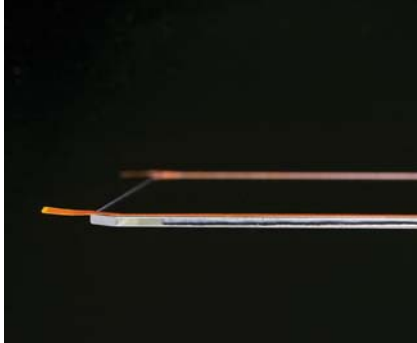
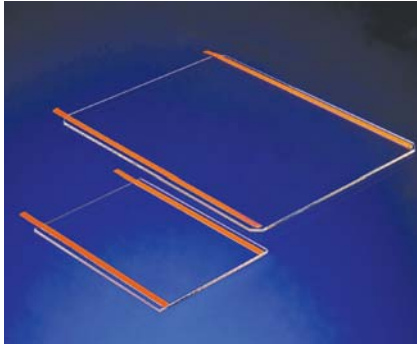


## LowProfile™ Bus Bar Thin-Film LCD Heater Panels



### Key Features

- Design flexibility
- Smooth bus bar surface
- No solder flaking
- Low-profile bus bar
- Uniform bus bar peel strength
- Insulated bus bar
- Lead free
- Provides rapid system startup without sacrificing display viewability
- Resists thermal shock
- High optical transparency
- Precise electrical resistivity
- Low reflectance
- Environmental stability

### Applications

- Avionic displays
- Temperature-controlled LCD displays
- Industrial displays
- Medical instrumentation

### LowProfile™ Bus Bar Thin-Film LCD Heater Panel

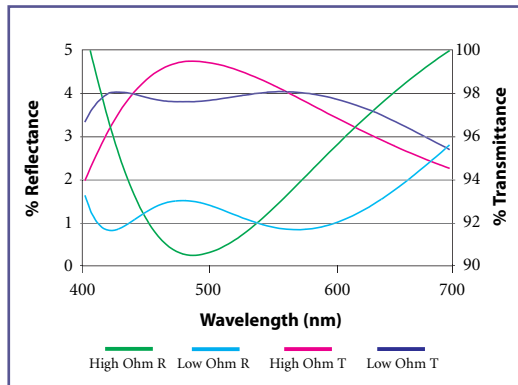
We have added a LowProfile™ bus bar option to our thin-film heater panels used in temperature-controlled LCD displays. This new bus bar consists of a gold-plated copper strip insulated with high temperature-resistance Kapton.

The heater coating utilizes a precisely controlled Indium Tin Oxide (ITO) layer as the transparent conducting medium. The surrounding dielectric layers are index matched for optimal performance in the customer-specified design medium.

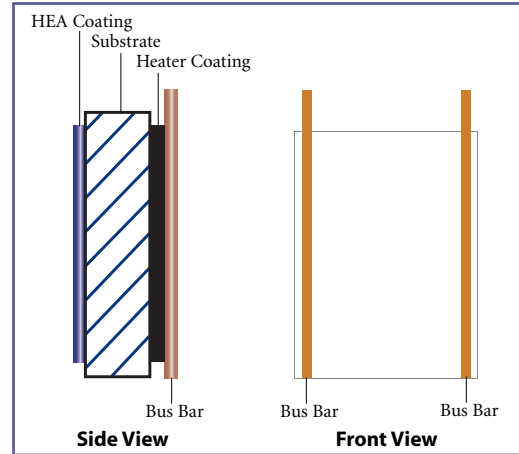
Our complete manufacturing facilities can provide the right heater panel to meet your requirements through design, prototype and OEM production volumes.

Our precision manufacturing techniques assure repeatable performance and tight tolerance compliance.

## Optical Performance



## Heater Panel Configuration



## Specifications

### Material

- Borofloat (standard substrate). Other substrates available upon request.

### Product Configuration

- Substrate Thickness: 0.7 mm to 2 mm
- Tolerancing:  $\pm 0.4$  mm L x W (Other glass thickness and tolerance configurations available upon request)
- Bus Bar Width: 4.1 mm
- Maximum Bus Bar Length: 23 cm
- Maximum Bus Bar Height: 0.15 mm

### Power Dissipation

- Example: 20 W/sq nominal resistance on 5.5" x 7.5" panel (with bus bar on long sides)  
Result: 85° C measured at center of panel in open air in steady state operation  
Condition: 20 volts, 1.4 amps (28 watts)

### Spectral Characteristics

Standard ITO Heater Coating – Nominal: 13-120  $\Omega$ /sq  
Tolerance:  $\pm 20\%$

- Reflectance: 2% typical from 425 to 675 nm at 10° incidence
- Overall Transmittance: 95% average from 425 to 675nm with second side AR (HEA®) coated  
 $\geq 91\%$  average from 425 to 675nm with second side uncoated

### Optional HEA® Coating on Second Side

- Reflectance:  $\leq 0.6\%$  absolute from 430 to 650nm at 10° incidence  
 $\leq 0.3\%$  average at 10° incidence

### Durability

- Humidity Resistance: > 24 hours (MIL-C-675)
- Adhesion: Quick tape test (MIL-M-13508)
- Abrasion Resistance: > 40-rub eraser test (MIL-C-675)
- Solubility Resistance: > 24 hours immersion in NaCl solution (MIL-C-675)
- Temperature Resistance: > 4 hours at -65° F and +160° F (MIL-C-14806)
- Operating Temperature: 85° C (185° F) continuous duty

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