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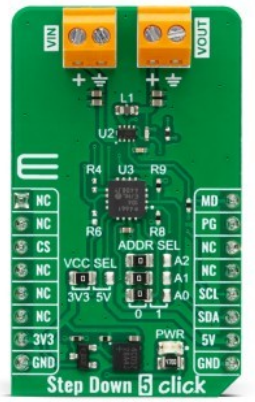
Step Down 5 Click



PID: MIKROE-5572

Step Down 5 Click is a compact add-on board that converts a higher voltage into a lower voltage level. This board features the TPS628510, a high-efficiency, easy-to-use, synchronous step-down DC/DC converter from Texas Instruments. The TPS628510 can provide up to 500mA output current with an input voltage ranging from 2.7V to 6V, specifically designed for applications where high efficiency is crucial. Its switching frequency is internally fixed at 2.25MHz, can select forced-PWM or PWM/PFM mode of operation, has selectable output voltage from 0.6V to 5.5V set via I2C-configurable digital potentiometer, and a Power Good signal to indicate stabilized output voltage. This Click board™ is suitable for power conversion solutions in automation and control applications, industrial sensors, test and measurement equipment, portable low-power devices, and more.

How does it work?

Step Down 5 Click is based on the TPS628510, a synchronous step-down converter from Texas Instruments, providing interface-configurable output voltage range from 0.6V to 5.5V suitable for point-of-load and post-regulation applications. This synchronous switch mode power converter is based on a peak current mode control topology and achieves fast and stable operation with an internally compensated control loop. It provides up to 0.5A load current over a wide input supply range from 2.7V to 6V and has excellent load and line regulation. In addition, it is characterized by high efficiency over a wide range of load output voltage from 0.6V to 5.5V, which can be easily adjusted using a digital potentiometer, the MCP4661 from Microchip.

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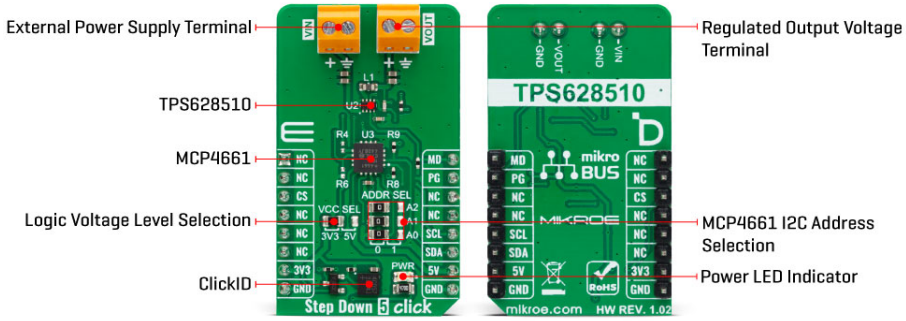

The TPS628510 supports forced fixed frequency PWM operation with the MD pin of the mikroBUS™ socket set to a high logic level. Its switching frequency is internally fixed at 2.25MHz. When the MD pin is set to a low logic level, the TPS628510 operates in power save mode (PFM) at a low output current and automatically transfers to fixed-frequency PWM mode at a higher output current. In PFM mode, the switching frequency decreases linearly based on the load to sustain high efficiency down to a very low output current. Alternatively, the TPS628510 can be synchronized to an external clock signal from 1.8MHz to 4MHz, applied to the MD pin. An internal PLL allows you to change from an internal clock to an external clock during operation.

Besides the operational mode selection pin, this Click board™ also has a power-good function routed to the PG pin of the mikroBUS™ socket, indicating that the output reached desired regulation and the possibility for the MCP4661 to choose 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.

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	Buck
Applications	Can be used for power conversion solutions in automation and control applications, industrial sensors, test and measurement equipment, portable low-power devices, and more
On-board modules	TPS628510 - synchronous step-down converter from Texas Instruments
Key Features	Based on a peak current mode control topology, output current up to 0.5A, selectable output voltage via digital potentiometer, high accuracy and efficiency, fixed switching frequency, forced PWM or PWM/PFM operation, power good indicatior, and more

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Interface	I2C,PWM
Feature	ClickID
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 Step Down 5 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	**MD**	Mode Selection
	NC	2	RST	INT	15	**PG**	Power-Good Indicator
ID COMM	**CS**	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-JP4	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1

Step Down 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Supply Voltage	2.7	-	6	V
Output Voltage	0.6	-	5.5	V
Output Current	-	-	0.5	A

Software Support

We provide a library for the Step Down 5 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

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(recommended), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for Step Down 5 Click driver.

Key functions

- stepdown5_set_wiper_0_pos Step Down 5 set wiper 0 position.
- stepdown5_set_r1_resistance Step Down 5 set potentiometer 0 resistance.
- stepdown5_set_output Step Down 5 set output voltage.

Example Description

This library contains API for the Step Down 5 Click driver. This driver provides the functions to set the output voltage treshold.

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.StepDown5

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 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™

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ClickID

Downloads

Step Down 5 click example on Libstock

MCP4661 datasheet

TPS628510 datasheet

Step Down 5 click 2D and 3D files v102

Step Down 5 click schematic v102

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