AGC
Your Dreams, Our Challenge

Glass lid with AGC Solder for Hermetic seal PKG

AGC Inc.

Development & Planning Div.
Advanced Materials Division
Electronics Materials General Division
Electronics Company

Overview:
Glass LID with AGC Solder for hermetic seal PKG

AGC
Your Dreams, Our Challenge

<Features>

1. Hetero-materials can be bonded

AGC Solder can bond between heterogeneous materials because of lower Young's modulus compared to other major solders.

2. Sealable in OXYGEN atmosphere

Because of having excellent oxidation resistant. Oxygen sealed in PKG effective to improve lifetime of UV-LED※

※ Influence of the LED heterostructure and chip package on the lifetime of high power UV-B and UV-C LEDs., Photonics west 2016, 9748-59, Session12

3. Low temperature sealing

Having lower temperature melting point than Au-Sn solder, which is the advantage of prevention of re-melting of already-bonded parts without risk of hermetic break even if post reflow process.

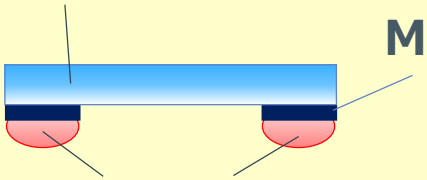
Overview:
Glass LID with AGC Solder for hermetic seal PKG

AGC
Your Dreams, Our Challenge

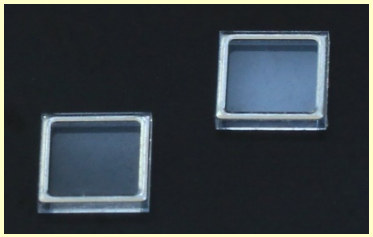
<AGC>

Glass LID

Silica, Borosilicate, etc.



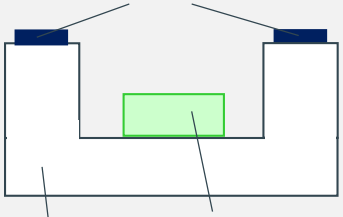
AGC Solder



Ready to seal

<Customer>

Metalize

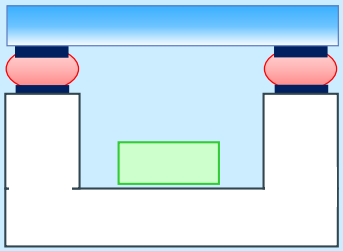


Solid state chip

LED, LD, etc.

Ceramics cavity

Customer to bond LED chip to cavity



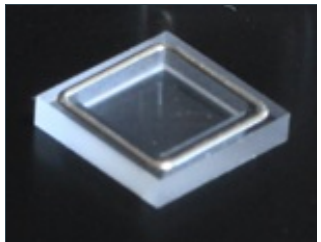
Hermetic sealing to make PKG in air (oxygen atmosphere), around 280℃

Overview:
Various shape of Glass LID with AGC Solder

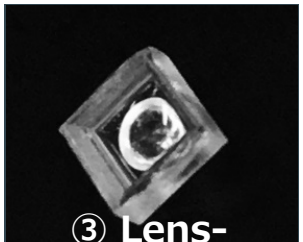
AGC
Your Dreams, Our Challenge

1. Various shape LID

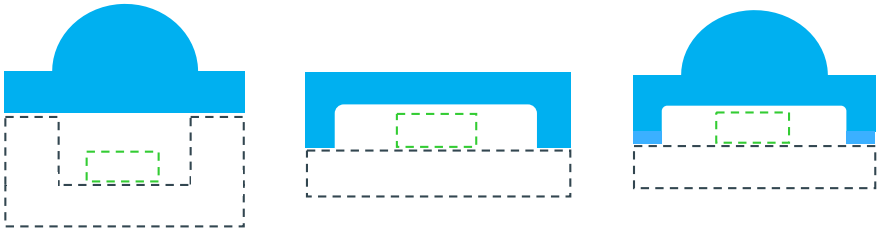
① Lens LID



② Cavity LID



③ Lens-Cavity LID

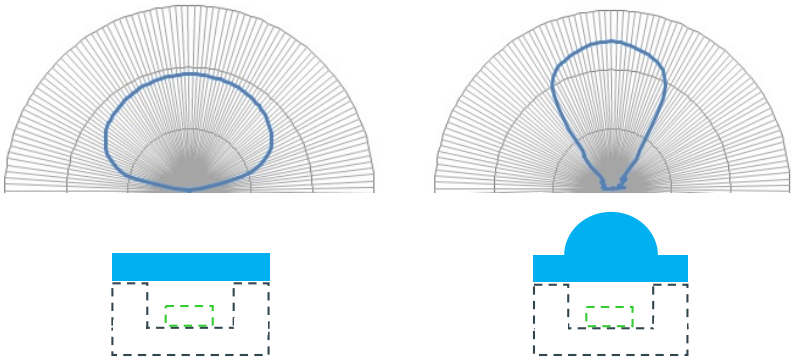


① : Lens LID make design flexibility of equipment increase

② : Cavity LID make assemble cost reduced because it can use ceramic plate for chip bonding

③ : ①＋②

2. Very precise lens shape control

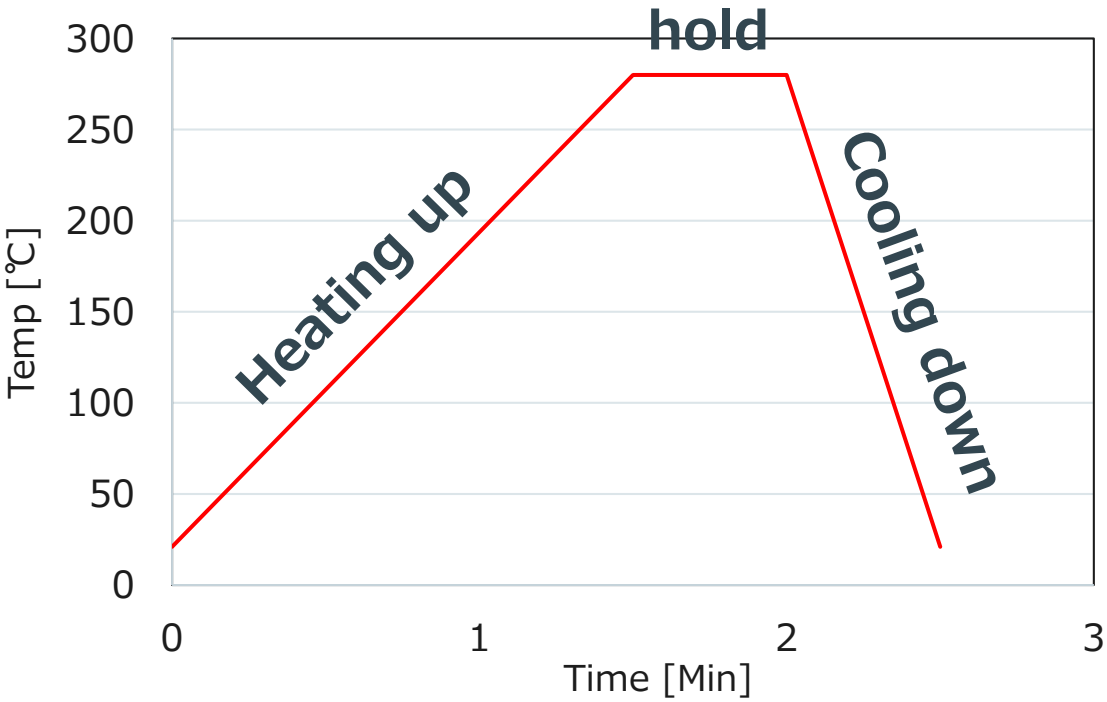


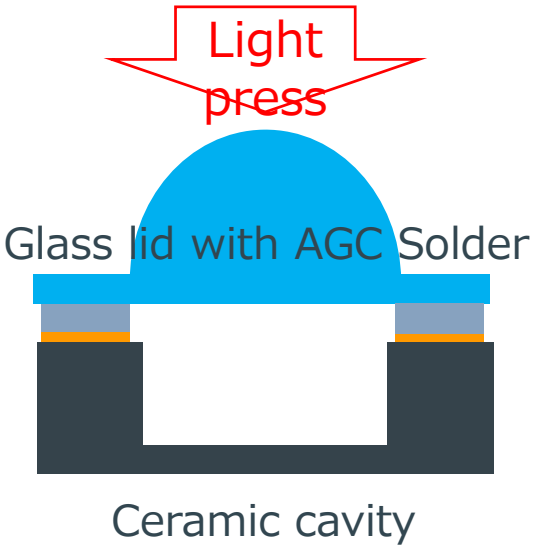
a) Flat LID

b) Lens LID

Neither stray light nor asymmetric light distribution.

Recommendation of bonding condition





	Heating up	hold	Cooling down
Time [Min]	～1.5	1～2	2～2.5
Temp [℃]	R.T.→280	280	280→R.T.
Press [g]		10 or more	

※ Depending on the ceramics cavity spec or the customer's post-bonding process condition, it may be better to adjust this recommendation. Please feel free to contact us.

Sealing of the package is completed simply by pressing glass lid and heating the AGC Solder.

Material properties / characteristics

AGC
Your Dreams, Our Challenge

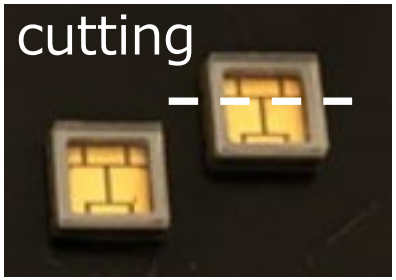
Physical property	AGC Solder (Sn-Ni-X)	Au-20Sn	Memo
Melting point (℃)	**230**	280	
Density (g*cm^{-3})	**7.3**	14.5	
Young's modulus※ (GPa)	**20**	57	Slope of Strain-Stress line
Vickers Hardness (HV0.002)	**85**	252	Measured after bonded
Thickness of surface oxide layer after heating up in air for bonding (nm)	**5**	23	Heating up to bonding temperature: AGC Solder (280’C) Au-Sn solder (320’C)

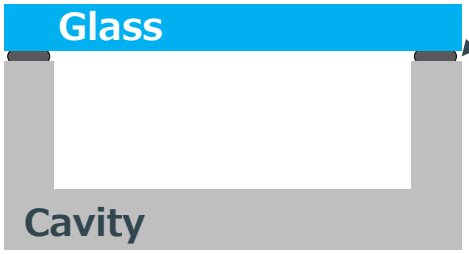
※ Slope of Stress-Strain line

Hardness of Solder after bonded

AGC
Your Dreams, Our Challenge

3.5mm-sq.PKG

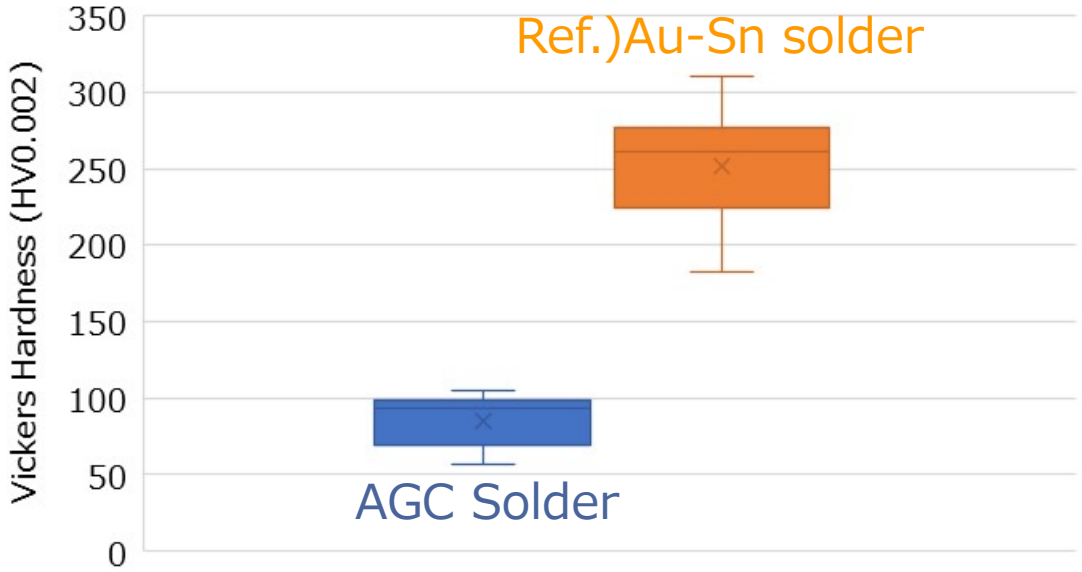




Solder
(AGC Solder, Au-Sn solder)

Vickers hardness of each solder after bonded was measured.

■ Vickers hardness after bonded



Hardness of AGC Solder is extremely low.

It means AGC Solder shows that it retains flexibility to reduce stress after bonded.

Hermetic evaluation result

AGC
Your Dreams, Our Challenge

■ **Helium leak test result after sealing**

Measuring method : Bombing method

Measurement condition :

Measured within 1 hour after applying 5.1 bar of He for 2 hours

Result : Helium leak rate 4.9×10^{-10} Pa*m³/s or less

■ **Helium leak test result after reflow heat resistance test**

Reflow condition: Heated at 260 ℃ for 40 seconds 5 times

Measurement condition :

Measured within 1 hour after applying 5.1 bar of He for 2 hours

Result : Helium leak rate 4.9×10^{-10} Pa*m³/s or less

AGC Solder has enough resistance to reflow at 260 ℃

END of FILE