SPL17-006

Digital differential pressure sensor

Pb-free, halogen-free and RoHS complian

Restricted

1. Security warning

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2. Publication history

Version	Date	Description	Author	Approved
0.1	2022.05.12	Preliminary Version	Layton	Wiming
0.2	2023.02.28	Modify the pin definition	Layton	Wiming

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1. Introduction

The SPL17-006 is a miniaturized Digital Gauge Pressure Sensor with a high accuracy and a low current consumption. The SPL17-006 is both a pressure and a temperature sensor. The pressure sensor element guarantees a high precision during temperature changes. The small package makes the SPL17-006 ideal for any devices. The SPL17-006‘s internal signal processor converts the output from the pressure and temperature sensor elements to 24-bit results. Each pressure sensor has been calibrated individually and contains calibration coefficients. The coefficients are used in the application to convert the measurement results to true pressure and temperature values.

Key features

- Gauge Pressure range: 0 ... 40kPa
- Temperature Range: 0…+70°C
- Supply voltage: 1.7 ... 3.6V (VDD), 1.2 ... 3.6V (VDDIO)
- Absolute accuracy: typ(after OPC). ±0.1kPa (0~40kPa),
- Temperature accuracy: ± 2°C (0~70°C)
- Measurement time: typ. 4 ms
- I2C interface, Embedded 24-bit ADC
- Pb-free, halogen-free and RoHS compliant

Typical applications

- Blood pressure monitoring

Specific notes

Particles can influence the performance of the pressure sensor, we strongly recommend you to introduce special measures to avoid deposition of particles on the MEMS membrane or screen particles after assembly as the assembly process is considered to be the main root cause for particle generation.

2. Test condition

Table 1: Test condition

Standard Conditions	Temperature	Humidity	Pressure
Environment conditions	-40°C…+85°C	25%RH…75%RH	0kPa…40kPa
Basic test conditions	+25°C	60%RH…70%RH	0kPa…40kPa

3. Absolute maximum ratings

Table 2: Absolute maximum ratings

Parameter	Condition	Min	Max	Units
Storage temperature		-40	+125	°C
Supply Voltage	All pins	-0.3	+3.63	V
Voltage at all IO Pins	All pins	-0.3	+3.63	V
ESD rating	JESD22-A114	-2	+2	kV
Overpressure		0	80	kPa

4. Electrical characteristics

VDD = 1.8V, VDDIO=1.8V, T=25°C, unless otherwise noted. If not stated otherwise, the given values are ±3 Sigma values over temperature/voltage range in the given operation mode.

Table 3: Operating conditions, output signal and mechanical characteristics（Target）

Parameter	Symbol	Condition	Min	Typ.(1)	Max	Units
Operating temperature	TA	Operational	-40	25	85	°C
		Full accuracy	0	25	70	°C
Operating Pressure	P		0		40	kPa
Supply voltage	VDD		1.7		3.6	V
Interface supply voltage	VDDIO		1.2		3.6	V
Supply current	Idd	1 Hz (with 1 measurement per second.)		2.8		μA
Peak current	Ipeak	During conversion		900		μA

Standby current	Iddsbm			5		nA
Absolute accuracy pressure	P_A	0~40kPa 0…+70°C after OPC(2)		±0.1		kPa
Noise in pressure	P_Noise			3		PaRMS
Offset temperature coefficient	TCO	0 kPa +25…+40°C		±1.5		Pa/K
Absolute accuracy temperature		0~+70°C		±2		°C
Pressure/Temperature measurement rate	f		0.25		128	Hz
Pressure measurement time	t			4		ms
Serial data clock	f_{I2C}	For I2C			3.4	MHz
Long term stability		12month(without OPC)		0.5		kPa

Note: (1) Typical specifications are not guaranteed; (2) OPC: One point calibration.

5. Applications

The example application circuit example uses the I2C serial interface with interrupt.

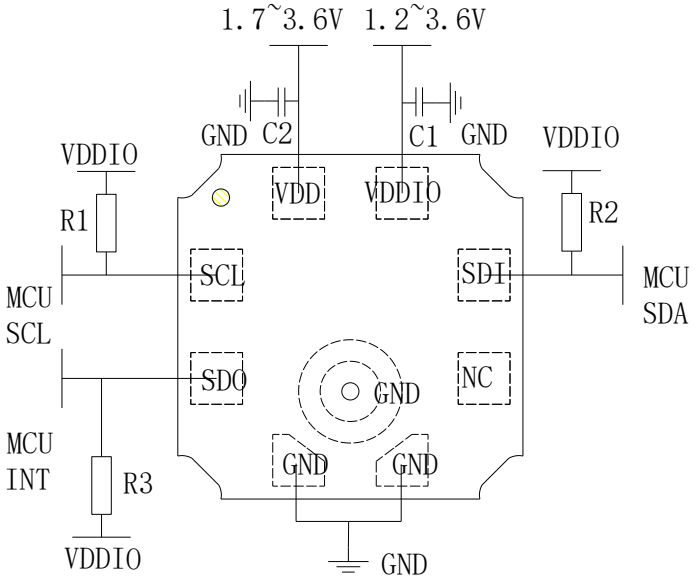


Figure 1: Typical application circuit(Top View)

Table 4 Component Values

Component	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Pull-up/down Resistor	R1, R2		5		KΩ	
	R3		3.3		KΩ	
Supply Blocking Capacitor	C1, C2	100	100		nF	The blocking capacitors should be placed as close to the pins as possible.

6. Mechanical characteristics

6.1 Pin configuration

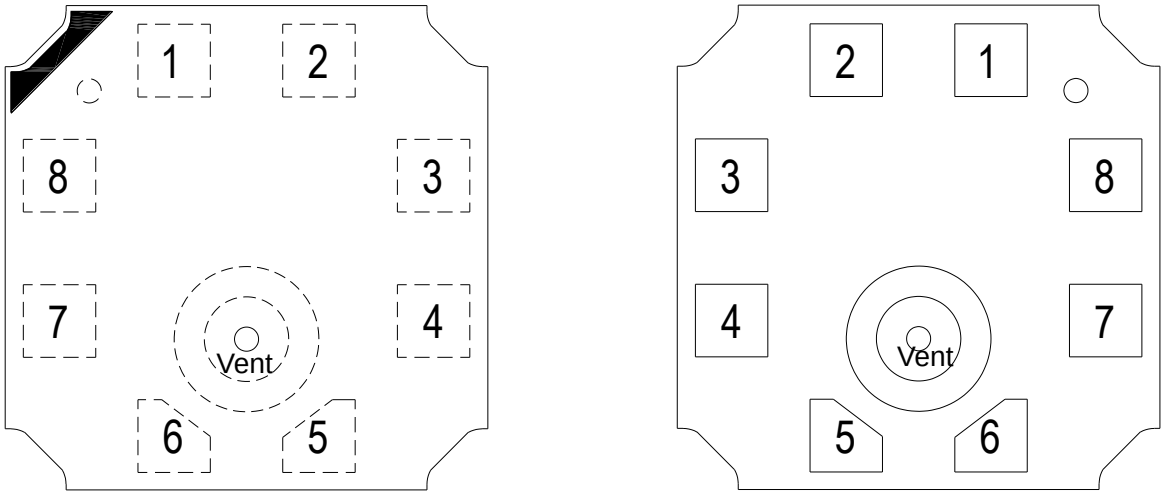


Figure 2: Layout pin configuration SPL17-006 (top view and bottom view)

Table 5: Pin configuration of SPL17-006

Pin	Name	Description
1	VDD	Supply voltage for analog blocks
2	VDDIO	Digital supply voltage for digital blocks and I/O interface
3	SDA	Serial data in/out
4	NC	Not connect
5	GND	Ground
6	GND	Ground
7	SDO	Serial Data Output
8	SCL	Serial Clock

6.2 Outline dimensions

The sensor is an 8-pin metal housing LGA 4 × 4 × 2 mm^3 package. Its dimensions are depicted in Figure 8. General tolerances are ±0.05mm.

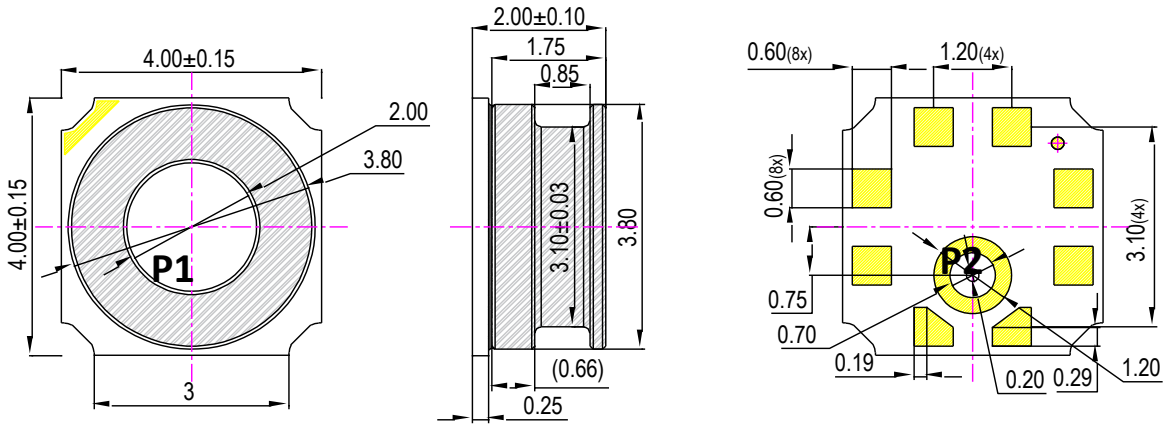


Figure 3: SPL17-006 outline and mechanical data

Note：When P1>P2, the sensor output >0.

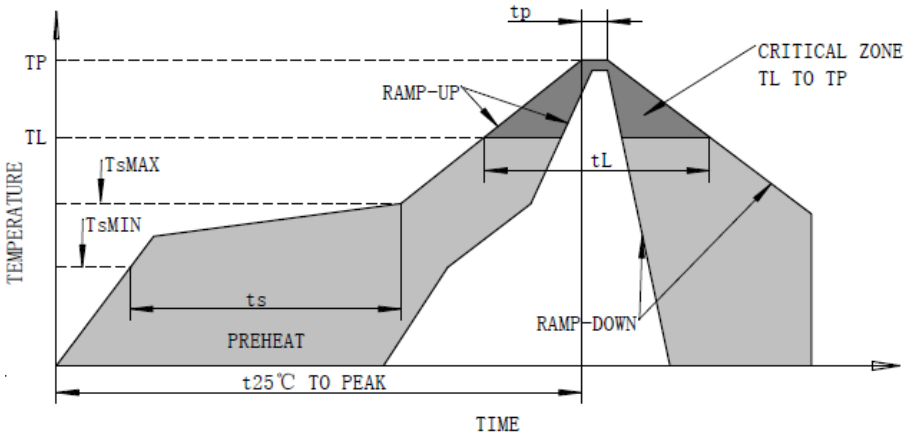
7. Storage and transportation

- Keep in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field.

- The MEMS pressure sensor with normal pack can be transported by ordinary conveyances. Please protect products against moist, shock, sunburn and pressure during transportation.
- Storage Temperature Range：-40°C～+125°C
- Operating Temperature Range：-40°C～+85°C

8. Soldering recommendation

Recommended solder reflow for flex board:



Profile Feature	Pb-Free Assembly
Average ramp-up rate(TsMAX to TP)	2°C /seconds max
Preheat -Temperature Min.(TsMIN) -Temperature Max.(TsMAX) -Time(TsMIN to TsMAX)(Ts)	 130°C 200°C 90～110 seconds
Time maintained above: -Temperature(TL) -Time(tL)	 217°C 50～60 seconds
Ramp time of Ts to TL	15-25 seconds
Time 25°C to peak temperature	300 seconds max
Peak temperature(TP)	235-240 °C
Ramp-down rate (peak to 217°C)	2～4°C /seconds