



## Features

- Compensated digital output
- Ultra-low pressure sensing
- Digital I<sup>2</sup>C output
- Gauge and differential types
- For use in clean, dry air and non-corrosive gas environments
- RoHS compliant\*

## Applications

Industrial:

- HVAC systems
- Process monitoring
- Packaging automation

\*\* Medical Devices (low/medium risk):

- Diagnostic equipment
- Analysis equipment

# BPS120 Series - 12 mm Digital Low Pressure Sensor

## Electrical Characteristics

|                                  |                                              |
|----------------------------------|----------------------------------------------|
| Supply Voltage (V <sub>s</sub> ) | 2.7 V minimum, 5 V typical, 5.5 V maximum    |
| Supply Current @ 5 V             | 1.2 mA minimum, 2 mA typical, 3.5 mA maximum |

## Performance Characteristics

|                                                         |                                                                                        |
|---------------------------------------------------------|----------------------------------------------------------------------------------------|
| Operating Temperature                                   | -40 °C to +85 °C (-40 °F to +185 °F)                                                   |
| Storage Temperature                                     | -55 °C to +100 °C (-67 °C to +212 °F)                                                  |
| Pressure Range                                          | 0.15 to 1.0 psi (10.3 to 68.9 mbar; 1.03 to 6.89 KPa; 4.2 to 27.7 in H <sub>2</sub> O) |
| Output                                                  | Digital I <sup>2</sup> C (1)                                                           |
| Effective ADC Resolution                                | 13 bit                                                                                 |
| Accuracy @ 25 °C                                        | ±0.25 % FS                                                                             |
| Total Error Band over 0 °C to 60 °C (+32 °F to +140 °F) | ± 1.5 % FS                                                                             |
| Long Term Stability                                     | ± 0.5 % FS                                                                             |
| Startup Time                                            | 15 ms maximum                                                                          |
| Digital Update Time                                     | 8.5 ms typical                                                                         |
| Proof Pressure                                          | 5X full scale pressure                                                                 |
| Burst Pressure                                          | 10 psi                                                                                 |

(1) I<sup>2</sup>C address is set to (0x28). Alternative addresses are available. Consult the factory for custom options.

## Product Characteristics

|                            |                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------|
| Media Compatibility        | Non-corrosive dry gasses                                                            |
| Moisture Sensitivity Level | 1                                                                                   |
| ESD Classification (HBM)   | 2 kV                                                                                |
| Marking                    | Partial model number, media compatibility, pressure type, pressure rating, lot code |
| Standard Packaging         | 250 pcs./13-inch reel                                                               |
| Weight                     | 1.307 grams (0.046 oz)                                                              |

## Transfer Function Formula

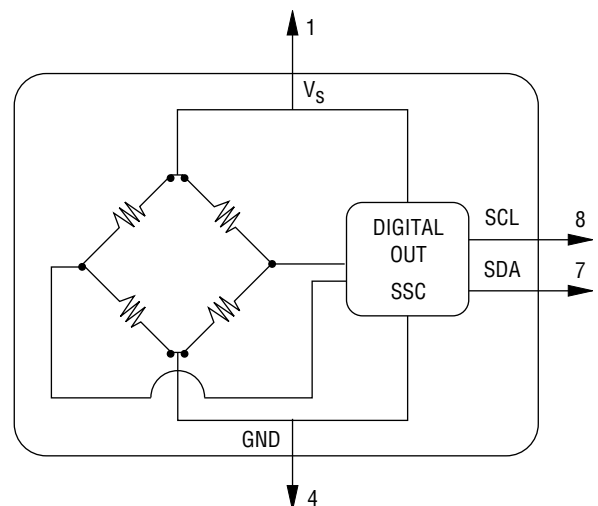
$$P_{\text{psi}} = (P_{\text{max}} - P_{\text{min}}) \cdot \left( \frac{P_{\text{counts}} - 0.1 \cdot \text{Max}}{0.8 \cdot \text{Max}} \right) + P_{\text{min}}$$

### Where

|                     |                            |
|---------------------|----------------------------|
| P <sub>psi</sub>    | = Measured Pressure in PSI |
| P <sub>counts</sub> | = Pressure Counts          |
| P <sub>min</sub>    | = Minimum Pressure         |
| P <sub>max</sub>    | = Maximum Pressure         |
| Max                 | = 16384 = 14 Bits          |

Consult factory for custom options such as supply voltage, temperature calibration range, output range accuracy specification, and update rate.

## Basic Circuit Schematic



Note: Power supply decoupling included.

\* RoHS3 Directive 2015/863 Amendments of Annex II on March 31, 2015

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## BPS120 Series - 12 mm Digital Low Pressure Sensor

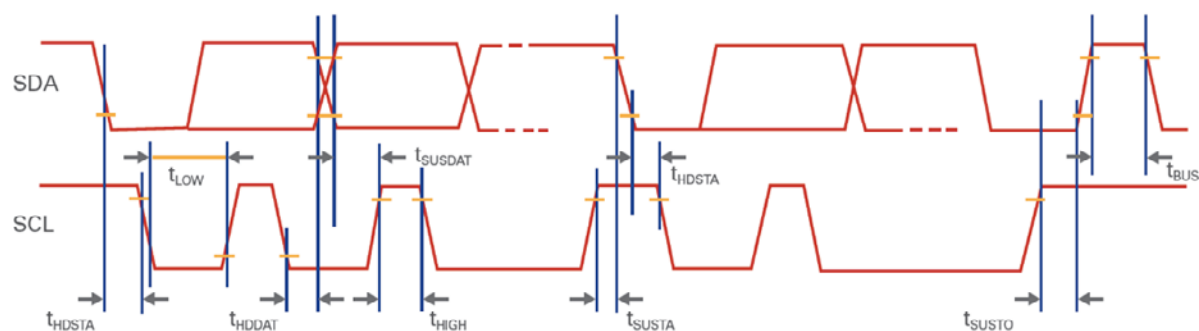
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### I<sup>2</sup>C Parameters

|                                                                    |                |
|--------------------------------------------------------------------|----------------|
| SCL Clock Frequency $f_{SCL}$                                      | 100 to 400 kHz |
| Start Condition Hold Time Relative to SCL Edge $t_{HDSTA}$         | 0.1 $\mu$ s    |
| Minimum SCL Clock Low Width <sup>1</sup> $t_{LOW}$                 | 0.6 $\mu$ s    |
| Minimum SCL Clock High Width <sup>1</sup> $t_{HIGH}$               | 0.6 $\mu$ s    |
| Start Condition Setup Time Relative to SCL Edge $t_{SUSTA}$        | 0.1 $\mu$ s    |
| Data Hold Time on SDA Relative to SCL Edge $t_{HDDAT}$             | 0.0 $\mu$ s    |
| Data Setup Time on SDA Relative to SCL Edge $t_{SUDAT}$            | 0.1 $\mu$ s    |
| Stop Condition Setup Time on SCL $t_{SUSTO}$                       | 0.1 $\mu$ s    |
| Bus Free Time Between Stop Condition and Start Condition $t_{BUS}$ | 2 $\mu$ s      |

<sup>1</sup> Combined low and high widths must equal or exceed minimum SCLK period.

### I<sup>2</sup>C Parameters



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### I<sup>2</sup>C Communication

Communication to the Model BPS120 is read only. To read the pressure counts, the master performs a read request by asserting a start condition, sending the 7-bit address of the part (0x28), and sets the read/write bit. The master then waits for an acknowledgement. The acknowledgement is sent by the pressure sensor along with 2 bits of status and bits 13:8 of the pressure counts, the master acknowledges the first 8 bits, and the pressure sensor sends the remaining 8 bits of data. The master then does not acknowledge and sends a stop condition, signaling the end of the transaction.



|    |                    |    |                      |   |                    |             |   |                               |
|----|--------------------|----|----------------------|---|--------------------|-------------|---|-------------------------------|
| S  | Start Conditioning | #  | Device Slave Address | # | Data Bit           | Status Bits |   |                               |
| RW | Read/Write Bit     | A  | Acknowledge Bit      | N | No Acknowledge Bit | 0           | 0 | Normal Operation, Good Packet |
|    |                    |    |                      |   |                    | 0           | 1 | Device in Command Mode        |
|    |                    |    |                      |   |                    | 1           | 0 | Stale Data                    |
| ST | Stop Condition     | SB | Status Bits          |   |                    | 1           | 1 | Diagnostic Condition Exists   |

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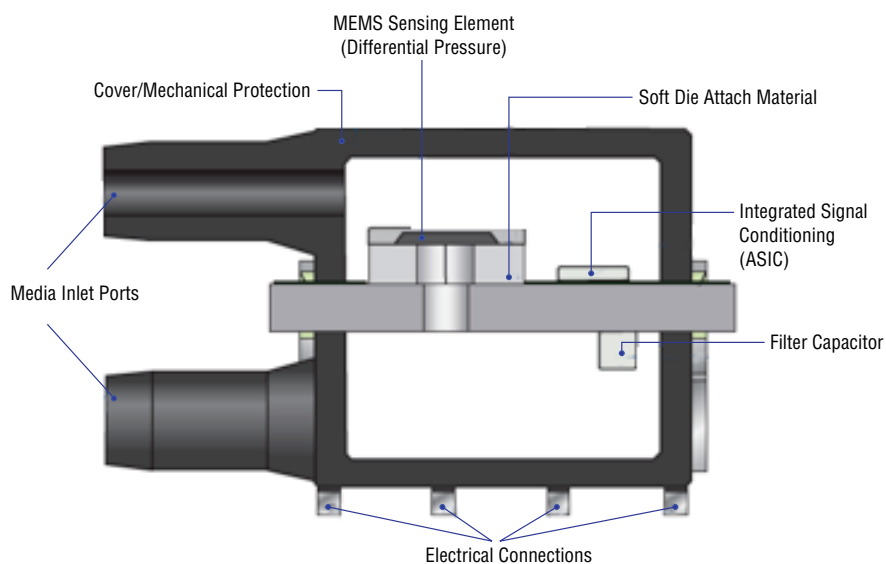
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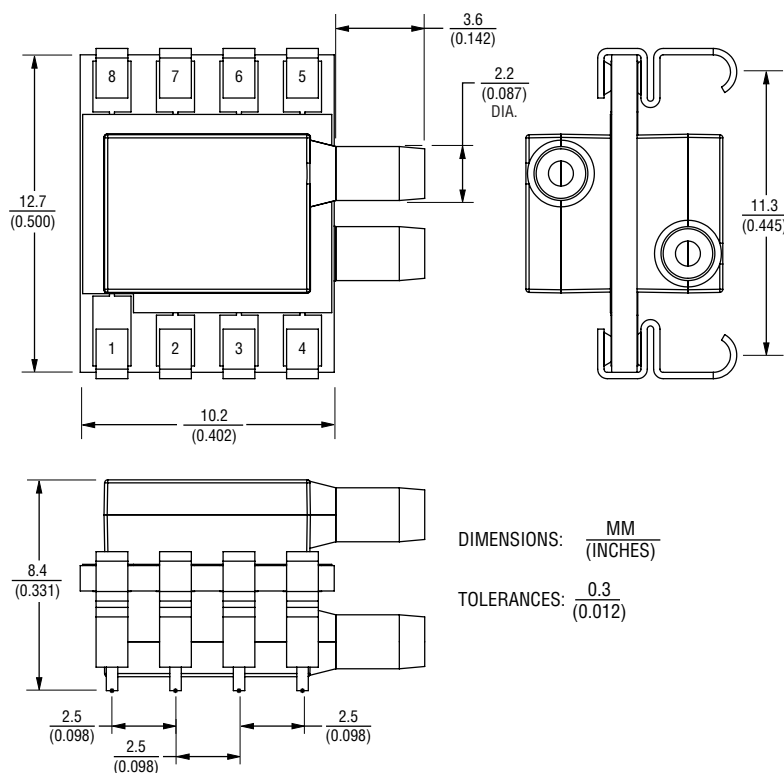
# BPS120 Series - 12 mm Digital Low Pressure Sensor

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## Cross Section



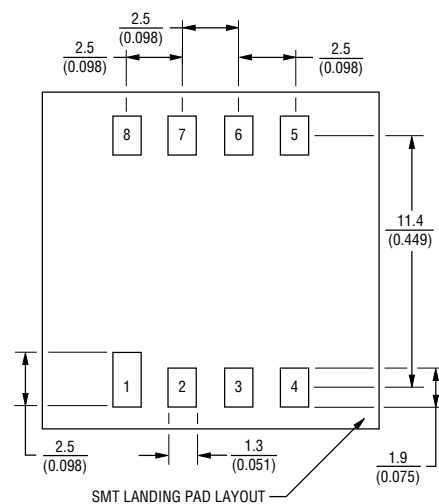
## Product Dimensions



## Terminal Assignment

| DEVICE PINOUT |                              |
|---------------|------------------------------|
| P1            | V <sub>s</sub>               |
| P2            | N/C                          |
| P3            | N/C                          |
| P4            | VSS - Ground                 |
| P5            | N/C                          |
| P6            | N/C                          |
| P7            | SDA - I <sup>2</sup> C Data  |
| P8            | SCL - I <sup>2</sup> C Clock |

## Recommended PCB Layout



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## BPS120 Series - 12 mm Digital Low Pressure Sensor

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### How To Order

**BPS120 - A D 0P30 - 2 D G**

Model Series \_\_\_\_\_

Digital

Media Compatibility \_\_\_\_\_

A = Air/Gas

Pressure Type \_\_\_\_\_

G = Gauge

D = Differential

Pressure (psi) \_\_\_\_\_

0P15 = 0.15

0P30 = 0.30

01P0 = 1.0

Terminal Pins \_\_\_\_\_

2 = Surface Mount Terminals

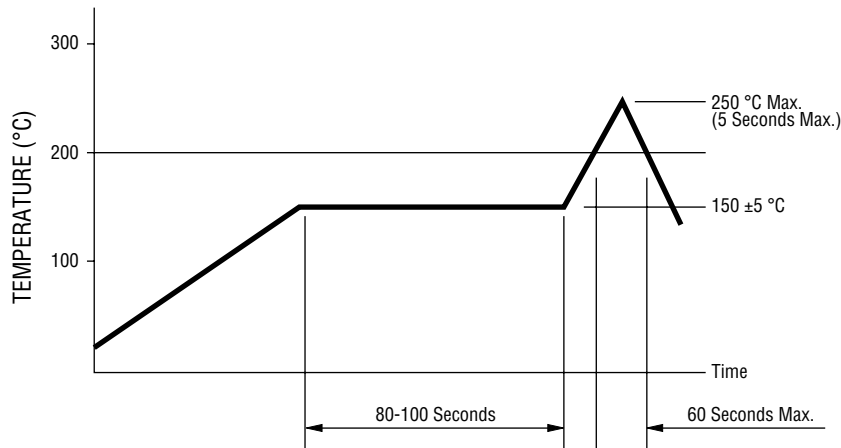
Port Style \_\_\_\_\_

D = Dual Port, Horizontal

Packaging Designator \_\_\_\_\_

G = 250 pcs. per 13-inch Reel

### Solder Profile



#### Notes:

1. No clean solder paste is recommended.
2. Aqueous wash is not recommended.
3. Use of water soluble soldering flux should be avoided due to possible corrosion.
4. Multiple passes through the soldering process is not recommended.
5. Other SMD processes and profiles should be verified by the customer.

Processing Method: Reflow soldering with infrared heat or forced air convection (only once).

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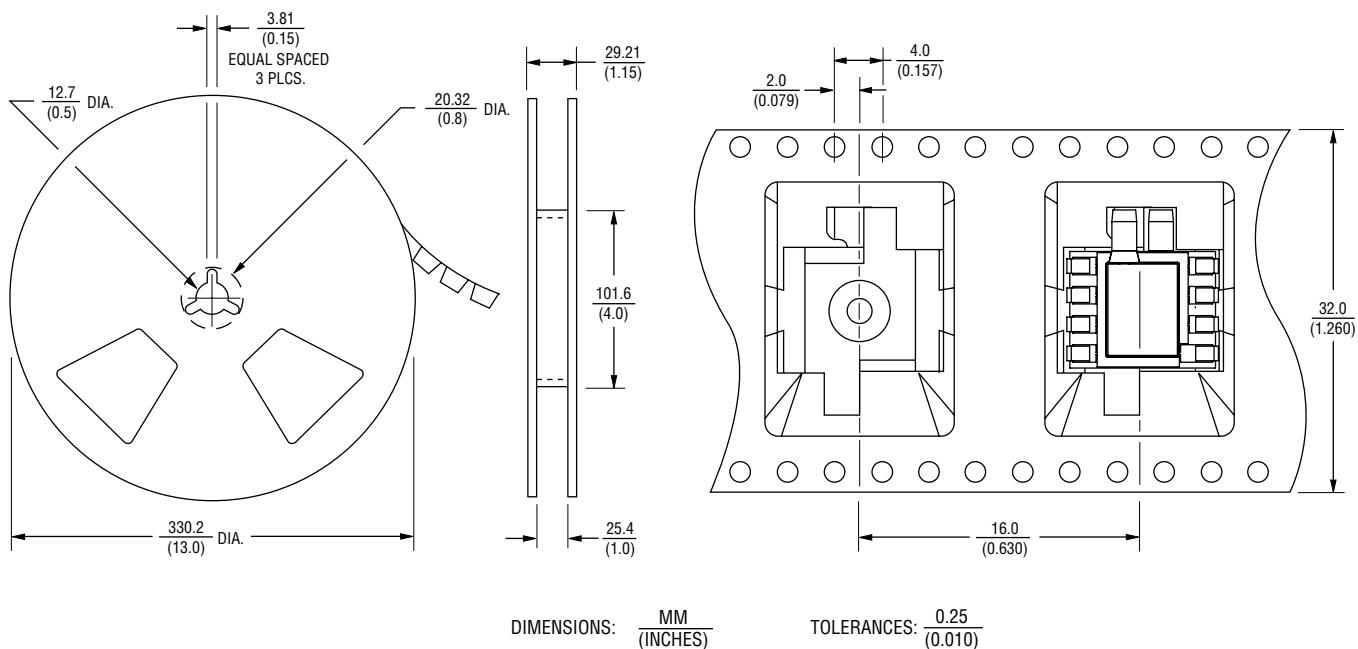
## BPS120 Series - 12 mm Digital Low Pressure Sensor

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### Packaging Specification

250 pieces per 13-inch reel.

Meets specifications of EIA-481-1 or EIA-481-2.



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