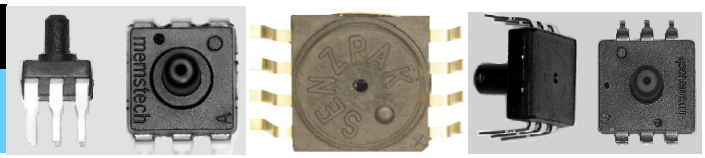
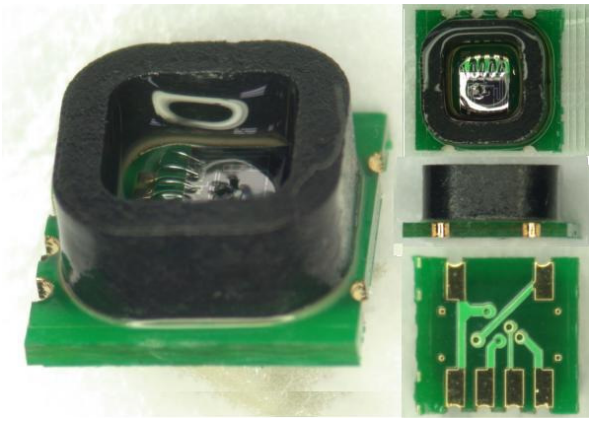
MPS-150A

Uncompensated, Absolute Pressure Sensor



Uncompensated, Absolute Pressure Sensor



The MPS series of surface mount pressure sensors provides a cost effective method of measuring absolute and or gauge pressure in a fully packaged format. The packaging formats of COB and surface mount cavity packages, provides the product with an application specific footprint that is particularly useful in various sensor applications. The Memstech piezo-resistive silicon pressure sensors can be used in most general applications within a variety of industry uses: Data recording, on board and Remote Diagnostics

The MPS series sensors are uncompensated, and can be used with clean dry gases such as air, nitrogen and other like gases. The product offers a 5 pin open bridge configuration for electrical connection to facilitate analogue calibration of offset and span, if required. A 4 pin closed bridge configuration is also available. 4 choices of footprint facilitate compatibility with existing component layouts. Applications use with voltage sourcing is recommended to give the maximum sensor performance in accuracy with the conservation of battery power in portable applications. A ratiometric signal processing and acquisition system should be used if possible.

A soft gel coating provides some measure of environmental protection, none the less, it is not recommended to expose this sensor to conditions of high moisture or corrosive chemicals. The sensor is housed in a surface mount package, and uses materials that are compliant with United States of America and European Union standards on hazardous material content.

FEATURES

- Competitive Cost
- Small size
- Absolute and Gauge Pressure Measurement
- High Impedance Bridge
- Low power consumption
  - ✓ PC board mountable
  - ✓ 100 mV output (@5V supply)
  - ✓ Variable package combinations: SMT/COB

THE MAIN FIELD OF APPLICATIONS

- ✓ Mobile altimeter/barometer
- ✓ Weather forecast
- ✓ Wristwatch
- ✓ Air balloon
- ✓ Non-Invasive Blood pressure monitoring

MEMSENZ™ I	MEMSENZ™ II	MEMSENZ™ III	MEMSENZ™ IV
Transduction Principle	Transduction Principle	Transduction Principle	Transduction Principle
Capacitive	Piezoresistive	Resistive	Capacitive
Processing Technology	Processing Technology	Processing Technology	Processing Technology
Bulk/Deep RIE	Bulk/Deep Wet Etch	Surface	Bulk
Actuation Mechanism	Actuation Mechanism	Actuation Mechanism	Actuation Mechanism
Force (External)	Pressure (External)	Thermal	Sound
Signal Condition	Signal Condition	Signal Condition	Signal Condition
Two chips/Single chip	Two chips/Single chip	Two chips	Two chips

MPS-150A

Uncompensated, Absolute Pressure Sensor

TECHNICAL DATA

Maximum ratings

Specification	Min.	Typ.	Max.	Unit
Operating Temperature	0	-	85	ºC
Storage Temperature	-20	-	105	ºC
Supply Voltage	+ 1	3.0	+ 12	V
Maximum Drive Current	-	-	3	mA

Data

Temperature=25±5℃, Relative humidity=45±5%

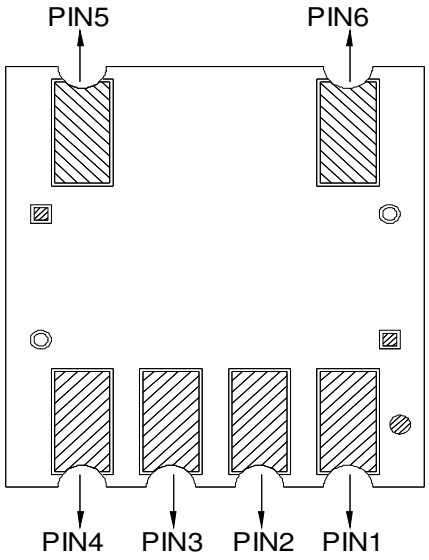
Specification	Min.	Typ.	Max.	Unit
Typical Operating Voltage	1.5	3	5.5	V
Operating Pressure Range (Span)	0	-	18	psiA
	0	-	940	mmHg
	0	-	125	kpa
	0	-	1.25	bar
Max Over Pressure (3x Span)	0	-	55	psiA
	0	-	2800	mmHg
	0	-	375	kpa
	0	-	3.75	bar
Zero Pressure Offset @ 3V	-15	8	+15	mV
Temperature coefficient of offset, TCO	-100	-	100	µV/V/ºC
	-2500	-	2500	ppmFS/ºC
Temperature coefficient of sensitivity, TCS (see note 6)	-6	-	-24	%FS/100ºC
Bridge Resistance (see note 4)	4500	5000	5500	Ω
Full Scale Span @3V over 125kPa	60	-	85	mV
Sensitivity	17	-	30	µV/V/mmHg
	0.92	-	1.57	mV//V/psi
	0.13	-	0.23	mV/V/kpa
	40	-	68	mV/bar
Non-Linearity	-0.5	+0.2	+0.5	%FS
Pressure Response Time (to 90% of registration)	-	-	20	ms
Warm Up Time (to 90% of span)	-	-	20	ms
Offset Stability over 4 hours (after an initial period of 180s stabilization)	-	0.25	-	%FS
Thermal Hysteresis	-0.3	-	+0.3	%FS
Pressure Hysteresis	-0.3	-	+0.3	%FS

1. Supply voltage DC and AC up to 5kHz,
2. Total error at half span is based on the difference between half span measurement and a straight line projection over the span of the device where NL% = $\frac{O(\frac{S}{2})-\frac{O(0)+O(S)}{2}}{O(\frac{S}{2})} x100$
3. Top side pressure application
4. Resistance is measured by sourcing a constant current of 0.7mA
5. TCO, TCR & TCS are product tested from 25ºC to 45ºC using constant voltage.
6. Binning in TCS is available as an option in bin ranges of 5%FS/100C as follows: -5…-10 (bin 1), -10…-15 (bin 2), -15…-20 (bin 3), -20…-25 (bin 4)

MPS-150A

Uncompensated, Absolute Pressure Sensor

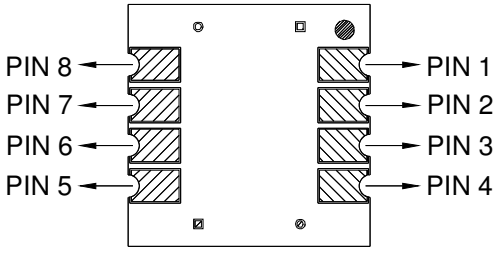
ELECTRICAL & PIN LAYOUT – OPTION A



Pad	Symbol	Description
1	Vcc-	Negative Supply (+ve arm of bridge)
2	Vout+	Positive Output
3	Vcc-	Negative Supply (-ve arm of bridge)
4	Vout-	Negative Output (connected to pad 5)
5	Vout-	Negative Output (connected to pad 4)
6	Vcc+	Positive Supply

*Open Bridge Layout - Pads 1 & 3 must be shorted by the

ELECTRICAL & PIN LAYOUT – OPTION B



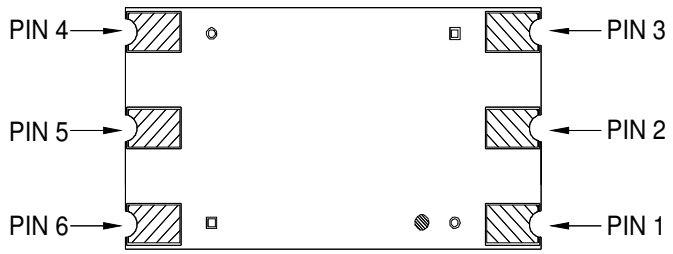
Pad	Symbol	Description
1 - 4	N/C	No Connection
5	Vout-	Negative Output
6	Vcc-	Negative Supply
7	Vcc+	Positive Supply
8	Vout+	Positive Output

*Closed bridge layout

MPS-150A

Uncompensated, Absolute Pressure Sensor

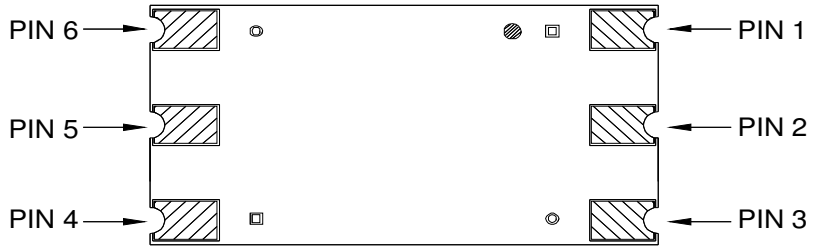
ELECTRICAL & PIN LAYOUT – OPTION C



Pad	Symbol	Description
1	N/C	No Connection
2	Vout-	Negative Output
3	Vcc+	Positive Supply
4	Vout+	Positive Output
5	Vcc-	Negative Supply (+ve arm of bridge)
6	Vcc-	Negative Supply (-ve arm of bridge)

*Open bridge layout - Pads 5 & 6 must be shorted by the user

ELECTRICAL & PIN LAYOUT – OPTION D



Pad	Symbol	Description
1	Vcc-	Negative Supply (+ve arm of bridge)
2	Vout+	Positive Output
3	Vcc+	Positive Supply (connected to pad 4)
4	Vcc+	Positive Supply (connected to pad 3)
5	Vout-	Negative Output
6	Vcc-	Negative Supply (-ve arm of bridge)

*Open bridge layout - Pads 1 & 6 must be shorted by the user

MPS-150A

Uncompensated, Absolute Pressure Sensor

SPECIFICATION NOTES

1. Operating and storage temperature to strictly not exceed stated values

2. Pressure unit conversion --- 1 atm=101.325 kPa=1013.25 hPa=14.6956 psi

3. Supply voltage DC and AC up to 5KHz.

4. Operating pressure and temperature. The nominal pressure under which the device can be exposed under normal operating conditions. Unless explicitly stated, other specifications are rated over the operating pressure and temperature ranges.

5. Proof pressure and temperature. The extremes of temperature and pressure that the device can withstand without performance degradation.

6. Supply Voltage is the nominal operating voltage. The device output is ratio metric (scales with the supply) within the stated range.

7. Stated Warm up time is a recommended time after power up before measurement stability is reached with the rated accuracy range.

8. Total error at half span is based on the difference between the half span measurement and a straight line projection over the span of the device where NL% = $\frac{O(\frac{S}{2})-\frac{O(0)+O(S)}{2}}{O(\frac{S}{2})} x100$

9. Accuracy represents the expected deviation of the sensor value from the ideal linear behavior over temperature and pressure, on fixed mounting configurations after pressure and electrical response times and warm up periods are taken into account, and include thermal and pressure linearity and hysteresis effects over the life of the sensor.

10 Offset stability represents the proportion of the deviation in offset (zero pressure output) at fixed temperature T=25+-5C, over the life of the sensor, and includes the effects of thermal and pressure hysteresis as well as other sources of drift.

11. Top side pressure application.

12. Resistance is measured by sourcing a constant current of 0.7mA, which represent the typical operating conditions.

13. TCO, TCR & TCS are tested from 0 Deg C to 50 Deg C, based on a linear approximation.

14. Terminology

a) OFFSET VOLTAGE (@ 25 °C) Output voltage under no-load / no-pressure (vacuum) conditions.
b) OUTPUT SPAN VOLTAGE (@ 25 °C) Difference between rated output voltage at the maximum operating pressure applied and offset voltage. The range of output change expected over the full range of pressure changes that can be applied to the device.
c) ZIN (@ 25 °C) Input impedance at no load and ambient pressure conditions
d) ZOUT (@ 25 °C) Output impedance at no load and ambient pressure conditions
e) LINEARITY (@ 25 °C) Linearity is expressed in terms of the deviation from the straight line connecting the no-pressure (vacuum) condition and rated voltage when the pressure is varied from the no-pressure condition to the span pressure. It is expressed as deviation (D1) found when the rated voltage is halved as a ratio to full scale (FS)

MPS-150A

Uncompensated, Absolute Pressure Sensor

f) PRESSURE HYSTERESIS (@ 25 ℃) Pressure hysteresis is expressed as difference (D2) between the response to an increasing pressure in no-load condition and a reducing pressure as a ratio to full scale (FS) when the pressure is reduced in the no-load condition after the pressure has been increased form the no-load condition to the rated pressure. In other wards the difference in output voltage before the sensor is subjected to rated pressure and immediately after reducing from the rated pressure as a ratio to full scale (FS).

g) OFFSET VOLTAGE – TEMPERATURE CHARACTERISTICS. This is the variation in the offset voltage in response to the change in the ambient temperature. It is expressed as the absolute difference (Δ1 or Δ2) between the offset voltage at 0℃ or at 50 ℃ and offset voltage at 25 ℃, which ever is higher, as a ratio to full scale (FS) |Δ1|/FS x 100 or |Δ2|/FS x 100, which ever is higher.

h) SENSITIVITY – TEMPERATURE CHARACTERISTICS
This is the variation (full scale <FS> variation) in the sensitivity in response to the change in the ambient temperature. It is expressed as the absolute difference (between FS1 and FS or FS2 and FS) between full scale (FS1,FS2) at 50 ℃ and full scale at 0℃ (FS) , whichever is higher, as a ratio to full scale(FS) at 25℃ |FS1-FS/FS x 100 or |FS2-FS|/FS x 100, which ever is higher. Measurements on product for binning purposes are performed at ambient and warm conditions.

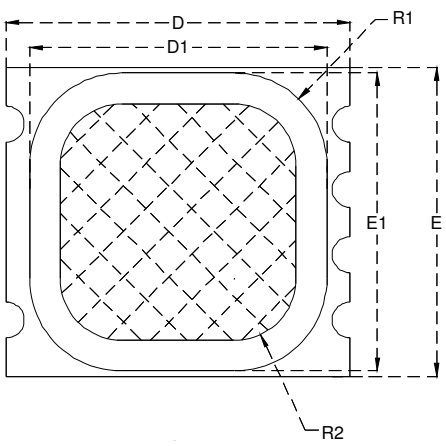
PRODUCT OPTIONS

Product Option	Interconnect Option	Mechanical Option (nominal footprint)	Electrical Specifications	Packaging Options available
A	A – Open bridge	A – 6x6.7	Standard	TY – Tray
AT	A – Open bridge	A – 6x6.7	TCS Binning	TY – Tray
B	B – Closed bridge	B – 7.6x7.6	Standard	TY – Tray
C	C – Open bridge	C – 6x12	Standard	TU – Tube
D	D – Open bridge	D – 6x17	Standard	TU – Tube

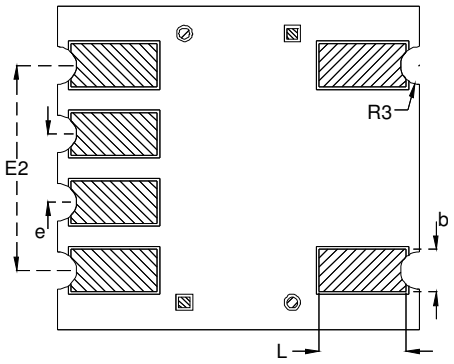
MPS-150A

Uncompensated, Absolute Pressure Sensor

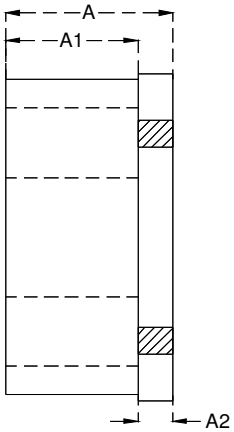
MECHANICAL DIMENSIONS – OPTION A AND AT



TOP VIEW



BOTTOM VIEW



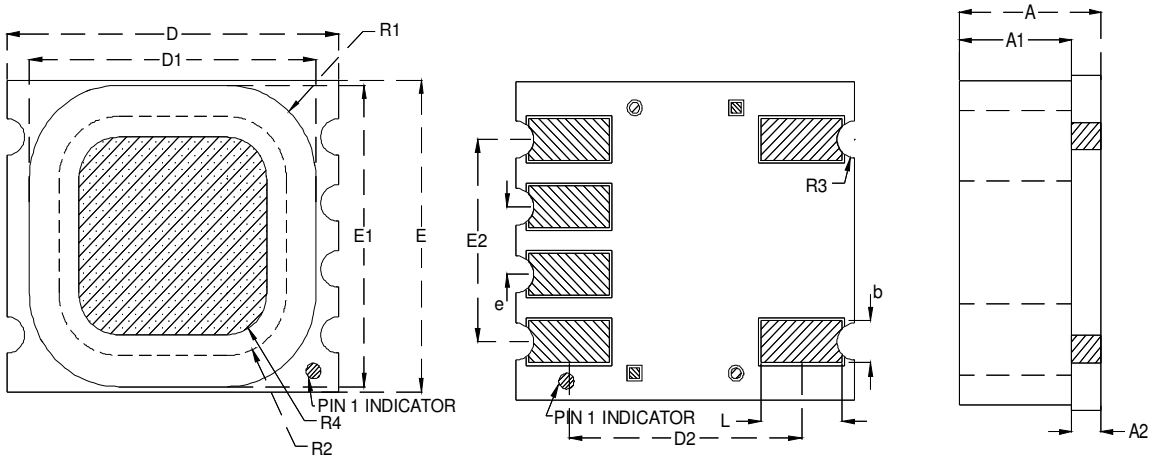
SIDE VIEW

SYMBOLS	MILLIMETER			INCHES		
	e=1.27 BASIC			e= 0.050 BASIC		
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM
A	2.985	3.035	3.100	0.1175	0.1195	0.1220
A1	2.350	2.400	2.450	0.0925	0.0945	0.0965
A2	0.635	0.635	0.650	0.0250	0.0250	0.0256
b	0.750	0.800	0.850	0.0295	0.0315	0.0335
D	6.650	6.700	6.750	0.2618	0.2638	0.2658
D1	5.750	5.800	5.850	0.2263	0.2283	0.2303
E	5.950	6.000	6.050	0.2343	0.2362	0.2382
E1	5.750	5.800	5.850	0.2263	0.2283	0.2303
E2	---	3.810	---	---	0.1500	---
L	1.550	1.600	1.650	0.0610	0.0630	0.0650
R1	1.750	1.800	1.850	0.0689	0.0709	0.0729
R2	1.150	1.200	1.250	0.0453	0.0472	0.0492
R3	---	0.350	---	---	0.0138	---

MPS-150A

Uncompensated, Absolute Pressure Sensor

MECHANICAL DIMENSIONS – OPTION B



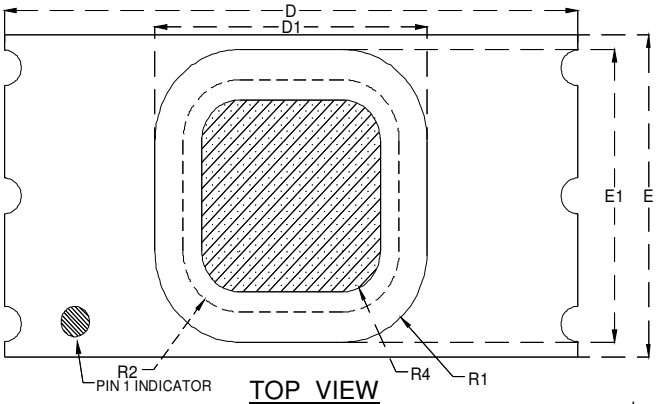
TOP VIEW BOTTOM VIEW SIDE VIEW

SYMBOLS	MILLIMETER			INCHES		
	e=1.27 BASIC			e= 0.050 BASIC		
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM
A	2.985	3.035	3.100	0.1175	0.1195	0.1220
A1	2.350	2.400	2.450	0.0925	0.0945	0.0965
A2	0.635	0.635	0.650	0.0250	0.0250	0.0256
b	0.750	0.800	0.850	0.0295	0.0315	0.0335
D	6.650	6.700	6.750	0.2618	0.2638	0.2658
D1	5.750	5.800	5.850	0.2263	0.2283	0.2303
D2	---	4.600	---	---	0.1811	---
E	5.950	6.000	6.050	0.2343	0.2362	0.2382
E1	5.750	5.800	5.850	0.2263	0.2283	0.2303
E2	---	3.810	---	---	0.1500	---
L	1.550	1.600	1.650	0.0610	0.0630	0.0650
R1	1.750	1.800	1.850	0.0689	0.0709	0.0729
R2	1.150	1.200	1.250	0.0453	0.0472	0.0492
R3	---	0.350	---	---	0.0138	---
R4	0.750	0.800	0.850	0.0295	0.0315	0.0335

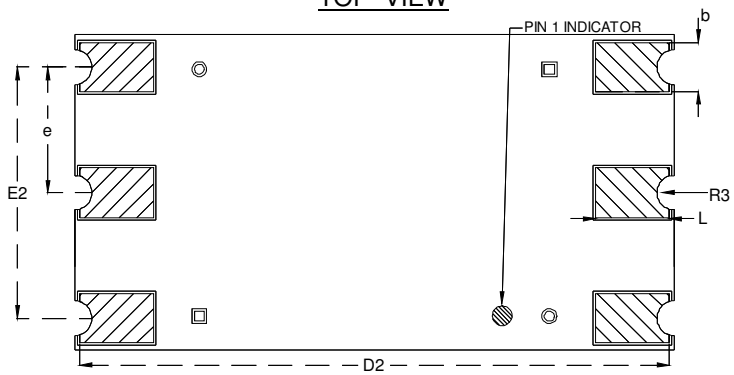
MPS-150A

Uncompensated, Absolute Pressure Sensor

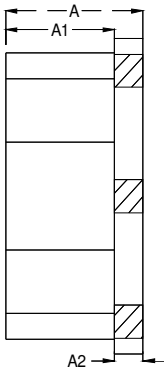
MECHANICAL DIMENSIONS – OPTION C



TOP VIEW



BOTTOM VIEW



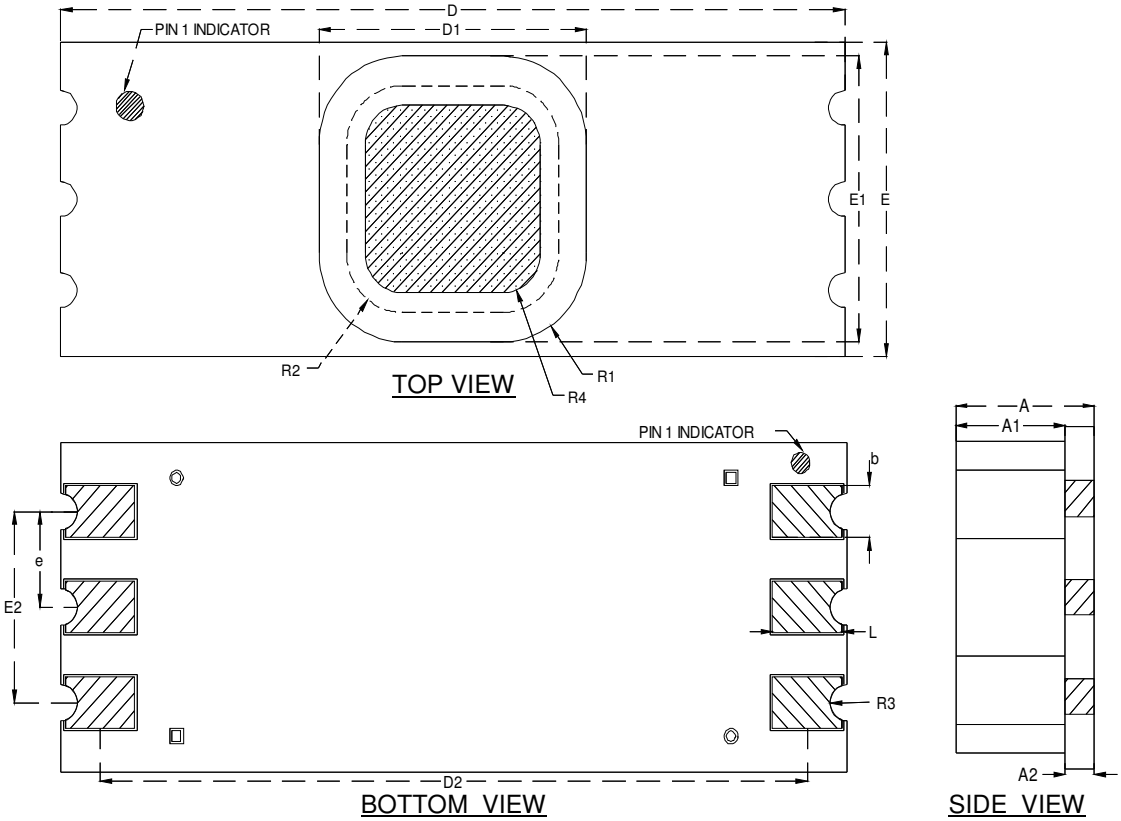
SIDE VIEW

SYMBOLS	MILLIMETER			INCHES		
	e=2.54 BASIC			e= 0.1000 BASIC		
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM
A	2.985	3.035	3.100	0.1175	0.1195	0.1220
A1	2.350	2.400	2.450	0.0925	0.0945	0.0965
A2	0.635	0.635	0.650	0.0250	0.0250	0.0256
b	0.950	1.000	1.050	0.0374	0.0394	0.0413
D	12.150	12.200	12.250	0.4783	0.4803	0.4823
D1	5.750	5.800	5.850	0.2263	0.2283	0.2303
D2	---	12.000	---	---	0.4724	---
E	6.330	6.380	6.430	0.2492	0.2512	0.2531
E1	5.750	5.800	5.850	0.2263	0.2283	0.2303
E2	---	5.080	---	---	0.2000	---
L	1.450	1.500	1.550	0.0571	0.0591	0.0610
R1	1.750	1.800	1.850	0.0689	0.0709	0.0729
R2	1.150	1.200	1.250	0.0453	0.0472	0.0492
R3	---	0.350	---	---	0.0138	---
R4	0.750	0.800	0.850	0.0295	0.0315	0.0335

MPS-150A

Uncompensated, Absolute Pressure Sensor

MECHANICAL DIMENSIONS – OPTION D

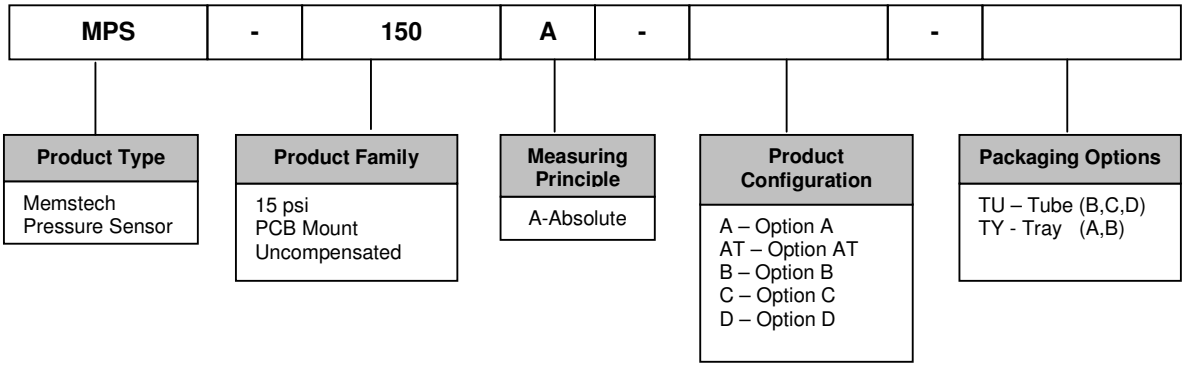


SYMBOLS	MILLIMETER			INCHES		
	e=1.85 BASIC			e= 0.0728 BASIC		
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM
A	2.985	3.035	3.100	0.1175	0.1195	0.1220
A1	2.350	2.400	2.450	0.0925	0.0945	0.0965
A2	0.635	0.635	0.650	0.0250	0.0250	0.0256
b	0.950	1.000	1.050	0.0374	0.0394	0.0413
D	16.950	17.000	17.050	0.6673	0.6693	0.6713
D1	5.750	5.800	5.850	0.2263	0.2283	0.2303
D2	---	15.300	---	---	0.6024	---
E	6.330	6.380	6.430	0.2492	0.2512	0.2532
E1	5.750	5.800	5.850	0.2263	0.2283	0.2303
E2	---	3.700	---	---	0.1457	---
L	1.450	1.500	1.550	0.0571	0.0591	0.0610
R1	1.750	1.800	1.850	0.0689	0.0709	0.0729
R2	1.150	1.200	1.250	0.0453	0.0472	0.0492
R3	---	0.350	---	---	0.0138	---
R4	0.750	0.800	0.850	0.0295	0.0315	0.0335

MPS-150A

Uncompensated, Absolute Pressure Sensor

HOW TO SPECIFY PART NUMBER



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Malaysia: PTD 43005 Jalan Perindustrian Murni 11, Taman Perindustrian Murni, 81400 Senai Johor, Malaysia. **Tel:** +607– 599 6323 **Fax:** +607–598 6388

Website: www.memstech.com

MEMSENZ™ I
Transduction Principle
Capacitive
Processing Technology
Bulk/Deep RIE
Actuation Mechanism
Force (External)
Signal Condition
Two chips/Single chip

MEMSENZ™ II
Transduction Principle
Piezoresistive
Processing Technology
Bulk/Deep Wet Etch
Actuation Mechanism
Pressure (External)
Signal Condition
Two chips/Single chip

MEMSENZ™ III
Transduction Principle
Resistive
Processing Technology
Surface
Actuation Mechanism
Thermal
Signal Condition
Two chips

MEMSENZ™ IV
Transduction Principle
Capacitive
Processing Technology
Bulk
Actuation Mechanism
Sound
Signal Condition
Two chips