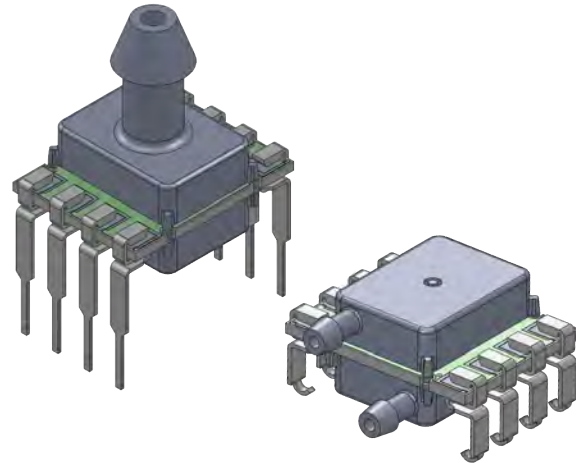


ELV Series - アナログ & デジタル出力圧力センサ

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Introduction

ELVアナログおよびデジタル圧力センサーシリーズは、All Sensorsの超低圧CoBeam2™テクノロジーを備えた4つの新しい製品ファミリーで構成されています。この革新的な検知素子技術は、低圧および微圧でクラス最高の安定性を提供し、実績のある世界クラスのサプライヤーによる校正と圧力範囲をカスタマイズする機能を備えています。

ELVシリーズは、パッケージの組み合わせにおいて非常に多くの選択肢があるため、設計エンジニアに卓越した柔軟性を提供します。

デジタルインターフェイスにより、センサーのさまざまなプロセス制御および測定システムへの統合が容易になり、シリアル通信チャンネルへの直接接続が可能になります。

これらの校正および補償済みのセンサーは、広い温度範囲にわたって正確で安定した出力を提供します。このシリーズは、空気やその他の乾燥ガスなどの非腐食性、非イオン性作動流体での使用を目的としています。湿気/過酷なメディアから保護するために、オプションで保護バリレンコーティングを利用できます。

<https://www.allsensors.com/products/elv-series>



ELVシリーズ：アナログ & デジタル出力圧力セン

特長

- ±0.5 inH2Oから150 psiおよび±2.5mbarから±10 barの圧力範囲
- 高精度ASICコンディショニング
- デジタルI2CまたはSPIインターフェイスまたはアナログのみのオプション
- 3V、3.3Vおよび5V電源電圧オプション

アプリケーション

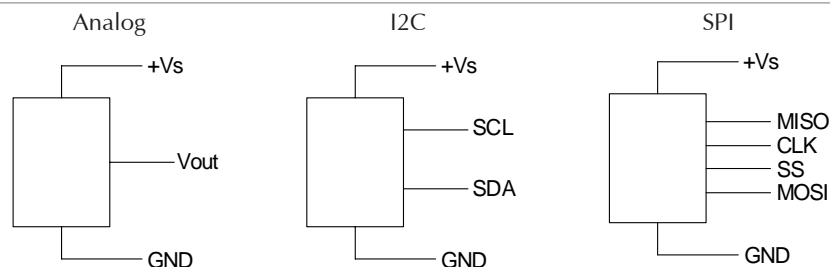
- 医療機器
- 医療装置
- ポータブル/ハンドヘルド機器
- 環境制御
- 環境計装
- 環境モニタリング
- HVAC
- 産業用制御
- 高度計
- 化学分析
- 気象学

接液材質

- シリコン
- RTV
- 金
- セラミック
- エポキシ
- ナイロンプラスチック
- アルミニウム

| 圧力センサ最大定格 | | 環境仕様 | |
|-----------|----------------|--------------|--|
| 供給電圧 (Vs) | 2.7 to 5.5 Vdc | 温度範囲 | |
| 最大デバイス温度 | 245° | 補償温度範囲: | 標準グレード 0°C to 50°C 産業グレード -20°C to 85°C |
| | | 動作温度範囲 | -25°C to 85°C |
| | | 保存温度範囲 | -40°C to 125°C |
| | | 湿度限界(結露なきこと) | 0 to 95% RH |

等価回路図



ELVH シリーズ製品ハイライト

- 0.5 ~60 inH₂Oおよび1 ~150 psiの圧力範囲。 2.5mbar~10 barの圧力範囲
- 差圧、ゲージ圧、絶対圧
- 0~50℃および-20~85℃の温度補正オプション
- 出力
 - アナログ出力をオプションを備えたデジタルI2CまたはSPI
 - 6つのI2Cアドレスオプション
 - 4つの伝達関数オプション
- 3.3V および 5V の供給電圧
- 多数のポートオプションで利用可能:
 - ポートなし
 - 返し付き垂直ポート
 - ニードルピッグポート
 - サイドポート
 - その他も用意ございます。工場にご確認下さい。
- 多数のリードオプション:
 - SMT J-lead
 - DIP lead
 - SIP lead
- 10 inH₂O以上の圧力範囲で提供されるパリレンコーティング

ELVI, ELVE & ELVA シリーズ製品ハイライト

- 100 mbar~10 barの圧力範囲
- 差圧、ゲージ圧、絶対圧
- -20 to 85℃の温度補正
- 出力オプション:
 - ELVI I2C のみ、非レシオメトリック
 - ELVE SPI のみ、非レシオメトリック
 - ELVA アナログのみ、レシオメトリック
- 3V および5V の供給電圧
- 多数のポートオプションで利用可能:
 - ポートなし
 - 返し付き垂直ポート
 - ニードルピッグポート
 - その他も用意ございます。工場にご確認下さい。
- 多数のリードオプション:
 - SMT J-lead
 - DIP lead
 - SIL lead
- 100mbar以上の圧力範囲で提供されるパリレンコーティング

ELVH シリーズ圧力範囲

| 圧力範囲 ¹ | | | | | 過負荷耐圧 ² | | 破壊耐圧 ³ | | コモンモード 圧力 ⁴ | |
|-------------------|-------|------|--------------|------|--------------------|-----|-------------------|-----|---------------------------|-----|
| 型番 | Pmin | Pmax | 圧力基準 | kPa | inH2O | kPa | inH2O | kPa | inH2O | kPa |
| | inH2O | | | | | | | | | |
| F50D | -0.5 | 0.5 | Differential | 0.1 | 270 | 67 | 415 | 103 | 415 | 103 |
| L01D | -1 | 1 | Differential | 0.2 | 270 | 67 | 415 | 103 | 415 | 103 |
| L02D | -2 | 2 | Differential | 0.5 | 270 | 67 | 415 | 103 | 415 | 103 |
| L04D | -4 | 4 | Differential | 1.0 | 300 | 75 | 415 | 103 | 415 | 103 |
| L05D | -5 | 5 | Differential | 1.2 | 300 | 75 | 415 | 103 | 415 | 103 |
| L10D | -10 | 10 | Differential | 2.5 | 350 | 87 | 415 | 103 | 415 | 103 |
| L20D | -20 | 20 | Differential | 5.0 | 350 | 87 | 415 | 103 | 415 | 103 |
| L30D | -30 | 30 | Differential | 7.5 | 350 | 87 | 415 | 103 | 415 | 103 |
| L60D | -60 | 60 | Differential | 14.9 | 350 | 87 | 415 | 103 | 415 | 103 |
| L01G | 0 | 1 | Gage | 0.2 | 270 | 67 | 415 | 103 | 415 | 103 |
| L02G | 0 | 2 | Gage | 0.5 | 270 | 67 | 415 | 103 | 415 | 103 |
| L04G | 0 | 4 | Gage | 1.0 | 300 | 75 | 415 | 103 | 415 | 103 |
| L05G | 0 | 5 | Gage | 1.2 | 300 | 75 | 415 | 103 | 415 | 103 |
| L10G | 0 | 10 | Gage | 2.5 | 350 | 87 | 415 | 103 | 415 | 103 |
| L20G | 0 | 20 | Gage | 5.0 | 350 | 87 | 415 | 103 | 415 | 103 |
| L30G | 0 | 30 | Gage | 7.5 | 350 | 87 | 415 | 103 | 415 | 103 |
| L60G | 0 | 60 | Gage | 14.9 | 350 | 87 | 415 | 103 | 415 | 103 |

| 型番 | Pmin | Pmax | 圧力基準 | kPa | psi | kPa | psi | kPa | psi | kPa |
|------|------|------|--------------|------|-----|------|-----|------|-----|------|
| | psi | | | | | | | | | |
| 001D | -1 | 1 | Differential | 7 | 10 | 69 | 15 | 103 | 15 | 103 |
| 005D | -5 | 5 | Differential | 34 | 15 | 103 | 15 | 103 | 15 | 103 |
| 015D | -15 | 15 | Differential | 103 | 30 | 207 | 150 | 1034 | 250 | 1724 |
| 030D | -30 | 30 | Differential | 207 | 60 | 414 | 250 | 1724 | 250 | 1724 |
| 060D | -60 | 60 | Differential | 414 | 120 | 827 | 250 | 1724 | 250 | 1724 |
| 001G | 0 | 1 | Gage | 7 | 10 | 69 | 15 | 103 | 15 | 103 |
| 005G | 0 | 5 | Gage | 34 | 15 | 103 | 15 | 103 | 15 | 103 |
| 015G | 0 | 15 | Gage | 103 | 30 | 207 | 75 | 517 | 250 | 1724 |
| 030G | 0 | 30 | Gage | 207 | 60 | 414 | 150 | 1034 | 250 | 1724 |
| 060G | 0 | 60 | Gage | 414 | 120 | 827 | 250 | 1724 | 250 | 1724 |
| 100G | 0 | 100 | Gage | 690 | 250 | 1724 | 250 | 1724 | 250 | 1724 |
| 150G | 0 | 150 | Gage | 1034 | 250 | 1724 | 250 | 1724 | 250 | 1724 |
| 015A | 0 | 15 | Absolute | 103 | 15 | 103 | 15 | 103 | 15 | 103 |
| 030A | 0 | 30 | Absolute | 207 | 60 | 414 | 150 | 1034 | 250 | 1724 |
| 060A | 0 | 60 | Absolute | 414 | 120 | 827 | 250 | 1724 | 250 | 1724 |
| 100A | 0 | 100 | Absolute | 690 | 250 | 1724 | 250 | 1724 | 250 | 1724 |
| 150A | 0 | 150 | Absolute | 1034 | 250 | 1724 | 250 | 1724 | 250 | 1724 |

追記1: PaおよびkPa単位の圧力範囲は近似値として表されます。

追記2: 過負荷耐圧差: 製品の1つのポートに安全に加えられる最大圧力。圧力が動作圧力範囲に戻ったときに仕様を維持します。これよりも高い圧力を加

えた場合、製品に恒久的な損傷を与える可能性があります。

追記3: 破裂圧力差: 圧力媒体が漏れることなく製品の1つのポートに加えられる最大圧力。製品が破裂圧力を超える圧力に晒された後に機能することは期

待出来ません。

追記4: コモンモード圧力: 圧力媒体が漏れることなく、差圧センサーの両方のポートに同時にに加えられる最大圧力。この最大圧力を超える圧力に晒された後、製品が機能することは期待できません。

ELV シリーズ - アナログ & デジタル出力圧力センサ

ELVH シリーズ圧力範囲(続き)

| 圧力範囲 ¹ | | | | 過負荷耐圧 ² | | 破壊耐圧 ³ | | コモンモード圧力 ⁴ | | |
|-------------------|-------|------|--------------|--------------------|------|-------------------|------|-----------------------|-------|------|
| 型番 | Pmin | Pmax | 圧力基準 | kPa | mbar | kPa | mbar | kPa | mbar | kPa |
| | mbar | | | | | | | | | |
| MF25D | -2.5 | 2.5 | Differential | 0.25 | 675 | 68 | 1034 | 103 | 1034 | 103 |
| MF12D | -12.5 | 12.5 | Differential | 1.25 | 750 | 75 | 1034 | 103 | 1034 | 103 |
| M025D | -25 | 25 | Differential | 2.5 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M050D | -50 | 50 | Differential | 5 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M075D | -75 | 75 | Differential | 7.5 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M100D | -100 | 100 | Differential | 10 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M160D | -160 | 160 | Differential | 16 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M250D | -250 | 250 | Differential | 25 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M500D | -500 | 500 | Differential | 50 | 2000 | 200 | 1034 | 103 | 1034 | 103 |
| MF25G | 0 | 2.5 | Gage | 0.25 | 675 | 68 | 1034 | 103 | 1034 | 103 |
| MF12G | 0 | 12.5 | Gage | 1.3 | 675 | 68 | 1034 | 103 | 1034 | 103 |
| M025G | 0 | 25 | Gage | 2.5 | 750 | 75 | 1034 | 103 | 1034 | 103 |
| M050G | 0 | 50 | Gage | 5.0 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M075G | 0 | 75 | Gage | 7.5 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M100G | 0 | 100 | Gage | 10 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M160G | 0 | 160 | Gage | 16 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M250G | 0 | 250 | Gage | 25 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M500G | 0 | 500 | Gage | 50 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| MN50G | -500 | 0 | Gage | -50 to 0 | 1034 | 103 | 5171 | 517 | 17237 | 1724 |
| M611A | 600 | 1100 | Absolute | 60 to 110 | 1034 | 103 | 5171 | 517 | 17237 | 1724 |
| 型番 | Pmin | Pmax | 圧力基準 | kPa | bar | kPa | bar | kPa | bar | kPa |
| bar | | | | | | | | | | |
| B001D | -1 | 1 | Differential | 100 | 3.1 | 310 | 10.3 | 1034 | 17.2 | 1724 |
| BF25D | -2.5 | 2.5 | Differential | 250 | 7.2 | 720 | 17.2 | 1724 | 17.2 | 1724 |
| B005D | -5 | 5 | Differential | 500 | 12.4 | 1240 | 17.2 | 1724 | 17.2 | 1724 |
| B010D | -10 | 10 | Differential | 1000 | 17 | 1700 | 17.2 | 1724 | 17.2 | 1724 |
| BN01G | -1 | 0 | Gage | -100 to 0 | 2 | 200 | 5.2 | 517 | 17.2 | 1724 |
| B001G | 0 | 1 | Gage | 100 | 2 | 200 | 5.2 | 517 | 17.2 | 1724 |
| BF25G | 0 | 2.5 | Gage | 250 | 6.2 | 620 | 10.3 | 1034 | 17.2 | 1724 |
| B005G | 0 | 5 | Gage | 500 | 8 | 800 | 17.2 | 1724 | 17.2 | 1724 |
| B010G | 0 | 10 | Gage | 1000 | 17 | 1700 | 17.2 | 1724 | 17.2 | 1724 |
| B001A | 0 | 1 | Absolute | 100 | 1 | 100 | 1.0 | 103 | 1.0 | 103 |
| B002A | 0 | 2 | Absolute | 200 | 5 | 500 | 10.3 | 1034 | 17.2 | 1724 |

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ELVI, ELVE, ELVA シリーズ圧力範囲

| 圧力範囲 ¹ | | | | 過負荷耐圧 ² | | 破壊耐圧 ³ | | コモンモード圧力 ⁴ | | |
|-------------------|--------------------------|------------------|--------------|--------------------|------|-------------------|------|-----------------------|------|------|
| 型番 | P _{min} mbar | P _{max} | 圧力基準 | kPa | mbar | kPa | mbar | kPa | mbar | kPa |
| M100D | -100 | 100 | Differential | 10 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M160D | -160 | 160 | Differential | 16 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M250D | -250 | 250 | Differential | 25 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M500D | -500 | 500 | Differential | 50 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M100G | 0 | 100 | Gage | 10 | 850 | 85 | 1034 | 103 | 1034 | 103 |
| M160G | 0 | 160 | Gage | 16 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M250G | 0 | 250 | Gage | 25 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| M500G | 0 | 500 | Gage | 50 | 1034 | 103 | 1034 | 103 | 1034 | 103 |
| 型番 | P _{min} bar | P _{max} | 圧力基準 | kPa | bar | kPa | bar | kPa | bar | kPa |
| B001D | -1 | 1 | Differential | 100 | 3.1 | 310 | 10.3 | 1034 | 17.2 | 1724 |
| B001G | 0 | 1 | Gage | 100 | 3.1 | 310 | 10.3 | 1034 | 17.2 | 1724 |
| BF25G | 0 | 2.5 | Gage | 250 | 6 | 620 | 17.2 | 1724 | 17.2 | 1724 |
| B005G | 0 | 5 | Gage | 500 | 12 | 1240 | 17.2 | 1724 | 17.2 | 1724 |
| B010G | 0 | 10 | Gage | 1000 | 14 | 1400 | 17.2 | 1724 | 17.2 | 1724 |
| B001A | 0 | 1 | Absolute | 100 | 1 | 100 | 1.0 | 103 | 1.0 | 103 |
| B002A | 0 | 2 | Absolute | 200 | 5 | 500 | 10.3 | 1034 | 17.2 | 1724 |
| 型番 | P _{min} psi | P _{max} | 圧力基準 | kPa | psi | kPa | psi | kPa | psi | kPa |
| 001D | -1 | 1 | Differential | 7 | 15 | 103 | 15 | 103 | 15 | 103 |
| 001G | 0 | 1 | Gage | 7 | 15 | 103 | 15 | 103 | 15 | 103 |
| 100G | 0 | 100 | Gage | 690 | 200 | 1379 | 250 | 1724 | 250 | 1724 |

ELVH シリーズの出力性能表

3.3V または5V、基準温度25°C。ポートB（上部ポート）に加えられる陽圧を測定。

| パラメーター | デジタル | | | | | アナログ | | | | |
|---|------|-------|-------|-------------|----|------|---------|-------|------|----|
| | Min | Typ | Max | 単位 | 追記 | Min | Typ | Max | 単位 | 追記 |
| フルスケールスパン (FSS) | | | | | | | | | | |
| (10% - 90%, 5% - 85% Transfer Function Options) | | | | | | | | | | |
| xxxD (Differential) | - | ±6554 | - | Count (Dec) | 5 | - | ±40% VS | - | V | 5 |
| xxxG (Gage), xxxA (Absolute) | - | 13108 | - | Count (Dec) | 5 | - | 80% VS | - | V | 5 |
| (5% - 95%, 4% - 94% Transfer Function Options) | | | | | | | | | | |
| xxxD (Differential) | - | ±7373 | - | Count (Dec) | 5 | - | ±45% VS | - | V | 5 |
| xxxG (Gage), xxxA (Absolute) | - | 14746 | - | Count (Dec) | 5 | - | 90% VS | - | V | 5 |
| オフセット | | | | | | | | | | |
| (10% - 90% Transfer Function Option) | | | | | | | | | | |
| xxxD (Differential) | - | 8192 | - | Count (Dec) | - | - | 50% VS | - | V | - |
| xxxG (Gage), xxxA (Absolute) | - | 1638 | - | Count (Dec) | - | - | 10% VS | - | V | - |
| (5% - 95% Transfer Function Option) | | | | | | | | | | |
| xxxD (Differential) | - | 8192 | - | Count (Dec) | - | - | 50% VS | - | V | - |
| xxxG (Gage), xxxA (Absolute) | - | 819 | - | Count (Dec) | - | - | 5% VS | - | V | - |
| (5% - 85% Transfer Function Option) | | | | | | | | | | |
| xxxD (Differential) | - | 7373 | - | Count (Dec) | - | - | 45% VS | - | V | - |
| xxxG (Gage), xxxA (Absolute) | - | 819 | - | Count (Dec) | - | - | 5% VS | - | V | - |
| (4% - 94% Transfer Function Option) | | | | | | | | | | |
| xxxD (Differential) | - | 8028 | - | Count (Dec) | - | - | 49% VS | - | V | - |
| xxxG (Gage), xxxA (Absolute) | - | 655 | - | Count (Dec) | - | - | 4% VS | - | V | - |
| 精度 | - | - | ±0.25 | %FSS | 6 | - | - | ±0.25 | %FSS | 6 |
| 総合精度誤差 (TEB) | | | | | | | | | | |
| F50D, L01G, MF25G | - | ±0.5 | ±3 | %FSS | 7 | - | ±0.5 | ±3 | %FSS | 7 |
| L01D, L02G, MF25D | - | ±0.5 | ±2 | %FSS | 7 | - | ±0.5 | ±2 | %FSS | 7 |
| L04G | - | ±0.5 | ±1.5 | %FSS | 7 | - | ±0.5 | ±1.5 | %FSS | 7 |
| Remaining ranges | - | ±0.5 | ±1 | %FSS | 7 | - | ±0.5 | ±1 | %FSS | 7 |
| 姿勢特性 | | | | | | | | | | |
| L02x, MF25x, & Below | - | ±0.2 | - | %FSS | 8 | - | ±0.2 | - | %FSS | 8 |
| Above L02x & MF25x | - | ±0.1 | - | %FSS | 8 | - | ±0.1 | - | %FSS | 8 |
| 起動時間 | | | | | | | | | | |
| | - | - | 3 | ms | - | - | - | 5 | ms | - |
| 応答速度 | | | | | | | | | | |
| | - | 0.46 | - | ms | - | - | 1 | - | ms | - |
| 供給電流 | | | | | | | | | | |
| 3.3V Supply Option | - | 3.1 | 3.9 | mA | - | - | 2.1 | 2.8 | mA | - |
| 5V Supply Option | - | 3.7 | 4.6 | mA | - | - | 2.7 | 3.5 | mA | - |

ELVH出力パフォーマンス仕様追記

追記5: フルスケールスパン (FSS) は、最大値と最小値の出力信号のカウントの差です。

追記6: 精度は、ベストフィット直線 (BFSL) に基づいて測定された偏差です。

追記7: 総合精度誤差は、オフセット、スパン温度、キャリブレーション、直線性、圧力ヒステリシス、オフセットウォームアップシフト、オフセット姿勢特性、長期オフセットドリフトの合計です。

追記8: パラメータは特性評価されており、100%テストされていません。

温度出力変換機能:

$$Temperature (^{\circ}C) = T_{out_{dig}} \times \left(\frac{200}{2^{11} - 1} \right) - 50$$

ELVI & ELVE シリーズの出力性能表

3 または 5V、基準温度 25°C。ポート B (上部ポート) に加えられる陽圧を測定。

| パラメーター | デジタル | | | | |
|------------------------------|-------|-------|-------|-------------|----|
| | Min | Typ | Max | 単位 | 追記 |
| フルスケールスパン (FSS) | - | 27000 | - | Count (Dec) | 5 |
| フルスケール出力 (FSO) | | | | | |
| Min Pressure | 2595 | 3000 | 3405 | Count (Dec) | - |
| Max Pressure | 29595 | 30000 | 30405 | Count (Dec) | - |
| オフセット | | | | | |
| xxxD (Differential) | 16095 | 16500 | 16905 | Count (Dec) | - |
| xxxG (Gage), xxxA (Absolute) | 2595 | 3000 | 3405 | Count (Dec) | - |
| 精度 | - | - | ±0.25 | %FSS | 6 |
| 総合精度誤差 (TEB) | - | - | ±1.5 | %FSS | 7 |
| A/D 分解能 | - | 12 | - | bit | - |
| 応答速度 | - | 0.5 | - | ms | 9 |
| 消費電流 | | | | | |
| 3V Supply Option | - | 4.5 | - | mA | - |
| 5V Supply Option | - | 5.3 | - | mA | - |

ELVI および ELVE 出力パフォーマンス仕様追記

追記5：フルスケールスパン (FSS) は、圧力範囲の最大と最小の出力信号間のカウンターの差です。

追記6：精度は、ベストフィット直線 (BFSL) に基づいて測定された偏差です。

追記7：総合精度誤差は、以下を含む、考えられるすべてのエラーの組み合わせから計算されます。オフセット、スパン温度、校正、直線性、圧力ヒステリシス、オフセットウォームアップシフト、オフセット姿勢特性、および長期オフセットドリフトの合計です。

追記9：圧カダイでの圧力変化と出力での信号変化の間の最大遅延時間。

ELVA シリーズの出力性能表

3Vまたは5V、基準温度25°C。ポートB（上部ポート）に加えられる陽圧を測定。

| パラメーター | アナログ | | | | |
|-----------------------------------|------|-----|-------|------|----|
| | Min | Typ | Max | 単位 | 追記 |
| フルスケールスパン (FSS) | | | | | |
| 3V Supply Option | - | 2.4 | - | V | 5 |
| 5V Supply Option | - | 4 | - | V | 5 |
| フルスケール出力 (FSO) (3V Option) | | | | | |
| Min Pressure | 0.26 | 0.3 | 0.34 | V | - |
| Max Pressure | 2.66 | 2.7 | 2.74 | V | - |
| フルスケール出力(FSO) (5V Option) | | | | | |
| Min Pressure | 0.44 | 0.5 | 0.56 | V | - |
| Max Pressure | 4.44 | 4.5 | 4.56 | V | - |
| オフセット (3V Option) | | | | | |
| xxxD (Differential) | 1.46 | 1.5 | 1.54 | V | - |
| xxxG (Gage), xxxA (Absolute) | 0.26 | 0.3 | 0.34 | V | - |
| オフセット(5V Option) | | | | | |
| xxxD (Differential) | 2.44 | 2.5 | 2.56 | V | - |
| xxxG (Gage), xxxA (Absolute) | 0.44 | 0.5 | 0.56 | V | - |
| 精度 | - | - | ±0.25 | %FSS | 6 |
| 総合精度誤差 (TEB) | - | - | ±1.5 | %FSS | 7 |
| A/D 分解能 | - | 12 | - | bit | - |
| D/A 解像度 | - | - | 11 | bit | - |
| 応答速度 | - | 0.5 | - | ms | 9 |
| 消費電流 | | | | | |
| 3V Supply Option | - | 4.5 | - | mA | - |
| 5V Supply Option | - | 5.3 | - | mA | - |

ELVA 出力パフォーマンス仕様追記

追記5：フルスケールスパン（FSS）は、圧力範囲の最大と最小の出力信号間のカウントの差です。

追記6：精度は、ベストフィット直線（BFSL）に基づいて測定された偏差です。

追記7：総合精度誤差は、以下を含む、考えられるすべてのエラーの組み合わせから計算されます。オフセット、スパン温度、校正、直線性、圧力ヒステリシス、オフセットウォームアップシフト、オフセット姿勢特性、および長期オフセットドリフトの合計です。

追記9：圧カダイでの圧力変化と出力での信号変化の間の最大遅延時間。

ELVH シリーズ注文ガイド

例： **ELVH-L01D-HRRD-C-NAA4** は、All Sensors ELVHシリーズアナログ+デジタル圧力センサ、圧力範囲1 inH2O 差圧、HRRDパッケージ（同一側デュアルバンプ付き圧カポートを備えたDIP）、補償温度範囲0℃~50℃、バリレンコーティングなし、アナログ出力、出力Vsupplyの10~90%、3.3 Vdc供給電圧。

ELVH - L01D - HRRD - C - NAA4

製品シリーズ
ELV Digital and Analog Series

圧力範囲 Note 10

| 差圧 | ゲージ圧 | 絶対圧 |
|-------------------|----------------------|------------------------|
| F50D ± 0.5 inH2O | L01G 0 to 1 inH2O | 015A 0 to 15 psi |
| L01D ± 1 inH2O | L02G 0 to 2 inH2O | 030A 0 to 30 psi |
| L02D ± 2 inH2O | L04G 0 to 4 inH2O | 060A 0 to 60 psi |
| L04D ± 4 inH2O | L05G 0 to 5 inH2O | 100A 0 to 100 psi |
| L05D ± 5 inH2O | L10G 0 to 10 inH2O | 150A 0 to 150 psi |
| L10D ± 10 inH2O | L20G 0 to 20 inH2O | M611A 600 to 1100 mbar |
| L20D ± 20 inH2O | L30G 0 to 30 inH2O | B001A 0 to 1 bar |
| L30D ± 30 inH2O | L60G 0 to 60 inH2O | B002A 0 to 2 bar |
| L60D ± 60 inH2O | 001G 0 to 1 psi | |
| 001D ± 1 psi | 005G 0 to 5 psi | |
| 005D ± 5 psi | 015G 0 to 15 psi | |
| 015D ± 15 psi | 030G 0 to 30 psi | |
| 030D ± 30 psi | 060G 0 to 60 psi | |
| 060D ± 60 psi | 100G 0 to 100 psi | |
| MF25D ± 2.5 mbar | 150G 0 to 150 psi | |
| MF12D ± 12.5 mbar | MF25G 0 to 2.5 mbar | |
| M025D ± 25 mbar | MF12G 0 to 12.5 mbar | |
| M050D ± 50 mbar | M025G 0 to 25 mbar | |
| M075D ± 75 mbar | M050G 0 to 50 mbar | |
| M100D ± 100 mbar | M075G 0 to 75 mbar | |
| M160D ± 160 mbar | M100G 0 to 100 mbar | |
| M250D ± 250 mbar | M160G 0 to 160 mbar | |
| M500D ± 500 mbar | M250G 0 to 250 mbar | |
| B001D ± 1 bar | M500G 0 to 500 mbar | |
| BF25D ± 2.5 bar | MN50G -500 to 0 mbar | |
| B005D ± 5 bar | BN01G -1 to 0 bar | |
| B010D ± 10 bar | B001G 0 to 1 bar | |
| | BF25G 0 to 2.5 bar | |
| | B005G 0 to 5 bar | |
| | B010G 0 to 10 bar | |

コーティング

| | |
|---|-------------|
| N | No Parylene |
| P | Parylene |

補償温度範囲

| | |
|---|---------------|
| C | 0°C to 50°C |
| I | -20°C to 85°C |

供給電圧

| | |
|---|---------|
| 4 | 3.3 Vdc |
| 5 | 5.0 Vdc |

出力

| | |
|---|--|
| A | 10% to 90% of Vsupply (analog), 2 ¹⁴ counts (digital) |
| B | 5% to 95% of Vsupply (analog), 2 ¹⁴ counts (digital) |
| C | 5% to 85% of Vsupply (analog), 2 ¹⁴ counts (digital) |
| D | 4% to 94% of Vsupply (analog), 2 ¹⁴ counts (digital) |

出カインターフェイス

| | DIP (8 pin) | Package Pinout Offering Code* | | |
|---|--------------------------------|-------------------------------|-------------|---------------|
| | | SMT (8 pin) | SIP (4 pin) | |
| A | Analog, (H-Style) | 3 | 3 | 4 |
| S | SPI | 2 | 2 | Not Available |
| 2 | I ² C, Address 0x28 | 1 | 1 | 5 |
| 3 | I ² C, Address 0x38 | 1 | 1 | 5 |
| 4 | I ² C, Address 0x48 | 1 | 1 | 5 |
| 5 | I ² C, Address 0x58 | 1 | 1 | 5 |
| 6 | I ² C, Address 0x68 | 1 | 1 | 5 |
| 7 | I ² C, Address 0x78 | 1 | 1 | 5 |

パッケージ選択コード(4ケタ) Note 10

| | DIP | SMT J-Lead | SIP |
|------|-----|------------|------|
| HNND | | HNNJ | HNNH |
| HAND | | HANJ | HANH |
| - | - | - | HAAH |
| HRND | | HRNJ | HRNH |
| HRRD | | HRRJ | HRRH |
| HDRD | | HDRJ | HDRH |
| HKND | | HKNJ | - |
| HJND | | HJNJ | HJNH |
| HJJD | | HJJJ | HJJH |

*パッケージピン出力注文コード端子情報

| Pin Code | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | GND | VS | SDA | SCL | N/C | N/C | N/C | N/C |
| 2 | GND | VS | MISO | SCLK | SS | N/C | N/C | N/C |
| 3 | N/C | VS | VOULT | GND | N/C | N/C | N/C | N/C |
| 4 | N/C | VS | VOULT | GND | - | - | - | - |
| 5 | GND | VS | SDA | SCL | - | - | - | - |

N/C: 接続なし

他社代替品の部品番号の相互参照については、All SensorsのWebサイトの部品番号ビルダーアプリケーションを参照してください。

注意: パレレンコーティングは10 inH2O、25 mbar以下またはJ-Leadでは使用出来ません。

ELVI シリーズ注文ガイド

例：ELVI-M100D-HNNJ-C-N2E3 は、All Sensors ELVIシリーズデジタル圧力センサー、圧力範囲100mBar 差圧、HNNJパッケージ（圧力ポートなしSMTJリード）、補償温度範囲0℃～50℃、パリレンコーティングなし、I2C出力、アドレス0x28、215カウントの9.16%～91.55%、3Vdc供給電圧。

ELVI - M100D - HNNJ - C - N 2 E 3

製品シリーズ
ELVI Digital and Analog Series

圧力範囲 Note 10

| 差圧 | ゲージ圧 | 絶対圧 |
|------------------|---------------------|------------------|
| M100D ± 100 mbar | M100G 0 to 100 mbar | B001A 0 to 1 bar |
| M160D ± 160 mbar | M160G 0 to 160 mbar | B002A 0 to 2 bar |
| M250D ± 250 mbar | M250G 0 to 250 mbar | |
| M500D ± 500 mbar | M500G 0 to 500 mbar | |
| B001D ± 1 bar | B001G 0 to 1 bar | |
| 001D ± 1 psi | BF25G 0 to 2.5 bar | |
| | B005G 0 to 5 bar | |
| | B010G 0 to 10 bar | |
| | 001G 0 to 1 psi | |
| | 100G 0 to 100 psi | |

コーティング

| | |
|---|-------------|
| N | No Parylene |
| P | Parylene |

補償温度範囲

| | |
|---|---------------|
| C | 0°C to 50°C |
| I | -20°C to 85°C |

供給電圧

| | |
|---|-------|
| 3 | 3 Vdc |
| 5 | 5 Vdc |

出力

E 9.16% to 91.55% of 2¹⁵ counts (digital)

パッケージピン出力注文コード*

| 出カインターフェイス | パッケージピン出力注文コード* | | |
|----------------------------------|-----------------|-------------|-------------|
| | DIP (8 pin) | SMT (8 pin) | SIL (4 pin) |
| 2 I ² C, Address 0x28 | 1 | 1 | 5 |
| 3 I ² C, Address 0x38 | 1 | 1 | 5 |
| 4 I ² C, Address 0x48 | 1 | 1 | 5 |
| 5 I ² C, Address 0x58 | 1 | 1 | 5 |
| 6 I ² C, Address 0x68 | 1 | 1 | 5 |
| 7 I ² C, Address 0x78 | 1 | 1 | 5 |

***パッケージピン出力注文コード端子情報**

| | DIP | SMT J-Lead | SIL F-Lead |
|--------|-----|------------|------------|
| HNNND | | HNNNJ | HNNNF |
| HANNND | | HANNNJ | HANNNF |
| - | - | - | HAANF |
| HKNNND | | HKNNNJ | HKNNNF |
| HCNNND | | - | - |

***パッケージ選択コード(4ケタ) 追記 10**

| Pin Code | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 | Vs | GND | N/C | N/C | SCL | N/C | N/C | SDA |
| 5 | Vs | GND | SCL | SDA | - | - | - | - |

/N/C: 接続なし

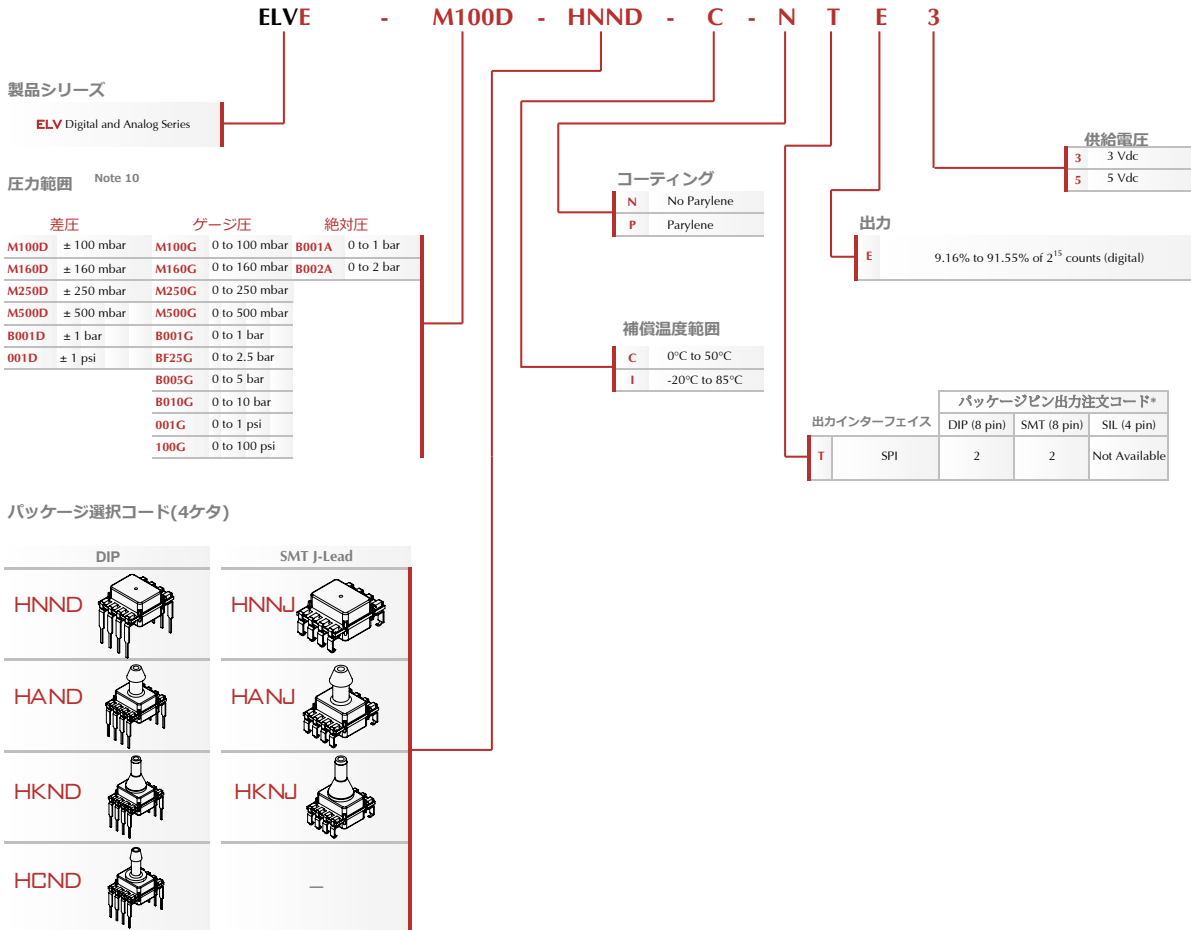
他社代替品の部品番号の相互参照については、All SensorsのWebサイトの部品番号ビルダーアプリケーションを参照してください。

注意: パリレンコーティングは10 inH2O、25 mbar以下またはJ-Leadでは使用出来ません。



ELVEシリーズ注文ガイド

例: **ELVE-M100D-HNND-C-NTE3** は、All Sensors ELVEシリーズデジタル圧力センサー、圧力範囲100 mbarの差圧、HNNFパッケージ (ポートなしのDIP)、補正温度範囲0°Cから50°C、パリレンコーティングなし、SPI出力、215カウントの9.16%から91.55%、3 Vdc供給電圧。



*パッケージピン出力注文コード端子情報

| Pin Code | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2 | Vs | GND | N/C | MISO | SCLK | SS | N/C | MOSI |

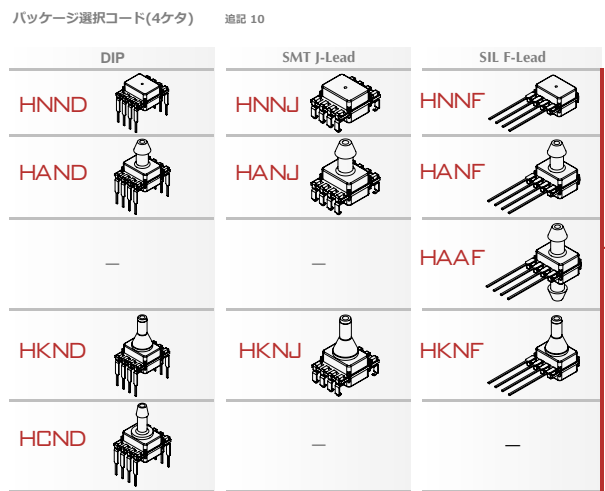
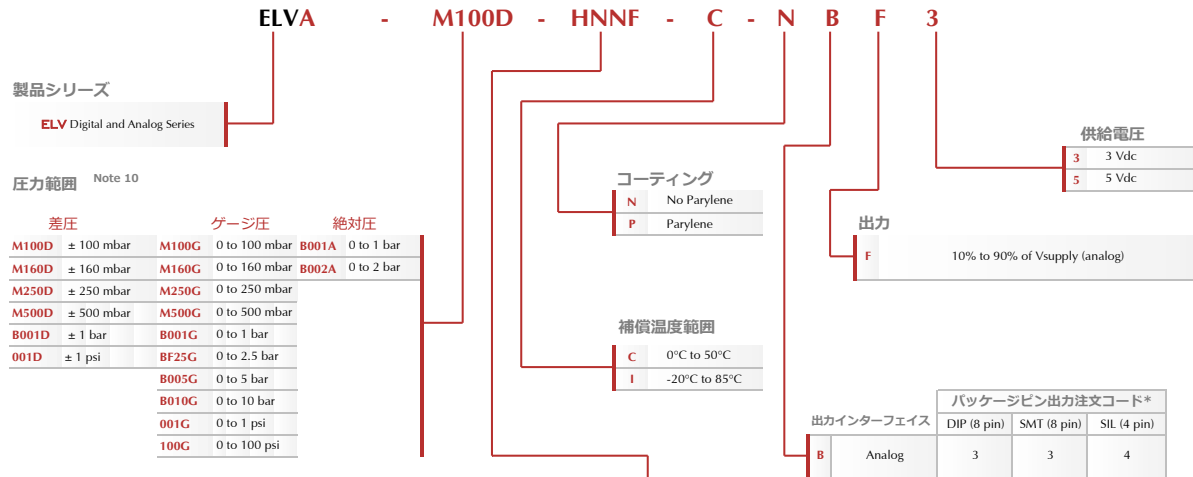
N/C: 接続なし

他社代替品の部品番号の相互参照については、All SensorsのWebサイトの部品番号ビルダーアプリケーションを参照してください。

注意: パリレンコーティングは10 inH2O、25 mbar以下またはJ-Leadでは使用出来ません。

ELVA シリーズ注文ガイド

例：ELVA-M100D-HNNF-C-NBF3 は、All Sensors ELVAシリーズアナログ圧力センサー、100 mbar差圧範囲、HNNFパッケージ（ポートなしのSIL）、補正温度範囲0°Cから50°C、パレレンコーティング、アナログ出力、10~90%Vsupply伝達関数、3 Vdc供給電圧。



*パッケージピン出力注文コード端子情報

| Pin Code | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| 3 | Vs | GND | VOUT | N/C | N/C | N/C | N/C | N/C |
| 4 | Vs | GND | VOUT | N/C | - | - | - | - |

N/C: Not Internally Connected

他社代替品の部品番号の相互参照については、All SensorsのWebサイトの部品番号ビルダーアプリケーションを参照してください。

注意: パレレンコーティングは10 inH2O、25 mbar以下またはJ-Leadでは使用出来ません。



Device Options

Parylene Coating:

Parylene coating provides a moisture barrier and protection from some harsh media. Unlike other pressure sensor suppliers offering a Parylene coating, All Sensors performs this process in-house and uses an advanced production system to achieve the highest accuracy and reliability. This avoids transferring products out of and back to the pressure sensor manufacturing facility, provides complete quality control and improves the delivery time to customers. Specially designed masking techniques allow All Sensors to apply a cost-effective, high-volume Parylene coating in-house.

Consult factory for applicability of Parylene for the target application and sensor type.

This option is only available for pressure ranges below ± 10 inH₂O and 25mbar and is not available for J-lead configurations.

Soldering Recommendations:

- 1) If possible, solder parts as a second operation only.
- 2) Post reflow and other high temperature processes, wait for 48 hrs before performing any calibration operations.
- 3) Perform spot cleaning as necessary only by hand. **DO NOT** wash or submerge device in cleaning liquid.
- 4) Max 270°C lead temperature (manual soldering 2-4 sec.)

If these devices are to be subjected to solder reflow assembly or other high temperature processing, they must be baked for 1 hour at 125°C within 24 hours prior to exposure. Failure to comply may result in cracking and/or delamination of critical interfaces within the package, and is not covered by warranty.

Evaluation Kit:

All Sensors offers evaluation kits to help design engineers evaluate potential devices early in the development process.

For the ELV series, All Sensors offers the EK-02 to allow for easy testing of the sensors.

I2C Interface for ELVH Series

The part enters Free Running mode (see table 1) after power-up: it performs an initial complete measurement, writes the calculated data to the output registers, sets the INT pin high, then starts the next reading. Note that a “special cycle” occurs every 255 cycles (~120 msec), which adds 400 µsec to the update time for that cycle.

I2C Communications Overview

The I2C interface uses a set of signal sequences for communication. The following is a description of the supported sequences. Refer to Figure 3 for usage.

Bus not Busy (I): During idle periods both data line (SDA) and clock line (SCL) remain HIGH.

START condition (ST): A HIGH to LOW transition of SDA line while the clock (SCL) is HIGH is interpreted as START condition. START conditions are always set by the master. Each initial request for a pressure value has to begin with a START condition.

Slave address (An): The I2C-bus requires a unique address for each device. After setting a START condition the master sends the address byte containing the 7 bit sensor address followed by a data direction bit (R/W). A "0" indicates a transmission from master to slave (WRITE), a "1" indicates a data request (READ).

Acknowledge (A or N): Data is transferred in units of 8 bits (1 byte) at a time, MSB first. Each data-receiving device, whether master or slave, is required to pull the data line LOW to acknowledge receipt of the data. The Master must generate an extra clock pulse for this purpose. If the receiver does not pull the data line down, a NACK condition exists, and the slave transmitter becomes inactive. The master determines whether to send the last command again or to set the STOP condition, ending the transfer.

DATA valid (Dn): State of data line represents valid data when, after a START condition, data line is stable for duration of HIGH period of clock signal. Data on line must be changed during LOW period of clock signal. There is one clock pulse per data bit.

DATA operation: The sensor starts to send 4 data bytes containing the current pressure and temperature values. The transmission may be halted by the host after any of the bytes by responding with a NACK.

STOP condition (P): LOW to HIGH transition of the SDA line while clock (SCL) is HIGH indicates a STOP condition. STOP conditions are always generated by the master.

I2C Exceptions

1. Sending a Start condition, then a Stop condition, without any transitions on the CLK line, creates a communication error for the next communication, even if the next start condition is correct and the clock pulse is applied. A second Start condition must be set, which clears the error and allows communication to proceed.
2. The Restart condition—a falling SDA edge during data transmission when the CLK clock line is still high—creates the same stall/deadlock. In the following data request, an additional Start condition must be sent for correct communication.
3. A falling SDA edge is not allowed between the start condition and the first rising SCL edge. If using an I2C address with the first bit 0, SDA must be held low from the start condition through the first bit.

Figure 3 - I2C Communication Diagram

I2C Communications Diagram

1. Read Data (with examples of reading pressure, pressure plus 8 bits of temperature and pressure plus 11 bits of temperature)

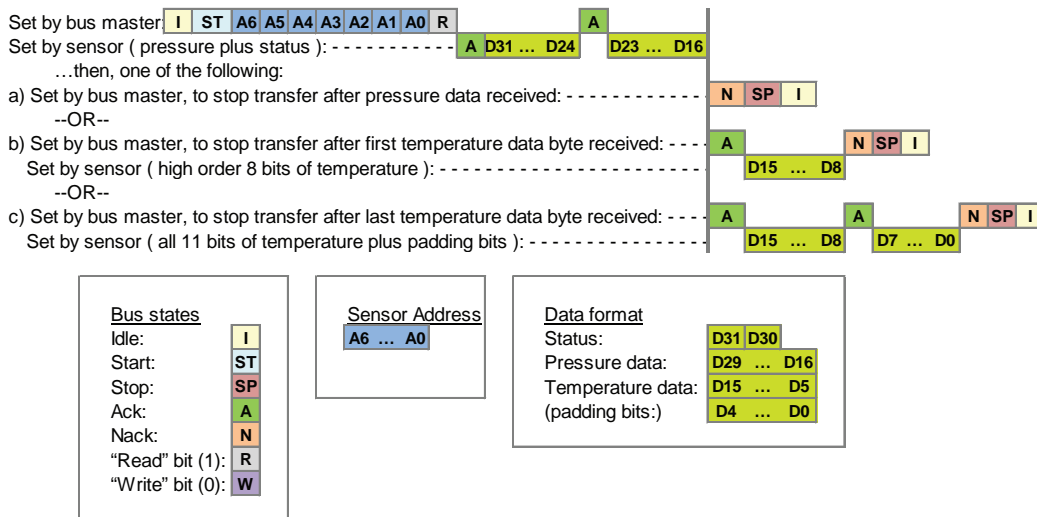


Figure 3 illustrates the sequence of signals set by both the host and the sensor for each command. Note that for the ReadData command, the host has the option of responding to the second or third bytes of data with a NACK instead of ACK. This terminates the data transmission after the pressure data, or after the pressure data and upper byte of temperature, have been transmitted. See Figure 6 for the I2C timing details.

SPI Interface for ELVH Series

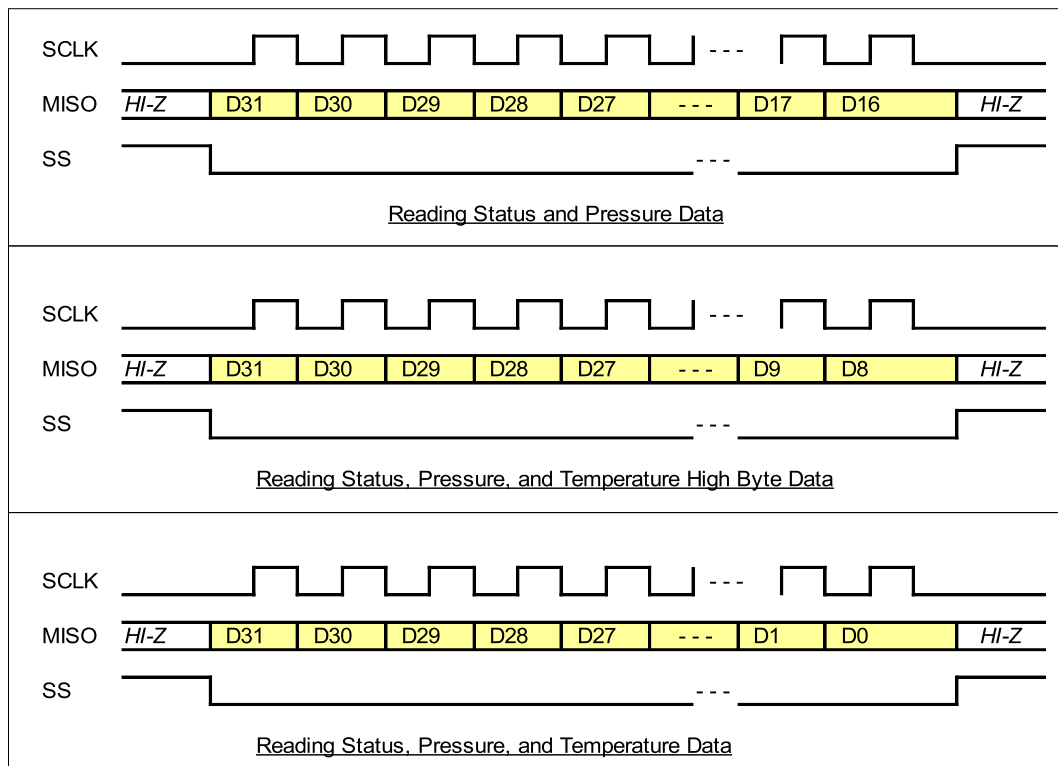
After power-up, the part enters Free Running mode and begins its periodic conversion cycle. The only bus interaction with the host is the SPI DataRead operation. Polling the sensor at a rate slower than the internal update rate will minimize bus activity and ensure that new values are presented with each transfer. Note that the Status bits should still be checked to verify updated data and the absence of error conditions.

ELVH sensors using the SPI interface option provide 3 signals for communication: SCLK, SS (Slave Select), and MISO.

SPI Bit Pattern

The sequence of bits and bus signals are shown in the following illustration (Figure 4). Refer to Figure 5 in the Interface Timing Diagram section for detailed timing data. As previously described, the incoming data may be terminated by raising SS after 2, 3, or 4 bytes have been received as illustrated below.

Figure 4 - SPI Bit Pattern



Interface Timing Diagrams for ELVH Series

Figure 5 - SPI Timing Diagram

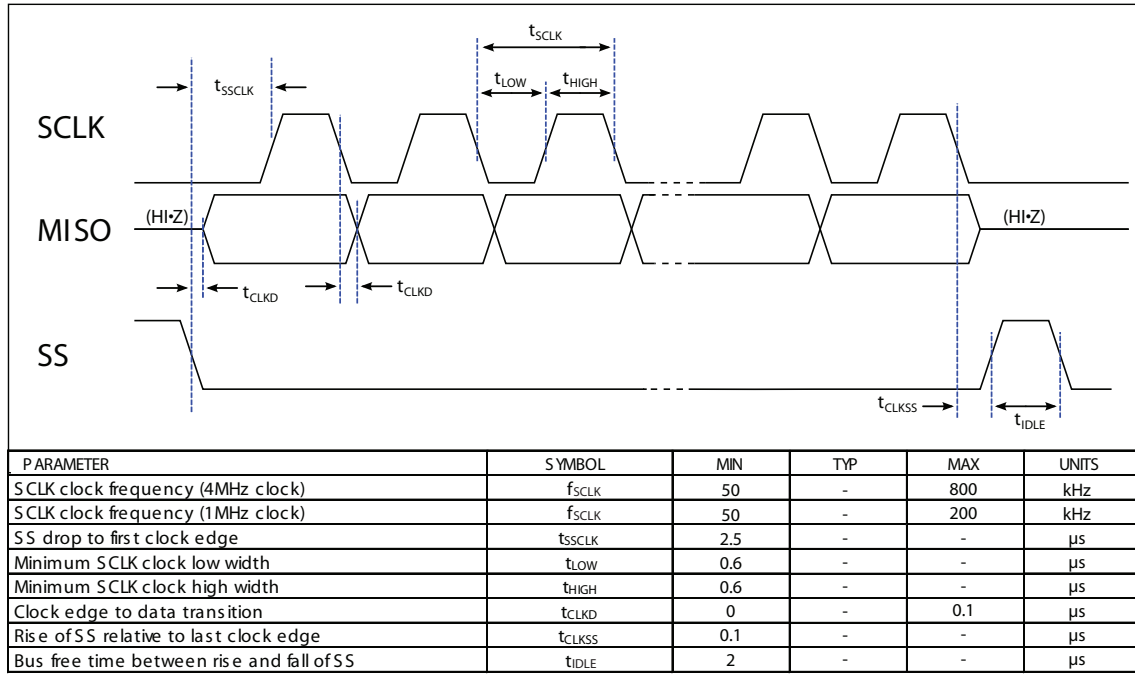
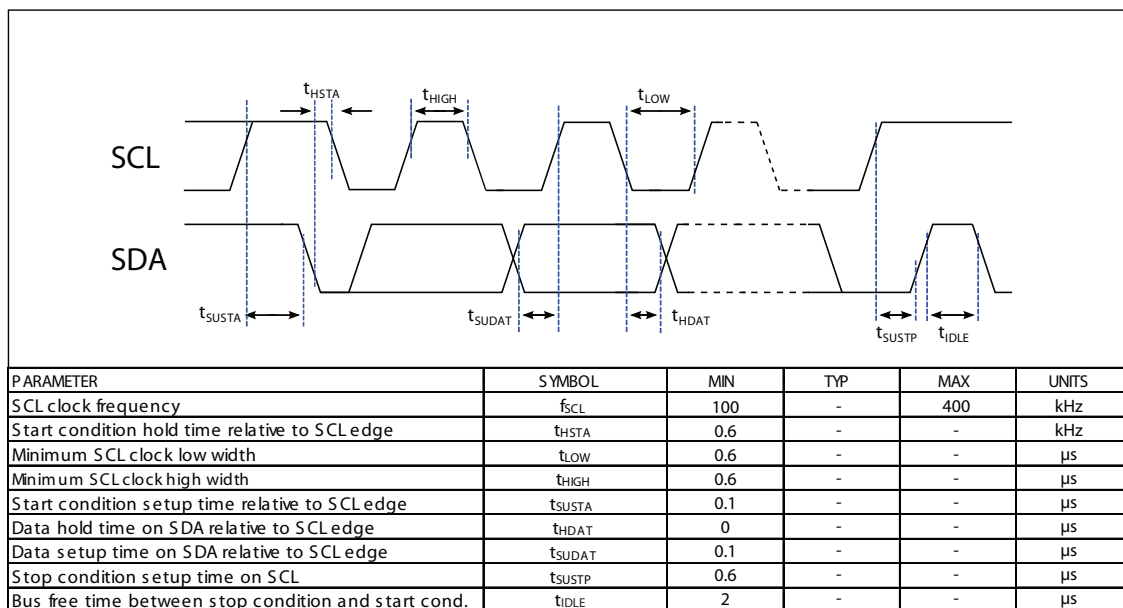


Figure 6 - I2C Timing Diagram



I²C Interface for ELVI Series

Introduction

The ELVI series sensors provide a digital output signal. The device runs a continuous program, which will store a corrected pressure value every 0.5 ms in the output registers of the internal ASIC.

According to the I²C-bus specification, the bus is controlled by a master device, which generates the clock signal, controls the bus access, and generates START and STOP conditions. These sensors are designed to work as slave devices, and will only respond to requests from a master device.

Digital I²C Interface

These devices comply with the following protocol in Figure 7, and timing as specified in Table 1 and Figure 8.

Bus not busy : During idle periods, both data line (SDA) and clock line (SCL) remain HIGH.

START condition (S) : HIGH to LOW transition of SDA line while clock (SCL) is HIGH is interpreted as START condition. START conditions are always generated by the master. Each initial request for a pressure value has to begin with a START condition.

STOP condition (P) : LOW to HIGH transition of SDA line while clock (SCL) is HIGH determines STOP condition. STOP conditions are always generated by the master. More than one request for the current pressure value can be transmitted without generation of intermediate STOP condition.

DATA valid (D) : State of data line represents valid data when, after START condition, data line is stable for duration of HIGH period of clock signal. Data on line must be changed during LOW period of clock signal. There is one clock pulse per bit of data.

Acknowledge (A) : HIGH to LOW transition of SDA line while clock (SCL) is HIGH is interpreted as START condition. START conditions are always generated by the master. Each initial request for a pressure value has to begin with a START condition.

Slave address : The I²C-bus master-slave concept requires a unique address for each device. These sensors have a preconfigured slave address, see the ELVI "How to Order" table on page 11. The sensor will then listen to both this address and 0x78. After generating a START condition the master sends the address byte containing a 7 bit address followed by a data direction bit (R/W). A "0" indicates a transmission from master to slave (WRITE), a "1" indicates a data request (READ).

DATA operation : The sensor sends 2 data bytes containing the current pressure value as a 15 bit value placed in the output registers.

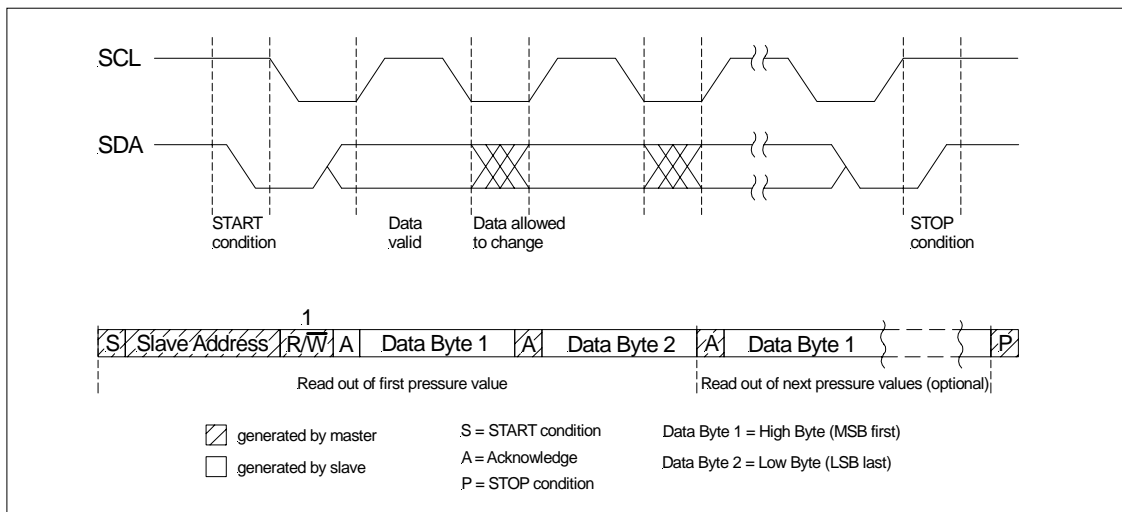


Figure7: I²Cbusprotocol



ELVI I²C BUS INTERFACE (Cont'd)

Table 1
I²C Interface Parameters

| Parameter | Symbol | Minimum | Nominal | Maximum | Unit | Specification Notes |
|--|---------------------|---------|---------|---------|---------------------|---------------------|
| Input High Level | - | 90 | - | 100 | % of V _s | 8 |
| Input Low Level | - | 0 | - | 10 | % of V _s | 8 |
| Output Low Level | - | - | - | 10 | % of V _s | 8 |
| Pull-Up Resistor | - | 500 | - | - | Ω | 8 |
| Load Capacitance @ SDA | C _{SDA} | - | - | 400 | pF | 8 |
| Input Capacitance @ SDA/SCL | C _{I2C,IN} | - | - | 10 | pF | 8 |
| Signal Clock Frequency | F _{SCL} | 100* | - | 400 | KHZ | 8 |
| Bus Free Time Between STOP and START Condition | t _{BUF} | 1.3 | - | - | μs | 8 |
| Hold Time (Repeated) START Condition, to First Clock Pulse | t _{HD,STA} | 0.8 | - | - | μs | 8 |
| Low Period of SCL | t _{LOW} | 1.3 | - | - | μs | 8 |
| High Period of SCL | t _{HIGH} | 0.6 | - | - | μs | 8 |
| Setup Time Repeated START Condition | t _{SU,STA} | 1 | - | - | μs | 8 |
| Data Hold Time | t _{HD,DAT} | 0 | - | - | μs | 8 |
| Data Setup Time | t _{SU,DAT} | 0.2 | - | - | μs | 8 |
| Rise Time of Both SDA and SCL | t _R | - | - | 0.3 | μs | 8 |
| Fall Time of Both SDA and SCL | t _F | - | - | 0.3 | μs | 8 |
| Setup Time for STOP Condition | t _{SU,STO} | 0.6 | - | - | μs | 8 |

Note 8: Parameter is characterized and not 100% tested.

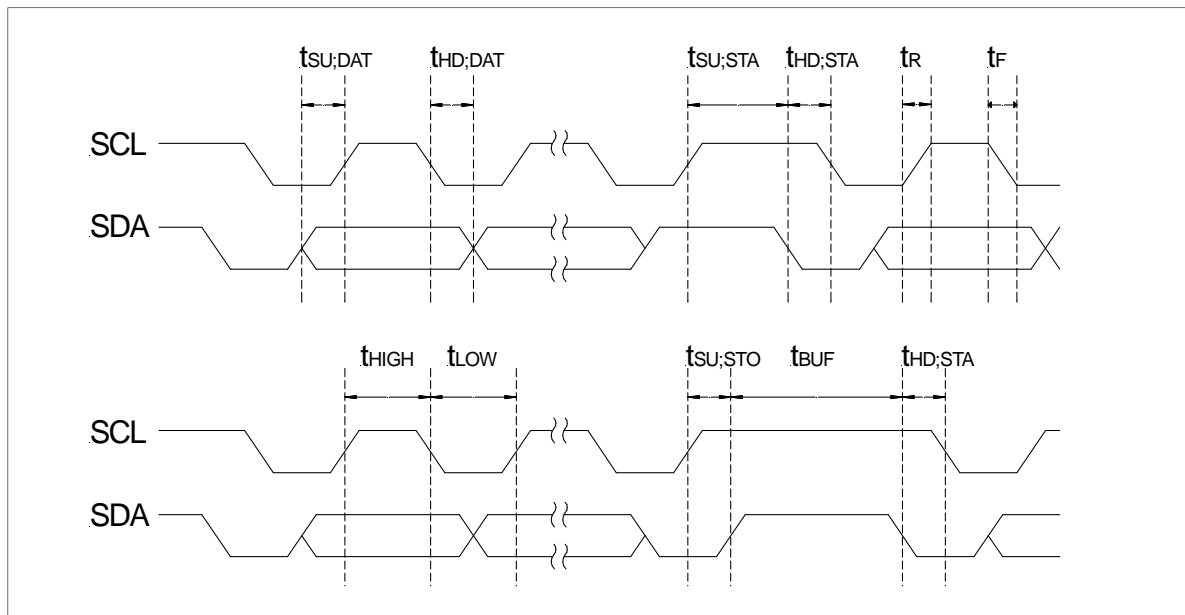


Figure 8. Timing Characteristics

SPI - SERIAL PERIPHERAL INTERFACE for ELVE Series

Introduction

The ELVE series sensors present a digital output signal. The device runs a continuous program, which will store a corrected sensor value about every 0.5 ms in the output registers of the internal ASIC. This cyclic program runs independently from the bus communication.

The SPI protocol specifies four signals: The clock (CLK) is generated by the master and input to all slaves. MOSI carries data from master to slave. MISO carries data from slave back to master. A slave select line (SS) allows individual selection of a slave device.

Timing requirements for these signals is shown in Table 2 and Figure 11.

SPI Modes

A pair of parameters called clock polarity (CPOL) and clock phase (CPHA) determine the edges of the clock signal on which the data are driven and sampled. Each of the two parameters has two possible states, which allows for four possible combinations, all of which are incompatible with one another.

The ELVE series supports clock phase (CPHA)=0 and polarity (CPOL)=0, which means that SCK is low when idle and data is sampled on the rising edge.

Slave Select

The falling edge of the SS line indicates the beginning of the transfer. Additionally, the SS line must not be negated and reasserted between the three bytes to be transmitted.

Data Operation

The MOSI line should always be set to high level. Because of internal configuration, the slave will answer the first byte with a value of 0xFF. The second and third byte contain the 15 bit pressure information (see Figure 10.)

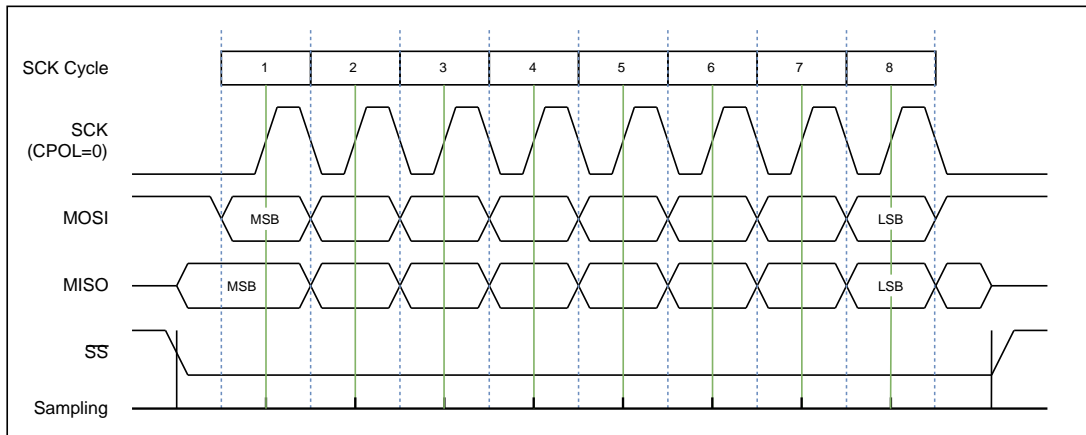


Figure 9: Example of a standard 1 byte SPI data transfer for CPHA=0 and CPOL=0

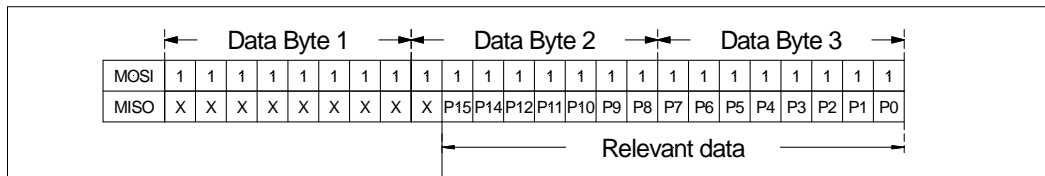


Figure 10: 3 byte data stream between ELVF sensor and master containing the pressure value as a 15 bit value.



ELVE SPI - SERIAL PERIPHERAL INTERFACE (Cont'd)

Table 2
Interface Parameters

| Parameter | Symbol | Minimum | Nominal | Maximum | Unit | Specification Notes |
|---|---------------------|-------------|---------|---------|------------|---------------------|
| Input High Level | - | 90 | - | 100 | % of V_s | 8 |
| Input Low Level | - | 0 | - | 10 | % of V_s | 8 |
| Output Low Level | - | - | - | 10 | % of V_s | 8 |
| Pull-Up Resistor | - | 500 | - | - | Ω | 8 |
| Load Capacitance @ MISO | C_{MISO} | - | - | 400 | pF | 8 |
| Input Capacitance @ Each Pin | C_{SPI_IN} | - | - | 10 | pF | 8 |
| Signal Clock Frequency | f_{SCK} | 100 | - | 640 | kHZ | 8 |
| MISO Hold Time after SCK Sample Slope | $t_{SPI_HD_MISO}$ | 200 | - | - | ns | 8 |
| MOSI Setup Time Before SCK Sample Slope | $t_{SPI_SU_MOSI}$ | $2/f_{CLK}$ | - | - | - | 8 |
| /SS Setup Time Before SCK Sample Slope | $t_{SPI_SU_SS}$ | 10 | - | - | ns | 8 |
| /SS Hold Time After SCK Sample Slope | $t_{SPI_HD_SS}$ | $1/f_{CLK}$ | - | - | - | 8 |

Note 8: Parameter is characterized and not 100% tested.

Note: All Sensors recommends SPI communication speeds of at least 100 kHz (max. 640 kHz). Please contact your nearest All Sensors sales office for further information.

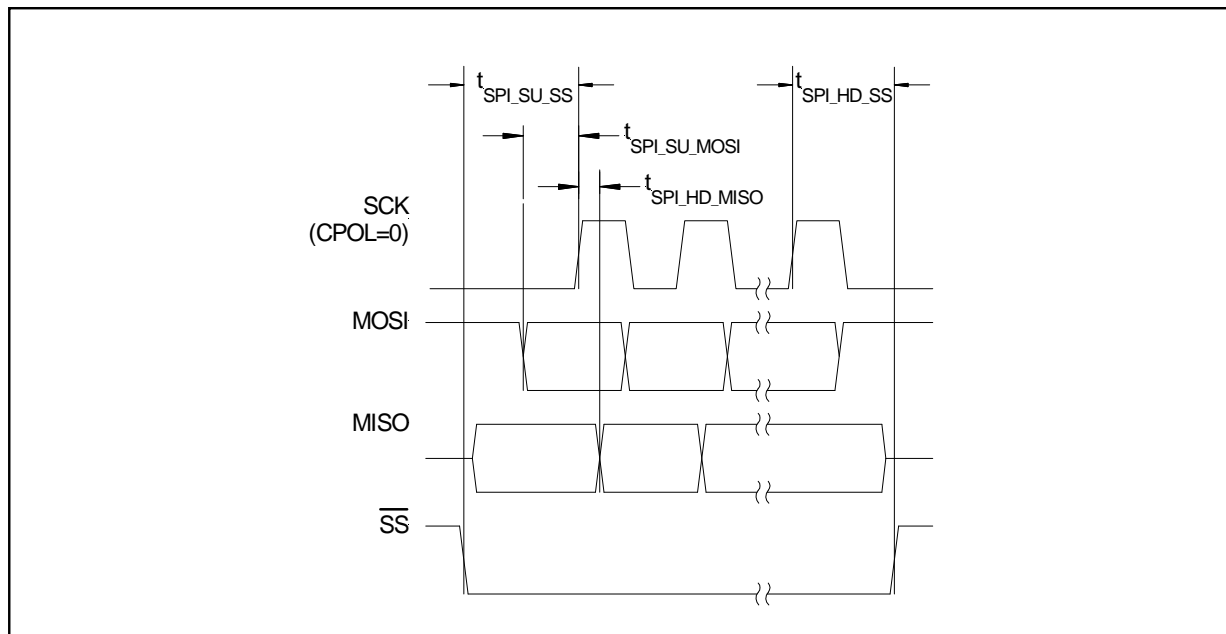
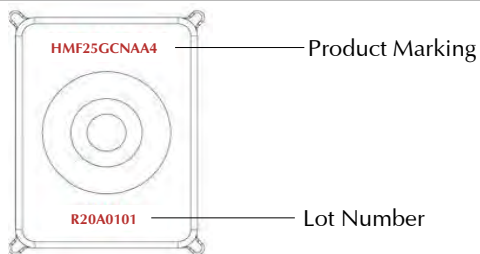
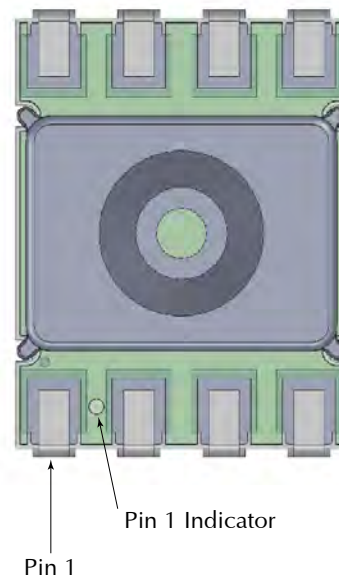
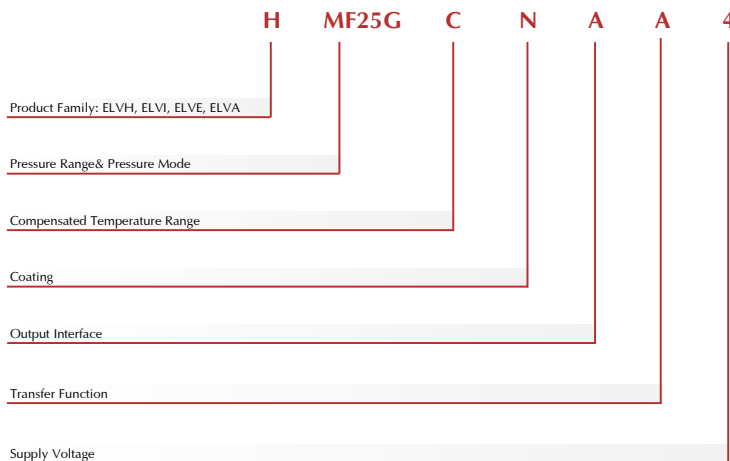


Figure 11: Timing characteristics

Product Marking and Pin Indicator



Example Product Marking: HMF25GCNAA4



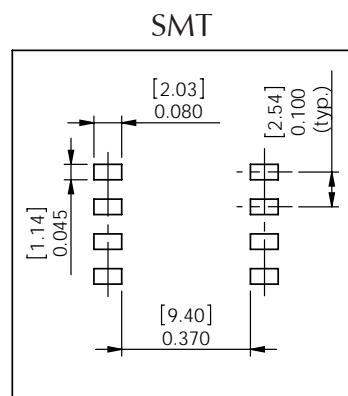
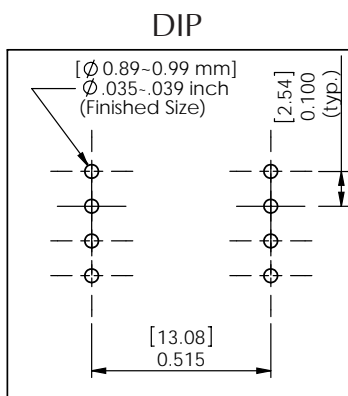
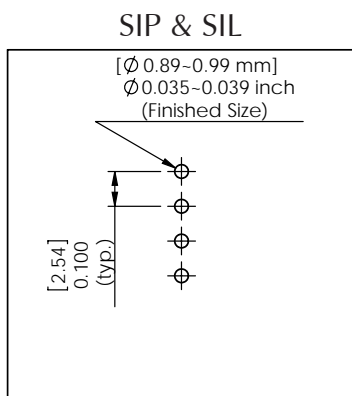
Pressure Tubing Recommendations

| Tubing Recommendations | | | | |
|------------------------|------------------|-------|--------------|---------------|
| Lid Type | ID | OD | Material* | |
| | | | Low Pressure | High Pressure |
| A | 5/32" | 1/4" | Silicone | Polyurethane |
| R | 1/16" | 1/8" | Silicone | Polyurethane |
| C | 1/8" | 1/4" | Silicone | Polyurethane |
| K | 3/32" | 5/32" | Silicone | Polyurethane |
| J | 1/16" | 1/8" | Silicone | Polyurethane |
| N | O-ring face seal | | | |

For the purposes of tubing recommendations, "Low Pressure" is defined as pressure ranges below 15 psi and "High Pressure" is defined as pressure ranges above 15 psi.

Note: 15 psi absolute is considered low pressure, whereas 15 psi differential and gage are considered high pressure.

Suggested Pad Layouts



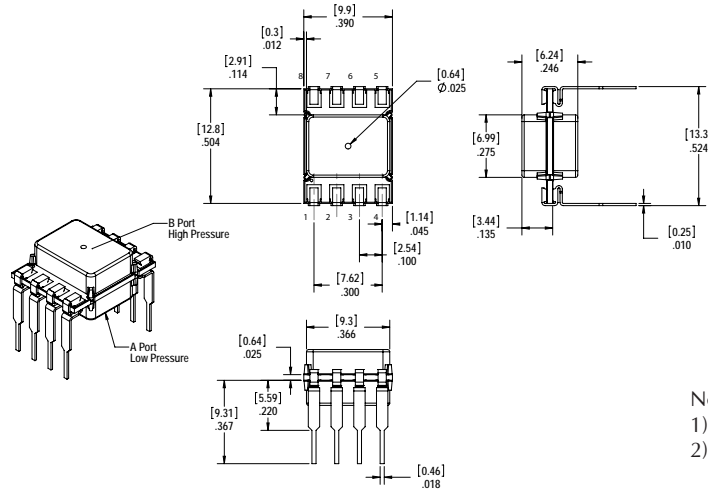
Dimensional Drawings - DIP Packages

Package Dimensions

DIP NN: No Port (Flat)

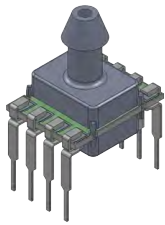


**HNND
PACKAGE**

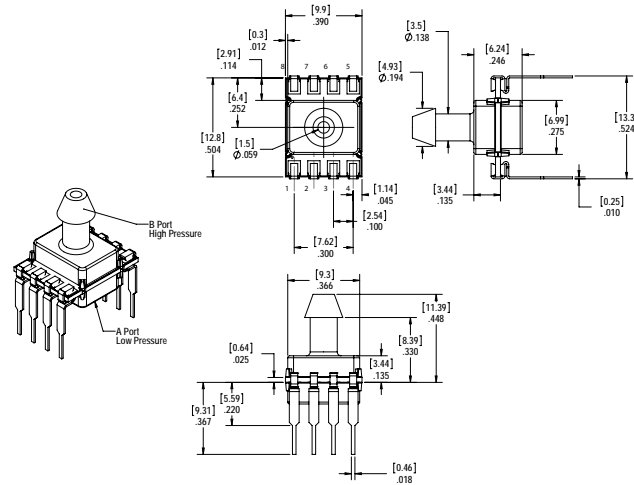


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-31.

DIP AN: Barbed Top Port Gage



**HAND
PACKAGE**

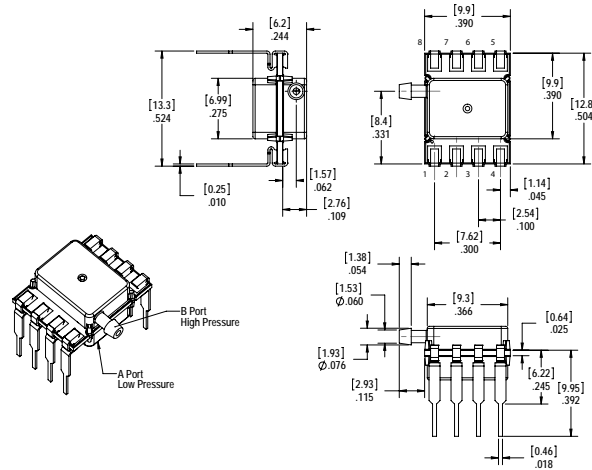


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-31.

DIP RN: Barbed Side Port Gage



**HRND
PACKAGE**



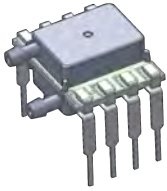
Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-31.

* Refer to How to Order Tables for pinouts

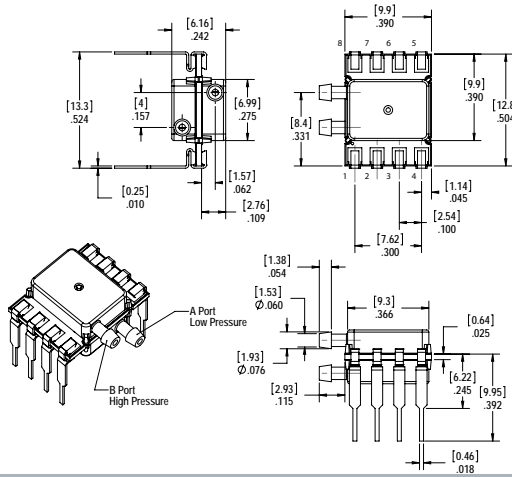
Dimensional Drawings - DIP Packages (Cont'd)

Package Dimensions

DIP RR: Barbed Side Port Differential



HRRD PACKAGE

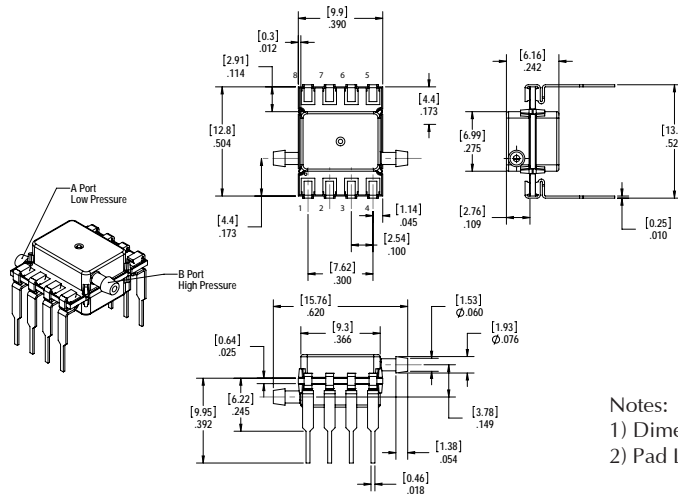


Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-31.

DIP DR: Barbed Opposite Side Port Differential



HDRD PACKAGE

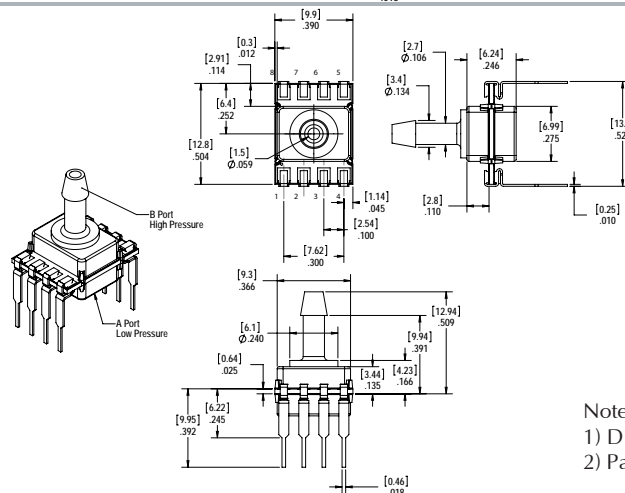


Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-31.

DIP CN: Barbed Top Port



HCND PACKAGE



Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-31.

* Refer to How to Order Tables for pinouts



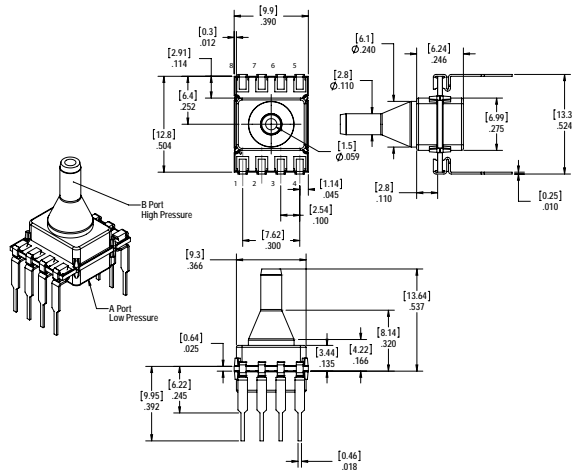
Dimensional Drawings - DIP Packages (Cont'd)

Package Dimensions

DIP KN: Non Barbed
Needle Top Port



**HKND
PACKAGE**

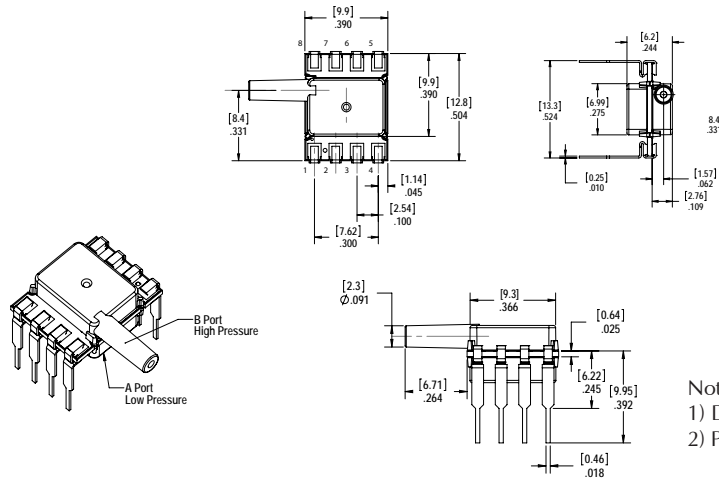


- Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-31.

DIP JN: Non Barbed
Tapered Side Port



**HJND
PACKAGE**

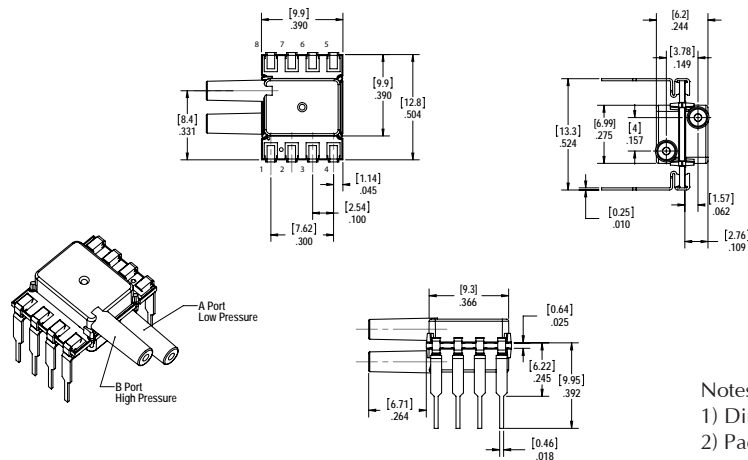


- Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-31.

DIP JJ: Non Barbed
Tapered Side Port



**HJJD
PACKAGE**



- Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-31.

* Refer to How to Order Tables for pinouts

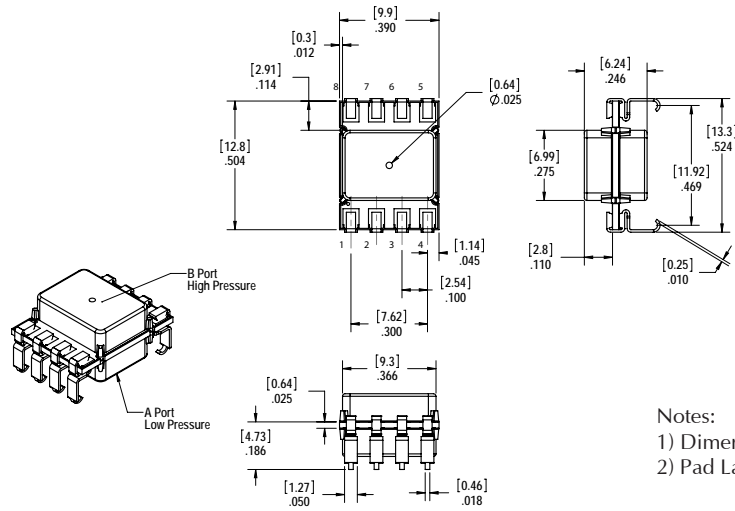
Dimensional Drawings - SMT Packages

Package Dimensions

SMT NN: No Port (Flat)



HNNJ
PACKAGE

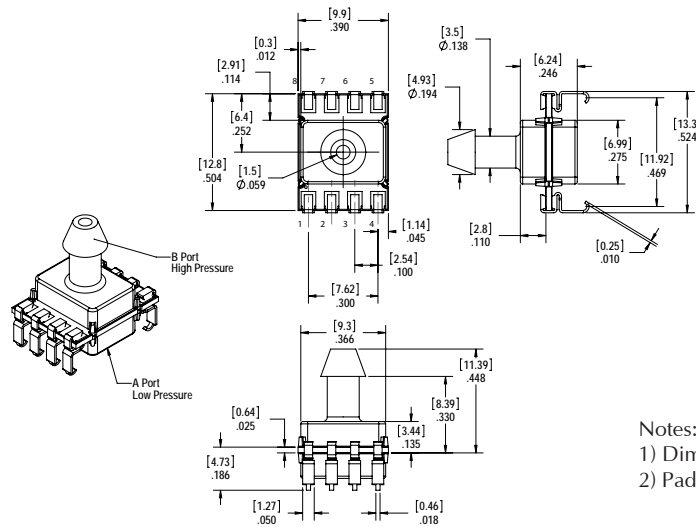


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-32.

SMT AN: Barbed Top Port Gage

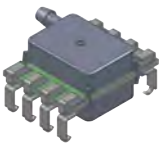


HANJ
PACKAGE

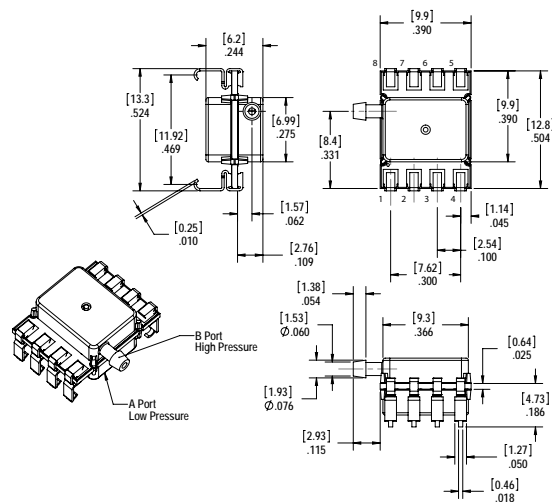


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-32.

SMT RN: Barbed Side Port Gage



HRNJ
PACKAGE



Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-32.

* Refer to How to Order Tables for pinouts

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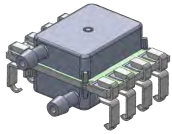
電話 : 047-489-5939



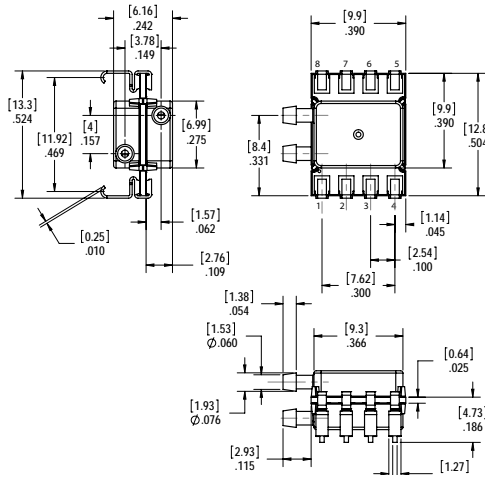
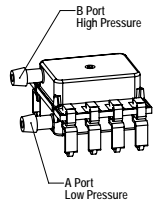
Dimensional Drawings - SMT Packages (Cont'd)

Package Dimensions

SMT RR: Barbed Side Port Differential



HRRJ PACKAGE

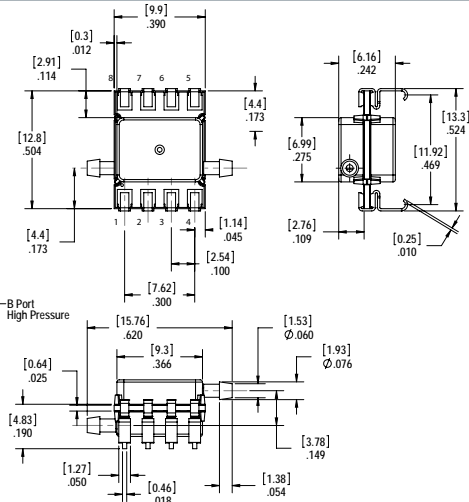
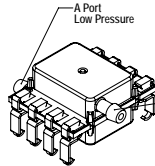


Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-32.

SMT DR: Barbed Opposite Side Port Differential



HDRJ PACKAGE

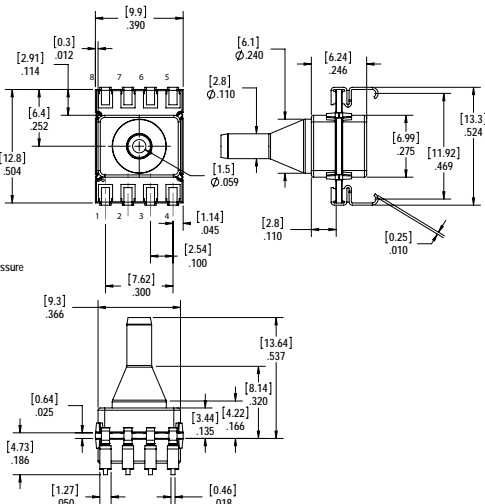
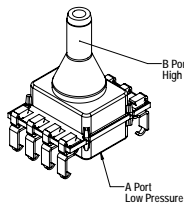


Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-32.

SMT KN: Non Barbed Needle Top Port



HKNJ PACKAGE



Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-32.

* Refer to How to Order Tables for pinouts

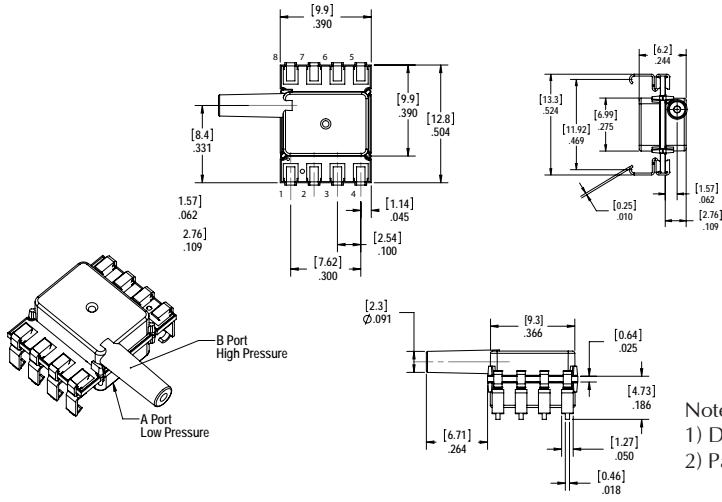
Dimensional Drawings - SMT Packages (Cont'd)

Package Dimensions

SMT JN: Non Barbed
Tapered Side Port



HJNJ
PACKAGE

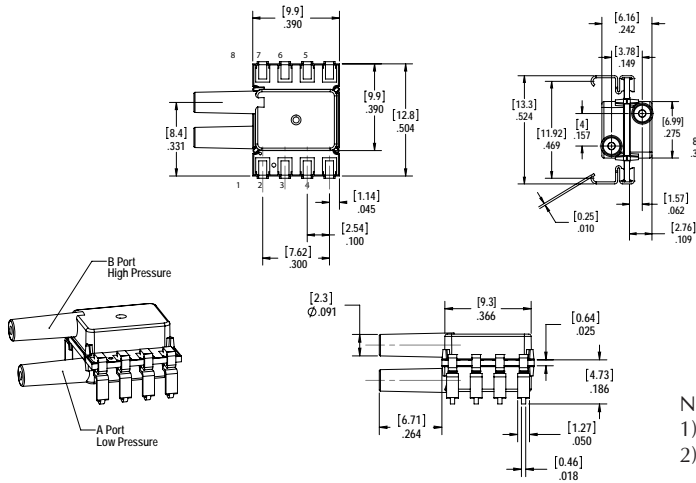


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-32.

SMT JJ: Non Barbed
Tapered Side Port



HJJJ
PACKAGE



Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-32.

* Refer to How to Order Tables for pinouts

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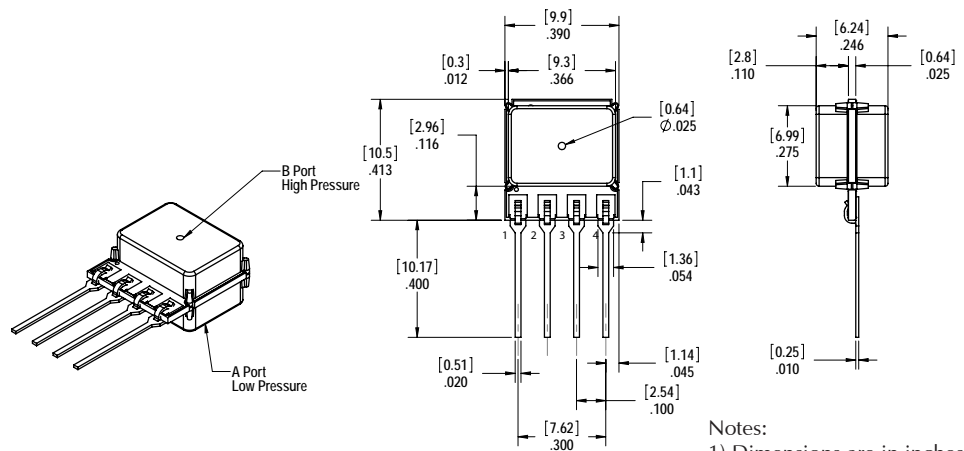
Dimensional Drawings - SIP H-Lead Packages

Package Dimensions

SIP H-Lead NN: No Port (Flat)



HNNH PACKAGE

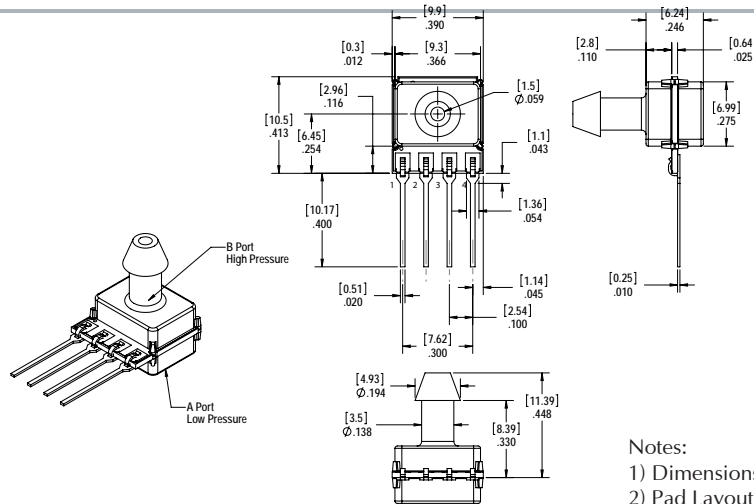


- Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-1.

SIP H-Lead AN: Barbed Top Port Gage



HANH PACKAGE

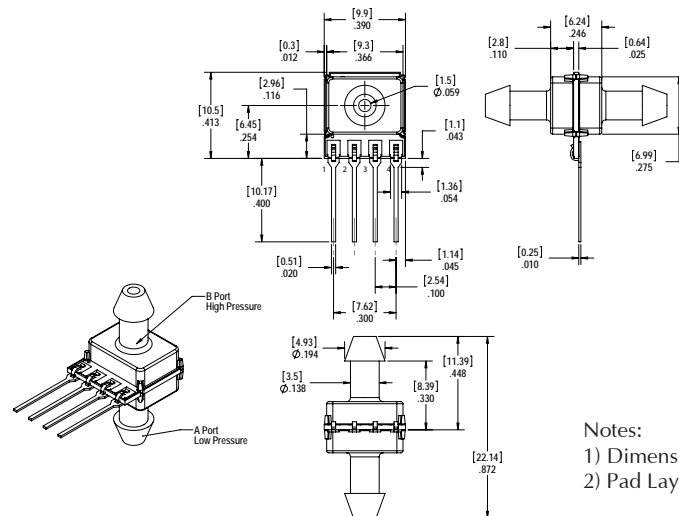


- Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-1.

SIP H-Lead AA: Barbed Top Port Differential



HAAH PACKAGE



- Notes:
 1) Dimensions are in inches [mm].
 2) Pad Layout: PAD-1.

* Refer to How to Order Tables for pinouts

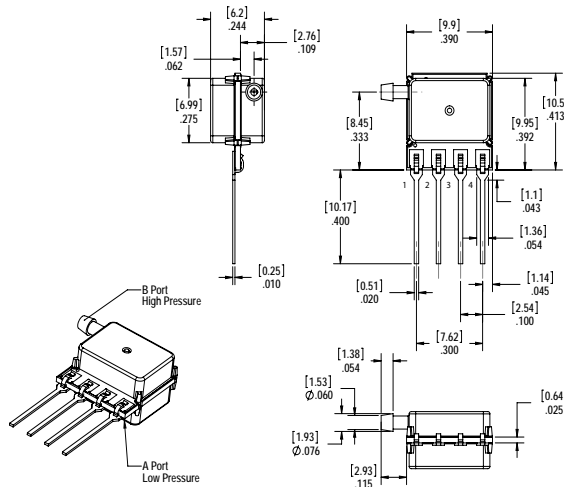
Dimensional Drawings - SIP H-Lead Packages (Cont'd)

Package Dimensions

SIP H-Lead RN: Barbed
Side Port Gage



HRNH
PACKAGE

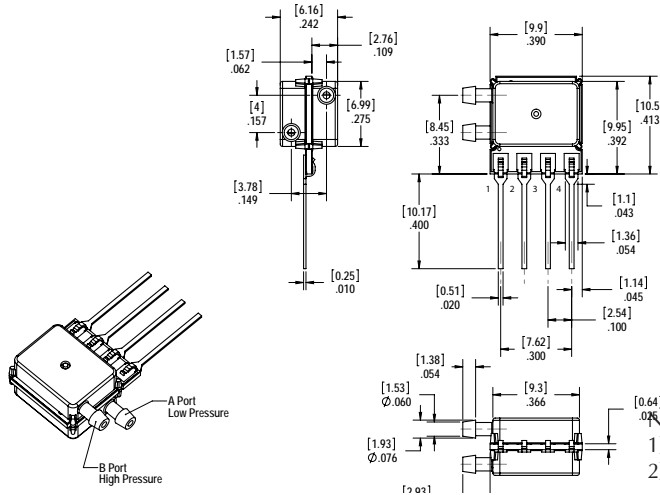


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

SIP H-Lead RR: Barbed
Side Port Differential



HRRH
PACKAGE

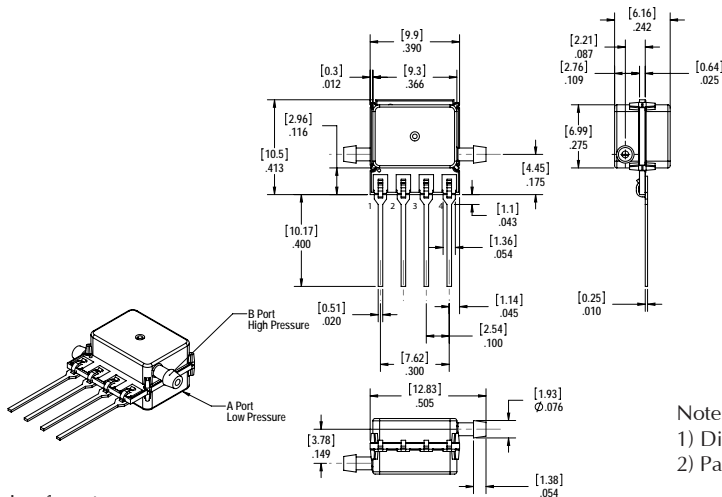


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

SIP H-Lead DR: Barbed
Opposite Side Port
Differential



HDRH
PACKAGE



Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

* Refer to How to Order Tables for pinouts

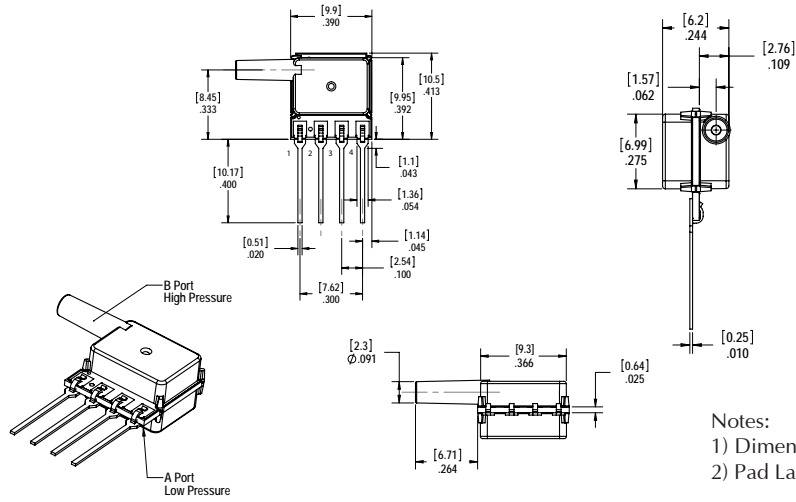
Dimensional Drawings - SIP H-Lead Packages (Cont'd)

Package Dimensions

SIP H-Lead JN: Non Barbed Tapered Side Port



HJNH
PACKAGE

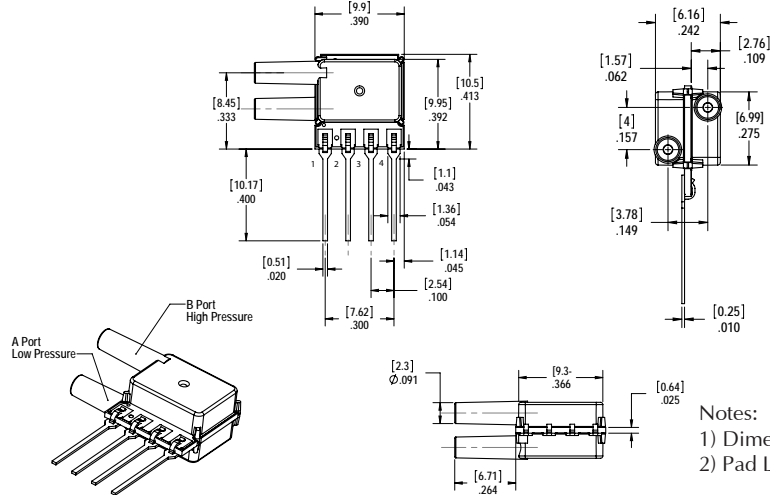


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

SIP H-Lead JJ: Non Barbed Tapered Side Port



HJJH
PACKAGE



Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

* Refer to How to Order Tables for pinouts

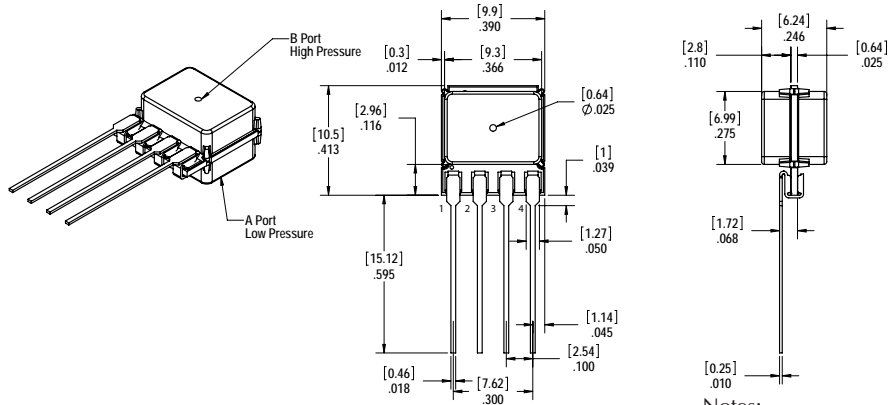
Dimensional Drawings - SIL F-Lead Packages

Package Dimensions

SIL F-Lead NN: No Port (Flat)



HNNF PACKAGE

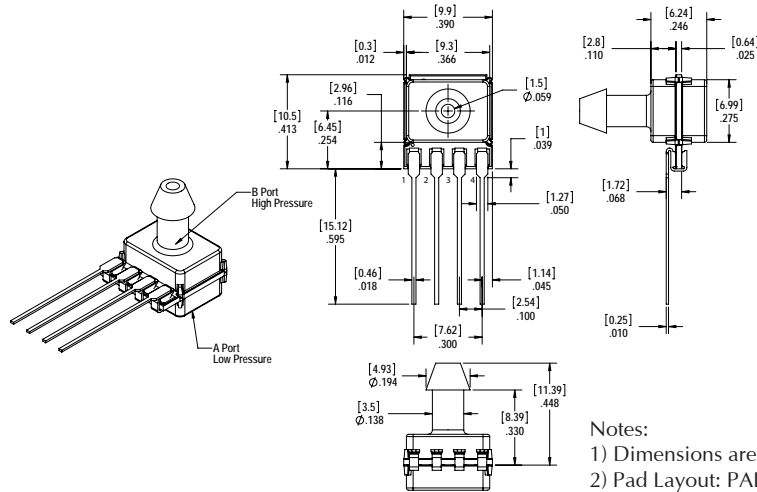


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

SIL F-Lead AN: Barbed Top Port Gage

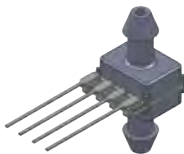


HANF PACKAGE

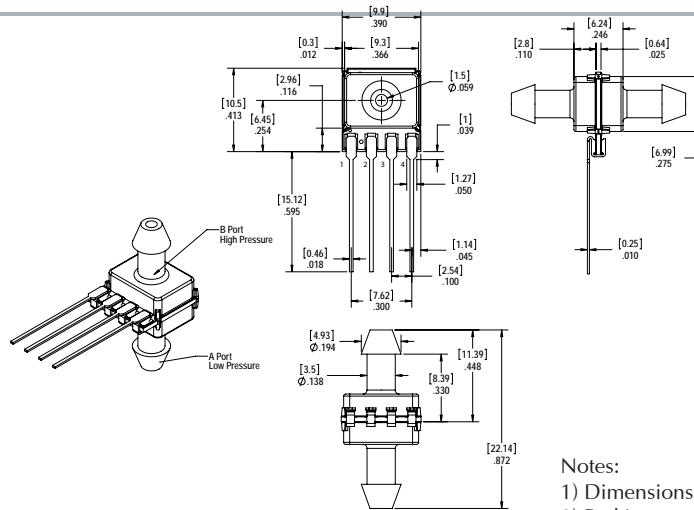


Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

SIL F-Lead AA: Barbed Top Port Differential



HAAF PACKAGE



Notes:
1) Dimensions are in inches [mm].
2) Pad Layout: PAD-1.

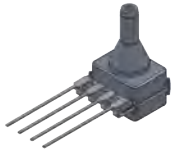
* Refer to How to Order Tables for pinouts



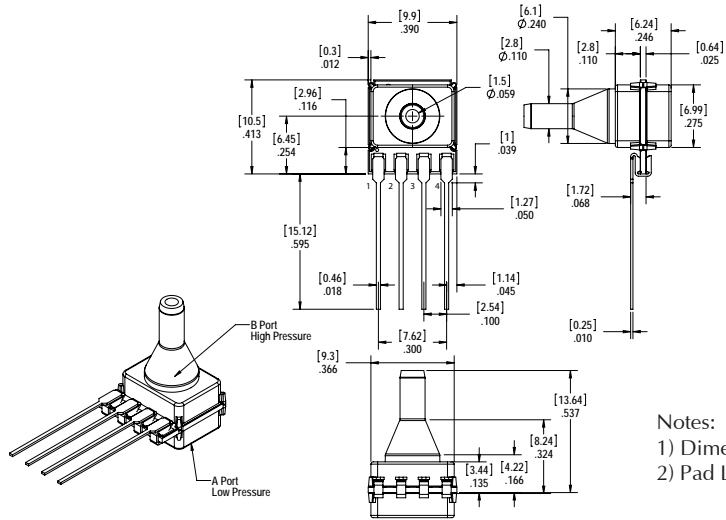
Dimensional Drawings - SIL F-Lead Packages (Cont'd)

Package Dimensions

SIL F-Lead KN: Non
Barbed Needle Top Port



HKNF
PACKAGE



Notes:

- 1) Dimensions are in inches [mm].
- 2) Pad Layout: PAD-1.

* Refer to How to Order Tables for pinouts