The Greening of the Switch

Using LCD and OLED Programmable Switches on Mobile Devices

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All the talk about “going green” over the past few years has had a huge affect on how design engineers develop new products. Beginning in the early part of this century with the RoHS directive, green initiatives have impacted nearly every aspect of designs – particularly in electronics and industrial applications. In many cases, going green will save money in the long run. For example, a compact fluorescent light bulb can save over US $30 in electricity costs over the lamp’s life time compared to an incandescent lamp and save 2,000 times its own weight in greenhouse gases.

Aside from reducing their speed from 70 mph to 55 mph in order to increase fuel efficiency by 23 percent on their morning commutes, design engineers are being challenged to balance functionality with low-power consuming devices.

Switching switches?

Power consumption is also evident when it comes to illuminated switches that appear on just about every electronic and industrial device on the market.

Switches are a critical component to any device. However, devices often have such vast arrays of switches that operate multiple functions that to make all these features accessible to users, and each illuminated switch requires power. Yet, the best option is not to stop using illuminated switches, which increase device usability.

The two main things that can be done to reduce power in such devices are to reduce the amount of switches on a device by using multi-functional or programmable switches, and to use more energy efficient illuminates switches. By using LCD and OLED technologies, engineers can realize more feature-rich and longer-lasting designs.

Combining functionality

The first consideration for design engineers is to strip down the mobile device of unnecessary switches, by looking at what features and functionality can be combined by multi-functional switches. This will minimize the number of switches that are needed. Engineers should not cut switches that will result in a loss of functionality, but in ways that will use existing switches more effectively.

In addition, the inclusion of specialized programmable switches that can dynamically handle multiple functions, such as programmable OLED and LCD switches should be considered. Such switches offer the capability of replacing a multitude of traditional switches and displays with just a few space- and battery-saving devices.
LCD or OLED – which is right for me?

Though both OLED and LCD programmable switches seek to accomplish the same purpose, there are a few differences in the two technologies.

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 quite power conscious. In addition, with monochrome LCDs the backlighting isn’t even necessary, thanks to their transflective nature, thus resulting in even better power consumption characteristics.

OLED, or organic light emitting diode, switches, on the other hand, do not use backlighting even when a displaying full color because they are actually emissive devices, meaning they emit light rather than transmit or reflect it. In essence, thanks to the solid state organic compounds at their core, OLED switches actually produce their own light.

OLED power savings

Instead of backlighting, OLED technology relies on thin organic layers to serve as the source of light. In between an anode and cathode layer, OLED programmable switches contain an organic conducting layer 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.

By using this approach for illumination, OLED switches consume less power than their color LCD counterparts using backlighting—up to ten times less—which can equate to longer battery life in mobile applications where constant illumination is a necessity, such as when full color capability is desired.

OLED programmable switches also often result in wider viewing angle, sharper picture quality for even easier viewing of small characters and images and can boast a faster response times than LCDs, particularly in colder or extreme environmental temperature situations.

Longevity of LCD

However, it is important to note that the actual displays on LCD programmable switches do tend to have better expected lifetimes than OLED switches. The typical LCD display has an approximate lifetime of 50,000 hours, whereas OLED displays carry an expected lifetime of around 15,000 hours. Although, it is estimated that within a year, the lifetime of OLED displays will be double in life expectancy thanks to technological advancement around this burgeoning technology.

LCD display technology is fully matured and has essentially reached its pinnacle in innovation, whereas OLED technology is still very much new and the associated research and development costs are
reflected in their higher price. 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 mobile device power management – especially in industrial equipment that needs to keep maintenance costs down.

**A common sense approach**

Engineers don’t have to use recycled shopping bags to do their part in providing energy savings and cutting operational costs of the devices they design. They can simply make common sense decisions as they make decisions in the section of switching components they incorporate into their device designs. Traditional electromechanical switches may be ideal for many applications where OLED and LCD programmable switches are not required, yet engineers can still find the proper balance between power consumption and functionality easier to overcome in many design situations. 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 they can cut the right type of costs from their designs.