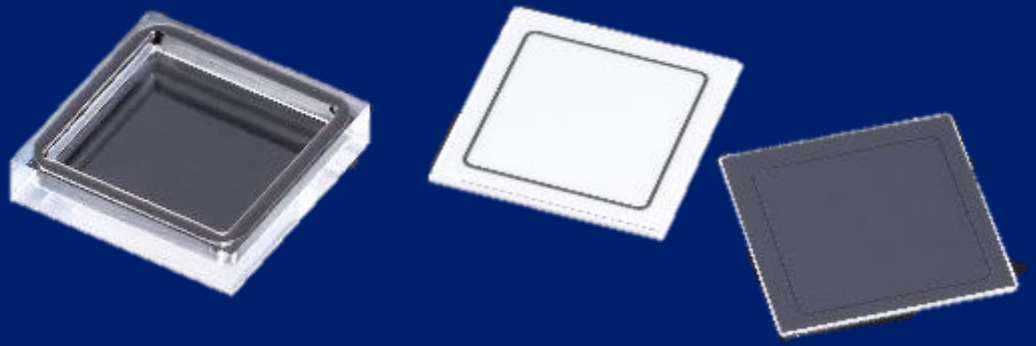
Introduction of AGC's Glass Lids with Seal Frit for Hermetic Sealing



AGC Inc.

Electronics Company Electronic Materials General Division
Advanced Materials Division
Semiconductor Materials Management Department
Frit Products Unit

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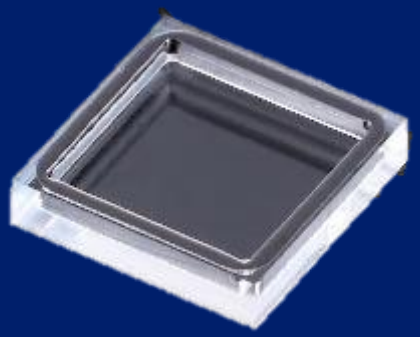
Product Features



1 Also Enables Bonding of Dissimilar Materials such as Glass and Ceramics

Enables selection of materials to be bonded (such as glass, ceramics, and metals) with a variety of coefficients of thermal expansion depending on the application

2 No Metallization Required

Glass frit is electrically insulated (no risk of short circuits)

3 Enables Low-Temperature Sealing Via Localized Heating (Full-surface heating also available)

Localized heating sealing avoids thermal damage to the devices.
E.g. 380°C or higher (full-surface heating) × 10 min, or from 10 sec – (localized heating)

4 Enables High Hermetic Sealing

Ensures a high level of hermetic sealing in normal atmospheric environments and under low load.

Supply Model

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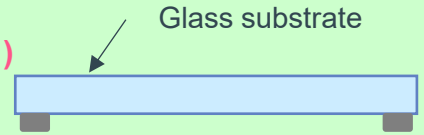
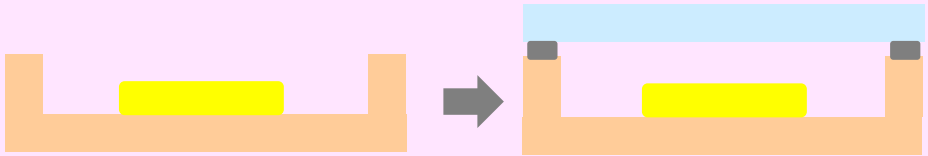
Supply model (1)
Flat lid



customer



A substrate with a cavity structure is prepared and bonded

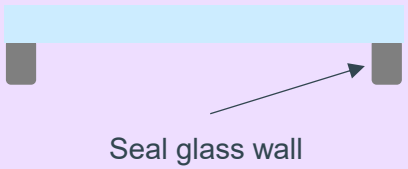
Our Proposals

[mm]

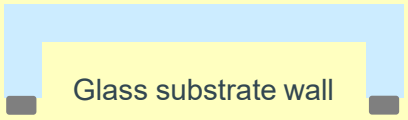
Glass Wall height
0.03
0.2
3.0

Cavity-structured lids can be fabricated with varying wall heights

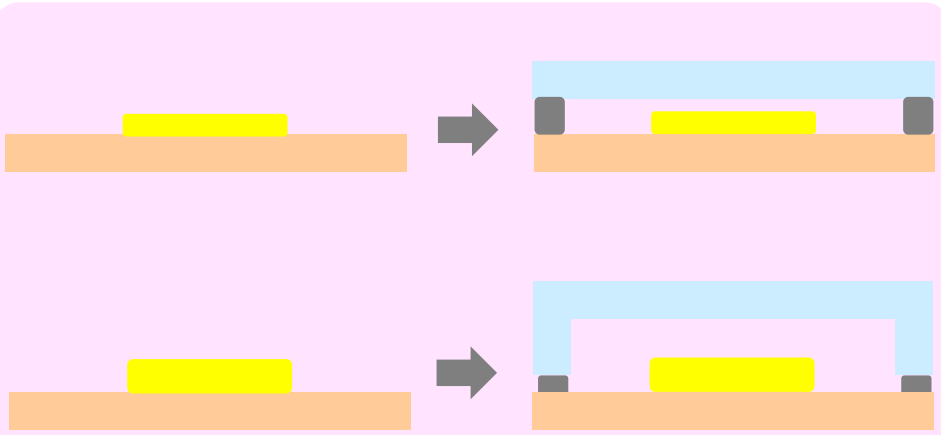
Supply model (2)
Seal cavity lid

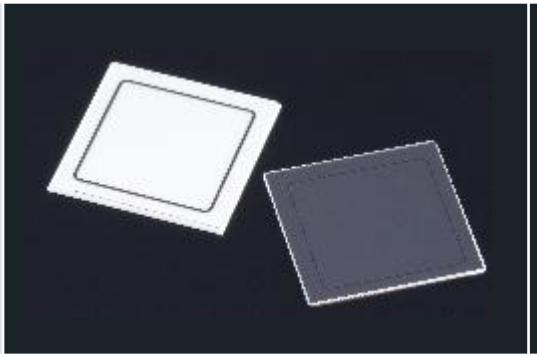
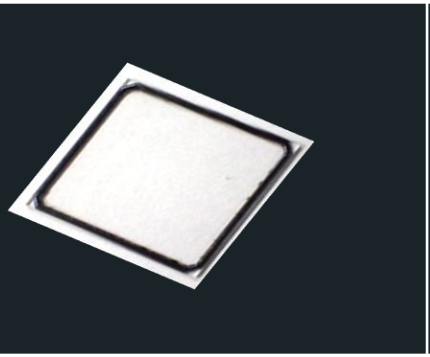
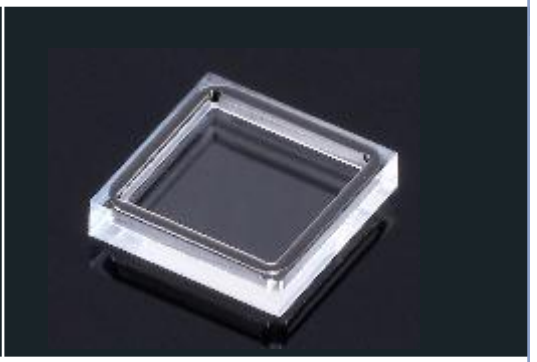
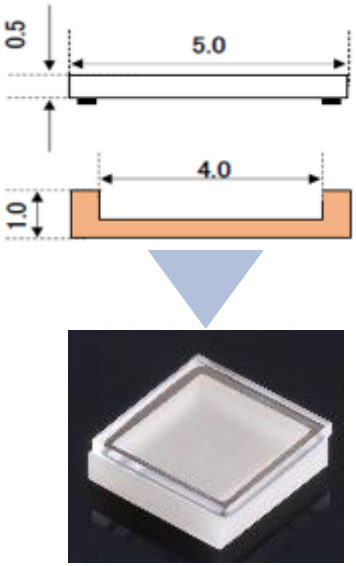
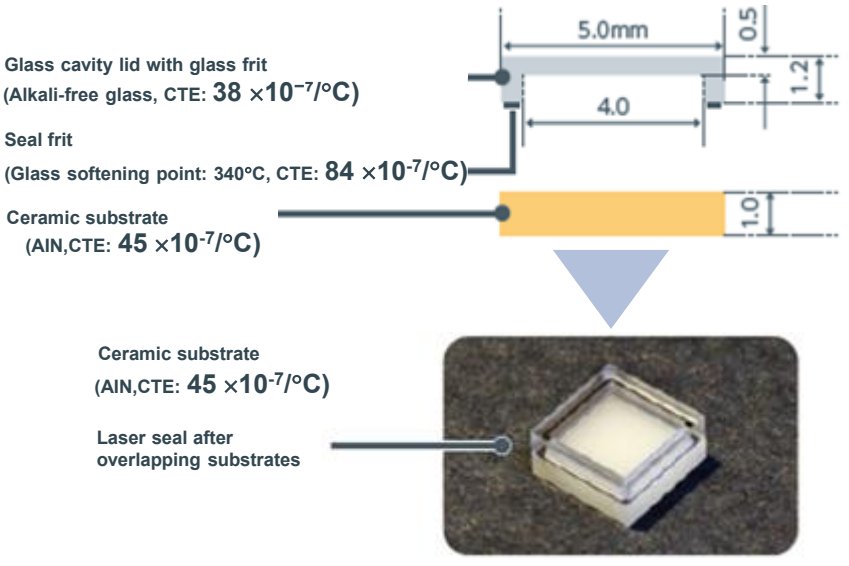


Supply model (3)
Glass cavity lid



A wide range of applications can be accommodated using only a flat substrate



Product details	Flat lid	Seal cavity lid	Glass cavity lid
Photo			
Substrate size	5mm–200mm□		
Glass substrate CTE	32–83 ×10^{-7}/°C		
Wall height	—	0.03–0.2mm	0.2–3.0mm
Seal frit film thickness	5–30μm		5–30μm
Usage			

Hermeticity Evaluation Results (Example of ACG's Experimental Data)

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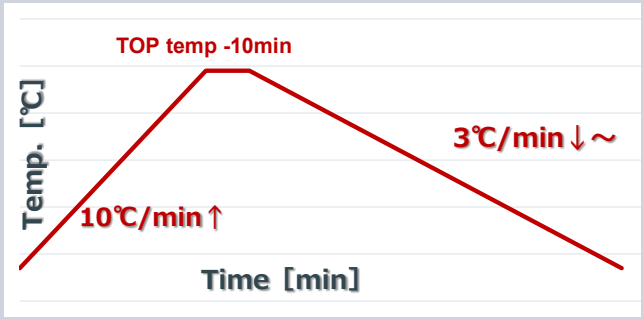
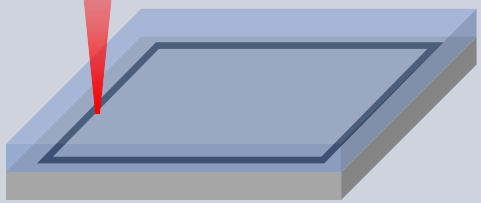
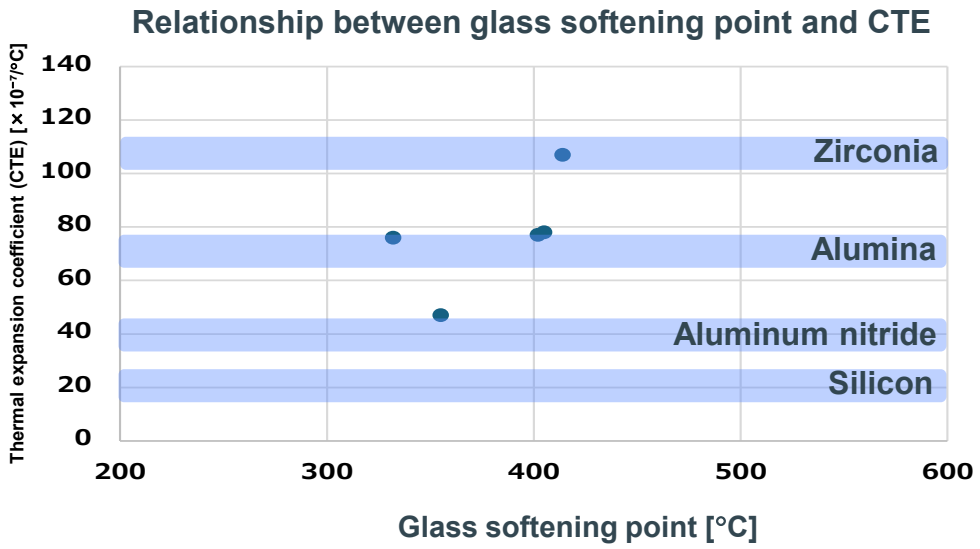
	Seal cavity lid	Glass cavity lid
Sealing conditions	<Full-surface heating> Load * The fluidity of the sealing material changes depending on the force applied. Glass substrate Alkali-free glass Sealant: 100um Substrate Silicon  	Localized heating Laser Load Glass substrate Alkali-free glass Sealing materials Substrate Aluminum nitride Laser * Sealing conditions are adjusted according to laser and irradiation time. 
Measurement method	Bombing method: 500KPa•G/4h 1h open	
Helium leak test results	2.4×10^{-9} Pa•m3/sec or less	5.8×10^{-9} Pa•m3/sec or less

Point! AGC's hermetic sealing materials ensure that customer's parts remain well protected.

[Reference] Seal Frit Codes

Physical properties	Flat lid and glass cavity lid varieties / Paste catalog varieties				
Code	**AP4290D1**	**AP4115AB**	**KFI0115B-200**	**P-V408HS**	**TNS062HS**
Glass type	Si-B-Pb-O	Bi-Zn-O	Bi-Zn-O	Te-V-O	Te-V-O
Glass transition point [°C]	340	344	357	288	266
Glass softening point [°C]	405	402	414	355	332
Thermal expansion coefficient (CTE) [$\times 10^{-7}$/°C]	78	77	107	47	76
Water resistance	Very Good	Very Good	Very Good	Good	Not Bad
Color	White	Yellow	Yellow	Brown	Brown
Sealing conditions Full-surface heating (TOP temp.)	430°C 10min	440°C 10min	430°C 10min	400°C 10min	360°C 10min



Point!

Applicable to a wide range of materials to be bonded

* By developing glass with a low melting point and low thermal expansion, we have achieved reliable bonding even at high film thicknesses—a condition that is typically disadvantageous in terms of stress—when bonding to substrates with low thermal expansion (such as silicon).

END

We will do our utmost to help you make your dreams come true.

Shin-Marunouchi Building

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