GZP6891A

Pressure Sensor

Analog Output

Datasheet

Version: V1.3

Issued Date:2025.03.18

Table of Contents

Document Revision History

Revision	Description	Date
V1.0	Initial release	2022.07.13
V1.1	Update the template	2023.05.04
V1.2	Change the application circuit diagram	2023.09.27
V1.3	Change the company logo	2025/03.18

1. Product Description

The GZP6891A pressure sensor is a state-of-the-art MEMS pressure sensor designed particularly for wide pressure measurement application in medical electronics, automotive electronics, and sports fitness equipment. 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 to 0.5…100kPa
- Differential pressure type
- Barbed nozzle with anti-detachment structure
- 3.3V or 5V power supply
- Absolute (fixed) voltage or ratio-metric output
- Suitable for non-corrosive gases

1.2. Application

- Medical fields such as ventilators, spirometers, negative pressure wound therapy, blood pressure monitoring, and sleep apnea therapy
- Industrial fields such as air flow measurement, heating, ventilation, and air conditioning, pneumatic equipment, and pressure switches
- Life sciences, small appliances, consumer electronics, sports and fitness equipment, firefighting equipment, and the Internet of Things
- Gas flow meters, gas emissions, and variable air volume control

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 E^2PROM inside the ASIC.

2.1 Block Diagram

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

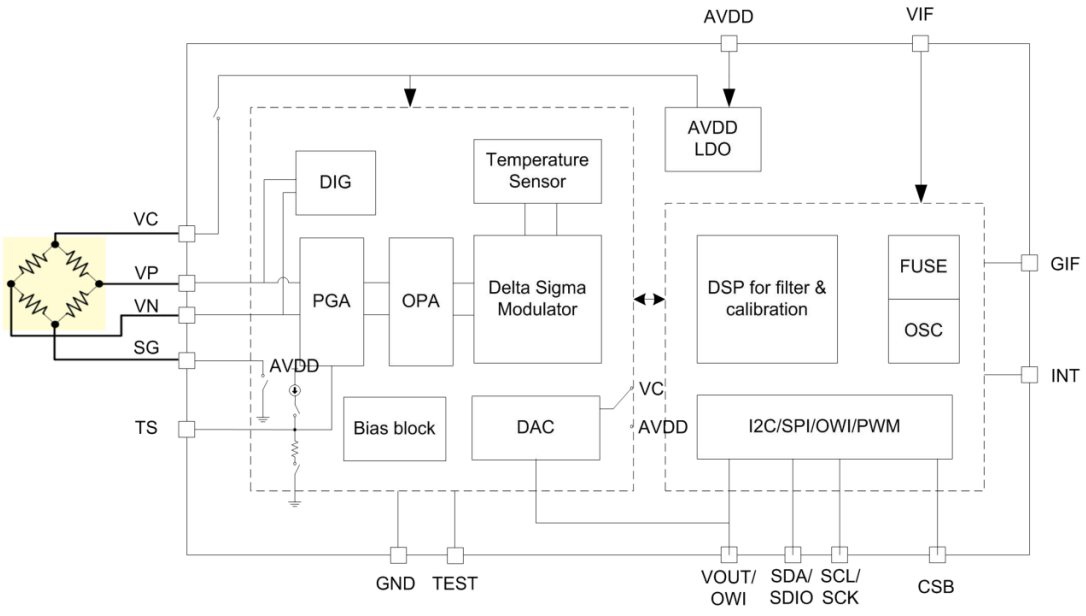


Fig.1 Block Diagram

2.2 Pin Definition

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

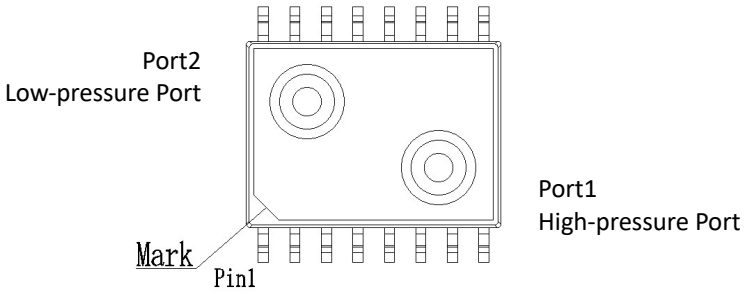


Fig.2 Pin configuration diagram

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

Tab.1 Pin Definition

Pin No.	Symbol	Description		Pin No.	Symbol	Description
1	NC	Floating pin		9	NC	Floating pin
2	NC	Floating pin		10	NC	Floating pin
3	NC	Floating pin		11	NC	Floating pin
4	GND	Power input negative		12	NC	Floating pin
5	GND	Power input negative		13	NC	Floating pin
6	OUT	Output signal		14	NC	Floating pin
7	NC	Floating pin		15	NC	Floating pin
8	NC	Floating pin		16	NC	Floating pin

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 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:

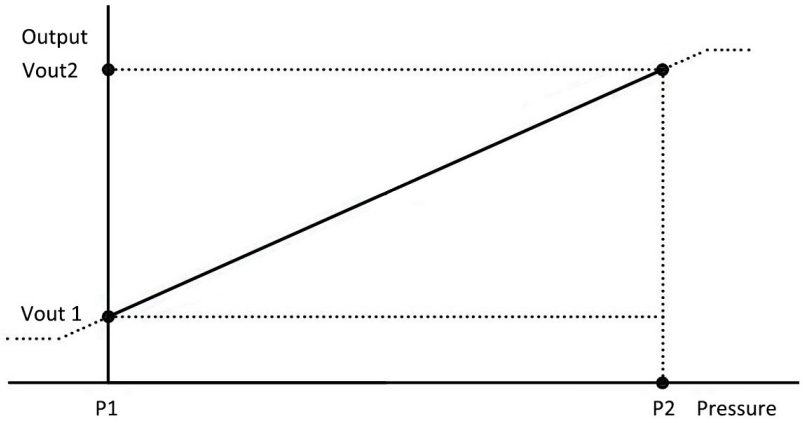


Fig.3 Voltage Output Curve

2.4 Accuracy

The accuracy of the GZP6891A 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

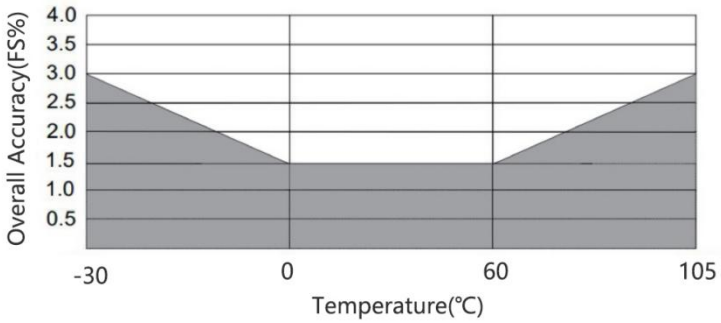


Fig.4 Relationship between overall accuracy and temperature

Tab.2 Overall Accuracy

Temperature (℃)	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	℃	
Storage temperature	-40		125	℃	

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

3.2 Performance Specification

Tab.4 Sensor performance indicators

Parameter	Value	Unit
Pressure range	-100…0 to 0.5…100	kPa
Output signal	0.5-4.5 (Customizable)	V
Accuracy	±1	%Span
Overload pressure	3× (Range ≤ 40kPa)	Rated
	2× (Range>40kPa)	
Burst pressure	4× (Range ≤ 40kPa)	
	3× (Range>40kPa)	
Compensation temperature	0 ~ 60 (Customizable)	℃

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	5	5.5	V	
Working current @25℃		1700		uA	
Filter capacitor		100		nF	
PSRR		90		dB	
Output current load			5	mA	
Short circuit current limiting	15	20	25	mA	
Upper clamp voltage	3/4		1	VDD	
Lower clamping voltage	0		1/4	VDD	

4. Applied Circuit

The recommended application circuit is shown in Figure 5.

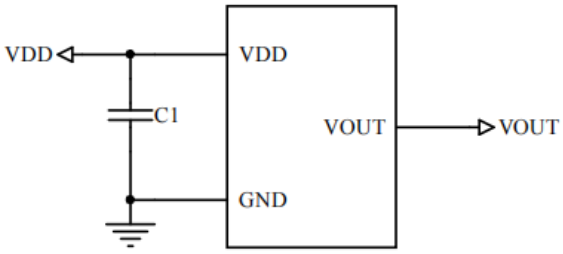


Fig.5 Application circuit

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).

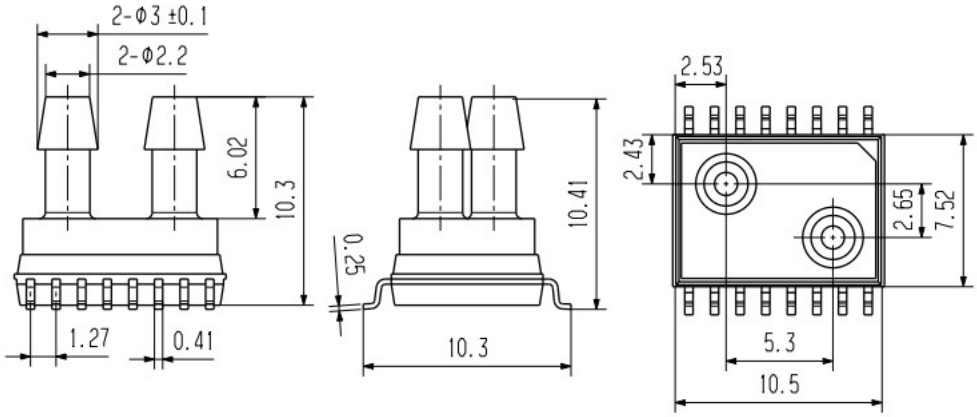


Fig.6 Sensor Dimensions

Recommended Footprint Layout refer to Figure 7.

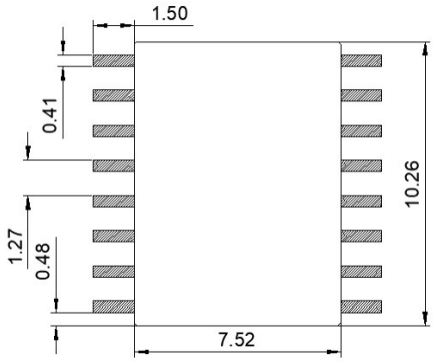


Fig.7 Recommended Footprint

6. Order Guide

GZP 6891 A-001KPW 50 K F01 WX

Tab.6 Order Guide

GZP	Pressure Sensor Series
6891	Product Series
A	Output type A: Analog output D: IIC interface
001KPW	Pressure Range: 700 Indicates the measured pressure value (including 0~1，-1~0，-1~1) Pressure unit: KP: KPa MP: MPa PS: PSI BA: Bar Pressure type: P: Positive pressure (e.g.0~1) N: Negative pressure (e.g. -1~0) W: Negative pressure to positive pressure (e.g.-1~1) 006KPP indicate from 0KPA to 1kPa measured pressure
50	Power Supply 50: 5Vdc; 33:3.3Vdc
K	Output: K:0.5-4.5V Z:0.2-2.7V 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)
F01	Packing Method F01: Plastic tube
WX	Company interior code

7. Model Example

Tab.7 Model Example

Pressure Range	Part Number
0~0.5	GZP6891A0.5KPP50K F01 WX
0~1	GZP6891A001KPP50K F01 WX
0~2.5	GZP6891A2.5KPP33Z F01 WX
0~5	GZP6891A005KPP50KF 01 WX
-0.5~0.5	GZP6891A0.5KPW50K F01 WX
-0.5~0.5	GZP6891A0.5KPW33Z F01 WX
-0.6~0.6	GZP6891A0.6KPW33Z F01 WX
-1~1	GZP6891A001KPW50K F01 WX
-5~5	GZP6891A005KPW33Z F01 WX
-7~7	GZP6891A007KPW55K F01 WX
-10~10	GZP6891A010KPW33Z 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)

- To minimize the zero drift as soldering, especially for the low pressure range, the recommended reflow oven temperature setting conditions are shown:

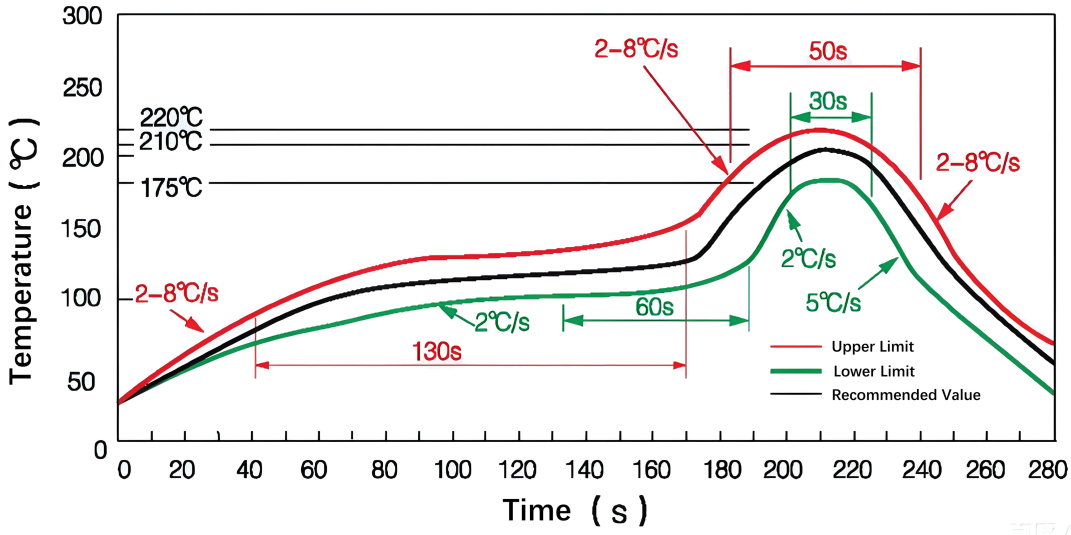


Fig.8 Remelting temperature setting conditions

(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 on P1 Port is dry non-corrosive gas and P2 Port 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: 47 PCS

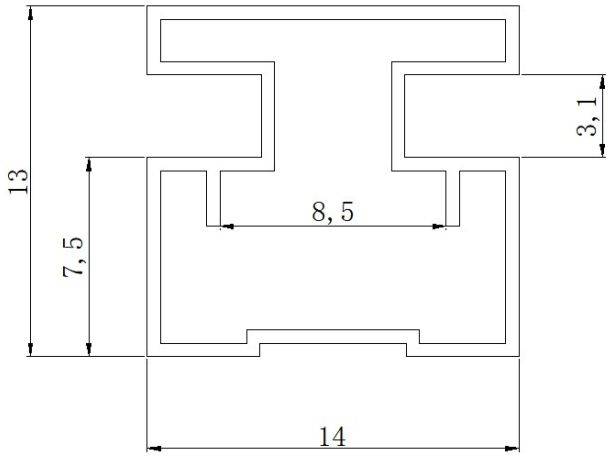
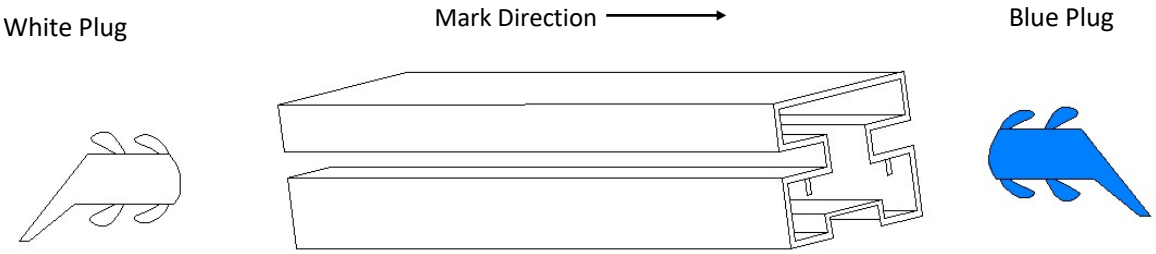
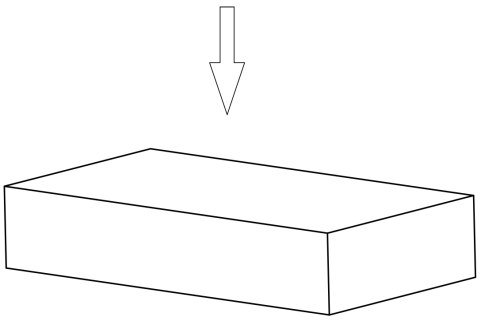


Fig.8 Section schematic diagram



(520mm x 14mm x 13mm，47PCS)



530mm x 145mm x 53mm，1880PCS

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

The information in this sheet has been carefully reviewed and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Furthermore, this information does not convey to the purchaser of such devices any license under the patent rights to the manufacturer. Sencoch Technology reserves the right to make changes without further notice to any product herein. Sencoch Technology makes no warranty, representation or guarantee regarding the suitability of its product for any particular purpose, nor does Sencoch Technology assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Typical parameters can and do vary in different applications. All operating parameters must be validated for each customer application by customer’s technical experts. Sencoch Technology does not convey any license under its patent rights nor the rights of others.