

## IR Thermo 4 Click



PID: MIKROE-6135

IR Thermo 4 Click is a compact add-on board for precise remote sensing applications. This board features the TPIS 1T 1386 L5.5 H thermopile sensor from Excelitas, known for its high accuracy and narrow 5° field of view (FoV). This sensor, part of the CaliPile™ family, features factory-calibrated data stored in EEPROM, ensuring reliable and accurate performance. The sensor also comes in an isothermal TO-39 package with an integrated lens hood for minimized stray light and enhanced thermal stability, making it ideal for challenging environmental conditions. With a built-in ADC and multiple filter options, the sensor's data is easily accessible via an I2C interface. IR Thermo 4 Click is well-suited for remote skin temperature monitoring, over-temperature protection, human presence sensing, and motion detection.

### How does it work?

IR Thermo 4 Click is based on the TPIS 1T 1386 L5.5 H, a high-accuracy thermopile sensor from Excelitas, known for its precise temperature measurements in various applications. This sensor, part of the CaliPile™ family, includes factory-calibrated data stored in its EEPROM, ensuring reliable performance out of the box. It has a narrow 5° field of view (FoV), enclosed in an isothermal TO-39 package for rapid adaptation to ambient temperature changes. Additionally, the integrated lens hood minimizes stray light interference and provides thermal stabilization, making it suitable for use in challenging environmental conditions.

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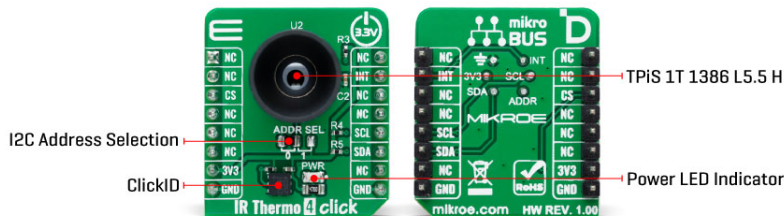
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Leveraging advanced thermopile technology, the TPiS 1T 1386 L5.5 H sensor offers much more than conventional remote temperature measurements. It can monitor remote object temperatures with fast over-temperature detection, which is ideal for applications such as remote skin temperature monitoring, over-temperature protection, human presence sensing, motion detection, and passive light barriers for people counting. While temperature calculations are performed on the host using the sensor's calibration data, the sensor continuously monitors for rapid temperature changes, triggering an over-temperature alert when necessary.

The sensor's output is digitized using a low-noise, high-resolution ADC, and alongside the reference PTAT temperature channel, the data is stored in the sensor's RAM, accessible via the I2C interface. A sensor's filter and event logic unit include multiple low-pass filter options and application-specific processing units, which can be configured to send interrupts to the host system. The factory-calibrated data is crucial for calculating both the sensor's temperature and the temperature of remote objects, and this data must be recalled after each power-up.

As mentioned, IR Thermo 4 Click uses a standard 2-wire I2C communication protocol to enable the host MCU to control the TPiS 1T 1386 L5.5 H. The I2C interface supports clock frequencies up to 400kHz, with the I2C address selectable via the ADDR SEL jumper. Once configured through the I2C interface, the INT pin allows the host to monitor rapid temperature changes and over-temperature conditions.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

## Specifications

Type	Temperature & humidity
Applications	Ideal for remote skin temperature monitoring, over-temperature protection, human presence sensing, and motion detection
On-board modules	TPiS 1T 1386 L5.5 H - high-accuracy narrow FoV thermopile sensor from Excelitas
Key Features	Narrow Field of View (FoV), factory-calibrated,

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	high sensitivity, isothermal TO-39 sensor package, I2C interface, built-in ADC, multiple low-pass filters, interrupt support, and more
Interface	I2C
Feature	ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

## Pinout diagram

This table shows how the pinout on IR Thermo 4 Click corresponds to the pinout on the 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>INT</b>	Interrupt
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	NC	
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	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1

## IR Thermo 4 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Field of View (FoV)	-	5	-	deg
Sensitivity	-	60	-	counts/K
Temperature Range	-20	-	+85	°C

## Software Support

We provide a library for the IR Thermo 4 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](#).

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## Library Description

This library contains API for IR Thermo 4 Click driver.

Key functions

- `irthermo4_read_ambient_temp` This function reads and calculates the ambient temperature in degrees Celsius.
- `irthermo4_read_object_temp` This function reads and calculates the object temperature in degrees Celsius.
- `irthermo4_get_int_pin` This function returns the INT pin logic state.

## Example Description

This example demonstrates the use of IR Thermo 4 Click by reading and displaying the ambient and object temperature measurements.

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.IRThermo4

## 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™](#)

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[ClickID](#)

## Downloads

[IR Thermo 4 click example on Libstock](#)

[IR Thermo 4 click 2D and 3D files v100](#)

[TPIS 1T 1386 L5.5 H datasheet](#)

[IR Thermo 4 click schematic v100](#)

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