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SolidSwitch 9 Click

PID: MIKROE-6619

SolidSwitch 9 Click is a compact add-on board designed for high-side switching across four independent channels for controlling resistive and inductive loads directly connected to ground, ideal for use in automotive and industrial environments. It is based on the VN9D5D20FN, a 4-channel high-side driver from STMicroelectronics with 24-bit SPI control for programming, diagnostics, and real-time control, integrated 10-bit ADC for precise current sensing, and flexible output control. It includes built-in diagnostics, it integrates a PWM engine with independent phase and frequency control for each channel, and supports multiple operating modes including limp-home functionality. SolidSwitch 9 Click is well suited for applications such as automotive lighting, motor control, industrial automation, and any system requiring safe, intelligent high-side load switching.

For more information about **SolidSwitch 9 Click** visit the official product page.

How does it work?

SolidSwitch 9 Click is based on the VN9D5D20FN, a 4-channel high-side driver with SPI control from STMicroelectronics, developed using advanced VIPower technology and qualified under the AEC-Q100 standard. This Click board™ provides high-side switching capabilities across four independent channels, designed to control both resistive and inductive loads directly connected to ground in automotive applications. Its compliance with the European directive 2002/95/EC ensures environmental compatibility. The core functionality is centered around a 24-bit SPI interface used for programming, diagnostics, and real-time control, offering precise digital current sensing feedback for each channel via an integrated 10-bit ADC with an accuracy of 0.1% of the full-scale range. For even more precision, trimming bits allow fine-tuning of the ADC reference current.

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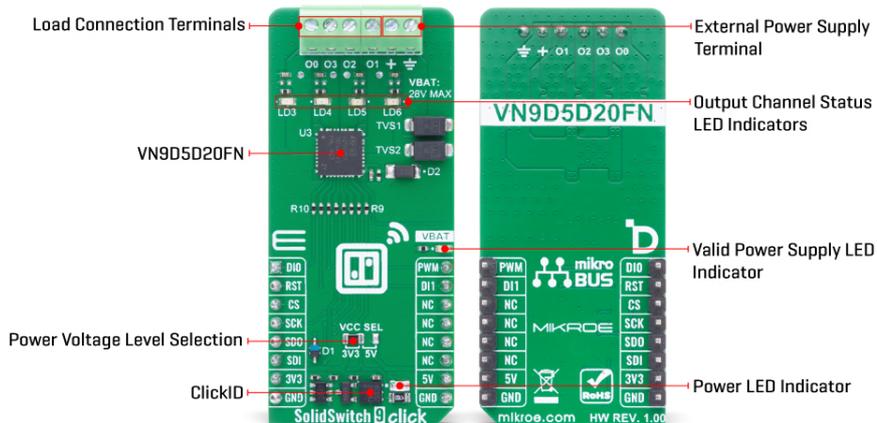
The VN9D5D20FN features four output channels (O0 to O3), which can be controlled either via the SPI interface or through two user-assignable direct inputs (DI0 and DI1), enabling flexible control even in scenarios where SPI is unavailable. Each output is accompanied by its own LED indicator (LD3 to LD6), allowing for immediate visual confirmation of the output state. To enhance safety and reliability, the VN9D5D20FN implements several diagnostic and protection mechanisms including open-load detection in the OFF-state, SPI-readable fault flags for conditions such as open-load, output short to VCC, overtemperature, communication errors, power limitations, and latch-off events.

The output current is actively limited to prevent damage during overloads, and power dissipation is regulated through dynamic thermal management, with a programmable shutdown mechanism that can either latch or auto-restart after a defined period. A dedicated VBAT LED indicator on the board provides a clear visual cue for system power availability, supporting input voltages up to 28V. The VN9D5D20FN supports multiple operation modes including Reset, Fail-safe, Normal, Standby, Sleep mode 1, Sleep mode 2, and Battery undervoltage mode, where the Reset, Fail-safe, and Sleep mode 1 are collectively referred to as limp-home mode.

In this mode, the device can function independently of the SPI interface, using VBAT and DIx signals for mode transitions and output control. By default configuration, DI0 controls outputs O0 and O1, while DI1 manages O2 and O3. Additionally, the VN9D5D20FN integrates a powerful PWM engine capable of generating independent phase-shifted PWM signals for each channel, supporting four selectable divider ratios ranging from 1/512 to 1/4096, making it ideal for finely tuned load modulation or motor control applications.

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

Specifications

Type	Power Switch
Applications	Ideal for automotive lighting, motor control, industrial automation, and any system requiring safe, intelligent high-side load switching

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On-board modules	VN9D5D20FN - 4-channel high-side driver with 24-bit SPI interface from STMicroelectronics
Key Features	Four independent high-side output channels, 24-bit SPI interface for programming and diagnostics, integrated 10-bit ADC with 0.1% FSR accuracy for digital current sensing, user-assignable direct input control, integrated PWM engine with independent phase and frequency control per channel, support for multiple operation modes, protection features, and more
Interface	GPIO,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 9 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS			Pin	Notes
Output Channel Control	DI0	1	AN	PWM	16	PWM	PWM Signal
ID SEL	RST	2	RST	INT	15	DI1	Output Channel Control
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	VBAT	-	Valid Power Supply LED Indicator
LD3-LD6	LD3-LD6	-	Output Channel Status LED Indicators
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V

SolidSwitch 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V

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External Power Supply	4	13	28	V
PWM Frequency Divider	1/4096	-	1/512	-

Software Support

[SolidSwitch 9 Click](#) 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 SolidSwitch 9 Click board by gradually increasing and decreasing the output duty cycle of each output channel one by one. After each update, the output is enabled and the diagnostic status is cleared.

Key Functions

- solidswitch9_cfg_setup This function initializes Click configuration structure to initial values.
- solidswitch9_init This function initializes all necessary pins and peripherals used for this Click board.
- solidswitch9_default_cfg This function executes a default configuration of SolidSwitch 9 Click board.
- solidswitch9_set_out_duty This function sets the output duty cycle for the selected output channels.
- solidswitch9_enable_out This function enables the selected outputs.
- solidswitch9_clear_all_status This function clears all status registers on the SolidSwitch 9 Click board.

Application Init

Initializes the logger and the Click board driver, and applies the default configuration.

Application Task

Adjusts the output duty cycle from 0% to 100% and back to 0% for each channel sequentially and clears the diagnostic status after each duty cycle update. The currently active output channel number is logged on the USB UART.

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 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

SolidSwitch 9 click example package

SolidSwitch 9 click 2D and 3D files v100

VN9D5D20FN datasheet

SolidSwitch 9 click schematic v100