

High Volume Pressure Sensor For Disposable Applications

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 piezoresistive technology, along with the added feature of on-chip, thin-film temperature compensation and calibration.

NOTE: Motorola is also offering the Chip Pak package in application-specific configurations, which will have an "SPX" prefix, followed by a four-digit number, unique to the specific customer.

Features

- Low Cost
- Integrated Temperature Compensation and Calibration
- Ratiometric to Supply Voltage
- Polysulfone Case Material (Medical, Class V Approved)
- Provided in Easy-to-Use Tape and Reel

Application Examples

- Medical Diagnostics
- Infusion Pumps
- Blood Pressure Monitors
- Pressure Catheter Applications
- Patient Monitoring

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.

Motorola's MPX2300DT1/MPX2301DT1 Pressure Sensors have 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 covers the silicon piezoresistive sensing element. The gel is a nontoxic, nonallergenic elastomer system which meets all USP XX Biological Testing Class V 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. The **MPX2301DT1** is a reduced gel option.

Preferred devices are Motorola recommended choices for future use and best overall value.

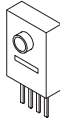
MPX2300DT1 MPX2301DT1

Motorola Preferred Device

PRESSURE SENSORS

0 to 300 mmHg (0 to 40 kPa)

CHIP PAK PACKAGE



**MPX2300/1DT1
CASE 423A**

PIN NUMBER			
1	V _S	3	S-
2	S+	4	Gnd

MPX2300DT1 MPX2301DT1

MAXIMUM RATINGS(NOTE)

Rating	Symbol	Value	Unit
Maximum Pressure (Backside)	P_{max}	125	PSI
Storage Temperature	T_{stg}	-25 to +85	°C
Operating Temperature	T_A	+15 to +40	°C

NOTE: Exposure beyond the specified limits may cause permanent damage or degradation to the device.

OPERATING CHARACTERISTICS ($V_S = 6$ Vdc, $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
Pressure Range	P_{OP}	0	—	300	mmHg
Supply Voltage ⁽⁷⁾	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	$\mu\text{V/V/mmHg}$
Full Scale Span ⁽¹⁾	V_{FSS}	2.976	3.006	3.036	mV
Linearity + Hysteresis ⁽²⁾	—	-1.5	—	1.5	% V_{FSS}
Accuracy ⁽⁹⁾ $V_S = 6$ V, $P = 101$ to 200 mmHg	—	-1.5	—	1.5	%
Accuracy ⁽⁹⁾ $V_S = 6$ V, $P = 201$ to 300 mmHg	—	-3.0	—	3.0	%
Temperature Effect on Sensitivity	TCS	-0.1	—	+0.1	%/°C
Temperature Effect on Full Scale Span ⁽³⁾	TCV_{FSS}	-0.1	—	+0.1	%/°C
Temperature Effect on Offset ⁽⁴⁾	TCV_{off}	-9.0	—	+9.0	$\mu\text{V}/^\circ\text{C}$
Input Impedance	Z_{in}	1800	—	4500	Ω
Output Impedance	Z_{out}	270	—	330	Ω
R_{CAL} (150 k Ω) ⁽⁸⁾	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}

NOTES:

- 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.
- Maximum deviation from end-point straight line fit at 0 and 200 mmHg.
- Slope of end-point straight line fit to full scale span at 15°C and +40°C relative to +25°C.
- Slope of end-point straight line fit to zero pressure offset at 15°C and +40°C relative to +25°C.
- For a 0 to 300 mmHg pressure step change.
- Stability is defined as the maximum difference in output at any pressure within P_{OP} and temperature within +10°C to +85°C after:
 - 1000 temperature cycles, -40°C to +125°C.
 - 1.5 million pressure cycles, 0 to 300 mmHg.
- Recommended voltage supply: 6 V \pm 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.
- Offset measurement with respect to the measured sensitivity when a 150k ohm resistor is connected to V_S and S+ output.
- Accuracy is calculated using the following equation:

$$\text{Error}_p = \{[V_p - \text{Offset}] / (\text{Sens}_{Nom} * V_{EX}) - P\} / P$$

Where:

- V_p = Actual output voltage at pressure P in microvolts (μV)
- Offset = Voltage output at $P = 0$ mmHg in microvolts (μV)
- Sens_{Nom} = Nominal sensitivity = 5.01 $\mu\text{V/V/mmHg}$
- V_{EX} = Excitation voltage
- P = Pressure applied to the device

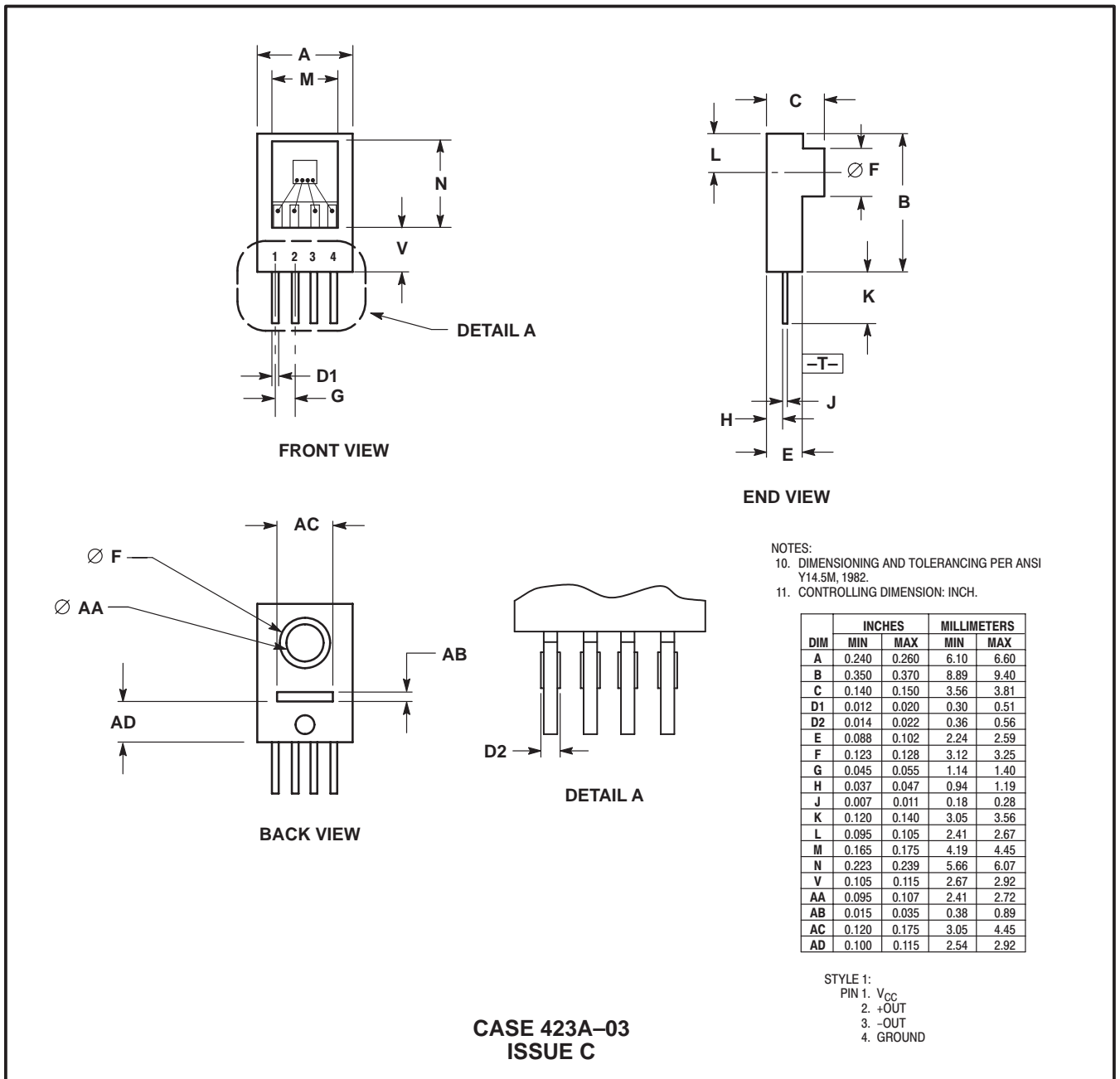
ORDERING INFORMATION

The MPX2300DT1/MPX2301DT1 silicon pressure sensors are available in tape and reel packaging.

Device Type/Order No.	Case No.	Device Description	Marking
MPX2300DT1	423A	Chip Pak, Full Gel	Date Code, Lot ID
MPX2301DT1	423A	Chip Pak, 1/3 Gel	Date Code, Lot ID

Packaging Information	Reel Size	Tape Width	Quantity
Tape and Reel	330 mm	24 mm	1000 pc/reel

PACKAGE DIMENSIONS



Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and the Stylized M Logo are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

MOTOROLA and the Stylized M Logo are registered in the US Patent & Trademark Office. All other product or service names are the property of their respective owners.

© Motorola, Inc. 2002.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1, Minami-Azabu, Minato-ku, Tokyo 106-8573 Japan. 81-3-3440-3569

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong. 852-26668334

Technical Information Center: 1-800-521-6274

HOME PAGE: <http://www.motorola.com/semiconductors/>



MOTOROLA

