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# **Grove - Digital Infrared Temperature Sensor**



The Digital Infrared temperature sensor is a non-contact temperature measurement module which bases on MLX90615. Both the IR sensitive thermopile detector chip and the signal conditioning chip are integrated in the same package. This module communicates with Arduino using SMBus, up to 127 sensors can be read via common 2 wires. Thanks to the module's low noise amplifier, 16-bit ADC and powerful DSP unit, it can achieved a high accuracy of 1°C over wide temperature rage and a high measurement resolution of 0.02°C.

# **Specifications**

| Item                      | Min | Typical | Max | Unit |
|---------------------------|-----|---------|-----|------|
| Voltage                   | 2.6 | 3       | 5   | V    |
| Current                   |     | 1.4     | 1.5 | mA   |
| Ambient Temperature Range |     | °C      |     |      |
| Object Temperature Range  |     | °C      |     |      |
| Dimension 20              |     |         |     | mm   |

# **Platforms Supported**

| Arduino | Raspberry Pi | BeagleBone | Wio | Linklt ONE |
|---------|--------------|------------|-----|------------|
|         | B            |            |     |            |

#### Caution

The platforms mentioned above as supported is/are an indication of the module's hardware or theoritical compatibility. We only provide software library or code examples for Arduino platform in most cases. It is not possible to provide software library / demo code for all possible MCU platforms. Hence, users have to write their own software library.

# Hardware Overview



| Pin Number | Name | Туре   | Function Description                             |  |
|------------|------|--------|--|--|
| 1          | GND  | -      | Signal ground                                    |  |
| 2          | VCC  | in     | Positive Power Supply Input Terminal(3.3V or 5V) |  |
| 3          | SDA  | in/out | I2C data input/output                            |  |
| 4          | SCL  | in     | I2C CLK  |  |

# Getting Started Play With Arduino

We provide an example here to show you how to use this sensor to measure the temperature of the target which is in front of the sensor, and print the result on the serial monitor.

#### Note

If this is the first time you work with Arduino, we firmly recommend you to see Getting Started with Arduino before the start.

#### Hardware

#### Hardware components:



- Step 1. Plug Grove Digital Infrared Temperature Sensor into port D2 of Grove-Base Shield.
- Step 2. Plug Grove Base Shield into Seeeduino.
- Step 3. Connect Seeeduino to PC via a USB cable.



#### Note

If we don't have Grove Base Shield, We also can directly connect Grove\_Ultrasonic\_Ranger to Arduino as below.

| Seeeduino | Grove-Ultrasonic Ranger |
|-----------|-------------------------|
| 5V        | Red                     |
| GND       | Black                   |
| SDA       | White                   |
| SCL       | Yellow                  |

#### Software

- Step 1. Download the library and demo code Digital\_Infrared\_Temperature\_Sensor\_MLX90615.
- Step 2. Refer to How to install library to install library for Arduino.
- Step 3. Open the demo code directly by the path:

#### File -> Examples -> Digital\_Infrared\_Temperature\_Sensor\_MLX90615 -> MLX90615Soft. As the following picture shown:

| 5        | singleDevi <u>ce</u>        | Arduino 1.8.3              |   | _        |                 |
|----------|-----------------------------|----------------------------|---|----------|-----------------|
| ile      | <u>E</u> dit <u>S</u> ketch | <u>T</u> ools <u>H</u> elp |   |          |                 |
|          | New                         | Ctrl+N                     |   |          |                 |
|          | Open                        | Ctrl+O                     |   |          |                 |
|          | Open Recent                 | : >                        |   |          |                 |
|          | Sketchbook                  | >                          |   |          |                 |
|          | Examples                    | ;                          | Built-in Examples                                   |          |                 |
|          | Close                       | Ctrl+W                     | 01.Basics   | >        |                 |
|          | Save                        | Ctrl+S                     | 02.Digital  | >        |                 |
|          | Save As                     | Ctrl+Shift+S               | 03.Analog   | >        |                 |
|          |                             |                            | 04.Communication                                    | >        |                 |
|          |                             | Ctrl+Shift+P               | 05.Control  | >        |                 |
|          | Print                       | Ctrl+P                     | 06.Sensors  | >        |                 |
|          | Preferences                 | Ctrl+Comma                 | 07.Display  | ,        |                 |
|          |                             |                            | 08.Strings  | Ś        |                 |
|          | Quit                        | Ctrl+Q                     | 09.USB  | ĺ,       |                 |
| 13       | Serial.be                   |                            | 10.StarterKit BasicKit                              | ĺ,       |                 |
| 14       | Serial.pr                   | intln("Setup               | 11.ArduinoISP                                       | <i>.</i> |                 |
| 15<br>16 | //-1-00615                  | writeEEPROM(De             | 11.ArduinoISP                                       |          | ust emissivity. |
| 10       |                             | .readEEPROM();             |   | -        | ust emissivity. |
| 18       | }                           | . I CAULDI KOM (/, )       | Examples for Arduino/Genuino Uno                    |          |                 |
| 19       | ·                           |                            | EEPROM  | >        |                 |
| 20       | void loop()                 |                            | SoftwareSerial                                      | >        |                 |
| 21 🗄     | 3                           |                            | SPI   | >        |                 |
| 22       | -                           | int("Object temp           | Wire  | >        |                 |
| 23       | -                           | intln(mlx90615.            | Examples from Custom Libraries                      |          |                 |
| 24       | -                           | int("Ambient ter           | Adafruit NeoPixel                                   | >        |                 |
| 25       | Serial.pr                   | intln(mlx90615.;           | Arduino SoftI2C-master                              | Ś        |                 |
| 26       | del ay (1000                | <b>.</b>                   | Digital Infrared Temperature Sensor MLX90615-master | í        | multiDevice     |
| 27<br>28 | delay(1000                  | /:                         |   | 1        |                 |
| 20       | 1                           |                            | FastLED   | ļ        | singleDevice    |
|          |                             |                            | Costura DA 17620 master                             | 1        |                 |

Since the sensor is factory calibrated with the digital SMBus compatible interface enabled, but the library is based on a soft i2c library, so you can use any digital pins on any AVR chip to drive the SDA and SCL lines. We use D2 as the SCL pin and D3 as the SDA pin in this demo code. You can use other port as long as you modify the code with matched pins.

- Step 4. Upload the code into Arduino. If you do not know how to upload the code, please check how to upload code.
- Step 5. Click Tool -> Serial Monitor to start up the Serial Monitor. And you will see the result.

|                            | Send                         |
|----------------------------|------------------------------|
|                            |                              |
| Ambient temperature: 29.38 |                              |
| Object temperature: 32.92  |                              |
| Ambient temperature: 29.38 |                              |
| Object temperature: 32.54  |                              |
| Ambient temperature: 29.38 |                              |
| Object temperature: 32.58  |                              |
| Ambient temperature: 29.38 |                              |
| Object temperature: 32.92  |                              |
| Ambient temperature: 29.38 |                              |
| Object temperature: 33.06  |                              |
| Ambient temperature: 29.42 |                              |
| Object temperature: 32.84  |                              |
| Ambient temperature: 29.48 |                              |
| Object temperature: 33.02  |                              |
| Ambient temperature: 29.52 | -                            |
| Autoscroll                 | No line ending ▼ 9600 baud ▼ |

Now, you can measure the temperature with this sensor. Ambient temperature is the MLX90615 package temperature and Object temperature is the object target temperature. According to our experiment, when you place the sensor in the normal indoor temperature, and ensure that there is nothing source of heat in front of the sensor's 1M scope. The Object temperature will approximately equal to Ambient temperature. When measuring the Object temperature, you should ensure the object is as close as possible whit the sensor, but do not touch the surface of the sensor, we recommend the distance is less than 3cm. Wish you have a fun try.

#### Тір

More details about Grove modules please refer to Grove System

### Resources

- [Zip] Grove Digital Infrared Temperature Sensor v1.0 eagle file.zip
- [PDF] MLX90615.pdf
- [Code] Demo Code

# **Tech Support**

Please submit any technical issue into our forum or drop mail to techsupport@seeed.cc.

http://wiki.seeedstudio.com/Grove-Digital\_Infrared\_Temperature\_Sensor/11-29-18