CBT-120-UV LEDs

Table of Contents

Technology Overview 2

Optical & Electrical Characteristics 3

Flux & Spectral Characteristics vs. Temperature 4

Lifetime & Power Maintenance. 5

Radiation Patterns 6

Thermal Resistance 6

Mechanical Dimensions 7

Ordering Information 8

Features:

- 11 W of optical power from 370 nm to 392 nm.
- High thermal conductivity package .
  - Junction to heat sink thermal resistance of 0.7 °C/W
- Photonic lattice technology for very high power density and uniform emission
- Large, monolithic chip with surface emitting area of 12 mm^2, 16:9 aspect ratio
- Low-profile window for efficient coupling into small-etendue systems
- High radiometric efficiency
- Environmentally friendly: RoHS compliant, mercury-free
- Variable drive currents: less than 1 A through 30 A

Applications

- Curing:
  - Inks
  - Coatings
  - Adhesives
- Inspection
- Machine Vision
- Fiber-coupled illumination
- Specialty Projection Systems for Maskless Lithography:
  - Optically matched to TI 0.95"DMD
- Rapid Prototyping and 3D printing
- Medical and Scientific Intrumentation

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Technology Overview

Luminus Big Chip LEDs™ benefit from innovations in device technology, chip packaging and thermal management. This suite of technologies give engineers and system designers the freedom to develop solutions both high in power and efficiency.

Photonic Lattice Technology

Luminus' photonic lattice technology enables large area LED chips to emit photons uniformly over the entire LED chip surface. The intense optical power density produced by these UV Big Chip LEDs™ facilitate designs which replace arc and halogen lamps where arrays of traditional high power LEDs cannot.

For UV devices, Luminus engineers the photonic lattice to maximize light extraction and to emit with a Lambertian far-field distribution pattern. The design maximizes efficiency and allows for flexible optical designs.

Packaging Technology

Thermal management is critical in high power LED applications. With a thermal resistance from junction to heat sink of 0.7°C/W, Luminus CBT-120-UV LEDs have the lowest thermal resistance of any LED on the market. This allows the LED to be driven at higher current densities while maintaining a low junction temperature, thereby resulting in brighter solutions and longer lifetimes.

Reliability

Designed from the ground up, Luminus Big Chip LEDs are one of the most reliable light sources in the world today. Big Chip LEDs have passed a rigorous suite of environmental and mechanical stress tests, including mechanical shock, vibration, temperature cycling and humidity, and have been fully qualified for use in extreme high power and high current applications. With very low failure rates and median lifetimes that typically exceed 10,000 hours, Luminus Big Chip LEDs are ready for even the most demanding applications.

Environmental Benefits

Luminus LEDs help reduce power consumption and the amount of hazardous waste entering the environment. All Big Chip LED products manufactured by Luminus are RoHS compliant and free of hazardous materials, including lead and mercury.

Understanding Big Chip LED Test Specifications

Every Luminus LED is fully tested to ensure that it meets the high quality standards expected from Luminus' products.

Testing Temperature

Luminus core board products are typically measured in such a way that the characteristics reported agree with how the devices will actually perform when incorporated into a system. This measurement is accomplished by mounting the devices on a 40^{o}C heat sink and allowing the device to reach thermal equilibrium while fully powered. Only after the device reaches equilibrium are the measurements taken. This method of measurement ensures that Luminus Big Chip LEDs perform in the field just as they are specified.

Multiple Operating Points (4.2 A, 18 A, 30 A)

The tables on the following pages provide typical optical and electrical characteristics. Since the LEDs can be operated over a wide range of drive conditions(currents from <1A to 30 A, and duty cycle from <1% to 100%), multiple drive conditions are listed.

CBT-120-UV devices are production specified at 18 A. The values shown at 4.2 A and 30 A are for additional reference at other possible drive conditions. Driving devices beyond recommended driving conditions shortens lifetime (see derating curves on page 5).

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Reference Optical & Electrical Characteristics (T_{hs} = 40°C)[1,2]

UV					
Drive Condition		**4.2 A**	**18 A**	**30 A**	
Parameter	**Symbol**	**Values[4]**			**Unit**
Current Density	j	0.35	1.5	2.5	A/mm²
Forward Voltage	$V_{F\,min}$		3.5		V
	V_F	3.4	3.7	3.9	V
	$V_{F\,max}$		4.1		V
Radiometric Flux[5]	Φ_{typ}	2.4	10.0	15.0	W
Radiometric Flux Density	Φ_R	0.2	0.8	1.2	W/mm²
Wavelength Range	λ	381.5 - 391.5	382 - 392	382.5 - 392.5	nm
Peak Wavelength	λ_p	386.5	387	387.5	nm
FWHM	$\Delta\lambda_{1/2}$	12	13	14	nm

	Symbol	UV	Unit
Emitting Area		12.0	mm²
Emitting Area Dimensions		4.63 × 2.6	mm × mm
Dynamic Resistance	Ω_{dyn}	0.02	Ω

Absolute Maximum Ratings

	Symbol	UV	Unit
Maximum Current[6]		30	A
Maximum Junction Temperature[7]	T_{jmax}	150	°C
Storage Temperature Range		-40 to +100	°C

Note 1: Data verification pending NIST calibration.

Note 2: All data are based on test conditions with a constant heat sink temperature T_{hs} = 40°C under pulse testing conditions. Pulse conditions: 25% duty-cycle and frequency of 360 Hz. Nominal $T_j \approx$ 80°C. See Thermal Resistance section for T_j and T_{hs} definition.

Note 3: Listed drive conditions are typical for common applications. CBT-120-UV devices can be driven at currents ranging from <1 A to 30 A and at duty cycles ranging from 1% to 100%. Drive current and duty cycle should be adjusted as necessary to maintain the junction temperature desired to meet application lifetime requirements.

Note 4: Unless otherwise noted, values listed are typical. Devices are production tested and specified at 18 A. Values at 4.2 A and 30 A are for reference only.

Note 5: Total flux from emitting area at listed peak wavelength. Reported performance is included to show trends for a selected power level. For specific minimum and maximum values, use bin tables. For product roadmap and future performance of devices, contact Luminus.

Note 6: CBT-120-UV LEDs are designed for operation to an absolute maximum current as specified above. Product lifetime data is specified at recommended forward drive currents. Sustained operation at or beyond absolute maximum currents will result in a reduction of device life time compared to recommended forward drive currents. Actual device lifetimes will also depend on junction temperature. Refer to the lifetime derating curves for further information. In pulsed operation, rise time from 10-90% of forward current should be longer than 0.5 µseconds.

Note 7: Lifetime dependent on LED junction temperature. Input power and thermal system must be properly managed to ensure lifetime. See charts on page 5 for further information.

Note 8: Special design considerations must be observed for operation under 1 A. Please contact Luminus for further information.

Note 9: Caution must be taken not to stare at the light emitted from these LEDs. Under special circumstances, the high intensity could damage the eye.

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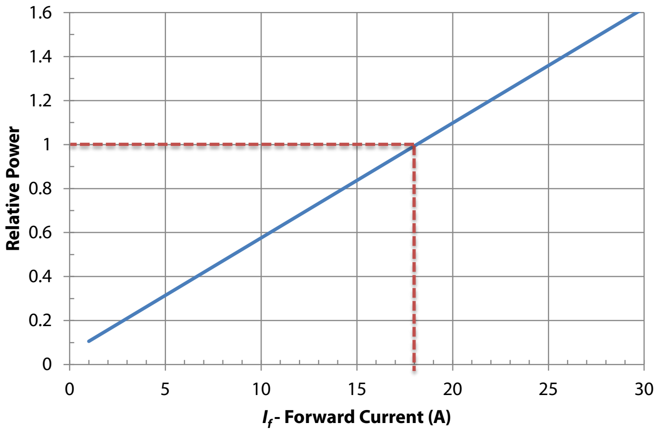
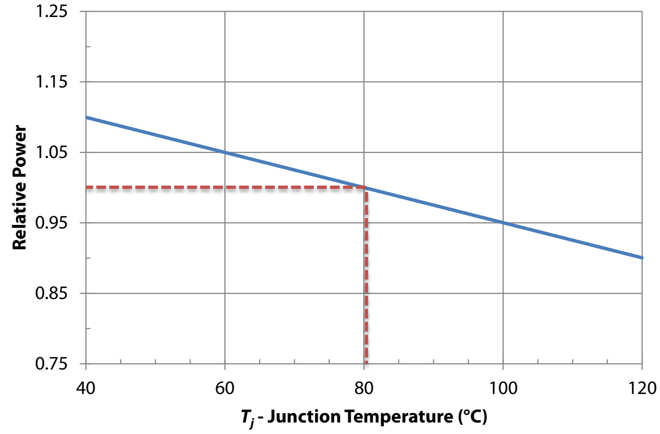
Optical & Electrical Characteristics

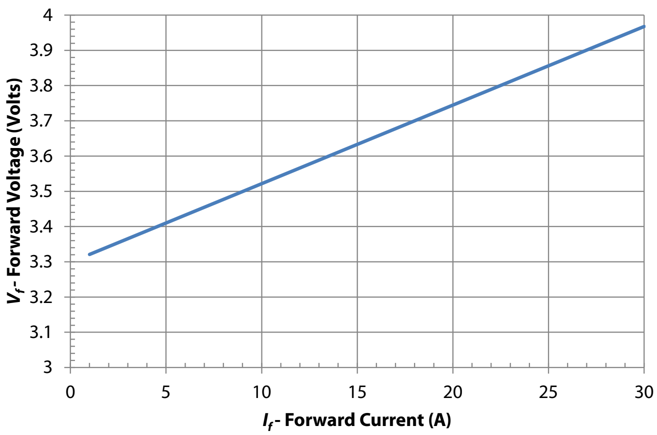
Relative Power *vs* Forward Current (I_f)
T_j = 120°C, normalized to 18 A



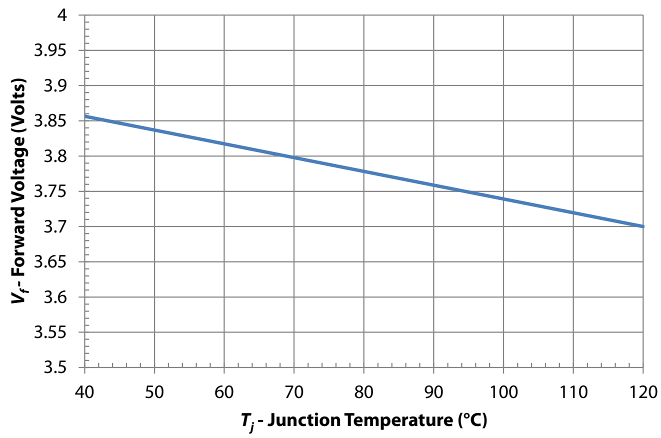
Relative Power *vs* Junction Temperature (T_j)
I_f = 18 A, normalized to 80°C



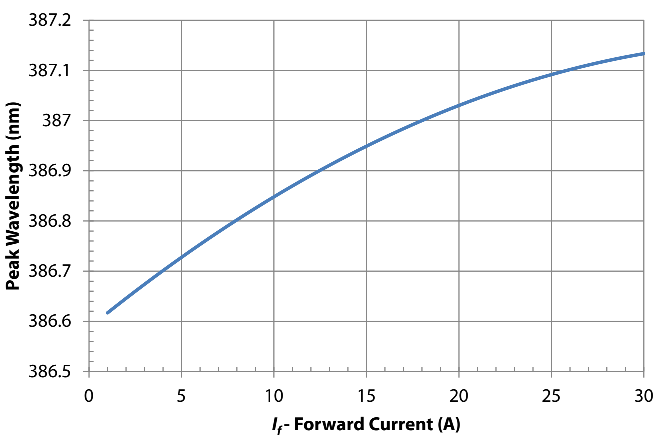
Forward Voltage (V_f) *vs* Forward Current (I_f)



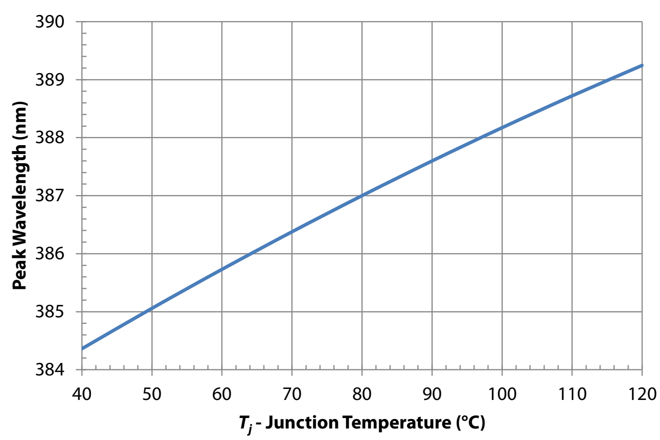
Forward Voltage (V_f) *vs* Junction Temperature (T_j)



Peak Wavelength *vs* Forward Current (I_f)



Peak Wavelength *vs* Junction Temperature (T_j)



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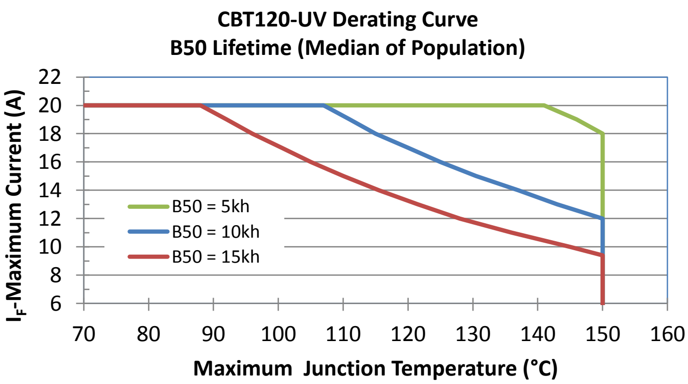
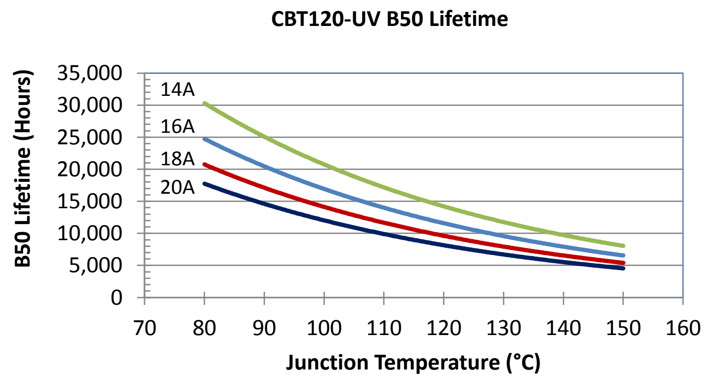
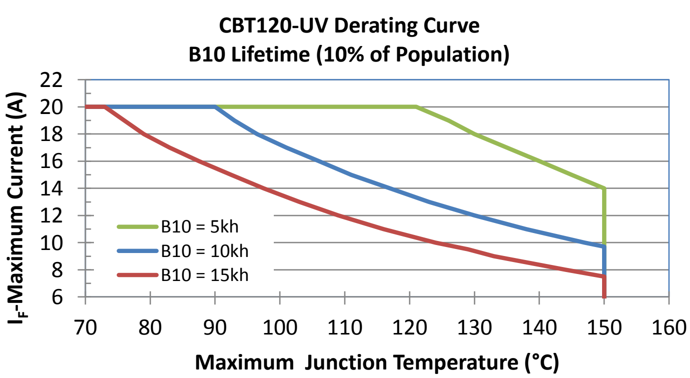
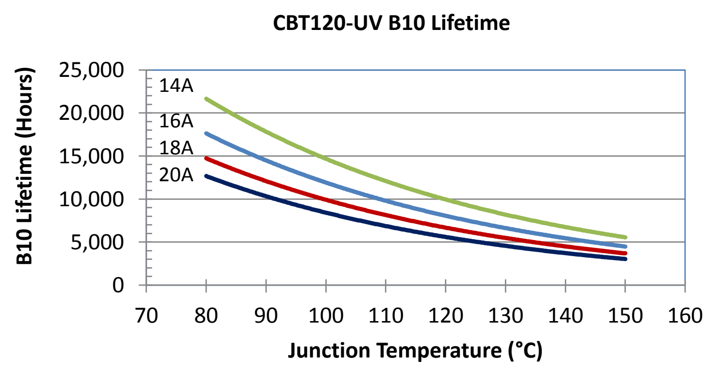
CBT-120-UV Reliability[10]

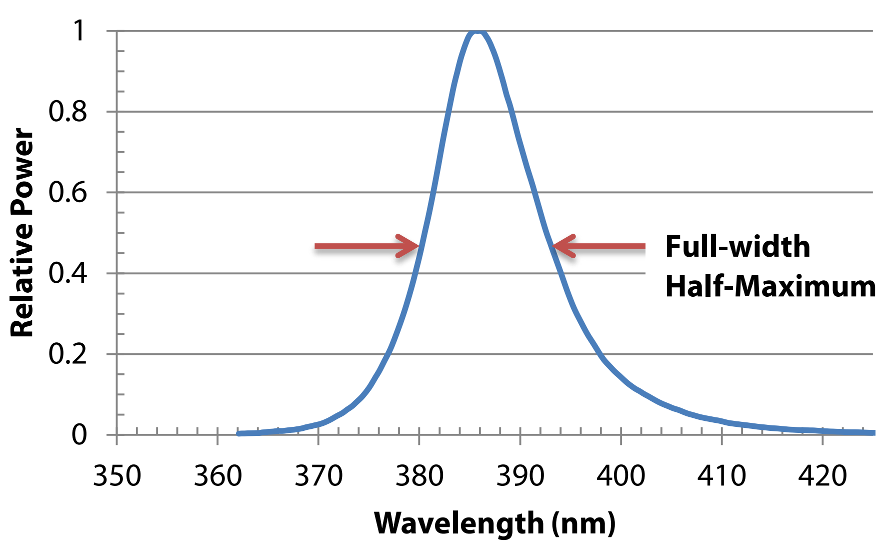








Typical Spectrum[11]



Note 10. Lifetime defined as time to 70% of initial intensity. Based on preliminary lifetime test data. Data can be used to model failure rate over typical product lifetime.

Note 11. Typical spectrum at current of 18 A in continuous operation.

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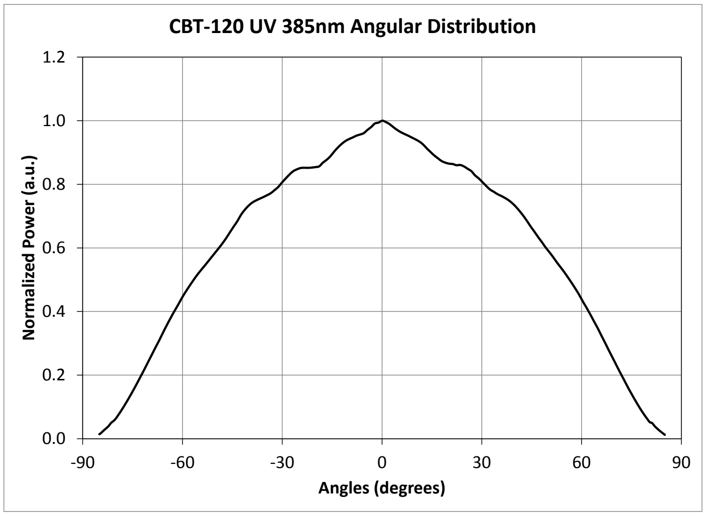
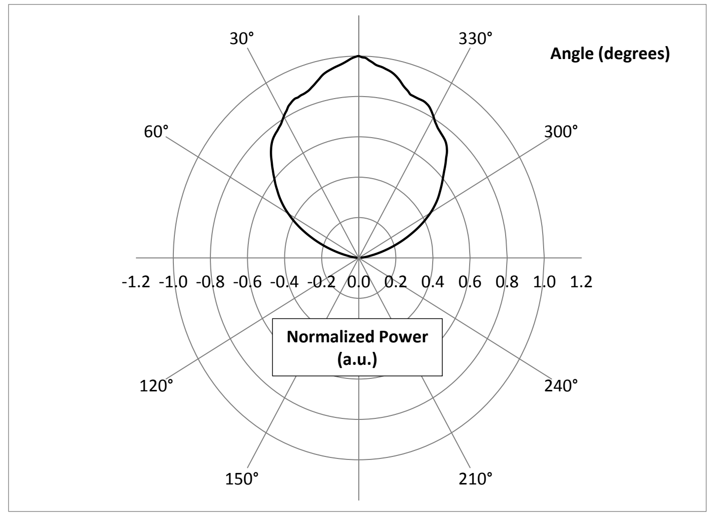
Typical Radiation Pattern

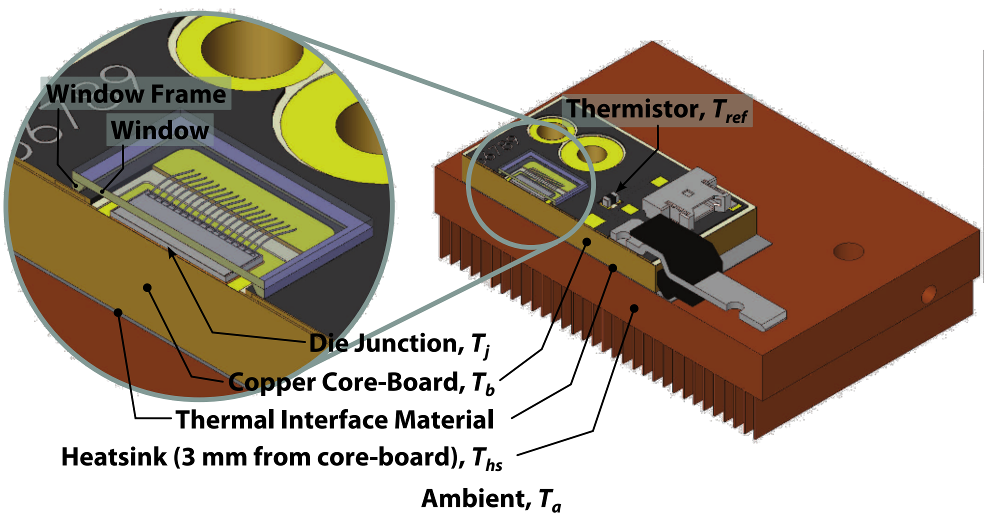
Typical Angular Radiation Pattern



Typical Polar Radiation Pattern



Thermal Resistance



Typical Thermal Resistance

$R_{\theta j\text{-}b}$ [1]	0.61 °C/W
$R_{\theta b\text{-}hs}$ [1]	0.12 °C/W
$R_{\theta j\text{-}hs}$ [2]	0.73 °C/W
$R_{\theta j\text{-}ref}$ [1]	0.64 °C/W

Note 1: Thermal resistance values are based on FEA model results correlated to measured $R_{\theta j\text{-}hs}$ data.

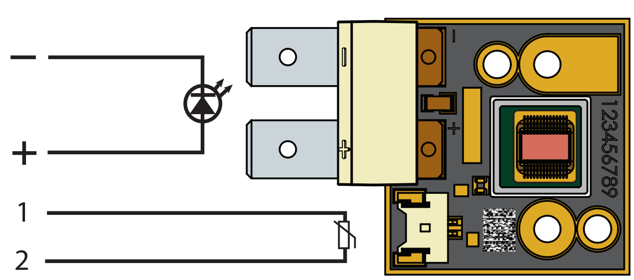
Note 2: Thermal Resistance is based on eGraf 1205 Thermal interface.

Thermistor Information

The thermistor used in CBT-120 devices mounted on coreboards is from Murata Manufacturing Co. The global part number is NCP15XH103J03RC. Please see http://www.murata.com/ for details on calculating thermistor temperature.

For more information on use of the thermistor, please contact Luminus directly.

Electrical Pinout



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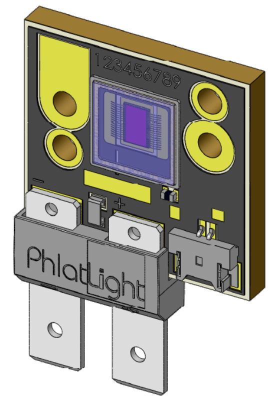
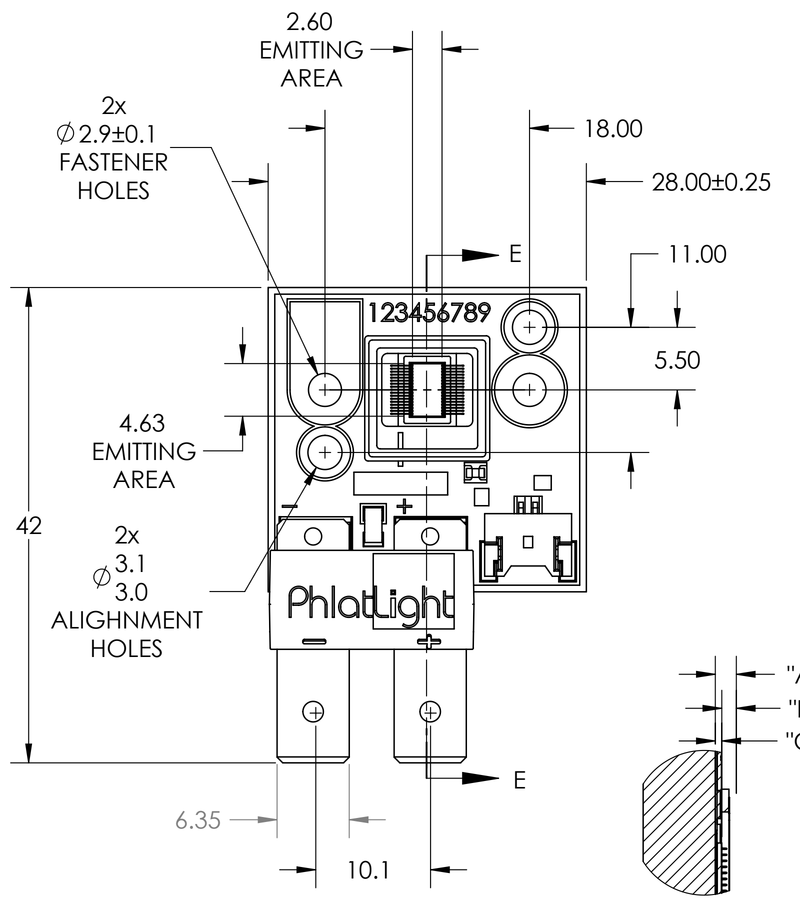
Mechanical Dimensions – CBT-120-UV Emitter

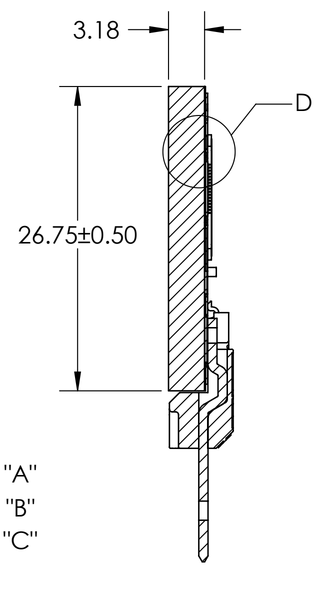


Dimensions in millimeters



DIMENSIONS IN MILLIMETERS

DETAIL D
SCALE 4 : 1



SECTION E-E

DIMENSION NAME	DESCRIPTION	NOMINAL DIMENSION	TOLERANCE
"A"	TOP OF METAL SUBSTRATE TO TOP OF GLASS	0.93	±0.07
"B"	EMITTING AREA TO TOP OF GLASS	0.64	±0.07
"C"	TOP OF METAL SUBSTRATE TO EMITTING AREA	0.28	±0.05

For detailed drawing of package, please refer to Luminus drawing #DWG-001907.

Recommended connector for Anode and Cathode: Panduit Disco Lok™ Series P/N: DNG14-250FL-C.

Thermistor Connector: MOLEX P/N 53780-0270. Recommended Female: MOLEX P/N 51146-0200 or equivalent.

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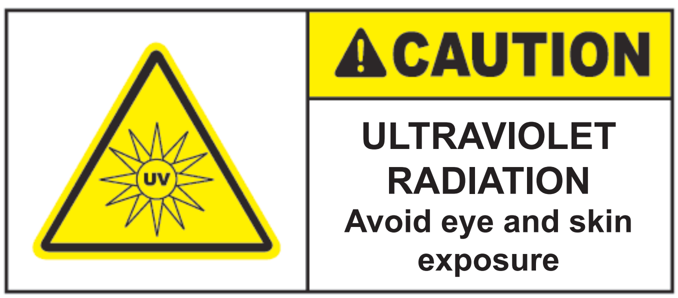
Ordering Information

Color	Bin Kit Code	Power		Wavelength	
		Min	Max	Min.	Max.
UV	G370-22*	7.0	9.1	370	382
	G382-22	7.0	9.1	382	392
	I370-22*	9.1	11.0	370	382
	I382-22	9.1	11.0	382	392

**Engineering samples only*



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