Product Specification

MCU	BMH No.
BMH02	BMH02xxx

Product Name

Pressure Module

Product Description

Pressure Module

Contents

1. Revision History

Version	Date	Description	Author
00.00	2017/04/20	Initial version	陳挺
V1.0	2017/06/21	Modify MCU description	陳挺

2. General Description

The BMH02xxx devices are a series of high precision pressure modules, using an internal silicon-based MEMS sensor. Together with an internal Holtek high precision dedicated 24-bit A/D converter, these pressure modules can provide an accuracy of 2mm with a measurement range of 6kPa, 10kPa or 40kPa depending upon the module selected. These modules can be used in application areas such as washing machines, water purifiers in addition to many other related products.

Their main advantages over other similar type modules are as follows:

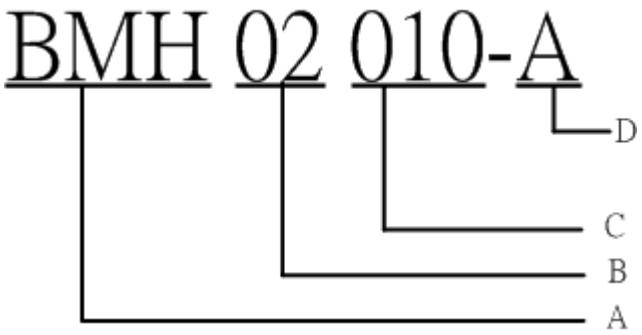
1. Internal regulated power supply with a wide voltage input range
2. Low standby power consumption: <1μA
3. PCBA size:14mm×14mm (BMH02XXX)
4. Directly outputs height value without requiring additional A/D conversion, reducing development costs
5. Standard I^2C interface
6. Module selection is provided for different measurement ranges
7. Dynamic taring function achieved using I^2C commands

BMH020xx

Applications:

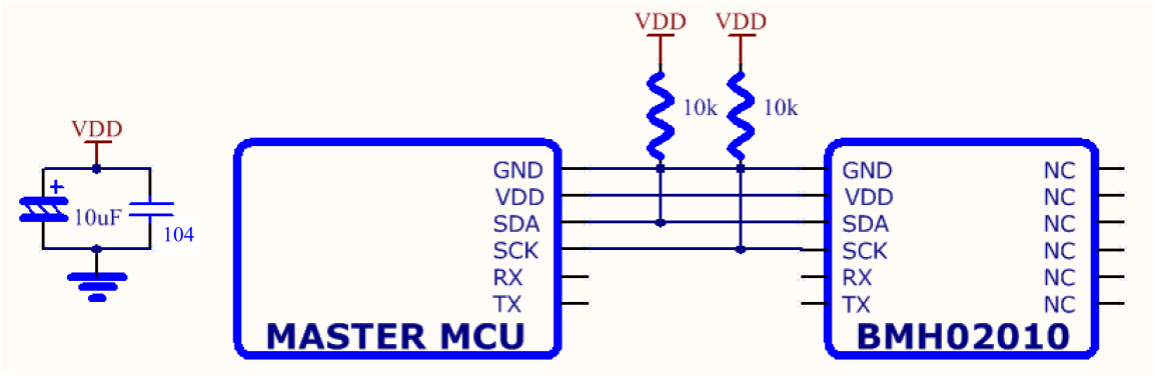
3. Selection Table

Module	Measurement Range / kPa
BMH02006	6
BMH02010	10
BMH02040	40



A	Product Type	BMH	Medical measurement module
B	Module Type	02	Pressure module
C	Module Number	006	Pressure module, range: 0~6kPa
		010	Pressure module, range: 0~10kPa
		040	Pressure module, range: 0~40kPa

4. Application Circuit and Description



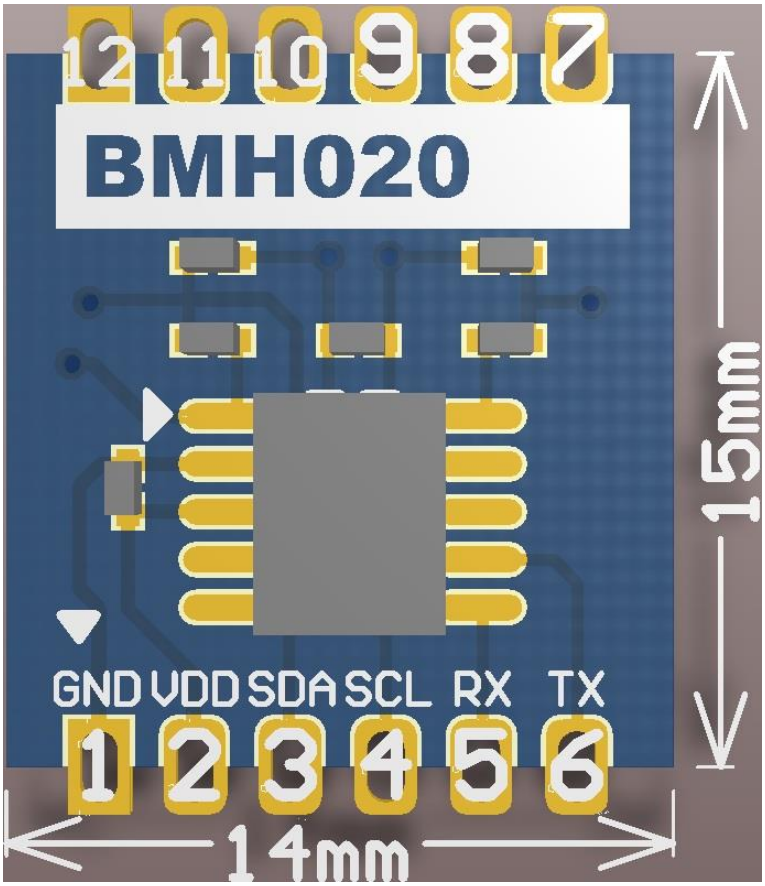
I²C Interface

Notes:

1. For maximum accuracy and best anti-interference, it is recommended that both the 0.1μF and 10μF capacitors are used. However in cost sensitive applications, the 10μF capacitor could be removed.

2. The figure above shows the I²C interface. Modules with SPI or UART interfaces are also provided.

5. Pin Assignment



BMH02006/BMH02010/BMH02040

6. Pin Description

BMH02006/BMH02010/BMH02040

Pin Name	Function	Type	Description
1	VSS	PWR	Power supply
2	VDD	PWR	Power supply
3	I²C SDA	I/O	I²C data line
4	I²C SCL	I/O	I²C clock line
5	RX	I/O	UART receiving line
6	TX	I/O	UART transmitting line
7	NC	–	No connection
8	NC	–	No connection
9	NC	–	No connection

Pin Name	Function	Type	Description
10	NC	–	No connection
11	NC	–	No connection
12	NC	–	No connection

7. Electrical Characteristics

7.1 D.C. Characteristics

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Operating Voltage	$f_{SYS} = f_{HIRC} = 4MHz$	2.6	–	5.5	V
Storage Temperature	3V	-50	–	125	℃
Operating Temperature	–	-10	–	60	℃
Operating Current	3V	–	1.5	2.4	mA
Standby Current	3V	–	1	3	μA

7.2 A.C. Characteristics

Module	Parameter	Min.	Typ.	Max.	Unit
BMH02006	Measurement Range		6		kPa
	Safe Load Limit	–	–	18	kPa
	Non-linearity	–	0.2	0.5	%F.S
	Hysteresis	–	0.05	0.1	%F.S
	Stability		0.2		%F.S/Y
	Zero Point Output Temperature Coefficient	-0.08	-0.03	0.08	%F.S/℃
	Full-scale Output Temperature Coefficient	-0.27	-0.22	-0.17	%F.S/℃
	Operating Temperature	-40	–	85	℃
	Storage Temperature	-50	–	125	℃
BMH02010	Measurement Range		10		kPa
	Safe Load Limit		30		kPa
	Non-linearity	–	0.2	0.5	%F.S
	Hysteresis	–	0.05	0.1	%F.S
	Stability		0.2		%F.S/Y
	Zero Point Output Temperature Coefficient	-0.08	-0.03	0.08	%F.S/℃
	Full-scale Output Temperature Coefficient	-0.27	-0.22	-0.17	%F.S/℃
	Operating Temperature	-40	–	85	℃
	Storage Temperature	-50	–	125	℃
BMH02040	Measurement Range		40		kPa
	Safe Load Limit		120		kPa
	Non-linearity	–	0.2	0.5	%F.S
	Hysteresis	–	0.05	0.1	%F.S
	Stability		0.2		%F.S/Y
	Zero Point Output Temperature Coefficient	-0.08	-0.03	0.08	%F.S/℃

Module	Parameter	Min.	Typ.	Max.	Unit
	Full-scale Output Temperature Coefficient	-0.27	-0.22	-0.17	%F.S/℃
	Operating Temperature	-40	–	85	℃
	Storage Temperature	-50	–	125	℃

8. Functional Description

Address	R/W	Byte1	Byte2	Description
0xAD	R	ADCDATA_H	ADCDATA_M	A/D value output, test mode
0xAE	R	Weight_H	Weight_L	Pressure value output
0xAF	R	Temp_H	Temp_L	Temperature output
0xC0	W	0xAA	–	Module sleep command
0xCA	W	CAL_H	CAL_L	Clear/tare/max. range setup: CAL=0: tare or zero point CAL>0: max. calibration value
	R	CAL_ST	–	Calibration failed: 0x00 Zero calibration in progress: 0x01 Zero calibration completed: 0x02 Max. value calibration in progress: 0x05 Max. value calibration completed (calibration completed): 0x06

8.1 Read Pressure Value

```
// Read Command
i2c_start();                          // send START signal
i2c_write(AddressByte & write);       // write command, bit0 is '0'
i2c_write(0xAE);                      // write register address
i2c_start();                          // send Repeat START signal
i2c_write(AddressByte & read);        // read command, with bit0 is '1'
PressureH = i2c_read(ACK);            // read 8 bits & send ACK signal
PressureL = i2c_read(NAK);            // read 8 bits & send NAK signal
i2c_stop();
```

There are positive and negative pressure values, the highest bit is the positive or negative sign, "0" indicates positive value, "1" indicates negative value. If a negative value is obtained, it means the pressure is under the zero point. The reading interval is recommended to be larger than 100ms.

8.2 Clear to Zero & Calibration

```
// Zero Point Calibration
i2c_start();                          // send START signal
i2c_write(AddressByte & write);       // write command, bit0 is'0'
i2c_write(0xCA);                      // write register address
i2c_write(0x00);                      // write H_data
```

```
i2c_write(0x00);                                    // write L_data
i2c_stop();                                         // send STOP signal
while (fun_ReadCalStatus()!= CAL_MIN_ED)    // Wait for calibration OK
{ GCC_CLRWDT(); }
// Max. Pressure Calibration
i2c_start();                                        // send START signal
i2c_write(AddressByte & write);                 // write command, bit0 is‘0’
i2c_write(0xCA);                                // write register address
i2c_write(0x13);                                // write H_data 0x13(5kg)
i2c_write(0x88);                                // write L_data 0x88(5kg)
i2c_stop();                                         // send STOP signal
while (fun_ReadCalStatus()!= CAL_MAX_ED)        // Wait for calibration OK
{ GCC_CLRWDT(); }
// Calibration completed
```

8.3 Sleep

```
// Write Command
i2c_start();                                    // send START signal
i2c_write(AddressByte & write);                 // write command, bit0 is‘0’
i2c_write(0xC0);                                // write register address
i2c_write(0xAA);                                // write L_data
i2c_stop();
```

Module sleep description:

The first valid pressure data will be obtained about 400ms after waking up from the sleep state. If there are no special power saving requirements, it is recommended that the module does not enter the sleep state, as this will ensure the most rapid pressure detection speed.

9. Tools Information

Development Tool Requirements List	
Demo	BMH0D001 Demo Board + BMH02xxx Pressure Module
Example Program	 主控IIC讀取模塊範例.zip
Application Note	