

Step Down 15 Click



PID: MIKROE-7007

Step Down 15 Click is a digitally programmable synchronous buck converter for generating efficient low-voltage rails in embedded and high-performance electronic systems. It features the [MCPF1412M06](#) point-of-load module from [Microchip Technology](#), accepting 4.5V to 16V input and delivering an adjustable 0.6V to 1.8V output at currents up to 6A. I2C and PMBus control enable voltage programming, telemetry, fault monitoring, and configurable protection, while onboard jumpers provide fixed voltage, address, logic-level, and synchronization options. Separate VIN and VOUT terminals simplify power connections. It is suitable for FPGAs, processors, servers, routers, telecom equipment, base stations, and other low-voltage digital systems and infrastructure.

For more information about **Step Down 15 Click** visit the official [product page](#).

How does it work?

Step Down 15 Click is based on the MCPF1412M06, a fully integrated, high-efficiency point-of-load (POL) switching regulator module from Microchip Technology. The device combines an on-chip PWM controller, integrated power MOSFETs, an output inductor, and supporting capacitors in a compact package, reducing the number of external components required for high-current voltage conversion. Its interleaved buck architecture provides inherent current sharing between two phases while reducing voltage stress on the internal power components. The MCPF1412M06 accepts input voltages from 4.5V to 16V and provides an adjustable output from 0.6V to 1.8V. Although the module supports continuous loads up to 12A, Step Down 15 Click is specified for output currents up to 6A. It operates across a temperature range from -40°C to +125°C and is suitable for supplying FPGAs, processors, DSPs, ASICs, servers, workstations, routers, switches, telecom equipment, base stations, and other low-voltage digital systems.

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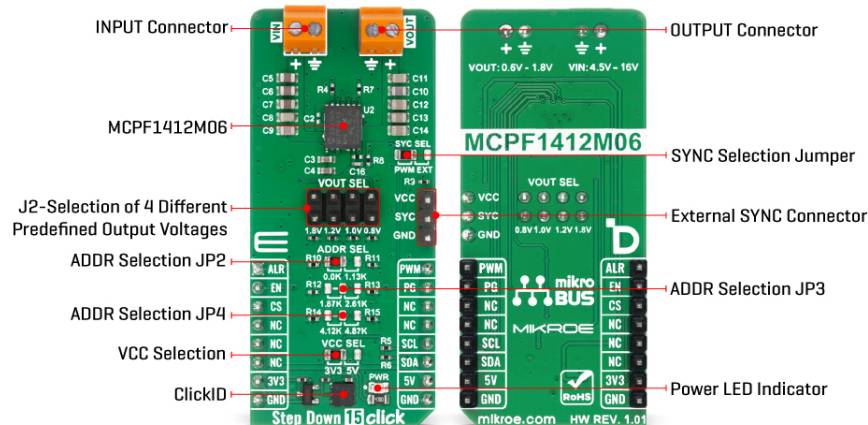
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The MCPF1412M06 uses a proprietary modulator with internal compensation to provide fast transient response and stable operation with different output capacitor configurations without requiring external loop compensation. It supports standalone voltage selection through an external resistor divider as well as digital configuration through I2C and PMBus™ commands. The output voltage can be programmed through the VOUT_COMMAND registers with a resolution of 1/256V, while additional settings allow control of soft-start behavior, voltage margining, undervoltage lockout thresholds, Power-Good limits, and fault responses. The device supports pseudo-constant-frequency COT operation and a PLL-controlled mode for digitally programmed output voltages and external synchronization. Input voltage, output voltage, temperature, and operating status can be monitored through the digital interface, while non-volatile memory can retain selected power-up settings. Integrated protection functions include soft start, overvoltage and undervoltage monitoring, thermally compensated overcurrent protection with hiccup operation, and thermal shutdown with automatic recovery.

Step Down 15 Click communicates with the host MCU through the I2C interface using the mikroBUS™ SCL and SDA pins, with PMBus™ commands supported over the same communication lines. The default 7-bit I2C address is 0x08, while the JP2-JP4 ADDR SEL jumpers provide several alternative address configurations. Besides the communication interface, the board uses the ALR pin on the AN position as an active-low SMBAlert# output for reporting warning and fault conditions. The EN pin on the RST position enables or disables the regulator, while the PWM pin can provide the synchronization signal when selected as the SYNC source. The PG pin on the INT position provides an open-drain Power-Good indication and is asserted when the output is within its configured regulation range and no active fault is present. The CS pin is used for ClickID communication and automatic board identification.

The external supply and regulated output are connected through separate two-pole screw terminals labeled VIN and VOUT. The J2 VOUT SEL header allows the user to select one of four predefined output voltages: 0.8V, 1.0V, 1.2V, or 1.8V. When no jumper is installed on J2, the output voltage can be programmed digitally across the supported 0.6V to 1.8V range. The JP5 SYNC SEL jumper selects whether the synchronization input is driven from the mikroBUS™ PWM pin or an external signal supplied through the three-pin J1 header, which exposes VCC, SYNC, and GND connections. The board also includes JP2-JP4 address-selection jumpers, a green PWR LED indicating the presence of the selected interface supply, and ClickID circuitry based on the DS28E36BQ identification device.

Step Down 15 Click uses both standard mikroBUS™ power rails: the 5V rail supplies the MCPF1412M06 bias circuitry, while the 3.3V rail supplies the ClickID section. The JP1 VCC SEL

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jumper, set to 3.3V by default, selects either the 3.3V or 5V logic level for the communication lines and control signals. The high-current conversion stage requires a separate external supply from 4.5V to 16V connected through the VIN screw terminal. This Click board™ comes equipped with a library containing easy-to-use functions and a ready-to-use code example.

Specifications

Type	Buck
Applications	Ideal for applications such as FPGA and processor power rails, servers, workstations, routers, switches, telecom equipment, base stations, and other low-voltage digital systems
On-board modules	MCP1412M06 - fully integrated 12A point-of-load switching regulator module with I2C and PMBus™ control from Microchip Technology
Key Features	Fully integrated interleaved buck architecture, 4.5V to 16V input, programmable 0.6V to 1.8V output at up to 6A, I2C and PMBus™ control, voltage and temperature telemetry, preset output selection, external synchronization, configurable protection, and more
Interface	GPIO, I2C, PWM
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 Step Down 15 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Alert	ALR	1	AN	PWM	16	PWM	PWM
Enable	EN	2	RST	INT	15	PG	Power Good
ClickID One-Wire	CS	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	SCL	Serial Clock
	NC	6	MOSI	SDA	11	SDA	Serial 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	Interface voltage selection

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JP2	ADDR SEL	Left	I2C peripheral address selection
JP3	ADDR SEL	-	I2C peripheral address selection
JP4	ADDR SEL	-	I2C peripheral address selection
JP5	SYN SEL	Left	SYNC selection between mikroBUS PWM and external
J1	-	-	External SYNC Connector
J2	VOUT SEL	-	Selection of 4 different predefined output voltages

Step Down 15 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Operating Temperature	-40	-	125	°C
Output Current	0	-	6	A
Input Voltage	4.5	-	16	V
Output Voltage	0.6	-	1.8	V

Software Support

[Step Down 15 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 Step Down 15 Click board for adjustable output voltage control and power monitoring. The application changes the output voltage within the supported range and reads PVIN, VOUT, VCC, temperature, and status information.

Key Functions

- `stepdown15_cfg_setup` This function initializes Click configuration structure to initial values.
- `stepdown15_init` This function initializes all necessary pins and peripherals used for this Click board.
- `stepdown15_default_cfg` This function executes a default configuration of Step Down 15 Click board.
- `stepdown15_set_vout` This function sets the output voltage command value.
- `stepdown15_read_pvin` This function reads and calculates the input voltage value.
- `stepdown15_read_temperature` This function reads and calculates the average temperature value.

Application Init

Initializes the logger and Step Down 15 Click driver, and applies the default configuration.

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Application Task

Adjusts the output voltage between minimum and maximum values, reads voltage and temperature measurements, checks the status register for fault conditions, and logs the results to the serial terminal.

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

[Step Down 15 Click example package](#)

[Step Down 15 Click 2D and 3D files v101](#)

[Step Down 15 Click schematic v101](#)

[MCPF1412M06 datasheet](#)

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