

Time-saving embedded tools

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia VAT: SR105917343 Registration No. 20490918 Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com www.mikroe.com

# DC Motor 19 Click





PID: MIKROE-4883

**DC Motor 19 Click** is a compact add-on board that contains a brushed DC motor driver. This board features the <u>TC78H653FTG</u>, a dual H-bridge driver for one or two DC brushed motors or one stepping motor, which incorporates DMOS with low ON resistance in output transistors from <u>Toshiba Semiconductor</u>. The Forward/Reverse/Brake/Stop mode can be selected according to the state of its input control signals, while the motor operation and current mode can be chosen through onboard switches alongside control signals. It has a wide operating voltage range of 1.8V to 7.5V with an output current capacity of 4A (DC). Besides, it also features built-in protection against under-voltage, overcurrent, and overtemperature conditions. This Click board<sup>™</sup> is suitable for driving DC brushed motors and stepping motors for low voltage equipment such as home electronic products and devices using a 5V USB power supply.

DC Motor 19 Click is supported by a <u>mikroSDK</u> compliant library, which includes functions that simplify software development. This <u>Click board</u> comes as a fully tested product, ready to be used on a system equipped with the <u>mikroBUS</u> socket.

## How does it work?

DC Motor 19 Click as its foundation uses the TC78H653FTG, a dual H-bridge driver for one or two DC brushed motors or one stepping motor from Toshiba Semiconductor. The integrated MOSFETs, which configures with an H-Bridge circuit inside the TC78H653FTG, use DMOS elements with low-on resistance ( $0.11\Omega$  typical with 5V power supply and activated Large mode). It has a wide operating voltage range with an output current capacity of 4A (DC) and control functions, including motor-related functions (Forward, Reverse, Brake, Stop), current control, and built-in detection circuits for overcurrent, overheat, and low/high voltage.

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As mentioned in the product description, DC Motor 19 Click communicates with MCU using several GPIO pins. Also, this Click board<sup>™</sup> has a Standby pin labeled as SBY routed to the CS pin of the mikroBUS<sup>™</sup> socket used to switch to Standby mode by toggling the pin. When the SBY pin is low, TC78H653FTG stops supplying the power to the logic circuit, the Standby current is significantly reduced because all circuits in the IC are configured with CMOS/DMOS elements, and the current consumption in this mode is 0µA typical.

To turn ON the internal MOSFETs of the TC78H653FTG, they need to be switched by the logic level, which is input to the control input pins: IN1, IN2, IN3, and IN4 pins routed to the RST, AN, PWM, and INT pins of the mikroBUS<sup>™</sup> socket. Thereby, the Forward/Reverse/Brake/Stop rotation direction mode can be selected according to the state of its input control signals, while the motor operation and current mode can be chosen through onboard switches labeled as MODE and LARGE, alongside control signals. With active LARGE mode, IN1 and IN2 pins control this mode while motor control pins A+ and A- are connected as OUT+ pin and pins B- and B+ pin are connected as OUT- pin. More information on the Motor Mode Selection can be found in the attached datasheet.

The DC Motor 19 supports an external power supply for the TC78H653FTG, which can be connected to the input terminal labeled as VM and should be within the range of 1.8V to 7.5V, while the DC motor coils can be connected to the terminals labeled as B+, B-, A-, and A+.

This Click board<sup>™</sup> 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<sup>™</sup> 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

n be used for driving DC brushed motors d stepping motors for low voltage			
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TC78H653FTG - dual H-bridge driver for one or two DC brushed motors or one stepping motor from Toshiba Semiconductor			
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Key Features	Low power consumption, dual bridge driver, high drive capability, low voltage drive, low-on resistance, selectable motor operation, built-in Standby and protection features, and more			
Interface	GPIO			
ClickID	No			
Compatibility	mikroBUS™			
Click board size	M (42.9 x 25.4 mm)			
Input Voltage	3.3V or 5V,External			

## **Pinout diagram**

This table shows how the pinout on DC Motor 19 Click corresponds to the pinout on the mikroBUS<sup>m</sup> socket (the latter shown in the two middle columns).

Notes	Pin	● ● mikro* ● ● ● BUS		Pin	Notes		
Motor Control Input 1	IN1	1	AN	PWM	16	IN3	Motor Control Input 3
Motor Control Input 2	IN2	2	RST	INT	15	IN4	Motor Control Input 4
Standby Mode	SBY	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
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	VM SEL	Left	TC78H653FTG Power Supply Selection VEXT/VCC: Left position VEXT, Right position VCC
SW1	LARGE	-	Large-Current Drive Mode Selection Switch
SW2	MODE	-	Motor Mode Selection Switch

# **DC Motor 19 Click electrical specifications**

Description	Min	Тур	Max	Unit
Supply Voltage VCC	3.3	-	5	V
External Power Supply VM	1.8	-	7.5	V
Maximum Output Current	-	-	4	Α

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Operating Temperature Range	-40	+25	+105	°C

## Software Support

We provide a library for the DC Motor 19 Click as well as a demo application (example), developed using MikroElektronika <u>compilers</u>. The demo can run on all the main MikroElektronika <u>development boards</u>.

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our <u>LibStock™</u> or found on <u>Mikroe github</u> <u>account</u>.

#### **Library Description**

This library contains API for DC Motor 19 Click driver.

#### Example key functions

- dcmotor19\_drive\_motor This function drives the motor for a certian time specified by time\_ms at the desired speed. The motor channel and mode must be previously selected using the dcmotor19\_set\_channel\_mode function.
- dcmotor19\_set\_channel\_mode This function sets the active channel and mode which will be used by the dcmotor19\_drive\_motor function.
- dcmotor19\_disable\_standby\_mode This function disables the standby mode.

#### **Example Description**

This example demonstrates the use of DC Motor 19 Click board  $^{m}$  by driving the motors in both direction in the span of 14 seconds.

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

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.DCMotor19

#### Additional notes and informations

Depending on the development board you are using, you may need <u>USB UART click</u>, <u>USB UART</u> <u>2 Click</u> or <u>RS232 Click</u> 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 <u>compilers</u>.

# mikroSDK

This Click board<sup>™</sup> is supported with <u>mikroSDK</u> - MikroElektronika Software Development Kit. To

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ensure proper operation of mikroSDK compliant Click board<sup>™</sup> demo applications, mikroSDK should be downloaded from the <u>LibStock</u> and installed for the compiler you are using.

For more information about mikroSDK, visit the <u>official page</u>. **Resources** 

<u>mikroBUS</u>™

<u>mikroSDK</u>

Click board<sup>™</sup> Catalog

Click boards<sup>™</sup>

#### **Downloads**

DC Motor 19 click example on Libstock

TC78H653FTG datasheet

DC Motor 19 click 2D and 3D files

DC Motor 19 click schematic

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