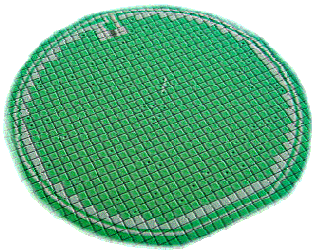
MS7228

PRESSURE SENSOR DIE (0-28 BAR) FOR HARSH ENVIRONMENT



- **0 to 2800 kPa range (28 bar or 406 PSI)**
- **Absolute pressure sensors**
- **Hermetic sensor**
- **RoHS-compatible & Pb-free[1]**

DESCRIPTION

The MS7228 is an absolute silicon micro-machined pressure sensor for harsh environment. A vacuum reference cavity is sealed on top of the sensitive silicon membrane by the anodic bonding of a Pyrex™ cap. The pressure, applied on the backside, is converted in electrical signal by piezo-resistors implanted in the silicon membrane. To improve the sensor stability, a drilled Pyrex™ is bonded on the backside. As the pressure port consists of Pyrex™ and silicon, both stable in most of the chemicals, the MS7228 is suitable for media-resistive applications.

FEATURES

- Media resistive pressure sensor die
- Output Span 150mV @ 5 V
- Temperature Range -40°…+125°C
- Linearity 0.05% (typical)
- Die Size 1.63 x 1.95 mm^2
- Low Cost, High reliability

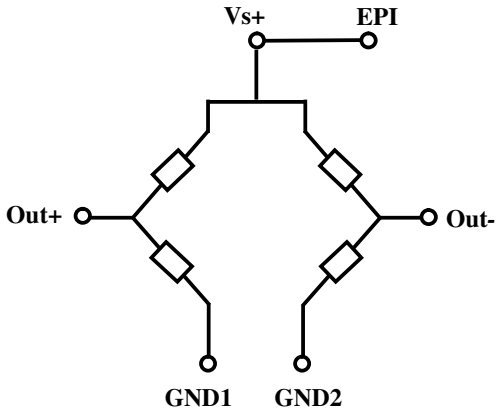
APPLICATION

- Harsh environments
- Absolute pressure sensor systems
- Braking systems
- Tire pressure
- Engine controls
- Diving computers

ELECTRICAL CONNECTIONS

Positive output for pressure applied backside

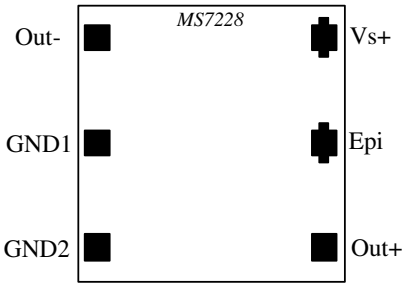
Vs+ : Supply voltage of Wheatstone bridge
Epi : Connection of epitaxial layer (membrane)
Out- : Negative output
Out+ : Positive output
GND1 : Ground
GND2 : Ground



深圳市新世联科技有限公司

地址：深圳市深南中路2066号华能大厦712室
电话：0755-83680810 83680820 83680830 83680860
网址：www.apollounion.com
邮编：518031
传真：0755-83680866
邮箱：sales@apollounion.com

PAD OUT

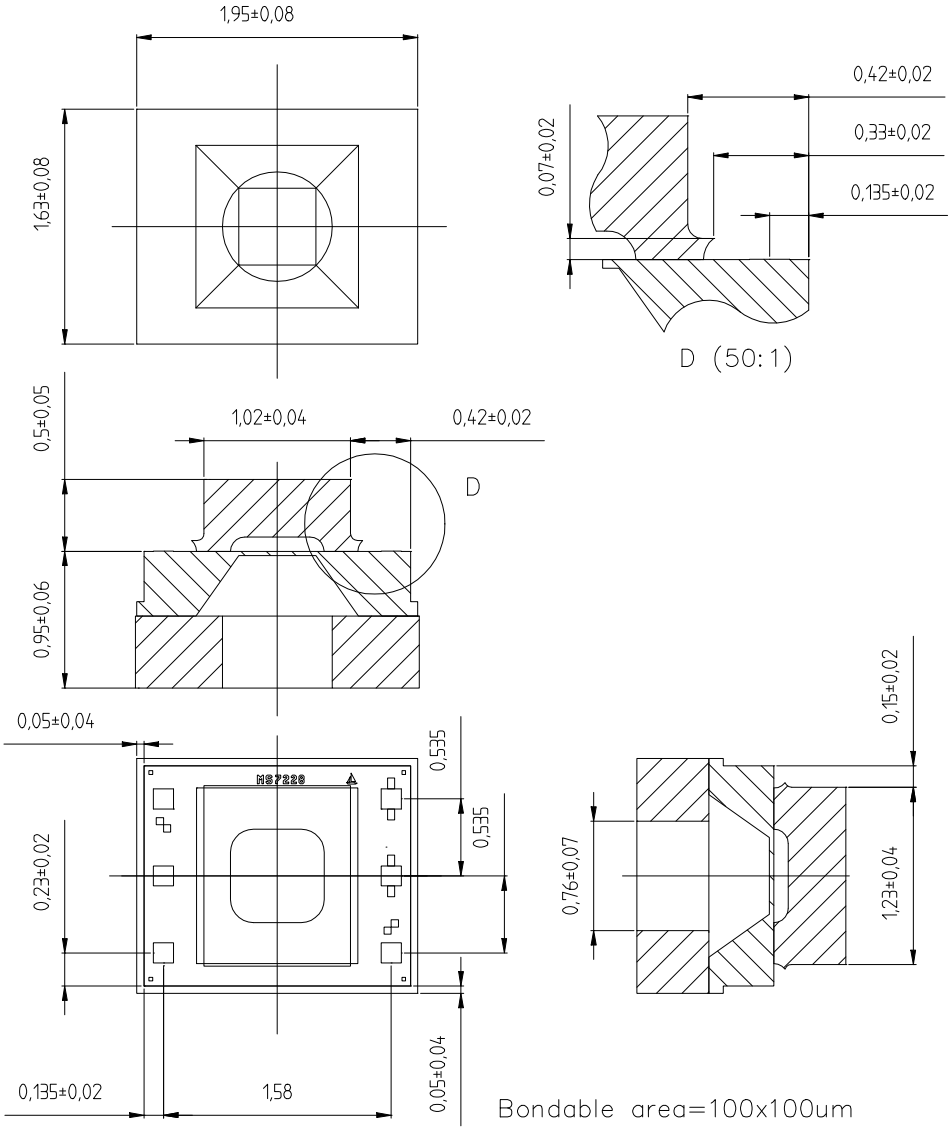


Important remarks:

As the sensing elements are diffused resistances, the voltage applied on the ground pads (GND1 and GND2) has to be lower than the voltage applied on supply voltage pad (Vs+).

The epitaxial layer is connected to the Vs+ pin on the die.

LAYOUT



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FULL SCALE PRESSURE

kPa	bar	mbar	PSI	atm	mm Hg	m H_2O	Inches H_2O
2800	28	28000	406	27.5	21002	285	11242

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Min	Max	Unit
Supply voltage	VS+	Ta = 25 °C		20	V
Storage temperature	T_S		-40	+150	°C
Pressure overload				70	Bar

ELECTRICAL CHARACTERISTICS

(Reference conditions: Supply Voltage VS+ = 5 Vdc; Ambient Temperature Ta = 25℃)

Parameter	Min	Typ	Max	Unit	Notes
Operating Pressure Range	0		28	Bar	
Operating Temperature Range	-40		125	℃	
Bridge Resistance	3.0	3.4	3.8	kΩ	
Full-scale span (FS)	100	130	160	mV	
Zero Pressure Offset	-40	0	40	mV	
Linearity		± 0.05	± 0.15	% FS	1
Temperature Coefficient of Resistance Span Offset	+ 2400 - 1500 - 80	+ 2800 - 1900	+ 3300 - 2300 + 80	ppm/℃ ppm/℃ μV/℃	2
Pressure Hysteresis		± 0.05	± 0.15	% FS	3
Repeatability		± 0.05	± 0.15	% FS	4
Temperature Hysteresis			0.3	% FS	5

NOTES

1) Deviation at one half full-scale pressure from the least squares best line fit over pressure range (0 to 28 bar).
2) Slope of the endpoint straight line from 25℃ to 60℃.
3) Output deviation at any pressure within the specified range, when this pressure is cycled to and from the minimum or maximum rated pressure, at 25℃.
4) Same as 3) after 10 pressure cycles
5) Maximum difference in offset after one thermal cycle from -40℃ to +125℃.

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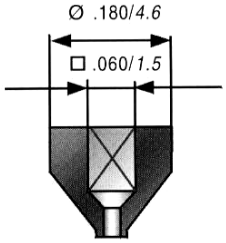
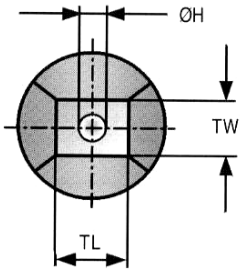
PICKING TOOLS

The MS7228 sensors have a topside Pyrex™ cap (1.23 x 1.02 mm^2) and a backside Pyrex™ (1.95 x 1.63 mm^2). The pick and place tool has to be of a soft material as rubber (Hardness 78-97 Shore A). Its external size must fit the Pyrex™ cap. Successful tests were done with some tools of SPT (see SPT drawing and references bellow).

SPT references	RTR-A1-060x060
External dimension	TL & TW: 0.06 inch /1.52 mm
Internal dimensions	∅H: 0.035 inch / 0.89 mm



Type A



WIRE BONDING

The bondable area is 100 x 100 μm^2. The location of the bonding pads is close to the top Pyrex glass edge reducing the possible size and angle of the bonding capillary. Refer to the detail view *D* on the layout for more precision.

ORDERING INFORMATION

Product Code	type	Product	Art.-Nr.
MS7228-A	Absolute	28 bar Pressure Sensors sawn on b/f	722825021

The MS7228 dice are supplied sawn on blue foil, mounted on plastic rings