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Thermo 21 Click

PID: MIKROE-4879

Thermo 21 Click is a compact add-on board that provides an accurate temperature measurement. This board features the ADT7301, a high-precision digital temperature sensor from Analog Devices. The ADT7301 houses an on-chip temperature sensor, a 13-bit A/D converter, a reference circuit, and serial interface logic functions in one package. Characterized by its high accuracy (up to ±0.5°C typical) and high resolution of 0.03125°C, this temperature sensor provides temperature data to the host controller with a configurable SPI interface. This Click board™ is appropriate for process control, environmental monitoring, domestic appliances, electronic test equipment, or other temperature measurement applications.

Thermo 21 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.

How does it work?

Thermo 21 Click as its foundation uses the ADT7301, a high-precision digital temperature sensor from Analog Devices. This temperature sensor is characterized by high accuracy; temperature range of 0°C to +70°C provides typical ±0.5°C accuracy. It contains a band-gap temperature sensor and a 13-bit ADC to monitor and digitize the temperature reading to a resolution of 0.03125°C. Wide supply voltage range, low supply current, and SPI-compatible interface make it ideal for various applications, including process control, environmental monitoring, domestic appliances, and many more.

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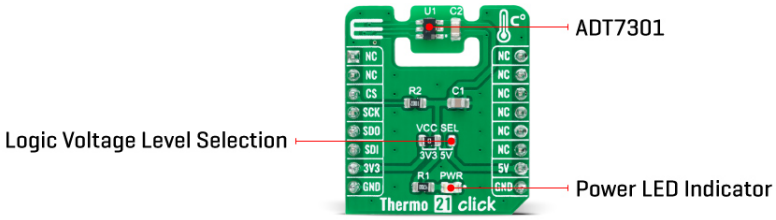

The ADT7301 is a 13-bit digital sensor with a 14th bit that acts as a sign bit. The internal ADC section of the ADT7301 consists of a conventional successive approximation converter based around a capacitor DAC. The on-chip temperature sensor allows an accurate measurement of the ambient device temperature, where the specified measurement range is −40°C to +150°C. It is unrecommended to operate the device at temperatures above +120°C because exposure beyond this limit affects device reliability.

This Click board™ communicates with MCU through a standard SPI interface to program the internal registers for complete control of the ADT7301. It is compatible with SPI, QSPI, and MICROWIRE protocols as well as DSPs. The ADT7301 can be placed into Shutdown mode via the control register, which means that the on-chip oscillator is shut down, and no further conversions are initiated until the ADT7301 is taken out of Shutdown mode.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the SPI communication lines properly. However, the Click board™ comes equipped with a library that contains easy-to-use functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Temperature & humidity
Applications	Can be used for process control, environmental monitoring, domestic appliances, electronic test equipment, or other temperature measurement applications
On-board modules	ADT7301 - high-precision digital temperature sensor from Analog Devices
Key Features	Low power consumption, high precission and accuracy, 13-bit temperature-to-digital converter, 0.03125°C temperature resolution, SPI compatible serial interface, Shutdown mode, and more
Interface	SPI
ClickID	No

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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 Thermo 21 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	
SPI Chip Select	**CS**	3	CS	RX	14	NC	
SPI Clock	**SCK**	4	SCK	TX	13	NC	
SPI Data OUT	**SDO**	5	MISO	SCL	12	NC	
SPI Data IN	**SDI**	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
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

Thermo 21 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Accuracy	-	±0.5	-	°C
Resolution	-	0.03125	-	°C
Operating Temperature Range	-40	+25	+120	°C

Software Support

We provide a library for the Thermo 21 Click as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for Thermo 21 Click driver.

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Key functions

- thermo21_temperature_read Temperature reading function.
- thermo21_generic_read Data reading function.

Example Description

This example application showcases ability of the click board to read temperature data.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Thermo21

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 MikroElektronika compilers.

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

Thermo 21 click 2D and 3D files

Thermo 21 click schematic

ADT7301 datasheet

Thermo 21 click example on Libstock

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