

1 SEM image of pressure sensor cross section.

2 Diced pressure sensors on glass carrier.

## HIGH TEMPERATURE PIEZORESISTIVE PRESSURE SENSOR DEVICES

### Fraunhofer Institute for Photonic Microsystems IPMS

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#### Features

- Low leakage current at High temperature
- Low offset voltage
- High temperature metallization
- Pressure ranges 5 till 20 bar possible

#### Applications

- Automotive
- Industrial controls
- White goods

#### Overview

The piezoresistive pressure sensor device was developed for the absolute and difference pressure measurement under harsh environment.

The pressure sensors consist of a Wheatstone bridge, realized using polysilicon resistors on a single crystal silicon membrane. The resistors are isolated dielectrically from the membrane. This architecture reduces the leakage currents especially at higher temperature ranges.

The sensor is bonded onto a 2 mm glass backplate to reduce later mounting stress.

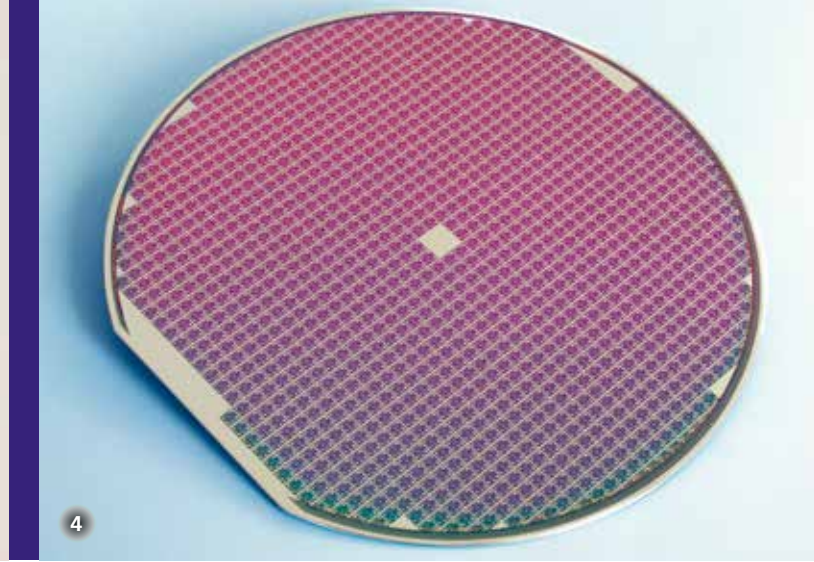
The metallization of the sensor allows operating temperatures up to 250°C.



Quality Management

ISO 9001

[www.dekra.com](http://www.dekra.com)



## MEMS Technologies

Fraunhofer IPMS develops and fabricates MEMS technologies in its 1500 m<sup>2</sup> (15,000 sf) clean room (class 4 according to ISO 14644-1).

Based on customized developed technologies Fraunhofer IPMS could provide sensor devices and technologies in small and medium quantities. Further customized modification of the process is possible on customer request.

The technology development and pilot fabrication are certified to the DIN EN9001:2008 standard by DEKRA.

## Process Technology Background

The pressure sensor technology was developed in collaboration with an automotive component supplier for hydraulic systems in cars.

This pressure sensor is a standard product, used here to monitor and control oil pressure in automatic switch gears. At present, it is used to produce sensor quantities of 300 to 500 thousand units per year, used by leading French automobile manufacturers. Fraunhofer IPMS has been audited successfully several times for quality assurance by the customer, and as a result is accepted as a single-source for this product.

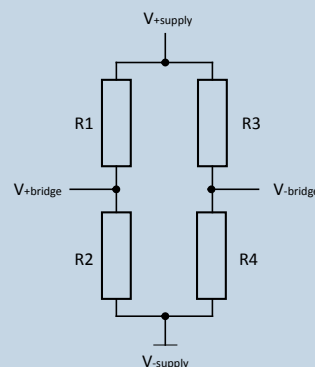
Based on our standard technology, we are developing pressure sensors for a variety of pressure ranges. By adjusting the membrane thickness, optimization for pressure ranges up to 20 bar (300 psi) is possible.

- 3 Pressure sensor for oil pressure control in automatic transmissions.
- 4 Completed six-inch wafer with pressure sensors.

## Technical Data [Type PPH11 @ 5V, 20-25°C]

Parameter	Value	Units
Pressure Range	11 bar FS (170 PSI)	
Span	60 mV	
Bridge resistance	1960 Ohm	
Offset voltage	< 10 +/- mV	
Temperature coefficient of bridge resistance	0.12 typ. %/K	
Temperature coefficient of offset	0.1 typ. % FS/K	
Temperature coefficient of span	0.2 typ. % FS/K	
Linearity error	<0.1 +/- % FS	
Maximum Ratings		
Over Pressure	60 Rearside [bar]	
Burst Pressure	60 Rearside [bar]	
Operation Temperature/ characterized	-40 min. Ta 250/150 max. Ta	

## Circuit Diagram



## Dimensions

