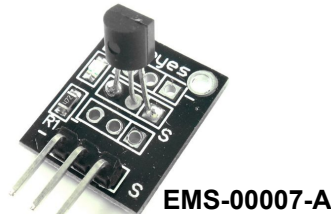


Digital Temperature Sensor (Technical Note)

What is DS18B20 Temperature Sensor?



The DS18B20 is a 3-pin device temperature sensor with 1-wire digital communication. It is widely used to measure temperature in hard environments like in chemical solutions, mines, or soil. It can measure a wide range of temperature from -55°C to $+125^{\circ}$ with a decent accuracy of $\pm 5^{\circ}\text{C}$.

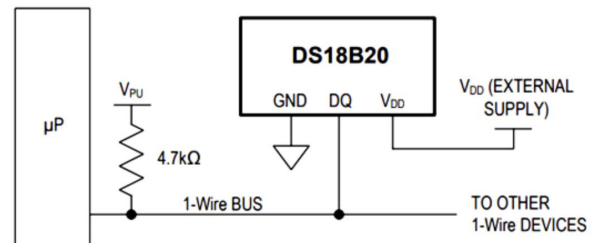
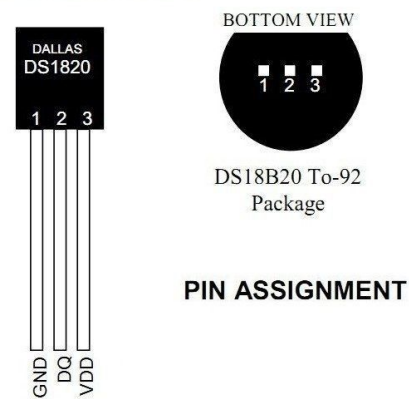
Sensor Specifications

- Programmable Digital Temperature Sensor
- Communicates using 1-wire method
- Operating voltage: 3V to 5V
- Temperature Range: -55°C to $+125^{\circ}\text{C}$
- Accuracy: $\pm 0.5^{\circ}\text{C}$
- Output Resolution: 9-bit to 12-bit (programmable)
- Unique 64-bit address enables multiplexing
- Conversion time: 750ms at 12-bit
- Programmable alarm options
- Available as To-92, SOP and even as a waterproof sensor

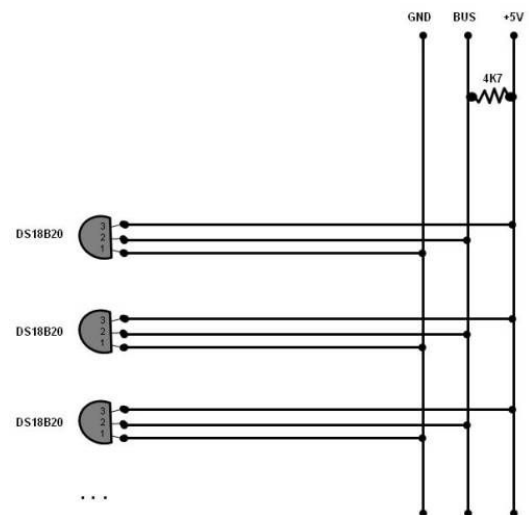
How to use the DS18B20 Sensor

The sensor works with the method of 1-wire communication. It requires only the data pin connected to the microcontroller with a pull up resistor and the other two pins are used for power as shown below.

The pull-up resistor is used to keep the line in high state when the bus is not in use. The temperature value measured by the sensor will be stored in a 2-byte register inside the sensor. This data can be read using the 1-wire method by sending in a sequence of data. There are two types of commands that are to be sent to read the values, one is a ROM command and the other is function command. The address value of each ROM memory along with the sequence is given in the datasheet. Please read through it to understand how to communicate with the sensor.



Application Schematic



Connection diagram for using multiple DS18B20 sensors on 1-wire interface

Digital Temperature Sensor (Technical Note)



Project

To sense environmental temperature by using KY001/DS18B20 connected to Arduino

Procedure

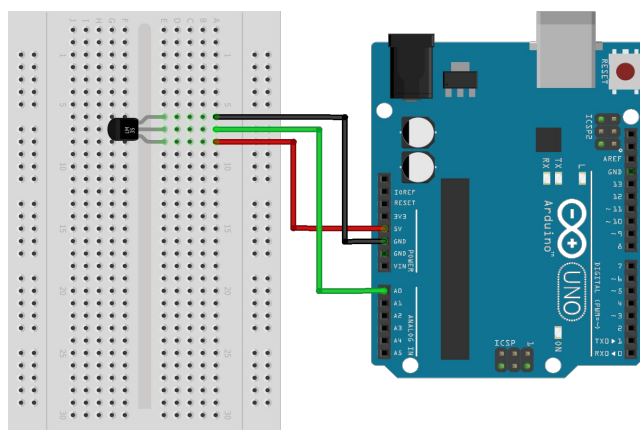
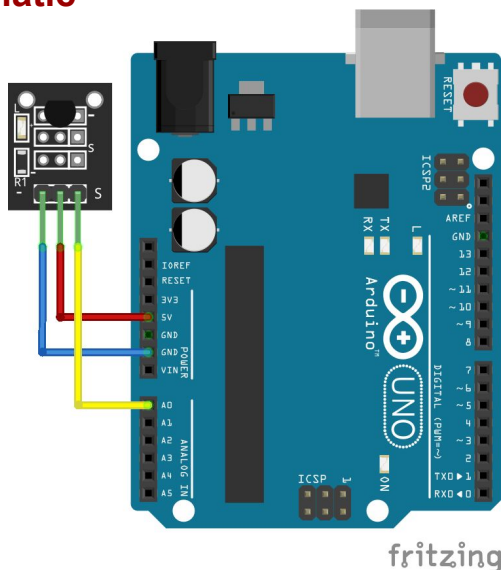
EMS-008-A (KY-001 Module)

- Connect **Middle** pin of sensor to **5V** of Arduino
- Connect **Minus** pin of sensor to **GND** of Arduino
- Connect pin **S** of sensor to pin **A0** of Arduino

EDS-008-A (DS18B20 Device)

- Connect **Vcc** pin of sensor to **5V** of Arduino
- Wire **GND** pin of the sensor to **GND** of the Arduino
- Connect **2nd(Middle)** pin to **A0** of Arduino

Schematic



Challenge Yourself

1. Make the temperature alert system
2. Design an automated switch system for turning a fan on and off dependent on temperature

Components Required

Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
DS18B20 Temp Sensor	EMS-00007-A or EDS-00003-A	1

Code

```
#include <OneWire.h>
#include <DallasTemperature.h>

/* Data wire is connected to pin A0 on
the Arduino*/
#define ONE_WIRE_BUS A0

/* Setup a oneWire instance to
communicate with any OneWire devices*/
OneWire oneWire(ONE_WIRE_BUS);
/* Pass our oneWire reference to Dallas
Temperature.*/
DallasTemperature sensors(&oneWire);

void setup()
{
    /* Initiate serial monitor*/
    Serial.begin(9600);
    /* Initiate sensor*/
    sensors.begin();
}

void loop()
{
    /* Request data from sensor*/
    sensors.requestTemperatures();
    /* Print date on serial monitor*/
    Serial.print("Temperature is: ");

    Serial.println(sensors.getTempCByIndex(
0));
    /* Delay for while*/
    delay(200);
}
```