



Light Matters

Designing illumination systems with high-brightness LEDs

Recently, I highlighted a very interesting CoB (Chip-on-Board) LED array from Sharp Microelectronics, called the "Tiger Zenigata".

The CoB concept entails placing tens to hundreds of individual tiny LED die in an array on a thermally-conductive substrate such as metal or alumina ceramic, then covering the entire area with a layer of phosphor. The result is an intense light source ideal for area-type lighting such as floodlights, street lights, down lights, etc. CoBs simplify the process of manufacturing a solid state lighting product because they are a single component- you no longer have to select, purchase and assemble your own array of LEDs in these applications.

The Tiger Zenigata is a CoB which actually incorporates two individual strings of LED die under two intermeshed phosphor coverings. One set provides warm white, the other provides cool white. Thus, with the right external circuitry, you can develop an LED light that has "color tunable" capability- it can vary from a warm (reddish) white of 2700 K to a cool (bluish) white of 5700 K smoothly, mimicking the characteristic dimming profile of an incandescent bulb, or change its color temperature programmatically.

The timing is perfect. Texas Instruments has just introduced an advanced two-string LED driver IC, the TPS92660. Most other LED driver ICs are single-channel, so building a color tunable LED lamp would normally require extra ICs, components and a larger PCB area.

A second factor to consider is "trimming". Based on the semiconductor manufacturing process used to fabricate LEDs, there is some inherent device-to-device variance of intensity and color temperature. As a result, even if the desired "mix" of warm and cool white light is intended to be pre-set at a particular color temperature, a small offset in the drive level to one set of LEDs is often necessary for uniformity. Texas Instruments anticipated this requirement and addressed it very elegantly; the TPS92660 has an internal non-volatile memory which can be programmed to "correct out" slight binning differences between LEDs.

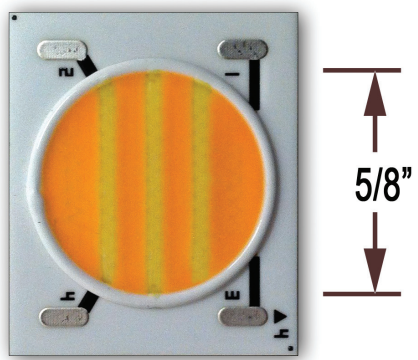


Figure 1—The Sharp "Tiger" High-Power LED array from Avnet and Silica. A single package with individually-controllable warm and cool LED arrays.

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I thought it would be interesting to combine the TPS92660 and Sharp Tiger Zenigata into a color-tunable "concept light", for display at LIGHTFAIR International in Philadelphia last month. LIGHTFAIR is the world's largest annual architectural lighting conference and exhibition, and Avnet participates every year with interactive exhibits based on new LED technology. You can see

the result at <http://youtu.be/F1geJ0vwJwo>, or by searching YouTube for the terms "TPS92660", or "Eskow Zenigata", etc.

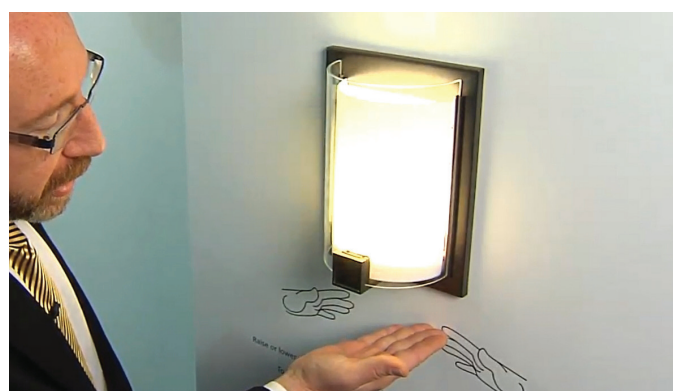


Photo 1—A simple Gesture-Controlled, Color-Tunable LED Sconce exhibited at LIGHTFAIR using components from TI, Sharp Microelectronics and TE Connectivity.

To make it a bit more fun, I used two Sharp IR distance sensors and a small MCU to track hand motion- so brightness and color temperature are "gesture controlled".

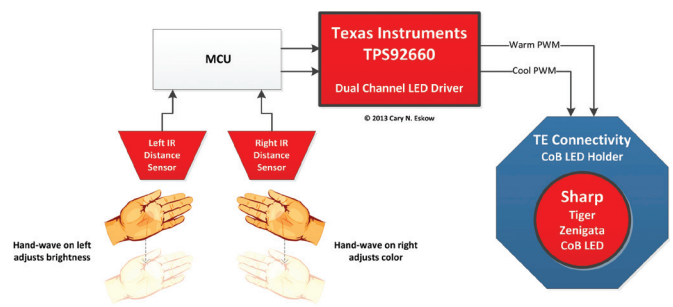


Figure 2—Block diagram of the Gesture-Controlled Sconce.

For more information on the Sharp Tiger Zenigata CoB LED or Texas Instruments' TPS92660 Two-String LED Driver IC, contact Silica in Europe (<http://www.silicalighting.eu>) or Avnet in the Americas (www.em.avnet.com). Avnet also provides TE Connectivity's CoB LED holders – highly recommended to simplify assembly.

Your questions and comments are always welcome. This and other Light Matters articles are downloadable at www.em.avnet.com/LightSpeed

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To learn more about designing an LED-based illumination system, go to:
www.em.avnet.com/LightSpeed