



[www.planarembded.com/transparent](http://www.planarembded.com/transparent)

## FAQ: Transparent Electroluminescent Displays

### Technology

#### **How transparent is the transparent display?**

The display has a transmission of 84%, which is very close to normal glass.

#### **What other colors are possible?**

Yellow or amber is our standard and preferred color. We have produced some red and green samples. Green has been fully tested and approved but samples are not currently available.

#### **Can a contrast color be added to the front half of the glass "sandwich?" Can the top glass panel be tinted?**

Transparent EL glass is typically bonded to thicker glass substrate and any tricks applicable to soda lime flat glass can be used before bonding with epoxy.

#### **What is the voltage that needs to be supplied to the glass?**

Between 190 V to 200 VAC (peak). Planar can either offer a complete display including electronics or just the glass only, in which case we can supply you with driving schematics for a consulting fee.

#### **What are the circuit limitations?**

Transparent EL can be used as a graphics display or with any custom symbol(s). Circuit traces are needed, but for transparent displays they are nearly invisible. Multiplexing is recommended when there are more than 40 segments. For instance in the speedometer demo we have used multiplexing by grouping the segments and driving them as rows and columns by our standard matrix driving board.

#### **What is the operating temperature range?**

Temperature range is limited by the electronics. In the newest electroluminescent designs we are quoting -50° C to +85° C operating, -50° C to +105° C non operating.

#### **What is the standard display thickness?**

The standard thickness of the EL panel is 1.1mm, with a protective cover glass that is also 1.1mm. The total thickness would be 2.2mm. This does not include drive electronics which can be remote to the EL panel or part of a module design.

#### **What are the factors for the shape of a transparent EL display?**

Minimum curvature of cut – minimum curve radii have not been determined. We can cut the glass to any shape, including corners. It is possible to cut or drill holes in the display.

**What are the available sizes?**

The max size display is roughly at 10.4" diagonal. Min size would be about 0.5" diagonal.

**What is the substrate made of?**

Transparent EL uses a glass substrate. It is unlikely that a polymer substrate could be used as the EL product process requires temperatures at/about 450°C. Most polymers would not withstand these temperatures.

**What is the brightness/frequency?**

Brightness is directly proportional to frequency. Typical specifications are 100cd/m<sup>2</sup> at 200Hz, with excellent contrast.

**Production****Do you have standard off-the-shelf transparent displays available?**

Unfortunately we do not have standard displays available at this time. We are focusing on applications that have the volume to support development of custom displays.

**What is the tooling cost for the glass?**

The tooling cost depends on the shape of the display. The standard shape is rectangular, although round shapes can be done at extra cost. We can provide estimates on tools costs. Fixturing and test equipment are over \$10,000 (US) depending on the complexity of the product.

**Can holes be drilled into the panel for mounting or to pass with a shaft (e.g., gauge needle)?**

Holes can be drilled at added cost.

**What is lead time for layout and production?**

Lead time for the glass only prototype, not including the driving electronics, is about two months and glass production can be started right after approval of the glass. We make typically do 1000-hour reliability tests for the glass, which requires about three additional months before production launch. The limiting factor is the design, prototyping and testing of the driving electronics.

**Where are transparent electroluminescent displays made?**

Electroluminescent glass is made in Finland and the drive electronics are manufactured in Asia.

**Is this technology mass production ready?**

Planar has been producing over 100,000 electroluminescent displays per year since about 1985. Our displays are in medical, industrial and military equipment.

**What volumes can be achieved with this technology?**

We can process about 150,000 substrates per year. One substrate is 195mm x 265mm. So, depending on the size of the end product the product quantity would increase.

## Demonstration Units

### How bright is the transparent demo?

About 130 cd/m<sup>2</sup>. Readability and brightness are the primary issues related to brightness. We can either make transparent EL very transparent and less scattering (like the current demo) or less transparent but more scattering with higher brightness. For more information on this topic see the white paper on transparent electroluminescent displays.

### Is the demo as bright as it can be made?

The driving frequency of the demo is 247 Hz. We have experience with driving matrix displays up to 350 Hz, and in segmented displays an even higher frequency can be used. Brightness and power consumption are proportional to the frequency, and thus much brighter display can be produced at the cost of higher power consumption.

### What type of samples or demonstration units are available?

We do have sample units available. They are currently in high demand but we will do our best to make them available for your review.

### Is it possible for you to make a sample display?

Yes, but we would need drawings and specs to do this work.

## Other

### What is the brief history of electroluminescent (EL) display technology?

Planar has 25 years experience in making Thin Film Electroluminescent (TFEL) displays and over 3 million displays have been manufactured with excellent field reliability.

### Would it be possible to have someone from your company to visit our location to introduce this technology to us?

Yes, Planar would be very willing to visit your location. Contact your regional sales manager, channel partner or email [sales@planar.com](mailto:sales@planar.com) to schedule a visit.

