

## DC Motor 26 Click



PID: MIKROE-5655

**DC Motor 26 Click** is a compact add-on board with a brushed DC motor driver. This board features the [TB9053FTG](#), a PWM-type, dual-channel, H-bridge, brushed DC motor driver from [Toshiba Semiconductor](#). The TB9053FTG is rated for an operating voltage range from 4.5V to 28V, with the motor controlled directly through a PWM signal or SPI serial interface. In addition, this driver allows a dual configuration with two motors with 5A current ratings per channel or one 10A channel drive in a Parallel mode of operation. It also has complete diagnostic and protection capabilities supporting robust and reliable operation. This Click board™ is suitable for driving DC brushed motors in various automotive applications such as control of the throttle valve, engine valves, retractable door mirrors, and seat heater.

DC Motor 26 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?

DC Motor 26 Click, as its foundation, uses the TB9053FTG, a dual-channel H-bridge, brushed DC motor driver from Toshiba Semiconductor. It comes with an enhanced package for an extra high thermal performance. The TB9053FTG allows a dual configuration with two motors with 5A current ratings per channel or one 10A channel drive in a Parallel mode of operation. It is also rated for an operating voltage range from 4.5V to 28V, with the motor controlled directly through a PWM signal (CLK) from the mikroBUS™ socket or SPI serial interface. The PWM control with low on-resistance enables highly efficient motor drive output, ensuring reliable operation for highly competitive automotive applications.

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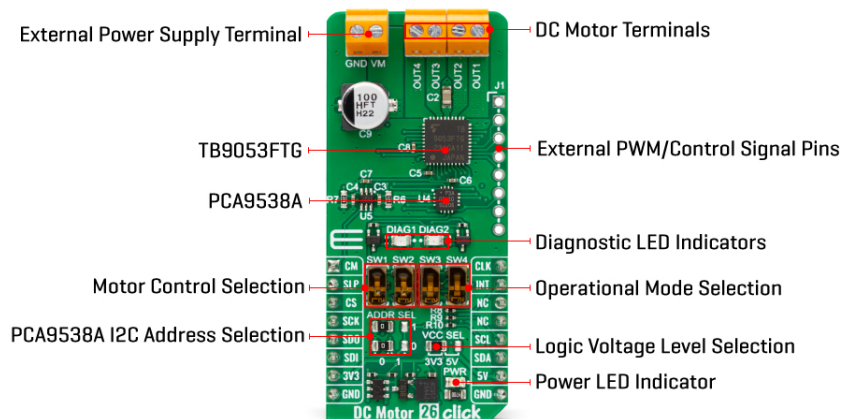
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Besides the SPI communication, several GPIO pins connected to the mikroBUS™ socket pins are also used to control the TB9053FTG associated with the [PCA9538A](#) I2C-configurable port expander, such as Sleep Mode pin and DC motor channels current monitor routed to the SLP and CM pins (default positions of RST and AN pins) of the mikroBUS™ socket. The PCA9538A 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, alongside its interrupt feature routed to the INT pin of the mikroBUS™ socket.

As mentioned, this Click board™ supports double or single DC motor configuration. The corresponding switches on the board marked with SW1-SW4 are used to select the motor control and operational modes. The first two represent the switches for motor control selection, more precisely, the choice of control directly by the PWM signal or through the SPI interface, while the second two represent the selection of the motor operational mode. There are four possible modes, i.e., Small Mode (two separated channels), Large Mode (two channels are connected and support one DC motor), Half Mode, and Prohibited Mode, where the channels are completely disabled.

In addition, the control and PWM signals can also be brought externally via the onboard header J1. In that case, the PWM1 and PWM2 pins specify forward, reverse, or brake modes for motor 1, and the PWM3 and PWM4 pins specify these modes for motor 2. The enable EN pins select the drive or stop mode for the motor. A broad range of configuration options for this driver, control, and mode selections can be found in the attached datasheet. This Click board™ also has additional LEDs for anomaly indication. Suppose a state such as an overtemperature or overcurrent/under voltage is detected. In that case, such anomaly is indicated by red LEDs marked as DIAG1 and DIAG2 associated with the interrupt pin.

The DC Motor 26 supports an external power supply for the TB9053FTG, which can be connected to the input terminal labeled as VM and should be within the range of 4.5V to 28V, while the DC motor coils can be connected to the terminals labeled from OUT1 up to OUT4.

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

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Type	Brushed
Applications	Can be used for automotive applications (AEC-Q100 Grade 1 qualified), such as control of the throttle valve, engine valves, retractable door mirrors, and seat heater
On-board modules	TB9053FTG - thermal enhanced QFN package brushed DC motor driver from Toshiba Semiconductor
Key Features	Driver for one or two DC motors, direct PWM control or through SPI interface, selectable motor control functions and operational modes, Sleep mode and current monitoring, full protection and diagnostics, and more
Interface	I2C, PWM, SPI
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 DC Motor 26 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Channel Current Monitor	<b>CM</b>	1	AN	PWM	16	<b>CLK</b>	PWM Signal
Sleep	<b>SLP</b>	2	RST	INT	15	<b>INT</b>	Interrupt
SPI Chip Select	<b>CS</b>	3	CS	RX	14	NC	
SPI Clock	<b>SCK</b>	4	SCK	TX	13	NC	
SPI Data OUT	<b>SDO</b>	5	MISO	SCL	12	<b>SCL</b>	I2C Clock
SPI Data IN	<b>SDI</b>	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
LD2-LD3	DIAG1-DIAG2	-	Diagnostic LED Indicators
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

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SW1-SW2	SW1-SW2	Default	Motor Control Selection
SW3-SW4	SW3-SW4	Default	Mode Selection
J1	J1	Unpopulated	External PWM/Control Signals Header

## DC Motor 26 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Supply Voltage	4.5	-	28	V
Output Current	5	6.5	10	A

## Software Support

We provide a library for the DC Motor 26 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 DC Motor 26 Click driver.

Key functions

- dcmotor26\_get\_motor\_current DC Motor 26 get motor current function.
- dcmotor26\_set\_ch1\_operation\_mode DC Motor 26 set ch1 operation mode function.
- dcmotor26\_set\_cm\_sel\_pin DC Motor 26 set cm sel pin function.

## Example Description

This example demonstrates the use of DC Motor 26 Click board™ by controlling the speed of DC motor over PWM duty cycle as well as displaying the motor current consumption.

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.DCMotor26

## Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART](#)

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[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, that needs to be downloaded from the [LibStock](#) and installed for the compiler you are using to ensure proper operation of mikroSDK compliant Click board™ demo applications.

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

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

## Downloads

[DC Motor 26 click example on Libstock](#)

[PCA9538A datasheet](#)

[TB9053FTG datasheet](#)

[DC Motor 26 click schematic](#)

[DC Motor 26 click 2D and 3D files](#)

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