

DC Motor 28 Click - FNG



PID: MIKROE-6506

DC Motor 28 Click - FNG is a compact add-on board designed for driving brushed DC motors. This board features the [TB67H453FNG](#), a single-channel H-Bridge driver from [Toshiba Semiconductor](#). With an operating voltage range of 4.5V to 44V and a maximum output current of 3.5A, it features integrated current monitoring, a trimmer for output current adjustment, multiple protection mechanisms, and flexible control options. Ideal for applications in industrial automation, robotics, and other motor-driven systems, this Click board™ provides a powerful and adaptable solution for various motion control needs.

For more information about **DC Motor 28 Click - FNG** visit the official [product page](#).

How does it work?

DC Motor 28 Click is based on the TB67H453FNG, a single-channel H-Bridge driver from Toshiba Semiconductor, designed to drive brushed DC motors with high precision and reliability. This IC is capable of controlling a single brushed DC motor in both directions or two brushed DC motors in a single direction (individual half bridge control mode). With an operating voltage range from 4.5V to 44V and a maximum output current of 3.5A, it provides a robust and versatile motor control solution suitable for a variety of applications like industrial automation, robotics, or general-purpose motor-driven systems.

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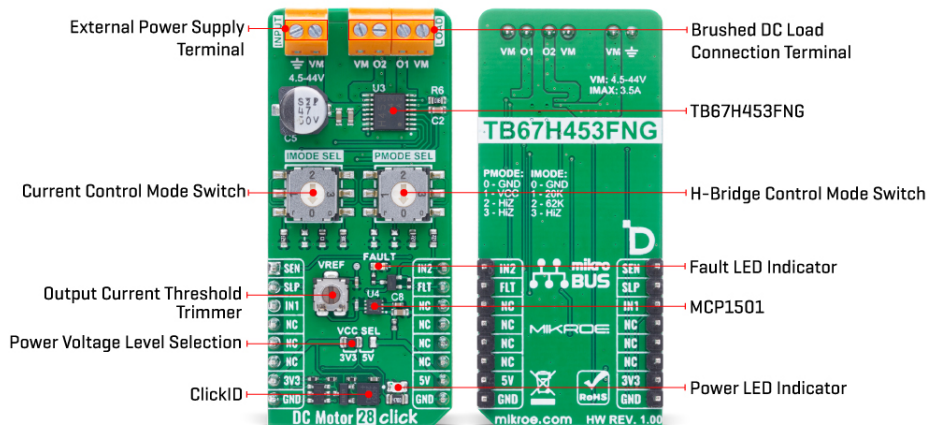
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One of the key features of the TB67H453FNG is its integrated current monitoring function, accessible through the SEN pin. This pin outputs a current level proportional to the current flowing through the low-side MOSFETs in the H-Bridge, allowing for precise current measurement and monitoring. Additionally, the IC is equipped with multiple protection mechanisms, including overtemperature detection, overcurrent protection, and undervoltage lockout, and a VREF trimmer, which enables users to set the output current threshold, further enhancing control over motor operation. The device also offers low power consumption, including a standby mode that minimizes energy usage when the motor is not in operation.

Motor control is managed through the IN1 and IN2 pins, which manage the H-Bridge operation. The PMODE SEL switch determines the control mode, and its settings are locked once the Sleep mode (SLP signal) is applied High and the driver operates. To modify the PMODE configuration, the SLP signal must first be set to LOW before adjusting the PMODE switch. Once the desired setting is selected, the SLP signal is re-applied, allowing the device to register the new mode. The PMODE SEL switch allows the user to choose between different functions. Setting it to Low activates Phase/Enable interface, setting it to High enables PWM (IN1/IN2) interface and setting it to Hi-Z (Open) switches to individual half bridge control mode.

The IMODE SEL switch is used to set the current control mode and the behavior of the overcurrent detection (ISD). The switch configures the driver for either constant current PWM mode or fixed off time control, with options for auto recovery or latched response to overcurrent. In Fixed Off Time Control Mode, the H-Bridge switches to short brake for a fixed period when the motor current exceeds the threshold, while in Constant Current PWM Control Mode, the H-Bridge switches to short brake until the next control signal input edge is asserted after the motor current exceeds the threshold. The IMODE SEL switch follows the same adjustment procedure as PMODE SEL, requiring the SLP signal to be cycled before changes take effect.

To enhance safety and diagnostics, the TB67H453FNG includes an error detection system that continuously monitors for irregular overcurrent conditions. If an anomaly is detected, the MOSFETs are automatically turned off to prevent damage. The status of these error conditions can be observed via the FLT pin, while a red FAULT LED provides a clear visual indication of any detected faults.

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

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functions and an example code that can be used as a reference for further development.

Specifications

Type	Brushed
Applications	Ideal for applications in industrial automation, robotics, and other motor-driven systems
On-board modules	TB67H453FNG - single-channel H-Bridge driver from Toshiba Semiconductor
Key Features	Single-channel H-Bridge driver, wide operating voltage range and output current, integrated current monitoring function, output current threshold trimmer, multiple protection features, switches for selecting control modes and choosing between constant current PWM and fixed off-time control, fault indicator, and more
Interface	Analog,GPIO
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 DC Motor 28 Click - FNG corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Current Monitor Output	SEN	1	AN	PWM	16	IN2	H-Bridge Control
Sleep Mode / ID SEL	SLP	2	RST	INT	15	FLT	Fault Indicator
H-Bridge Control / ID COMM	IN1	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
LD2	FAULT	-	Fault LED Indicator
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V

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SW1	PMODE SEL	Left	H-Bridge Mode Control Switch
SW2	IMODE SEL	Left	Current Mode Control Switch
VR1	VREF	-	Output Current Threshold Trimmer

DC Motor 28 Click - FTG electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	4.5	-	44	V
Output Current	-	-	3.5	A

Software Support

[DC Motor 28 Click - FNG](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

Example Description

This example demonstrates the use of the DC Motor 28 Click - FNG. It initializes the Click driver, calibrates the offset for accurate current measurements, and then controls the motor in different states while measuring and logging the output current in milliamps (mA).

Key Functions

- dcmotor28fng_cfg_setup Config Object Initialization function.
- dcmotor28fng_init Initialization function.
- dcmotor28fng_drive_motor This function drives the motor in the selected PWM control mode state.
- dcmotor28fng_calib_offset This function calibrates the zero current offset value.
- dcmotor28fng_get_out_current This function reads the current output measurement in mA.

Application Init

Initializes the logger and the DC Motor 28 Click - FNG driver and performs offset calibration for current measurements.

Application Task

Controls the motor in a sequence of states: FORWARD, BRAKE, REVERSE, and COAST. In each state, the output current is measured and logged, providing insights into the motor's performance and consumption.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time

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data monitoring. Set it up properly by following [this tutorial](#).

- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[TB67H453FxG datasheet](#)

[DC Motor 28 Click - FNG example package](#)

[DC Motor 28 Click - FNG 2D and 3D files v100](#)

[DC Motor 28 Click - FNG schematic v100](#)

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