XGZP6857D Pressure Sensor Module

Features

- Ranges: -100kPa～5kPa…200kPa(-15PSI～0.7PSI…30PSI)
- Optional 5V or 3.3V or 3V power supply
- Gage & Vacuum Type
- For Non-corrosive gas or air
- Calibrated, I2C Signal output or Analog signal
- Temp. Compensated:0℃～+60℃(32℉～+140℉)
- Low Cost for high volume application

Applications

■ For Medical and healthy equipment field, such as Blood pressure test and monitor, Patient Monitoring, Infusion and Syringe Pumps, Anesthesia Machines, Respirators and Ventilators, NPWT, DVT, COPD Treatment, catheter, Kidney dialysis, Cupping& Cosmetology, Massage device etc.

■ For Home appliance field, such as Refrigerator, Printer, Humidifier, Washer/Dryer, Coffee Machine, Cleaner, Robotic, Emergency Lamp,Sport Equipment etc.

■ For Other fields, such as air pump, emergency lamp, dust collector, HVAC and pneumatic device,automotive application etc.

Introduction

XGZP6857D is a prefect silicon pressure sensor module offering a I2C digital interface for reading pressure over the specified full scale pressure span and temp.range.

The XGZP6857D incorporates a silicon piezoresistive pressure sensor die and an interior Application Specific Integrated Circuit(ASIC).

The XGZP6857D is fully calibrated and temperature compensated for offset,sensitivity, temperature and non-linearity,so XGZP6857D pressure sensor module satisfy the prefect repeatability,linearity, stability and sensibility, which can be applied directly in medical equipment, fitness machine,home electronics,and other pneumatic devices etc.

XGZP6857D pressure sensor module is for high volume application at an affordable cost and perfect performance.

Customized calibrations(excitation voltage and pressure range) are available.

Performance Parameter

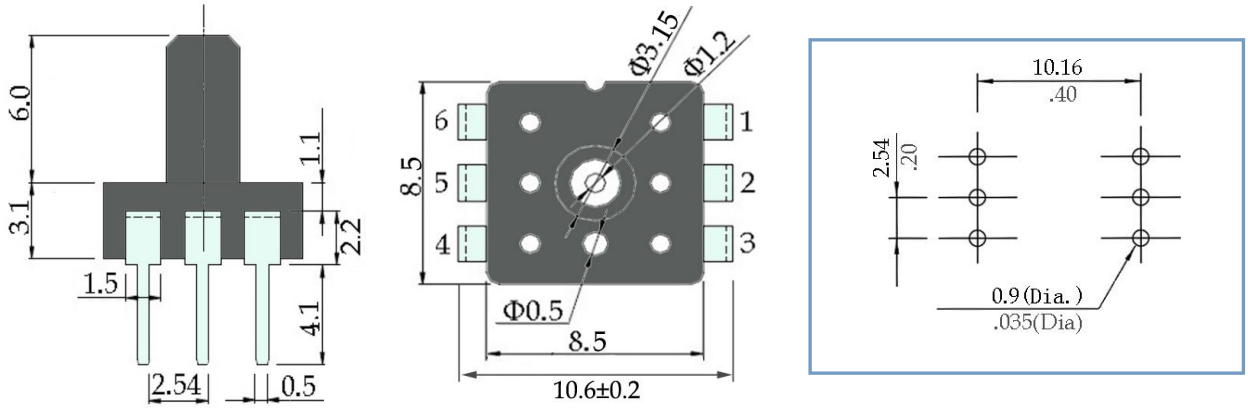
Unless otherwise specified, measurements were taken with a supply voltage of 5 Vdc at a temperature of 25±1℃ and humidity ranging from 25％～85％

Item	Data	Unit
Power Supply	5(or 3.3 or 3)	V
Max. Excitation current	3	mA
Output Resolution	24	Bit
Accuracy	±1.0(or ±0.5)	%Span
Response Time	2.5ms@OSR_P=1024X	Ms
SDA/SCL pull up resistor	4.7	Kohm
ESD HBM	4000	V
TCO(Temp. Coefficient of Offset)	±0.03	%FS/℃
TCS(Temp. Coefficient of Span)	±0.03	%FS/℃
Long Term Stability(1year)	±0.5	%Span
Over Pressure	2X	Rated
Compensation Temp.	0 ～ 65/32 ～ 149	℃/℉
Ambient Temp.	-10 ～ 85/14 ～ 176	℃/℉
Storage Temp.	-40 ～ 125/-40 ～ 257	℃/℉
TSO(Temp. Coefficient of Offset)	±0.03	%FS/℃

Pressure Range (100kPa=0.1MPa=1bar≈14.5PSI)

Pressure Range（kPa）	Model
0 ～ 2.5	XGZP6857D025HPG
0 ～ 5	XGZP6857D005KPG
0 ～ 10	XGZP6857D010KPG
0 ～ 20	XGZP6857D020KPG
0 ～ 40	XGZP6857D040KPG
0 ～ 100	XGZP6857D100KPG
0 ～ 200	XGZP6857D200KPG
-100 ～ 0	XGZP6857D100KPGN
-30 ～ 0	XGZP6857D030KPGN
-20 ～ 0	XGZP6857D020KPGN
-5 ～ 5	XGZP6857D005KPGPN
-40 ～ 40	XGZP6857D040KPGPN
-100 ～ 100	XGZP6857D100KPGPN
-100 ～ 200	XGZP6857D200KPGPN
Available for more custom pressure range such like -2.5～2.5kPa, 0～60kPa etc,. Please contact factory for tailor-made parameter	

Dimension & Recommended Footprint (Unit:mm)



Electric Connection

1	2	3	4	5	6
GND	SCL	SDA	NC	VDD	NC

NOTE:

1,N/C Pins must be left floating

2,Soldering of lead Pins:250'C for 5 sec max.

3,Please add 0.1uf capacitor between VDD and GND

Order Guide

XGZP6857 D 100 KP G

- G: Pressure Type(G:Gauge GN:Negative GPN:P+N)
- KP: Pressure Unit(KP：kPa HP:hPa)
- 100: Pressure Range(000-999)
- D: Output Signal(A: Analog(0.5-4.5V) D:I2C)
- XGZP6857: Series

Note: 5Vdc as default power voltage, add 33(or 30) behind model signify 3.3V(or 3.0V) power supply, e.g. XGZP6857D040KPG33(or XGZP6857D040KPG30)

Notes:

1. Implement ESD protection during soldering and assembly.
2. Overload voltage(6.5Vdc) or current(5mA) may burn the ASIC.
3. The medium must be compatible with the pressurized parts.
4. Please contact us for special request on parameter and application.

I2C INTERFACE:

I2C bus uses SCL and SDA as signal lines. Both lines are connected to VDDIO externally via pull-up resistors so that they are pulled high when the bus is free. The I2C device address of IC is shown below. The LSB bit of the 7bits device address is configured via SDO/ADDR pin(set as 1).

I2C Address

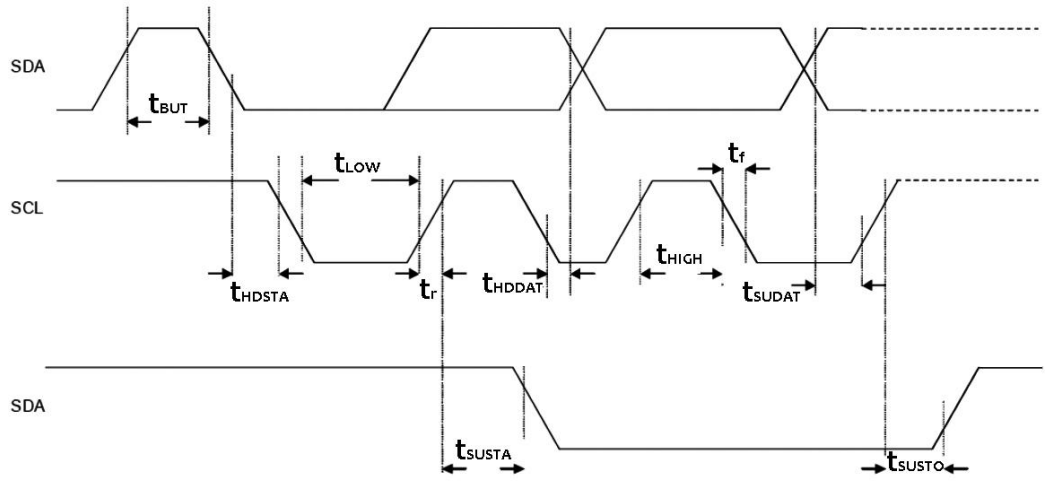
A7	A6	A5	A4	A3	A2	A1	W/R
1	1	0	1	1	0	SDA/ADDR	0/1

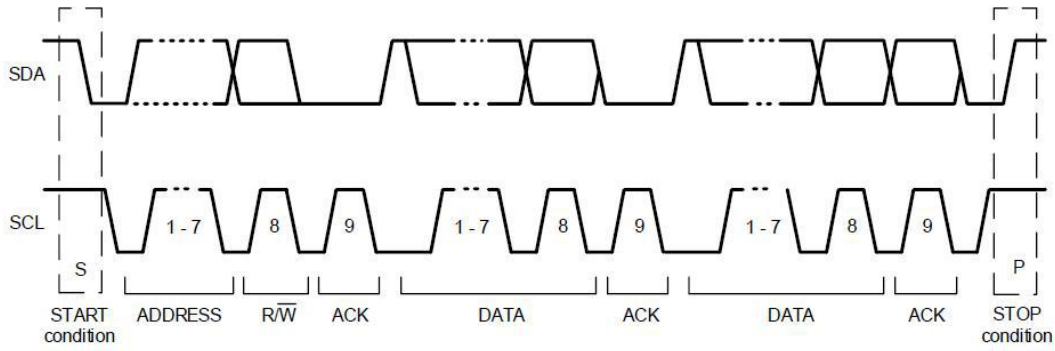
Electrical specification of the I2C interface pins

Symbol	Parameter	Condition	Min	Max	Unit
f_{scl}	Clock frequency			400	KHz
t_{LOW}	SCL low pulse		1.3		us
t_{HIGH}	SCL high pulse		0.6		us
t_{SUDAT}	SDA setup time		0.1		us
t_{HDDAT}	SDA hold time		0.0		us
t_{SUSTA}	Setup Time for a repeated start		0.6		us
t_{HDSTA}	Hold time for a start condition		0.6		us
t_{SUSTO}	Setup Time for a stop condition		0.6		us
t_{BUF}	Time before a new transmission		1.3		us

The I2C interface protocol has special bus signal conditions. Start (S), stop (P) and binary data conditions are shown below. At start condition, SCL is high and SDA has a falling edge. Then the slave address is sent. After the 7 address bits, the direction control bit R/W selects the read or write operation. When a slave device recognizes that it is being addressed, it should acknowledge by pulling SDA low in the ninth SCL (ACK) cycle.

At stop condition, SCL is also high, but SDA has a rising edge. Data must be held stable at SDA when SCL is high. Data can change value at SDA only when SCL is low.





I2C Time Diagram and I2C Protocol

IIC Read Process

The I2C address is as follows: A1 is 1

A7	A6	A5	A4	A3	A2	A1	W/R
1	1	0	1	1	0	SDO/ADDR	0/1

As the following instruction sequences for reading data:

1. Read the 0xA5 register value, put the read binary value "and" on "11111111101" then write to 0xA5.
2. Send instructions 0x0A to 0x30 register for one temperature acquisition, one pressure data acquisition.
3. Read the 0x30 register address. If Sco bit is 0,signify the acquisition end, the data can be read.
4. Read 0x06, 0x07, 0x08 register address data to form a 24-bit AD value (pressure data AD value).
5, Install the read 24 bit AD value to calculate the final pressure output : OUT (Pa) =AD/2^23*Fullscale.

Pay attention to the Fullscale value
Eg:When Fullscale pressure is 600000Pa,2^19<600000<2^20, it need 20bits at least to state the pressure in a 24bit AD.
Here the Fullscale value is 2^20

Interior registers data

Addr	Description	R/W	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
0x00	SPI _Ctrl	RW	SDO_active	LSB_first	Softreset			Softreset	LSB_first	SDO_active	0x00
0x01	Part_ID	R	PartID<7:0>								0x00
0x02	Status	R	Error_code<3:0>						1'b0	DRDY	
0x06	DATA_MSB	R	Data out<23:16>								0x00
0x07	DATA_CSB	R	Data out<15:8>								0x00
0x08	DATA_LSB	R	Data out<7:0>								0x00
0x09	TEMP_MSB	R	Temp out<15:8>								0x00
0x0A	TEMP_LSB	R	Temp out<7:0>								0x00
0x30	CMD	RW	Sleep_time<3:0>				Sco	Measurement_ctrl<2:0>			0x00
0x6C	OTP_CMD	RW	Blow start<6:0>							margin	0x00

Reg0x00

SDO_active: 1: 4-wire SPI, 0: 3-wire SPI

LSB_first: 1: LSB first for SPI interface, 0: MSB first for SPI interface

Soft_reset: 1: Reset all the CFS2300 registers (except 'margin'), automatically come back to 0 after reset complete.

Reg0x01

Part ID**:** OTP programmed 8 bits Part ID, corresponding to OTP register Reg0xA4. Read only from the address 0x01.

Reg0x02

DRDY：1, indicates once conversion complete, and the output data is ready for reading.

Error_code: When diagnostic function enabled, These bits stores the error information.

Error_code[3]: VINP short to VDD

Error_code[2]: VINP short to GND

Error_code[1]: VINN short to VDD

Error_code[0]: VINN short to GND

Reg0x06-Reg0x08

Data_out: 24 bits ADC output data when 'raw_data_on' = 0 with an LSB equals to (1/2^23)*(VEXT-PSW). 24 bits calibrated data when 'raw_data_on' = 1.

Reg0x09-Reg0x0a

Temp_out: Temperature output with an LSB equals to (1/256) °C

Reg0x30

Sleep_time<3:0>: 0000:0ms, 0001:62.5ms, 0010:125ms ... 1111: 1s, only active during sleep mode conversion.

Measurement_control<1:0>: 000b, indicate a single shot temperature signal conversion. 001b, indicate a single shot sensor signal conversion. 010b: indicate a combined conversion (once temperature conversion immediately followed by once sensor signal conversion). 011b: indicate a sleep mode conversion (periodically perform once combined conversion with an interval time of 'sleep_time'), 100b: OTP programming mode, enter this mode to when programming OTP banks.

Sco: 1, Start of conversion, automatically come back to 0 after conversion ends (except sleep mode conversion).

Reg0x6C

Blow_start<6:0>: Write these bits into 0110101b to start the OTP blowing. The whole OTP banks would be automatically programmed as what stored in the corresponding OTP registers. The OTP banks can only be programmed once.
Margin: Provides a critical read condition to filter out "weak programmed" bits when OTP reloading during soft reset. It is recommended to set this bit after OTP programmed in factory to check if the OTP banks are reliably programmed

The total pressure output value which include REG0x06, REG0x07 and REG0x08 registers are24 bits. The highest position is the sign bit, and the symbol digit value is "1" when it represents "negative". The symbol digit value is "0" when it represents "positive".

The number of temperature output values in the REG0x09 and REG0x0A registers are 16 bits, the highest is the symbol bit.
The symbol digit value is "1" when it represents "negative", and the symbol digit value is "0" when it represents "positive".

For example, if the decimal values of REG0x06, REG0x07, REG0x08, REG0x09 and REG0x0A readout are x, y, z, a, b

Pressure cal_AD value:
Pressure [kPa] = (Pressure 3rd Byte [23:16] x 65536+Pressure 2nd Byte [15:8] x 256 + Pressure1st Byte [7:0]) / k/1000
Among them, Pressure 3rd Byte [23:16] is the hexadecimal value read out by REG0x06 and converted into decimal and then brought into the formula;
Pressure 2nd Byte [15:8] is the hexadecimal value read out by REG0x07 and converted into decimal and then brought into the formula;
Pressure1st Byte [7:0] is the hexadecimal value read out by REG0x08 and converted into decimal and then brought into the formula;
The value of k is related to the range, as shown in Table 1-1 below:

Pressure range(kpa)	K(value)
1000＜P≤2000	2^2
500＜P≤1000	2^3
260＜P≤500	2^4
131＜P≤260	2^5
65＜P≤131	2^6
32＜P≤65	2^7
16＜P≤32	2^8

If the pressure range P is 100 kPa,→k = 2^6.

Temperature value: n=a*2^8+b

Positive and negative processing: if n>2^15, it is a negative value, the temperature value = (n-2^16) /256; (℃)

If n<2^15 is positive, the temperature is =n/256; (℃).

Any more question, please contact sales or tech-support(info@CFSensor.com)

The listed specifications and dimensions are subject to change without prior notice.

Overall Notes:

Mounting

Adopting land on the PC board for ensuring the sensor is securely fixed.

Soldering

Due to its small size, the thermal capacity of the pressure sensor is low.Therefore, take steps to minimize the effects of external heat.Damage and changes to characteristics may occur due to heat deformation. Use a non-corrosive resin type of flux. Since the pressure sensor is exposed to the atmosphere, do not allow flux to enter inside.

▼ Manual soldering

⊙Raise the temperature of the soldering tip between 260 and 300°C/500 and 572°F (30 W) and solder within 5 seconds.

⊙The sensor output may vary if the load is applied on the terminal during soldering.

⊙Keep the soldering tip clean.

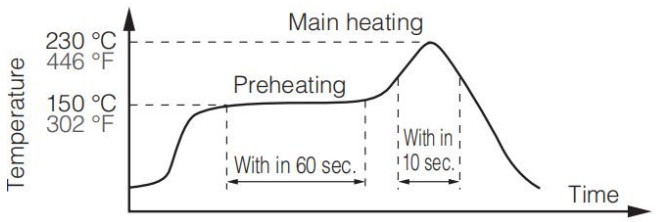
▼DIP soldering (DIP Terminal)

⊙Keep the temperature of the DIP solder tank below 260°C/500 and solder within 5 seconds.

⊙To avoid heat deformation, do not perform DIP soldering when mounting on the circuit board which has a small thermal capacity.

▼Reflow soldering (SMD Terminal)

⊙The recommended reflow temperature profile conditions are given below.



⊙We recommend the screen solder printing method as the method of cream.
⊙Please refer to the recommended PC board specification diagram for the PC board foot pattern.
⊙Self alignment may not always work as expected, therefore, please carefully the position of the terminals and pattern.
⊙The temperature of the profile is assumed to be a value measured with the printed wiring board of the terminal neighborhood.
⊙Please evaluate solderbility under the actual mounting conditions since welding and deformation of the pressure inlet port may occur due to heat stress depending on equipments or conditions.
▼ Rework soldering
⊙Complete rework at a time.
⊙Use a flattened soldering tip when performing rework on the solder bridge. Do not add the flux.
⊙Keep the soldering tip below the temperature described in the specifications.
▼ Avoid drop and rough handling as excessive force may deform the terminal and damage soldering characteristics.
▼ Keep the circuit board warpage within 0.05 mm of the full width of the sensor.
▼ After soldering, do not apply stress on the soldered part when cutting or bending the circuit board.
▼ Prevent human hands or metal pieces from contacting with the sensor terminal. Such contact may cause anomalous outlets as the terminal is exposed to the atmosphere.
▼ After soldering, prevent chemical agents from adhering to the sensor when applying coating to avoid insulation deterioration of the circuit board.
▼ Please consult us concerning leadfree soldering.

Wire Connection

▼ Correctly wire as in the connection diagram. Reverse connection may damage the product and degrade the performance.
▼ Do not use idle terminals to prevent damages to the sensor.

Cleaning

▼ Since the pressure sensor chip is exposed to the atmosphere, do not allow cleaning fluid to enter inside.
▼ Avoid ultrasonic cleaning since this may cause breaks or disconnections in the wiring.

Environment

▼Please avoid using or storing the pressure sensor chip in a place exposed to corrosive gases (such as the gases given off by organic solvents, sulfurous acid gas, hydrogen sulfides, etc.) which will adversely affect the performance of the pressure sensor chip.

▼Since this pressure sensor chip does not have a water-proof construction, please do not use the sensor in a location where it may be sprayed with water, etc.

▼Avoid using the pressure sensors chip in an environment where condensation may form. Furthermore, its output may fluctuate if any moisture adhering to it freezes.

▼The pressure sensor chip is constructed in such a way that its output will fluctuate when it is exposed to light. Especially when pressure is to be applied by means of a transparent tube, take steps to prevent the pressure sensor chip from being exposed to light.

▼Avoid using the pressure sensor chip where it will be susceptible to ultrasonic or other high-frequency vibration.

▼Please keep the sensors sealed using static shielding bags on storage. The PINs of sensor are plated by Ag. If the sensors expose to an atmosphere, the PINs will be black by oxidation.

Quality Check under actual loading conditions

To assure reliability, check the sensor under actual loading conditions. Avoid any situation that may adversely affect its performance.

Other handling precautions

▼That using the wrong pressure range or mounting method may result in accidents.

▼The only direct pressure medium you can use is dry air. The use of other media, in particular, corrosive gases (organic solvent based gases, sulfurous acid based gases, and hydrogen sulfide based gases, etc.) and media that contains moisture or foreign substances will cause malfunction and damage. Please do not use them.

▼The pressure sensor chip is positioned inside the pressure inlet. Never poke wires or other foreign matter through the pressure inlet since they may damage the chip or block the inlet. Avoid use when the atmospheric pressure inlet is blocked.

▼Use an operating pressure which is within the rated pressure range. Using a pressure beyond this range may cause damage.

▼Since static charge can damage the pressure sensor chip, bear in mind the following handling precautions.

⊙When storing the pressure sensor chips, use a conductive material to short the pins or wrap the entire chip in aluminum foil. Plastic containers should not be used to store or transport the chips since they readily become charged.

⊙ When using the pressure sensor chips, all the charged articles on the bench surface and the work personnel should be grounded so that any ambient static will be safely discharged.

▼Based on the pressure involved, give due consideration to the securing of the pressure sensor DIP type and to the securing and selection of the inlet tube.

Safety Precautions

● Do not use these sensors under any circumstances in which the range of their ratings, environment conditions or other specifications are exceeded. Using the sensors in any way which causes their specifications to be exceeded may generate abnormally high levels of heat, emit smoke, etc., resulting in damage to the circuitry and possibly causing an accident.

● Before connecting a connector, check the pin layout by referring to the connector wiring diagram, specifications diagram, etc., and make sure that the connector is connected properly. Take note that mistakes made in connection may cause unforeseen problems in operation, generate abnormally high levels of heat, emit smoke, etc., resulting in damage to the circuitry.

● Do not use any pressure sensor which has been disassembled or remodeled.

● Protection circuit recommended.

The possible failure mode is either open or short of the output transistor.

An ecess heat is the cause for short mode failure. For any important and serious application in terms of safety, add protection circuit or any other protection method.

- Various safety equipment and safety equipment
- Traffic light
- Security crime prevention equipment
- Equipment concerning control and safety of trains, cars, etc.
- Applications such as temperature control using sensor output etc.

● If it is expected that malfunction of each sensor may cause injury to persons or serious expansion damage, be sure to implement safety measures such as double safety circuit.