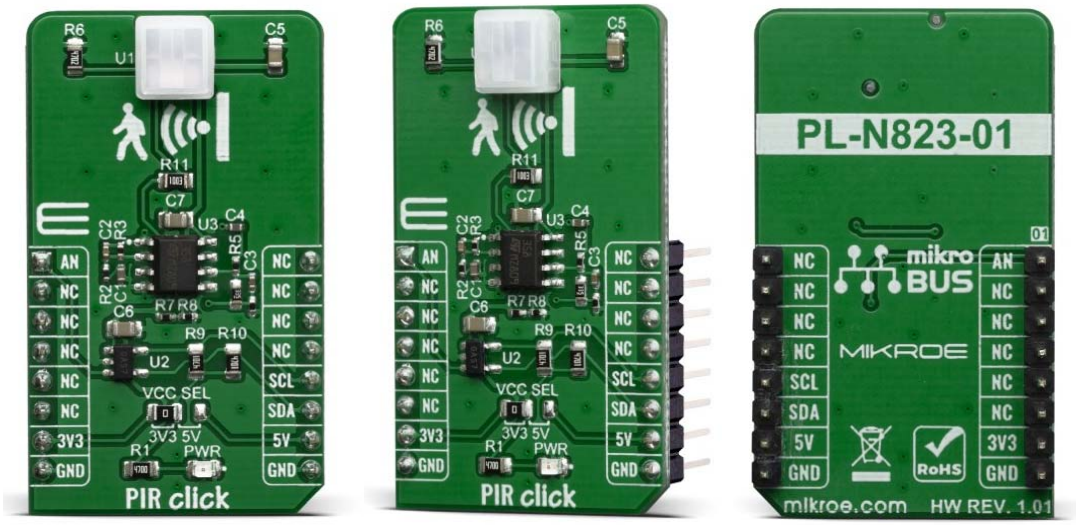


PIR CLICK

PID: MIKROE-3339 Weight: 19 g

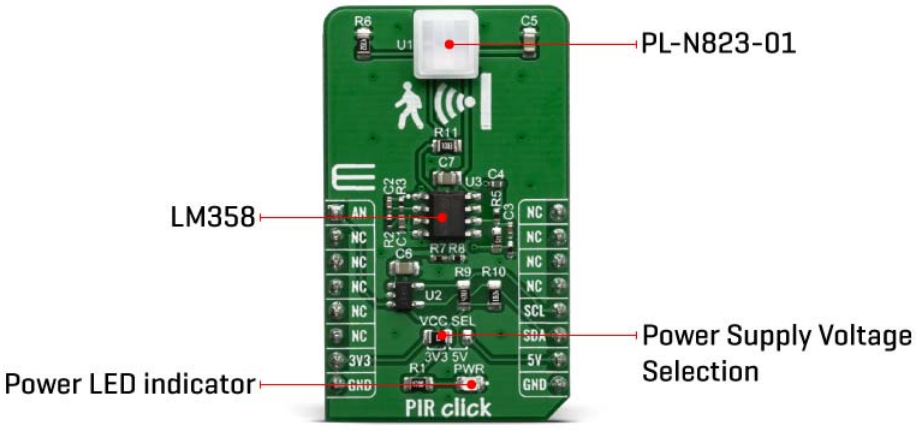
PIR Click is a pyroelectric sensor which generates a voltage when exposed to infrared radiation emitted by live bodies. It is equipped with the PL-N823-01, an infrared sensor from KEMET that uses the pyrolectric effect of ceramic by absorbing infrared rays emitted from the human body, while the the white plastic Fresnel lens covering the sensor filters visible light. This detects the natural infrared signature produced by humans. However, it can also detect infrared rays without using lenses.

PIR 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.

The PIR sensor is a kind of thermal sensor which is able to detect the movement of a heat source. As the most general heat source in indoor environments, humans with motion can be detected by PIR sensors. However, this sensor cannot detect static human subjects. We call this sensing mode “passive sensing”, since the sensor itself is passively triggered by moving subjects. It is important to state that the sensor can be used for developing various applications, the typical ones including human presence detection sensing for energy saving functions in: contactless switching, building or office automation equipment, home applicances, lighting, display products, air-conditioners, TV, PC monitors, rice cookers and many more.

HOW DOES IT WORK?

The main component of the PIR click is the PL-N823-01 –a PL Pyroelectric Infrared Sensors from KEMET. Due to the absence of a lens, KEMET’s Pyro Sensor is low profile, as it does not protrude, which makes it ideal for gathering visual requirements. With KEMET’s proprietary piezoelectric ceramic material and element structure of the Pyroelectric Infrared Sensor, you can also detect humans through glass or resin. This allows more freedom in the design of the outer appearance of the end product.



Such a sensor system aims to provide the reliable human detection and human scenario perception. In order to achieve this goal, a conditioning sensing circuit with a low-noise signal amplifier with adjusted amplification gain is developed. Besides, the gain amplification, the onboard circuit serves also as a proprietary 1Hz signal filter, which ensures rejection of all unwanted components of the signal. That way, a reliable movement detection system is achieved. The output signal is routed to the AN pin of the mikroBUS™, as well as to the MCP3221 – a 12-Bit A/D Converter with I2C Interface, from microship. That way, the user can choose whether to read the output signal via the I2C interface, or directly, by reading the voltage on the analog pin of the used MCU.

Some of the numerous benefits of using this particular click, equiped with the PL-N823-01 infrared sensor, are a wide view angle up to 60 degrees ether way, detection possible through glass or resin, low power consumption, excellent radio wave performance in high-frequency band, a compact and low profile (5.0x4.8x1.7mm) and all of this is possible without a lens because it is not required. The low power consumption that we are speaking of is down in the µA range. When it comes to the performance characteristics, the operating temperature should be between -40C to +70C and the storage temperature should be between -40C to +85C.

The PIR Click board™ offers a selection between 3.3V and 5V operation, with the onboard SMD jumper, labeled as PWR SEL. This allows both 3.3V and 5V MCUs to be interfaced with this Click board™.

The attached device datasheet contains an in-depth explanation of all the mentioned functions. However, Mikroe provides a library with functions that make the final code clean and readable, simplifying working with this device. These functions internally employ the aforementioned communication mechanism and expose only a simple and clean interface to the user. The provided example code demonstrates the functionality of these functions. It can be used as a reference point for a custom development.

SPECIFICATIONS

Type	Motion
Applications	Human presence detection sensing for energy saving functions in: contactless switching, office automation equipment, home applicances, lighting, display products, air-conditioners, TV, PC monitors, rice cookers and many more.
On-board modules	PL-N823-01, PL Pyroelectric Infrared Sensors from KEMET
Key Features	Wide view angle, detection possible through glass or resin, low power consumption, excellent radio wave performance in high-frequency band, low profile
Interface	GPIO,I2C
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V,5V

PINOUT DIAGRAM

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

Notes	Pin	mikroBUS				Pin	Notes
Analog signal OUT	AN	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 Position	Default Option	Description
JP1	PWR SEL	Left	3V3	Power Supply Voltage Selection 3V3/5V, left position 3v3, right position 5v
LD1	PWR	-	-	Power LED Indicator

SOFTWARE SUPPORT

We provide a library for the PRI 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

Library contains function for reading single ADC conversion data Library contains function for reading single ADC conversion converted to miliVolts Library contains function for scaling ADC data to value in desired range Library contains constant for device address

Key functions:

- `uint16_t pir_getAdc( void )` - reads single ADC conversion data
- `float pir_getMiliVolt( uint16_t refVoltage )` - reads 12bit ADC data and convets it to miliVolts
- `float pir_scaleResults( uint16_t inVal, uint16_t outMin, uint16_t outMax )` - scales ADC conversion data (inVal) to desired range (from outMin to outMax) and returns scaled data (outVal)

Examples description

The application is composed of three sections :

- System Initialization - Initializes LOG, I2C and AN pin as input
- Application Initialization - Initializes I2C driver
- Application Task - Reads ADC data, converts it to miliVolts and logs scaled value in miliVolts

```
void applicationTask( )
{
    adcVal = pir_getAdc( );
    mapOut = pir_scaleResults( adcVal, 0, 3303 );
    FloatToStr(mapOut, text);
    mikrobus_logWrite(" Voltage: ", _LOG_TEXT);
    mikrobus_logWrite(text, _LOG_TEXT);
    mikrobus_logWrite(" miliVolts ", _LOG_LINE);
    Delay_ms(100);
}
```

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

- Converisons

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.