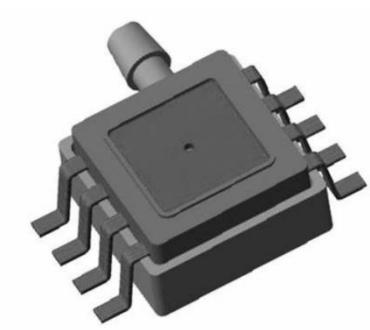
HBP451 Series Pressure Sensor

Product Features



- Measuring range: -100kPa ~ +700kPa (Optional), Gauge pressure
- Silicon piezoresistive MEMS technology
- SOP8 single nozzle package
- High integration and excellent reliability
- High sensitivity and stability
- Operation temperature: -40 to +85°C
- Suitable for a variety of gases (can be customized for corrosive gas applications)

Typical Applications

- **Smart home appliance:** Coffee maker, Soya milk machine, Oven, Vacuum pump, etc.
- **Medical equipment:** Electronic sphygmomanometer, Respirator, Oxygen concentrator, etc.
- **Automotive applications:** Automotive steering systems.
- **Industrial pressure control:** Pressure gauges, Pneumatic systems, etc.

General Description

The HBP451 series are silicon piezoresistive pressure sensors. The MEMS pressure chip adopts the Wheatstone bridge structure, which is four resistors diffused on a circular silicon diaphragm. When force is applied to the silicon crystal, the crystal lattice deforms, causing carriers to scatter from one energy valley to another, causing changes in carrier mobility, perturbing the average amount of carriers in the longitudinal and transverse directions, thus changing the resistivity of the silicon and generating a voltage output signal with a linear relationship. The product has good linearity, repeatability and stability, and high sensitivity. Customers can choose the standard amplifier circuit such as instrumentation amplifier, debugging and compensation for the output and temperature drift according to the needs, to achieve high accuracy, high stability and high reliability of pressure measurement. The product adopts the standard SOP8 package form, which is convenient for customers to use. The products are suitable for various types of gas pressure detection, and have a wide range of applications in health care, smart home appliances, industrial control, etc.

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Basic performance

Table 1: Basic performance of HBP451

Parameter	Min.	Typ.	Max.	Units	Remark
Pressure range	-100		700	kPa	Optional
Constant voltage supply		5	10	V	
Constant current supply		1	2	mA	
Operating temperature	-40	0-60	+85	℃	Optional,default typical values
Compensation temperature	-40		+125	℃	
Bridge arm resistors	4	5	6	kΩ	
Null point output	-15		+15	mV	
Full scale output	35	45	55	mV	10kPa
	60	75	90	mV	40kPa
	70	90	110	mV	200kPa
Bridge resistance temperature error	1600	2000	2400	ppm/℃	
Null point temperature error	-0.08		0.08	$\%V_{FS}$/℃	
Full scale temperature error	-0.27	-0.22	-0.17	$\%V_{FS}$/℃	Constant voltage
	-0.03		0.03	$\%V_{FS}$/℃	Constant current
Linear	-0.3		0.3	$\%V_{FS}$	Best-fit straight line
Pressure hysteresis	-0.1	0.05	0.1	$\%V_{FS}$	
Temperature hysteresis	-0.3		0.3	$\%V_{FS}$	

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Overload pressure		2 times		Standard range	
Burst pressure		3 times		Standard range	
Media compatibility	Air and non-corrosive gases				

Notes: Unless otherwise stated, the data in the above table are tested under the following conditions: The measurement medium is air; barometric pressure (101325±500) Pa; temperature (25±2)°C; vibration 0.1g(1m/s2); humidity (50%±10%) is RH; DC (1±0.001)mA DC during constant current test; voltage value (5±0.005)V DC during constant voltage test.

Package Dimensions

The drawing of the product package dimension is shown in Figure1 below. All dimensions are in millimeter unit (mm). For the unmarked dimensional tolerances are ±0.1mm.

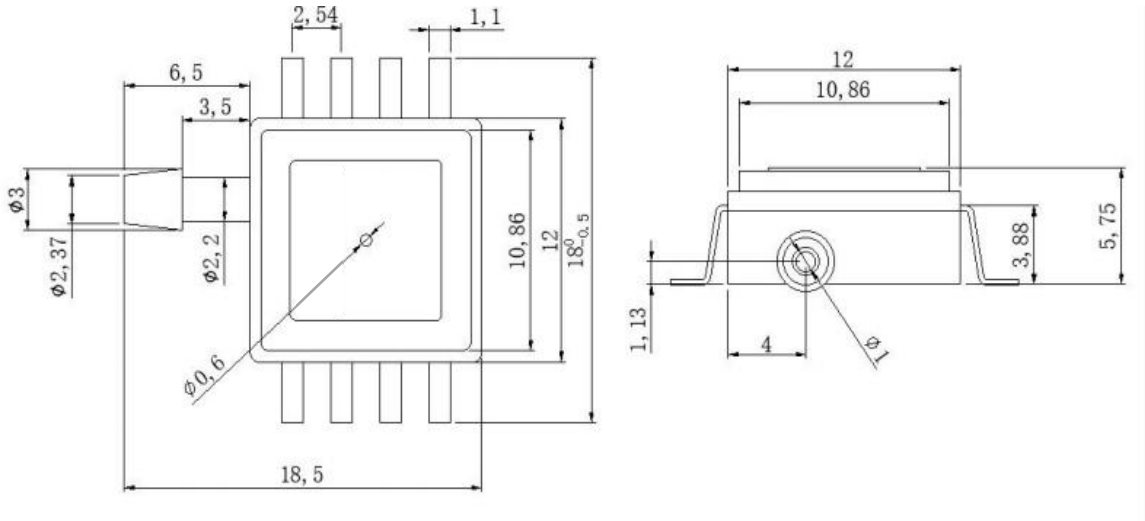


Figure 1: Drawing of package dimension

Pin Definition and Function Description

Please refer to Figure 2 for the Pins definition and Table 2 for the Pins description.

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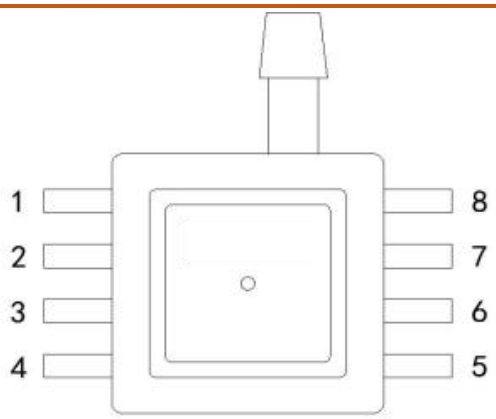


Figure 2: Pins definition

Table 2: Pin definition and description

Pin	Symbol 1	Definition 1
1	Vout-	Negative Output Extreme
2	VDD	Power supply
3	Vout+	Positive Output Extreme
4	GND	Ground
5,6,7,8	NC	Not connected

Pin	Symbol 2	Definition 2
1	GND	Ground
2	Vout+	Negative Output Extreme
3	VDD	Power supply
4	Vout-	Positive Output Extreme
5,6,7,8	NC	Not connected

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Amplifier Circuit Reference

Instrumentation amplifiers with differential input, single-ended output, high input impedance and high common-mode rejection ratio as well as low drift and low noise are widely used in pressure sensor bridge interfaces for amplifying weak signals. Pressure sensors are driven by constant current or constant current or constant voltage drive for signal conversion, the customer can be based on the actual application needs of the signal for appropriate amplification. Figure 3 shows the reference amplification circuit for pressure sensors.

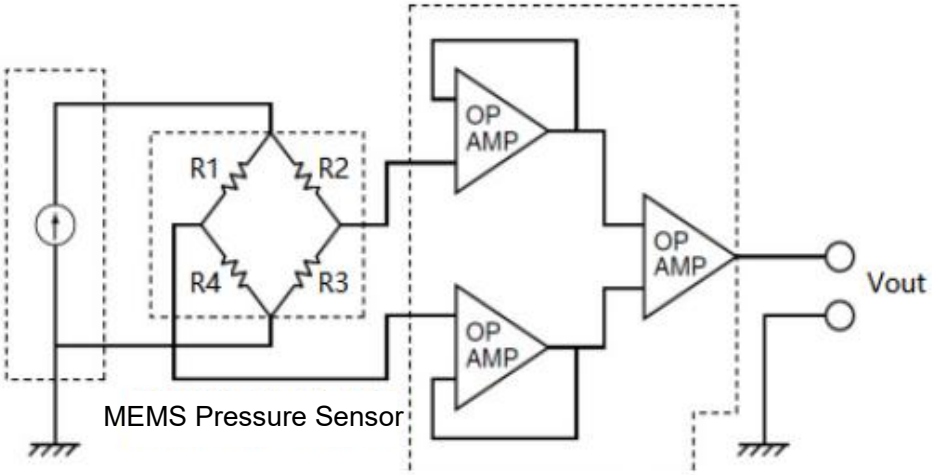


Figure 3: Amplifier circuit reference

Recommended Reflow Curve

Please refer to Figure 4 for the recommended reflow curve and Table 3 for the reflow parameters.

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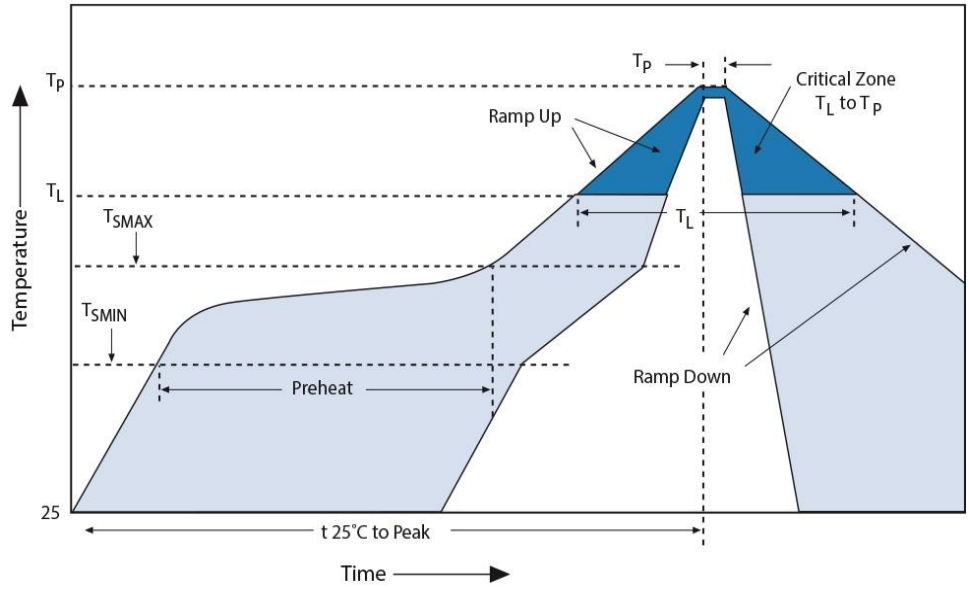


Figure 4: Recommended reflow curve

Table 3: Reflow Parameters Description

Curve Feature	Lead free
Mean heating rate (T_{SMAX} to T_P)	3°C/s the fastest
Min temperature of preheating area(T_{SMIN})	150°C
Max temperature of preheating area(T_{SMAX})	200°C
TSMIN to TSMAX (t_S)	60~180 s
Reflux zone temperature (T_L)	217°C
Reflux zone time (t_L)	60~150s
Peak temp. (T_P)	260°C
Peak temp.+/-5°Ckeeping time(t_P)	20~40 s
Drop speed (T_P to T_{SMAX})	6°C/s the fastest
Time from 25°C to peak temperature	Max 8 min

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Notes:

1) Dust is not allowed to fall on sensor chip to avoid any damage on the product.
2) Cleaning agent or cleaner is not allowed to penetrate the product after reflow. Do not expose the product to ultrasonic handling or cleaning to avoid damage.
3) Please use non-corrosive rose-scented flux. Because the product is exposed, be careful not to allow the flux to invade the product.
4) It is recommended that the reflow welding times not exceed 3 times.

Model Selection Information

The model information of HBP451 series is shown in Figure5.

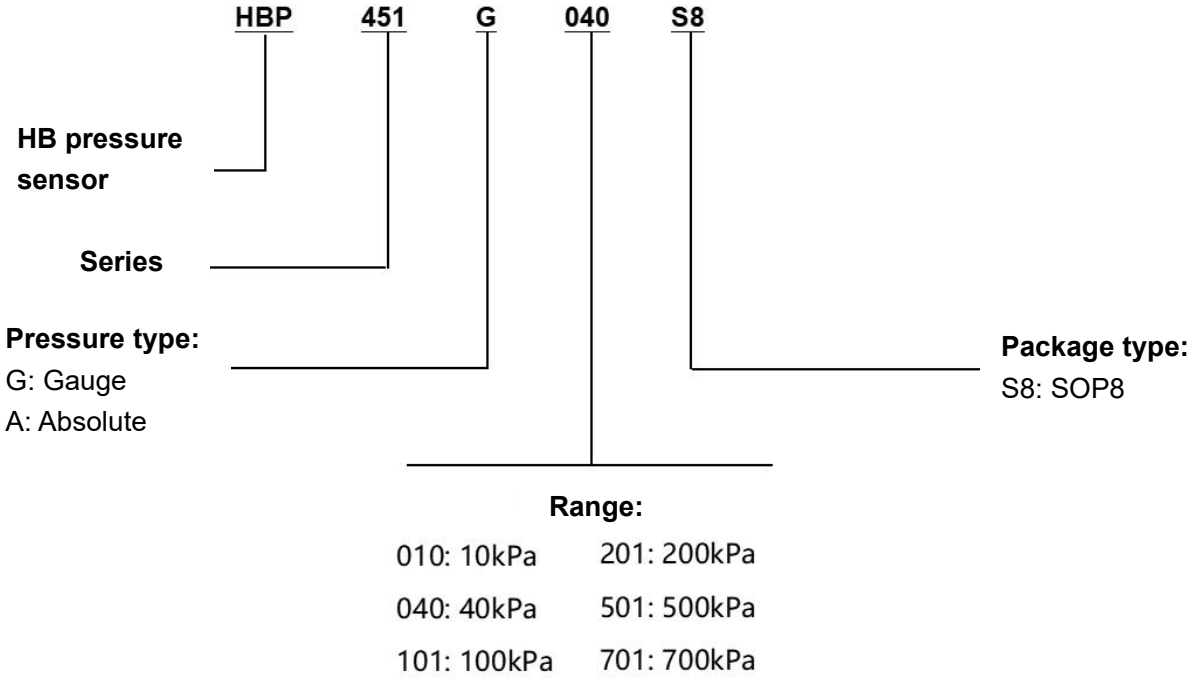


Figure 5: Schematic of model selection information

***Notes:**

1) Some special package product does not include in above.
2) Pressure conversion: 10kPa=100hPa=100mBar≈75mmHg≈1020mmH2O≈1.45PSI

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Customized services

Haobang is oriented to customer needs, providing customers with flexible customization solutions to meet different needs. The effective customization services include but not limited to the most cost-effective sensor chips and modules with different ranges, packaging sizes, and application ranges. For more information, please contact info@haobang-smt.com.

Document history

Table 4: Document history

Revision	Description	Date
1.0	Initial	2024 Jun

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