



9

**THINGS YOU NEED
TO KNOW ABOUT
TRANSPARENT OLED**

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What Is Transparent OLED Technology?

Transparent OLED is a breakthrough transparent display technology that displays dynamic or interactive information on a transparent surface glass. This revolutionary display allows users to view what is shown on a glass video screen while still being able to see through it. Designers can overlay text, digital images and video content onto physical objects or scenes that sit behind the glass.

Transparent OLED displays are self-emitting and utilize cutting-edge Organic Light Emitting Diode (OLED) technology to eliminate the need for a backlight or enclosure, making it possible to create truly see-through installations in a virtually frameless glass design.

This eBook will highlight the *9 Things You Need To Know About Transparent OLED technology*.

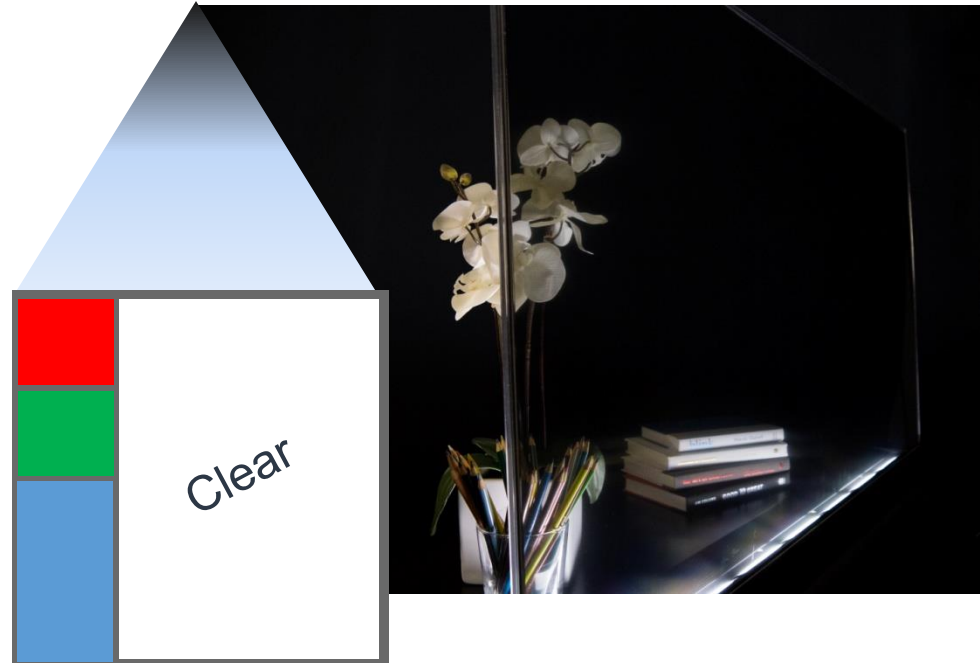


1

T-OLED Pixels Are Partially Clear

Each pixel in a transparent OLED is made up of 4 sub-pixels. Color is created by the combination of the red, green, and blue sub-pixels and the remaining area of the pixel is clear. That clear section creates the transparency.

This is why there is a direct relationship between resolution and transparency. If the display contains more active pixels that creates less space for the clear pixels and results in a display that is less see through. This is why the [Planar® LookThru™ OLED Transparent Display](#) is full HD resolution today, as it optimizes transmission and resolution.



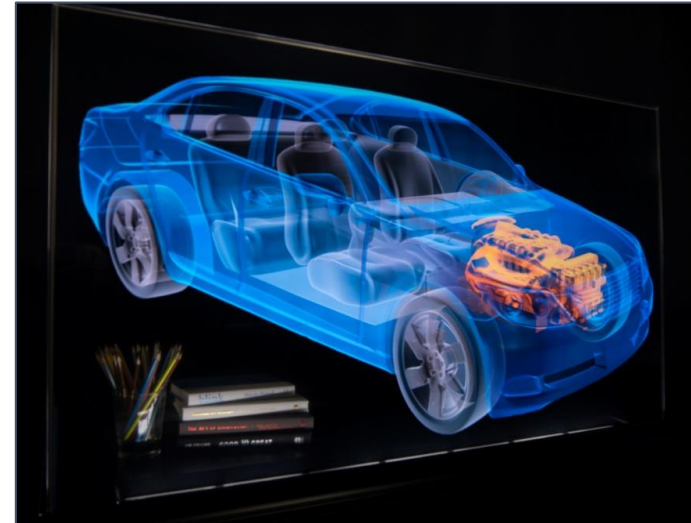
2

Black is Clear – White is Opaque

White or bright content will be opaque and will shine from the screen and appear in the foreground



Black or dark (or off-state) content will be see-through



Unlike transparent LCD displays, black or dark content on the screen is clear and white or bright content is opaque. You can see this in the photos above. The car image appears to be floating in space and through the black background you can clearly see the books and pencils which are physical objects set behind the display. The full screen image of the boat appears in the foreground, but if you look closely at the hull of the boat you will see some objects behind the display, made visible by the dark area.

3

Ambient Light Affects Perceived Transparency

The more you light the items behind, the more transparent the screen

No uplight. Display looks more opaque.



Plant is uplit. Display looks more transparent.

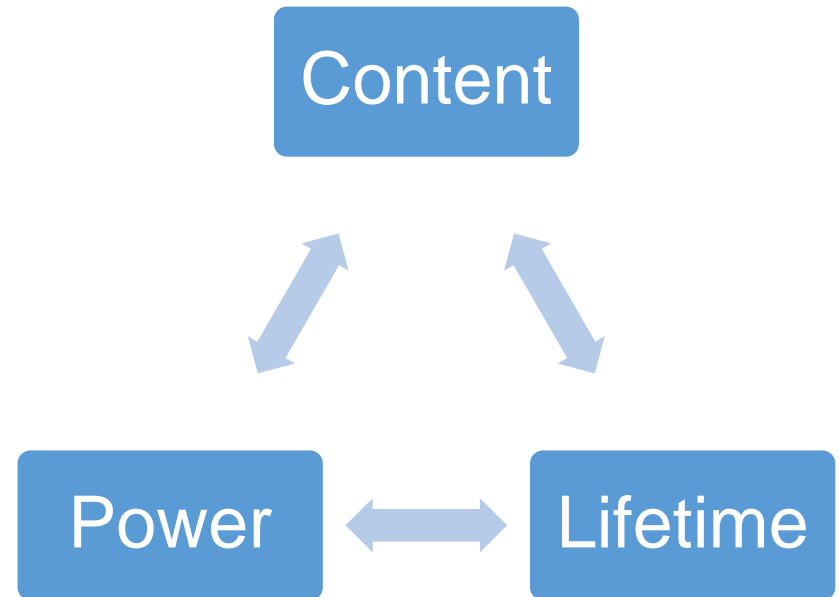


Just like any glass surface, ambient light affects that appearance of transparency. The two images above are the same display, the same on-screen content (of the model), and the same plant behind the display. The only difference is that the plant has been “uplit.” With more light on the object behind the screen you can see that the leaves of grass are much more visible through the display than they would be if the light was off. A transparent display in an entirely dark room will appear opaque. A transparent display in a light filled room with objects or scenes heavily lit behind the display will appear like transparent glass.

4

Content Is King of Lifetime and Power

- Content drives power and lifetime
- Black pixels are at rest (low power, longer life)
- Highest energy use color is blue (and it ages faster than other primaries)
- Lifetime is related to hours of use for each pixel
- For a **longer life**, keep the content mostly black and keep the content moving to avoid damaging the display with image retention



5

Readability Makes Exhibits Possible

The transparent OLED is quite clear, which makes reading fine details or text on objects behind the display possible. This means that retail merchandisers or museum exhibit designers can put the transparent OLED in front of goods or artifacts without obscuring their view.

In addition, the display is optically clear enough to make it possible to see a long distance past the display. A wall that is 12 feet past the display will be clearly visible. A sign that is 10 meters away can be read. Another electronic display placed behind the transparent glass will create a unique 3D layered effect and is quite possible with this display technology.



*Pencils and book titles are readable through display.
Objects dozens of feet or meters behind the display are viewable.*

6

Display Has Nearly 360 Degree Viewing Angle

- Text or content on front is reversed on the back
- Backside is lower contrast and brightness than front side
- Objects or scenes behind the display is reflected, but does not fully obscure the image, as you can see in this photograph.
- This opens up new possibilities for two-way displays and applications like:
 - assisted retail,
 - ticket counters, or
 - workspace dividers in corporate environments



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Broad Color Gamut Reads As Brightness

OLED has long been recognized for its amazing color performance. While best-in-class LCD displays achieve around 72% NTSC color space (a measure of the number of colors that the display is capable of showing), OLED can achieve greater than 100%. This means more vivid reds, more vibrant greens, and eye-popping blues.

This color performance, together with the peak brightness characteristics of the emissive display, create a display that appears much brighter than you might expect from reading the specifications alone. Your eye translates color as brightness and in a side-by-side comparison with a “brighter” display, the transparent OLED will be the most vivid.



Greater than 100% NTSC

8

Thin Edge Details Make Tiling Possible

The Planar LookThru OLED display is fantastic when used as a single display, but sometimes the application requires something larger than 55 inches. This is where the design of the product allows for installation flexibility. In the illustration to the right, you see four displays tiled into a video wall array. Two sitting on the table top and two mounted to the ceiling. Three edges of the display have only 5mm of inactive area, which makes the tiling effect quite possible and attractive.

To achieve the full video wall experience, the video wall should be accompanied by a multi-channel video processor which can play back one video or content selection across multiple monitors assembled into a video wall.



Edge detail is approximately 5mm on three sides; 76 mm wide on one long edge

9

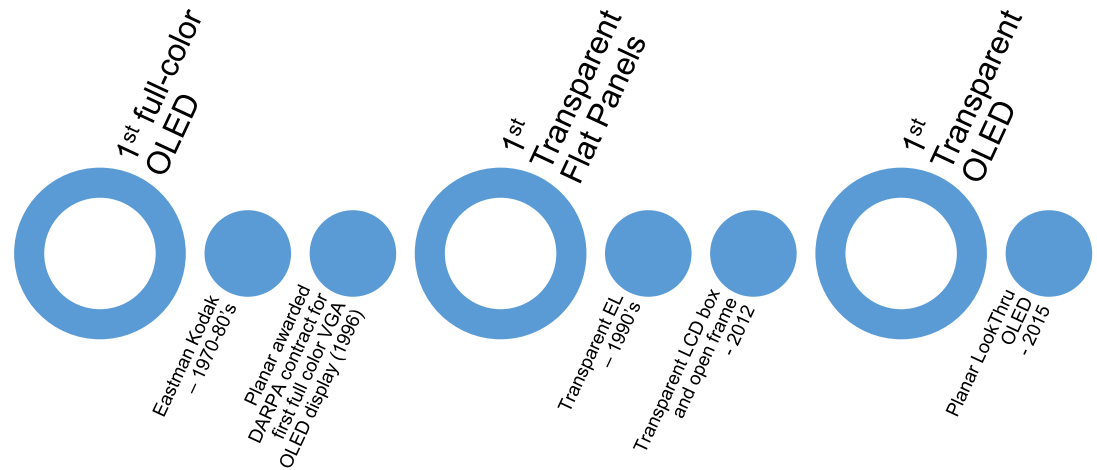
Planar Is A Market Pioneer

Planar Has Been Leading Innovation In Transparent Display And OLED

Development on OLED started in earnest in the 1980s. By the 1990's, Eastman Kodak was a subcontractor to Planar on a DARPA contract from the US government to develop a commercial product in VGA resolution.

Planar introduced our first transparent display, an electroluminescent display, in the late 1990's. Since then, we have had transparent displays in our line-up, adding the Planar® LookThru™ LCD display box and installation kit in 2012.

In early 2015, Planar was first to demonstrate a transparent OLED and now offers a line of transparent OLED products.



Planar LookThru Transparent OLED Displays

The [Planar® LookThru™ OLED Transparent Display](#) is offered in 55-inch diagonal. It can be used in both portrait and landscape modes, can be table mounted, ceiling mounted, or built into custom fixtures using the straight flush-mount design. The display can be tiled to create large, eye-catching video wall arrays.

The Planar LookThru OLED provides Full HD resolution that allows for beautiful graphics and full-motion video. It comes with standard digital inputs including HDMI and DisplayPort, and is fully controllable for advanced installations.



The display is available with optional touch screen interactivity, offering 32 simultaneous touch points.

The Planar LookThru OLED utilizes proprietary proprietary [Planar® Extended Ruggedness and Optics™](#) (ERO™) technology featuring Corning® Gorilla® Glass. This high-durability surface can withstand the rigors of high-traffic environments and interactive touch. It also improves perceived contrast by more than 300 percent, making the display more readable and impactful even in bright public venues.

www.planar.com/lookthru



Table top



Ceiling mount



Straight mount

Comparing Planar Transparent Display Technology



Feature	Benefit	PLANAR [®]	PLANAR [®]
Technology	<ul style="list-style-type: none"> Inherent benefits of core display technology 	OLED	LCD
Transmissivity	<ul style="list-style-type: none"> The perceived transparency of the display in test environment conditions Readability and viewability of objects or scenes in the background 	45%	12%
Sizes and configurations	<ul style="list-style-type: none"> Active area on which to place video or imagery Mechanical design and level of integration required by integrator or client 	55" monitor for table, ceiling, or aligned mounting	32" display box and open-frame
Bezel Width	<ul style="list-style-type: none"> Mechanical design to allow for sleek enclosures and a modern look Small bezels allow tiled video wall applications, with use of a Planar VCS processor 	5mm/5mm/5mm/76mm	31mm/31mm/31mm/31mm (even bezel)
Color Gamut	<ul style="list-style-type: none"> Color saturation for realistic imagery and video 	100% NTSC	72% NTSC
Protective Glass Surface	<ul style="list-style-type: none"> Exposed surface ruggedized for public installation Strong and smooth touch surface 	ERO	ERO
Input Connectivity	<ul style="list-style-type: none"> Input sources 	HDMI (4), DisplayPort (1)	HDMI (1) DisplayPort (1)
Touch Interactivity	<ul style="list-style-type: none"> Creates new ways to engage customers 	32 Pt IR touch	Third-party only

Considerations When Planning & Designing Transparent OLED Displays

Creativity is the watch word when designing with transparent displays. Whether in stand-alone configurations or integrated into larger video wall arrays (as illustrated to the right), the possibilities are endless.

When specifying a transparent OLED display, one must remember the limitations of the technology, as well as its benefits. The best performance of the display will come when content developers, artists, and programmers work closely with integrators to ensure the content utilizing a lot of black in every frame (for maximum transparency and lifetime), is highly dynamic (no static logos or words), and makes the use of ambient or spot lighting that can be orchestrated with the screen content for amazing effect.



Applications

The Planar LookThru OLED fulfills the promise of transparent displays with never-before-possible applications in digital signage including retail, hospitality, corporate and museum settings.

It can be integrated into any environment in which glass is used including building exteriors, room dividers, glass conference rooms, storefront windows, glass counters, museum exhibits and ticket booths.



Retail



Corporate



Hospitality



Museum





Summary

The Planar LookThru OLED display can create stunning and impactful installations like no one has seen outside of science fiction movies. With thoughtful design and creative content, these displays can revolutionize and modernize interiors with impactful color, relevant graphics and text, and a wow-effect that will draw customers to engage. From museum exhibits to brand retailing, from corporate briefing centers to the restaurant bar, designers and visionaries now have a new material with which to design. Activated glass has been a dream for decades and is now a reality!

Additional Information

Planar is a global leader in display and digital signage technology, providing premier solutions for the world's most demanding environments. Retailers, educational institutions, government agencies, businesses, utilities and energy firms, and home theater enthusiasts all depend on Planar to provide superior performance when image experience is of the highest importance.

Planar solutions are used by the world's leading organizations in applications ranging from digital signage to simulation and from interactive kiosks to large-scale data visualization.

Founded in 1983, Planar is headquartered in Oregon, US, with offices worldwide.

Please visit us at www.planar.com where you can learn more about Planar's innovative display solutions.



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