MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

I2C Isolator 3 Click

PID: MIKROE-4467

I2C Isolator 3 Click is a compact add-on board that offers completely isolated bidirectional communication. This board features the CPC5902, a dual optically isolated bidirectional logic-bus repeater from IXYS Integrated Circuits Division. The CPC5902 pass DC signals and don’t need to be clocked periodically to sustain the logic states. It supports I2C clock stretching while providing 3750Vrms of galvanic isolation. When different supply voltages are applied on both power sides of the CPC5902, it can also function as a logic level translator for levels as low as 2.7V or as high as 5.5V. This Click board™ is ideal for Power-over-Ethernet applications, providing buffering and isolation of the clock and data signals between MCU and the Power Supply Equipment (PSE) controller, and also suitable as an I2C bus length extender and logic-level translator.

I2C Isolator 3 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?

I2C Isolator 3 Click is based on the CPC5902, a dual optically isolated bidirectional logic-bus repeater from IXYS Integrated Circuits Division. It bidirectionally buffers the two I2C signals across the isolation barrier and supports I2C clock stretching while providing 3750Vrms of galvanic isolation. The buffered signals will always return to their proper value after a transient interruption on either side. Unlike competitive magnetically isolated digital isolators, transformer, or capacitive isolators, the CPC5902 doesn’t need to be clocked periodically to sustain the logic states. Besides, it offers glitch-free operation as well as excellent reliability and a very long operational life. If different supply voltage levels are used at each power

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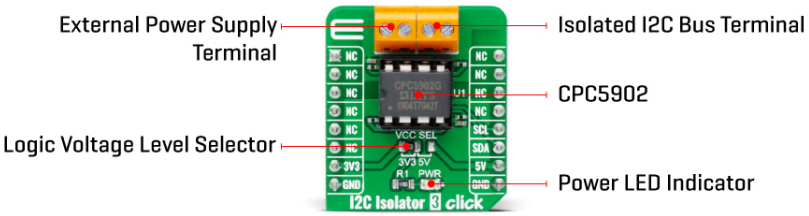
supply side, it can also function as a logic level translator for levels as low as 2.7V or as high as 5.5V.



This optically coupled I2C bus repeater is ideal for Power-over-Ethernet (PoE) applications, providing buffering and isolation of the clock and data signals between the host controller and the Power Supply Equipment (PSE) controller. Additional applications include power supply high side interface, I2C bus length extender, and isolated signal monitoring and control. An extensive operational power supply range of 2.7V to 5.5V also enables I2C logic level translation applications.

I2C Isolator 3 Click communicates with MCU using the standard I2C 2-Wire interface and supports both Standard and Fast Mode with a transfer rate up to 400kbps. The CPC5902 is also fully compatible with any single or double wire bus in the frequency range from 0 Hz to 500 kHz, which corresponds to a 400 kbps transfer rate for the I2C bus. It also possesses two terminals labeled as VIN and I2C at the bottom of the Click board™, where VIN represents the B-side power supply of the repeater, while the other I2C corresponds to the isolated bidirectional logic-bus terminal.

This Click board™ is designed to operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. It allows for both 3.3V and 5V capable MCUs to use the I2C communication lines properly. However, the Click board™ comes equipped with a library that contains functions and an example code that can be used, as a reference, for further development.

Specifications

Type	I2C,Isolators
Applications	Can be used for Power-over-Ethernet applications, providing buffering and isolation of the clock and data signals between MCU and the Power Supply Equipment (PSE) controller, and also suitable as an I2C bus length extender and logic-level translator.
On-board modules	CPC5902 - a dual optically isolated bidirectional logic-bus repeater from IXYS Integrated Circuits Division

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Key Features	Optically isolated bidirectional logic-bus repeater, supports I2C clock stretching, it offers glitch-free operation as well as excellent reliability and a very long operational life.
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on I2C Isolator 3 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	
	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

I2C Isolator 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Logic Level Supply Voltage	3.3	-	5	V
Operating Supply Voltage	2.7	-	5.5	V
Isolation Voltage	3750	-	-	Vrms
I2C Clock Frequency	0	-	500	kHz
Operating Temperature Range	-40	25	+85	°C

Software Support

We provide a library for the I2C Isolator 3 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.

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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

The library covers all the necessary functions to control I2C Isolator 3 Click board™. Library performs a standard I2C interface communication.

Key functions:

- void i2cisolator3_set_slave_address (uint8_t slave_addr) - Set slave address function.
- void i2cisolator3_send_cmd (uint8_t command) - Send command function.
- void i2cisolator3_burst_read (uint8_t reg, uint8_t *p_rx_data, uint8_t n_bytes) - Burst read function.

Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C and start to write log.
- Application Initialization - Initialization driver enables - I2C, set set I2C slave address of the Thermo 20 Click board™, performs software reset, also write log.
- Application Task - (code snippet) This is an example that demonstrates the use of the I2C Isolator 3 Click board™ . In this example, we measure temperature from the Thermo 20 Click board™ connected to the I2C Isolator 3 Click board™. All data logs write on USB UART changes every 3 sec.

Additional Functions :

- void calculate_temperature( ) - Calculate temperature in degrees Celsius.

The full application code, and ready to use projects can be found on our LibStock page.

Other mikroE Libraries used in the example:

- I2C
- 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.

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For more information about mikroSDK, visit the official page.

Resources

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Click board™ Catalog

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I2C Isolator 3 click 2D and 3D files

CPC5902 datasheet

I2C Isolator 3 click schematic

I2C Isolator 3 click example on Libstock

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