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Surface temp Click





PID: MIKROE-4205

Surface temp Click is high accuracy digital temperature sensor Click board[™], offering breakthrough performance over a wide industrial range. It is equipped with the <u>ADT7420</u>- an accurate 16-Bit Digital I2C temperature sensor from <u>Analog Devices</u>. It features high temperature accuracy, ultralow temperature drift (0.0073°C), fast first temperature conversion on power-up, no temperature calibration/correction required, and more. This makes the Surface Temp Click board[™] a great choice for RTD and thermistor replacement, medical equipment, food transportation and storage, environmental monitoring, HVAC, and other applications.

Surface temp 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?

The Surface temp Click is based around the ADT7420 which has a 16-bit ADC to monitor and digitize the temperature to 0.0078°C resolution. The ADC resolution, by default, is set to 13 bits (0.0625°C) and is a user programmable mode that can be changed through the serial interface. The ADT7420 is guaranteed to operate over supply voltages from 2.7 V to 5.5 V. Operating at 3.3 V, the average supply current is typically 210 μ A. The ADT7420 has a shutdown mode that powers down the device and offers a shutdown current of typically 2.0 μ A at 3.3 V. The ADT7420 is rated for operation over the -40° C to $+150^{\circ}$ C temperature range.

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ISO 9001: 2015 certification of quality management system (QMS).



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The Surface temp Click board[™] have a sensing pad, which is thermally connected to a ADT7420, for temperature sensing. The internal temperature sensor has high accuracy and linearity over the entire rated temperature range without needing correction or calibration by the user.

In normal mode (default power-up mode) the ADT7420 runs an automatic conversion sequence. During this automatic conversion sequence, a conversion typically takes 240 ms to complete and the ADT7420 is continuously converting. This means that as soon as one temperature conversion is completed, another temperature conversion begins. Each temperature conversion result is stored in the temperature value registers and is available through the I2C interface. In continuous conversion mode, the read operation provides the most recent converted result.

Like most I2C-compatible devices, the ADT7420 has a 7-bit serial address. The address can be selected by IP2 and IP3 jumpers (details in ADT7420 datasheet). Pin A0 and Pin A1 are available for address selection, giving the ADT7420 four possible I2C addresses.

The INT and CT pins have two undertemperature/overtemperature modes: comparator mode and interrupt mode. The interrupt mode is the default power-up overtemperature mode. The CT pin is an open-drain output that becomes active when the temperature exceeds a programmable critical temperature limit. The INT pin is also an open-drain output that becomes active when the temperature exceeds a programmable limit. The INT pin and CT pin can operate in comparator and interrupt event modes.

The voltage range which can be used to power up the Surface temp Click, allows it to work with controllers which have GPIO on both 3.3V and 5V. It can be selected by soldering a small SMD jumper, labeled as VCC SEL to the correct position. As well as PWR LED indicator for signaling that power is present on the system.

Specifications

Туре	Temperature & humidity			
Applications Mikroe produces entire development toolchains for all major microcontrol Committed to excellency, we are dedicated to helping engineers bring the	RTD and thermistor replacement, Thermocouple cold junction compensation, Medical equipment, Industrial control and test, Food transportation and storage, Environmental monitoring and HVAC, Laser diode temperature control. Programmable er architectures. project development up to speed and achieve outstanding results.			
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	interrupts. Low power.		
On-board modules	ADT7420		
Key Features	High accuracy digital temperature sensor offering breakthrough performance over a wide industrial range. 16-bit ADC to monitor and digitize the temperature to 0.0078°C resolution.		
Interface	I2C		
Feature	No ClickID		
Compatibility	mikroBUS™		
Click board size	M (42.9 x 25.4 mm)		
Input Voltage	3.3V or 5V		

Pinout diagram

Notes	Pin	● ● mikro* ● ● ● BUS				Pin	Notes
	NC	1	AN	PWM	16	СТ	Critical Overtemp Indicator
	NC	2	RST	INT	15	INT	Overtemp and Undertemp Indicator
	NC	3	CS	RX	14	NC	
	NC	4	SCK	ΤX	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 supply voltage selection: left position 3V3, right position 5V
JP2	PWR	Left	Slave address selection: Left position 0, right position 1
J3	PWR	Left	Slave address selection: Left position 0, right position 1

Surface temp Click electrical specifications

Description	Min	Тур	Max	Unit
Supply Voltage	2.7	-	5.5	V
Temperature accuracy from -20°C to +105°C	-	±0.25	-	°C
Temperature drift	-	0.0073	-	°C
Power consumption at 3.3 V in normal mode	-	700	-	μW
Power consumption at 3.3 V in shutdown mode	-	7	-	μW
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Resolution	-	16	_	bit

Software Support

We provide a library for the Surface temp 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 contains basic functions for working with Surface temp click.

Key functions:

- float surfacetemp get temperature (void) Getting temperature value.
- uint8 t surfacetemp get status (void) Getting device status.
- uint8 t surfacetemp setup (void) Device initialization.

Examples description

The application is composed of three sections :

- System Initialization Initializes INT pin, PWM pin, I2C module and LOG module.
- Application Initialization Initializes I2C driver, click board and sets thresholds.
- Application Task Reads temperature value and value log on the USBUART.

The full application code, and ready to use projects can be found on our <u>LibStock</u> page.

Other mikroE Libraries used in the example:

- I2C
- UART

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 <u>mikroSDK</u> - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board[™] demo applications, mikroSDK should be downloaded from the <u>LibStock</u> and installed for the compiler you are using.

For more information about mikroSDK, visit the official page. Resources

mikroBUS™

mikroSDK

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Click board[™] Catalog

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Downloads

Surface Temp click example on Libstock

Surface Temp click 2D and 3D files

Surface Temp click schematic

ADT7420 datasheet

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