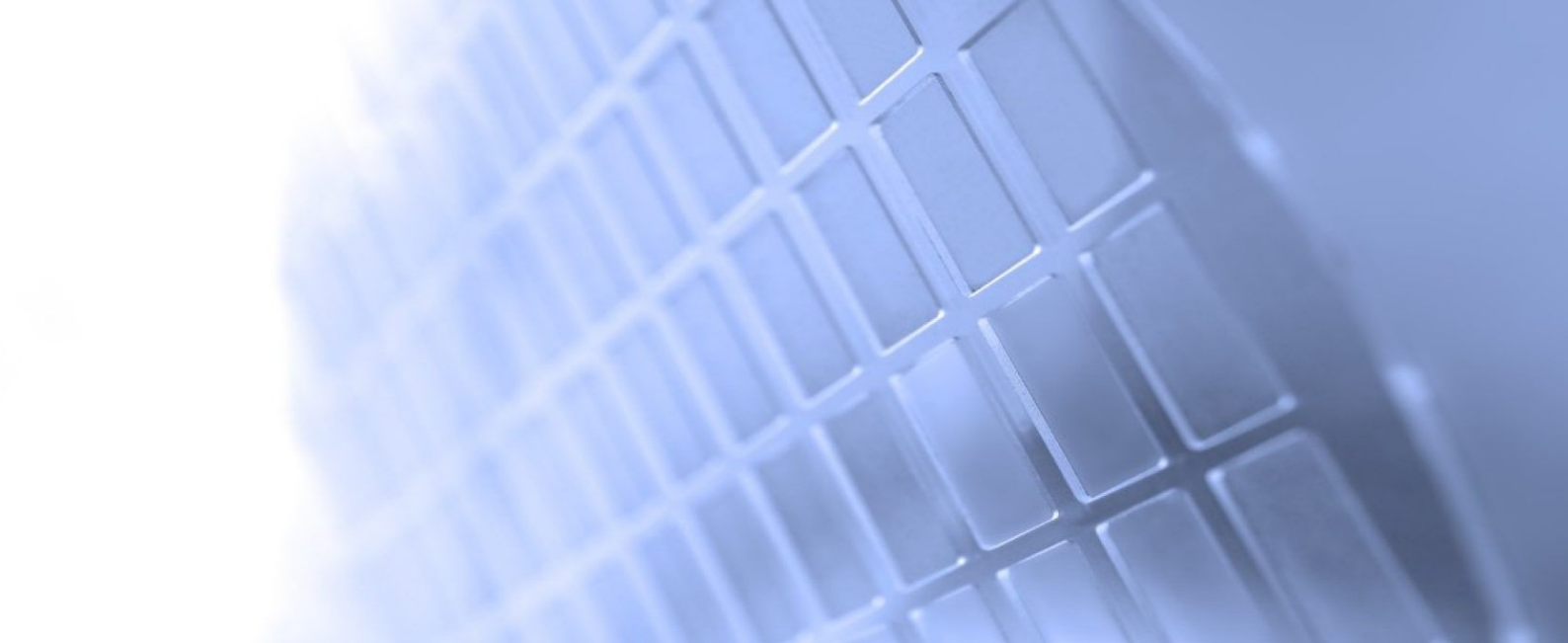


Прецизионные стеклянные решения

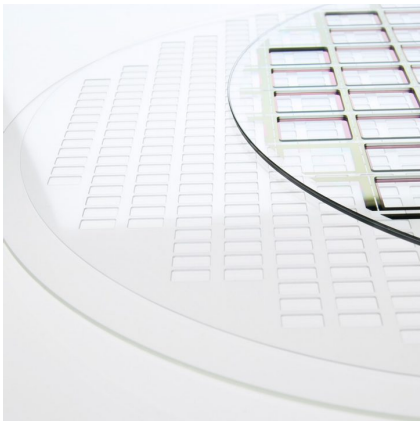
Описание

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Россия +7(495)268-04-70	Киргизия +996(312)-96-26-47	Казахстан +7(7172)727-132	



Precision glass wafers and panels enabling high performance consumer electronics and IoT applications



Corning Precision Glass Solutions is uniquely positioned to offer industry-leading wafer and panel format glass-based solutions. Our products help customers deliver increasingly demanding functionality and form factor requirements for consumer devices and the Internet of Things applications.

The inherent properties of glass – high optical transmission, excellent electrical performance, tight geometrical tolerances, and pristine surface quality – along with Corning's ability to offer different compositions in a wide range of coefficients of thermal expansion (CTE) and refractive indices, position Corning glass as the premier material for next-generation semiconductors and immersive communications applications.

Backed by more than 160 years of material science expertise, Precision Glass Solutions delivers value to customers through a unique set of capabilities under single leadership within Corning. These include a deep understanding of glass composition and form factors, precision finishing, laser processing, material deposition, metrology, and a reliable supply chain that's been built over decades. Precision Glass Solutions is a one-stop shop helping solve customers' toughest technology challenges.

CORNING

Precision Glass
Solutions

REALITY
REVEALED

Corning ARS 2.0

High-Refractive Index Glass Product Data Sheet

New solutions for augmented reality are here. Corning's high-refractive index, optical-grade glasses have a wider field of view, superior transmittance, and greater clarity. The following data apply to a typical sample of ARS 2.0.

*Wafer Properties

Available Thickness	≥ 0.3 mm
Diameter	≤ 300 mm
TTV	≤ 1 μ m
Warp	≤ 20 μ m

*Customized specifications are available upon request.

Mechanical Properties

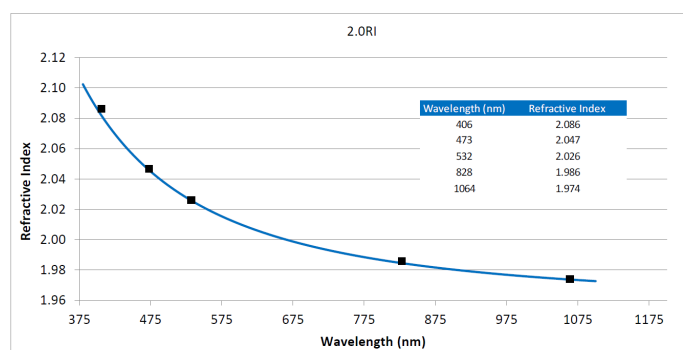
Young's Modulus	116 GPa
Poisson's Ratio	0.3
Shear Modulus	45 GPa
Knoop Hardness	664 kg/mm ²
Fracture Toughness	0.753 MPa · m ^{0.5}

Chemical Durability (Class)

To Acids	ISO 8424	SR 3.3
To Base	ISO 10629	AR 1.0
To Climate	ISO 22531	CR 0

Optical Properties

Refractive Index, n_d (587.6 nm)	2.01
Abbe number, V_d	25.7
Stress Optical Coefficient	1.53 (nm/mm/ MPa)



Physical Properties

Density @ RT	5.162 g/cm ³
CTE RT-300°C	7.18x10 ⁻⁶ /°C
Softening point	713°C
Anneal point	634°C
Strain point	613°C
Heat Capacity (RT)	0.42 J/(g*K)
Heat Capacity (300°C)	0.57 J/(g*K)

Thermal Properties

Temperature °C	Specific Heat Cp (J/g. °C)	Conductivity (W/m.K)
25	0.42	0.85
100	0.49	0.86
200	0.54	0.93
300	0.57	1.00
400	0.6	1.08
500	0.61	1.26
600	0.61	1.48
600	0.81	2.17

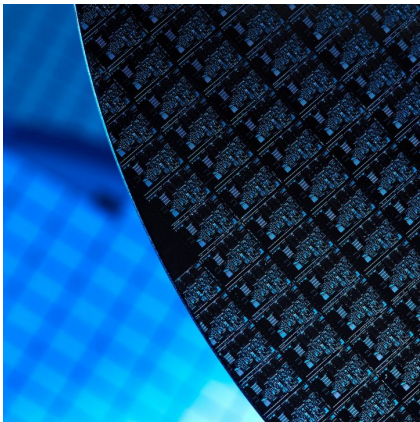
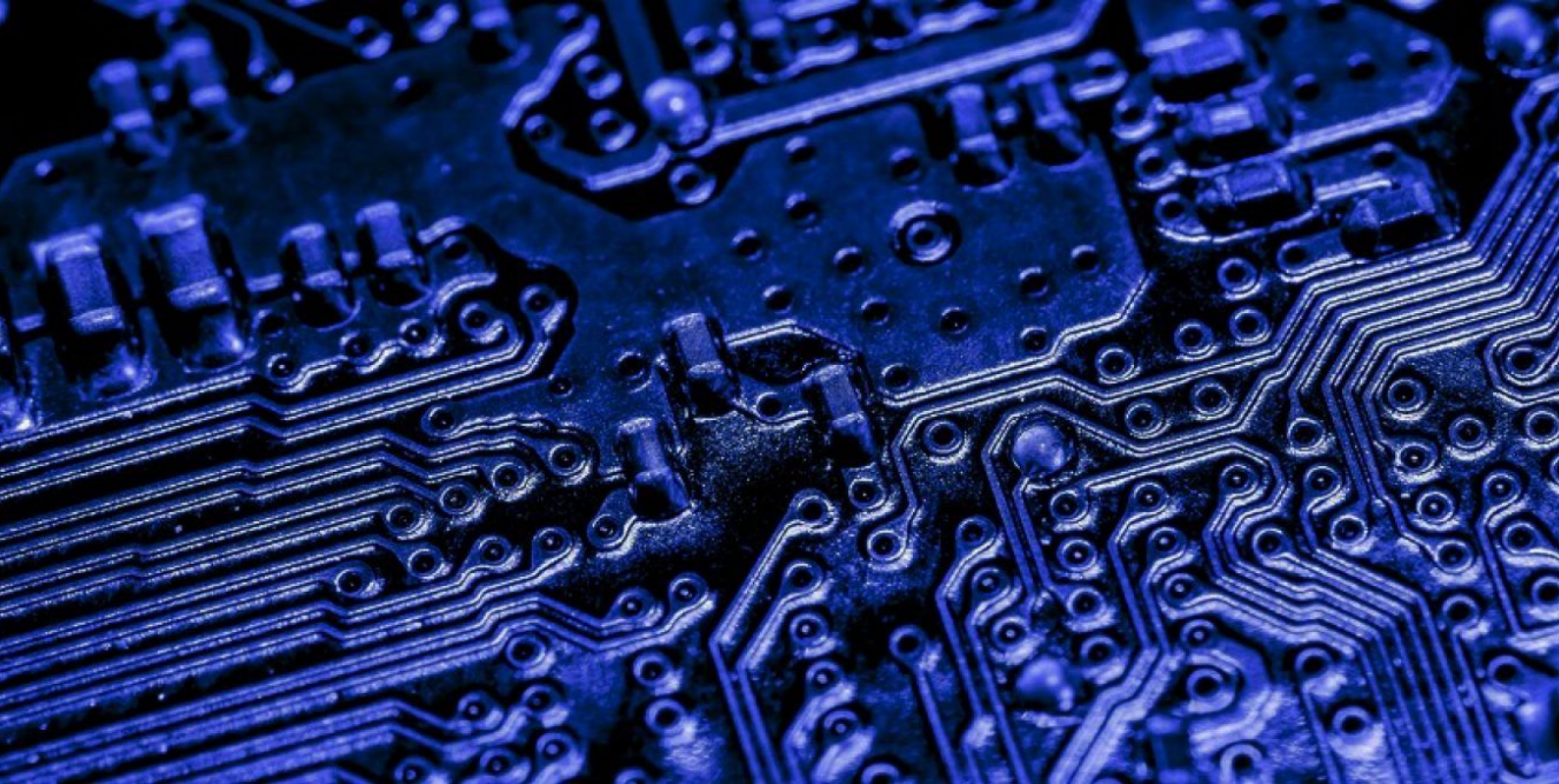
Electrical Properties

Frequency (Hz)	Dielectric Constant	Loss Tangent
1 x 10 ³	18.44	0.000
5 x 10 ³	18.38	0.000
1 x 10 ⁴	18.38	0.001
5 x 10 ⁴	18.37	0.001
1 x 10 ⁵	18.37	0.001
5 x 10 ⁵	18.35	0.001
1 x 10 ⁶	18.34	0.001

Internal Transmittance

Wavelength (nm)	Transmittance (%)
460	96.88
525	99.11
633	99.79
828	99.99
1064	99.99

Internal transmittance measured at 10 mm thickness.



Corning provides high precision glass carriers for temporary bonding in advanced semiconductor packaging processes such as silicon wafer thinning and fan-out level processing. Our ultra-flat glass carriers have superior surface quality, thickness, and edge strength, making them the substrate of choice for advanced packaging.

Corning's glass carriers are available in a wide range of CTEs to meet customers' most challenging requirements – from research & development phase to mass production. We have an established global supply chain and have shipped hundreds of thousands of wafers to top-tier customers already.

Learn more about Corning Carrier Solutions below, including our two product categories: Standard Glass carriers and Advanced Packaging Carriers.

CORNING

Carrier Solutions Standard Glass Carriers

Applications

- Glass carriers for temporary bonding in advanced semiconductor packaging processes such as Silicon wafer thinning and fan-out level processing

Benefits

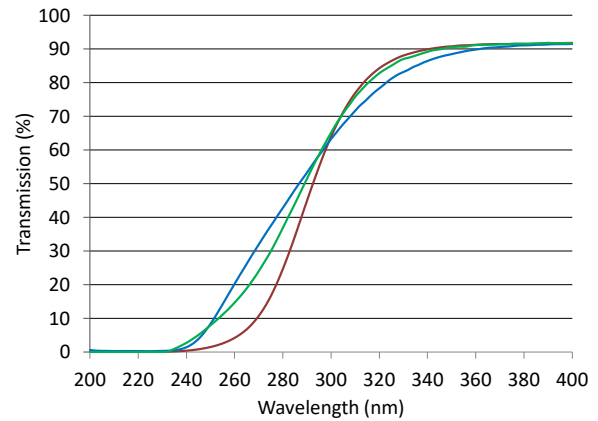
- Tunable CTE and mechanical properties to meet various semiconductor process requirements
- Scalable form factor in both wafer and panel formats
- Low TTV and warp
- Optically transparent enabling UV or IR based debond processes and laser mark serialization
- Excellent chemical durability conducive to semiconductor process environments

Property	SG 3.4	SG 7.8	SG 9.0
CTE (0-300°C, $\times 10^{-6}/^{\circ}\text{C}$)	3.4	7.8	9.0
Density (g/cm ³)	2.38	2.39	2.42
Young's Modulus (GPa)	73.6	69.3	65.8
Shear Modulus (GPa)	30.1	28.5	26.0
Vicker's Hardness (kgf/mm ²) 200gm load	640	534	489
Annealing Point (°C)	722	628	646
Strain Point (°C)	669	574	596
Refractive Index (589.3nm)	1.51	1.50	1.49

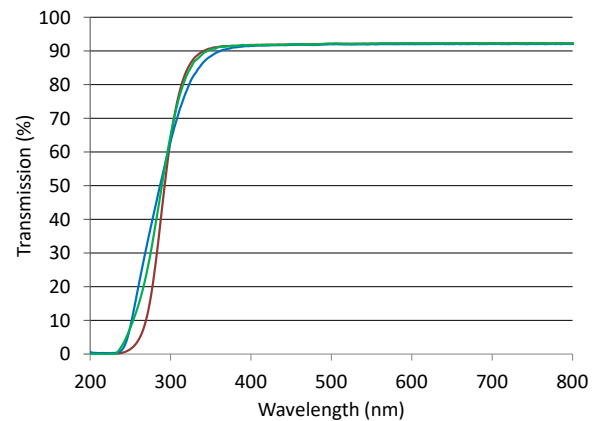
Options and Features

CTE Offerings	$3.4 \times 10^{-6}/^{\circ}\text{C} - 10 \times 10^{-6}/^{\circ}\text{C}$
Form Factors	Wafers: 100mm – 450mm Panels: Up to 600mm x 600mm
Thickness	Wafers: 0.4mm – 1.1mm Panels: 0.7mm - 2.0mm
Edge Beveling	Radius (R) Type and Chamfer (C)
Surface Roughness	< 1.0nm
Features	Wafers: Semi-standard notch/flat Panels: Orientation corner profiles
Surface ID Marking	Semi-standard or custom

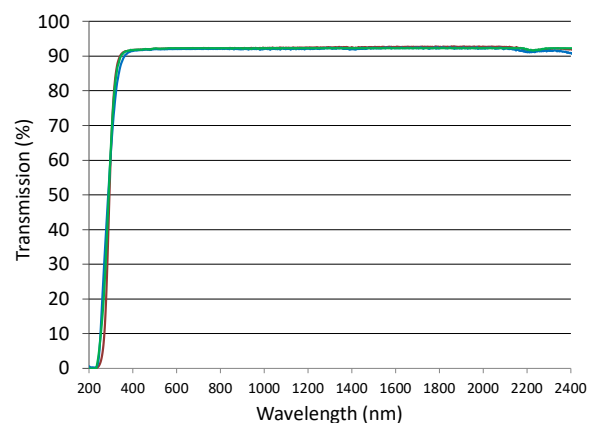
UV Transmission



Visible Transmission



IR Transmission



0.7mm thickness

SG 3.4 SG 7.8 SG 9.0

CORNING

Carrier Solutions *Advanced Packaging Carriers*

Applications

- Glass carriers for temporary bonding in advanced semiconductor packaging processes such as fan-out level processing

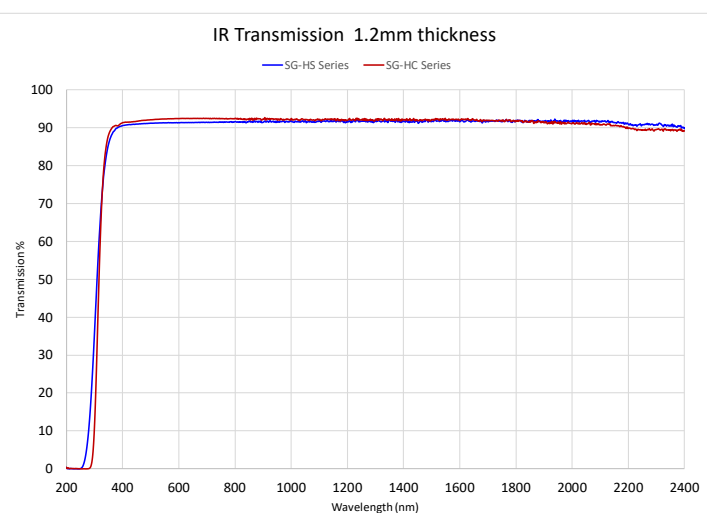
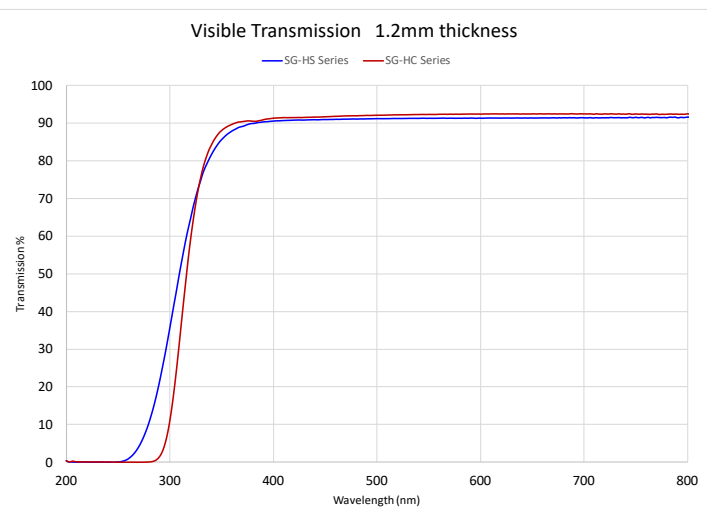
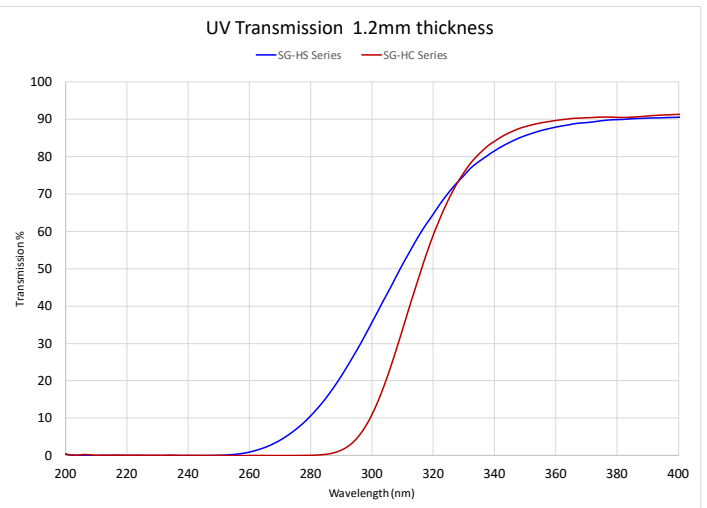
Benefits

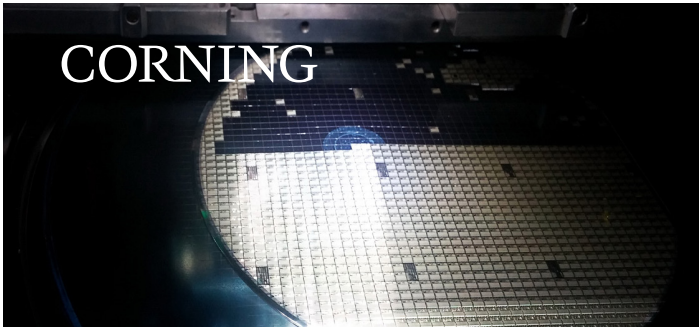
- Specially developed to reduce customers' challenge of in-process warp by up to 40%
- Available in fine granularities across a range of CTEs up to 12.6ppm/°C
- High stiffness to help overcome CTE mismatch challenge
- Ultra low TTV and warp
- Excellent chemical durability conducive to semiconductor process environments
- Optically transparent enabling UV or IR based debond processes and laser mark serialization

Property	SG-HS	SG-HC
CTE (0-300°C, x10 ⁻⁶ /°C)	4.9 - 7.9	9.6 - 12.6
CTE Granularity (x10 ⁻⁶ /°C)	0.2	0.4
Density (g/cm ³)	2.56 - 2.57	2.50 - 2.51
Young's Modulus (GPa)	80 - 87	75 - 78
Shear Modulus (GPa)	32 - 34	30 - 32
Poisson's Ratio	0.26 - 0.27	0.23 - 0.24
Vicker's Hardness (kgf/mm ²) 200gm load	635 - 670	635 - 670
Annealing Point (°C)	600 - 680	440 - 510
Strain Point (°C)	560 - 640	400 - 470
Refractive Index (589.3nm)	1.54 - 1.55	1.52 - 1.53

Options and Features

Diameter (mm)	100-300
Thickness (mm)	0.4 to 2.0
Edge Beveling	Radius (R) Type and Chamfer (C)
Surface Roughness (nm)	< 1.0
Features	Semi-standard notch/flat or custom
Surface ID Marking	Semi-standard or custom





Carrier Solutions

Ultra-Low TTV Glass Wafers

Our Ultra-Low TTV Glass Wafers have superior surface quality, flexible thickness, and can be available in a wide range of CTEs to meet customers' most challenging requirements – from research & development phase to mass production.

Applications

This glass wafer has one of the lowest TTV currently available and enables advanced semiconductor manufacturing as well as RF applications for 5G connectivity and hybrid bonding.

- Enables ultra-thinning of device wafer (final thickness <10µm)
- Allows more TTV tolerance for the adhesive layer to achieve same total stack TTV in semiconductor packaging
- Supports existing temporary bonding infrastructure to enable thinner device wafers
- Improves yield of Z-height sensitive processes

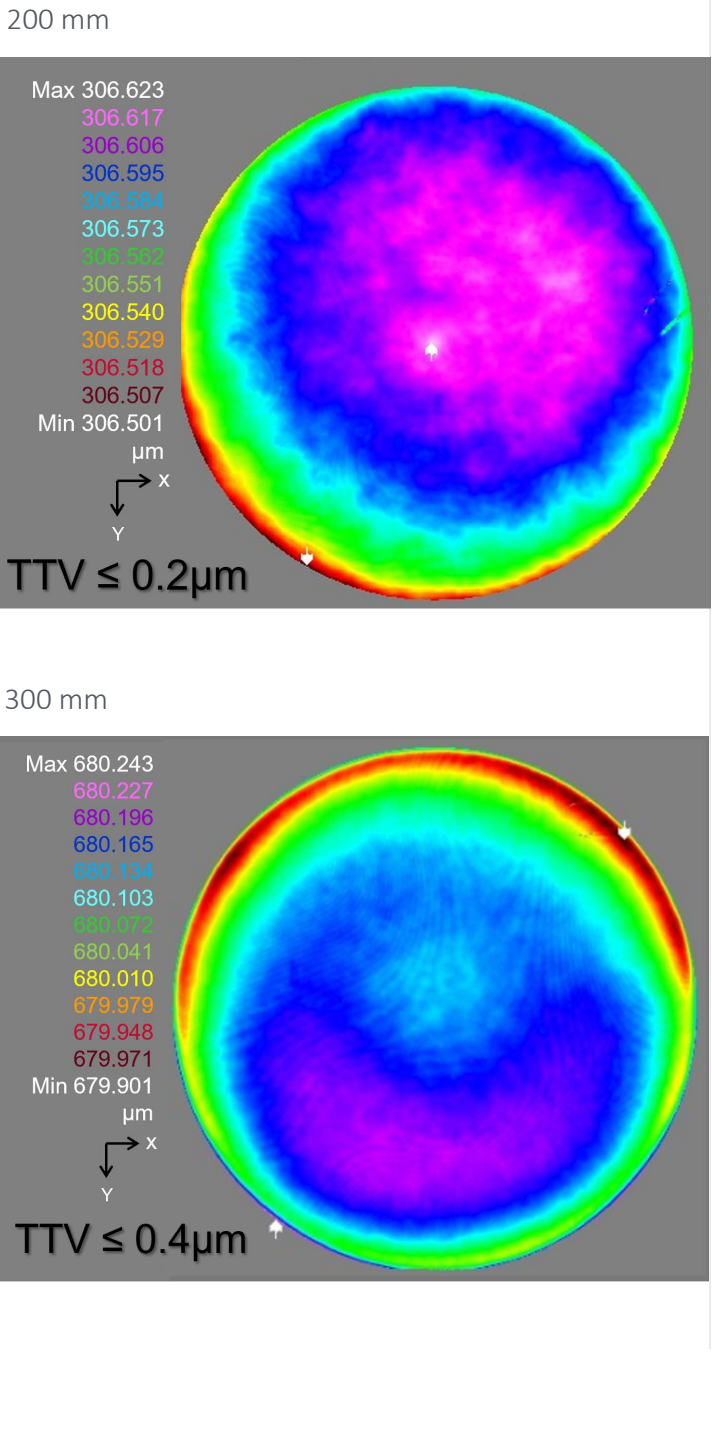
Key Benefits

- TTV 0.2µm is available in sizes up to 200mm (3mm edge exclusion)
- TTV 0.4µm is available in sizes up to 300mm (2mm edge exclusion)
- This product is available now in a range of thicknesses for a variety of glass compositions.
- Available in across a range of CTEs from 3.4 to 12.6 ppm/°C
- High stiffness to help overcome CTE mismatch challenge
- Optically transparent enabling UV or IR based debond processes and laser mark serialization

Options and Features

Diameter (mm)	100-300
Thickness (mm)	0.5 to 1.0
Edge Beveling	Radius (R) Type and Chamfer (C)
Surface Roughness (nm)	< 1.0
Features	Semi-standard notch/flat or custom
Surface ID Marking	Semi-standard or custom

For other non-standard specifications please contact Corning.



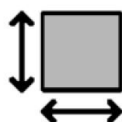
Custom Glass Solutions specializes in providing customers with made-to-order, display-grade glass in custom sizes and quantities, suitable for a wide variety of applications.

Attributes That Matter



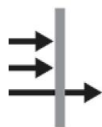
CTE Matching

*Essential for
precision processing*



Large Size Availability

Decreases processing costs



High Transmission

*Excellent for
optical applications*



Low Total Thickness
Variation (TTV)

*Increases yield and provides
consistent thickness*

Corning's industry-leading display glass is now available in Development Kits in four formats:

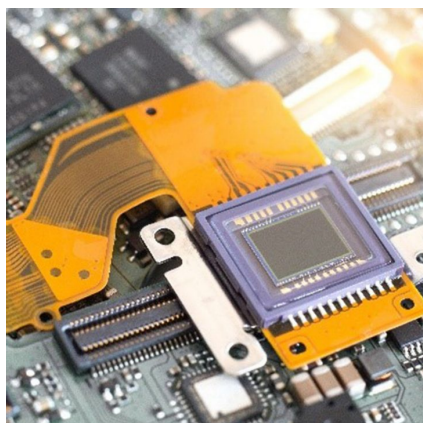
Corning® Eagle XG® Glass, 100x100x0.7mm

Corning® Eagle XG® Glass, 100x100x1.1mm

Corning® Eagle XG® Glass, 370x470x0.7mm

Corning® Eagle XG® Glass, 370x470x1.1mm

About Custom Glass Solutions



Corning's proprietary fusion draw process creates ultra-flat substrates with precise thickness control. This manufacturing platform produces large-sized glass substrates up to Gen 10.5, enabling customized substrate offerings that maximize glass utilization and minimize glass handling.

Available in panel or wafer format, our flexible design solutions and manufacturing processes help lower customers' costs, giving them more glass and reducing waste. From industry leading materials like Corning® Eagle XG® Glass and Corning Lotus™ NXT Glass, our high-quality array of glasses feature superior surface quality and tightly-controlled total thickness variation (TTV). We offer custom quantities of cost-effective form factors or full sheets of Gen 5 (1300mm x 1100mm) and above.



CORNING

Wafer-Level Capping Solutions

Applications

- Protective material in MEMS-based devices
- Display devices
- CMOS image sensors
- IR cut filters
- Pressure sensors
- Gyroscopes/Accelerometers
- Spectroscopy

Benefits

- CTE can be matched to Silicon
- Custom sizes enable higher output/glass utilization
- Flat and smooth surface is excellent for IR/AR coatings and semiconductor processing
- Display- and semiconductor-grade cleanliness
- World-class metrology systems

Capabilities

- Available sizes: 150/200/300mm wafers
- Wafer thickness: 1.1mm – 0.1mm
- Panel availability: up to 500mm x 500mm;
- Custom sizes available upon request
- Panel thickness: 1.1mm – 0.1mm
- Photo lithography and patterning process
- Cavity wafers
- Custom anti-reflective and chrome coatings
- Glass to metal seal
- Electroplating
- Complete metrology solutions



Wafer-Level Optic Solutions

Applications

- Micro-optics and substrates
- Refractive and diffractive optical elements (ROEs & DOEs)
- 3D sensors, optics, spacers, heat sinks, and camera optics
- Beam shaping elements
- Homogenizers and optical sensors
- RF components
- Nanoimprint lithography substrates
- Hard disk masters and molds
- Blazed-wavelength and sub-wavelength diffraction gratings

Benefits of Corning Wafer-Level Optic Solutions

- Various melting and forming methods enable significant volume supply of high-precision wafers with lowest thickness variation: part to part and batch to batch
- Compatible with wafer-level optic and semicon manufacturing processes and legacy equipment and tools
- Supporting capabilities include ceramics, automated laser glass-cutting, photostructuring, bonding, dicing, and coatings
- Best-in-class metrology minimizes reliability risks and enables fine resolution data across the full wafer
- Fracture mechanics glass strength experts available to train and consult on many applications

Multiple Compositions* for Diverse Applications

Glass/CTE	Abbe Value v_D	Refractive Index n_D
SG 0.5	67.8	1.459
SG 5.1	65.0	1.487
SG 7.1	60.7	1.492
SG 7.8	61.7	1.496
SG 3.4	62.7	1.510
SG 3.6	62.7	1.510
SG 8.2	64.2	1.517
SG 9.3	58.9	1.523
SG 9.5	57.1	1.523
SG 3.8	61.9	1.523
SG 3.7	61.1	1.527
SG 9.0	55.6	1.530
SG 10.0	41.6	1.601

*Active glasses shown here; Others available upon request

Material Properties and Attributes

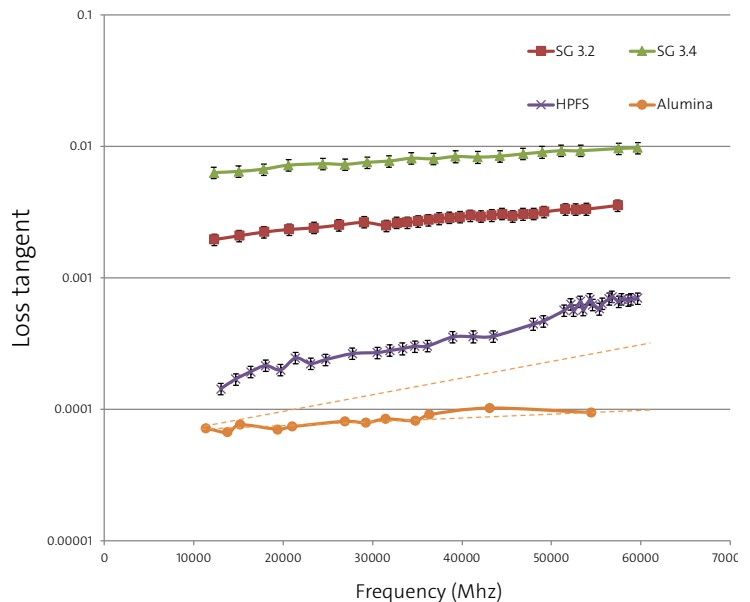
- Diameters: 100/150/200/300 mm
- Diameter tolerance*: +/- 0.200 mm
- Thickness range: 0.10-5.0 mm
- Thickness tolerance*: +/- 0.020 mm
- Available upon request: Various sizes/shapes/features, semi notch/flat specifications, laser serialization, laser processing, structuring, holes, bonding, coatings
- Large volume capacity: up to 60k WPM
- Typical lead-time: 2-12 weeks
- Polish scratch/dig: 20/10 to 80/50 per military spec
- World-class Tropel® FlatMaster® MSP metrology

*Other tighter tolerances available upon request

Typical Properties and Attributes

TTV	$\leq 1 \mu\text{m}$ to $\leq 5 \mu\text{m}$
Bow	$\leq 5 \mu\text{m}$ to $\leq 30 \mu\text{m}$
Warp	+/- $20 \mu\text{m}$ to $\pm 40 \mu\text{m}$
Surface roughness (Ra)	$\leq 10 \text{\AA}$
SORI	$\leq 0.5 \mu\text{m}$ to $\leq 1.5 \mu\text{m}$

Low-loss, High-frequency Electrical Performance



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Россия +7(495)268-04-70	Киргизия +996(312)-96-26-47	Казахстан +7(7172)727-132	