THERMO K click

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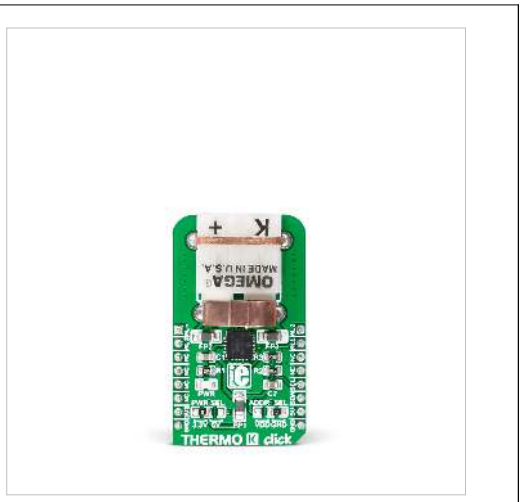

THERMO K click	
IC/Module	MCP9600 datasheet [1]
Interface	I2C
Power supply	3.3V or 5V
Product page	shop.mikroe.com/click/sensors/thermo-k [2]
Schematic	THERMO K click schematic [3]

THERMO K click carries the **MCP9600 IC from Microchip** and and depending on the type of probe it uses, the click can measure temperatures from –200 °C to +1372 °C. THERMO K click is designed to run either on 3.3V or 5V power supply. It communicates with the target MCU through I2C interface.

Features and usage notes

Temperature range

With the type-K probe, available in our store [4], this click can measure temperature up to +480 °C.

MCP9600 from Microchip

The MCP9600 IC converts thermocouple EMF to degree Celsius with integrated Cold-Junction compensation. It corrects the thermocouple nonlinear error characteristics of eight thermocouple types and outputs ±1.5°C accurate temperature data.

4 alert outputs

THERMO K click has 4 alert outputs onboard that can be used to detect multiple temperature zones. You can define on which specific temperature the THERMO K click will send an alarm.

Low power modes

Low-Power modes are available for battery-powered applications. In shut-down mode the module uses only 2 µA.

Thermocouple probe

In order to use THERMO K click you need to connect the appropriate K-type thermocouple probe (not included in the package) into the PCC-SMP connector.

Key features

- MCP9600 IC from Microchip
  - Four Programmable Temperature Alert Outputs
  - Operating Current: 300 µA (typical)
  - Shutdown Current: 2 µA (typical)
- Interface: I2C
- 3.3V or 5V power supply

Jumpers and settings

Designator	Name	Default Position	Default Option	Description: describe the use + list all options with respective descriptions
JP1	PWR.SEL.	Left	3V3	Power Supply Voltage Selection 3V3/5V, left position 3v3, right position 5V
JP2	ADDR. SEL.	Right	GND	I2C address Selection. Left position (VDD) is 1100111x and right position (GND) is 1100000x .

Additional information

Our store [5] offers Thermocouple Type-K Glass Braid Insulated probes.

Pinout diagram

This table shows how the pinout on THERMO K click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin		mikroBUS™			Pin	Notes
Alert 4 output	**ALERT4**	1	AN	PWM	16	**ALERT2**	Alert 2 output
Alert 3 output	**ALERT3**	2	RST	INT	15	**ALERT1**	Alert 1 output
Not connected	NC	3	CS	TX	14	NC	Not connected
Not connected	NC	4	SCK	RX	13	NC	Not connected
Not connected	NC	5	MISO	SCL	12	**SCL**	I2C Clock
Not connected	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

Programming

The demo shows the temperature on the TFT or LCD display.
It measures every half a second.
We have examples for PIC, dsPIC, PIC32, ARM, AVR and FT90x compilers.
The code snippet is from the Example folder of the PIC compiler and P18F87K22 MCU.

This example is a temperature reading routine.
First, we are reading the “Thermocouple Temperature Register” and then we are converting the value to a temperature in the Celsius scale.

```
 float Read_Temperature()
{
    float Temperature;

    tmp_data[0] = MCP9600_TH;



    I2C1_Start();
    I2C1_Wr( MCP9600_I2C_ADDR );
    I2C1_Wr( tmp_data[ 0 ] );
    I2C1_Stop();
    Delay_us( 50 );
    I2C1_Start();
    I2C1_Wr( MCP9600_I2C_ADDR | 1 );
    tmp_data[ 0 ] = I2C1_Rd( 1 );
    tmp_data[ 1 ] = I2C1_Rd( 0 );
    I2C1_Stop();

    if((tmp_data[0] & 0x80) == 0x80)
    {
        tmp_data[0] = tmp_data[0] & 0x7F;

        Temperature = 1024 - (tmp_data[0]*16 + tmp_data[1] / 16);
    }
    else
    {

        Temperature = (tmp_data[0] * 16 + (float)tmp_data[1] / 16);

    }

    return Temperature;

}
```

Resources

- THERMO K schematic [3]
- MCP9600 datasheet [1]
- Libstock Library [6]
- mikroBUS™ standard specifications [7]

References

[1] http://ww1.microchip.com/downloads/en/DeviceDoc/20005426B.pdf
[2] https://shop.mikroe.com/click/sensors/thermo-k
[3] http://cdn-docs.mikroe.com/images/3/3e/THERMO_K_click_schematic.pdf
[4] https://shop.mikroe.com/accessories/sensors/thermocouple-type-k-glass-braid-insulated
[5] https://shop.mikroe.com/accessories/sensors/thermocouple-type-k-glass-braid-insulated?search_query=thermocouple&results=2
[6] http://libstock.mikroe.com/projects/view/1976/thermo-k-click
[7] http://download.mikroe.com/documents/standards/mikrobus/mikrobus-standard-specification-v200.pdf

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