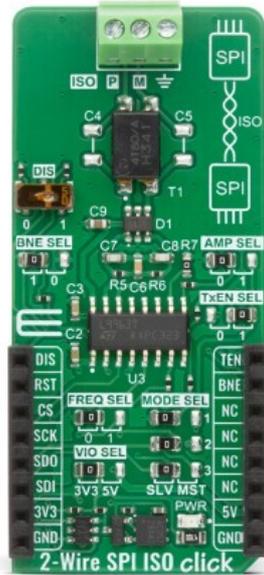


2-Wire SPI ISO Click



PID: MIKROE-6778

2-Wire SPI ISO Click is a compact add-on board that provides a galvanically isolated communication bridge between devices operating in different voltage domains, enabling SPI data transfer across isolation barriers. It is based on the [L9963T](#), an automotive general-purpose SPI to isolated SPI transceiver from [STMicroelectronics](#). The board allows conversion between a standard 4-wire SPI and a proprietary 2-wire isolated SPI interface, supporting both transformer and capacitive isolation. It can be configured as either Master or Slave, with support for SPI frames from 8 to 64 bits, clock frequencies up to 10MHz in Slave mode, and programmable clock options in Master mode. The isolated side features selectable operating speeds of 333kbps or 2.66Mbps, while internal buffering ensures smooth data flow across asynchronous domains. This Click board™ is ideal for automotive 48V and high-voltage systems, backup energy storage, UPS, industrial networks, remote sensors, and portable equipment.

For more information about **2-Wire SPI ISO Click** visit the official [product page](#).

How does it work?

2-Wire SPI ISO Click is based on the L9963T, an automotive general-purpose SPI to isolated SPI transceiver from STMicroelectronics that provides a galvanically isolated communication bridge between devices operating in different voltage domains. The L9963T is designed to transfer data from a classical 4-wire SPI interface to a proprietary 2-wire isolated interface and back, ensuring data exchange in environments where galvanic isolation is required. It supports both transformer and capacitive isolation, since the generated isolated signal is compatible with both decoupling technologies. This Click board™ is ideal for automotive 48V and high-voltage

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.

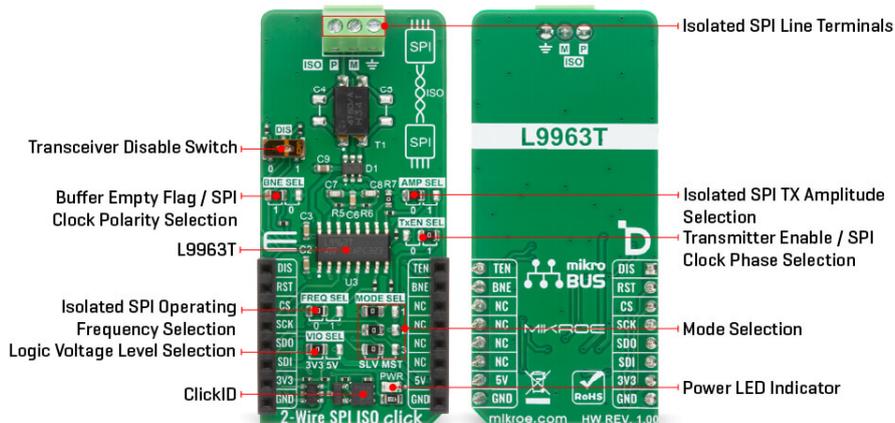


ISO 27001: 2013 certification of informational security management system.
 ISO 14001: 2015 certification of environmental management system.
 OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

systems, backup energy storage and UPS applications, industrial communication networks, portable and semi-portable devices, and remote sensors, providing an isolated SPI communication link for demanding embedded applications.



The L9963T can be configured either as a Slave or a Master mode of the SPI bus by placing MODE SEL jumpers in the proper positions and supports any SPI frame length from 8 to 64 bits, transferring data transparently without performing protocol checks. In Slave mode, the SPI interface can operate at up to 10MHz, while in Master mode the clock frequency can be selected among 250kHz, 1MHz, 4MHz, or 8MHz. On the isolated SPI side, two operating modes are available: a low-speed mode at 333kbps and a high-speed mode at 2.66Mbps, selectable via the FREQ SEL jumper.

The device internally manages the asynchronicity between both sides, enabling the use of all frequency configurations across the two SPI domains. To accommodate timing differences and ensure smooth data flow, the L9963T integrates a buffer with 3 slots for frames received on the SPI port and 20 slots for frames received on the isolated SPI port, decoupling the two clock domains. The board also features a DIS switch that allows the user to disable the transmitter and place the device into a low-power mode when set to position 1, or keep it in normal operating mode when set to position 0. A set of jumpers provides additional flexibility: BNE SEL controls the SDO Buffer Not Empty flag and allows SPI clock polarity (CPOL) selection, AMP SEL selects the isolated SPI transmit amplitude and threshold between low and high, and TxEN SEL enables the transmitter or selects the SPI clock phase (CPHA).

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VIO SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. Also, this 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	Isolators,SPI
Applications	Ideal for automotive 48V and high-voltage systems, backup energy storage, UPS, industrial networks, remote sensors, and portable equipment
On-board modules	L9963T - automotive general purpose SPI to

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).

	isolated SPI transceiver from STMicroelectronics
Key Features	Conversion between 4-wire SPI and proprietary 2-wire isolated SPI interface, support for transformer and capacitive isolation, configurable Master or Slave operation, support for SPI frames from 8 to 64 bits, 10MHz SPI operation in Slave mode, programmable SPI Master clock options, isolated SPI operating speeds, internal buffering with 3 slots on the SPI side and 20 slots on the isolated SPI side, and more
Interface	SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on 2-Wire SPI ISO Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Transceiver Disable	DIS	1	AN	PWM	16	TEN	Transmitter Enable / SPI Clock Phase
ID SEL	RST	2	RST	INT	15	BNE	Buffer Flag / SPI Clock Polarity
SPI Select / ID COMM	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	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	VIO SEL	Left	Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2/JP7-JP8	MODE SEL	Left	Mode Selection SLV/MST: Left position SLV, Right position MST
JP3	FREQ SEL	Left	Isolated SPI Operating Frequency Selection

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).

			0/1: Left position 0, Right position 1
JP4	AMP SEL	Left	Isolated SPI TX Amplitude Selection 0/1: Left position 0, Right position 1
JP5	TxEN SEL	Right	Transmitter Enable / SPI Clock Phase Selection 0/1: Left position 0, Right position 1
JP6	BNE SEL	Left	SDO Buffer Empty Flag / SPI Clock Polarity Selection 1/0: Left position 1, Right position 0
SW1	DIS	Left	Transceiver Disable Switch

2-Wire SPI ISO Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
SPI Clock Frequency (Slave mode)	-	-	10	MHz
SPI Clock Frequency (Master mode)	0.25	-	8	MHz
Isolated SPI Speed	0.333	-	2.66	Mbps
SPI Frame Length	8	-	64	bits

Software Support

[2-Wire SPI ISO Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

Example Description

This example demonstrates the use of a 2-Wire SPI ISO Click board by showing the communication between the two Click boards (Slave and Master). That is performed by sending commands to a 2-Wire SPI ISO Click (Slave) to read the device ID of a Accel 22 Click board connected to the 2-Wire SPI ISO Click (Master).

Key Functions

- `c2wirespiiso_cfg_setup` Config Object Initialization function.
- `c2wirespiiso_init` Initialization function.
- `c2wirespiiso_default_cfg` Click Default Configuration function.
- `c2wirespiiso_write` This function writes a desired number of data bytes by using SPI serial interface.
- `c2wirespiiso_read` This function reads a desired number of data bytes by using SPI serial interface.
- `c2wirespiiso_get_bne_pin` This function returns the RX buffer not empty (BNE) pin logic state.

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 Init

Initializes the driver and performs the Click default configuration.

Application Task

Reads and checks the device ID of a Accel 22 Click board connected to the 2-Wire SPI ISO (Master) Click, and displays the results on the USB UART approximately once per second.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[2-Wire SPI ISO click example package](#)

[2-Wire SPI ISO click 2D and 3D files v100](#)

[L9963T datasheet](#)

[2-Wire SPI ISO click schematic v100](#)

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).