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## TMP100 Temperature Sensor (SKU:TOY0045)

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### Contents

- [1 Introduction](#)
  - [1.1 Applications](#)
  - [1.2 Specification](#)
- [2 Documents](#)
- [3 Diagram](#)
  - [3.1 More details](#)
- [4 TMP100 Register Introduction](#)
  - [4.1 Address Pins and Slave Addresses](#)
  - [4.2 Pointer Register introduction](#)
  - [4.3 Resolution of the TMP100](#)
  - [4.4 Configuration Register Format](#)
  - [4.5 Byte of Temperature Register](#)
- [5 Sample Code](#)

### Introduction

This temperature sensor used TMP100 chip is ideal for extended temperature measurement in a variety of communication, consumer, environmental, and instrumentation applications, etc...

You can change the address or working voltage of the device depend on the environment. 5V or 3.3V regular voltage input change by one tiny switch. I2C digital output communication, easy to get temperature data of different address, the resolution can be changed also.

This sensor is able to be powered by 5V or 3.3V which make it compatible with both Gadgeteer, Arduino DUE 3.3V system and standard Arduino UNO/Mega 5V system.

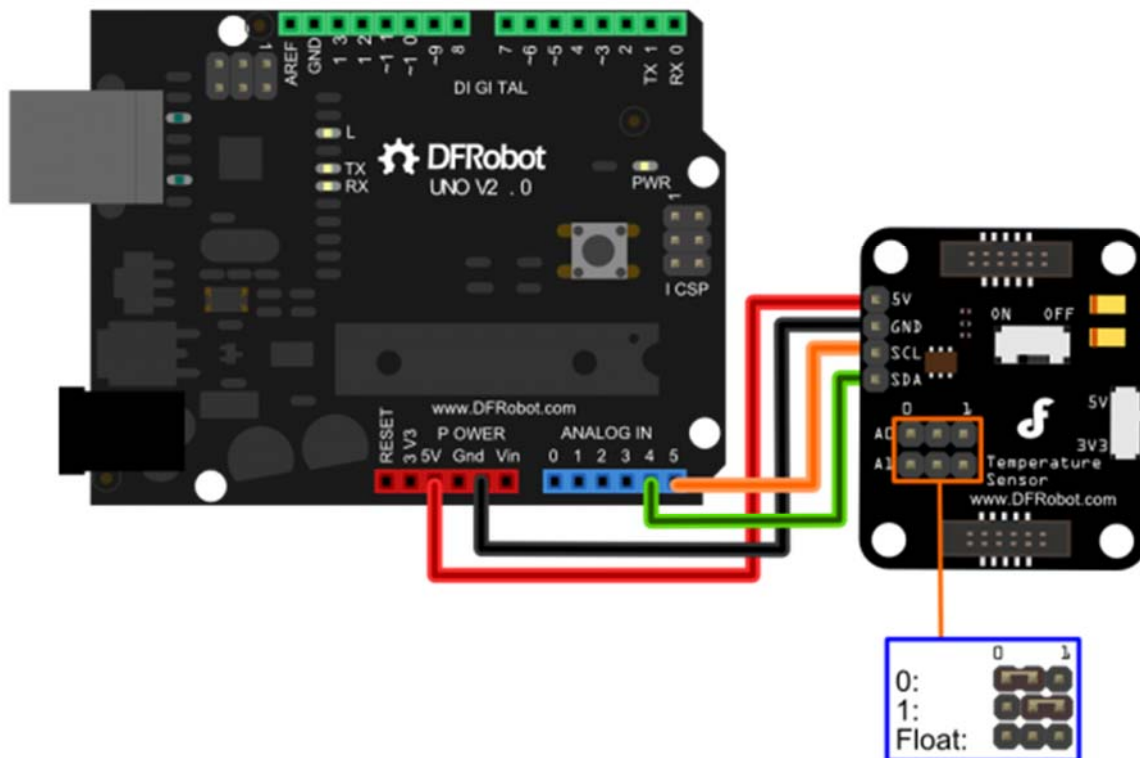
## Applications

- Power-supply Temperature Monitoring
- Computer Peripheral Thermal Protection
- Thermostat Controls project,etc...

## Specification

- Input Voltage:2.7-5.5V
- Working current:45uA(0.1uA standby)
- Resolution:9-12 Bits
- Address:B1001000-B1001111
- Operating frequency:100KHZ/400KHZ/3.4MHZ
- Accuracy: $\pm 2^{\circ}\text{C}$ @ $-25^{\circ}\text{C}\sim 85^{\circ}\text{C}$ , $\pm 3^{\circ}\text{C}$ @ $-55^{\circ}\text{C}\sim 125^{\circ}\text{C}$
- Interface:I2C Digital Output x1  
.NET gadgeteer connector (IDC10)Socket x2
- Size:32 x 27mm

## Diagram



TOY0045 diagram

More details

- **ON/OFF Switch:**ON for Enable the module & OFF for Disable the module

- **5V/3V3 Switch:**5V or 3V3 power selection,make it compatible with both Gadgeteer, Arduino DUE 3.3V system and standard Arduino UNO/Mega 5V system.

## TMP100 Rsgister Introduction

### Address Pins and Slave Addresses

#### Steps:

1. Change the address in the code(it should be matched with the board)
2. Change the short current cap on the board according to the table
3. Power the whole system again once change the address

ADD1	ADD0	SLAVE ADDRESS
0	0	1001000
0	Float	1001001
0	1	1001010
1	0	1001100
1	Float	1001101
1	1	1001110
Float	0	1001011
Float	1	1001111

Address Pins and Slave Addresses

## Pointer Register introduction

### Pointer Register Type

P7	P6	P5	P4	P3	P2	P1	P0
0	0	0	0	0	0	Register Bits	

### Pointer Addresses of the TMP100 Registers

P1	P0	REGISTER
0	0	Temperature Register(Read Only)
0	1	Configuration Register(Read/Write)
1	0	TLOW Register(Read/Write)
1	1	THIGH Register(Read/Write)

## Pointer Register Type

### Resolution of the TMP100

R1	R0	RESOLUTION	CONVERSION TIME (typical)
0	0	9 Bits(0.5 °C)	40ms
0	1	10 Bits(0.25 °C)	80ms
1	0	11 Bits(0.125 °C)	160ms
1	1	12 Bits(0.0625 °C)	320ms

### Resolution of the TMP100

### Configuration Register Format

D7	D6	D5	D4	D3	D2	D1	D0
OS/ALERT	R1	R0	F1	F0	POL	TM	SD

### Configuration Register Format

For the TMP100, Shutdown Mode is enabled when the SD bit is 1. The device will shutdown once the current conversion is completed. For SD equal to 0, the device will maintain continuous conversion.

The power-up/reset value of the Configuration Register is all bits equal to 0. The OS/ALERT bit will read as 1 after power-up/reset.

Byte of Temperature Register

### Byte1-High

D7	D6	D5	D4	D3	D2	D1	D0
T11	T10	T9	T8	T7	T6	T5	T4

### Byte2-Low

D7	D6	D5	D4	D3	D2	D1	D0
T3	T2	T1	T0	0	0	0	0

Byte of Temperature Register

### Sample Code

```
/*
  Sample code for the TMP100 Temperature sensor
  website:www.DFRobot.com

  Connection:

  VCC-5V
  GND-GND
  SDA-Analog pin 4
  SCL-Analog pin 5
*/

#include <Wire.h>
int tmpAddress = B1001011; //Slave Addresses set
int ResolutionBits = 10; //Resolution set
void setup()
{
  Wire.begin(); // join i2c bus (address optional for master)
```

```

Serial.begin(9600); // start serial for output
SetResolution();
}

void loop()
{
  getTemperature();
  delay(200);
}

float getTemperature()
{
  Wire.requestFrom(tmpAddress,2);
  byte MSB = Wire.read();
  byte LSB = Wire.read();
  int TemperatureSum = ((MSB << 8) | LSB) >> 4;
  float celsius = TemperatureSum*0.0625;
  Serial.print("Celsius: ");
  Serial.println(celsius);
}

void SetResolution(){
  if (ResolutionBits < 9 || ResolutionBits > 12) exit;
  Wire.beginTransaction(tmpAddress);
  Wire.write(B00000001); //addresses the configuration register
  Wire.write((ResolutionBits-9) << 5); //writes the resolution bits
  Wire.endTransmission();
  Wire.beginTransaction(tmpAddress); //resets to reading the temperature
  Wire.write((byte)0x00);

```

Wire.endTransmission();