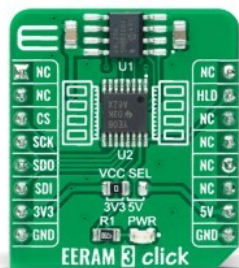


## EERAM 3 Click



PID: MIKROE-4854

**EERAM 3 Click** is a compact add-on board that contains EERAM memory designed to retain data during power loss without the aid of external batteries. This board features the 48L256, a serial EERAM with SRAM memory core, including hidden EEPROM backup from Microchip Technology. The 48L256 is structured as a 256-Kbit SRAM with EEPROM backup in each memory cell, where SRAM is organized as 32,768x8 bits and uses the SPI serial interface. It offers unlimited reads and writes, invisible-to-user data transfers on power loss, 100,000 backups (data can be transferred 100,000 times), and data retention (data is kept safe for 10 years minimum). This Click board™ is ideal for nonvolatile memory applications requiring frequent or rapid writes and unlimited endurance.

EERAM 3 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?

EERAM 3 Click as its foundation uses the 48L256, an SPI nonvolatile EERAM memory IC designed to retain data when power is disrupted from Microchip Technology. The user can treat this Click board™ as a full symmetrical read/write SRAM: it allows symmetrical reads and writes and has no limits on cell usage. It is structured as a 256-Kbit SRAM with EEPROM backup in each memory cell, where SRAM is organized as 32,768x8 bits. The 48L256 specifies 100.000 endurance cycles with data retention of a minimum of 10 years, which gives the 48L256 the unique capability to handle unlimited reads/writes to the memory.

Mikroe produces entire development toolchains for all major microcontroller architectures.

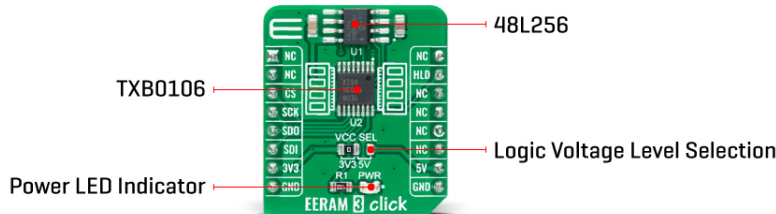
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



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 backup EEPROM is invisible to the user and cannot be accessed by the user independently. The 48L256 includes circuitry that detects VCC voltage dropping below a certain threshold, shuts its connection to the outside environment, and transfers all SRAM data to the EEPROM portion of each cell for safekeeping. When VCC returns, the circuitry automatically returns the data to the SRAM, and the user's interaction with the SRAM can continue with the same data set.

The 48L256 communicates with MCU through a standard SPI interface that enables very high clock speeds up to 66MHz, supporting the two most common SPI modes - SPI Mode 0 and 3, and a proper logic voltage level conversion performed by the appropriate voltage level translator. The VCC logic level provides a needed reference voltage for one side of the [TXB0106](#), a 6-bit bidirectional level shifting, and a voltage translator with automatic direction sensing from Texas Instruments. On another side of the level shifter, the reference voltage is taken from the 3.3V mikroBUS™ power rail.

Another feature of this Click board™ represents the configurable HOLD function labeled as HLD routed on the INT pin of the mikroBUS™ socket. The HLD pin is used to suspend transmission to the 48L256 while in the middle of a serial sequence without re-transmitting the entire sequence over again. It must be held high any time this function is not being used. Once the device is selected and a serial sequence is underway, the HLD pin may be pulled low to pause further serial communication without resetting the serial sequence.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the SPI communication lines properly. However, the 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	EERAM
Applications	Can be used for nonvolatile memory applications requiring frequent or rapid writes and unlimited endurance
On-board modules	48L256 - serial EERAM with SRAM memory core, including hidden EEPROM backup from

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).

	Microchip Technology
Key Features	Low power consumption, unlimited reads/writes, standard serial SRAM protocol, high-speed SPI interface, cell-based nonvolatile backup, data endurance and retention, and more
Interface	SPI
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V or 5V

## Pinout diagram

This table shows how the pinout on EERAM 3 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	
	NC	2	RST	INT	15	<b>HLD</b>	SPI Suspension
SPI Chip Select	<b>CS</b>	3	CS	RX	14	NC	
SPI Clock	<b>SCK</b>	4	SCK	TX	13	NC	
SPI Data OUT	<b>SDO</b>	5	MISO	SCL	12	NC	
SPI Data IN	<b>SDI</b>	6	MOSI	SDA	11	NC	
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	<b>5V</b>	Power Supply
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

## EERAM 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Memory Size	-	-	256	kbit
Write Endurance	100.000	-	-	Store Cycles
Data Retention	10	-	-	Years
Operating Temperature Range	-40	+25	+85	°C

## Software Support

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).

We provide a library for the EERAM 3 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

## Library Description

This library contains API for EERAM 3 Click driver.

Key functions:

- eeram3\_memory\_secure\_write - This function securely writes a desired number of data bytes starting from the selected memory address.
- eeram3\_memory\_secure\_read - This function securely reads a desired number of data bytes starting from the selected memory address.
- eeram3\_set\_block\_protection - This function sets the block protection bits of the Status register.

## Examples description

This example demonstrates the use of EERAM 3 Click board™.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other mikroE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.EERAM3

## 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™](#)

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).

[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

## Downloads

[EERAM 3 click example on Libstock](#)

[TXB0106 datasheet](#)

[48L256 datasheet](#)

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

[EERAM 3 click schematic](#)

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).