

# Digital Output Semiconductor Pressure Sensor

# AP4 Series

## Description

The AP4 pressure sensor series is 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. The AP4 series measures gauge pressure.



AP4\*N



AP4\*R

## Features

- Digital output
- High accuracy  $\pm 1.5\%$ FS
- Supply voltage 3.0, 3.3 & 5.0 Vdc
- Low supply current Max 3.5 mA at 3.3 Vdc
- Operating temperature -40 to 125°C
- Wide compensated temperature 0 to 85°C
- Package compatible with Fujikura’s XFPM integrated pressure sensor
- Customization available

## Applications

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

**RoHS Compliant**

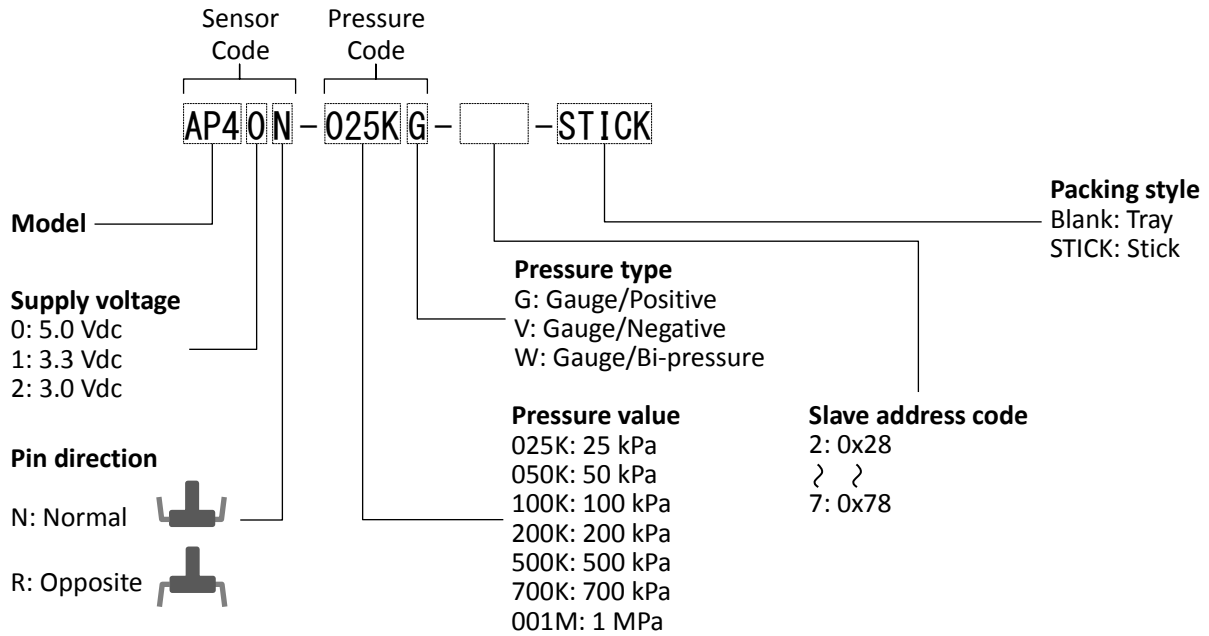
## Device Lineup

| Model | Pin Direction            | Pressure Type | Supply Voltage | Accuracy       | Pressure Range |      |       |       |     |      |      |      |       |       |  |
|-------|--------------------------|---------------|----------------|----------------|----------------|------|-------|-------|-----|------|------|------|-------|-------|--|
|       |                          |               |                |                | -100           | -50  | 0     | 25    | 50  | 100  | 200  | 500  | 700   | 1000  |  |
|       |                          |               |                |                | (-15)          | (-7) |       | (3)   | (7) | (15) | (30) | (70) | (100) | (150) |  |
| AP4   | Normal<br>or<br>Opposite | Gauge         | 5.0 Vdc        | $\pm 1.5\%$ FS |                |      |       | 025KG |     |      |      |      |       |       |  |
|       |                          |               | 3.3 Vdc        |                |                |      |       | 050KG |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      |       | 100KG |     |      |      |      |       |       |  |
|       |                          |               | 3.0 Vdc        |                |                |      |       | 200KG |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      |       | 500KG |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      | 700KG |       |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      | 001MG |       |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      | 050KV |       |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      | 100KV |       |     |      |      |      |       |       |  |
|       |                          |               |                |                |                |      | 100KW |       |     |      |      |      |       |       |  |

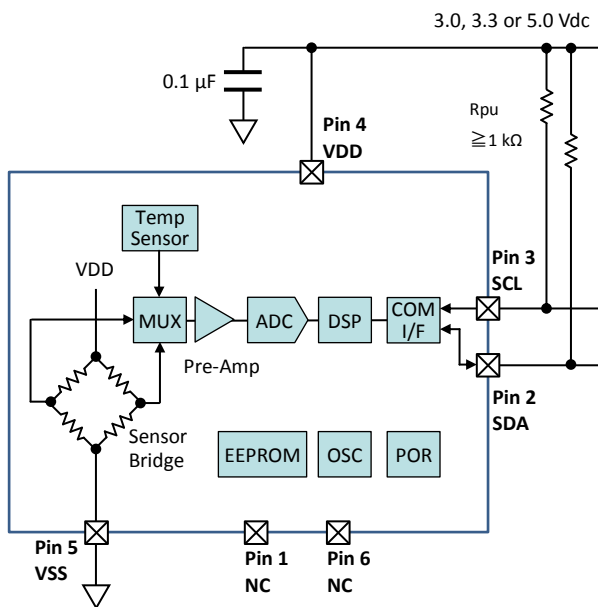
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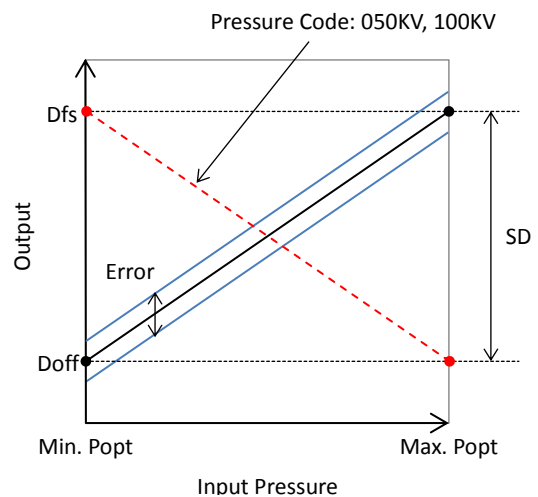
## Device Name Code



## Block Diagram



## Output Characteristics



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## 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  |
| Load Pressure               | Pmax+   | See Pressure Range Table |      |
| Operating Temperature       | Topt    | -40 to +125              | °C   |
| Storage Temperature         | Tstg    | -40 to +125              | °C   |

## General Specifications

| Item                    | Symbol | Sensor Code               |           |          | Unit |
|-------------------------|--------|---------------------------|-----------|----------|------|
|                         |        | AP40*                     | AP41*     | AP42*    |      |
| 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 | -      | 0 to +85                  |           |          | °C   |
| Operating Humidity      | Hopt   | 30 to 85 (non-condensing) |           |          | %RH  |
| Storage Humidity        | Hstg   | 30 to 85 (non-condensing) |           |          | %RH  |

## Pressure Range

| Item                           | Symbol | Pressure Code |       |       |       |       |       |       |       |       |       | Unit |
|--------------------------------|--------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
|                                |        | 025KG         | 050KG | 100KG | 200KG | 500KG | 700KG | 001MG | 050KV | 100KV | 100KW |      |
| Absolute Maximum Load Pressure | Pmax+  | +50           | +100  | +200  | +400  | +1000 | +1400 | +1500 | +100  | +200  | +200  | kPa  |
| Measurement Pressure           | Popt   | Min.          | 0     | 0     | 0     | 0     | 0     | 0     | -50   | -100  | -100  |      |
|                                |        | Max.          | +25   | +50   | +100  | +200  | +500  | +700  | +1000 | 0     | 0     |      |

## Electrical Characteristics

Ambient temperature Ta = 25°C

| Item                     | Condition                           | Symbol | Rating |       |       | Unit  |
|--------------------------|-------------------------------------|--------|--------|-------|-------|-------|
|                          |                                     |        | Min.   | Typ.  | Max.  |       |
| Offset Pressure Data     | Min. Popt, 050KV & 100KV: Max. Popt | Doff   | 598    | 819   | 1040  | Count |
| Full Scale Pressure Data | Max. Popt, 050KV & 100KV: Min. Popt | Dfs    | 15344  | 15565 | 15786 | Count |
| Span Pressure Data       | Min. to max. Popt                   | SD     | -      | 14746 | -     | Count |
| Accuracy                 | 0 to 85°C                           | Error  | -1.5   | -     | +1.5  | %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. |

## Communication Interface & Protocol

| Item               | Content  |
|--------------------|--|
| Interface          | I <sup>2</sup> C™  |
| Slave Address      | 7 bit, 0x28 to 0x78  |
| Measurement Packet | <p>Slave Address [6:0]      Status Bit [13:8]      Pressure Data [7:0]</p> <p>S 6 5 4 3 2 1 0 R A 15 14 13 12 11 10 9 8 A 7 6 5 4 3 2 1 0 N S</p> <p>From Master to Slave      From Slave to Master      From Slave to Master      From Master to Slave</p> <p> <span style="border: 1px solid black; padding: 2px;">S</span> Start Condition      <span style="border: 1px solid black; padding: 2px;">R</span> Read (1)      <span style="border: 1px solid black; padding: 2px;">A</span> ACK      <span style="border: 1px solid black; padding: 2px;">N</span> NACK<br/> <span style="border: 1px solid black; padding: 2px;">S</span> Stop Condition      <span style="border: 1px solid black; padding: 2px;">A</span>      <span style="border: 1px solid black; padding: 2px;">N</span>      <span style="border: 1px solid black; padding: 2px;">S</span> </p> |

I<sup>2</sup>C™ is a trademark of NXP Semiconductors.

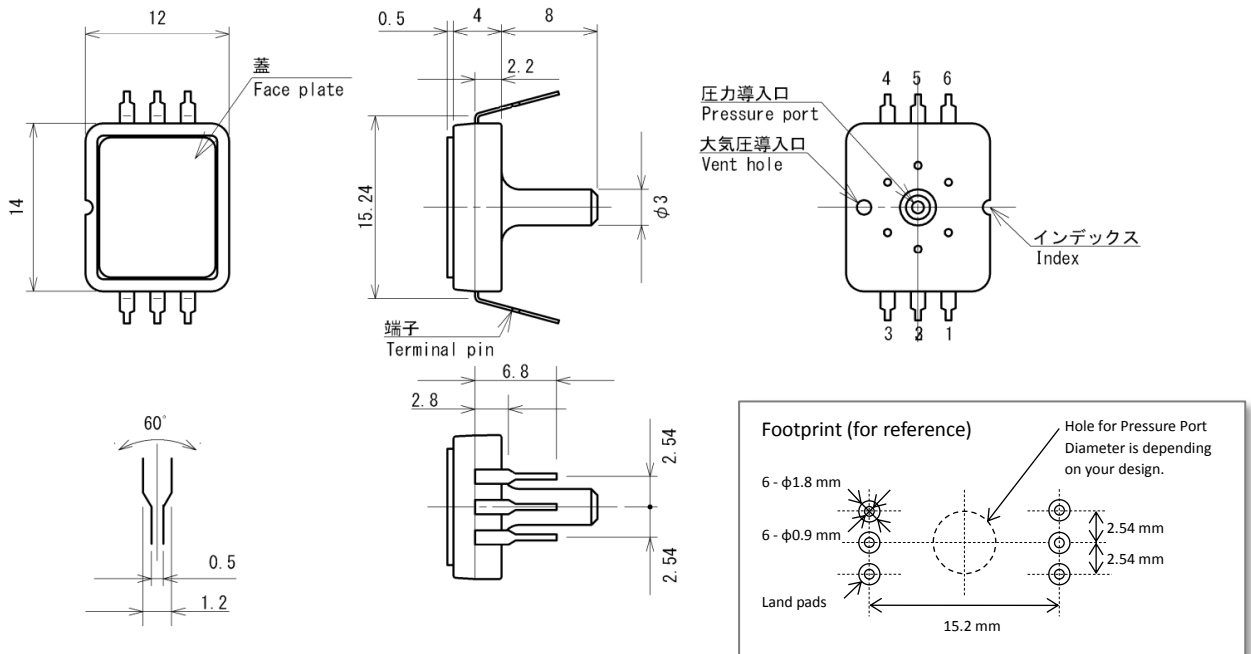
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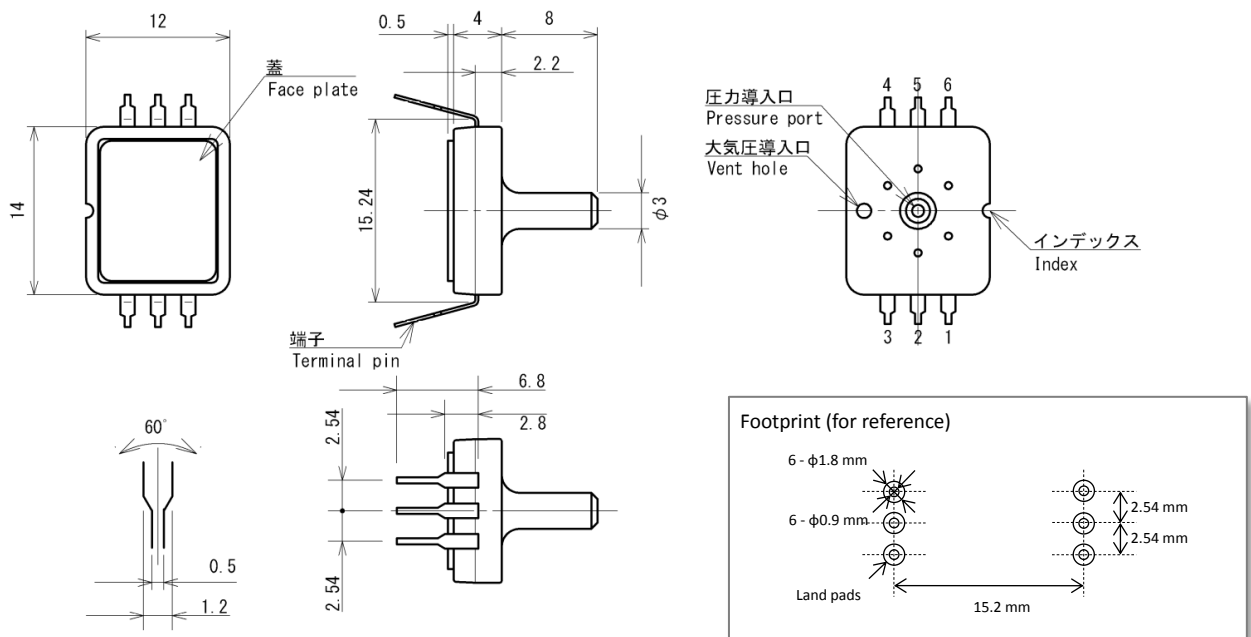
## Package Dimensions

unit: mm

### Sensor Code: AP4\*N



### Sensor Code: AP4\*R



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