

## Zero-Cross Click



PID: MIKROE-5760

**Zero-Cross Click** is a compact add-on board that has the ability to detect the change from positive to negative or negative to a positive level of a sinusoidal waveform. This board features circuitry that provides Zero Crossing Detection (ZCD). Whenever the sine wave crosses the ground potential, the output shifts from HIGH logic to LOW or vice-versa. The waveform depends on the frequency, but the output is a pulse wave, so a Zero-Crossing detection circuit is also called a pulse wave generator circuit. This Click board™ makes the perfect solution for the development of frequency counters, phase meters, time maker generators, and more.

### How does it work?

Zero-Cross Click is based on the circuitry that provides Zero Crossing Detection (ZCD). The alternate current can be connected over two block terminals. As it is intended for this Click board™ to work with high voltages, the critical components are placed on the bottom side, but still, take all precautions when working with this Click board™. On the top side is an AC ON LED for visual presentation of the AC presence. All the magic is happening in the circuitry at the bottom side of this Click board™.

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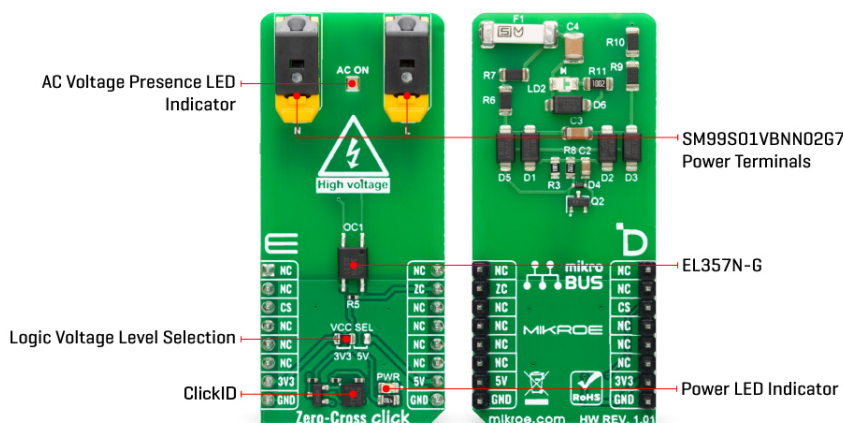
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The current passes through the Graetz bridge circuitry, consisting of four DLGL5980. The alternate current converts to a direct current, which is necessary for driving an LED in an [EL357N-G](#), a phototransistor photocoupler from Everlight. When activated, the optocoupler sends a LOW logic state to a ZC pin, which is the pin with which the Zero-Cross Click communicates with the host MCU.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC 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	Optocoupler
Applications	Can be used for the development of frequency counters, phase meters, time-maker generators, and more
On-board modules	The circuitry that provides Zero Crossing Detection (ZCD)
Key Features	Pulse wave generator circuit, alternate current presence, zero crossing detection from positive to negative, and from negative to positive, block terminals for connecting high voltages, and more
Interface	GPIO
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V, External

## Pinout diagram

This table shows how the pinout on Zero-Cross Click corresponds to the pinout on the

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mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	<b>ZC</b>	Zero Crossing Detection
ID COMM	<b>CS</b>	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	<b>5V</b>	Power Supply
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	AC ON	-	AC Voltage Presence LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

## Zero-Cross Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
AC Voltage Range	-	220	-	V

## Software Support

We provide a library for the Zero-Cross 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 Zero-Cross Click driver.

Key functions

- zerocross\_pin\_read Zero-Cross pin reading function.
- zerocross\_get\_freq Zero-Cross frequency reading function.

## Example Description

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This example demonstrates the use of the Zero-Cross Click board™.

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.ZeroCross

## 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 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™](#)

[ClickID](#)

## Downloads

[Zero-Cross click example on Libstock](#)

[EL357N-G datasheet](#)

[BC817-25LT3G datasheet](#)

[1N4148WT datasheet](#)

[Zero-Cross click 2D and 3D files](#)

[Zero-Cross click schematic](#)

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