Pick-and-Place

PG-DSOF-8-16

Application Note

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Revision History 2011-09-01, Revision 1.1	
Page or Item	**Subjects (major changes since previous revision)**
Page 10, 11	recommendation for nozzle added

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Last Trademarks Update 2010-06-09

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This Application Note provides information about pick-and-place capability of PG-DSOF-8-16 pressure sensor package, outline dimensions and printed circuit board (PCB) design.

1.1 Package Description

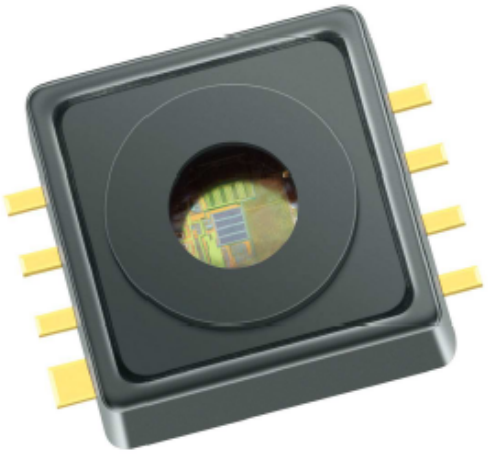
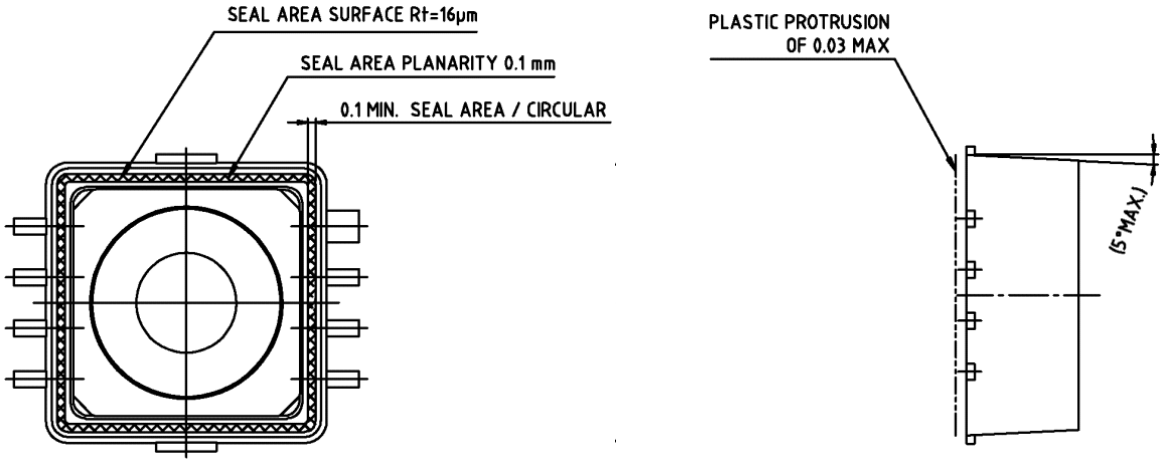
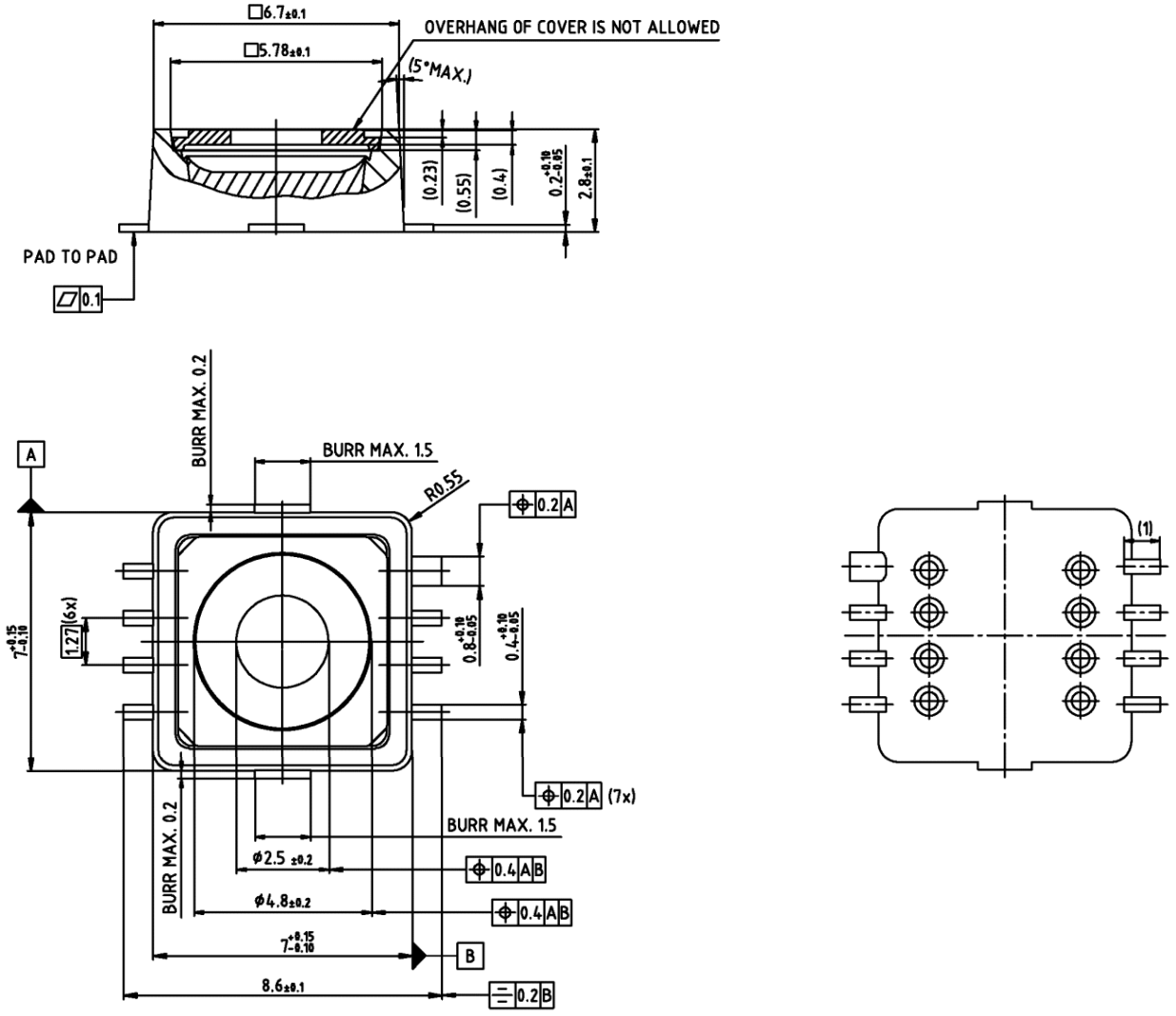


Figure 1 PG-DSOF8-16 High Volume Pressure Sensor Package

The PG-DSOF (Plastic Green Dual Small Outline Flat) is a leaded surface mount package with a flat lead form, where the leads are bent inside the molding compound (Thermo set). The lead surface finish is Ni/NiP/Pd/Au.

1.2 Package Outline





1.3 Printed Circuit Board Design

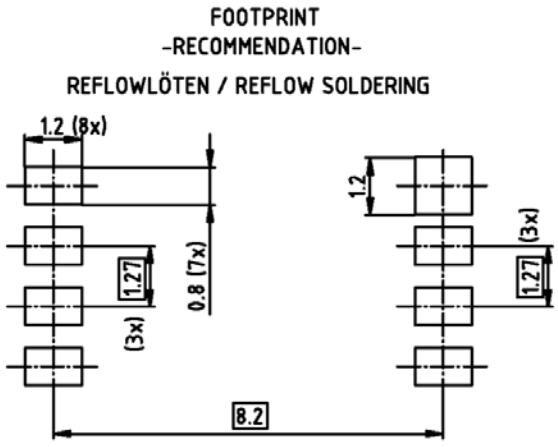


Figure 2 PG-DSOF-8-16 Recommended PCB Design

2 Component Placement Guideline

2.1 Component Placement

Although the self-alignment effect due to the surface tension of the liquid solder will support the formation of reliable solder joints, the components have to be placed accurately according to their geometry. Positioning the packages manually is not recommended, but it is possible.

For PG-DSOF-8-16 package with a pad width of 0.4 mm (respectively 0.8 mm) and a pitch of 1.27 mm, an automatic pick-and-place machine is recommended to achieve reliable solder joints.

Component placement accuracies of ±50 µm are obtained with modern automatic component placement machines using vision systems. With these systems, both the PCB and the components are optically measured and the components are placed on the PCB at their programmed positions. The fiducials on the PCB are located either on the edge of the PCB for the entire PCB or additionally on individual mounting positions (local fiducials). They are detected by a vision system. Recognition of the packages immediately before the mounting process is performed by a special vision system, enabling the complete package to be correctly centered.

The device pad to PCB pad misalignment has to be better than 50 µm to assure a robust mounting process. Generally this is achievable with a wide range of placement systems.

The following recommendations are important to follow:

- Especially on large boards, local fiducials close to the device can compensate for PCB tolerances.
- The lead recognition capabilities of the placement system should be used, not the outline centering. Outline centering can only be used for packages in which the tolerances between pad and outline are small compared to the placement accuracy needed.
- To ensure the identification of the packages by the vision system, adequate lighting and the correct choice of measuring modes are necessary. Accurate settings can be taken from the equipment manuals.
- Placement force that is too high can squeeze out solder paste and cause solder joint shorts. On the other hand, placement force that is too low can lead to insufficient contact between package and solder paste and may result in insufficient sticking of the component on the solder paste, which furthermore may lead to shifted or dropped devices.

The PG-DSOF-8-16 device is delivered in tape and reel packing which is suitable for being used in pick-and-place equipment.

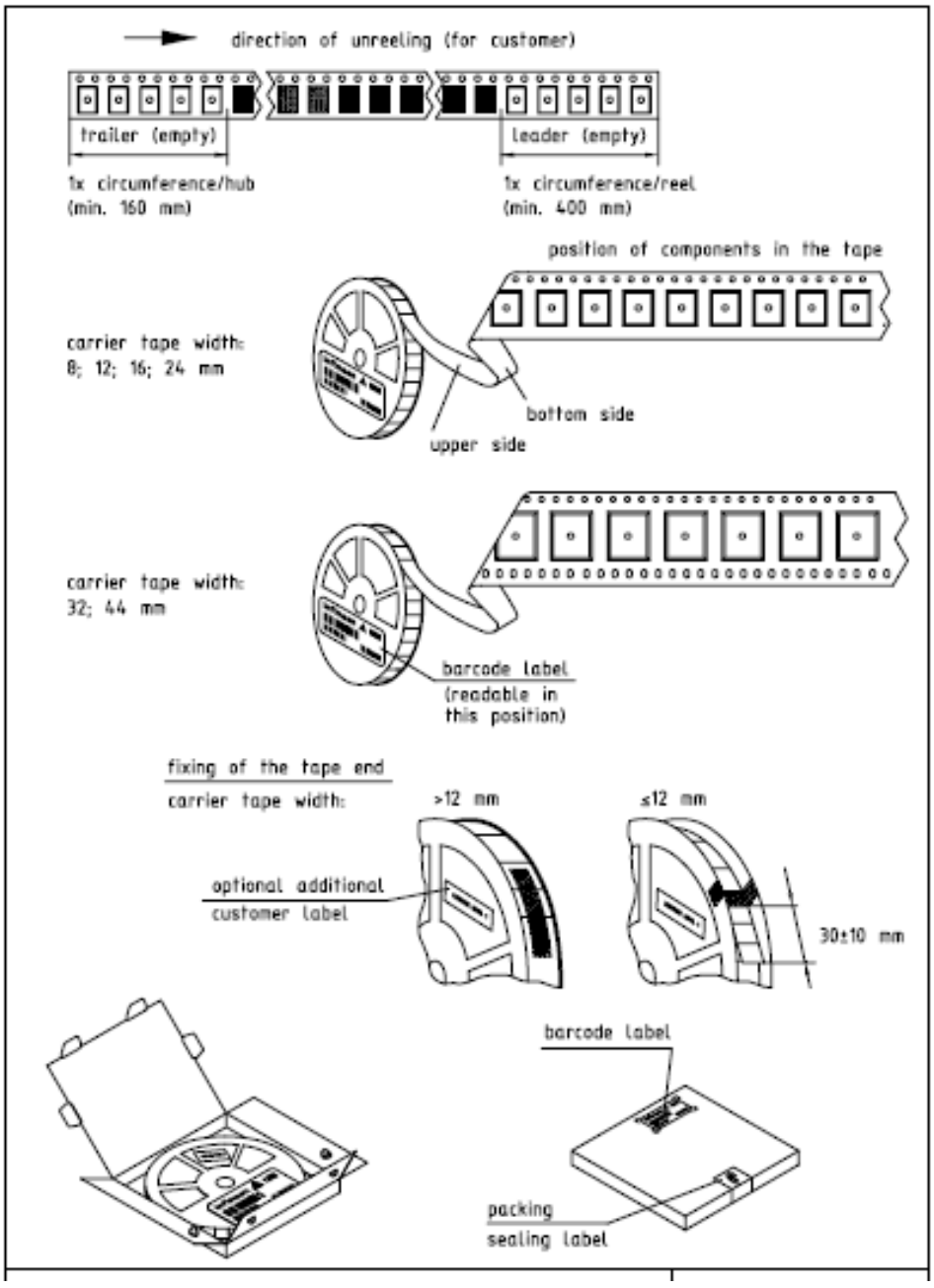


Figure 3 Tape and Reel Packing

Carrier tape width of PG-DSOF: 16 mm

2.2 Nozzle

A pick-up nozzle suitable for the package body size should be used. Regarding the PG-DSOF package it is recommended that the used nozzle seals on the package rim. If a smaller nozzle is used this may lead to increased force in the package center, nozzle shape and size are more critical in this case.

For PG-DSOF-8-16 pick-and-place should be considered:

- a dynamic vacuum pressure puls of min. 10 kPa can be applied.
- the nozzle should be sealed on the package rim.
- if the nozzle is sealed on the lid, push/pull forces >5N should be avoided.

Recommendation for nozzle, sealed on the package rim:

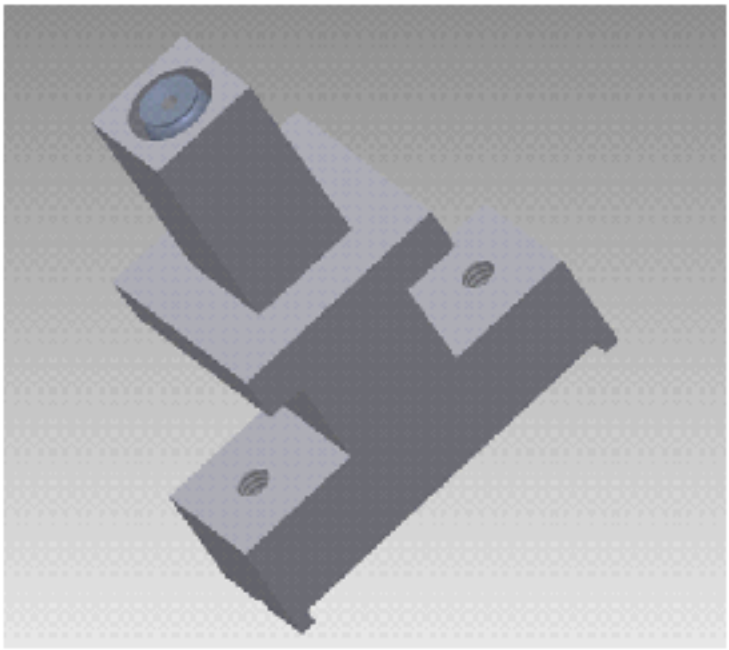


Figure 4 Recommended pick-up nozzle for PG-DSOF package

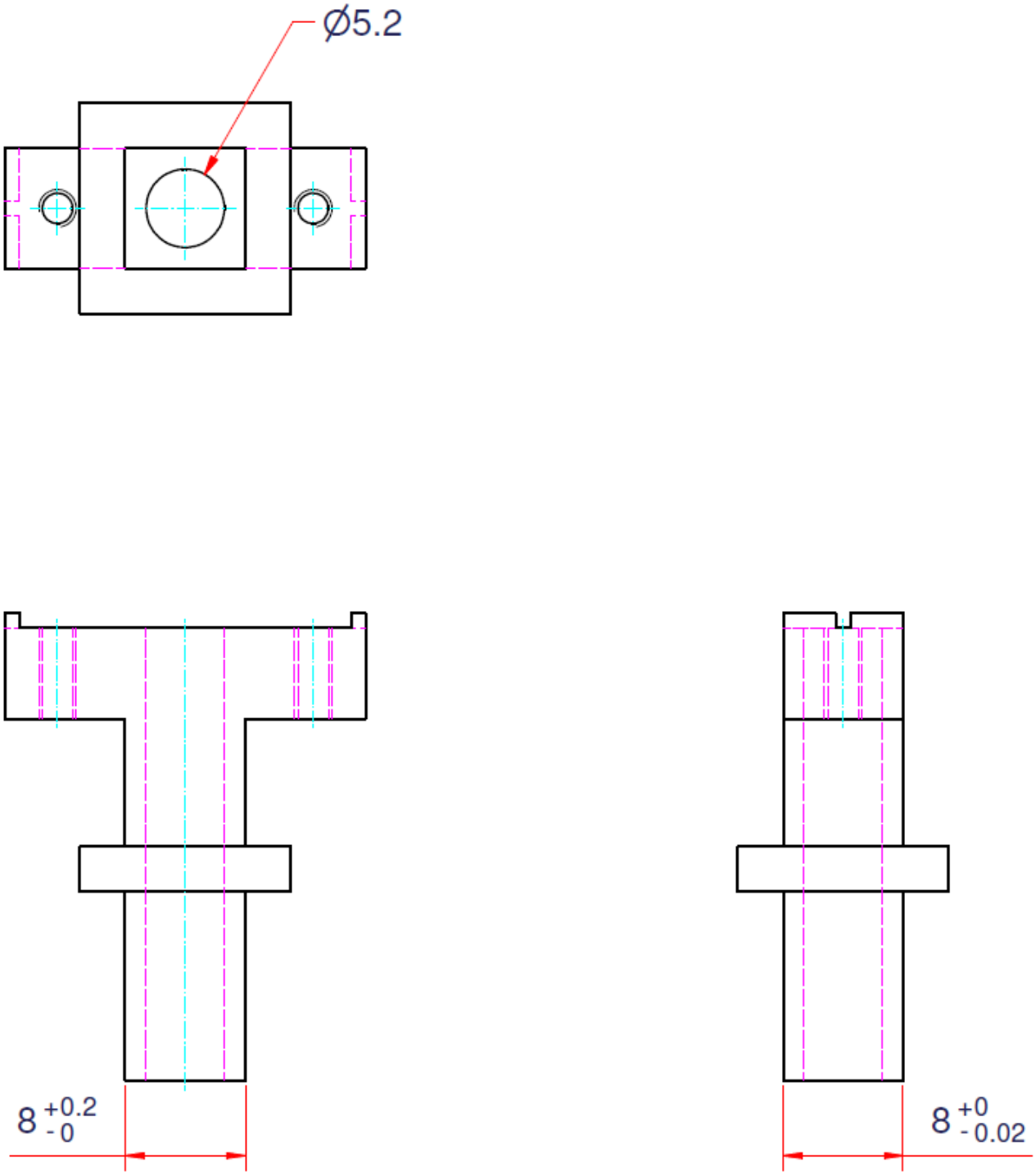


Figure 5 Drawing of the nozzle

If it is not possible to use nozzles with sealing on the package rim, please keep in mind that:

- push/pull forces >5N on the lid are avoided
- nozzle shapes are used, which consider a pressure inlet diameter of the PG-DSOF package of 2.5 mm .

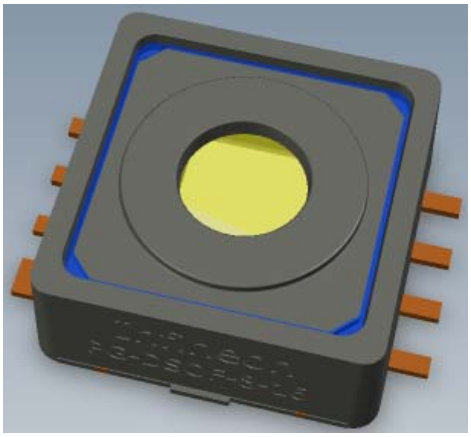


Figure 6 3D Model of PG-DSOF-8-16

Figure 7 shows different nozzle shapes for the PG-DSOF package if the nozzle is not sealed on the package rim. In this case nozzle shapes must be used where vacuum applying is possible, that means the hole in the lid has to be taken into account.

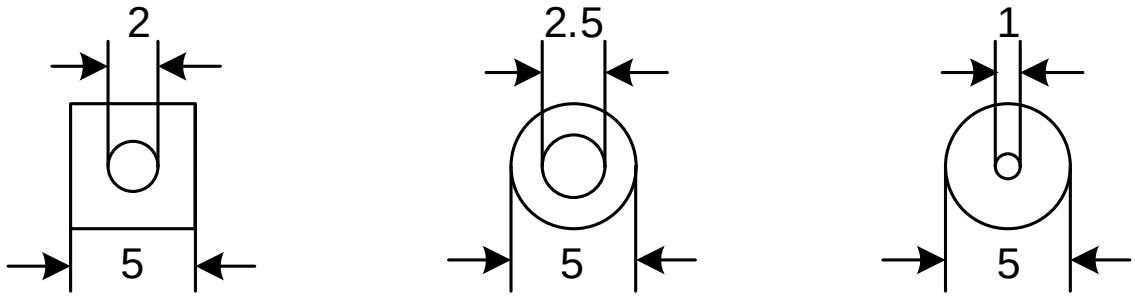


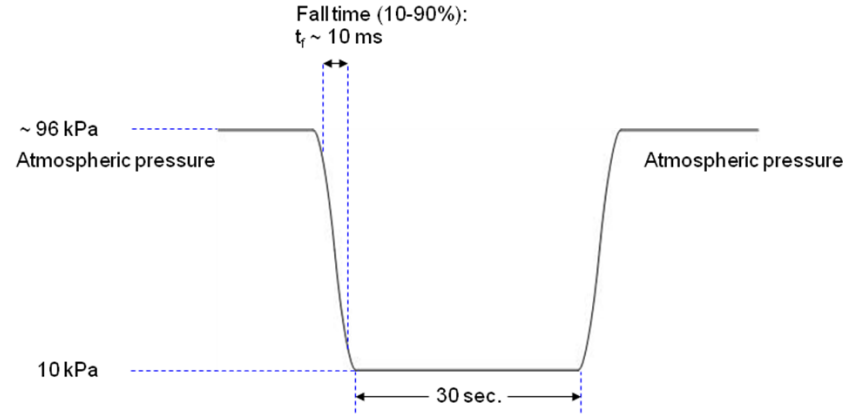
Figure 7 Nozzles for PG-DSOF, for sealing on the lid

3 Component Test for Pick-and-Place

3.1 Vacuum Pressure Pulse

A dynamic vacuum test was performed to show, that a vacuum pressure pulse sealed on the package rim, will have no influence on the sensors reliability.

Applied vacuum pressure pulse:



Visual inspection of the vacuum pressure puls applied on the component with a stereo microscope:

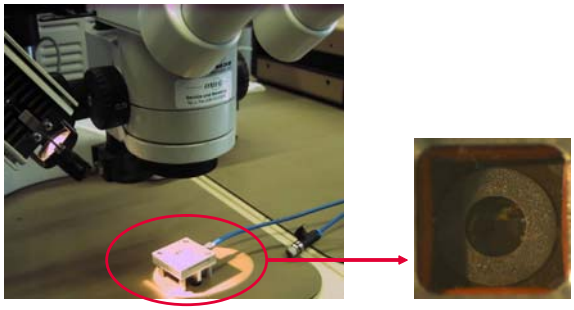
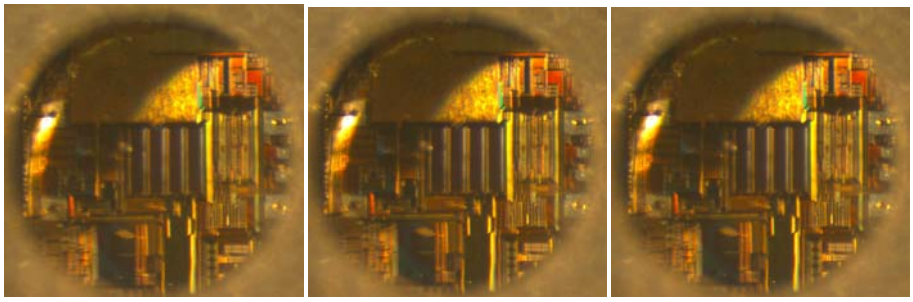


Figure 8 Stereo microscope for inspection

Pictures taken while applying the vacuum pressure pulse:



atmospheric pressure vacuum atmospheric pressure

Comparison before, during and after applying vacuum pulse shows no modification on the sensor surface (gel)

3.2 Electrical test

Sensor characteristics were measured before and after vacuum pressure pulse. In **Figure 9** and **Figure 10** the el. measurement of the sensor output accuracy before and after vacuum pulse is plotted. The sensor output signal is displayed as deviation from the characteristic sensor function in mbar versus applied pressure.

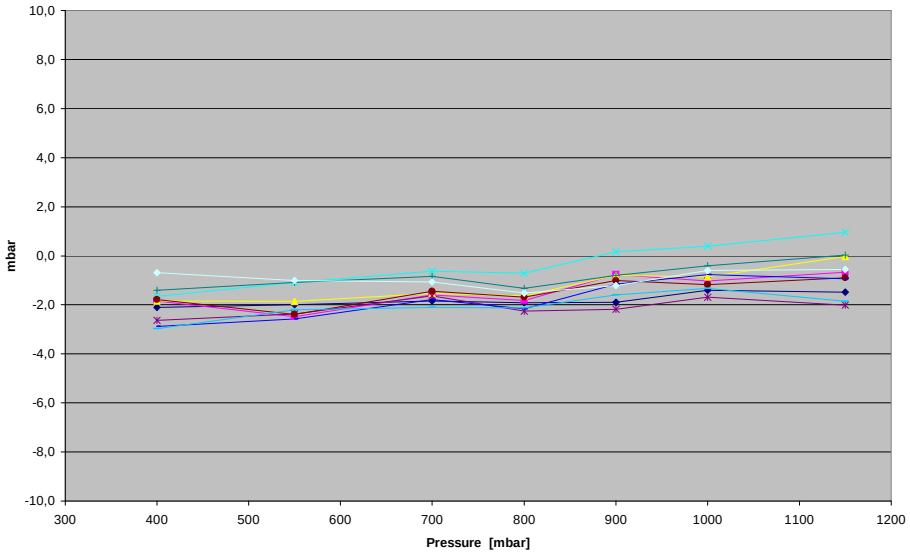


Figure 9 El. measurement before vacuum

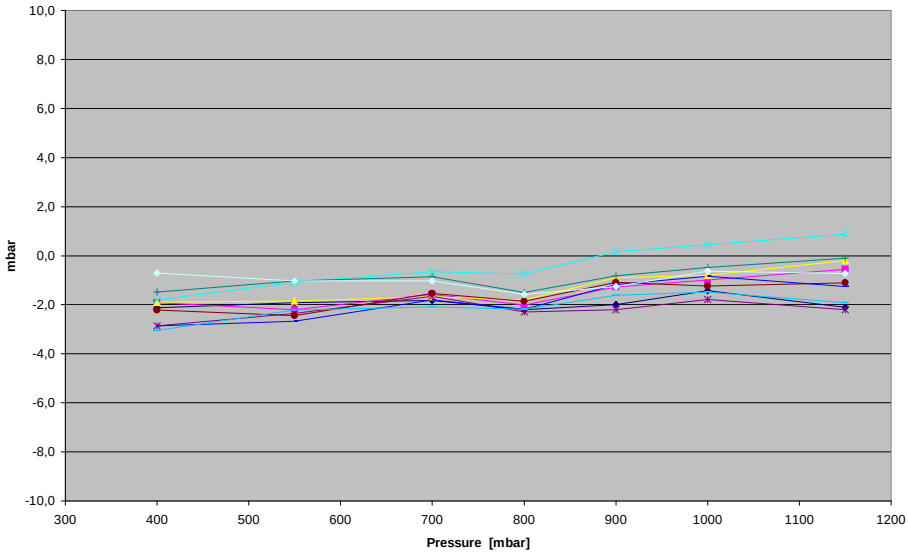


Figure 10 El. measurement after vacuum

3.3 Result

Result of vacuum pressure test:

- After several vacuum pressure pulses on a device no influences on the gel, wire bonds and sensor cells are observed.
- Accuracy measurements before and after vacuum pressure pulse show no electrical signal changes.
- The reliability of the sensors is not influenced.
- A minimum vacuum pressure of 10 kPa with pick-and-place tools will have no influence on the sensor performance.

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