OLED Switches Dominate in Electronic Device Design: Why and When to Use Them

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Display technology has become a key battleground when it comes to top of the line devices. From flat screen TVs to handheld gaming systems, we've seen major manufacturers debate the pros and cons of OLED vs LCD technology repeatedly over the past few years. The nuances of these two technologies have even trickled down to the consumer level where the purchase of a new TV or smartphone requires most users to compare the attributes of OLED vs LCD displays.

When designing the user interface of an electronic device, engineers consider some of the same qualities that consumers evaluate in choosing between Samsung and HTC handsets. The challenge design engineers face has become universal—they need to balance functionality with low power consuming devices.

Power consumption is a critical criterion for specifying illuminated switches that appear on just about every electronic and industrial device on the market. There are two ways to reduce power in such devices: strip down the device of unnecessary switches and use more energy efficient illuminated switches.

OLED and LCD programmable switches can minimize the number of switches that are needed in a device. These switches can dynamically handle multiple functions and replace a host of traditional switches and displays in a device. A handful of space-saving and battery-conserving programmable switches can do what it took hundreds of switches to do in the past. Engineers can now realize more feature-rich and longer-lasting designs.

Choosing between an OLED or LCD programmable switch requires a solid understanding of the differences between the two display technologies. Though they seek to accomplish the same purpose, OLED and LCD switches are not equal.

LCD and OLED Switch Basics

LCD, or liquid crystal display, programmable switches utilize a thin, flat panel made up of a number of either monochrome or color pixels filled with a liquid crystal material and typically arrayed in front of backlighting—thus providing the illumination necessary to create color and also to see the displayed characters or images in low-light situations. This method of illumination is effective and reduces power consumption over projection and plasma display technologies. In addition, with monochrome LCDs the backlighting isn't even necessary, thanks to their transflective nature, thus resulting in even better power consumption characteristics.

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OLED, or organic light emitting diode, switches, on the other hand, do not use backlighting even when displaying full color because they are actually emissive devices, meaning they emit light rather than transmit or reflect it. Instead of backlighting, OLED technology relies on thin organic layers to serve as the source of light. Between an anode and cathode layer, OLED programmable switches contain an organic conducting and emissive layer. When a current is applied and passes through the device, new electrons are injected which adds electron "holes" in the cathode layer. This conducting layer is made of organic plastic molecules, such as polyaniline, that transport the electron holes from the anode. The emissive layer consists of organic plastic molecules different from those in the conducting layer, such as polyflourene, which transport electrons from the cathode. This is how OLED displays produce light.

OLED Power Savings

Thanks to the solid state organic compounds at their core, OLED switches produce their own light and consume up to ten times less power than their color LCD counterparts using backlighting. This can equate to longer battery life in mobile devices where constant illumination is a necessity, such as when full color capability is desired.

OLED programmable switch technology has made it possible to have a switch that can play full motion video on its face. Imagine for a moment sitting in the security command and control center of a large Las Vegas casino. You're likely picturing a wall filled with high-end flat panel monitors attached to an extensive network of cameras strategically placed throughout the gambling floor tracking the movements of every would-be jackpot winner. Now think of the energy being used to power all those monitors and the equipment needed to combat the heat they are dissipating and keep the room at a comfortable temperature.

With that in mind, now picture that same security command and control center, but this time with only a few monitors sitting above a console filled with high-resolution OLED pushbutton switches, each being fed by and displaying video images from a security camera. As security personnel are monitoring the video feeds being displayed on the switches and they see something they want to take a closer look at, they simply push the OLED switch displaying the video feed of interest and up comes the image on the larger monitor. Think of the power that could be saved by implementing such a system.

Viewing Angle Considerations

OLED programmable switches also result in a larger viewing angle of 180 degrees. Because LCDs work by blocking light, they have an inherent viewing obstacle from certain angles. OLEDs produce their own light, so they have a much wider viewing range.

OLED has 50 times greater contrast than LCD products producing sharp, clear characters and images. They can also have faster response times than LCDs, particularly in colder or extreme environmental temperature situations.

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Longevity of OLED and LCD Switches

Just a few years ago LCD programmable switches had significantly better expected lifetimes that OLED switches, and this was a major selling point of LCD technology over OLED. However, OLED technology is quickly catching up to LCD technology in terms of longevity. OLED and LCD display life are nearing the same 30,000-50,000 hour lifespan, although LCD technology seems to retain its crispness just a little longer.

LCD display technology is fully matured and has essentially reached its pinnacle in innovation, whereas OLED technology is still advancing. Therefore, in designs where cost is a major issue and where some of the OLED functionality described above is not necessary, LCD programmable switches may be the best solution to improve device power management – especially in industrial equipment that needs to keep maintenance costs down.

The reason to opt for OLED or LCD depends on what is required from the device. Size, weight, brightness, power and field of view are all factors that come into play. Often times, however, it comes down to economics. The key is to critically analyze the device's design and determine which programmable switch display technology is best suited for the specific application of the device – and to look for ways to find the proper balance between power consumption and functionality at the right cost.

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