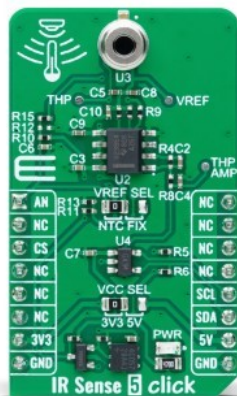


# IR Sense 5 Click



PID: MIKROE-6093

IR Sense 5 Click is a compact add-on board designed for accurate, non-contact surface temperature measurement. This board features the ZTP-148SRC1, a thermopile IR sensor from Amphenol, with a measurement range from -20 to +100°C, an active area of 0.7x0.7mm<sup>2</sup>, and a typical field of view of 85 degrees. The board also integrates an OPA2365AIDR OpAmp for signal amplification and an MCP3221 analog-to-digital converter for digitizing the output. Additional features include output offset selection and test points for signal monitoring. This Click board™ is perfect for human thermometry, home appliances, occupancy detection, HVAC systems, and automotive use applications.

## How does it work?

IR Sense 5 Click is based on the ZTP-148SRC1, a thermopile IR sensor from Amphenol. This infrared thermopile sensor is designed for non-contact surface temperature measurement, offering a stable response to DC radiation. The ZTP-148SRC1 can measure temperatures from -20 to +100°C, featuring an active area of 0.7x0.7mm<sup>2</sup> and a typical field of view (FoV) of 85 degrees. The sensor consists of thermo-elements, a flat IR filter, and a thermistor for temperature compensation, all housed in a hermetically sealed TO package. Its typical applications include human thermometry, non-contact temperature measurement, home appliances such as air conditioners, occupancy detection, HVAC systems, automotive applications, and various other uses.

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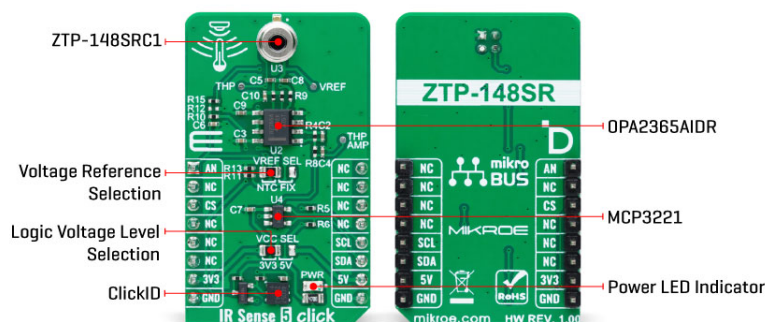
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As mentioned, the ZTP-148SRC1 features a high-sensitivity thermopile with a rapid response time and an integrated thermistor for precise ambient temperature compensation. As an analog-output sensor, it utilizes the [OPA2365AIDR](#) OpAmp to amplify the thermopile's analog output voltage. This amplified signal is then digitized via the I2C interface using the [MCP3221](#) analog-to-digital converter. This board also has an output offset selection achieved via the VREF SEL jumper. Selection is made between a fixed offset value of 200mV, generated by a voltage divider (R11 and R13 resistors) or from the ZTP-148SRC1's thermistor output. This offset is crucial for signal conditioning, ensuring the sensor's output is within the optimal range for further processing and improving measurement accuracy by compensating for ambient temperature variations. Besides, the thermistor's value can be monitored through the AN pin of the mikroBUS™ socket.

The board also includes three test points for signals from the ZTP-148SRC1: the raw signal from the thermopile on TP2, the selected voltage reference at TP3, and the amplified signal from the OPA2365AIDR on TP1. These test points allow consistent prototyping and testing.

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             | IR sensors, Temperature & humidity                                                                                                                                                                                                                                                         |
| Applications     | Ideal for human thermometry, home appliances, occupancy detection, HVAC systems, automotive, and more                                                                                                                                                                                      |
| On-board modules | ZTP-148SRC1 - thermopile IR sensor from Amphenol                                                                                                                                                                                                                                           |
| Key Features     | Non-contact surface temperature measurement, capable of measuring temperatures ranging from -20 to +100°C, active area of 0.7x0.7mm², field of view of 85 degrees, operational amplifier for signal amplification, ADC for digitizing the output, offset selection, test points for signal |

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|                  |                      |
|------------------|----------------------|
|                  | monitoring, and more |
| Interface        | Analog,I2C           |
| Feature          | ClickID              |
| Compatibility    | mikroBUS™            |
| 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 IR Sense 5 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

| Notes             | Pin         |  |      |     |    | Pin        | Notes        |
|-------------------|-------------|-----------------------------------------------------------------------------------|------|-----|----|------------|--------------|
| Thermistor Output | <b>AN</b>   | 1                                                                                 | AN   | PWM | 16 | NC         |              |
|                   | NC          | 2                                                                                 | RST  | INT | 15 | NC         |              |
| ID COMM           | <b>CS</b>   | 3                                                                                 | CS   | RX  | 14 | NC         |              |
|                   | NC          | 4                                                                                 | SCK  | TX  | 13 | NC         |              |
|                   | NC          | 5                                                                                 | MISO | SCL | 12 | <b>SCL</b> | I2C Clock    |
|                   | NC          | 6                                                                                 | MOSI | SDA | 11 | <b>SDA</b> | I2C Data     |
| 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                                                        |
| JP1   | VCC SEL  | Left    | Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V |
| JP2   | VREF SEL | Left    | Reference Voltage Selection NTC/FIX: Left position NTC, Right position FIX |

## IR Sense 5 Click electrical specifications

| Description                 | Min | Typ | Max  | Unit |
|-----------------------------|-----|-----|------|------|
| Supply Voltage              | 3.3 | -   | 5    | V    |
| Operating Temperature Range | -20 | -   | +100 | °C   |

## Software Support

We provide a library for the IR Sense 5 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

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Manager(recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

## Library Description

This library contains API for IR Sense 5 Click driver.

Key functions

- `irsense5_get_obj_temp` This function reads and calculate object temperature in degree Celsius [degC].
- `irsense5_get_amb_temp` This function reads and calculate ambient temperature in degree Celsius [degC].
- `irsense5_read_raw_adc_thm` This function reads the thermistor raw ADC value.

## Example Description

This library contains API for the IR Sense 5 Click driver for measuring ambient and object temperature.

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.IRSense5

## 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](#)

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[Click boards™](#)

[ClickID](#)

## Downloads

[MCP3221 datasheet](#)

[IR Sense 5 click example on Libstock](#)

[IR Sense 5 click 2D and 3D files v100](#)

[IR Sense 5 click schematic v100](#)

[OPA2365AIDR datasheet](#)

[ZTP-148SRC1 datasheet](#)

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