Grove - Temperature Sensor User Manual

Release date： 2015/9/22

Version： 1.0

Wiki: http://www.seeedstudio.com/wiki/Grove_-_Temperature_Sensor_V1.2

Bazaar: http://www.seeedstudio.com/depot/Grove-Temperature-Sensor-p-774.html?cPath=25_125

Document Revision History

Revision	Date	Author	Description
1.0	Sep 22, 2015	Loovee	Create file

Contents

Disclaimer

For physical injuries and possessions loss caused by those reasons which are not related to product quality, such as operating without following manual guide, natural disasters or force majeure, we take no responsibility for that.

Under the supervision of Seeed Technology Inc., this manual has been compiled and published which covered the latest product description and specification. The content of this manual is subject to change without notice.

Copyright

The design of this product (including software) and its accessories is under tutelage of laws. Any action to violate relevant right of our product will be penalized through law. Please consciously observe relevant local laws in the use of this product.

1. Introduction

The Grove - Temperature Sensor uses a <u>Thermistor</u> to detect the ambient temperature. The resistance of a thermistor will increase when the ambient temperature decreases. It's this characteristic that we use to calculate the ambient temperature. The detectable range of this sensor is -40 - 125°C, and the accuracy is $\pm$1.5°C

Note: This wiki works with Grove - Temperature sensor V1.1 as well, for V1.0 please refer to *Grove - Temperature Sensor*
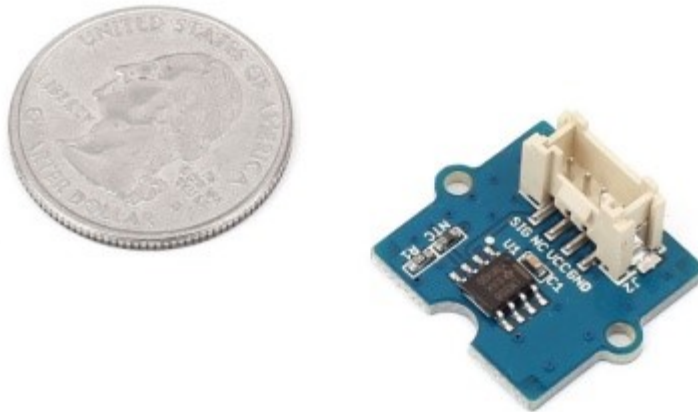
2. Specifications

- Voltage: 3.3 ~ 5V

- Zero power resistance: 100 K Ω

- Resistance Tolerance: ±1%

- Operating temperature range: -40 ~ +125 ℃

- Nominal B-Constant： 4250 ~ 4299K

3. Getting Started

After this section, you can make Grove - Temperature Sensor V1.1/1.2 run with only few steps.

3.1 Preparations

Now we are making a simple demo to get data from Grove - Temperature Sensor V1.1/1.2 require following modules.
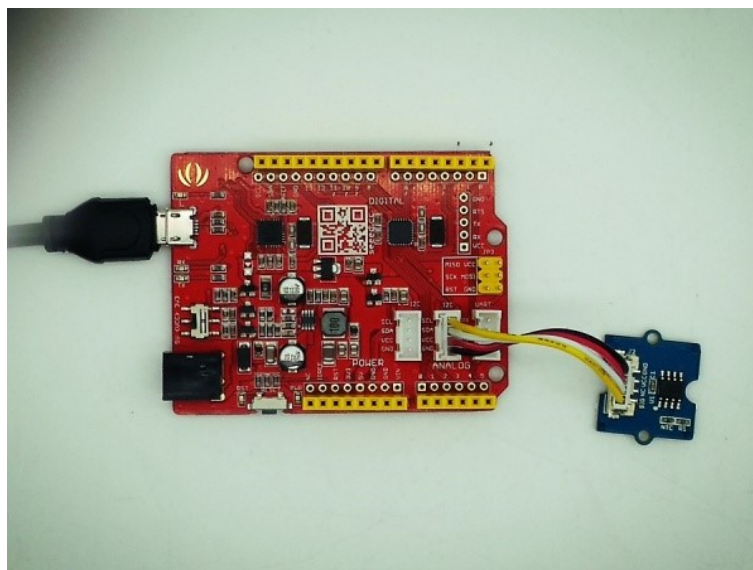
- Seeeduino v4.2

Seeeduino V4.2 is fully compatible with Arduino.

If this is your first time using Arduino, Please put hand on here to start your Arduino journey.

3.2 Connecting hardware

Just connect Grove - Temperature Sensor into A5 connector of Seeeduino v4.2

As shown below:

3.3 Download

Launch Arduino IDE and click **File>New** to open a new page.

Then copy below code into Arduino IDE:

```
// Demo code for Grove - Temperature Sensor V1.1/1.2
// Loovee @ 2015-8-26
```

```
#include <math.h>

const int B=4275;                  // B value of the thermistor
const int R0 = 100000;             // R0 = 100k
const int pinTempSensor = A5;      // Grove - Temperature Sensor connect to A5

void setup()
{
    Serial.begin(9600);
}

void loop()
{
    int a = analogRead(pinTempSensor );

    float R = 1023.0/((float)a)-1.0;
    R = 100000.0*R;

    //convert to temperature via datasheet ;
    float temperature=1.0/(log(R/100000.0)/B+1/298.15)-273.15;

    Serial.print("temperature = ");
    Serial.println(temperature);

    delay(100);
}
```
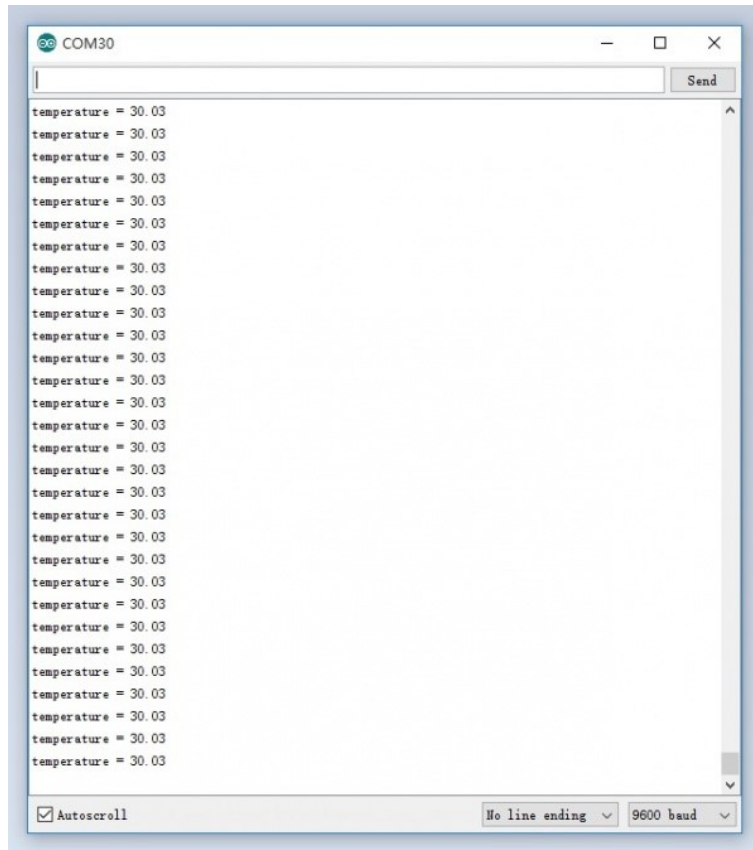
Click **Tools>Board** to choose Arduino UNO and select respective serial port.

Now click **Upload (CTRL+U)** to burn testing code. Please refer to here for any error prompt and

you can also add comment on forum

3.4   Review Results

After upload completed, Open Serial Monitor of your Arduino IDE, you can get the temperature:

4. Reference

If you want to know how the algorithm of temperature coming, please refer to the below image:

1. Zero-power Resistance of Thermistor: R

   $R=R_0 \exp B (1/T-1/T_0)$ ···(1)

   R: Resistance in ambient temperature T (K)

   (K: absolute temperature)

   R_0: Resistance in ambient temperature T_0 (K)

   B: B-Constant of Thermistor

2. B-Constant

   as (1) formula

   $B= \ell n (R/R_0) / (1/T-1/T_0)$ ·····························(2)
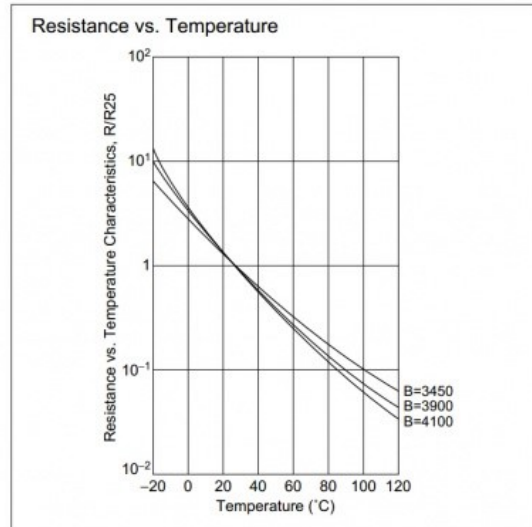
3. Thermal Dissipation Constant

   When electric power P (mW) is spent in ambient temperature T_1 and thermistor temperature rises T_2, there is a formula as follows

   $P=C (T_2-T_1)$ ···(3)

   C: Thermal dissipation constant (mW/°C)

   Thermal dissipation constant is varied with dimensions, measurement conditions, etc.

Resistance vs. Temperature

5. Resources

- Grove - Temperature Sensor v1.1 Eagle File

- Grove - Temperature Sensor v1.1.PDF

- Temperature Sensor datasheet

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Temperature Sensor Development Tools *category:*

Click to view products by Seeed Studio *manufacturer:*

Other Similar products are found below :

EVAL-ADT7516EBZ EVAL-ADT75EBZ T20321SS2B T2016P2CRRXC4S2 MAX1455EVKIT-NS DC2507A DS18B20EVKIT# MAX6654EVKIT EV-TEMPSENSE-ARDZ MAX1617AEVKIT BB-WSK-REF-2 MCP9800DM-TS1 TMPSNSRD-RTD2 MIKROE-2273 MIKROE-2501 MIKROE-2539 MIKROE-2554 DPP201Z000 DPP901Z000 1899 EV-BUNCH-WSN-2Z DPP904R000 KIT0021 SEN0206 SEN0227 MIKROE-2769 3251 SEN-13314 3263 SEN0137 LM20XEVM 3328 TMP708EVM BOOSTXL-TMP107 DC1785B MHUM-01 3538 DPP201G000 DFR0066 WPP100B009 SDT310LTC100A3850 SI7005EVB-UDP-M3L1 2857 1782 2652 269 3245 3622 3648 3721