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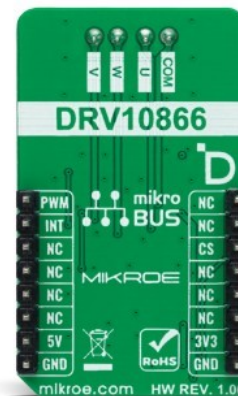www.mikroe.com

Brushless 24 Click

PID: MIKROE-5478

Brushless 24 Click is a compact add-on board for controlling brushless DC (BLDC) motors with any MCU. This board features the DRV10866, a 3-phase sensorless motor driver from Texas Instruments with integrated MOSFETs capable of driving current up to 800mA in peak. The DRV10866 also has a 150° sensorless BEMF control scheme implemented for a 3-phase motors, alongside a synchronous rectification mode of operation that achieves increased efficiency for motor driver applications. Besides choosing the motor speed and a wide operating voltage range of up to 5V, it also has several built-in protection circuits, such as undervoltage, lock detection, voltage surge protection, and overtemperature. This Click board™ makes the perfect solution for low-noise fan motor drive applications.

Brushless 24 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?

Brushless 24 Click is based on the DRV10866, a fully integrated three-phase BLDC motor driver from Texas Instruments. The DRV10866 motor driver comes with integrated power MOSFETs with current drive capability up to 800mA peak (based on populated 3.9k resistor), specifically designed for low-noise energy-saving fan motor drive applications connected to the terminals labeled as U, V, W, and COM. It provides PWM/enable control interface (PWM pin of the mikroBUS™ socket), wide operating voltage range, robust on-chip protection features, low RDSON, and efficient switching algorithms to ensure excellent thermal performance and high drive capability.

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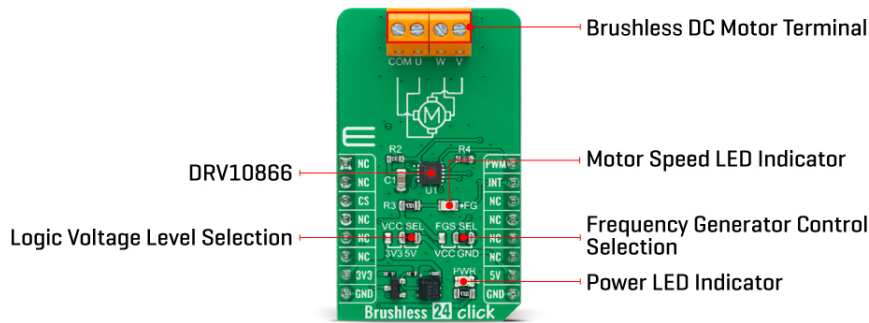
The DRV10866 implements a 150° commutation (sensorless BEMF control scheme) for a 3-phase motor alongside a synchronous rectification mode of operation that achieves increased efficiency for motor driver applications. In addition, the DRV10866 has a frequency generator pin (FG) that outputs a 50% duty cycle of PWM waveform in the normal operation condition. The FG represents the motor speed and phase information, detectable through an interrupt pin of the mikroBUS™ socket and a blue LED indicator marked as FG. During the Start-Up sequence, the FG output will stay at high impedance until the motor speed reaches a certain level and BEMF is detected, while during lock protection conditions, the FG will remain high until the motor restarts and the Start-Up process is completed.

Apart from this function, the DRV10866 can also output either full FG or half of the FG to indicate motor status with open-drain output through the FGS SEL selection jumper. When FGS SEL is placed in a VCC position, the FG output frequency is half that when the jumper is set to a GND position. The DRV10866 has multiple built-in protection blocks, including UVLO, overcurrent protection, lock protection, and thermal shutdown protection.

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 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	Brushless
Applications	Can be used for low-noise fan motor drive applications
On-board modules	DRV10866 - three-phase BLDC motor driver from Texas Instruments
Key Features	Sensorless BLDC driver, high current drive capability, low MOSFET ON resistance, integrated protection features, 150° commutation, synchronous rectification PWM operation, selectable FG, and more
Interface	PWM

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ClickID	Yes
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Brushless 24 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS			Pin	Notes
	NC	1	AN	PWM	16	**PWM**	PWM Signal
	NC	2	RST	INT	15	**INT**	Motor Speed
	NC	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	FG	-	Motor Speed LED Indicator
JP1	VCC SEL	Right	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	FGS SEL	Right	Frequency Generator Control Selection VCC/GND: Left position VCC, Right position GND

Brushless 24 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Output Current	-	800	-	mA

Software Support

We provide a library for the Brushless 24 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 Brushless 24 Click driver.

Key functions

- brushless24_set_duty_cycle Brushless 24 sets PWM duty cycle.

- brushless24_pwm_start Brushless 24 start PWM module.

- brushless24_get_int_state Brushless 24 get INT pin state.

Example Description

This application is a schowcase of controlling speed of brushless motor using Brushless 24 Click.

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.Brushless24

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. 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™

mikroSDK

Click board™ Catalog

Click Boards™

ClickID

Downloads

[Brushless 24 click example on Libstock](#)

[Brushless 24 click 2D and 3D files](#)

[DRV10866 datasheet](#)

[Brushless 24 click schematic](#)