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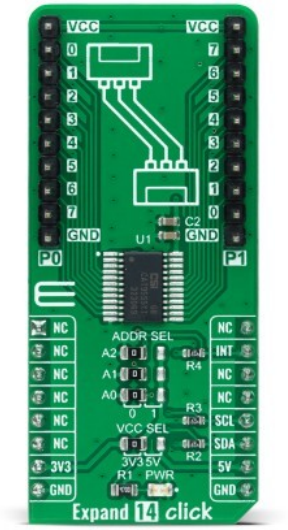
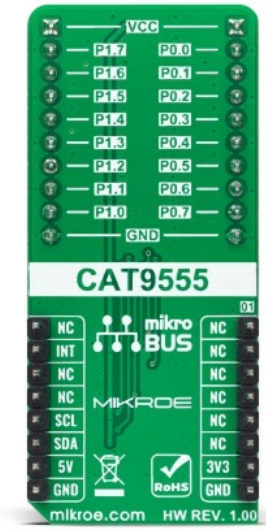
Expand 14 Click





PID: MIKROE-5241

Expand 14 Click is a compact add-on board that contains a multi-port I/O expander. This board features the CAT9555, a CMOS device that provides 16-bit parallel input/output port expansion from ON Semiconductor. The CAT9555 contains two 8-bit configuration ports (input or output), input, output, and polarity inversion registers, alongside an I2C-compatible serial interface. Any of the sixteen I/Os can be configured as an input or output by writing to the configuration register. It also features an active-low interrupt output, indicating to the host controller that an input state has been changed. This Click board™ provides a simple solution when additional I/Os are needed while keeping interconnections to a minimum in system monitoring applications, industrial controllers, portable equipment, and many more.

Expand 14 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 14 Click as its foundation uses the CAT9555, a general-purpose I/O expander from ON Semiconductor. It contains two 8-bit configuration ports (input or output), input, output, and polarity inversion registers, alongside an I2C-compatible serial interface, where any of the sixteen I/Os can be configured as an input or output by writing to the configuration register. This port expander represents a simple solution when additional I/Os are needed while keeping interconnections to a minimum; particularly great for sensors, power switches, LEDs, pushbuttons, and fans.

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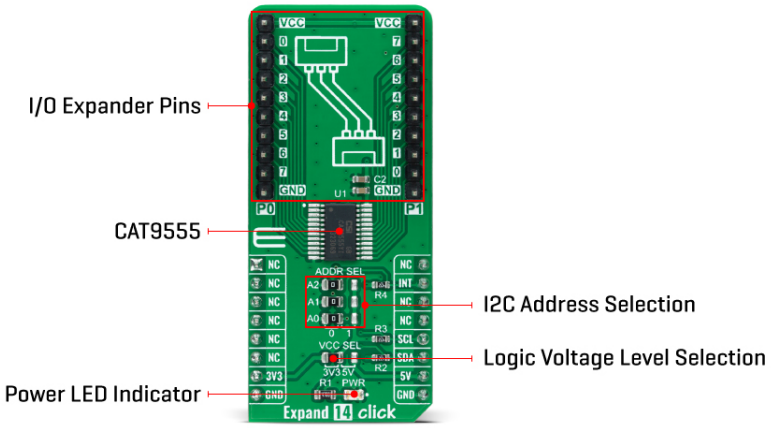

Each I/O port is 5V input tolerant, with a high current I/O drive sink of up to 25mA and an I/O source of up to 10mA, maximum. Additionally, each I/O port is compatible with logic thresholds of 2.5V, 3.3V, and 5V.

This Click board™ communicates with MCU using the standard I2C 2-Wire interface with a maximum clock frequency of 400kHz. The CAT9555 has a 7-bit slave address with the first four MSBs fixed to 0100. The address pins A0, A1, and A2, are programmed by the user and determine the value of the last three LSBs of the slave address, which can be selected by positioning onboard SMD jumpers labeled as ADDR SEL to an appropriate position marked as 0 or 1.

Besides, it also features an active-low interrupt feature, routed to the INT pin of the mikroBUS™ socket, indicating to the host controller that an input state has been changed.

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 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	Port expander
Applications	Can be used for sensors, power switches, LEDs, pushbuttons, and fans
On-board modules	CAT9555 - general-purpose I/O expander from ON Semiconductor
Key Features	16 I/O Pins that default to inputs at Power−Up, 5V Tolerant I/Os, high drive capability, individual I/O configuration, polarity inversion register, interrupt, and more
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)

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Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Expand 14 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	**INT**	Interrupt
	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	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	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
JP2-JP4	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1
J1-J2	P0-P1	Populated	I/O Expander Ports

Expand 14 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Output Current - Source/Sink	-	10/24	-	mA
Number of I/Os	-	-	16	pins
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the Expand 14 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

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This library contains API for Expand 14 Click driver.

Key functions

- expand14_set_pin_direction This function sets the direction of the selected pins.
- expand14_set_all_pins_value This function sets the value of all output pins.
- expand14_read_port_value This function reads the value of the selected port input pins.

Example Description

This example demonstrates the use of Expand 14 Click board™ by setting and reading the ports state.

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.Expand14

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

CAT9555 datasheet

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[Expand 14 click schematic]

[Expand 14 click 2D and 3D files]

[Expand 14 click example on Libstock]