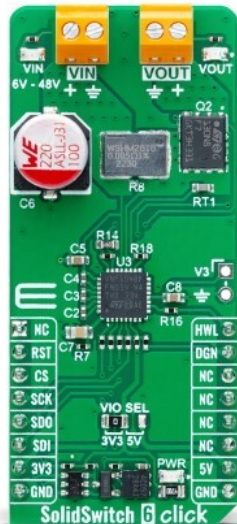


SolidSwitch 6 Click



PID: MIKROE-6089

SolidSwitch 6 Click is a compact add-on board for reliable load management in automotive power distribution systems. This board features the VNF1048F, a high-side switch controller with intelligent e-fuse protection from STMicroelectronics. This board supports an input voltage range of 6V to 48V, controls external MOSFET, and offers essential protection features such as overcurrent, under-voltage, and thermal shutdown, with diagnostic feedback via SPI. It also includes an NTC resistor for monitoring MOSFET temperature and operates with either 3.3V or 5V logic levels. SolidSwitch 6 Click is ideal for automotive applications like load control in cars, trucks, and other vehicles, ensuring safety and performance.

How does it work?

SolidSwitch 6 Click is based on the VNF1048F, a high-side switch controller for automotive applications from STMicroelectronics. This intelligent controller is designed to drive external MOSFETs in a high-side configuration, making it ideal for 12V, 24V, and 48V power distribution systems. Its key feature is intelligent e-fuse protection, which provides reliable overcurrent protection. It is crucial for automotive environments where safety and performance are paramount, like load management in cars, trucks, and other vehicles. The board operates with an external supply voltage ranging from 6V to 48V, allowing flexibility in power applications, with an integrated VIN green LED indicator showing an active external power supply.

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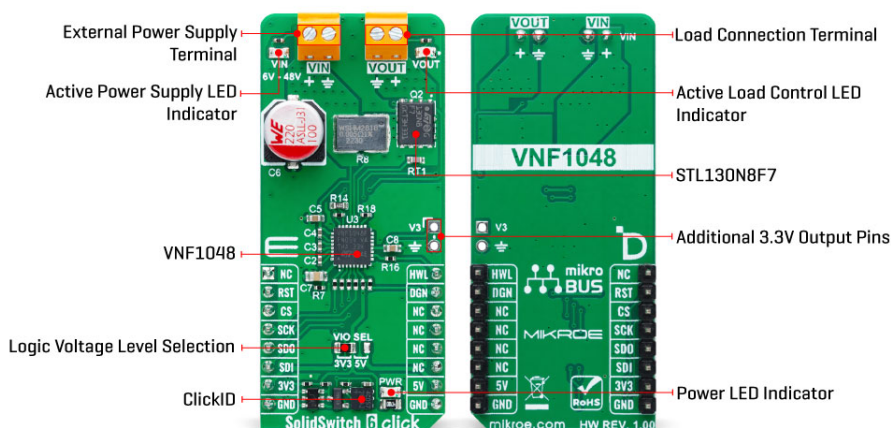
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At its core, the VNF1048F replaces traditional high-current automotive fuses with an advanced overcurrent protection mechanism capable of detecting and responding to excessive current to protect connected systems. It features an integrated gate drive that controls an external MOSFET (Q2 [STL130N8F7](#)) used for load control. The load connection is made through a VOUT terminal, accompanied by a green LED that indicates active load control. Additionally, SolidSwitch 6 Click integrates an NTC (Negative Temperature Coefficient) resistor, which monitors the external MOSFET's temperature to ensure safe operation.

The VNF1048F offers protection features, including battery under-voltage shutdown, configurable external MOSFET desaturation shutdown, and hard short-circuit latch-off. It also protects the device and external MOSFET overheating, automatically shutting down in case of high temperatures. Despite its robust features, SolidSwitch 6 Click boasts a very low standby current, ensuring operation even in power-sensitive applications.

The VNF1048F communicates with the host MCU via a 3.3V and 5V CMOS-compatible SPI interface, enabling system protection and diagnostics. In addition to the SPI interface pins, this board also uses other mikroBUS™ socket pins, such as the DGN pin for diagnostic feedback and the HWL pin, which triggers a state where the registers are locked from writing, enhancing system security and prevent unintended configuration changes. The board also includes an unpopulated header labeled V3, which provides access to the output of the 3.3V internal LDO voltage regulator intended for logic and I/O supply.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VIO 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 functions and an example code that can be used as a reference for further development.

Specifications

Type	Relay
Applications	Ideal for automotive applications like load control in cars, trucks, and other vehicles
On-board modules	VNF1048F - high-side switch controller with intelligent e-fuse protection from STMicroelectronics
Key Features	High-side switch controller, intelligent e-fuse

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	protection, NTC resistor for monitoring MOSFET temperature, diagnostic feedback, multiple protection features, SPI interface, additional 3.3V output for I/O and supply, and more
Interface	SPI
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 SolidSwitch 6 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	HWL	Register Write Lock
ID SEL	RST	2	RST	INT	15	DGN	Diagnostic Feedback
SPI Select / ID COMM	CS	3	CS	RX	14	NC	
SPI Clock	SCK	4	SCK	TX	13	NC	
SPI Data OUT	SDO	5	MISO	SCL	12	NC	
SPI Data IN	SDI	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	VIN	-	Active Power Supply LED Indicator
LD3	VOUT	-	Active Load Control LED Indicator
JP1	VIO SEL	Left	Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V

SolidSwitch 6 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	6	-	48	V

Software Support

We provide a library for the SolidSwitch 6 Click as well as a demo application (example),

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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 SolidSwitch 6 Click driver.

Key functions

- `solidswitch6_get_vout` This function reads the raw ADC value and converts it to a proportional voltage level using the SPI serial interface.
- `solidswitch6_set_control` This function writes control registers to configure the switch controller using the SPI serial interface.
- `solidswitch6_get_device_temperature` This function reads the raw ADC value and converts it to device temperature in degrees Celsius using the SPI serial interface.

Example Description

This library contains API for the SolidSwitch 6 Click driver and demonstrate uses of the high-side switch controller with intelligent fuse protection.

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.SolidSwitch6

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

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[mikroBUS™](#)

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Downloads

[SolidSwitch 6 click example on Libstock](#)

[SolidSwitch 6 click 2D and 3D files v100](#)

[SolidSwitch 6 click schematic v100](#)

[VNF1048F datasheet](#)

[STL130N8F7 datasheet](#)

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