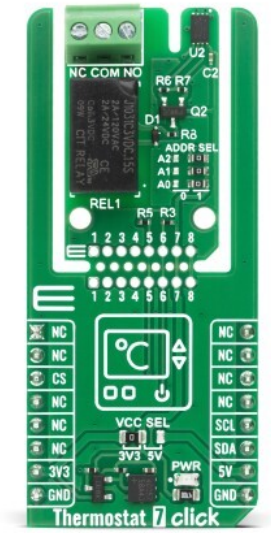
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Thermostat 7 Click





PID: MIKROE-6948

Thermostat 7 Click is a compact add-on board designed for thermostat control, temperature monitoring, and relay-based load switching. This board is based on the N34TS04, a digital output temperature sensor with SPD EEPROM from onsemi. It measures temperature at least ten times per second over a -20°C to +125°C range with 0.0625°C resolution, compares readings against programmable high, low, and critical limits, and signals threshold events through an open-drain pin that controls the onboard J1031C3VDC.15S relay for switching loads up to 2A and 60VDC. The board supports Standard-mode, Fast-mode, and Fast Plus I2C communication, configurable I2C addressing, 4Kb SPD EEPROM with bank switching and write protection, and Click Snap functionality. This Click board™ is suitable for smart thermostats, thermal protection systems, heaters, fans, alarms, temperature-triggered automation, and embedded load-control applications.

For more information about **Thermostat 7 Click** visit the official product page.

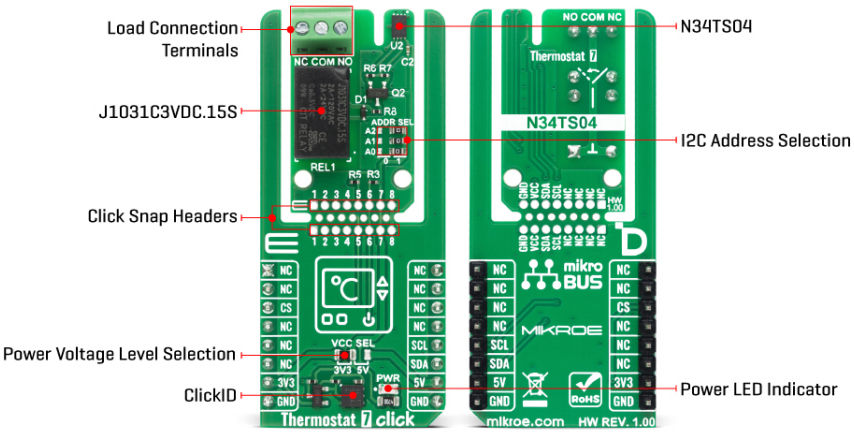
How does it work?

Thermostat 7 Click is based on the N34TS04, a digital output temperature sensor with SPD EEPROM from onsemi. The N34TS04 combines a temperature sensor and 4Kb of Serial Presence Detect (SPD) EEPROM in a single device, implementing the JEDEC TSE2004av DDR4 specification. The host MCU communicates with the N34TS04 through the Standard-mode, Fast-mode, and Fast Plus I2C communication, allowing operation at 100kHz, 400kHz, and 1MHz bus speeds, while the onboard ADDR SEL jumper allows the I2C address to be configured according to system requirements, making the board suitable for applications where multiple I2C devices share the same bus. The temperature sensor measures temperature at least ten times per second and provides digital temperature readings to the host MCU with a resolution of

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0.0625°C over a temperature range from -20°C to +125°C. These readings are internally compared against programmable high, low, and critical temperature limits stored in device registers.



This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main sensor/IC/module area to become movable by breaking the PCB, opening many new possibilities for implementation. Thanks to the Snap feature, the N34TS04 can operate autonomously by accessing its signals directly on the pins marked 1-8. Additionally, the Snap part includes a specified and fixed screw hole position, enabling users to secure the Snap board in their desired location.

When the measured temperature exceeds or falls below the configured limits, the N34TS04 can signal the condition through its open-drain event pin. This signal is used to control the onboard J1031C3VDC.15S relay, which switches the connected load through the onboard terminal. The relay supports load control up to 2A and up to 60VDC, making the board suitable for thermostat-based switching, thermal protection, temperature-triggered control systems, heaters, fans, alarms, and other load-control applications where a digital temperature sensor must directly influence an external circuit.

In addition to temperature sensing, the N34TS04 includes two 2Kb SPD EEPROM banks, with one bank activated for access at power-up and bank switching available through software commands after power-up. Each of the four 1Kb SPD EEPROM blocks can also be write-protected by software command, allowing configuration data, calibration information, or system identification data to be stored securely.

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.

Click Snap

Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click

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Snap, visit the official page dedicated to this feature.

Specifications

Type	Temperature & humidity
Applications	Ideal for smart thermostats, thermal protection systems, heaters, fans, alarms, temperature-triggered automation, and embedded load-control applications
On-board modules	N34TS04 - digital output temperature sensor with SPD EEPROM from onsemi
Key Features	Digital output temperature sensing, thermostat control functionality, relay-based load switching, JEDEC TSE2004av DDR4 specification support, temperature measurement at least 10 times per second, programmable high, low, and critical temperature limits, two 2Kb SPD EEPROM banks, software-controlled EEPROM bank switching, software write protection for four 1Kb EEPROM blocks, and more
Interface	I2C
Feature	Click Snap,ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Thermostat 7 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	NC	
ID COMM	**CS**	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
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left

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			position 3V3, Right position 5V
JP2-JP4	ADDR SEL	Right	I2C Address Selection 0/1: Left position 0, Right position 1

Thermostat 7 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Temperature Range	-20	-	+125	°C
Temperature Resolution	-	0.0625	-	°C
Relay Current Range	-	-	2	A
Relay Voltage Range	-	-	60	VDC

Software Support

Thermostat 7 Click demo application is developed using the NECTO Studio, ensuring compatibility with mikroSDK's open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a mikroBUS™ socket.

Example Description

This example demonstrates the use of Thermostat 7 Click board by reading and displaying the temperature in Celsius and whether the temperature limit has been passed.

Key Functions

- thermostat7_cfg_setup This function initializes Click configuration structure to initial values.
- thermostat7_init This function initializes all necessary pins and peripherals used for this Click board.
- thermostat7_default_cfg This function executes a default configuration of Thermostat 7 Click board.
- thermostat7_set_high_limit This function sets the high alarm temperature limit.
- thermostat7_read_temperature This function reads the temperature value in degrees Celsius.
- thermostat7_read_alarm_status This function reads the current alarm status by reading the temperature data register.

Application Init

Initializes the driver and performs the Click default configuration.

Application Task

Reads the temperature and alarm status from the sensor every second and logs both over UART.

Application Output

This Click board can be interfaced and monitored in two ways:

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- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following this tutorial.
- UART Terminal - Monitor data via the UART Terminal using a USB to UART converter. For detailed instructions, check out this tutorial.

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the NECTO Studio. The application code can also be found on the MIKROE GitHub account.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

ClickID

Downloads

Thermostat 7 click example package

Thermostat 7 click 2D and 3D files v100

Thermostat 7 click schematic v100

J1031C3VDC.15S datasheet

N34TS04 datasheet

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