

Multi-Chip/Quad-Lens Fixtures vs. Single-Chip/Single-Lens RGB Fixtures

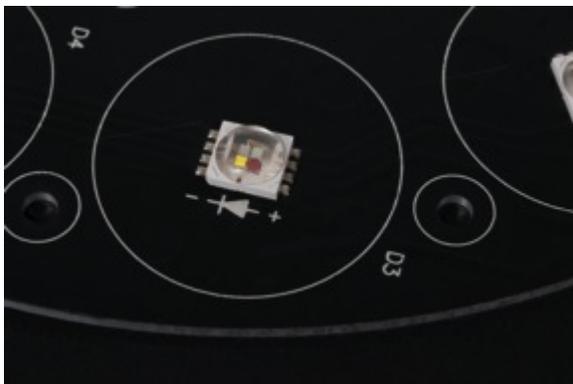
By Eric Loader, director, and Michael Giardina, product manager, Acclaim Lighting

In the world of LED lighting for architectural use, single-chip/single-lens red-green-blue (RGB) fixtures primarily get the call. Why? The decision often begins and ends with lumen output. Simply put, single-chip/single-lens fixtures provide about 15 percent more lumens than their multi-chip/quad-lens counterparts. But with multi-chip fixtures relatively new in architectural applications, there are other not-so-well-known factors to consider. Given numerous advantages, quad-lens fixtures in many instances can provide the best fit in architectural applications, including illumination and accent lighting for buildings, facades, columns and other structures as well as pathways and landscapes.

Dissecting the Technology

Single-chip/lens fixtures contain only one color (red, green or blue) either as a single lamp or in a group of lamps under a lens. Multi-chip quad-lens fixtures, conversely, contain four colors (including white or amber) under a single lens.

Multi-Chip



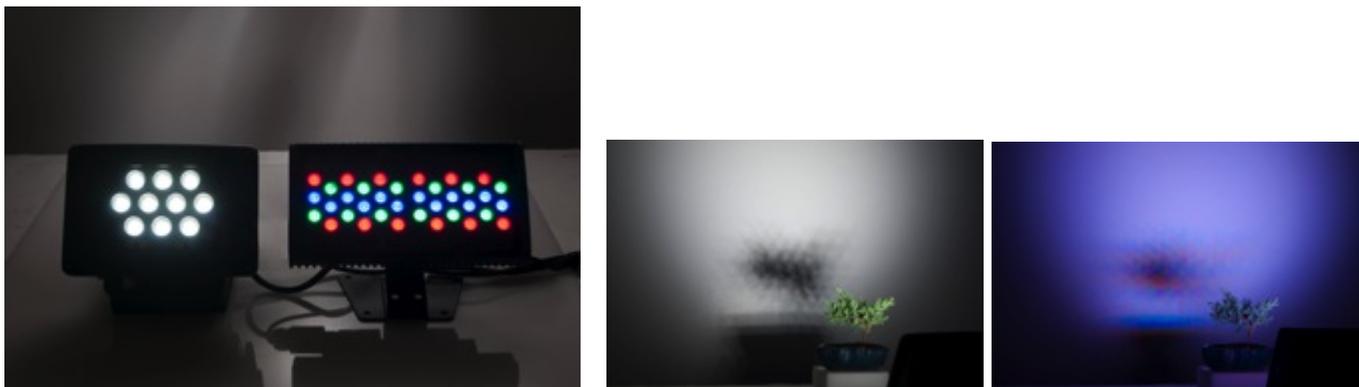
Single-Chip



That leads to an important distinction: Multi-chip/quad-lens units mix colors together inside of the lens, whereas single-chip/lens fixtures mix colors outside of the lens. Color mixing within the lens results in more

precise color matching and improved aesthetics where the fixtures themselves are visible. Aesthetics arise in this discussion because single-chip lens fixtures deliver only one color through the lens. To project a blended color, red, green and blue fixtures may be placed in a row, providing a 'carnival' or "lite-brite" look of red, green and blue light.

(PHOTO ON LEFT) Multi-chip/quad- lens fixture on left with color mixing within the lens. Note the "lite-brite" effect with outside-the-lens color mixing used in the single-chip/single-lens fixture on the right. (CENTER PHOTO) Projected light from multi-chip/quad-lens fixture on full. (PHOTO ON RIGHT) Projected light from single-chip/quad-lens fixture on full. Note the difference in projected white color with both fixtures placed on full.



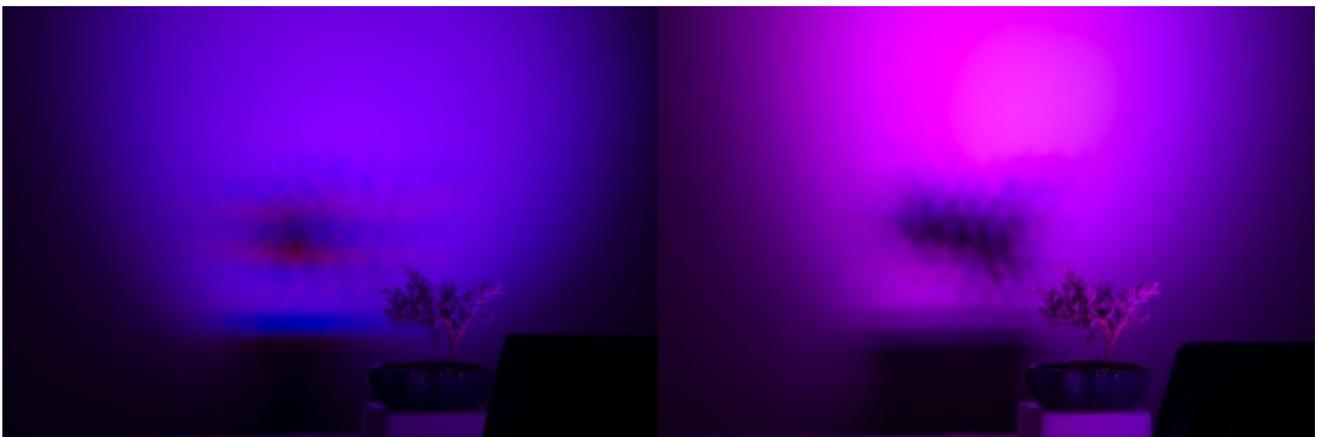
For example, when users seek magenta out of a traditional RGB fixture, they will see red and blue LEDs. Conversely, with a quad-lens LED fixture designed to deliver magenta, you will only see magenta coming out of the lenses. This innovation removes the stigma surrounding the use of LED technology in applications where fixtures can be seen.

(PHOTO ON LEFT) To produce magenta, the multi-chip/quad-lens fixture at left only shows magenta coming out of the lenses while the single-chip/single-lens fixture shows red and blue LEDs. (PHOTO ON RIGHT) To produce cyan/aqua, the multi-chip/quad-lens fixture at left only shows cyan/aqua coming out of the lenses while the single-chip/single-lens fixture shows green and blue LEDs.



On top of that, mixing occurs over a distance with single-chip/lens fixtures, so if the projection length is short, rainbow effects and color striping will occur. Quad-lens fixtures—because the individual colors mix under the lens—project a blended color from the start. So an ideal color mix travels the entire length of projection – a true homogenized beam.

The photos on the left show output from multi-chip/quad-lens fixtures as opposed to lower-quality output from single-chip/single-lens fixtures.





Overall, these advantages allow placement of quad-lens fixtures in plain sight and provide an appealing visual of the light source as well as its projection. With similar costs and energy usage, and using only slightly larger housings, multi-chip/quad-lens fixtures are ideal for almost any architectural application.

Commercial Evolution of LED Lighting

Elation Lighting Inc., Acclaim Lighting's sister company and a leading manufacturer in the entertainment-lighting market, was one of the first to offer LED fixtures for stage and theatrical lighting in 2003. These fixtures employed single-chip/lens RGB color mixing with single diodes and optics positioned over each lens. In 2007, the company was one of the first to adopt surface-mounted tri-color lighting fixtures (with RGB mixed under the lenses) for the entertainment market. Quad-color technology arrived in 2009, with white added to the traditional RGB setup. Elation Lighting, based on the success of tri-color fixtures, instantly added quad-color technology to its roster.

Cree Inc., an LED-packaging innovator, led the quad-lens revolution by combining 4-in-1 LED clusters with output lenses from several optical-lens manufacturers. This marriage of technology enabled ideal under-the-lens color mixing. Cree's 5- or 10-watt-per-package MCE LEDs, available in single color, multi-color RGB or dynamic white, allowed architects and lighting designers to expand their offerings. Osram Opto Semiconductors, with its Ostar LEDs, also joined the quad-color race with a 15-watt package offering increased efficacy and performance. Cree now also offers a 15-watt package, the XML series.

The quad-color addition of the white LED--whether 4,000 K or 5,600 K color temperatures from Cree Inc. or 5,600 K from Osram Opto Semiconductors--gave lighting designers increased color options in the pastel range as well as the ability to produce true white in various color temperatures by adding RGB to the white LED.

Both companies also offer tunable white versions with warm and cool white LEDs in the 2,700-10,000 K range that provide 500-lumen output.

Other well-known multi-chip manufacturers in the quad-color game include ProLight Opto Technology Corp. and Opto Tech Corp. ProLight now offers RGBA (amber) or RGBW (white) 5-watt and 10-watt packages. Development continues with 6-in-1 multi-chips– RGBAW+UV – that are making their way into entertainment lighting fixtures in 2013.

Consider Multi-Chip LEDs for Architectural Applications

Backed by so much innovation among LED suppliers, Acclaim Lighting realizes quad-color’s potential in the architectural market. Tri- or quad-color LED technology can outperform traditional single-lens RGB technology -- providing excellent color range and a homogenized effect from the lighting fixture. The result is a more natural and appealing lighting effect in many applications.

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(BOX/GRAPHIC) Multi-Chip/Quad-Lens Fixtures Compared to Single-Chip/Single-Lens RGB Fixtures

Advantages:

- Visual improvement when fixture is in sight
- Homogenized beam
- No multi-color shadows
- Broader color gamut
- Smaller-width fixture face

Disadvantages:

- Slightly deeper fixture needed to fit optics
- Lower lumens / watt efficacy not as high

Ties:

- Cost
- Life span
- Energy usage
- Mounting capability