IR Thermometry Module

BMH63K203
User Guide

Revision: V1.10 Date: April 25, 2024

www.bestmodulescorp.com

Contents

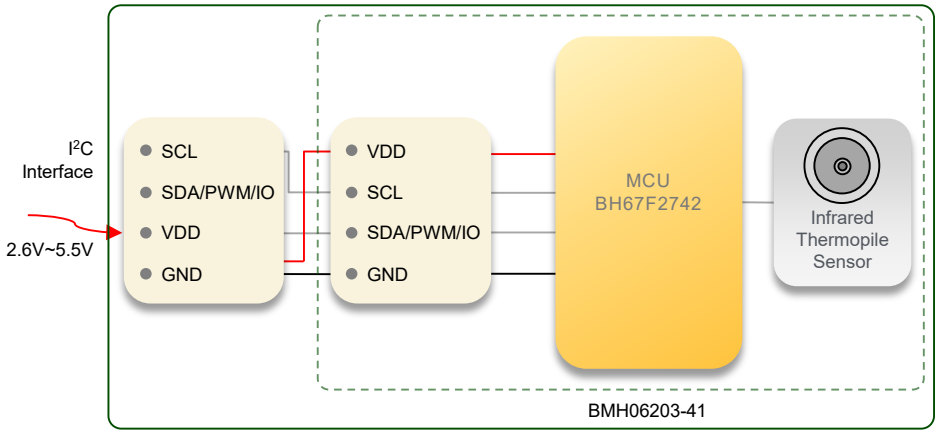
Introduction

The Best Modules BMH63K203 is an IR thermometry module, which is developed using an MCU, the BH67F2742. It contains an adapter cable and the BMH06203-41 module. The module uses a 24-bit Delta Sigma A/D converter chip and an infrared thermopile sensor to implement the temperature reading function. The temperature measurement range is 0~100°C, which has been calibrated before delivery. The module supports I²C, PWM and IO operating modes. It can implement the mode operating setting, ambient temperature reading and other functions using the I²C communication mode via the communication interface. The module is suitable for use in infrared thermometers (ear thermometers and forehead thermometers), industrial thermometers, electric ovens, induction cookers and other products.

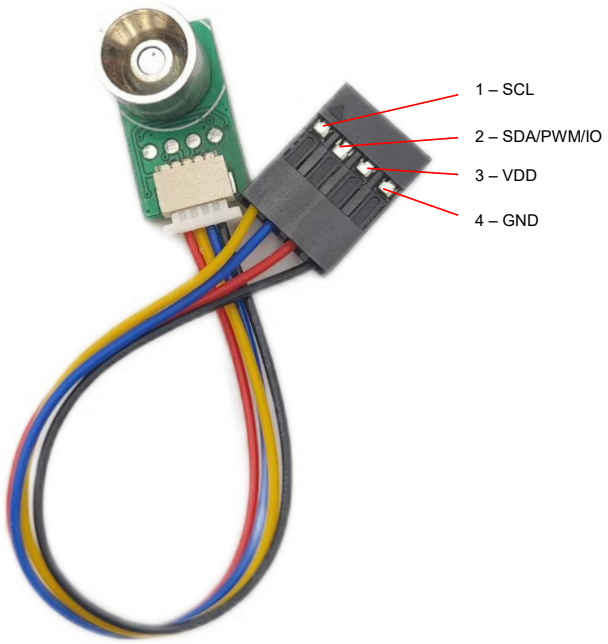
Features

- Operating voltage: 2.6V~5.5V
- Operating current: 1.5mA @ 3.3V
- Standby current: <3μA
- MCU: BH67F2742
- Module characteristics:
  - Measurement range: 0~100°C
  - Resolution: 0.1°C
  - Accuracy: ±0.2 (32~43°C); ±0.3 (30~45°C); ±1 (0~100°C)
  - Directly output temperature values
  - Operating modes: I²C Mode (default), PWM Mode, IO Mode 1, IO Mode 2
  - Factory calibration
- Communication interface:
  - Interface×1 (SCL, SDA/PWM/IO, VDD, GND)
  - Communication method: I²C (address: 0x28)
- Provides Arduino Library support
- BMH06203-41 Module size: 18.3mm×10mm×8.8mm

Block Diagram



Pin Description



Interface Pins:

Pin	Function	Operating Mode	Description
1	SCL	I²C	I²C clock line
2	SDA	I²C	I²C data line
	PWM	PWM	PWM output pin
	IO	IO	IO output pin
3	VDD	I²C/PWM/IO	Positive power supply
4	GND	I²C/PWM/IO	Negative power supply, ground

Technical Specifications

Recommended Operation Conditions

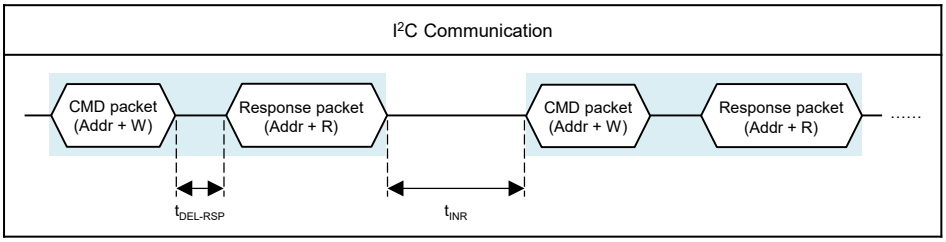
Ta=25°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Operating Voltage	—	2.6	—	5.5	V
I_{DD}	Operating Current	V_{DD}=3.3V	—	1.5	2.4	mA
I_{STB}	Standby Current	V_{DD}=3.3V	—	1	3	uA
	Field of View	—	—	108	—	°
	Resolution	—	—	0.1	—	°C
	Accuracy	Blackbody temperature 32~43°C	-0.2	—	0.2	°C
		Blackbody temperature 30~45°C	-0.3	—	0.3	°C
		Blackbody temperature 0~100°C	-1	—	1	°C

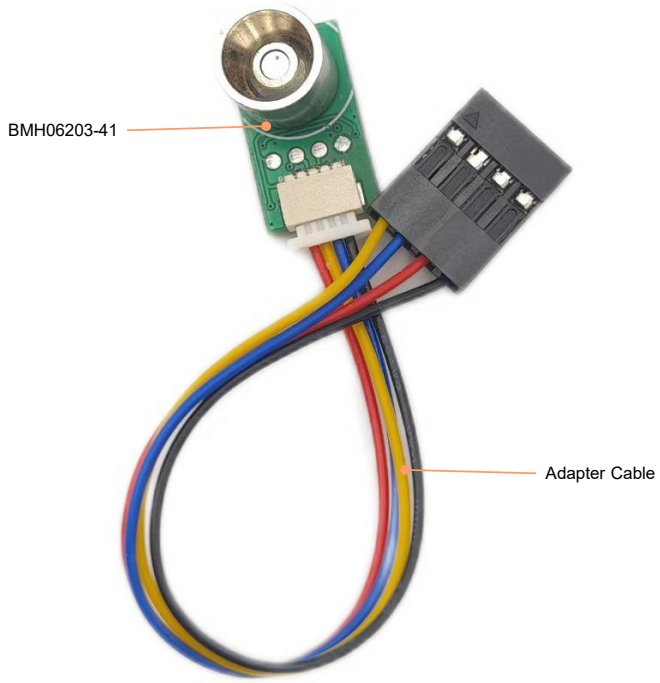
Timing Specification

Ta=25°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{DEL-RSP}$	Response Delay Time	V_{DD}=3.3V	10	—	—	ms
t_{INR}	Interval Time	V_{DD}=3.3V	10	—	—	ms

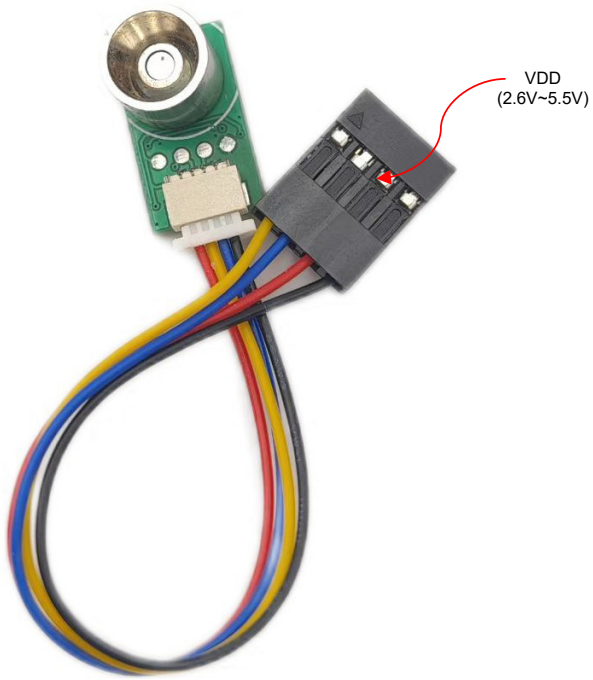


Hardware Overview



BMH06203-41+Adapter Cable

Power Supply



- Communication interface: provided by the VDD input, 2.6V~5.5V

Adapter Cable

The adapter cable is a 4-pin SH1.0mm to 4-pin female 2.54mm connector with the length of 100mm. The cable facilitates the connection between the IR thermometry module and the BMduino development board. The SH1.0mm connector is to connect to the IR thermometry module.

- **4-pin SH1.0mm Pins:**

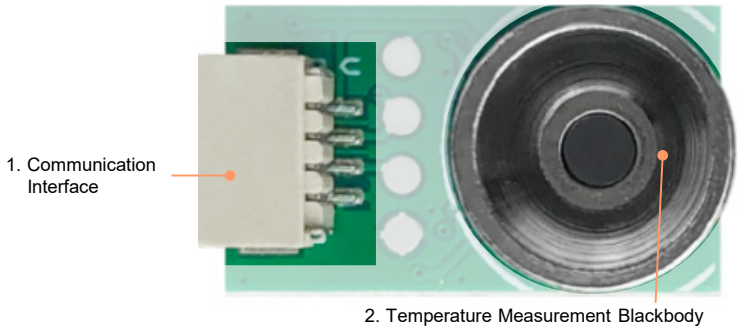
#	4-pin SH1.0mm	Note
1	VDD	Red
2	SCL	Yellow
3	SDA/PWM/IO	Blue
4	GND	Black

- **4-pin female 2.54mm Pins:**

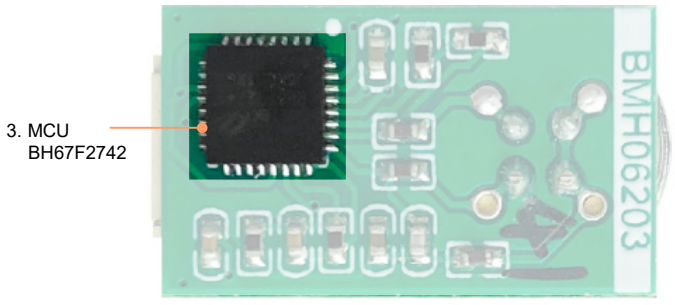
#	4-pin Female 2.54mm Connector	Note
1	SCL	Yellow
2	SDA/PWM/IO	Blue
3	VDD	Red
4	GND	Black

IR Thermometry Module: BMH06203-41

The BMH06203-41 is made of 24-bit A/D converter chip and an infrared thermopile sensor,which are specially designed for high precision infrared sensor by Holtek. The measurement resolution can reach 0.01℃.



PCBA Front View



PCBA Back View

- Communication Interface:
  - ♦ Interface×1 (VDD, SCL, SDA/PWM/IO, GND)
  - ♦ Communication method: I^2C (address: 0x28)

Communication Interface

- Communication method: I²C
- I²C address: 0x28

  I²C Address Format:

MSB LSB

A6	A5	A4	A3	A2	A1	A0	R/W
0	1	0	1	0	0	0	

Slave address (0x28)

  Note: R/W=1: Read direction
  =0: Write direction

- I²C communication speed: ≤400kHz
- Communication logic reference voltage: 2.6V~5.5V
- Module SCL/SDA pin with the MCU internal pull-up resistor
- Communication protocol:
  - Refer to the BMH06203-41 IR thermometry module datasheet

Operating Mode

- The module has four operating modes, known as I²C Mode (default), PWM Mode, IO Mode 1 and IO Mode 2. Mode switching can be implemented by setting Model[2:0] in the EEPROM (08h)

Model[2:0]	Operating Mode
000	IIC_MODE (default)
001	PWM_MODE
010	IO_MODE1
110	IO_MODE2

- PWM mode:
  - Set Model[2:0] in the EEPROM (08h) to 001 to select PWM mode
  - Power on the module again to switch to PWM output mode
  - PWM pin will output a square wave with different duty ratio and frequency of about 60Hz, which is determined by the minimum threshold, maximum threshold and measured temperature

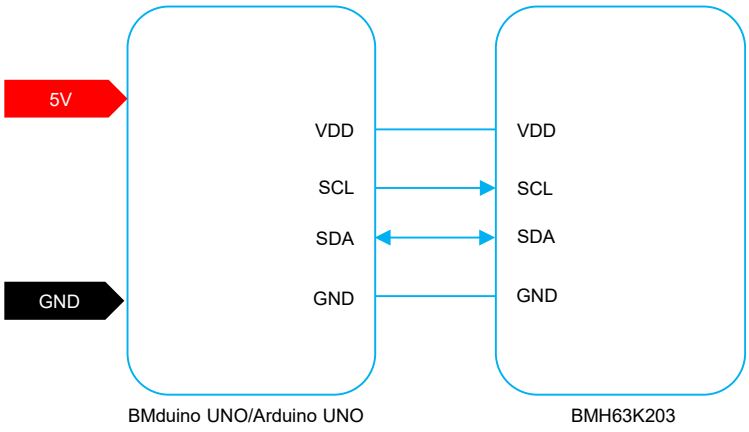
PWM Pin	
Frequency	**Duty**
About 60Hz	(measured temperature – minimum threshold)/ (maximum threshold – minimum threshold)

- IO mode:
  - Set Model[2:0] in the EEPROM (08h) to 010 to select IO mode 1
  - Set Model[2:0] in the EEPROM (08h) to 110 to select IO mode 2
  - Power on the module again to switch to the selected IO mode
  - IO pin will output a high or low level determined by the operating mode, measured temperature and temperature threshold

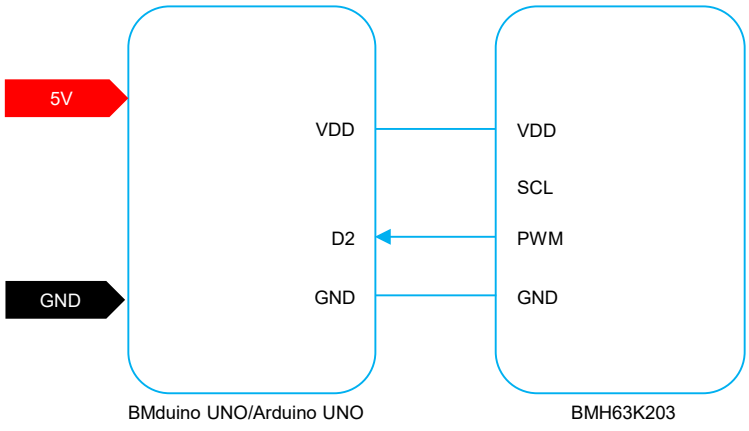
Module		IO Pin
Mode Selection	Measured Temperature	
MODE1	≥temperature threshold	Low
	<temperature threshold	High
MODE2	≥temperature threshold	High
	<temperature threshold	Low

- PWM or IO mode switching to I²C mode:
  - When the module has been powered on, if the SCL low time, T1, is detected to be 50ms, it can be switched to I²C mode. At this point, set Model[2:0] in the EEPROM (08h) to 000 and then power on the module again to switch to I²C mode

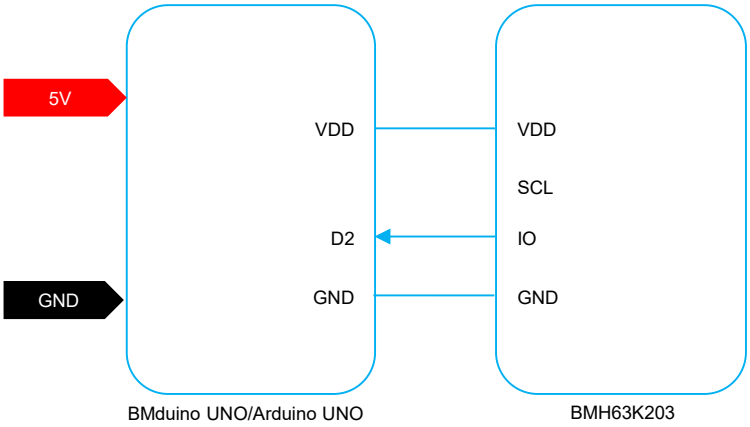
Application Circuits



I²C Mode Connection Diagram



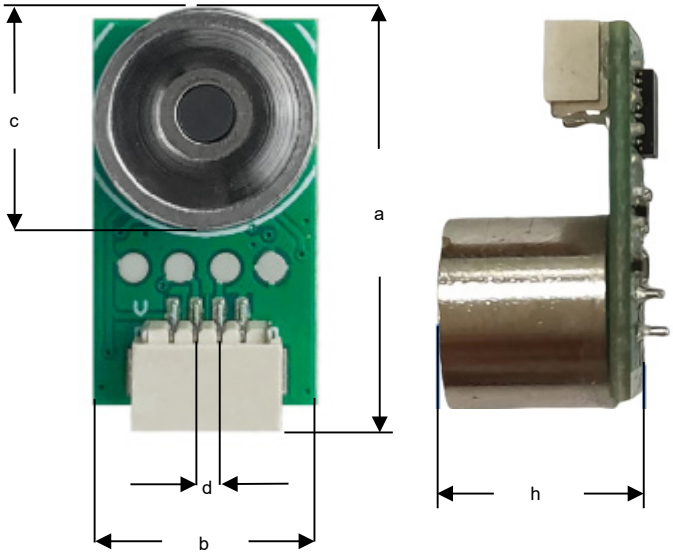
PWM Mode Connection Diagram



IO Mode Connection Diagram

Dimensions

IR Thermometry Module: BMH06203-41



Dimension Information

Symbol \ Unit	mm	inch
a	18.3	0.72
b	10.0	0.39
c	9.00	0.35
d	1.0	0.04
h	8.8	0.35

Dimension List