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MERIT SENSOR™

DATA SHEET

# *LP Series – Analog*

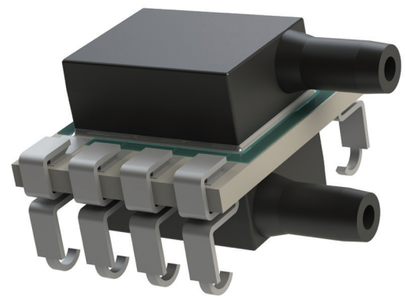
**LP Series - Analog** is a surface mountable pressure sensor package with a compensated analog output suitable for **ultra-low pressure sensing applications.**

COMPANY: Merit Sensor is a leader in piezoresistive pressure sensing and partners with clients to create high performing solutions for a variety of applications and industries.

SENTIUM: Merit Sensor products incorporate a proprietary Sentium® technology developed to provide superior stability.

TECHNOLOGY: Merit Sensor utilizes a piezoresistive Wheatstone bridge in a design that anodically bonds glass to a chemically etched silicon diaphragm. All products are RoHS compliant.

CAPABILITIES: Merit Sensor designs, engineers, fabricates, dices, assembles, tests and sells die and packaged products from a state-of-the-art facility near Salt Lake City, Utah



RoHS Compliant

## FEATURES

| | |
|---|---|
| Pressure Range | 0.04 to 15 psi (2.5 mbar to 1 bar; 250 Pa to 100 kPa; 1 in $H_2O$ to 415 in $H_2O$) |
| Output | Amplified Analog |
| Type | Gage, Differential and Absolute |
| Media | Clean, Dry Air and Non-corrosive Gases |
| Packaging | Tape and Reel |
| Customization | Supply Voltage, Temperature Calibration Range, Output Range, Accuracy Specification, Update Rate, etc. |

## BENEFITS

| | |
|---|---|
| Performance | Enjoy best-in-class performance due to Merit's proprietary Sentium technology |
| Cost | Save money over time with high-performing die |
| Security | Feel confident doing business with an experienced company backed by a solid parent company (NASDAQ: MMSI) |
| Speed | Get to market quickly with creative and flexible solutions |
| Service | Experience prompt, personal and professional support |

## **1410 Family** Part Number Configurator

1410-XXXX-XX-XX

***Pressure***
P04 = 250 Pa
P07 = 500 Pa
P15 = .15psi
P30 = .30psi
1P0 = 1.0psi
15P = 15psi

***Reference***
D = Differential
G = Gage
A = Absolute

***Calibrated Supply Voltage***
1 = 5.0V
2 = 3.3V

***Pin Type***
1 = J-lead

***Port***
1 = Dual horizontal, facing same direction
2 = Single Horizontal

***Output Range***
2 = 10 to 90 %Vs

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## SPECIFICATIONS

| Parameter | Minimum | Typical | Maximum | Units | Notes |
|---|---|---|---|---|---|
| **Electrical** | | | | | |
| Supply Voltage (Vs) | 4.5 | 5 | 5.5 | V | Depending on calibrated supply voltage |
| Supply Voltage (Vs) | 3.0 | 3.3 | 3.6 | V | |
| Supply Current | 1.25 | 2 | 2.4 | mA | (1) |
| Output Current | | | 1.9 | mA | |
| Min Output Load Resistance | 5 | | | kΩ | (2) |
| Operating Temperature | -40 | | 85 | °C | |
| Storage Temperature | -55 | | 100 | °C | |
| **Performance** | | | | | |
| DAC Resolution | | | 12 | Bit | |
| Ratiometric Output Range (Vout) | | 10 to 90 | | %Vs | |
| Accuracy | -1.5 | | 1.5 | %FS | (3) (4) |
| Lifetime Drift | -0.5 | | 0.5 | %FS | |
| Startup Time | | | 8 | ms | |
| Analog Update Time | | 25 | | ms | |
| Proof Pressure | 5X | | | | (5) |
| Burst Pressure | 10X | | | | |

***Notes:***
**(1)** @ 5V input voltage
**(2)** Must be added at the point of use
**(3)** Over 0°C to 60°C
**(4)** Applicable if Vs = ±5% of calibrated supply voltage
**(5)** Full scale pressure

**Transfer Function Formula**

$$P_{psi} = (P_{max} - P_{min}) \cdot \left( \frac{V_{out} - V_{min}}{V_{max} - V_{min}} \right) + P_{min}$$

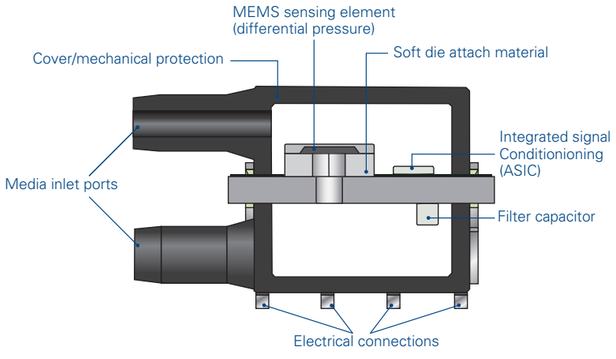
***Where***

| | |
|---|---|
| $P_{psi}$ | = *Measured Pressure in PSI* |
| $P_{Max}$ | = Maximum Pressure |
| $P_{Min}$ | = Minimum Pressure |
| $V_{min}$ | = Minimum Volatage (Usually 10% Vs) |
| $V_{max}$ | = Maximum Volatage (Usually 90% Vs) |
| $V_{out}$ | = Output voltage (pin 6) |

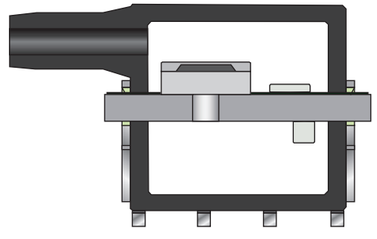
**Media Compatibility**

For Use With Non-corrosive Dry Gasses
Solder temperature: max 250 °C, 5 seconds max

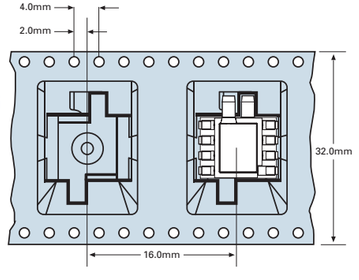
## CROSS SECTION FOR DIFFERENTIAL AND GAGE




## CROSS SECTION FOR ABSOLUTE

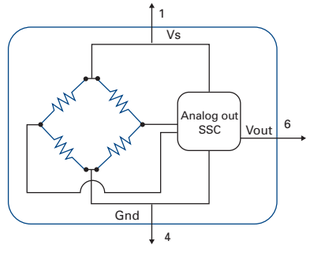


## PACKAGING AND SHIPPING




## ELECTRICAL

Note: Power supply decoupling and output filtering included



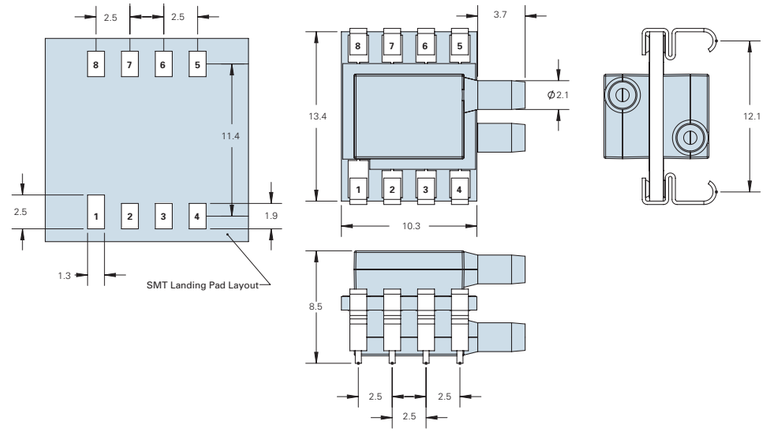

MERIT SENSOR™

LP Series – Analog

## DIMENSIONS FOR STANDARD OPTIONS (in millimeters)

Dimensions for reference only. Engineering drawings (with tolerance) available upon order.

| Device Pinout |
|---|
| **P1** = Vs |
| **P2** = N/C |
| **P3** = N/C |
| **P4** = Ground |
| **P5** = N/C |
| **P6** = Vout |
| **P7** = N/C |
| **P8** = N/C |




## Example 1: 0.0 to 0.15 PSI Gage 0-60°C

Part: 1410-P15G-12-11

$P_{min}$ =0.0 psi, $P_{max}$ =0.15 psi

$V_{out}$ =2.5 V

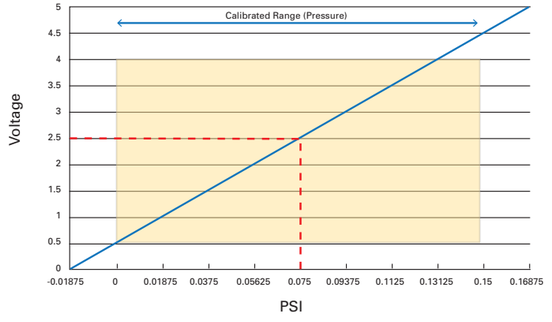
$V_{minCompV}$ = 0.5 V, $V_{maxCompV}$ =4.5 V

$$P_{psi} = (P_{max} - P_{min}) \cdot \left( \frac{V_{out} - V_{min}}{V_{max} - V_{min}} \right) + P_{min}$$

$$PSI = (0.15 - 0.0) \cdot \left( \frac{2.5 - 0.5}{4.5 - 0.5} \right) + 0$$

$PSI$ =.075

Part: 1410-P15G-12-11




## Example 2: -0.15 to 0.15 PSI Differential 0-60°C

Part: 1410-P15D-12-11

$P_{min}$ =-0.15 psi, $P_{max}$ =0.15 psi

$V_{out}$ =3.25 V

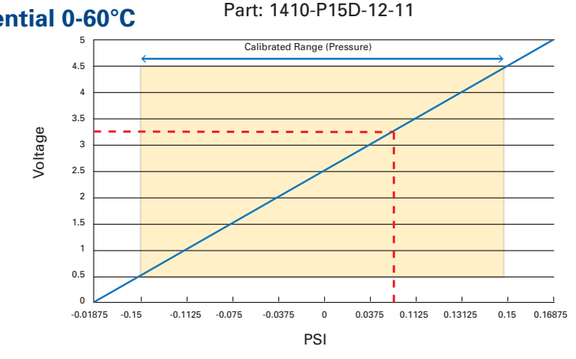
$V_{minCompV}$ =0.5 V, $V_{maxCompV}$ =4.5 V

$$P_{psi} = (P_{max} - P_{min}) \cdot \left( \frac{V_{out} - V_{min}}{V_{max} - V_{min}} \right) + P_{min}$$

$$PSI = (0.15 - (-0.15)) \cdot \left( \frac{3.25 - 0.5}{4.5 - 0.5} \right) + (-0.15)$$

$PSI$= .05625

Part: 1410-P15D-12-11



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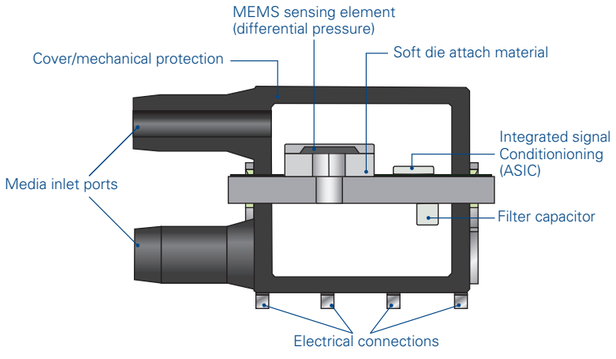


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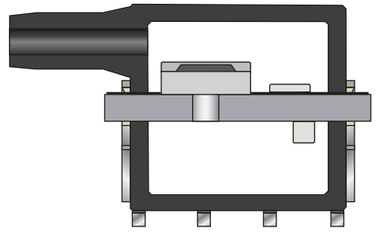

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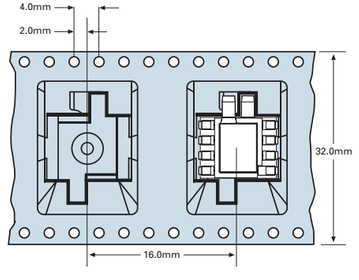


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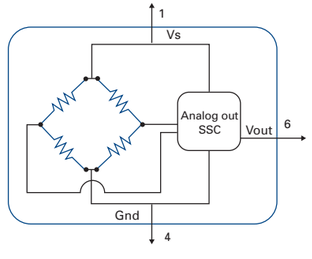


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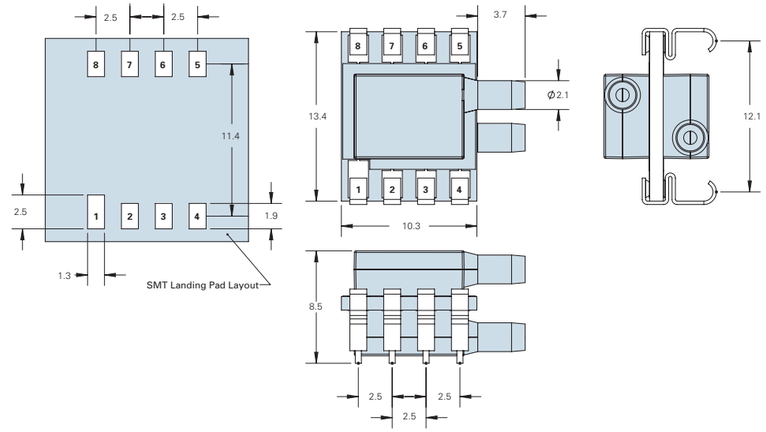


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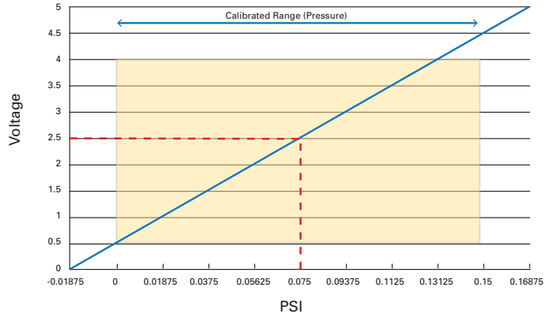


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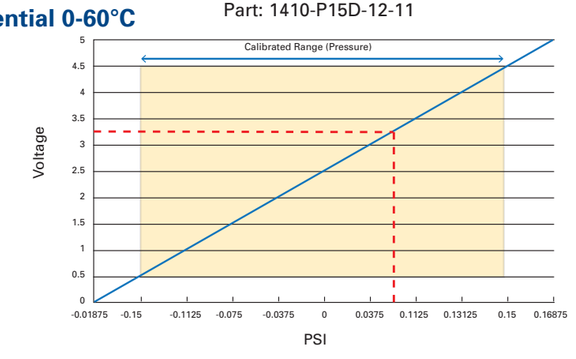

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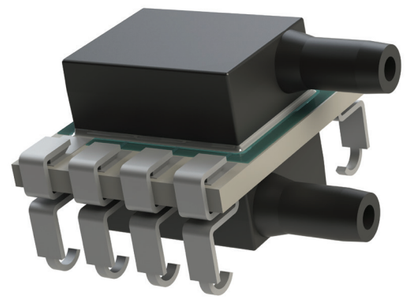

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