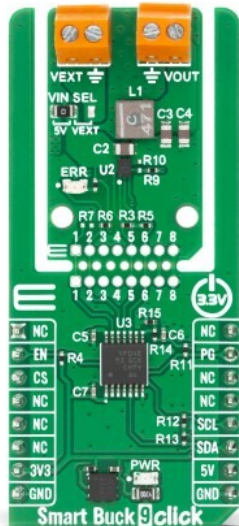


Smart Buck 9 Click



PID: MIKROE-6982

Smart Buck 9 Click is a compact add-on board for digitally configurable step-down power regulation in embedded systems. It is based on the [AP61406FCBW8-7](#), a 4A synchronous buck converter with a 2.3V to 5.5V input range and 0.3V to 3.6V adjustable output, from [Diodes Incorporated](#). The Click supports I2C communication, programmable PFM/PWM operation, selectable switching frequency, adjustable output current limit, 20mV output voltage steps, EN control, and Power-Good feedback for flexible power-rail management. With VIN selection, VEXT and VOUT screw terminals, PWR and ERR indicators, ClickID, and Click Snap, it suits POL supplies, network video cameras, wireless routers, hard disk drives, LVDDR5, and embedded low-voltage rails.

For more information about **Smart Buck 9 Click** visit the official [product page](#).

How does it work?

Smart Buck 9 Click is a compact add-on board designed for step-down DC/DC conversion in applications that require a digitally configurable low-voltage power rail. This Click board™ is based on the AP61406FCBW8-7 from Diodes Incorporated, a synchronous buck converter with an input voltage range from 2.3V to 5.5V and a wide output voltage range from 0.3V to 3.6V. The device integrates high-side and low-side power MOSFETs and can deliver up to 4A of output current, making it suitable for general-purpose point-of-load supplies, network video cameras, wireless routers, hard disk drive power rails, LVDDR5 supplies, and other embedded systems that need efficient local power regulation.

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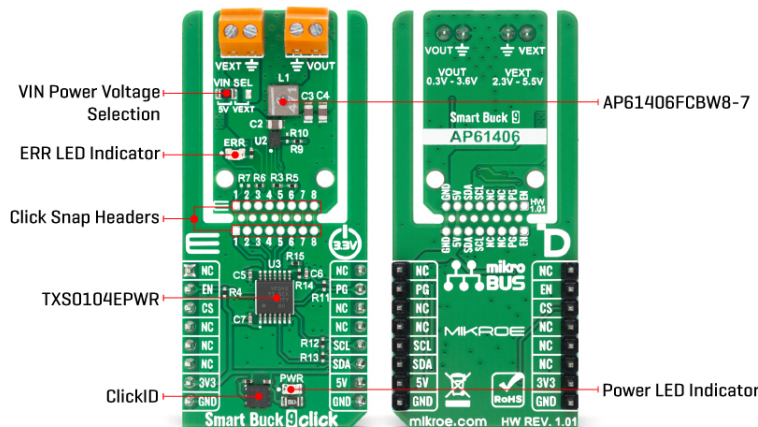
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The AP61406FCBW8-7 uses constant on-time control to support fast transient response, simple loop stabilization, and low output voltage ripple with a reduced number of external components. Through its internal register control, the converter supports programmable PFM or PWM operation, selectable switching frequency, programmable output current limit, and output voltage adjustment in 20mV steps. It also includes a Power-Good output and protection functions such as undervoltage lockout, input overvoltage protection, peak and valley current limiting, short-circuit recovery, and thermal shutdown, helping the board operate in compact power-management designs.

Smart Buck 9 Click communicates with the host MCU through the I2C interface, using the mikroBUS™ SDA and SCL pins for serial data and clock. The EN pin is routed to the mikroBUS™ RST pin and allows the host MCU to turn the regulator on or off, while the PG pin is routed to the mikroBUS™ INT pin to provide Power-Good status feedback. The mikroBUS™ CS pin is used for ClickID communication with the onboard identification circuitry. The I2C and control lines are routed through an onboard TXS0104E level translator, allowing the control interface to remain compatible with the board logic while the converter operates from the selected input rail.

This Click board™ also includes input and output screw terminals for easy connection to an external supply and load. The VEXT terminal provides an external input option, while the VOUT terminal gives access to the regulated output voltage. The VIN SEL jumper selects whether the AP61406 input is supplied from the mikroBUS™ 5V rail or from the external VEXT terminal. A green PWR LED indicates that the board is powered, while the red ERR LED is connected to the Power-Good signal and provides a visual indication when the regulated output is not within its valid operating range. The board also includes ClickID support and a Click Snap section, which allows the upper power-conversion part of the board to be separated from the mikroBUS™ section when the design requires remote or mechanically flexible placement.

Smart Buck 9 Click uses the mikroBUS™ 3.3V rail for board logic and ClickID circuitry, while the converter input can be supplied from the mikroBUS™ 5V rail or from an external 2.3V to 5.5V source through the VEXT terminal. This Click board™ comes with a library containing easy-to-use functions and an example code that can be used as a reference for further development. The example demonstrates how to initialize the board, communicate with the AP61406FCBW8-7 through I2C, configure the regulator, and monitor its status.

Click Snap

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Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the [official page](#) dedicated to this feature.

Specifications

Type	Buck
Applications	Ideal for applications such as point-of-load supplies, network video cameras, wireless routers, hard disk drives, LVDDR5 power rails, and embedded low-voltage power management
On-board modules	AP61406FCBW8-7 - 4A I2C synchronous buck converter with adjustable output voltage from Diodes Incorporated
Key Features	Based on the AP61406FCBW8-7 synchronous buck converter, 2.3V to 5.5V input range, 0.3V to 3.6V adjustable output, up to 4A load current, I2C configuration, programmable PFM/PWM operation, selectable switching frequency, 20mV output voltage steps, adjustable current limit, EN control, Power-Good feedback, VIN selection, screw-terminal access, ClickID, Click Snap, and more
Interface	I2C
Feature	Click Snap, ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Smart Buck 9 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	
Enable	EN	2	RST	INT	15	PG	Power Good
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

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Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP2	VIN SEL	Left	VIN Selection Jumper
LD2	ERR	-	Error LED Indicator

Smart Buck 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	2.3	-	5.5	V
Output Voltage	0.3	-	3.6	V
Output Current	-	-	4	A
Increment VOUT Adjust	-	20	-	mV

Software Support

[Smart Buck 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 Smart Buck 9 Click board for output voltage control. The application periodically sets the output voltage across the supported range and monitors the device status register for fault conditions.

Key Functions

- `smartbuck9_cfg_setup` This function initializes Click configuration structure to initial values.
- `smartbuck9_init` This function initializes all necessary pins and peripherals used for this Click board.
- `smartbuck9_default_cfg` This function executes a default configuration of Smart Buck 9 Click board.
- `smartbuck9_set_vout` This function sets the VOUT output voltage.
- `smartbuck9_get_pg_pin` This function returns the PG pin logic state.
- `smartbuck9_read_reg` This function reads a single byte of data from the selected register.

Application Init

Initializes the logger and Smart Buck 9 Click driver, and applies the default configuration.

Application Task

Steps the output voltage from minimum to maximum value, reads the status register, and logs detected faults such as input overvoltage, output overvoltage, overcurrent, thermal shutdown, and power-not-good state.

Application Output

This Click board can be interfaced and monitored in two ways:

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- 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

[Smart Buck 9 Click example package](#)

[Smart Buck 9 Click 2D and 3D files v101](#)

[Smart Buck 9 Click schematic v101](#)

[AP61406FCBW8-7 datasheet](#)

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