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Motion 3 Click

PID: MIKROE-4049

Motion 3 Click is a Click board™ based on EKMC1606112, PIR motion sensor from Panasonic Corporation that's used as human motion detector. Also featured on Motion 3 Click bord is TLP241A photorelay from Toshiba that is used to provide a reinforced galvanic isolation for the external signals used to drive some external high power electronic equipment when motion is detected. It's allowing up to 40V between the SSR contacts in OFF state, and currents up to 2A while in ON state, thanks to a very low ON-state resistance.

Motion 3 Click board™ 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?

Motion 3 Click is using a PIR sensor that can detect changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. Detection performance of EKMC1606112 at ambient temperature of 25℃ with temperature difference of 8℃ is up to 17m and for temperature difference of 4℃ it's up to 12m. Angle detection area with 128 detection zones is 62°±31°horizontal and 62°±31°vertical.

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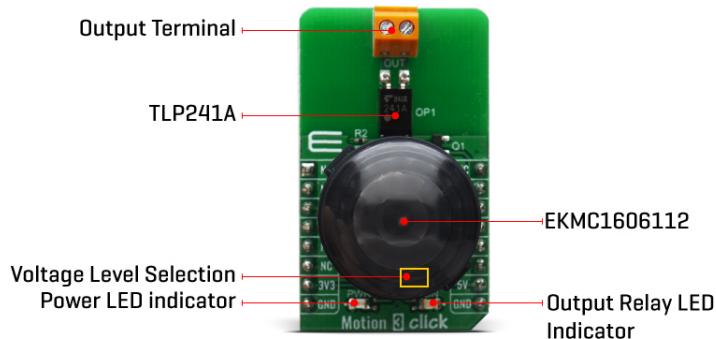
Output from PIR sensor is feed into buffer and then photorelay alowing users to directly control with galvanic isolation from sensor and MCU electronic devices such as lights, motors, gates etc. The TLP241A photorelay is able to effectively replace traditionally used mechanical relays, bringing up the full set of inherited benefits: virtually unlimited number of cycles since there are no moving parts that would wear off, no bouncing effect on the output contacts, high resistance to mechanical shock and environmental influence, low current required for the activation, constant resistance since no carbon and rust can build up on contacts, there is no sparking or electric arc forming while operated, compact size, higher isolation voltage, and so on.

When an object, such as a person, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well. In some cases, going back and forth towards the sensor (parallel movement to the axis Z), may not be detected.

Difficulty in sensing the heat source is that glass, acrylic or similar materials standing between the target and the sensor may not allow a correct transmission of infrared rays and also non-movement or quick movements of the heat source inside the detection area.

Specifications

Type	Motion
Applications	Alarm systems, light switch controllers, automatic doors and similar systems where human presence needs to be detected.
On-board modules	EKMC1606112 the PIR motion sensor
Key Features	128 detection zones, wide detection range and maximum range between 12 and 17 m
Interface	GPIO
ClickID	No
Compatibility	mikroBUS™

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Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Motion 3 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro BUS			Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	**INT**	Interrupt
Enable	**EN**	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	**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
PWR	LD1	-	Power LED Indicator
ON	LD2	-	Photorelay ON Indicator
JP1	VCC SEL	Left	Logic voltage level selection: left position 3.3V, right position 5V

Detection performance and electrical characteristics

	Temperature Difference	Value
Detection Range	8℃	up to 17m
	4℃	up to 12m
Detection Area	**Detection Angle**	**Value**
	Horizontal	62°(±31°)
	Vertical	62°(±31°)
	Detection Zones	128
Photorelay Characteristics	**Maximum Voltage**	**Maximum Current**
	40V	2A

Software Support

We provide a library for the Motion 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.

Library Description

Library provides functions for controlling en pin, and getting int pin state.

Key functions:

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- void motion3_set_en_pin (uint8_t state) - Function for setting en pin state
- uint8_t motion3_get_int (void) - Function for getting int pin state

Examples description

The application is composed of three sections :

- System Initialization - Initialization of pins
- Application Initialization - Maps pins and enables device
- Application Task - Waiting for motion to be detected

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

Other mikroE Libraries used in the example:

- UART

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.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

Motion 3 click example on Libstock

EKMC160611 datasheet

Motion 3 click schematic

Motion 3 click 2D and 3D files