Document Number: MPX2300DT1
Rev. 11, 09/2015

RoHS

MPX2300DT1, 0 to 40 kPa, Differential Compensated Pressure Sensor

MPX2300DT1

Freescale Semiconductor has developed a 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 providing an economic solution for the designer. This new chip carrier package uses Freescale Semiconductor's unique sensor die with its piezoresistive technology, along with the added feature of on-chip, thin-film temperature compensation and calibration.

Features

- Integrated temperature compensation and calibration
- Ratiometric to supply voltage
- Polysulfone case material (ISO 10993)
- Provided in easy-to-use tape and reel

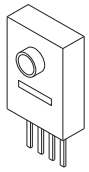
Typical applications

- Medical diagnostics
- Infusion pumps
- Blood pressure monitors
- Pressure catheter applications
- Patient monitoring

NOTE

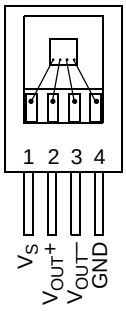
The die and wire bonds are exposed on the front side of the chip pak (pressure is applied to the backside of the device). Front side die and wire protection must be provided in the customer's housing. Use caution when handling the devices during all processes.

Chip Pak package
Back view



MPX2300DT1
Case 98ASB13355C

Front view



Pinout

Ordering information						
Device name	Shipping	Package	Pressure type			Device marking
			Gauge	Differential	Absolute	
MPX2300DT1	Tape and Reel	98ASB13355C		•		XXXX = Device code XXX = Trace code

Freescale reserves the right to change the detail specifications as may be required to permit improvements in the design of its products.

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Contents

Related Documentation

The MPX2300DT1 device features and operations are described in a variety of reference manuals, user guides, and application notes. To find the most-current versions of these documents:

1. Go to the Freescale homepage at:

   http://www.freescale.com/

2. In the Keyword search box at the top of the page, enter the device number MPX2300DT1.
3. In the Refine Your Result pane on the left, click on the Documentation link.

1 General Description

The MPX2300DT1 pressure sensor has been designed for medical usage by combining the performance of Freescale'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: ISO 10993-5:1999, ISO 10993-10:2002, and ISO 10993-11:1993.

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.

1.1 Block diagram

Figure 1 shows a block diagram of the internal circuitry integrated on a pressure sensor chip.

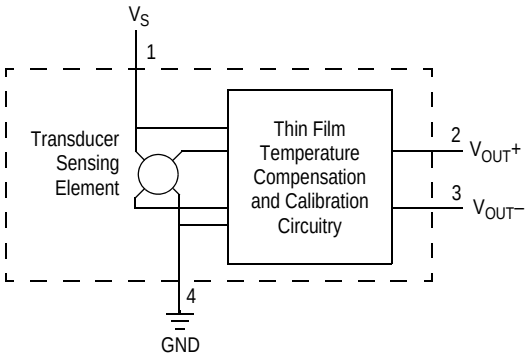


Figure 1. Block diagram

1.2 Pinout

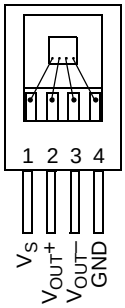


Figure 2. Device pinout (front view)

Table 1. Pin functions

Pin	Name	Function
1	V_S	Voltage supply
2	$V_{OUT}+$	Output voltage
3	$V_{OUT}-$	Output voltage
4	GND	Ground

2 Mechanical and Electrical Specifications

2.1 Maximum ratings

Table 2. Maximum ratings[1]

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

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

2.2 Operating characteristics

Table 3. Operating characteristics (V_S = 6 V_{DC}, T_A = 25 °C unless otherwise noted)

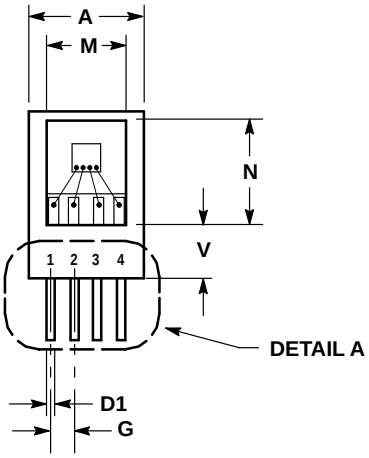
Characteristics	Symbol	Min	Typ	Max	Unit
Pressure range	P_{OP}	0	—	300	mmHg
Supply voltage[1]	V_S	—	6.0	10	V_{DC}
Supply current	I_O	—	1.0	—	mAdc
Zero pressure offset	V_{OFF}	-0.75	—	0.75	mV
Sensitivity	—	4.95	5.0	5.05	µV/V/mmHg
Full-scale span[2]	V_{FSS}	2.976	3.006	3.036	mV
Linearity + Hysteresis[3]	—	-1.5	—	1.5	$\%V_{FSS}$
Accuracy V_S = 6 V, P = 101 to 200 mmHg	—	-1.5	—	1.5	%
Accuracy 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[4]	TCV_{FSS}	-0.1	—	+0.1	%/°C
Temperature effect on offset[5]	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)[6]	R_{CAL}	97	100	103	mmHg
Response time[7] (10% to 90%)	t_R	—	1.0	—	ms

1. 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.
2. Measured at 6.0 V_{DC} 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.
3. Maximum deviation from end-point straight line fit at 0 and 200 mmHg.
4. Slope of end-point straight line fit to full scale span at 15 °C and +40 °C relative to +25 °C.
5. Slope of end-point straight line fit to zero pressure offset at 15 °C and +40 °C relative to +25 °C.
6. Offset measurement with respect to the measured sensitivity when a 150 k resistor is connected to V_S and V_{OUT}+ output.
7. For a 0 to 300 mmHg pressure step change.

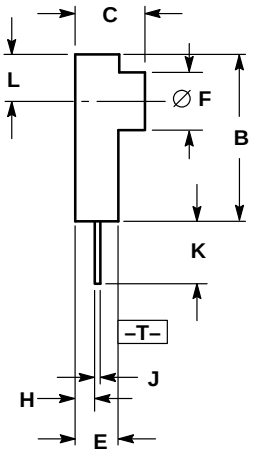
3 Package Dimensions

3.1 Package description

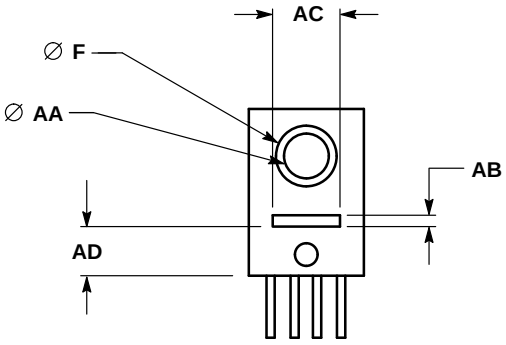
This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASB13355C.pdf.



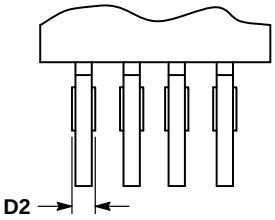
FRONT VIEW



END VIEW



BACK VIEW



DETAIL A

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. 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
C	0.140	0.150	3.56	3.81
D1	0.012	0.020	0.30	0.51
D2	0.014	0.022	0.36	0.56
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
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

Case 98ASB1335C, Chip Pak package

4 Revision History

Table 4. Revision history

Revision number	Revision date	Description
9	10/2012	• Added Table 1. Pin Numbers on page 1.
10	09/2015	• Updated format.
11	09/2015	• Corrected pinout on first page and Section 1.2 and Table 1. • Replaced Figure 1, Block diagram.

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