HP5806

PRECISION BAROMETER AND ALTIMETER SENSOR

Features

- Supply voltage: 1.7 – 3.6 V.
- Relative accuracy: ± 0.06 mBar.
- Absolute accuracy: ± 1 mBar.
- Temperature accuracy: ± 0.5°C.
- Operation temperature: -40 – 85 °C.
- Pressure range: 300mbar~1200mbar.
- Standby current<0.5μA.
- Size: 4.5 x 4.5 x 2.5mm.
- Water proof design can use in 100m.
- High-speed I2C digital output interface.

4.5x4.5x2.5mm

Application Examples

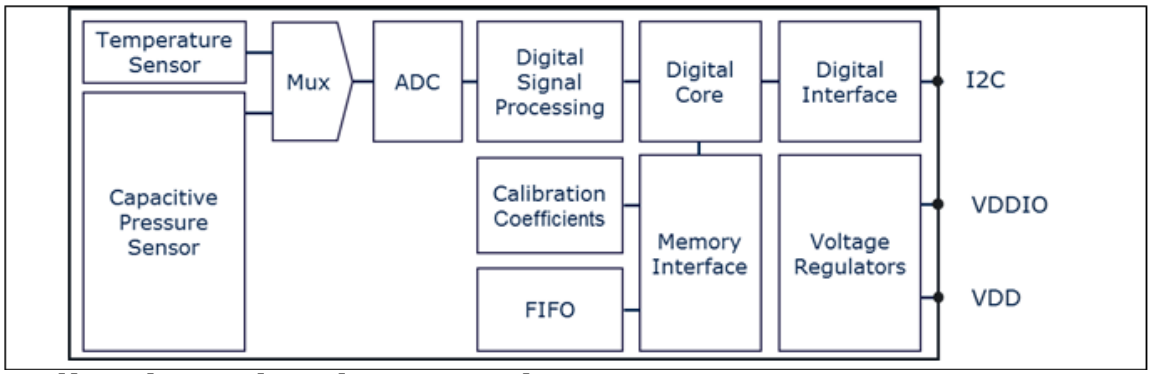
- Mobile Altimeter / Barometer
- Industrial Pressure and Temperature Sensor System
- Adventure and Sports watches
- Weather Station Equipment
- Indoor Navigation and Map Assist
- Data loggers for pressure, temperature and altitude.
- Panel computer
- Barometers

Descriptions

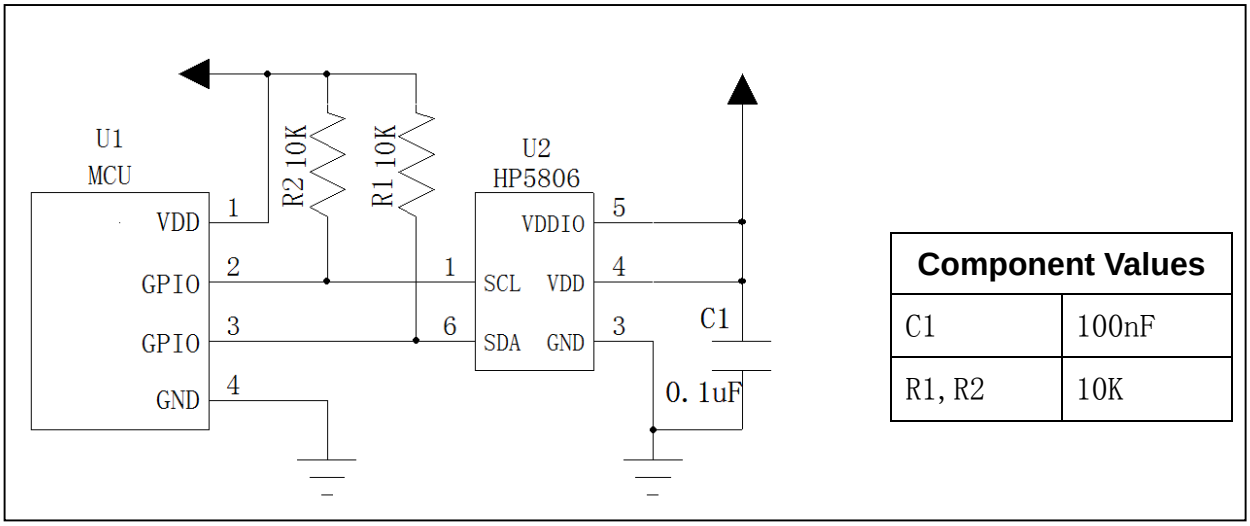
The HP5806 is a miniaturized Digital Barometric Air Pressure Sensor with a high accuracy and a low current consumption, capable of measuring both pressure and temperature. The pressure sensor element is based on a capacitive principle which guarantees high precision during temperature changes. The small package makes the HP5806 ideal for mobile applications and wearable devices.

The HP5806‘s internal signal processor converts the output from the pressure and temperature sensor elements to 24 bit results. Each unit is individually calibrated. The calibration coefficients calculated during this process are stored in the calibration registers. The coefficients are used in the application to convert the measurement results to high accuracy pressure and temperature values. The HP5806 result FIFO can store up to 32 measurement results, allowing for a reduced host processor polling rate.

1. Block Diagram

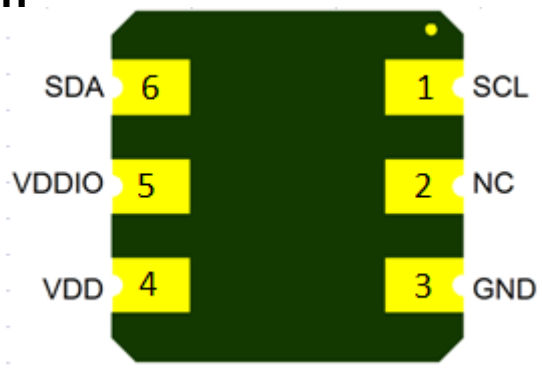


2. Application Circuit Example



Component Values	
C1	100nF
R1, R2	10K

3. Pin Configuration



Bottom view

Table 1 Pin Descriptions

Pin	Name	Function
1	SCL	I2C serial clock input pin
2	NC	NO Connect
3	GND	Ground
4	VDD	Supply voltage for analog blocks
5	VDDIO	Digital supply voltage for digital blocks and I/O interface
6	SDA	I2C serial bi-directional data pin

4. Definitions, acronyms and abbreviations

An explanation of terms and definitions used in this datasheet

Table 2 definitions

Term	Definition/explanation
Absolute accuracy	The absolute measurement accuracy over the entire measurement range.
Digital bit depth	The total bit depth used for conversion of the sensor input to the digital output. Measured in bits.
Digital resolution	The pressure value represented by the LSB change in output. This value should be much smaller than the sensor noise.
Full Scale Range (FSR)	The peak-to-peak measurement range of the sensor.
LSB	Least Significant Bit
Measurement time	The time required to acquire one sensor output result. This value determines the maximum measurement rate.
MSB	Most Significant Bit
Non-linearity	The deviation of measured output from the best-fit straight line, relative to 1000 mBar and 25 °C.
Output compensation	The process of applying an algorithm to the sensor output to improve the absolute accuracy of the sensor across temperature and to minimize unit to unit output variation. This algorithm makes use of both the temperature sensor readings and the individual calibration coefficients.
Precision (noise)	The smallest measurable change, expressed as rms, after sensor oversampling.
Pressure temperature coefficient	The pressure measurement deviation, after compensation, from expected measurement value due to temperature change from 25 °C. Measured in Pa/K.
Sensor calibration	The process, during the production test, where the sensor's measurement results are compared against reference values, and a set of calibration coefficients are calculated from the deviation. The coefficients are stored in the sensor's memory and are used in the output compensation.
Sensor oversampling rate (OSR)	Specifies the number of sensor measurements used internally to generate one sensor output result.

5. Specifications

5.1 Operating Range

The following operating conditions must not be exceeded in order to ensure correct operation of the device. All parameters specified in the following sections refer to these operating conditions, unless noted otherwise.

Table 3 Operating Range

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Pressure	P_a	300		1100	mBar	
Temperature	T_a	-40		85	℃	
Supply voltage	V_{DD}	1.7		3.6	V	
Supply voltage IO	V_{DDIO}	1.2		3.6	V	
Supply voltage ramp-up time	t_{vddup}	0.001		5	ms	Time for supply voltage to reach 90% of final value.
Solder drift		-1.5	-0.8		mBar	Minimum solder height 50um.
Long term stability				1	mBar	12 months

5.2 Absolute Maximum Ratings

Table 4 Absolute Maximum Ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
V_{DD} and V_{DDIO}	V_{DDxx_max}			4	V	
Voltage on any pin	V_{max}			4	V	
Storage temperature	T_s	-40		125	℃	
Overpressure	P_{max}			5	Bar	
ESD	V_{ESD_HBM}	-2		2	KV	HBM

Note: Parameter above those listed as “absolute maximum ratings” may cause permanent damage to the device. Exposure to maximum rating conditions for extended periods may affect device reliability.

5.3 Current Consumption

Test conditions (unless otherwise specified in the table): VDD= 1.8V and VDDIO=1.8V. Typ. values (PA=1000mBar and TA=25°C). Max./Min. values (PA= 950-1050mBar and TA=0...+65°C).

Table 5 Current Consumption

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Peak Current Consumption	I_{peak}		345		µA	during Pressure measurement
			280		µA	during Temperature measurement
Standby Current Consumption	I_{stb}		<0.5		µA	
Current Consumption. *(1 measurement per second.)*	I_{1Hz}		2.1		µA	Low precision
			11			Standard precision
			38			High precision

5.4 Temperature Transfer Function

Test conditions (unless otherwise specified in the table): VDD= 1.8V and VDDIO=1.8V. Typ. values (PA=1000mBar and TA=25°C). Max./Min. values (PA= 950-1050mBar and TA=0...+65°C)

Table 6 Temperature Transfer Function

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Temperature accuracy	A_t		+/-0.5		°C	
Temperature data resolution	A_{t_res}		0.01		°C	
Temperature measurement rate	f	1		128	Hz	

5.5 Pressure Transfer Function

Table 7 Pressure Transfer Function

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Absolute pressure accuracy	A_{p_abs}		+/-20		Pa	P_A=600-1050mBar T_A=20...+65°C
			+/-50		Pa	P_A=400-1050mBar T_A=0...+65°C
			+/-170		Pa	P_A=400-1050mBar T_A=-20...65°C
Relative pressure accuracy	A_{p_rel}		+/-6		Pa	P_A=400-1050mBar T_A=20...+60°C
Pressure precision	A_{p_prc}		5.0		Pa_{RMS}	Low Power
			1.2			Standard
			0.5			High Precision
Power supply rejection	A_{p_psr}			0.063	Pa_{RMS}	Measured with 217Hz square wave and broad band noise, 100mV_{pp}
Pressure temperature sensitivity of calibrated measurements	A_{p_tmp}			0.5	Pa/K	1000mBar, 25...+40°C.
Pressure data resolution	A_{p_res}			0.06	Pa_{RMS}	
Pressure measurement rate	f	1		128	Hz	
Pressure measurement time	t		5.2		ms	Low Power
			27.6			Standard
			105			High Precision

Note: Pressure precision is measured as the average standard deviation. Please refer to the Pressure Configuration (PRS_CFG) register description for all precision mode options.

5.6 Timing Characteristics

Table 8 Timing Characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Start-up timing						
Time to sensor ready	T_{Sensor_rdy}			12	ms	The SENSOR_RDY bit in the Measurement Configuration register will be set when the sensor is ready.
Time to coefficients are available	T_{Coef_rdy}			40	ms	The COEF_RDY bit in the Measurement Configuration register will be set when the coefficients can be read out.
Note: Start-up timing is measured from VDD > 1.2V & VDDIO > 0.6V or Soft Reset.						
I^2C Clock.	f_{I2C}			3.4	MHz	

6. Functional Description

6.1 Operating Modes

The HP5806 supports 3 different modes of operation: Standby, Command, and Background mode.

- **Standby Mode**

- Default mode after power on or reset. No measurements are performed.
- All registers and compensation coefficients are accessible.

- **Command Mode**

- One temperature or pressure measurement is performed according to the selected precision.
- The sensor will return to Standby Mode when the measurement is finished, and the measurement result will be available in the data registers.

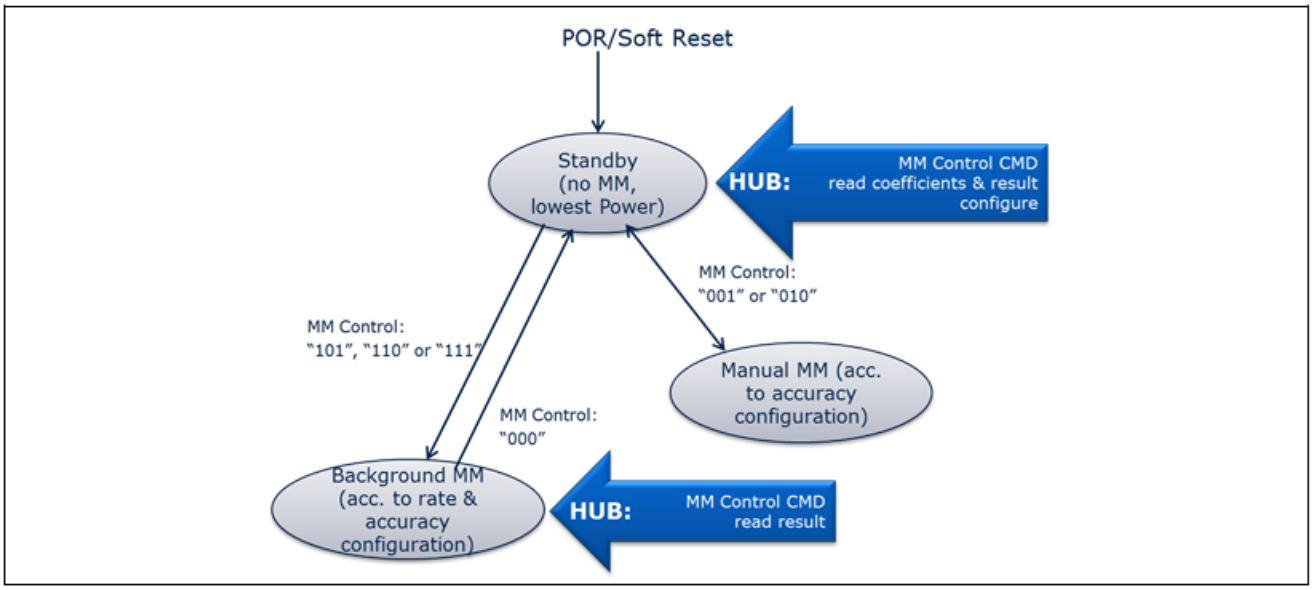
- **Background Mode**

- Pressure and/or temperature measurements are performed continuously according to the selected measurement precision and rate. The temperature measurement is performed immediately after the pressure measurement.
- The FIFO can be used to store 32 measurement results and minimize the number of times the sensor must be accessed to read out the results.

6.2 Mode transition diagram

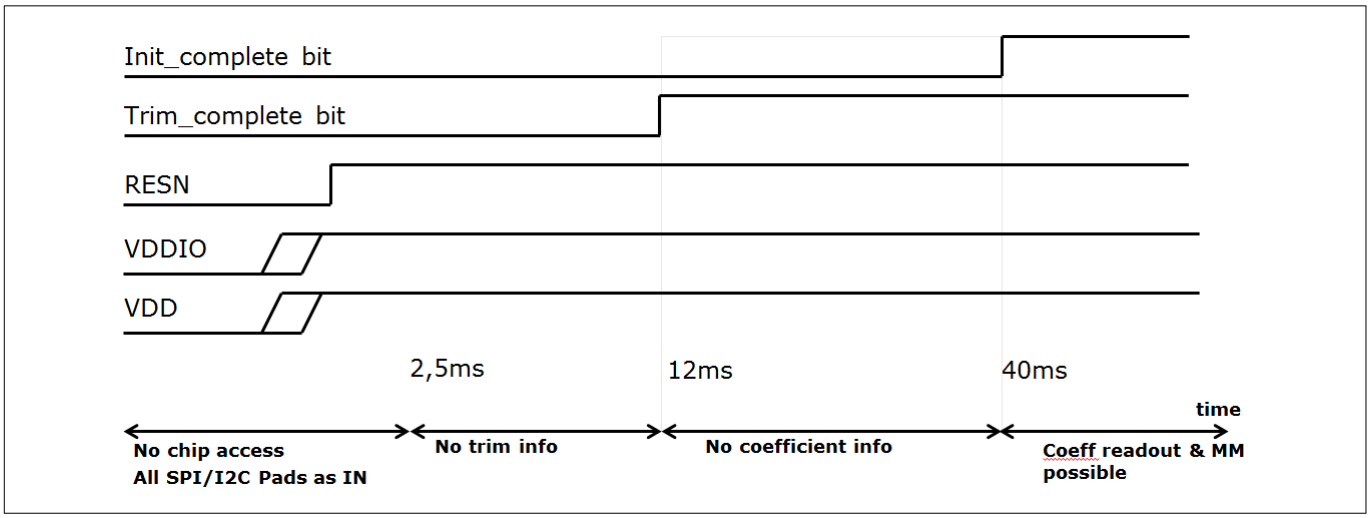
The mode transition diagram is shown below.

Functional Description



6.3 Start-up sequence

The star-up sequence of the HP5806 is shown below. This diagram shows when the registers are accessible for read and/or write and also when the Pressure/Temperature measurements can start.



6.4 Measurement Precision and Rate

Different applications require different measurement precision and measurement rates. Some applications, such as weather stations, require lower precision and measurement rates than for instance indoor navigation and sports applications.

When the HP5806 is in Background Mode, the measurement precision and rate can be configured to

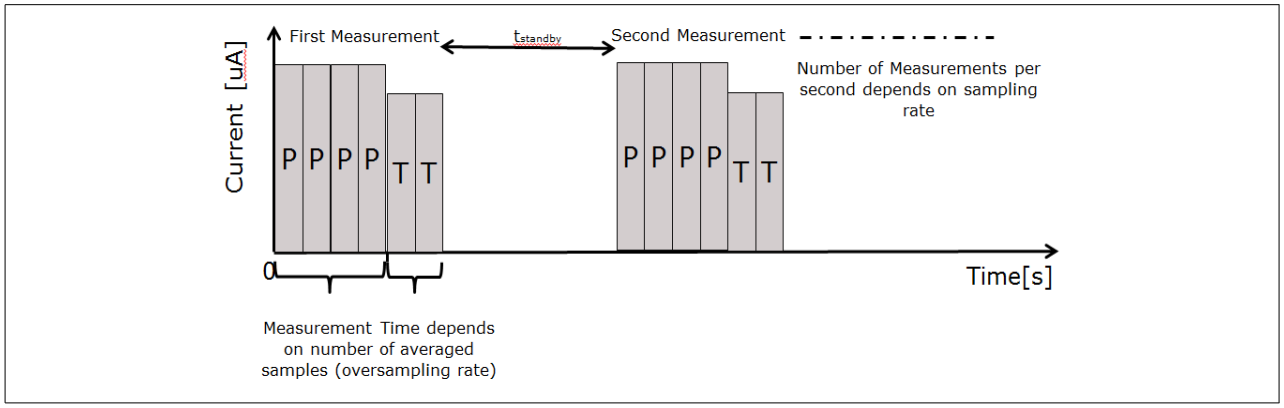
match the requirements of the application. This reduces current consumption of the sensor and the system.

In order to achieve a higher precision, the HP5806 will read the sensor multiple times (oversampling), and combine the readings into one result. This increases the current consumption and also the measurement time, reducing the maximum possible measurement rate. It is necessary to balance the accuracy and data rate required for each application with the allowable current consumption.

The measurement precision, rate and time is set in the Pressure Configuration (PRS_CFG) and Temperature Configuration (TMP_CFG) registers. The register descriptions contain information about the current consumption and the possible combinations of measurement precision, time, and rate.

Enabling temperature measurements allows for compensation of temperature drift in the pressure measurement. The rates of these measurements can be set independently, but temperature compensation is more accurate when temperature and pressure measurements are taken together. This reduces the maximum pressure measurement rate, since: Ratetemperature*Timetemperature + Ratepressure*Timepressure< 1 second. Measurement Settings and Use Case Examples contains a table with examples of combinations of pressure and temperature precision and rates for different use cases.

In the figure below is described the Temperature and Pressure measurements sequence in background mode.



6.5 I2C Interface

- I2C interface
- The sensor's default interface.
- The sensor's address is 0x77.

6.6 Calibration and Measurement Compensation

Table 9 Compensation Scale Factors

Oversampling Rate	Scale Factor (kP or kT)
1 (single)	524288
2 times (Low Power)	1572864
4 times	3670016
8 times	7864320
16 times (Standard)	253952
32 times	516096
64 times (High Precision)	1040384
128 times	2088960

Pressure Steps

- Read the pressure calibration coefficients (c00, c10, c20, c30, c01, c11, and c21) from the calibration Coefficient register

  Note: c00 and c10, *read from the coefficient register are 20 bit 2's complement numbers.*
  c20, c30, c01, c11, and c21, *read from the coefficient register are 16 bit 2's complement numbers.*

- Choose scaling factors kT (for temperature) and kP (for pressure) based on the chosen precision rate. The scaling factors are listed in ***Table 9***.

- Read the pressure and temperature result from the registers or FIFO.

  Note: *The measurements read from the result registers (or FIFO) are 24 bit 2´s complement numbers. Depending on the chosen measurement rates, the temperature may not have been measured since the last pressure measurement.*

- Calculate scaled measurement results.

  $T_{raw\_sc} = T_{raw}/kT$

  $P_{raw\_sc} = P_{raw}/kP$

- Calculate compensated measurement results.

  $P_{comp}(Pa) = c00 + P_{raw\_sc}*(c10 + P_{raw\_sc} *(c20+ P_{raw\_sc} *c30)) + T_{raw\_sc} *c01 + T_{raw\_sc} *P_{raw\_sc} *(c11+P_{raw\_sc}*c21)$

Temperature Steps

- Read the temperature calibration coefficients (c0 and c1) from the Calibration Coefficients (COEF) register.

  Note: *The coefficients read from the coefficient register are 12 bit 2´s complement numbers.*

- Choose scaling factor kT (for temperature) based on the chosen precision rate. The scaling factors are listed in ***Table 9***

- Read the temperature result from the temperature register or FIFO.

  Note: *The temperature measurements read from the temperature result register (or FIFO) are 24 bit 2´s complement numbers.*

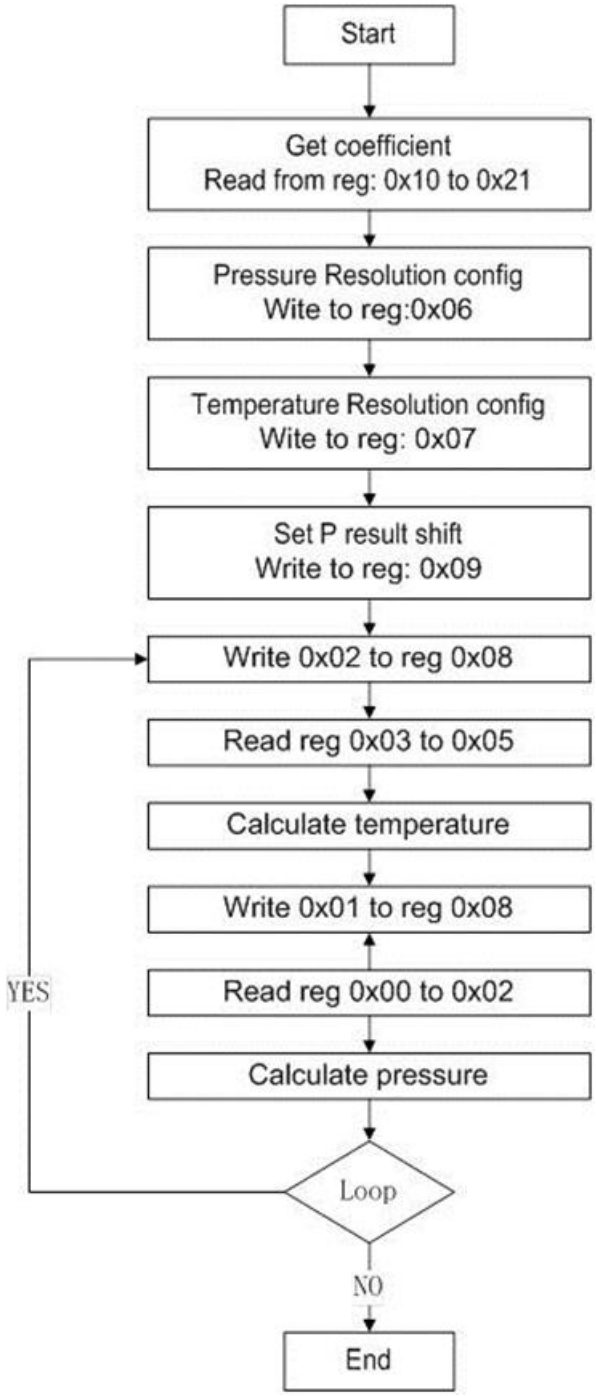
- Calculate scaled measurement results.

  $Traw\_sc = Traw/kT$

- Calculate compensated measurement results.

  $Tcomp\ (°C) = c0*0.5 + c1*Traw\_sc$

6.7 Flow chart



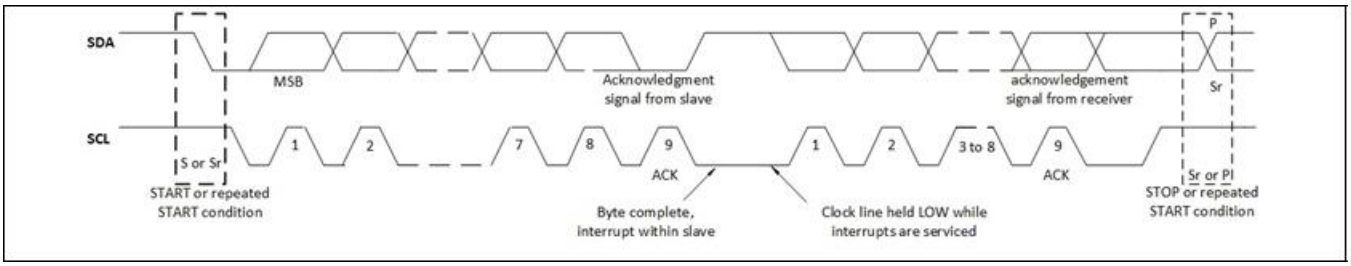
7. I2C Interface

The I2C slave interface is compatible with Philips I2C Specification version 2.1. The I2C interface supports standard, fast and high speed mode.

The sensor's address is 0x77. The I2C interface uses the pins described in **Table 1**

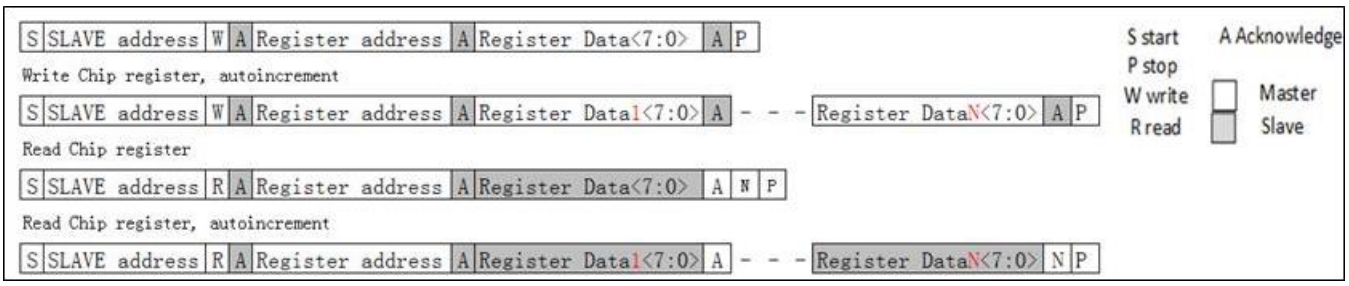
The basic timing is shown in the diagram below:

Digital interfaces



2C timing diagram

In one access, without stop, incremental read (address is auto increment) and auto-incremental write is supported. The read and write access is described below:

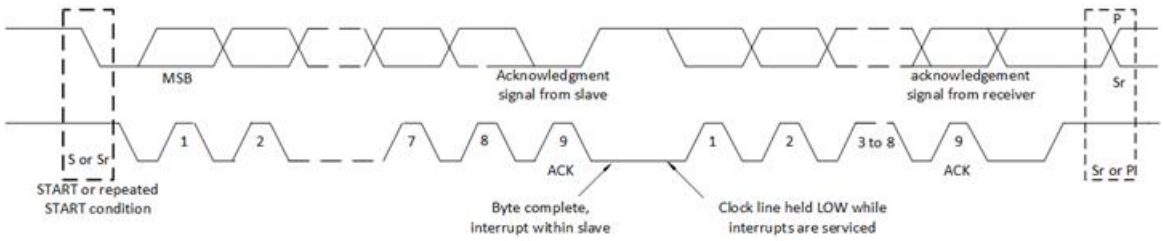


I2C write and read commands

7.1 I2C timings

The I²C timing is shown in the diagram below and corresponding values are given in the table below. The naming refers to I²C Specification version 2.1, the abbreviations used "S&F mode" = standard and fast mode, "HS mode" = high speed mode, Cb = bus capacitance on SDA line.

I²C timing diagram



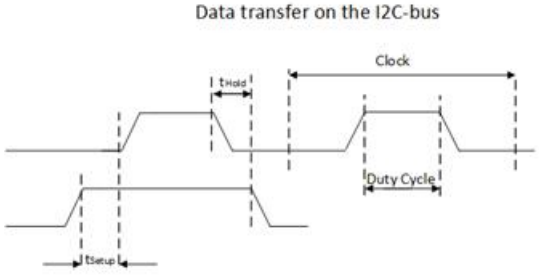


Table 10 I2C timings

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
		20			ns	S&F mode
Data setup time on SDI pin	t_{Setup}	5			ns	HS mode
Data hold time on SDI pin	t_{Hold}	0			ns	S&F&HSmode,
				70	%	S&F mode,
Duty Cycle	DC			55	%	HS mode,

8. Register Map

Table 11 Register Map (Continued)

Register Name	Addr.	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	Reset State
PSR_B2	0x00	PSR[23:16] (r)								00_h
PSR_B1	0x01	PSR[15:8](r)								00_h
PSR_B0	0x02	PSR[7:0](r)								00_h
TMP_B2	0x03	TMP[23:16] (r)								00_h
TMP_B1	0x04	TMP[15:8] (r)								00_h
TMP_B0	0x05	TMP[7:0] (r)								00_h
PRS_CFG	0x06	-	PM_RATE [2:0] (rw)			PM_PRC [3:0] (rw)				00_h
TMP_CFG	0x07	TMP_EXT (rw)	TMP_RATE [2:0] (rw)			TM_PRC [3:0] (rw)				00_h
MEAS_CFG	0x08	COEF_RDY (r)	SENSOR_RDY (r)	TMP_RDY (r)	PRS_RDY (r)	-	MEAS_CRTL [2:0] (rw)			00_h
CFG_REG	0x09	-	-			TMP_SHIFT_EN (rw)	PRS_SHIFT_EN (rw)	FIFO_EN (rw)	-	00_h
FIFO_STS	0x0B	-	-	-	-	-	-	FIFO_FULL(r)	FIFO_EMPTY(r)	00_h
RESET	0x0C	FIFO_FLUSH (w)	-	-	-	SOFT_RST [3:0] (w)				00_h
Product ID	0x0D	REV_ID [3:0] (r)				PROD_ID [3:0] (r)				10_h
COEF	0x10-0x21	< see register description >								XX_h
Reserved	0x22-0x27	Reserved								XX_h
COEF_SRCE	0x28	TMP_COEF_SRCE (r)	Reserved							XX_h

9. Register description

9.1. Pressure Data (PRS_Bn)

The Pressure Data registers contains the 24 bit (3 bytes) 2's complement pressure measurement value.
If the FIFO is enabled, the register will contain the FIFO pressure and/or temperature results (please see ***FIFO operation***). Otherwise, the register contains the pressure measurement results and will not be cleared after read.

9.1.1 PRS_R2

The highest b of the three bytes measured pressure value.yte

PRS_B2 **Address:** 00H
Pressure (MSB data) **Reset value:** 00H

7	6	5	4	3	2	1	0
PRS23	**PRS22**	**PRS21**	**PRS20**	**PRS19**	**PRS18**	**PRS17**	**PRS16**
r							

Field	Bits	Type	Description
PRS[23:16]	7:0	r	MSB of 24 bit 2´s complement pressure data.

9.1.2 PRS_B1

The middle byte of the three bytes measured pressure value.

PRS_B1 **Address:** 01H
Pressure (LSB data) **Reset value:** 00H

7	6	5	4	3	2	1	0
PRS15	**PRS14**	**PRS13**	**PRS12**	**PRS11**	**PRS10**	**PRS9**	**PRS8-**
r							

Field	Bits	Type	Description
PRS[15:8]	7:0	r	LSB of 24 bit 2´s complement pressure data.

9.1.3 PRS_B0

The lowest byte of the three bytes measured pressure value.

PRS_B0 **Address:** 02H

Pressure (XLSB data) **Reset value:** 00H

7	6	5	4	3	2	1	0
PRS7	**PRS6**	**PRS5**	**PRS4**	**PRS3**	**PRS2**	**PRS1**	**PRS0**
r							

Field	Bits	Type	Description
PRS[7:0]	7:0	r	XLSB of 24 bit 2´s complement pressure data.

9.2. Temperature Data (TMP_Tn)

The Temperature Data registers contain the 24 bit (3 bytes) 2's complement temperature measurement value (Unless the FIFO is enabled, please see FIFO operation) and will not be cleared after the read.

9.2.1 TMP_B2

The highest byte of the three bytes measured temperature value.

TMP_B2 **Address:** 03H

Temperature (MSB data) **Reset value:** 00H

7	6	5	4	3	2	1	0
TMP23	**TMP22**	**TMP21**	**TMP20**	**TMP19**	**TMP18**	**TMP17**	**TMP16**
r							

Field	Bits	Type	Description
TMP[23:16]	7:0	r	MSB of 24 bit 2´s complement temperature data.

9.2.2 TMP_B1

The middle byte of the three bytes measured temperature value.

TMP_B1 **Address:** 04H

Temperature (LSB data) **Reset value:** 00H

7	6	5	4	3	2	1	0
TMP15	**TMP14**	**TMP13**	**TMP12**	**TMP11**	**TMP10**	**TMP9**	**TMP8**
r							

Field	Bits	Type	Description
TMP[15:8]	7:0	r	LSB of 24 bit 2´s complement temperature data.

9.2.3 TMP_B0

The lowest part of the three bytes measured temperature value.

TMP_B0 **Address:** 05H

Temperature (XLSB data) **Reset value:** 00H

7	6	5	4	3	2	1	0
TMP7	**TMP6**	**TMP5**	**TMP4**	**TMP3**	**TMP2**	**TMP1**	**TMP0**
r							

Field	Bits	Type	Description
TMP[7:0]	7:0	r	XLSB of 24 bit 2´s complement temperature data.

9.3. Pressure Configuration (PRS_CFG)

Configuration of pressure measurement rate (PM_RATE) and resolution (PM_PRC)

PRS_CFG	**Address:**	06H
Pressure measurement configuration	**Reset value:**	00H

7	6	5	4	3	2	1	0
-	**PM_RATE[2:0]**			**PM_PRC[3:0]**			
-	rw			rw			

Field	Bits	Type	Description
-	7	-	Reserved.
PM_RATE[2:0]	6:4	rw	Pressure measurement rate: 000 - 1 measurements pr. sec. 001 - 2 measurements pr. sec. 010 - 4 measurements pr. sec. 011 - 8 measurements pr. sec. 100 - 16 measurements pr. sec. 101 - 32 measurements pr. sec. 110 - 64 measurements pr. sec. 111 - 128 measurements pr. sec. *Applicable for measurements in Background mode only*
PM_PRC[3:0]	3:0	rw	Pressure oversampling rate: 0000 - Single. (Low Precision) 0001 - 2 times (Low Power). 0010 - 4 times. 0011 - 8 times. 0100 *) - 16 times (Standard). 0101 *) - 32 times. 0110 *) - 64 times (High Precision). 0111 *) - 128 times. 1xxx - TBD

* Note: Use in combination with a bit shift. See ***FIFO configuration (CFG_REG)*** register

Table 12 Precision (PaRMS) and pressure measurement time (ms) versus oversampling rate

Oversampling (PRC[3:0])	**Single (0000)**	**2 times (0001)**	**4 times (0010)**	**8 times (0011)**	**16 times (0100)**	**32 times (0101)**	**64 times (0110)**	**128 times (0111)**
Measurement time (ms)	3.6	5.2	8.4	14.8	27.6	53.2	104.4	206.8
Precision (Pa_{RMS})	5		2.5		1.2	0.9	0.5	

Table 13 Estimated current consumption (uA)

Oversampling (PRC[3:0]) **Measurements pr sec.** **(PM_RATE([2:0])**	**Single (0000)**	**2 times (0001)**	**4 times (0010)**	**8 times (0011)**	**16 times (0100)**	**32 times (0101)**	**64 times (0110)**	**128 times (0111)**
1 (000)	2.1	2.7	3.8	6.1	11	20	38	75
2 (001)								
4 (010)								
8 (011)	*Note: The current consumption can be calculated as the Measurement Rate * Current Consumption of 1 measurement per. sec.*							n.a.
16 (100)							n.a.	n.a.
32 (101)						n.a.	n.a.	n.a.
64 (110)					n.a.	n.a.	n.a.	n.a.
128 (111)			n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: The table shows the possible combinations of Pressure Measurement Rate and oversampling when no temperature measurements are performed. When temperature measurements are performed the possible combinations are limited to $Rate_{temperature}$ *x Measurement* $Time_{temperature}$ + $Rate_{pressure}$ *x Measurement* $Time_{pressure}$ *< 1 second.*

9.4. Temperature Configuration (TMP_CFG)

Configuration of temperature measurement rate (TMP_RATE) and resolution (TMP_PRC)

TMP_CFG **Address:** 07_H

Temperature measurement configuration **Reset value:** 00_H

7	6	5	4	3	2	1	0
TMP_EXT	**TMP_RATE[6:4]**			**-**	**TMP_PRC[2:0]**		
rw	rw			-	rw		

Field	Bits	Type	Description
TMP_EXT	7	rw	Temperature measurement 0 - Internal sensor (**TBD**) 1 - External sensor (in pressure sensor MEMS element) *Note: It is highly recommended to use the same temperature sensor as the source of the calibration coefficients. Please see the **Coefficient Source** register*
TMP_RATE[2:0]	6:4	rw	Temperature measurement rate: 000 - 1 measurement pr. sec. 001 - 2 measurements pr. sec. 010 - 4 measurements pr. sec. 011 - 8 measurements pr. sec. 100 - 16 measurements pr. sec. 101 - 32 measurements pr. sec. 110 - 64 measurements pr. sec. 111 - 128 measurements pr. sec.. *Applicable for measurements in Background mode only*
TMP_PRC[2:0]	2:0	rw	Temperature oversampling (precision): 000 - single. (Default) - Measurement time 3.6 ms. *Note: Following are optional, and may not be relevant:* 001 - 2 times. 010 - 4 times. 011 - 8 times. 100 - 16 times. 101 - 32 times. 110 - 64 times.. 111 - 128 times. 1xxx - TBD.

9.5 Sensor Operating Mode and Status (MEAS_CFG)

Setup measurement mode

MEAS_CFG	**Address:**	08_H
Measurement configuration	**Reset value:**	00_H

7	6	5	4	3	2	1	0
COEF_RDY	SENSOR_RDY	TEM_RDY	PRS_RDY	-	MEAS_CTRL		
r	r	r	r	-	rw		

Field	Bits	Type	Description
COEF_RDY	7	r	Coefficients will be read to the Coefficients Registers after start- up: 0 - Coefficients are not available yet. 1 - Coefficients are available.
SENSOR_RDY	6	r	The pressure sensor is running through self-initialization after start-up. 0 - Sensor initialization not complete 1 - Sensor initialization complete It is recommended not to start measurements until the sensor has completed the self-initialization.
TMP_RDY	5	r	Temperature measurement ready 1 - New temperature measurement is ready. Cleared when temperature measurement is read.
PRS_RDY	4	r	Pressure measurement ready 1 - New pressure measurement is ready. Cleared when pressure measurement is read.
-	3	-	Reserved.
MEAS_CTRL	2:0	rw	Set measurement mode and type: *Standby Mode* 000 - Idle / Stop background measurement *Command Mode* 001 - Pressure measurement 010 - Temperature measurement 011 - na. 100 - na. *Background Mode* 101 - Continuous pressure measurement 110 - Continuous temperature measurement 111 - Continuous pressure and temperature measurement

9.6. FIFO configuration (CFG_REG)

Configuration of interrupts, measurement data shift, and FIFO enable.

CFG_REG **Address:** 09H

Configuration register **Reset value:** 00H

7	6	5	4	3	2	1	0
_				**T_SHIFT**	**P_SHIFT**	**FIFO_EN**	_
_				rw	rw	rw	_

Field	Bits	Type	Description
_	7	_	Reserved
_	6	_	Reserved
_	5	_	Reserved
_	4	_	Reserved
T_SHIFT	3	rw	Temperature result bit-shift 0 - no shift. 1 - shift result right in data register. *Note: Must be set to '1' when the oversampling rate is >8 times.*
P_SHIFT	2	rw	Pressure result bit-shift 0 - no shift. 1 - shift result right in data register. *Note: Must be set to '1' when the oversampling rate is >8 times.*
FIFO_EN	1	rw	Enable the FIFO: 0 - Disable. 1 - Enable.
_	0	_	Reserved

9.7 FIFO Status (FIFO_STS)

FIFO status register

FIFO_STS **Address:** $0B_H$

FIFO status register **Reset value:** 00_H

7	6	5	4	3	2	1	0
-						FIFO_FULL	FIFL_EMPTY
-						r	r

Field	Bits	Type	Description
-	7:2	-	Reserved.
FIFO_FULL	1	r	0 - The FIFO is not full 1 - The FIFO is full
FIFO_EMPTY	0	r	0 - The FIFO is not empty 1 - The FIFO is empty

9.8 Soft Reset and FIFO flush (RESET)

Flush FIFO or generate soft reset.

RESET **Address:** 0C$_H$

FIFO flush and soft reset **Reset value:** 00$_H$

7	6	5	4	3	2	1	0
FIFO_FLUSH	-			SOFT_RST			
w	-			w			

Field	Bits	Type	Description
FIFO_FLUSH	7	w	FIFO flush 1 - Empty FIFO After reading out all data from the FIFO, write '1' to clear all old data.
-	6:4	-	Reserved.
SOFT_RST	3:0	w	Write '1001' to generate a soft reset. A soft reset will run through the same sequences as in power-on reset.

9.9 Product and Revision ID (ID)

Product and Revision ID

ID **Address:** 0D$_H$

Product and revision ID **Reset value:** 0x10$_H$

7	6	5	4	3	2	1	0
REV_ID				PROD_ID			
r				r			

Field	Bits	Type	Description
REV_ID	7:4	r	Revision ID
PROD_ID	3:0	r	Product ID

9.10 Calibration Coefficients (COEF)

The Calibration Coefficients register contains the 2´s complement coefficients that are used to calculate the compensated pressure and temperature values.

Table 14 Calibration Coefficients

Coefficient	Addr.	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
c0	0x10	c0 [11:4]							
c0/c1	0x11	c0 [3:0]				c1 [11:8]			
c1	0x12	c1[7:0]							
c00	0x13	c00 [19:12]							
c00	0x14	c00 [11:4]							
c00/c10	0x15	c00 [3:0]				c10 [19:16]			
c10	0x16	c10 [15:8]							
c10	0x17	c10 [7:0]							
c01	0x18	c01 [15:8]							
c01	0x19	c01 [7:0]							
c11	0x1A	c11 [15:8]							
c11	0x1B	c11 [7:0]							
c20	0x1C	c20 [15:8]							
c20	0x1D	c20 [7:0]							
c21	0x1E	c21 [15:8]							
c21	0x1F	c21 [7:0]							
c30	0x20	c30 [15:8]							
c30	0x21	c30 [7:0]							

Note: Generate the decimal numbers out of the calibration coefficients registers data:

```
C20 := reg0x1D + reg0x1C * 2^ 8
 if (C20 > (2^15 - 1))
C20 := C20 - 2^16
end if

C0 := (reg0x10 * 2^ 4) + ((reg0x11 / 2^4) & 0x0F)
if (C0 > (2^11 - 1))
 C0 := C0 - 2^12
end if
```

9.11 Coefficient Source

States which internal temperature sensor the calibration coefficients are based on: the ASIC temperature

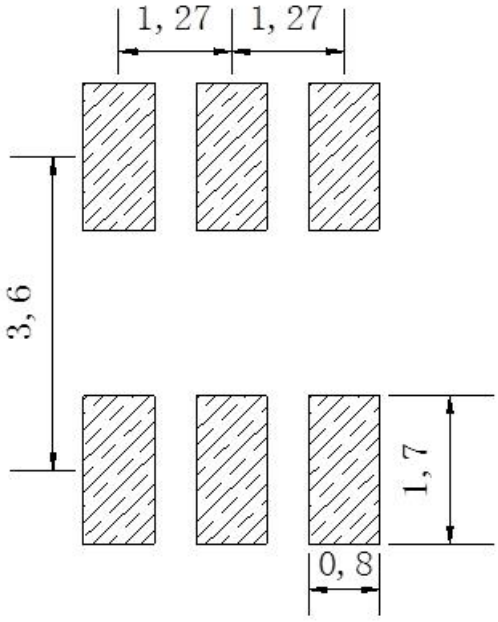
Sensor or the MEMS element temperature sensor, the coefficients are only valid for one sensor and it is highly recommended to use the same temperature sensor in the application. This is set-up in the Temperature Configuration register

TMP_COEF_SRCE **Address:** 28H
Temperature Coefficients Source **Reset value:** XXH

7	6	5	4	3	2	1	0
TMP_COEF_SRCE	-						
r	-						

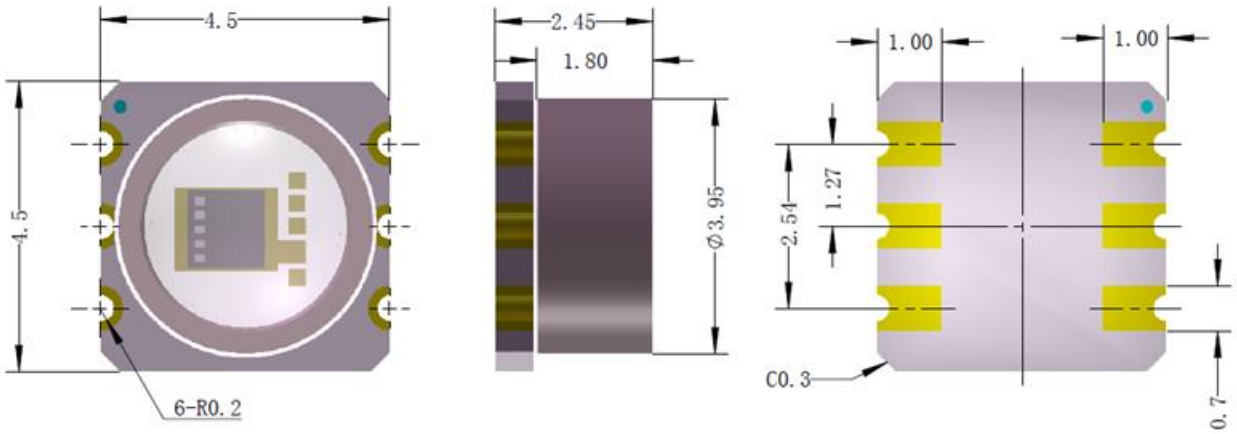
Field	Bits	Type	Description
TMP_COEF_SRCE	7	r	Temperature coefficients are based on: 0 - Internal temperature sensor (**TBD**) 1 - External temperature sensor (of pressure sensor MEMS element)
-	6:0	-	Reserved

10. Recommended PAD Layout



unit: mm

11. Package information



Notes:

(1) Mechanical Dimension (unit: mm)

(2) General tolerance (0.15mm)

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