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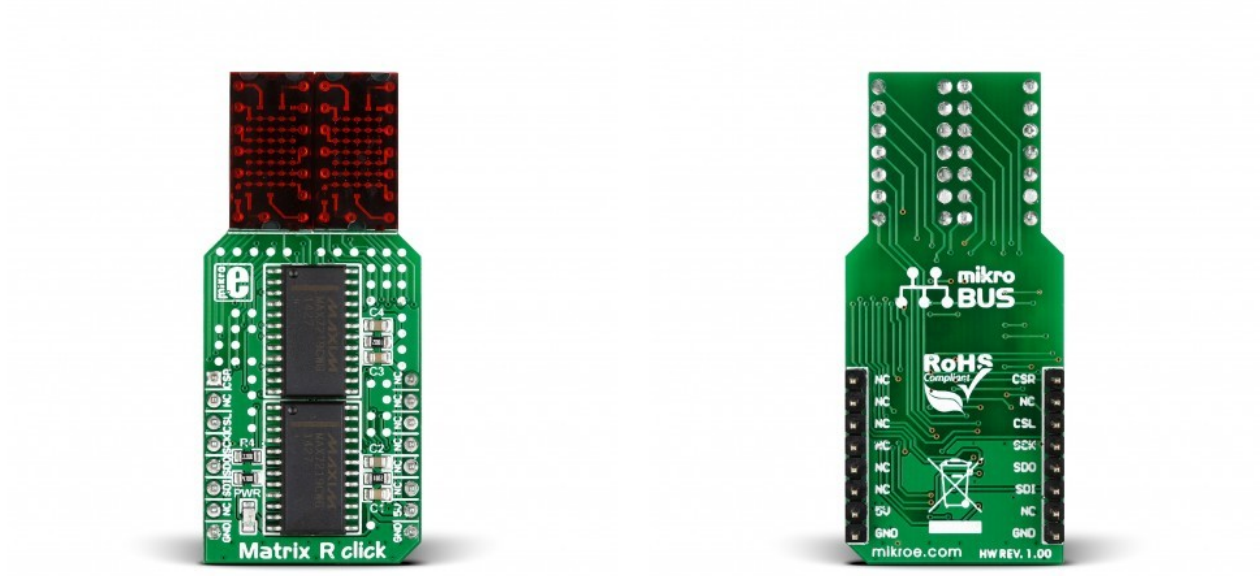
# Matrix R Click




PID: MIKROE-2245

**Matrix R Click** is a compact add-on board that controls two onboard red 5x7 matrices. This board features two MAX7219, serially interfaced, 8-digit LED display drivers from Analog Devices. The active area of each matrix is 7.62mm high and 5.08mm wide. The 7x5 is a standard resolution for displaying ASCII characters, so the Matrix R Click is essentially a dual-character display capable of showing letters in more readable typefaces compared to a 14-segment display. This Click board™ makes the perfect solution for the development of user interfaces, graphical displays of information, and similar applications that display clearly visible low-resolution graphics or text.

Matrix R 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?

Matrix R Click is based on two MAX7219, serially interfaced, 8-digit LED display drivers from Analog Devices. The MAX7219 over 10MHz serial interface is capable of addressing each LED of the two onboard red 5x7 matrices individually or all at the same time. It has digital and analog brightness control, blanked display on Power-Up sequence, low-power shutdown with data retained, and more features. It also includes a BCD code-B decoder, multiplex scan circuitry, segment and digit drivers, and an 8x8 static RAM that stores each data. Users can get four-character displays if they double up on a board with two adjacent mikroBUS™ sockets, such as Fusion, Clicker 2, or Flip&Click.

The Matrix R Click uses an SPI serial interface to communicate to the host microcontroller, with

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speeds of up to 10MHz. Each MAX7219's chip select pin is connected to the appropriate pin on the mikroBUS™ socket. The MAX7219 that controls the left display is connected to the pin labeled CSL, while the right is connected to the pin labeled CSR. Serial data is loaded into the shift register while the corresponding chip select pin is in a low logic state. The peak segment current is set to around 40mA with an external resistor. The display's brightness can be controlled by the internal PWM by the software.

This Click board™ can be operated only with a 5V 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 | LED Matrix |
| Applications | Can be used for the development of user interfaces, graphical displays of information, and similar applications that display clearly visible low-resolution graphics or text |
| On-board modules | MAX7219 - serially interfaced, 8-digit LED display drivers from Analog Devices |
| Key Features | Pair of 7x5 LED matrices, pair of MAX7219 8-digit LED display drivers, drivers control each LED of the matrices individually, or all at the same time, brightness control, blank on Power-Up, low power consumption, high performance, and more |
| Interface | GPIO,SPI |
| Feature | No ClickID |
| Compatibility | mikroBUS™ |
| Click board size | L (57.15 x 25.4 mm) |
| Input Voltage | 5V |

## Pinout diagram

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

| Notes | Pin | mikroBUS | | | | Pin | Notes |
|---|---|---|---|---|---|---|---|
| Right Display SPI Chip Select | **CSR** | 1 | AN | PWM | 16 | NC | |
| | NC | 2 | RST | INT | 15 | NC | |
| Left Display SPI Chip Select | **CSL** | 3 | CS | RX | 14 | NC | |
| SPI Clock | **SCK** | 4 | SCK | TX | 13 | NC | |
| SPI Data OUT | **SDO** | 5 | MISO | SCL | 12 | NC | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SPI Data IN | **SDI** | 6 | MOSI | SDA | 11 | NC | |
| | NC | 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 |

## Matrix R Click electrical specifications

| Description | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Receiver inputs voltage range | - | 5 | - | V |

## Software Support

We provide a library for the Matrix R Click as well as a demo application (example), developed using MIKROE compilers. The demo can run on all the main MIKROE development boards.

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

### Library Description

This library contains API for Matrix R Click driver.

Key functions

- matrixr_display_characters This function displays the specified characters on the L/R segments of the click.
- matrixr_set_csn_high This function sets the CSN pin output to high.
- matrixr_set_csn_low This function sets the CSN pin output to low.

### Example Description

This example showcases how to prepare the logger and click modules for use and how to display ASCII characters on both of the LED segments of the click.

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.MatrixR

### Additional notes and informations

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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 MIKROE compilers.

## mikroSDK

This Click board™ is supported with mikroSDK - MIKROE 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

Matrix R click example on Libstock

Matrix R click schematic

MAX7219 datasheet

Matrix R click 2D and 3D files