Document Number: MPXC12DT1
Rev. 1.0, 09/2015

RoHS

MPXC12DT1, 10 kPa, Uncompensated, Silicon Pressure Sensor

MPXC12DT1

Freescale Semiconductor has developed 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 standard, uncompensated sensor permits manufacturers to design and add their own external temperature compensation and signal conditioning networks.

Compensation techniques are simplified because of Freescale's single element strain gauge design.

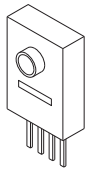
Features

- Ratiometric to supply voltage
- Polysulfone case material (ISO 10993)
- Provided in easy-to-use tape and reel
- Patented silicon shear stress strain gauge design

Typical applications

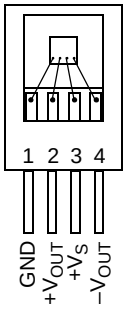
- Respiratory diagnostics

Chip Pak package
Back view



MPXC12DT1
Case 98ASB13355C

Front view



Pinout

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.

Ordering information						
Device name	Shipping	Package	Pressure type			Device marking
			Gauge	Differential	Absolute	
MPXC12DTI	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 MPXC12DT1 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 MPXC12DT1.
3. In the Refine Your Result pane on the left, click on the Documentation link.

1 General Description

Freescale Semiconductor's biocompatible pressure sensors have been designed for medical usage by combining the performance of the 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 MPXC12DT1 does not come with gel on the backside of the device. This enables the customer to customize sensor with gel specific to the intended application space.

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.

1.1 Block diagram

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

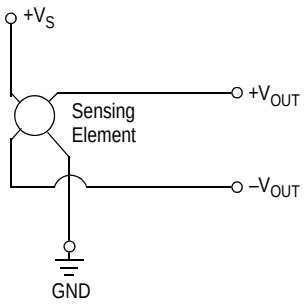


Figure 1. Block diagram

1.2 Pinout

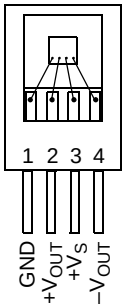


Figure 2. Device pinout (front view)

Table 1. Pin functions

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

2 Mechanical and Electrical Specifications

2.1 Maximum ratings

Table 2. Maximum ratings[1]

Rating	Symbol	Value	Unit
Maximum pressure (backside)	P_{max}	75	kPa
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 = 3.0 V_{DC}, T_A = 25 °C unless otherwise noted, P1 > P2)

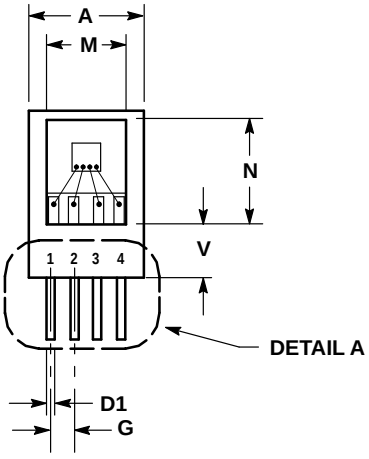
Characteristic	Symbol	Min	Typ	Max	Unit
Pressure range[1]	P_{OP}	0	—	10	kPa
Supply voltage[2]	V_S	—	3	6	V_{DC}
Supply current	I_O	—	6.0	—	mAdc
Full-scale span[3]	V_{FSS}	45	65	80	mV
Offset[4]	V_{OFF}	0	20	35	mV
Sensitivity	$\Delta V/\Delta P$	—	6.5	—	mV/kPa
Linearity	—	0	—	10	$\%V_{FSS}$
Pressure hysteresis (0 to 10 kPa)	—	—	±0.1	—	$\%V_{FSS}$
Temperature hysteresis (+15 °C to +40 °C)	—	—	±0.1	—	$\%V_{FSS}$
Input impedance	Z_{IN}	400	—	550	Ω
Output impedance	Z_{OUT}	750	—	1250	Ω
Response time[5] (10% to 90%)	t_R	—	1.0	—	ms
Warm-up[6]	—	—	20	v	ms
Offset stability[7]	—	—	±0.5	—	$\%V_{FSS}$

1. 1.0 kPa (kilo Pascal) equals 0.145 psi.
2. Device is ratiometric within this specified excitation range. Operating the device above the specified excitation range may induce additional error due to device self-heating.
3. Full-scale span (V_{FSS}) is defined as the algebraic difference between the output voltage at full rated pressure and the output voltage at the minimum rated pressure.
4. Offset (V_{OFF}) is defined as the output voltage at the minimum rated pressure.
5. Response time is defined as the time for the incremental change in the output to go from 10% to 90% of its final value when subjected to a specified step change in pressure.
6. Warm-up time is defined as the time required for the product to meet the specified output voltage after the pressure is stabilized.
7. Offset stability is the product's output deviation when subjected to 1000 hours of Pulsed Pressure, Temperature Cycling with Bias Test.

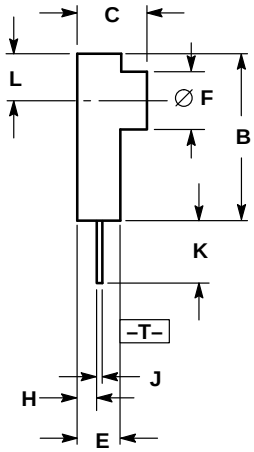
3 Package Dimensions

3.1 Package description

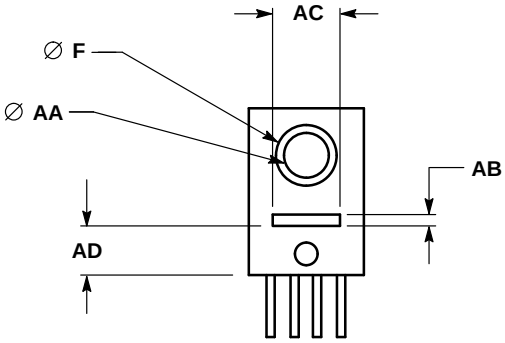
This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASB13355C.pdf.



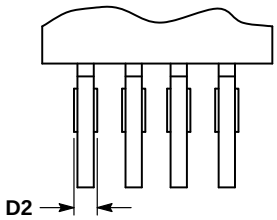
FRONT VIEW



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
0	11/2010	• Initial release.
1	08/2015	• Updated format.

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