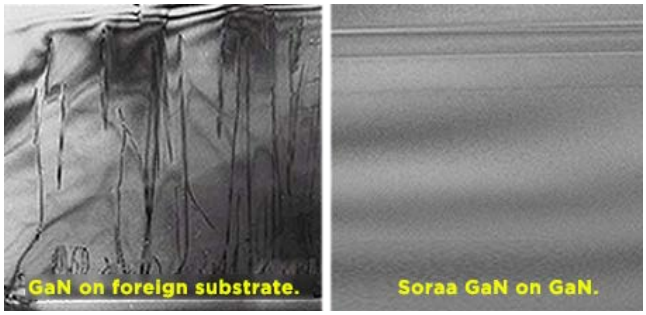
TECHNOLOGY

GAN ON GAN

GAN ON GAN

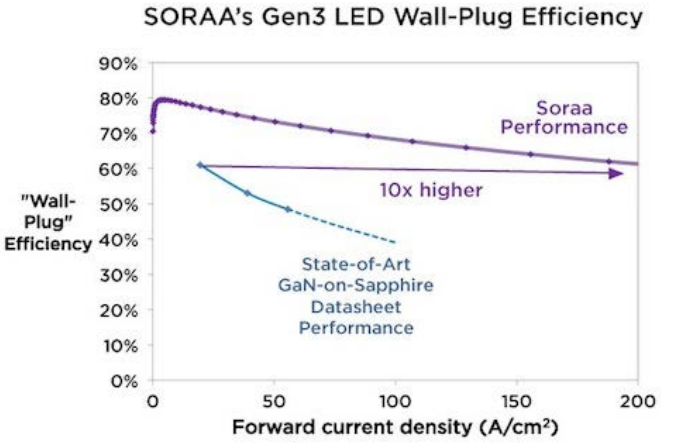


SIMPLY PERFECT CRYSTALS

The main advantage of Soraa's GaN on GaN (Gallium Nitride on Gallium Nitride) LED material is that it allows reliable operation at very high current densities. With a 1000x fewer defects than conventional LEDs (which build GaN layers on cheaper foreign substrates like sapphire, silicon carbide, or silicon) Soraa's LED has a near-perfect crystal structure. This enables Soraa LEDs to emit more than 5x more light per unit area of LED material than conventional LEDs. GaN on GaN's optical transparency and high thermal and electrical conductivity also enable a very robust, simple LED design that delivers maximum light output and performance.

RECORD-SETTING INNOVATION

Soraa's third generation (Gen3) GaN on GaN™ LED achieves world-record setting wall-plug-efficiency, outperforming the nearest competitor by 20% at normal operating conditions. In just one year, Soraa has achieved a remarkable 30% increase in white lumen per watt (lm/W) efficiency over its prior generation LED, setting a pace of technology evolution unrivalled in the LED industry. The company's Gen3 LED runs at 75% wall-plug-efficiency at a current density of 35A/cm2 and a junction temperature of 85°C, efficiency levels that are out of reach for other LED manufacturers. Soraa leverages the properties of the native GaN substrate and a chip-on-board LED package design to create a very robust, single point source that enables excellent beam control.



Source: Competitor data sheet, and Soraa internal data at 85°C junction temperature

TECHNOLOGY

GAN ON GAN VP3 VIVID COLOR VP3 NATURAL WHITE POINT SOURCE OPTICS

VP3 VIVIDCOLOR™

SIMPLY PERFECT COLOR

In the past century, a parade of energy-efficient lighting technologies have held out the promise of earth-friendly light. But in this rush to energy-efficiency, we've forgotten something very basic: color is as ancient and as important as light.

Humans understand color – in the million years we've walked the earth, our eyes, our brains, and our bodies have learned what perfect, full-spectrum light means. Our behaviors, our emotional well-being, and our human interactions depend on seeing colors as we are meant to see them.

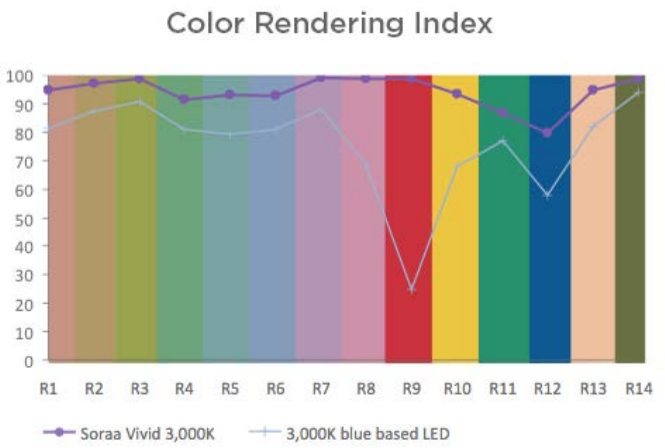
When all the technological complexity is said and done, Soraa offers you simplicity. Simply Perfect Light. Energy efficient AND true in every color of the rainbow. VP3 VIVID COLOR.

NUANCES OF COLOR IN WHITE LIGHT

Many lighting technologies, including blue-based LEDs, have reduced quality of light to the starkness of color temperature. In that world, your choice of white light simply comes down to: warm white or cool?

This ignores the importance of color rendering: do your colors appear as they would in natural, full-spectrum light? At the most basic level, color rendering of a light source is defined by CRI, which uses a defined set of 8 pastel colors and measures how true-to-natural they appear when illuminated by the source. Since most of us do not live in a pastel world, a practical and meaningful extension of CRI is to include deep colors, in particular a 9th color, red, whose rendering is defined by the metric R9.

Soraa abandons this one-color-at-a-time approach in favor of a unified idea. A continuous spectrum, in which all colors – pastels, vivids, and everything in between - appear as they are meant to be.



Superior rendering of all colors with Soraa VIVID

TECHNOLOGY

VP3 NATURALWHITE™

Competitor LED

SORAA LED

SIMPLY PERFECT WHITES

Violet light resides at the tail of the visible spectrum, and most of the time we do not think too much about it. After all, we were all taught that red, green, and blue makes white light. So we hardly noticed when blue-based LEDs killed violet.

But color scientists have long known that violet light plays an all-important role in our perception of another color – white. White in all its shades is ubiquitous in our environment. Whites convey the emotional meaning of clarity, brightness, and space. Manufacturers and marketers strive to create ever whiter whites. And the color of light that allows us to see true whites is violet.

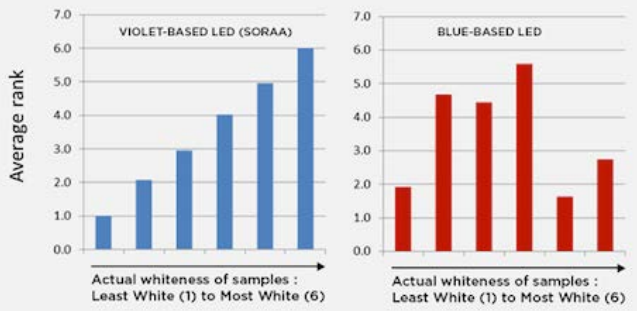
Soraa offers a solution that is radical in its simplicity. Simply Perfect Whites. VP3 NATURAL WHITE.

THE SCIENCE OF WHITES

Our perception of whiteness is strongly influenced by the presence of fluorescent whitening agents in both natural objects (like teeth), and manufactured objects (like clothing and paints). These whitening agents are excited by the violet content in visible light, which our historical light sources – daylight, incandescents, and halogens - have contained. Thus, we live in a world with infinite shades of whiteness, determined by the level of fluorescence in each object.

Increasing adoption of blue-based LEDs now threatens this nuanced world. With their complete lack of violet content, peer-reviewed academic research shows that blue-based LEDs wash out the differences between whites. Bright or creamy, all whites look the same, yellowish and dull, and we lose the ability to tell one from the other.

The same research shows that with Soraa's violet-based LEDs, whiteness choices are as clear as the day.



Test subjects were asked to rank calibrated white samples accurately from least white (Rank 1) to most white (Rank 6).

Under a blue-based LED, the ranking was random, as subjects could not tell one white from another.

Under a violet-based LED, they ranked the samples perfectly.

Source: Kevin W. Houser, Minchen Wei, Aurélien David & Michael R. Krames (2014) "Whiteness Perception under LED Illumination", LEUKOS: The Journal of the Illuminating Engineering Society of North America, 10:3, 165-180

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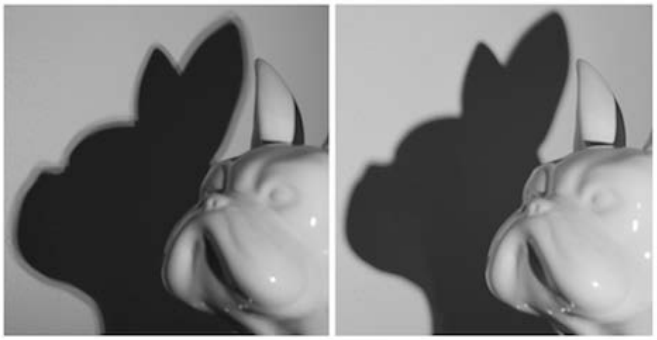
POINTSOURCEOPTICS™



Clear single shadows with Soraa **POINT SOURCE OPTICS**

SIMPLY PERFECT BEAMS

Directional lighting poses several stringent requirements which LED lighting manufacturers must meet: well controlled beam angles from 9 degrees to 60 degrees; tight form factors often established based on their halogen predecessors; uniform color across the beam; and sharp single shadows like halogen and incandescent lamps.

The relatively large size of most LED light sources makes this a challenge. Fundamental laws of optics dictate that large sources in small form factors result in wide beam angles. Color variations across the LED light source are often clearly seen in the beam. And the multiple-source-arrays of LEDs used to create sufficient lumen output cast multiple shadows, obscuring detail in colors and textures.

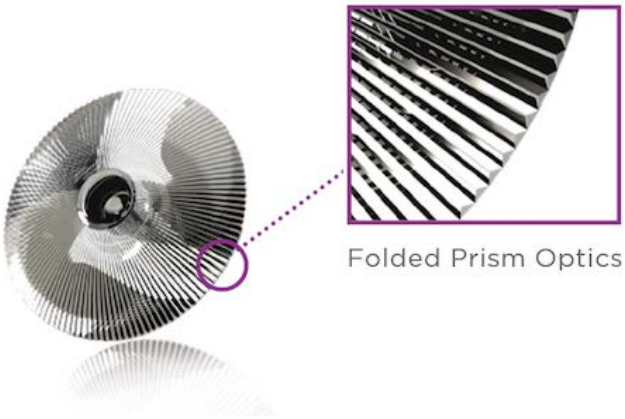
Soraa's answer to these challenges is a tour-de-force of integrated LED and optical engineering. Simply Perfect Beams. POINT SOURCE OPTICS.

POINTSOURCEOPTICS™

The nearly flawless crystal structure of Soraa's GaN on GaN™ LED allows it to operate at currents that are more than five times higher than LEDs built on non-GaN substrates. As a result, Soraa's LED emits five times more light from a given LED area than any other LED.

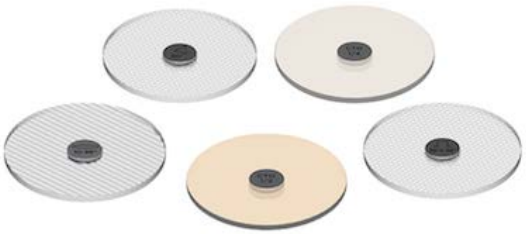
A lot of light from a very small source means… a point-source LED! Those same laws of optics that hinder beam design with large multiple light sources become an asset with a small single source. To that, we add innovative folded optics with precision-cut prismatic lenses, which allows us to focus beams within a very compact optical envelope.

With a point source and sophisticated folded optics, Soraa creates very narrow beams in form factors as challenging as the compact MR16 and the low-profile AR111. Every one of them



PRODUCTS

SNAP SYSTEM

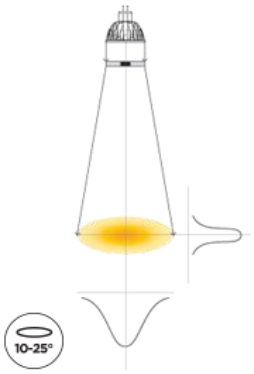


UNLIMITED POSSIBILITIES

The Soraa Snap System is the first LED lamp/accessory solution that is optimized to work as an integrated system. Based on high brightness single source GaN on GaN™ LED technology combined with an innovative set of magnetic filters and lens attachments, it completely redefines accessory application.

SHAPE BEAMS

Now you can achieve multiple distributions with single lamp specification, apply beam shapes that were never before possible, and fine tune installations for unique conditions and requirements. The Snap System has several beam shaping attachments, including beam spreaders, linear lenses, and "flat-tops" that provide rectangular beam distribution patterns to perfectly illuminate furniture, art, and other rectangular objects.



SHIFT COLOR

The Snap System's CCT Shifter filters can provide color temperatures that are rare or impossible to find, like a warm, glowing natural 2200K CCT, providing excellent flexibility and freedom to adapt many color temperatures to any installation while specifying only one lamp. The Soraa lamps' clean light and excellent color rendering are a perfect match for CCT shifting.

DOWNLOAD SNAP SPEC SHEET

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