

Expand 8 Click



PID: MIKROE-4442

Expand 8 Click is a compact add-on board that contains a multi-port I/O expander with bi-directional input/outputs. This board features the [MAX7317](#), 10-Port SPI-interfaced I/O expander with overvoltage and hot-insertion protection from [Analog Devices](#). The MAX7317 provides microprocessors with 10 I/O ports rated to 7V. Each port can be individually configured as either an open-drain output or an overvoltage-protected Schmitt input that supports hot insertion. All port pins remain high impedance in Power-Down mode with up to 8V asserted on them. This Click board™ is intended for use as a port expander in system monitoring applications, industrial controllers, portable equipment, and many more.

Expand 8 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?

Expand 8 Click as its foundation uses the MAX7317, a general-purpose input/output (GPIO) peripheral from Analog Devices that provides 10 I/O ports, P0 to P9, controlled through a high-speed SPI-compatible serial interface. Each port, P0 to P9 can be configured as open-drain, current-sink outputs rated at 20mA maximum, or as CMOS inputs, or as open-drain outputs. Loads should be connected to a supply voltage no higher than 7V.

Mikroe produces entire development toolchains for all major microcontroller architectures.

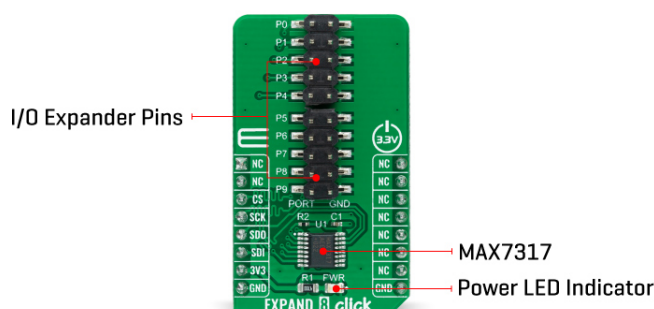
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.



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 MAX7317 contains ten 8-bit internal registers. These ten registers addressed as 0x00 - 0x09 control an I/O port each. Write 0x00 to the output register to set the port as a logic-low output, or 0x01 to set the port as a logic-high output or logic input.

Expand 8 Click communicates with MCU through a 16-bit 4-wire serial interface compatible with standard SPI, QSPI™, MICROWIRE™ guaranteed to operate at 35Mbps on its 3.3V power supply. During the Power-Up sequence, all control registers of the MAX7317 are in a reset state. Power-Up status sets I/O ports, P0 to P9, into a high impedance state and puts the device into Shutdown mode. The I/O ports P0-P9 remains high impedance with up to 8V asserted on them when the MAX7317 is powered down. Therefore, it can be used in hot-swap applications.

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	Port expander
Applications	Intended for use as a port expander in system monitoring applications, industrial controllers, portable equipment, and many more.
On-board modules	MAX7317 - 10-Port SPI-interfaced I/O expander with overvoltage and hot-insertion protection from Maxim Integrated
Key Features	10-Port I/O expander, overvoltage protection, support hot-insertion, SPI, QSPI™, MICROWIRE™ compatible serial interface, low power consumption, and more.
Interface	SPI
ClickID	No
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V

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).

Pinout diagram

This table shows how the pinout on Expand 8 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	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	SDO	5	MISO	SCL	12	NC	
SPI Data IN	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
J1-J2	P0-P9	Populated	I/O Expander Port

Expand 8 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Output Load Voltage P0 - P9	-	-	7	V
Maximum Output Current	-	-	20	mA
Operating Temperature Range	-40	+25	+125	°C

Software Support

We provide a library for the Expand 8 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 Expand 8 click board. Library performs a standard SPI interface communication.

Key functions:

- void expand8_write_data (uint8_t addr, uint8_t tx_data) - Generic write data function.
- uint8_t expand8_read_data (uint8_t addr) - Generic read data function.
- EXPAND8_RETVAL_T expand8_set_port (uint8_t sel_port, uint8_t sel_impd) - Set port function.

Examples description

The application is composed of three sections :

- System Initialization - Initializes SPI, set the CS pin as outputs and begins to write log.

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).

- Application Initialization - Initialization driver enables - SPI, also write log.
- Application Task - (code snippet) This is an example that demonstrates the use of the Expand 8 click board. Expand 8 click by toggling each of 10 available ports every 1 second. Results are being sent to the Usart Terminal where you can track their changes.

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

[Expand 8 click 2D and 3D files](#)

[MAX7317 datasheet](#)

[Expand 8 click schematic](#)

[Expand 8 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).