# GZP6847A

## Pressure Sensor

Analog Output

Datasheet

Version: V1.7

Issued Date:2023.09.27

# Table of Contents

## Document Revision History

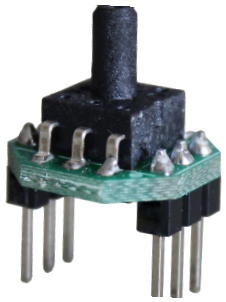
| Revision | Description | Date |
|---|---|---|
| V1.0 | Initial release | 2014.09.27 |
| V1.1 | Complete product information | 2020.10.28 |
| V1.2 | Modified product dimensional drawings<br>Modified selection table<br>Added electrical parameters | 2020.11.20 |
| V1.3 | Add cover and table of contents | 2021.10.04 |
| V1.4 | Adjust product classification | 2022.03.16 |
| V1.5 | Change of company address | 2022.08.29 |
| V1.6 | Template Updates | 2023.04.24 |
| V1.7 | Change the application circuit diagram | 2023.09.27 |

# 1. Product Description

The GZP6847A pressure sensor is a state-of-the-art MEMS pressure sensor designed particularly for wide pressure measurement application in medical&health care, industry & automation, household appliances and consumer electronics with specific pressure range. It is composed of a silicon piezoresistive pressure sensing chip and a signal conditioning integrated circuit. The initial signal from the sensing chip is amplified, temperature compensated, calibrated and finally converted to a high level analog output voltage that is proportional to the applied pressure.

## 1.1 Product Characteristics

- Multiple range from -100…0～1…1500kPa
- Gauge pressure type
- DIP6 packaging
- 3.3V or 5V power supply
- Absolute ( fixed ) voltage or ratio-metric output
- Suitable for non-corrosive gases



## 1.2. Application

- Medical applications include ventilators, oxygen concentrators, monitors, and nebulizers
- Automotive electronics applications include power steering and brake assist
- Sports and fitness equipment applications include massagers, massage chairs, and air mattresses
- Water heaters, oxygen dispensers, beer dispensers, coffee machines, air pumps, electric breast pumps, and vacuum cleaners
- Negative pressure measurement, vacuum pumps, and pressure gauges

# 2. Function Description

This product is made with advanced micro-electromechanical principles, the key technology is the silicon piezoresistive effect based MEMS pressure sensor chip and high performance signal conditioning AISC chip, the silicon micro-piezoresistive MEMS pressure sensor chip is through the Wheatstone bridge composed of four strain sensitive resistors. The output signal is amplified, temperature compensated and linearised by the ASIC chip, and the linearity of the transfer function and temperature compensation is achieved by the digital processing circuitry in the ASIC. High accurate pressure measurement over the full operating temperature range is achieved by a polynomial compensation algorithm and a multi-point pressure calibration technique at multiple temperatures. The transfer function of the pressure sensor is created from the following parameters:

- Minimum and maximum rated pressure
- Output voltage at minimum and maximum rated pressure
- Clamp voltage

All parameters required for the complete calibration algorithm (e.g. offset, gain, temperature coefficients of offset and gain, and linearity parameters) are determined after calibration and stored in the E²PROM inside the ASIC.

## 2.1 Block Diagram

The functional block diagram of the pressure sensor is shown in Figure 1.

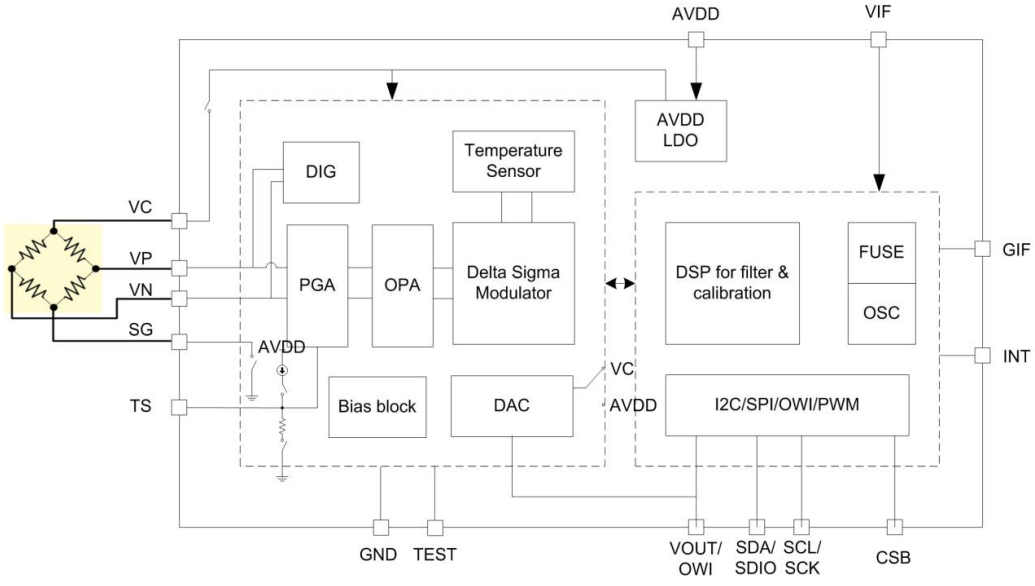



Fig.1 Block Diagram

## 2.2 Pin Definition

The pin configuration of the pressure sensor is shown in Figure 2.

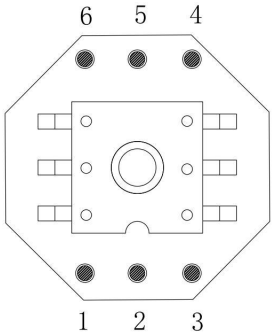



Fig.2 Pin configuration diagram

The corresponding relationship of the pressure sensor pins is shown in Table 1.

Tab.1 Pin Definition

| PIN No. | Description | Remark |
|---|---|---|
| 1 | NC | Floating pin |
| 2 | VDD | Power input positive |
| 3 | GND | Power input negative |
| 4 | VDD | Power input positive |
| 5 | OUT | Output positive |
| 6 | GND | Power input negative |

## 2.3 Pressure Function

The pressure sensor is calibrated at the factory and the output signal of the sensor has a linear transfer relationship with the applied pressure as shown below.

Pressure Transducer Transfer Function:

Vout = K*P+B, where.

Vout = signal output voltage (V)

P = actual pressure (kPa)  P1 = lower pressure limit (kPa)  P2 = upper pressure limit (kPa)

Vout1 = Lower pressure limit output (V) Vout2 = Upper pressure limit output (V)

K = (Vout2 - Vout1) / (P2 - P1)

B = (Vout1*P2- Vout2*P1) / (P2 - P1)

The transfer characteristics of the pressure sensor are shown in Figure 3 below:

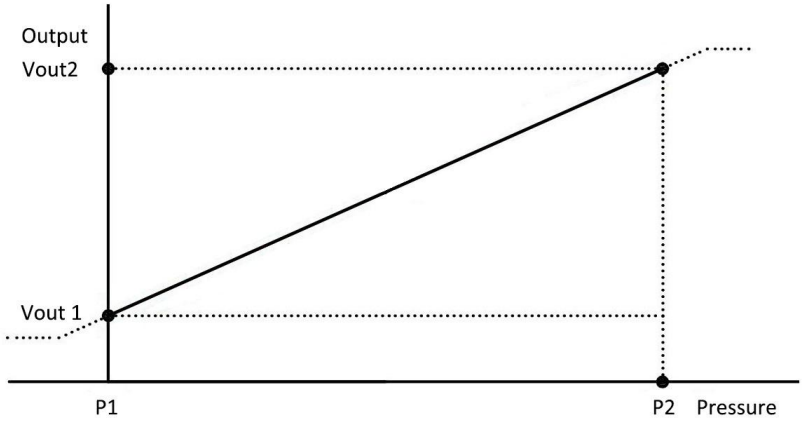



Fig.3 Voltage Output Curve

## 2.4 Accuracy

The accuracy of the GZP6847A pressure sensor consists of the error in its linearity, repeatability, and hysteresis. The value calculated with the transfer function is the specified and theoretical value of the sensor. The error of the sensor is equal to the difference between the actual output value of the sensor at the specified input pressure and the specified output value.

## Overall Accuracy

Overall accuracy includes more error apart from the product's accuracy:

Pressure drift: The output deviation between the actual output voltage and the specified output voltage at zero and full scale over a specified pressure range.

Temperature effect: Output deviation between zero and full scale at different temperatures over a temperature range.

The overall accuracy is expressed in terms of error bands, and the data are shown in Figure 4 and Table 2.

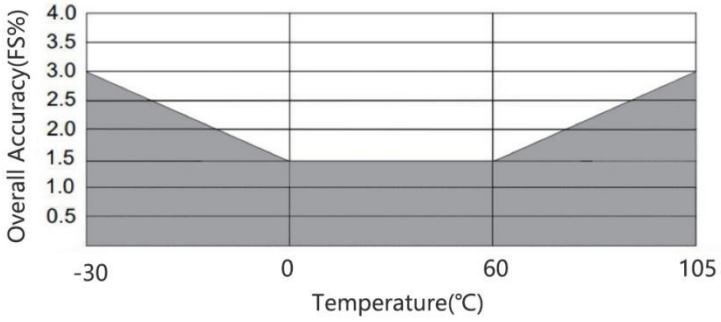



Fig.4 Relationship between overall accuracy and temperature

Tab.2 Overall Accuracy

| Temperature (°C) | Overall Accuracy(Full Span) |
|---|---|
| -30~105 | ±3.0% |
| 0~60 | ±1.5% |

*Different pressure range may have different overall error, please consult Sencoch for more details.

# 3. Technical Specifications

Measured at a power supply of (5±0.25)V DC and a temperature of 25°C

## 3.1 Maximum Rated Parameters

The maximum sensor rating parameter is shown in the Table 3 as shown.

Tab.3 The maximum rated parameters

| Parameter | Min. | Typical Value | Max. | Unit | Remark |
|---|---|---|---|---|---|
| Maximum voltage | | | 6.5 | V | |
| Output current load | | | 5 | mA | |
| ESD Protection | | ±2 | | KV | |
| Operating temperature | -30 | | 105 | °C | |
| Storage temperature | -40 | | 125 | °C | |

*Long exposure at the specified limits may cause degradation to the device.

## 3.2 Performance Specification

Sensor performance specification are shown in the Table 4 as shown.

Tab.4 Sensor performance indicators

| Parameter | Value | Unit |
|---|---|---|
| Pressure range | -100…0 ~ 1…1500 | kPa |
| Output signal | 0.5-4.5 ( Customizable ) | V |
| Accuracy | ±1 | %Span |
| Overload pressure | 4X (Range≤60kPa) | Rated |
| | 2.5X (60kPa<Range≤200kPa) | Rated |
| | 1.5X (Range>200kPa) | Rated |
| Burst pressure | 5X (Range≤60kPa) | Rated |
| | 3X (60kPa<Range≤200kPa) | Rated |
| | 2X (Range>200kPa) | Rated |
| Compensation temperature | 0 ~ 60 (Customizable) | °C |

1. The 0.5~4.5V output voltage is based on 5V power supply or optional 0.2~2.7V output based on 3.3V power supply. The output can be customized to other voltage range by order.

2. The different pressure range may have different accuracy, overload and burst pressure , please consult Sencoch for more details.

## 3.3 Electrical Characteristics

The electrical characteristics of the sensor are shown in Table 5.

Tab.5 The electrical characteristics

| Parameter | Minimum | Typical Value | Maximum | Unit | Remark |
|---|---|---|---|---|---|
| Supply voltage | 3.3 | 5 | 5.5 | V | |
| Working current @25°C | | 1700 | | uA | |
| Filter capacitor | | 100 | | nF | |
| PSRR | | 60 | | dB | |
| Output current load | | | 5 | mA | |
| Input common mode signal rejection ratio | 80 | 110 | | dB | |
| Short circuit current limiting | 15 | 20 | 25 | mA | |
| Upper clamp voltage | 3/4 | | 1 | VDD | |
| Lower clamping voltage | 0 | | 1/4 | VDD | |

## 4. Application Circuit

The recommended application circuit is shown in Figure 5.

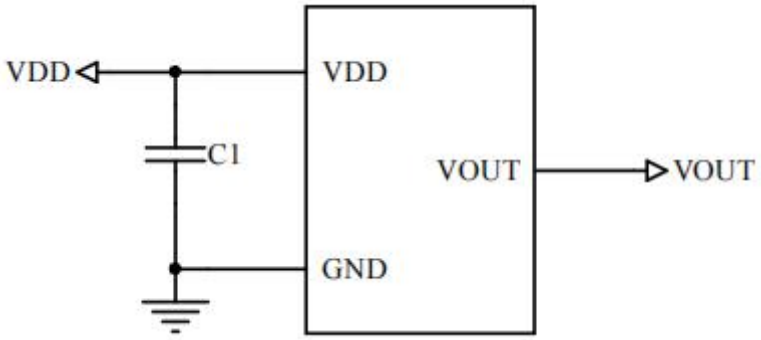



Fig.5 Application circuit

**Notice :**

- The recommended value of C1 is 100nF, and the recommended values of R1 and R2 are 4.7k
- Please confirm the electrical definition before assembly
- Do not have any electrical connection to the NC pin, otherwise it may cause product failure.
- Provide anti-static protection during welding
- Overload voltage (6.5Vdc) may burn out the circuit chip
- This product has no reverse polarity protection, please pay attention to the power polarity during assembly

## 5. Structure (Unit: mm)

Refer to Figure 6 for sensor dimensions (error is ±0.1mm if not specified).

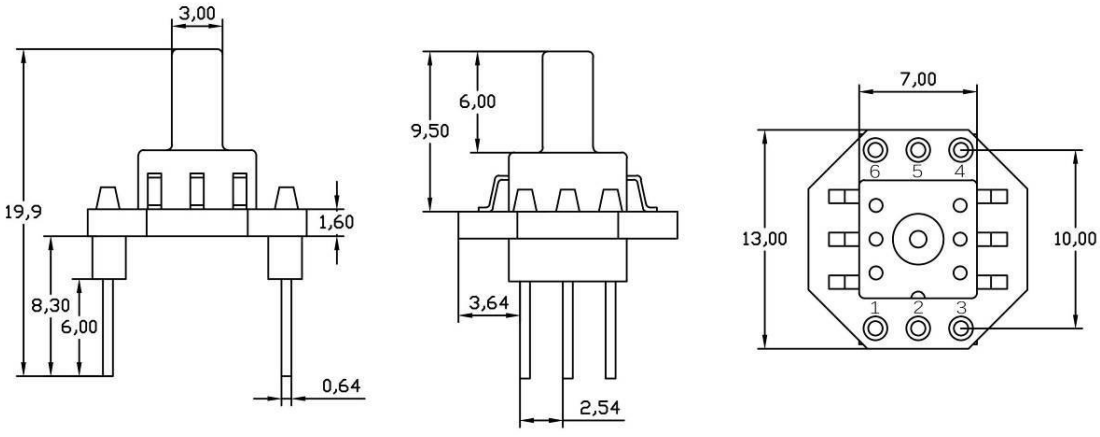



Fig.6 Sensor Dimensions

Recommended Footprint Layout refer to Figure 7.

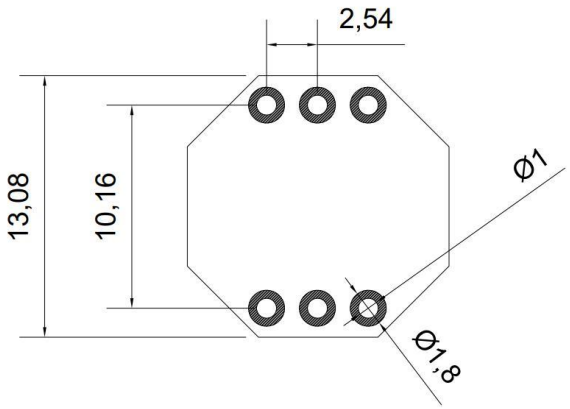



Fig.7 Recommended Footprint

## 6. Order Guide

GZP 6847 A 040KPW 50 K F01 WX

Tab.6 Order Guide

| | |
|---|---|
| GZP | Pressure Sensor Series |
| 6847 | Product Series |
| A | Output type A: Analog output D: IIC interface |
| 040KPW | Pressure Range:<br>040 Indicates the measured pressure value ( including 0~40，-40~0，-40~40)<br>Pressure unit: KP: KPa MP: MPa PS: PSI BA: Bar<br>Pressure type: P: Positive pressure (e.g.0~40) N: Negative pressure (e.g. -40~0) W: Negative pressure to positive pressure (e.g.-40-40)<br>040KPW indicate from -40KPA to 40kPa measured pressure |
| 50 | Power Supply 50: 5Vdc; 33: 3.3Vdc |
| K | Output: K:0.5-4.5V Z:0.2-2.7V H:0.2~4.7V<br>E: Proportional voltage output (please note the output voltage range after the model number)<br>T: Custom output (please note the output voltage range after the model number) |
| F01 | Packing Method F01: Plastic tube |
| WX | Company interior code |

# 7. Model Example

Tab.7 Model Example

| Pressure Range | Part Number(5V Power supply) |
|---|---|
| 0 ~ 2.5 | GZP6847A2.5KPG50K F01 WX |
| 0 ~ 5 | GZP6847A005KPG50K F01 WX |
| 0 ~ 5 | GZP6847A005KPG33Z F01 WX |
| 0 ~ 10 | GZP6847A010KPG50K F01 WX |
| 0 ~ 20 | GZP6847A020KPG50K F01 WX |
| 0 ~ 20 | GZP6847A020KPG33T0525 F01 WX |
| 0 ~ 40 | GZP6847A040KPG50K F01 WX |
| 0 ~ 40 | GZP6847A040KPG33Z F01 WX |
| 0 ~ 100 | GZP6847A101KPG50K F01 WX |
| 0 ~ 100 | GZP6847A101KPG33Z F01 WX |
| 0 ~ 200 | GZP6847A201KPG50K F01 WX |
| 0 ~ 500 | GZP6847A501KPG50K F01 WX |
| 0 ~ 500 | GZP6847A501KPG33Z F01 WX |
| 0 ~ 700 | GZP6847A701KPG50K F01 WX |
| 0 ~ 700 | GZP6847A701KPG33Z F01 WX |
| 0 ~ 1000 | GZP6847A001MPG50K F01 WX |
| 0 ~ 1000 | GZP6847A001MPG33Z F01 WX |
| 0 ~ 1500 | GZP6847A1.5MPG50K F01 WX |
| -100 ~ 1500 | GZP6847A1.5MPW50K F01 WX |
| -100 ~ 1000 | GZP6847A001MPW50K F01 WX |
| -100 ~ 700 | GZP6847A701KPW50K F01 WX |
| -100 ~ 500 | GZP6847A501KPW50K F01 WX |
| -100 ~ 300 | GZP6847A301KPW50K F01 WX |
| -100 ~ 300 | GZP6847A301KPW33Z F01 WX |
| -100 ~ 100 | GZP6847A101KPW50K F01 WX |
| -60 ~ 60 | GZP6847A060KPW50K F01 WX |
| -40 ~ 40 | GZP6847A040KPW50K F01 WX |
| -25 ~ 25 | GZP6847A025KPW50K F01 WX |
| -10 ~ 10 | GZP6847A010KPW50K F01 WX |
| -5 ~ 5 | GZP6847A005KPW50K F01 WX |
| -1 ~ 1 | GZP6847A001KPW50K F01 WX |
| -100 ~ 0 | GZP6847A101KPN50K F01 WX |
| -100 ~ 0 | GZP6847A101KPN33Z F01 WX |
| -30 ~ 0 | GZP6847A030KPN33Z F01 WX |
| -20 ~ 0 | GZP6847A020KPN50K F01 WX |

1. Above model example is for order information only, contact Sencoch for production and stock status.

2. For more customized ranges and special parameter part numbers, please consult Sencoch or agents.

# 8. Instructions for Use

## 8.1 Soldering

Since this product has a small structure with low heat capacity, please minimize the influence of heat from the outside. Otherwise, it may be damaged due to thermal deformation and cause changes in characteristics. Please use non-corrosive rosin type flux. In addition, since the product is exposed to the outside, please be careful not to allow flux to penetrate into the inside.

( 1) Manual soldering

- Use a soldering iron with a head temperature between 260 and 300°C (30 W) and perform the work within 5 seconds.
- Please note that the output may change when soldering with a load applied to the terminals.
- Please keep the soldering iron tip clean.

( 2) Reflow soldering (SMD terminal type)

- The recommended reflow oven temperature setting conditions are shown:

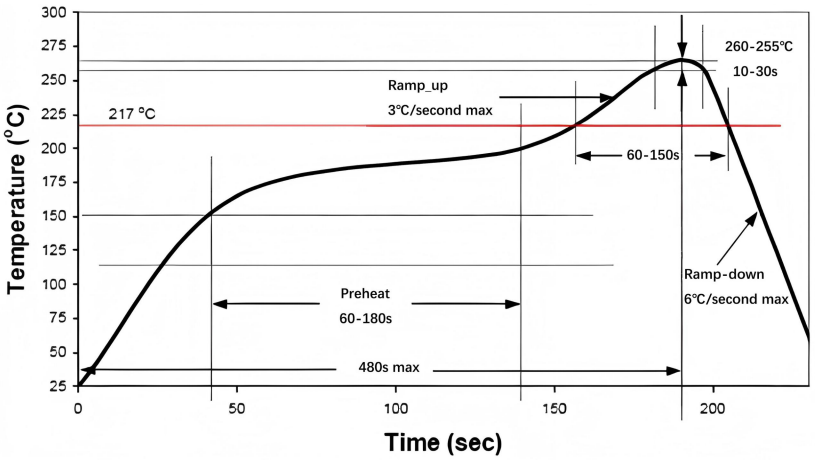



Fig.8 Remelting temperature setting conditions

( 3) The warping of the printed circuit board relative to the entire sensor should be kept below 0.05mm. Please manage this.

( 4) After installing the sensor, be careful not to generate stress on the solder joint when cutting and bending the substrate.

( 5) Since the sensor terminals are exposed, contact with metal pieces or other objects may cause abnormal output. Be careful not to touch the terminals with metal pieces or your hands.

(6) When applying coating to prevent insulation degradation of the substrate after soldering, be careful not to allow chemicals to adhere to the sensor.

## 8.2 Cleaning Requirements

( 1) Since the product is open type, please be careful not to allow cleaning fluid to enter the interior.

( 2) Please avoid using ultrasonic cleaning as it may cause product failure.

## 8.3 Storage and Transportation

( 1) This product is not drip-proof, so do not use it in places where it may be splashed with water.

( 2) Do not use in an environment where condensation occurs. In addition, if moisture attached to the sensor chip freezes, it may cause fluctuations in sensor output or damage.

( 3) Due to the structure of the pressure sensor chip, the output will fluctuate when it is exposed to light. Especially when applying pressure through a transparent cover, etc., please avoid light from reaching the sensor chip.

( 4) Normally packaged pressure sensors can be transported by ordinary transportation vehicles. Please note: The product must be protected from moisture, shock, sunburn and pressure during transportation.

## 8.4 Other Precautions

( 1) If the installation method is incorrect, it may cause an accident, so please be careful.

( 2) Avoid using the product in a manner that applies high-frequency vibrations, such as ultrasonic waves.

( 3) The only pressure medium that can be used directly is non-corrosive gas. Other media, especially corrosive media or media containing foreign matter, may cause malfunction and damage. Therefore, please avoid using it in the above environment.

( 4) A pressure sensor chip is located inside the pressure inlet. Inserting a needle or other foreign object into the pressure inlet can damage the chip and clog the inlet, so please avoid such an operation.

( 5) Regarding the operating pressure, please use it within the rated pressure range. Using it outside the range may cause damage.

( 6) Since static electricity may cause damage, please be careful to ground charged objects on the table and operators when using it to allow the surrounding static electricity to discharge safely.

If you have any questions, please feel free to ask.

# 9. Packing Information

**Tube Packing**

Quantity per tube: 38 PCS

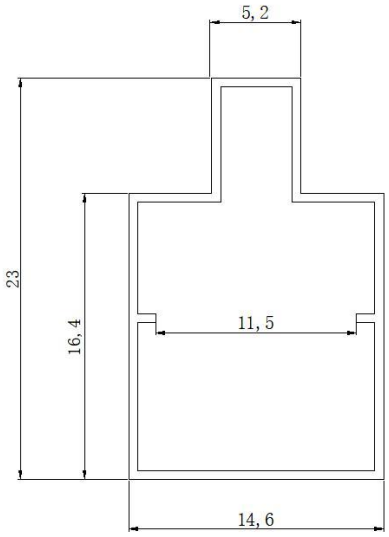
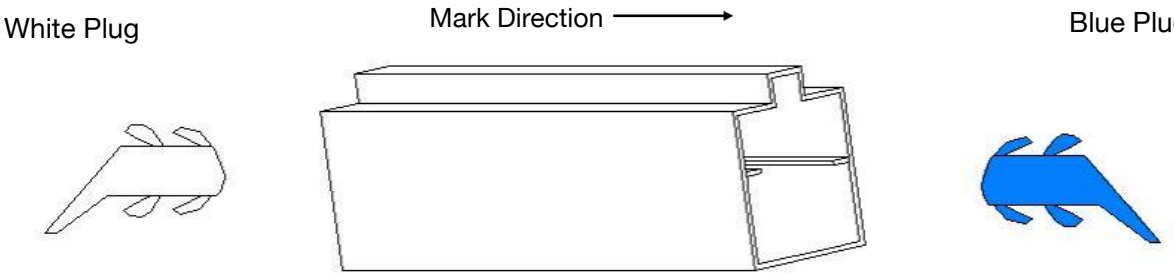
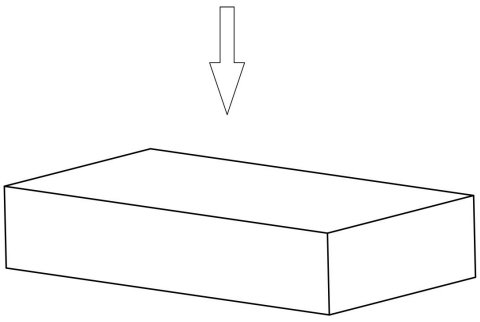



Fig.8 Section schematic diagram




（520mm x 24.6mm x 23mm，38PCS）



530mm x 145mm x 53mm，760PCS

Fig.9 Outer Packing

## Safety Precautions

This product is made of semiconductor components for general electronic equipment (communication equipment, measuring equipment, working machinery, etc.). Products using these semiconductor components may malfunction and fail due to external interference and surges, so please confirm the performance and quality under actual use. To be on the safe side, please perform safety design on the device (setting of protection circuits such as fuses and circuit breakers, multiple devices, etc.) so that life, body, property, etc. will not be harmed in the event of a malfunction. To prevent injuries and accidents, please be sure to comply with the following matters:

·The driving current and voltage should be used below the rated values.

Please wire according to the electrical definition . In particular, reverse connection of the power supply may cause accidents due to circuit damage such as heat, smoke, and fire, so please be careful.

·Be careful when fixing the product and connecting the pressure inlet .

## Warranty and Disclaimer

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