

## STSPIN233 CLICK

PID: MIKROE-3546

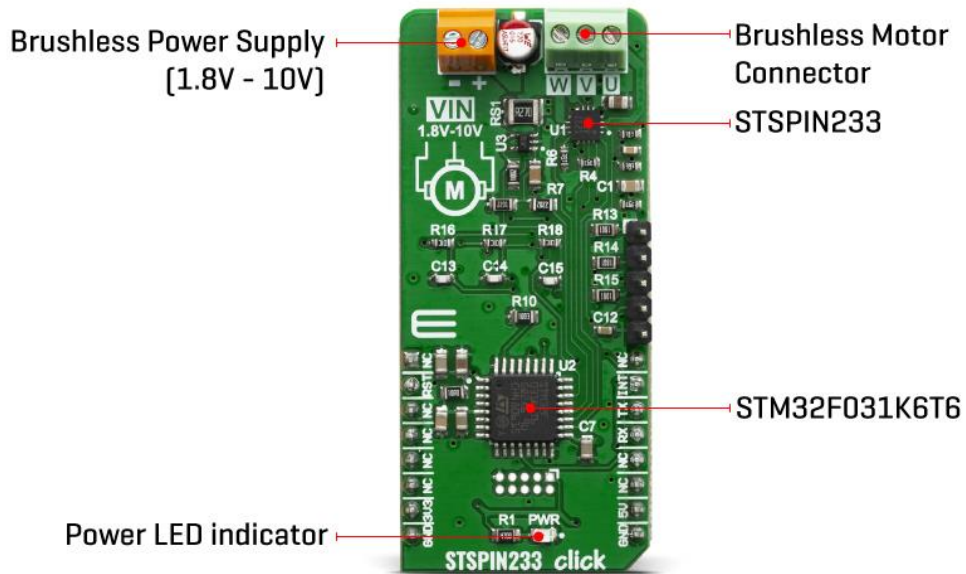
Weight: 30 g

**STSPIN233 click** is a complete solution for a 3-phase integrated motor driver, based on the STSPIN233, Low voltage 3-phase integrated motor driver. It is optimized for battery-powered, low voltage motor driving applications, featuring the lowest standby current available on the market (max 80 nA). The STSPIN233 is a high-efficiency motor driver, featuring low ON resistance MOSFETs as the output stage, and extremely low leakage current (max 1 $\mu$ A). Its output stage implements the PWM current control with fixed OFF time, along with a full set of protection features. The device can be used with the step motor voltage ranging from 1.8V to 10V, and current up to 1.3A per bridge.

STSPIN233 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?

This Click board™ is optimized for driving brushless motors in portable applications. Therefore, the STSPIN233 from STMicroelectronics contains three independent H-Bridges, and each of them controls one phase of the brushless motor. These integrated H-Bridges are very efficient - with ON resistance of approximately 400mΩ (HS+LS) across each bridge. These features make STSPIN233 click perfectly suited for rapid development of various battery-powered stepper motor applications, including toys, printers, mechatronics, drones, robotics-related applications, etc.



Besides the brushless driver IC, this Click board™ also has STM32F031K6T6 MCU onboard, which serves as a “brain” of the STSPIN233 Click. It comes with a preloaded firmware, which is programmed to take control of the motor driver. It reads the current motor status and signals from an optional rotary encoder, calculates values of desired and real motor status in real time and makes necessary corrections to the motor driver. The motor can be controlled by using these pins: RST, INT, and UART pins – RX and TX. That way, very reliable brushless motor driver is achieved.

The RST pin of the STSPIN233 Click is used to set both bridge outputs in HIGH-Z mod, disconnecting the power supply from the H-Bridges. This pin allows lower average power consumption as no current can flow from the power supply to the motor. This pin is routed to the RST pin of the mikroBUS™.

The INT pin has a double purpose: when set to a high logic level, it acts as a chip enable, allowing the device to operate. In the case of a fault condition on the IC, it will be asserted to a LOW logic level, acting as an interrupt pin. After a timeout period defined by the external capacitor and resistor values, a restart attempt will be made. This pin is routed to both INT pin of the mikroBUS™, allowing the host MCU to use both functions. The mentioned pin is labeled as FLT on the Click board™, respectively.


The motor power supply can be connected to the input terminal labeled as VIN and should be within the range of 1.8V to 10V. Brushless motor coils can be connected to the terminals labeled as U, V, and W. The Click board™ requires an external power supply for the motor in order to work. However, it also requires 3.3V from the mikroBUS™ rail.

## SPECIFICATIONS

<b>Type</b>	Brushed
<b>Applications</b>	STSPIN233 click is perfectly suited for rapid development of various battery-powered stepper motor applications, including toys, printers, mechatronics, drones, robotics-related applications, etc.
<b>On-board modules</b>	STSPIN233, a low voltage DC brushed motor driver by STMicroelectronics.
<b>Key Features</b>	The main IC features a set of protection features, allowing reliable performance. It is optimized for a low-power and battery-operated applications, featuring very low ON resistance, and lowest standby current on the market.
<b>Interface</b>	UART,GPIO
<b>Compatibility</b>	mikroBUS
<b>Click board size</b>	L (57.15 x 25.4 mm)
<b>Input Voltage</b>	3.3V,5V

## PINOUT DIAGRAM

This table shows how the pinout on STSPIN233 click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
Reset Input	<b>RST</b>	2	RST	INT	15	<b>INT</b>	Fault Interrupt Out
	NC	3	CS	RX	14	<b>RX</b>	UART Receive
	NC	4	SCK	TX	13	<b>TX</b>	UART Transmit
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
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

## STSPIN233 CLICK ELECTRICAL SPECIFICATIONS

Description	Min	Typ	Max	Unit
Input voltage	1.8	-	10	V

Output current	0	-	1.3	A
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## SOFTWARE SUPPORT

We provide a library for the STSPIN233 Click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

### Library Description

Library contains functions for STSPIN233 click initialization and basic control. User has at its disposal this library, which contains functions for waking up the module and sending commands to it. Click board can also be initialized and used with UART terminal.

Key functions:

- void stspin233\_send\_single\_cmd ( uint8\_t \*tx\_buf ) - Send single command
- void stspin233\_send\_double\_cmd ( uint8\_t \*cmd\_buf, uint8\_t \*arg\_buf ) - Send double command
- void stspin233\_wakeup( ) - Module wake-up (procedure)

### Examples description

The application is composed of three sections :

- System Initialization - Initializes UART module and all necessary GPIO pins.
- Application Initialization - Initializes driver init, starts basic engine setups and initializes a uart interrupt routine for logs data.
- Application Task - Waits for valid user input and executes functions based on set of valid commands.
- Commands : 'S or s' - Start Motor 'B or b' - Brake/Stop motor 'D or d' - Change of motor direction '?' - FW motor status

```
void application_task ( )
{
    uint8_t console_drdy;
    char console_rx_data;

    console_drdy = UART_Rdy_Ptr( );

    if ( console_drdy != 0 )
```

```
{  
    console_rx_data = UART_Rd_Ptr( );  
    app_cmd_parser( console_rx_data );  
}  
}
```

#### Additional Functions :

- `app_cmd_parser ( )` - Console command parser
- `set_interrupt ( )` - Interrupt init and enable
- Note - For all other commands that you can use to control your engine, see the firmware documentation. We used an 8 pole motor for the test.

The full application code, and ready to use projects can be found on our LibStock page. Other mikroE Libraries used in the example:

- UART

#### **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. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

## MIKROSDK

This Click board™ is supported with mikroSDK - MikroElektronika 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™ Standard specification

LibStock: mikroSDK

## DOWNLOADS

STSPIN233 click example on Libstock

STSPIN233 click 2D and 3D files

STSPIN233 click schematic

STSPIN233 datasheet