

FRAM 5 Click



PID: MIKROE-5119

FRAM 5 Click is a compact add-on board representing a highly reliable ferroelectric random access memory solution. This board features the FM24V10, a 1Mbit nonvolatile memory employing an advanced ferroelectric process organized as 128K words of 8 bits each from Infineon. This I2C configurable FRAM performs read and write operations similar to a RAM providing reliable data retention for 151 years while eliminating the complexities, overhead, and system-level reliability problems caused by EEPROM and other nonvolatile memories. This Click board™ is ideal for nonvolatile memory applications requiring frequent or rapid writes and unlimited endurance.

FRAM 5 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?

FRAM 5 Click as its foundation uses the FM24V10, a 1Mbit ferroelectric random access memory (FRAM) logically organized as 131,072×8 bits and accessed using an industry-standard I2C interface from Infineon. The functional operation of the FRAM is similar to serial I2C EEPROM, where the significant difference between the FM24V10 and EEPROM represents the F-RAM's superior write performance, high endurance, and low power consumption. This Click board™ is ideal for nonvolatile memory applications requiring frequent or rapid writes, where example ranges from data collection to demanding industrial controls where the long write time of serial EEPROM can cause data loss.

Mikroe produces entire development toolchains for all major microcontroller architectures.

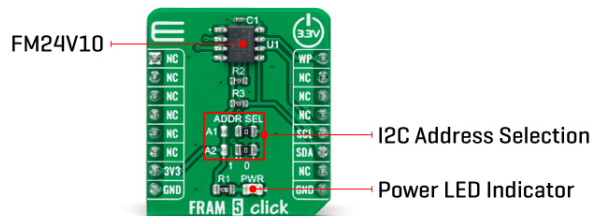
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



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).



This Click board™ communicates with MCU using the standard I2C 2-Wire interface, supporting operation with a clock frequency up to 3.4MHz. Unlike serial EEPROM, the FM24V10 performs write operations at bus speed, where no write delays are incurred. It provides reliable data retention for 151 years while eliminating the complexities, overhead, and system-level reliability problems caused by EEPROM and other nonvolatile memories and supports 10 trillion (10¹⁴) read/write cycles or 100 million times more write cycles than EEPROM. Besides, the FM24V10 allows choosing its I2C slave address using the SMD jumpers labeled ADDR SEL. The selection can be made by positioning the SMD jumpers to an appropriate position marked as 1 or 0.

An additional feature of this FRAM represents the configurable Write Protection function labeled as WP routed on the PWM pin of the mikroBUS™ socket. The WP pin protects the entire memory and all registers from write operations and must be set to a high logic state to inhibit all the write operations. All memory and register writes are prohibited when this pin is high, and the address counter is not incremented.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using 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	FRAM
Applications	Can be used for nonvolatile memory applications requiring frequent or rapid writes and unlimited endurance
On-board modules	FM24V10 - 1Mbit nonvolatile memory employing an advanced ferroelectric process organized as 128K words of 8 bits each from Infineon
Key Features	Low power consumption, high endurance, 151 years data retention, advanced high-reliability ferroelectric process, fast serial interface, sophisticated write protection scheme, and more

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).

Interface	I2C
ClickID	No
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on FRAM 5 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS				Pin	Notes
	NC	1	AN	PWM	16	WP	Write Protect
	NC	2	RST	INT	15	NC	
	NC	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	NC	
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1-JP2	ADDR SEL	Right	I2C Address Selection 1/0: Left position 1, Right position 0

FRAM 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Memory Size	-	-	1	Mbit
Write Endurance	10 ¹⁴	-	-	Write Cycles
Data Retention	151	-	-	Years
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the FRAM 5 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

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).

This library contains API for FRAM 5 Click driver.

Key functions

- `fram5_check_communication` This function checks the communication by reading and verifying the device ID.
- `fram5_memory_write` This function writes a desired number of data bytes starting from the selected memory address.
- `fram5_memory_read` This function reads a desired number of data bytes starting from the selected memory address.

Example Description

This example demonstrates the use of FRAM 5 Click board™ by writing specified data to the memory and reading it back.

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.FRAME5

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. UART terminal is available in all MikroElektronika [compilers](#).

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™](#)

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).

Downloads

[FRAM 5 click example on Libstock](#)

[FM24V10 datasheet](#)

[FRAM 5 click 2D and 3D files](#)

[FRAM 5 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).