GZP6858A

Pressure Sensor

Analog Output

Datasheet

Version: V1.8

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Table of Contents

Document Revision History

Revision	Describe	Date
V1.0	Initial release	2018.03.27
V1.1	Improve product information	2020.10.22
V1.2	Modify the block Modify the selection table Add electrical parameters	2021.01.27
V1.3	The selection guide has added products with a 6.5mm air nozzle length The appearance structure has added a schematic diagram of the product with a 6.5mm air nozzle length The cover and table of contents have been added	2021.09.22
V1.4	Adjust product classification	2022.03.16
V1.5	Change company address	2022.08.29
V1.6	Template modification	2023.05.09
V1.7	Change the application circuit diagram	2023.09.27
V1.8	Modify the application circuit diagram and product dimensions	2024.10.10

1. Product Description

The GZP6858A pressure sensor is a compact MEMS pressure sensor designed particularly for a wide applications with various 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 Features

- Multiple range from 0 ~ 100...700kPa
- SOP8 packaging
- Absolute pressure type
- 3.3V or 5V power supply
- Absolute (fixed) voltage or ratio-metric output
- Suitable for non-corrosive gases or liquid

1.2 Application

- Automotive electronics applications include automotive air intake systems, tire pressure gauges, and onboard air pumps
- Inflators, vacuum pumps, diaphragm pumps, pressure switches, pneumatic control systems, and industrial equipment
- Medical applications include non-vacuum drainage, sprayers, and ward air dynamics
- Fire extinguishers, weather stations, and navigation systems
- Other absolute pressure measurement systems

2. Function Description

This product is made with advanced micro-electromechanical principles. The core technology is a MEMS pressure sensor chip based on the silicon piezoresistive effect and a high-performance signal conditioning AISC chip. The silicon micro-piezoresistive MEMS pressure sensor chip outputs a voltage signal proportional to the measured pressure through a Wheatstone bridge composed of four strain-sensitive resistors. The signal is amplified, temperature compensated and linearized by the ASIC chip to obtain an output voltage that is in a prescribed relationship with the applied pressure. The linearity and temperature compensation of the transfer function are realized by the digital processing circuit in the ASIC. Through the polynomial compensation algorithm and multi-point pressure calibration technology at multiple temperatures, high-precision pressure measurement is achieved within the full operating temperature range.

The transfer function of the pressure sensor is created by the following parameters:

- Minimum and maximum pressure ratings
- Voltage values at minimum and maximum rated pressure
- Clamping voltage

All parameters required for a complete calibration algorithm, such as 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 sensor functional block diagram is shown in Figure 1.

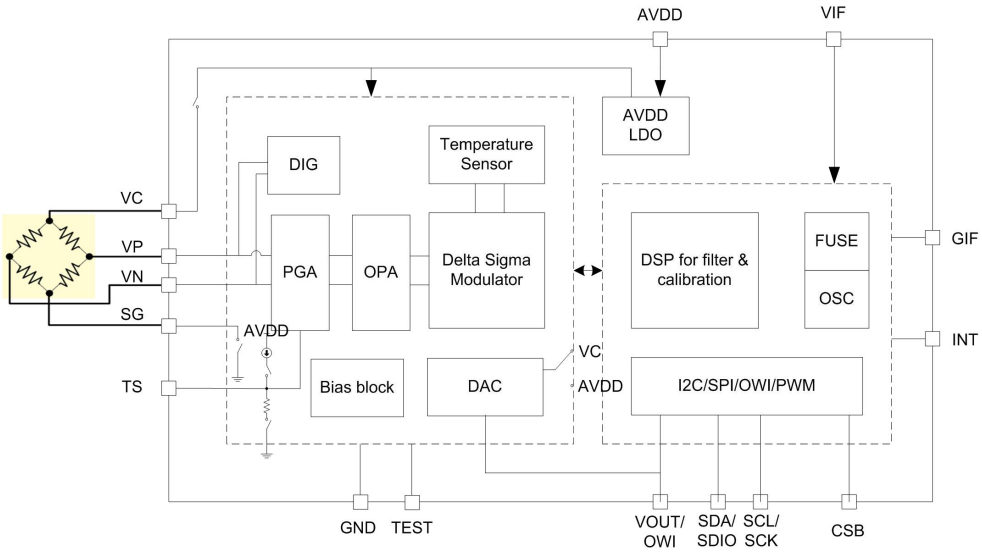


Fig.1 Block Diagram

2.2 Pin Definition

The pin diagram is shown in Figure 2.

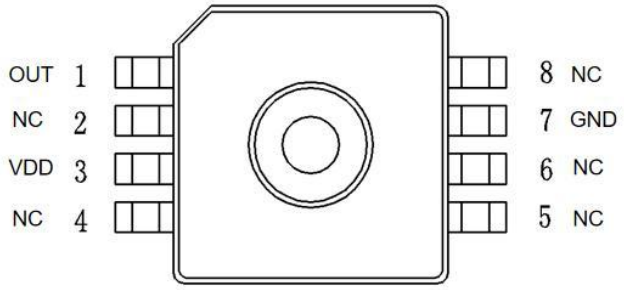


Fig.2 Pin Diagram

Tab.1 Pin correspondence

PIN No.	Description	Remark
1	Vout	Output positive
2	NC	Floating pin
3	VDD	Input positive
4	NC	Floating pin
5	NC	Floating pin
6	NC	Floating pin
7	GND	Input negative
8	NC	Floating pin

2.3 Pressure Function

There is a linear transfer relationship between the sensor's output signal and the applied pressure.

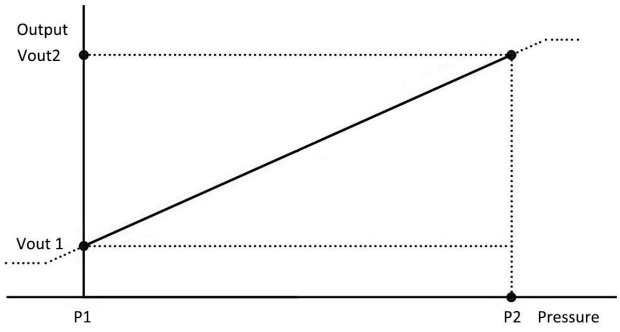


Fig.3 Pressure sensor transfer characteristic curve

The transfer function of the pressure sensor is created by the following parameters:

- Minimum and maximum pressure ratings
- Voltage values at minimum and maximum rated pressure
- Clamping voltage

All parameters required for a complete calibration algorithm, such as offset, gain, temperature coefficients of offset and gain, and linearity parameters, are determined after calibration and stored in the E²PROM inside the ASIC.

Pressure sensor transfer function:

Vout = (K * P + B) @ absolute voltage output, VDD = 5 VDC;

Vout = (K * P + B) @ absolute voltage output, VDD = 3.3 VDC;

Vout = (K * P + B)/5*VDD @ proportional voltage output;

Of which,

Vout : signal output voltage (VDC)

P: Actual pressure (kPa)

P1: Lower limit pressure (kPa)

P2: Upper limit pressure (kPa)

Vout1: Lower limit pressure output (V)

Vout2: Upper limit pressure output (V)

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

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

Example Part Number	Pressure range		Output voltage		Transfer function coefficients	
	P1	P2	Vout1	Vout2	K	B
GZP6858A40500KPA33Z	40kPa	500kPa	0.2	2.7	0.0054	-0.017
GZP6858A40500KPA50K	40kPa	500kPa	0.5	4.5	0.0087	0.152
GZP6858A40500KPA33E*	40kPa	500kPa	0.1*3.3	0.9*3.3	0.0057	0.100

* Taking 10% to 90% VDD proportional voltage output as example.

2.4 Accuracy

The accuracy of the GZP6858A pressure sensor is composed of its linearity, repeatability, and hysteresis errors. The value calculated by the transfer function is the specified value of the sensor and also the theoretical value. The error of the sensor is equal to the difference between the actual output voltage value of the sensor under the specified input pressure and the specified output voltage value.

Overall accuracy

The overall accuracy includes more error sources based on the product accuracy:

(1) Pressure drift: The output deviation between the actual output voltage at zero point and full scale and the specified output voltage within the specified pressure range.

(2) Temperature effect: The output deviation of zero point and full scale at different temperatures within the temperature range.

(3) The overall accuracy is expressed by an error band, which consists of three line segments. The data are shown in Figure 4 and Table 2.

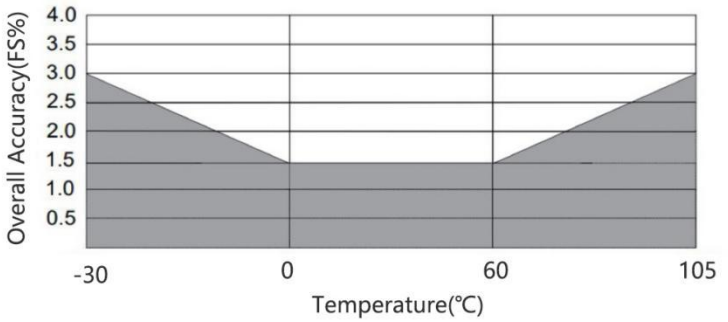


Fig.4 Relationship between overall accuracy and temperature

Tab.2 Overall accuracy table

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

*Different pressure ranges have different overall accuracy, please consult customer service 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 Ratings

The maximum rated parameters of the sensor are shown in Table 3.

Tab.3 The maximum rated parameters of the sensor

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 Indicators

The sensor performance indicators are shown in Table 4.

Tab.4 Sensor performance indicators

Parameter	Value	Unit
Pressure range	0 ~ 100...700	kPa
Output signal	0.5-4.5 (Customizable)	V
Accuracy	±1	%Span
Overload pressure	2× (Range ≤ 350kPa)	Rated
	1.5× (Range>350kPa)	
Burst pressure	3× (Range ≤ 350kPa)	
	2× (Range>350kPa)	
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	Min.	Typ.	Max.	Unit	Remark
Supply voltage	3.3		5.5	V	
Working current @25°C		1500		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

Figure 5 is for the recommended application circuit of the chip.

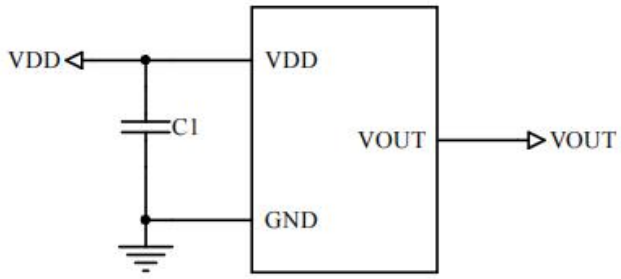


Fig.5 Application circuit

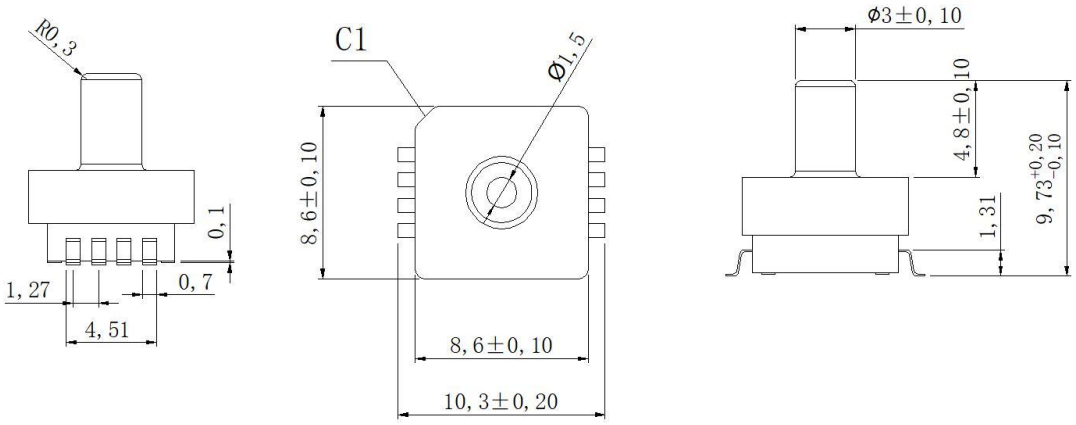
Notice:

- The recommended value of C1 is 100nF. 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 connection protection, please pay attention to the power polarity during assembly

5. Appearance and Structure

The sensor dimensions refer to Figure 6. (Error ±0.1mm if not specified)

L0 type nozzle length is 4.80 mm



L1 type nozzle length is 6.50 mm

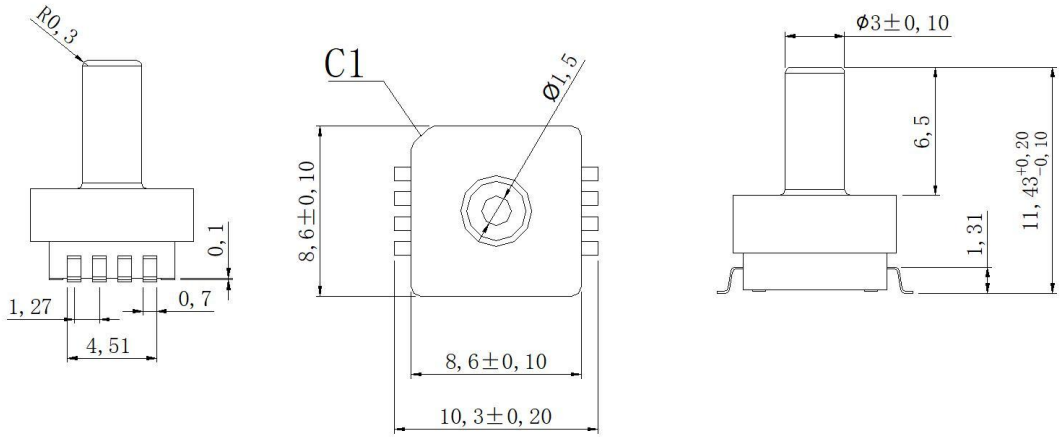


Fig.6 Sensor Dimensions

Recommended footprint as Figure 7.

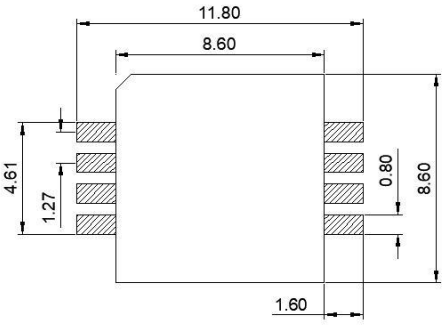


Fig.7 Recommended Footprint

6. Order Guide

GZP 6858A 50400KPA 50K B01 WX

Tab.6 Selection Guide

GZP	Pressure Sensor Series
6858	Product Series
A	Output type A: Analog output D: IIC output
15115KPA	Pressure range: 15115 means the minimum pressure (15) and the maximum pressure (115) Pressure unit: KP: KPa MP :MPa PS: PSi BA:Bar Pressure Type: A: Absolute Therefore, 15115KPA means the absolute pressure of 15KPA to 115KPA
50	Power supply 50: 5 Vdc; 33 : 3.3Vdc
K	Output K: 0.5~4.5 V Z : 0.2~2.7V H:0.2~4.7V E: Proportional voltage output (please note the output voltage range after the model number) T: Custom output (please note the output voltage range after the model number)
L0	Air nozzle length L0: Air nozzle length 4.80mm L1: Air nozzle length 6.5mm
B01	Packing method B01: Taping F01: Tube
WX	Company interior code

7. Model Example

Tab.8 Model example

Pressure Range	Part Number
0 ~ 100KPa	GZP6858A00100KPA33ZL0 F01 WX
10 ~100KPa	GZP6858A10100KPA50T046406L0 F01 WX
15 ~ 115KPa	GZP6858A15115KPA50KL0 F01 WX
15 ~ 115KPa	GZP6858A15115KPA33ZL0 F01 WX
15~115KPa	GZP6858A15115KPA50HL1 F01 WX
20~350KPa	GZP6858A20350KPA50KL0 F01 WX
30~350KPa	GZP6857A30350KPA33ZL0 F01 WX
20 ~ 400KPa	GZP6858A20400KPA50KL0 F01 WX
20~400KPa	GZP6858A20400KPA50E0545L0 F01 WX
20~400KPa	GZP6858A20400KPA50T0248L0 F01 WX
50~400KPa	GZP6858A50400KPA50KL0 F01 WX
0~700KPa	GZP6858A00700KPA50E0545L0 F01 WX
0~700KPa	GZP6858A00700KPA50KL0 F01 WX
0~180PSI	GZP6858A00180PSA50KL0 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. Instruction 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

- Please use a soldering iron with a head temperature of 260 to 300°C (30 W) and perform the work within 5 seconds.
- When soldering with a load applied to the terminals, please be careful as the output may change.
- Please keep the soldering iron tip clean.

(2) Reflow soldering (SMD terminal type)

The recommended reflow oven temperature setting conditions are show:

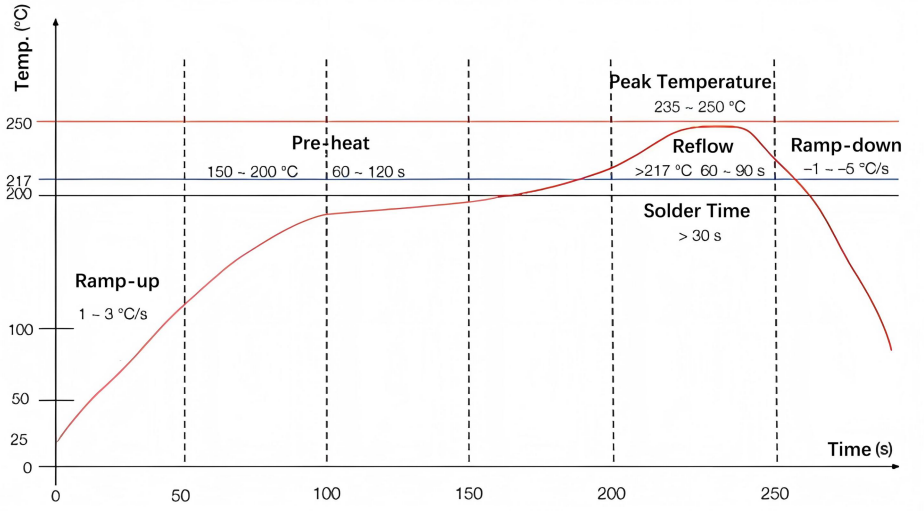


Fig.8 Reflow soldering

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

(4) When cutting and bending the substrate after mounting the sensor, be careful not to cause stress on the soldered parts .

(5) Since the sensor terminals are exposed, if metal pieces touch the terminals, abnormal output may occur. Be careful not to touch them with metal pieces or your hands.

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

8.2 Cleaning requirements

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

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 locations where it may be splashed with water.

(2) Do not use the product in an environment where condensation occurs. If moisture attached to the sensor chip freezes, it may cause a change in sensor output or damage the sensor.

(3) Due to the structure of the pressure sensor chip, the output will change 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 tools. Please note: The product should be protected from moisture, impact, sunburn and pressure during transportation.

8.4 Other precautions for use

(1) Incorrect installation methods may cause accidents, 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 or liquid. 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. If a needle or other foreign object is inserted into the pressure inlet, the chip may be damaged or the inlet may be blocked, so please avoid such operations. Also, please avoid blocking the air inlet during use .

(5) Please use the product within the rated pressure range. Using the product outside the rated pressure range may cause damage.

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

(7) Please pay full attention to the fixing and selection of the product, sleeve, and introduction tube according to the pressure used.

(8) Since this specification is for a single product, in order to improve reliability during actual use, please confirm the performance and quality under actual use conditions.

9. Packaging Information

Tube Packing

Quantity per tube: 58 PCS

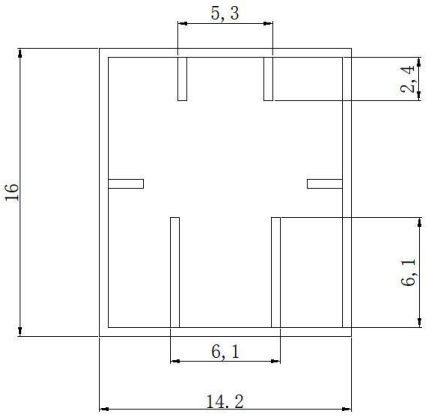
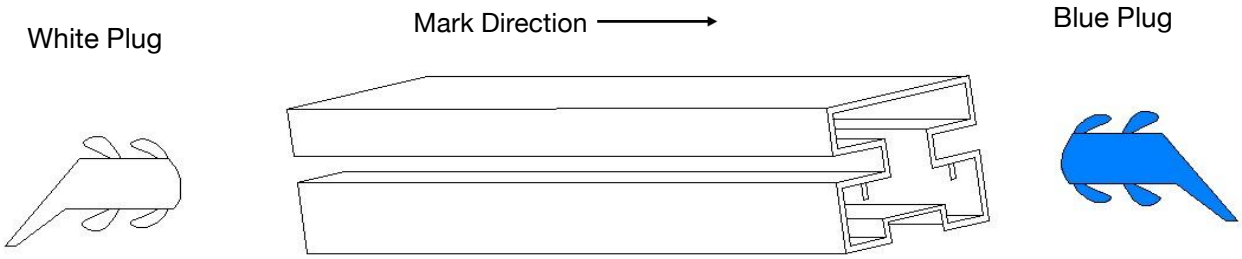
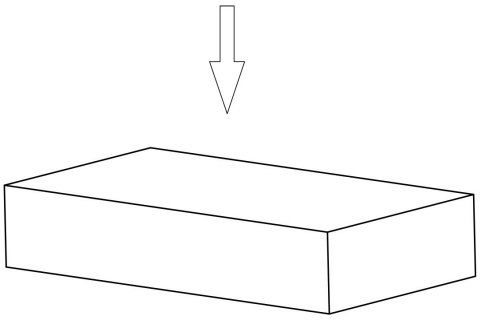


Fig.9 Section schematic diagram



（520mm x 14mm x 13mm，45PCS）



530mm x 145mm x 53mm，1800PCS

Fig.10 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 .

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