ADP910 Datasheet

Digital Differential Pressure Sensor

- Excellent repeatability , no drift
- Built-in temperature compensation
- High reliability and long-term stability
- High signal-to-noise ratio
- MCU with high processing power
- Short response time and fast measurement speed
- Small size and light weight

Product Summary

ADP910 is a digital differential pressure sensor designed for high-precision differential pressure measurement with a response time of less than 2ms. The chip inside the sensor can measure the pressure difference of air, nitrogen, and oxygen through the influence of airflow on the temperature field distribution around it. It has the characteristics of high precision, no drift, and strong stability. At the same time, it has excellent performance in terms of sensitivity, shock resistance, and temperature changes.

The ADP910 sensor has a standard I^2C interface, simple communication method, and can be easily connected to a microprocessor.

Applications

ADP910 is designed for home appliances, medical and other industries, and is widely used in HVAC, VAV controllers, gas boilers, pellet stoves and fuel cells, heat recovery systems, filter monitoring, as well as medical breathing devices, fire protection residual pressure monitoring systems and other scenarios.

Figure 1. ADP910 differential pressure sensor

1. Sensor Parameters and Materials

1.1 Pin Assignment

Figure 2. ADP910 pin diagram

Figure 2 shows the pin and vent indication diagram of ADP910 . A and B are vents, and both A and B can be used as air inlet and air outlet according to the situation. When vent A is the air inlet, the differential pressure is positive, and when vent B is the air inlet, the differential pressure is negative. The pin names and function descriptions are shown in Table 1.

Table 1. ADP910 Pin Assignments

Pin number	Pin Name	Description
1	SDA	Serial data (I^2C interface)
2	GND	Grounding
3	VDD	VDD Power supply (requires external 0.1 µf filter capacitor)
4	SCL	Serial clock (I^2C interface)

1.2 Sensor parameters

Table 2. Sensor parameters

Parameter	Description
Measuring range	- 500 ~ 500 Pa
Zero point accuracy	0.3 Pa
Accuracy	Reading × 3%
Zero point repeatability	0.1 Pa
Repeatability	Reading × 0.5%
Year offset	<0.05 Pa
Response time	<2 ms
Calibration gas	Air
Fluid Compatibility	Air, nitrogen, oxygen (non-condensing state)
Temperature compensation range	0 ～ 50° C

Note : Unless otherwise stated, all sensor differential pressure parameters are measured at 25° C , V DD 3.3 V , and 966 mbar absolute pressure.

1.3 Temperature parameters

Table 3. Temperature parameters

Parameter	Numeric
Measuring range	-40 ～ 85° C
Accuracy	At -10 to 60° C , 2° C At -40 ~ -10 ° C and 60 ~ 85 ° C , 3 ° C
Repeatability	0.3° C

Note: The temperature in the table refers to the temperature inside the sensor . This temperature value depends not only on the gas temperature, but also on the ambient temperature around the sensor .

1.4 Electrical parameters

Table 4. Electrical parameters

Parameter	Symbol	State	Minimum	Typical Value	Maximum	Unit
Supply voltage	VDD	-	3.2	3.3	5.5	V
Supply Current	IDD	Measurement	-	10	12	mA

1.5 Timing parameters

Table 5. Timing parameters

Parameter	Description
Power-up time (time until the sensor is ready)	≤ 25 ms
I^2C SCL frequency	≤4 00 kHz
Pressure difference value update rate (in continuous mode)	5 00 Hz

1.6 Mechanical parameters

Table 6. Mechanical parameters

Parameter	Numeric
Rated burst pressure	5 bar
weight	6.1 g

1.7 Absolute minimum and maximum values

Table 7. Absolute minimum and maximum values

Parameter	scope
Voltage (VDD)	-0.3 ～ 5.5 V
The maximum voltage on the pins (SDA , SCL)	-0.3 ～ VDD +0.3 V
Input current on any pin	±70 mA
Operating temperature range	-40 ～ 85° C
Storage temperature range	-40 ～ 85° C
ESD HBM (Human Model)	2 kV

Note: This parameter is for air and nitrogen. Long-term exposure to oxygen at high temperature (>50 °C) will shorten the product life.

1.8 Material

Table 8. Materials

Parameter	Description
Material	PBT (polybutylene terephthalate), glass (silicon nitride, silicon oxide), silicon, gold, FR 4 (glass cloth), static sealing silicone, epoxy resin, copper alloy, lead-free solder
Standards / Certifications	REACH compliant , RoHS standard

2. Typical circuit diagram

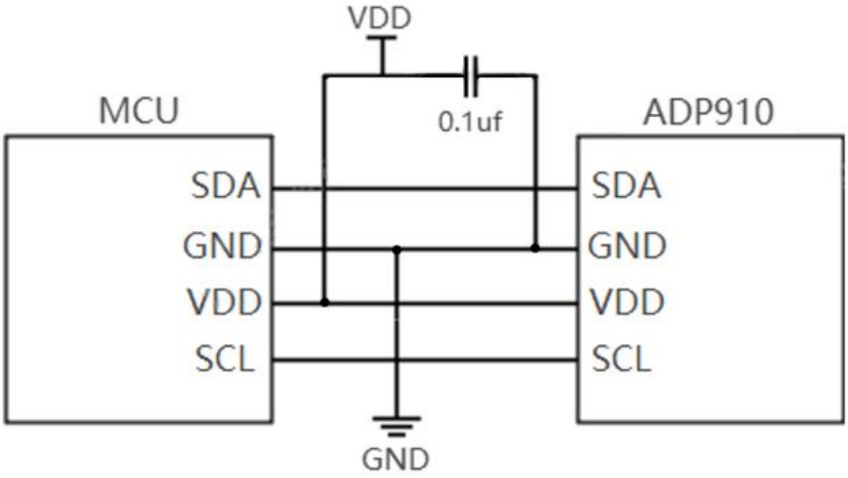

Figure 3. Typical circuit diagram

3. Communication Protocol

The I^2C of ADP910 adopts the standard 7-bit addressing I2C. In the 7-bit addressing process, the slave address starts to be transmitted in the first byte after the start signal. The first 7 bits of the byte are the slave address, and the 8th bit is the read/write bit, where 0 means write and 1 means read, as shown in Figure 4.

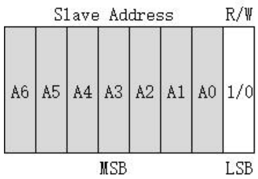

Figure 4. Standard I^2C 7-bit addressing format

I^2C host can be a computer, an I^2C reading device, etc. When the host sends a multi-byte command to ADP910 , that is, the timing diagram of the host writing multiple bytes to the slave is shown in Figure 5.

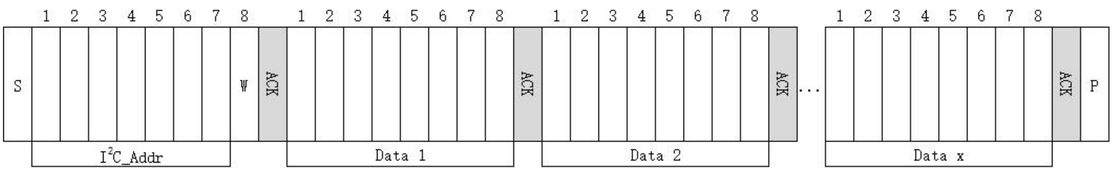

Figure 5. I^2C master writes 2 bytes of data to slave

When the host reads back multiple bytes from the ADP910 , that is, the timing diagram of the host reading multiple bytes from the slave is shown in Figure 6.

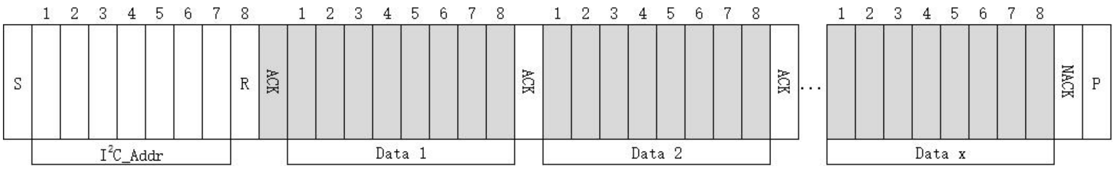

Figure 6. I^{2}C master reads multi - byte data from slave

Note: S : Start bit (Start signal); R / W : Read/Write bit; ACK : Acknowledge bit; NACK : Non-acknowledge bit; P : Stop bit (Stop signal);

White bottom data bit: host signal; gray bottom data bit: slave signal

3.1 ADP910 Slave Address

The I^{2}C slave address of ADP910 is 0x25 , which is 0 100101 in binary . When the host writes data to ADP910 , the first byte sent is 0x4A ; when the host reads data from ADP910 , the first byte sent is 0x4B.

3.2 ADP910 Instruction Set

Sent by the host to ADP910 are all composed of two bytes. See Table 9 for details.

Table 9. ADP910 Instruction Set

Instruction Description	**Instruction**	**Return from the machine**
Continuous measurement command	36 1 E	The slave returns 6 bytes
Product Type Reading Instructions	E 2 01	The slave returns 3 bytes

3.2.1 Continuous measurement instructions

The format of the continuous measurement instruction is shown in Table 10.

Table 10. Continuous measurement instruction format

Meaning	Address	Continuous measurement command	
Sending format	Byte 1	Byte 2	Byte 3
	0x4A	0x36	0x1E

The format returned by the continuous measurement command is shown in Table 11.

Table 11. Continuous measurement command return format

Meaning	Address	Differential pressure raw data		CRC	Temperature raw data		CRC
Slave return format	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
	0x4B	xx	xx	xx	xx	xx	xx

Note: **xx** indicates the data returned by the slave.

Example:

Host sends: 4 A 36 1 E

Slave return: 4 B 09 60 F 9 13 66 21

Among them, 0 x 0960 is the differential pressure raw data, 0 x 1508 is the temperature raw data, and their corresponding CRC 8 check values are 0 xF 9 and 0 x 21 respectively. For the CRC 8 algorithm, see Section 3.3.

According to the calculation formula in Table 12, it can be concluded that the differential pressure is 0 x 0960/60=2400/60=40 (Pa); the temperature is 0 x 1366/200=4966/200=24.83 (℃).

Table 12. Pressure difference and temperature calculation formula

Pressure difference calculation formula	Differential pressure = original differential pressure data/60
Temperature calculation formula	Temperature = original temperature data/200

3.2.2 Product type reading instructions

The format table of product type read instructions is shown in Table 13.

Table 13. Product type read instruction format table

Meaning	Address	Product Type Reading Instructions	
Sending format	Byte 1	Byte 2	Byte 3
	0x4A	0xE 2	0x01

The format table returned by the product type read command is shown in Table 14.

Table 14. Product type read command return format table

Meaning	Address	Product Type Code		CRC
Slave return format	Byte 1	Byte 2	Byte 3	Byte 4
	0x4B	xx	xx	xx

Note: **xx** indicates the data returned by the slave.

Example:

Host send: 4 A E 2 01

Slave return: 4 B 41 53 D 1

Among them, 0 x 4153 is the product type code of ADP910 , and 0 xD 1 is the CRC 8 check value of 0 x 4153 .

3.3 CRC 8 check

There are three CRC standards: CRC 8 , CRC 16 , and CRC 32. The ADP910 uses CRC 8. Taking the polynomial x8 + x5 + x4 +1 (0x31) as an example, the CRC 8 checksum byte is generated by the CRC algorithm with the properties shown in Table 15.

Table 15. Values corresponding to each attribute

property	value
length	8 bits
Polynomial	x8 + x5 + x4 +1
Initial Value	0xFF
Does the input need to be inverted?	False
Does the output need to be inverted?	False
Final XOR value	0x00

C language code for calculating the CRC code is as follows:

```
//************************************************************
//Function name: Calc _ CRC 8
//Function: CRC 8 calculation, initial value: 0 xFF , polynomial: 0 x 31 ( x 8 + x 5 + x 4 +1)
//Parameter: u 8 * data : the first number of CRC verification; u 8 Num : the length of CRC verification data
//Return: crc : the calculated value of crc 8
//**************************************************************
u 8 Calc _ CRC 8( u 8 * data , u 8 Num )
{
	u 8 bit , byte , crc =0 xFF ;
	for ( byte =0; byte < Num ; byte ++)
{
		crc ^=( data [ byte ]);
		for ( bit =8; bit >0;-- bit )
{
			if ( crc &0 x 80) crc =( crc <<1)^0 x 31;
			else crc =( crc << 1);
}
}
	return crc ;
}
```

4. Dimensions

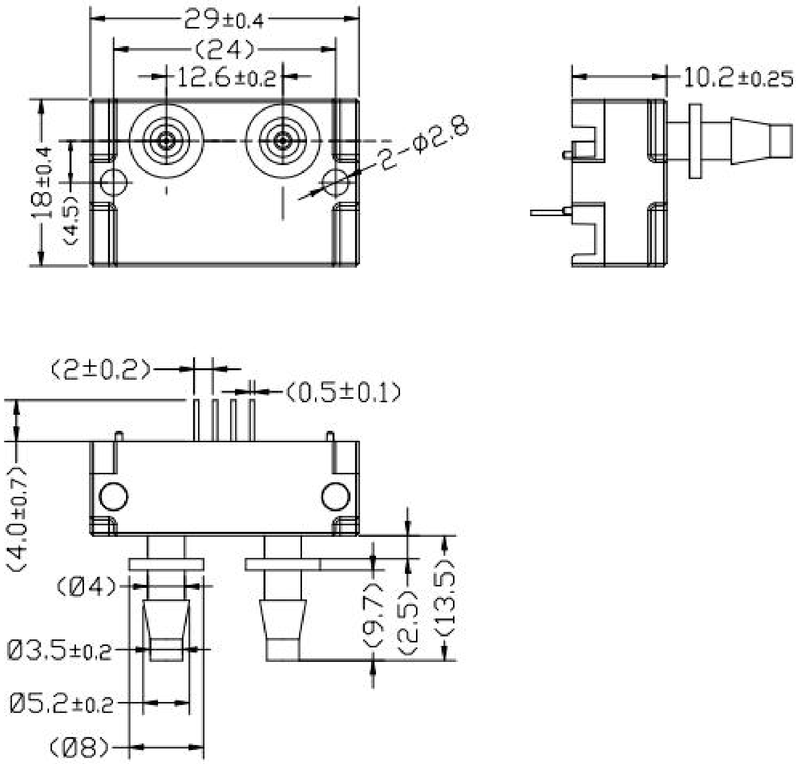

Figure 7. ADP910 Dimensions (Unit: mm, tolerance ±0.5 not specified, chamfer R 0.5 not specified)

5. Welding

Reflow soldering may damage the sensor, so customers are required to use manual soldering of the ADP910 sensor. When soldering, the soldering temperature should be lower than 350°C and the contact time should be less than 5 seconds.

Warning and Personal Injury

Do not use this product in safety protection devices or emergency stop devices, or in any other application where personal injury may occur due to failure of the product, unless there is a specific purpose or authorization for use. Refer to the product data sheet and instructions before installing, handling, using or maintaining the product. Failure to follow the advice may result in death or serious personal injury. The company will not be liable for all compensation for personal injury and death caused thereby, and will exempt any claims that may arise from the company's managers and employees, as well as affiliated agents, distributors, etc., including: various costs, claims, attorney fees, etc.

Quality Assurance

Guangzhou Aosong Electronic Co., Ltd. provides the following quality assurance to direct purchasers of its products (calculated from the date of shipment), with the technical specifications indicated in the Aosong Electronic product manual. If the product is proven to be defective during the warranty period, the company will provide free repair or replacement services.

Product Categories	Warranty period
ADP910 Differential Pressure Sensor	12 months

The company is only responsible for defective products that are used in situations that meet the technical requirements of the product. The company does not make any guarantees for the application of products in special scenarios that are not recommended. The company also does not make any promises about the reliability of products applied to other products or circuits that are not supported by the company.

This manual is subject to change without prior notice.

The final right of interpretation of this product belongs to Guangzhou Aosong Electronic Co., Ltd.

Copyright © 2025 , ASAIR ®