bios Chip-on-Board

SkyBlue™ LED Circadian Solutions

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.

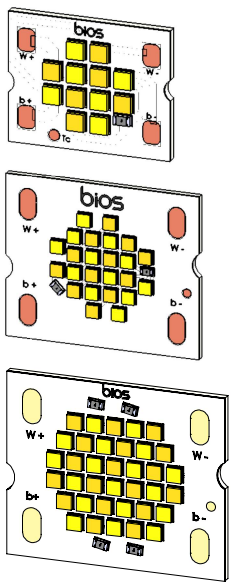
Daytime + Evening Solutions

BIOS COBs are available for Day-to-Evening applications: You can choose from Biological Dynamic and Biological Tunable. Biological Dynamic and Biological 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 SykBlue spectrum for high daytime circadian stimulation. BIOS Biological Static LEDs are ideal for day-only applications (such as offices, schools, outpatient clinics, etc.).

CHIP-ON-BOARD FEATURES + APPLICATIONS



BIOS SkyBlue COB Profiles
Nominal 9mm, 14mm, and 18mm,
22mm* Light Emitting Surface (LES)

*Contact factory for order inquiries or more information on 22mm COB profile.

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°C.
- 100% factory tested at T_j = 85°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

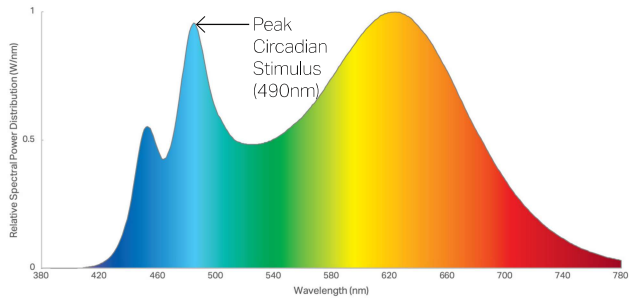
Pursuant to the terms and conditions set forth in our Limited Warranty, Biological Innovation and Optimization Systems, LLC ("BIOS") warrants its BIOS Sky Blue™ COB, Linear, and Tape LED components (collectively known as the "Product") against defects in materials or workmanship for a period of five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

CHIP-ON-BOARD SPECTRAL POWER DISTRIBUTION

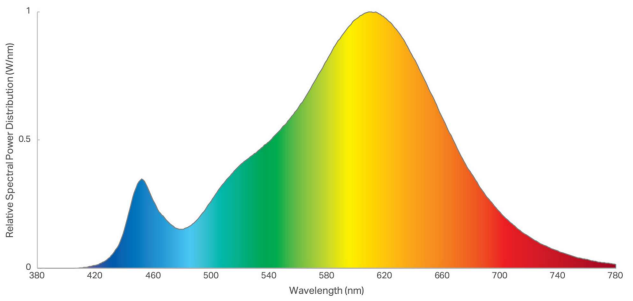
BIOLOGICAL TUNABLE SPECTRUM

Daytime ⟶ **Evening**

BIOS SkyBlue™ 3500K
High Melanopic Ratio (M/P)
M/P = 0.83



BIOS 2700K COB (SkyBlue removed)
Low Melanopic Ratio (M/P)
M/P = 0.47

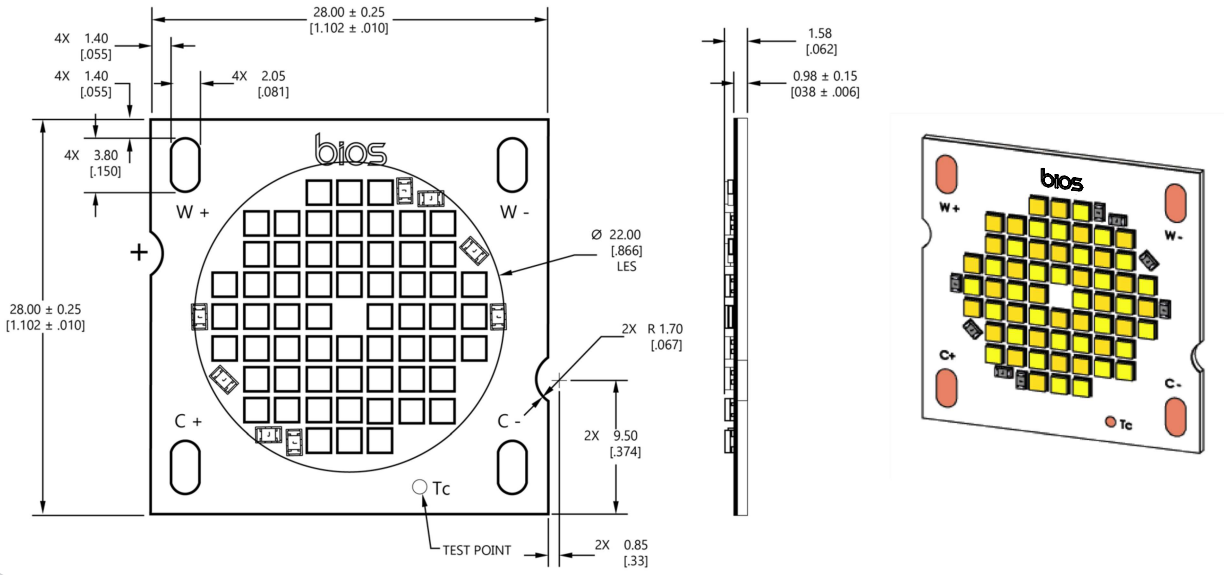


Note: BIOS Biological Static Solutions includes BIOS SkyBlue Daytime Spectra only. BIOS Biological Dynamic and Biological Tunable Solutions include both SkyBlue Daytime and BIOS Evening spectra.

COB DIMENSIONS AND DETAILS

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

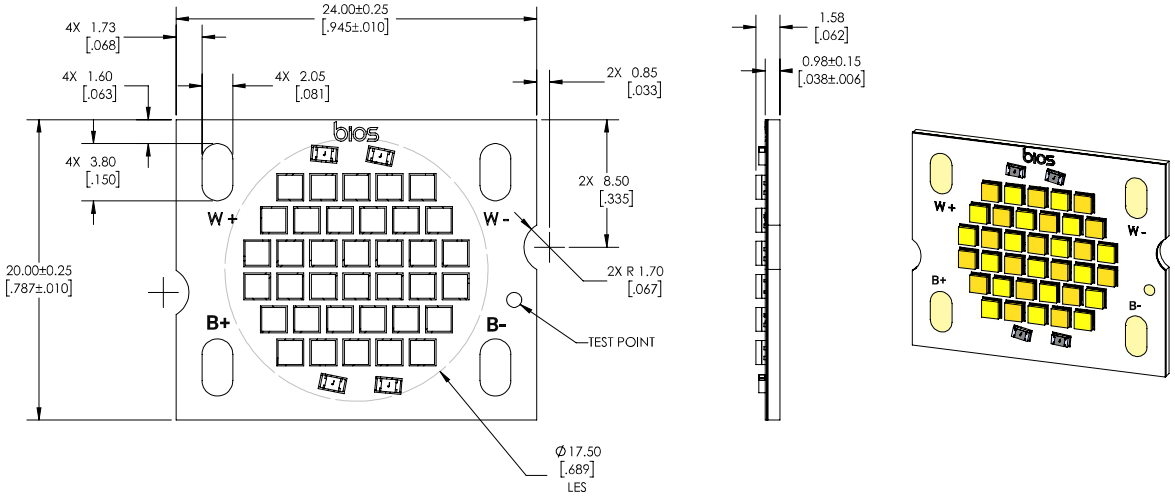
**Contact factory for order inquiries or more information on 22mm COB profile, estimate 16 week lead time.*



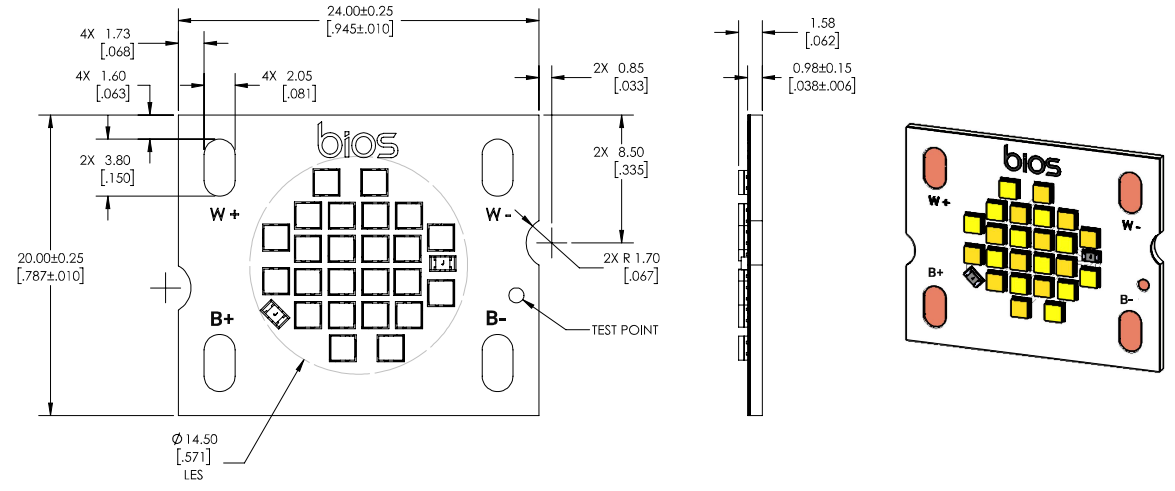
Note: Dimensions outside parentheses are in millimeters. Dimensions inside parentheses are in inches.

COB DIMENSIONS AND DETAILS

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



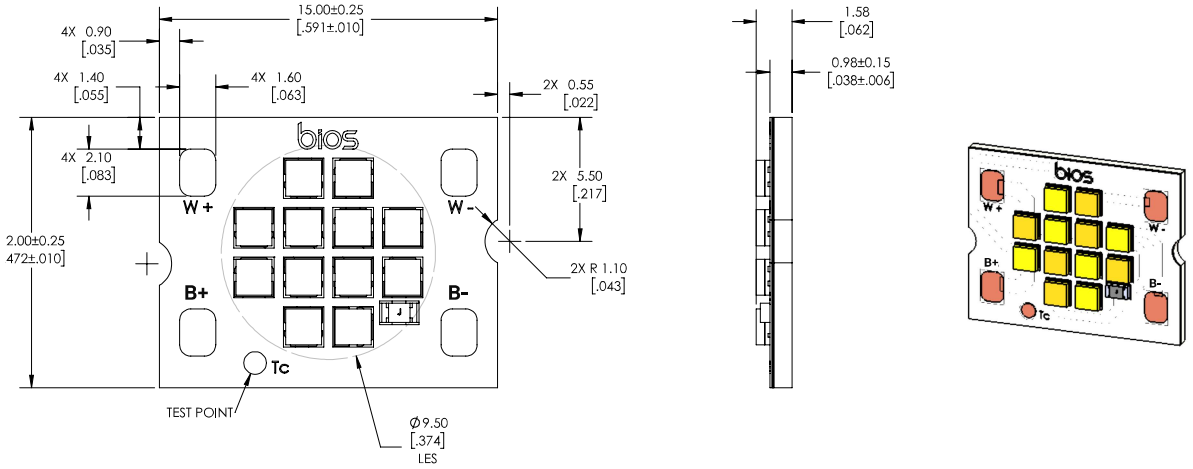
14 mm COB (BH-CCOB-8XX-14MM01)



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

COB DIMENSIONS AND DETAILS

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



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

CHIP-ON-BOARD PART NUMBER DETAILS

BH -	___COB	-	8_____	-	_____ MM01
	⬇		⬇		⬇
	BIOS Engine		**Daytime CCT**		**Light Emitting Surface Size**
	C = Biological Static or Biological Tunable ***D*** = Dynamic		***30*** = 3000K ***35*** = 3500K ***40*** = 4000K		22MM = ***22**** 18MM = ***18*** 14MM = ***14*** 09MM = ***09***

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

COB - FULL PART NUMBERS

Biological Static / Biological Tunable

BIOS SkyBlue™ Performance Characteristics

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

BIOS Part Number	COB LES Size (mm)	Daytime		Evening[1]		Voltage (V)	Current (mA)		Lumens		Efficacy	CRI	R9
		CCT	M/P[2]	CCT	M/P[2]	Typ.	Nominal	Max.	Nominal	Max.	Typ. lm/W		
BH-CCOB-830-22MM01-1	22*	3000K	0.74	2700K	0.44	36V	Consult Factory	→	→	→	→	→	→
BH-CCOB-835-22MM01-1	22*	3500K	0.83	2700K	0.44	36V	Consult Factory	→	→	→	→	→	→
BH-CCOB-840-22MM01-2	22*	4000K	0.90	2700K	0.44	36V	Consult Factory	→	→	→	→	→	→
BH-CCOB-830-18MM01-1	18	3000K	0.72	2700K	0.44	36V	600	1100	2100	3325	115	83	90
BH-CCOB-835-18MM01-1	18	3500K	0.80	2700K	0.44	36V	600	1100	2200	3600	120	83	90
BH-CCOB-840-18MM01-2	18	4000K	0.90	2700K	0.44	36V	600	1100	2500	4000	125	83	90
BH-CCOB-830-14MM01-1	14	3000K	0.72	2700K	0.44	36V	400	800	1375	2600	115	83	90
BH-CCOB-835-14MM01-1	14	3500K	0.80	2700K	0.44	36V	400	800	1475	2825	120	83	90
BH-CCOB-840-14MM01-2	14	4000K	0.90	2700K	0.44	36V	400	800	1650	3150	125	83	90
BH-CCOB-830-09MM01-1	9	3000K	0.72	2700K	0.44	36V	200	400	675	2600	115	83	90
BH-CCOB-835-09MM01-1	9	3500K	0.80	2700K	0.44	36V	200	400	750	1425	120	83	90
BH-CCOB-840-09MM01-2	9	4000K	0.90	2700K	0.44	36V	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 the10 degree Standard Observer.

COB - FULL PART NUMBERS

Biological Dynamic

BIOS SkyBlue™ Performance Characteristics

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

BIOS Part Number	COB LES Size (mm)	Daytime		Evening[1]		Voltage (V)	Current (mA)		Lumens		Efficacy	CRI	R9
		CCT	M/P[2]	CCT	M/P[2]	Typ.	Nominal	Max.	Nominal	Max.	Typ. lm/W		
BH-DCOB-830-22MM01-1	22*	3000K	0.74	2700K	0.47	36V	Consult Factory	→					
BH-DCOB-835-22MM01-1	22*	3500K	0.83	3000K	0.49	36V	Consult Factory	→					
BH-DCOB-840-22MM01-1	22*	4000K	0.90	3500K	0.57	36V	Consult Factory	→					
BH-DCOB-830-18MM01-1	18	3000K	0.72	2700K	0.47	36V	600	1100	2100	3325	115	83	90
BH-DCOB-835-18MM01-1	18	3500K	0.83	3000K	0.49	36V	600	1100	2225	3625	120	83	90
BH-DCOB-840-18MM01-1	18	4000K	0.88	3500K	0.57	36V	600	1100	2650	4200	125	87	79
BH-DCOB-830-14MM01-1	14	3000K	0.72	2700K	0.47	36V	400	800	1375	2600	115	83	90
BH-DCOB-835-14MM01-1	14	3500K	0.83	3000K	0.49	36V	400	800	1500	2850	120	83	90
BH-DCOB-840-14MM01-1	14	4000K	0.88	3500K	0.57	36V	400	800	1750	3325	125	87	79
BH-DCOB-830-09MM01-1	9	3000K	0.72	2700K	0.47	36V	200	400	675	1300	115	83	90
BH-DCOB-835-09MM01-1	9	3500K	0.83	3000K	0.49	36V	200	400	775	1450	120	83	90
BH-DCOB-840-09MM01-1	9	4000K	0.88	3500K	0.57	36V	200	400	875	1650	125	87	79

**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.

COB PERFORMANCE CHARACTERISTICS

Absolute Maximum Ratings & Optical/Electrical Characteristics

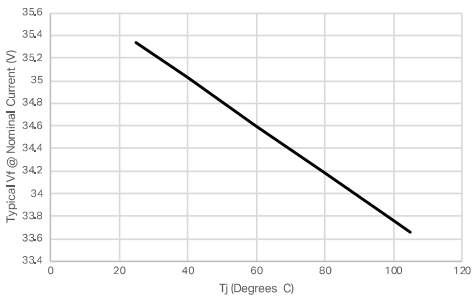
Parameter	Minimum	Typical	Maximum
Operating Case Temperature (T_c)			105°C
Junction Temperature (T_j)			125°C
Viewing Angle (2 Θ1/2)		130 degrees	
Reverse Voltage (V_r)			5 volts
Ambient Operating Temperature (T_{opr})	-40°C		+85°C
Storage Temperature (T_{sto})	-40°C		+85°C
Electrostatic Discharge (ESD)			4000 V HBM

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

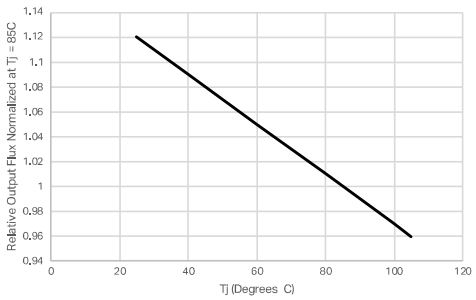
Mechanical Dimensions & Thermal Resistance

Part Number	Light Emitting Surface (LES) Diameter	Board Size	Typical Thermal Resistance (Rthj-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

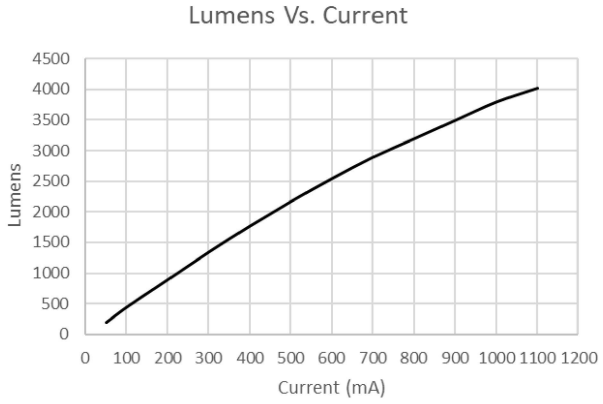


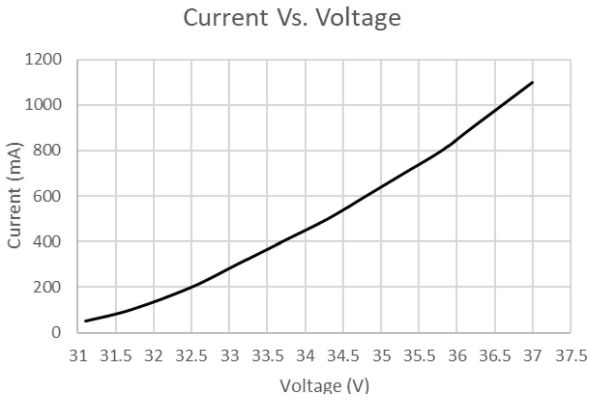
Relative Output Flux vs. Junction Temperature



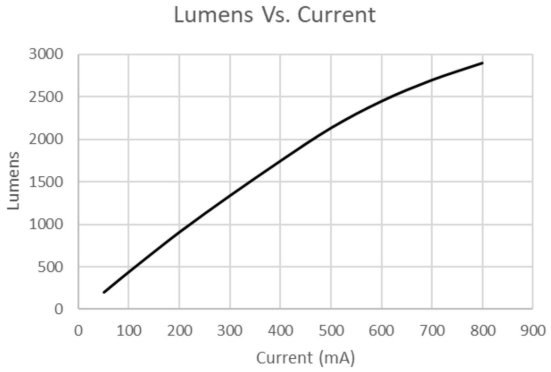
CHIP-ON-BOARD PERFORMANCE CHARACTERISTICS

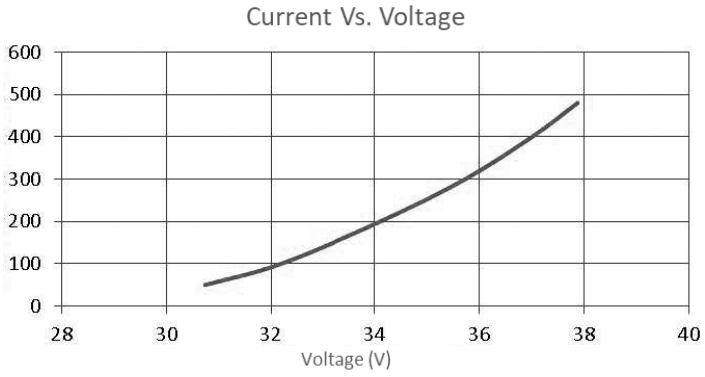
18 mm COB (BH-CCOB-8XX-18MM01-1)



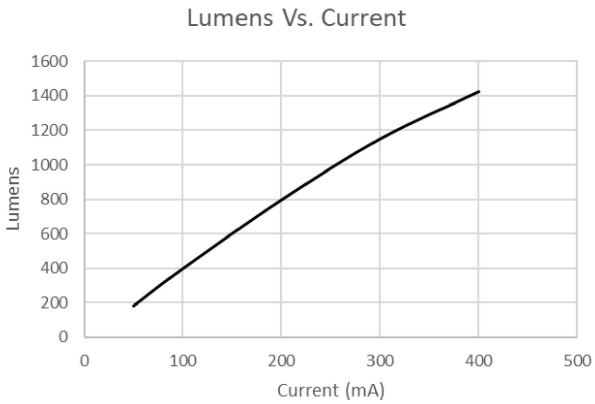


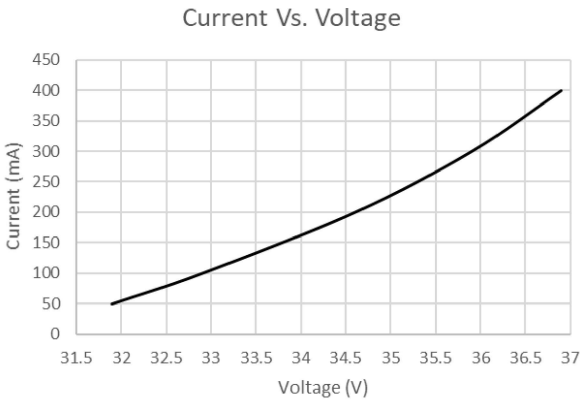
14 mm COB (BH-CCOB-8XX-14MM01-1)





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





BIO-DIMMING™ GENERATION 2 MODULE

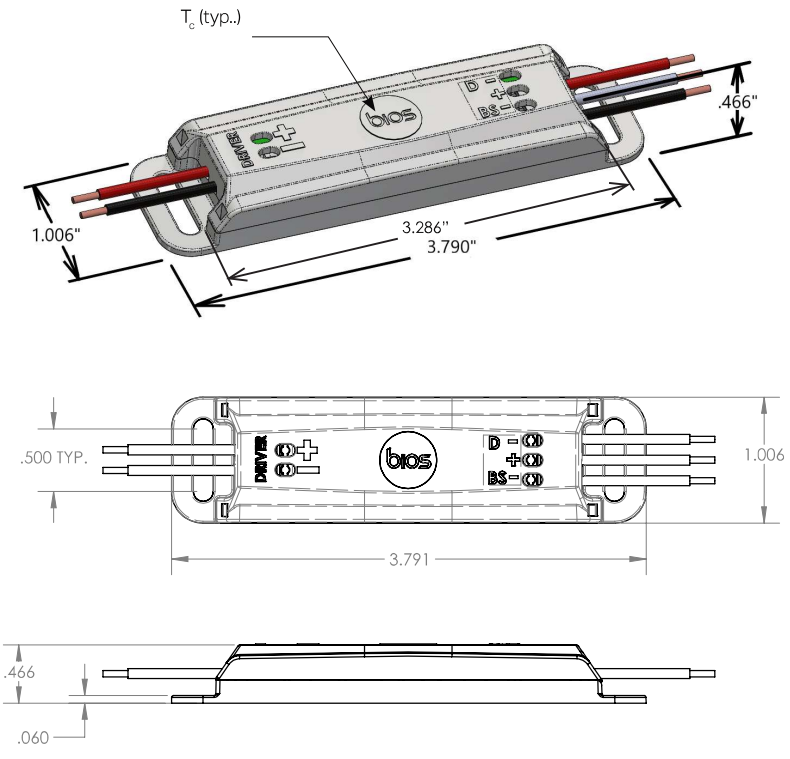
Overview

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

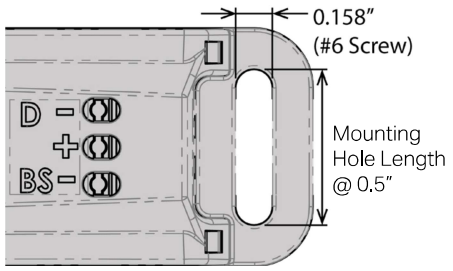
BIOS Bio-Dimming Module has an on-board sensor that allows for compatibility with all standard architectural dimming protocols with no specific interface requirements. For additional information about Bio-Dimming, please go to *www.bioslighting.com*.

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 at 36V.
- 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.

COB ACCESSORY INFORMATION

BIOS Biological Static, Biological Dynamic, Biological, 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	Widegerm	Shinland	Optosource
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	20mm x 24mm				
BH-CCOB-8xx-09MM01-1	9mm	12mm x 15mm	495/46651	WC-CTM9	SL-CDM/CTM-9	--

BIO-DIMMING™ MODULE PART NUMBERS

BIOS Part Number	COB 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	3	70
BH-0DIM-835-CBPRSL -1	Biological Static COB	3500K	n/a				
BH-0DIM-840-CBPRSL -2	Biological Static COB	4000K	n/a				
BH-DDIM-830-CBPRDL-1	Biological Dynamic COB	3000K	2700K				
BH-DDIM-835-CBPRDL-1	Biological Dynamic COB	3500K	3000K				
BH-DDIM-840-CBPRDL-1	Biological Dynamic COB	4000K	3500K				
BH-0DIM-830-CBPRDL-1	Biological Tunable COB	3000K	2700K				
BH-0DIM-835-CBPRDL-1	Biological Tunable COB	3500K	2700K				
BH-0DIM-840-CBPRDL-2	Biological Tunable COB	4000K	2700K				

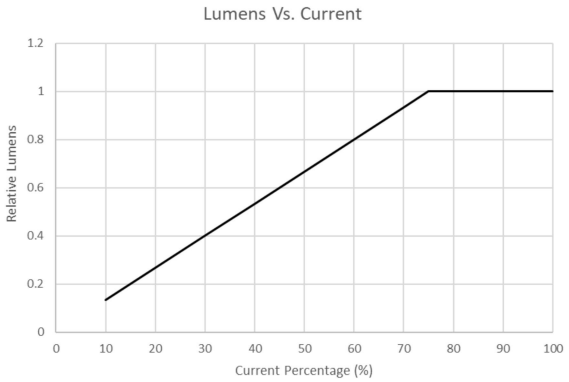
BIO-DIMMING MODULE TECHNOLOGY GUIDE

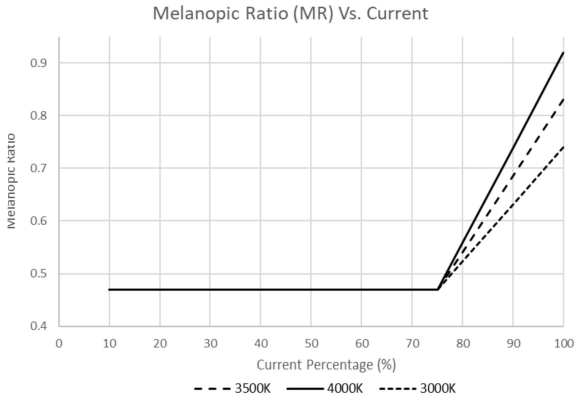
BIOS LED Solution	Reuires Bio-Dimming Module? COB	CCT Note	Lighting Controls Note	BIOS SkyBlue (490nm)
Biological Static	Yes	No CCT Change	Intensity Dimming Control Only	Daytime SkyBlue Spectrum Always Present
Biological Dynamic	Yes	***"500K Shift"*** 4000K dims to 3500K 3500K dims to 3000K 3000K dims 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	Requires two drivers and Control Source, allows Separate Control of Intensity + Spectrum	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	Requires two drivers and Control Source, allows Separate Control of Intensity + Spectrum	Daytime SkyBlue spectrum removed by adjusting "Spectrum Channel"

BIO-DIMMING™ PERFORMANCE CHARACTERISTICS

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

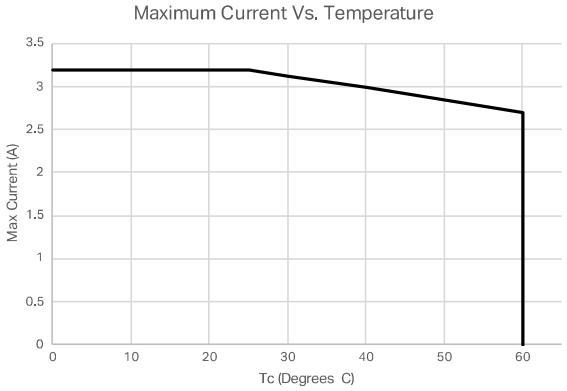
**Measurements taken at the LED Board*





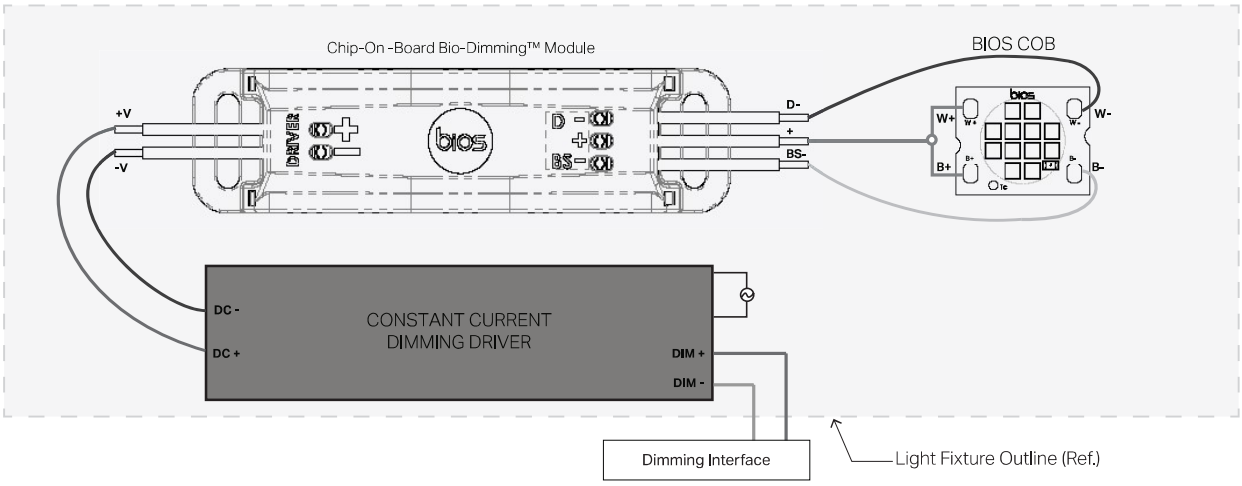
SkyBlue Linear Array / Tape Light + Dynamic Bio-Dimming Module*

***Measurement taken at the Bio-Dimming Module*

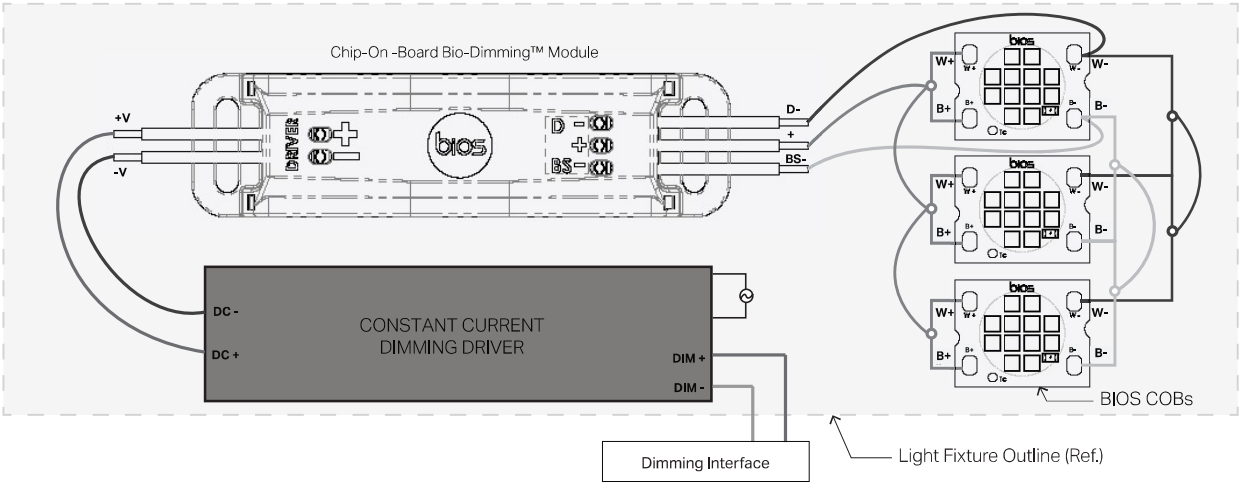


COB ***SINGLE-CHANNEL*** DRIVER WIRING DIAGRAMS

Biological Static | *Biological Tunable* | *Biological Dynamic*
Single COB

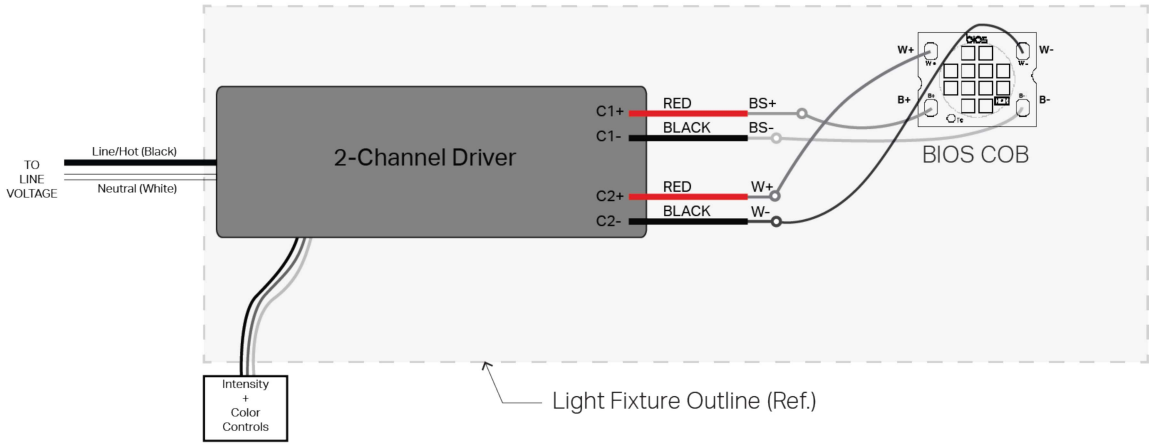


Biological Static | *Biological Tunable* | *Biological Dynamic*
Multiple COBs

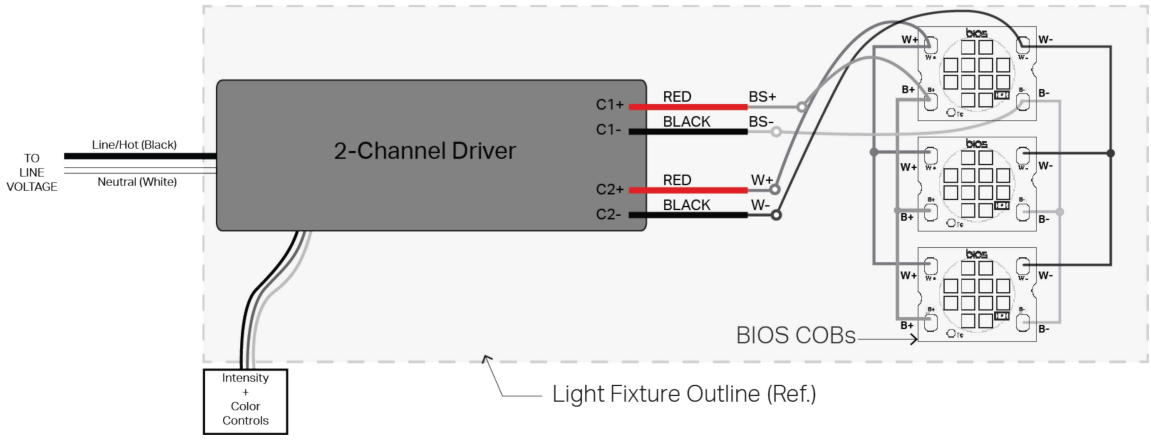


COB ***TWO- CHANNEL*** DRIVER WIRING DIAGRAMS

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



Biological Static | *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.*

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, and Biological Tunable Single-Channel or Biological Tunable Two-Channel)
Step 4a **-** Build the COB Light Engine Part Number *(Refer to Pages 5-6)*
Step 4b **-** Add the corresponding Bio-Dimming Module Part Number *(Refer to Page 10)*
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 P/N*** and ***Bio-Dimming Module P/N*** to complete your ordering code.

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

BIOS COB		***Bio-Dimming Module***
*BH - **D**COB - 8**35** - **09**MM01*	**+**	*BH - DDIM - 8**35** - 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 5-6 for COB part numbers	+	Refer to page 10 for corresponding Bio-Dimming Module part number
Biological Static COB [Two-Channel Control]	Refer to pages 5-6 for COB part numbers		n/a
Biological Dynamic COB Bio-Dimming [Single-Channel Control]	Refer to pages 5-6 for COB part numbers	+	Refer to page 10 for corresponding Bio-Dimming Module part number
Biological Dynamic COB [Two-Channel Control]	Refer to pages 5-6 for COB part numbers		n/a
Biological Tunable COB Bio-Dimming [Single-Channel Control]	Refer to pages 5-6 for COB part numbers	+	Refer to page 10 for corresponding Bio-Dimming Module part number
Biological Tunable COB [Two-Channel Control]	Refer to pages 5-6 for COB part numbers		n/a

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 products 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, ankle straps, 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 recommendations 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 a 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 system. 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.