Gauge Pressure Type

AL4 Series

# Low Pressure & Digital Output Semiconductor Pressure Sensor

Description

The AL4 pressure sensor series is a low pressure and digital output pressure sensor. It composed of a silicon piezoresistive pressure sensing chip and a signal conditioning integrated circuit. The low-level signal from the sensing chip is amplified, temperature compensated, calibrated and finally converted to digital data that is proportional with the applied pressure.
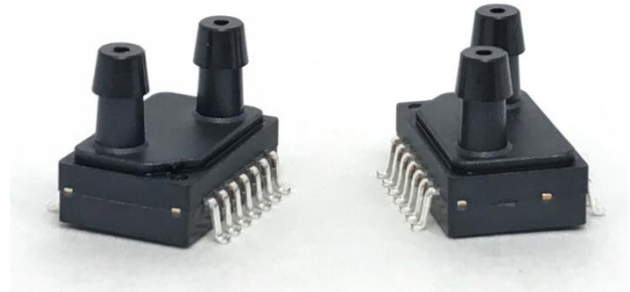
AL4*DB

Features

- Low pressure range (Gauge)
- High proof pressure +100 kPa
- I^{2}C or SPI digital output
- High accuracy ±1.0 %FS
- Supply voltage 3.0, 3.3 & 5.0 Vdc
- Low supply current Max 3.5 mA at 3.3 Vdc
- Moisture sensitivity level (MSL) 1
- Miniature 11.36mm x 10.32 mm SMT package
- Dual barbed ports
- Operating temperature -40 to 85°C
- Compensated temperature -5 to 65°C
- Pressure range modification available

Applications

- Battery-operated Devices
- Medical Devices
- Industrial Pneumatic Devices
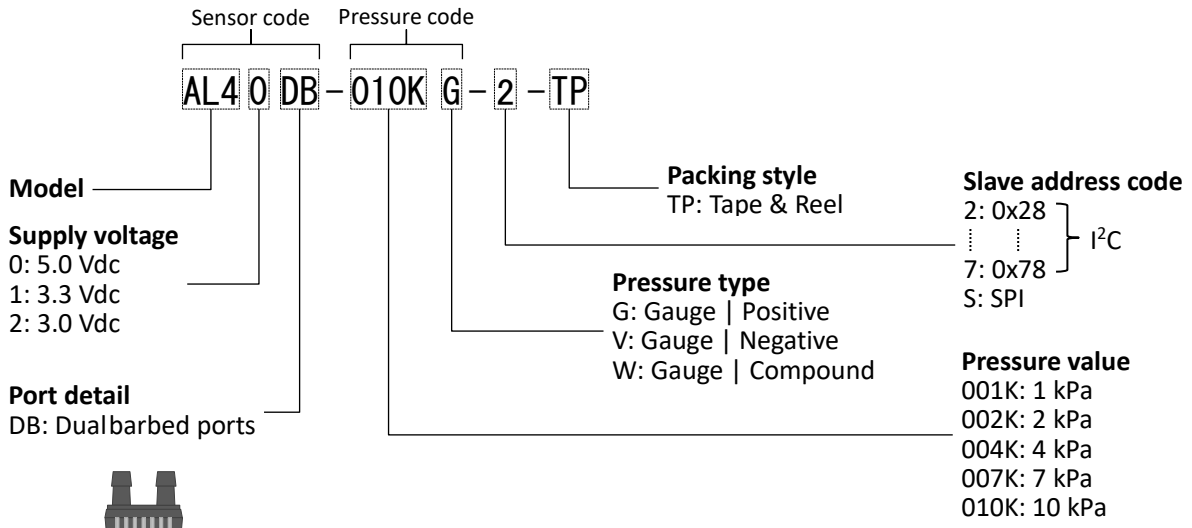- Consumer Devices

✓ **RoHS Compliant**

Device Lineup

Model	Pressure Type	Supply Voltage	Accuracy	Pressure Range										
				-10 (-100)	-7 (-70)	-4 (-40)	-2 (-20)	-1 (-10)	0	1 (10)	2 (20)	4 (40)	7 (70)	10 kPa (100) cmH$_2$0
AL4	Gauge	5.0 Vdc 3.3 Vdc 3.0 Vdc	±1.0%FS								002KG 004KG 007KG 010KG 002KV 004KV 007KV 010KV 001KW 002KW 004KW 007KW 010KW			

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Low Pressure & Digital Output Semiconductor Pressure Sensor

Device Name Code

Sensor code   Pressure code

AL4 0 DB – 010K G – 2 – TP

Model

Supply voltage
0: 5.0 Vdc
1: 3.3 Vdc
2: 3.0 Vdc

Port detail
DB: Dual barbed ports

Packing style
TP: Tape & Reel

Pressure type
G: Gauge | Positive
V: Gauge | Negative
W: Gauge | Compound

Slave address code
2: 0x28 ⎫
⋮   ⎬ I²C
7: 0x78 ⎭
S: SPI

Pressure value
001K: 1 kPa
002K: 2 kPa
004K: 4 kPa
007K: 7 kPa
010K: 10 kPa
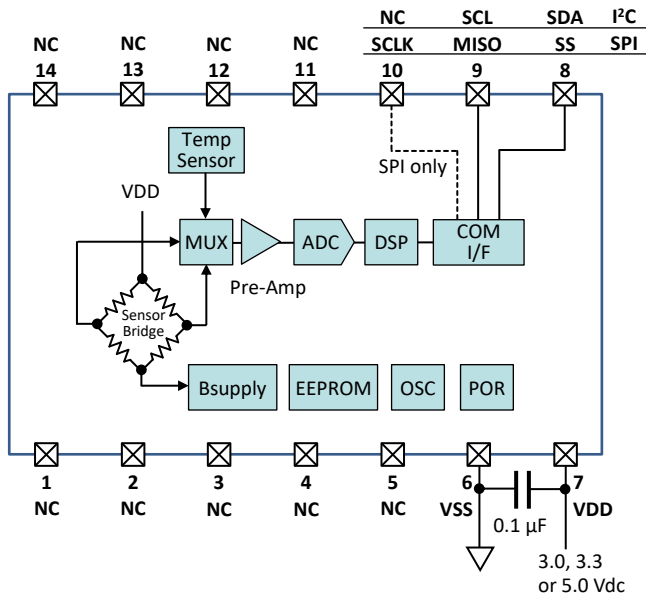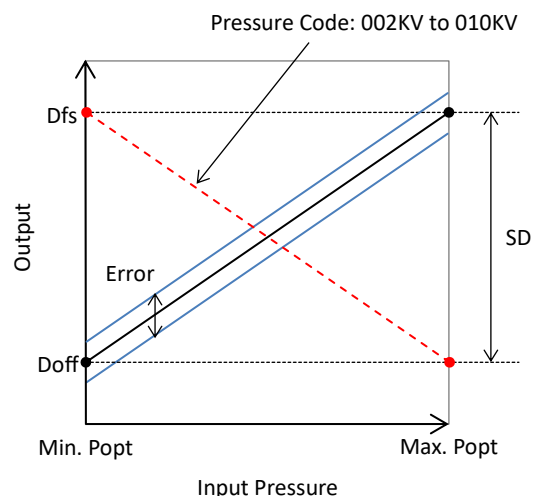
Block Diagram

Communication mode is factory setting.
User can NOT change communication mode like I²C to SPI or SPI to I²C.

			I²C
NC	SCL	SDA	
SCLK	MISO	SS	SPI

| NC 14 | NC 13 | NC 12 | NC 11 | 10 | 9 | 8 |

Temp Sensor

VDD

MUX → [Pre-Amp] → ADC → DSP → COM I/F

SPI only

Sensor Bridge

Bsupply | EEPROM | OSC | POR

| 1 NC | 2 NC | 3 NC | 4 NC | 5 NC | 6 VSS | 7 VDD |

0.1 µF

3.0, 3.3 or 5.0 Vdc

Output Characteristics

Pressure Code: 002KV to 010KV

Dfs

Output

Error

Doff

SD

Min. Popt   Max. Popt

Input Pressure

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Low Pressure & Digital Output
Semiconductor Pressure Sensor

Gauge Pressure Type

AL4 Series

Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply Voltage	VDDmax	-0.3 to +6	Vdc
Voltage at Digital I/O Pins	Vdiomax	-0.3 to VDD + 0.3	Vdc
Proof Pressure, Burst Pressure		See Pressure Range Table	
Operating Temperature	Topt	-40 to +85	°C
Storage Temperature	Tstg	-40 to +85	°C

General Specifications

Item	Symbol	Sensor Code			Unit
		AL40DB	AL41DB	AL42DB	
Supply Voltage	VDD	5.0±0.25	3.3±0.165	3.0±0.15	Vdc
Type of Pressure	-	Gauge pressure			
Pressure Media	-	Non-corrosive gases			
Compensated Temperature	-	-5 to +65			°C
Operating Humidity	Hopt	to 95 (non-condensing, +65°C)			%RH
Storage Humidity	Hstg	to 95 (non-condensing, +65°C)			%RH

Pressure Range

Item	Symbol		Pressure Code														Unit
			002KG	004KG	007KG	010KG	002KV	004KV	007KV	010KV	001KW	002KW	004KW	007KW	010KW	
Abs. Max. Proof Pressure	Pmax+		+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	kPa
Abs. Min. Burst Pressure	Pburst		+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	+100	
Measurement Pressure	Popt	Min.	0	0	0	0	-2	-4	-7	-10	-1	-2	-4	-7	-10	
		Max.	+2	+4	+7	+10	0	0	0	0	+1	+2	+4	+7	+10	

Electrical Characteristics

Ambient temperature Ta = 25°C

Item	Condition	Symbol	Rating			Unit
			Min.	Typ.	Max.	
Offset Pressure Data	Min. Popt, 002KV to 010KV: Max. Popt	Doff	672	819	966	Count
Full Scale Pressure Data	Max. Popt, 002KV to 010KV: Min. Popt	Dfs	15418	15565	15712	Count
Span Pressure Data	Min. to max. Popt	SD	-	14746	-	Count
Accuracy	-5 to +65°C	Error	-1.0	-	+1.0	%FS
Supply Current	VDD = 5 Vdc	Ic	-	-	4.5	mAdc
	VDD = 3.3, 3.0 Vdc		-	-	3.5	
Response Time	for reference	tr	-	1	-	msec.

I²C Communication Protocol

Item	Content
Data Fetch	
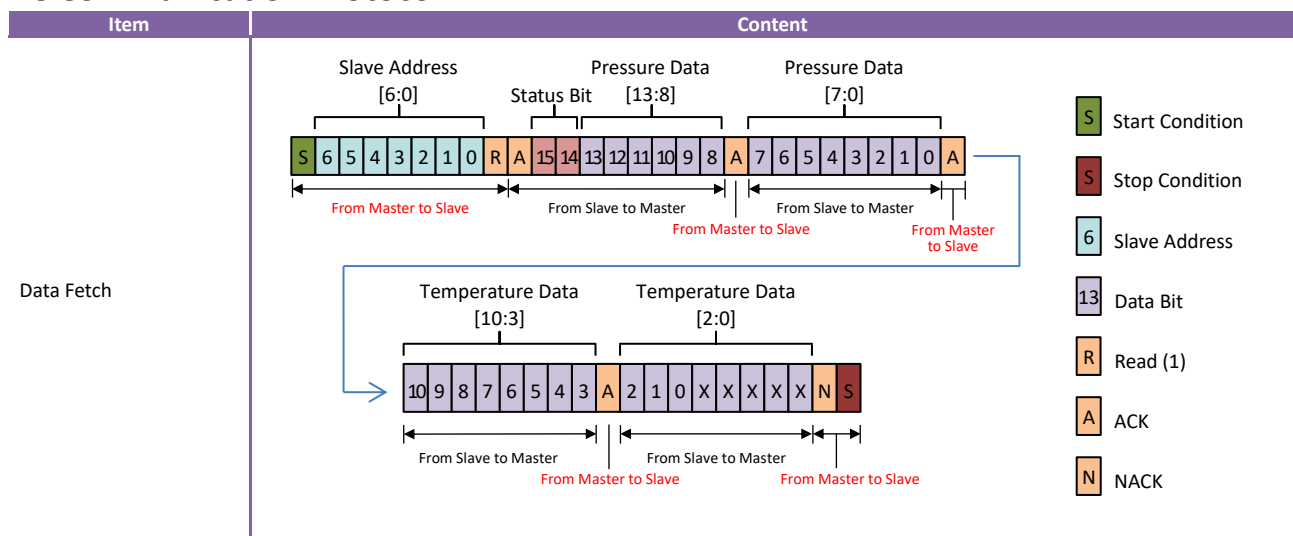
I²C™ is a trademark of NXP Semiconductors.

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SPI Communication Protocol

Item	Content
Data Fetch	 Packet = [{S(1:0),P(13:8)},{P(7:0)},{T(10:3)},{T(2:0),xxxxx}] S(1:0) = Status bits of packet (Normal, Command, Busy, EEPROM Error) P(13:8) = Upper 6 bits of 14-bit pressure data P(7:0) = Lower 8 bits of 14-bit pressure data T(10:3) = Corrected temperature data (if application does not require corrected temperature data, terminate read only.) T(2:0),xxxxx = Remaining bits of corrected temperature data for full 11-bit resolution Hi-Z = High impedance

Circuit Diagram

I²C	SPI
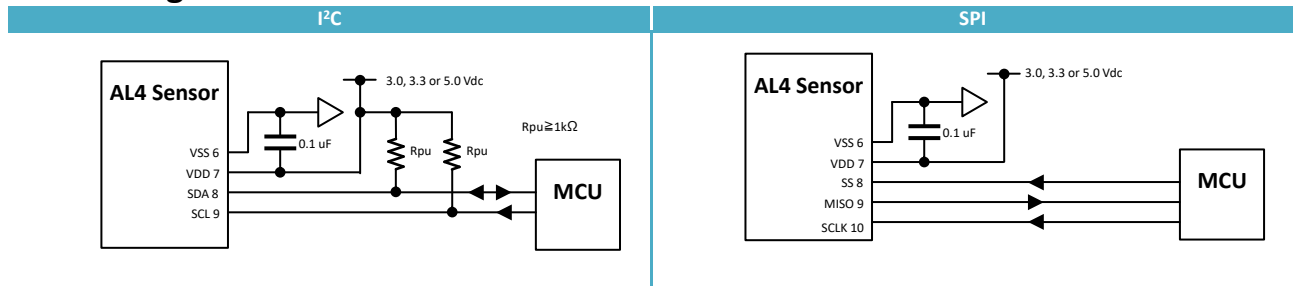
Package Dimensions

unit: mm

Port A: Pressure port

Port B: Vent to atmospheric pressure