SCHOTT HermeS® – Hermetic Through Glass Vias (TGV)

For reliable and miniaturized packaging of sensitive MEMS devices



Introduction

MEMS-powered devices and sensors are often exposed to extremely harsh environments, e.g. pressure sensors in corrosive industrial production lines. Nevertheless they must function perfectly over long periods of time. The reliability and performance of the MEMS device depends on the long-term robustness of the MEMS packaging technology.

Product Description

SCHOTT HermeS® is a glass substrate with hermetically sealed solid "Through Glass Vias" (TGV). HermeS® enables fully gastight and therefore long-term robust enclosures for MEMS devices. The fine-pitched vias allow the reliable conduction of electrical signals and power into and out of the MEMS device. Since HermeS® can be placed directly under the silicon MEMS, it makes miniaturized, fully hermetic 3D Wafer Level Chip Size Packaging (WLCSP) possible.

Applications



Industrial Hermetic MEMS Sensor
HermeS® enables long-term, reliable and extremely rugged packaging of industrial sensors.



Medical MEMS
With HermeS®, medical electronics can be packaged robustly to withstand body fluids and sterilization cycles over long periods of time.



RF MEMS
HermeS® provides superior RF properties through absolute hermeticity in an extremely miniaturized design.

SCHOTT
glass made of ideas

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Advantages of HermeS® compared to TSV (Through Silicon Vias)

- **Superior reliability** of the packaging leads to long term performance of the MEMS device due to higher mechanical, thermal and chemical resistance of glass
- **Excellent RF performance**, due to low dielectric constant of glass and highly conductive via materials
- **Optical transparency** of glass enables better processing and quality control during the production process of a MEMS device
- **Anodic bonding** with Silicon is feasible

Technical data of wafer			
Wafer thickness	500 ±20 µm (min. 280 µm)		
Wafer size	4", 6", 8"		
Contact via pitch	250 µm	200 µm	150 µm*
Contact via diameter	100 µm	80 µm	50 µm*
Via density	50k* (6"), 100k* (8")		
Via materials	**Tungsten (W)** – combined with Borofloat® 33 and AF 32® eco 33 **Iron Nickel (FeNi)** – combined with D 263® T eco (others available on request)		
Hermeticity	[≤ 1×10^{-9} Pa · m^3/s], [≤ 1×10^{-8} mbar/s], [≤ 1×10^{-8} atm cc/s]		
Technical data of glass			
Glass material	Borofloat® 33	AF 32® eco 33	D 263® T eco
Coefficient of thermal expansion	3.25 x 10^{-6}/K (match to Si)	3.2 x 10^{-6}/K (match to Si)	7.2 x 10^{-6}/K
Dielectric constant @ 1MHz	4.6	5.1	6.7
Refractive index (@ 600 nm)	1.47	1.51	1.52

*Under development



Advantages of working with SCHOTT

Strong know-how in hermetic sealing and special glass

- SCHOTT is an expert for hermetic glass-to-metal sealing since 1941.
- SCHOTT is one of the leading developers and manufacturers of specialty glass with a 130 year history

SCHOTT HermeS® enables extremely miniaturized Chip Size Packaging since the Through Glass Vias can be directly attached to the silicon MEMS.

This results in:
~ 80% foot print reduction compared to ceramic package
~ 35% volume reduction compared to ceramic package

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