

Interview with NLT Technologies on transflective displays

At one time, transflective displays were the hottest property in the optoelectronics market. The last two SID Display Weeks cast a sharp eye on this emerging technology, and nearly every OEM was promoting it. And then abruptly, it disappeared. At SID 2012, no one was talking about it anymore. What happened to transflective displays? ECN recently had the chance to talk with Bob Dunhouse of NLT Technologies regarding this strange phenomenon.



ECN: First off, define, in your own words, a “transflective display.”

Bob Dunhouse: The word “Transflective” is the morphing of two words “Transmissive” and “Reflective” and it’s used to describe Liquid Crystal Displays that have both transmissive and reflective properties.

ECN: What are the advantages and disadvantages of transflective displays?

Bob Dunhouse: There are two types of transflective displays. The first relies on a highly reflective material on the panel’s TFT layer to reflect surrounding light to the viewer (“reflective mode”).

Images seen in low light are by small openings in the reflective layer that allow light from the panel’s backlight to pass through (“transmissive mode”).

The major advantage of this technology is its ability to display an image in high ambient light with no backlight. In applications where even the smallest amount of power is a concern this technology is the way to go. There are a few trade-offs however.

To maximize the reflective surface, the openings in the reflective layer need to be kept small however by doing so it limits the light throughput or transmissivity of the panel. In low light, where the backlight is needed, the reduced transmissivity limits peak luminance making them appear dim compared to standard transmissive panels. Also due to the metalized reflective surface some find the image too “metallic” in appearance, colors not as vibrant and whites not true white.

The second transreflective technology uses standard transmissive LCD displays that are modified with passive enhancements. The enhancements may include specialized outer AR films combined with backlight recycling techniques for a more efficient lighting system and greater peak luminance performance. Because this technology is based off of standard mass produced products its major advantage is cost. A minor disadvantage is it requires the backlight to always be on but with the recent improvements in backlight designs and LED efficiencies most find the added power reasonable. These are really the best transreflective products providing a balance between cost and day or night performance.

ECN: Why do manufacturers like transreflective displays?

Bob Dunhouse: There will always be a need for outdoor displays but the effects of the sun can quickly overpower any standard LCD. In the past customers would buy and supply their panel inventory to a third party company for “enhancements”. This created a whole cottage industry of third party companies that applied solutions which include adding more backlights, using current overdriving schemes, adding glass overlays with AR coatings and sometimes direct bonding the glass overlays. As one example adding backlight bulbs is a “brute-force” attempt to overwhelm the effects of sunlight but it has faced challenges with added heat, power and reliability issues. The obvious disadvantage to these methods is added cost, time and complexity not to mention the loss of manufacturer’s warranty. Providing an outdoor viewable technology direct from the manufacturer avoids these and other pitfalls associated with product enhancements.

ECN: Why aren’t OEMs or anyone else talking about transreflective displays anymore?

Bob Dunhouse: They should be. The demand is real and will continue to be for the foreseeable future. Many OEMs are focused on the commercial or mobile space where true industrial performance is not really needed. Televisions and tablets get the hype but in the industrial world transreflective displays play a significant role.

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ECN: Is there a fundamental problem with transflective displays that will prevent their widespread deployment?

Bob Dunhouse: No. There will always be a need for an outdoor display. While many of us don't really need one for our PC, the manufacturers of outdoor products certainly do. Sales of transflective displays will just continue to grow and grow.

ECN: From the customer's and OEM's perspective, what is the most viable alternative to transflective displays?

Bob Dunhouse: There are other technologies that are good for use outdoors like the electrophoretic displays used in most of the newer e-Readers. But they have several limitations primarily in speed and color. For full color reproduction, speeds to support video applications and a technology that preserves contrast in high ambient light transflective panels provide a great solution. Remember, when shopping for an outdoor viewable display many get caught up in the numbers game. Big peak luminance figures over 1000 nits looks great but what I like to say to people who are shopping "shop luminance but by contrast". The key to outdoor viewing is the preservation of contrast and if a passive solution is available even the better.

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