TEMP&HUM 5 CLICK

PID: MIKROE-3425
Weight: 18 g


Temp&Hum 5 click is a temperature and humidity sensing click board™, packed with features that allow simple integration into any design. It can measure a wide range of temperature and relative humidity values with high accuracy. The Click board™ is equipped with the HIH6130 sensor, offering the complete measurement system onboard: capacitive humidity sensor, bandgap thermal sensor, signal processing, and the I2C communication interface. Featuring good reliability over time, high accuracy, and low hysteresis, it represents an ideal solution to be used in various temperature and humidity related applications.

Temp&Hum 5 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 HIH6130 sensor IC has compensation for relative humidity in the range from 10 to 90 %RH and temperature in the range from 0 °C to 50°C, yielding typical accuracy of ±3 %RH and ±0.5°C. It consumes a very low amount of power while operated. The measurement data available over the I2C interface, requires a simple conversion formula to be applied since the HIH6130 already performs calibration. Featuring high reliability and long-term stability, high Signal-to-Noise (SNR) ratio, good accuracy, and low power consumption, Temp&Hum 5 click is an ideal solution for development of a range of different applications, including battery operated weather stations, thermostats and humidistats, microenvironment centers, respiratory therapy applications, air conditioners, HVAC systems, and other similar applications.

HOW DOES IT WORK?

The main component of Temp&Hum 5 click is the HIH6130, a relative humidity and temperature sensor with I²C Interface, by Honeywell. This sensor IC integrates two very accurate sensing components: temperature sensor, and relative humidity sensor. The HIH6130 sensor integrates the complete temperature and humidity measurement system on a chip. Each sample is factory calibrated, providing an expected performance for each unit. The measurement results are available over the I2C interface. By applying simple conversion formulas, it is possible to obtain readings in physical units, directly. These conversion formulas are given in the HIH6130 datasheet and provide readings in °C and %RH.

HIH6130

Voltage Level Selection

Power LED Indicator
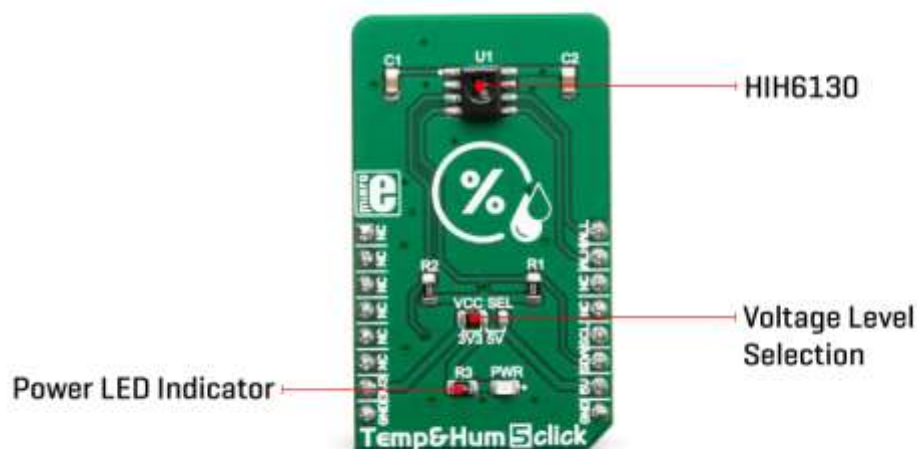
The HIH6130 features two ALARM outputs, which are used to indicate if the RH readings have exceeded, or fallen below a certain threshold, which can be programmed by the user, over the I2C. Besides the threshold values, the HIH6130 allows setting the polarity of the signal on these pins, as well as their driving topology (push-pull or open-

drain). Temp&Hum 5 click does not feature any pull-up resistors, thus allowing the user to choose the most suitable method. ALARM pins are routed to the mikroBUS™ INT and PWM pins, which are labeled as ALH and ALL on this Click board™, respectively.

The HIH6130 incorporates an accurate bandgap temperature sensor, which can measure the temperature in the range between -25°C and 85°C which is suitable for most demanding applications. The accuracy is greater if the range is narrowed down: when used over the range between 0°C and 60°C, the typical accuracy is ±0.5°C. Also, the repeatability of the temperature measurement is very good, since each sensor unit is factory-calibrated. The HIH6130 sensor IC can be reliably used for prolonged periods of time, as it has a very low thermal drift of less than 0.05°C per five-year interval.

After the measurement has been converted by a high-precision 14-bit ADC, it is fed to a logic back-end which applies factory-calibrated correction and converts the raw data into a compensated value. By applying a simple conversion formula, the temperature measurement can be read directly in °C. Please note that the sensor will take some time to accommodate to the ambient temperature, especially if the temperature changes quickly, considering the thermal conductivity of the PCB itself. However, the Click board™ surface is not very large, resulting in lower thermal inertia.

The humidity sensor is a laser-trimmed capacitor-based sensor which changes the capacitance proportionally to the relative humidity. However, the capacitance of this sensor is affected by changes in the ambient temperature, as well. However, the HIH6130 IC features a multilayered design which protects the sensing element from various application hazards, including condensation, dust, dirt, oils, and other environmental hazards, making it very robust and reliable, even in harsh conditions. The datasheet of the HIH6130 offers a map of the RH accuracy at different temperatures, covering a range of different values. The RH sensor accuracy varies in the range between ±1% and ±3%, depending on the measurement conditions. This table can be used to check the exact accuracy for some specific ℃ and %RH conditions. The industry-leading long-term stability of the humidity sensor is reflected in its low drift from 0.05% to 1.2%, during a 5-year interval.

After the measurement has been converted by high-precision 14-bit ADC, it is fed to a logic back-end which applies factory-calibrated correction and converts the raw data into a compensated value. By applying a simple conversion formula, the temperature measurement can be read directly in %RH. Note that capacitor-based humidity sensors commonly suffer from a small hysteresis, which may occur if the sensor is used in very humid conditions for prolonged periods of time. However, this hysteresis is not irreversible. The HIH6130 datasheet specifies that its hysteresis should stay within the range of ±1 %RH.

Temp&Hum 5 click uses the I2C communication interface. It has pull-up resistors for the I2C interface, connected to a voltage level that can be selected by moving the VCC SEL jumper to an appropriate position (3.3V or 5V), allowing the Click board™ to be interfaced with a wide range of different MCUs.

SPECIFICATIONS:

Type	Temperature / Humidity
Applications	An ideal solution for development of various applications, including battery operated weather stations, thermostats and humidistats, microenvironment centers, respiratory therapy applications, air conditioners, HVAC systems, and other similar applications.
On-board modules	HIH6130, a relative humidity and temperature sensor with I²C Interface, by Honeywell.
Key Features	High accuracy, good linearity, proven reliability, long-term stability, excellent repeatability, two ALERT lines allow for simplified firmware, multilayered protection against environmental hazards, etc.
Interface	I2C
Input Voltage	3.3V or 5V
Click board size	M (42.9 x 25.4 mm)

PINOUT DIAGRAM:

This table shows how the pinout on **Temp&Hum 5 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	**ALL**	Low Level Alert
	NC	2	RST	INT	15	**ALH**	High Level Alert
	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	Description
PWR	PWR	-	Power LED indicator
VCC SEL	VCC SEL	Left	Power supply voltage level: left position 3.3V, right position 5V

SOFTWARE SUPPORT

We provide a library for the **Temp&Hum 5 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

The library includes function for read Temperature and Relative Humidity data and function for start measurement. The user also has the function for reads HIGH or LOW alarm state.

Key functions:

- `uint8_t temphum5_startMeasurement()` - Functions for start measurement
- `float temphum5_getTemperature(uint8_t tempIn)` - Functions for read Temperature data
- `float temphum5_getHumidity()` - Functions for read Relative Humidity data

Examples description

The application is composed of the three sections :

- System Initialization - Initializes I2C module and sets PWM and INT pin as INPUT

- Application Initialization - Initialization driver init

- Application Task - (code snippet) - Reads Temperature and Humidity data and this data logs to USBUART every 1 sec.

```
void applicationTask()
{
    char demoText[ 50 ];
    float Temperature;
    float Humidity;

    temphum5_startMeasurement();

    Temperature = temphum5_getTemperature(_TEMPHUM5_TEMP_DATA_IN_CELSIUS);
    FloatToStr(Temperature, demoText);
    demoText[ 6 ] = 0;
    mikrobus_logWrite(" Temperature : ", _LOG_TEXT);
    mikrobus_logWrite(demoText, _LOG_TEXT);
    mikrobus_logWrite( " C", _LOG_LINE);

    Humidity = temphum5_getHumidity();
    FloatToStr(Humidity, demoText);
    demoText[ 6 ] = 0;
    mikrobus_logWrite(" Humidity : ", _LOG_TEXT);
    mikrobus_logWrite(demoText, _LOG_TEXT);
    mikrobus_logWrite( " RH", _LOG_LINE);

    mikrobus_logWrite("--------------------------", _LOG_LINE);
    Delay_ms( 1000 );
}
```

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
- Conversions

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.