

DATE

PROJECT

TYPE



R4 and R6 LED Downlights with BIOS SkyBlue™ Circadian Lighting Technology

PRODUCT DETAILS

Dynamic 24-Hour Lighting Solutions to Regulate Circadian Systems and Create Healthier Spaces

BIOS SkyBlue™ Circadian Lighting Technology brings the benefits of blue skies inside by emulating the makeup of nature’s light spectrum.

Light sends signals to the body that create biological responses, many associated with the body’s internal 24-hour clock, or circadian system. These signals can impact mood, hormone production, energy levels, alertness, fatigue and more.

BIOS LEDs are expertly designed to generate psychological and biological responses, offering the most comprehensive approach to wellness lighting. BIOS LEDs provide high daytime stimulus by pin-pointing the peak sensitivity of the ‘sky blue’ visible light spectrum wavelengths, approx. 490nm, needed to effectively communicate and trigger circadian response.

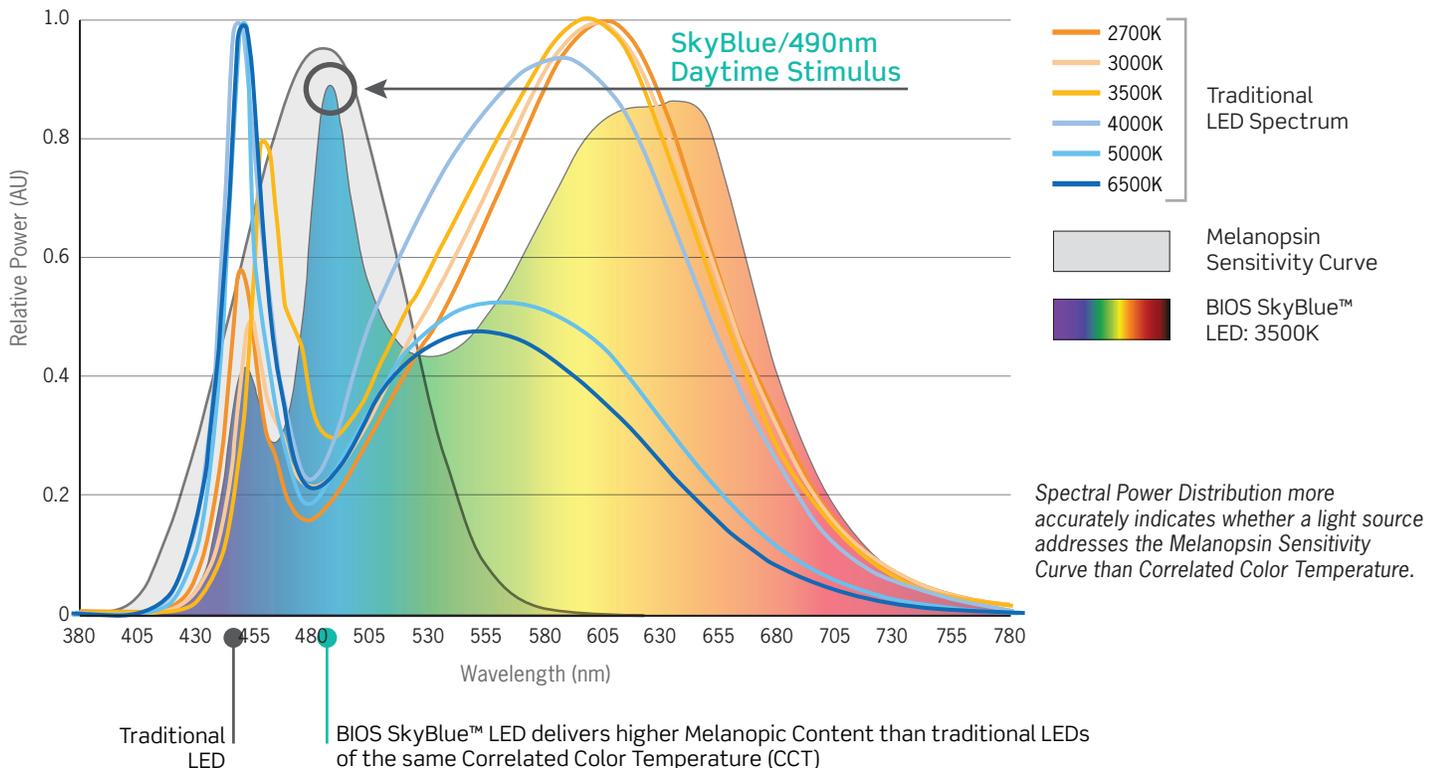
BIOLOGICAL BENEFITS

- Strengthens Your Circadian Rhythm
- Increases Alertness
- Enhances Productivity
- Boosts Mood
- Promotes a Better Night Sleep

PERFORMANCE COMPARISONS

Spectral Power Composition and M/P Ratios: BIOS SkyBlue™ LED Compared to Traditional LEDs

The body’s biological response to light can be measured by the melanopic (non-visual) to photopic (visible light) ratio called the M/P ratio. During the day, a high M/P ratio is optimal, while at night a low M/P ratio is best.



For additional information, visit www.bioslighting.com

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CIRCADIAN LIGHTING SOLUTIONS: TUNABLE AND STATIC BIO-DIMMING™ MODULES



Tunable Bio-Dimming™ Module

- Senior Living
- Hospitality
- Factories
- Residential
- Neonatal Intensive Care Unit/NICU

BIOS SkyBlue **Tunable** Bio-Dimming is best suited for 24-hour facilities or evening applications, where full light output is desired as the day progresses, but also a need to minimize circadian impact in the evening.

When dimming, the sky blue wavelengths are removed first, resulting in a modest color temperature shift to 2700K. This provides both psychological and biological benefits without a harsh change in CCT. This shift occurs within the first 20% of the dimming profile.

In the remaining 80% of the dimming profile, light output is reduced, enabling a standard linear reduction of the sky blue depleted spectrum.

Tunable Bio-Dimming adds the ability to fine-tune and dim-down the sky blue signal as desired, calibrate light levels and regulate spectral changes.

Compatible with all standard dimming and control protocols, making installation easy and inexpensive.

Static Bio-Dimming™ Module

- Schools
- Sports Facilities
- Offices
- Retail
- Healthcare Facilities
- Outpatient Clinics
- Factories

BIOS SkyBlue **Static** Bio-Dimming supports proper daytime circadian stimulus, best suited for day-only applications.

- Color of light remains constant throughout the day:
 - 490nm 'Blue Boost' does not reduce during the day
 - Apparent CCT of 3000K, 3500K or 4000K remains constant
- High Melanopic to Photopic (m/p) ratio:
 - While m/p ratio will remain constant if light level is dimmed, EML (Equivalent Melanopic Lux) and CS (Circadian Stimulus) values will be affected due to reduced vertical illuminance

A steady, but invisible, sky blue signal boost to white light is delivered throughout the day for high daytime circadian stimulus. When dimming, these sky blue wavelengths remain as overall light intensity is dimmed down.

Compatible with all standard dimming and control protocols, making installation easy and inexpensive.

BIO-DIMMING™ PROTOCOLS

TUNABLE BIO-DIMMING PROTOCOL			
DIMMER LEVEL	CCT	SKYBLUE %	LIGHT OUTPUT
100%	Initial CCT 3000K/3500K/4000K	100%	100%
99% - 81%	Gradual Shift down to 2700K	100% - 0%	100%
80%	2700K	0% No SkyBlue Wavelengths	100%
79% - 0%	2700K	0% No SkyBlue Wavelengths	Linear Dimming

STATIC BIO-DIMMING PROTOCOL			
DIMMER LEVEL	CCT	SKYBLUE %	LIGHT OUTPUT
100%	Initial CCT 3000K/3500K/4000K	100%	100%
99% - 0%	Initial CCT 3000K/3500K/4000K	100%	Linear Dimming

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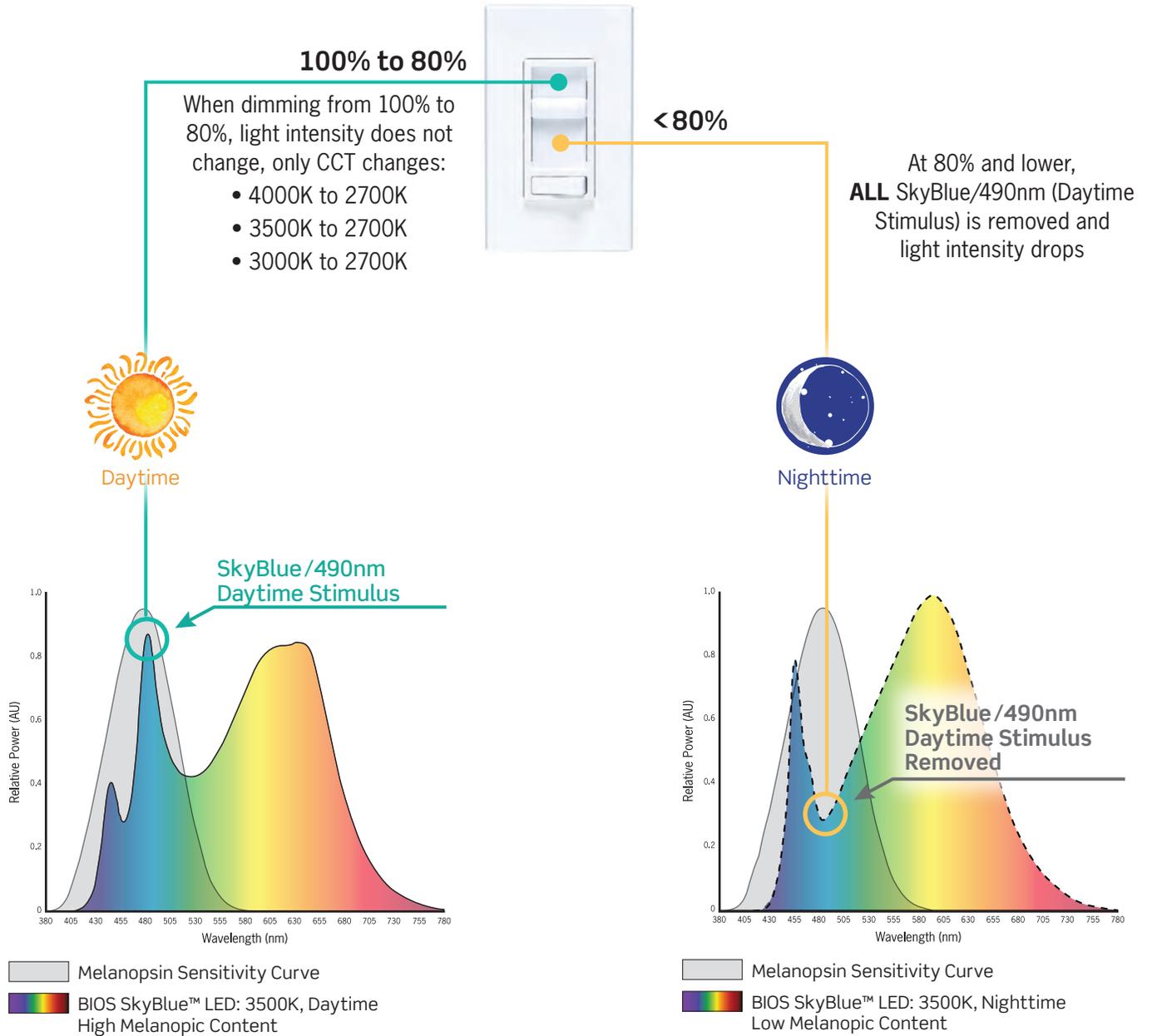
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TUNABLE BIO-DIMMING™



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WELL BUILDING STANDARDS

BIOS SkyBlue™ LED contributes to satisfying Circadian Lighting Design Features and meets other features within the WELL Light Concept, including color quality and visual comfort metrics; helping buildings deliver more thoughtful and intentional spaces that enhance human health and well-being.

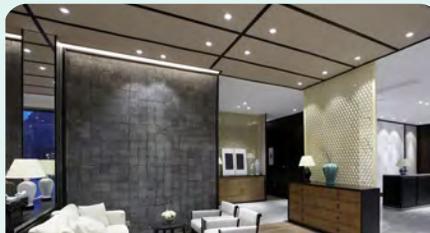
Circadian Lighting Design

WELL v2™ Feature L03

Provide users with appropriate exposure to light for maintaining circadian health and aligning the circadian rhythm with the day-night cycle

*EML (Equivalent Melanopic Lux) is a measurement of the effect of both natural and electric light on the human circadian rhythm.

BIOS SkyBlue™ LED



Maintains Lighting Design Intent

- Highest M/P Ratio for a given CCT
- Most effective technology to help meet EML* vertical light requirements

Traditional White LED



Increase Fixture Quantity

- More luminaires required to achieve higher light levels on vertical surfaces
- Increases energy use and lighting power density within the space

Glare Control

WELL v2™ Feature L04

Manage glare by using strategies, such as calculation of glare and choosing the appropriate light fixtures for the space



Visually Comfortable / Energy Efficient

- Higher M/P Ratio means fewer luminaires needed to illuminate the space
- Naturally minimizes amount of glare



Increase Glare / Increase Energy

- Higher output luminaires are needed within the space to meet EML targets
- Increases energy use
- Probability of increased glare and visual discomfort in the space

Electric Light Quality

WELL v2™ Feature L07

Develop and implement strategies to create a visually comfortable lighting environment



Desirable CCT / Great Color Quality

- 80+ CRI
- Ultra High R9 (>90)



Increase CCT / Decrease Color Quality

- Higher CCTs (5000K, 6500K) required to achieve the target EML values
- Does not meet R9 requirements