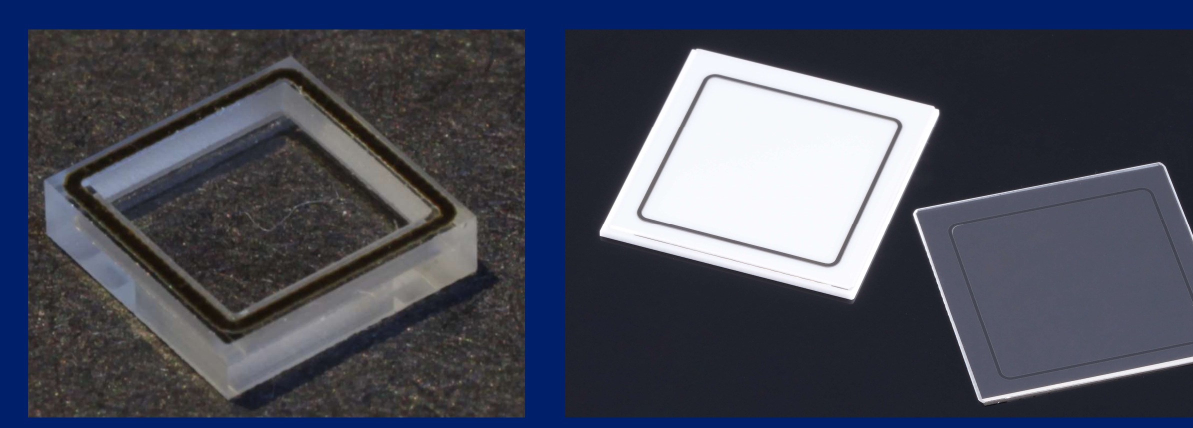
Introduction of AGC's Glass Lid for Hermetic Sealing

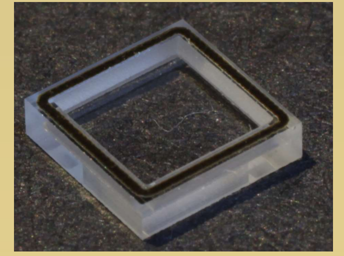


AGC Inc.　Electronics Company
Electronic Materials General Division
Advanced Materials Division
Frit Products Unit

Your Dreams, Our Challenge

AGC's Glass Lid Advantages

AGC Glass Lid With Seal Frit



	Glass Lid with Seal Frit	Gold-Tin Solder (Other companies' products)
Sealing Materials	・Frit = **Insulation** ・**Direct Printing** +Firing in an electric furnace	・Solder = Conductor ・Foil (Preform)
Lid Pretreatment	・**No Metallization** ・**No Au plating**	・Metallize required
Sealing method	・Heating or **Laser** +Pressure	・Heating
Sealing Temperature	・380℃～ Heating : ×10min. Laser : ×10sec.～	・330℃ Heating
Sealing Environment	・Hermetically sealing **under atmospheric conditions**	・Inert Atmosphere (N2 purge or vacuum)

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AGC Glass Lid with Seal Frit

1）Different CTE Materials Sealing

Sealing materials such as, glass, ceramics, metals, and other with various coefficients of thermal expansion for various applications.

2）High Hermetic Sealing

High hermetic sealing under atmospheric conditions and low weight for sealing.

3）Local heating sealing (Laser) at lower temperatures and thermal sealing (furnace)

- Lower temperature sealing without metallization.
- Local heating sealing (Laser) with no thermal damage to devices.

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AGC Glass Lid with Seal Frit with Different Patterns

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customer

[mm]

Wall height

0.03

0.2

3.0

Flat Lid

Glass substrate

Preparation of cavity type substrates
→ Sealing with Flat Lid.

Seal Cavity Lid

Sealing glass wall

Glass Cavity Lid

Glass substrate wall

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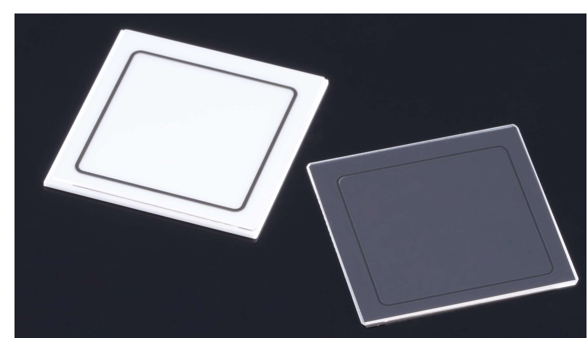
Flat Glass Lid Pattern



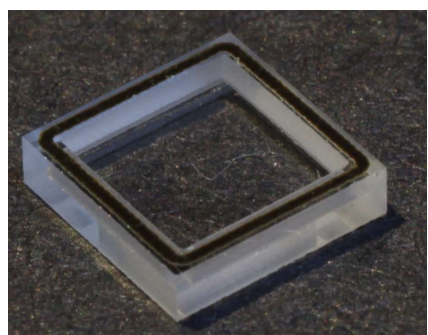
purpose

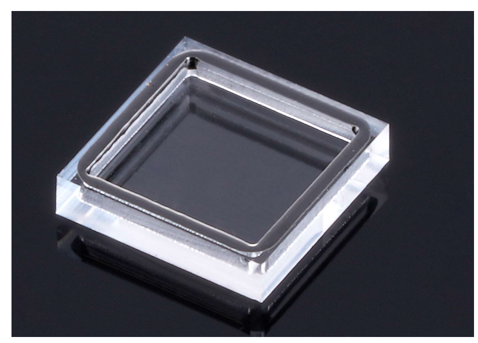
LED/LD/MEMS Mirror Hermetic Packages for Optics

Flat Lid	
Substrate Size	5mm～200mm□
Substrate CTE	3.2～8.3ppm/℃
Wall height	―
Seal frit film thickness	5～30μm

0.5
5.0
4.0
1.0

Cavity Glass Lid Pattern

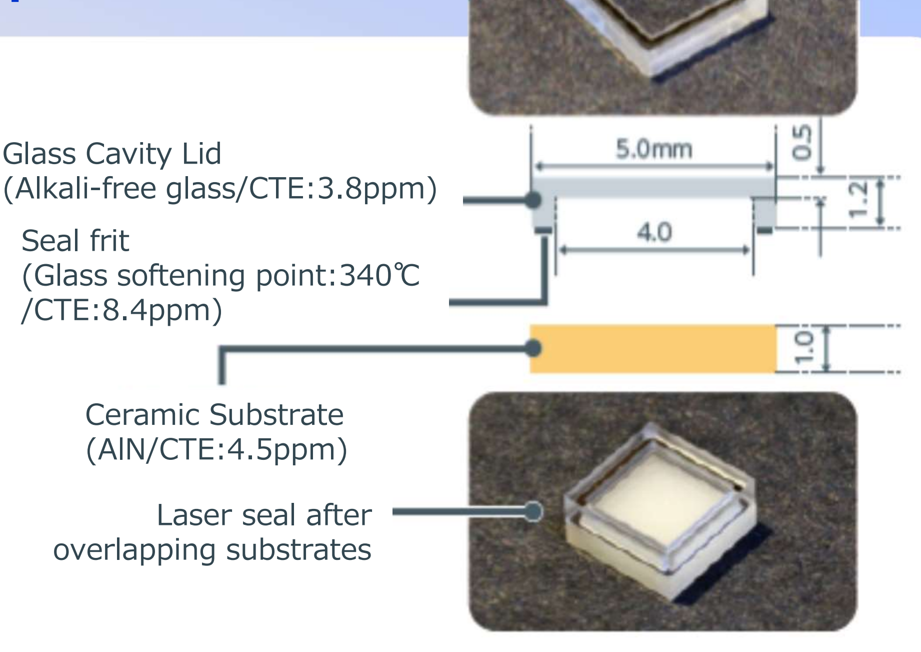




purpose

LED/LD/MEMS Mirror Hermetic Packages for Optics

Glass Cavity Lid		Seal Cavity Lid	
Substrate Size	5mm～200mm□	Substrate Size	5mm～200mm□
Substrate CTE	3.2～8.3ppm/℃	Substrate CTE	3.2～8.3ppm/℃
Wall height	0.2～3.0mm	Wall height	0.03～0.2mm
Seal frit film thickness	5～30μm	Seal frit film thickness	



AGC's Airtightness Evaluation Results

Glass Cavity Lid:

- Substrates : Alkali-free glass/Aluminum nitride
- Sealing conditions : Local heating
- Measurement method : Bombing method
  Test conditions : 500KPa・G/4h 1h open
- Helium leak result: 5.8×10^{-9} Pa・m3/sec or less

Seal Cavity Lid:

- Wall height/Seal frit film thickness : 100μm
- Substrate : Alkali-free glass/Silicon wafer
- Sealing conditions : Furnace heating
- Measurement method : Bombing method
  Test conditions : 500KPa・G/4h 1h open
- Helium leak result: 2.4×10^{-9} Pa・m3/sec or less

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AGC Seal frit features

- Applications for wide range of bonding materials.
- Development of lower expansion/lower melting point glass for lower CTE bonding materials with higher seal frit thickness.

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AGC Hermetic Sealing Glass Frits

	For Glass Cavity Lid／ Paste catalog codes				For Seal Cavity Lid
Codes	AP4290D1	AP4115AB	KFI0115B-200	TNS062-ZC2-P150	S243HES
Glass type	SiO_2-B_2O_3-PbO	Bi_2O_3-ZnO	Bi_2O_3-ZnO	TeO_2-V_2O_5	V_2O_5-TeO_2-ZnO
Glass transition point	340℃	344℃	357℃	270℃	312℃
Glass softening point	405℃	402℃	414℃	340℃	370℃
CTE	7.8 ppm	7.7 ppm	10.7ppm	8.4ppm	4.2 ppm
water resistant	Good	Good	Good	Not good	Good
Color	White	Yellow	Yellow	Brown	Brown

【Sealing conditions】

Codes	AP4290D1	AP4115AB	KFI0115B-200	TNS062-ZC2-P150	S243HES
Thermal heating (TOP temp.)	430℃-10min	440℃-10min	430℃-10min	380℃-10min	440℃-10min

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Hermetic Sealing Methods

	Thermal Heating	Local Heating (Laser Sealing)
Sealing Process	Loads ※The fluidity of the sealing material changes depending on the force applied. Glass substrate Sealing materials Si wafer	Laser Loads Glass substrate Sealing materials Si wafer
Sealing Conditions	TOP温度 -10min 10℃/min↑ 3℃/min↓～ Temp. [℃] Time [min]	Laser ※Sealing conditions are adjusted according to laser and irradiation time.

- Package sealing is done by pressing glass lid and heating.
- No binder burn out required.

END

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