



## MS4525

### SPECIFICATIONS

- PCB Mounted Pressure Transducers
- Amplified Ratiometric Analog Output
- Differential, Gage, Absolute, Compound, & Vacuum
- Temperature Compensated
- 3.3 or 5.0 V<sub>DC</sub> Supply Voltage

### FEATURES

- PSI Pressure Ranges
- PCB Mountable
- High Level Analog Output
- Barbed Pressure Ports

### APPLICATIONS

- Blocked Filter Detection
- Altitude and Airspeed Measurements
- Medical Instruments
- Fire Suppression System
- Panel Meter
- Air Movement/Environmental Controls
- Pneumatic Controls

The MS4525 is a small, ceramic based, PCB mounted pressure transducer from Measurement Specialties. The transducer is built using Measurement Specialties' proprietary UltraStable™ process and the latest CMOS sensor conditioning circuitry to create a low cost, high performance transducer designed to meet the strictest requirements from OEM customers.

The MS4525 is fully calibrated and temperature compensated with a total error band (TEB) of less than 1.0% over the compensated range. The sensor operates from single supply of either 3.3 or 5.0V<sub>DC</sub> and requires a single external component for proper operation.

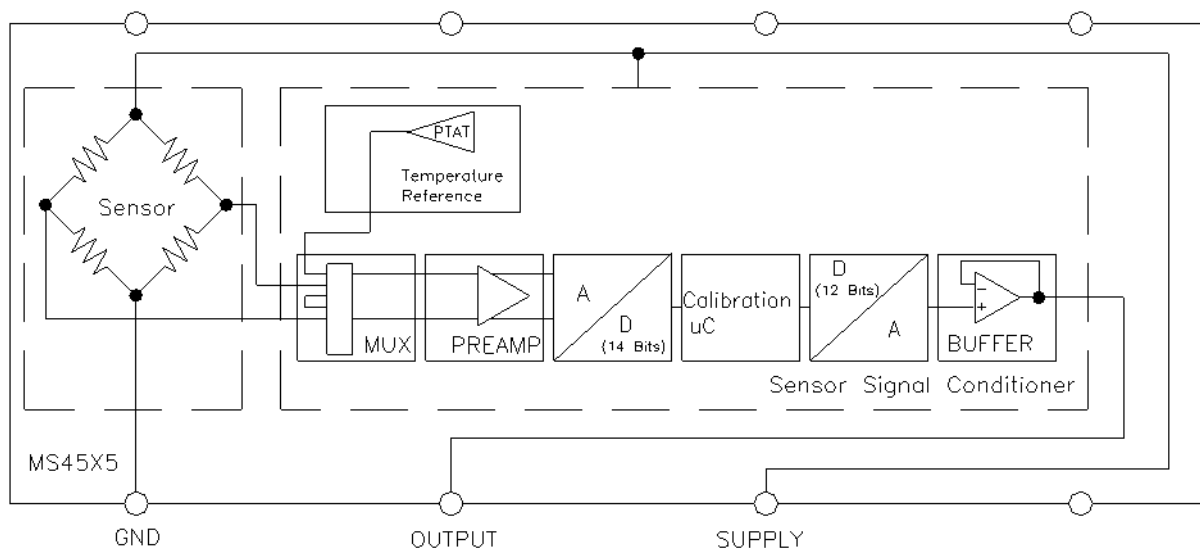
The rugged ceramic transducer is available in side port, top port, and manifold mount and can measure absolute, gage, differential, or compound pressure from 1 to 150psi. The 1/8" barbed pressure ports mate securely with 3/32" ID tubing.

### STANDARD RANGES (PSI)

| Pressure | Absolute | Gage           | Differential | Compound | Vacuum     | Option Availability |
|----------|----------|----------------|--------------|----------|------------|---------------------|
| 1        |          | DS, SS, TP, MM | DS, SS, TP   |          |            | -F                  |
| 2        |          | DS, SS, TP, MM | DS, SS, TP   |          |            | -F                  |
| 5        |          | DS, SS, TP, MM | DS, SS, TP   |          |            | -F                  |
| 15       | SS, TP   | DS, SS, TP, MM | DS, MM       | SS, TP   | SS, TP, DS | -F                  |
| 30       | SS, TP   | DS, SS, TP, MM | DS, MM       | SS, TP   |            | -F                  |
| 50       | SS, TP   | DS, SS, TP, MM | DS, MM       | SS, TP   |            | -F                  |
| 100      | SS, TP   | DS, SS, TP, MM | DS, MM       | SS, TP   |            | -F                  |
| 150      | SS, TP   | DS, SS, TP, MM | DS, MM       | SS, TP   |            | -F                  |

See Package Configurations: DS= Dual Side Port, SS= Single Side Port, TP= Top Port, MM= Manifold Mount  
 Pin Style "L" is only available SS and MM port types.  
 Pin Style "C" is only available SS, TP and MM port types.

### BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

| Parameter                         | Conditions                         | Min               | Max  | Unit | Notes          |
|-----------------------------------|------------------------------------|-------------------|------|------|----------------|
| Supply Voltage                    | T <sub>A</sub> = 25 °C             | 2.7               | 5.5  | V    |                |
| Output Current                    | T <sub>A</sub> = 25°C              |                   | 3    | mA   |                |
| Load Resistance (R <sub>L</sub> ) | T <sub>A</sub> = 25°C              | 10                |      | kΩ   |                |
| Storage Temperature               |                                    | -40               | +125 | °C   |                |
| Humidity                          | T <sub>A</sub> = 25°C              |                   | 95   | %RH  | Non Condensing |
| Overpressure                      | T <sub>A</sub> = 25 °C, both Ports | Not to Exceed 300 |      | psi  |                |
| Burst Pressure                    | T <sub>A</sub> = 25 °C, Port 1     |                   |      | psi  | See Table 1    |
| ESD                               | HBM                                | -4                | +4   | kV   | EN 61000-4-2   |
| Solder Temperature                | 250°C, 5 sec max.                  |                   |      |      |                |

### TABLE 1- BURST PRESSURE BY RANGE AND PACKAGE STYLE

| Range | DS  | TP, SS, MM | Unit |
|-------|-----|------------|------|
| 001   | 20  | 20         | psi  |
| 002   | 20  | 20         | psi  |
| 005   | 15  | 20         | psi  |
| 015   | 45  | 90         | psi  |
| 030   | 90  | 200        | psi  |
| 050   | 150 | 300        | psi  |
| 100   | 300 | 300        | psi  |
| 150   | 300 | 300        | psi  |

## ENVIRONMENTAL SPECIFICATIONS

| Parameter            | Conditions  |
|----------------------|---|
| Mechanical Shock     | Mil Spec 202F, Method 213B, Condition C, 3 Drops              |
| Mechanical Vibration | Mil Spec 202F, Method 214A, Condition 1E, 1Hr Each Axis       |
| Thermal Shock        | 100 Cycles over Storage Temperature, 30 minute dwell          |
| Life                 | 1 Million FS Cycles   |
| MTTF                 | >10Yrs, 70 °C, 1.188 Million Pressure Cycles, 120%FS Pressure |

## PERFORMANCE SPECIFICATIONS

Supply Voltage<sup>1</sup>: 5.0V or 3.3 V<sub>DC</sub>

Ambient Temperature: 25°C (unless otherwise specified)

| PARAMETERS                          | MIN   | TYP  | MAX   | UNITS | NOTES |
|-------------------------------------|-------|------|-------|-------|-------|
| Output                              | 0.500 |      | 4.500 | V     | 1,2,3 |
|                                     | 0.250 |      | 4.750 |       |       |
| Accuracy                            | -0.25 |      | 0.25  | %Span | 2     |
| Total Error Band (TEB)              | -1.0  |      | 1.0   | %Span | 3,5   |
| Supply Current                      |       | 3    |       | mA    | 5     |
| Long Term Stability (Offset & Span) |       | ±0.5 |       | %Span |       |
| Compensated Temperature             | -10   |      | +85   | °C    | 4     |
| Operating Temperature               | -25   |      | +105  | °C    |       |
| Response Time                       |       | 1    |       | mS    | 5     |
| Weight                              |       | 3    |       | grams |       |
| Start time to data ready            |       |      | 5     | ms    |       |

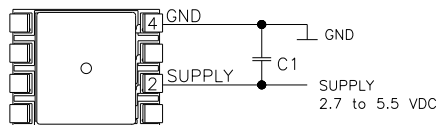
Media

Non-Corrosive Dry Gases Compatible with Ceramic, Silicon, Borosilicate Glass, RTV, Gold, Aluminum and Epoxy. See "Wetted Material by Port Designation" chart below.

### Notes

1. Proper operation requires an external capacitor placed as shown in Connection Diagram. Output is ratiometric to supply voltage variations of less than 10%.
2. The maximum deviation from a best fit straight line (BFSL) fitted to the output measured over the pressure range at 25°C. Includes all errors due to pressure non linearity, hysteresis, and non repeatability.
3. Total error band includes all accuracy errors, thermal errors over the compensated temperature range, and span and offset calibration tolerances. For ideal sensor output with respect to input pressure, reference Pressure Transfer Function charts below. TEB values are valid only at the calibrated supply voltage.
4. For errors beyond the compensated temperature range, see Extended Temperature Multiplier chart below.
5. This product can be configured for custom OEM requirements, contact factory for lower power consumption or higher accuracy.
6. Long term stability over a year period with constant voltage and temperature
7. Pressure connection: barbed ports are designed for use with tubing 3/32" ID, 60-70A durometer (PVC).
8. For details on environmental conditions and pressure type descriptions, reference to relative tables.

## CONNECTION DIAGRAM

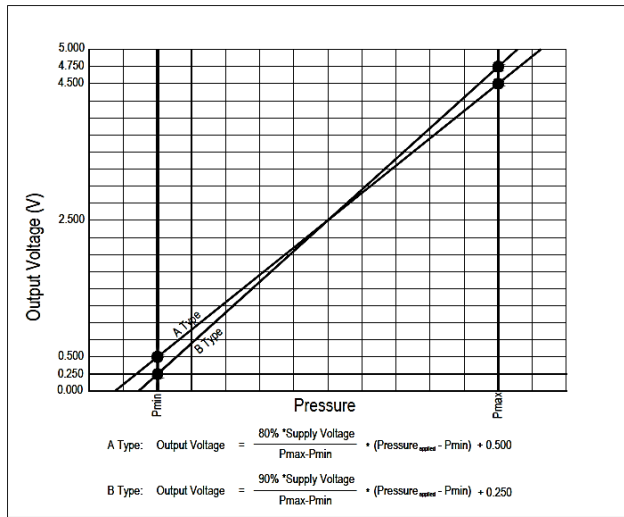


### Notes:

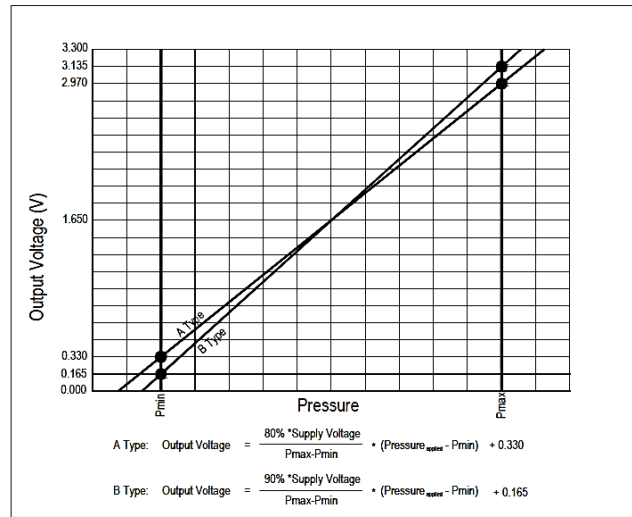
1. Place 100nF capacitor between Supply and GND to within 2 cm of sensor.

## PRESSURE AND TEMPERATURE TRANSFER FUNCTION

Pressure Transfer Functions, Supply=5V



Pressure Transfer Functions, Supply=3.3V



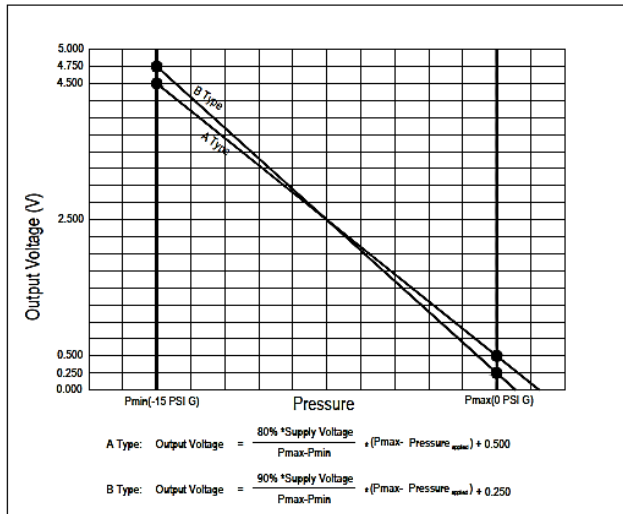
### Sensor Output at Significant Percentages, Supply 5V

| % OUTPUT | OUTPUT TYPE A (PSI)                     | OUTPUT TYPE B (PSI)                    | VOLTAGE (V) |
|----------|---|--|-------------|
| 0        | $P_{MIN} - (P_{MAX} - P_{MIN}) * 10/80$ | $P_{MIN} - (P_{MAX} - P_{MIN}) * 5/90$ | 0.000       |
| 5        |   | $P_{MIN}$                              | 0.250       |
| 10       | $P_{MIN}$                               |  | 0.500       |
| 50       |   |  | 2.500       |
| 90       | $P_{MAX}$                               |  | 4.500       |
| 95       |   | $P_{MAX}$                              | 4.750       |
| 100      | $P_{MAX} + (P_{MAX} - P_{MIN}) * 10/80$ | $P_{MAX} + (P_{MAX} - P_{MIN}) * 5/90$ | 5.000       |

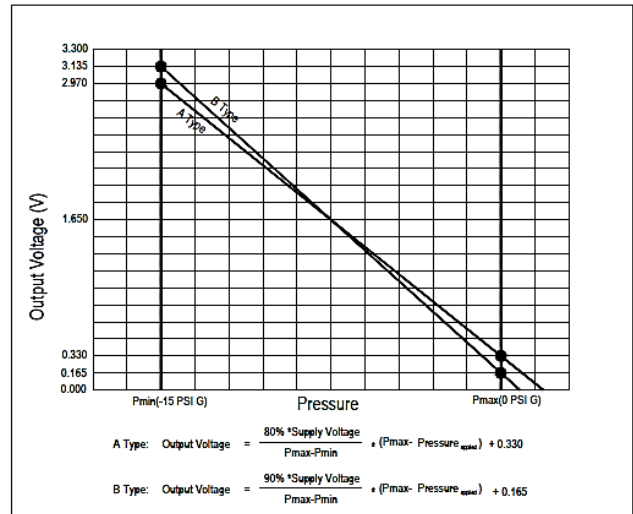
### Sensor Output at Significant Percentages, Supply 3.3V

| % Output P | Output A (psi)                          | Output B (psi)                         | Voltage (V) |
|------------|---|--|-------------|
| 0          | $P_{MIN} - (P_{MAX} - P_{MIN}) * 10/80$ | $P_{MIN} - (P_{MAX} - P_{MIN}) * 5/90$ | 0.000       |
| 5          |   | $P_{MIN}$                              | 0.165       |
| 10         | $P_{MIN}$                               |  | 0.330       |
| 50         |   |  | 1.650       |
| 90         | $P_{MAX}$                               |  | 2.970       |
| 95         |   | $P_{MAX}$                              | 3.315       |
| 100        | $P_{MAX} + (P_{MAX} - P_{MIN}) * 10/80$ | $P_{MAX} + (P_{MAX} - P_{MIN}) * 5/90$ | 3.300       |

Vacuum Series Transfer Functions, Supply=5V



Vacuum Series Transfer Functions, Supply=3.3V



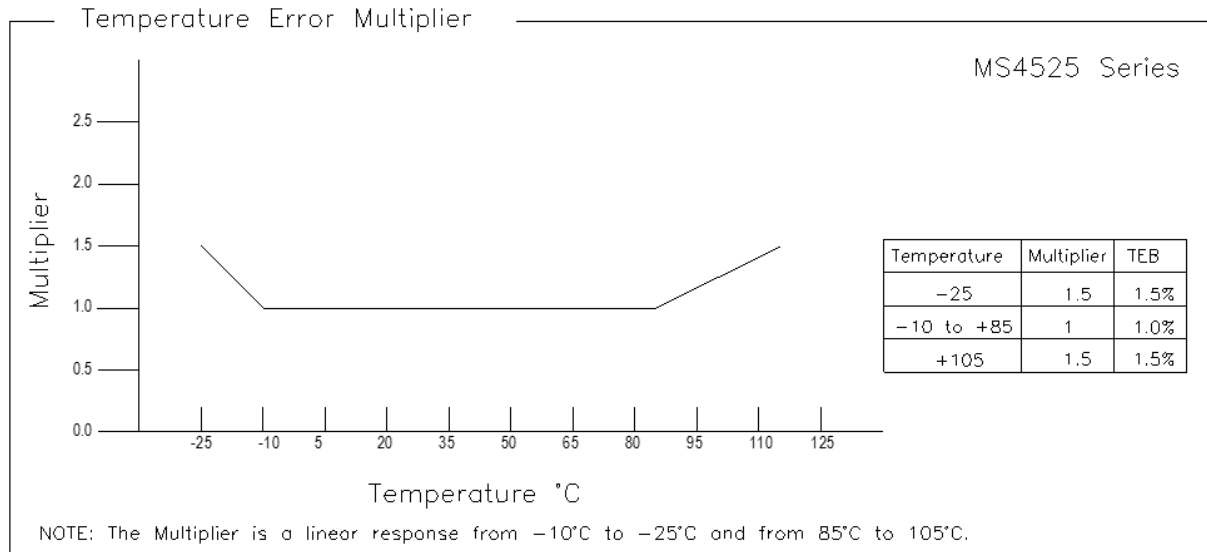
**Sensor Output at Significant Percentages, Supply 5V**

| % Output | Output Type A [psiG] | Output Type B [psiG] | Voltage [V] |
|----------|----------------------|----------------------|-------------|
| 0        | 1.6875               | 0.833                | 0.000       |
| 5        |                      | 0                    | 0.250       |
| 10       | 0                    |                      | 0.500       |
| 50       |                      |                      | 2.500       |
| 90       | -15                  |                      | 4.500       |
| 95       |                      | -15                  | 4.750       |
| 100      |                      |                      | 5.000       |

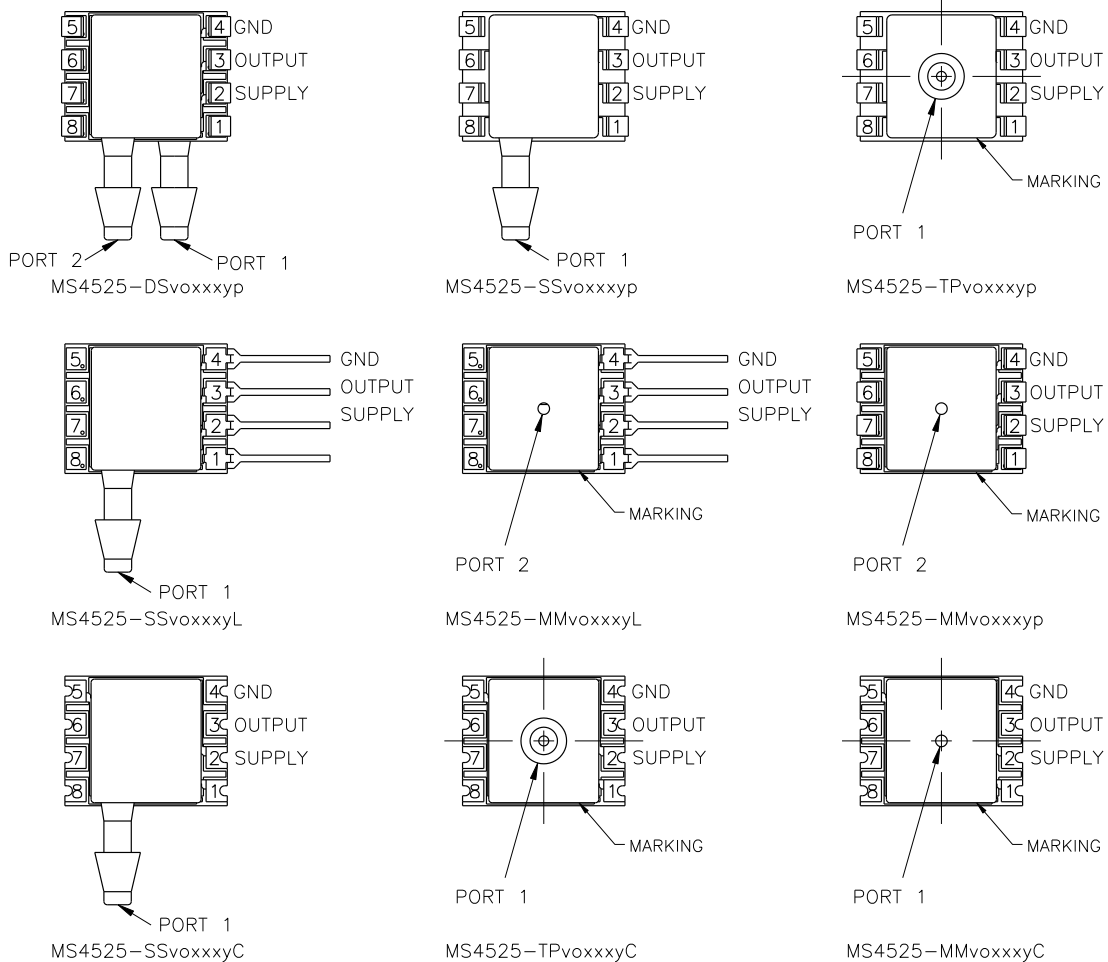
**Sensor Output at Significant Percentages, Supply 3.3V**

| % Output | Output Type A [psiG] | Output Type B [psiG] | Voltage [V] |
|----------|----------------------|----------------------|-------------|
| 0        | 1.6875               | 0.833                | 0.000       |
| 5        |                      | 0                    | 0.165       |
| 10       | 0                    |                      | 0.330       |
| 50       |                      |                      | 1.650       |
| 90       | -15                  |                      | 2.970       |
| 95       |                      | -15                  | 3.315       |
| 100      |                      |                      | 3.300       |

## EXTENDED TEMPERATURE MULTIPLIER CHART



## PACKAGE, PINOUT & PRESSURE TYPE CONFIGURATION



| Pin Name | Pin    | Function                |
|----------|--------|-------------------------|
| SUPPLY   | 2      | Positive Supply Voltage |
| OUTPUT   | 3      | Analog Output           |
| GND      | 4      | Ground                  |
|          | 1, 5-8 | No Connection           |

| Pressure Type                  | P <sub>min</sub>    | P <sub>max</sub>    | Description  |
|--------------------------------|---------------------|---------------------|--|
| Absolute                       | 0psiA               | +P <sub>range</sub> | Output is proportional to the difference between 0psiA (P <sub>min</sub> ) and pressure applied to Port 1.   |
| Differential/<br>Bidirectional | -P <sub>range</sub> | +P <sub>range</sub> | Output is proportional to the difference between Port 1 and Port 2. Output swings positive when Port 1 > Port 2. Output is 50% of supply voltage when Port 1 = Port 2. |
| Gage                           | 0psiG               | +P <sub>range</sub> | Output is proportional to the difference between 0psiG (P <sub>min</sub> ) and Port 1. Output swings positive when Port 1 > Port 2.                                    |
| Compound                       | -15psiG             | +P <sub>range</sub> | Output is proportional to the difference between -15psiG pressure (P <sub>min</sub> ) and pressure applied to Port 1.  |

P<sub>range</sub> is equal to the maximum full scale pressure specified in the ordering information.

## WETTED MATERIAL BY PORT DESIGNATION

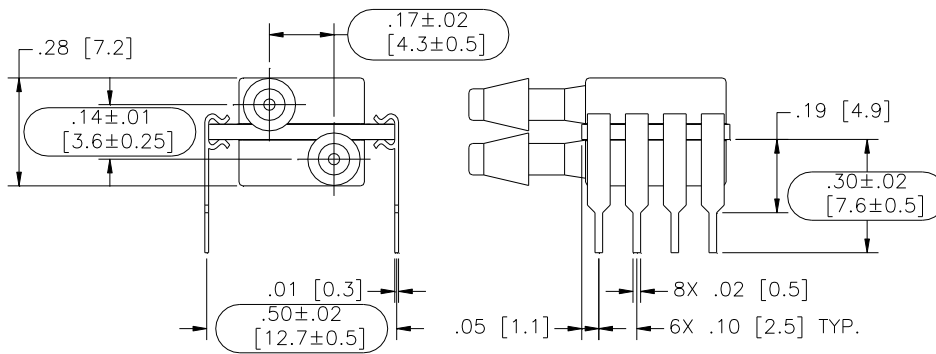
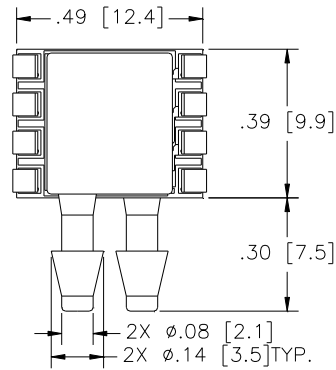
| Style      | Port   | Material |         |                    |     |      |          |       |
|------------|--------|----------|---------|--------------------|-----|------|----------|-------|
|            |        | Ceramic  | Silicon | Borosilicate Glass | RTV | Gold | Aluminum | Epoxy |
| DS, MM     | Port 1 | X        | X       | X                  | X   |      |          | X     |
|            | Port 2 | X        | X       | X                  | X   | X    | X        | X     |
| SS, TP, SM | Port 1 | X        | X       | X                  | X   | X    | X        | X     |

"X" Indicates Wetted Material

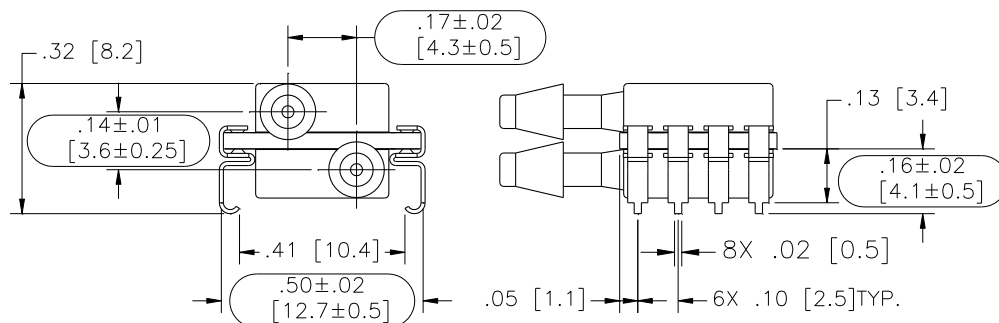
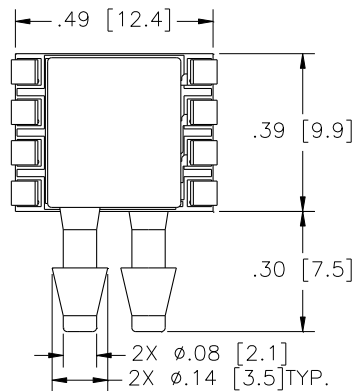


## DIMENSIONS

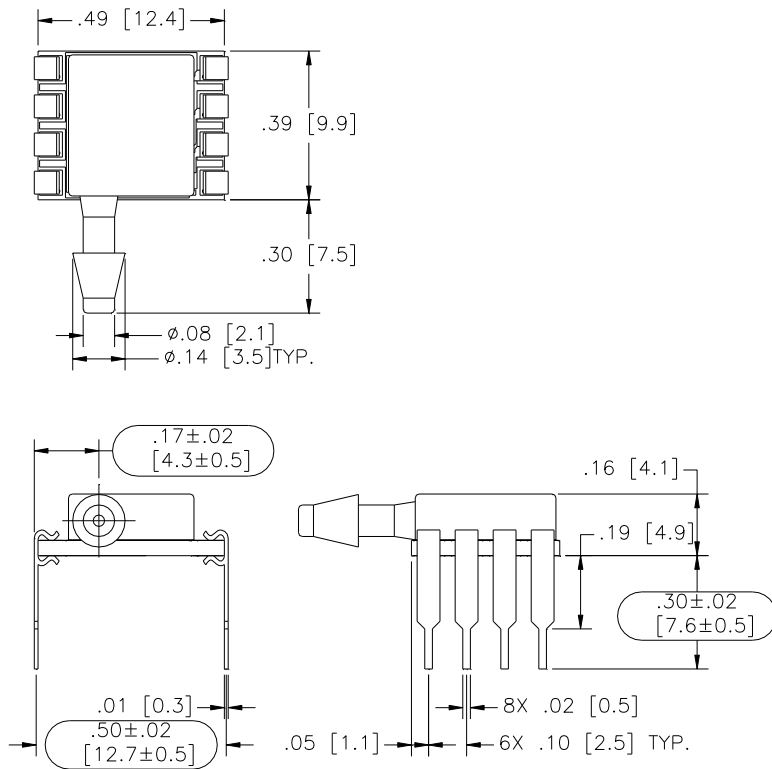
(in INCHES [mm])  
 Model: MS4525-DSvoxxxyp



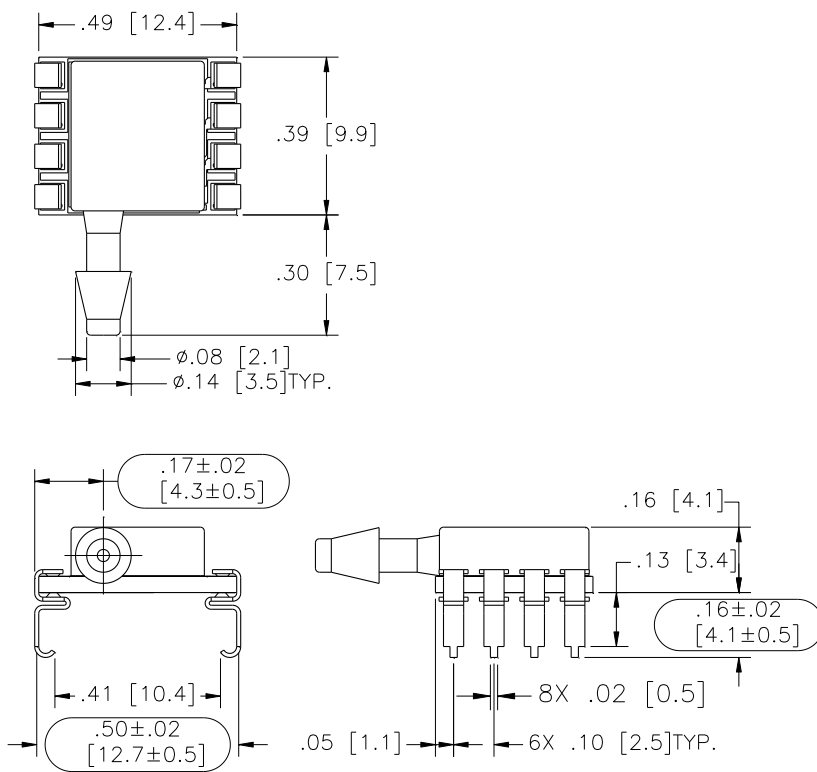
Model: MS4525-DSvoxxxys



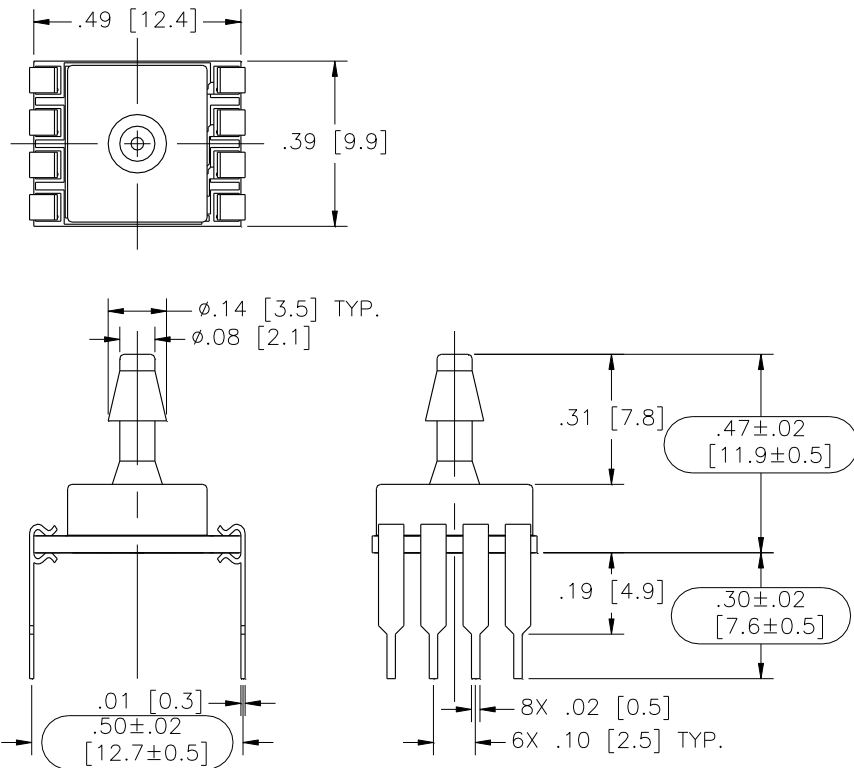
Model: MS4525-SSvoxxxxyP



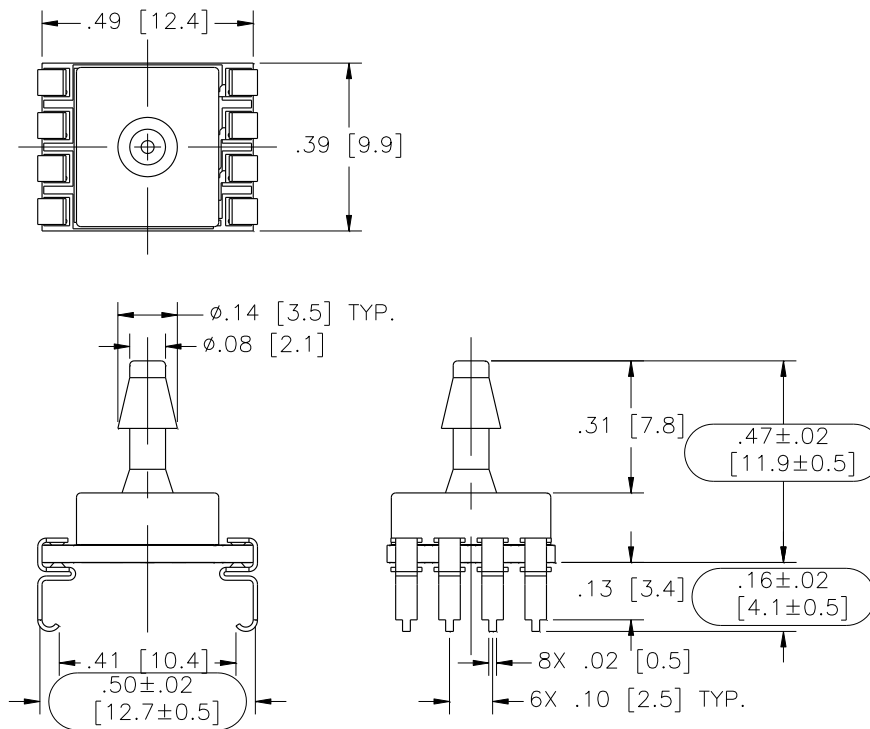
Model: MS4525-SSvoxxxxyS



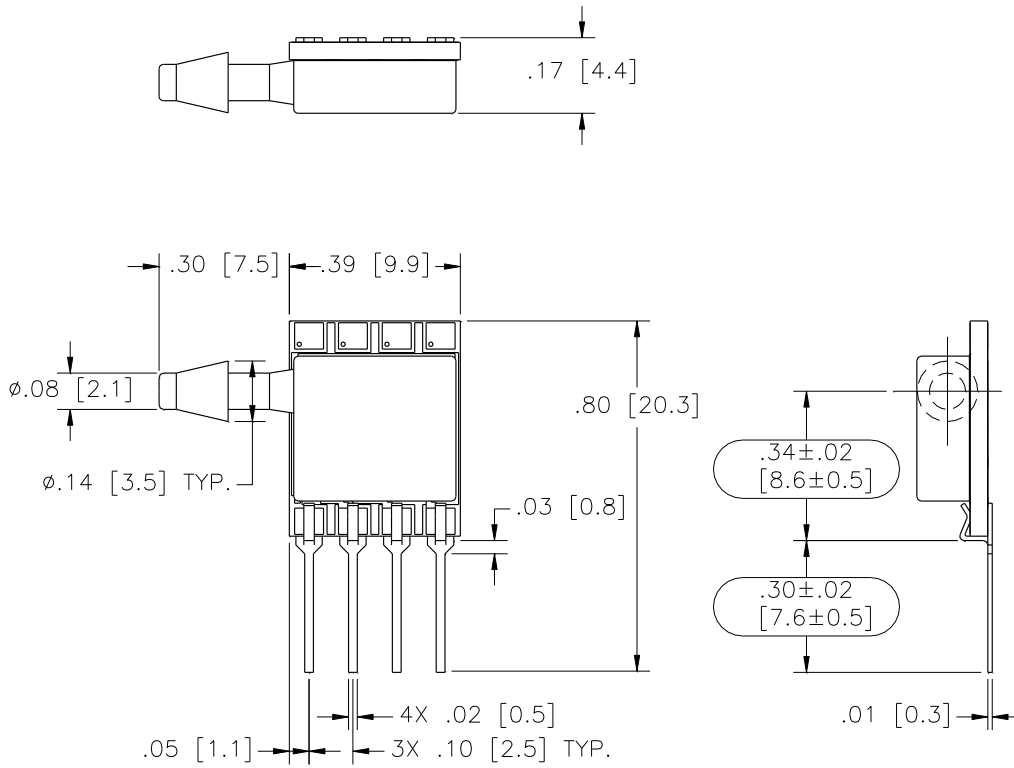
Model: MS4525-TPvoxxxyp



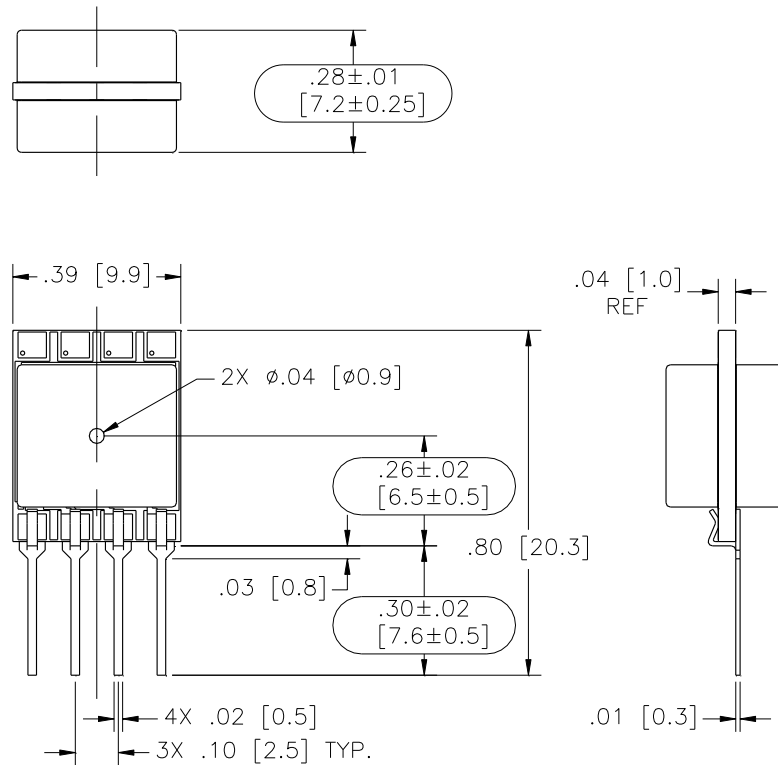
Model: MS4525-TPvoxxxys



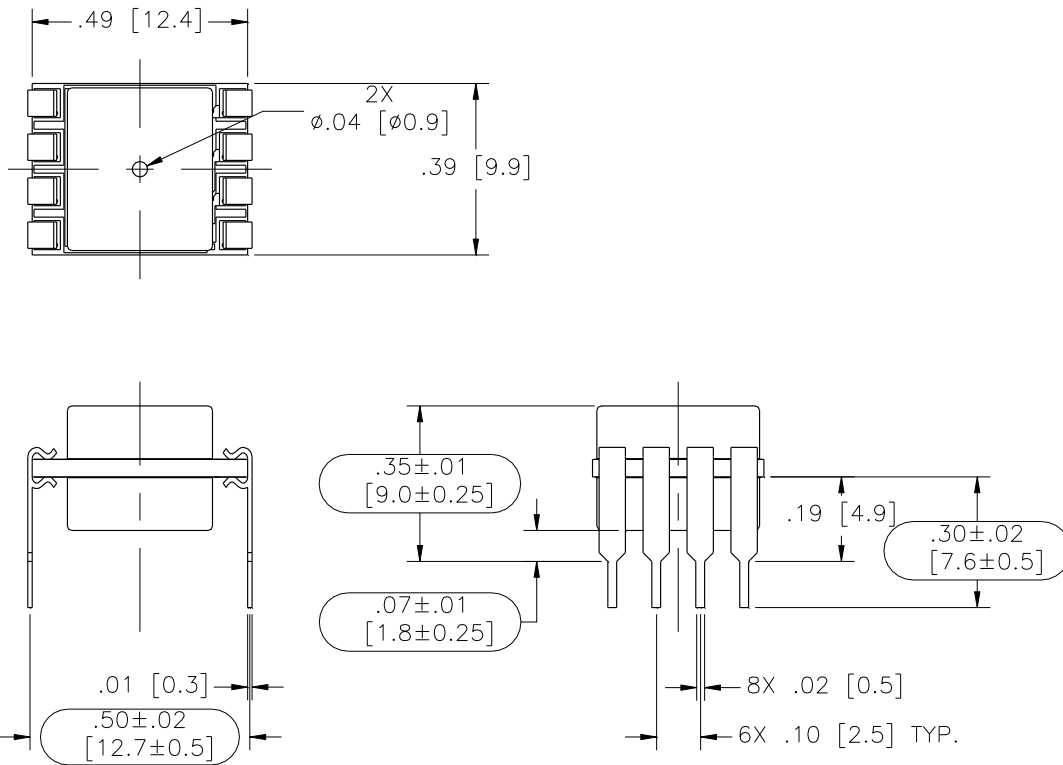
Model: MS4525-SSvoxxxxyl



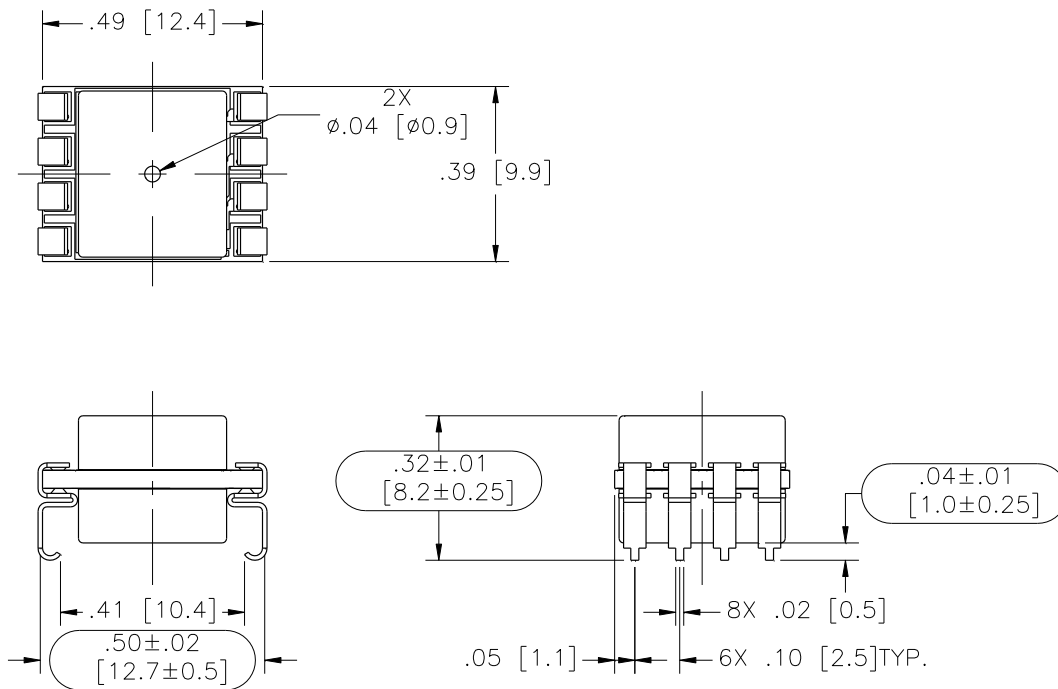
Model: MS4525-MMvoxxxxyl



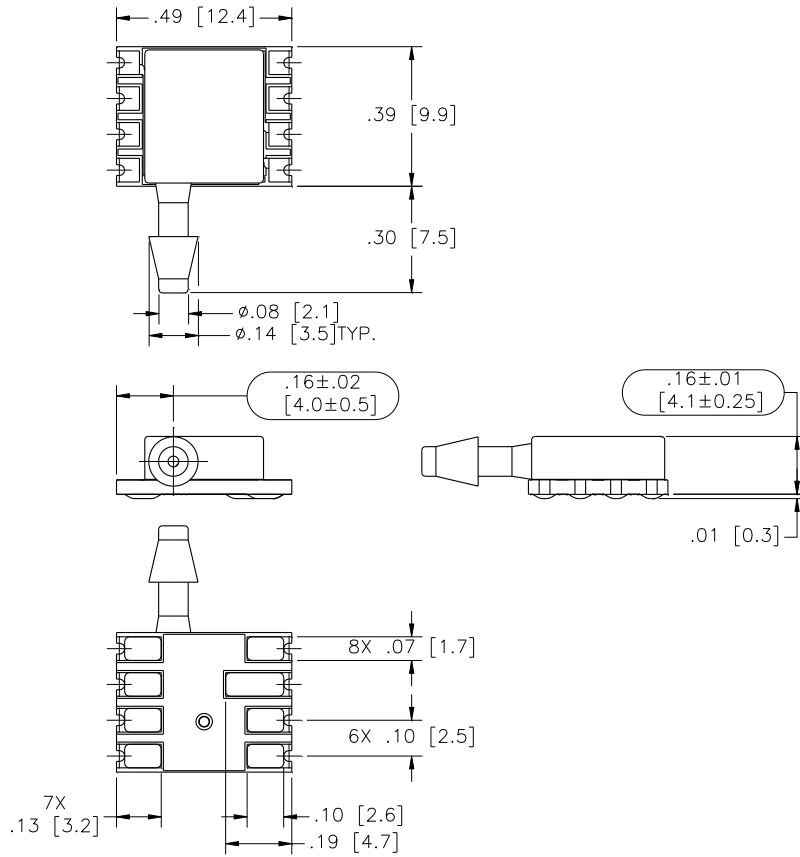
Model: MS4525-MMvoxxxyP



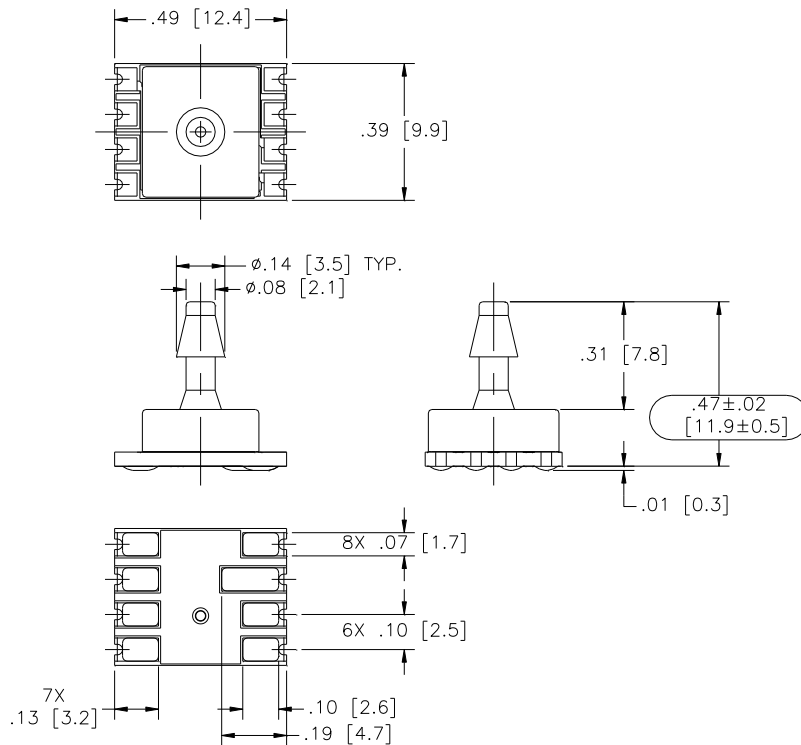
Model: MS4525-MMvoxxxyS



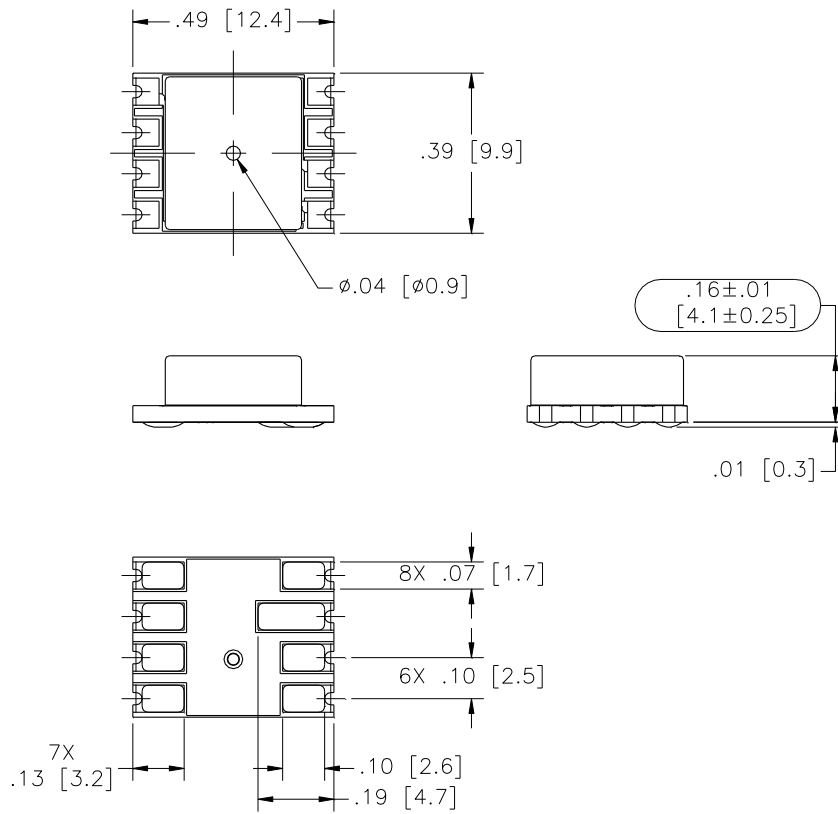
Model: MS4525-SSvoxxxyC



Model: MS4525-TPvoxxxyC



Model: MS4525-MMv0xxxxyC



## AVAILABLE OPTIONS

### Gel Coat (-F Option)

The MS4525 is designed for nonionic and clean dry air applications. Select this option for added protection in high humidity or slightly corrosive environments with the application of a silicone gel elastomer to sensor and ASIC. For questions concerning media compatibility, contact the factory.

## ORDERING INFORMATION

4525 – TP 3 A 030 C P F

| Package Type |                 |
|--------------|-----------------|
| SS           | Single Sideport |
| DS           | Dual Sideport   |
| TP           | Top Port        |
| MM           | Manifold Mount  |

| Supply Voltage |                     |
|----------------|---------------------|
| 3              | 3.3V <sub>DC</sub>  |
| 5              | 5.0 V <sub>DC</sub> |

| Output Type |            |
|-------------|------------|
| A           | 10% to 90% |
| B           | 5% to 95%  |

| Pressure Range [psi] |
|----------------------|
| 001                  |
| 002                  |
| 005                  |
| 015                  |
| 030                  |
| 050                  |
| 100                  |
| 150                  |

| Option Type |             |
|-------------|-------------|
| F           | Gel Coating |
| [Blank]     | No Tube     |

| Pin Type |              |
|----------|--------------|
| P        | Thru Hole    |
| S        | J lead       |
| L        | In Line      |
| C        | Castellation |

| Pressure Type |              |
|---------------|--------------|
| G             | Gage         |
| A             | Absolute     |
| D             | Differential |
| C             | Compound     |
| V             | Vacuum       |

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