A datasheet](#)

[Multi Stepper Click - TB67S101 schematic](#)

[Multi Stepper Click - TB67S101 2D and 3D files](#)

[Multi Stepper Click - TB67S101 example on Libstock](#)

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