

eFuse Click



PID: MIKROE-4726

eFuse Click is a compact add-on board that contains a programmable electronic power breaker. This board features the STPW12, an integrated electronic power breaker optimized to monitor the input power from STMicroelectronics. Connected in series to the power rail, it can disconnect the electronic circuitry on its output if the power consumption overcomes the programmed limit. The intervention of the protection is communicated to the MCU through a signal on the fault pin. The device can also be enabled/disabled through a dedicated Enable pin with a direct PWM mode, which can be achieved through an external PWM signal. This Click board™ is suitable for industrial and consumer applications, fault protection, overcurrent surge protection, and more.

eFuse Click is supported by a [mikroSDK](#) compliant library, which includes functions that simplify software development. This [Click board™](#) comes as a fully tested product, ready to be used on a system equipped with the [mikroBUS™](#) socket.

How does it work?

eFuse Click as its foundation uses the STPW12, a programmable electronic power breaker optimized to monitor the input power from STMicroelectronics. The device is designed and optimized to work on 12V power rails, even if the operating supply voltage can range from 10.5V to 18V. Connected in series to the power rail, it can disconnect the electronic circuitry on its output if the power consumption overcomes the programmed limit. The intervention threshold is programmed by the resistor connected by the RSET terminal. When this happens, the STPW12 automatically opens the integrated power switch and disconnects the load.

Mikroe produces entire development toolchains for all major microcontroller architectures.

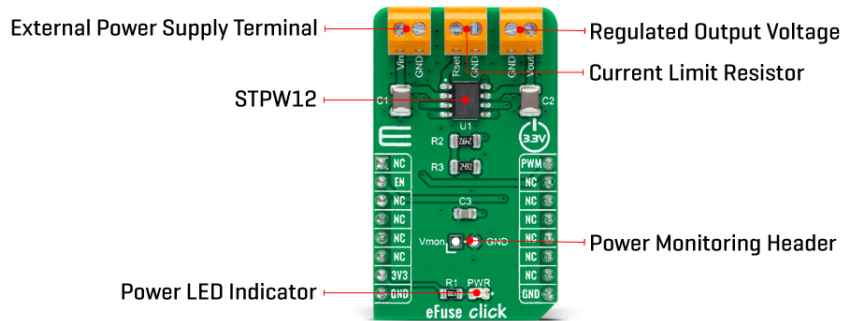
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
 ISO 14001: 2015 certification of environmental management system.
 OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).



The overcoming of the power limit threshold is signaled on the monitor/fault pin on the onboard header pin labeled as VMON. The monitor/fault pin is proportional to the power, continuously present on the pin, and provides two valuable signals for the real-time control of the device and application status. After a particular delay time, programmable by the user, the STPW12 automatically tries again to close the internal switch and re-connect the load.

eFuse Click communicates with MCU using two GPIO pins routed on the PWM and RST pins of the mikroBUS™ socket labeled PWM and EN. The device can be enabled or disabled through a dedicated Enable (EN) pin with a direct PWM mode, which can be achieved through an external PWM signal. In this mode, the device's internal power switch can be driven ON/OFF by an external PWM signal, provided to the PWM pin of the STPW12 (square wave, maximum 2kHz, duty cycle 20% - 100%). This approach allows the user to optimize the design power distribution system in terms of accurate power control, choice of isolation material, safety improvements, such as the reduced risk of flammability and easier qualification and certification flow.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before use with MCUs with different logic levels. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Power Switch
Applications	Can be used for industrial and consumer applications, fault protection, overcurrent surge protection, and more
On-board modules	STPW12 - programmable electronic power breaker optimized to monitor the input power from STMicroelectronics
Key Features	Real-time input power sensing, undervoltage lockout, PWM mode, thermal shutdown, enable function, short-circuit current limit, and more
Interface	GPIO, PWM
Feature	No ClickID

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
 ISO 14001: 2015 certification of environmental management system.
 OHSAS 18001: 2008 certification of occupational health and safety management system.




ISO 9001: 2015 certification of quality management system (QMS).

Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V, External

Pinout diagram

This table shows how the pinout on eFuse 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	PWM	PWM Signal
Enable	EN	2	RST	INT	15	NC	
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	3.3V	7	3.3V	5V	10	NC	
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
J1	VMON	Unpopulated	Power Monitoring Header

eFuse Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage VCC	-	3.3	-	V
External Supply Voltage VIN	10.5	12	18	V
Current Limit	-	1	-	A
Power Limit Range	10	-	15	W
PWM Signal Frequency	-	2	-	kHz
PWM Duty Cycle	20	-	100	%
Operating Temperature Range	-40	+25	+125	°C

Software Support

We provide a library for the eFuse Click on our [LibStock](#) page, as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Library Description

The library covers all the necessary functions to control eFuse Click board™. Library performs a standard SPI interface communication.

Key functions:

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
 ISO 14001: 2015 certification of environmental management system.
 OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

- void efuse_enable_device (uint8_t en_dev) - Enable the device function.
- Enable the device function. float efuse_get_voltage (uint16_t adc_data) - Get voltage function.
- float efuse_get_power (uint16_t adc_data, float input_voltage) - Get power function.

Examples description

The application is composed of three sections :

- System Initialization - Initializes SPI, set RST, CS and PWM pin as outputs, begins to write log.
- Application Initialization - Initialization driver enables - SPI and enable the device, also write log.
- Application Task - (code snippet) This is an example that demonstrates the use of the eFuse Click board. In this example, we monitoring and display ADC and voltage (mV). Results are being sent to the Usart Terminal where you can track their changes. All data logs write on USB uart changes approximately for every 3 sec.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other mikroE Libraries used in the example:

- SPI
- UART
- Conversions

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. The terminal available in all MikroElektronika [compilers](#), or any other terminal application of your choice, can be used to read the message.

mikroSDK

This Click board™ is supported with [mikroSDK](#) - MikroElektronika 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

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[eFuse click 2D and 3D files](#)

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
 ISO 14001: 2015 certification of environmental management system.
 OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

[STPW12 datasheet](#)

[eFuse click schematic](#)

[eFuse click example on Libstock](#)

Mikroe produces entire development toolchains for all major microcontroller architectures.

Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).