Chip Pak High Volume Pressure Sensor for Disposable, Backside Pressure Applications

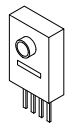
MPX2300D

PRESSURE SENSORS

Motorola has developed a low cost, high volume, miniature pressure sensor package which is ideal as a sub–module component or a disposable unit. The unique concept of the Chip Pak allows great flexibility in system design while allowing an economic solution for the designer. This new chip carrier package uses Motorola's unique sensor die with its patented, piezoresistive implant technology, along with the added feature of on–chip, thin–film temperature compensation and calibration.

Features:

- Low Cost
- Patented piezoresistive strain gauge implant, temperature compensation and calibration all integrated on a single, monolithic sensor die.
- Pressure Range Available: 0–300 mmHg
- Polysulfone (Mindell S–1000) Case Material (Medical, Class VI Approved)



CHIP PAK ELEMENT
CASE 423–03
Style 1

Motorola is offering the Chip Pak option package. Application–specific parts will have an "SPX" prefix, followed by a four digit number, unique to the specific customer. Devices will be shipped in a tape and reel packaging.

NOTE: The die and wire bonds are exposed on the front side of the Chip Pak (pressure is applied to the backside of the device). Front side die and wire protection must be provided in the customer's housing. Use caution when handling the devices during all processes.

Pin Number, Style 1			
1	**2**	**3**	**4**
V_S	S+	S–	Ground

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Overpressure (Backside)	P_{max}	125	PSI
Burst Pressure	P_{burst}	1000	kPa
Supply Voltage	V_{Smax}	10	Vdc
Storage Temperature	T_{stg}	85	°C
Operating Temperature	T_A	+15 to +40	°C

Motorola's MPX2300D Pressure Sensors. Motorola's MPX2300D pressure sensor has been designed for medical usage by combining the performance of Motorola's shear stress pressure sensor design and the use of biomedically approved materials. Materials with a proven history in medical situations have been chosen to provide a sensor that can be used with confidence in applications, such as invasive blood pressure monitoring. It can be sterilized using ethylene oxide. The portions of the pressure sensor that are required to be biomedically approved are the rigid housing and the gel coating.

The rigid housing is molded from a white, medical grade polysulfone that has passed extensive biological testing including: tissue culture test, rabbit implant, hemolysis, intracutaneous test in rabbits, and system toxicity, USP.

A silicone dielectric gel that has been used extensively in implants covers the silicon piezoresistive sensing element. The gel is a nontoxic, nonallergenic polymer system which passes pyrogen testing, as well as meeting all USP XX Biological Testing Class VI requirements. The properties of the gel allow it to transmit pressure uniformly to the diaphragm surface, while isolating the internal electrical connections from the corrosive effects of fluids, such as saline solution. The gel provides electrical isolation sufficient to withstand defibrillation testing, as specified in the proposed Association for the Advancement of Medical Instrumentation (AAMI) Standard for blood pressure transducers. A biomedically approved opaque filler in the gel prevents bright operating room lights from affecting the performance of the sensor.

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OPERATING CHARACTERISTICS (V_S = 6 Vdc, T_A = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
Pressure Range	P_{OP}	0	—	300	mmHg
Supply Voltage(8)	V_S	—	6.0	10	Vdc
Supply Current	I_o	—	1.0	—	mAdc
Zero Pressure Offset	V_{off}	–0.75	—	0.75	mV
Sensitivity	—	4.95	5.0	5.05	µV/V/mmHg
Full Scale Span(1)	V_{FSS}	2.976	3.006	3.036	mV
Linearity + Hysteresis	—	– 2.0	—	2.0	
Temperature Effect on Sensitivity	TCS	–0.1	—	+0.1	%/°C
Temperature Effect on Full Scale Span	TCV_{FSS}	–0.1	—	+0.1	%/°C
Temperature Effect on Offset(4)	TCV_{off}	–9.0	—	+9.0	µV/°C
Input Impedance	Z_{in}	1800	—	4500	Ω
Output Impedance	Z_{out}	270	—	330	Ω
R_{CAL} (150 kΩ)(9)	R_{CAL}	97	100	103	mmHg
Response Time(5) (10% to 90%)	t_R	—	1.0	—	ms
Temperature Error Band	—	0	—	85	°C
Stability(6)	—	—	±0.5	—	$\%V_{FSS}$

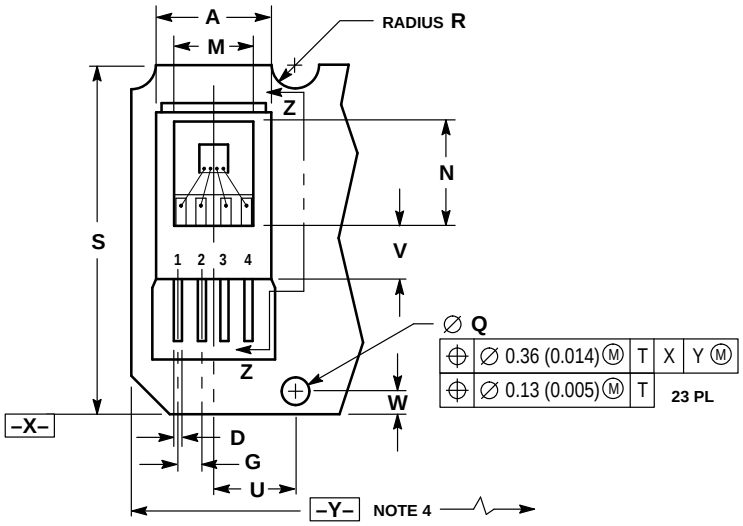
MECHANICAL CHARACTERISTICS

Characteristics	Symbol	Min	Typ	Max	Unit
Weight (Case 423)	—	—	170	—	mg
Warm–Up	—	—	15	—	Sec

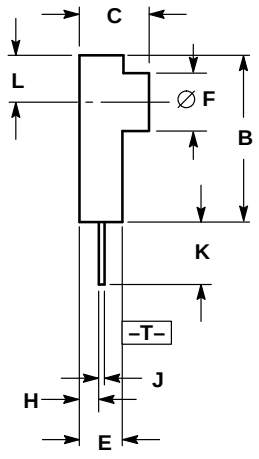
NOTES:

1. Measured at 6.0 Vdc excitation for 100 mmHg pressure differential. V_{FSS} and FSS are like terms representing the algebraic difference between full scale output and zero pressure offset.
2. Maximum deviation from end–point straight line fit at 0 and 300 mmHg.
3. Slope of end–point straight line fit to full scale span at 0°C and +85°C relative to +25°C.
4. Slope of end–point straight line fit to zero pressure offset at 0°C and +85°C relative to +25°C.
5. For a 0 to 300 mmHg pressure step change.
6. Stability is defined as the maximum difference in output at any pressure within P_{OP} and temperature within +10°C to +85°C after:
   a. 1000 temperature cycles, –40°C to +125°C.
   b. 1.5 million pressure cycles, 0 to 300 mmHg.
7. Operating characteristics based on positive pressure differential relative to the vacuum side (gauge/differential).
8. Recommended voltage supply: 6 V ± 0.2 V, regulated. Sensor output is ratiometric to the voltage supply. Supply voltages above +10 V may induce additional error due to device self–heating.
9. Offset measurement with respect to the measured sensitivity when a 150k ohm resistor is connected to V_S and S+ output.

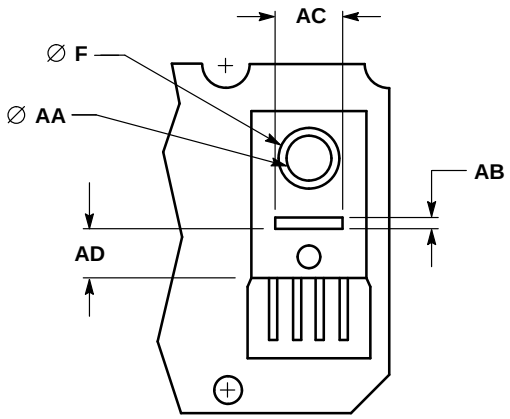
PACKAGE DIMENSIONS



FRONT VIEW



SECTION Z–Z



BACK VIEW

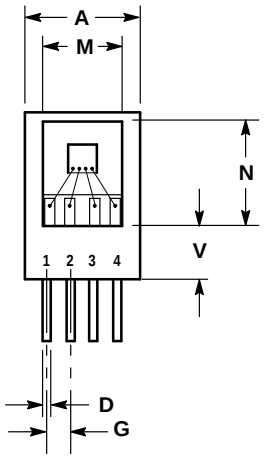
NOTES:
10. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
11. CONTROLLING DIMENSION: INCH.
12. 24 UNITS PER STRIP AT 8.89 (0.350) PITCH.
13. OVERALL LENGTH OF STRIP EQUALS 212.7-214.00 (8.375-8.425).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.240	0.260	6.10	6.60
B	0.350	0.370	8.89	9.40
C	0.140	0.150	3.56	3.81
D	0.012	0.020	0.30	0.51
E	0.088	0.102	2.24	2.59
F	0.123	0.128	3.12	3.25
G	0.045	0.055	1.14	1.40
H	0.037	0.047	0.94	1.19
J	0.007	0.011	0.18	0.28
K	0.120	0.140	3.05	3.56
L	0.095	0.105	2.41	2.67
M	0.165	0.175	4.19	4.45
N	0.223	0.239	5.66	6.07
Q	0.055	0.065	1.40	1.65
R	0.048	0.052	1.22	1.32
S	0.745	0.755	18.92	19.18
U	0.175 BSC		4.44 BSC	
V	0.105	0.115	2.67	2.92
W	0.050 BSC		1.27 BSC	
AA	0.095	0.107	2.41	2.72
AB	0.015	0.035	0.38	0.89
AC	0.120	0.175	3.05	4.45
AD	0.100	0.115	2.54	2.92

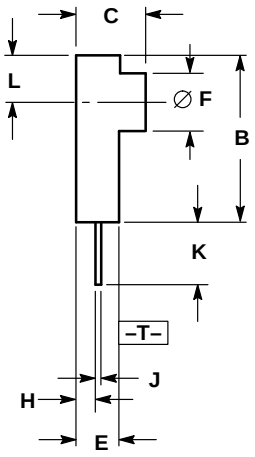
STYLE 1:
PIN 1. V_{CC}
2. +OUT
3. –OUT
4. GROUND

CASE 423–03
ISSUE B

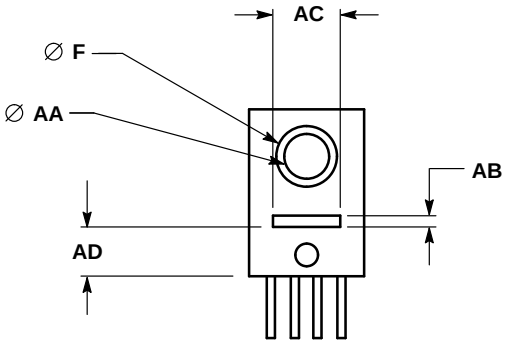
PACKAGE DIMENSIONS — CONTINUED



FRONT VIEW



END VIEW



BACK VIEW

NOTES:
14. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
15. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.240	0.260	6.10	6.60
B	0.350	0.370	8.89	9.40
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V	0.105	0.115	2.67	2.92
AA	0.095	0.107	2.41	2.72
AB	0.015	0.035	0.38	0.89
AC	0.120	0.175	3.05	4.45
AD	0.100	0.115	2.54	2.92

STYLE 1:
PIN 5. V_{CC}
6. +OUT
7. –OUT
8. GROUND

CASE 423A–01
ISSUE O

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