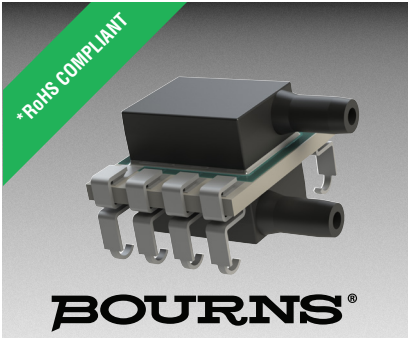


# PRELIMINARY



## Features

- Compensated digital output
- Ultra-low pressure sensing
- Digital I<sup>2</sup>C output
- Gage 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:
- 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
Effective ADC Resolution .....	13 bit
Ratiometric Output Range (V <sub>out</sub> ) .....	0.5 V to 4.5 % V <sub>s</sub>
Pressure Accuracy 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 .....	2 ms minimum, 5 ms typical, 125 ms maximum
Proof Pressure .....	5X full scale pressure
Burst Pressure .....	10 psi

### Product Characteristics

Media Compatibility .....	Non-corrosive dry gasses
Moisture Sensitivity Level .....	1
ESD Classification (HBM) .....	2 kV
Marking .....	<b>B</b> , model number, pressure, date code
Standard Packaging .....	250 pcs./13-inch reel
Weight .....	1.306 grams (0.046 oz)

### Transfer Function Formula

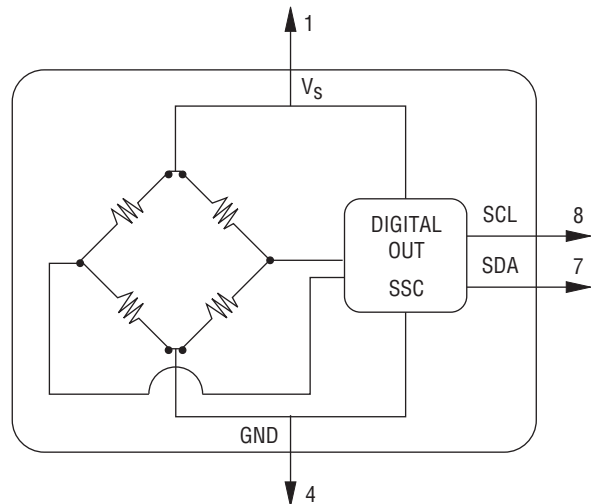
$$P_{\text{psi}} = (P_{\text{max}} - P_{\text{min}}) \cdot \left( \frac{P_{\text{counts}} - 0.1 \cdot \text{Max}}{0.8 \cdot \text{Max}} \right) + P_{\text{min}}$$

#### Where

- P<sub>psi</sub> = Measured Pressure in PSI
- P<sub>counts</sub> = Pressure Counts from Merit Sensor Part
- 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.

\* RoHS Directive 2015/863, Mar 31, 2015 and Annex.

\*\* Bourns® products have not been specifically designed and tested for FDA Class III applications and equivalent applications covered by other regulatory authority such as the European Council, and their use in such applications is neither recommended nor supported.

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Users should verify actual device performance in their specific applications.

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# BPS120 Series - 12 mm Digital Low Pressure Sensor

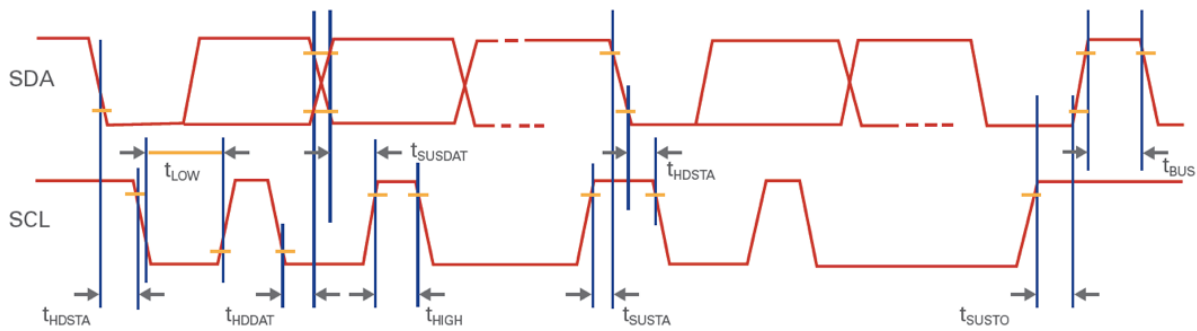


## I<sup>2</sup>C Parameters

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.

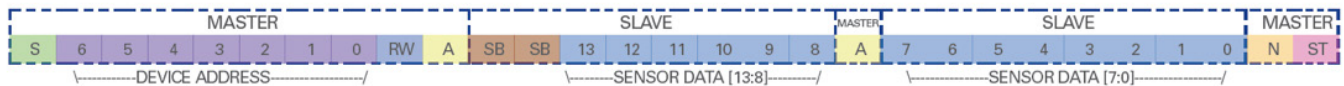
## I<sup>2</sup>C Parameters



Used by permission, ZMDI

## 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 (if the part has an open address, 7 bits of anything is acceptable), 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.



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

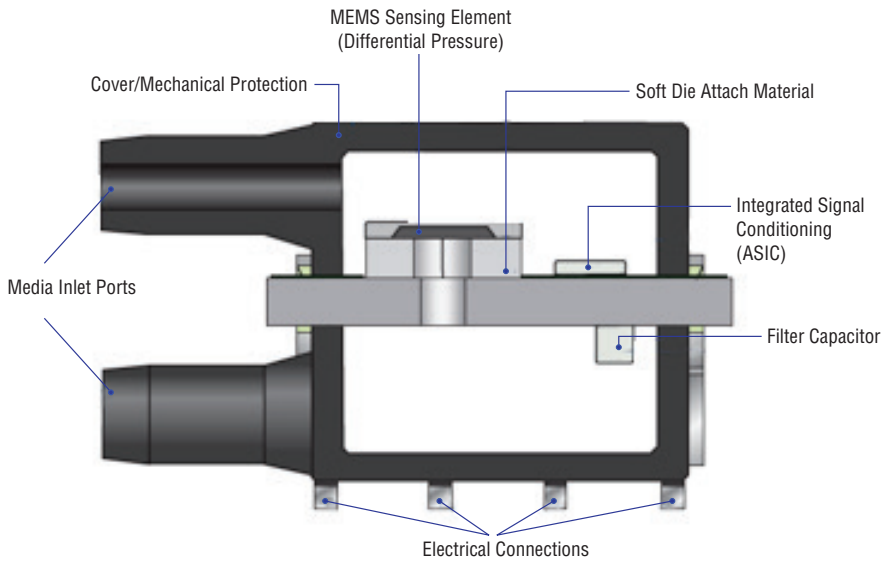
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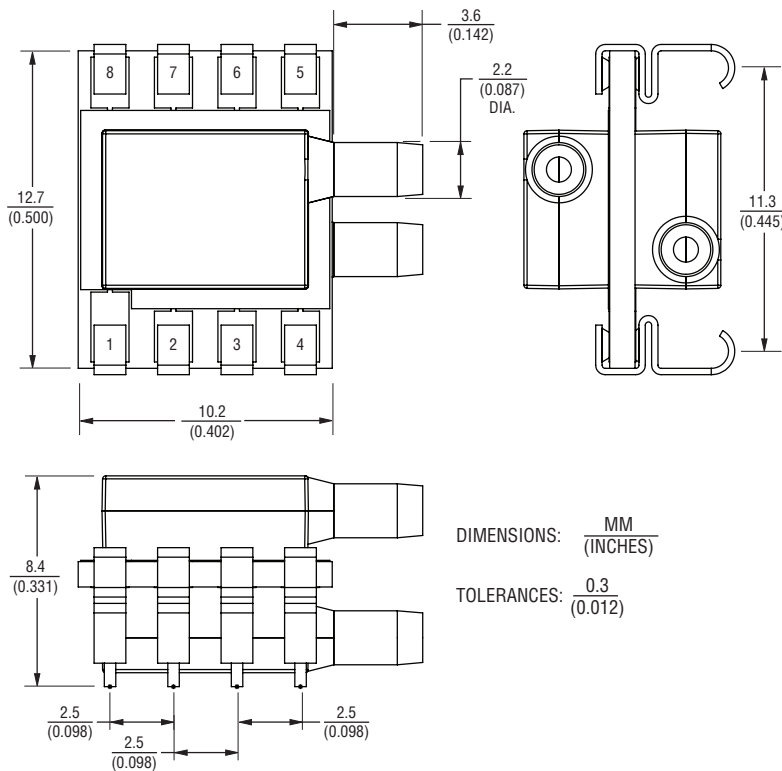
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# BPS120 Series - 12 mm Digital Low Pressure Sensor

## Cross Section



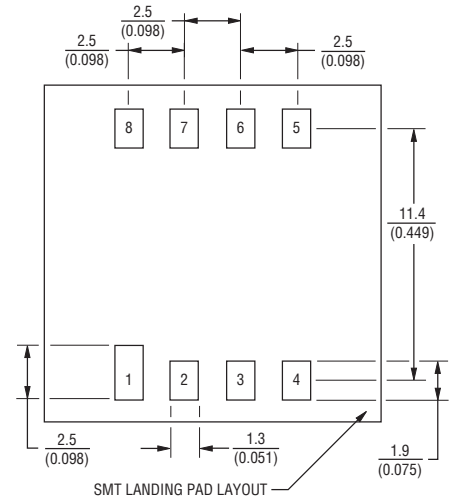
## Product Dimensions



## 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

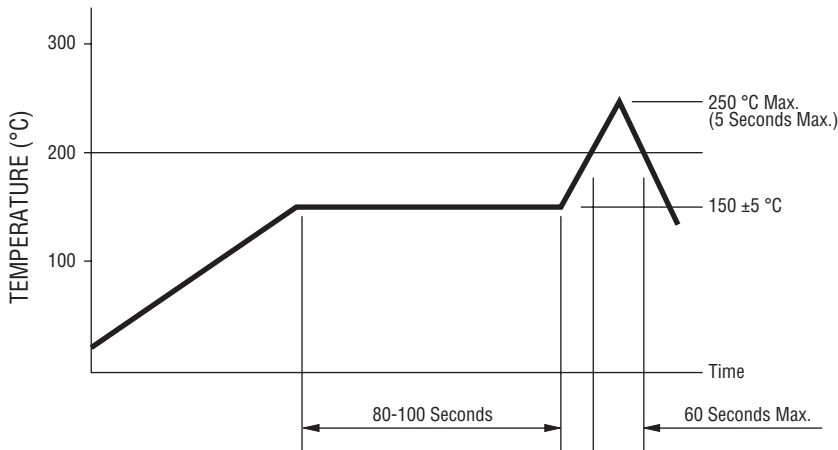
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## How To Order

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



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

### 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.

Specifications are subject to change without notice.

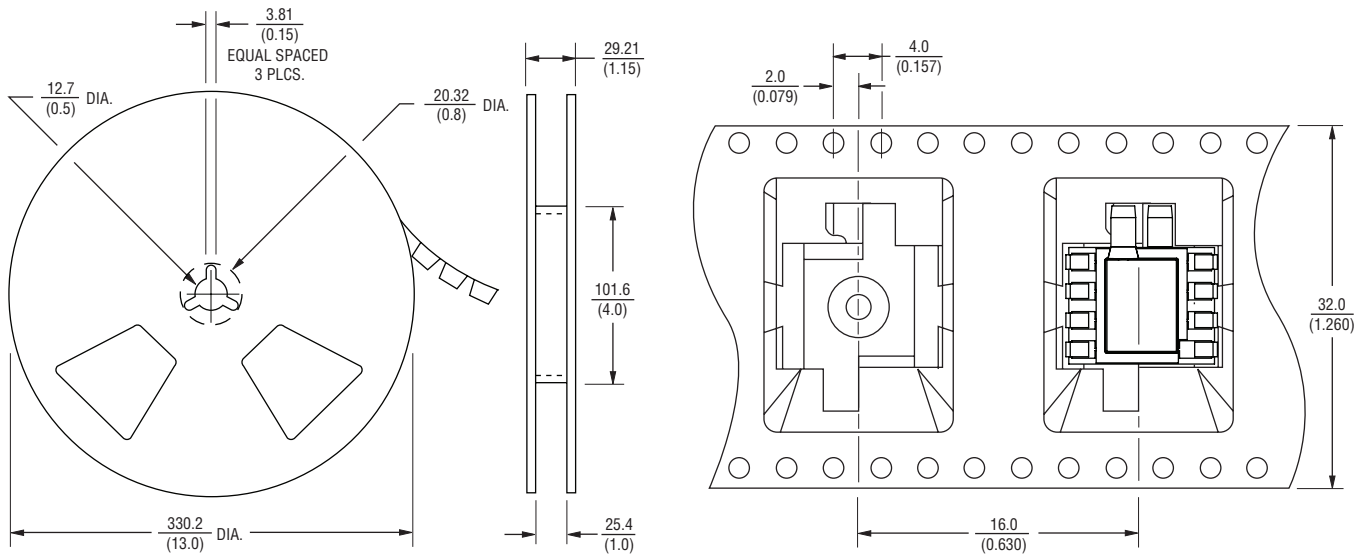
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# BPS120 Series - 12 mm Digital Low Pressure Sensor

## Packaging Specification

250 pieces per 13-inch reel.  
Meets specifications of EIA-481-1 or EIA-481-2.



DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

TOLERANCES:  $\frac{0.25}{(0.010)}$

## **BOURNS®**

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