

Chip-on-Board

SkyBlue™ LED Circadian Solutions

bios

Circadian Lighting Without Compromise

BIOS SkyBlue™ Circadian LED solutions include a blue peak at 490nm, giving you the health and wellness benefits of a “blue sky”, supporting healthy circadian rhythms and improved daytime alertness. BIOS COBs encompass a complete family, with a standard optical and mechanical interface, and compatible with off-the-shelf optics and holders. These standardized features make it easy to design and control downlights, pendants, and directional fixtures for circadian lighting - without compromising color temperature or requiring additional illumination.

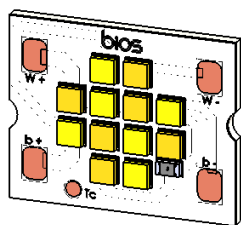
Daytime + Evening Solutions

BIOS COBs are available for Day-to-Evening applications: you can choose from Biological Dynamic and Biological Tunable. Biological Dynamic and Tunable maintain light output while reducing circadian light signals for evening use. The day-to-evening light engines pair with any single-channel driver and any dimming interface. BIOS Day-to-Evening Solutions are available in 3000K, 3500K, and 4000K and are compatible with two-channel color tuning systems.

Daytime Only Solutions

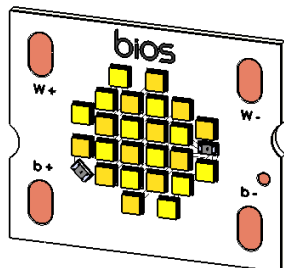
BIOS COBs are also available in Biological Static SkyBlue™ spectrum for high daytime circadian stimulation. BIOS Static SkyBlue™ Solutions are ideal for day-only applications (such as offices, schools, outpatient clinics, etc.).

Chip-on-Board Features + Applications



COB Features

- High lumen density for directional lighting
- Enables system beam angles from 10° to 80°
- $L_{70} > 54,000$ hours
- 9,000 hour LM-80 tested
- Specified “hot” performance at $T_j = 85^\circ\text{C}$
- 100% factory tested at $T_j = 85^\circ\text{C}$
- Environmentally friendly: RoHS and REACH compliant
- ‘UL Recognized’ component

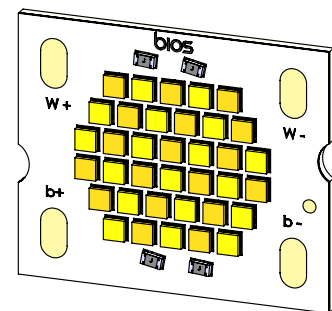


Luminaire Profiles

- Downlights
- Specialty
- Multiples
- Decorative
- Directional
- Accent Lights
- Cylinders
- Low Bay Fixtures
- Pendants
- Retrofit

Applications

- Healthcare Facilities
- Senior Living
- Sports Facilities
- WELL Buildings
- Hospitality
- Schools
- Offices
- NICU
- Factories
- Retail
- Residential



Pursuant to the terms and conditions set forth in our Limited Warranty, Biological Innovation and Optimization Systems, LLC (“BIOS”) warrants its BIOS SkyBlue™ COB Linear and Tape LED components (collectively known as the “Product”) against defects in materials or workmanship for a period of five (5) years from the original date of purchase.

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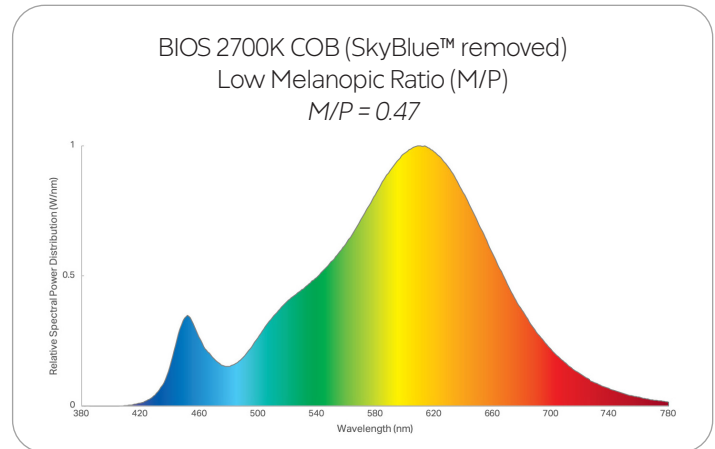
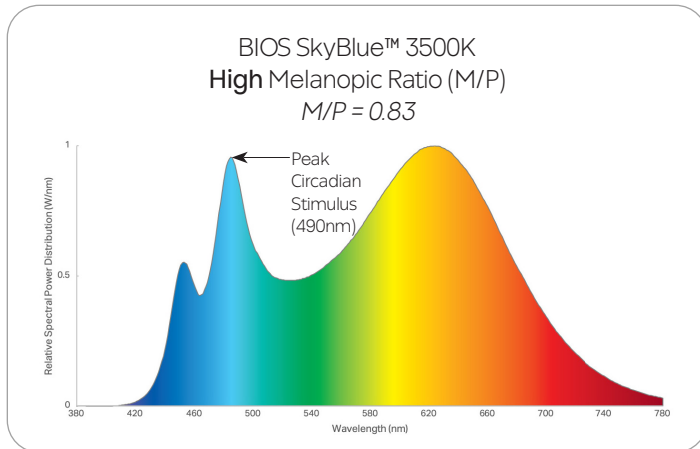
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Chip-on-Board Spectral Power Distribution

BIOLOGICAL TUNABLE WHITE SPECTRUM

Daytime → Evening

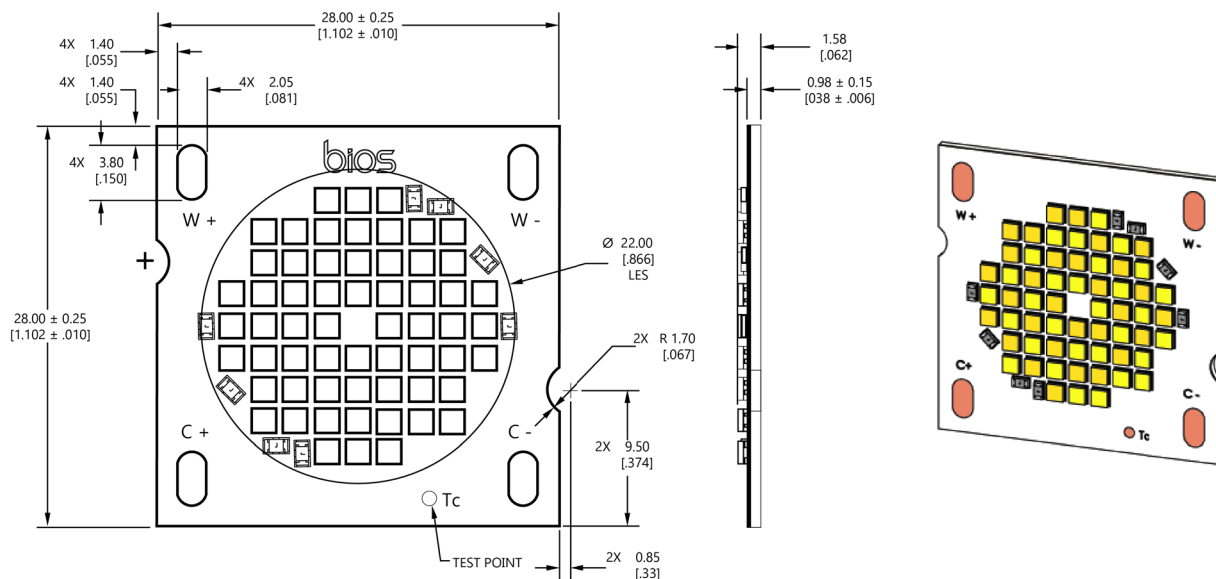


Note: BIOS Biological Static Solutions includes BIOS SkyBlue™ Daytime Spectra only. BIOS Biological Dynamic and Biological Tunable Solutions include both SkyBlue™ Daytime and BIOS Evening Spectra.

COB Dimensions and Details

22 mm COB (BH-CCOB-8XX-22MM01-1)

**Contact factory for order inquiries or more information on 22mm COB profile, estimate 16 week lead time.*



Note: Dimensions outside parentheses are in millimeters. Dimensions inside parentheses are in inches.

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COB - Full Part Numbers

BIOLOGICAL STATIC / BIOLOGICAL TUNABLE

BIOS SkyBlue™ Performance Characteristics

Data Shown for Ambient Temperature (T_a) = 25°C

BIOS Part Number	Label	COB LES Size (mm)	Daytime		Evening ¹		Current		Lumens		Efficacy	CRI	R9
			CCT	M/P ²	CCT	M/P ²	Nominal	Max.	Nominal	Max.	Typ. lm/W		
BH-CCOB-830-22MM01-1	CTM-22-2730-80-36-TWPR	22*	3000K	0.74	2700K	0.44	Consult Factory	→					
BH-CCOB-835-22MM01-1	CTM-22-2750-80-36-TWPR	22*	3500K	0.83	2700K	0.44	Consult Factory	→					
BH-CCOB-840-22MM01-2	CTM-22-275C-8X-36-TWPR	22*	4000K	0.90	2700K	0.44	Consult Factory	→					
BH-CCOB-830-18MM01-1	CTM-18-2730-80-36-TWPR	18	3000K	0.72	2700K	0.44	600	1100	2100	3325	115	83	90
BH-CCOB-835-18MM01-1	CTM-18-2750-80-36-TWPR	18	3500K	0.80	2700K	0.44	600	1100	2200	3600	120	83	90
BH-CCOB-840-18MM01-2	CTM-18-275C-8X-36-TWPR	18	4000K	0.90	2700K	0.44	600	1100	2500	4000	125	83	90
BH-CCOB-830-14MM01-1	CTM-14-2730-80-36-TWPR	14	3000K	0.72	2700K	0.44	400	800	1375	2600	115	83	90
BH-CCOB-835-14MM01-1	CTM-14-2750-80-36-TWPR	14	3500K	0.80	2700K	0.44	400	800	1475	2825	120	83	90
BH-CCOB-840-14MM01-2	CTM-14-275C-8X-36-TWPR	14	4000K	0.90	2700K	0.44	400	800	1650	3150	125	83	90
BH-CCOB-830-09MM01-1	CTM-9-2730-80-36-TWPR	9	3000K	0.72	2700K	0.44	200	400	675	2600	115	83	90
BH-CCOB-835-09MM01-1	CTM-9-2750-80-36-TWPR	9	3500K	0.80	2700K	0.44	200	400	750	1425	120	83	90
BH-CCOB-840-09MM01-2	CTM-9-275C-8X-36-TWPR	9	4000K	0.90	2700K	0.44	200	400	825	1550	125	83	90

*Contact factory for order inquiries or more information on 22mm COB profile, estimate 16 week lead time.

¹ Evening spectra are only available for Biological Tunable and Biological Dynamic Solutions. BIOS Biological Static solutions only include BIOS SkyBlue™ daytime spectrum.

² M/P - The melanopic ratios (M/P) provided are m-EER values from the Lucas, et al. model. Corresponding CIE melanopic Daylight Equivalent Ratios (m-DER) can be extrapolated by applying a 10% reduction to the M/P ratios as shown.

Note: COB measurements provided in this document are taken on bare LED boards and do not account for changes which may occur once the module is installed within a luminaire. COB measurements are based on the 10 degree Standard Observer.

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COB - Full Part Numbers

BIOLOGICAL DYNAMIC

BIOS SkyBlue™ Performance Characteristics

Data Shown for Ambient Temperature (T_a) = 25°C

BIOS Part Number	Label	COB LES Size (mm)	Daytime		Evening ¹		Current		Lumens		Efficacy	CRI	R9
			CCT	M/P ²	CCT	M/P ²	Nominal	Max.	Nominal	Max.	Typ. lm/W		
BH-DCOB-830-22MM01-1	CTM-22-2730-80-36-TWPR	22*	3000K	0.74	2700K	0.47	Consult Factory	→					
BH-DCOB-835-22MM01-1	CTM-22-2750-80-36-TWPR	22*	3500K	0.83	3000K	0.49	Consult Factory	→					
BH-DCOB-840-22MM01-2	CTM-22-275C-8X-36-TWPR	22*	4000K	0.90	3500K	0.57	Consult Factory	→					
BH-DCOB-830-18MM01-1	CTM-18-2730-80-36-TWPR	18	3000K	0.72	2700K	0.47	600	1100	2100	3325	115	83	90
BH-DCOB-835-18MM01-1	CTM-18-2750-80-36-TWPR	18	3500K	0.83	3000K	0.49	600	1100	2225	3625	120	83	90
BH-DCOB-840-18MM01-2	CTM-18-275C-8X-36-TWPR	18	4000K	0.90	3500K	0.57	600	1100	2500	4000	125	83	90
BH-DCOB-830-14MM01-1	CTM-14-2730-80-36-TWPR	14	3000K	0.72	2700K	0.47	400	800	1375	2600	115	83	90
BH-DCOB-835-14MM01-1	CTM-14-2750-80-36-TWPR	14	3500K	0.83	3000K	0.49	400	800	1500	2850	120	83	90
BH-DCOB-840-14MM01-2	CTM-14-275C-8X-36-TWPR	14	4000K	0.90	3500K	0.57	400	800	1650	3150	125	83	90
BH-DCOB-830-09MM01-1	CTM-9-2730-80-36-TWPR	9	3000K	0.72	2700K	0.47	200	400	675	1300	115	83	90
BH-DCOB-835-09MM01-1	CTM-9-2750-80-36-TWPR	9	3500K	0.83	3000K	0.49	200	400	775	1450	120	83	90
BH-DCOB-840-09MM01-2	CTM-9-275C-8X-36-TWPR	9	4000K	0.90	3500K	0.57	200	400	825	1550	125	83	90

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Note: COB measurements provided in this document are taken on bare LED boards and do not account for changes which may occur once the module is installed within a luminaire. COB measurements are based on the 10 degree Standard Observer.

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COB Performance Characteristics

Absolute Maximum Ratings & Optical/Electrical Characteristics

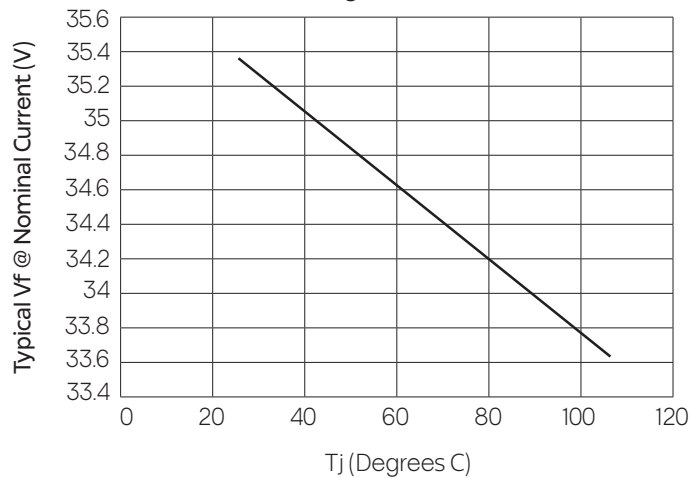
Parameter	Minimum	Typical	Maximum
Operating Case Temperature (T_c)			105°C
Junction Temperature (T_j)			125°C
Viewing Angle (2θ 1/2)		130 degrees	
Reverse Voltage (V_r)			5 volts
Ambient Operating Temperature (T_{opr})	-40°C		+85°C
Storage Temperature (T_{sto})	-40°C		+85°C
Electrostatic Discharge (ESD)			4000 V HBM

Note: T_c point can be measured at either of the two (2) negative solder pads.

Mechanical Dimensions & Thermal Resistance

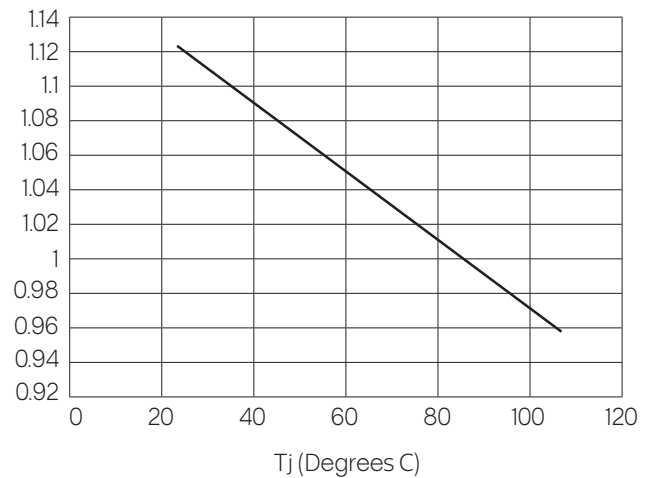
Part Number	Light Emitting Surface (LES) Diameter	Board Size	Typical Thermal Resistance (R_{thj-c})	PCB Thickness
BH-CCOB-8xx-18MM01-1	17.5 mm	20 mm x 24 mm	0.5 K/W	1 mm
BH-CCOB-8xx-14MM01-1	14.5 mm	20 mm x 24 mm	0.67 K/W	1 mm
BH-CCOB-8xx-09MM01-1	9.5 mm	12 mm x 15 mm	1.8 K/W	1 mm

Typ. Forward Voltage vs. Junction Temperature



Relative Output Flux Normalized at Tj = 85°C

Relative Output vs. Junction Temperature



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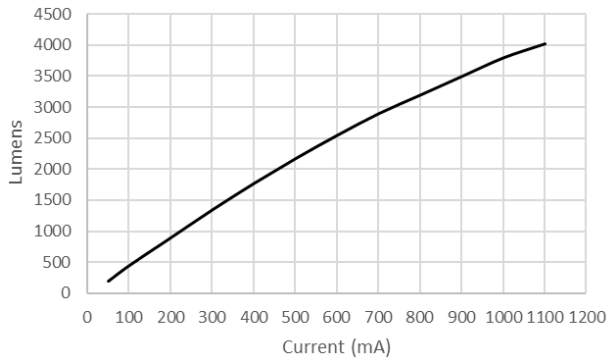
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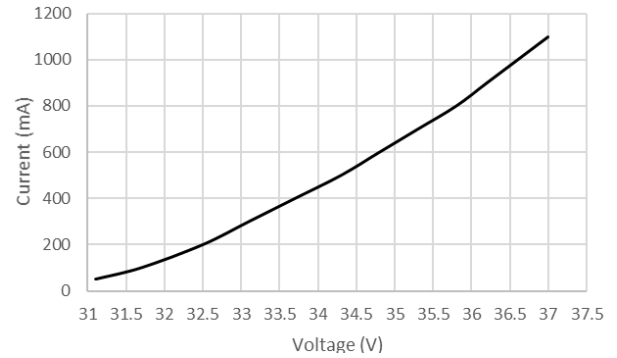
COB Performance Characteristics

18 mm COB (BH-CCOB-8XX-18MM01-1)

Lumens Vs. Current

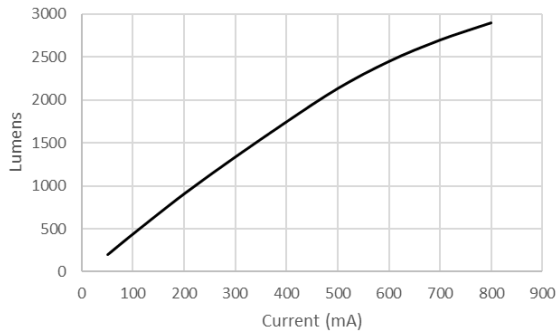


Current Vs. Voltage

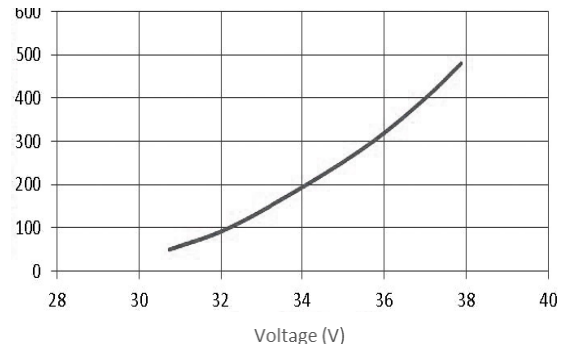


14 mm COB (BH-CCOB-8XX-14MM01-1)

Lumens Vs. Current

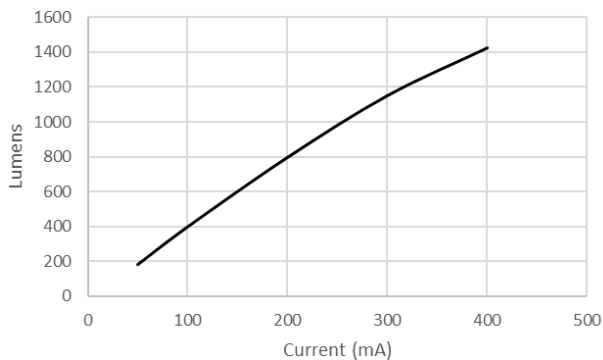


Current Vs. Voltage

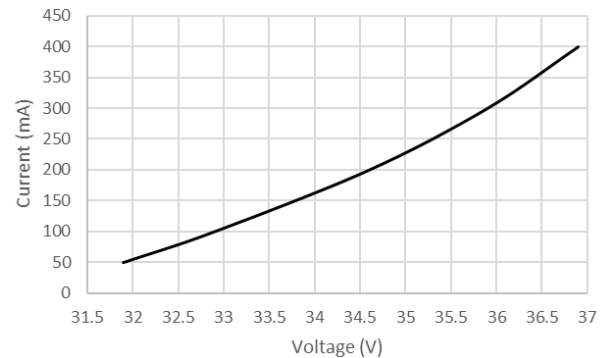


9 mm COB (BH-CCOB-8XX-09MM01-1)

Lumens Vs. Current



Current Vs. Voltage



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Bio-Dimming™ Module Details

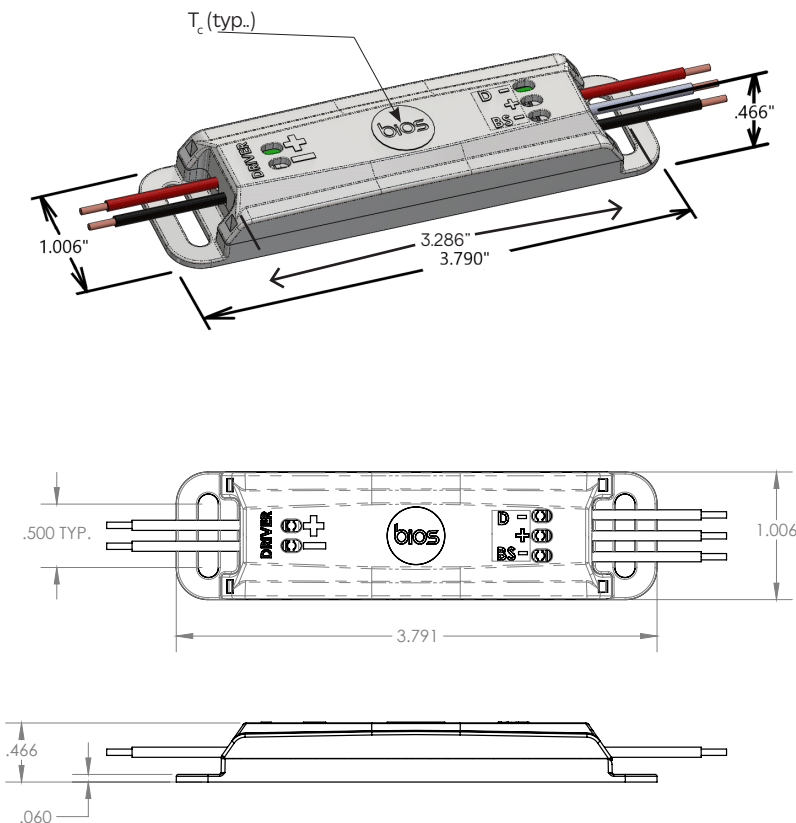
Overview

To achieve effective circadian lighting, it is important to create biologically brighter days and darker nights. The BIOS Bio-Dimming™ Module is designed to integrate that concept into a single dimming interface. The Bio-Dimming™ Module senses current from the single channel LED driver and steers that current to LED strings on the BIOS SkyBlue™ COB accordingly.

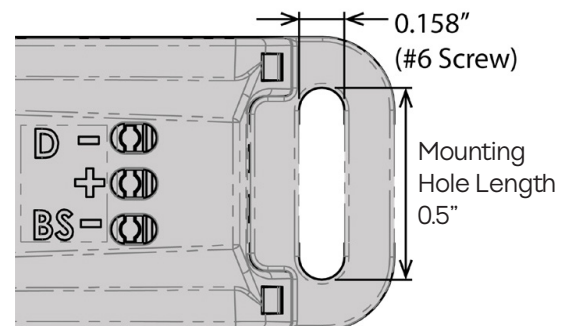
The BIOS Bio-Dimming™ Module responds to the driver output current, which allows for compatibility with all standard architectural dimming protocols with no specific interface requirements. For additional information, please visit www.bioslighting.com

To select the appropriate Bio-Dimming™ Module, you must indicate Static or Dynamic and the desired CCT. When dimming with the Static Bio-Dimming™ Module, SkyBlue™ wavelengths dim as light intensity is dimmed down. When dimming with the Dynamic Bio-Dimming™ Module, SkyBlue™ wavelengths are removed first (to 75% of maximum), followed by a standard dimming profile of SkyBlue™-depleted spectrum.

Bio-Dimming™ Module Dimensions



Bio-Dimming™ Module Mounting Hole Detail



- Works with most single channel constant current drivers
- Works with any dimming protocol (0-10 V, DMX, ELV, DALI, etc.)
- **Case Temperature (T_c) - 70° max.**

Notes:

- T_c point to be measured on the top of Bio-Dimmer™ housing at the BIOS logo.
- All dimensions shown are in inches.

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COB Accessory Information

BIOLOGICAL STATIC / DYNAMIC / TUNABLE

Compatible Third Party Suppliers - LED COB Holder

BIOS Part Number	Light Emitting Surface (LES) Diameter	Board Size	Third Party Supplier + COB Holder Part Number			
			Bender + Wirth	Widgerm	Shinland	Optospource
BH-CCOB-8XX-18MM01-1	18mm	20mm x 24mm	442/46648	--	SL-CTM-14-HD-B-V2	H192420A-02
BH-CCOB-8XX-14MM01-1	14mm					
BH-CCOB-8XX-09MM01-2	9mm	12mm x 15mm	495/46651	WC-CTM9	SL-CDM/CTM-9	--

COB Dimensions and Details

BIOS Part Number	Board Profile	Daytime CCT	Evening CCT	Typical		Current (A)	Operational Temp (°C)
				Min.	Max.	Max.	Max.
BH-0DIM-830-CBPRSL-1	Biological Static COB	3000K	N/A	22	60	1.2	70
BH-0DIM-835-CBPRSL-1		3500K					
BH-0DIM-840-CBPRSL-2		4000K					
BH-DDIM-830-CBPRDL-1	Biological Dynamic COB	3000K	2700K				
BH-DDIM-835-CBPRDL-1		3500K	3000K				
BH-DDIM-840-CBPRDL-2		4000K	3500K				
BH-0DIM-830-CBPRDL-1	Biological Tunable White	3000K	2700K				
BH-0DIM-835-CBPRDL-1		3500K					
BH-0DIM-840-CBPRDL-2		4000K					

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COB Dimensions and Details

BIOS LED Solution	Required Bio-Dimming™ Module?	CCT Note	Lighting Controls Note	BIOS SkyBlue™ (490nm)
	COB			
Biological Static	Yes	No CCT Change	Intensity Dimming Control Only	Daytime SkyBlue™ Spectrum Always Present
Biological Dynamic	Yes	"500K Shift" 4000K dims to 3500K 3500K dims to 3000K 3000K dims to 2700K	Intensity Dimming + Spectrum Change Controlled Together	Daytime SkyBlue™ Spectrum removed with Bio-Dimming™
Biological Dynamic (Two-Channel)	No	"500K Shift" 4000K dims to 3500K 3500K dims to 3000K 3000K dims to 2700K	Intensity Dimming + Spectrum Change Controlled Separately	Daytime SkyBlue™ Spectrum removed by adjusting "Spectrum Channel"
Biological Tunable (Single-Channel)	Yes	"Dims to 2700K" 4000K dims to 2700K 3500K dims to 2700K 3000K dims to 2700K	Intensity Dimming + Spectrum Change Controlled Together	Daytime SkyBlue™ Spectrum removed with Bio-Dimming™
Biological Tunable (Two-Channel)	No	"Dims to 2700K" 4000K dims to 2700K 3500K dims to 2700K 3000K dims to 2700K	Intensity Dimming + Spectrum Change Controlled Separately	Daytime SkyBlue™ Spectrum removed by adjusting "Spectrum Channel"

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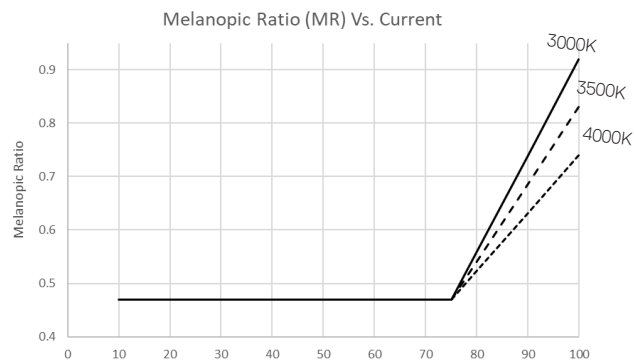
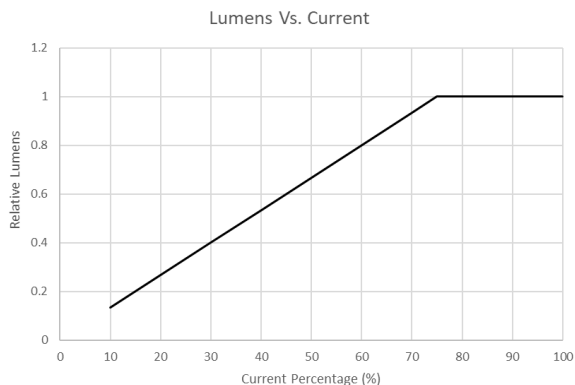
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Bio-Dimming™ Performance Characteristics

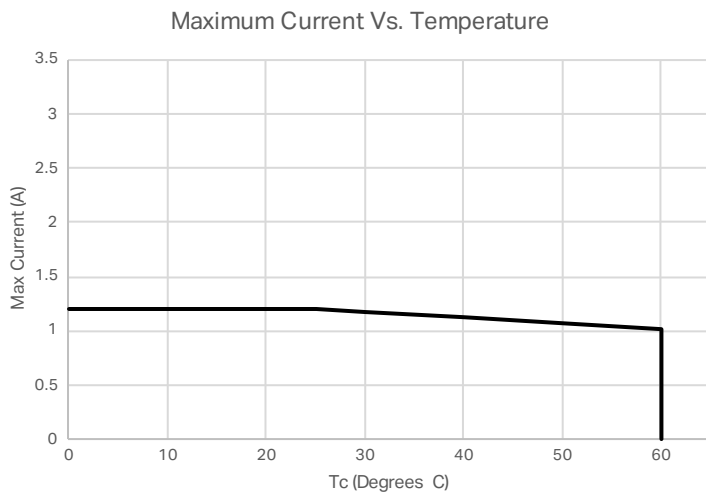
SkyBlue™ Linear Array / Tape Light + Dynamic Bio-Dimming™ Module*

**Measurements taken at the LED Board*



SkyBlue™ Linear Array / Tape Light + Dynamic Bio-Dimming™ Module*

**Measurements taken at the LED Board*



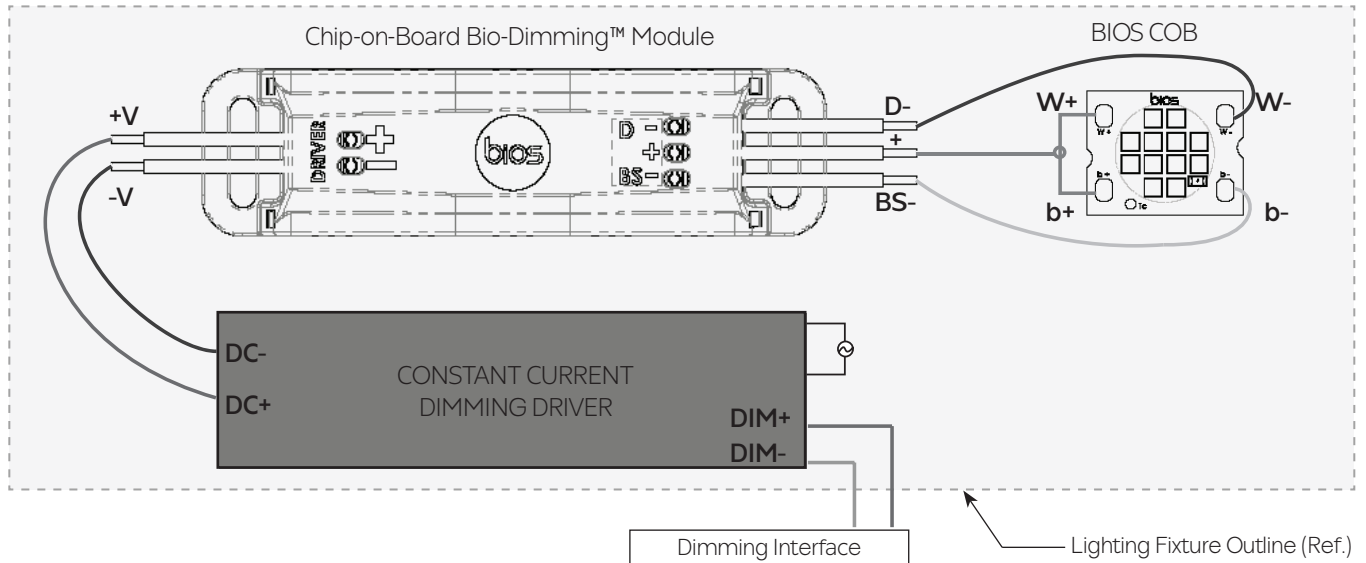
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SkyBlue™ LED Circadian Solutions

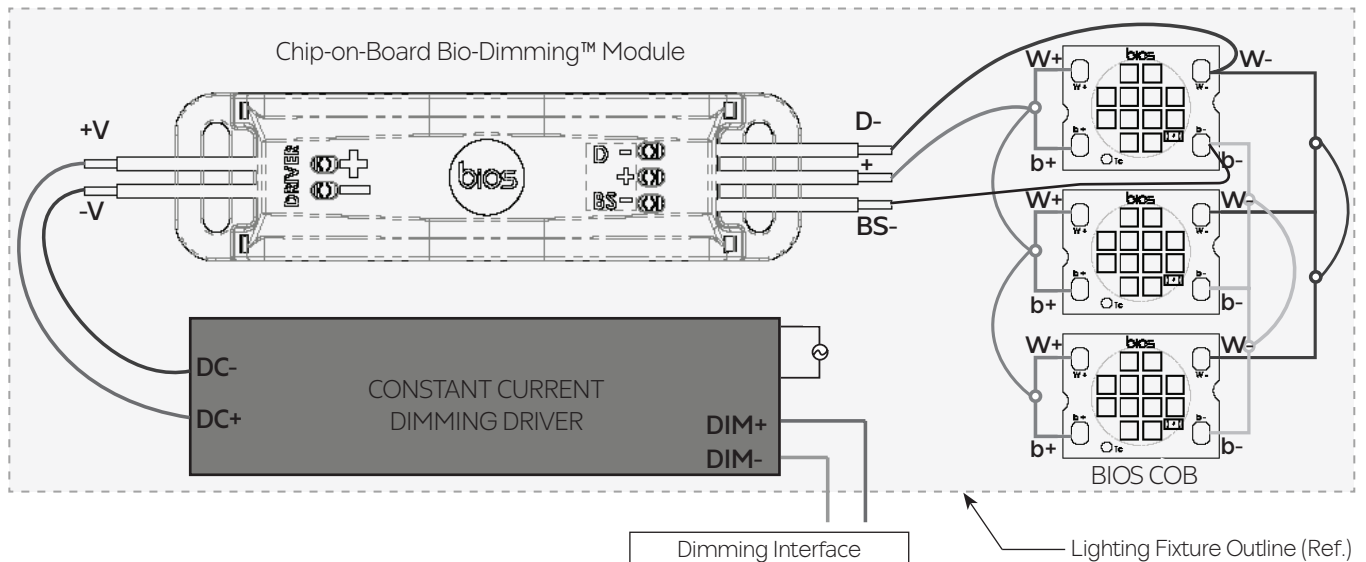
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COB Single-Channel Driver Wiring Diagram

Biological Static | Biological Tunable | Biological Dynamic
Single COB



Biological Static | Biological Tunable | Biological Dynamic
Multiple COBs



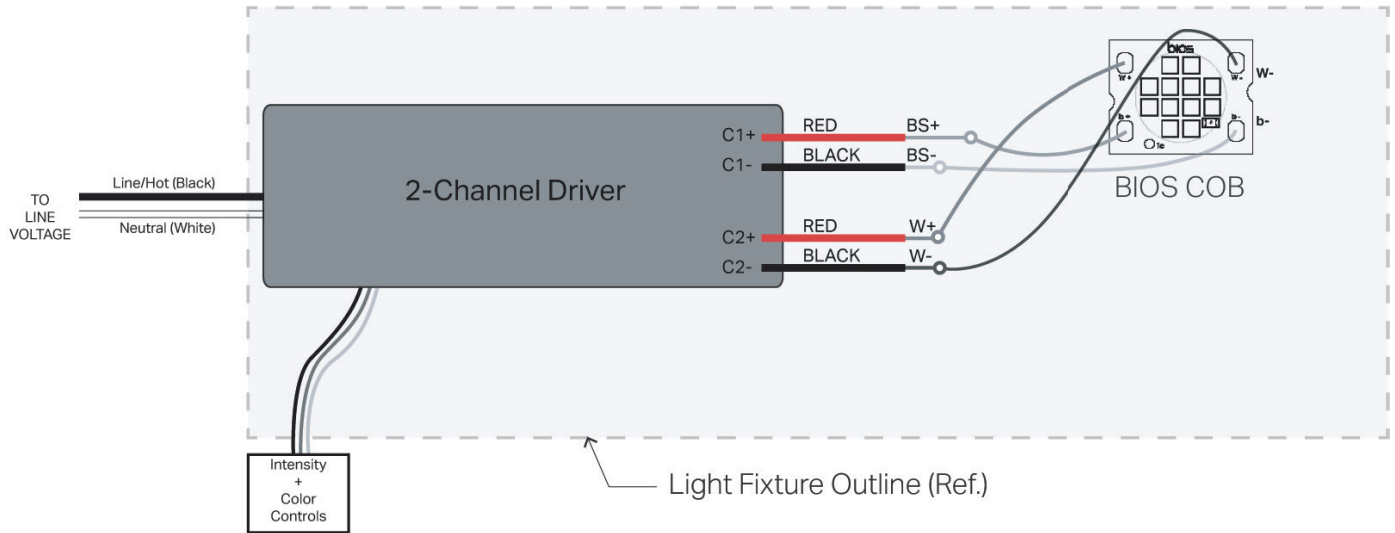
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SkyBlue™ LED Circadian Solutions

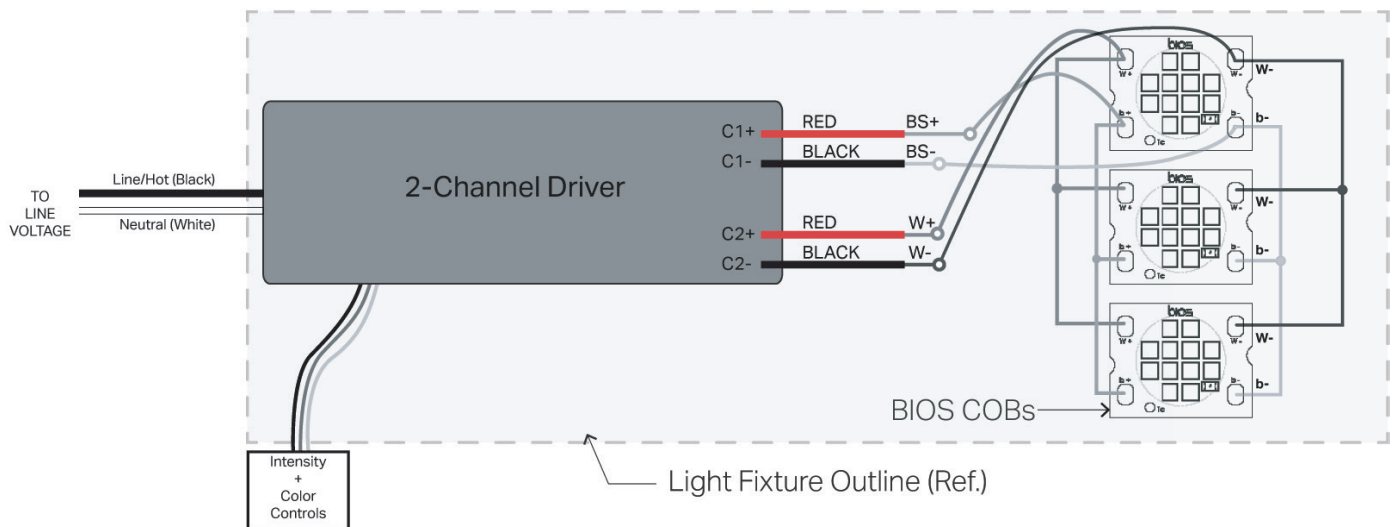
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COB Two-Channel Driver Wiring Diagrams

Biological Tunable | Biological Dynamic
2-Channel Drive | Single COB



Biological Tunable | Biological Dynamic
2-Channel Drive | Multiple COBs



For additional information about BIOS LED Solutions and 2-Channel Drivers, please refer to [Bios SkyBlue COB 2-Channel App Note.pdf](#) at www.bioslighting.com

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How to Create a BIOS Ordering Code

Step 1 - Select COB Size

Step 2 - Select your daytime cct

Step 3 - Select the BIOS Light Engine

(Biological Static, Biological Dynamic, Biological Tunable (single or two-channel))

Step 4a - Build the COB Light Engine Part Number (Refer to pages 4-5)

Step 4b - Add the corresponding Bio-Dimming™ Module Part Number (Refer to page 6)

Step 5 - Build your complete BIOS Solution Ordering Code (see example below)

Building A Complete BIOS Ordering Code

Use the ordering code information in the table below to build your BIOS order.

You must provide BOTH a **BIOS Profile Part Number** and **Bio-Dimming™ Module Part Number** to complete your ordering code.

Complete Ordering Code Example for BIOS 3500K Biological Dynamic 9mm COB

BIOS COB

Bio-Dimming™ Module

BH - DCOB - 835 - 09MM01 - 1

+

BH - DDIM - 835 - CBPRDL - 1

BIOS SkyBlue™ COB Circadian Solution ⁴	BIOS Light Engine Part Number		Bio-Dimming™ Module Part Number
Biological Static COB Bio-Dimming™ (Single Channel Control)	Refer to pages 5-7 for COB part numbers	+	Refer to page 8 for corresponding Bio-Dimming™ Module part number
Biological Static COB (Two-Channel Control)	Refer to pages 5-7 for COB part numbers		N/A
Biological Dynamic COB Bio-Dimming™ (Single Channel Control)	Refer to pages 5-7 for COB part numbers	+	Refer to page 8 for corresponding Bio-Dimming™ Module part number
Biological Dynamic COB (Two-Channel Control)	Refer to pages 5-7 for COB part numbers		N/A
Biological Tunable White Bio-Dimming™ (Single Channel Control)	Refer to pages 5-7 for COB part numbers	+	Refer to page 8 for corresponding Bio-Dimming™ Module part number
Biological Tunable White (Two-Channel Control)	Refer to pages 5-7 for COB part numbers		N/A

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BIOS Safety + Handling Notes

BIOS products are designed for robust performance in general lighting applications; however, care must be taken when handling and assembling the LEDs within their luminaires. To avoid damaging BIOS COBs, please refer to the following application notes and guidelines, which outline recommended care and handling practices when working with these devices. For more detailed information, please visit the BIOS website at www.bioslighting.com.

General Handling

Devices are made to be lifted or carried with tweezers on two (2) "mouse bite" locations. At no time should the devices be handled by or should anything come in contact with the light emitting surface (LES) area. There are electrical connections under the LES which, if damaged, will cause the device to fail.

Static Electricity

LEDs are electronic devices which can be damaged by electrostatic discharge (ESD). Please use appropriate measures to assure the devices do not experience ESD during their handling and/or storage. ESD protection guidelines should be used at all times when working with LEDs.

Storage: BIOS product are delivered in ESD shielded bags and should be stored in these bags until used.

Assembly: Individuals handling LEDs during assembly should be trained in ESD protection practices. Assemblers should maintain constant conductive contact with a path to ground by means of a wrist strap, mat, or other ESD protection system.

Transporting: When transporting the devices from one assembly area to another, ESD shielded carts and carriers should be used.

Electrical Contact

BIOS COBs are designed with electrical contact pads on their top surface. These pads are clearly marked with "+" and "-" polarity. Wires can be soldered to the contact pads for electrical connections or other solderless connector products are available. If wires are being soldered to the COB product, we recommend attaching these wires prior to mounting the devices to a heat sink. Please contact BIOS for specific recommendations on how to solder wires if not familiar with the standard practice. BIOS can also offer design recommendation for jigs to enable easy soldering of multiple products in rapid succession.

Chemical Compatibility

The resin material used to form the emitters inside the LES can gather hydrocarbons from the surrounding environment. As the result, certain chemical compounds are not recommended for use with BIOS products. Use of these compounds can cause damage to the light output of the device and may permanently damage the device.

Thermal Interface Material (TIM)

Proper thermal management is critical for successful operation of any LED systems. Excess operating temperature can reduce the light output of the device, and excessive heating can cause permanent damage to the device. Use of a proper TIM is a crucial component for effective heat transfer away from the LED during normal operation. Please refer to the BIOS website for specific recommendations for TIM solutions.

Human Eye Safety

Caution must be taken not to stare at the light emitted from BIOS LEDs, as severe eye damage may occur.