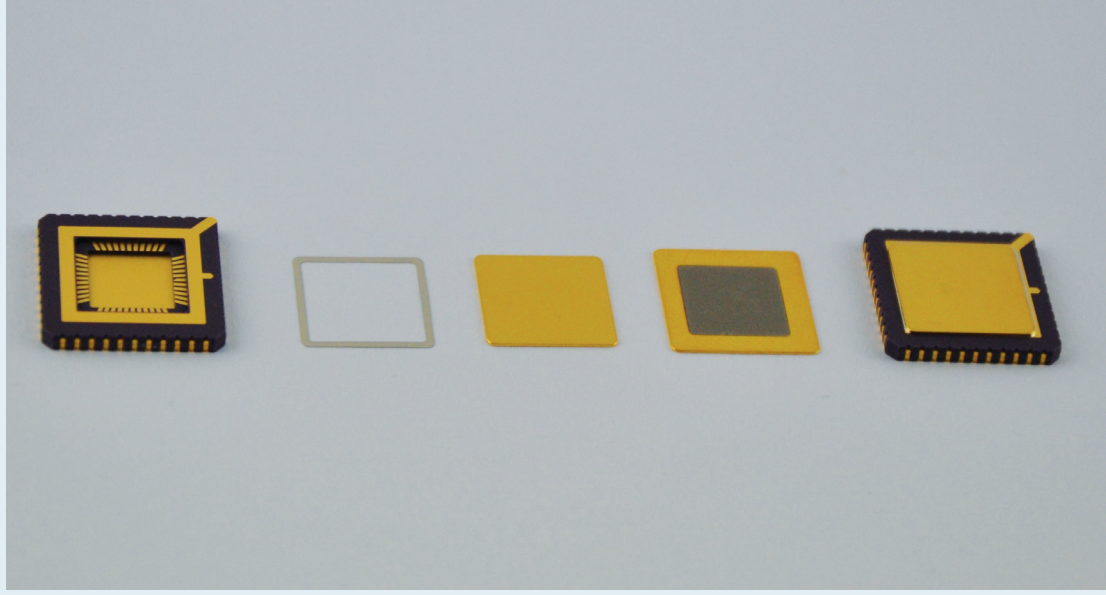


Hermetic vacuum sealing



HIGHLIGHTS

General Features

- Fast engineering service
- High throughput equipment
- Class 100 clean room operation
- Process/material customization
- Competitive costs

Applications

- MEMS gyro
- MEMS resonators
- Microbolometer – IR sensors
- MEMS Pressure sensors
- X-Ray detectors
- MEMS atomic clocks
- MEMS seismic sensors

Hermetic vacuum sealing is the process that allows sealing a ceramic or metallic package (container) with a lid by means of a solder preform, AuSn is the most common one, or by means of glass frit soldering that assures the hermeticity of the package.

SAES' packaging procedure typically consists of three different steps:

- Outgassing of components
- Preform Soldering
- Hermetic sealing and getter activation

Containers with MEMS chip inside are outgassed in order to clean the inner surfaces and reduce degassing from the die attach material.

Preform alloy (typically AuSn) is melted in reducing atmosphere onto the Au frame of container. The procedure is typically performed before the sealing process. Reducing atmosphere prevent oxidation of preform material and Au coatings, resulting in good wettability of Au surfaces.

Getter film is activated during the sealing process. Depending on application, different activation procedures are carried out following customer requirements. After getter activation, the solder preform is melted and put in contact with the lid surface in order to get the sealing of the device. The getter activation and sealing process are specifically designed and optimized taking in account the customer's desired performance of the device and the manufacturing effectiveness.

Process Capabilities

The main features of SAES' process capabilities are listed below:

- Vacuum chamber level down to $2 \cdot 10^{-6}$ mbar
- Maximum process temperature 450 °C
- Temperature uniformity $\pm 7\%$ along the entire process chamber
- Package size accommodation up to 1 inch and more (fully customized solutions)
- Fast heating and cool down temperature profiles
- Overall process time compliant with high throughput requirements
- Reducing atmosphere process for enhancement of surface wettability, for reliable hermetic sealing

Discrete Hermetic sealing features

1) Getter integration and specific sealing process for high vacuum level requirements

	Vacuum level inside discrete MEMS (mbar)
SAES' process with PageLid®	$< 10^{-3}$
Process without PageLid®	> 10

2) Specific thermal treatment of components resulting in material compliant with high vacuum level demands

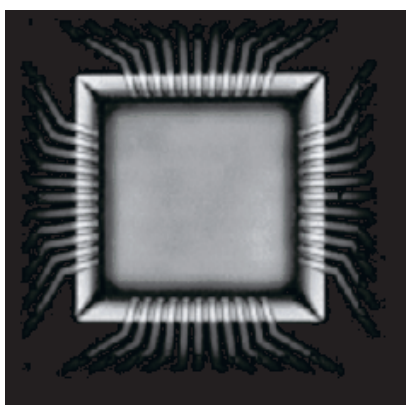
	Gas released by components before sealing (mbar·cm ³)
No thermal treatment	10^{-1}
SAES' thermal treatment	10^{-3}

3) Hermetic sealing quality enabling prolonged lifetime of devices

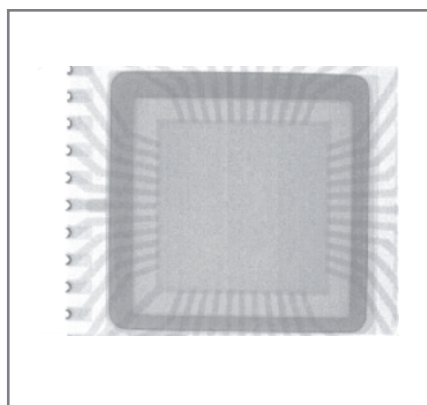
	Leak Rate (mbar·L·s ⁻¹)
SAES' hermetic sealing	$< 2 \cdot 10^{-16}$

Quality checks

X-Ray and SAM inspections (performed on request, in outsourcing): inspection of bonding frame from a qualitative point of view, they're useful for preliminary check of macroscopic voids or discontinuities in the sealing frame that prevent vacuum sealing.



C-SAM



X-Ray

The SAES Group manufacturing companies are ISO9001 certified, the Asian and Italian companies are ISO14001 certified also. Full information about our certifications for each company of the Group is available on our website at: www.saesgroup.com

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