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 13 Click





PID: MIKROE-5101

DC Motor 13 Click is a compact add-on board with a brushed DC motor driver. This board features the TB67H481FNG, a dual-channel, H-bridge, brushed DC motor driver from Toshiba Semiconductor. Fabricated with the BiCD process (DMOSFET is used for output power transistor), it covers a wide operating voltage range of 8.2V to 44V with a maximum output current capacity of 2A. It also offers many helpful features that support a robust and reliable operation, like the decay modes selection function, several protection features, and one anomaly detection indicator. This Click board™ makes the perfect solution for driving two brushed or one stepping motors in various applications such as consumer electronics and industrial equipment.

DC Motor 13 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.

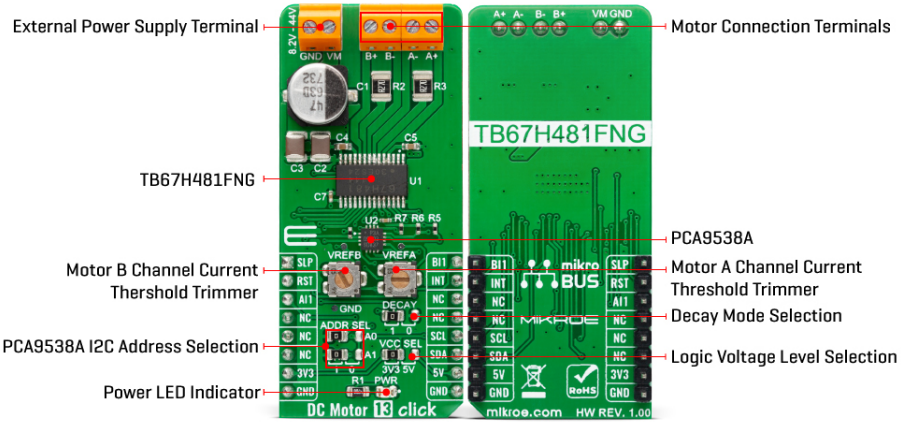
How does it work?

DC Motor 13 Click is based on the TB67H481FNG, a dual-channel, H-bridge, brushed DC motor driver from Toshiba Semiconductor. The TB67H481FNG has a current limit function that monitors the current flowing in the motor and performs constant current PWM control. When the motor current reaches the set current value, determined using onboard VREF trimmers (VREFA and VREFB), the TB67H481FNG shifts to Decay mode and annotates the current. Various Decay mode functions are selectable by positioning the SMD jumper, labeled as DECAY, to an appropriate position marked as 0 and 1. Also, Mixed Decay Mode can be selected by removing the JP2 jumper for the board. The TB67H481FNG has a built-in regulator that allows the motor to be driven by a single power supply, provides a motor output voltage rating

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of around 40V, and has integrated protection mechanisms such as over-current, over-temperature, and under-voltage lockout for error detection.



The setting current value can be adjusted with the torque function (100%, 71%, 38%, or 0%), controlled through the PCA9538A port expander, which establishes communication with the MCU via the I2C serial interface. When high torque is not needed, lowering the torque setting can suppress the motor current. In addition to these torque setting pins, with the help of the expander, it is also possible to control some other signals, such as the control signals for selecting the operating mode of the motor driver. These pins, in combination with AI1 and BI1 pins, routed to default positions of CS and PWM pins of the mikroBUS™ socket, enable operational modes like CW, CCW, or short-brake.

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. Besides, all circuits can be stopped using the Sleep function, routed to default positions of the AN pin of the mikroBUS™ socket, and thus enable power saving mode, while the RST pin provides a general-purpose reset function.

The DC Motor 13 Click supports an external power supply for the TB67H481FNG, which can be connected to the input terminal labeled as VM and should be within the range of 8.2V to 44V, while the two brushed or one stepping motor coils can be connected to the terminals labeled as B+, B-, A-, and A+.

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

Type	Brushed
Applications	Can be used for driving two brushed or one stepping motors in various applications such as consumer electronics and industrial equipment

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On-board modules	TB67H481FNG - dual-channel, H-bridge, brushed DC motor driver from Toshiba Semiconductor
Key Features	Low power consumption, BiCD-based structure, high breakdown voltage/large current, power saving function, various protection features, selectable decay mode, error detection function, and more
Interface	GPIO,I2C
ClickID	No
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 13 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Sleep Mode	**SLP**	1	AN	PWM	16	**BI1**	Motor B Channel Control
Reset	**RST**	2	RST	INT	15	**INT**	Interrupt
Motor A Channel Control	**AI1**	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

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	DECAY	Left	Decay Mode Selection 1/0 , Left position 1, Right position 0
JP3-JP4	ADDR SEL	Left	I2C Address Selection 1/0 , Left position 1, Right position 0
VREFA	VREFA	-	Motor A Current Threshold Trimmer
VREFB	VREFB	-	Motor B Current Threshold Trimmer

DC Motor 13 Click electrical specifications

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Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Supply Voltage VM	8.2	24	44	V
Maximum Output Voltage	-	-	50	V
Maximum Output Current	-	-	2	A

Software Support

We provide a library for the DC Motor 13 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 13 Click driver.

Key functions

- dcmotor13_set_outa_mode This function sets the OUTA mode.
- dcmotor13_set_outb_mode This function sets the OUTB mode.
- dcmotor13_set_outa_torque This function sets the OUTA torque.

Example Description

This example demonstrates the use of DC Motor 13 Click board™ by driving the motors in both direction in the span of 9 seconds.

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.DCMotor13

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, that needs

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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™

Downloads

DC Motor 13 click example on Libstock

DC Motor 13 click 2D and 3D files

TB67H481FNG datasheet

PCA9538A datasheet

DC Motor 13 click schematic