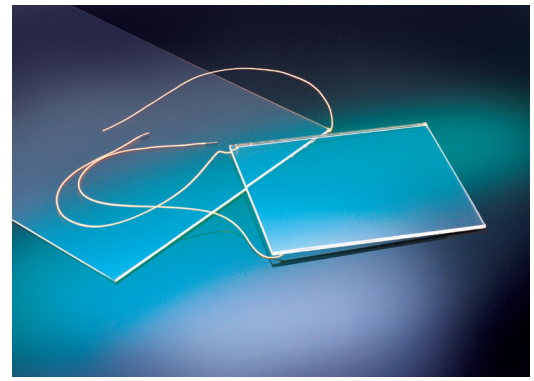


Glass Resistive Heaters for LCD Displays

WIN-SHIELD™ G Heaters



Customer Value Proposition:

Parker Chomerics WIN-SHIELD G Heaters provide a uniform temperature control solution for LCD displays. In cold environments, an LCD display must be heated to prevent slow response times or loss of functionality. The heater utilizes an Indium Tin Oxide (ITO) coating to form a conductive layer for resistive heating. Our glass heaters allow LCDs to perform well in extreme cold situations.

WIN-SHIELD G Heaters are also used in applications that require de-fogging and de-icing. Furthermore, EMI shielding can be incorporated into the design to add combined functionality into one window. Screen printed graphics, such as black borders or multicolored logos can be used to enhance the aesthetics of the display.

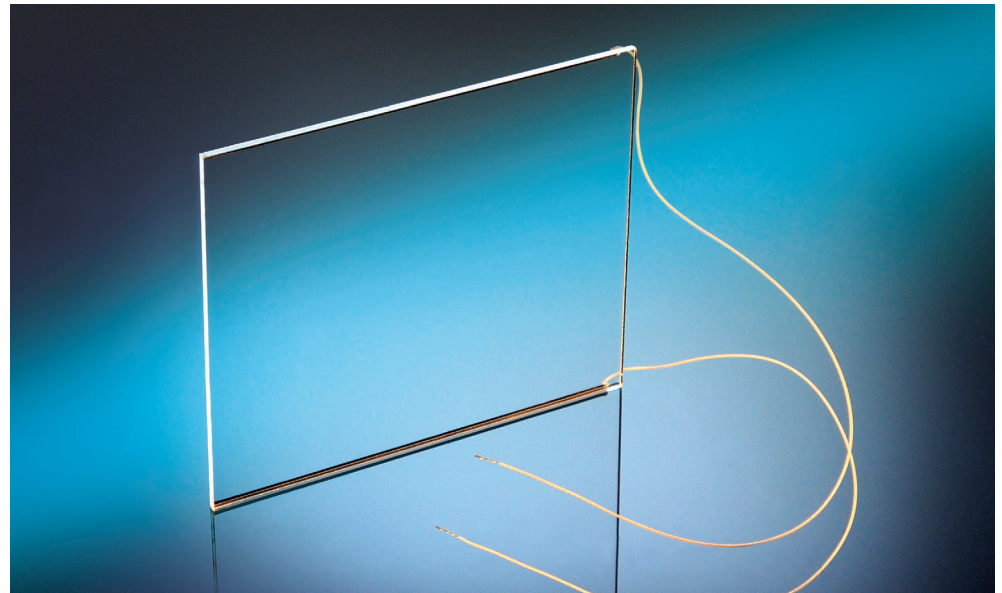
WIN-SHIELD G Heaters can be combined on the opposite surface with various EMI shielding materials such as: index matched Indium Tin Oxide (ITO) coating, blackened plated stainless steel mesh and blackened copper mesh. ITO coatings are available with sheet resistances of 4-20 ohms/sq. Mesh products are available in 100, 80, and 50 Openings Per Inch (OPI). Our products are terminated with our high performance CHO-BOND® 578 silver epoxy. Additionally, CHO-FOIL® Metal Adhesive Tapes can be utilized for the conductive grounding surface.

WIN-SHIELD G Heaters can also be laminated with PVB to pass safety and boot kick test requirements. Chemically strengthened or thermally tempered soda lime float glass is available for applications with stringent mechanical requirements. In our class 1000 clean room, we assemble our large formatted windows in a controlled, clean environment.

Parker Chomerics WIN-SHIELD G Heaters are used in many industries including Avionics, Industrial, Medical, Military, and Electronic Signage.

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Product Features:

- Uniform thermal output
- Environmental stability
- Low power consumption
- Low reflectance
- High reliability
- EMI shielding option
- ITO shielding
- Mesh shielding
- Laminated glass
- Border graphics
- Screen printed logos
- Clear float glass
- Borosilicate glass
- Chemically strengthened glass
- Military ruggedized displays
- Able to pass safety and boot kick requirements

Typical Applications:

- Point of Sale applications
- Industrial displays
- Medical displays
- Kiosk & security terminals
- Ruggedized displays
- Military ruggedized displays
- Display de-icing
- Display de-fogging

Product Information

Specifications

Maximum Product Dimensions ¹	19" x 28" or 34" diagonal	480 x 710 mm or 863 mm diagonal
Nominal Thickness ²	0.030" to 0.160"	0.7 to 4 mm
Standard Tolerances ³ Length and Width	± 0.015"	± 0.4 mm
Electrical Properties	Resistance (Standard)	4-20 Ω/sq ±20% (sheet resistance depends on system design)
	Termination (Standard)	Indium-Tin buss bars with insulated wire leads Strain relief for wires Custom wire sizes and terminations available
	Typical Configuration	System Voltage: 24 VDC Lead to Lead Resistance: 10 Ω Amperage: 2.4 A Wattage: 55.3 W Coating Resistance: 16 Ω/sq Window Size 14 x 9"
Environmental Specifications	Salt Solubility	24-hr salt soak (MIL-C-675)
	Abrasion	40-rub eraser (MIL-C-675)
	Humidity	24 hr (MIL-C-675)
	Adhesion	MIL-M-13508
Thermal	Typical Operating Temperature Range	-40 to +70°C (-40 to +160°F)
Storage	25°C (80°F), 50% relative humidity	

1 Custom sizes available upon request

2 Standard thicknesses are listed above. Other thicknesses are available upon request.

3 Custom tolerances available upon request

Physical Properties:

Lamination

WIN-SHIELD glass can be laminated with a PVB interlayer to provide safety glass with antireflective surfaces and embedded EMI Shielding inside the glass laminate. The soft PVB interlay acts to prevent sharp glass ejection and maintain a barrier in the event of breakage. PVB also adds to reduce the sound transmission through the glass laminate.

A wide variety of thicknesses and sizes are available for fabrication into final shapes. Screen printing can also be added to a monolithic or laminated glass for decorative purposes and to mask bezel areas. Black border and multicolor logos are easily added to the window. Customer provided graphics can be incorporated into the design. Parts up to 19" x 28" (48 cm x 71 cm) can be screen printed with any graphic.

Optical Properties:

Anti-reflective Coatings

Anti-reflective (AR) coatings are used in high performance applications where high light transmission and low reflection is desired. AR coatings are used to increase the contrast ratio of a

display by reducing ambient light reflections. Transmission of the overall window will increase 3-4% per coated surface when AR coatings are used. WIN-SHIELD glass meets difficult physical environmental requirements where other materials would not be suitable. Maintaining high optical transparency and maximum clarity in demanding applications makes this glass suitable for a wide variety of applications.

Anti-reflective Coating Design:

Optimized for visible light (400-700 nm)
Average Reflection < 0.7%

ITO Coating Design

When designing an ITO coating it is important to specify the medium to which the coating will be optimized. For example an ITO coating exposed to air will be designated to be

- Index matched to 1.0

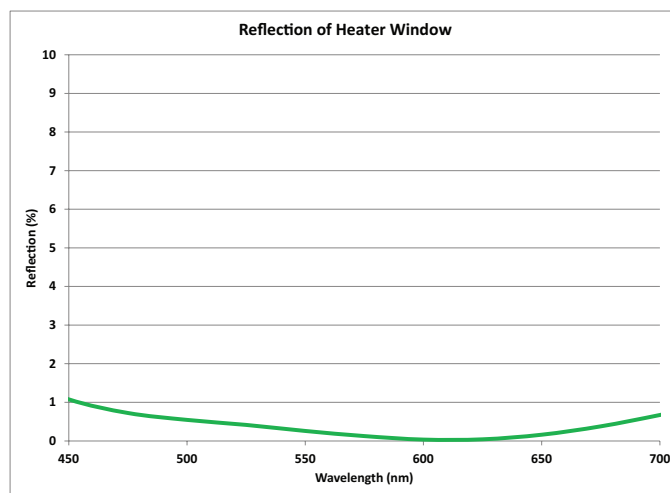
For ITO coatings that are to be optically bonded to the LCD via an adhesive, the coating should be designated to be

- Index matched to 1.45

By specifying the correct index matching, the coating will be optimized for minimal reflection and maximum transparency.

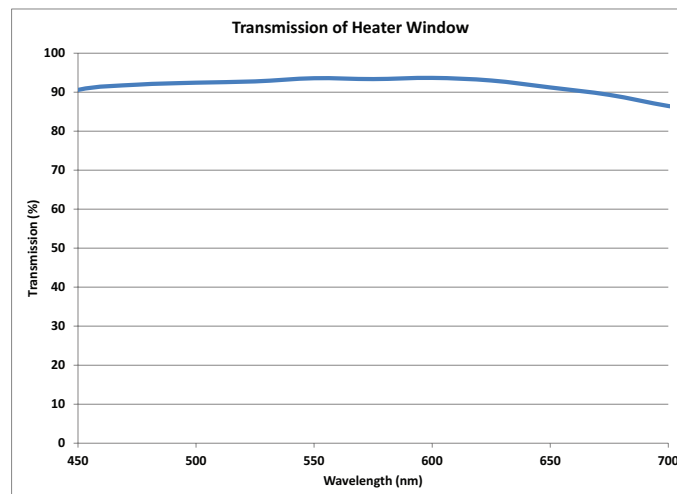
Reflectance

Ravg < 0.75% from 425 to 675 nm.



Transmission

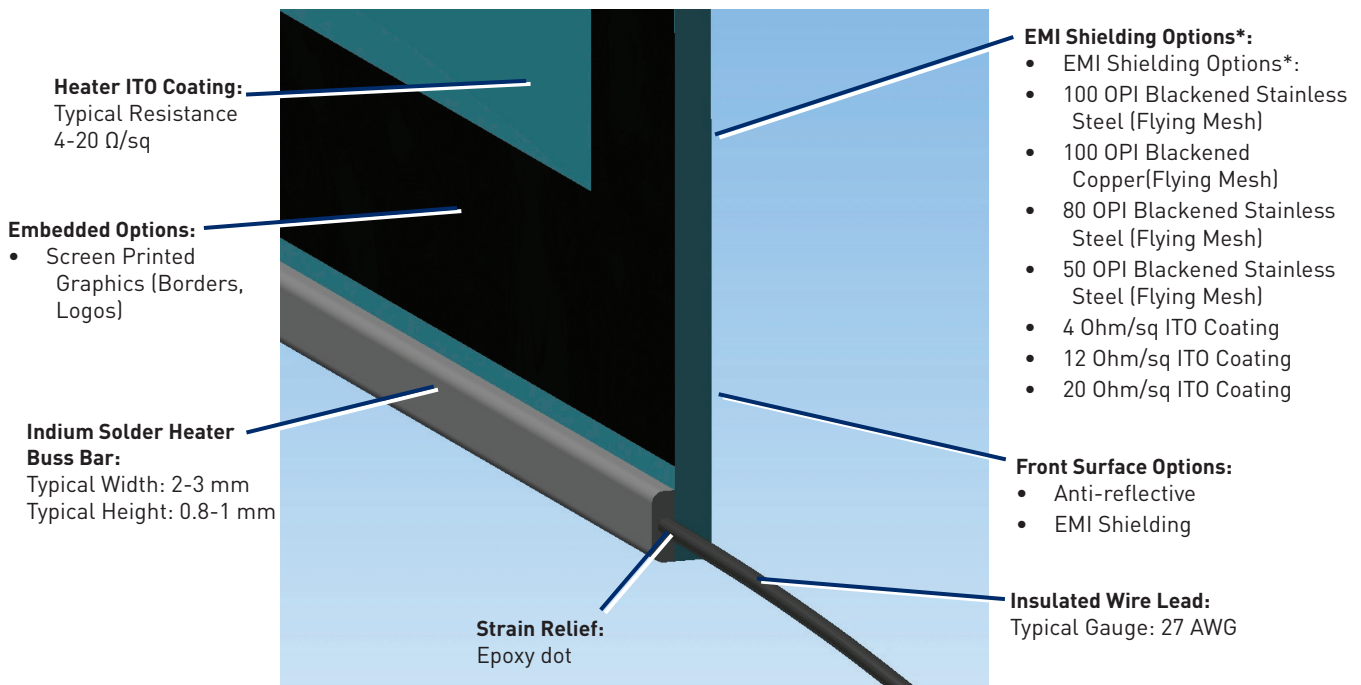
Tavg > 95% from 425 to 675 nm with second surface Anti-reflective coating.



Product Information:

Design Guide (Please choose from the following options):

1. Front Surface Options:
 - Anti-reflective
 - EMI shielding
2. EMI Shielding Options:
 - 100 OPI Blackened Stainless Steel (Flying Mesh)
 - 100 OPI Blackened Copper (Flying Mesh)
 - 80 OPI Blackened Stainless Steel (Flying Mesh)
 - 50 OPI Blackened Stainless Steel (Flying Mesh)
 - 4 Ohm/sq ITO Coating
 - 12 Ohm/sq ITO Coating
 - 20 Ohm/sq ITO Coating
3. Rear Surface Options:
 - Integrated heater
 - Screen Printed Graphics (Borders, Logos)
4. Silver Epoxy Buss Bar (CHO BOND® 578):
 - I Buss for EMI Shielding Only



Typical Edge Termination:

I Buss

Notes:

- *EMI shielding option can be on front for ITO coatings or embedded inside lamination for mesh materials.
- **Buss bar will reside on opposite side of heater.

www.chomerics.com
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