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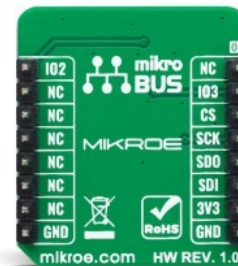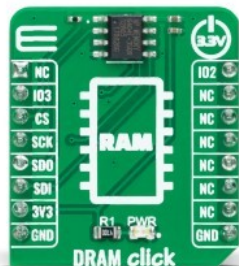www.mikroe.com

DRAM Click

PID: MIKROE-5337

DRAM Click is a compact add-on board representing a dynamic random-access memory solution. This board contains the APS6404L-3SKR from AP Memory, a high-performance 64Mb SPI/KPI PSRAM memory organized as 8M x 8 bits each. This Pseudo-SRAM device features a high speed, low pin count interface and incorporates a seamless self-managed refresh mechanism to maximize the performance of memory read operation. It has 4 SDR I/O pins and operates in SPI or QPI (quad peripheral interface) mode with frequencies up to 133 MHz. This Click board™ is most suitable for low-power and low-cost portable applications.

DRAM 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?

DRAM Click is based on the APS6404L-3SQR, a 64Mb PSRAM (Pseudo-SRAM) memory with an SPI/QPI interface from AP Memory. Organized as 8M x 8 bits each, this high speed, high performance memory has a page size of 1024 bytes. It also incorporates a seamless, self-managed refresh mechanism specially designed to maximize the performance of the memory read operation (it does not require the support of DRAM refresh from the system host). It is most suitable for low-power and low-cost portable applications.

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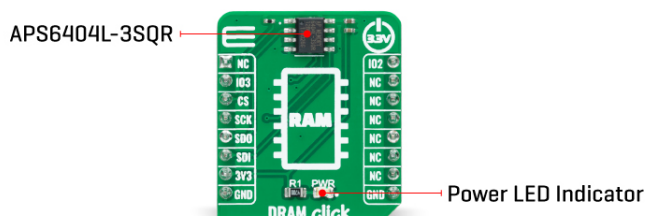
The APS6404L-3SQR communicates with the MCU using a SPI serial interface that also supports Quad SPI and the two most common modes, SPI Mode 0 (QSPI Mode 1), with a maximum SPI frequency of 133MHz. The APS6404L-3SQR includes an on-chip voltage sensor that is used to start the self-initialization process. When the main power supply voltage reaches a stable level at or above the minimum supply voltage level, the device will require 150µs and user-issued RESET Operation to complete its self-initialization process. The device powers up in SPI mode by default configuration but can also be switched into QPI mode. The CS pin must be set to high logic level before initiating any operations.

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	DRAM
Applications	Can be used for low-power and low-cost portable applications
On-board modules	APS6404L-3SQR - 64Mb PSRAM (Pseudo-SRAM) memory from AP Memory
Key Features	Low power consumption, SPI/QPI with SDR mode, high performance, organized as 8M x 8bits, page size of 1024 bytes, self-managed refresh mechanism, software reset, and more
Interface	QSPI,SPI
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

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This table shows how the pinout on DRAM 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	IO2	QSPI IO2
QSPI IO3	IO3	2	RST	INT	15	NC	
SPI Chip Select	CS	3	CS	RX	14	NC	
SPI Clock	SCK	4	SCK	TX	13	NC	
SPI Data OUT / QSPI IO1	SDO	5	MISO	SCL	12	NC	
SPI Data IN / QSPI IO0	SDI	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

DRAM Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Memory Size	-	-	64	Mb
Operating Temperature Range	-25	+25	+85	°C

Software Support

We provide a library for the DRAM 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 DRAM Click driver.

Key functions

- dram_memory_write This function writes a desired number of data bytes starting from the selected memory address.

- dram_memory_read This function reads a desired number of data bytes starting from the selected memory address.

- dram_memory_read_fast This function reads a desired number of data bytes starting from the selected memory address performing fast read feature.

Example Description

This example demonstrates the use of DRAM 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), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.DRAM

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™

Downloads

DRAM click example on Libstock

DRAM click 2D and 3D files

APS6404L-3SQR datasheet

DRAM click schematic

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